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]	0.648 ± 0.401	18529762	0.995	0.770	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(4.188 \pm 138.431) \times 10^{-2}$	18529762	0.294	0.483	1.159×10^{-2}	-133	369
sulfurdioxide total vertical column precision [DU]	0.625 ± 1.024	18529762	0.197	0.401	0.349	4.467×10^{-2}	39.1
sulfurdioxide slant column density corrected [DU]	$(2.123 \pm 40.799) \times 10^{-2}$	18529762	0.250	0.368	9.710×10^{-3}	-55.7	305
sulfurdioxide slant column density cobra [DU]	$(2.099 \pm 38.257) \times 10^{-2}$	18529762	0.250	0.368	9.710×10^{-3}	-55.7	38.1
sulfurdioxide slant column density cobra precision [DU]	0.302 ± 0.148	18529762	0.213	0.158	0.254	8.124×10^{-2}	37.4
sulfurdioxide slant column density window1 [DU]	0.180 ± 0.727	18529762	0.225	0.748	0.204	-278	118
sulfurdioxide slant column density window1 precision [DU]	0.302 ± 0.148	18529762	0.213	0.158	0.254	8.124×10^{-2}	37.4
sulfurdioxide slant column density corrected win1 [DU]	$(5.290 \pm 71.596) \times 10^{-2}$	18529762	2.500×10^{-2}	0.731	3.136×10^{-2}	-278	117
background so2 slant column offset window1 [DU]	-0.128 ± 0.203	18529762	-0.260	0.214	-0.177	-1.22	4.46
sulfurdioxide slant column density window2 [DU]	1.98 ± 9.18	18529762	1.25	11.6	1.74	-1.092×10^{3}	1.157×10^{3}
sulfurdioxide slant column density window2 precision [DU]	8.10 ± 2.19	18529762	7.43	2.52	7.79	2.15	753
sulfurdioxide slant column density corrected win2 [DU]	1.02 ± 8.81	18529762	1.25	11.2	1.03	-1.091×10^{3}	1.159×10^{3}
background so2 slant column offset window2 [DU]	-0.966 ± 2.980	18529762	1.25	3.63	1.885×10^{-2}	-19.2	14.8
sulfurdioxide slant column density window3 [DU]	-12.2 ± 24.2	18529762	-12.9	30.7	-12.6	-720	617
sulfurdioxide slant column density window3 precision [DU]	27.9 ± 12.8	18529762	22.5	9.34	24.5	9.15	252
sulfurdioxide slant column density corrected win3 [DU]	-7.50 ± 23.33	18529762	-8.40	29.5	-7.57	-725	619
background so2 slant column offset window3 [DU]	4.73 ± 7.24	18529762	-0.560	11.4	4.25	-31.7	28.3
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.21	18529762	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(3.214 \pm 7.845) \times 10^{-2}$	18529762	1.539×10^{-2}	1.731×10^{-2}	1.536×10^{-2}	2.387×10^{-4}	2.34
fitted radiance shift [nm]	$(-4.176 \pm 25.586) \times 10^{-4}$	18529762	-5.000×10^{-4}	1.840×10^{-3}	-3.886×10^{-4}	-8.740×10^{-2}	0.110
fitted radiance squeeze [1]	$(-3.525 \pm 19.658) \times 10^{-5}$	18529762	-1.000×10^{-5}	2.073×10^{-4}	-1.882×10^{-5}	-1.573×10^{-2}	8.996×10^{-2}
fitted root mean square [1]	$(1.316 \pm 0.616) \times 10^{-3}$	18529762	9.250×10^{-4}	6.173×10^{-4}	1.123×10^{-3}	3.260×10^{-4}	0.164
sulfurdioxide total air mass factor polluted [1]	0.814 ± 0.420	18529762	0.700	0.541	0.765	5.000×10^{-2}	2.89
sulfurdioxide total air mass factor polluted precision [1]	0.108 ± 0.119	18529762	3.500×10^{-2}	0.106	6.172×10^{-2}	2.703×10^{-3}	2.06
sulfurdioxide clear air mass factor polluted [1]	0.696 ± 0.284	18529762	0.620	0.376	0.669	5.004×10^{-2}	2.74
number of spectral points in retrieval [1]	73.4 ± 0.5	18529762	73.0	1.000	73.0	52.0	74.0

Table 2: Percentile ranges

Variable	1 %	5 %	10 %	15.9 %	25 %	75 %	84.1 %	90 %	95 %	99 %
qa value [1]	0.0	0.0	6.000×10^{-2}	0.120	0.230	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	−3.04	−1.02	−0.595	−0.390	−0.225	0.258	0.439	0.672	1.17	3.59
sulfurdioxide total vertical column precision [DU]	9.785×10^{-2}	0.137	0.165	0.189	0.223	0.623	0.861	1.19	1.90	4.90
sulfurdioxide slant column density corrected [DU]	−0.901	−0.508	−0.363	−0.269	−0.172	0.196	0.299	0.403	0.572	1.11
sulfurdioxide slant column density cobra [DU]	−0.901	−0.508	−0.363	−0.269	−0.172	0.196	0.299	0.403	0.572	1.11
sulfurdioxide slant column density cobra precision [DU]	0.138	0.165	0.178	0.189	0.204	0.362	0.422	0.477	0.565	0.857
sulfurdioxide slant column density window1 [DU]	−1.90	−0.947	−0.605	−0.392	−0.179	0.569	0.759	0.942	1.23	2.03
sulfurdioxide slant column density window1 precision [DU]	0.138	0.165	0.178	0.189	0.204	0.362	0.422	0.477	0.565	0.857
sulfurdioxide slant column density corrected win1 [DU]	−1.75	−0.976	−0.698	−0.517	−0.328	0.402	0.608	0.816	1.15	2.14
background so2 slant column offset window1 [DU]	−0.389	−0.331	−0.306	−0.287	−0.262	-4.806×10^{-2}	3.314×10^{-2}	0.115	0.244	0.576
sulfurdioxide slant column density window2 [DU]	−19.2	−12.5	−9.21	−6.75	−3.97	7.68	10.7	13.5	17.3	25.2
sulfurdioxide slant column density window2 precision [DU]	4.30	5.22	5.76	6.18	6.67	9.19	10.0	10.8	12.0	14.6
sulfurdioxide slant column density corrected win2 [DU]	−20.4	−13.3	−9.87	−7.36	−4.56	6.61	9.40	11.9	15.3	22.3
background so2 slant column offset window2 [DU]	−9.79	−6.95	−5.35	−4.09	−2.54	1.10	1.40	1.67	2.09	4.11
sulfurdioxide slant column density window3 [DU]	−70.9	−51.3	−42.0	−35.2	−27.7	3.06	11.1	18.4	28.1	47.1
sulfurdioxide slant column density window3 precision [DU]	13.7	16.2	18.1	19.4	20.9	30.3	34.9	40.7	52.1	82.6
sulfurdioxide slant column density corrected win3 [DU]	−65.4	−45.6	−36.3	−29.6	−22.2	7.26	14.8	21.6	30.8	49.3
background so2 slant column offset window3 [DU]	−10.0	−5.40	−3.85	−2.65	−1.05	10.4	12.7	14.5	16.6	19.9
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]	1.214×10^{-3}	2.407×10^{-3}	3.679×10^{-3}	5.911×10^{-3}	8.702×10^{-3}	2.601×10^{-2}	3.679×10^{-2}	5.800×10^{-2}	0.106	0.366
fitted radiance shift [nm]	-8.069×10^{-3}	-4.230×10^{-3}	-2.879×10^{-3}	-2.086×10^{-3}	-1.371×10^{-3}	4.680×10^{-4}	1.150×10^{-3}	1.999×10^{-3}	3.465×10^{-3}	7.516×10^{-3}
fitted radiance squeeze [1]	-6.558×10^{-4}	-3.655×10^{-4}	-2.564×10^{-4}	-1.905×10^{-4}	-1.274×10^{-4}	7.997×10^{-5}	1.290×10^{-4}	1.738×10^{-4}	2.368×10^{-4}	3.828×10^{-4}
fitted root mean square [1]	5.825×10^{-4}	7.208×10^{-4}	7.965×10^{-4}	8.535×10^{-4}	9.237×10^{-4}	1.541×10^{-3}	1.813×10^{-3}	2.071×10^{-3}	2.476×10^{-3}	3.571×10^{-3}
sulfurdioxide total air mass factor polluted [1]	6.679×10^{-2}	0.199	0.304	0.402	0.515	1.06	1.23	1.40	1.61	1.95
sulfurdioxide total air mass factor polluted precision [1]	8.499×10^{-3}	1.593×10^{-2}	2.230×10^{-2}	2.783×10^{-2}	3.525×10^{-2}	0.142	0.190	0.241	0.327	0.572
sulfurdioxide clear air mass factor polluted [1]	0.176	0.269	0.347	0.417	0.498	0.874	0.976	1.06	1.18	1.51
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]	0.627 ± 0.401	10119483	0.780	1.000	0.0	1.000	0.220	1.000
sulfurdioxide total vertical column [DU]	$(5.654 \pm 175.111) \times 10^{-2}$	10119483	0.547	1.206×10^{-2}	-133	135	-0.254	0.293
sulfurdioxide total vertical column precision [DU]	0.781 ± 1.299	10119483	0.526	0.401	4.467×10^{-2}	39.1	0.239	0.765
sulfurdioxide slant column density corrected [DU]	$(2.462 \pm 42.305) \times 10^{-2}$	10119483	0.383	9.566×10^{-3}	-16.1	53.6	-0.179	0.204
sulfurdioxide slant column density cobra [DU]	$(2.441 \pm 41.315) \times 10^{-2}$	10119483	0.383	9.566×10^{-3}	-16.1	13.7	-0.179	0.204
sulfurdioxide slant column density cobra precision [DU]	0.320 ± 0.165	10119483	0.191	0.267	8.550×10^{-2}	10.2	0.204	0.395
sulfurdioxide slant column density window1 [DU]	0.173 ± 0.785	10119483	0.781	0.201	-73.1	13.7	-0.199	0.582
sulfurdioxide slant column density window1 precision [DU]	0.320 ± 0.165	10119483	0.191	0.267	8.550×10^{-2}	10.2	0.204	0.395
sulfurdioxide slant column density corrected win1 [DU]	$(6.110 \pm 77.465) \times 10^{-2}$	10119483	0.766	3.100×10^{-2}	-73.1	13.7	-0.343	0.423
background so2 slant column offset window1 [DU]	-0.112 ± 0.236	10119483	0.238	-0.175	-1.22	4.46	-0.266	-2.791×10^{-2}
sulfurdioxide slant column density window2 [DU]	2.67 ± 9.21	10119483	11.8	2.38	-306	857	-3.39	8.44
sulfurdioxide slant column density window2 precision [DU]	7.99 ± 2.06	10119483	2.44	7.70	2.36	333	6.61	9.05
sulfurdioxide slant column density corrected win2 [DU]	0.955 ± 8.662	10119483	11.1	0.988	-317	857	-4.56	6.51
background so2 slant column offset window2 [DU]	-1.72 ± 3.47	10119483	5.39	-0.720	-19.2	14.8	-4.29	1.10
sulfurdioxide slant column density window3 [DU]	-14.4 ± 23.3	10119483	29.6	-14.8	-219	147	-29.4	0.228
sulfurdioxide slant column density window3 precision [DU]	26.8 ± 12.2	10119483	8.23	23.6	9.91	251	20.5	28.7
sulfurdioxide slant column density corrected win3 [DU]	-7.20 ± 22.45	10119483	28.3	-7.22	-219	154	-21.3	6.98
background so2 slant column offset window3 [DU]	7.23 ± 7.04	10119483	11.8	7.87	-28.7	28.3	1.04	12.8
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.20	10119483	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(4.261 \pm 10.214) \times 10^{-2}$	10119483	2.839×10^{-2}	1.561×10^{-2}	2.387×10^{-4}	2.34	6.580×10^{-3}	3.498×10^{-2}
fitted radiance shift [nm]	$(-2.684 \pm 24.258) \times 10^{-4}$	10119483	1.666×10^{-3}	-2.513×10^{-4}	-4.117×10^{-2}	4.418×10^{-2}	-1.125×10^{-3}	5.410×10^{-4}
fitted radiance squeeze [1]	$(-5.769 \pm 21.433) \times 10^{-5}$	10119483	2.217×10^{-4}	-3.069×10^{-5}	-1.223×10^{-2}	1.727×10^{-3}	-1.506×10^{-4}	7.101×10^{-5}
fitted root mean square [1]	$(1.391 \pm 0.697) \times 10^{-3}$	10119483	7.326×10^{-4}	1.162×10^{-3}	3.260×10^{-4}	3.781×10^{-2}	9.292×10^{-4}	1.662×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.764 ± 0.431	10119483	0.578	0.709	5.000×10^{-2}	2.89	0.443	1.02
sulfurdioxide total air mass factor polluted precision [1]	0.106 ± 0.137	10119483	9.854×10^{-2}	5.465×10^{-2}	2.703×10^{-3}	2.06	2.997×10^{-2}	0.129
sulfurdioxide clear air mass factor polluted [1]	0.650 ± 0.304	10119483	0.438	0.611	5.004×10^{-2}	2.74	0.416	0.854
number of spectral points in retrieval [1]	73.5 ± 0.5	10119483	1.000	73.0	71.0	74.0	73.0	74.0

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

Variable	mean $\pm\sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.674 ± 0.400	8410279	0.750	1.000	0.0	1.000	0.250	1.000
sulfurdioxide total vertical column [DU]	$(2.425 \pm 72.935) \times 10^{-2}$	8410279	0.423	1.113×10^{-2}	-40.1	369	-0.198	0.225
sulfurdioxide total vertical column precision [DU]	0.437 ± 0.461	8410279	0.297	0.306	4.468×10^{-2}	37.7	0.209	0.506
sulfurdioxide slant column density corrected [DU]	$(1.716 \pm 38.906) \times 10^{-2}$	8410279	0.351	9.872×10^{-3}	-55.7	305	-0.164	0.187
sulfurdioxide slant column density cobra [DU]	$(1.687 \pm 34.213) \times 10^{-2}$	8410279	0.351	9.872×10^{-3}	-55.7	38.1	-0.164	0.187
sulfurdioxide slant column density cobra precision [DU]	0.279 ± 0.122	8410279	0.121	0.244	8.124×10^{-2}	37.4	0.203	0.324
sulfurdioxide slant column density window1 [DU]	0.190 ± 0.649	8410279	0.711	0.206	-278	118	-0.158	0.554
sulfurdioxide slant column density window1 precision [DU]	0.279 ± 0.122	8410279	0.121	0.244	8.124×10^{-2}	37.4	0.203	0.324
sulfurdioxide slant column density corrected win1 [DU]	$(4.304 \pm 63.810) \times 10^{-2}$	8410279	0.692	3.176×10^{-2}	-278	117	-0.312	0.381
background so2 slant column offset window1 [DU]	-0.147 ± 0.152	8410279	0.185	-0.180	-1.15	2.07	-0.258	-7.248×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.16 ± 9.07	8410279	11.4	0.998	-1.092×10^{3}	1.157×10^{3}	-4.63	6.76
sulfurdioxide slant column density window2 precision [DU]	8.23 ± 2.33	8410279	2.61	7.91	2.15	753	6.76	9.37
sulfurdioxide slant column density corrected win2 [DU]	1.10 ± 8.98	8410279	11.3	1.08	-1.091×10^{3}	1.159×10^{3}	-4.56	6.73
background so2 slant column offset window2 [DU]	$(-5.988 \pm 189.784) \times 10^{-2}$	8410279	2.09	0.326	-15.8	14.8	-0.998	1.09
sulfurdioxide slant column density window3 [DU]	-9.57 ± 24.96	8410279	31.6	-9.69	-720	617	-25.3	6.31
sulfurdioxide slant column density window3 precision [DU]	29.2 ± 13.5	8410279	10.4	25.6	9.15	252	21.6	32.0
sulfurdioxide slant column density corrected win3 [DU]	-7.86 ± 24.35	8410279	30.9	-8.04	-725	619	-23.3	7.63
background so2 slant column offset window3 [DU]	1.71 ± 6.25	8410279	9.64	0.845	-31.7	26.6	-3.00	6.63
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.22	8410279	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(1.953 \pm 2.674) \times 10^{-2}$	8410279	1.175×10^{-2}	1.519×10^{-2}	9.873×10^{-4}	1.28	1.037×10^{-2}	2.212×10^{-2}
fitted radiance shift [nm]	$(-5.971 \pm 26.989) \times 10^{-4}$	8410279	2.007×10^{-3}	-5.815×10^{-4}	-8.740×10^{-2}	0.110	-1.656×10^{-3}	3.515×10^{-4}
fitted radiance squeeze [1]	$(-8.239 \pm 168.917) \times 10^{-6}$	8410279	1.940×10^{-4}	-5.872×10^{-6}	-1.573×10^{-2}	8.996×10^{-2}	-1.039×10^{-4}	9.006×10^{-5}
fitted root mean square [1]	$(1.225 \pm 0.486) \times 10^{-3}$	8410279	4.887×10^{-4}	1.091×10^{-3}	3.298×10^{-4}	0.164	9.177×10^{-4}	1.406×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.874 ± 0.398	8410279	0.488	0.818	5.000×10^{-2}	2.67	0.602	1.09
sulfurdioxide total air mass factor polluted precision [1]	0.110 ± 0.094	8410279	0.115	7.167×10^{-2}	5.453×10^{-3}	1.41	4.082×10^{-2}	0.156
sulfurdioxide clear air mass factor polluted [1]	0.752 ± 0.247	8410279	0.316	0.712	0.141	2.40	0.580	0.896
number of spectral points in retrieval [1]	73.4 ± 0.5	8410279	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]	0.688 ± 0.396	12956752	0.730	1.000	0.0	1.000	0.270	1.000
sulfurdioxide total vertical column [DU]	$(2.652 \pm 96.691) \times 10^{-2}$	12956752	0.438	9.803×10^{-3}	-133	108	-0.206	0.232
sulfurdioxide total vertical column precision [DU]	0.494 ± 0.690	12956752	0.318	0.311	4.960×10^{-2}	39.1	0.213	0.531
sulfurdioxide slant column density corrected [DU]	$(1.652 \pm 35.284) \times 10^{-2}$	12956752	0.352	8.449×10^{-3}	-55.7	80.7	-0.166	0.186
sulfurdioxide slant column density cobra [DU]	$(1.644 \pm 34.774) \times 10^{-2}$	12956752	0.352	8.449×10^{-3}	-55.7	36.4	-0.166	0.186
sulfurdioxide slant column density cobra precision [DU]	0.285 ± 0.132	12956752	0.135	0.243	8.124×10^{-2}	28.7	0.200	0.335
sulfurdioxide slant column density window1 [DU]	0.189 ± 0.668	12956752	0.717	0.207	-278	72.2	-0.159	0.558
sulfurdioxide slant column density window1 precision [DU]	0.285 ± 0.132	12956752	0.135	0.243	8.124×10^{-2}	28.7	0.200	0.335
sulfurdioxide slant column density corrected win1 [DU]	$(4.452 \pm 65.922) \times 10^{-2}$	12956752	0.702	2.753×10^{-2}	-278	72.7	-0.319	0.383
background so2 slant column offset window1 [DU]	-0.145 ± 0.174	12956752	0.195	-0.183	-1.15	3.84	-0.264	-6.883×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.51 ± 8.94	12956752	11.3	1.31	-746	1.157×10^{3}	-4.27	7.06
sulfurdioxide slant column density window2 precision [DU]	8.00 ± 2.10	12956752	2.48	7.68	2.15	534	6.60	9.08
sulfurdioxide slant column density corrected win2 [DU]	1.01 ± 8.71	12956752	11.1	1.01	-744	1.159×10^{3}	-4.52	6.54
background so2 slant column offset window2 [DU]	-0.501 ± 2.568	12956752	2.79	0.225	-19.2	14.8	-1.64	1.15
sulfurdioxide slant column density window3 [DU]	-9.28 ± 24.32	12956752	31.0	-9.61	-720	262	-24.8	6.21
sulfurdioxide slant column density window3 precision [DU]	27.3 ± 11.9	12956752	9.08	24.2	9.15	233	20.8	29.8
sulfurdioxide slant column density corrected win3 [DU]	-5.52 ± 23.33	12956752	29.7	-5.75	-725	258	-20.4	9.30
background so2 slant column offset window3 [DU]	3.76 ± 6.82	12956752	10.4	3.03	-31.7	27.3	-1.46	8.91
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.21	12956752	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.276 \pm 3.963) \times 10^{-2}$	12956752	1.296×10^{-2}	1.521×10^{-2}	3.963×10^{-4}	1.41	9.847×10^{-3}	2.280×10^{-2}
fitted radiance shift [nm]	$(-4.268 \pm 23.626) \times 10^{-4}$	12956752	1.786×10^{-3}	-3.828×10^{-4}	-5.378×10^{-2}	3.763×10^{-2}	-1.349×10^{-3}	4.370×10^{-4}
fitted radiance squeeze [1]	$(-1.644 \pm 17.501) \times 10^{-5}$	12956752	1.948×10^{-4}	-8.277×10^{-6}	-1.573×10^{-2}	2.642×10^{-2}	-1.080×10^{-4}	8.678×10^{-5}
fitted root mean square [1]	$(1.249 \pm 0.542) \times 10^{-3}$	12956752	5.310×10^{-4}	1.083×10^{-3}	3.260×10^{-4}	0.164	9.072×10^{-4}	1.438×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.847 ± 0.386	12956752	0.479	0.809	5.000×10^{-2}	2.89	0.583	1.06
sulfurdioxide total air mass factor polluted precision [1]	0.104 ± 0.098	12956752	9.973×10^{-2}	6.552×10^{-2}	2.894×10^{-3}	2.06	3.954×10^{-2}	0.139
sulfurdioxide clear air mass factor polluted [1]	0.724 ± 0.250	12956752	0.331	0.701	5.900×10^{-2}	2.72	0.552	0.884
number of spectral points in retrieval [1]	73.4 ± 0.5	12956752	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]	0.599 ± 0.405	3973660	0.810	0.490	0.0	1.000	0.190	1.000
sulfurdioxide total vertical column [DU]	$(6.092 \pm 182.795) \times 10^{-2}$	3973660	0.578	1.338×10^{-2}	-88.4	369	-0.267	0.311
sulfurdioxide total vertical column precision [DU]	0.836 ± 1.372	3973660	0.567	0.435	4.467×10^{-2}	38.9	0.257	0.823
sulfurdioxide slant column density corrected [DU]	$(2.514 \pm 46.636) \times 10^{-2}$	3973660	0.382	1.058×10^{-2}	-10.9	305	-0.178	0.204
sulfurdioxide slant column density cobra [DU]	$(2.468 \pm 41.496) \times 10^{-2}$	3973660	0.382	1.058×10^{-2}	-10.9	31.7	-0.178	0.204
sulfurdioxide slant column density cobra precision [DU]	0.316 ± 0.166	3973660	0.176	0.263	8.511×10^{-2}	37.4	0.209	0.385
sulfurdioxide slant column density window1 [DU]	0.184 ± 0.772	3973660	0.772	0.212	-61.2	118	-0.184	0.588
sulfurdioxide slant column density window1 precision [DU]	0.316 ± 0.166	3973660	0.176	0.263	8.511×10^{-2}	37.4	0.209	0.385
sulfurdioxide slant column density corrected win1 [DU]	$(5.978 \pm 75.661) \times 10^{-2}$	3973660	0.751	3.662×10^{-2}	-61.2	117	-0.333	0.418
background so2 slant column offset window1 [DU]	-0.124 ± 0.221	3973660	0.219	-0.184	-1.05	3.62	-0.268	-4.944×10^{-2}
sulfurdioxide slant column density window2 [DU]	2.31 ± 9.46	3973660	12.0	2.10	-1.092×10^{3}	857	-3.79	8.21
sulfurdioxide slant column density window2 precision [DU]	8.29 ± 2.42	3973660	2.54	7.99	2.36	753	6.83	9.37
sulfurdioxide slant column density corrected win2 [DU]	0.976 ± 8.963	3973660	11.3	0.998	-1.091×10^{3}	857	-4.67	6.64
background so2 slant column offset window2 [DU]	-1.34 ± 3.27	3973660	4.68	-6.575×10^{-2}	-19.2	12.2	-3.59	1.09
sulfurdioxide slant column density window3 [DU]	-18.7 ± 22.9	3973660	28.7	-18.4	-402	617	-32.9	-4.21
sulfurdioxide slant column density window3 precision [DU]	30.0 ± 15.5	3973660	10.7	25.6	9.76	252	21.5	32.2
sulfurdioxide slant column density corrected win3 [DU]	-13.0 ± 23.1	3973660	29.0	-12.5	-406	619	-27.2	1.76
background so2 slant column offset window3 [DU]	5.70 ± 7.54	3973660	12.4	5.75	-31.7	28.3	-0.579	11.9
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.18	3973660	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(5.611 \pm 12.477) \times 10^{-2}$	3973660	4.580×10^{-2}	1.866×10^{-2}	2.387×10^{-4}	2.28	5.701×10^{-3}	5.150×10^{-2}
fitted radiance shift [nm]	$(-3.529 \pm 31.507) \times 10^{-4}$	3973660	1.999×10^{-3}	-3.642×10^{-4}	-8.740×10^{-2}	0.110	-1.391×10^{-3}	6.081×10^{-4}
fitted radiance squeeze [1]	$(-5.681 \pm 21.536) \times 10^{-5}$	3973660	2.227×10^{-4}	-3.414×10^{-5}	-1.405×10^{-2}	8.996×10^{-2}	-1.532×10^{-4}	6.949×10^{-5}
fitted root mean square [1]	$(1.364 \pm 0.666) \times 10^{-3}$	3973660	6.490×10^{-4}	1.166×10^{-3}	3.339×10^{-4}	0.105	9.475×10^{-4}	1.597×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.754 ± 0.488	3973660	0.628	0.626	5.000×10^{-2}	2.80	0.406	1.03
sulfurdioxide total air mass factor polluted precision [1]	0.121 ± 0.160	3973660	0.132	5.334×10^{-2}	2.827×10^{-3}	1.82	2.600×10^{-2}	0.158
sulfurdioxide clear air mass factor polluted [1]	0.633 ± 0.332	3973660	0.437	0.562	5.004×10^{-2}	2.30	0.385	0.822
number of spectral points in retrieval [1]	73.4 ± 0.5	3973660	1.000	73.0	52.0	74.0	73.0	74.0

3 Granule outlines

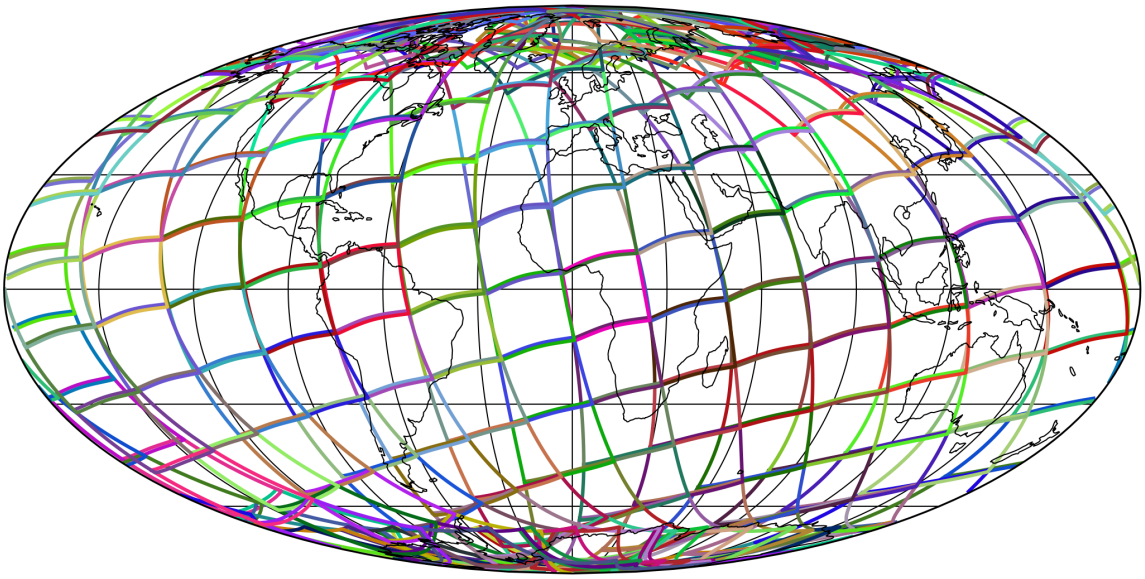

Figure 1: Outline of the granules.

4 Input data monitoring

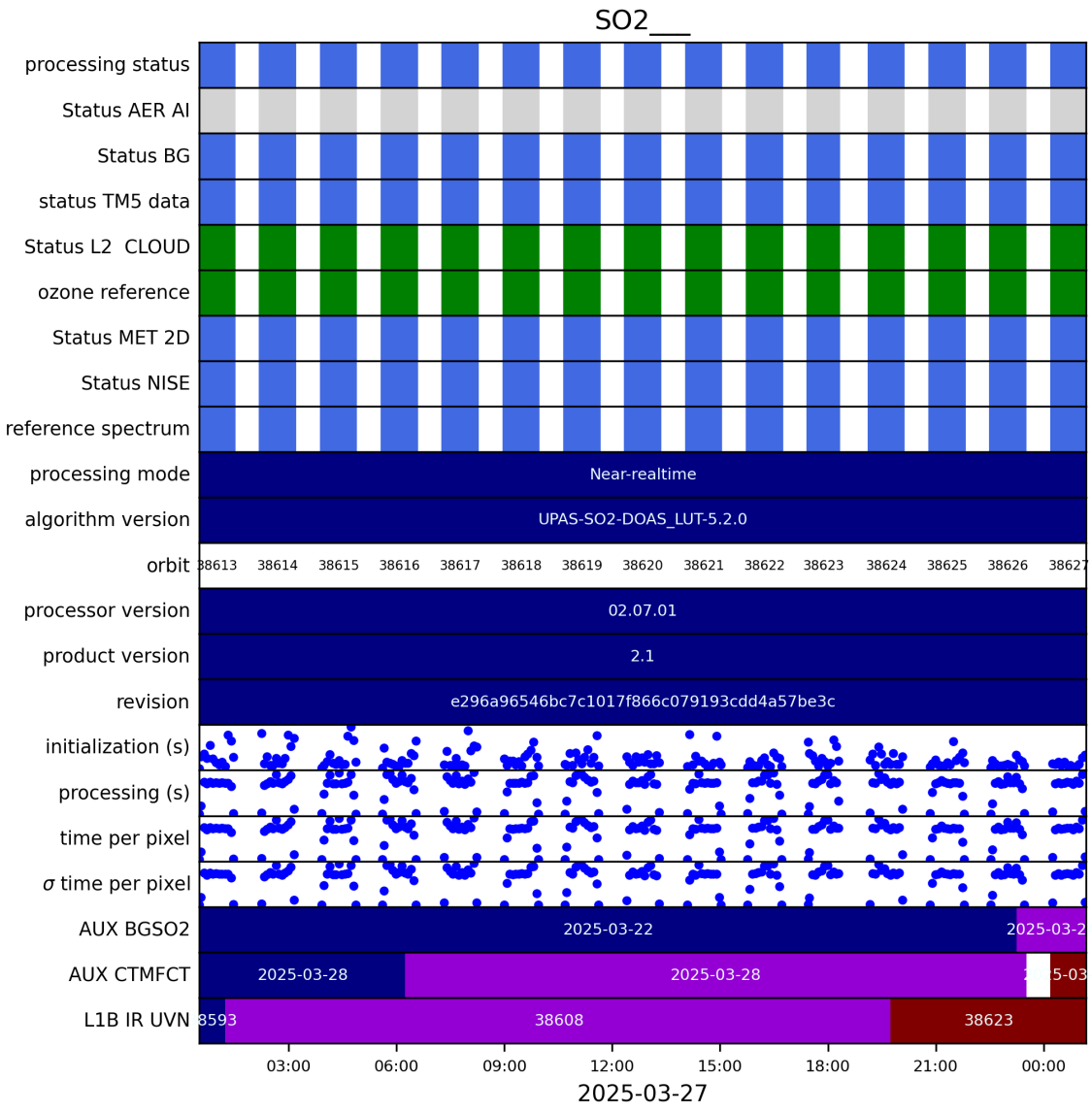

Figure 2: Input data per granule

5 Warnings and errors

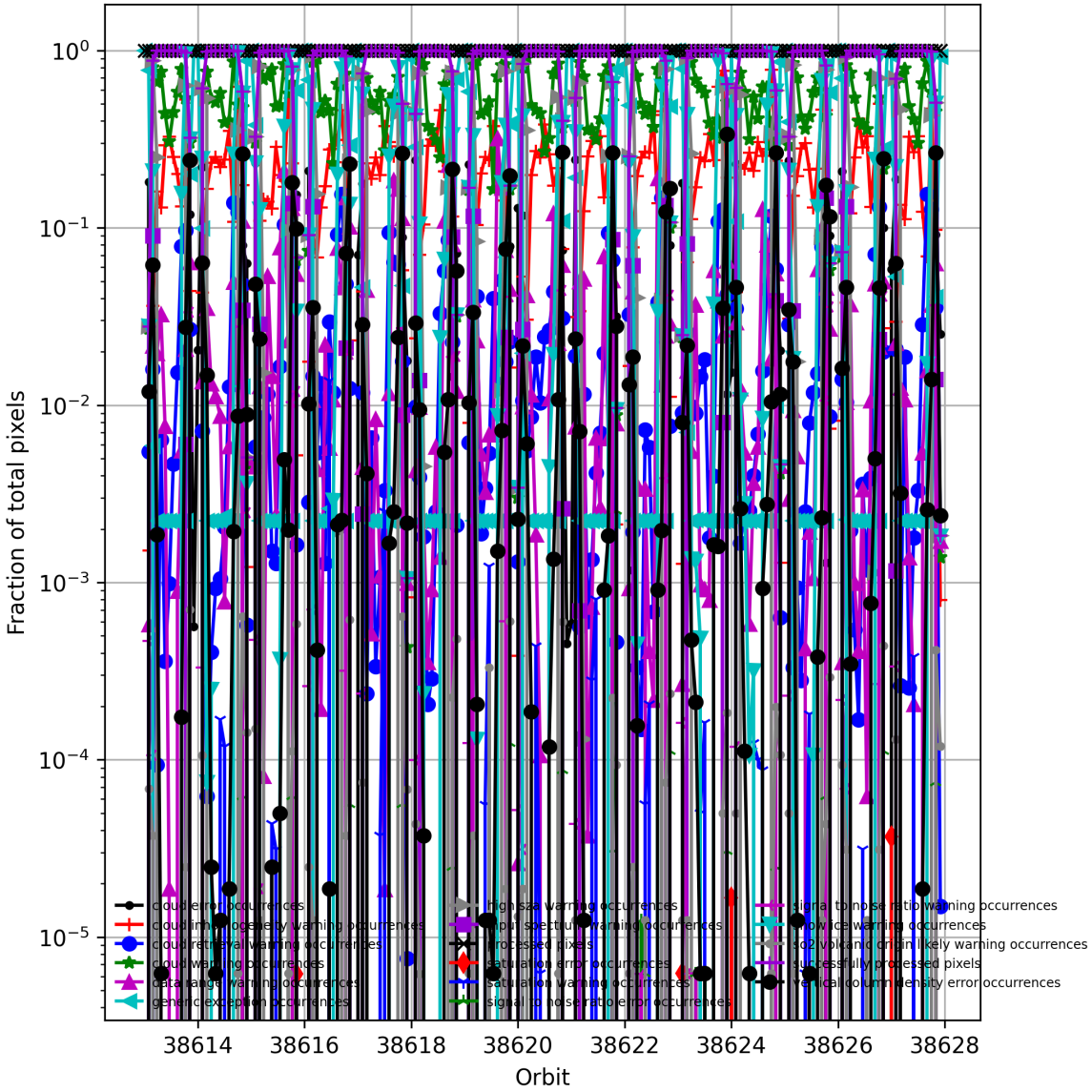

Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

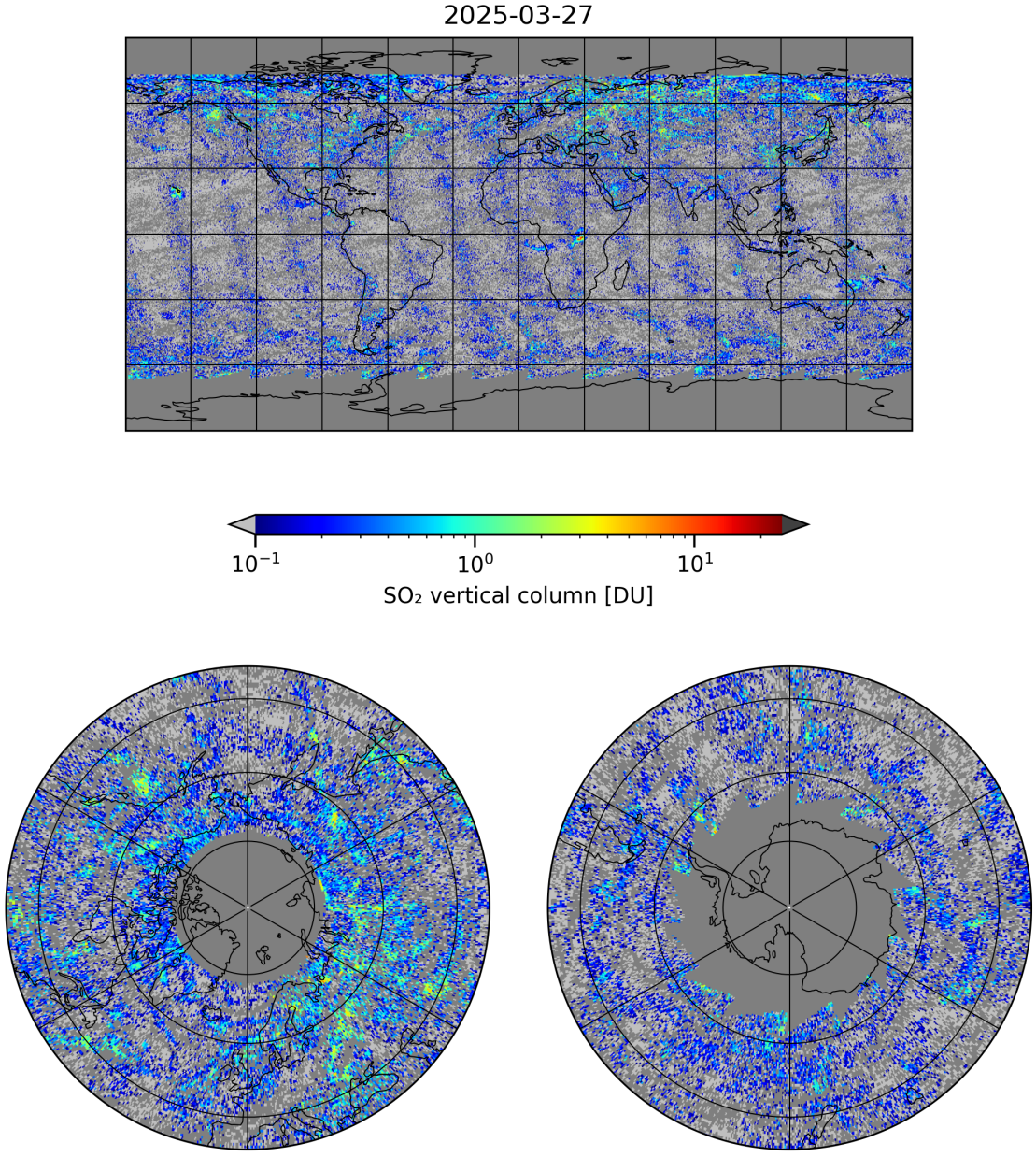

Figure 4: Map of "SO_2 vertical column" for 2025-03-27 to 2025-03-28

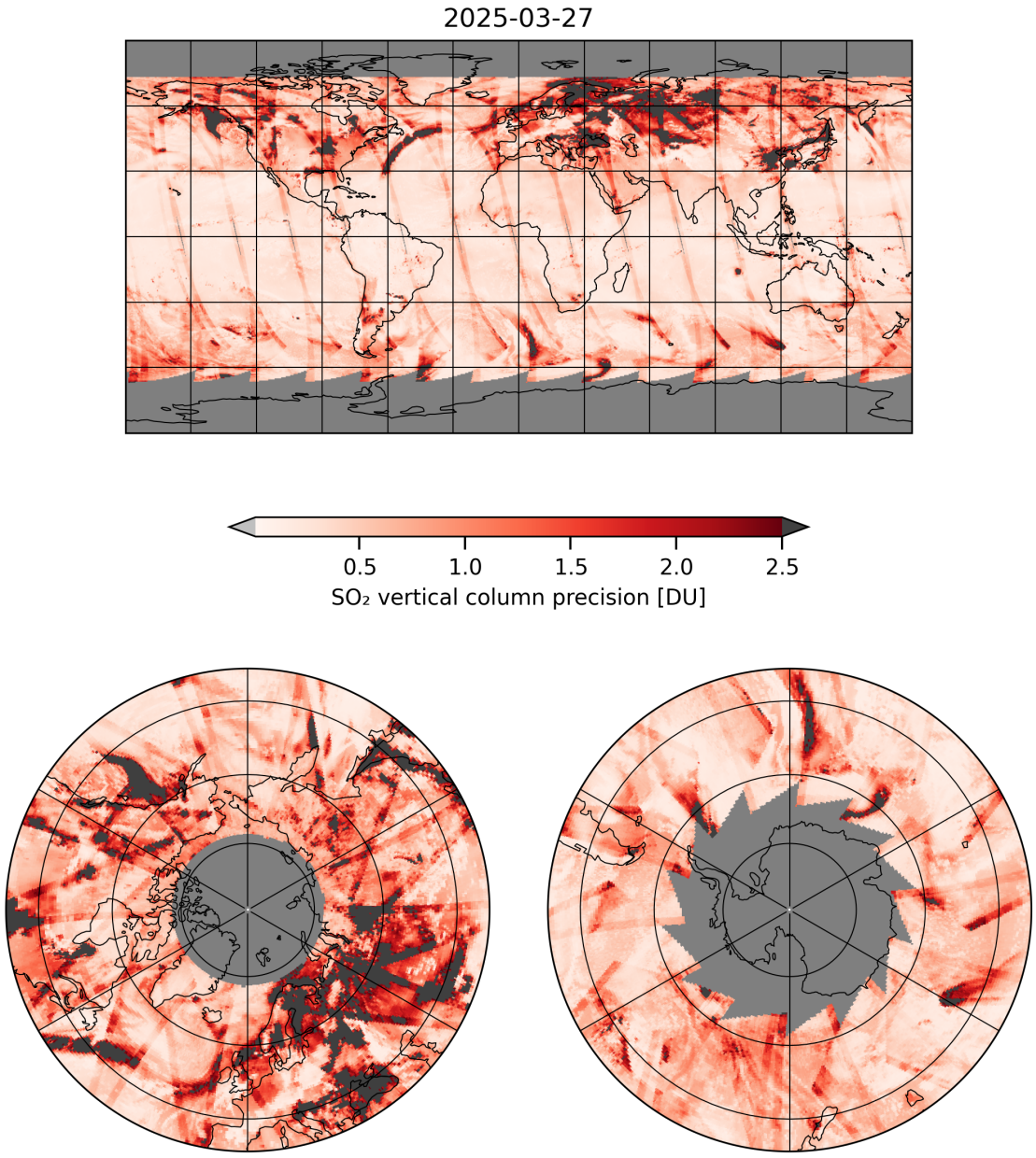

Figure 5: Map of "SO_2 vertical column precision" for 2025-03-27 to 2025-03-28

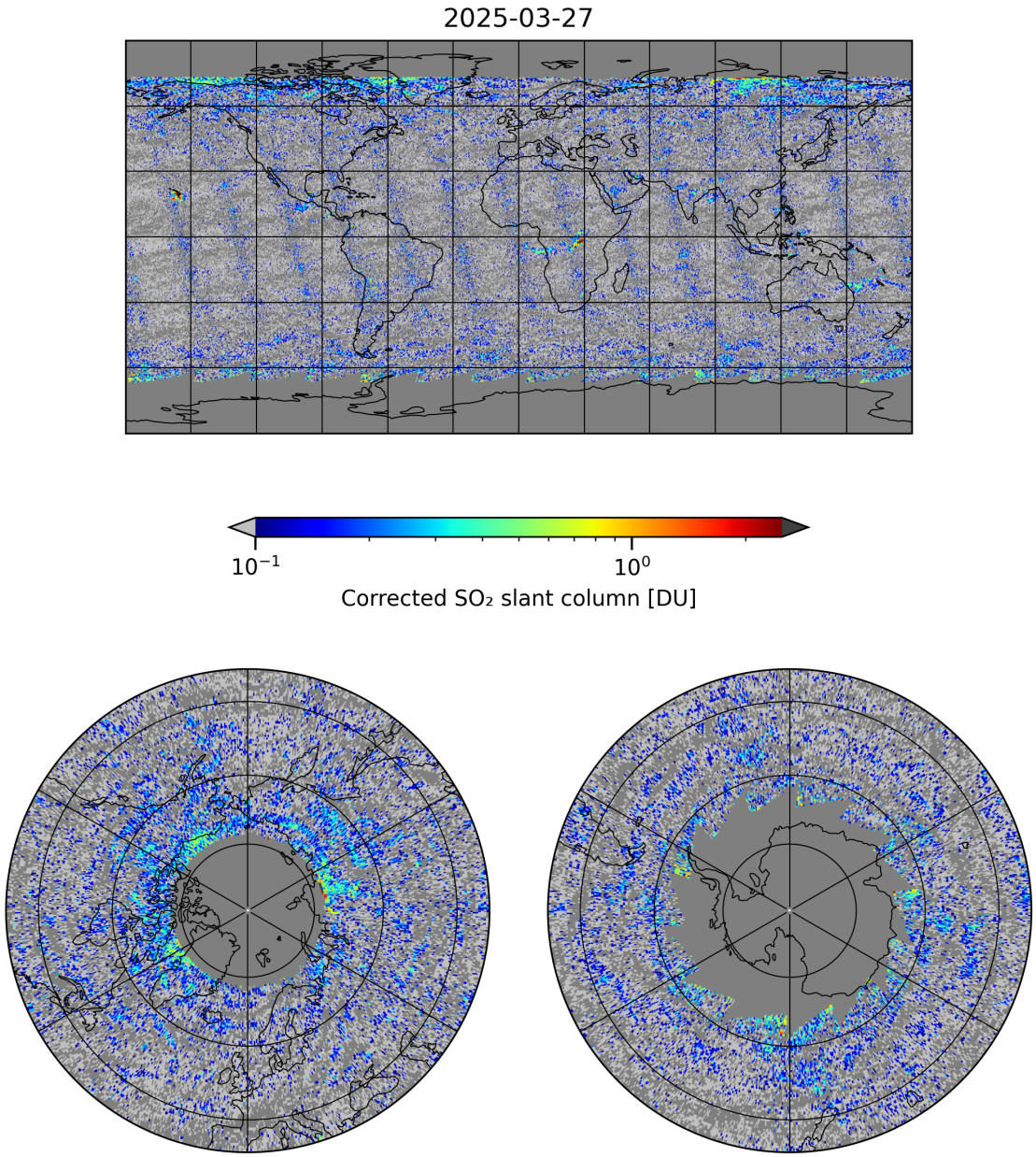

Figure 6: Map of “Corrected SO_2 slant column” for 2025-03-27 to 2025-03-28

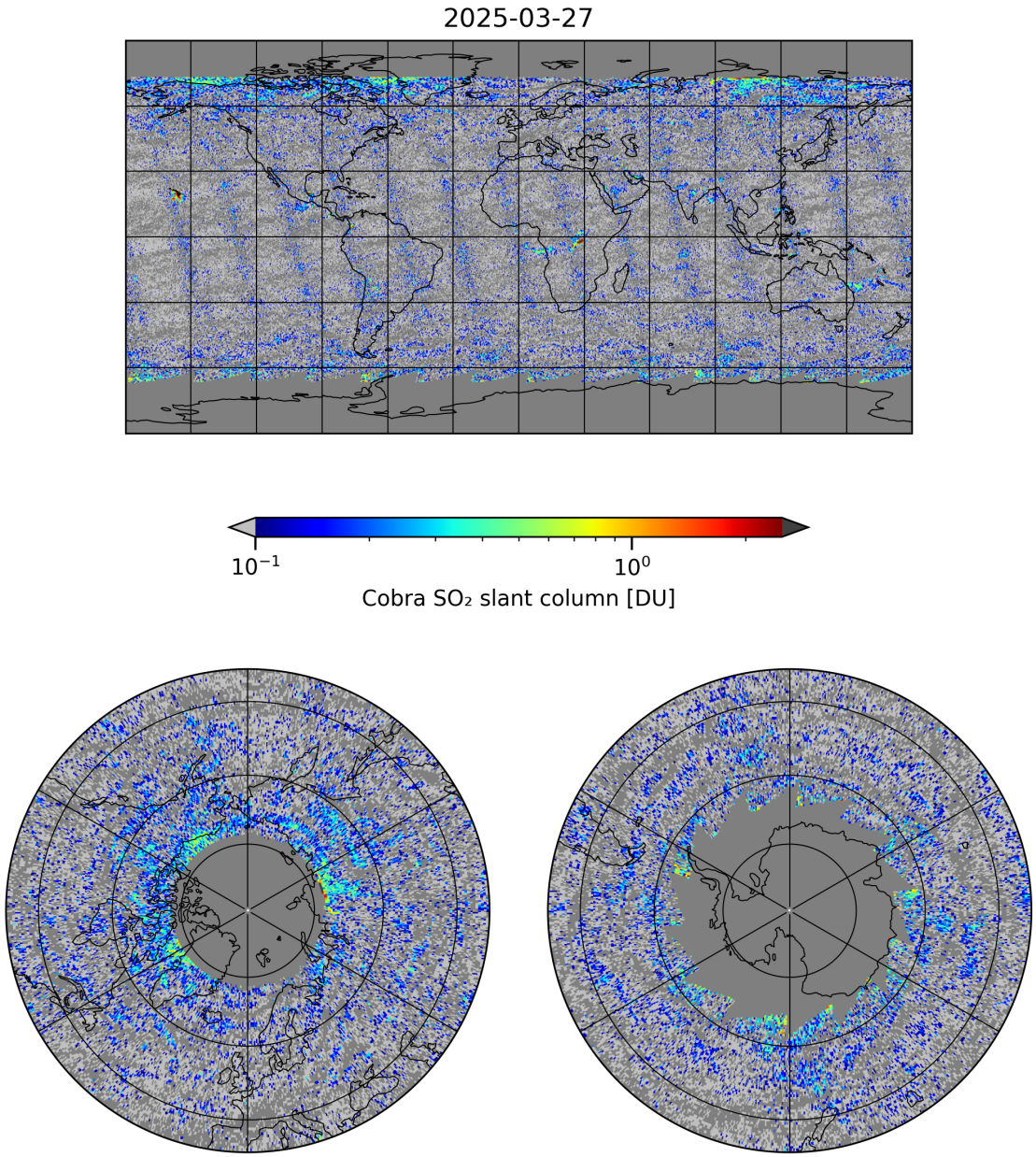

Figure 7: Map of "Cobra SO_2 slant column" for 2025-03-27 to 2025-03-28

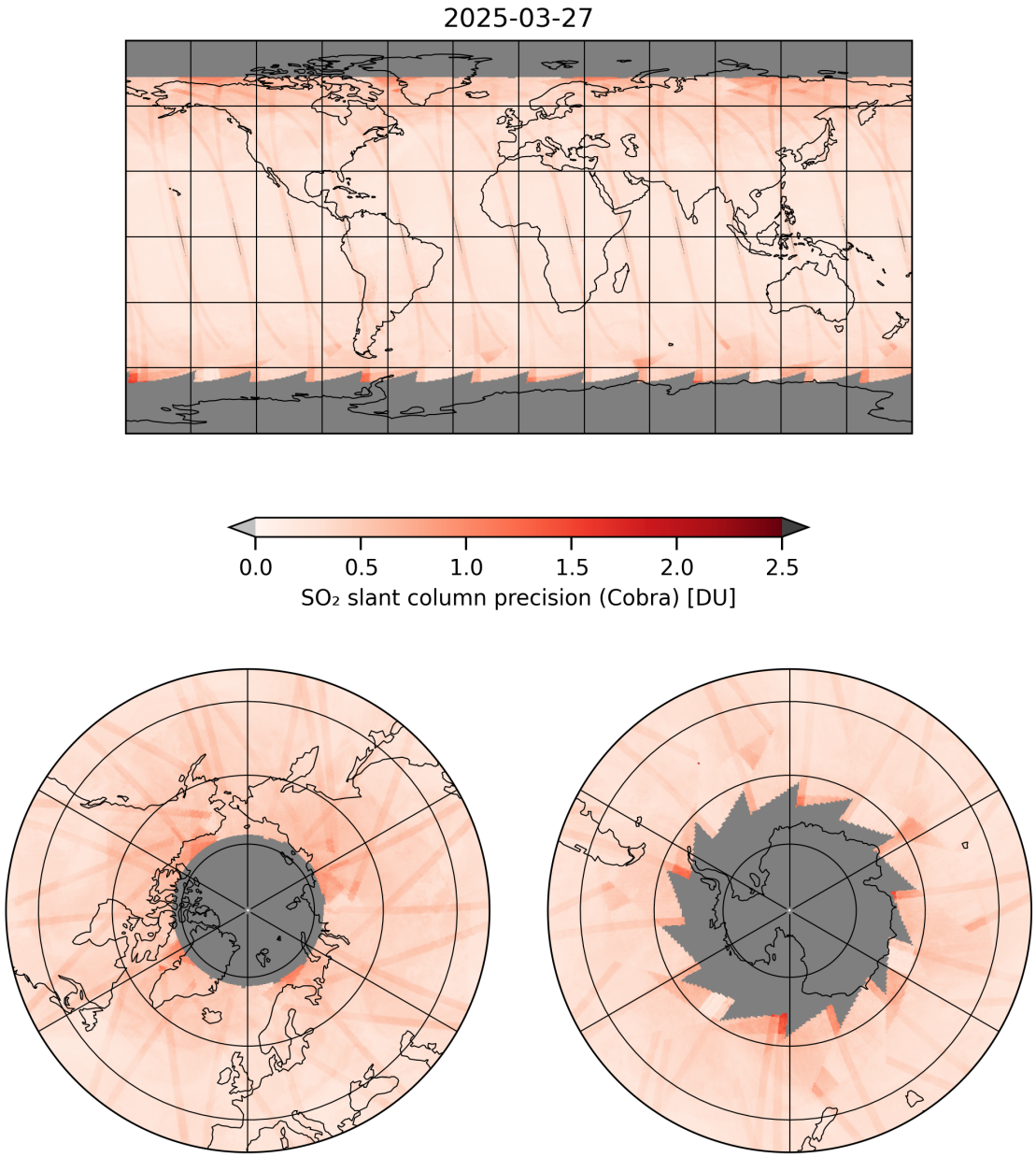

Figure 8: Map of "SO_2 slant column precision (Cobra)" for 2025-03-27 to 2025-03-28

