

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 $\frac{1}{2}$ 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]	0.646 ± 0.403	13691464	0.995	0.780	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(2.890 \pm 93.702) \times 10^{-2}$	13691464	0.249	0.439	9.974×10^{-3}	-54.8	360
sulfurdioxide total vertical column precision [DU]	0.481 ± 0.626	13691464	0.222	0.303	0.322	4.066×10^{-2}	84.1
sulfurdioxide slant column density corrected [DU]	$(1.846 \pm 42.455) \times 10^{-2}$	13691464	0.258	0.370	9.134×10^{-3}	-30.1	312
sulfurdioxide slant column density cobra [DU]	$(1.807 \pm 37.205) \times 10^{-2}$	13691464	0.258	0.370	9.134×10^{-3}	-30.1	57.9
sulfurdioxide slant column density cobra precision [DU]	0.295 ± 0.131	13691464	0.213	0.124	0.257	8.295×10^{-2}	39.0
sulfurdioxide slant column density window1 [DU]	0.131 ± 0.685	13691464	0.125	0.745	0.132	-89.2	124
sulfurdioxide slant column density window1 precision [DU]	0.295 ± 0.131	13691464	0.213	0.124	0.257	8.295×10^{-2}	39.0
sulfurdioxide slant column density corrected win1 [DU]	$(3.372 \pm 67.516) \times 10^{-2}$	13691464	-2.500×10^{-2}	0.728	1.679×10^{-2}	-89.2	124
background so2 slant column offset window1 [DU]	$(-9.708 \pm 13.940) \times 10^{-2}$	13691464	-0.180	0.166	-0.125	-0.736	2.78
sulfurdioxide slant column density window2 [DU]	1.18 ± 9.00	13691464	1.75	11.2	1.12	-977	1.226×10^3
sulfurdioxide slant column density window2 precision [DU]	8.18 ± 2.44	13691464	7.43	2.61	7.82	2.31	730
sulfurdioxide slant column density corrected win2 [DU]	-0.163 ± 8.912	13691464	-0.250	11.1	-0.136	-977	1.225×10^3
background so2 slant column offset window2 [DU]	-1.35 ± 1.77	13691464	-0.250	2.37	-0.974	-14.2	4.29
sulfurdioxide slant column density window3 [DU]	-8.97 ± 23.59	13691464	-8.40	29.1	-8.82	-1.059×10^3	694
sulfurdioxide slant column density window3 precision [DU]	28.2 ± 13.5	13691464	22.5	10.4	24.6	9.31	420
sulfurdioxide slant column density corrected win3 [DU]	-1.35 ± 23.48	13691464	0.560	29.0	-1.05	-1.048×10^3	696
background so2 slant column offset window3 [DU]	7.62 ± 4.89	13691464	10.6	6.90	8.11	-20.2	29.8
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.20	13691464	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(2.987 \pm 5.560) \times 10^{-2}$	13691464	2.878×10^{-2}	2.645×10^{-2}	1.606×10^{-2}	1.755×10^{-4}	2.56
fitted radiance shift [nm]	$(-1.993 \pm 25.613) \times 10^{-4}$	13691464	1.000×10^{-4}	1.676×10^{-3}	-2.023×10^{-4}	-0.110	0.110
fitted radiance squeeze [1]	$(-4.904 \pm 19.286) \times 10^{-5}$	13691464	-3.000×10^{-5}	2.218×10^{-4}	-4.302×10^{-5}	-5.120×10^{-2}	7.971×10^{-2}
fitted root mean square [1]	$(1.285 \pm 0.516) \times 10^{-3}$	13691464	1.025×10^{-3}	4.990×10^{-4}	1.145×10^{-3}	2.816×10^{-4}	0.140
sulfurdioxide total air mass factor polluted [1]	0.921 ± 0.499	13691464	0.700	0.606	0.812	5.000×10^{-2}	2.81
sulfurdioxide total air mass factor polluted precision [1]	0.128 ± 0.149	13691464	3.500×10^{-2}	0.125	8.051×10^{-2}	3.203×10^{-3}	2.26
sulfurdioxide clear air mass factor polluted [1]	0.763 ± 0.380	13691464	0.660	0.387	0.688	7.801×10^{-2}	2.84
number of spectral points in retrieval [1]	73.4 ± 0.5	13691464	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]	-2.01	-0.811	-0.509	-0.348	-0.206	0.232	0.383	0.560	0.899	2.32
sulfurdioxide total vertical column precision [DU]	8.875×10^{-2}	0.128	0.155	0.180	0.217	0.520	0.688	0.887	1.27	3.00
sulfurdioxide slant column density corrected [DU]	-0.851	-0.494	-0.360	-0.269	-0.174	0.196	0.296	0.393	0.545	0.998
sulfurdioxide slant column density cobra [DU]	-0.851	-0.494	-0.360	-0.269	-0.174	0.196	0.296	0.393	0.545	0.998
sulfurdioxide slant column density cobra precision [DU]	0.144	0.172	0.188	0.199	0.214	0.338	0.396	0.452	0.540	0.761
sulfurdioxide slant column density window1 [DU]	-1.63	-0.908	-0.629	-0.441	-0.242	0.502	0.695	0.879	1.15	1.91
sulfurdioxide slant column density window1 precision [DU]	0.144	0.172	0.188	0.199	0.214	0.338	0.396	0.452	0.540	0.761
sulfurdioxide slant column density corrected win1 [DU]	-1.61	-0.955	-0.701	-0.527	-0.342	0.386	0.584	0.775	1.07	1.88
background so2 slant column offset window1 [DU]	-0.367	-0.268	-0.233	-0.215	-0.190	-2.353×10^{-2}	3.486×10^{-2}	8.690×10^{-2}	0.159	0.312
sulfurdioxide slant column density window2 [DU]	-20.1	-13.1	-9.78	-7.28	-4.48	6.76	9.61	12.2	15.7	23.3
sulfurdioxide slant column density window2 precision [DU]	4.31	5.18	5.72	6.15	6.66	9.28	10.2	11.1	12.4	15.3
sulfurdioxide slant column density corrected win2 [DU]	-21.8	-14.5	-11.1	-8.52	-5.71	5.41	8.17	10.7	14.1	21.3
background so2 slant column offset window2 [DU]	-6.40	-4.65	-3.82	-3.13	-2.39	-2.574×10^{-2}	0.241	0.450	0.763	1.83
sulfurdioxide slant column density window3 [DU]	-69.3	-47.8	-37.9	-30.9	-23.3	5.72	13.2	20.0	29.3	48.3
sulfurdioxide slant column density window3 precision [DU]	13.2	15.5	17.5	19.0	20.7	31.1	35.9	41.6	53.3	85.4
sulfurdioxide slant column density corrected win3 [DU]	-61.4	-40.2	-30.3	-23.3	-15.7	13.4	20.7	27.3	36.5	55.5
background so2 slant column offset window3 [DU]	-4.17	-0.420	1.24	2.63	4.25	11.2	12.3	13.3	14.6	17.7
sulfurdioxide slant column cobra flag [1]	1.000	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
integrated so2 profile apriori [DU]	3.082×10^{-4}	4.381×10^{-4}	7.482×10^{-4}	1.808×10^{-3}	5.867×10^{-3}	3.232×10^{-2}	4.594×10^{-2}	6.619×10^{-2}	0.102	0.258
fitted radiance shift [nm]	-7.990×10^{-3}	-3.957×10^{-3}	-2.529×10^{-3}	-1.720×10^{-3}	-1.059×10^{-3}	6.174×10^{-4}	1.277×10^{-3}	2.130×10^{-3}	3.635×10^{-3}	7.870×10^{-3}
fitted radiance squeeze [1]	-5.537×10^{-4}	-3.590×10^{-4}	-2.758×10^{-4}	-2.182×10^{-4}	-1.571×10^{-4}	6.462×10^{-5}	1.189×10^{-4}	1.689×10^{-4}	2.406×10^{-4}	4.132×10^{-4}
fitted root mean square [1]	6.009×10^{-4}	7.471×10^{-4}	8.313×10^{-4}	8.930×10^{-4}	9.646×10^{-4}	1.464×10^{-3}	1.698×10^{-3}	1.930×10^{-3}	2.263×10^{-3}	3.126×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.101	0.276	0.382	0.470	0.572	1.18	1.45	1.68	1.93	2.34
sulfurdioxide total air mass factor polluted precision [1]	1.105×10^{-2}	1.930×10^{-2}	2.505×10^{-2}	3.013×10^{-2}	3.745×10^{-2}	0.162	0.216	0.277	0.394	0.742
sulfurdioxide clear air mass factor polluted [1]	0.226	0.312	0.374	0.433	0.511	0.898	1.03	1.23	1.64	2.03
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]	0.600 ± 0.412	9610369	0.820	0.490	0.0	1.000	0.180	1.000
sulfurdioxide total vertical column [DU]	$(1.984 \pm 81.720) \times 10^{-2}$	9610369	0.398	8.002×10^{-3}	-46.9	77.5	-0.189	0.209
sulfurdioxide total vertical column precision [DU]	0.442 ± 0.619	9610369	0.268	0.288	4.066×10^{-2}	42.7	0.199	0.467
sulfurdioxide slant column density corrected [DU]	$(1.367 \pm 32.504) \times 10^{-2}$	9610369	0.348	7.573×10^{-3}	-7.52	40.7	-0.165	0.183
sulfurdioxide slant column density cobra [DU]	$(1.363 \pm 32.234) \times 10^{-2}$	9610369	0.348	7.573×10^{-3}	-7.52	23.8	-0.165	0.183
sulfurdioxide slant column density cobra precision [DU]	0.275 ± 0.114	9610369	0.103	0.241	8.295×10^{-2}	8.98	0.205	0.309
sulfurdioxide slant column density window1 [DU]	0.117 ± 0.628	9610369	0.710	0.125	-10.3	25.2	-0.234	0.475
sulfurdioxide slant column density window1 precision [DU]	0.275 ± 0.114	9610369	0.103	0.241	8.295×10^{-2}	8.98	0.205	0.309
sulfurdioxide slant column density corrected win1 [DU]	$(2.668 \pm 61.297) \times 10^{-2}$	9610369	0.689	1.381×10^{-2}	-10.3	25.1	-0.326	0.363
background so2 slant column offset window1 [DU]	$(-9.021 \pm 14.793) \times 10^{-2}$	9610369	0.203	-0.118	-0.641	1.04	-0.200	3.314×10^{-3}
sulfurdioxide slant column density window2 [DU]	1.08 ± 8.28	9610369	10.6	1.08	-224	485	-4.25	6.40
sulfurdioxide slant column density window2 precision [DU]	7.70 ± 2.03	9610369	2.26	7.42	2.31	218	6.38	8.64
sulfurdioxide slant column density corrected win2 [DU]	-0.140 ± 8.189	9610369	10.5	-0.107	-224	482	-5.38	5.13
background so2 slant column offset window2 [DU]	-1.22 ± 1.68	9610369	2.38	-0.925	-10.3	4.29	-2.29	9.382×10^{-2}
sulfurdioxide slant column density window3 [DU]	-8.72 ± 21.82	9610369	27.1	-8.75	-199	694	-22.2	4.89
sulfurdioxide slant column density window3 precision [DU]	26.4 ± 13.1	9610369	8.42	23.0	9.31	420	19.7	28.1
sulfurdioxide slant column density corrected win3 [DU]	-1.47 ± 21.70	9610369	27.1	-1.17	-205	696	-14.8	12.3
background so2 slant column offset window3 [DU]	7.25 ± 4.95	9610369	7.65	8.39	-18.8	21.1	3.43	11.1
sulfurdioxide slant column cobra flag [1]	1.99 ± 0.17	9610369	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(3.061 \pm 6.061) \times 10^{-2}$	9610369	3.261×10^{-2}	1.280×10^{-2}	1.755×10^{-4}	2.56	2.440×10^{-3}	3.505×10^{-2}
fitted radiance shift [nm]	$(-8.175 \pm 258.067) \times 10^{-5}$	9610369	1.579×10^{-3}	-1.053×10^{-4}	-4.548×10^{-2}	4.811×10^{-2}	-8.877×10^{-4}	6.916×10^{-4}
fitted radiance squeeze [1]	$(-7.864 \pm 17.748) \times 10^{-5}$	9610369	2.146×10^{-4}	-6.580×10^{-5}	-8.742×10^{-3}	5.168×10^{-3}	-1.789×10^{-4}	3.567×10^{-5}
fitted root mean square [1]	$(1.217 \pm 0.473) \times 10^{-3}$	9610369	4.304×10^{-4}	1.091×10^{-3}	3.323×10^{-4}	1.453×10^{-2}	9.293×10^{-4}	1.360×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.971 ± 0.543	9610369	0.726	0.853	5.000×10^{-2}	2.81	0.570	1.30
sulfurdioxide total air mass factor polluted precision [1]	0.140 ± 0.165	9610369	0.135	8.906×10^{-2}	3.203×10^{-3}	2.26	4.006×10^{-2}	0.175
sulfurdioxide clear air mass factor polluted [1]	0.799 ± 0.430	9610369	0.473	0.710	7.801×10^{-2}	2.84	0.489	0.962
number of spectral points in retrieval [1]	73.4 ± 0.5	9610369	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]	0.754 ± 0.359	4081095	0.570	1.000	0.0	1.000	0.430	1.000
sulfurdioxide total vertical column [DU]	$(5.025 \pm 117.146) \times 10^{-2}$	4081095	0.558	1.647×10^{-2}	-54.8	360	-0.258	0.300
sulfurdioxide total vertical column precision [DU]	0.573 ± 0.632	4081095	0.347	0.405	4.535×10^{-2}	84.1	0.283	0.631
sulfurdioxide slant column density corrected [DU]	$(2.971 \pm 59.642) \times 10^{-2}$	4081095	0.431	1.369×10^{-2}	-30.1	312	-0.200	0.231
sulfurdioxide slant column density cobra [DU]	$(2.851 \pm 46.854) \times 10^{-2}$	4081095	0.431	1.369×10^{-2}	-30.1	57.9	-0.200	0.231
sulfurdioxide slant column density cobra precision [DU]	0.342 ± 0.155	4081095	0.155	0.300	0.105	39.0	0.244	0.400
sulfurdioxide slant column density window1 [DU]	0.164 ± 0.803	4081095	0.838	0.154	-89.2	124	-0.264	0.574
sulfurdioxide slant column density window1 precision [DU]	0.342 ± 0.155	4081095	0.155	0.300	0.105	39.0	0.244	0.400
sulfurdioxide slant column density corrected win1 [DU]	$(5.030 \pm 80.255) \times 10^{-2}$	4081095	0.835	2.510×10^{-2}	-89.2	124	-0.386	0.449
background so2 slant column offset window1 [DU]	-0.113 ± 0.115	4081095	9.247×10^{-2}	-0.131	-0.736	2.78	-0.168	-7.533×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.43 ± 10.51	4081095	12.9	1.26	-977	1.226×10^3	-5.12	7.78
sulfurdioxide slant column density window2 precision [DU]	9.33 ± 2.91	4081095	2.92	8.94	2.64	730	7.66	10.6
sulfurdioxide slant column density corrected win2 [DU]	-0.217 ± 10.416	4081095	12.8	-0.217	-977	1.225×10^3	-6.61	6.18
background so2 slant column offset window2 [DU]	-1.65 ± 1.92	4081095	2.42	-1.06	-14.2	4.29	-2.71	-0.286
sulfurdioxide slant column density window3 [DU]	-9.56 ± 27.31	4081095	34.5	-9.03	-1.059×10^3	645	-26.5	8.03
sulfurdioxide slant column density window3 precision [DU]	32.4 ± 13.5	4081095	10.9	29.1	10.2	331	24.7	35.6
sulfurdioxide slant column density corrected win3 [DU]	-1.06 ± 27.24	4081095	34.5	-0.688	-1.048×10^3	662	-18.1	16.4
background so2 slant column offset window3 [DU]	8.50 ± 4.61	4081095	5.82	7.72	-20.2	29.8	5.66	11.5
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.26	4081095	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.815 \pm 4.141) \times 10^{-2}$	4081095	1.615×10^{-2}	1.951×10^{-2}	1.412×10^{-3}	0.905	1.304×10^{-2}	2.919×10^{-2}
fitted radiance shift [nm]	$(-4.760 \pm 24.934) \times 10^{-4}$	4081095	1.830×10^{-3}	-4.700×10^{-4}	-0.110	0.110	-1.428×10^{-3}	4.018×10^{-4}
fitted radiance squeeze [1]	$(2.064 \pm 20.900) \times 10^{-5}$	4081095	2.311×10^{-4}	1.584×10^{-5}	-5.120×10^{-2}	7.971×10^{-2}	-9.755×10^{-5}	1.335×10^{-4}
fitted root mean square [1]	$(1.446 \pm 0.574) \times 10^{-3}$	4081095	5.970×10^{-4}	1.298×10^{-3}	2.816×10^{-4}	0.140	1.078×10^{-3}	1.675×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.806 ± 0.348	4081095	0.411	0.746	5.000×10^{-2}	2.63	0.574	0.985
sulfurdioxide total air mass factor polluted precision [1]	$(9.802 \pm 9.644) \times 10^{-2}$	4081095	9.822×10^{-2}	6.045×10^{-2}	3.922×10^{-3}	1.88	3.429×10^{-2}	0.133
sulfurdioxide clear air mass factor polluted [1]	0.677 ± 0.196	4081095	0.246	0.660	7.844×10^{-2}	1.62	0.546	0.792
number of spectral points in retrieval [1]	73.4 ± 0.5	4081095	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]	0.657 ± 0.390	8739529	0.750	1.000	0.0	1.000	0.250	1.000
sulfurdioxide total vertical column [DU]	$(2.819 \pm 92.231) \times 10^{-2}$	8739529	0.446	1.018×10^{-2}	-50.3	360	-0.211	0.236
sulfurdioxide total vertical column precision [DU]	0.490 ± 0.663	8739529	0.302	0.320	5.447×10^{-2}	73.8	0.221	0.523
sulfurdioxide slant column density corrected [DU]	$(1.719 \pm 39.300) \times 10^{-2}$	8739529	0.377	9.149×10^{-3}	-23.3	312	-0.178	0.199
sulfurdioxide slant column density cobra [DU]	$(1.701 \pm 36.464) \times 10^{-2}$	8739529	0.377	9.149×10^{-3}	-23.3	57.9	-0.178	0.199
sulfurdioxide slant column density cobra precision [DU]	0.301 ± 0.132	8739529	0.136	0.263	8.720×10^{-2}	24.0	0.215	0.351
sulfurdioxide slant column density window1 [DU]	0.125 ± 0.690	8739529	0.761	0.131	-79.4	124	-0.253	0.507
sulfurdioxide slant column density window1 precision [DU]	0.301 ± 0.132	8739529	0.136	0.263	8.720×10^{-2}	24.0	0.215	0.351
sulfurdioxide slant column density corrected win1 [DU]	$(3.586 \pm 67.899) \times 10^{-2}$	8739529	0.743	2.077×10^{-2}	-79.4	124	-0.346	0.397
background so2 slant column offset window1 [DU]	$(-8.872 \pm 14.630) \times 10^{-2}$	8739529	0.173	-0.120	-0.736	2.78	-0.185	-1.243×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.32 ± 8.96	8739529	11.3	1.22	-532	1.226×10^3	-4.39	6.90
sulfurdioxide slant column density window2 precision [DU]	8.15 ± 2.27	8739529	2.57	7.79	2.31	518	6.68	9.24
sulfurdioxide slant column density corrected win2 [DU]	-0.156 ± 8.862	8739529	11.2	-0.133	-532	1.225×10^3	-5.73	5.43
background so2 slant column offset window2 [DU]	-1.47 ± 1.87	8739529	2.63	-1.03	-14.2	4.29	-2.67	-4.579×10^{-2}
sulfurdioxide slant column density window3 [DU]	-6.71 ± 23.36	8739529	29.1	-6.79	-314	645	-21.2	7.89
sulfurdioxide slant column density window3 precision [DU]	27.1 ± 11.3	8739529	9.50	24.1	9.31	331	20.5	30.0
sulfurdioxide slant column density corrected win3 [DU]	0.958 ± 23.010	8739529	28.7	0.967	-306	662	-13.3	15.4
background so2 slant column offset window3 [DU]	7.66 ± 4.89	8739529	6.74	7.97	-20.2	29.8	4.35	11.1
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.23	8739529	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.128 \pm 4.021) \times 10^{-2}$	8739529	1.984×10^{-2}	1.430×10^{-2}	2.274×10^{-4}	2.56	6.356×10^{-3}	2.620×10^{-2}
fitted radiance shift [nm]	$(-2.205 \pm 21.601) \times 10^{-4}$	8739529	1.625×10^{-3}	-1.997×10^{-4}	-7.209×10^{-2}	0.110	-1.046×10^{-3}	5.791×10^{-4}
fitted radiance squeeze [1]	$(-4.135 \pm 19.626) \times 10^{-5}$	8739529	2.252×10^{-4}	-3.470×10^{-5}	-1.344×10^{-2}	7.971×10^{-2}	-1.511×10^{-4}	7.415×10^{-5}
fitted root mean square [1]	$(1.311 \pm 0.522) \times 10^{-3}$	8739529	5.516×10^{-4}	1.167×10^{-3}	3.325×10^{-4}	8.523×10^{-2}	9.704×10^{-4}	1.522×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.910 ± 0.457	8739529	0.554	0.826	5.000×10^{-2}	2.52	0.602	1.16
sulfurdioxide total air mass factor polluted precision [1]	0.123 ± 0.152	8739529	0.106	7.580×10^{-2}	3.446×10^{-3}	2.19	3.933×10^{-2}	0.145
sulfurdioxide clear air mass factor polluted [1]	0.776 ± 0.378	8739529	0.374	0.706	8.237×10^{-2}	2.52	0.533	0.906
number of spectral points in retrieval [1]	73.4 ± 0.5	8739529	1.000	73.0	52.0	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]	0.668 ± 0.418	3415199	0.800	1.000	0.0	1.000	0.200	1.000
sulfurdioxide total vertical column [DU]	$(3.036 \pm 88.611) \times 10^{-2}$	3415199	0.418	9.769×10^{-3}	-54.8	260	-0.195	0.223
sulfurdioxide total vertical column precision [DU]	0.451 ± 0.515	3415199	0.292	0.324	4.066×10^{-2}	84.1	0.206	0.498
sulfurdioxide slant column density corrected [DU]	$(2.104 \pm 42.390) \times 10^{-2}$	3415199	0.350	9.209×10^{-3}	-30.1	142	-0.164	0.186
sulfurdioxide slant column density cobra [DU]	$(2.055 \pm 38.055) \times 10^{-2}$	3415199	0.350	9.209×10^{-3}	-30.1	53.2	-0.164	0.186
sulfurdioxide slant column density cobra precision [DU]	0.276 ± 0.125	3415199	9.072×10^{-2}	0.240	8.295×10^{-2}	39.0	0.208	0.298
sulfurdioxide slant column density window1 [DU]	0.164 ± 0.662	3415199	0.703	0.155	-89.2	103	-0.195	0.508
sulfurdioxide slant column density window1 precision [DU]	0.276 ± 0.125	3415199	9.072×10^{-2}	0.240	8.295×10^{-2}	39.0	0.208	0.298
sulfurdioxide slant column density corrected win1 [DU]	$(2.766 \pm 65.317) \times 10^{-2}$	3415199	0.687	9.173×10^{-3}	-89.2	103	-0.329	0.358
background so2 slant column offset window1 [DU]	-0.137 ± 0.117	3415199	0.126	-0.161	-0.641	0.976	-0.209	-8.307×10^{-2}
sulfurdioxide slant column density window2 [DU]	0.707 ± 9.159	3415199	11.2	0.710	-977	968	-4.91	6.30
sulfurdioxide slant column density window2 precision [DU]	8.27 ± 2.83	3415199	2.68	7.87	2.39	730	6.66	9.34
sulfurdioxide slant column density corrected win2 [DU]	-0.179 ± 9.089	3415199	11.1	-0.150	-977	967	-5.71	5.37
background so2 slant column offset window2 [DU]	-0.886 ± 1.537	3415199	1.83	-0.498	-11.1	4.29	-1.69	0.146
sulfurdioxide slant column density window3 [DU]	-13.3 ± 23.9	3415199	29.1	-12.6	-1.059×10^3	348	-27.4	1.63
sulfurdioxide slant column density window3 precision [DU]	30.4 ± 16.9	3415199	12.3	25.5	9.44	254	21.2	33.5
sulfurdioxide slant column density corrected win3 [DU]	-6.63 ± 24.13	3415199	29.6	-5.83	-1.048×10^3	358	-21.1	8.56
background so2 slant column offset window3 [DU]	6.66 ± 4.92	3415199	7.34	6.88	-20.2	29.8	3.15	10.5
sulfurdioxide slant column cobra flag [1]	1.99 ± 0.14	3415199	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(5.178 \pm 7.617) \times 10^{-2}$	3415199	5.404×10^{-2}	2.899×10^{-2}	1.755×10^{-4}	2.07	9.061×10^{-3}	6.311×10^{-2}
fitted radiance shift [nm]	$(-1.586 \pm 31.887) \times 10^{-4}$	3415199	1.587×10^{-3}	-2.060×10^{-4}	-0.110	0.110	-9.902×10^{-4}	5.970×10^{-4}
fitted radiance squeeze [1]	$(-4.599 \pm 18.174) \times 10^{-5}$	3415199	2.075×10^{-4}	-4.229×10^{-5}	-5.120×10^{-2}	1.653×10^{-2}	-1.479×10^{-4}	5.966×10^{-5}
fitted root mean square [1]	$(1.205 \pm 0.474) \times 10^{-3}$	3415199	3.736×10^{-4}	1.091×10^{-3}	2.816×10^{-4}	0.140	9.415×10^{-4}	1.315×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.940 ± 0.586	3415199	0.661	0.749	5.000×10^{-2}	2.81	0.527	1.19
sulfurdioxide total air mass factor polluted precision [1]	0.130 ± 0.141	3415199	0.157	8.069×10^{-2}	3.650×10^{-3}	2.26	3.104×10^{-2}	0.188
sulfurdioxide clear air mass factor polluted [1]	0.759 ± 0.403	3415199	0.378	0.654	7.844×10^{-2}	2.84	0.501	0.878
number of spectral points in retrieval [1]	73.4 ± 0.5	3415199	1.000	73.0	52.0	74.0	73.0	74.0

3 Granule outlines

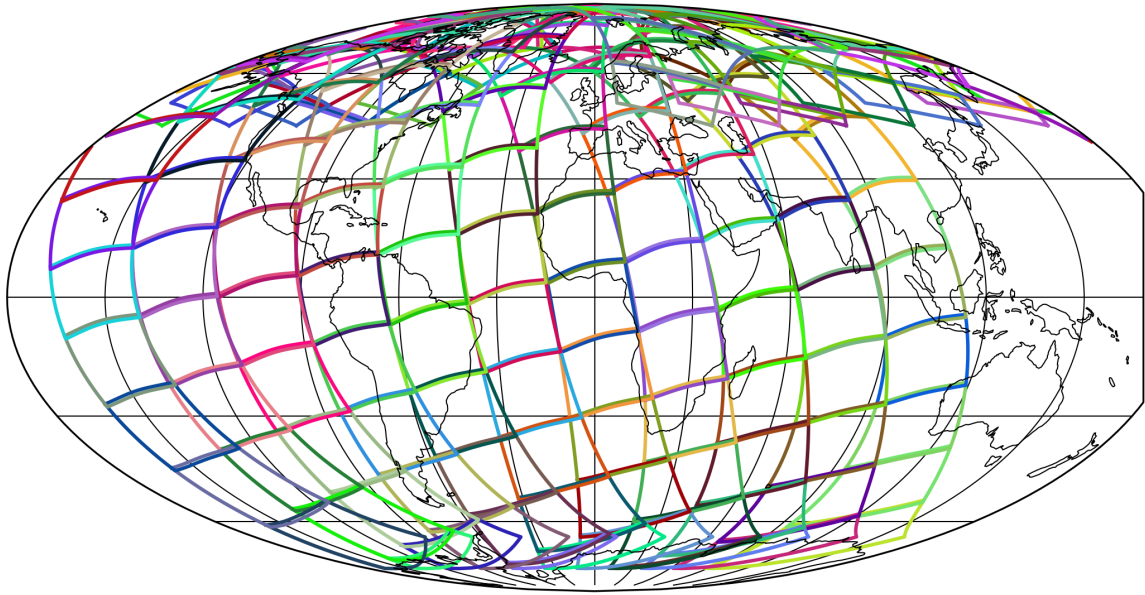


Figure 1: Outline of the granules.

4 Input data monitoring

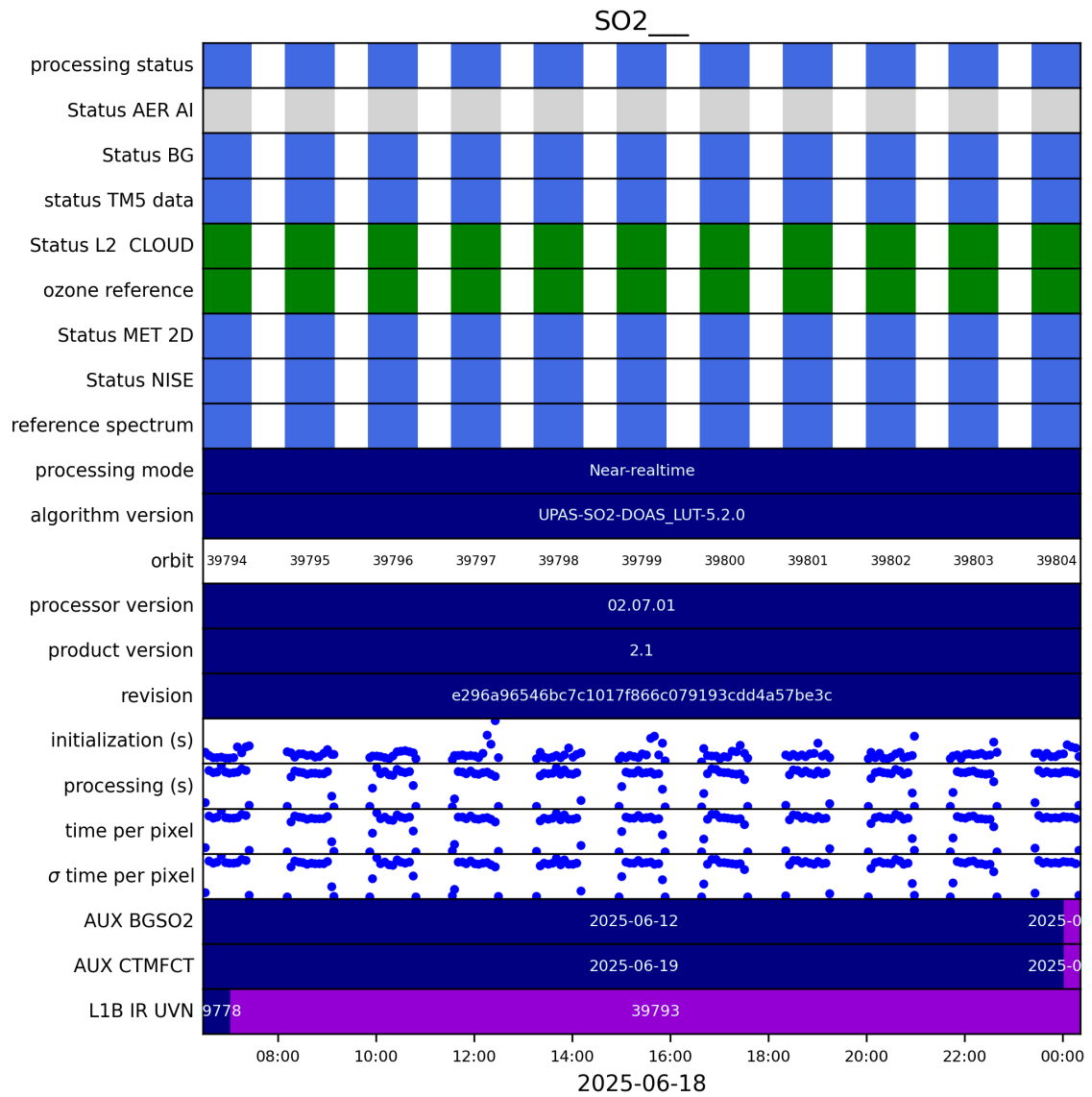


Figure 2: Input data per granule

5 Warnings and errors

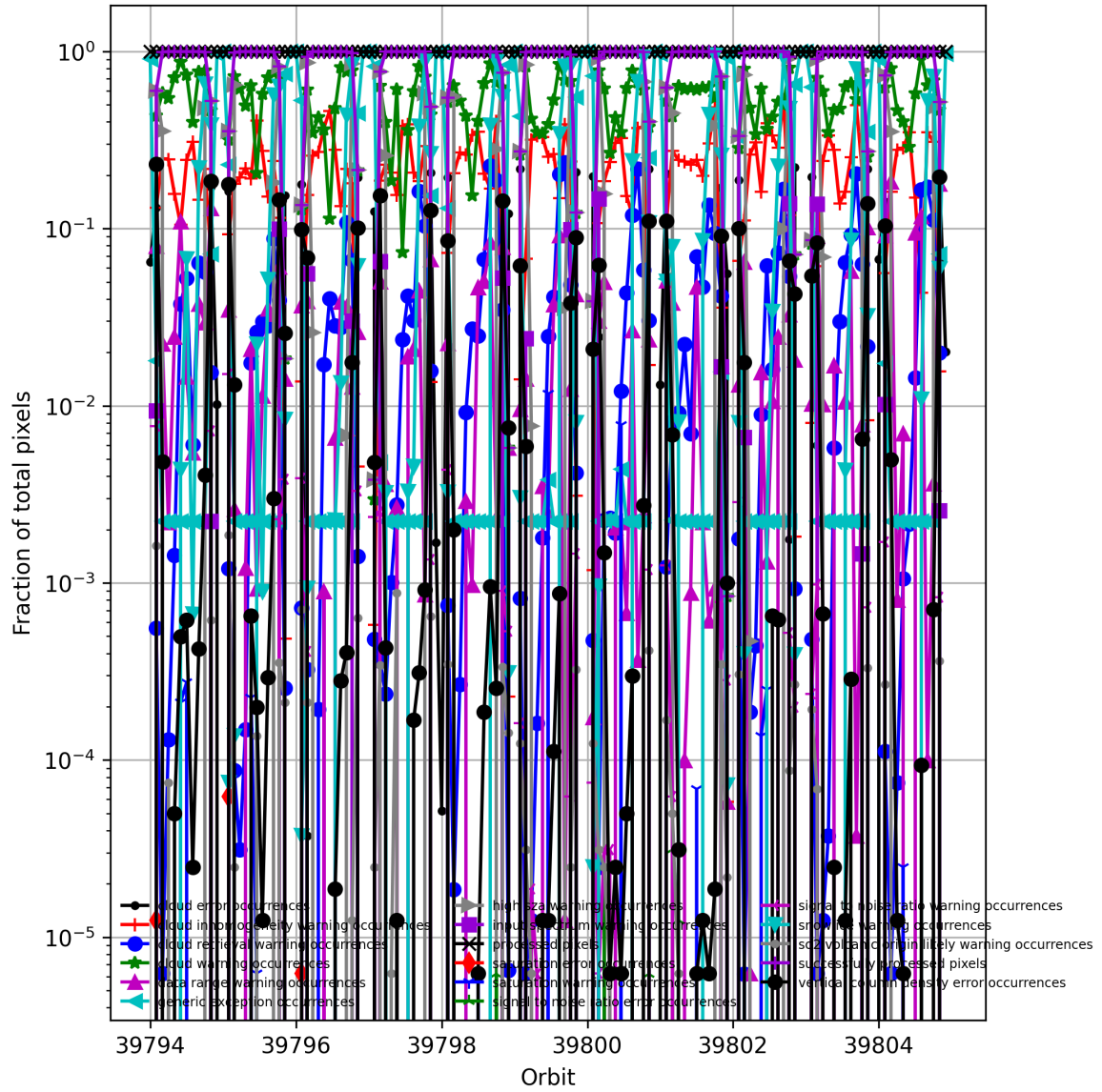


Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

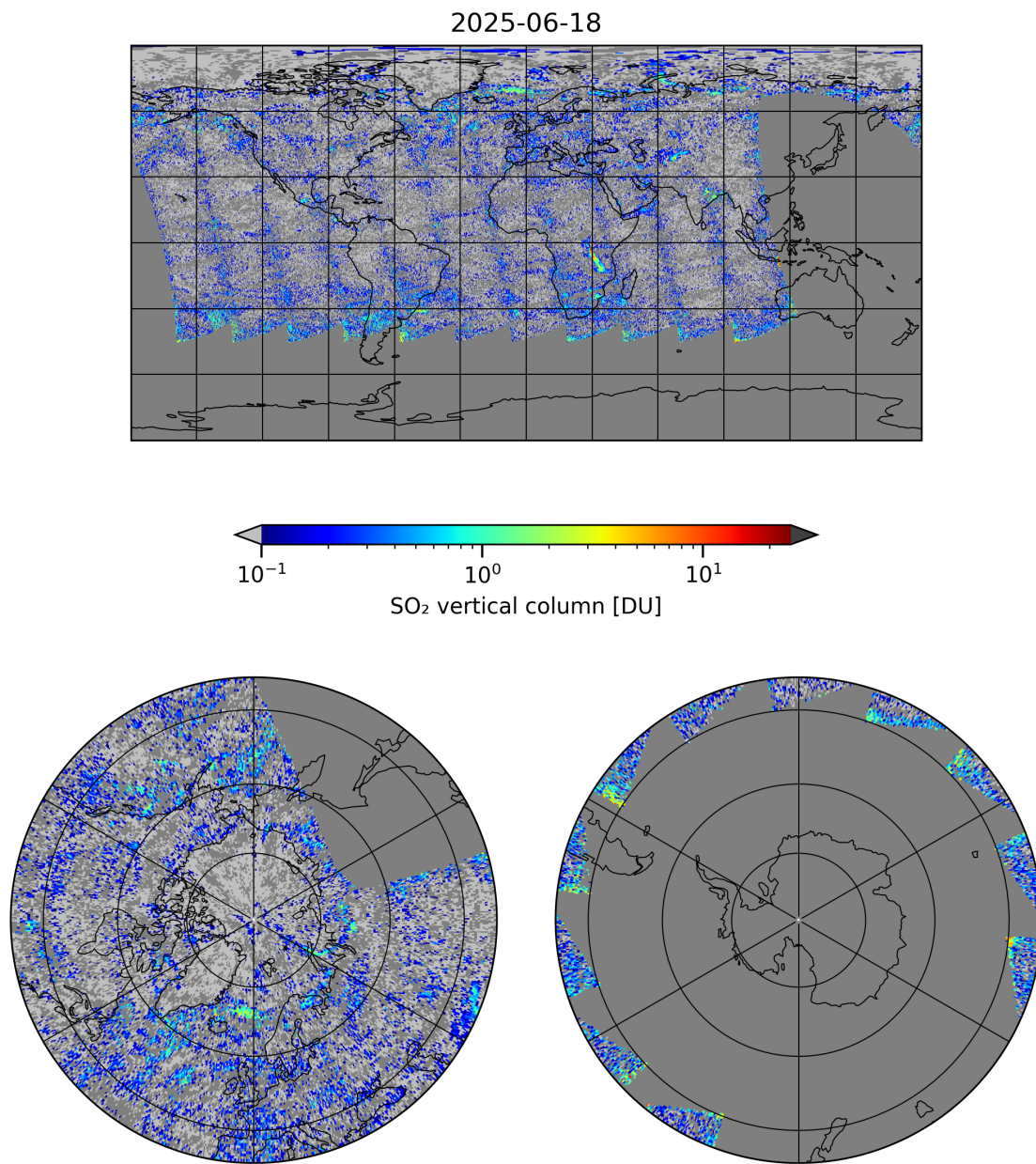


Figure 4: Map of “SO₂ vertical column” for 2025-06-18 to 2025-06-19

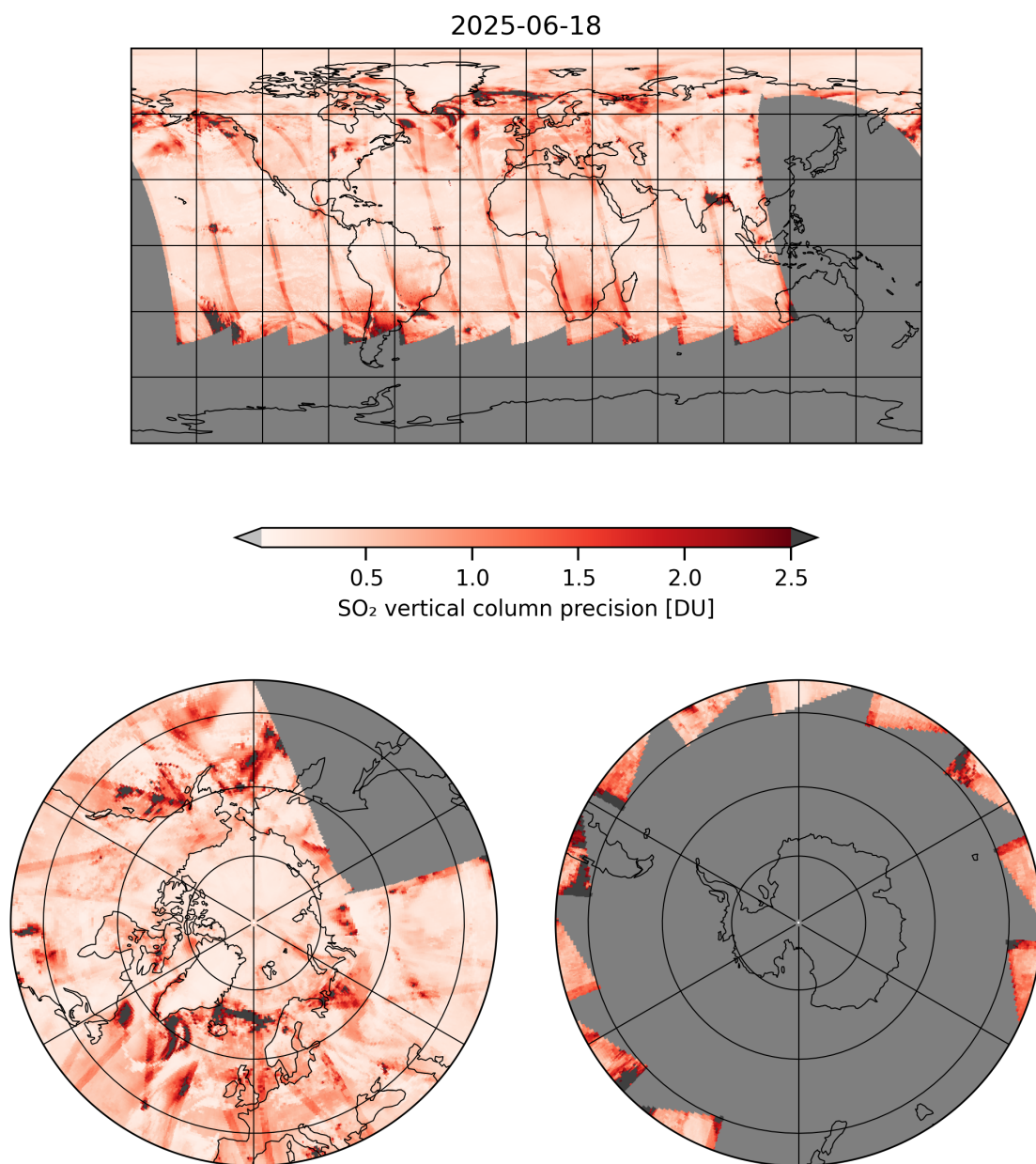


Figure 5: Map of “SO₂ vertical column precision” for 2025-06-18 to 2025-06-19

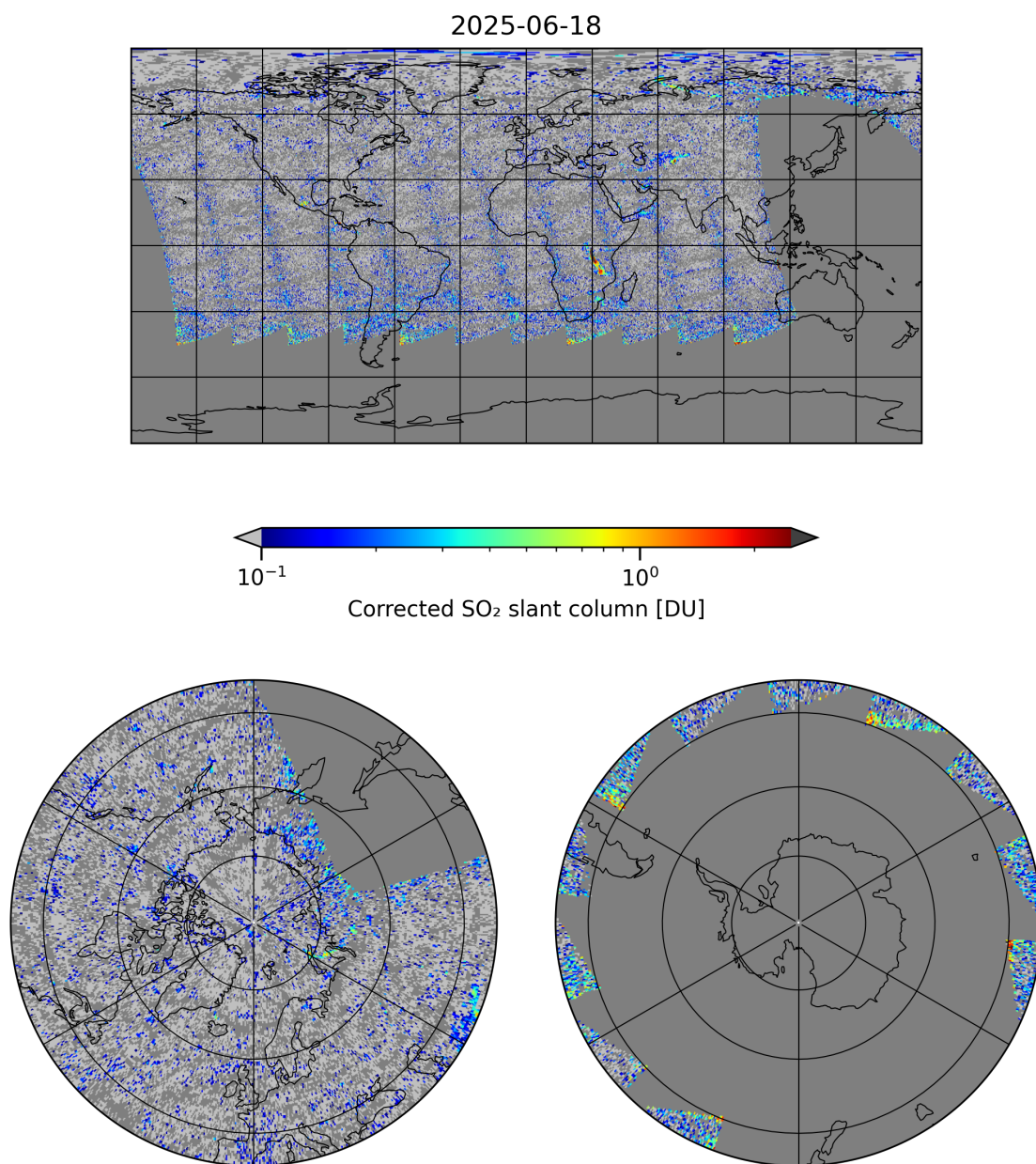


Figure 6: Map of “Corrected SO₂ slant column” for 2025-06-18 to 2025-06-19

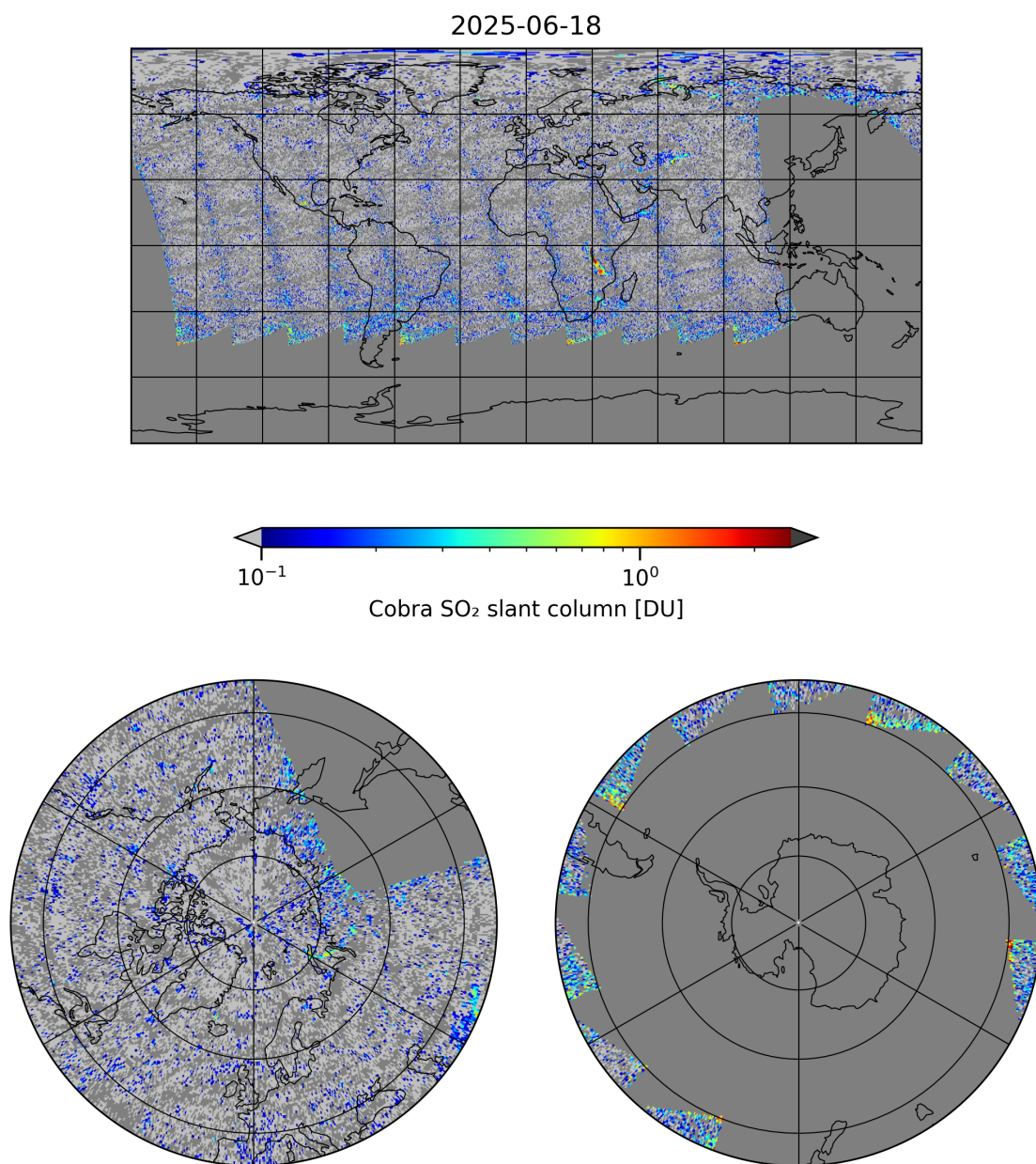


Figure 7: Map of “Cobra SO₂ slant column” for 2025-06-18 to 2025-06-19

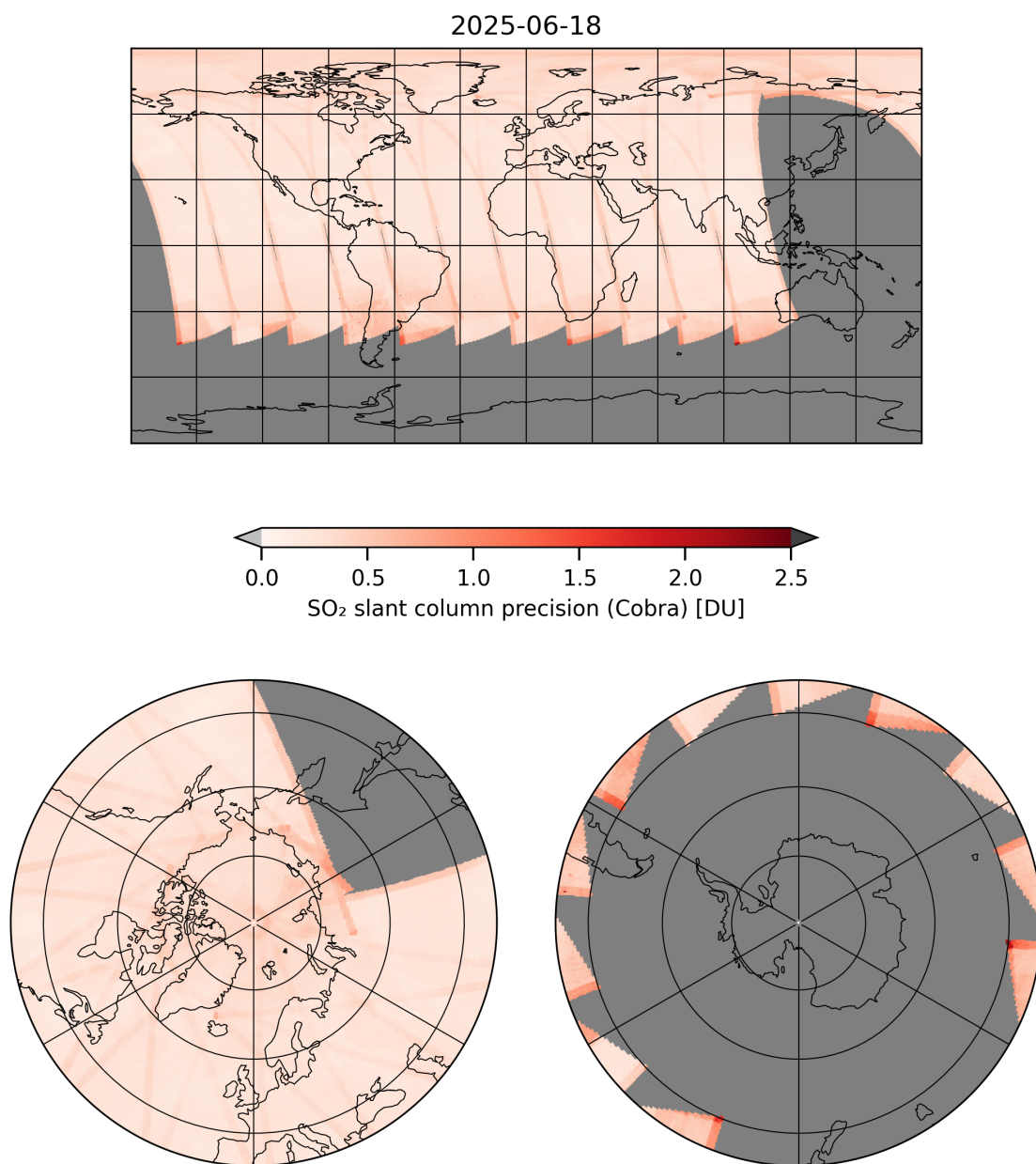


Figure 8: Map of “SO₂ slant column precision (Cobra)” for 2025-06-18 to 2025-06-19

