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]	0.625 ± 0.416	18532688	0.995	0.810	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(3.918 \pm 152.291) \times 10^{-2}$	18532688	0.223	0.413	8.707×10^{-3}	-500	664
sulfurdioxide total vertical column precision [DU]	0.590 ± 1.098	18532688	0.222	0.336	0.302	3.140×10^{-2}	147
sulfurdioxide slant column density corrected [DU]	$(1.560 \pm 49.955) \times 10^{-2}$	18532688	0.227	0.338	7.973×10^{-3}	-40.0	1.550×10^{3}
sulfurdioxide slant column density cobra [DU]	$(1.541 \pm 33.893) \times 10^{-2}$	18532688	0.227	0.338	7.973×10^{-3}	-40.0	44.9
sulfurdioxide slant column density cobra precision [DU]	0.272 ± 0.123	18532688	0.188	0.118	0.232	7.491×10^{-2}	19.3
sulfurdioxide slant column density window1 [DU]	$(8.444 \pm 64.354) \times 10^{-2}$	18532688	0.125	0.703	9.340×10^{-2}	-65.7	47.0
sulfurdioxide slant column density window1 precision [DU]	0.272 ± 0.123	18532688	0.188	0.118	0.232	7.491×10^{-2}	19.3
sulfurdioxide slant column density corrected win1 [DU]	$(-3.110 \pm 62.698) \times 10^{-2}$	18532688	-7.500×10^{-2}	0.675	-4.631×10^{-2}	-65.7	47.1
background so2 slant column offset window1 [DU]	-0.116 ± 0.170	18532688	-0.180	0.196	-0.167	-1.37	3.70
sulfurdioxide slant column density window2 [DU]	-1.40 ± 8.60	18532688	-1.25	10.8	-1.55	-530	711
sulfurdioxide slant column density window2 precision [DU]	7.84 ± 2.17	18532688	6.97	2.47	7.49	2.13	557
sulfurdioxide slant column density corrected win2 [DU]	-2.32 ± 8.40	18532688	-2.25	10.6	-2.31	-530	712
background so2 slant column offset window2 [DU]	-0.919 ± 2.413	18532688	0.750	2.49	-0.269	-12.9	16.9
sulfurdioxide slant column density window3 [DU]	7.19 ± 23.50	18532688	7.28	29.3	6.89	-3.352×10^{3}	3.685×10^{3}
sulfurdioxide slant column density window3 precision [DU]	28.9 ± 12.6	18532688	22.5	9.13	25.5	12.0	1.425×10^{3}
sulfurdioxide slant column density corrected win3 [DU]	10.7 ± 22.6	18532688	10.6	28.2	10.7	-3.363×10^{3}	3.678×10^{3}
background so2 slant column offset window3 [DU]	3.56 ± 6.85	18532688	8.40	10.0	3.89	-24.2	25.2
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.20	18532688	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(4.155 \pm 7.369) \times 10^{-2}$	18532688	2.461×10^{-2}	2.649×10^{-2}	2.436×10^{-2}	6.411×10^{-4}	2.01
fitted radiance shift [nm]	$(-3.543 \pm 25.081) \times 10^{-4}$	18532688	-5.000×10^{-4}	1.706×10^{-3}	-3.987×10^{-4}	-6.973×10^{-2}	6.739×10^{-2}
fitted radiance squeeze [1]	$(-3.853 \pm 17.567) \times 10^{-5}$	18532688	-3.000×10^{-5}	2.063×10^{-4}	-3.301×10^{-5}	-1.473×10^{-2}	1.759×10^{-2}
fitted root mean square [1]	$(1.208 \pm 0.505) \times 10^{-3}$	18532688	9.250×10^{-4}	4.833×10^{-4}	1.062×10^{-3}	2.899×10^{-4}	6.807×10^{-2}
sulfurdioxide total air mass factor polluted [1]	0.904 ± 0.583	18532688	0.620	0.630	0.772	5.000×10^{-2}	3.19
sulfurdioxide total air mass factor polluted precision [1]	0.142 ± 0.159	18532688	3.500×10^{-2}	0.157	7.816×10^{-2}	2.500×10^{-3}	1.91
sulfurdioxide clear air mass factor polluted [1]	0.798 ± 0.565	18532688	0.580	0.383	0.659	3.141×10^{-2}	3.22
number of spectral points in retrieval [1]	73.4 ± 0.5	18532688	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	4.000×10^{-2}	9.000×10^{-2}	0.190	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	−3.13	−0.932	−0.525	−0.341	−0.195	0.219	0.377	0.580	1.04	3.65
sulfurdioxide total vertical column precision [DU]	8.247×10^{-2}	0.106	0.130	0.156	0.194	0.530	0.781	1.15	1.91	5.73
sulfurdioxide slant column density corrected [DU]	−0.798	−0.455	−0.330	−0.247	−0.159	0.178	0.269	0.359	0.500	0.923
sulfurdioxide slant column density cobra [DU]	−0.798	−0.455	−0.330	−0.247	−0.159	0.178	0.269	0.359	0.500	0.923
sulfurdioxide slant column density cobra precision [DU]	0.136	0.159	0.171	0.181	0.194	0.312	0.373	0.428	0.500	0.729
sulfurdioxide slant column density window1 [DU]	−1.62	−0.913	−0.639	−0.455	−0.264	0.439	0.618	0.788	1.04	1.76
sulfurdioxide slant column density window1 precision [DU]	0.136	0.159	0.171	0.181	0.194	0.312	0.373	0.428	0.500	0.729
sulfurdioxide slant column density corrected win1 [DU]	−1.59	−0.952	−0.714	−0.552	−0.380	0.295	0.478	0.657	0.935	1.73
background so2 slant column offset window1 [DU]	−0.375	−0.315	−0.283	−0.261	−0.228	-3.144×10^{-2}	6.553×10^{-2}	0.140	0.221	0.363
sulfurdioxide slant column density window2 [DU]	−21.6	−15.1	−11.9	−9.56	−6.92	3.92	6.70	9.25	12.8	20.5
sulfurdioxide slant column density window2 precision [DU]	4.27	5.06	5.54	5.93	6.40	8.87	9.73	10.6	11.8	14.5
sulfurdioxide slant column density corrected win2 [DU]	−22.8	−16.0	−12.7	−10.3	−7.64	2.99	5.65	8.03	11.3	18.2
background so2 slant column offset window2 [DU]	−8.57	−5.86	−4.05	−2.95	−1.91	0.584	0.848	1.07	1.48	2.63
sulfurdioxide slant column density window3 [DU]	−51.0	−30.7	−21.4	−14.7	−7.50	21.8	29.6	36.7	46.2	65.0
sulfurdioxide slant column density window3 precision [DU]	16.4	18.3	19.5	20.6	22.0	31.1	35.6	41.1	52.4	83.2
sulfurdioxide slant column density corrected win3 [DU]	−46.0	−26.1	−17.0	−10.4	−3.32	24.9	32.2	38.8	47.8	66.0
background so2 slant column offset window3 [DU]	−11.6	−8.00	−6.08	−4.07	−1.22	8.80	10.7	12.3	14.1	17.0
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]	4.104×10^{-3}	6.886×10^{-3}	9.322×10^{-3}	1.164×10^{-2}	1.466×10^{-2}	4.115×10^{-2}	5.537×10^{-2}	6.986×10^{-2}	0.119	0.375
fitted radiance shift [nm]	-7.907×10^{-3}	-3.995×10^{-3}	-2.621×10^{-3}	-1.857×10^{-3}	-1.250×10^{-3}	4.559×10^{-4}	1.152×10^{-3}	2.018×10^{-3}	3.514×10^{-3}	7.616×10^{-3}
fitted radiance squeeze [1]	-5.026×10^{-4}	-3.274×10^{-4}	-2.506×10^{-4}	-1.966×10^{-4}	-1.392×10^{-4}	6.708×10^{-5}	1.173×10^{-4}	1.637×10^{-4}	2.304×10^{-4}	3.950×10^{-4}
fitted root mean square [1]	5.856×10^{-4}	7.037×10^{-4}	7.718×10^{-4}	8.248×10^{-4}	8.896×10^{-4}	1.373×10^{-3}	1.604×10^{-3}	1.839×10^{-3}	2.185×10^{-3}	3.082×10^{-3}
sulfurdioxide total air mass factor polluted [1]	6.163×10^{-2}	0.183	0.294	0.395	0.511	1.14	1.42	1.73	2.23	2.69
sulfurdioxide total air mass factor polluted precision [1]	7.987×10^{-3}	1.585×10^{-2}	2.294×10^{-2}	2.842×10^{-2}	3.603×10^{-2}	0.193	0.266	0.343	0.467	0.738
sulfurdioxide clear air mass factor polluted [1]	0.147	0.270	0.354	0.424	0.492	0.875	0.996	1.20	2.43	2.94
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]	0.686 ± 0.402	7028297	0.750	1.000	0.0	1.000	0.250	1.000
sulfurdioxide total vertical column [DU]	$(7.728 \pm 230.754) \times 10^{-2}$	7028297	0.604	1.312×10^{-2}	-151	490	-0.281	0.322
sulfurdioxide total vertical column precision [DU]	0.950 ± 1.617	7028297	0.673	0.428	5.065×10^{-2}	48.3	0.260	0.934
sulfurdioxide slant column density corrected [DU]	$(2.151 \pm 40.387) \times 10^{-2}$	7028297	0.391	9.718×10^{-3}	-7.55	62.6	-0.183	0.208
sulfurdioxide slant column density cobra [DU]	$(2.143 \pm 40.003) \times 10^{-2}$	7028297	0.391	9.718×10^{-3}	-7.55	15.2	-0.183	0.208
sulfurdioxide slant column density cobra precision [DU]	0.320 ± 0.151	7028297	0.181	0.273	8.734×10^{-2}	8.63	0.214	0.395
sulfurdioxide slant column density window1 [DU]	0.149 ± 0.743	7028297	0.783	0.156	-65.5	41.3	-0.238	0.545
sulfurdioxide slant column density window1 precision [DU]	0.320 ± 0.151	7028297	0.181	0.273	8.734×10^{-2}	8.63	0.214	0.395
sulfurdioxide slant column density corrected win1 [DU]	$(-2.872 \pm 740.533) \times 10^{-3}$	7028297	0.774	-2.812×10^{-2}	-65.5	41.2	-0.407	0.367
background so2 slant column offset window1 [DU]	-0.152 ± 0.157	7028297	0.158	-0.173	-0.999	3.70	-0.250	-9.235×10^{-2}
sulfurdioxide slant column density window2 [DU]	-0.670 ± 9.541	7028297	12.1	-0.986	-106	74.4	-6.90	5.21
sulfurdioxide slant column density window2 precision [DU]	8.54 ± 2.25	7028297	2.76	8.21	2.39	129	6.99	9.75
sulfurdioxide slant column density corrected win2 [DU]	-2.39 ± 9.19	7028297	11.7	-2.38	-111	66.3	-8.24	3.46
background so2 slant column offset window2 [DU]	-1.72 ± 3.05	7028297	3.97	-0.623	-12.9	16.9	-3.53	0.439
sulfurdioxide slant column density window3 [DU]	4.35 ± 25.03	7028297	31.7	4.75	-183	185	-11.2	20.4
sulfurdioxide slant column density window3 precision [DU]	30.8 ± 12.3	7028297	9.54	27.6	12.2	211	24.0	33.5
sulfurdioxide slant column density corrected win3 [DU]	10.5 ± 24.5	7028297	31.0	10.8	-178	185	-4.77	26.2
background so2 slant column offset window3 [DU]	6.19 ± 5.60	7028297	8.77	5.83	-18.5	25.2	1.77	10.5
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.24	7028297	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(6.063 \pm 11.002) \times 10^{-2}$	7028297	4.111×10^{-2}	2.459×10^{-2}	6.411×10^{-4}	2.01	1.410×10^{-2}	5.521×10^{-2}
fitted radiance shift [nm]	$(-1.871 \pm 24.690) \times 10^{-4}$	7028297	1.677×10^{-3}	-2.257×10^{-4}	-3.610×10^{-2}	3.509×10^{-2}	-1.047×10^{-3}	6.301×10^{-4}
fitted radiance squeeze [1]	$(8.413 \pm 184.816) \times 10^{-6}$	7028297	2.103×10^{-4}	8.181×10^{-6}	-7.802×10^{-3}	1.133×10^{-2}	-9.670×10^{-5}	1.136×10^{-4}
fitted root mean square [1]	$(1.387 \pm 0.621) \times 10^{-3}$	7028297	7.036×10^{-4}	1.188×10^{-3}	3.545×10^{-4}	3.575×10^{-2}	9.656×10^{-4}	1.669×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.690 ± 0.394	7028297	0.540	0.656	5.000×10^{-2}	2.76	0.386	0.926
sulfurdioxide total air mass factor polluted precision [1]	0.102 ± 0.148	7028297	9.011×10^{-2}	4.822×10^{-2}	2.500×10^{-3}	1.91	2.829×10^{-2}	0.118
sulfurdioxide clear air mass factor polluted [1]	0.600 ± 0.266	7028297	0.408	0.596	3.141×10^{-2}	2.29	0.387	0.795
number of spectral points in retrieval [1]	73.5 ± 0.5	7028297	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]	0.588 ± 0.420	11504391	0.840	0.490	0.0	1.000	0.160	1.000
sulfurdioxide total vertical column [DU]	$(1.591 \pm 69.405) \times 10^{-2}$	11504391	0.338	7.099×10^{-3}	-500	664	-0.160	0.178
sulfurdioxide total vertical column precision [DU]	0.370 ± 0.465	11504391	0.243	0.252	3.140×10^{-2}	147	0.165	0.408
sulfurdioxide slant column density corrected [DU]	$(1.199 \pm 54.984) \times 10^{-2}$	11504391	0.311	7.113×10^{-3}	-40.0	1.550×10^{3}	-0.147	0.163
sulfurdioxide slant column density cobra [DU]	$(1.174 \pm 29.539) \times 10^{-2}$	11504391	0.311	7.113×10^{-3}	-40.0	44.9	-0.147	0.163
sulfurdioxide slant column density cobra precision [DU]	0.242 ± 0.089	11504391	8.411×10^{-2}	0.216	7.491×10^{-2}	19.3	0.186	0.270
sulfurdioxide slant column density window1 [DU]	$(4.509 \pm 57.060) \times 10^{-2}$	11504391	0.658	6.112×10^{-2}	-65.7	47.0	-0.277	0.381
sulfurdioxide slant column density window1 precision [DU]	0.242 ± 0.089	11504391	8.411×10^{-2}	0.216	7.491×10^{-2}	19.3	0.186	0.270
sulfurdioxide slant column density corrected win1 [DU]	$(-4.834 \pm 54.539) \times 10^{-2}$	11504391	0.624	-5.537×10^{-2}	-65.7	47.1	-0.366	0.258
background so2 slant column offset window1 [DU]	$(-9.342 \pm 17.431) \times 10^{-2}$	11504391	0.247	-0.161	-1.37	2.82	-0.219	2.793×10^{-2}
sulfurdioxide slant column density window2 [DU]	-1.85 ± 7.93	11504391	10.2	-1.84	-530	711	-6.93	3.23
sulfurdioxide slant column density window2 precision [DU]	7.41 ± 2.00	11504391	2.13	7.12	2.13	557	6.16	8.28
sulfurdioxide slant column density corrected win2 [DU]	-2.29 ± 7.88	11504391	10.1	-2.28	-530	712	-7.31	2.74
background so2 slant column offset window2 [DU]	-0.433 ± 1.751	11504391	2.10	-9.286×10^{-2}	-8.54	16.9	-1.44	0.660
sulfurdioxide slant column density window3 [DU]	8.92 ± 22.34	11504391	28.0	8.04	-3.352×10^{3}	3.685×10^{3}	-5.46	22.6
sulfurdioxide slant column density window3 precision [DU]	27.8 ± 12.6	11504391	7.91	24.1	12.0	1.425×10^{3}	21.2	29.1
sulfurdioxide slant column density corrected win3 [DU]	10.9 ± 21.4	11504391	26.7	10.6	-3.363×10^{3}	3.678×10^{3}	-2.56	24.2
background so2 slant column offset window3 [DU]	1.95 ± 7.05	11504391	11.5	2.34	-24.2	20.9	-3.89	7.61
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.17	11504391	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.990 \pm 3.155) \times 10^{-2}$	11504391	2.217×10^{-2}	2.427×10^{-2}	1.162×10^{-3}	1.85	1.503×10^{-2}	3.720×10^{-2}
fitted radiance shift [nm]	$(-4.564 \pm 25.263) \times 10^{-4}$	11504391	1.685×10^{-3}	-5.090×10^{-4}	-6.973×10^{-2}	6.739×10^{-2}	-1.349×10^{-3}	3.360×10^{-4}
fitted radiance squeeze [1]	$(-6.721 \pm 16.334) \times 10^{-5}$	11504391	1.999×10^{-4}	-5.651×10^{-5}	-1.473×10^{-2}	1.759×10^{-2}	-1.616×10^{-4}	3.827×10^{-5}
fitted root mean square [1]	$(1.098 \pm 0.378) \times 10^{-3}$	11504391	3.846×10^{-4}	1.004×10^{-3}	2.899×10^{-4}	6.807×10^{-2}	8.586×10^{-4}	1.243×10^{-3}
sulfurdioxide total air mass factor polluted [1]	1.03 ± 0.64	11504391	0.760	0.854	5.000×10^{-2}	3.19	0.580	1.34
sulfurdioxide total air mass factor polluted precision [1]	0.166 ± 0.160	11504391	0.192	0.113	5.495×10^{-3}	1.50	4.328×10^{-2}	0.236
sulfurdioxide clear air mass factor polluted [1]	0.919 ± 0.657	11504391	0.400	0.695	0.129	3.22	0.536	0.936
number of spectral points in retrieval [1]	73.4 ± 0.5	11504391	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]	0.663 ± 0.407	13494680	0.770	1.000	0.0	1.000	0.230	1.000
sulfurdioxide total vertical column [DU]	$(2.505 \pm 118.258) \times 10^{-2}$	13494680	0.423	8.464×10^{-3}	-151	272	-0.201	0.222
sulfurdioxide total vertical column precision [DU]	0.514 ± 0.845	13494680	0.290	0.304	4.739×10^{-2}	44.9	0.208	0.499
sulfurdioxide slant column density corrected [DU]	$(1.218 \pm 30.374) \times 10^{-2}$	13494680	0.322	6.979×10^{-3}	-15.6	40.6	-0.153	0.169
sulfurdioxide slant column density cobra [DU]	$(1.215 \pm 30.187) \times 10^{-2}$	13494680	0.322	6.979×10^{-3}	-15.6	22.2	-0.153	0.169
sulfurdioxide slant column density cobra precision [DU]	0.256 ± 0.111	13494680	0.100	0.220	8.048×10^{-2}	14.9	0.189	0.289
sulfurdioxide slant column density window1 [DU]	0.100 ± 0.588	13494680	0.663	0.106	-65.7	47.0	-0.228	0.434
sulfurdioxide slant column density window1 precision [DU]	0.256 ± 0.111	13494680	0.100	0.220	8.048×10^{-2}	14.9	0.189	0.289
sulfurdioxide slant column density corrected win1 [DU]	$(-3.786 \pm 57.716) \times 10^{-2}$	13494680	0.644	-4.943×10^{-2}	-65.7	47.1	-0.369	0.276
background so2 slant column offset window1 [DU]	-0.138 ± 0.145	13494680	0.164	-0.175	-1.37	2.82	-0.232	-6.801×10^{-2}
sulfurdioxide slant column density window2 [DU]	-1.76 ± 8.29	13494680	10.5	-1.87	-485	423	-7.09	3.43
sulfurdioxide slant column density window2 precision [DU]	7.64 ± 2.02	13494680	2.33	7.34	2.13	428	6.29	8.62
sulfurdioxide slant column density corrected win2 [DU]	-2.33 ± 8.18	13494680	10.4	-2.32	-485	423	-7.54	2.88
background so2 slant column offset window2 [DU]	-0.573 ± 2.162	13494680	2.04	-5.655×10^{-2}	-12.9	16.9	-1.39	0.652
sulfurdioxide slant column density window3 [DU]	9.94 ± 23.03	13494680	29.0	9.43	-260	2.020×10^{3}	-4.71	24.3
sulfurdioxide slant column density window3 precision [DU]	28.3 ± 11.9	13494680	8.76	25.0	12.0	622	21.7	30.5
sulfurdioxide slant column density corrected win3 [DU]	12.6 ± 22.1	13494680	28.0	12.2	-264	2.014×10^{3}	-1.55	26.4
background so2 slant column offset window3 [DU]	2.61 ± 6.48	13494680	9.26	2.96	-24.2	25.1	-1.85	7.41
sulfurdioxide slant column cobra flag [1]	1.99 ± 0.14	13494680	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(3.269 \pm 3.845) \times 10^{-2}$	13494680	2.234×10^{-2}	2.462×10^{-2}	1.777×10^{-3}	1.83	1.591×10^{-2}	3.825×10^{-2}
fitted radiance shift [nm]	$(-3.013 \pm 24.196) \times 10^{-4}$	13494680	1.778×10^{-3}	-3.101×10^{-4}	-4.924×10^{-2}	3.818×10^{-2}	-1.219×10^{-3}	5.590×10^{-4}
fitted radiance squeeze [1]	$(-3.368 \pm 16.288) \times 10^{-5}$	13494680	1.919×10^{-4}	-2.847×10^{-5}	-1.381×10^{-2}	1.279×10^{-2}	-1.266×10^{-4}	6.527×10^{-5}
fitted root mean square [1]	$(1.140 \pm 0.454) \times 10^{-3}$	13494680	4.047×10^{-4}	1.012×10^{-3}	3.279×10^{-4}	6.433×10^{-2}	8.639×10^{-4}	1.268×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.812 ± 0.417	13494680	0.508	0.756	5.000×10^{-2}	2.68	0.523	1.03
sulfurdioxide total air mass factor polluted precision [1]	0.127 ± 0.132	13494680	0.138	7.232×10^{-2}	3.460×10^{-3}	1.50	3.759×10^{-2}	0.175
sulfurdioxide clear air mass factor polluted [1]	0.675 ± 0.242	13494680	0.313	0.645	5.325×10^{-2}	2.81	0.506	0.819
number of spectral points in retrieval [1]	73.5 ± 0.5	13494680	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]	0.520 ± 0.423	4358465	0.900	0.490	0.0	1.000	0.1000	1.000
sulfurdioxide total vertical column [DU]	$(6.607 \pm 195.517) \times 10^{-2}$	4358465	0.354	8.264×10^{-3}	-116	664	-0.163	0.191
sulfurdioxide total vertical column precision [DU]	0.688 ± 1.374	4358465	0.483	0.264	3.140×10^{-2}	79.2	0.131	0.614
sulfurdioxide slant column density corrected [DU]	$(2.327 \pm 86.175) \times 10^{-2}$	4358465	0.385	1.053×10^{-2}	-10.1	1.550×10^{3}	-0.180	0.205
sulfurdioxide slant column density cobra [DU]	$(2.261 \pm 41.717) \times 10^{-2}$	4358465	0.385	1.053×10^{-2}	-10.1	44.9	-0.180	0.205
sulfurdioxide slant column density cobra precision [DU]	0.308 ± 0.138	4358465	0.150	0.266	7.491×10^{-2}	19.3	0.218	0.368
sulfurdioxide slant column density window1 [DU]	$(2.671 \pm 76.218) \times 10^{-2}$	4358465	0.830	3.652×10^{-2}	-33.3	41.2	-0.391	0.439
sulfurdioxide slant column density window1 precision [DU]	0.308 ± 0.138	4358465	0.150	0.266	7.491×10^{-2}	19.3	0.218	0.368
sulfurdioxide slant column density corrected win1 [DU]	$(-1.842 \pm 73.270) \times 10^{-2}$	4358465	0.765	-3.934×10^{-2}	-33.3	41.3	-0.417	0.348
background so2 slant column offset window1 [DU]	$(-4.513 \pm 21.709) \times 10^{-2}$	4358465	0.356	-0.117	-0.999	3.70	-0.215	0.141
sulfurdioxide slant column density window2 [DU]	-0.508 ± 9.215	4358465	11.6	-0.632	-530	711	-6.36	5.19
sulfurdioxide slant column density window2 precision [DU]	8.30 ± 2.44	4358465	2.71	7.88	2.40	557	6.71	9.43
sulfurdioxide slant column density corrected win2 [DU]	-2.28 ± 8.91	4358465	11.1	-2.27	-530	712	-7.85	3.29
background so2 slant column offset window2 [DU]	-1.77 ± 2.65	4358465	3.70	-1.34	-12.9	16.9	-3.37	0.329
sulfurdioxide slant column density window3 [DU]	-0.310 ± 22.831	4358465	27.8	-1.169×10^{-2}	-1.125×10^{3}	1.550×10^{3}	-14.0	13.8
sulfurdioxide slant column density window3 precision [DU]	30.1 ± 13.9	4358465	9.55	26.5	12.7	1.425×10^{3}	22.6	32.1
sulfurdioxide slant column density corrected win3 [DU]	5.83 ± 23.19	4358465	28.3	6.56	-1.133×10^{3}	1.550×10^{3}	-7.94	20.4
background so2 slant column offset window3 [DU]	6.14 ± 7.18	4358465	10.9	7.89	-21.8	25.0	0.862	11.8
sulfurdioxide slant column cobra flag [1]	1.95 ± 0.32	4358465	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(5.914 \pm 11.350) \times 10^{-2}$	4358465	4.389×10^{-2}	2.041×10^{-2}	7.029×10^{-4}	2.01	1.013×10^{-2}	5.402×10^{-2}
fitted radiance shift [nm]	$(-5.276 \pm 26.788) \times 10^{-4}$	4358465	1.385×10^{-3}	-6.436×10^{-4}	-6.973×10^{-2}	6.739×10^{-2}	-1.302×10^{-3}	8.268×10^{-5}
fitted radiance squeeze [1]	$(-5.976 \pm 20.486) \times 10^{-5}$	4358465	2.533×10^{-4}	-5.725×10^{-5}	-1.473×10^{-2}	1.759×10^{-2}	-1.871×10^{-4}	6.610×10^{-5}
fitted root mean square [1]	$(1.378 \pm 0.565) \times 10^{-3}$	4358465	5.755×10^{-4}	1.236×10^{-3}	2.899×10^{-4}	6.807×10^{-2}	1.013×10^{-3}	1.588×10^{-3}
sulfurdioxide total air mass factor polluted [1]	1.23 ± 0.85	4358465	1.58	0.968	5.000×10^{-2}	3.19	0.508	2.08
sulfurdioxide total air mass factor polluted precision [1]	0.190 ± 0.213	4358465	0.232	0.121	2.500×10^{-3}	1.91	3.243×10^{-2}	0.265
sulfurdioxide clear air mass factor polluted [1]	1.22 ± 0.96	4358465	1.83	0.788	3.141×10^{-2}	3.22	0.449	2.28
number of spectral points in retrieval [1]	73.4 ± 0.5	4358465	1.000	73.0	52.0	74.0	73.0	74.0

3 Granule outlines

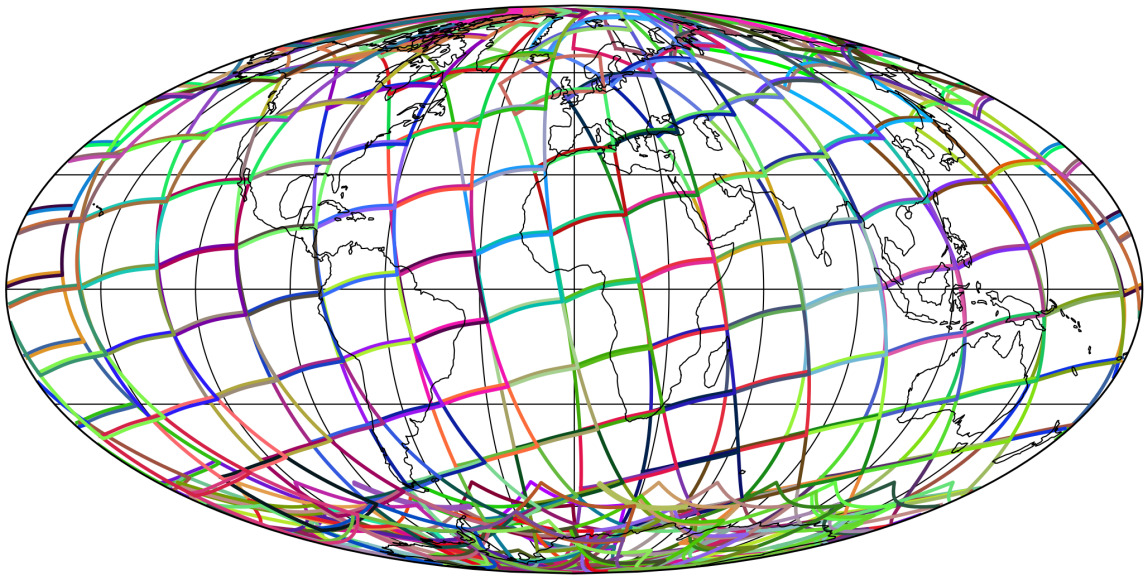

Figure 1: Outline of the granules.

4 Input data monitoring

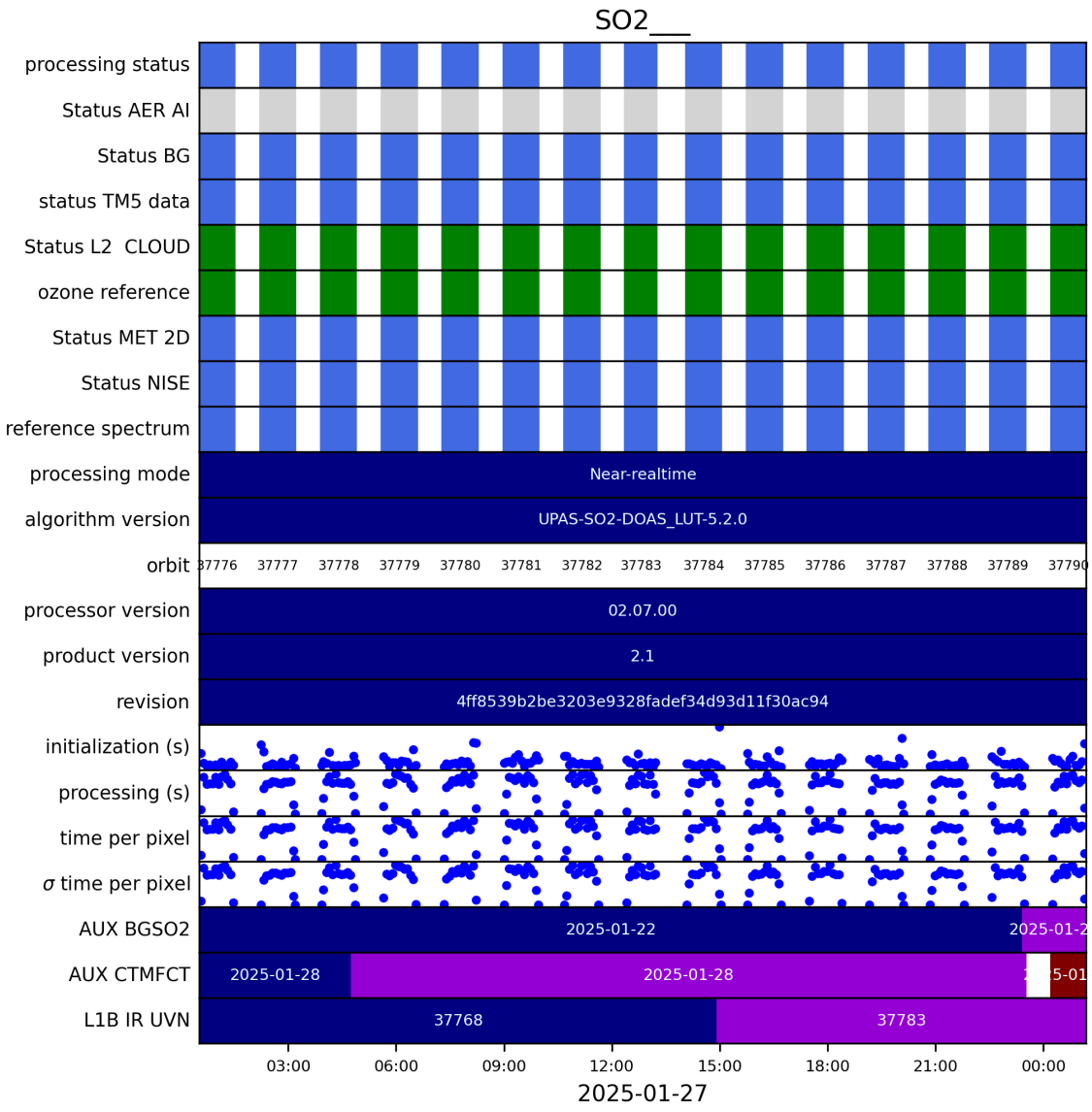

Figure 2: Input data per granule

5 Warnings and errors

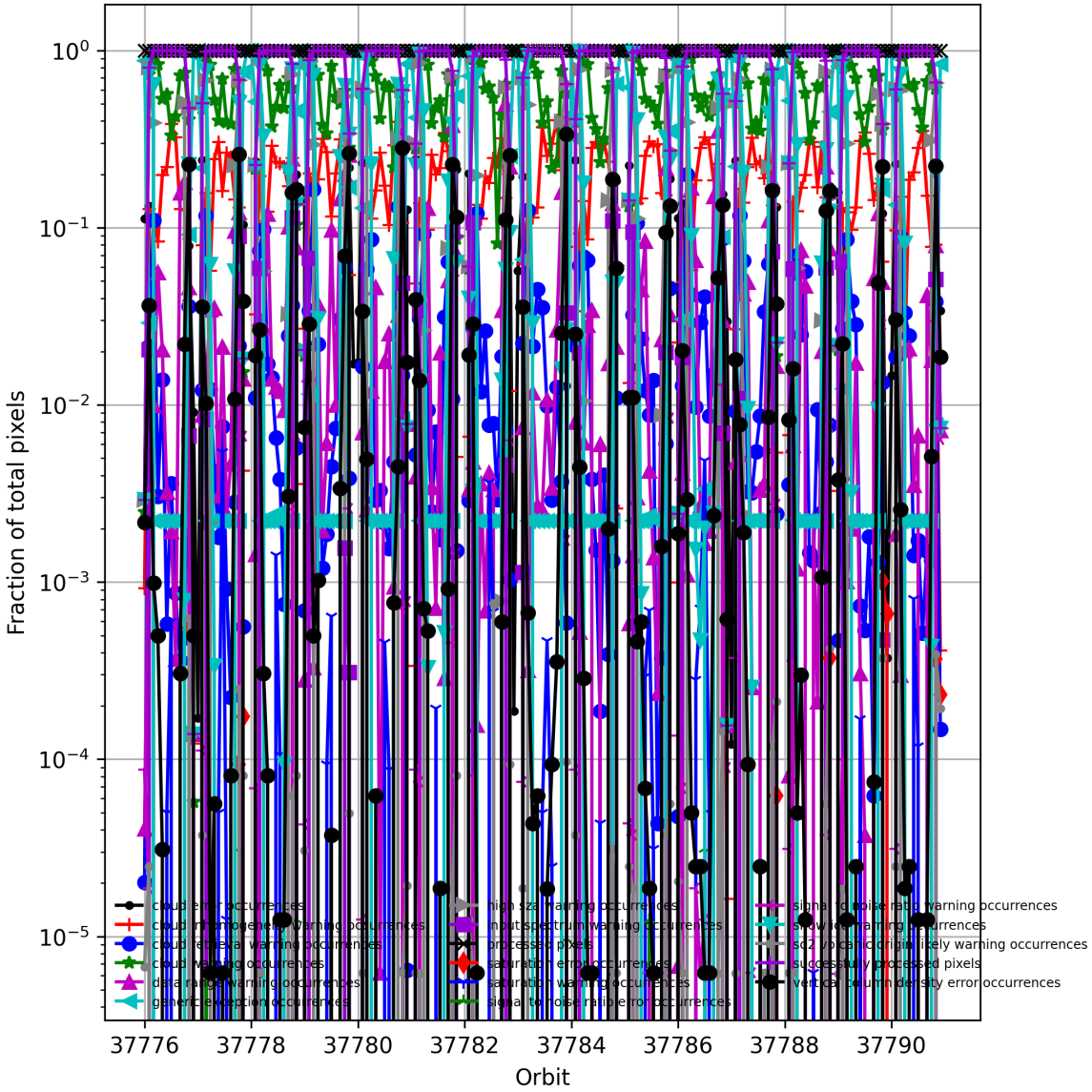

Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

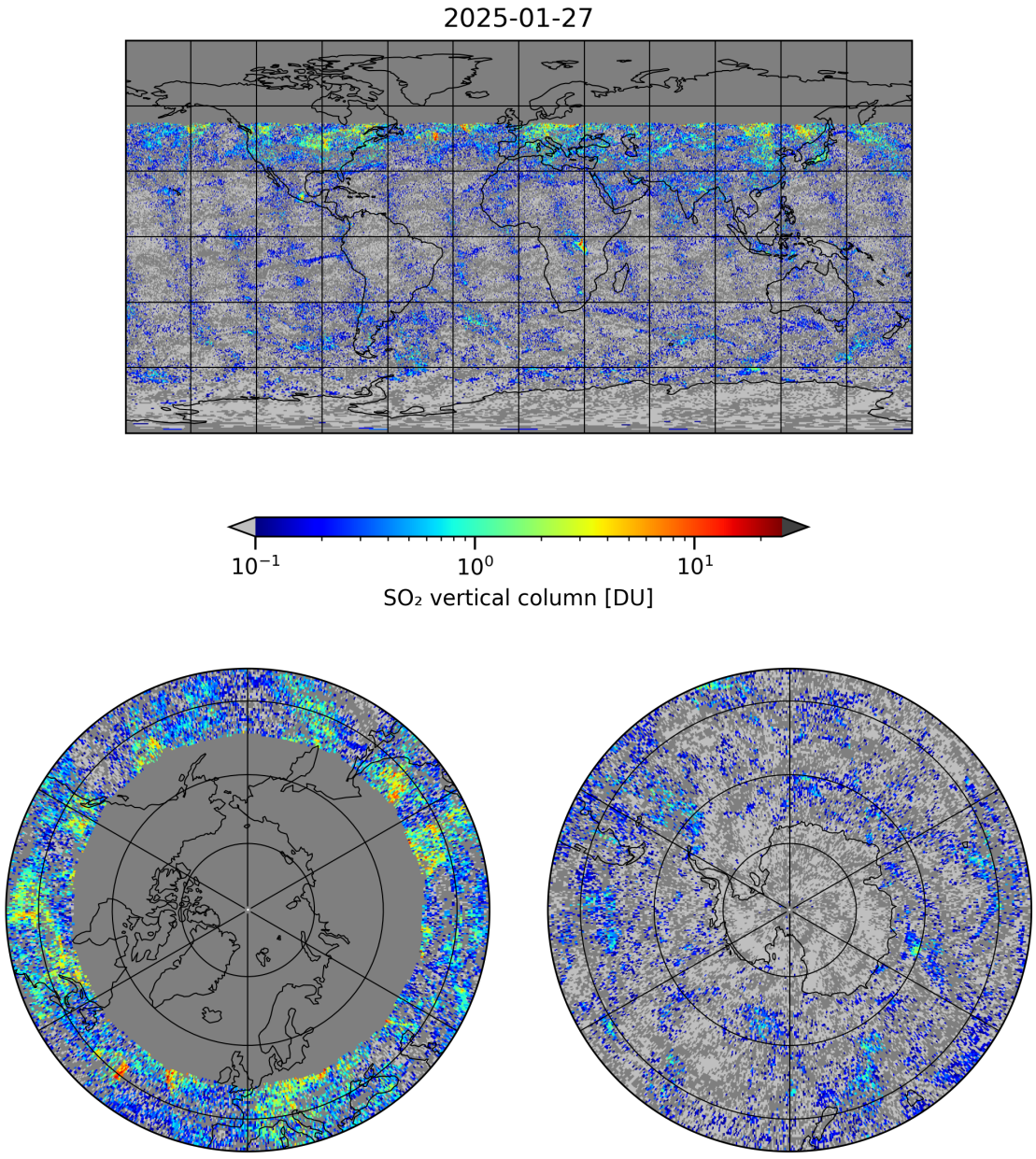

Figure 4: Map of "SO_2 vertical column" for 2025-01-27 to 2025-01-28

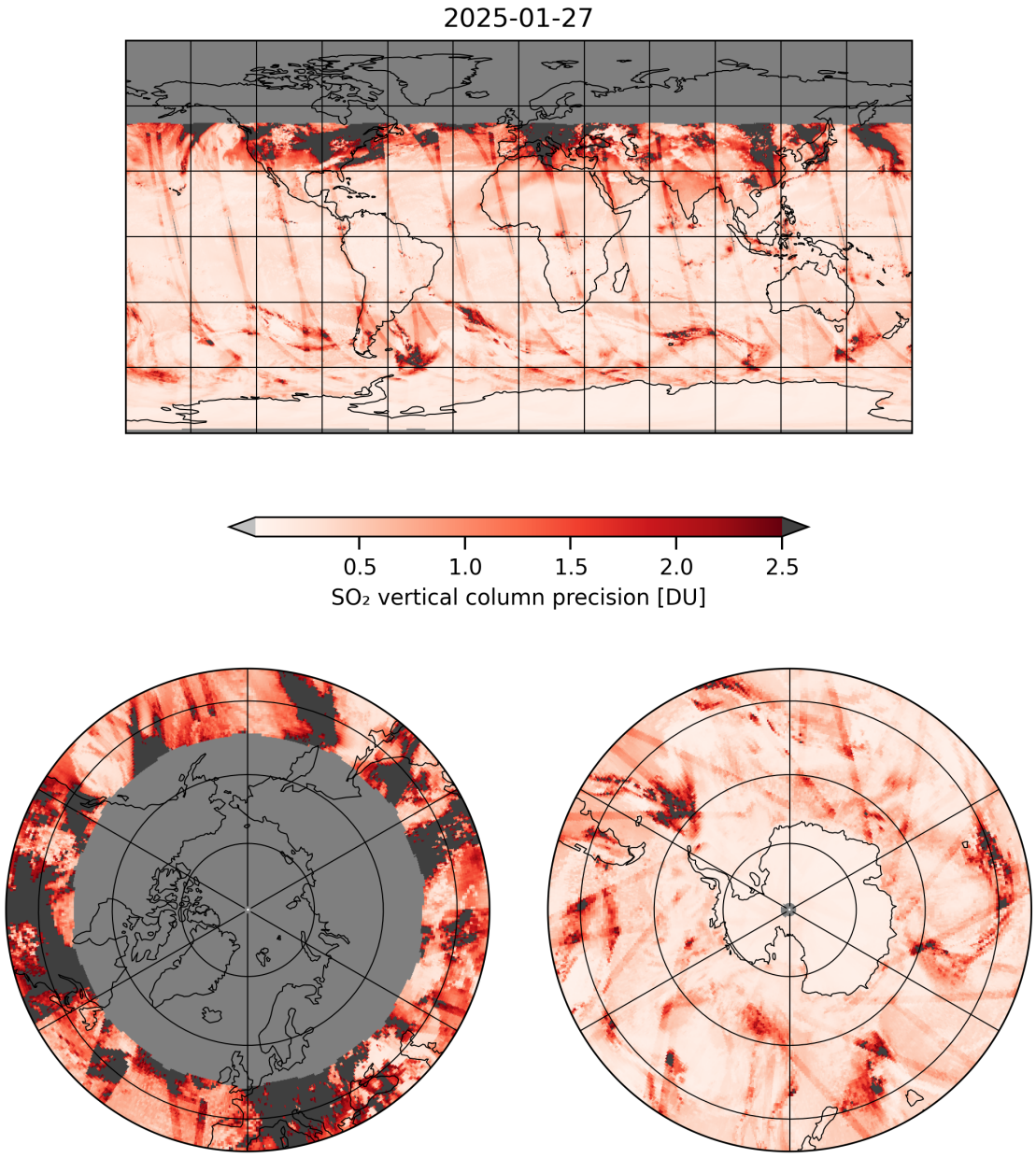

Figure 5: Map of "SO_2 vertical column precision" for 2025-01-27 to 2025-01-28

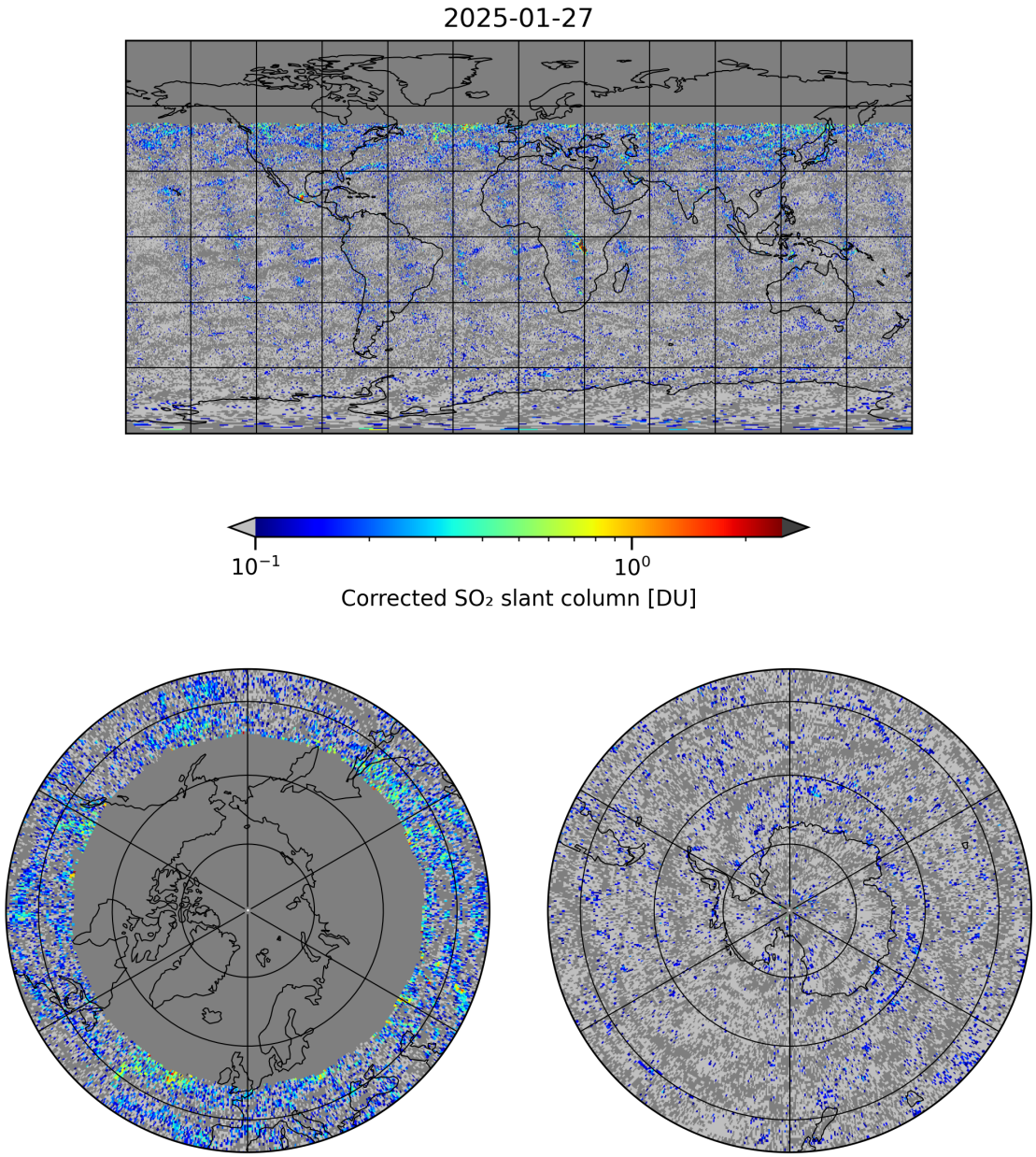

Figure 6: Map of “Corrected SO_2 slant column” for 2025-01-27 to 2025-01-28

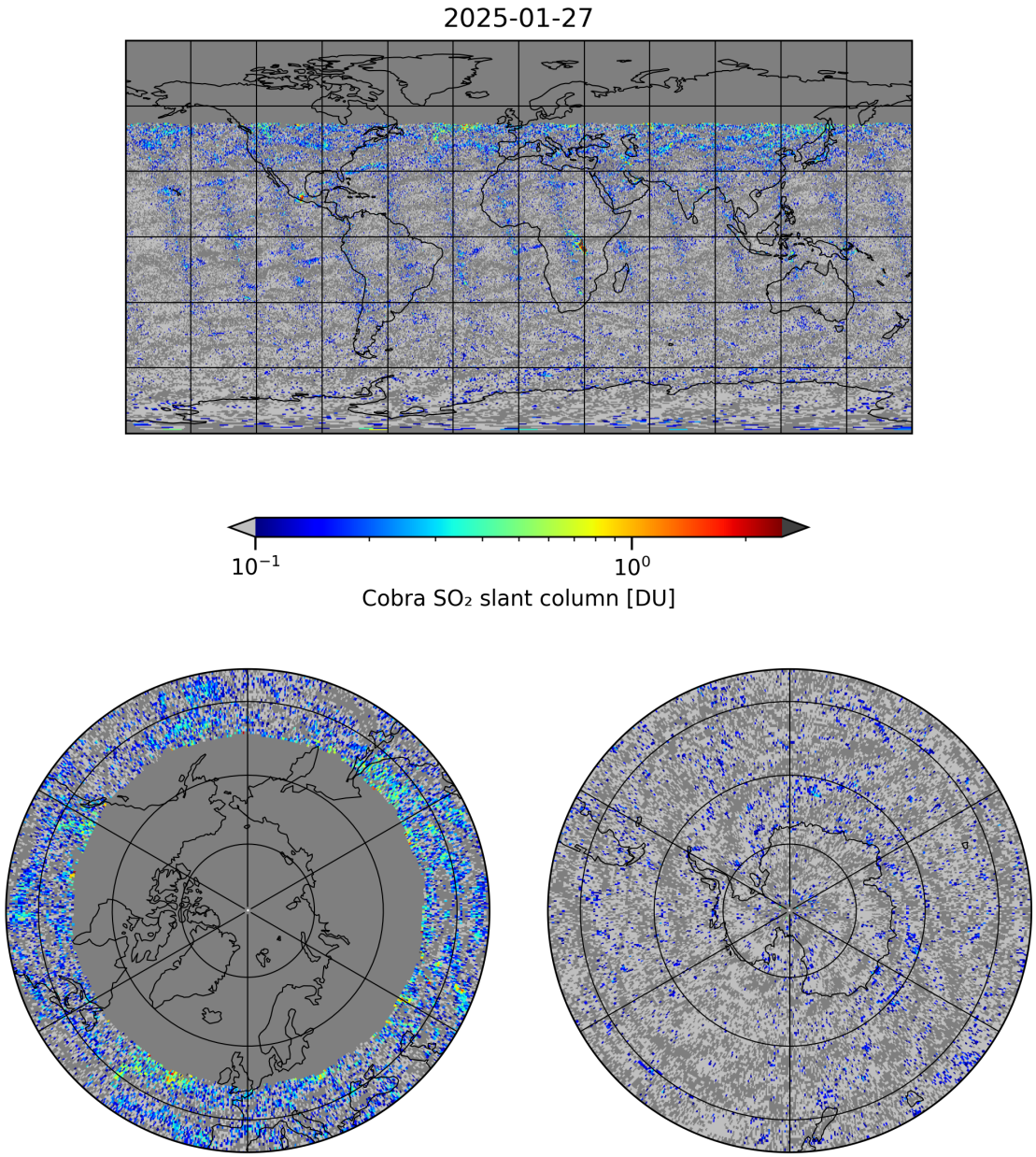

Figure 7: Map of "Cobra SO_2 slant column" for 2025-01-27 to 2025-01-28

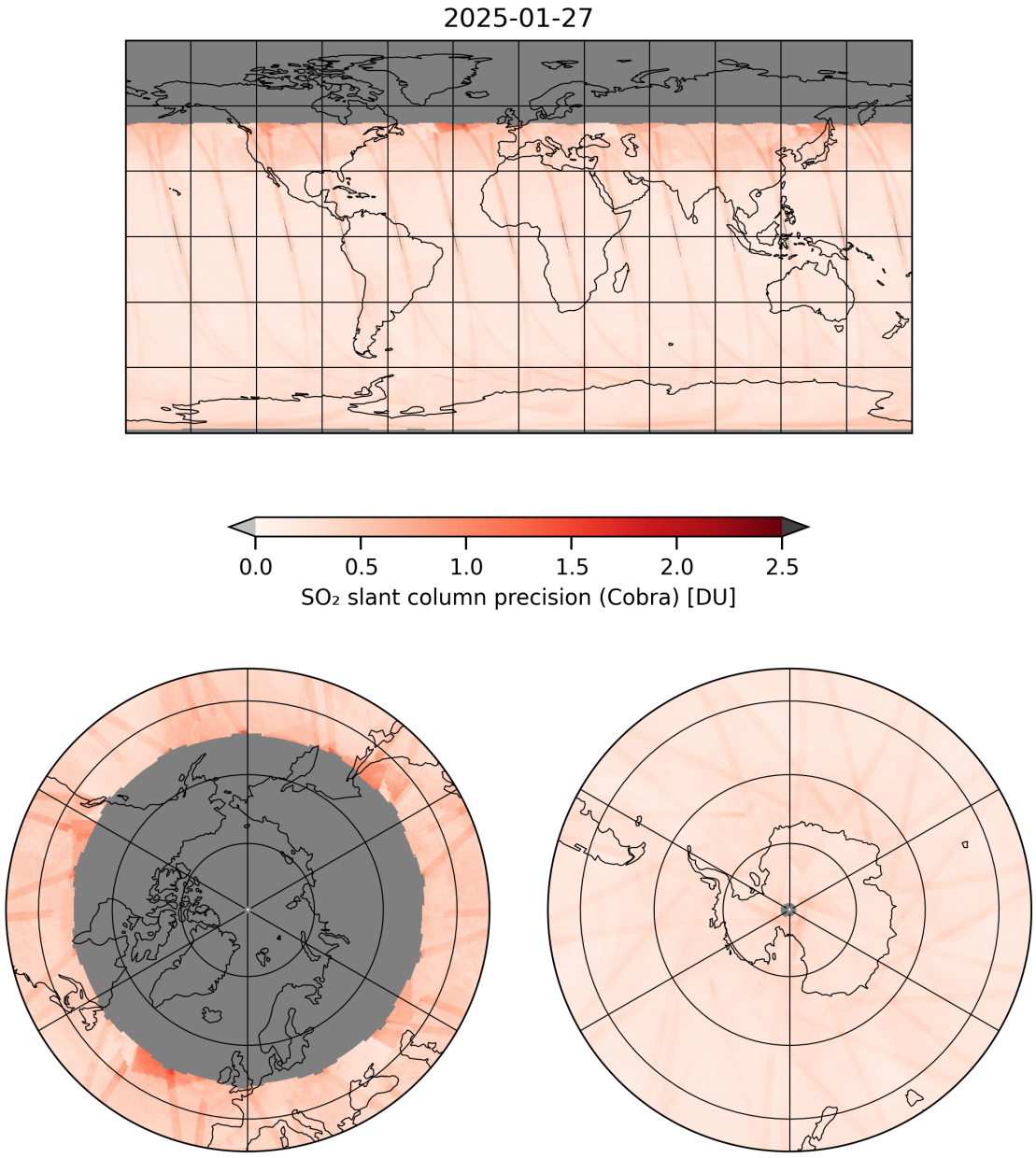

Figure 8: Map of "SO_2 slant column precision (Cobra)" for 2025-01-27 to 2025-01-28

