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]	0.589 ± 0.423	7375735	0.995	0.850	0.490	0.0	1.000
sulfurdioxide total vertical column [DU]	$(3.458 \pm 121.431) \times 10^{-2}$	7375735	0.223	0.393	8.521×10^{-3}	-74.1	304
sulfurdioxide total vertical column precision [DU]	0.534 ± 0.906	7375735	0.122	0.330	0.286	4.481×10^{-2}	68.5
sulfurdioxide slant column density corrected [DU]	$(1.592 \pm 36.788) \times 10^{-2}$	7375735	0.242	0.336	8.042×10^{-3}	-9.81	346
sulfurdioxide slant column density cobra [DU]	$(1.581 \pm 33.943) \times 10^{-2}$	7375735	0.242	0.336	8.042×10^{-3}	-9.81	155
sulfurdioxide slant column density cobra precision [DU]	0.268 ± 0.121	7375735	0.213	0.107	0.231	8.124×10^{-2}	34.9
sulfurdioxide slant column density window1 [DU]	$(8.612 \pm 63.374) \times 10^{-2}$	7375735	0.125	0.696	9.176×10^{-2}	-35.5	76.4
sulfurdioxide slant column density window1 precision [DU]	0.268 ± 0.121	7375735	0.213	0.107	0.231	8.124×10^{-2}	34.9
sulfurdioxide slant column density corrected win1 [DU]	$(-6.752 \pm 615.652) \times 10^{-3}$	7375735	-2.500×10^{-2}	0.667	-2.429×10^{-2}	-35.5	76.1
background so2 slant column offset window1 [DU]	$(-9.287 \pm 18.399) \times 10^{-2}$	7375735	-0.220	0.211	-0.152	-1.39	1.99
sulfurdioxide slant column density window2 [DU]	-0.250 ± 8.571	7375735	-0.250	10.7	-0.347	-960	1.343×10^{3}
sulfurdioxide slant column density window2 precision [DU]	7.71 ± 2.25	7375735	6.97	2.47	7.35	2.09	742
sulfurdioxide slant column density corrected win2 [DU]	-1.88 ± 8.40	7375735	-1.75	10.5	-1.86	-962	1.343×10^{3}
background so2 slant column offset window2 [DU]	-1.63 ± 2.25	7375735	-0.250	2.38	-1.07	-16.4	8.95
sulfurdioxide slant column density window3 [DU]	3.34 ± 22.87	7375735	1.68	28.3	2.76	-402	953
sulfurdioxide slant column density window3 precision [DU]	27.3 ± 12.5	7375735	20.3	9.64	23.7	10.7	279
sulfurdioxide slant column density corrected win3 [DU]	11.6 ± 22.1	7375735	11.8	27.5	11.4	-395	952
background so2 slant column offset window3 [DU]	8.27 ± 6.75	7375735	7.28	9.58	8.36	-34.8	31.1
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.22	7375735	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(2.250 \pm 3.565) \times 10^{-2}$	7375735	1.316×10^{-2}	1.416×10^{-2}	1.469×10^{-2}	6.920×10^{-4}	1.57
fitted radiance shift [nm]	$(-2.138 \pm 24.928) \times 10^{-4}$	7375735	-5.000×10^{-4}	1.774×10^{-3}	-2.641×10^{-4}	-3.885×10^{-2}	5.194×10^{-2}
fitted radiance squeeze [1]	$(-5.475 \pm 18.708) \times 10^{-5}$	7375735	-3.000×10^{-5}	2.169×10^{-4}	-4.348×10^{-5}	-1.790×10^{-2}	1.393×10^{-2}
fitted root mean square [1]	$(1.190 \pm 0.491) \times 10^{-3}$	7375735	9.250×10^{-4}	4.644×10^{-4}	1.052×10^{-3}	3.327×10^{-4}	8.466×10^{-2}
sulfurdioxide total air mass factor polluted [1]	0.941 ± 0.578	7375735	0.660	0.685	0.803	5.000×10^{-2}	2.92
sulfurdioxide total air mass factor polluted precision [1]	0.150 ± 0.154	7375735	3.500×10^{-2}	0.173	9.007×10^{-2}	3.060×10^{-3}	1.48
sulfurdioxide clear air mass factor polluted [1]	0.802 ± 0.499	7375735	0.500	0.424	0.678	4.368×10^{-2}	2.97
number of spectral points in retrieval [1]	73.4 ± 0.5	7375735	73.0	1.000	73.0	71.0	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	2.000×10^{-2}	6.000×10^{-2}	0.150	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	−2.74	−0.862	−0.495	−0.323	−0.185	0.207	0.355	0.547	0.971	3.26
sulfurdioxide total vertical column precision [DU]	8.594×10^{-2}	0.108	0.126	0.146	0.181	0.511	0.727	1.03	1.71	4.68
sulfurdioxide slant column density corrected [DU]	−0.781	−0.448	−0.326	−0.245	−0.159	0.177	0.267	0.355	0.492	0.916
sulfurdioxide slant column density cobra [DU]	−0.781	−0.448	−0.326	−0.245	−0.159	0.177	0.267	0.355	0.492	0.916
sulfurdioxide slant column density cobra precision [DU]	0.136	0.160	0.173	0.183	0.195	0.303	0.357	0.411	0.494	0.714
sulfurdioxide slant column density window1 [DU]	−1.58	−0.891	−0.626	−0.448	−0.261	0.435	0.613	0.781	1.04	1.75
sulfurdioxide slant column density window1 precision [DU]	0.136	0.160	0.173	0.183	0.195	0.303	0.357	0.411	0.494	0.714
sulfurdioxide slant column density corrected win1 [DU]	−1.51	−0.908	−0.678	−0.521	−0.353	0.314	0.496	0.673	0.945	1.73
background so2 slant column offset window1 [DU]	−0.379	−0.291	−0.262	−0.238	−0.215	-3.548×10^{-3}	0.117	0.202	0.272	0.418
sulfurdioxide slant column density window2 [DU]	−20.5	−13.9	−10.7	−8.30	−5.66	5.03	7.75	10.2	13.7	21.2
sulfurdioxide slant column density window2 precision [DU]	4.22	4.97	5.42	5.80	6.26	8.74	9.61	10.5	11.7	14.4
sulfurdioxide slant column density corrected win2 [DU]	−22.3	−15.4	−12.1	−9.76	−7.12	3.38	6.00	8.36	11.6	18.3
background so2 slant column offset window2 [DU]	−8.64	−6.14	−4.68	−3.64	−2.62	−0.241	8.137×10^{-2}	0.418	0.941	2.86
sulfurdioxide slant column density window3 [DU]	−52.8	−32.9	−24.1	−17.8	−11.0	17.3	25.0	32.2	41.8	60.9
sulfurdioxide slant column density window3 precision [DU]	14.9	16.7	17.9	18.9	20.2	29.8	34.5	39.7	50.7	80.7
sulfurdioxide slant column density corrected win3 [DU]	−43.1	−23.9	−15.2	−9.04	−2.22	25.3	32.5	39.1	48.1	66.6
background so2 slant column offset window3 [DU]	−8.20	−2.74	−0.457	1.26	3.64	13.2	15.4	17.2	18.8	21.3
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]	1.695×10^{-3}	4.307×10^{-3}	6.363×10^{-3}	7.967×10^{-3}	9.954×10^{-3}	2.411×10^{-2}	3.051×10^{-2}	3.944×10^{-2}	5.866×10^{-2}	0.149
fitted radiance shift [nm]	-7.681×10^{-3}	-3.811×10^{-3}	-2.476×10^{-3}	-1.746×10^{-3}	-1.148×10^{-3}	6.265×10^{-4}	1.333×10^{-3}	2.193×10^{-3}	3.654×10^{-3}	7.621×10^{-3}
fitted radiance squeeze [1]	-5.746×10^{-4}	-3.731×10^{-4}	-2.833×10^{-4}	-2.213×10^{-4}	-1.573×10^{-4}	5.958×10^{-5}	1.105×10^{-4}	1.570×10^{-4}	2.228×10^{-4}	3.791×10^{-4}
fitted root mean square [1]	5.772×10^{-4}	6.955×10^{-4}	7.660×10^{-4}	8.199×10^{-4}	8.847×10^{-4}	1.349×10^{-3}	1.574×10^{-3}	1.795×10^{-3}	2.127×10^{-3}	2.996×10^{-3}
sulfurdioxide total air mass factor polluted [1]	7.268×10^{-2}	0.195	0.311	0.413	0.532	1.22	1.55	1.86	2.20	2.46
sulfurdioxide total air mass factor polluted precision [1]	9.272×10^{-3}	1.758×10^{-2}	2.415×10^{-2}	3.051×10^{-2}	3.831×10^{-2}	0.211	0.295	0.380	0.475	0.658
sulfurdioxide clear air mass factor polluted [1]	0.178	0.299	0.375	0.431	0.496	0.921	1.06	1.29	2.15	2.60
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]	0.709 ± 0.394	2522957	0.680	1.000	0.0	1.000	0.320	1.000
sulfurdioxide total vertical column [DU]	$(6.993 \pm 168.459) \times 10^{-2}$	2522957	0.567	1.525×10^{-2}	-61.4	304	-0.261	0.305
sulfurdioxide total vertical column precision [DU]	0.806 ± 1.193	2522957	0.580	0.395	5.806×10^{-2}	68.5	0.252	0.832
sulfurdioxide slant column density corrected [DU]	$(2.765 \pm 44.444) \times 10^{-2}$	2522957	0.392	1.190×10^{-2}	-7.07	155	-0.182	0.210
sulfurdioxide slant column density cobra [DU]	$(2.746 \pm 43.155) \times 10^{-2}$	2522957	0.392	1.190×10^{-2}	-7.07	155	-0.182	0.210
sulfurdioxide slant column density cobra precision [DU]	0.315 ± 0.144	2522957	0.149	0.273	8.124×10^{-2}	34.9	0.221	0.371
sulfurdioxide slant column density window1 [DU]	0.166 ± 0.740	2522957	0.780	0.164	-9.55	14.5	-0.227	0.553
sulfurdioxide slant column density window1 precision [DU]	0.315 ± 0.144	2522957	0.149	0.273	8.124×10^{-2}	34.9	0.221	0.371
sulfurdioxide slant column density corrected win1 [DU]	$(2.536 \pm 74.076) \times 10^{-2}$	2522957	0.776	-3.313×10^{-3}	-8.91	14.3	-0.383	0.392
background so2 slant column offset window1 [DU]	-0.140 ± 0.140	2522957	0.119	-0.159	-1.15	1.99	-0.217	-9.824×10^{-2}
sulfurdioxide slant column density window2 [DU]	0.319 ± 9.647	2522957	12.3	4.084×10^{-2}	-459	70.2	-5.98	6.31
sulfurdioxide slant column density window2 precision [DU]	8.68 ± 2.22	2522957	2.74	8.37	2.42	280	7.15	9.89
sulfurdioxide slant column density corrected win2 [DU]	-1.87 ± 9.34	2522957	11.9	-1.86	-462	60.0	-7.84	4.11
background so2 slant column offset window2 [DU]	-2.19 ± 2.76	2522957	3.18	-1.21	-16.4	8.95	-3.58	-0.392
sulfurdioxide slant column density window3 [DU]	1.17 ± 25.11	2522957	31.7	1.44	-184	165	-14.5	17.3
sulfurdioxide slant column density window3 precision [DU]	30.7 ± 12.7	2522957	10.4	27.4	11.5	207	23.4	33.8
sulfurdioxide slant column density corrected win3 [DU]	11.4 ± 24.7	2522957	31.3	11.4	-162	164	-4.17	27.2
background so2 slant column offset window3 [DU]	10.3 ± 5.8	2522957	7.88	9.46	-31.1	31.1	6.66	14.5
sulfurdioxide slant column cobra flag [1]	1.96 ± 0.27	2522957	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(3.033 \pm 5.053) \times 10^{-2}$	2522957	1.745×10^{-2}	1.587×10^{-2}	1.449×10^{-3}	1.57	1.099×10^{-2}	2.844×10^{-2}
fitted radiance shift [nm]	$(-3.952 \pm 260.655) \times 10^{-5}$	2522957	1.889×10^{-3}	-7.847×10^{-5}	-3.204×10^{-2}	3.677×10^{-2}	-1.008×10^{-3}	8.806×10^{-4}
fitted radiance squeeze [1]	$(3.785 \pm 187.019) \times 10^{-6}$	2522957	2.141×10^{-4}	6.049×10^{-6}	-2.619×10^{-3}	1.607×10^{-3}	-1.013×10^{-4}	1.128×10^{-4}
fitted root mean square [1]	$(1.370 \pm 0.585) \times 10^{-3}$	2522957	6.025×10^{-4}	1.191×10^{-3}	3.570×10^{-4}	7.650×10^{-3}	9.904×10^{-4}	1.593×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.724 ± 0.379	2522957	0.517	0.711	5.000×10^{-2}	2.54	0.438	0.955
sulfurdioxide total air mass factor polluted precision [1]	$(8.284 \pm 8.458) \times 10^{-2}$	2522957	7.619×10^{-2}	5.106×10^{-2}	3.060×10^{-3}	1.39	3.236×10^{-2}	0.109
sulfurdioxide clear air mass factor polluted [1]	0.672 ± 0.271	2522957	0.418	0.686	4.368×10^{-2}	1.74	0.458	0.877
number of spectral points in retrieval [1]	73.5 ± 0.5	2522957	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]	0.526 ± 0.424	4852778	0.890	0.410	0.0	1.000	0.110	1.000
sulfurdioxide total vertical column [DU]	$(1.620 \pm 87.452) \times 10^{-2}$	4852778	0.332	6.349×10^{-3}	-74.1	299	-0.159	0.173
sulfurdioxide total vertical column precision [DU]	0.393 ± 0.671	4852778	0.250	0.249	4.481×10^{-2}	29.0	0.155	0.405
sulfurdioxide slant column density corrected [DU]	$(9.824 \pm 320.766) \times 10^{-3}$	4852778	0.312	6.463×10^{-3}	-9.81	346	-0.149	0.163
sulfurdioxide slant column density cobra [DU]	$(9.754 \pm 279.612) \times 10^{-3}$	4852778	0.312	6.463×10^{-3}	-9.81	46.6	-0.149	0.163
sulfurdioxide slant column density cobra precision [DU]	0.244 ± 0.098	4852778	8.039×10^{-2}	0.216	8.358×10^{-2}	33.1	0.188	0.268
sulfurdioxide slant column density window1 [DU]	$(4.484 \pm 56.607) \times 10^{-2}$	4852778	0.656	6.000×10^{-2}	-35.5	76.4	-0.276	0.380
sulfurdioxide slant column density window1 precision [DU]	0.244 ± 0.098	4852778	8.039×10^{-2}	0.216	8.358×10^{-2}	33.1	0.188	0.268
sulfurdioxide slant column density corrected win1 [DU]	$(-2.345 \pm 53.850) \times 10^{-2}$	4852778	0.620	-3.307×10^{-2}	-35.5	76.1	-0.340	0.280
background so2 slant column offset window1 [DU]	$(-6.829 \pm 19.864) \times 10^{-2}$	4852778	0.293	-0.145	-1.39	1.64	-0.214	7.880×10^{-2}
sulfurdioxide slant column density window2 [DU]	-0.546 ± 7.938	4852778	9.98	-0.512	-960	1.343×10^{3}	-5.51	4.47
sulfurdioxide slant column density window2 precision [DU]	7.21 ± 2.09	4852778	2.06	6.92	2.09	742	5.98	8.04
sulfurdioxide slant column density corrected win2 [DU]	-1.89 ± 7.86	4852778	9.85	-1.87	-962	1.343×10^{3}	-6.80	3.05
background so2 slant column offset window2 [DU]	-1.34 ± 1.86	4852778	2.20	-0.988	-11.9	8.59	-2.37	-0.167
sulfurdioxide slant column density window3 [DU]	4.47 ± 21.52	4852778	26.8	3.33	-402	953	-9.48	17.3
sulfurdioxide slant column density window3 precision [DU]	25.5 ± 12.0	4852778	7.34	22.1	10.7	279	19.3	26.7
sulfurdioxide slant column density corrected win3 [DU]	11.7 ± 20.6	4852778	25.8	11.4	-395	952	-1.36	24.5
background so2 slant column offset window3 [DU]	7.23 ± 6.99	4852778	10.5	7.33	-34.8	25.9	2.08	12.6
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.19	4852778	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(1.843 \pm 2.358) \times 10^{-2}$	4852778	1.334×10^{-2}	1.408×10^{-2}	6.920×10^{-4}	1.51	9.486×10^{-3}	2.283×10^{-2}
fitted radiance shift [nm]	$(-3.044 \pm 24.266) \times 10^{-4}$	4852778	1.693×10^{-3}	-3.542×10^{-4}	-3.885×10^{-2}	5.194×10^{-2}	-1.202×10^{-3}	4.910×10^{-4}
fitted radiance squeeze [1]	$(-8.518 \pm 17.974) \times 10^{-5}$	4852778	2.144×10^{-4}	-6.836×10^{-5}	-1.790×10^{-2}	1.393×10^{-2}	-1.837×10^{-4}	3.069×10^{-5}
fitted root mean square [1]	$(1.096 \pm 0.403) \times 10^{-3}$	4852778	3.810×10^{-4}	9.904×10^{-4}	3.327×10^{-4}	8.466×10^{-2}	8.494×10^{-4}	1.230×10^{-3}
sulfurdioxide total air mass factor polluted [1]	1.05 ± 0.63	4852778	0.880	0.880	5.000×10^{-2}	2.92	0.582	1.46
sulfurdioxide total air mass factor polluted precision [1]	0.185 ± 0.169	4852778	0.232	0.131	4.801×10^{-3}	1.48	4.452×10^{-2}	0.277
sulfurdioxide clear air mass factor polluted [1]	0.869 ± 0.572	4852778	0.455	0.673	0.122	2.97	0.507	0.962
number of spectral points in retrieval [1]	73.4 ± 0.5	4852778	1.000	73.0	71.0	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]	0.643 ± 0.413	5768415	0.790	1.000	0.0	1.000	0.210	1.000
sulfurdioxide total vertical column [DU]	$(2.920 \pm 113.958) \times 10^{-2}$	5768415	0.416	8.495×10^{-3}	-74.1	304	-0.198	0.218
sulfurdioxide total vertical column precision [DU]	0.524 ± 0.848	5768415	0.308	0.299	5.061×10^{-2}	68.5	0.204	0.512
sulfurdioxide slant column density corrected [DU]	$(1.348 \pm 32.395) \times 10^{-2}$	5768415	0.325	7.291×10^{-3}	-7.07	155	-0.154	0.171
sulfurdioxide slant column density cobra [DU]	$(1.343 \pm 31.823) \times 10^{-2}$	5768415	0.325	7.291×10^{-3}	-7.07	155	-0.154	0.171
sulfurdioxide slant column density cobra precision [DU]	0.258 ± 0.113	5768415	9.108×10^{-2}	0.223	8.997×10^{-2}	34.9	0.192	0.283
sulfurdioxide slant column density window1 [DU]	0.112 ± 0.588	5768415	0.666	0.110	-35.5	76.4	-0.223	0.442
sulfurdioxide slant column density window1 precision [DU]	0.258 ± 0.113	5768415	9.108×10^{-2}	0.223	8.997×10^{-2}	34.9	0.192	0.283
sulfurdioxide slant column density corrected win1 [DU]	$(-1.203 \pm 57.718) \times 10^{-2}$	5768415	0.646	-2.604×10^{-2}	-35.5	76.1	-0.345	0.301
background so2 slant column offset window1 [DU]	-0.124 ± 0.148	5768415	0.155	-0.160	-0.984	1.97	-0.217	-6.184×10^{-2}
sulfurdioxide slant column density window2 [DU]	-0.574 ± 8.340	5768415	10.5	-0.645	-960	551	-5.89	4.63
sulfurdioxide slant column density window2 precision [DU]	7.61 ± 2.08	5768415	2.40	7.28	2.09	495	6.22	8.61
sulfurdioxide slant column density corrected win2 [DU]	-1.90 ± 8.25	5768415	10.4	-1.87	-962	547	-7.10	3.34
background so2 slant column offset window2 [DU]	-1.32 ± 2.05	5768415	1.93	-0.909	-16.4	8.95	-2.11	-0.173
sulfurdioxide slant column density window3 [DU]	5.26 ± 22.84	5768415	28.6	4.59	-402	273	-9.26	19.4
sulfurdioxide slant column density window3 precision [DU]	26.9 ± 11.7	5768415	9.19	23.8	10.7	205	20.2	29.4
sulfurdioxide slant column density corrected win3 [DU]	12.6 ± 22.1	5768415	27.9	12.2	-395	276	-1.49	26.4
background so2 slant column offset window3 [DU]	7.35 ± 6.37	5768415	8.73	7.72	-34.8	31.1	3.13	11.9
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.17	5768415	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(1.884 \pm 1.635) \times 10^{-2}$	5768415	1.218×10^{-2}	1.440×10^{-2}	2.224×10^{-3}	0.623	1.037×10^{-2}	2.255×10^{-2}
fitted radiance shift [nm]	$(-1.371 \pm 23.720) \times 10^{-4}$	5768415	1.748×10^{-3}	-1.671×10^{-4}	-3.531×10^{-2}	3.677×10^{-2}	-1.043×10^{-3}	7.058×10^{-4}
fitted radiance squeeze [1]	$(-3.589 \pm 16.857) \times 10^{-5}$	5768415	1.979×10^{-4}	-3.130×10^{-5}	-1.790×10^{-2}	1.153×10^{-2}	-1.321×10^{-4}	6.580×10^{-5}
fitted root mean square [1]	$(1.134 \pm 0.445) \times 10^{-3}$	5768415	3.739×10^{-4}	1.014×10^{-3}	3.327×10^{-4}	8.466×10^{-2}	8.701×10^{-4}	1.244×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.837 ± 0.452	5768415	0.526	0.760	5.000×10^{-2}	2.49	0.530	1.06
sulfurdioxide total air mass factor polluted precision [1]	0.139 ± 0.150	5768415	0.157	7.083×10^{-2}	3.498×10^{-3}	1.48	3.678×10^{-2}	0.194
sulfurdioxide clear air mass factor polluted [1]	0.670 ± 0.240	5768415	0.334	0.641	5.727×10^{-2}	2.61	0.491	0.825
number of spectral points in retrieval [1]	73.4 ± 0.5	5768415	1.000	73.0	71.0	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]	0.375 ± 0.391	1377666	0.960	0.210	0.0	1.000	4.000×10^{-2}	1.000
sulfurdioxide total vertical column [DU]	$(4.304 \pm 123.967) \times 10^{-2}$	1377666	0.293	7.869×10^{-3}	-41.3	299	-0.136	0.157
sulfurdioxide total vertical column precision [DU]	0.497 ± 0.941	1377666	0.281	0.183	4.481×10^{-2}	26.9	0.129	0.410
sulfurdioxide slant column density corrected [DU]	$(2.312 \pm 50.301) \times 10^{-2}$	1377666	0.386	1.103×10^{-2}	-9.81	346	-0.180	0.206
sulfurdioxide slant column density cobra [DU]	$(2.278 \pm 40.342) \times 10^{-2}$	1377666	0.386	1.103×10^{-2}	-9.81	38.9	-0.180	0.206
sulfurdioxide slant column density cobra precision [DU]	0.308 ± 0.139	1377666	0.126	0.276	8.124×10^{-2}	33.1	0.222	0.349
sulfurdioxide slant column density window1 [DU]	$(-3.229 \pm 76.348) \times 10^{-2}$	1377666	0.840	-1.184×10^{-2}	-23.7	47.9	-0.455	0.385
sulfurdioxide slant column density window1 precision [DU]	0.308 ± 0.139	1377666	0.126	0.276	8.124×10^{-2}	33.1	0.222	0.349
sulfurdioxide slant column density corrected win1 [DU]	$(9.027 \pm 729.361) \times 10^{-3}$	1377666	0.762	-1.683×10^{-2}	-23.7	47.4	-0.391	0.372
background so2 slant column offset window1 [DU]	$(4.132 \pm 24.758) \times 10^{-2}$	1377666	0.447	7.464×10^{-2}	-1.39	1.98	-0.199	0.248
sulfurdioxide slant column density window2 [DU]	0.974 ± 9.169	1377666	11.1	0.896	-636	1.343×10^{3}	-4.61	6.47
sulfurdioxide slant column density window2 precision [DU]	8.02 ± 2.71	1377666	2.66	7.56	2.36	742	6.43	9.10
sulfurdioxide slant column density corrected win2 [DU]	-1.79 ± 8.85	1377666	10.6	-1.81	-636	1.343×10^{3}	-7.10	3.50
background so2 slant column offset window2 [DU]	-2.77 ± 2.45	1377666	3.88	-2.76	-16.4	8.80	-4.47	-0.588
sulfurdioxide slant column density window3 [DU]	-3.65 ± 21.24	1377666	25.4	-3.46	-365	953	-16.2	9.20
sulfurdioxide slant column density window3 precision [DU]	28.2 ± 14.9	1377666	10.9	23.0	11.9	279	20.0	30.8
sulfurdioxide slant column density corrected win3 [DU]	8.18 ± 21.46	1377666	25.8	8.79	-367	952	-4.33	21.5
background so2 slant column offset window3 [DU]	11.8 ± 7.0	1377666	11.5	13.9	-17.5	31.1	6.15	17.7
sulfurdioxide slant column cobra flag [1]	1.94 ± 0.34	1377666	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(3.395 \pm 6.733) \times 10^{-2}$	1377666	2.693×10^{-2}	1.683×10^{-2}	6.920×10^{-4}	1.51	5.329×10^{-3}	3.226×10^{-2}
fitted radiance shift [nm]	$(-5.248 \pm 28.145) \times 10^{-4}$	1377666	1.553×10^{-3}	-6.774×10^{-4}	-3.885×10^{-2}	5.194×10^{-2}	-1.383×10^{-3}	1.692×10^{-4}
fitted radiance squeeze [1]	$(-1.396 \pm 2.303) \times 10^{-4}$	1377666	3.029×10^{-4}	-1.312×10^{-4}	-1.177×10^{-2}	1.393×10^{-2}	-2.883×10^{-4}	1.458×10^{-5}
fitted root mean square [1]	$(1.397 \pm 0.571) \times 10^{-3}$	1377666	6.237×10^{-4}	1.306×10^{-3}	3.370×10^{-4}	8.271×10^{-2}	1.017×10^{-3}	1.641×10^{-3}
sulfurdioxide total air mass factor polluted [1]	1.41 ± 0.78	1377666	1.51	1.46	5.000×10^{-2}	2.92	0.672	2.18
sulfurdioxide total air mass factor polluted precision [1]	0.200 ± 0.162	1377666	0.187	0.156	3.060×10^{-3}	1.45	8.787×10^{-2}	0.275
sulfurdioxide clear air mass factor polluted [1]	1.38 ± 0.81	1377666	1.52	1.21	4.528×10^{-2}	2.97	0.689	2.21
number of spectral points in retrieval [1]	73.4 ± 0.5	1377666	1.000	73.0	71.0	74.0	73.0	74.0

3 Granule outlines

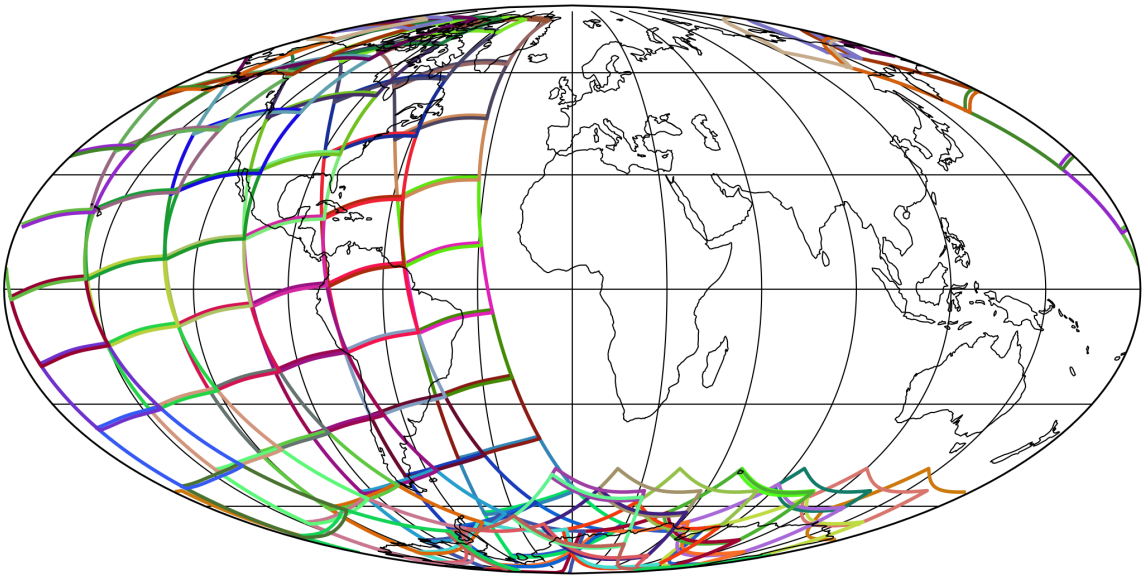


Figure 1: Outline of the granules.

4 Input data monitoring

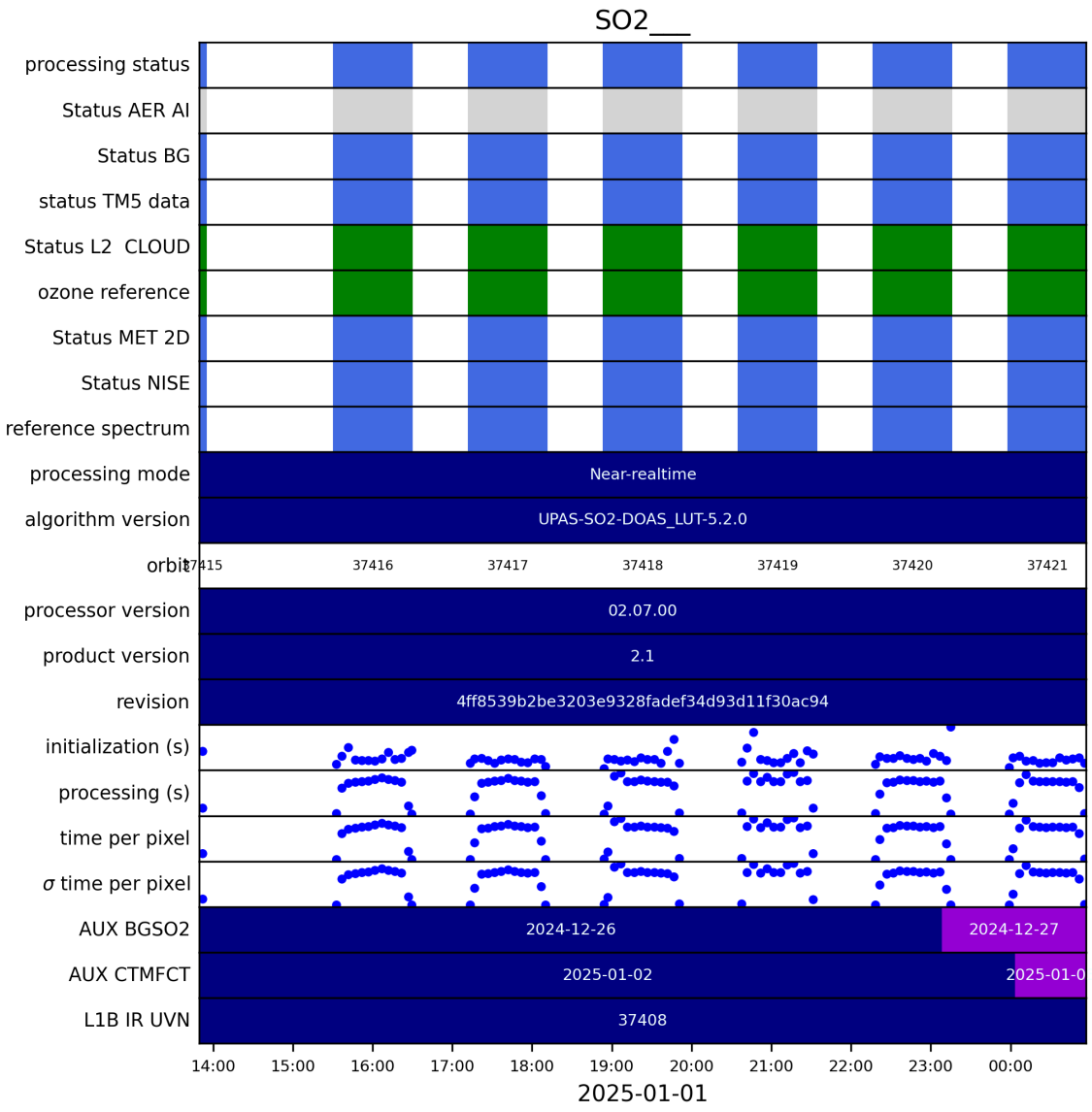


Figure 2: Input data per granule

5 Warnings and errors

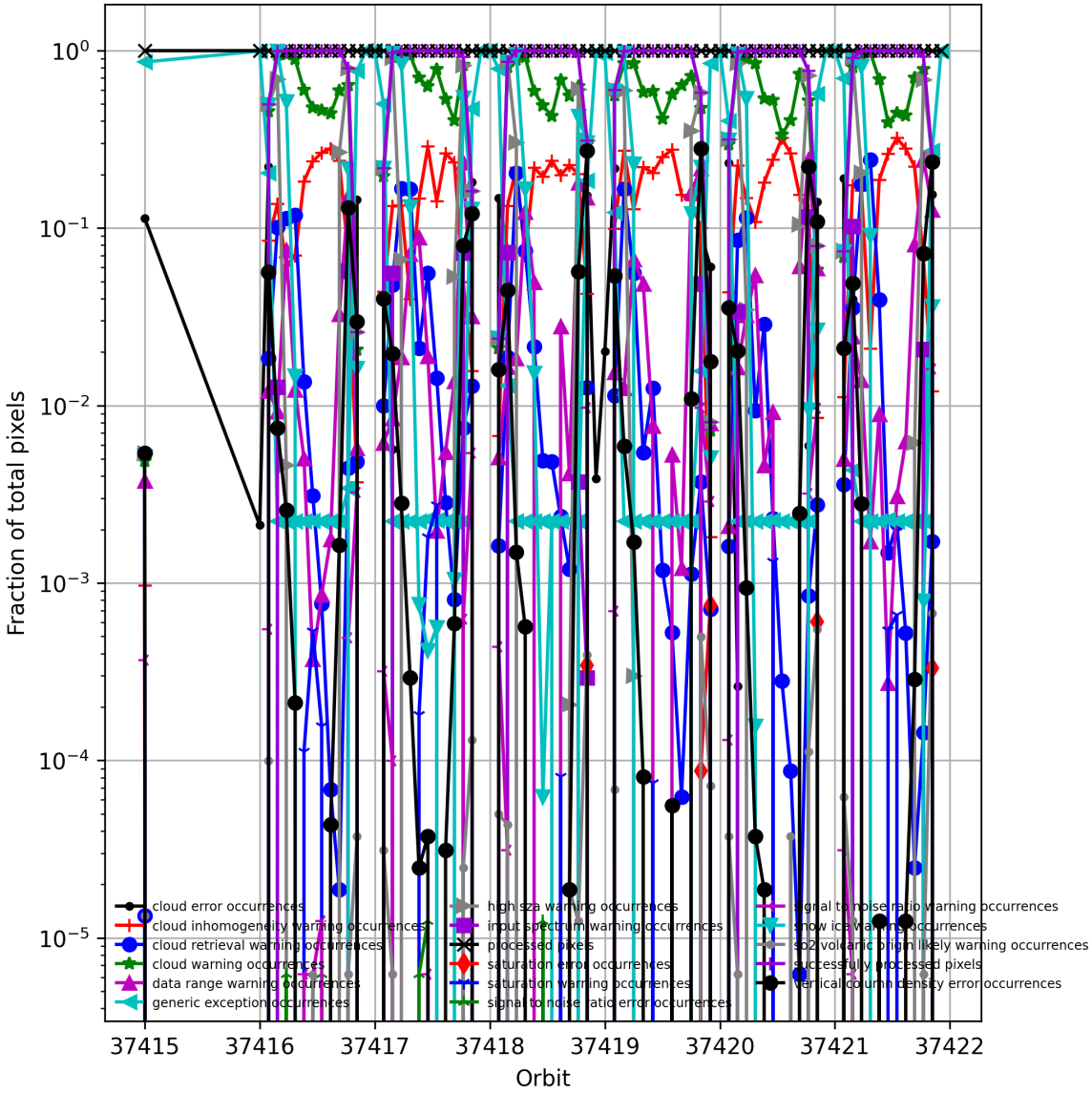


Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

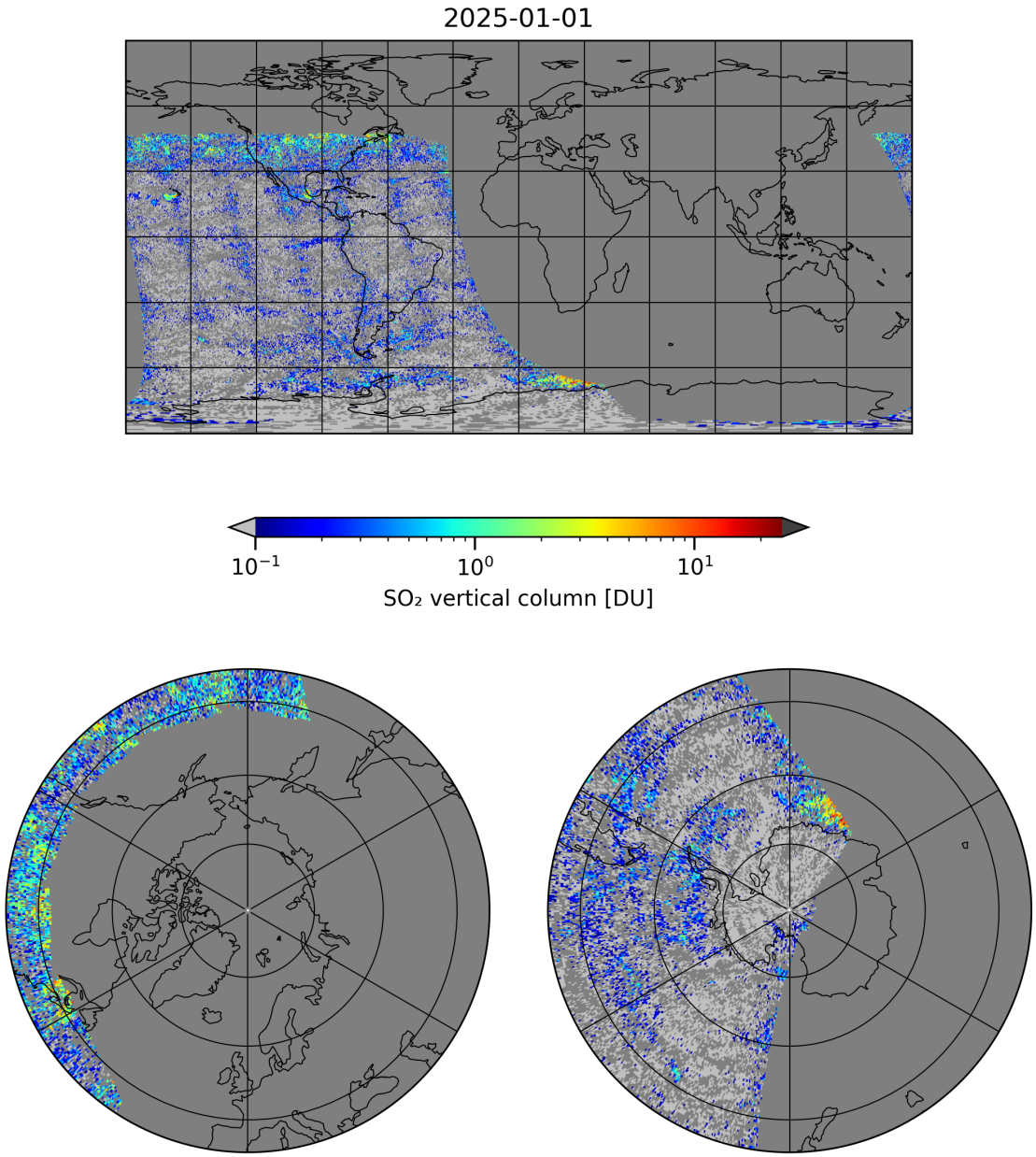


Figure 4: Map of "SO_2 vertical column" for 2025-01-01 to 2025-01-02

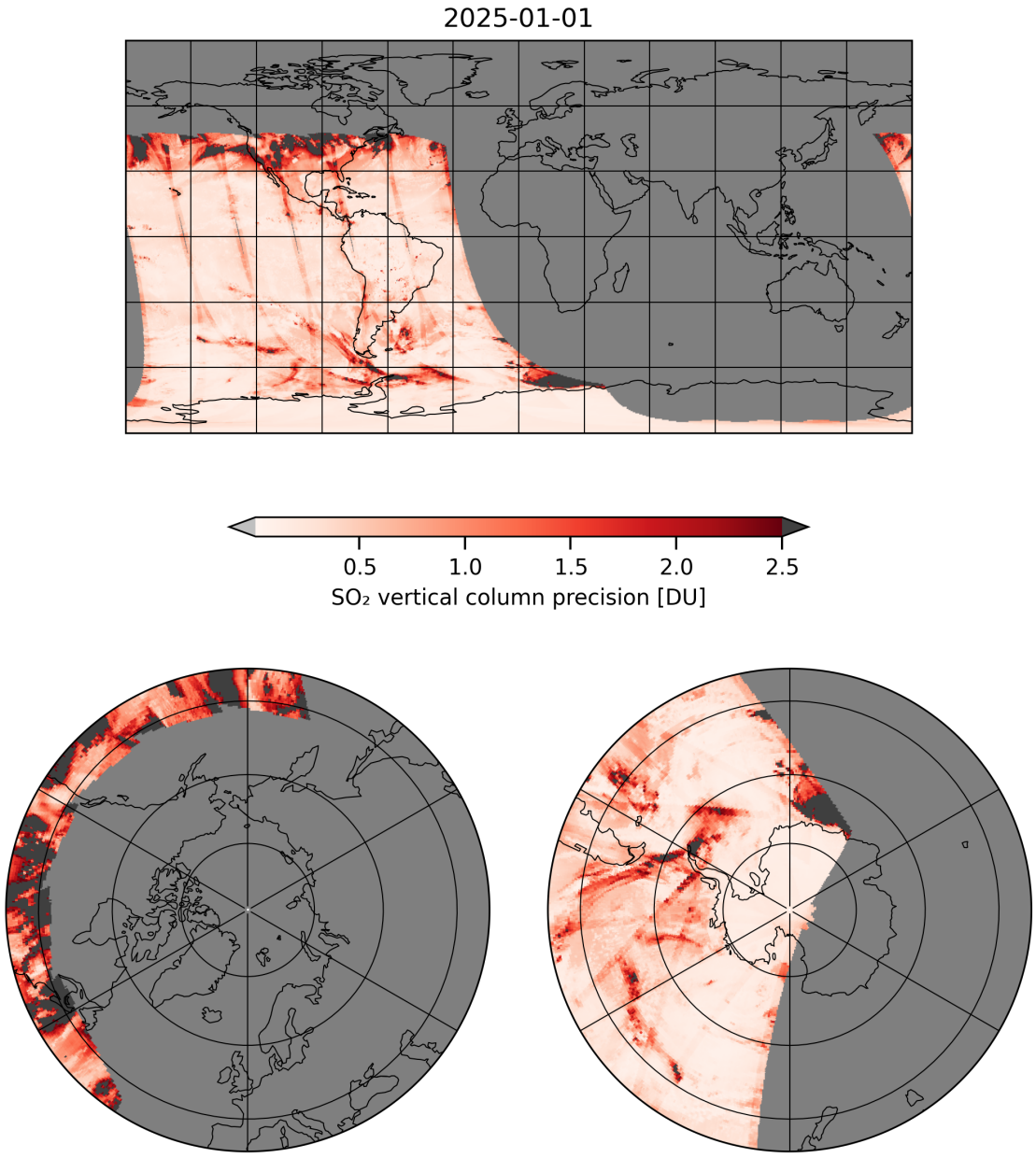


Figure 5: Map of "SO_2 vertical column precision" for 2025-01-01 to 2025-01-02

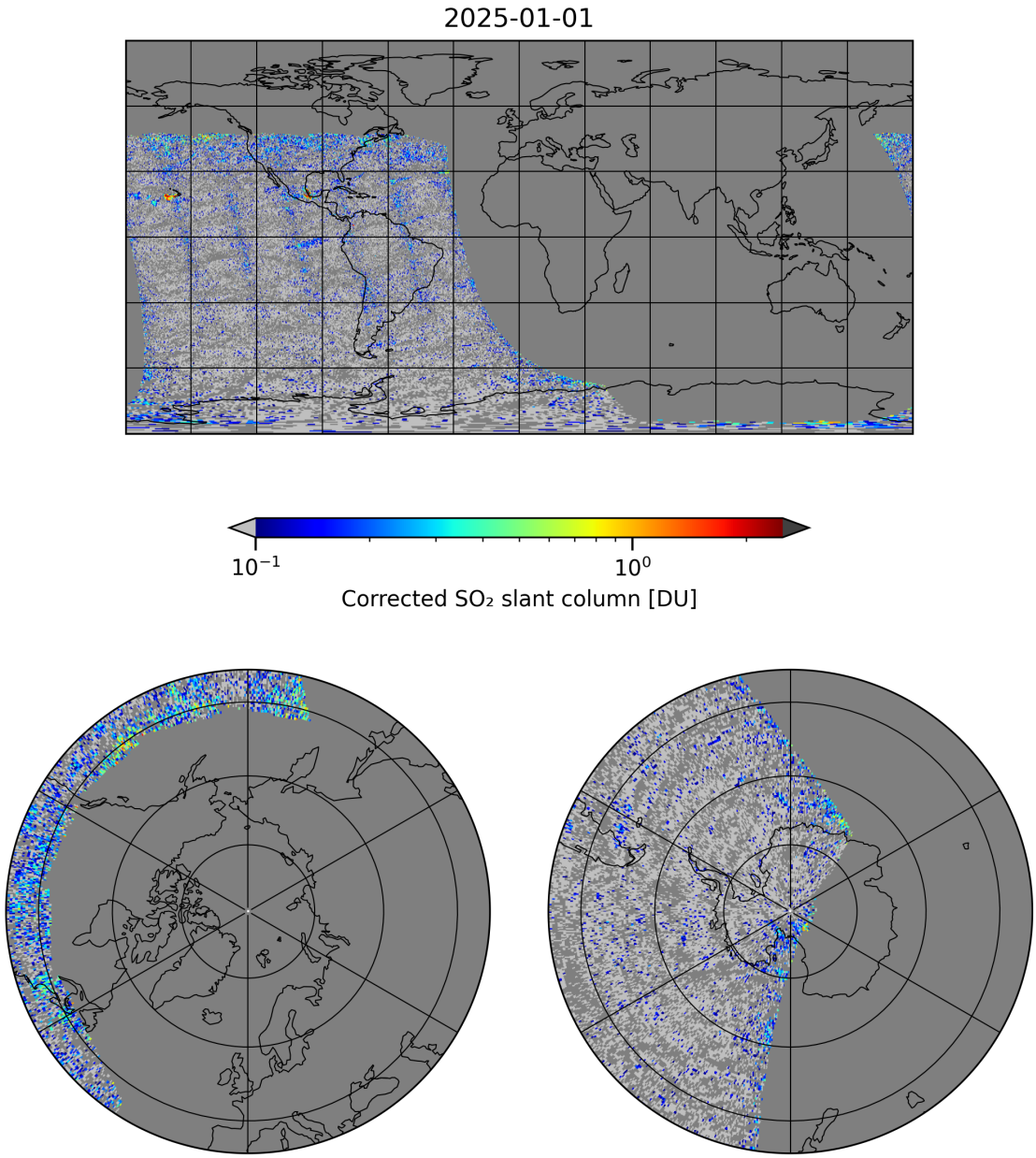


Figure 6: Map of "Corrected SO_2 slant column" for 2025-01-01 to 2025-01-02

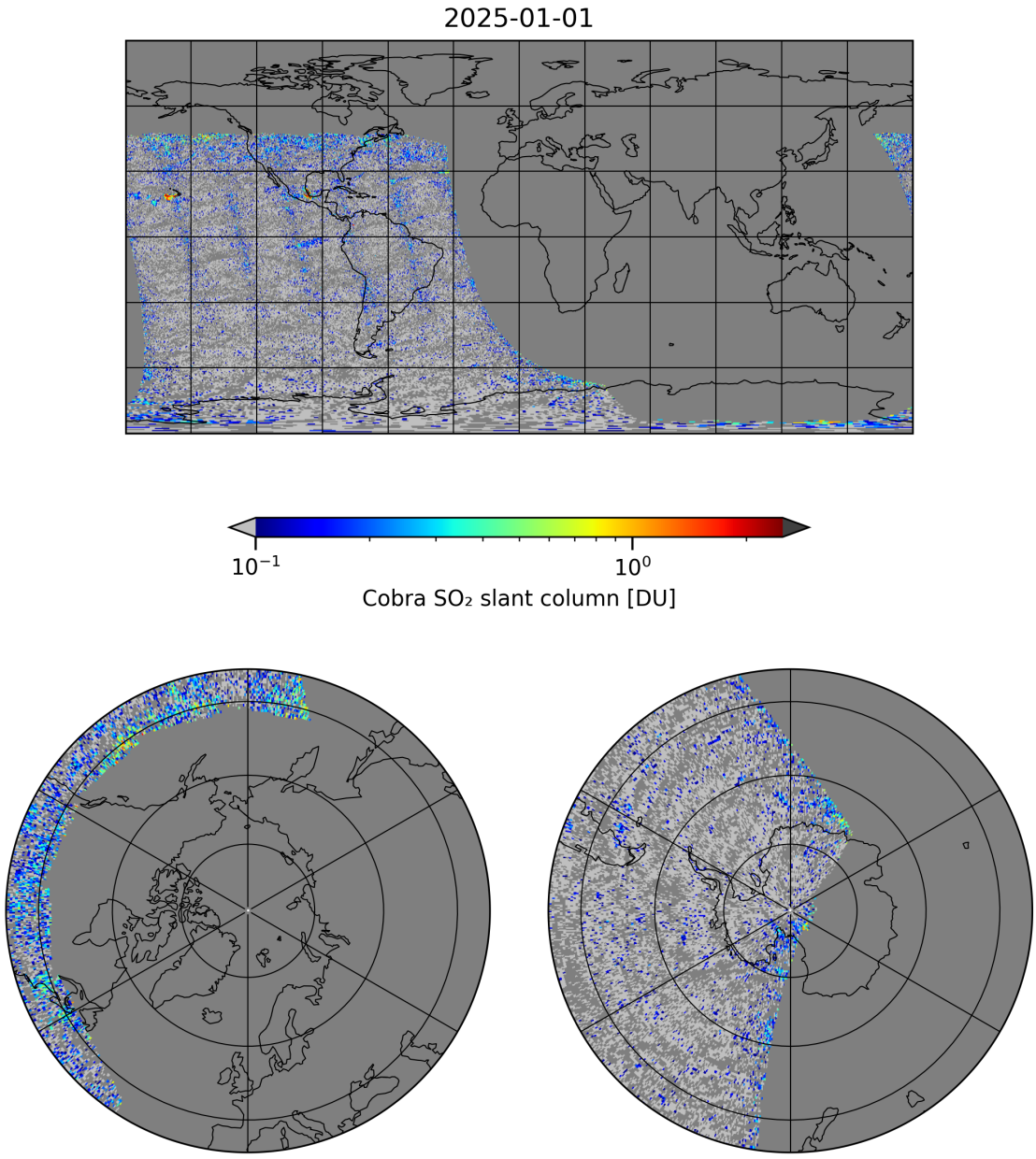


Figure 7: Map of "Cobra SO_2 slant column" for 2025-01-01 to 2025-01-02

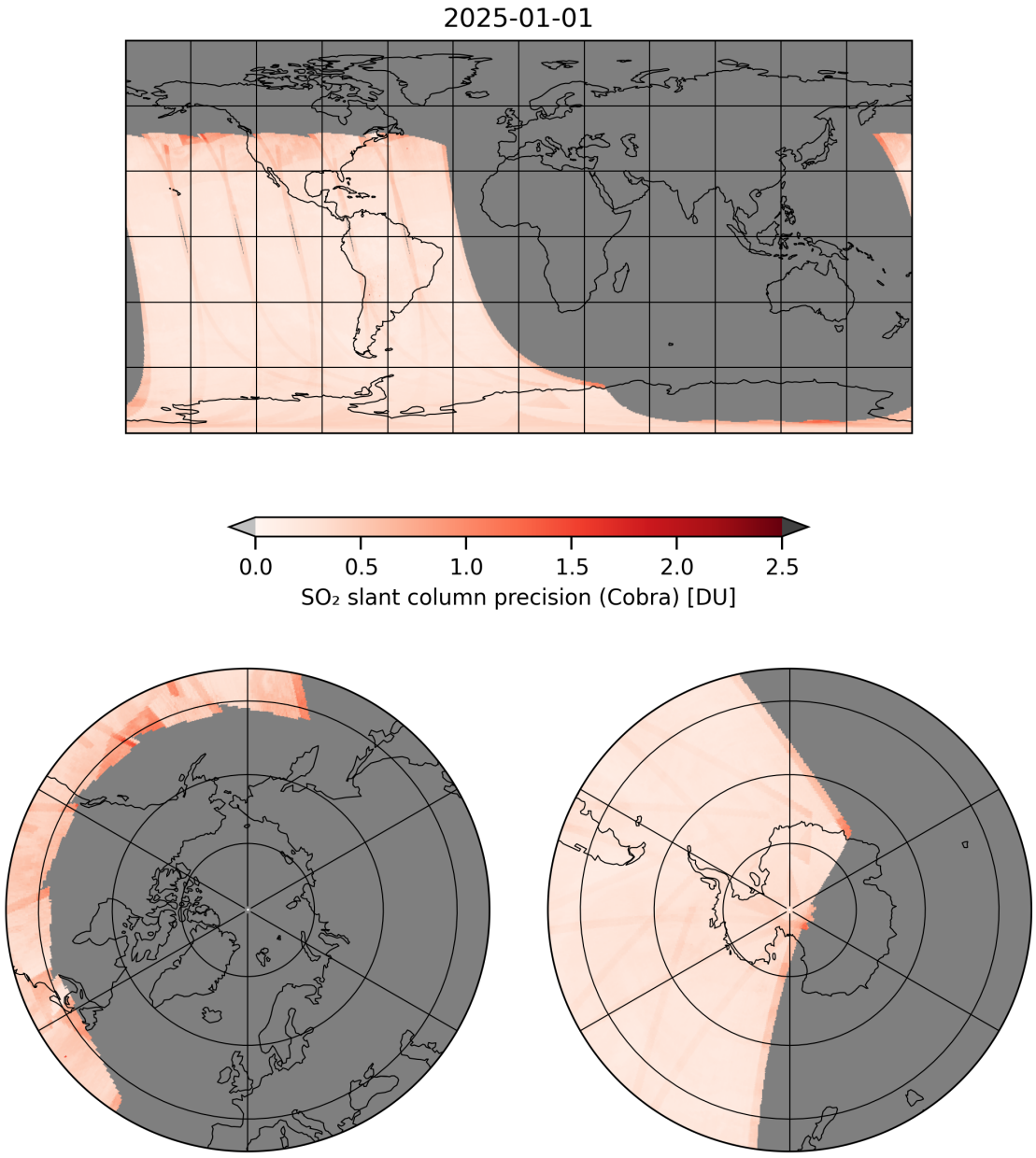


Figure 8: Map of "SO_2 slant column precision (Cobra)" for 2025-01-01 to 2025-01-02