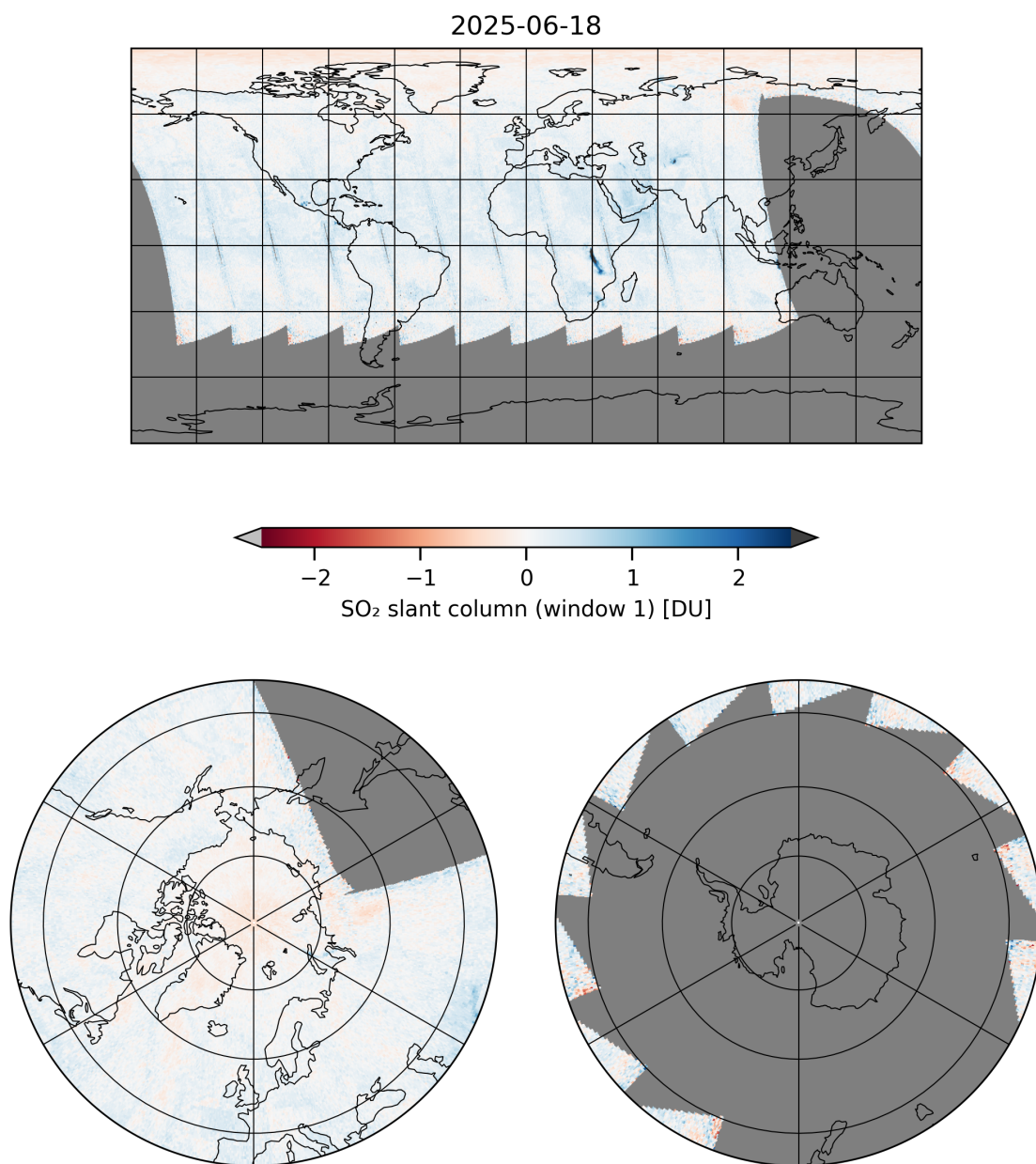


Figure 9: Map of “SO₂ slant column (window 1)” for 2025-06-18 to 2025-06-19

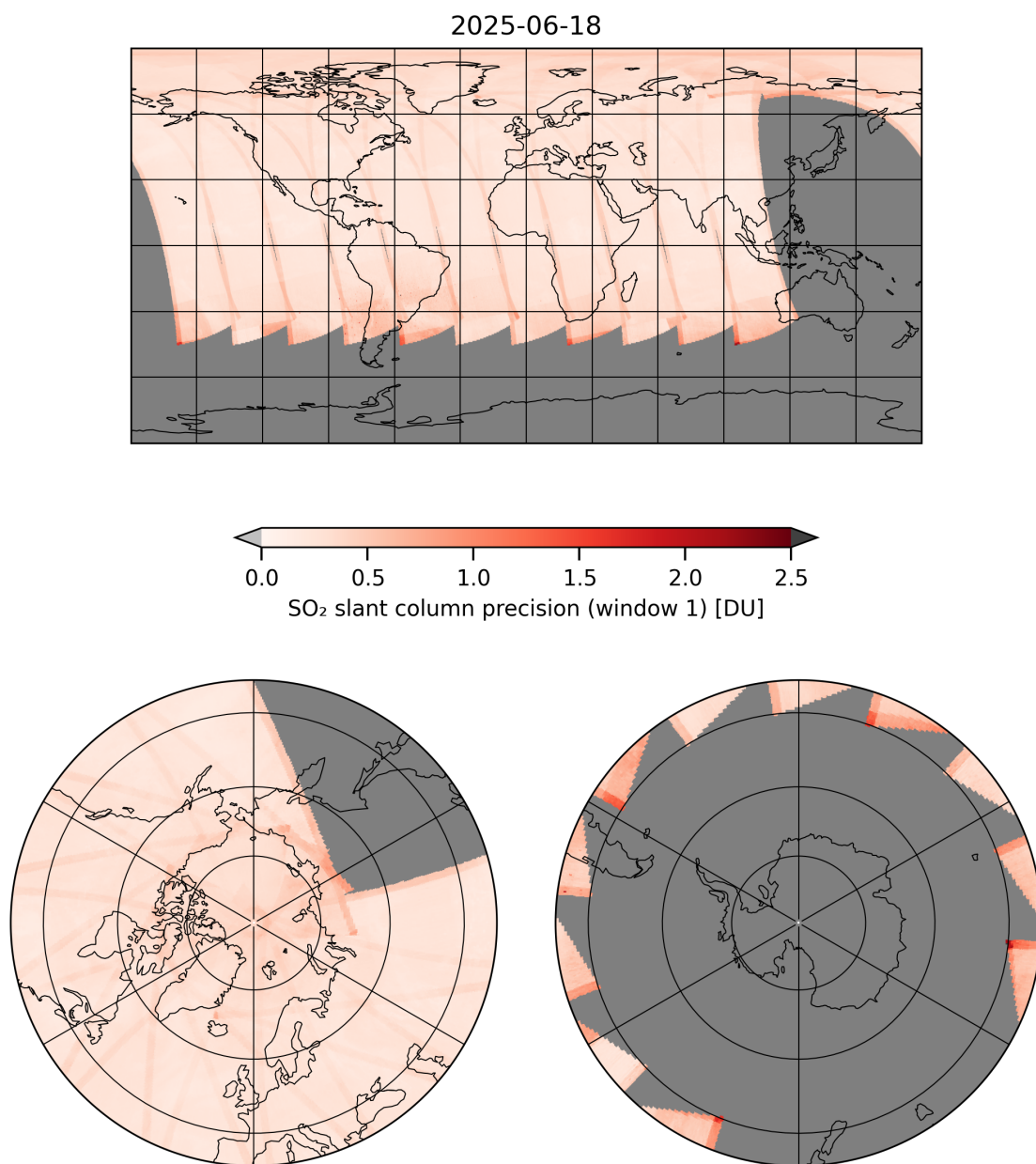


Figure 10: Map of “SO₂ slant column precision (window 1)” for 2025-06-18 to 2025-06-19

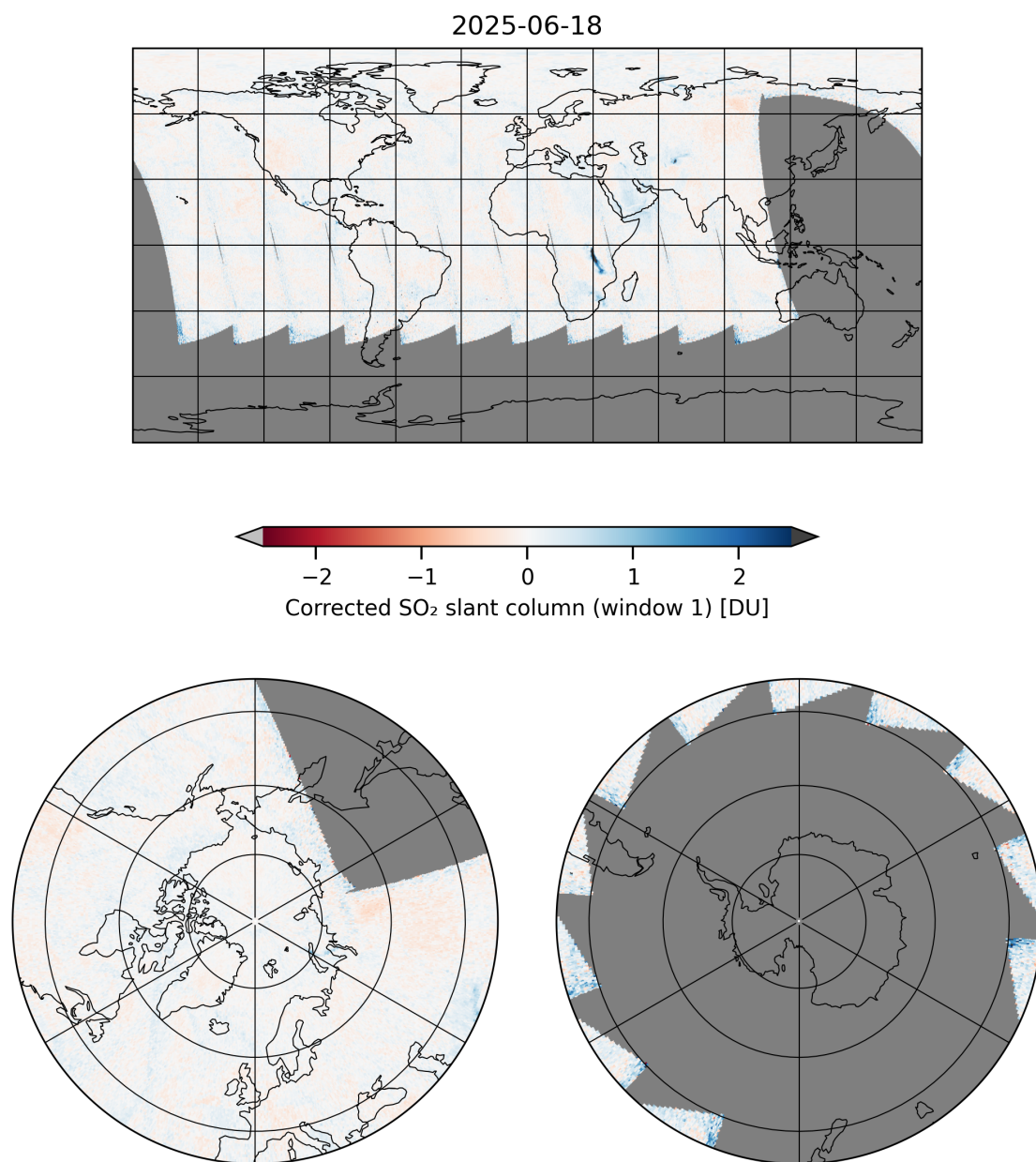


Figure 11: Map of “Corrected SO₂ slant column (window 1)” for 2025-06-18 to 2025-06-19

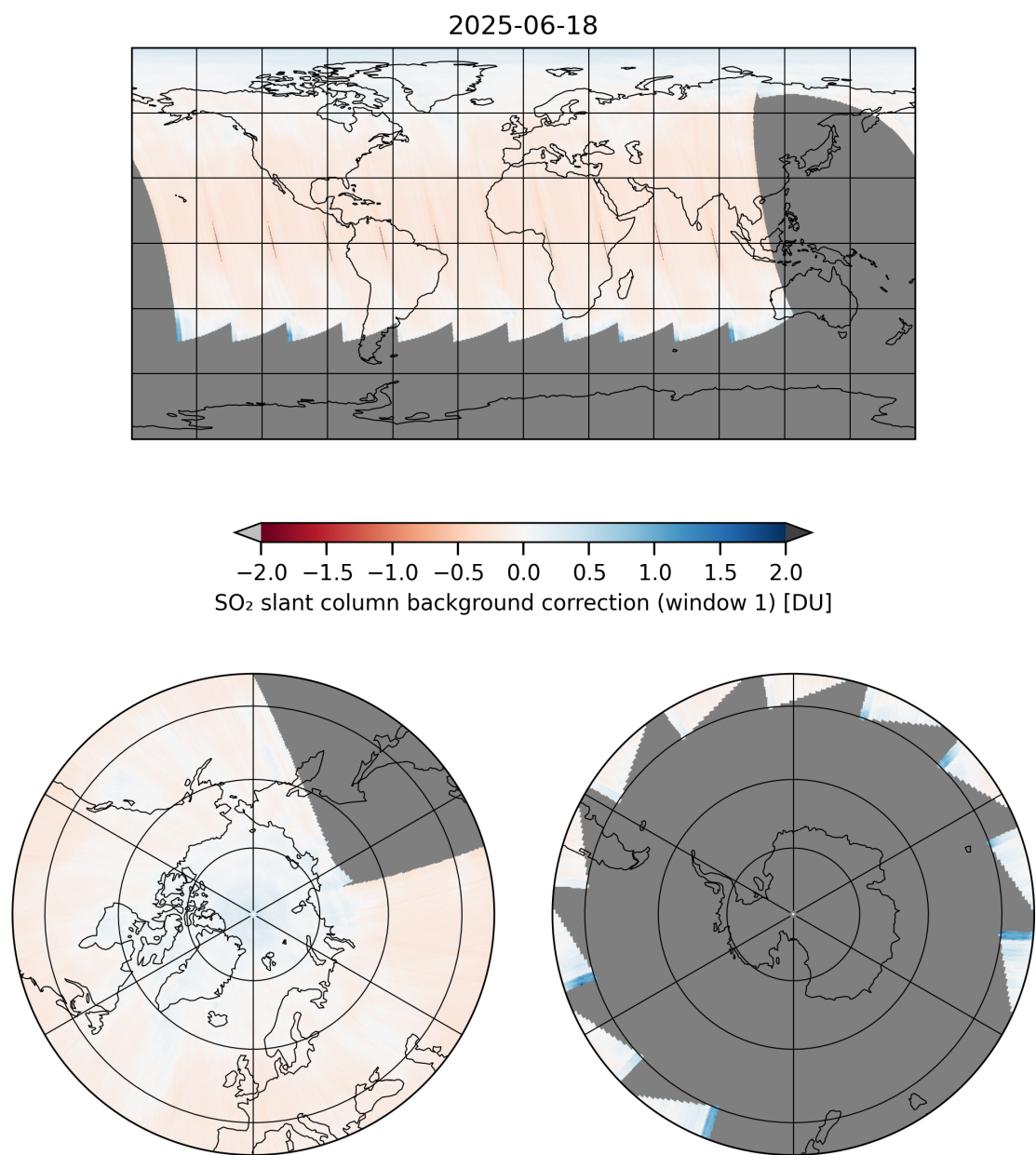


Figure 12: Map of “SO₂ slant column background correction (window 1)” for 2025-06-18 to 2025-06-19

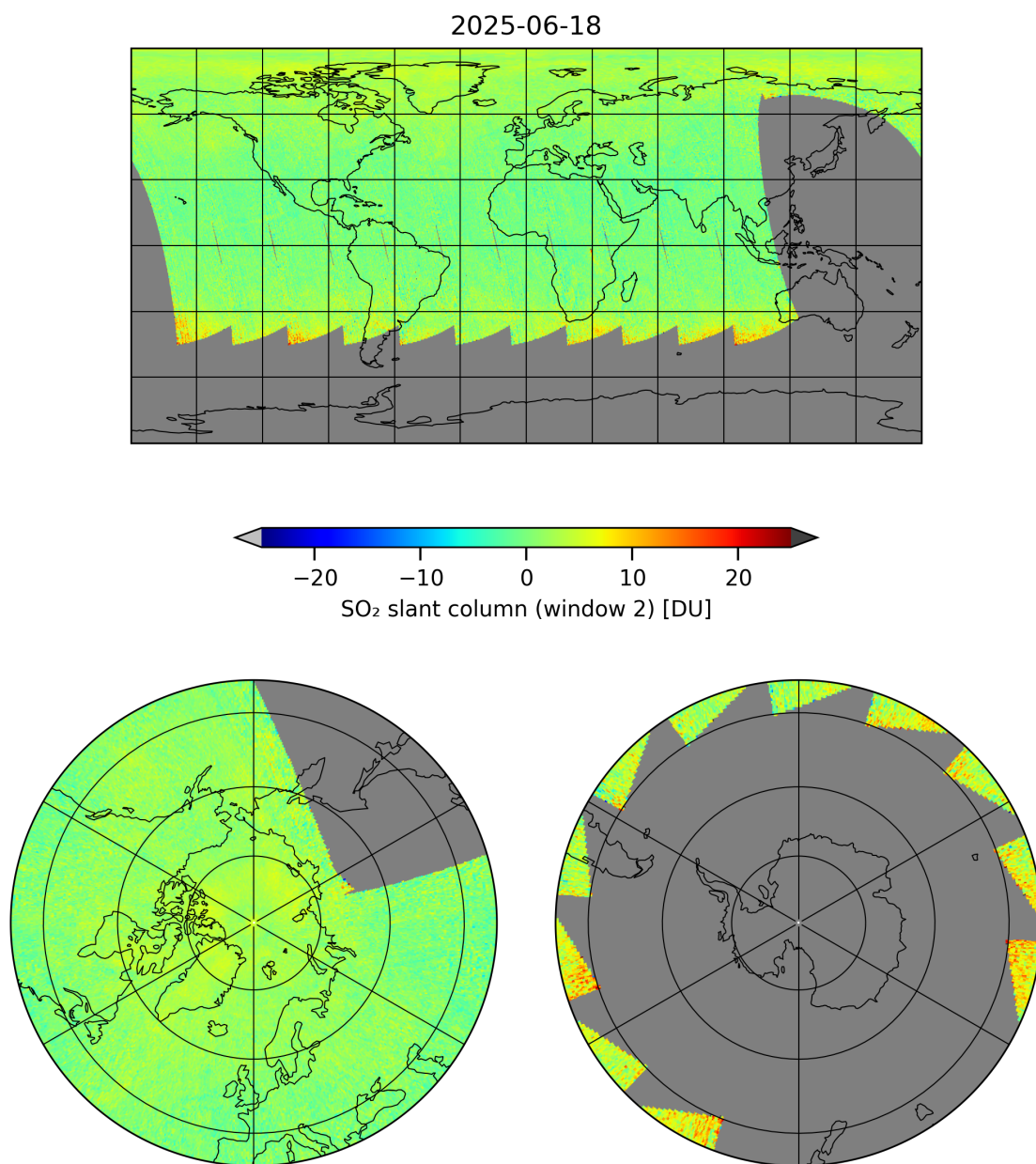


Figure 13: Map of “SO₂ slant column (window 2)” for 2025-06-18 to 2025-06-19

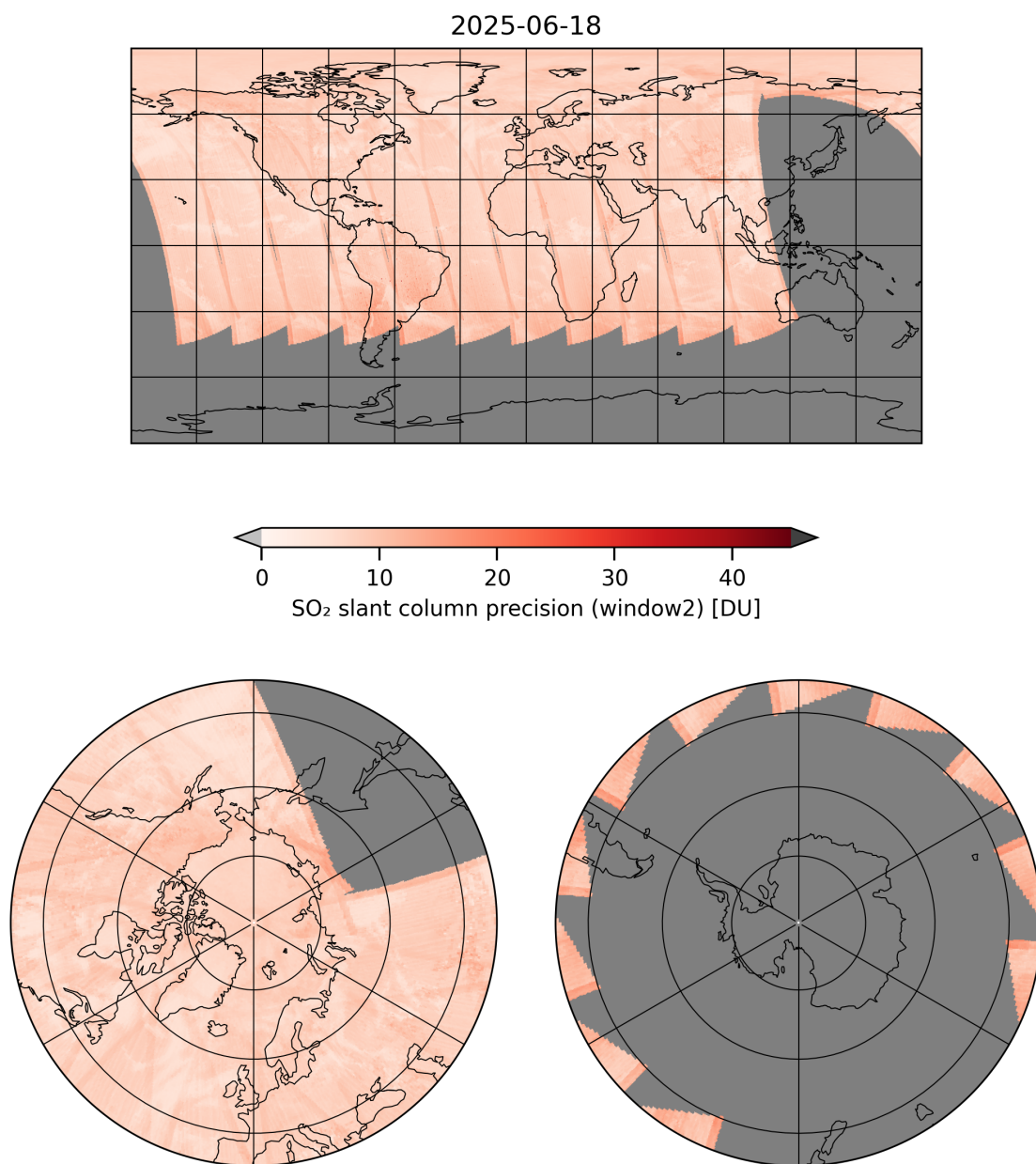


Figure 14: Map of “SO₂ slant column precision (window2)” for 2025-06-18 to 2025-06-19

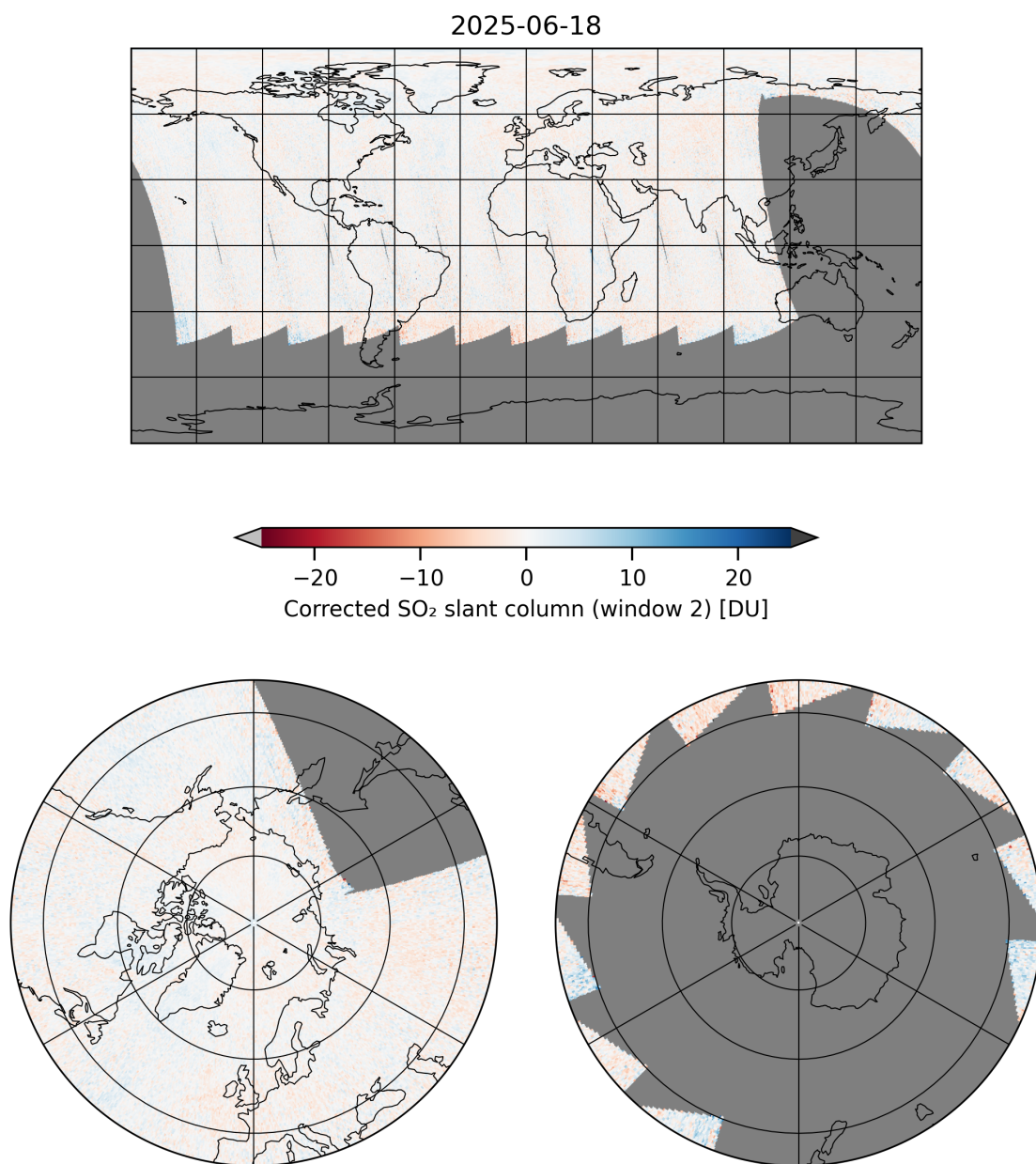


Figure 15: Map of “Corrected SO₂ slant column (window 2)” for 2025-06-18 to 2025-06-19

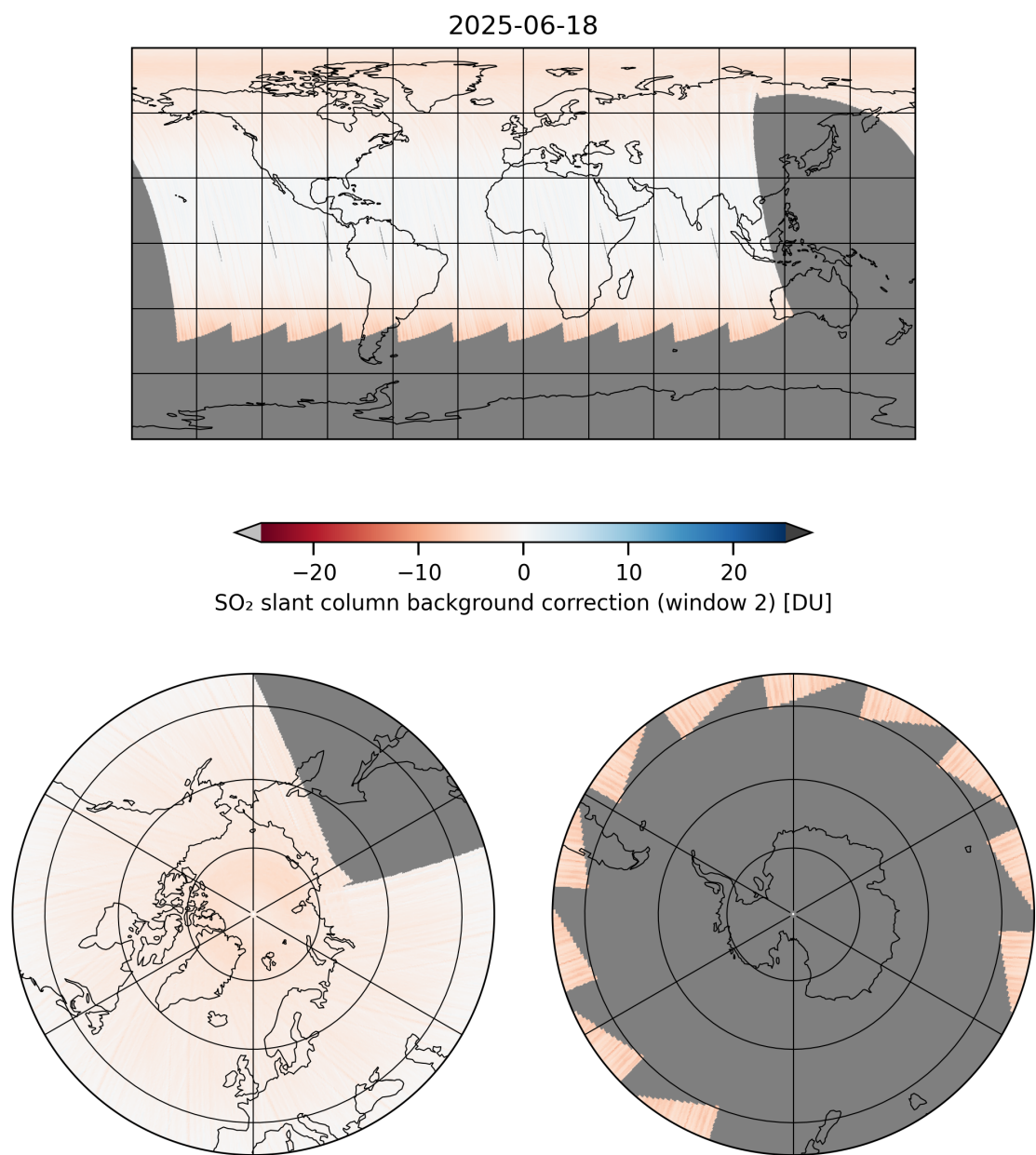


Figure 16: Map of “SO₂ slant column background correction (window 2)” for 2025-06-18 to 2025-06-19

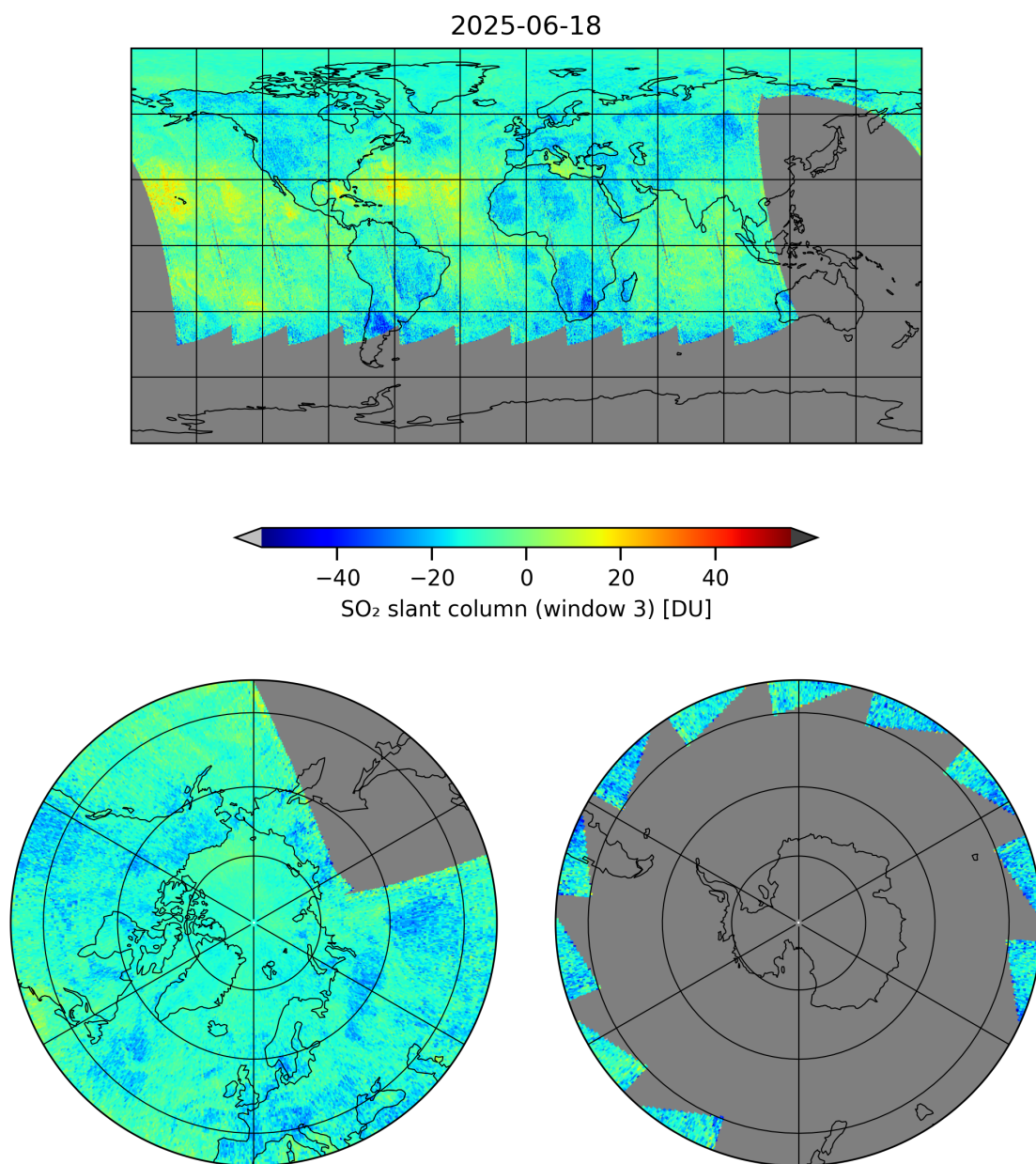


Figure 17: Map of “SO₂ slant column (window 3)” for 2025-06-18 to 2025-06-19

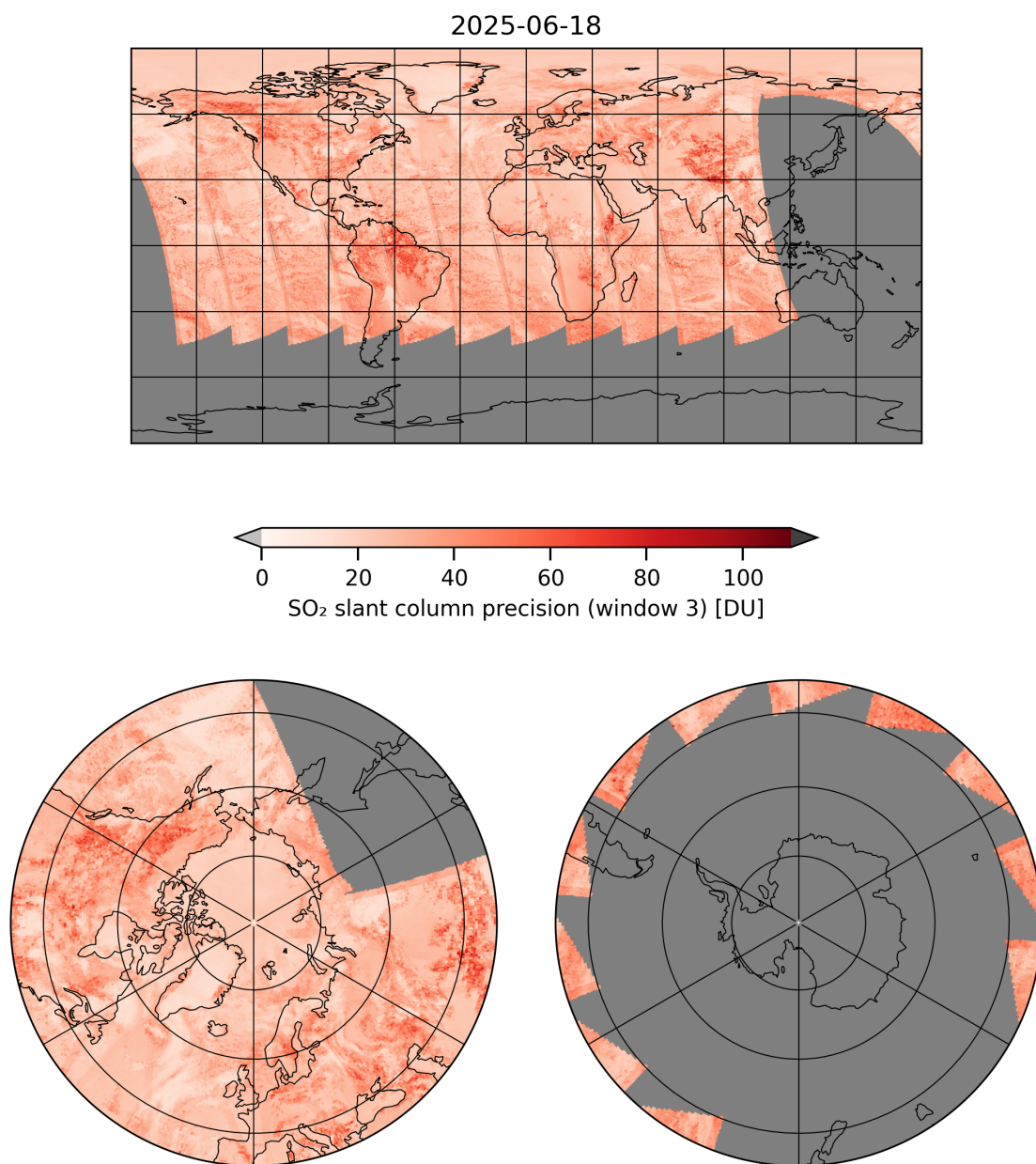


Figure 18: Map of “SO₂ slant column precision (window 3)” for 2025-06-18 to 2025-06-19

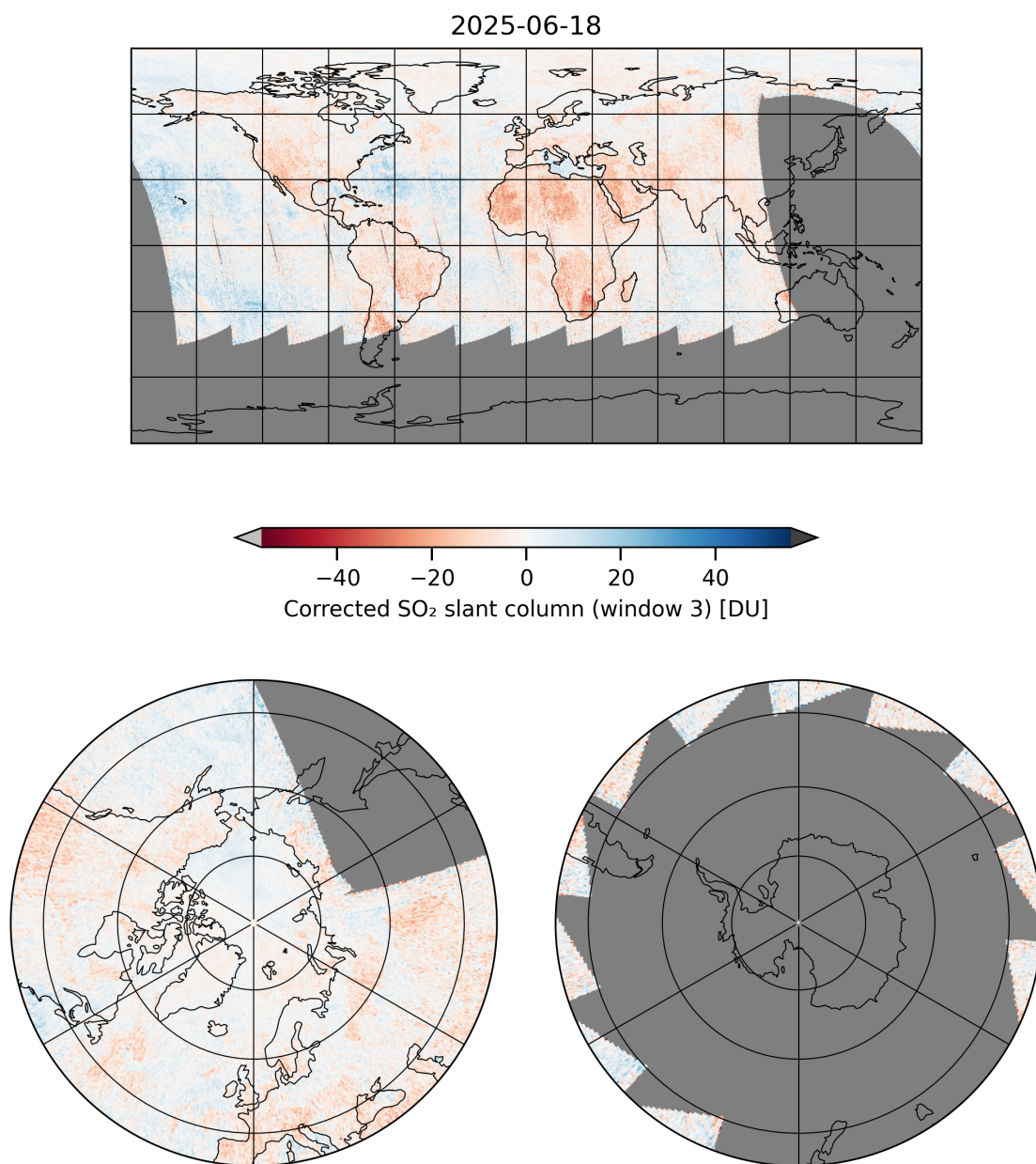


Figure 19: Map of “Corrected SO₂ slant column (window 3)” for 2025-06-18 to 2025-06-19

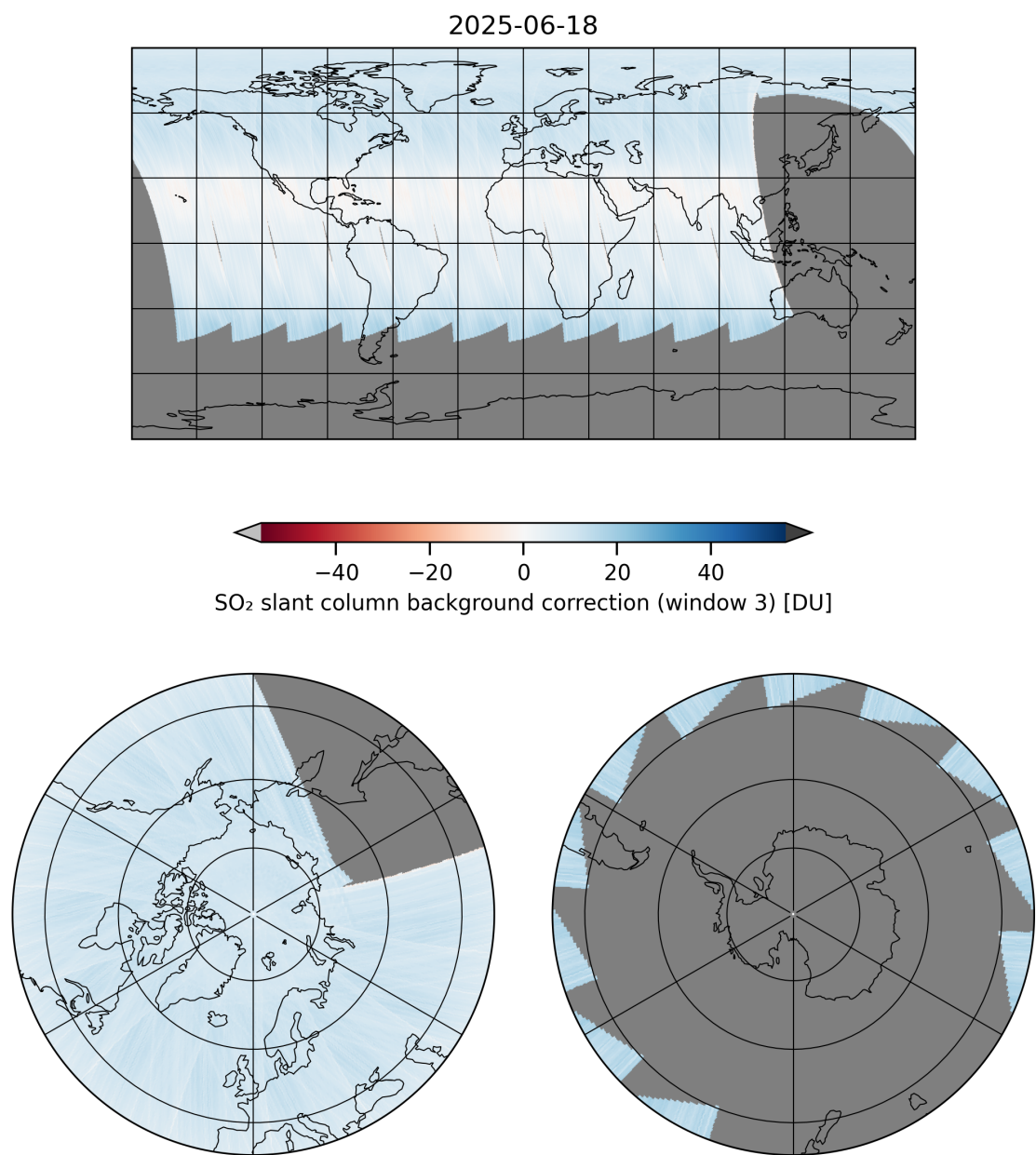


Figure 20: Map of “SO₂ slant column background correction (window 3)” for 2025-06-18 to 2025-06-19

