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]	0.635 ± 0.413	17299576	0.995	0.800	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(4.535 \pm 157.384) \times 10^{-2}$	17299576	0.249	0.416	9.324×10^{-3}	-148	504
sulfurdioxide total vertical column precision [DU]	0.603 ± 1.153	17299576	0.197	0.343	0.307	2.476×10^{-2}	49.4
sulfurdioxide slant column density corrected [DU]	$(1.746 \pm 35.666) \times 10^{-2}$	17299576	0.242	0.341	8.576×10^{-3}	-19.4	67.2
sulfurdioxide slant column density cobra [DU]	$(1.721 \pm 33.911) \times 10^{-2}$	17299576	0.242	0.341	8.576×10^{-3}	-25.6	61.4
sulfurdioxide slant column density cobra precision [DU]	0.274 ± 0.121	17299576	0.188	0.118	0.236	7.153×10^{-2}	21.5
sulfurdioxide slant column density window1 [DU]	0.108 ± 0.647	17299576	0.125	0.708	0.116	-179	116
sulfurdioxide slant column density window1 precision [DU]	0.274 ± 0.121	17299576	0.188	0.118	0.236	7.153×10^{-2}	21.5
sulfurdioxide slant column density corrected win1 [DU]	$(3.659 \pm 63.172) \times 10^{-2}$	17299576	2.500×10^{-2}	0.682	2.033×10^{-2}	-179	116
background so2 slant column offset window1 [DU]	$(-7.115 \pm 17.631) \times 10^{-2}$	17299576	-0.140	0.198	-0.122	-1.19	2.38
sulfurdioxide slant column density window2 [DU]	1.49 ± 8.67	17299576	0.750	11.0	1.33	-906	761
sulfurdioxide slant column density window2 precision [DU]	7.83 ± 2.13	17299576	6.97	2.45	7.50	1.97	590
sulfurdioxide slant column density corrected win2 [DU]	2.50 ± 8.41	17299576	2.75	10.7	2.51	-903	763
background so2 slant column offset window2 [DU]	1.01 ± 2.40	17299576	2.25	2.51	1.72	-14.2	12.3
sulfurdioxide slant column density window3 [DU]	-6.51 ± 23.50	17299576	-6.16	29.5	-6.71	-1.097×10^3	187
sulfurdioxide slant column density window3 precision [DU]	26.8 ± 12.5	17299576	21.5	9.29	23.6	9.11	547
sulfurdioxide slant column density corrected win3 [DU]	-12.4 ± 22.6	17299576	-12.9	28.4	-12.4	-1.097×10^3	167
background so2 slant column offset window3 [DU]	-5.93 ± 6.81	17299576	-9.52	10.1	-5.76	-28.2	18.1
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.21	17299576	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(4.828 \pm 13.990) \times 10^{-2}$	17299576	2.104×10^{-2}	3.060×10^{-2}	2.503×10^{-2}	5.314×10^{-4}	3.90
fitted radiance shift [nm]	$(-3.627 \pm 24.483) \times 10^{-4}$	17299576	-5.000×10^{-4}	1.681×10^{-3}	-4.010×10^{-4}	-0.110	9.582×10^{-2}
fitted radiance squeeze [1]	$(-4.661 \pm 17.748) \times 10^{-5}$	17299576	-3.000×10^{-5}	2.076×10^{-4}	-3.972×10^{-5}	-9.623×10^{-2}	2.185×10^{-2}
fitted root mean square [1]	$(1.214 \pm 0.503) \times 10^{-3}$	17299576	9.250×10^{-4}	4.895×10^{-4}	1.076×10^{-3}	2.985×10^{-4}	0.163
sulfurdioxide total air mass factor polluted [1]	0.906 ± 0.584	17299576	0.660	0.636	0.768	5.000×10^{-2}	3.11
sulfurdioxide total air mass factor polluted precision [1]	0.136 ± 0.145	17299576	3.500×10^{-2}	0.158	7.801×10^{-2}	2.500×10^{-3}	1.94
sulfurdioxide clear air mass factor polluted [1]	0.788 ± 0.559	17299576	0.580	0.378	0.652	2.891×10^{-2}	3.14
number of spectral points in retrieval [1]	73.4 ± 0.5	17299576	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	5.000×10^{-2}	0.1000	0.200	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	−3.24	−0.929	−0.528	−0.343	−0.195	0.221	0.382	0.589	1.06	3.93
sulfurdioxide total vertical column precision [DU]	8.309×10^{-2}	0.105	0.128	0.155	0.194	0.537	0.762	1.13	1.99	5.90
sulfurdioxide slant column density corrected [DU]	−0.794	−0.458	−0.332	−0.249	−0.161	0.181	0.274	0.365	0.507	0.946
sulfurdioxide slant column density cobra [DU]	−0.794	−0.458	−0.332	−0.249	−0.161	0.181	0.274	0.365	0.507	0.946
sulfurdioxide slant column density cobra precision [DU]	0.136	0.160	0.172	0.183	0.196	0.314	0.372	0.425	0.498	0.722
sulfurdioxide slant column density window1 [DU]	−1.60	−0.893	−0.621	−0.437	−0.244	0.464	0.645	0.816	1.08	1.80
sulfurdioxide slant column density window1 precision [DU]	0.136	0.160	0.172	0.183	0.196	0.314	0.372	0.425	0.498	0.722
sulfurdioxide slant column density corrected win1 [DU]	−1.52	−0.891	−0.653	−0.491	−0.317	0.365	0.551	0.733	1.01	1.81
background so2 slant column offset window1 [DU]	−0.365	−0.273	−0.240	−0.214	−0.182	1.574×10^{-2}	0.110	0.184	0.273	0.431
sulfurdioxide slant column density window2 [DU]	−18.7	−12.3	−9.11	−6.75	−4.09	6.87	9.69	12.3	15.8	23.5
sulfurdioxide slant column density window2 precision [DU]	4.24	5.06	5.55	5.95	6.42	8.87	9.70	10.5	11.7	14.2
sulfurdioxide slant column density corrected win2 [DU]	−17.9	−11.2	−7.90	−5.50	−2.83	7.84	10.5	12.9	16.1	22.9
background so2 slant column offset window2 [DU]	−6.77	−4.15	−2.26	−1.06	3.092×10^{-2}	2.54	2.80	3.02	3.36	5.51
sulfurdioxide slant column density window3 [DU]	−64.8	−44.7	−35.3	−28.6	−21.3	8.24	16.0	23.0	32.4	50.9
sulfurdioxide slant column density window3 precision [DU]	13.4	15.5	17.0	18.2	19.8	29.1	33.6	38.8	49.8	80.4
sulfurdioxide slant column density corrected win3 [DU]	−69.3	−49.4	−40.2	−33.7	−26.5	1.83	9.10	15.7	24.5	42.4
background so2 slant column offset window3 [DU]	−20.0	−17.4	−15.4	−13.5	−10.8	−0.662	1.39	2.91	4.58	7.58
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]	3.058×10^{-3}	5.934×10^{-3}	8.609×10^{-3}	1.099×10^{-2}	1.423×10^{-2}	4.482×10^{-2}	5.887×10^{-2}	7.374×10^{-2}	0.120	0.456
fitted radiance shift [nm]	-7.731×10^{-3}	-3.916×10^{-3}	-2.582×10^{-3}	-1.841×10^{-3}	-1.247×10^{-3}	4.347×10^{-4}	1.112×10^{-3}	1.957×10^{-3}	3.409×10^{-3}	7.398×10^{-3}
fitted radiance squeeze [1]	-5.162×10^{-4}	-3.381×10^{-4}	-2.601×10^{-4}	-2.053×10^{-4}	-1.472×10^{-4}	6.045×10^{-5}	1.103×10^{-4}	1.561×10^{-4}	2.212×10^{-4}	3.781×10^{-4}
fitted root mean square [1]	5.739×10^{-4}	7.029×10^{-4}	7.742×10^{-4}	8.292×10^{-4}	8.965×10^{-4}	1.386×10^{-3}	1.609×10^{-3}	1.831×10^{-3}	2.158×10^{-3}	3.088×10^{-3}
sulfurdioxide total air mass factor polluted [1]	6.126×10^{-2}	0.193	0.303	0.397	0.508	1.14	1.45	1.75	2.23	2.68
sulfurdioxide total air mass factor polluted precision [1]	7.470×10^{-3}	1.535×10^{-2}	2.186×10^{-2}	2.723×10^{-2}	3.477×10^{-2}	0.193	0.257	0.326	0.430	0.673
sulfurdioxide clear air mass factor polluted [1]	0.147	0.255	0.340	0.409	0.488	0.865	0.992	1.21	2.39	2.91
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]	0.698 ± 0.399	6668126	0.740	1.000	0.0	1.000	0.260	1.000
sulfurdioxide total vertical column [DU]	$(9.380 \pm 241.321) \times 10^{-2}$	6668126	0.623	1.573×10^{-2}	-148	504	-0.287	0.337
sulfurdioxide total vertical column precision [DU]	0.991 ± 1.704	6668126	0.646	0.435	4.423×10^{-2}	49.4	0.272	0.918
sulfurdioxide slant column density corrected [DU]	$(2.548 \pm 40.814) \times 10^{-2}$	6668126	0.393	1.141×10^{-2}	-7.49	50.0	-0.183	0.210
sulfurdioxide slant column density cobra [DU]	$(2.529 \pm 39.996) \times 10^{-2}$	6668126	0.393	1.141×10^{-2}	-25.6	10.9	-0.183	0.210
sulfurdioxide slant column density cobra precision [DU]	0.319 ± 0.145	6668126	0.171	0.274	8.434×10^{-2}	14.0	0.216	0.388
sulfurdioxide slant column density window1 [DU]	0.176 ± 0.746	6668126	0.793	0.182	-179	15.7	-0.217	0.576
sulfurdioxide slant column density window1 precision [DU]	0.319 ± 0.145	6668126	0.171	0.274	8.434×10^{-2}	14.0	0.216	0.388
sulfurdioxide slant column density corrected win1 [DU]	$(6.451 \pm 74.337) \times 10^{-2}$	6668126	0.784	3.850×10^{-2}	-179	15.8	-0.345	0.439
background so2 slant column offset window1 [DU]	-0.112 ± 0.161	6668126	0.152	-0.132	-1.19	2.38	-0.209	-5.710×10^{-2}
sulfurdioxide slant column density window2 [DU]	2.27 ± 9.57	6668126	12.3	1.94	-628	127	-4.05	8.23
sulfurdioxide slant column density window2 precision [DU]	8.54 ± 2.15	6668126	2.64	8.24	2.28	545	7.06	9.70
sulfurdioxide slant column density corrected win2 [DU]	2.43 ± 9.16	6668126	11.8	2.42	-629	125	-3.45	8.30
background so2 slant column offset window2 [DU]	0.167 ± 3.073	6668126	4.19	1.36	-14.2	12.3	-1.80	2.39
sulfurdioxide slant column density window3 [DU]	-9.39 ± 24.97	6668126	31.9	-9.02	-190	147	-25.1	6.77
sulfurdioxide slant column density window3 precision [DU]	28.7 ± 12.2	6668126	9.15	25.8	9.68	212	22.1	31.2
sulfurdioxide slant column density corrected win3 [DU]	-12.5 ± 24.5	6668126	31.2	-12.2	-185	142	-27.9	3.28
background so2 slant column offset window3 [DU]	-3.09 ± 5.71	6668126	9.61	-3.49	-20.5	18.1	-7.96	1.65
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.25	6668126	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(7.603 \pm 21.874) \times 10^{-2}$	6668126	4.775×10^{-2}	2.689×10^{-2}	5.314×10^{-4}	3.90	1.350×10^{-2}	6.125×10^{-2}
fitted radiance shift [nm]	$(-2.018 \pm 24.324) \times 10^{-4}$	6668126	1.613×10^{-3}	-2.398×10^{-4}	-0.110	9.582×10^{-2}	-1.028×10^{-3}	5.849×10^{-4}
fitted radiance squeeze [1]	$(-1.802 \pm 187.967) \times 10^{-6}$	6668126	2.120×10^{-4}	-2.803×10^{-7}	-9.623×10^{-2}	2.569×10^{-3}	-1.065×10^{-4}	1.054×10^{-4}
fitted root mean square [1]	$(1.386 \pm 0.610) \times 10^{-3}$	6668126	6.757×10^{-4}	1.199×10^{-3}	3.448×10^{-4}	0.163	9.775×10^{-4}	1.653×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.671 ± 0.390	6668126	0.497	0.632	5.000×10^{-2}	2.77	0.383	0.880
sulfurdioxide total air mass factor polluted precision [1]	$(9.642 \pm 12.718) \times 10^{-2}$	6668126	9.572×10^{-2}	4.547×10^{-2}	2.500×10^{-3}	1.94	2.625×10^{-2}	0.122
sulfurdioxide clear air mass factor polluted [1]	0.577 ± 0.266	6668126	0.418	0.564	2.891×10^{-2}	1.91	0.363	0.781
number of spectral points in retrieval [1]	73.5 ± 0.5	6668126	1.000	73.0	52.0	74.0	73.0	74.0

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

Variable	mean $\pm\sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.595 ± 0.417	10631450	0.830	0.490	0.0	1.000	0.170	1.000
sulfurdioxide total vertical column [DU]	$(1.496 \pm 61.282) \times 10^{-2}$	10631450	0.335	6.981×10^{-3}	-34.5	74.6	-0.159	0.176
sulfurdioxide total vertical column precision [DU]	0.360 ± 0.432	10631450	0.250	0.250	2.476×10^{-2}	36.3	0.163	0.413
sulfurdioxide slant column density corrected [DU]	$(1.243 \pm 32.006) \times 10^{-2}$	10631450	0.315	7.149×10^{-3}	-19.4	67.2	-0.149	0.166
sulfurdioxide slant column density cobra [DU]	$(1.214 \pm 29.448) \times 10^{-2}$	10631450	0.315	7.149×10^{-3}	-19.4	61.4	-0.149	0.166
sulfurdioxide slant column density cobra precision [DU]	0.245 ± 0.093	10631450	8.714×10^{-2}	0.221	7.153×10^{-2}	21.5	0.188	0.275
sulfurdioxide slant column density window1 [DU]	$(6.474 \pm 57.259) \times 10^{-2}$	10631450	0.660	8.088×10^{-2}	-76.8	116	-0.258	0.402
sulfurdioxide slant column density window1 precision [DU]	0.245 ± 0.093	10631450	8.714×10^{-2}	0.221	7.153×10^{-2}	21.5	0.188	0.275
sulfurdioxide slant column density corrected win1 [DU]	$(1.908 \pm 54.953) \times 10^{-2}$	10631450	0.629	1.109×10^{-2}	-76.8	116	-0.302	0.327
background so2 slant column offset window1 [DU]	$(-4.566 \pm 18.079) \times 10^{-2}$	10631450	0.248	-0.111	-1.18	1.56	-0.172	7.665×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.00 ± 8.01	10631450	10.2	1.00	-906	761	-4.11	6.12
sulfurdioxide slant column density window2 precision [DU]	7.38 ± 2.00	10631450	2.13	7.11	1.97	590	6.14	8.27
sulfurdioxide slant column density corrected win2 [DU]	2.54 ± 7.91	10631450	10.1	2.56	-903	763	-2.49	7.58
background so2 slant column offset window2 [DU]	1.54 ± 1.66	10631450	2.07	1.90	-6.42	11.9	0.547	2.62
sulfurdioxide slant column density window3 [DU]	-4.70 ± 22.33	10631450	28.2	-5.45	-1.097×10^{3}	187	-19.1	9.08
sulfurdioxide slant column density window3 precision [DU]	25.5 ± 12.5	10631450	8.51	22.2	9.11	547	18.8	27.3
sulfurdioxide slant column density corrected win3 [DU]	-12.4 ± 21.4	10631450	26.8	-12.6	-1.097×10^{3}	167	-25.8	0.984
background so2 slant column offset window3 [DU]	-7.71 ± 6.84	10631450	11.4	-7.29	-28.2	13.2	-13.6	-2.21
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.19	10631450	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(3.087 \pm 3.247) \times 10^{-2}$	10631450	2.447×10^{-2}	2.439×10^{-2}	1.141×10^{-3}	2.09	1.482×10^{-2}	3.929×10^{-2}
fitted radiance shift [nm]	$(-4.636 \pm 24.529) \times 10^{-4}$	10631450	1.685×10^{-3}	-5.108×10^{-4}	-5.515×10^{-2}	6.789×10^{-2}	-1.358×10^{-3}	3.271×10^{-4}
fitted radiance squeeze [1]	$(-7.471 \pm 16.446) \times 10^{-5}$	10631450	2.013×10^{-4}	-6.292×10^{-5}	-1.145×10^{-2}	2.185×10^{-2}	-1.693×10^{-4}	3.202×10^{-5}
fitted root mean square [1]	$(1.106 \pm 0.384) \times 10^{-3}$	10631450	3.978×10^{-4}	1.015×10^{-3}	2.985×10^{-4}	5.093×10^{-2}	8.597×10^{-4}	1.257×10^{-3}
sulfurdioxide total air mass factor polluted [1]	1.05 ± 0.64	10631450	0.787	0.872	5.000×10^{-2}	3.11	0.589	1.38
sulfurdioxide total air mass factor polluted precision [1]	0.161 ± 0.151	10631450	0.188	0.114	5.878×10^{-3}	1.50	4.245×10^{-2}	0.230
sulfurdioxide clear air mass factor polluted [1]	0.920 ± 0.647	10631450	0.399	0.695	0.159	3.14	0.546	0.945
number of spectral points in retrieval [1]	73.4 ± 0.5	10631450	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]	0.677 ± 0.401	12352059	0.750	1.000	0.0	1.000	0.250	1.000
sulfurdioxide total vertical column [DU]	$(2.550 \pm 111.083) \times 10^{-2}$	12352059	0.415	8.525×10^{-3}	-99.7	152	-0.197	0.218
sulfurdioxide total vertical column precision [DU]	0.505 ± 0.843	12352059	0.288	0.302	4.519×10^{-2}	36.9	0.204	0.493
sulfurdioxide slant column density corrected [DU]	$(1.249 \pm 29.832) \times 10^{-2}$	12352059	0.324	7.237×10^{-3}	-19.4	61.4	-0.154	0.170
sulfurdioxide slant column density cobra [DU]	$(1.246 \pm 29.641) \times 10^{-2}$	12352059	0.324	7.237×10^{-3}	-25.6	61.4	-0.154	0.170
sulfurdioxide slant column density cobra precision [DU]	0.257 ± 0.106	12352059	9.896×10^{-2}	0.225	8.434×10^{-2}	17.2	0.190	0.289
sulfurdioxide slant column density window1 [DU]	0.118 ± 0.587	12352059	0.664	0.124	-179	34.2	-0.212	0.453
sulfurdioxide slant column density window1 precision [DU]	0.257 ± 0.106	12352059	9.896×10^{-2}	0.225	8.434×10^{-2}	17.2	0.190	0.289
sulfurdioxide slant column density corrected win1 [DU]	$(2.514 \pm 57.675) \times 10^{-2}$	12352059	0.648	1.427×10^{-2}	-179	34.2	-0.307	0.341
background so2 slant column offset window1 [DU]	$(-9.257 \pm 15.000) \times 10^{-2}$	12352059	0.167	-0.129	-0.946	2.17	-0.184	-1.736×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.04 ± 8.34	12352059	10.6	0.927	-906	761	-4.33	6.26
sulfurdioxide slant column density window2 precision [DU]	7.63 ± 1.99	12352059	2.30	7.35	1.97	545	6.32	8.62
sulfurdioxide slant column density corrected win2 [DU]	2.40 ± 8.20	12352059	10.5	2.42	-903	763	-2.81	7.64
background so2 slant column offset window2 [DU]	1.37 ± 2.09	12352059	2.00	1.91	-14.2	12.3	0.593	2.59
sulfurdioxide slant column density window3 [DU]	-3.59 ± 23.08	12352059	29.3	-3.97	-247	154	-18.3	11.0
sulfurdioxide slant column density window3 precision [DU]	26.5 ± 11.9	12352059	8.83	23.3	9.11	227	19.9	28.7
sulfurdioxide slant column density corrected win3 [DU]	-10.5 ± 22.1	12352059	28.1	-10.8	-264	135	-24.6	3.49
background so2 slant column offset window3 [DU]	-6.88 ± 6.35	12352059	9.06	-6.69	-28.2	18.1	-11.4	-2.30
sulfurdioxide slant column cobra flag [1]	1.99 ± 0.13	12352059	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(3.451 \pm 5.439) \times 10^{-2}$	12352059	2.568×10^{-2}	2.546×10^{-2}	9.969×10^{-4}	2.63	1.583×10^{-2}	4.151×10^{-2}
fitted radiance shift [nm]	$(-3.127 \pm 23.716) \times 10^{-4}$	12352059	1.753×10^{-3}	-3.167×10^{-4}	-0.110	9.582×10^{-2}	-1.216×10^{-3}	5.365×10^{-4}
fitted radiance squeeze [1]	$(-4.174 \pm 16.603) \times 10^{-5}$	12352059	1.937×10^{-4}	-3.546×10^{-5}	-9.623×10^{-2}	2.185×10^{-2}	-1.350×10^{-4}	5.870×10^{-5}
fitted root mean square [1]	$(1.141 \pm 0.446) \times 10^{-3}$	12352059	4.082×10^{-4}	1.021×10^{-3}	3.417×10^{-4}	0.163	8.686×10^{-4}	1.277×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.830 ± 0.427	12352059	0.512	0.765	5.000×10^{-2}	2.71	0.534	1.05
sulfurdioxide total air mass factor polluted precision [1]	0.126 ± 0.128	12352059	0.141	7.321×10^{-2}	2.816×10^{-3}	1.28	3.695×10^{-2}	0.178
sulfurdioxide clear air mass factor polluted [1]	0.677 ± 0.251	12352059	0.312	0.646	4.314×10^{-2}	2.71	0.510	0.822
number of spectral points in retrieval [1]	73.4 ± 0.5	12352059	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]	0.528 ± 0.425	4242435	0.900	0.490	0.0	1.000	0.1000	1.000
sulfurdioxide total vertical column [DU]	$(7.912 \pm 214.622) \times 10^{-2}$	4242435	0.387	9.648×10^{-3}	-148	504	-0.176	0.211
sulfurdioxide total vertical column precision [DU]	0.749 ± 1.527	4242435	0.528	0.302	2.476×10^{-2}	49.4	0.136	0.665
sulfurdioxide slant column density corrected [DU]	$(2.716 \pm 45.936) \times 10^{-2}$	4242435	0.390	1.166×10^{-2}	-7.49	64.1	-0.181	0.209
sulfurdioxide slant column density cobra [DU]	$(2.645 \pm 41.689) \times 10^{-2}$	4242435	0.390	1.166×10^{-2}	-7.49	24.5	-0.181	0.209
sulfurdioxide slant column density cobra precision [DU]	0.310 ± 0.137	4242435	0.146	0.269	7.153×10^{-2}	21.5	0.221	0.367
sulfurdioxide slant column density window1 [DU]	$(7.155 \pm 76.133) \times 10^{-2}$	4242435	0.838	7.831×10^{-2}	-32.9	116	-0.352	0.486
sulfurdioxide slant column density window1 precision [DU]	0.310 ± 0.137	4242435	0.146	0.269	7.153×10^{-2}	21.5	0.221	0.367
sulfurdioxide slant column density corrected win1 [DU]	$(6.174 \pm 73.169) \times 10^{-2}$	4242435	0.775	3.737×10^{-2}	-32.9	116	-0.344	0.432
background so2 slant column offset window1 [DU]	$(-9.812 \pm 223.720) \times 10^{-3}$	4242435	0.351	-9.162×10^{-2}	-1.18	2.38	-0.176	0.176
sulfurdioxide slant column density window2 [DU]	2.53 ± 9.21	4242435	11.7	2.41	-490	551	-3.38	8.29
sulfurdioxide slant column density window2 precision [DU]	8.25 ± 2.33	4242435	2.67	7.88	2.46	481	6.71	9.38
sulfurdioxide slant column density corrected win2 [DU]	2.76 ± 8.84	4242435	11.2	2.77	-487	554	-2.81	8.34
background so2 slant column offset window2 [DU]	0.229 ± 2.715	4242435	3.78	0.758	-14.0	12.3	-1.41	2.37
sulfurdioxide slant column density window3 [DU]	-14.0 ± 22.7	4242435	28.0	-13.7	-1.097×10^3	170	-27.8	0.245
sulfurdioxide slant column density window3 precision [DU]	27.2 ± 13.6	4242435	10.2	24.1	9.27	547	19.3	29.5
sulfurdioxide slant column density corrected win3 [DU]	-17.5 ± 23.1	4242435	28.4	-16.8	-1.097×10^3	154	-31.3	-2.91
background so2 slant column offset window3 [DU]	-3.56 ± 7.27	4242435	11.4	-1.55	-28.2	18.1	-9.21	2.24
sulfurdioxide slant column cobra flag [1]	1.94 ± 0.34	4242435	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(7.451 \pm 22.777) \times 10^{-2}$	4242435	5.046×10^{-2}	2.056×10^{-2}	5.657×10^{-4}	3.90	8.768×10^{-3}	5.923×10^{-2}
fitted radiance shift [nm]	$(-5.176 \pm 25.871) \times 10^{-4}$	4242435	1.386×10^{-3}	-6.272×10^{-4}	-4.150×10^{-2}	6.789×10^{-2}	-1.294×10^{-3}	9.236×10^{-5}
fitted radiance squeeze [1]	$(-6.435 \pm 20.159) \times 10^{-5}$	4242435	2.502×10^{-4}	-5.942×10^{-5}	-1.066×10^{-2}	1.423×10^{-2}	-1.891×10^{-4}	6.107×10^{-5}
fitted root mean square [1]	$(1.378 \pm 0.548) \times 10^{-3}$	4242435	5.745×10^{-4}	1.247×10^{-3}	2.985×10^{-4}	4.899×10^{-2}	1.024×10^{-3}	1.598×10^{-3}
sulfurdioxide total air mass factor polluted [1]	1.17 ± 0.85	4242435	1.51	0.847	5.000×10^{-2}	3.11	0.456	1.97
sulfurdioxide total air mass factor polluted precision [1]	0.170 ± 0.184	4242435	0.217	0.115	2.500×10^{-3}	1.94	2.967×10^{-2}	0.247
sulfurdioxide clear air mass factor polluted [1]	1.15 ± 0.94	4242435	1.68	0.725	2.891×10^{-2}	3.14	0.405	2.09
number of spectral points in retrieval [1]	73.4 ± 0.5	4242435	1.000	73.0	52.0	74.0	73.0	74.0

