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:

$$\overline{x} = \frac{1}{N}\sum_{i=1}^{N} x_i \tag{1}$$

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 $\sigma(x) = \sqrt{V(x)}$.

$$V(x) = \frac{1}{N-1}\sum_{i=1}^{N}(x_i - \overline{x})^2 \tag{2}$$

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:

$$P(x \leq m) = P(x \geq m) = \int_{-\infty}^{m} f(x)\,\mathrm{d}x = \frac{1}{2} \tag{3}$$

with $f(x)$ the probability density function.

The median is a special case of a percentile. Instead of ½ 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}.

$$C_{kl} = C(x_{(k)}, x_{(l)}) = \frac{1}{N-1}\sum_{i=1}^{N}(x_{(k),i} - \overline{x_{(k)}})(x_{(l),i} - \overline{x_{(l)}}) \tag{4}$$

Rather than a dimensionally dependent covariance, it is often easier to interpret a correlation matrix R_{kl}, a matrix of Pearson's r coefficients:

$$R_{kl} = R(x_{(k)}, x_{(l)}) = \frac{C_{kl}}{\sqrt{C_{kk}C_{ll}}} = \frac{C_{kl}}{\sqrt{V(x_k)V(x_l)}} \tag{5}$$

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]	0.651 ± 0.409	18543380	0.995	0.780	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(5.369 \pm 164.205) \times 10^{-2}$	18543380	0.263	0.478	1.159×10^{-2}	-149	1.308×10^{3}
sulfurdioxide total vertical column precision [DU]	0.671 ± 1.166	18543380	0.222	0.423	0.338	4.223×10^{-2}	158
sulfurdioxide slant column density corrected [DU]	$(2.160 \pm 43.195) \times 10^{-2}$	18543380	0.235	0.358	9.584×10^{-3}	-33.0	668
sulfurdioxide slant column density cobra [DU]	$(2.138 \pm 38.131) \times 10^{-2}$	18543380	0.235	0.358	9.584×10^{-3}	-33.0	30.2
sulfurdioxide slant column density cobra precision [DU]	0.296 ± 0.155	18543380	0.213	0.151	0.243	8.298×10^{-2}	33.8
sulfurdioxide slant column density window1 [DU]	0.183 ± 0.718	18543380	0.225	0.733	0.200	-90.1	55.8
sulfurdioxide slant column density window1 precision [DU]	0.296 ± 0.155	18543380	0.213	0.151	0.243	8.298×10^{-2}	33.8
sulfurdioxide slant column density corrected win1 [DU]	$(3.344 \pm 70.690) \times 10^{-2}$	18543380	2.500×10^{-2}	0.713	1.095×10^{-2}	-90.1	55.9
background so2 slant column offset window1 [DU]	-0.150 ± 0.208	18543380	-0.300	0.208	-0.198	-1.41	4.57
sulfurdioxide slant column density window2 [DU]	0.959 ± 9.048	18543380	0.250	11.4	0.723	-1.050×10^{3}	1.784×10^{3}
sulfurdioxide slant column density window2 precision [DU]	8.08 ± 2.23	18543380	7.43	2.59	7.73	2.19	432
sulfurdioxide slant column density corrected win2 [DU]	-1.01 ± 8.81	18543380	-0.750	11.1	-0.991	-1.050×10^{3}	1.783×10^{3}
background so2 slant column offset window2 [DU]	-1.97 ± 2.71	18543380	-0.250	3.51	-1.17	-17.2	11.9
sulfurdioxide slant column density window3 [DU]	-5.03 ± 24.34	18543380	-6.16	30.7	-5.17	-1.784×10^{3}	1.471×10^{3}
sulfurdioxide slant column density window3 precision [DU]	28.1 ± 12.8	18543380	22.5	9.59	24.8	10.0	1.187×10^{3}
sulfurdioxide slant column density corrected win3 [DU]	6.44 ± 23.24	18543380	6.16	29.3	6.45	-1.780×10^{3}	1.470×10^{3}
background so2 slant column offset window3 [DU]	11.5 ± 7.4	18543380	6.16	11.9	11.1	-22.7	37.3
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.21	18543380	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(3.109 \pm 7.331) \times 10^{-2}$	18543380	1.946×10^{-2}	1.656×10^{-2}	1.609×10^{-2}	2.343×10^{-4}	2.90
fitted radiance shift [nm]	$(-3.398 \pm 25.279) \times 10^{-4}$	18543380	-5.000×10^{-4}	1.828×10^{-3}	-3.228×10^{-4}	-0.110	8.058×10^{-2}
fitted radiance squeeze [1]	$(-2.580 \pm 20.257) \times 10^{-5}$	18543380	1.000×10^{-5}	2.062×10^{-4}	-1.004×10^{-5}	-1.535×10^{-2}	1.621×10^{-2}
fitted root mean square [1]	$(1.298 \pm 0.636) \times 10^{-3}$	18543380	9.250×10^{-4}	5.989×10^{-4}	1.090×10^{-3}	3.095×10^{-4}	7.724×10^{-2}
sulfurdioxide total air mass factor polluted [1]	0.803 ± 0.441	18543380	0.780	0.542	0.754	5.000×10^{-2}	3.08
sulfurdioxide total air mass factor polluted precision [1]	0.113 ± 0.130	18543380	3.500×10^{-2}	0.114	6.344×10^{-2}	2.500×10^{-3}	1.72
sulfurdioxide clear air mass factor polluted [1]	0.697 ± 0.329	18543380	0.580	0.387	0.661	3.049×10^{-2}	3.28
number of spectral points in retrieval [1]	73.4 ± 0.5	18543380	73.0	1.000	73.0	52.0	155

Table 2: Percentile ranges

Variable	1 %	5 %	10 %	15.9 %	25 %	75 %	84.1 %	90 %	95 %	99 %
qa value [1]	0.0	0.0	5.000×10^{-2}	0.110	0.220	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	−3.50	−1.10	−0.607	−0.389	−0.223	0.255	0.440	0.692	1.28	4.24
sulfurdioxide total vertical column precision [DU]	9.629×10^{-2}	0.133	0.160	0.186	0.218	0.641	0.940	1.39	2.22	5.57
sulfurdioxide slant column density corrected [DU]	−0.904	−0.496	−0.353	−0.261	−0.167	0.190	0.291	0.393	0.563	1.13
sulfurdioxide slant column density cobra [DU]	−0.904	−0.496	−0.353	−0.261	−0.167	0.190	0.291	0.393	0.563	1.13
sulfurdioxide slant column density cobra precision [DU]	0.135	0.162	0.174	0.185	0.199	0.350	0.415	0.482	0.586	0.879
sulfurdioxide slant column density window1 [DU]	−1.87	−0.913	−0.583	−0.378	−0.172	0.561	0.750	0.933	1.22	2.06
sulfurdioxide slant column density window1 precision [DU]	0.135	0.162	0.174	0.185	0.199	0.350	0.415	0.482	0.586	0.879
sulfurdioxide slant column density corrected win1 [DU]	−1.75	−0.970	−0.700	−0.524	−0.340	0.373	0.574	0.777	1.11	2.13
background so2 slant column offset window1 [DU]	−0.499	−0.351	−0.321	−0.302	−0.279	-7.117×10^{-2}	1.047×10^{-2}	9.685×10^{-2}	0.218	0.539
sulfurdioxide slant column density window2 [DU]	−19.9	−13.3	−10.0	−7.62	−4.88	6.53	9.52	12.3	16.0	24.0
sulfurdioxide slant column density window2 precision [DU]	4.27	5.18	5.70	6.11	6.60	9.20	10.1	10.9	12.1	14.8
sulfurdioxide slant column density corrected win2 [DU]	−22.5	−15.3	−11.9	−9.35	−6.56	4.55	7.32	9.81	13.2	20.3
background so2 slant column offset window2 [DU]	−9.37	−7.16	−5.92	−4.89	−3.58	-6.474×10^{-2}	0.212	0.476	0.987	3.03
sulfurdioxide slant column density window3 [DU]	−65.1	−44.8	−35.1	−28.1	−20.4	10.4	18.3	25.5	35.1	54.0
sulfurdioxide slant column density window3 precision [DU]	14.2	16.6	18.2	19.5	21.1	30.7	35.1	40.7	52.2	82.6
sulfurdioxide slant column density corrected win3 [DU]	−51.5	−31.6	−22.2	−15.5	−8.12	21.2	28.6	35.3	44.4	62.7
background so2 slant column offset window3 [DU]	−2.22	0.450	1.85	3.45	5.56	17.4	19.6	21.3	23.4	26.8
sulfurdioxide slant column cobra flag [1]	0.0	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
integrated so2 profile apriori [DU]	1.493×10^{-3}	3.597×10^{-3}	5.571×10^{-3}	7.396×10^{-3}	9.618×10^{-3}	2.618×10^{-2}	3.483×10^{-2}	5.128×10^{-2}	0.102	0.312
fitted radiance shift [nm]	-7.922×10^{-3}	-4.127×10^{-3}	-2.781×10^{-3}	-1.997×10^{-3}	-1.291×10^{-3}	5.376×10^{-4}	1.224×10^{-3}	2.077×10^{-3}	3.549×10^{-3}	7.561×10^{-3}
fitted radiance squeeze [1]	-6.920×10^{-4}	-3.572×10^{-4}	-2.447×10^{-4}	-1.794×10^{-4}	-1.172×10^{-4}	8.894×10^{-5}	1.390×10^{-4}	1.855×10^{-4}	2.531×10^{-4}	4.217×10^{-4}
fitted root mean square [1]	5.803×10^{-4}	7.164×10^{-4}	7.867×10^{-4}	8.400×10^{-4}	9.056×10^{-4}	1.504×10^{-3}	1.784×10^{-3}	2.063×10^{-3}	2.516×10^{-3}	3.622×10^{-3}
sulfurdioxide total air mass factor polluted [1]	5.868×10^{-2}	0.174	0.267	0.369	0.495	1.04	1.22	1.41	1.65	2.08
sulfurdioxide total air mass factor polluted precision [1]	8.057×10^{-3}	1.393×10^{-2}	2.083×10^{-2}	2.707×10^{-2}	3.481×10^{-2}	0.148	0.201	0.256	0.351	0.625
sulfurdioxide clear air mass factor polluted [1]	0.156	0.253	0.327	0.395	0.480	0.867	0.963	1.05	1.20	1.92
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]	0.646 ± 0.411	8904067	0.790	1.000	0.0	1.000	0.210	1.000
sulfurdioxide total vertical column [DU]	$(9.244 \pm 222.847) \times 10^{-2}$	8904067	0.642	1.594×10^{-2}	-149	212	-0.293	0.349
sulfurdioxide total vertical column precision [DU]	0.980 ± 1.564	8904067	0.784	0.486	4.223×10^{-2}	69.5	0.255	1.04
sulfurdioxide slant column density corrected [DU]	$(3.031 \pm 46.105) \times 10^{-2}$	8904067	0.388	1.138×10^{-2}	-13.4	148	-0.180	0.209
sulfurdioxide slant column density cobra [DU]	$(3.000 \pm 44.451) \times 10^{-2}$	8904067	0.388	1.138×10^{-2}	-13.4	22.2	-0.180	0.209
sulfurdioxide slant column density cobra precision [DU]	0.330 ± 0.185	8904067	0.198	0.265	8.385×10^{-2}	6.60	0.206	0.404
sulfurdioxide slant column density window1 [DU]	0.201 ± 0.820	8904067	0.790	0.222	-15.0	26.7	-0.178	0.611
sulfurdioxide slant column density window1 precision [DU]	0.330 ± 0.185	8904067	0.198	0.265	8.385×10^{-2}	6.60	0.206	0.404
sulfurdioxide slant column density corrected win1 [DU]	$(5.584 \pm 81.336) \times 10^{-2}$	8904067	0.775	2.170×10^{-2}	-15.0	26.6	-0.357	0.418
background so2 slant column offset window1 [DU]	-0.145 ± 0.244	8904067	0.218	-0.205	-1.41	4.57	-0.288	-7.026×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.67 ± 9.36	8904067	11.9	1.35	-117	116	-4.47	7.45
sulfurdioxide slant column density window2 precision [DU]	8.27 ± 2.24	8904067	2.76	7.91	2.41	196	6.72	9.47
sulfurdioxide slant column density corrected win2 [DU]	-1.06 ± 9.00	8904067	11.4	-1.02	-118	114	-6.75	4.66
background so2 slant column offset window2 [DU]	-2.73 ± 3.12	8904067	4.99	-1.95	-17.2	11.9	-5.17	-0.177
sulfurdioxide slant column density window3 [DU]	-7.48 ± 24.26	8904067	30.7	-7.44	-194	176	-22.7	7.96
sulfurdioxide slant column density window3 precision [DU]	28.3 ± 12.7	8904067	9.61	25.0	10.1	216	21.3	30.9
sulfurdioxide slant column density corrected win3 [DU]	6.83 ± 23.17	8904067	29.1	6.95	-186	183	-7.61	21.5
background so2 slant column offset window3 [DU]	14.3 ± 6.8	8904067	11.9	14.4	-18.7	37.3	8.13	20.0
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.23	8904067	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(4.366 \pm 10.109) \times 10^{-2}$	8904067	2.598×10^{-2}	1.760×10^{-2}	2.343×10^{-4}	2.90	8.430×10^{-3}	3.441×10^{-2}
fitted radiance shift [nm]	$(-1.864 \pm 24.935) \times 10^{-4}$	8904067	1.729×10^{-3}	-1.831×10^{-4}	-3.321×10^{-2}	3.303×10^{-2}	-1.071×10^{-3}	6.575×10^{-4}
fitted radiance squeeze [1]	$(-3.317 \pm 23.949) \times 10^{-5}$	8904067	2.279×10^{-4}	-7.162×10^{-6}	-1.006×10^{-2}	2.120×10^{-3}	-1.278×10^{-4}	1.001×10^{-4}
fitted root mean square [1]	$(1.433 \pm 0.768) \times 10^{-3}$	8904067	7.711×10^{-4}	1.163×10^{-3}	3.453×10^{-4}	3.780×10^{-2}	9.329×10^{-4}	1.704×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.669 ± 0.408	8904067	0.547	0.615	5.000×10^{-2}	3.08	0.359	0.906
sulfurdioxide total air mass factor polluted precision [1]	0.102 ± 0.150	8904067	9.130×10^{-2}	4.822×10^{-2}	2.500×10^{-3}	1.72	2.592×10^{-2}	0.117
sulfurdioxide clear air mass factor polluted [1]	0.577 ± 0.273	8904067	0.416	0.531	3.049×10^{-2}	3.08	0.365	0.780
number of spectral points in retrieval [1]	73.5 ± 0.5	8904067	1.000	73.0	52.0	155	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]	0.655 ± 0.406	9639313	0.780	1.000	0.0	1.000	0.220	1.000
sulfurdioxide total vertical column [DU]	$(1.789 \pm 77.266) \times 10^{-2}$	9639313	0.384	8.869×10^{-3}	-53.1	1.308×10^{3}	-0.182	0.202
sulfurdioxide total vertical column precision [DU]	0.386 ± 0.434	9639313	0.231	0.278	4.781×10^{-2}	158	0.196	0.427
sulfurdioxide slant column density corrected [DU]	$(1.356 \pm 40.304) \times 10^{-2}$	9639313	0.333	8.127×10^{-3}	-33.0	668	-0.157	0.176
sulfurdioxide slant column density cobra [DU]	$(1.341 \pm 31.154) \times 10^{-2}$	9639313	0.333	8.127×10^{-3}	-33.0	30.2	-0.157	0.176
sulfurdioxide slant column density cobra precision [DU]	0.265 ± 0.112	9639313	0.114	0.230	8.298×10^{-2}	33.8	0.194	0.308
sulfurdioxide slant column density window1 [DU]	0.167 ± 0.608	9639313	0.687	0.183	-90.1	55.8	-0.168	0.519
sulfurdioxide slant column density window1 precision [DU]	0.265 ± 0.112	9639313	0.114	0.230	8.298×10^{-2}	33.8	0.194	0.308
sulfurdioxide slant column density corrected win1 [DU]	$(1.275 \pm 59.102) \times 10^{-2}$	9639313	0.664	2.264×10^{-3}	-90.1	55.9	-0.327	0.337
background so2 slant column offset window1 [DU]	-0.154 ± 0.168	9639313	0.200	-0.191	-1.24	2.48	-0.272	-7.202×10^{-2}
sulfurdioxide slant column density window2 [DU]	0.307 ± 8.696	9639313	10.9	0.190	-1.050×10^{3}	1.784×10^{3}	-5.23	5.71
sulfurdioxide slant column density window2 precision [DU]	7.90 ± 2.20	9639313	2.43	7.59	2.19	432	6.51	8.95
sulfurdioxide slant column density corrected win2 [DU]	-0.967 ± 8.630	9639313	10.8	-0.964	-1.050×10^{3}	1.783×10^{3}	-6.39	4.45
background so2 slant column offset window2 [DU]	-1.27 ± 2.04	9639313	2.39	-0.816	-15.6	11.8	-2.39	-1.580×10^{-3}
sulfurdioxide slant column density window3 [DU]	-2.77 ± 24.20	9639313	30.6	-3.08	-1.784×10^{3}	1.471×10^{3}	-18.1	12.5
sulfurdioxide slant column density window3 precision [DU]	28.0 ± 12.8	9639313	9.55	24.6	10.0	1.187×10^{3}	20.9	30.4
sulfurdioxide slant column density corrected win3 [DU]	6.08 ± 23.29	9639313	29.4	5.98	-1.780×10^{3}	1.470×10^{3}	-8.57	20.8
background so2 slant column offset window3 [DU]	8.85 ± 6.90	9639313	12.0	7.88	-22.7	31.9	2.93	14.9
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.19	9639313	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(1.947 \pm 2.489) \times 10^{-2}$	9639313	1.230×10^{-2}	1.532×10^{-2}	5.921×10^{-4}	2.00	1.030×10^{-2}	2.260×10^{-2}
fitted radiance shift [nm]	$(-4.816 \pm 25.511) \times 10^{-4}$	9639313	1.885×10^{-3}	-4.617×10^{-4}	-0.110	8.058×10^{-2}	-1.476×10^{-3}	4.083×10^{-4}
fitted radiance squeeze [1]	$(-1.900 \pm 16.083) \times 10^{-5}$	9639313	1.894×10^{-4}	-1.233×10^{-5}	-1.535×10^{-2}	1.621×10^{-2}	-1.097×10^{-4}	7.976×10^{-5}
fitted root mean square [1]	$(1.173 \pm 0.448) \times 10^{-3}$	9639313	4.607×10^{-4}	1.044×10^{-3}	3.095×10^{-4}	7.724×10^{-2}	8.850×10^{-4}	1.346×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.927 ± 0.433	9639313	0.537	0.851	5.000×10^{-2}	2.93	0.625	1.16
sulfurdioxide total air mass factor polluted precision [1]	0.123 ± 0.109	9639313	0.128	8.333×10^{-2}	4.949×10^{-3}	1.50	4.292×10^{-2}	0.171
sulfurdioxide clear air mass factor polluted [1]	0.808 ± 0.337	9639313	0.339	0.744	0.137	3.28	0.597	0.936
number of spectral points in retrieval [1]	73.4 ± 0.5	9639313	1.000	73.0	52.0	74.0	73.0	74.0

Table 5: Parameterlist and basic statistics for the analysis for observations over water

Variable	mean $\pm\sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.685 ± 0.399	13613800	0.740	1.000	0.0	1.000	0.260	1.000
sulfurdioxide total vertical column [DU]	$(3.309 \pm 120.724) \times 10^{-2}$	13613800	0.438	9.887×10^{-3}	-124	137	-0.206	0.232
sulfurdioxide total vertical column precision [DU]	0.547 ± 0.899	13613800	0.319	0.306	4.979×10^{-2}	72.4	0.213	0.531
sulfurdioxide slant column density corrected [DU]	$(1.642 \pm 34.583) \times 10^{-2}$	13613800	0.345	8.338×10^{-3}	-33.0	65.2	-0.162	0.182
sulfurdioxide slant column density cobra [DU]	$(1.637 \pm 34.269) \times 10^{-2}$	13613800	0.345	8.338×10^{-3}	-33.0	30.2	-0.162	0.182
sulfurdioxide slant column density cobra precision [DU]	0.281 ± 0.136	13613800	0.134	0.234	8.298×10^{-2}	33.8	0.196	0.329
sulfurdioxide slant column density window1 [DU]	0.182 ± 0.665	13613800	0.707	0.198	-90.1	55.8	-0.162	0.545
sulfurdioxide slant column density window1 precision [DU]	0.281 ± 0.136	13613800	0.134	0.234	8.298×10^{-2}	33.8	0.196	0.329
sulfurdioxide slant column density corrected win1 [DU]	$(2.348 \pm 65.297) \times 10^{-2}$	13613800	0.688	7.209×10^{-3}	-90.1	55.9	-0.333	0.355
background so2 slant column offset window1 [DU]	-0.158 ± 0.186	13613800	0.200	-0.198	-0.871	3.71	-0.278	-7.840×10^{-2}
sulfurdioxide slant column density window2 [DU]	0.657 ± 8.805	13613800	11.1	0.454	-1.050×10^{3}	995	-5.03	6.10
sulfurdioxide slant column density window2 precision [DU]	7.95 ± 2.15	13613800	2.48	7.60	2.21	432	6.52	9.01
sulfurdioxide slant column density corrected win2 [DU]	-0.979 ± 8.620	13613800	10.9	-0.971	-1.050×10^{3}	995	-6.44	4.48
background so2 slant column offset window2 [DU]	-1.64 ± 2.43	13613800	2.91	-1.00	-17.2	11.9	-2.93	-2.451×10^{-2}
sulfurdioxide slant column density window3 [DU]	-2.31 ± 24.14	13613800	30.6	-2.56	-928	169	-17.6	13.0
sulfurdioxide slant column density window3 precision [DU]	27.7 ± 12.3	13613800	9.33	24.3	10.0	497	20.9	30.2
sulfurdioxide slant column density corrected win3 [DU]	8.38 ± 22.83	13613800	29.1	8.13	-920	176	-6.21	22.9
background so2 slant column offset window3 [DU]	10.7 ± 7.0	13613800	11.1	10.2	-22.7	37.3	5.21	16.3
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.18	13613800	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.196 \pm 3.395) \times 10^{-2}$	13613800	1.331×10^{-2}	1.532×10^{-2}	2.343×10^{-4}	1.19	9.883×10^{-3}	2.319×10^{-2}
fitted radiance shift [nm]	$(-3.339 \pm 24.282) \times 10^{-4}$	13613800	1.808×10^{-3}	-3.049×10^{-4}	-0.110	4.551×10^{-2}	-1.270×10^{-3}	5.372×10^{-4}
fitted radiance squeeze [1]	$(-1.905 \pm 18.473) \times 10^{-5}$	13613800	1.963×10^{-4}	-7.161×10^{-6}	-1.190×10^{-2}	1.621×10^{-2}	-1.085×10^{-4}	8.778×10^{-5}
fitted root mean square [1]	$(1.235 \pm 0.566) \times 10^{-3}$	13613800	5.208×10^{-4}	1.055×10^{-3}	3.095×10^{-4}	7.724×10^{-2}	8.909×10^{-4}	1.412×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.829 ± 0.400	13613800	0.482	0.792	5.000×10^{-2}	2.63	0.559	1.04
sulfurdioxide total air mass factor polluted precision [1]	0.108 ± 0.104	13613800	0.108	6.629×10^{-2}	2.500×10^{-3}	1.40	3.885×10^{-2}	0.147
sulfurdioxide clear air mass factor polluted [1]	0.720 ± 0.276	13613800	0.350	0.699	3.999×10^{-2}	2.61	0.531	0.881
number of spectral points in retrieval [1]	73.4 ± 0.5	13613800	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]	0.585 ± 0.420	3769126	0.850	0.490	0.0	1.000	0.150	1.000
sulfurdioxide total vertical column [DU]	$(9.505 \pm 236.143) \times 10^{-2}$	3769126	0.589	1.441×10^{-2}	-149	1.308×10^{3}	-0.268	0.321
sulfurdioxide total vertical column precision [DU]	0.930 ± 1.557	3769126	0.775	0.440	4.223×10^{-2}	158	0.235	1.01
sulfurdioxide slant column density corrected [DU]	$(3.059 \pm 61.690) \times 10^{-2}$	3769126	0.382	1.150×10^{-2}	-15.8	668	-0.177	0.206
sulfurdioxide slant column density cobra [DU]	$(2.986 \pm 44.337) \times 10^{-2}$	3769126	0.382	1.150×10^{-2}	-15.8	28.7	-0.177	0.206
sulfurdioxide slant column density cobra precision [DU]	0.322 ± 0.180	3769126	0.175	0.261	8.776×10^{-2}	17.1	0.206	0.381
sulfurdioxide slant column density window1 [DU]	0.191 ± 0.805	3769126	0.783	0.212	-39.9	41.5	-0.187	0.596
sulfurdioxide slant column density window1 precision [DU]	0.322 ± 0.180	3769126	0.175	0.261	8.776×10^{-2}	17.1	0.206	0.381
sulfurdioxide slant column density corrected win1 [DU]	$(4.992 \pm 79.588) \times 10^{-2}$	3769126	0.759	1.703×10^{-2}	-39.9	41.6	-0.354	0.404
background so2 slant column offset window1 [DU]	-0.141 ± 0.244	3769126	0.216	-0.206	-1.41	4.57	-0.287	-7.045×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.38 ± 9.49	3769126	11.9	1.16	-721	1.784×10^{3}	-4.69	7.22
sulfurdioxide slant column density window2 precision [DU]	8.38 ± 2.41	3769126	2.73	8.05	2.19	370	6.83	9.56
sulfurdioxide slant column density corrected win2 [DU]	-1.10 ± 9.21	3769126	11.5	-1.06	-720	1.783×10^{3}	-6.81	4.66
background so2 slant column offset window2 [DU]	-2.48 ± 3.05	3769126	4.73	-1.49	-17.2	11.9	-4.85	-0.113
sulfurdioxide slant column density window3 [DU]	-12.4 ± 23.4	3769126	29.3	-12.0	-512	1.471×10^{3}	-26.8	2.45
sulfurdioxide slant column density window3 precision [DU]	29.8 ± 14.3	3769126	10.0	26.1	10.6	800	22.0	32.0
sulfurdioxide slant column density corrected win3 [DU]	0.262 ± 23.538	3769126	29.4	0.967	-515	1.470×10^{3}	-14.1	15.3
background so2 slant column offset window3 [DU]	12.7 ± 7.9	3769126	13.3	12.7	-16.1	37.3	6.08	19.4
sulfurdioxide slant column cobra flag [1]	1.96 ± 0.26	3769126	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(5.571 \pm 12.550) \times 10^{-2}$	3769126	4.035×10^{-2}	2.119×10^{-2}	3.558×10^{-4}	2.90	8.965×10^{-3}	4.931×10^{-2}
fitted radiance shift [nm]	$(-3.509 \pm 28.843) \times 10^{-4}$	3769126	1.889×10^{-3}	-3.766×10^{-4}	-4.966×10^{-2}	8.058×10^{-2}	-1.353×10^{-3}	5.368×10^{-4}
fitted radiance squeeze [1]	$(-4.207 \pm 23.261) \times 10^{-5}$	3769126	2.282×10^{-4}	-1.812×10^{-5}	-1.535×10^{-2}	1.124×10^{-2}	-1.389×10^{-4}	8.927×10^{-5}
fitted root mean square [1]	$(1.409 \pm 0.737) \times 10^{-3}$	3769126	6.920×10^{-4}	1.170×10^{-3}	3.467×10^{-4}	5.065×10^{-2}	9.460×10^{-4}	1.638×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.758 ± 0.546	3769126	0.695	0.604	5.000×10^{-2}	2.93	0.348	1.04
sulfurdioxide total air mass factor polluted precision [1]	0.130 ± 0.188	3769126	0.133	5.443×10^{-2}	2.500×10^{-3}	1.72	2.504×10^{-2}	0.158
sulfurdioxide clear air mass factor polluted [1]	0.657 ± 0.460	3769126	0.448	0.547	3.049×10^{-2}	3.28	0.355	0.803
number of spectral points in retrieval [1]	73.4 ± 0.5	3769126	1.000	73.0	52.0	155	73.0	74.0

3 Granule outlines

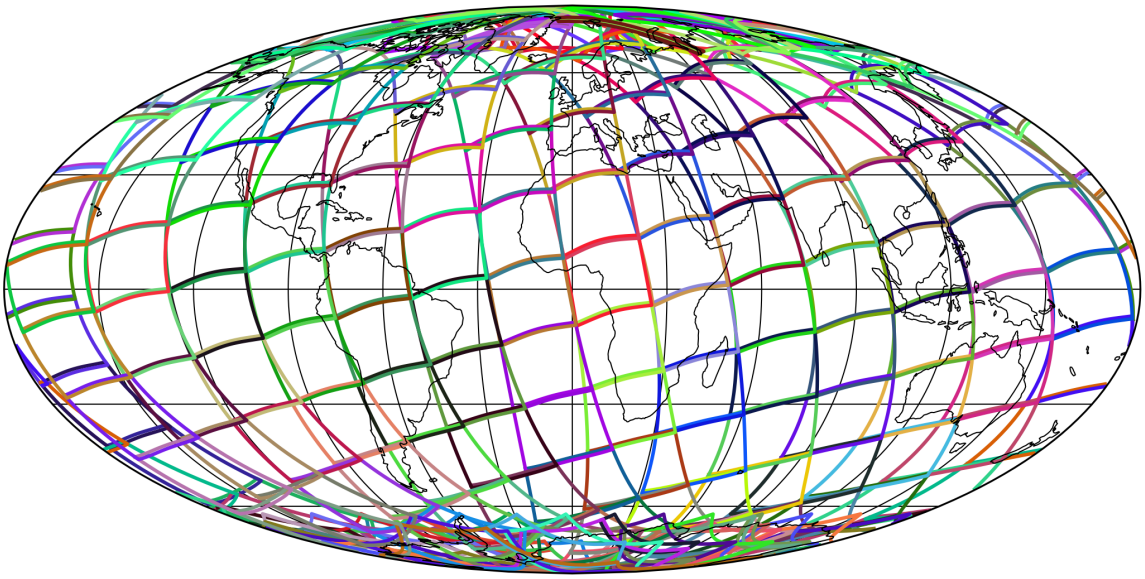


Figure 1: Outline of the granules.

4 Input data monitoring

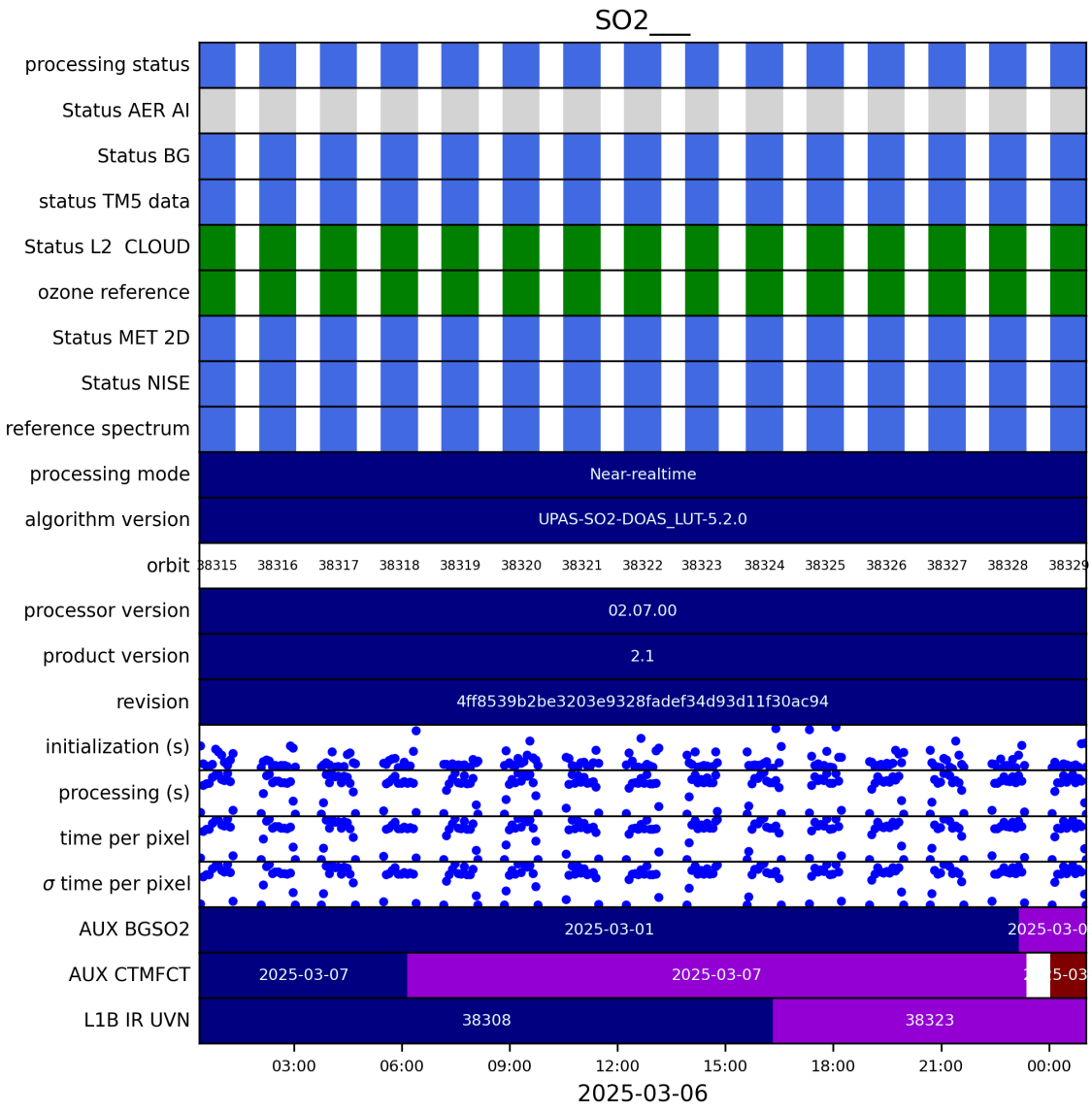


Figure 2: Input data per granule

5 Warnings and errors

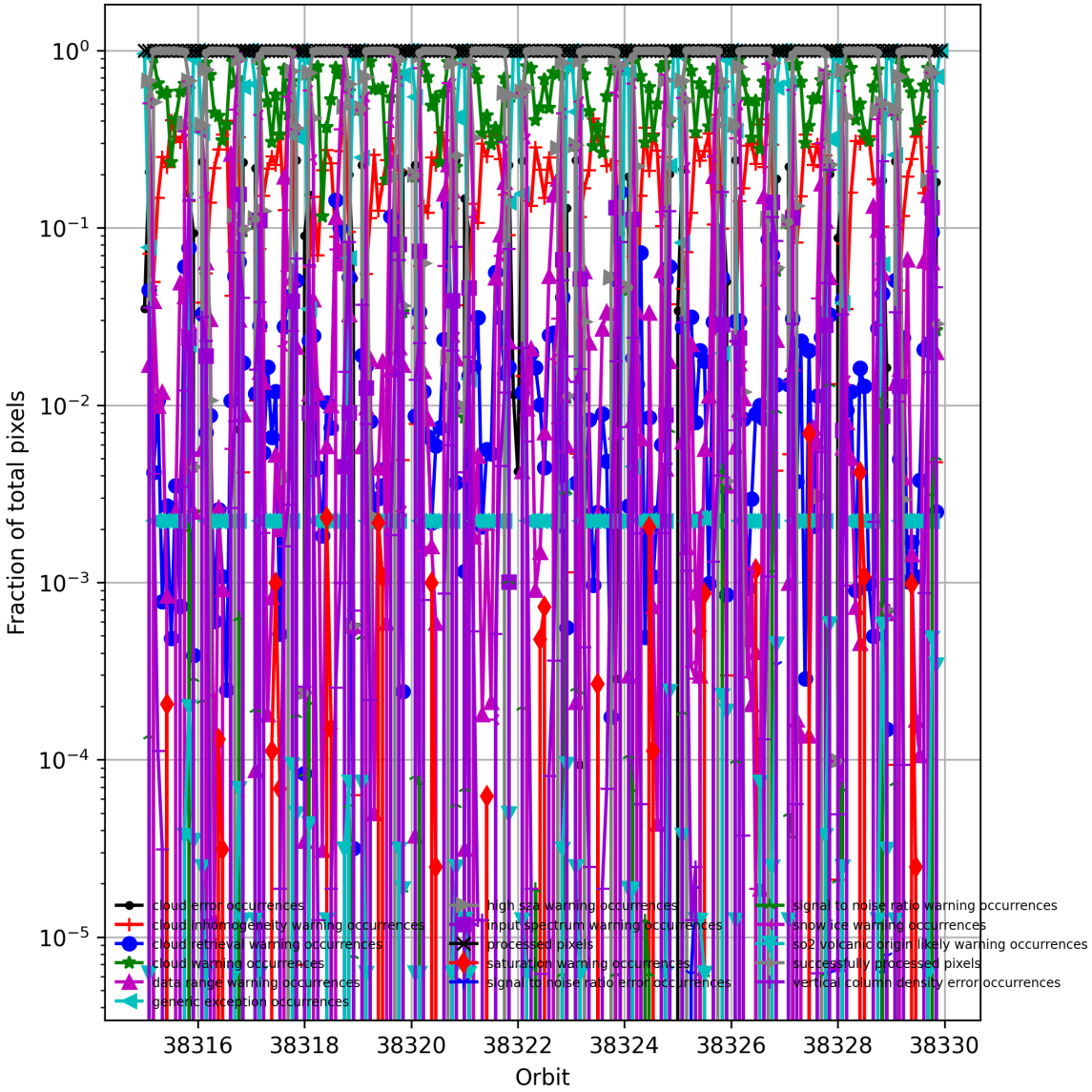


Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

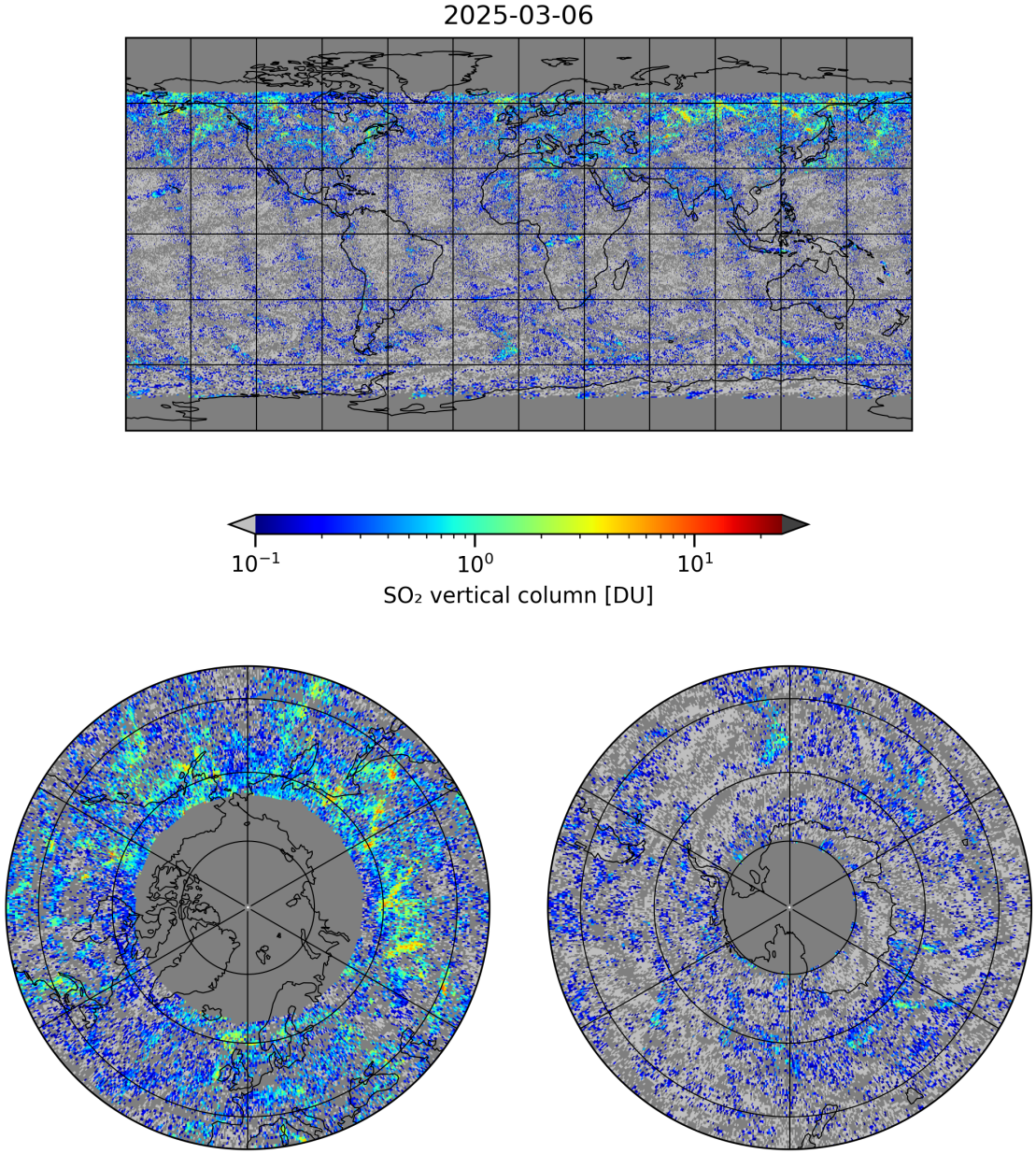


Figure 4: Map of "SO_2 vertical column" for 2025-03-06 to 2025-03-07

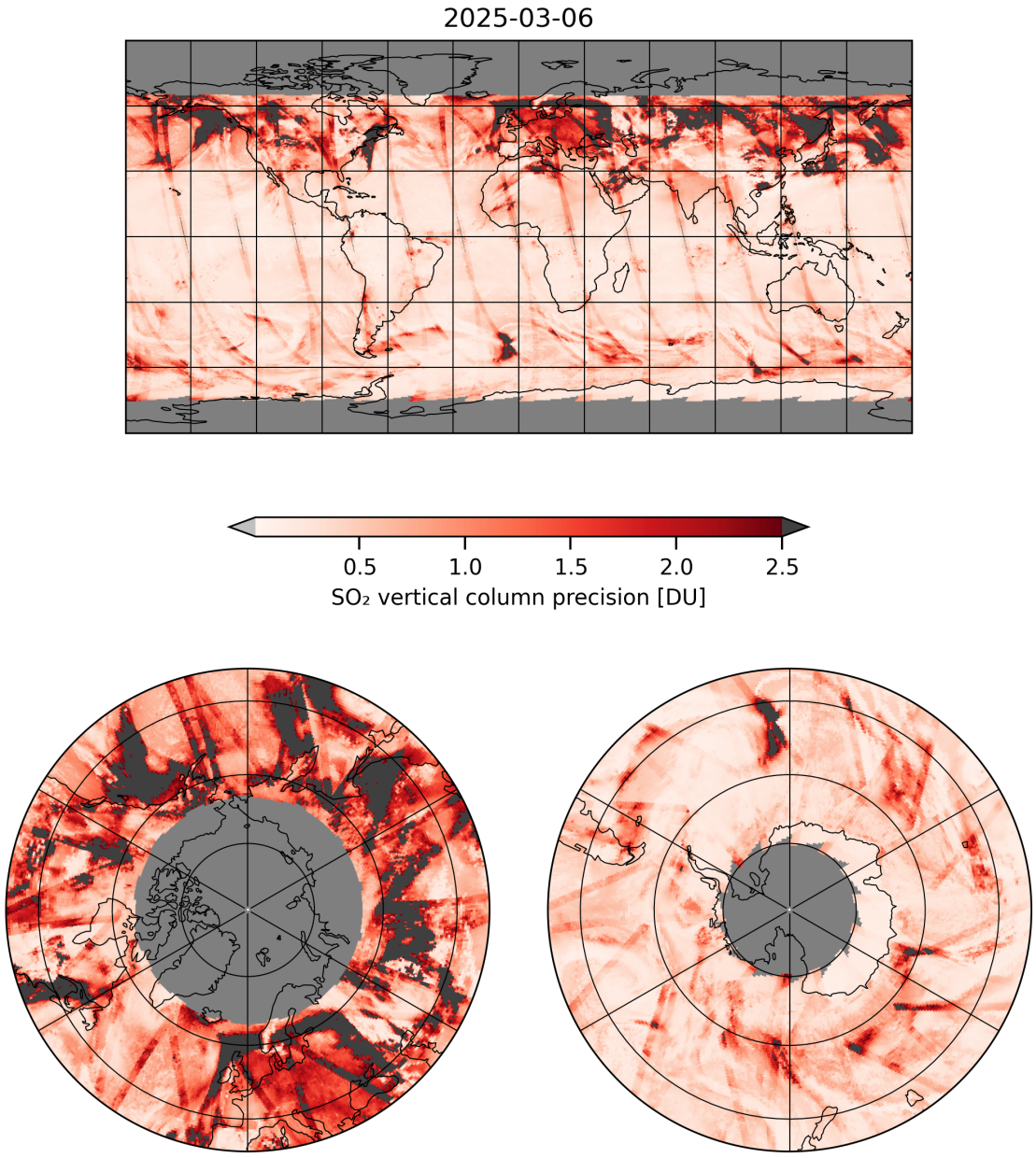


Figure 5: Map of "SO_2 vertical column precision" for 2025-03-06 to 2025-03-07

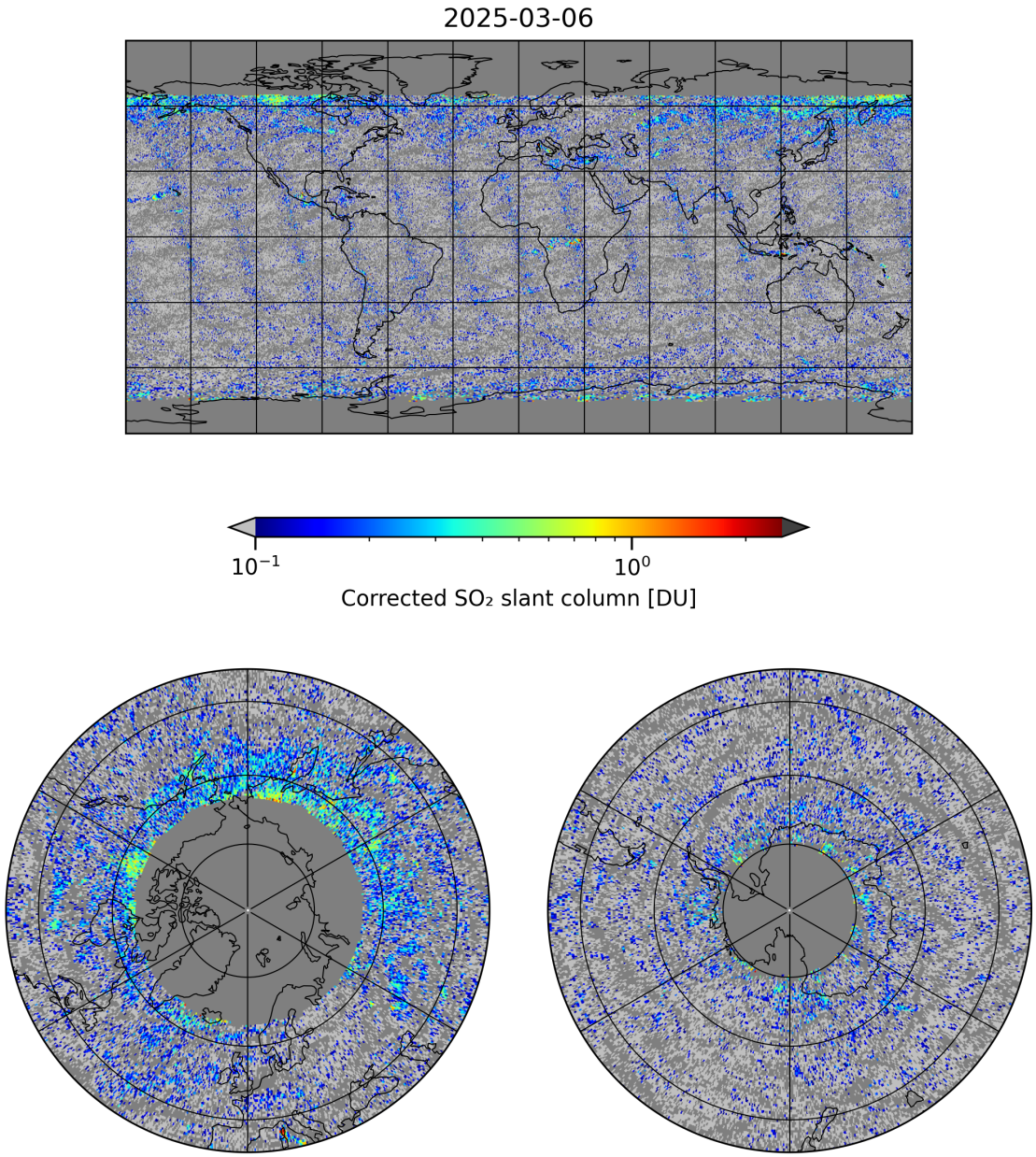


Figure 6: Map of "Corrected SO_2 slant column" for 2025-03-06 to 2025-03-07

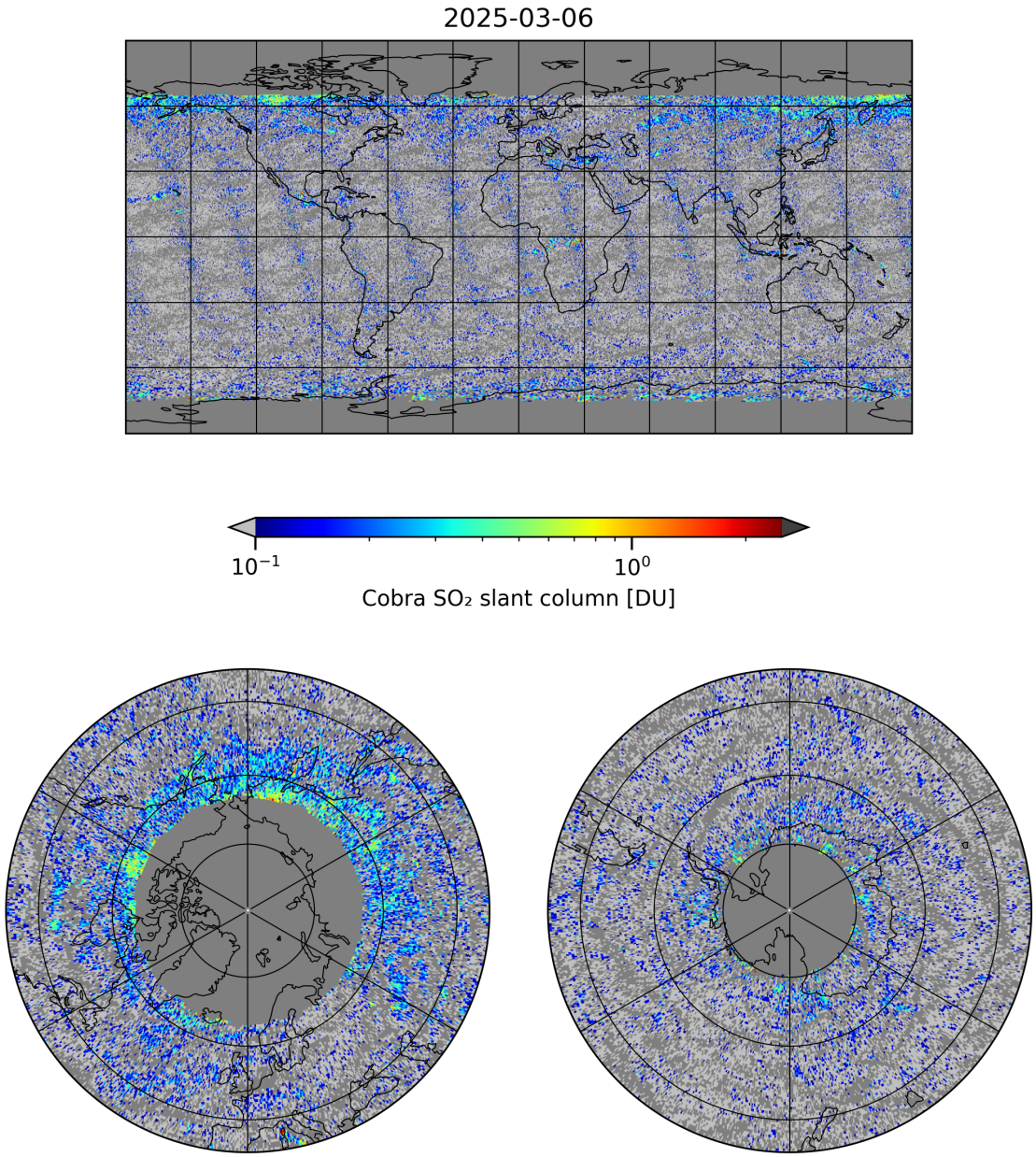


Figure 7: Map of "Cobra SO_2 slant column" for 2025-03-06 to 2025-03-07

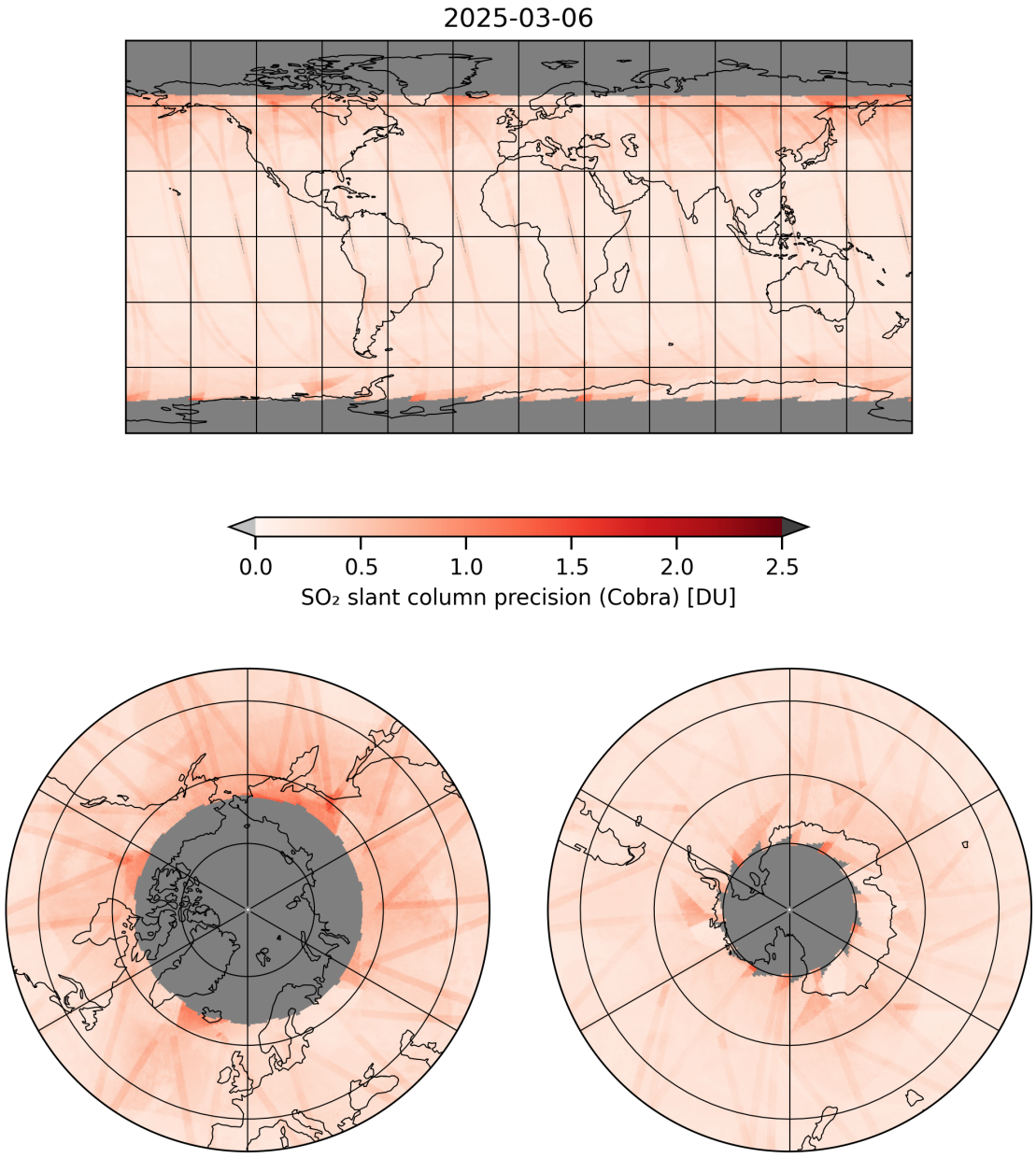


Figure 8: Map of "SO_2 slant column precision (Cobra)" for 2025-03-06 to 2025-03-07