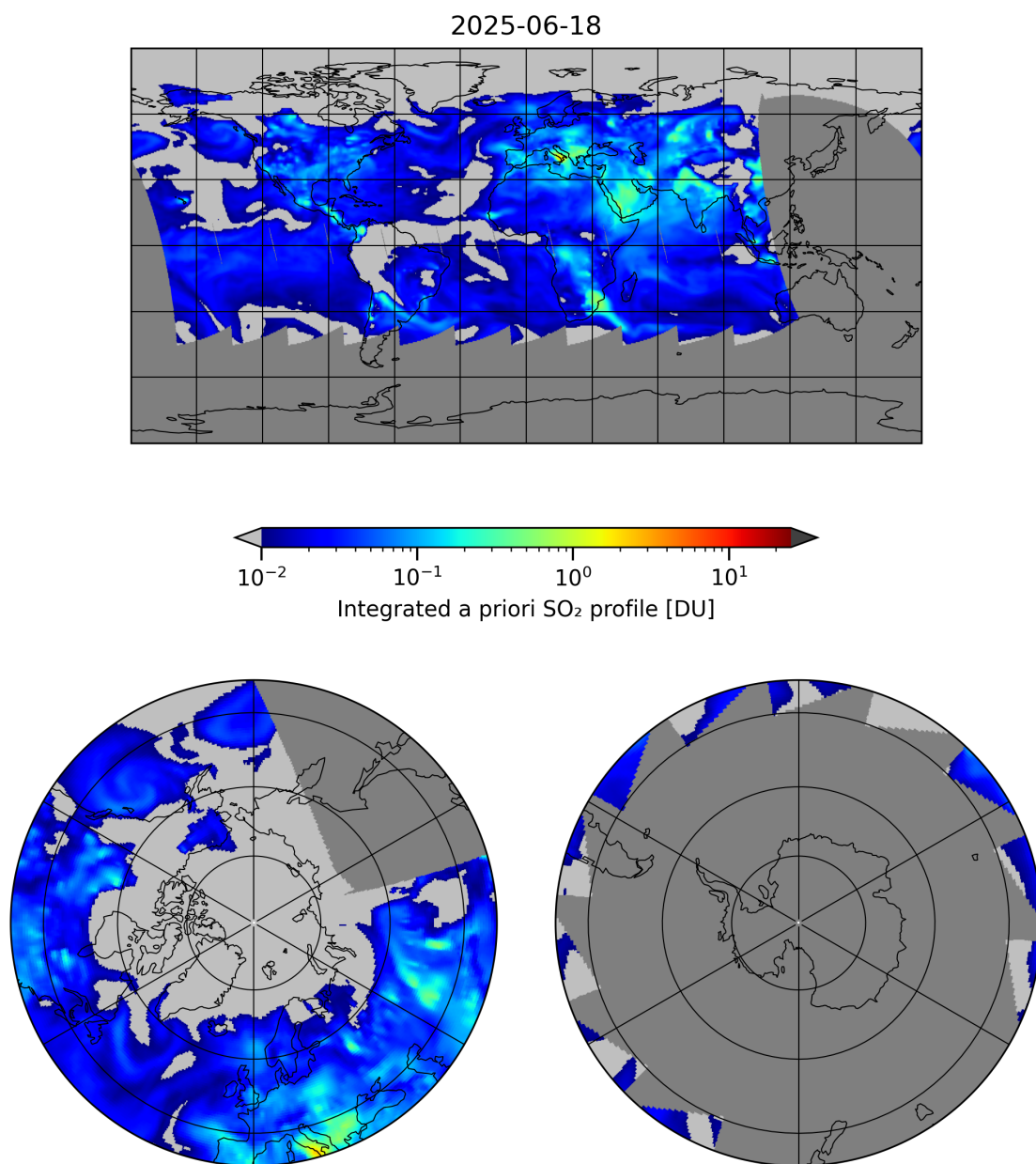


Figure 21: Map of “Integrated a priori SO₂ profile” for 2025-06-18 to 2025-06-19

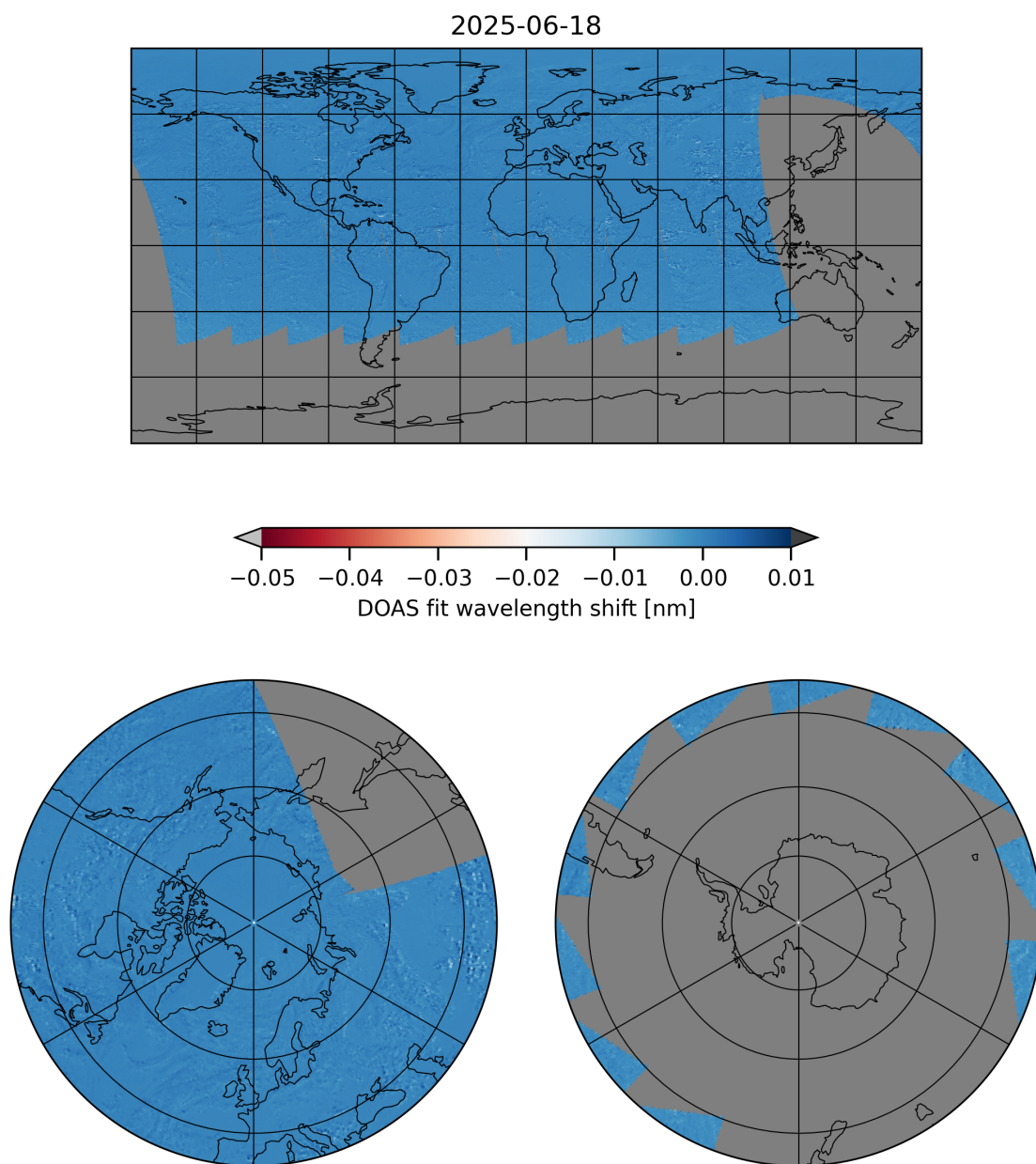


Figure 22: Map of “DOAS fit wavelength shift” for 2025-06-18 to 2025-06-19

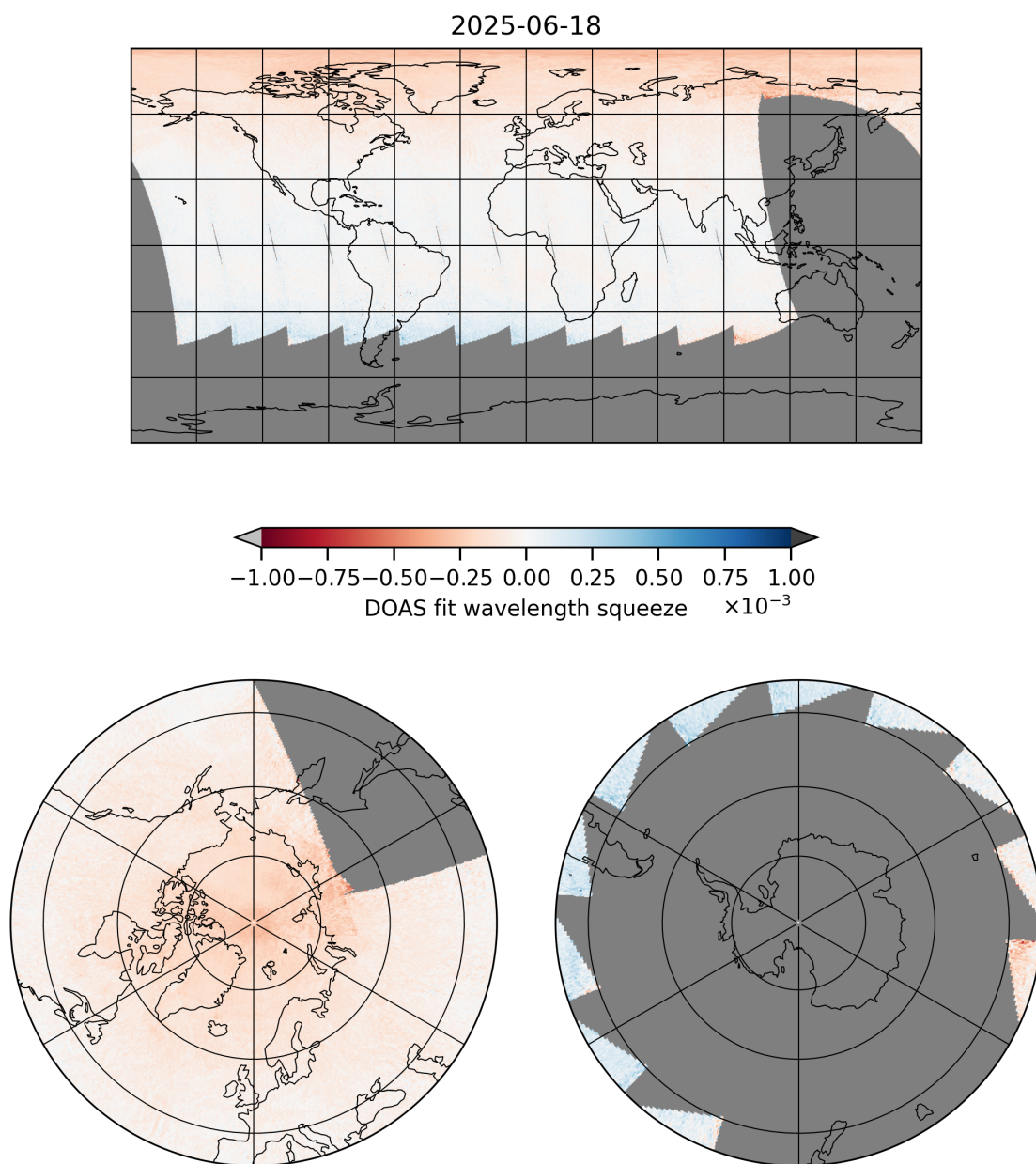


Figure 23: Map of "DOAS fit wavelength squeeze" for 2025-06-18 to 2025-06-19

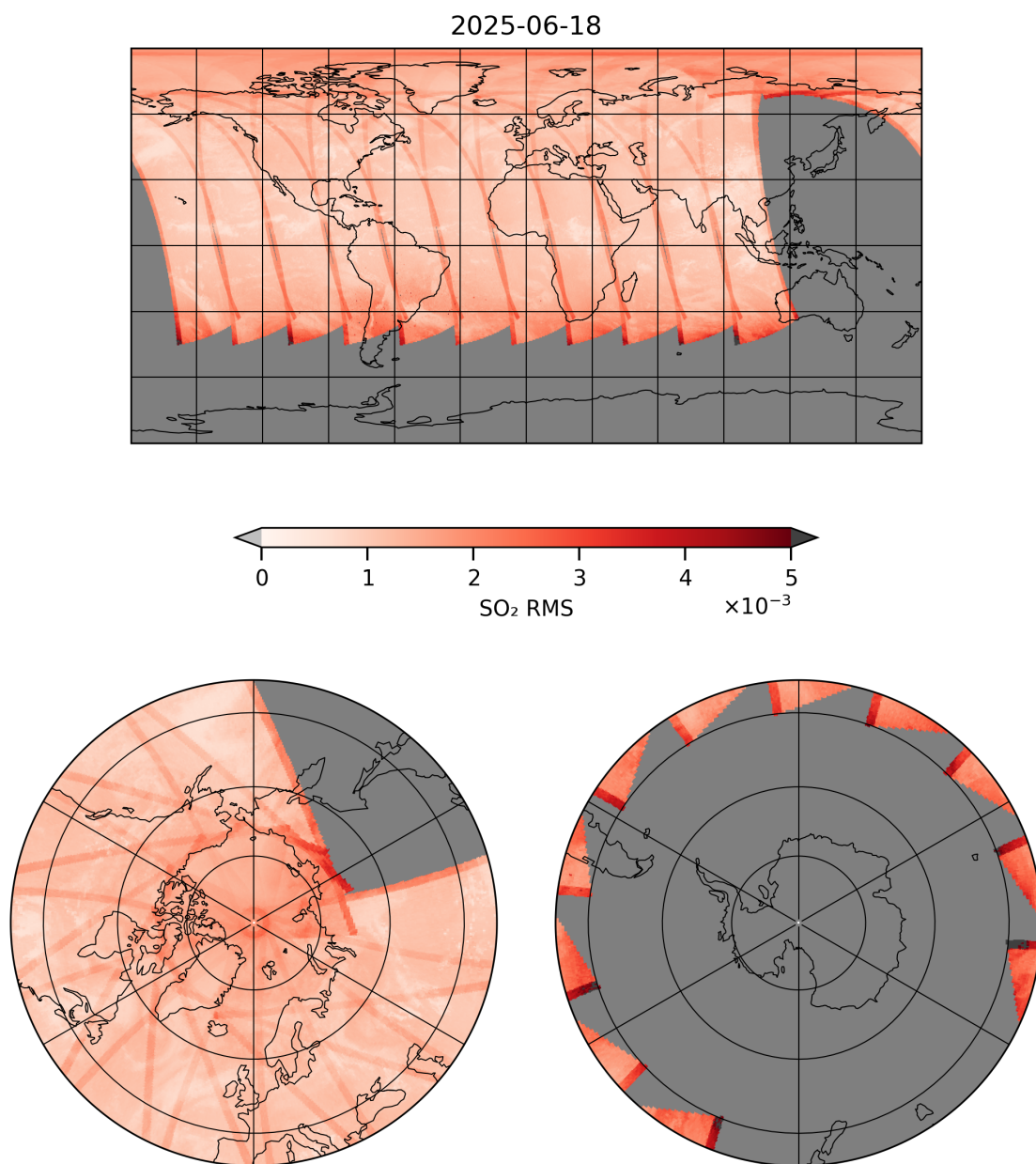


Figure 24: Map of “SO₂ RMS” for 2025-06-18 to 2025-06-19

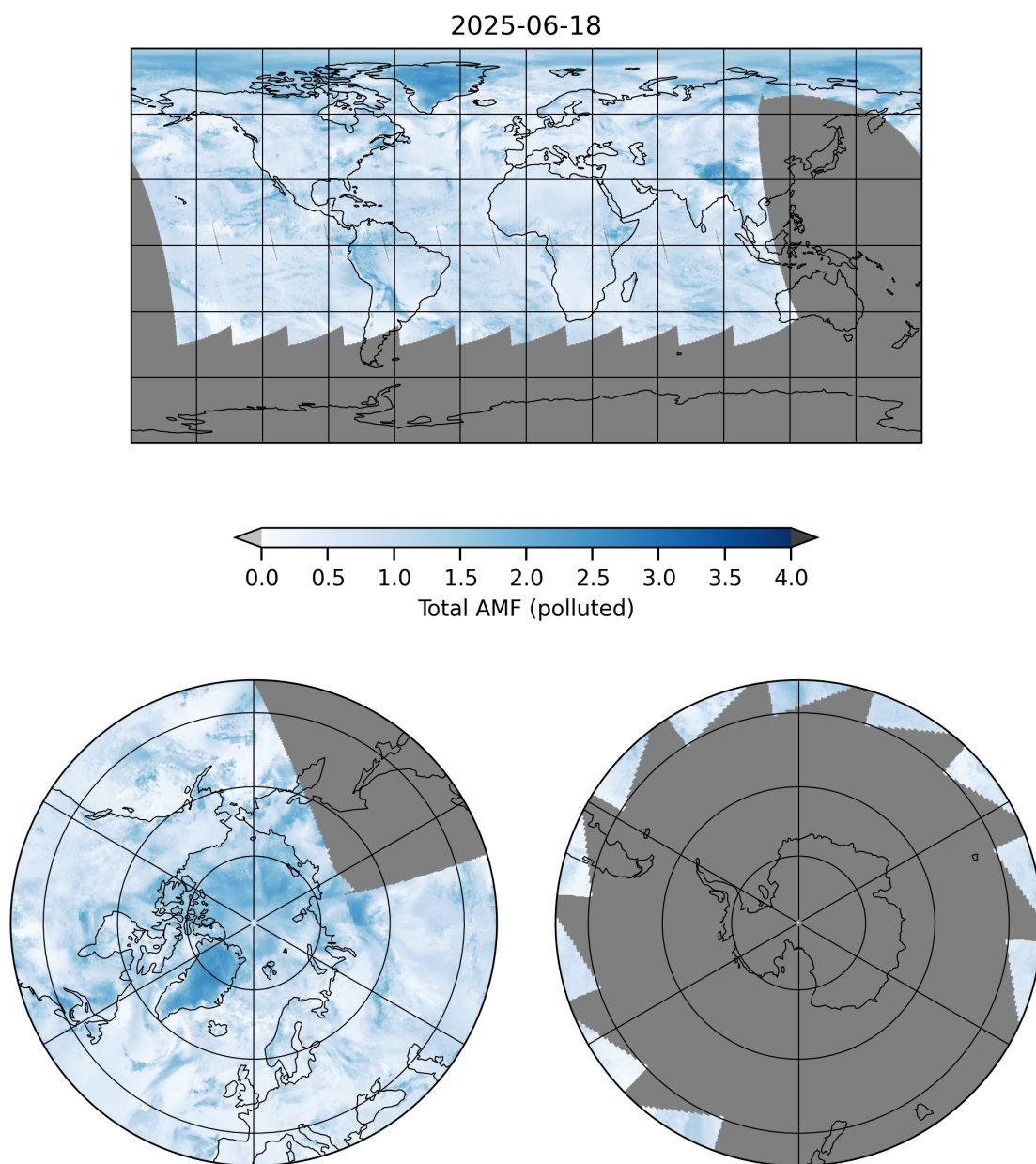


Figure 25: Map of “Total AMF (polluted)” for 2025-06-18 to 2025-06-19

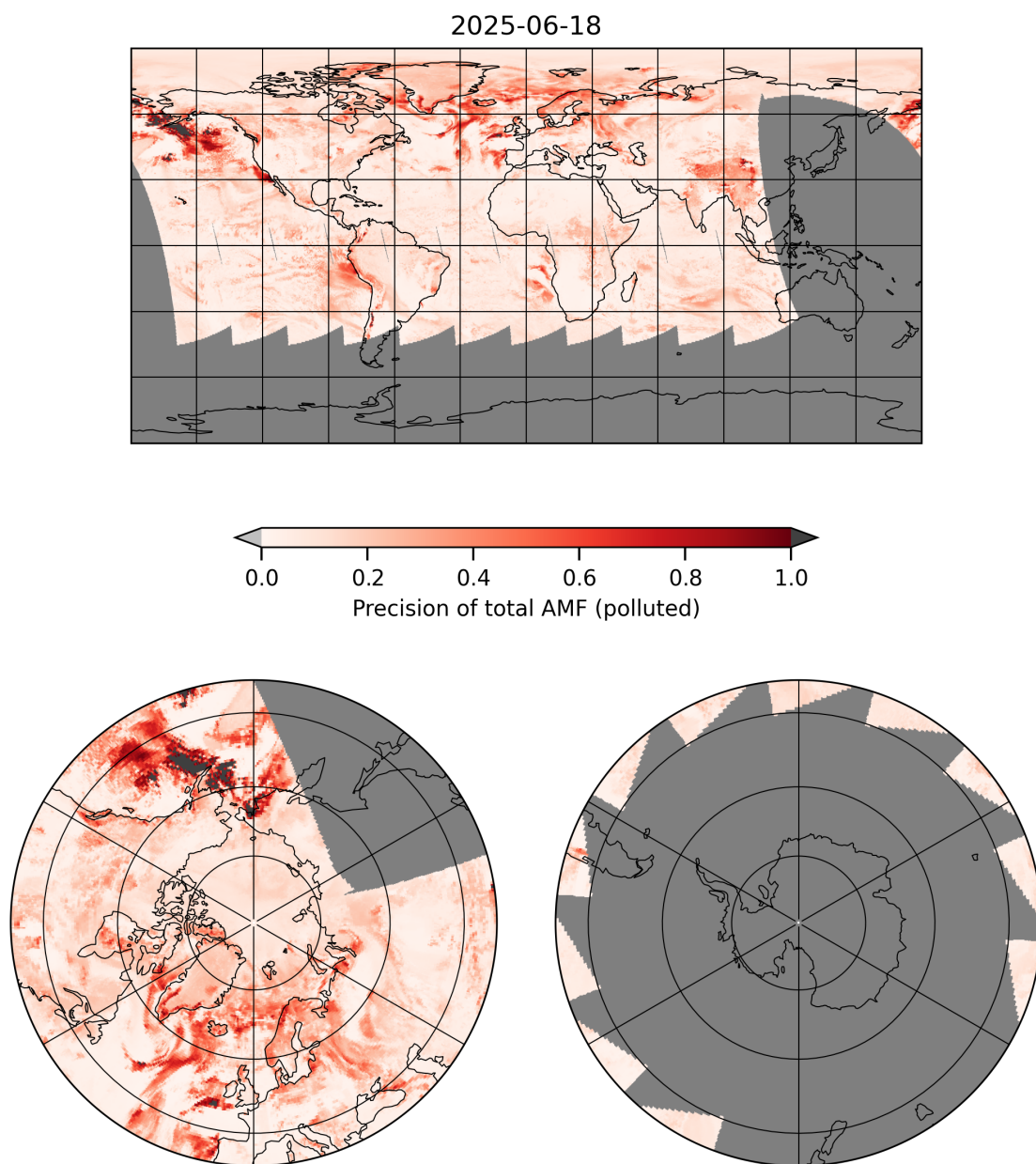


Figure 26: Map of “Precision of total AMF (polluted)” for 2025-06-18 to 2025-06-19

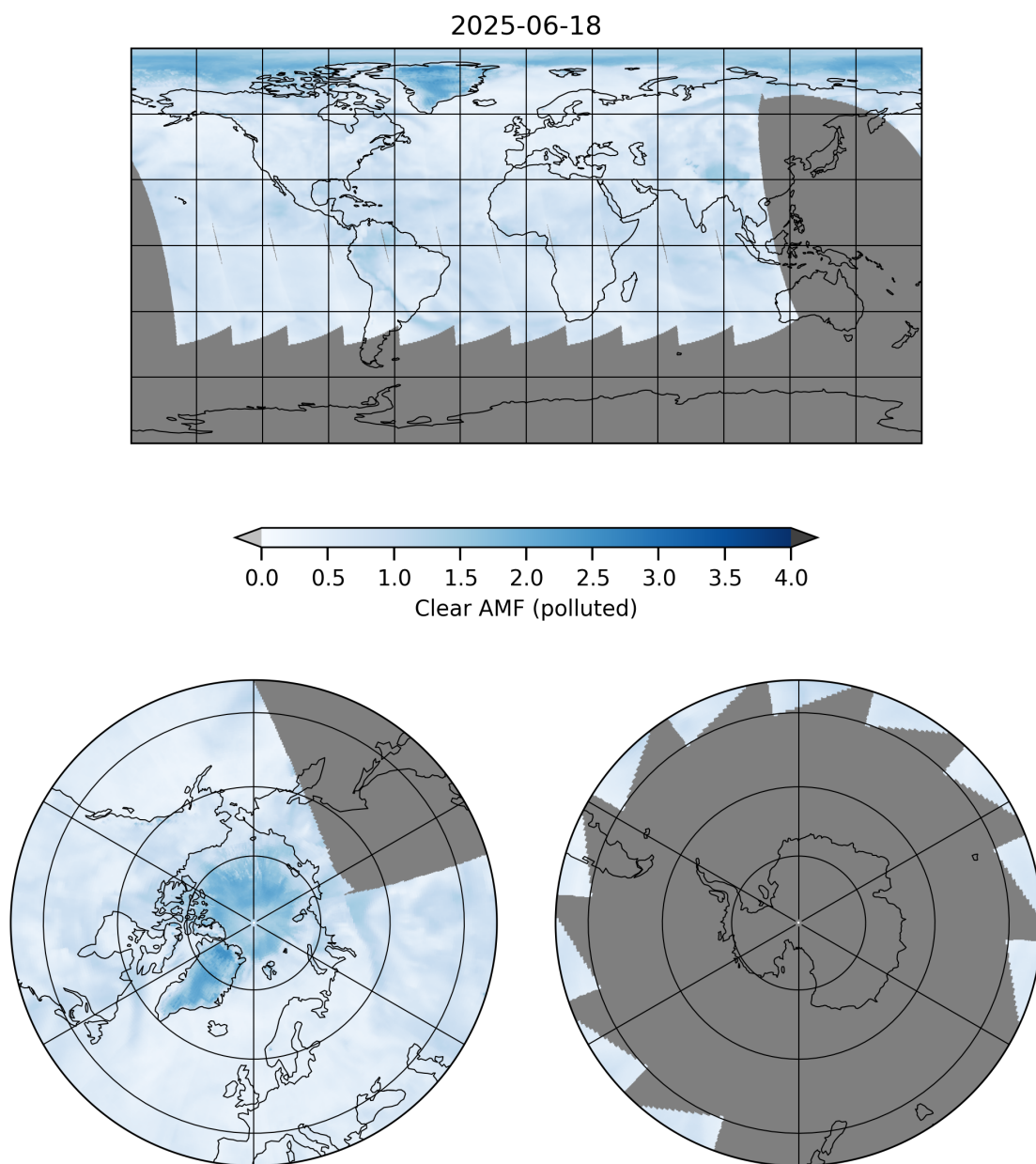


Figure 27: Map of “Clear AMF (polluted)” for 2025-06-18 to 2025-06-19

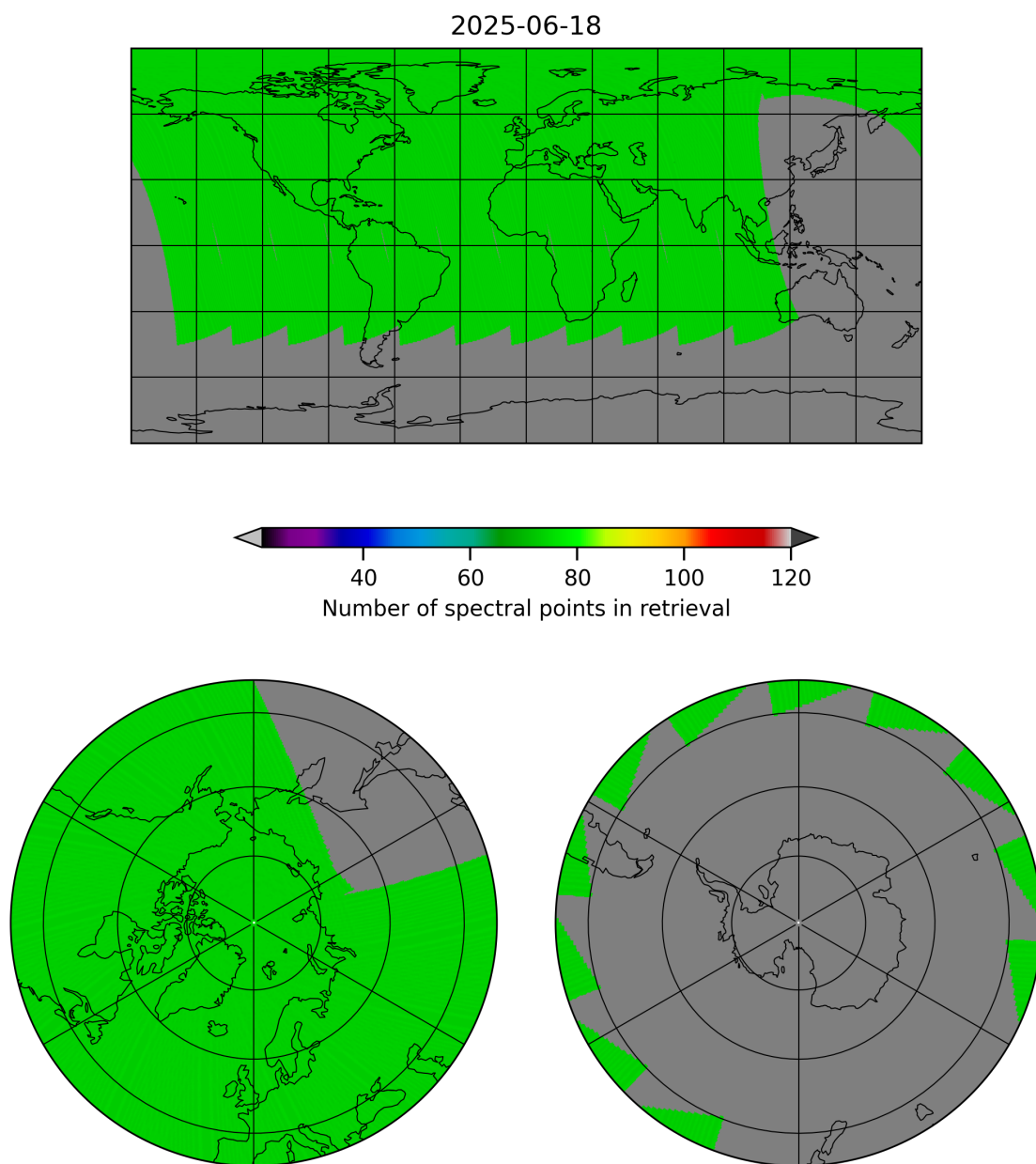


Figure 28: Map of “Number of spectral points in retrieval” for 2025-06-18 to 2025-06-19

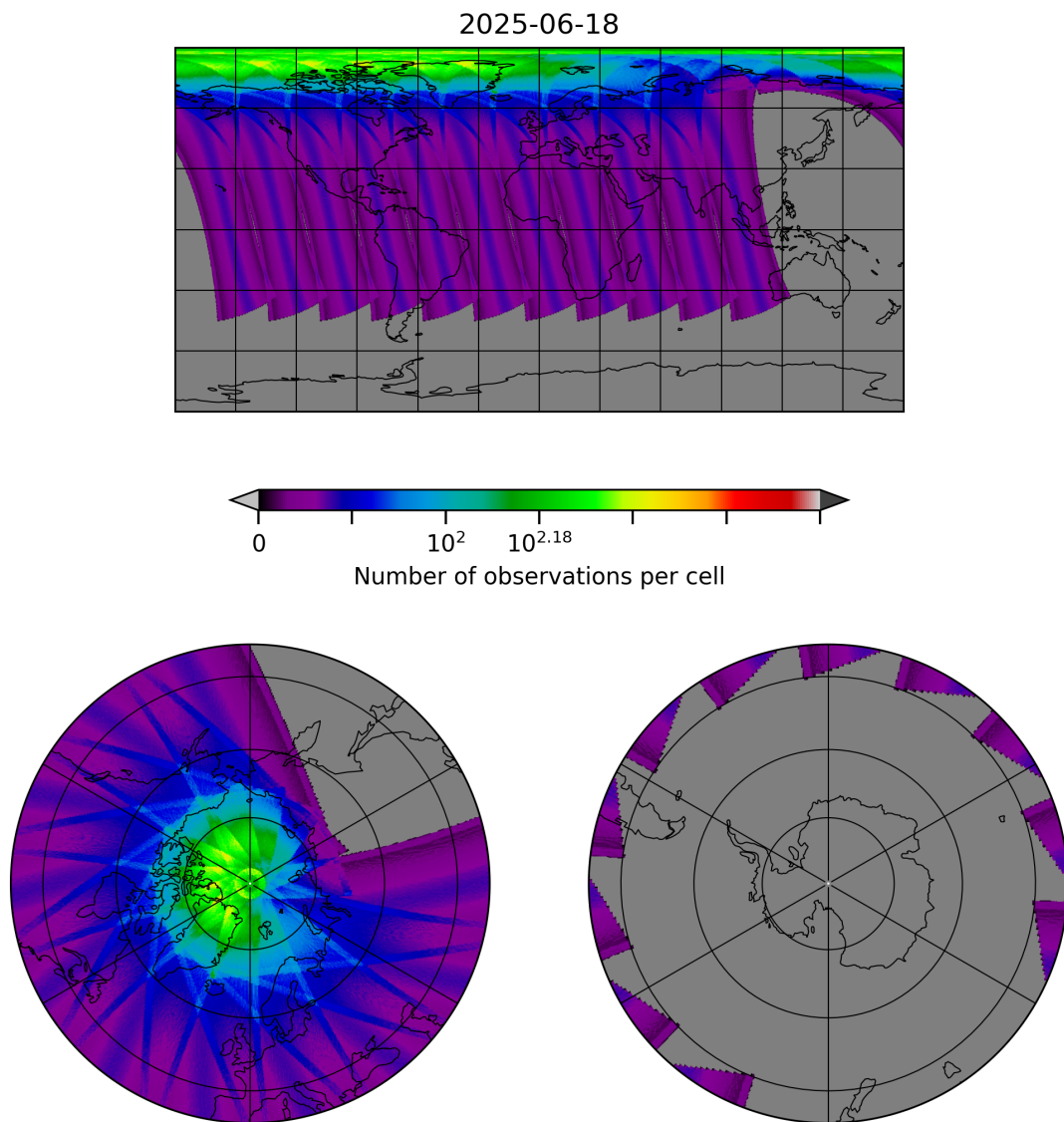


Figure 29: Map of the number of observations for 2025-06-18 to 2025-06-19

7 Zonal average

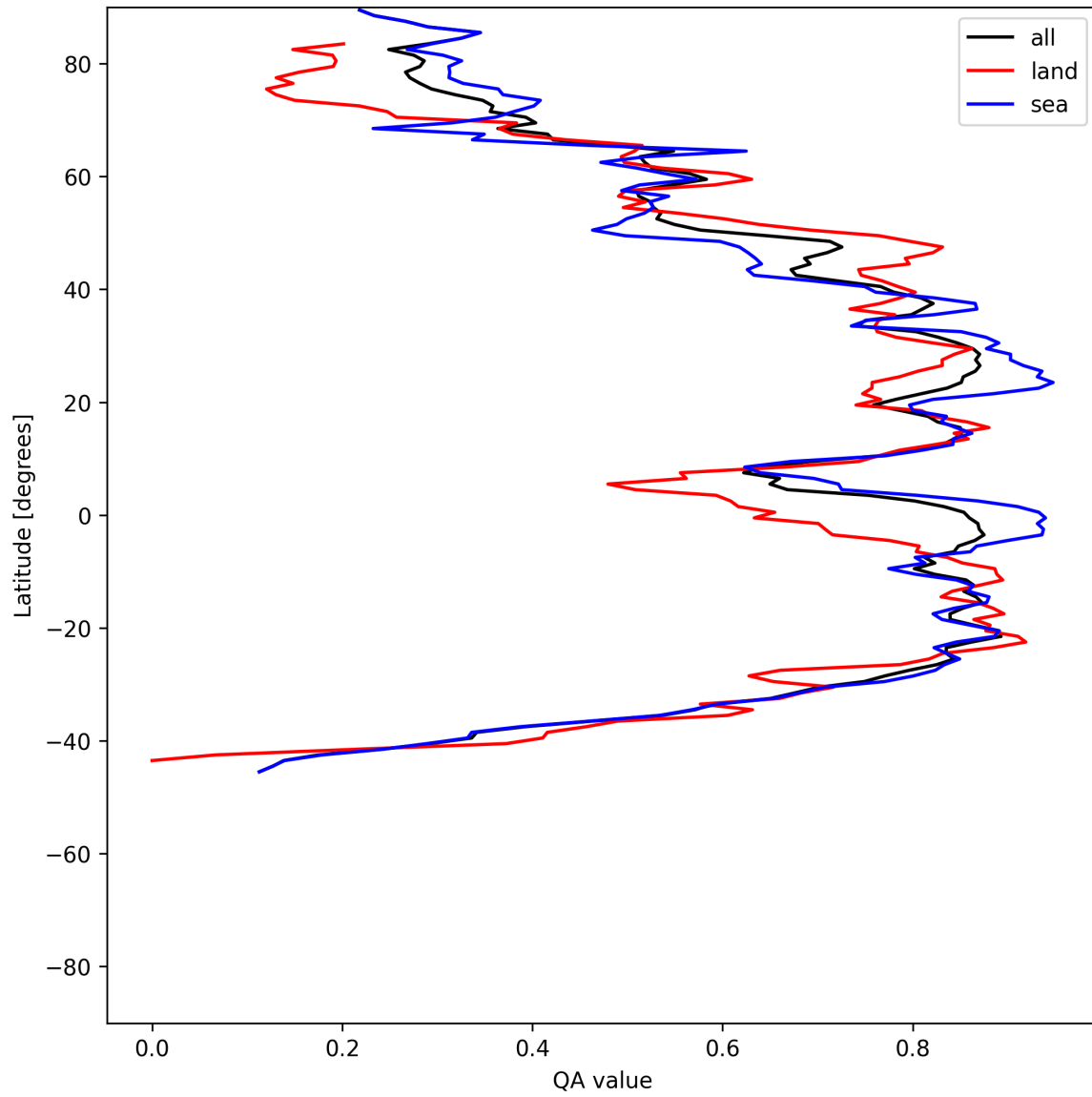


Figure 30: Zonal average of “QA value” for 2025-06-18 to 2025-06-19.

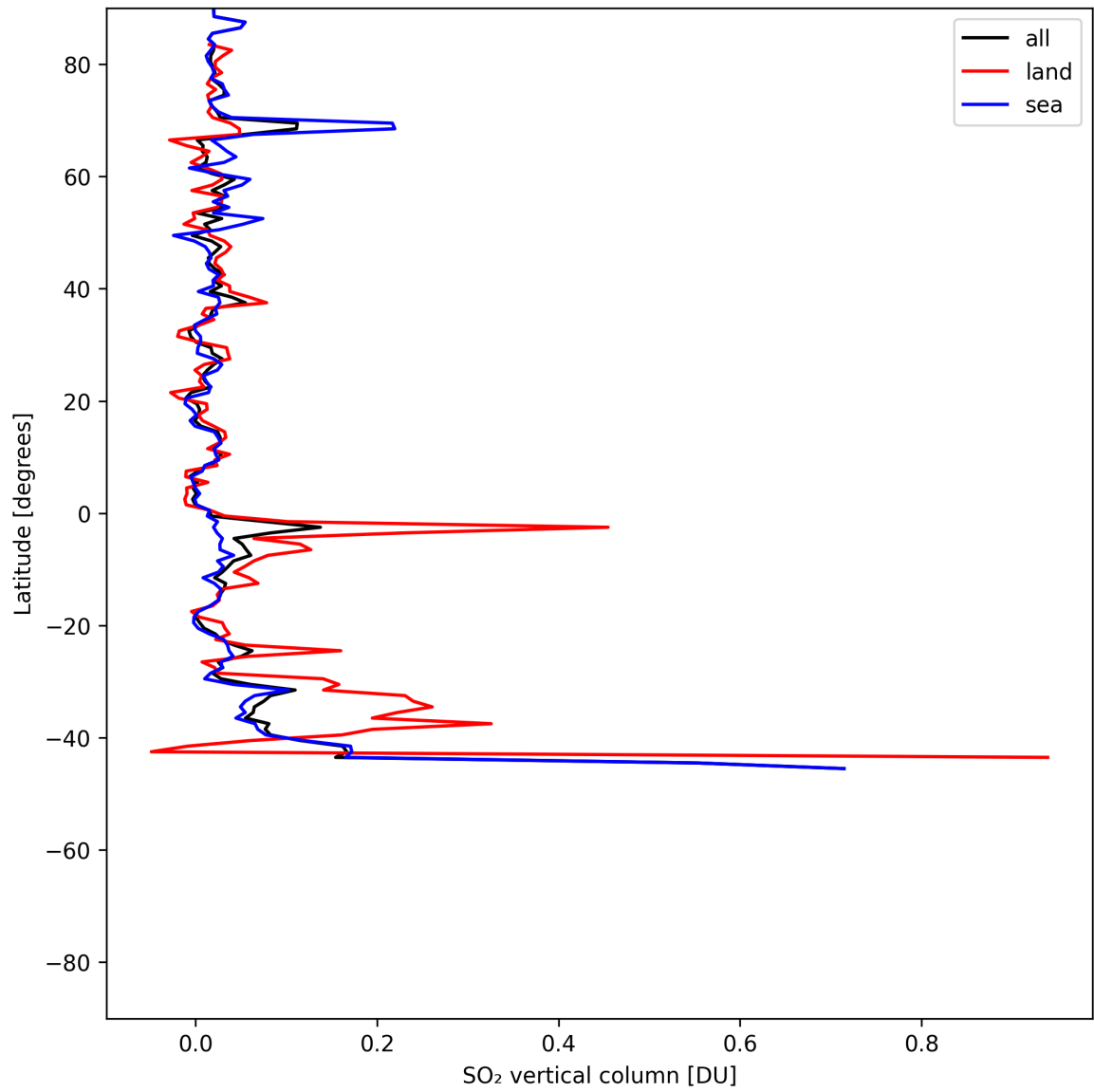


Figure 31: Zonal average of “SO₂ vertical column” for 2025-06-18 to 2025-06-19.

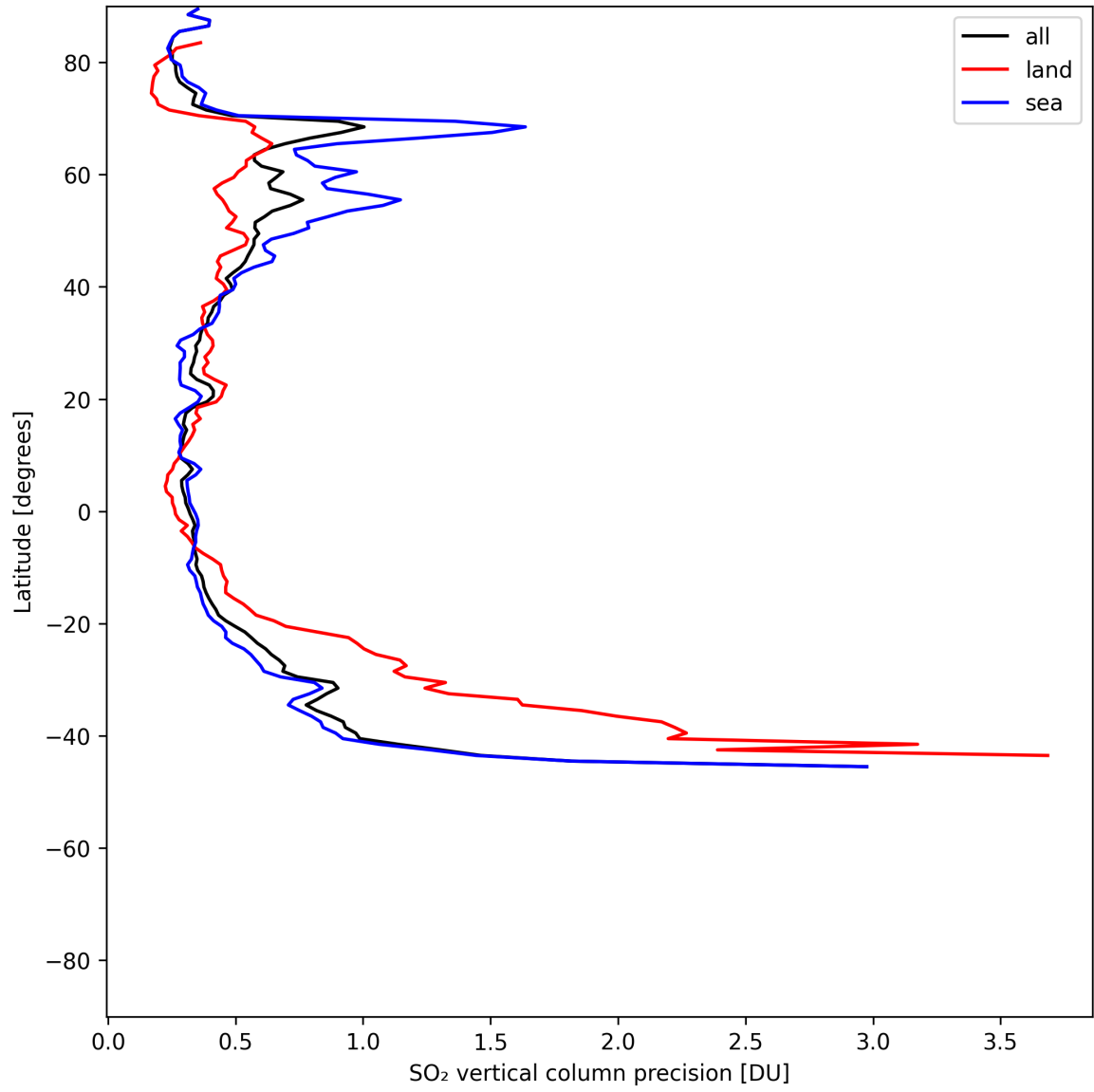


Figure 32: Zonal average of “SO₂ vertical column precision” for 2025-06-18 to 2025-06-19.

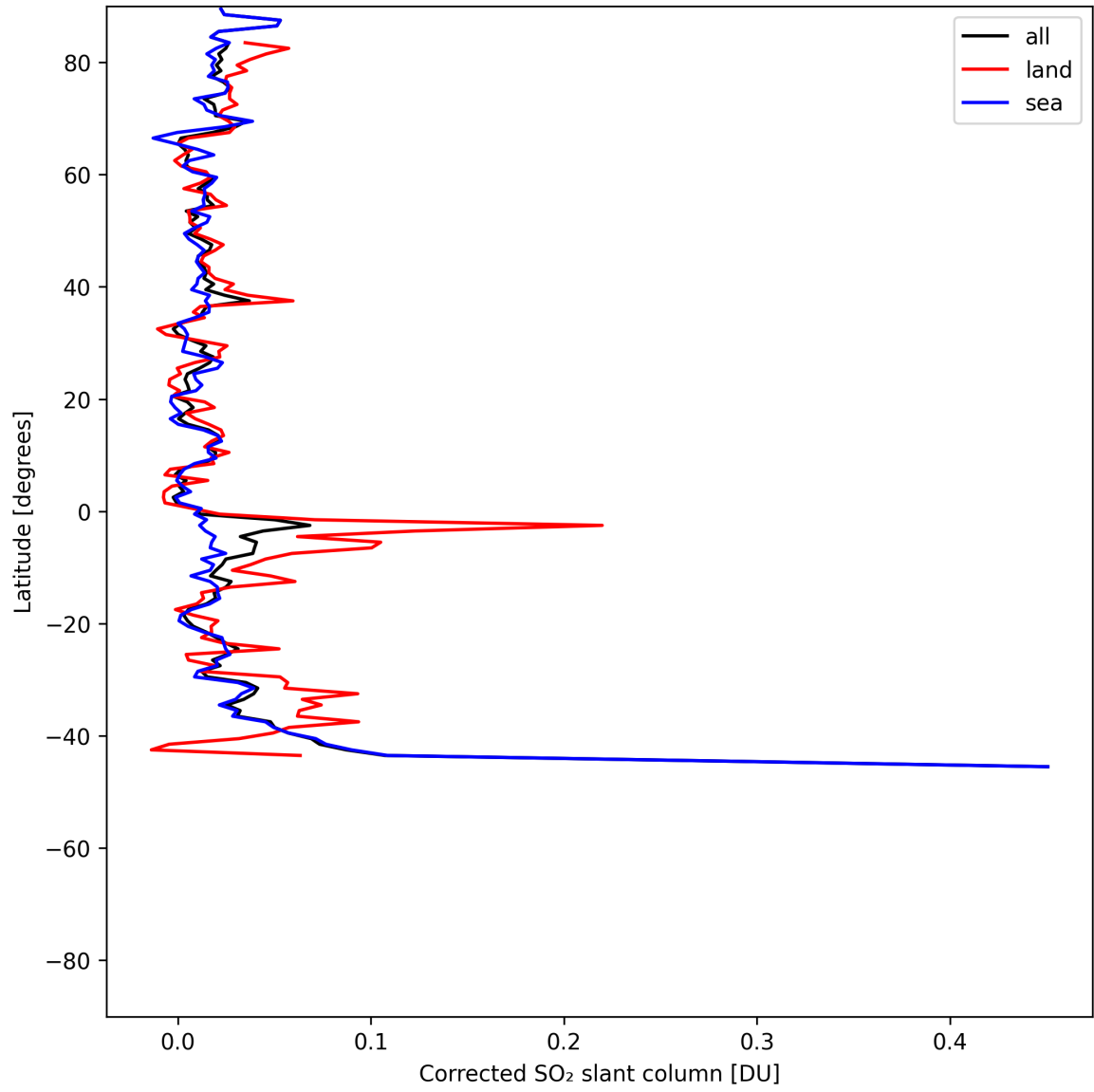


Figure 33: Zonal average of “Corrected SO₂ slant column” for 2025-06-18 to 2025-06-19.

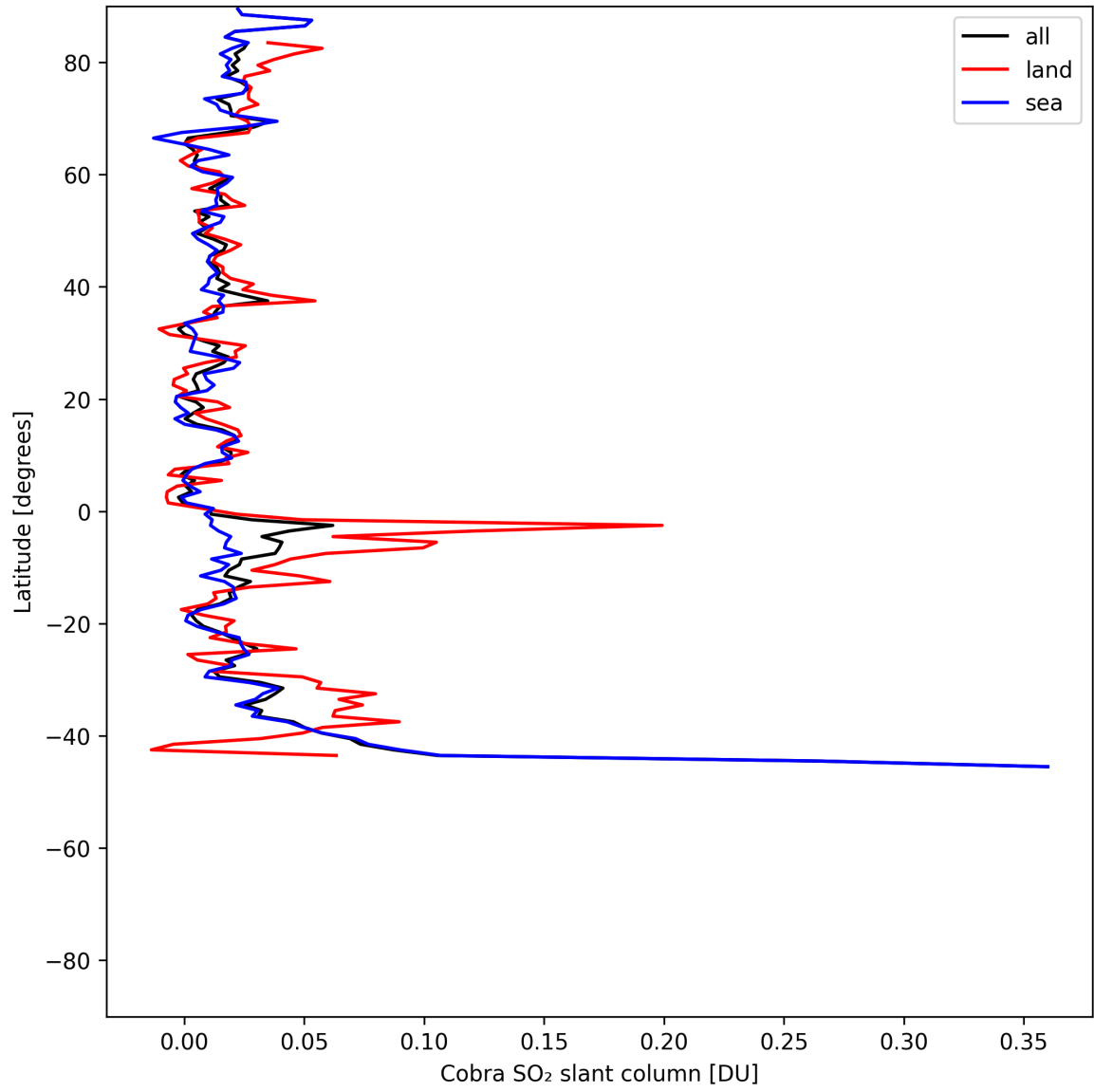


Figure 34: Zonal average of “Cobra SO₂ slant column” for 2025-06-18 to 2025-06-19.

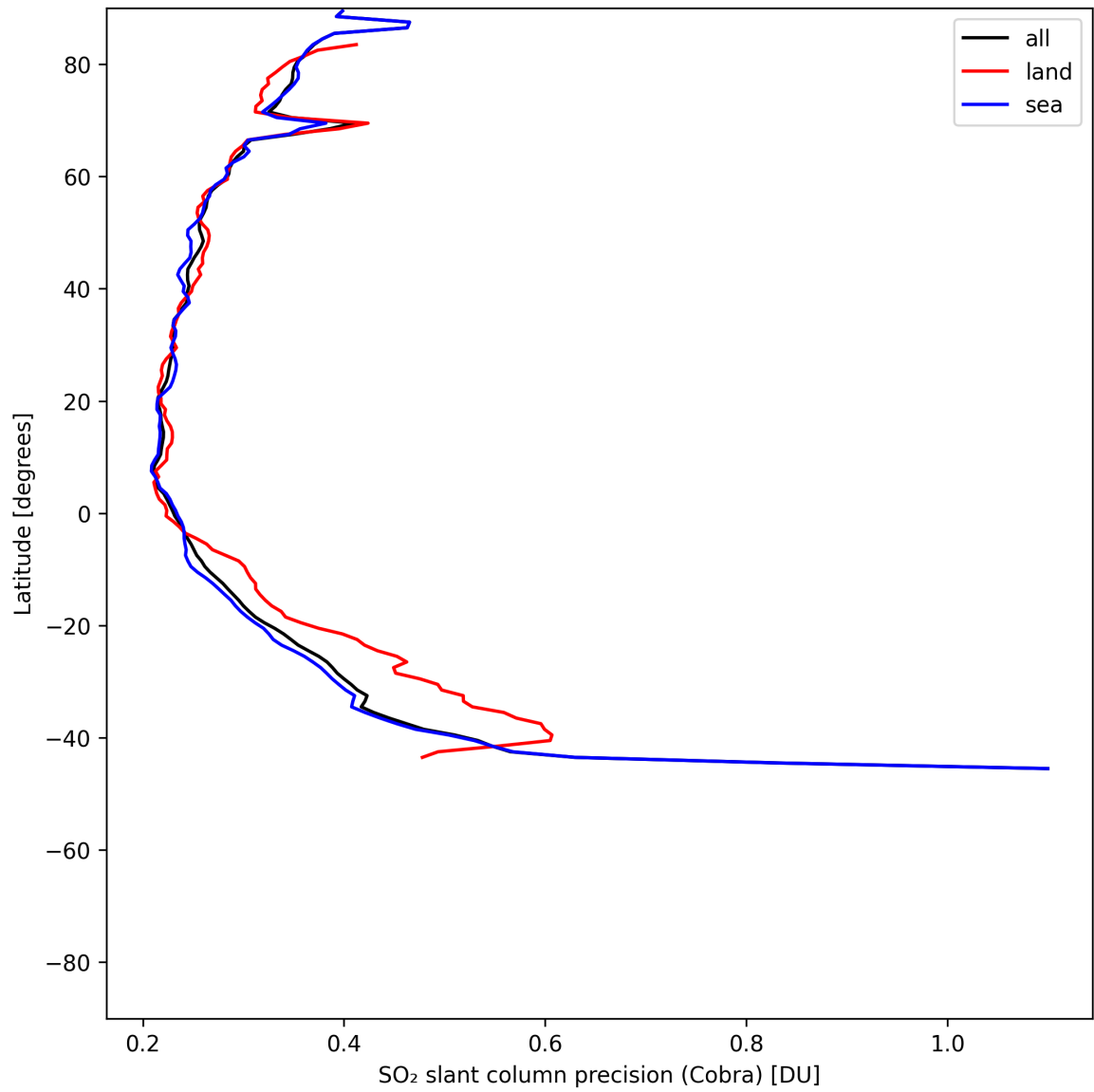


Figure 35: Zonal average of “SO₂ slant column precision (Cobra)” for 2025-06-18 to 2025-06-19.

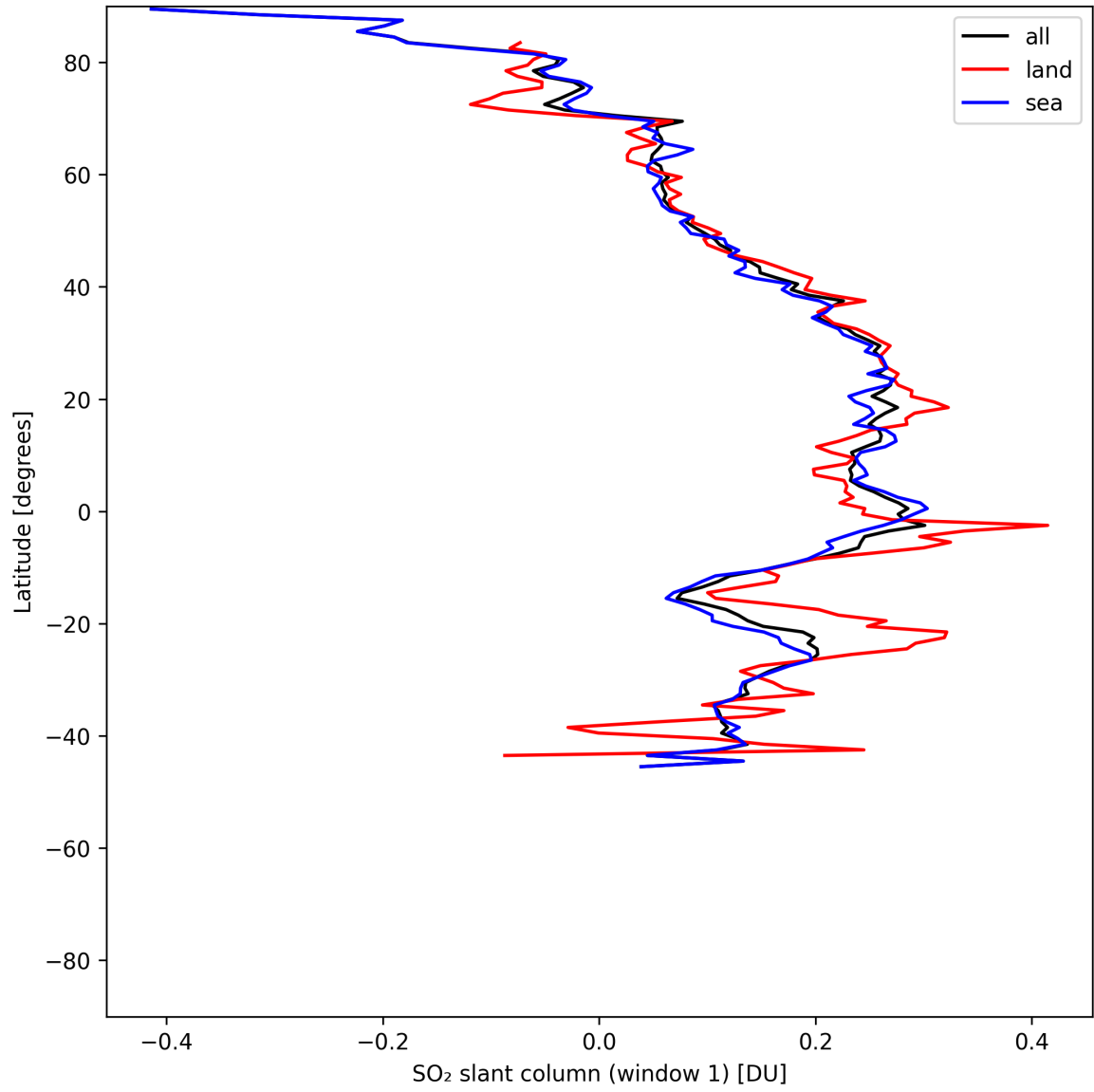


Figure 36: Zonal average of “SO₂ slant column (window 1)” for 2025-06-18 to 2025-06-19.