3 Granule outlines

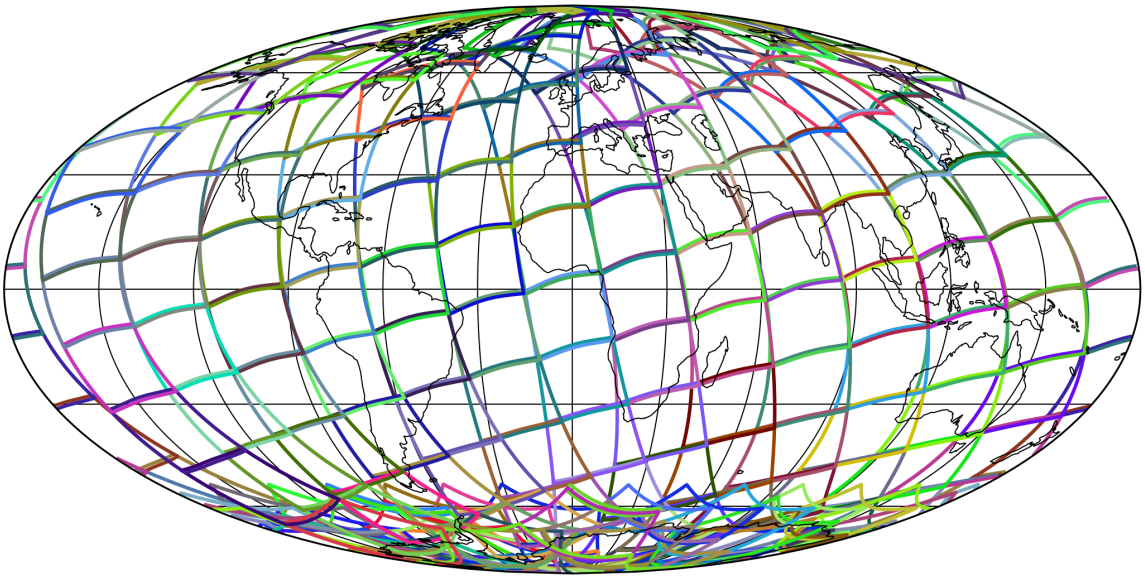

Figure 1: Outline of the granules.