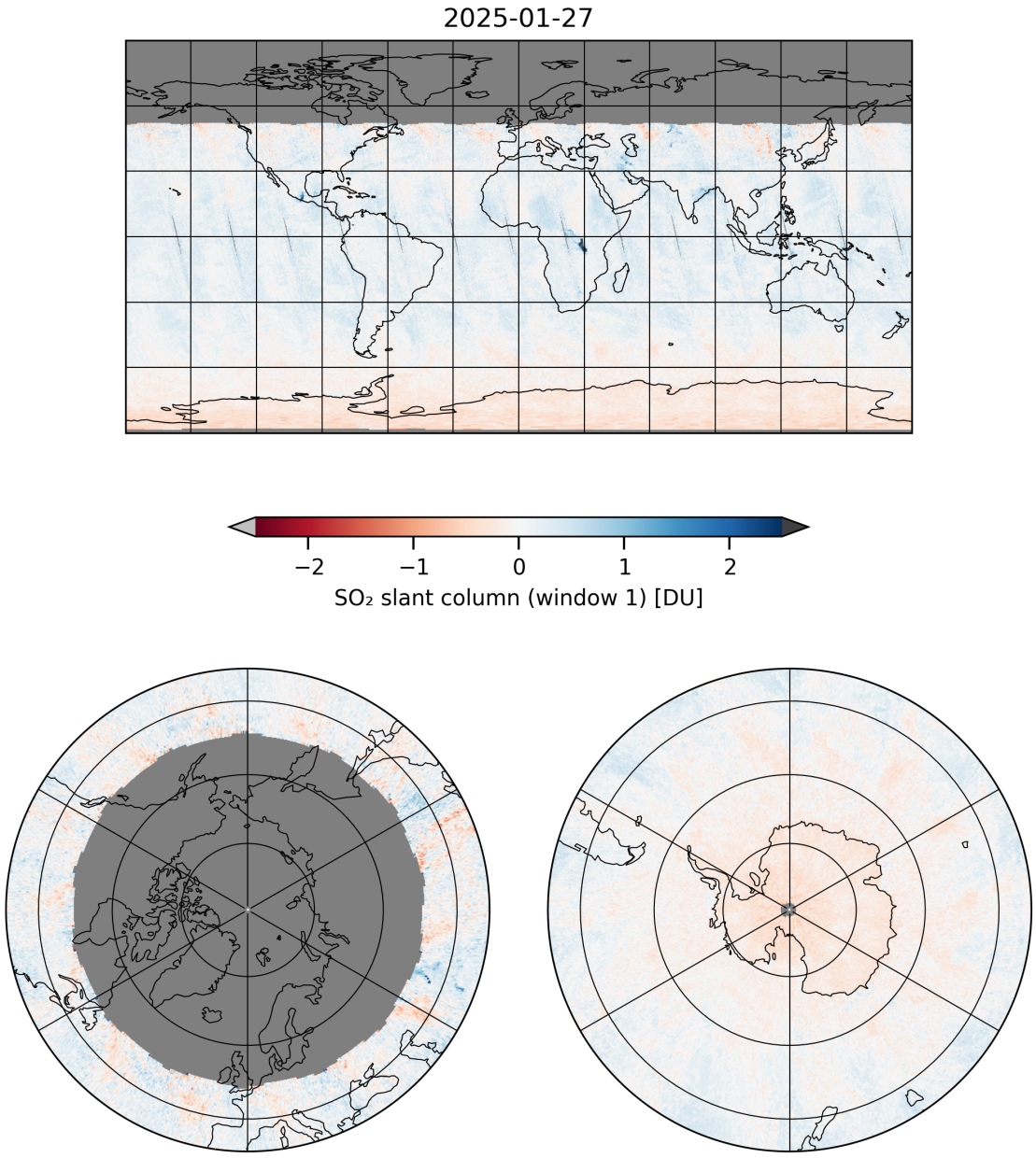

Figure 9: Map of "SO_2 slant column (window 1)" for 2025-01-27 to 2025-01-28

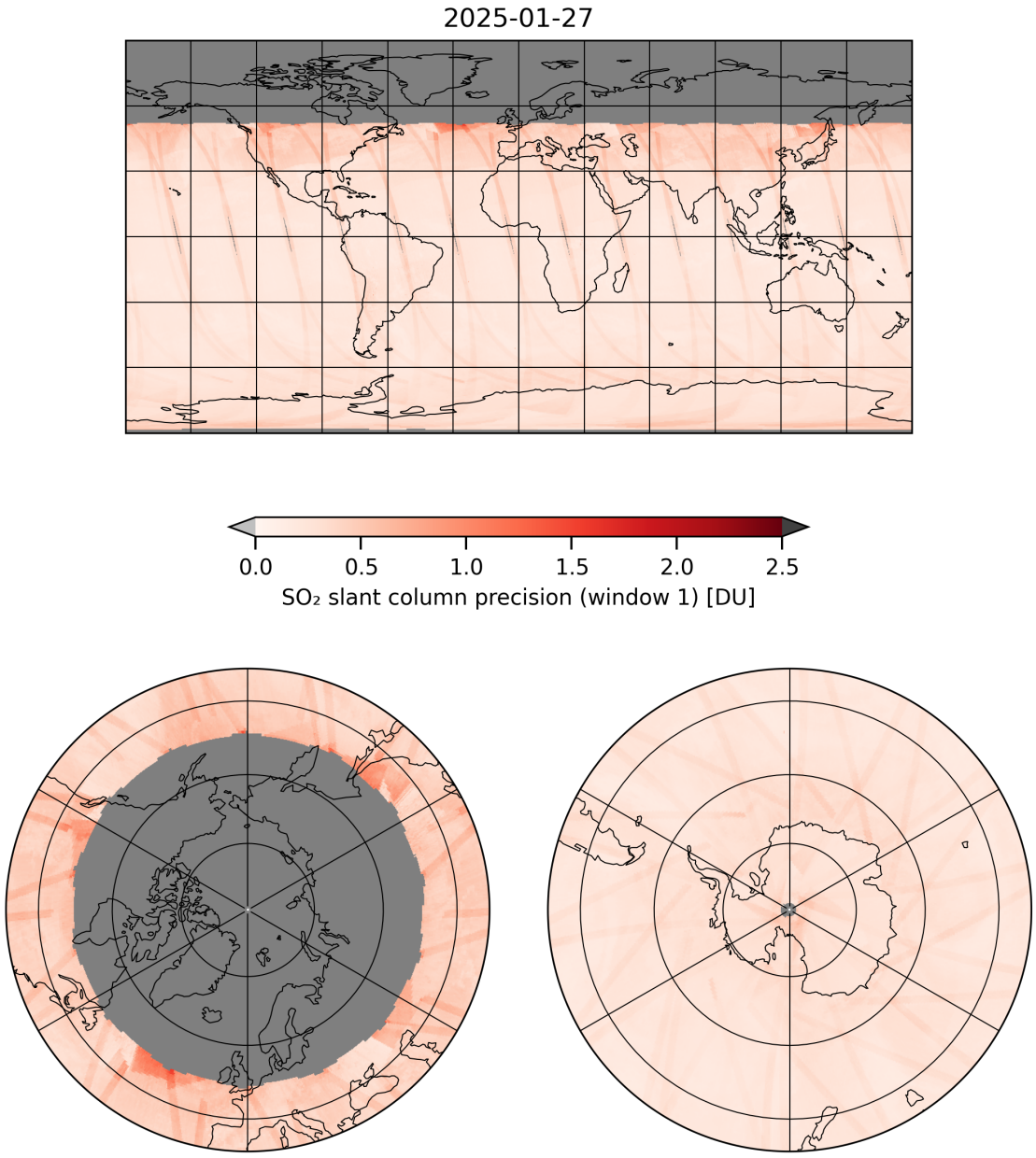

Figure 10: Map of "SO_2 slant column precision (window 1)" for 2025-01-27 to 2025-01-28

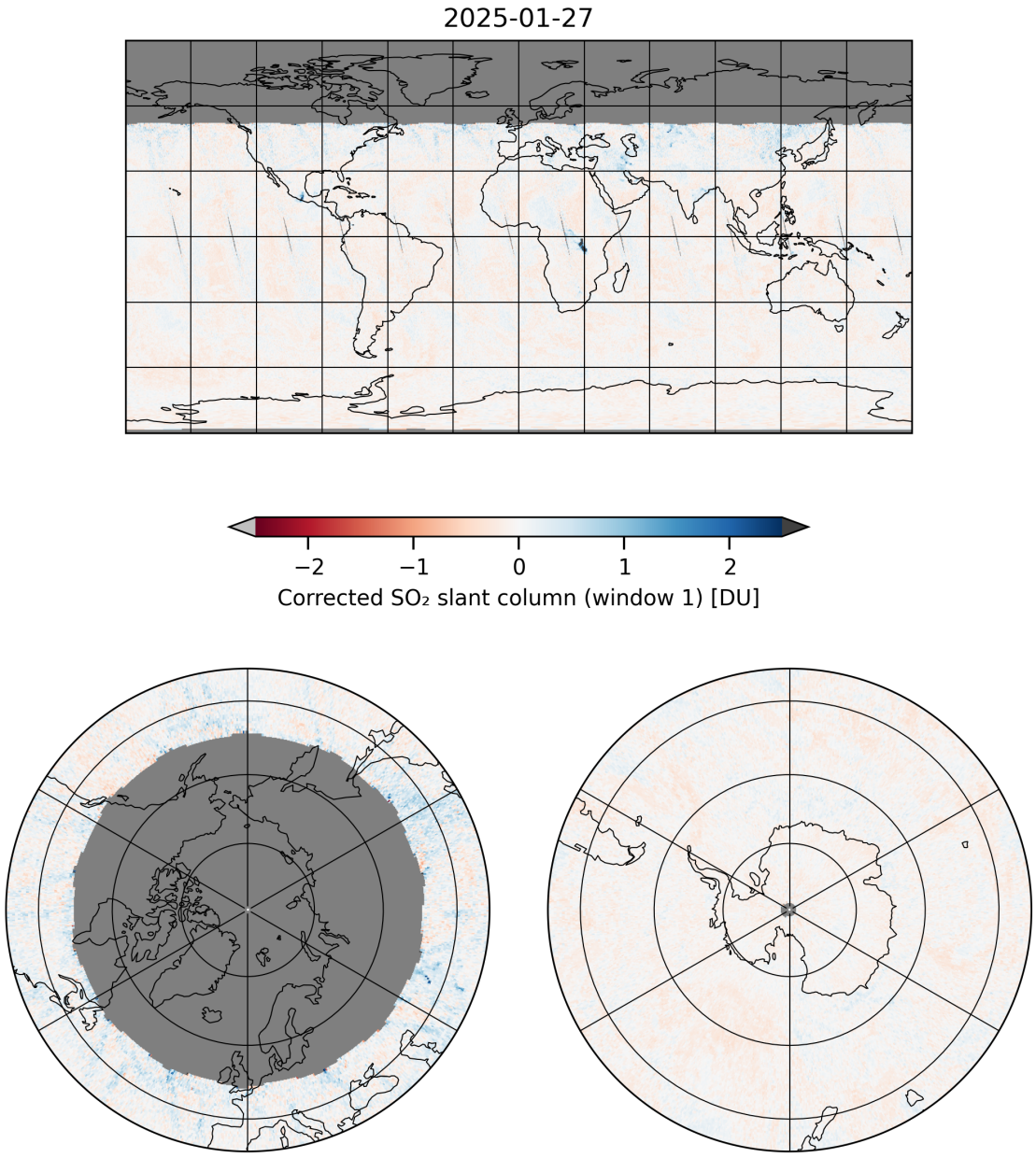

Figure 11: Map of “Corrected SO_2 slant column (window 1)” for 2025-01-27 to 2025-01-28

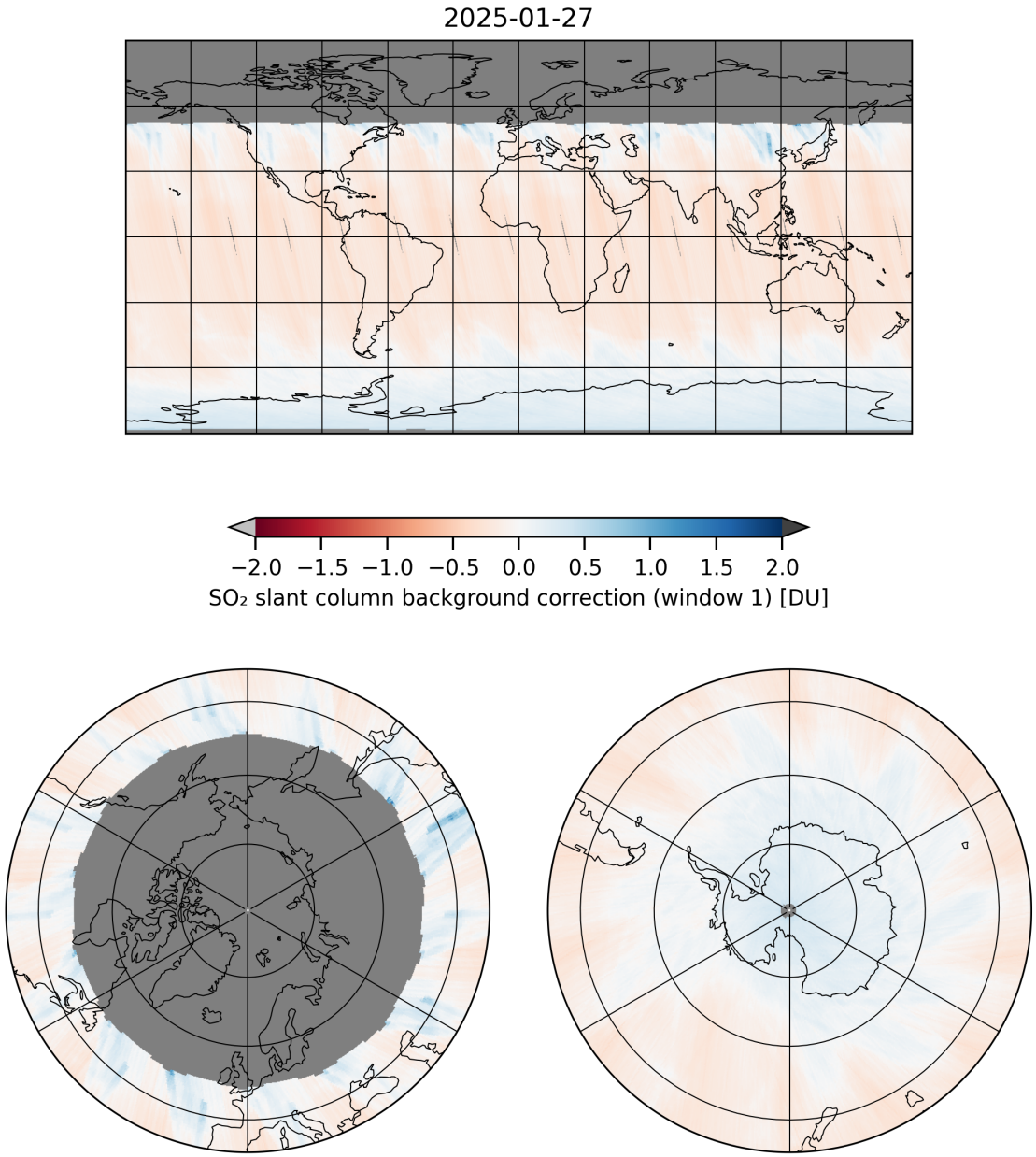

Figure 12: Map of "SO_2 slant column background correction (window 1)" for 2025-01-27 to 2025-01-28

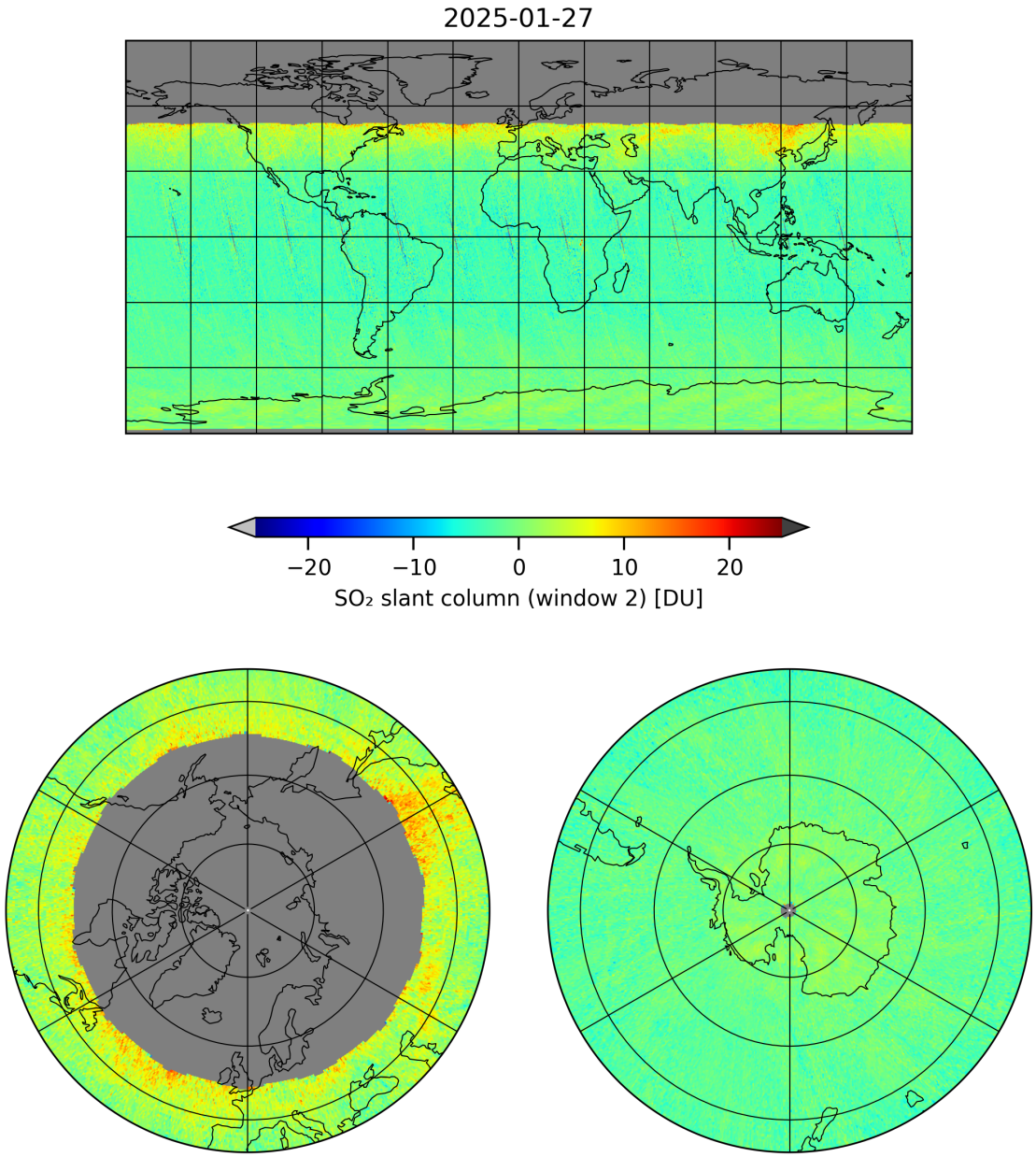

Figure 13: Map of "SO_2 slant column (window 2)" for 2025-01-27 to 2025-01-28

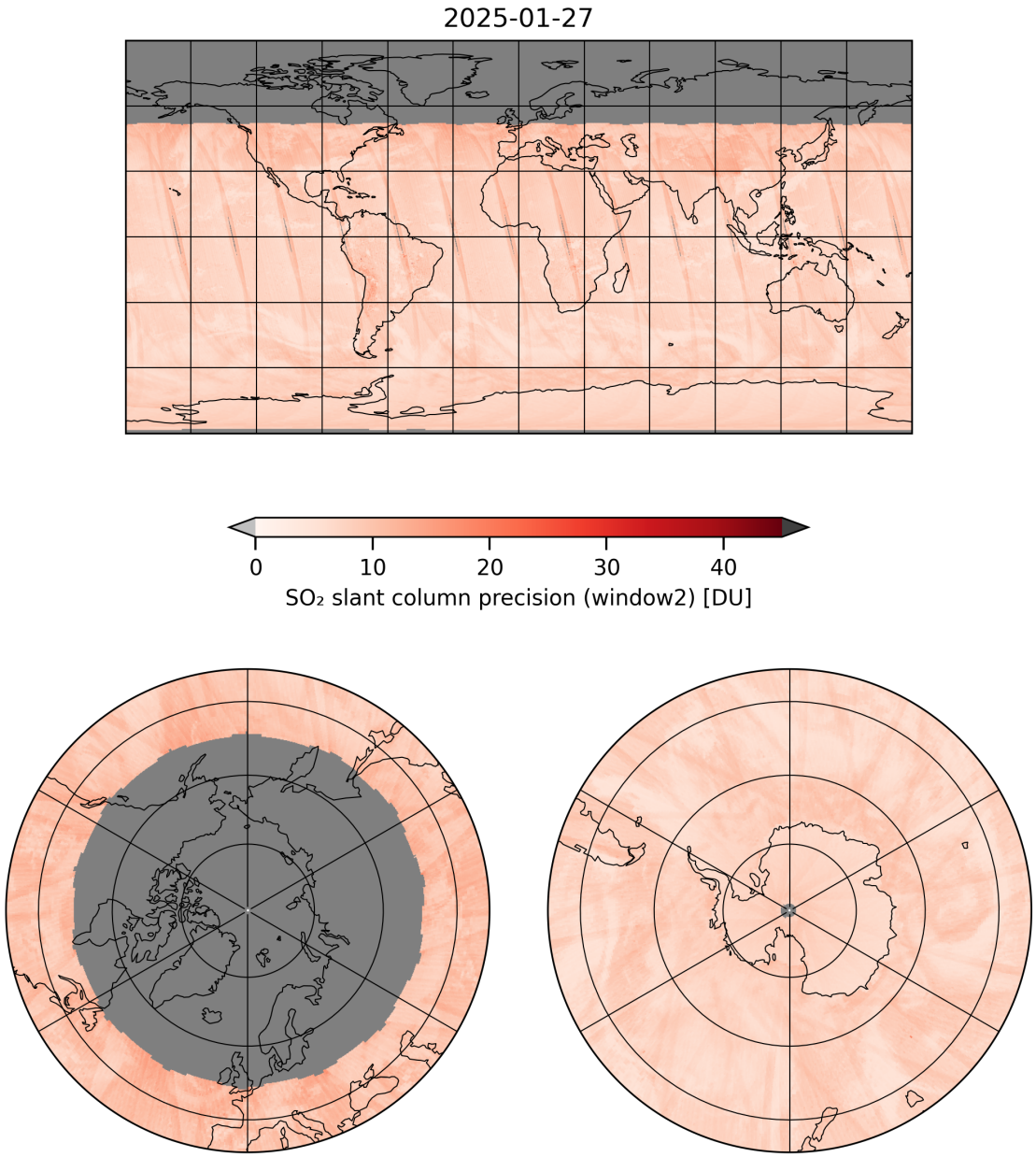

Figure 14: Map of "SO_2 slant column precision (window2)" for 2025-01-27 to 2025-01-28

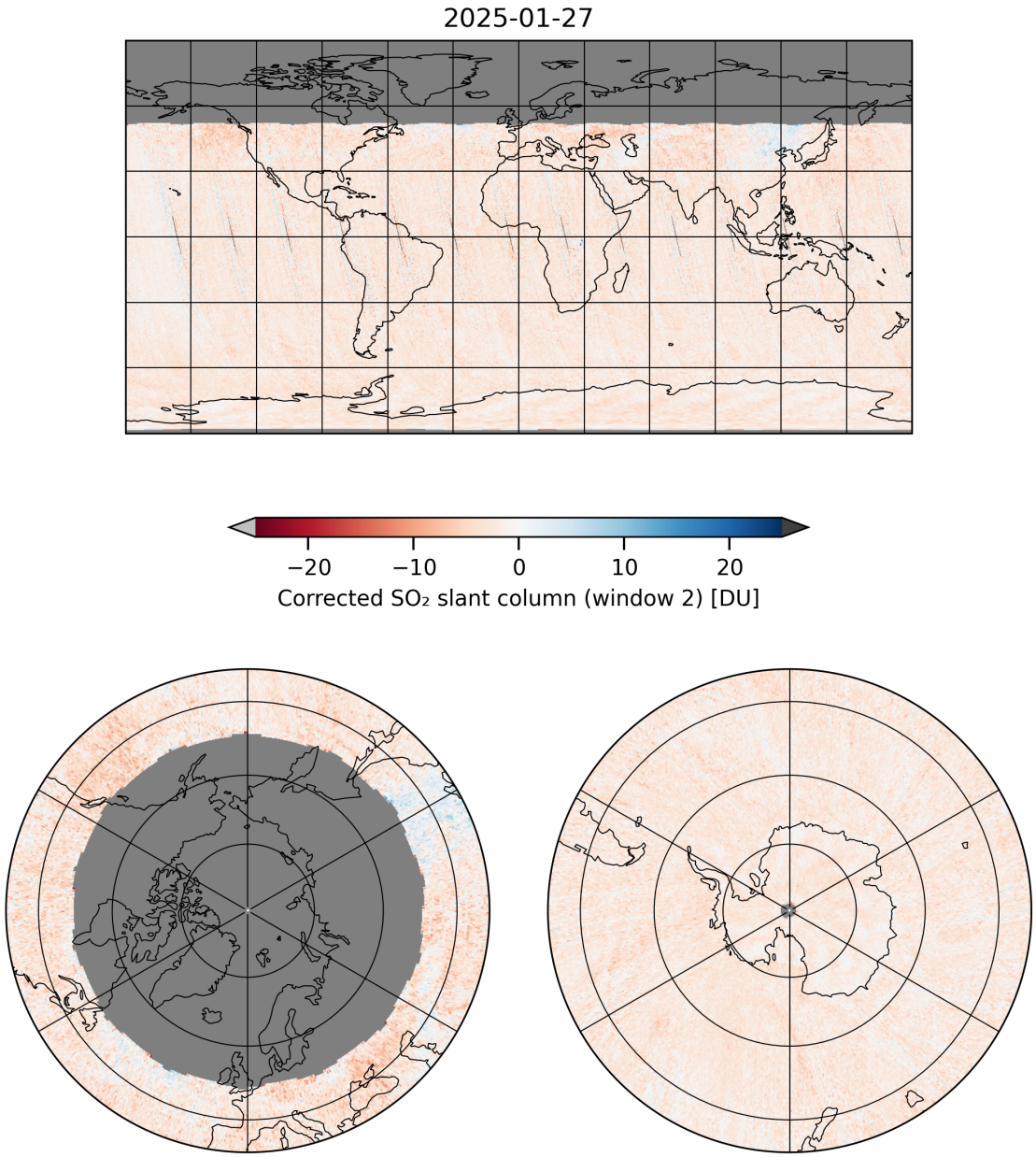

Figure 15: Map of "Corrected SO_2 slant column (window 2)" for 2025-01-27 to 2025-01-28

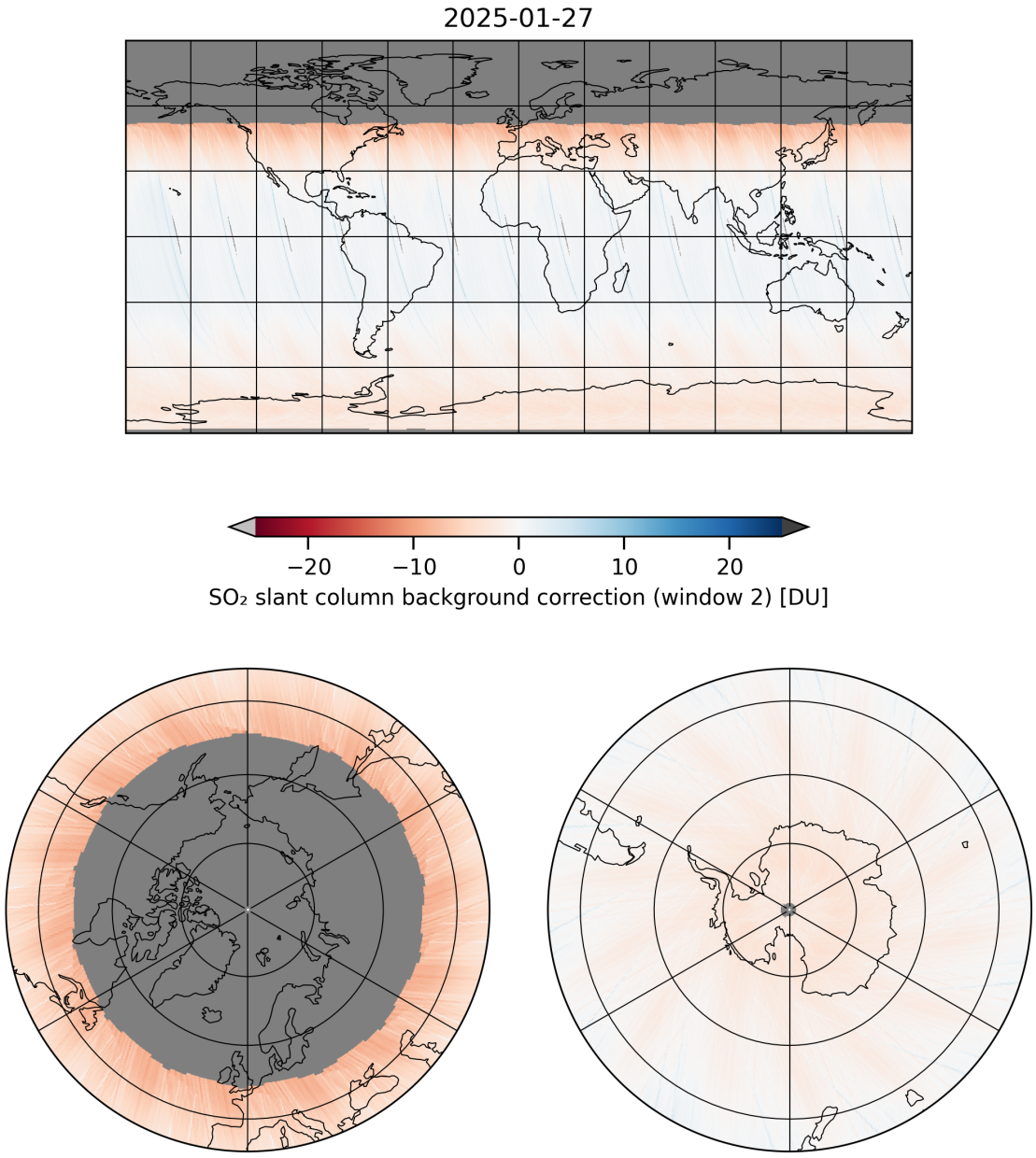

Figure 16: Map of "SO_2 slant column background correction (window 2)" for 2025-01-27 to 2025-01-28

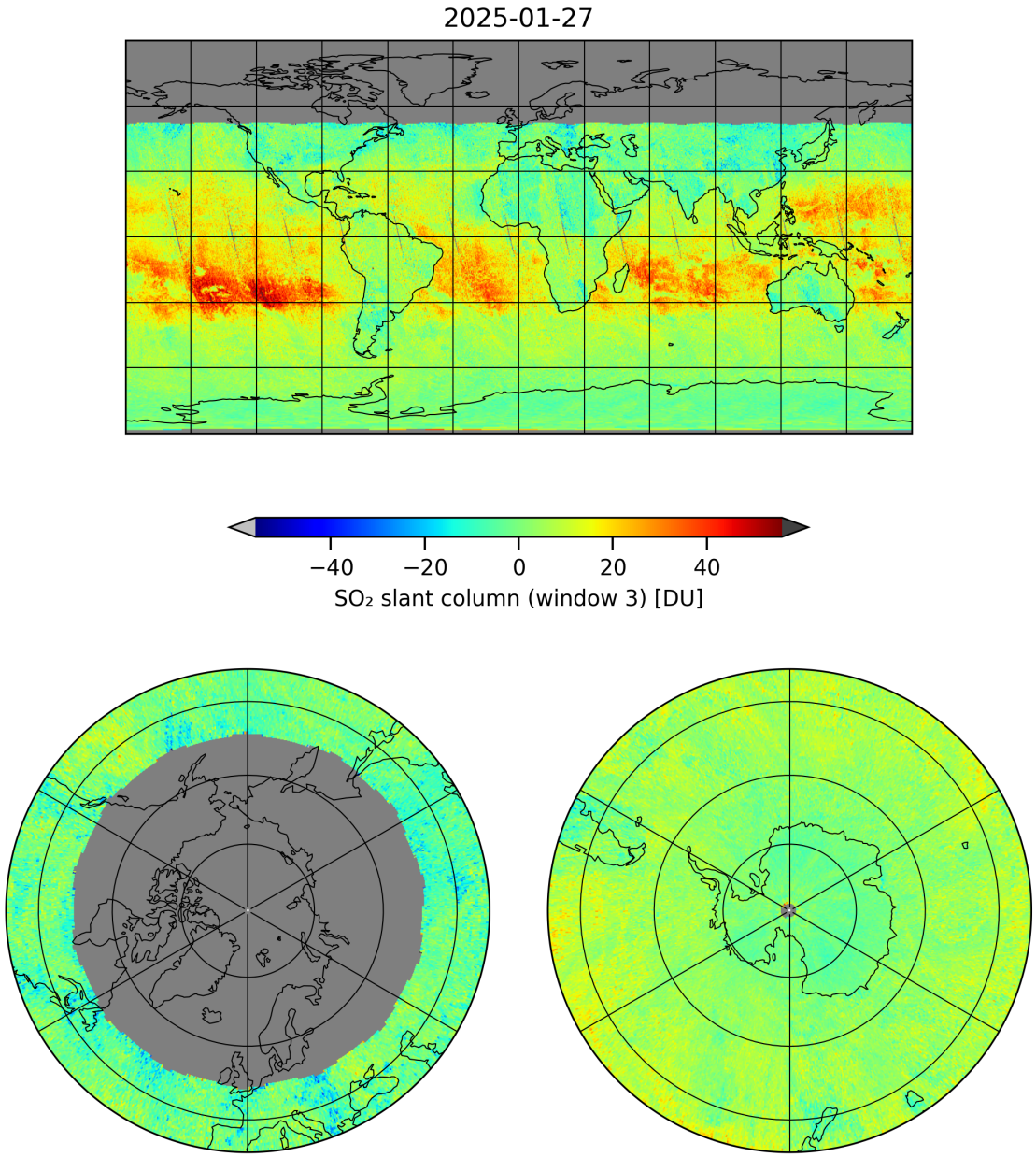

Figure 17: Map of "SO_2 slant column (window 3)" for 2025-01-27 to 2025-01-28

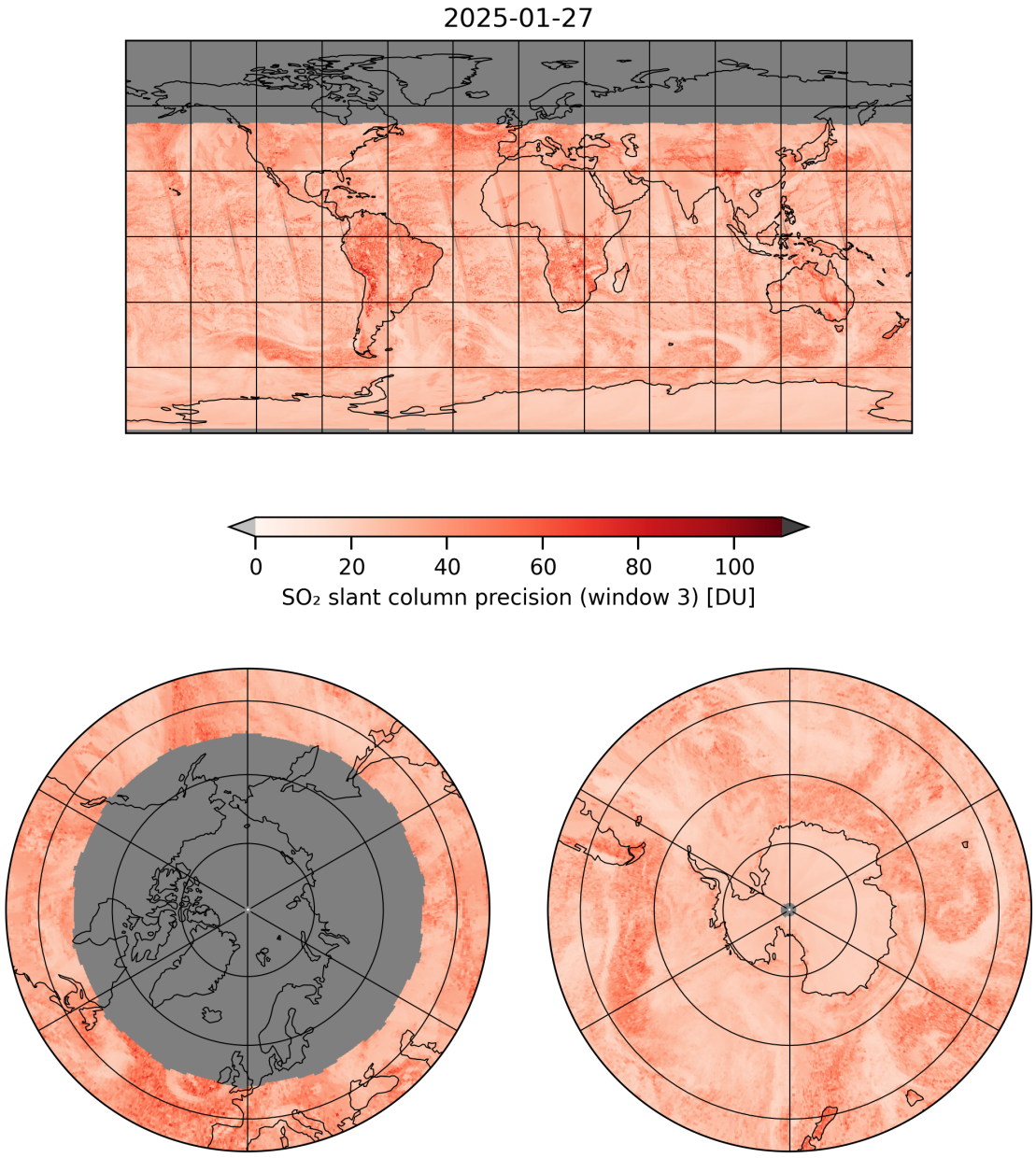

Figure 18: Map of "SO_2 slant column precision (window 3)" for 2025-01-27 to 2025-01-28

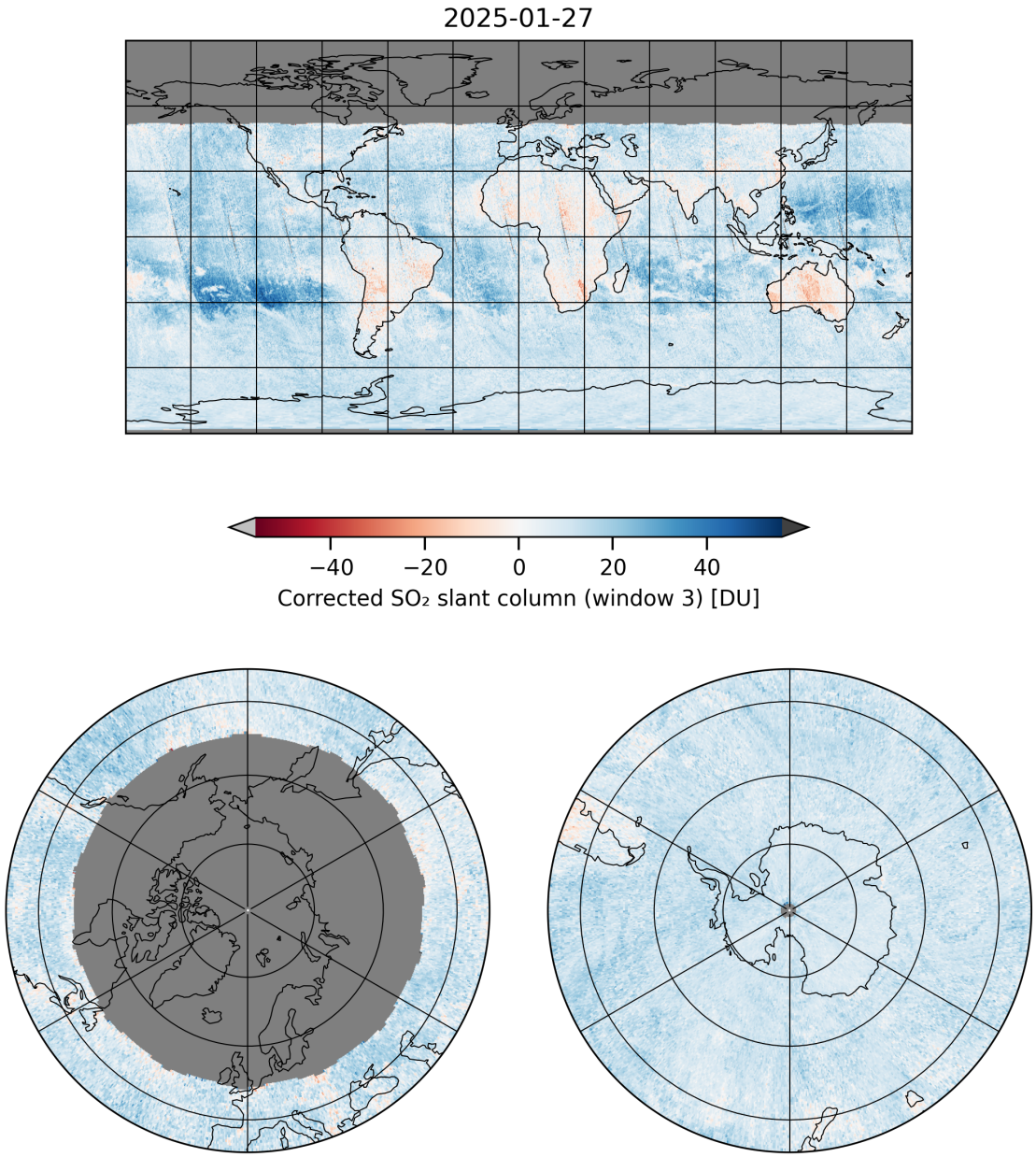

Figure 19: Map of "Corrected SO_2 slant column (window 3)" for 2025-01-27 to 2025-01-28

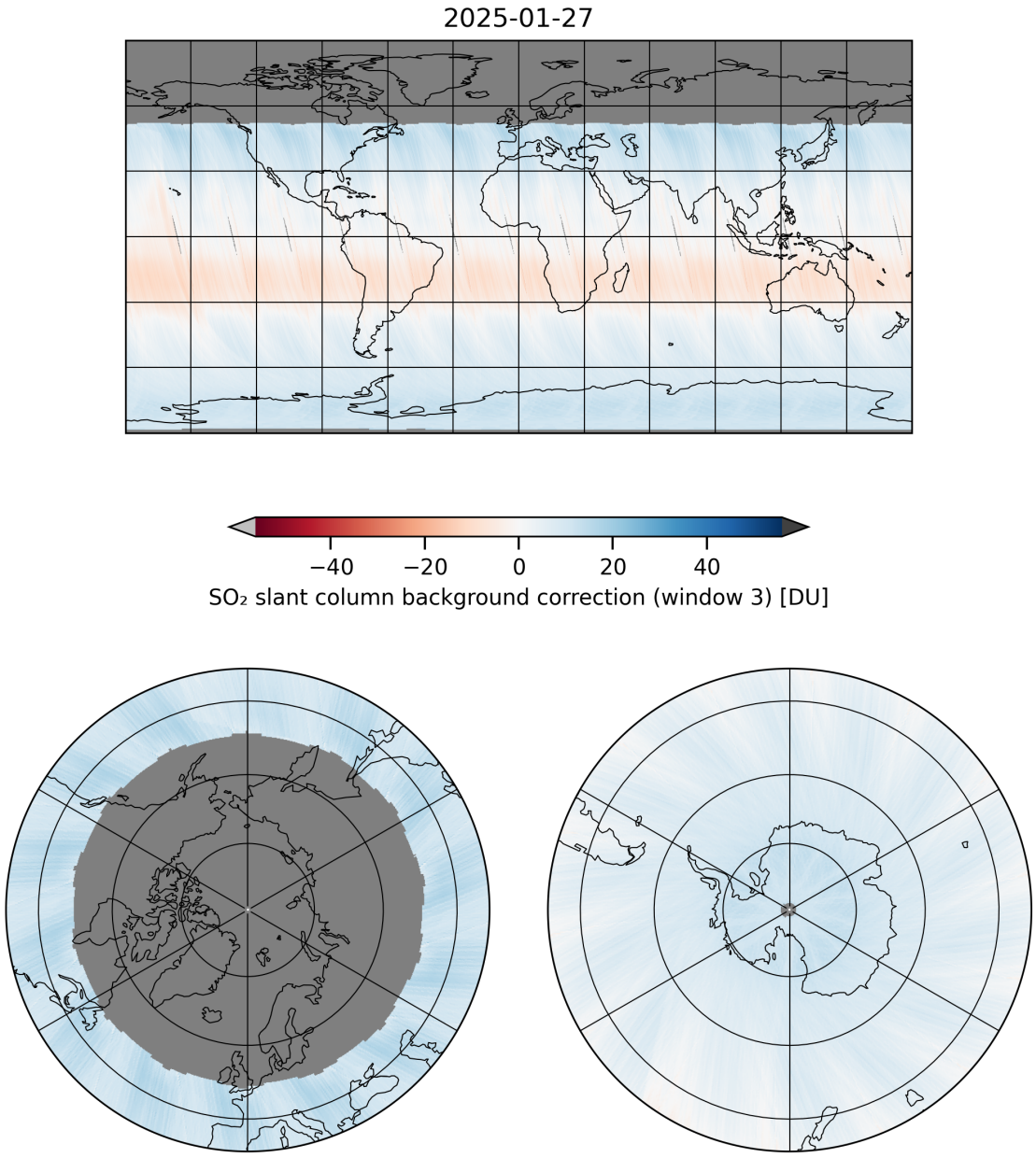

Figure 20: Map of "SO_2 slant column background correction (window 3)" for 2025-01-27 to 2025-01-28

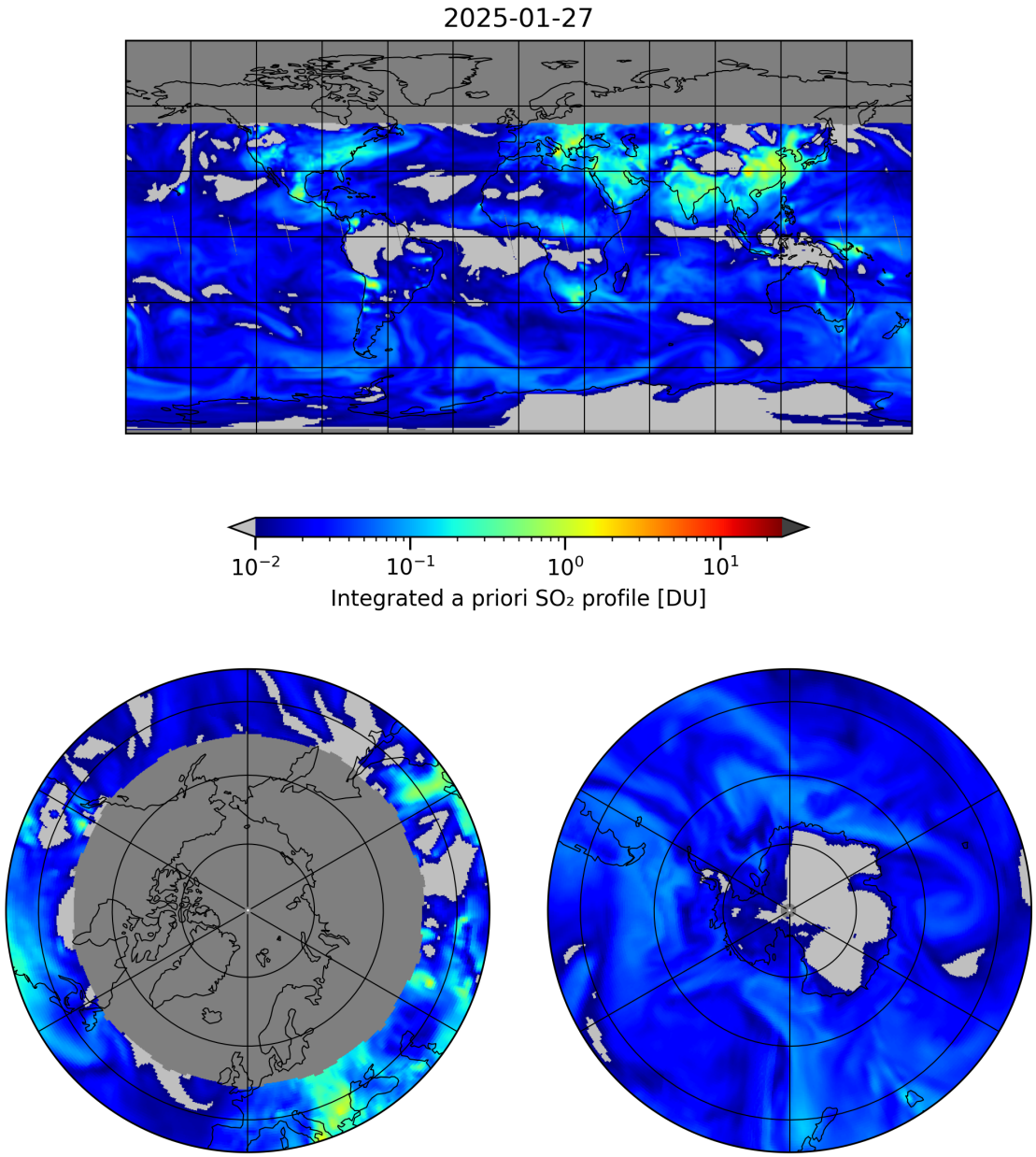

Figure 21: Map of “Integrated a priori SO_2 profile” for 2025-01-27 to 2025-01-28