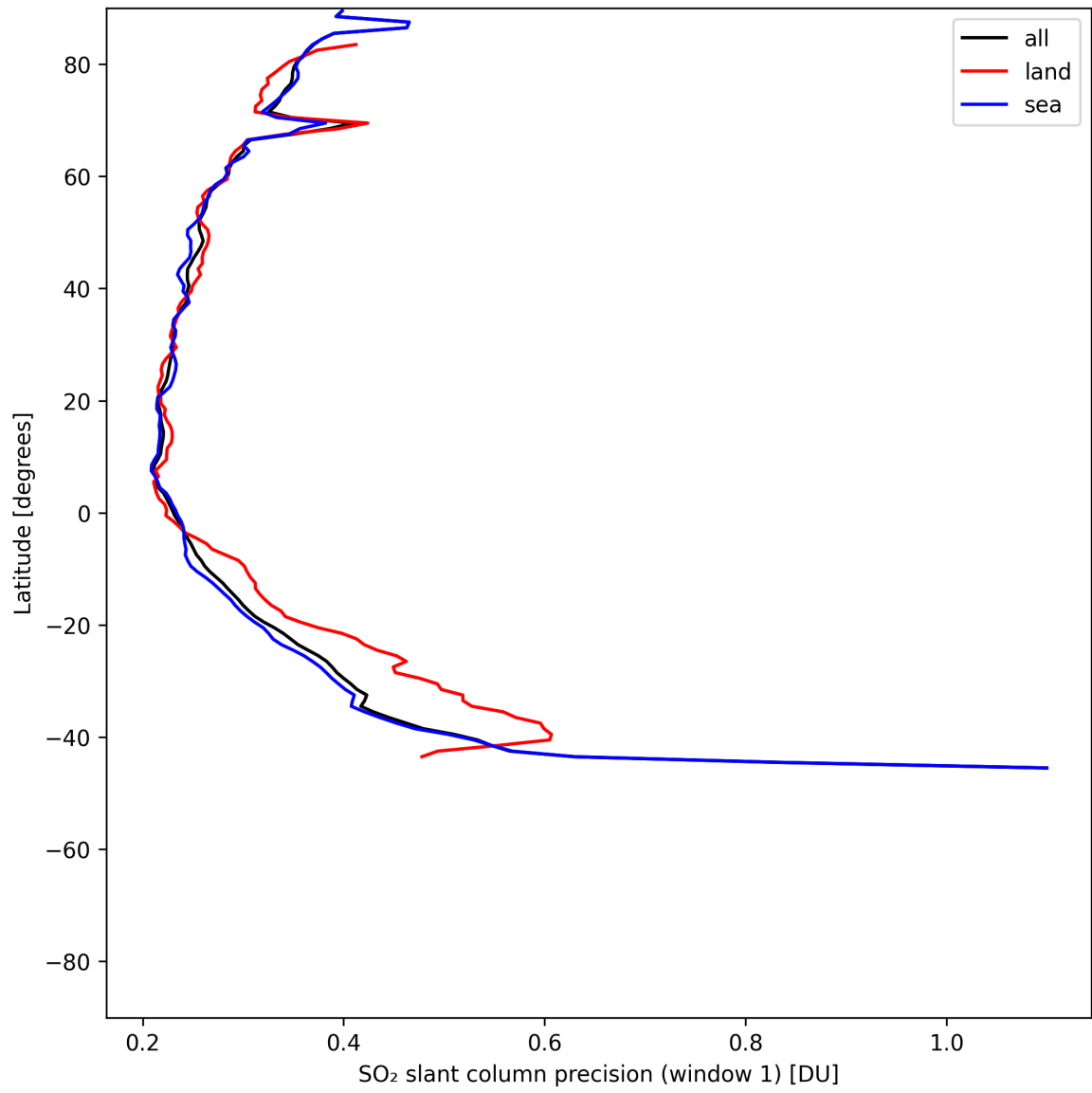


Figure 37: Zonal average of “SO₂ slant column precision (window 1)” for 2025-06-18 to 2025-06-19.

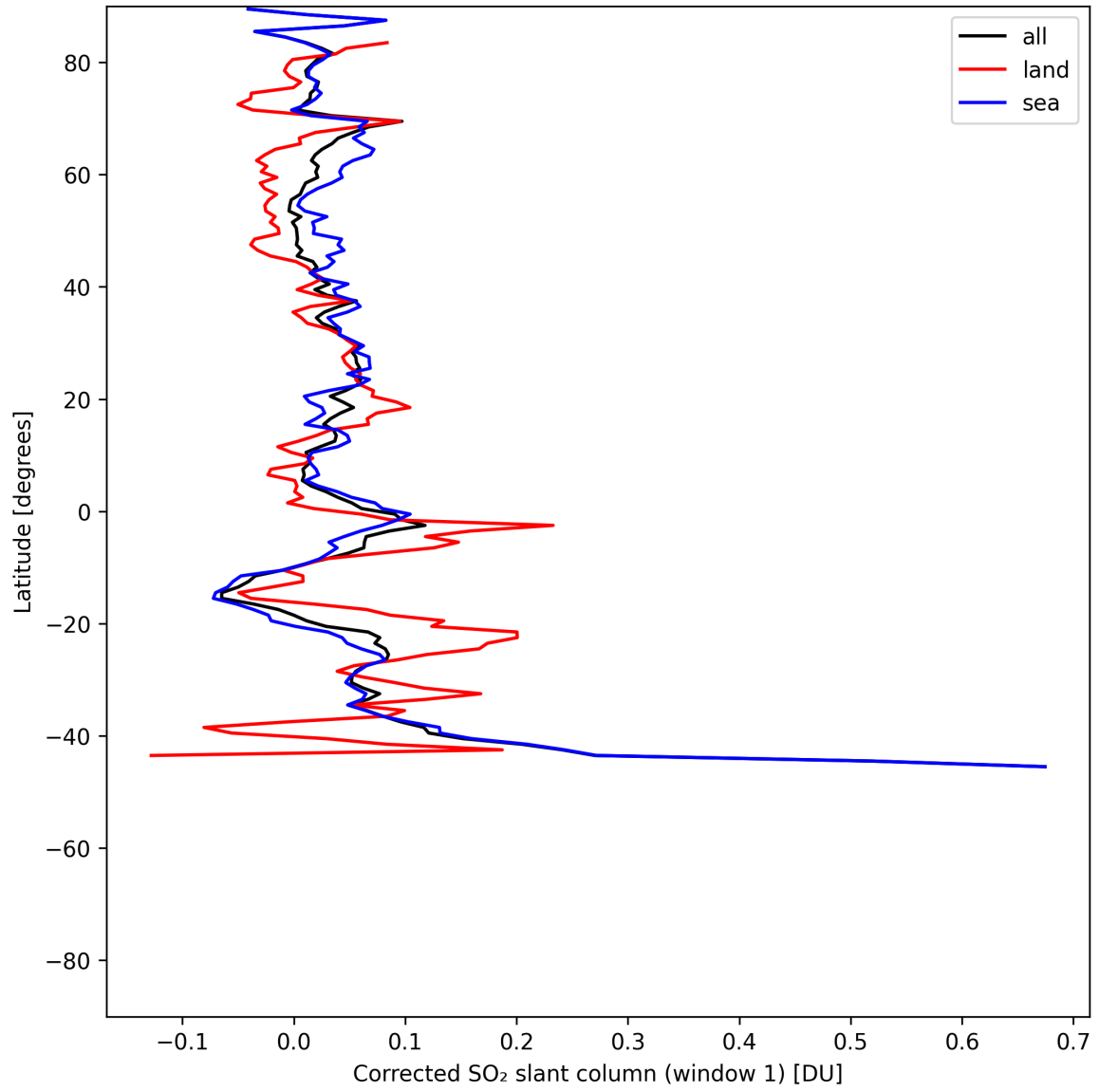


Figure 38: Zonal average of “Corrected SO₂ slant column (window 1)” for 2025-06-18 to 2025-06-19.

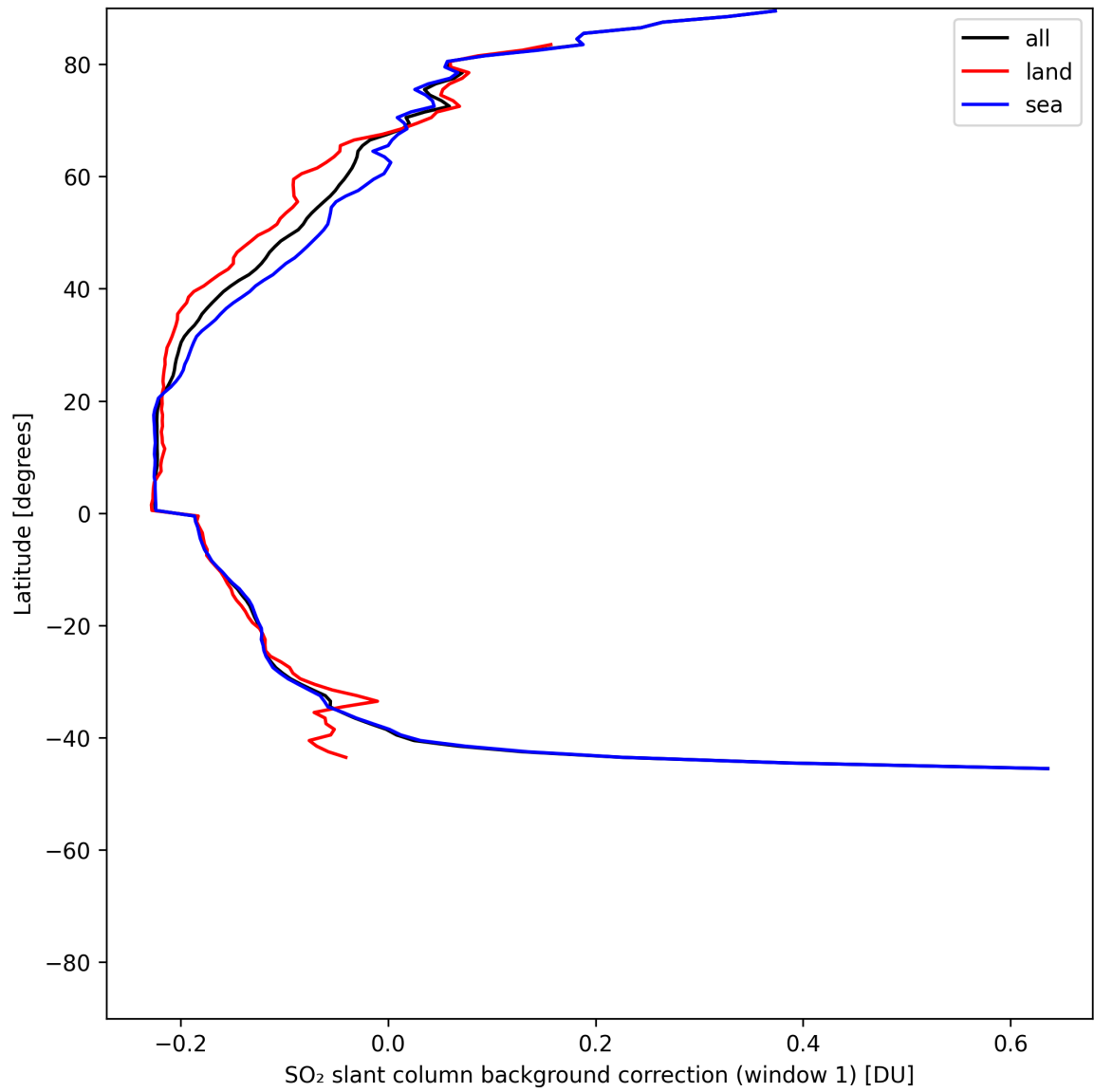


Figure 39: Zonal average of “SO₂ slant column background correction (window 1)” for 2025-06-18 to 2025-06-19.

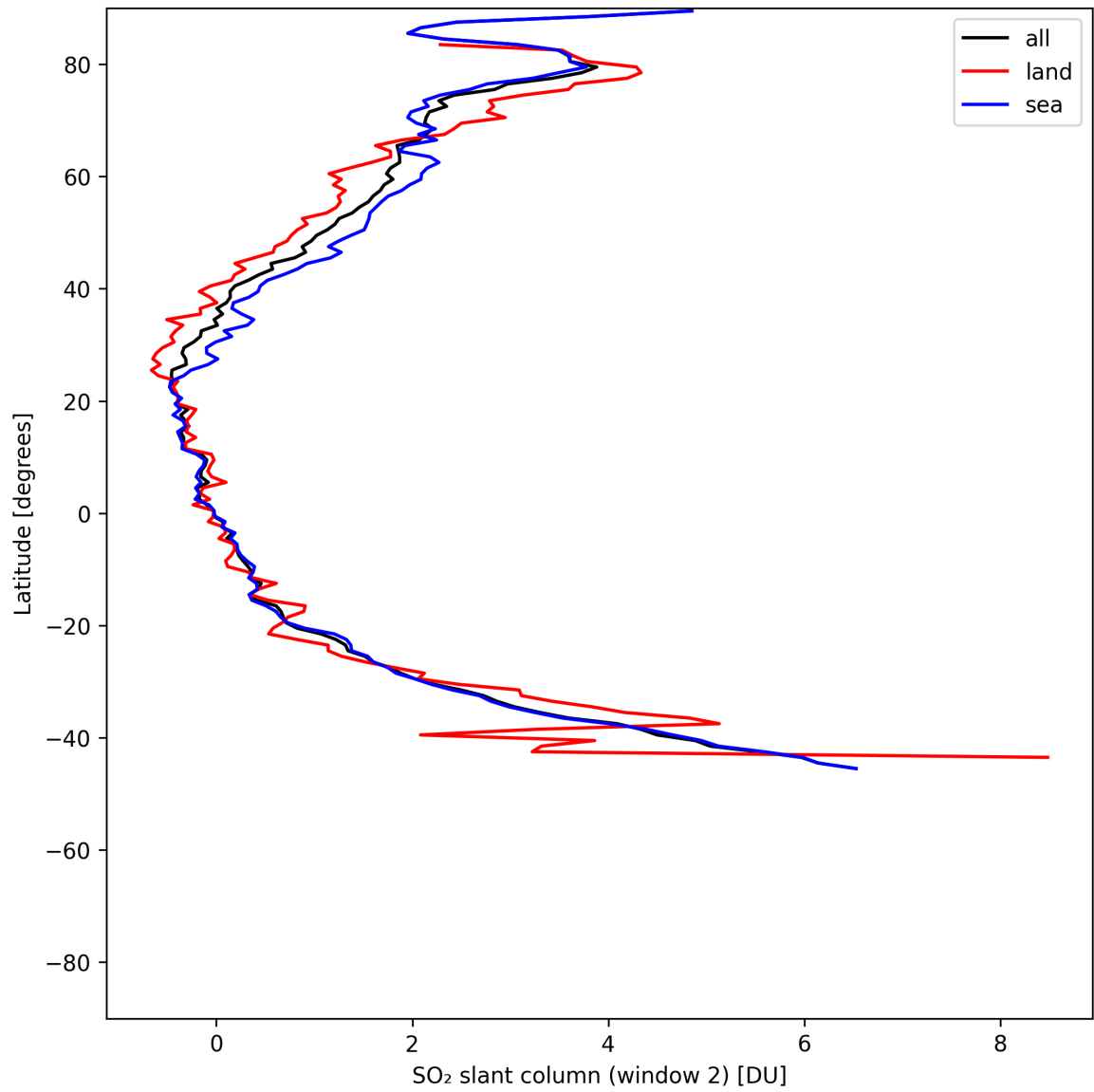


Figure 40: Zonal average of “SO₂ slant column (window 2)” for 2025-06-18 to 2025-06-19.

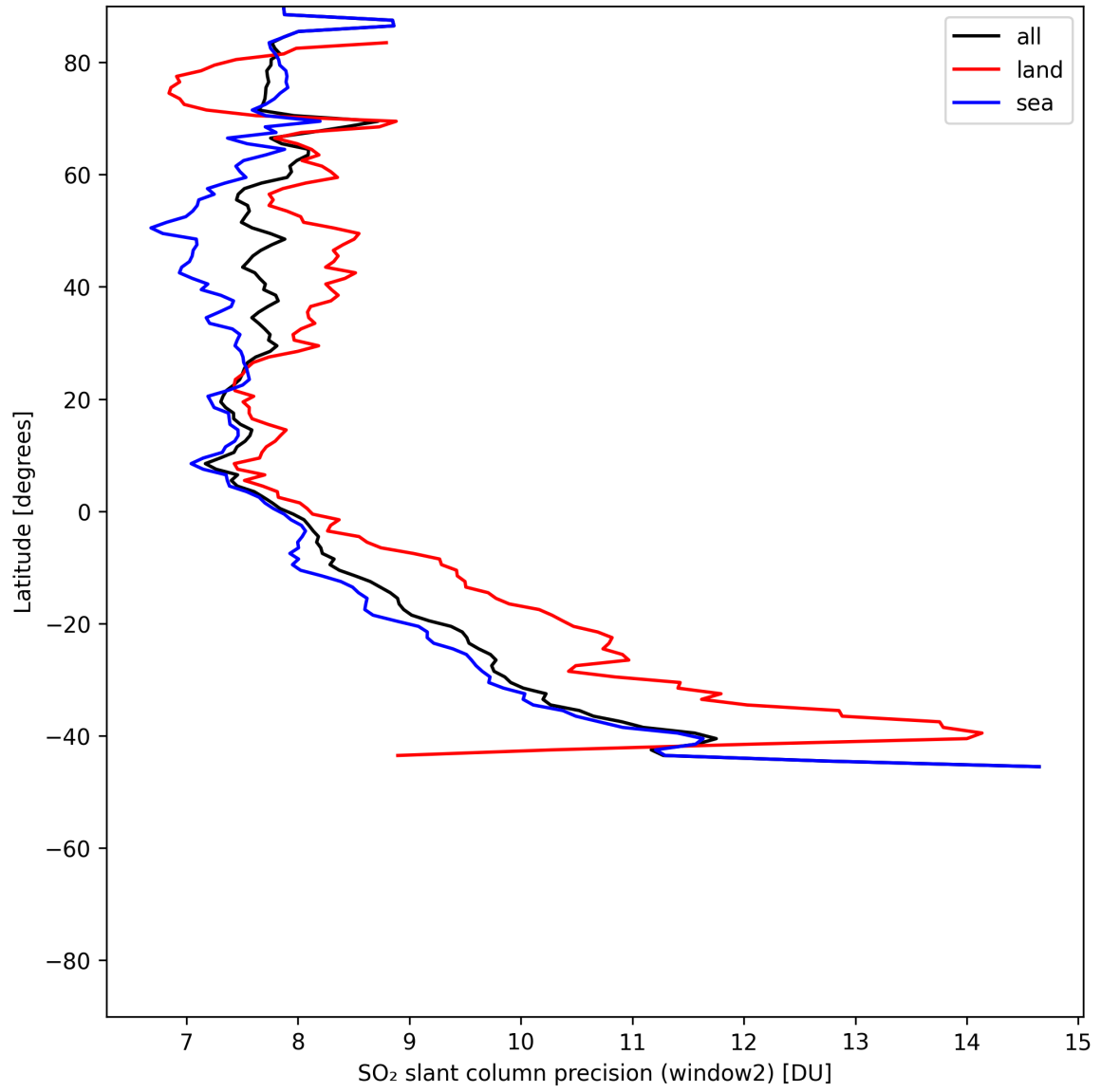


Figure 41: Zonal average of “SO₂ slant column precision (window2)” for 2025-06-18 to 2025-06-19.

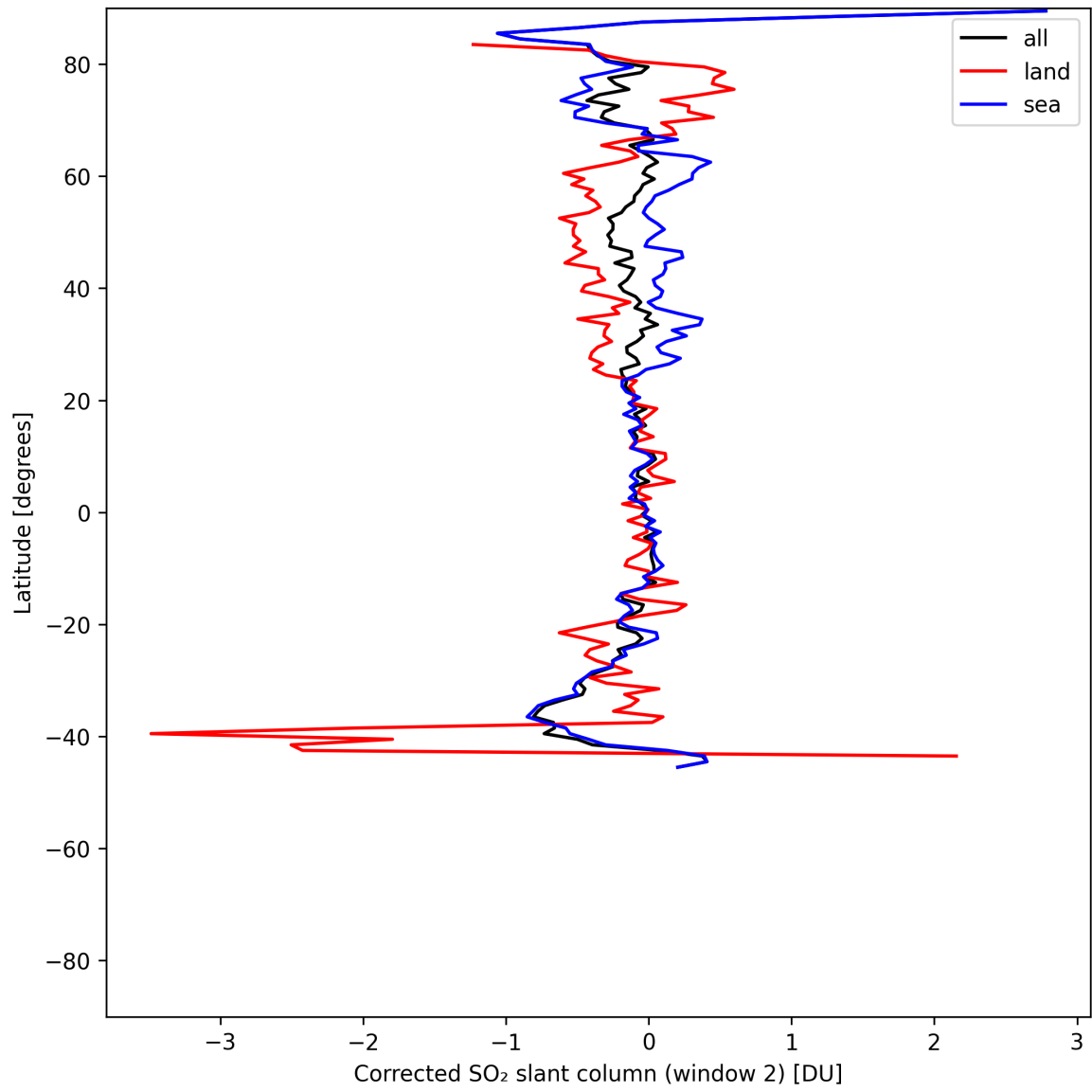


Figure 42: Zonal average of “Corrected SO₂ slant column (window 2)” for 2025-06-18 to 2025-06-19.

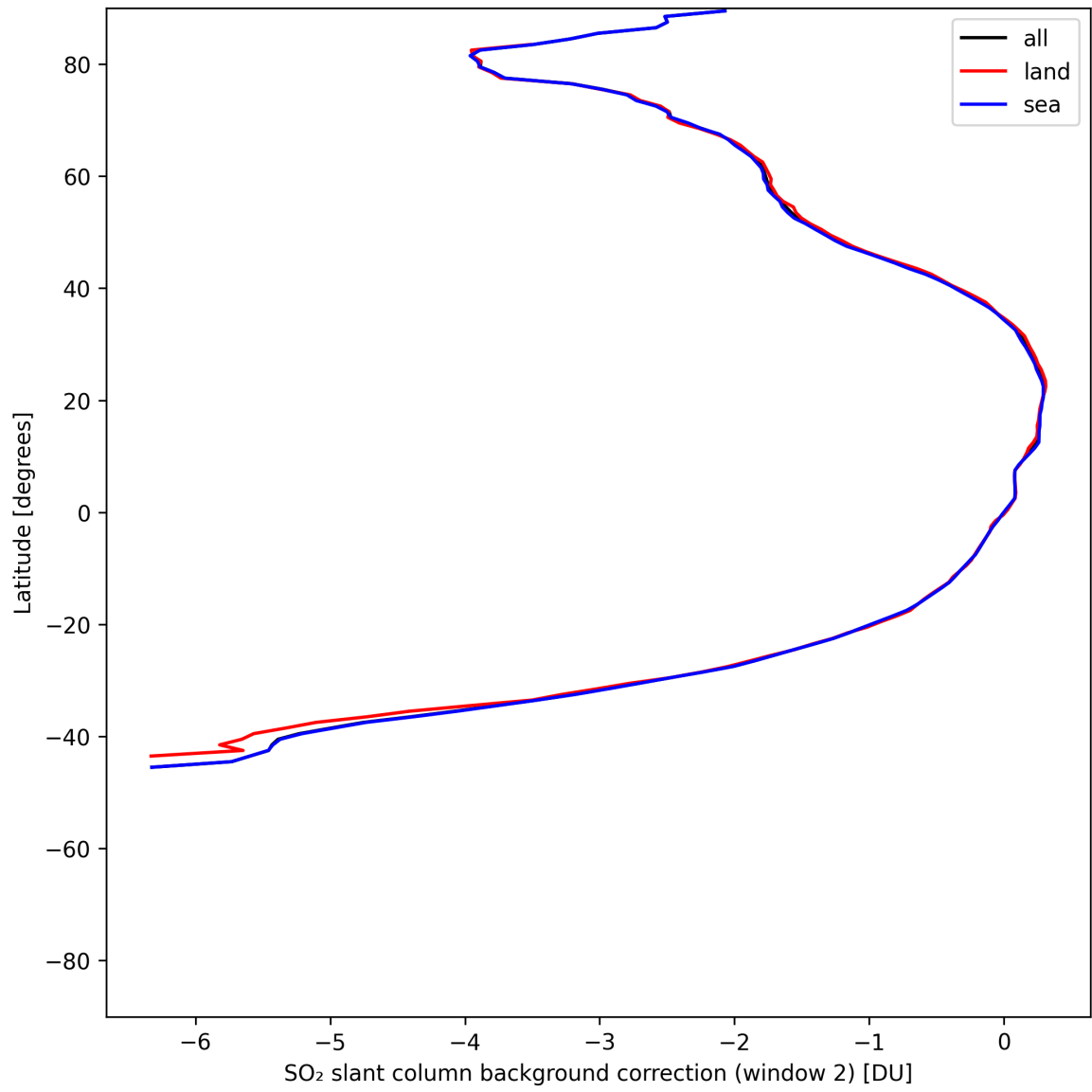


Figure 43: Zonal average of “SO₂ slant column background correction (window 2)” for 2025-06-18 to 2025-06-19.

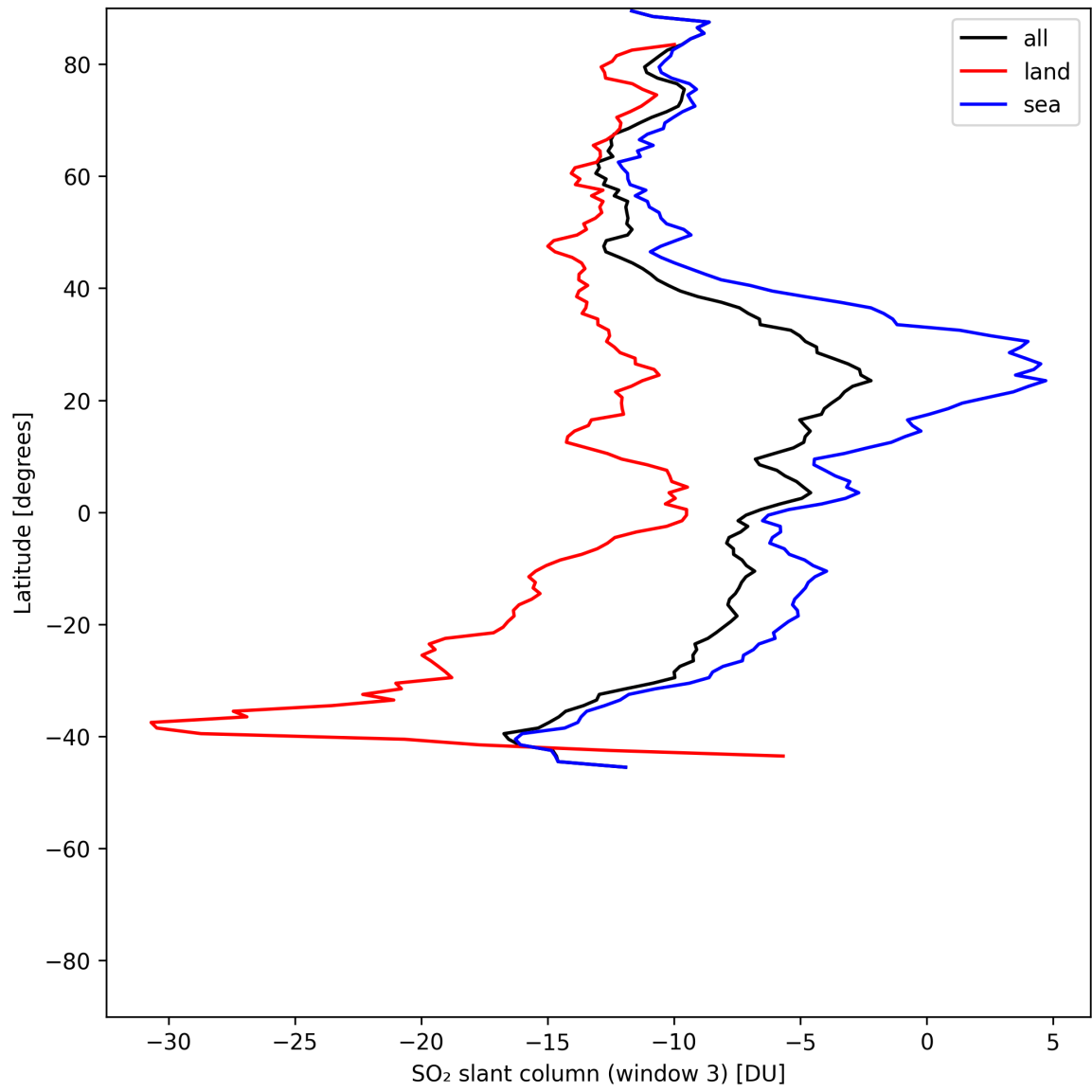


Figure 44: Zonal average of “SO₂ slant column (window 3)” for 2025-06-18 to 2025-06-19.

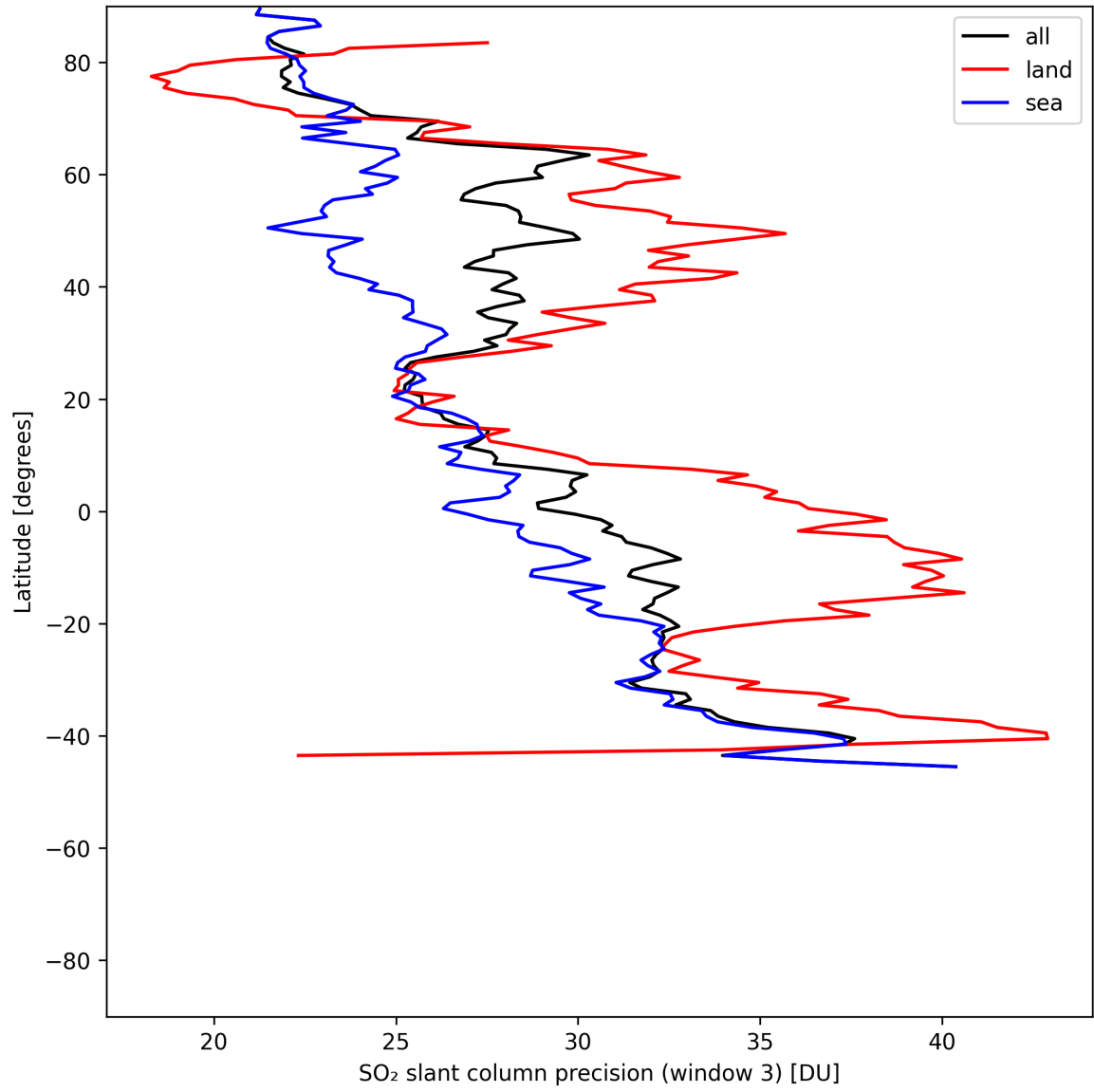


Figure 45: Zonal average of “SO₂ slant column precision (window 3)” for 2025-06-18 to 2025-06-19.

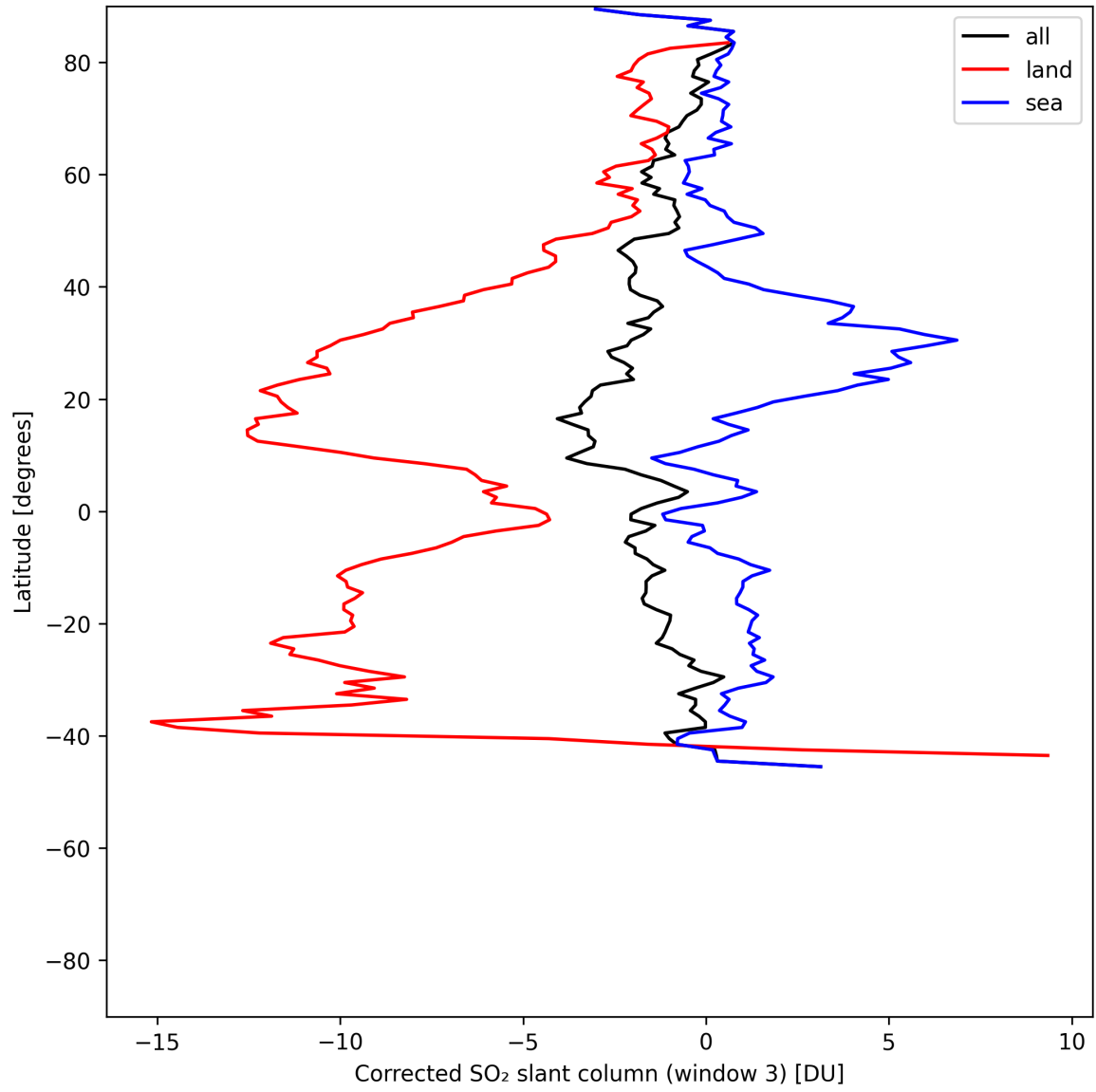


Figure 46: Zonal average of “Corrected SO₂ slant column (window 3)” for 2025-06-18 to 2025-06-19.

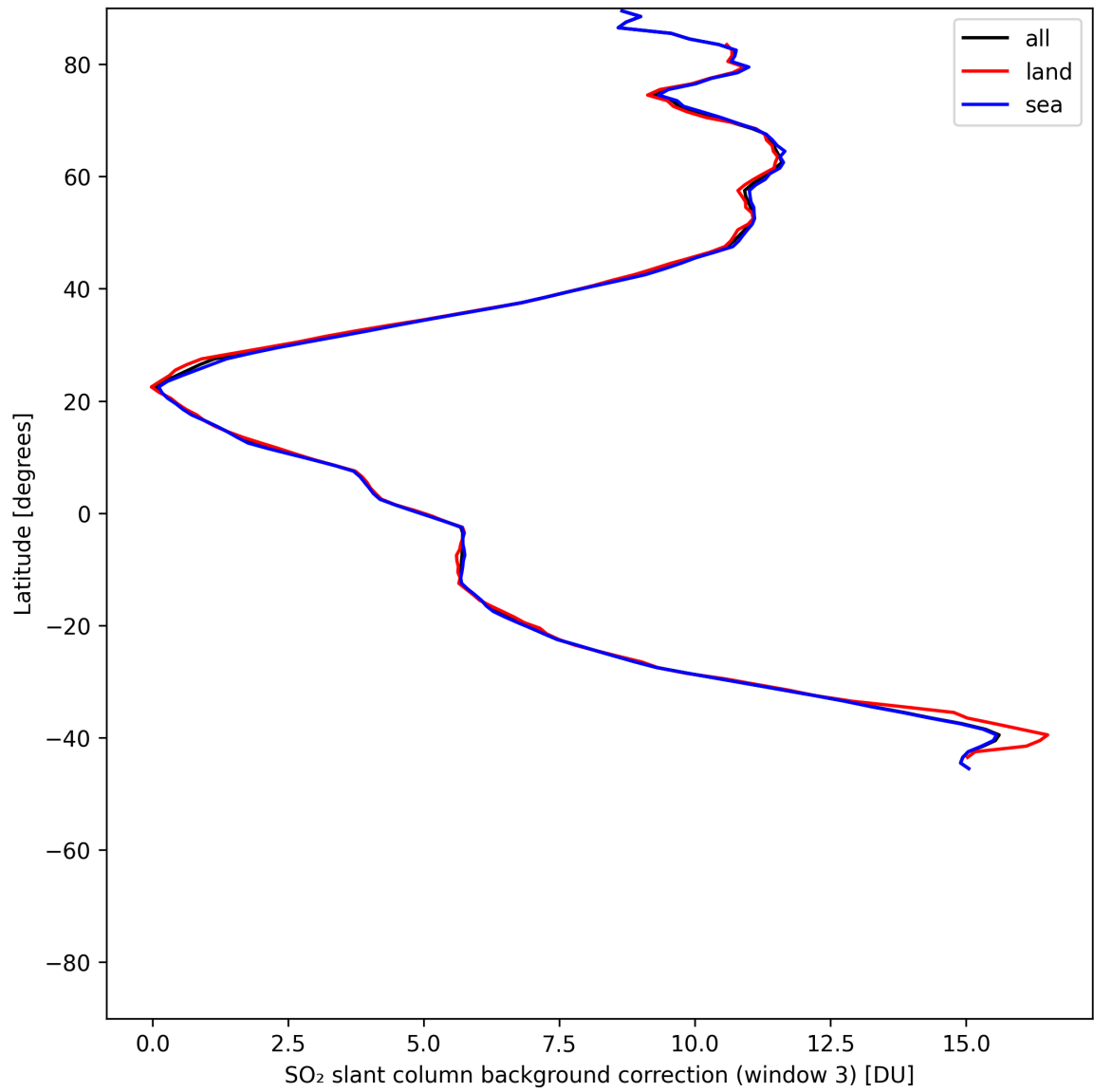


Figure 47: Zonal average of “SO₂ slant column background correction (window 3)” for 2025-06-18 to 2025-06-19.

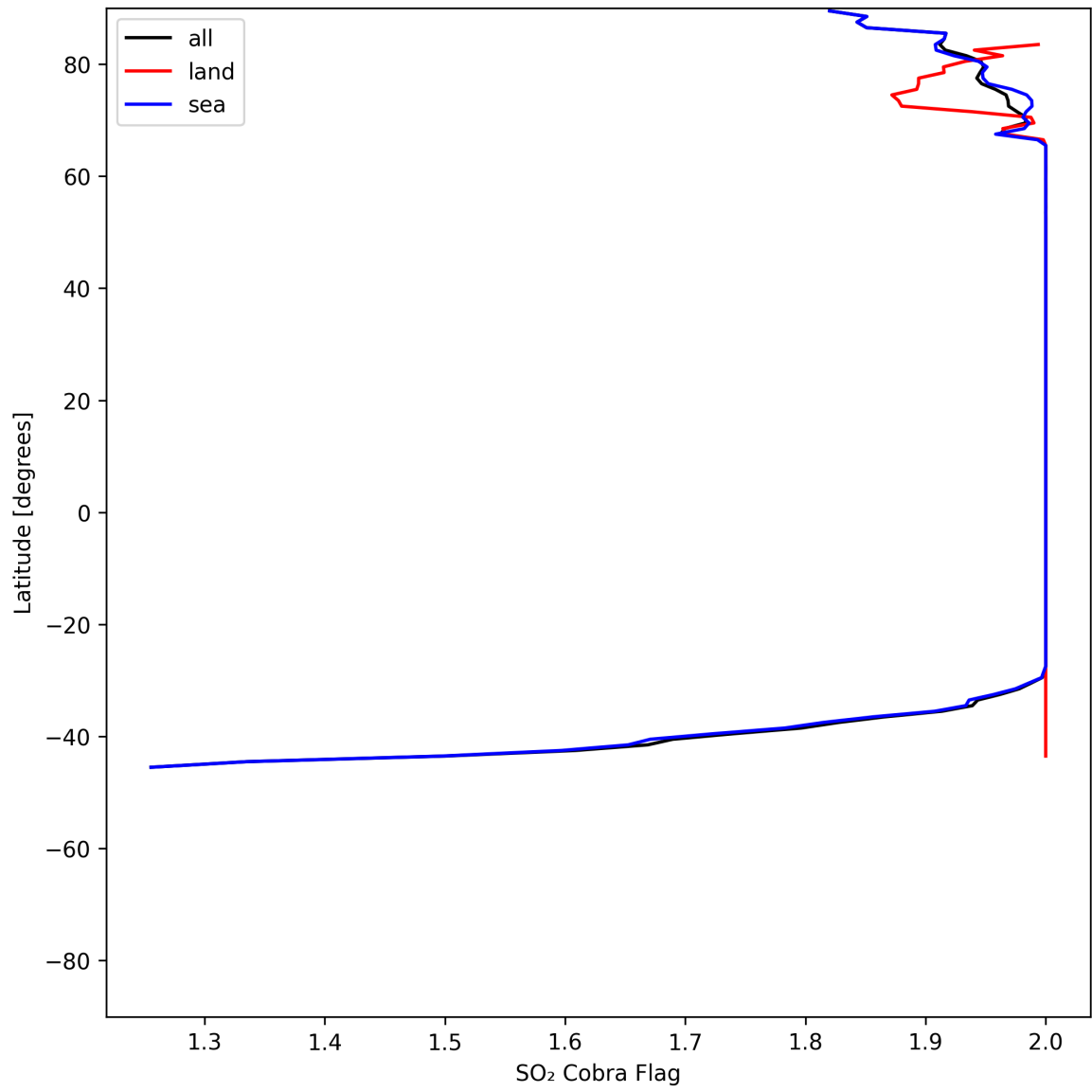


Figure 48: Zonal average of "SO₂ Cobra Flag" for 2025-06-18 to 2025-06-19.

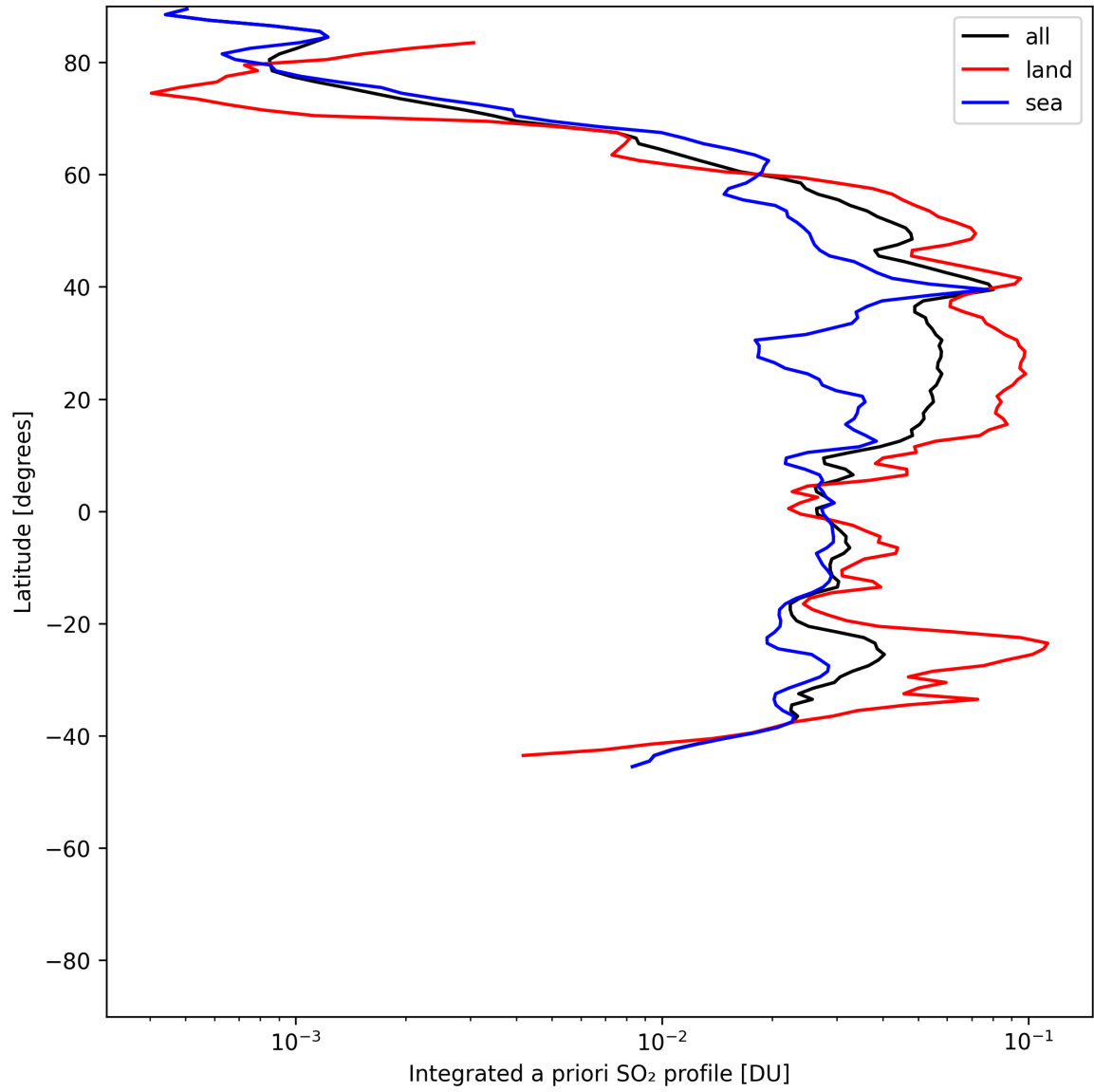


Figure 49: Zonal average of “Integrated a priori SO₂ profile” for 2025-06-18 to 2025-06-19.

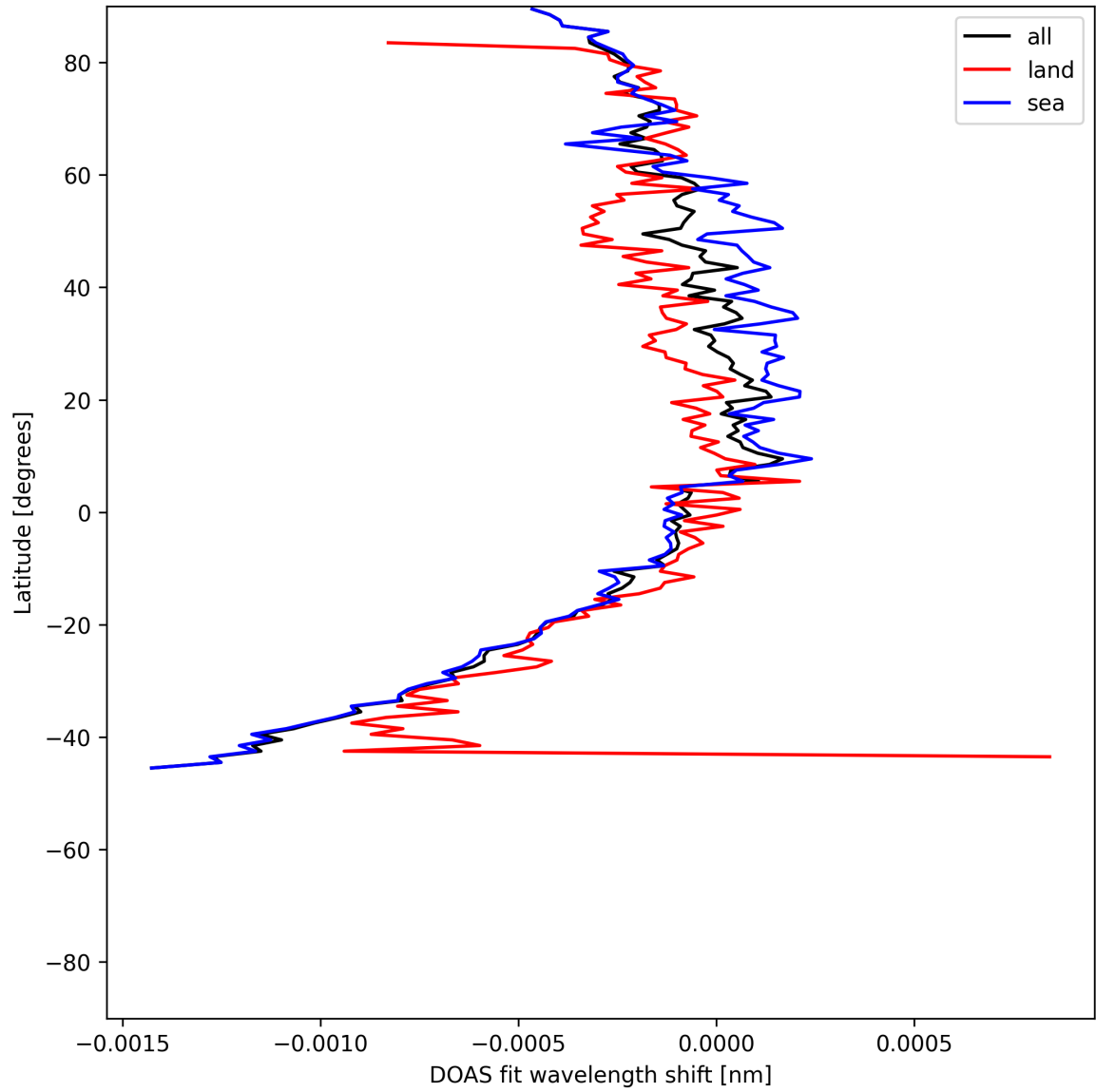


Figure 50: Zonal average of “DOAS fit wavelength shift” for 2025-06-18 to 2025-06-19.

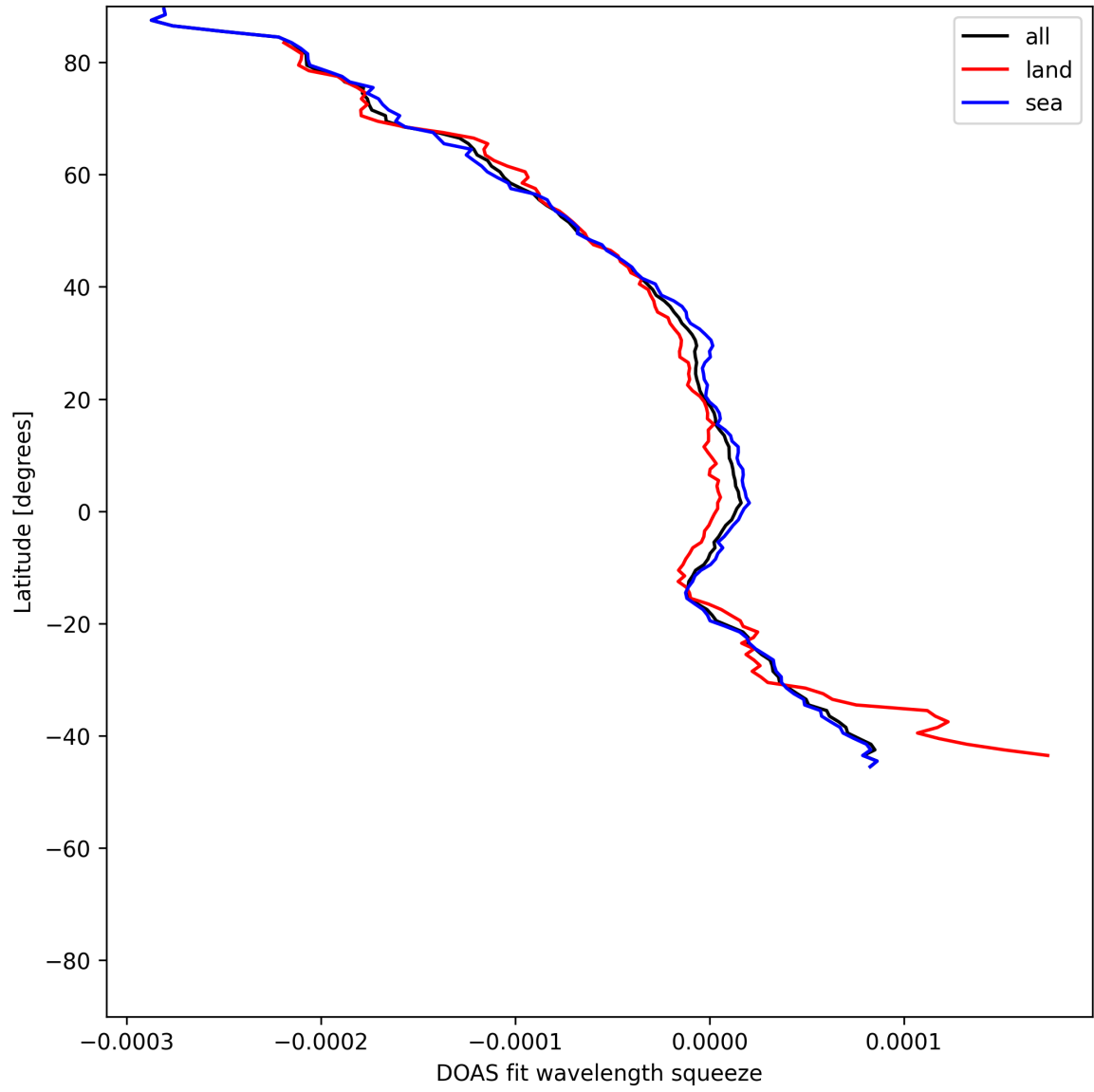


Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-06-18 to 2025-06-19.