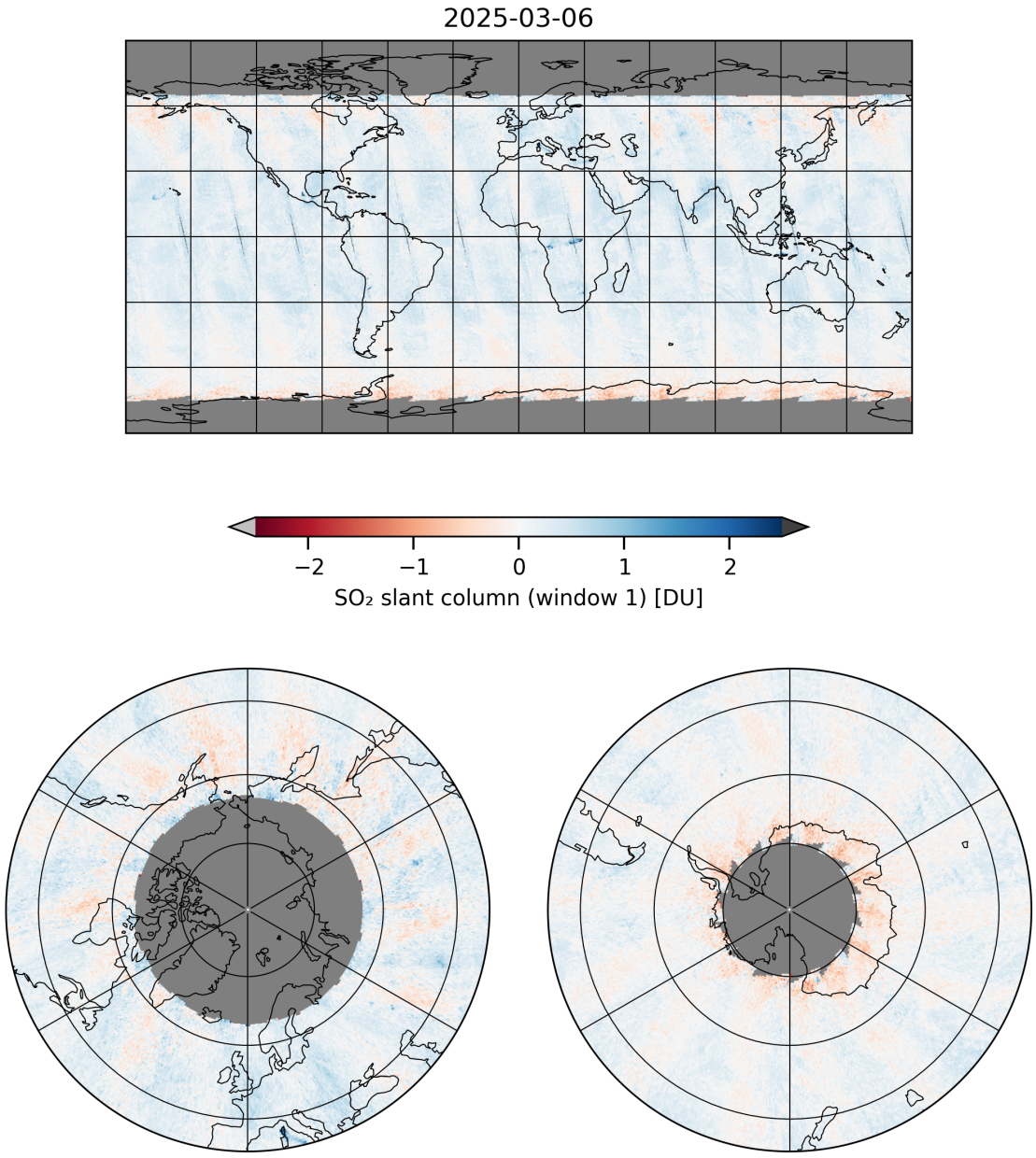


Figure 9: Map of "SO_2 slant column (window 1)" for 2025-03-06 to 2025-03-07

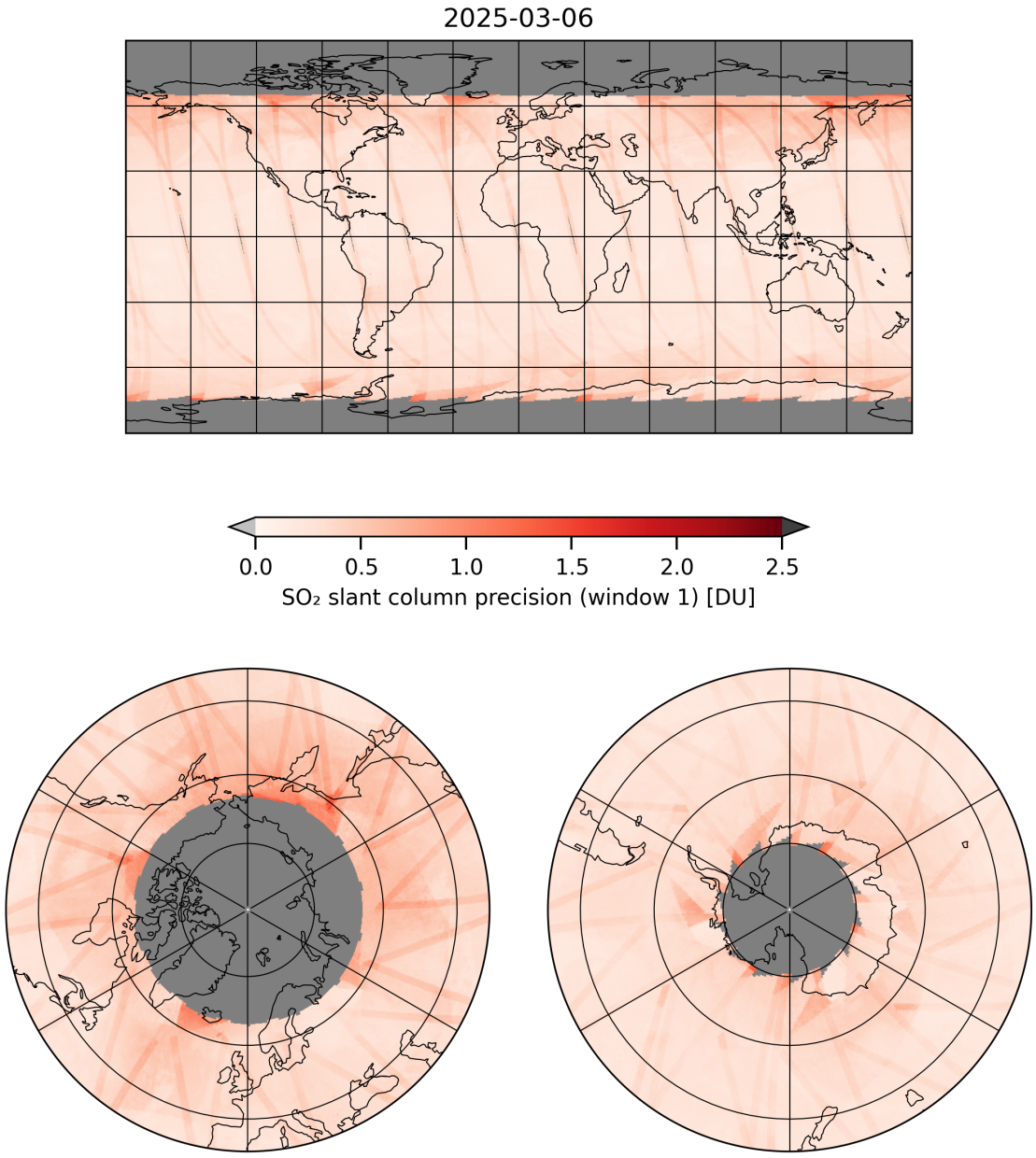


Figure 10: Map of "SO_2 slant column precision (window 1)" for 2025-03-06 to 2025-03-07

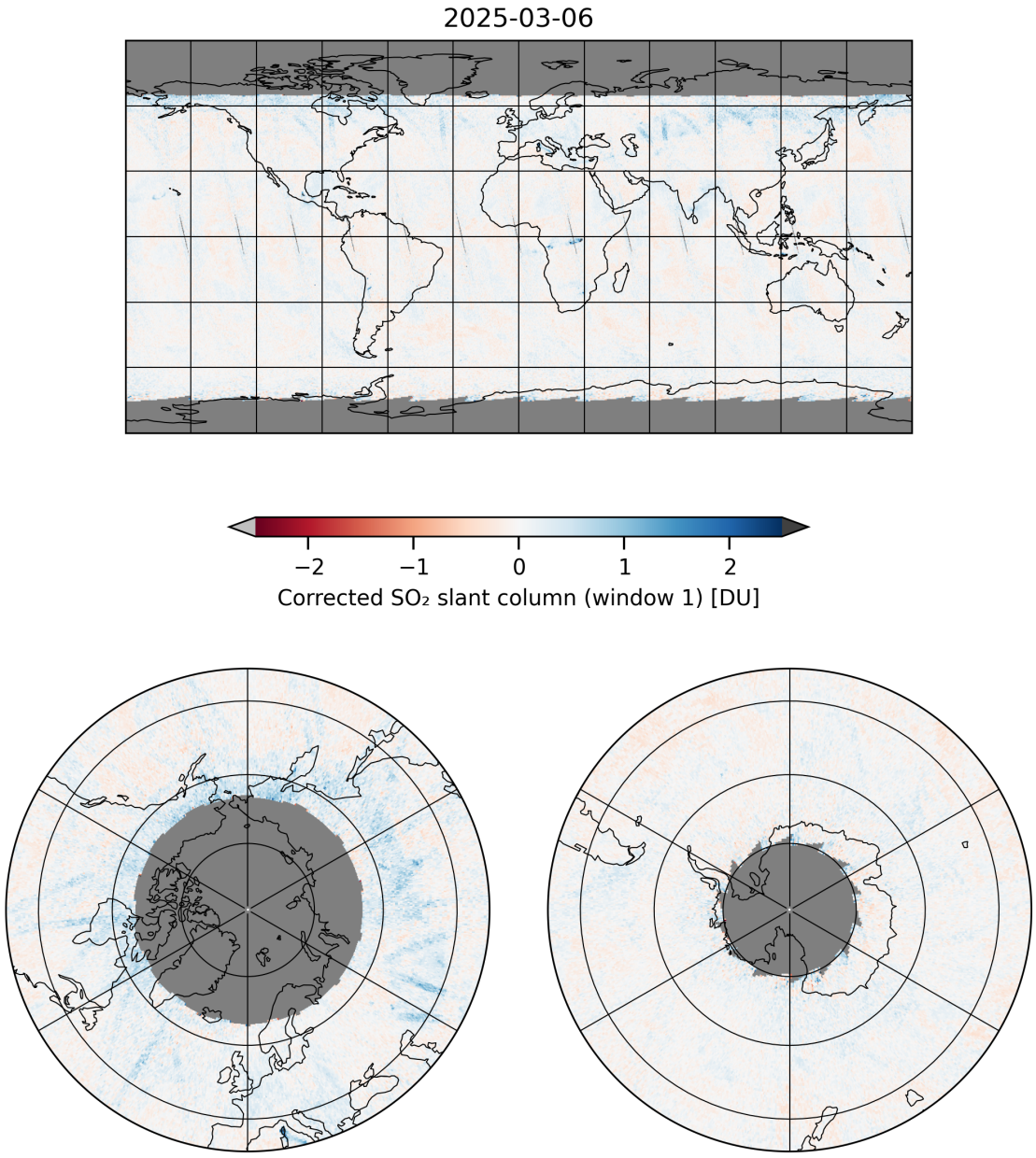


Figure 11: Map of “Corrected SO_2 slant column (window 1)” for 2025-03-06 to 2025-03-07

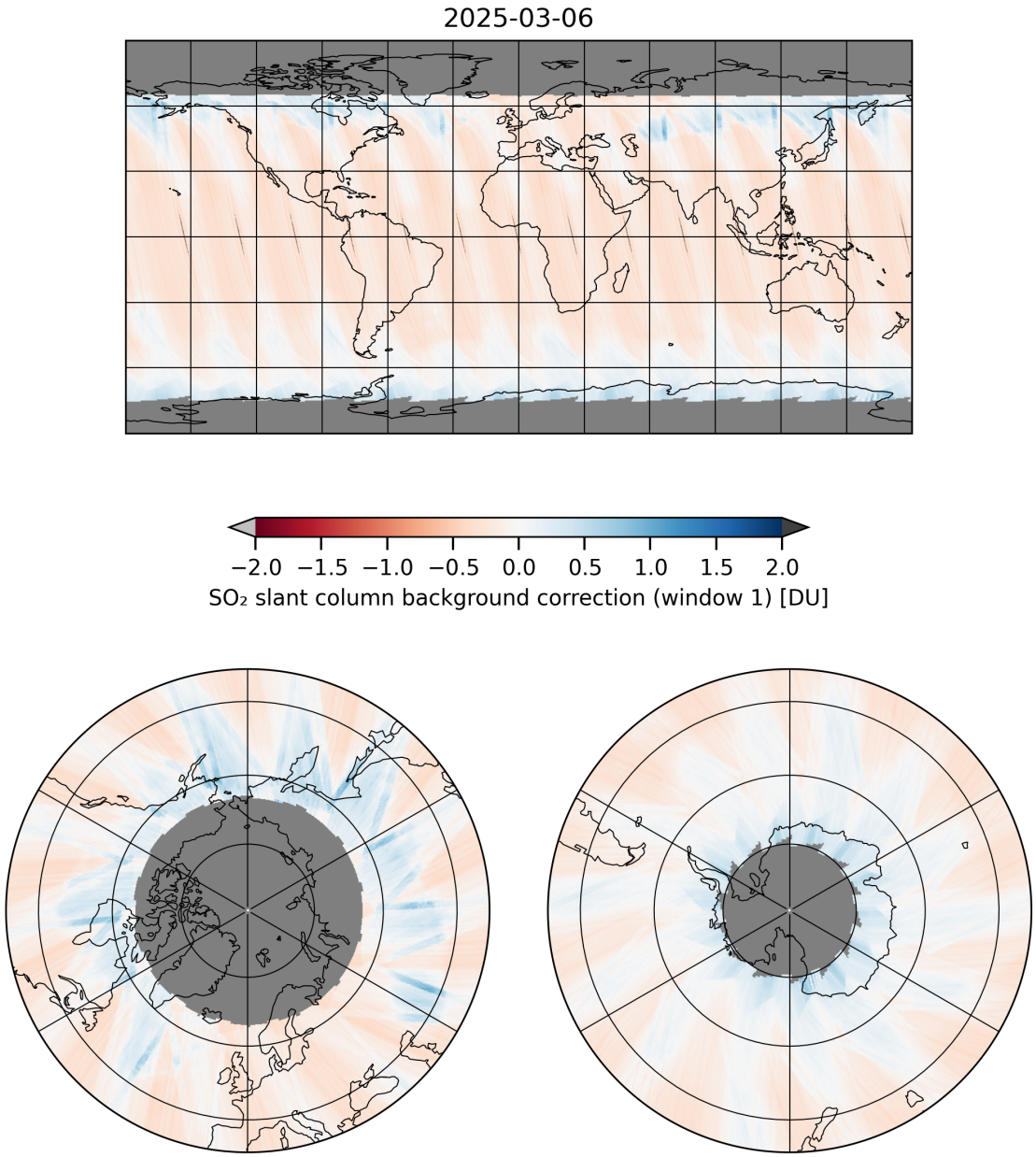


Figure 12: Map of "SO_2 slant column background correction (window 1)" for 2025-03-06 to 2025-03-07

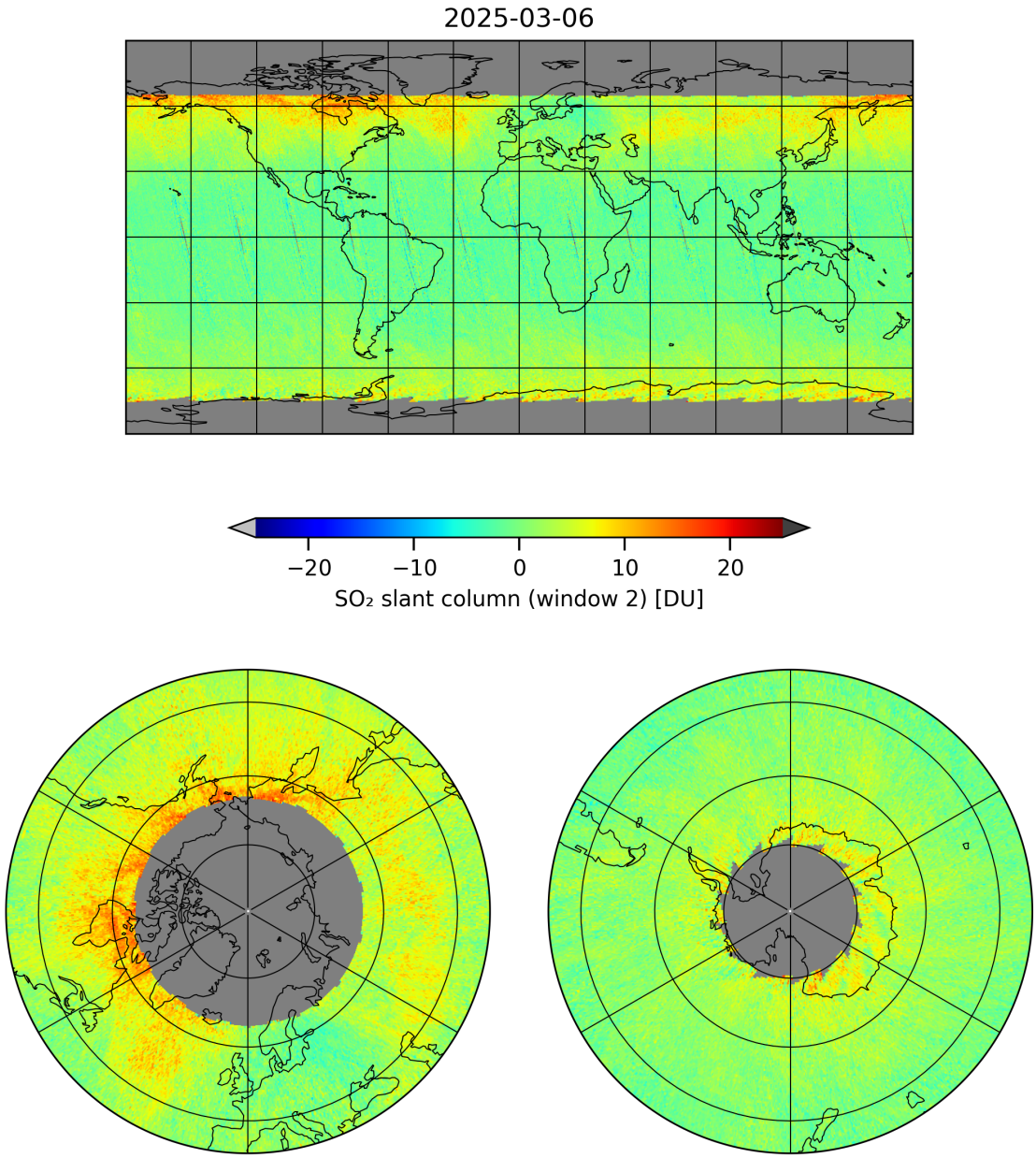


Figure 13: Map of "SO_2 slant column (window 2)" for 2025-03-06 to 2025-03-07

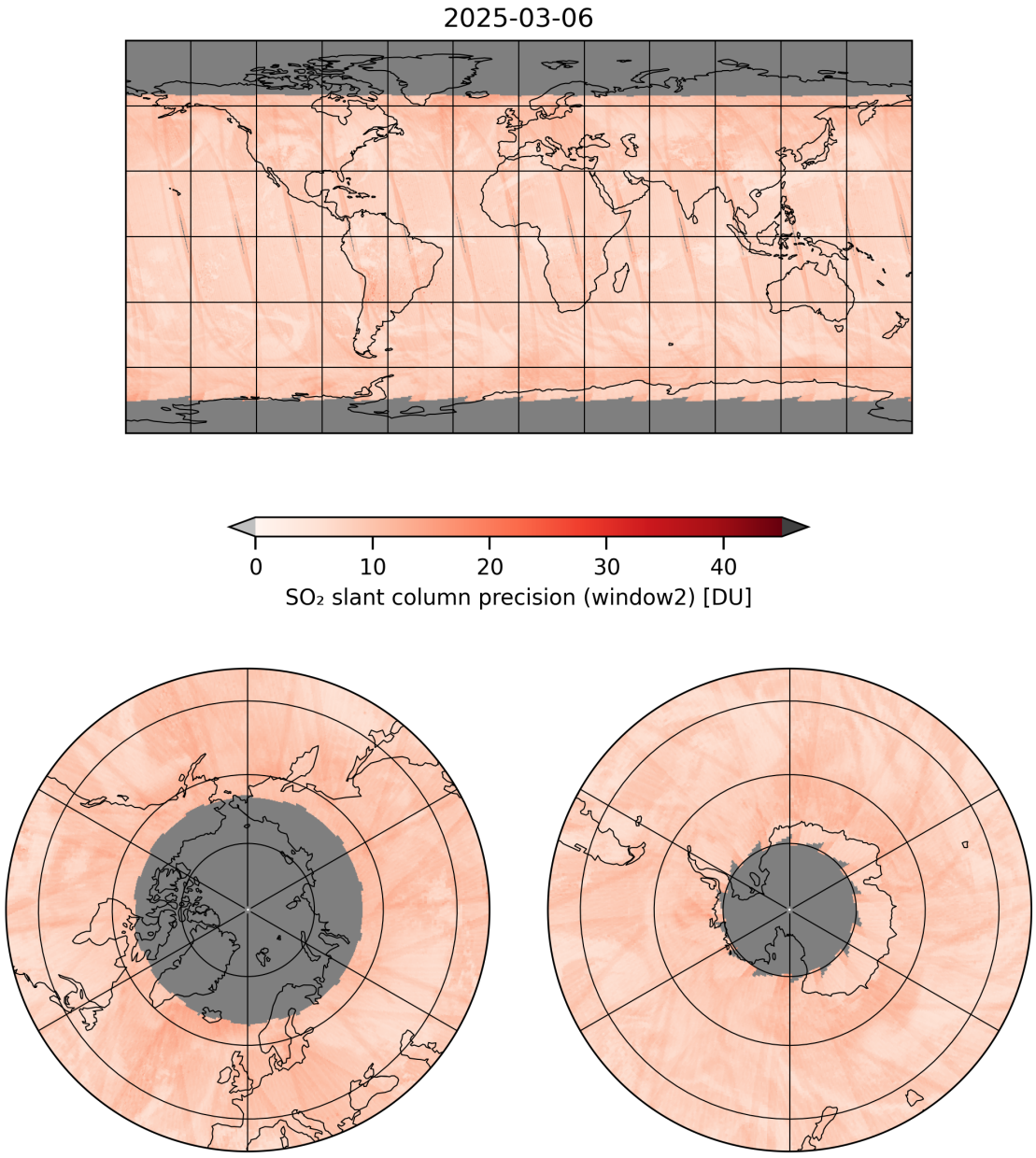


Figure 14: Map of "SO_2 slant column precision (window2)" for 2025-03-06 to 2025-03-07

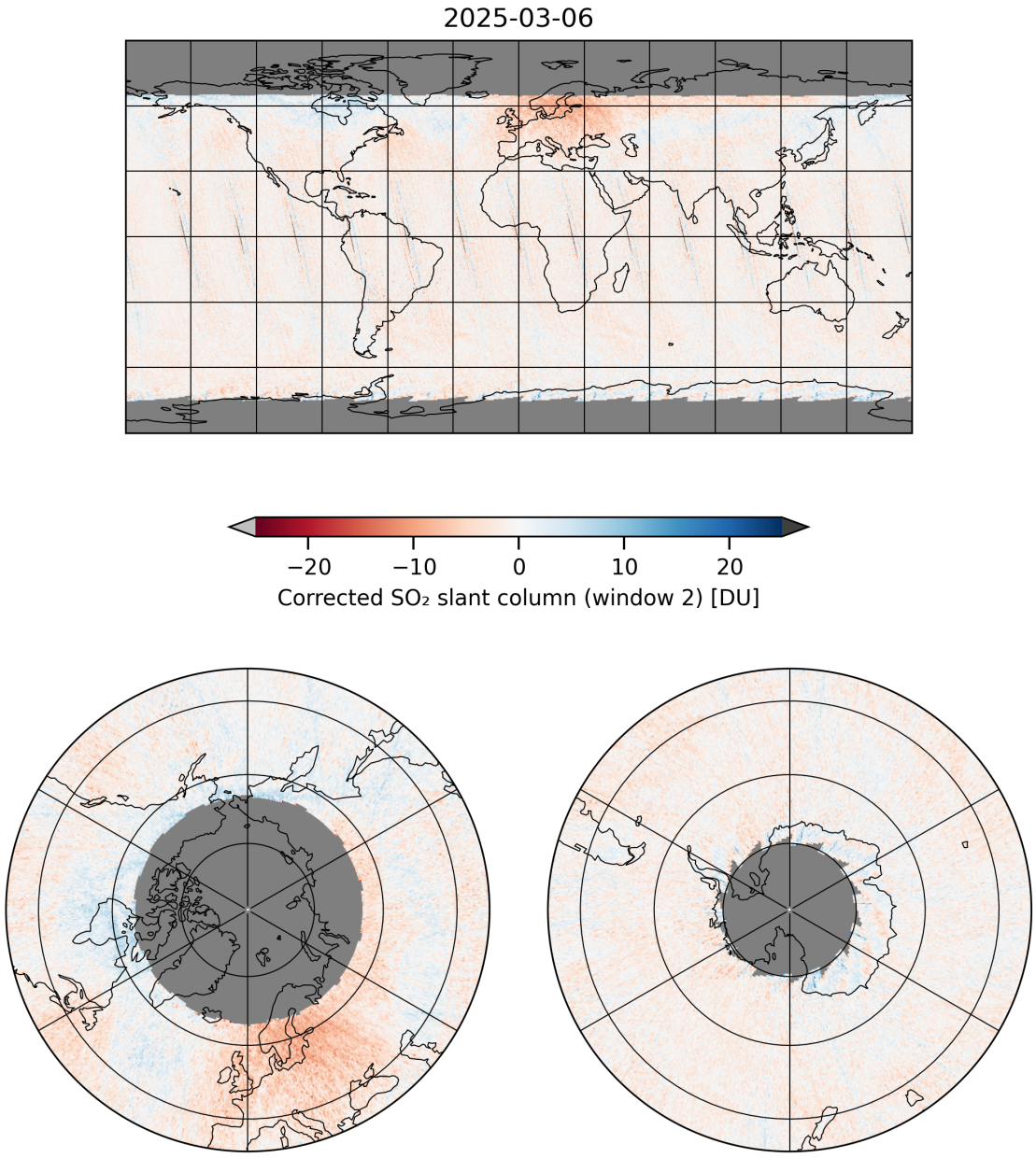


Figure 15: Map of "Corrected SO_2 slant column (window 2)" for 2025-03-06 to 2025-03-07

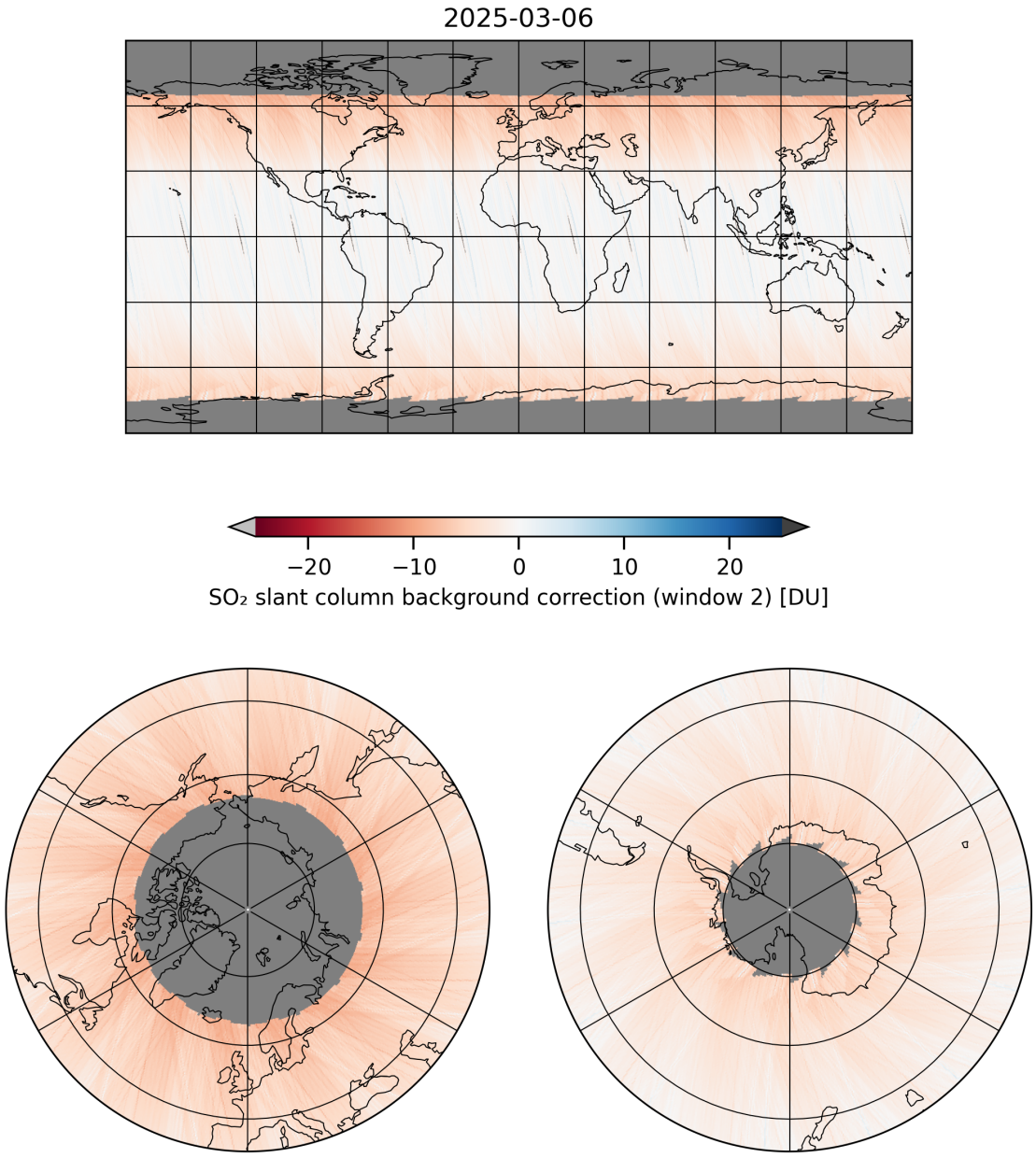


Figure 16: Map of "SO_2 slant column background correction (window 2)" for 2025-03-06 to 2025-03-07

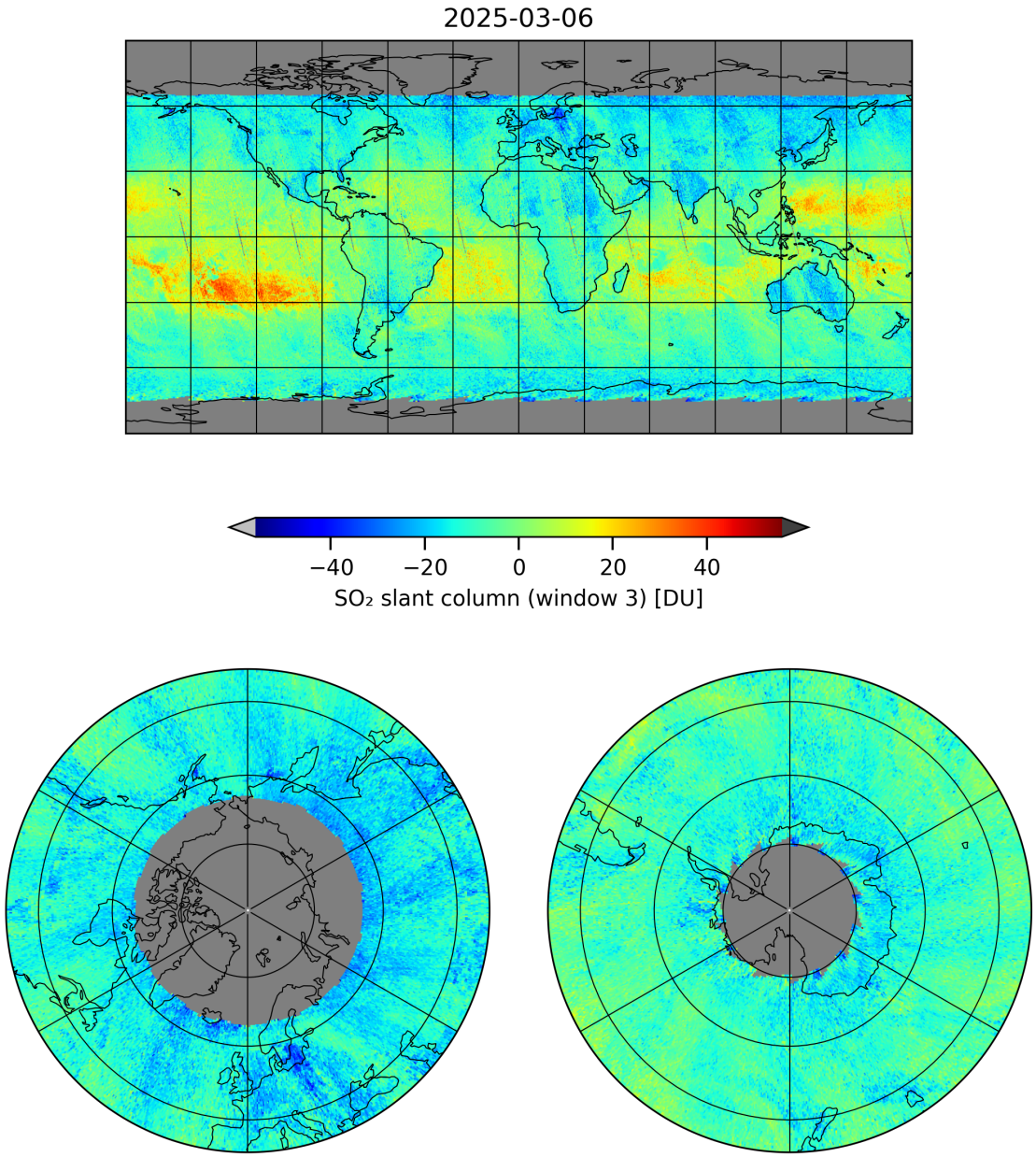


Figure 17: Map of "SO_2 slant column (window 3)" for 2025-03-06 to 2025-03-07

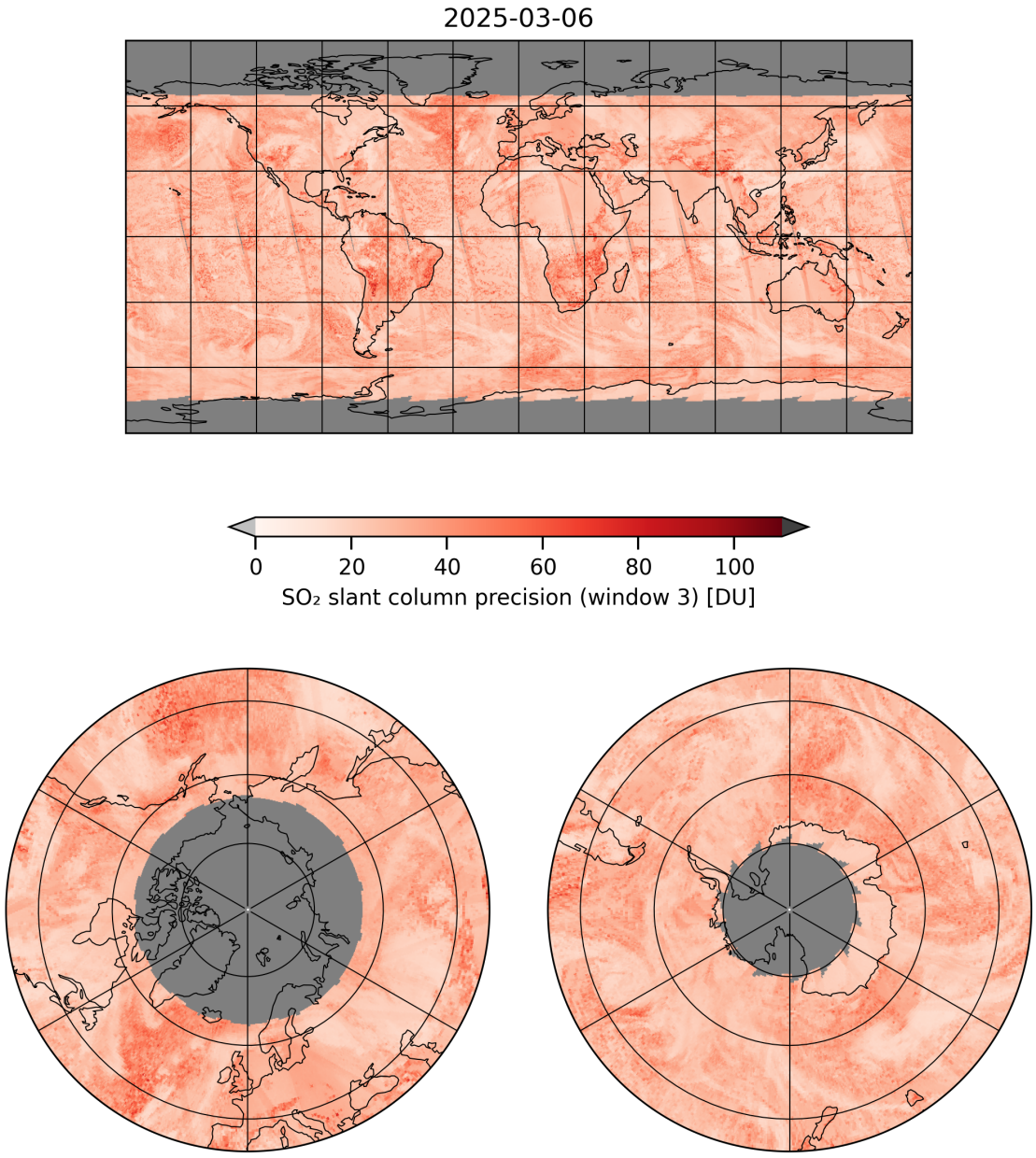


Figure 18: Map of "SO_2 slant column precision (window 3)" for 2025-03-06 to 2025-03-07

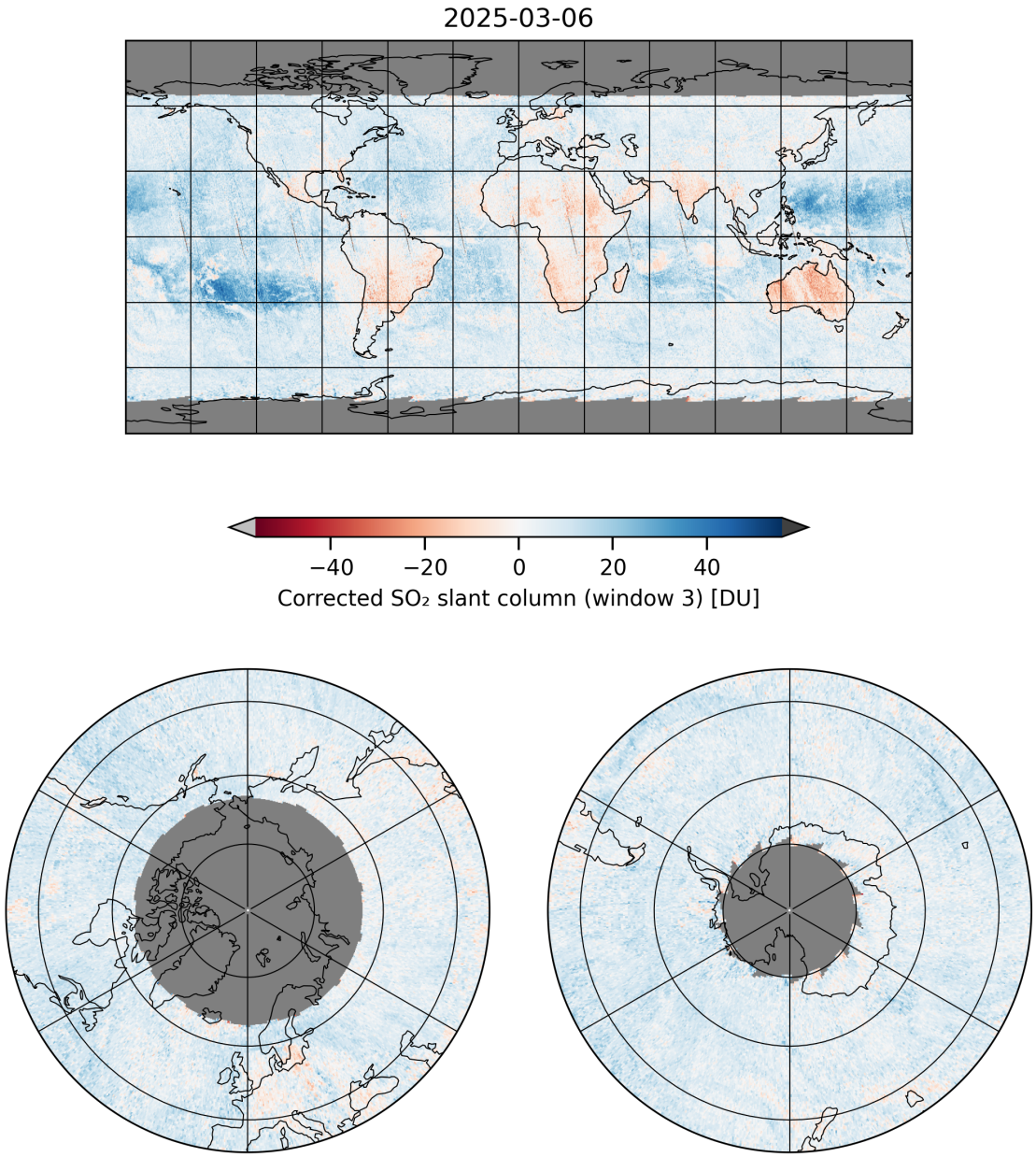


Figure 19: Map of “Corrected SO_2 slant column (window 3)” for 2025-03-06 to 2025-03-07

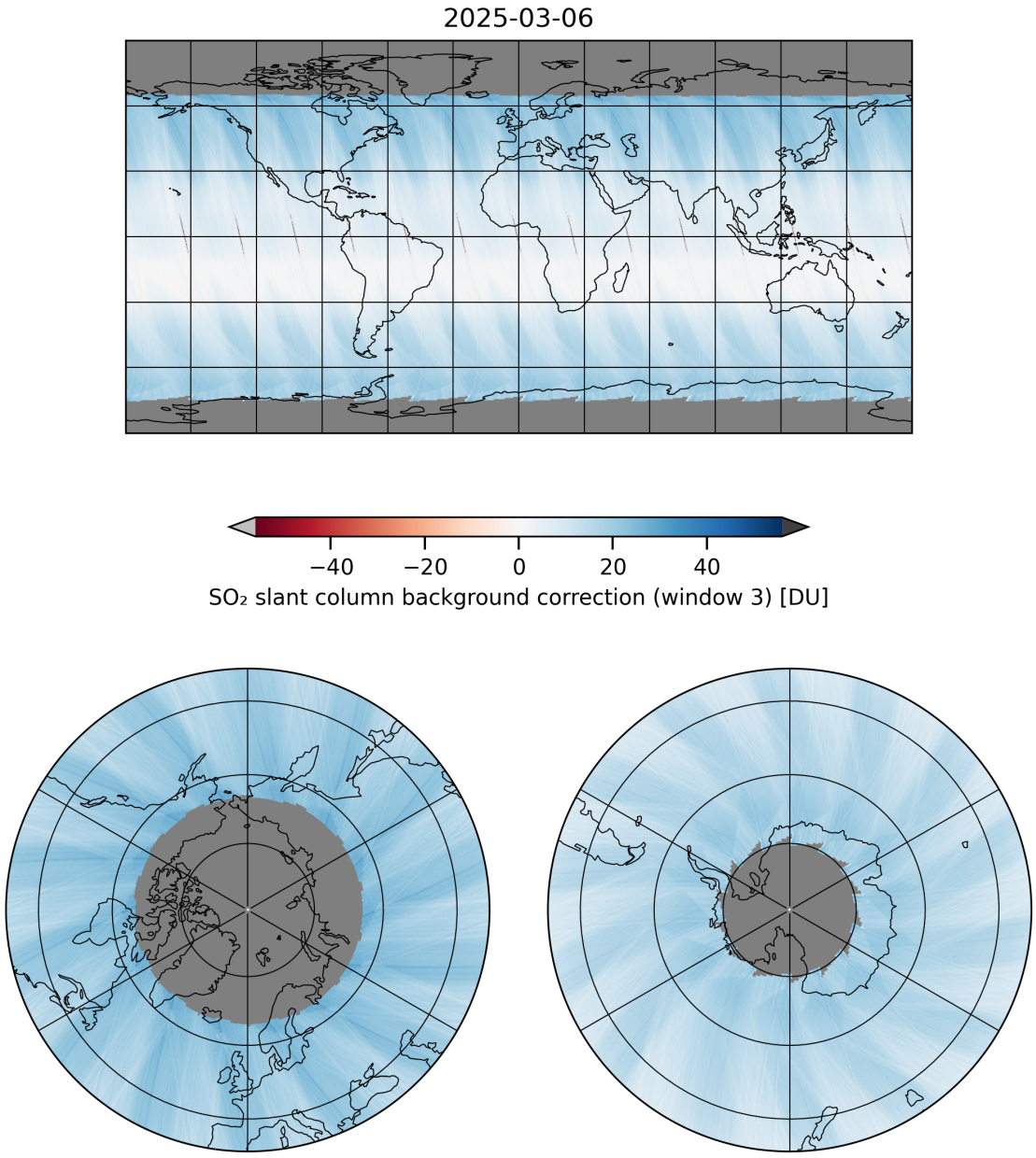


Figure 20: Map of "SO_2 slant column background correction (window 3)" for 2025-03-06 to 2025-03-07

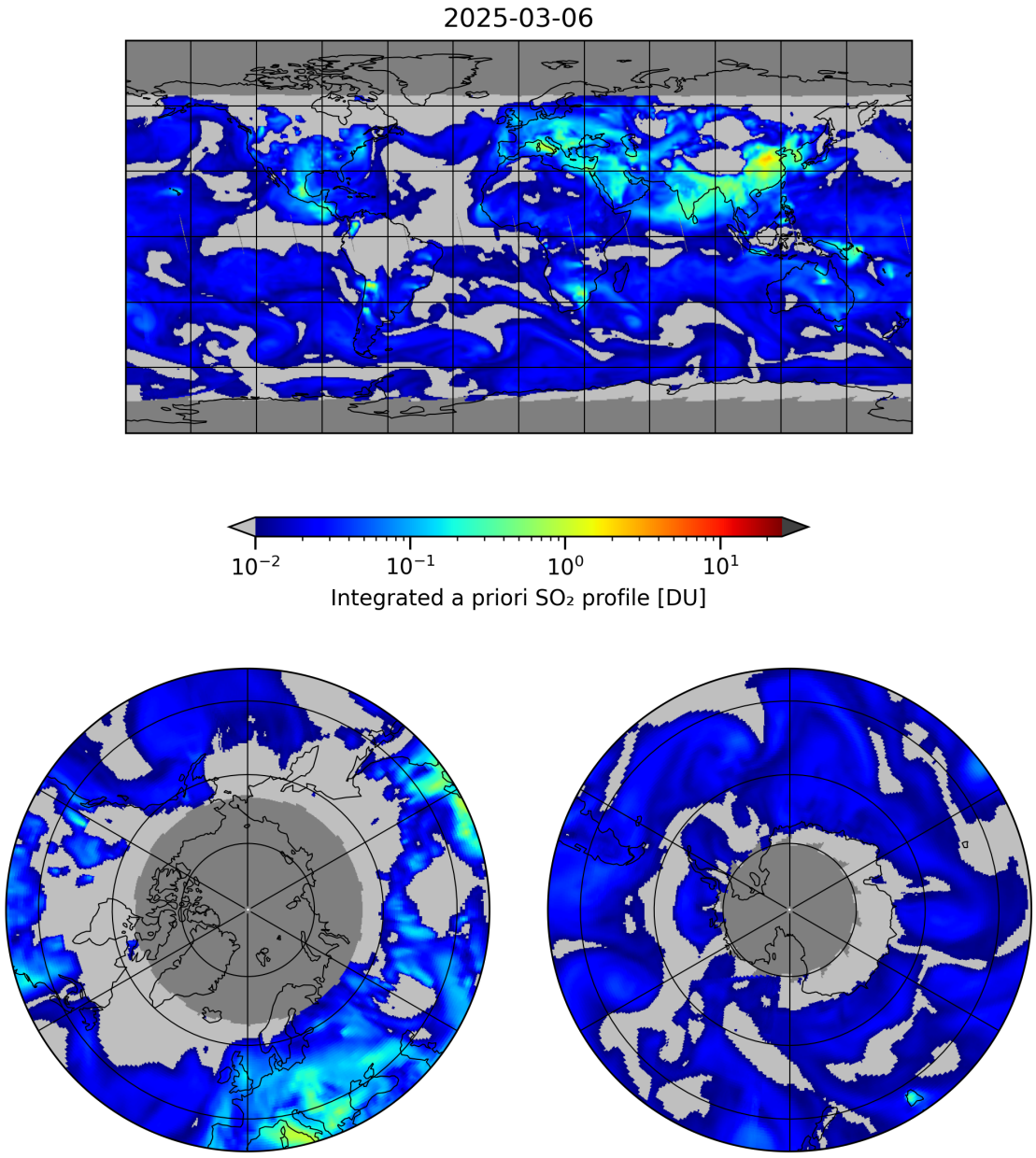


Figure 21: Map of “Integrated a priori SO_2 profile” for 2025-03-06 to 2025-03-07