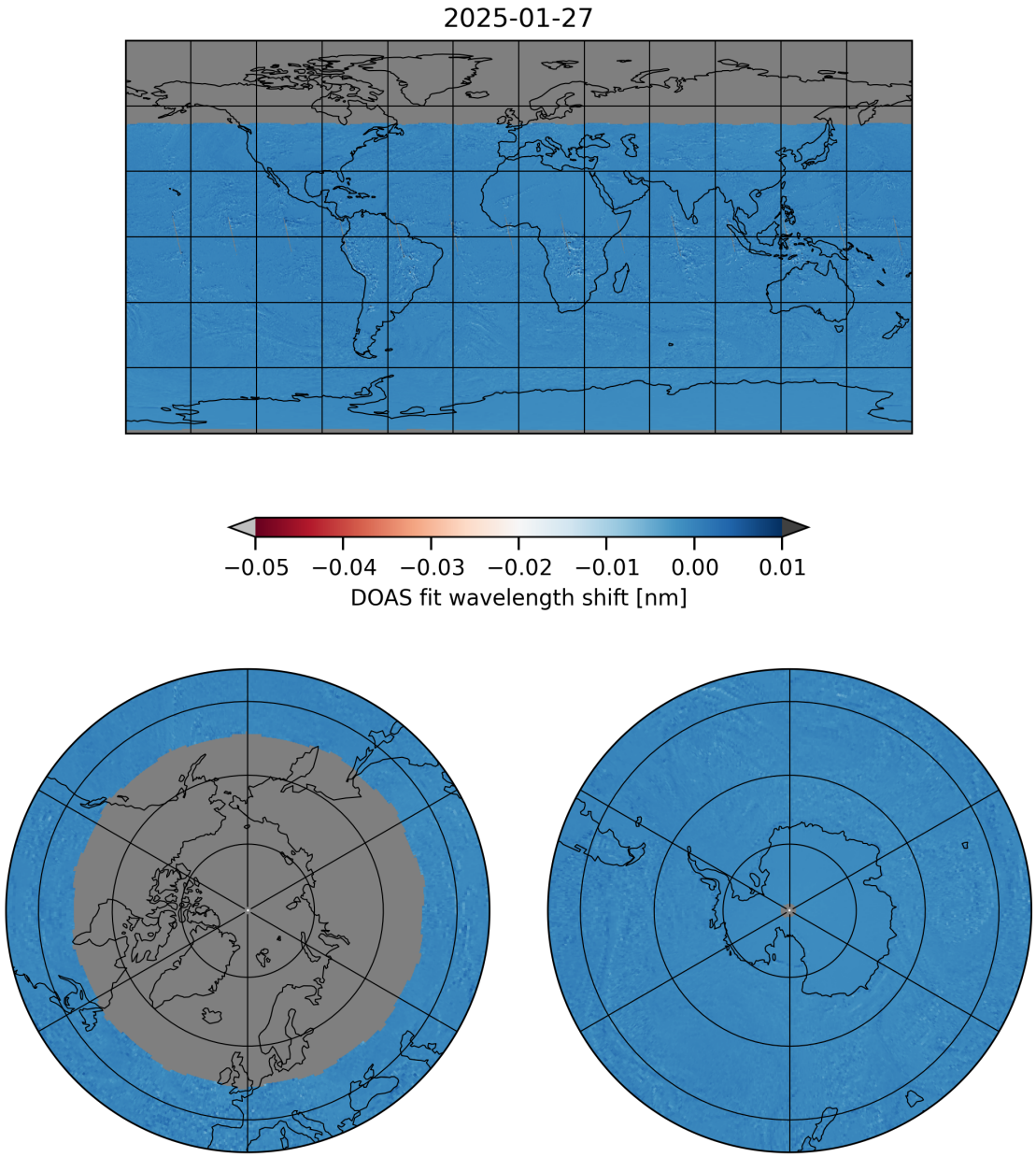

Figure 22: Map of “DOAS fit wavelength shift” for 2025-01-27 to 2025-01-28

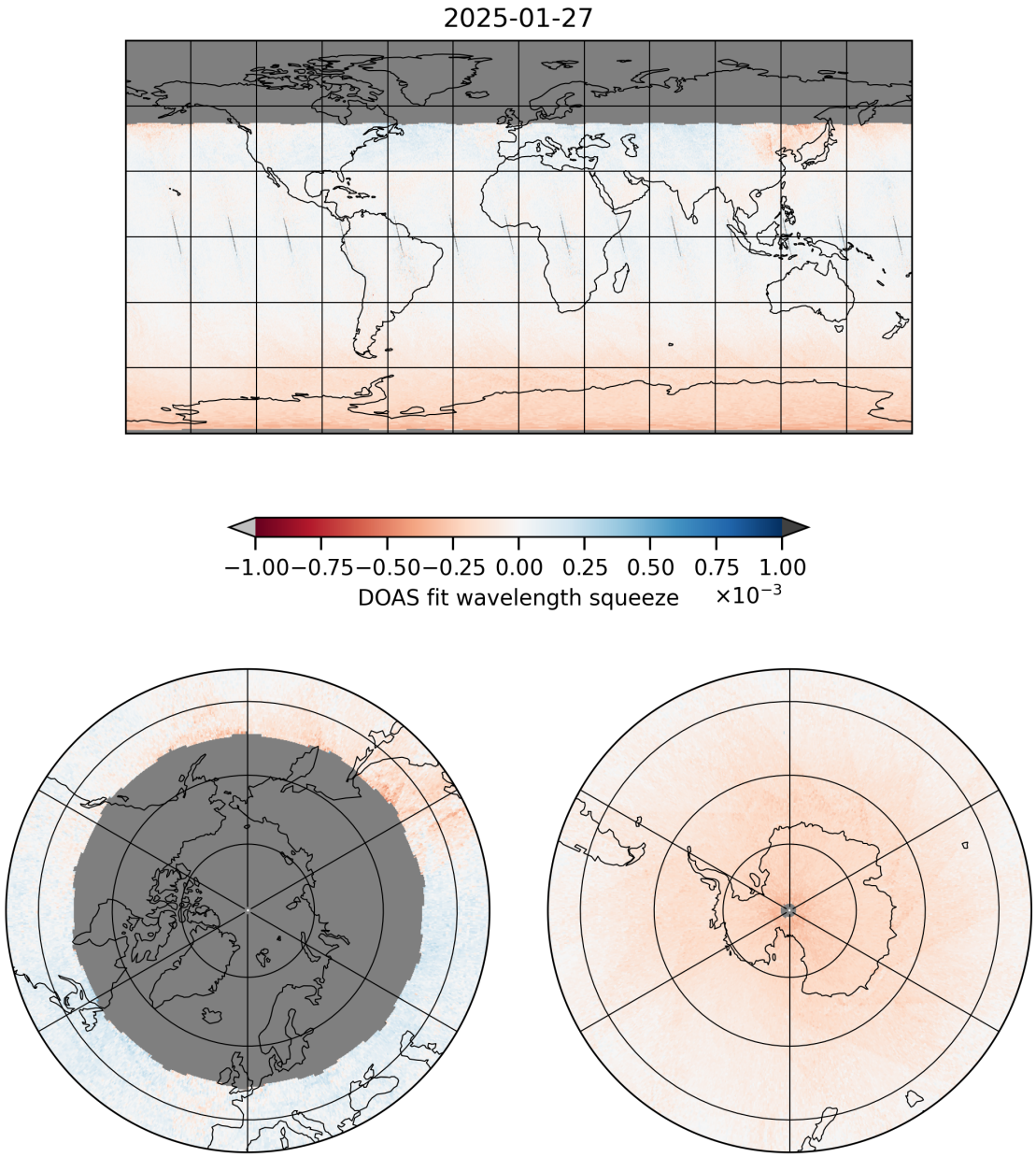

Figure 23: Map of “DOAS fit wavelength squeeze” for 2025-01-27 to 2025-01-28

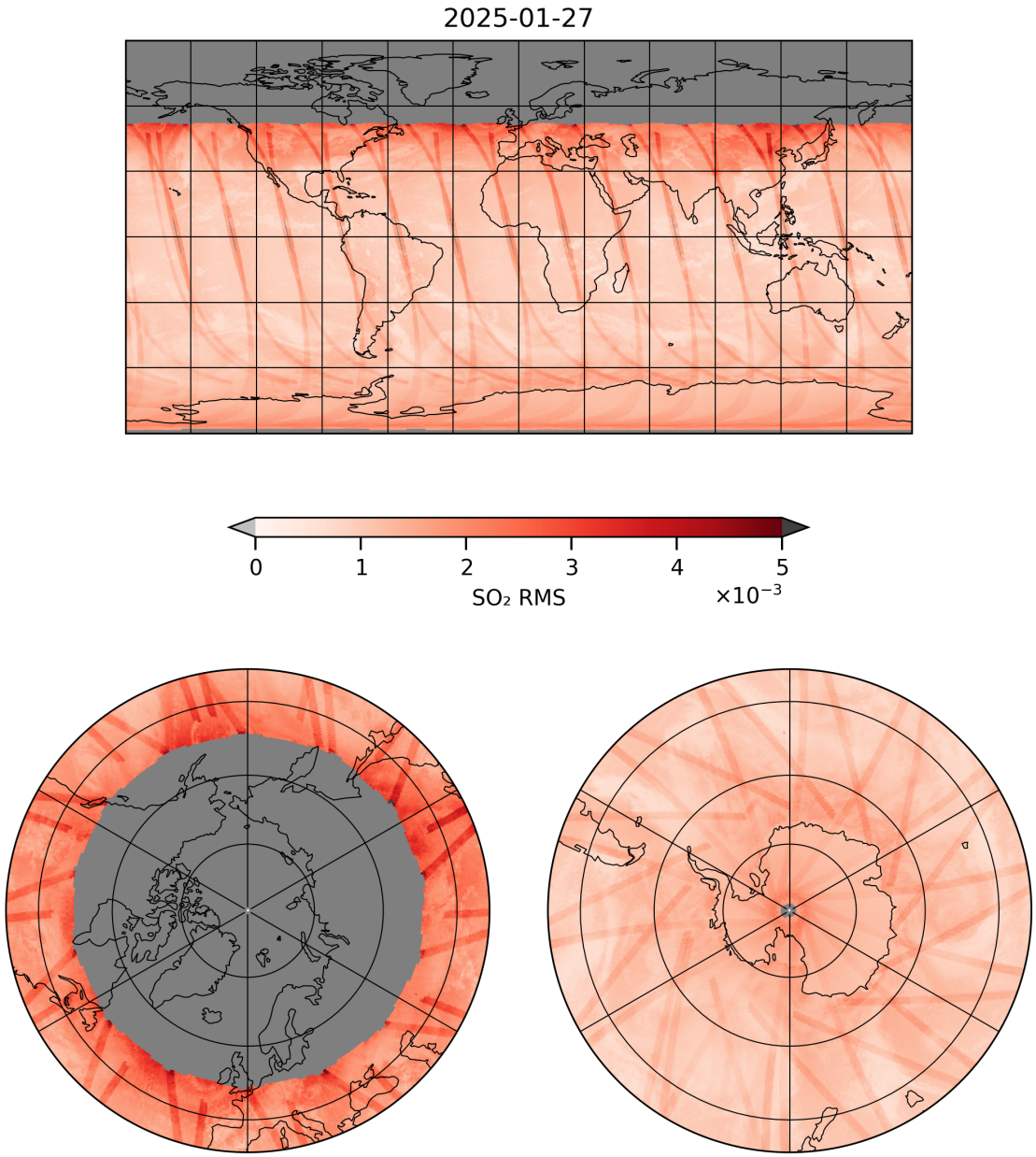

Figure 24: Map of "SO_2 RMS" for 2025-01-27 to 2025-01-28

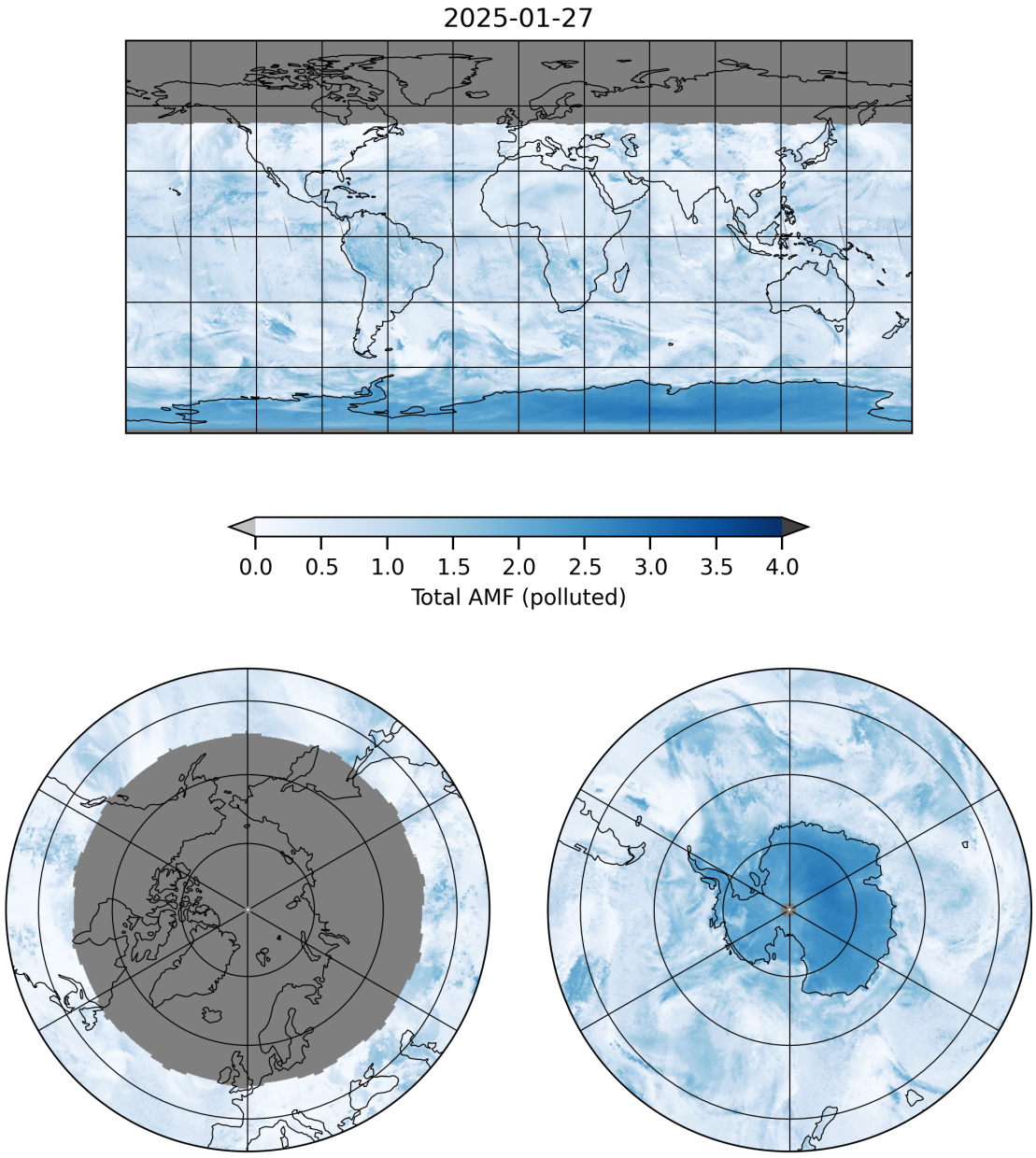

Figure 25: Map of “Total AMF (polluted)” for 2025-01-27 to 2025-01-28

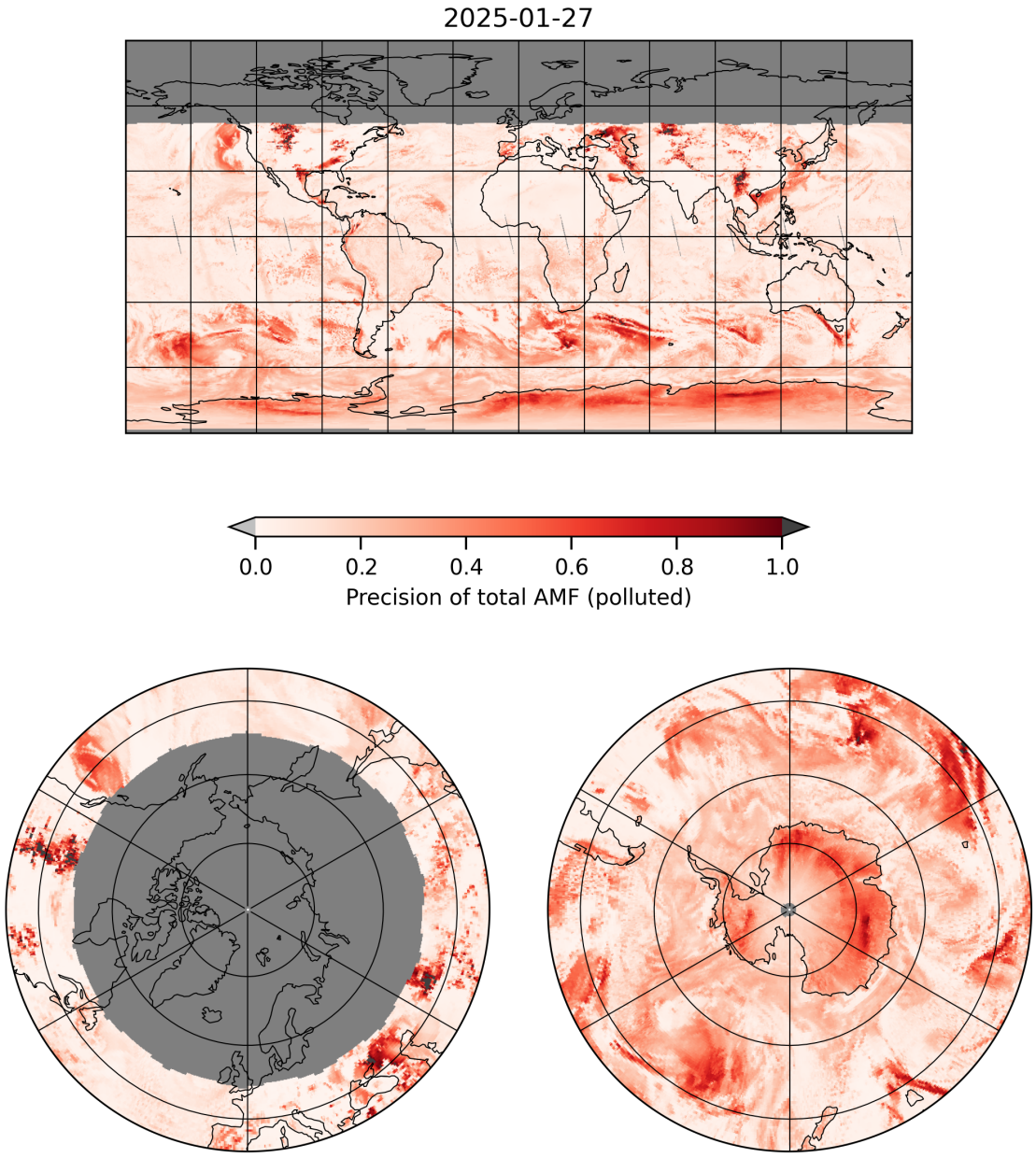

Figure 26: Map of “Precision of total AMF (polluted)” for 2025-01-27 to 2025-01-28

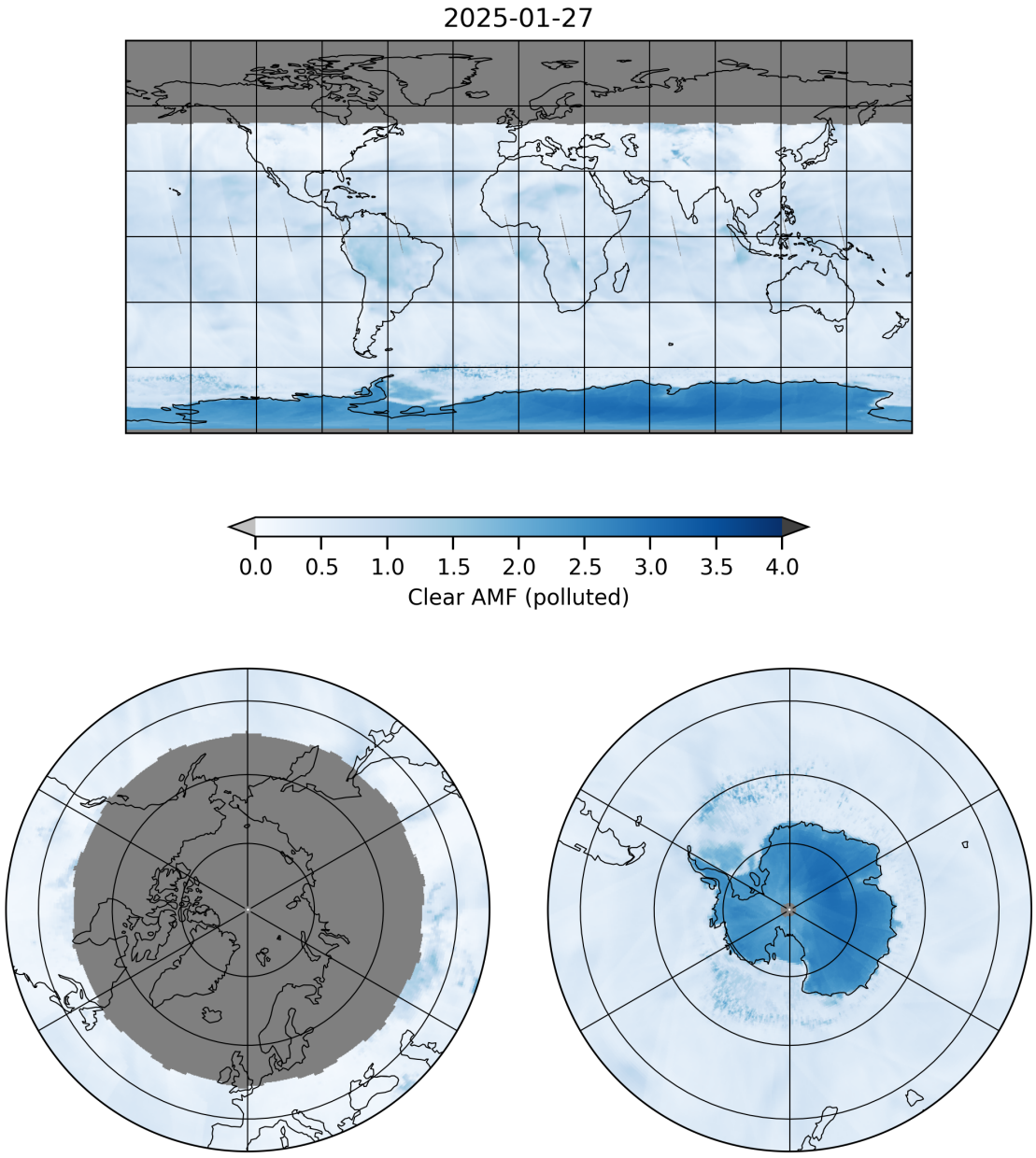

Figure 27: Map of “Clear AMF (polluted)” for 2025-01-27 to 2025-01-28

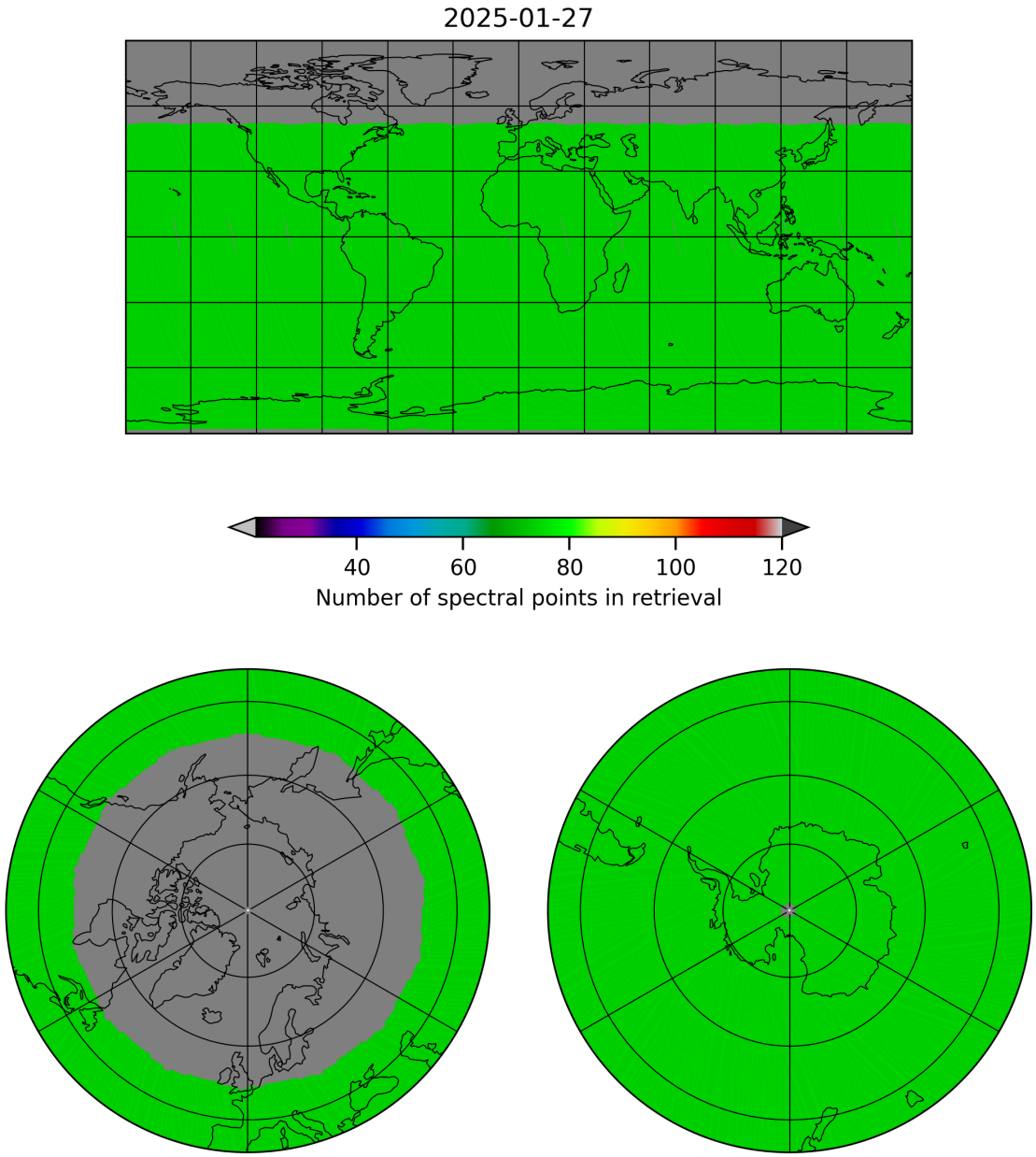

Figure 28: Map of “Number of spectral points in retrieval” for 2025-01-27 to 2025-01-28

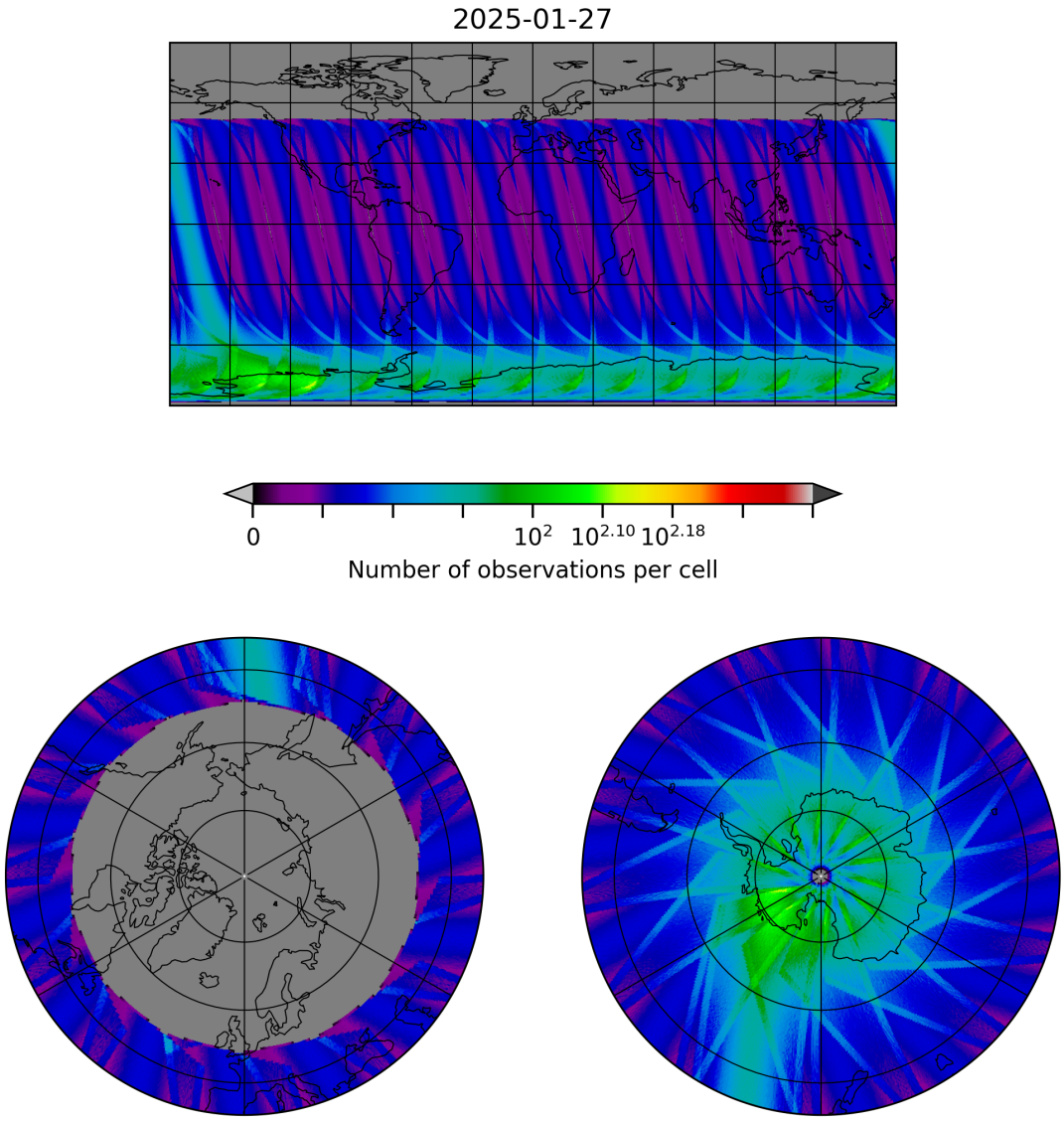

Figure 29: Map of the number of observations for 2025-01-27 to 2025-01-28

7 Zonal average

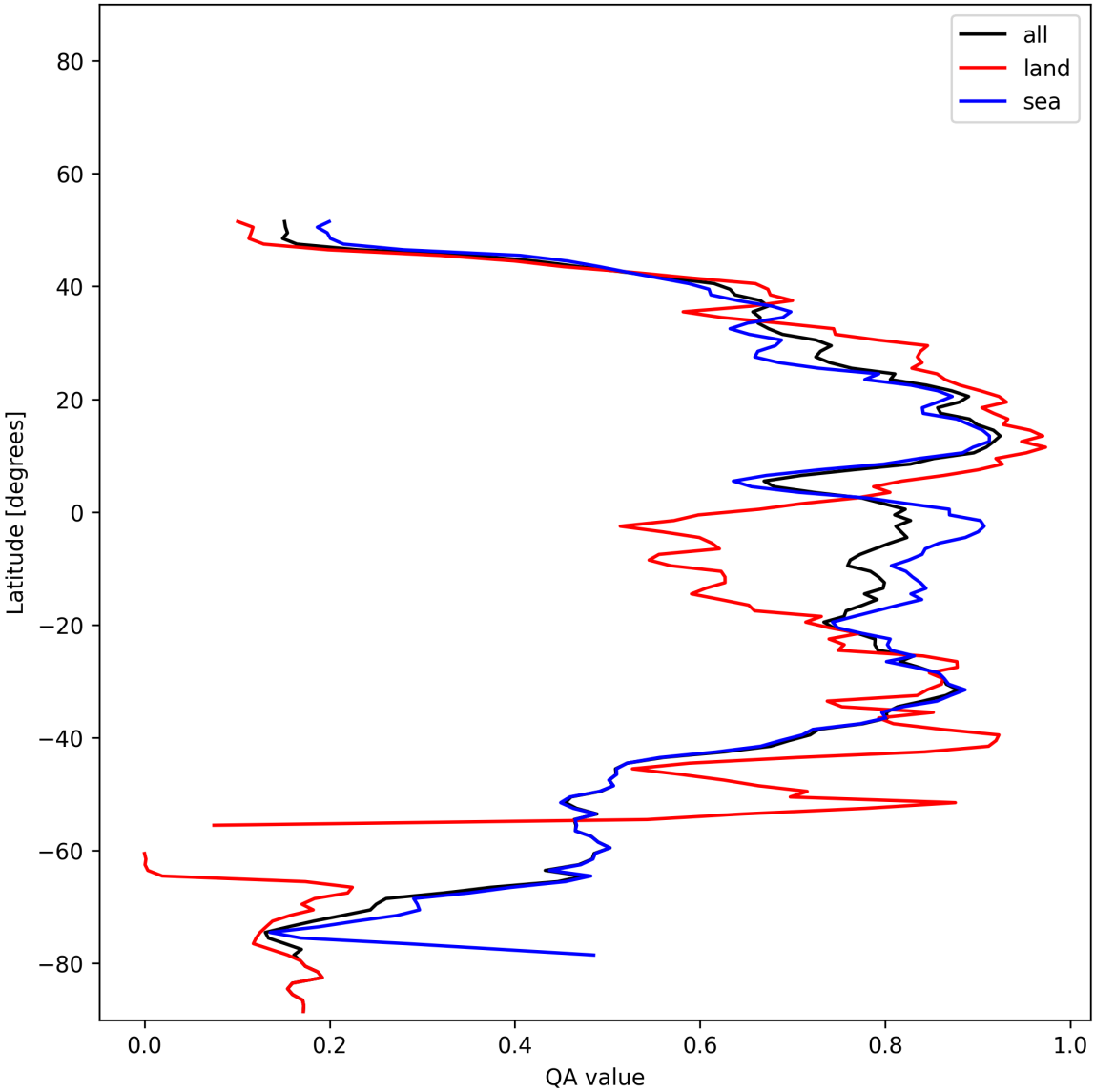

Figure 30: Zonal average of “QA value” for 2025-01-27 to 2025-01-28.

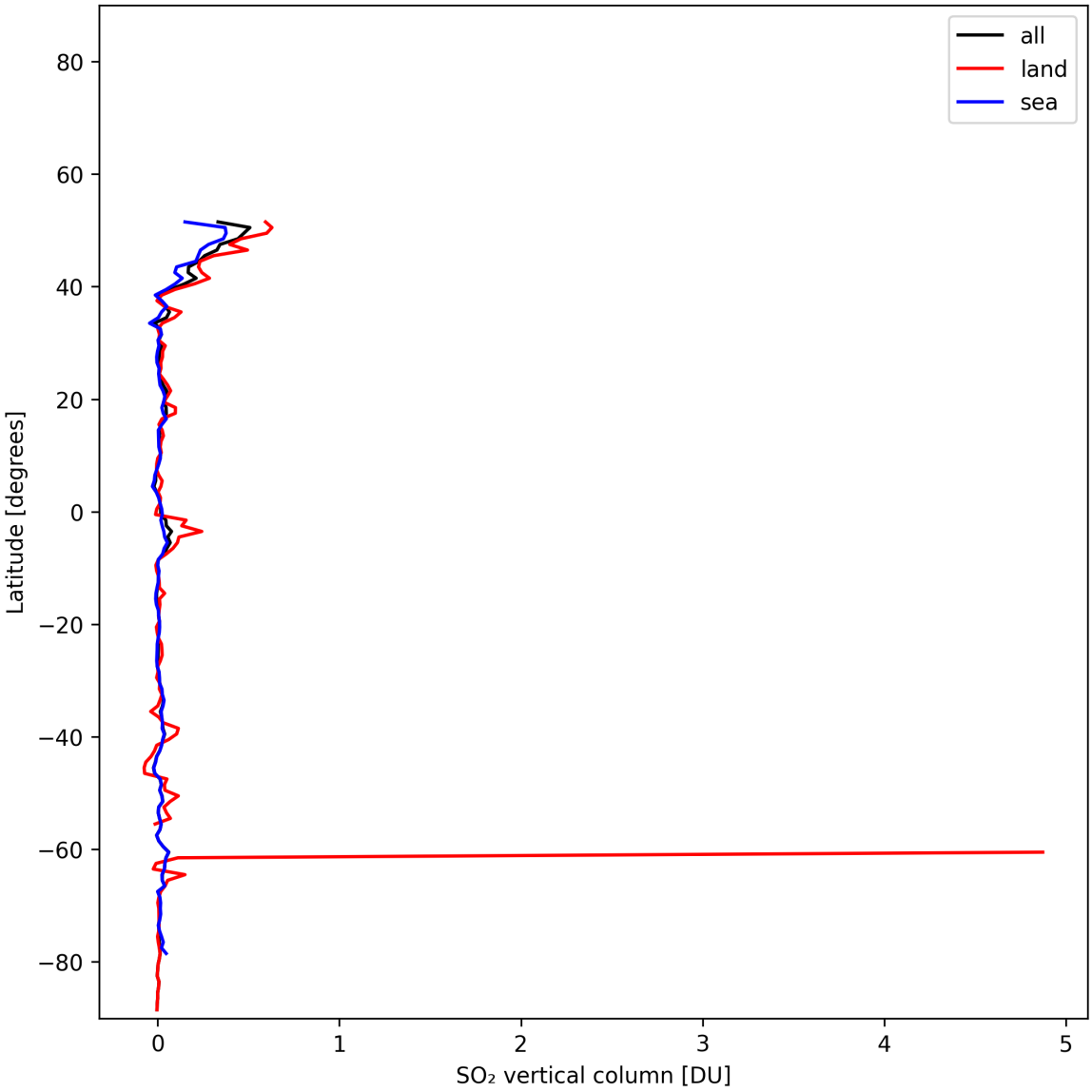

Figure 31: Zonal average of "SO_2 vertical column" for 2025-01-27 to 2025-01-28.

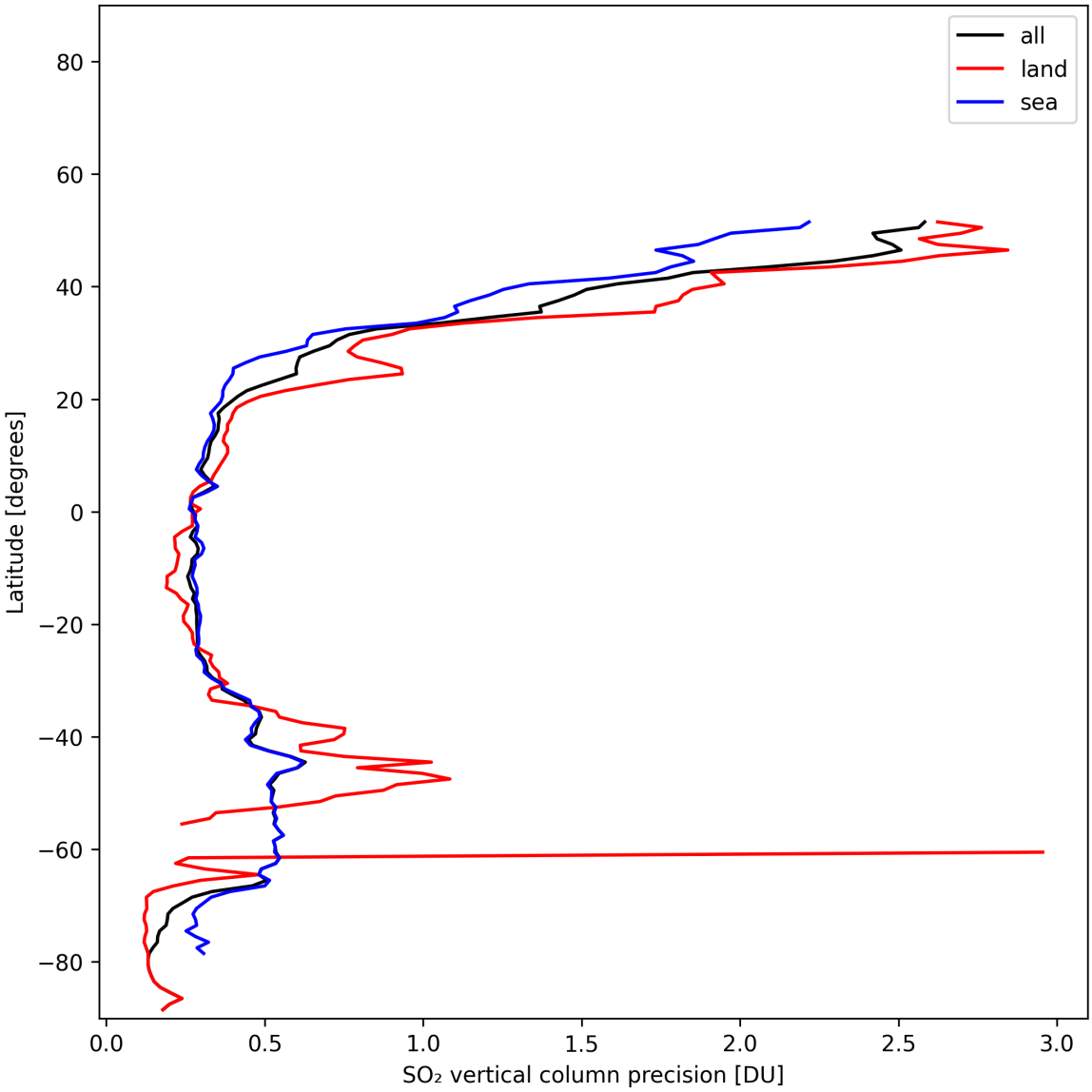

Figure 32: Zonal average of "SO_2 vertical column precision" for 2025-01-27 to 2025-01-28.

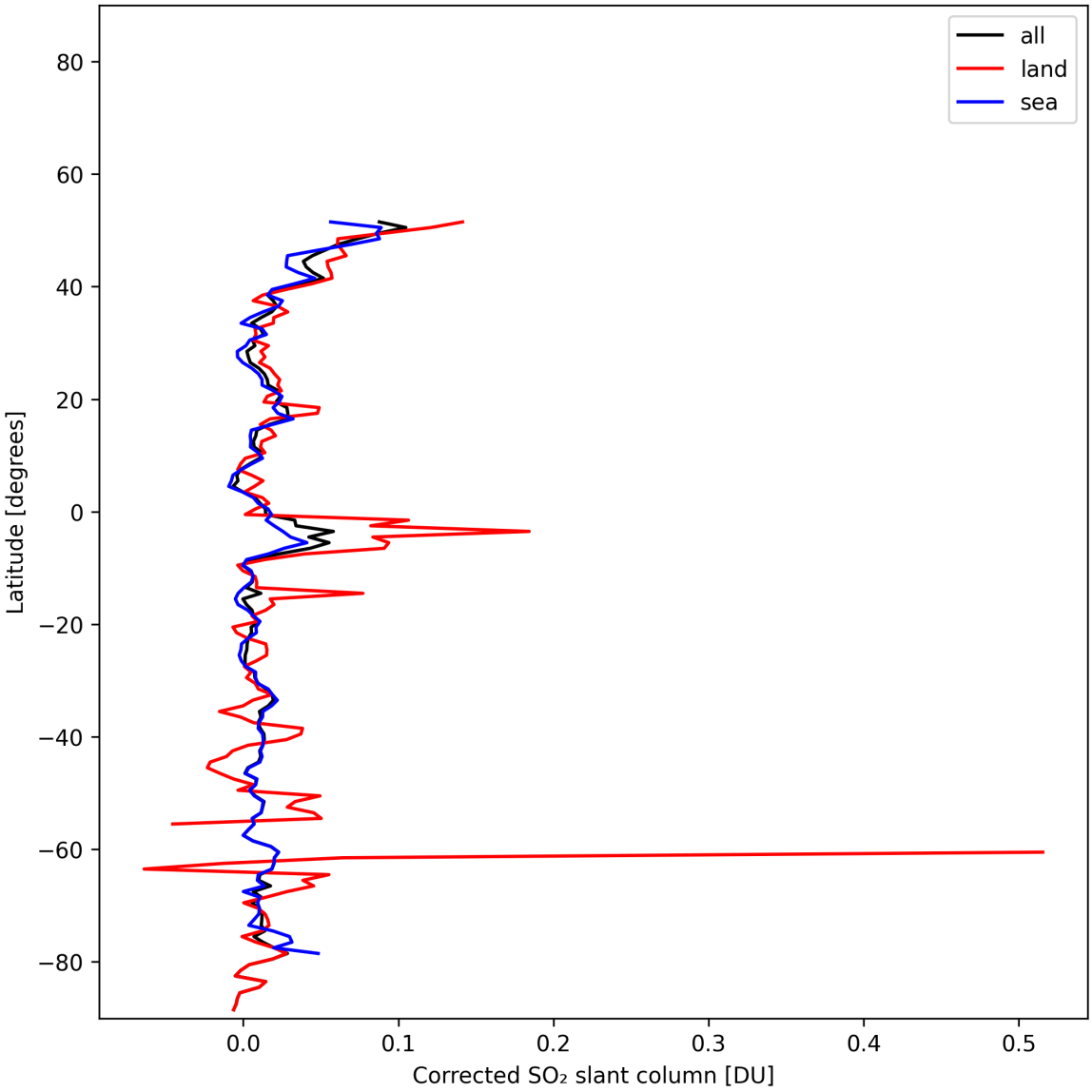

Figure 33: Zonal average of “Corrected SO_2 slant column” for 2025-01-27 to 2025-01-28.

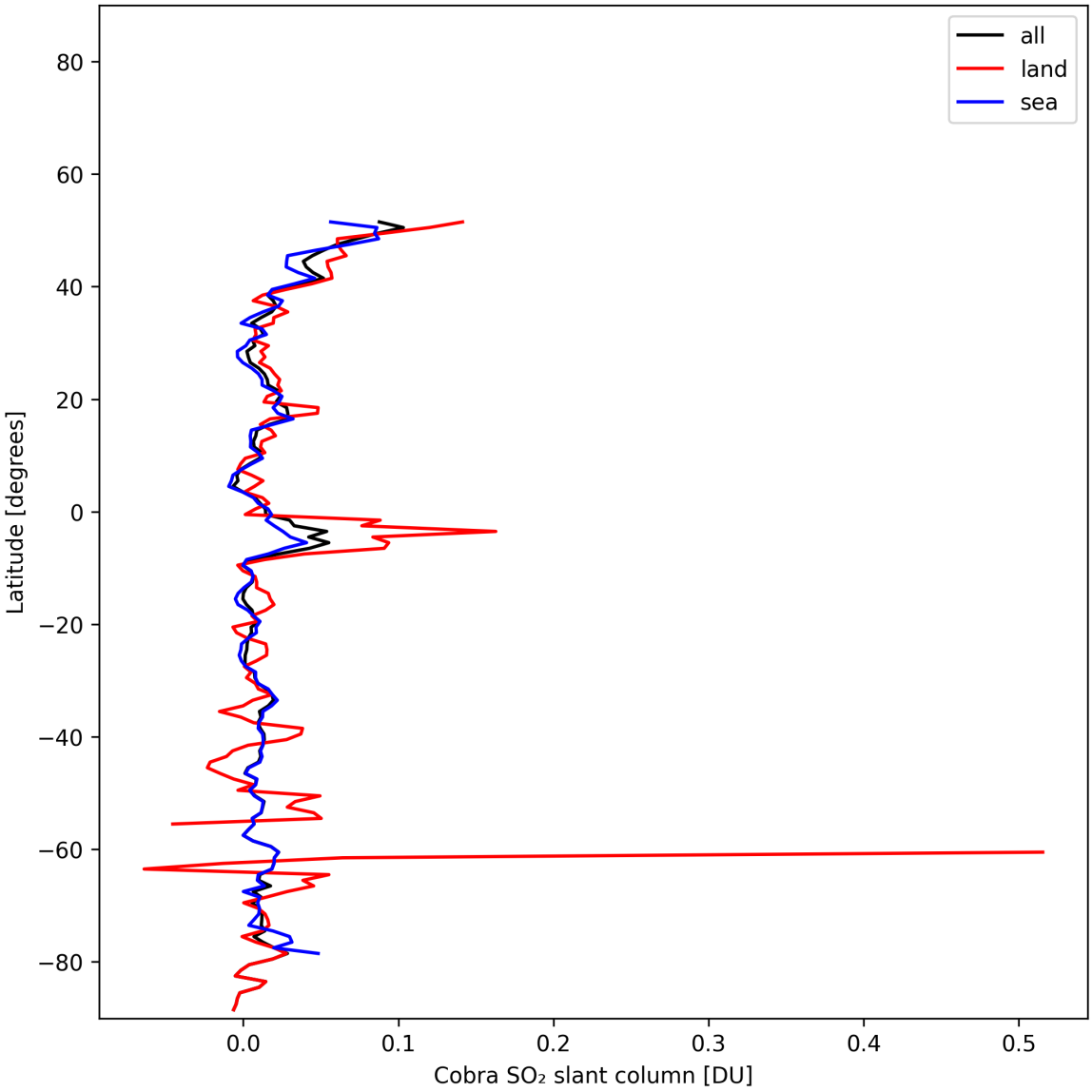

Figure 34: Zonal average of "Cobra SO_2 slant column" for 2025-01-27 to 2025-01-28.

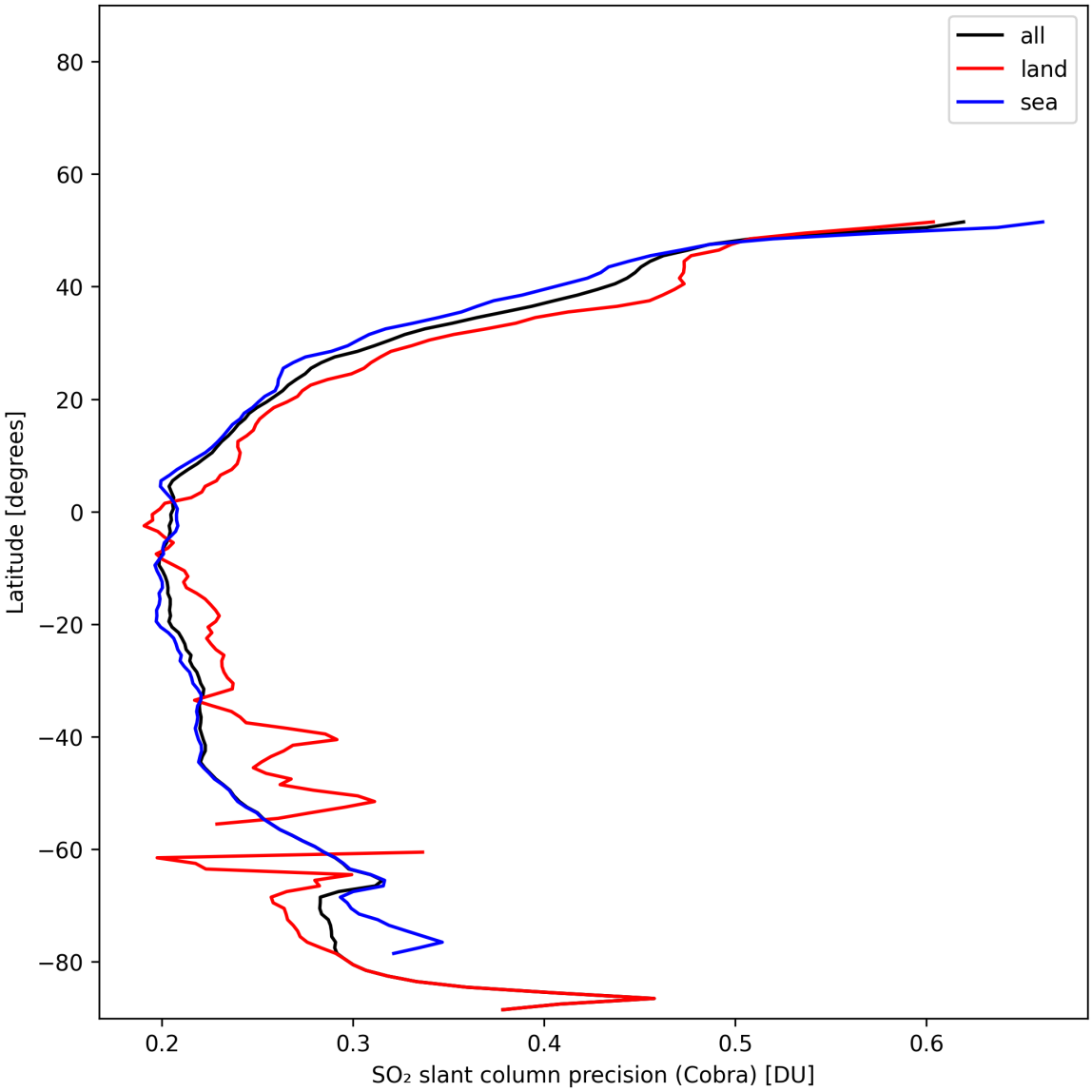

Figure 35: Zonal average of "SO_2 slant column precision (Cobra)" for 2025-01-27 to 2025-01-28.

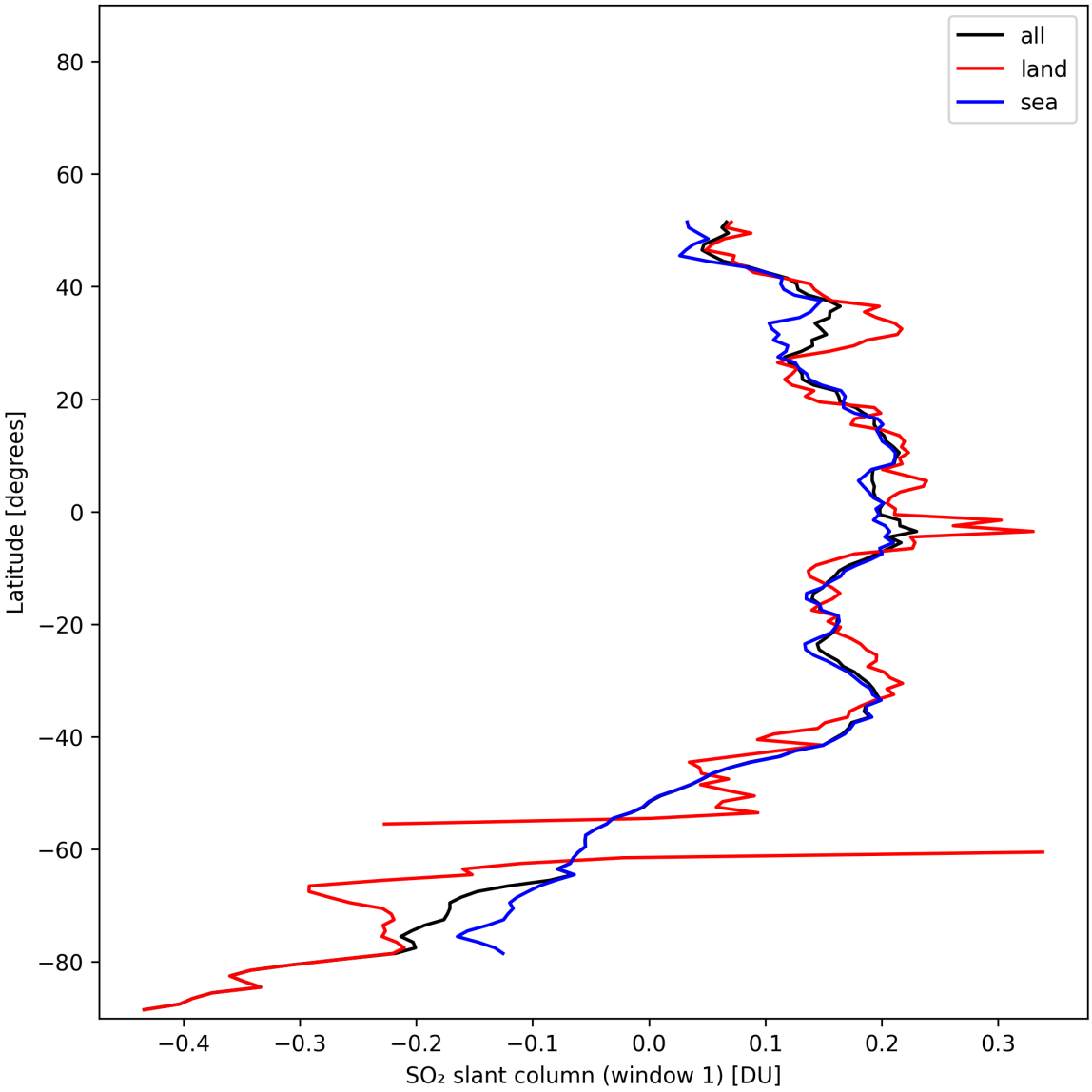

Figure 36: Zonal average of "SO_2 slant column (window 1)" for 2025-01-27 to 2025-01-28.