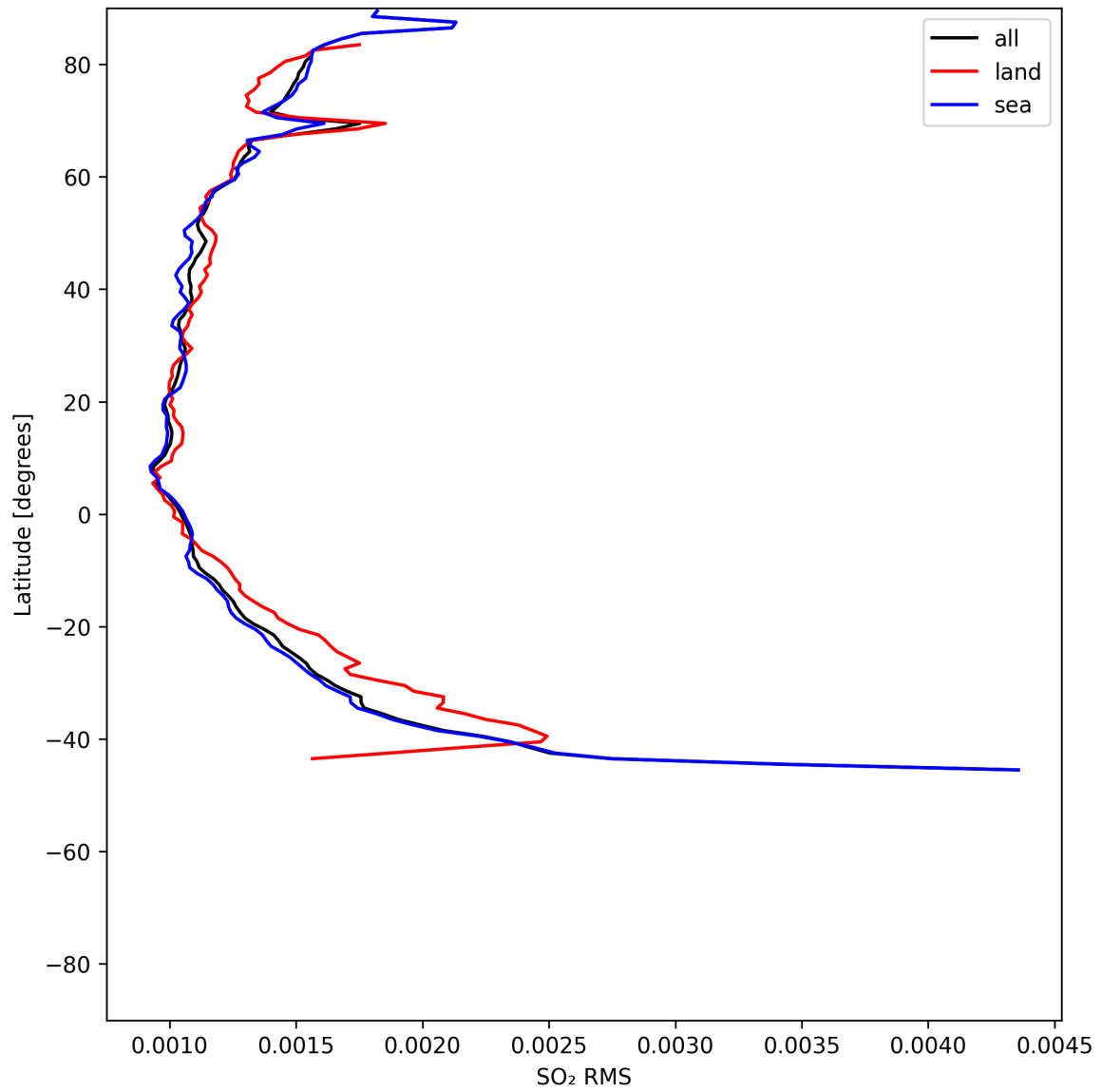


Figure 52: Zonal average of “SO₂ RMS” for 2025-06-18 to 2025-06-19.

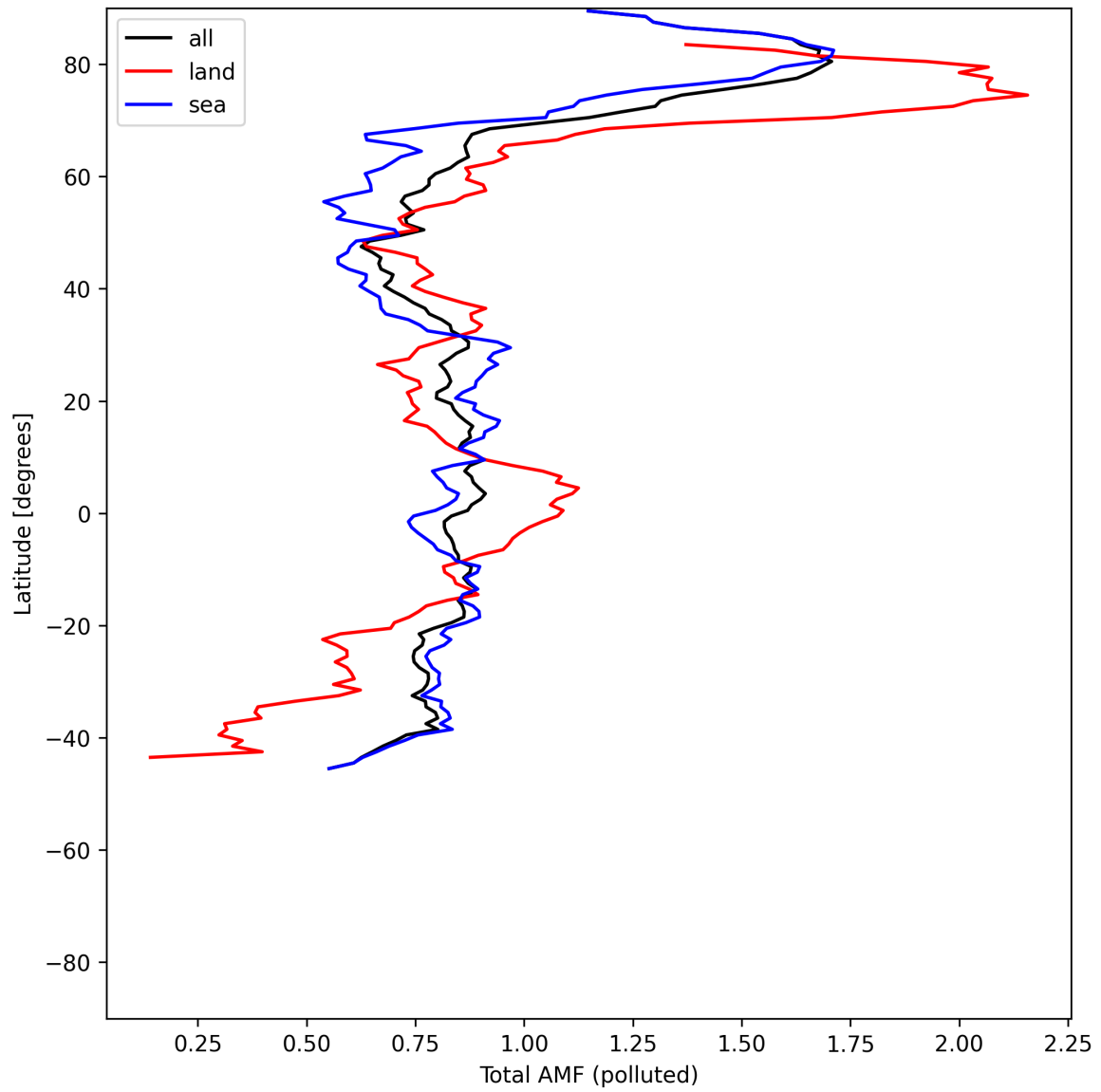


Figure 53: Zonal average of “Total AMF (polluted)” for 2025-06-18 to 2025-06-19.

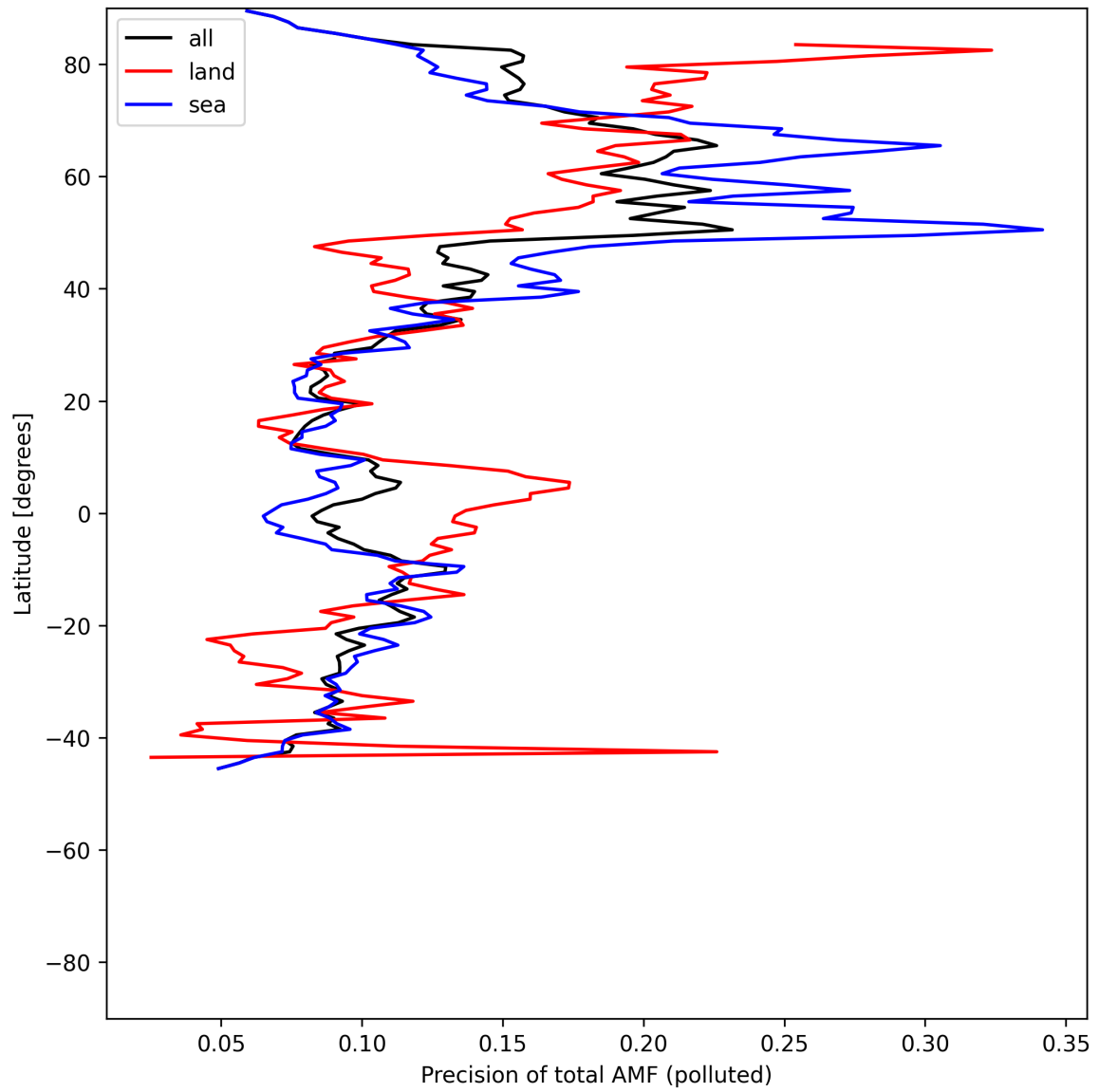


Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-06-18 to 2025-06-19.

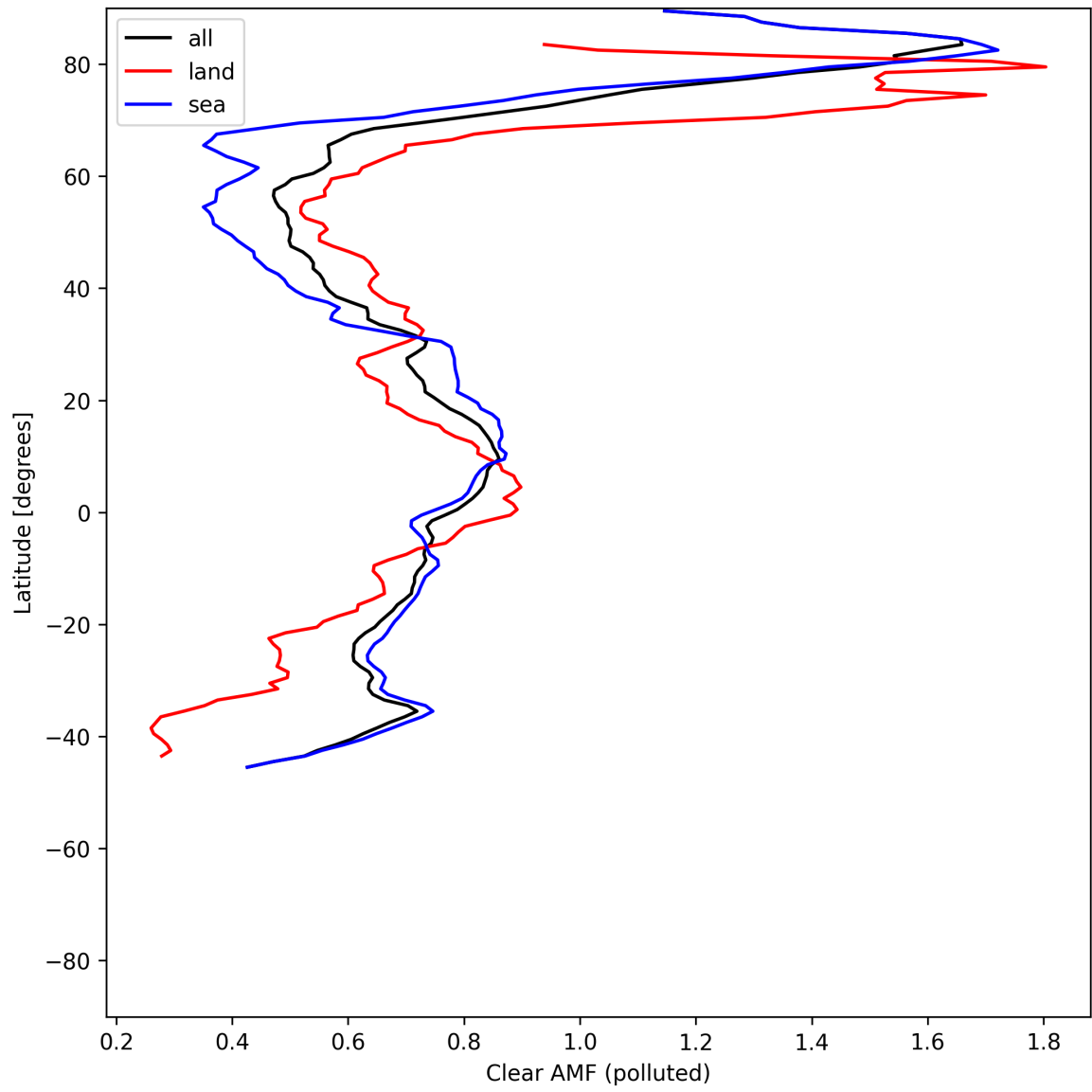


Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-06-18 to 2025-06-19.

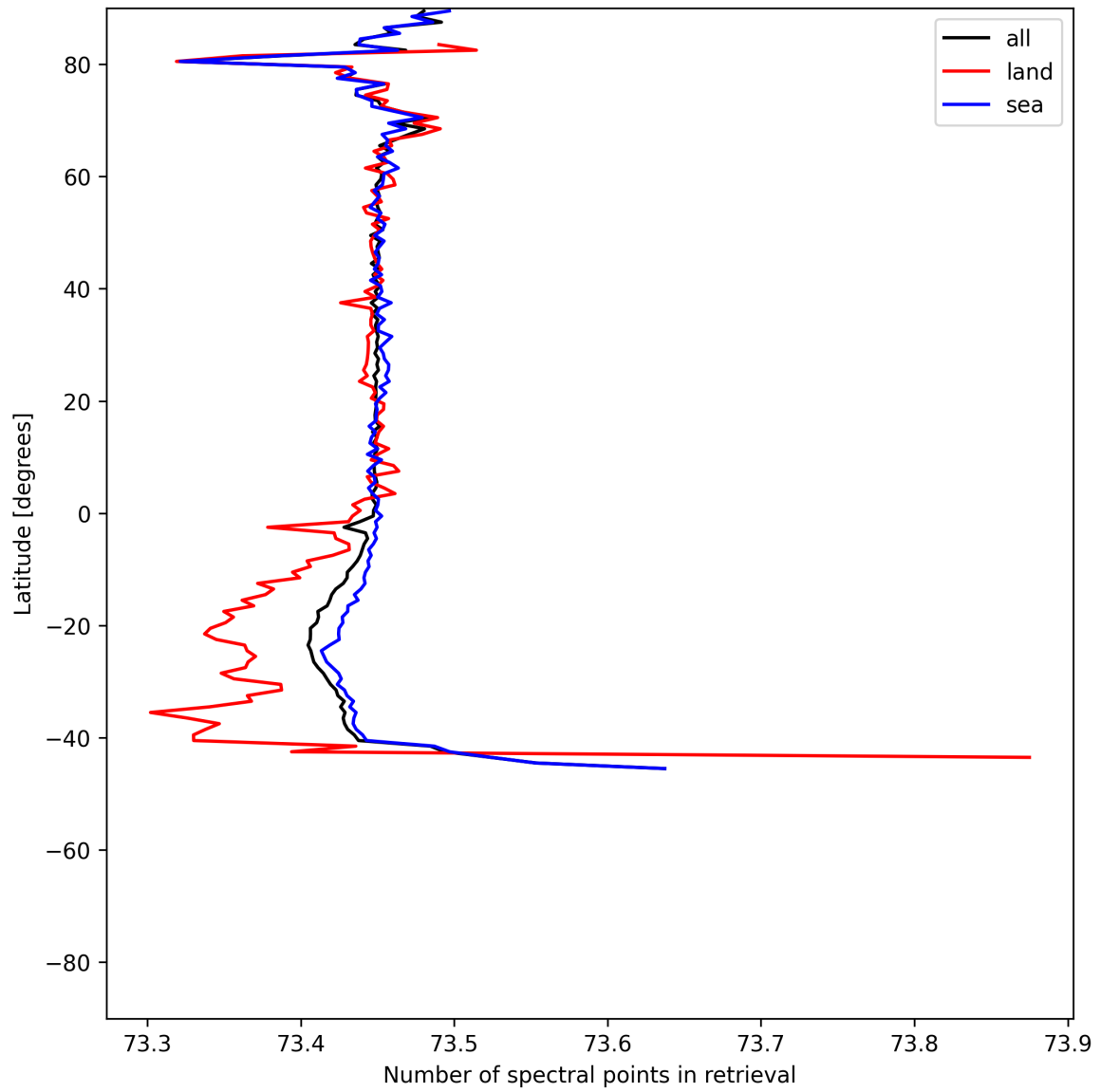


Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-06-18 to 2025-06-19.

8 Histograms

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

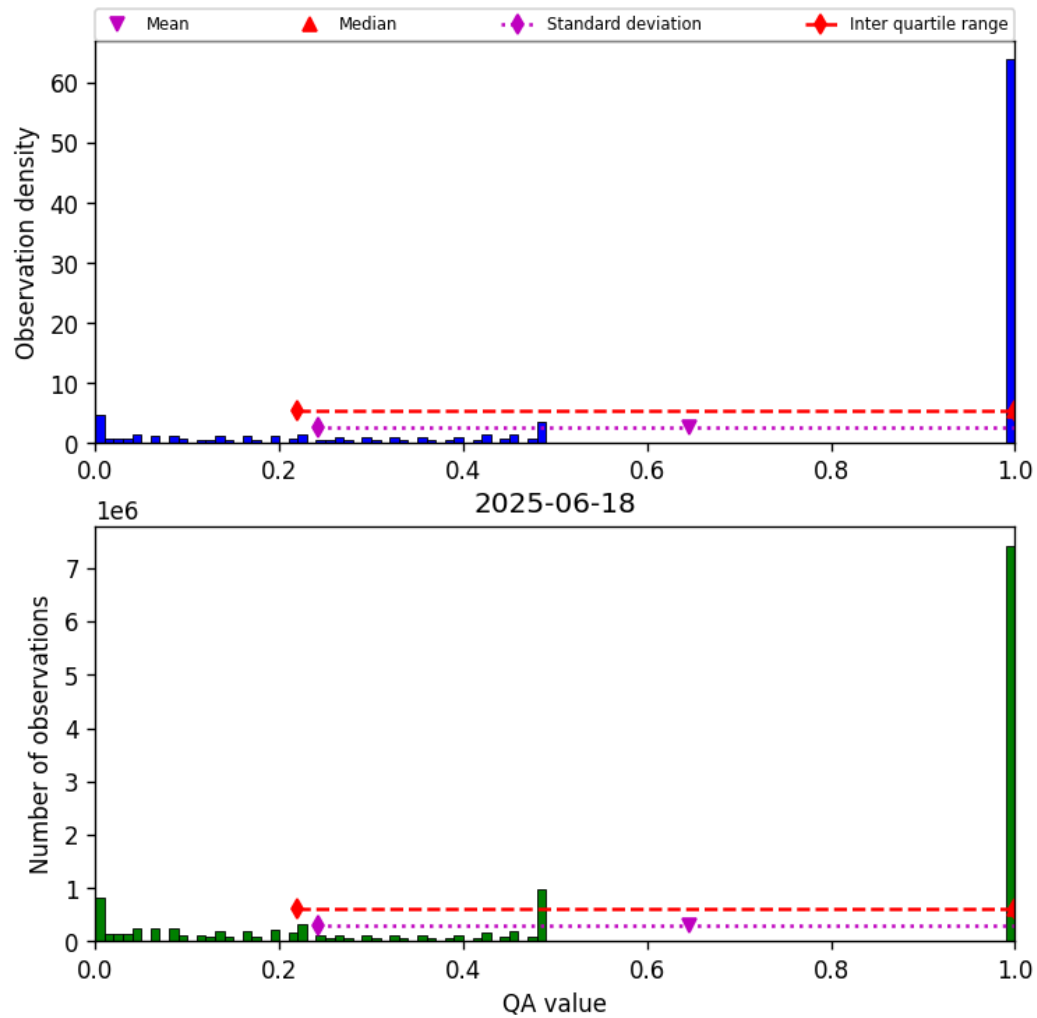


Figure 57: Histogram of “QA value” for 2025-06-18 to 2025-06-19

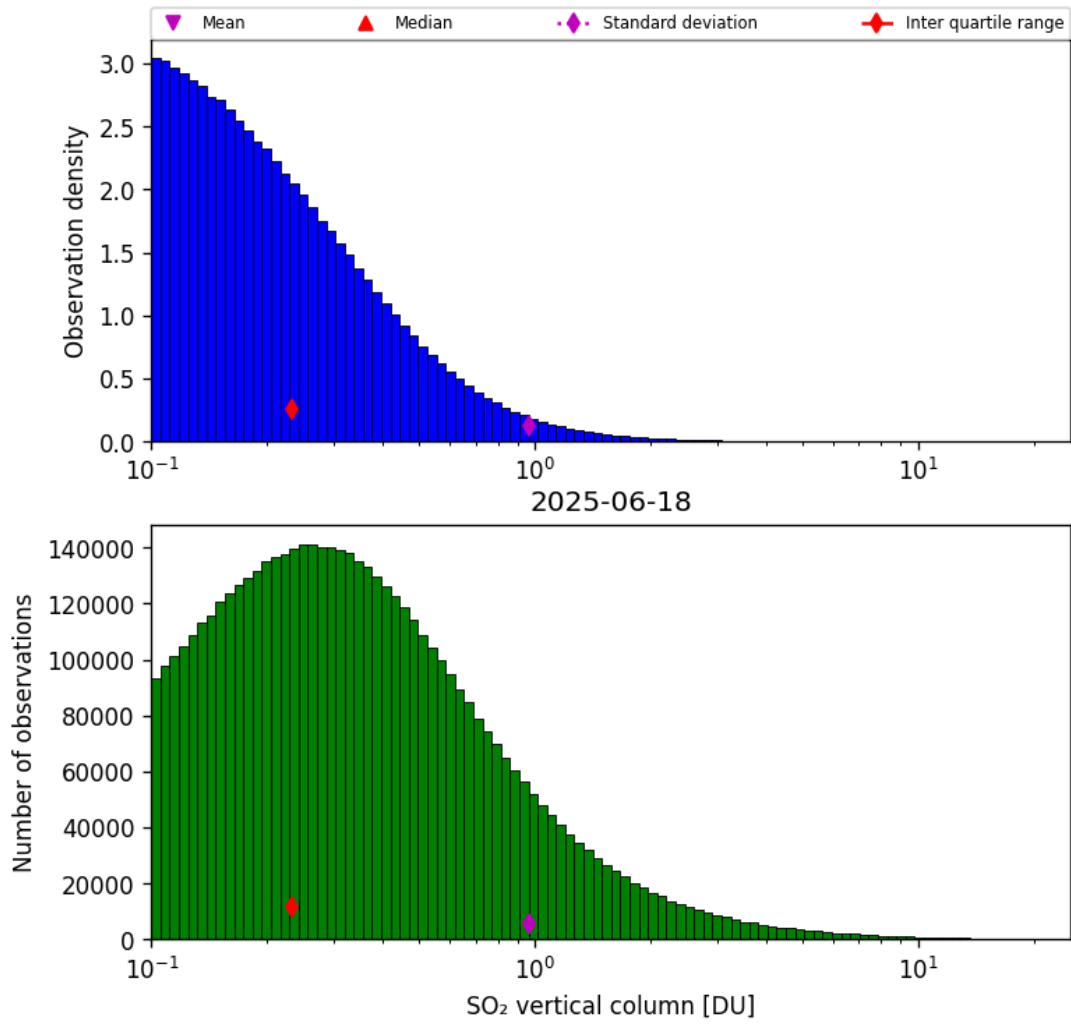


Figure 58: Histogram of “SO₂ vertical column” for 2025-06-18 to 2025-06-19

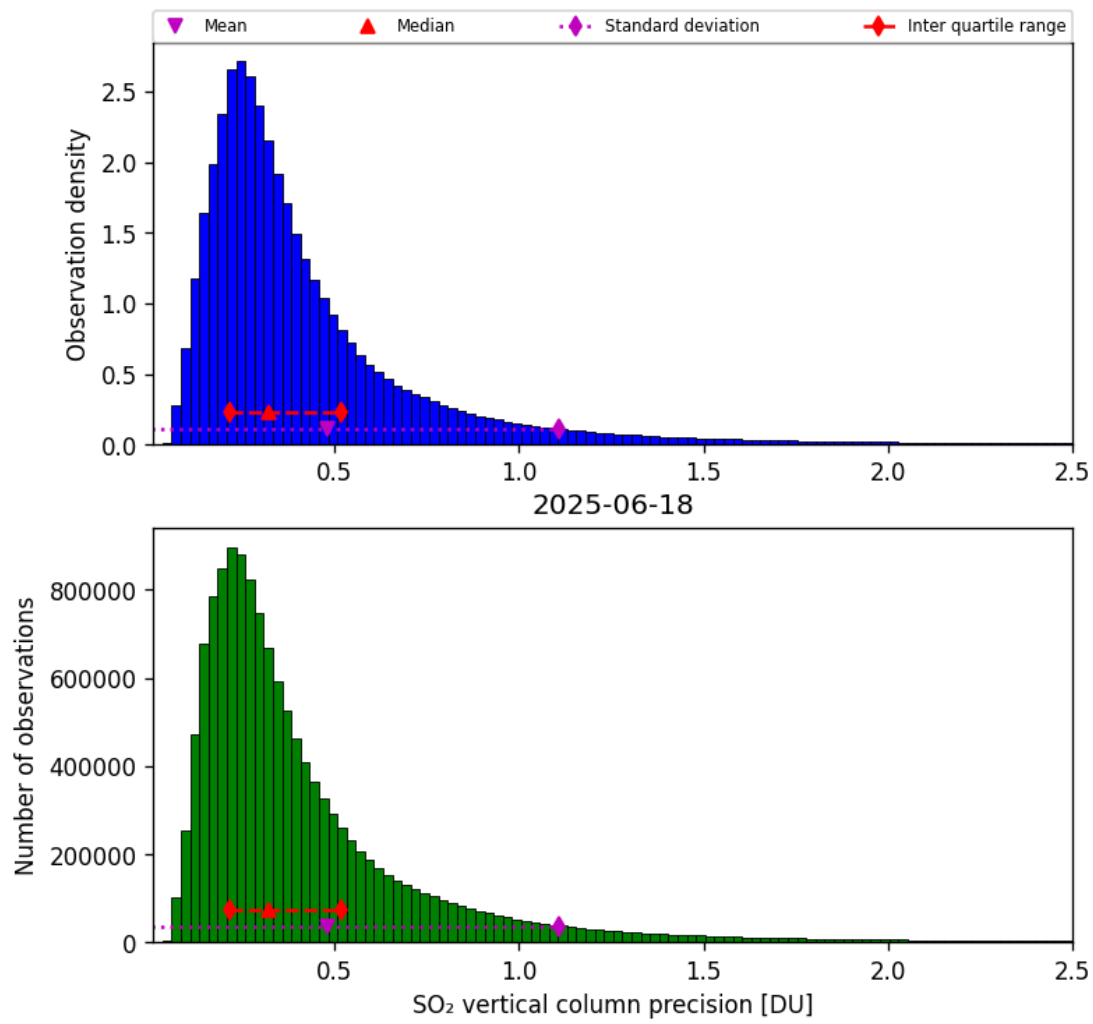


Figure 59: Histogram of “SO₂ vertical column precision” for 2025-06-18 to 2025-06-19

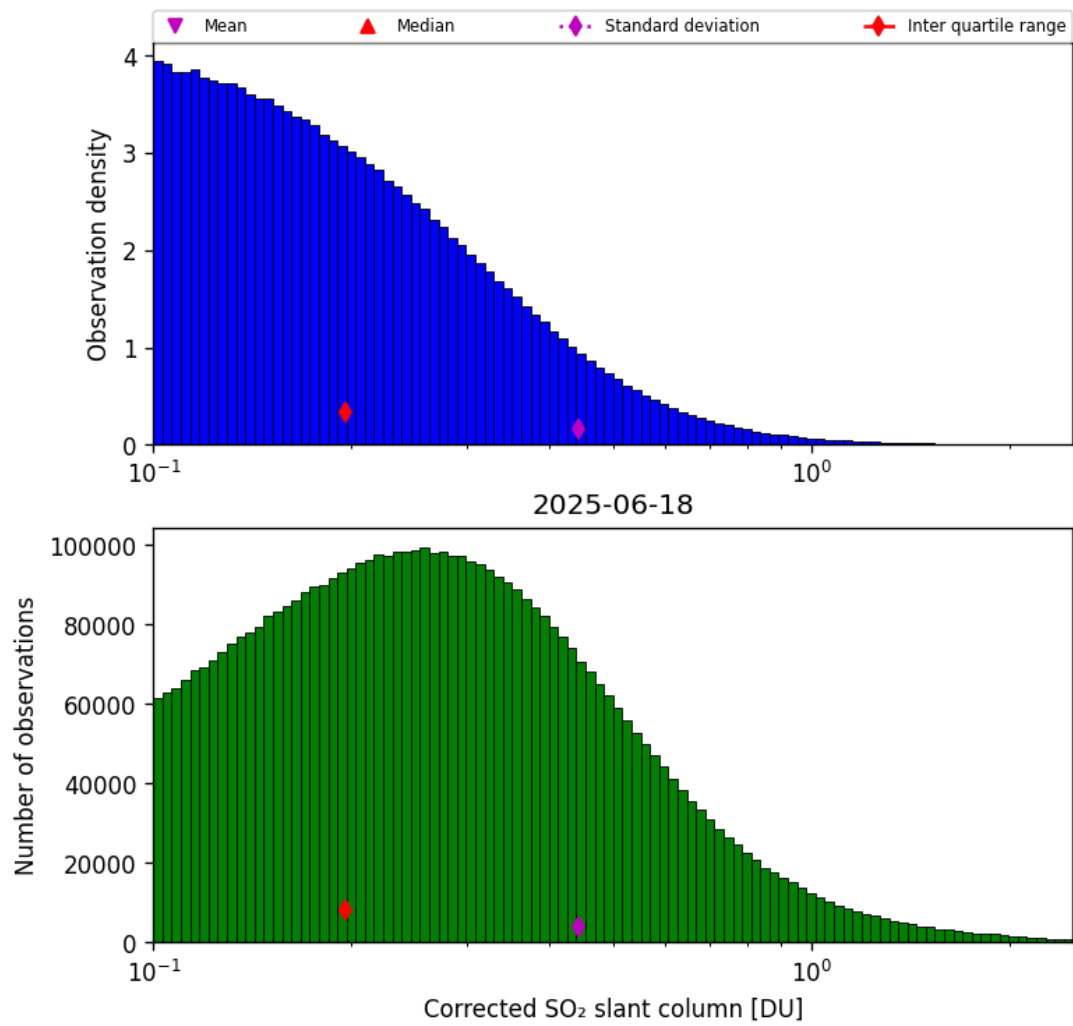


Figure 60: Histogram of “Corrected SO₂ slant column” for 2025-06-18 to 2025-06-19

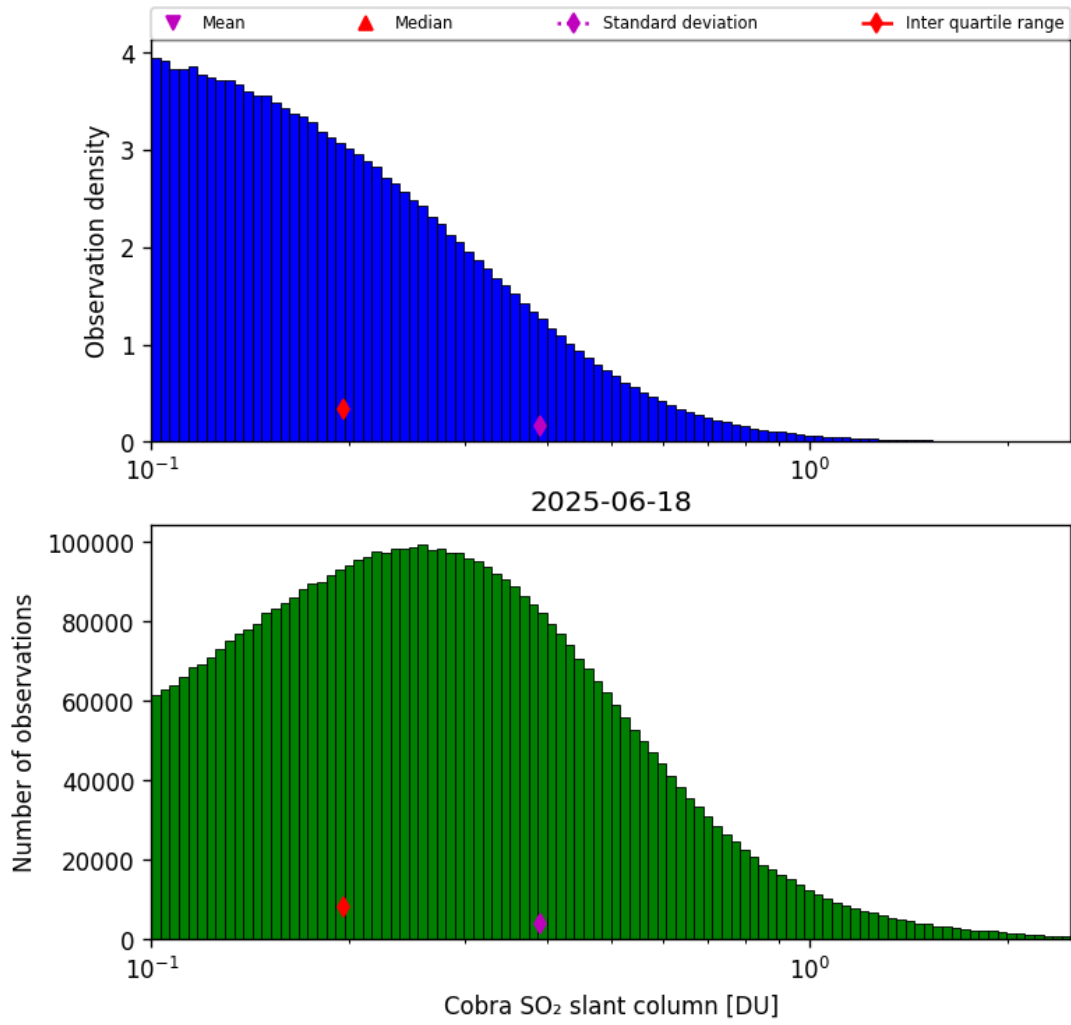


Figure 61: Histogram of “Cobra SO₂ slant column” for 2025-06-18 to 2025-06-19

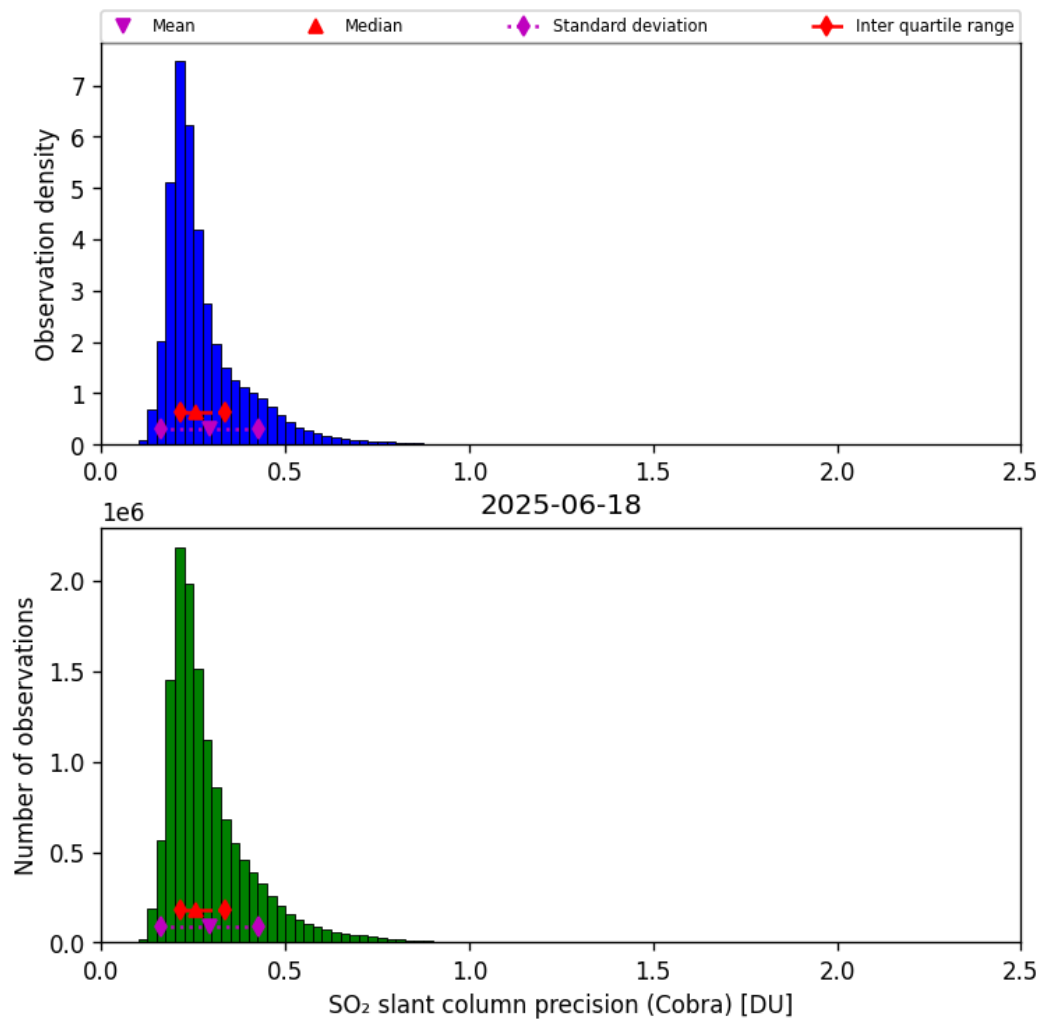


Figure 62: Histogram of “SO₂ slant column precision (Cobra)” for 2025-06-18 to 2025-06-19

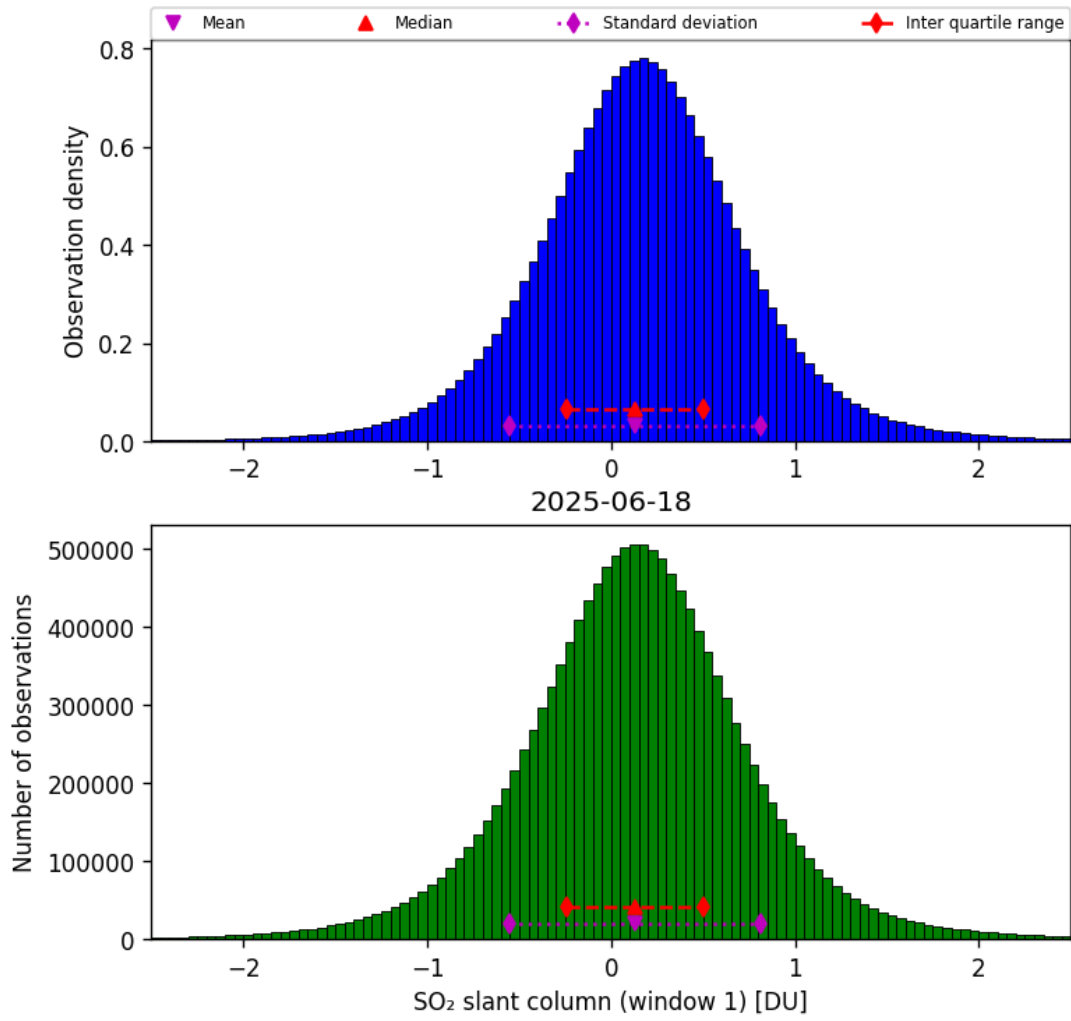


Figure 63: Histogram of “SO₂ slant column (window 1)” for 2025-06-18 to 2025-06-19

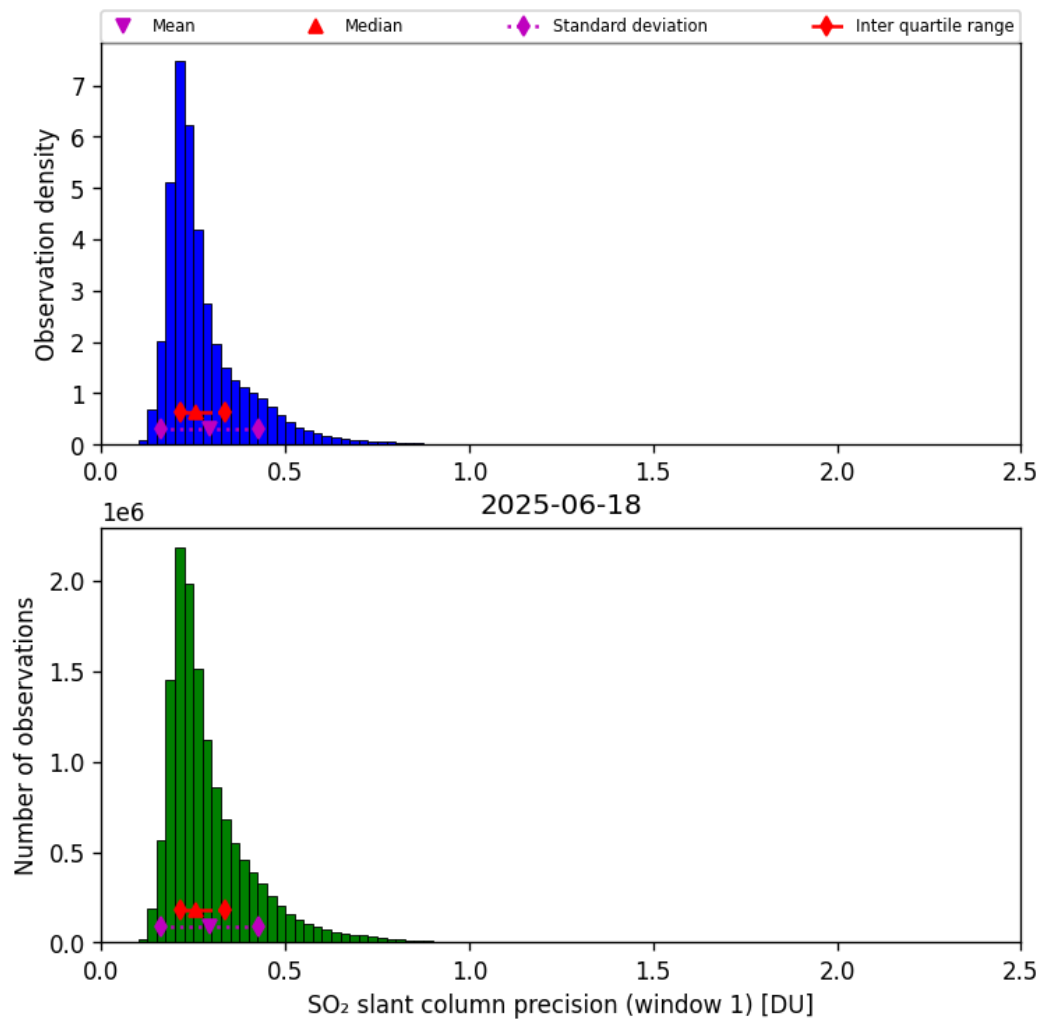


Figure 64: Histogram of “SO₂ slant column precision (window 1)” for 2025-06-18 to 2025-06-19

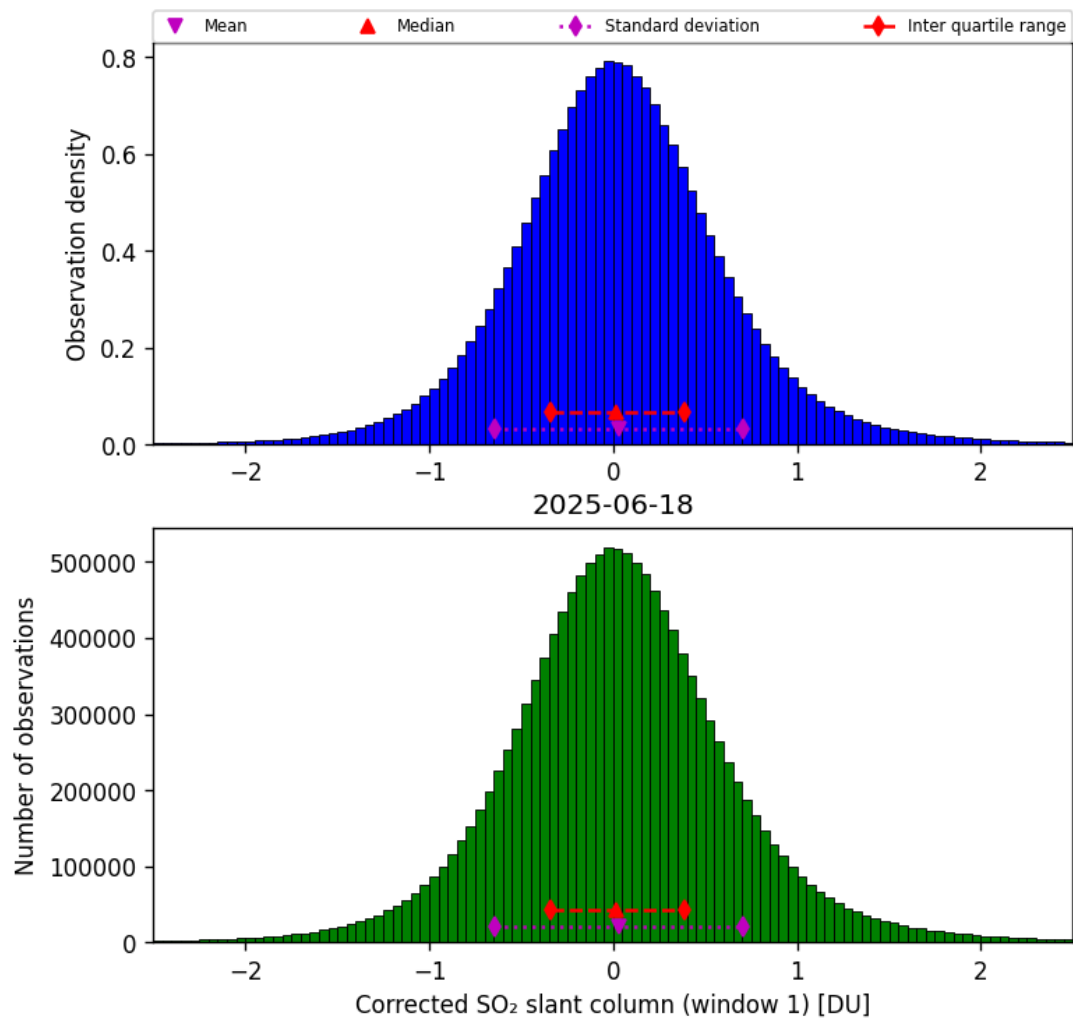


Figure 65: Histogram of “Corrected SO₂ slant column (window 1)” for 2025-06-18 to 2025-06-19

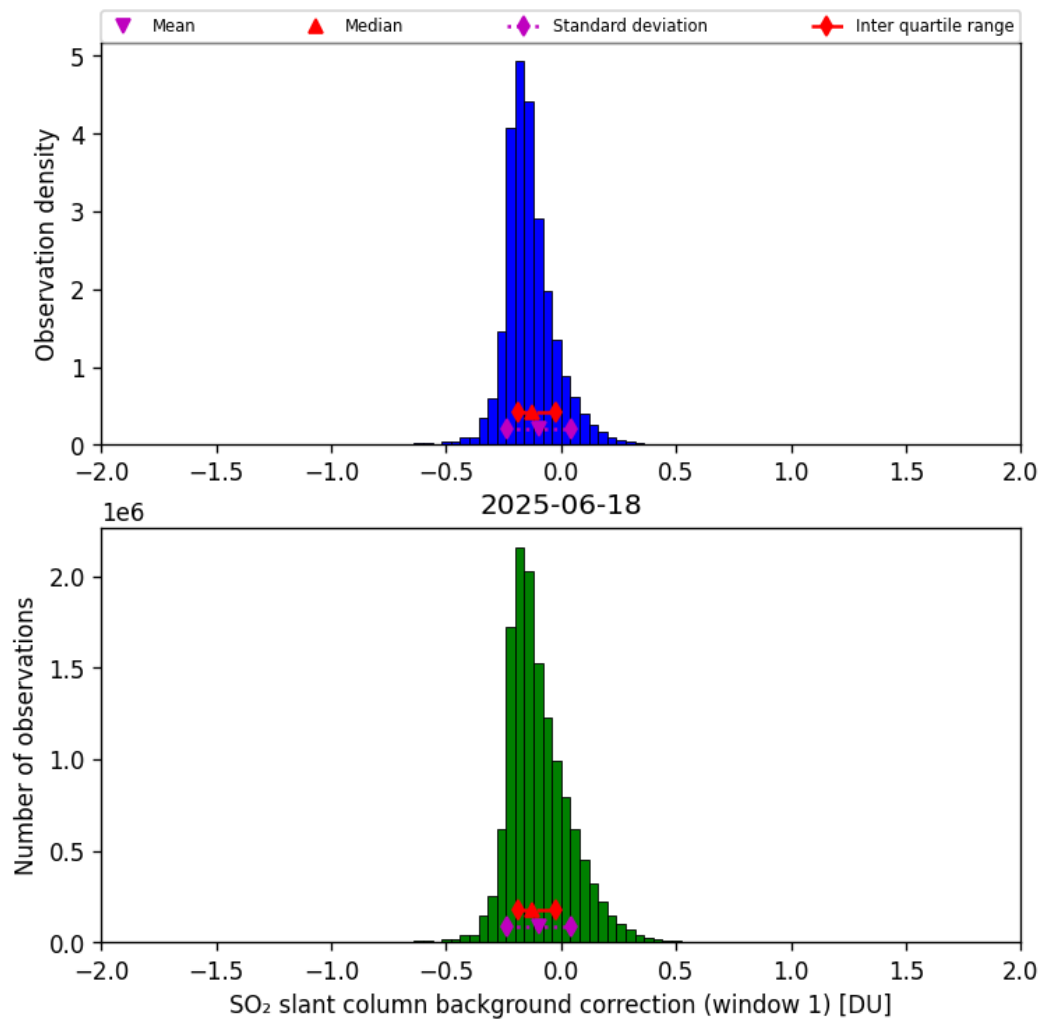


Figure 66: Histogram of “SO₂ slant column background correction (window 1)” for 2025-06-18 to 2025-06-19