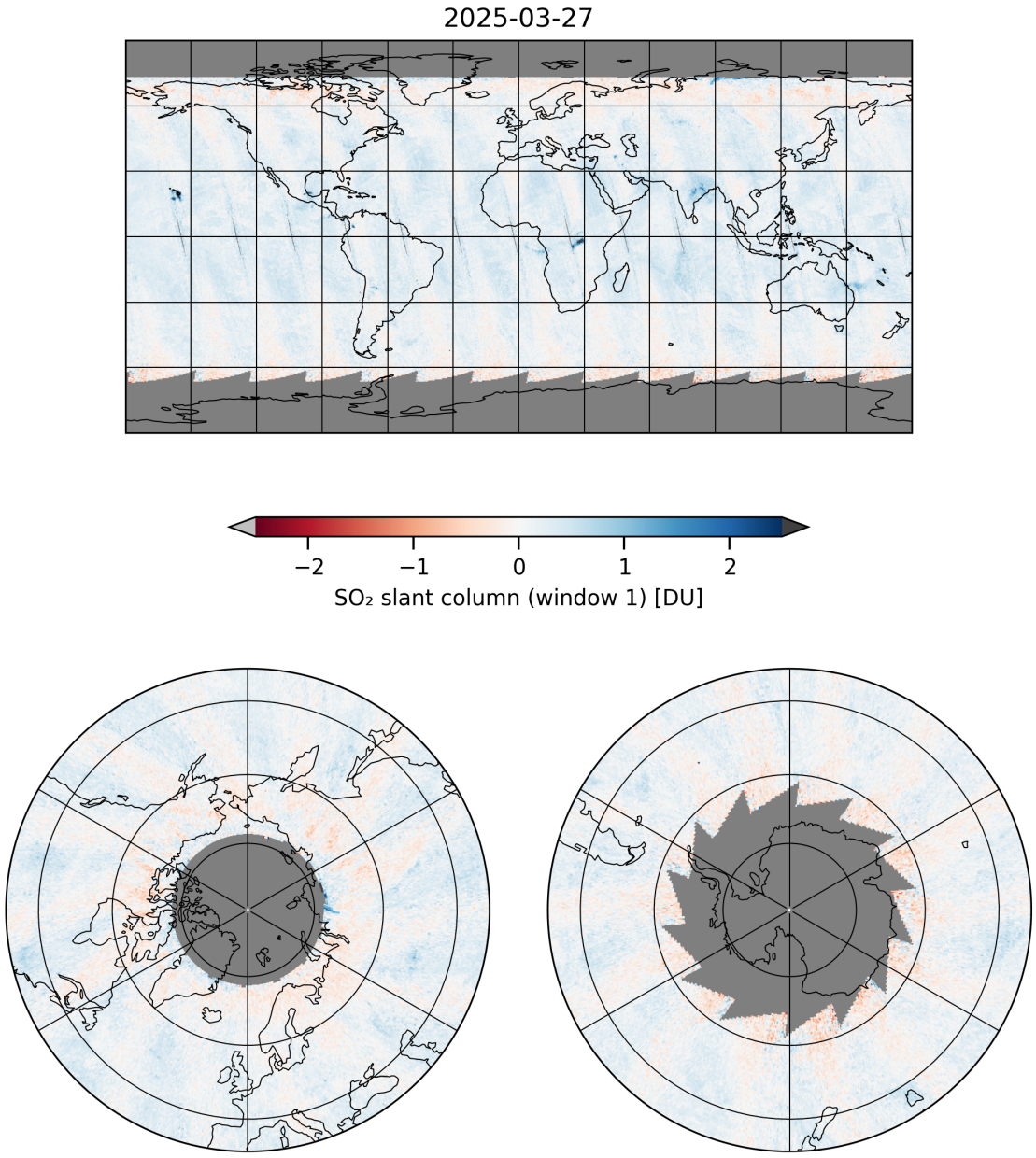

Figure 9: Map of "SO_2 slant column (window 1)" for 2025-03-27 to 2025-03-28

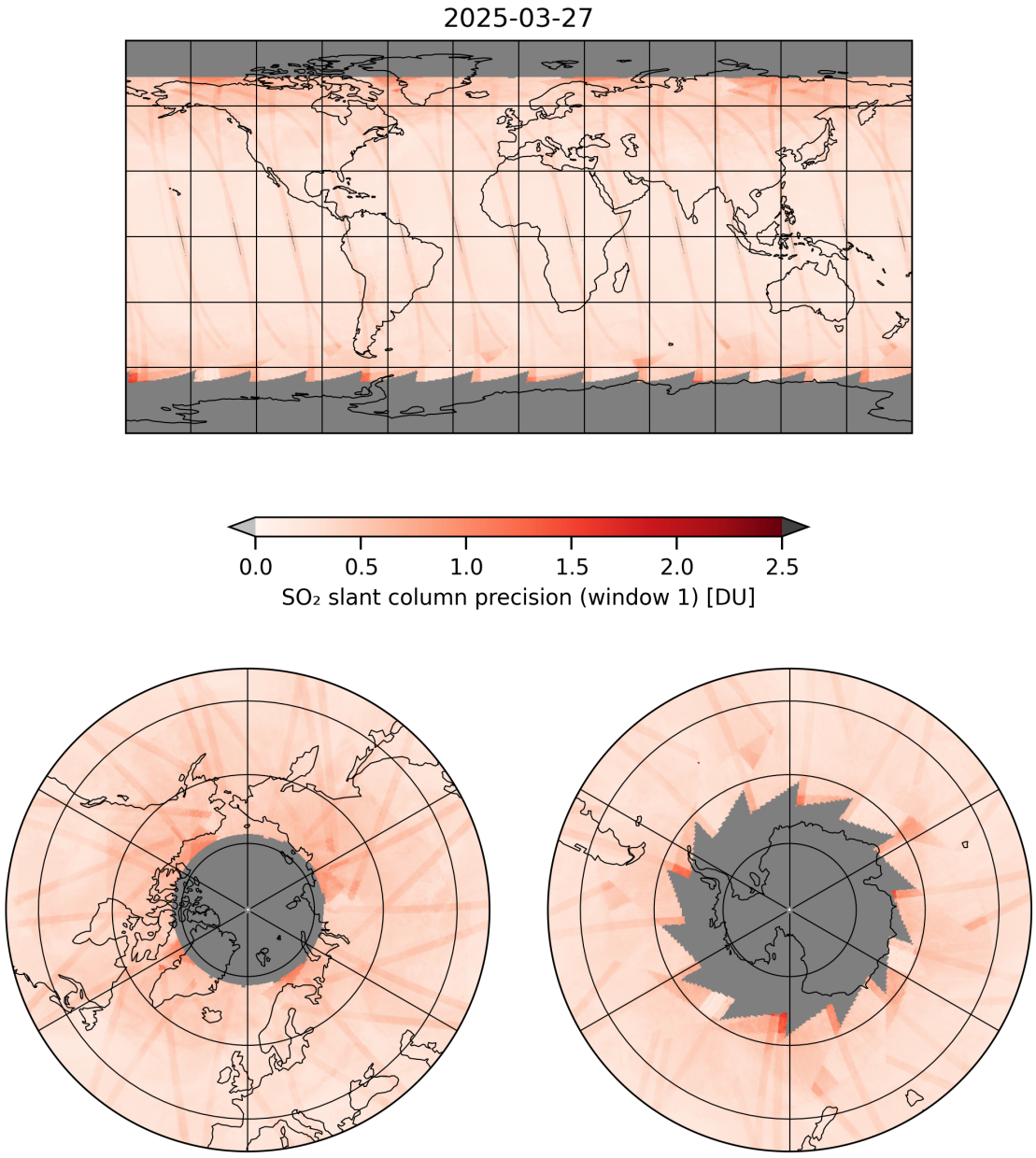

Figure 10: Map of "SO_2 slant column precision (window 1)" for 2025-03-27 to 2025-03-28

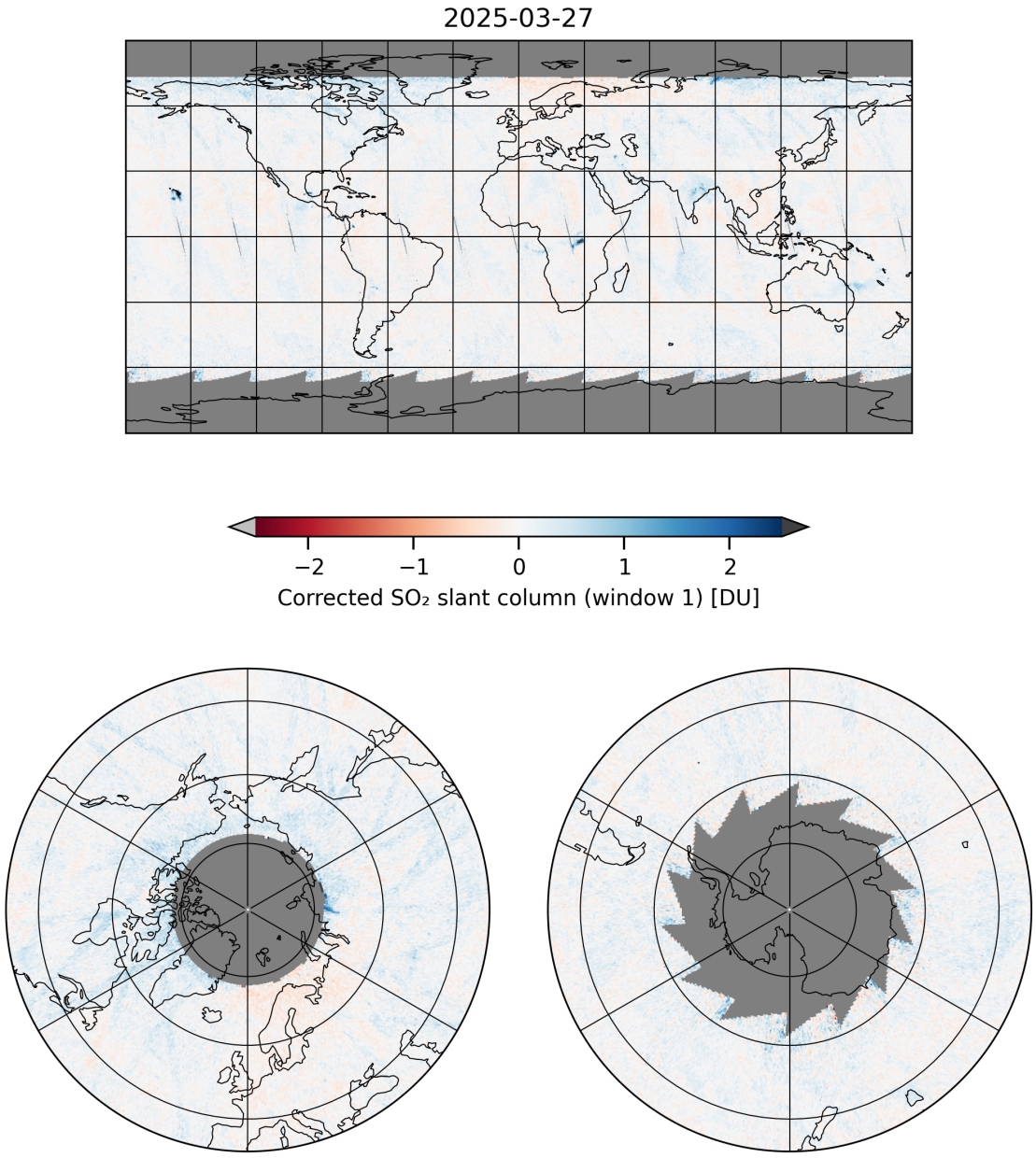

Figure 11: Map of "Corrected SO_2 slant column (window 1)" for 2025-03-27 to 2025-03-28

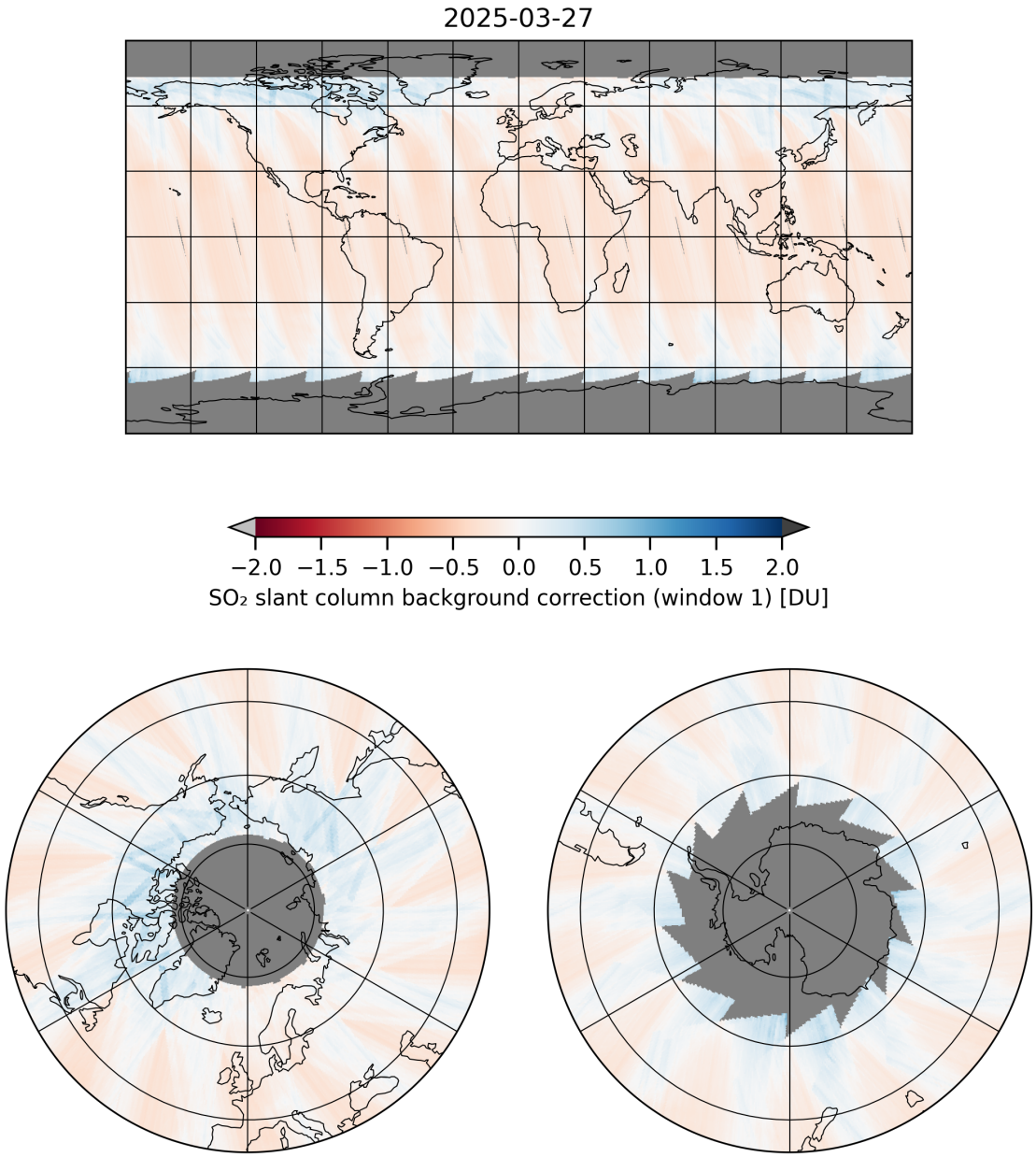

Figure 12: Map of "SO_2 slant column background correction (window 1)" for 2025-03-27 to 2025-03-28

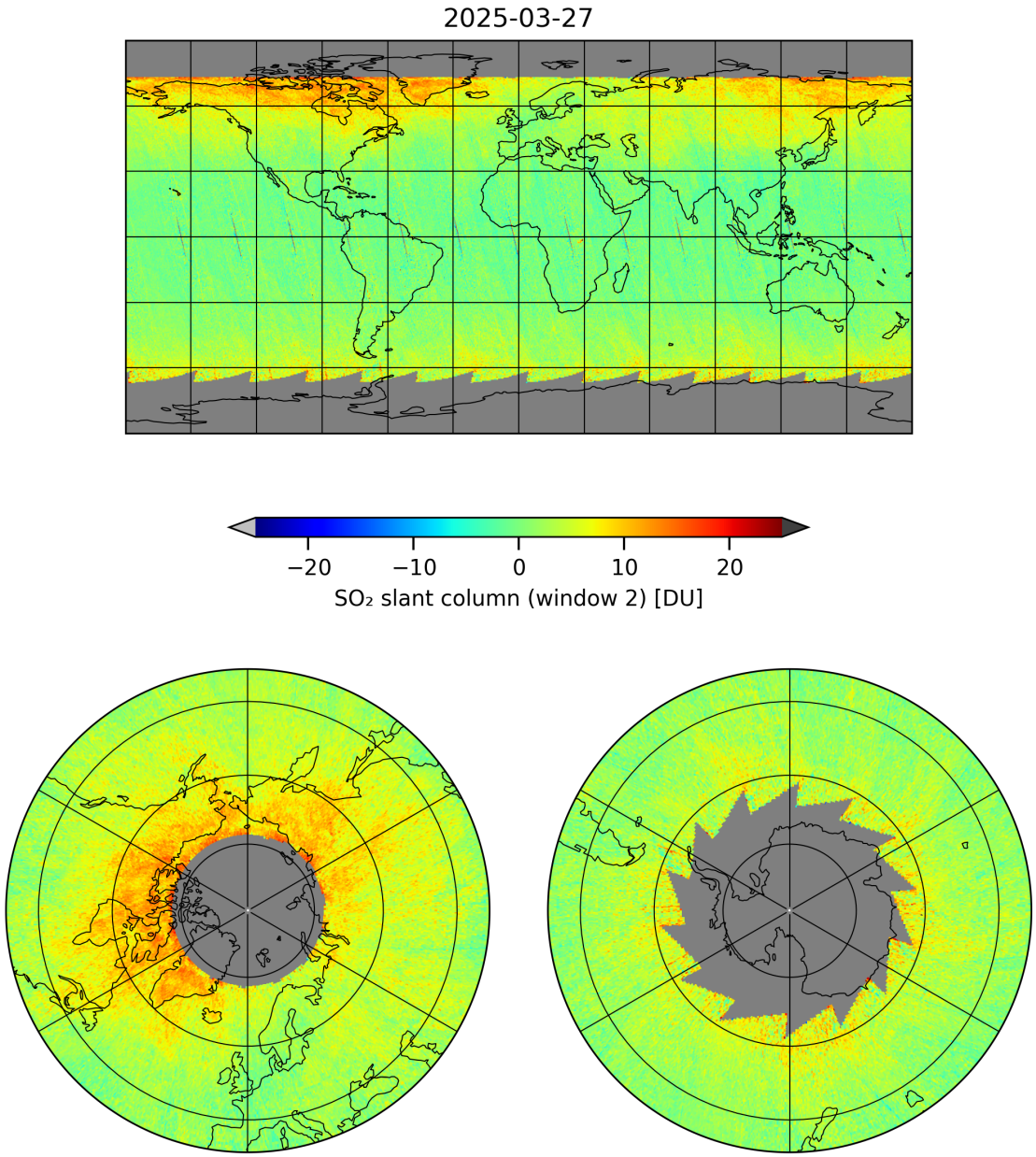

Figure 13: Map of "SO_2 slant column (window 2)" for 2025-03-27 to 2025-03-28

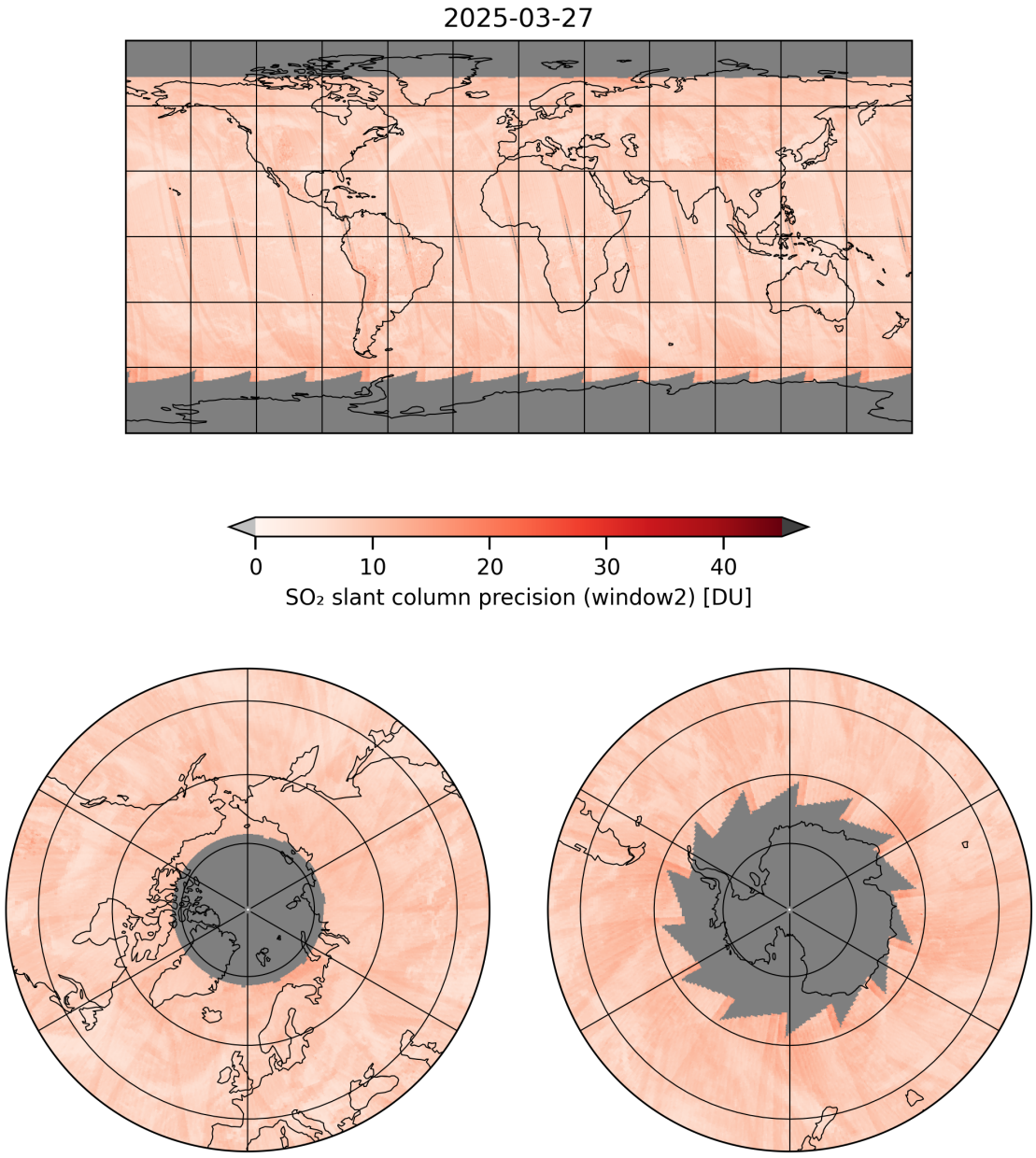

Figure 14: Map of "SO_2 slant column precision (window2)" for 2025-03-27 to 2025-03-28

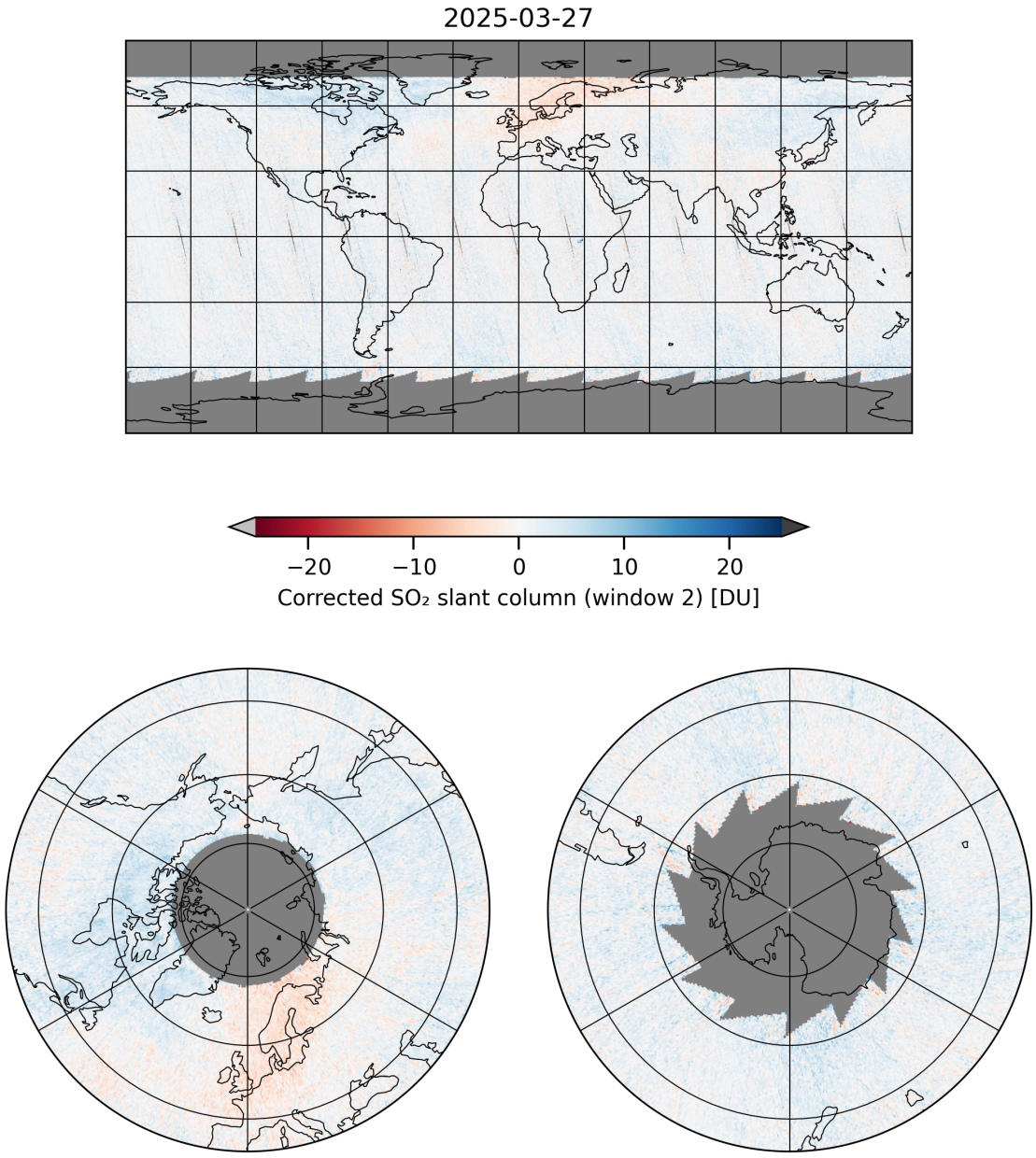

Figure 15: Map of "Corrected SO_2 slant column (window 2)" for 2025-03-27 to 2025-03-28

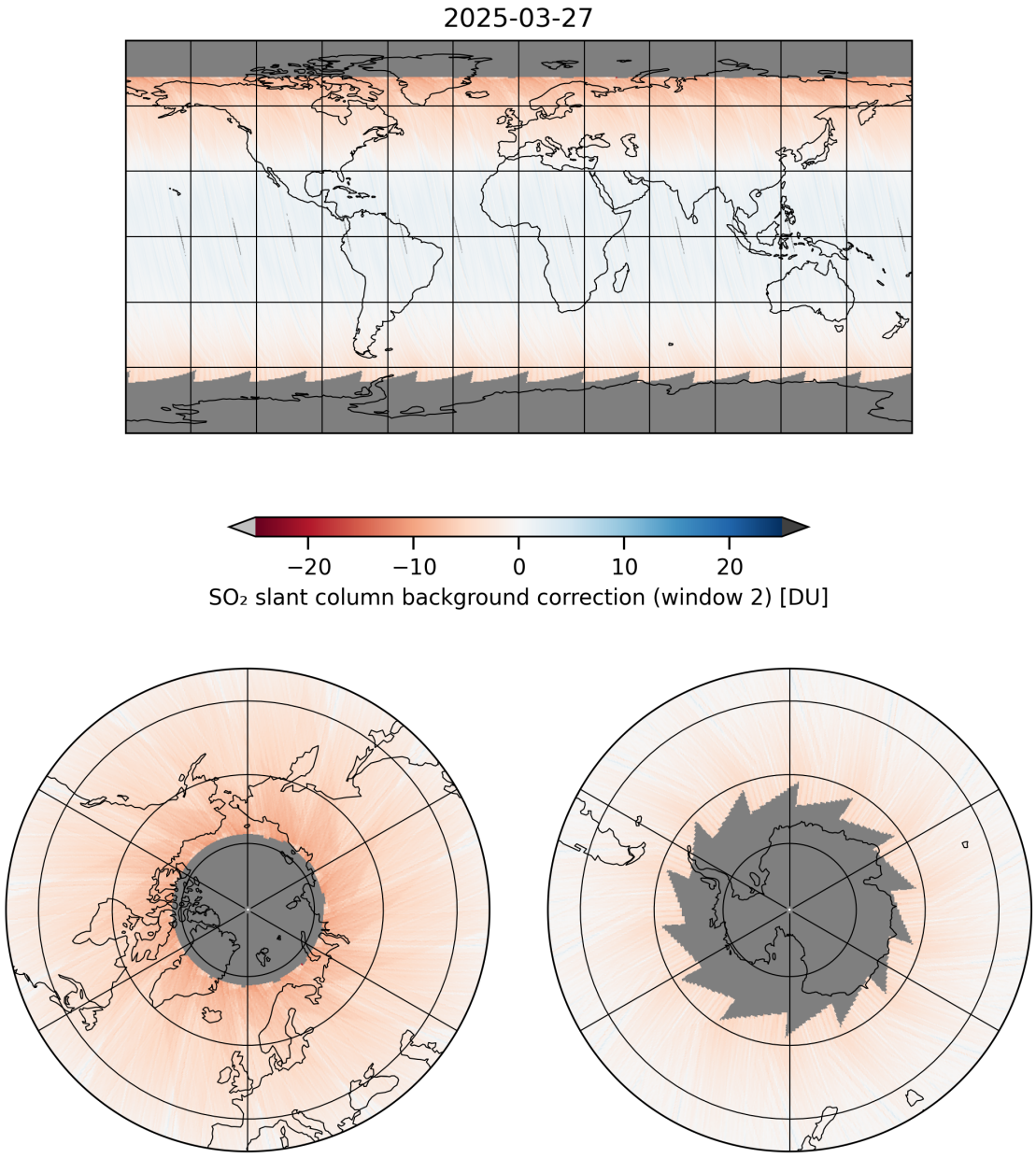

Figure 16: Map of "SO_2 slant column background correction (window 2)" for 2025-03-27 to 2025-03-28

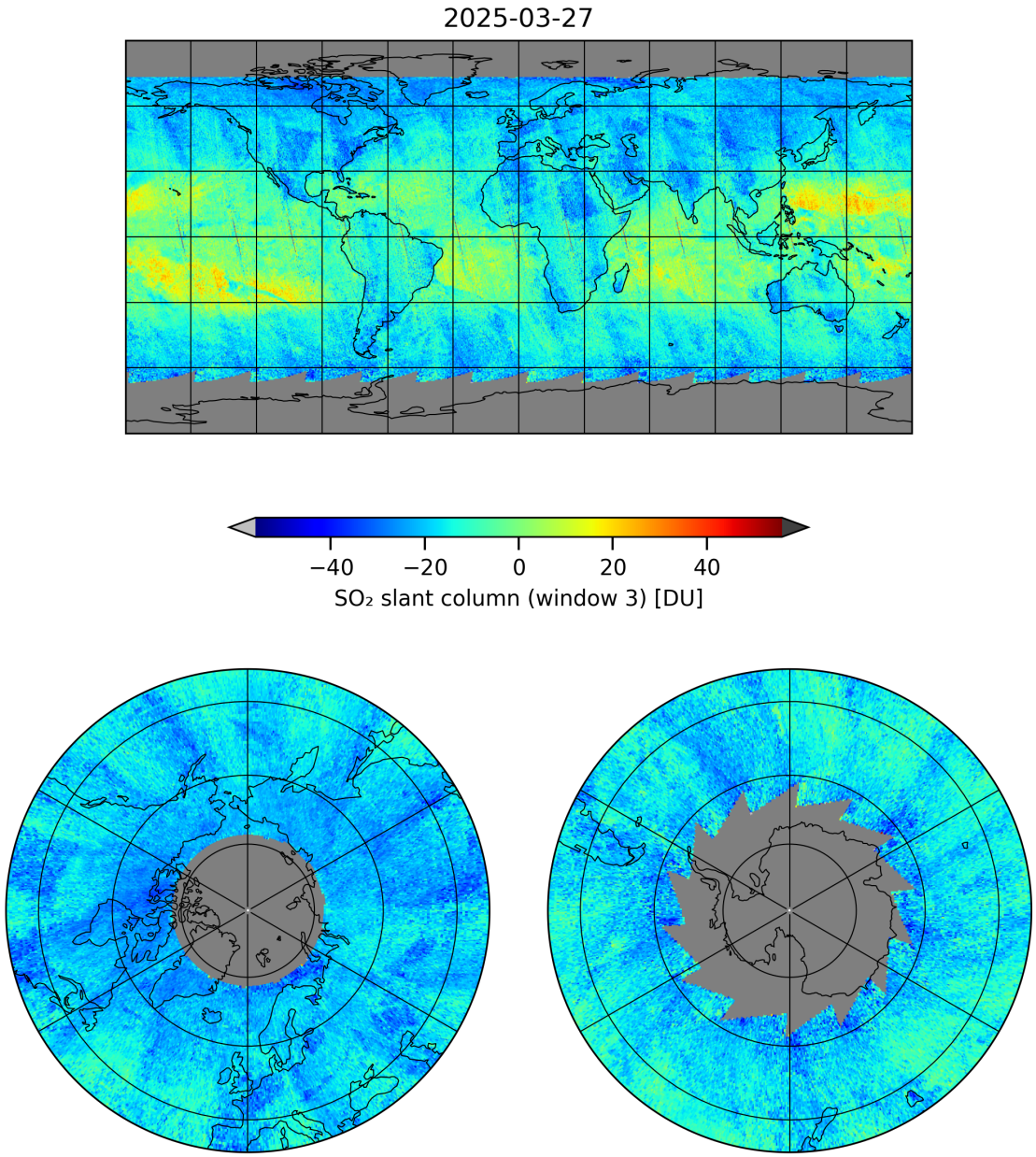

Figure 17: Map of "SO_2 slant column (window 3)" for 2025-03-27 to 2025-03-28

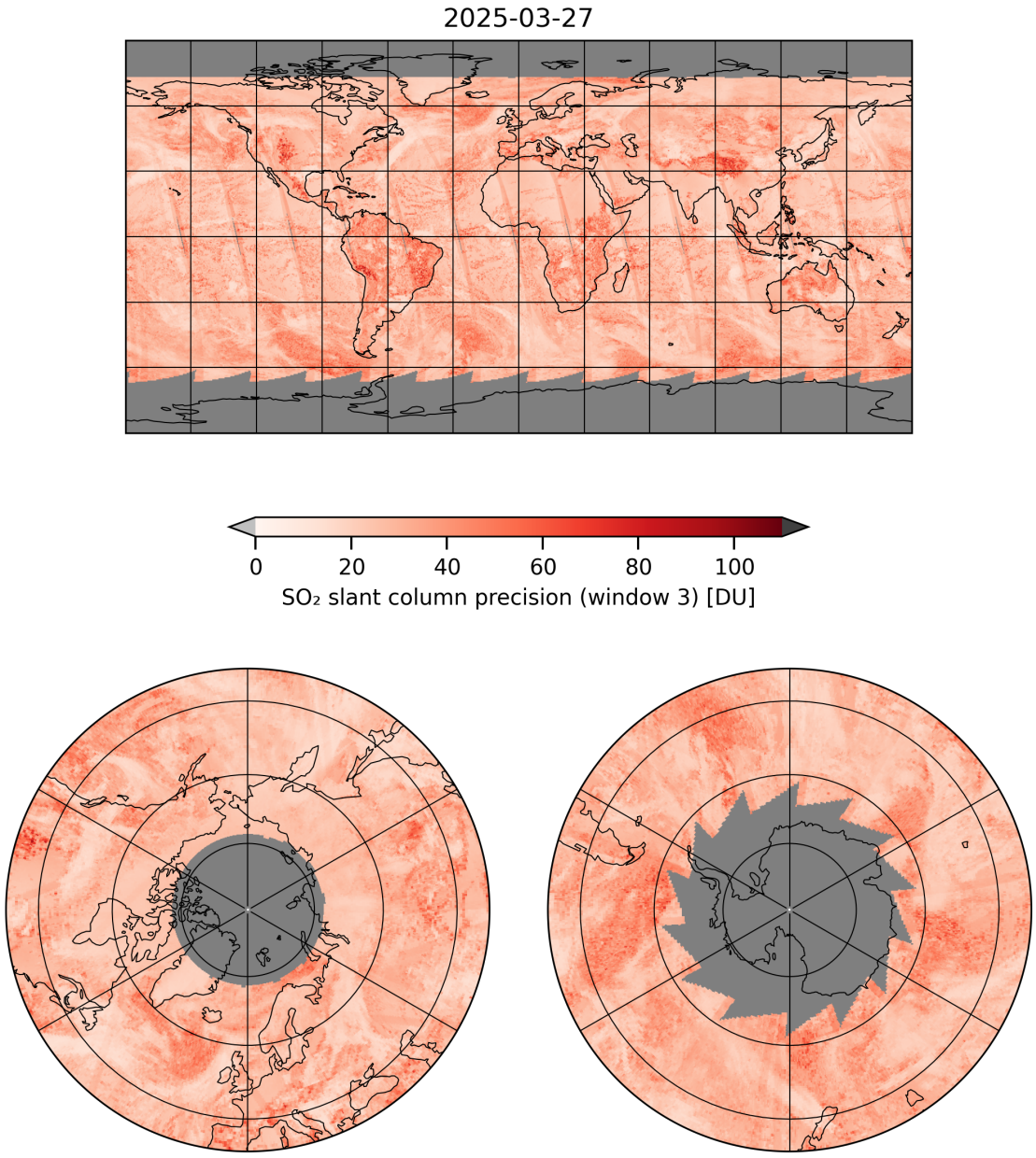

Figure 18: Map of "SO_2 slant column precision (window 3)" for 2025-03-27 to 2025-03-28

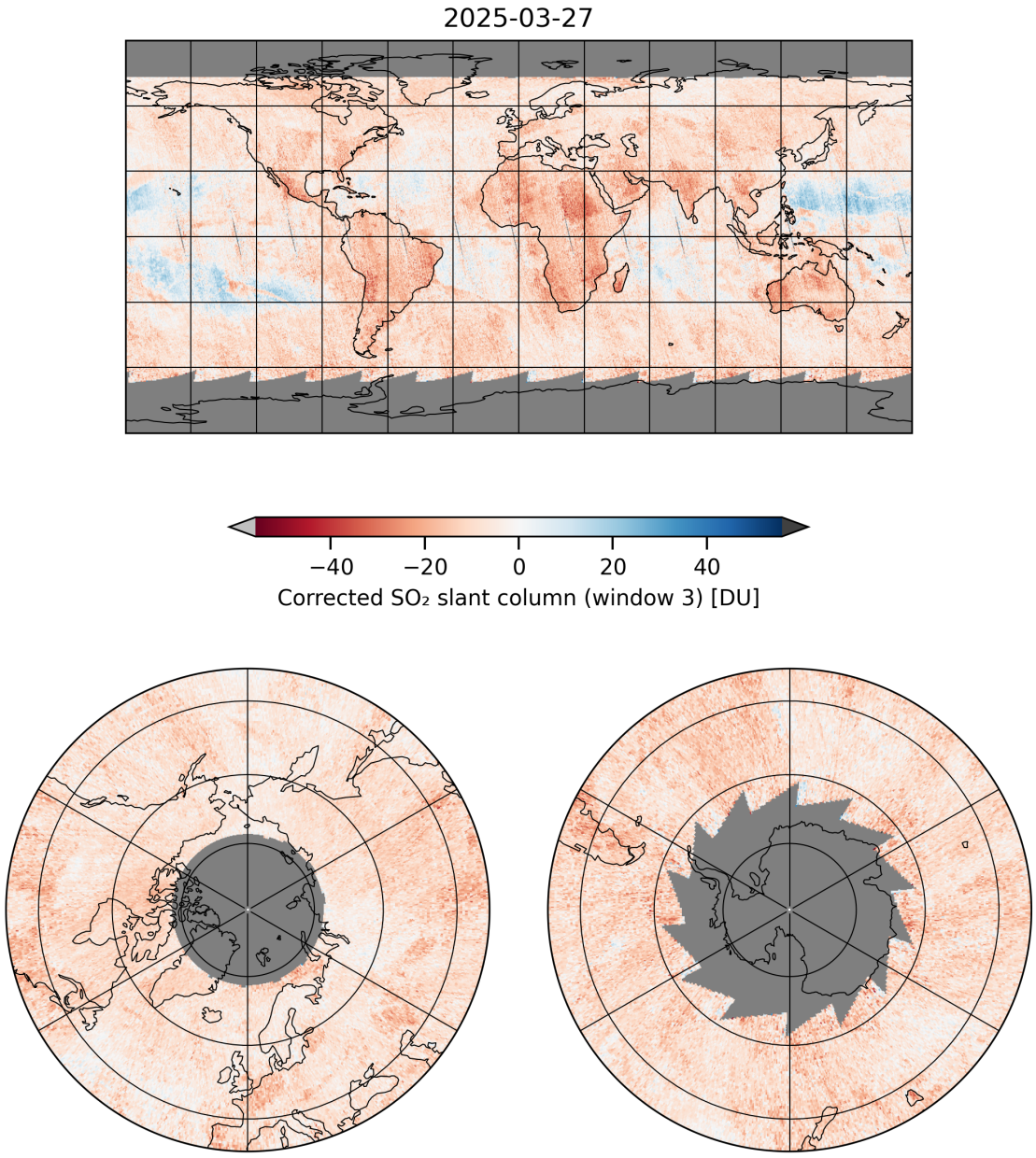

Figure 19: Map of "Corrected SO_2 slant column (window 3)" for 2025-03-27 to 2025-03-28

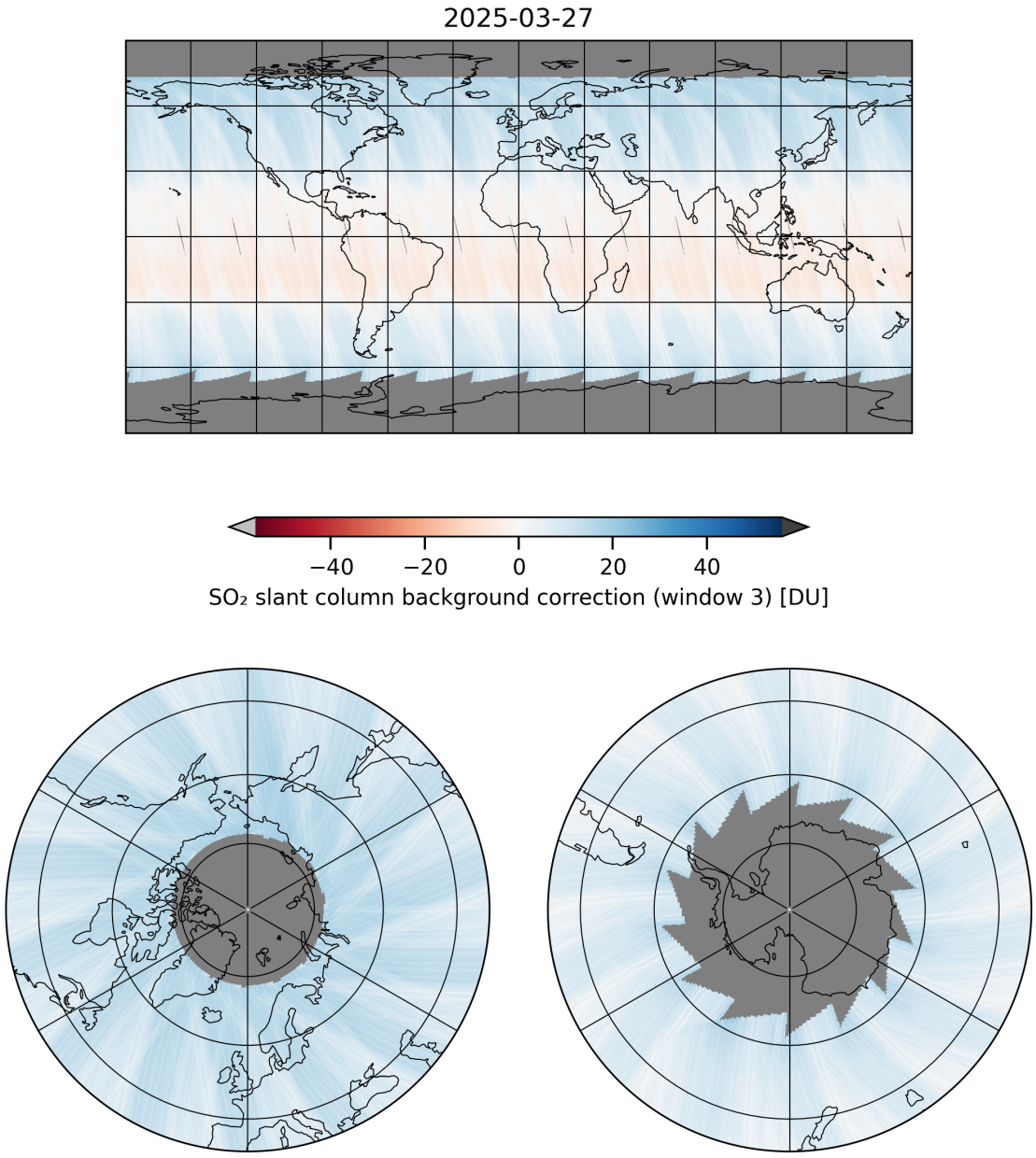

Figure 20: Map of "SO_2 slant column background correction (window 3)" for 2025-03-27 to 2025-03-28

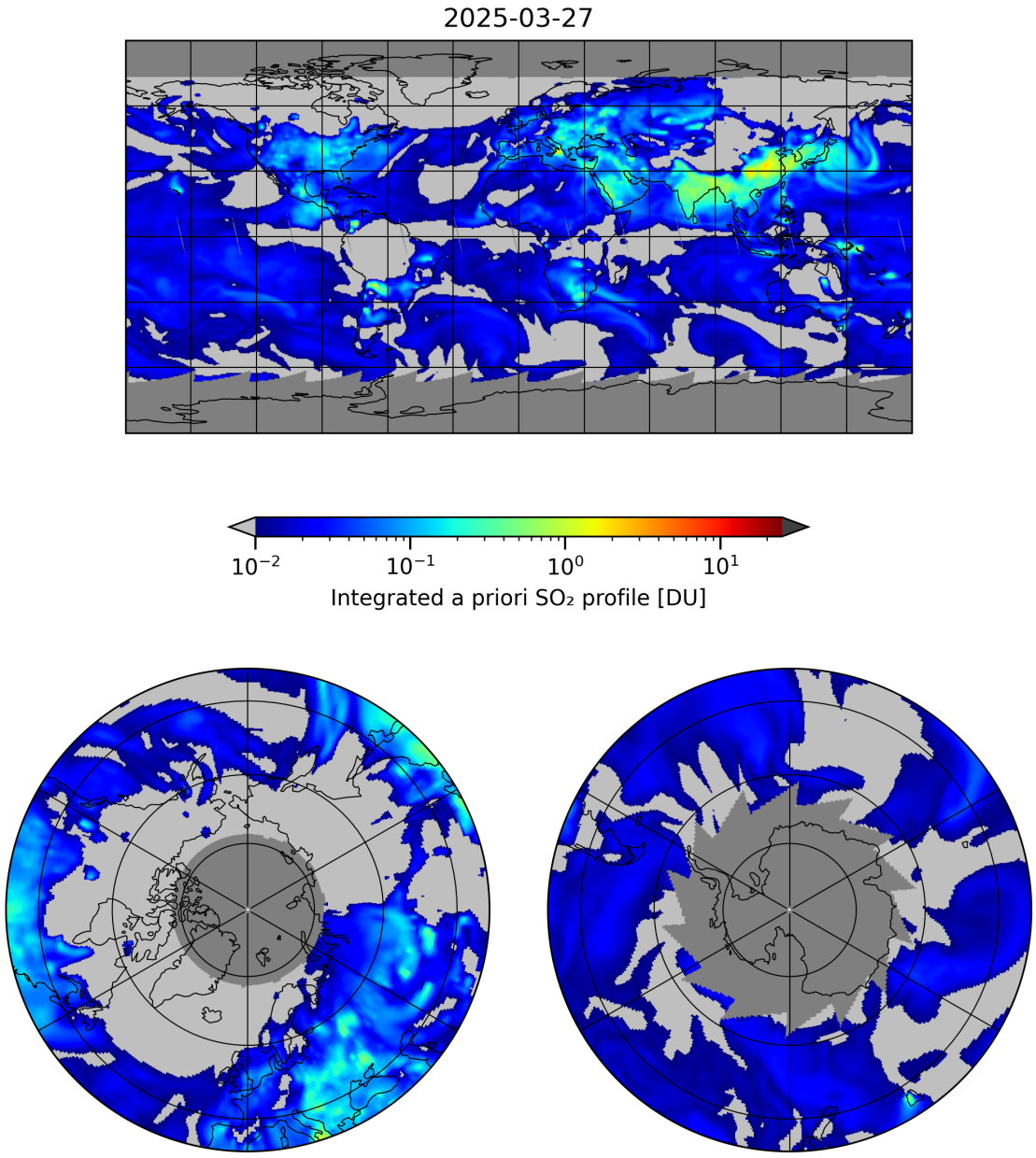

Figure 21: Map of “Integrated a priori SO_2 profile” for 2025-03-27 to 2025-03-28