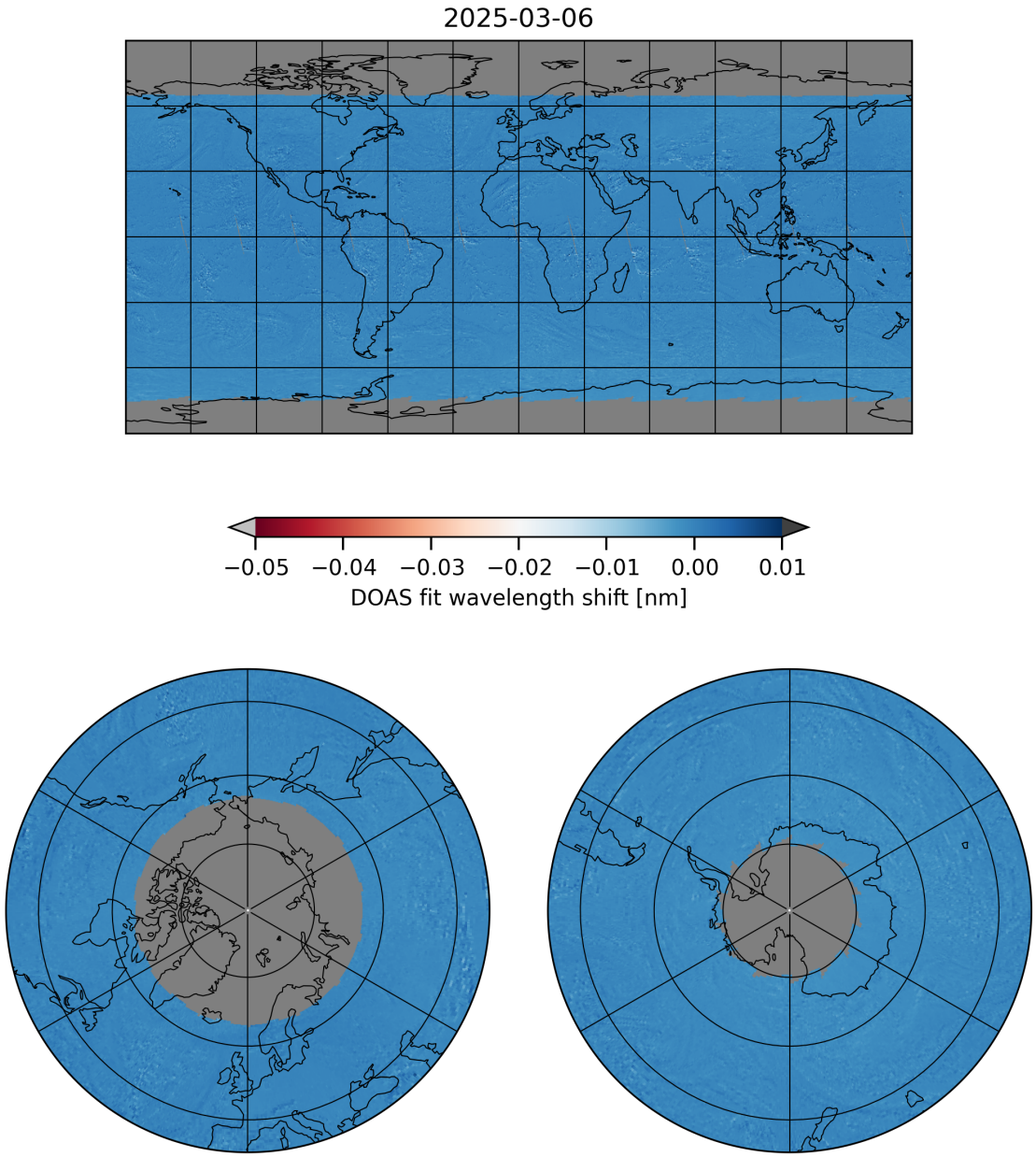


Figure 22: Map of “DOAS fit wavelength shift” for 2025-03-06 to 2025-03-07

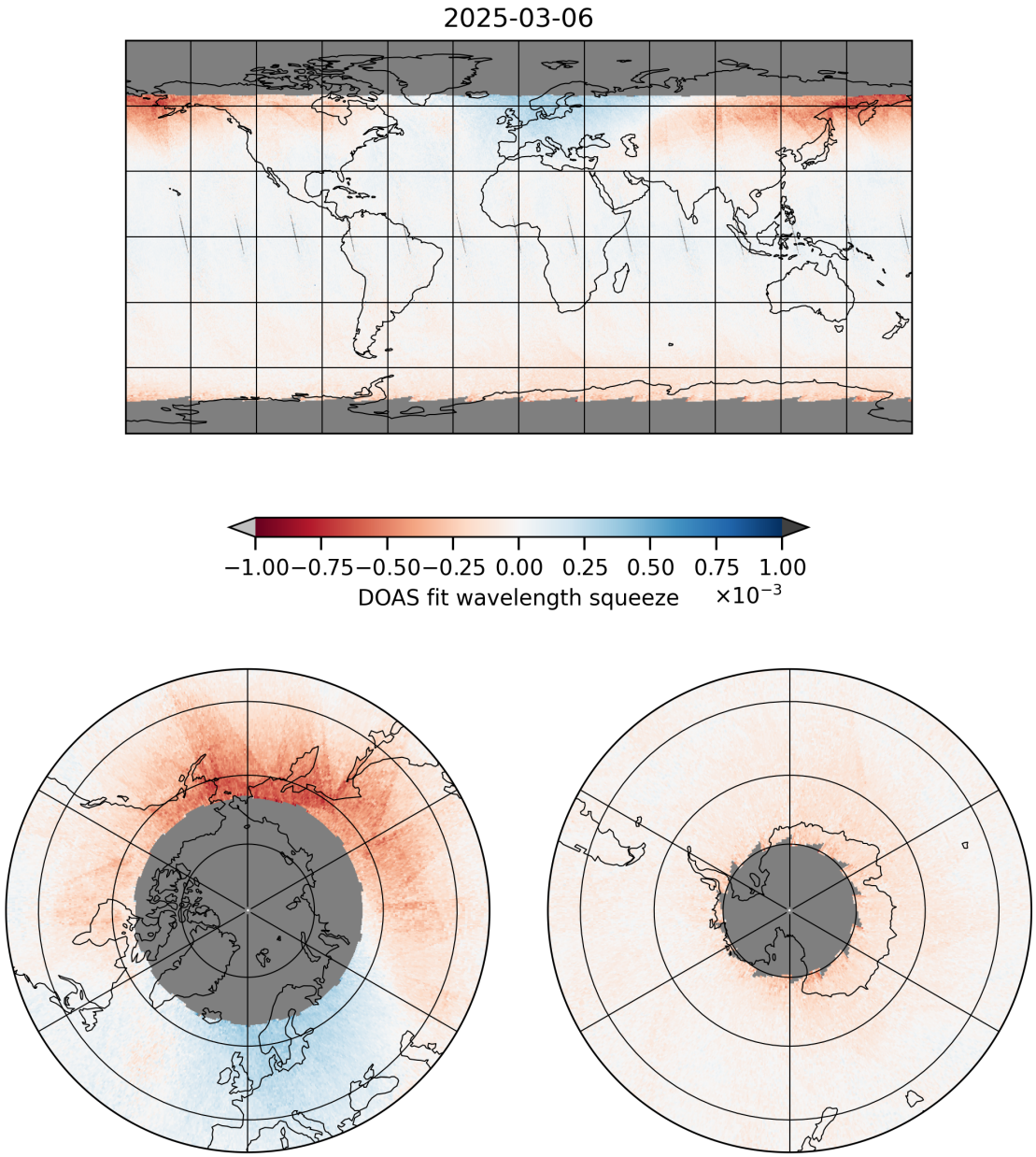


Figure 23: Map of “DOAS fit wavelength squeeze” for 2025-03-06 to 2025-03-07

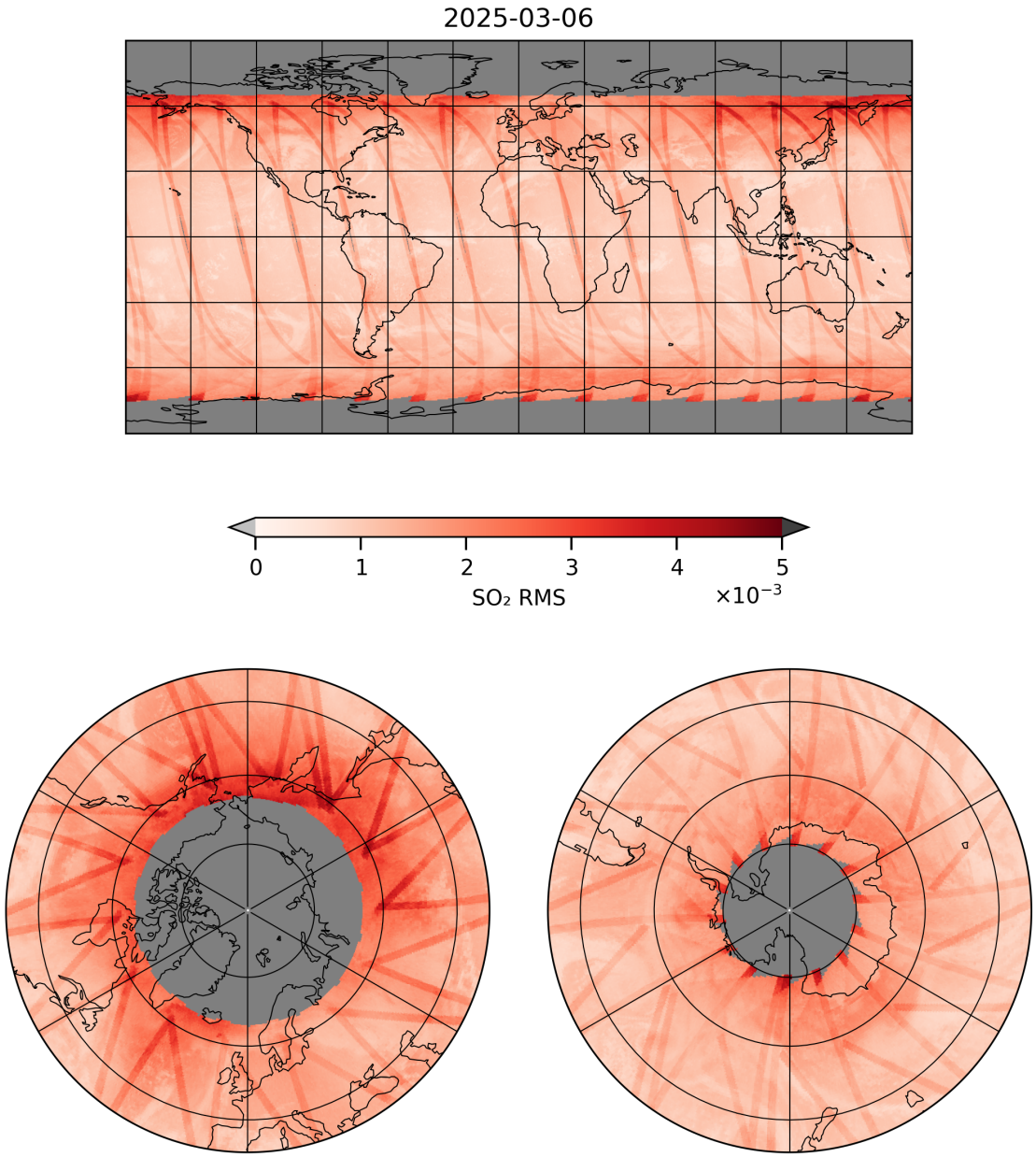


Figure 24: Map of "SO_2 RMS" for 2025-03-06 to 2025-03-07

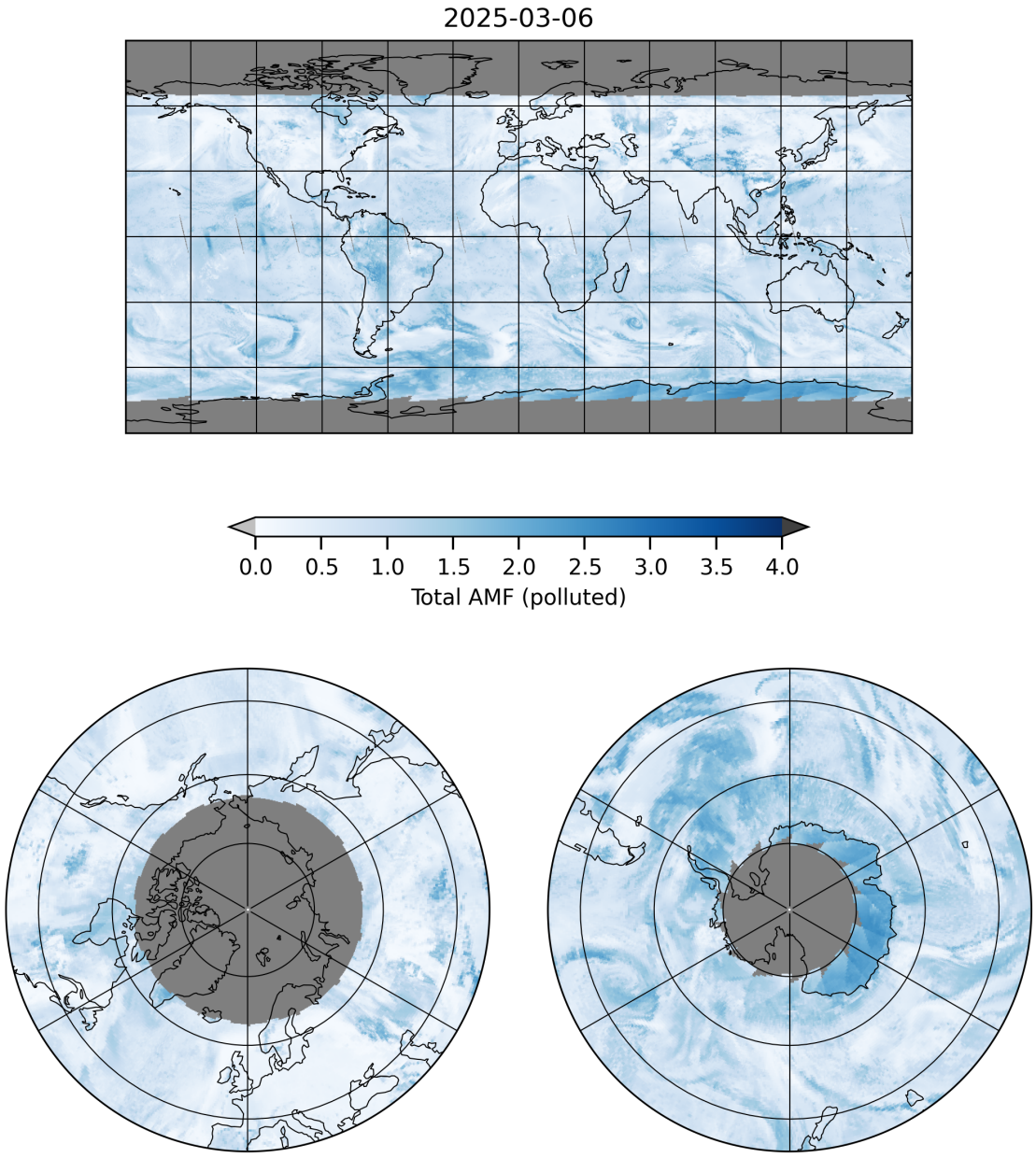


Figure 25: Map of “Total AMF (polluted)” for 2025-03-06 to 2025-03-07

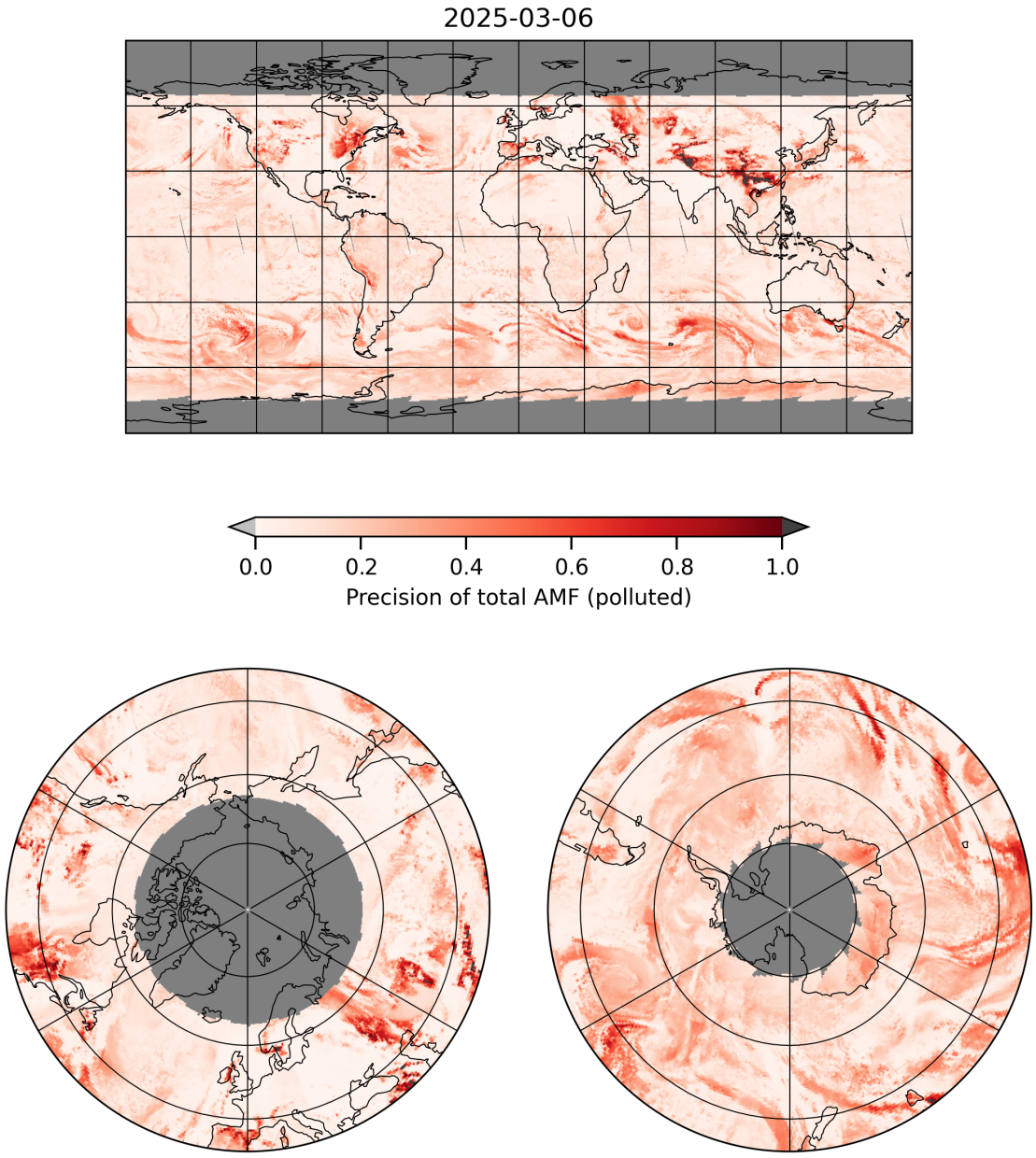


Figure 26: Map of “Precision of total AMF (polluted)” for 2025-03-06 to 2025-03-07

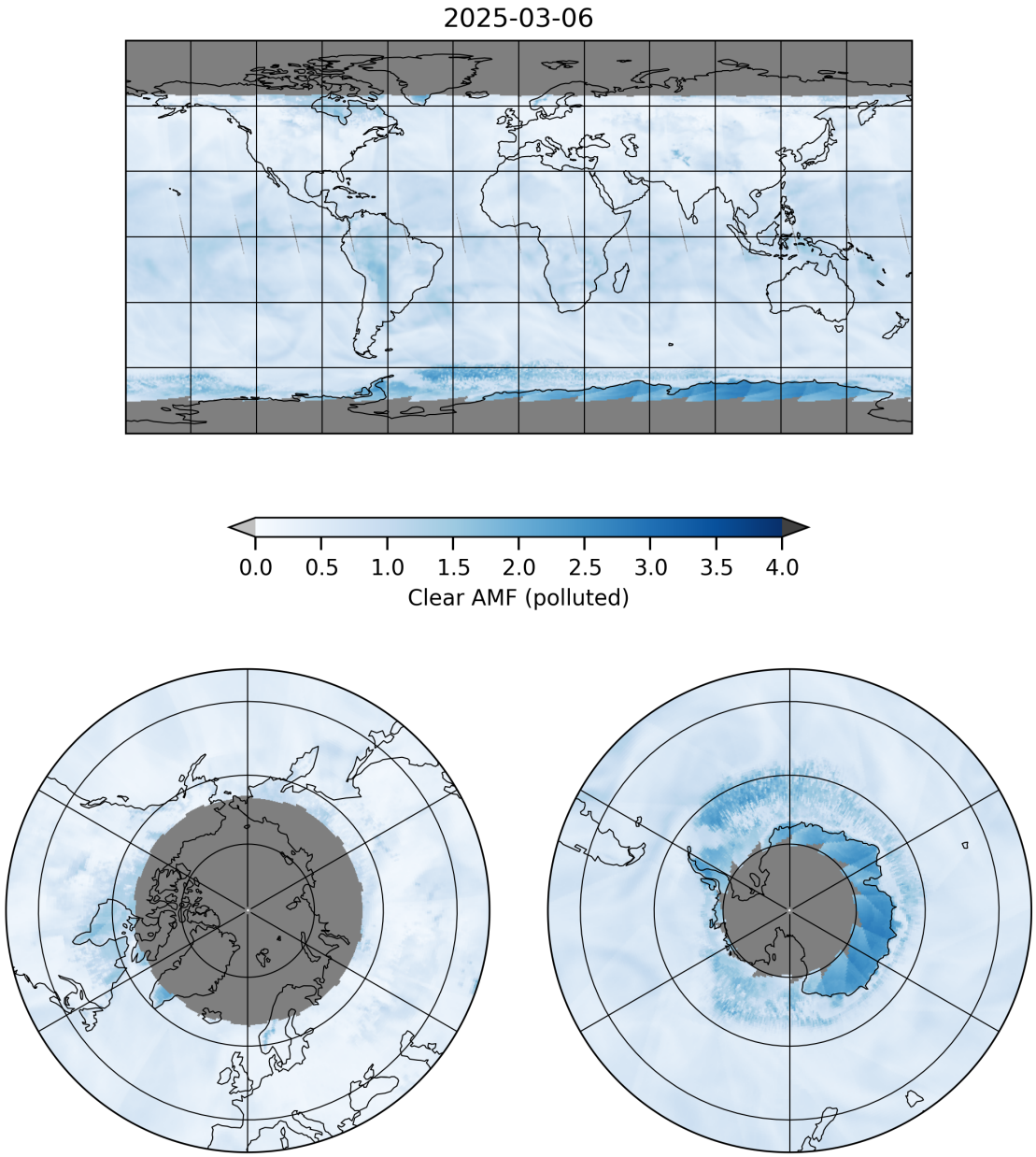


Figure 27: Map of “Clear AMF (polluted)” for 2025-03-06 to 2025-03-07

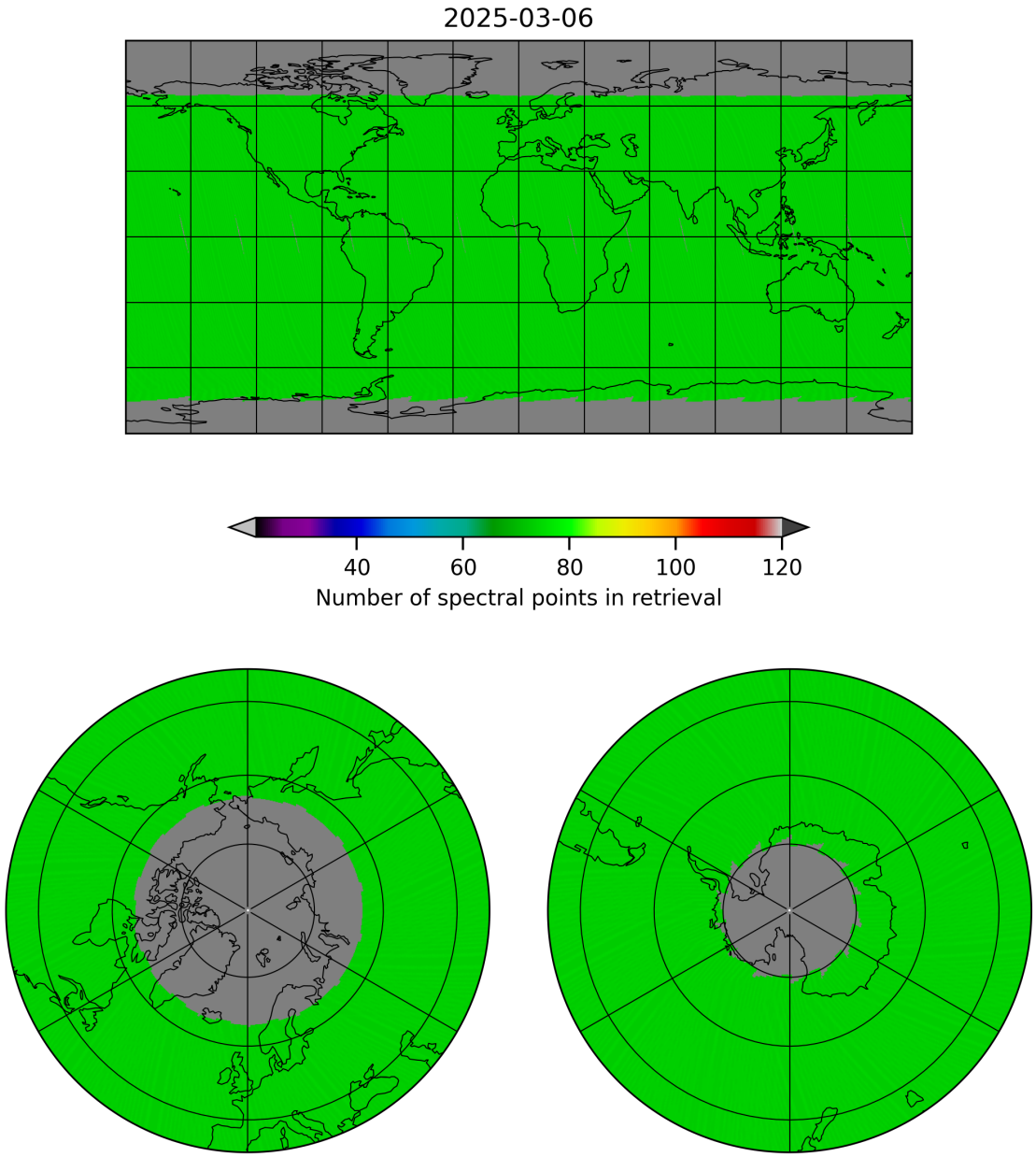


Figure 28: Map of “Number of spectral points in retrieval” for 2025-03-06 to 2025-03-07

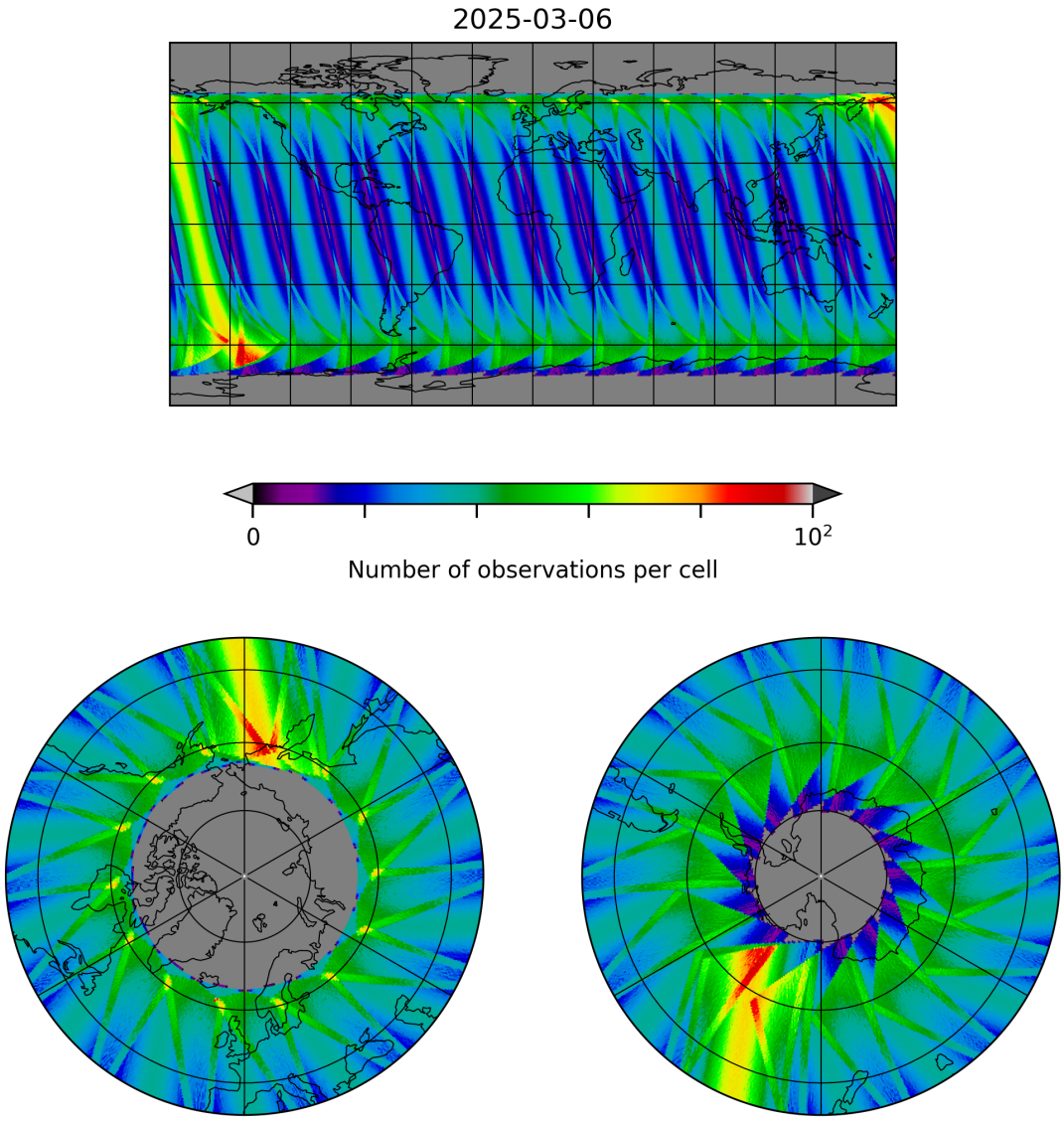


Figure 29: Map of the number of observations for 2025-03-06 to 2025-03-07

7 Zonal average

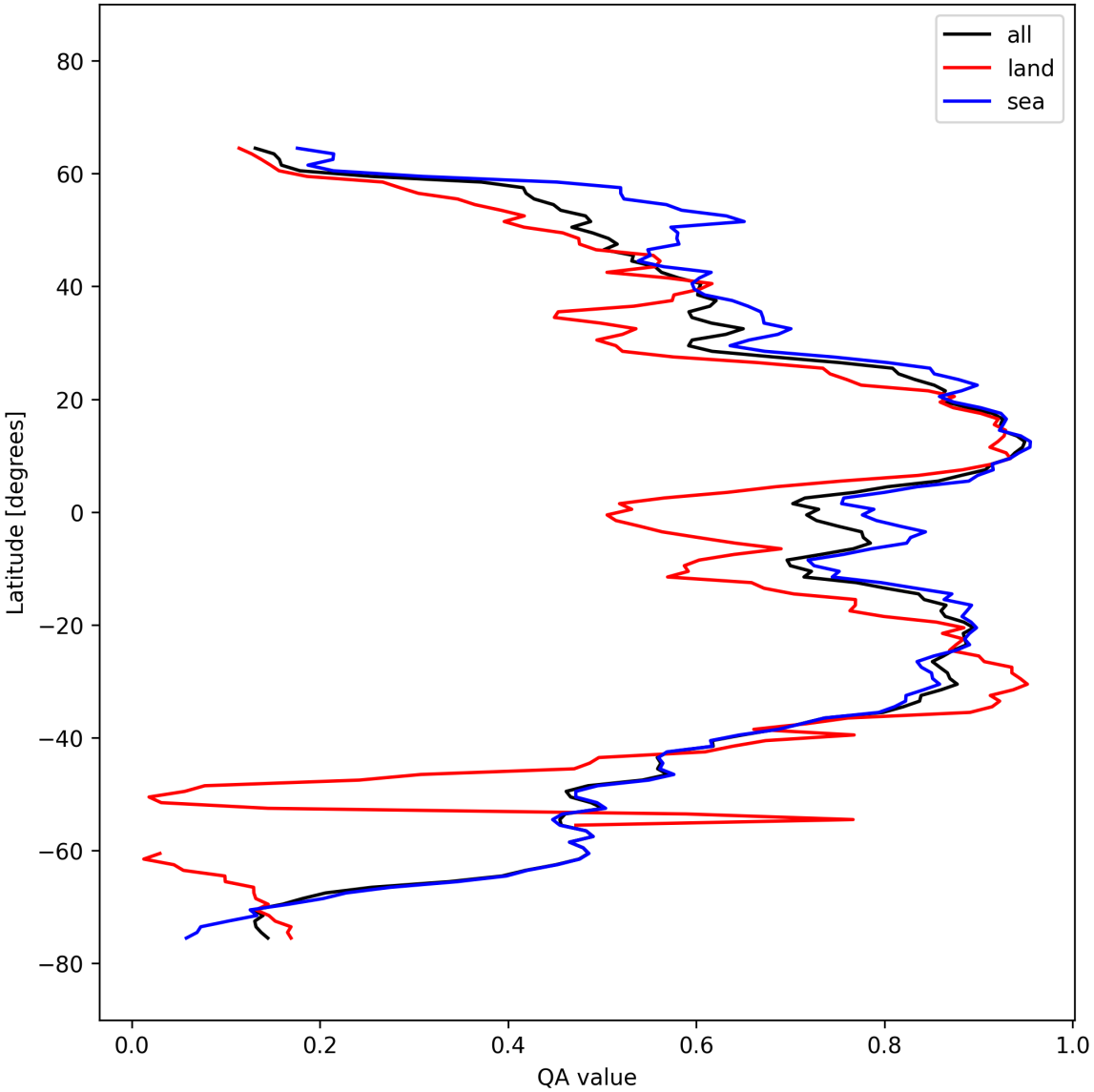


Figure 30: Zonal average of “QA value” for 2025-03-06 to 2025-03-07.

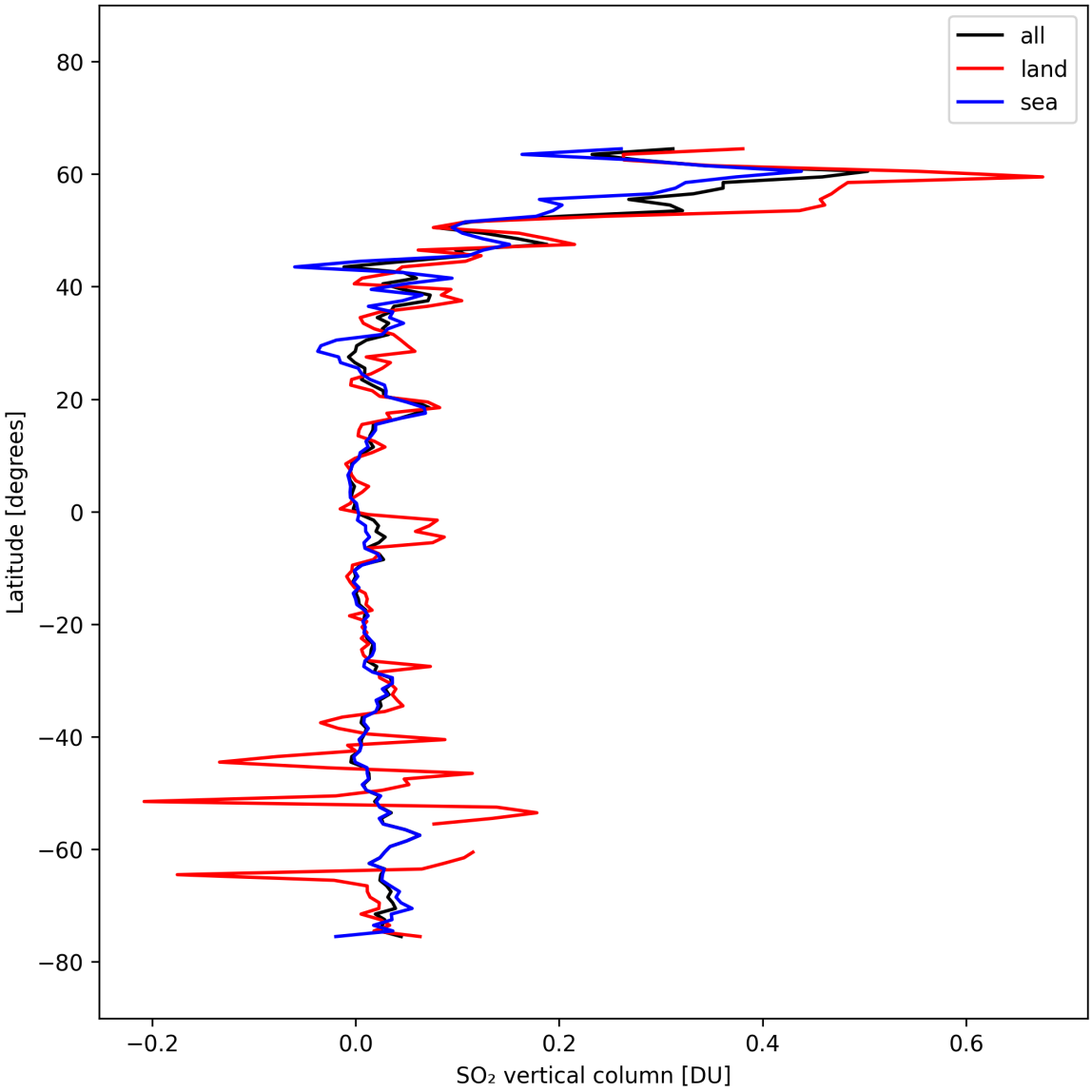


Figure 31: Zonal average of "SO_2 vertical column" for 2025-03-06 to 2025-03-07.

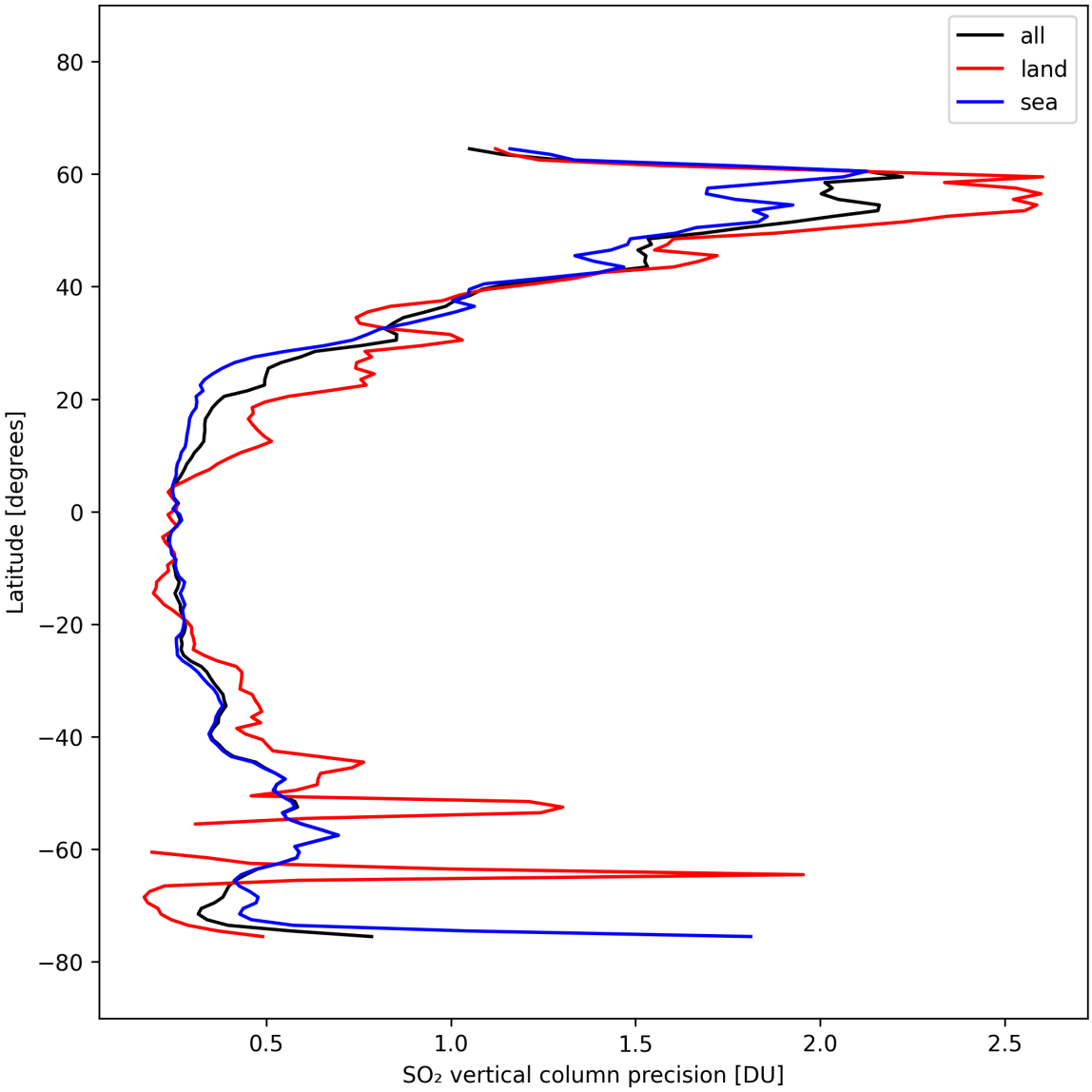


Figure 32: Zonal average of "SO_2 vertical column precision" for 2025-03-06 to 2025-03-07.

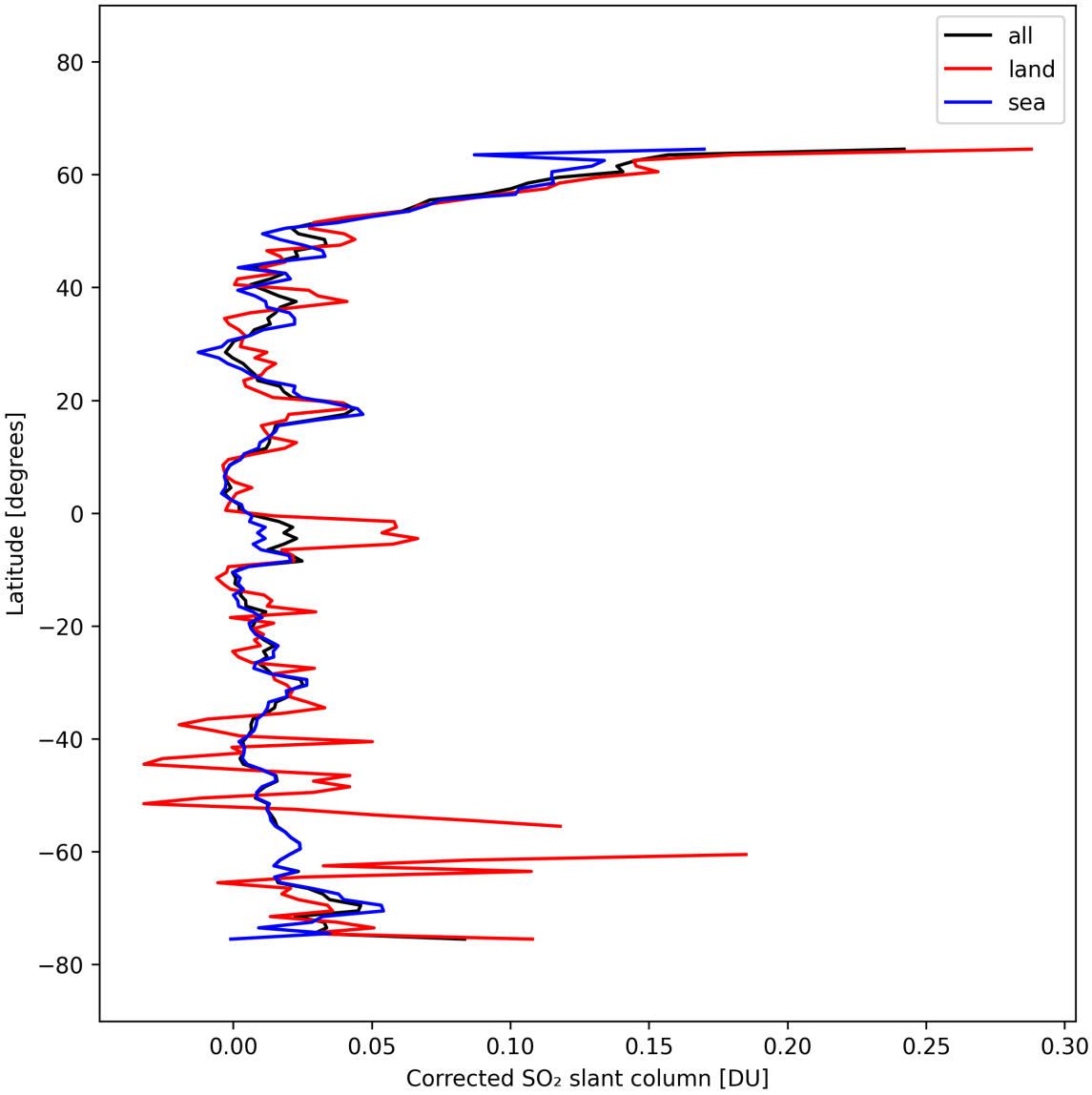


Figure 33: Zonal average of “Corrected SO_2 slant column” for 2025-03-06 to 2025-03-07.

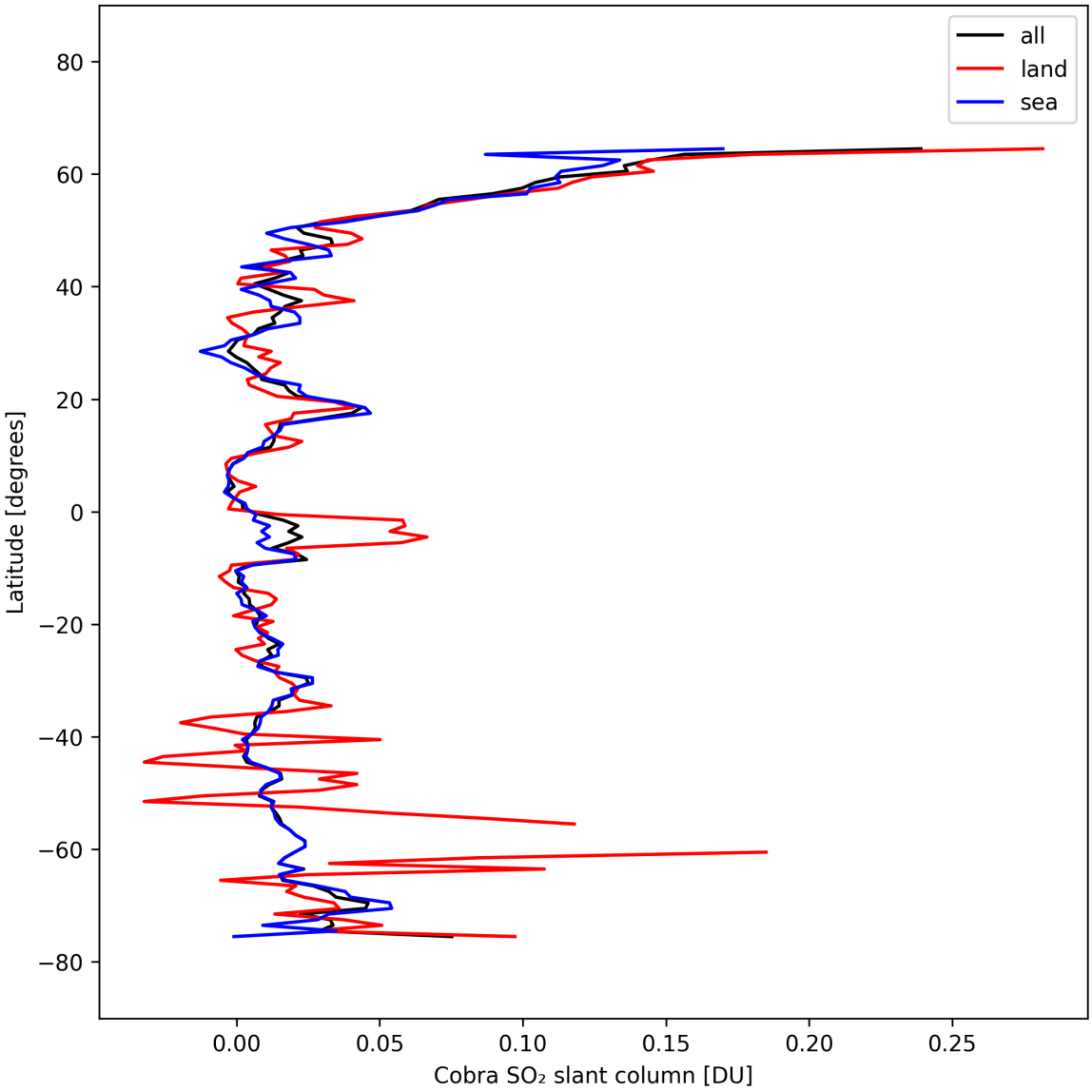


Figure 34: Zonal average of "Cobra SO_2 slant column" for 2025-03-06 to 2025-03-07.

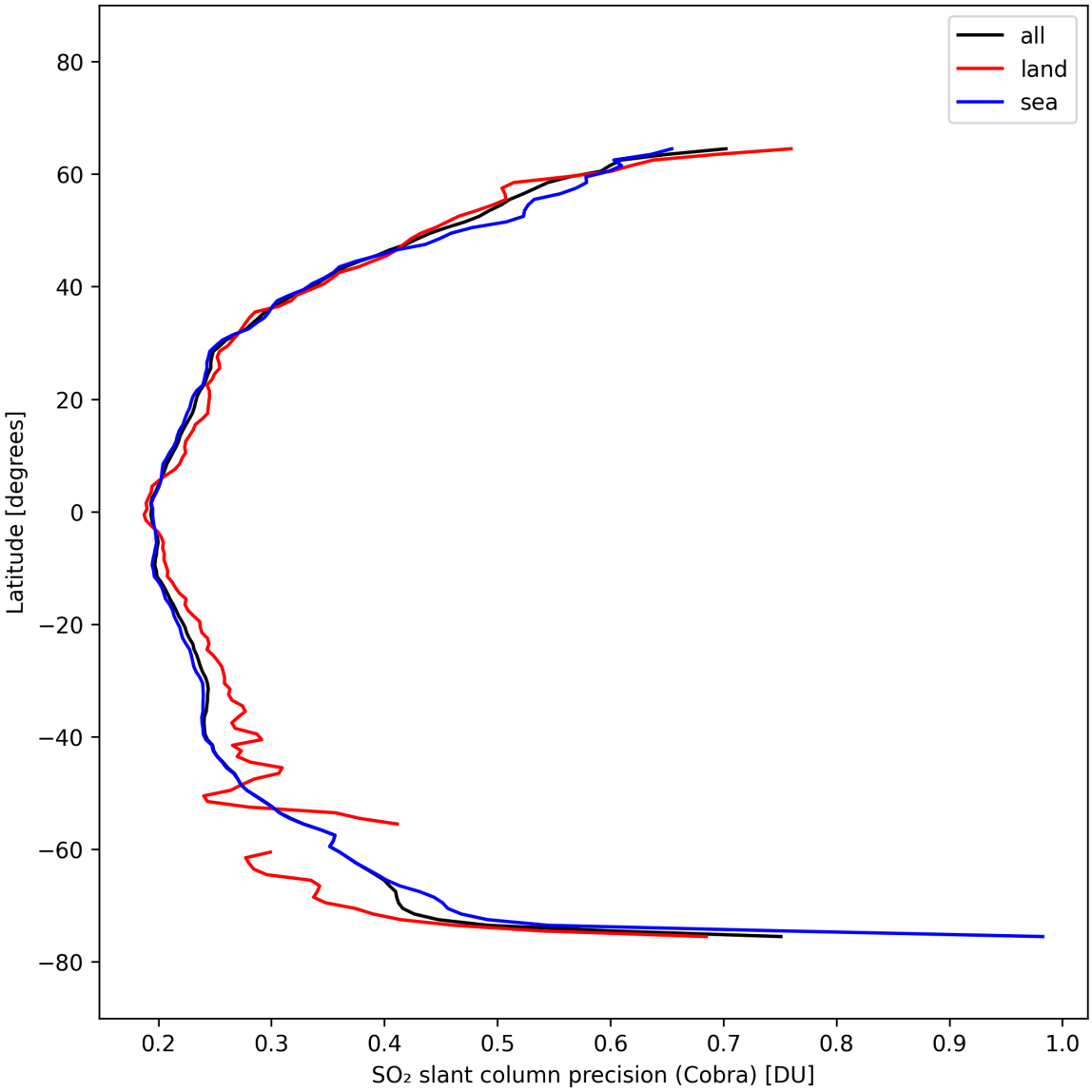


Figure 35: Zonal average of "SO_2 slant column precision (Cobra)" for 2025-03-06 to 2025-03-07.

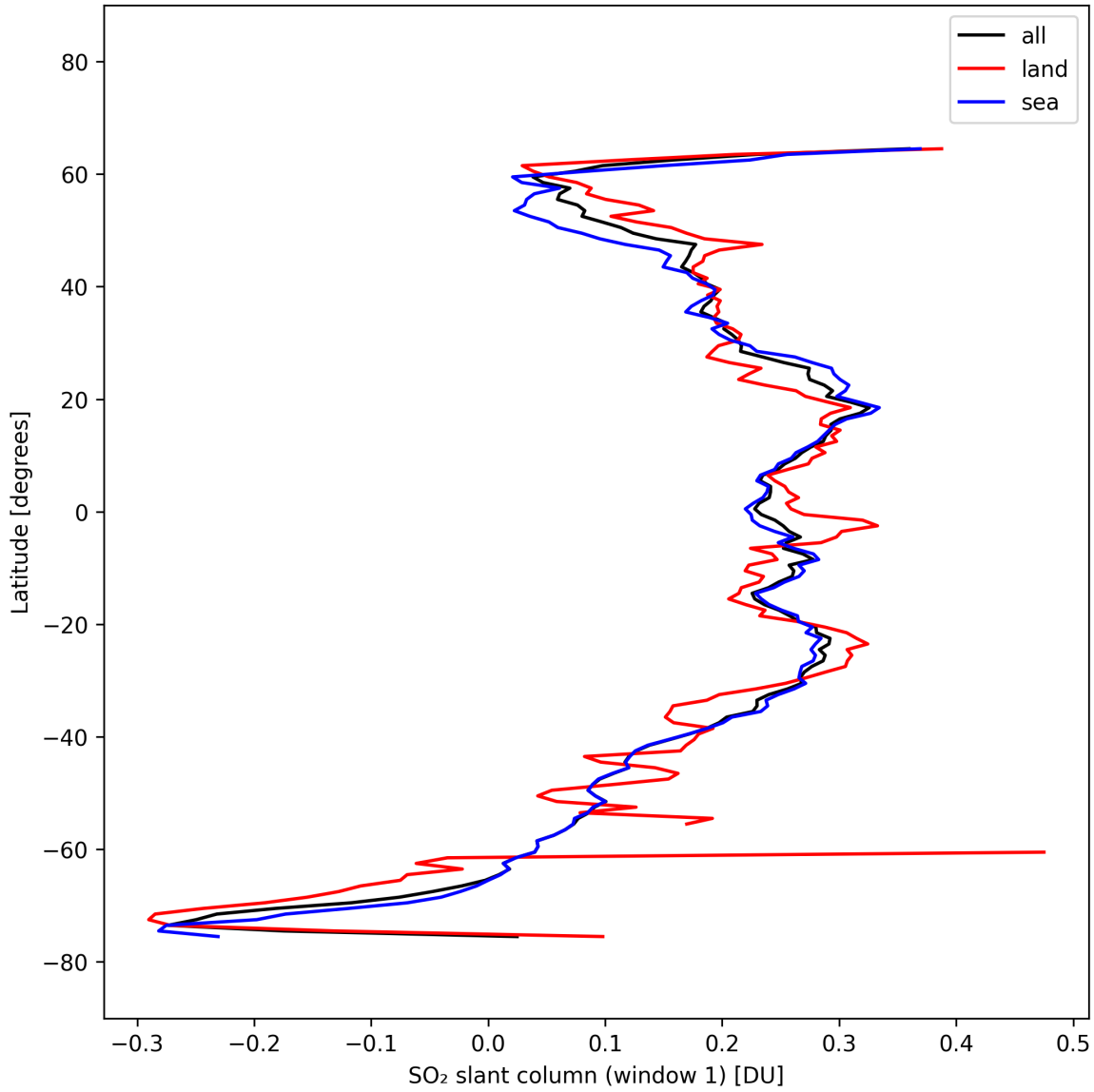


Figure 36: Zonal average of "SO_2 slant column (window 1)" for 2025-03-06 to 2025-03-07.