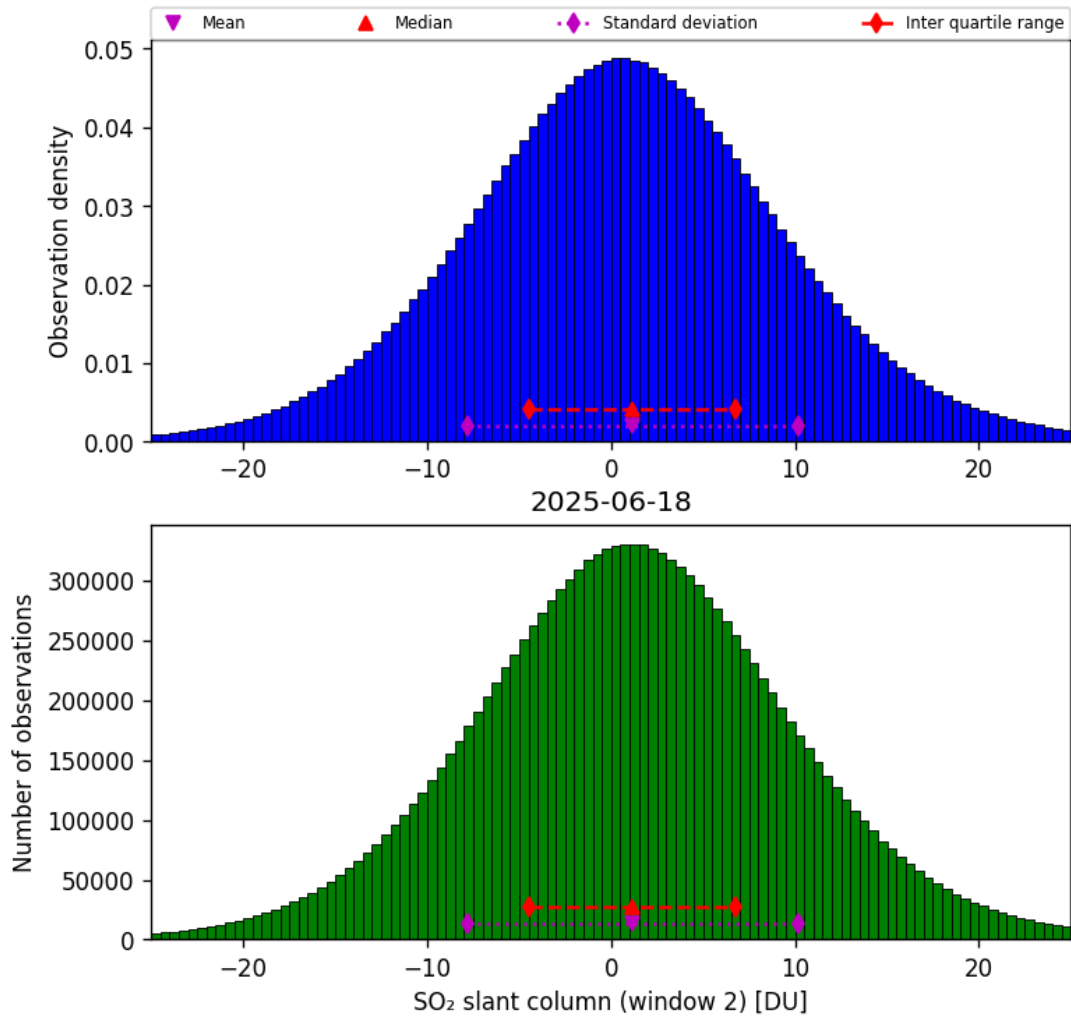


Figure 67: Histogram of “SO₂ slant column (window 2)” for 2025-06-18 to 2025-06-19

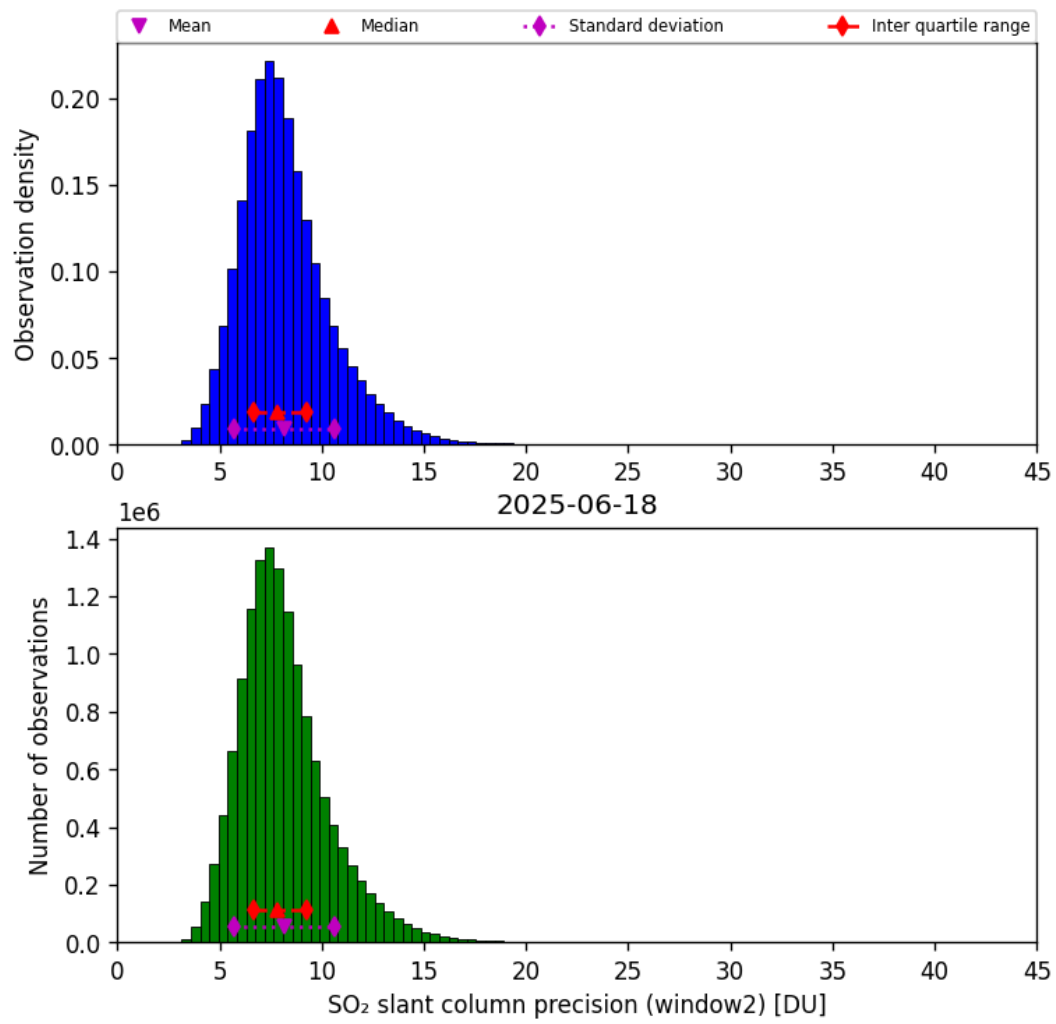


Figure 68: Histogram of “SO₂ slant column precision (window2)” for 2025-06-18 to 2025-06-19

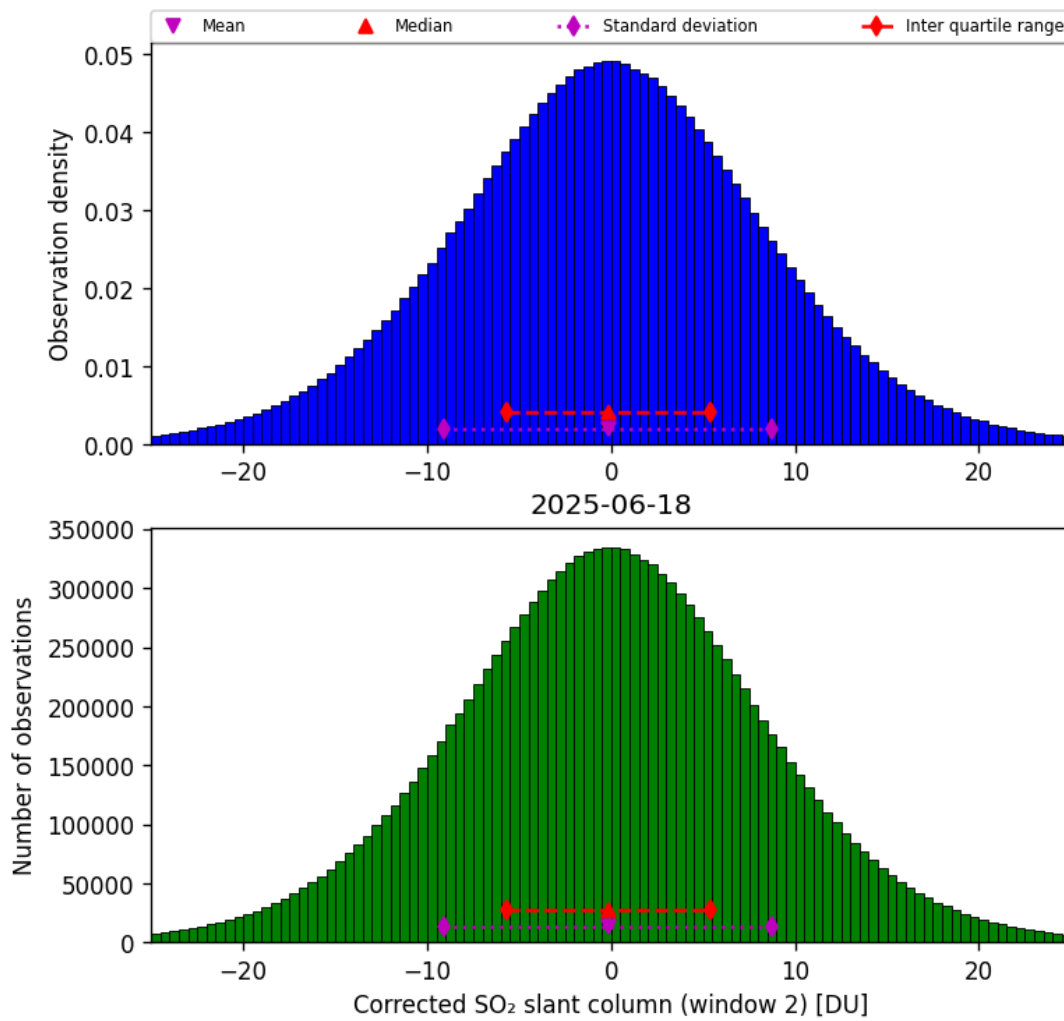


Figure 69: Histogram of “Corrected SO₂ slant column (window 2)” for 2025-06-18 to 2025-06-19

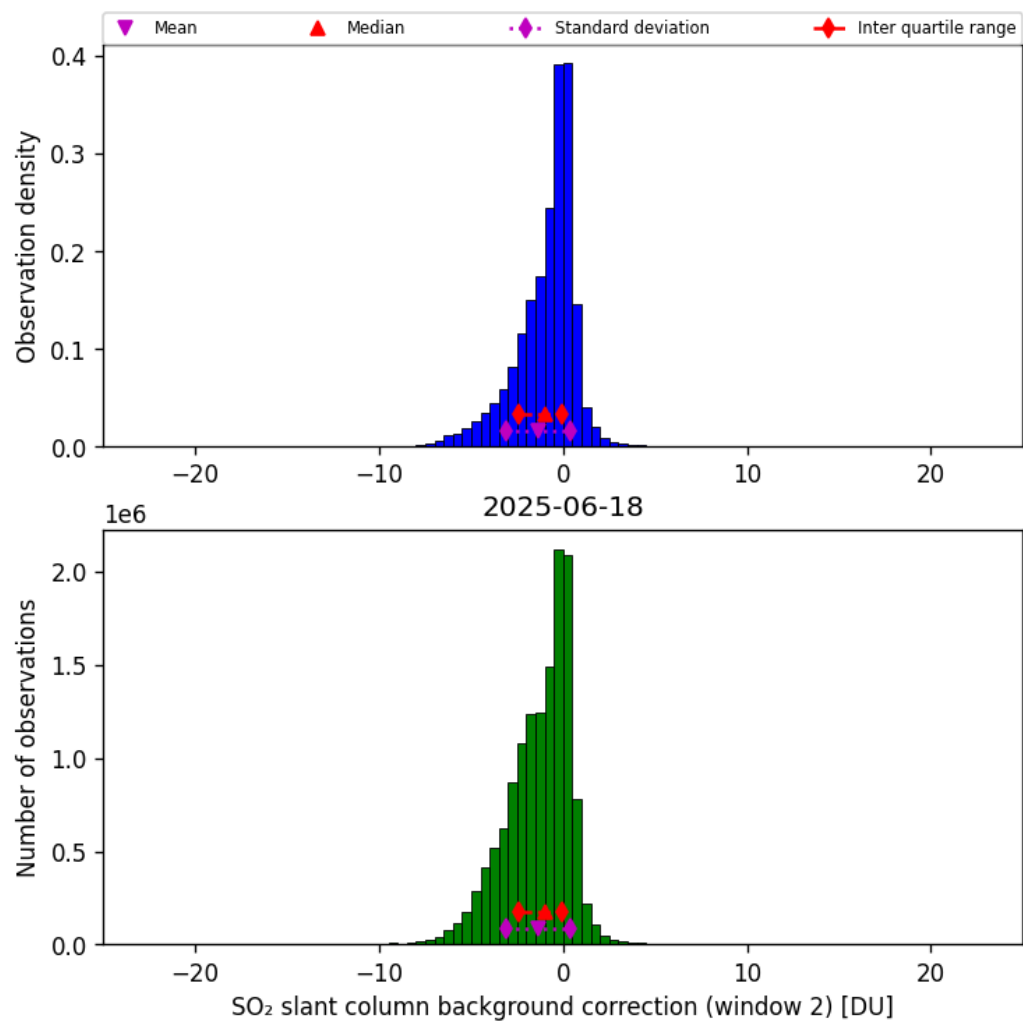


Figure 70: Histogram of “SO₂ slant column background correction (window 2)” for 2025-06-18 to 2025-06-19

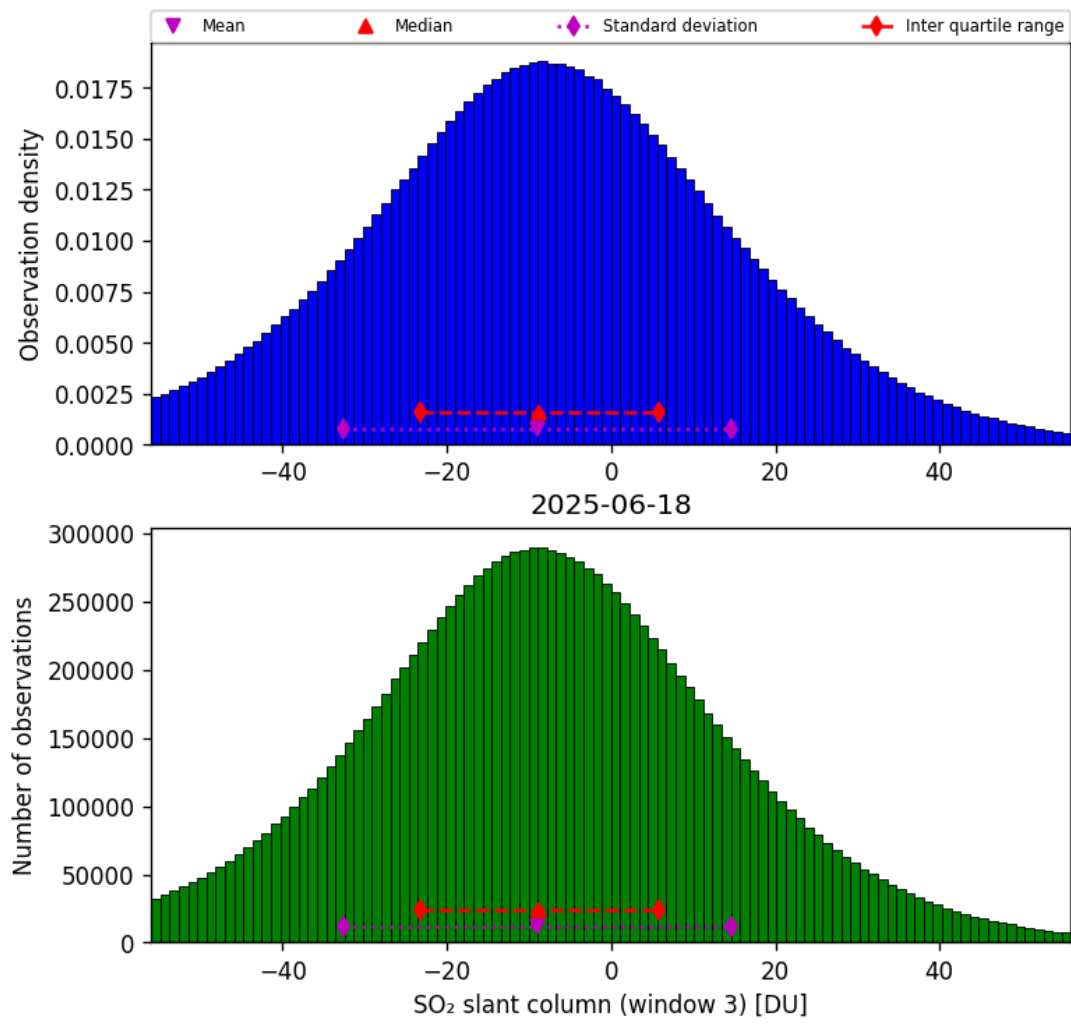


Figure 71: Histogram of “SO₂ slant column (window 3)” for 2025-06-18 to 2025-06-19

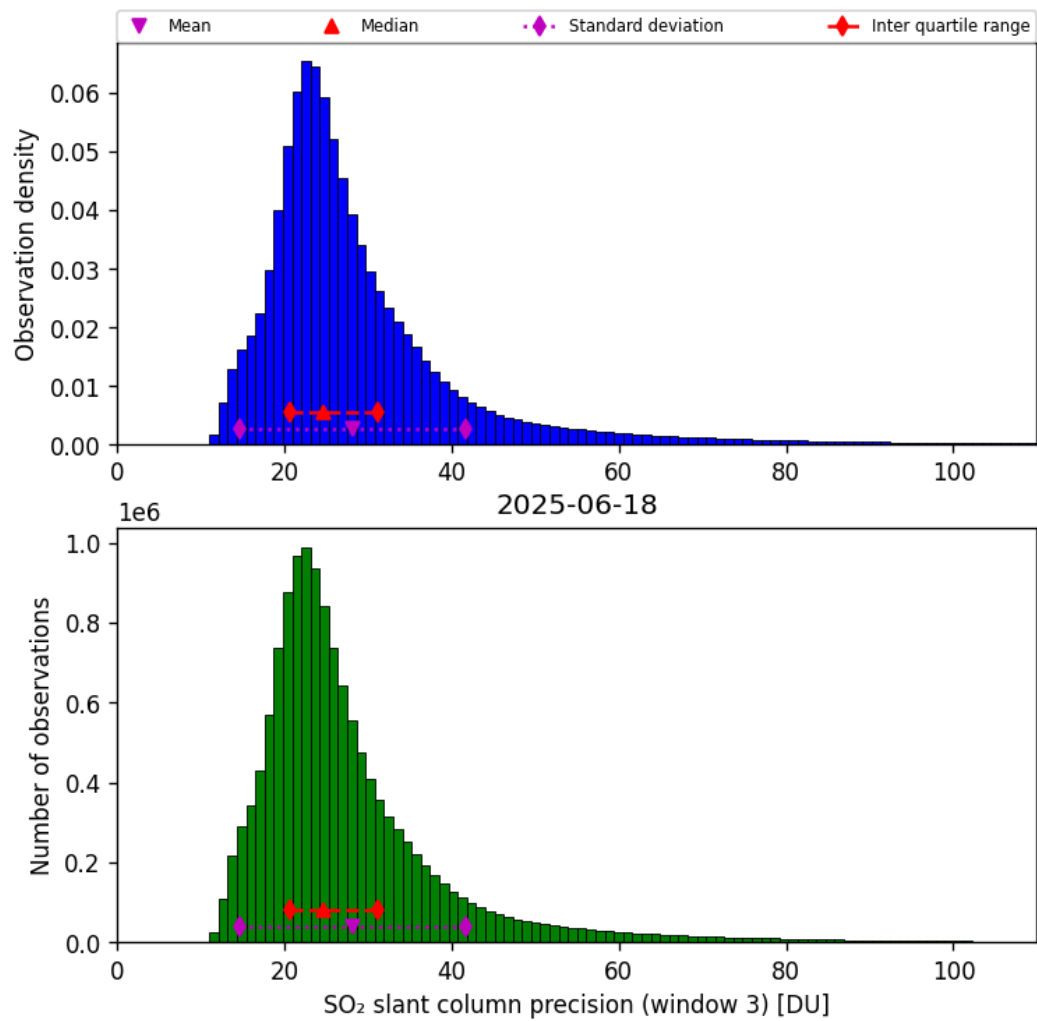


Figure 72: Histogram of “SO₂ slant column precision (window 3)” for 2025-06-18 to 2025-06-19

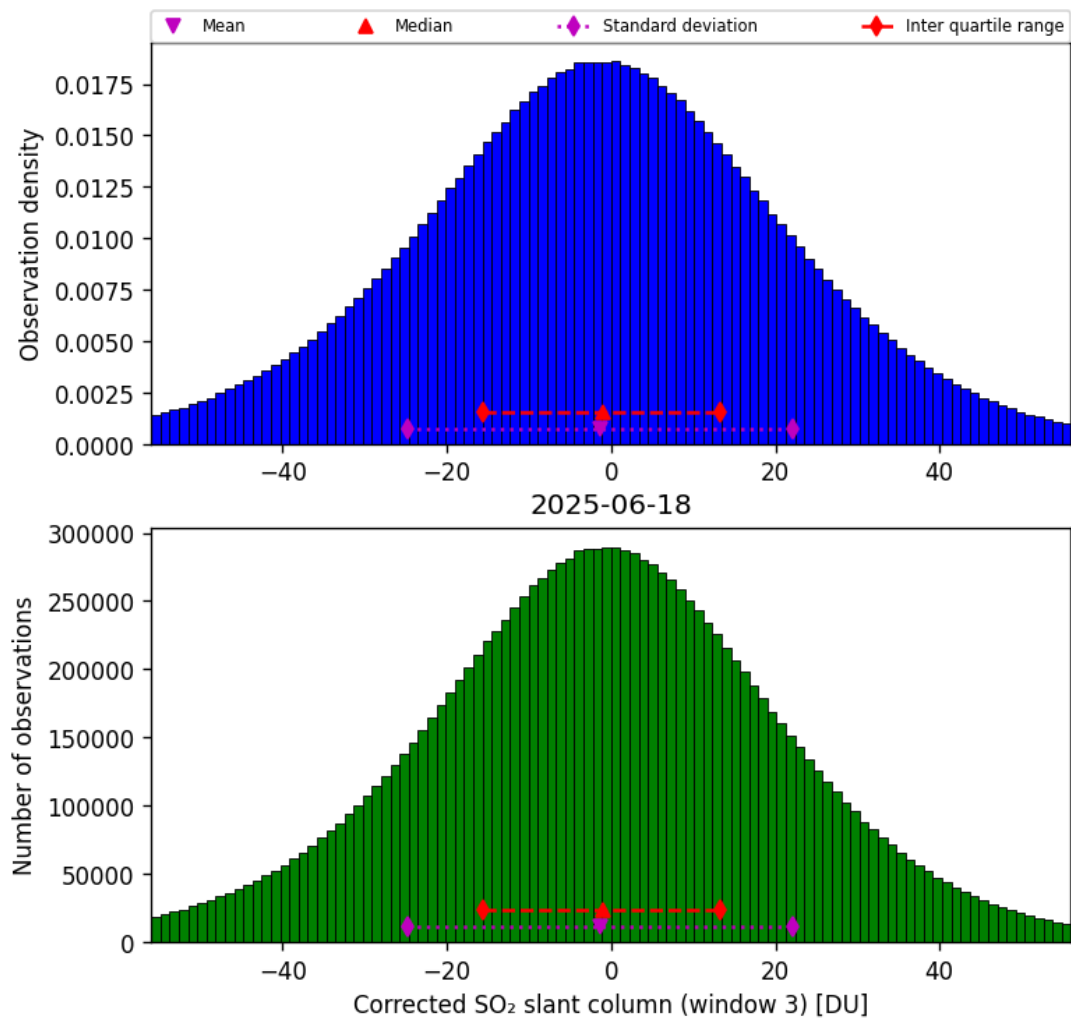


Figure 73: Histogram of “Corrected SO₂ slant column (window 3)” for 2025-06-18 to 2025-06-19

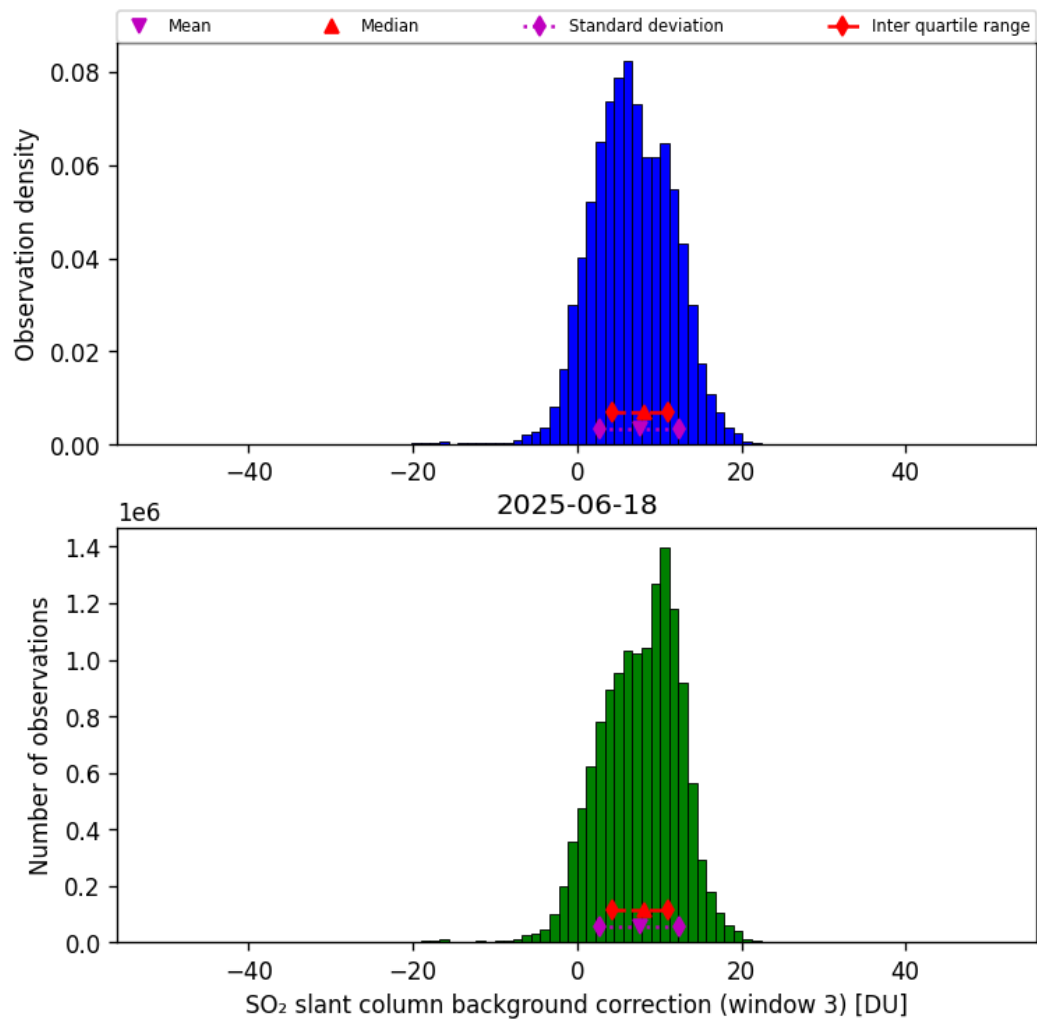


Figure 74: Histogram of “SO₂ slant column background correction (window 3)” for 2025-06-18 to 2025-06-19

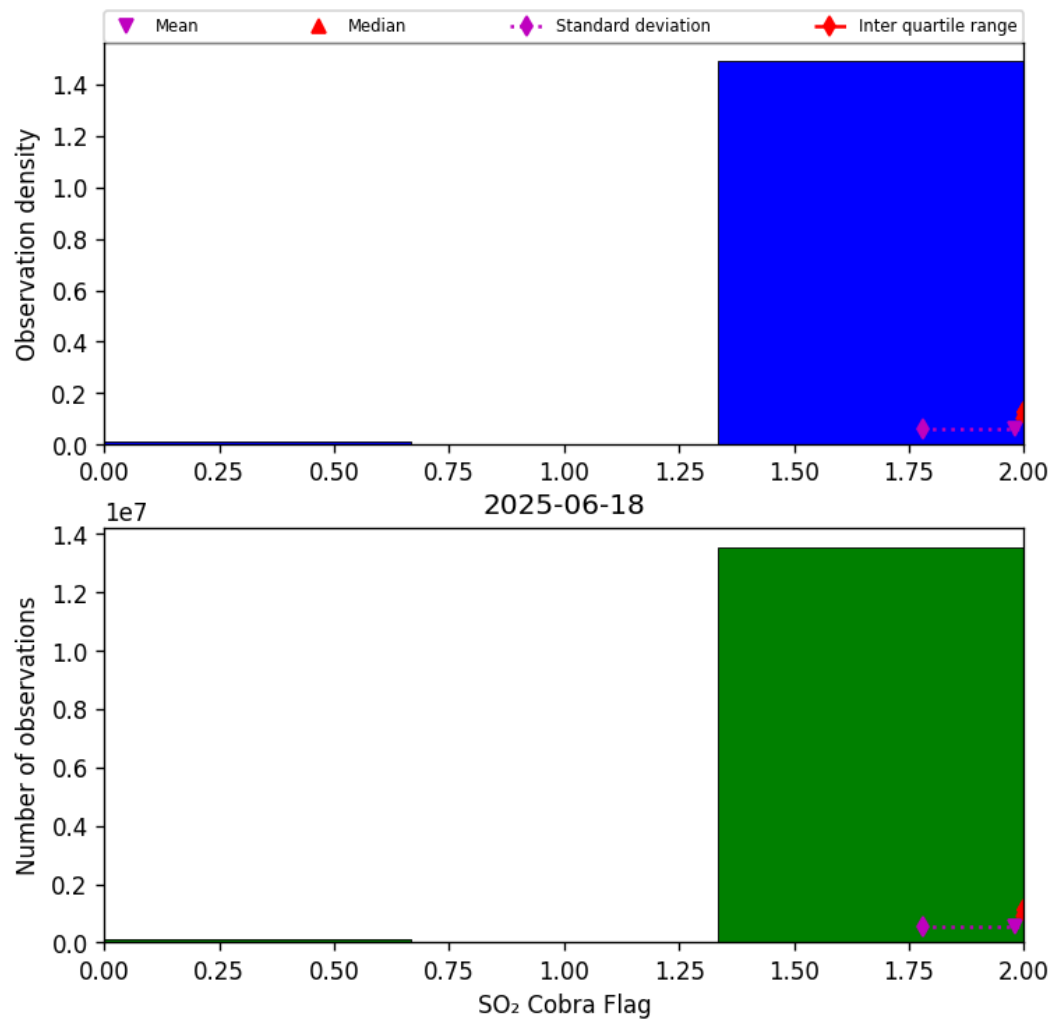


Figure 75: Histogram of “SO₂ Cobra Flag” for 2025-06-18 to 2025-06-19

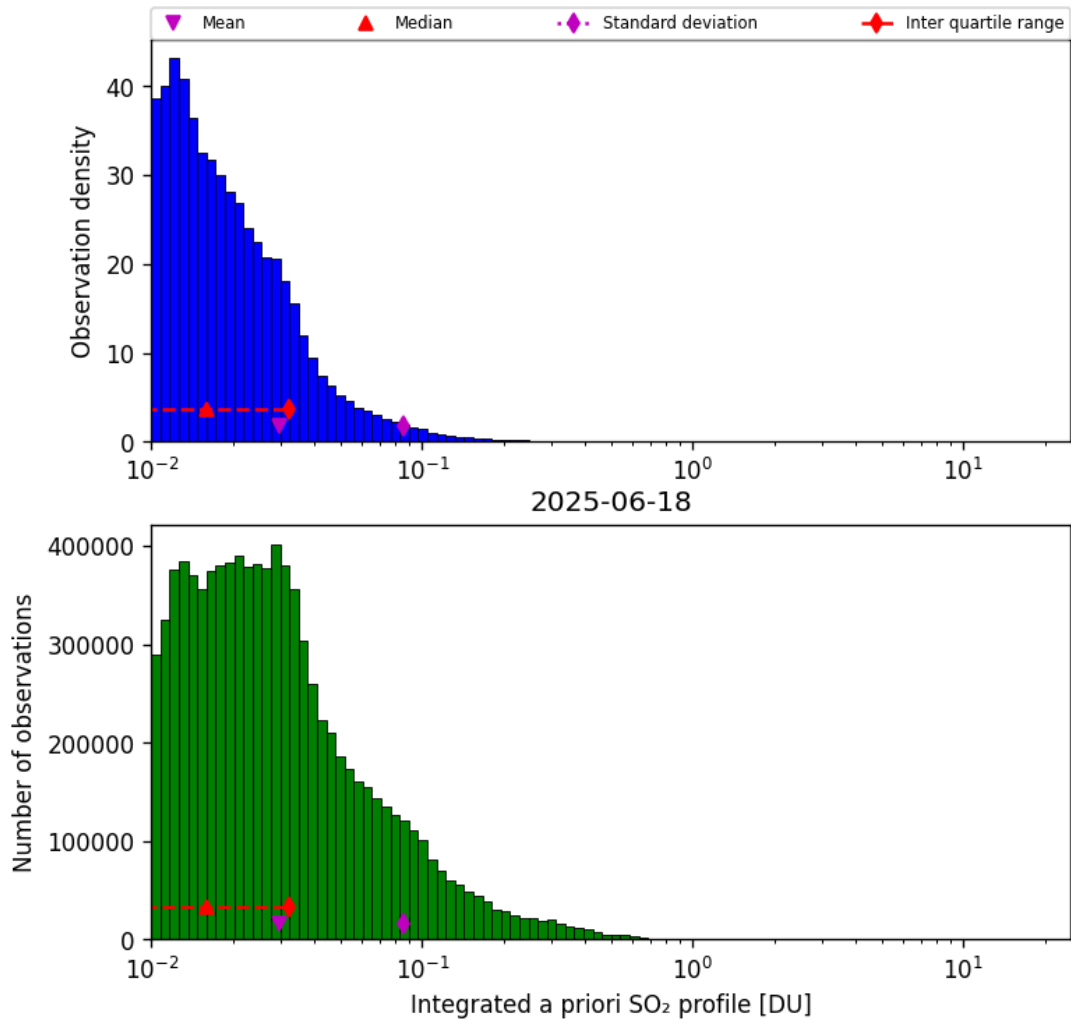


Figure 76: Histogram of “Integrated a priori SO₂ profile” for 2025-06-18 to 2025-06-19

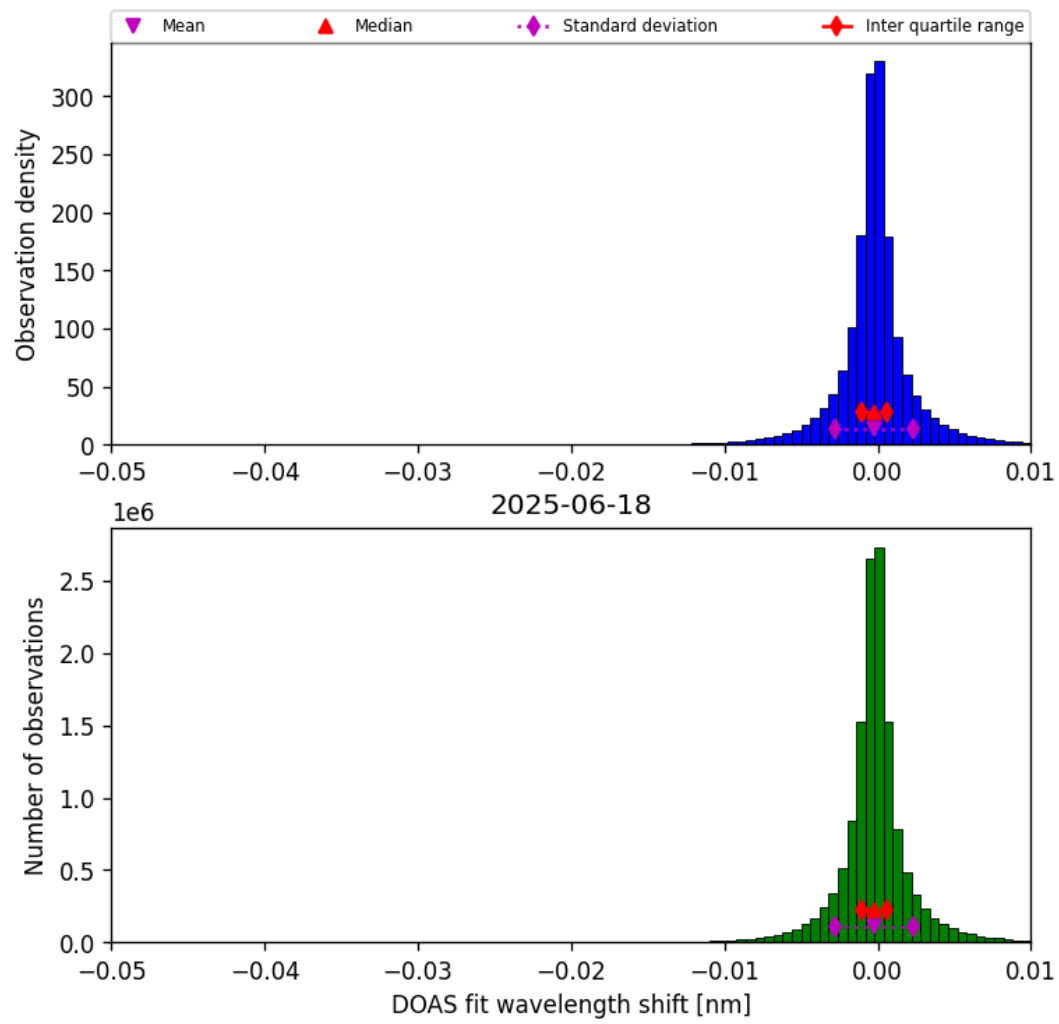


Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-06-18 to 2025-06-19

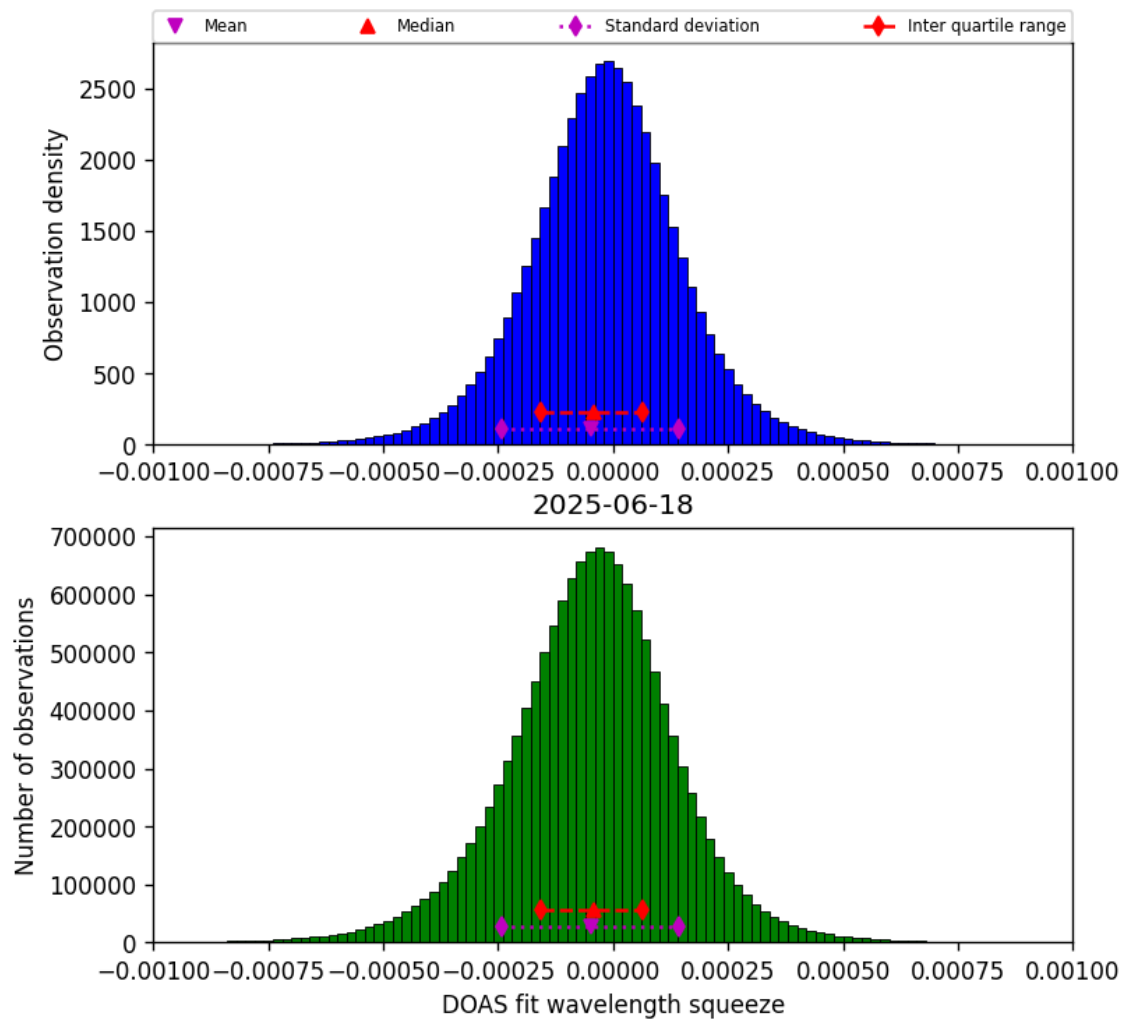


Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-06-18 to 2025-06-19

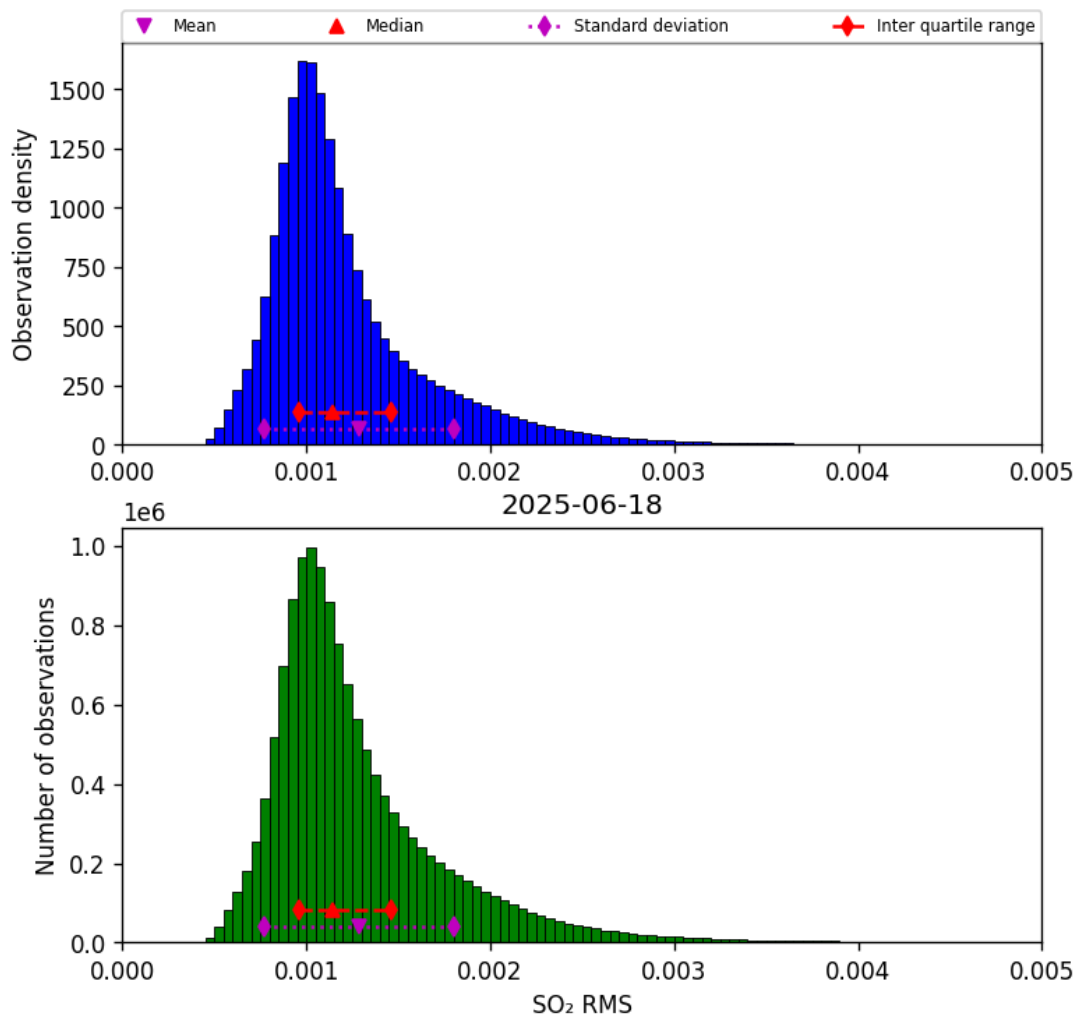


Figure 79: Histogram of “SO₂ RMS” for 2025-06-18 to 2025-06-19

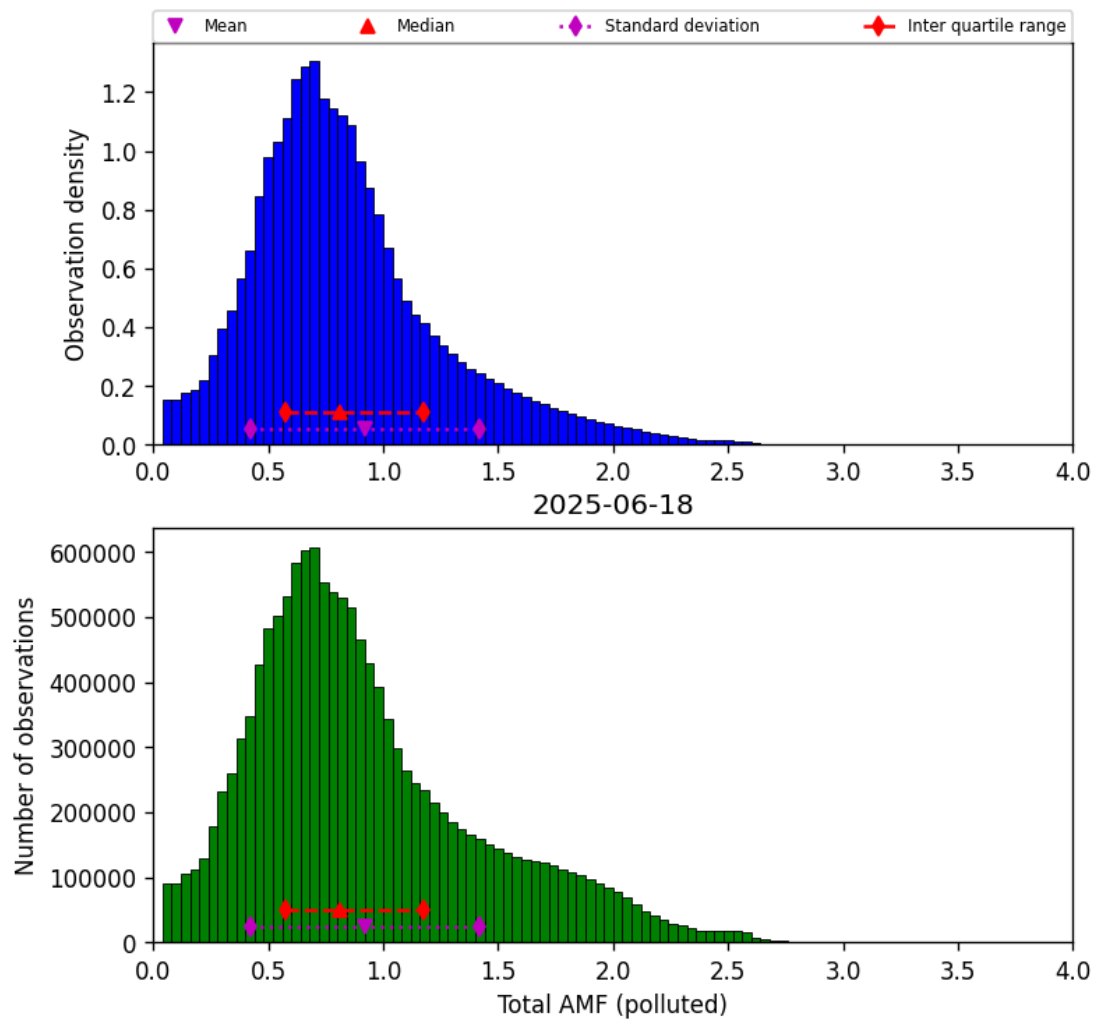


Figure 80: Histogram of “Total AMF (polluted)” for 2025-06-18 to 2025-06-19

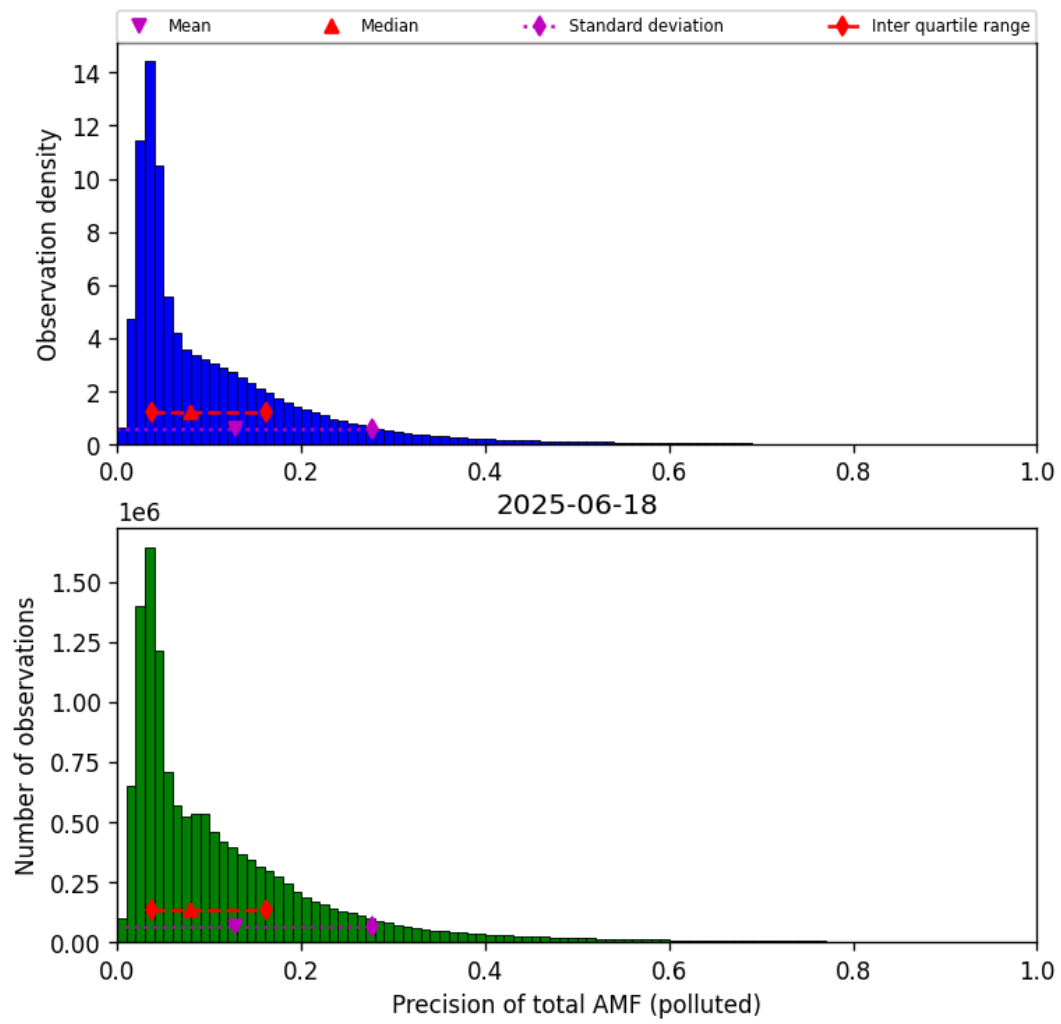


Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-06-18 to 2025-06-19

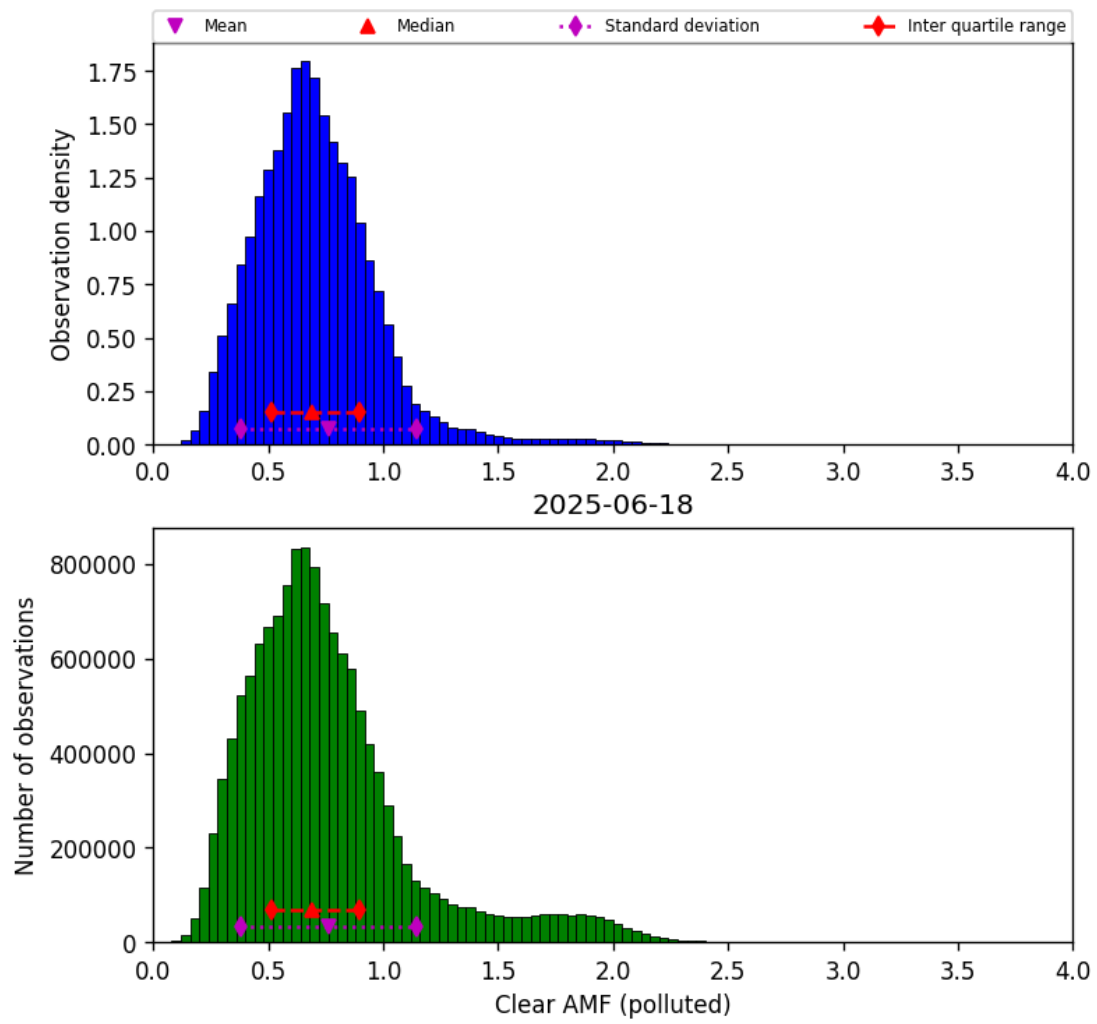


Figure 82: Histogram of “Clear AMF (polluted)” for 2025-06-18 to 2025-06-19

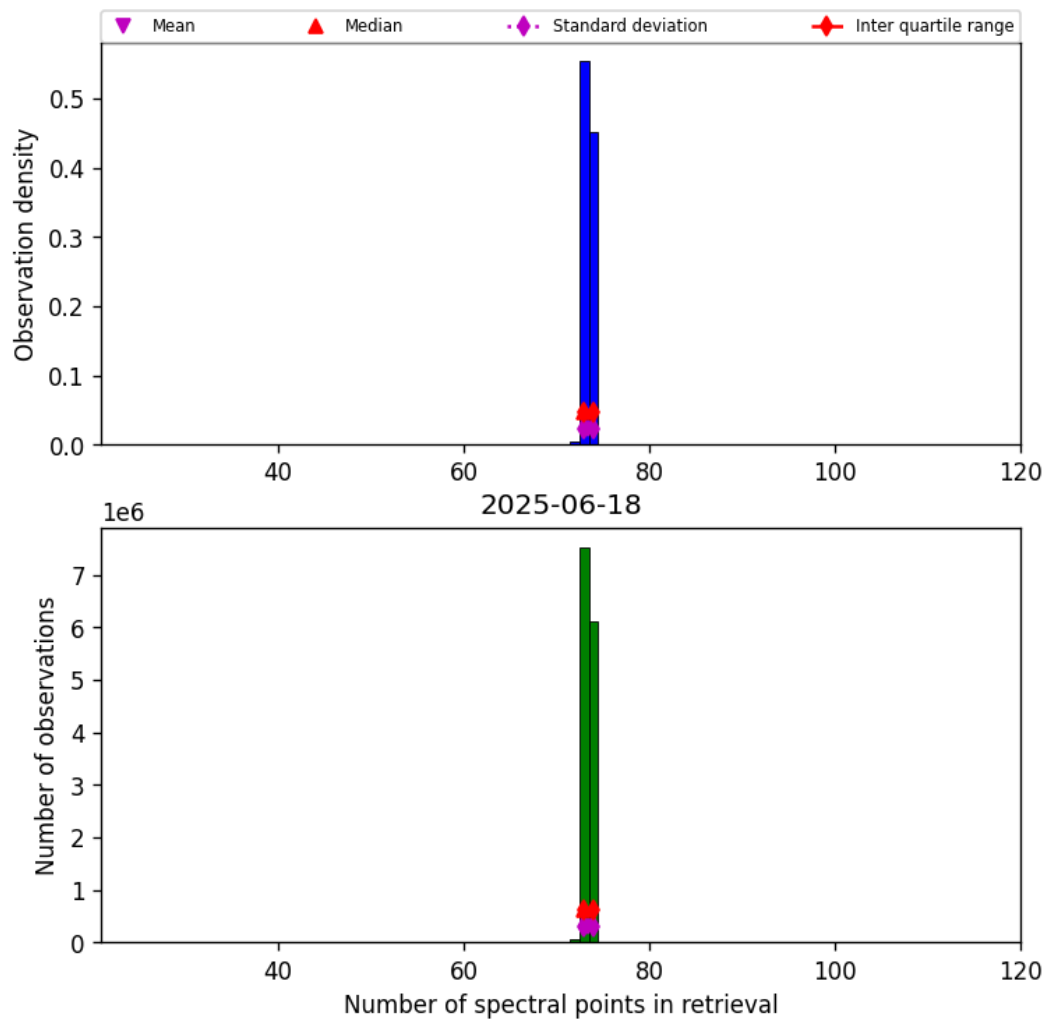


Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-06-18 to 2025-06-19

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.