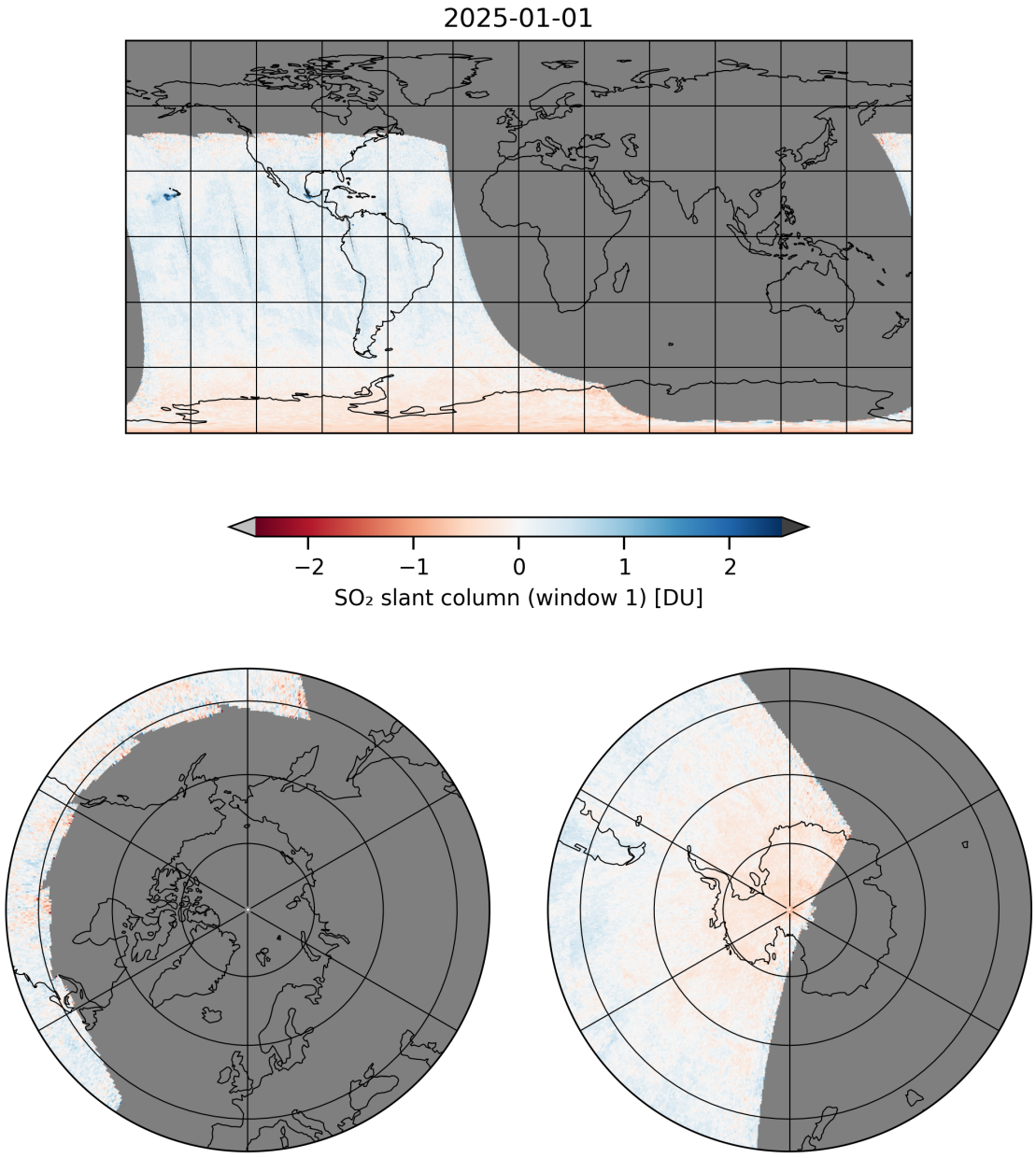


Figure 9: Map of "SO_2 slant column (window 1)" for 2025-01-01 to 2025-01-02

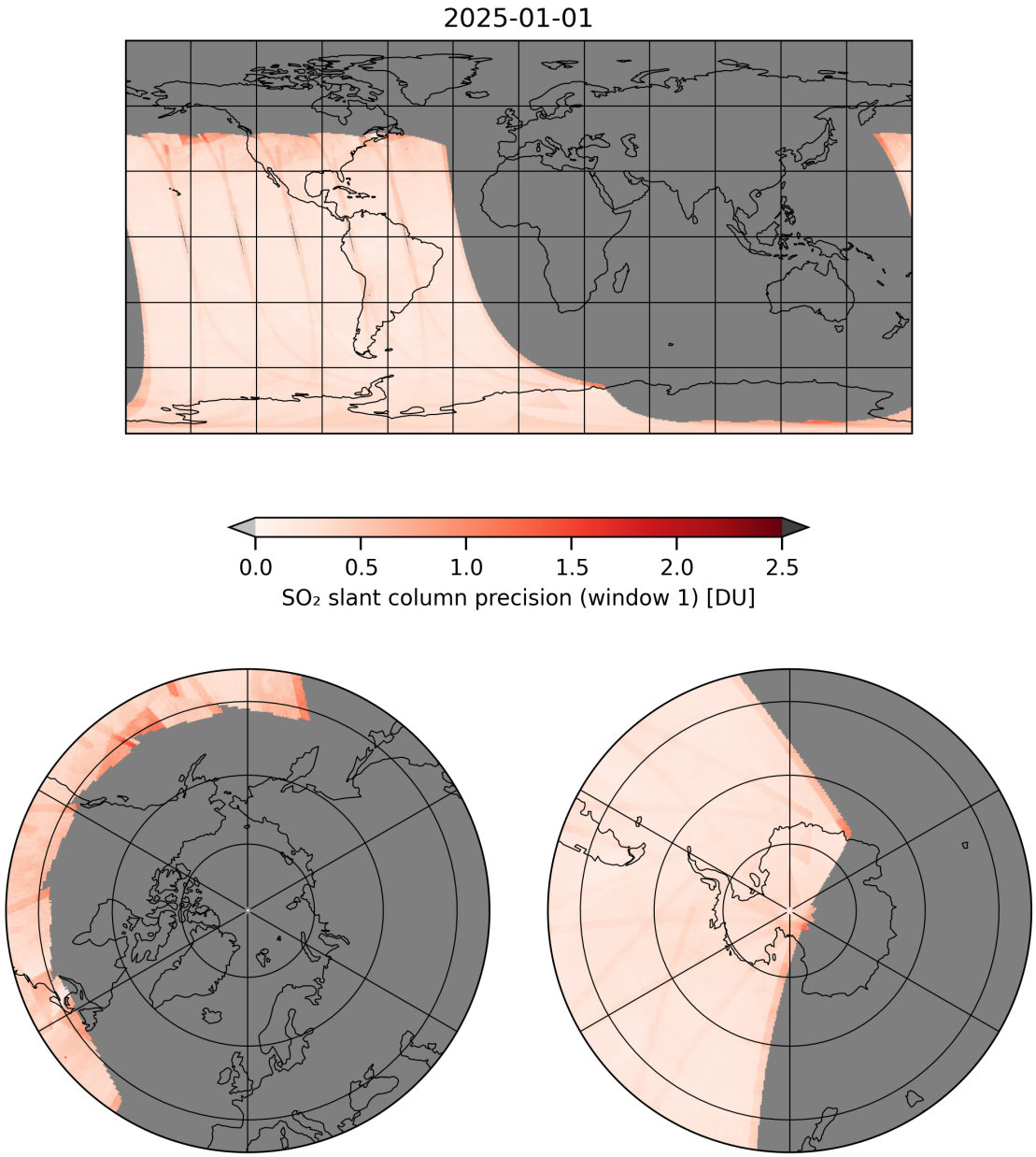


Figure 10: Map of "SO_2 slant column precision (window 1)" for 2025-01-01 to 2025-01-02

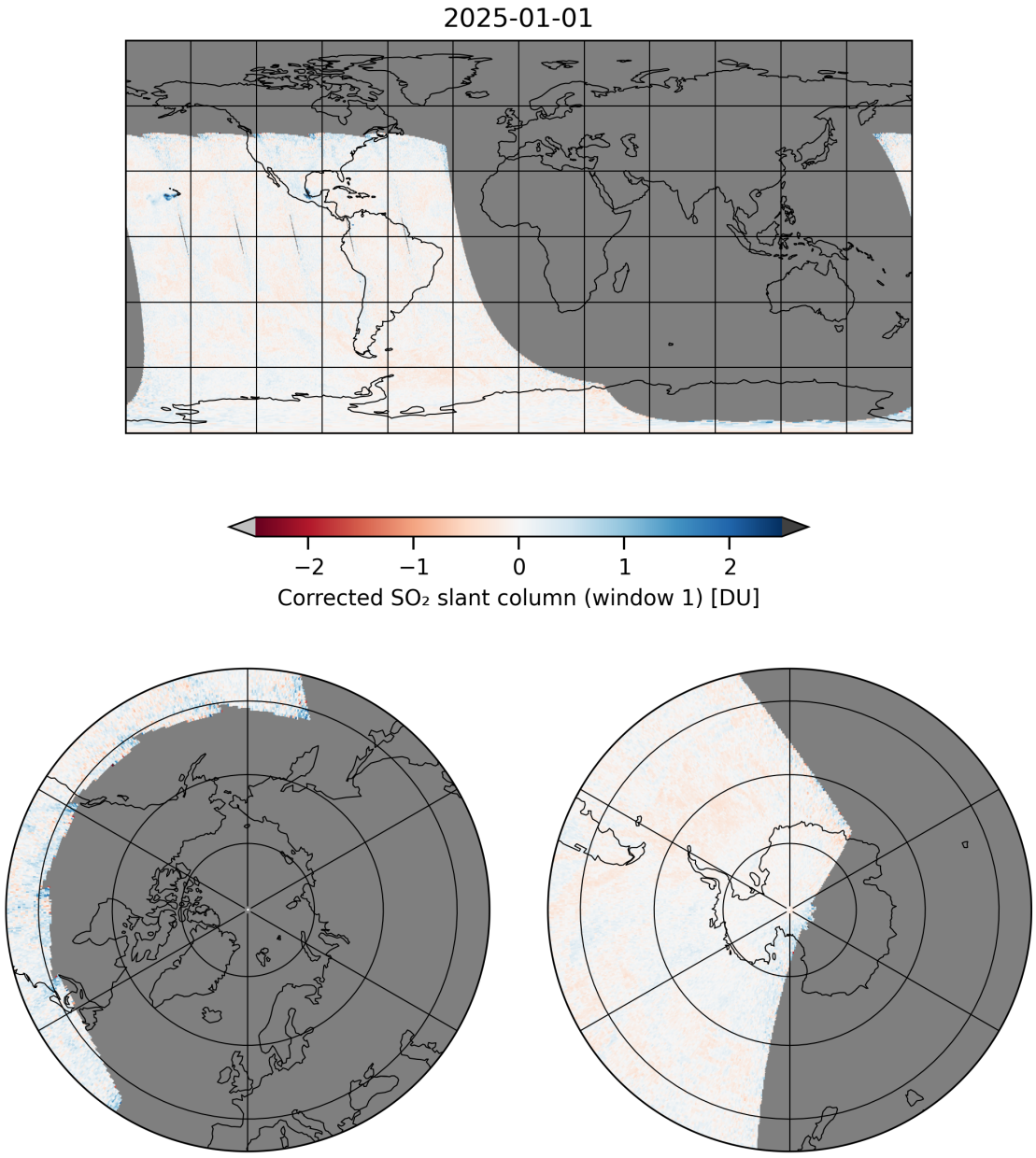


Figure 11: Map of “Corrected SO_2 slant column (window 1)” for 2025-01-01 to 2025-01-02

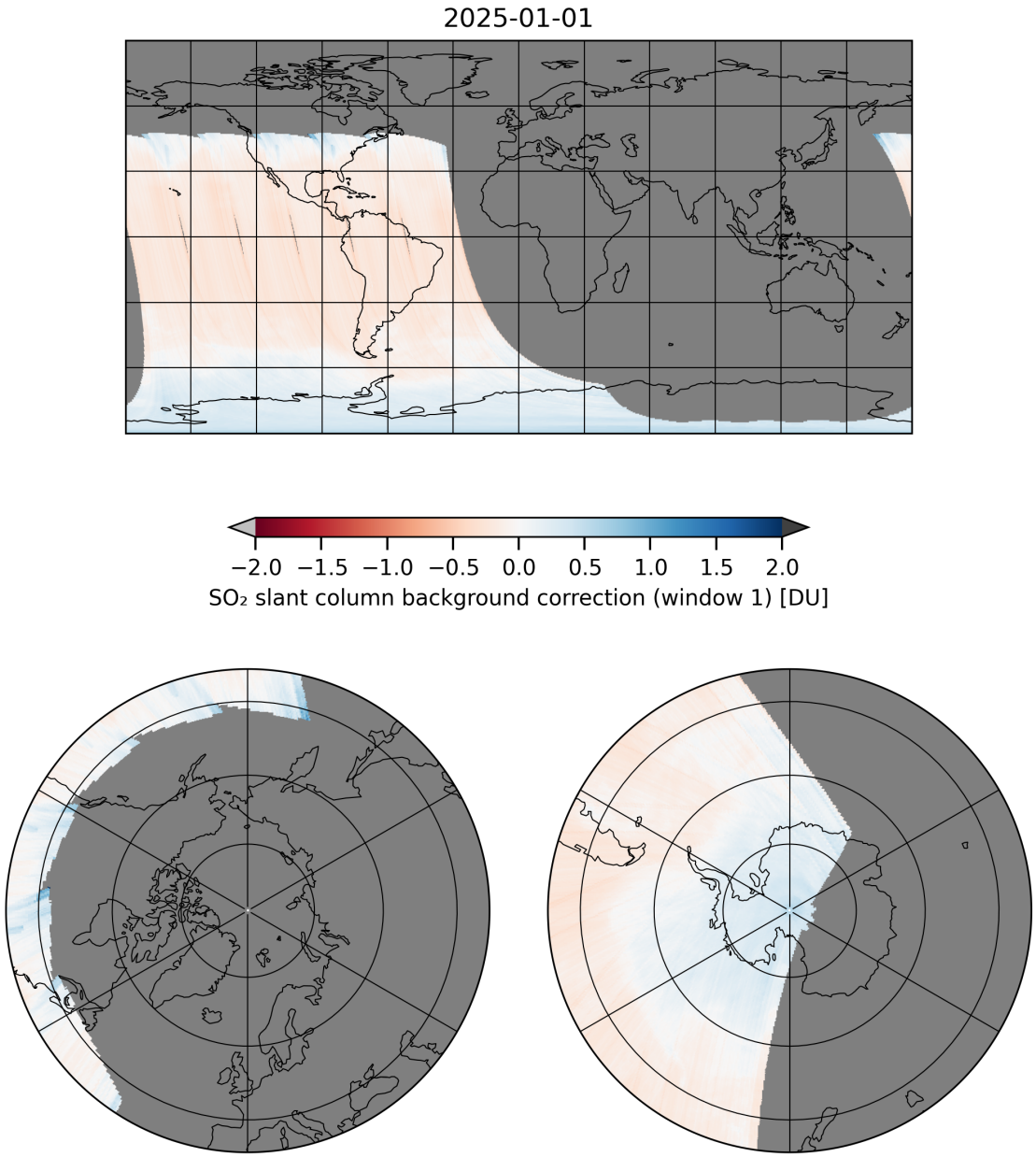


Figure 12: Map of "SO_2 slant column background correction (window 1)" for 2025-01-01 to 2025-01-02

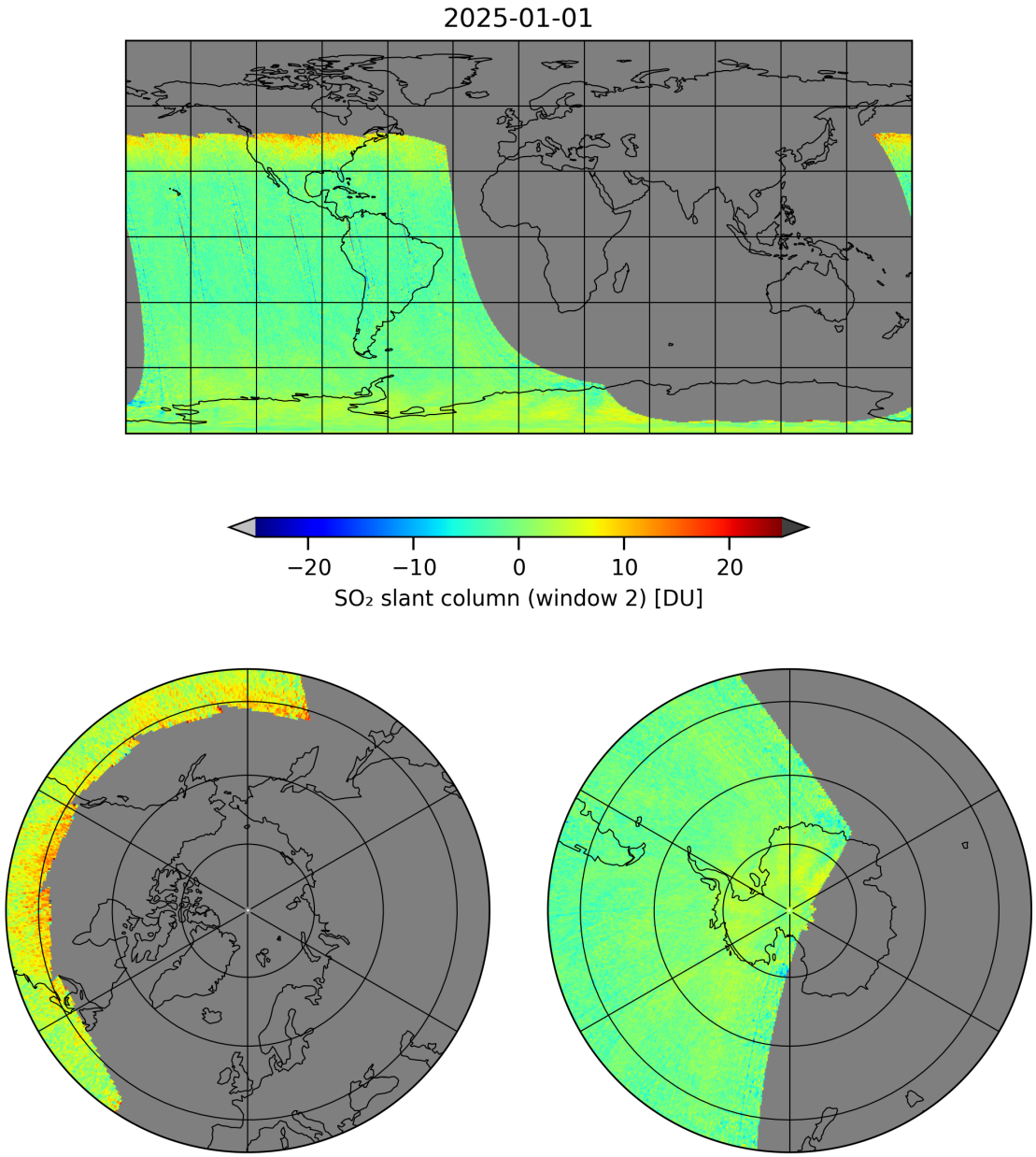


Figure 13: Map of "SO_2 slant column (window 2)" for 2025-01-01 to 2025-01-02

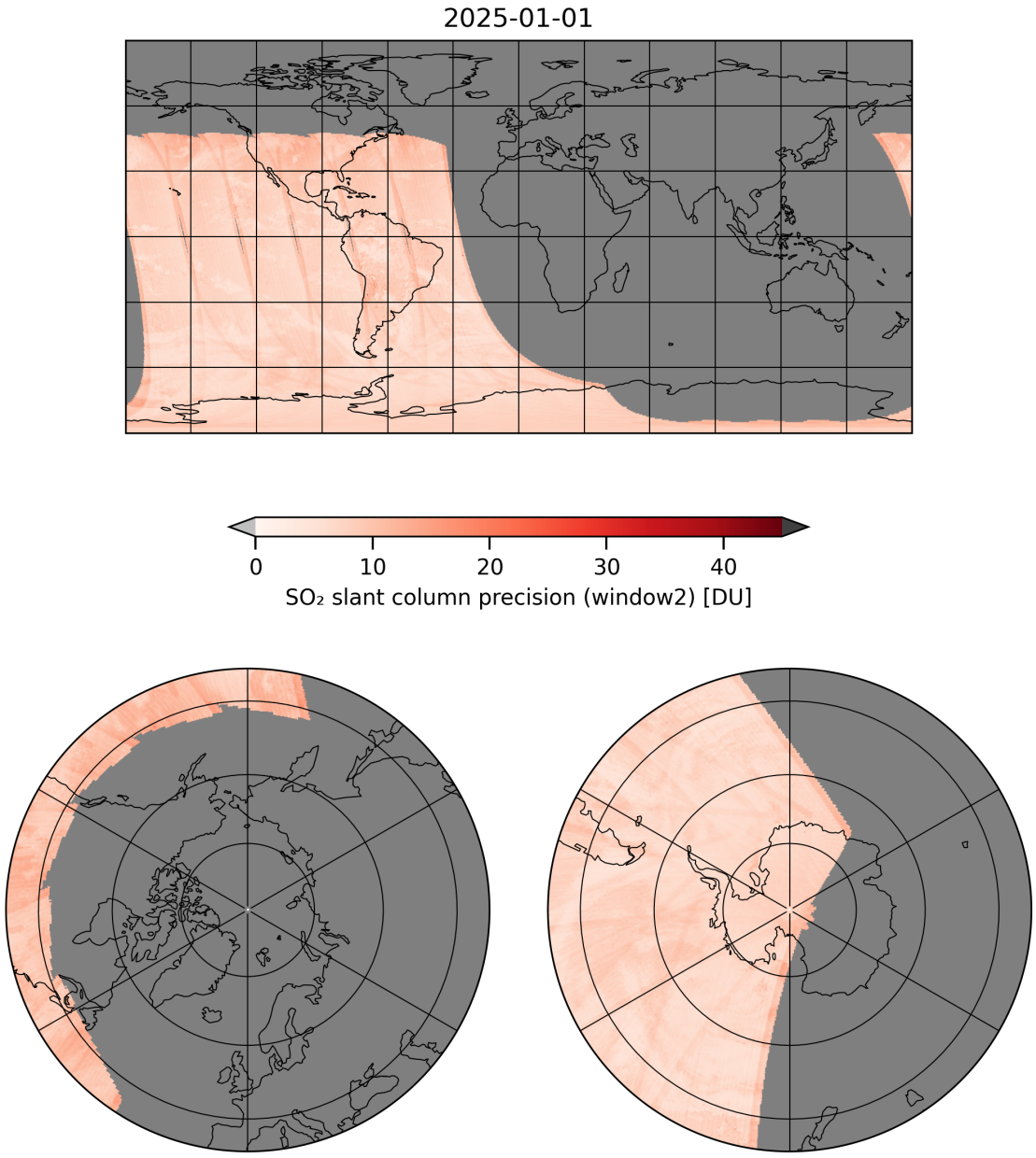


Figure 14: Map of "SO_2 slant column precision (window2)" for 2025-01-01 to 2025-01-02

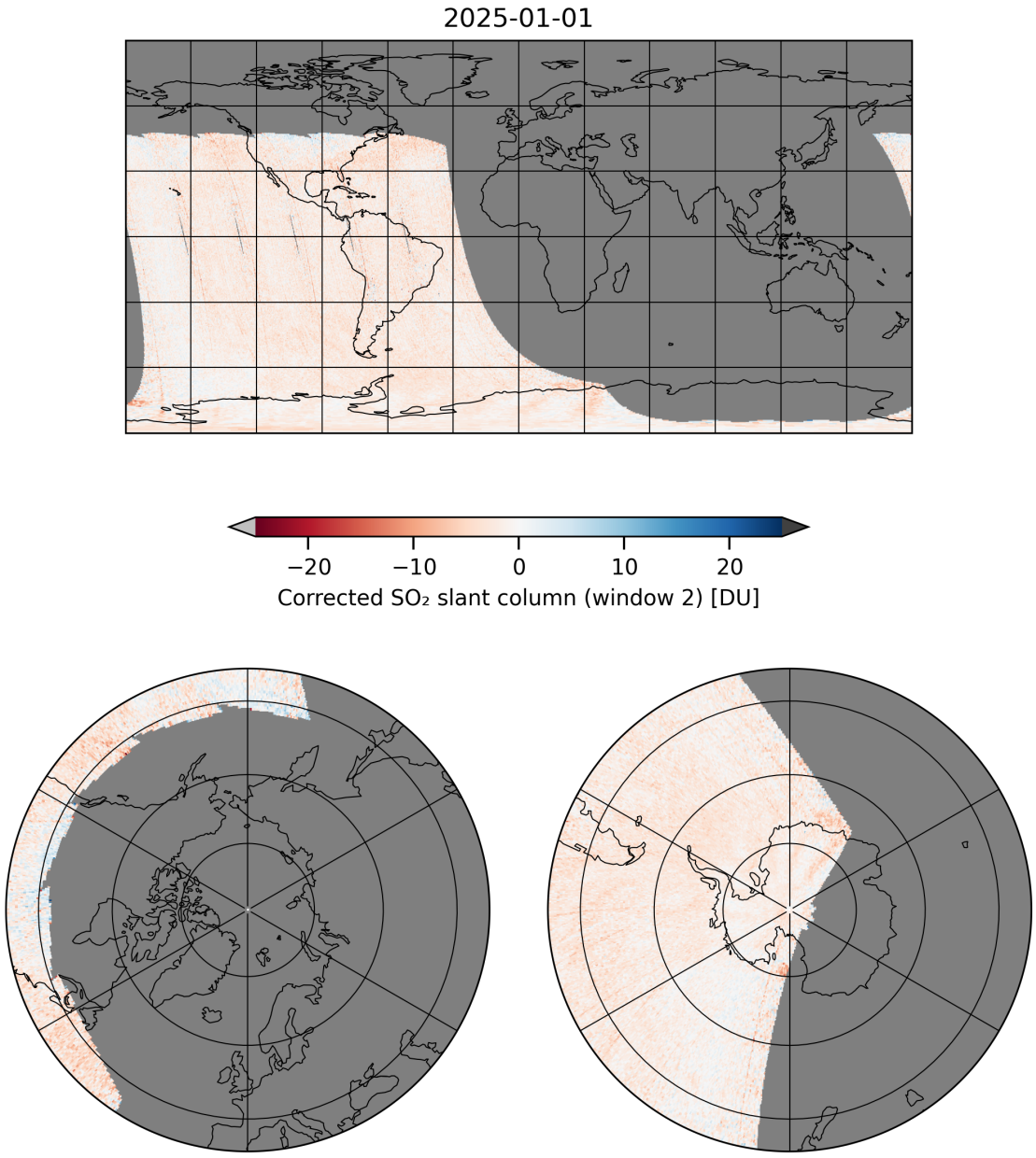


Figure 15: Map of "Corrected SO_2 slant column (window 2)" for 2025-01-01 to 2025-01-02

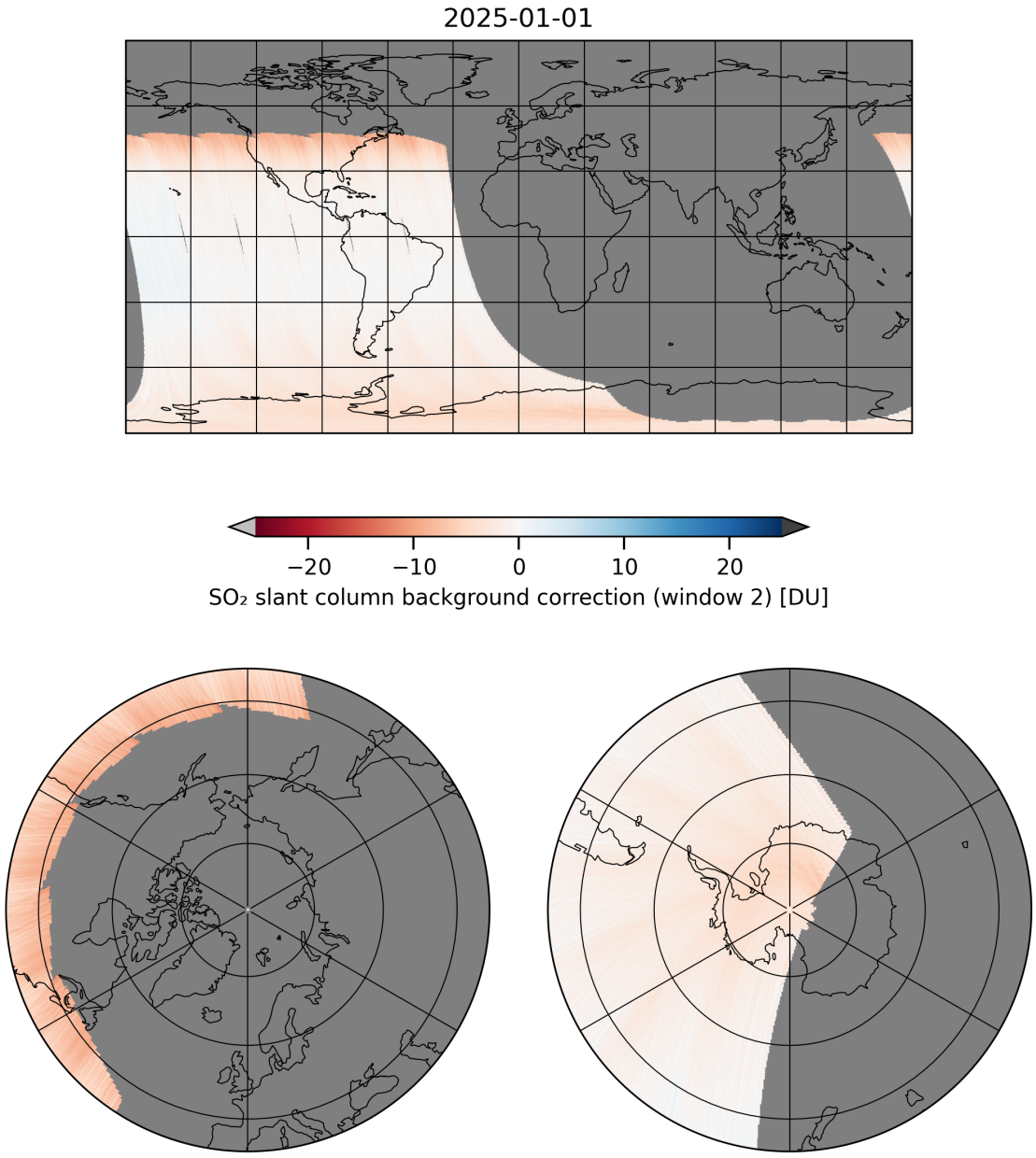


Figure 16: Map of "SO_2 slant column background correction (window 2)" for 2025-01-01 to 2025-01-02

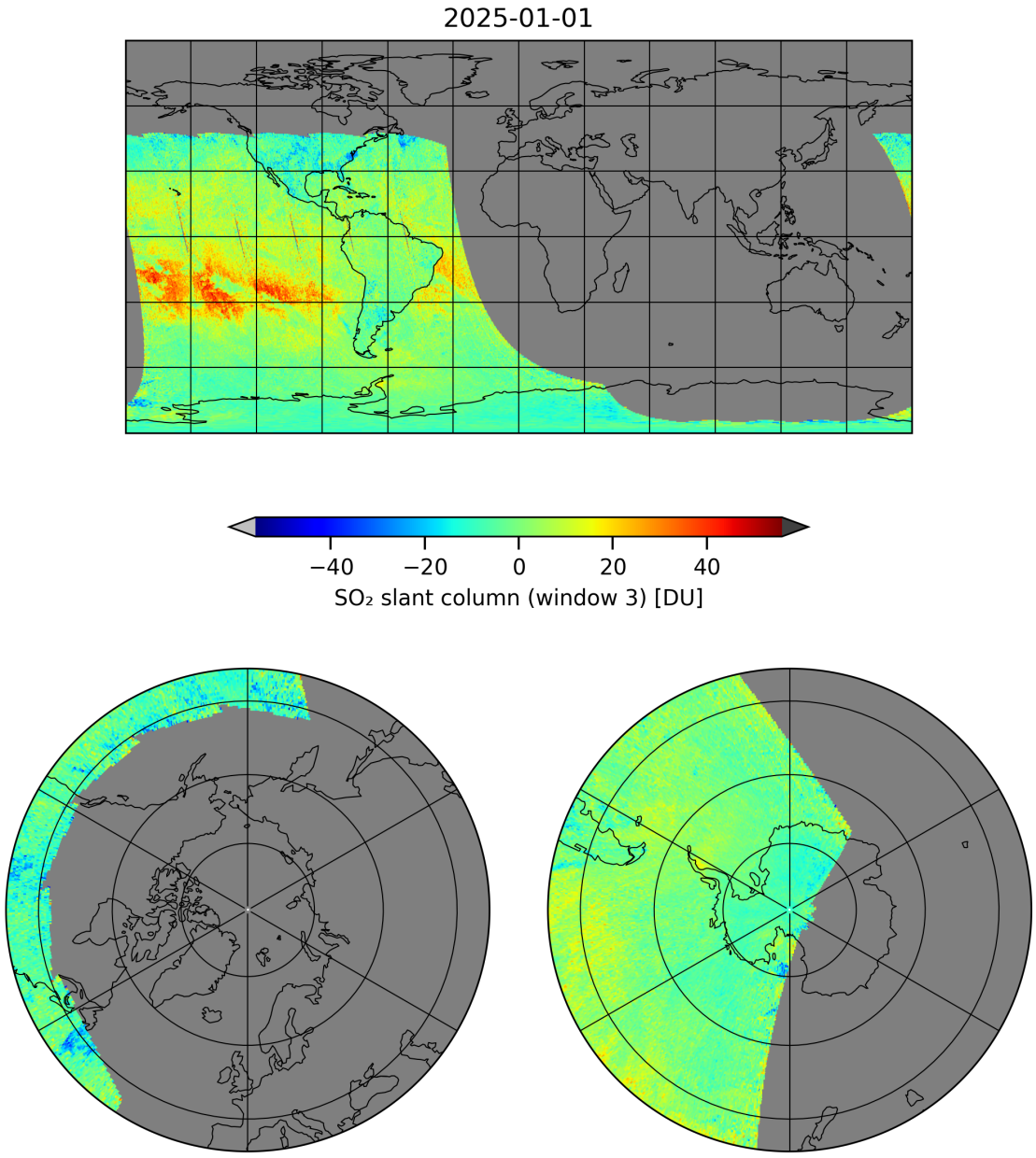


Figure 17: Map of "SO_2 slant column (window 3)" for 2025-01-01 to 2025-01-02

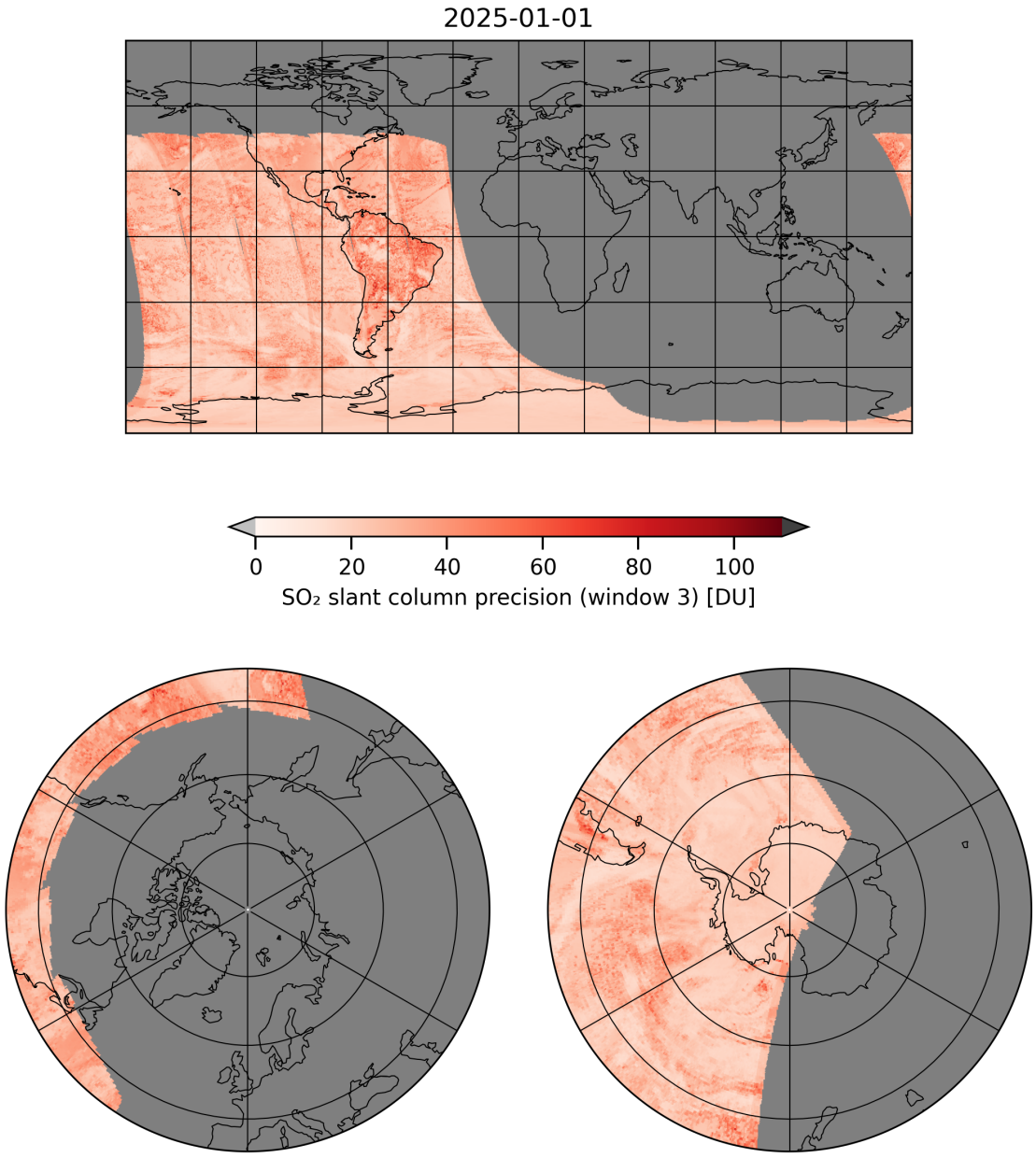


Figure 18: Map of "SO_2 slant column precision (window 3)" for 2025-01-01 to 2025-01-02

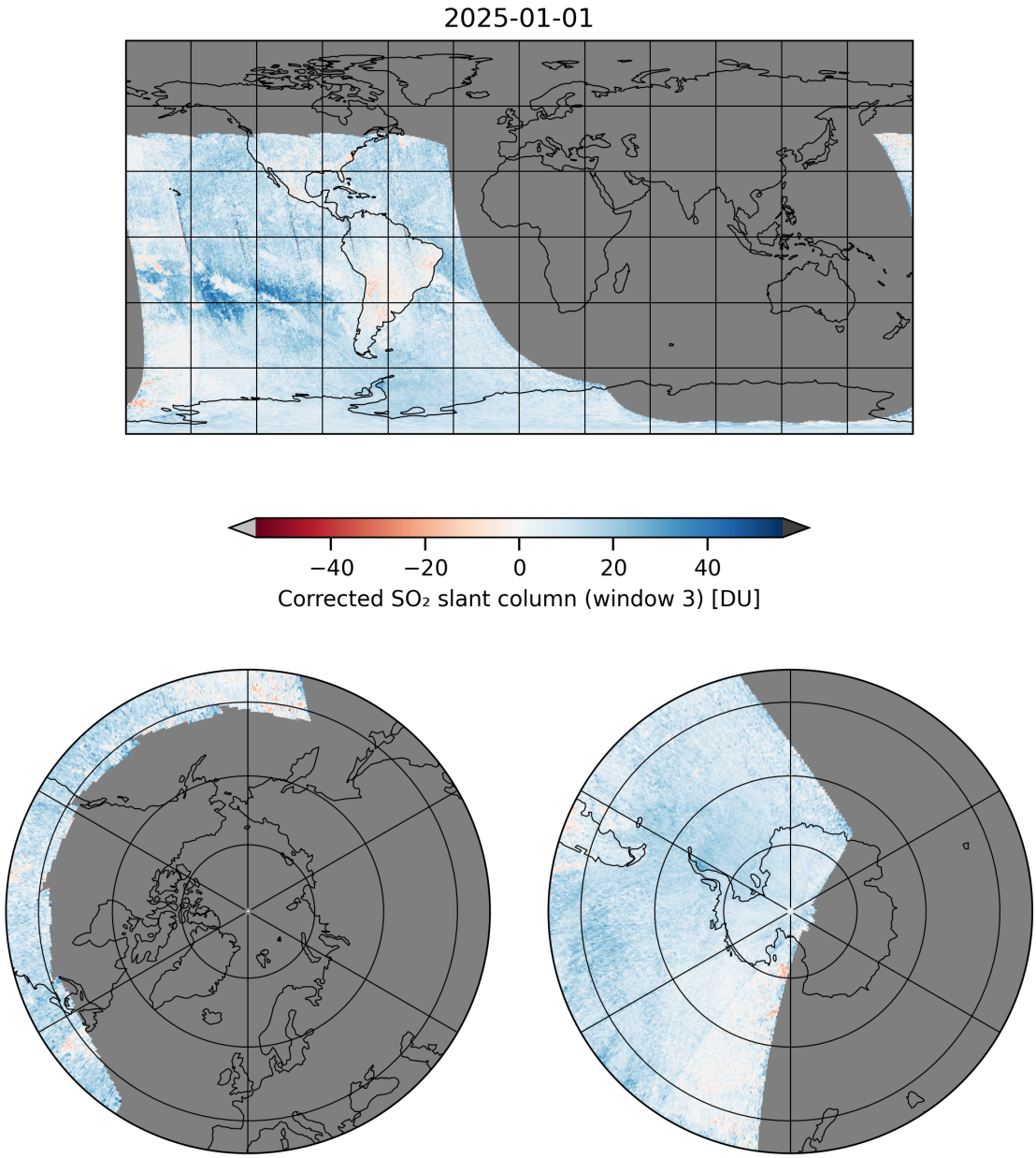


Figure 19: Map of "Corrected SO_2 slant column (window 3)" for 2025-01-01 to 2025-01-02

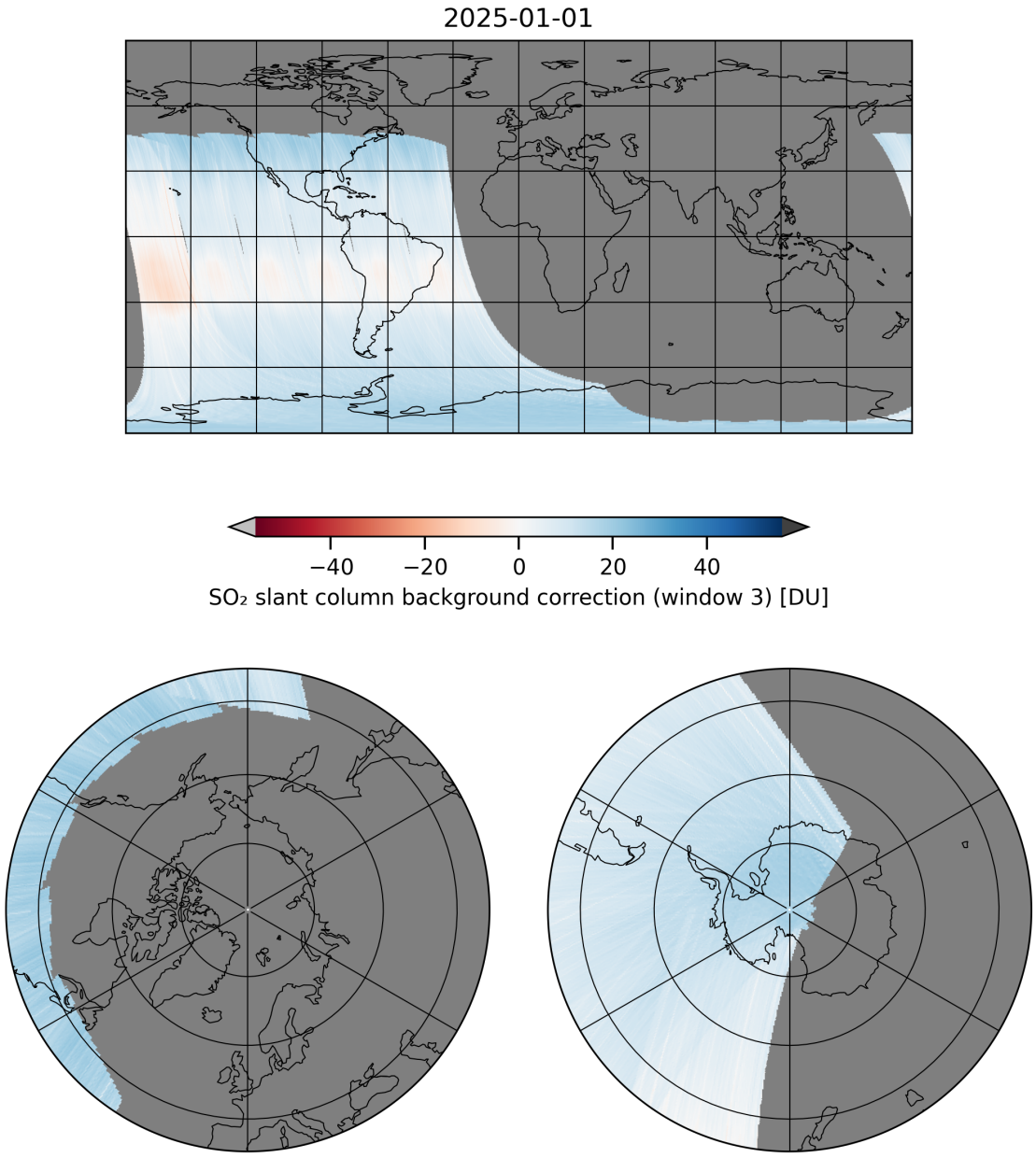


Figure 20: Map of "SO_2 slant column background correction (window 3)" for 2025-01-01 to 2025-01-02

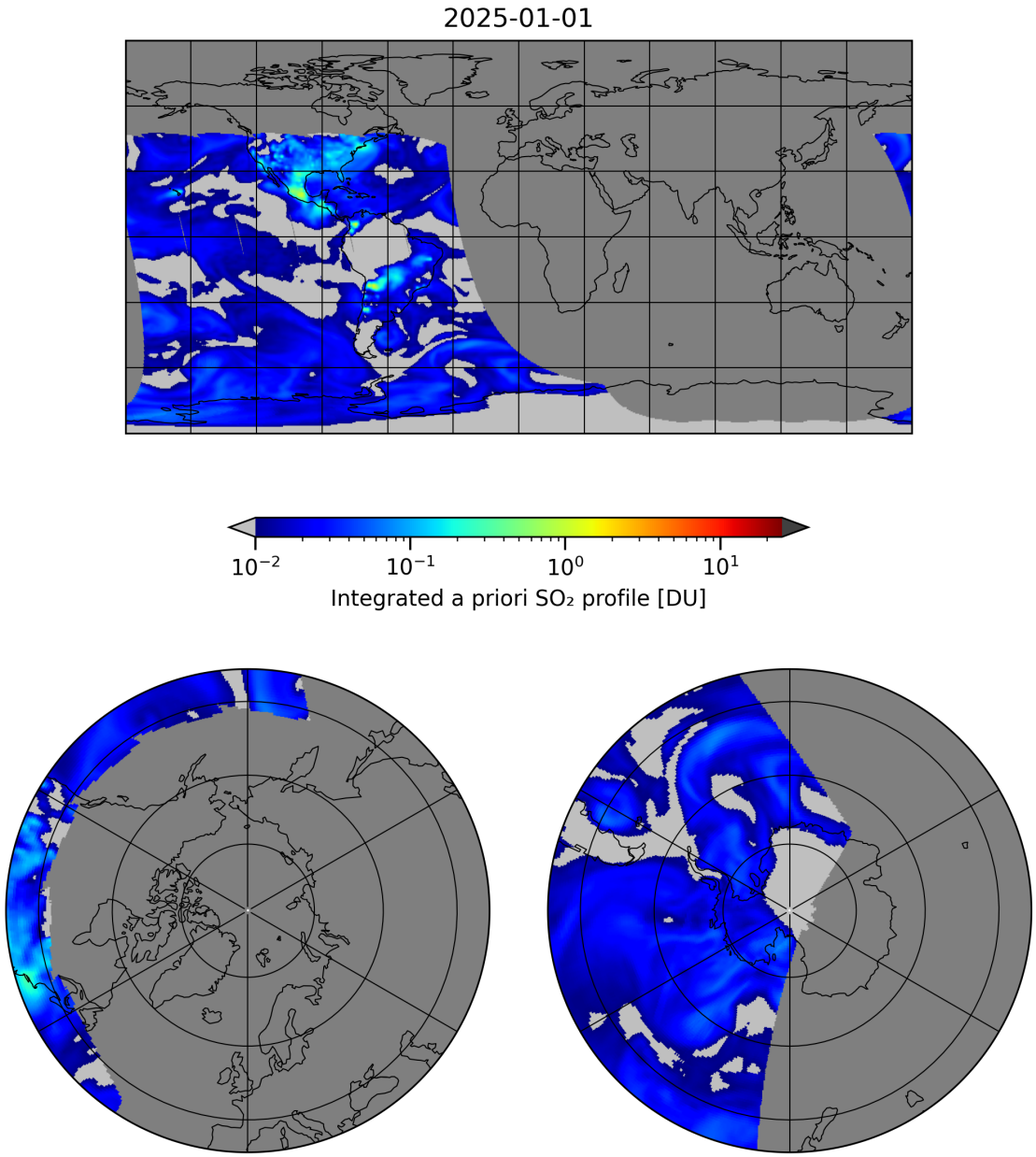


Figure 21: Map of “Integrated a priori SO_2 profile” for 2025-01-01 to 2025-01-02