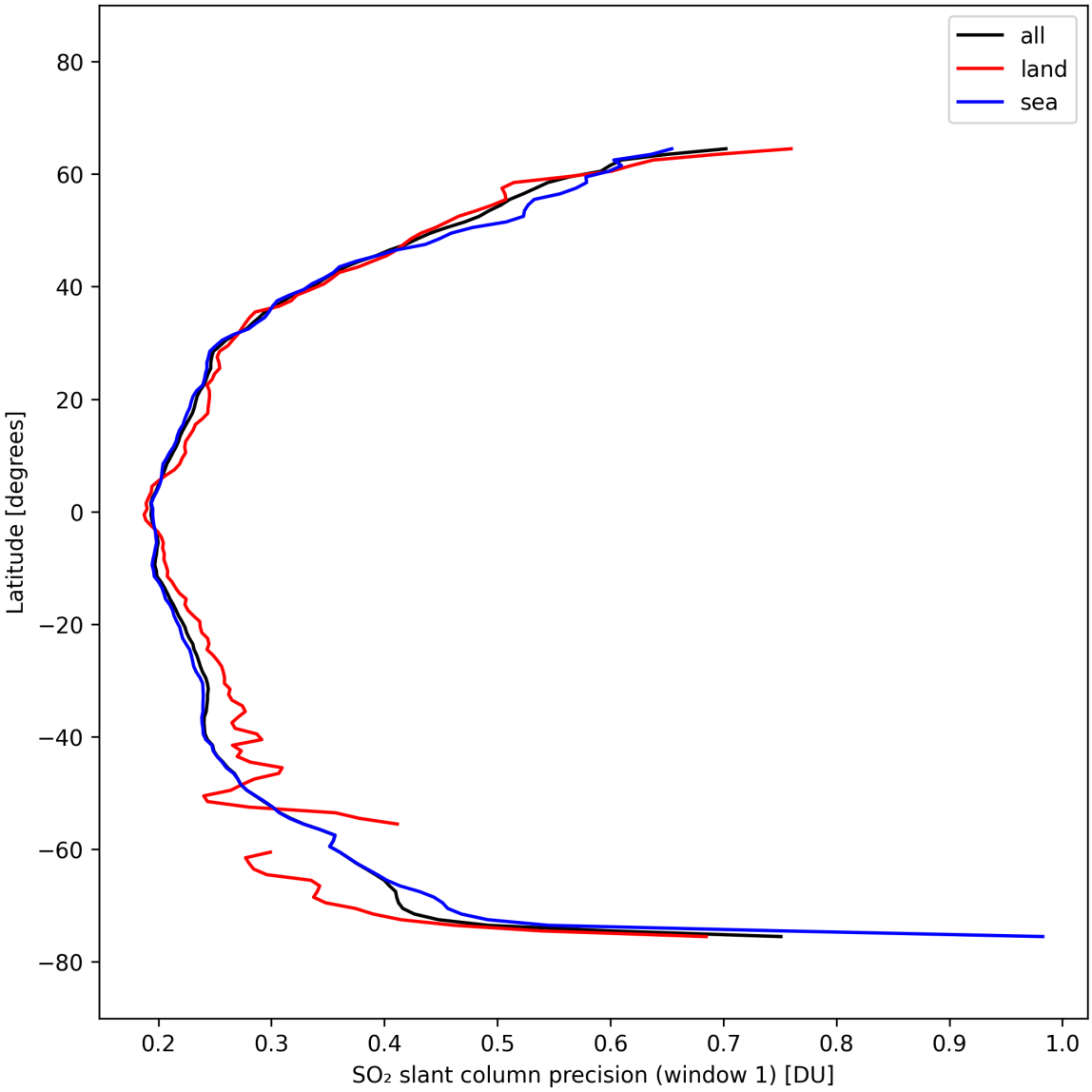


Figure 37: Zonal average of "SO_2 slant column precision (window 1)" for 2025-03-06 to 2025-03-07.

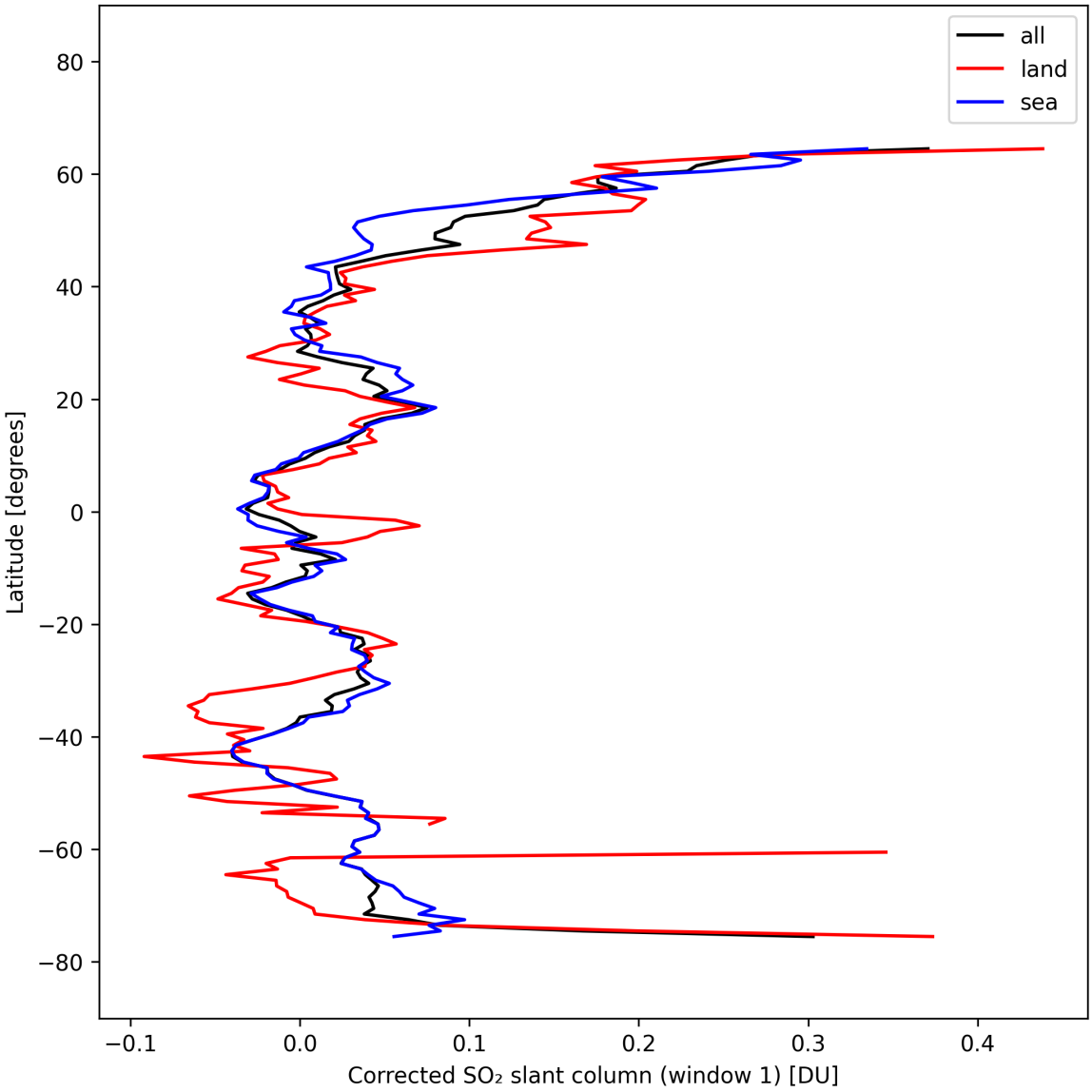


Figure 38: Zonal average of "Corrected SO_2 slant column (window 1)" for 2025-03-06 to 2025-03-07.

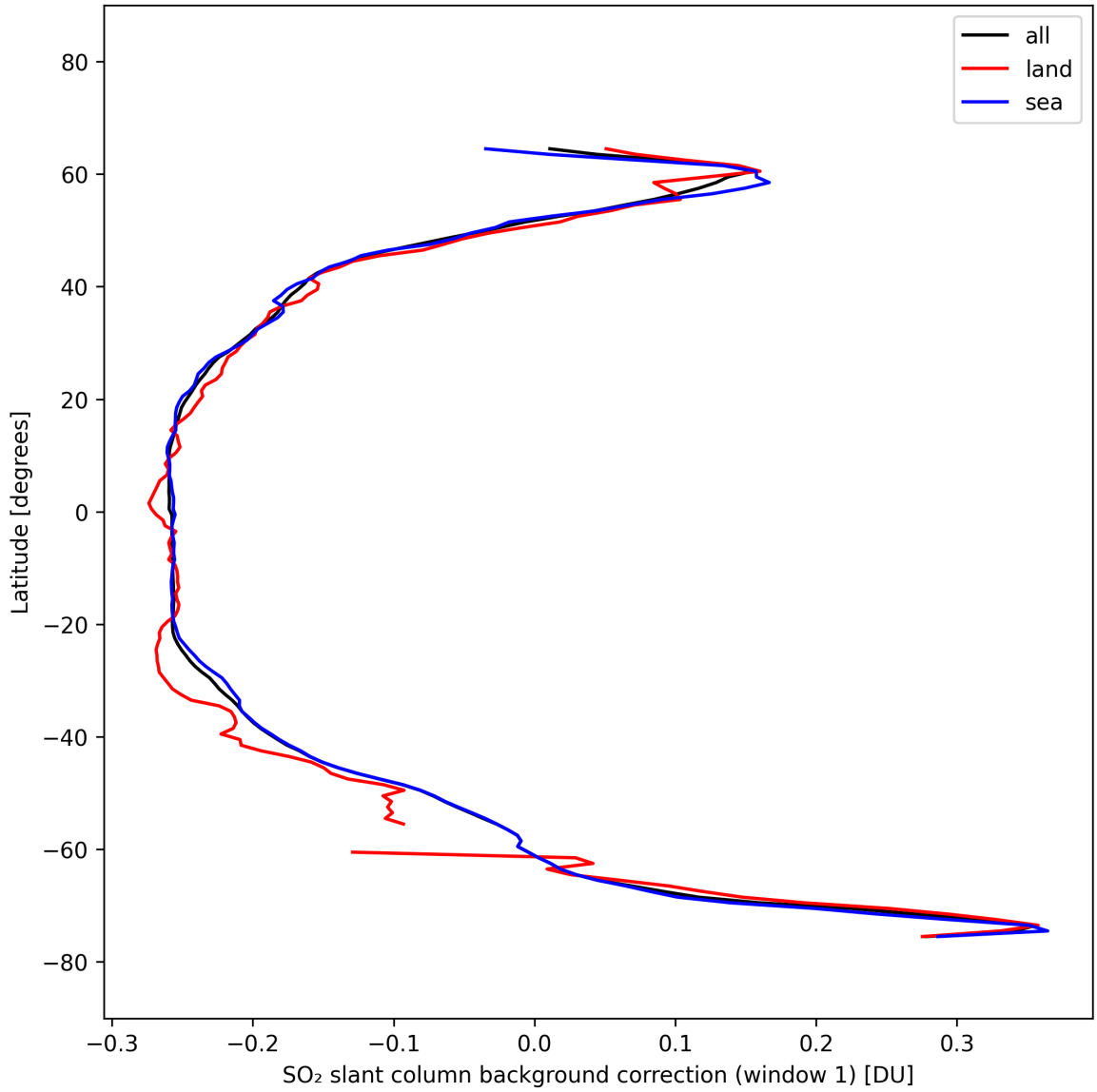


Figure 39: Zonal average of "SO_2 slant column background correction (window 1)" for 2025-03-06 to 2025-03-07.

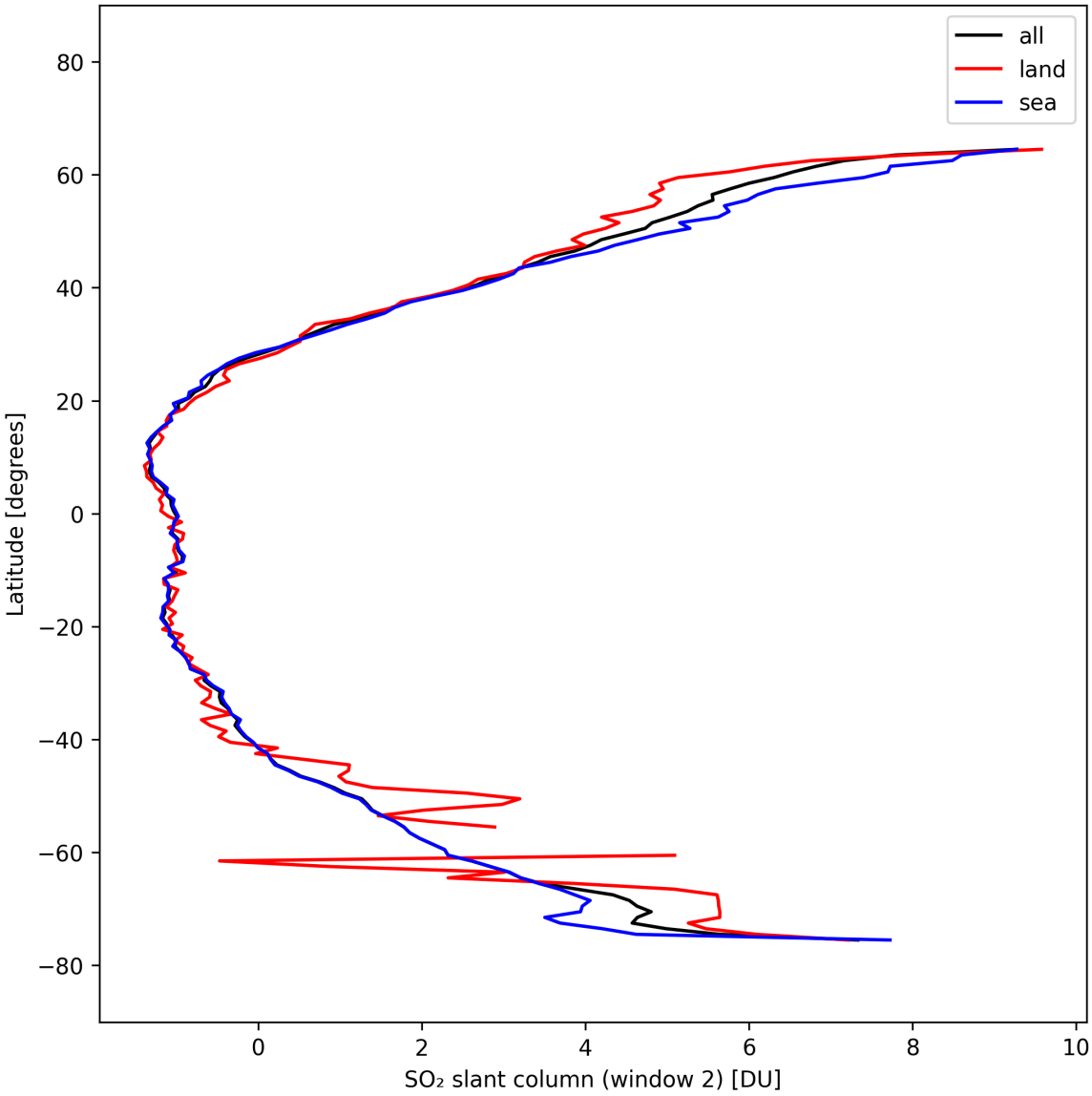


Figure 40: Zonal average of "SO_2 slant column (window 2)" for 2025-03-06 to 2025-03-07.

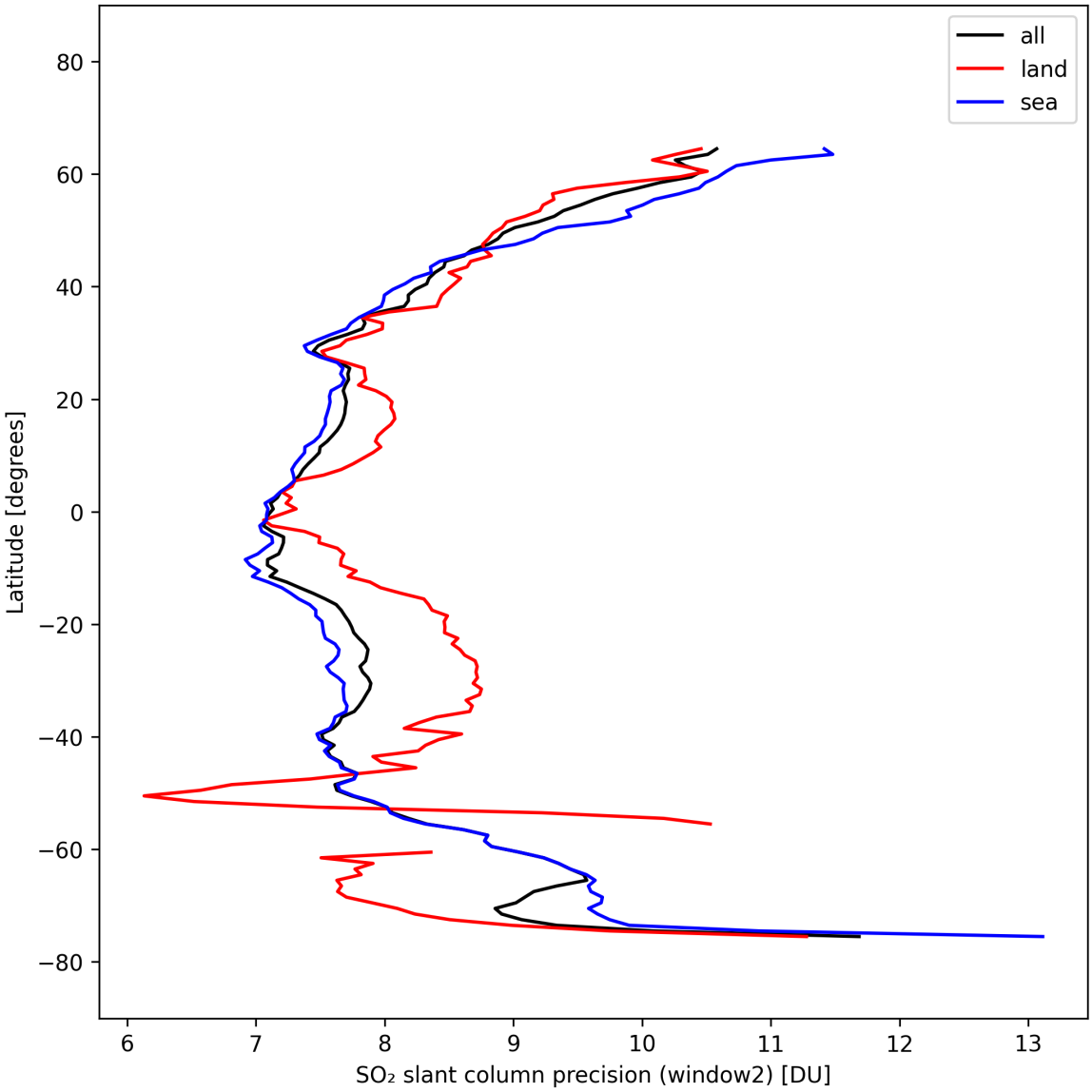


Figure 41: Zonal average of "SO_2 slant column precision (window2)" for 2025-03-06 to 2025-03-07.

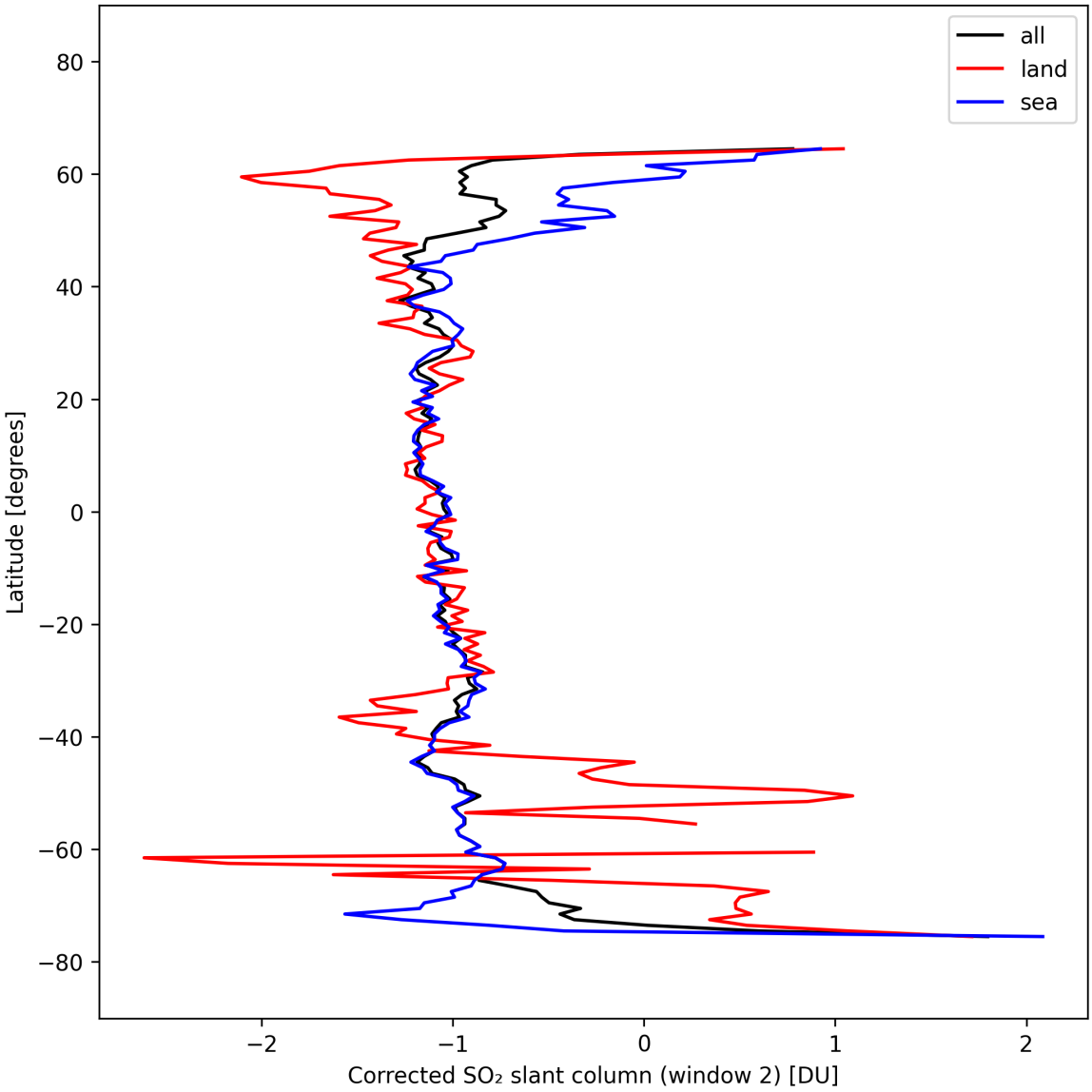


Figure 42: Zonal average of “Corrected SO_2 slant column (window 2)” for 2025-03-06 to 2025-03-07.

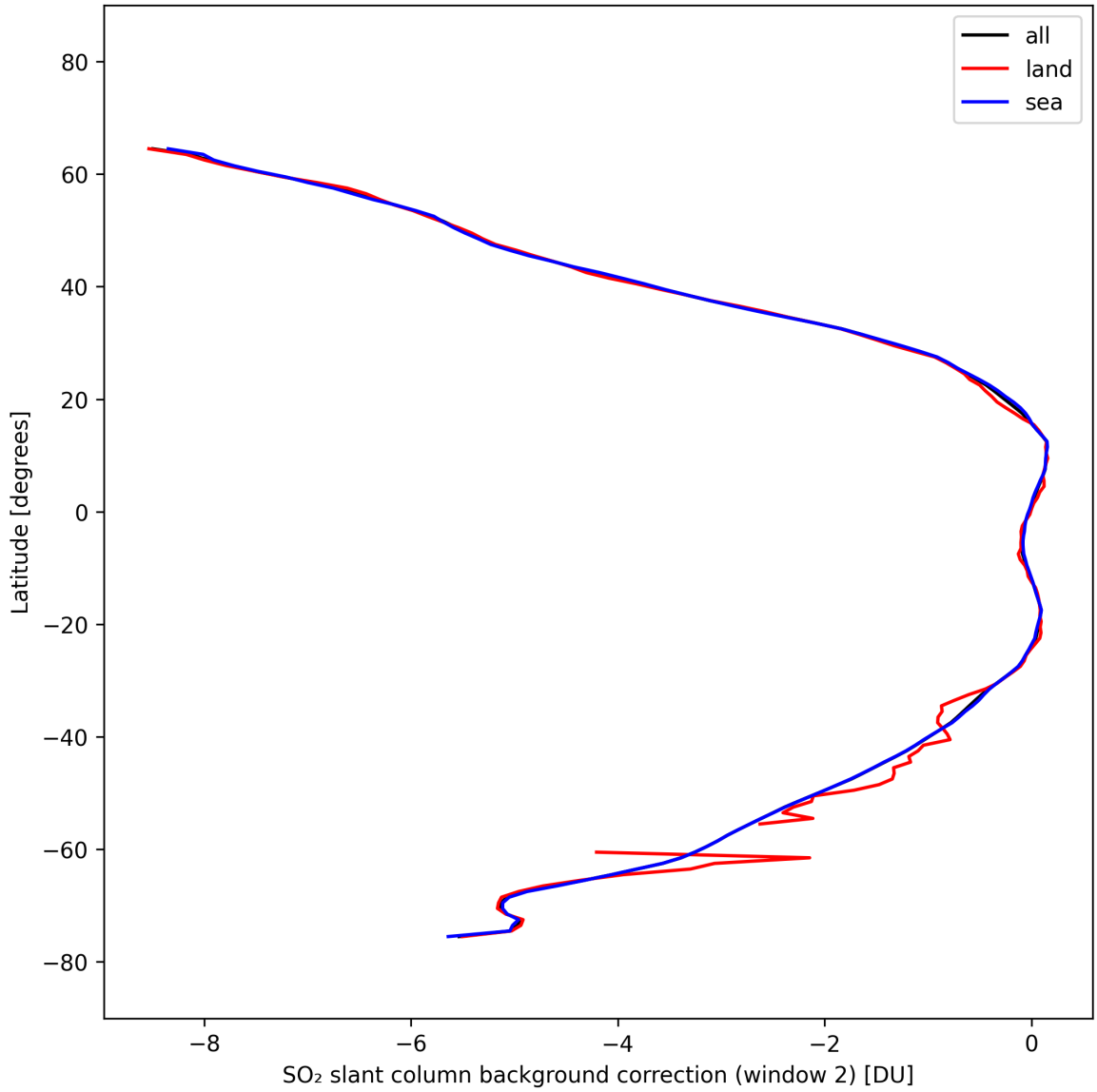


Figure 43: Zonal average of "SO_2 slant column background correction (window 2)" for 2025-03-06 to 2025-03-07.

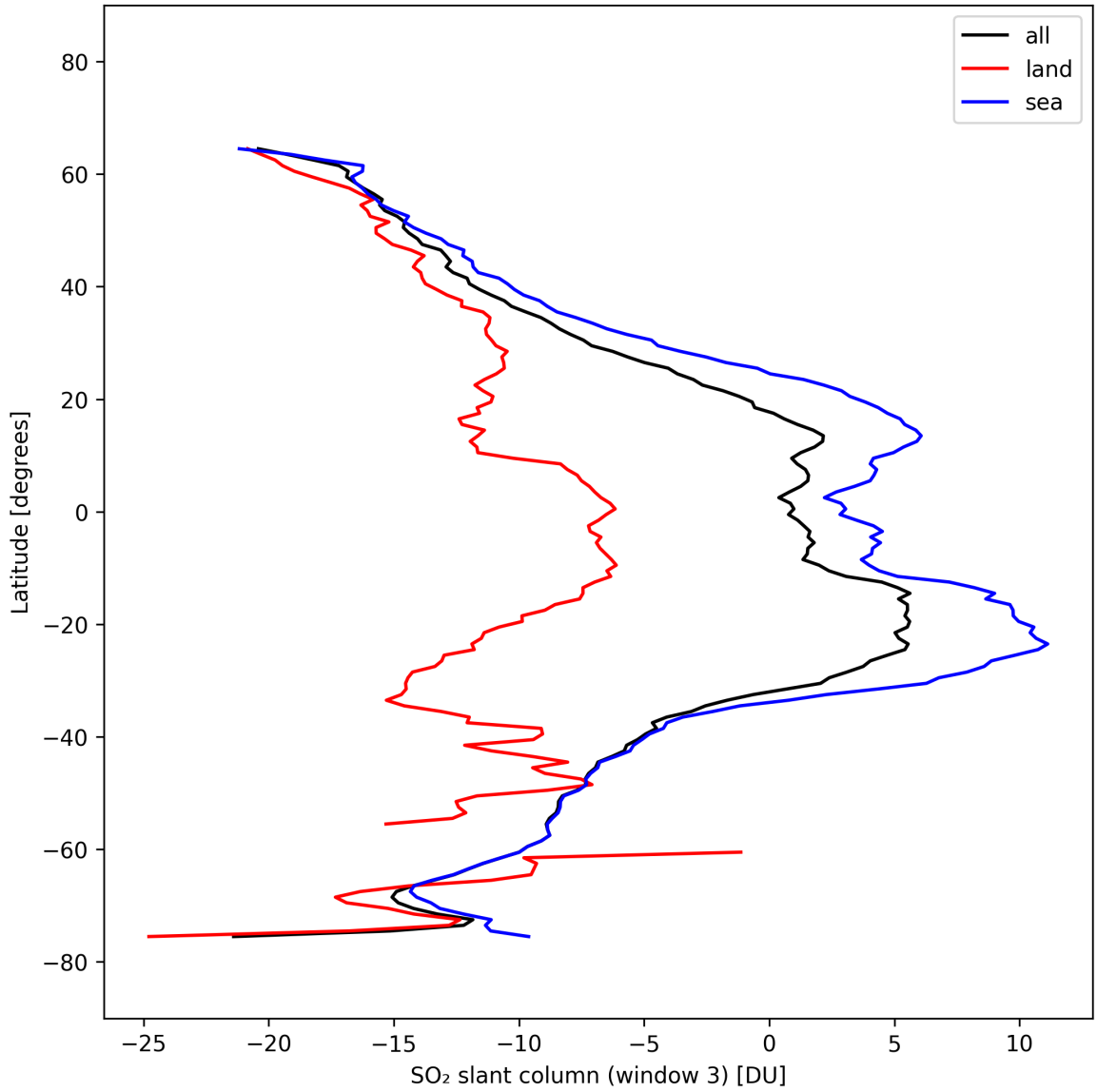


Figure 44: Zonal average of "SO_2 slant column (window 3)" for 2025-03-06 to 2025-03-07.

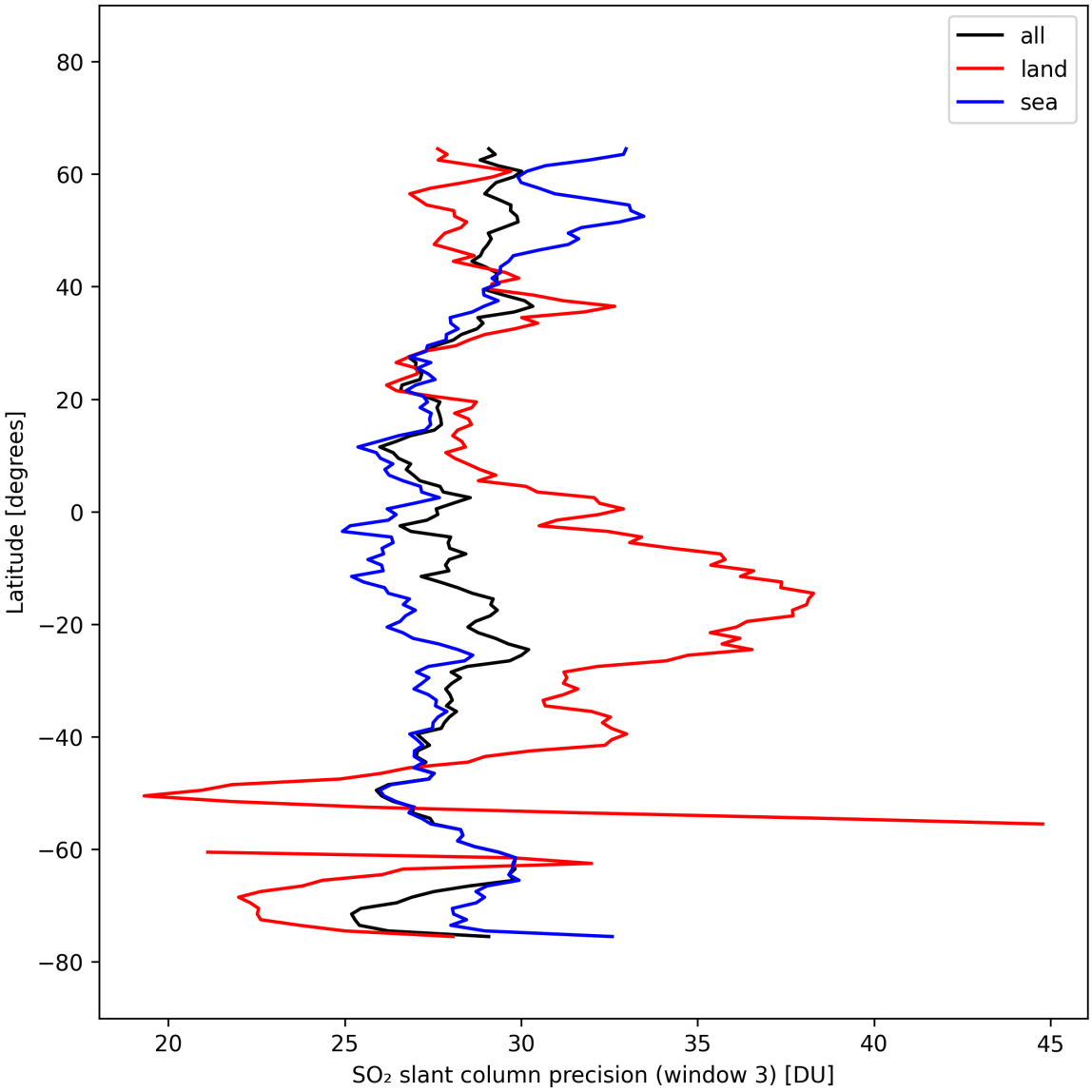


Figure 45: Zonal average of "SO_2 slant column precision (window 3)" for 2025-03-06 to 2025-03-07.

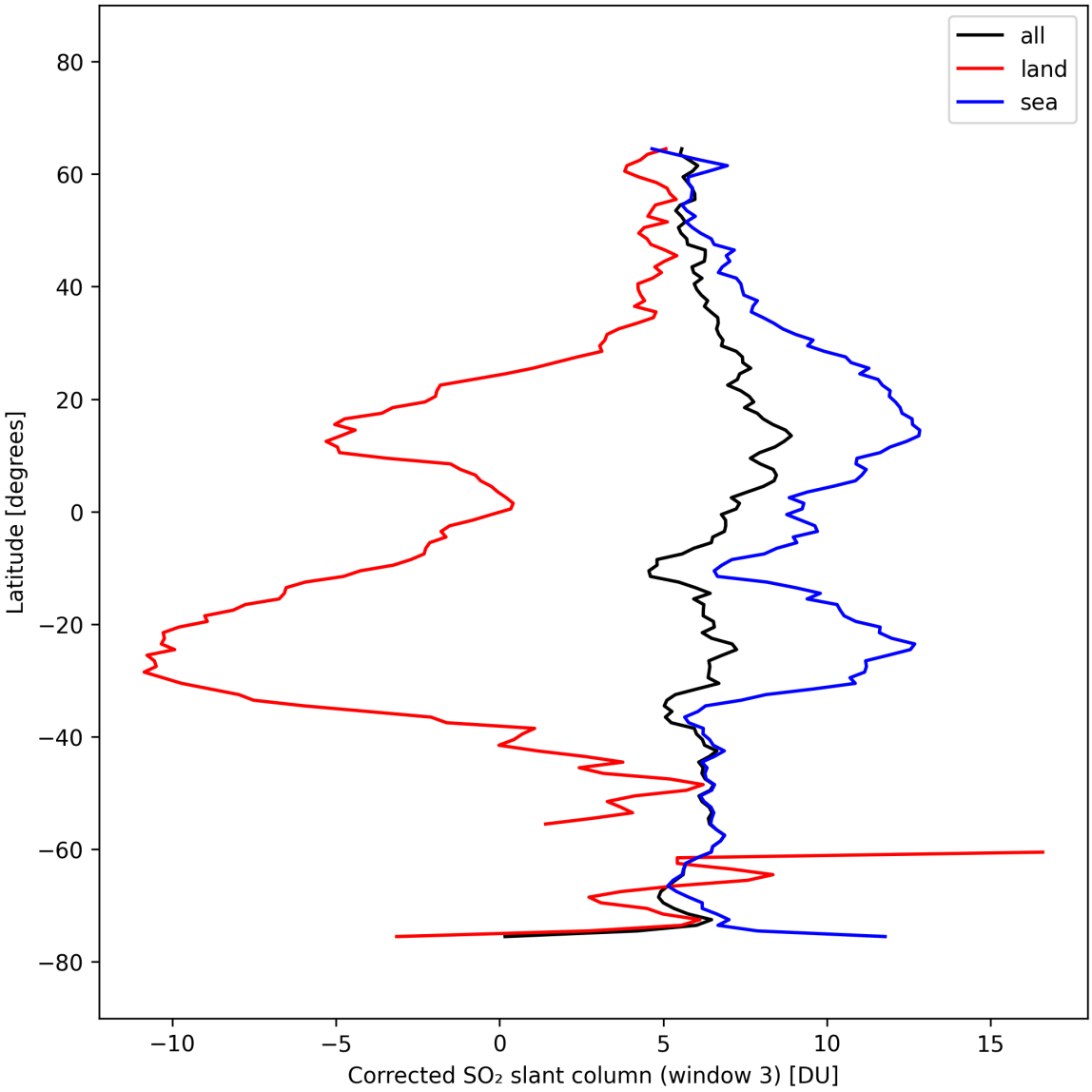


Figure 46: Zonal average of "Corrected SO_2 slant column (window 3)" for 2025-03-06 to 2025-03-07.

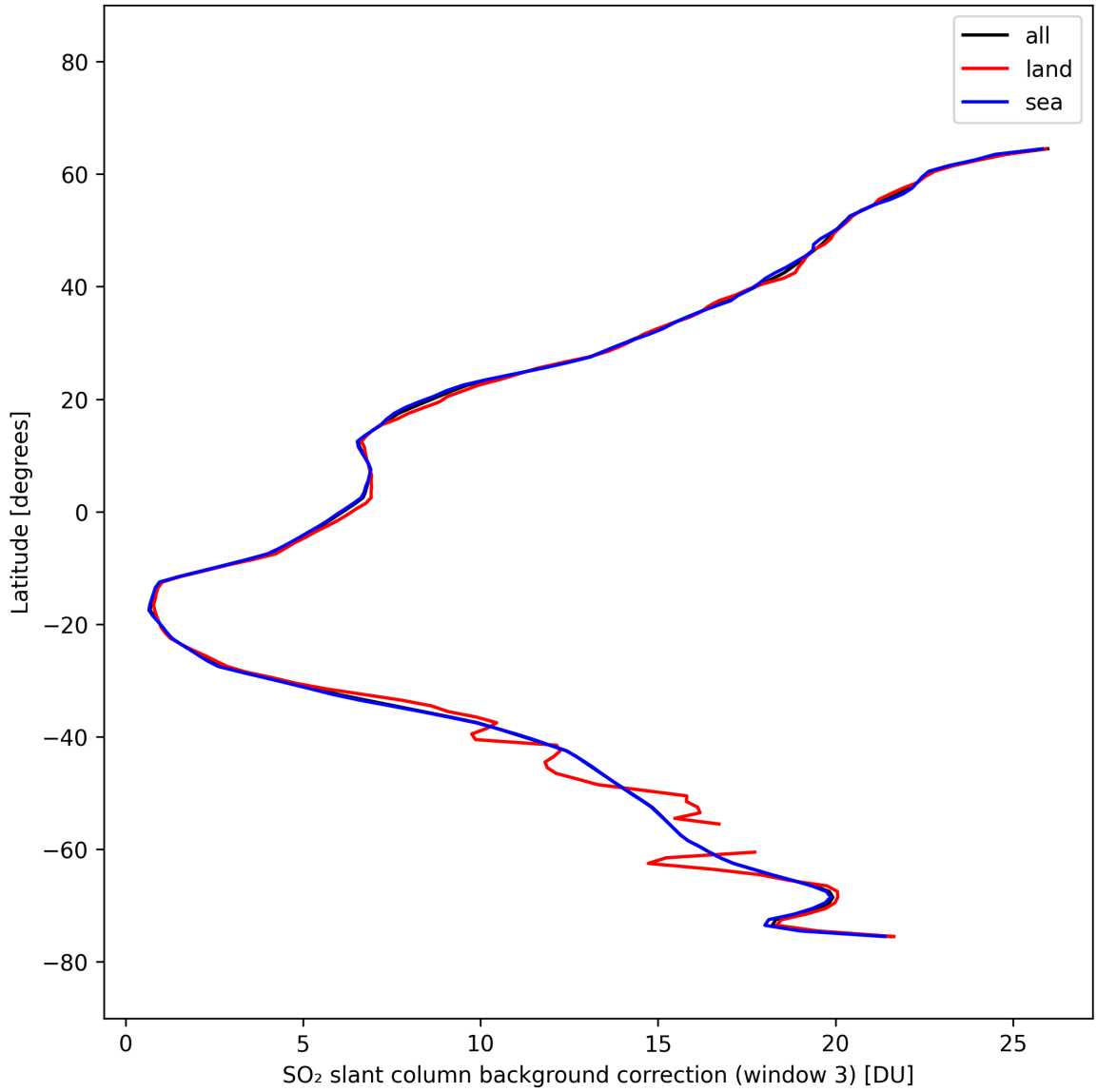


Figure 47: Zonal average of "SO_2 slant column background correction (window 3)" for 2025-03-06 to 2025-03-07.

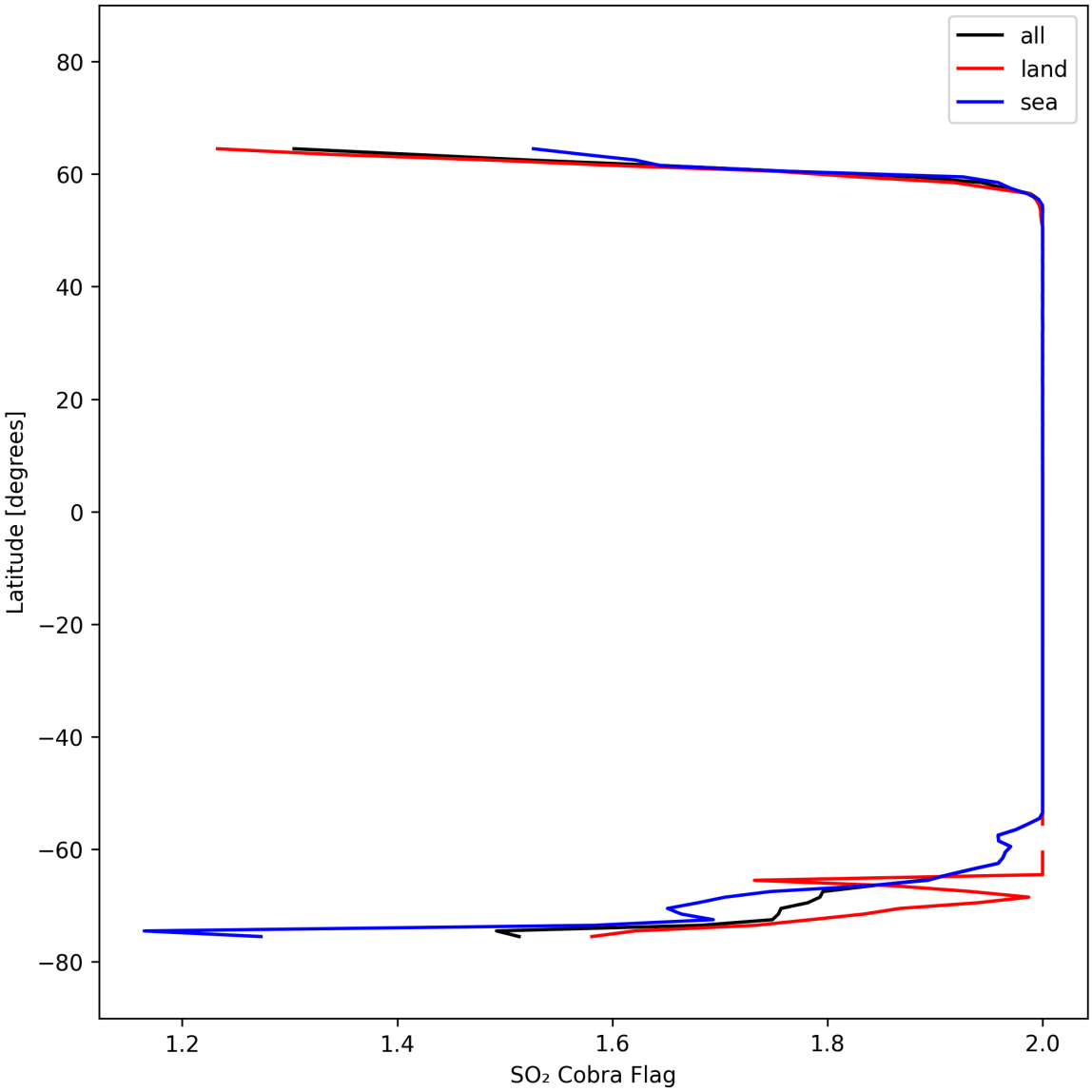


Figure 48: Zonal average of "SO_2 Cobra Flag" for 2025-03-06 to 2025-03-07.

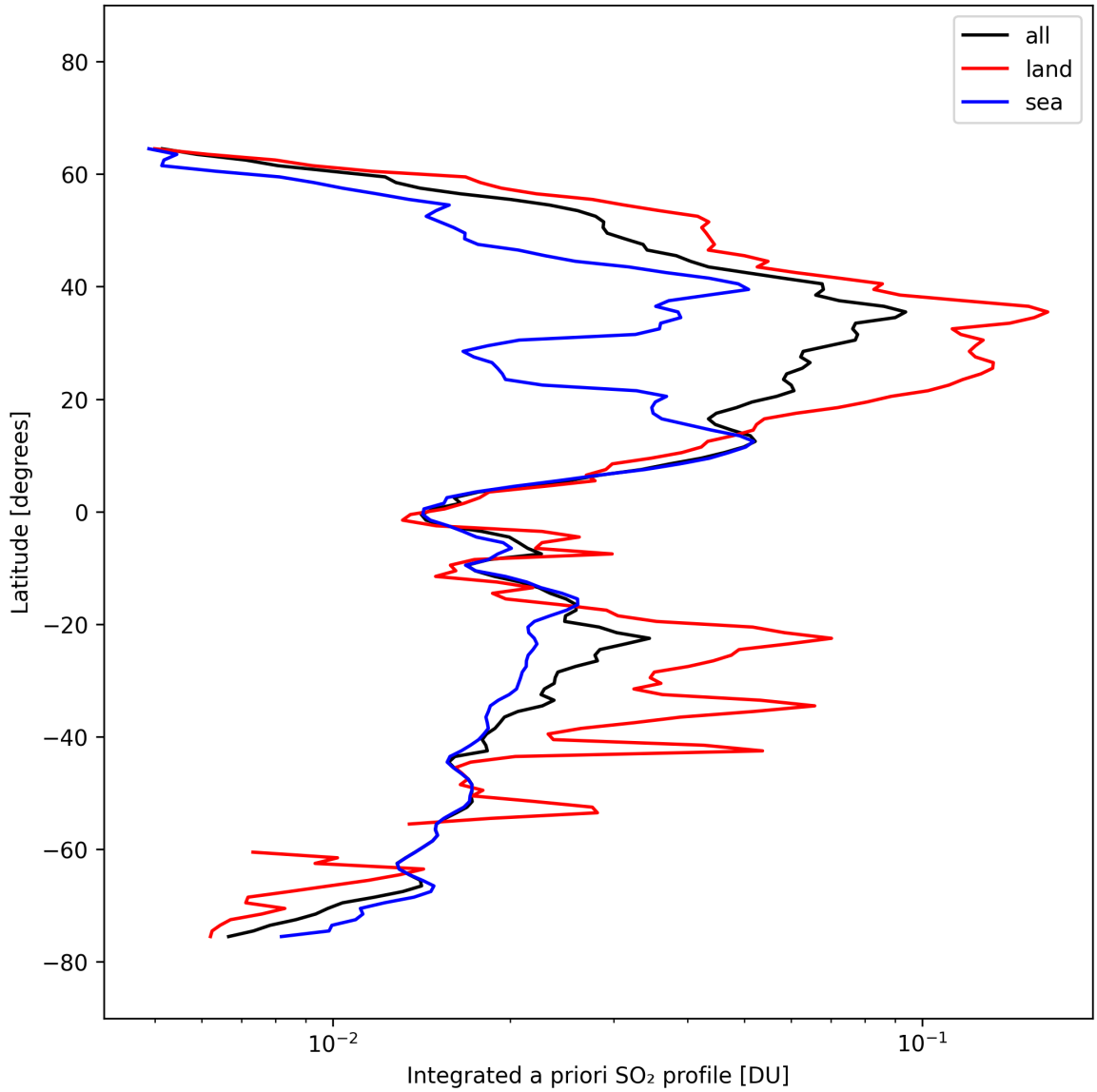


Figure 49: Zonal average of “Integrated a priori SO_2 profile” for 2025-03-06 to 2025-03-07.

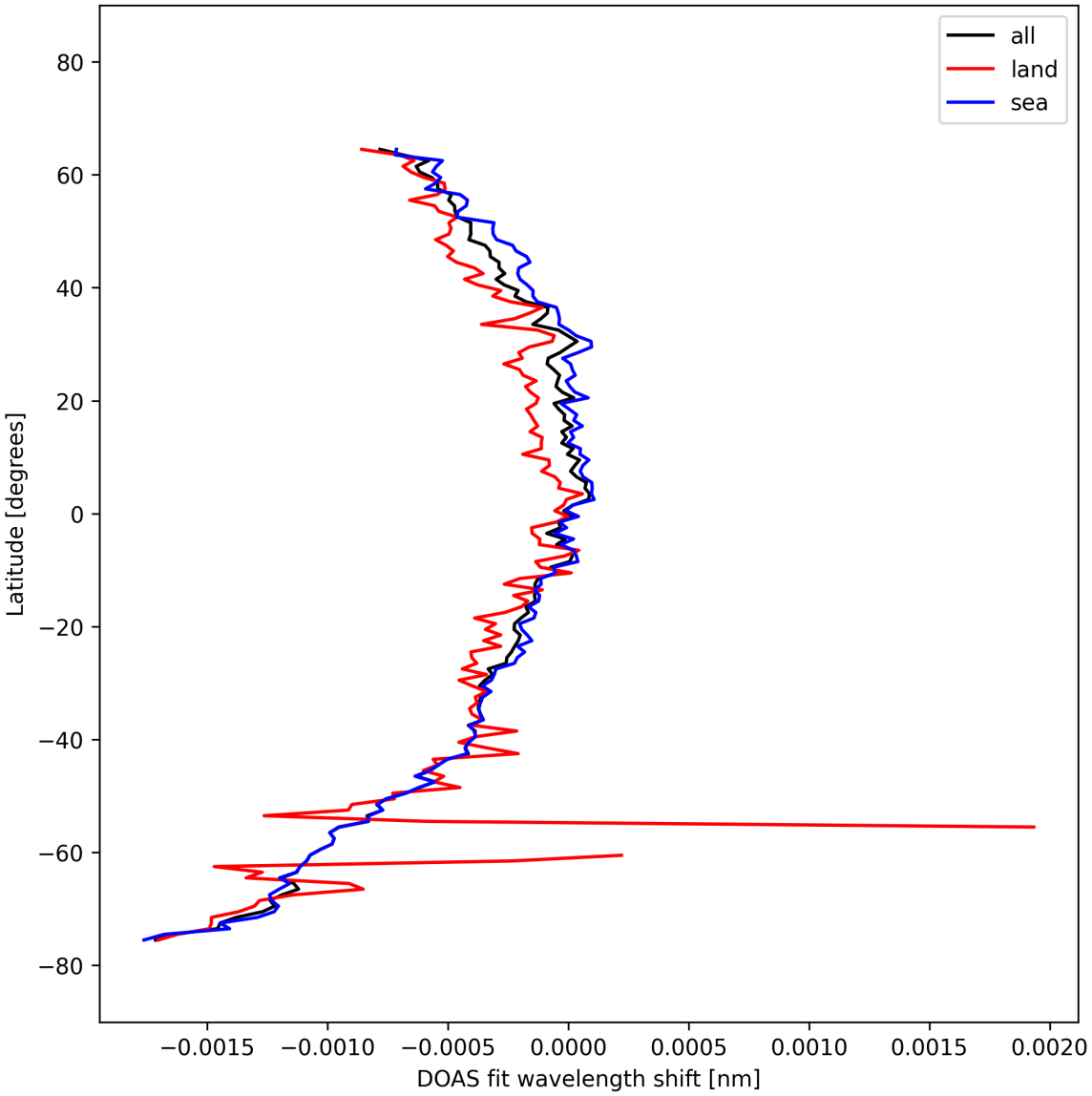


Figure 50: Zonal average of “DOAS fit wavelength shift” for 2025-03-06 to 2025-03-07.