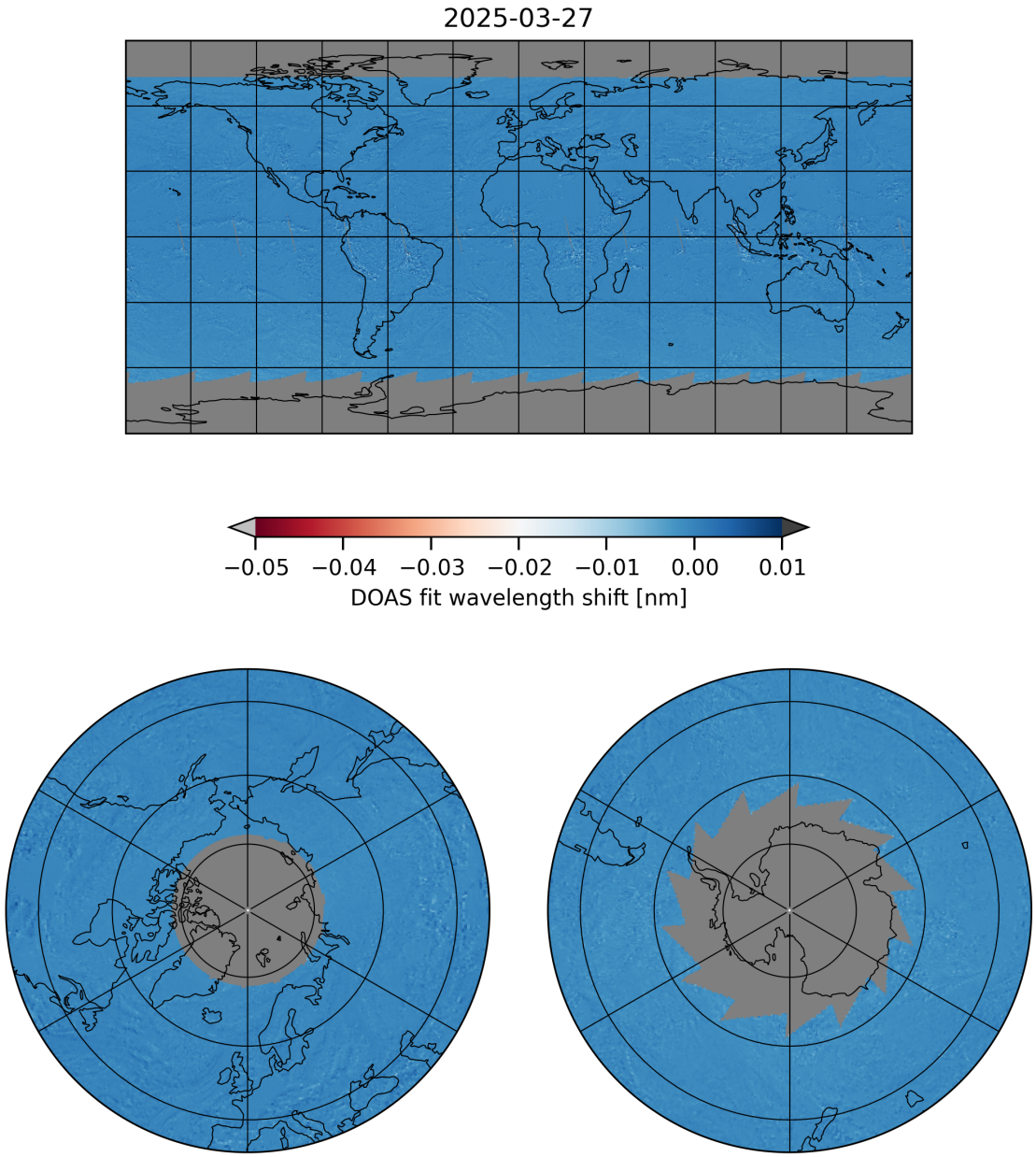

Figure 22: Map of “DOAS fit wavelength shift” for 2025-03-27 to 2025-03-28

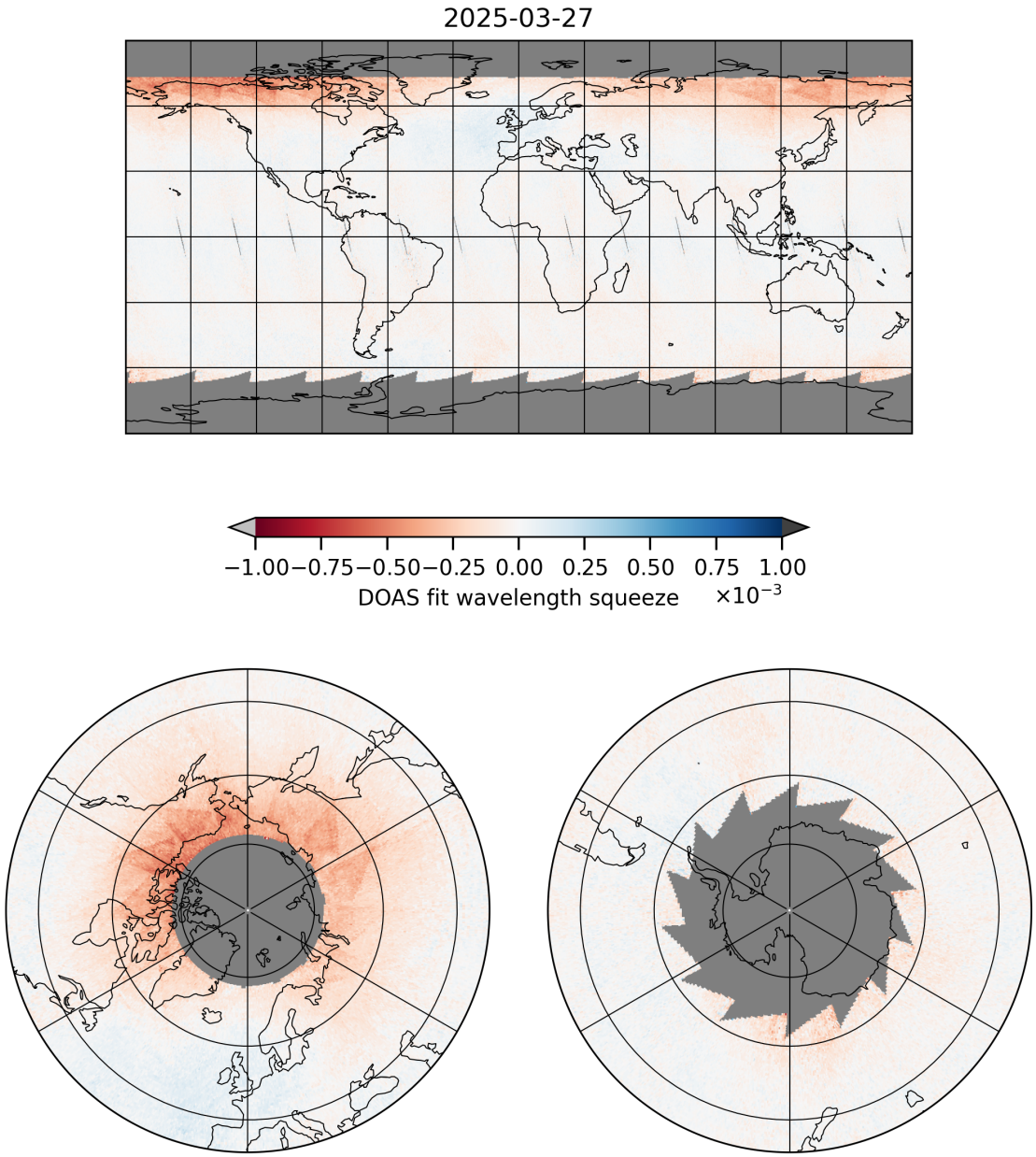

Figure 23: Map of “DOAS fit wavelength squeeze” for 2025-03-27 to 2025-03-28

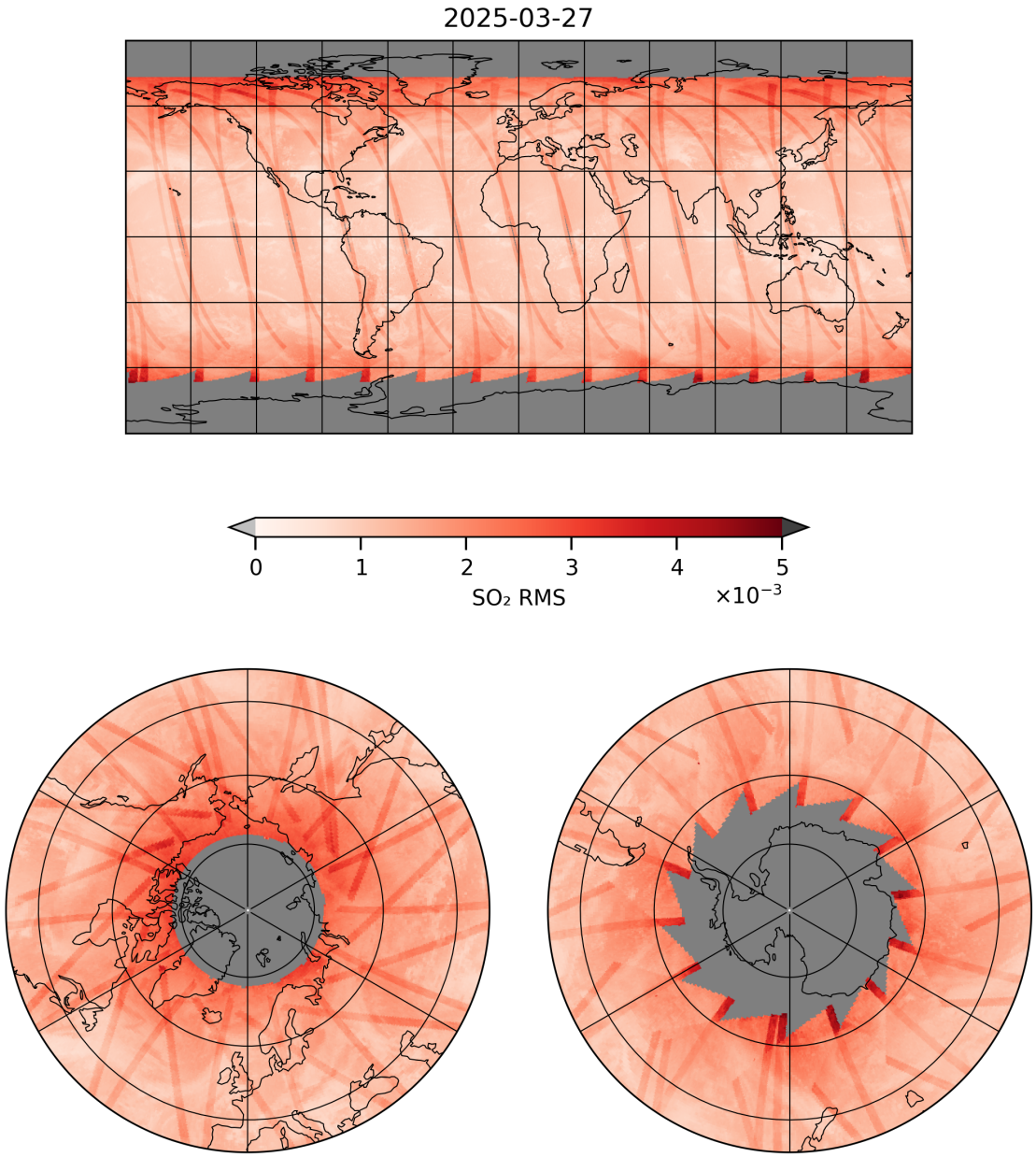

Figure 24: Map of "SO_2 RMS" for 2025-03-27 to 2025-03-28

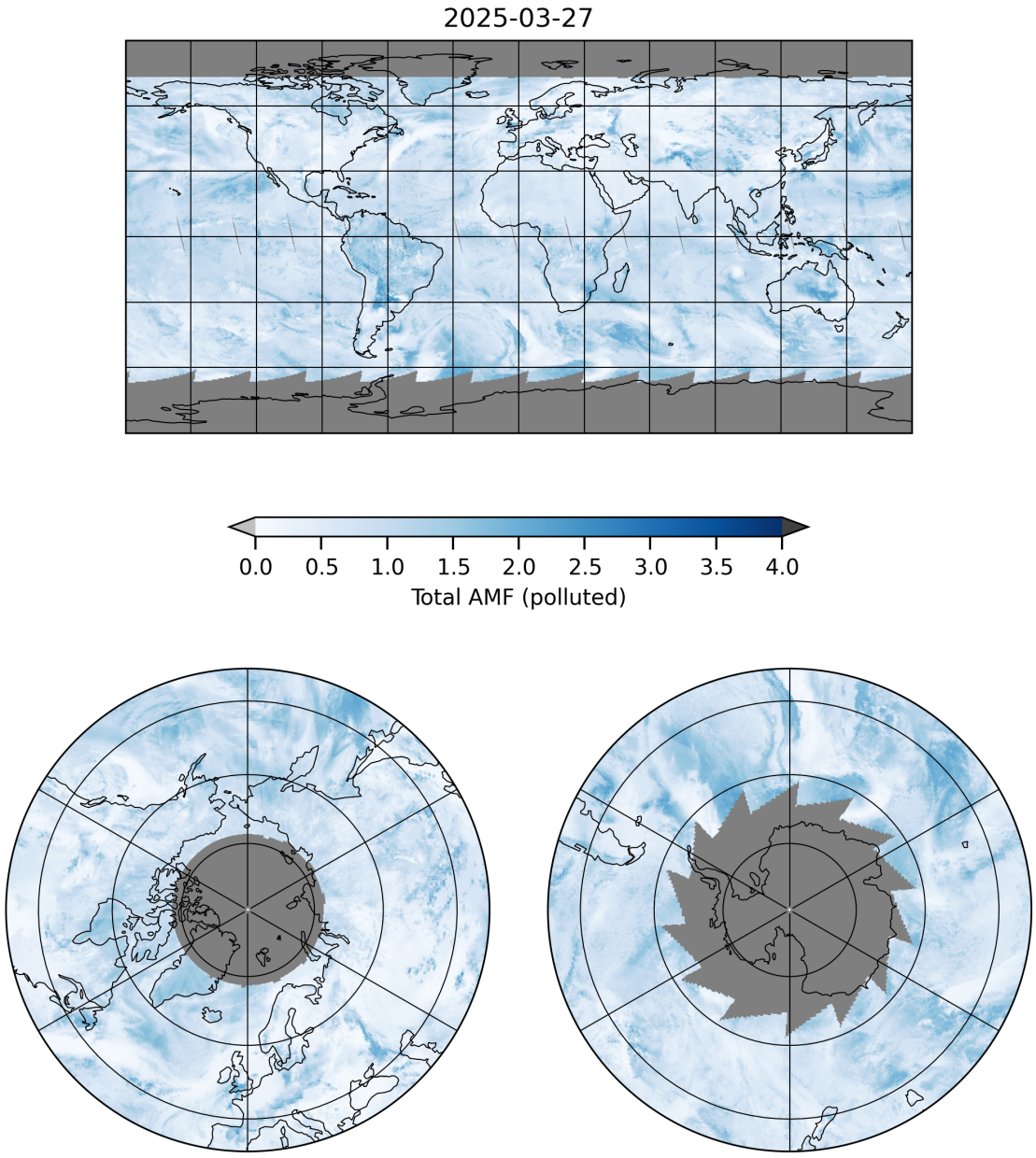

Figure 25: Map of “Total AMF (polluted)” for 2025-03-27 to 2025-03-28

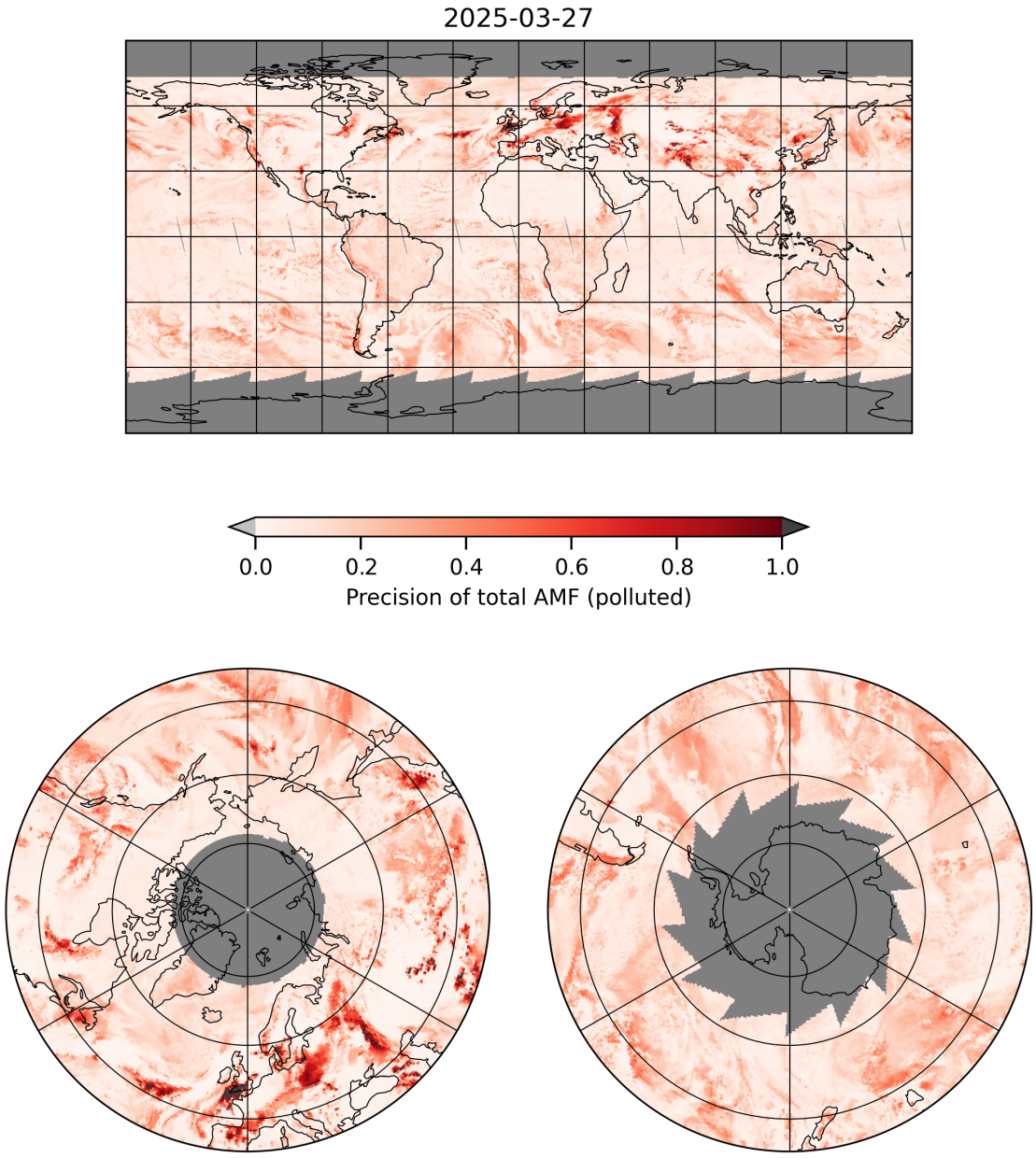

Figure 26: Map of “Precision of total AMF (polluted)” for 2025-03-27 to 2025-03-28

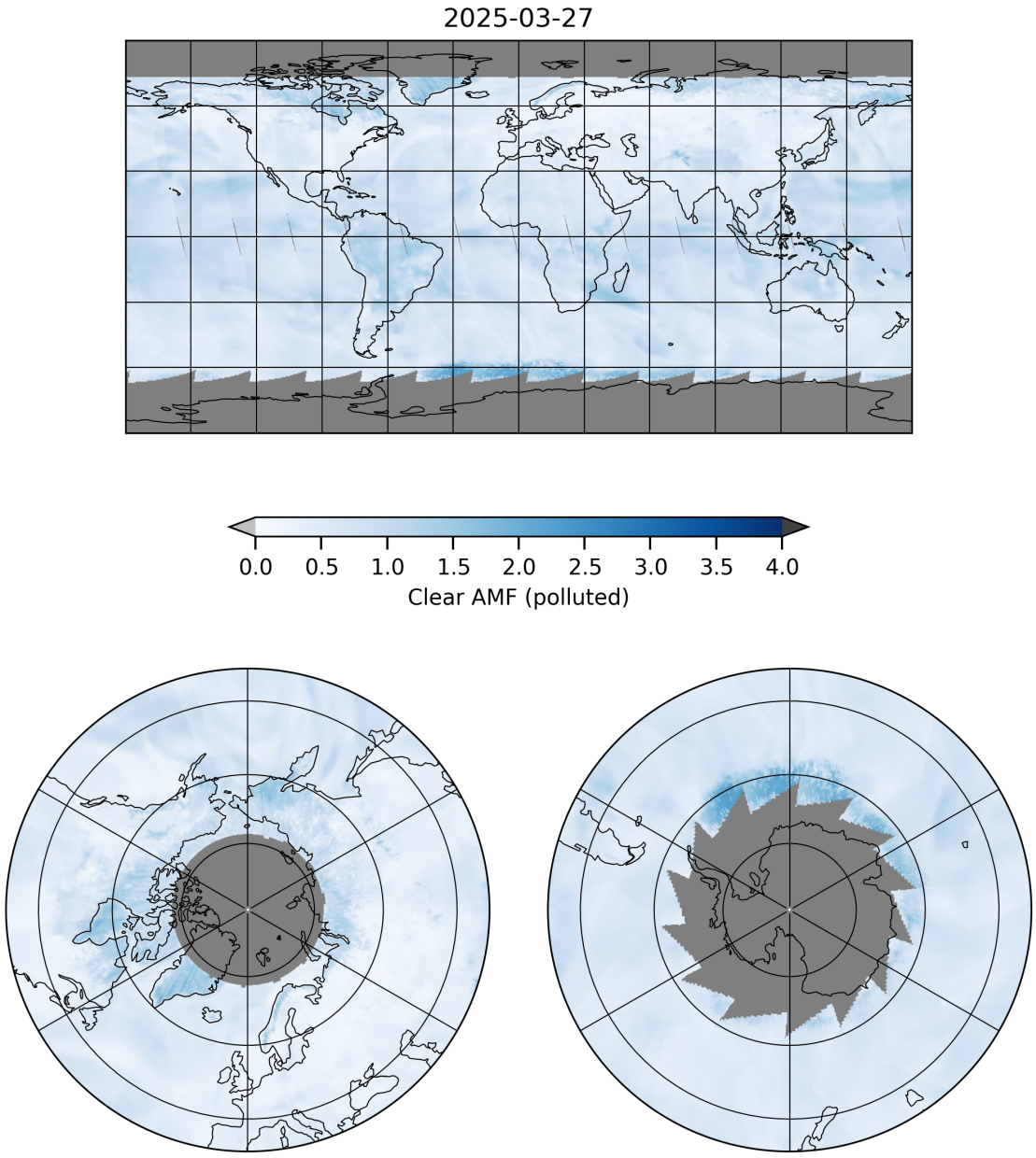

Figure 27: Map of “Clear AMF (polluted)” for 2025-03-27 to 2025-03-28

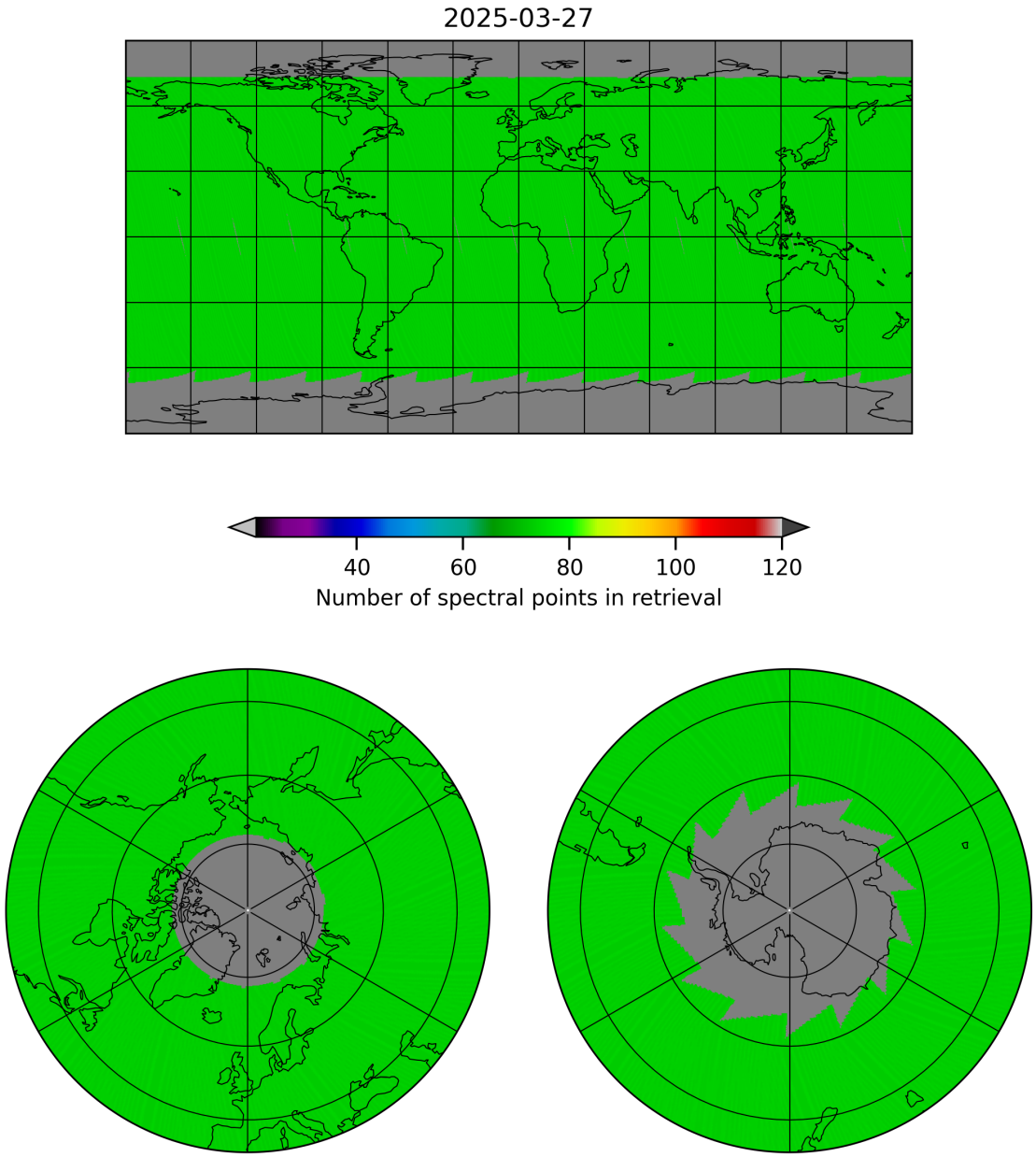

Figure 28: Map of “Number of spectral points in retrieval” for 2025-03-27 to 2025-03-28

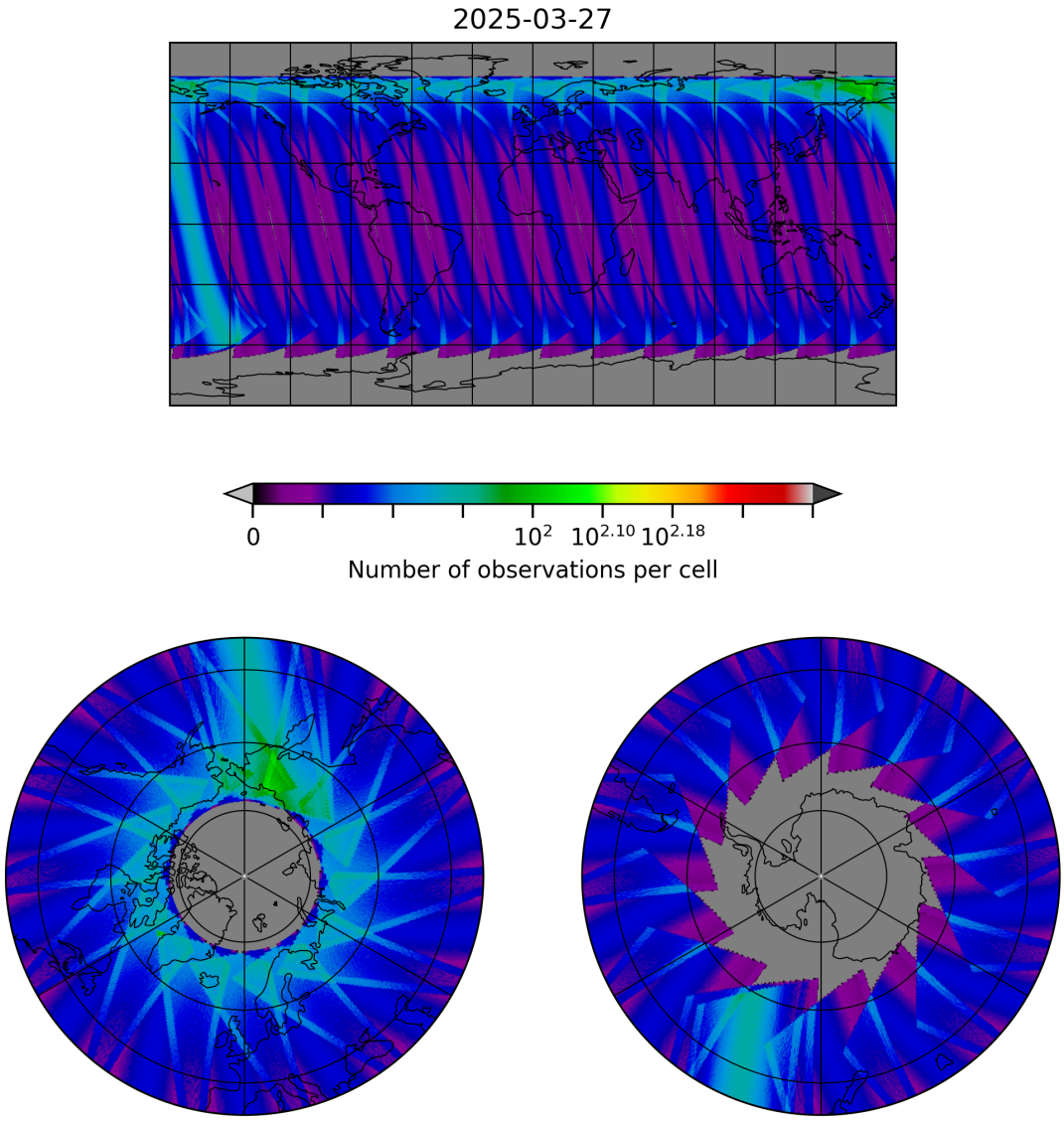

Figure 29: Map of the number of observations for 2025-03-27 to 2025-03-28

7 Zonal average

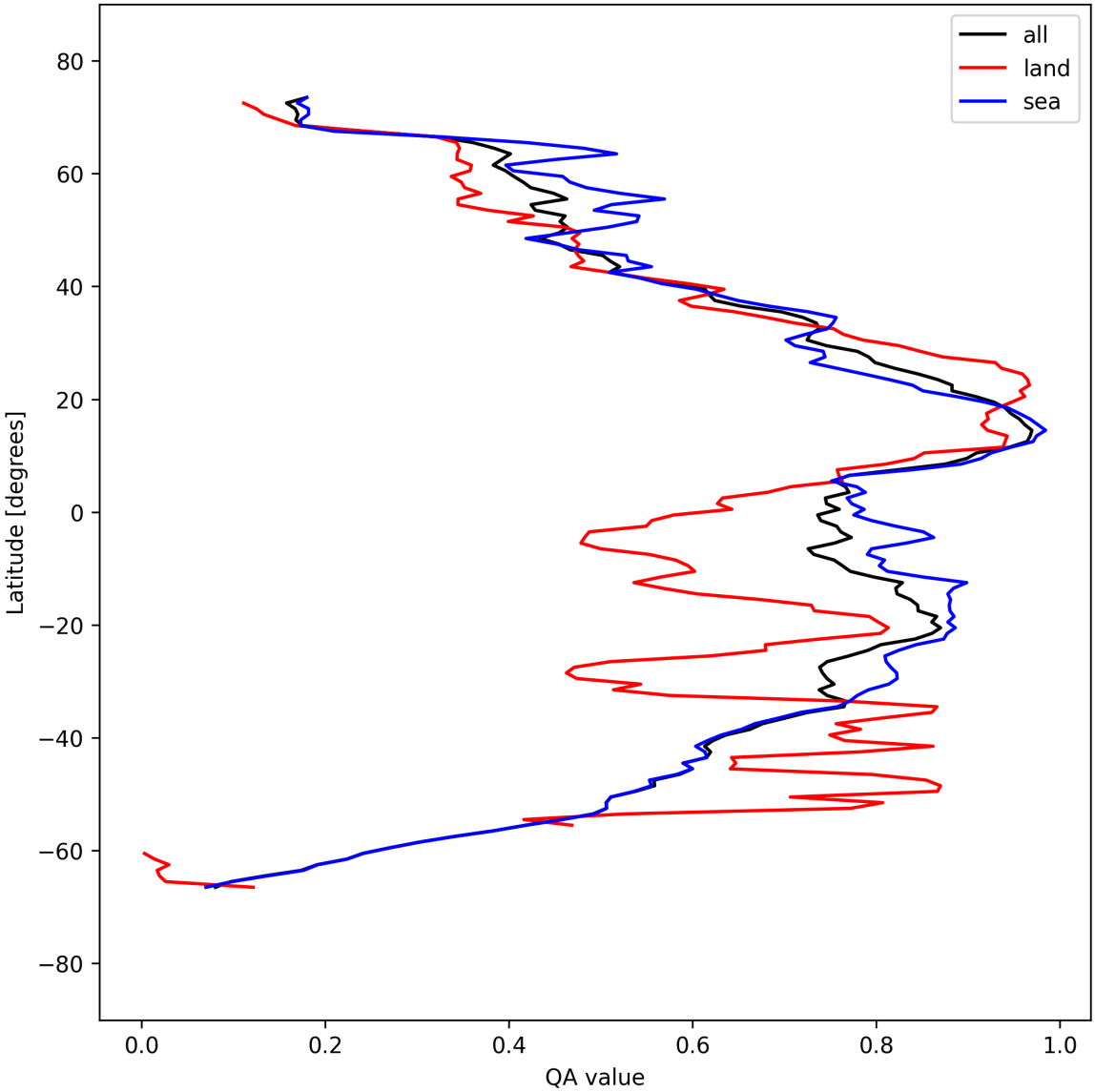

Figure 30: Zonal average of “QA value” for 2025-03-27 to 2025-03-28.

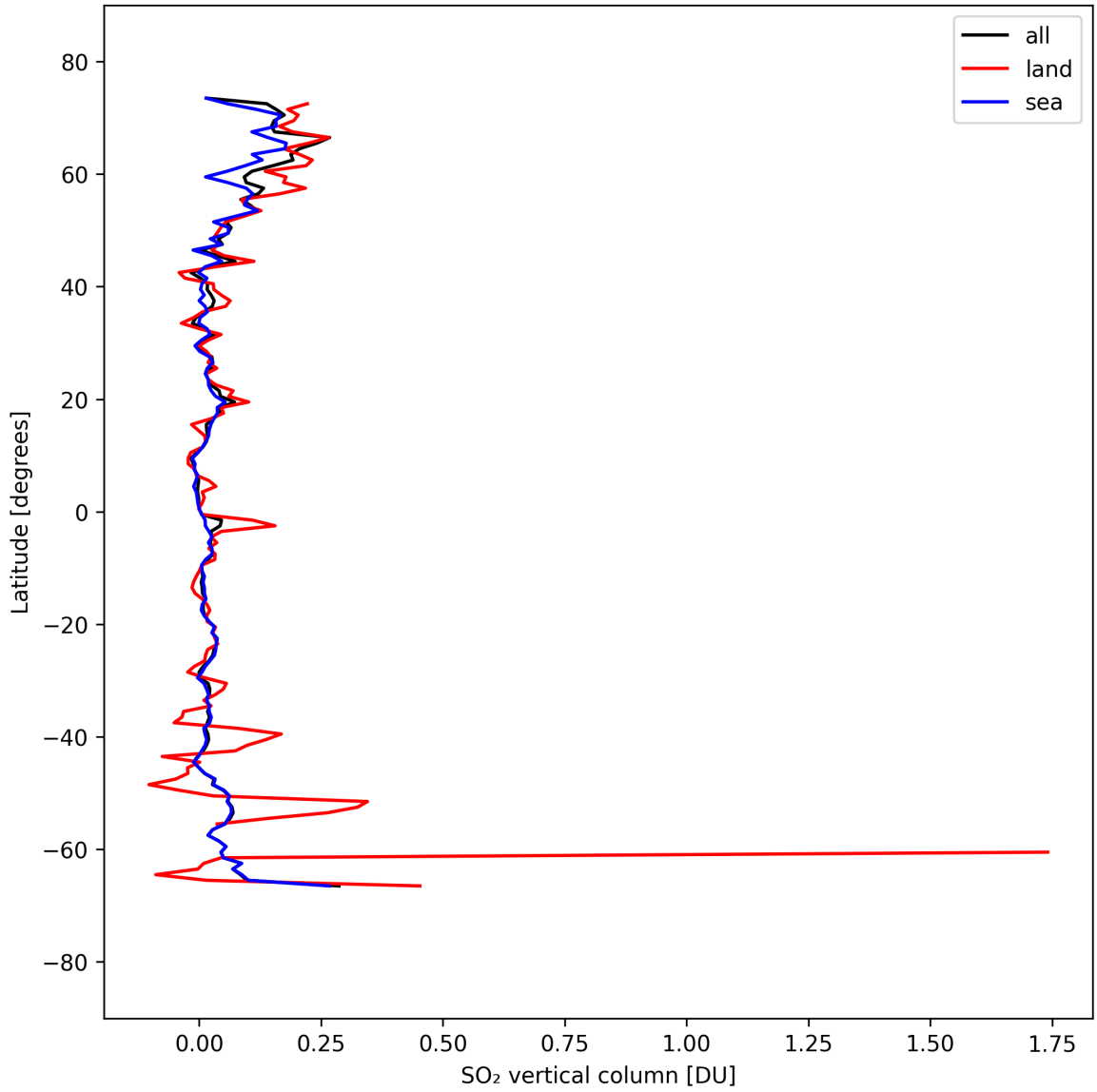

Figure 31: Zonal average of "SO_2 vertical column" for 2025-03-27 to 2025-03-28.

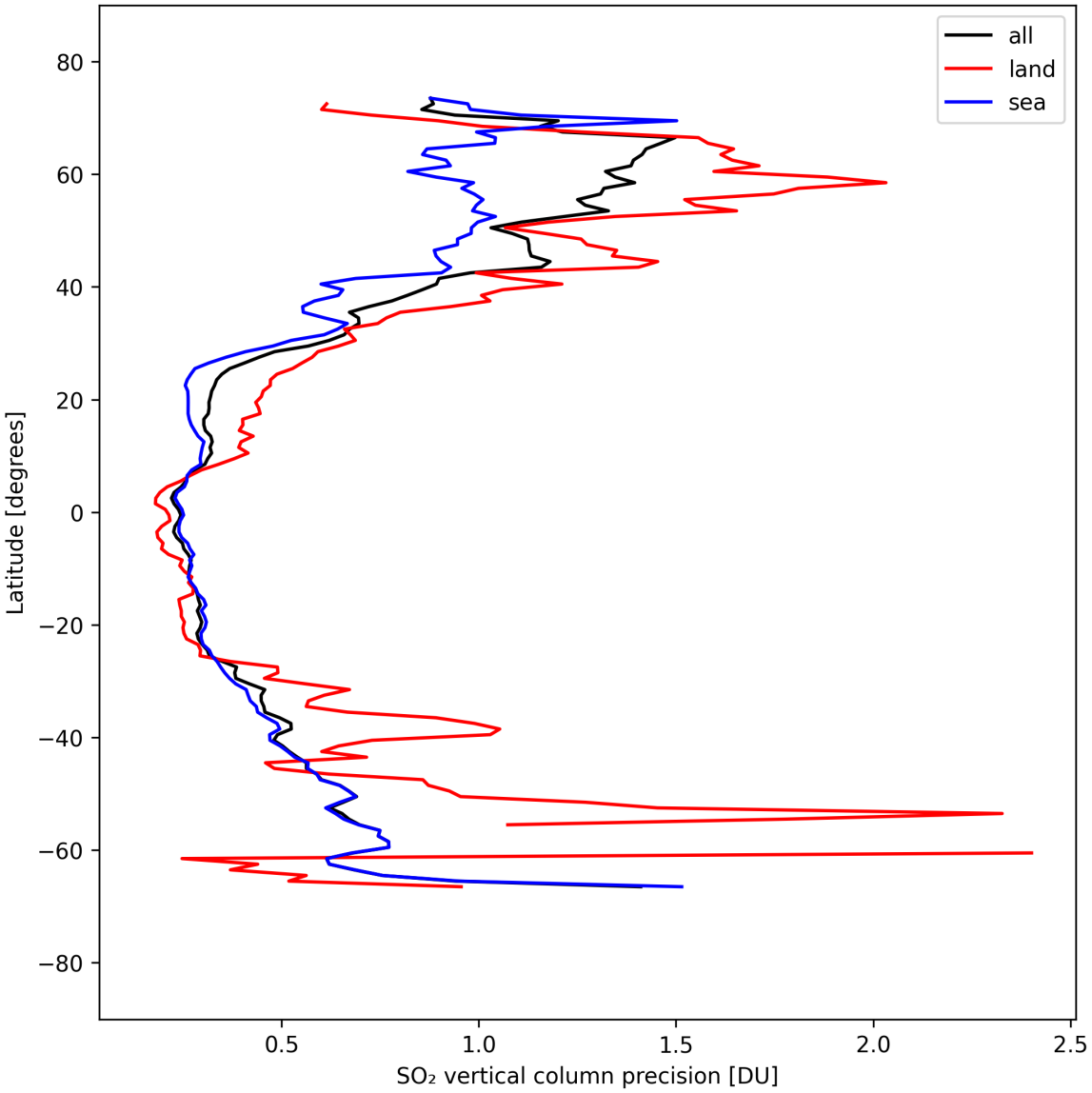

Figure 32: Zonal average of "SO_2 vertical column precision" for 2025-03-27 to 2025-03-28.

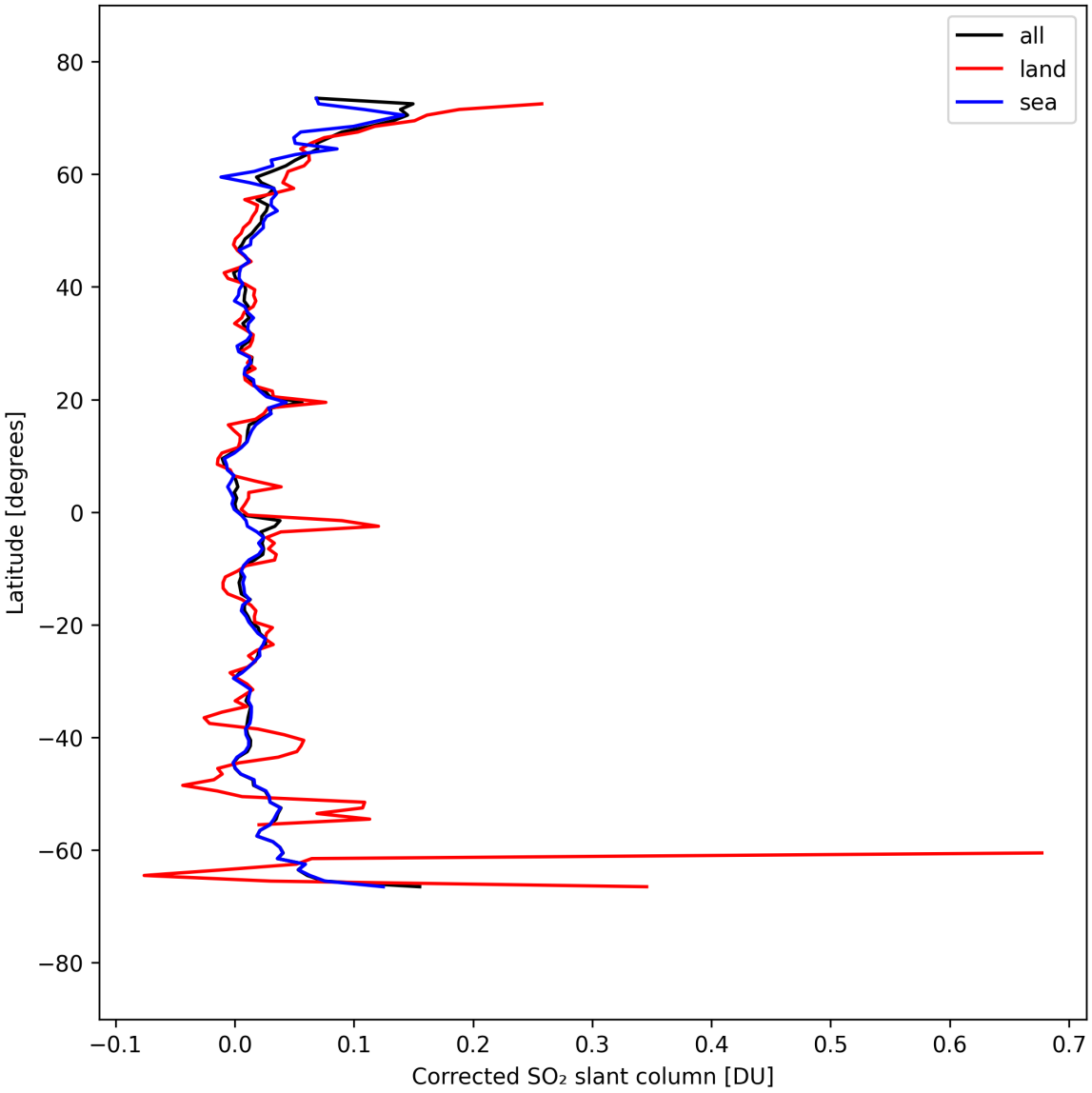

Figure 33: Zonal average of “Corrected SO_2 slant column” for 2025-03-27 to 2025-03-28.

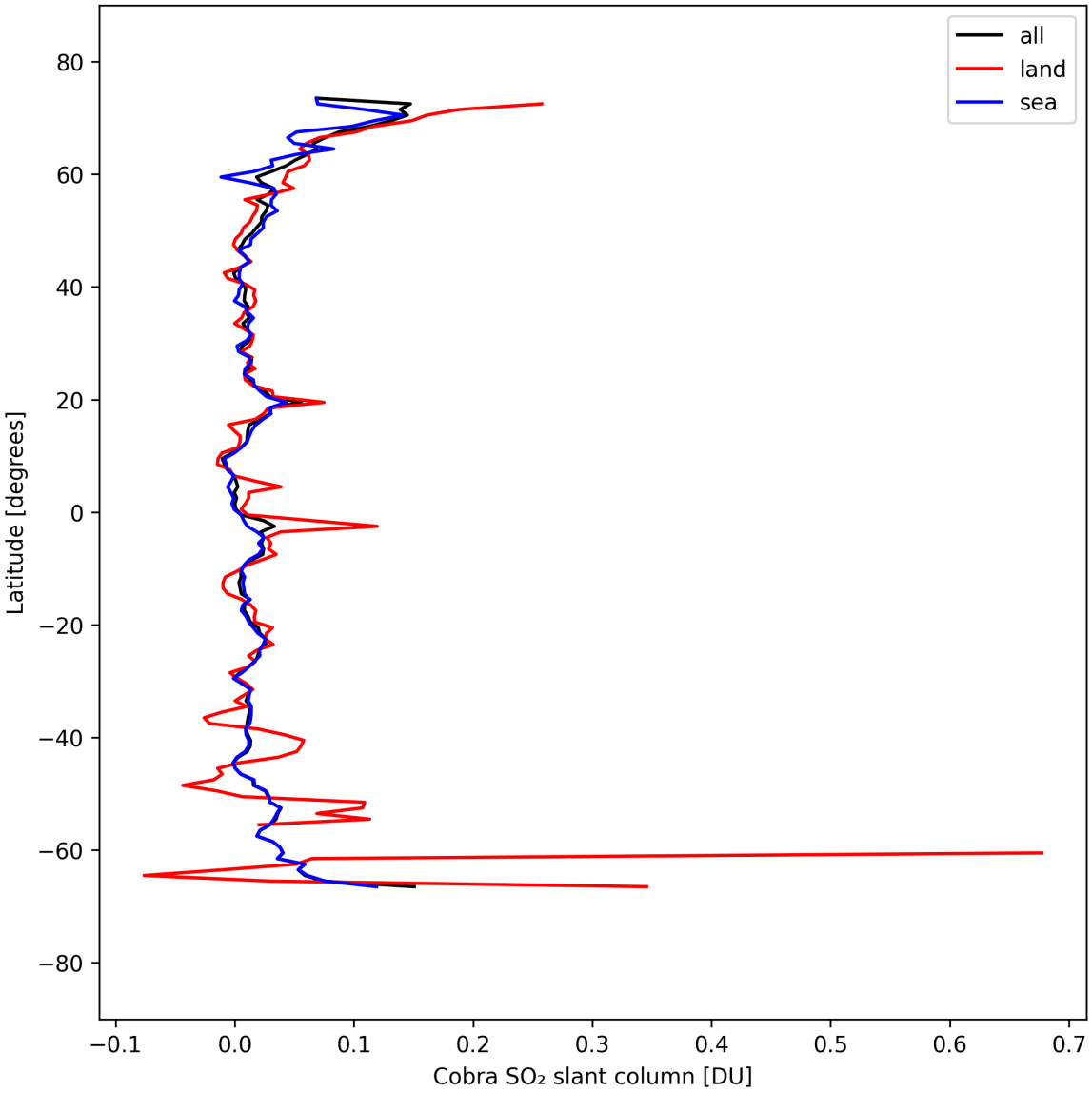

Figure 34: Zonal average of “Cobra SO_2 slant column” for 2025-03-27 to 2025-03-28.

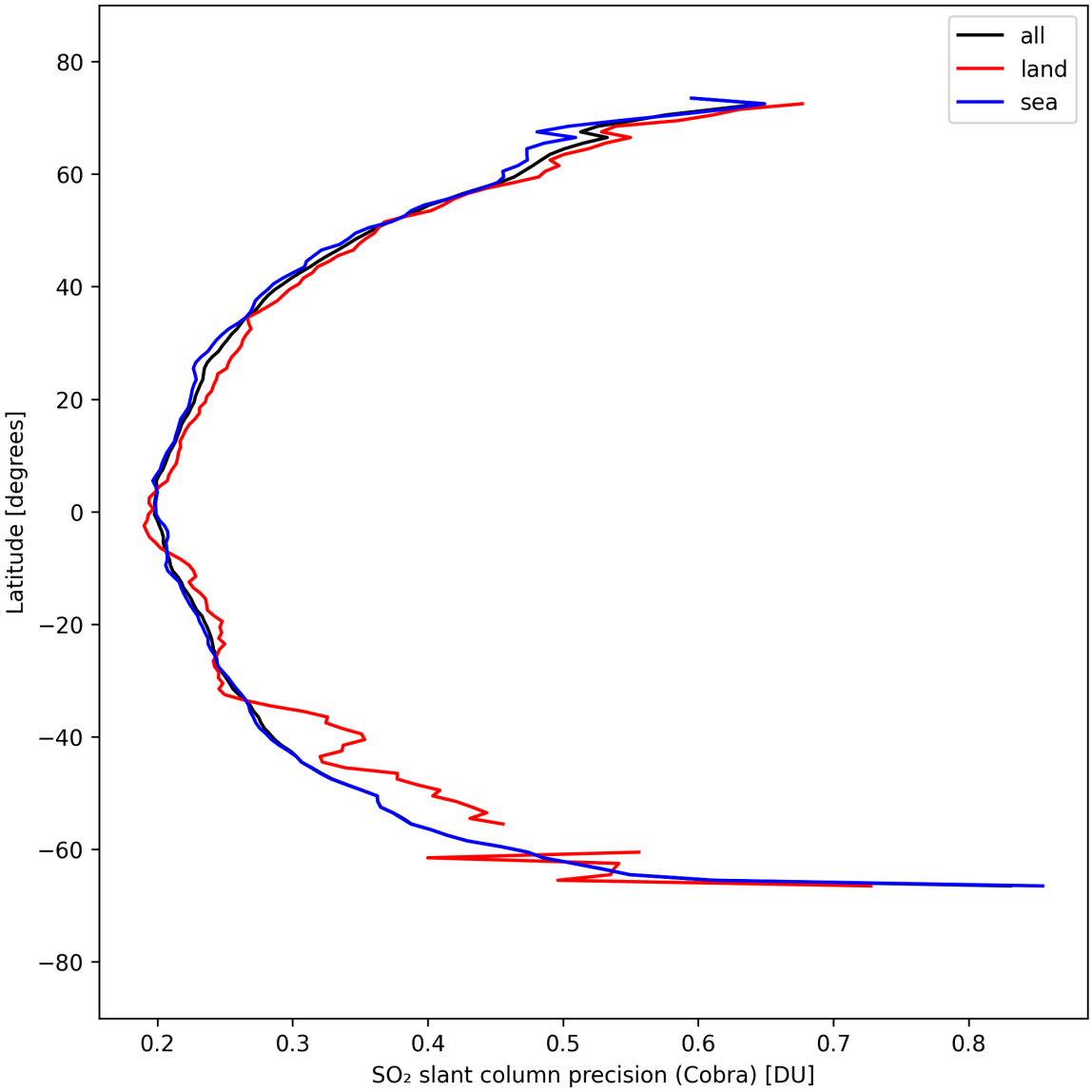

Figure 35: Zonal average of "SO_2 slant column precision (Cobra)" for 2025-03-27 to 2025-03-28.

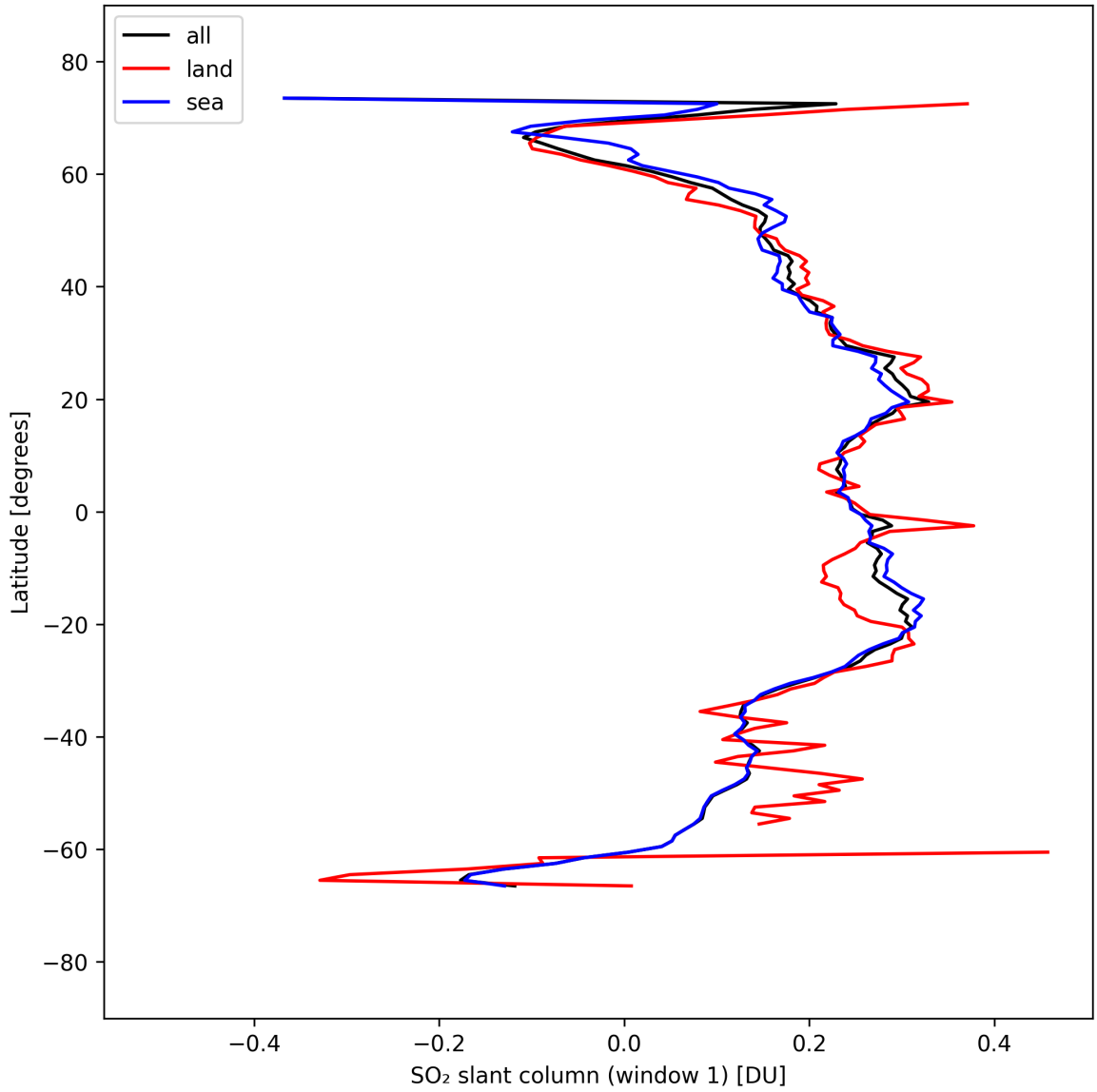

Figure 36: Zonal average of "SO_2 slant column (window 1)" for 2025-03-27 to 2025-03-28.