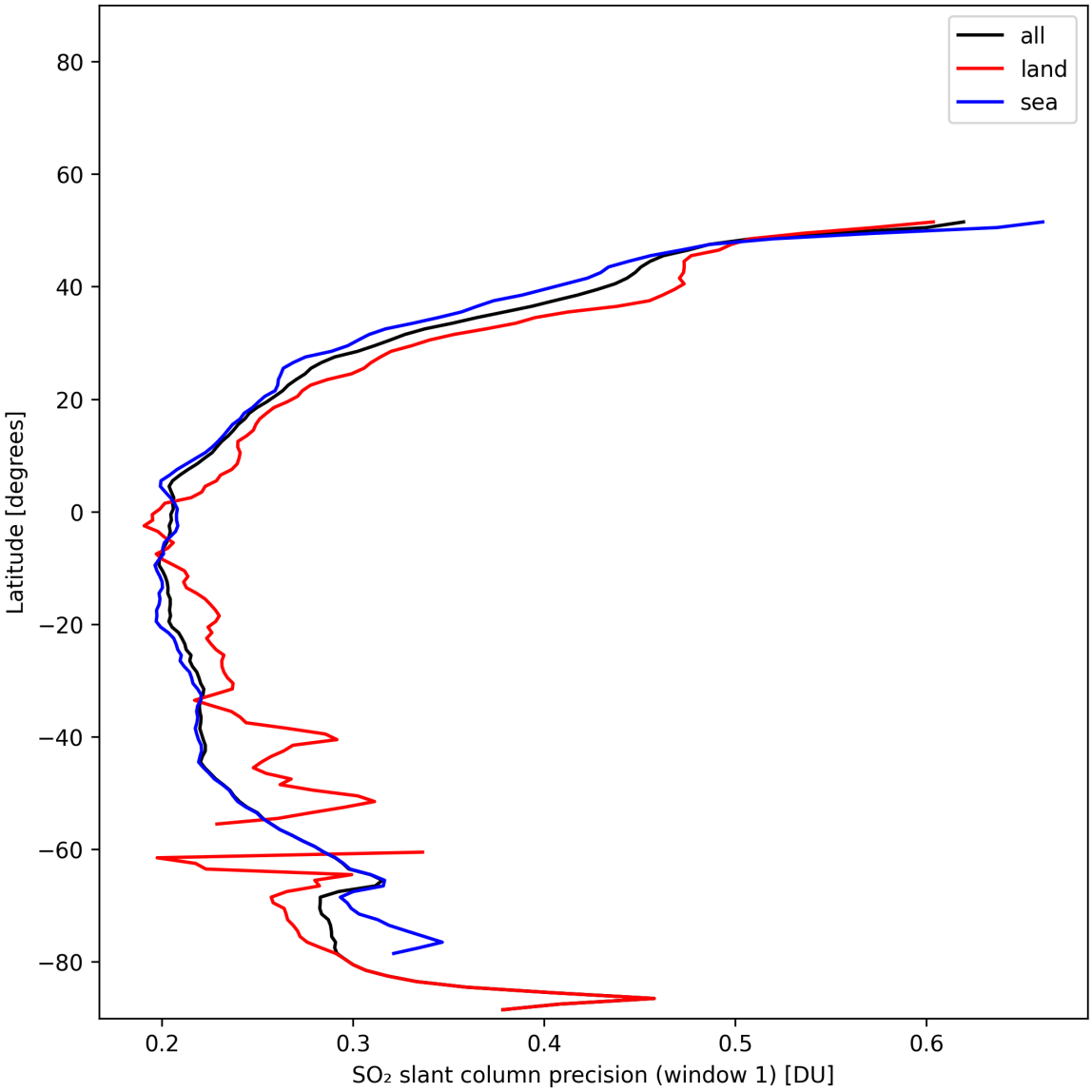

Figure 37: Zonal average of "SO_2 slant column precision (window 1)" for 2025-01-27 to 2025-01-28.

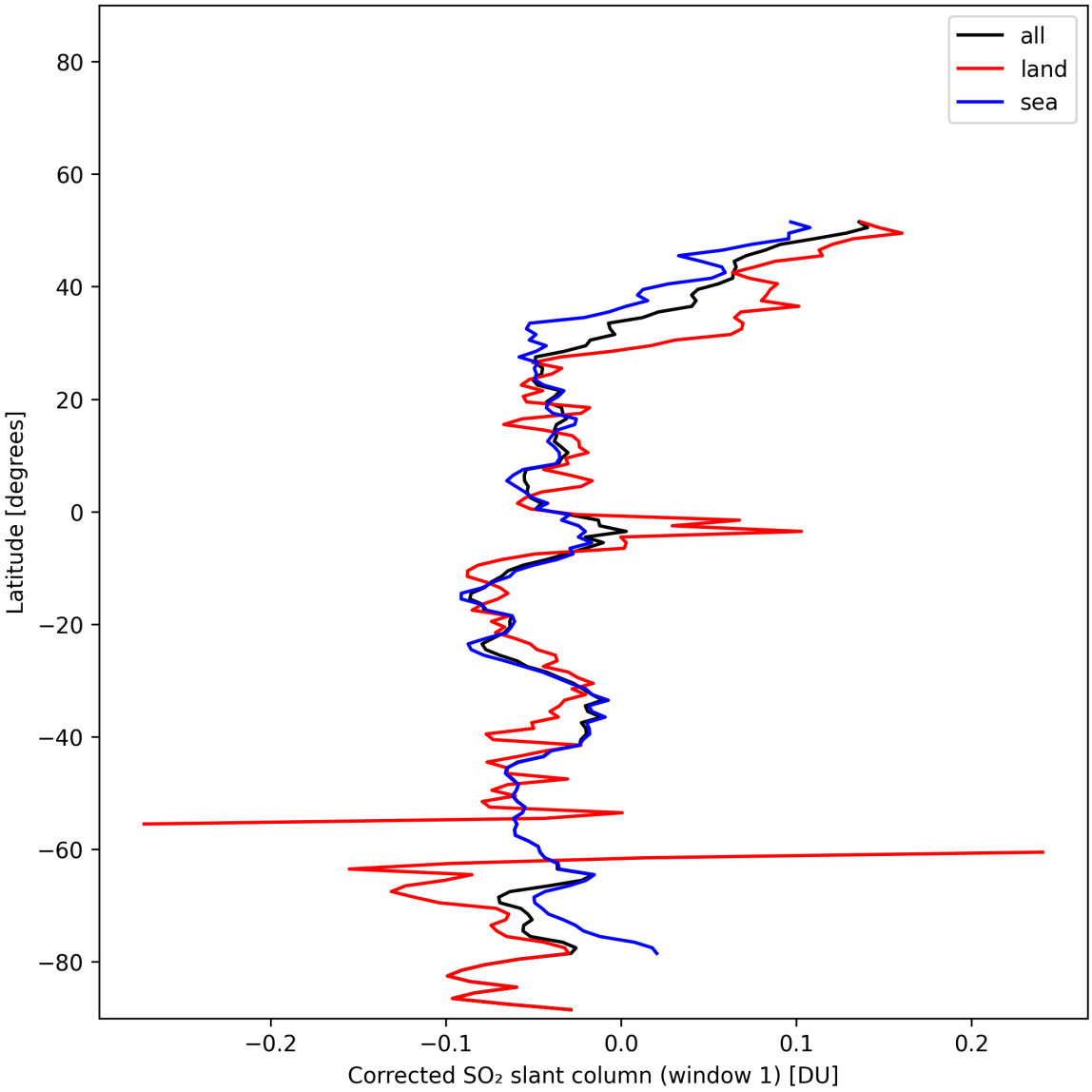

Figure 38: Zonal average of "Corrected SO_2 slant column (window 1)" for 2025-01-27 to 2025-01-28.

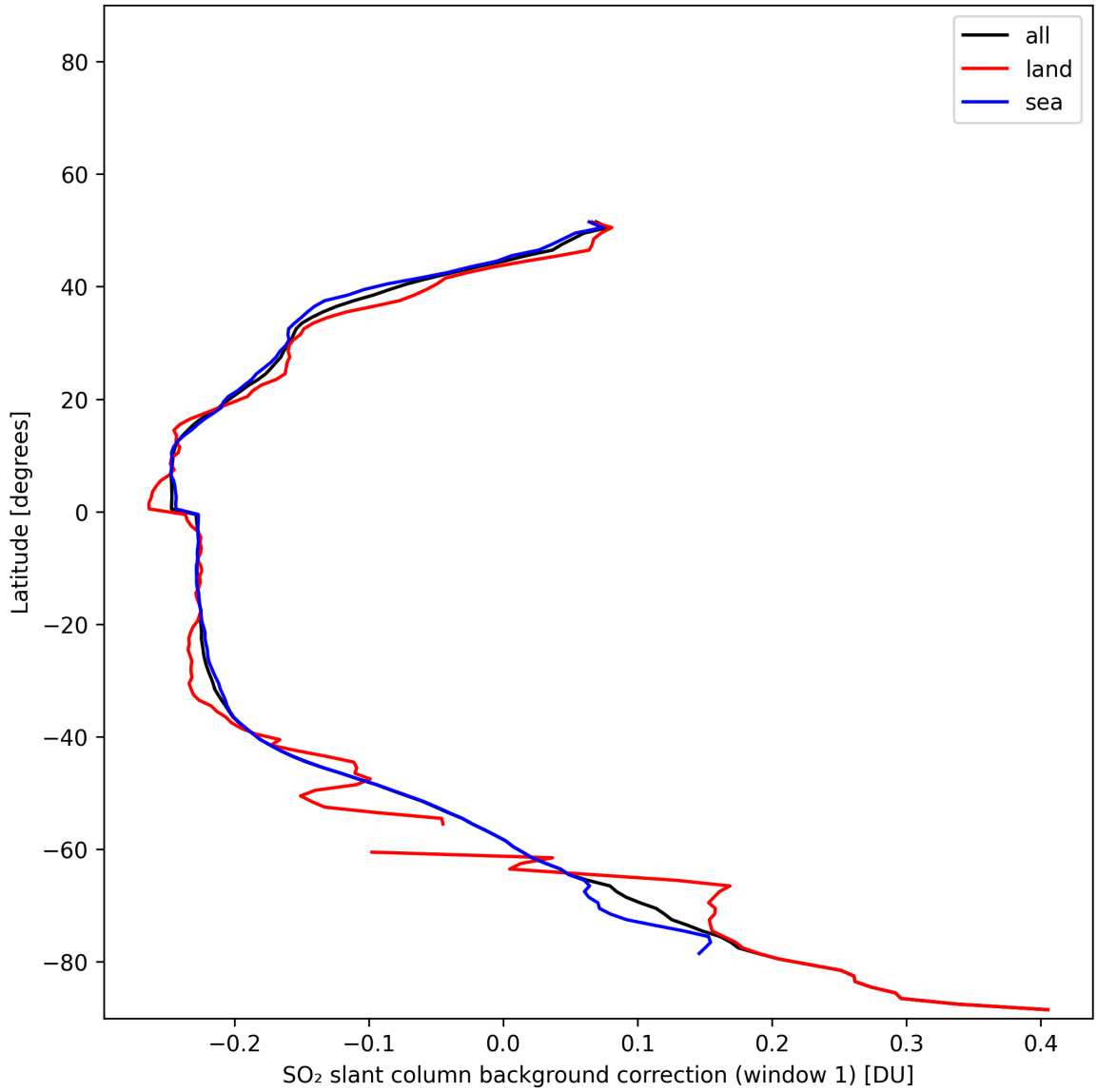

Figure 39: Zonal average of "SO_2 slant column background correction (window 1)" for 2025-01-27 to 2025-01-28.

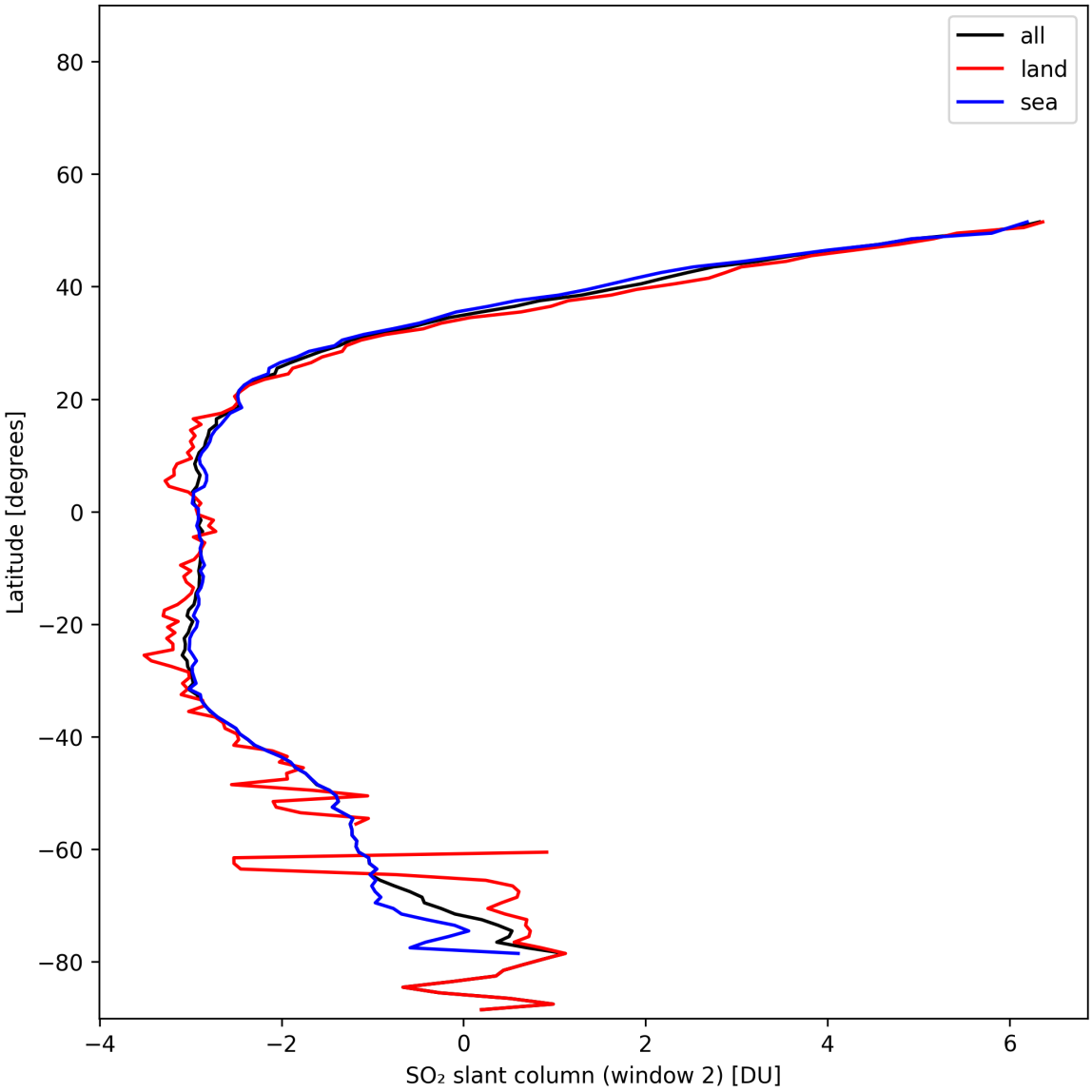

Figure 40: Zonal average of "SO_2 slant column (window 2)" for 2025-01-27 to 2025-01-28.

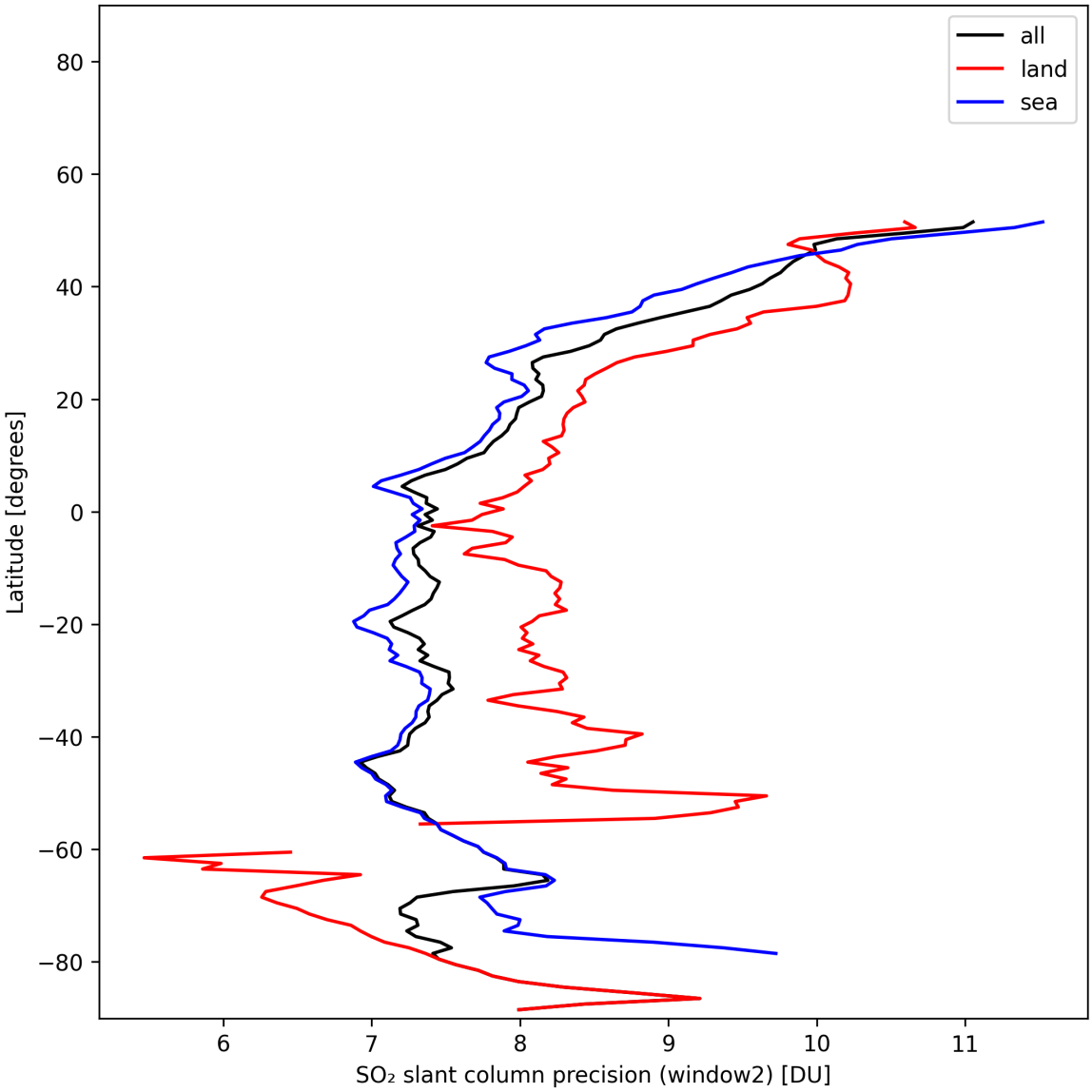

Figure 41: Zonal average of "SO_2 slant column precision (window2)" for 2025-01-27 to 2025-01-28.

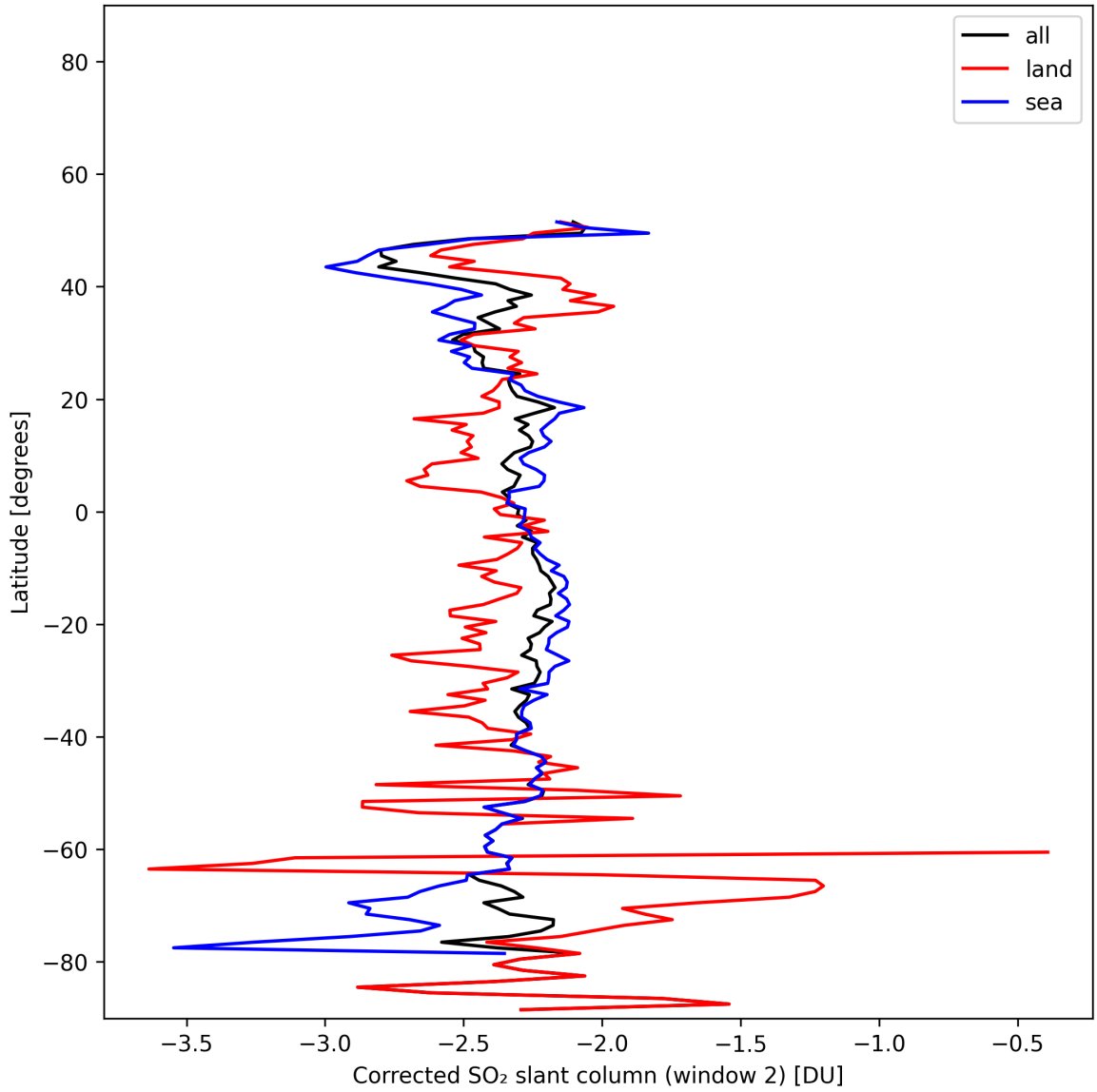

Figure 42: Zonal average of "Corrected SO_2 slant column (window 2)" for 2025-01-27 to 2025-01-28.

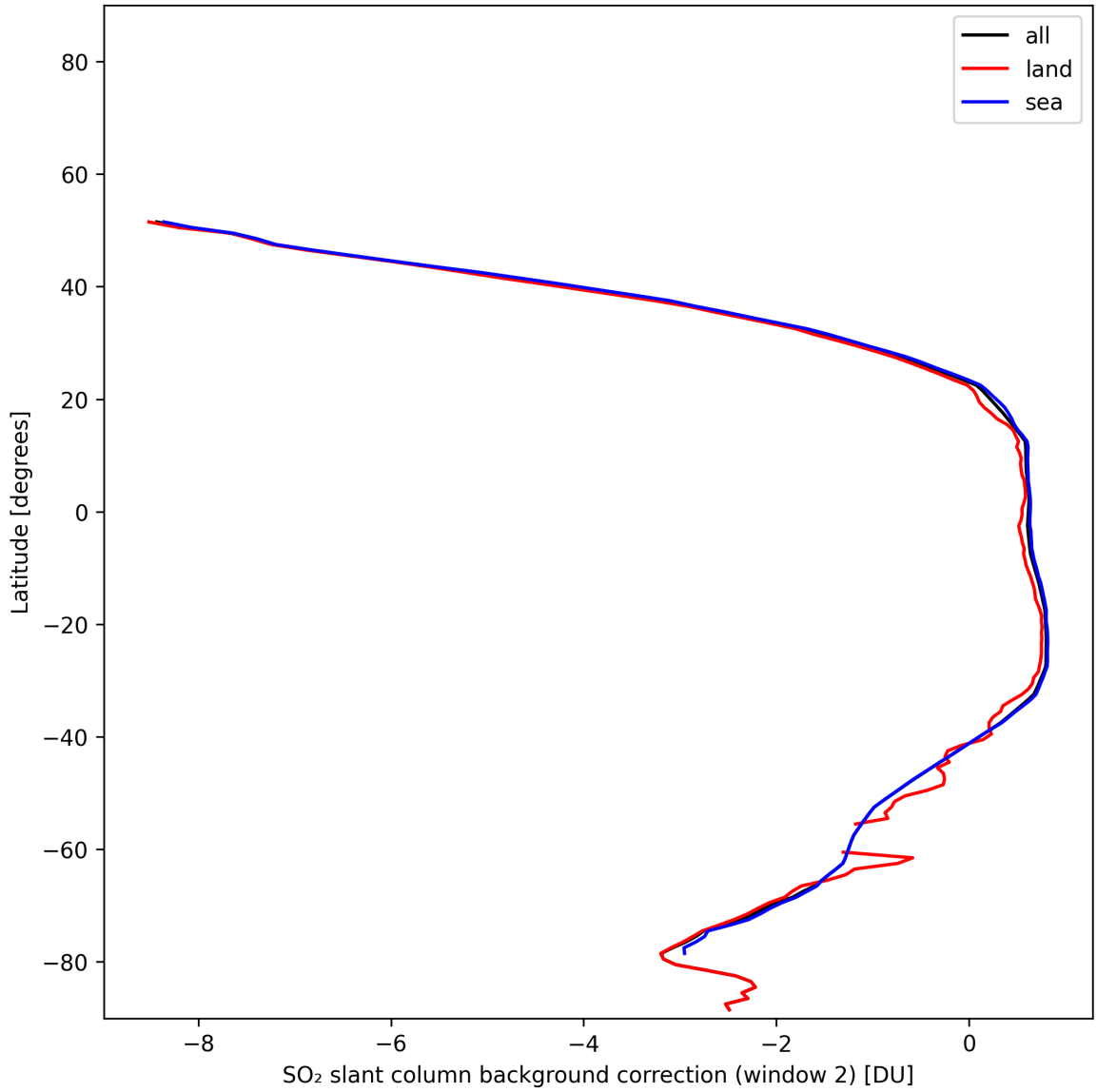

Figure 43: Zonal average of "SO_2 slant column background correction (window 2)" for 2025-01-27 to 2025-01-28.

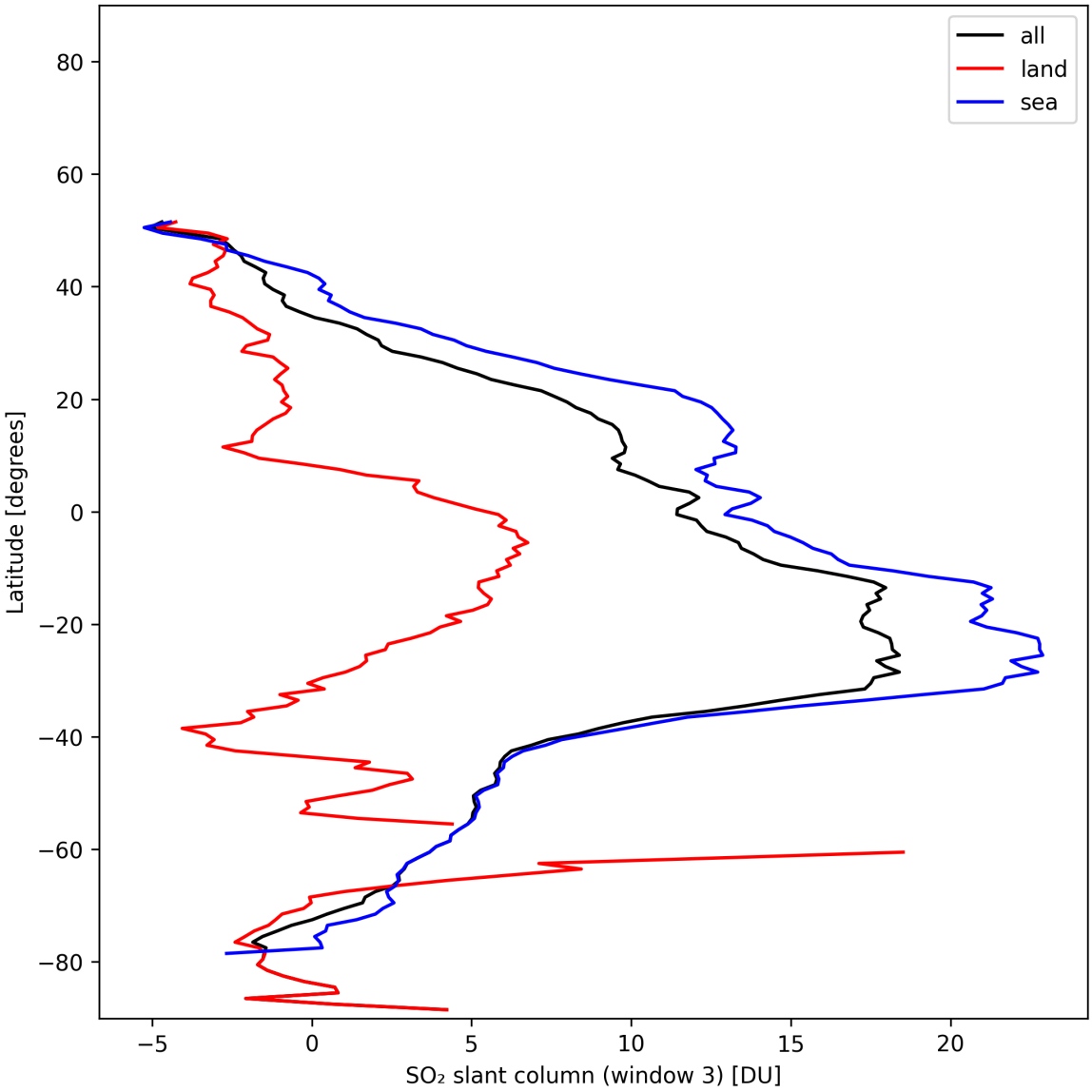

Figure 44: Zonal average of "SO_2 slant column (window 3)" for 2025-01-27 to 2025-01-28.

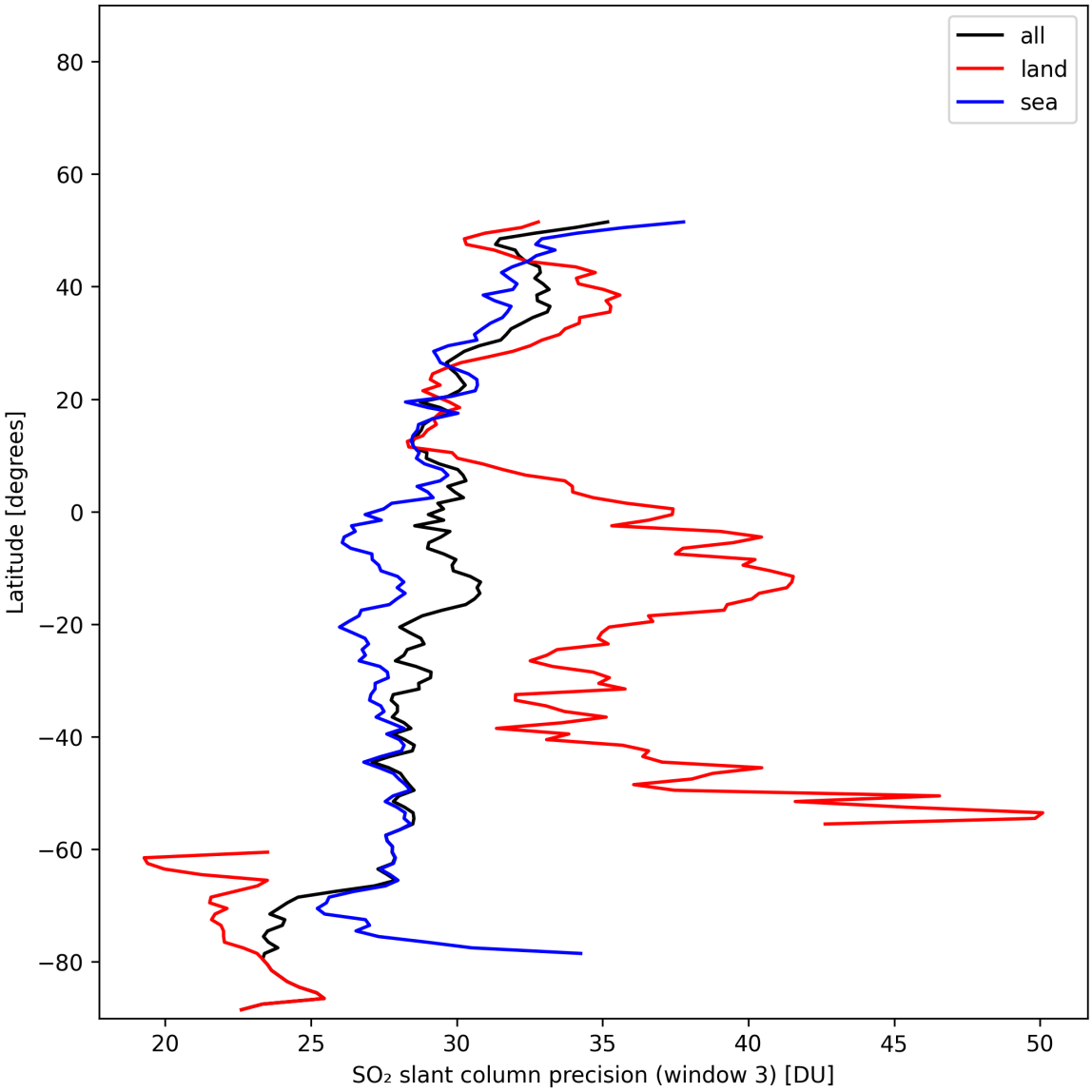

Figure 45: Zonal average of "SO_2 slant column precision (window 3)" for 2025-01-27 to 2025-01-28.

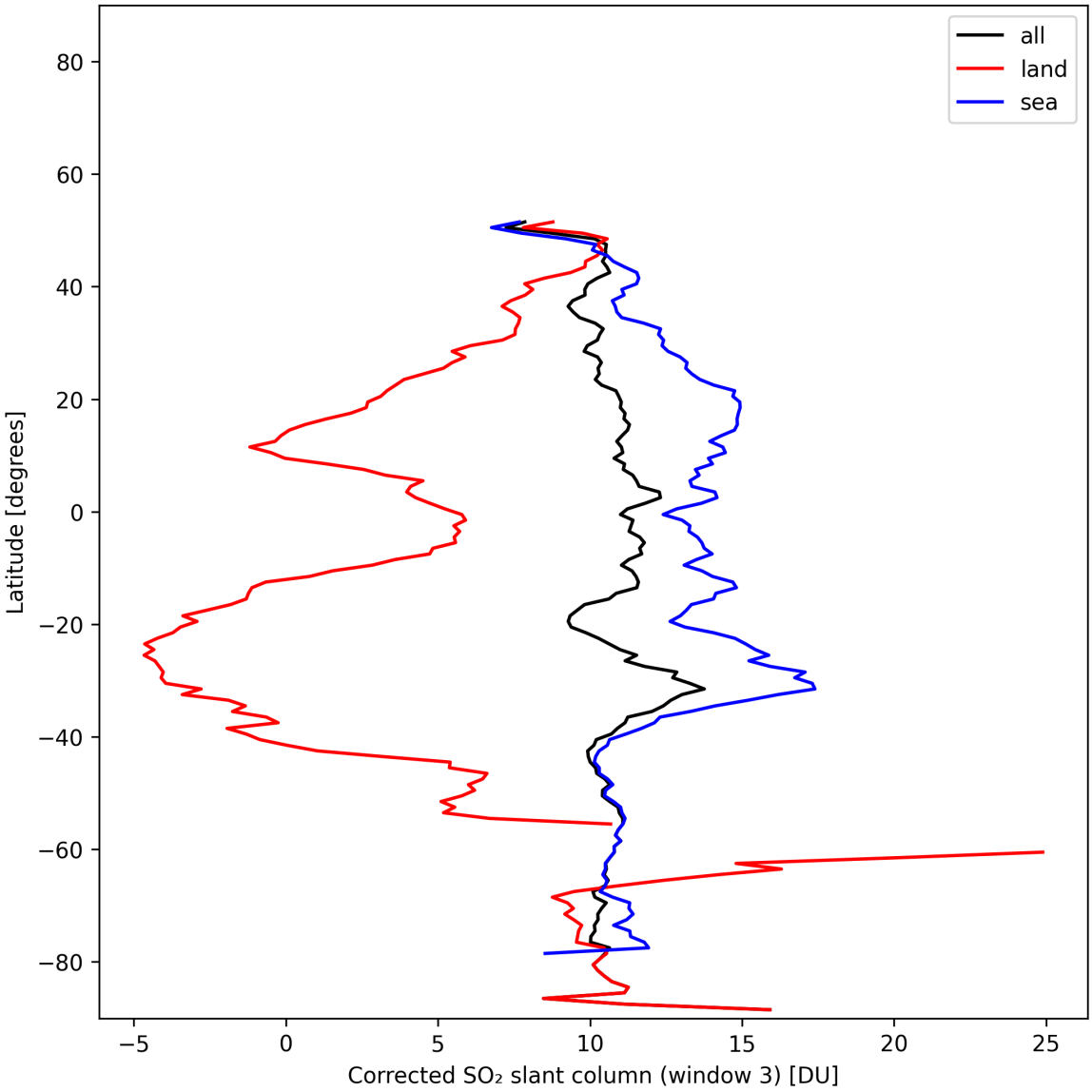

Figure 46: Zonal average of "Corrected SO_2 slant column (window 3)" for 2025-01-27 to 2025-01-28.

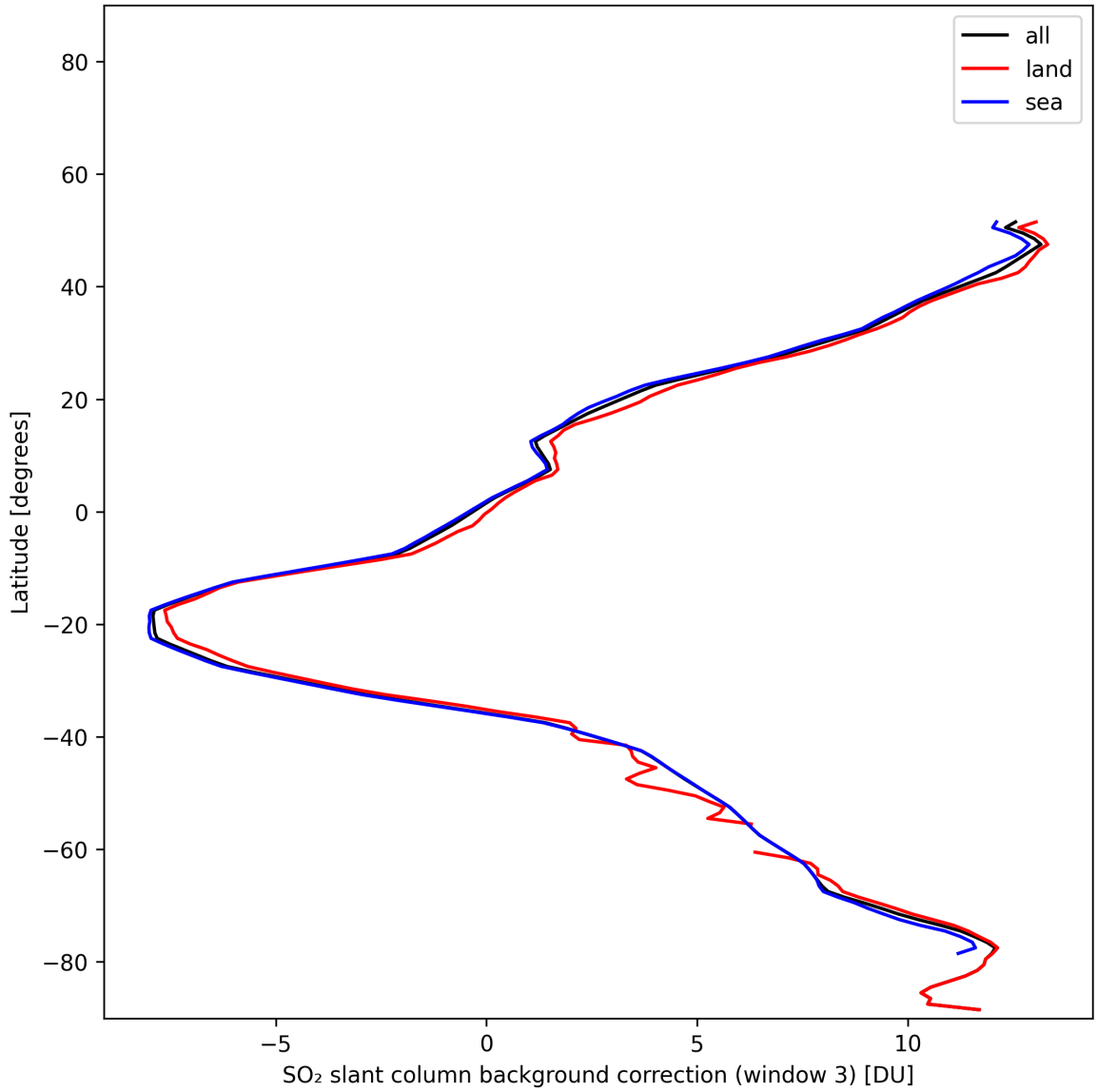

Figure 47: Zonal average of "SO_2 slant column background correction (window 3)" for 2025-01-27 to 2025-01-28.

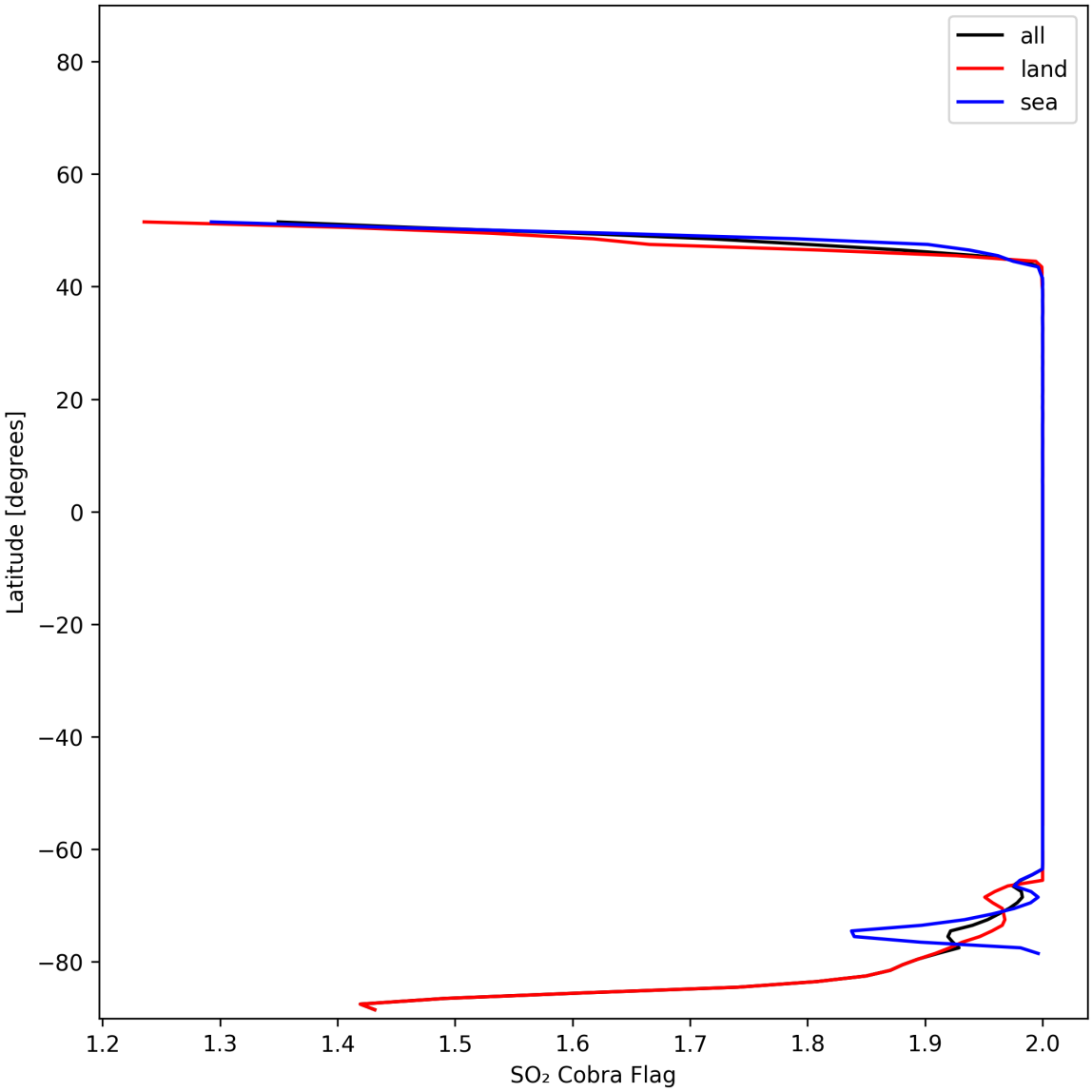

Figure 48: Zonal average of "SO_2 Cobra Flag" for 2025-01-27 to 2025-01-28.

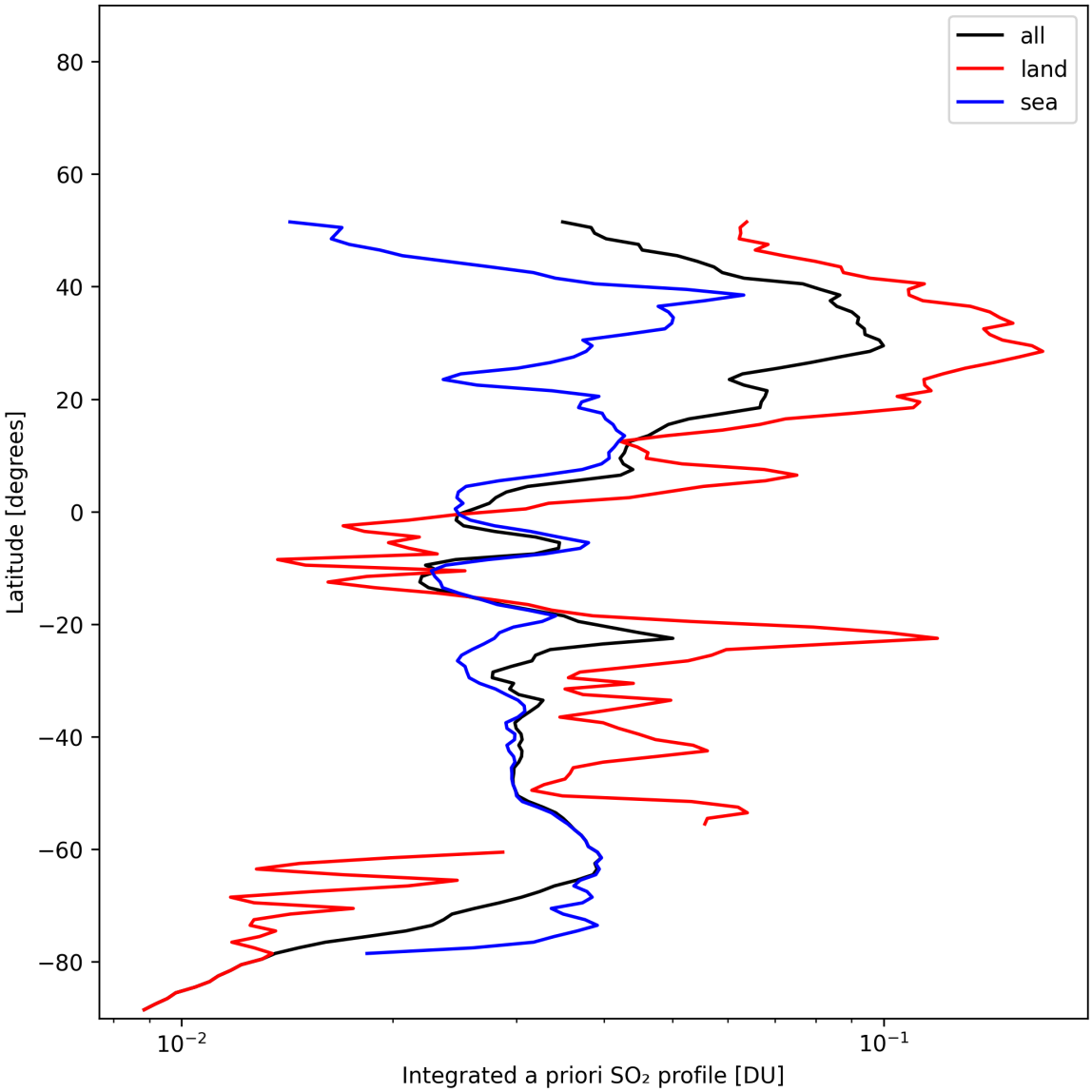

Figure 49: Zonal average of “Integrated a priori SO_2 profile” for 2025-01-27 to 2025-01-28.

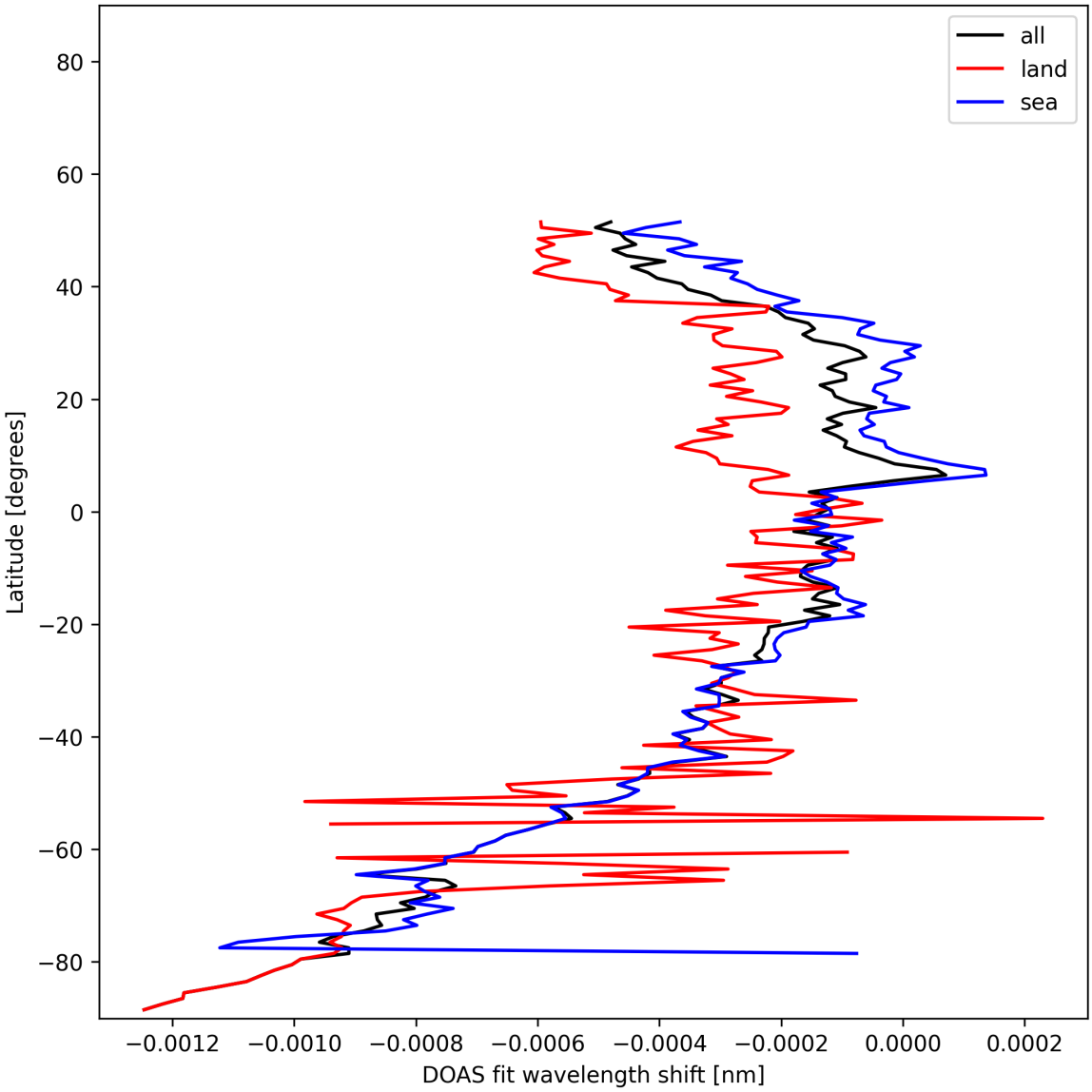

Figure 50: Zonal average of “DOAS fit wavelength shift” for 2025-01-27 to 2025-01-28.

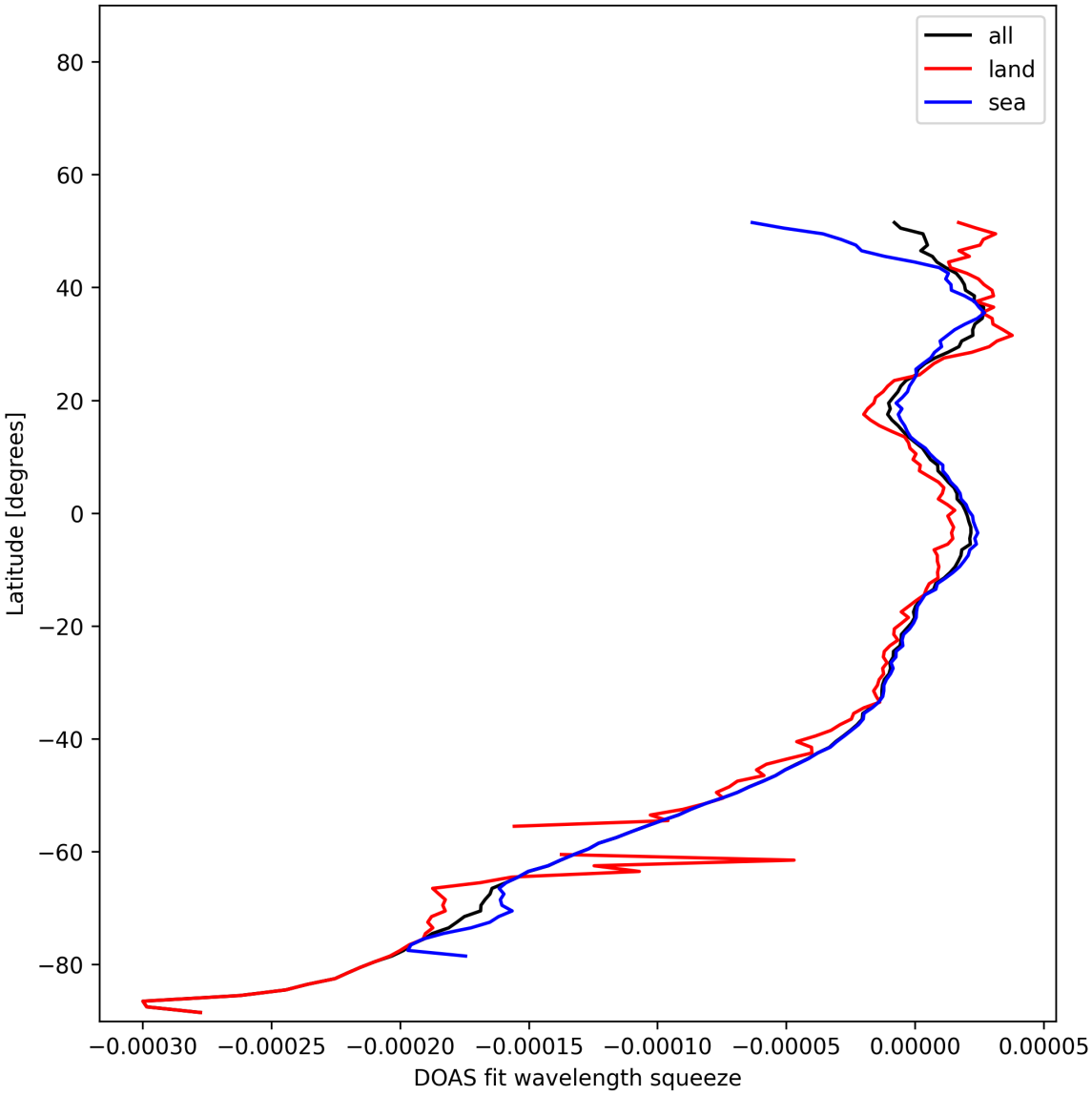

Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-01-27 to 2025-01-28.