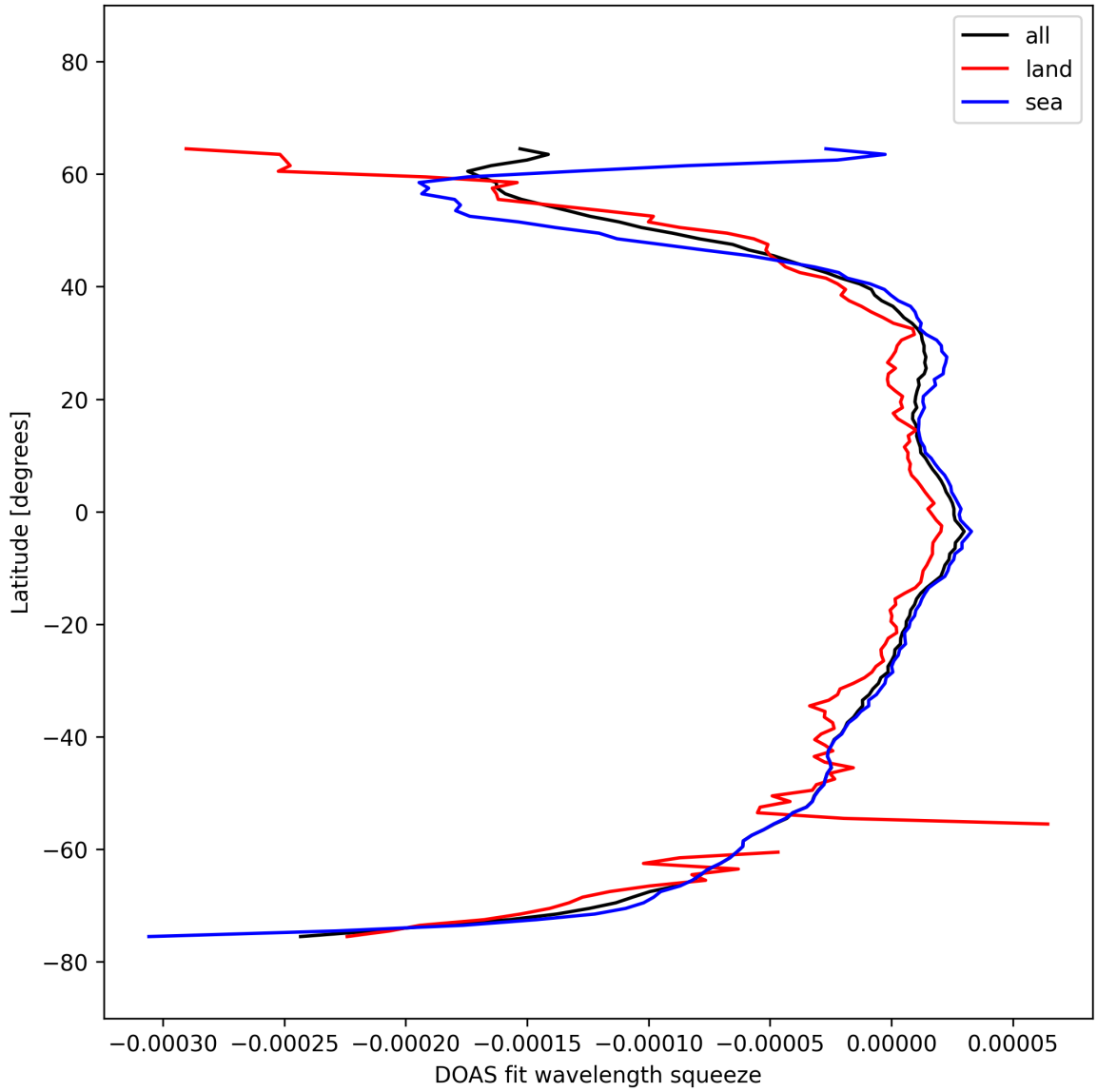


Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-03-06 to 2025-03-07.

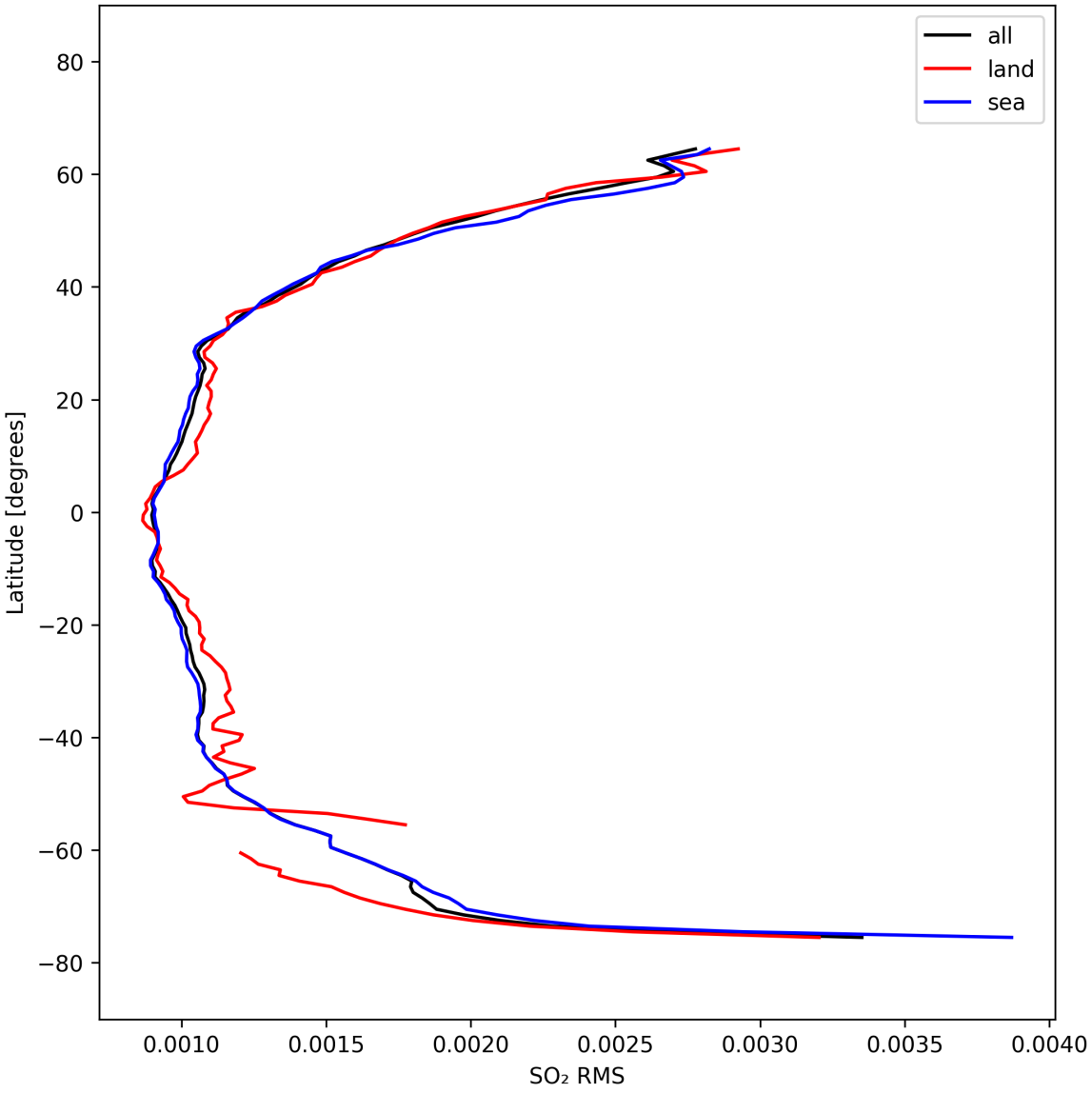


Figure 52: Zonal average of "SO_2 RMS" for 2025-03-06 to 2025-03-07.

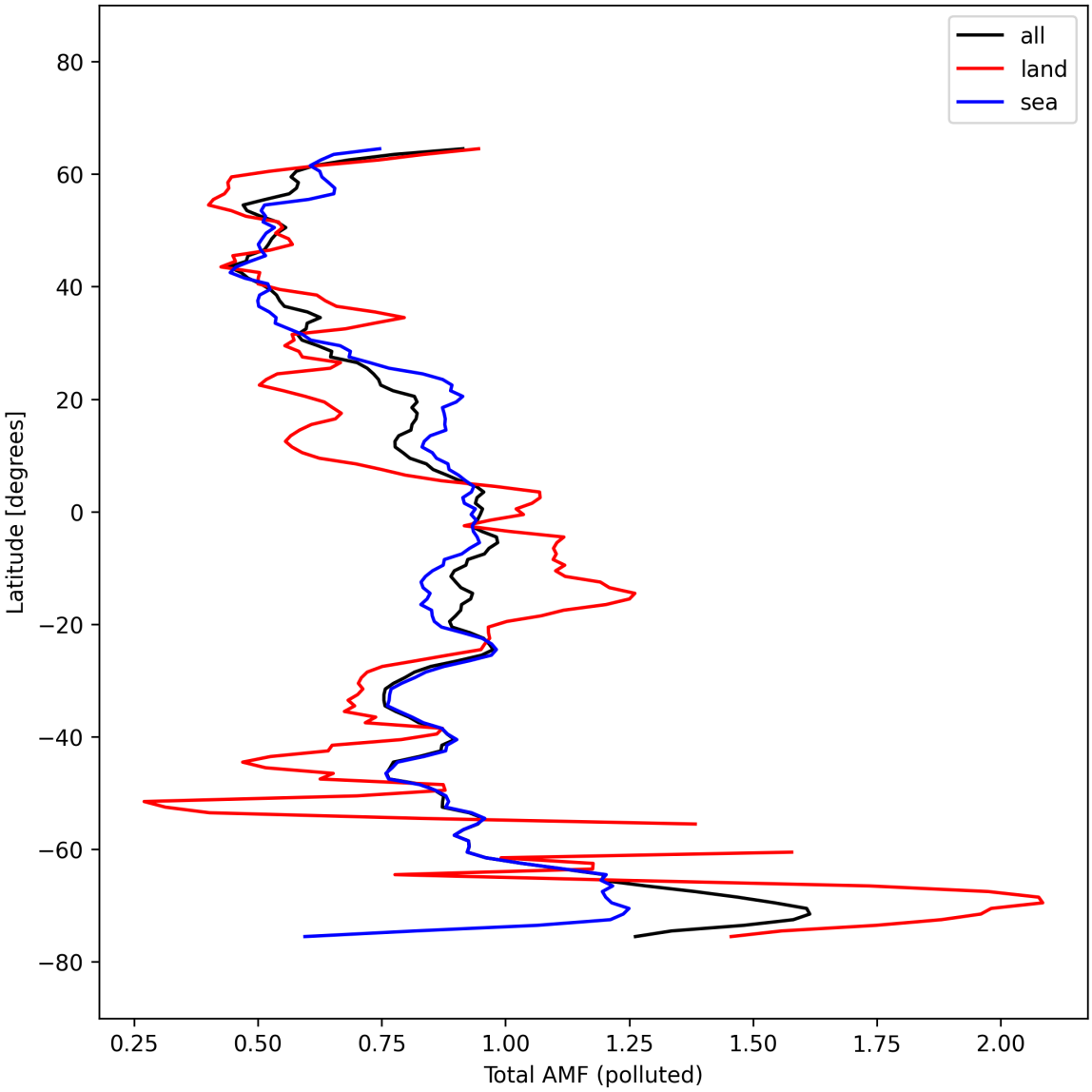


Figure 53: Zonal average of “Total AMF (polluted)” for 2025-03-06 to 2025-03-07.

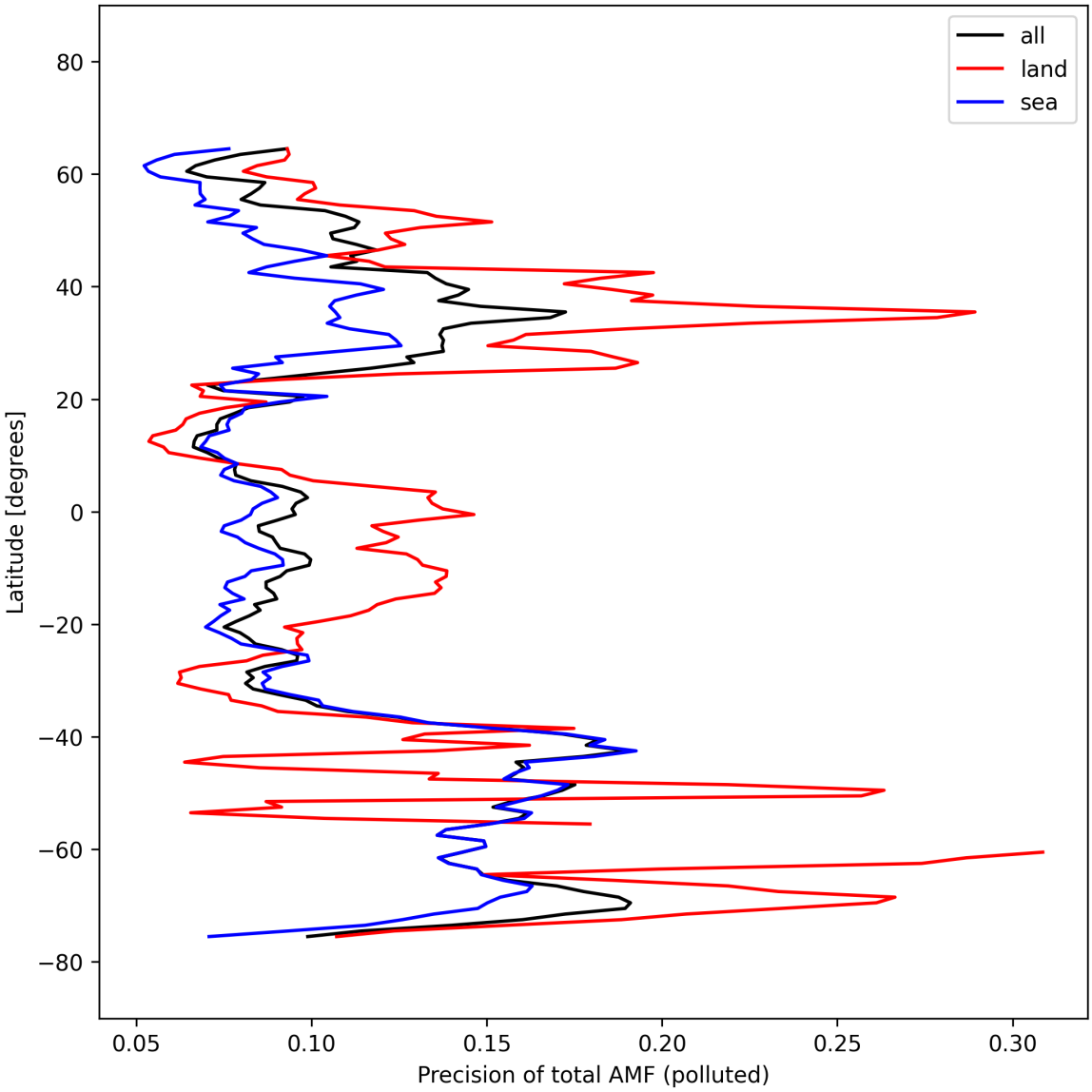


Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-03-06 to 2025-03-07.

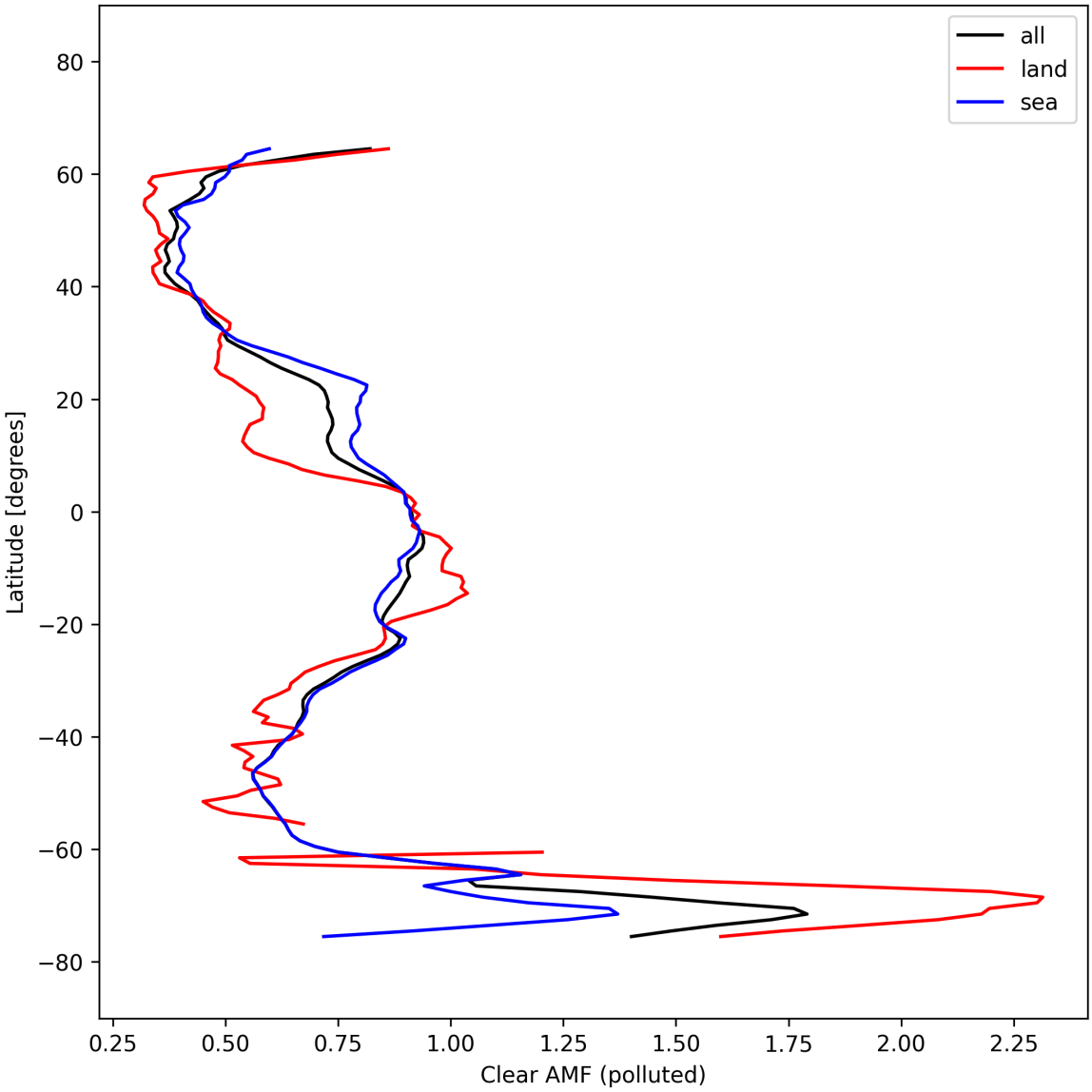


Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-03-06 to 2025-03-07.

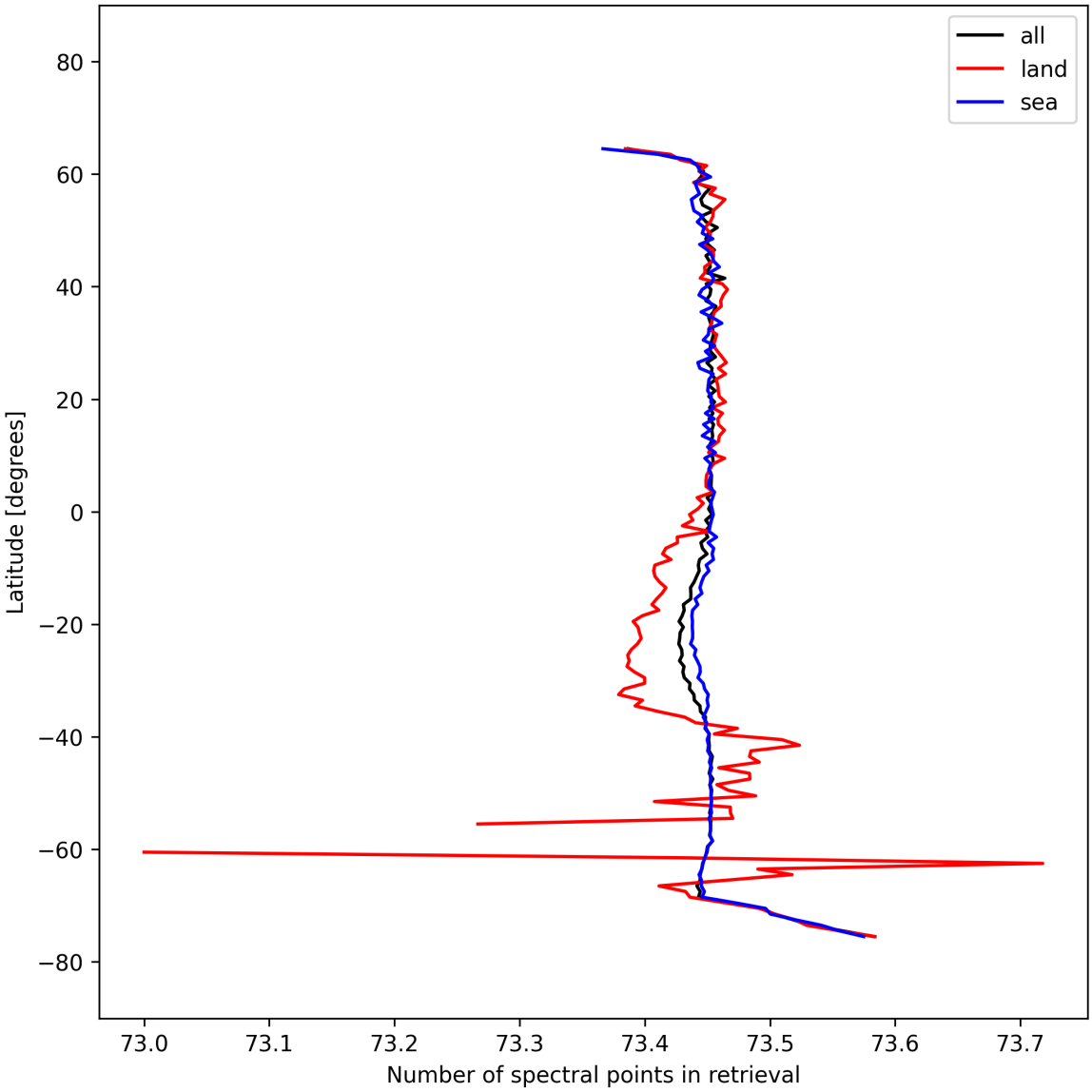


Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-03-06 to 2025-03-07.

8 Histograms

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

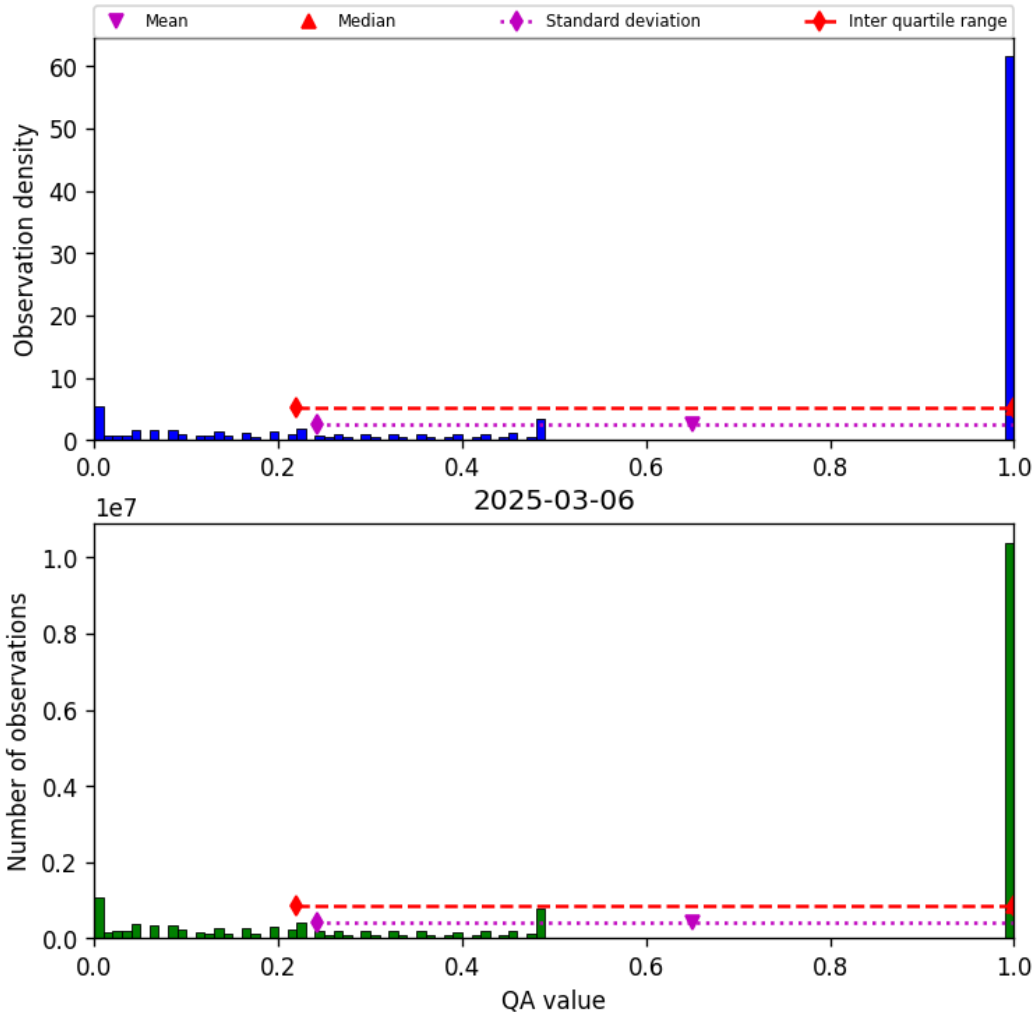


Figure 57: Histogram of “QA value” for 2025-03-06 to 2025-03-07

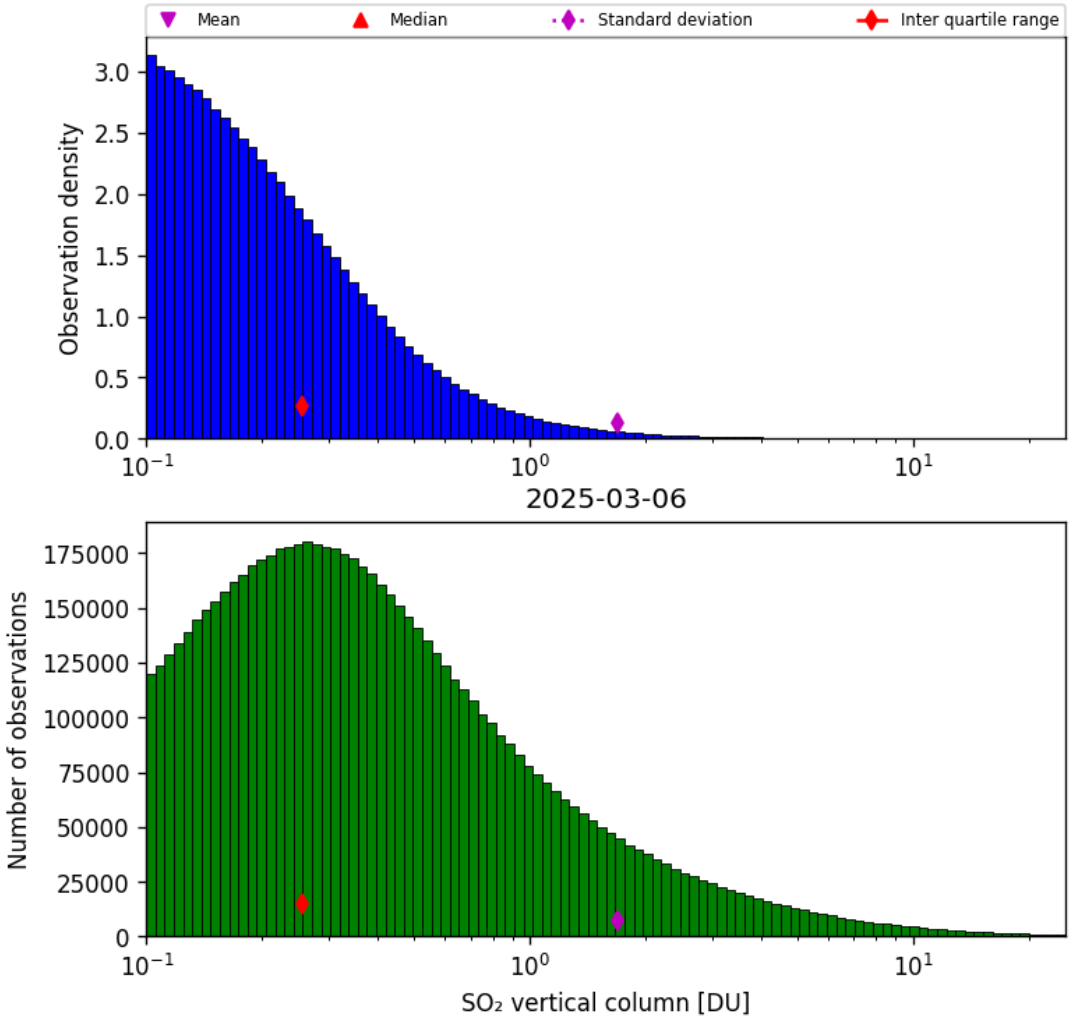


Figure 58: Histogram of "SO_2 vertical column" for 2025-03-06 to 2025-03-07

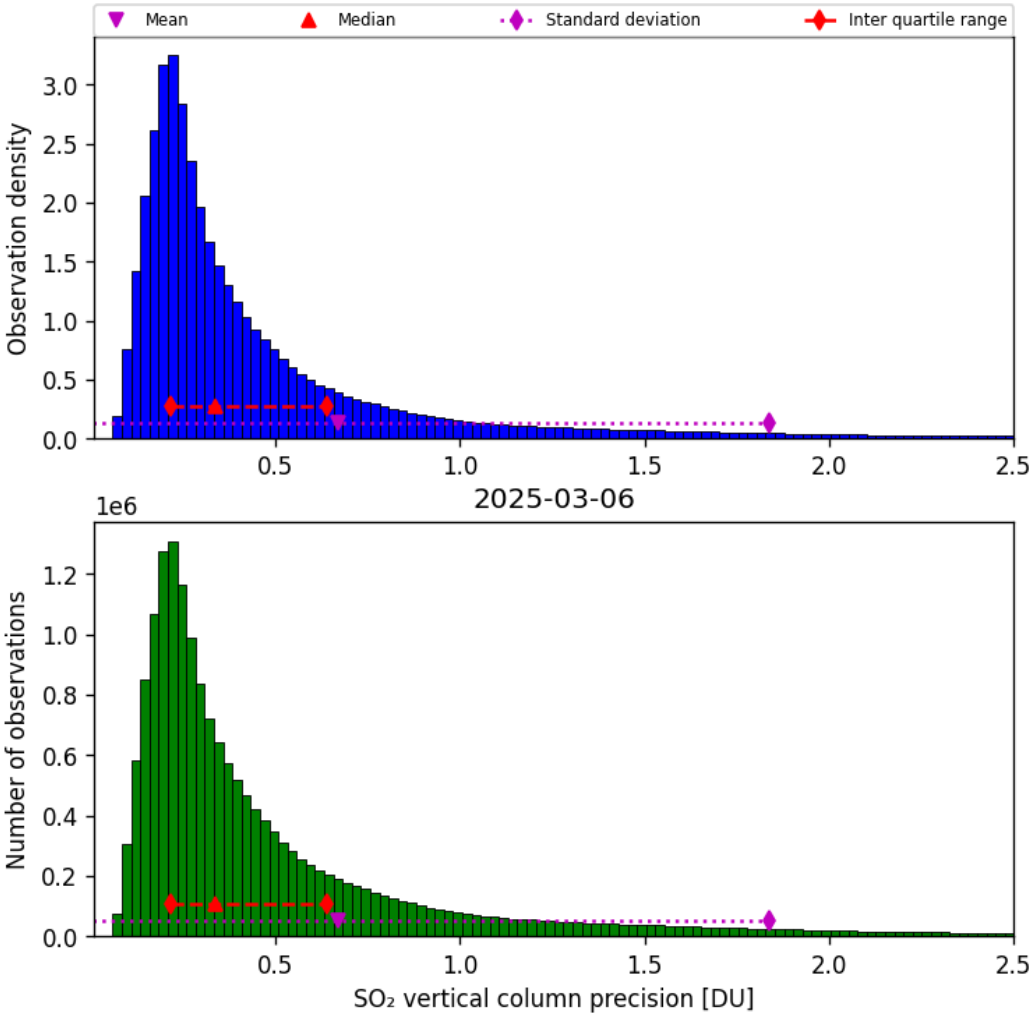


Figure 59: Histogram of "SO_2 vertical column precision" for 2025-03-06 to 2025-03-07

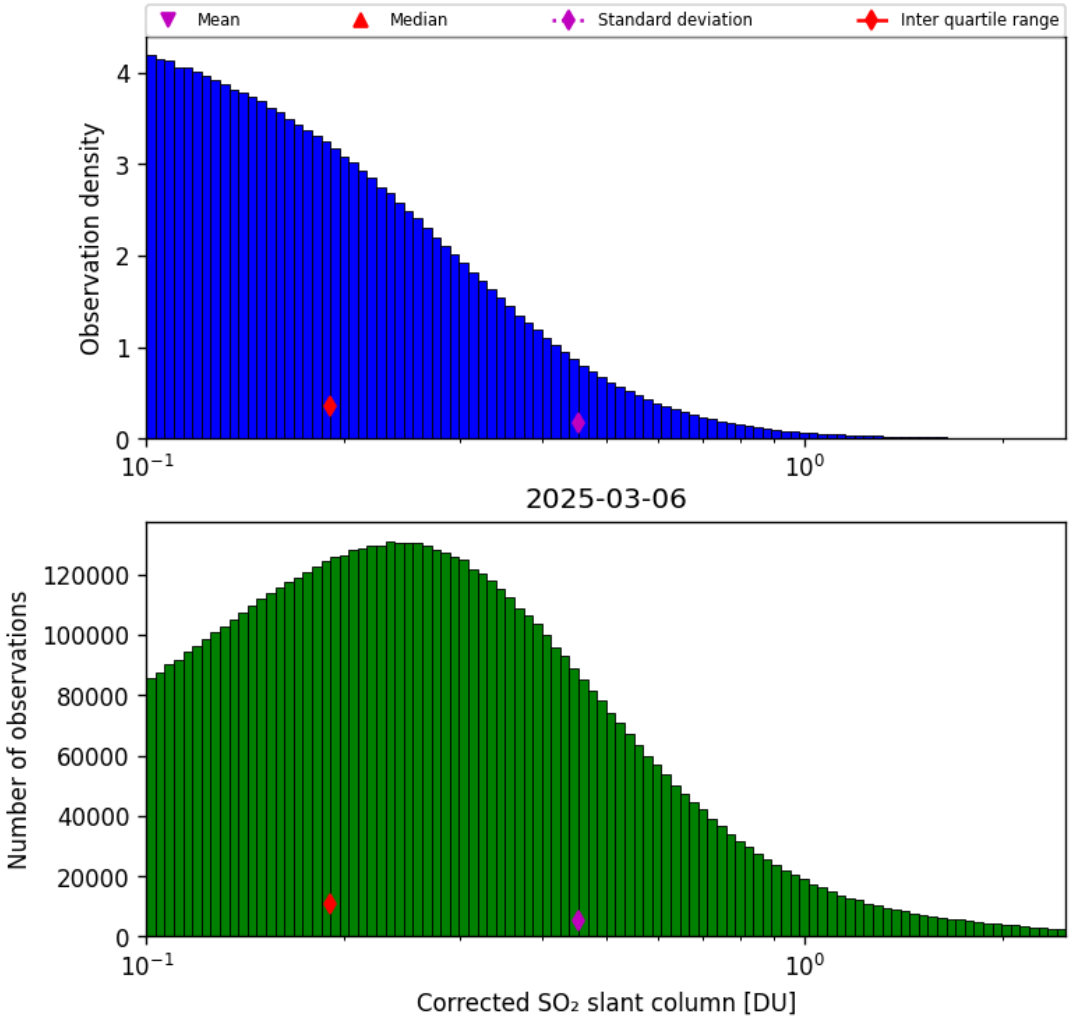


Figure 60: Histogram of "Corrected SO_2 slant column" for 2025-03-06 to 2025-03-07

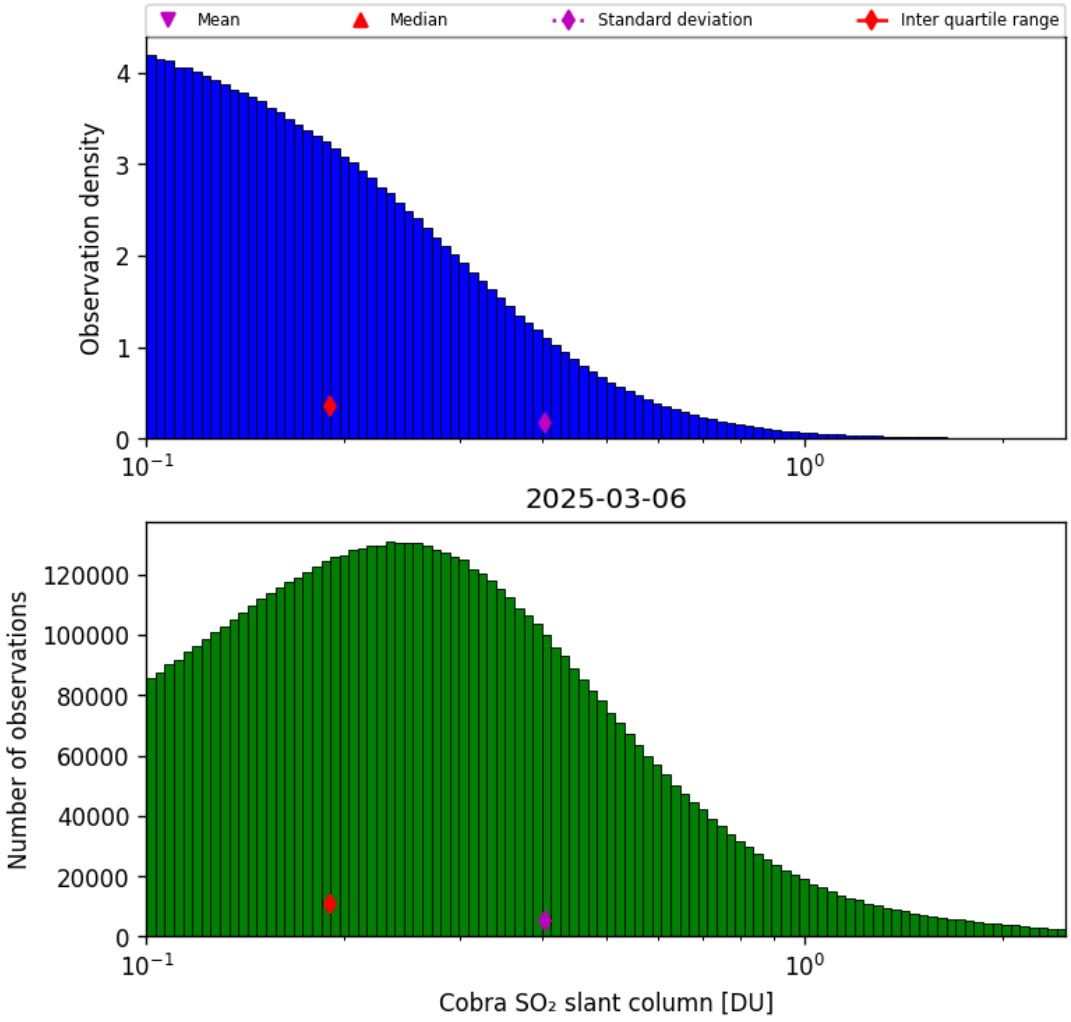


Figure 61: Histogram of "Cobra SO_2 slant column" for 2025-03-06 to 2025-03-07

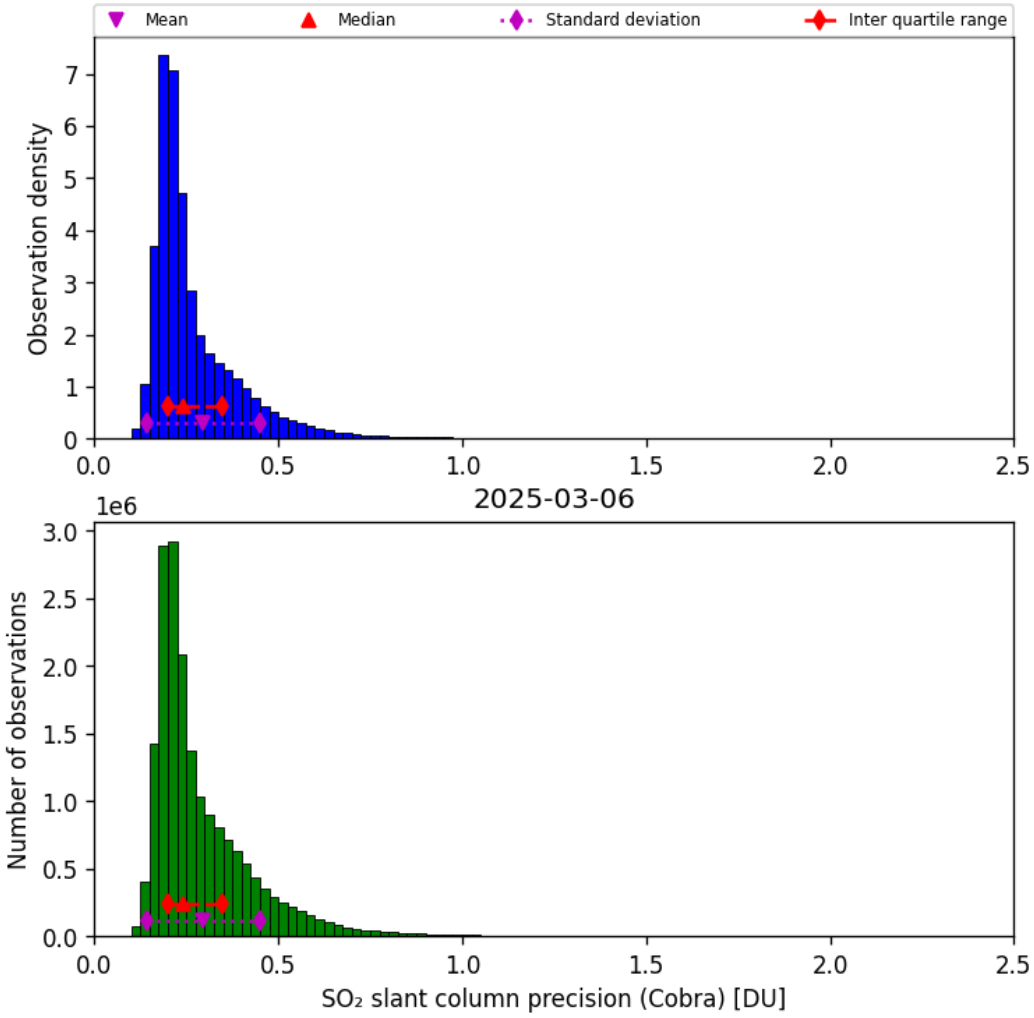


Figure 62: Histogram of "SO_2 slant column precision (Cobra)" for 2025-03-06 to 2025-03-07

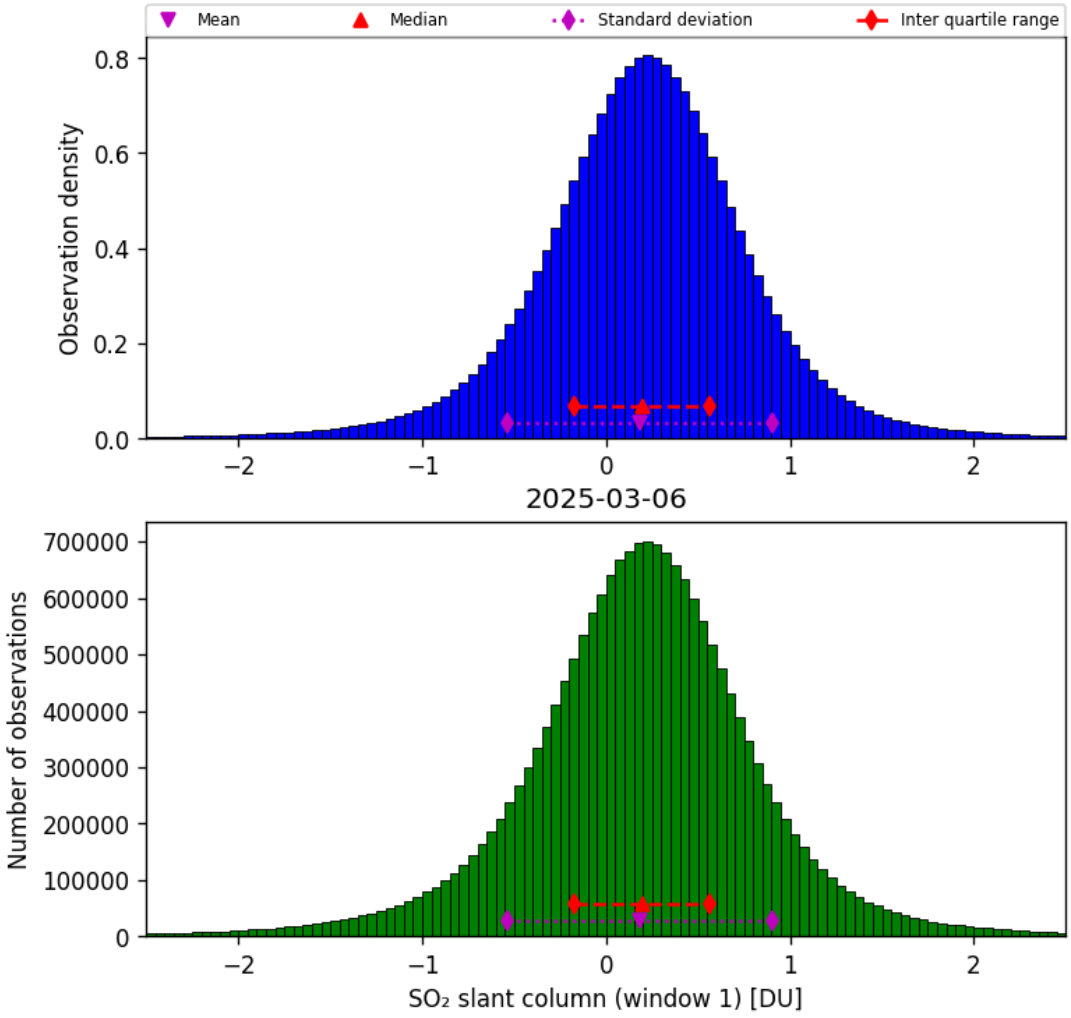


Figure 63: Histogram of "SO_2 slant column (window 1)" for 2025-03-06 to 2025-03-07

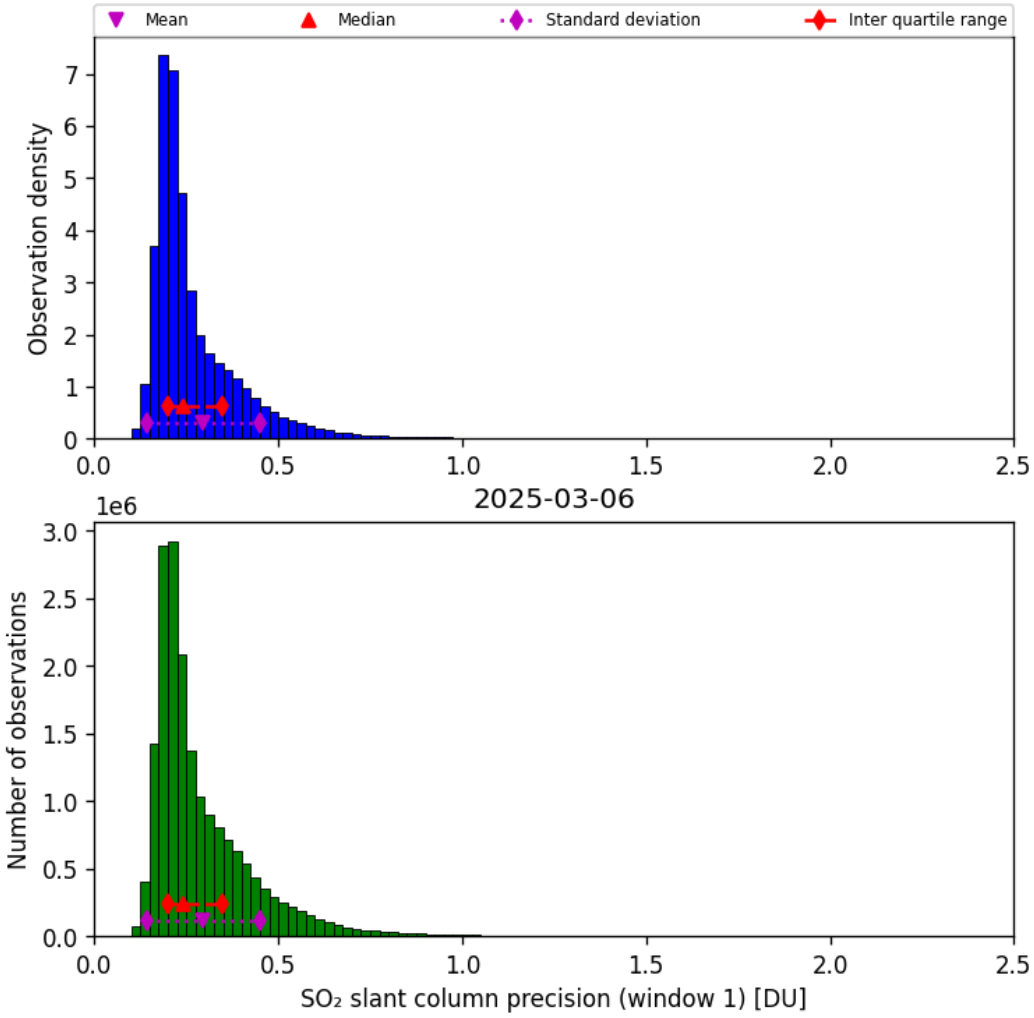


Figure 64: Histogram of "SO_2 slant column precision (window 1)" for 2025-03-06 to 2025-03-07

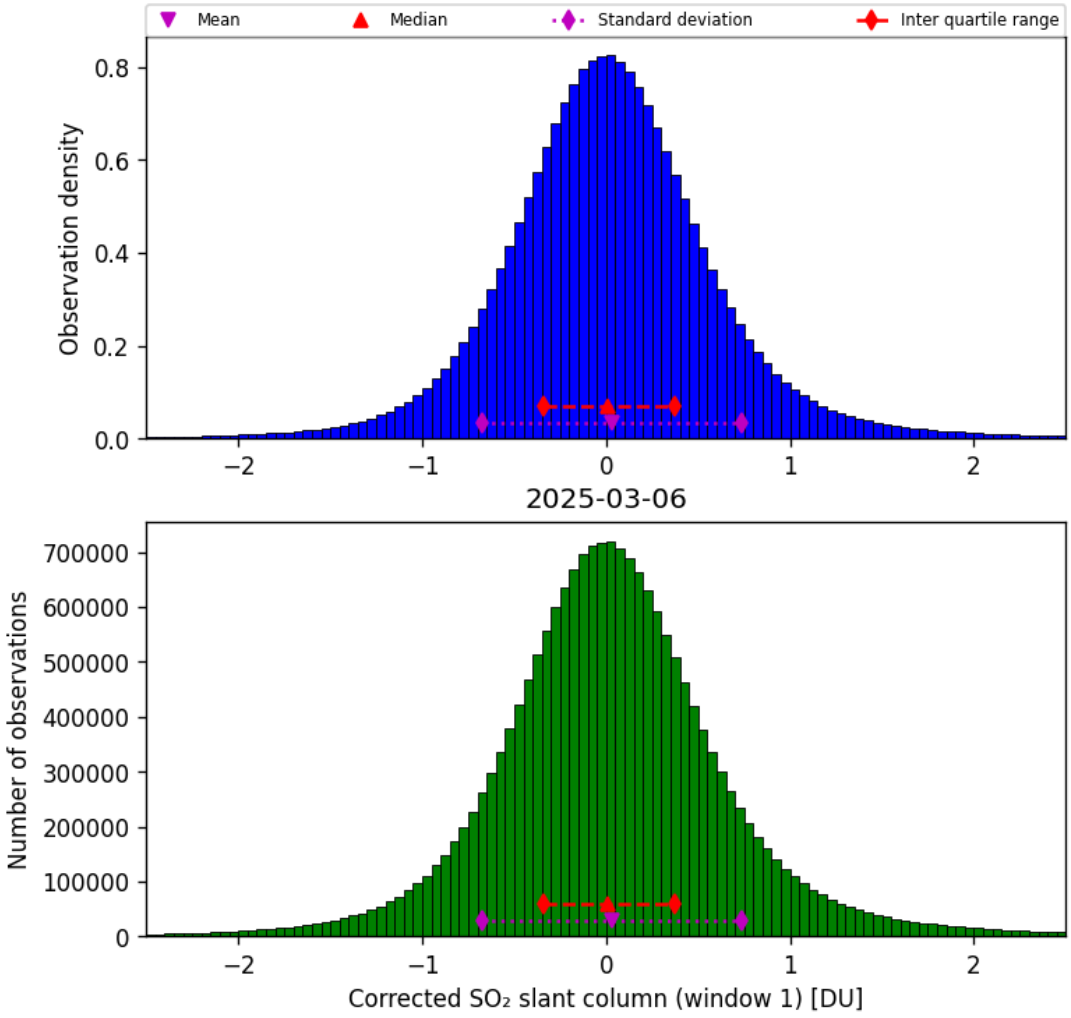


Figure 65: Histogram of "Corrected SO_2 slant column (window 1)" for 2025-03-06 to 2025-03-07

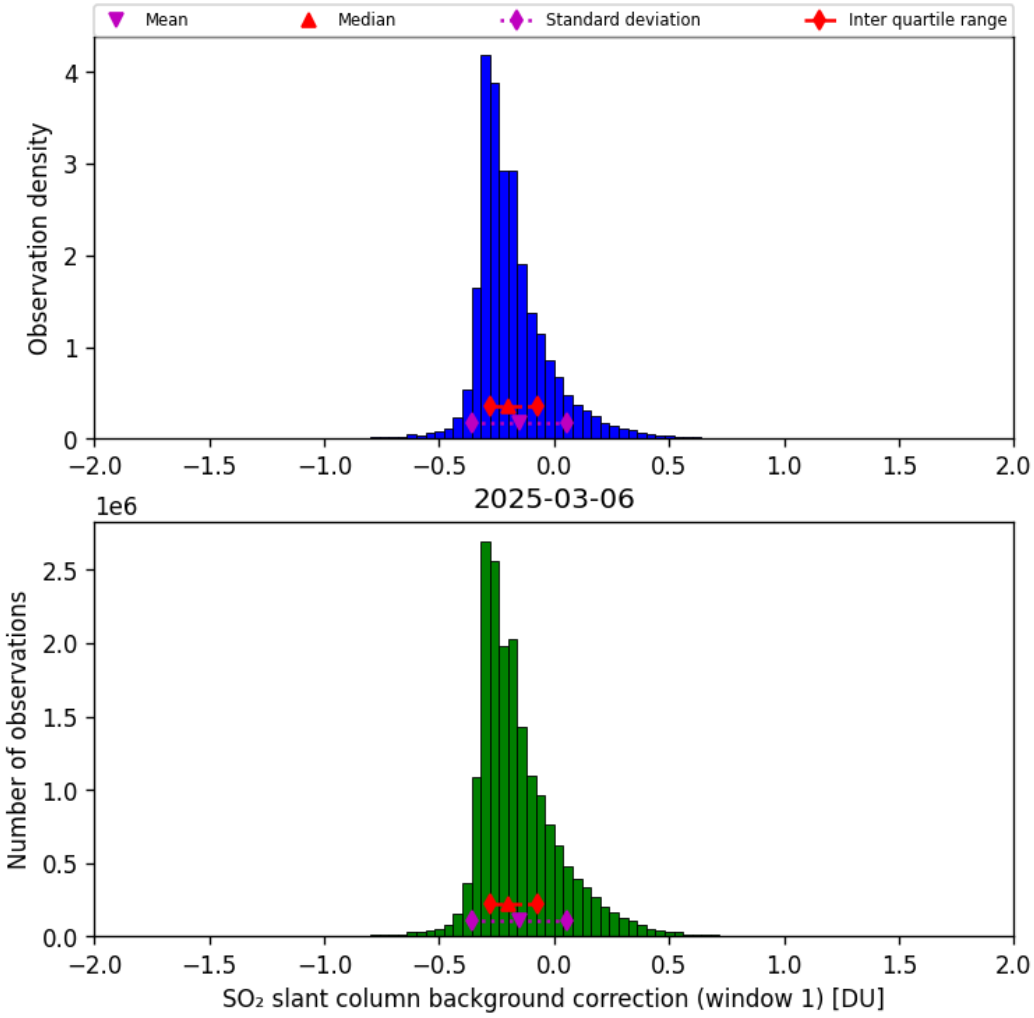


Figure 66: Histogram of "SO_2 slant column background correction (window 1)" for 2025-03-06 to 2025-03-07