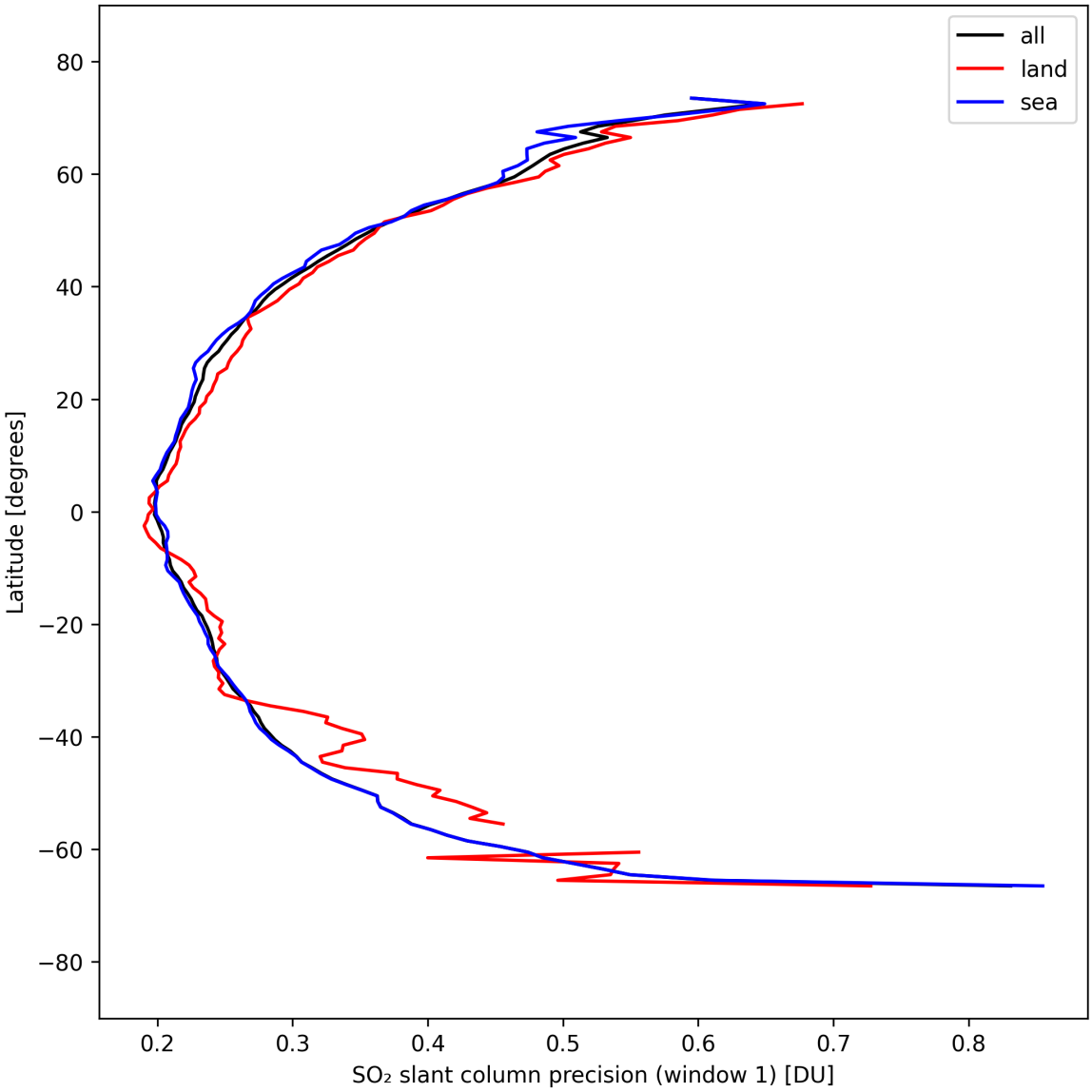

Figure 37: Zonal average of "SO_2 slant column precision (window 1)" for 2025-03-27 to 2025-03-28.

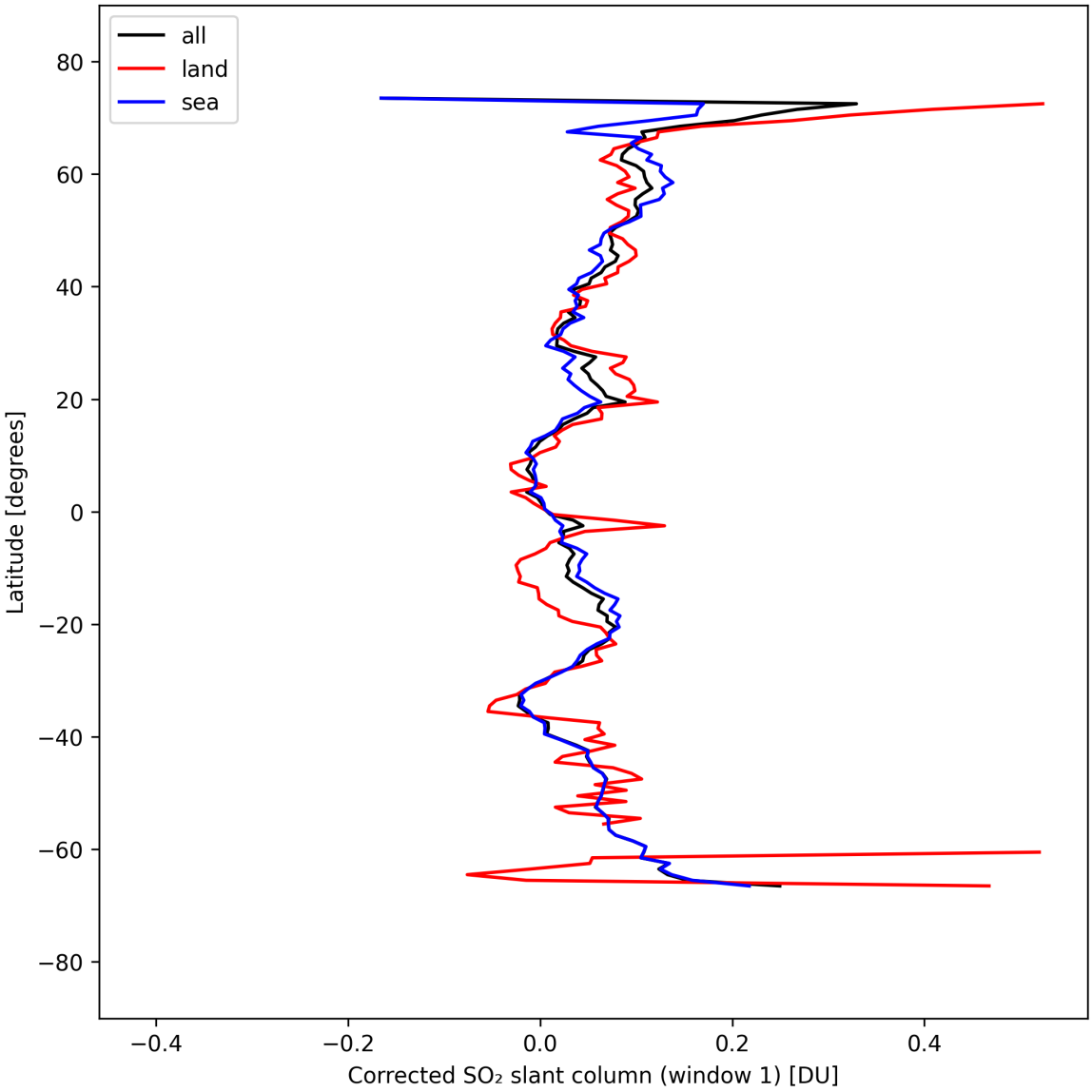

Figure 38: Zonal average of "Corrected SO_2 slant column (window 1)" for 2025-03-27 to 2025-03-28.

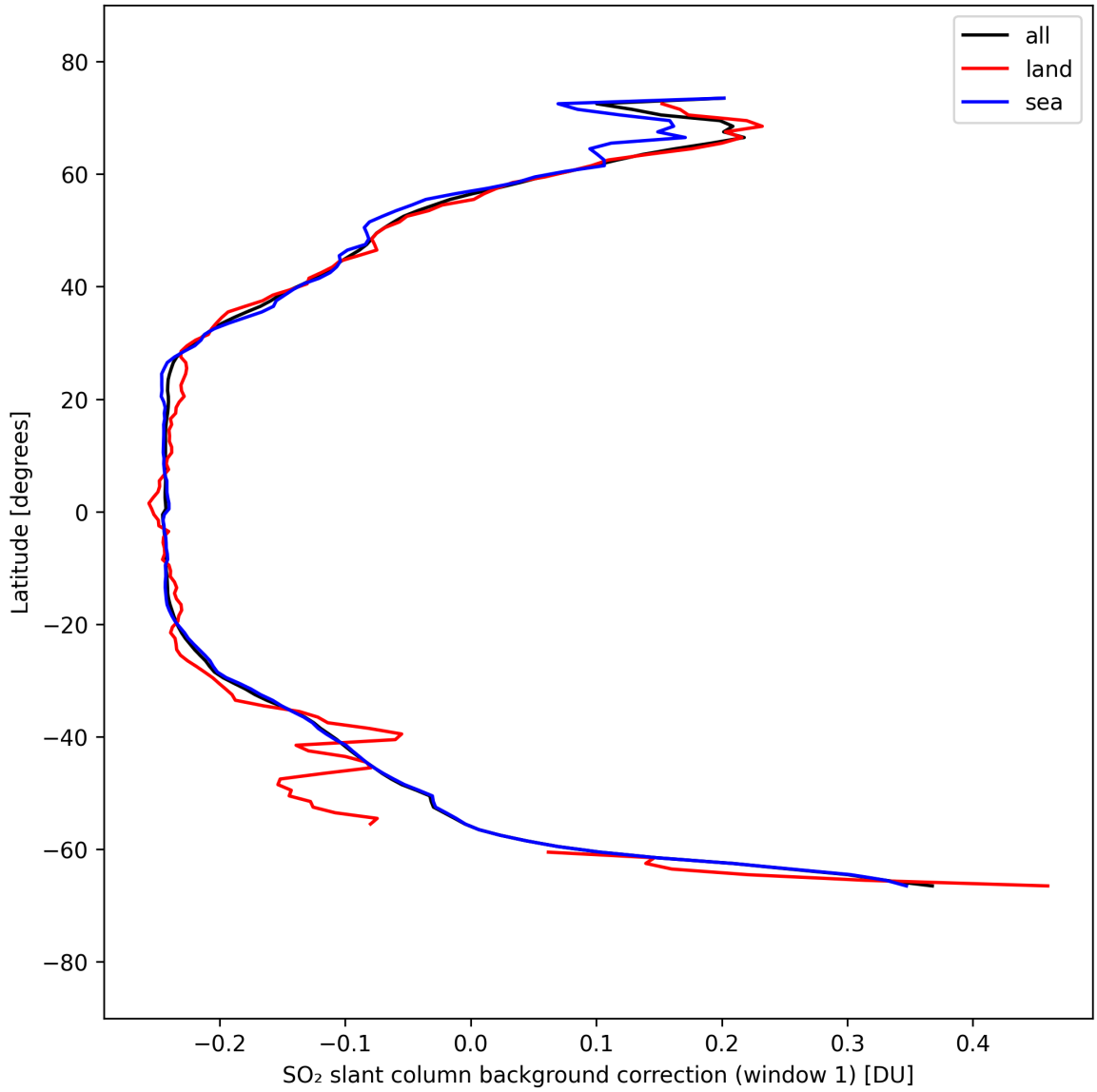

Figure 39: Zonal average of "SO_2 slant column background correction (window 1)" for 2025-03-27 to 2025-03-28.

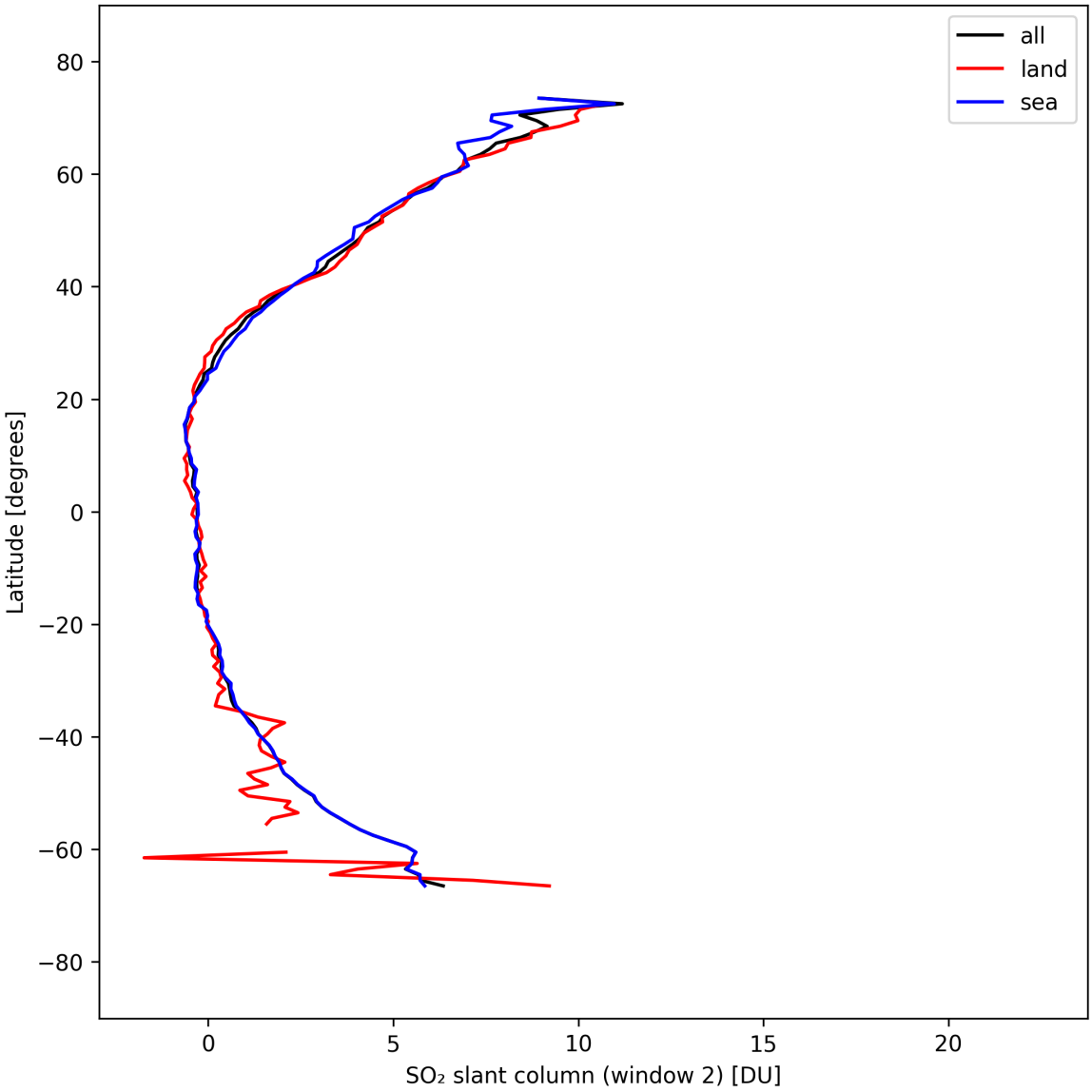

Figure 40: Zonal average of "SO_2 slant column (window 2)" for 2025-03-27 to 2025-03-28.

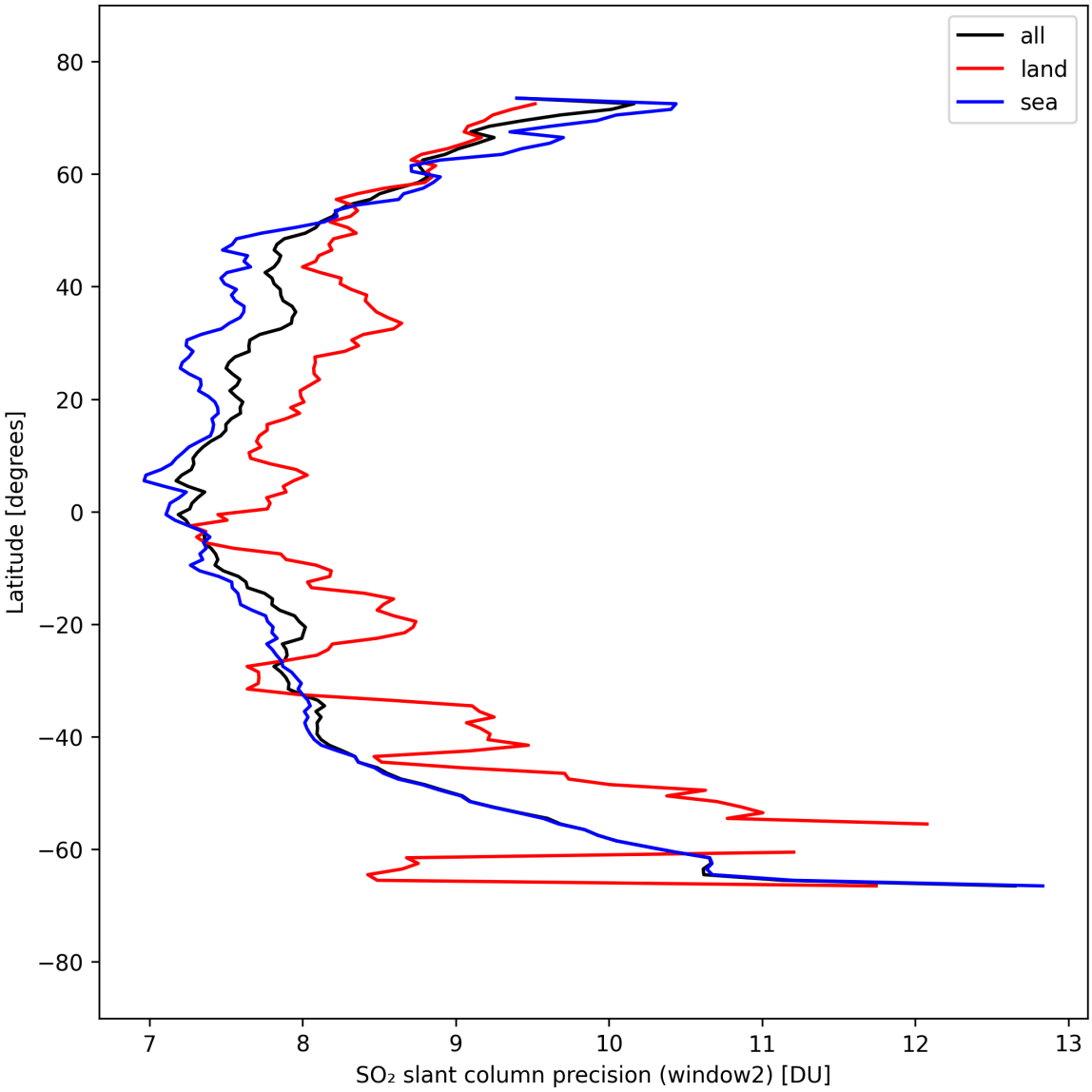

Figure 41: Zonal average of "SO_2 slant column precision (window2)" for 2025-03-27 to 2025-03-28.

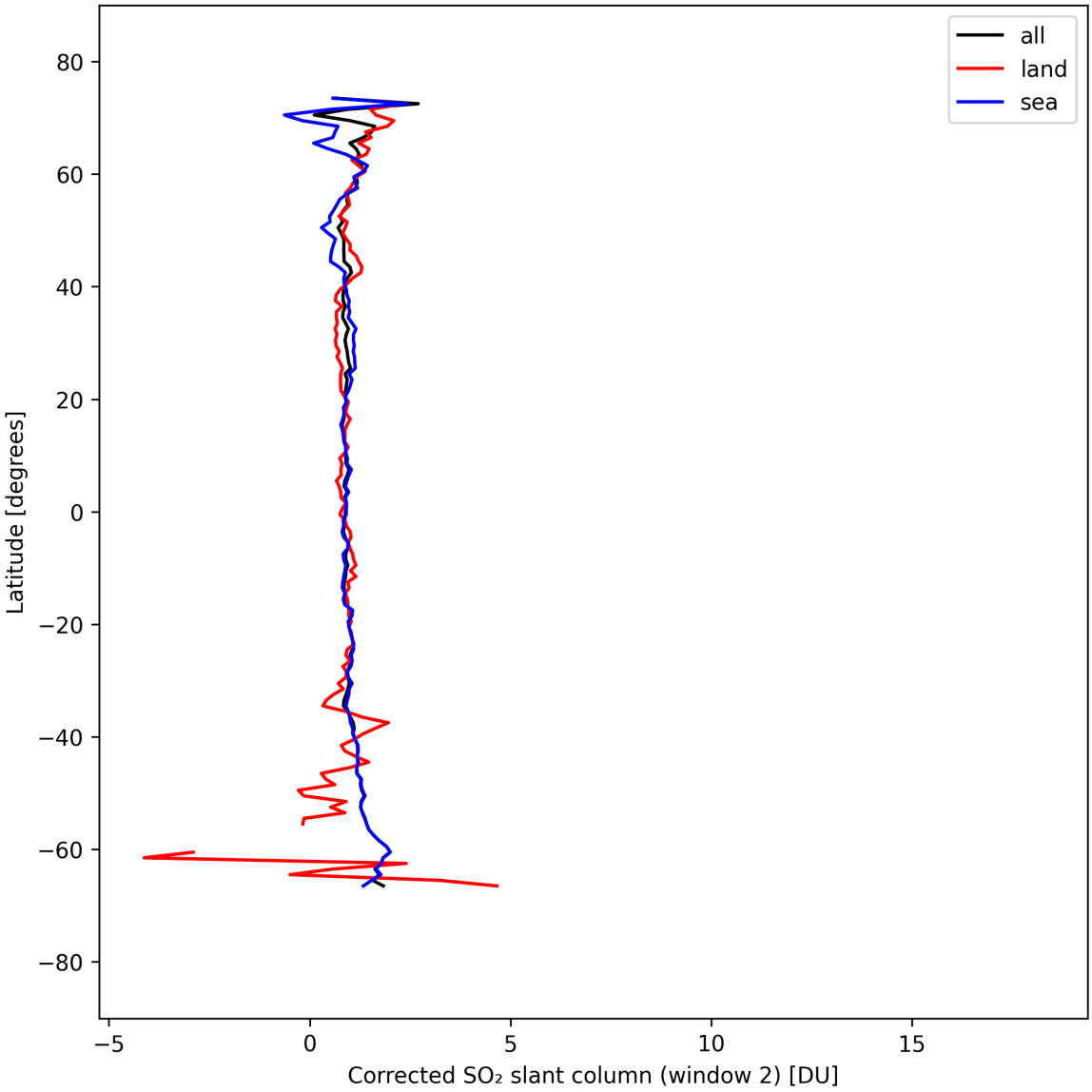

Figure 42: Zonal average of “Corrected SO_2 slant column (window 2)” for 2025-03-27 to 2025-03-28.

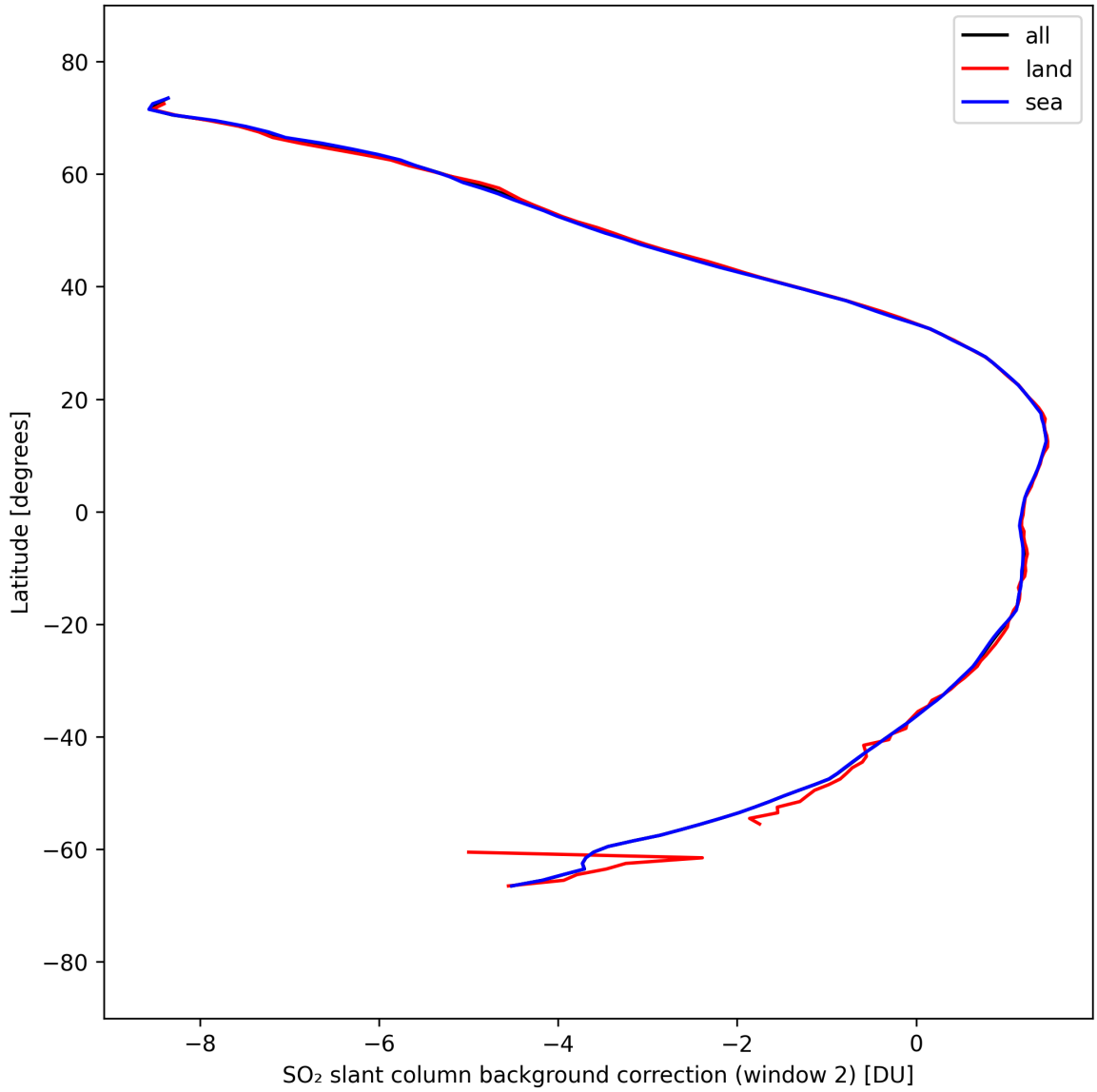

Figure 43: Zonal average of "SO_2 slant column background correction (window 2)" for 2025-03-27 to 2025-03-28.

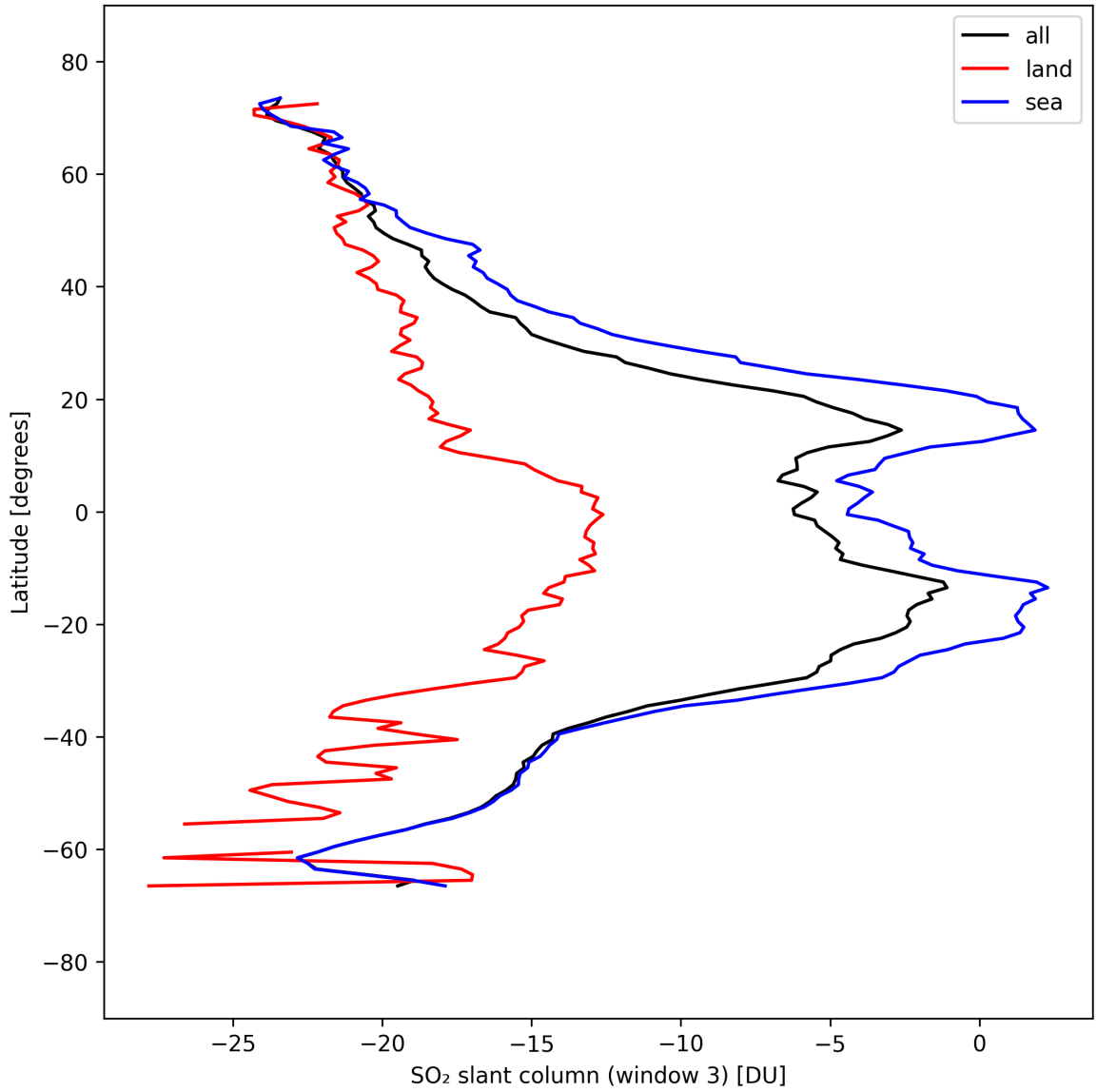

Figure 44: Zonal average of "SO_2 slant column (window 3)" for 2025-03-27 to 2025-03-28.

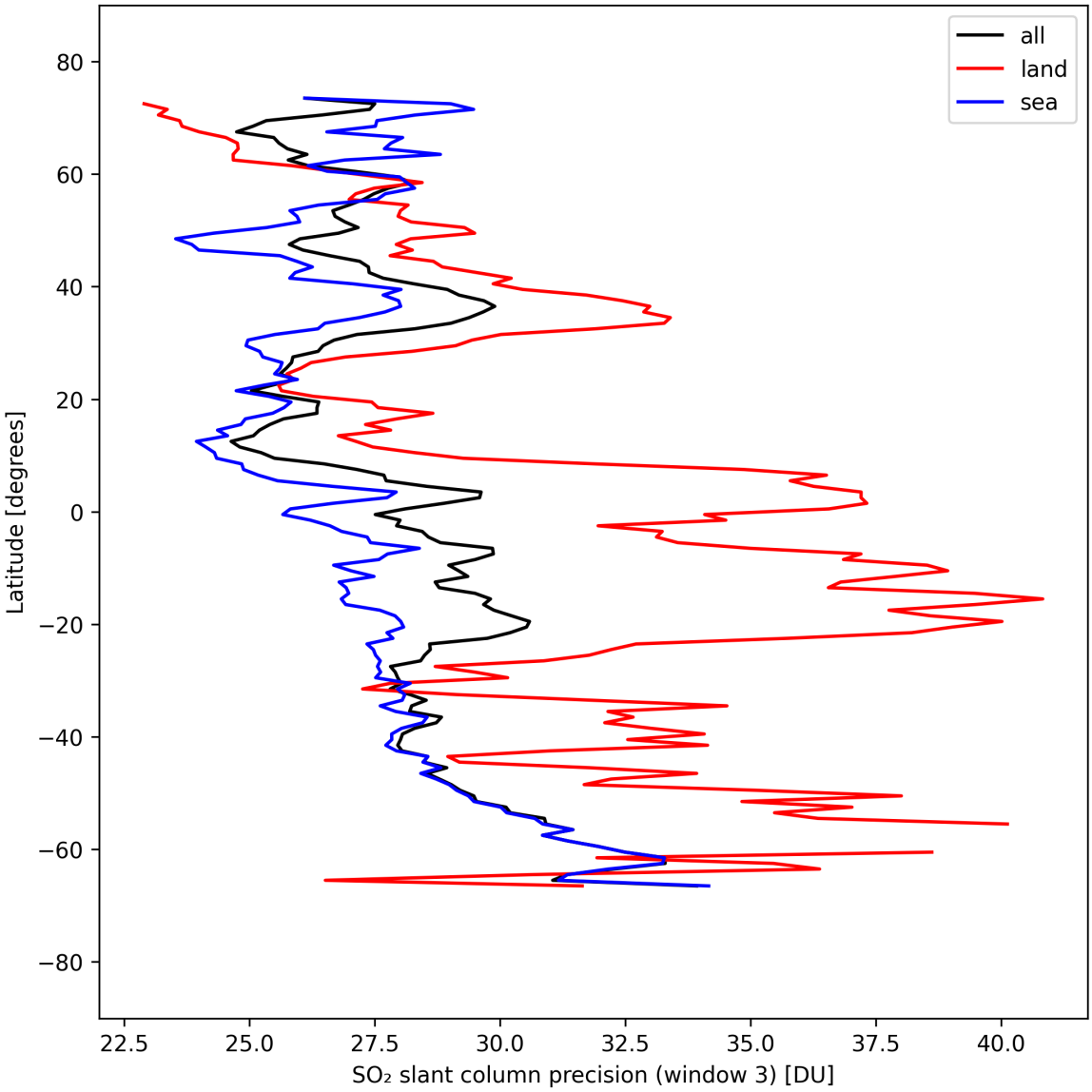

Figure 45: Zonal average of "SO_2 slant column precision (window 3)" for 2025-03-27 to 2025-03-28.

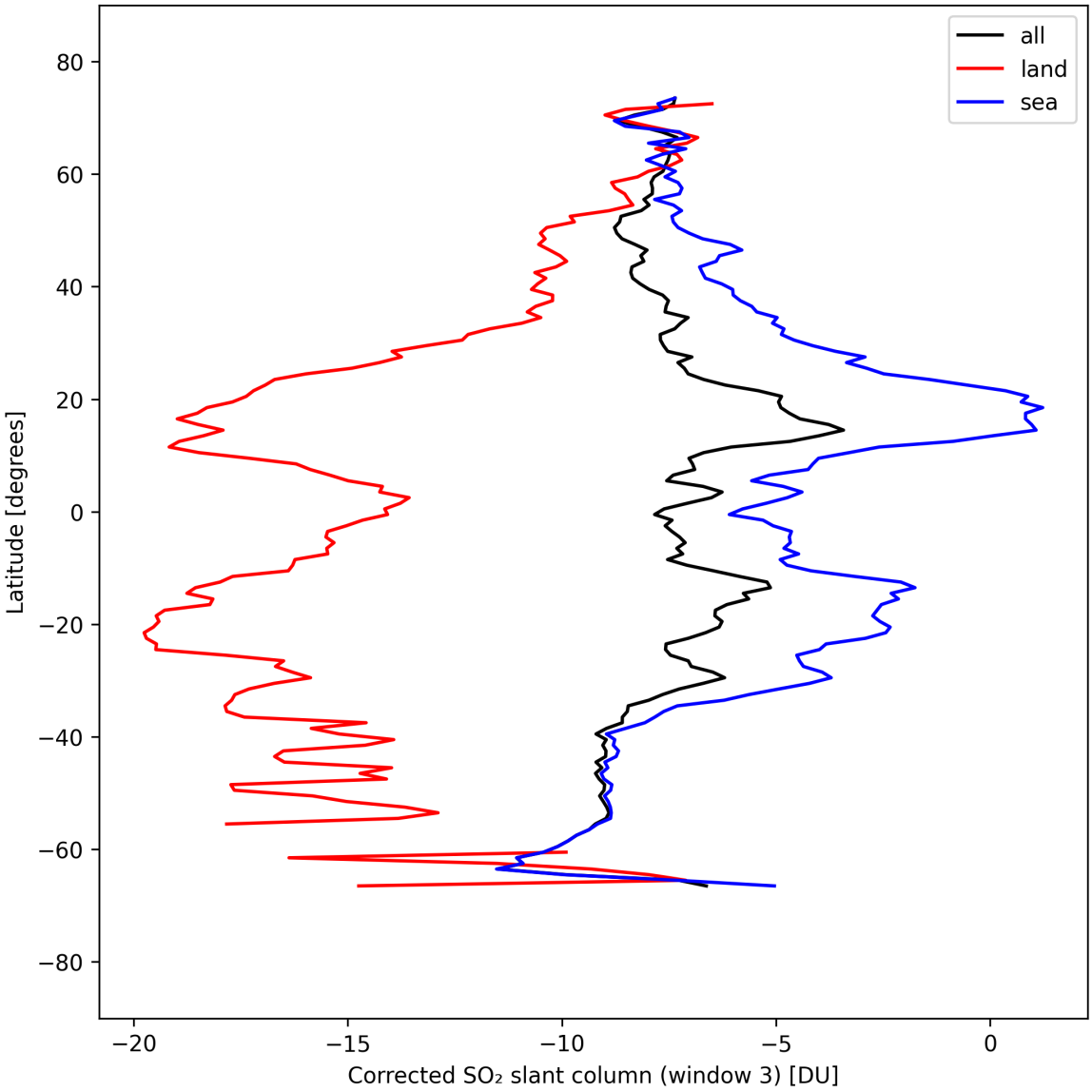

Figure 46: Zonal average of "Corrected SO_2 slant column (window 3)" for 2025-03-27 to 2025-03-28.

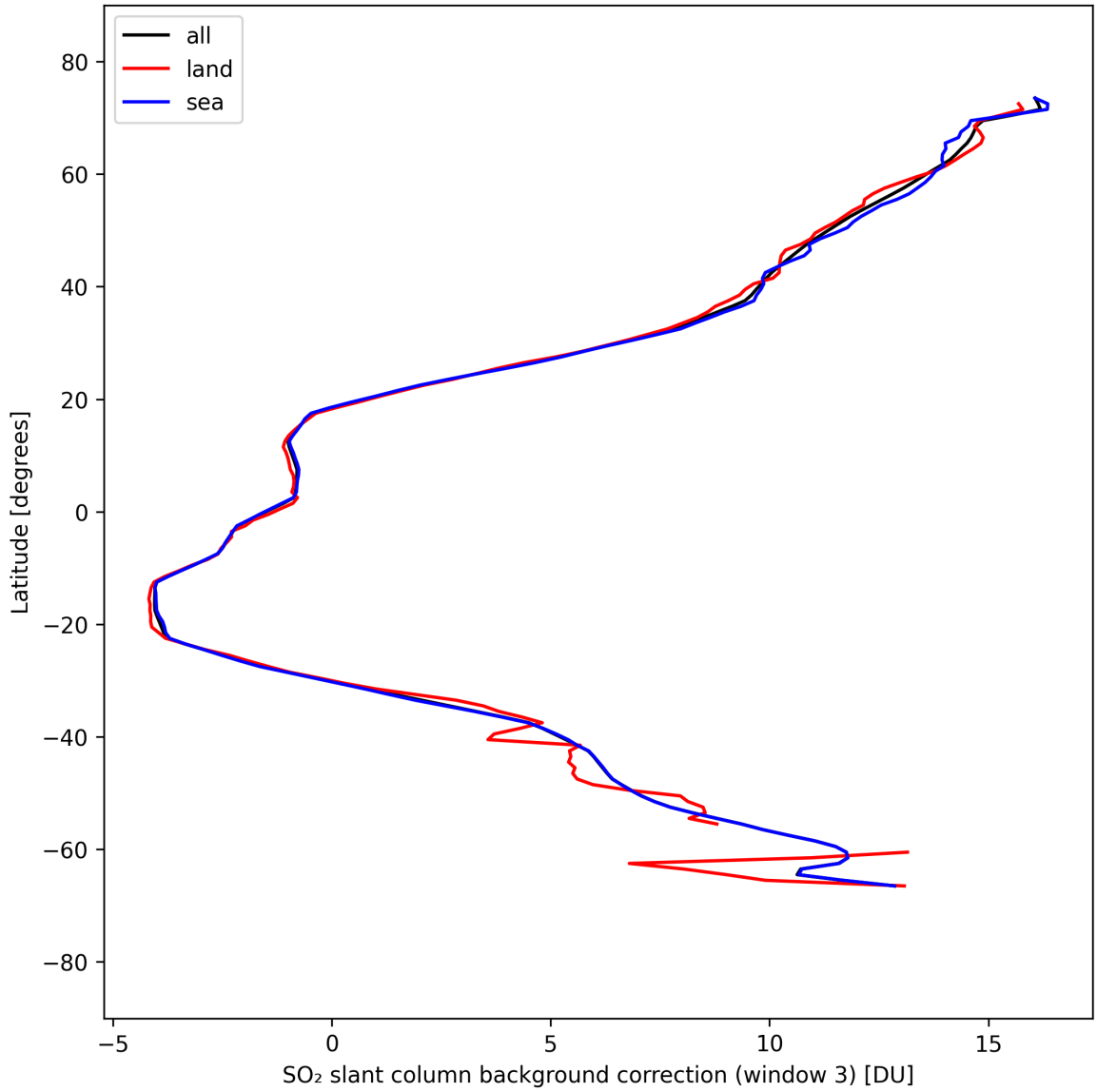

Figure 47: Zonal average of "SO_2 slant column background correction (window 3)" for 2025-03-27 to 2025-03-28.

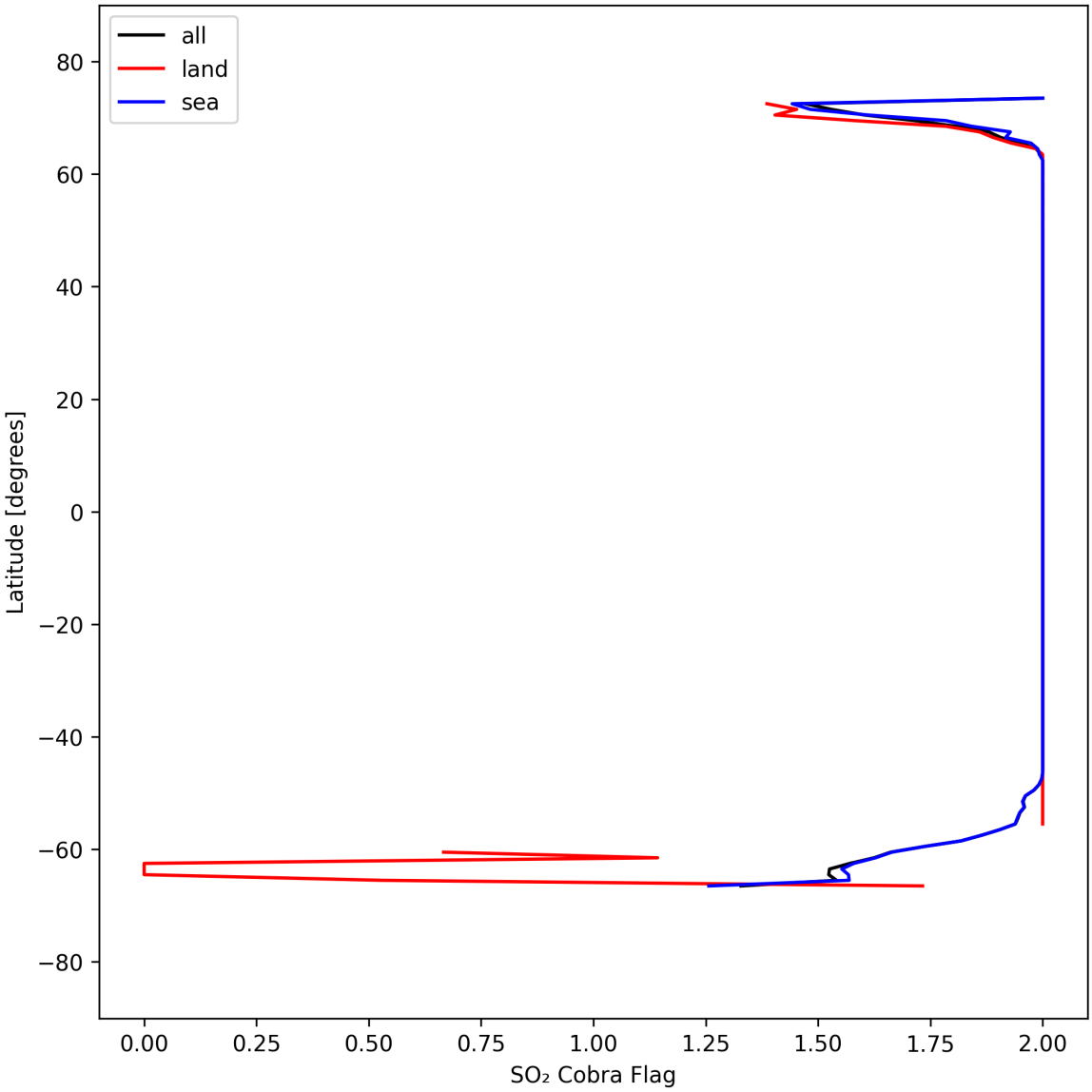

Figure 48: Zonal average of "SO_2 Cobra Flag" for 2025-03-27 to 2025-03-28.

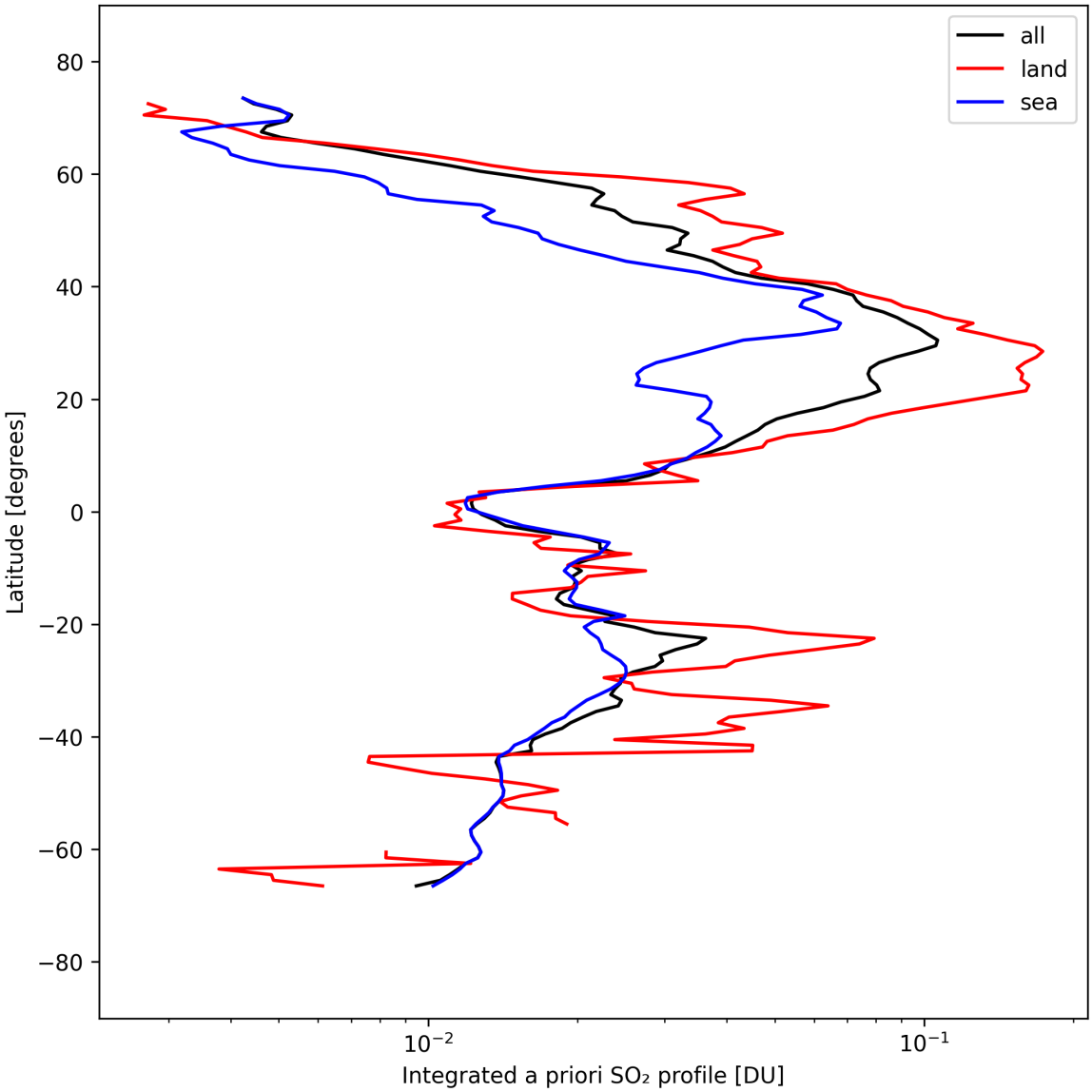

Figure 49: Zonal average of “Integrated a priori SO_2 profile” for 2025-03-27 to 2025-03-28.

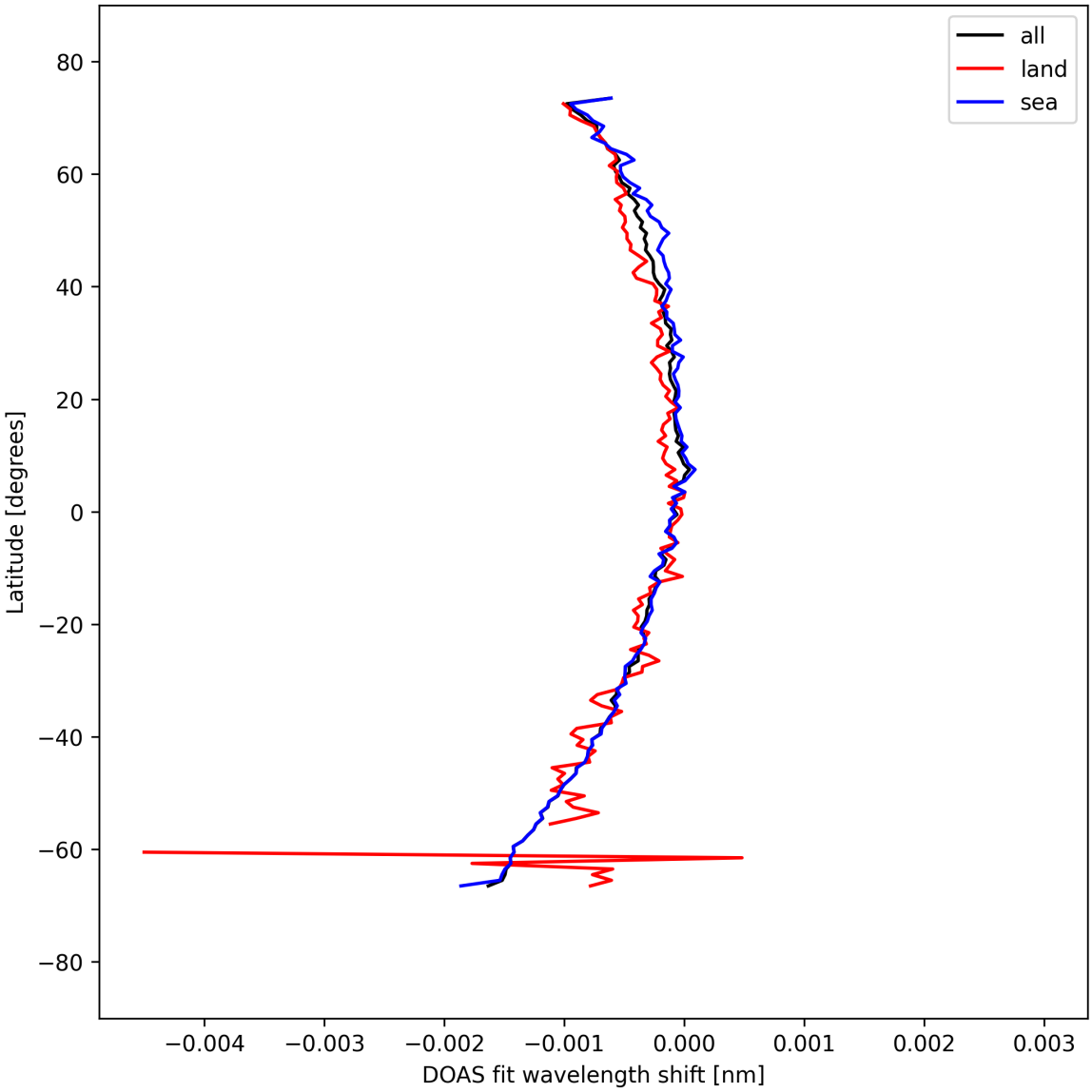

Figure 50: Zonal average of “DOAS fit wavelength shift” for 2025-03-27 to 2025-03-28.

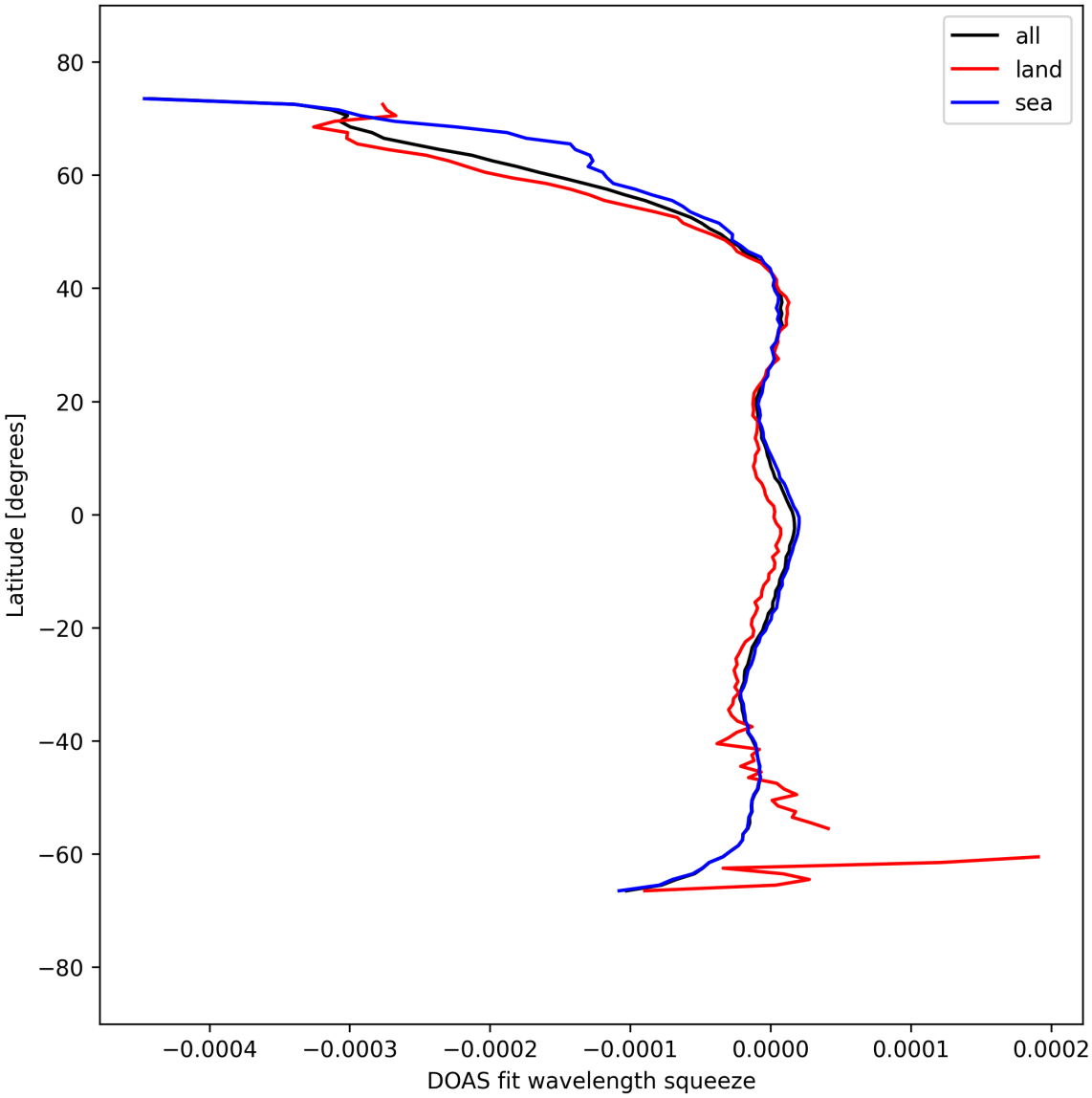

Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-03-27 to 2025-03-28.