4 Input data monitoring

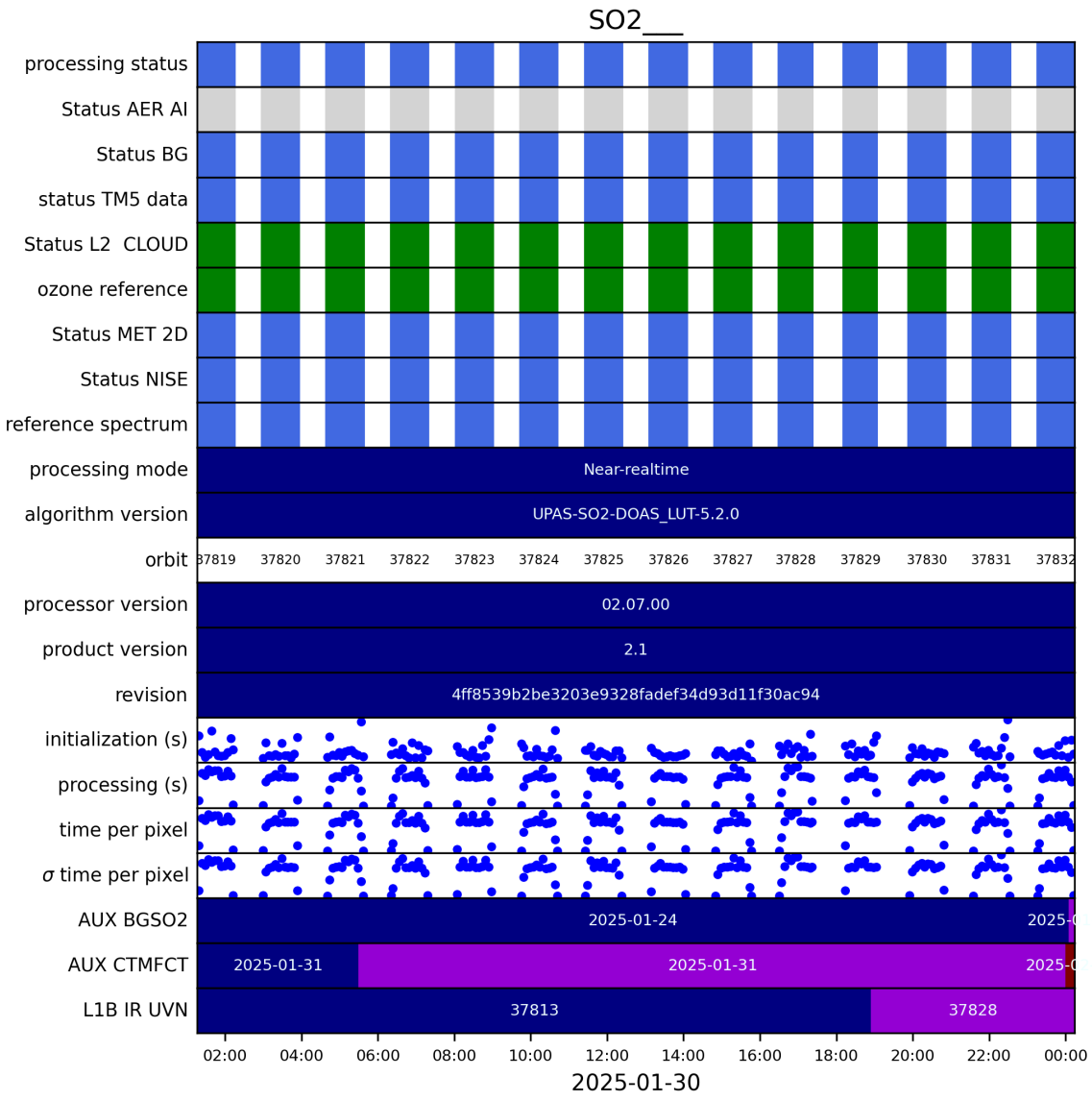

Figure 2: Input data per granule

5 Warnings and errors

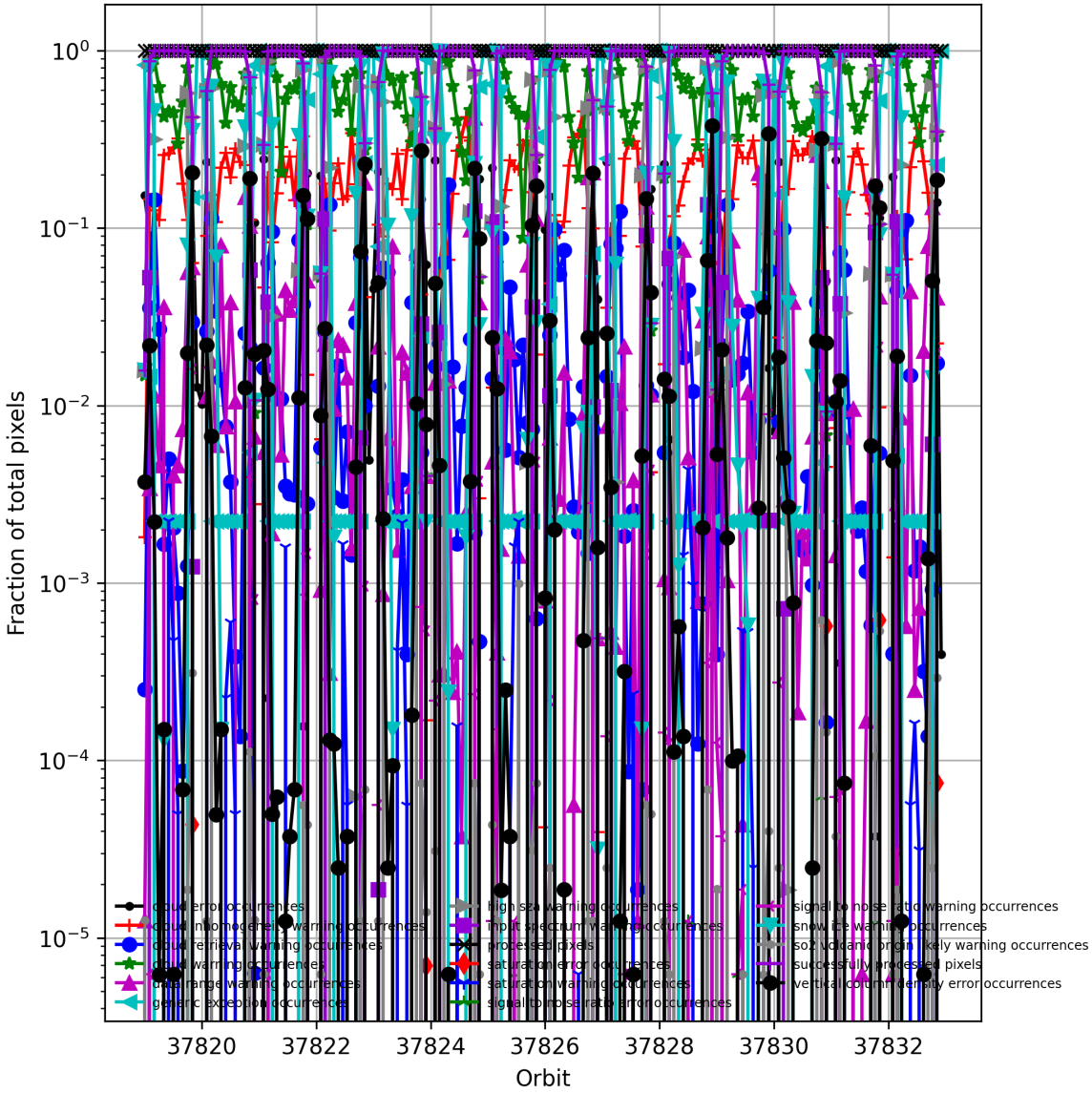

Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

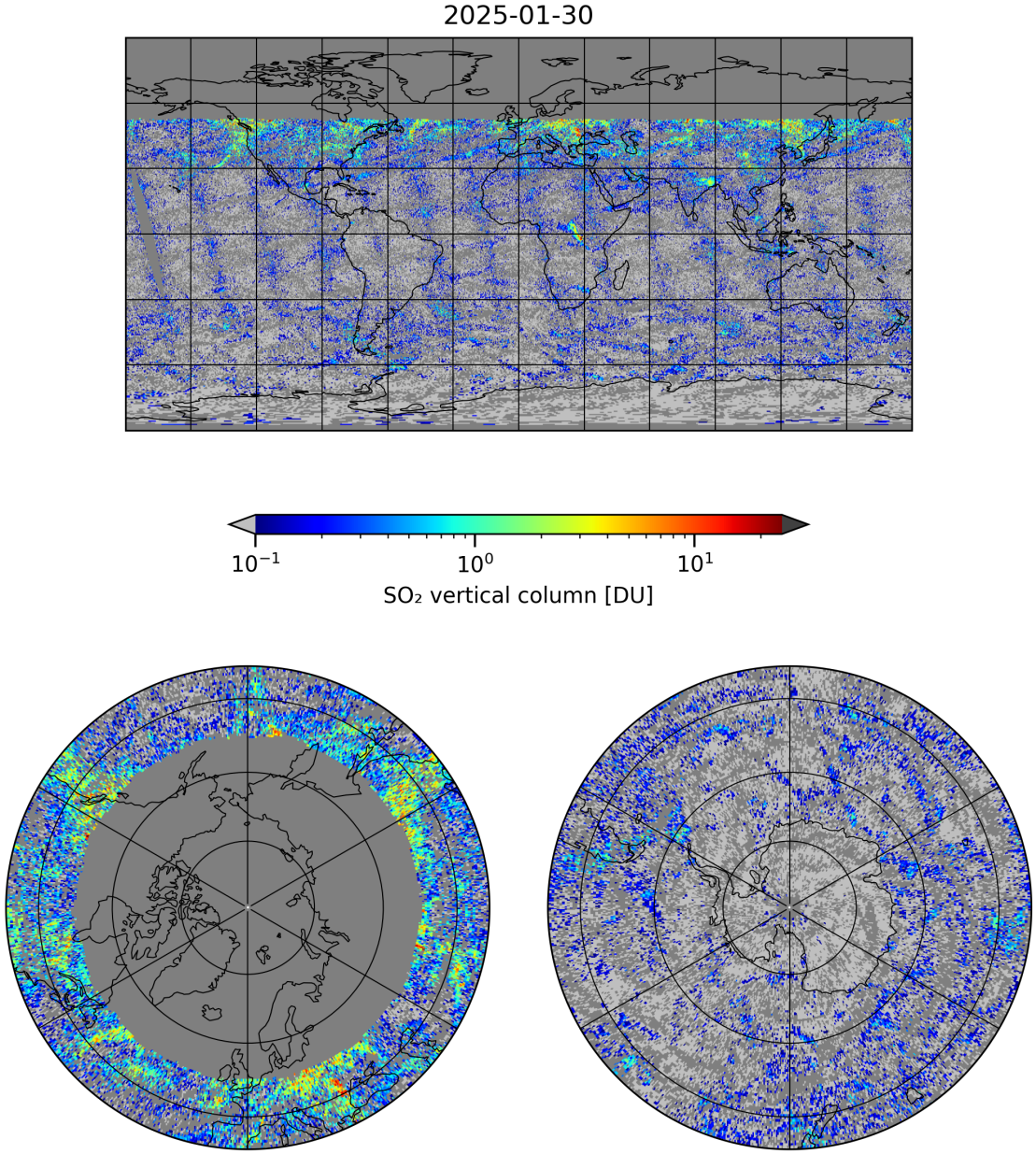

Figure 4: Map of "SO_2 vertical column" for 2025-01-30 to 2025-01-31

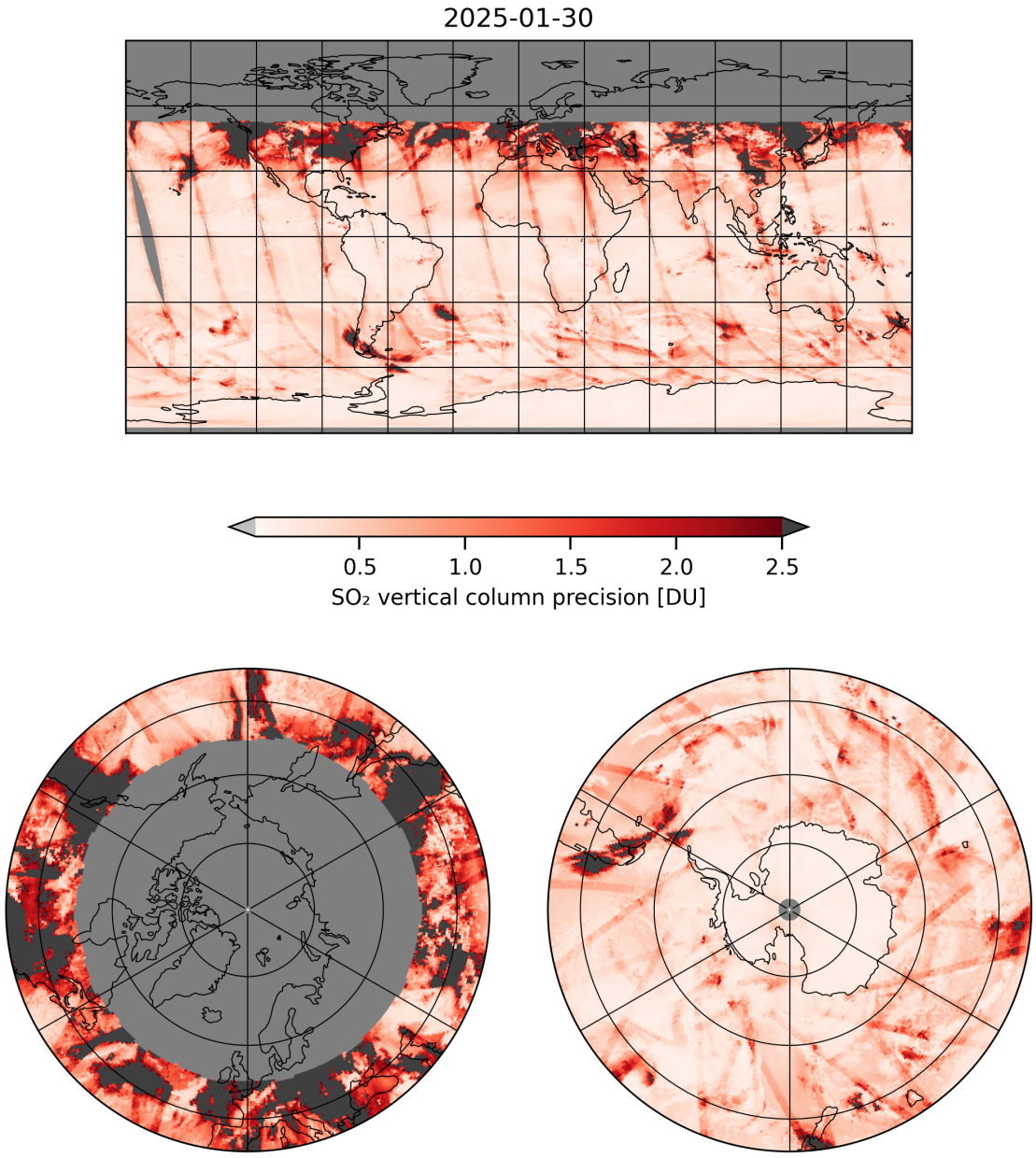

Figure 5: Map of "SO_2 vertical column precision" for 2025-01-30 to 2025-01-31

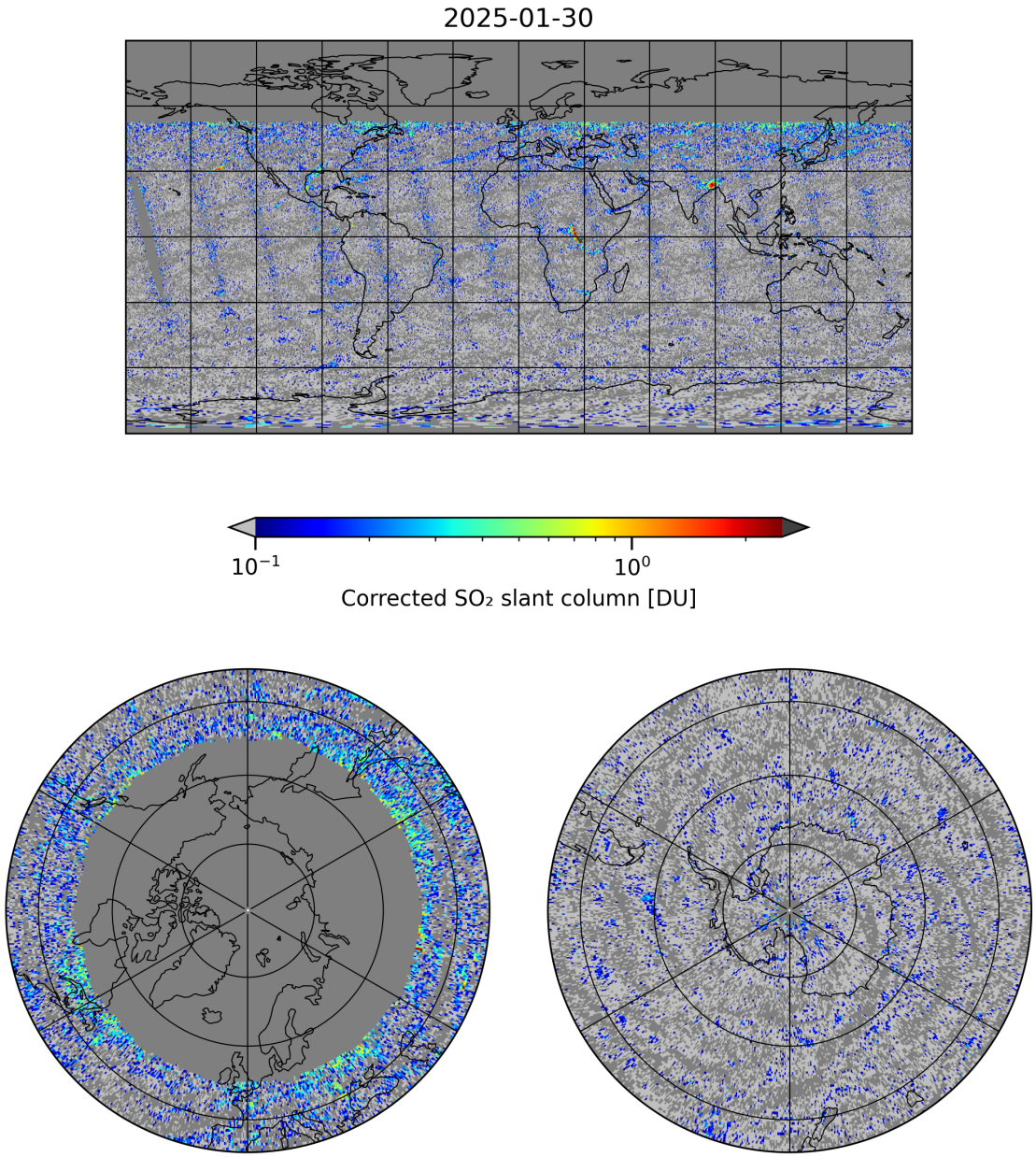

Figure 6: Map of "Corrected SO_2 slant column" for 2025-01-30 to 2025-01-31

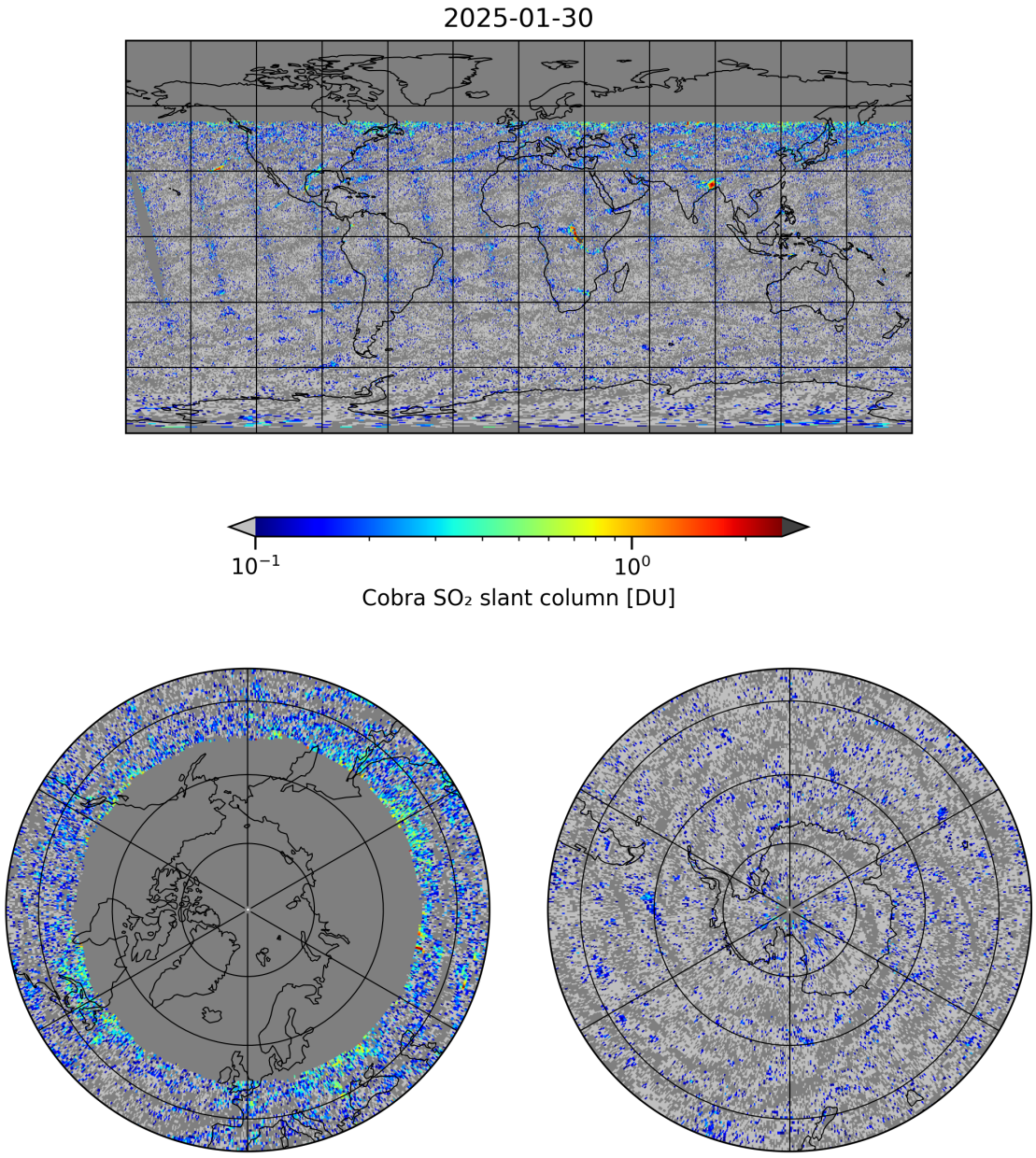

Figure 7: Map of "Cobra SO_2 slant column" for 2025-01-30 to 2025-01-31

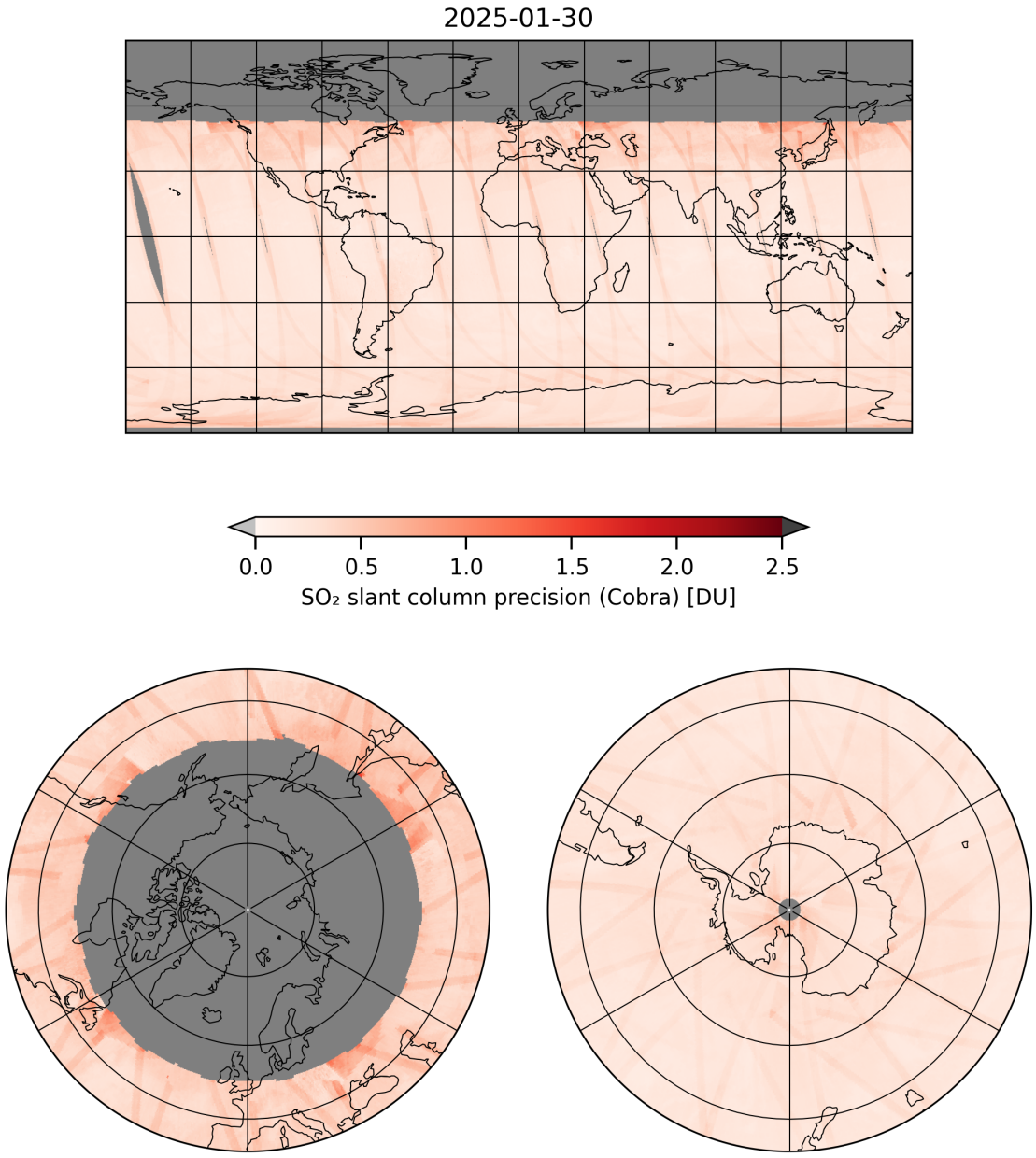

Figure 8: Map of "SO_2 slant column precision (Cobra)" for 2025-01-30 to 2025-01-31

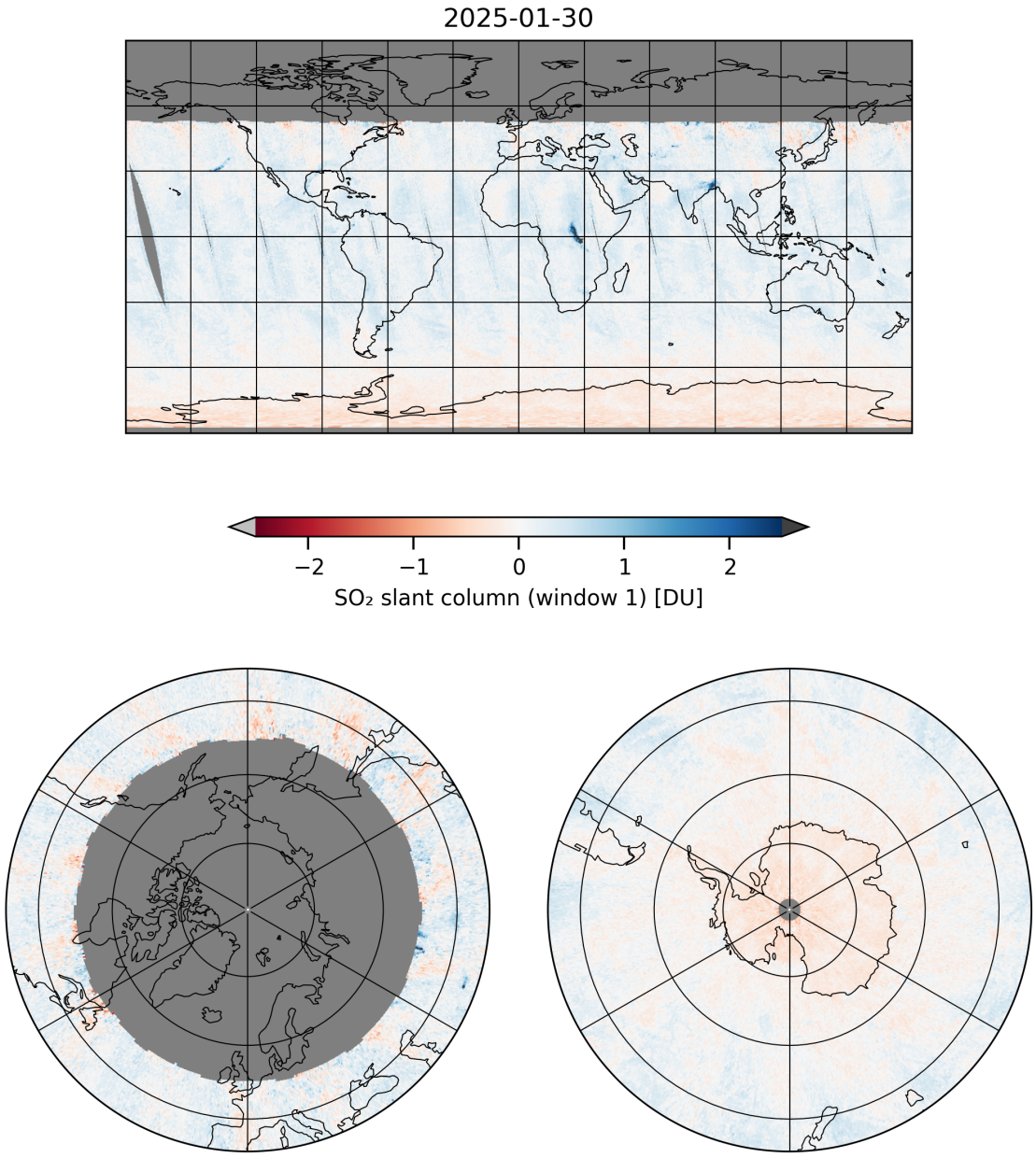

Figure 9: Map of "SO_2 slant column (window 1)" for 2025-01-30 to 2025-01-31

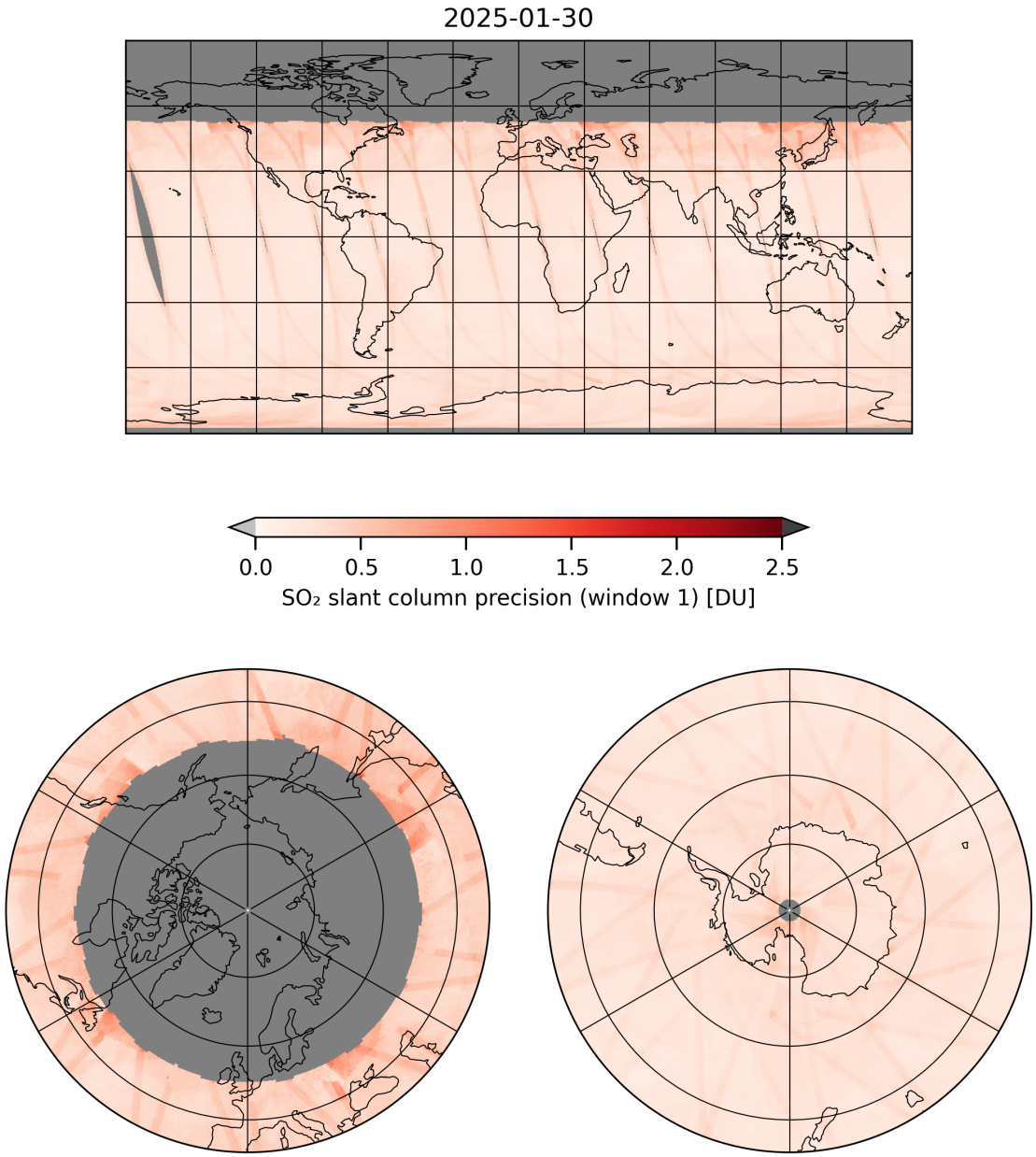

Figure 10: Map of "SO_2 slant column precision (window 1)" for 2025-01-30 to 2025-01-31

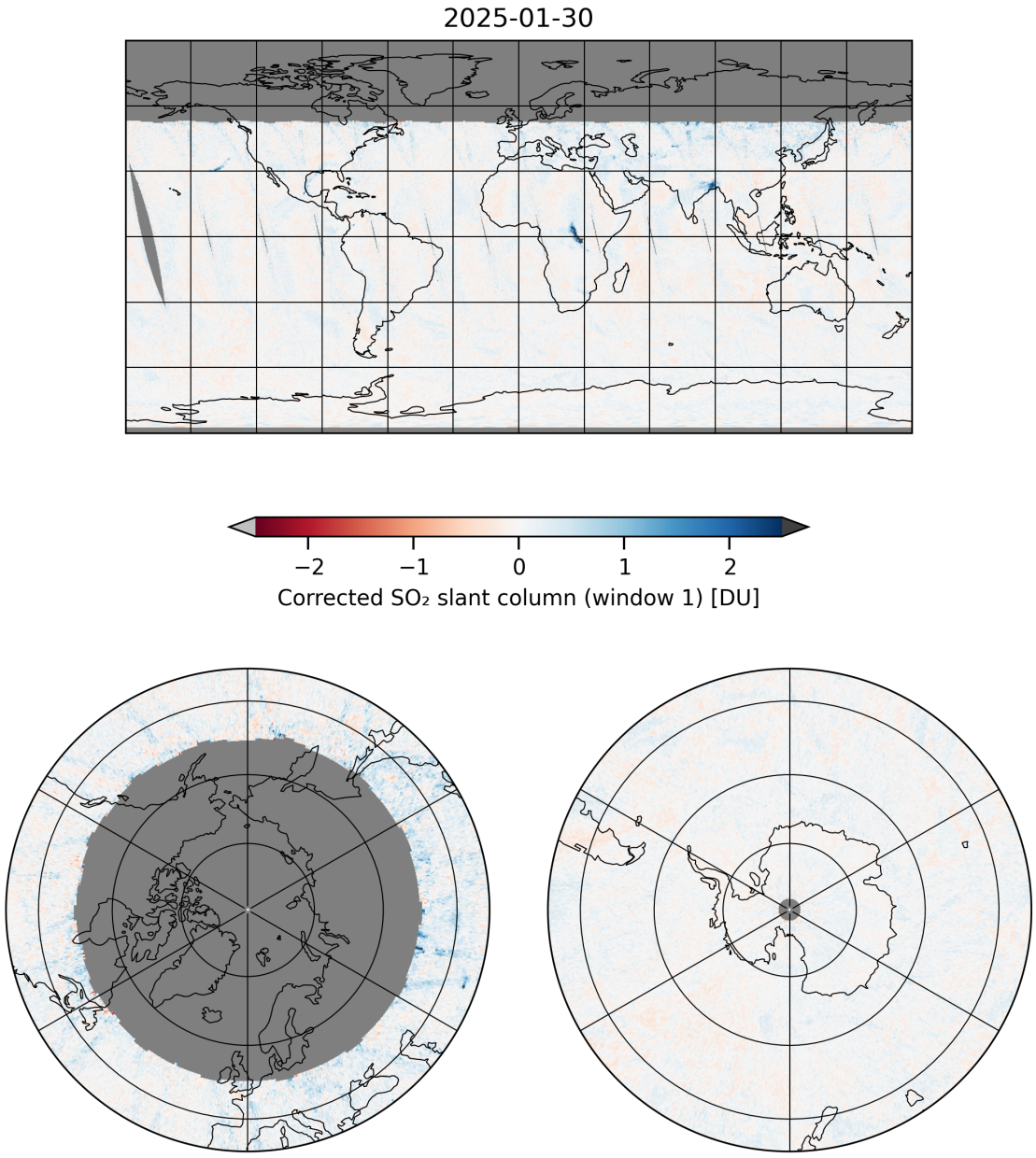

Figure 11: Map of "Corrected SO_2 slant column (window 1)" for 2025-01-30 to 2025-01-31

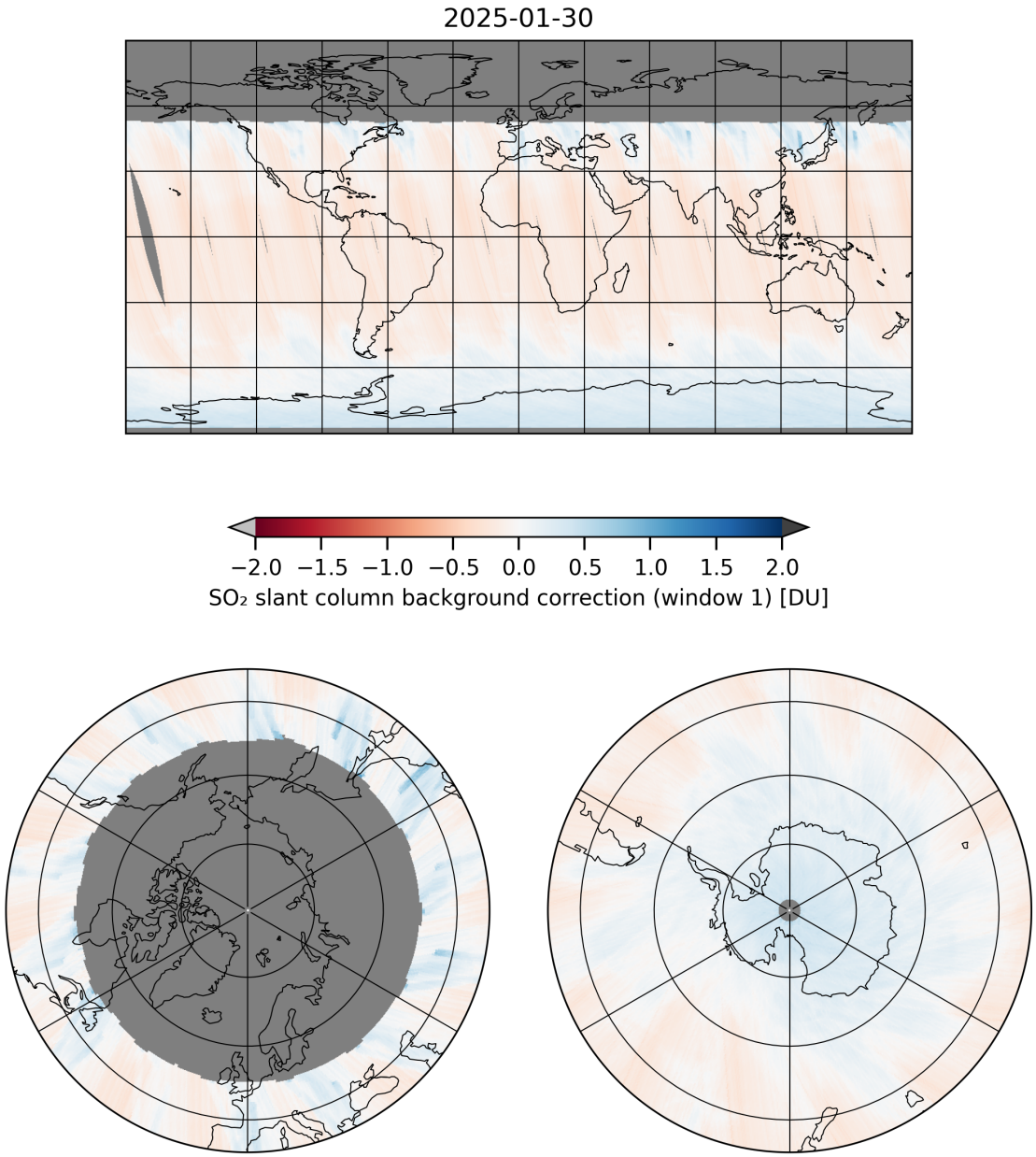

Figure 12: Map of "SO_2 slant column background correction (window 1)" for 2025-01-30 to 2025-01-31