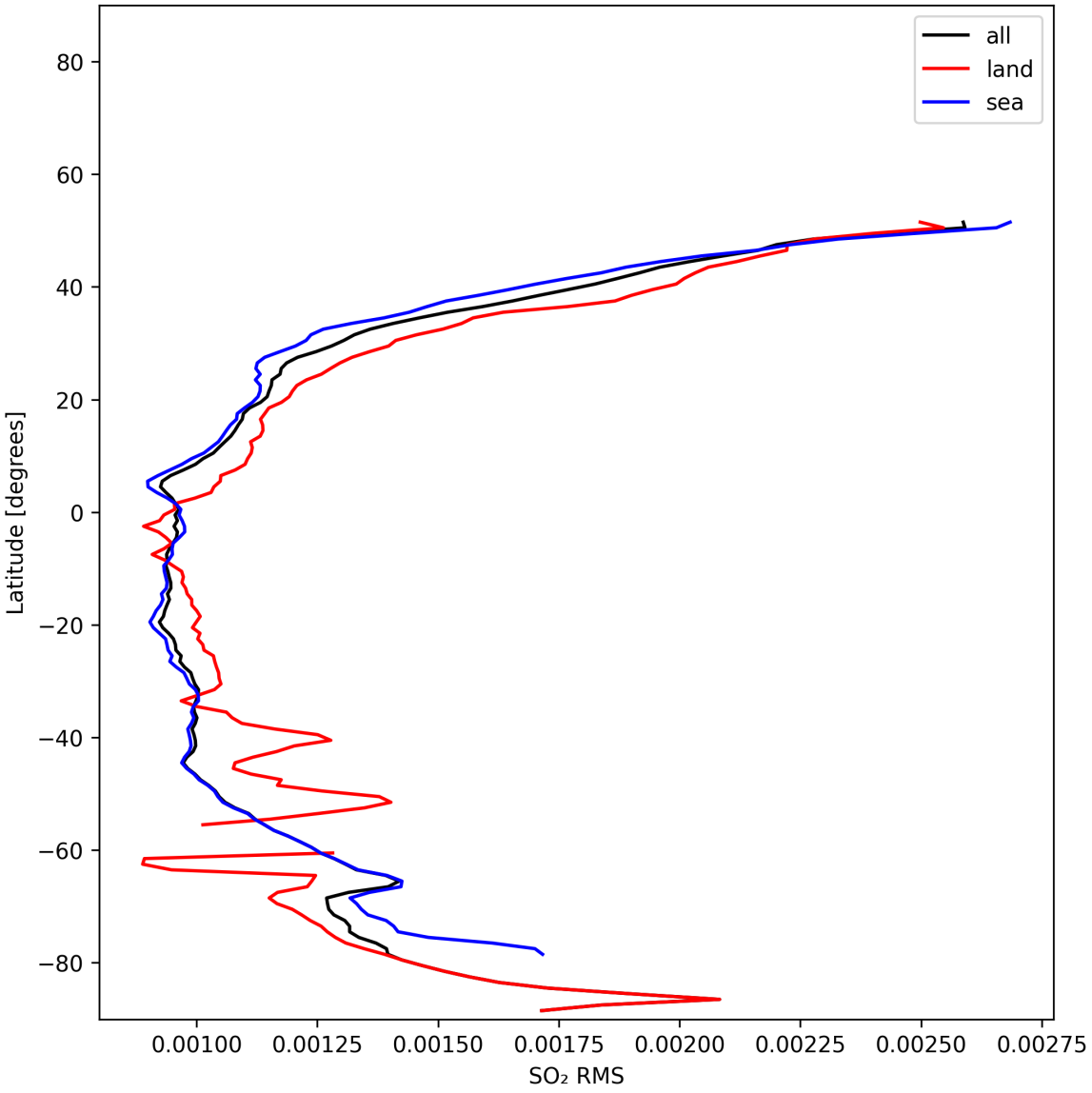

Figure 52: Zonal average of "SO_2 RMS" for 2025-01-27 to 2025-01-28.

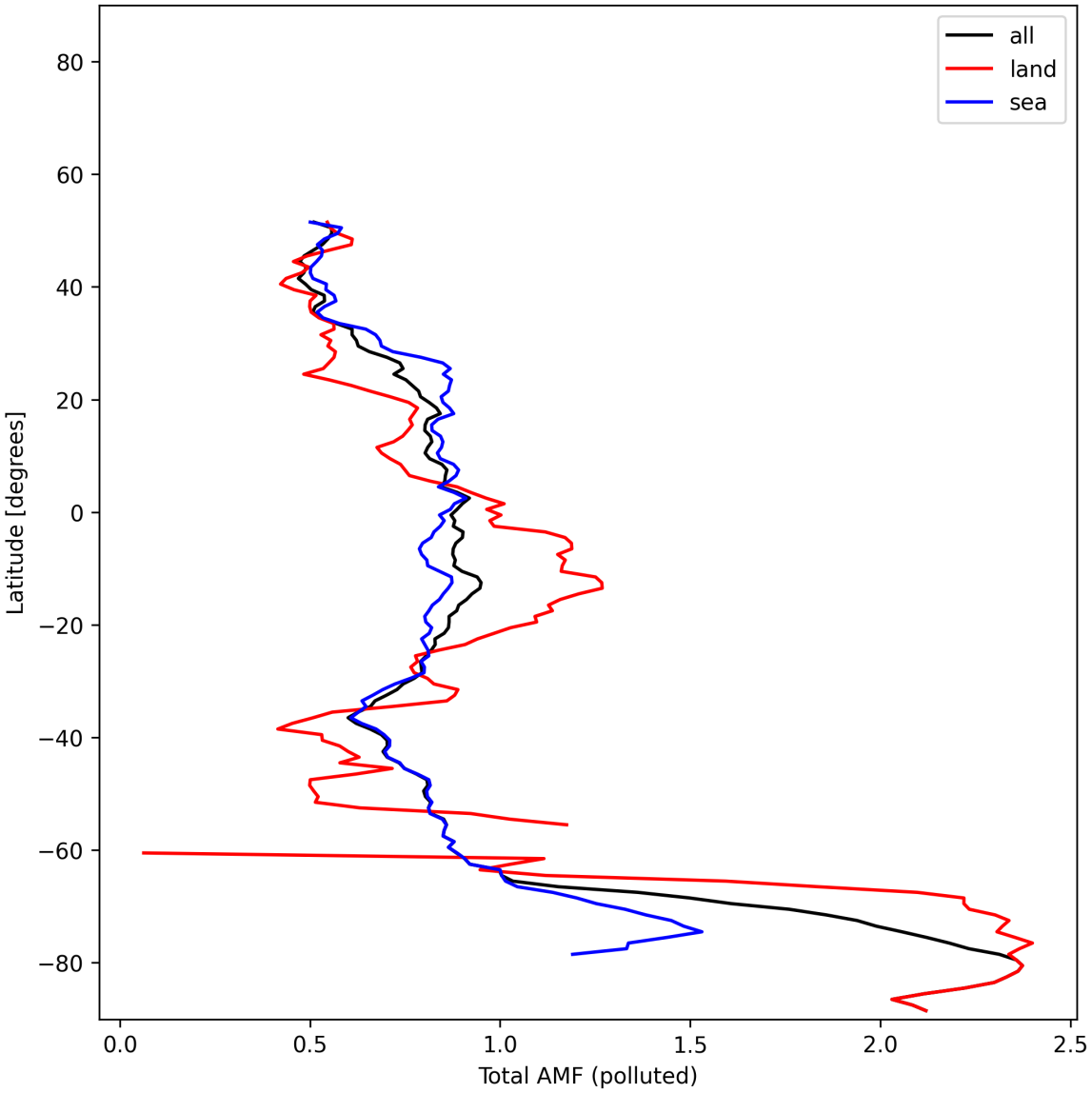

Figure 53: Zonal average of “Total AMF (polluted)” for 2025-01-27 to 2025-01-28.

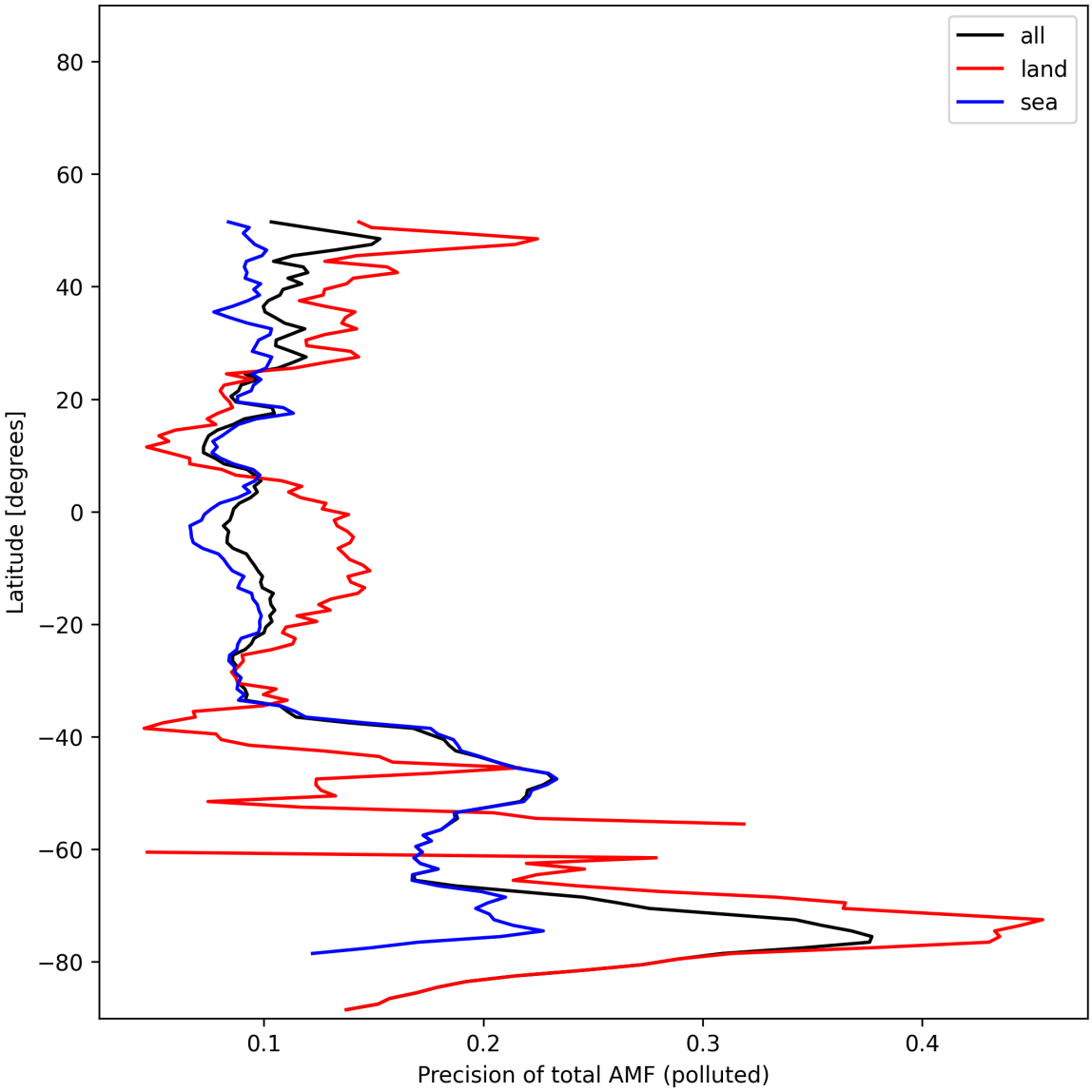

Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-01-27 to 2025-01-28.

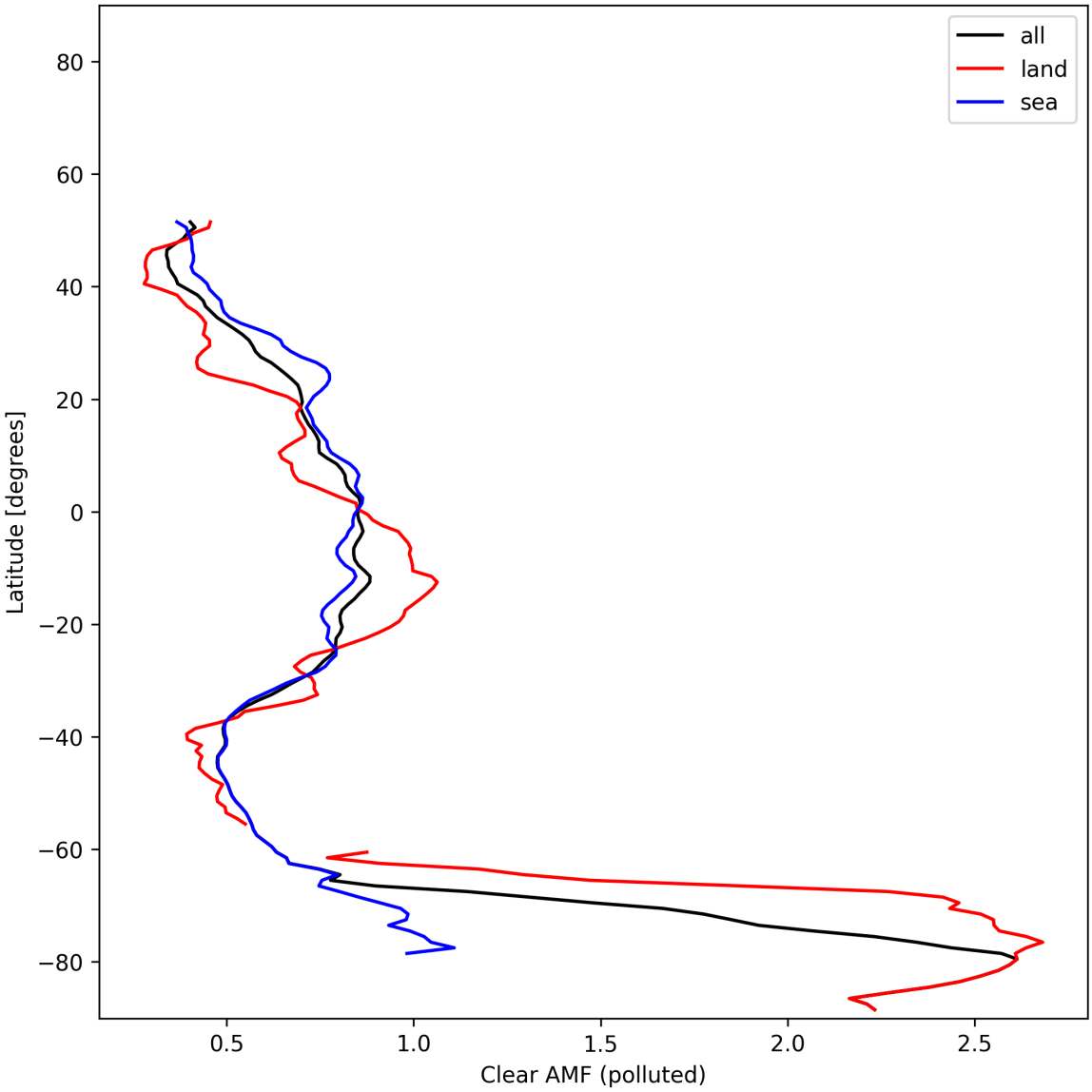

Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-01-27 to 2025-01-28.

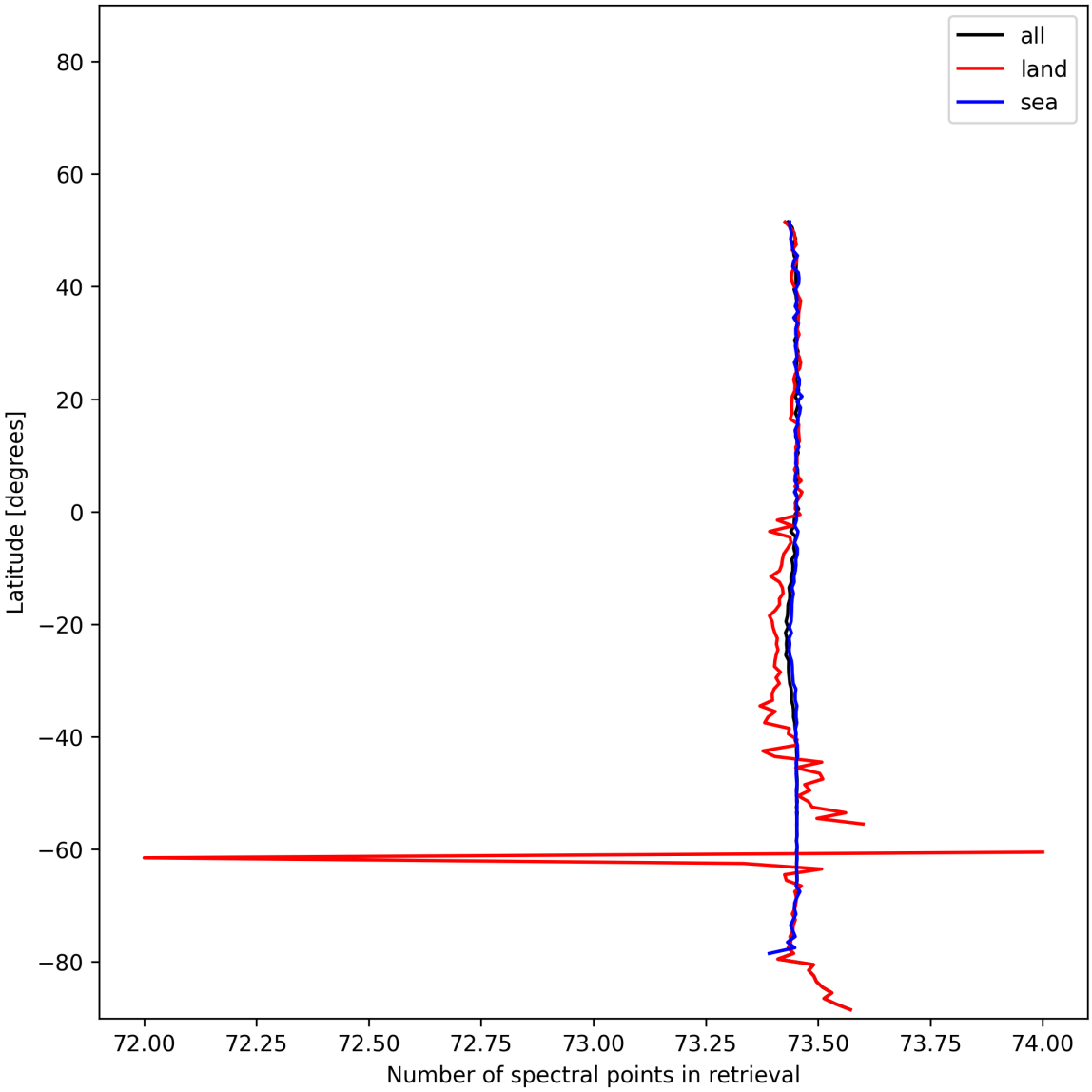

Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-01-27 to 2025-01-28.

8 Histograms

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

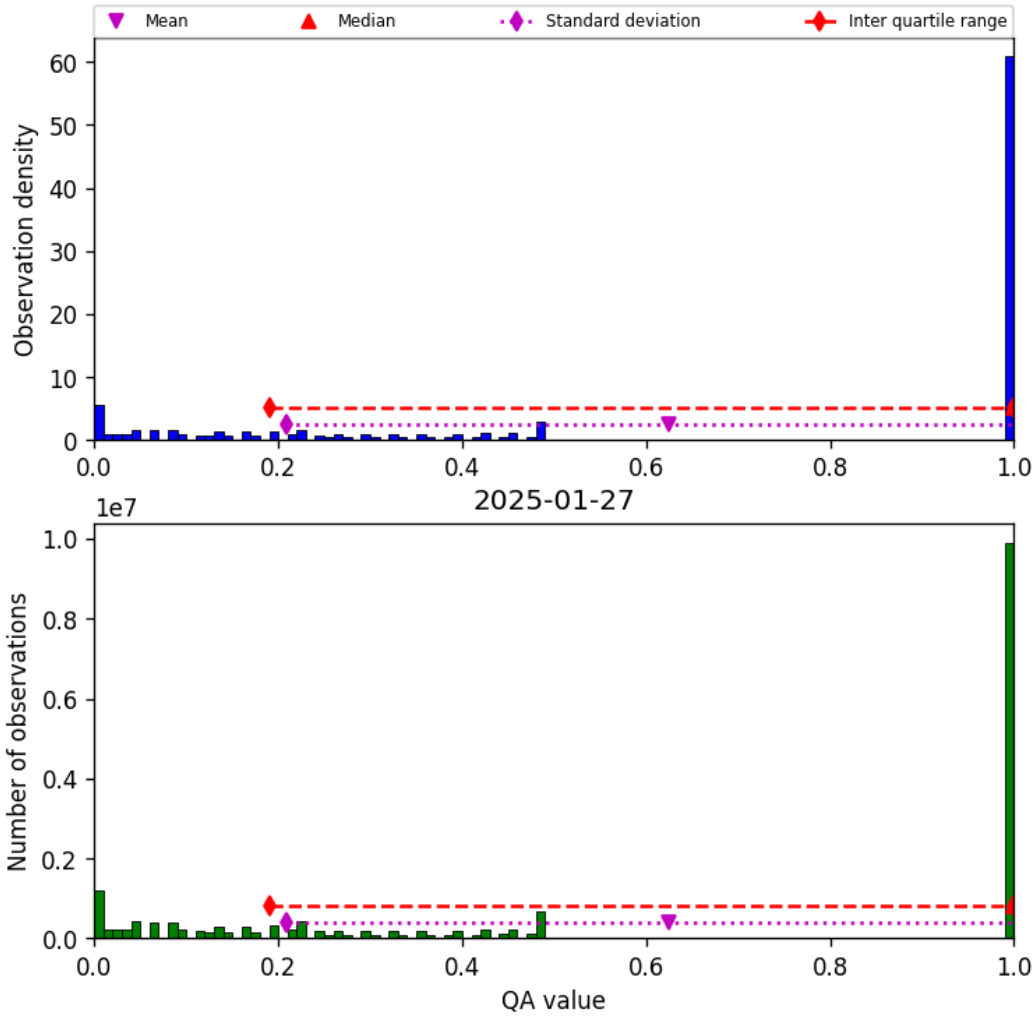

Figure 57: Histogram of “QA value” for 2025-01-27 to 2025-01-28

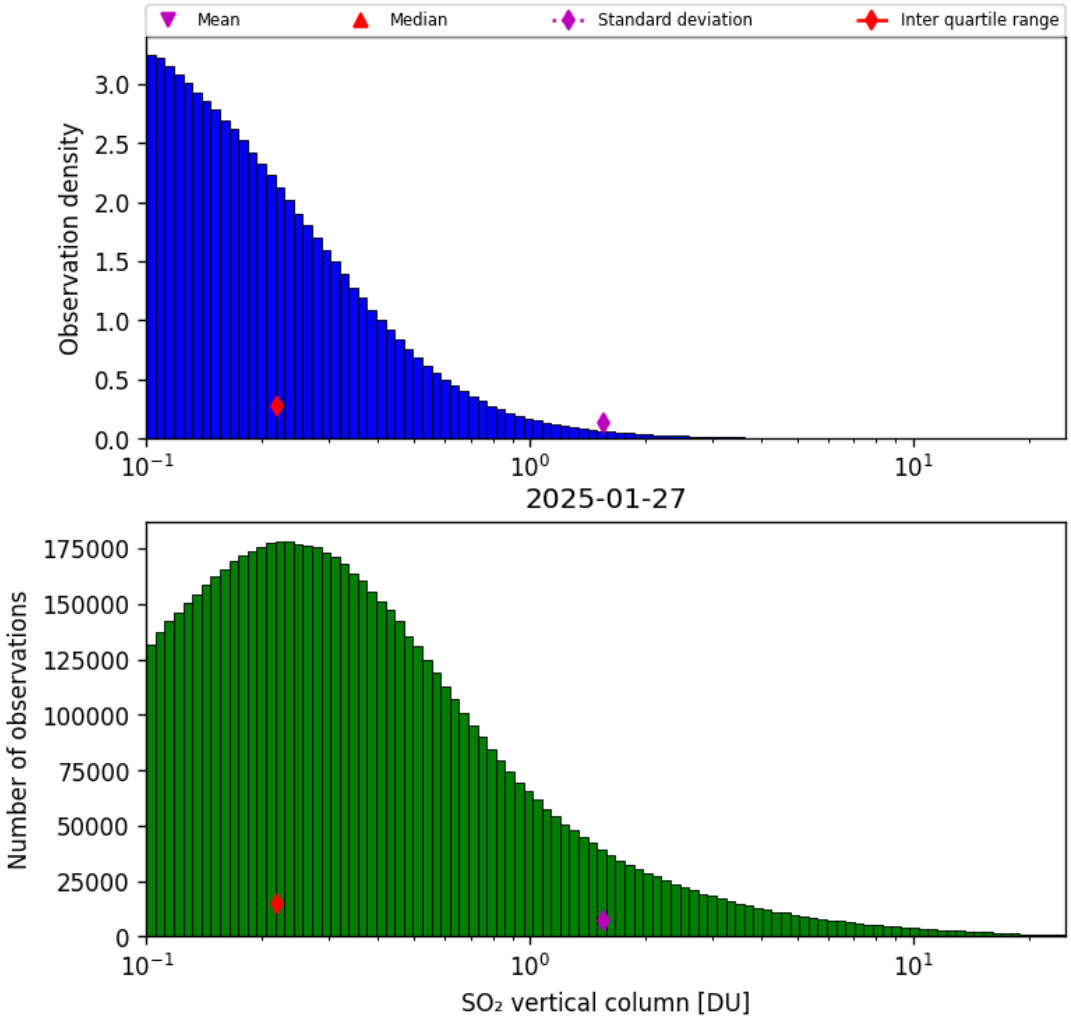

Figure 58: Histogram of "SO_2 vertical column" for 2025-01-27 to 2025-01-28

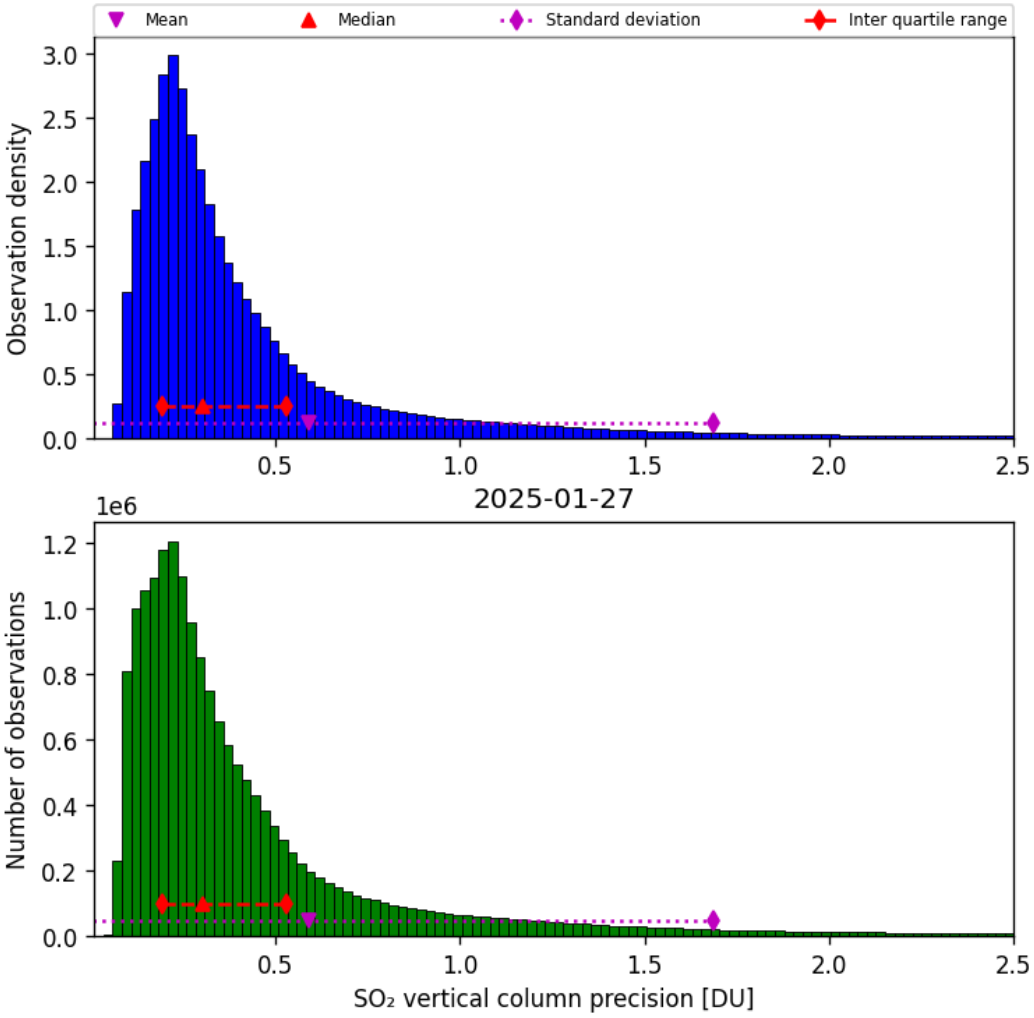

Figure 59: Histogram of "SO_2 vertical column precision" for 2025-01-27 to 2025-01-28

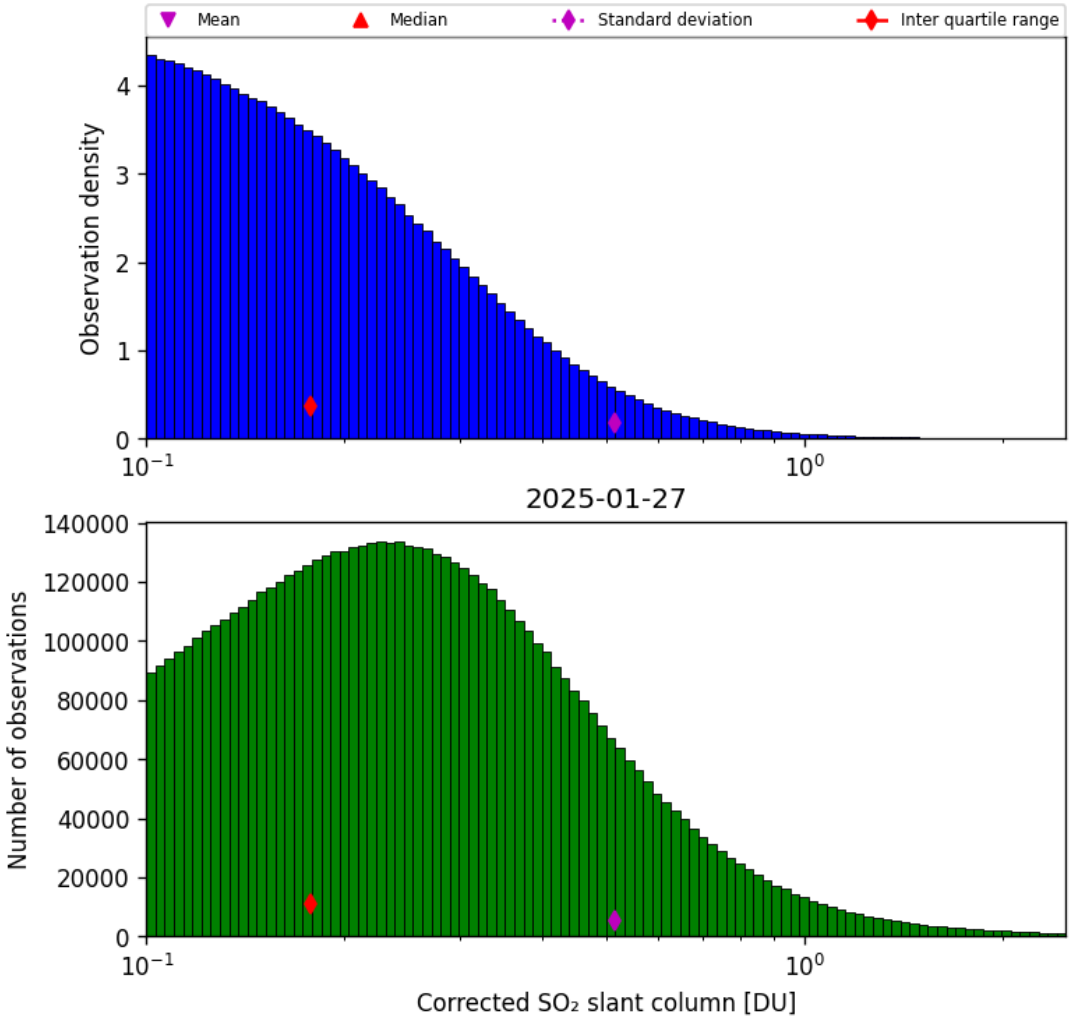

Figure 60: Histogram of "Corrected SO_2 slant column" for 2025-01-27 to 2025-01-28

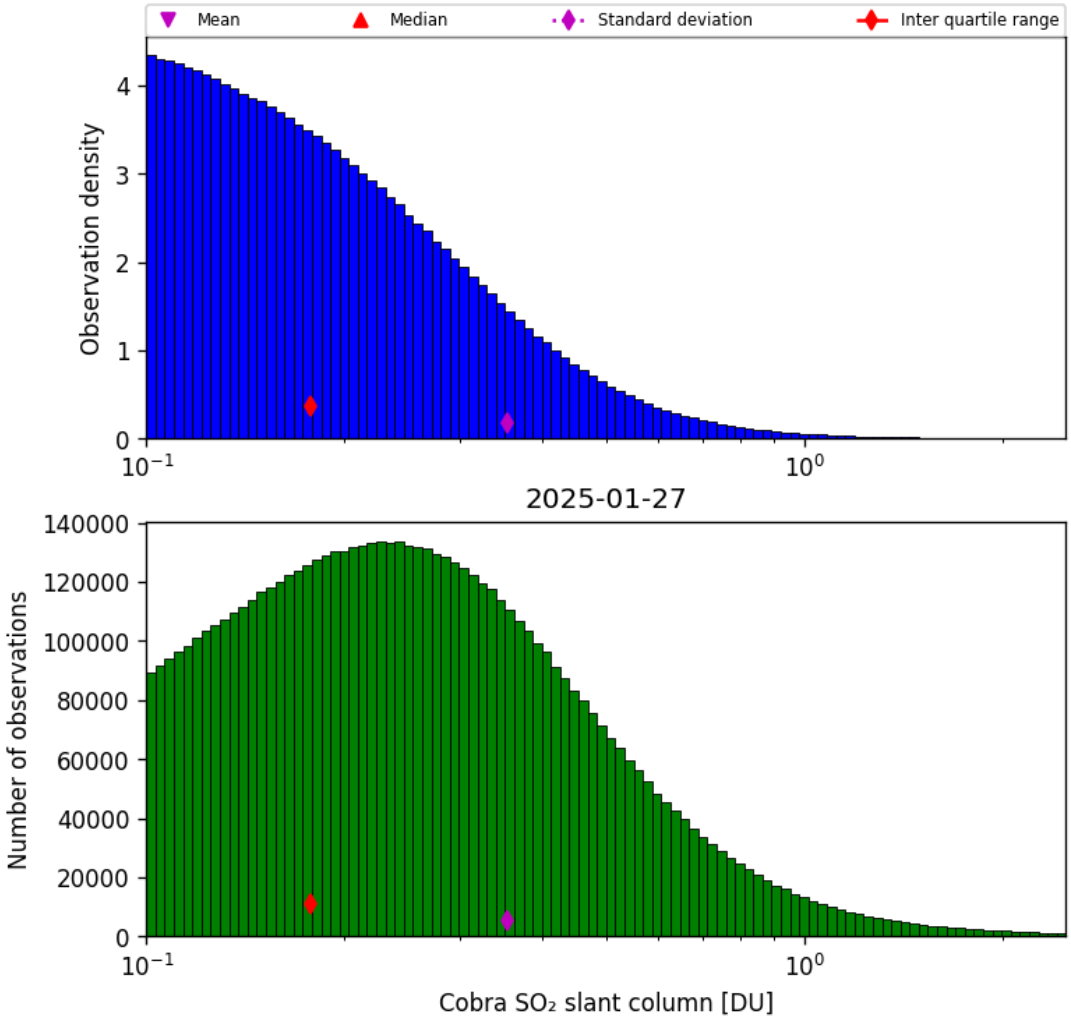

Figure 61: Histogram of "Cobra SO_2 slant column" for 2025-01-27 to 2025-01-28

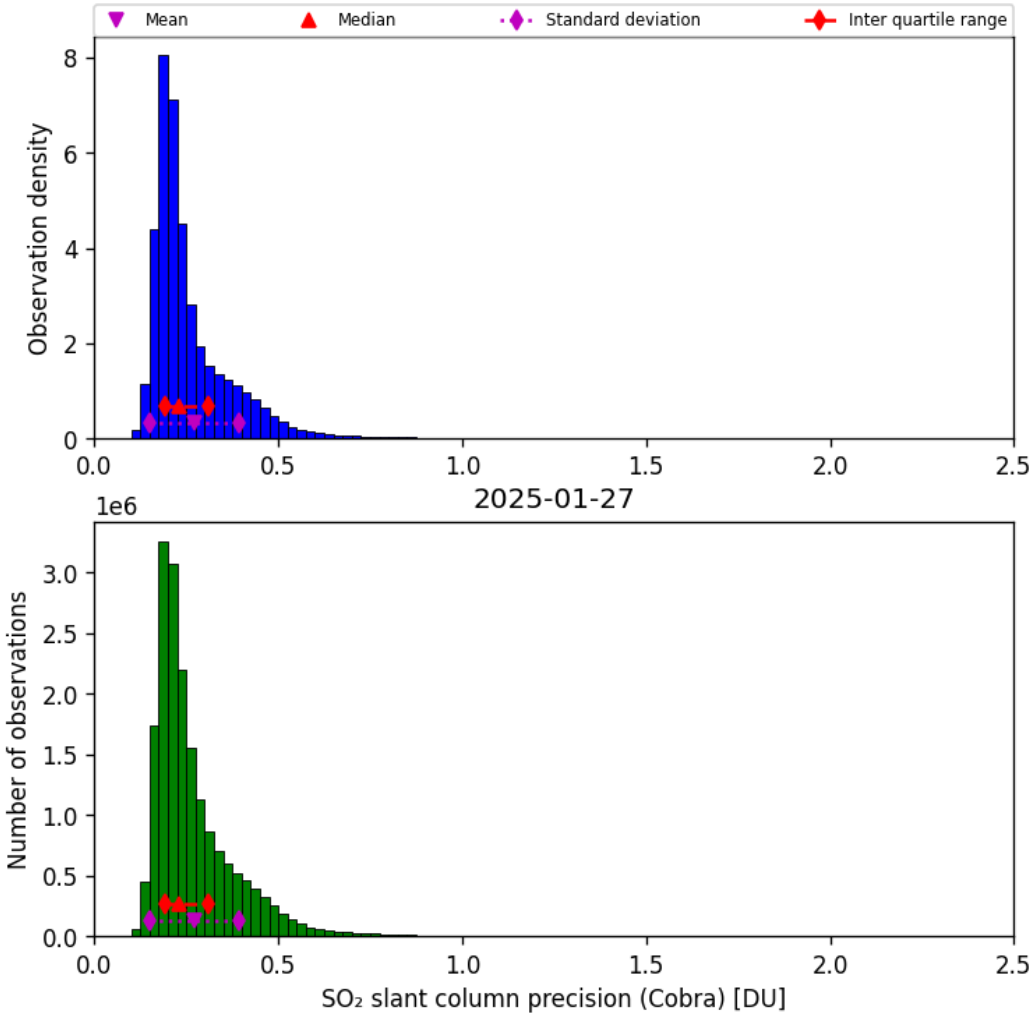

Figure 62: Histogram of "SO_2 slant column precision (Cobra)" for 2025-01-27 to 2025-01-28

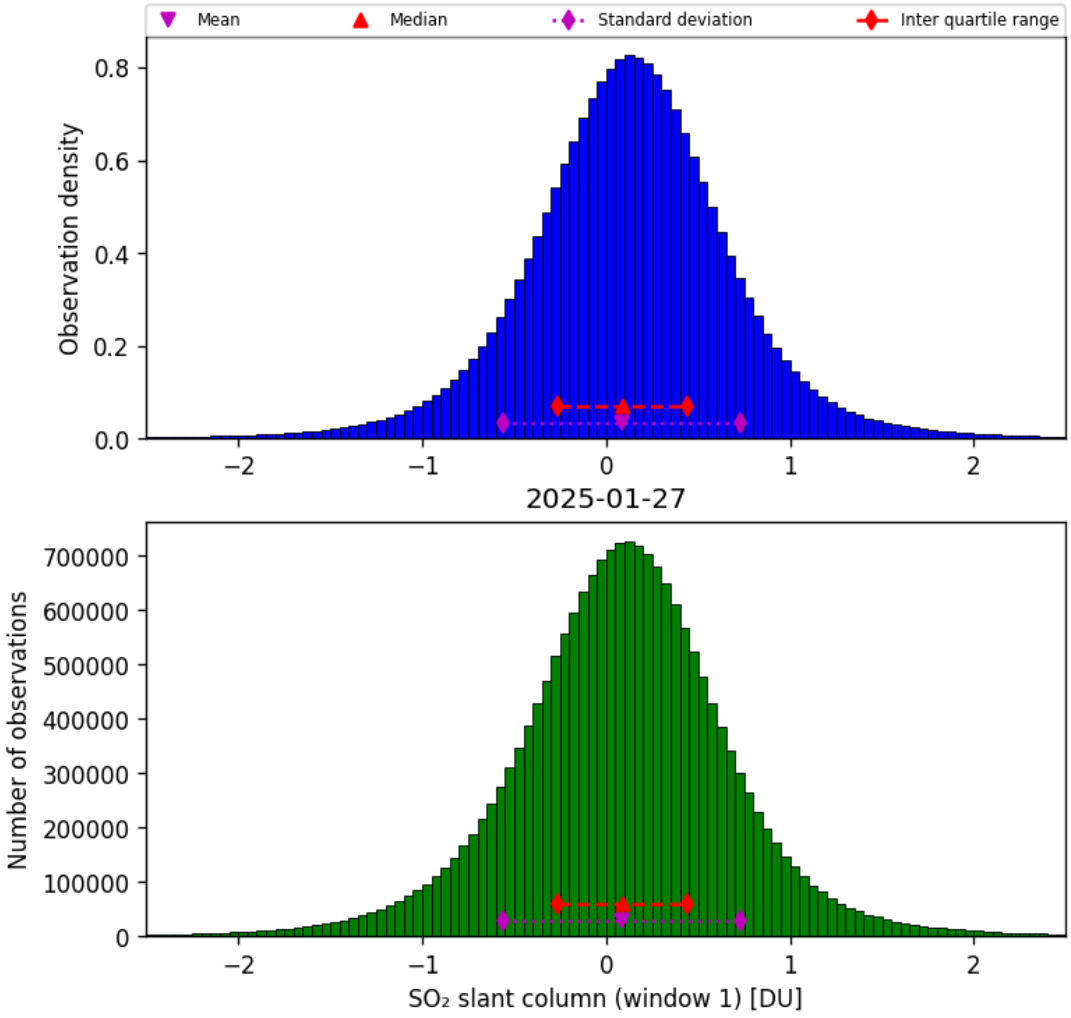

Figure 63: Histogram of "SO_2 slant column (window 1)" for 2025-01-27 to 2025-01-28

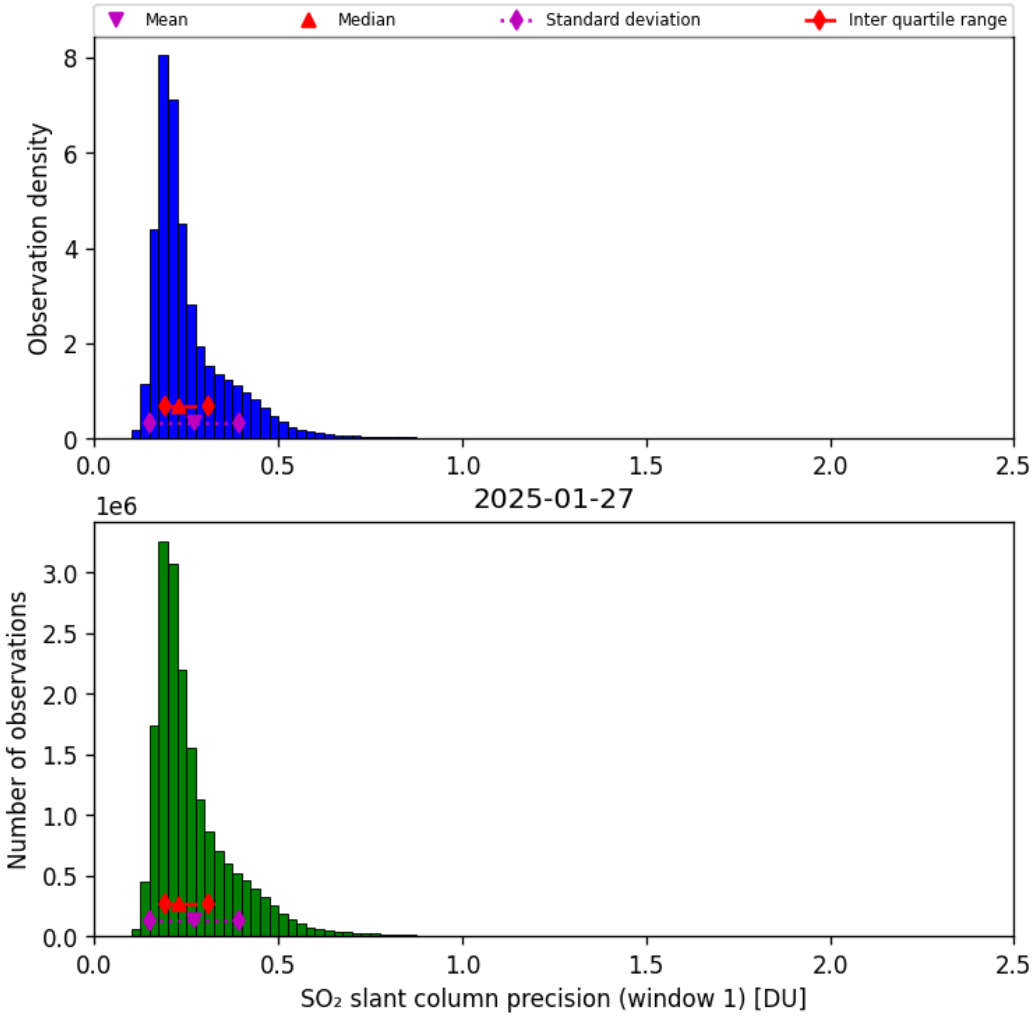

Figure 64: Histogram of "SO_2 slant column precision (window 1)" for 2025-01-27 to 2025-01-28

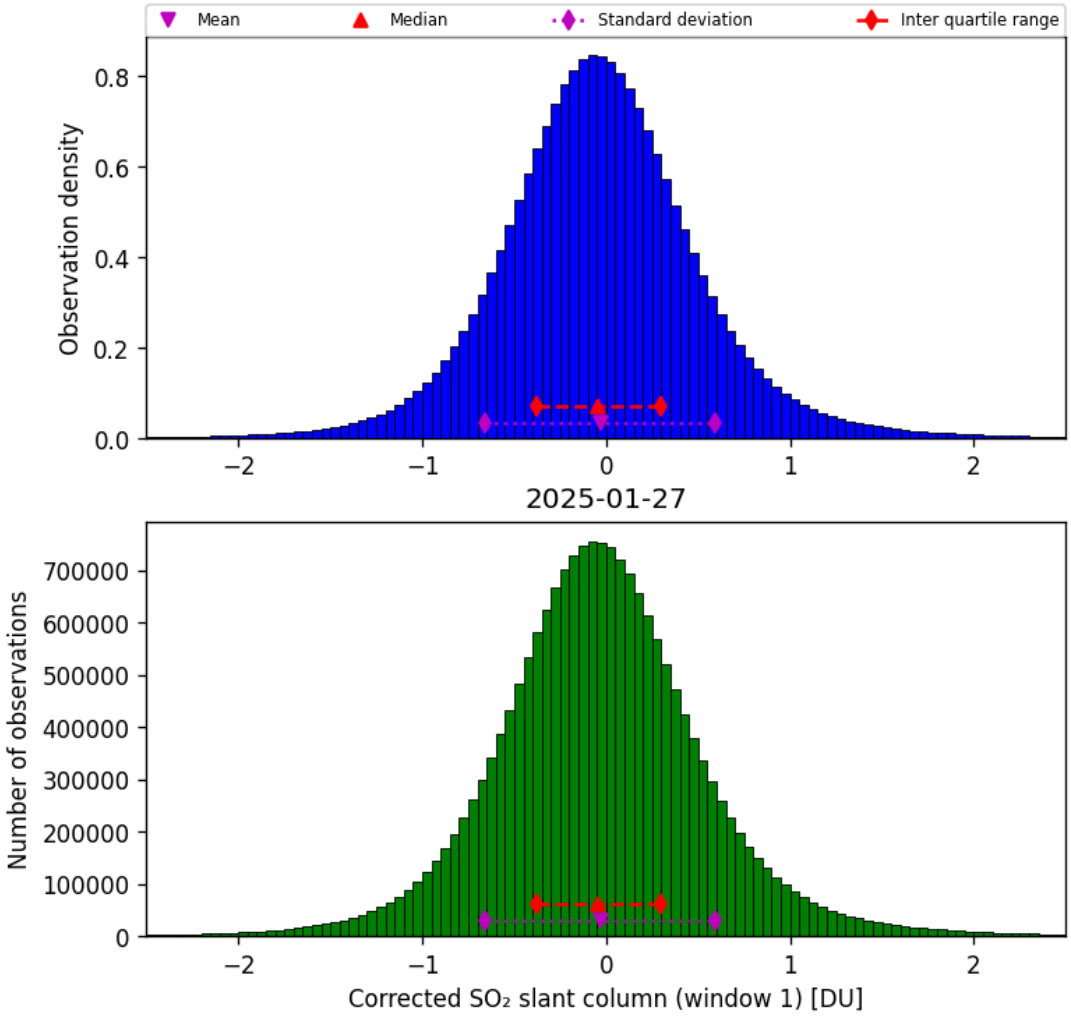

Figure 65: Histogram of "Corrected SO_2 slant column (window 1)" for 2025-01-27 to 2025-01-28

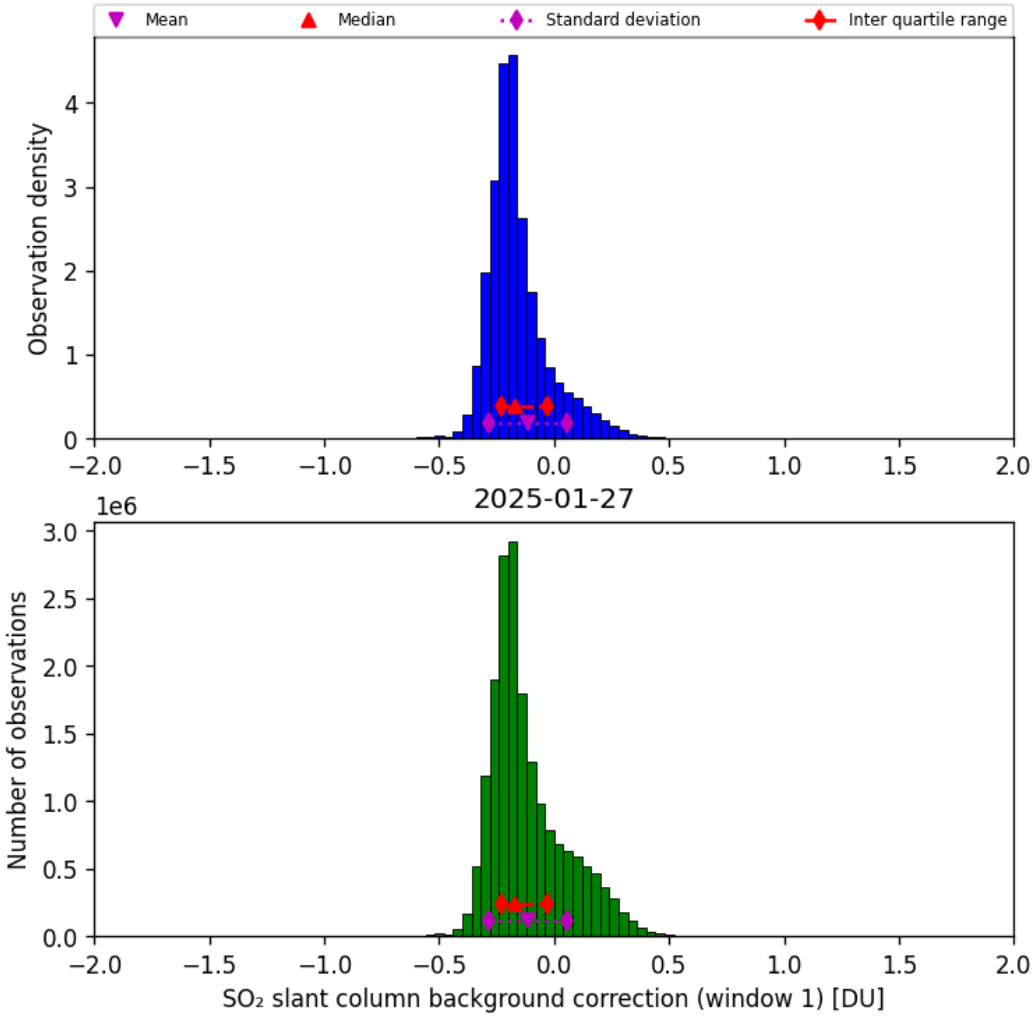

Figure 66: Histogram of "SO_2 slant column background correction (window 1)" for 2025-01-27 to 2025-01-28