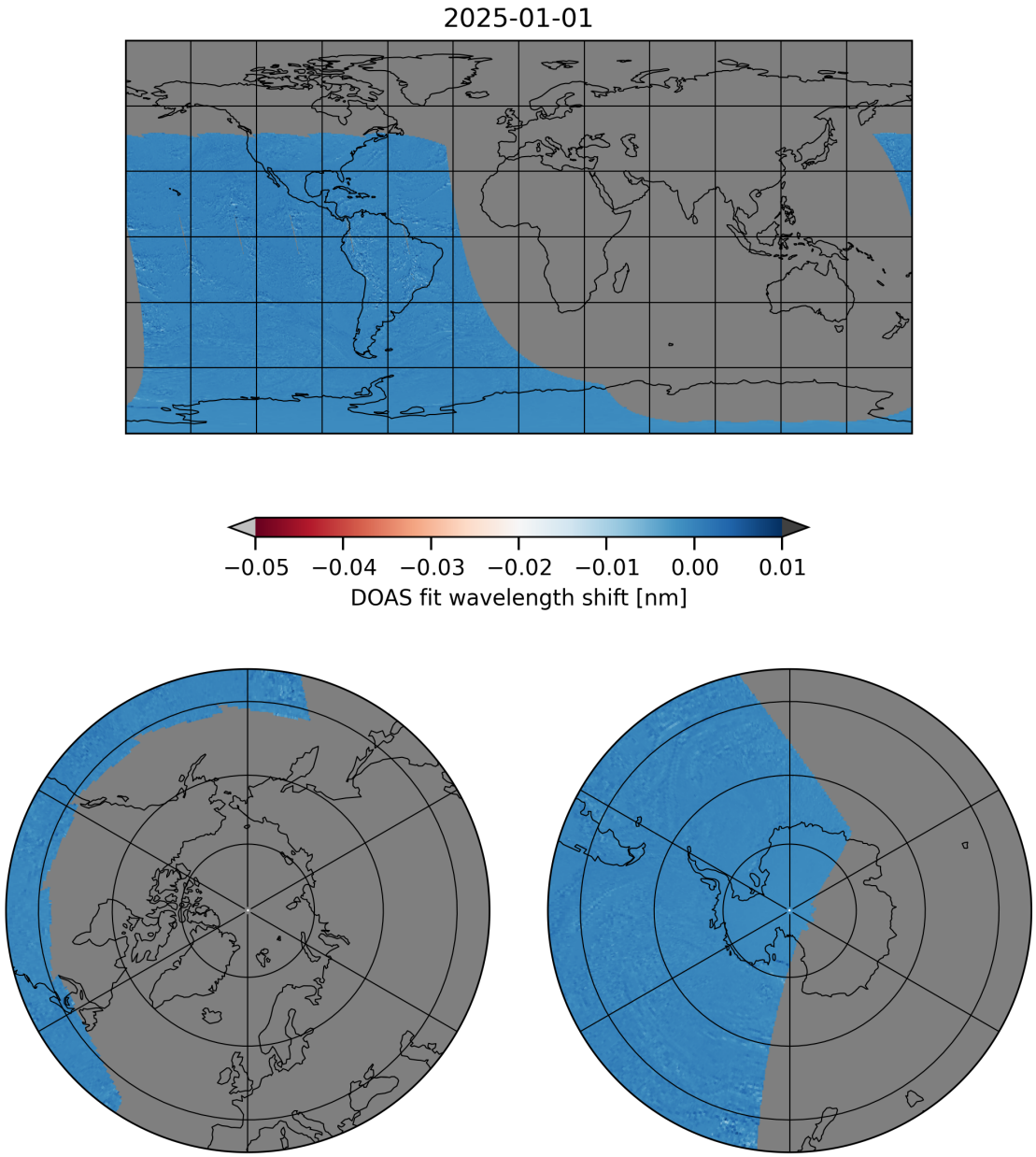


Figure 22: Map of “DOAS fit wavelength shift” for 2025-01-01 to 2025-01-02

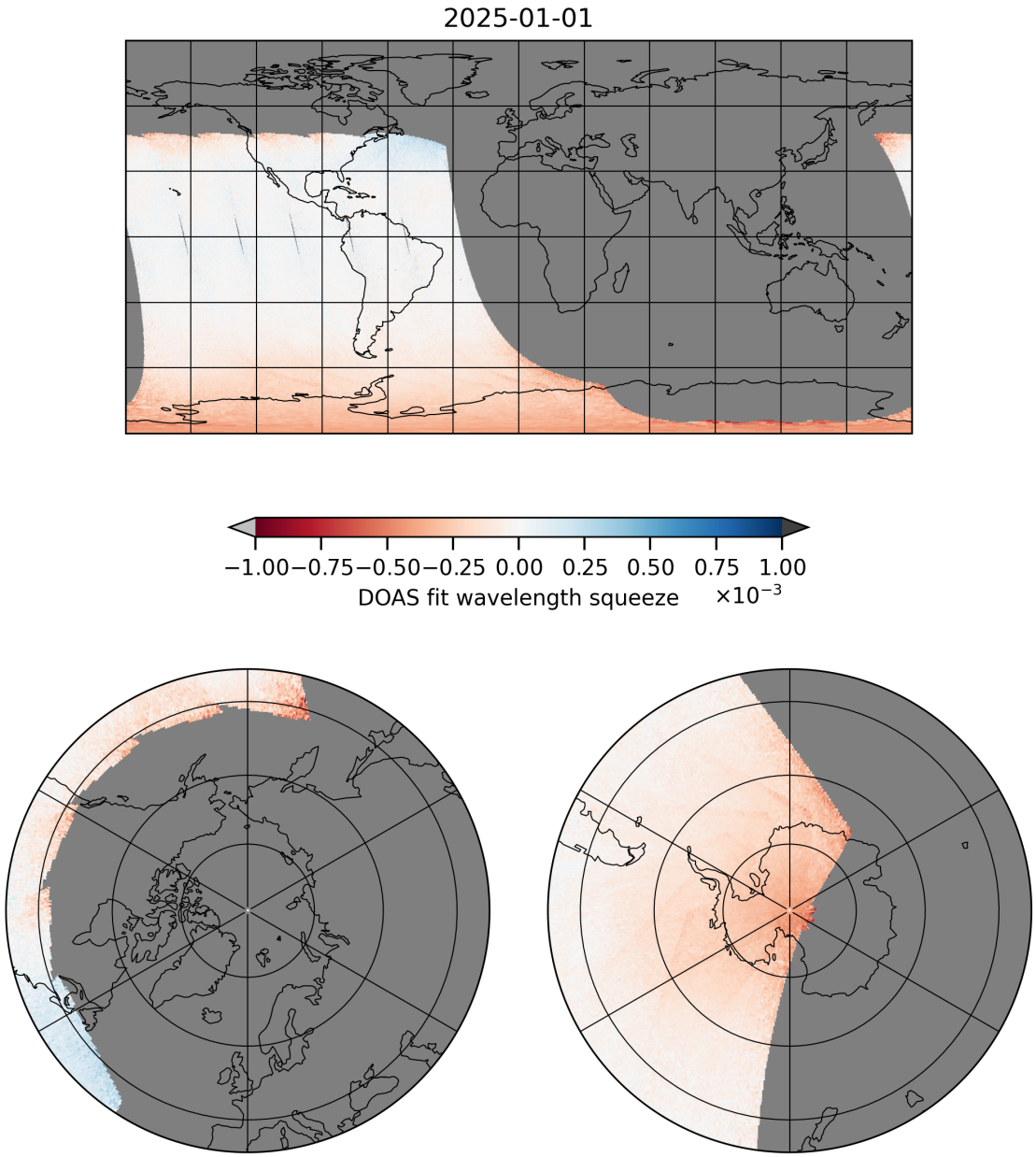


Figure 23: Map of “DOAS fit wavelength squeeze” for 2025-01-01 to 2025-01-02

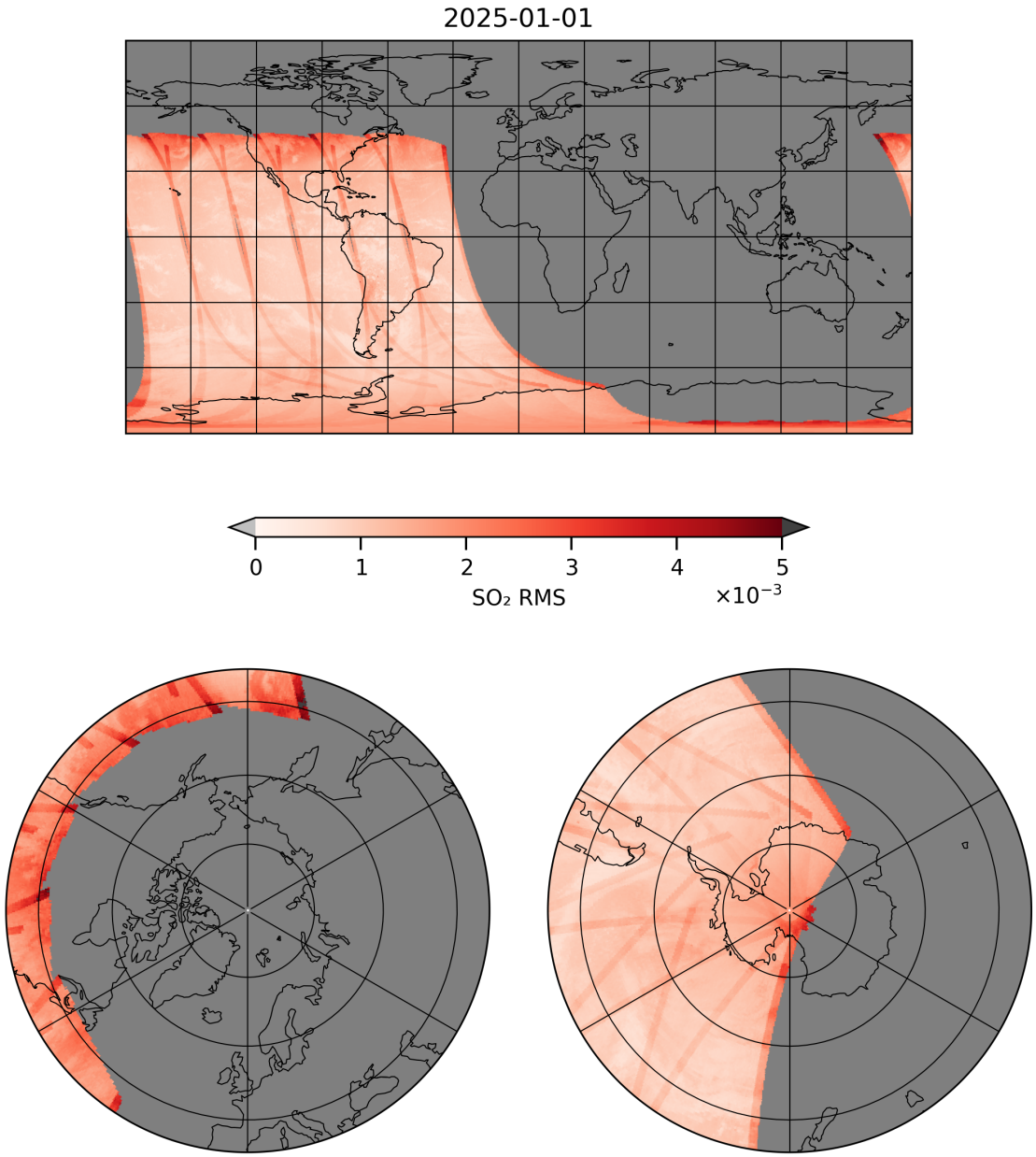


Figure 24: Map of "SO_2 RMS" for 2025-01-01 to 2025-01-02

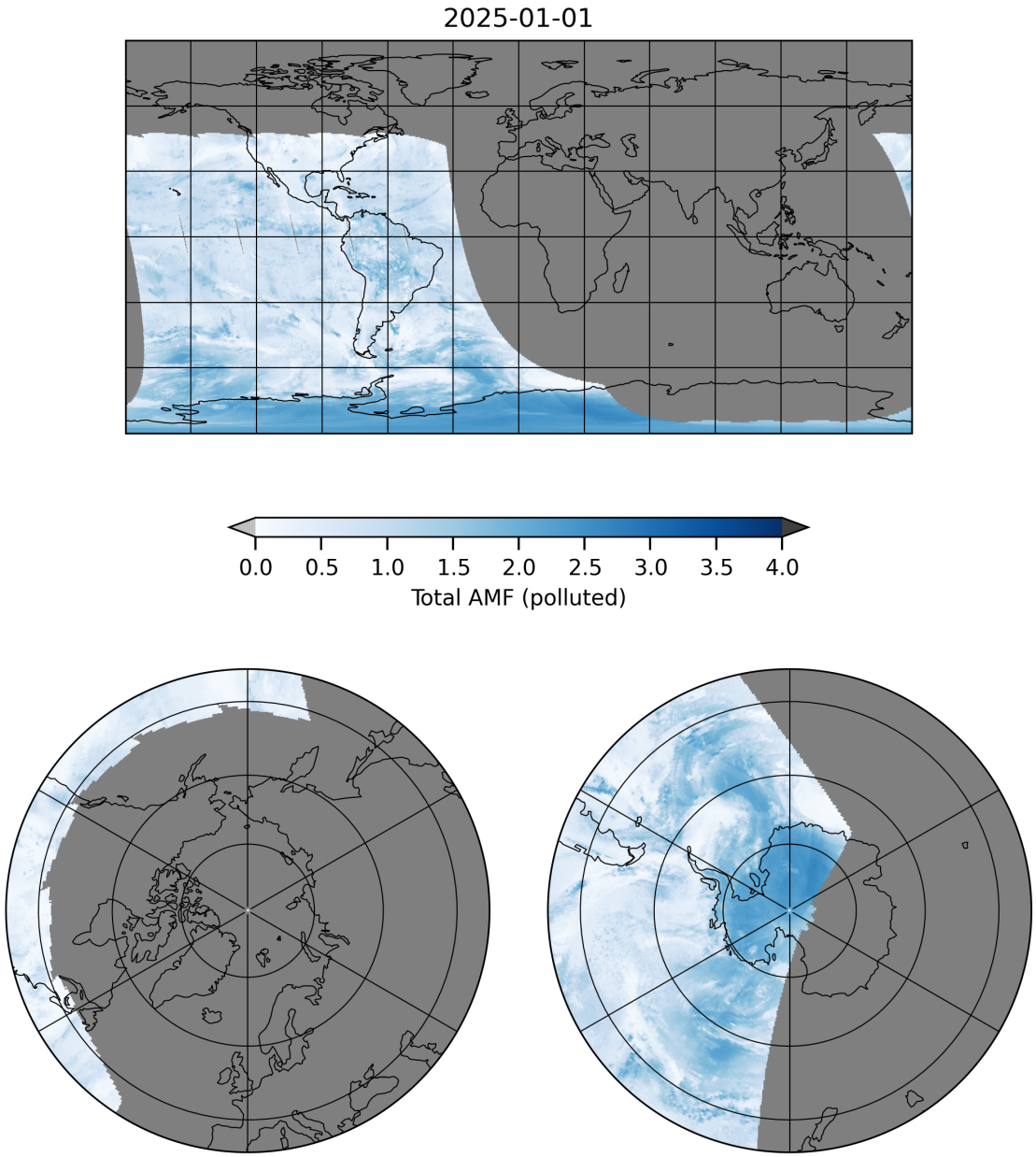


Figure 25: Map of “Total AMF (polluted)” for 2025-01-01 to 2025-01-02

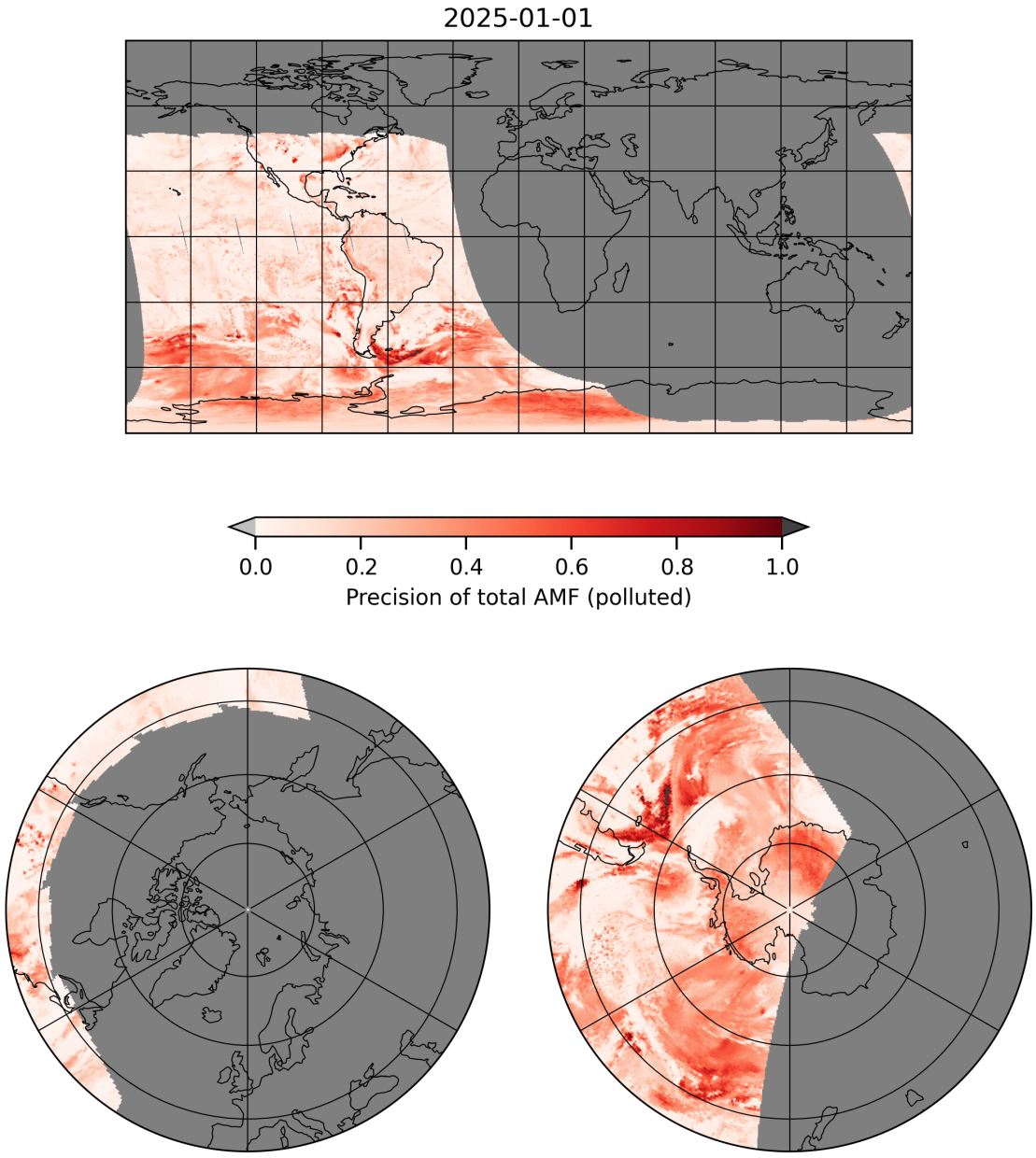


Figure 26: Map of “Precision of total AMF (polluted)” for 2025-01-01 to 2025-01-02

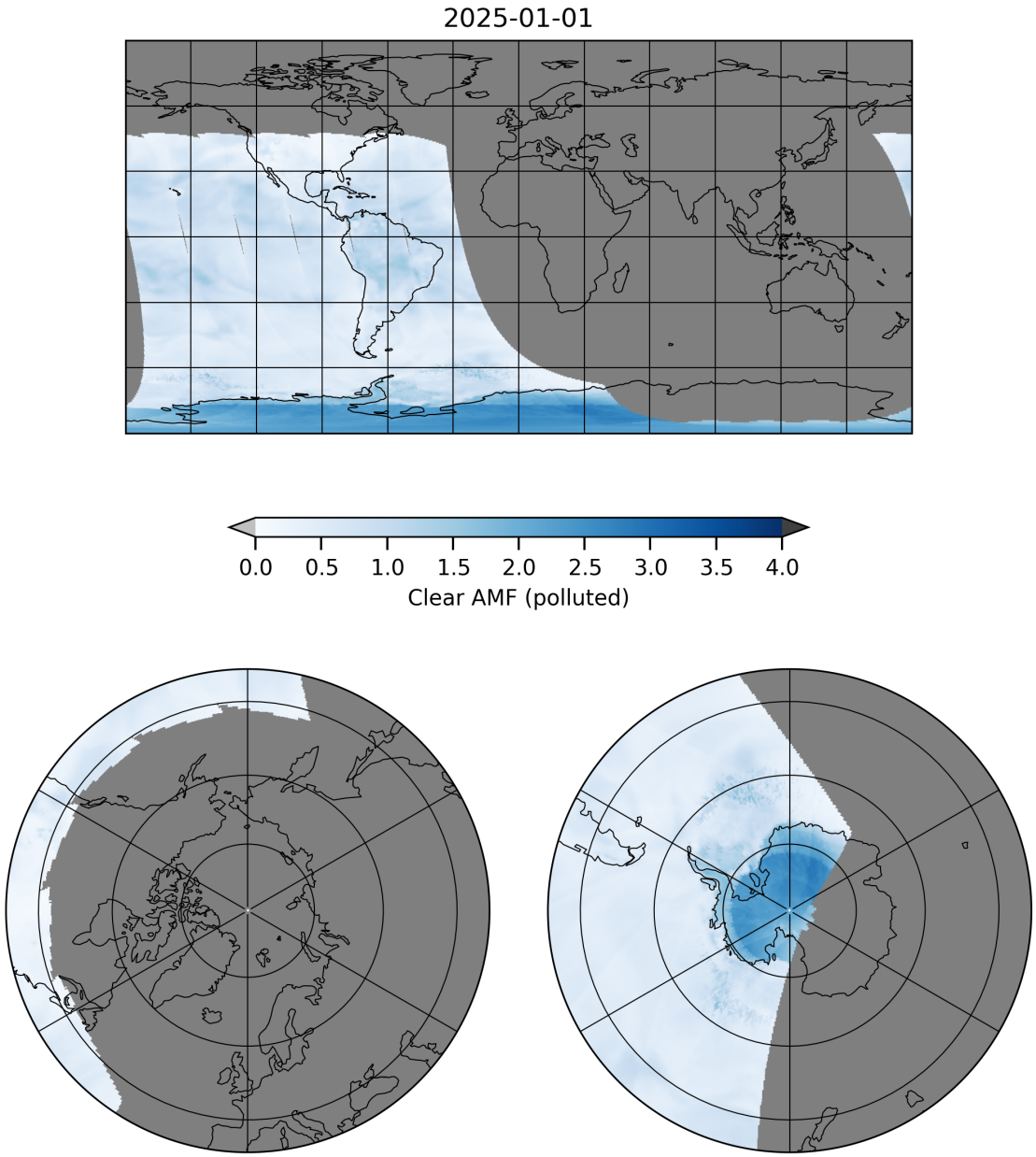


Figure 27: Map of “Clear AMF (polluted)” for 2025-01-01 to 2025-01-02

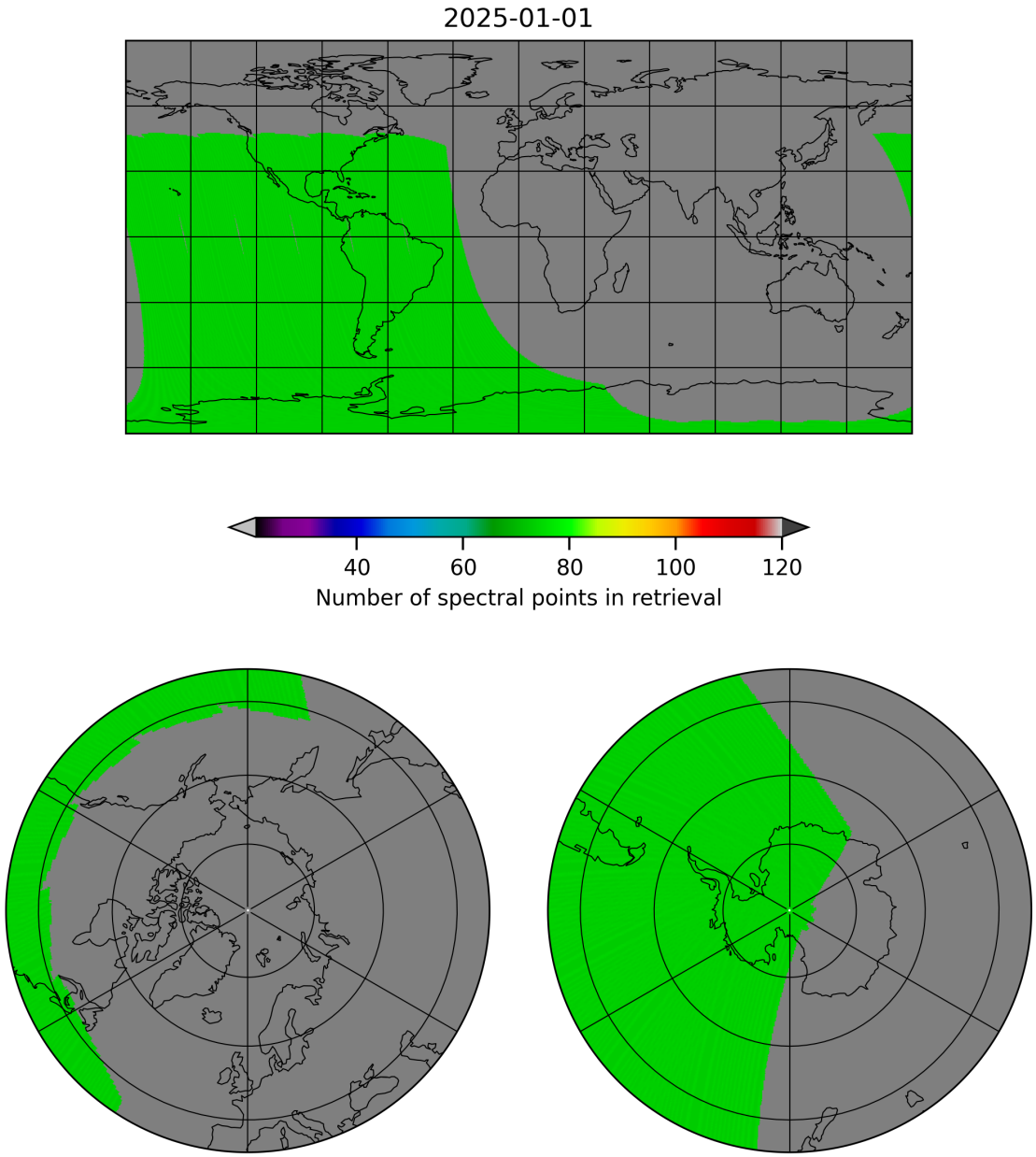


Figure 28: Map of “Number of spectral points in retrieval” for 2025-01-01 to 2025-01-02

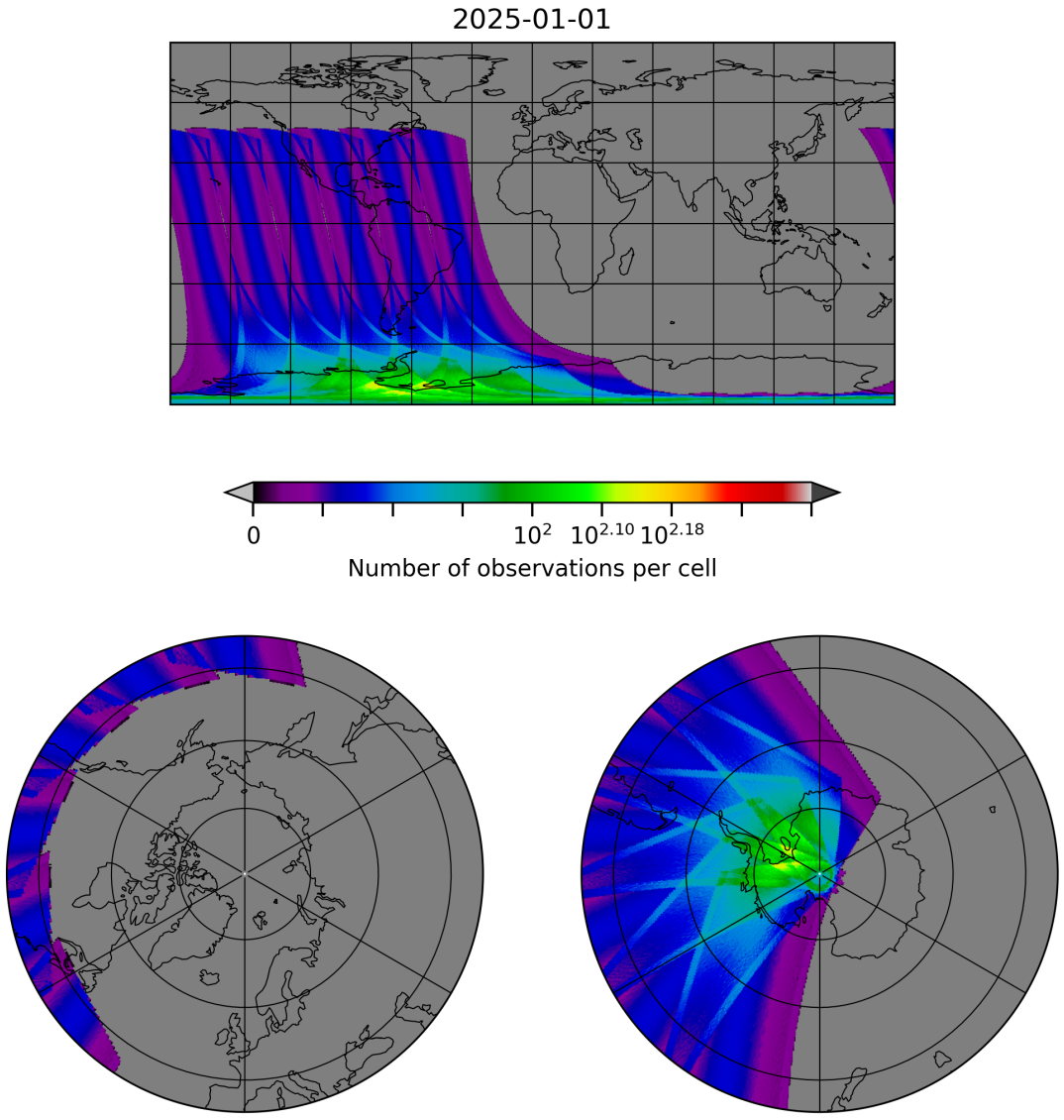


Figure 29: Map of the number of observations for 2025-01-01 to 2025-01-02

7 Zonal average

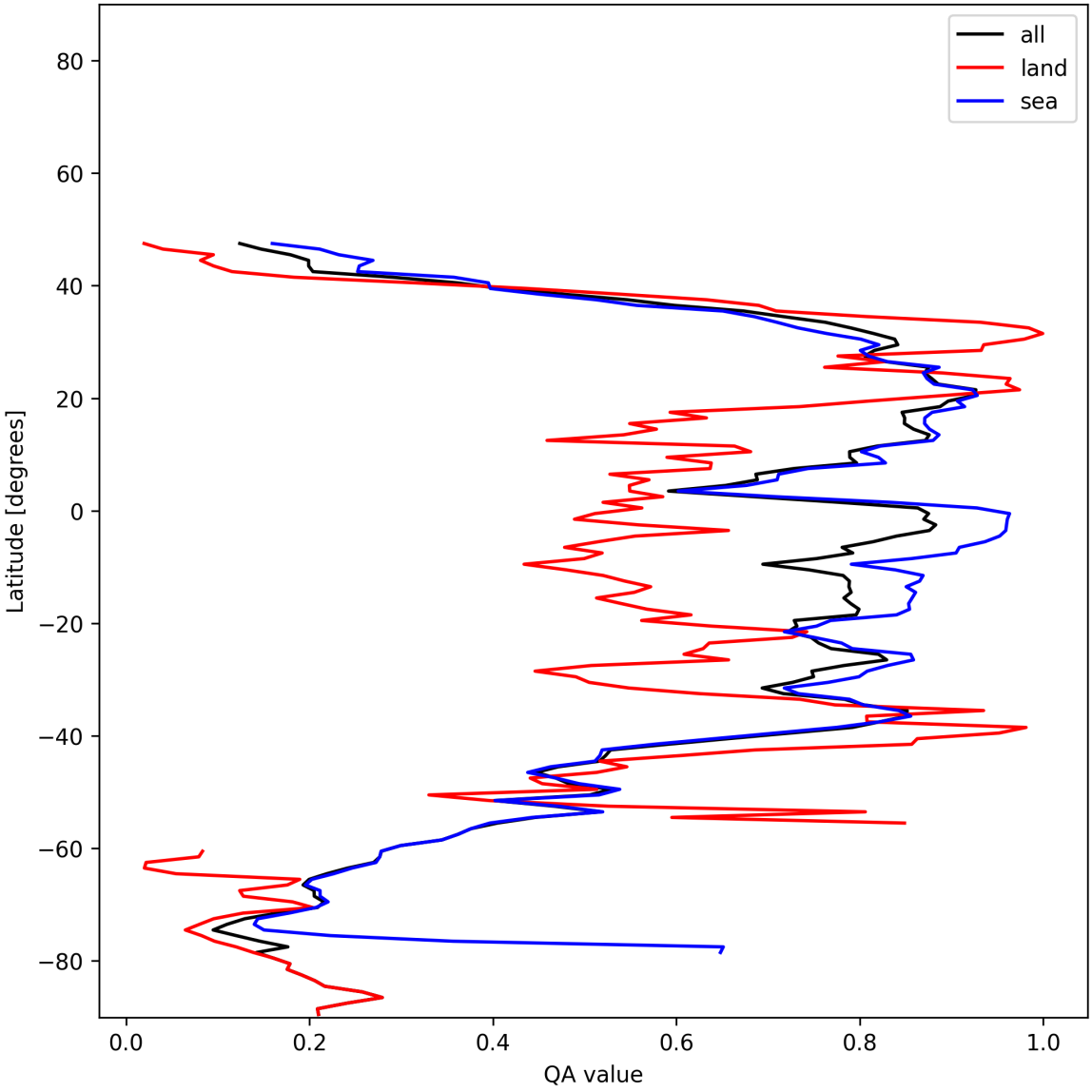


Figure 30: Zonal average of “QA value” for 2025-01-01 to 2025-01-02.

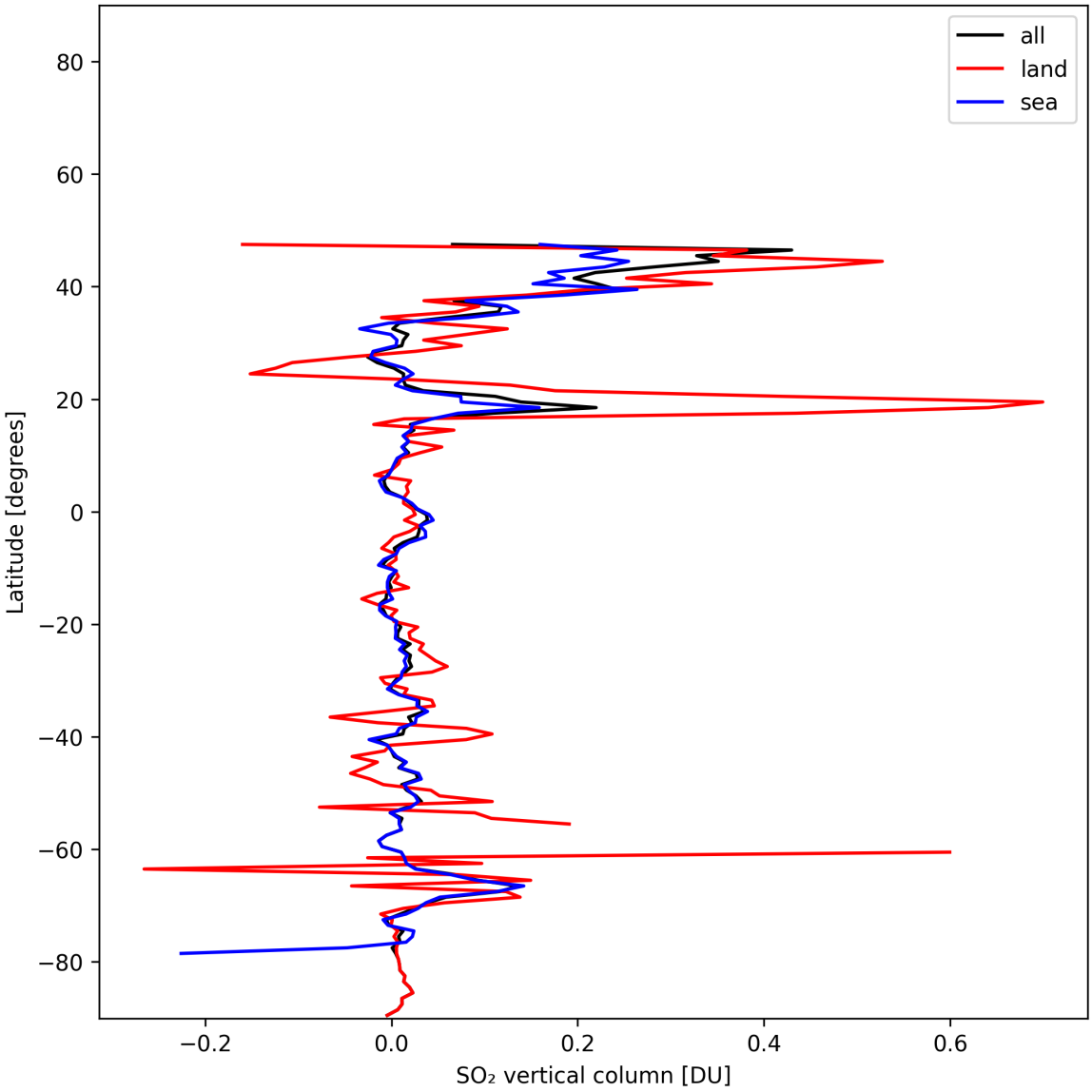


Figure 31: Zonal average of "SO_2 vertical column" for 2025-01-01 to 2025-01-02.

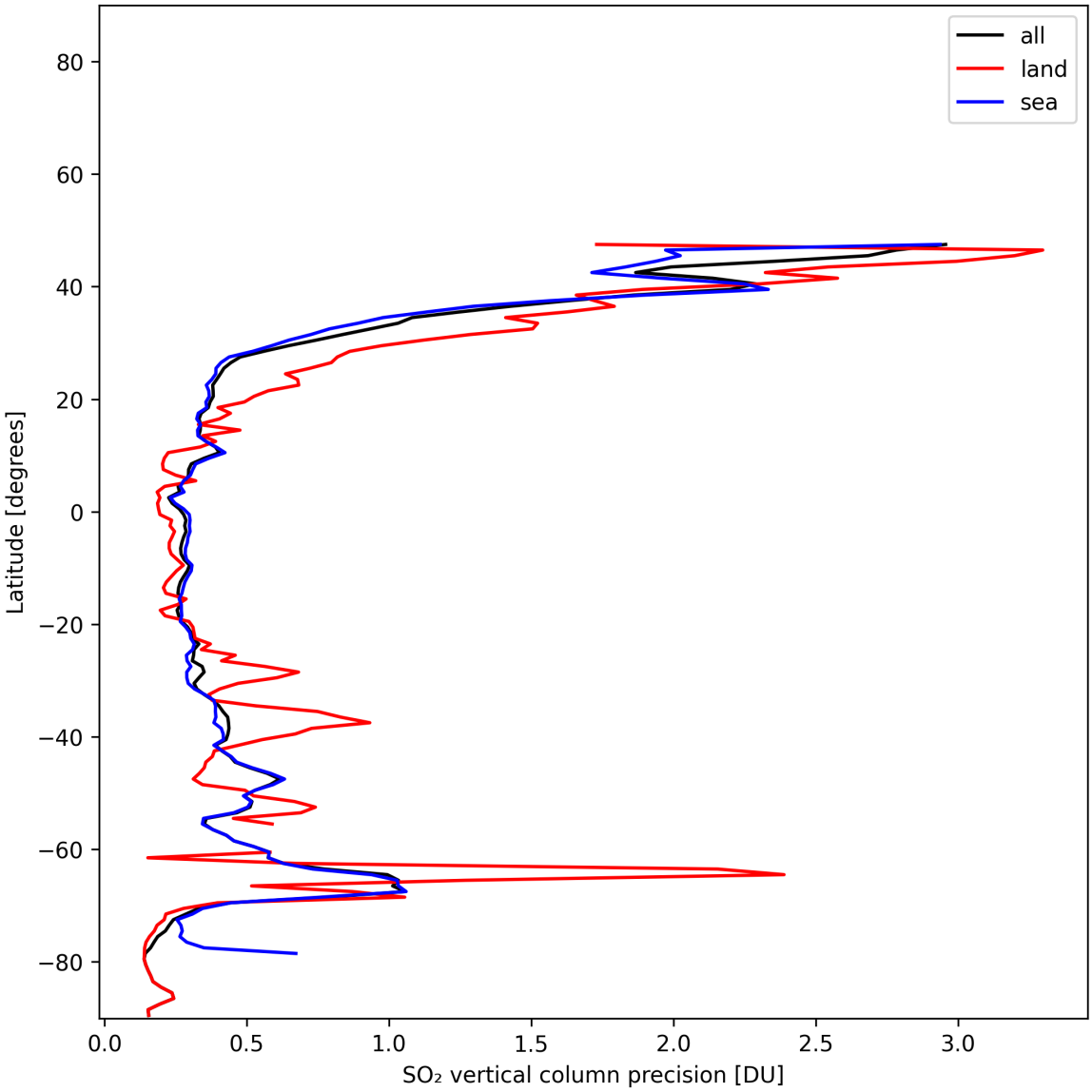


Figure 32: Zonal average of "SO_2 vertical column precision" for 2025-01-01 to 2025-01-02.

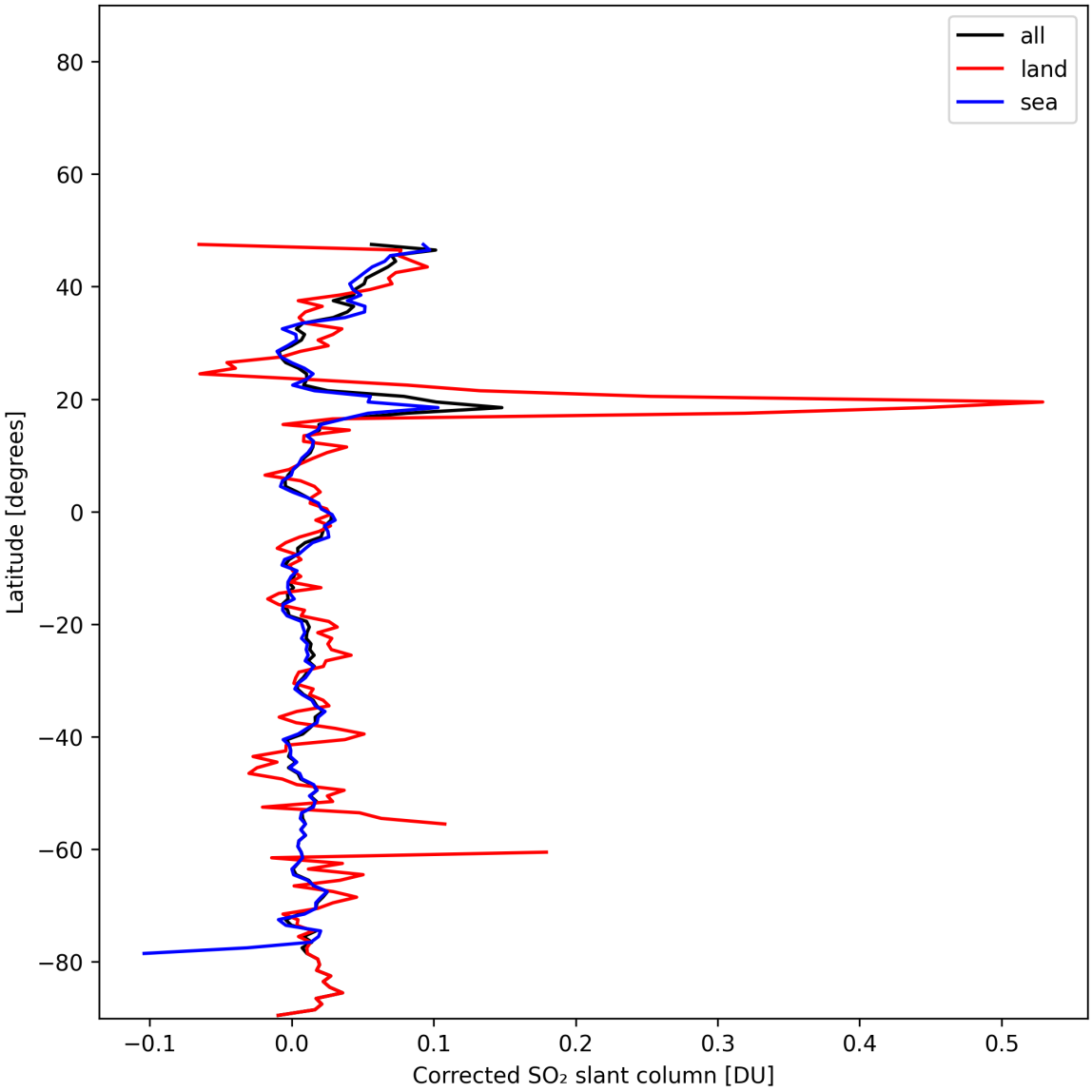


Figure 33: Zonal average of “Corrected SO_2 slant column” for 2025-01-01 to 2025-01-02.

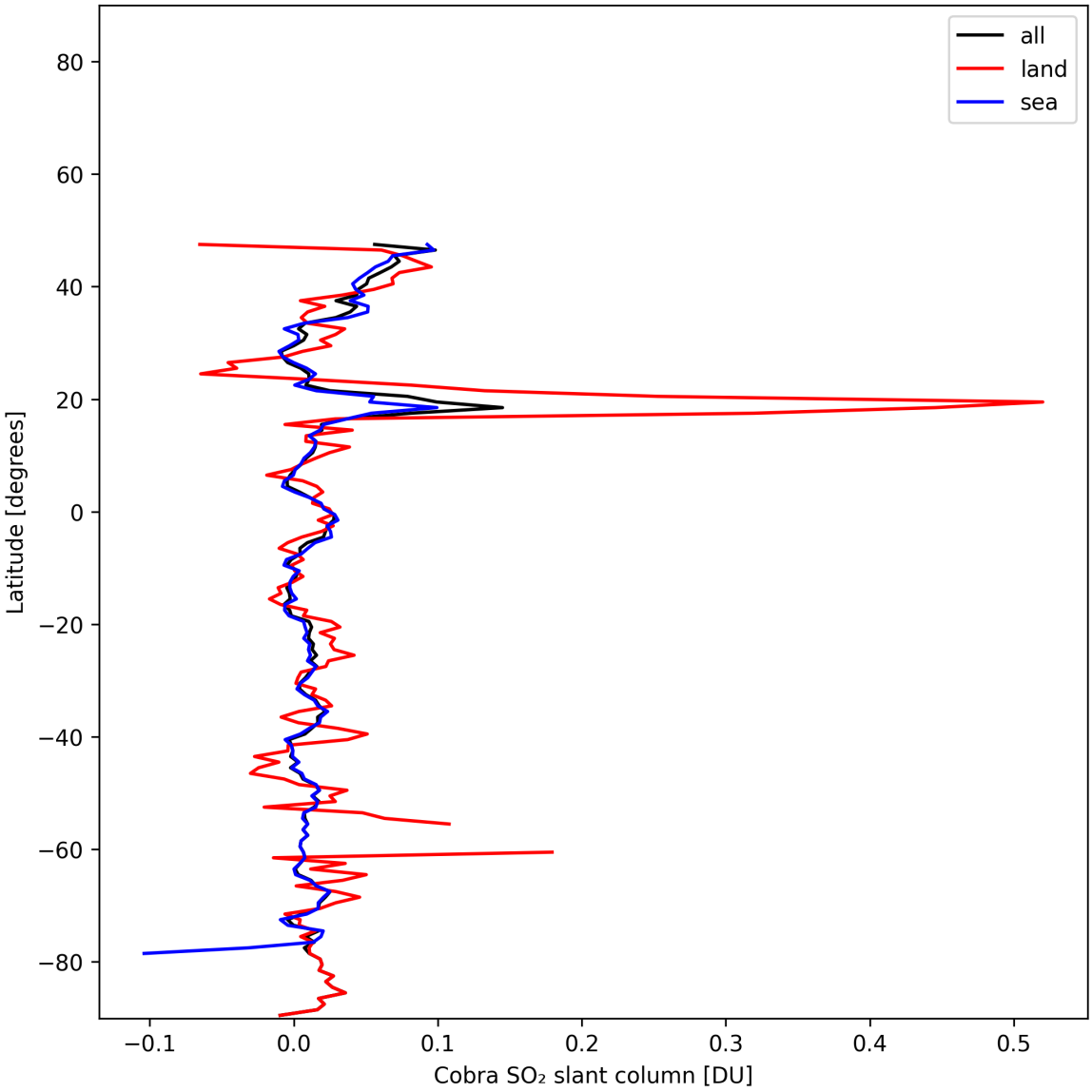


Figure 34: Zonal average of "Cobra SO_2 slant column" for 2025-01-01 to 2025-01-02.

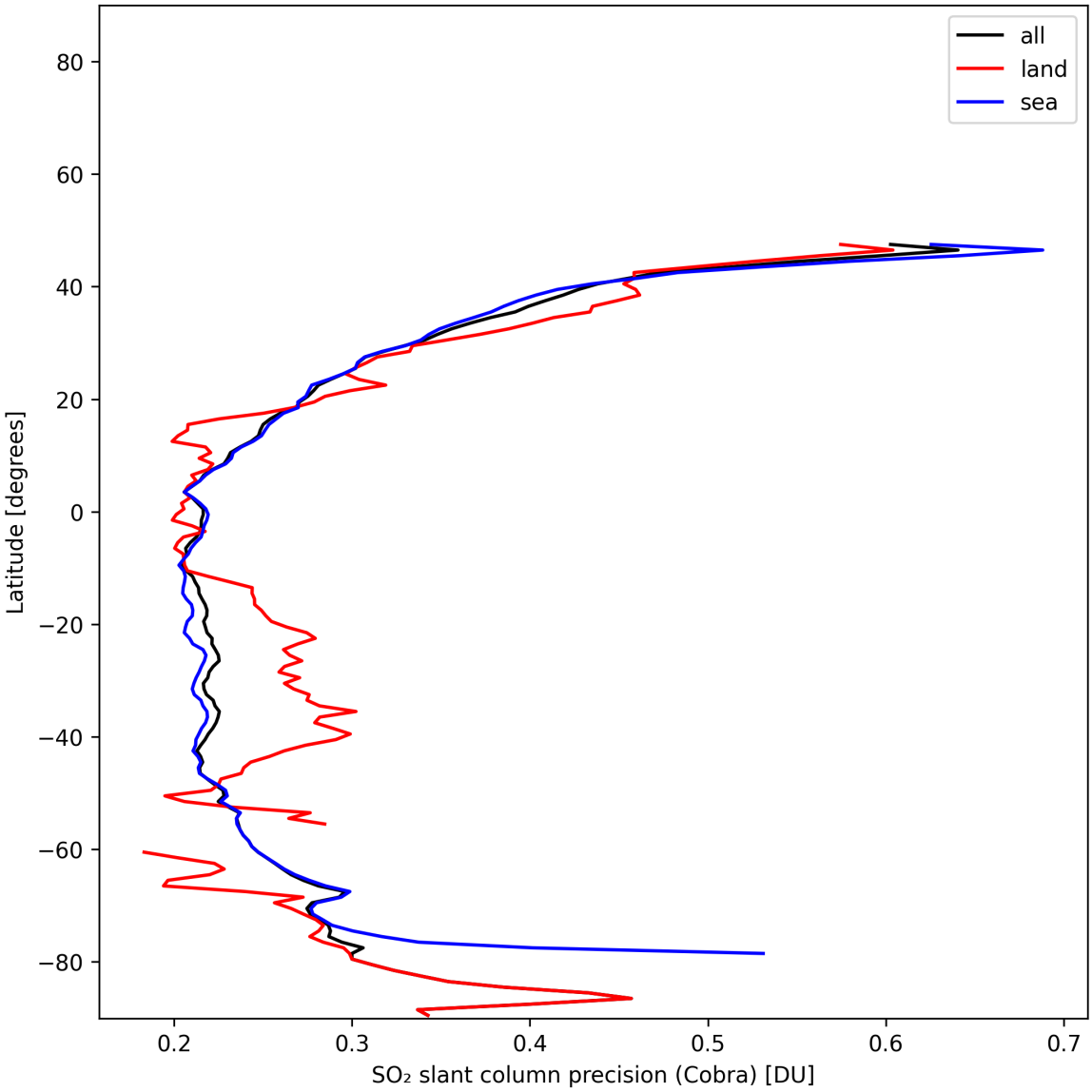


Figure 35: Zonal average of "SO_2 slant column precision (Cobra)" for 2025-01-01 to 2025-01-02.

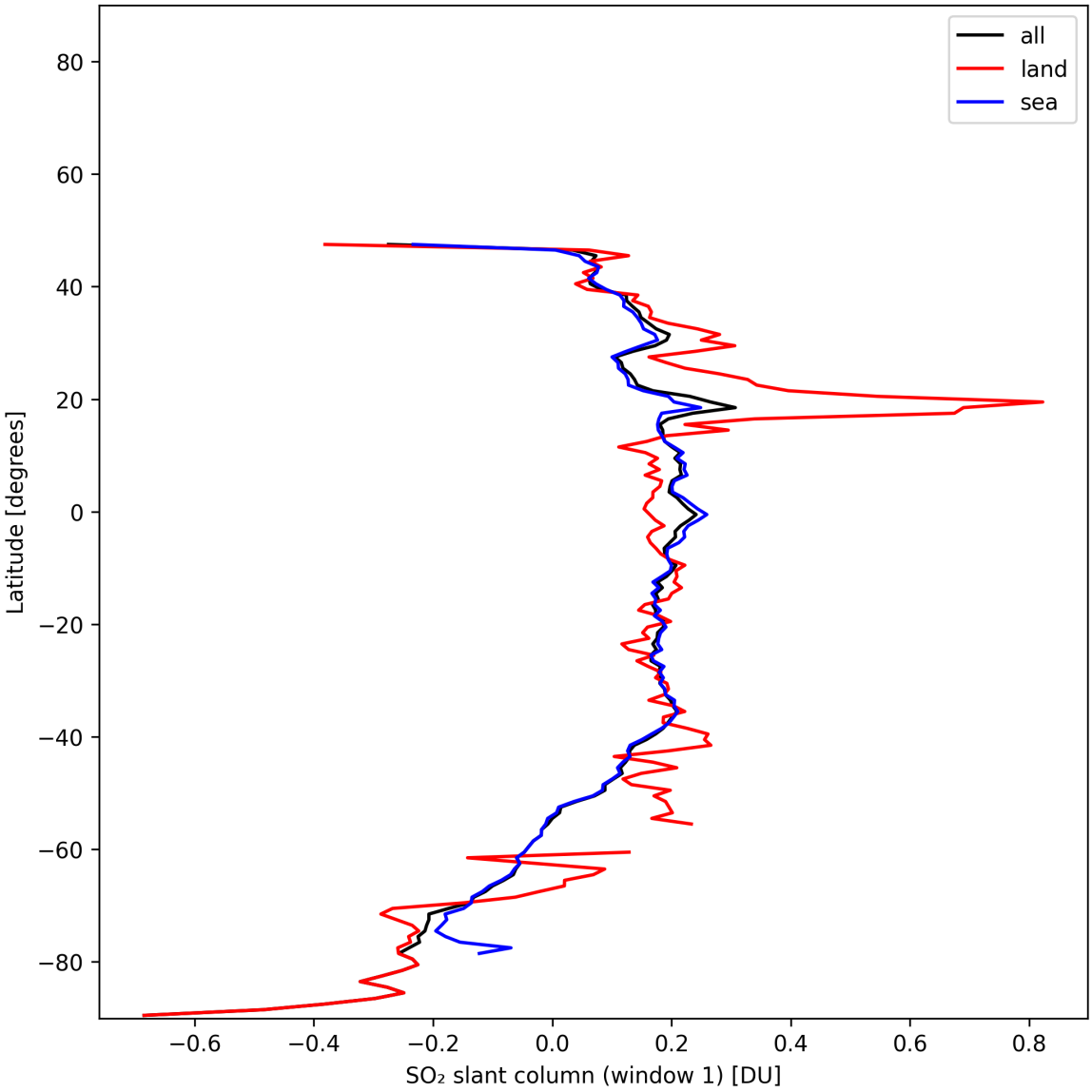


Figure 36: Zonal average of "SO_2 slant column (window 1)" for 2025-01-01 to 2025-01-02.