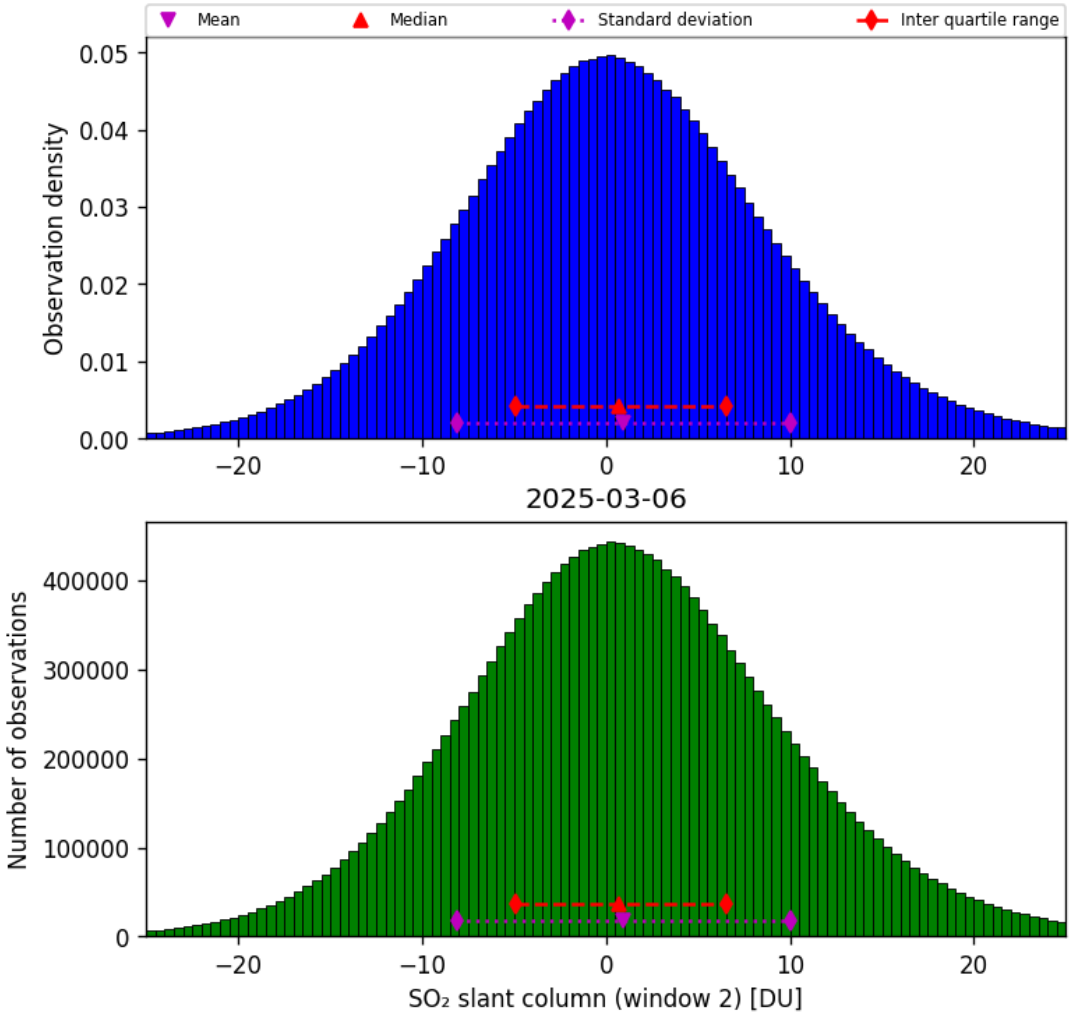


Figure 67: Histogram of "SO_2 slant column (window 2)" for 2025-03-06 to 2025-03-07

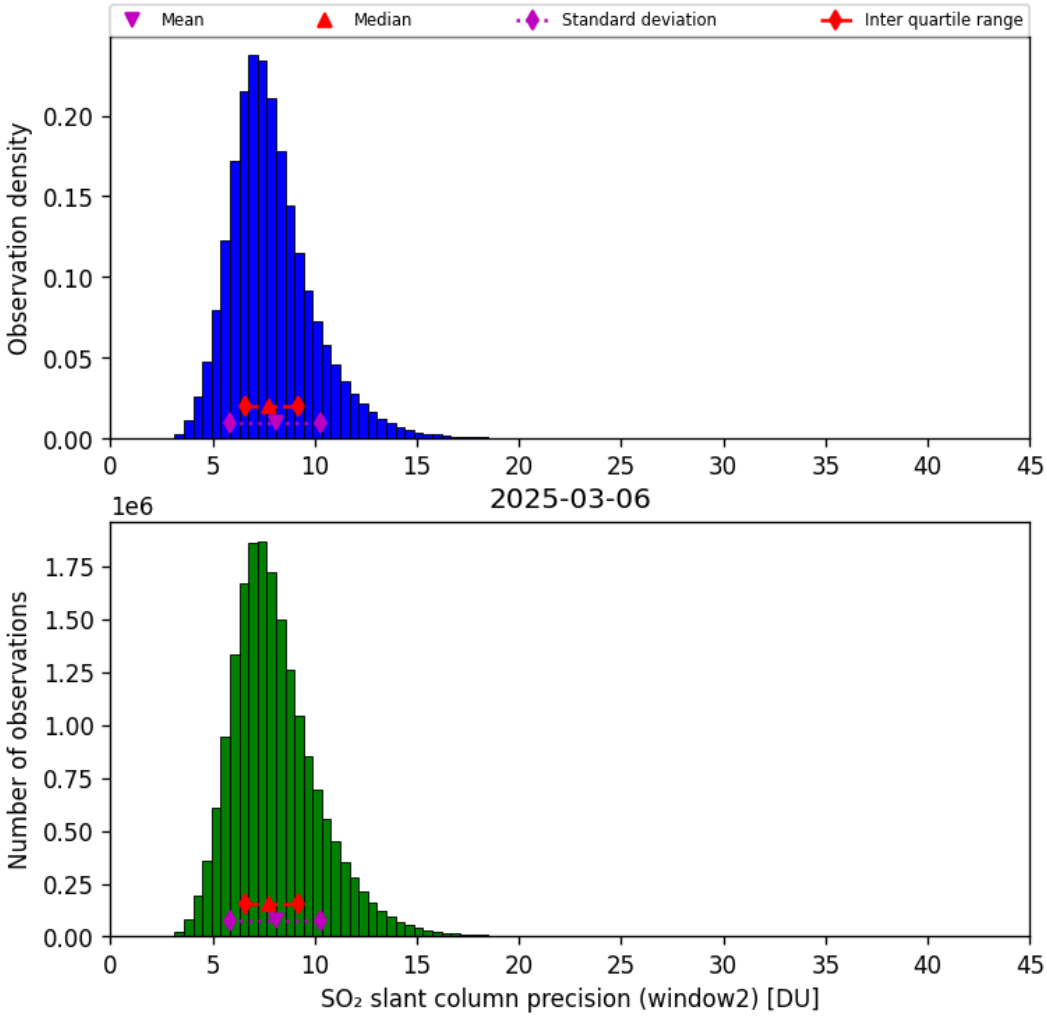


Figure 68: Histogram of "SO_2 slant column precision (window2)" for 2025-03-06 to 2025-03-07

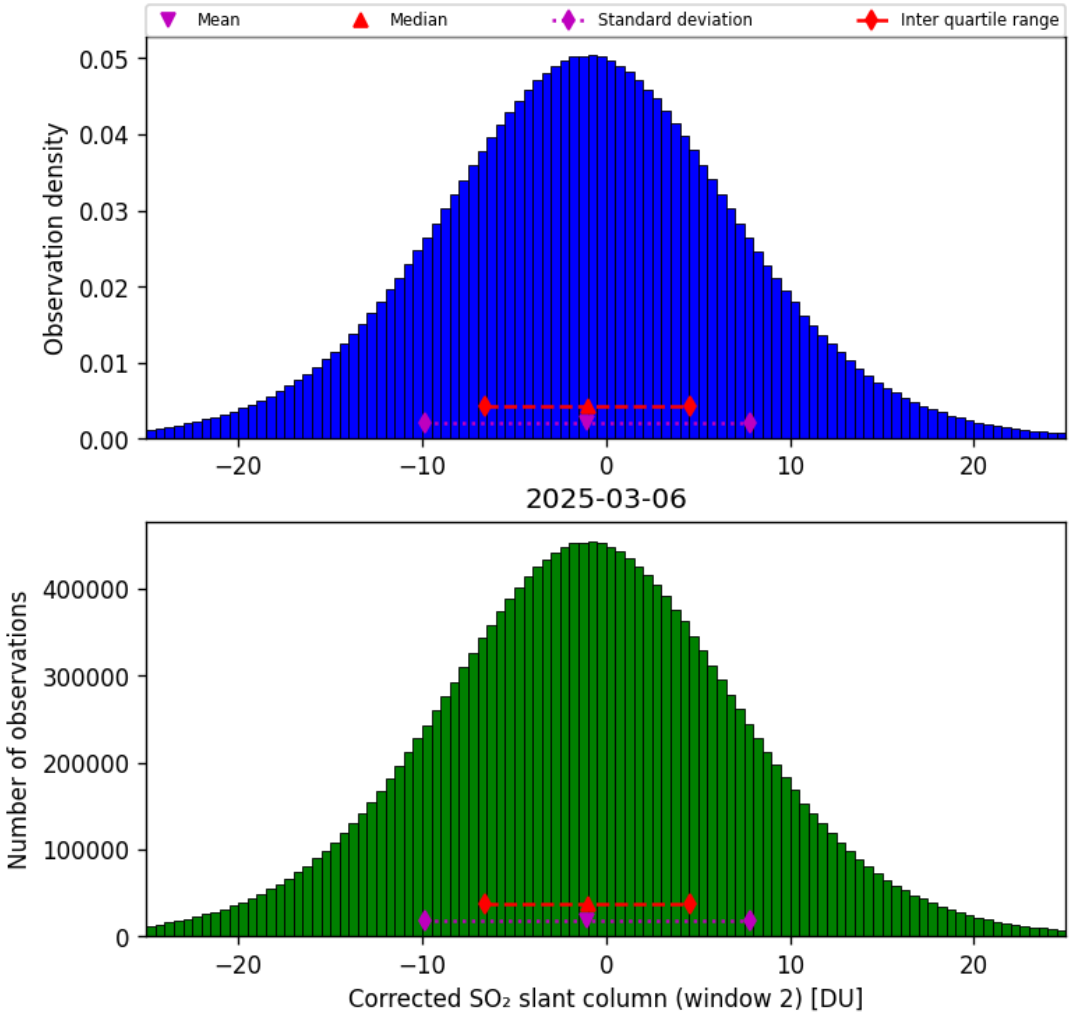


Figure 69: Histogram of "Corrected SO_2 slant column (window 2)" for 2025-03-06 to 2025-03-07

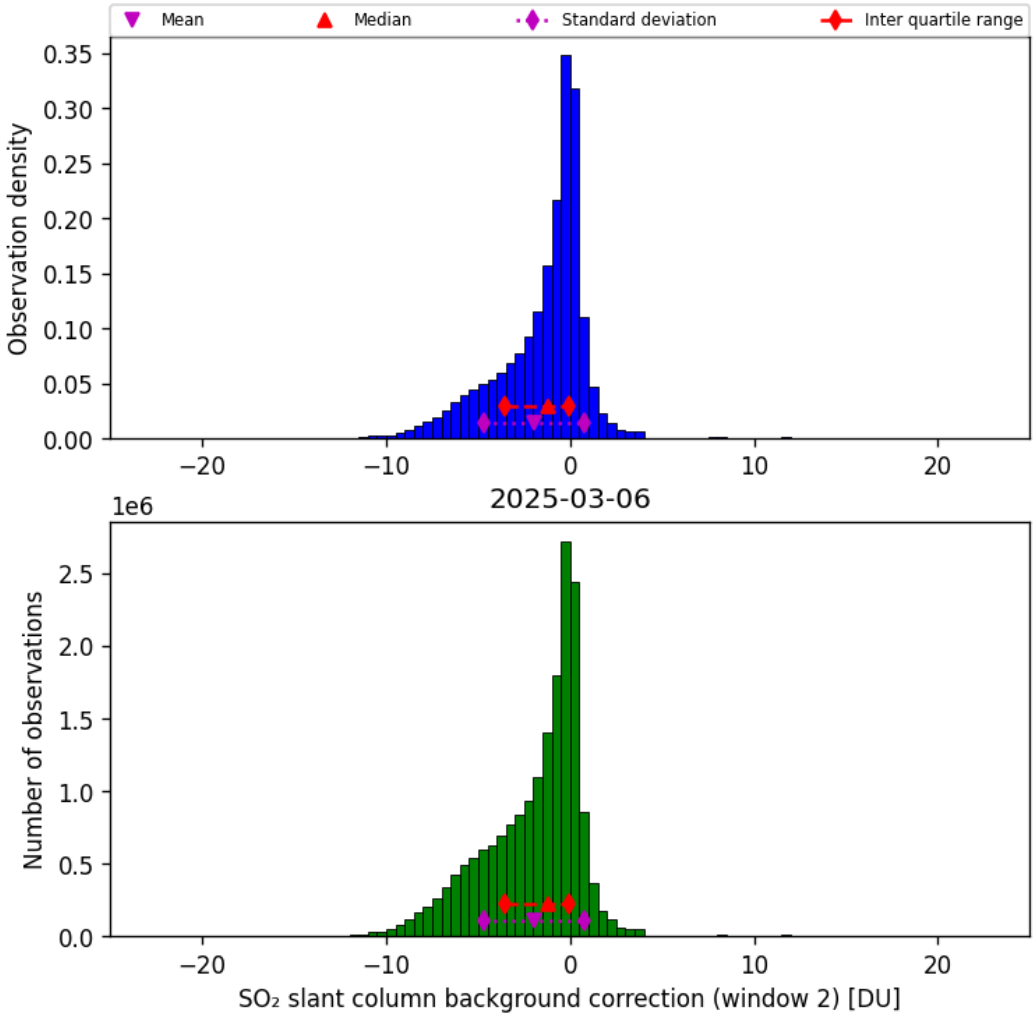


Figure 70: Histogram of "SO_2 slant column background correction (window 2)" for 2025-03-06 to 2025-03-07

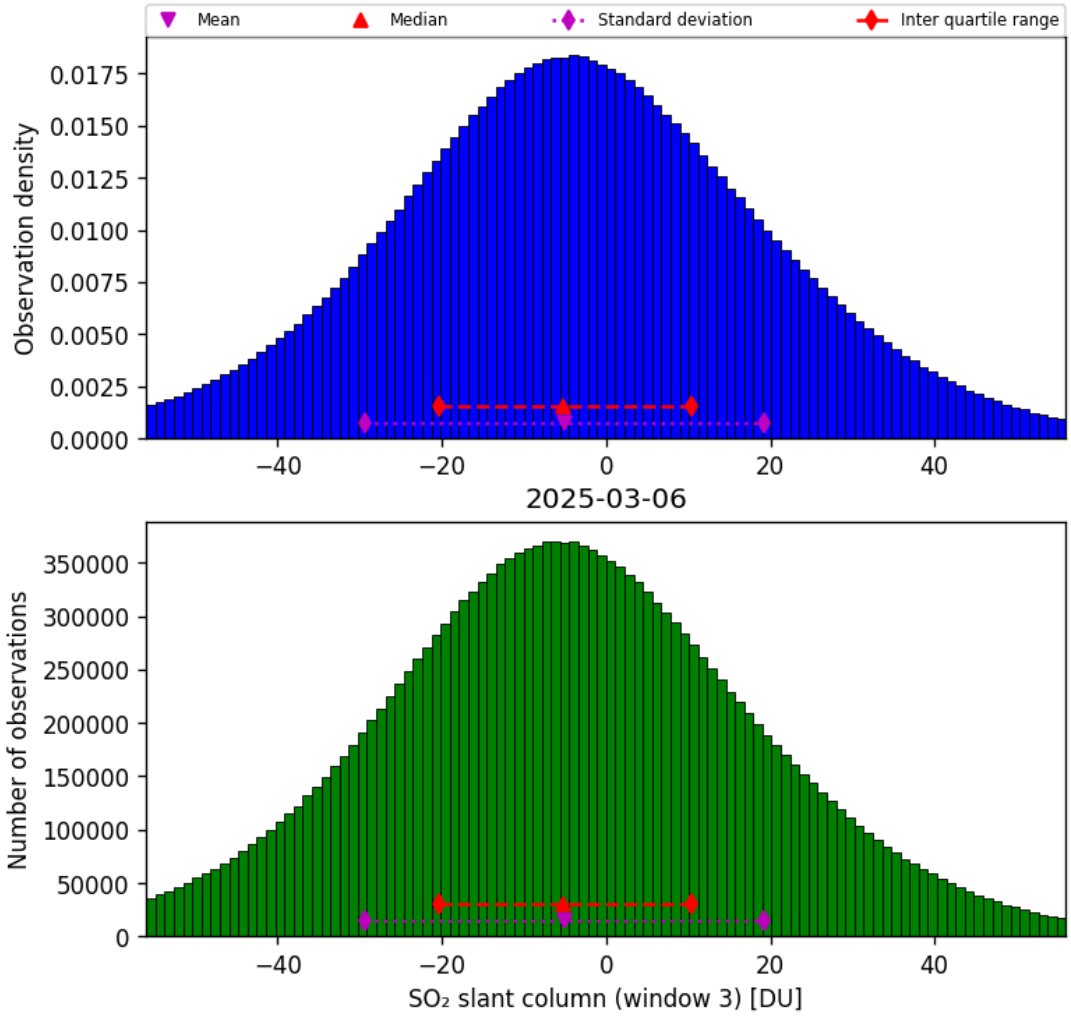


Figure 71: Histogram of "SO_2 slant column (window 3)" for 2025-03-06 to 2025-03-07

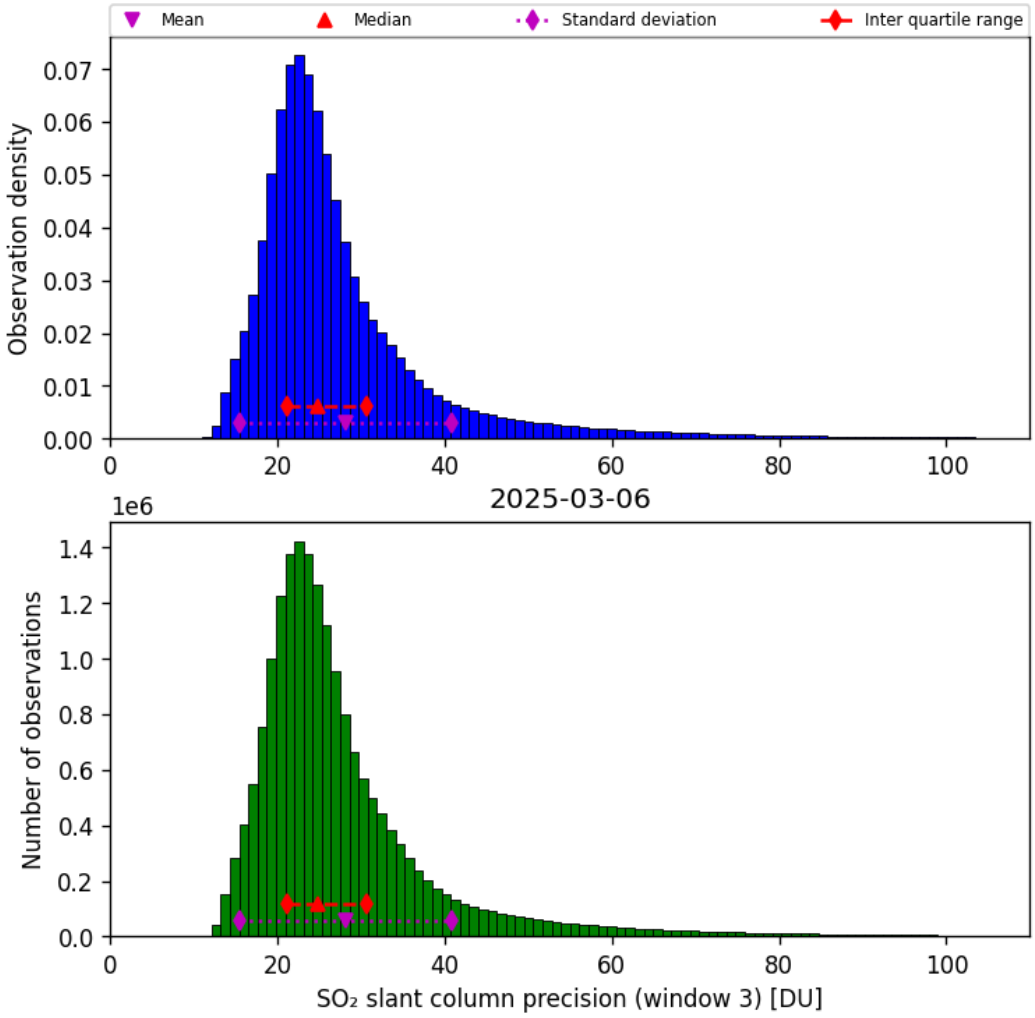


Figure 72: Histogram of "SO_2 slant column precision (window 3)" for 2025-03-06 to 2025-03-07

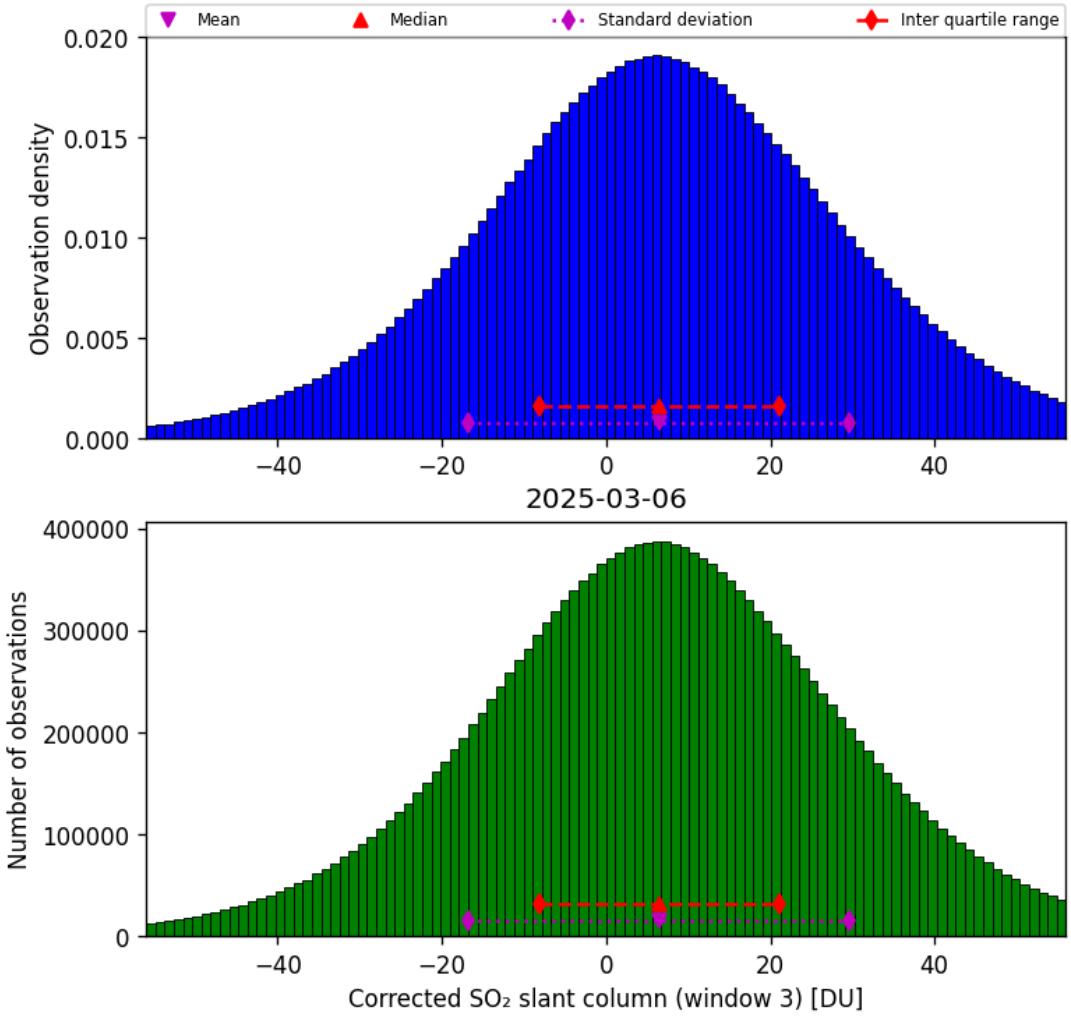


Figure 73: Histogram of "Corrected SO_2 slant column (window 3)" for 2025-03-06 to 2025-03-07

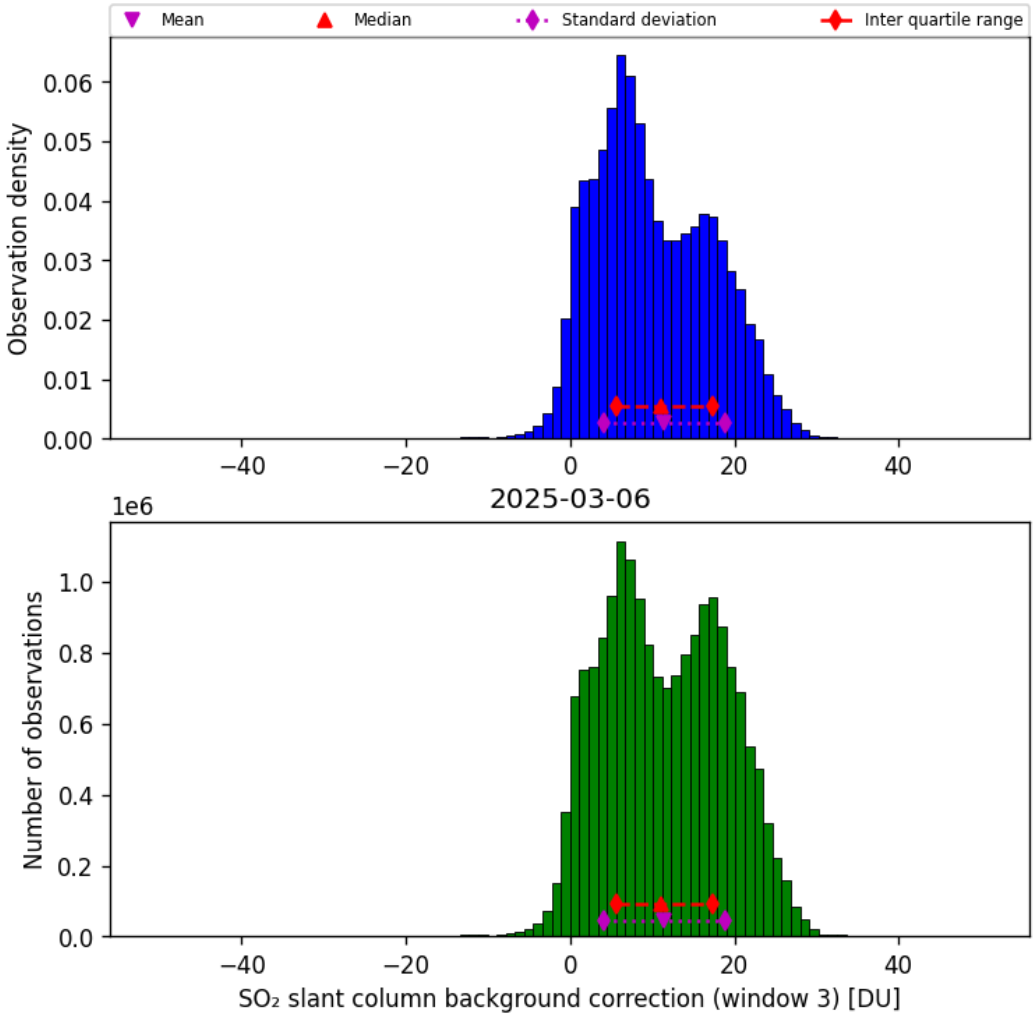


Figure 74: Histogram of "SO_2 slant column background correction (window 3)" for 2025-03-06 to 2025-03-07

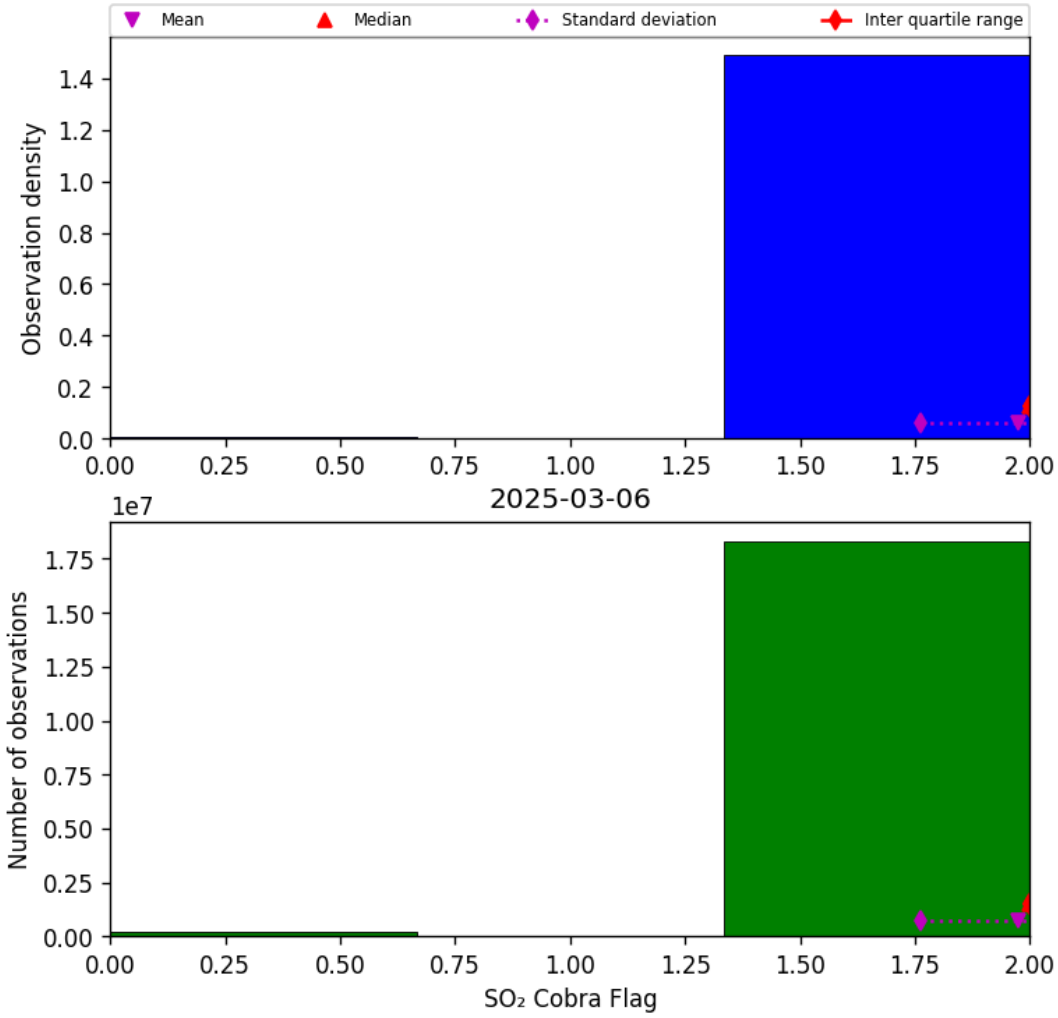


Figure 75: Histogram of "SO_2 Cobra Flag" for 2025-03-06 to 2025-03-07

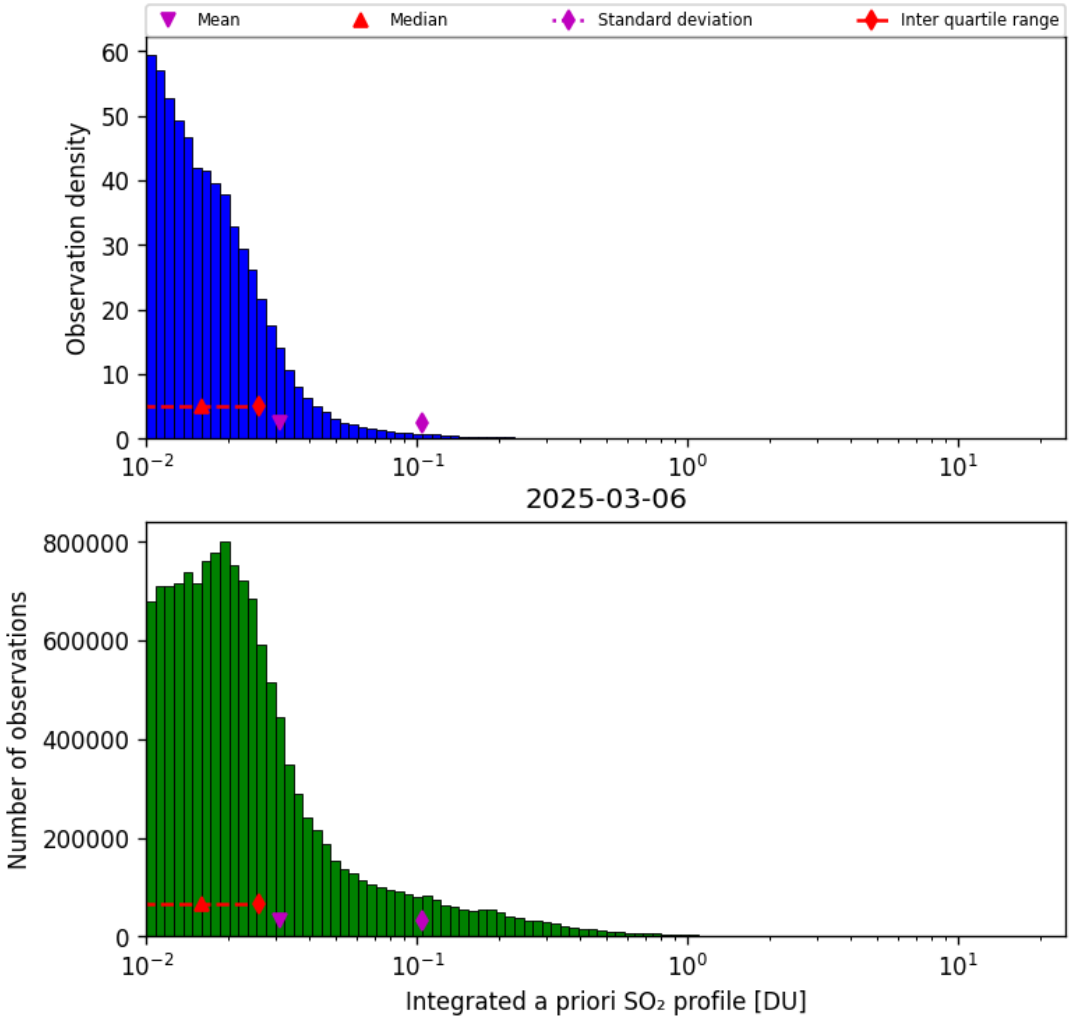


Figure 76: Histogram of "Integrated a priori SO_2 profile" for 2025-03-06 to 2025-03-07