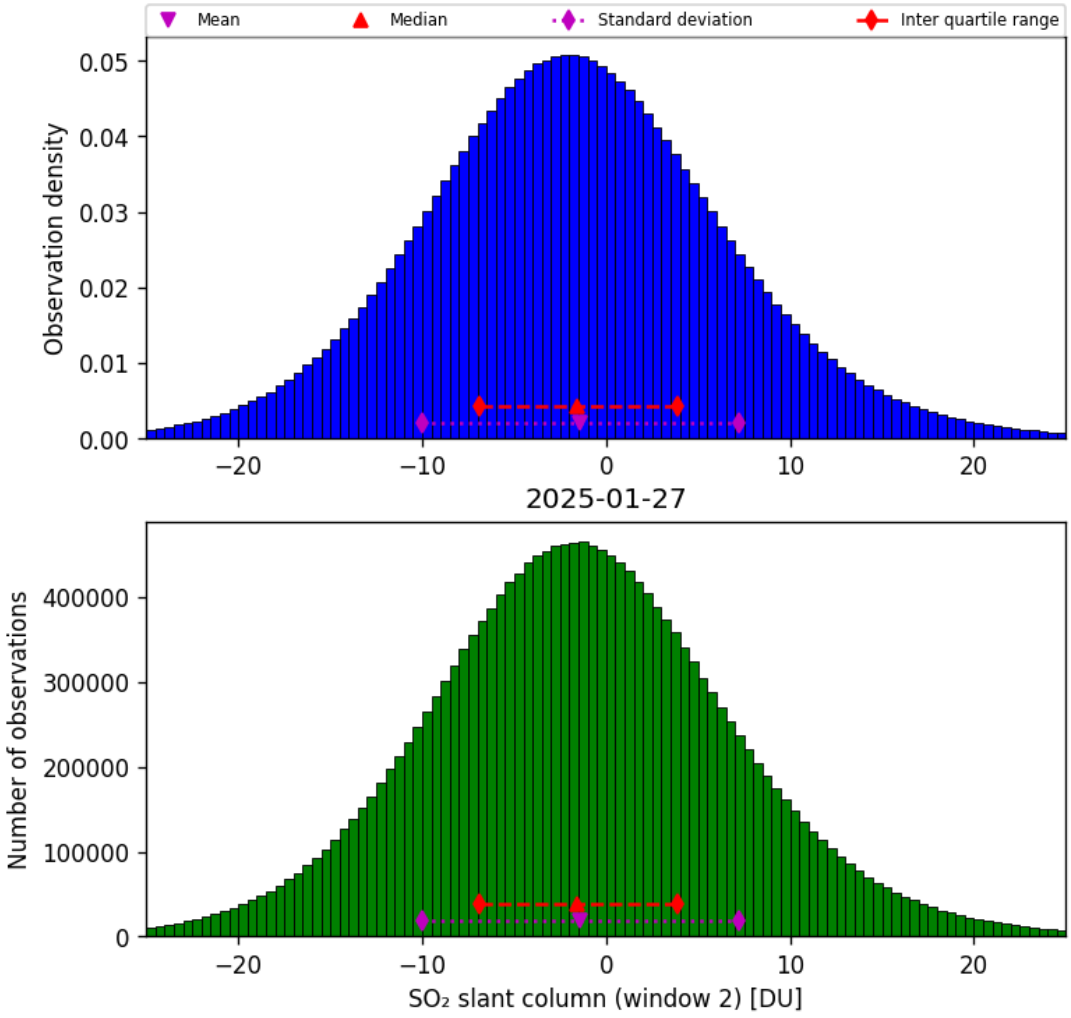

Figure 67: Histogram of "SO_2 slant column (window 2)" for 2025-01-27 to 2025-01-28

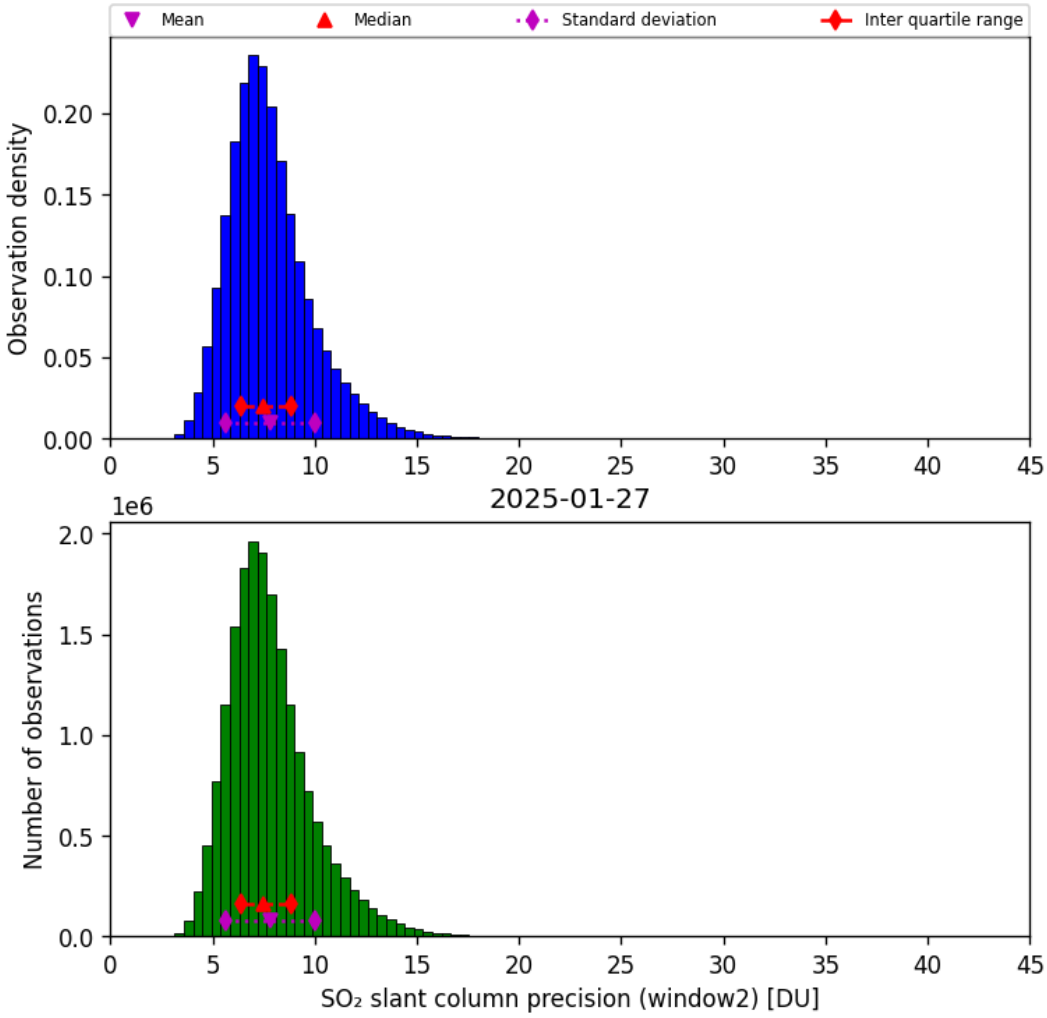

Figure 68: Histogram of "SO_2 slant column precision (window2)" for 2025-01-27 to 2025-01-28

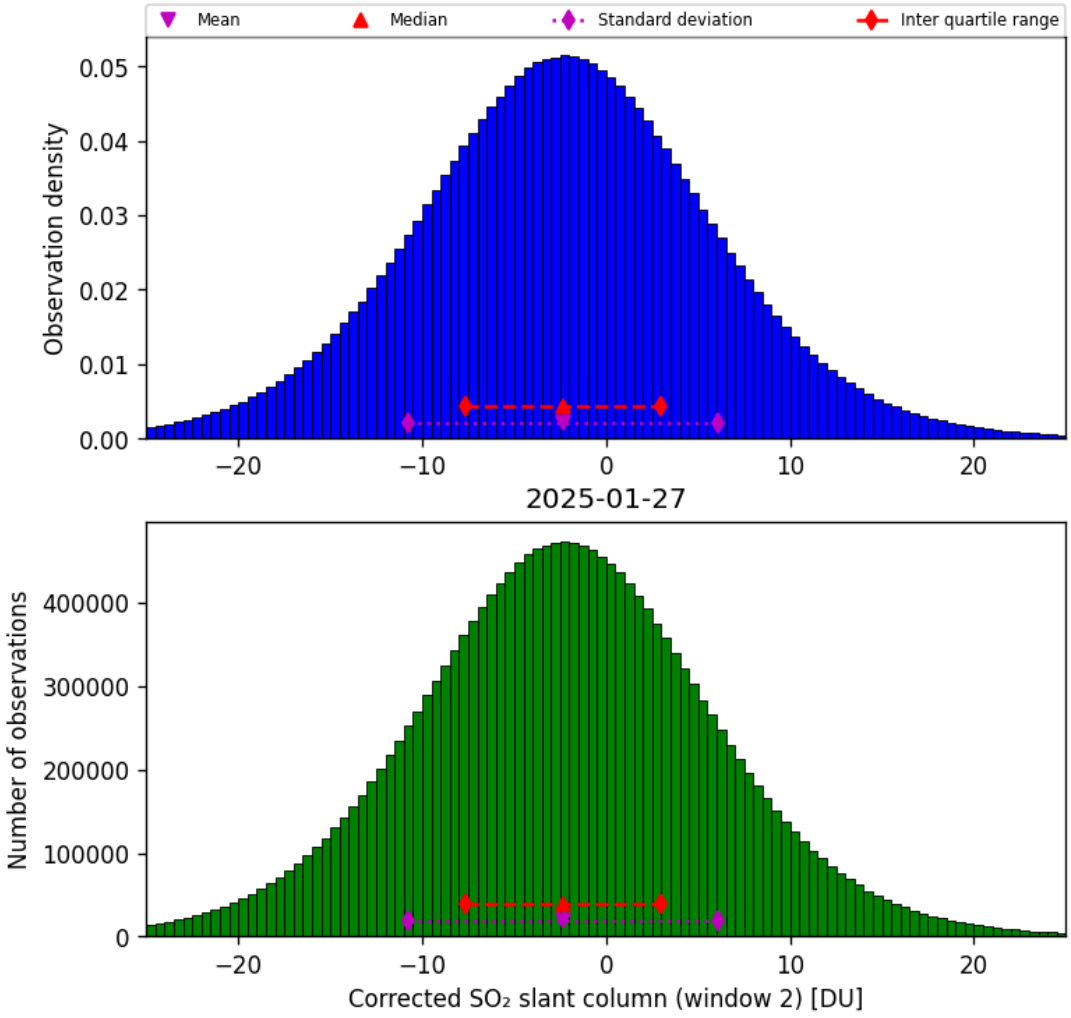

Figure 69: Histogram of "Corrected SO_2 slant column (window 2)" for 2025-01-27 to 2025-01-28

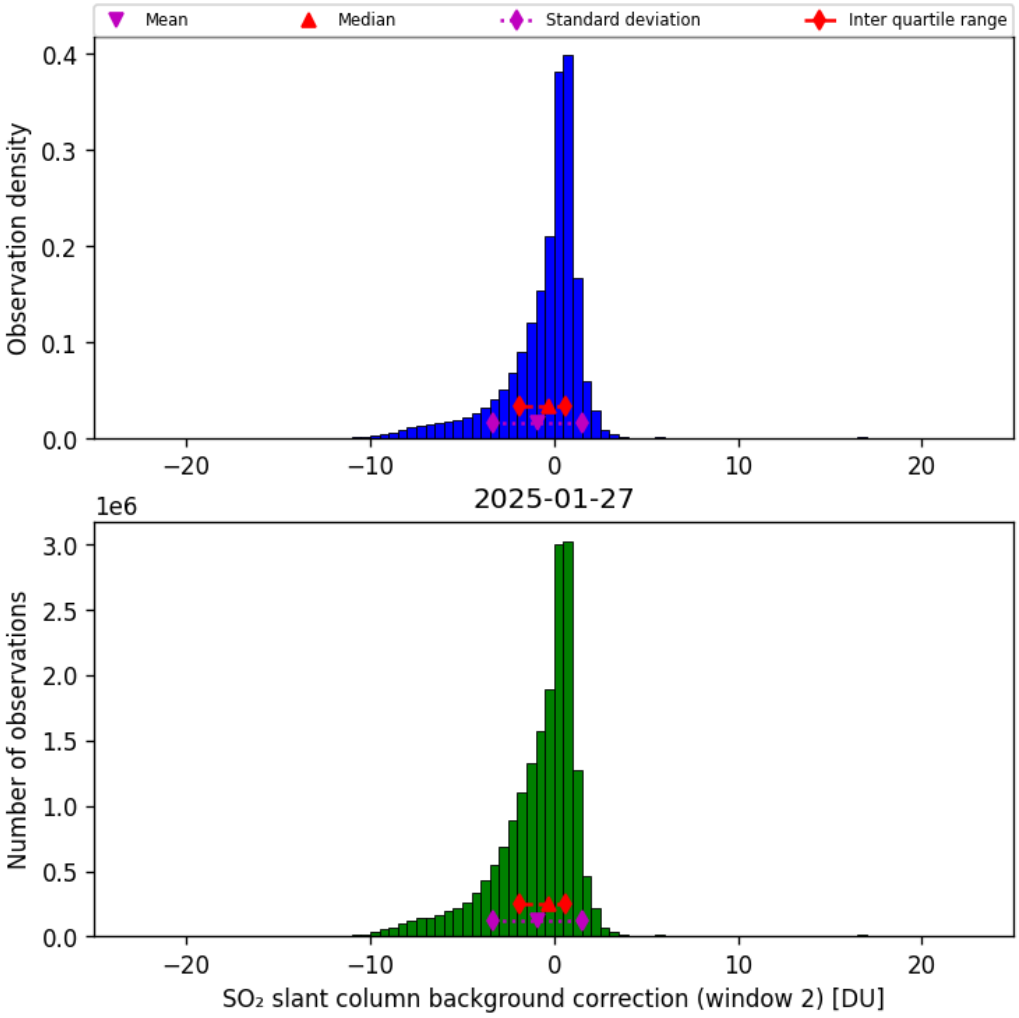

Figure 70: Histogram of "SO_2 slant column background correction (window 2)" for 2025-01-27 to 2025-01-28

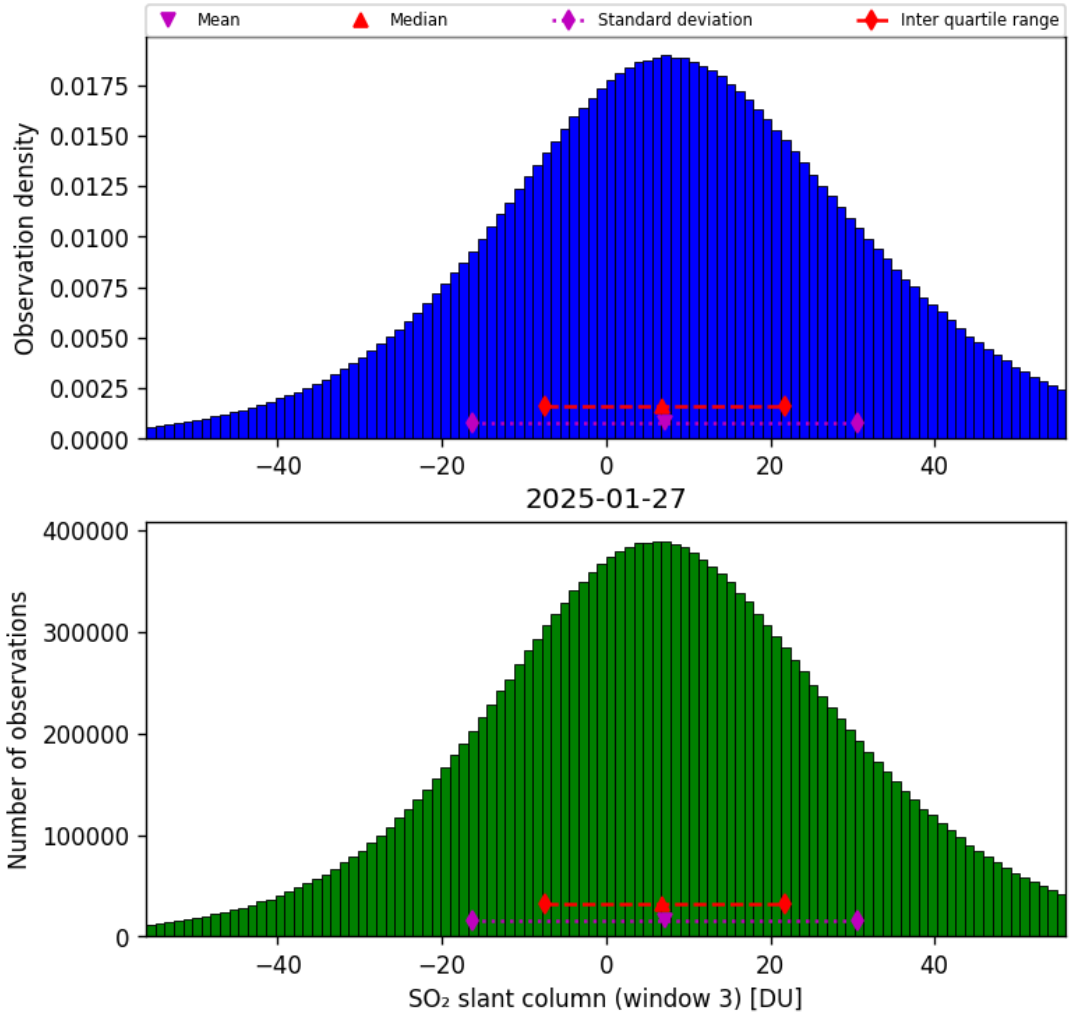

Figure 71: Histogram of "SO_2 slant column (window 3)" for 2025-01-27 to 2025-01-28

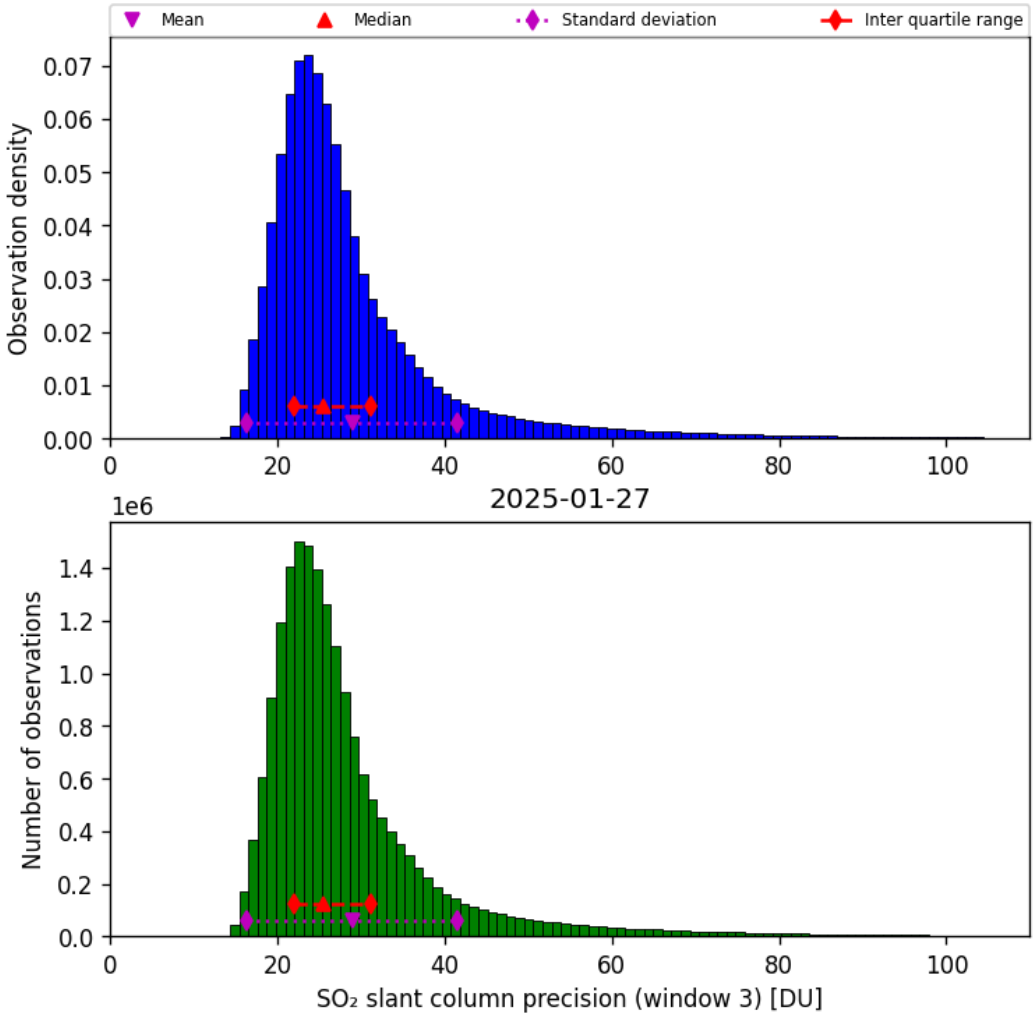

Figure 72: Histogram of "SO_2 slant column precision (window 3)" for 2025-01-27 to 2025-01-28

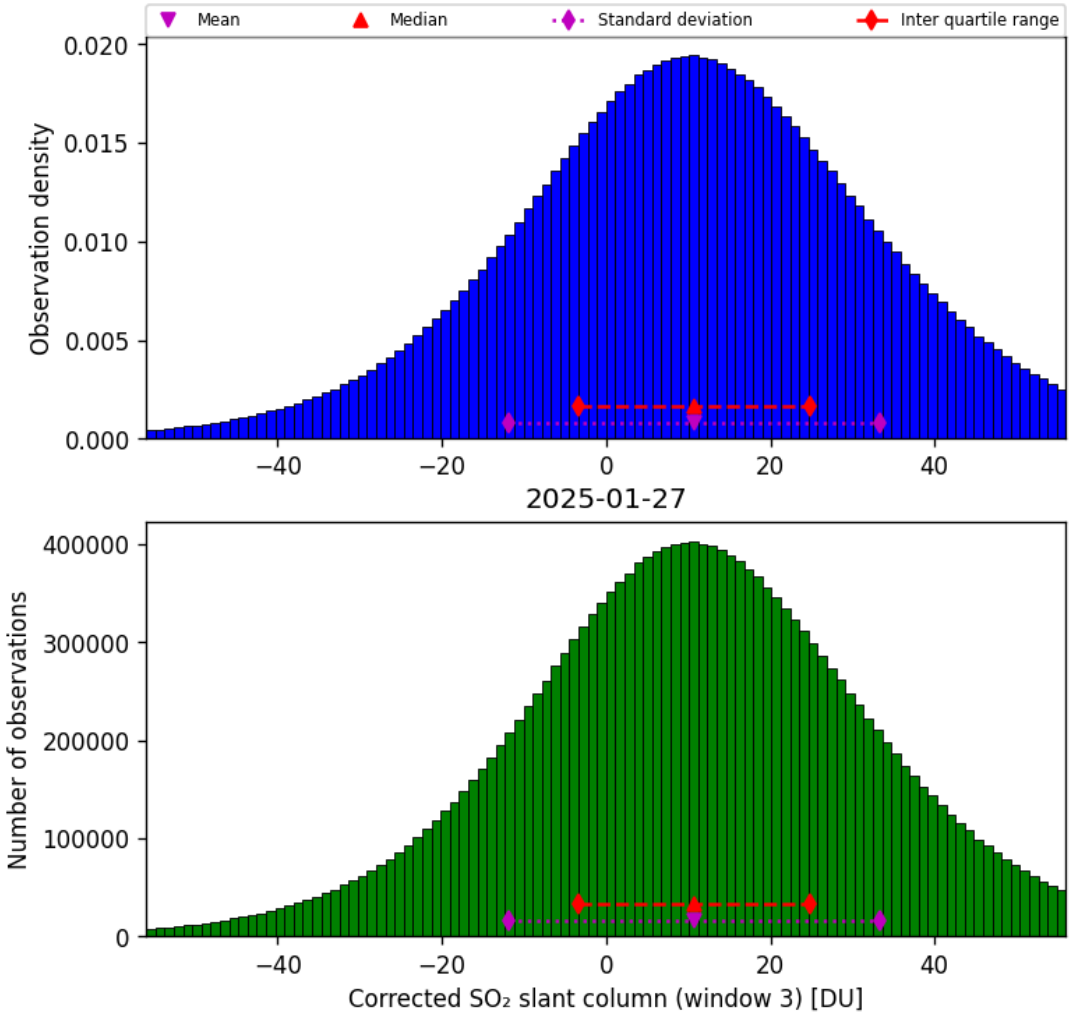

Figure 73: Histogram of "Corrected SO_2 slant column (window 3)" for 2025-01-27 to 2025-01-28

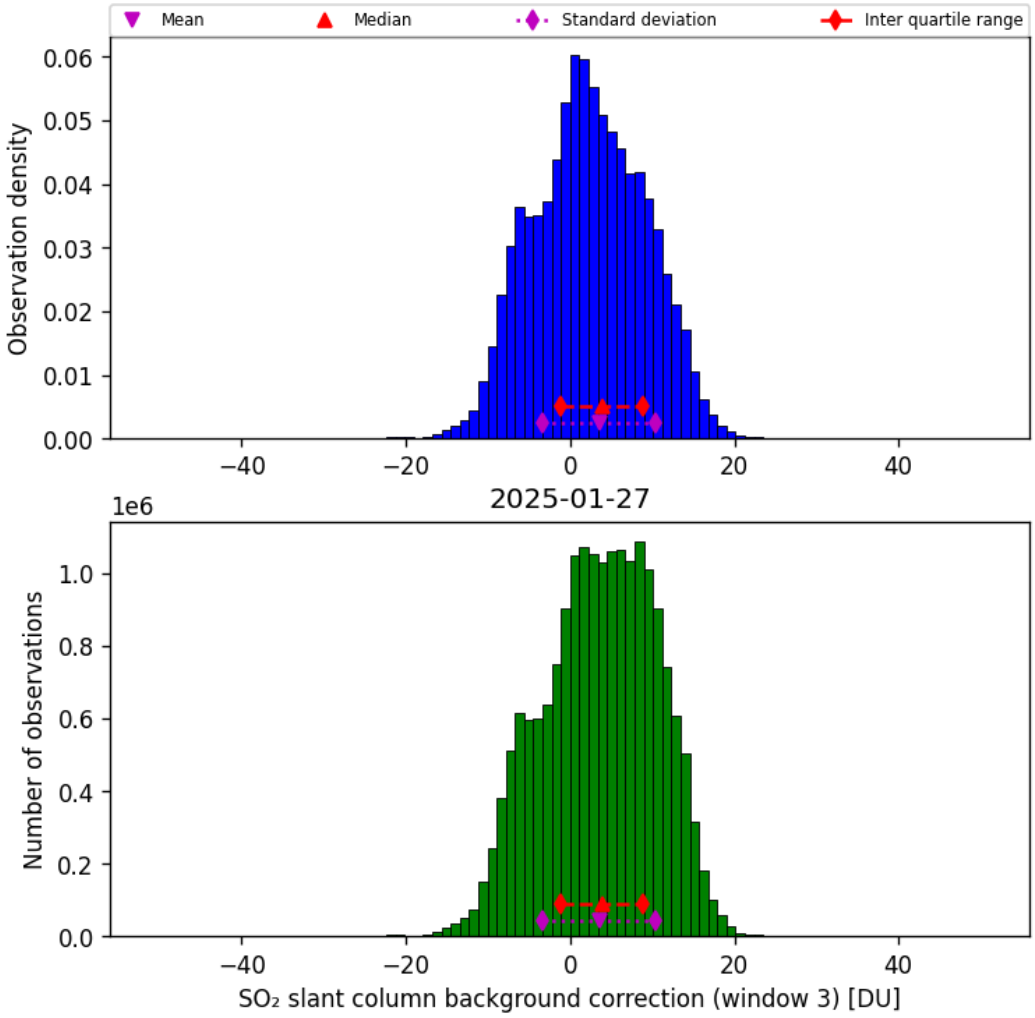

Figure 74: Histogram of "SO_2 slant column background correction (window 3)" for 2025-01-27 to 2025-01-28

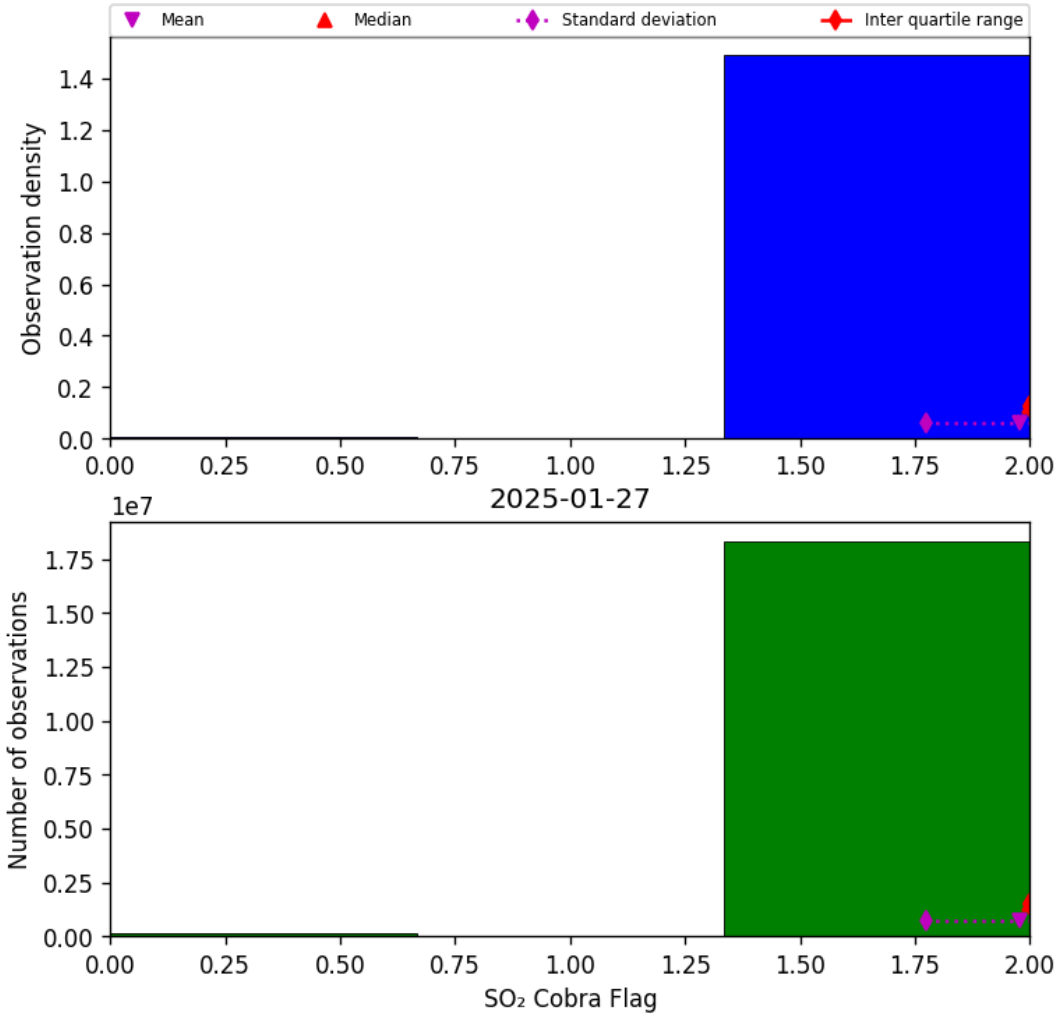

Figure 75: Histogram of "SO_2 Cobra Flag" for 2025-01-27 to 2025-01-28

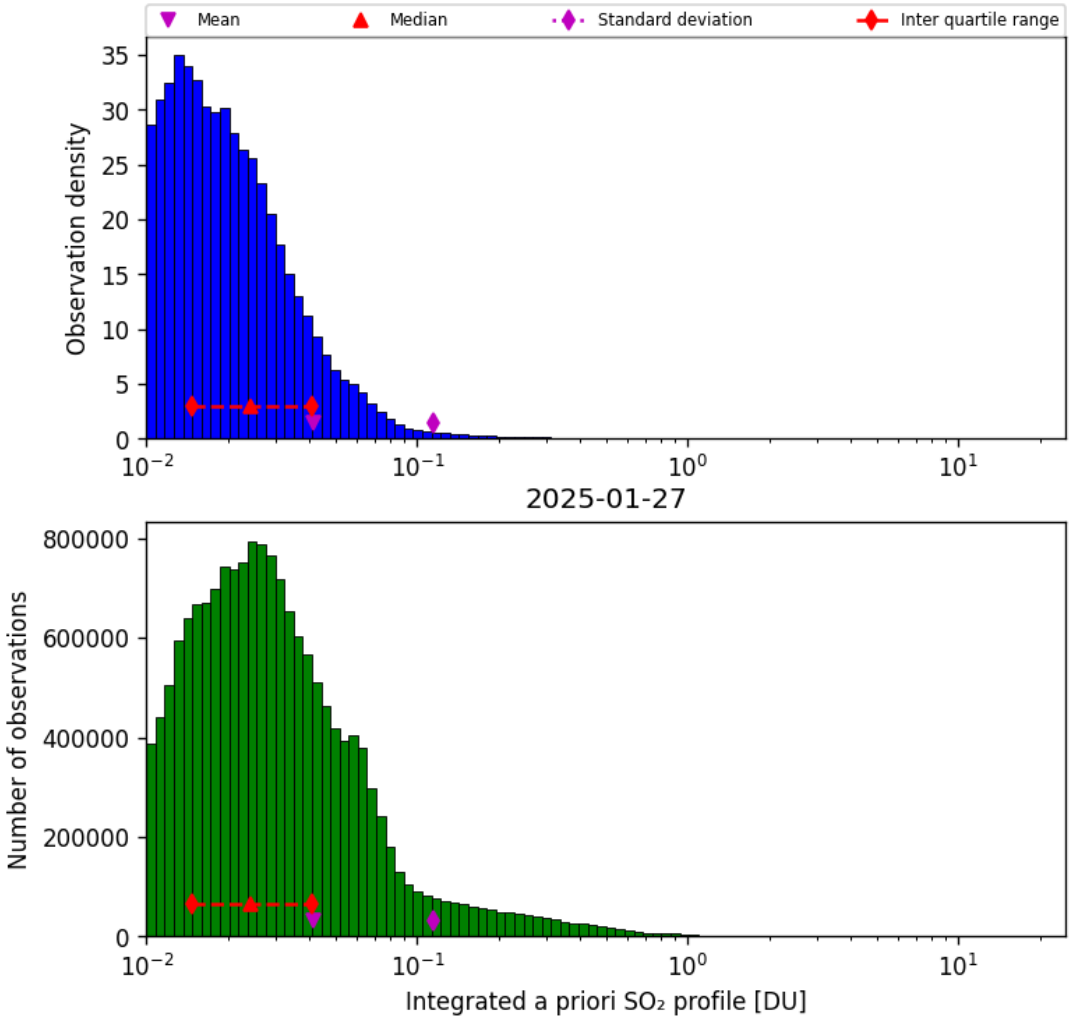

Figure 76: Histogram of “Integrated a priori SO_2 profile” for 2025-01-27 to 2025-01-28

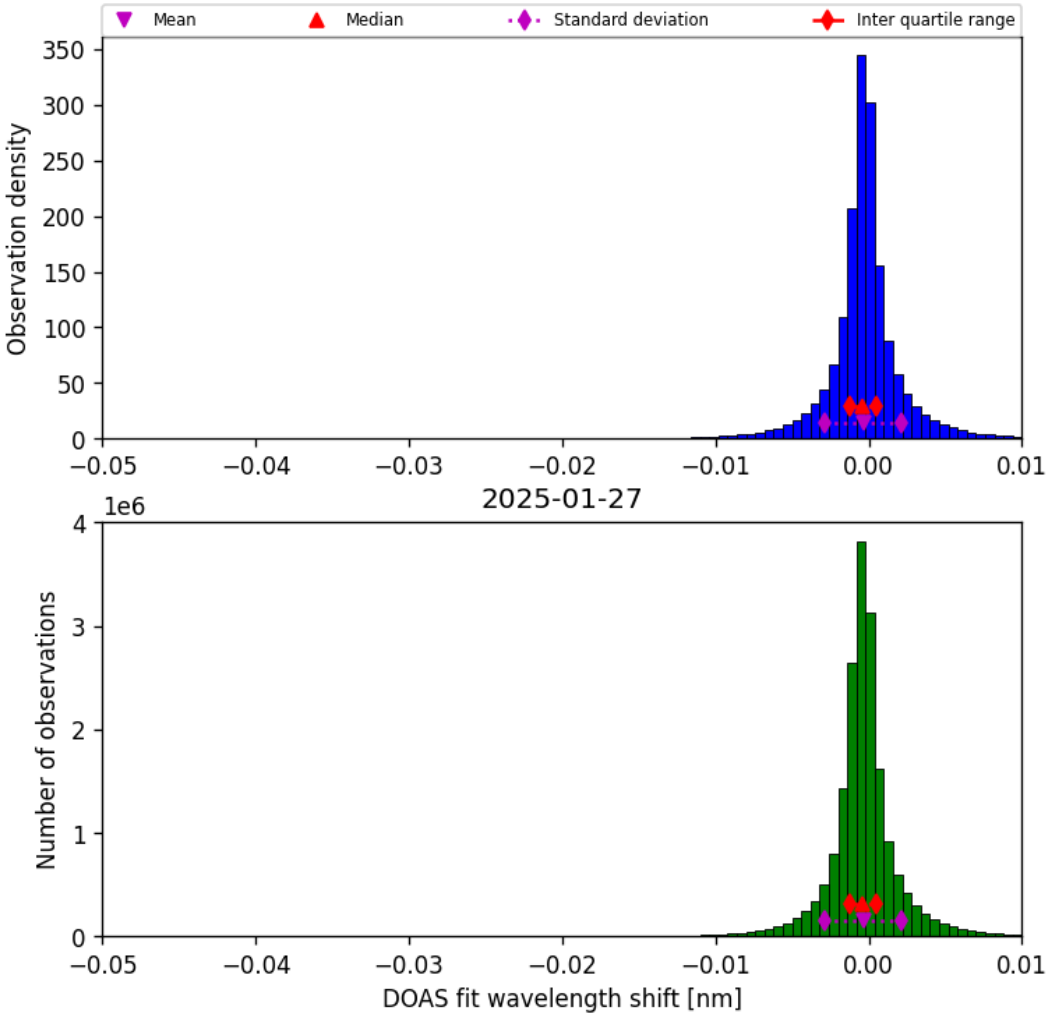

Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-01-27 to 2025-01-28

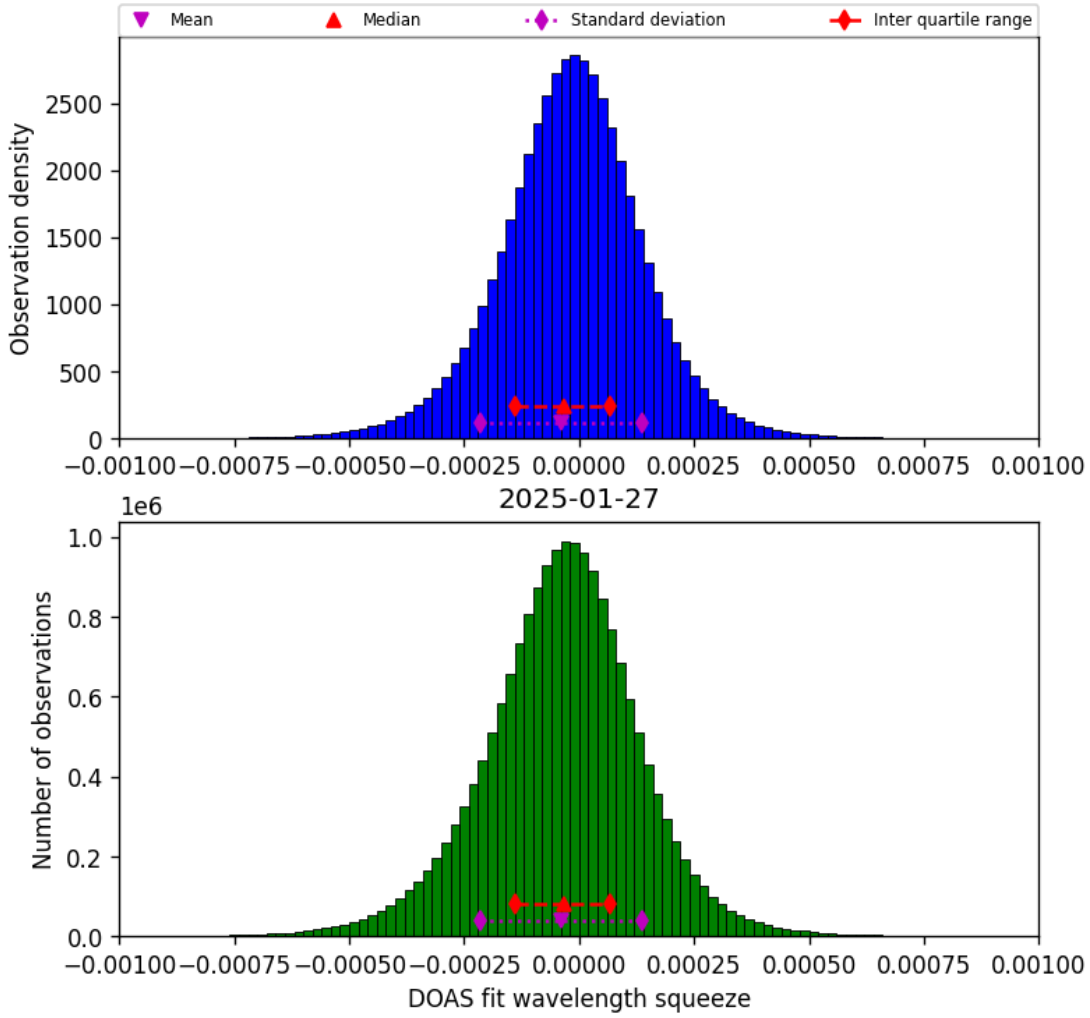

Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-01-27 to 2025-01-28

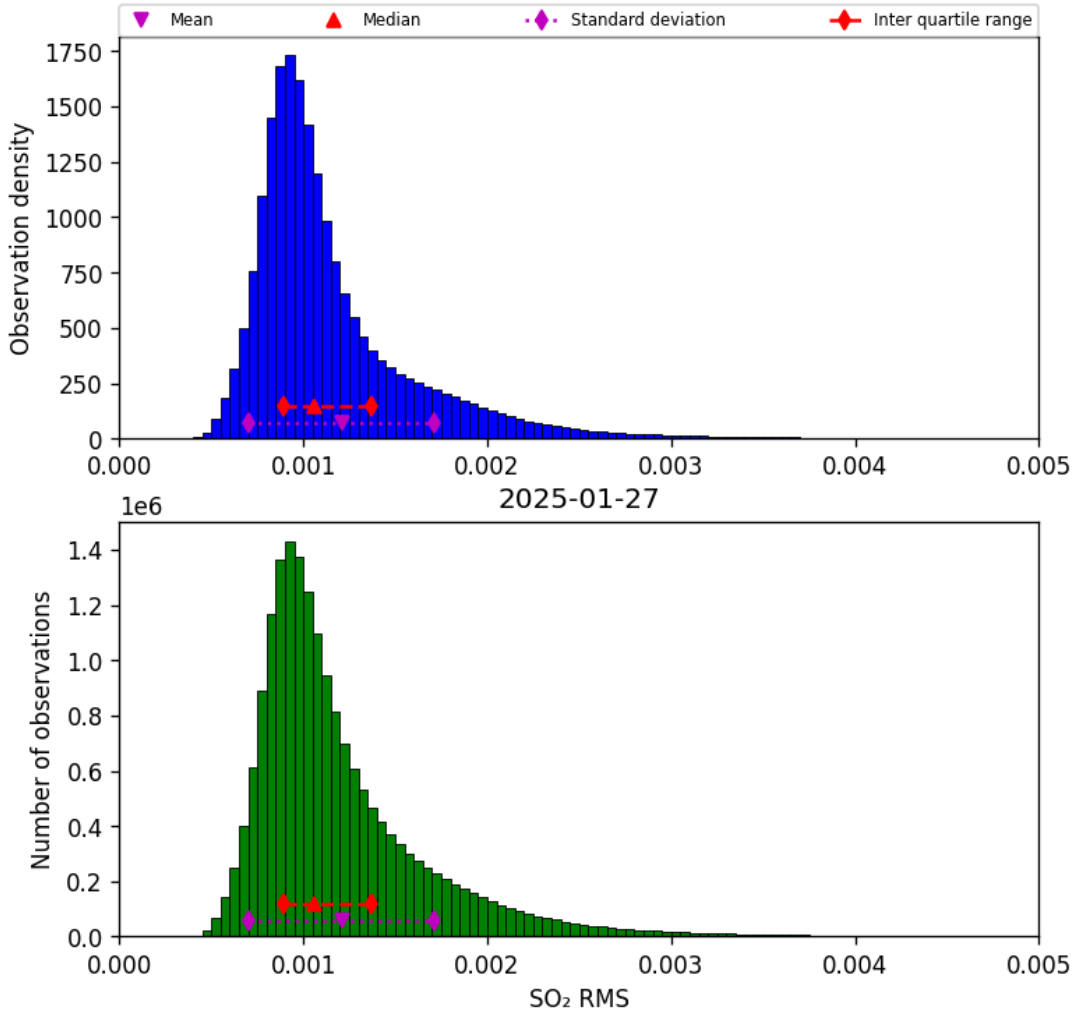

Figure 79: Histogram of "SO_2 RMS" for 2025-01-27 to 2025-01-28

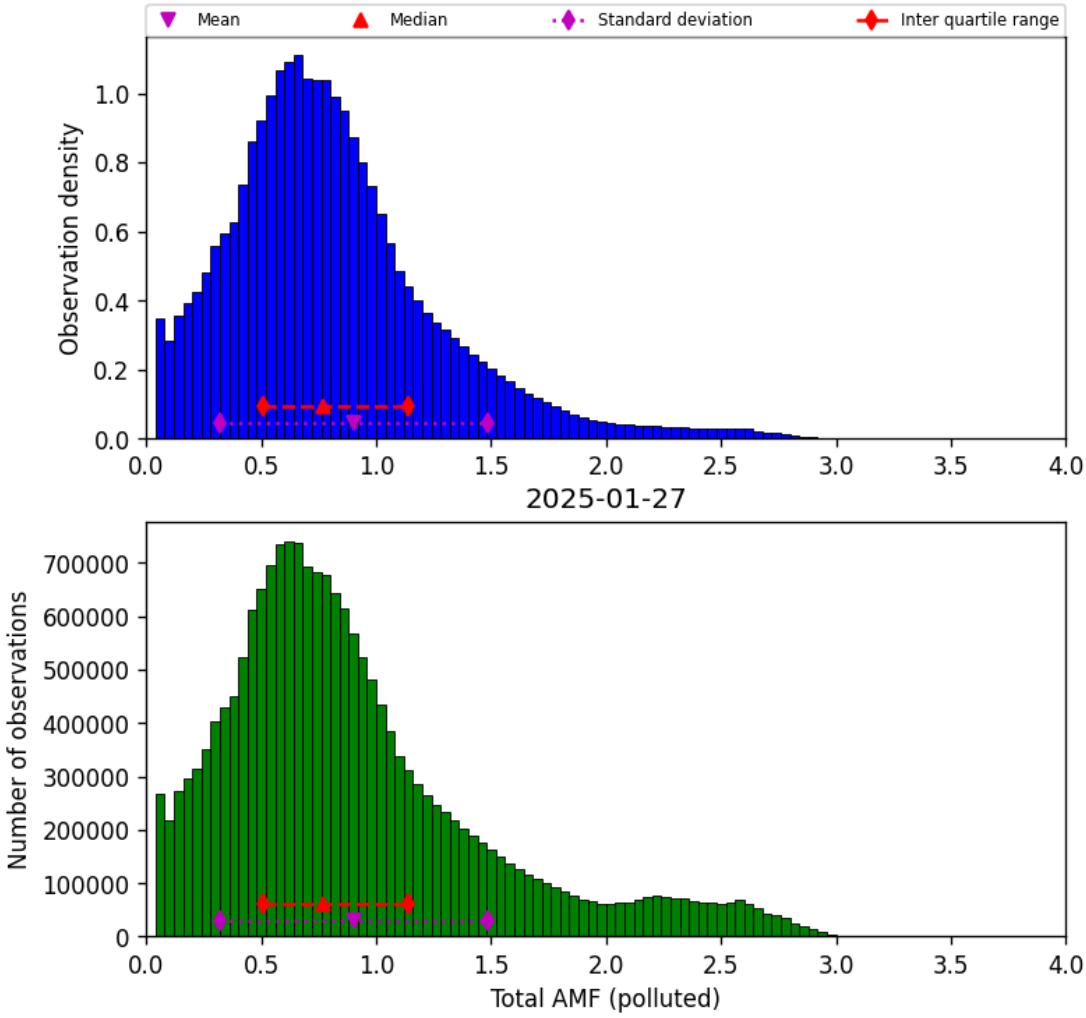

Figure 80: Histogram of “Total AMF (polluted)” for 2025-01-27 to 2025-01-28

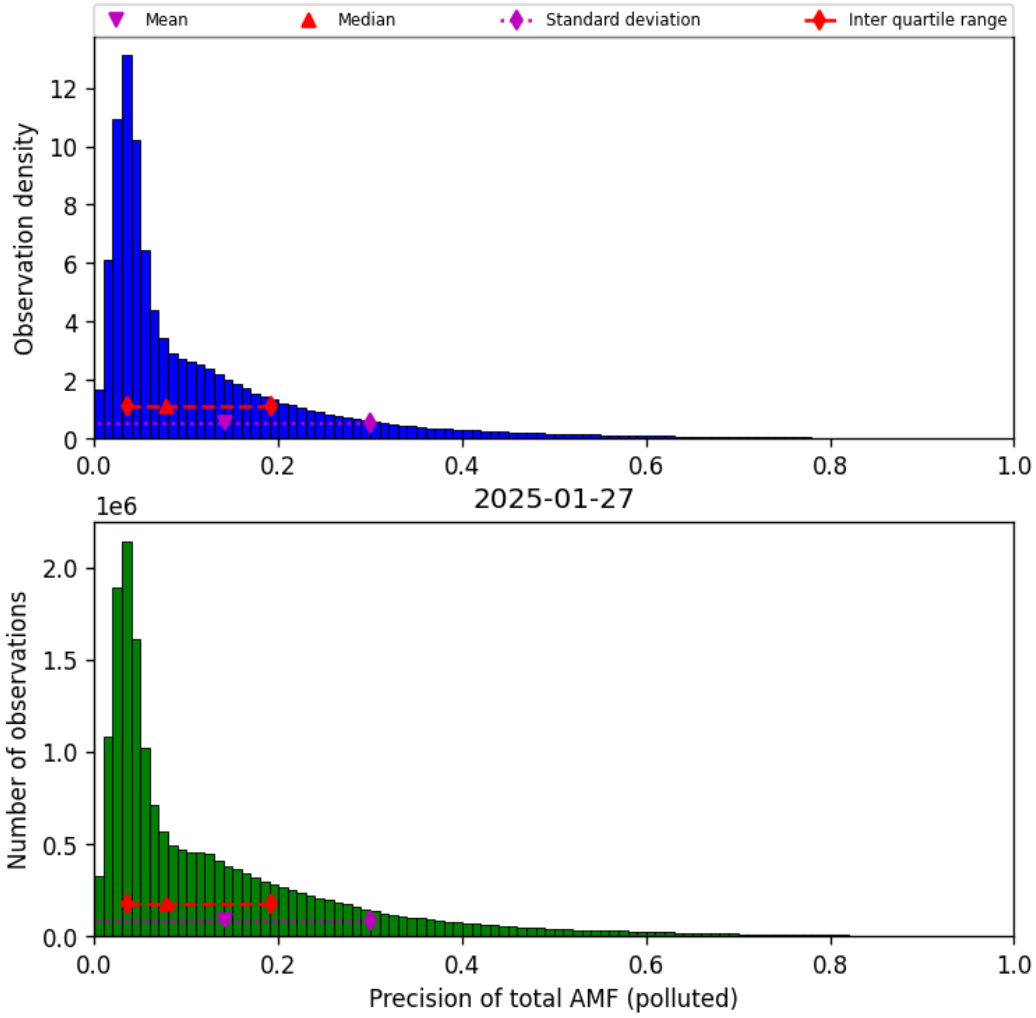

Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-01-27 to 2025-01-28

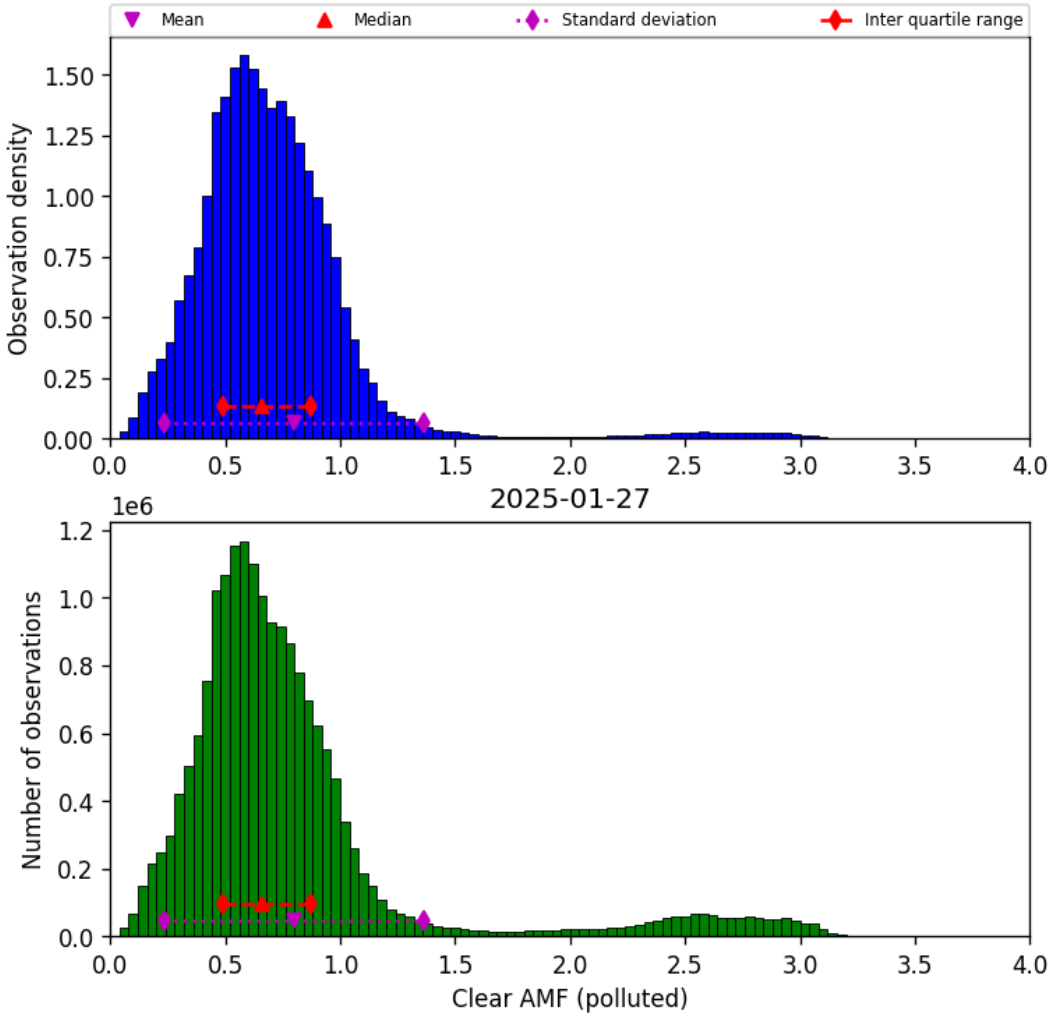

Figure 82: Histogram of “Clear AMF (polluted)” for 2025-01-27 to 2025-01-28

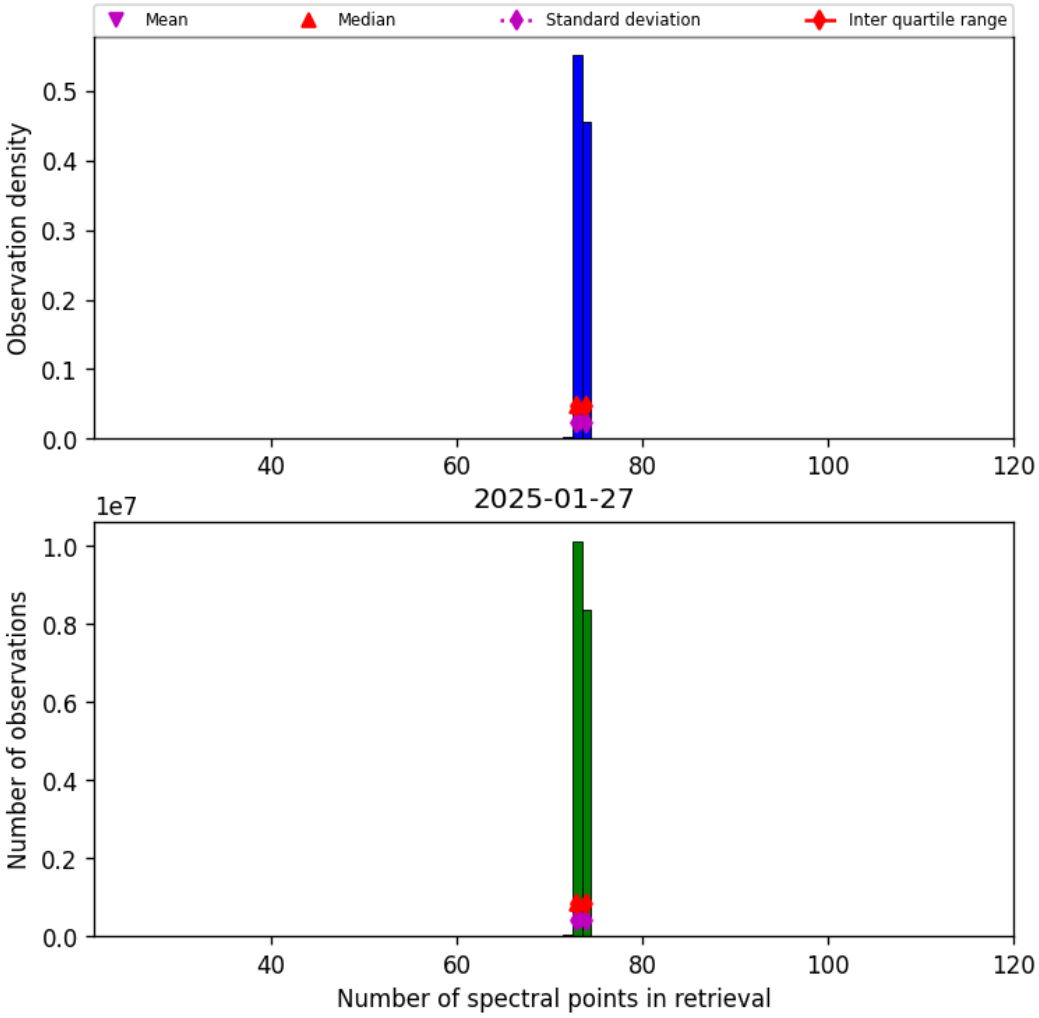

Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-01-27 to 2025-01-28

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.