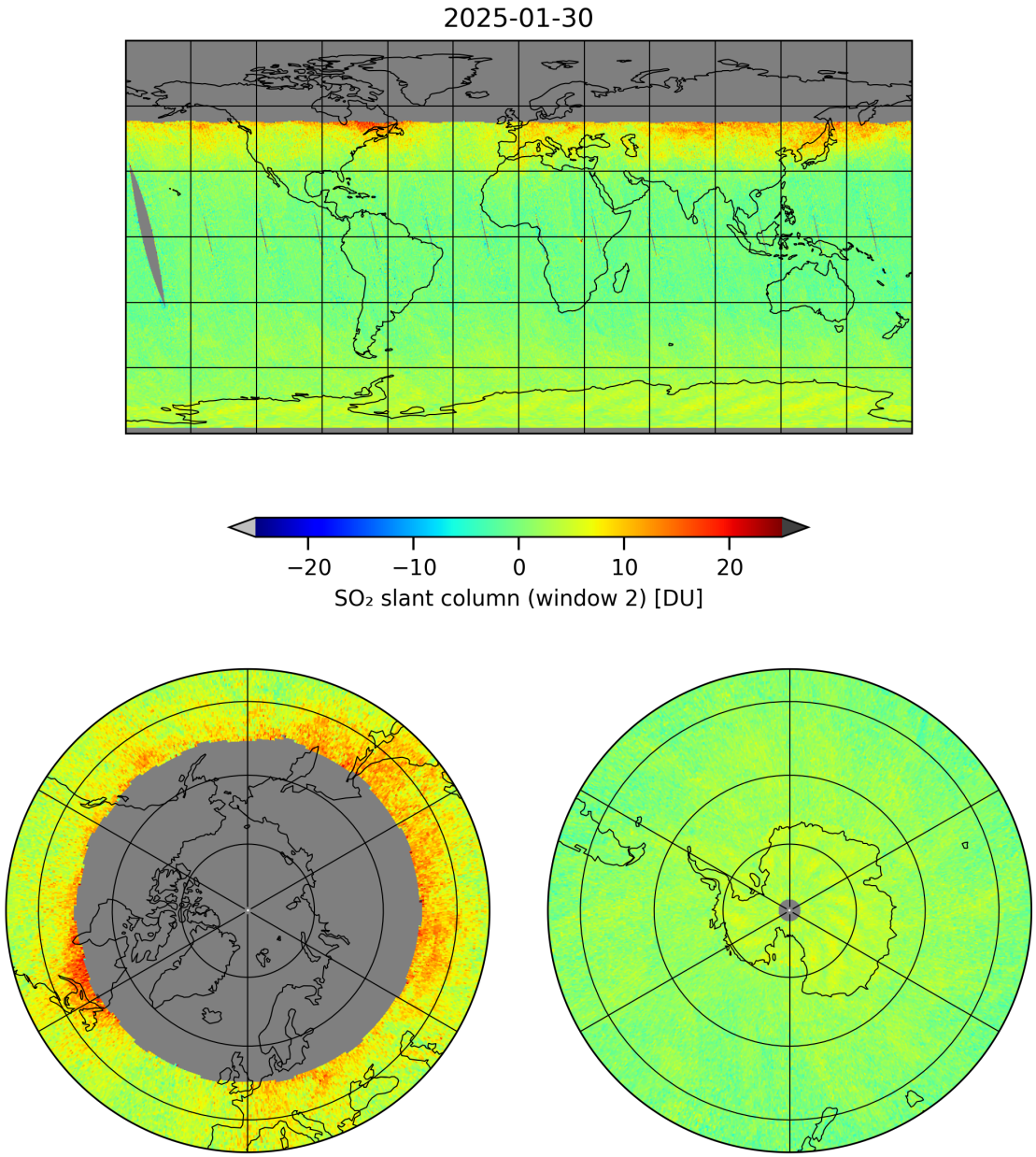

Figure 13: Map of "SO_2 slant column (window 2)" for 2025-01-30 to 2025-01-31

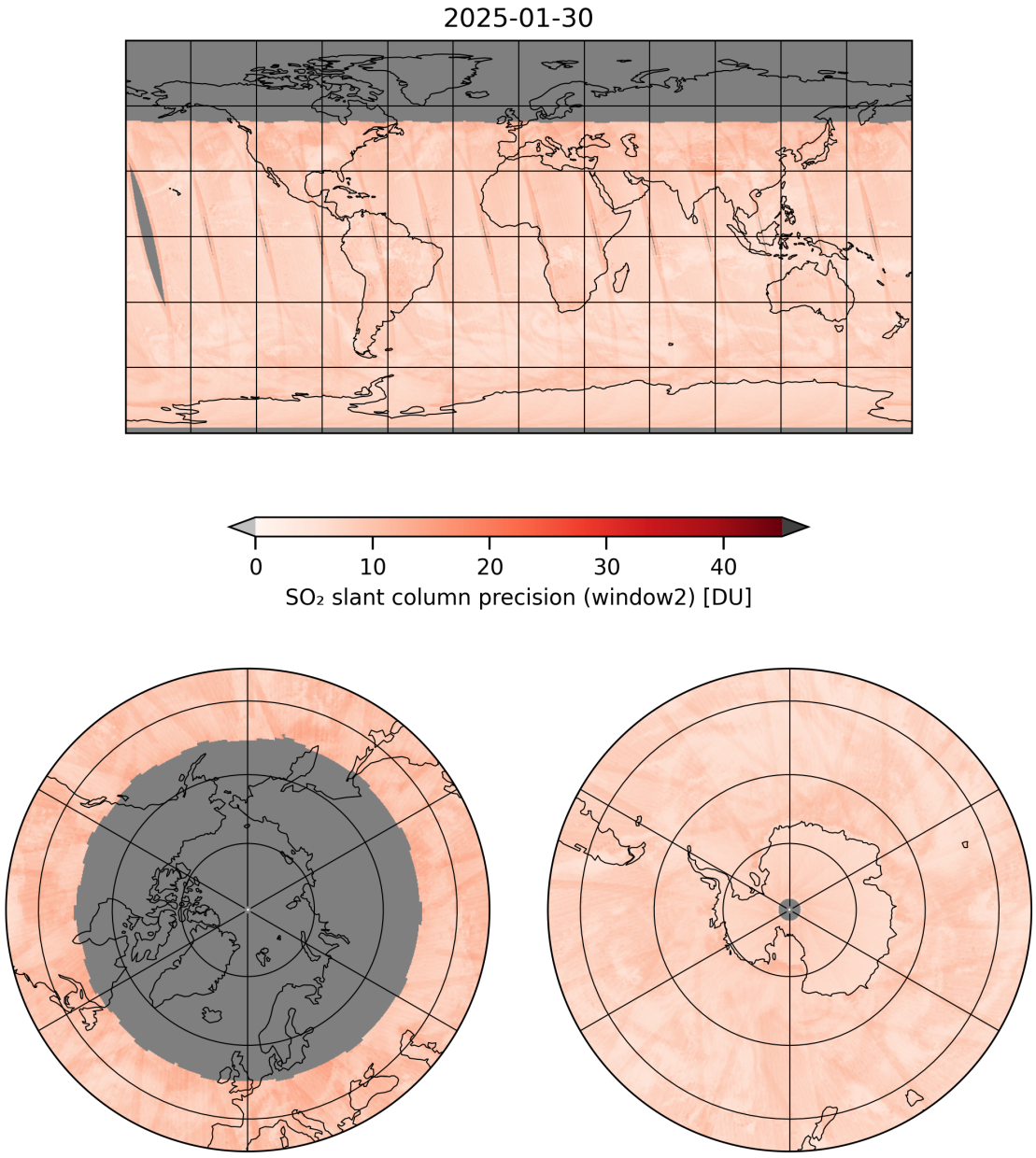

Figure 14: Map of "SO_2 slant column precision (window2)" for 2025-01-30 to 2025-01-31

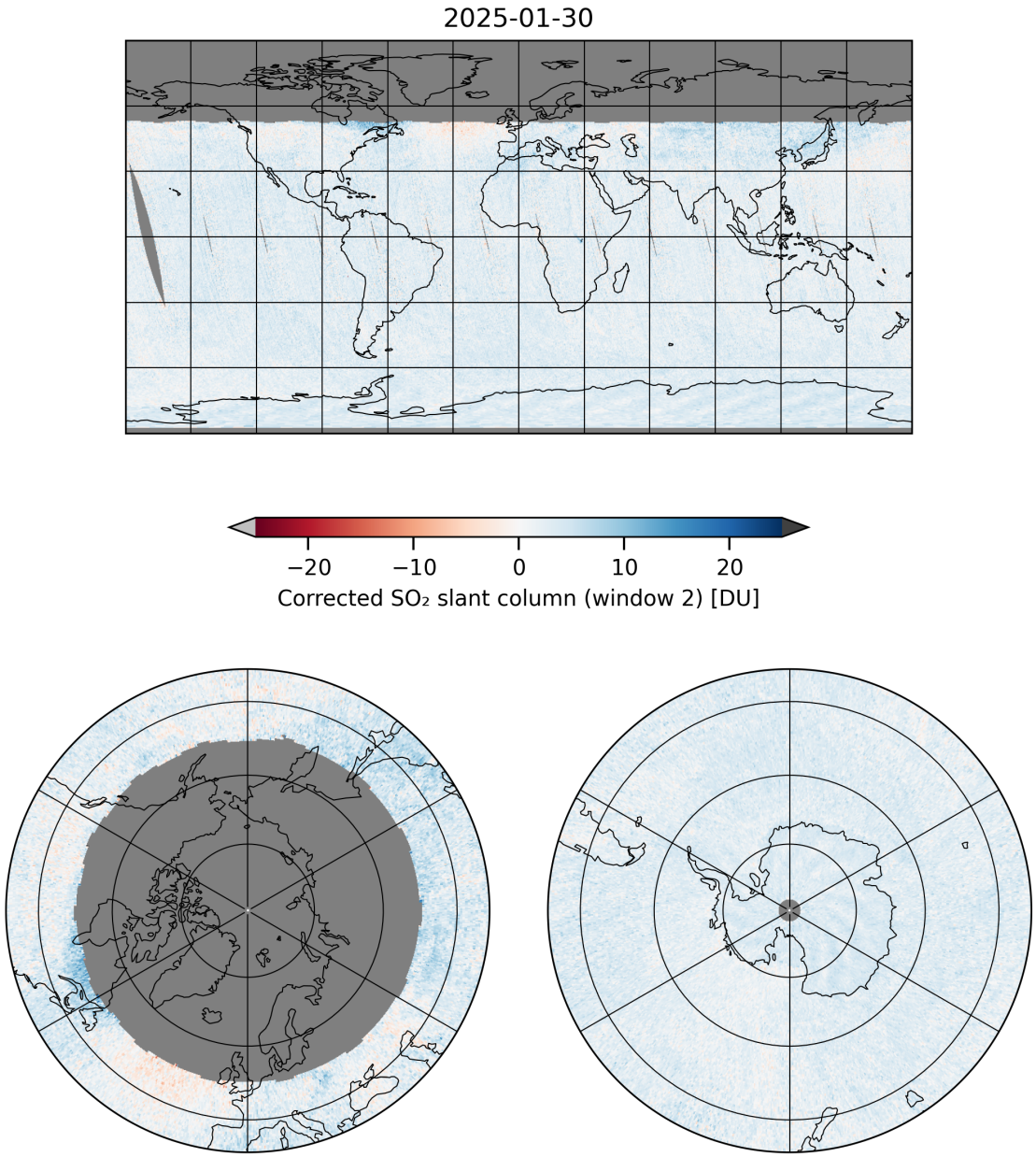

Figure 15: Map of “Corrected SO_2 slant column (window 2)” for 2025-01-30 to 2025-01-31

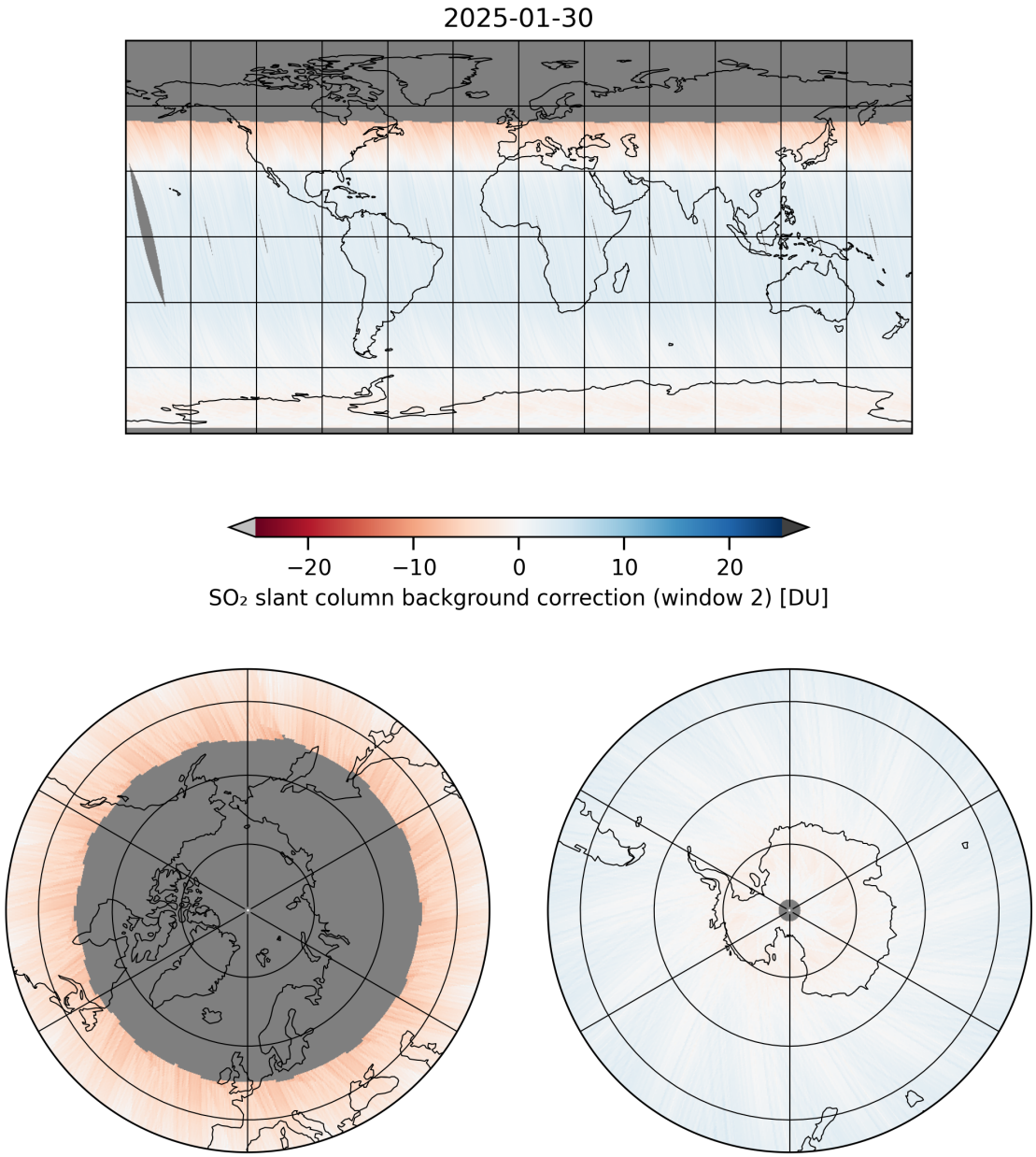

Figure 16: Map of "SO_2 slant column background correction (window 2)" for 2025-01-30 to 2025-01-31

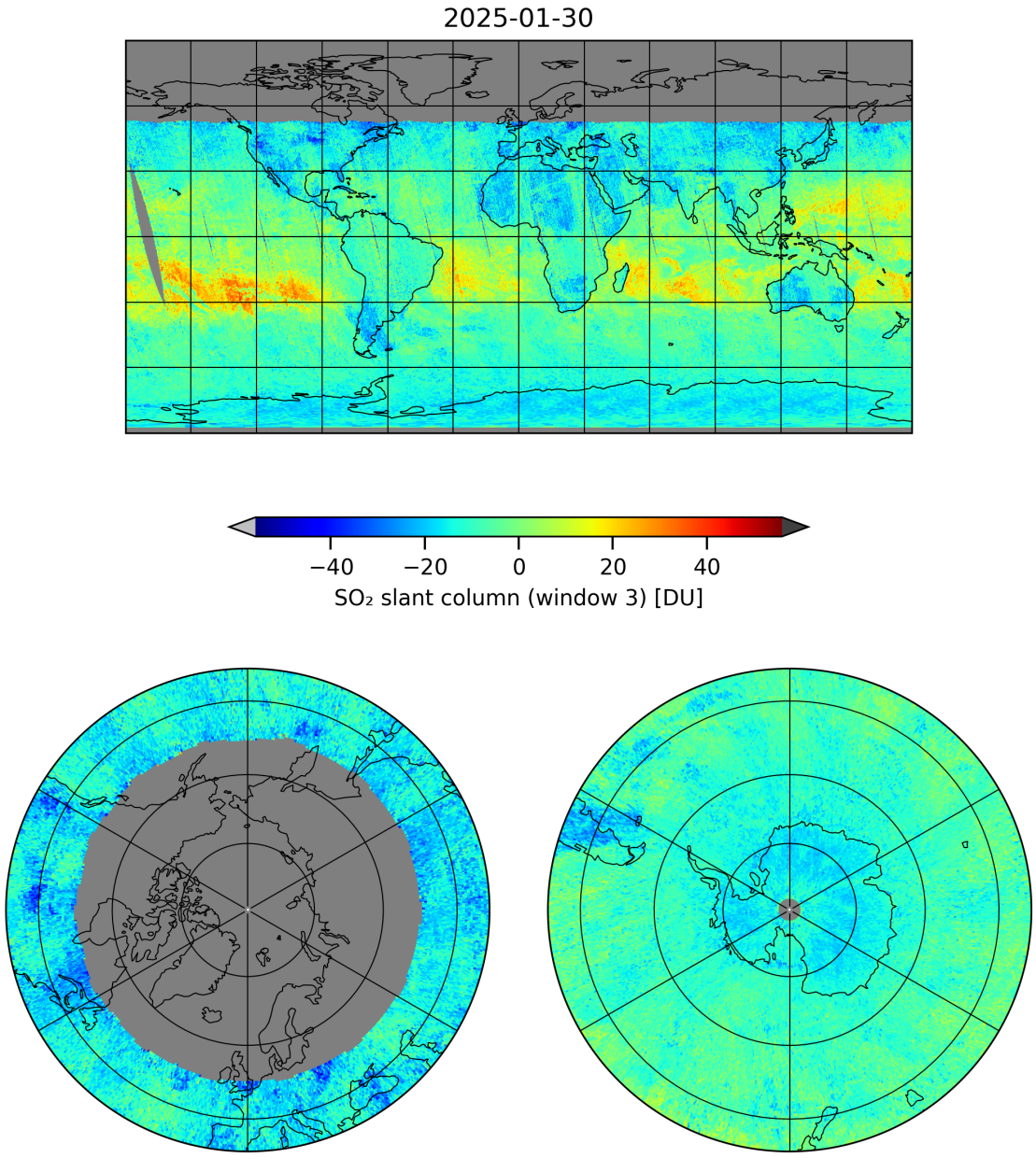

Figure 17: Map of "SO_2 slant column (window 3)" for 2025-01-30 to 2025-01-31

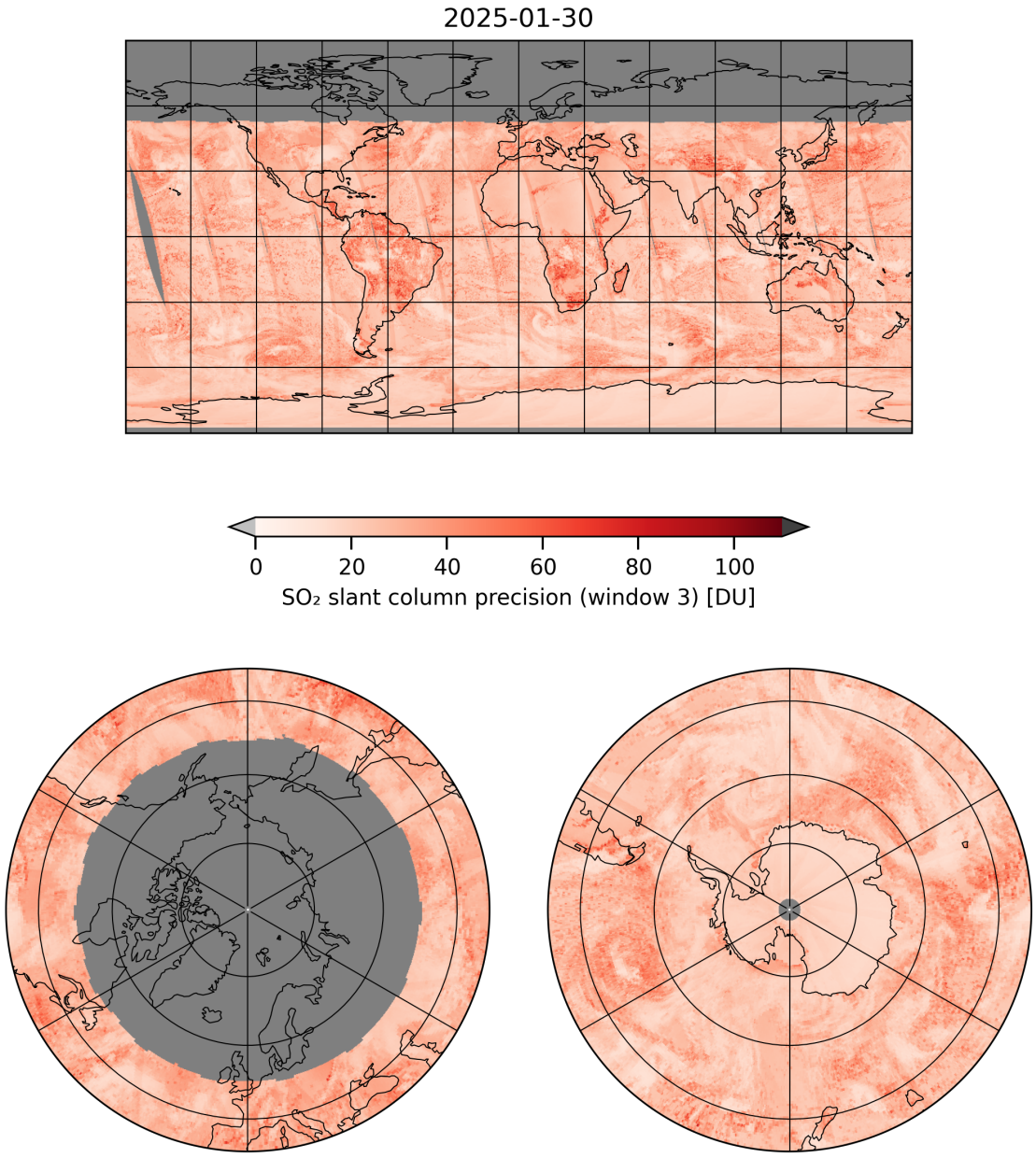

Figure 18: Map of "SO_2 slant column precision (window 3)" for 2025-01-30 to 2025-01-31

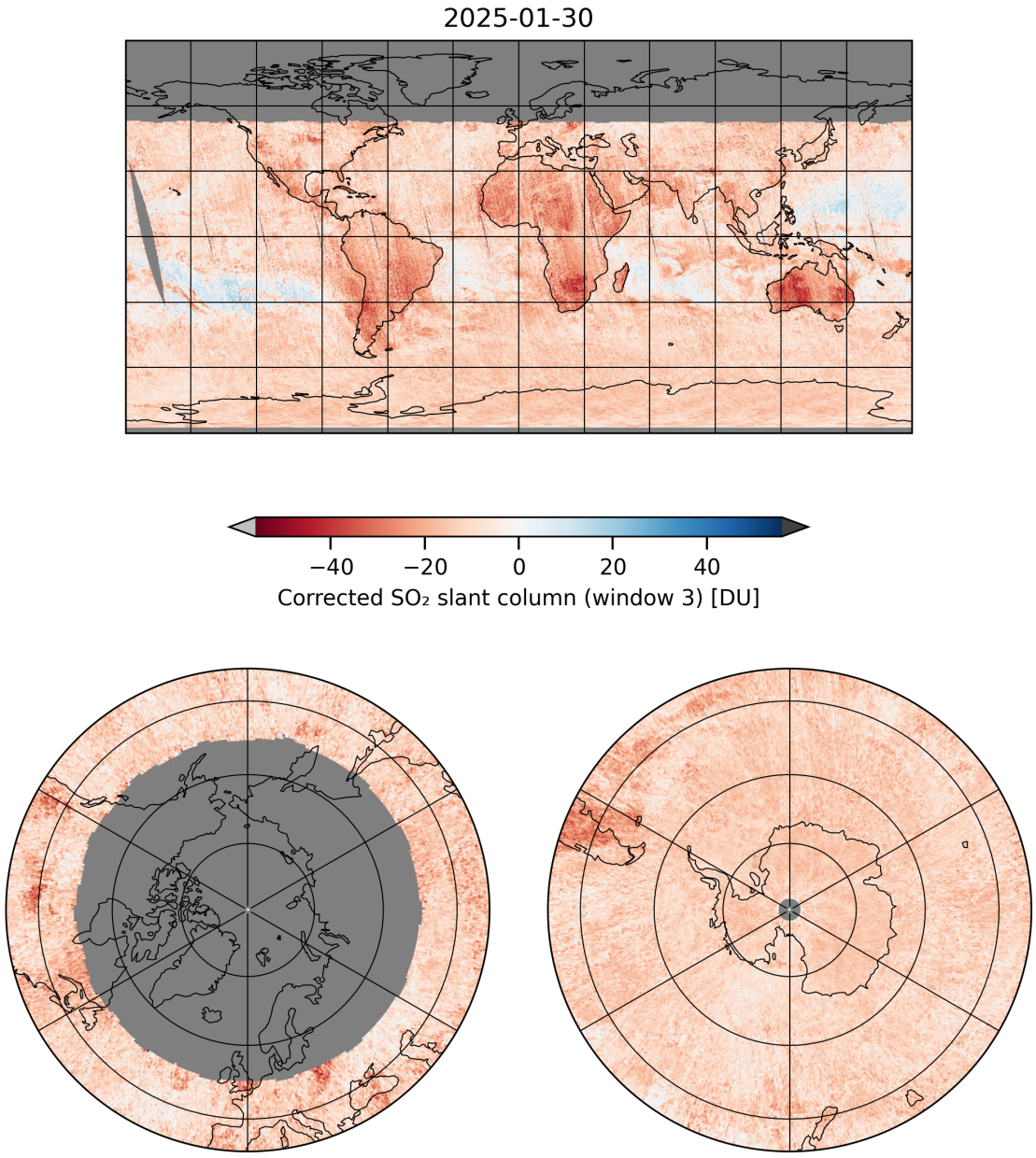

Figure 19: Map of "Corrected SO_2 slant column (window 3)" for 2025-01-30 to 2025-01-31