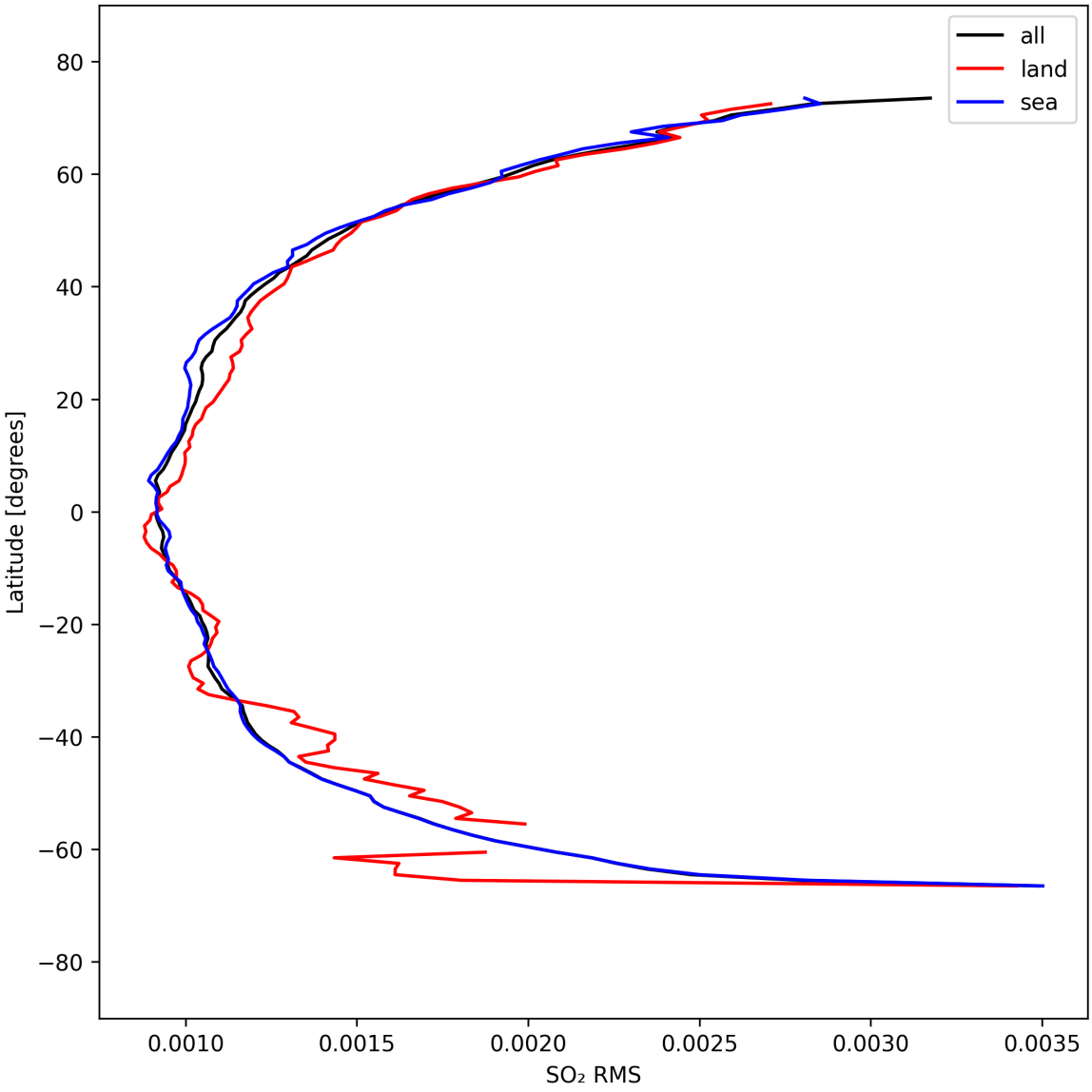

Figure 52: Zonal average of "SO_2 RMS" for 2025-03-27 to 2025-03-28.

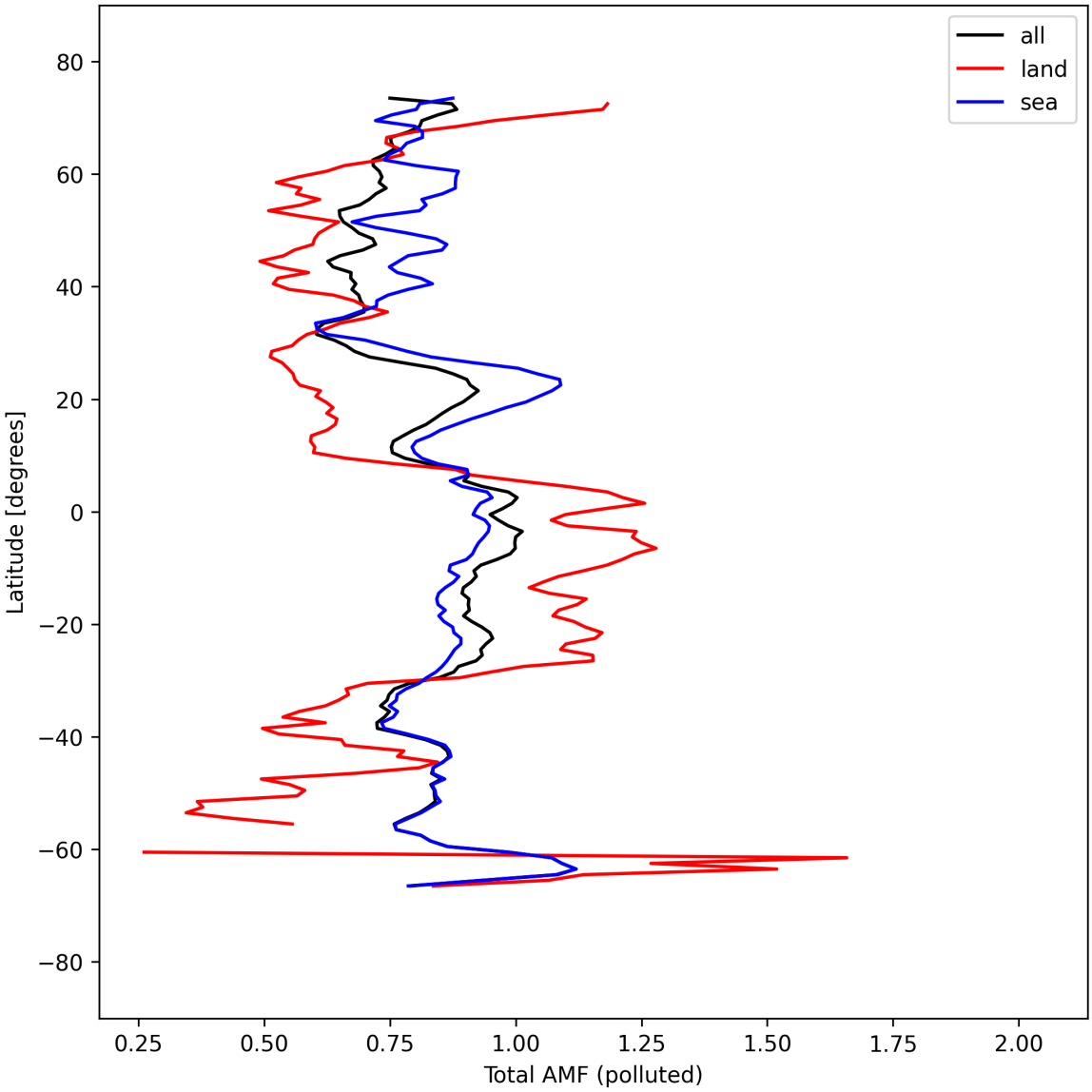

Figure 53: Zonal average of “Total AMF (polluted)” for 2025-03-27 to 2025-03-28.

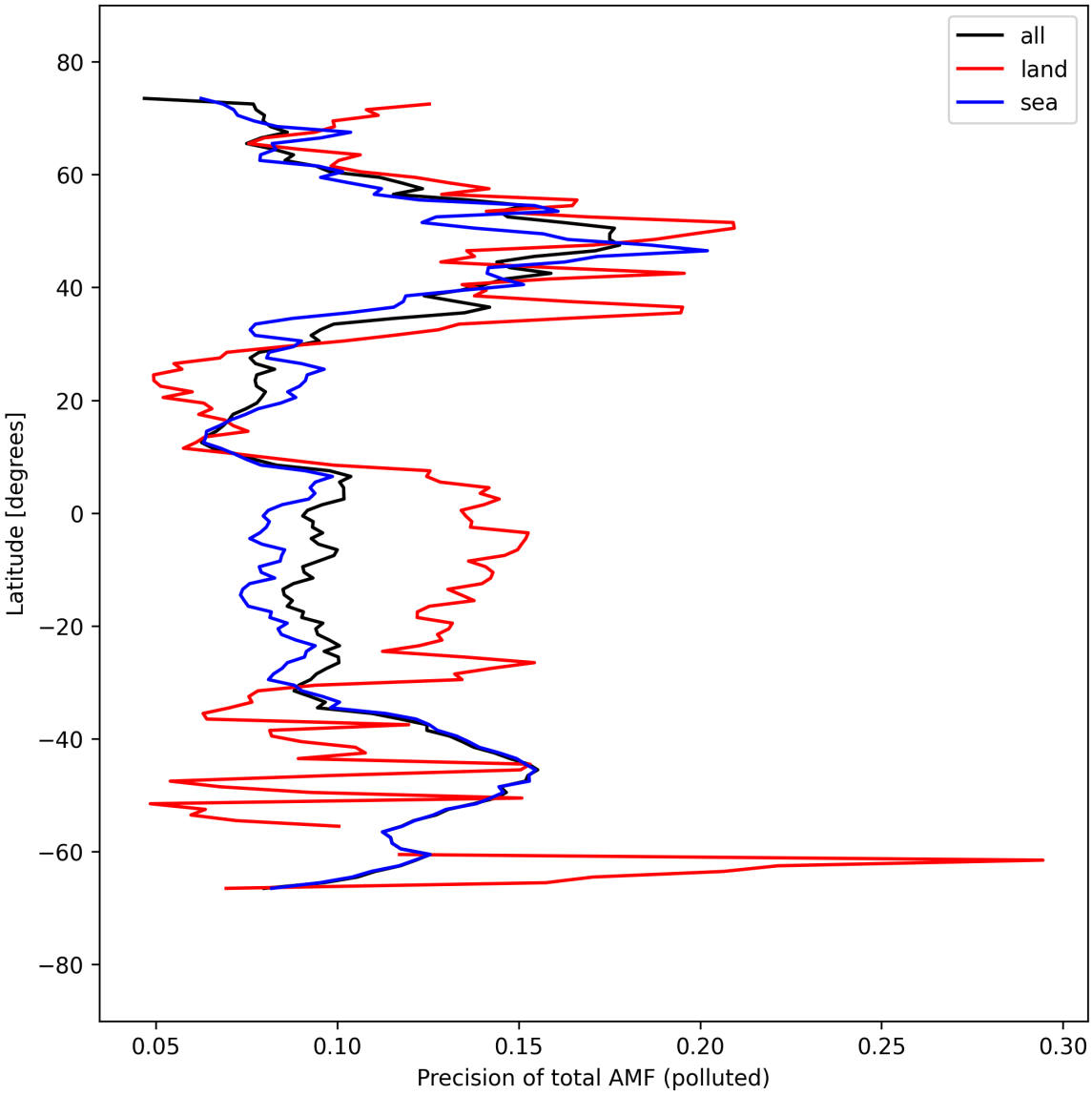

Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-03-27 to 2025-03-28.

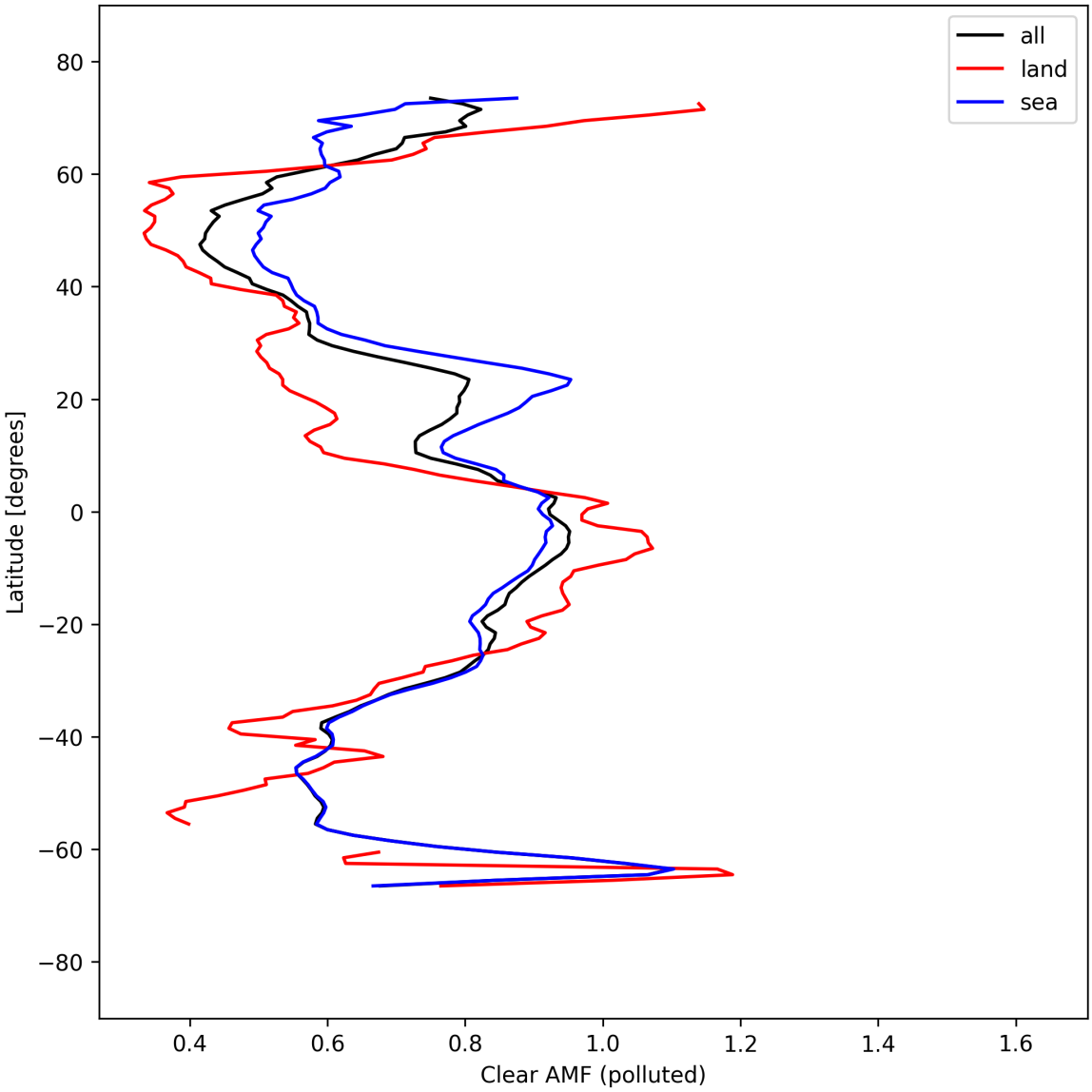

Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-03-27 to 2025-03-28.

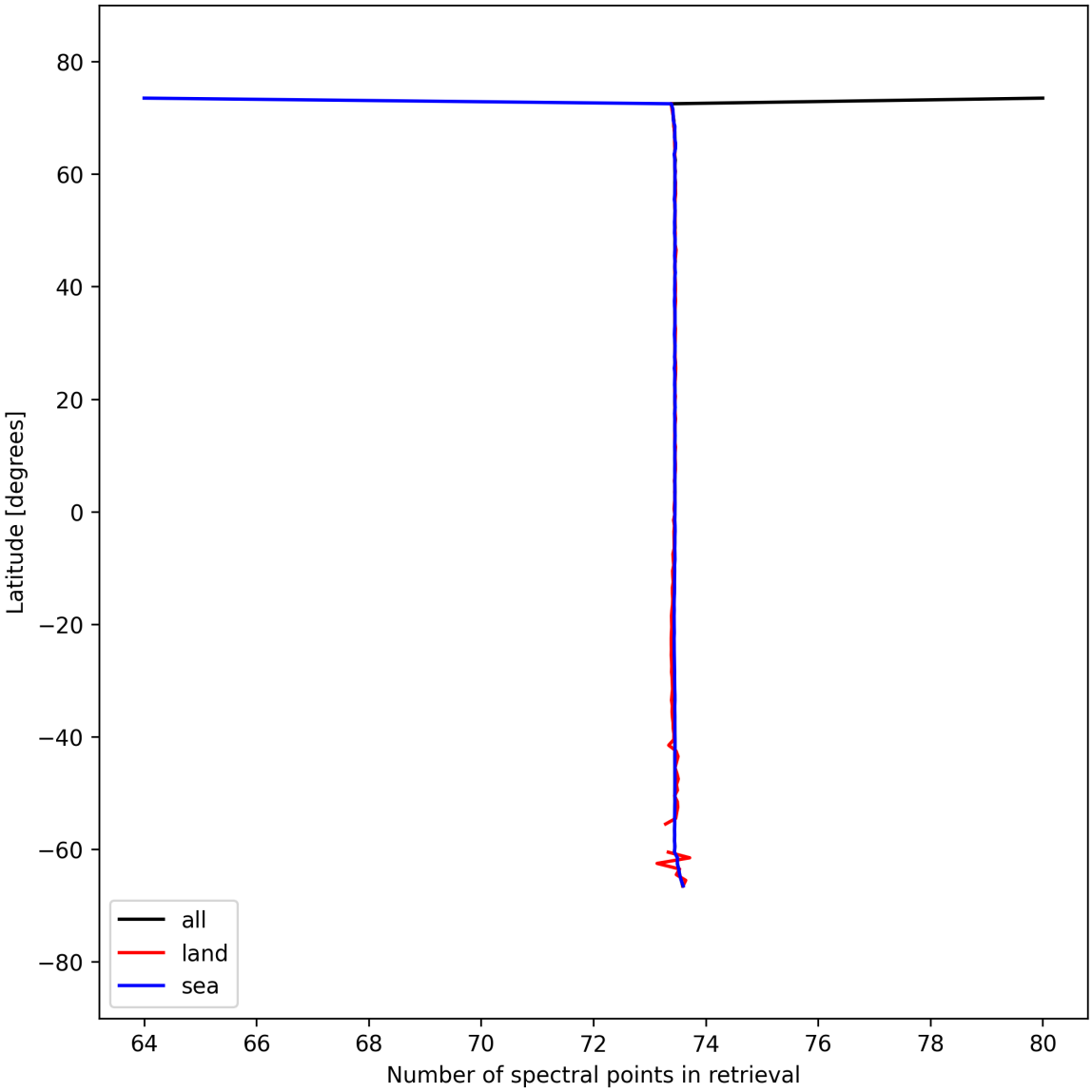

Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-03-27 to 2025-03-28.

8 Histograms

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

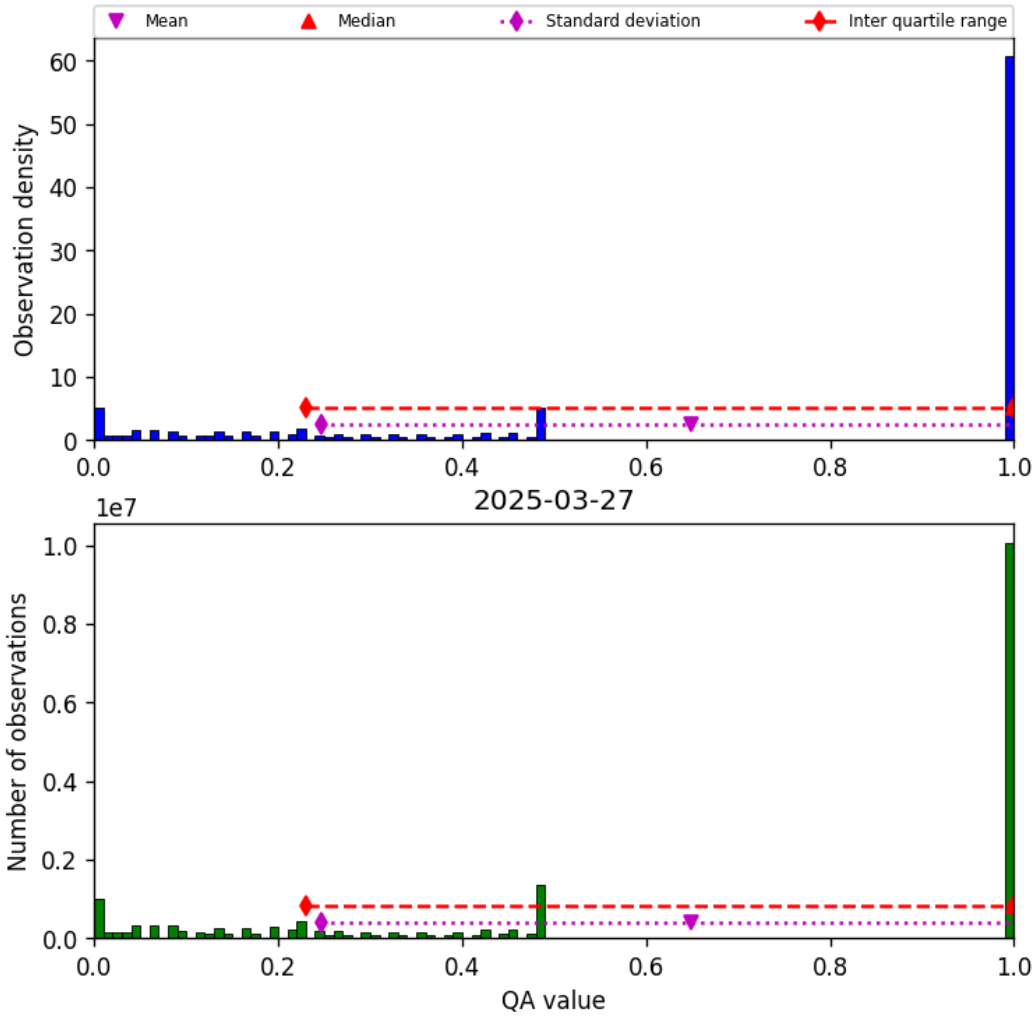

Figure 57: Histogram of “QA value” for 2025-03-27 to 2025-03-28

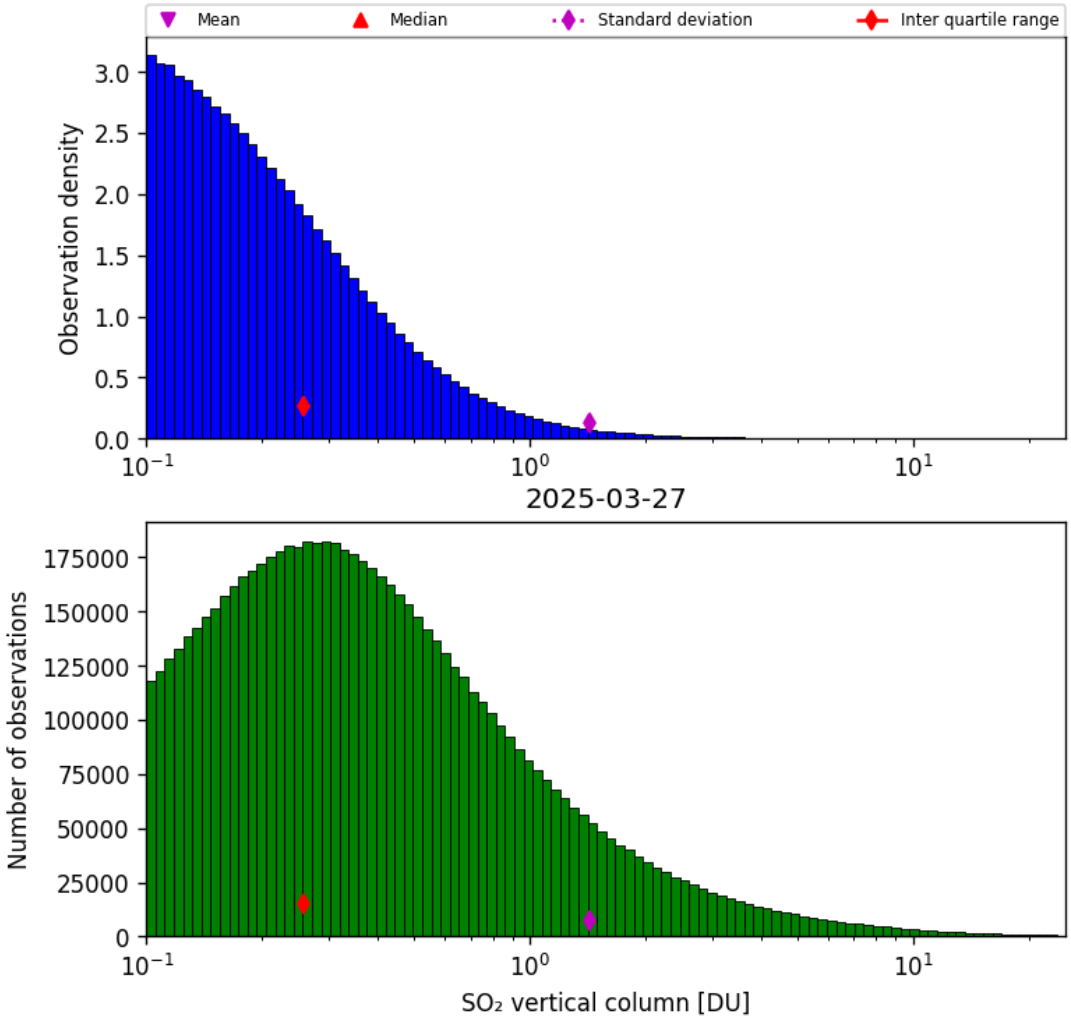

Figure 58: Histogram of "SO_2 vertical column" for 2025-03-27 to 2025-03-28

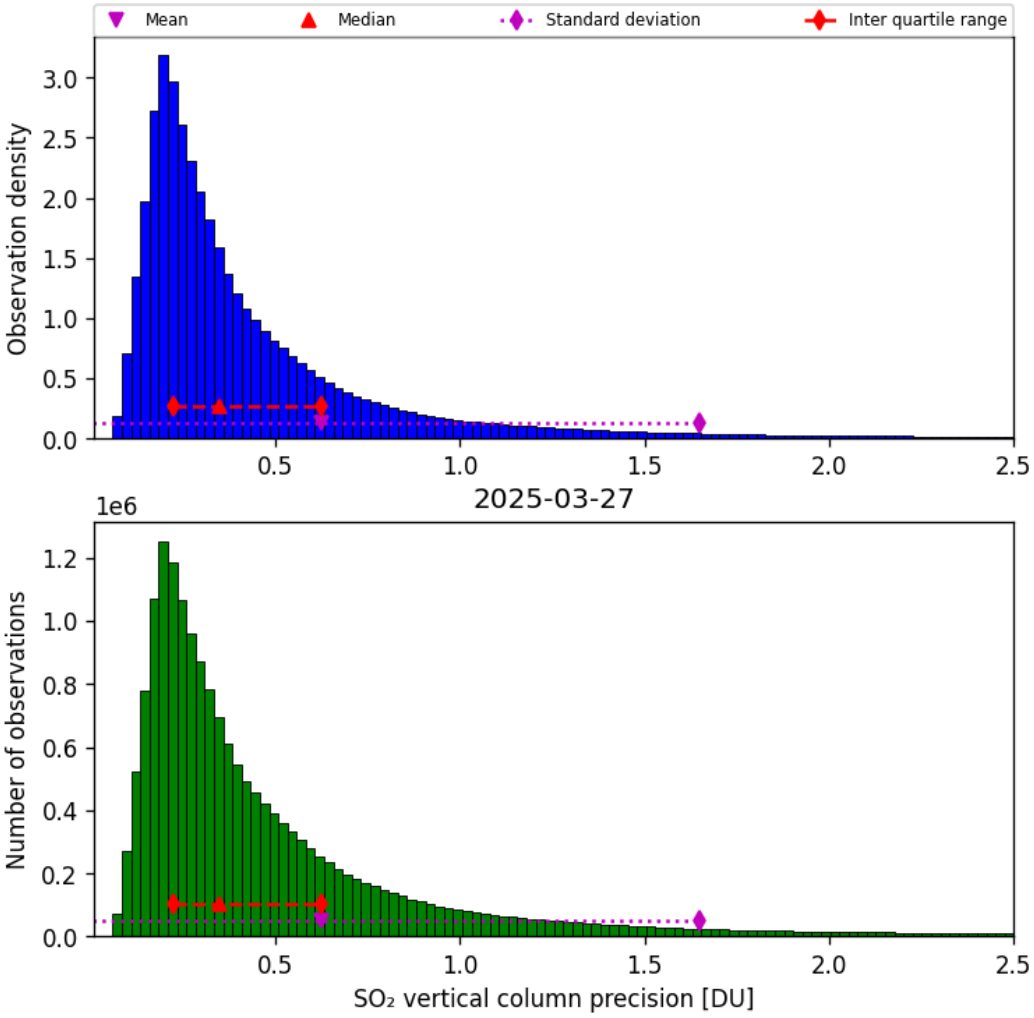

Figure 59: Histogram of "SO_2 vertical column precision" for 2025-03-27 to 2025-03-28

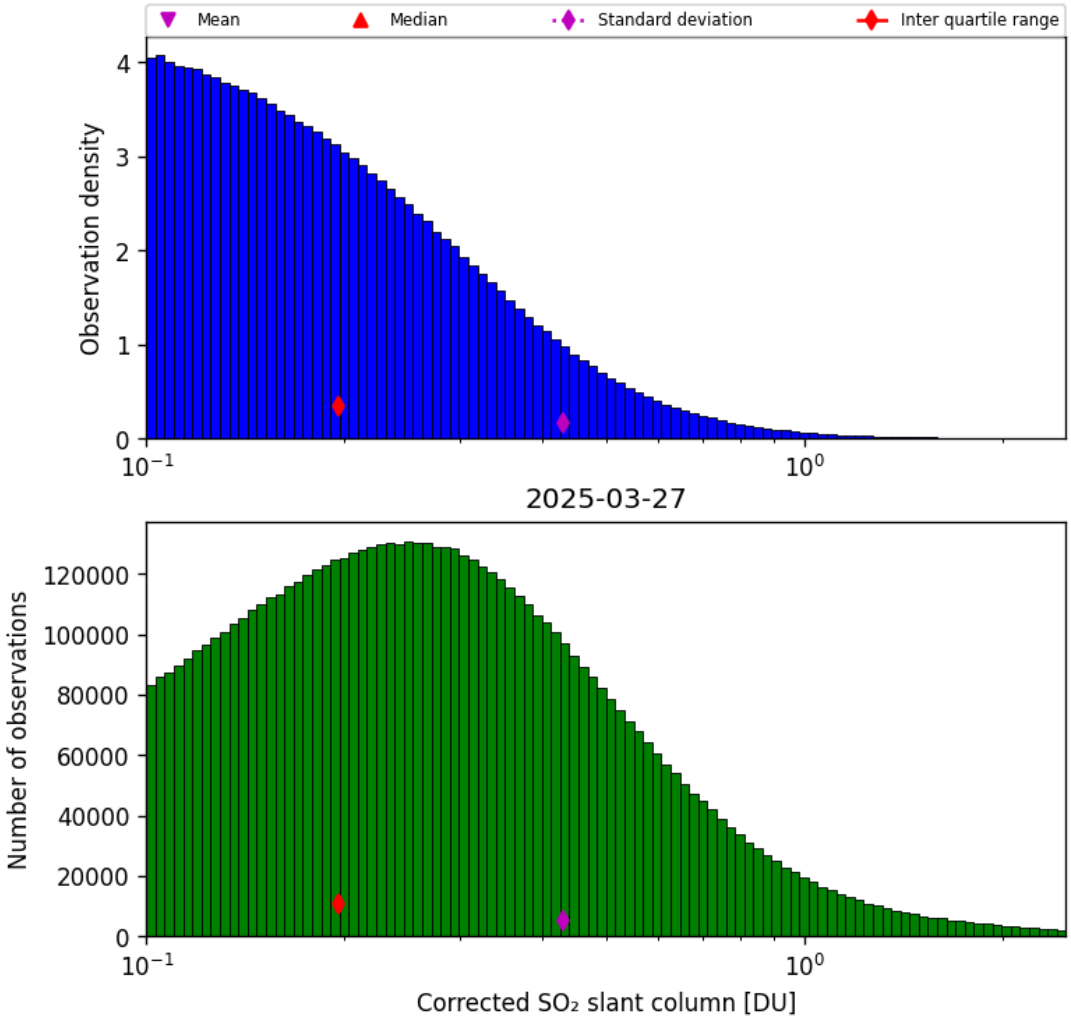

Figure 60: Histogram of "Corrected SO_2 slant column" for 2025-03-27 to 2025-03-28

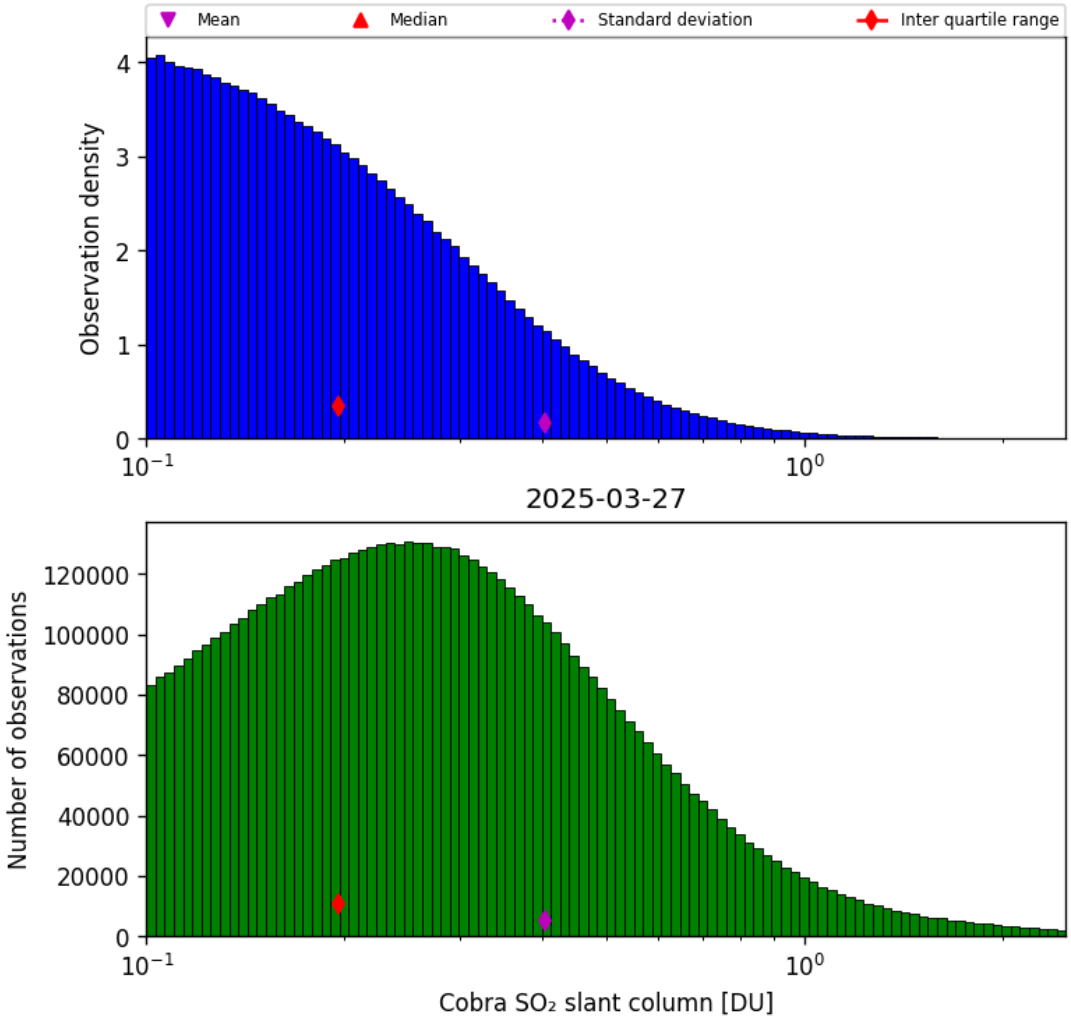

Figure 61: Histogram of "Cobra SO_2 slant column" for 2025-03-27 to 2025-03-28

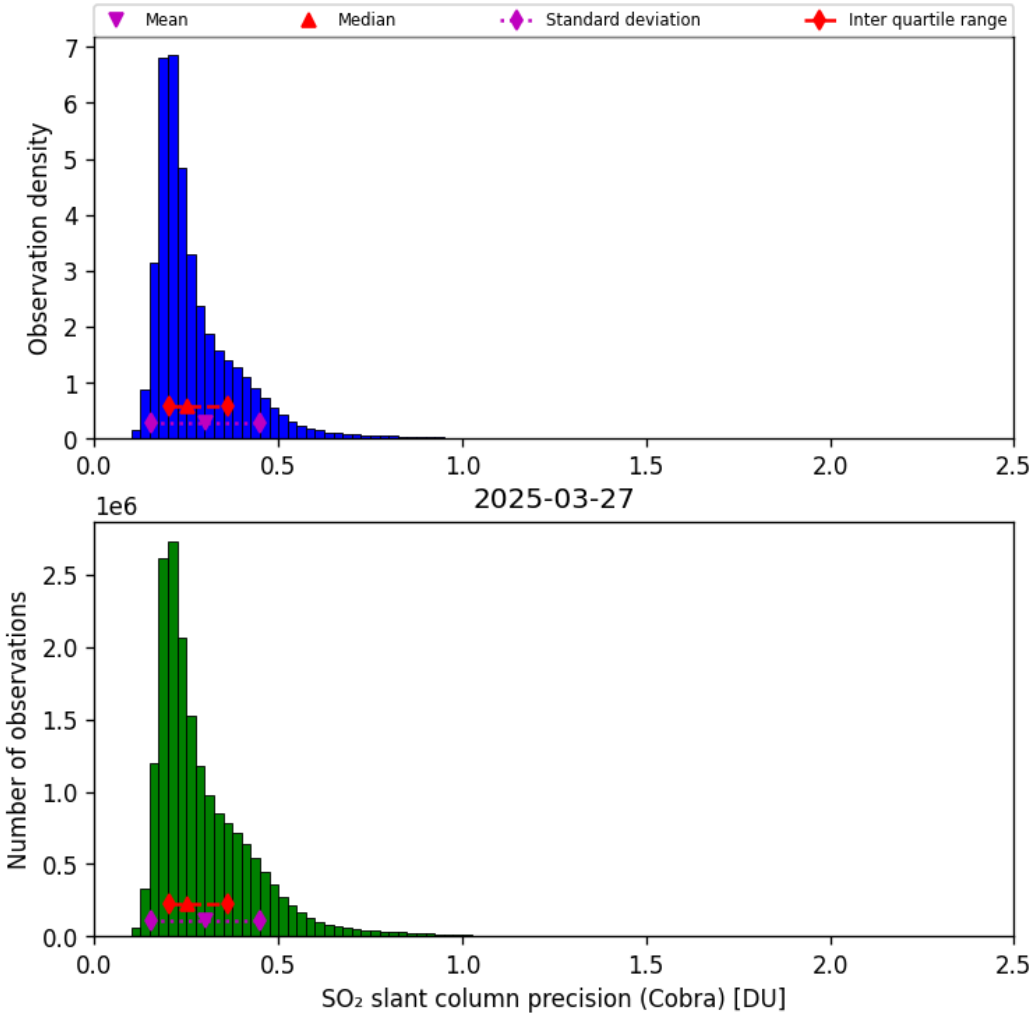

Figure 62: Histogram of "SO_2 slant column precision (Cobra)" for 2025-03-27 to 2025-03-28

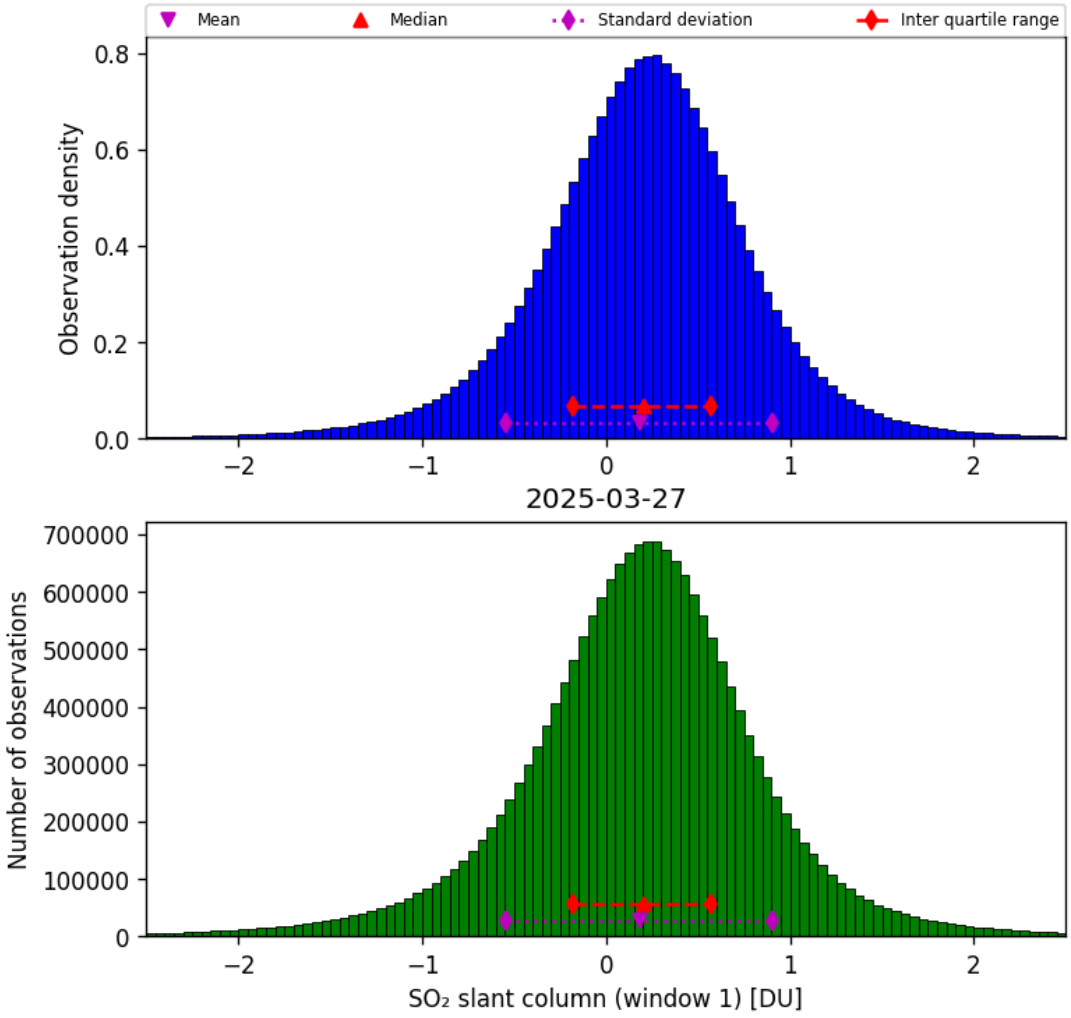

Figure 63: Histogram of "SO_2 slant column (window 1)" for 2025-03-27 to 2025-03-28

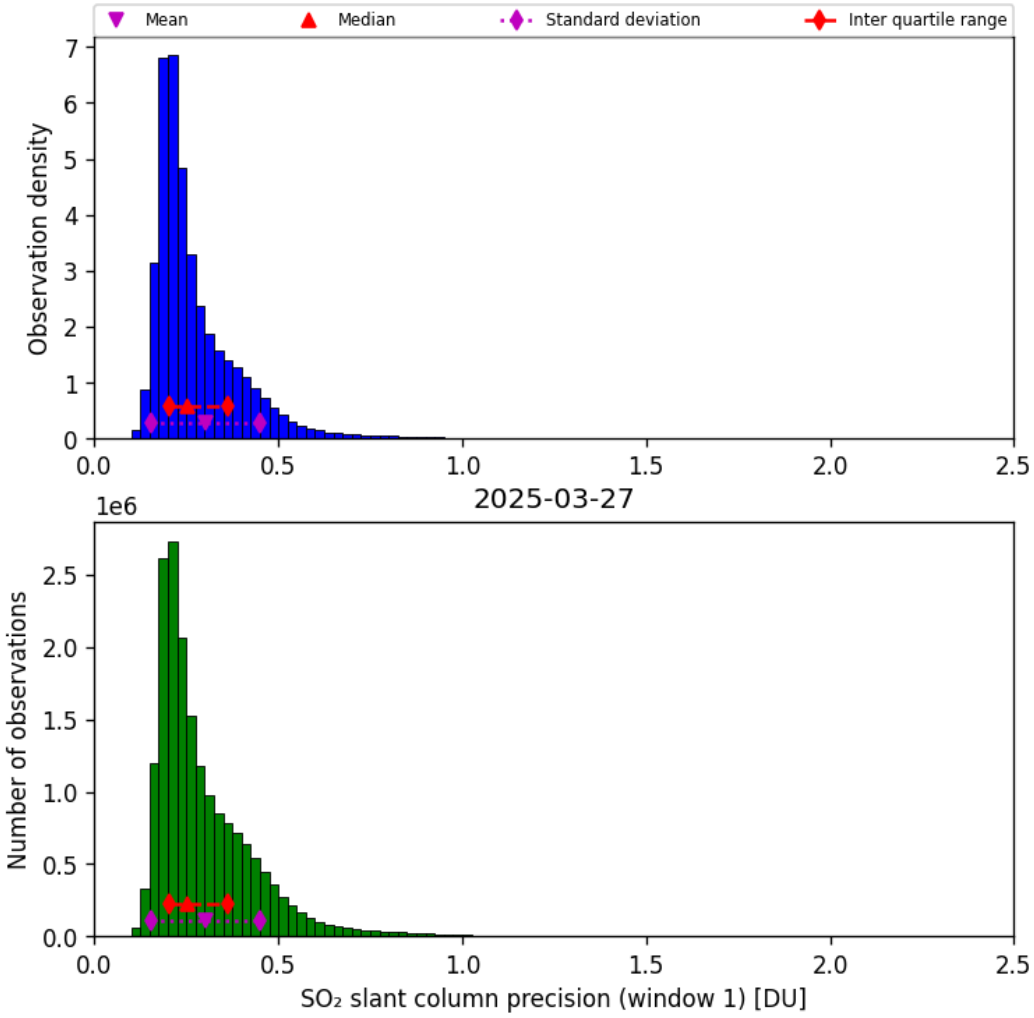

Figure 64: Histogram of "SO_2 slant column precision (window 1)" for 2025-03-27 to 2025-03-28

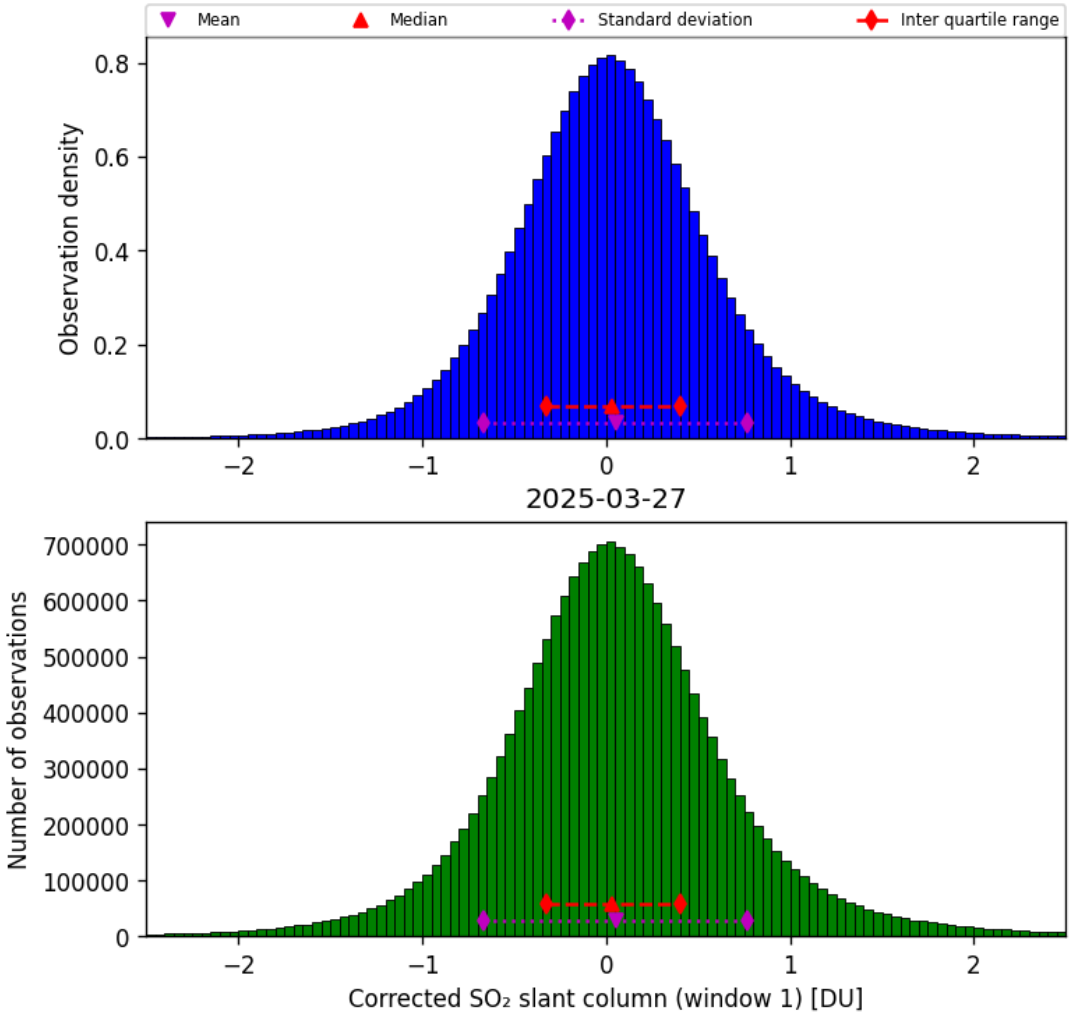

Figure 65: Histogram of "Corrected SO_2 slant column (window 1)" for 2025-03-27 to 2025-03-28

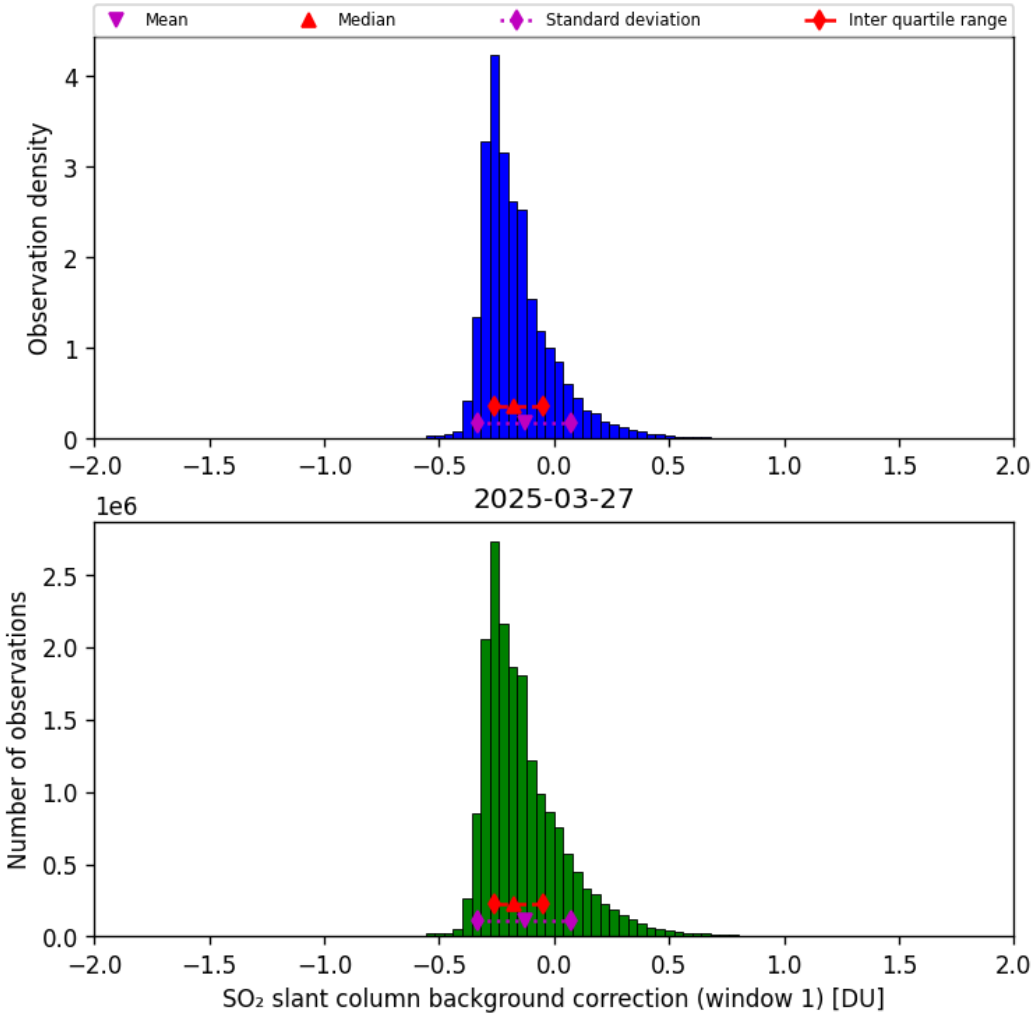

Figure 66: Histogram of "SO_2 slant column background correction (window 1)" for 2025-03-27 to 2025-03-28