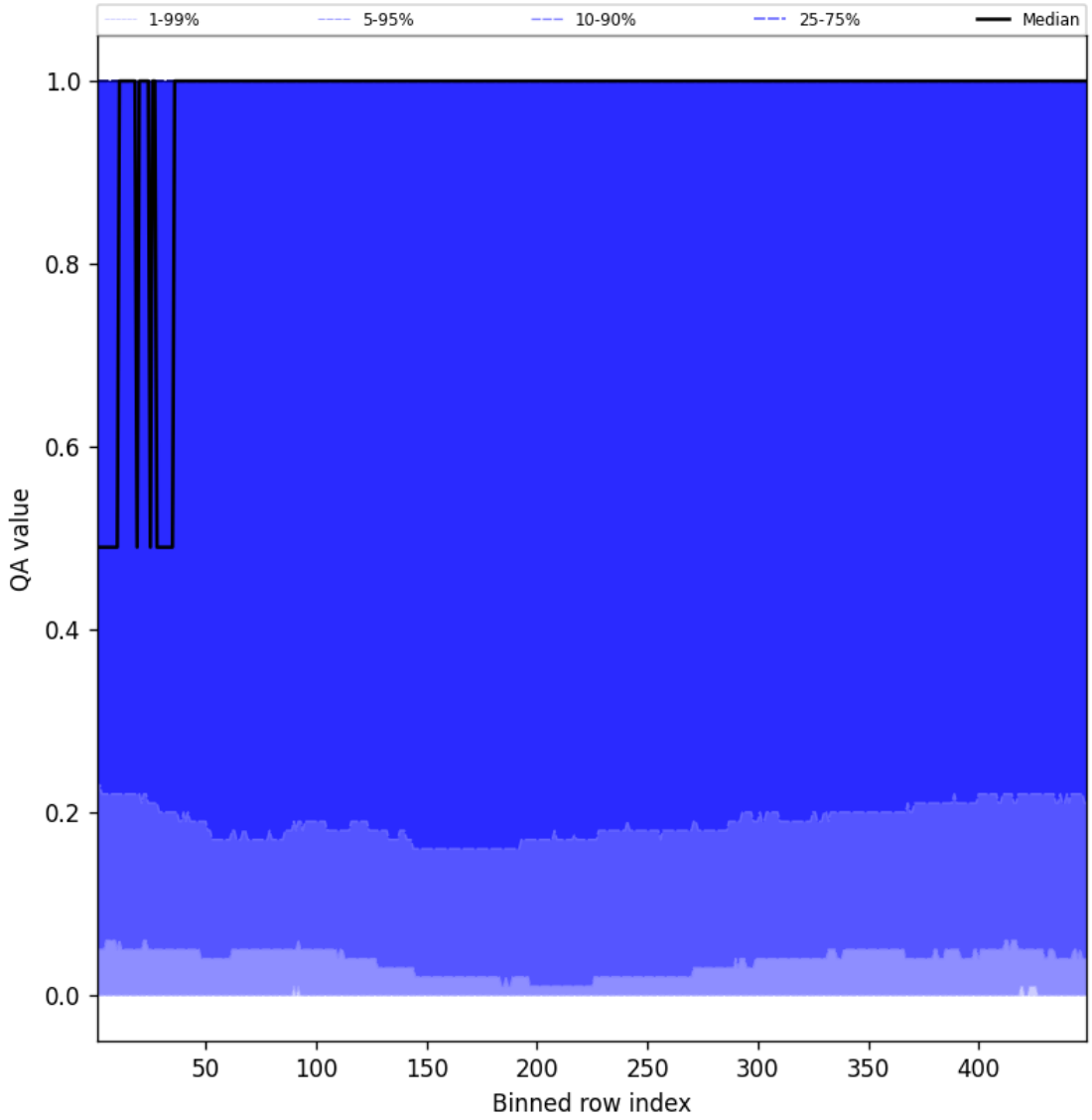

Figure 84: Along track statistics of “QA value” for 2025-01-27 to 2025-01-28

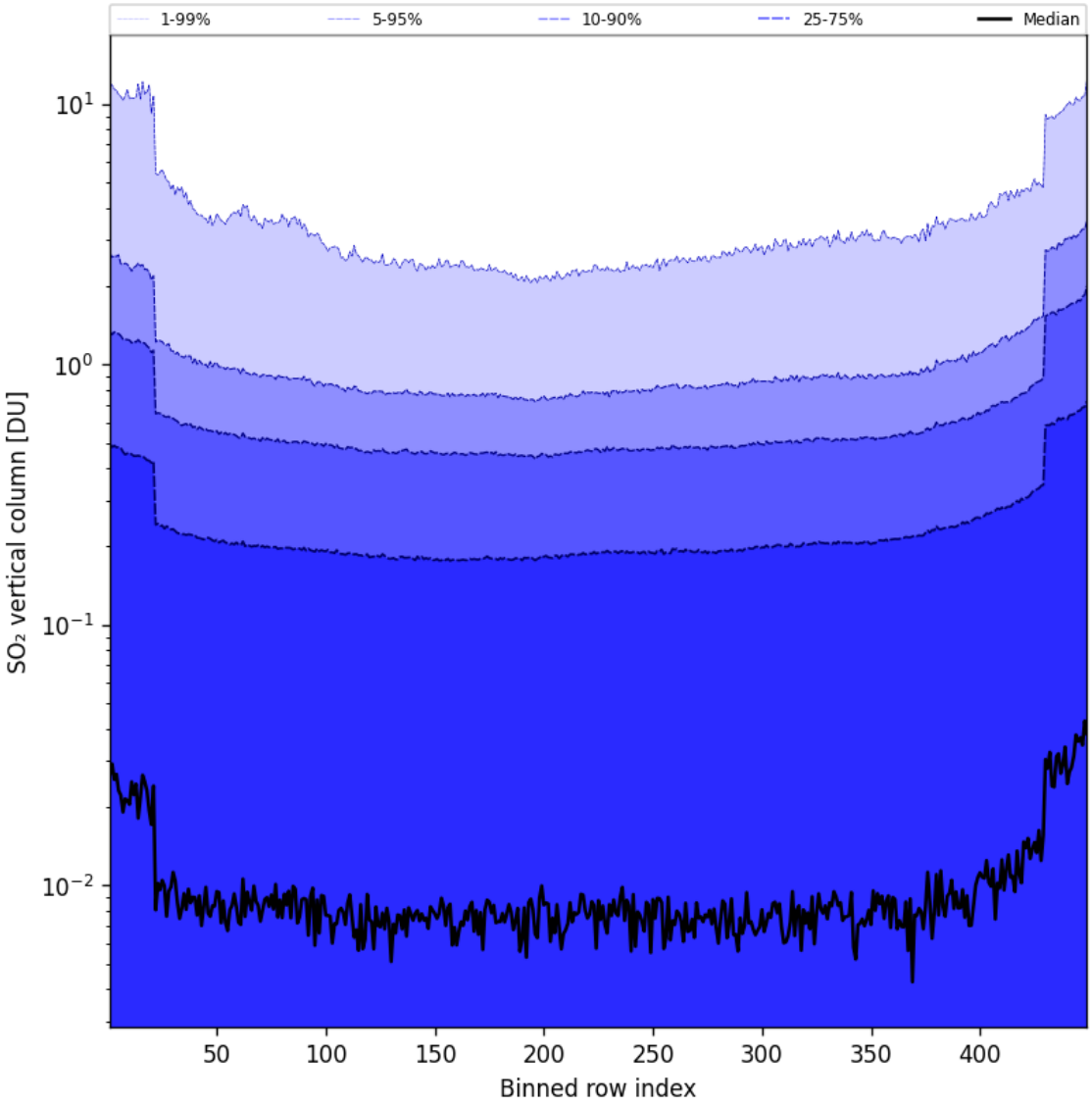

Figure 85: Along track statistics of "SO_2 vertical column" for 2025-01-27 to 2025-01-28

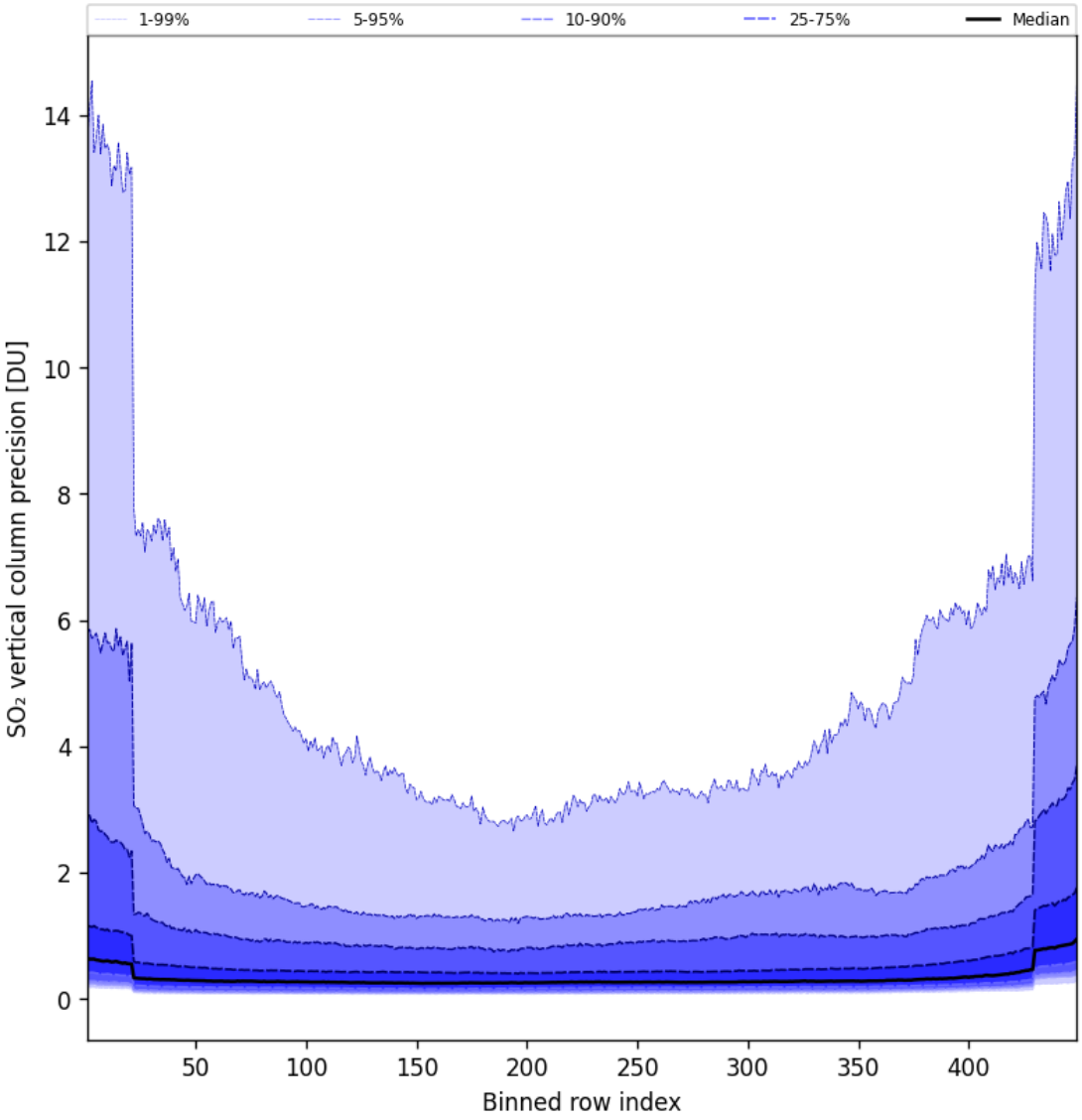

Figure 86: Along track statistics of "SO_2 vertical column precision" for 2025-01-27 to 2025-01-28

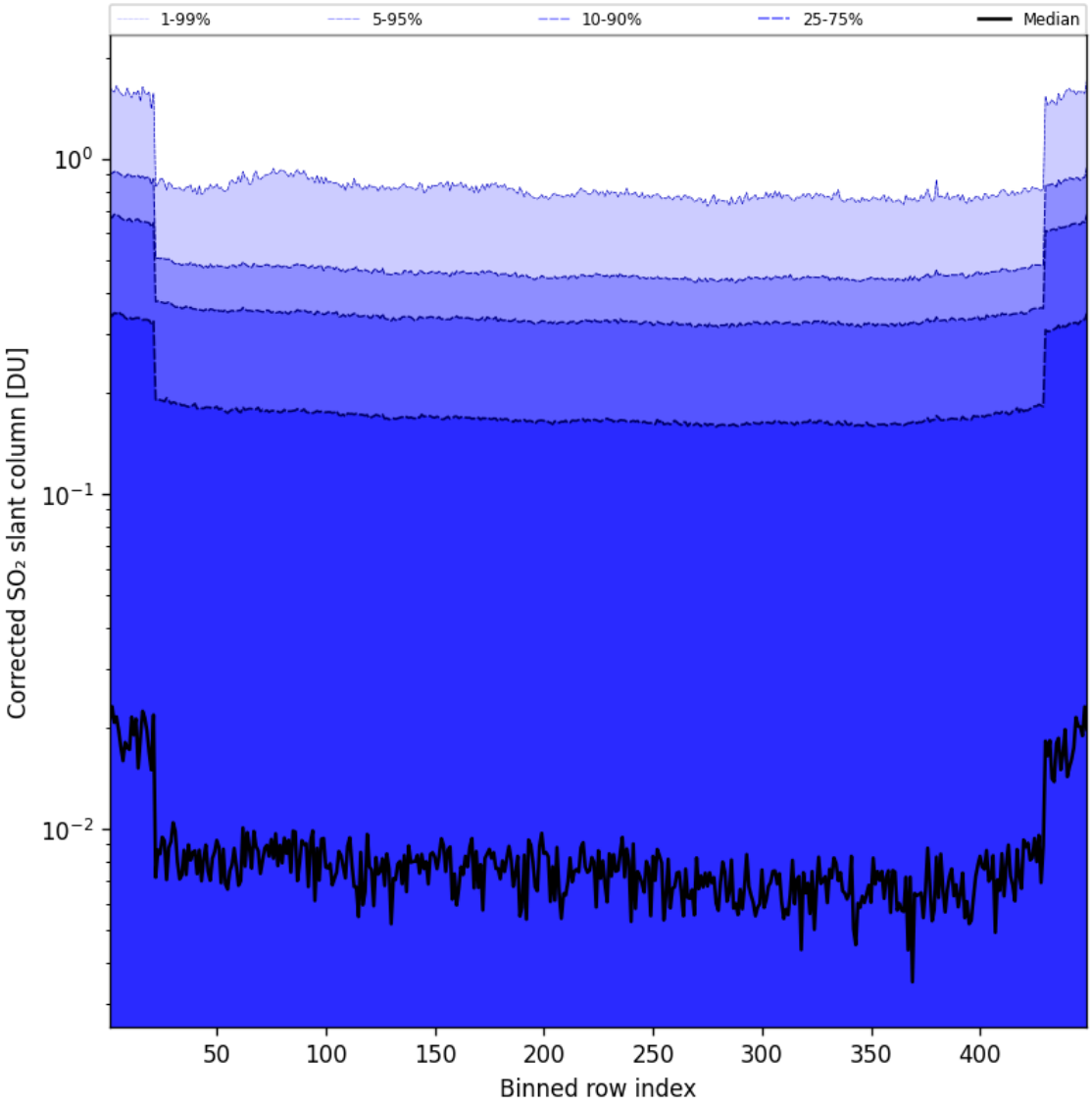

Figure 87: Along track statistics of "Corrected SO_2 slant column" for 2025-01-27 to 2025-01-28

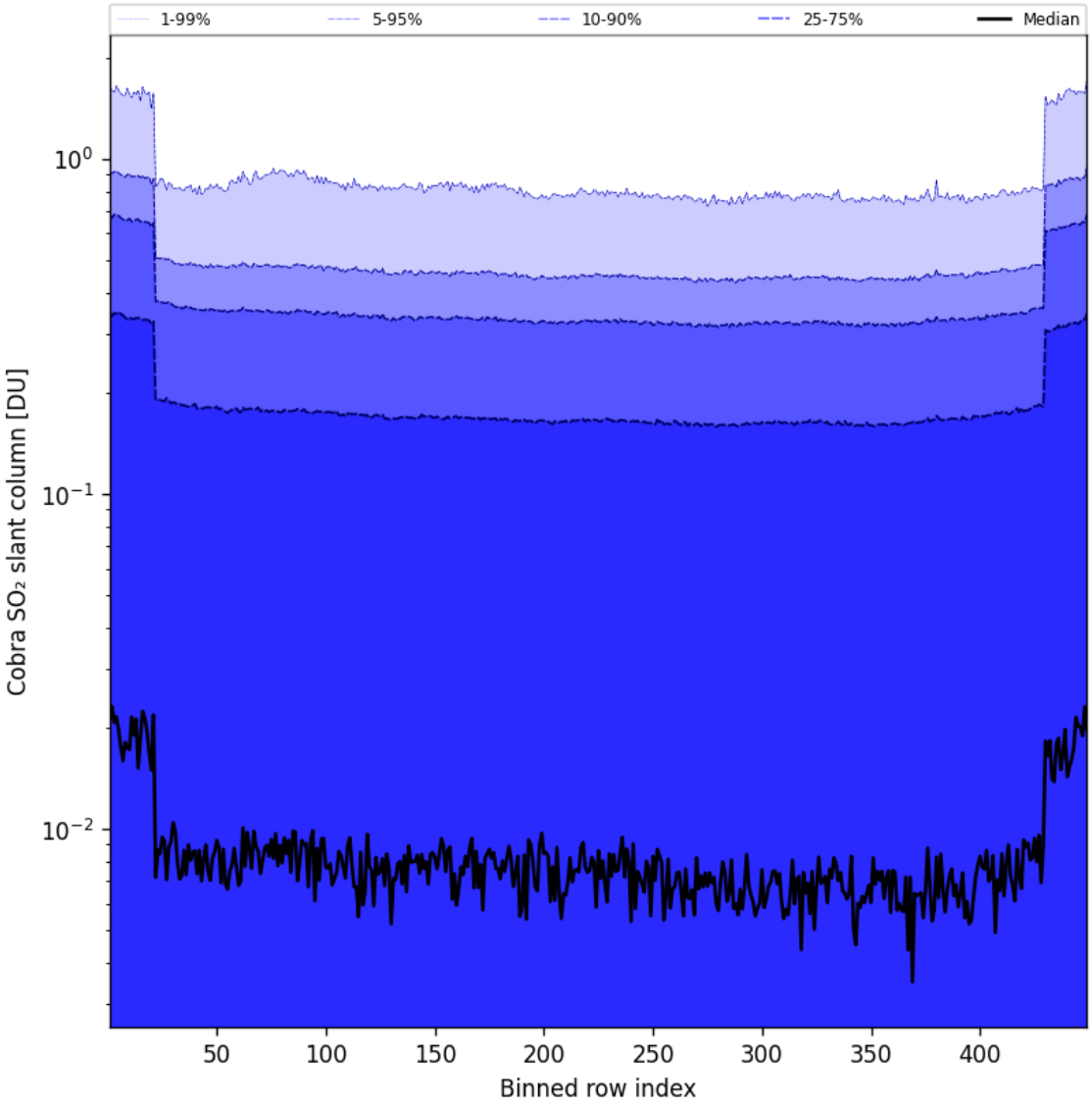

Figure 88: Along track statistics of "Cobra SO_2 slant column" for 2025-01-27 to 2025-01-28

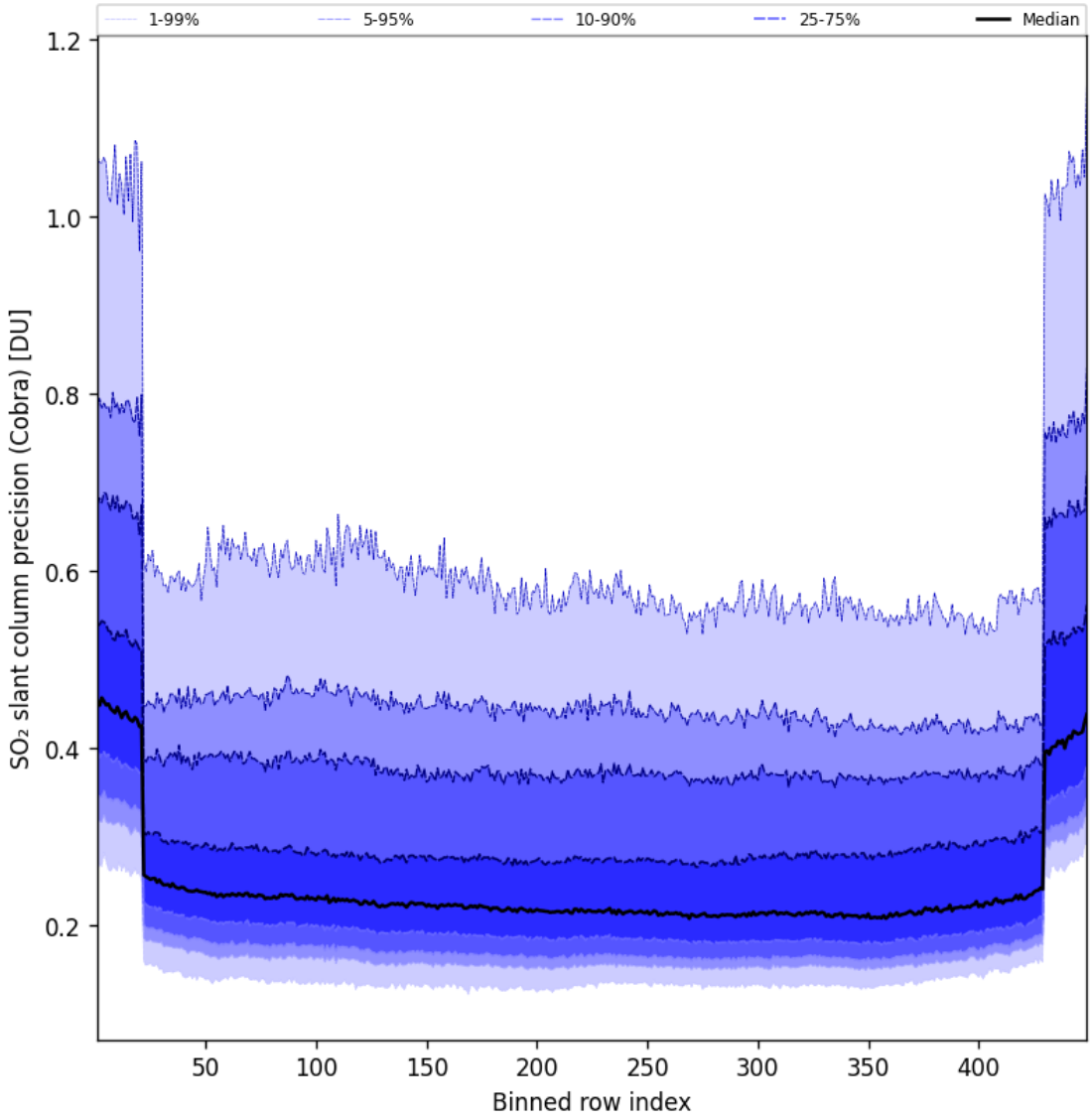

Figure 89: Along track statistics of "SO_2 slant column precision (Cobra)" for 2025-01-27 to 2025-01-28

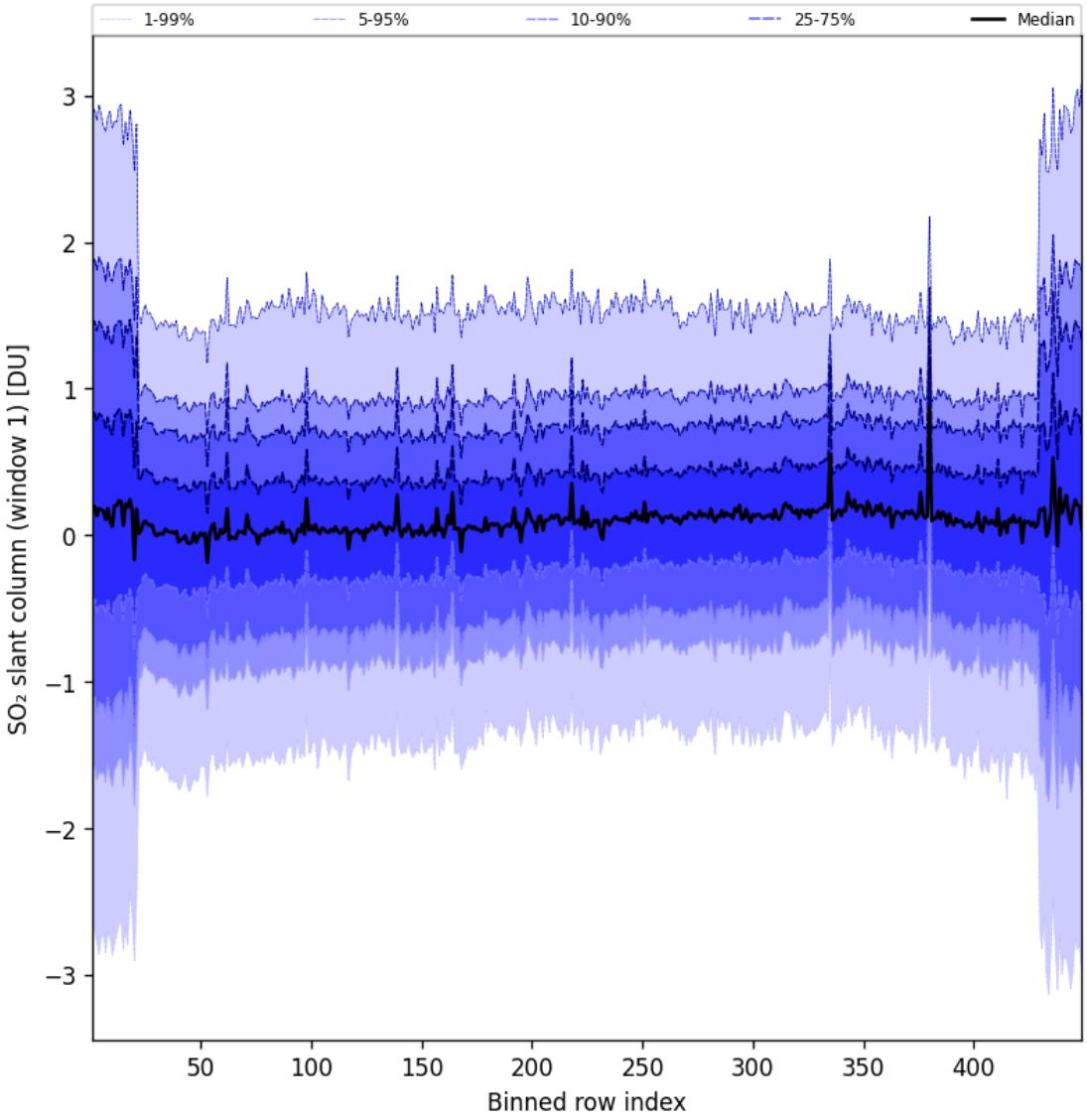

Figure 90: Along track statistics of "SO_2 slant column (window 1)" for 2025-01-27 to 2025-01-28

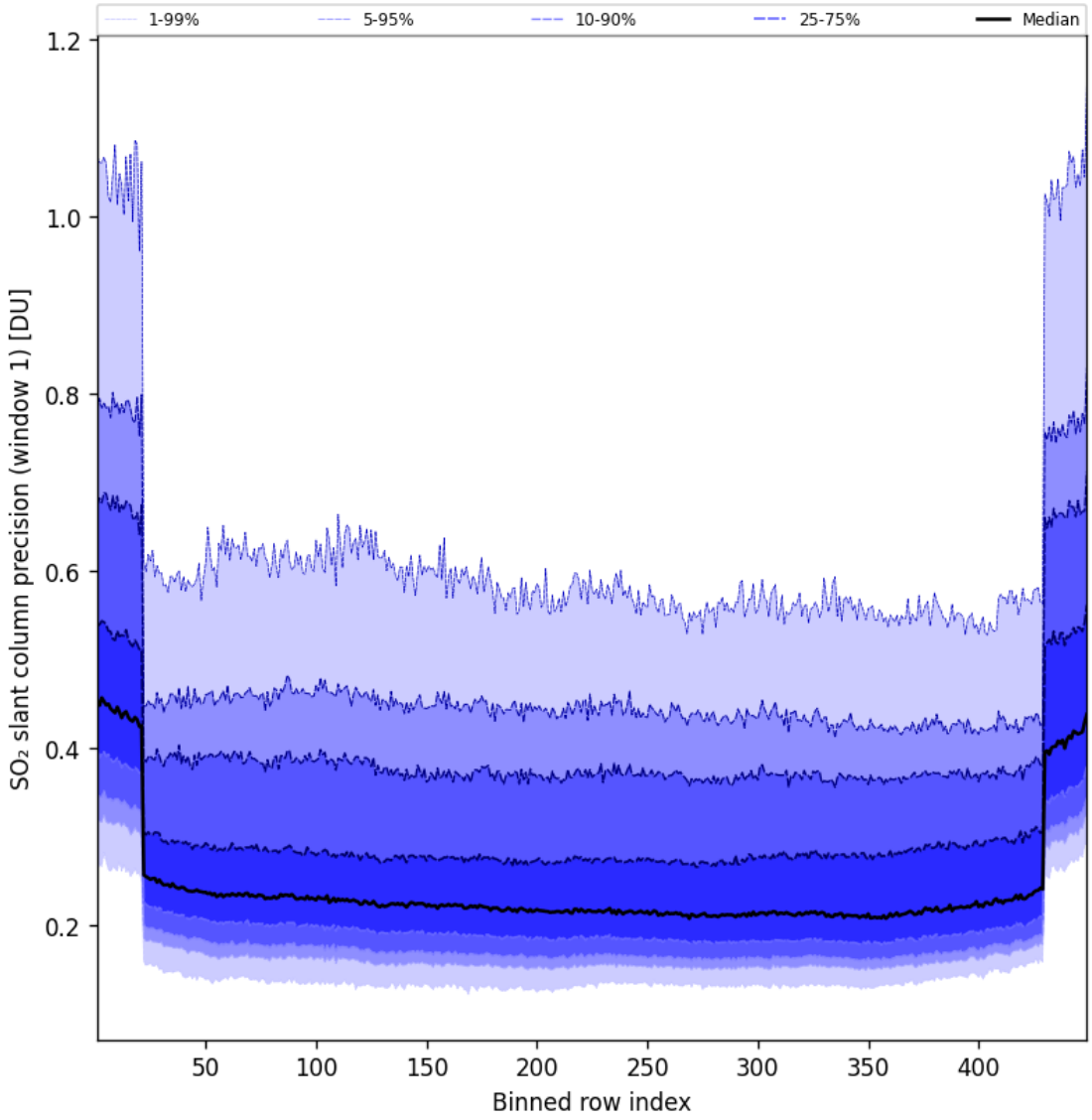

Figure 91: Along track statistics of "SO_2 slant column precision (window 1)" for 2025-01-27 to 2025-01-28

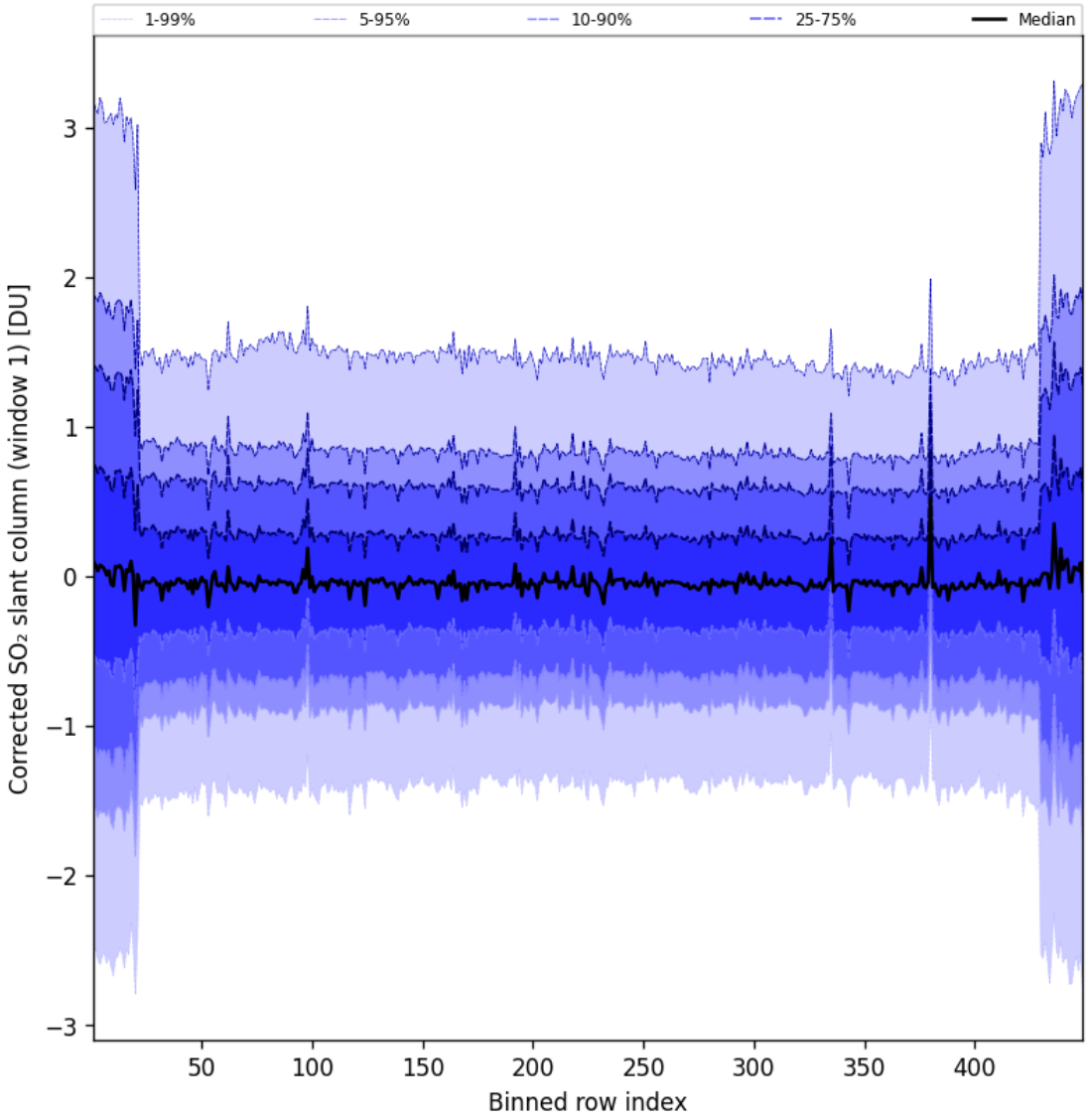

Figure 92: Along track statistics of “Corrected SO_2 slant column (window 1)” for 2025-01-27 to 2025-01-28

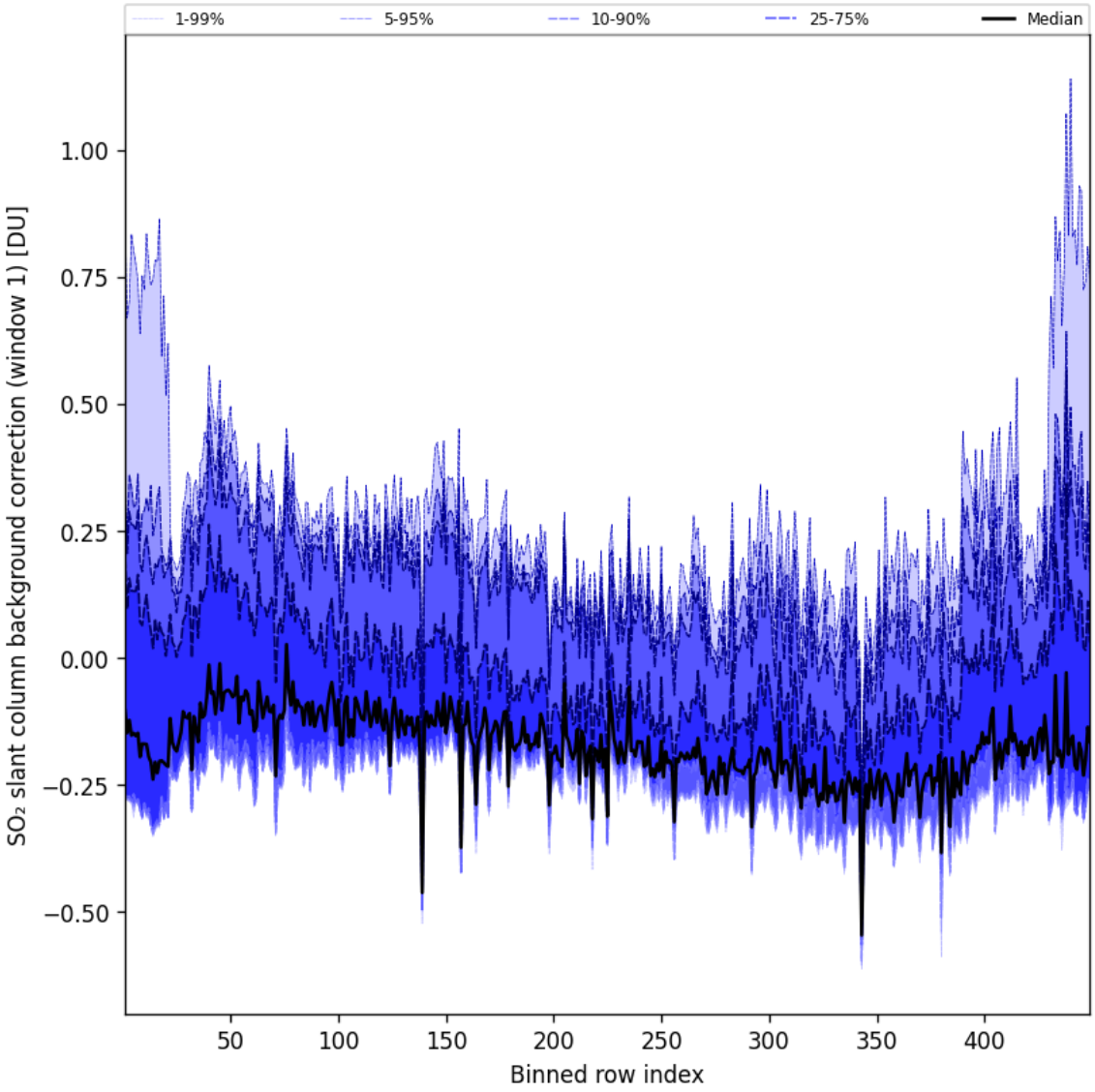

Figure 93: Along track statistics of "SO_2 slant column background correction (window 1)" for 2025-01-27 to 2025-01-28

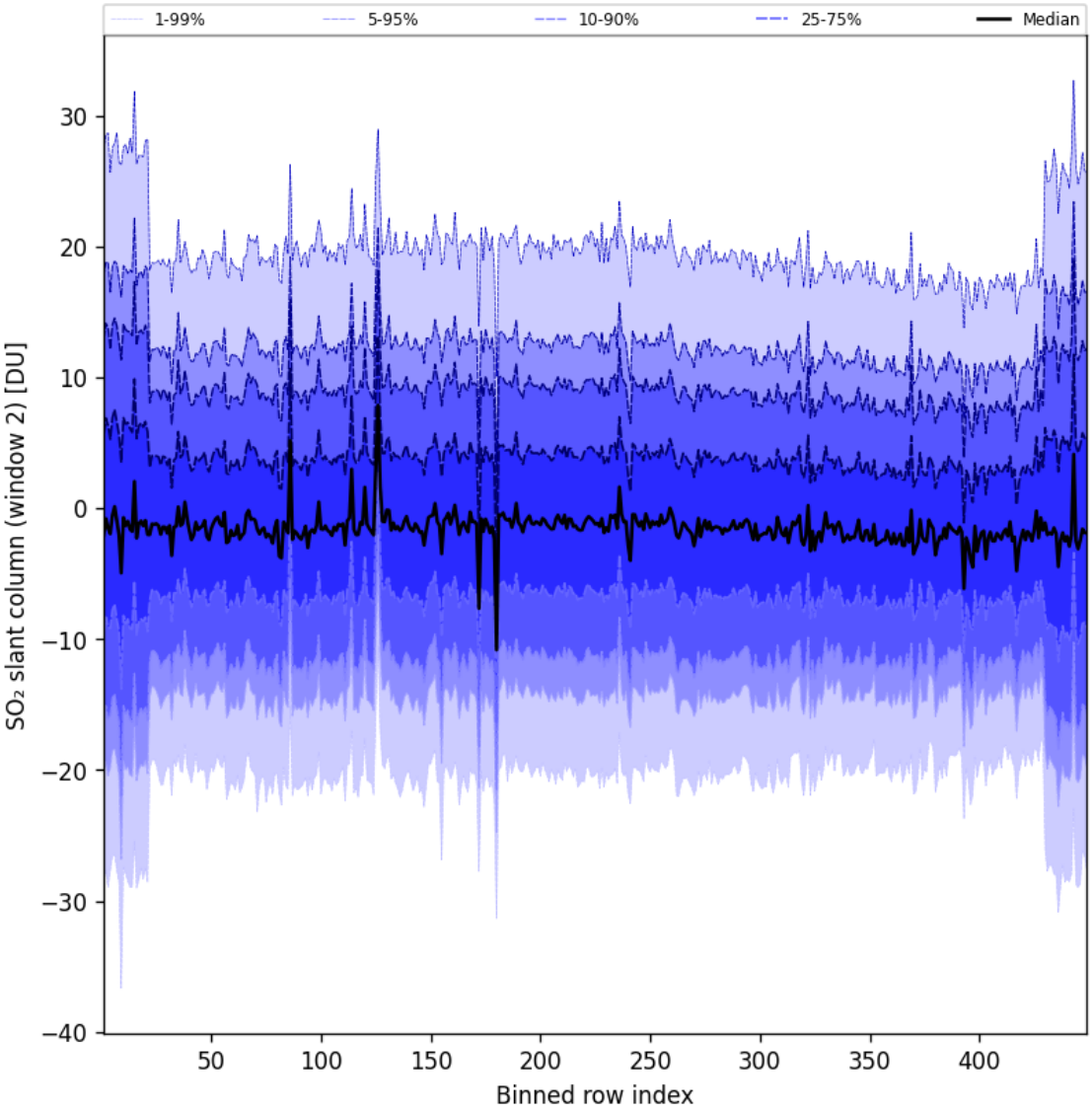

Figure 94: Along track statistics of "SO_2 slant column (window 2)" for 2025-01-27 to 2025-01-28

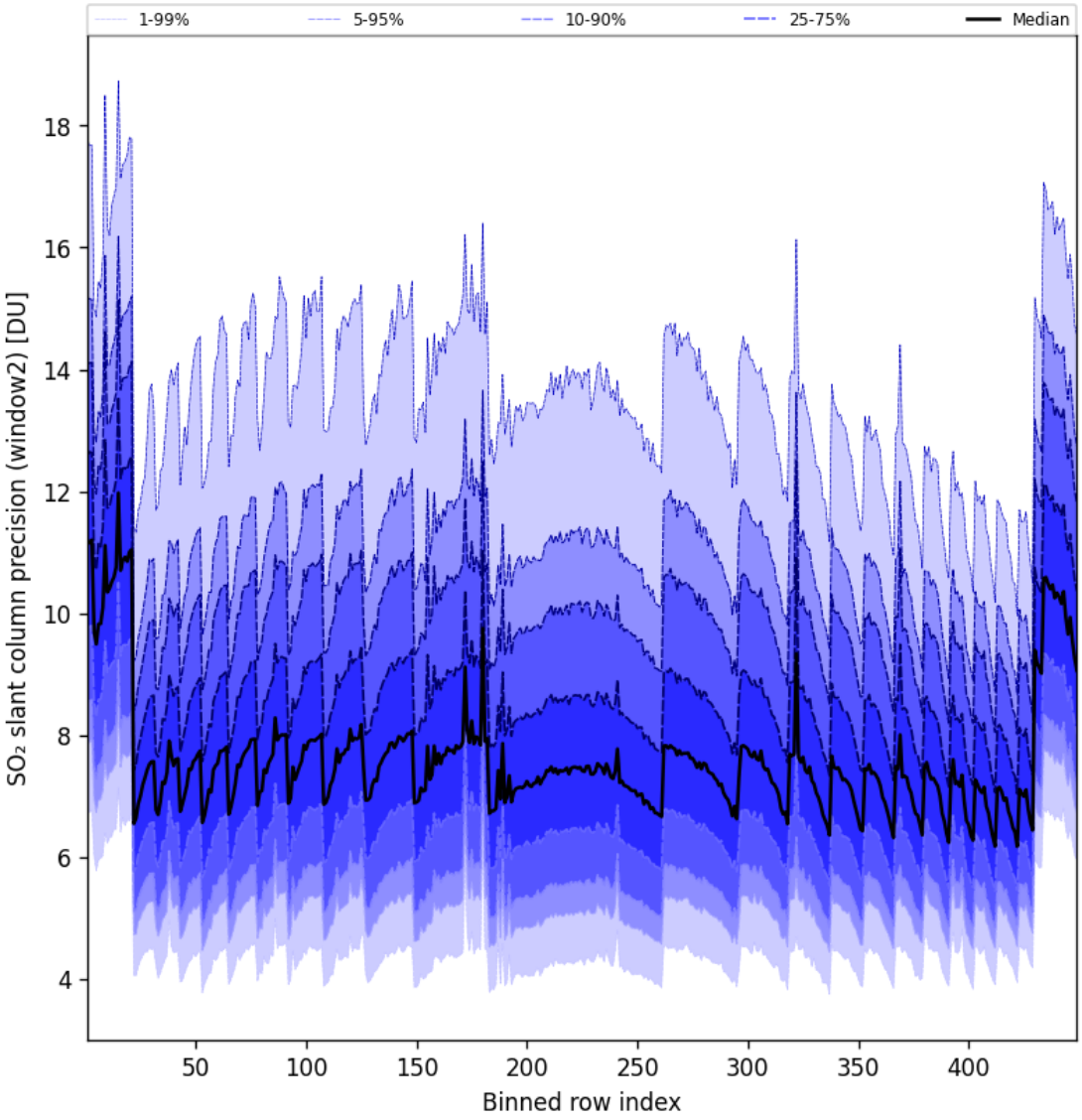

Figure 95: Along track statistics of "SO_2 slant column precision (window2)" for 2025-01-27 to 2025-01-28

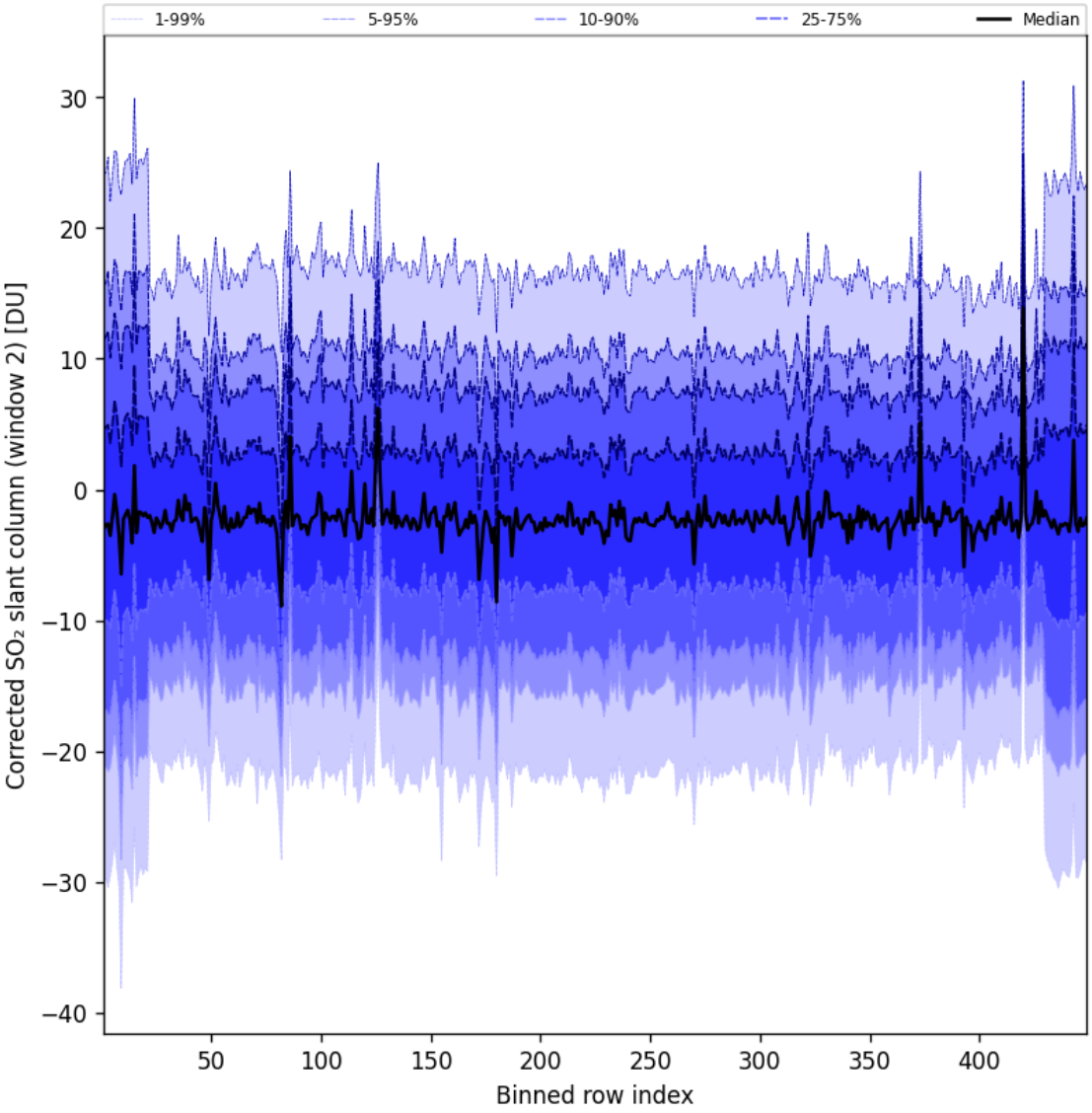

Figure 96: Along track statistics of “Corrected SO_2 slant column (window 2)” for 2025-01-27 to 2025-01-28