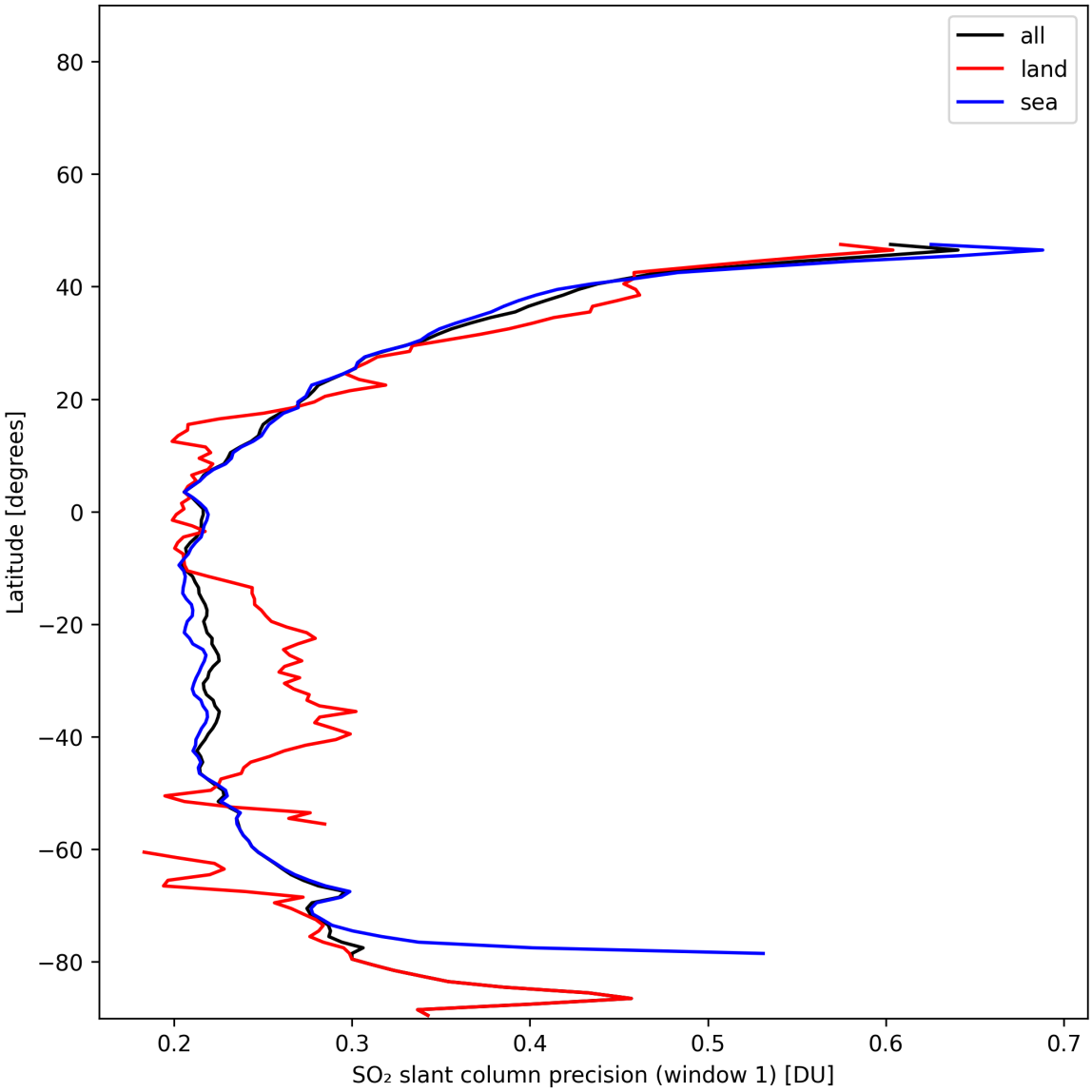


Figure 37: Zonal average of "SO_2 slant column precision (window 1)" for 2025-01-01 to 2025-01-02.

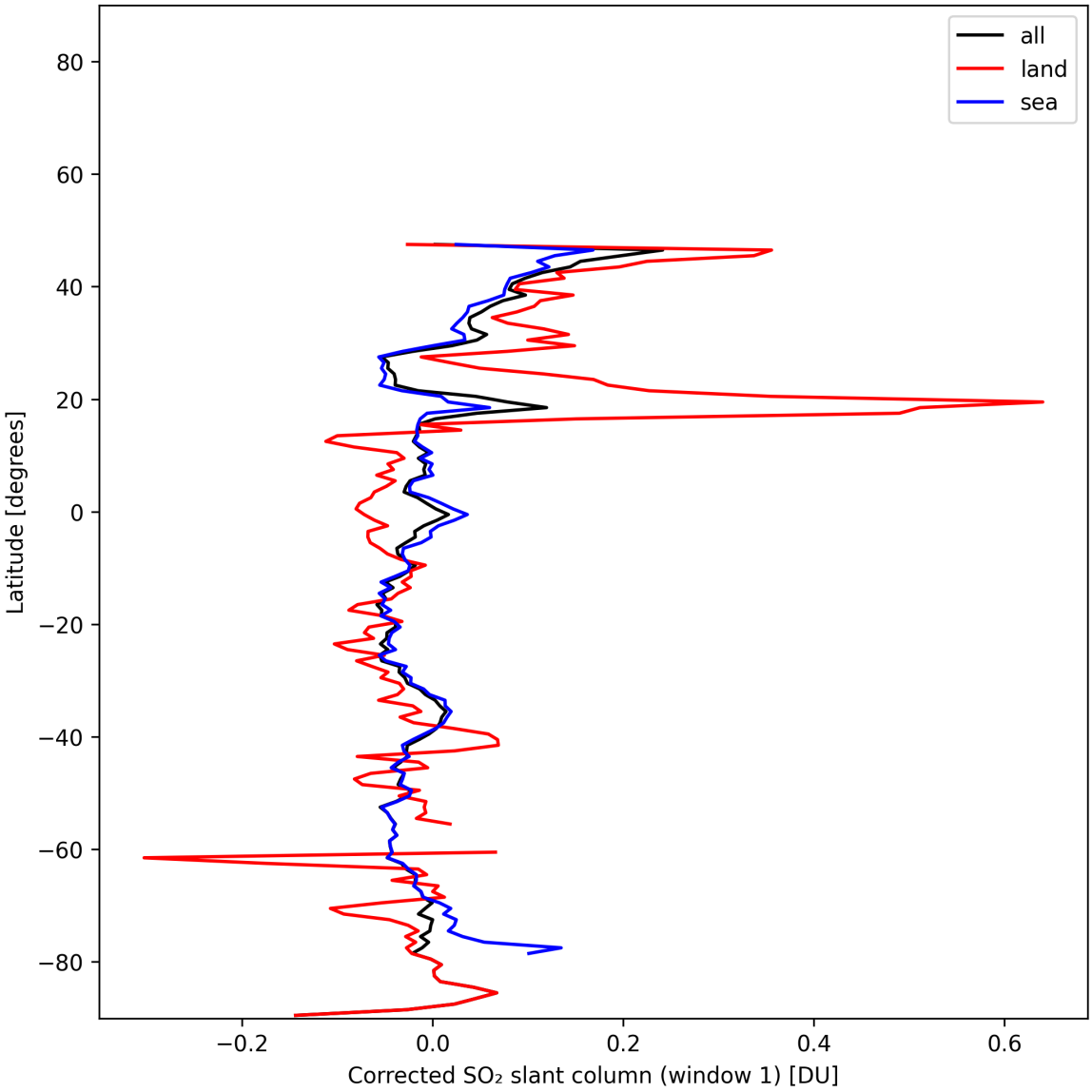


Figure 38: Zonal average of “Corrected SO_2 slant column (window 1)” for 2025-01-01 to 2025-01-02.

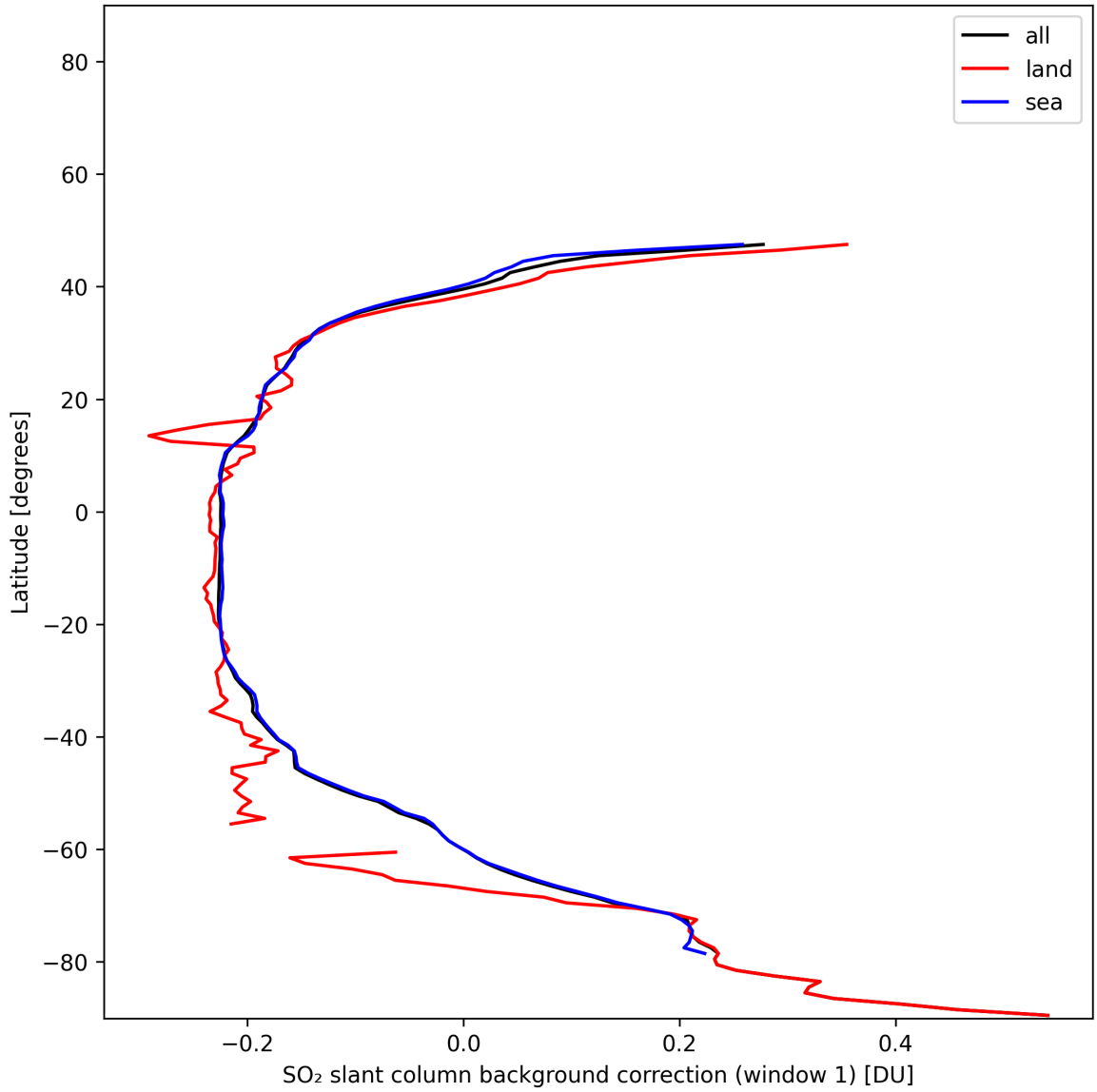


Figure 39: Zonal average of "SO_2 slant column background correction (window 1)" for 2025-01-01 to 2025-01-02.

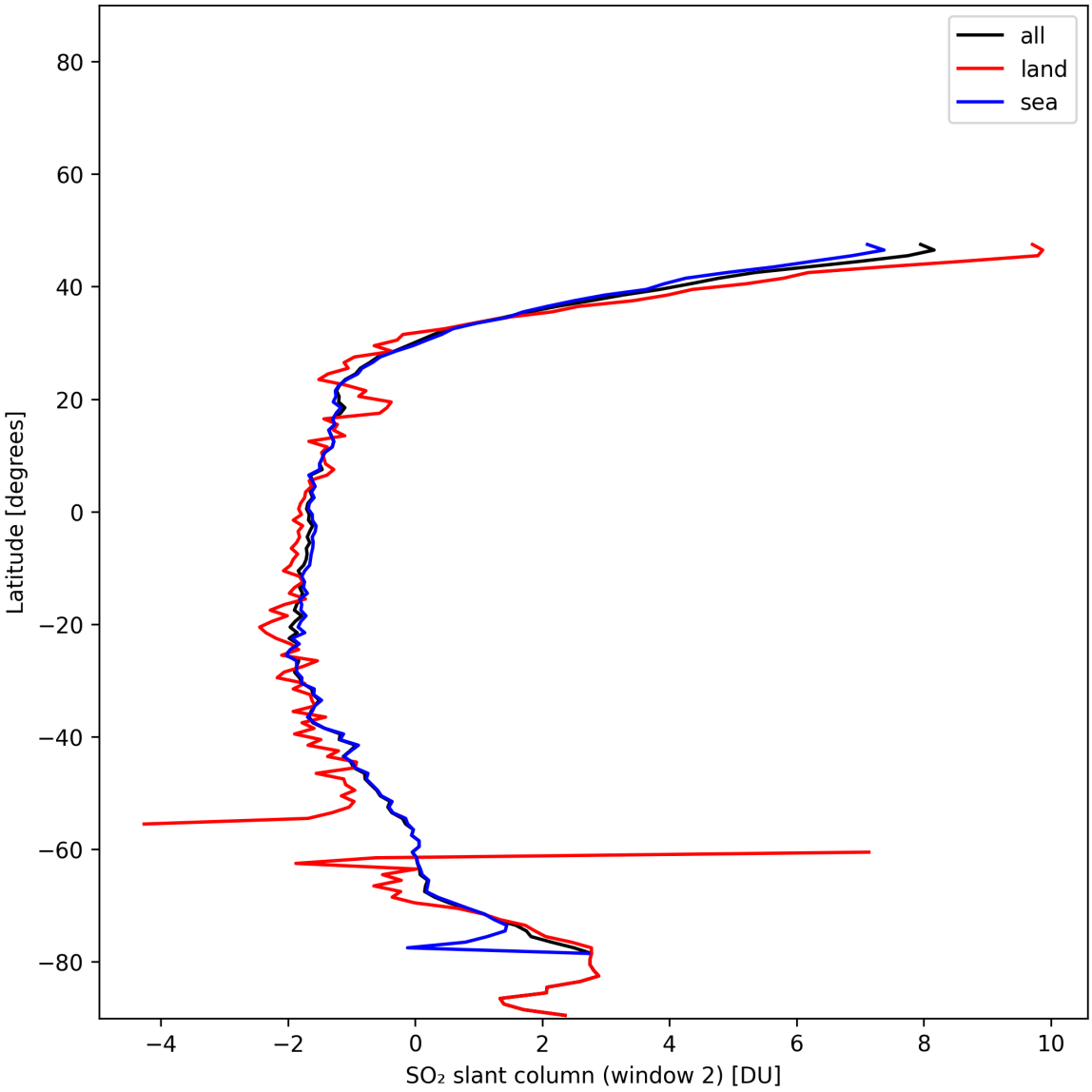


Figure 40: Zonal average of "SO_2 slant column (window 2)" for 2025-01-01 to 2025-01-02.

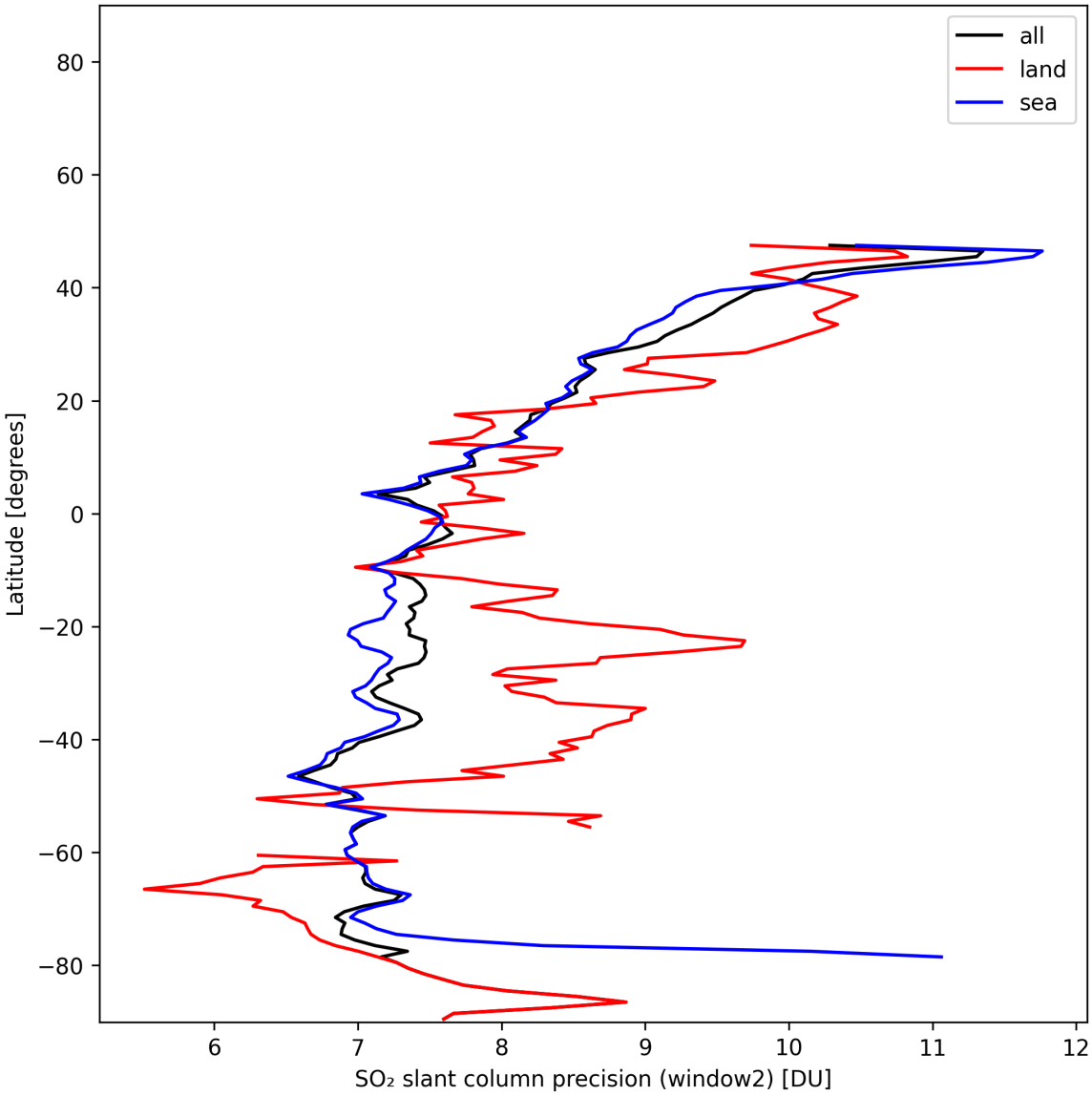


Figure 41: Zonal average of "SO_2 slant column precision (window2)" for 2025-01-01 to 2025-01-02.

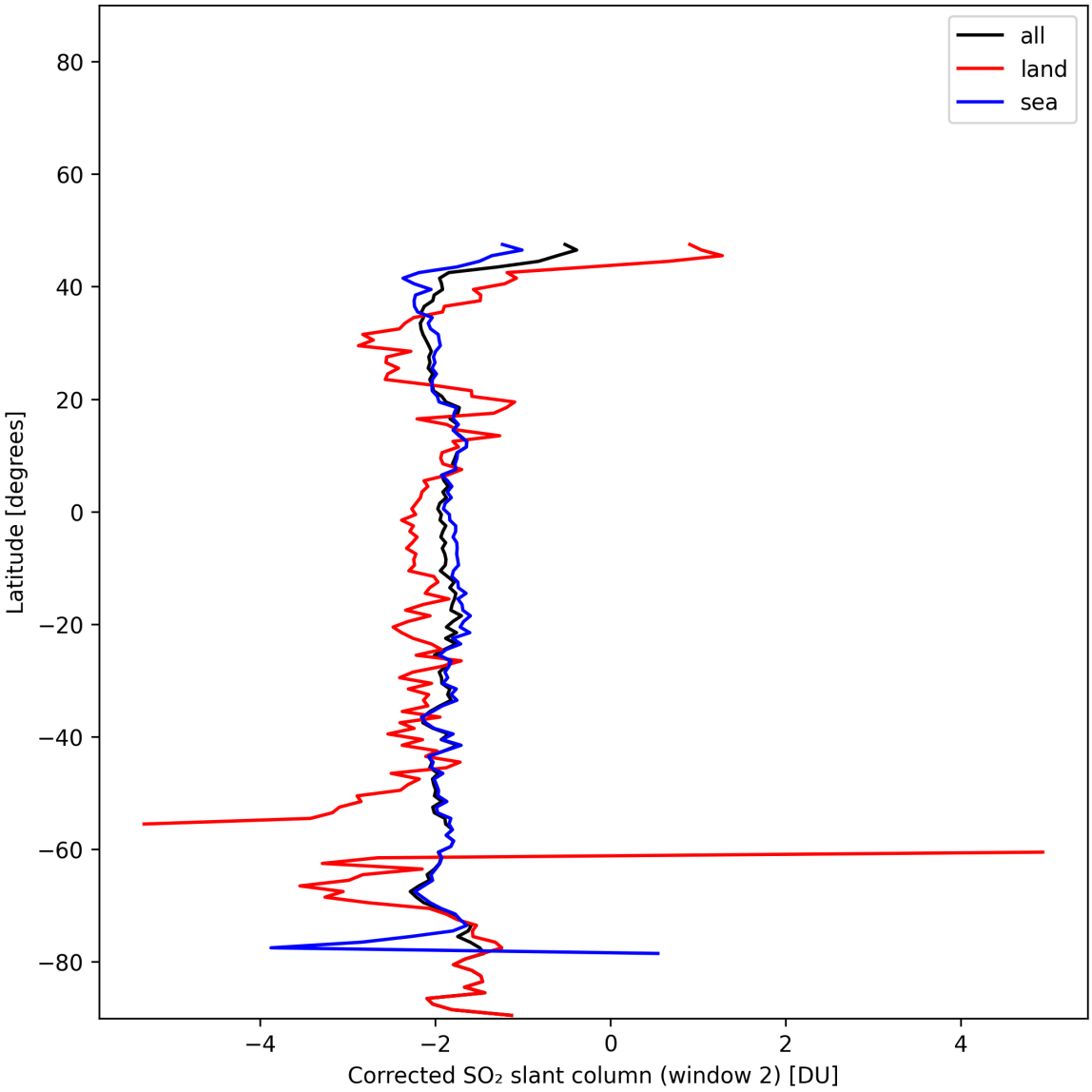


Figure 42: Zonal average of "Corrected SO_2 slant column (window 2)" for 2025-01-01 to 2025-01-02.

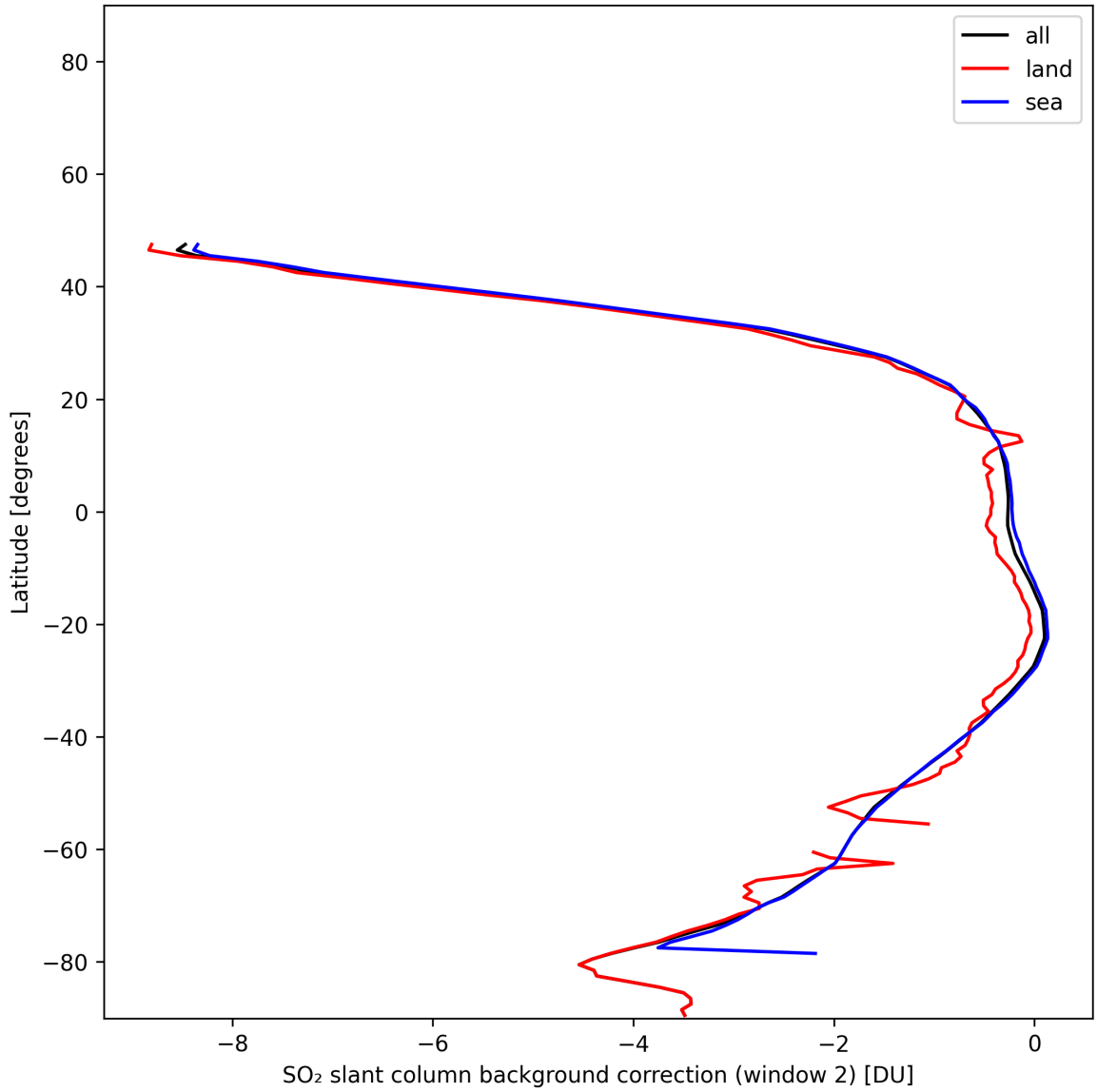


Figure 43: Zonal average of "SO_2 slant column background correction (window 2)" for 2025-01-01 to 2025-01-02.

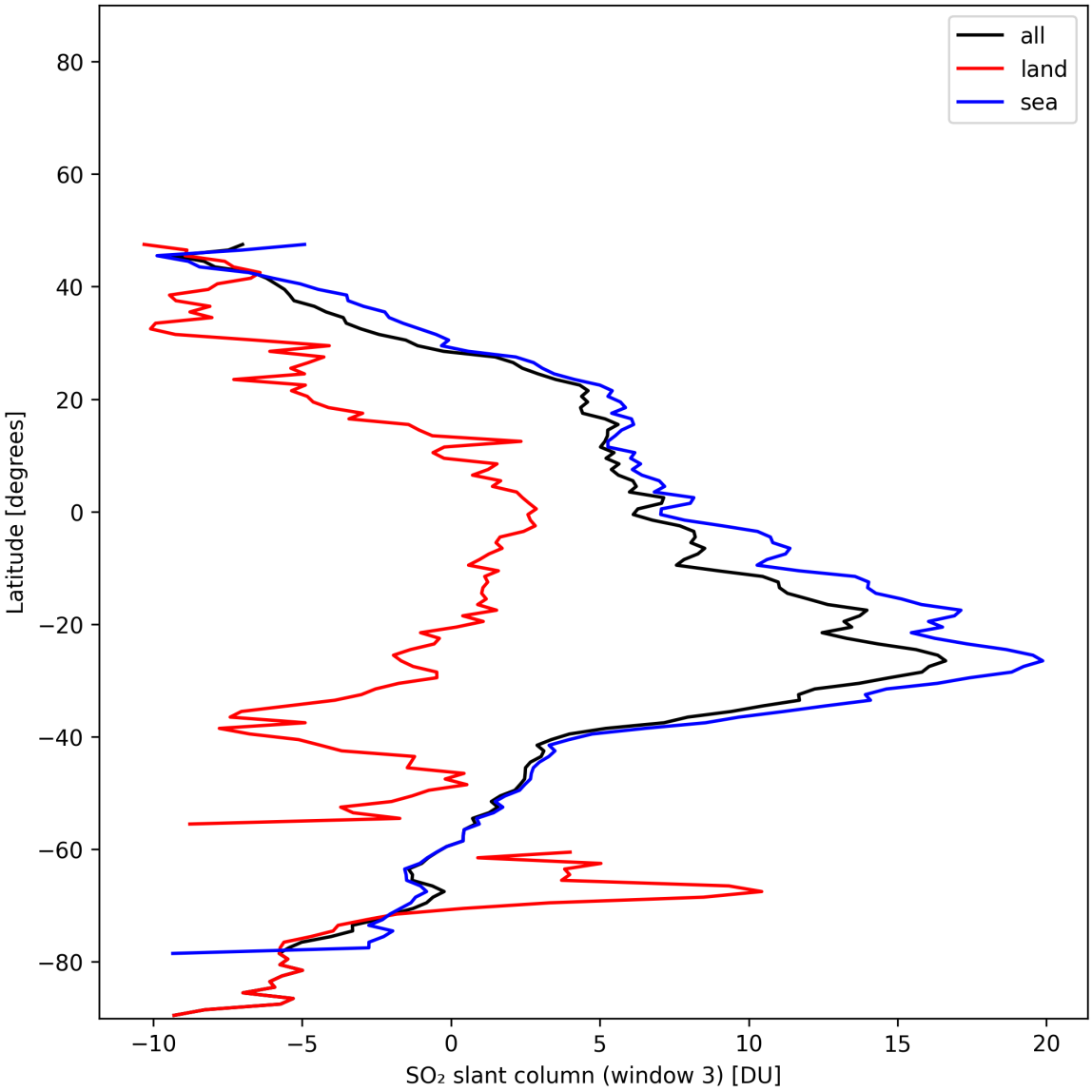


Figure 44: Zonal average of "SO_2 slant column (window 3)" for 2025-01-01 to 2025-01-02.

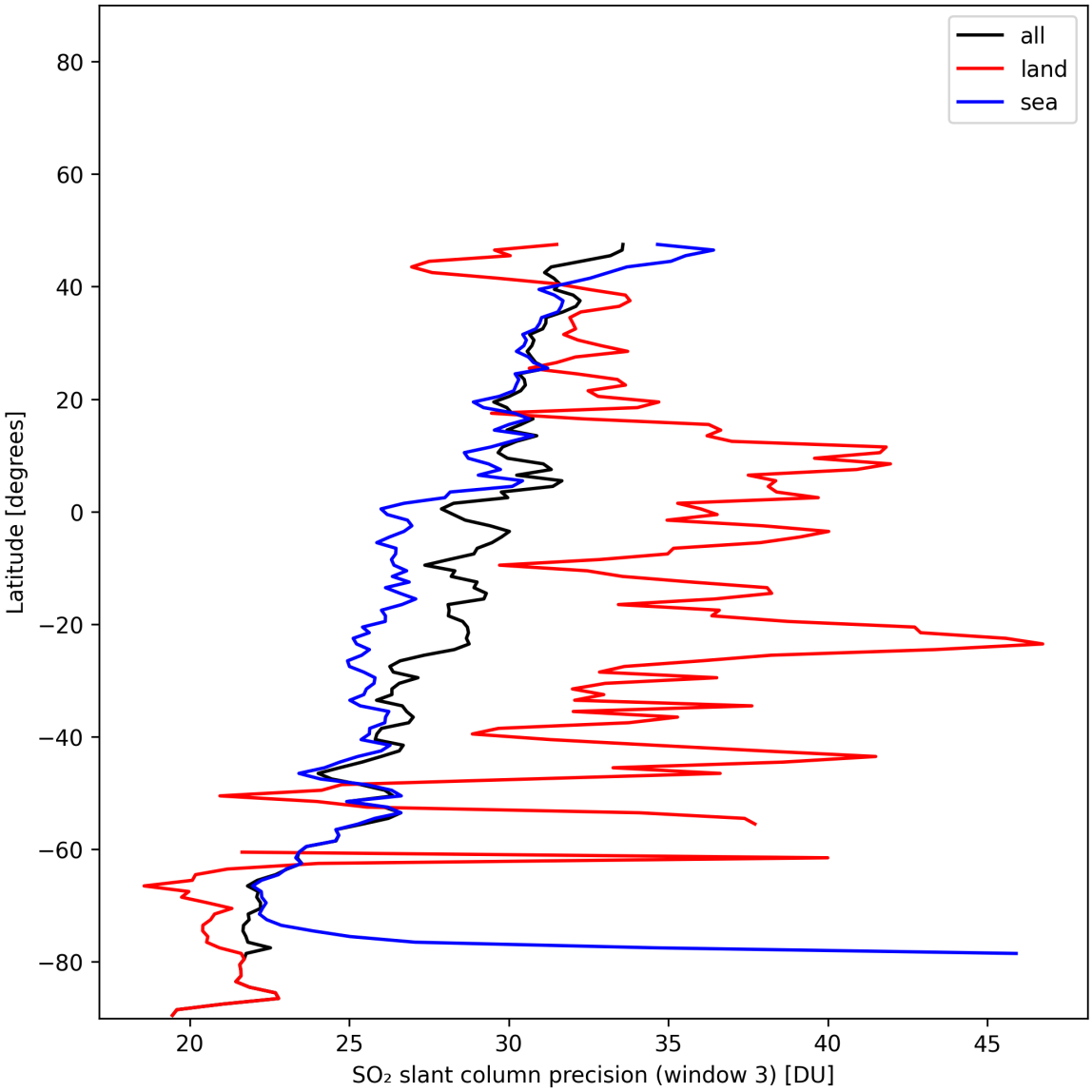


Figure 45: Zonal average of "SO_2 slant column precision (window 3)" for 2025-01-01 to 2025-01-02.

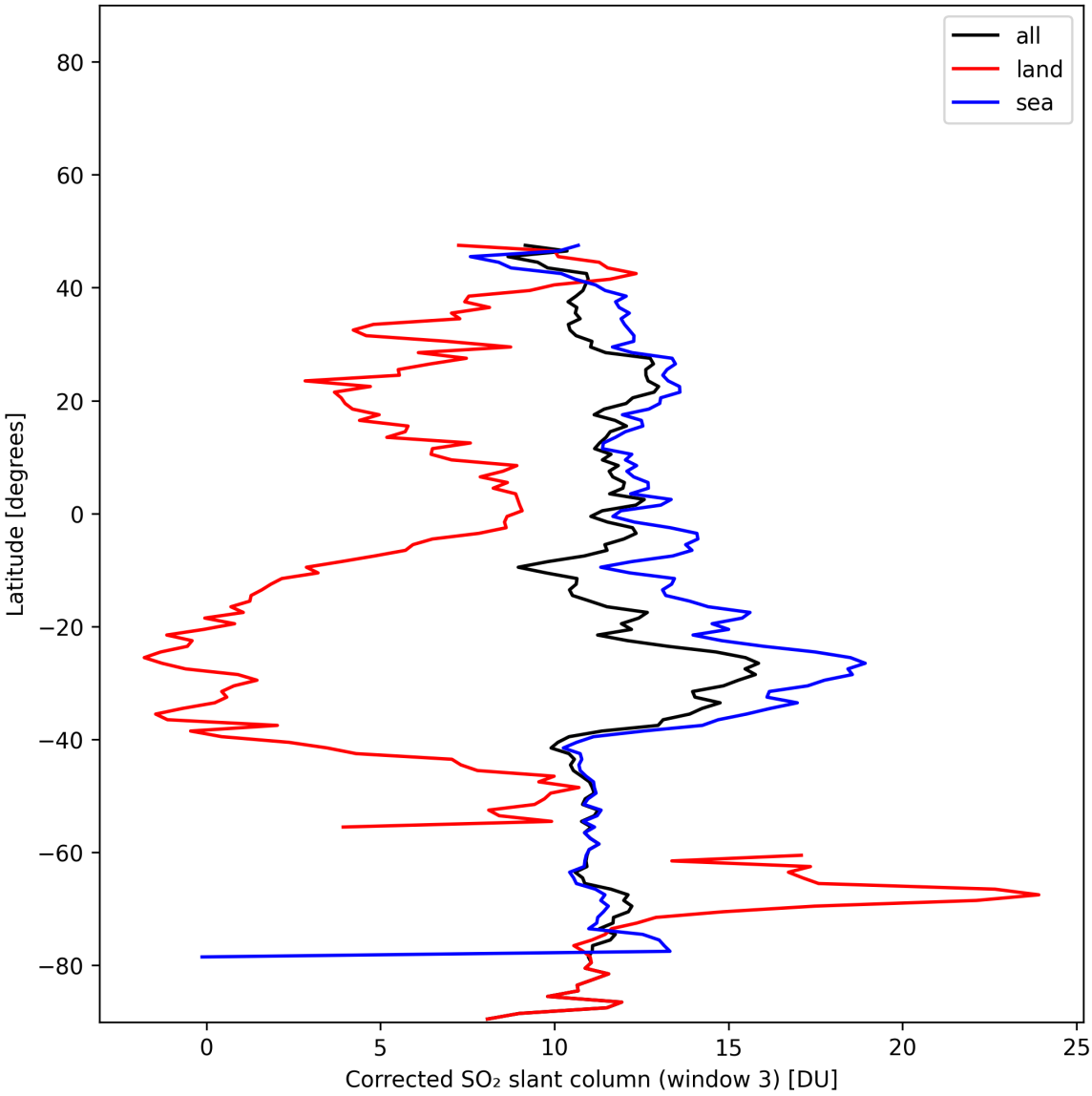


Figure 46: Zonal average of “Corrected SO_2 slant column (window 3)” for 2025-01-01 to 2025-01-02.

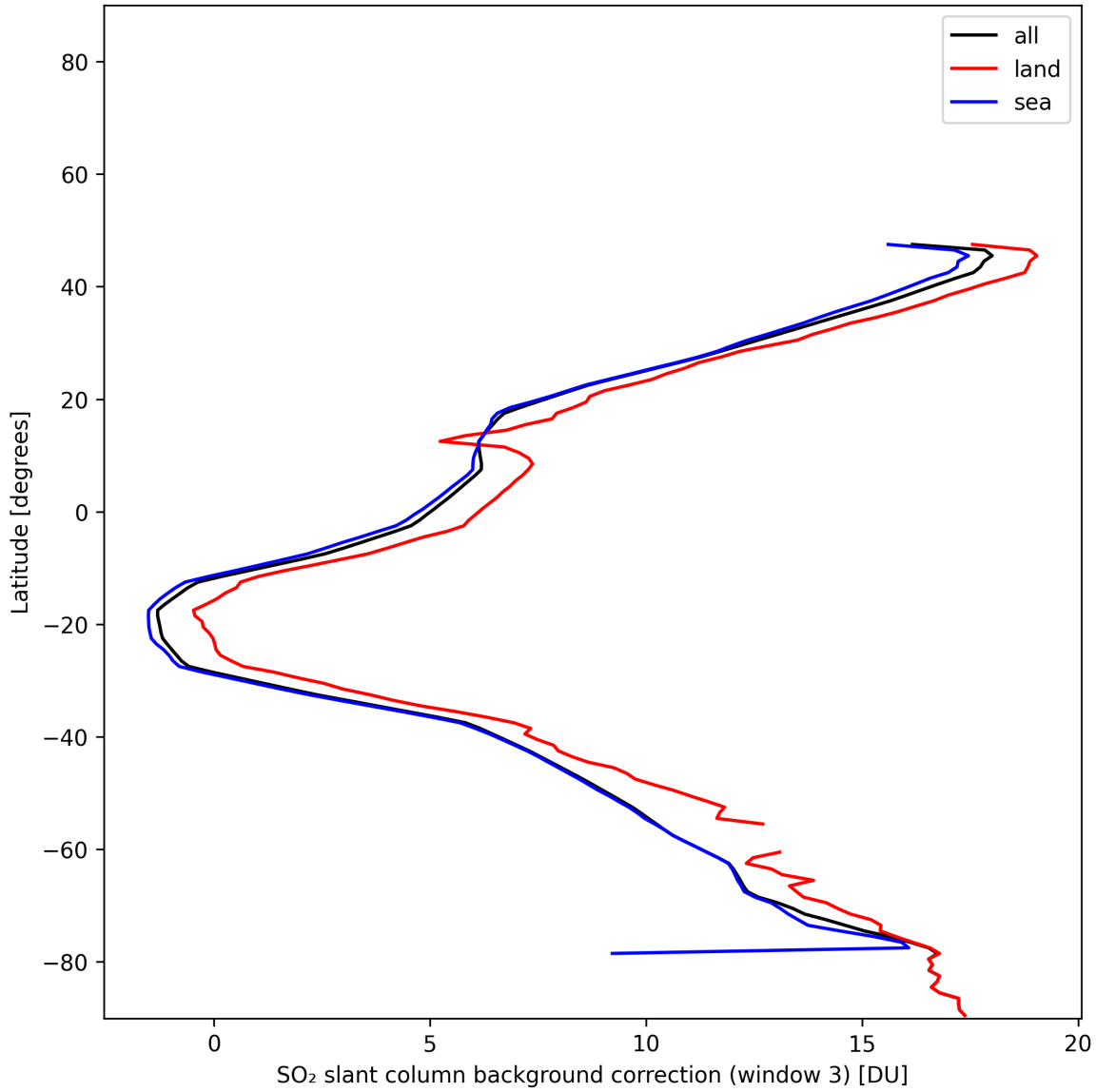


Figure 47: Zonal average of "SO_2 slant column background correction (window 3)" for 2025-01-01 to 2025-01-02.

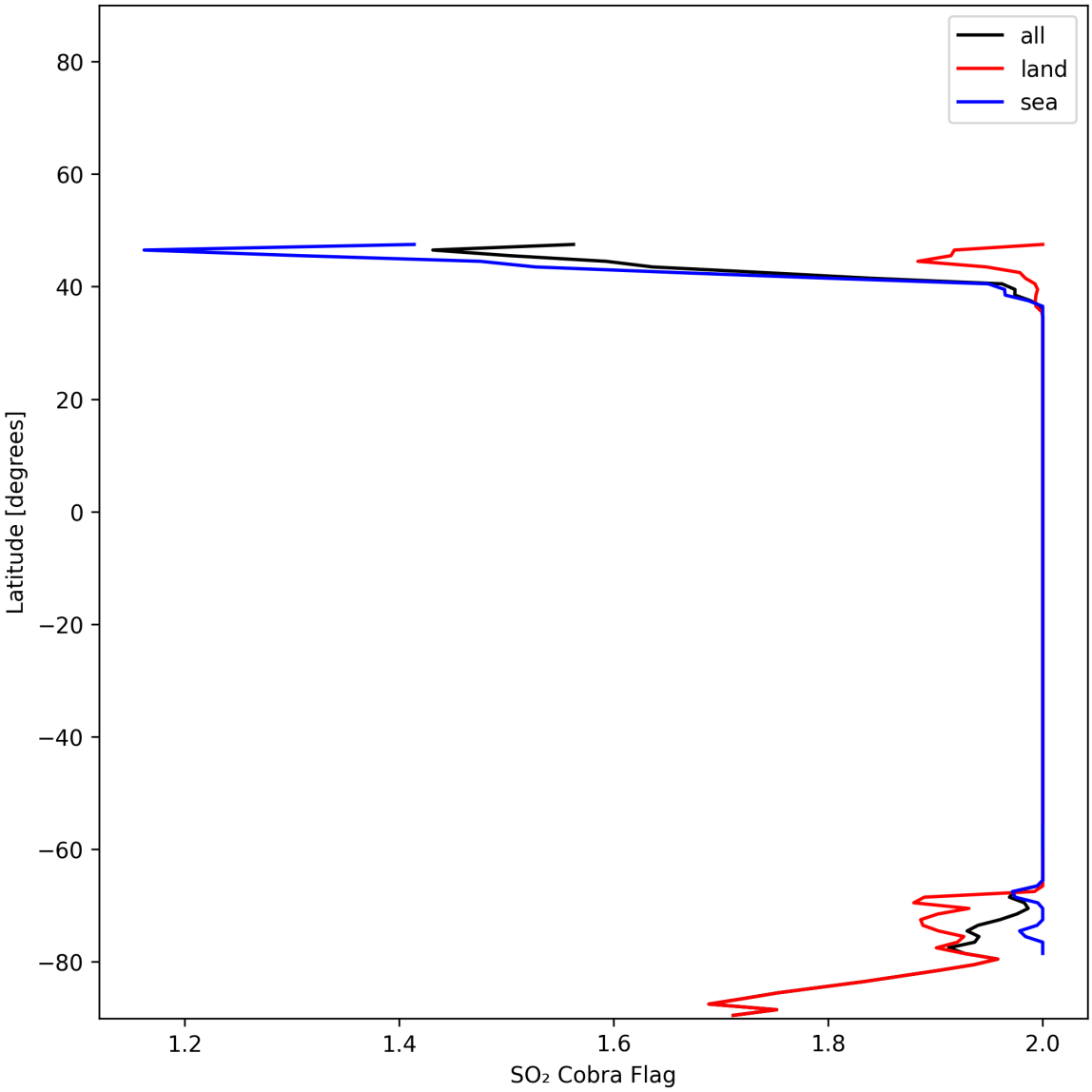


Figure 48: Zonal average of "SO_2 Cobra Flag" for 2025-01-01 to 2025-01-02.

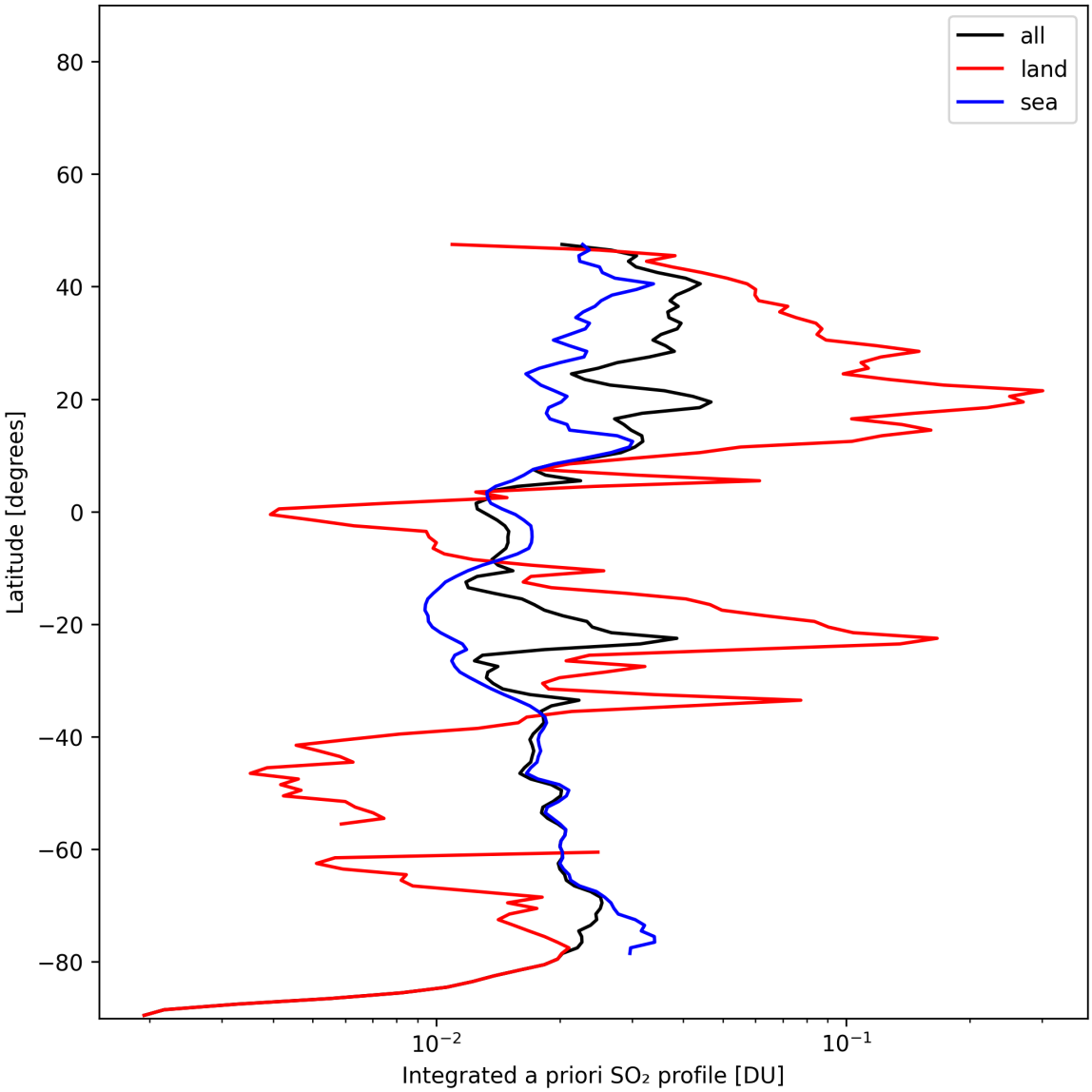


Figure 49: Zonal average of “Integrated a priori SO_2 profile” for 2025-01-01 to 2025-01-02.

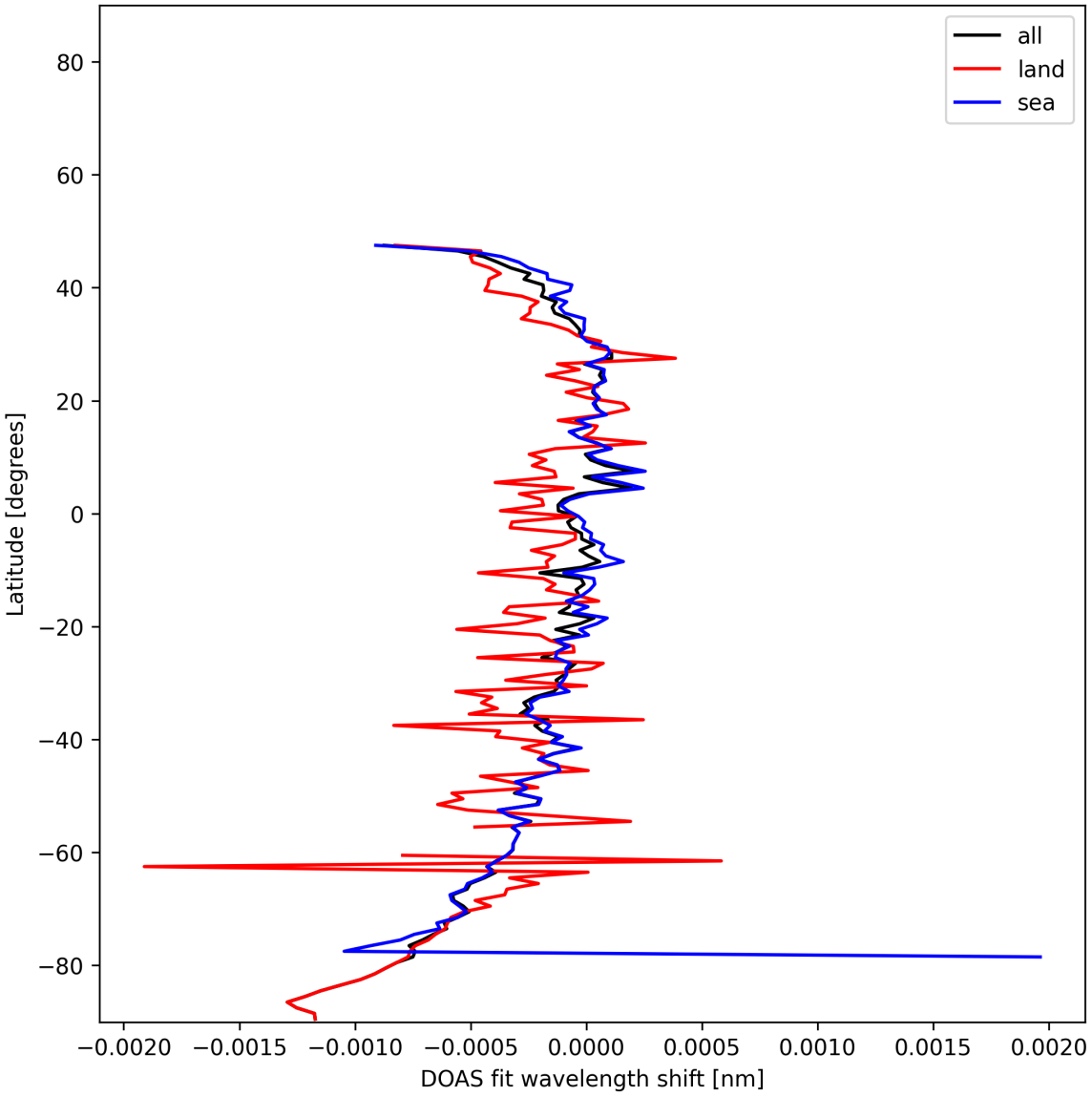


Figure 50: Zonal average of “DOAS fit wavelength shift” for 2025-01-01 to 2025-01-02.

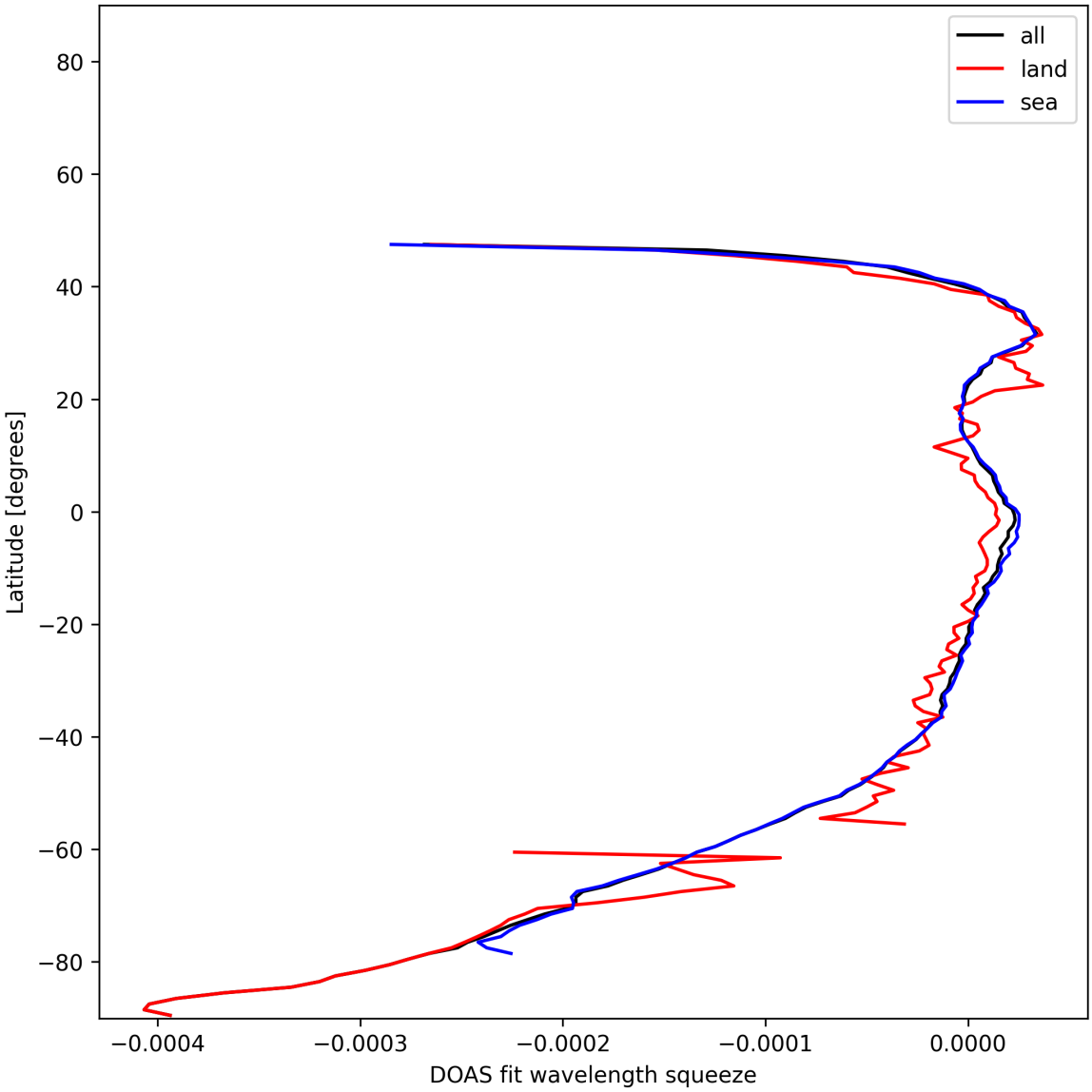


Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-01-01 to 2025-01-02.