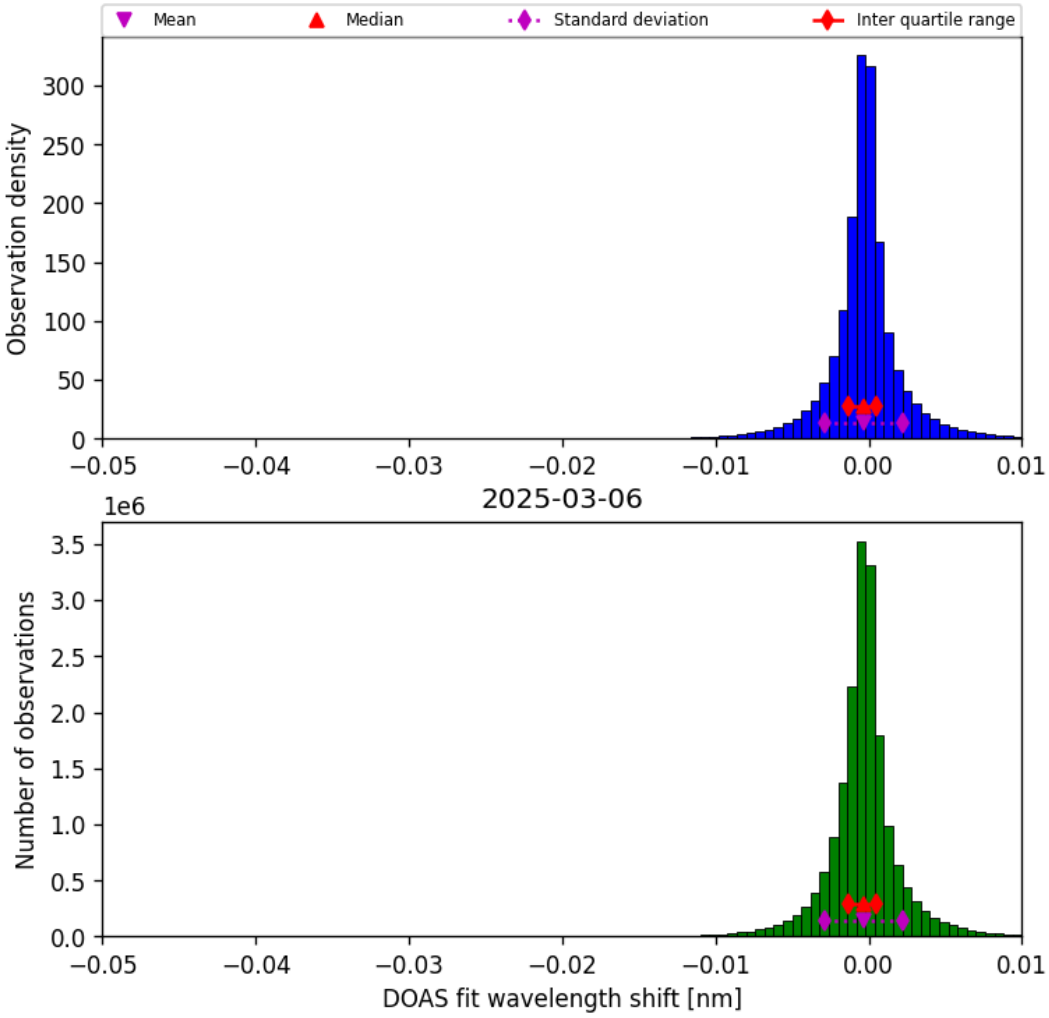


Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-03-06 to 2025-03-07

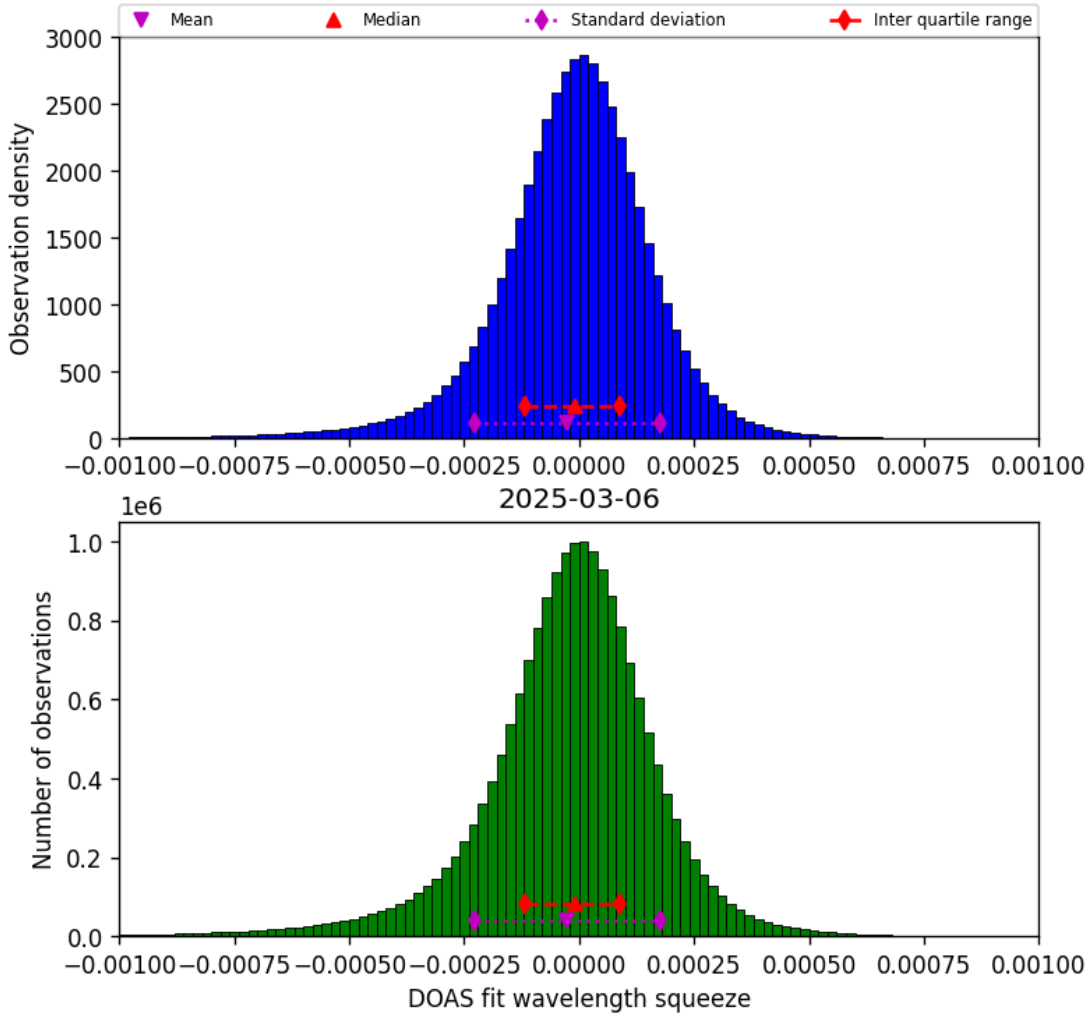


Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-03-06 to 2025-03-07

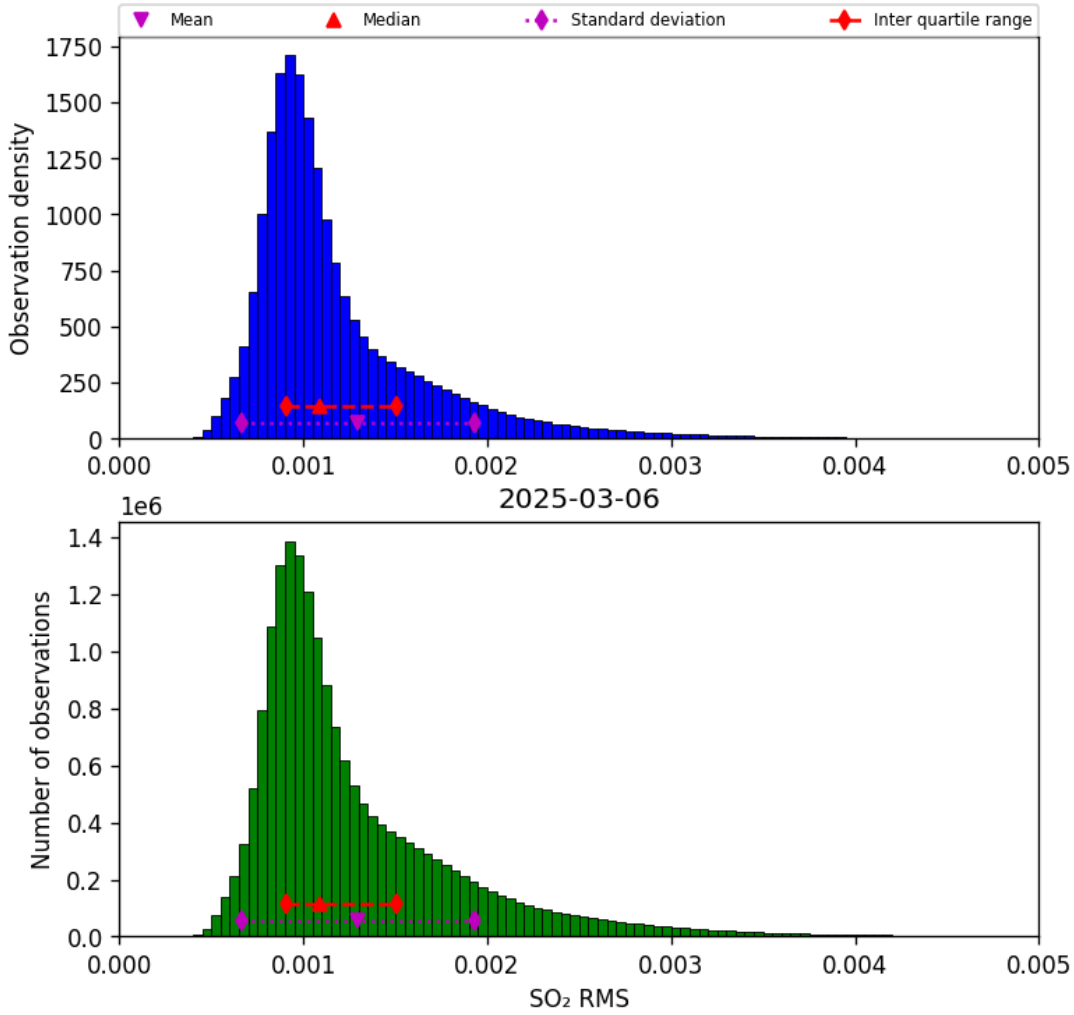


Figure 79: Histogram of "SO_2 RMS" for 2025-03-06 to 2025-03-07

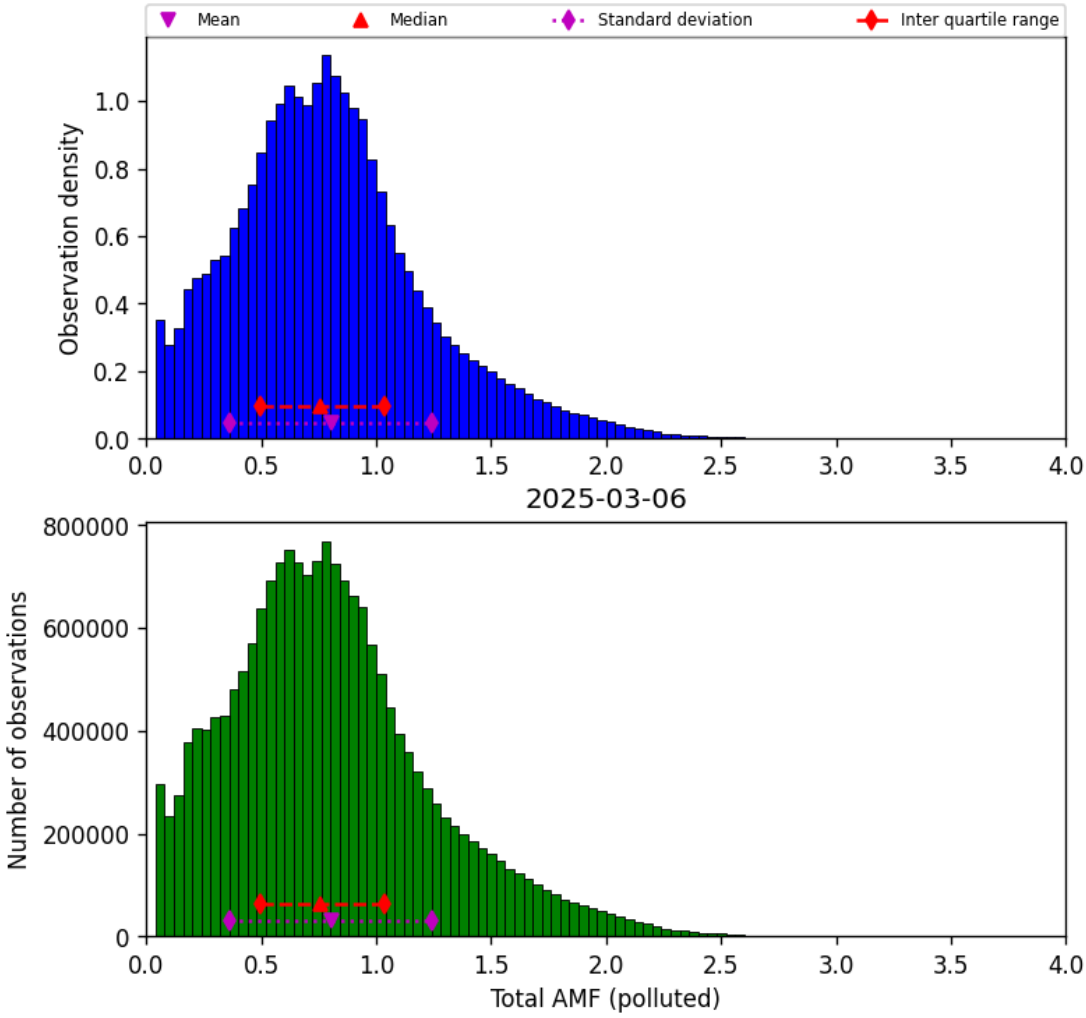


Figure 80: Histogram of “Total AMF (polluted)” for 2025-03-06 to 2025-03-07

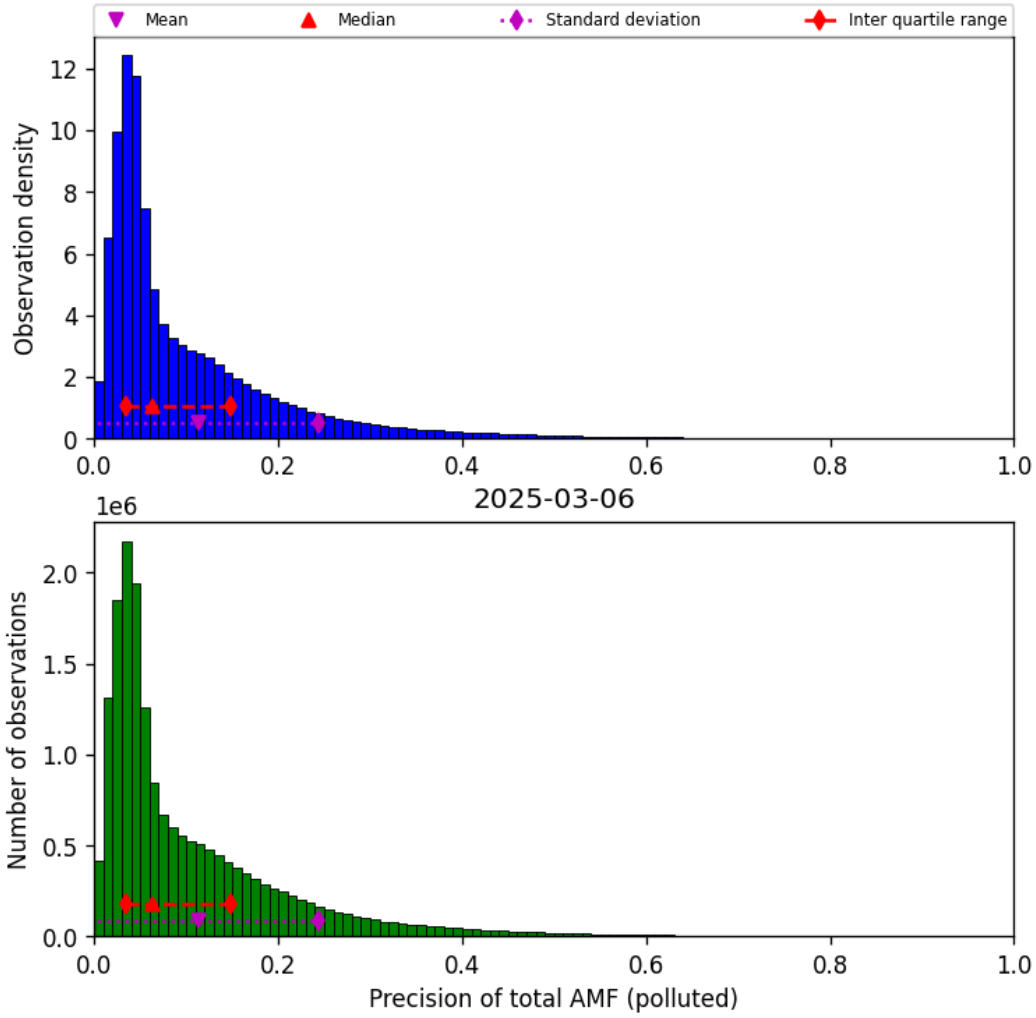


Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-03-06 to 2025-03-07

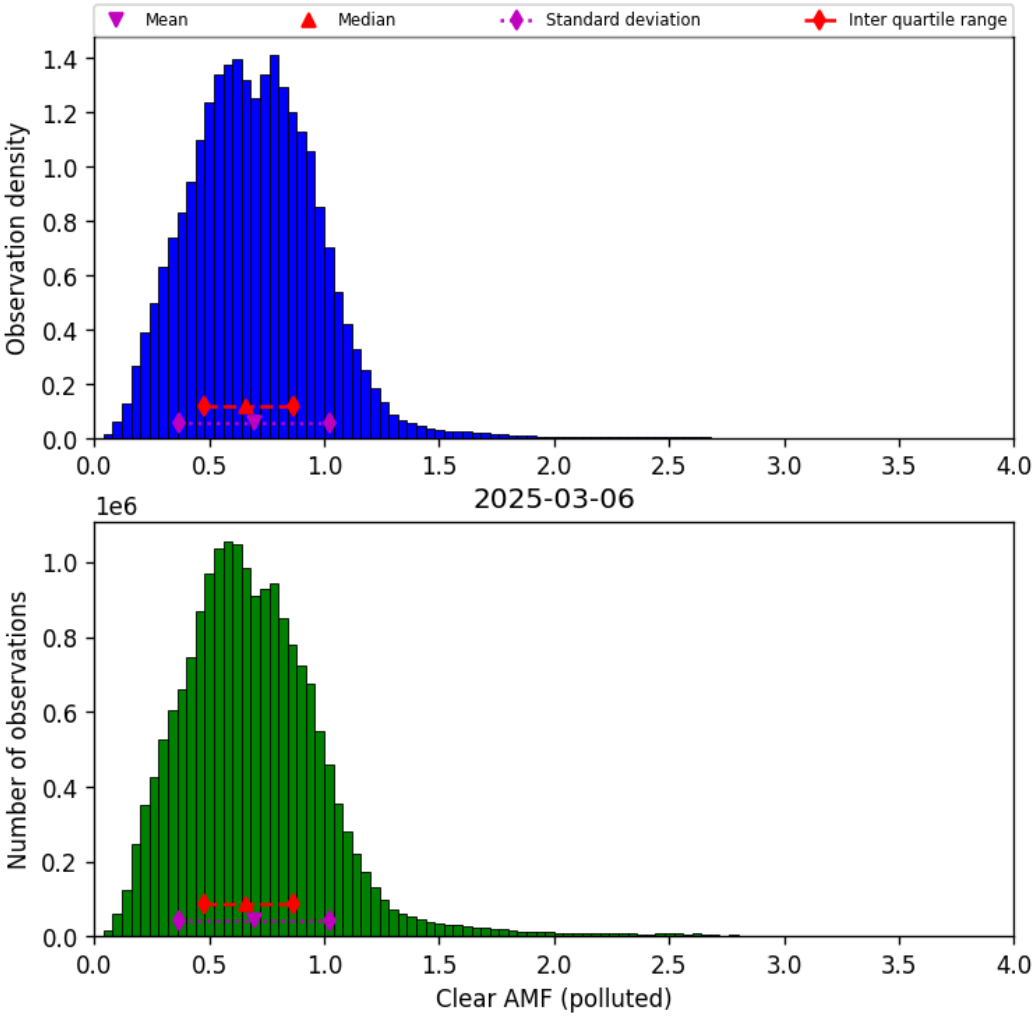


Figure 82: Histogram of “Clear AMF (polluted)” for 2025-03-06 to 2025-03-07

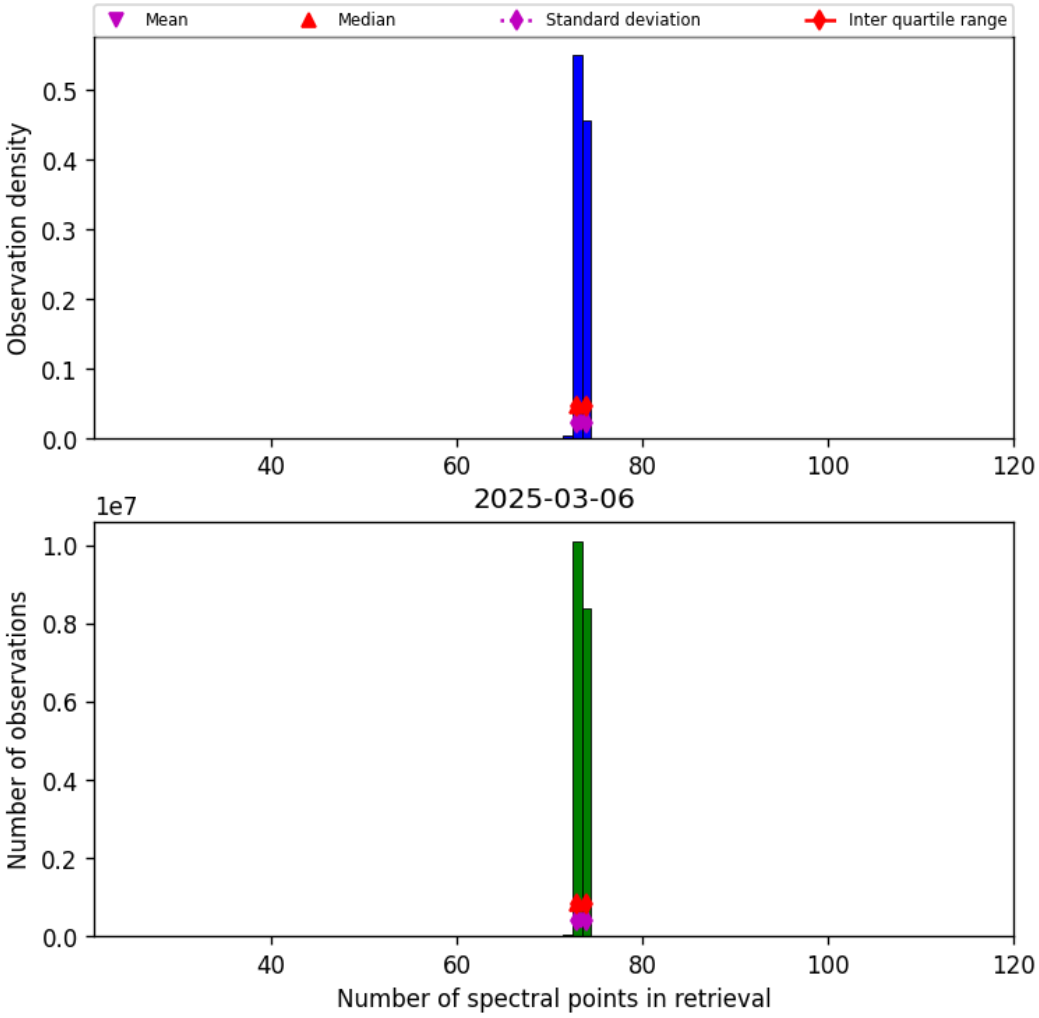


Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-03-06 to 2025-03-07

9 Along track statistics

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

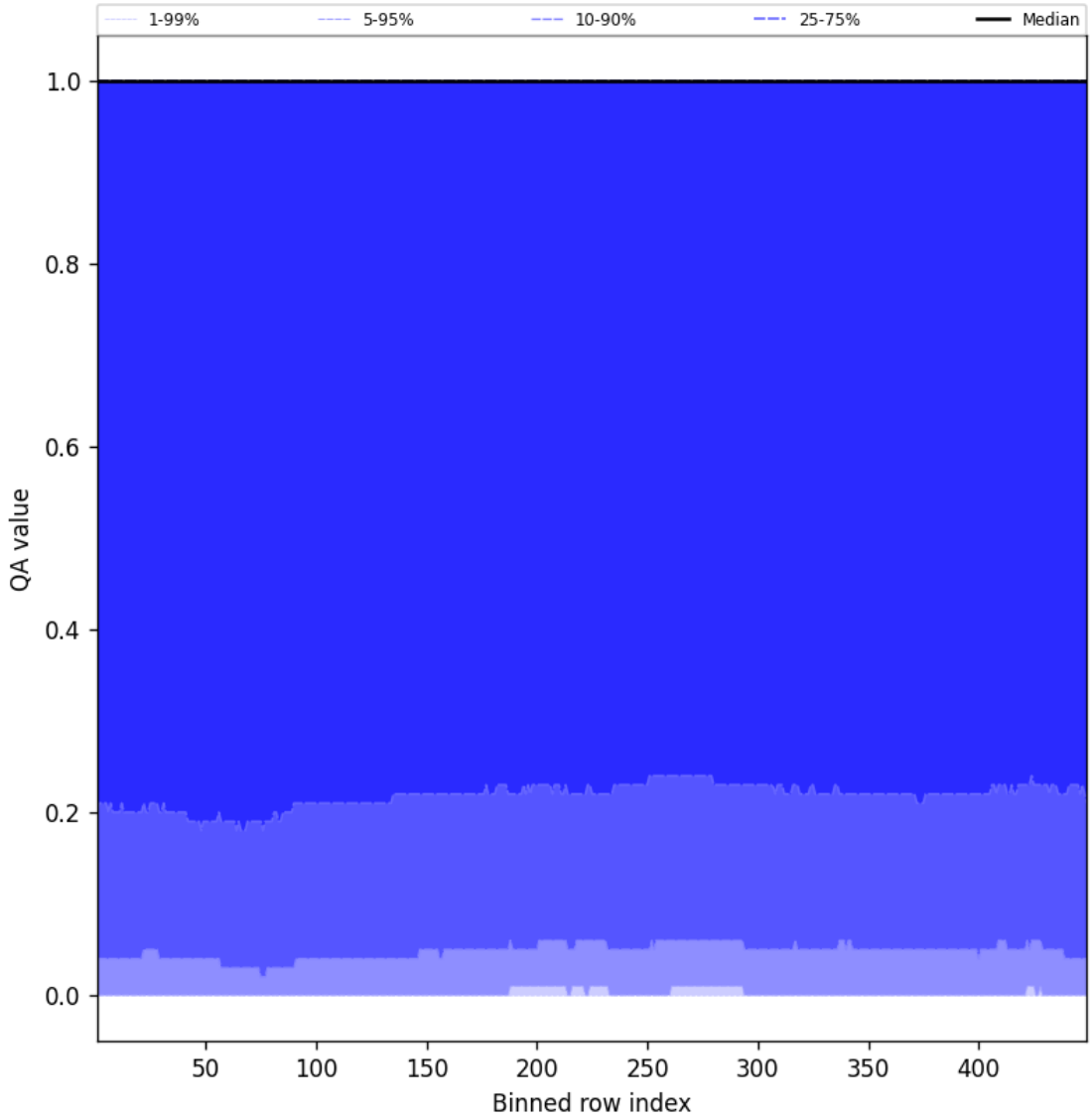


Figure 84: Along track statistics of “QA value” for 2025-03-06 to 2025-03-07

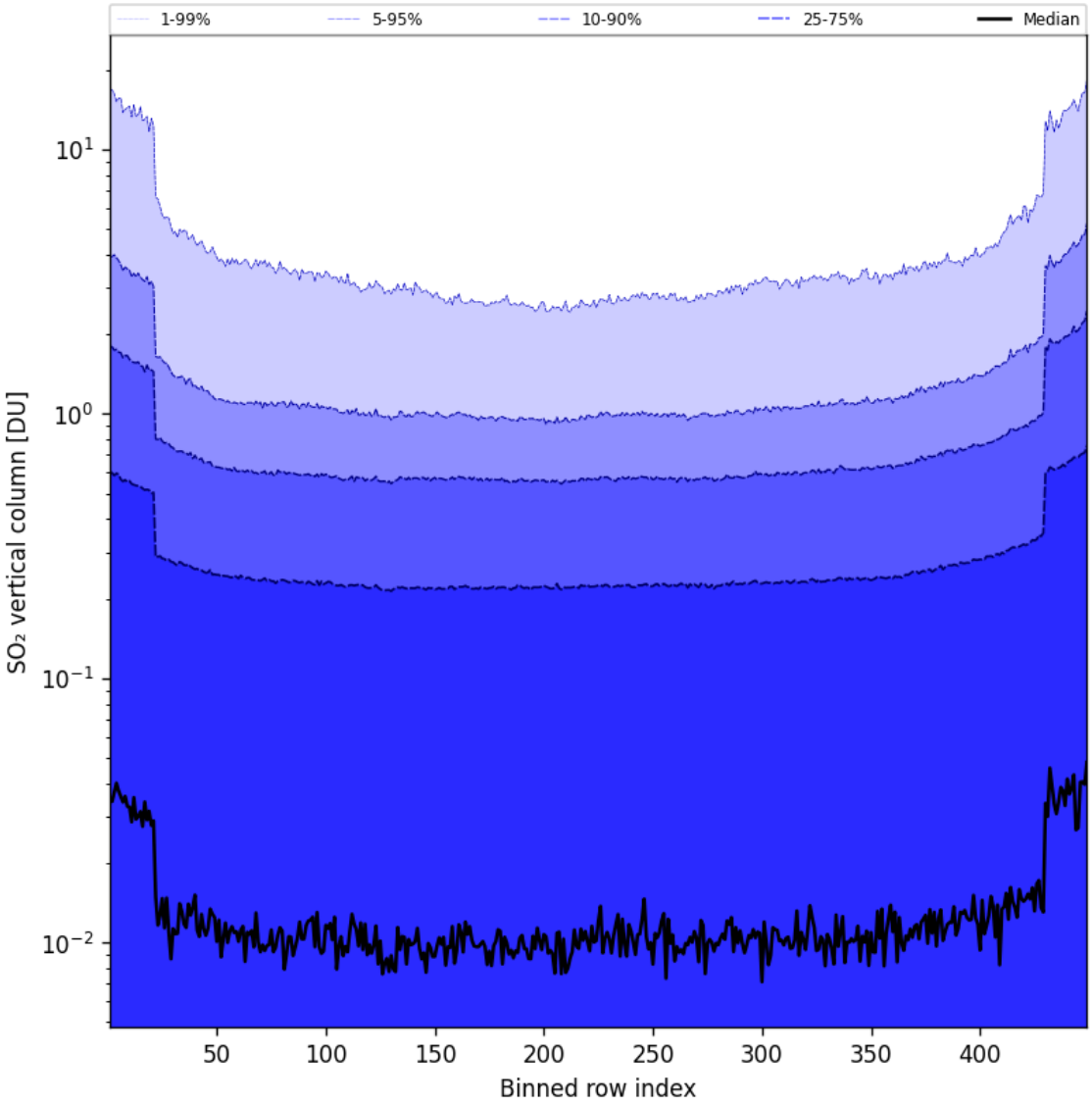


Figure 85: Along track statistics of "SO_2 vertical column" for 2025-03-06 to 2025-03-07

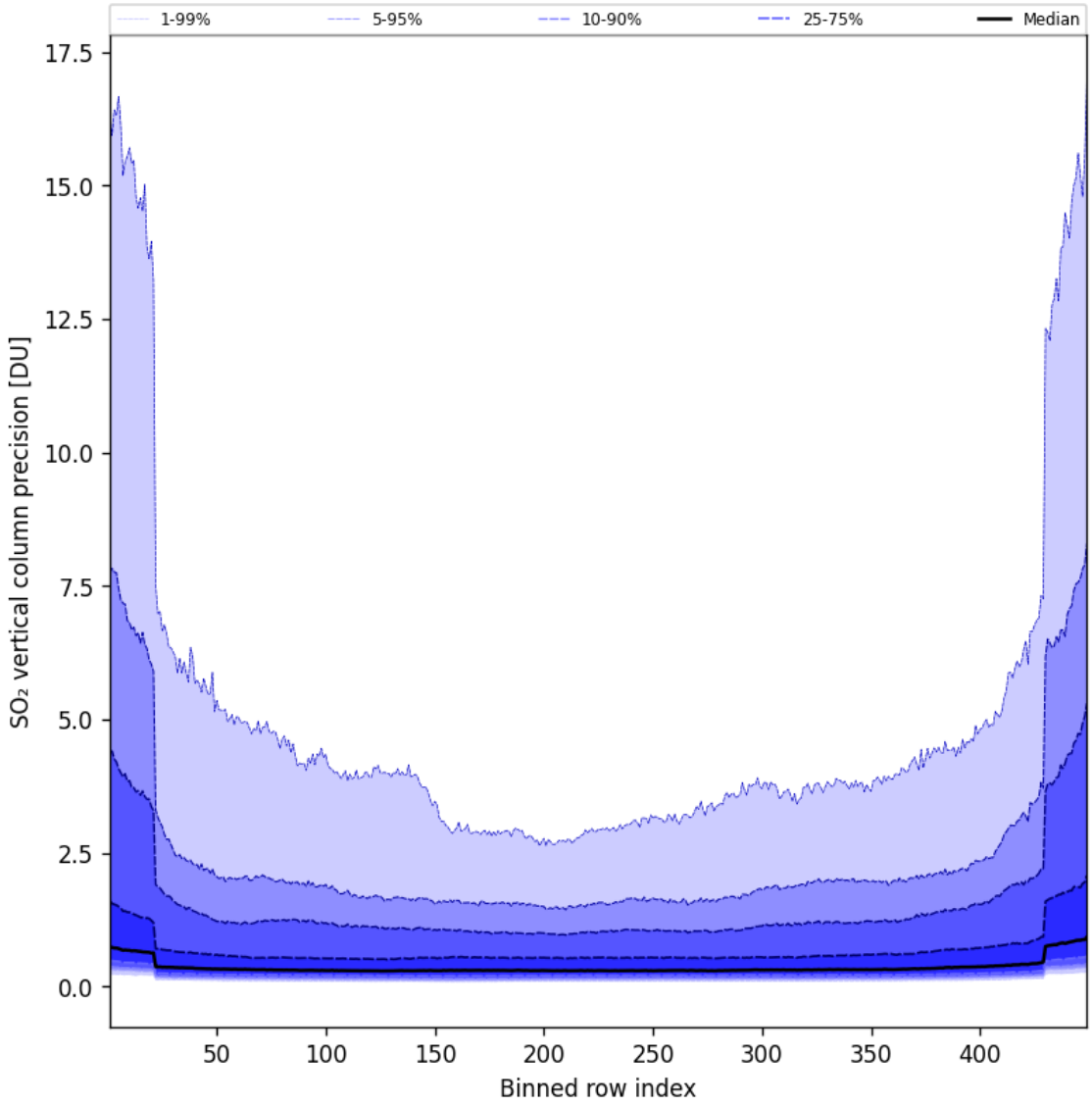


Figure 86: Along track statistics of "SO_2 vertical column precision" for 2025-03-06 to 2025-03-07

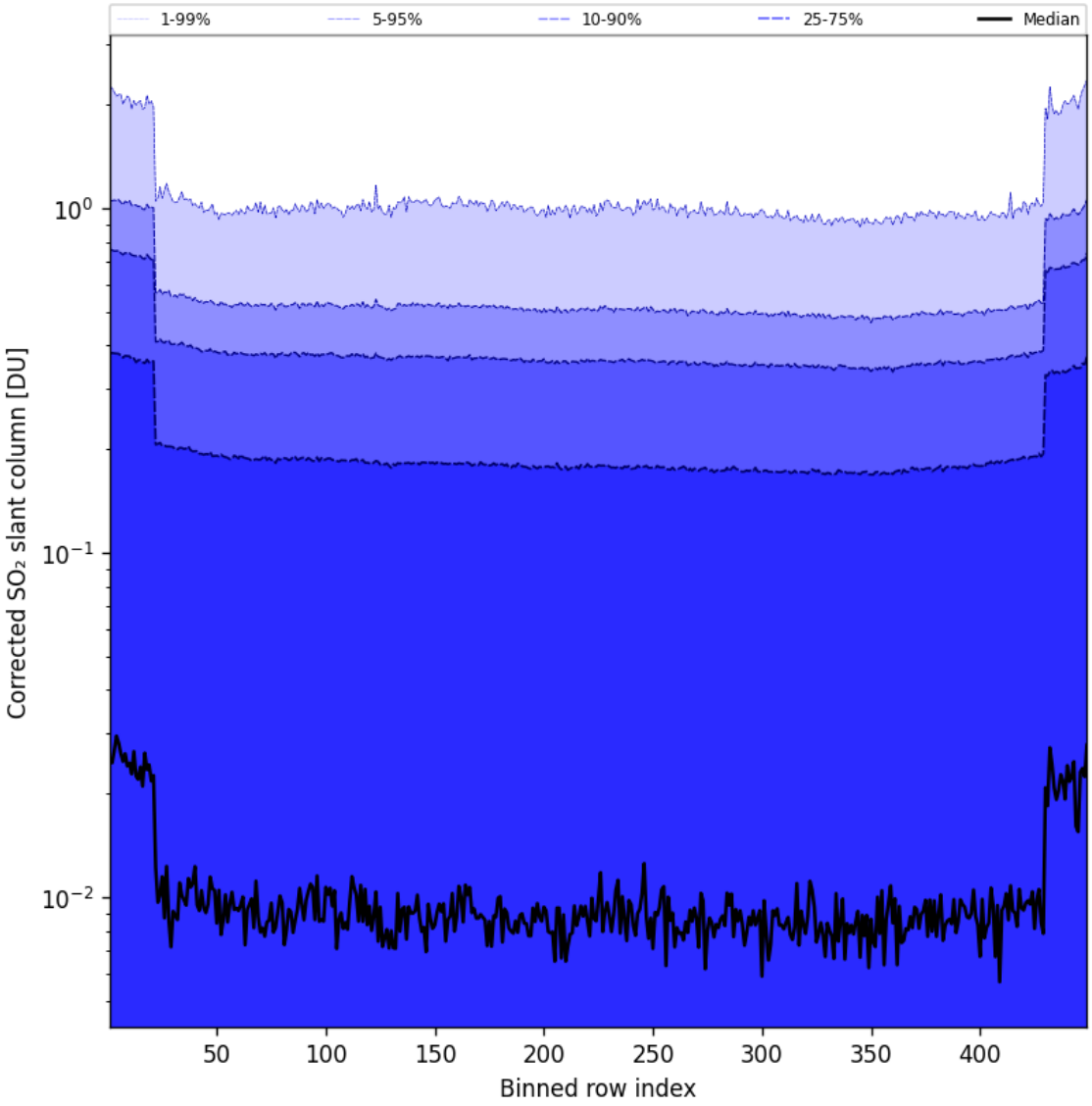


Figure 87: Along track statistics of "Corrected SO_2 slant column" for 2025-03-06 to 2025-03-07

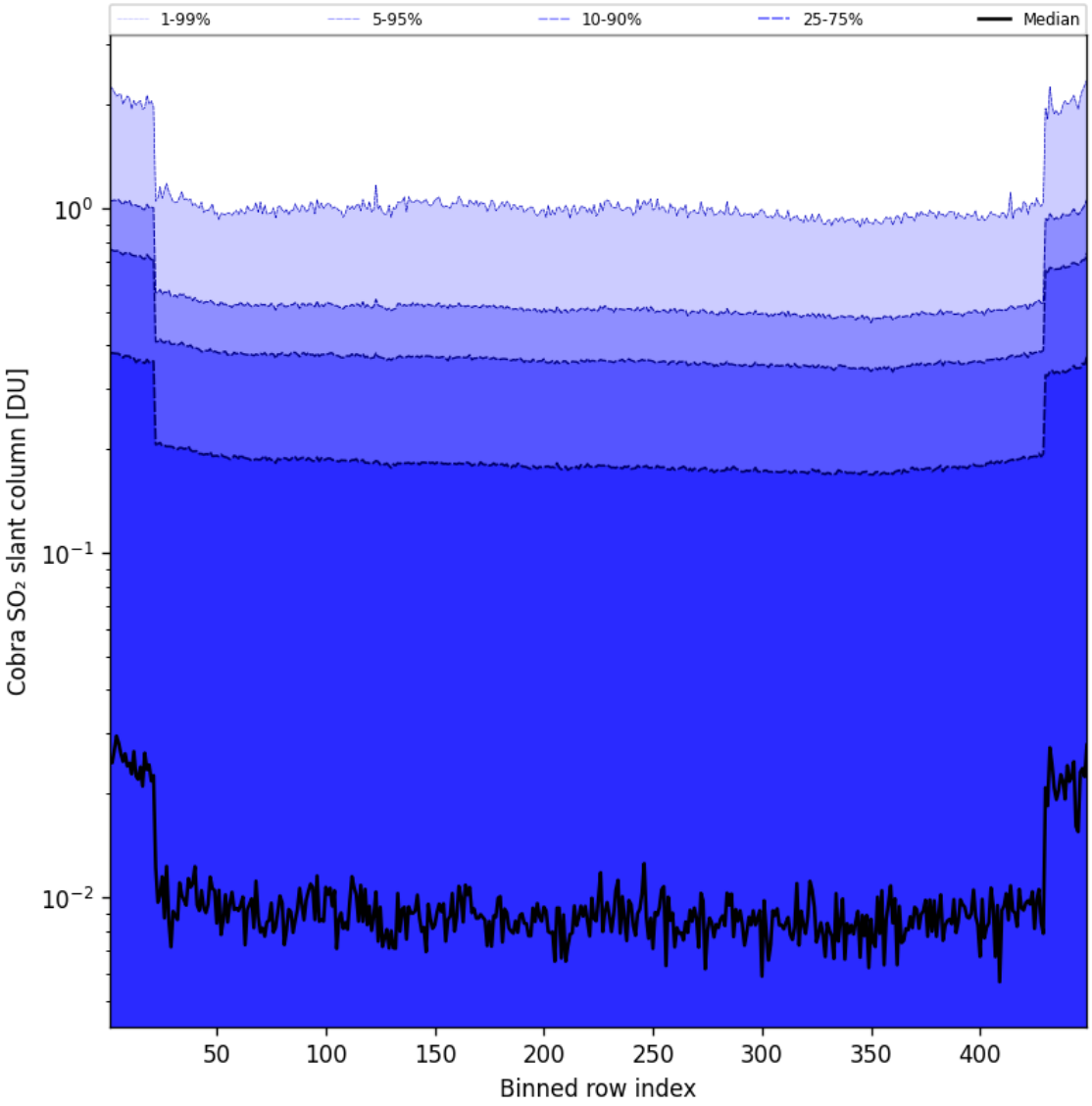


Figure 88: Along track statistics of "Cobra SO_2 slant column" for 2025-03-06 to 2025-03-07

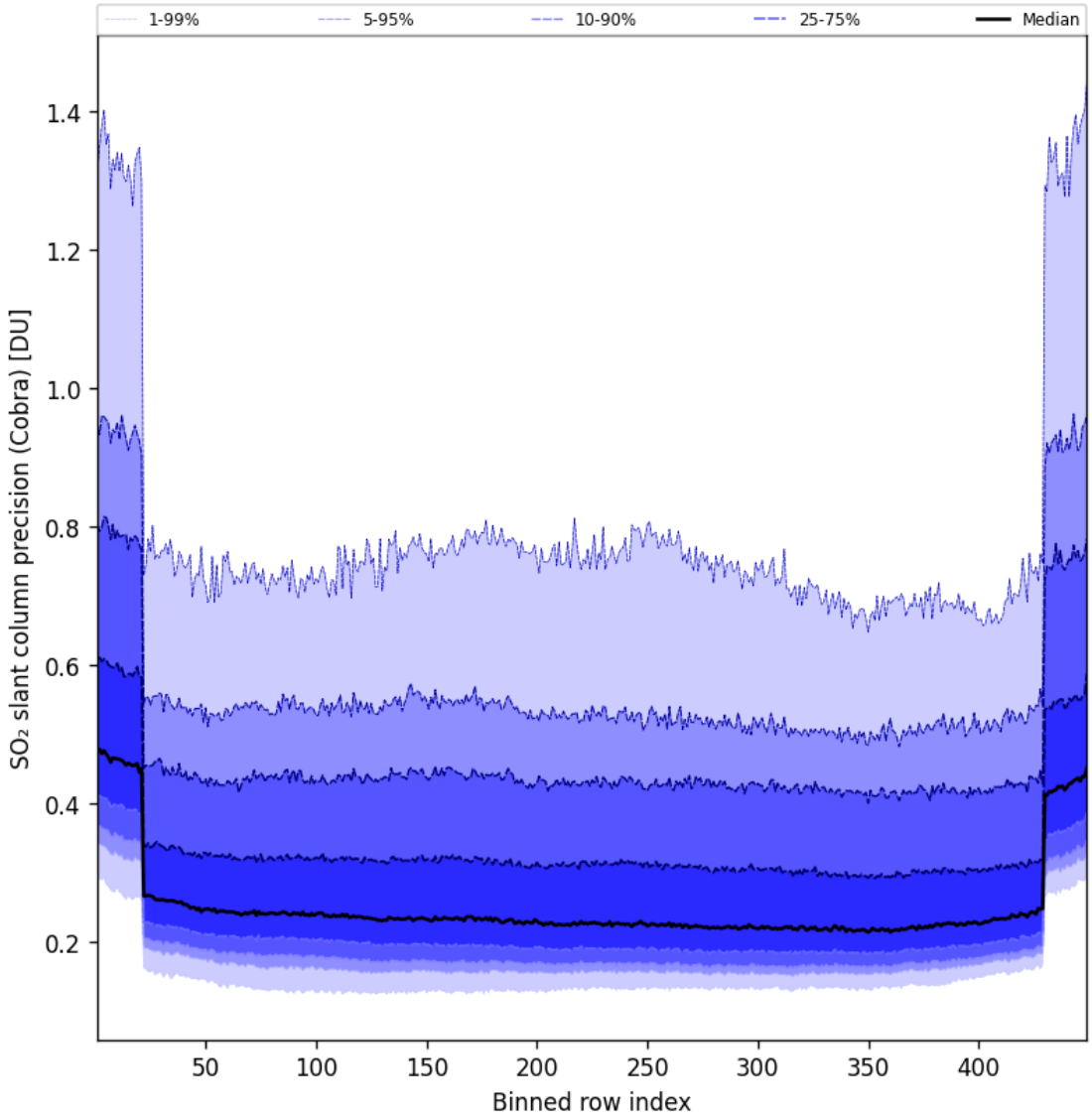


Figure 89: Along track statistics of "SO_2 slant column precision (Cobra)" for 2025-03-06 to 2025-03-07

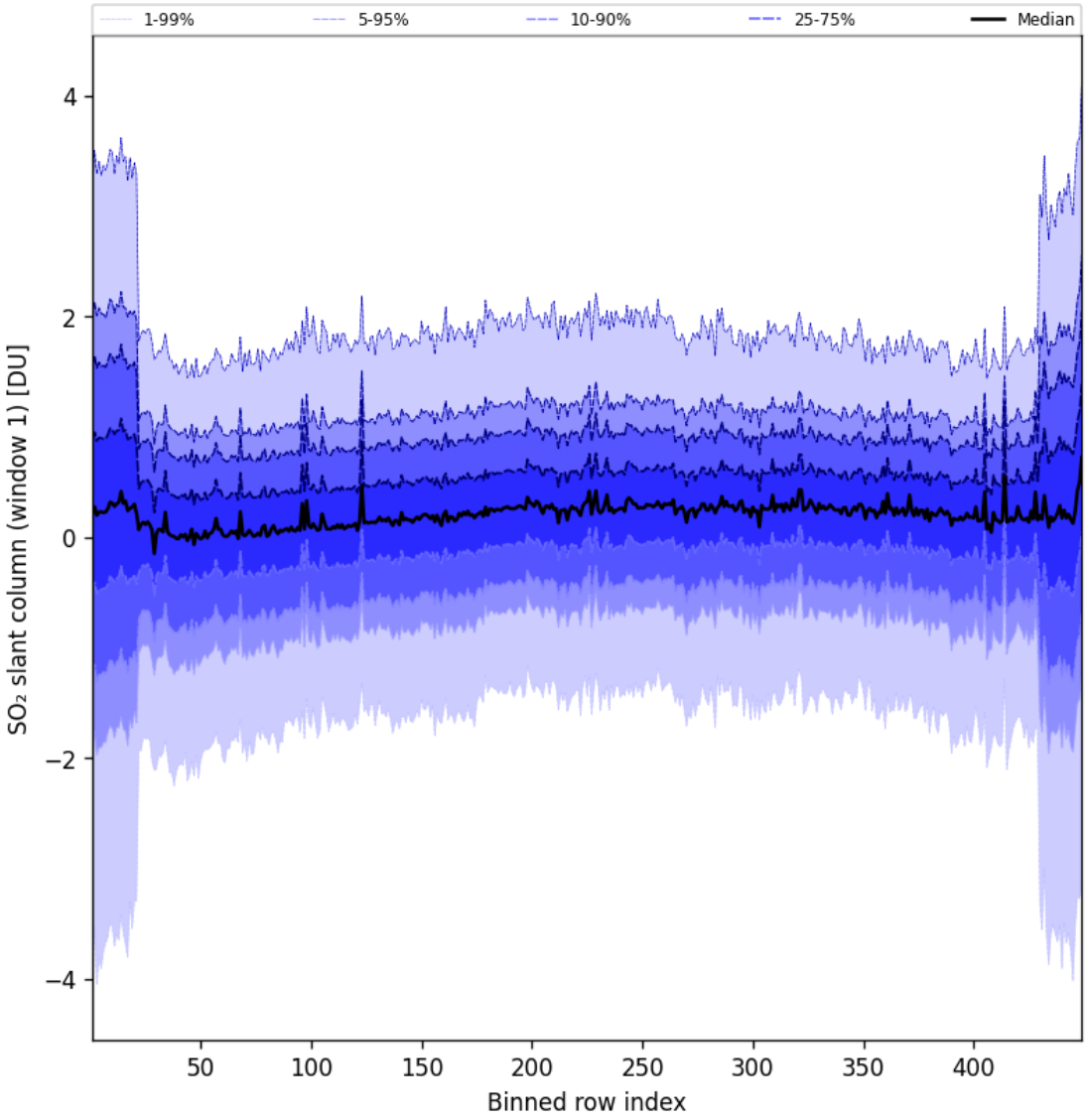


Figure 90: Along track statistics of "SO_2 slant column (window 1)" for 2025-03-06 to 2025-03-07

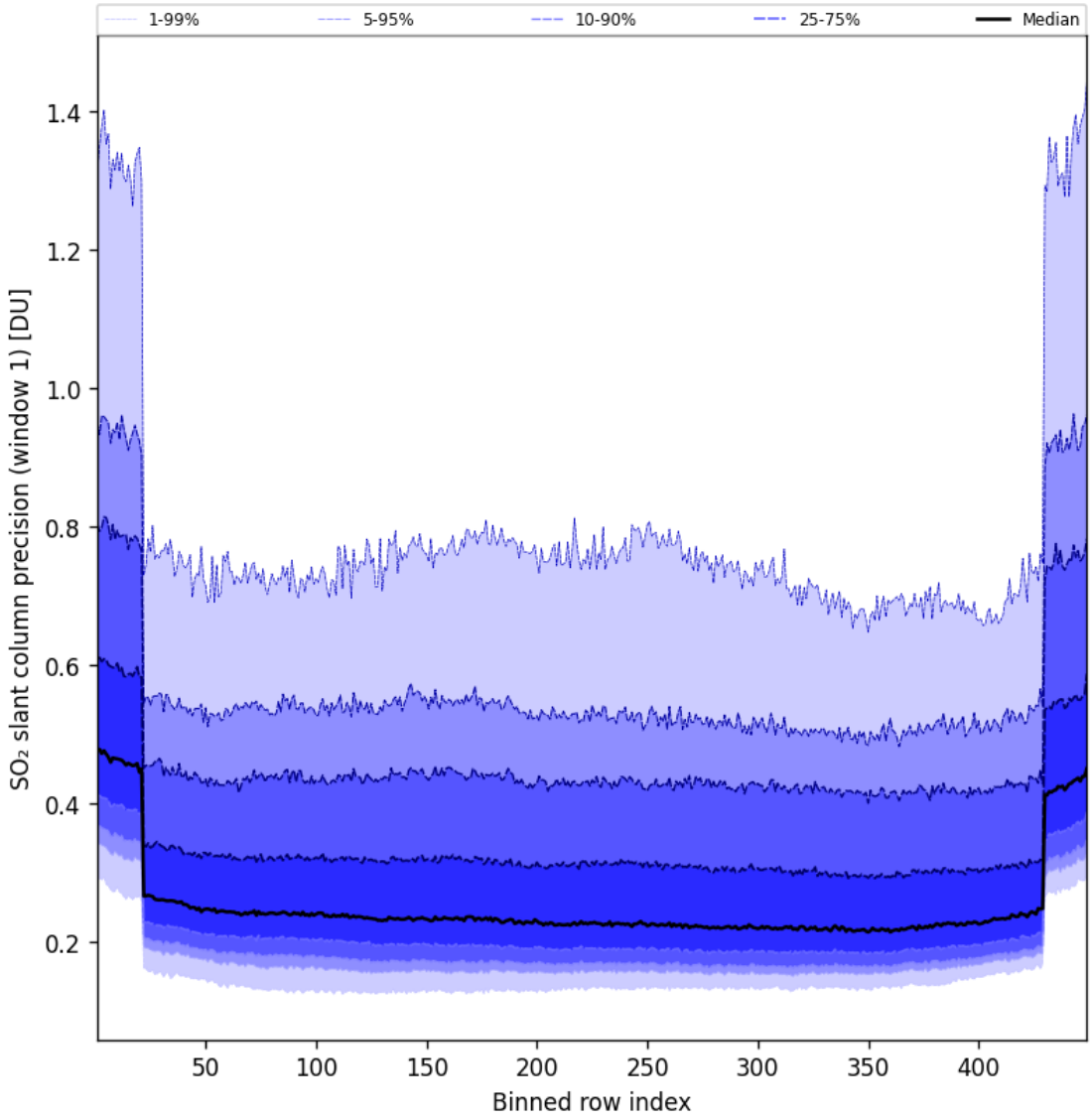


Figure 91: Along track statistics of "SO_2 slant column precision (window 1)" for 2025-03-06 to 2025-03-07

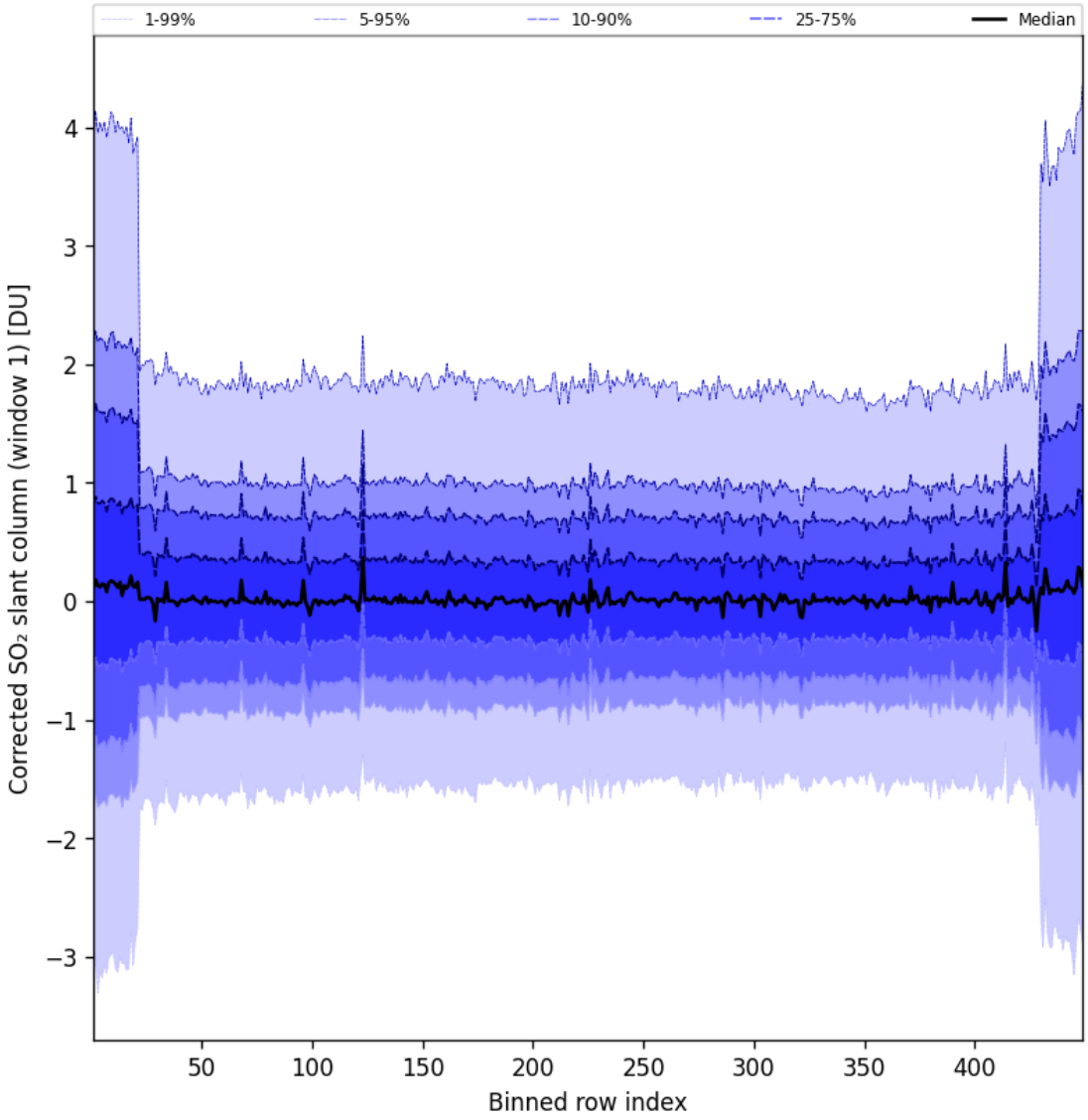


Figure 92: Along track statistics of “Corrected SO_2 slant column (window 1)” for 2025-03-06 to 2025-03-07

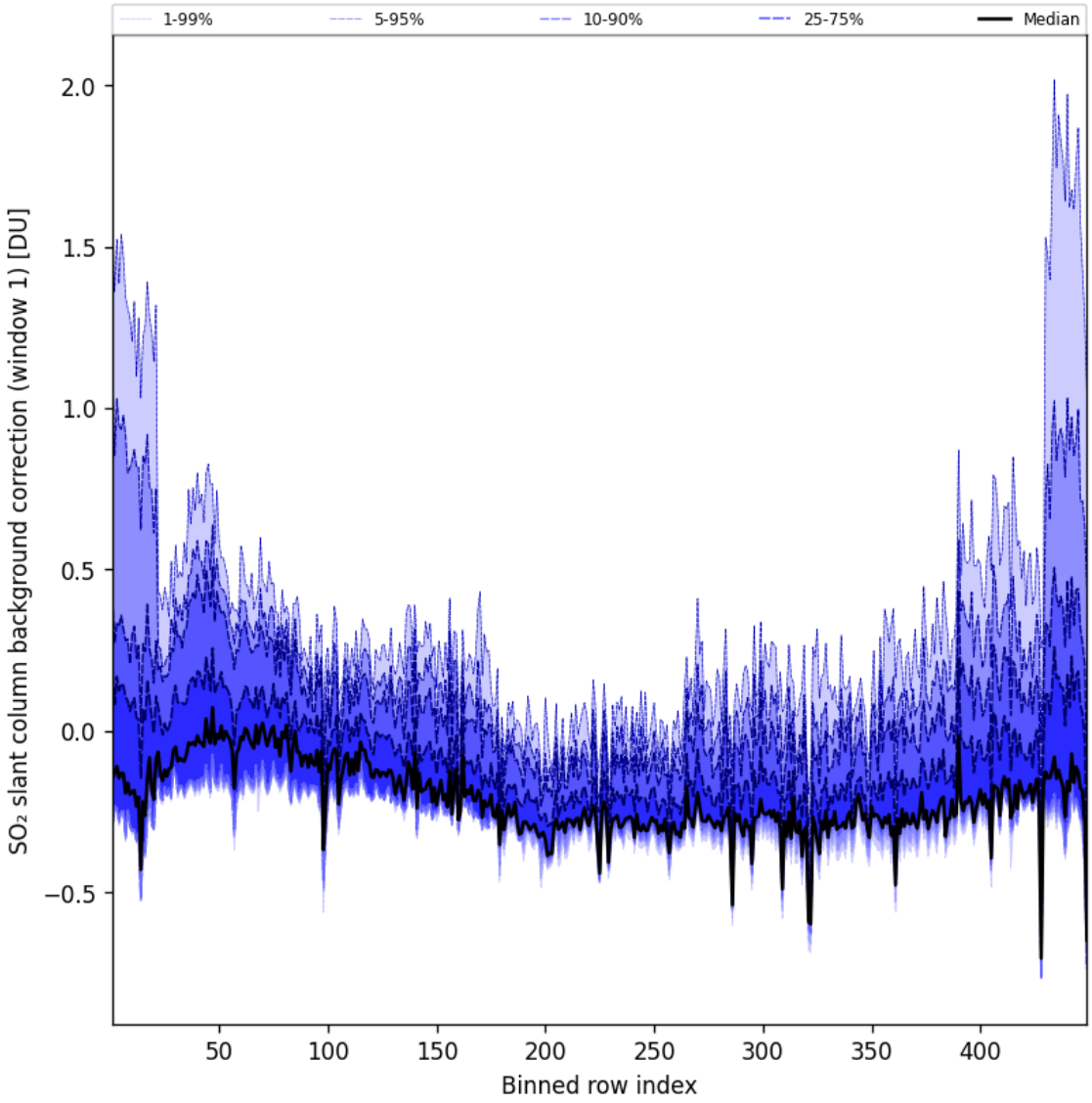


Figure 93: Along track statistics of "SO_2 slant column background correction (window 1)" for 2025-03-06 to 2025-03-07

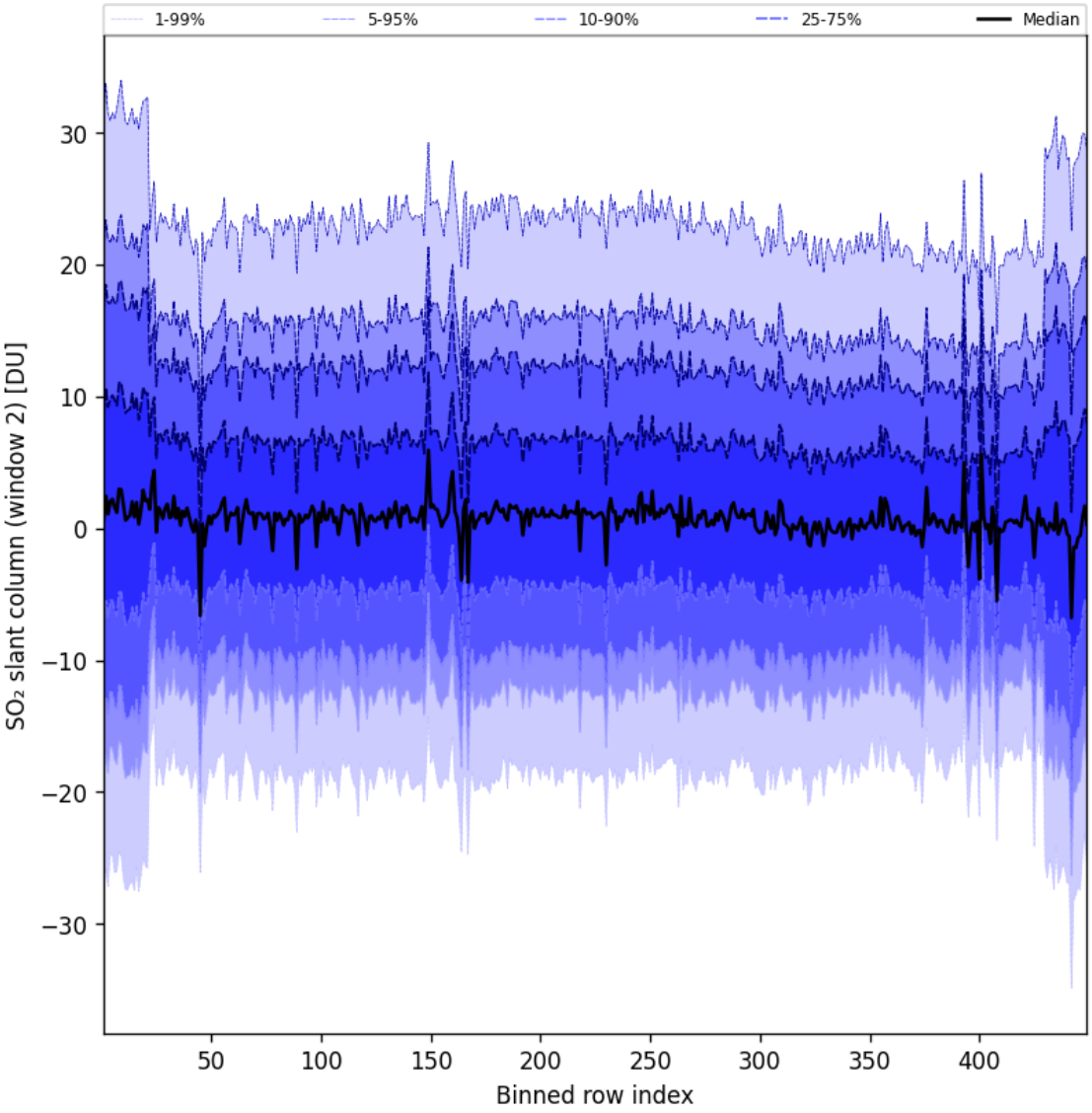


Figure 94: Along track statistics of "SO_2 slant column (window 2)" for 2025-03-06 to 2025-03-07

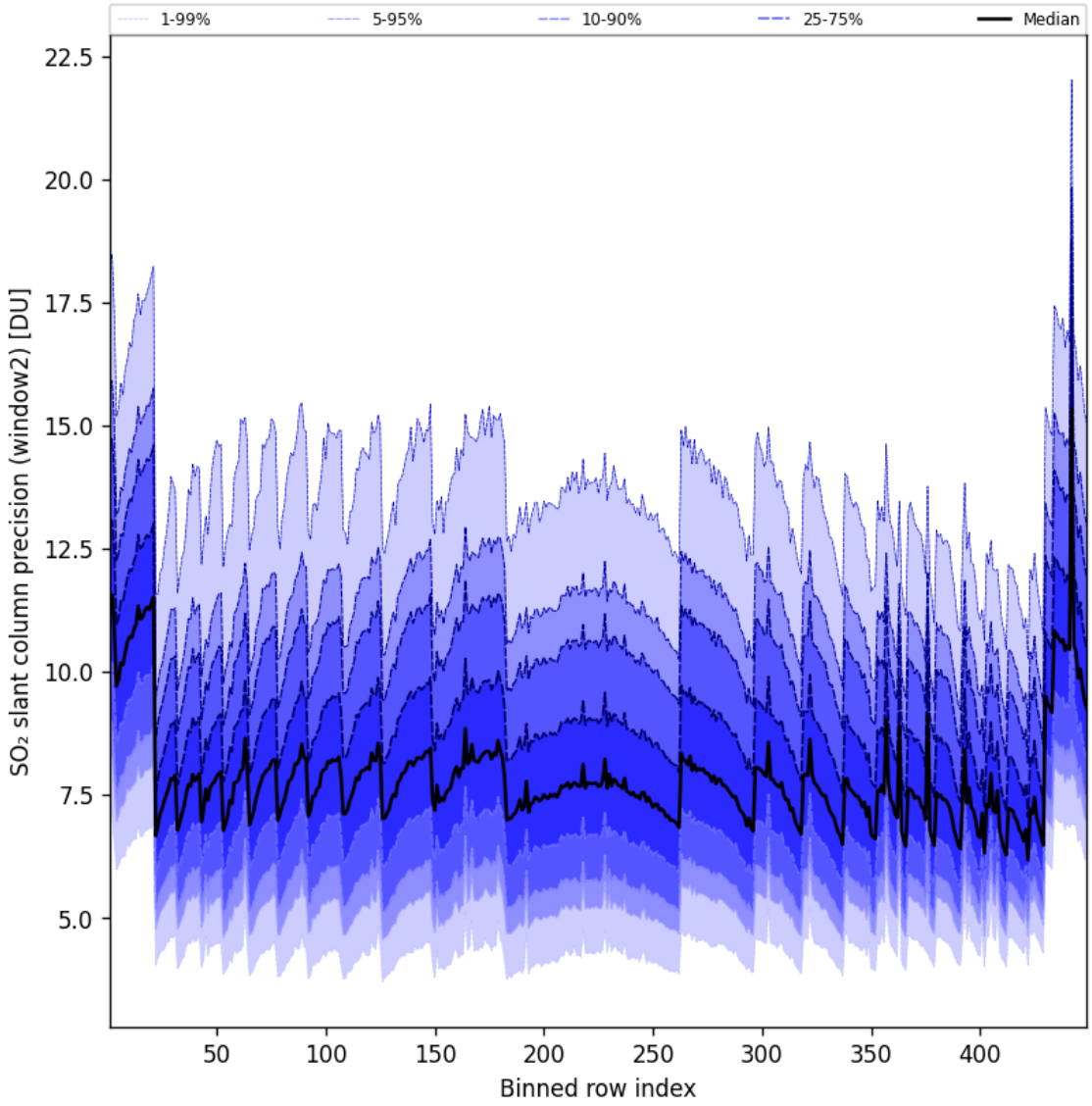


Figure 95: Along track statistics of "SO_2 slant column precision (window2)" for 2025-03-06 to 2025-03-07

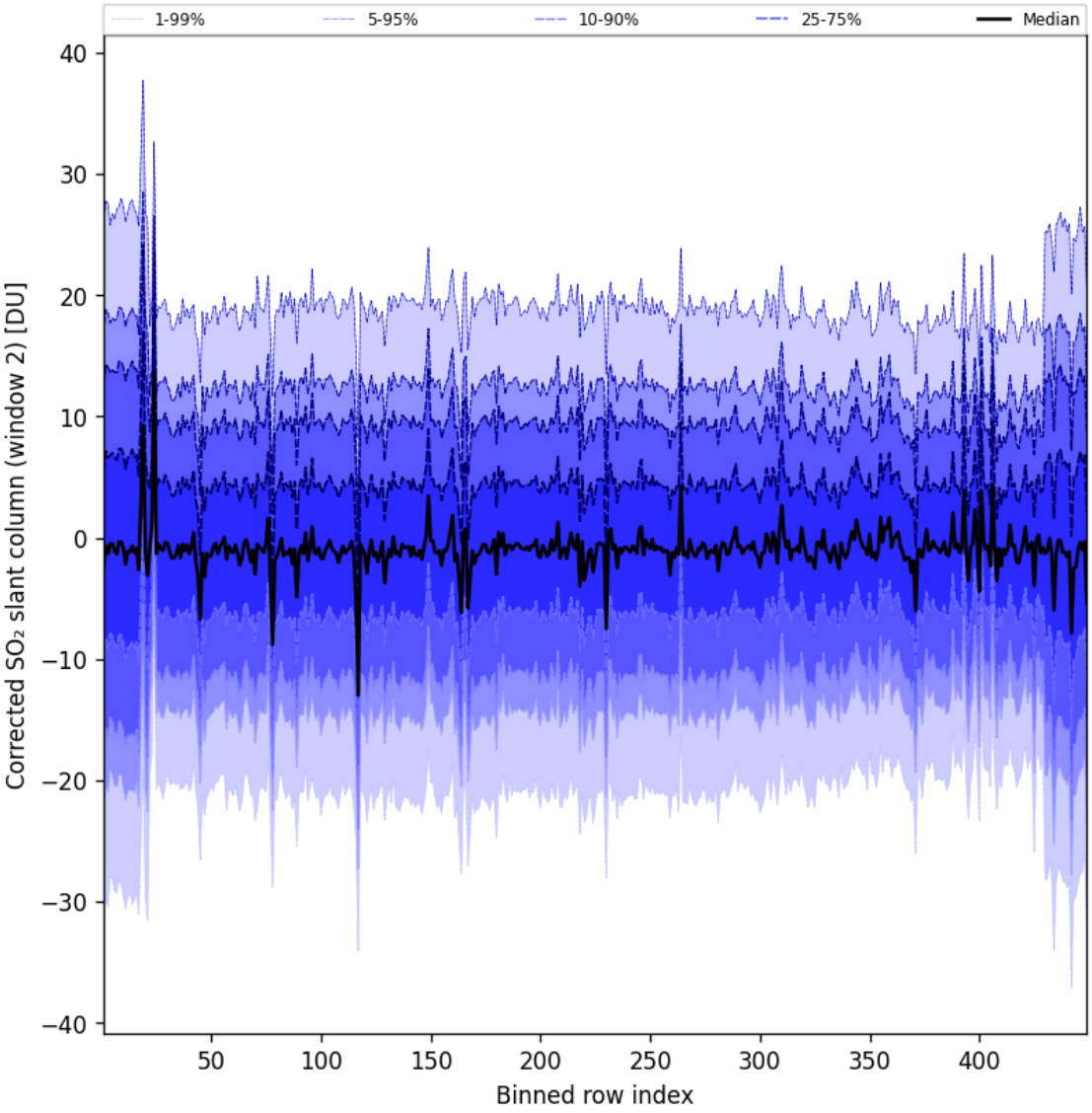


Figure 96: Along track statistics of “Corrected SO_2 slant column (window 2)” for 2025-03-06 to 2025-03-07