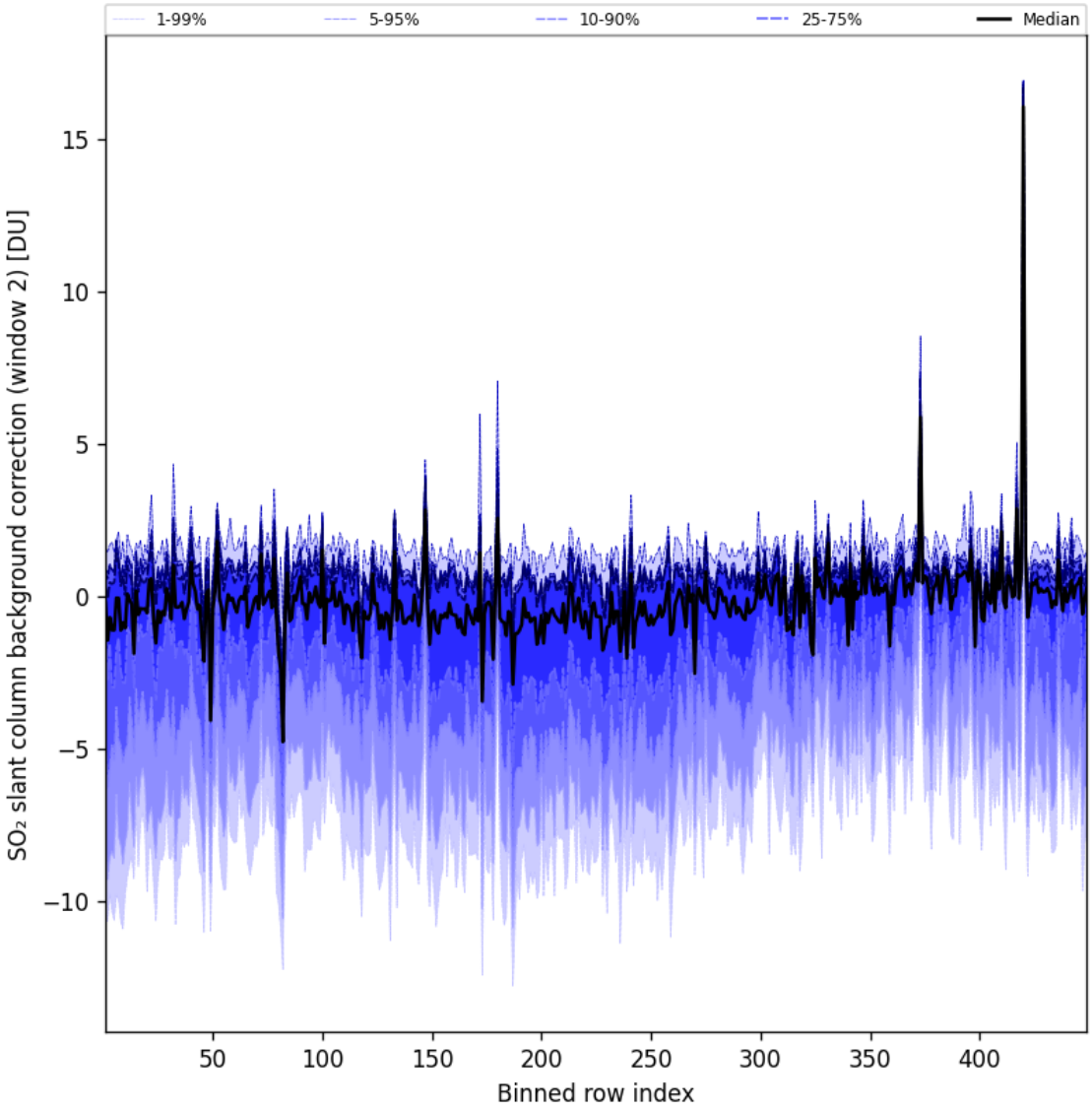

Figure 97: Along track statistics of "SO_2 slant column background correction (window 2)" for 2025-01-27 to 2025-01-28

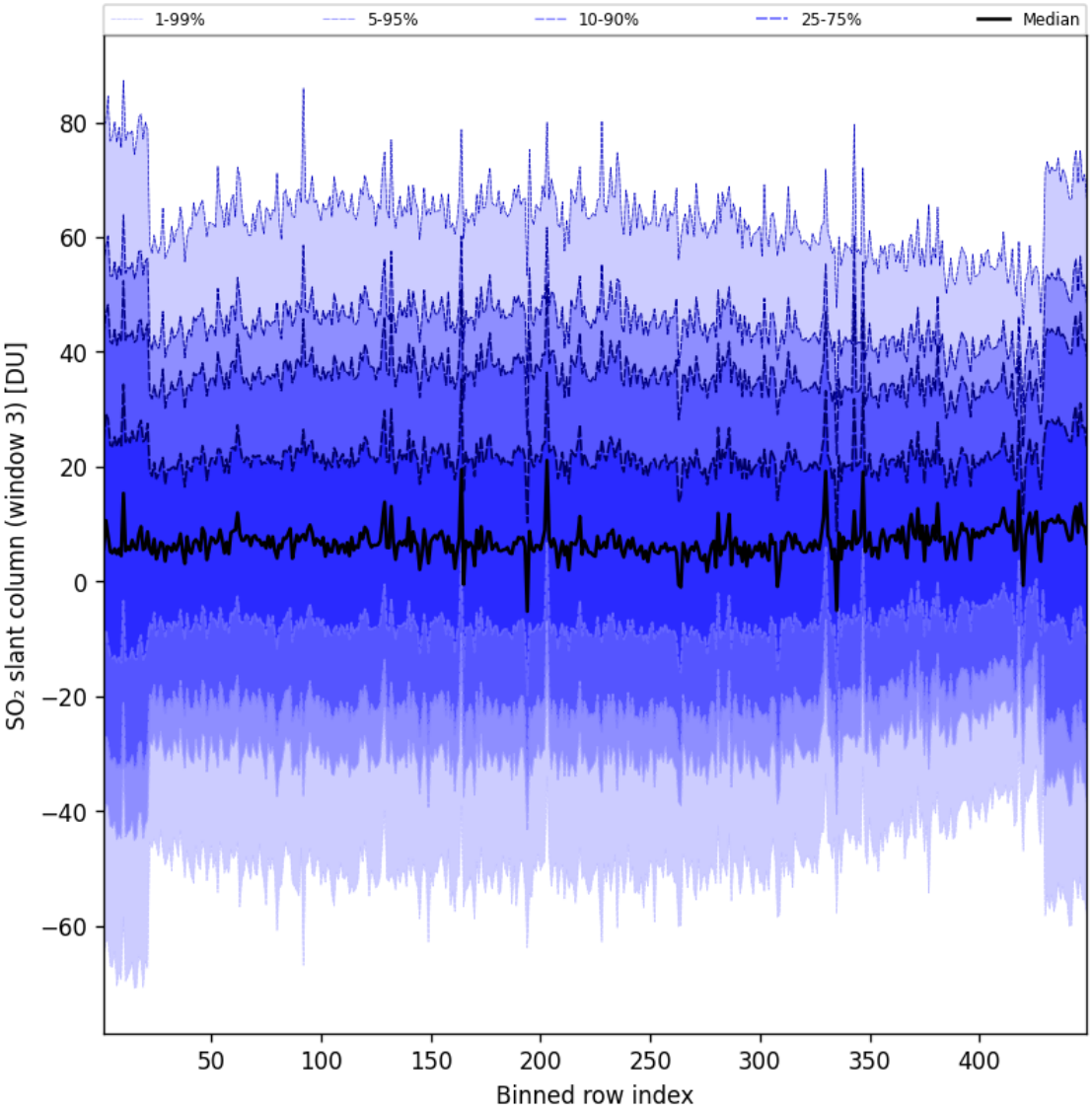

Figure 98: Along track statistics of "SO_2 slant column (window 3)" for 2025-01-27 to 2025-01-28

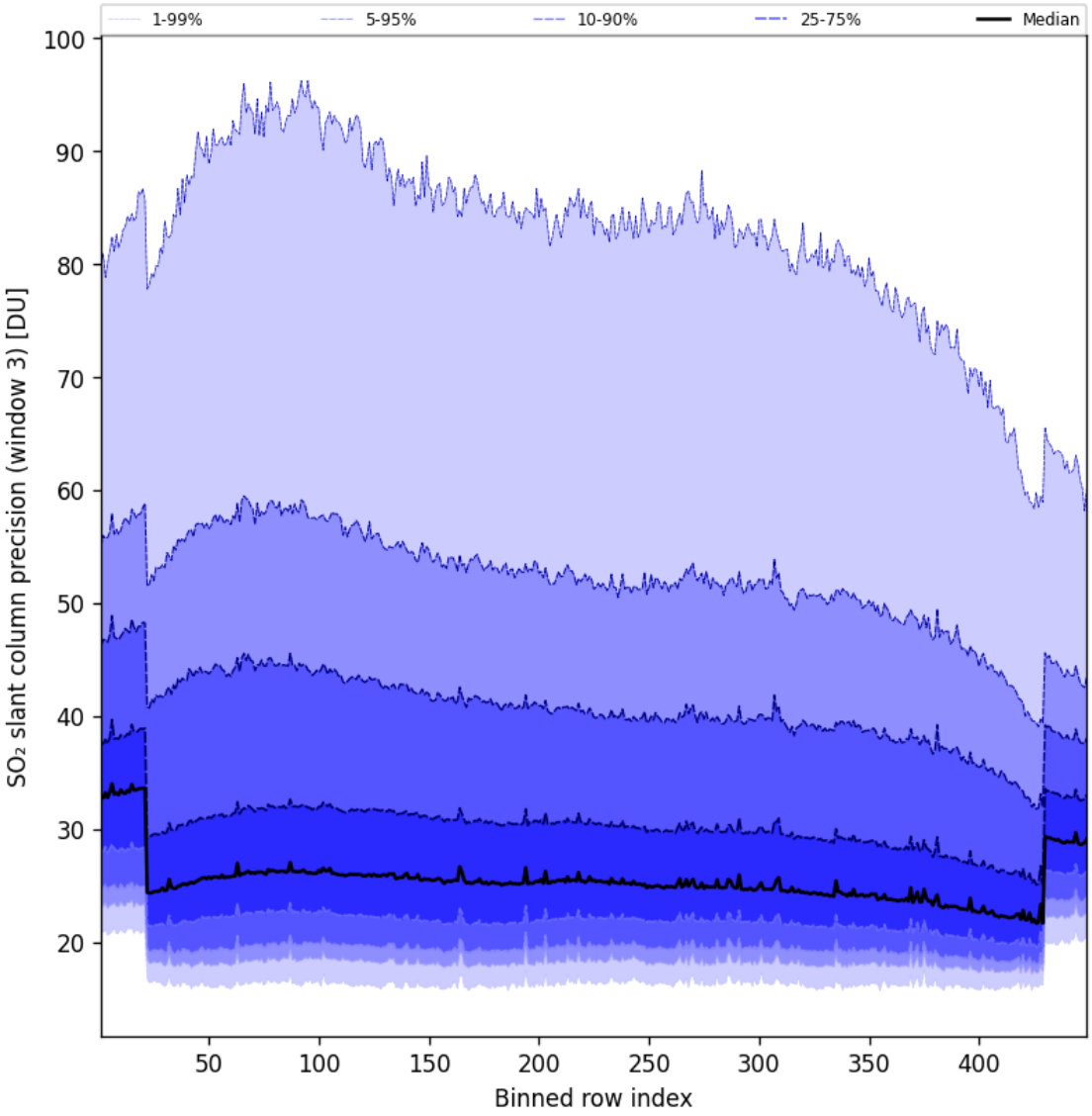

Figure 99: Along track statistics of "SO_2 slant column precision (window 3)" for 2025-01-27 to 2025-01-28

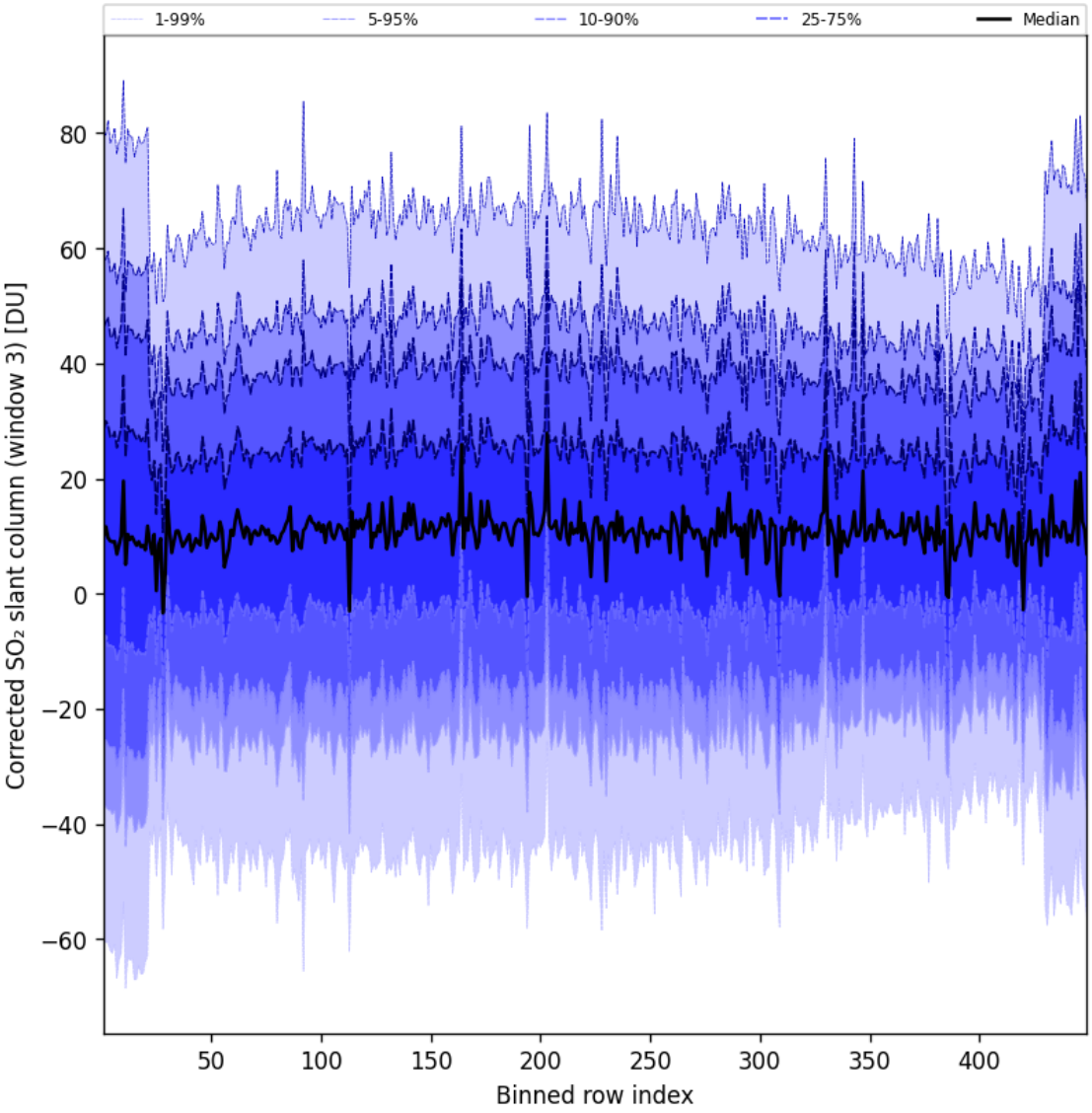

Figure 100: Along track statistics of “Corrected SO_2 slant column (window 3)” for 2025-01-27 to 2025-01-28

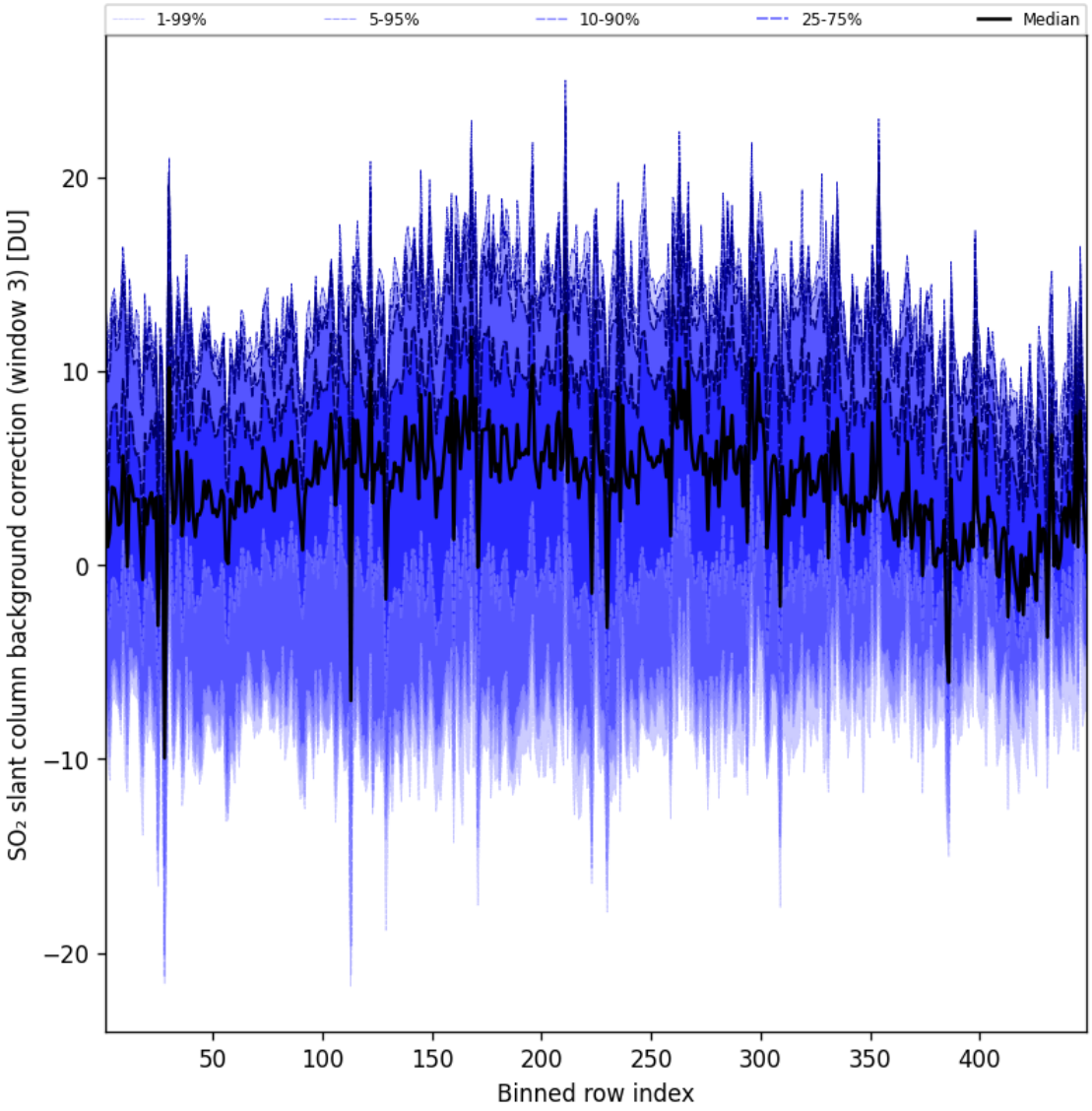

Figure 101: Along track statistics of "SO_2 slant column background correction (window 3)" for 2025-01-27 to 2025-01-28

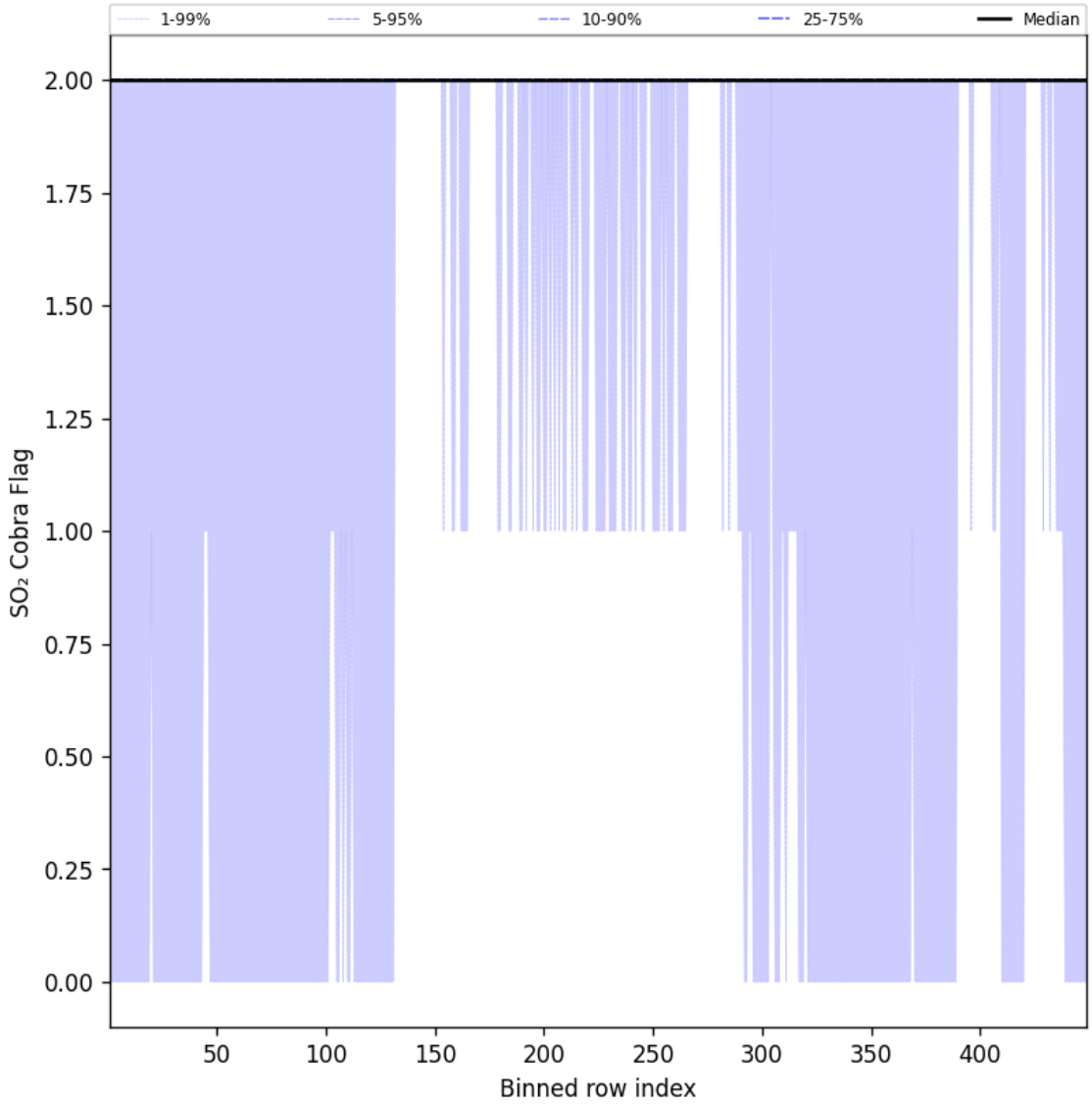

Figure 102: Along track statistics of "SO_2 Cobra Flag" for 2025-01-27 to 2025-01-28

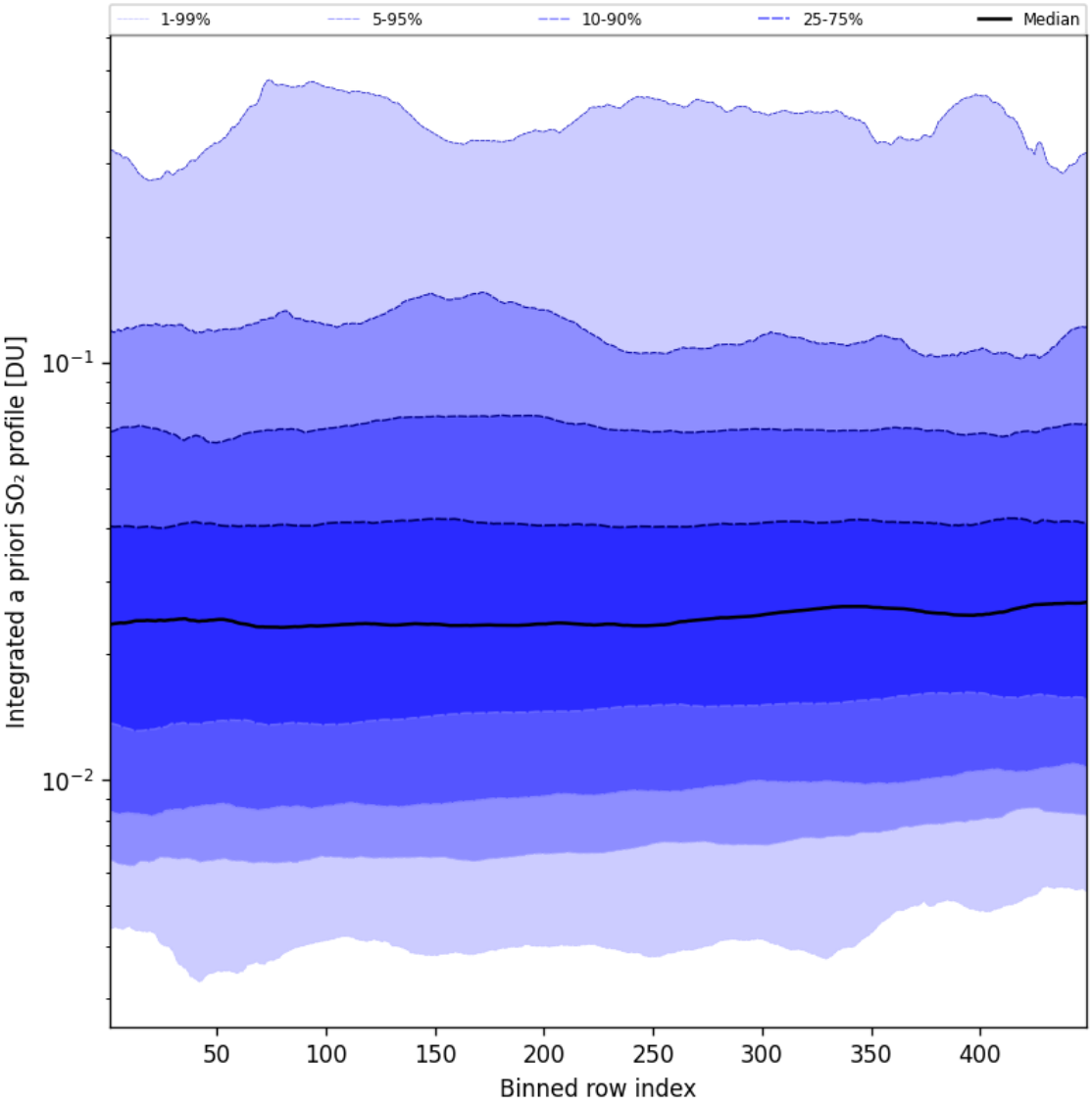

Figure 103: Along track statistics of “Integrated a priori SO_2 profile” for 2025-01-27 to 2025-01-28

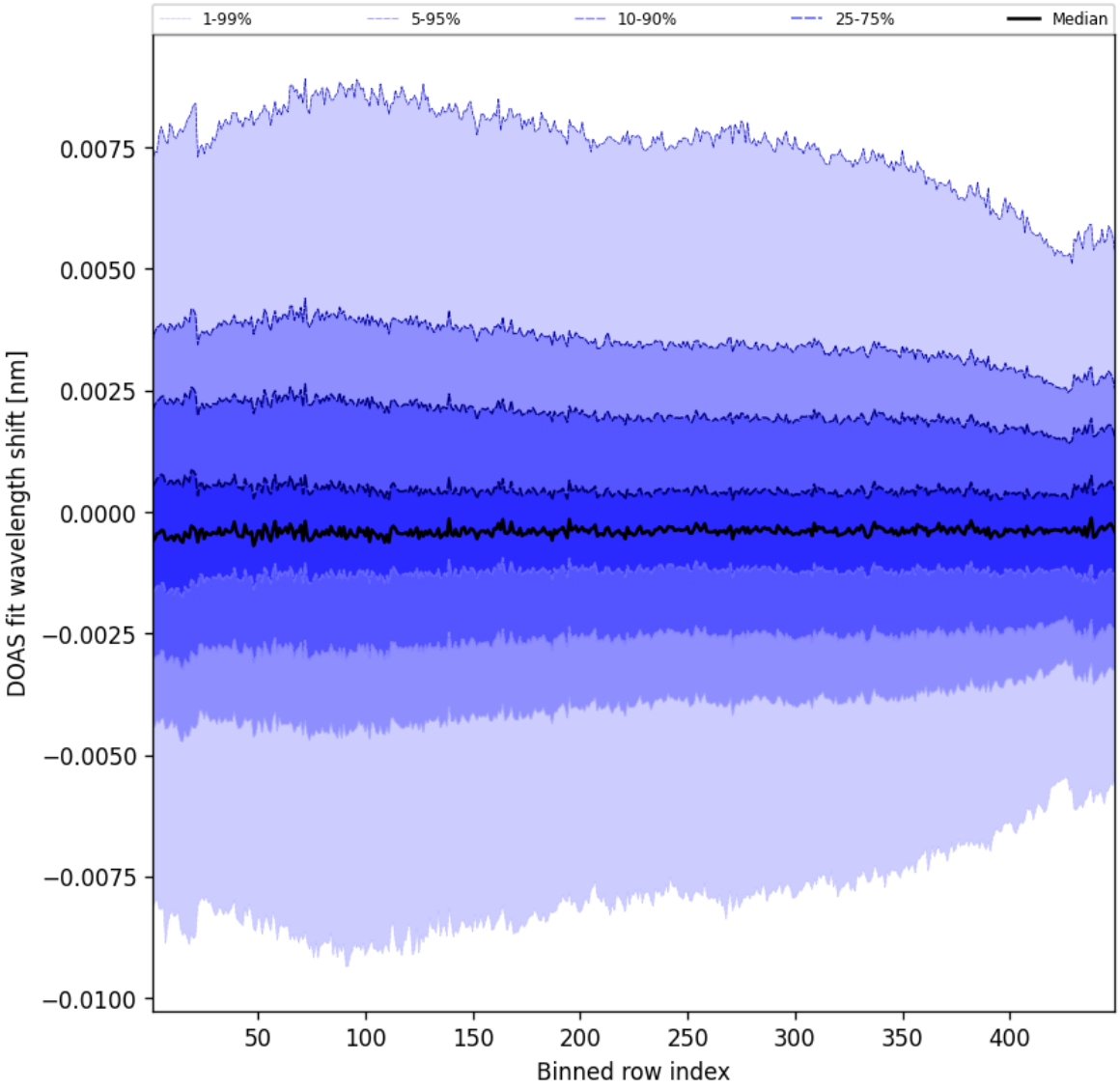

Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2025-01-27 to 2025-01-28

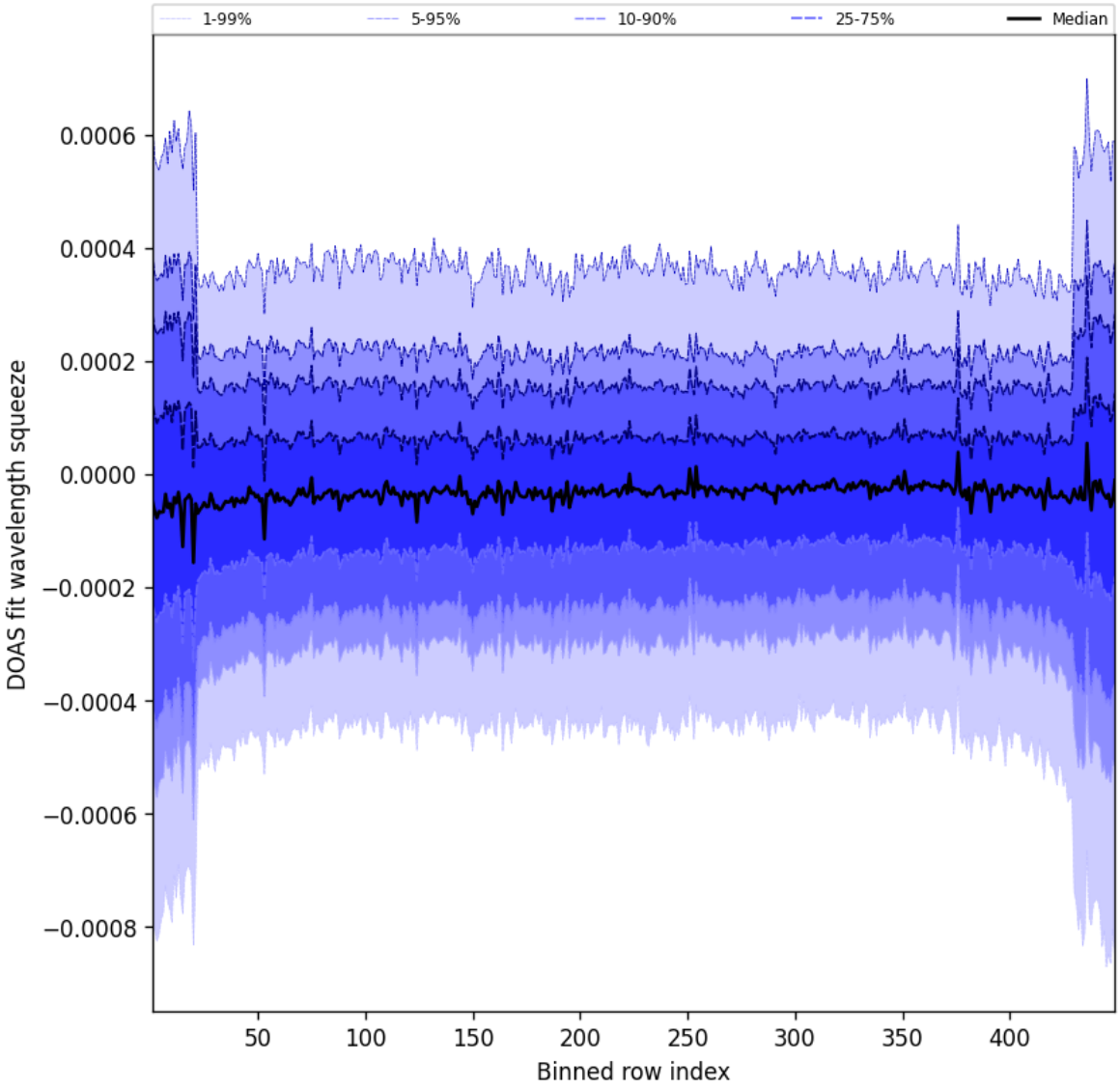

Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2025-01-27 to 2025-01-28

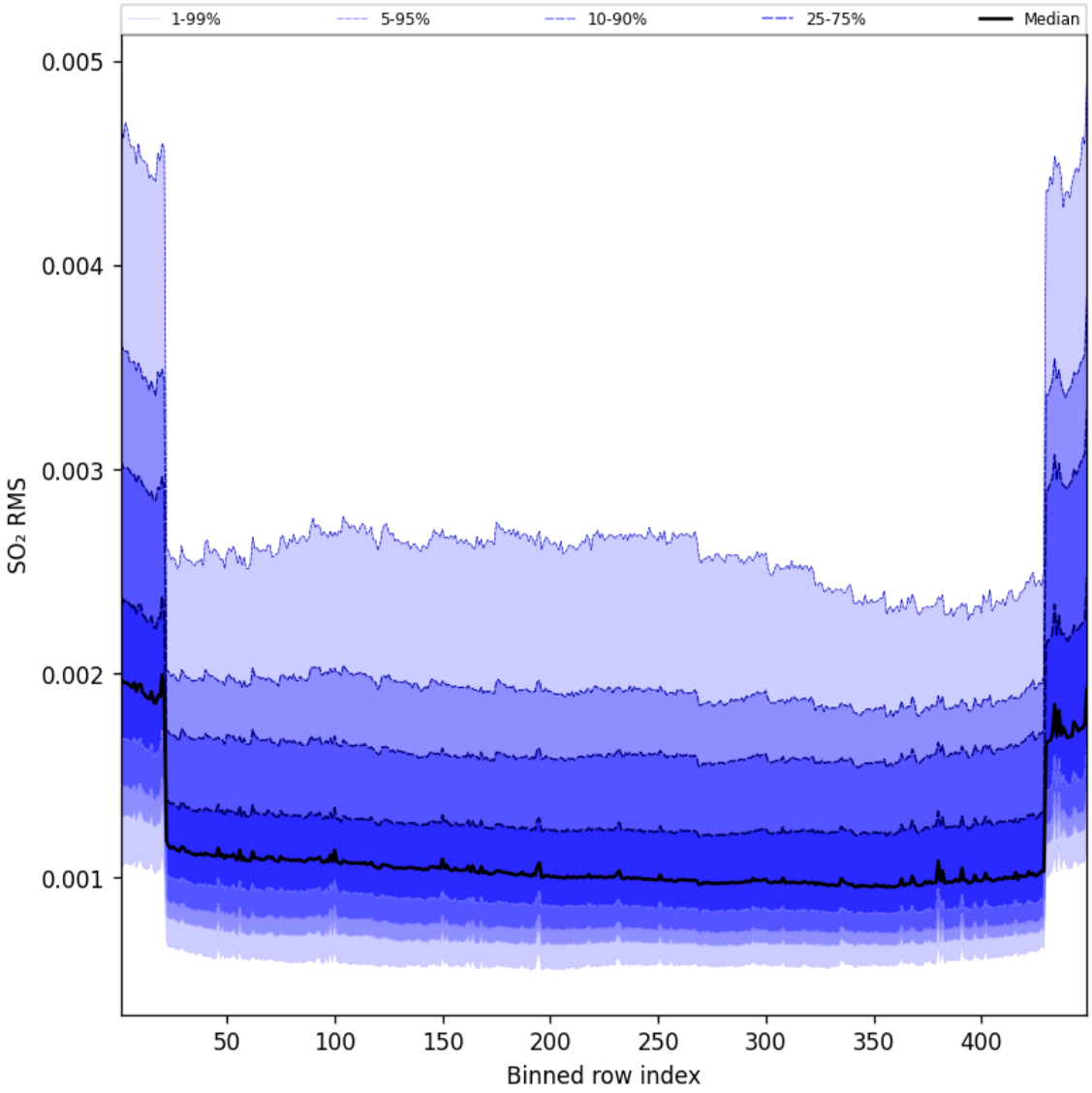

Figure 106: Along track statistics of "SO_2 RMS" for 2025-01-27 to 2025-01-28

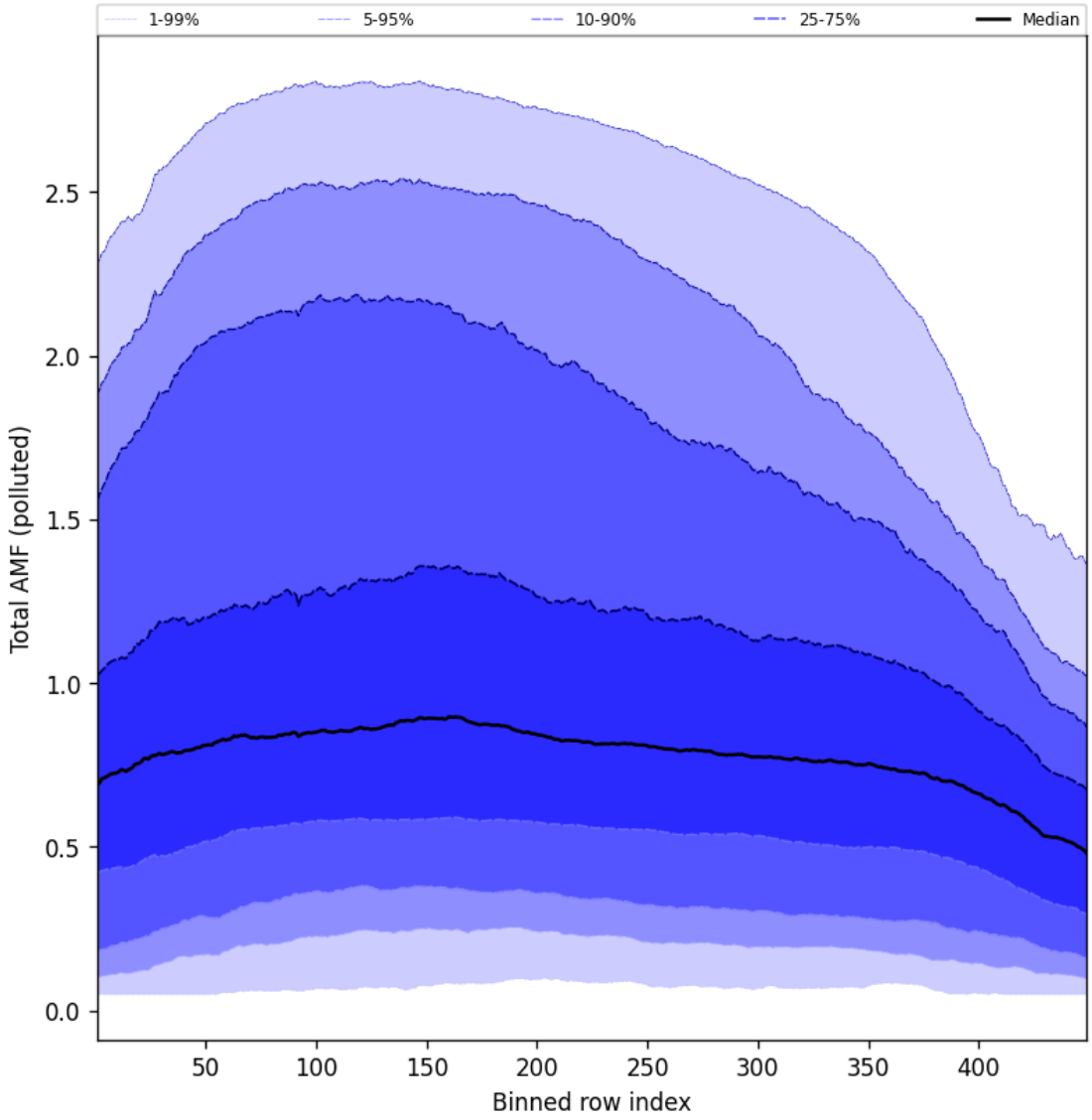

Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-01-27 to 2025-01-28

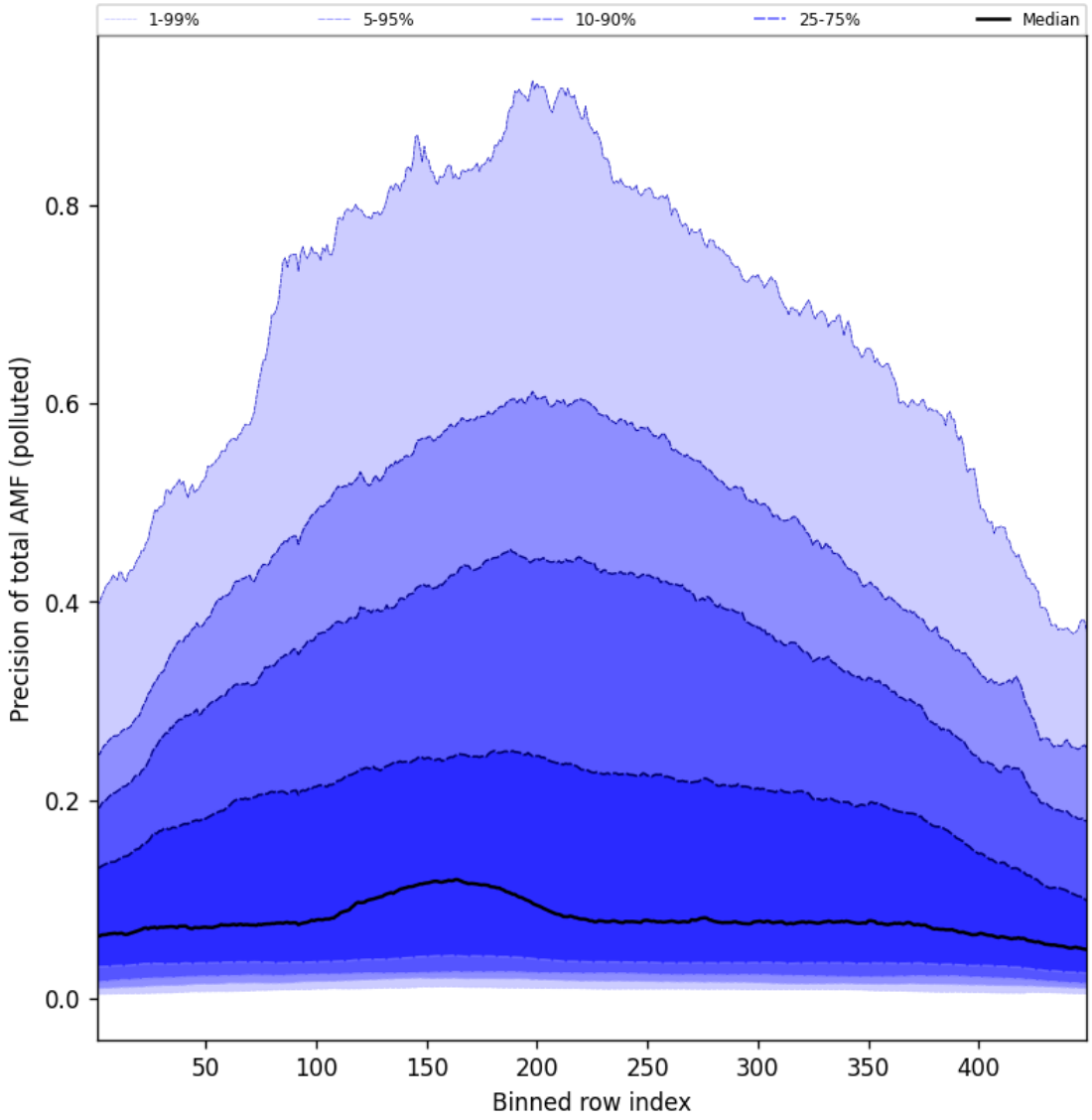

Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-01-27 to 2025-01-28

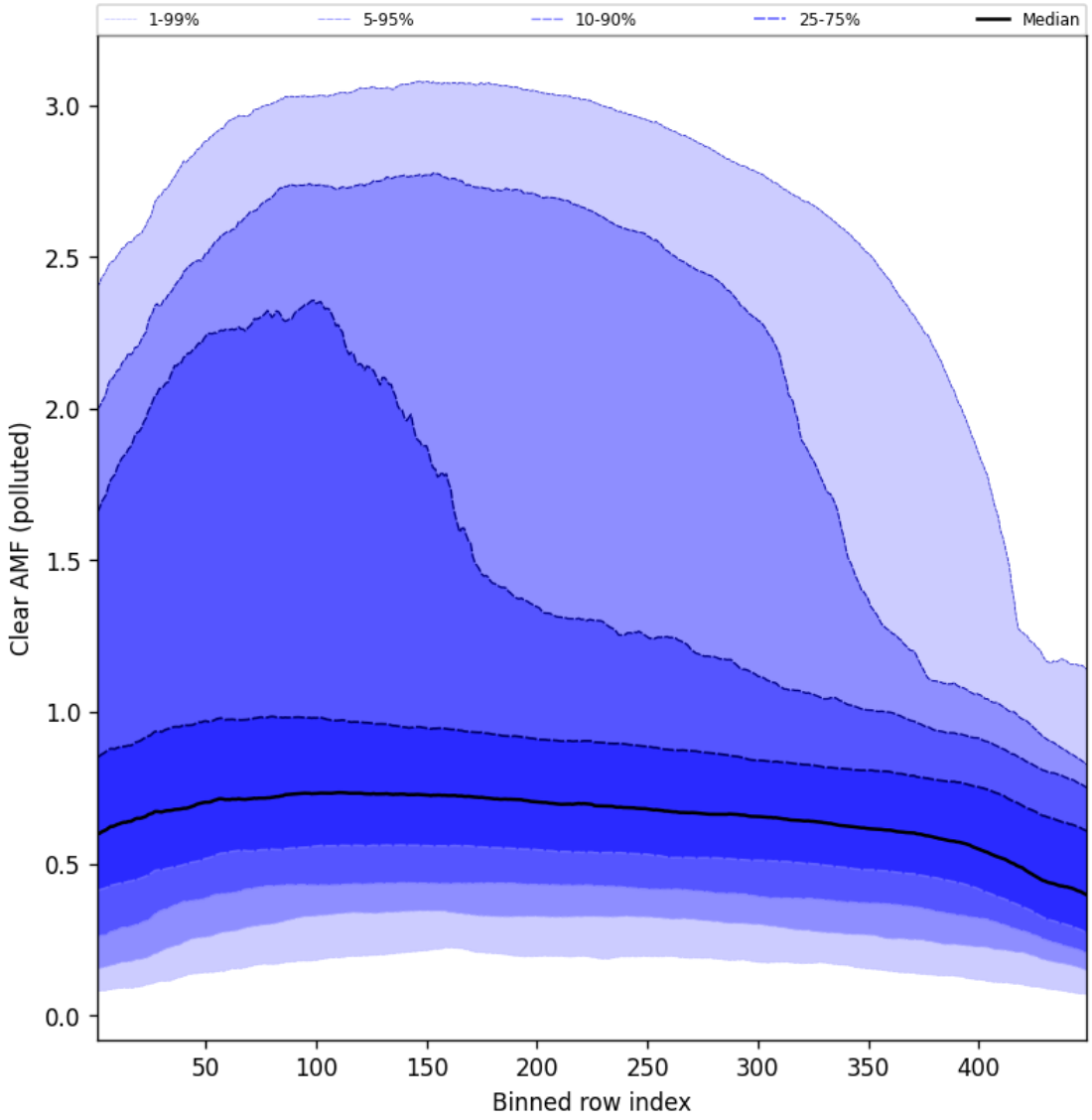

Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-01-27 to 2025-01-28

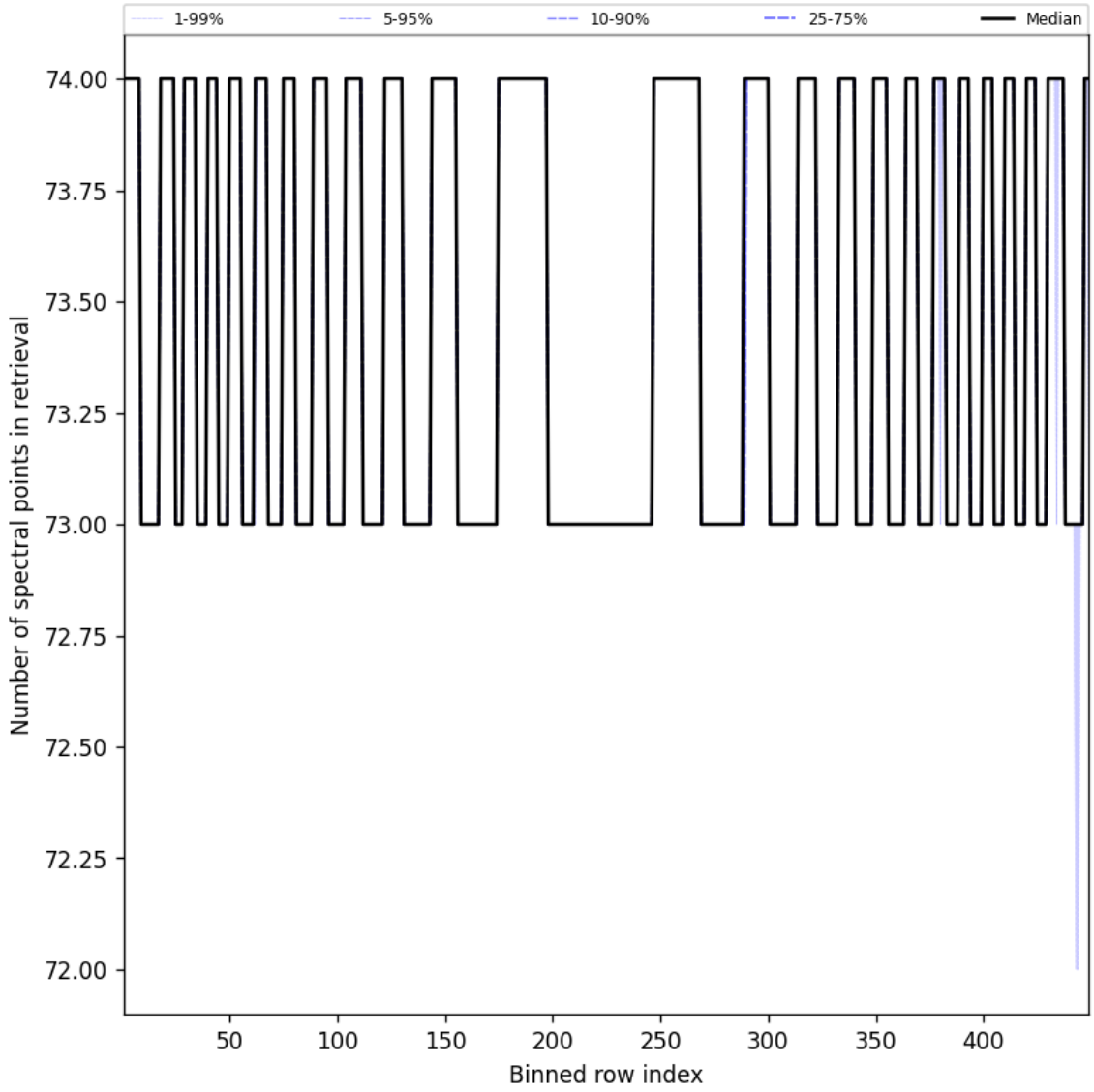

Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-01-27 to 2025-01-28

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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11 Copyright information of 'PyCAMA'

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