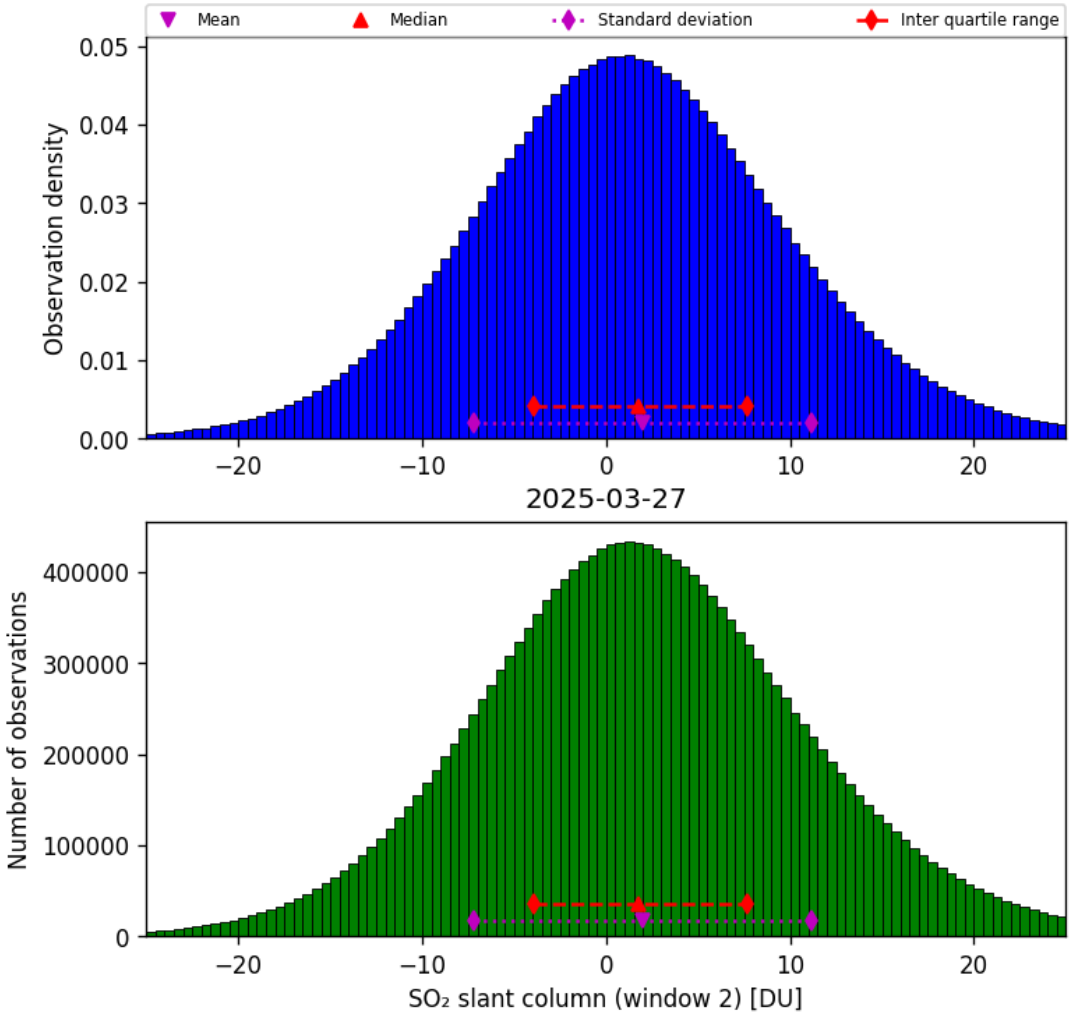

Figure 67: Histogram of "SO_2 slant column (window 2)" for 2025-03-27 to 2025-03-28

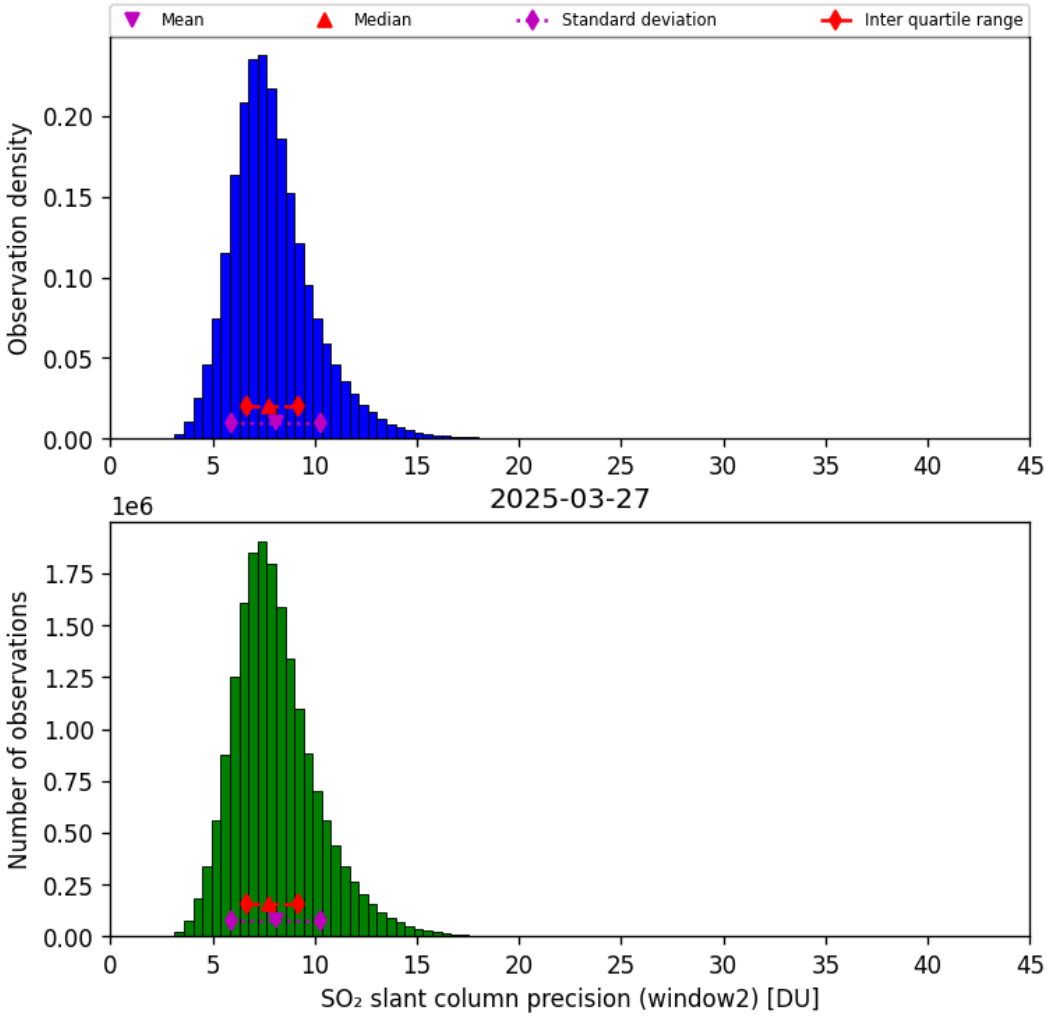

Figure 68: Histogram of "SO_2 slant column precision (window2)" for 2025-03-27 to 2025-03-28

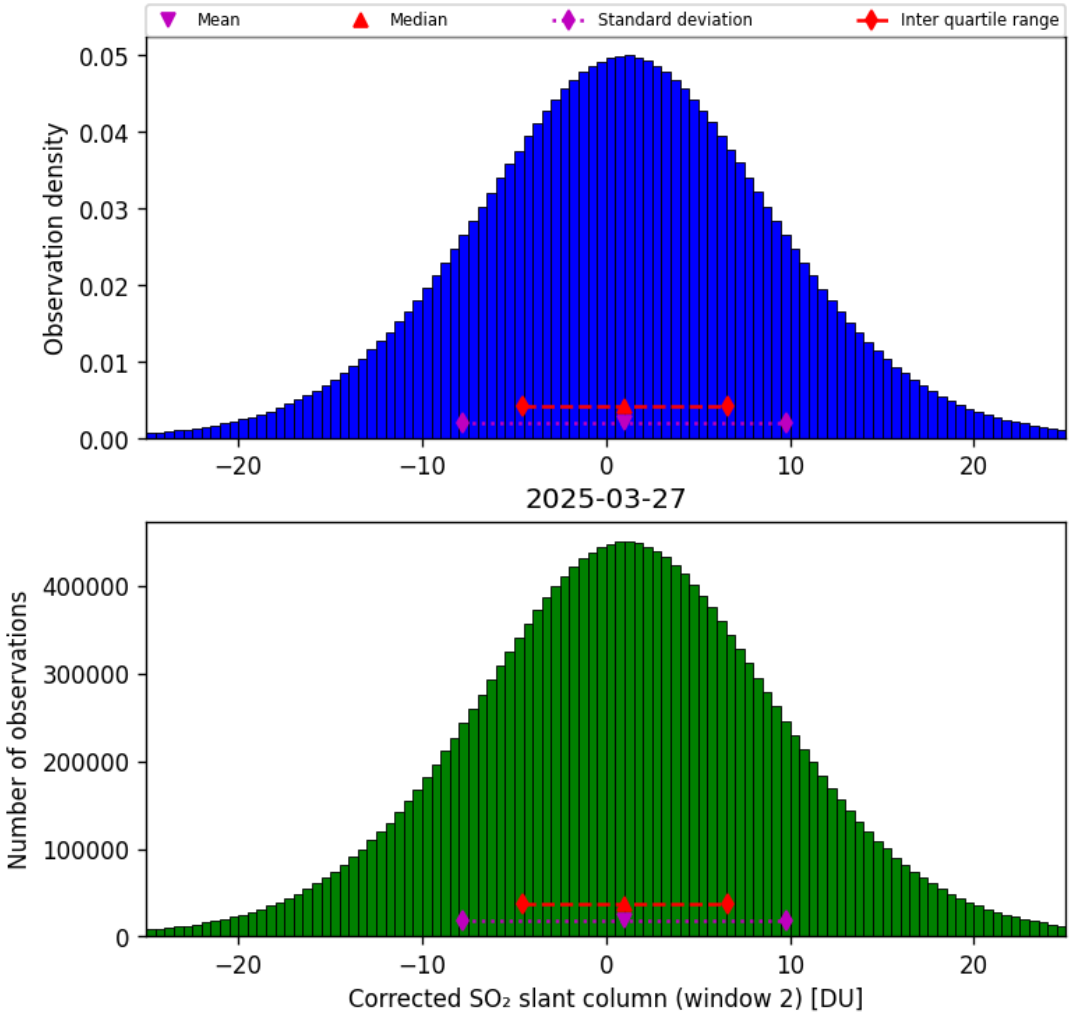

Figure 69: Histogram of "Corrected SO_2 slant column (window 2)" for 2025-03-27 to 2025-03-28

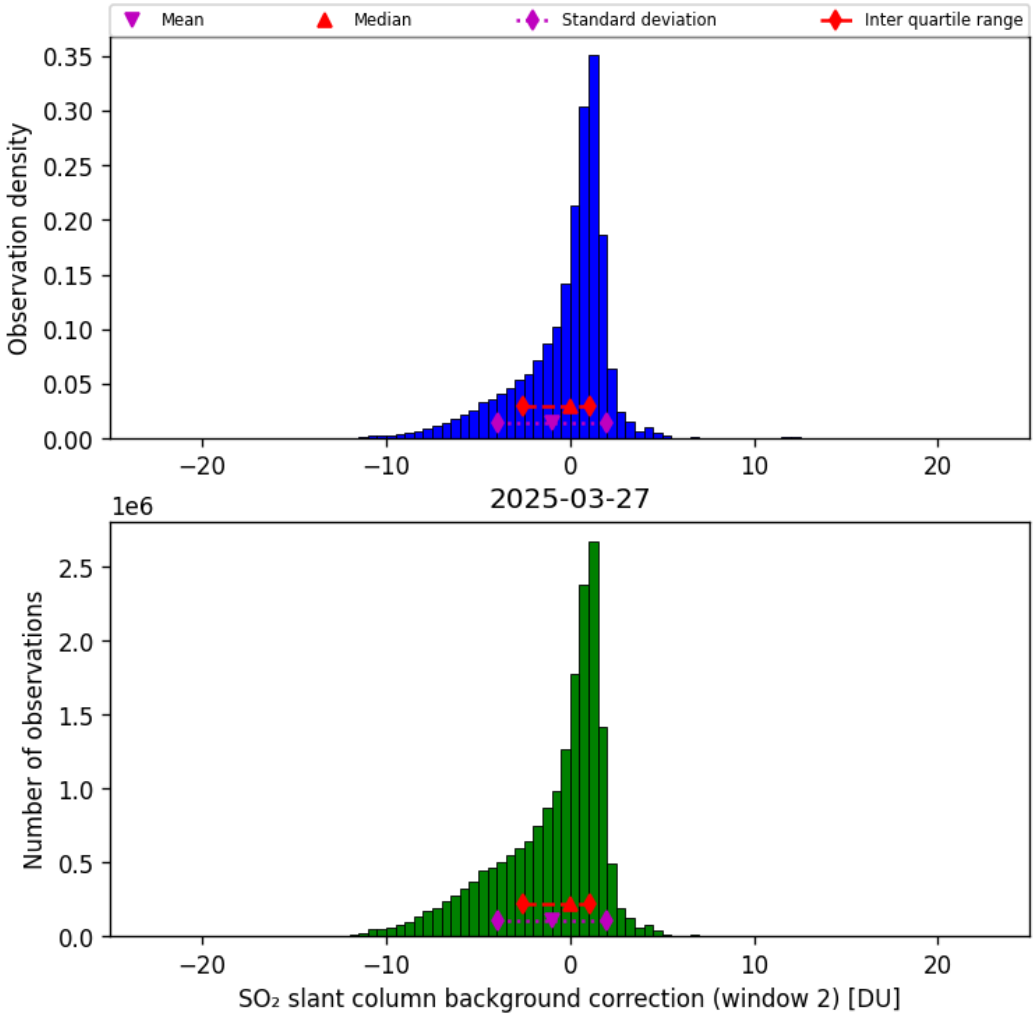

Figure 70: Histogram of "SO_2 slant column background correction (window 2)" for 2025-03-27 to 2025-03-28

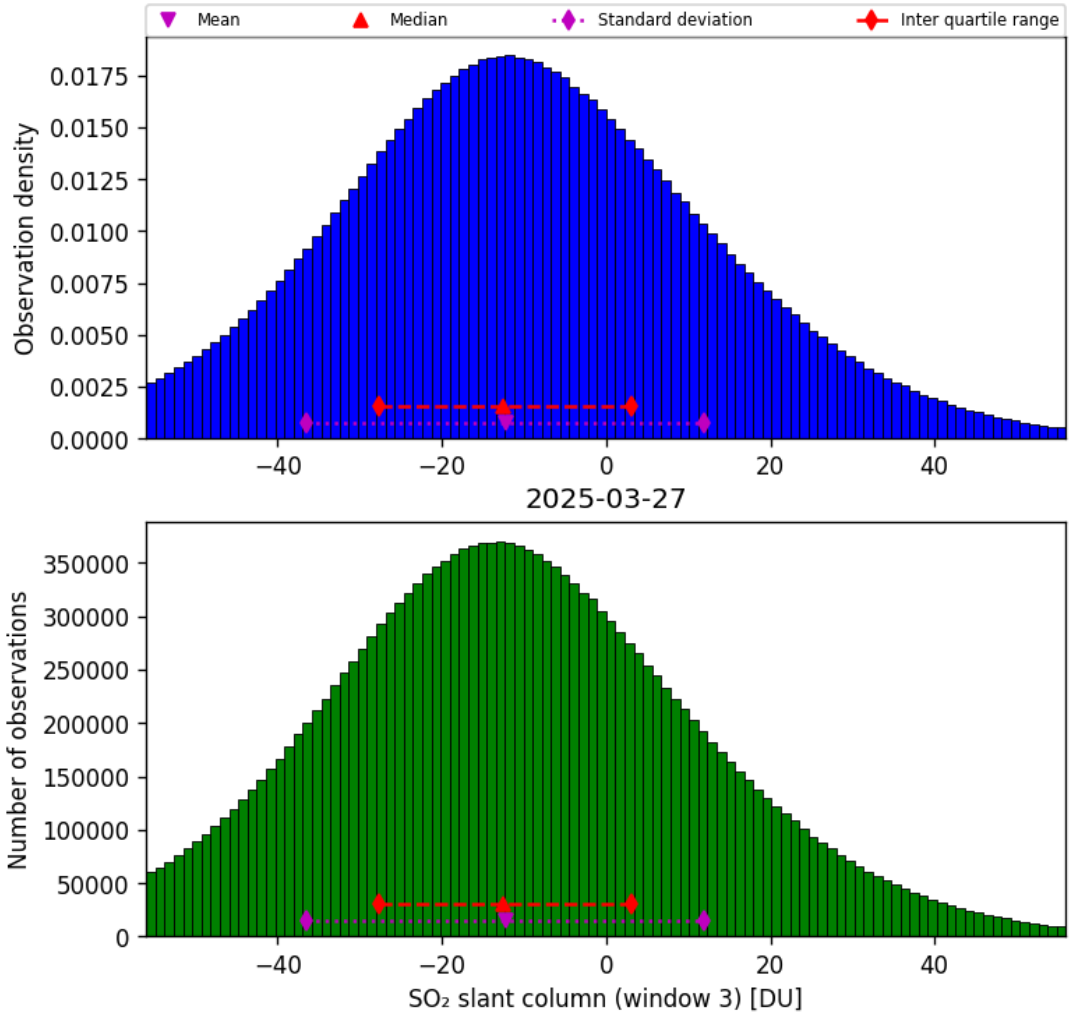

Figure 71: Histogram of "SO_2 slant column (window 3)" for 2025-03-27 to 2025-03-28

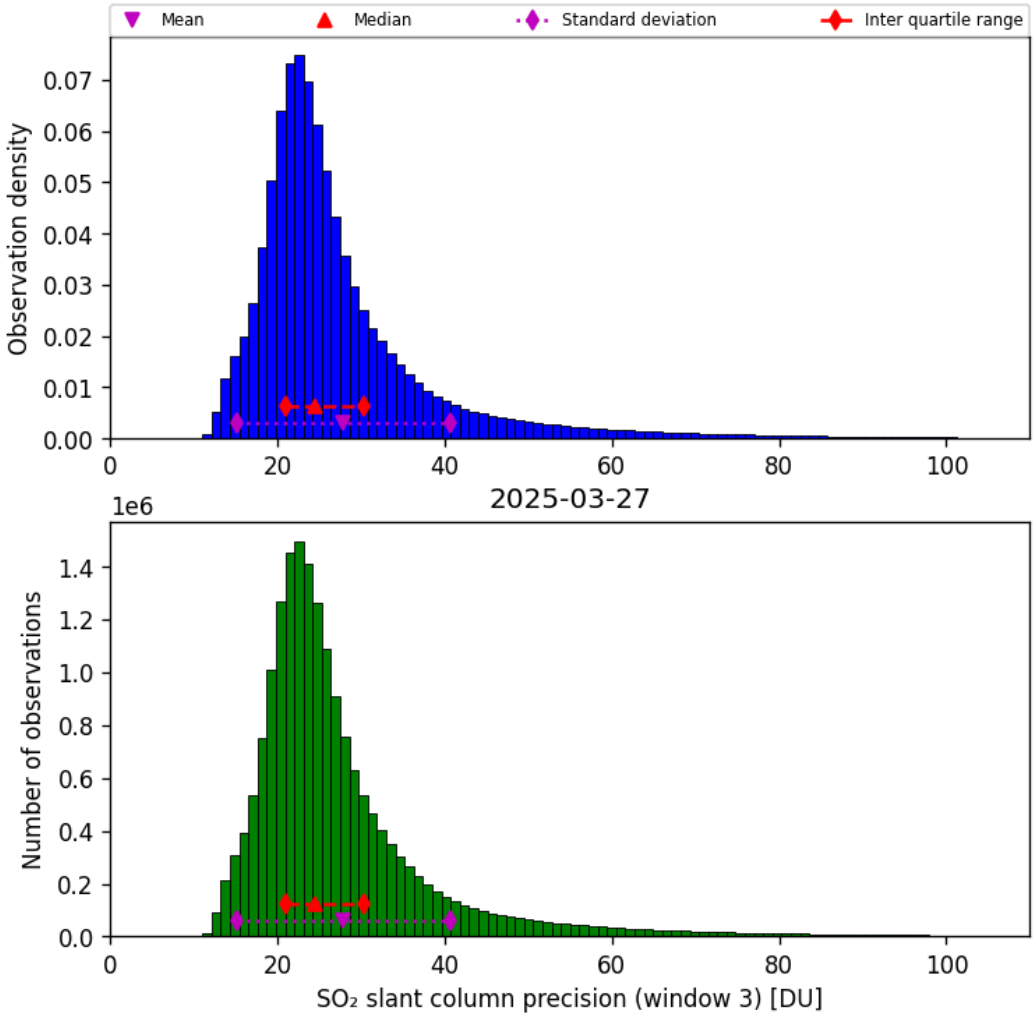

Figure 72: Histogram of "SO_2 slant column precision (window 3)" for 2025-03-27 to 2025-03-28

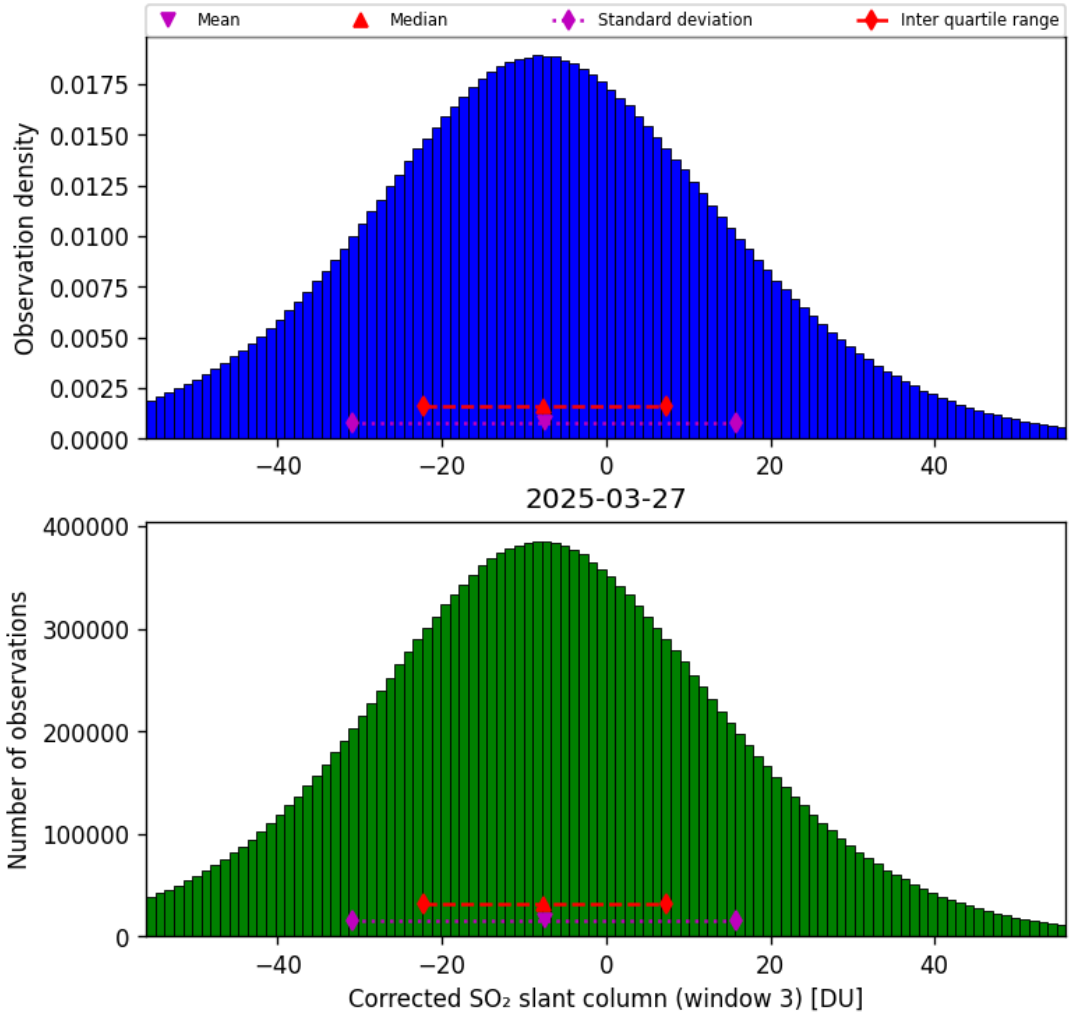

Figure 73: Histogram of "Corrected SO_2 slant column (window 3)" for 2025-03-27 to 2025-03-28

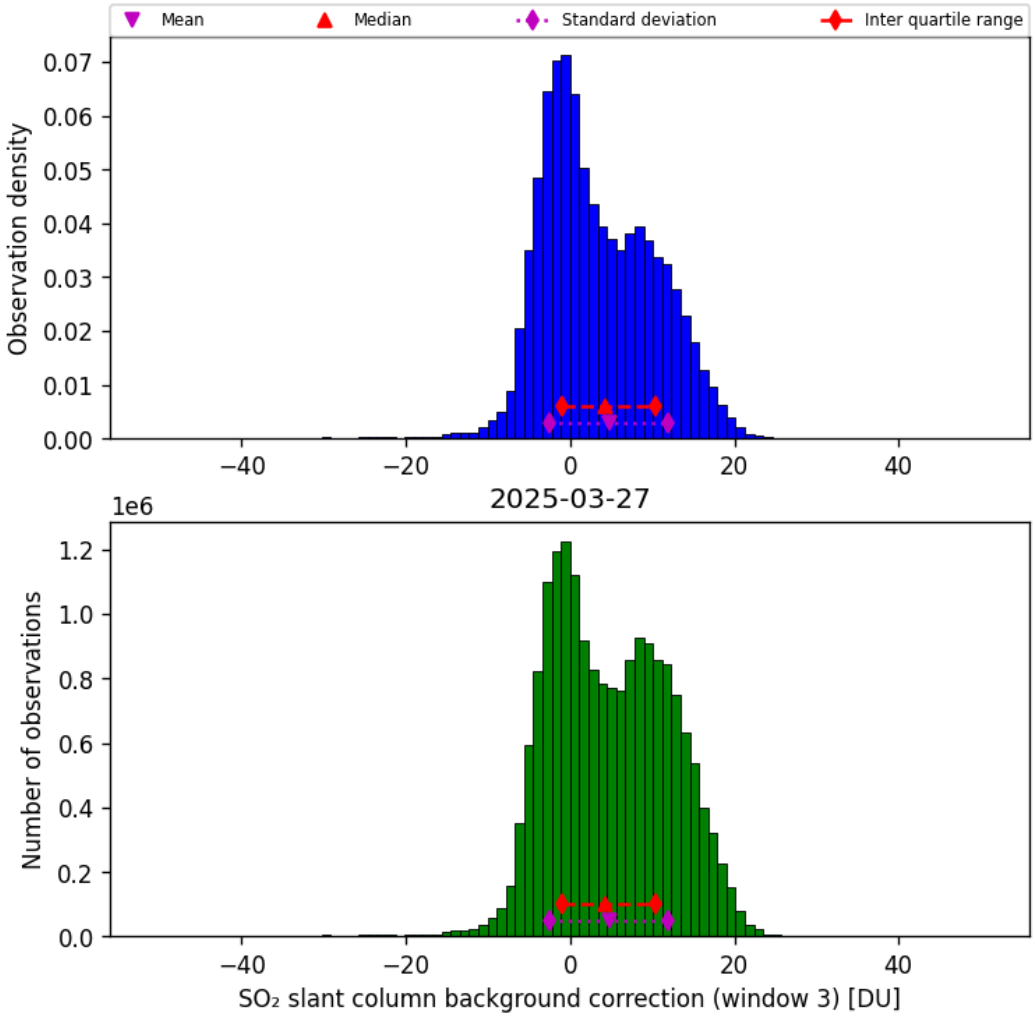

Figure 74: Histogram of "SO_2 slant column background correction (window 3)" for 2025-03-27 to 2025-03-28

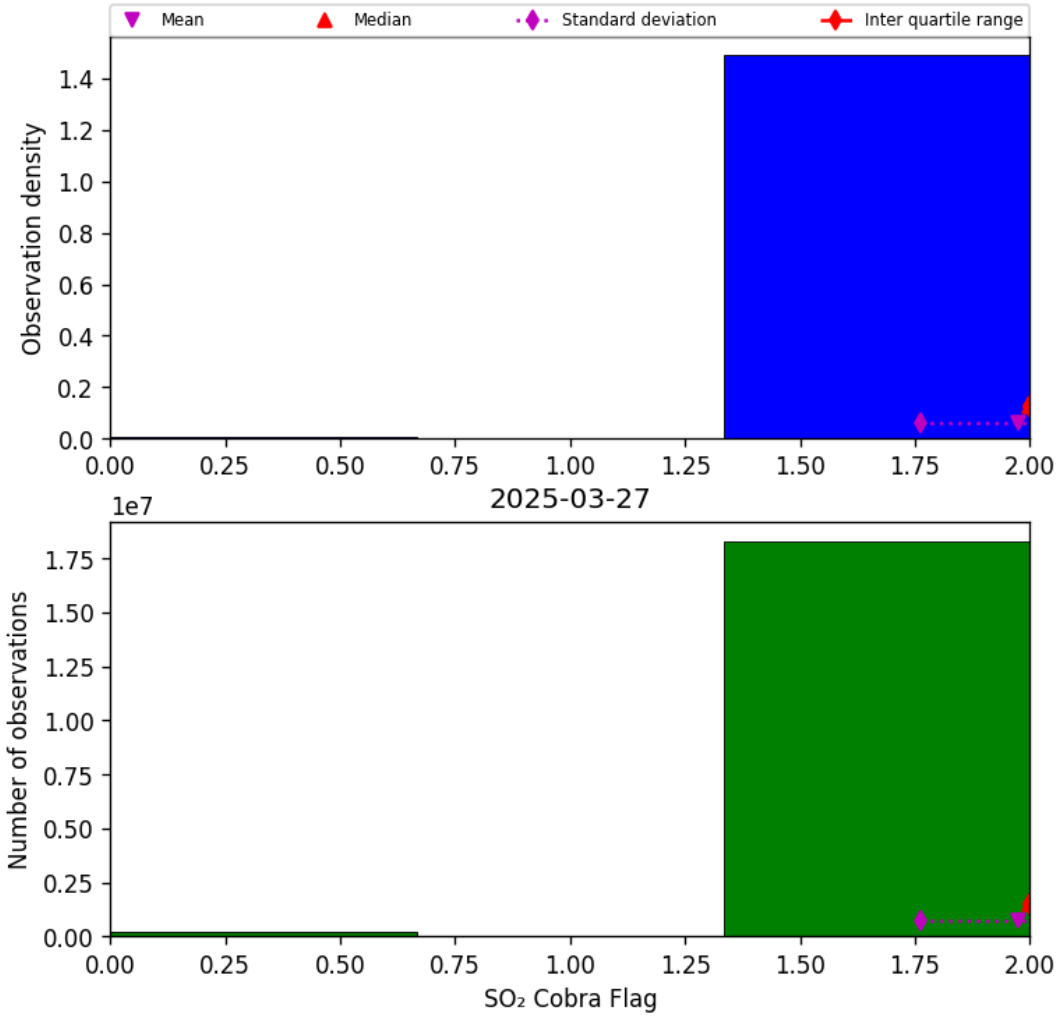

Figure 75: Histogram of "SO_2 Cobra Flag" for 2025-03-27 to 2025-03-28

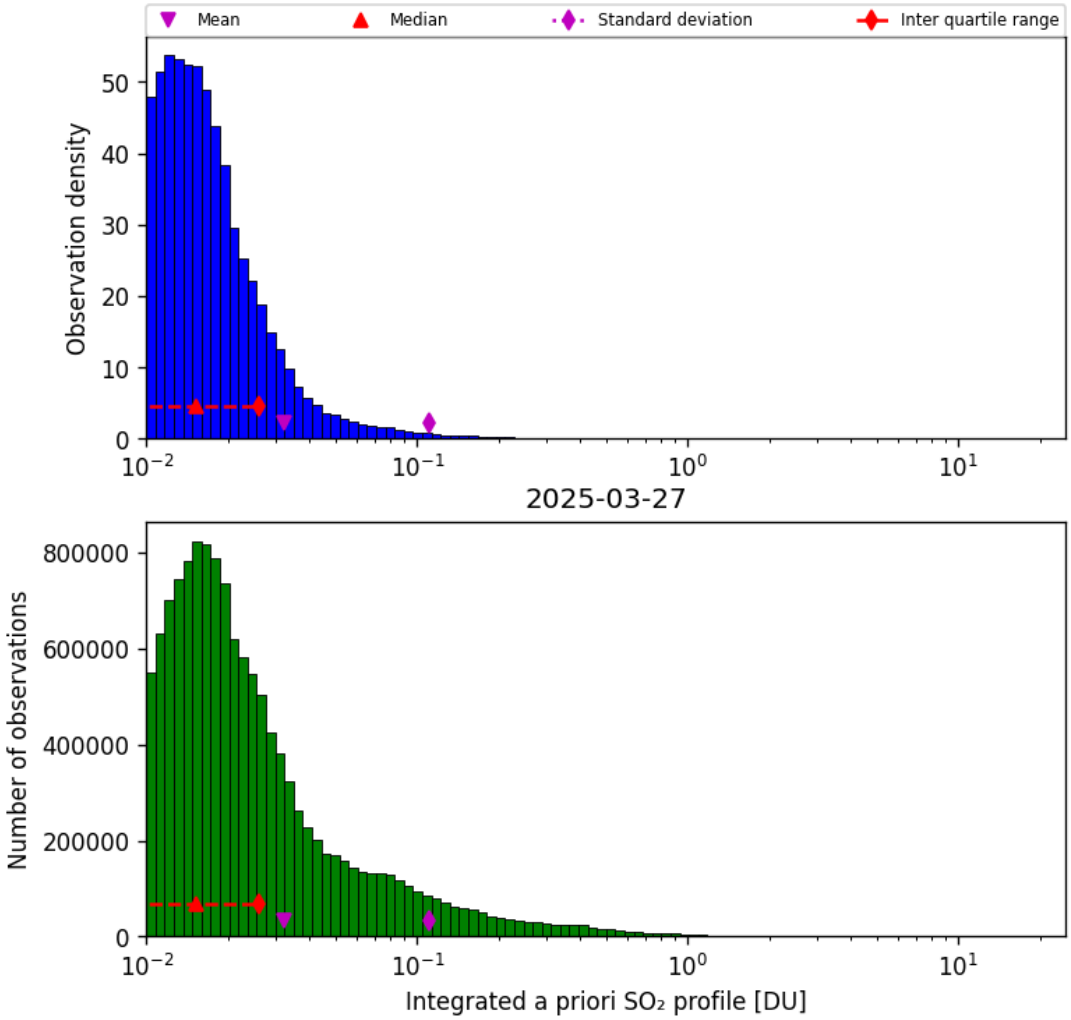

Figure 76: Histogram of "Integrated a priori SO_2 profile" for 2025-03-27 to 2025-03-28

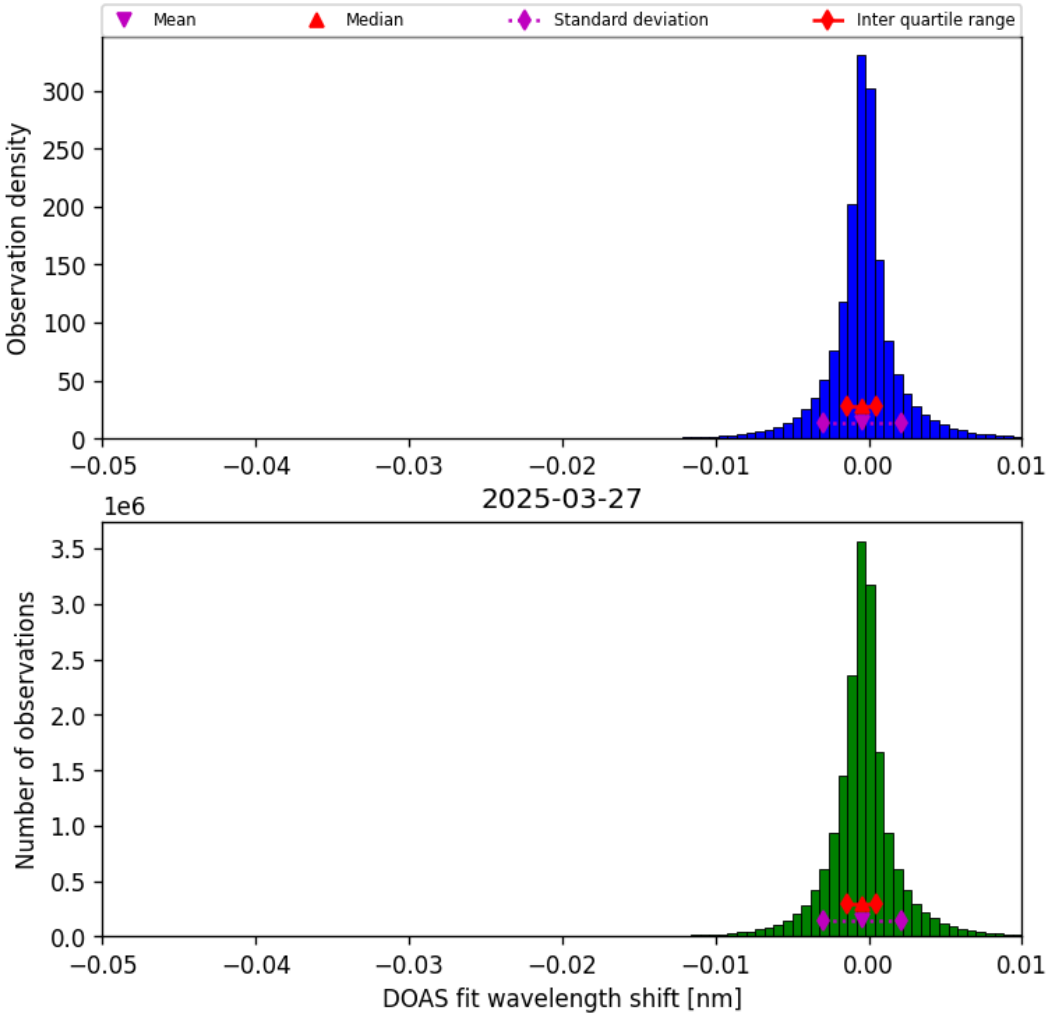

Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-03-27 to 2025-03-28

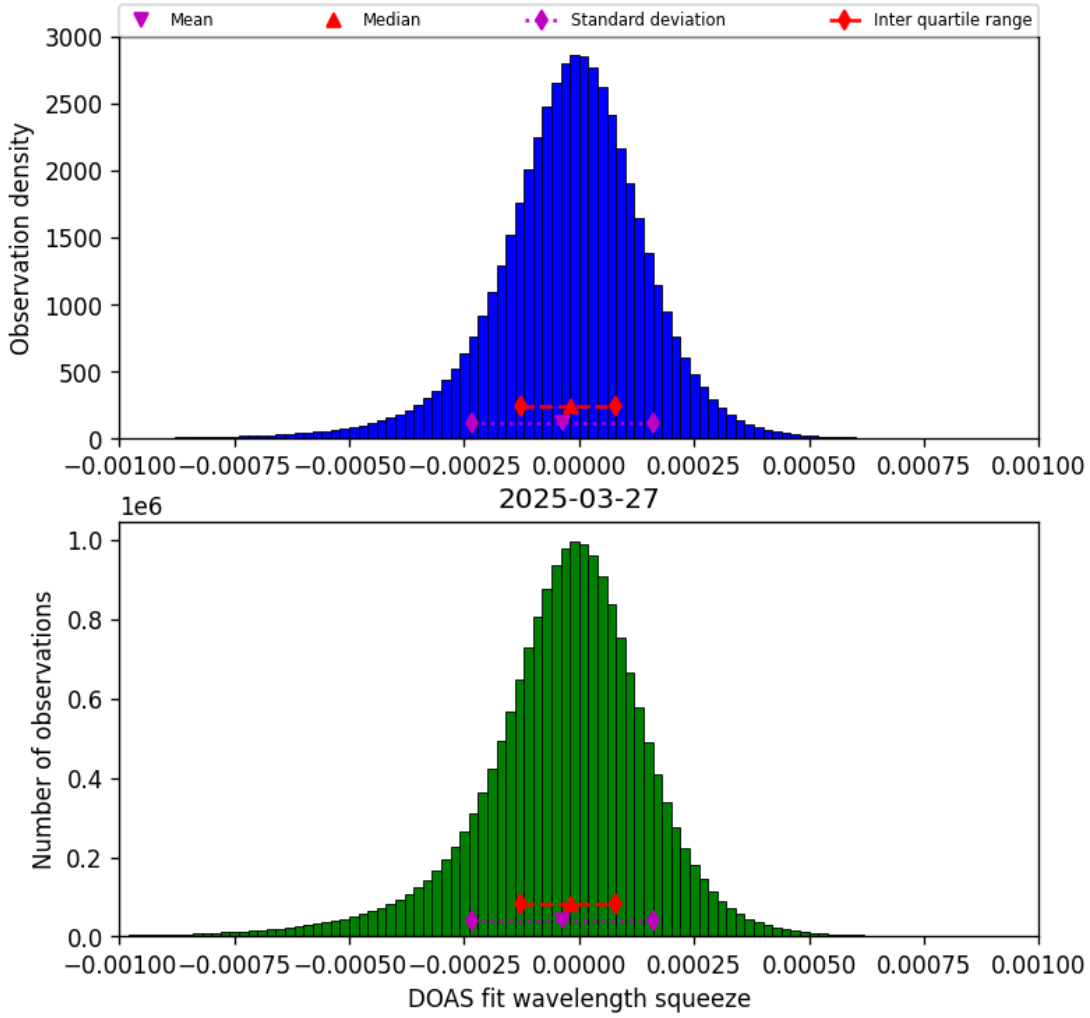

Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-03-27 to 2025-03-28

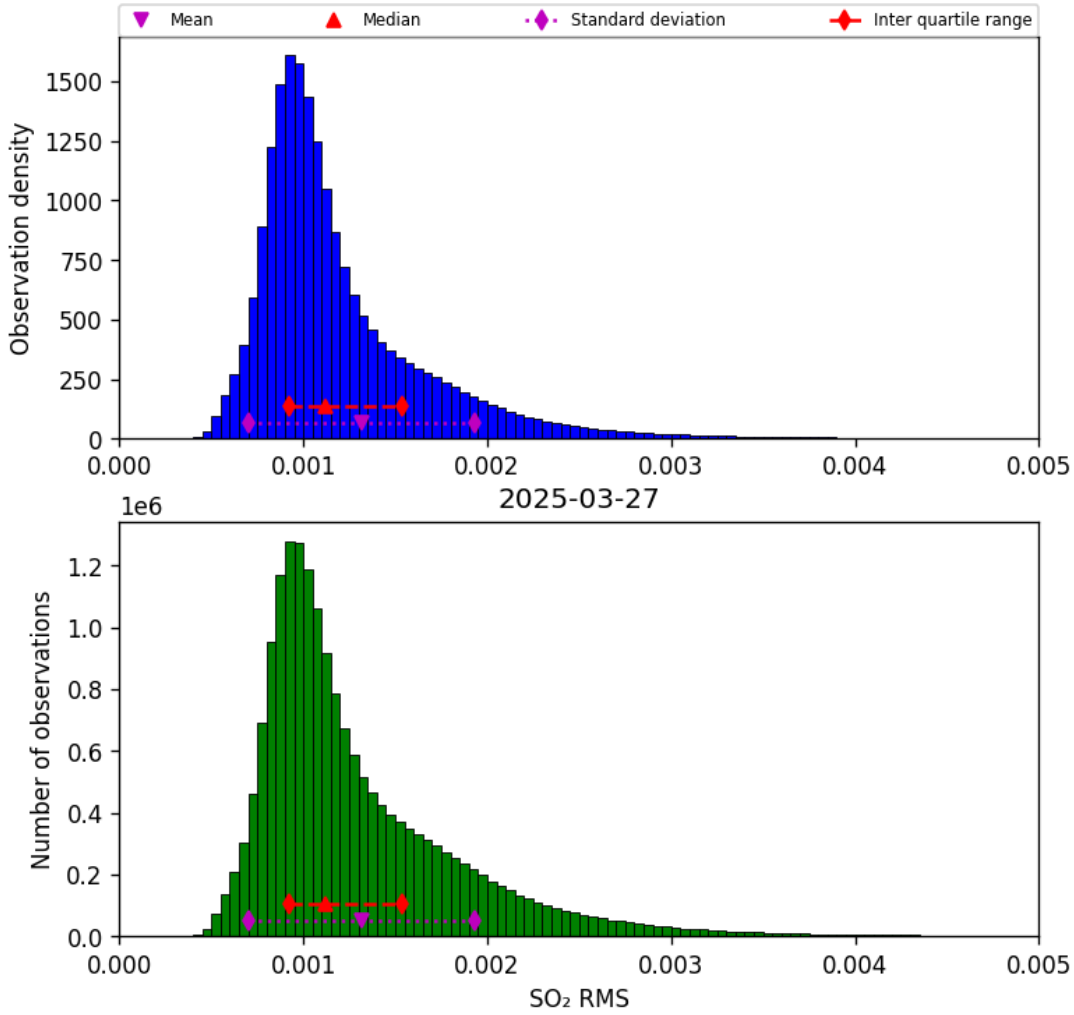

Figure 79: Histogram of "SO_2 RMS" for 2025-03-27 to 2025-03-28

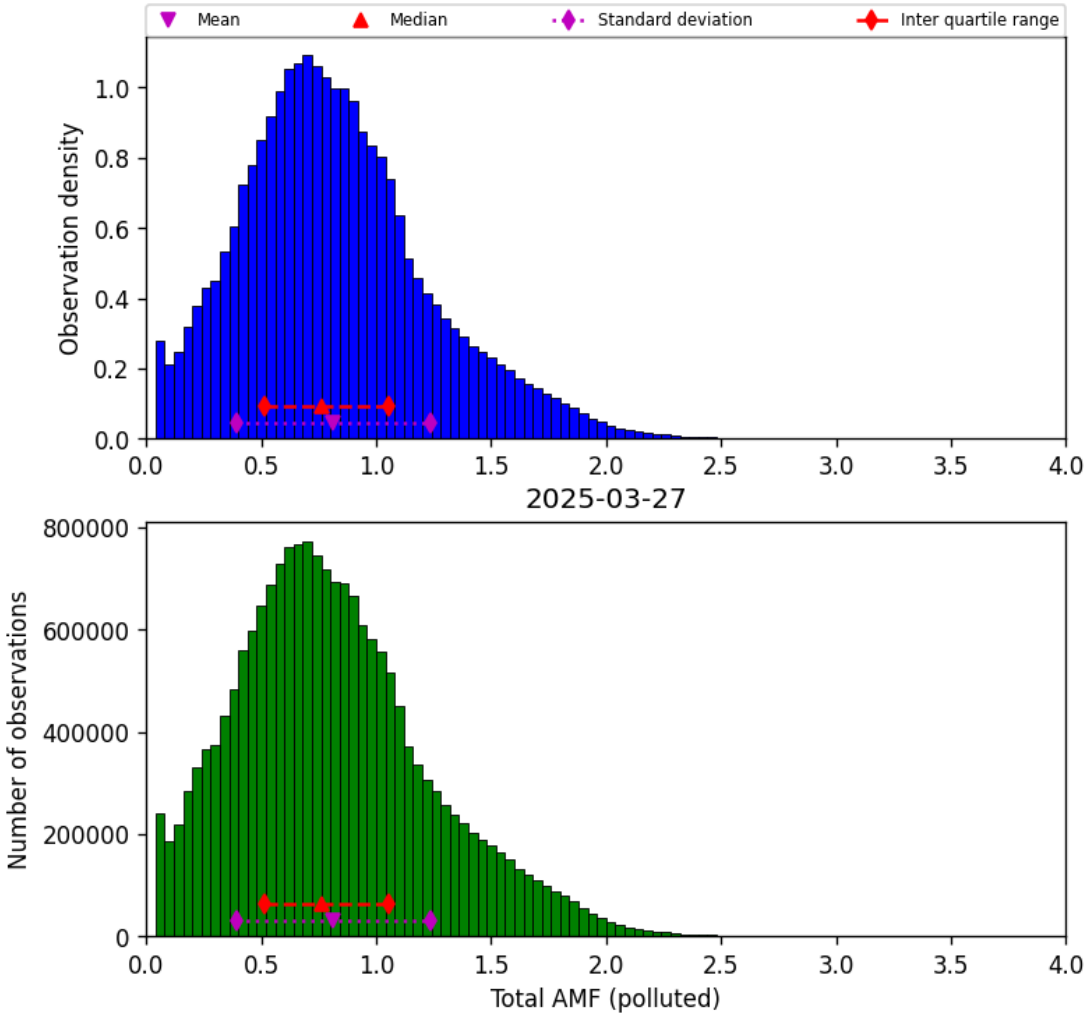

Figure 80: Histogram of “Total AMF (polluted)” for 2025-03-27 to 2025-03-28

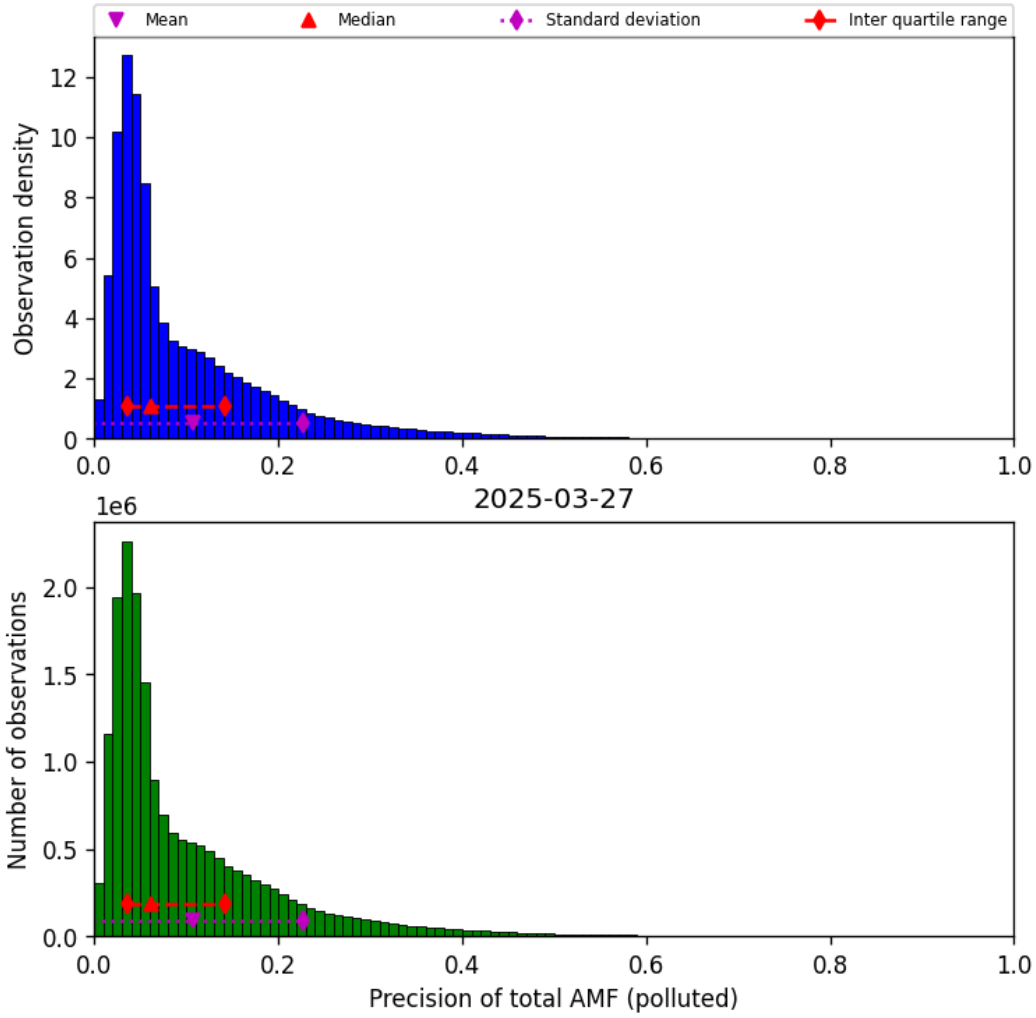

Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-03-27 to 2025-03-28

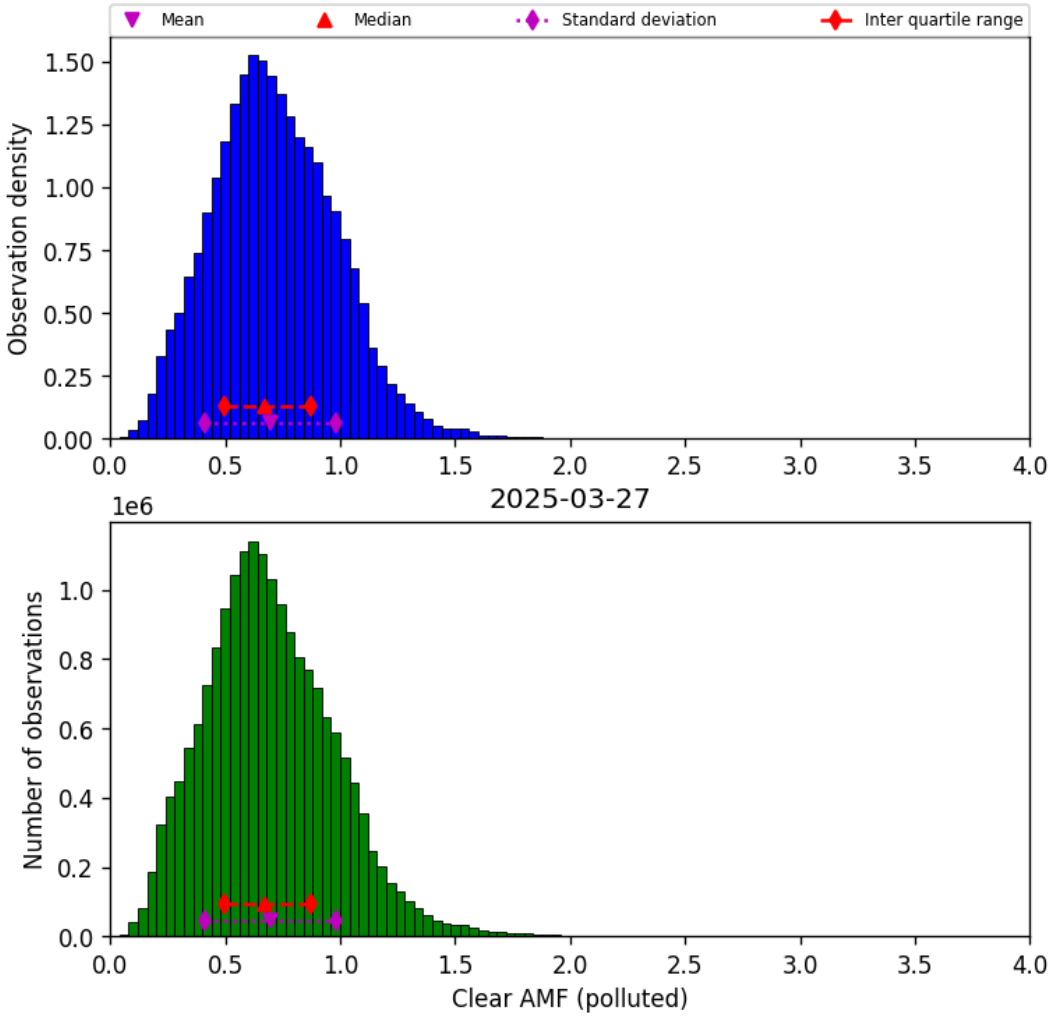

Figure 82: Histogram of “Clear AMF (polluted)” for 2025-03-27 to 2025-03-28

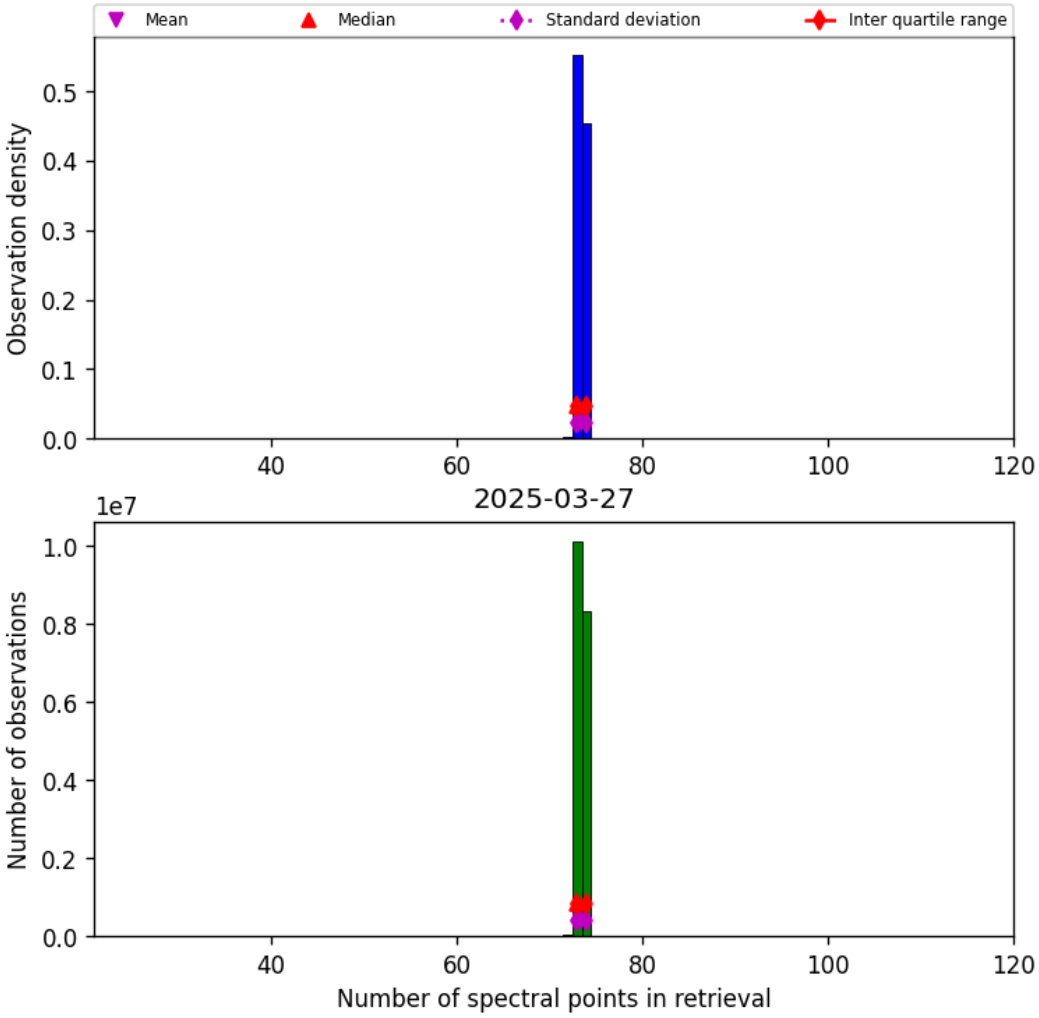

Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-03-27 to 2025-03-28

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.