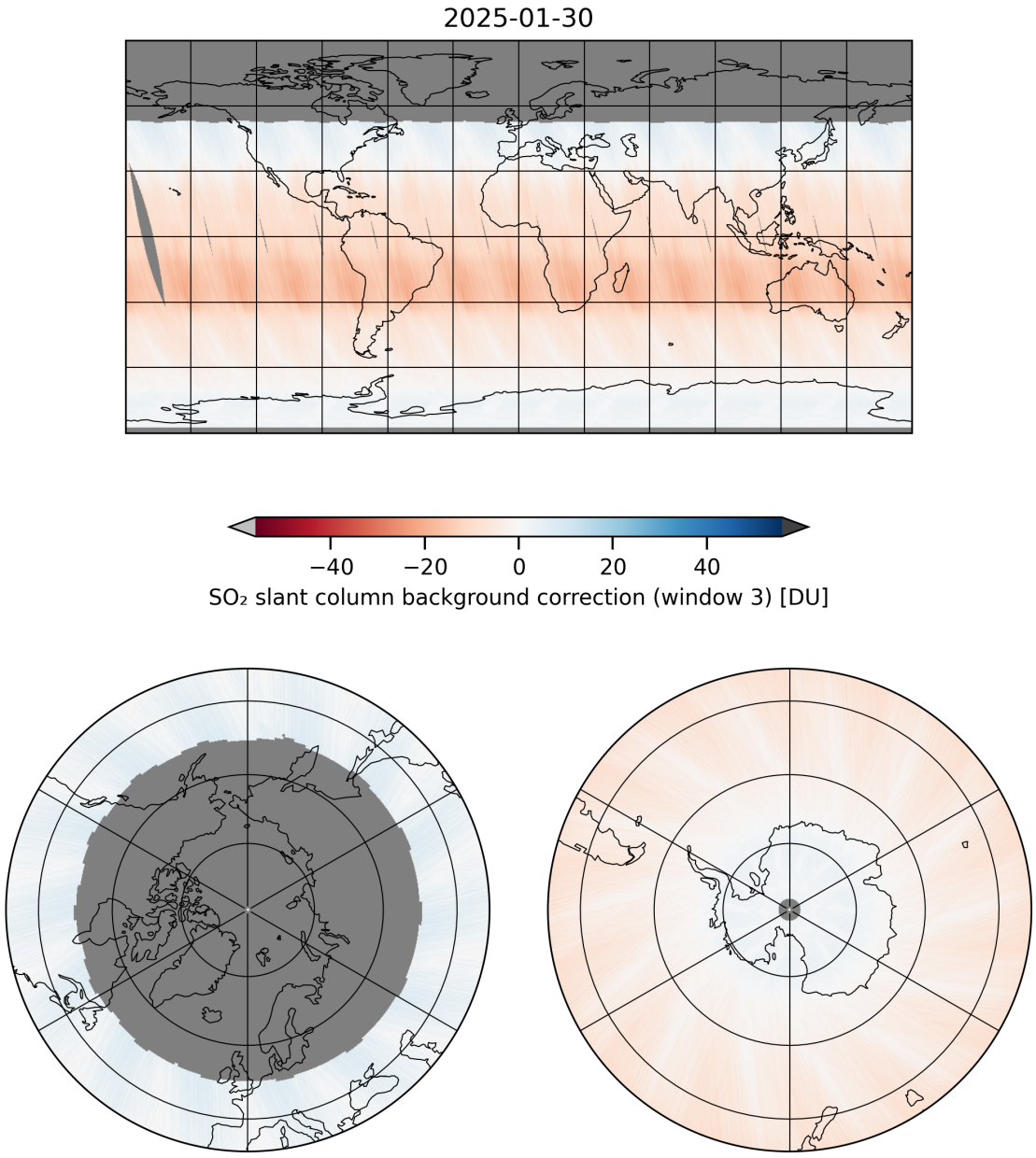

Figure 20: Map of "SO_2 slant column background correction (window 3)" for 2025-01-30 to 2025-01-31

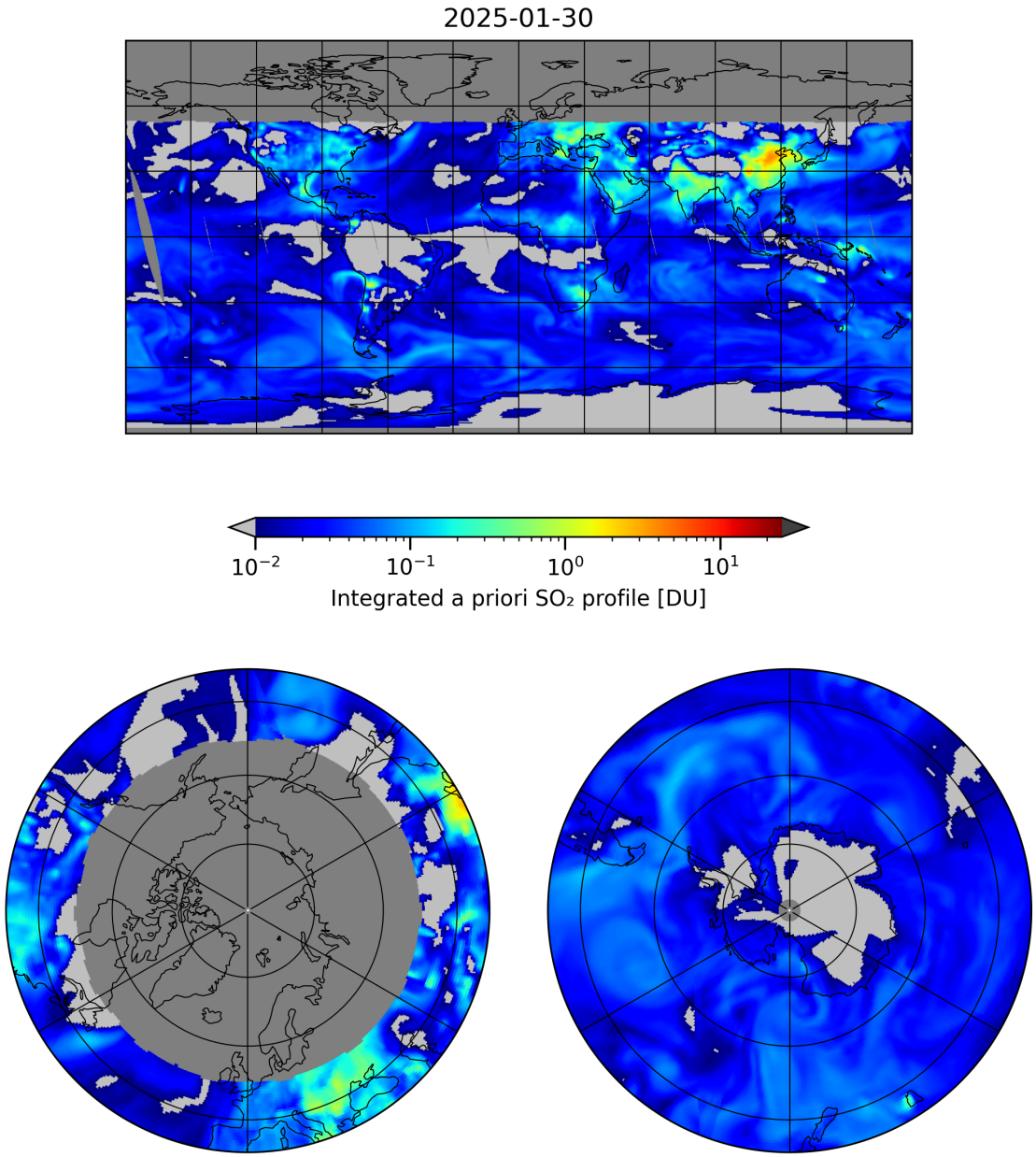

Figure 21: Map of “Integrated a priori SO_2 profile” for 2025-01-30 to 2025-01-31