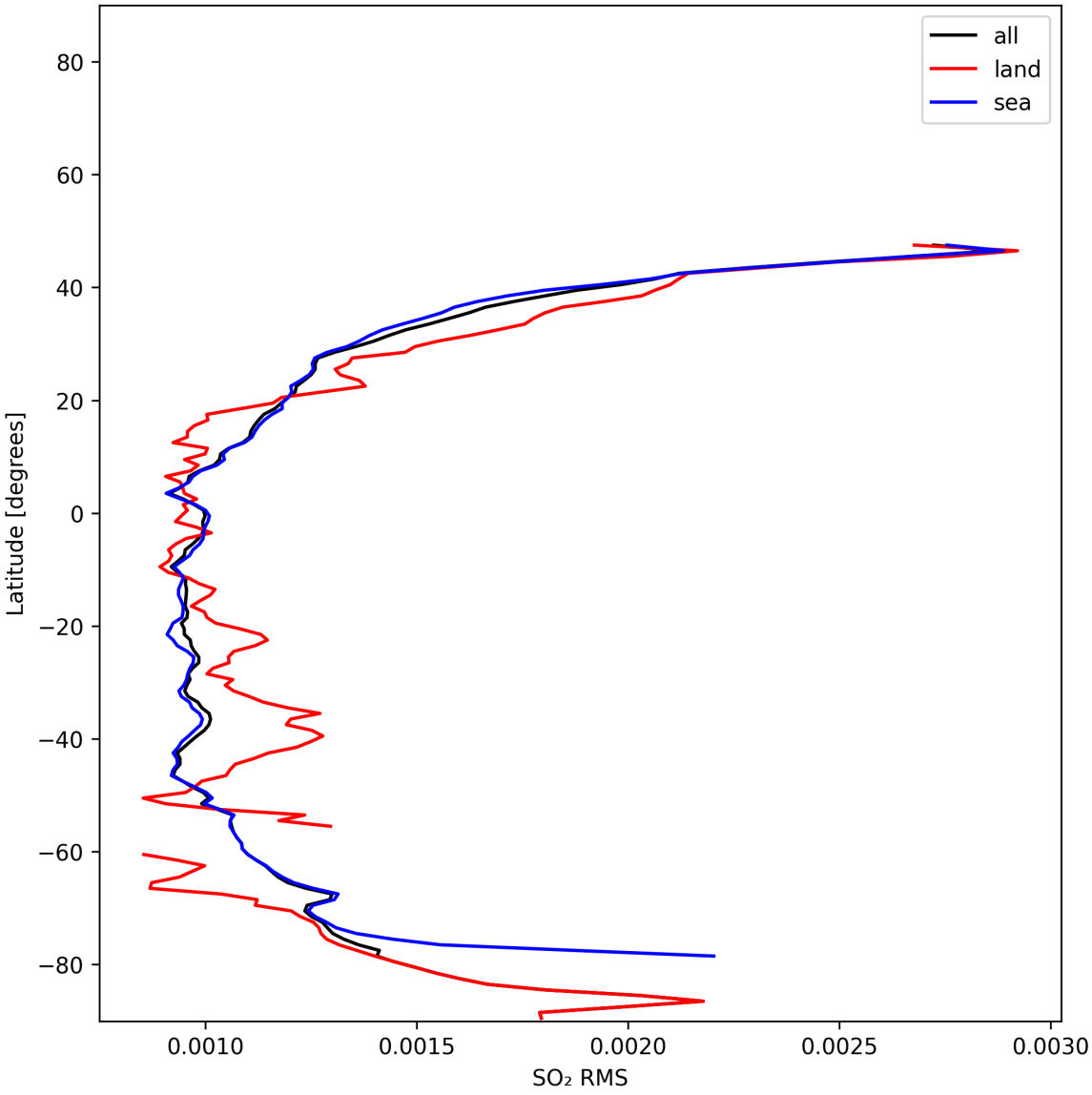


Figure 52: Zonal average of "SO_2 RMS" for 2025-01-01 to 2025-01-02.

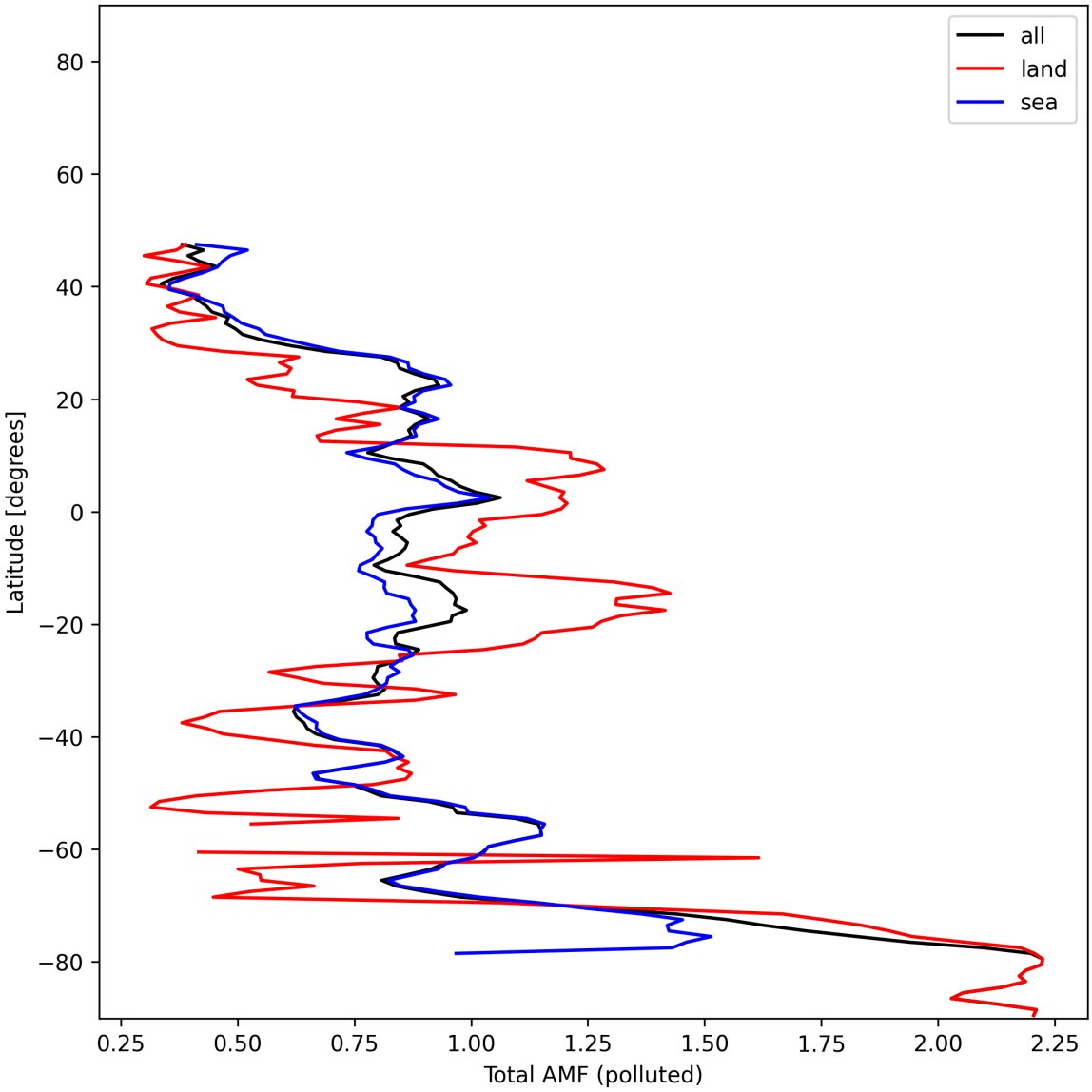


Figure 53: Zonal average of “Total AMF (polluted)” for 2025-01-01 to 2025-01-02.

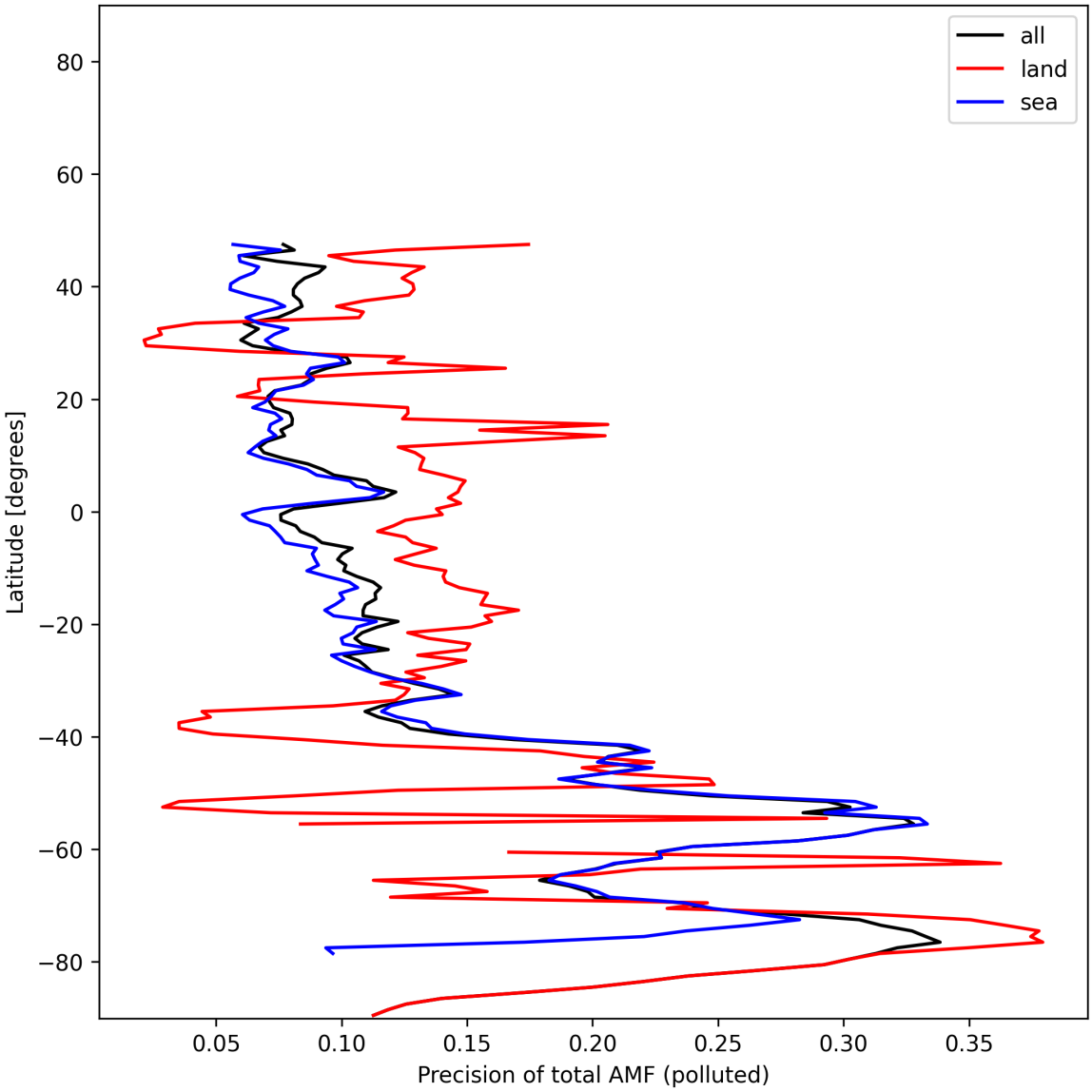


Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-01-01 to 2025-01-02.

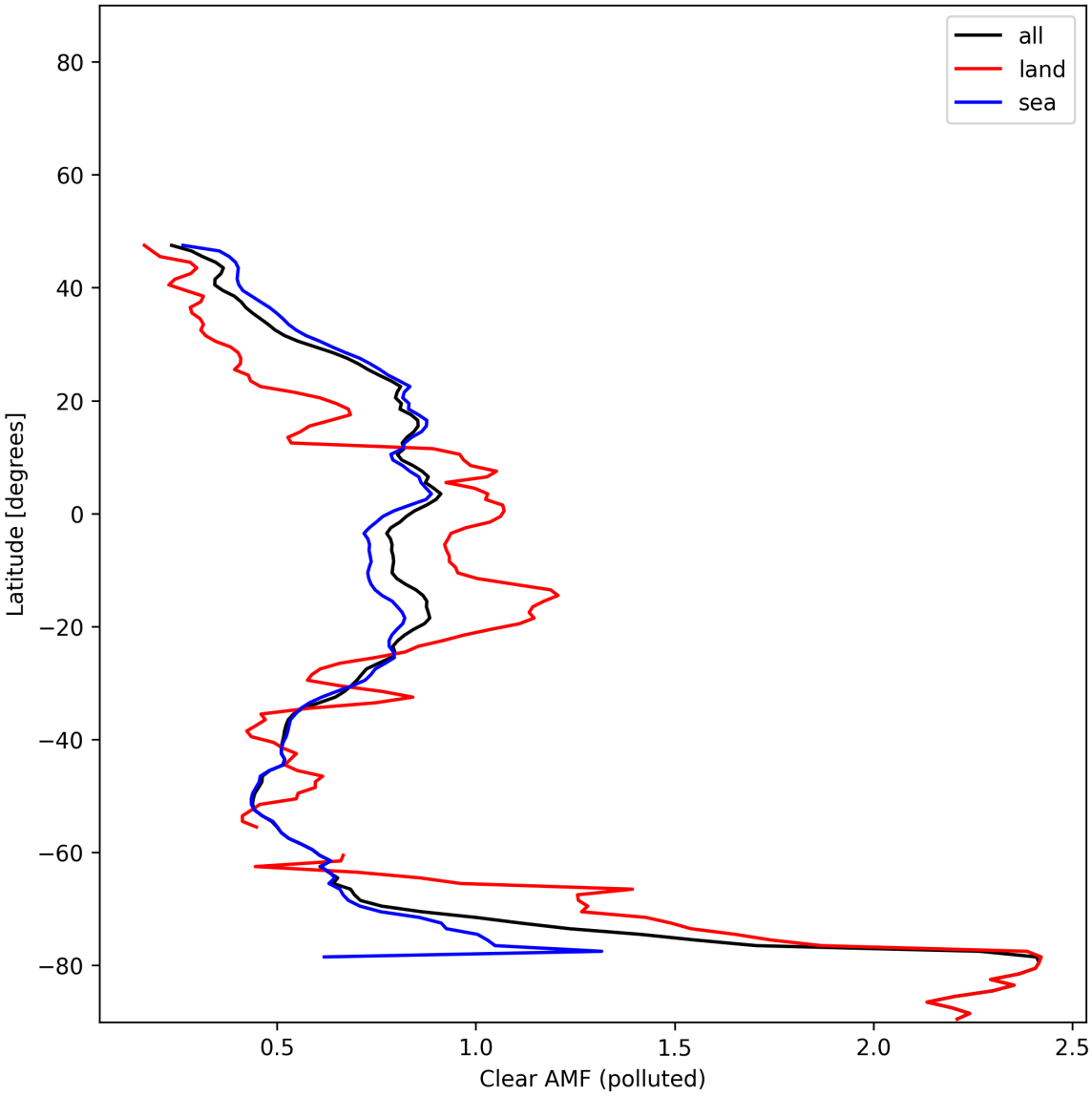


Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-01-01 to 2025-01-02.

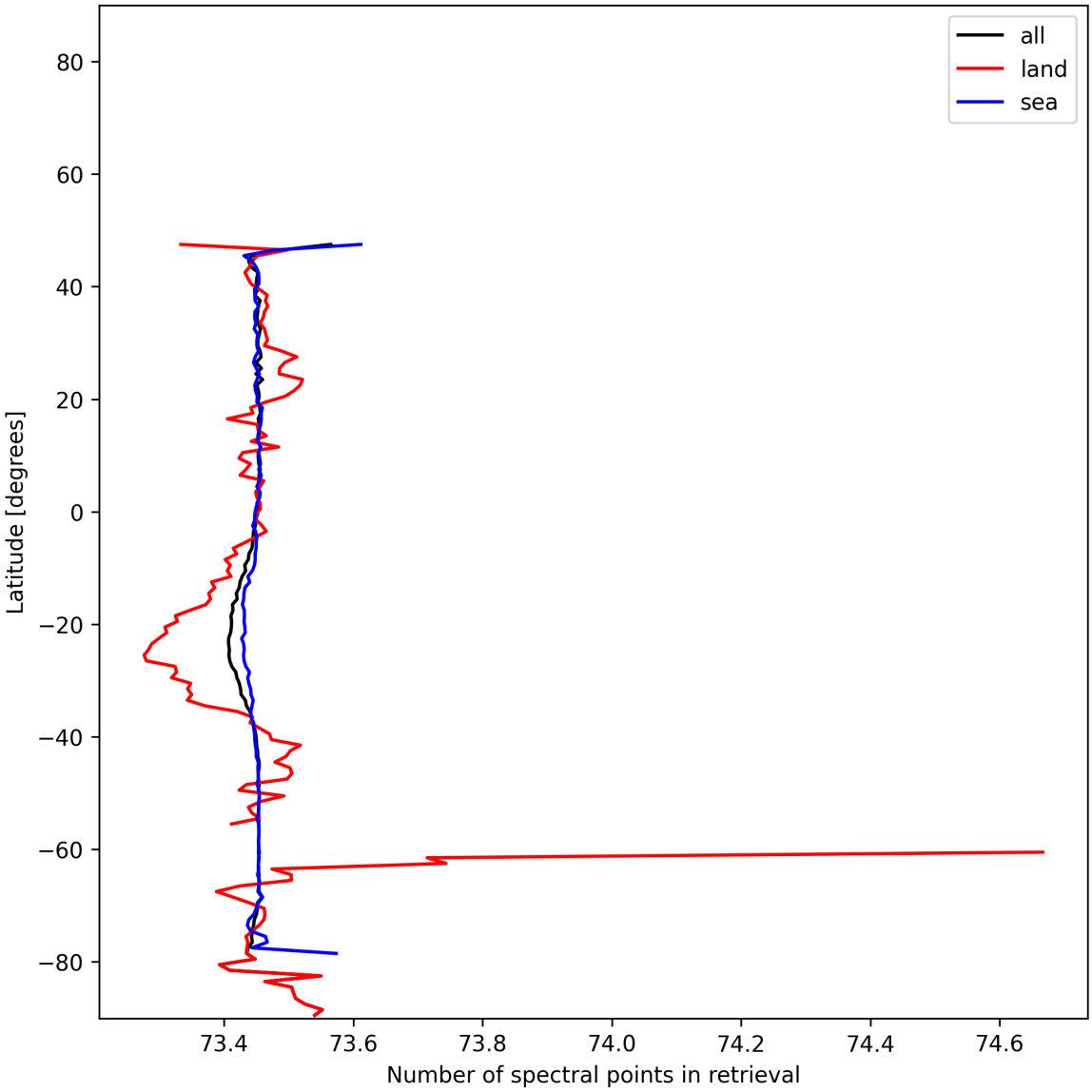


Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-01-01 to 2025-01-02.

8 Histograms

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

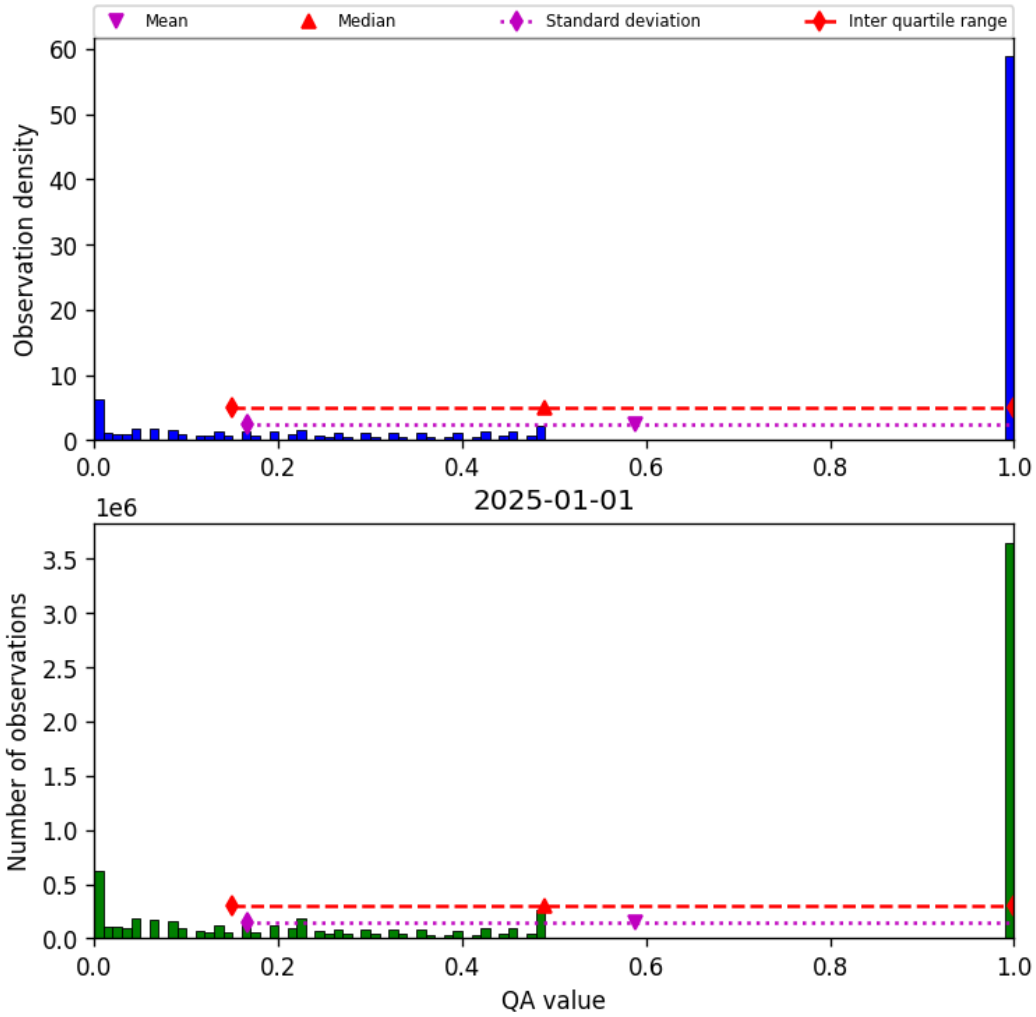


Figure 57: Histogram of “QA value” for 2025-01-01 to 2025-01-02

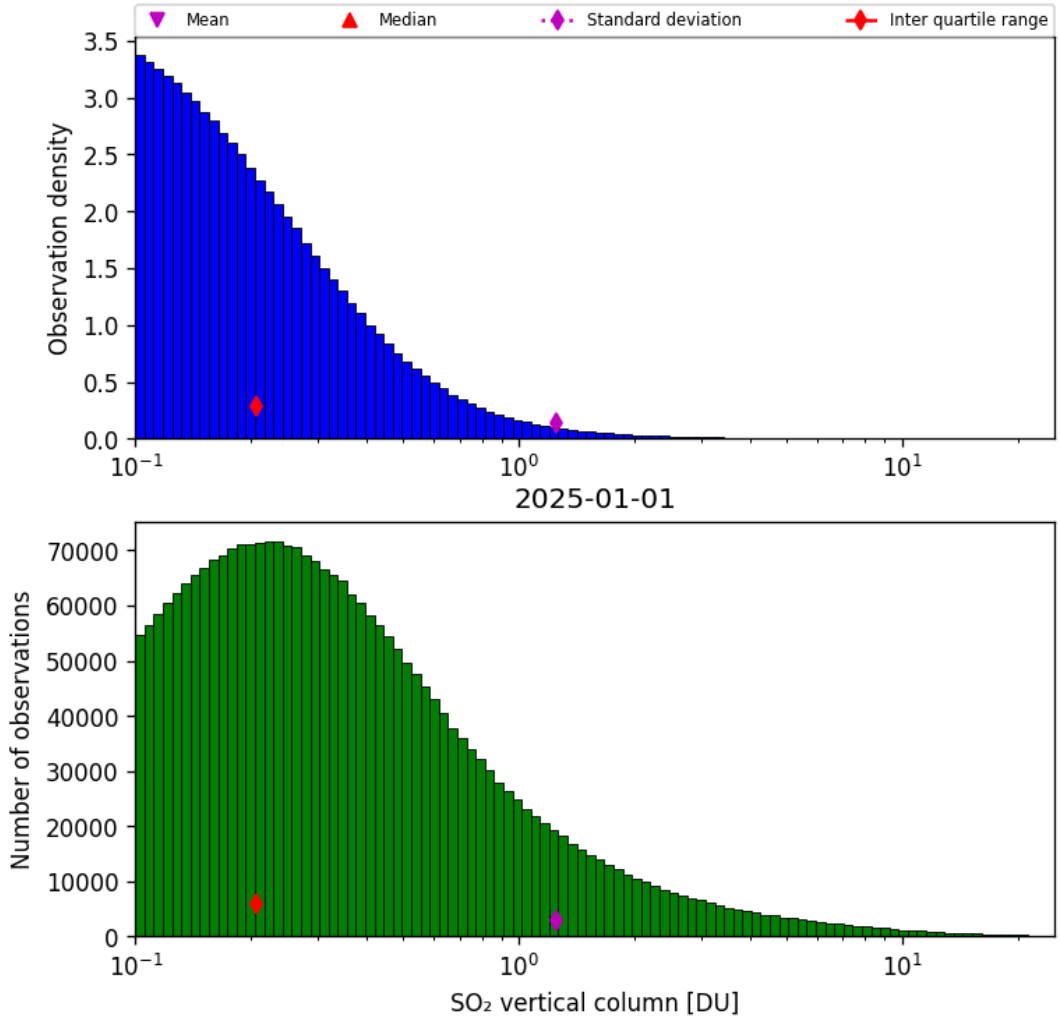


Figure 58: Histogram of "SO_2 vertical column" for 2025-01-01 to 2025-01-02

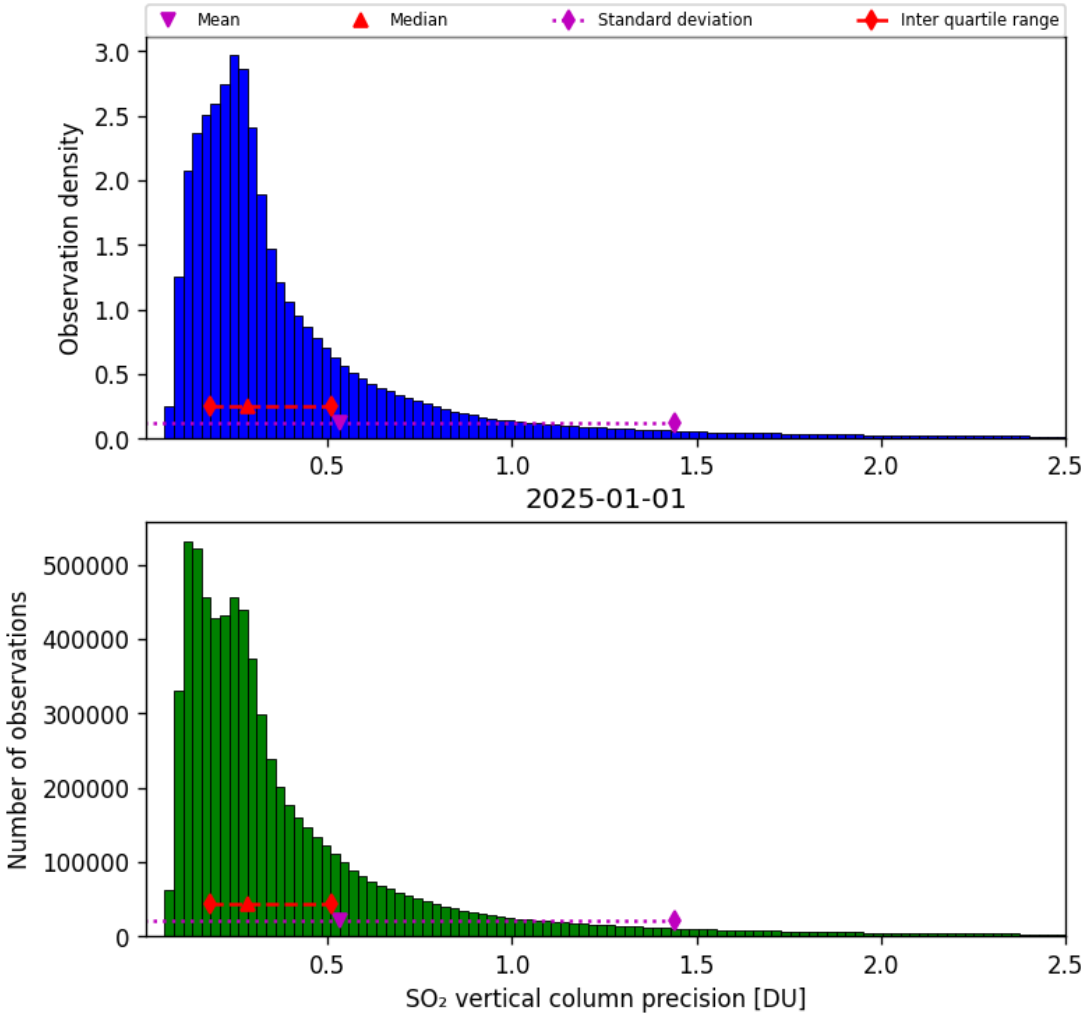


Figure 59: Histogram of "SO_2 vertical column precision" for 2025-01-01 to 2025-01-02

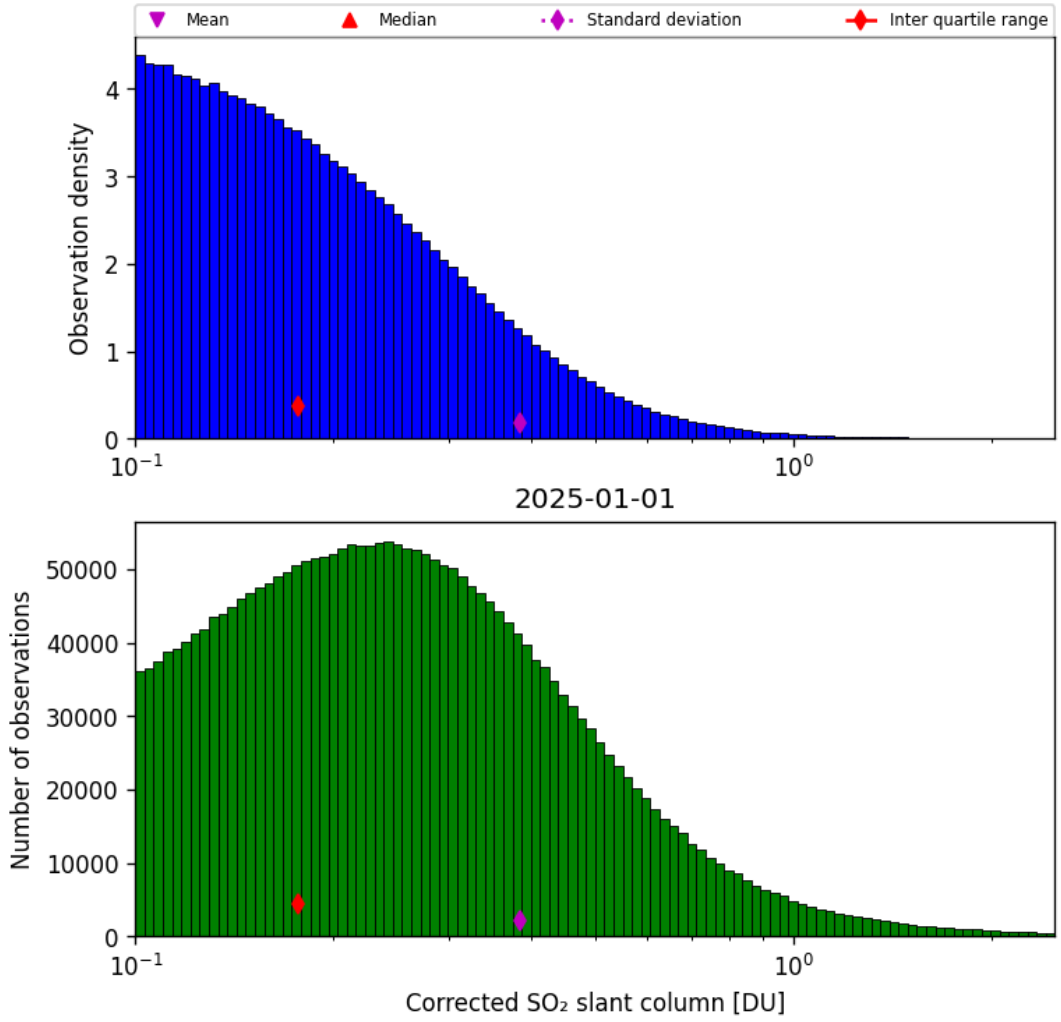


Figure 60: Histogram of "Corrected SO_2 slant column" for 2025-01-01 to 2025-01-02

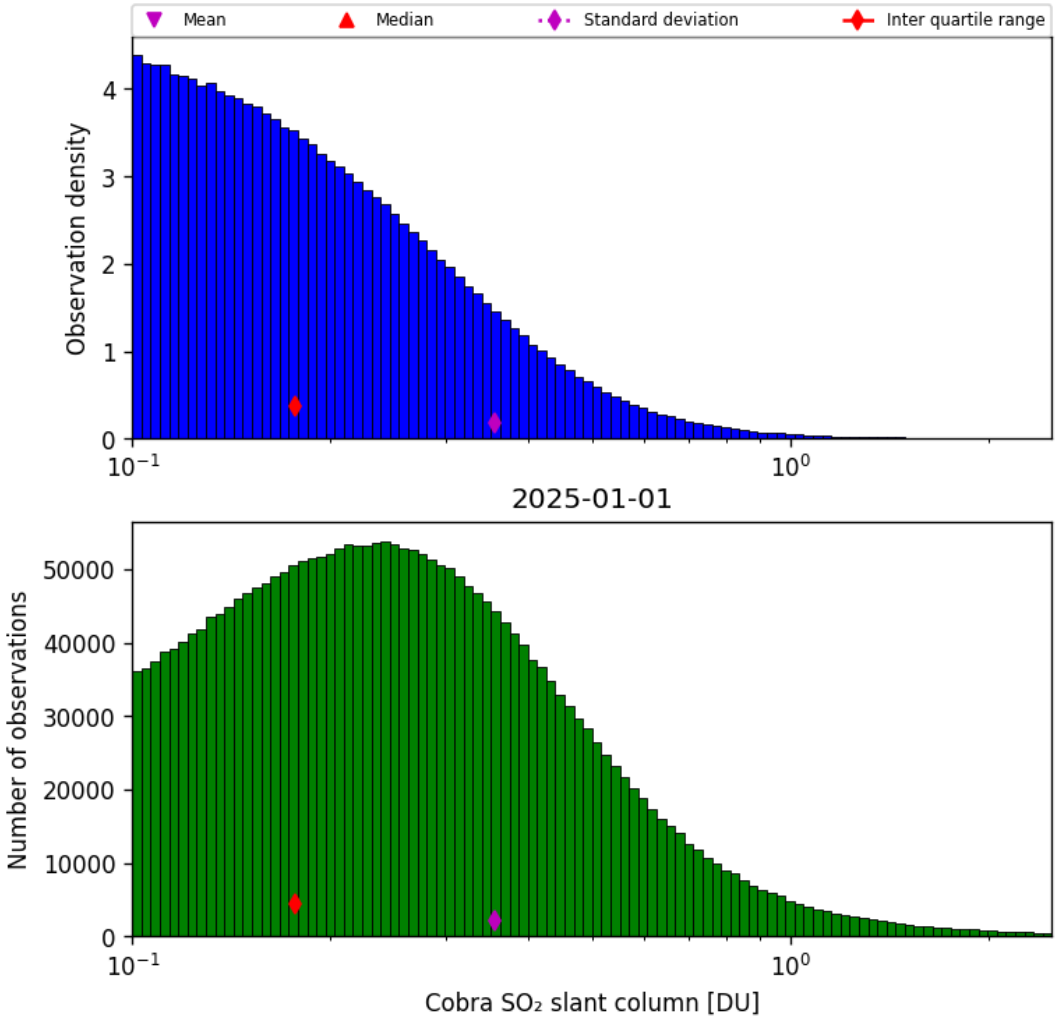


Figure 61: Histogram of "Cobra SO_2 slant column" for 2025-01-01 to 2025-01-02

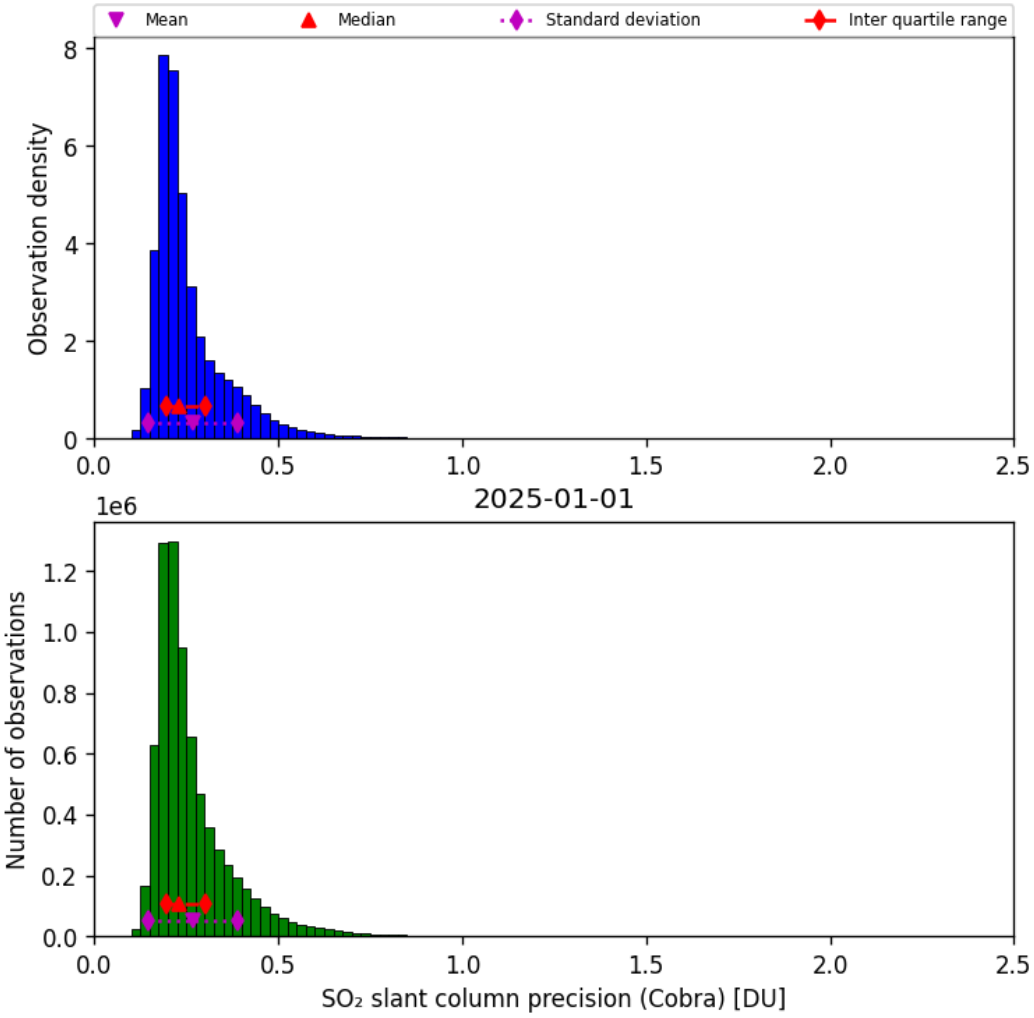


Figure 62: Histogram of "SO_2 slant column precision (Cobra)" for 2025-01-01 to 2025-01-02

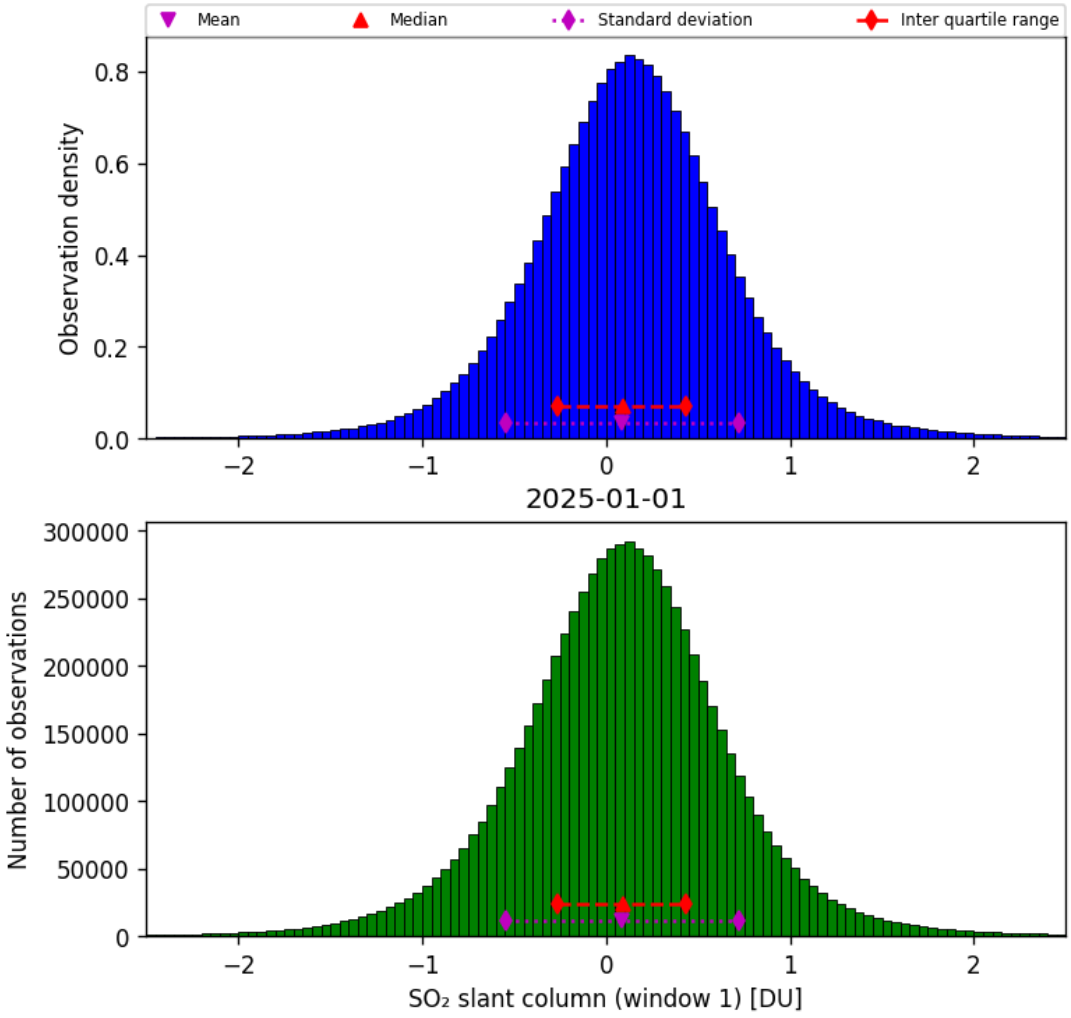


Figure 63: Histogram of "SO_2 slant column (window 1)" for 2025-01-01 to 2025-01-02

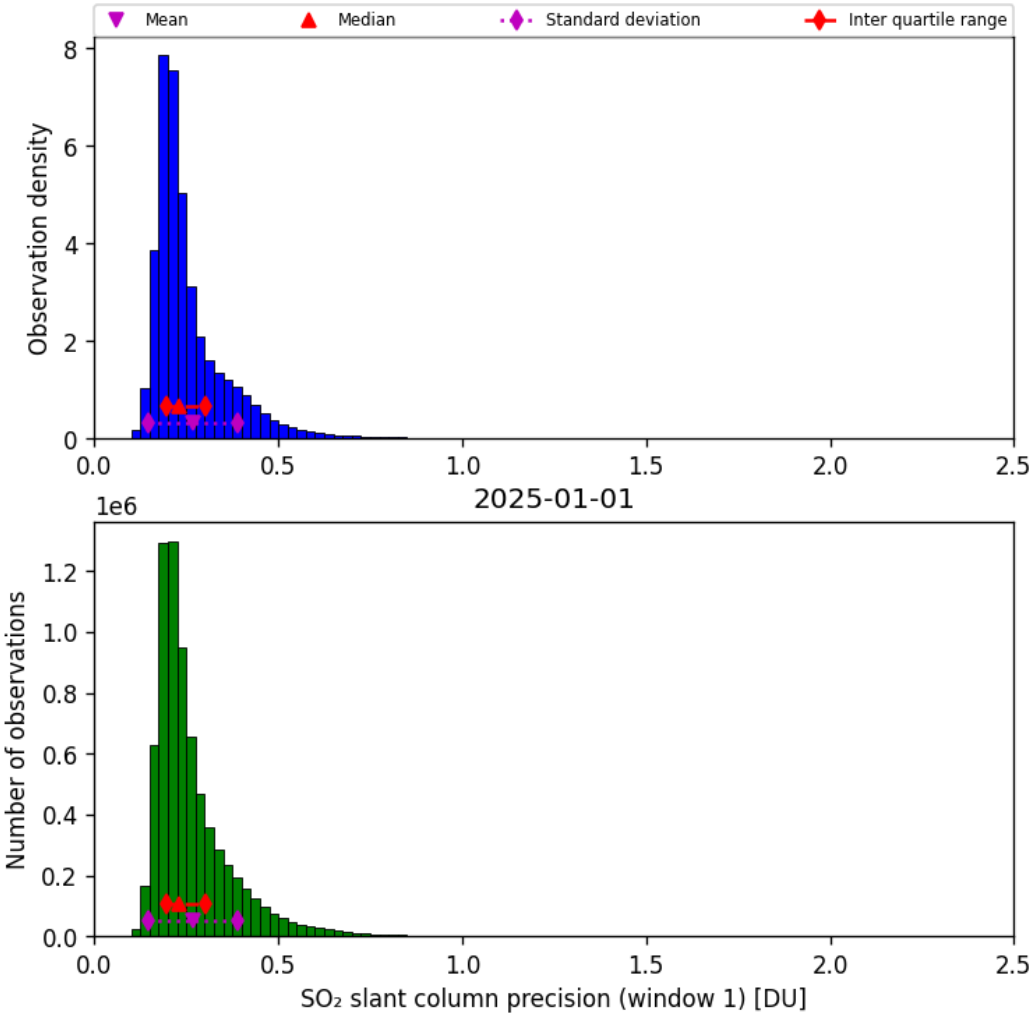


Figure 64: Histogram of "SO_2 slant column precision (window 1)" for 2025-01-01 to 2025-01-02

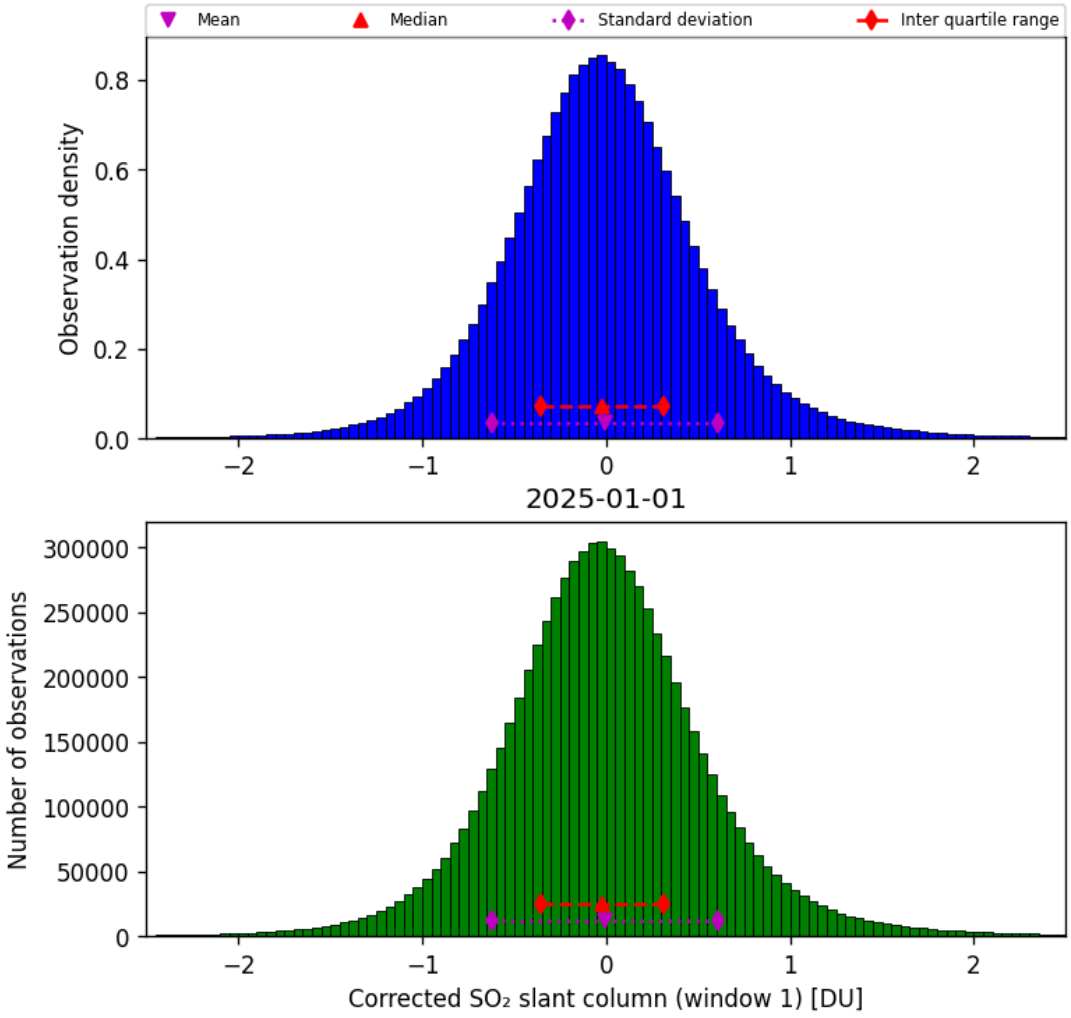


Figure 65: Histogram of "Corrected SO_2 slant column (window 1)" for 2025-01-01 to 2025-01-02

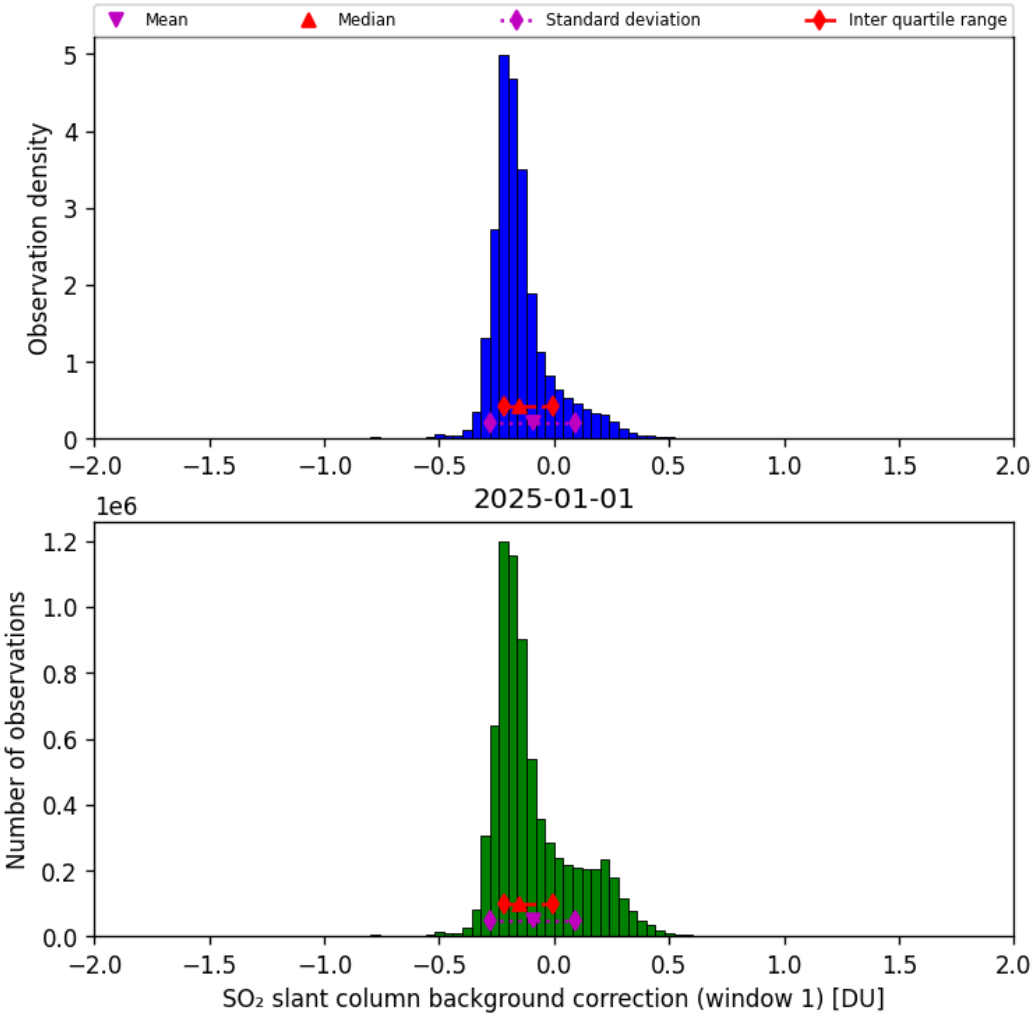


Figure 66: Histogram of "SO_2 slant column background correction (window 1)" for 2025-01-01 to 2025-01-02