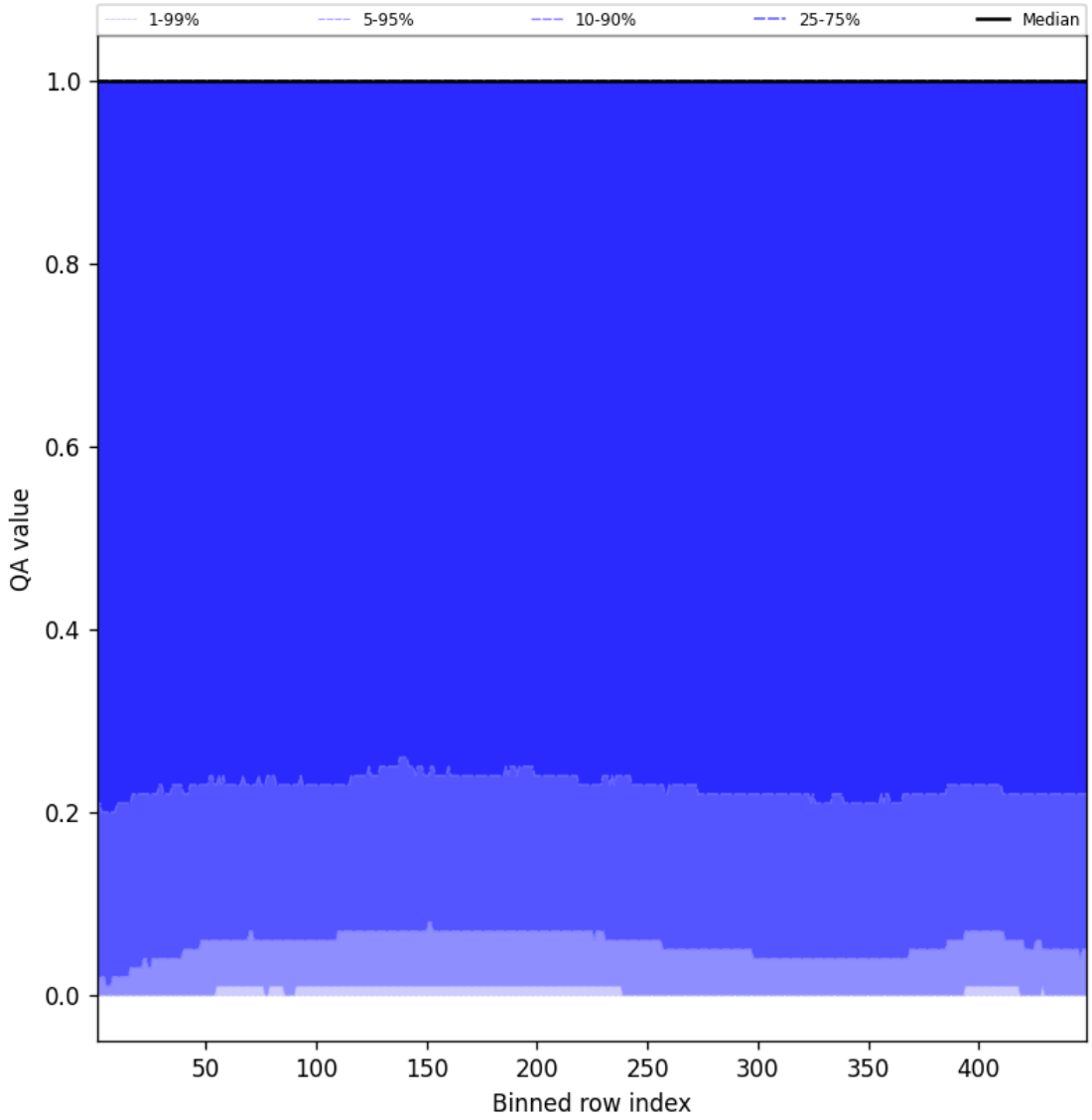

Figure 84: Along track statistics of “QA value” for 2025-03-27 to 2025-03-28

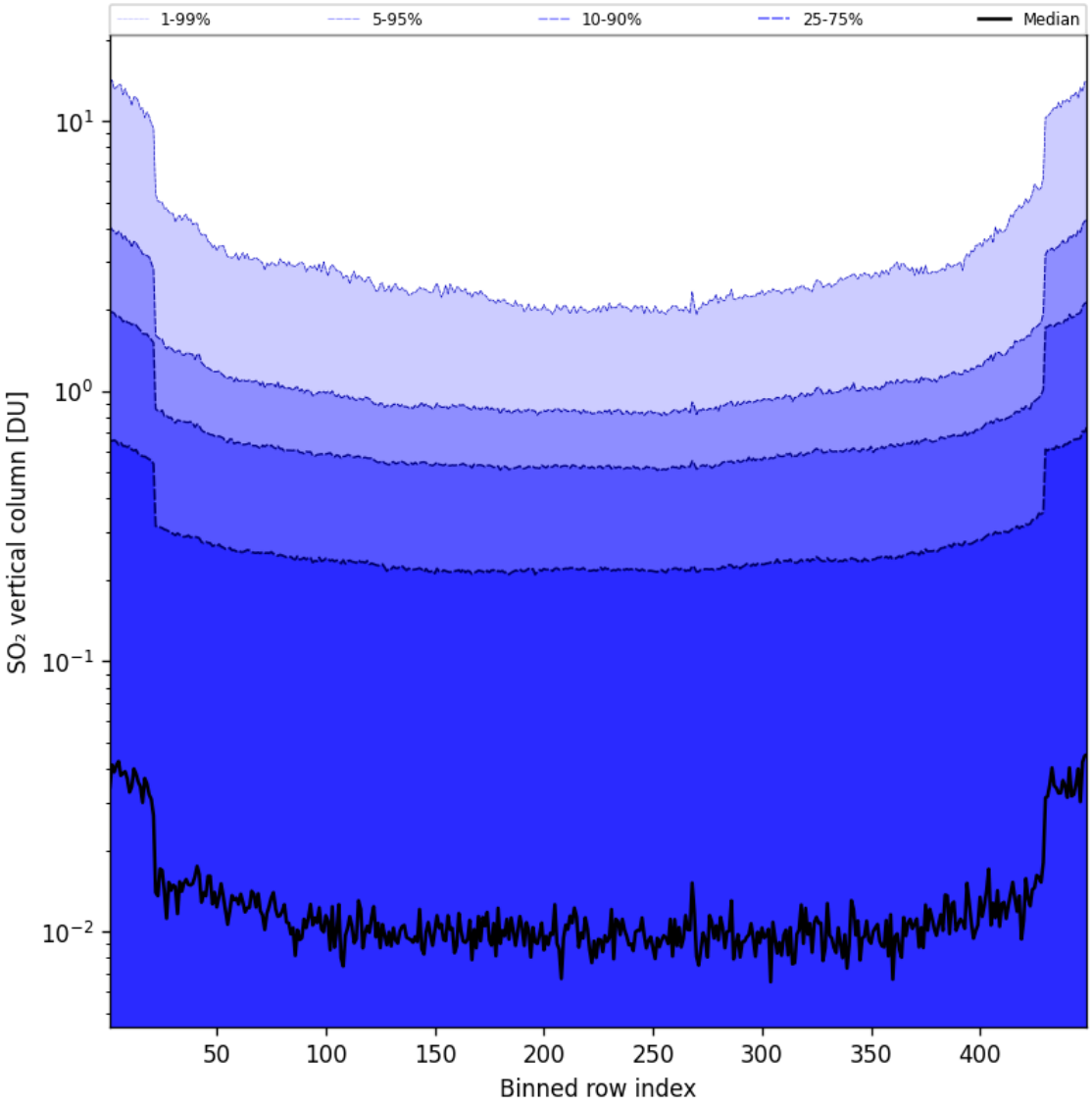

Figure 85: Along track statistics of "SO_2 vertical column" for 2025-03-27 to 2025-03-28

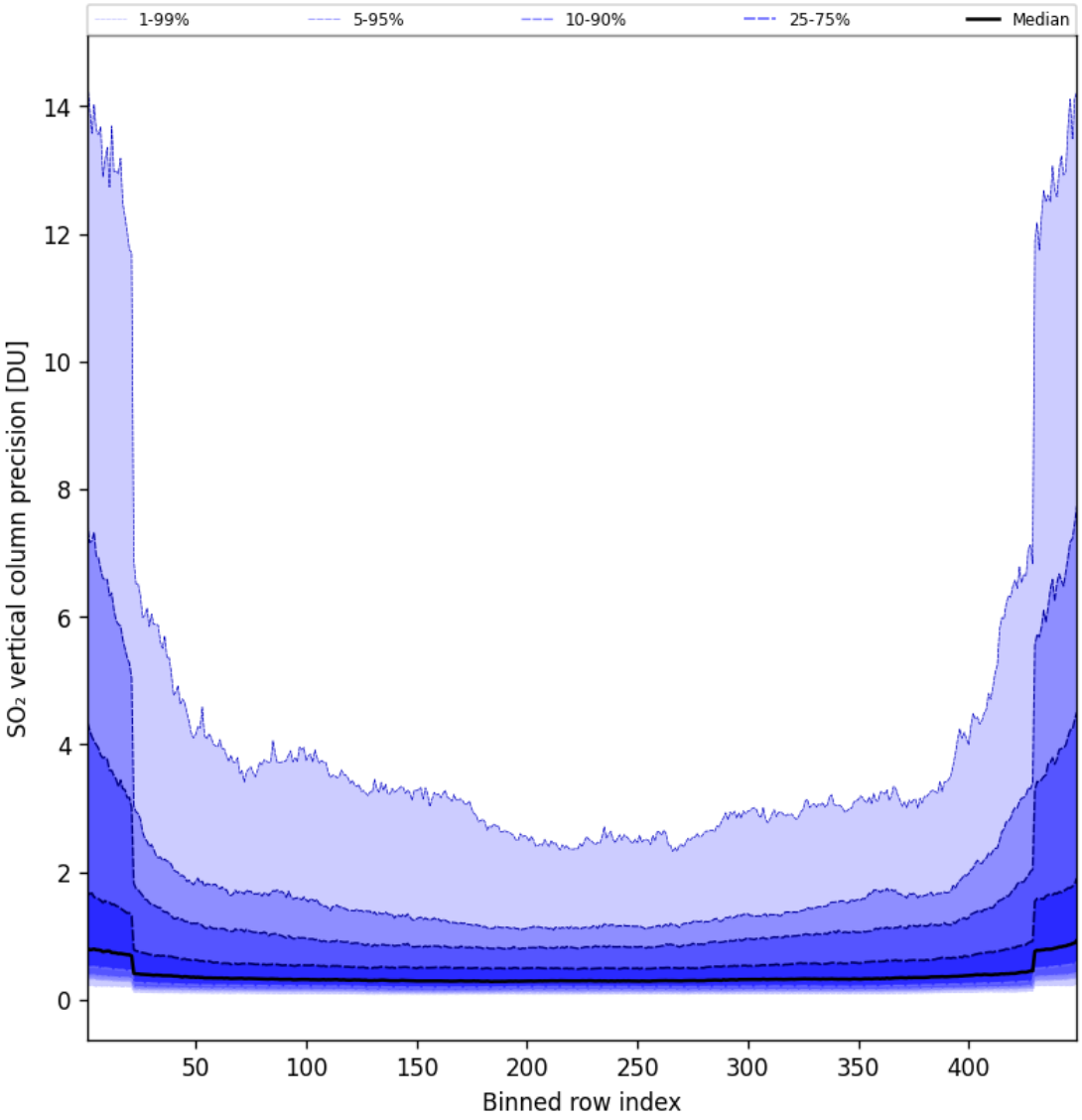

Figure 86: Along track statistics of "SO_2 vertical column precision" for 2025-03-27 to 2025-03-28

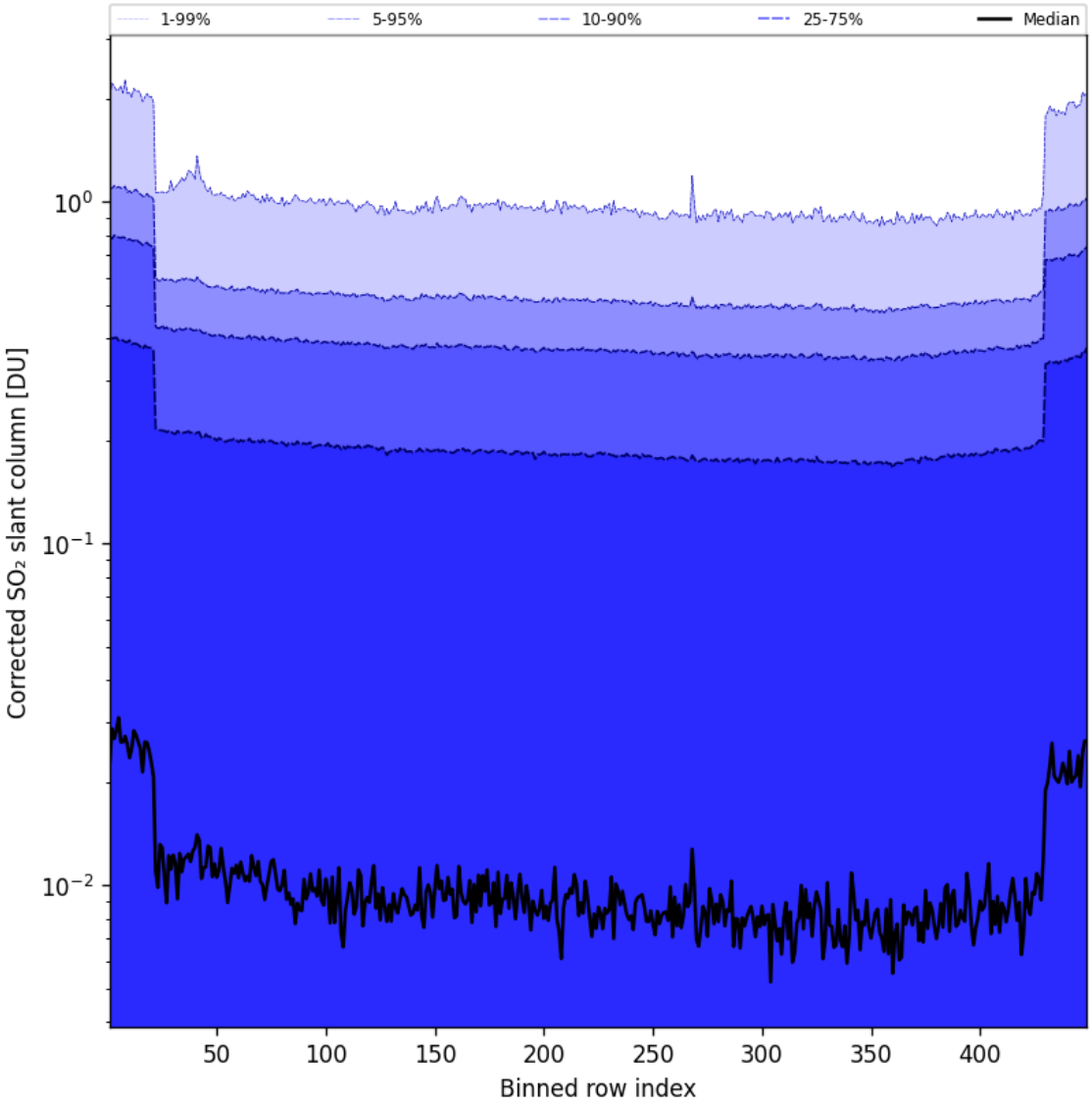

Figure 87: Along track statistics of "Corrected SO_2 slant column" for 2025-03-27 to 2025-03-28

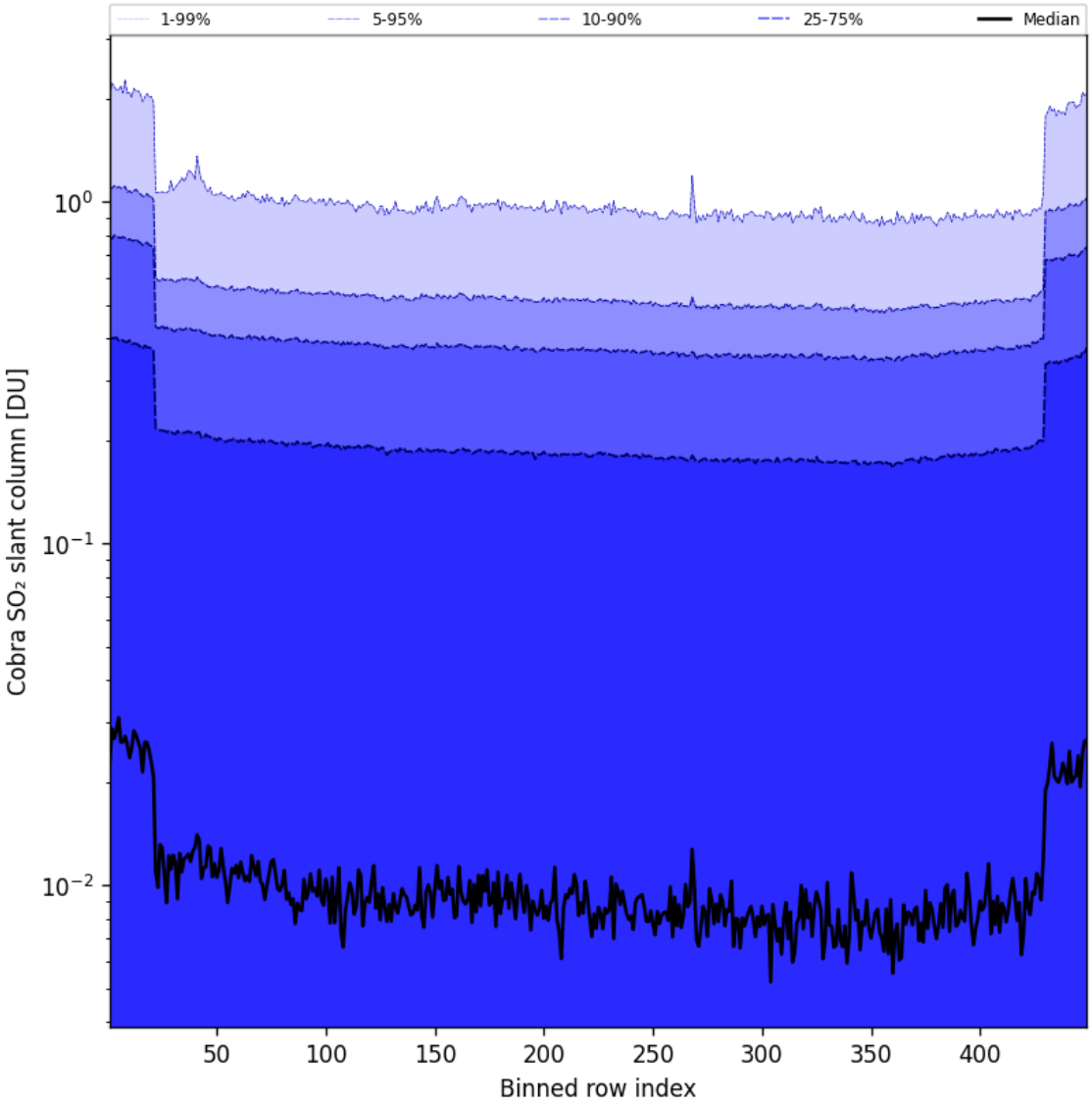

Figure 88: Along track statistics of “Cobra SO_2 slant column” for 2025-03-27 to 2025-03-28

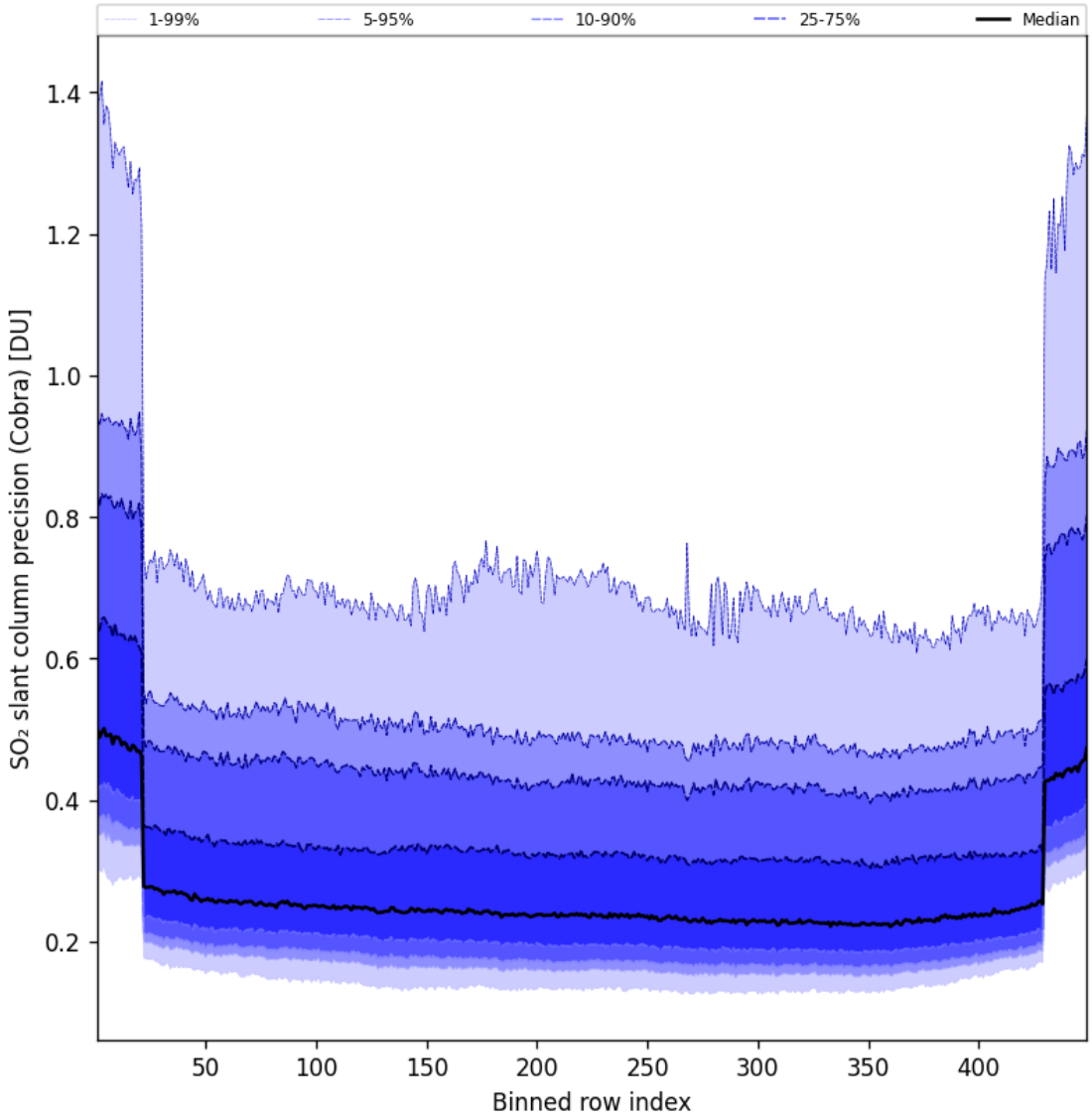

Figure 89: Along track statistics of "SO_2 slant column precision (Cobra)" for 2025-03-27 to 2025-03-28

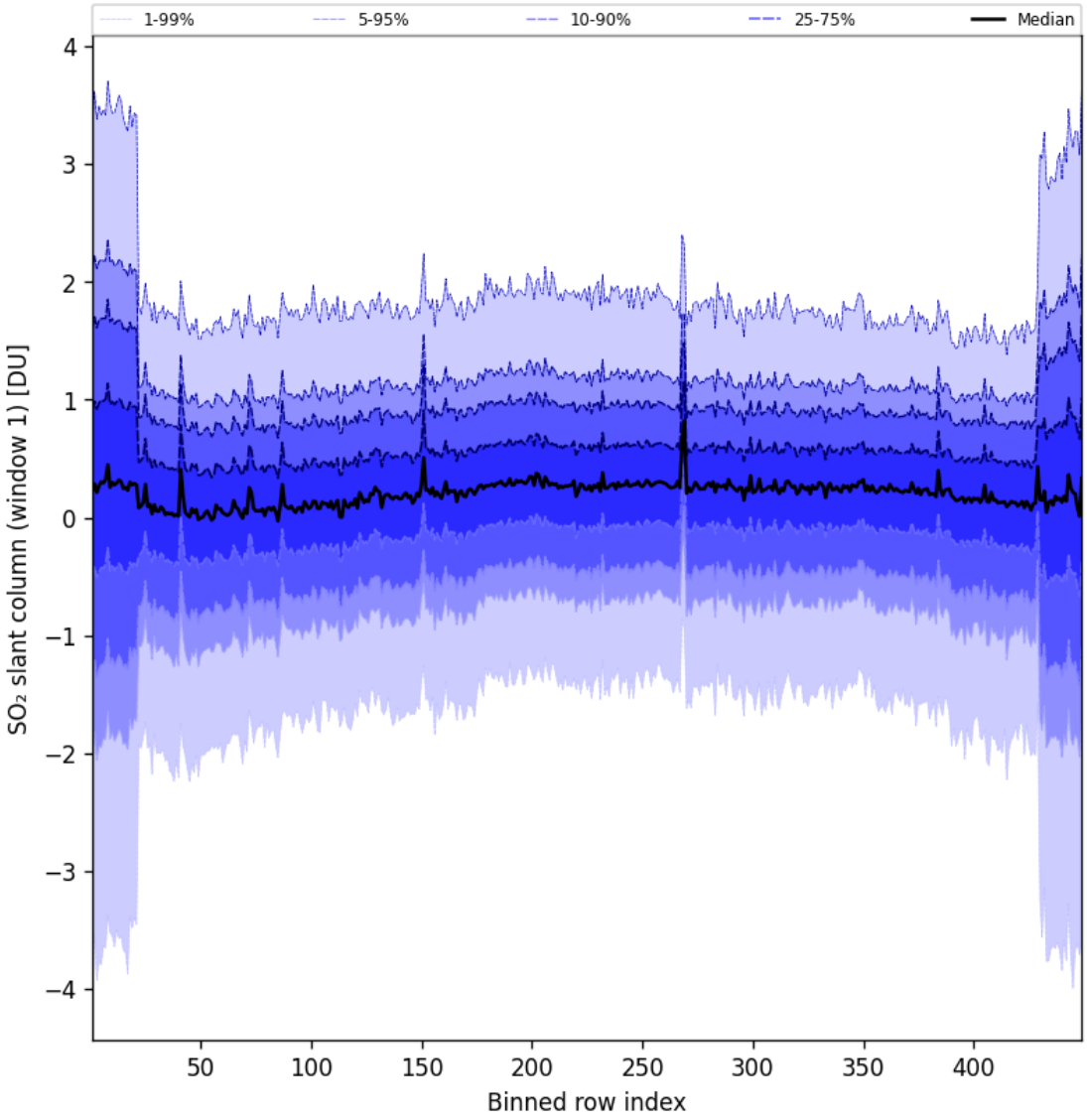

Figure 90: Along track statistics of "SO_2 slant column (window 1)" for 2025-03-27 to 2025-03-28

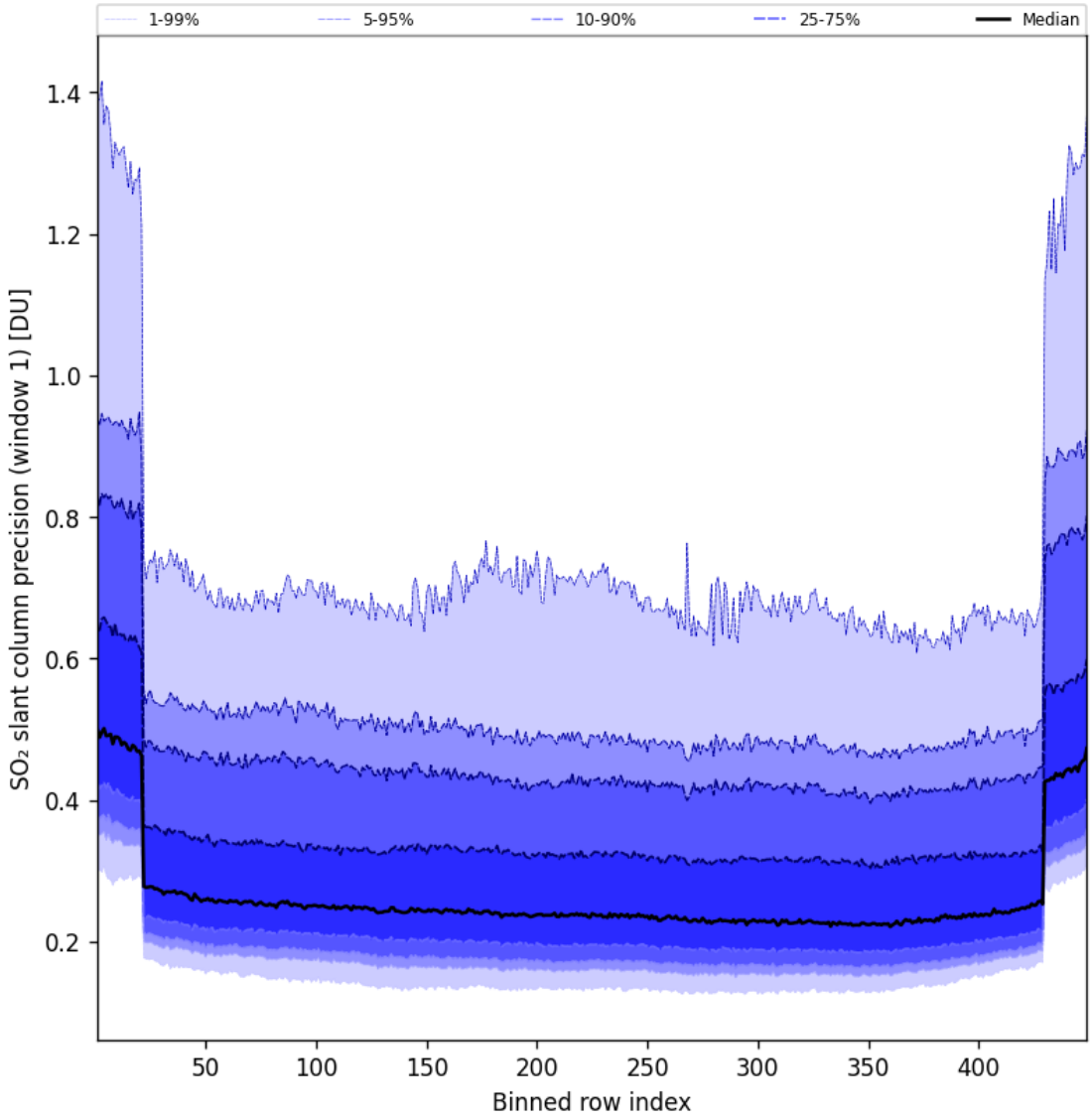

Figure 91: Along track statistics of "SO_2 slant column precision (window 1)" for 2025-03-27 to 2025-03-28

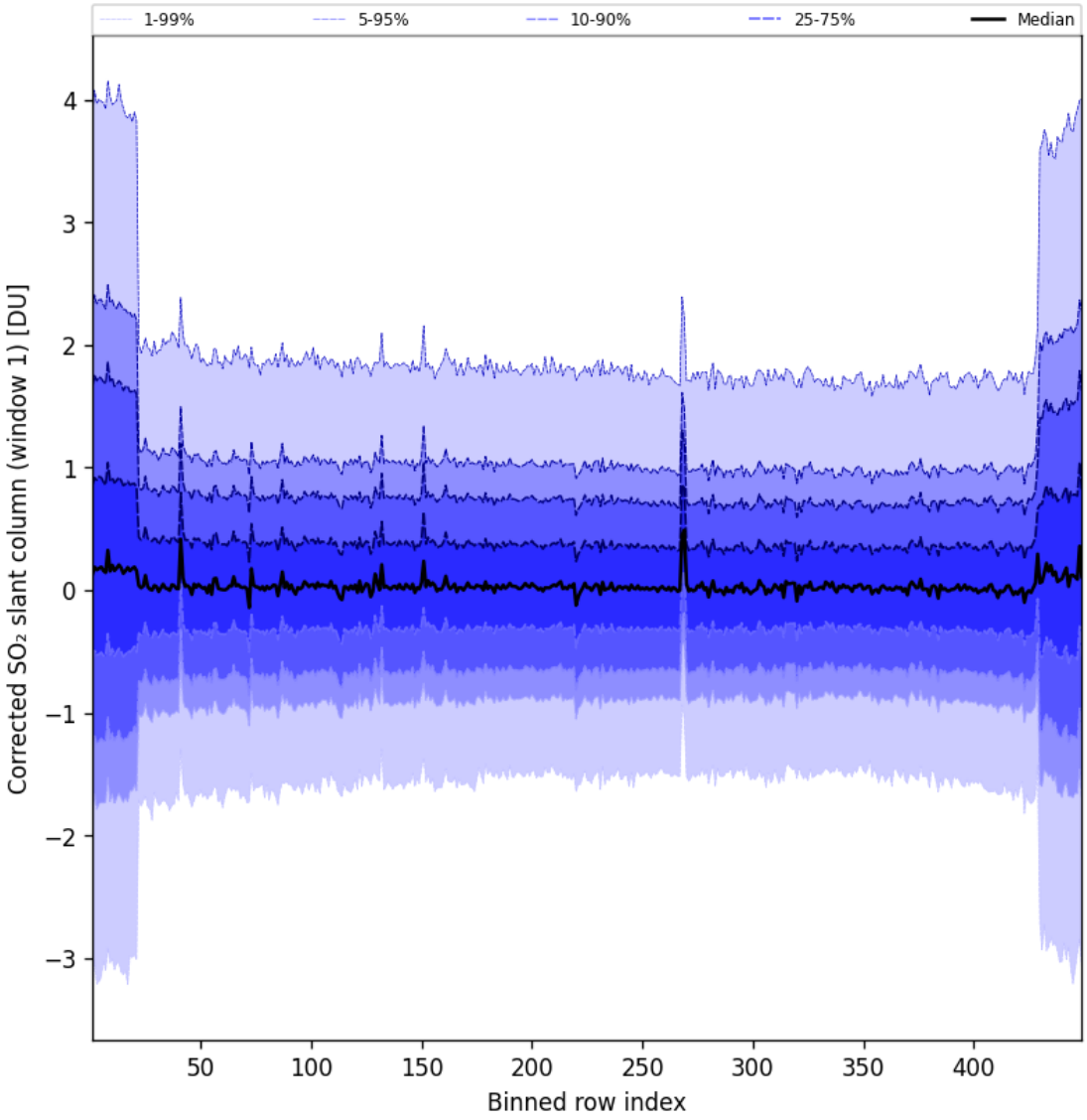

Figure 92: Along track statistics of “Corrected SO_2 slant column (window 1)” for 2025-03-27 to 2025-03-28

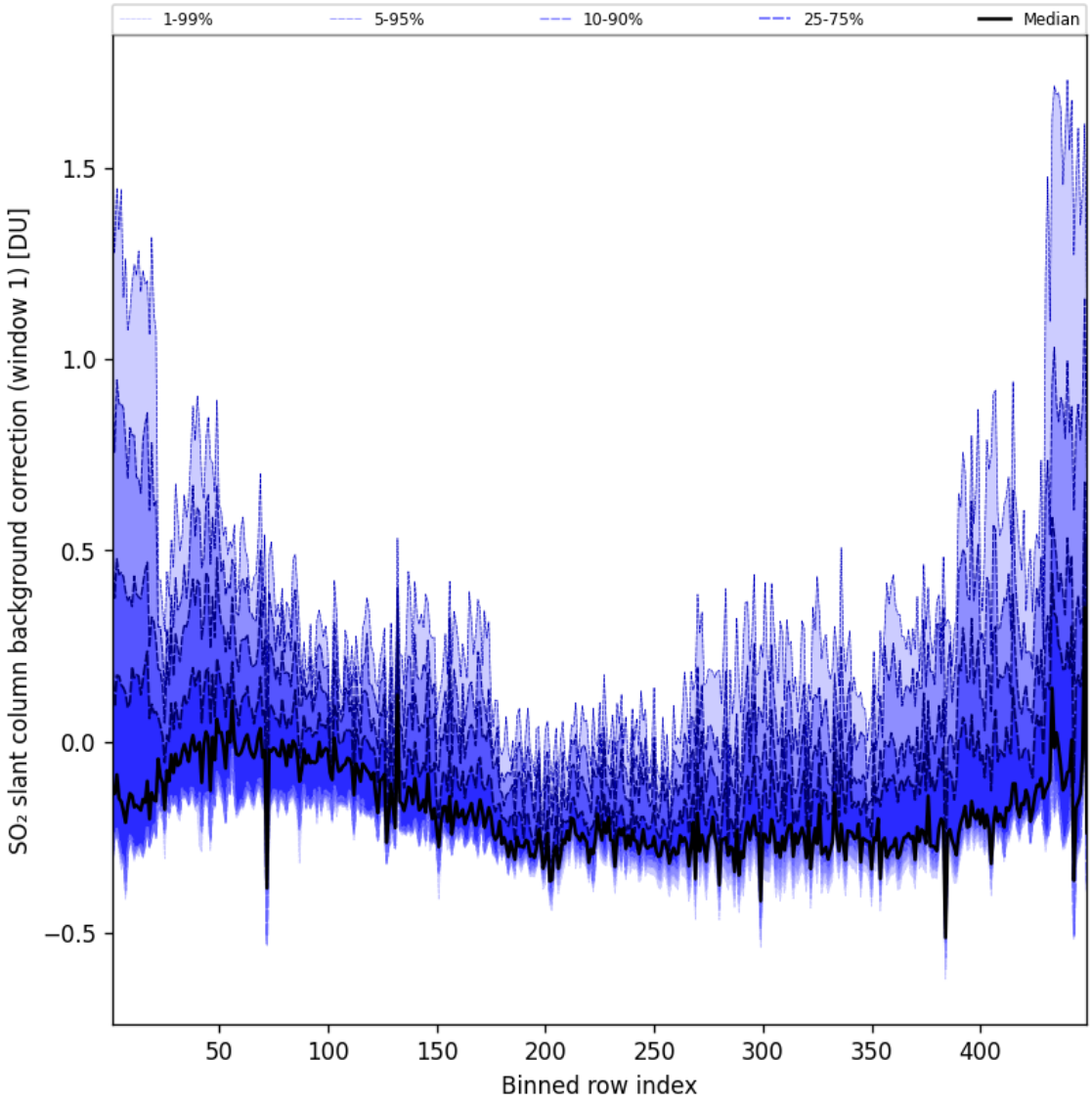

Figure 93: Along track statistics of "SO_2 slant column background correction (window 1)" for 2025-03-27 to 2025-03-28

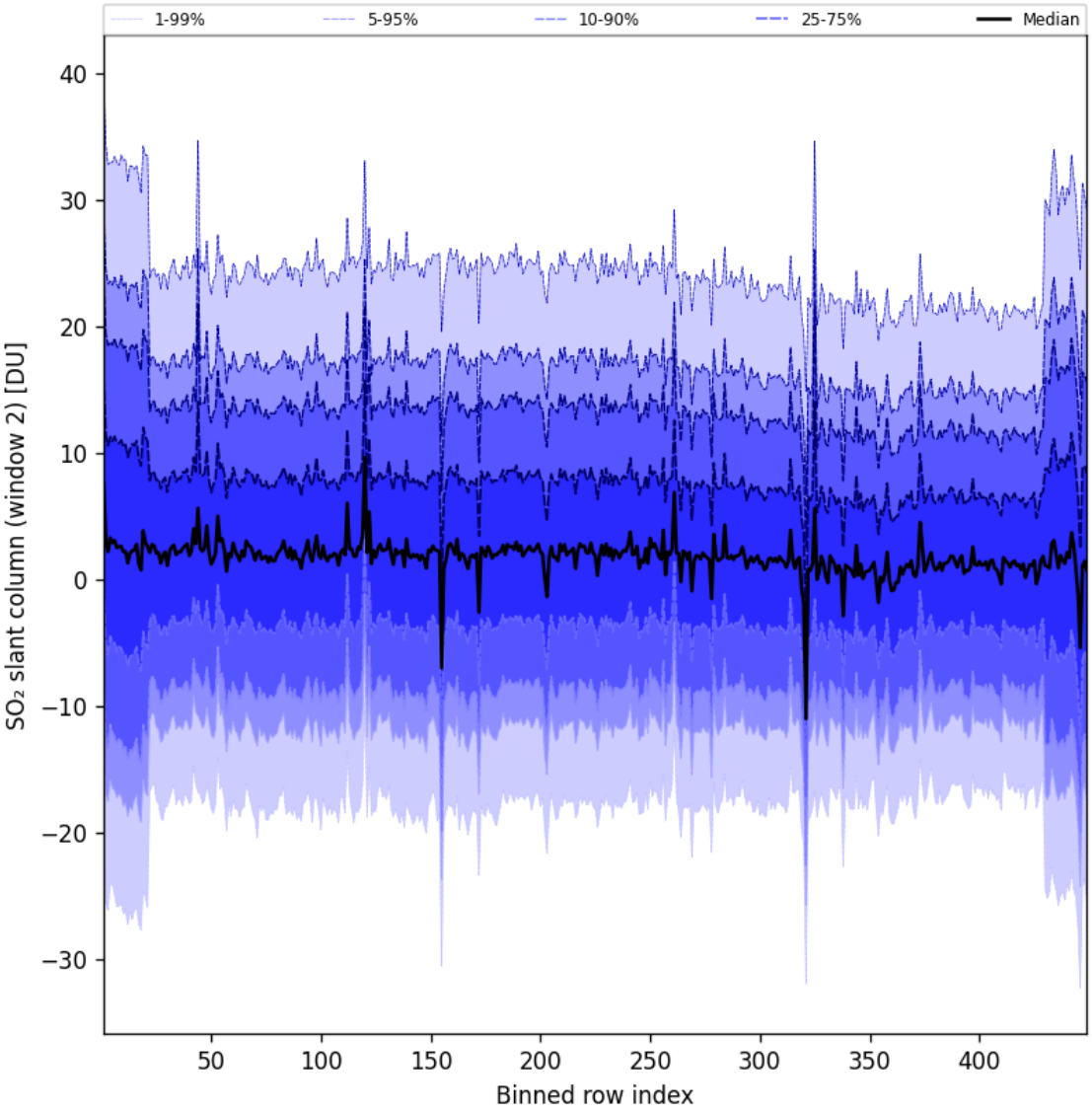

Figure 94: Along track statistics of "SO_2 slant column (window 2)" for 2025-03-27 to 2025-03-28

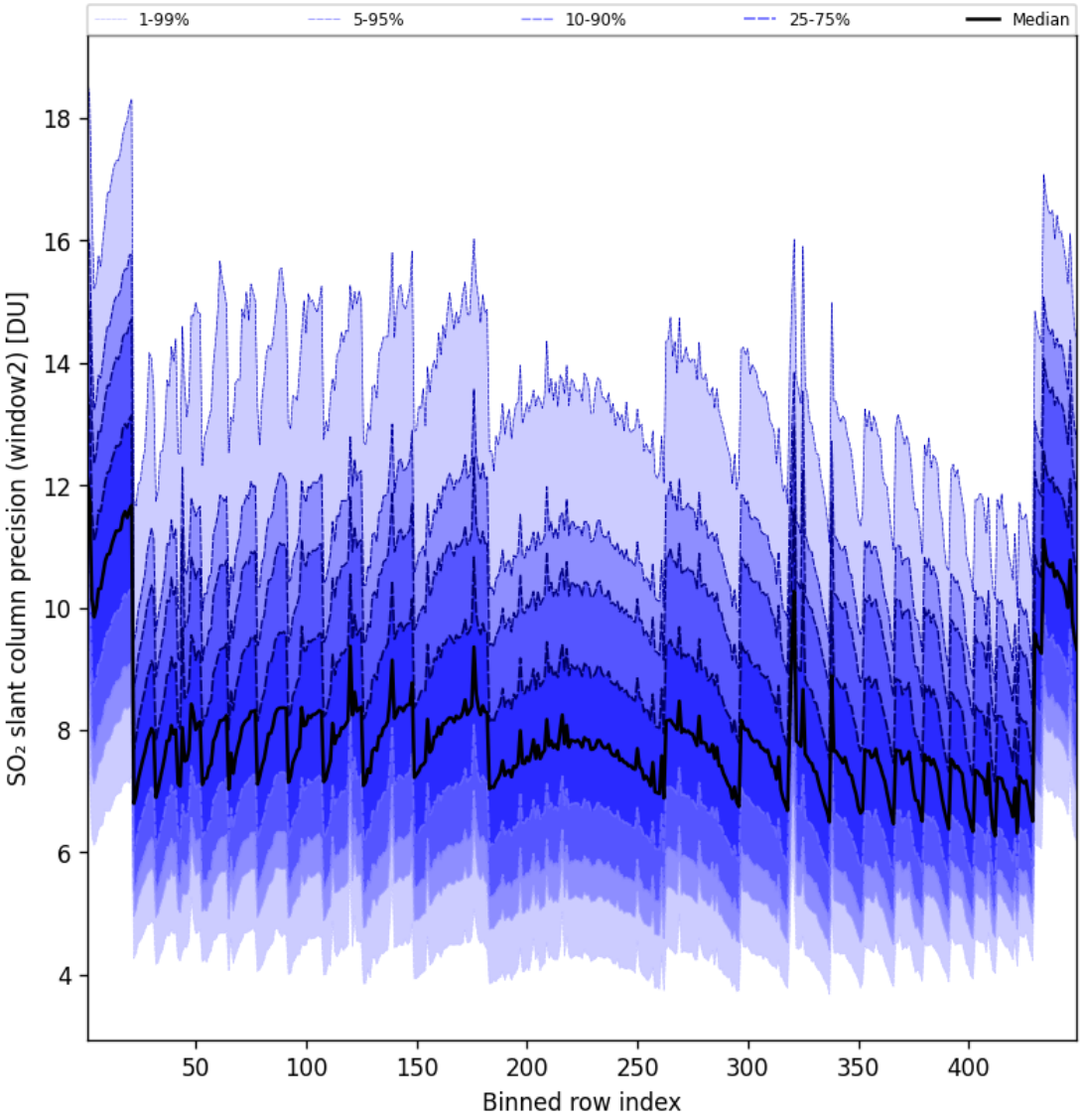

Figure 95: Along track statistics of "SO_2 slant column precision (window2)" for 2025-03-27 to 2025-03-28

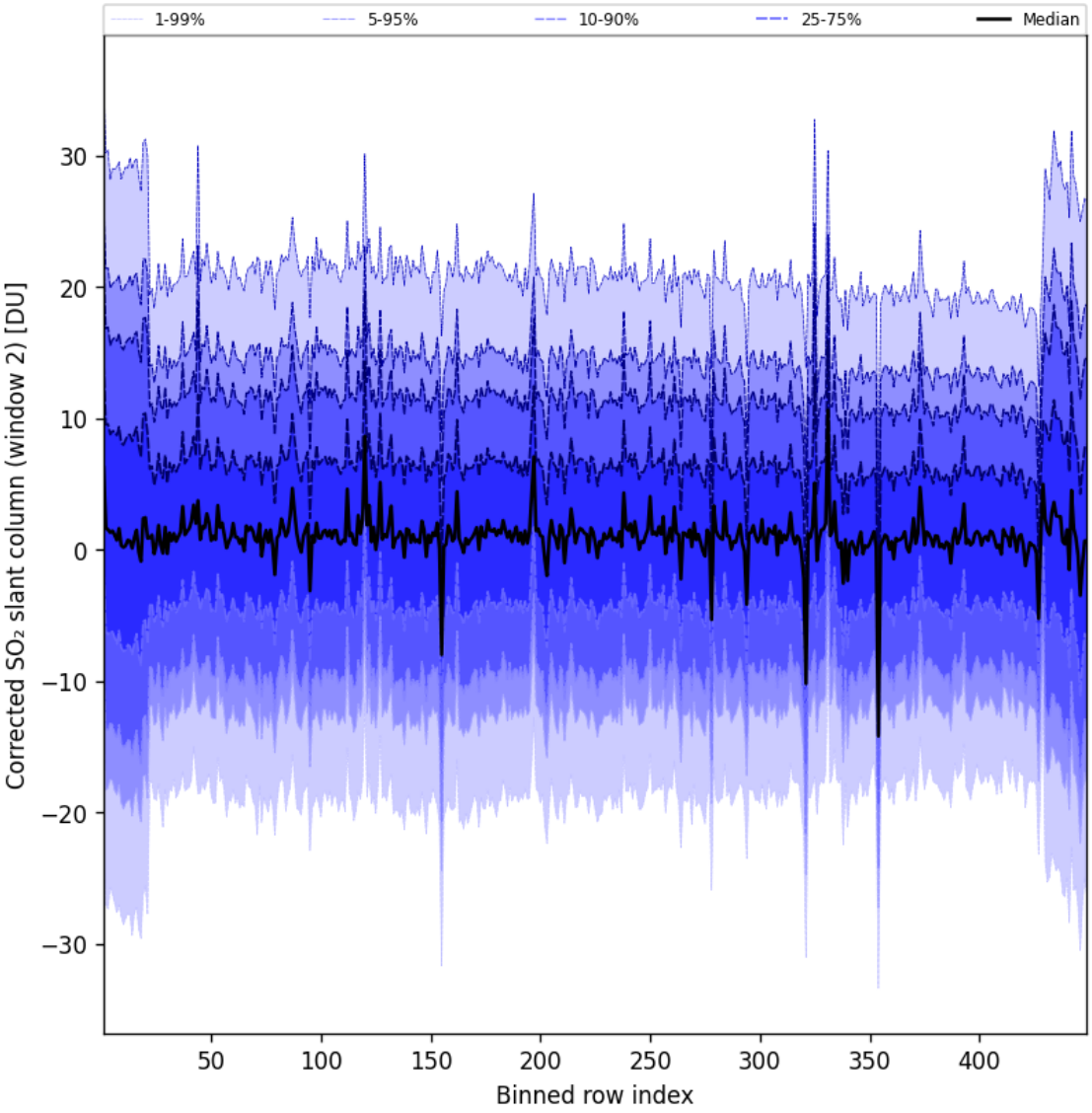

Figure 96: Along track statistics of “Corrected SO_2 slant column (window 2)” for 2025-03-27 to 2025-03-28