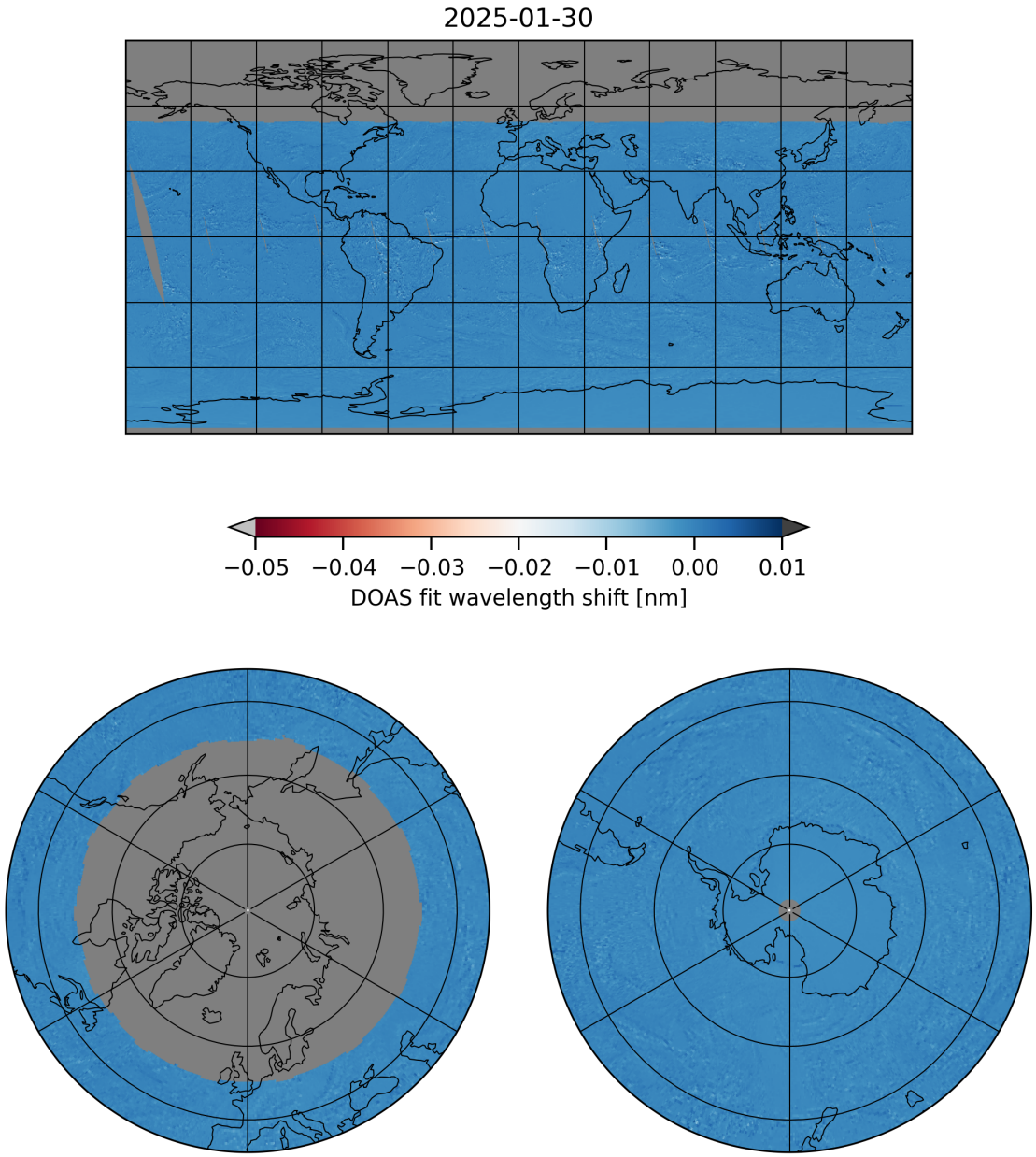

Figure 22: Map of “DOAS fit wavelength shift” for 2025-01-30 to 2025-01-31

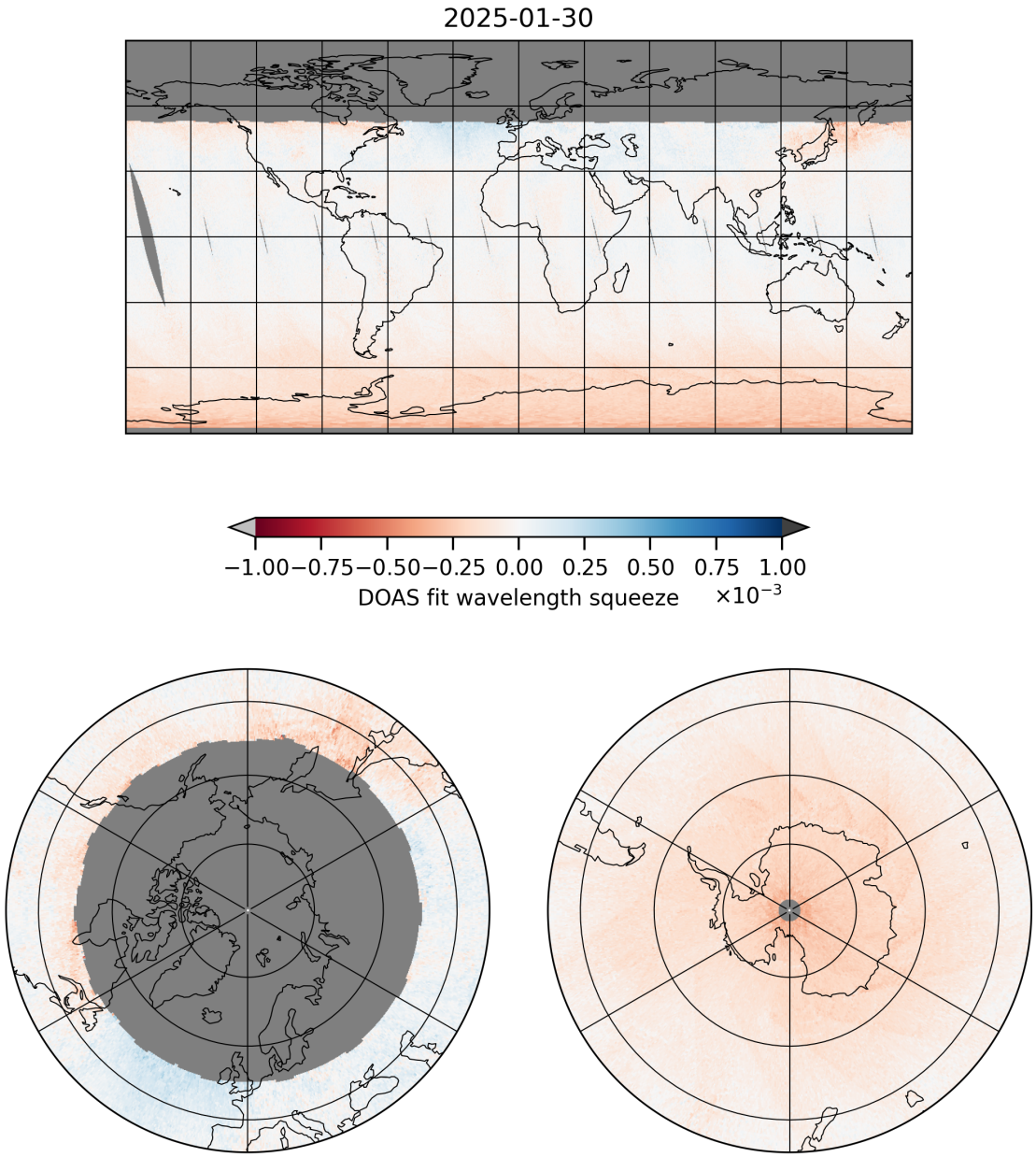

Figure 23: Map of “DOAS fit wavelength squeeze” for 2025-01-30 to 2025-01-31

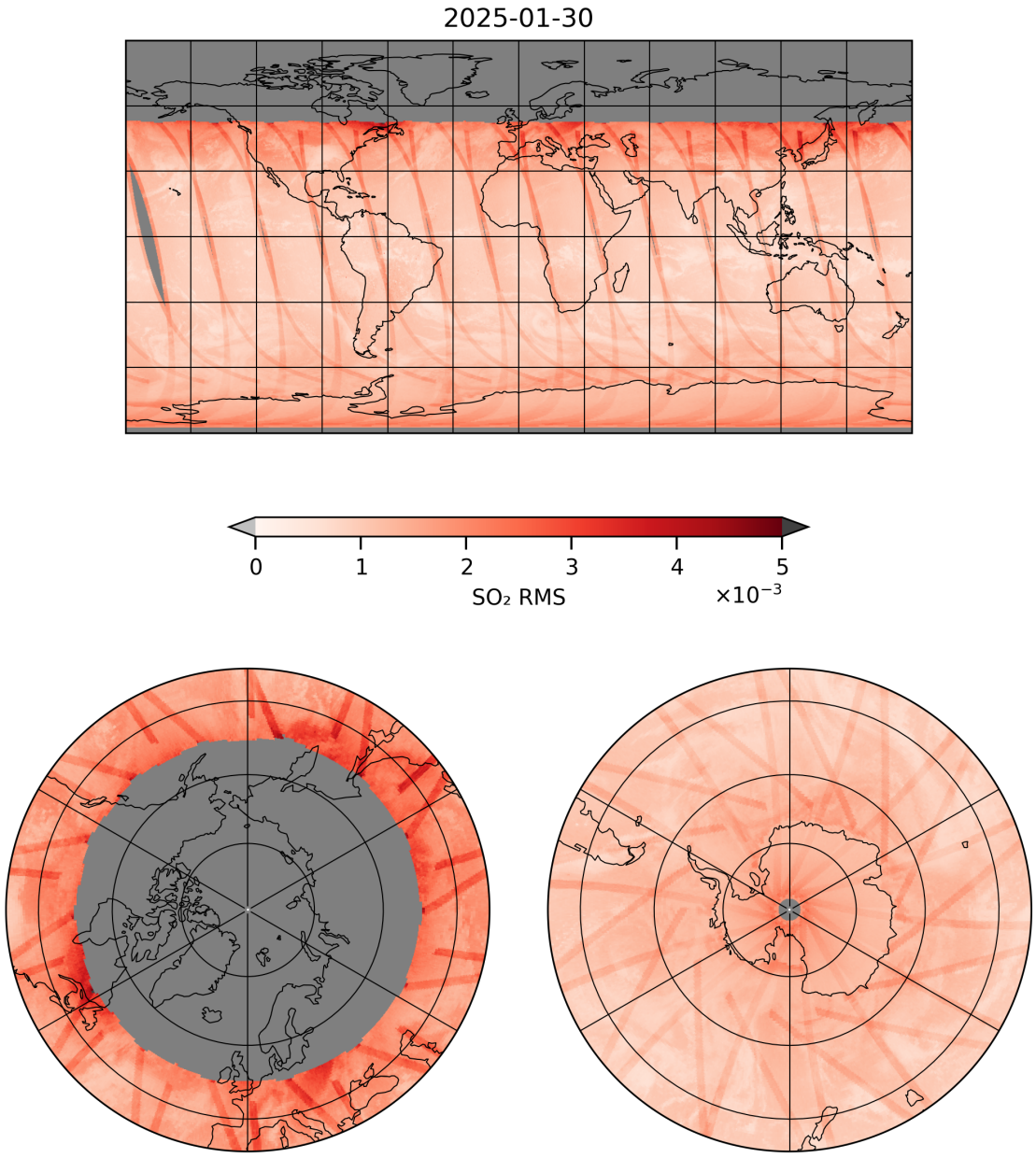

Figure 24: Map of "SO_2 RMS" for 2025-01-30 to 2025-01-31

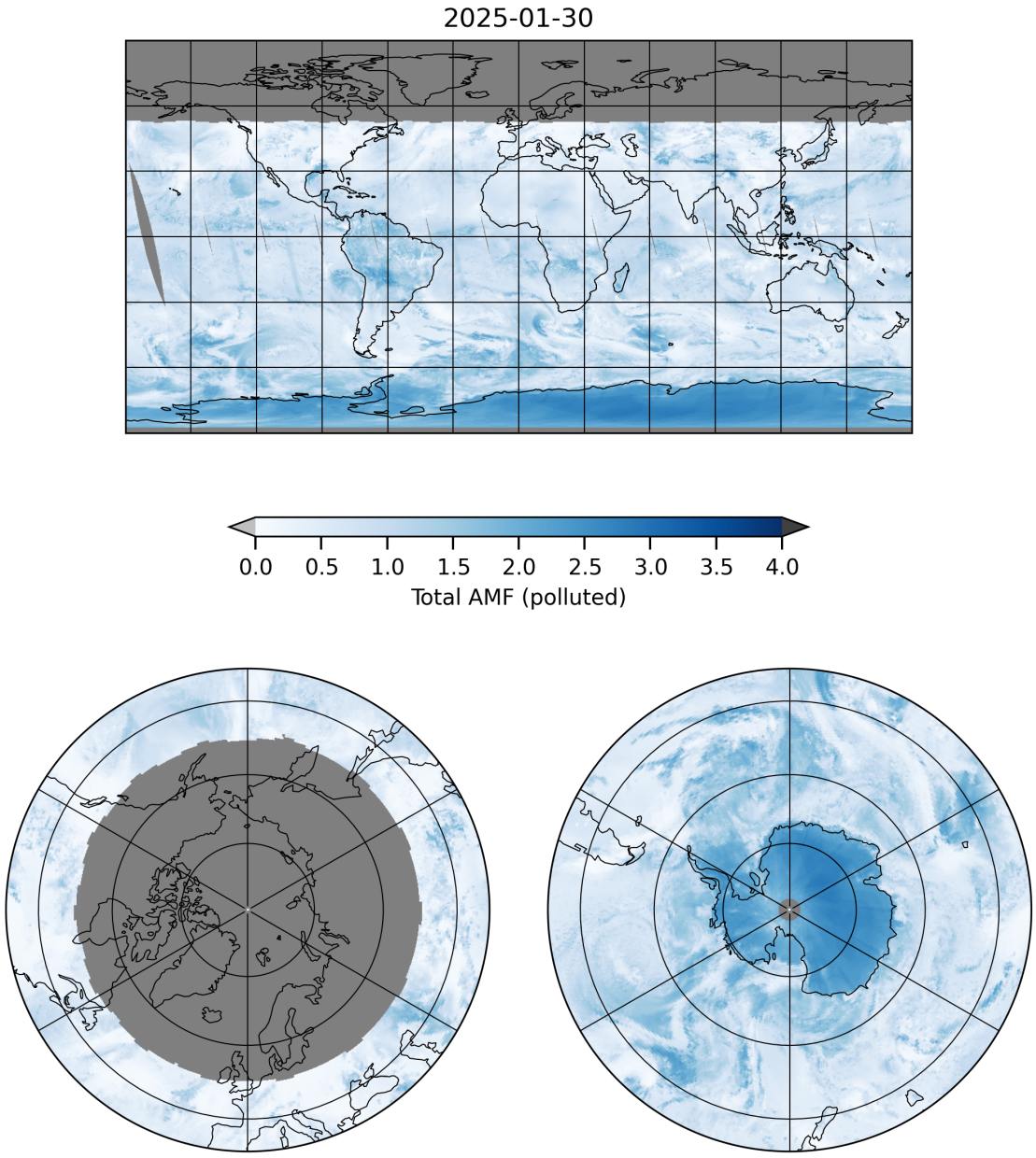

Figure 25: Map of “Total AMF (polluted)” for 2025-01-30 to 2025-01-31

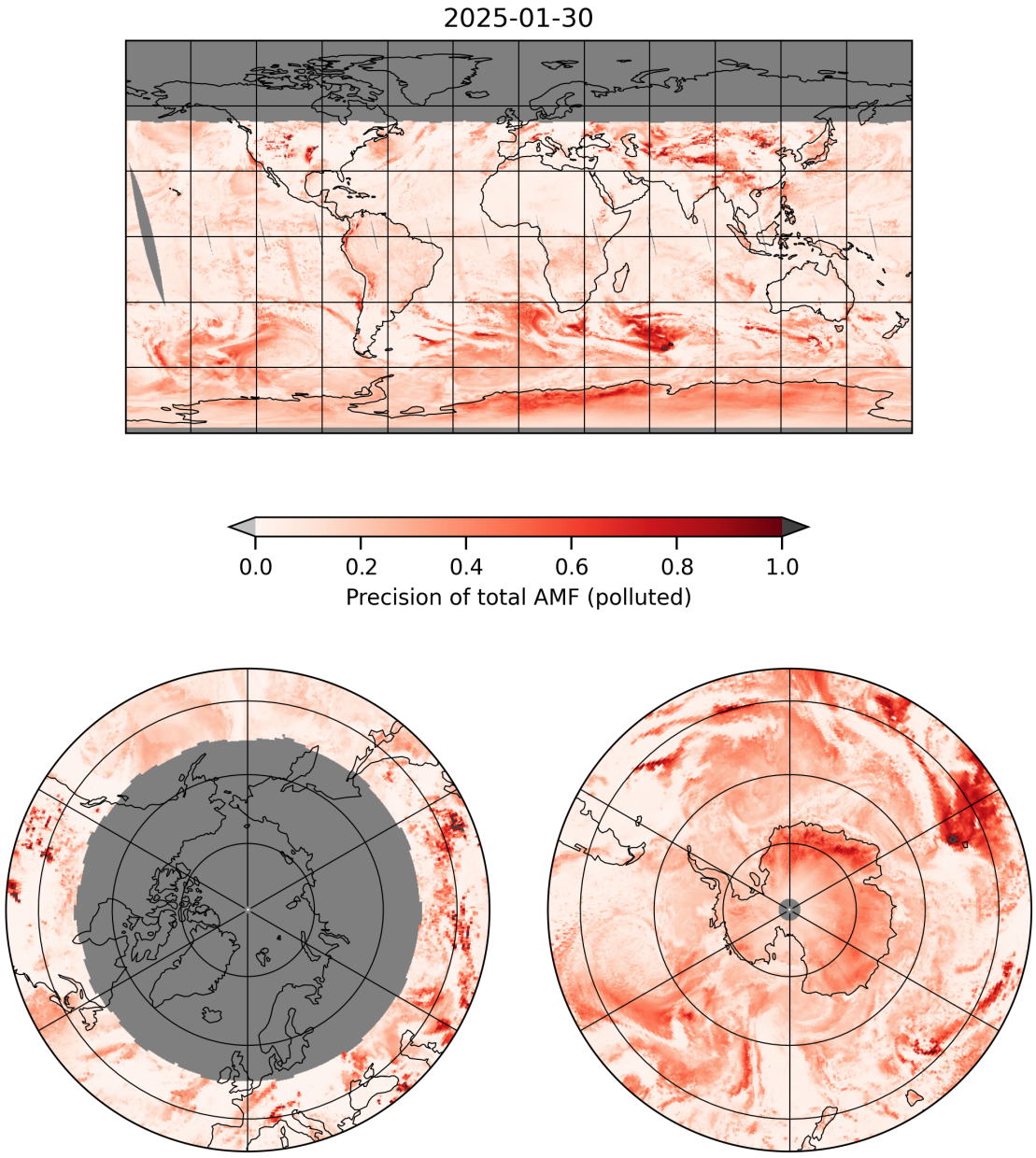

Figure 26: Map of “Precision of total AMF (polluted)” for 2025-01-30 to 2025-01-31

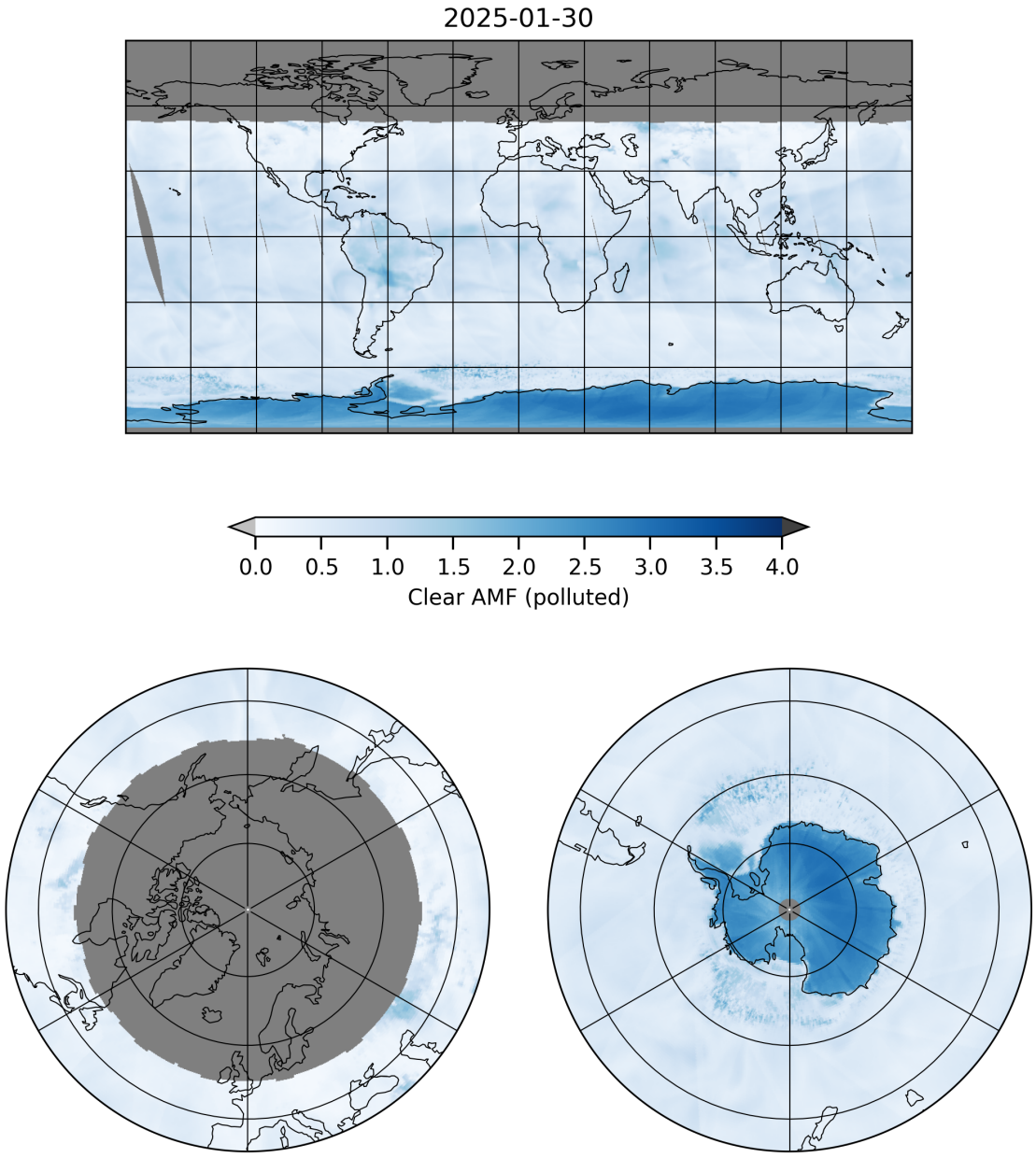

Figure 27: Map of “Clear AMF (polluted)” for 2025-01-30 to 2025-01-31

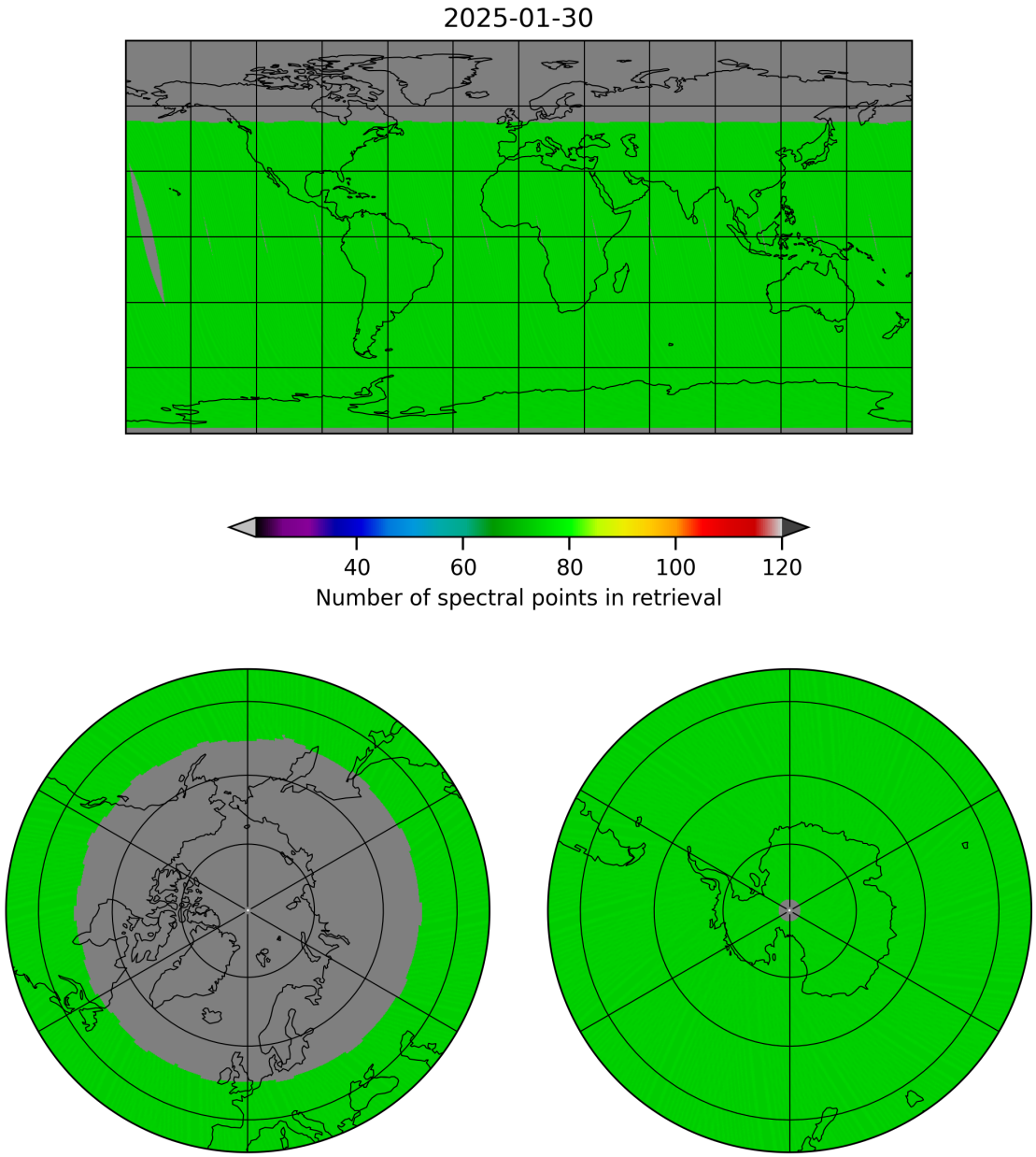

Figure 28: Map of “Number of spectral points in retrieval” for 2025-01-30 to 2025-01-31

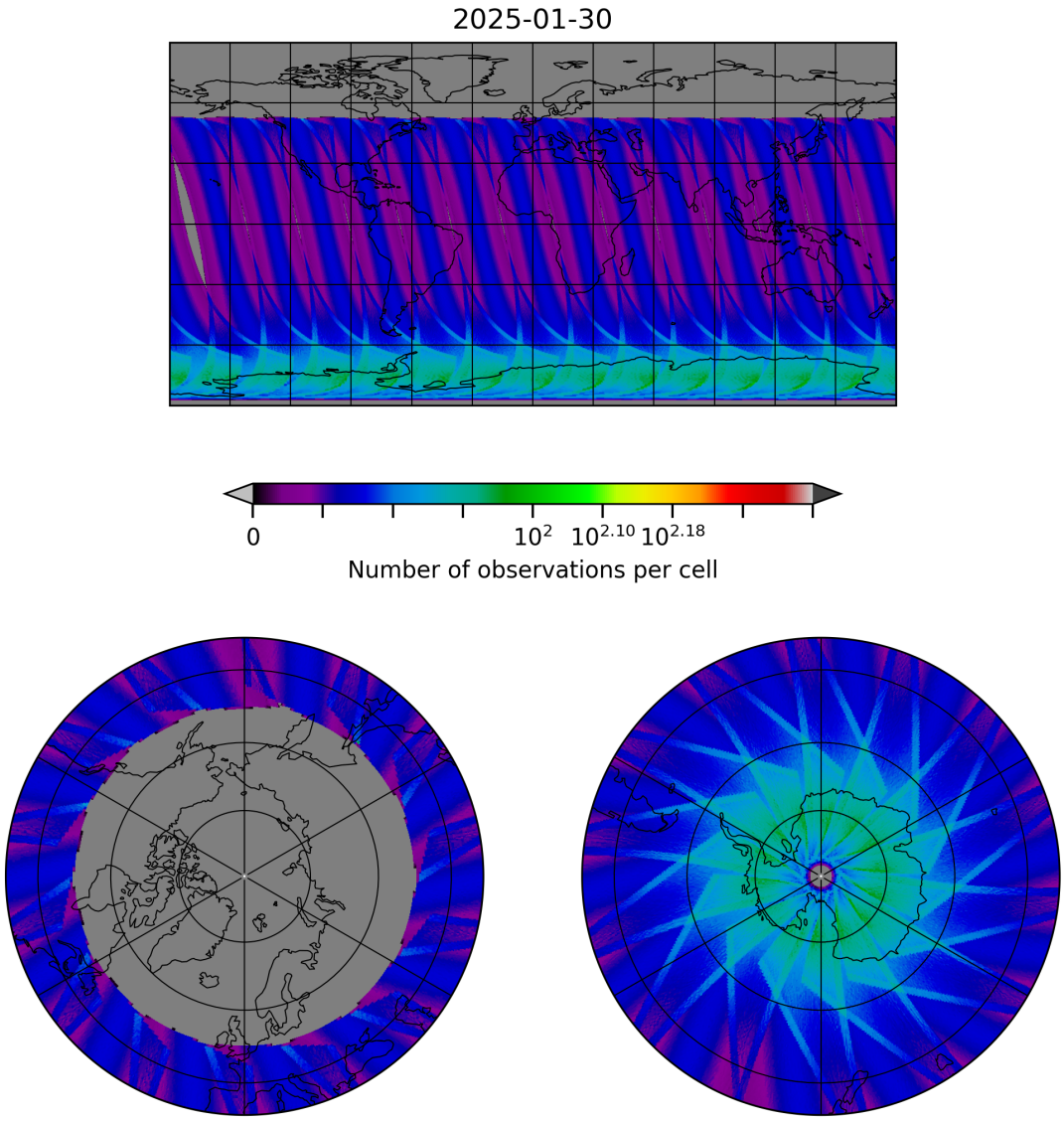

Figure 29: Map of the number of observations for 2025-01-30 to 2025-01-31

7 Zonal average

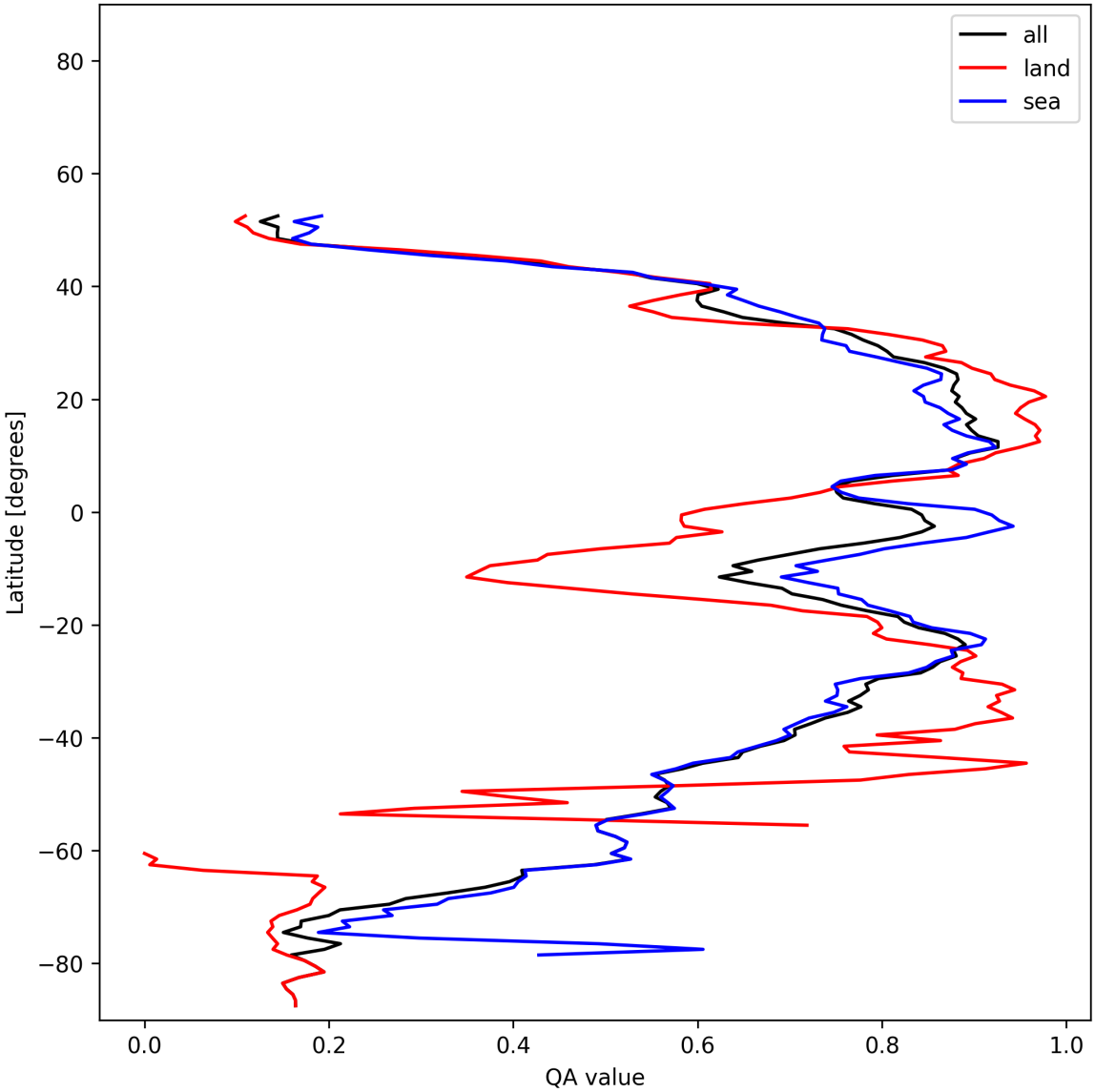

Figure 30: Zonal average of “QA value” for 2025-01-30 to 2025-01-31.

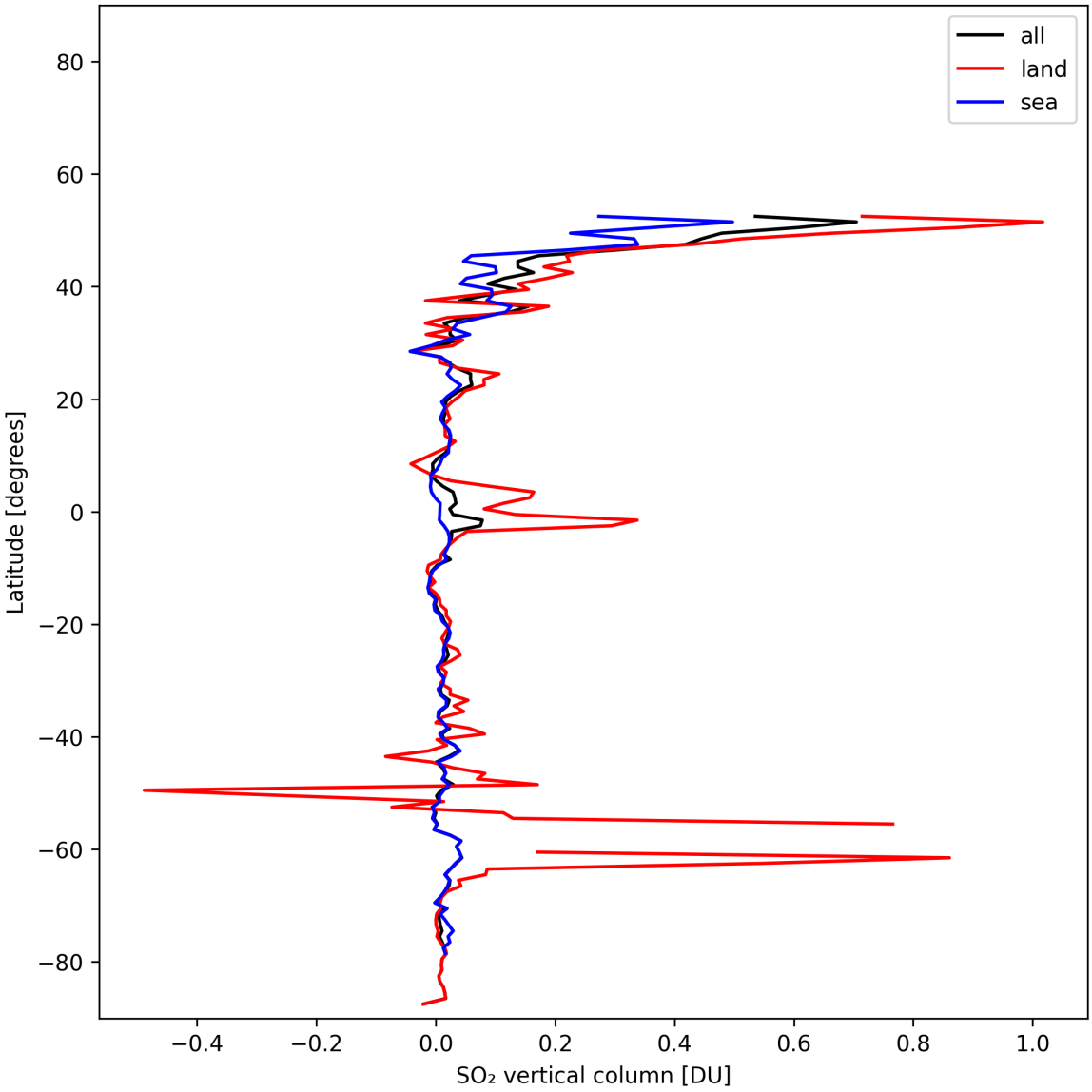

Figure 31: Zonal average of "SO_2 vertical column" for 2025-01-30 to 2025-01-31.