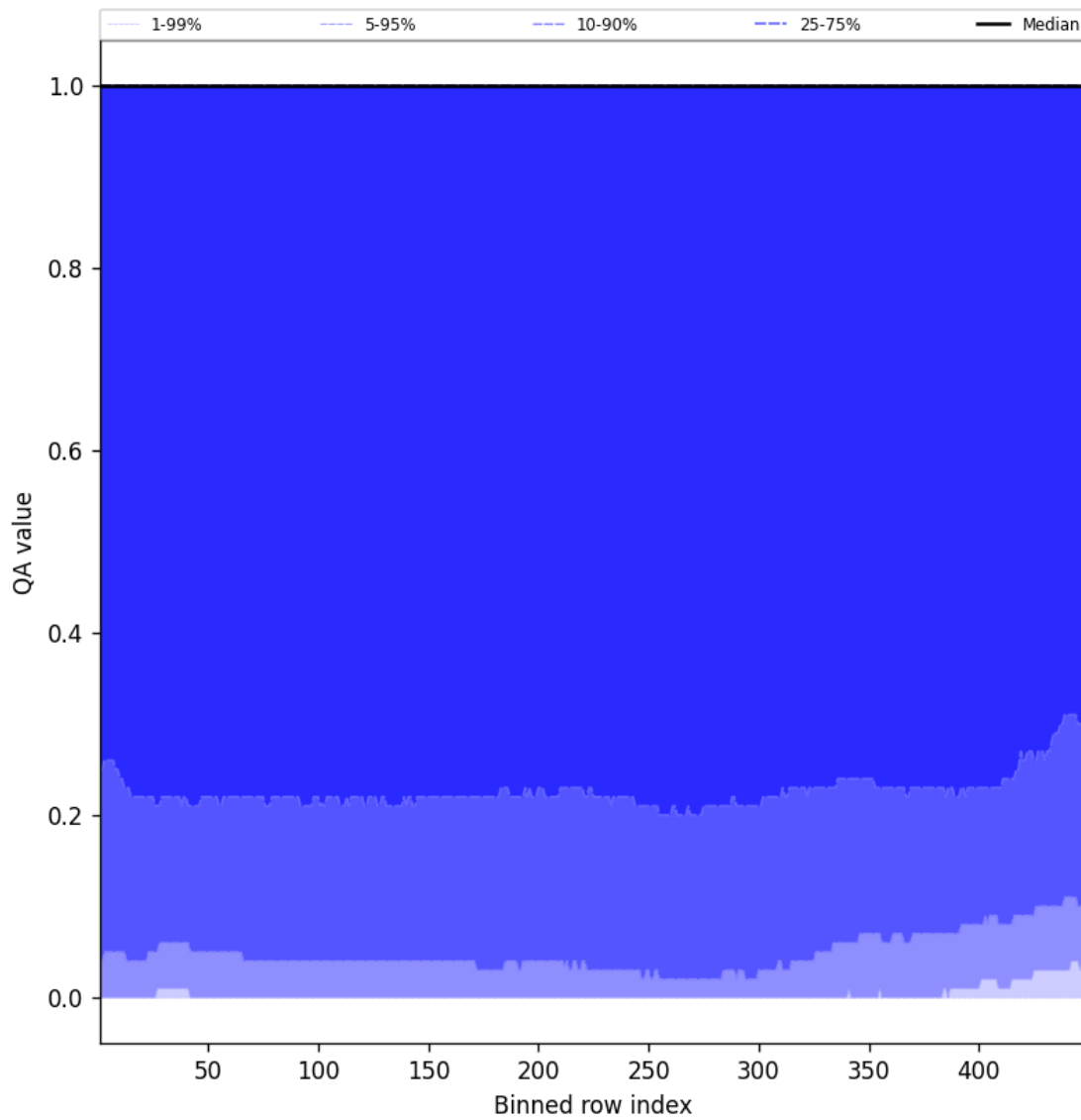


Figure 84: Along track statistics of “QA value” for 2025-06-18 to 2025-06-19

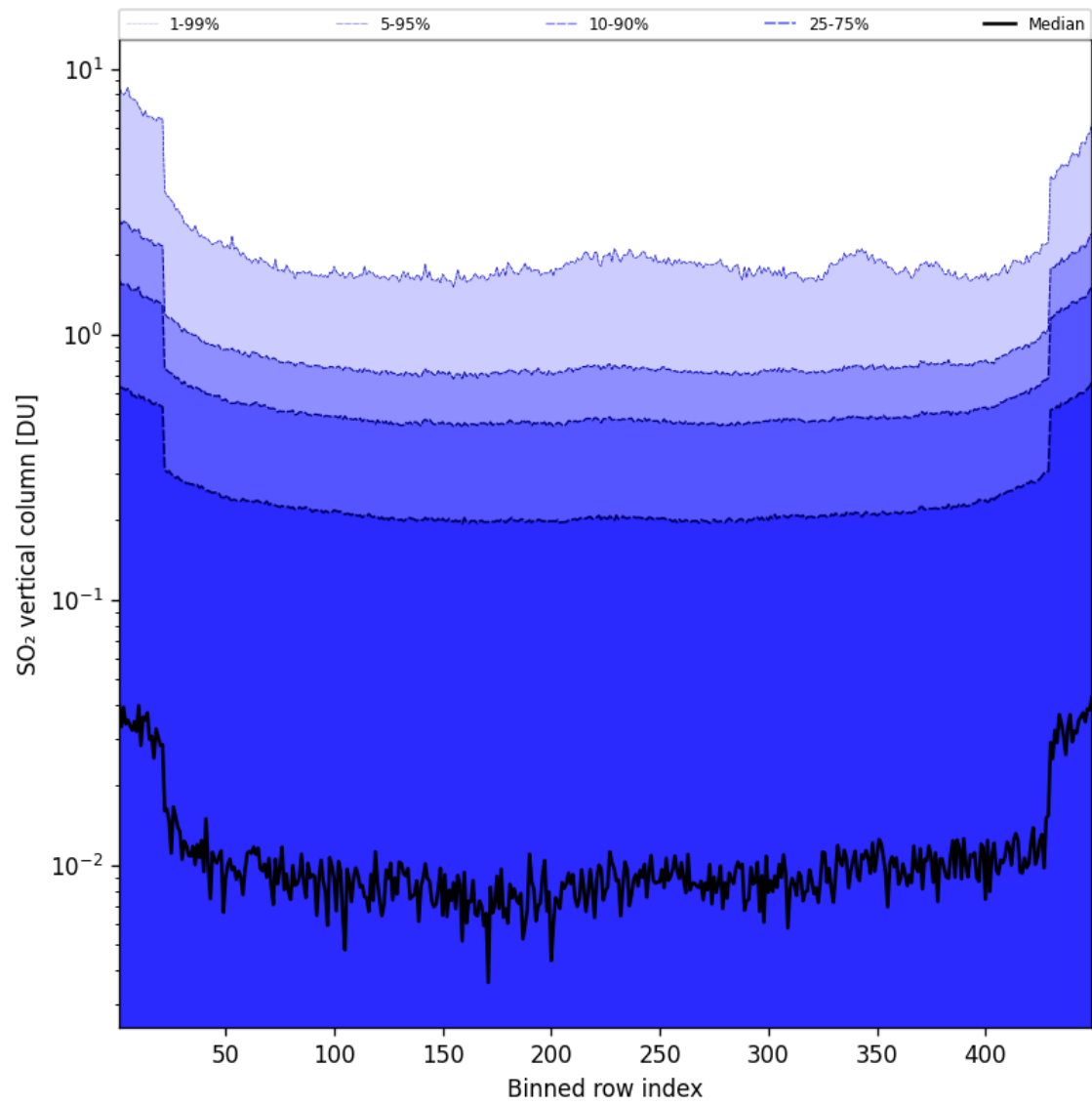


Figure 85: Along track statistics of “SO₂ vertical column” for 2025-06-18 to 2025-06-19

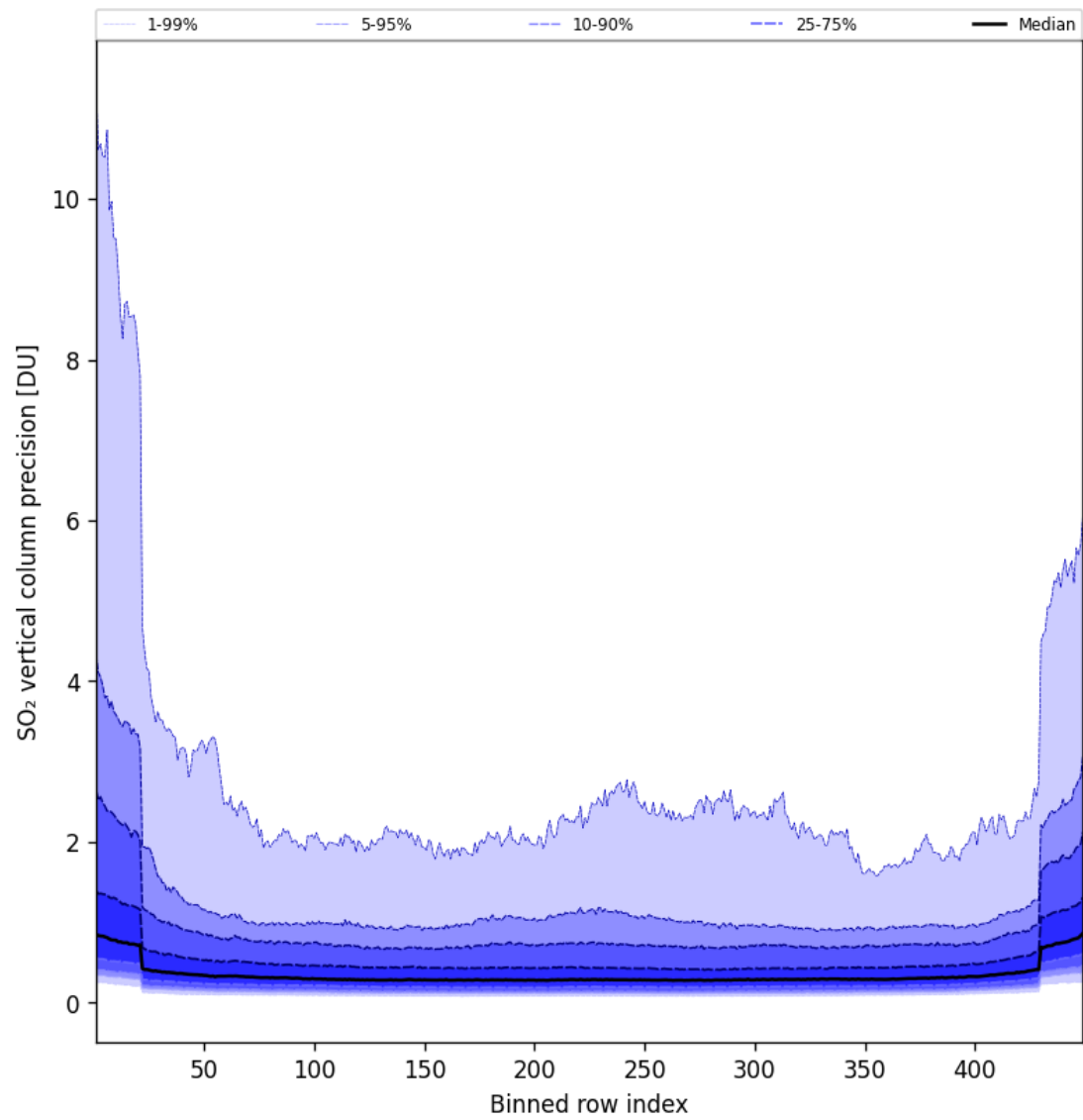


Figure 86: Along track statistics of “SO₂ vertical column precision” for 2025-06-18 to 2025-06-19

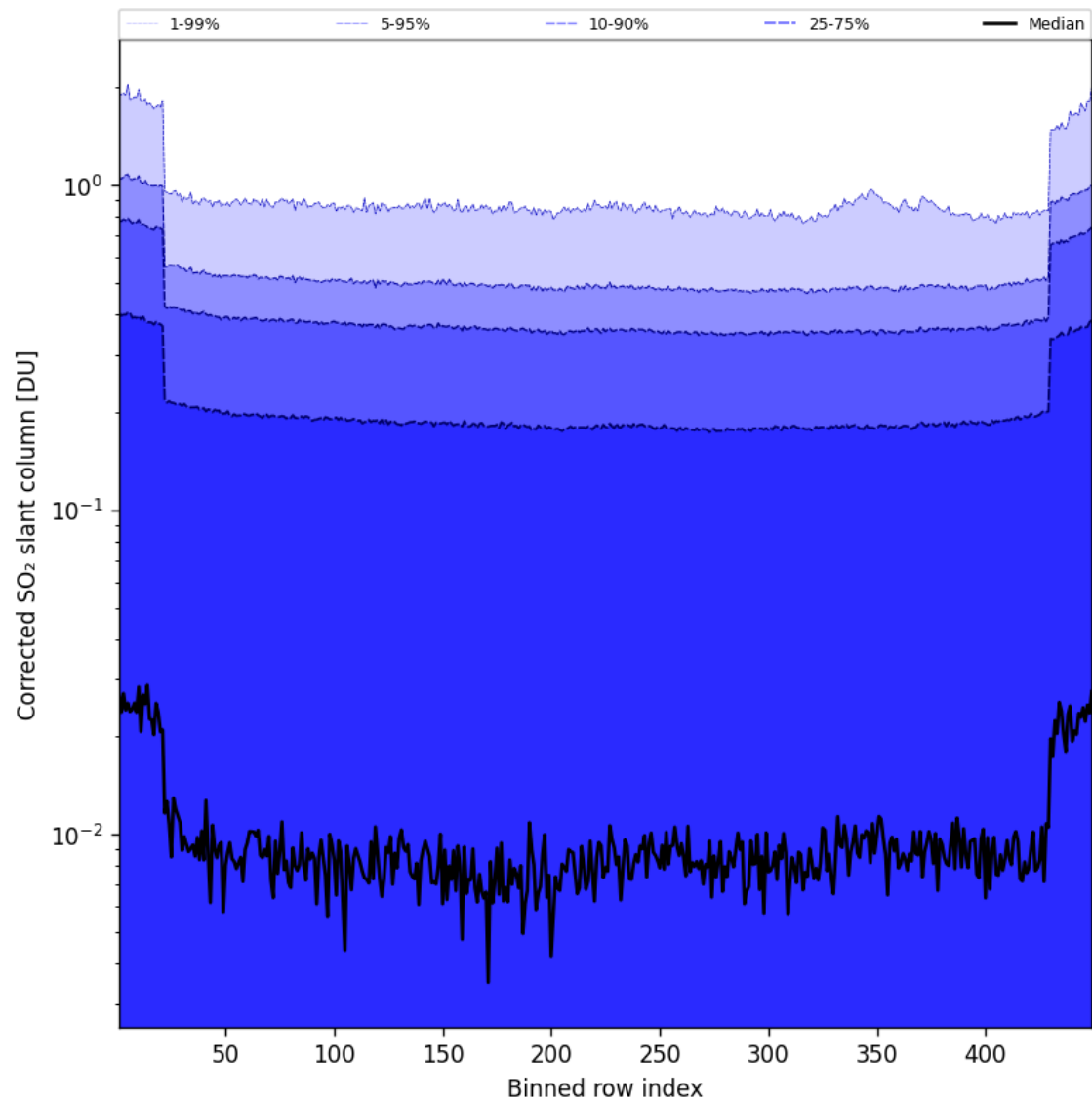


Figure 87: Along track statistics of “Corrected SO₂ slant column” for 2025-06-18 to 2025-06-19

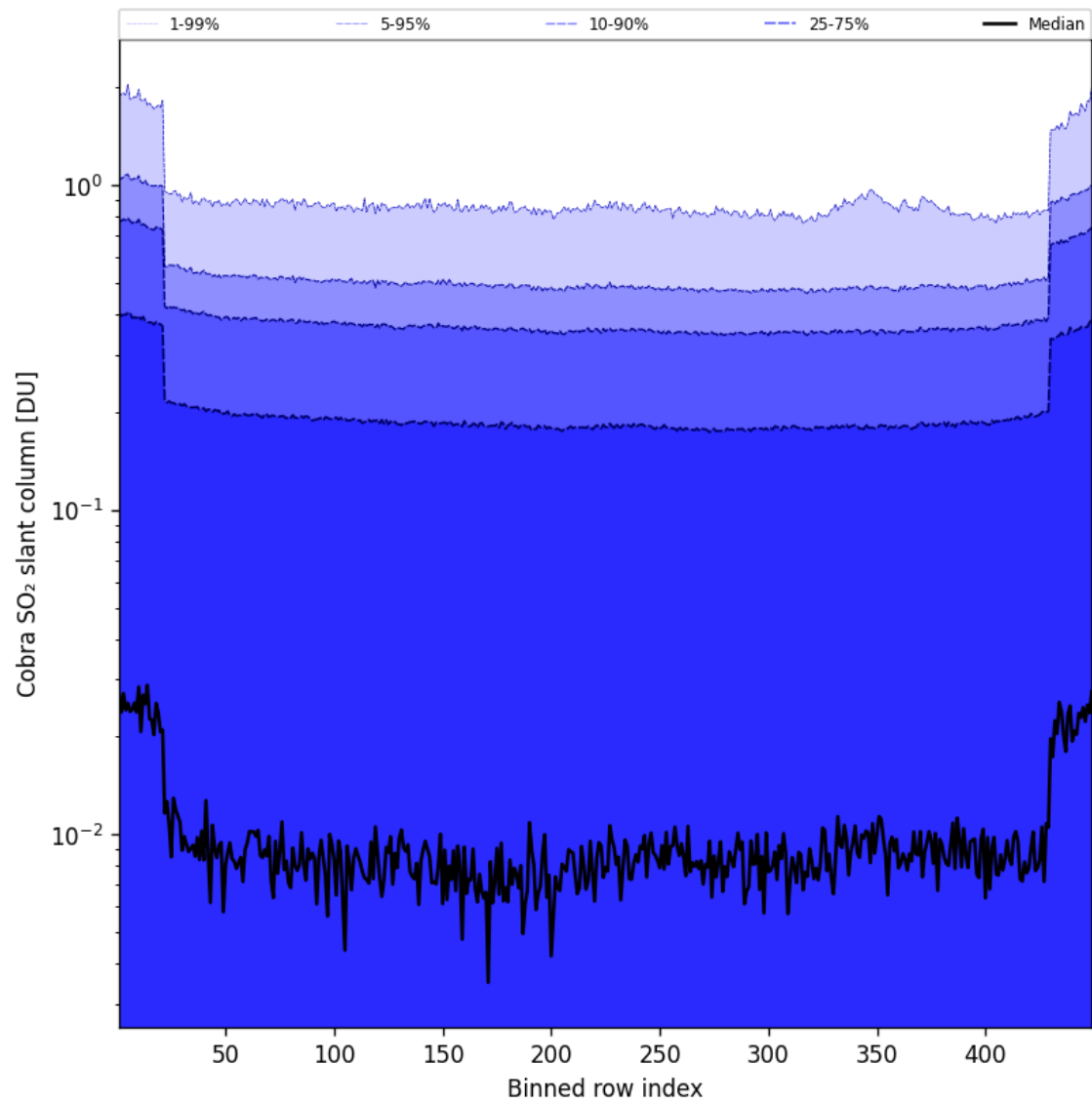


Figure 88: Along track statistics of “Cobra SO₂ slant column” for 2025-06-18 to 2025-06-19

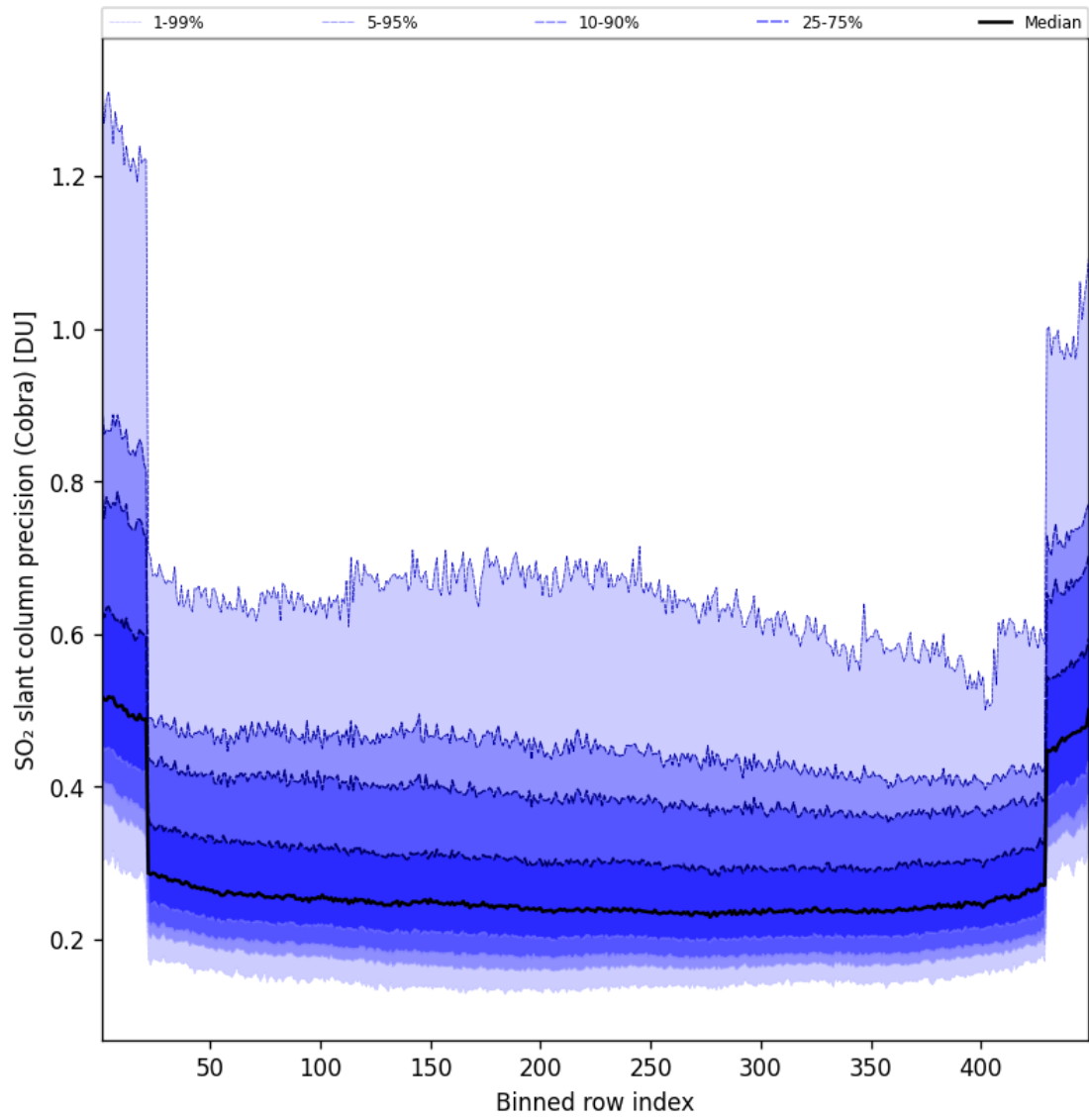


Figure 89: Along track statistics of “SO₂ slant column precision (Cobra)” for 2025-06-18 to 2025-06-19

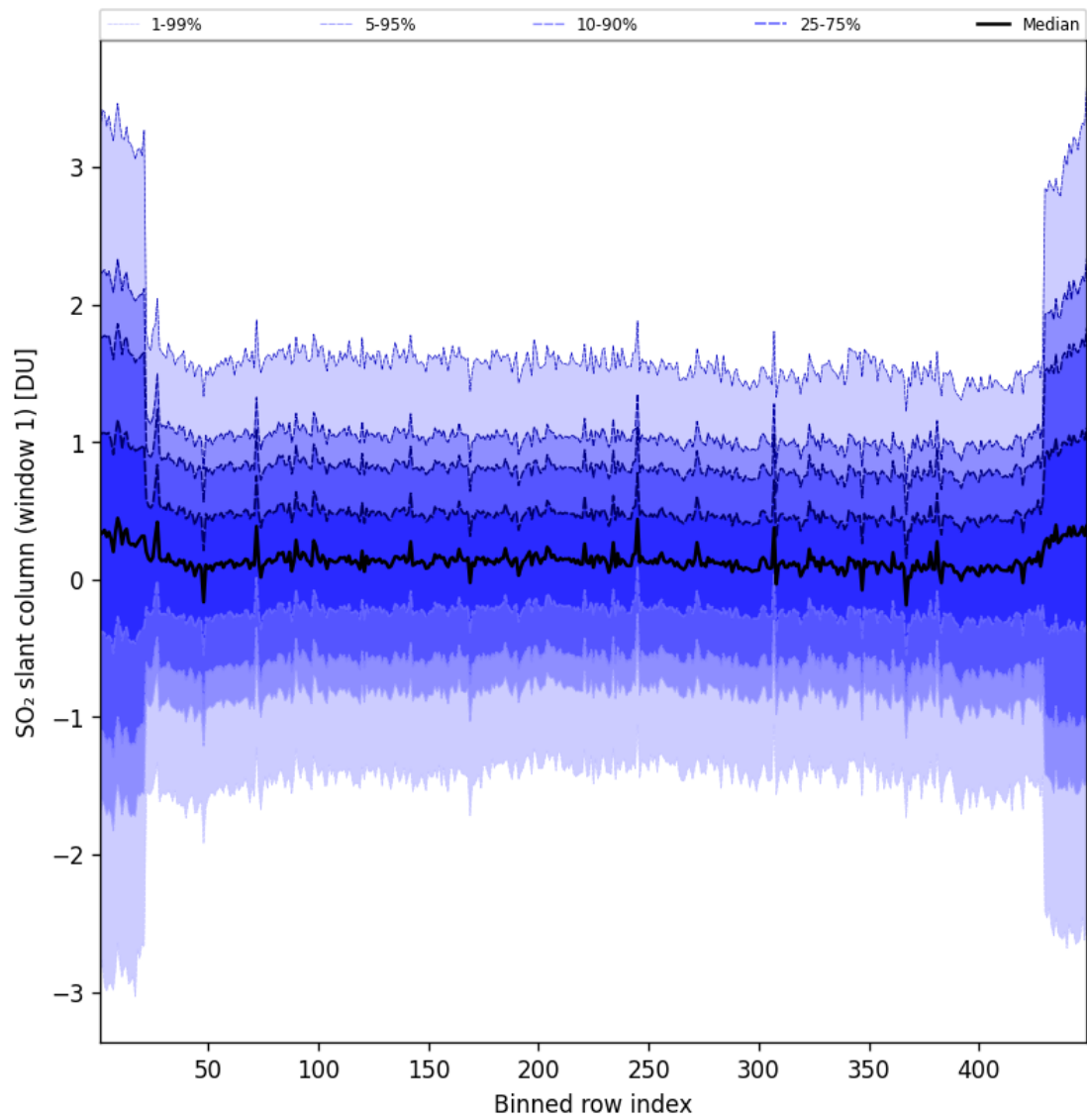


Figure 90: Along track statistics of “SO₂ slant column (window 1)” for 2025-06-18 to 2025-06-19

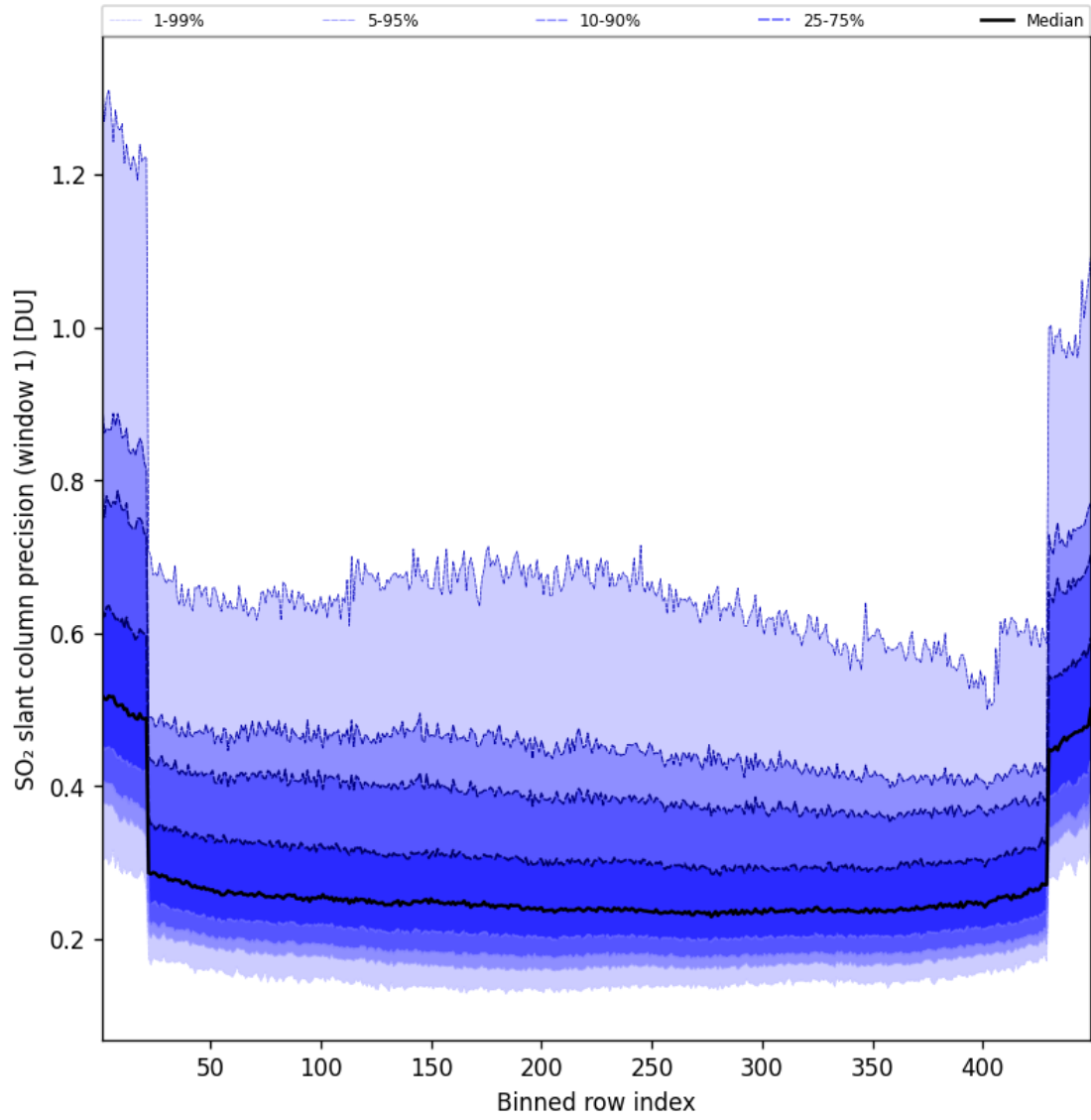


Figure 91: Along track statistics of “SO₂ slant column precision (window 1)” for 2025-06-18 to 2025-06-19

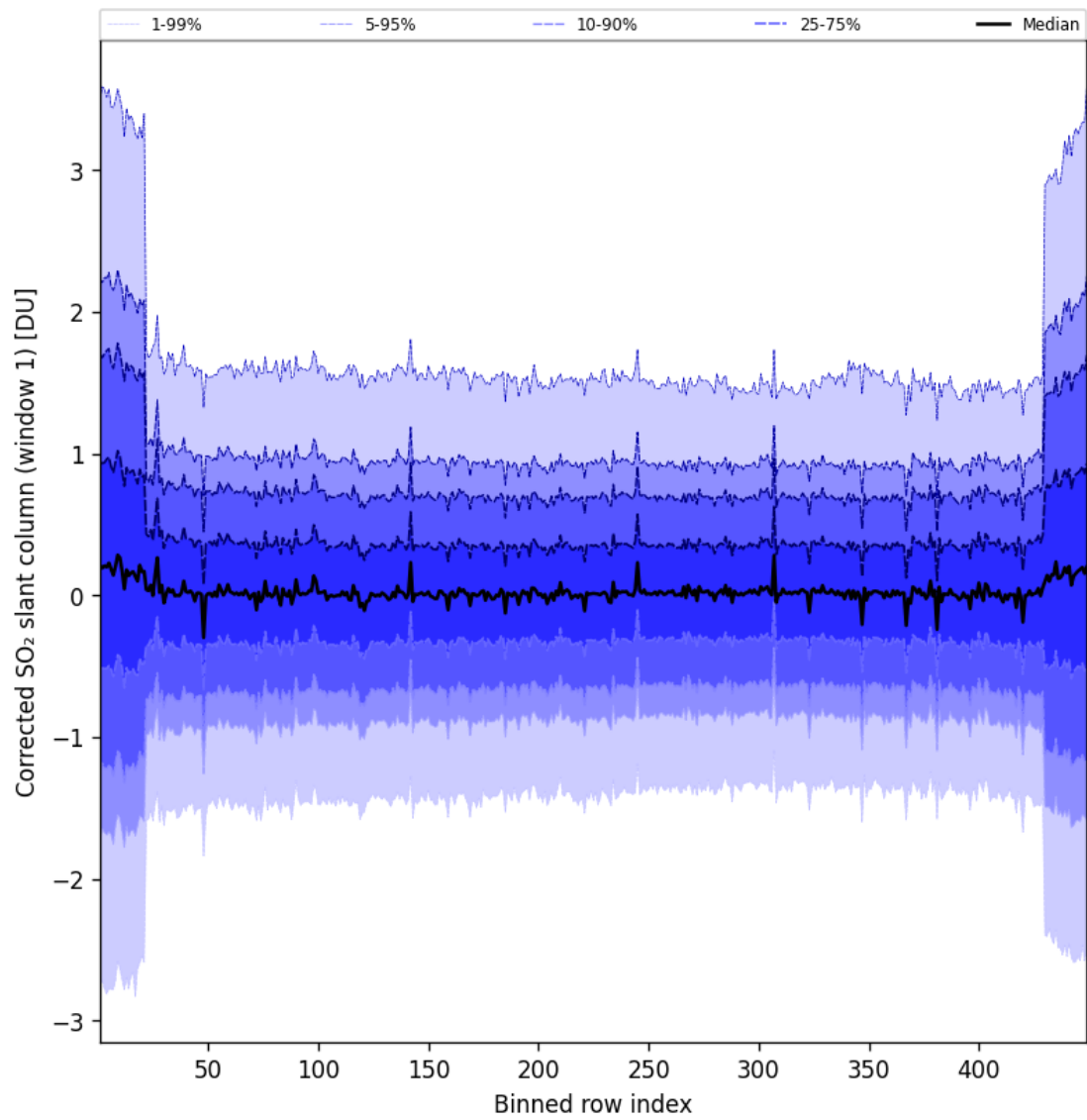


Figure 92: Along track statistics of “Corrected SO₂ slant column (window 1)” for 2025-06-18 to 2025-06-19

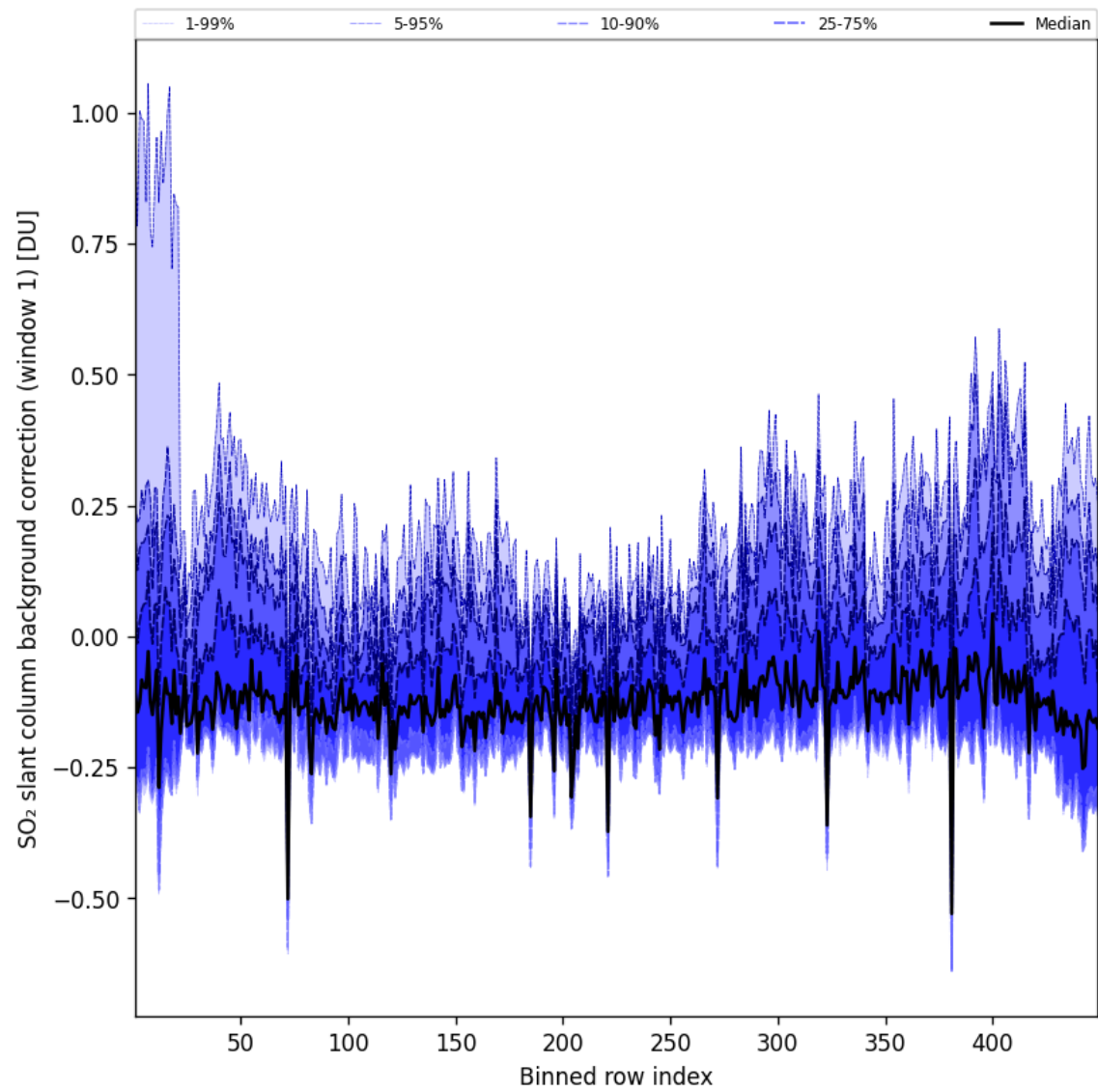


Figure 93: Along track statistics of “SO₂ slant column background correction (window 1)” for 2025-06-18 to 2025-06-19

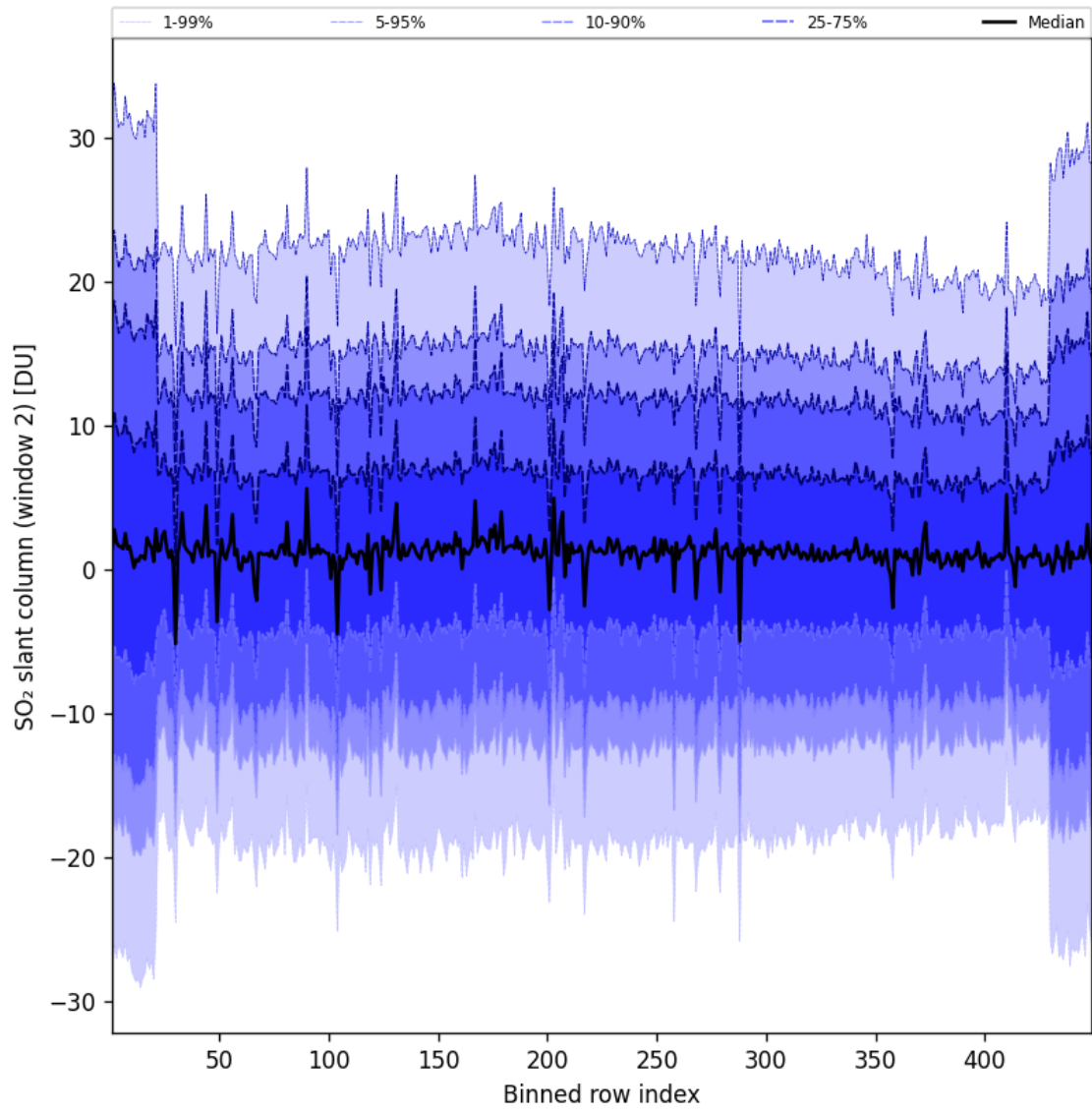


Figure 94: Along track statistics of “SO₂ slant column (window 2)” for 2025-06-18 to 2025-06-19

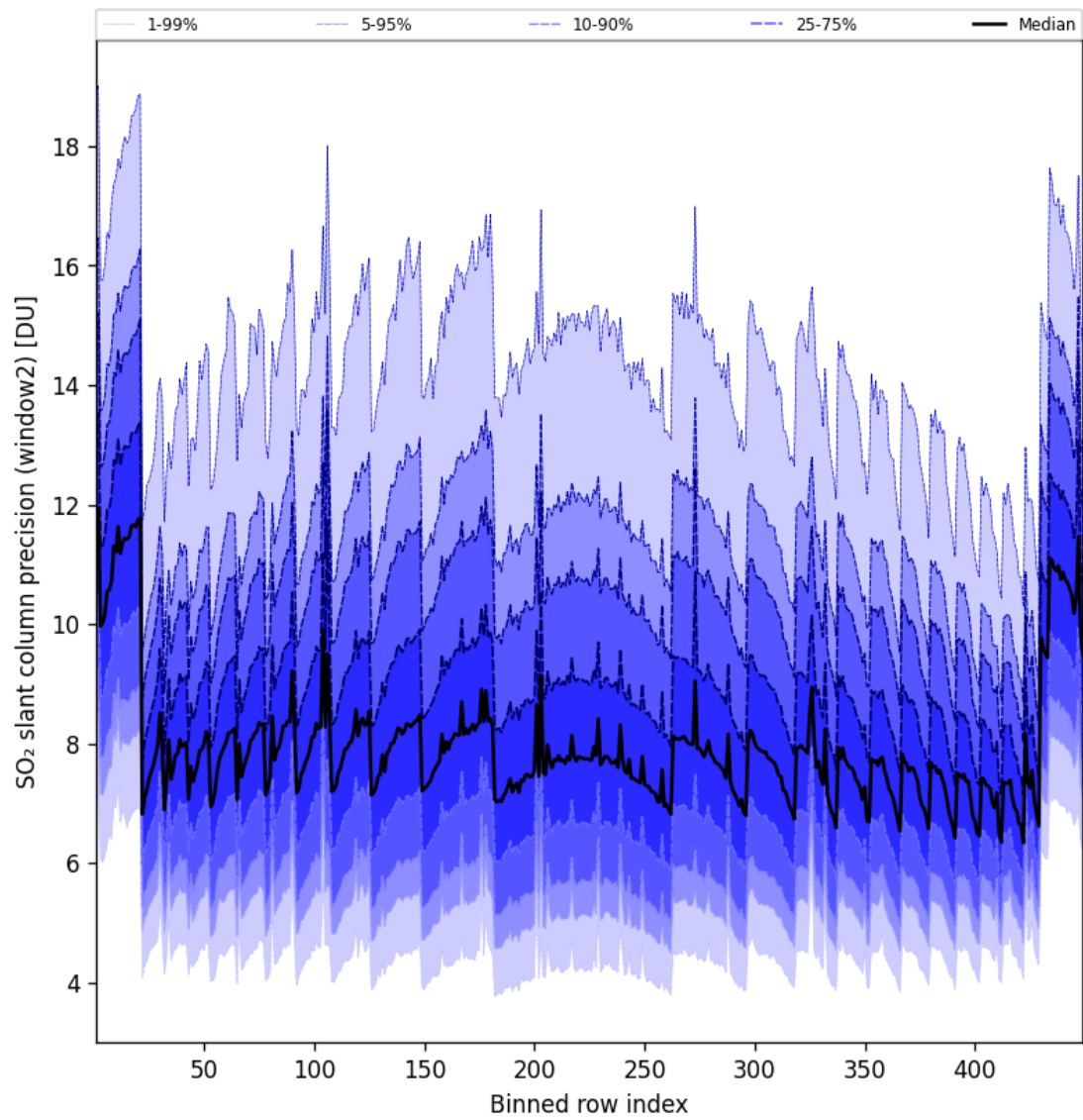


Figure 95: Along track statistics of “SO₂ slant column precision (window2)” for 2025-06-18 to 2025-06-19

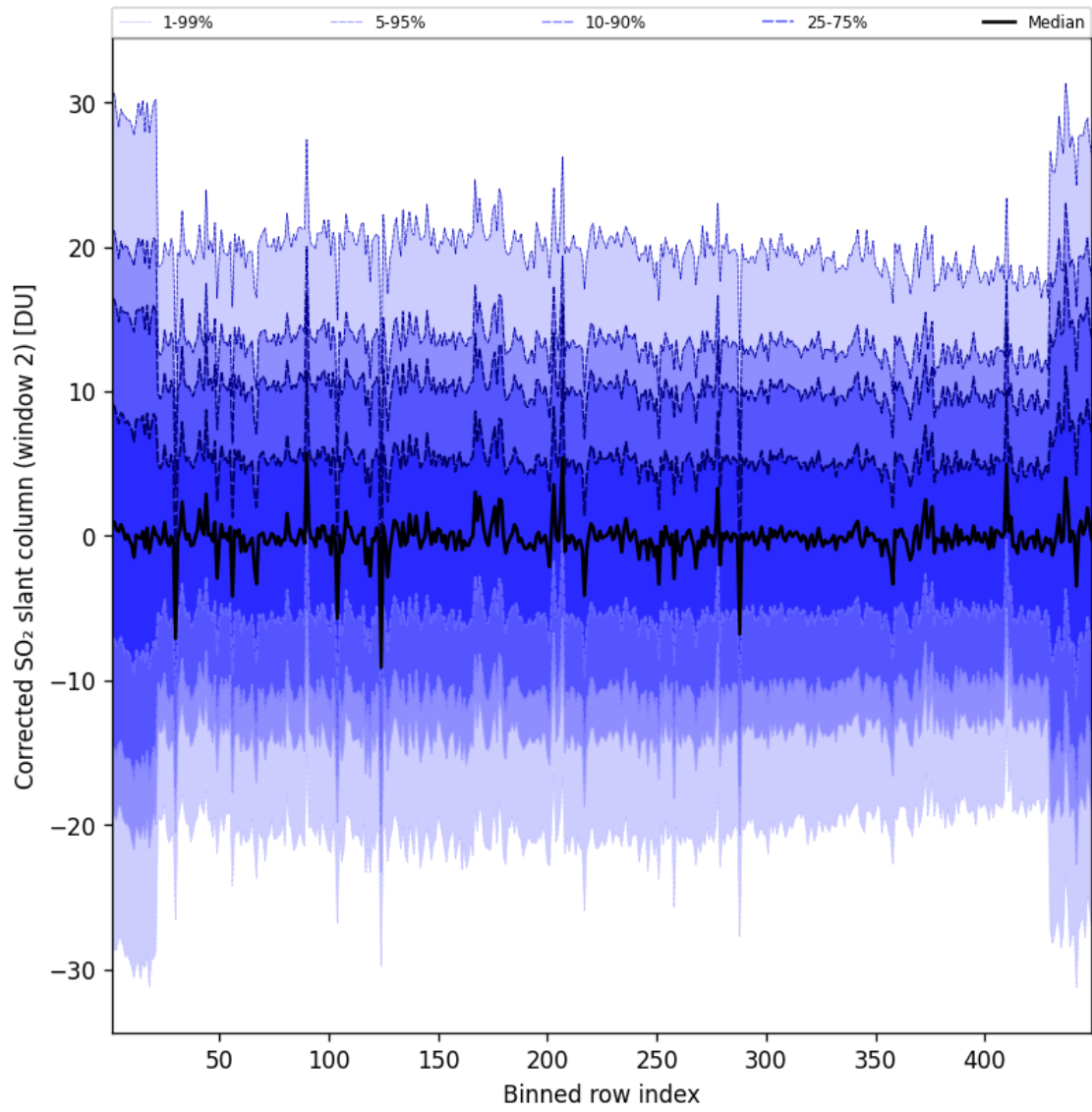


Figure 96: Along track statistics of “Corrected SO₂ slant column (window 2)” for 2025-06-18 to 2025-06-19