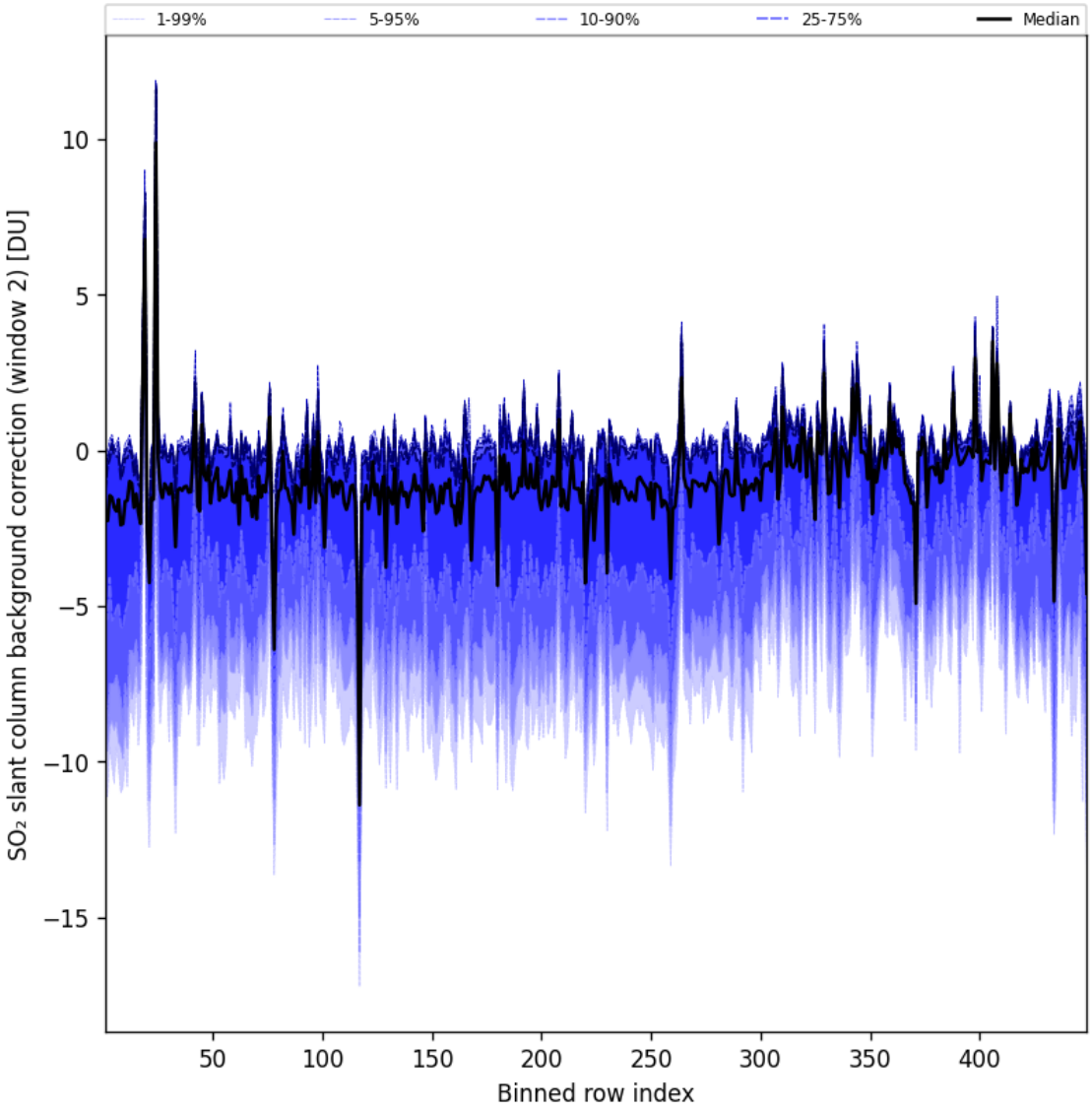


Figure 97: Along track statistics of "SO_2 slant column background correction (window 2)" for 2025-03-06 to 2025-03-07

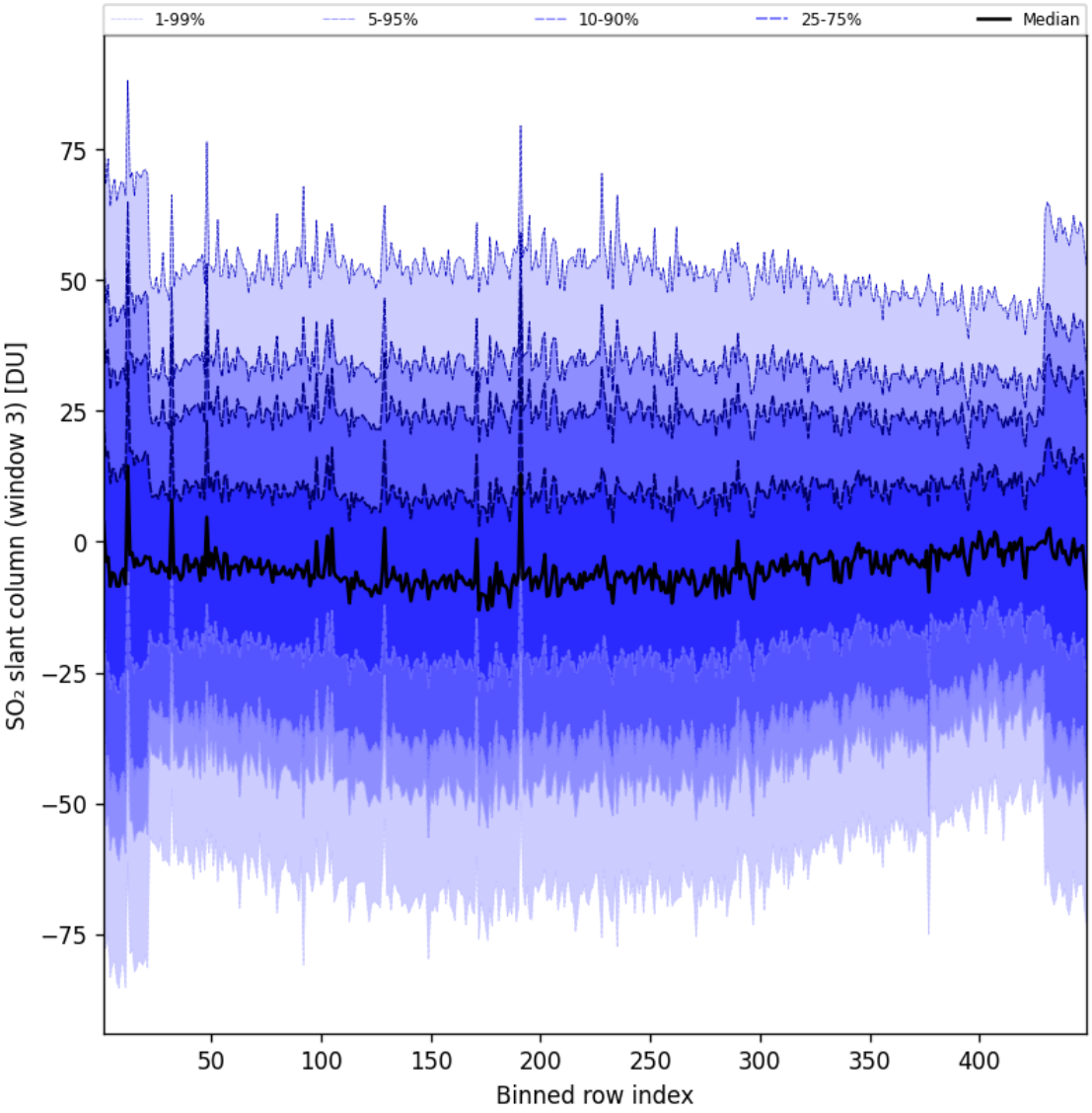


Figure 98: Along track statistics of "SO_2 slant column (window 3)" for 2025-03-06 to 2025-03-07

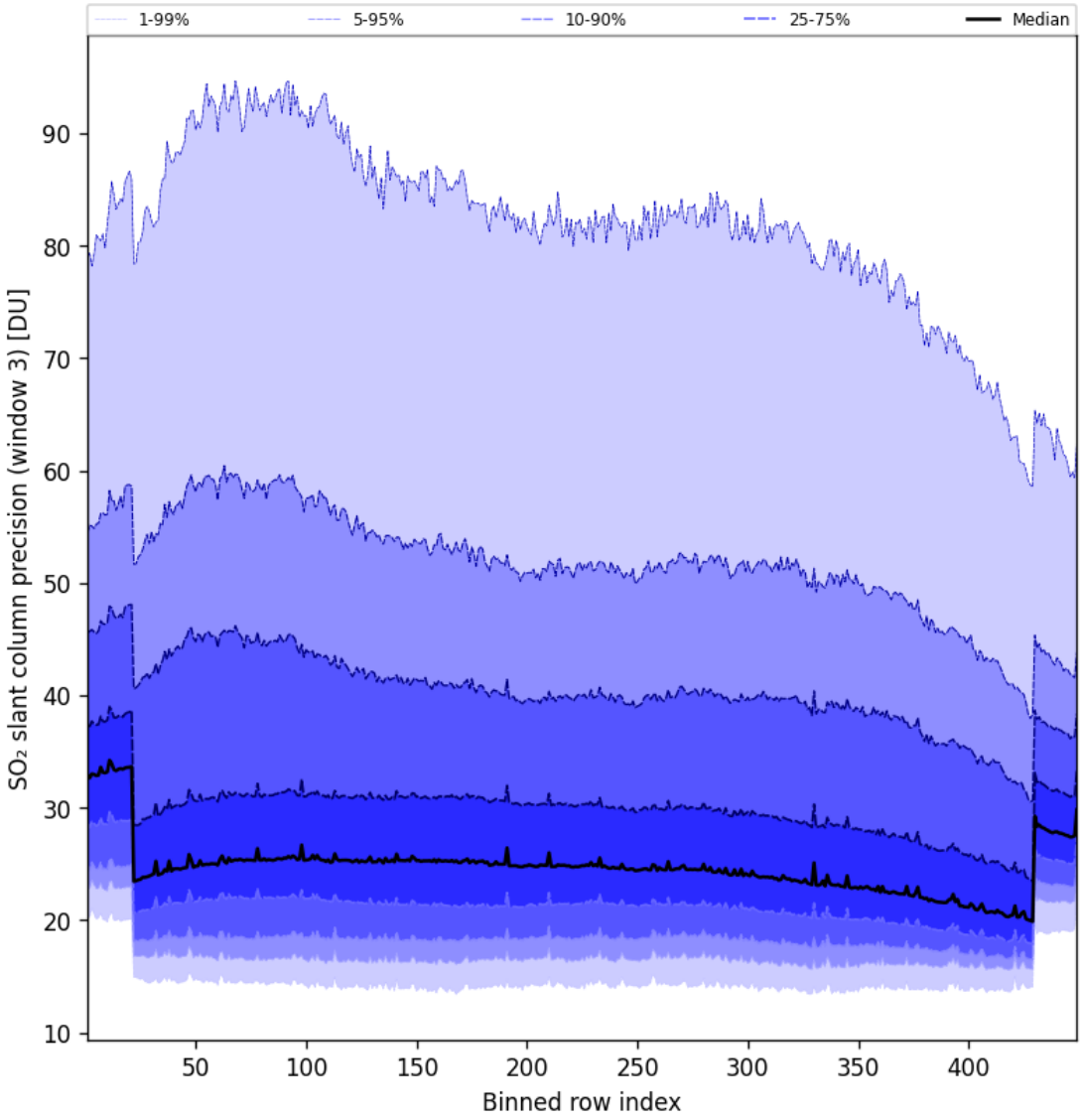


Figure 99: Along track statistics of "SO_2 slant column precision (window 3)" for 2025-03-06 to 2025-03-07

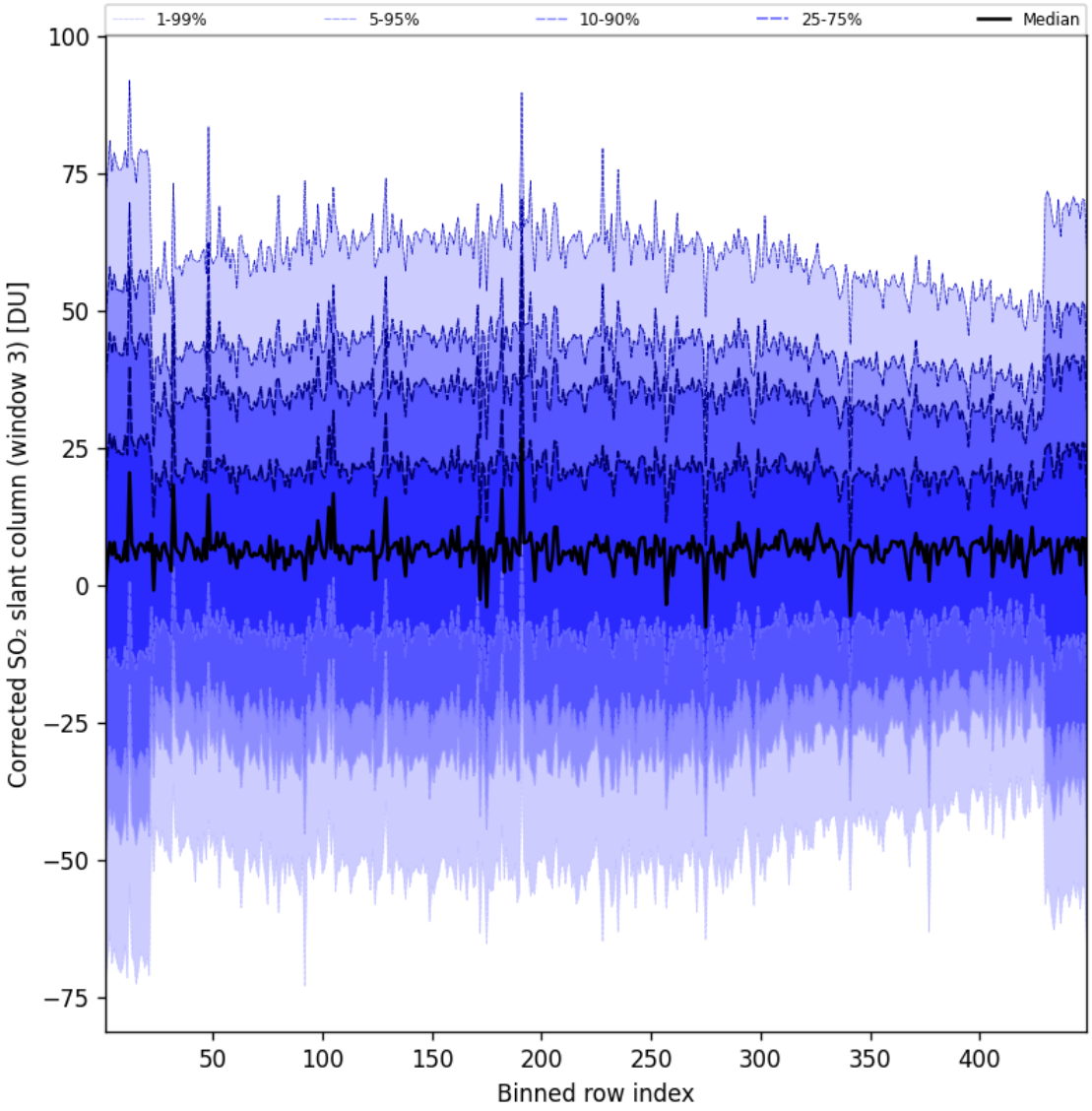


Figure 100: Along track statistics of “Corrected SO_2 slant column (window 3)” for 2025-03-06 to 2025-03-07

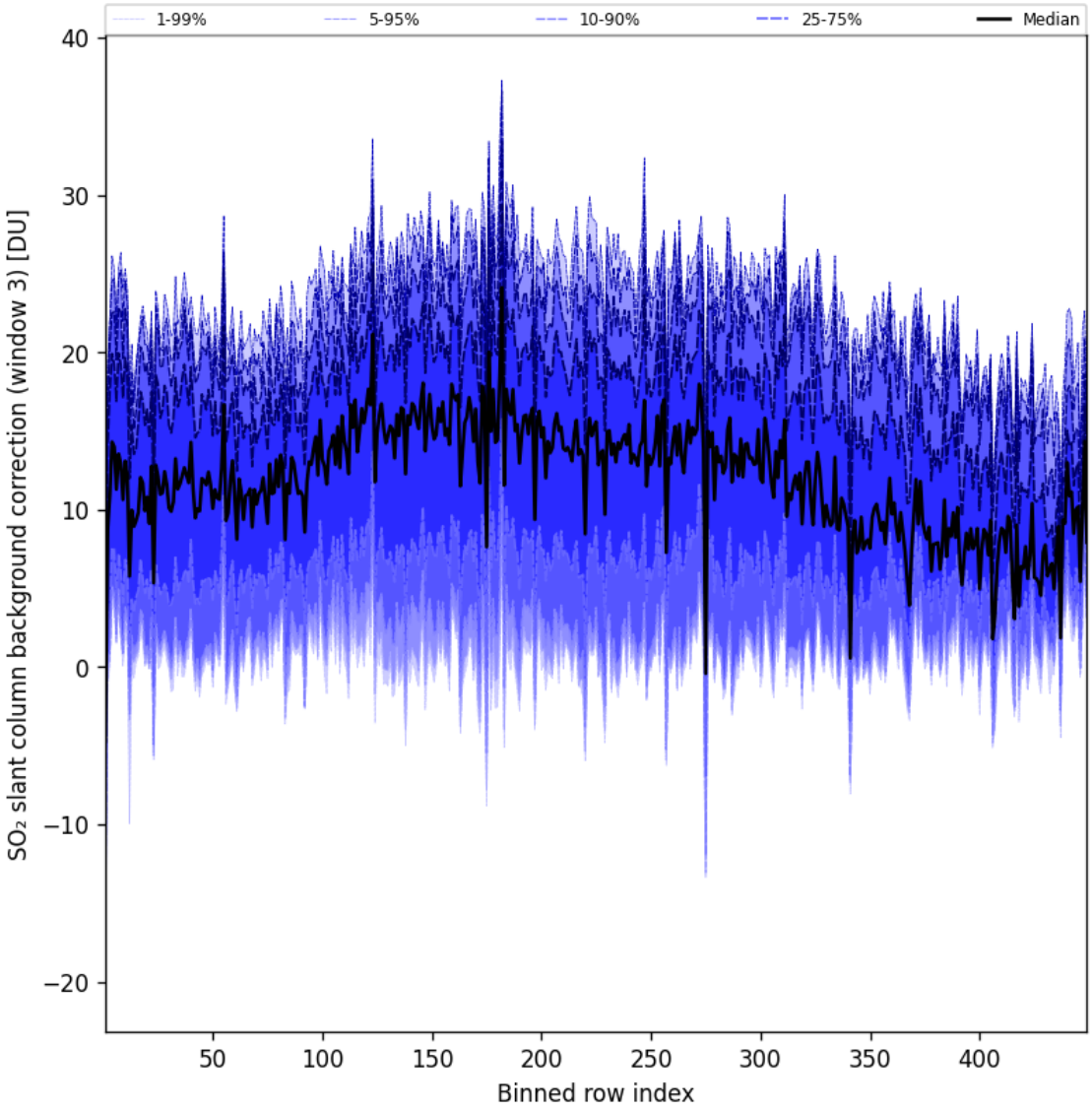
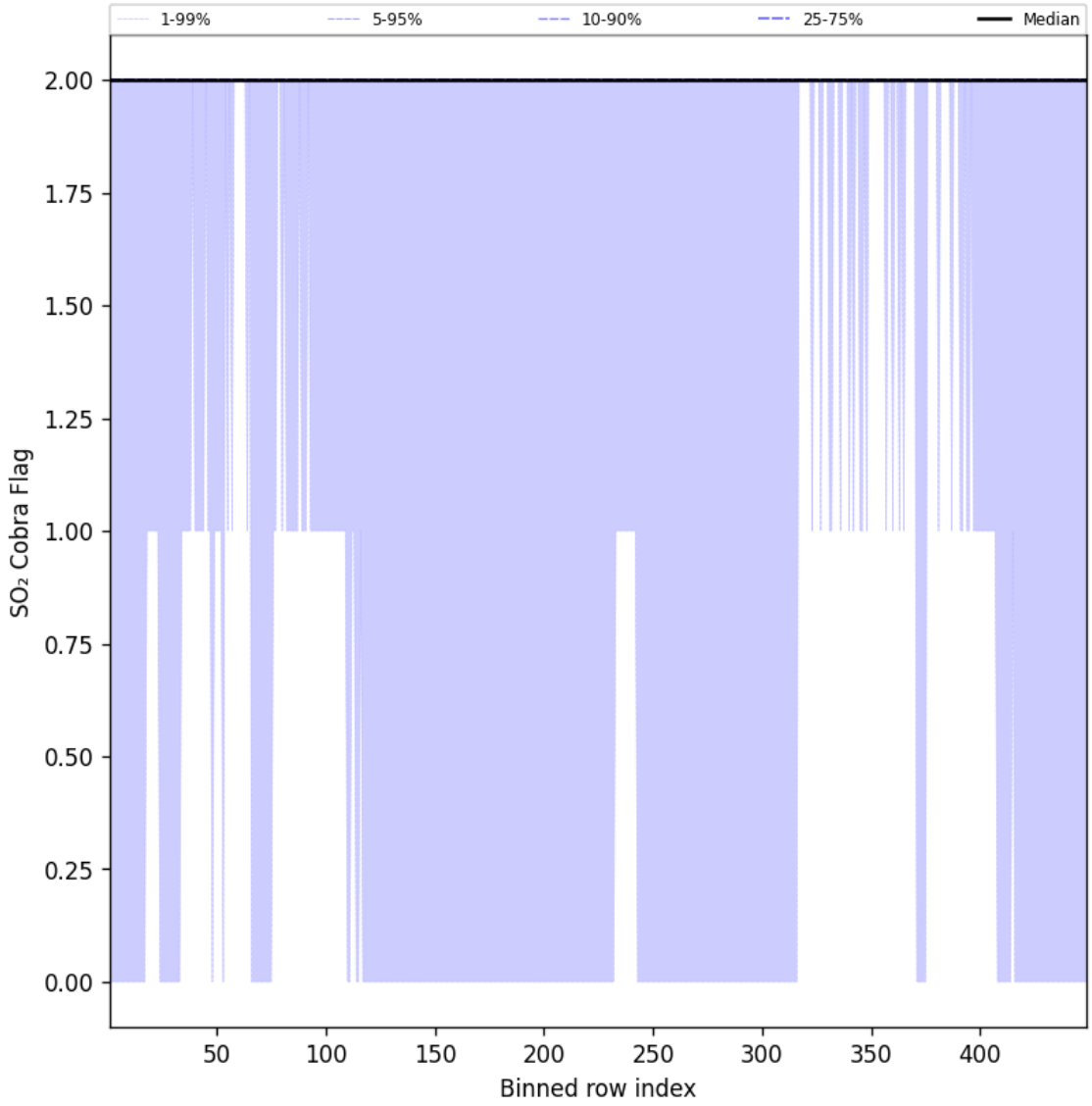


Figure 101: Along track statistics of "SO_2 slant column background correction (window 3)" for 2025-03-06 to 2025-03-07



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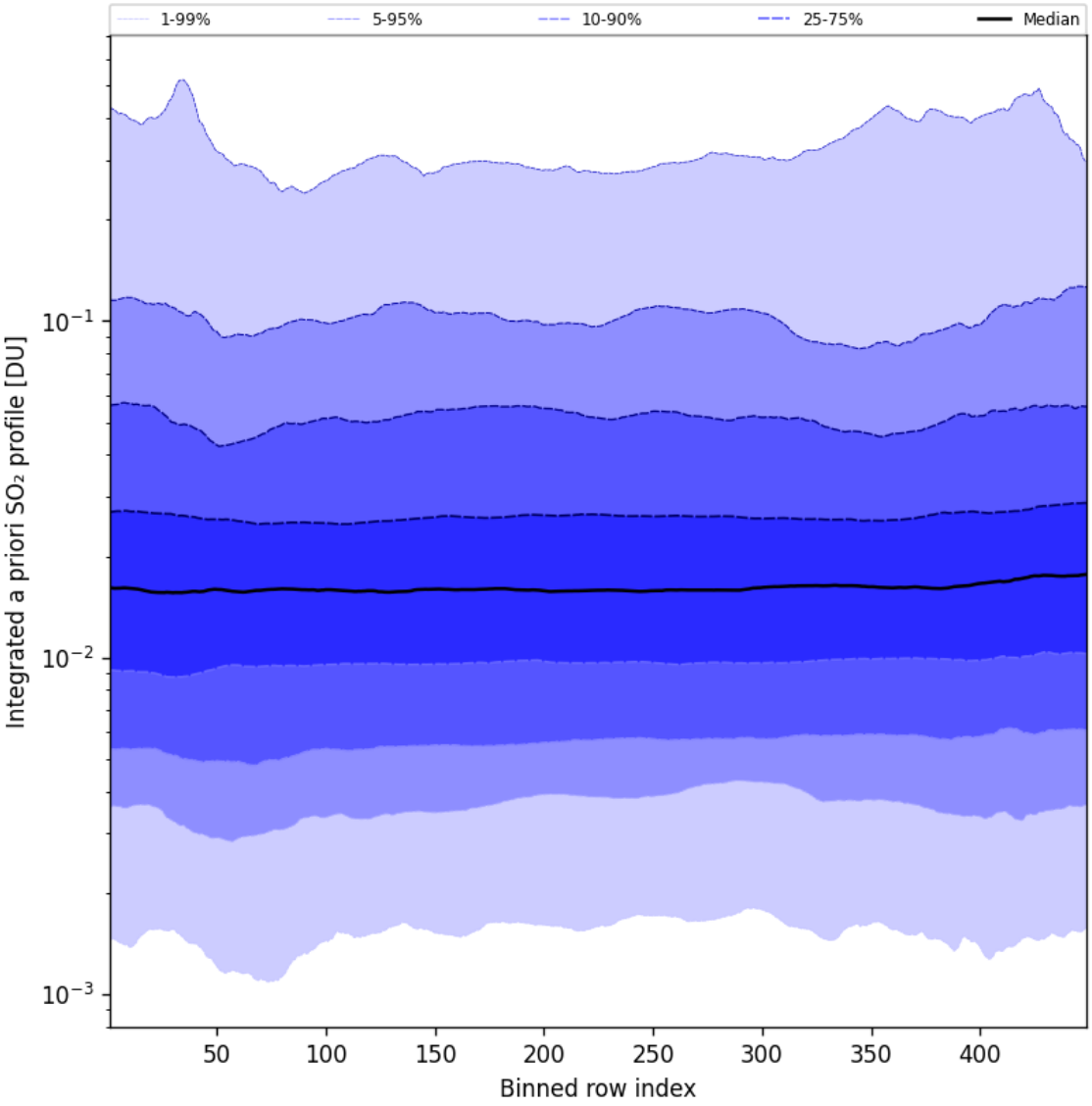
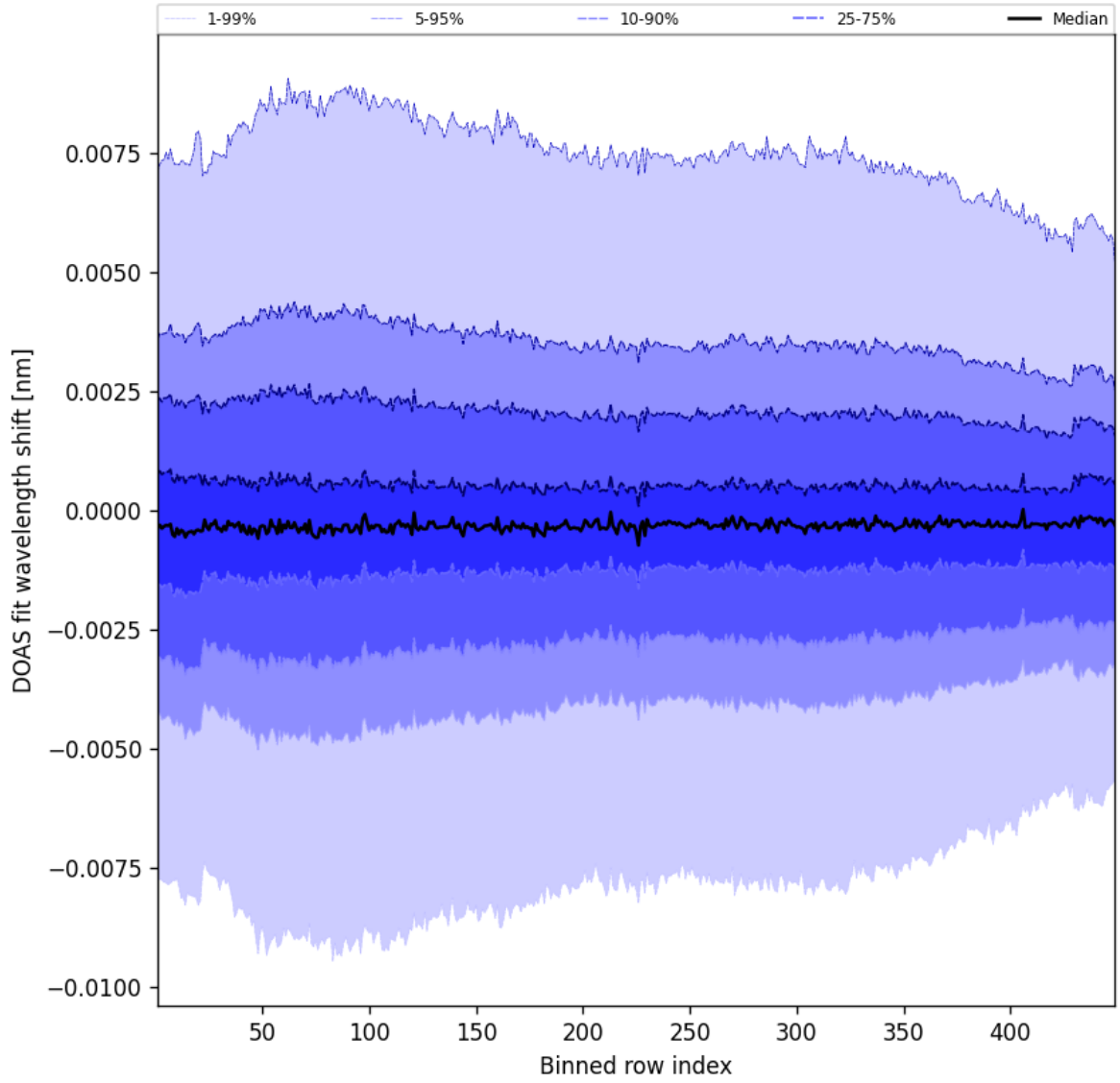


Figure 103: Along track statistics of “Integrated a priori SO_2 profile” for 2025-03-06 to 2025-03-07



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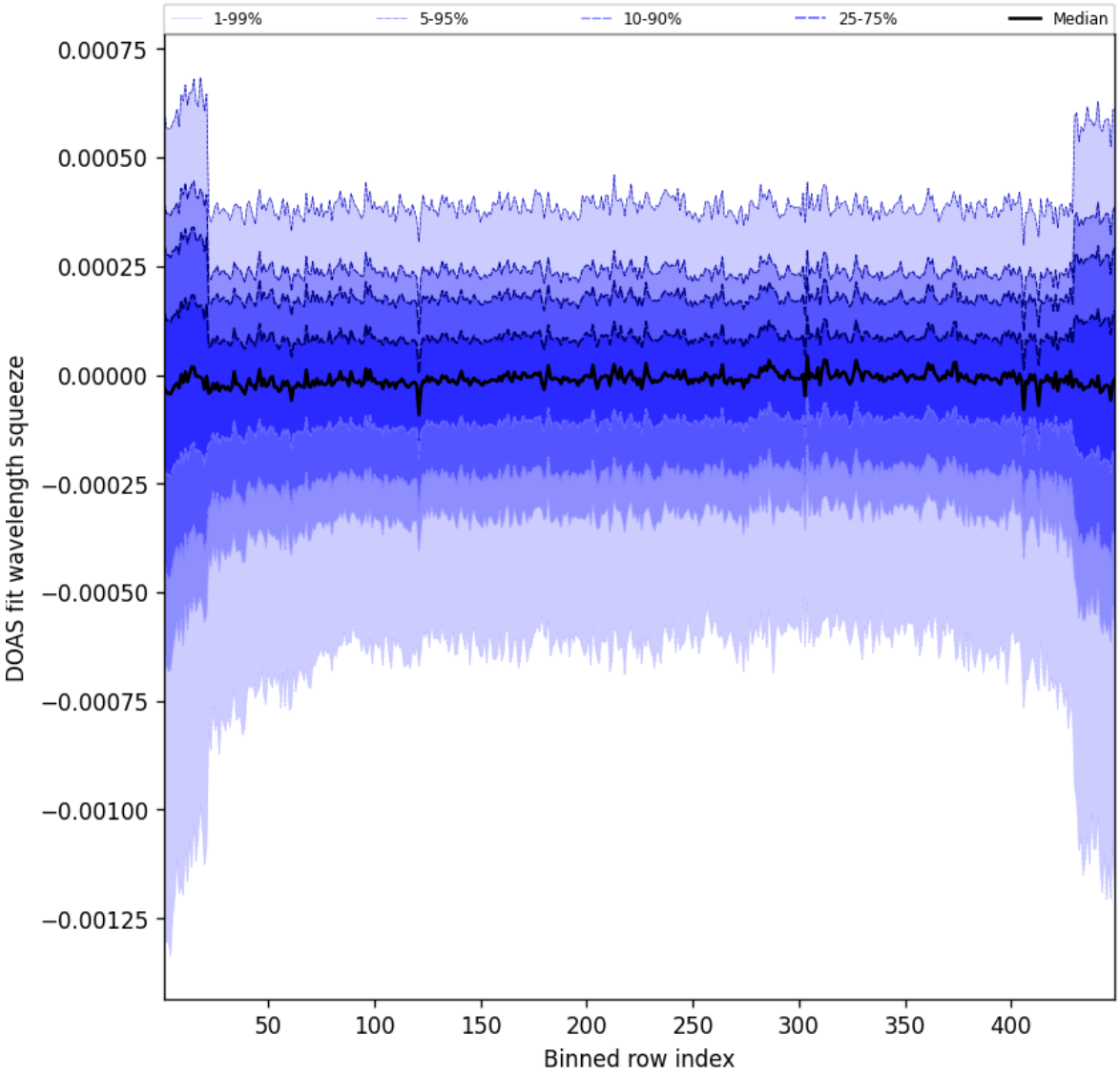

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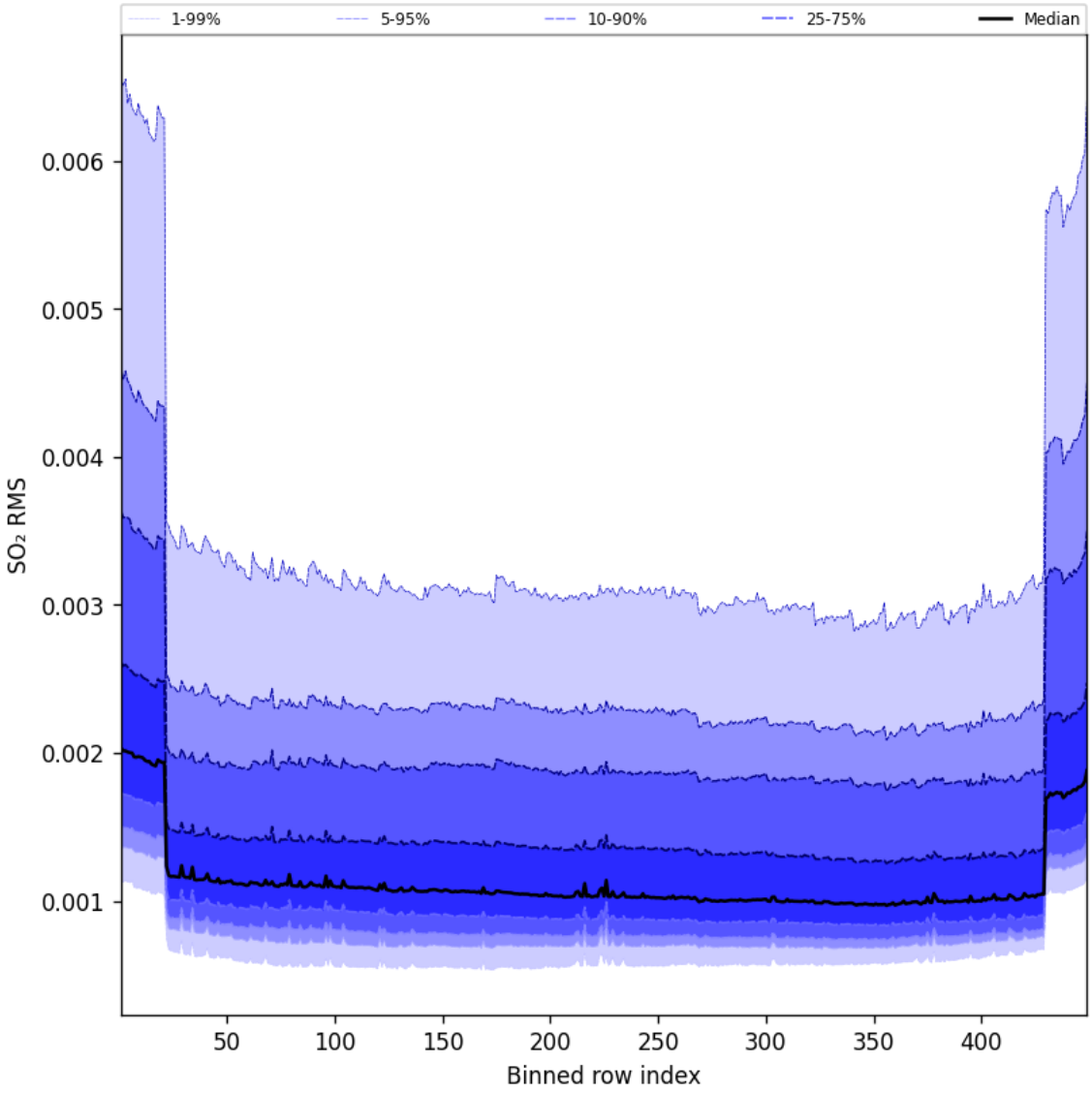

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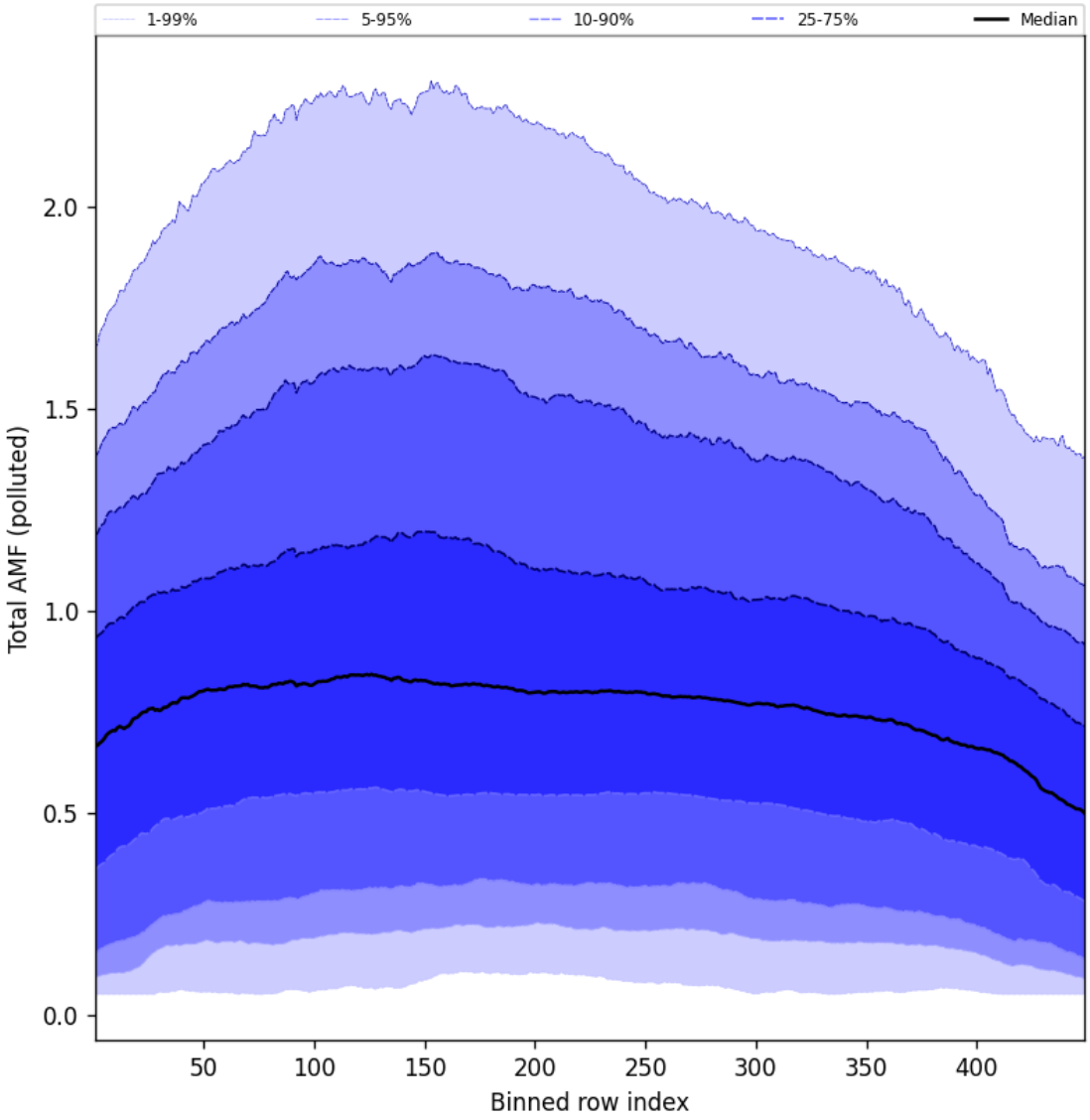

Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-03-06 to 2025-03-07

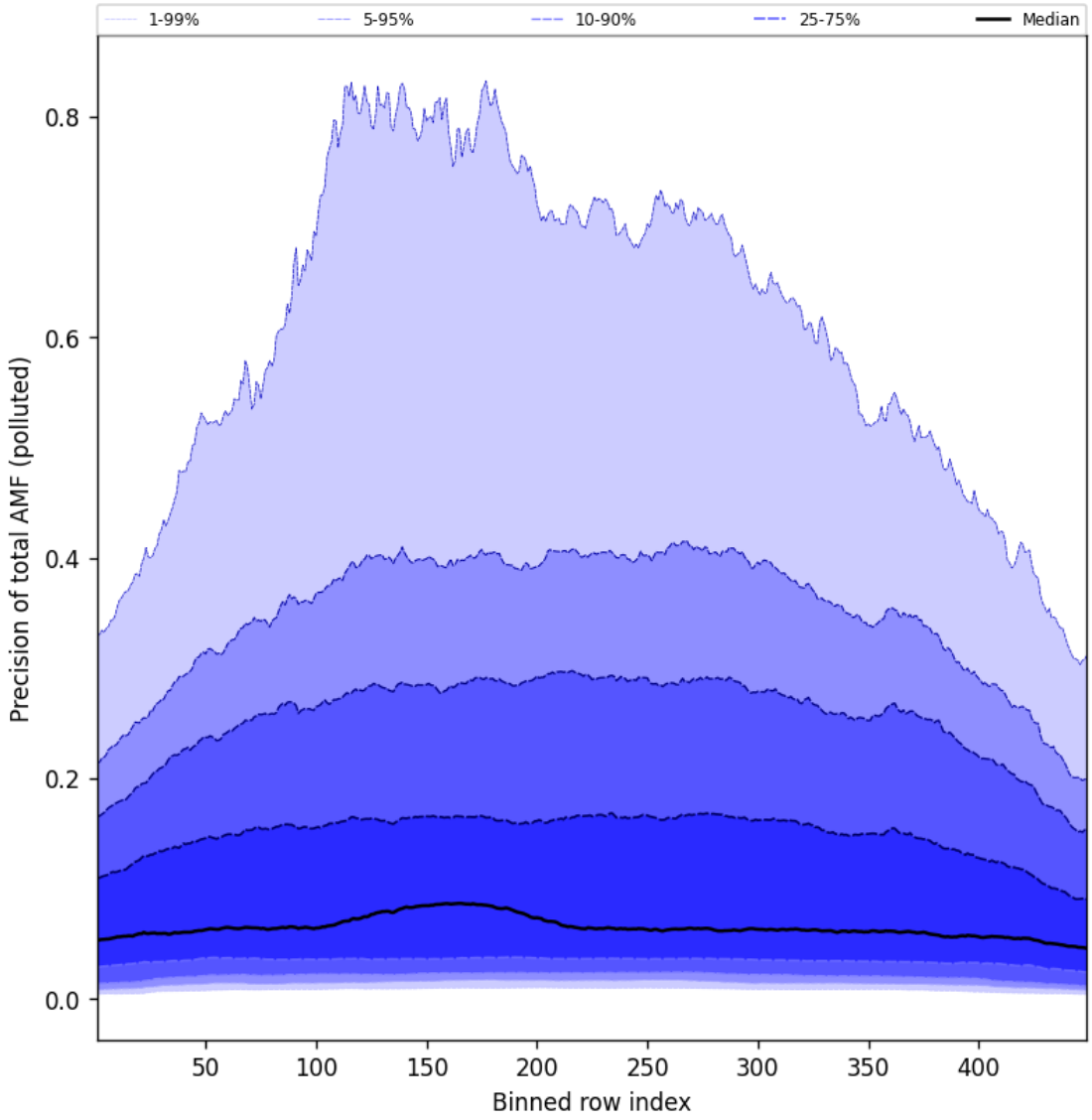

Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-03-06 to 2025-03-07

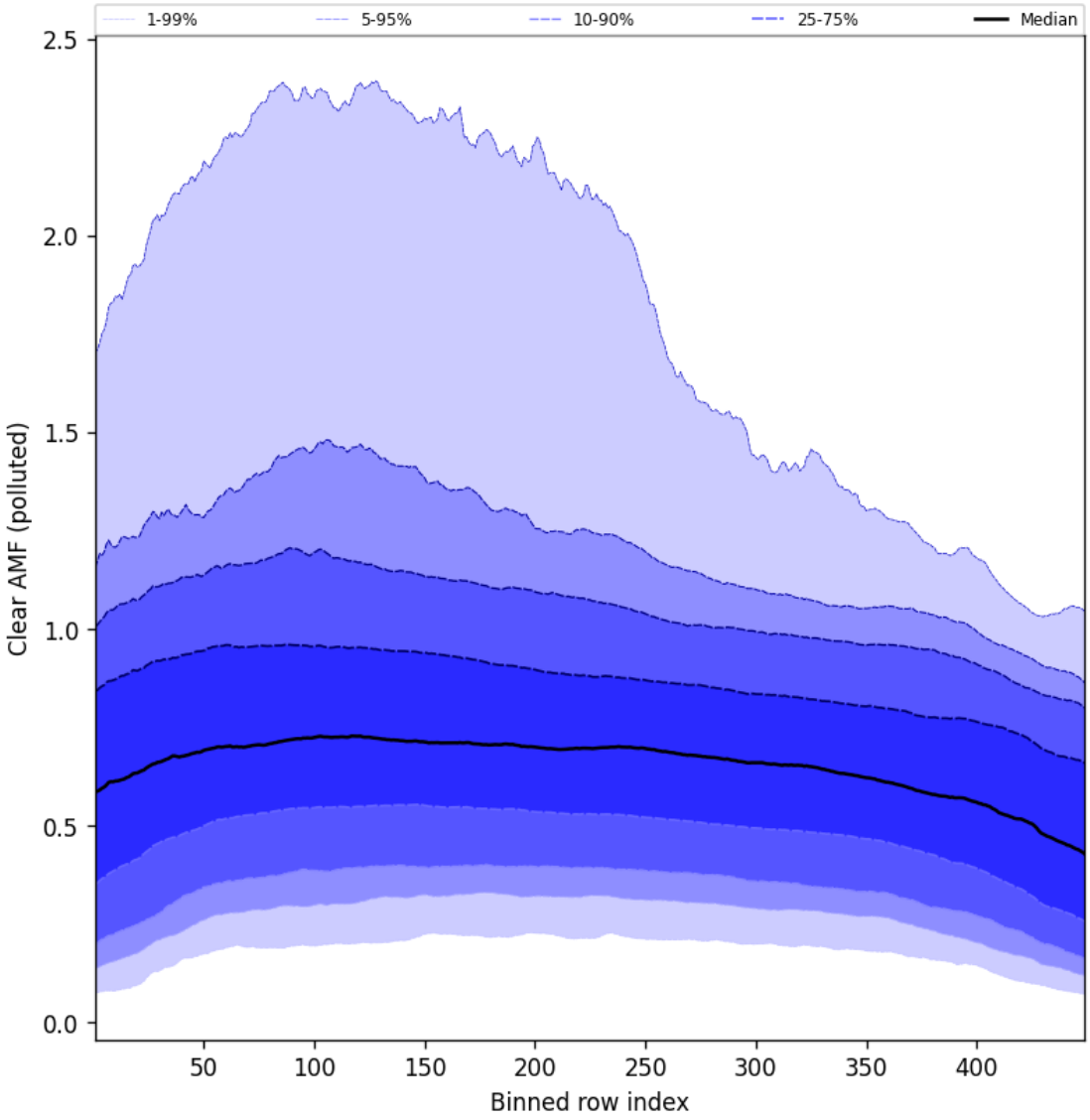

Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-03-06 to 2025-03-07

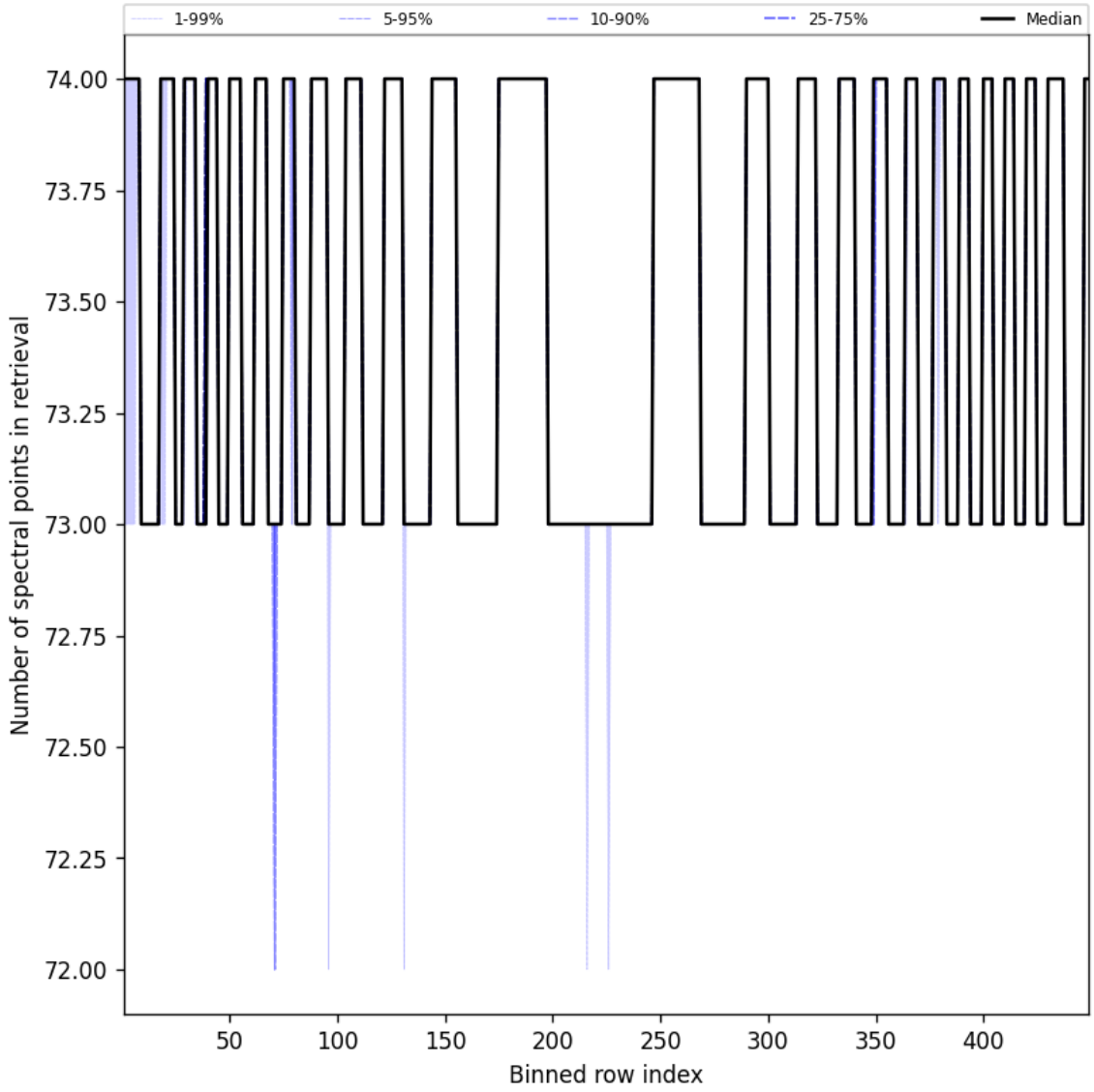

Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-03-06 to 2025-03-07

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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