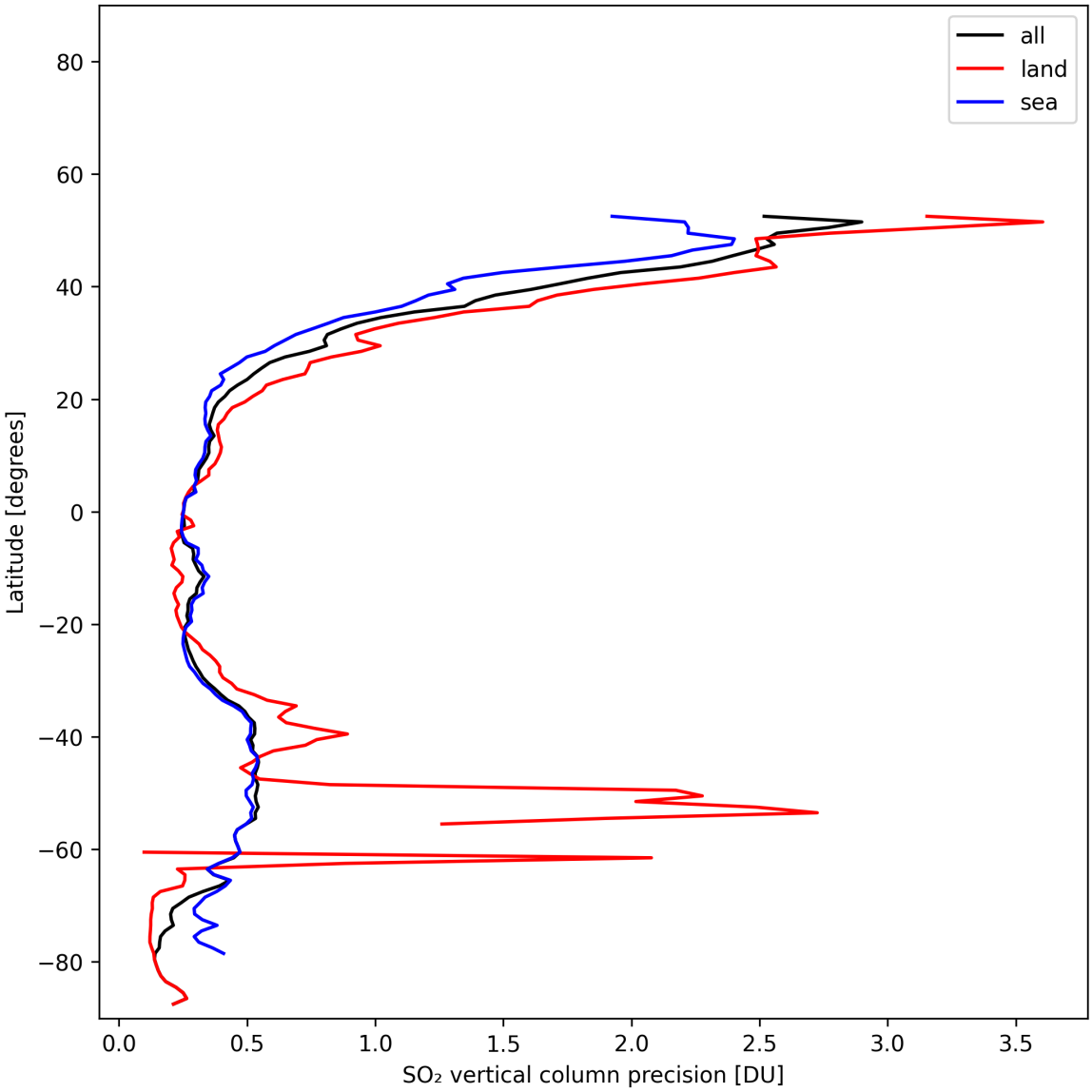

Figure 32: Zonal average of "SO_2 vertical column precision" for 2025-01-30 to 2025-01-31.

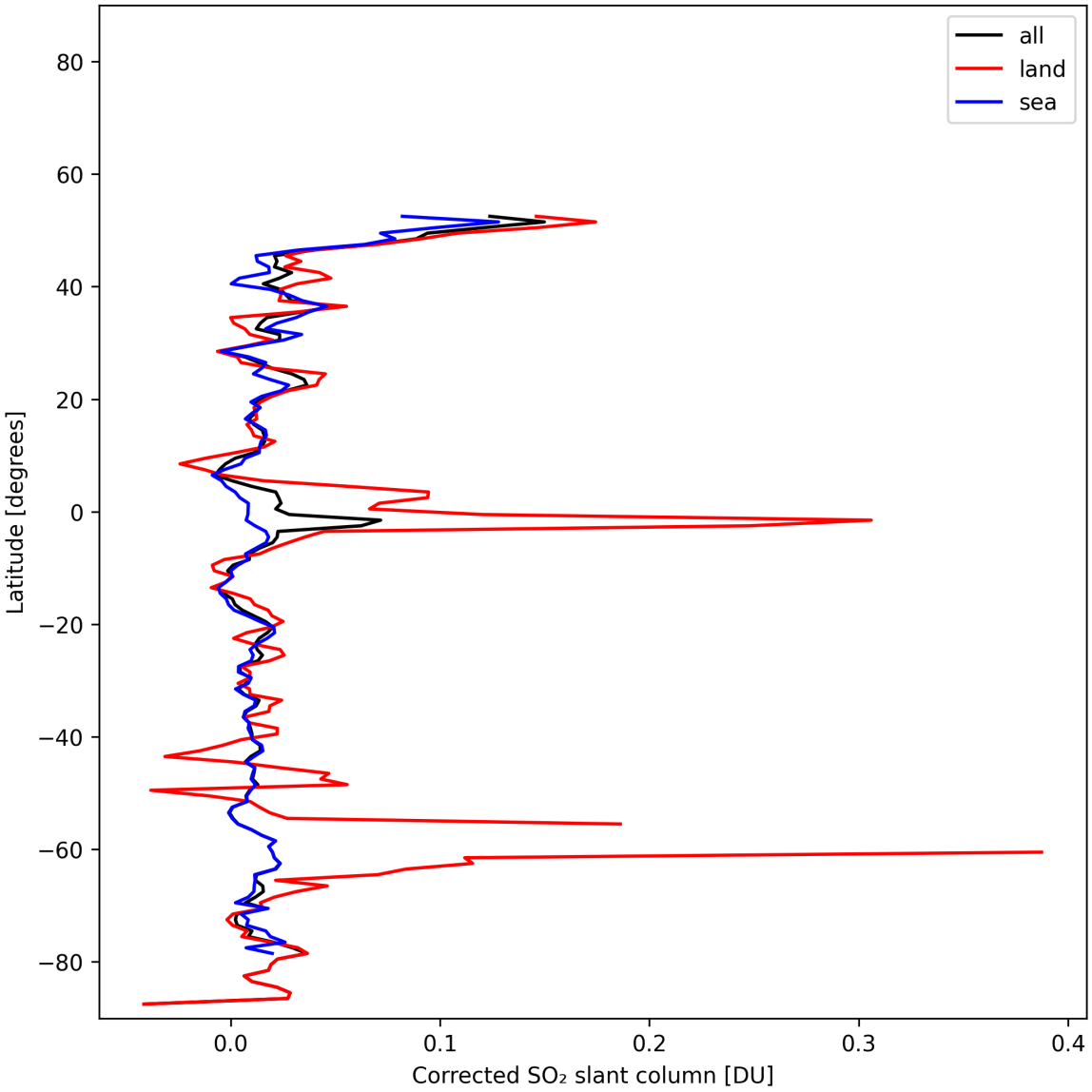

Figure 33: Zonal average of “Corrected SO_2 slant column” for 2025-01-30 to 2025-01-31.

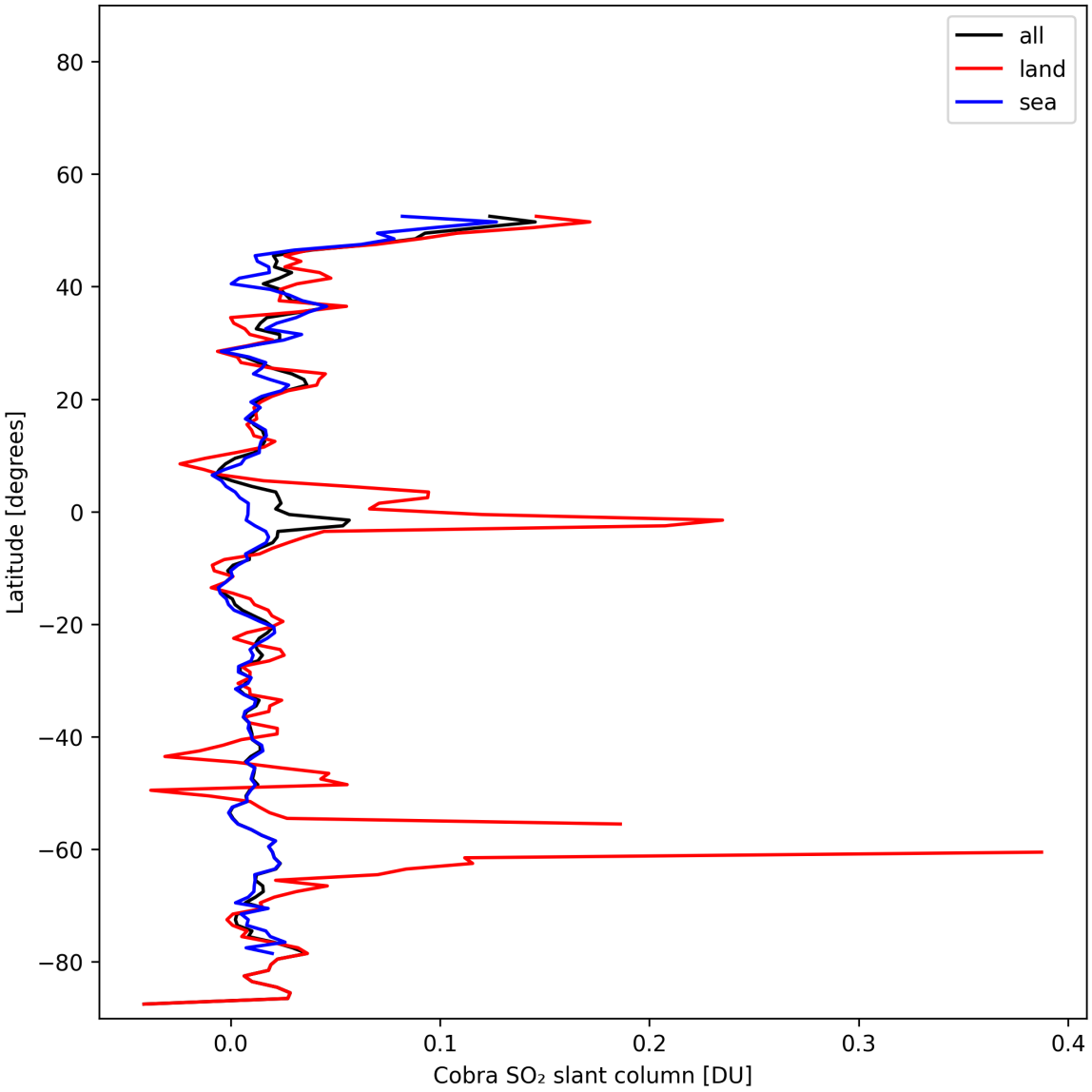

Figure 34: Zonal average of "Cobra SO_2 slant column" for 2025-01-30 to 2025-01-31.

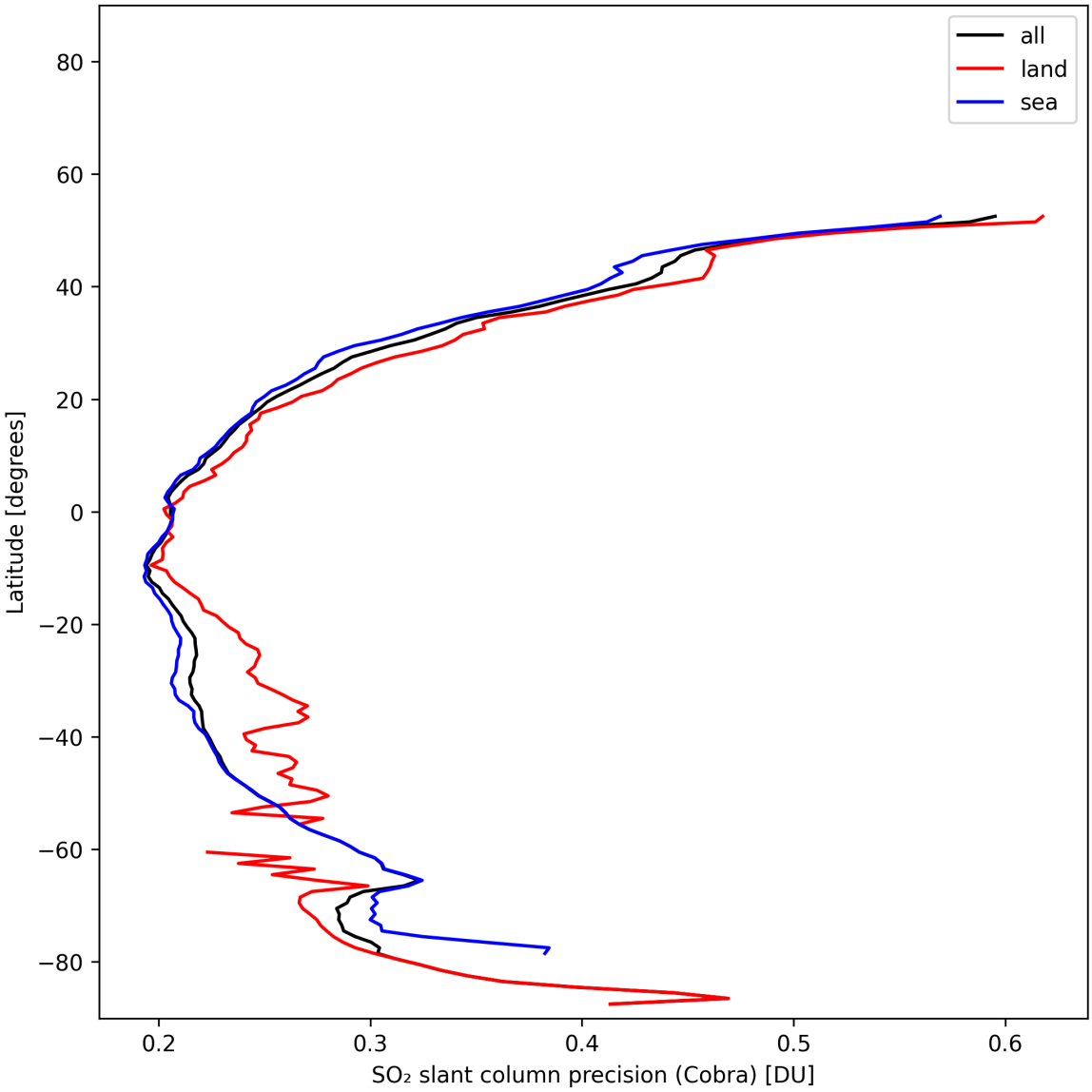

Figure 35: Zonal average of "SO_2 slant column precision (Cobra)" for 2025-01-30 to 2025-01-31.

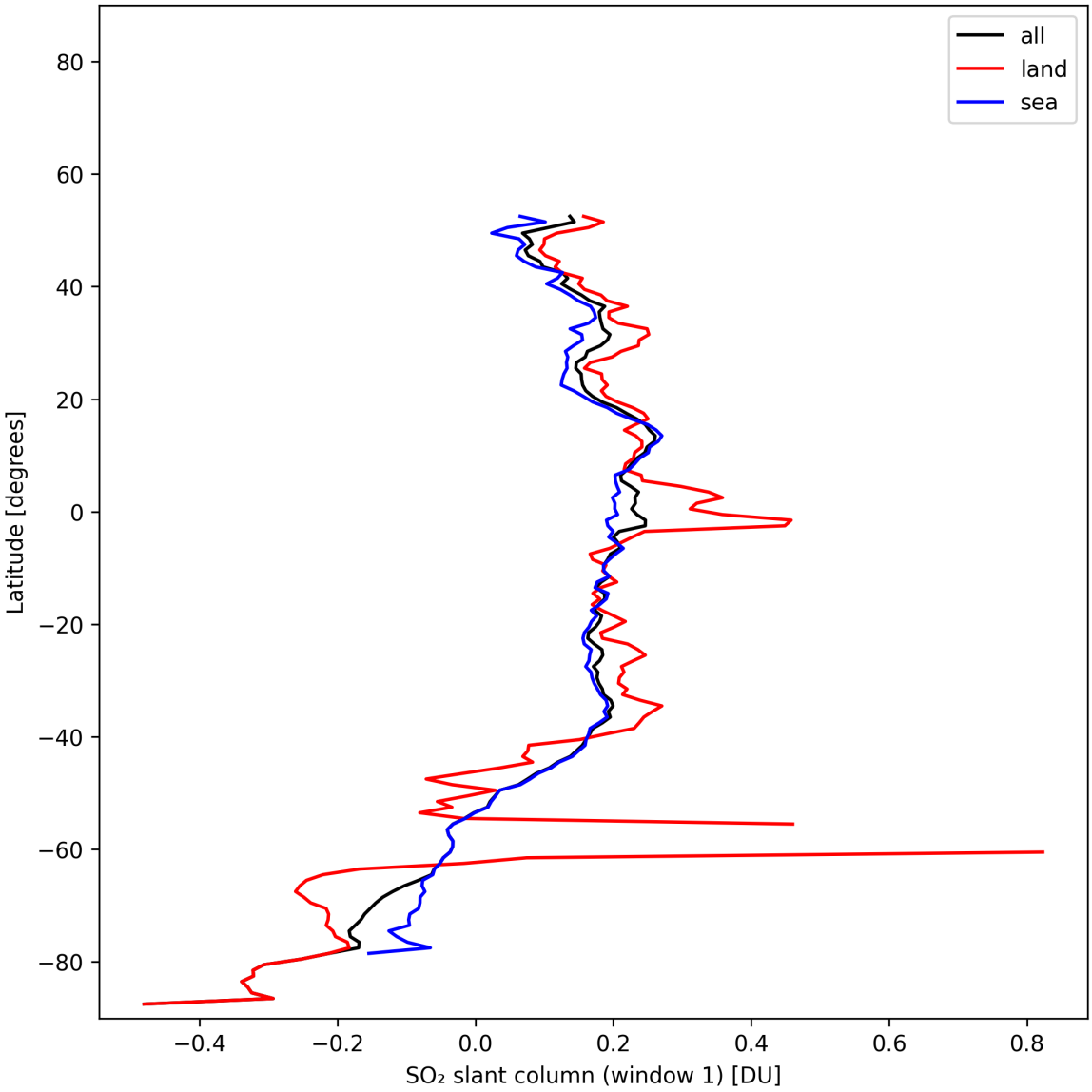

Figure 36: Zonal average of "SO_2 slant column (window 1)" for 2025-01-30 to 2025-01-31.

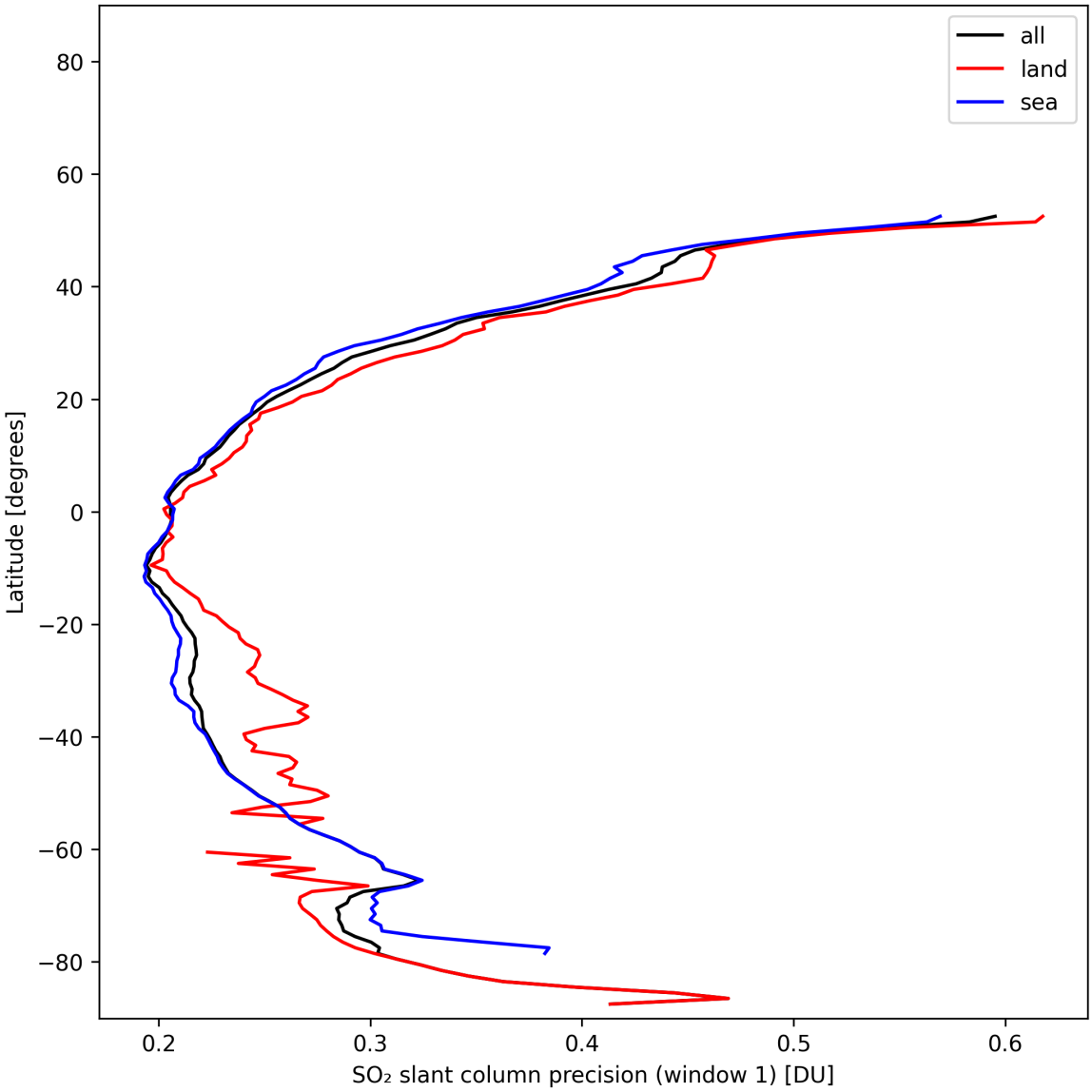

Figure 37: Zonal average of "SO_2 slant column precision (window 1)" for 2025-01-30 to 2025-01-31.

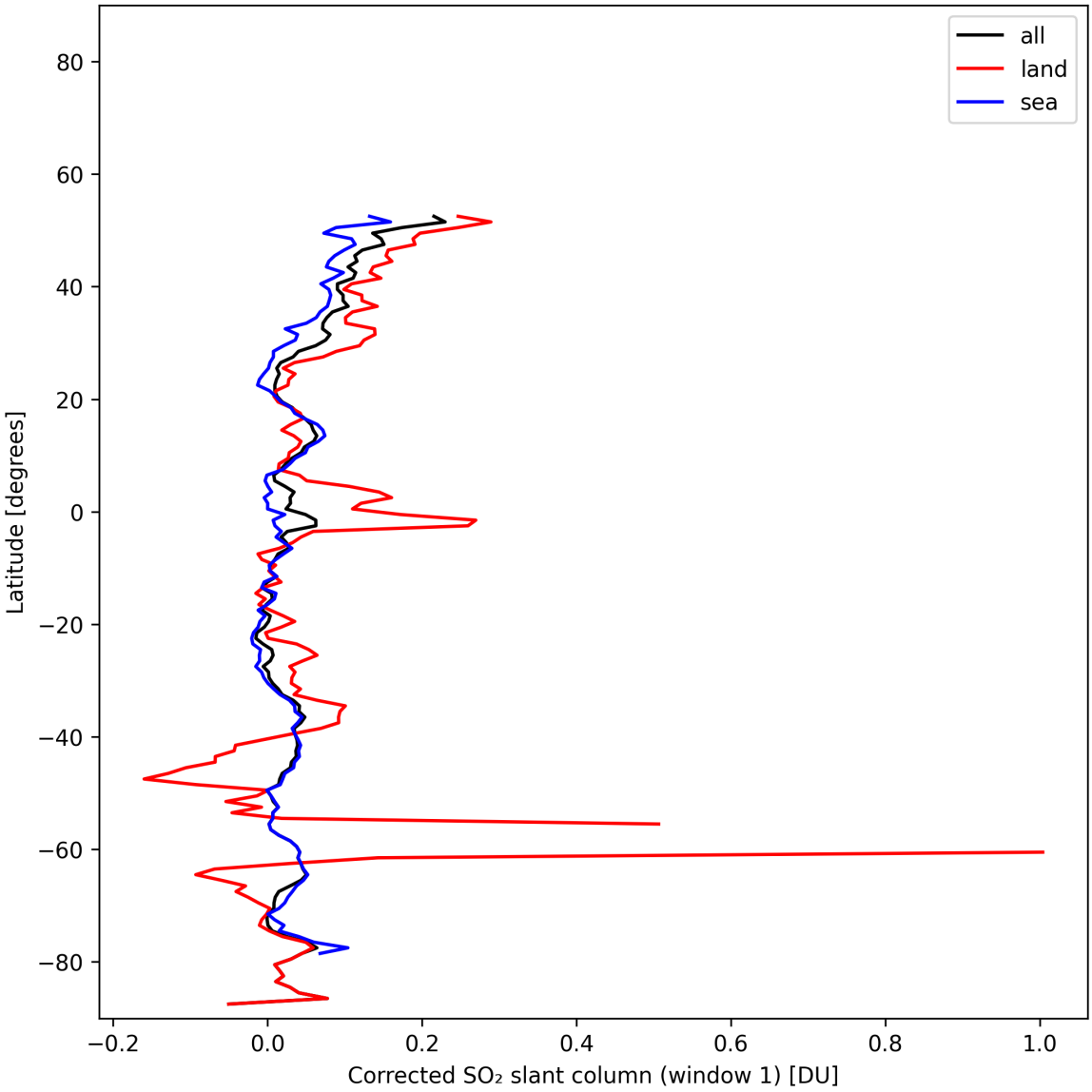

Figure 38: Zonal average of "Corrected SO_2 slant column (window 1)" for 2025-01-30 to 2025-01-31.