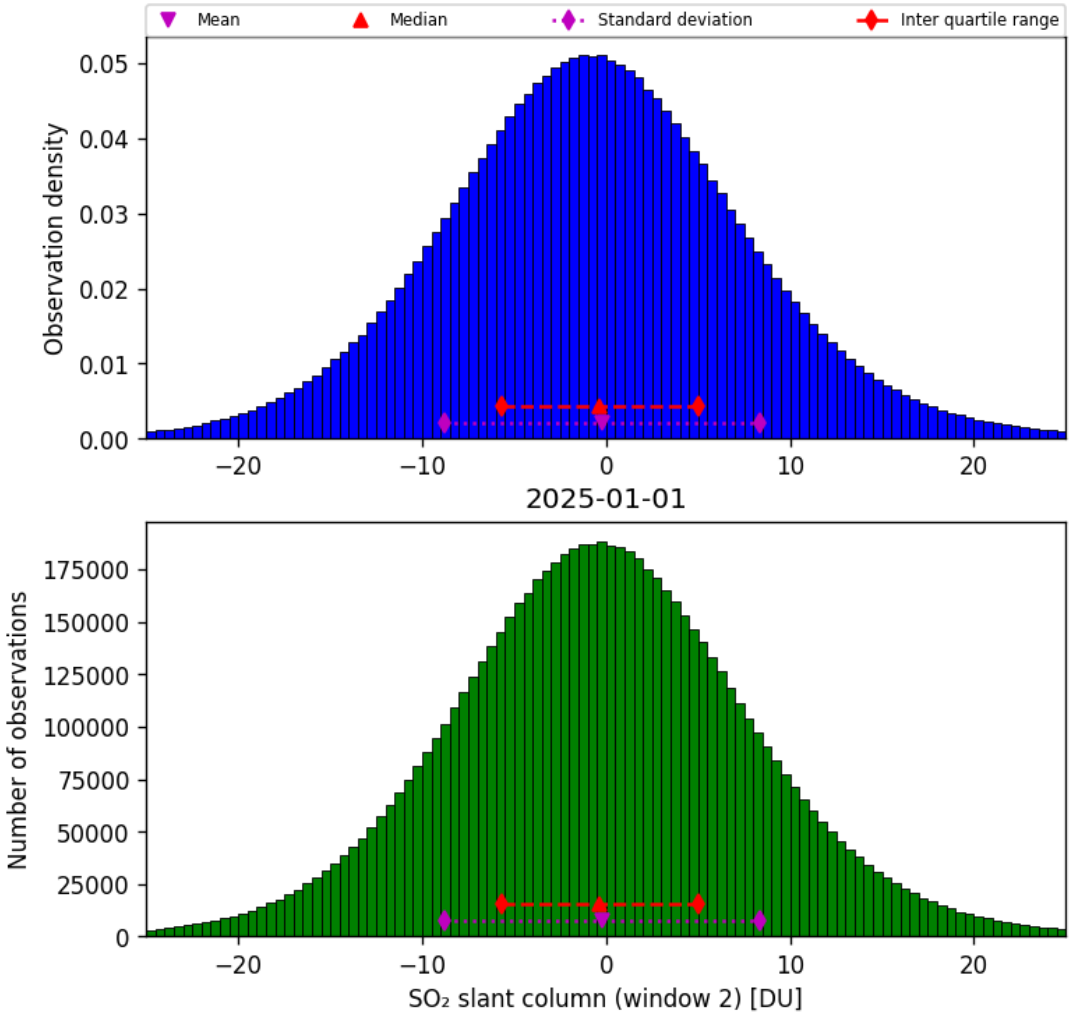


Figure 67: Histogram of "SO_2 slant column (window 2)" for 2025-01-01 to 2025-01-02

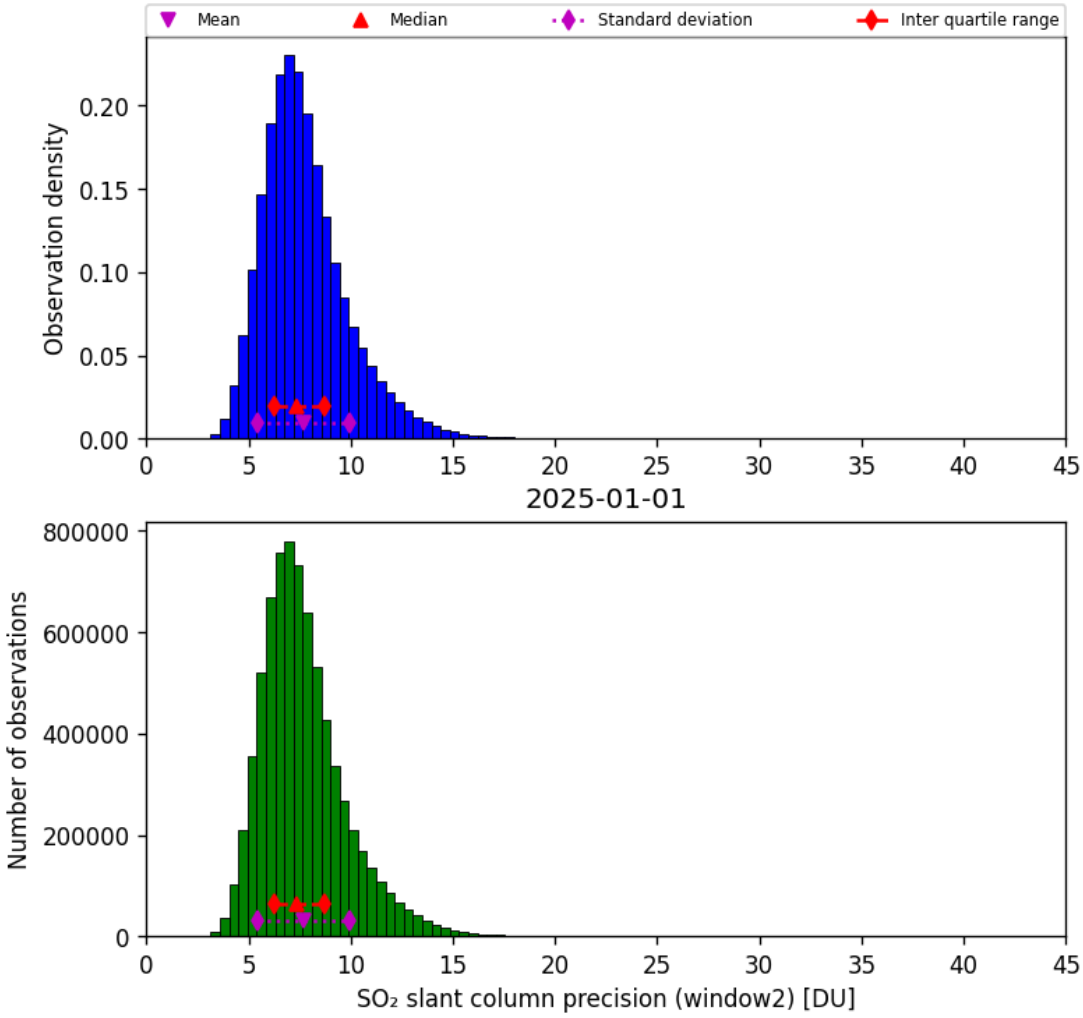


Figure 68: Histogram of "SO_2 slant column precision (window2)" for 2025-01-01 to 2025-01-02

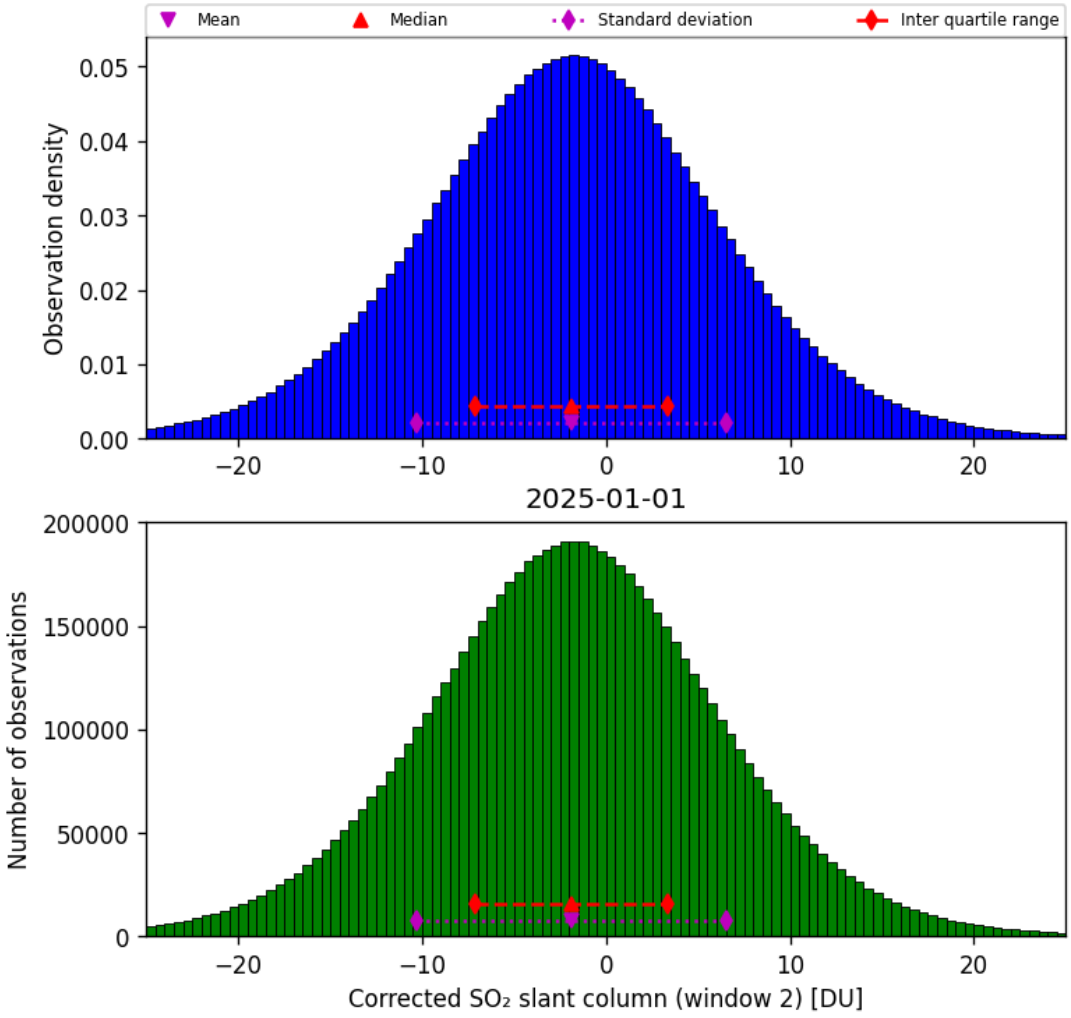


Figure 69: Histogram of "Corrected SO_2 slant column (window 2)" for 2025-01-01 to 2025-01-02

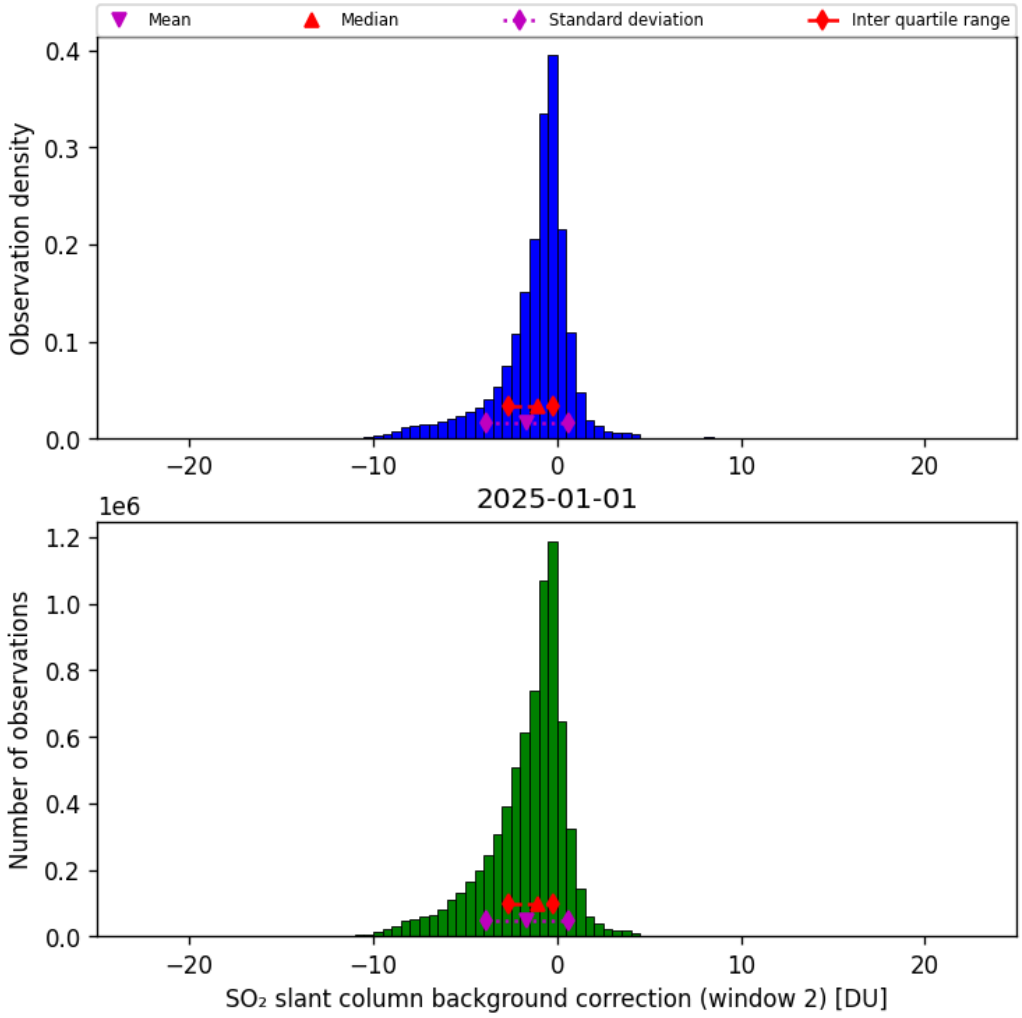


Figure 70: Histogram of "SO_2 slant column background correction (window 2)" for 2025-01-01 to 2025-01-02

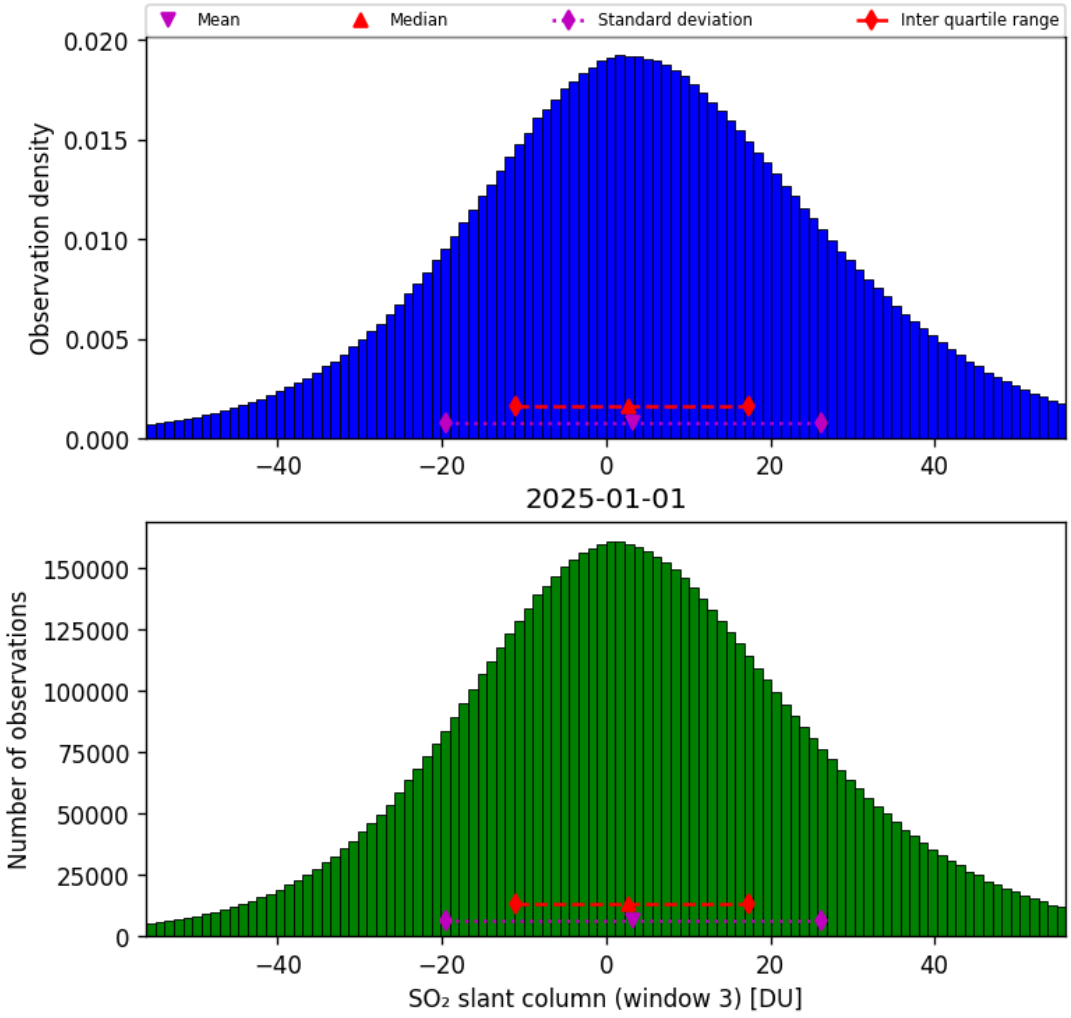


Figure 71: Histogram of "SO_2 slant column (window 3)" for 2025-01-01 to 2025-01-02

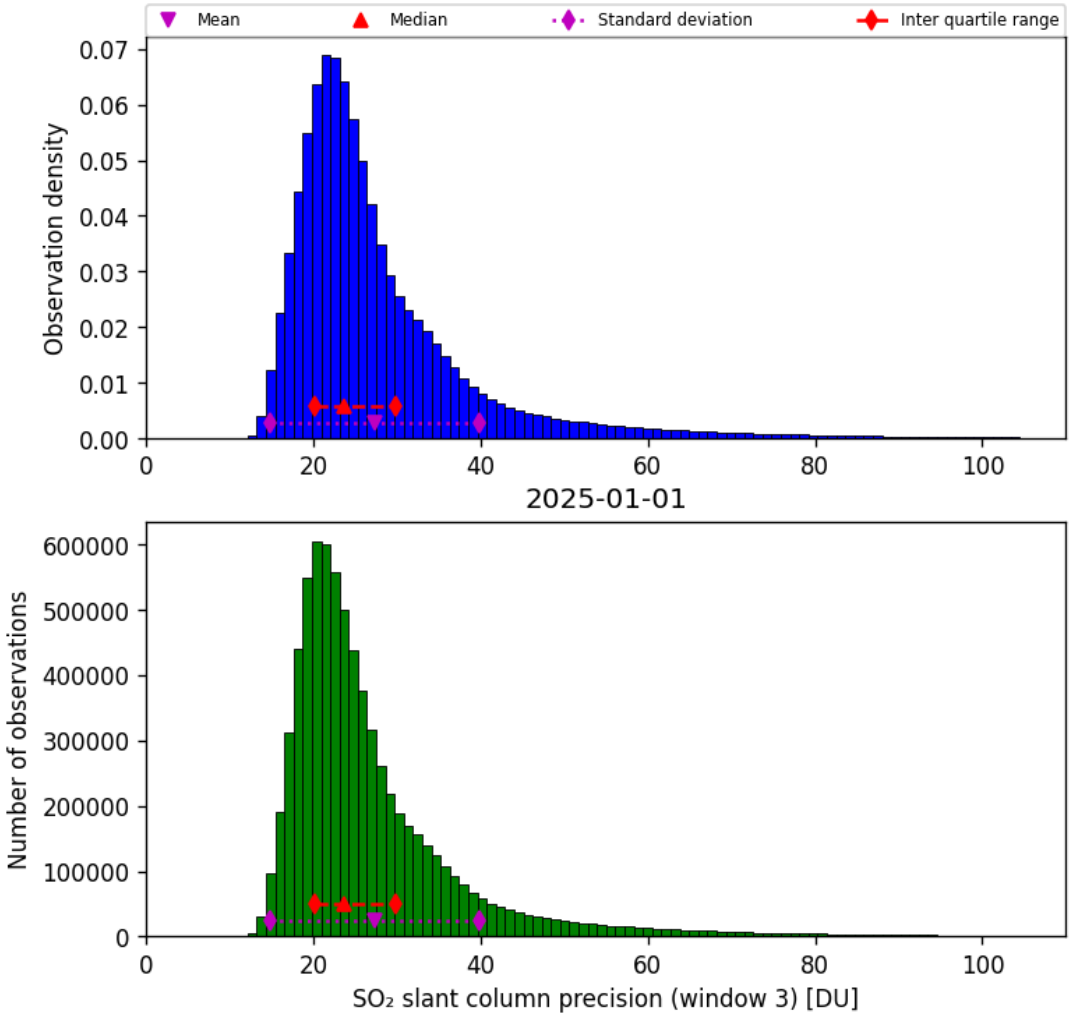


Figure 72: Histogram of "SO_2 slant column precision (window 3)" for 2025-01-01 to 2025-01-02

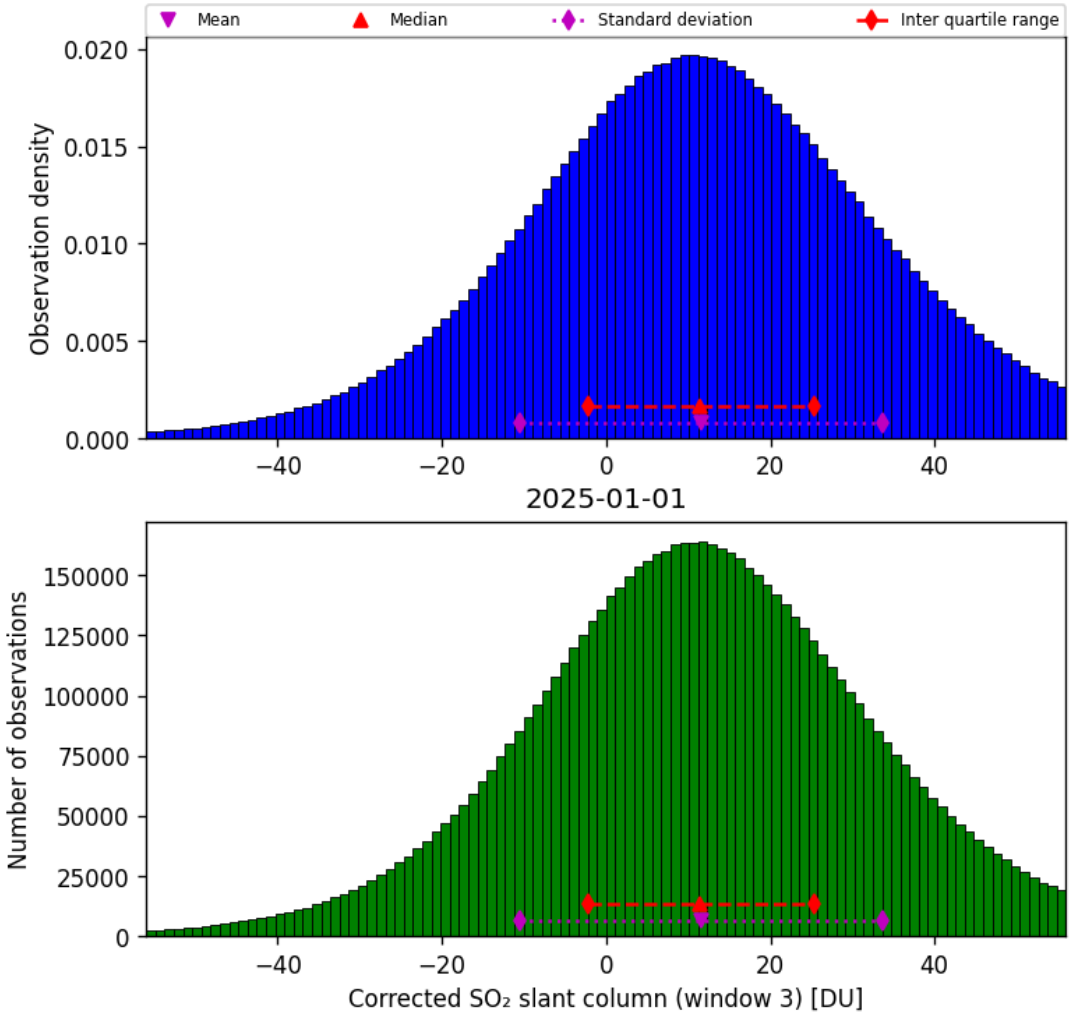


Figure 73: Histogram of "Corrected SO_2 slant column (window 3)" for 2025-01-01 to 2025-01-02

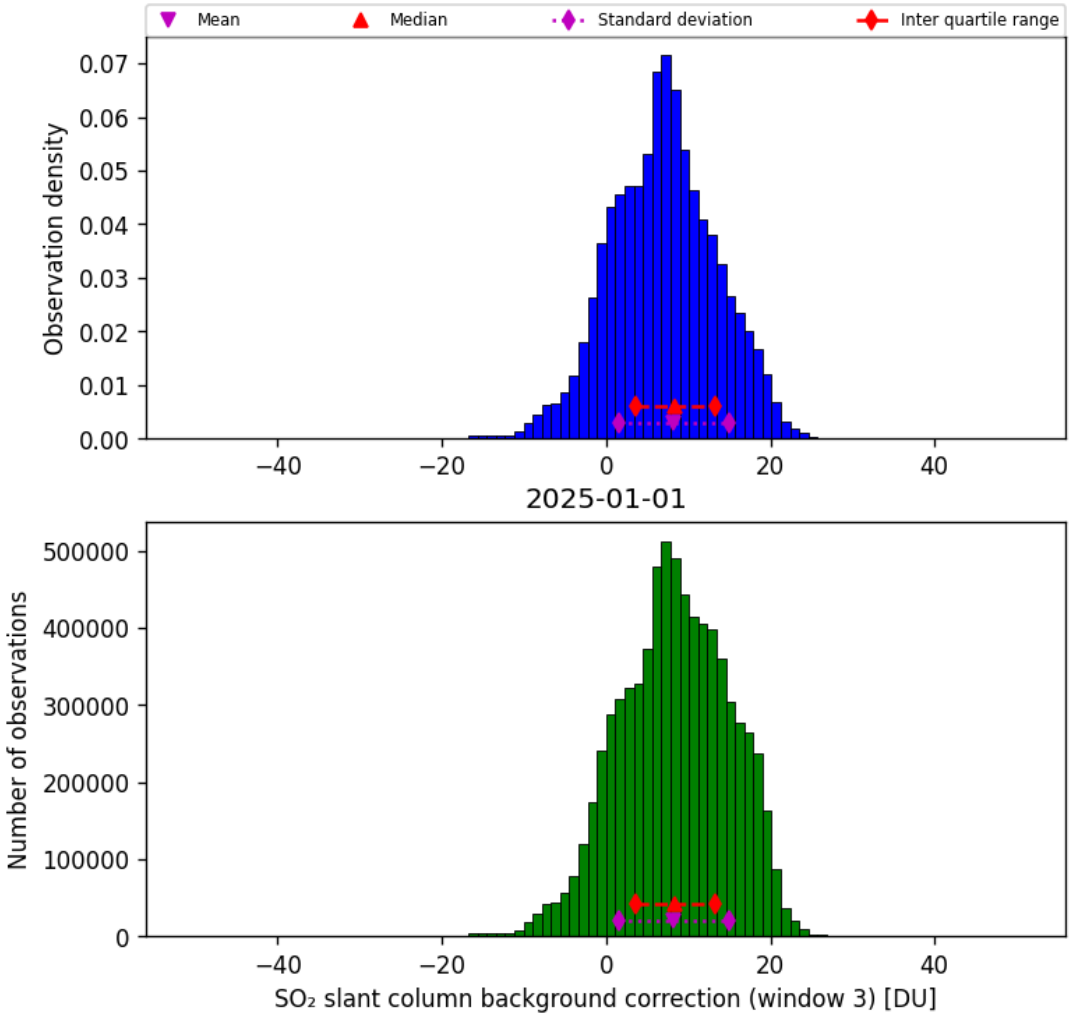


Figure 74: Histogram of "SO_2 slant column background correction (window 3)" for 2025-01-01 to 2025-01-02

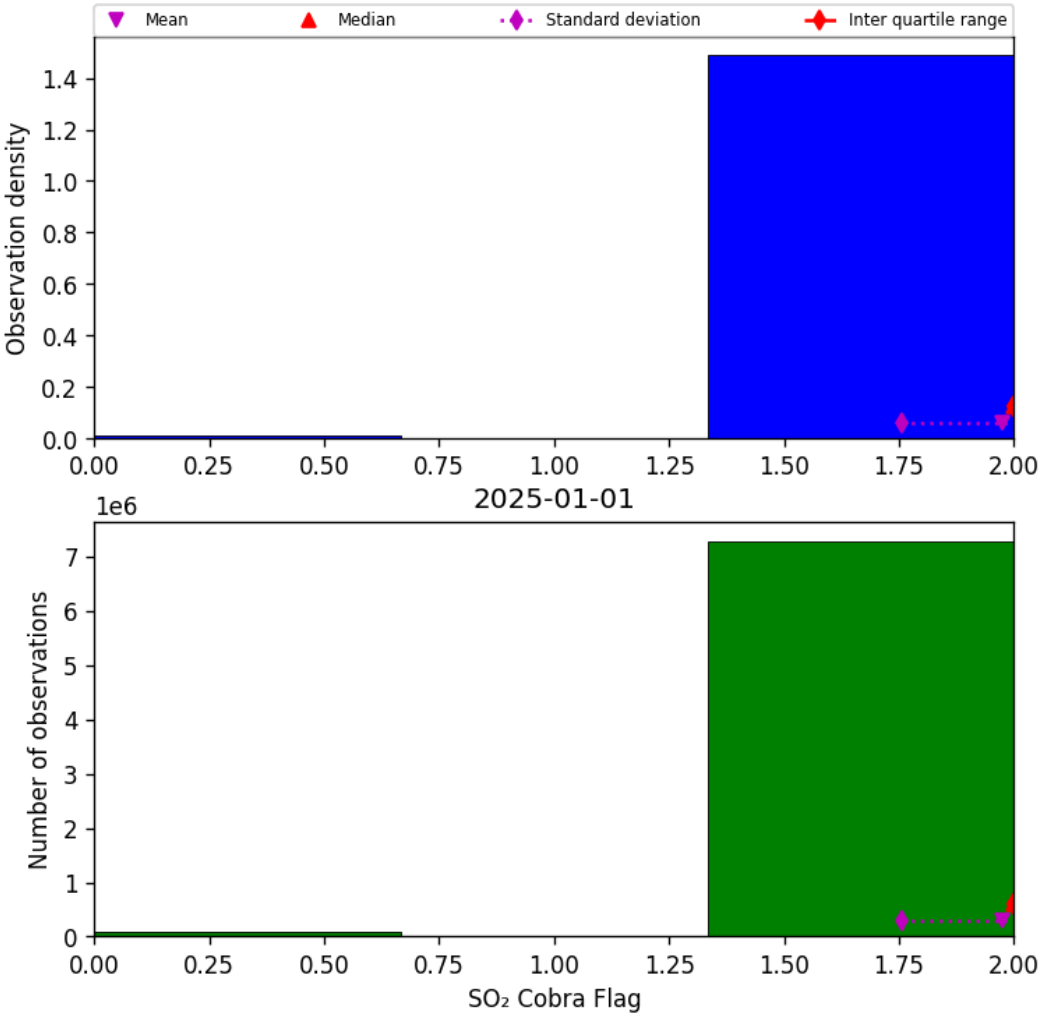


Figure 75: Histogram of "SO_2 Cobra Flag" for 2025-01-01 to 2025-01-02

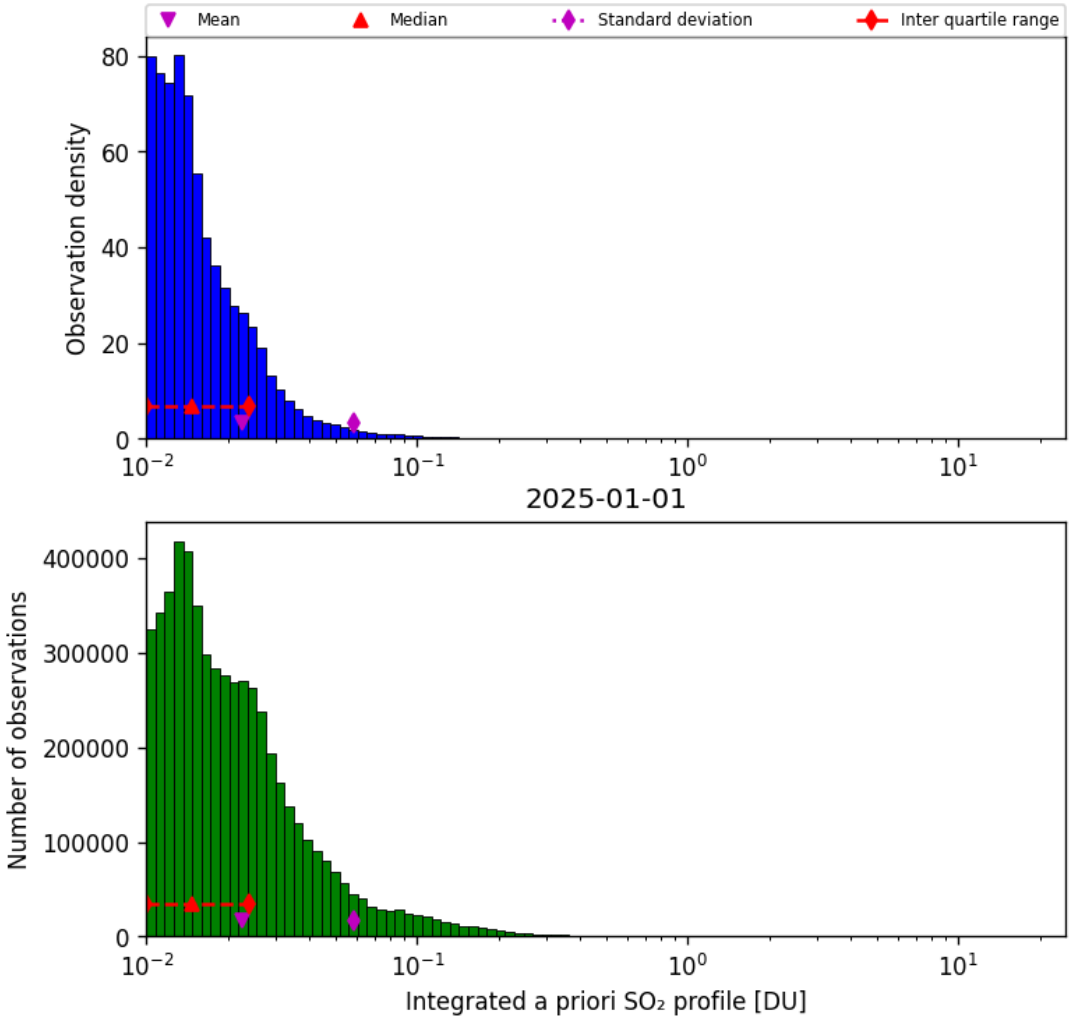


Figure 76: Histogram of "Integrated a priori SO_2 profile" for 2025-01-01 to 2025-01-02

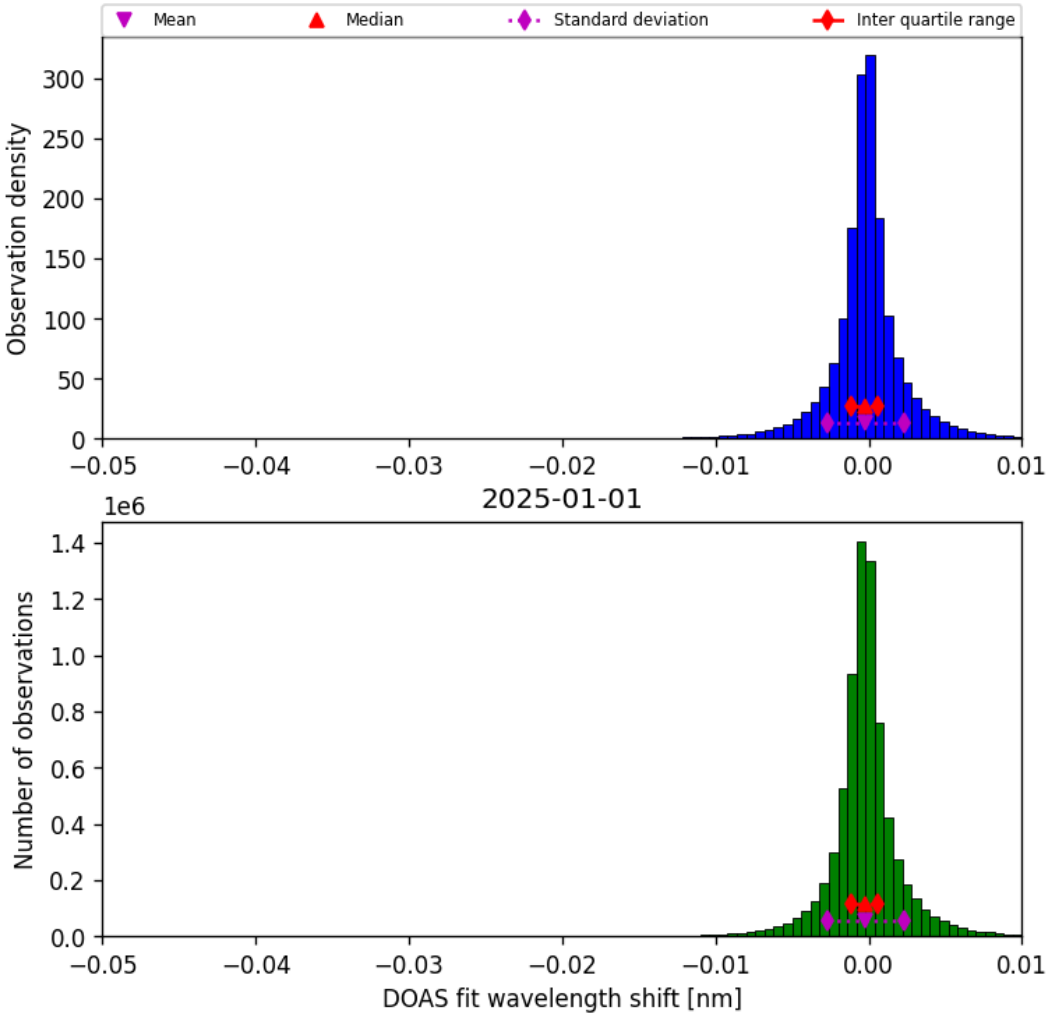


Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-01-01 to 2025-01-02

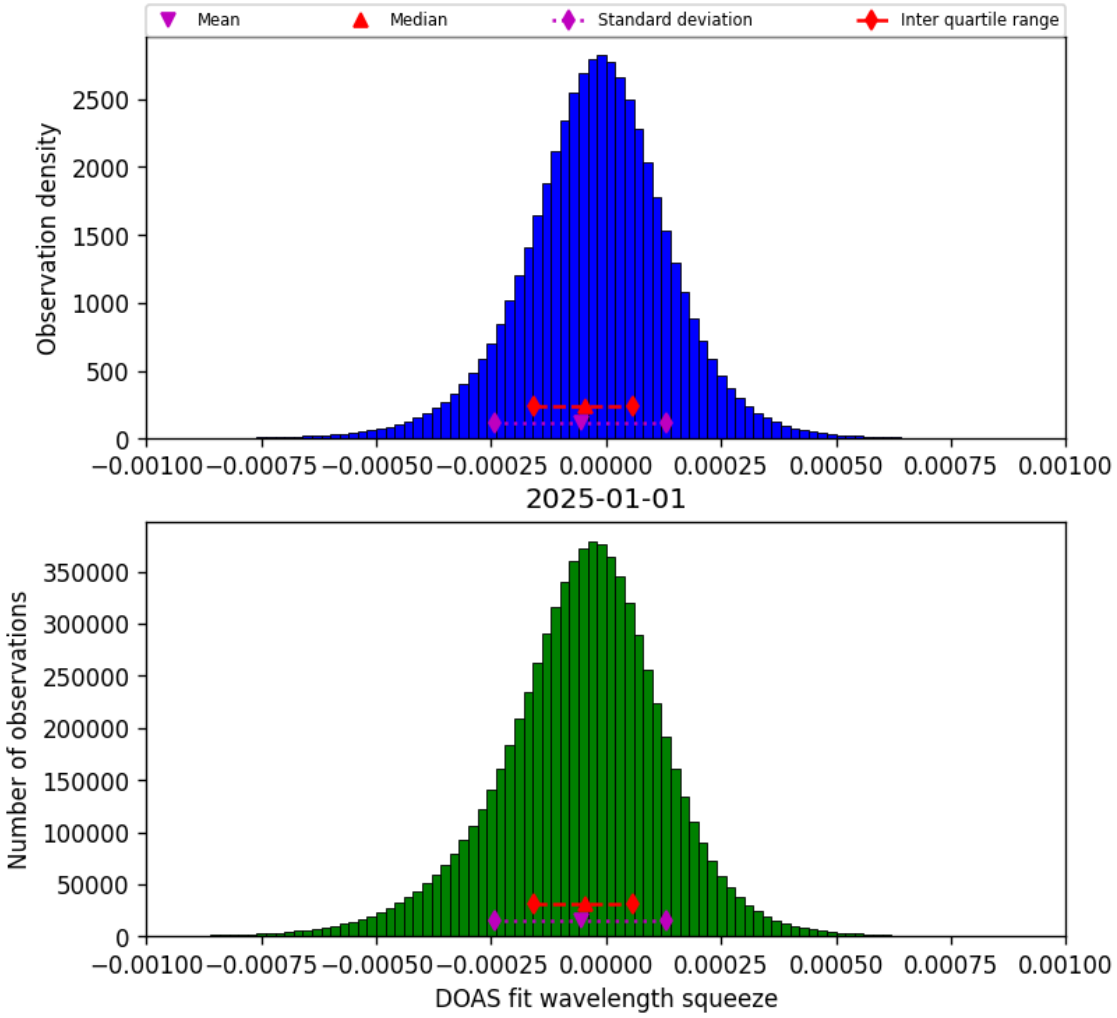


Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-01-01 to 2025-01-02

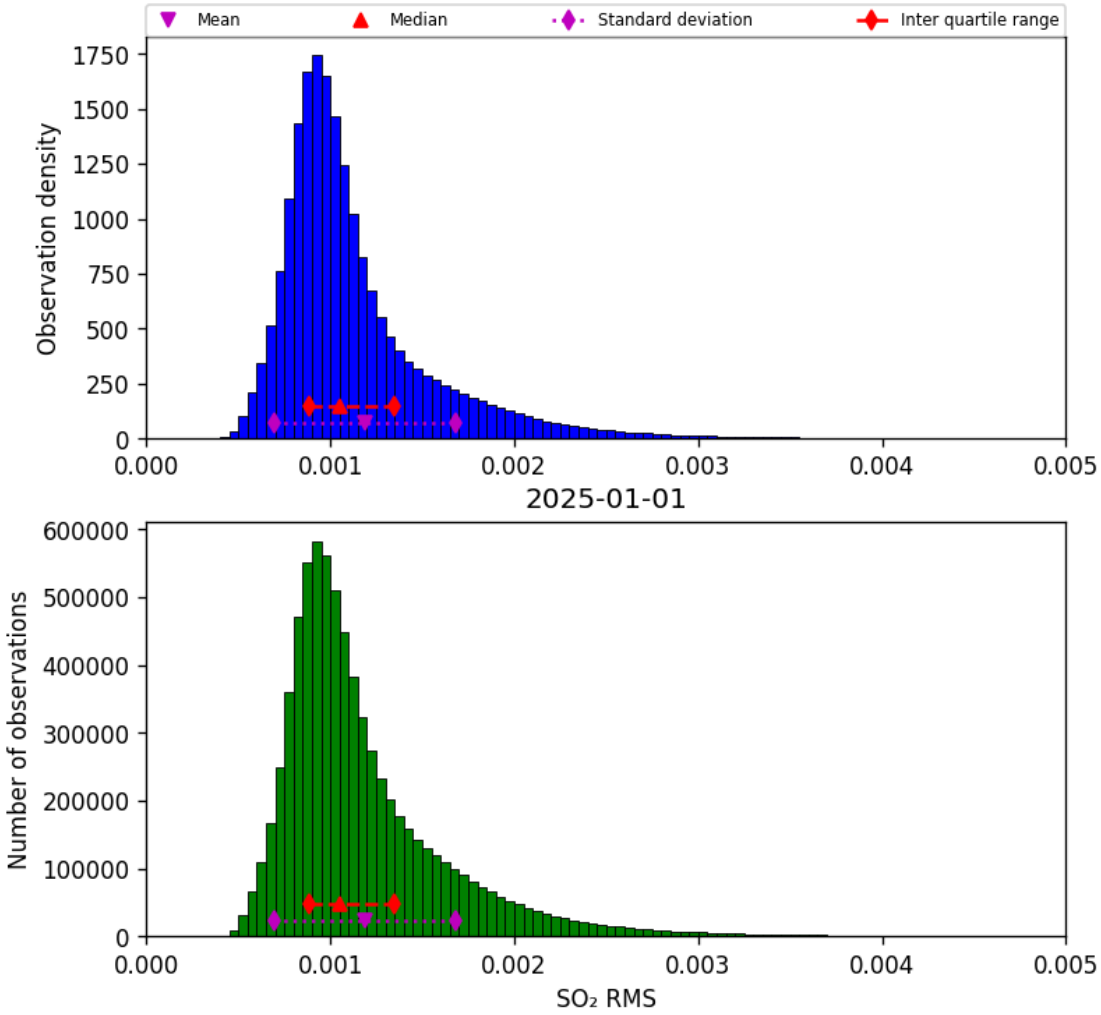


Figure 79: Histogram of "SO_2 RMS" for 2025-01-01 to 2025-01-02

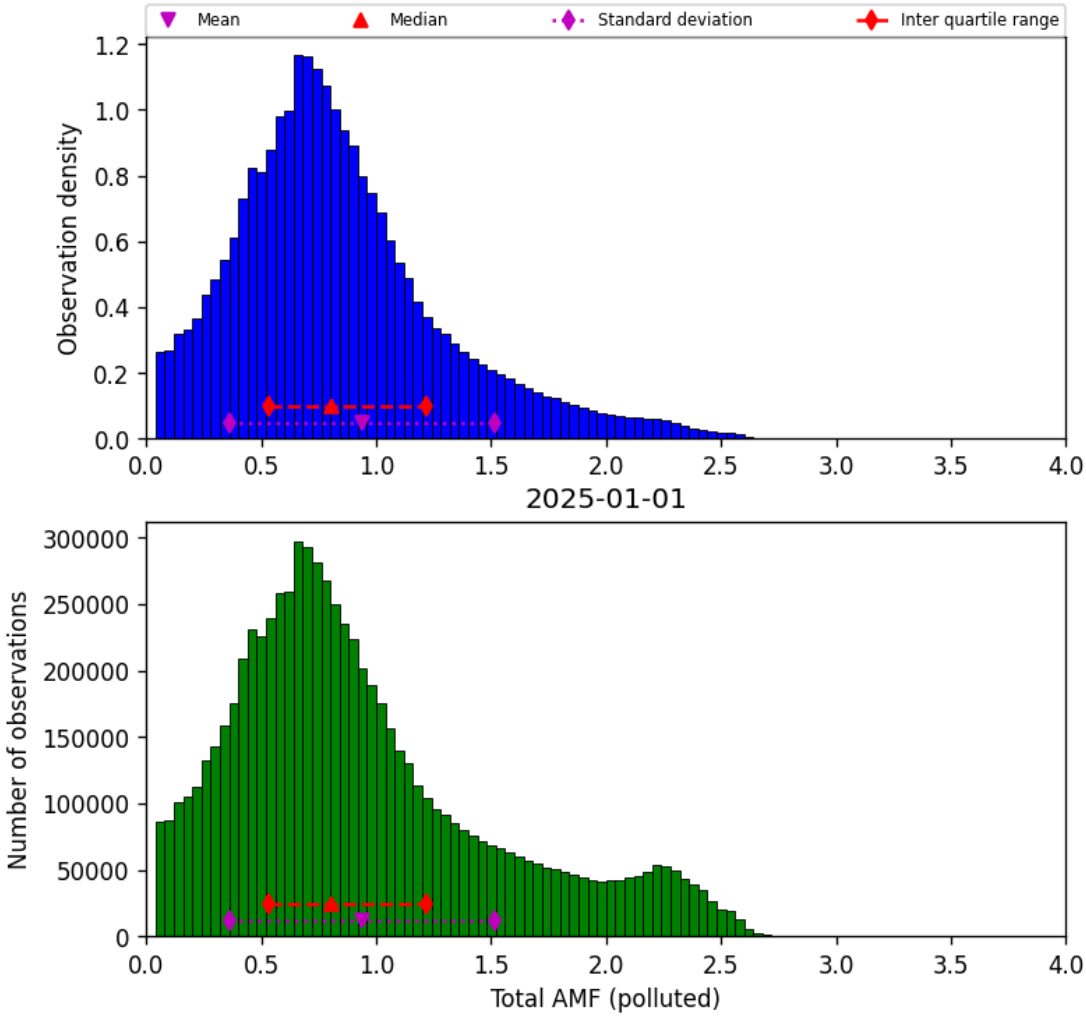


Figure 80: Histogram of “Total AMF (polluted)” for 2025-01-01 to 2025-01-02

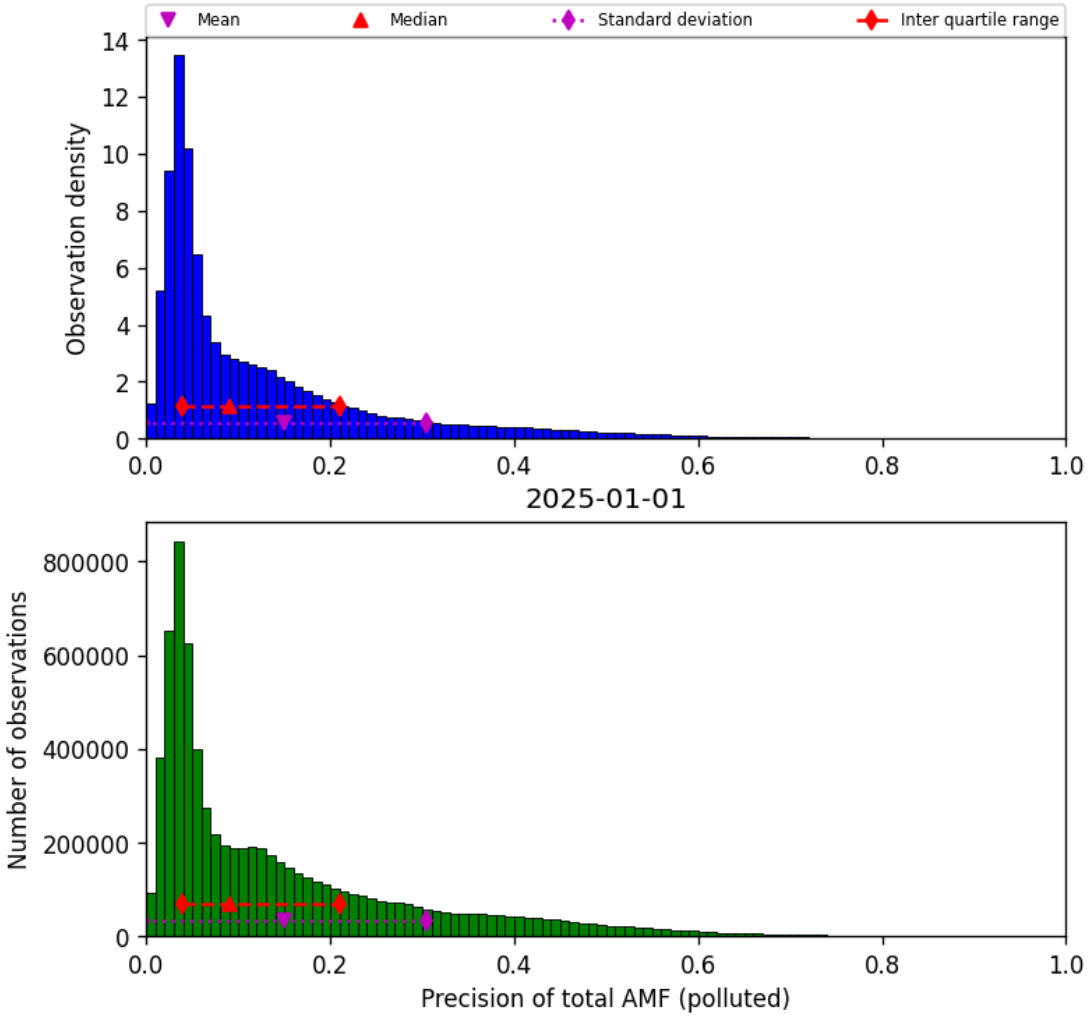


Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-01-01 to 2025-01-02

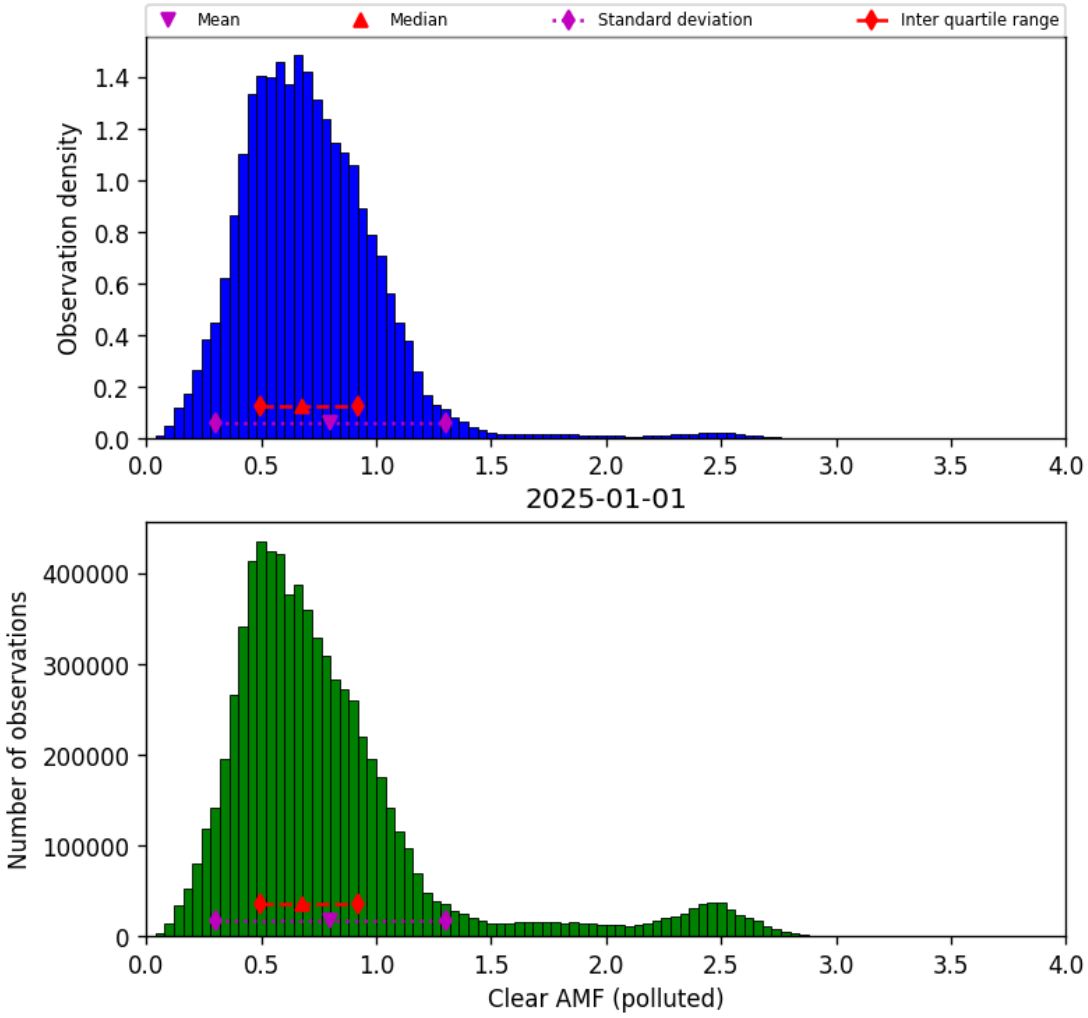


Figure 82: Histogram of “Clear AMF (polluted)” for 2025-01-01 to 2025-01-02

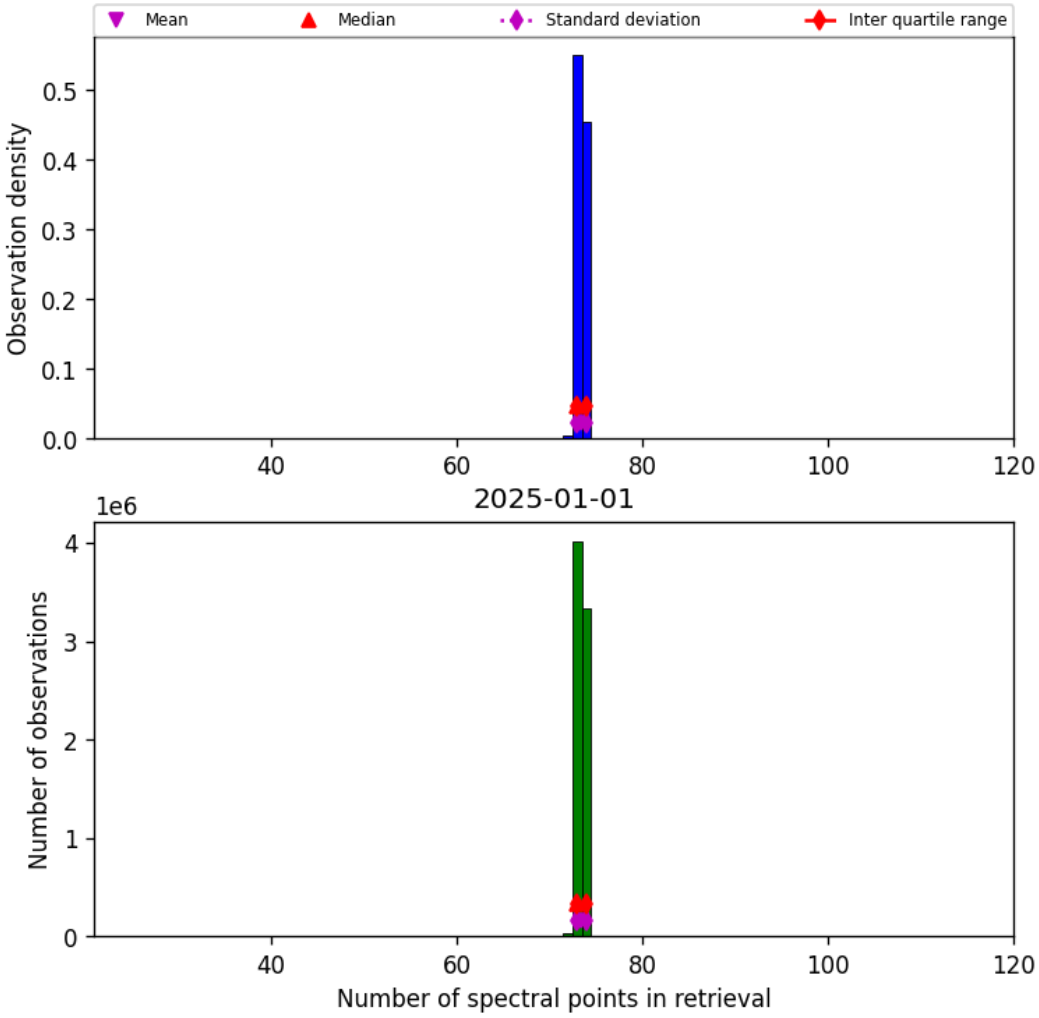


Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-01-01 to 2025-01-02

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.