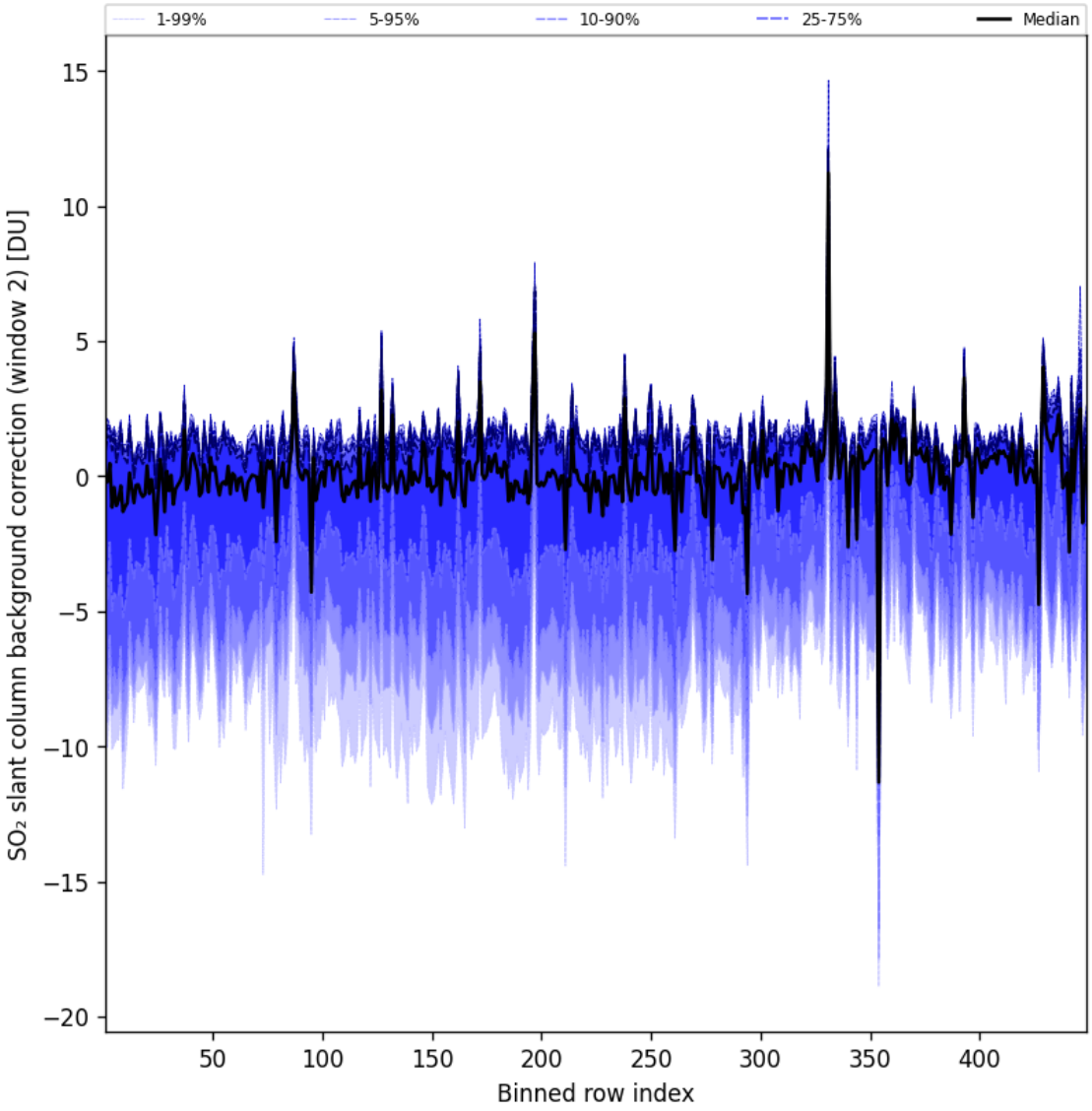

Figure 97: Along track statistics of "SO_2 slant column background correction (window 2)" for 2025-03-27 to 2025-03-28

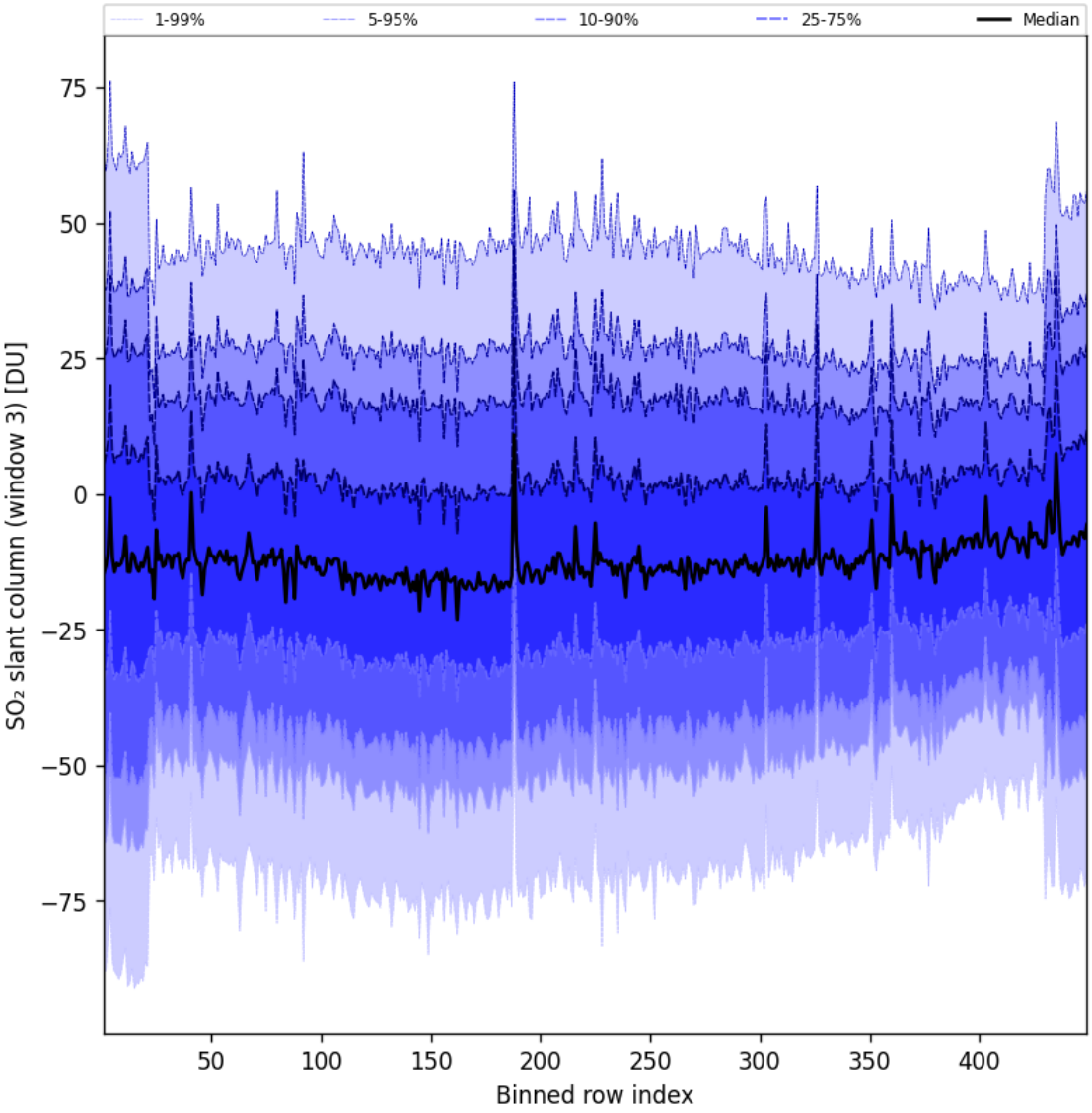

Figure 98: Along track statistics of "SO_2 slant column (window 3)" for 2025-03-27 to 2025-03-28

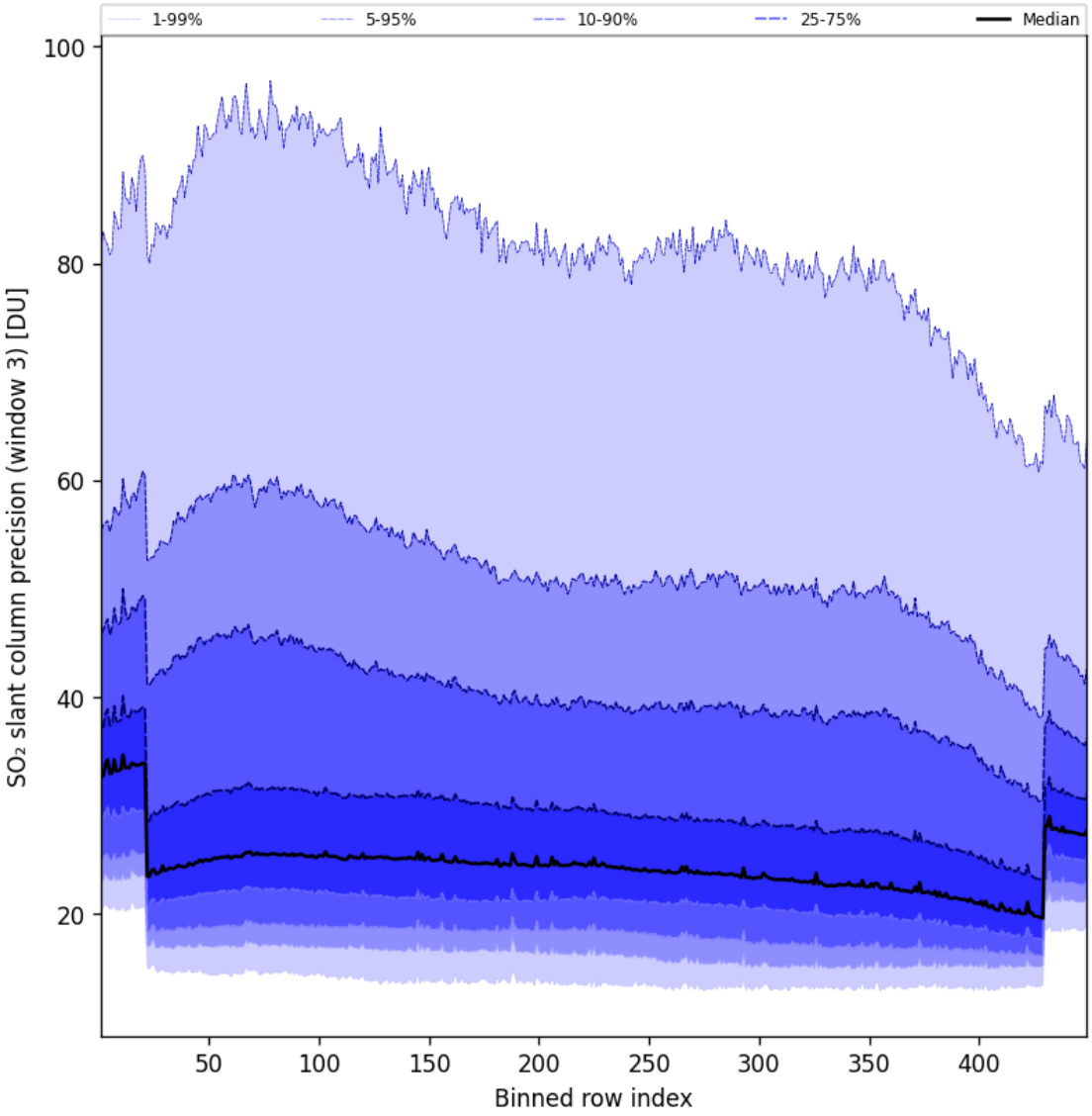

Figure 99: Along track statistics of "SO_2 slant column precision (window 3)" for 2025-03-27 to 2025-03-28

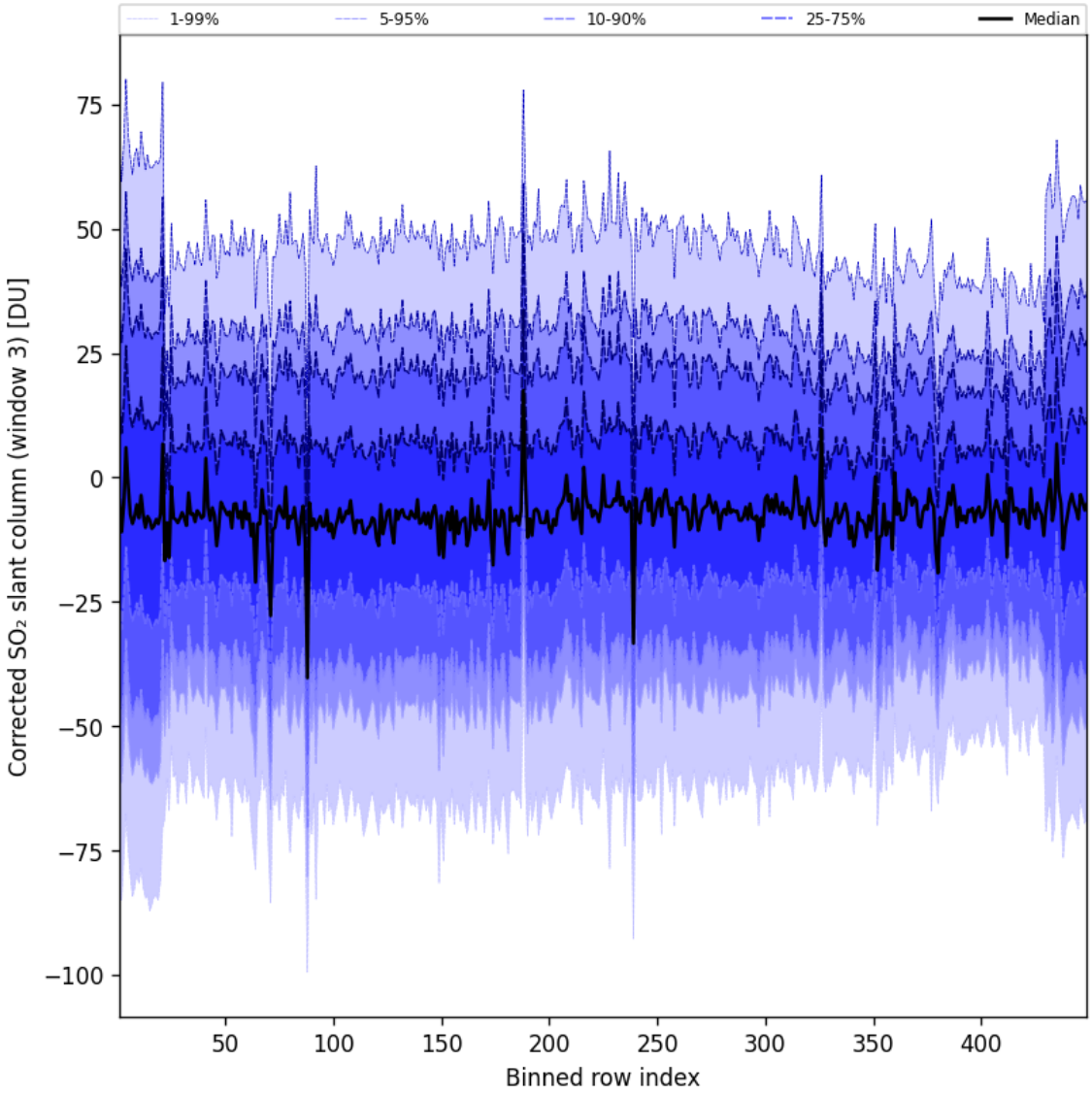

Figure 100: Along track statistics of “Corrected SO_2 slant column (window 3)” for 2025-03-27 to 2025-03-28

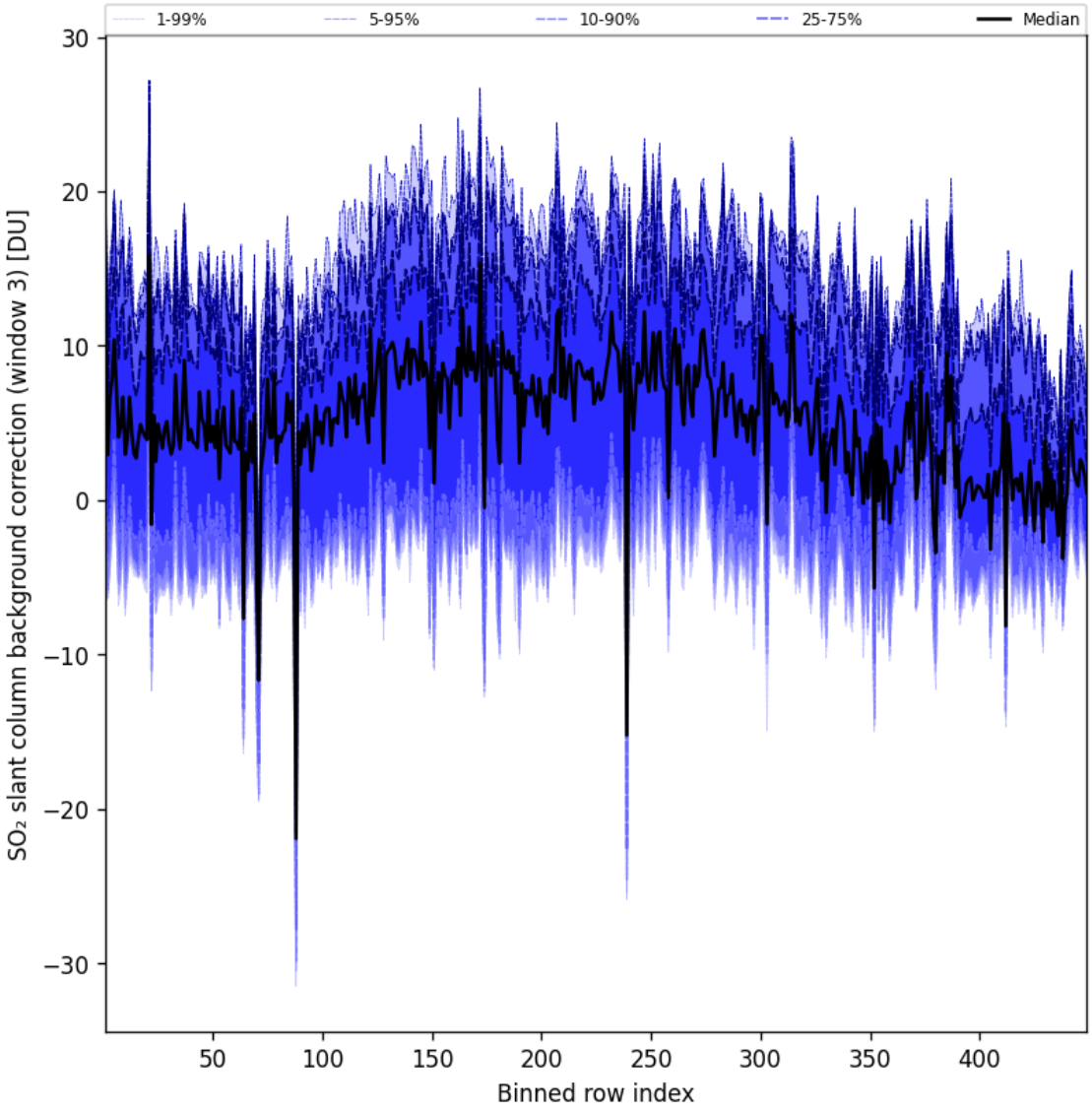

Figure 101: Along track statistics of "SO_2 slant column background correction (window 3)" for 2025-03-27 to 2025-03-28

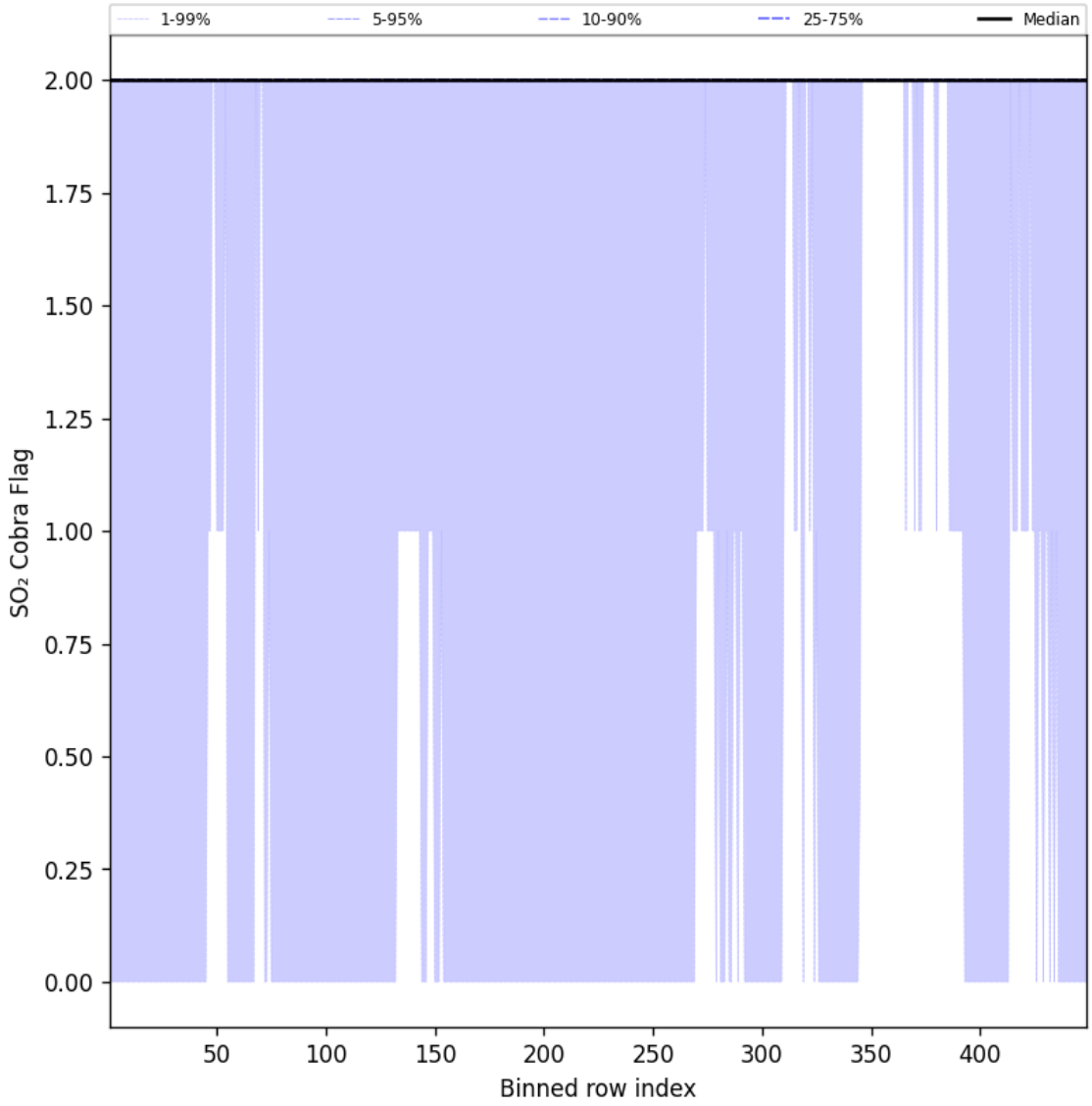

Figure 102: Along track statistics of "SO_2 Cobra Flag" for 2025-03-27 to 2025-03-28

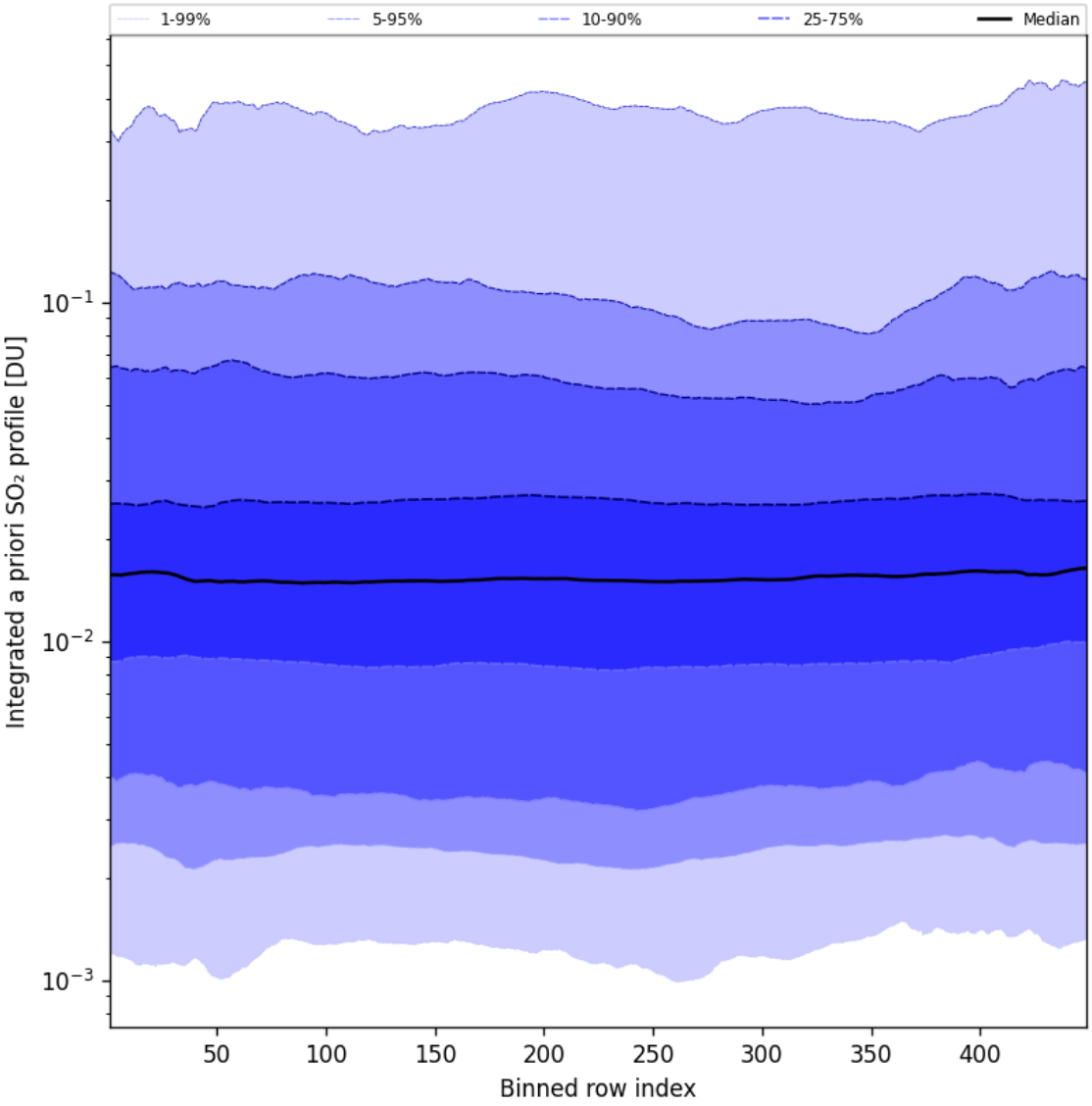

Figure 103: Along track statistics of “Integrated a priori SO_2 profile” for 2025-03-27 to 2025-03-28

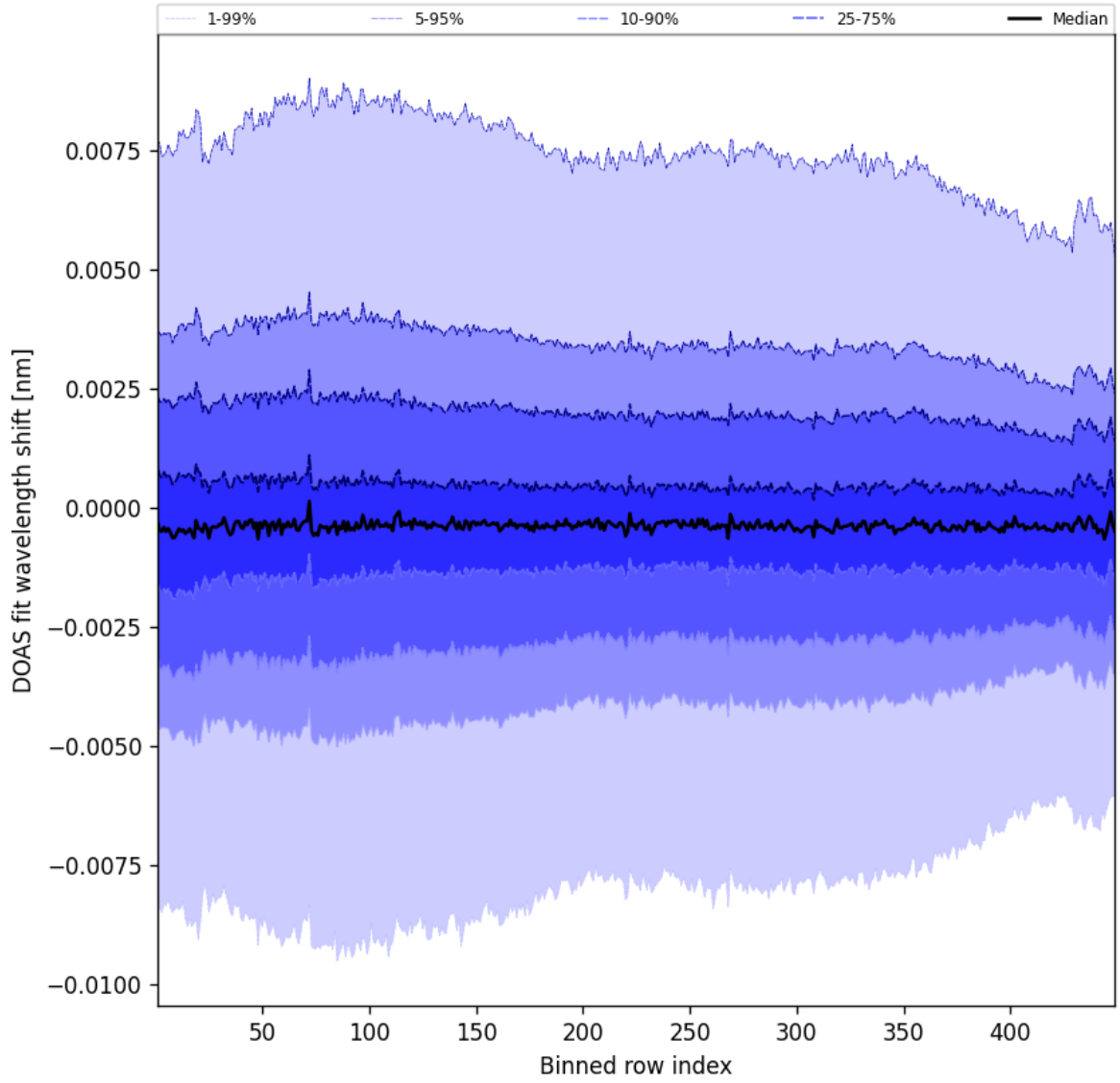

Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2025-03-27 to 2025-03-28

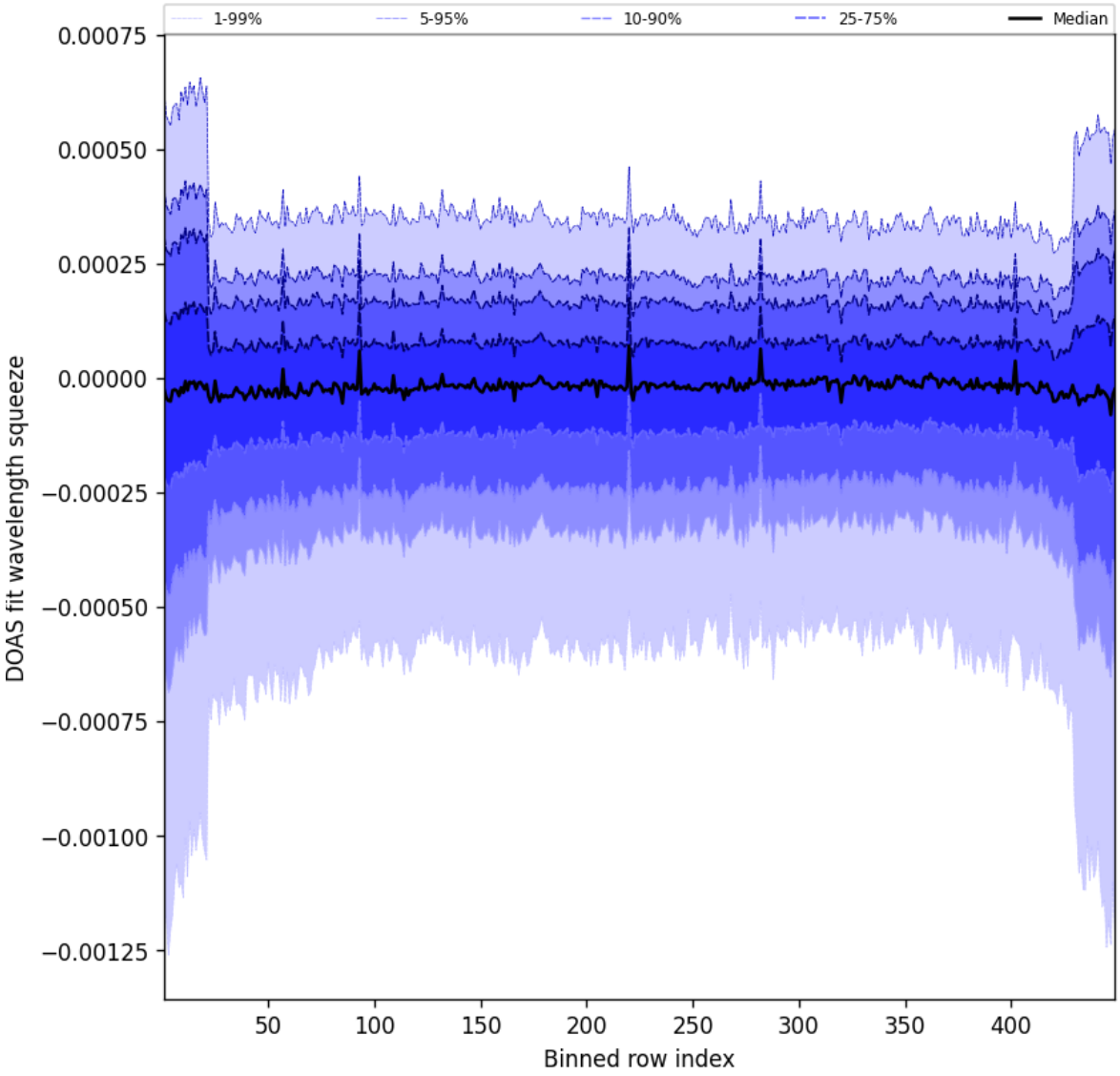

Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2025-03-27 to 2025-03-28

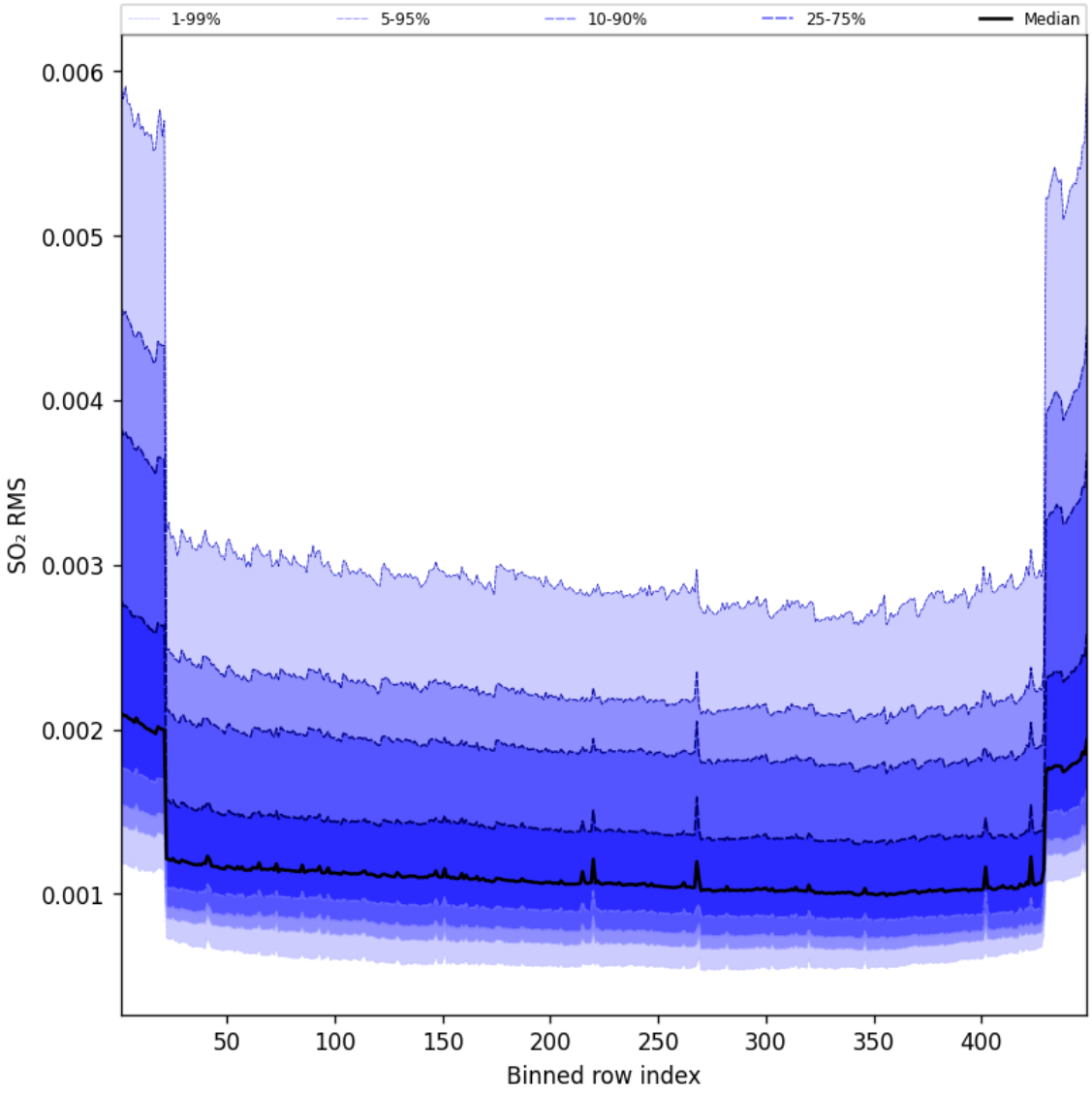

Figure 106: Along track statistics of "SO_2 RMS" for 2025-03-27 to 2025-03-28

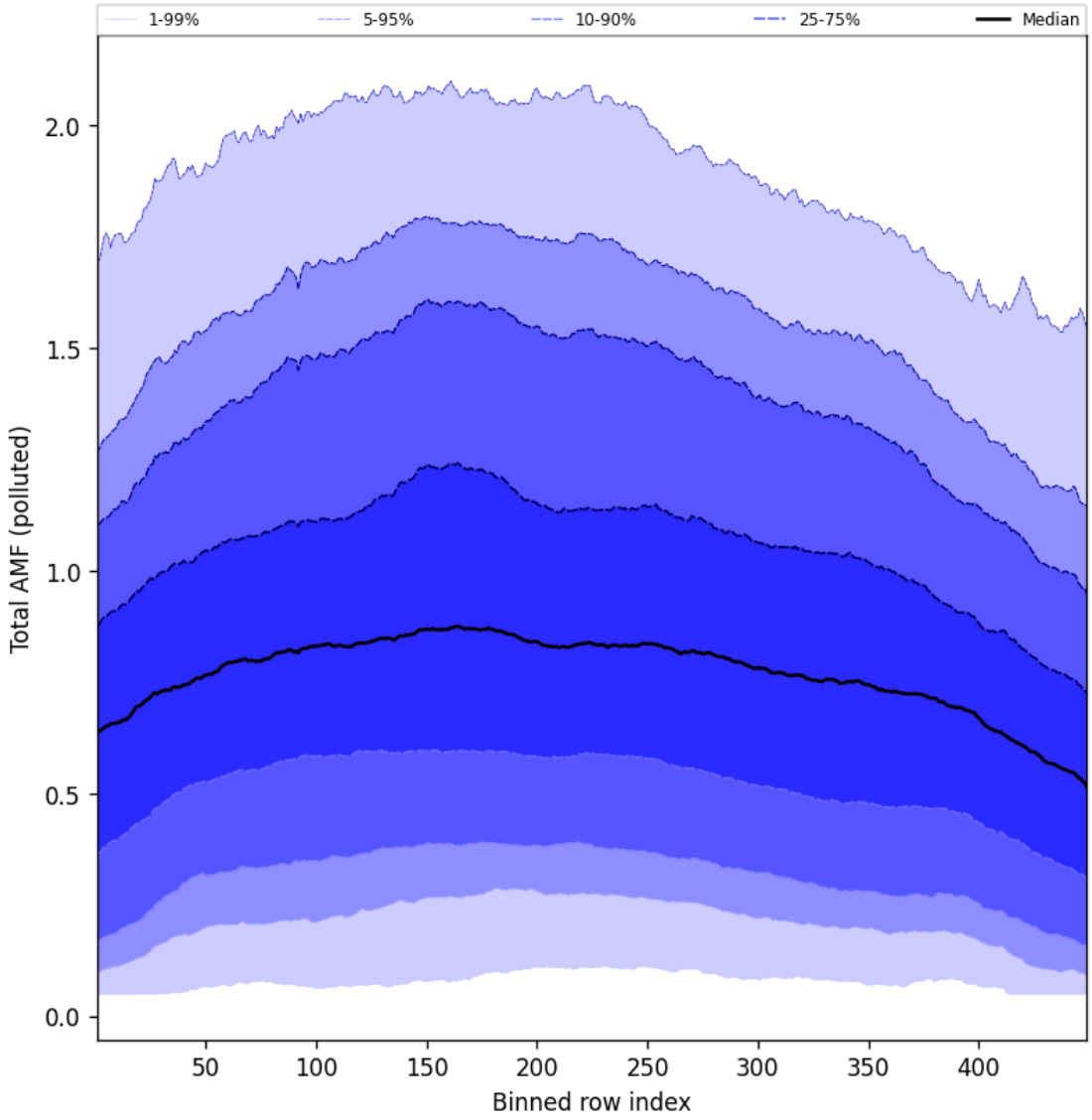

Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-03-27 to 2025-03-28

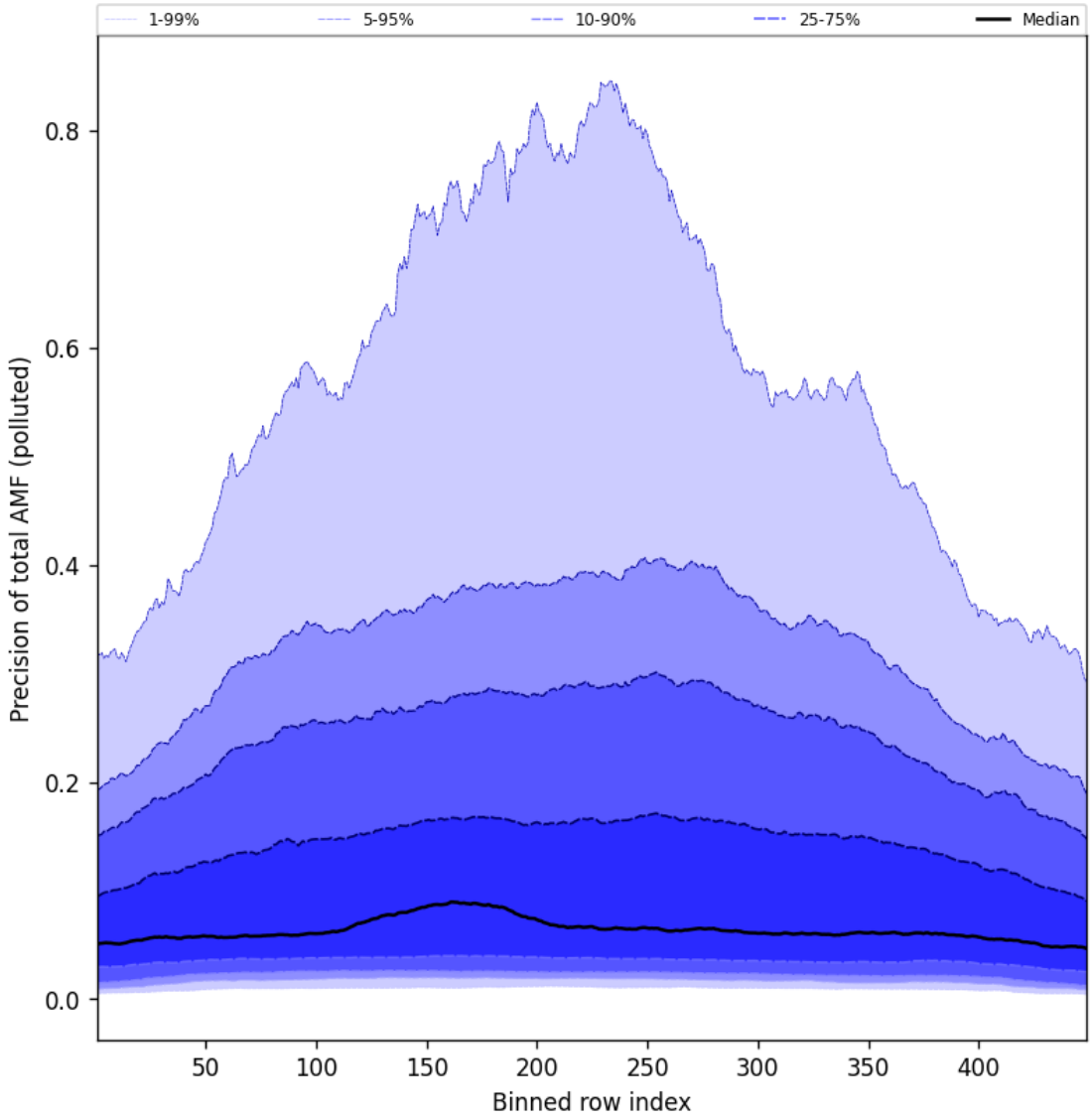

Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-03-27 to 2025-03-28

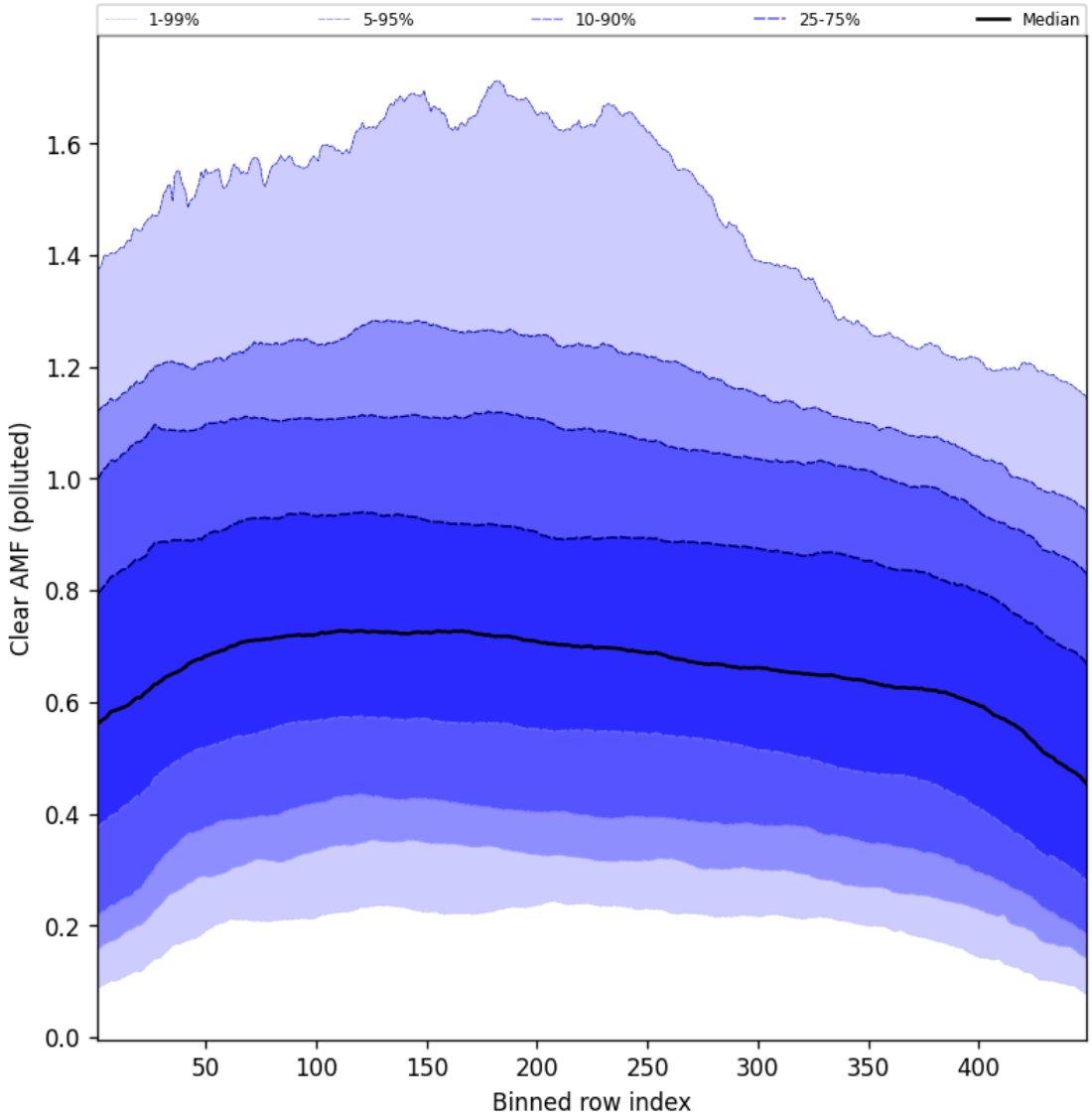

Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-03-27 to 2025-03-28

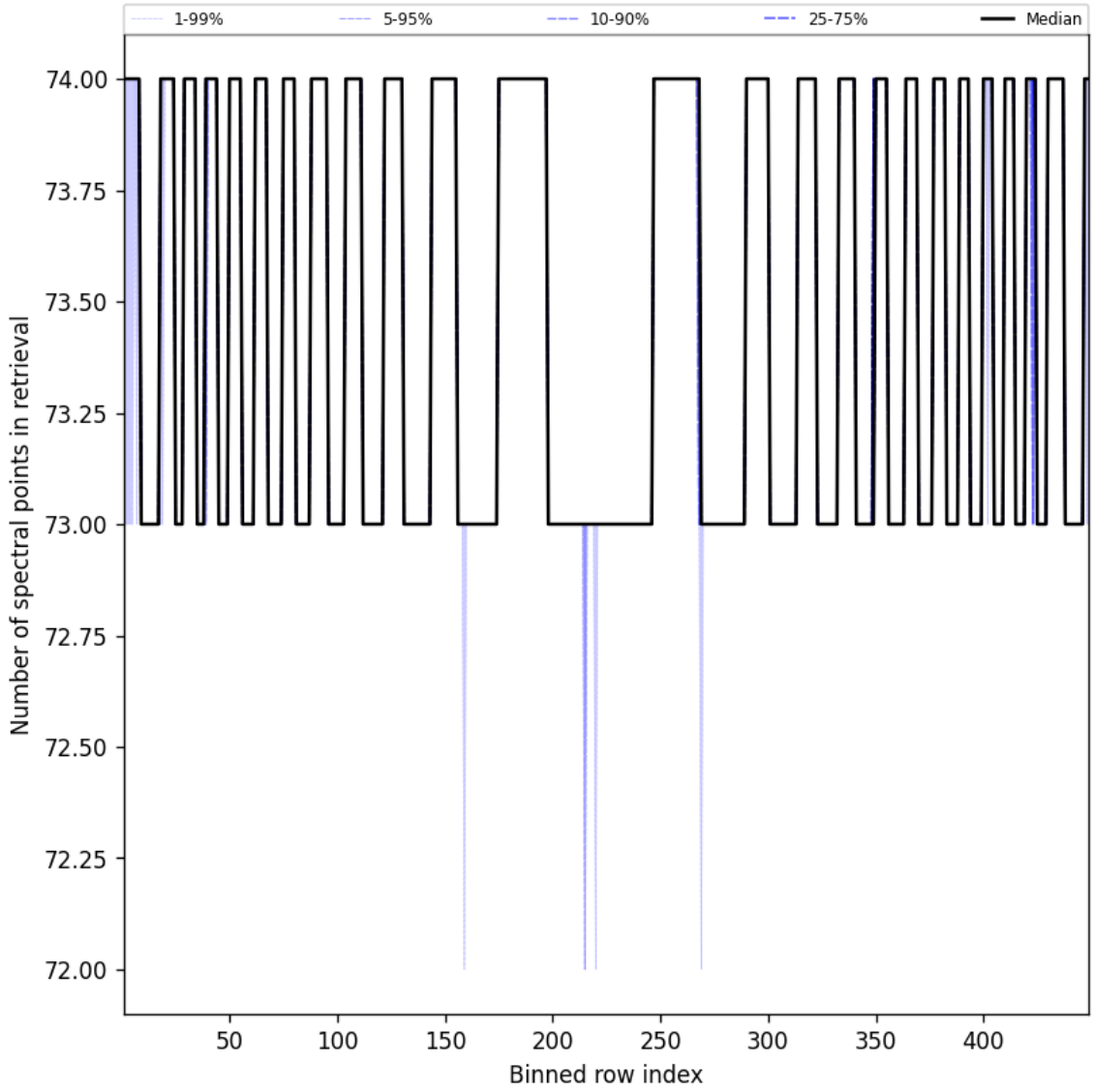

Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-03-27 to 2025-03-28

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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