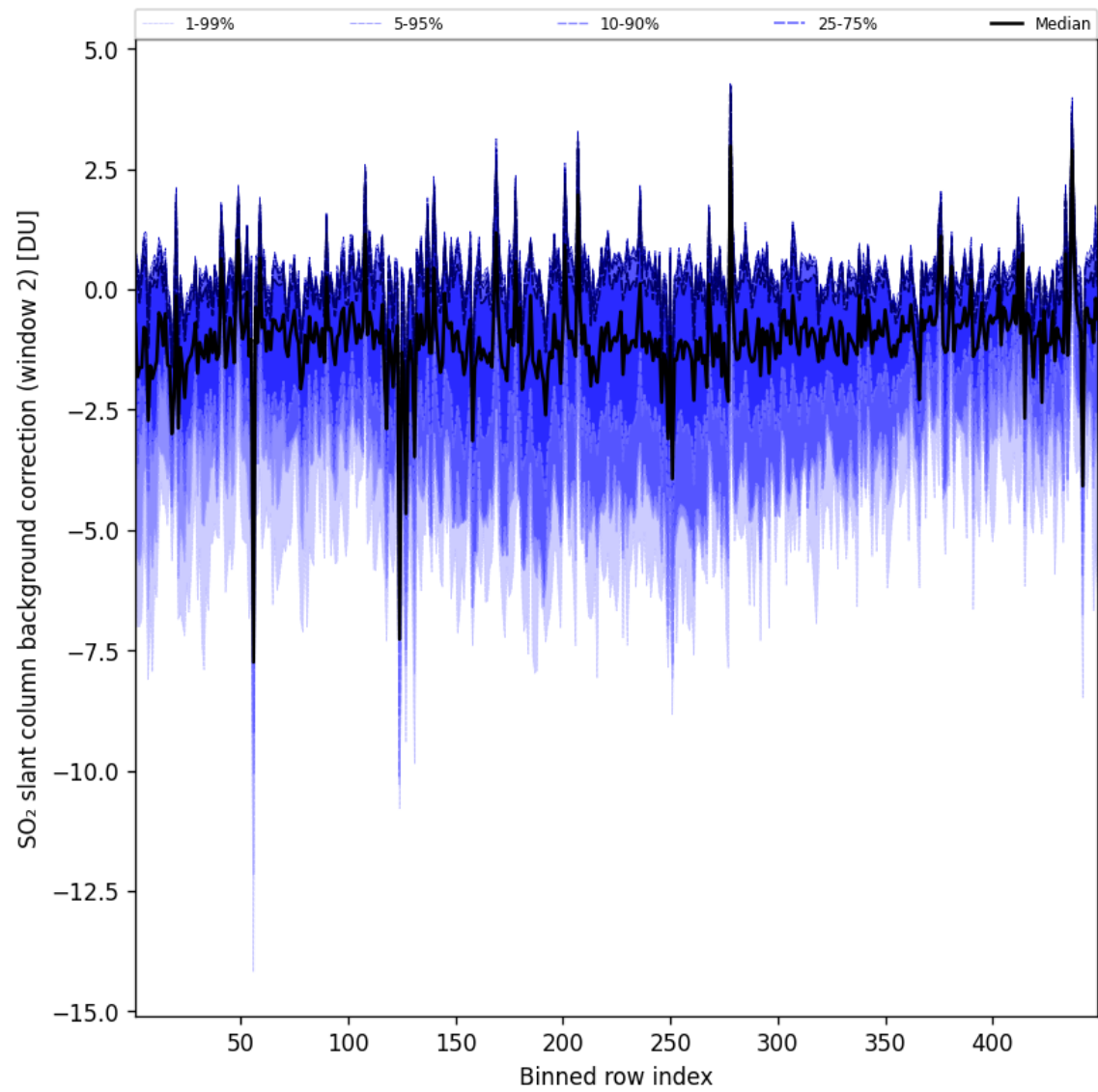


Figure 97: Along track statistics of “SO₂ slant column background correction (window 2)” for 2025-06-18 to 2025-06-19

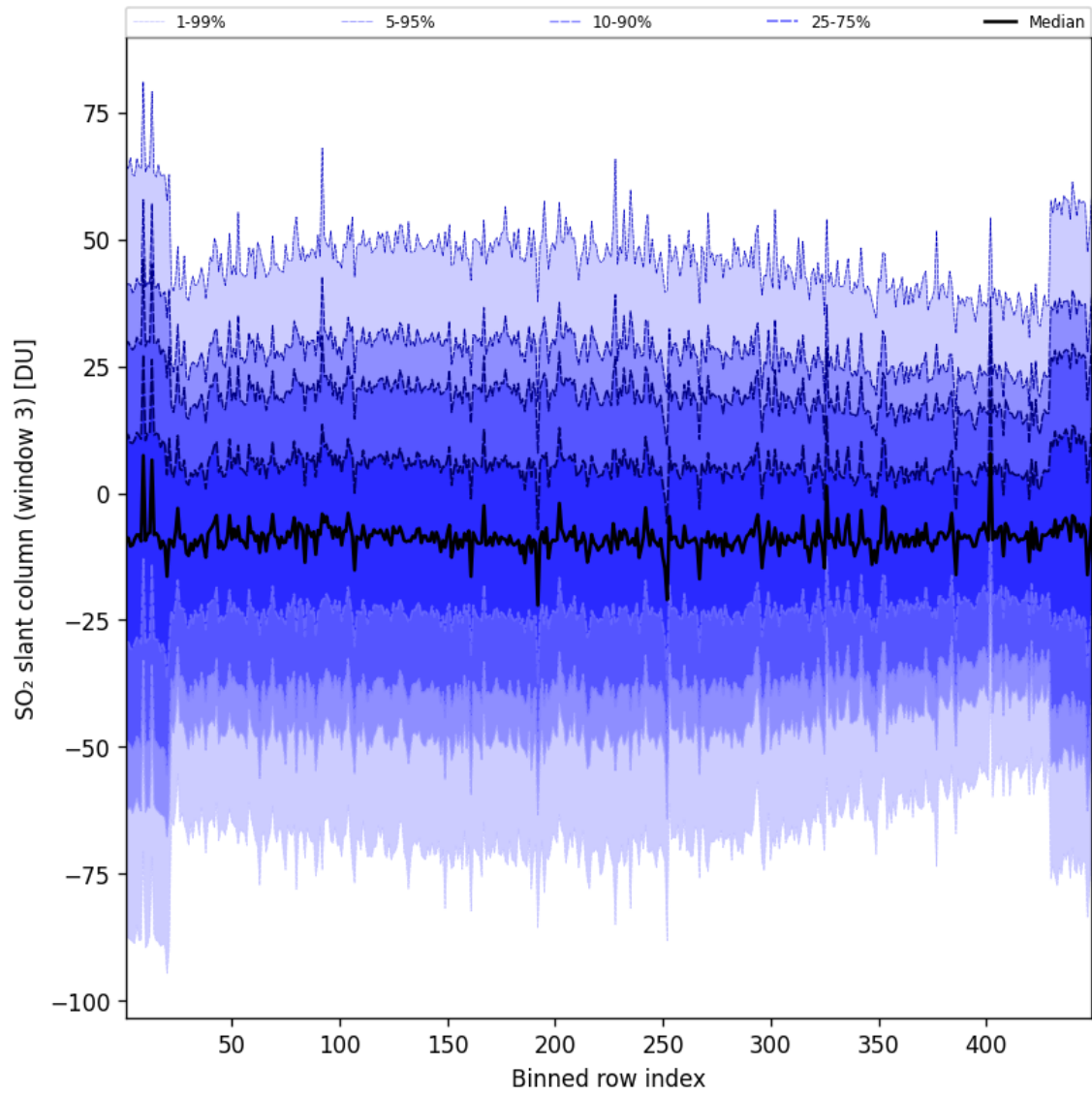


Figure 98: Along track statistics of “SO₂ slant column (window 3)” for 2025-06-18 to 2025-06-19

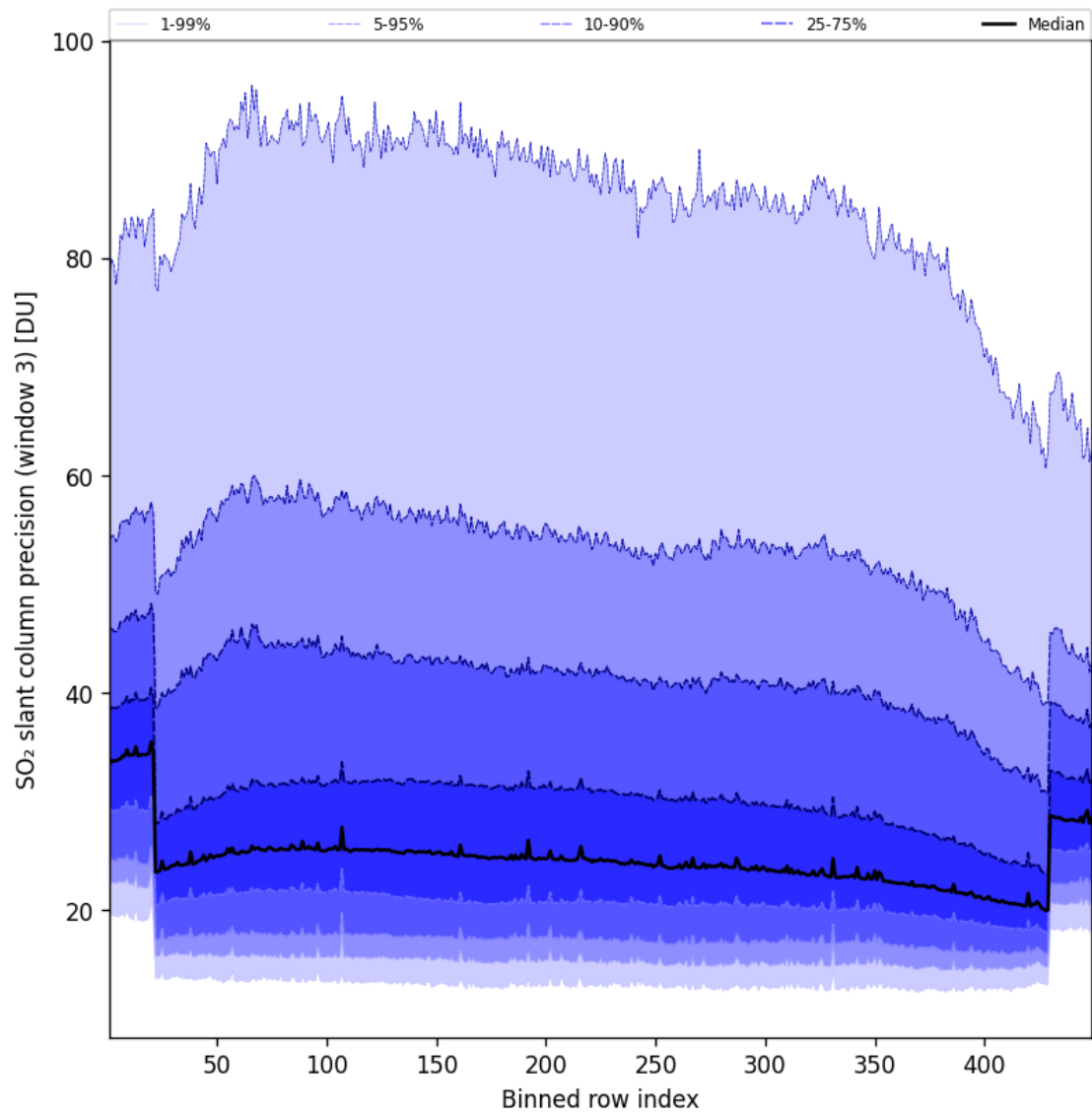


Figure 99: Along track statistics of “SO₂ slant column precision (window 3)” for 2025-06-18 to 2025-06-19

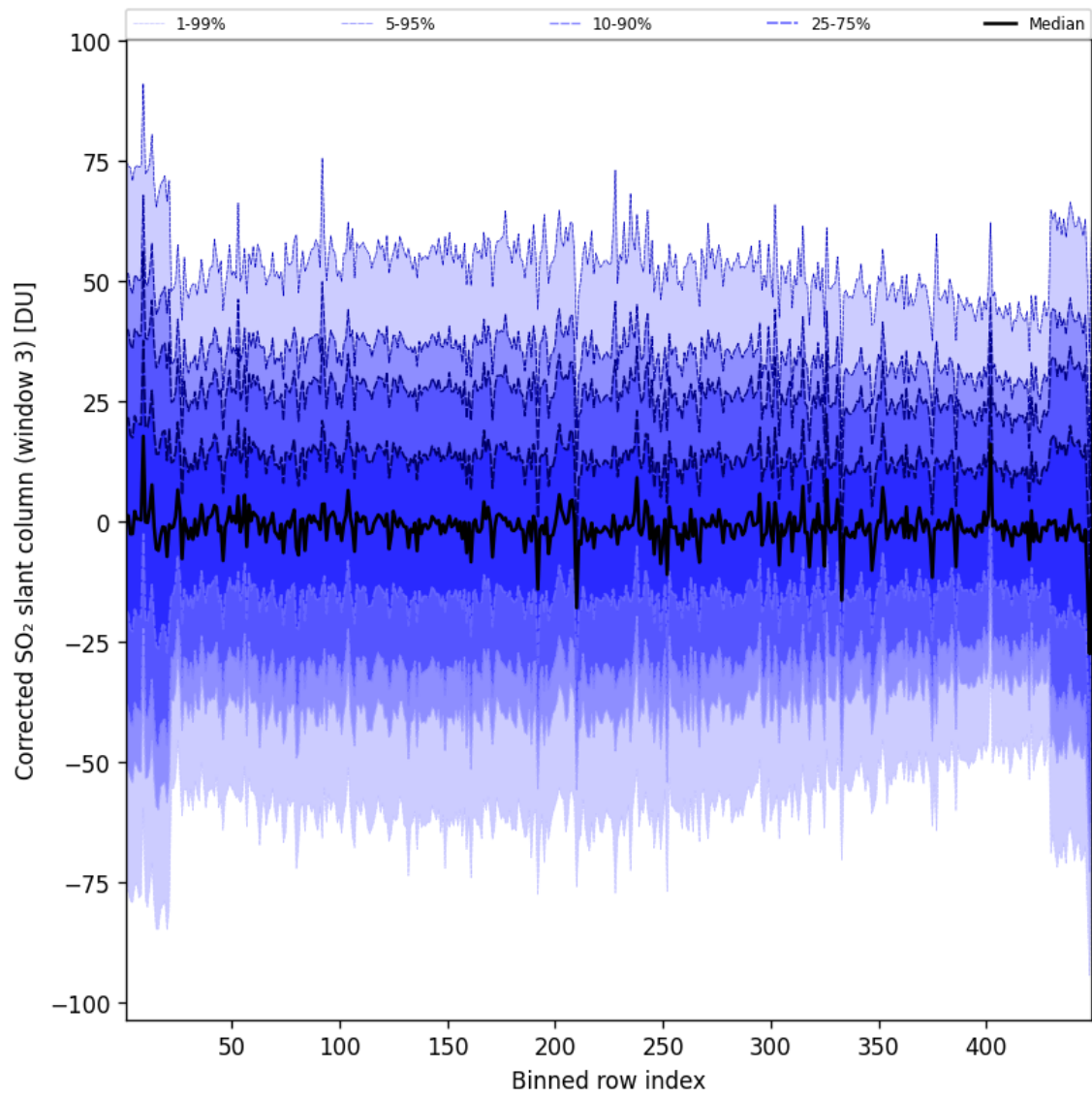


Figure 100: Along track statistics of “Corrected SO₂ slant column (window 3)” for 2025-06-18 to 2025-06-19

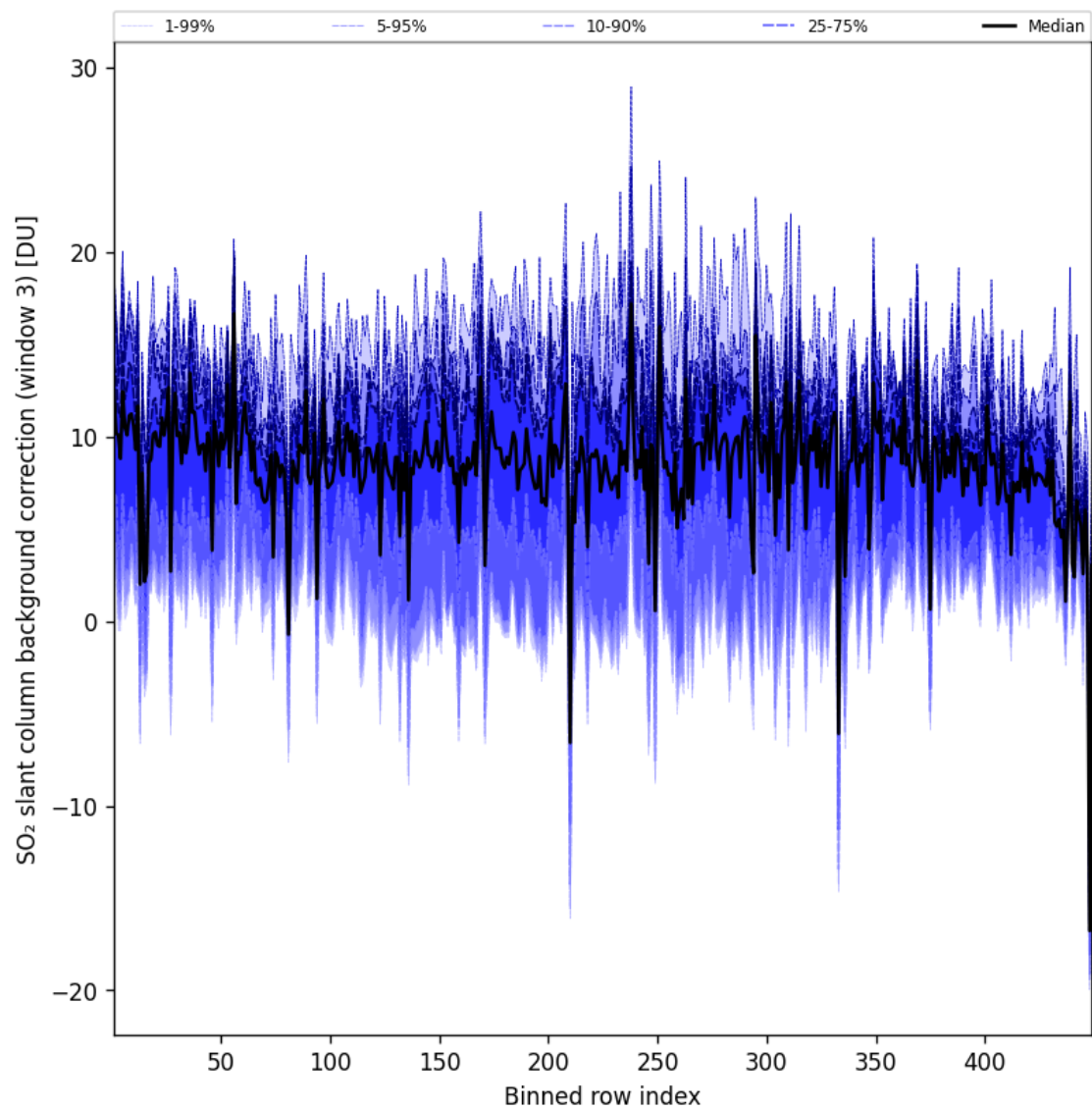


Figure 101: Along track statistics of “SO₂ slant column background correction (window 3)” for 2025-06-18 to 2025-06-19

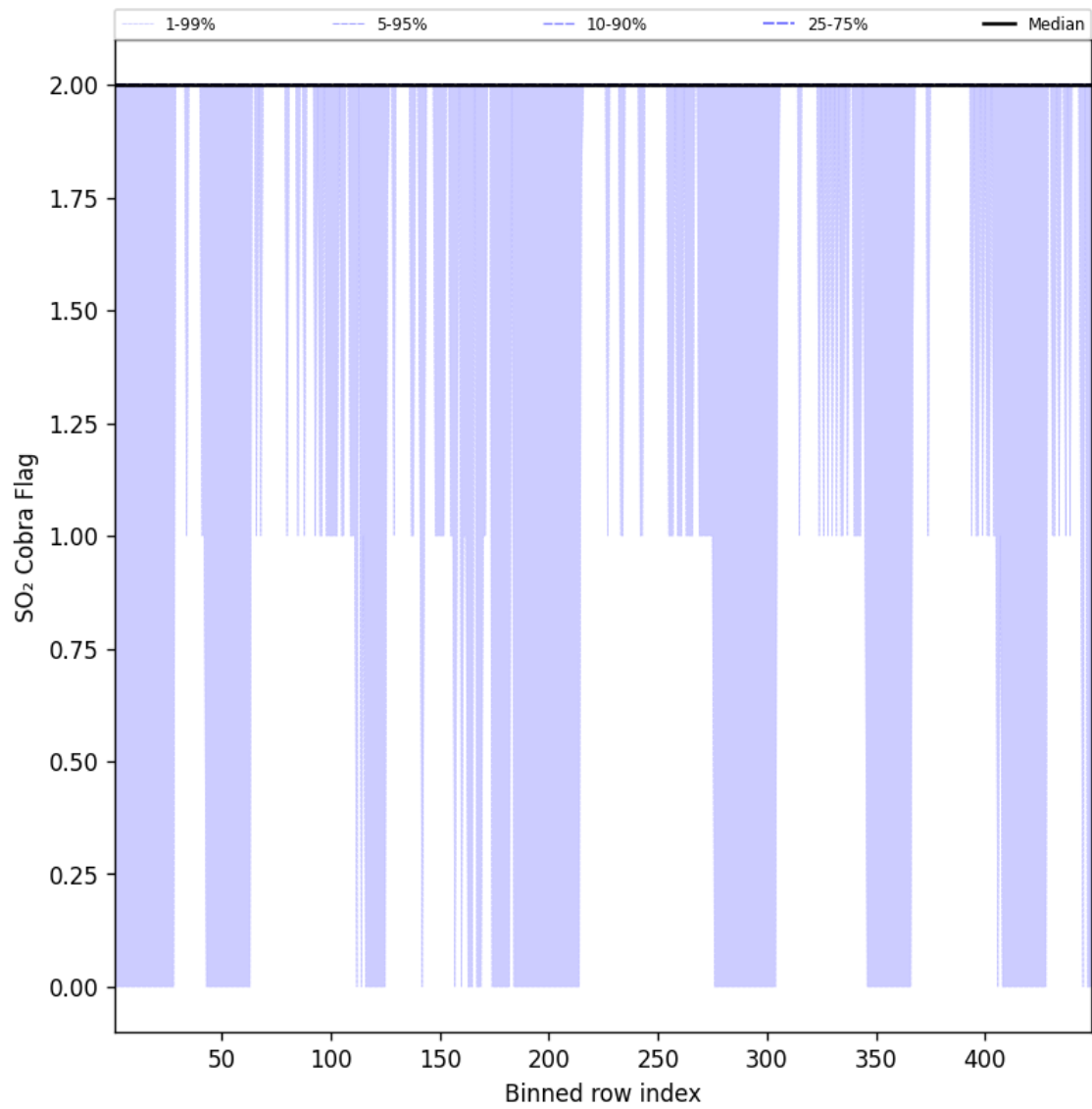


Figure 102: Along track statistics of “SO₂ Cobra Flag” for 2025-06-18 to 2025-06-19

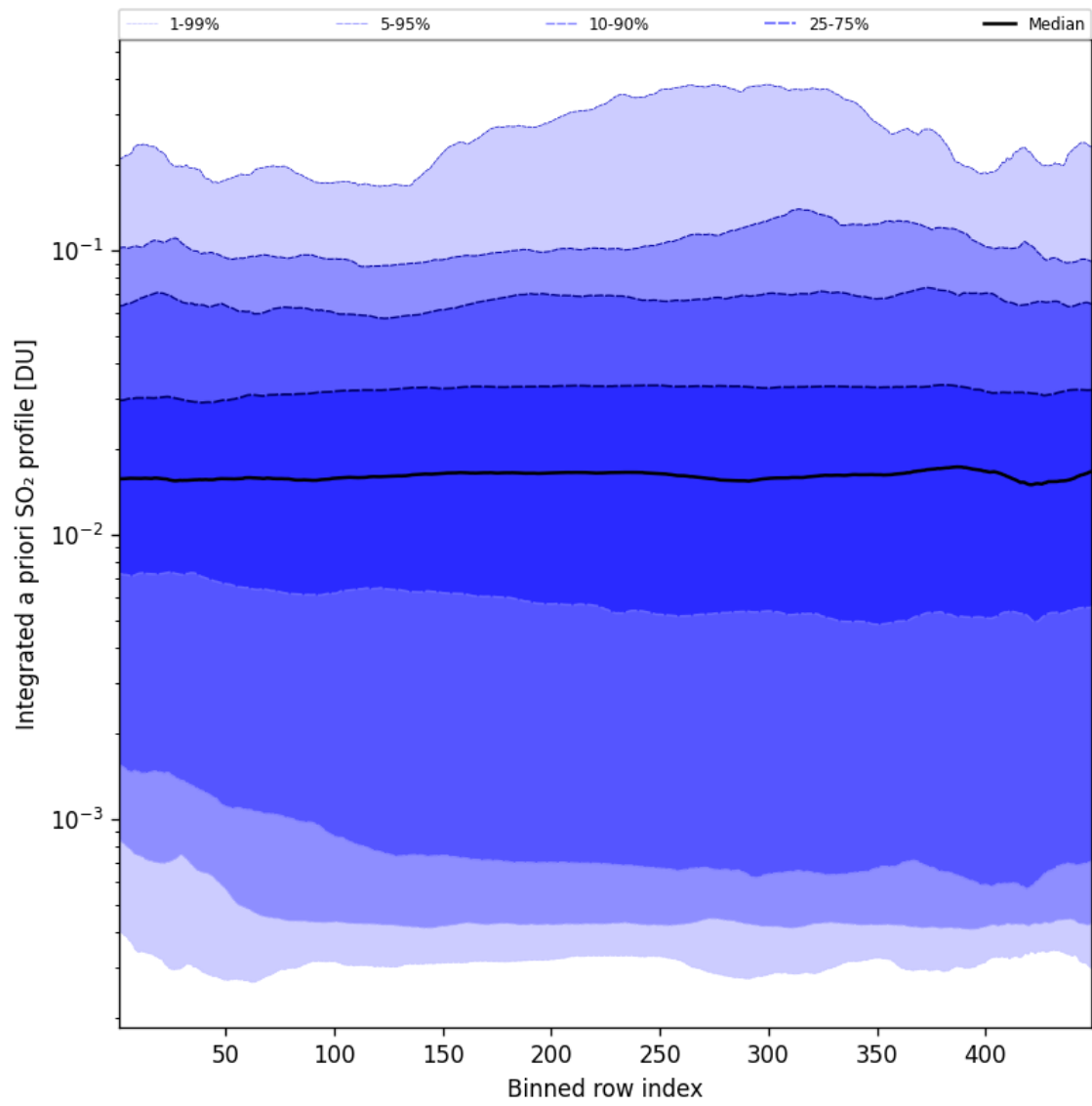


Figure 103: Along track statistics of “Integrated a priori SO₂ profile” for 2025-06-18 to 2025-06-19

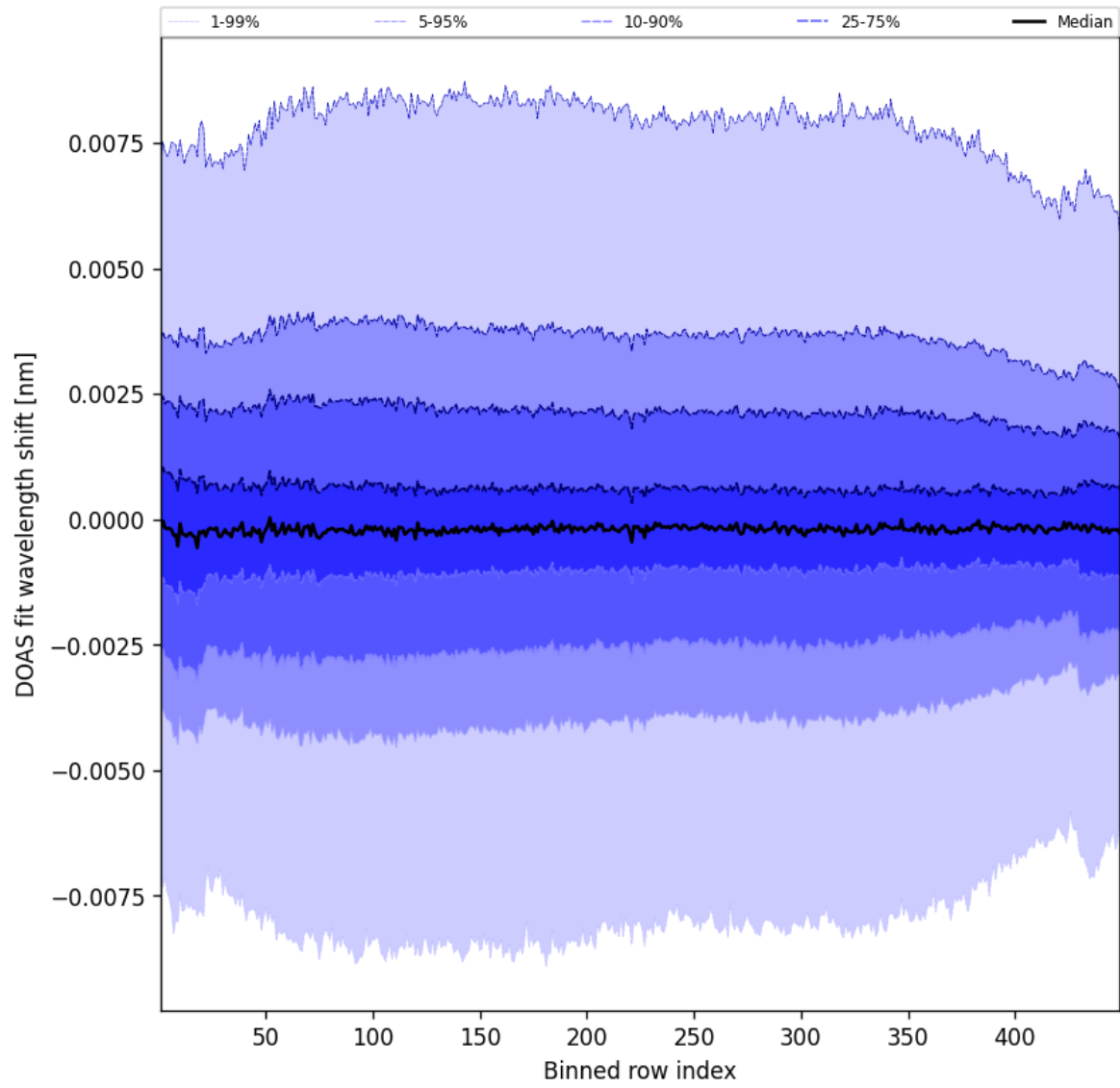


Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2025-06-18 to 2025-06-19

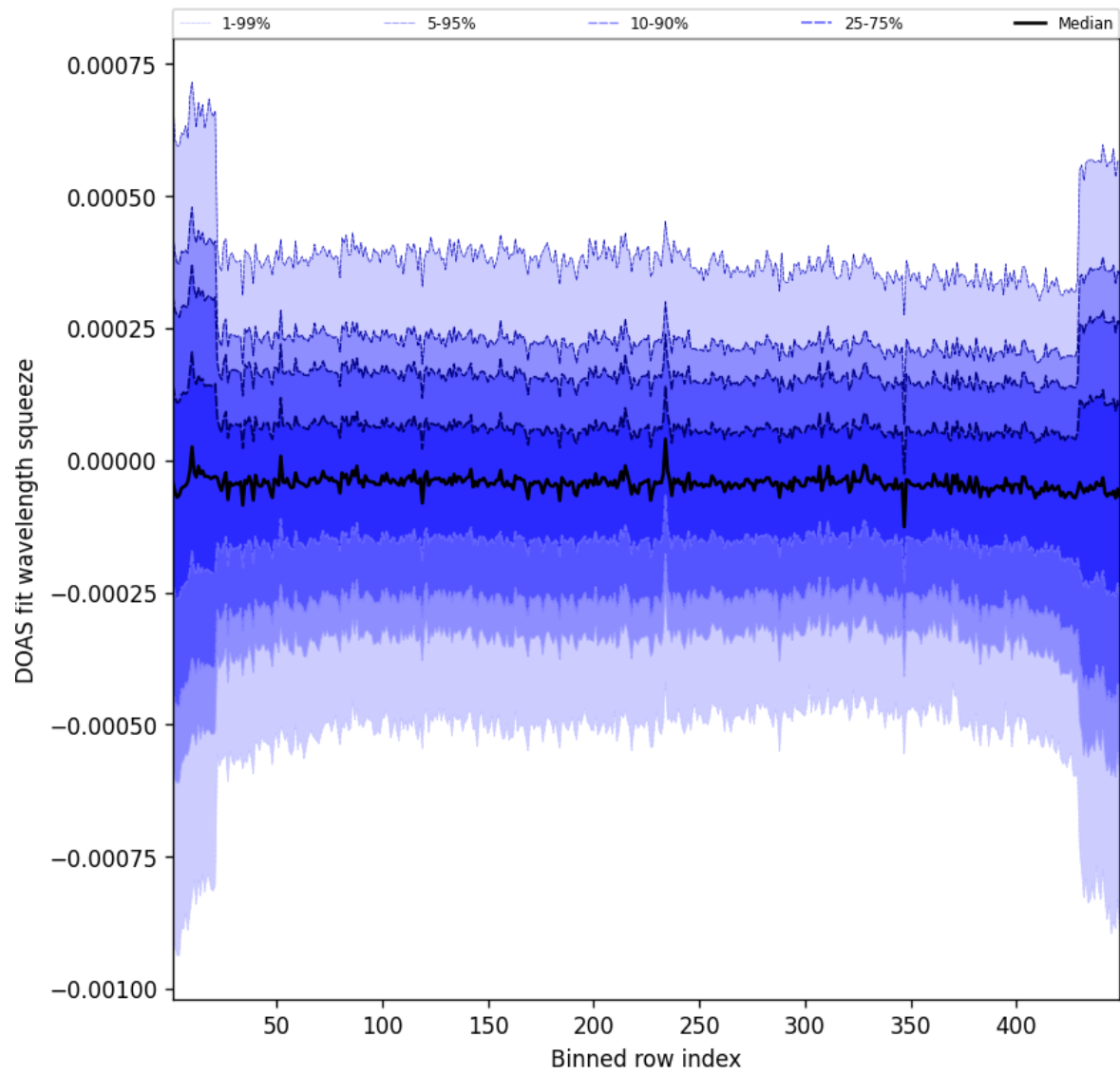


Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2025-06-18 to 2025-06-19

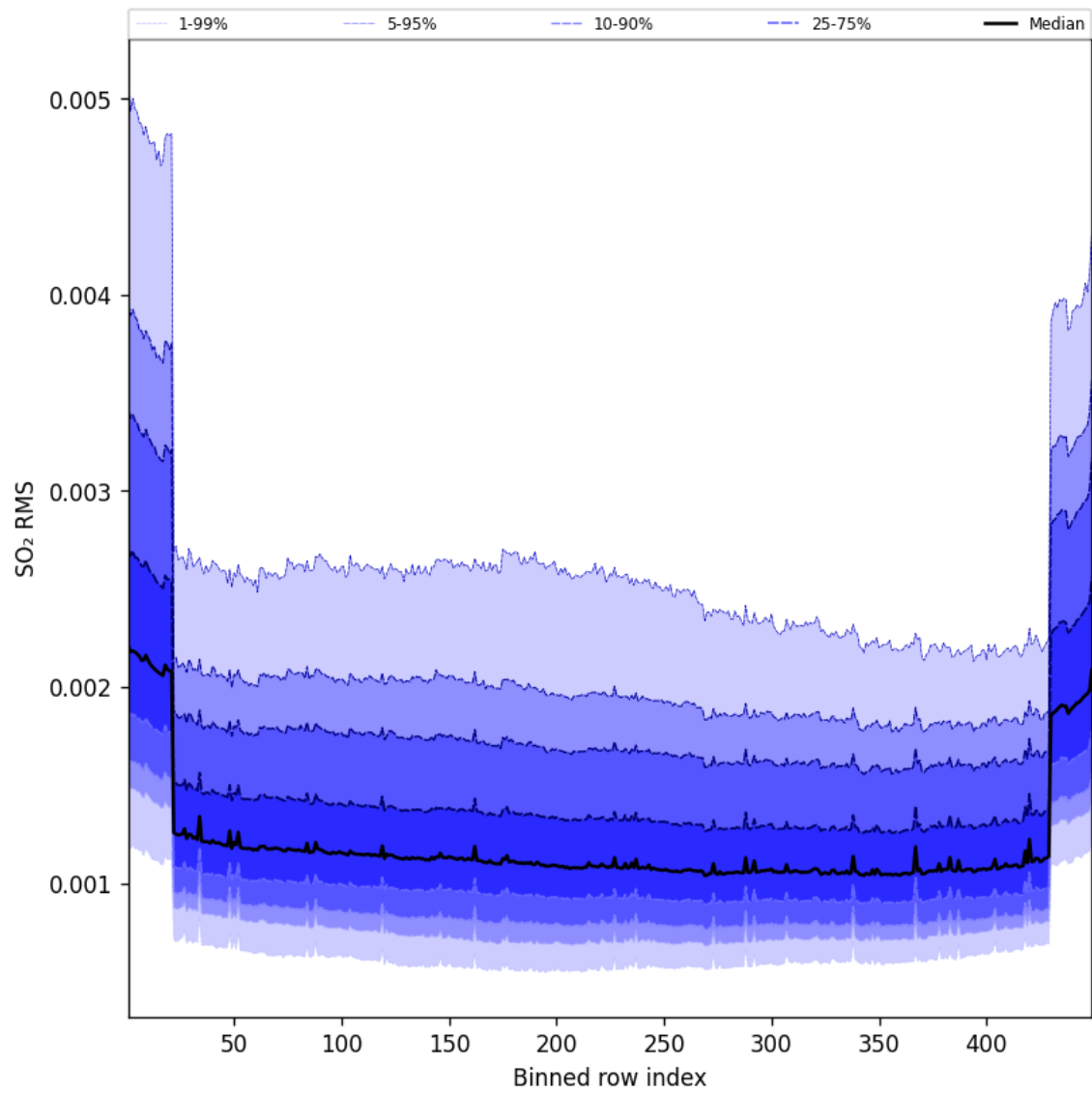


Figure 106: Along track statistics of “SO₂ RMS” for 2025-06-18 to 2025-06-19

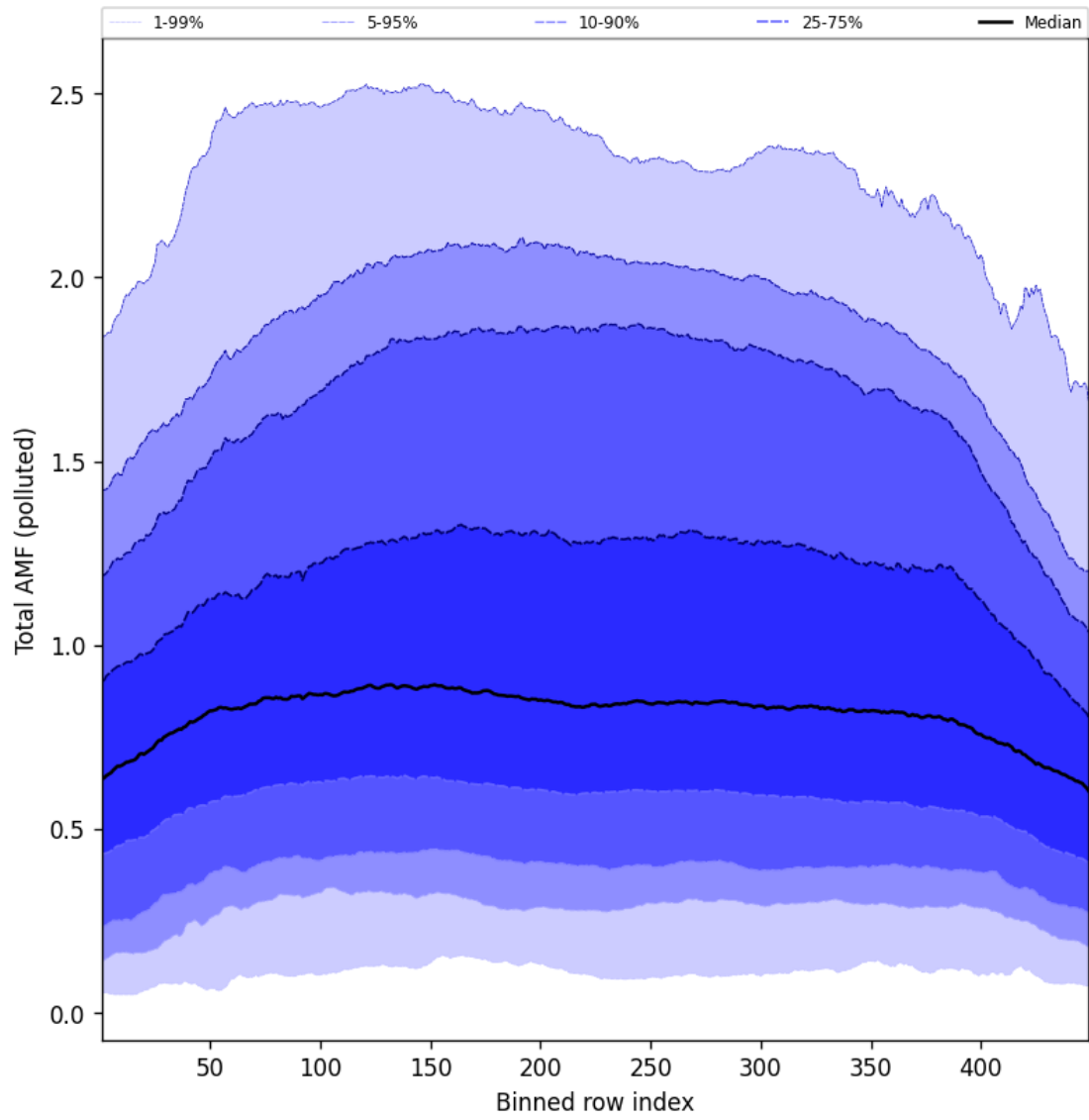


Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-06-18 to 2025-06-19

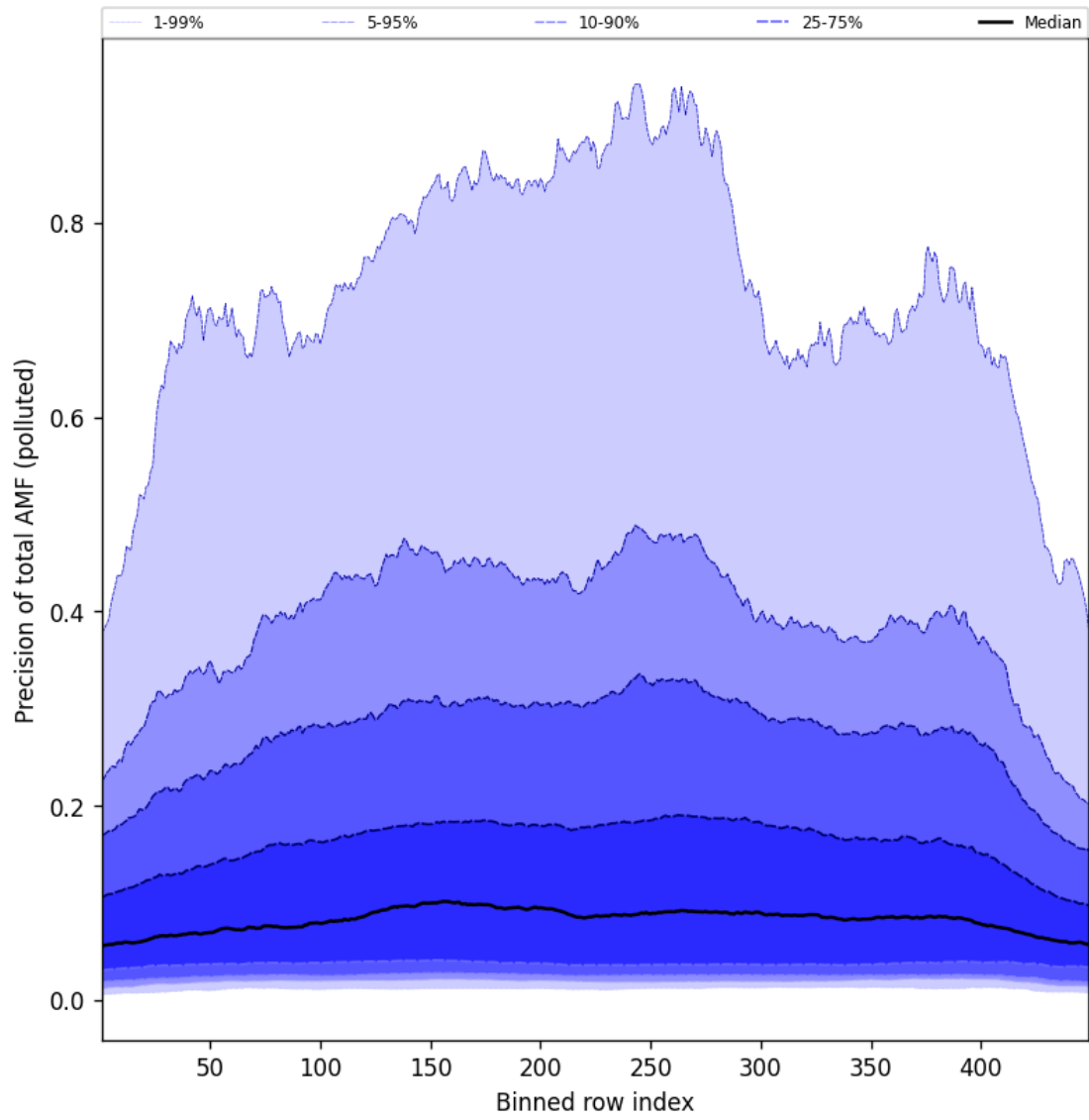


Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-06-18 to 2025-06-19

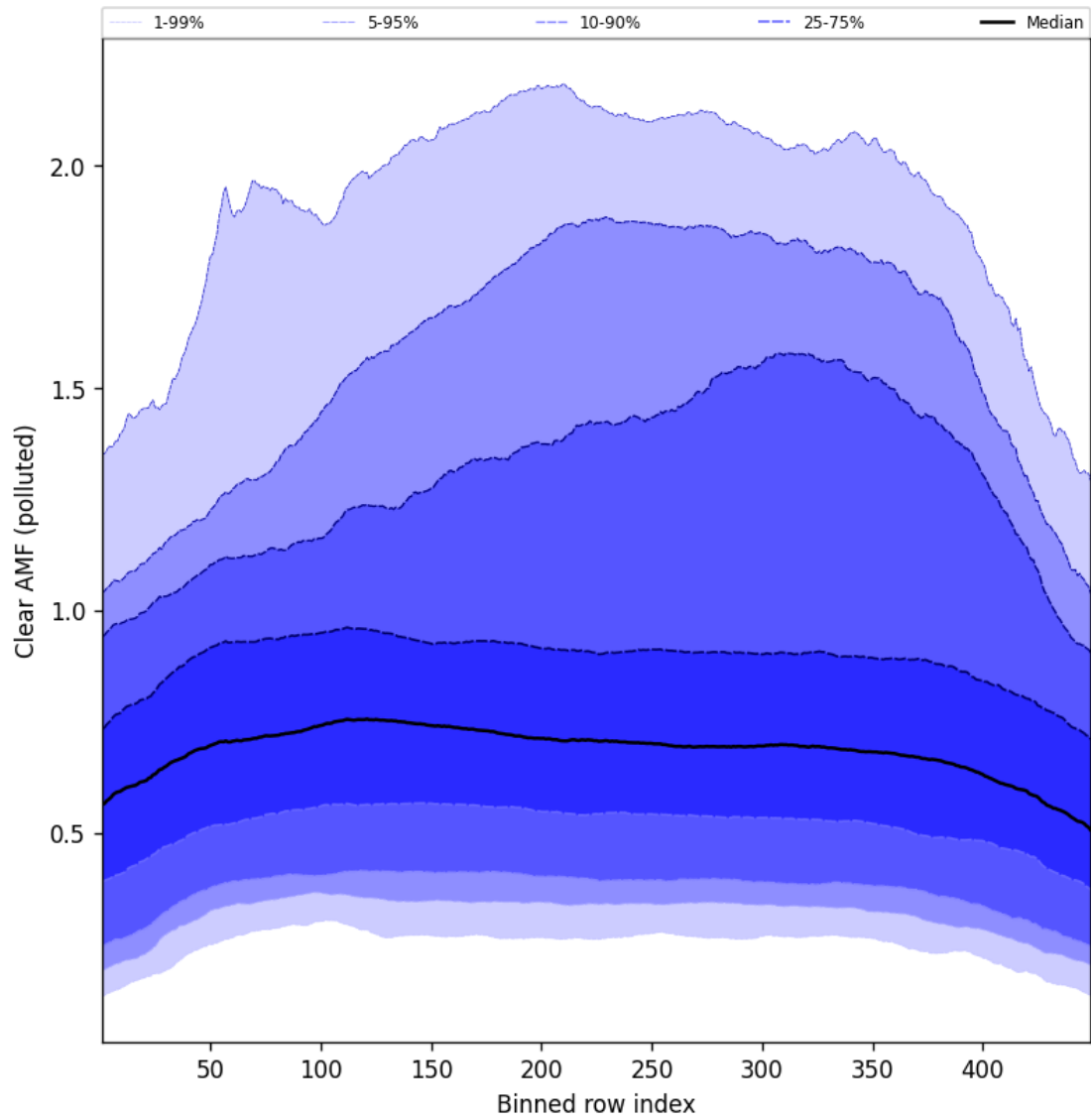


Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-06-18 to 2025-06-19

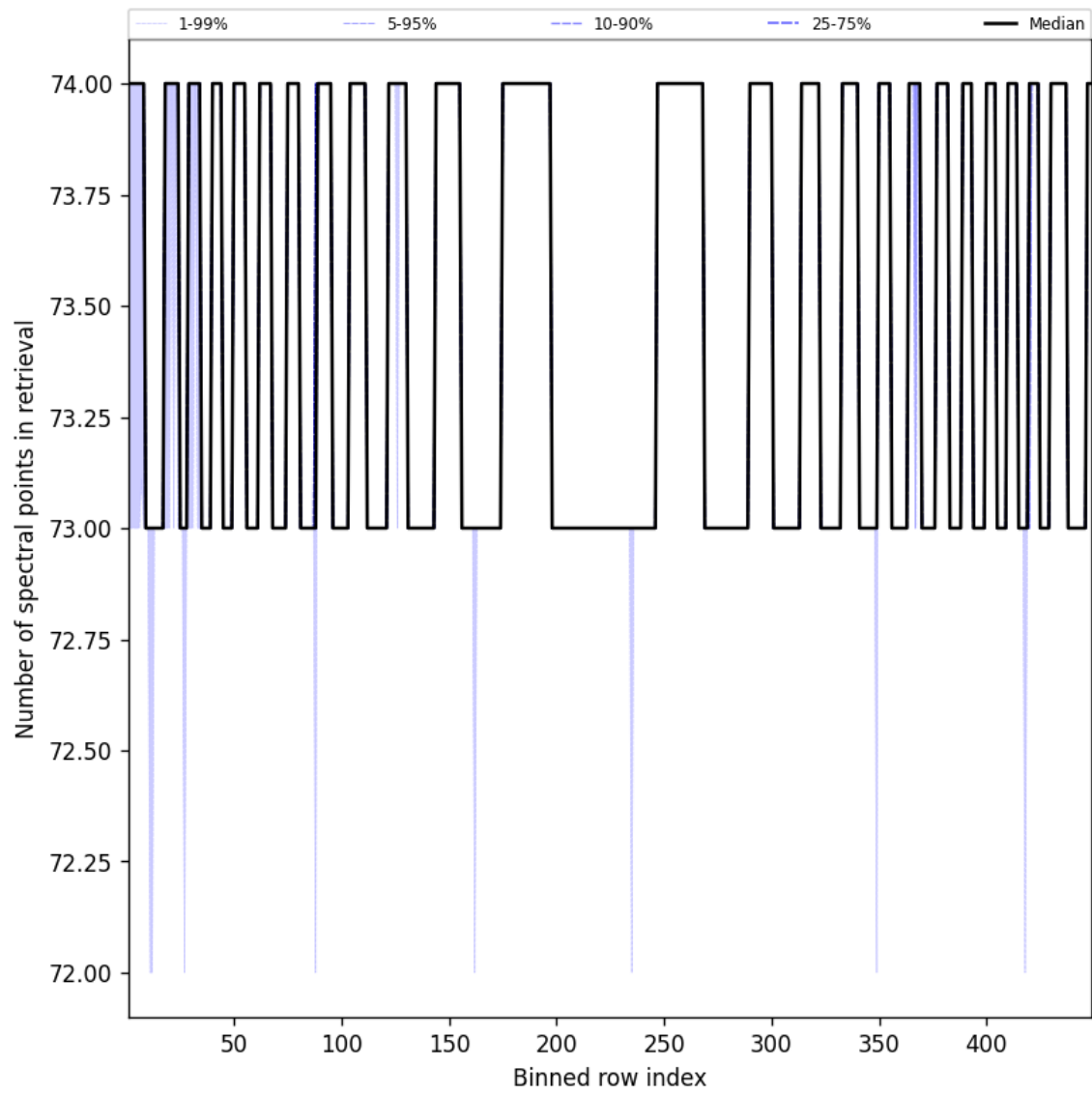


Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-06-18 to 2025-06-19

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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