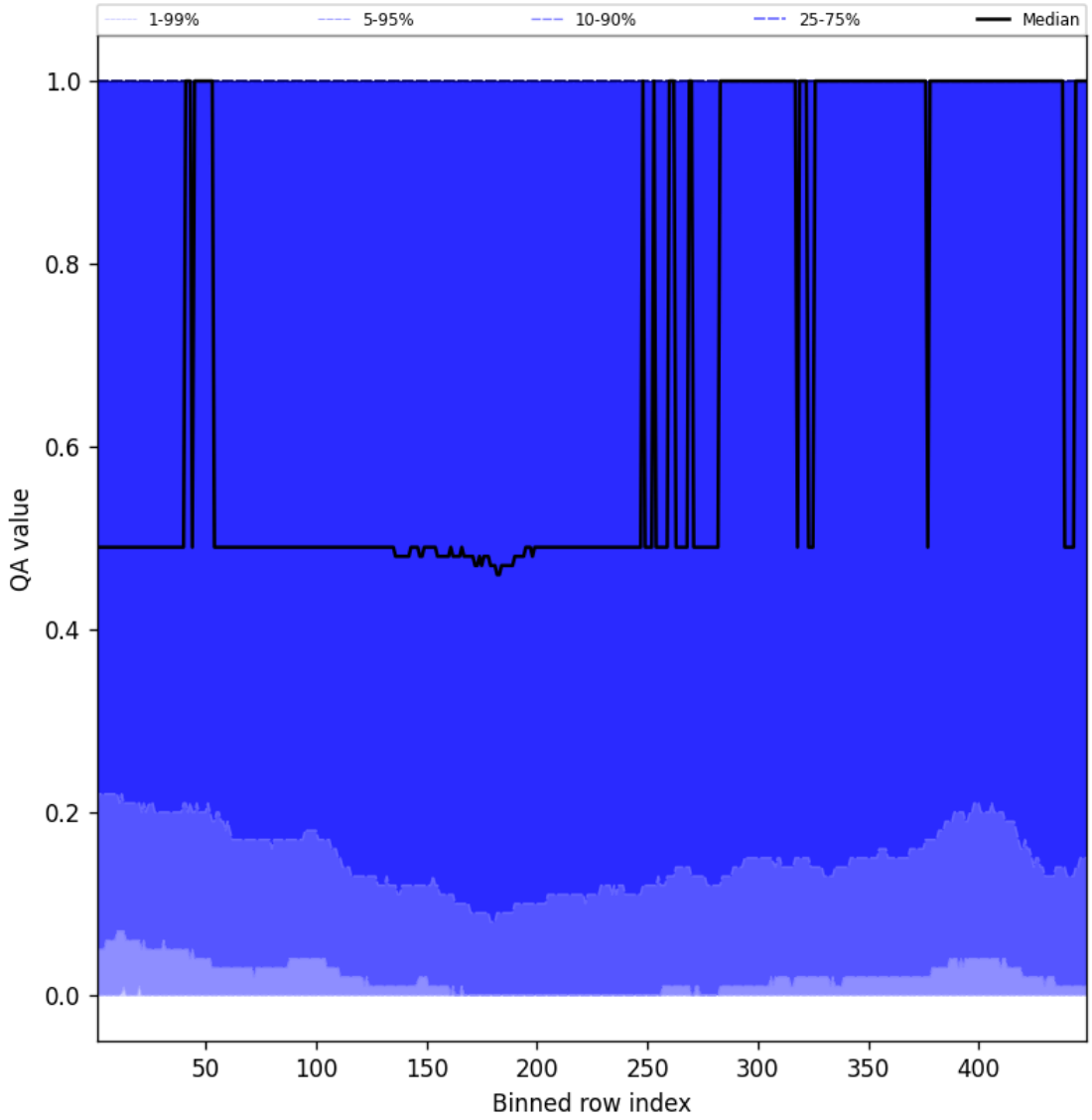


Figure 84: Along track statistics of “QA value” for 2025-01-01 to 2025-01-02

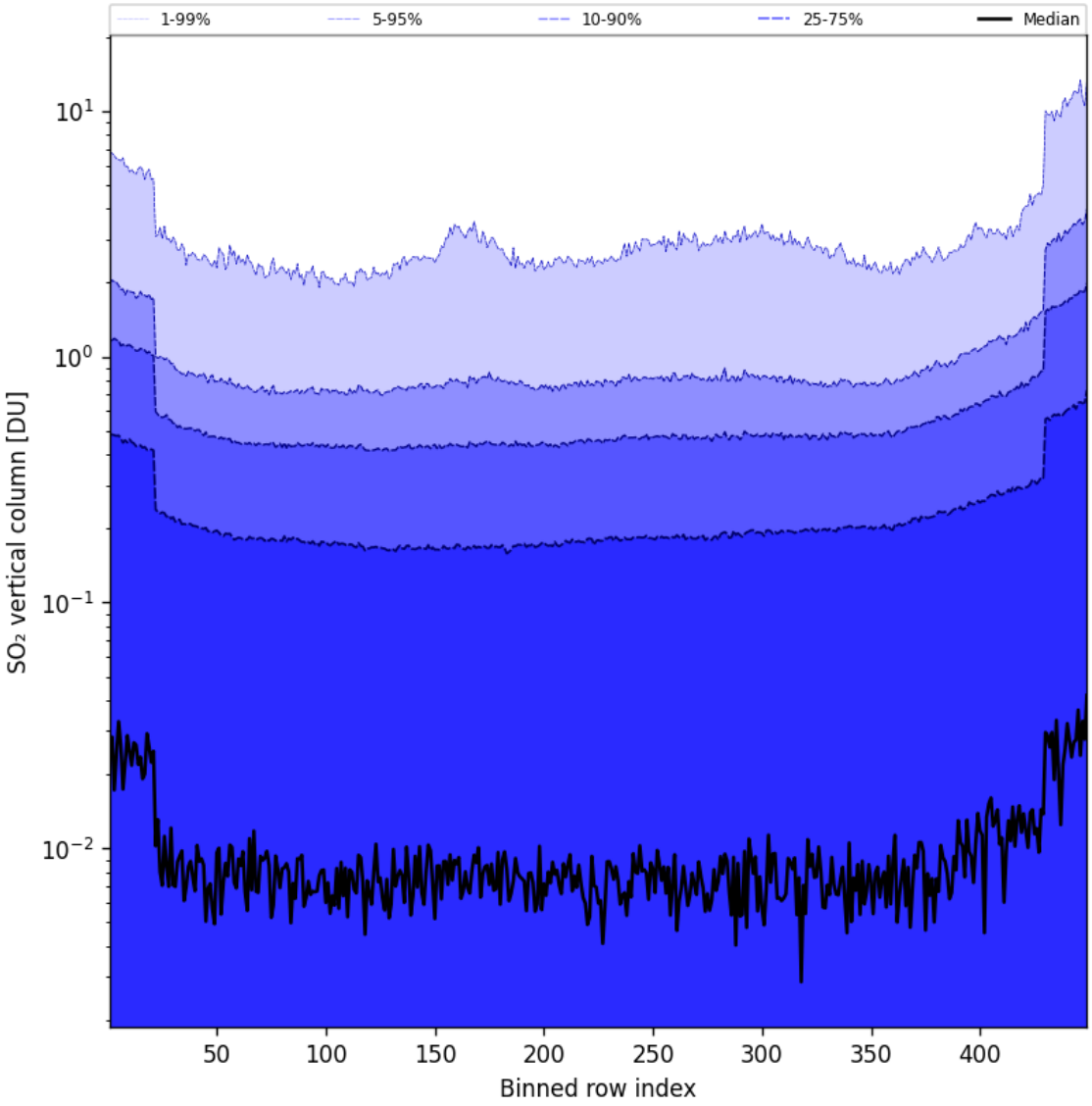


Figure 85: Along track statistics of "SO_2 vertical column" for 2025-01-01 to 2025-01-02

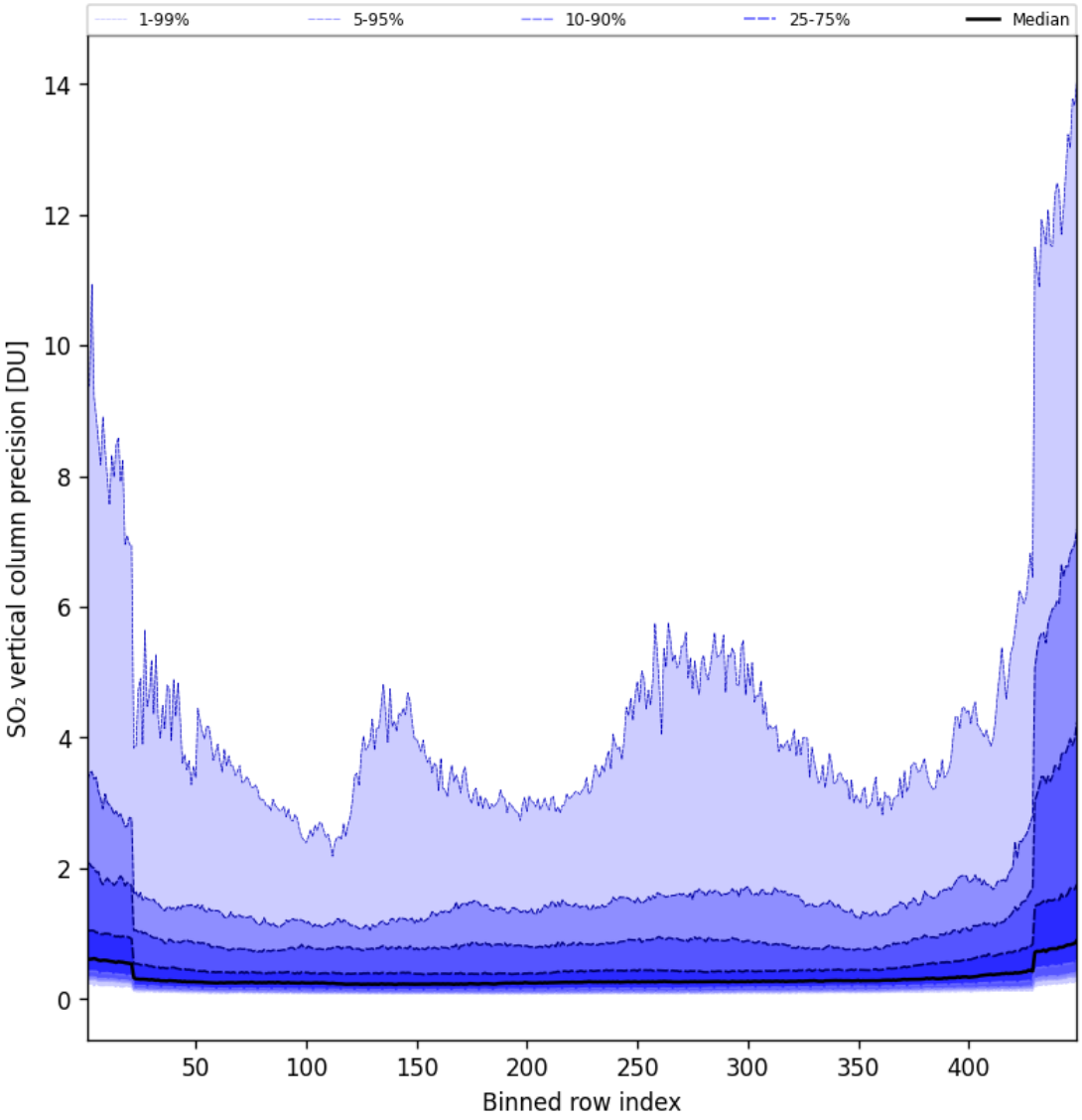


Figure 86: Along track statistics of "SO_2 vertical column precision" for 2025-01-01 to 2025-01-02

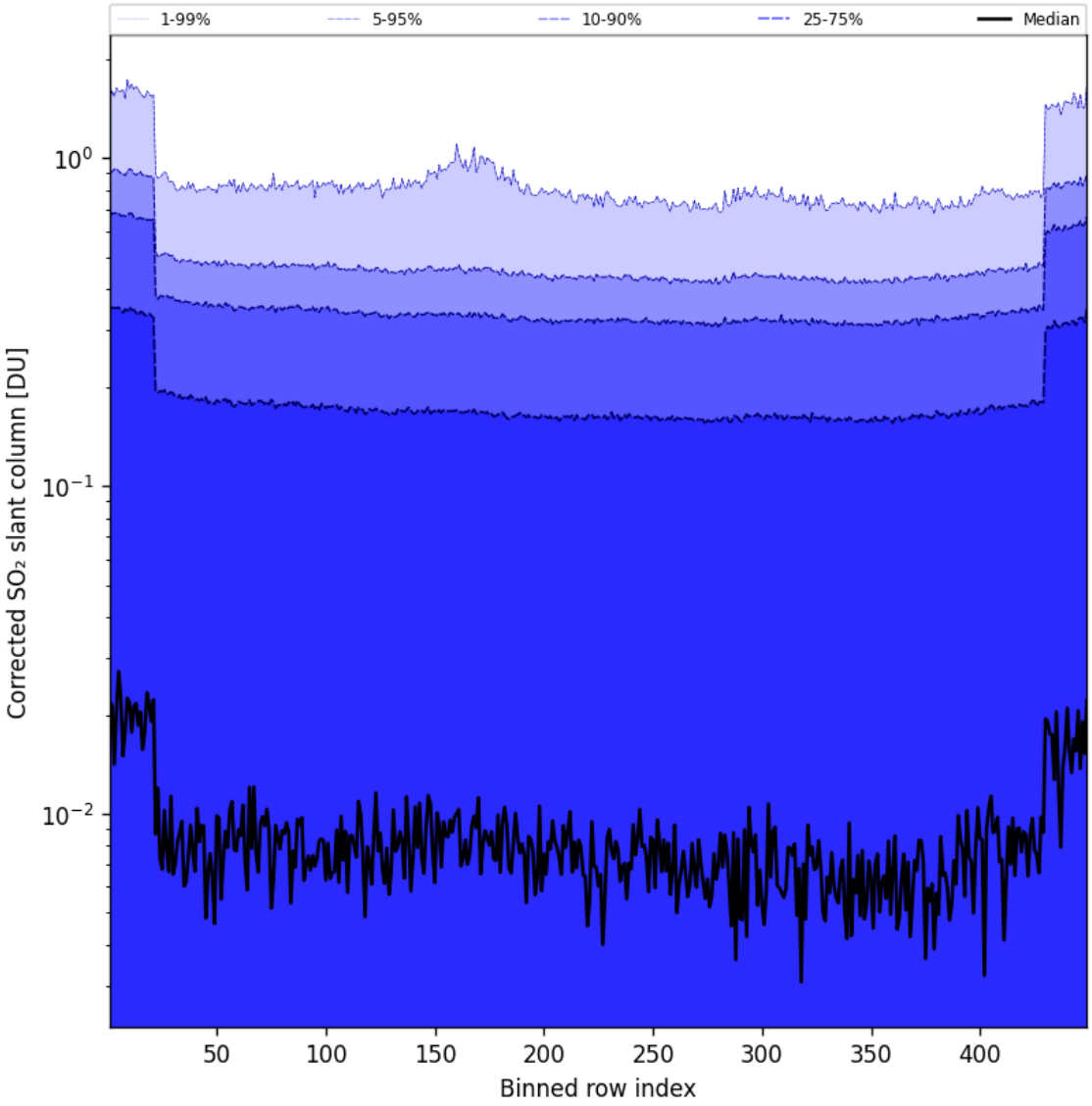


Figure 87: Along track statistics of “Corrected SO_2 slant column” for 2025-01-01 to 2025-01-02

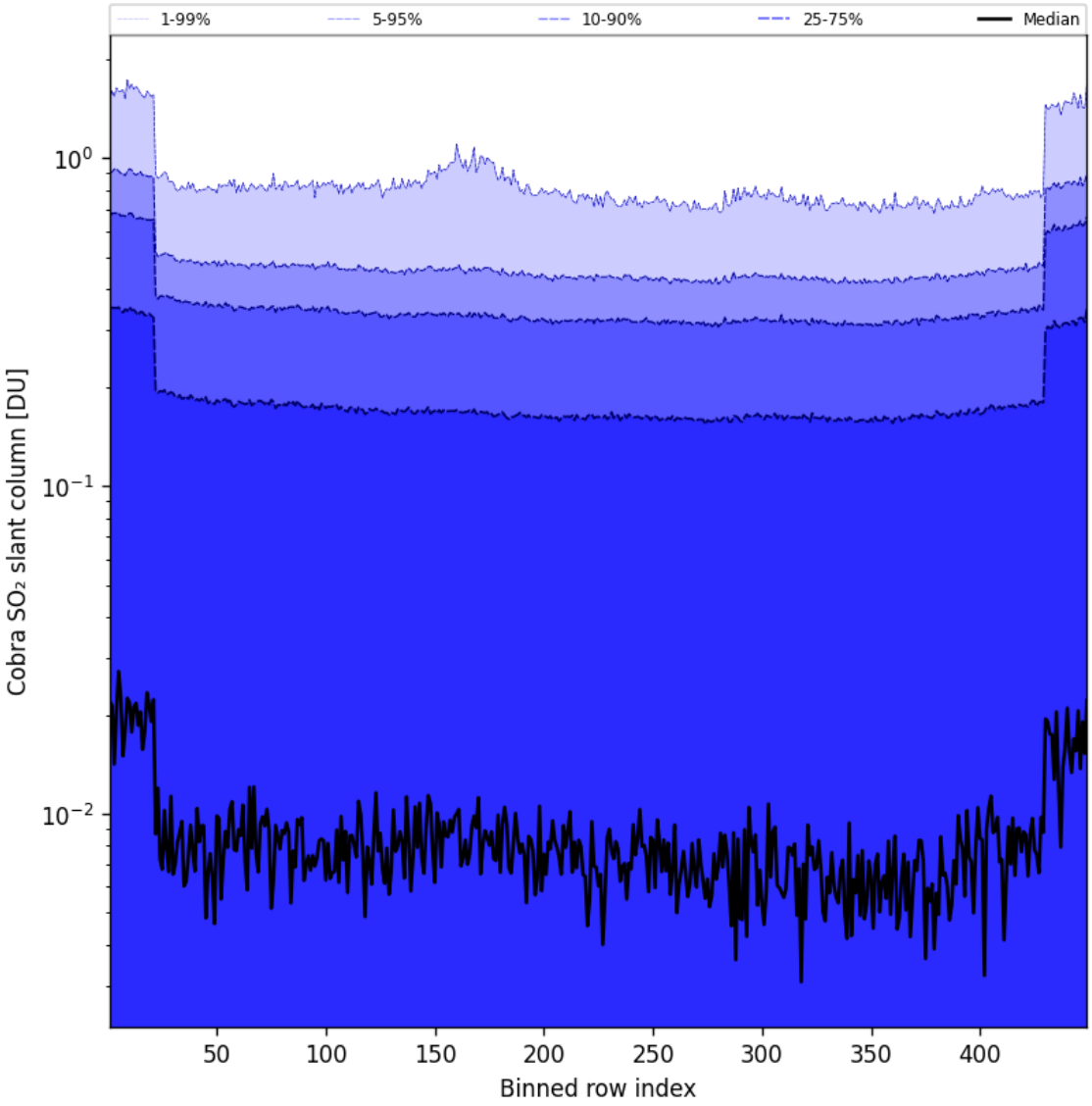


Figure 88: Along track statistics of “Cobra SO_2 slant column” for 2025-01-01 to 2025-01-02

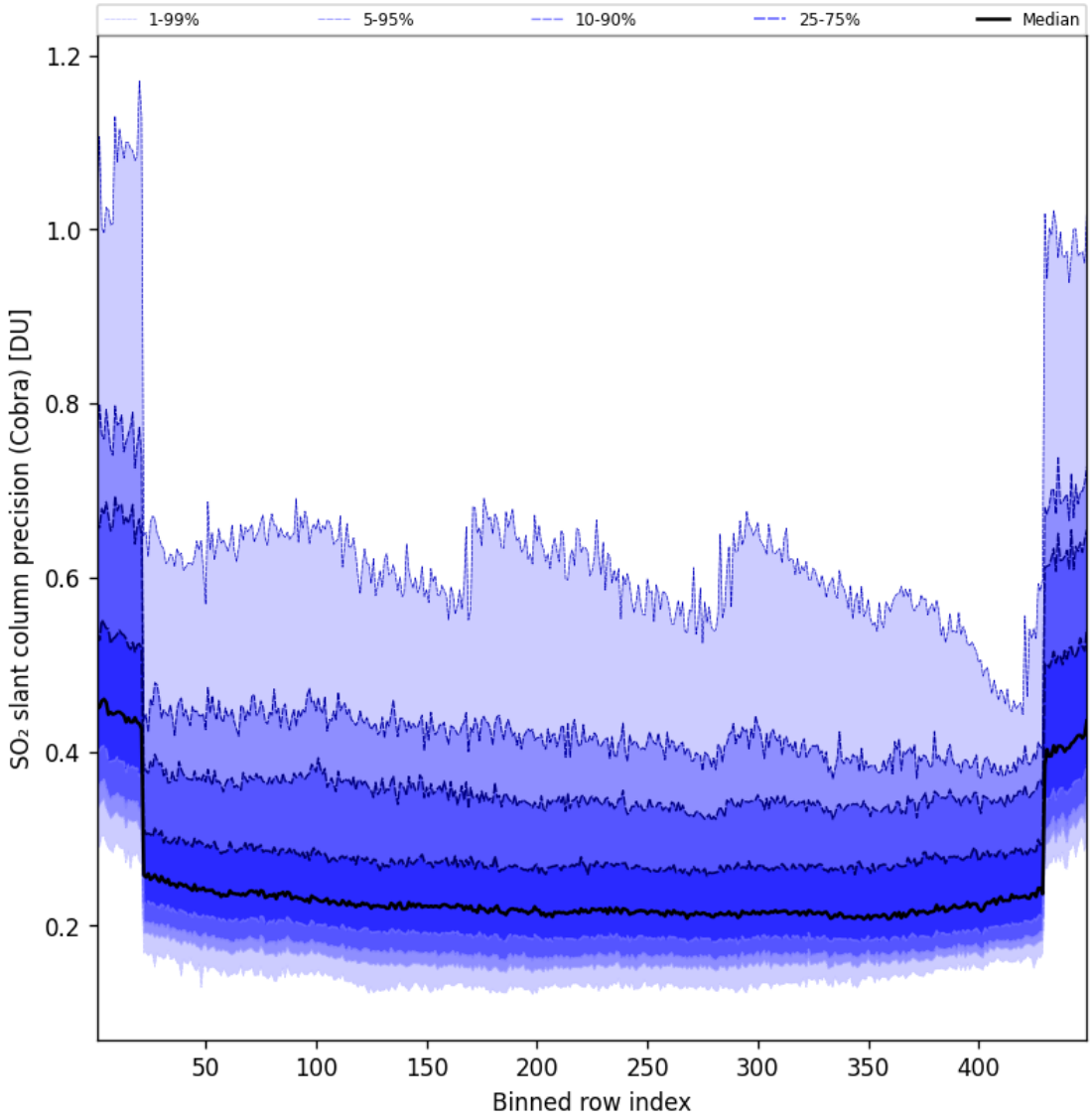


Figure 89: Along track statistics of "SO_2 slant column precision (Cobra)" for 2025-01-01 to 2025-01-02

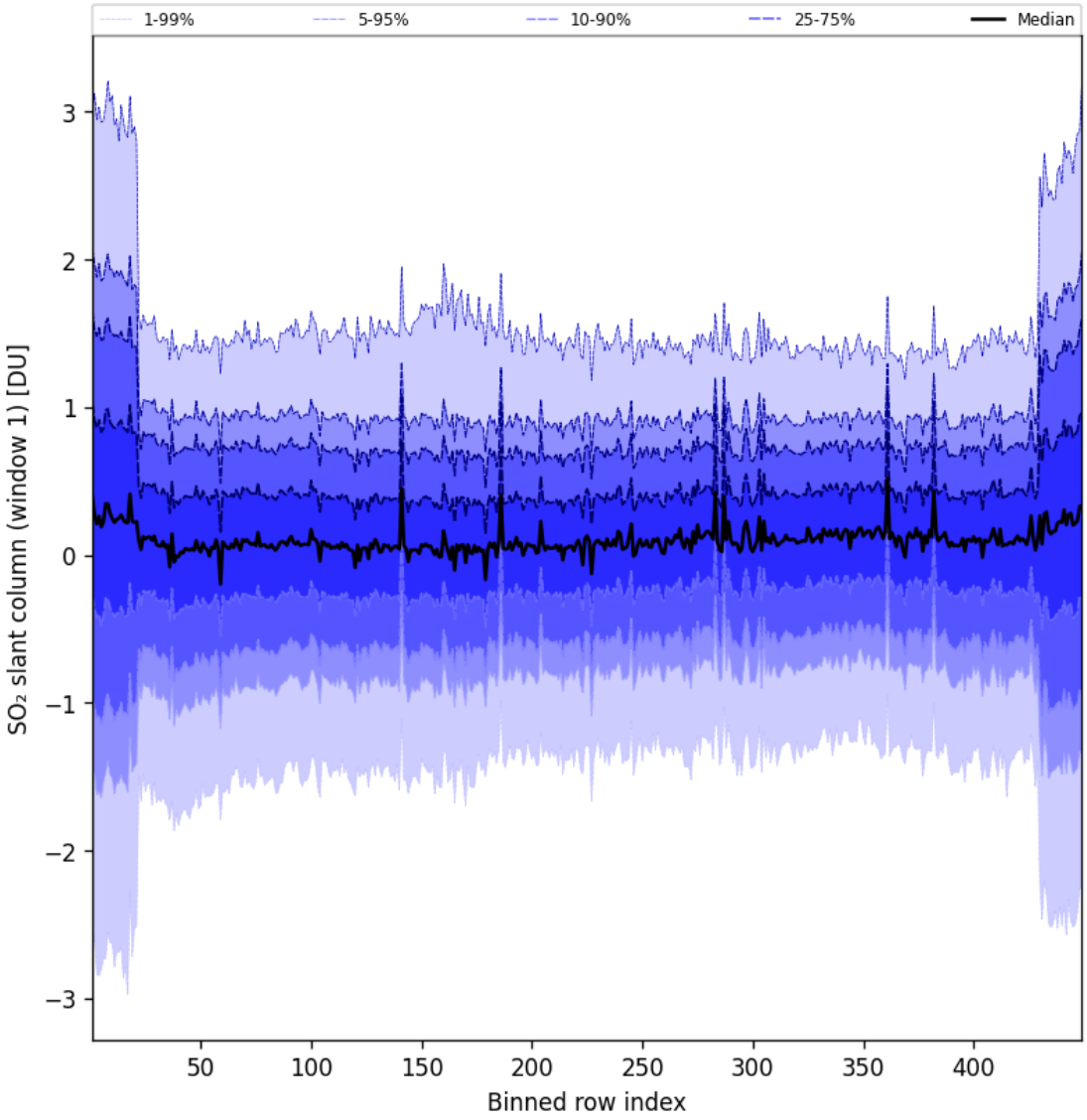


Figure 90: Along track statistics of "SO_2 slant column (window 1)" for 2025-01-01 to 2025-01-02

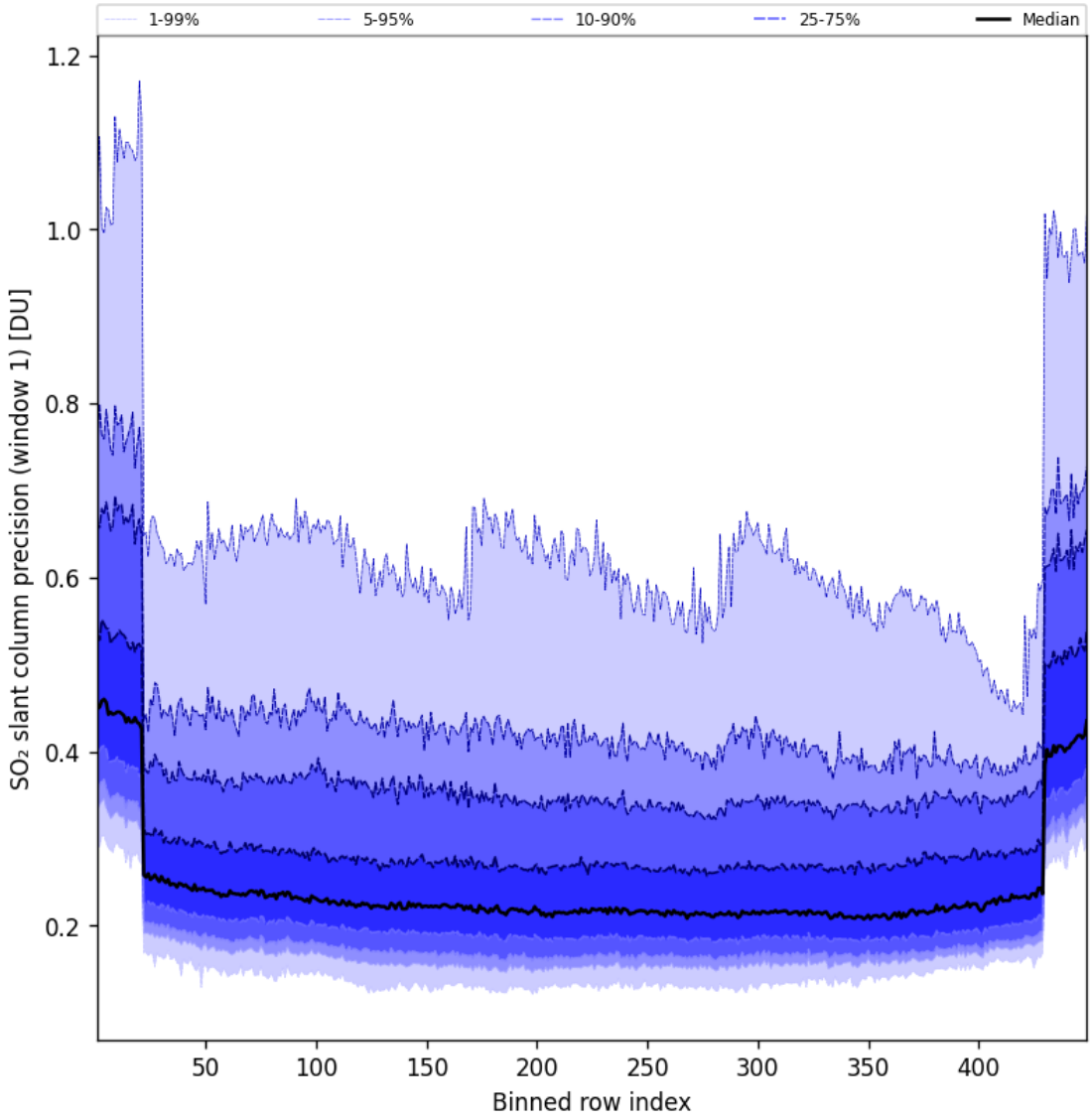


Figure 91: Along track statistics of "SO_2 slant column precision (window 1)" for 2025-01-01 to 2025-01-02

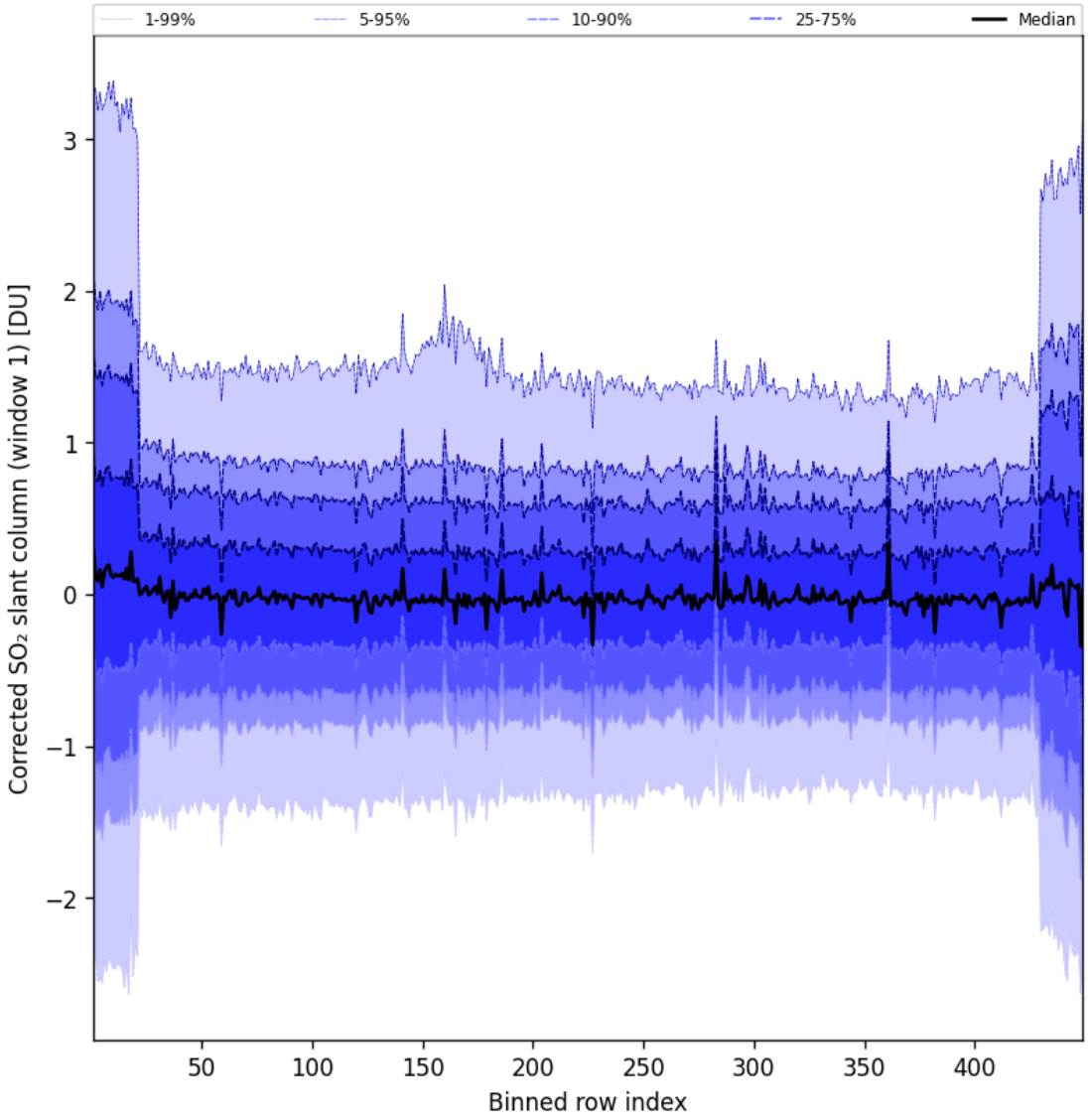


Figure 92: Along track statistics of “Corrected SO_2 slant column (window 1)” for 2025-01-01 to 2025-01-02

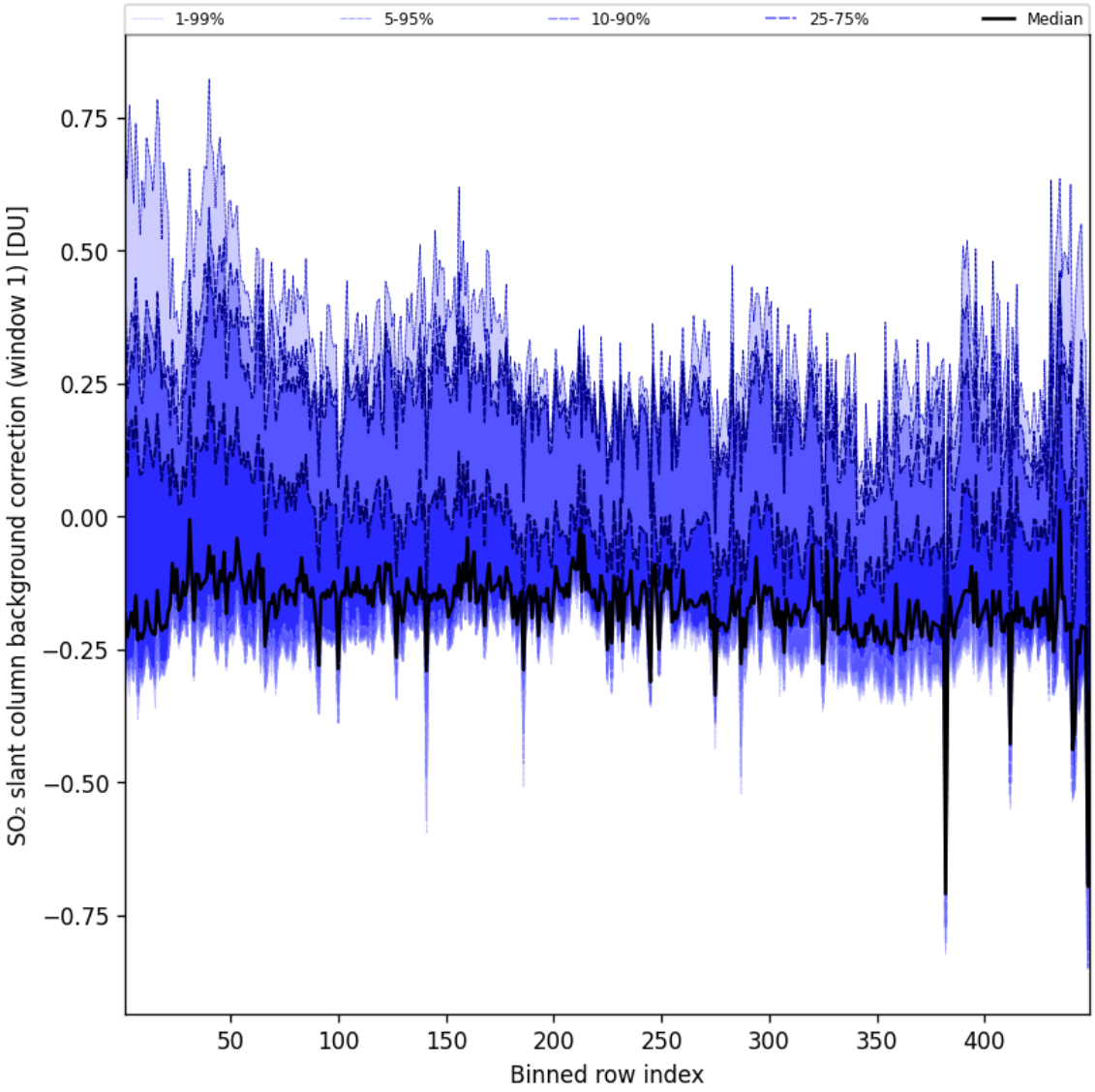


Figure 93: Along track statistics of "SO_2 slant column background correction (window 1)" for 2025-01-01 to 2025-01-02

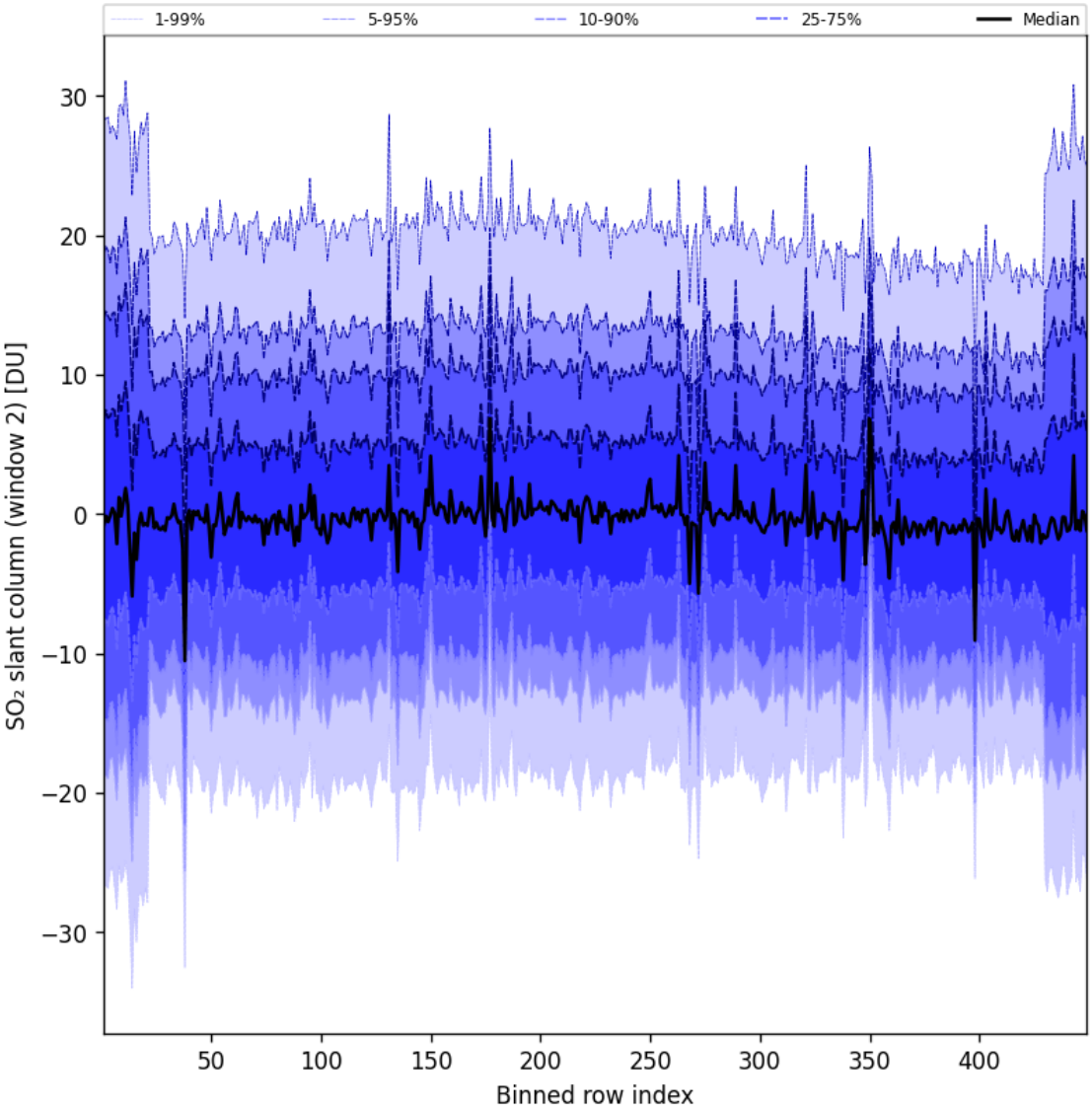


Figure 94: Along track statistics of "SO_2 slant column (window 2)" for 2025-01-01 to 2025-01-02

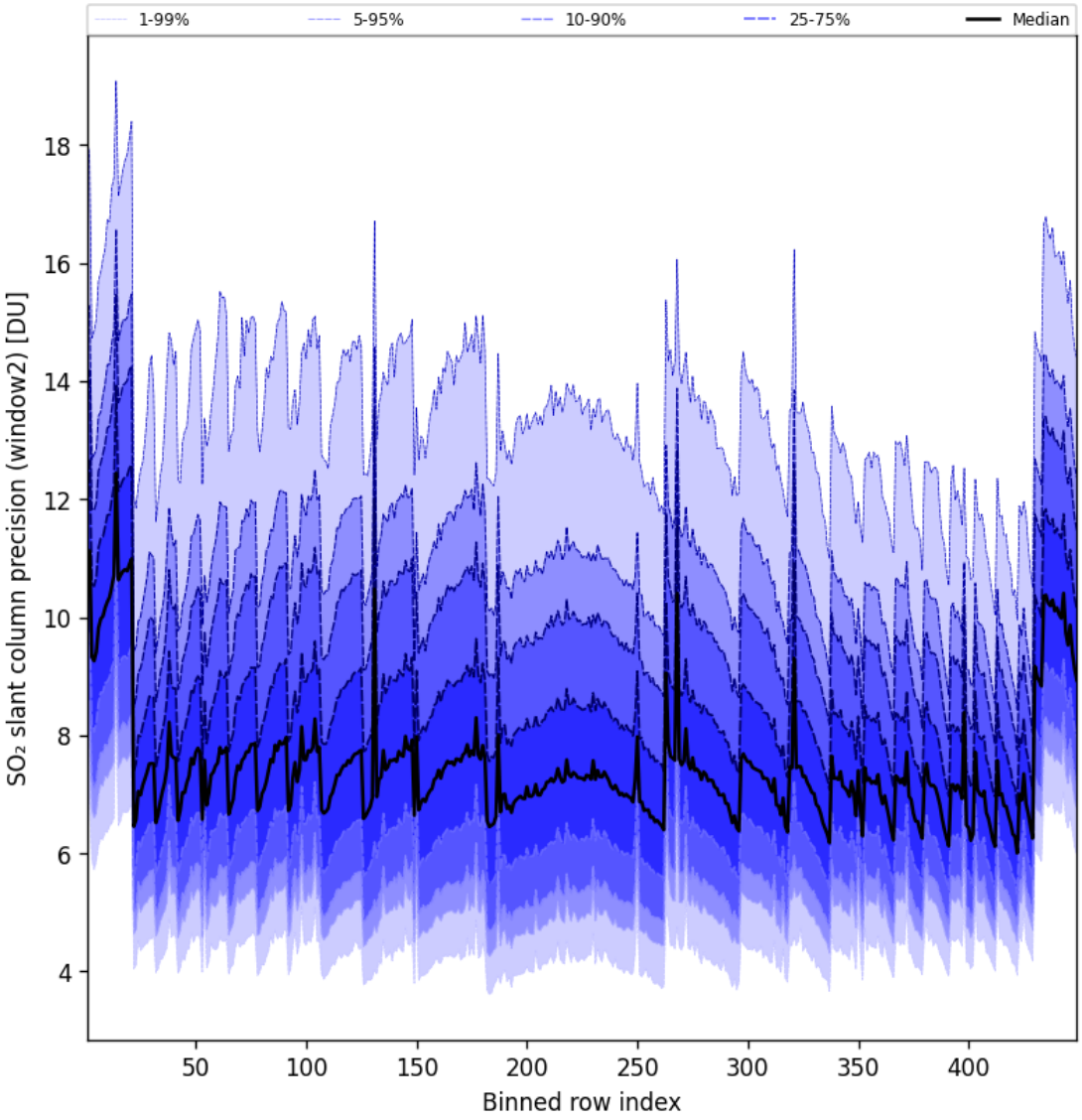


Figure 95: Along track statistics of "SO_2 slant column precision (window2)" for 2025-01-01 to 2025-01-02

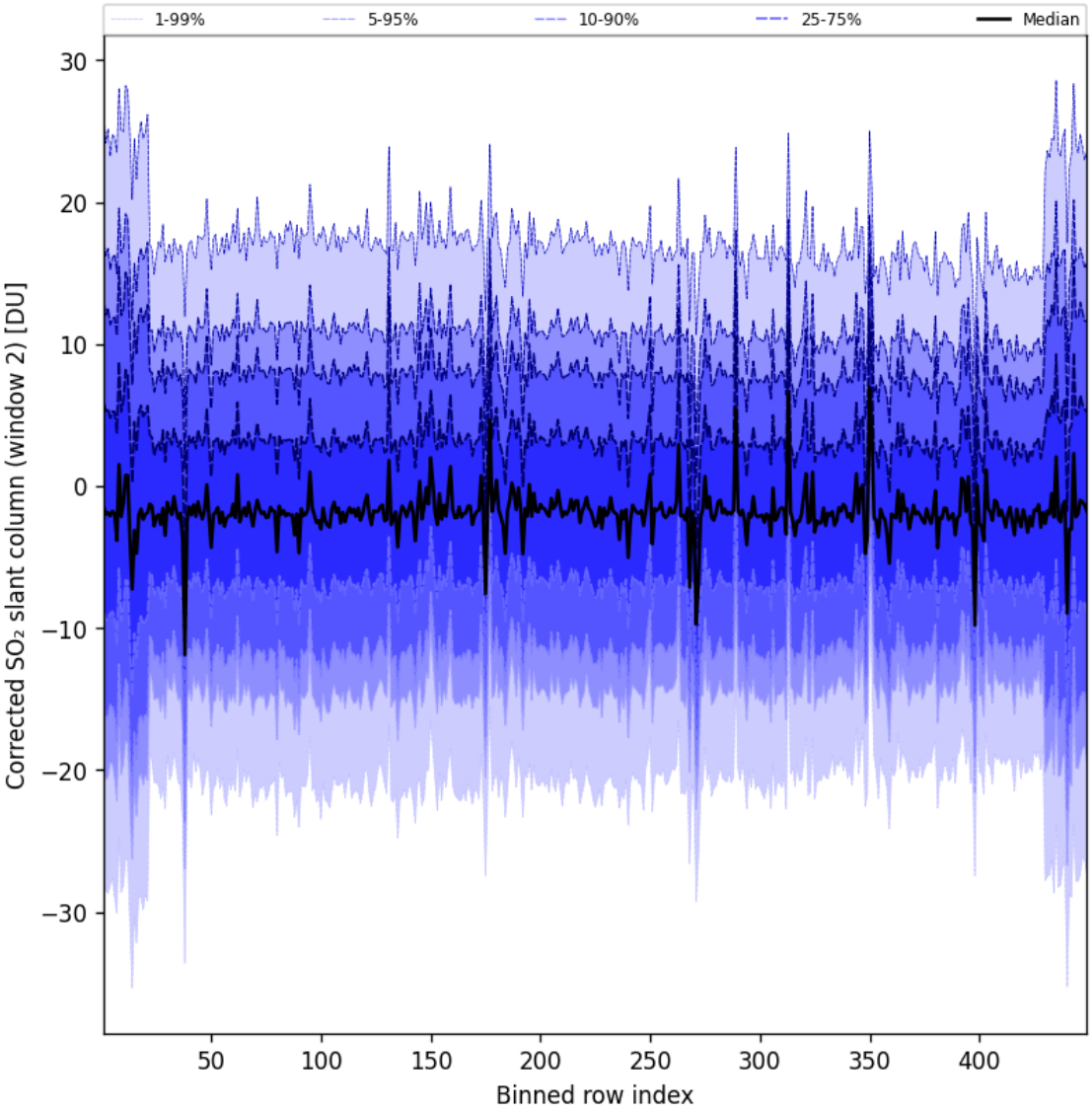


Figure 96: Along track statistics of “Corrected SO_2 slant column (window 2)” for 2025-01-01 to 2025-01-02

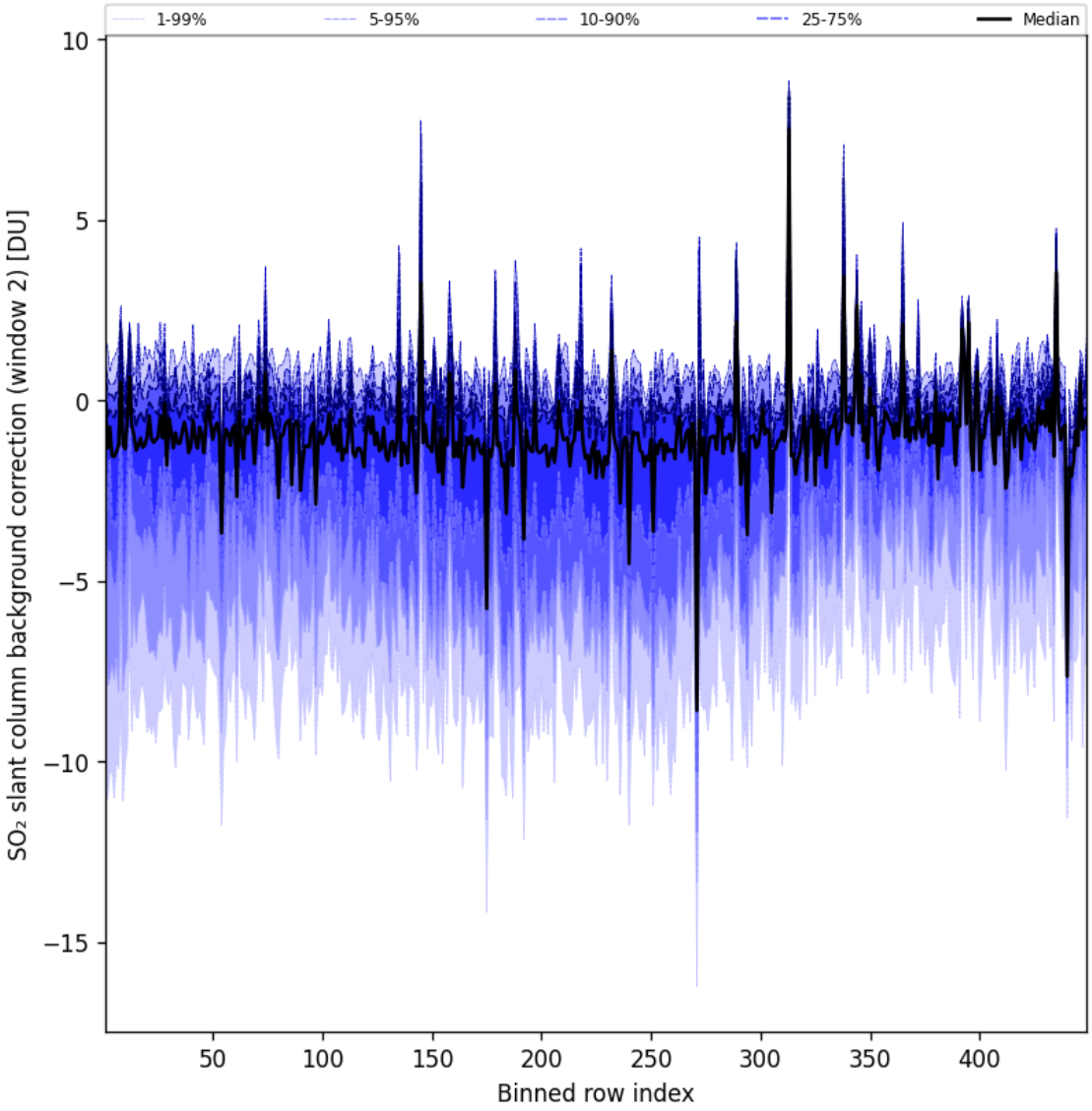


Figure 97: Along track statistics of "SO_2 slant column background correction (window 2)" for 2025-01-01 to 2025-01-02

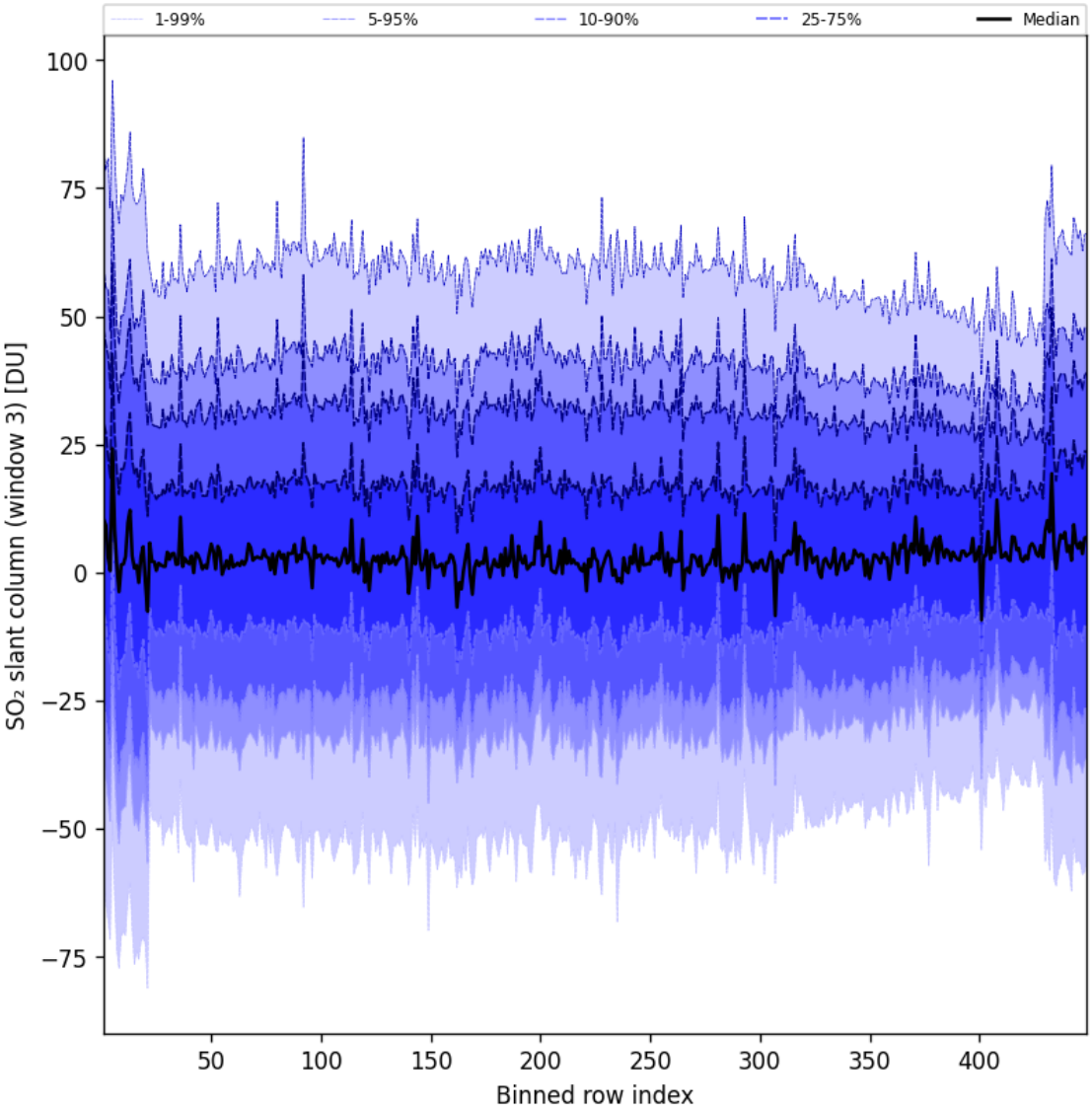


Figure 98: Along track statistics of "SO_2 slant column (window 3)" for 2025-01-01 to 2025-01-02

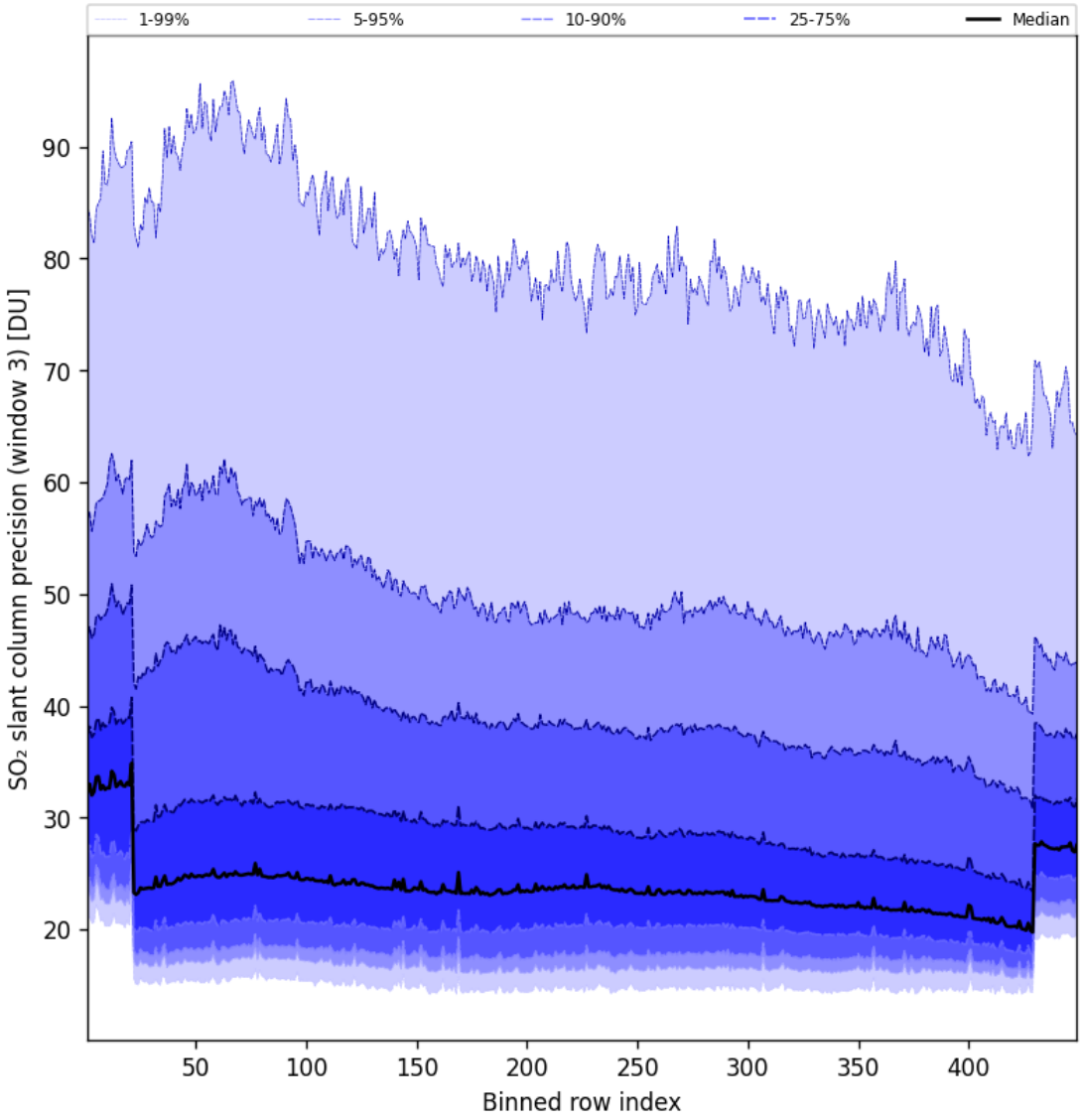


Figure 99: Along track statistics of "SO_2 slant column precision (window 3)" for 2025-01-01 to 2025-01-02

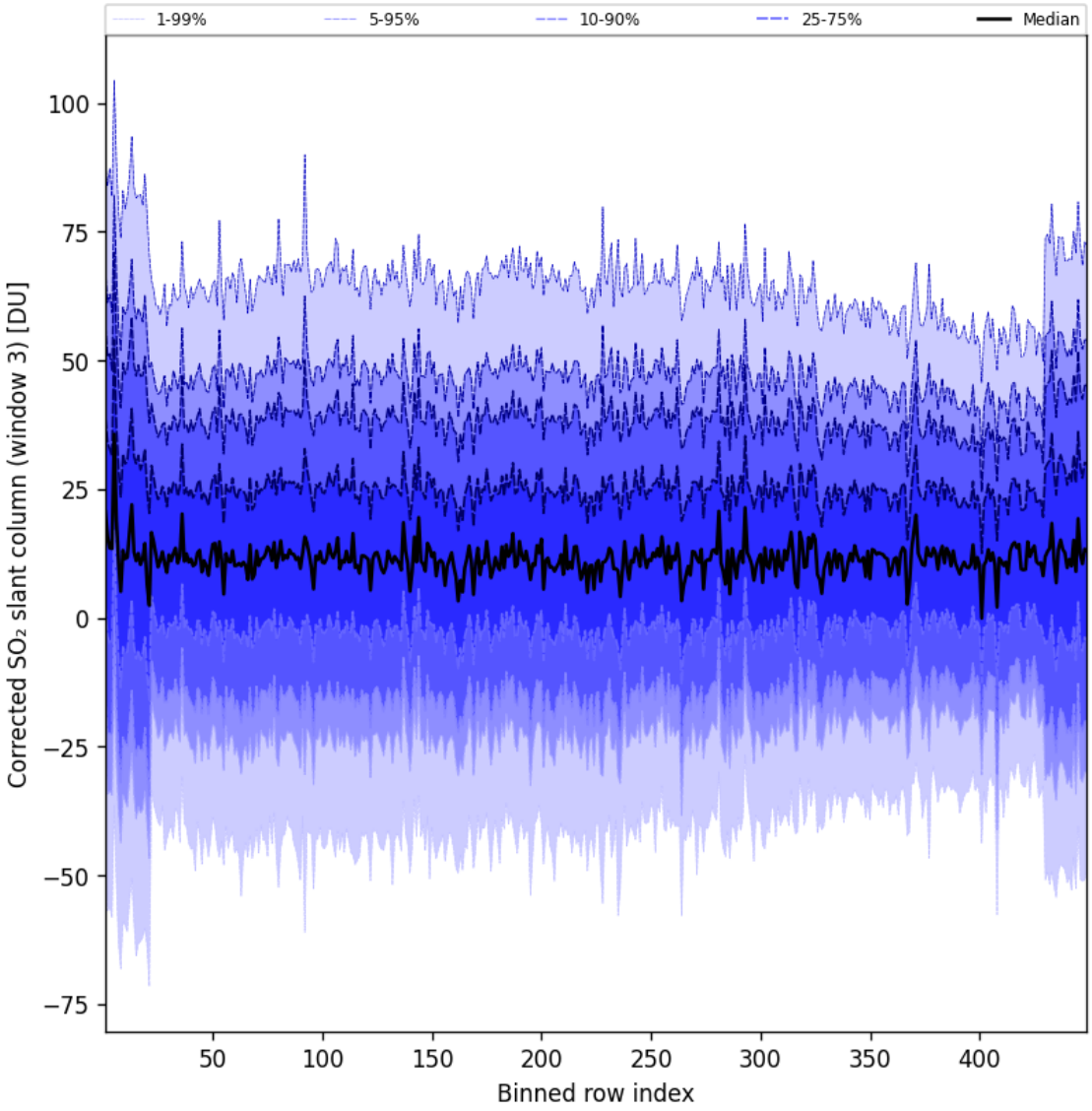


Figure 100: Along track statistics of “Corrected SO_2 slant column (window 3)” for 2025-01-01 to 2025-01-02

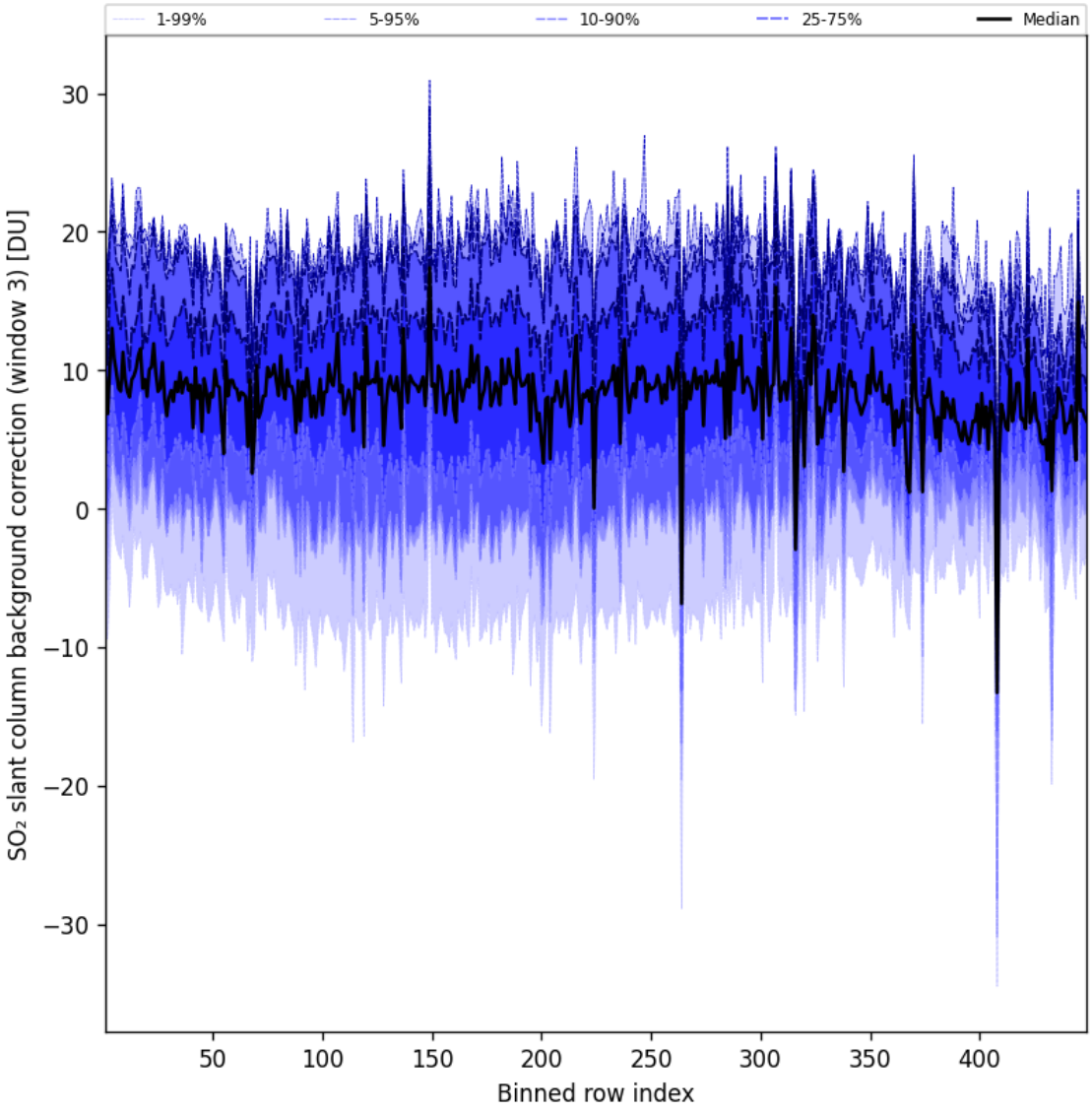


Figure 101: Along track statistics of "SO_2 slant column background correction (window 3)" for 2025-01-01 to 2025-01-02

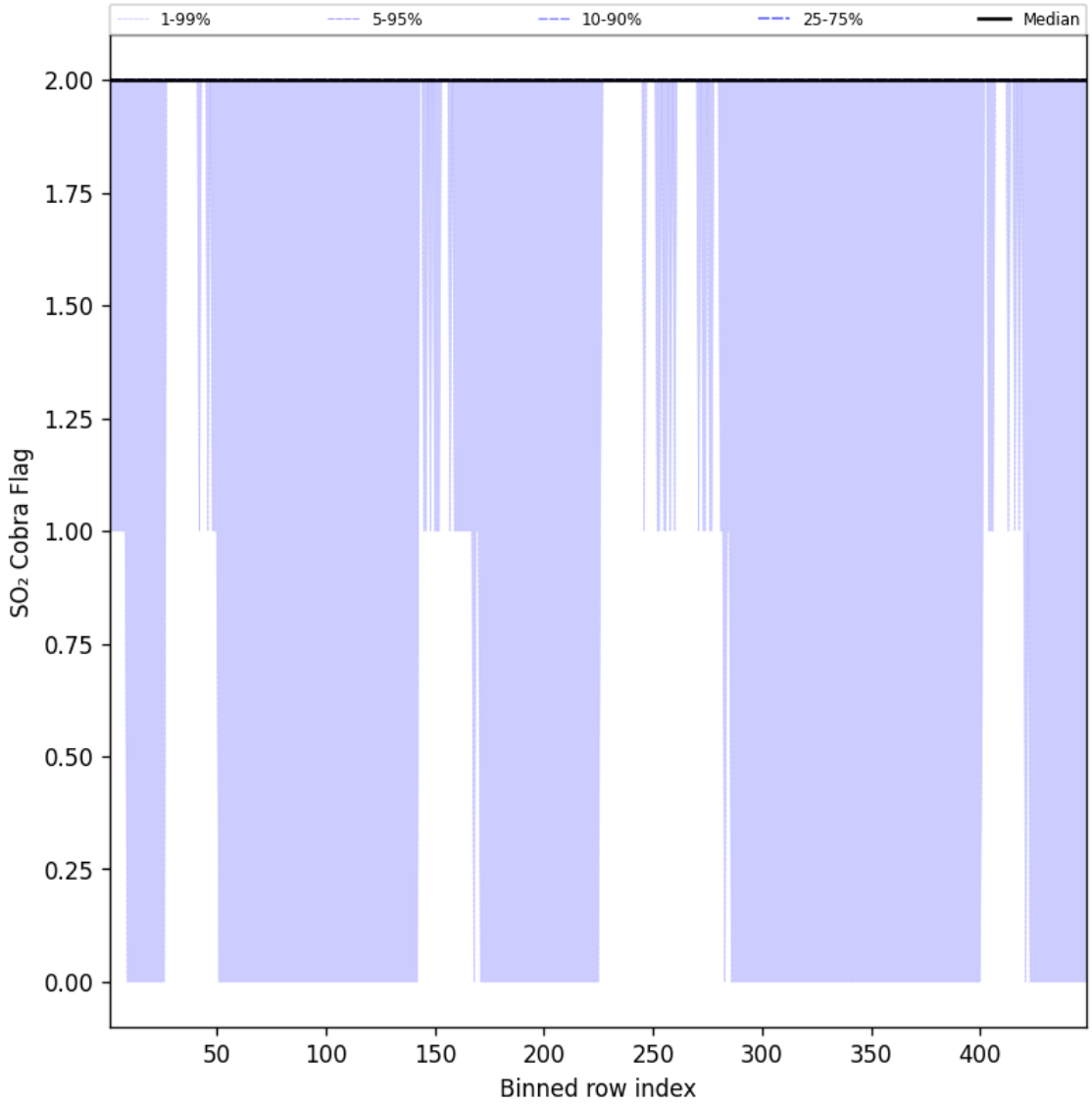


Figure 102: Along track statistics of "SO_2 Cobra Flag" for 2025-01-01 to 2025-01-02

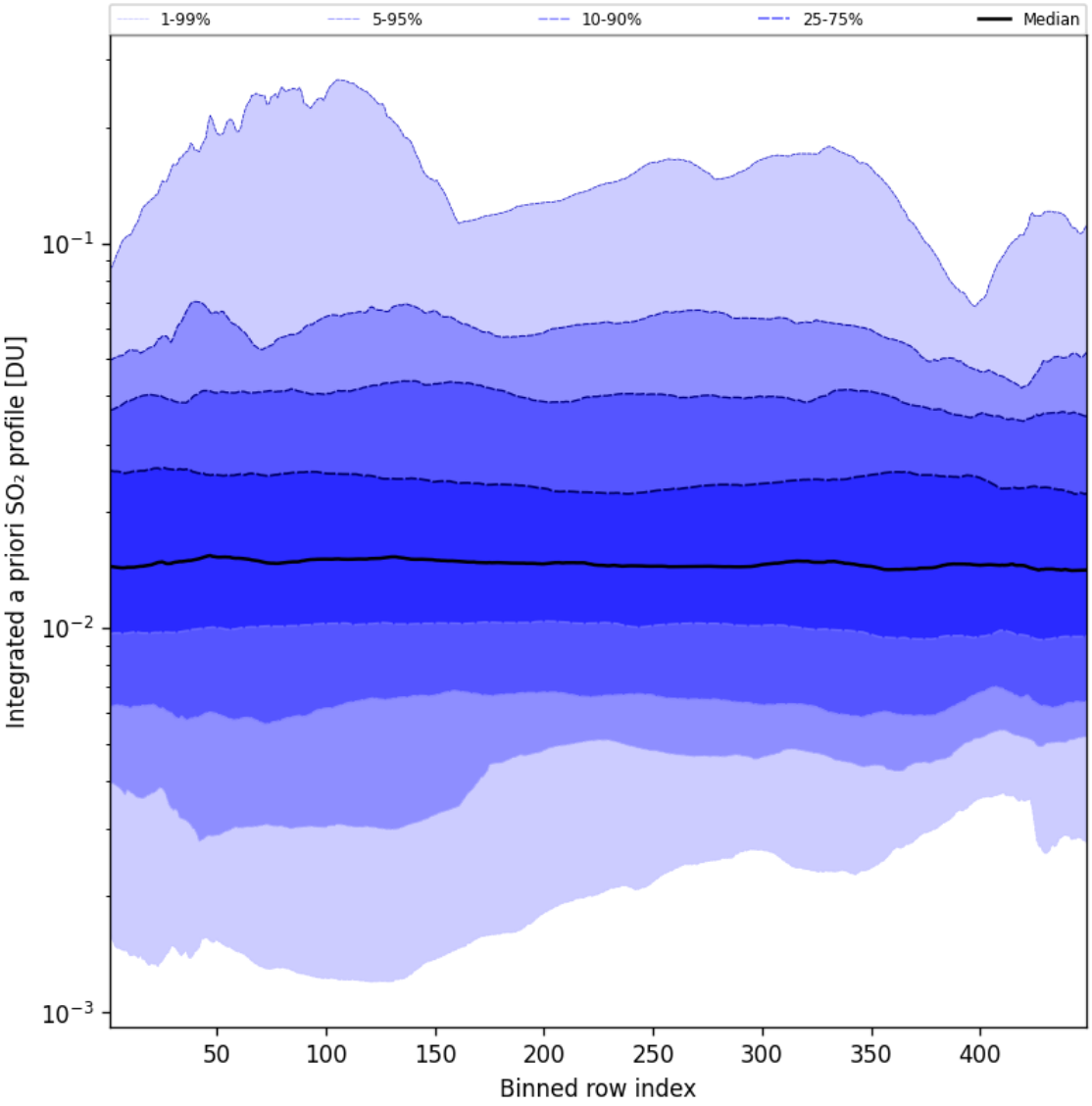
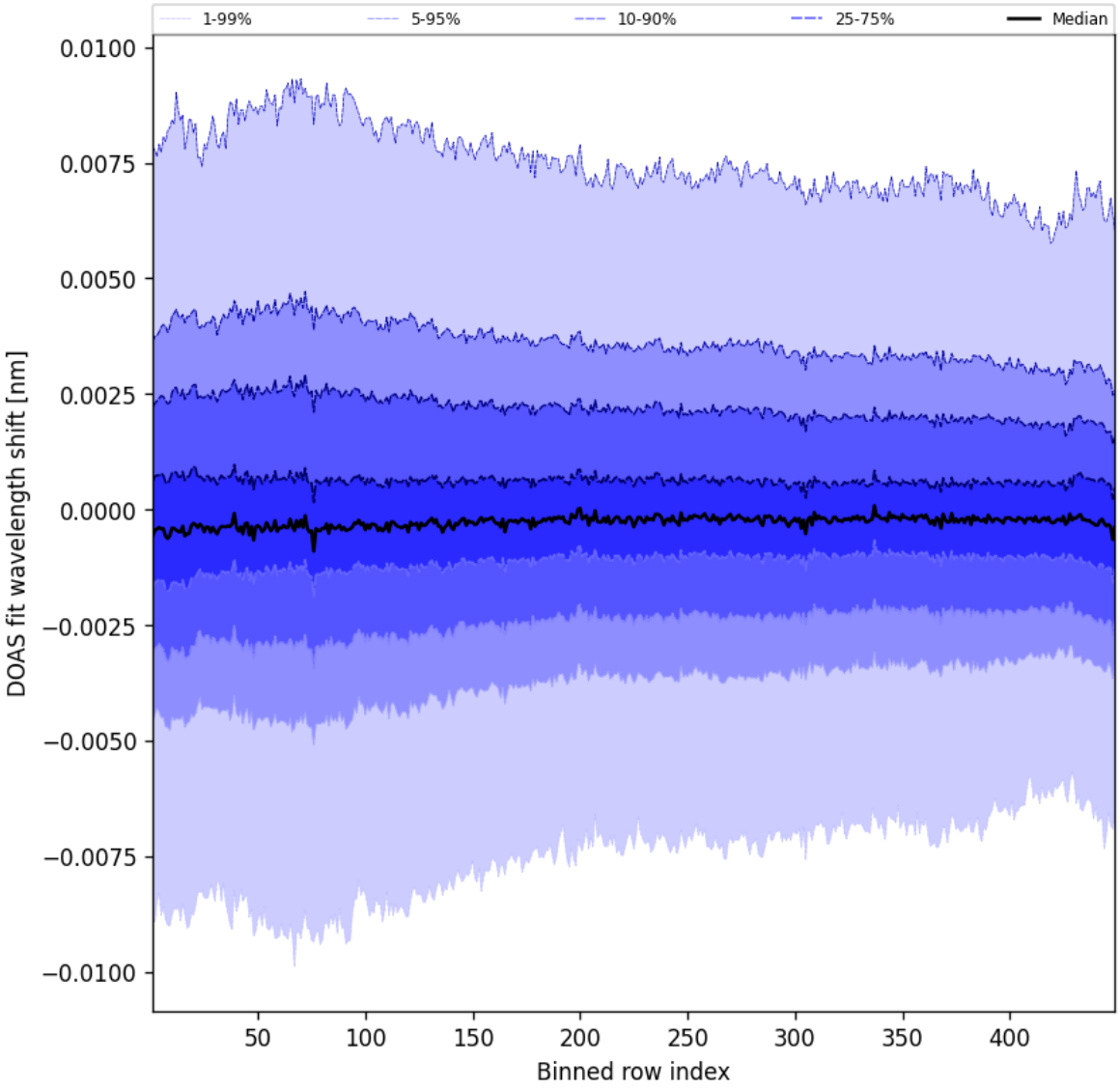


Figure 103: Along track statistics of “Integrated a priori SO_2 profile” for 2025-01-01 to 2025-01-02



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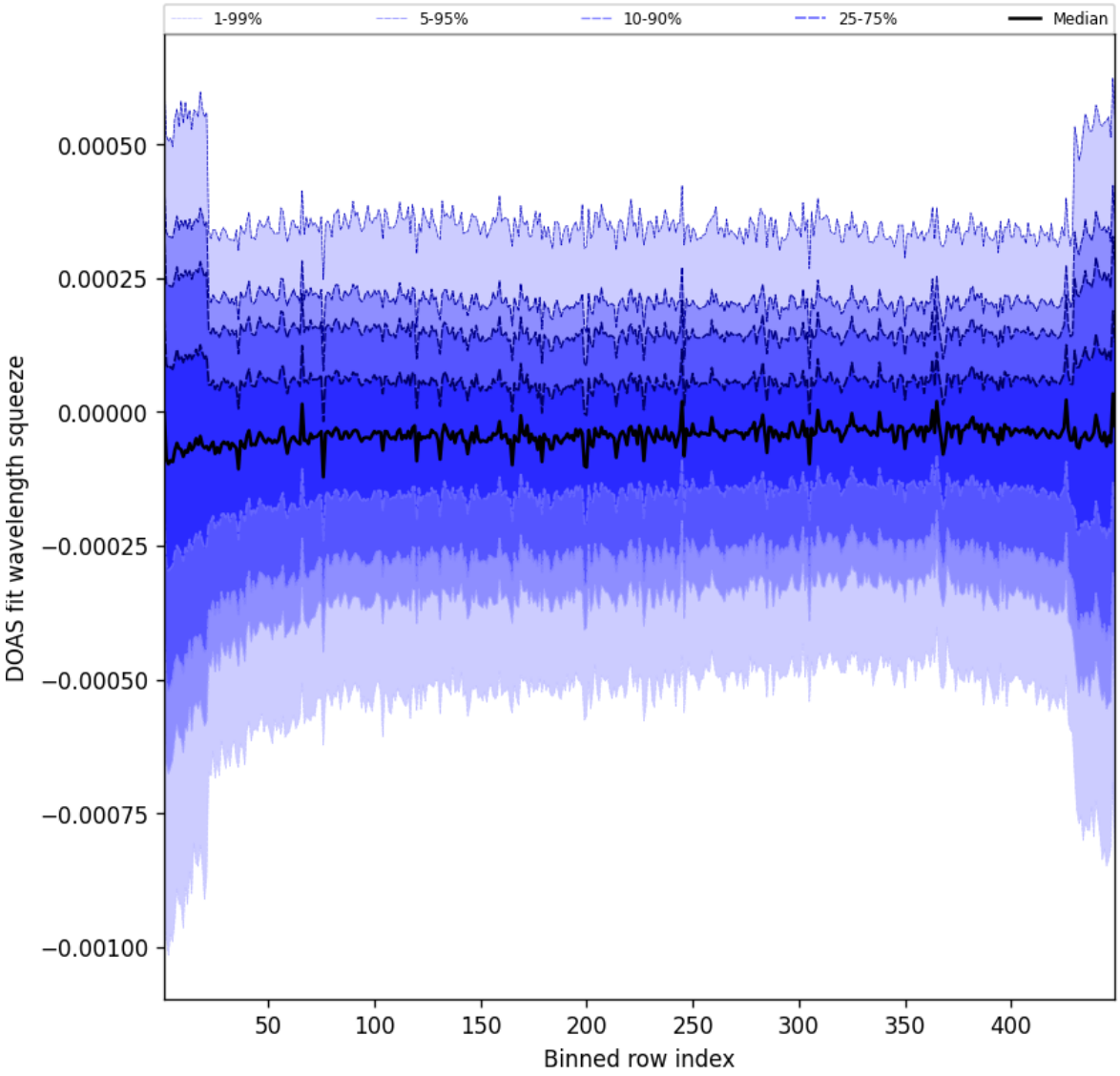

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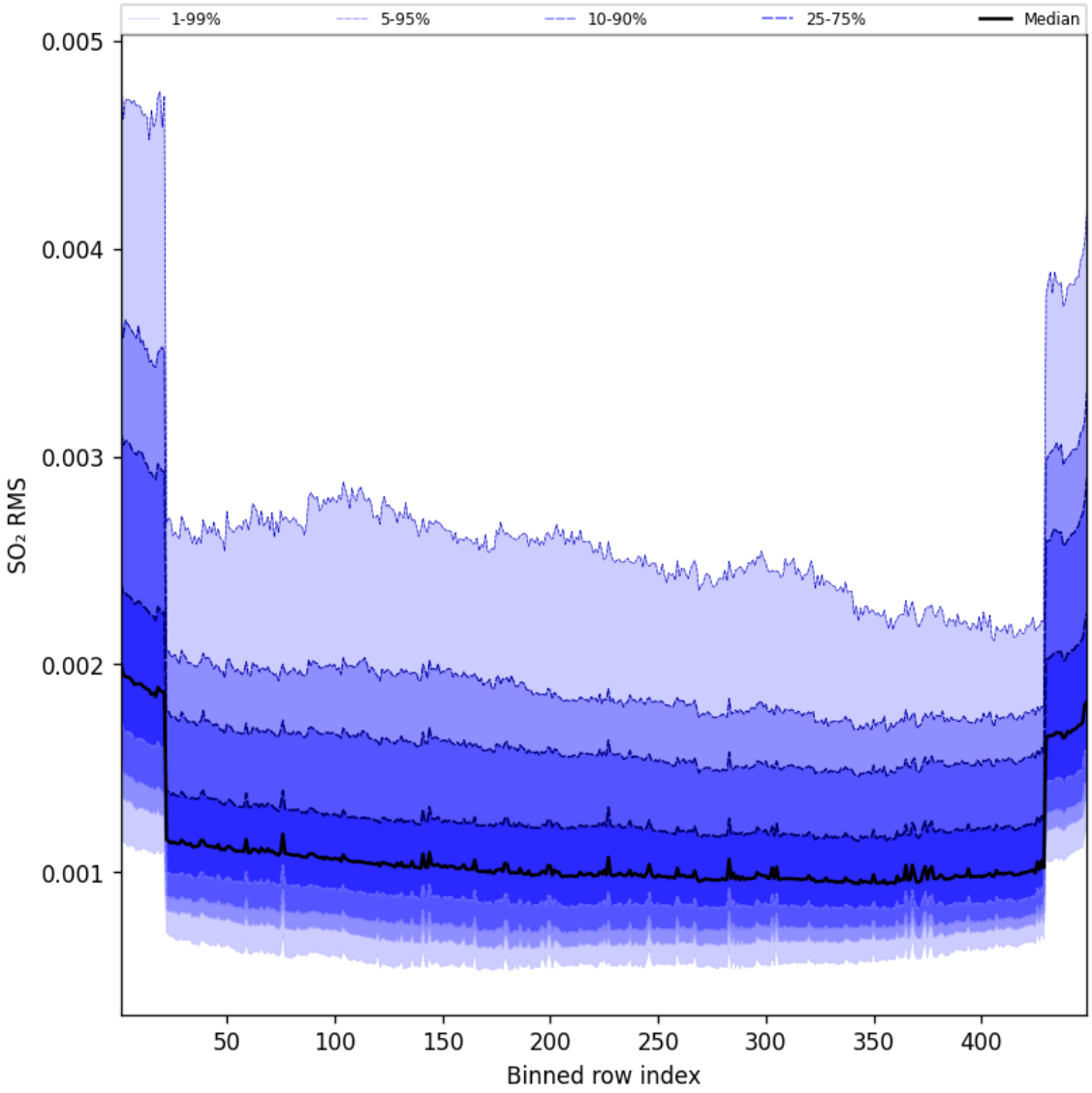

Figure 106: Along track statistics of "SO_2 RMS" for 2025-01-01 to 2025-01-02

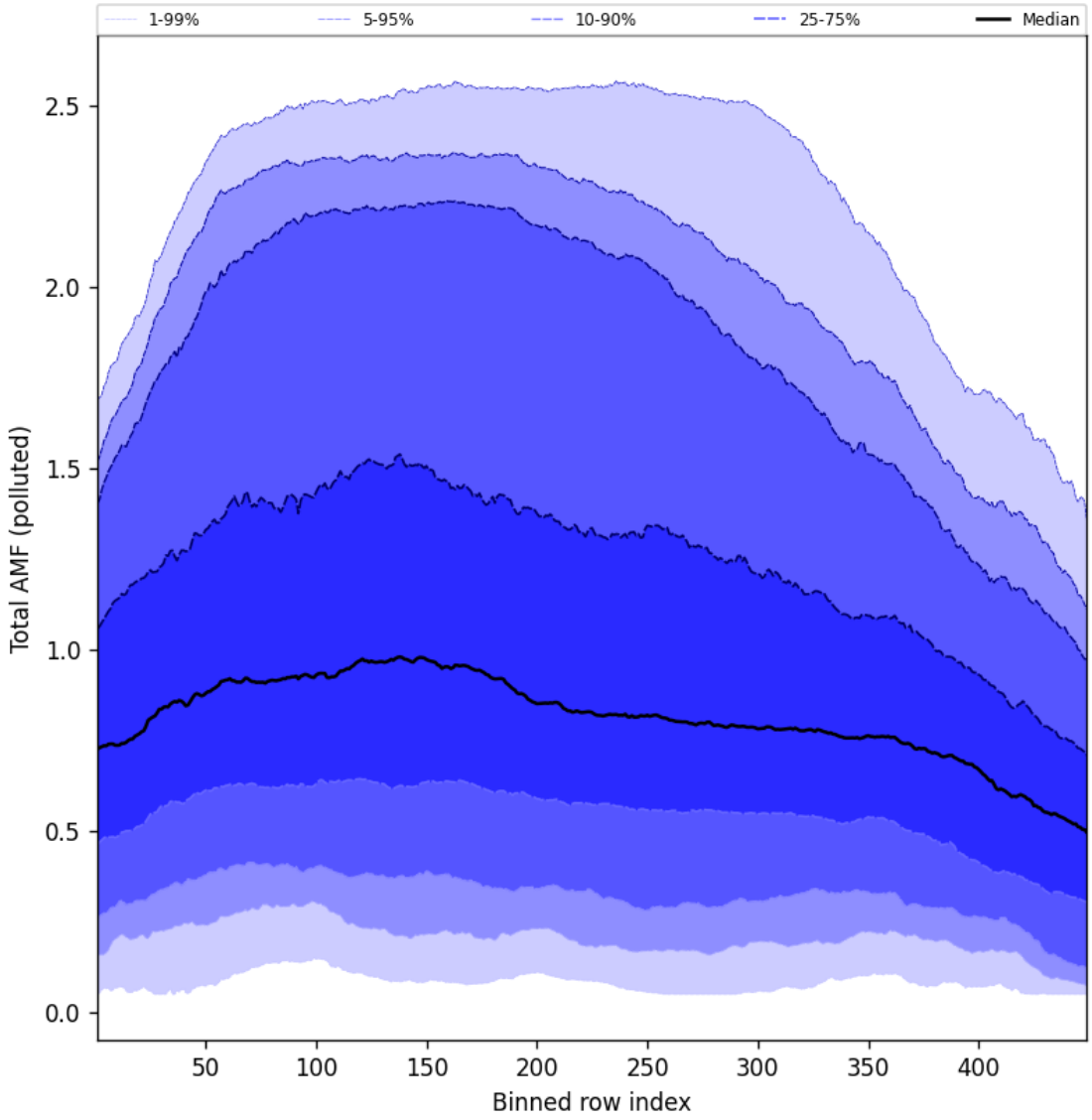

Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-01-01 to 2025-01-02

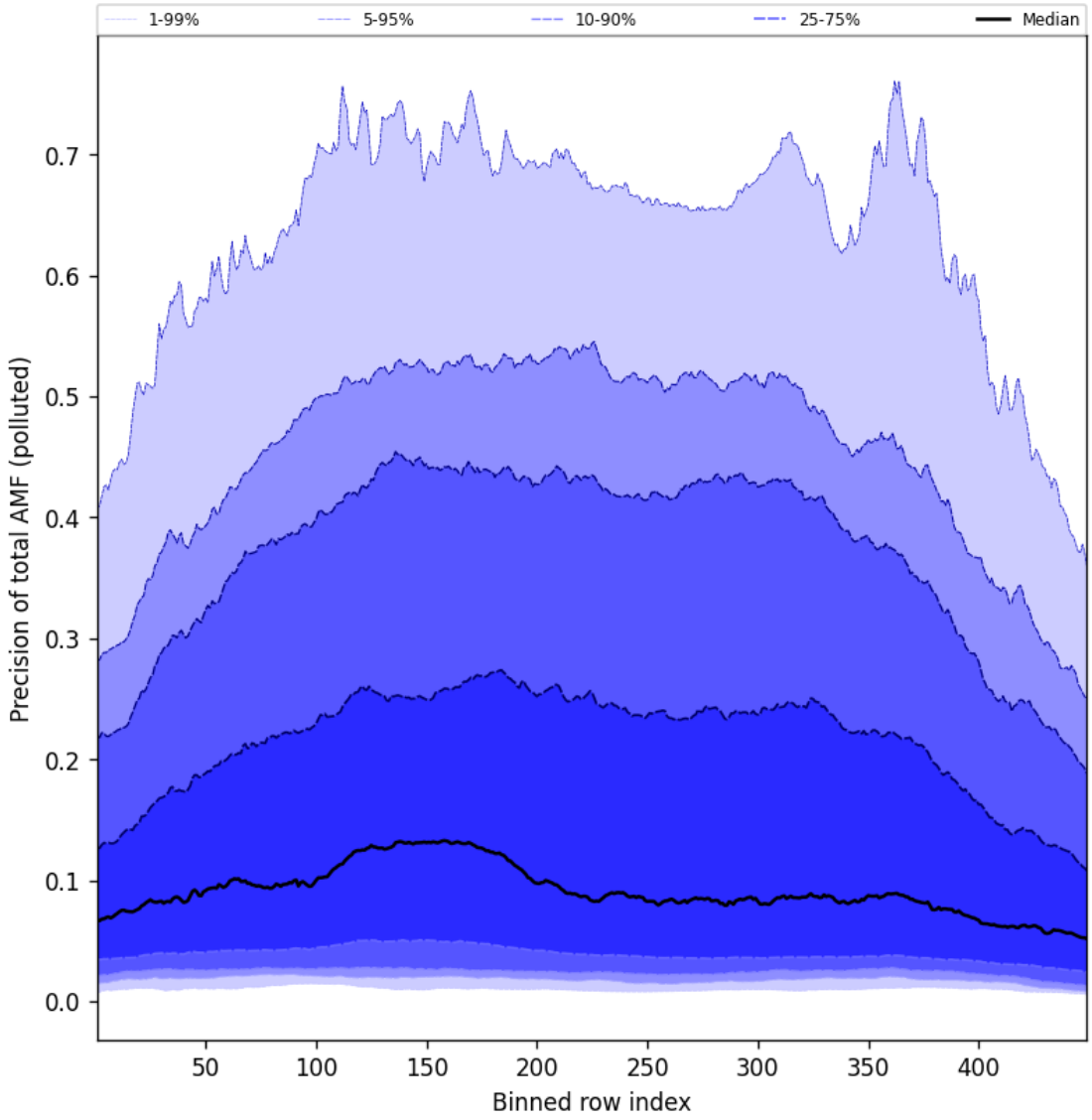

Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-01-01 to 2025-01-02

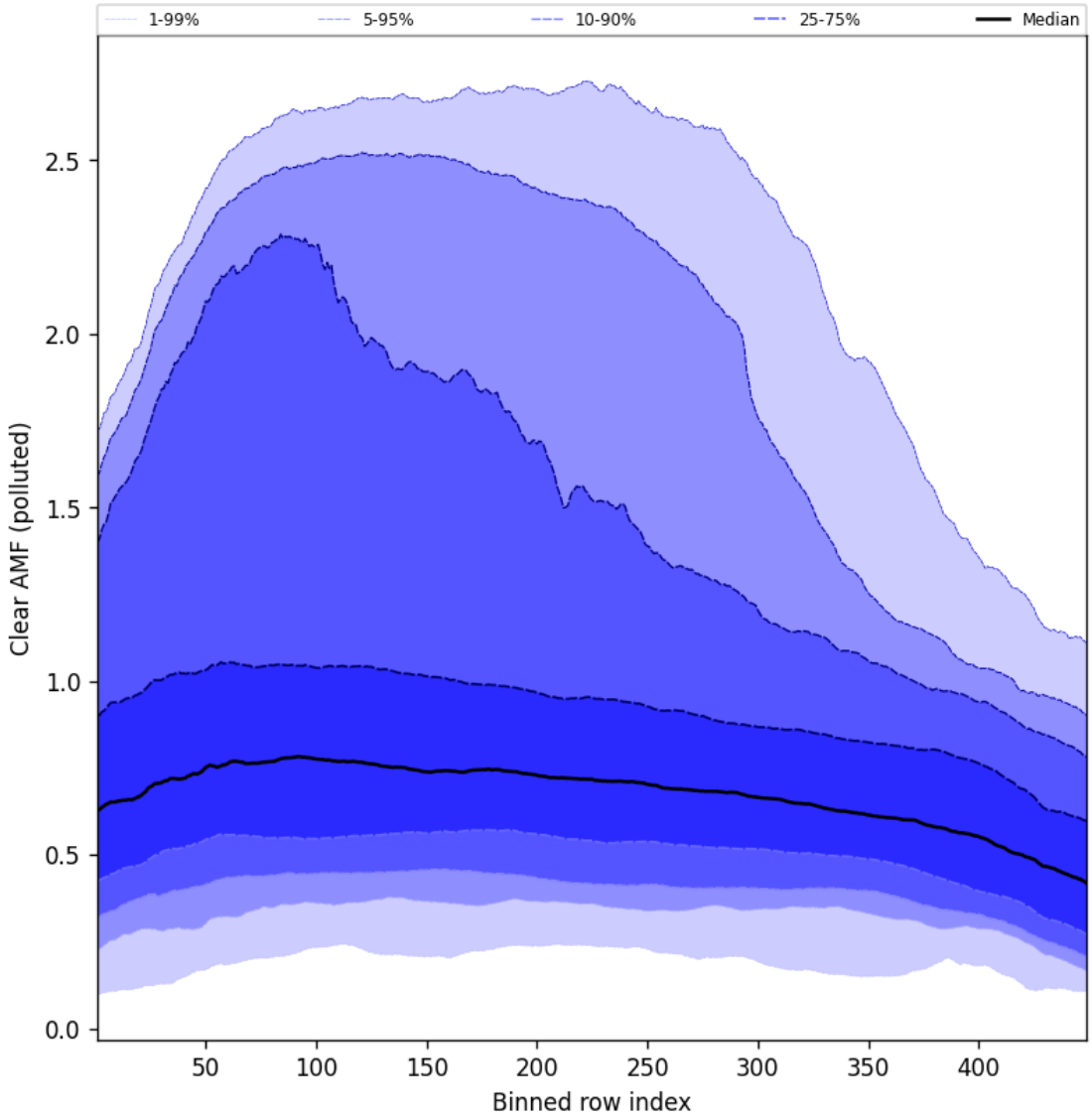

Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-01-01 to 2025-01-02

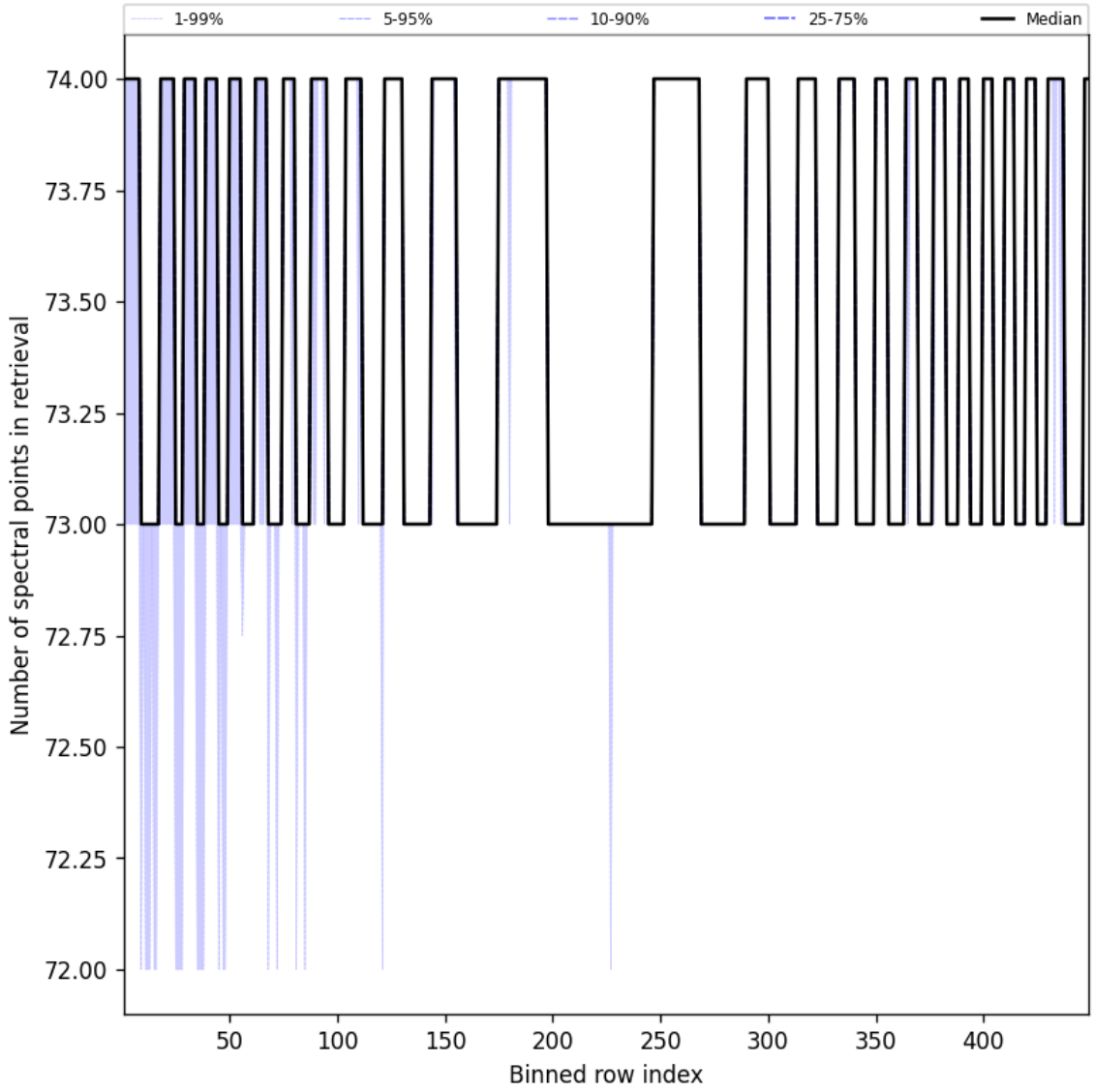

Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-01-01 to 2025-01-02

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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