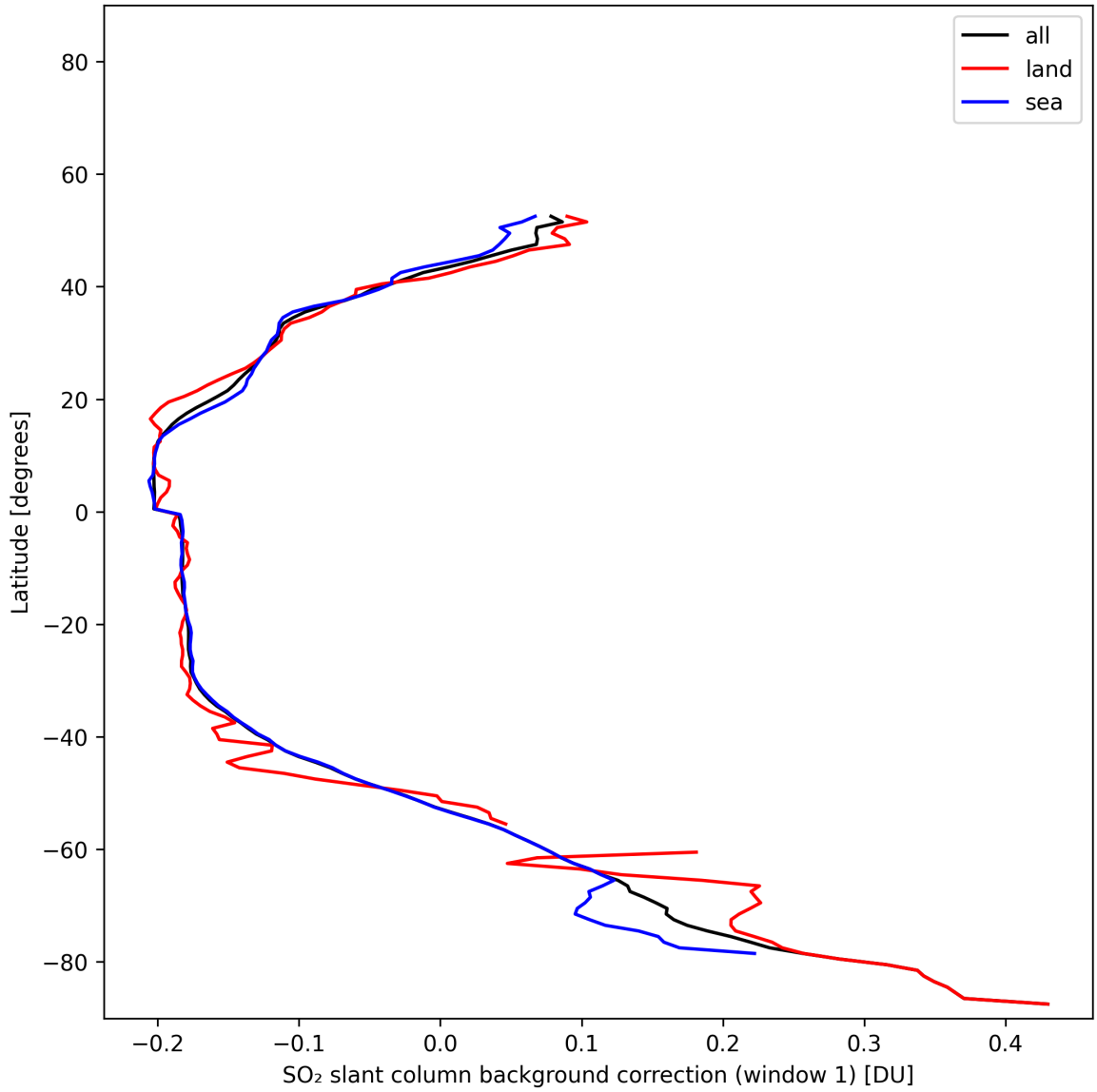

Figure 39: Zonal average of "SO_2 slant column background correction (window 1)" for 2025-01-30 to 2025-01-31.

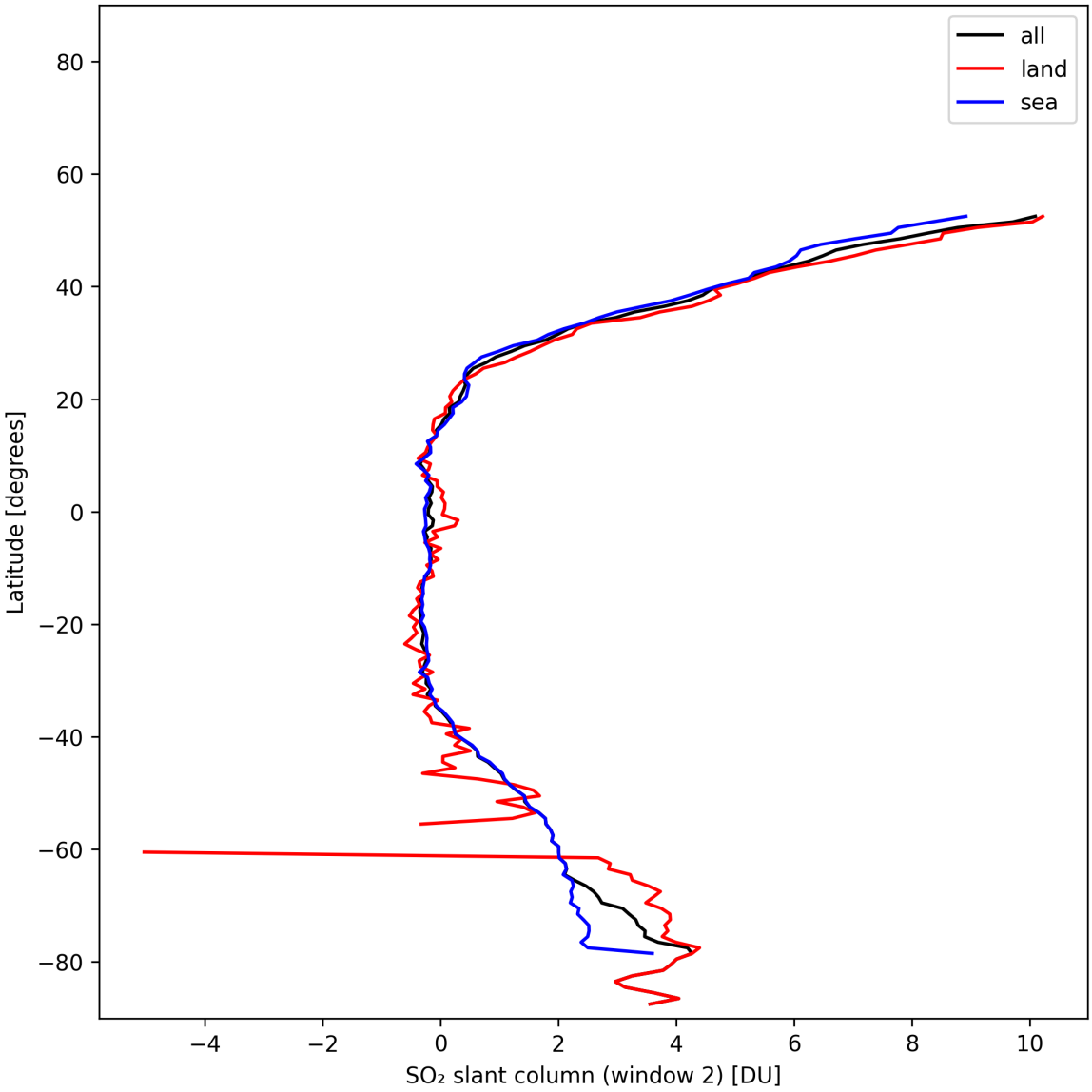

Figure 40: Zonal average of "SO_2 slant column (window 2)" for 2025-01-30 to 2025-01-31.

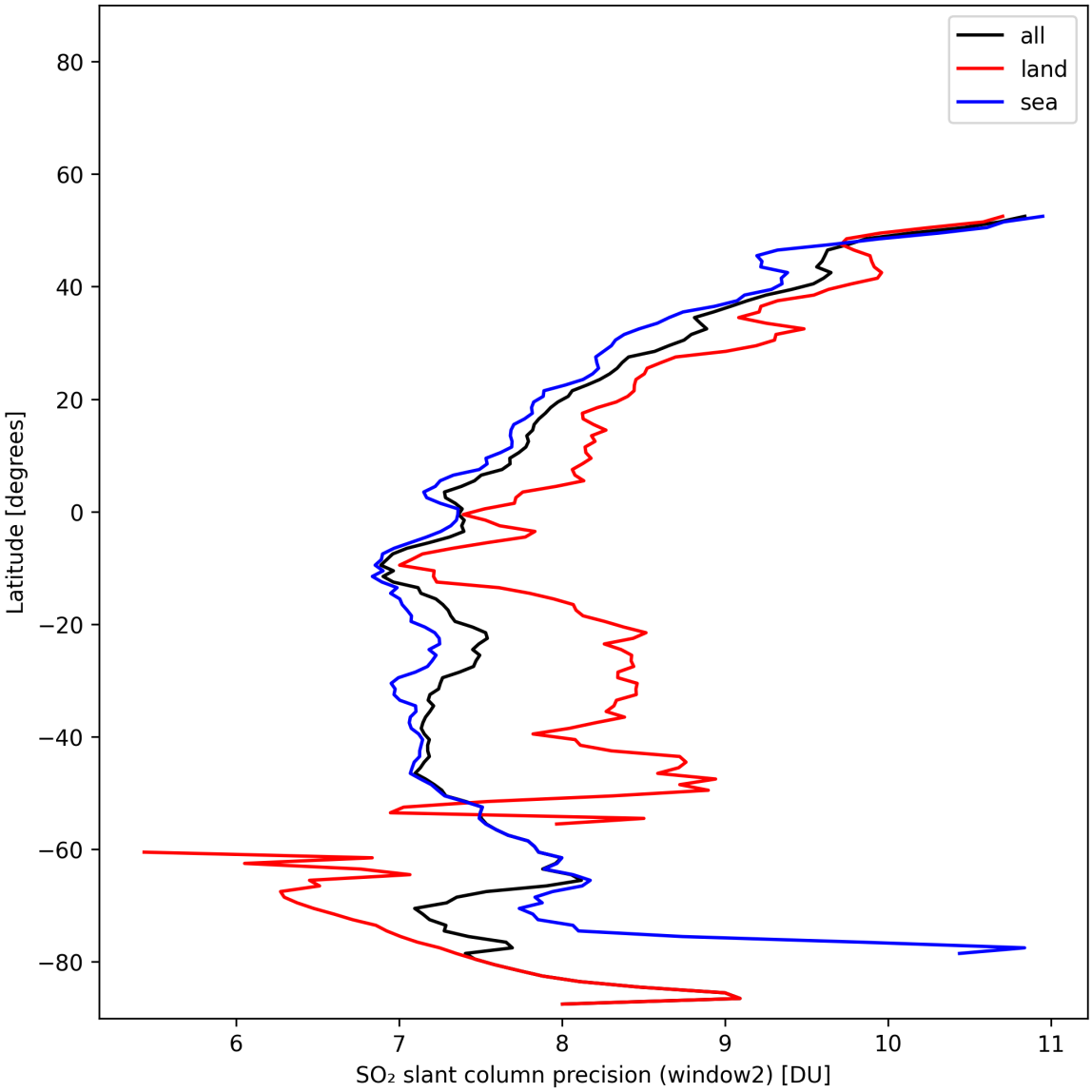

Figure 41: Zonal average of "SO_2 slant column precision (window2)" for 2025-01-30 to 2025-01-31.

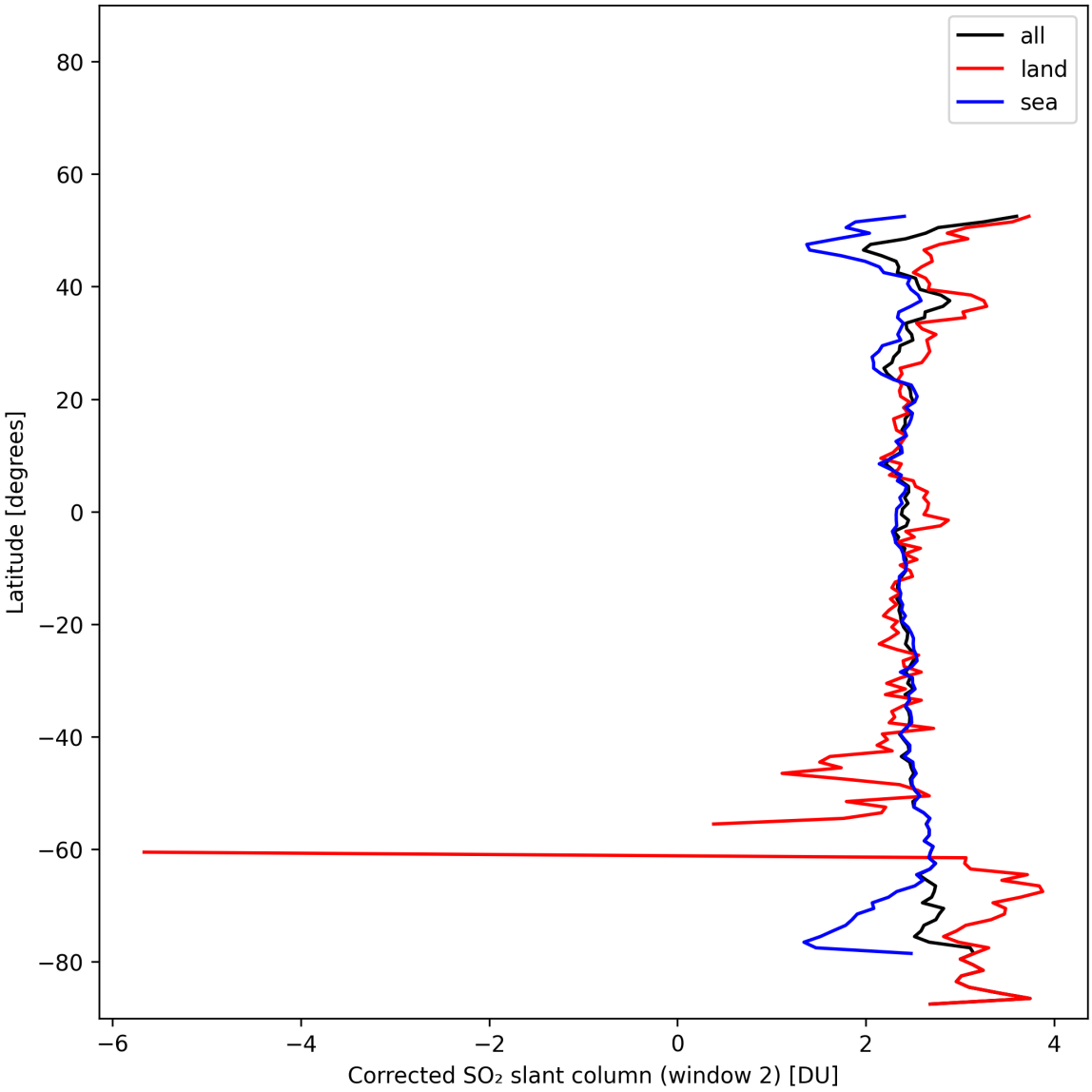

Figure 42: Zonal average of "Corrected SO_2 slant column (window 2)" for 2025-01-30 to 2025-01-31.

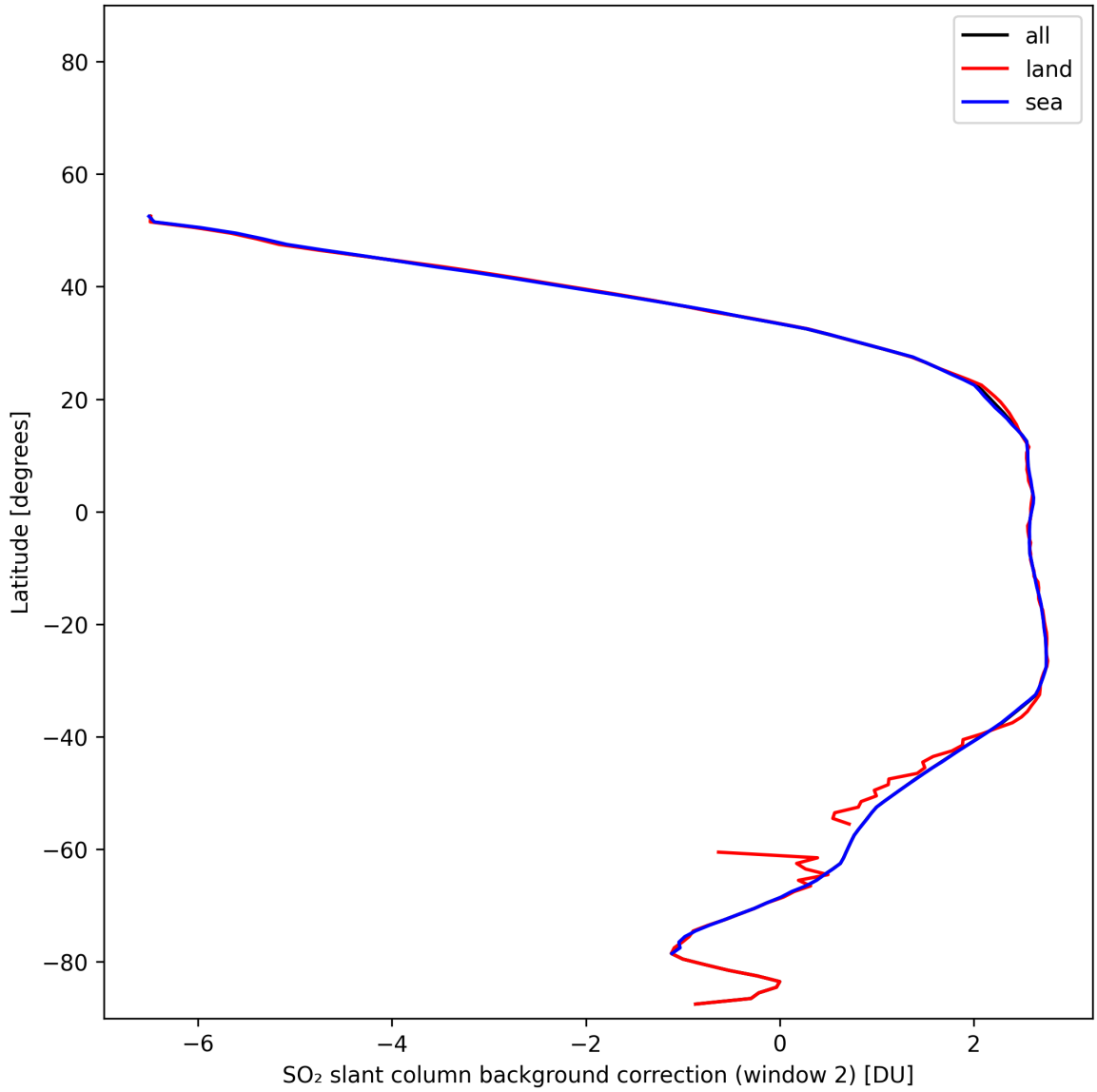

Figure 43: Zonal average of "SO_2 slant column background correction (window 2)" for 2025-01-30 to 2025-01-31.

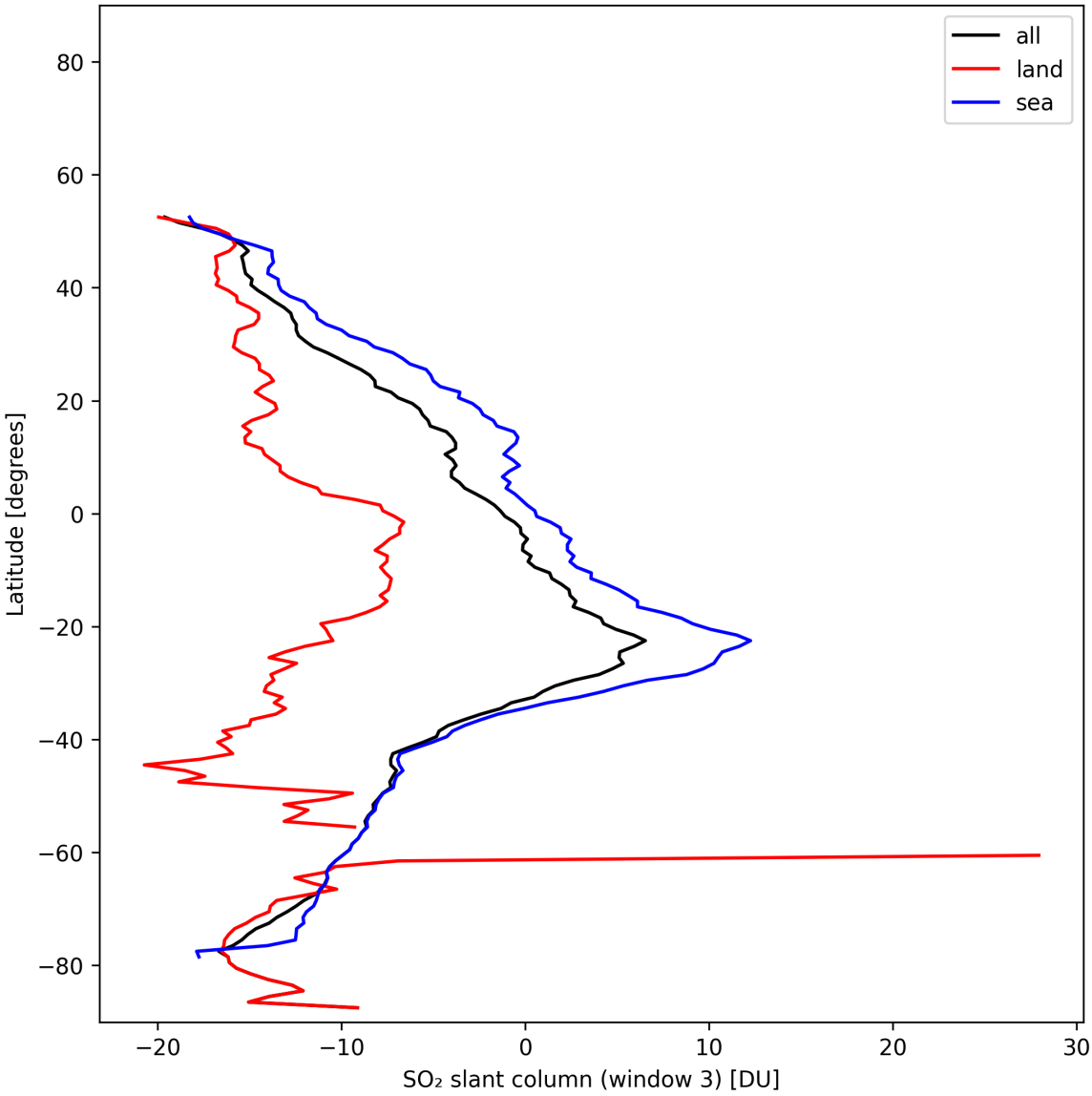

Figure 44: Zonal average of "SO_2 slant column (window 3)" for 2025-01-30 to 2025-01-31.

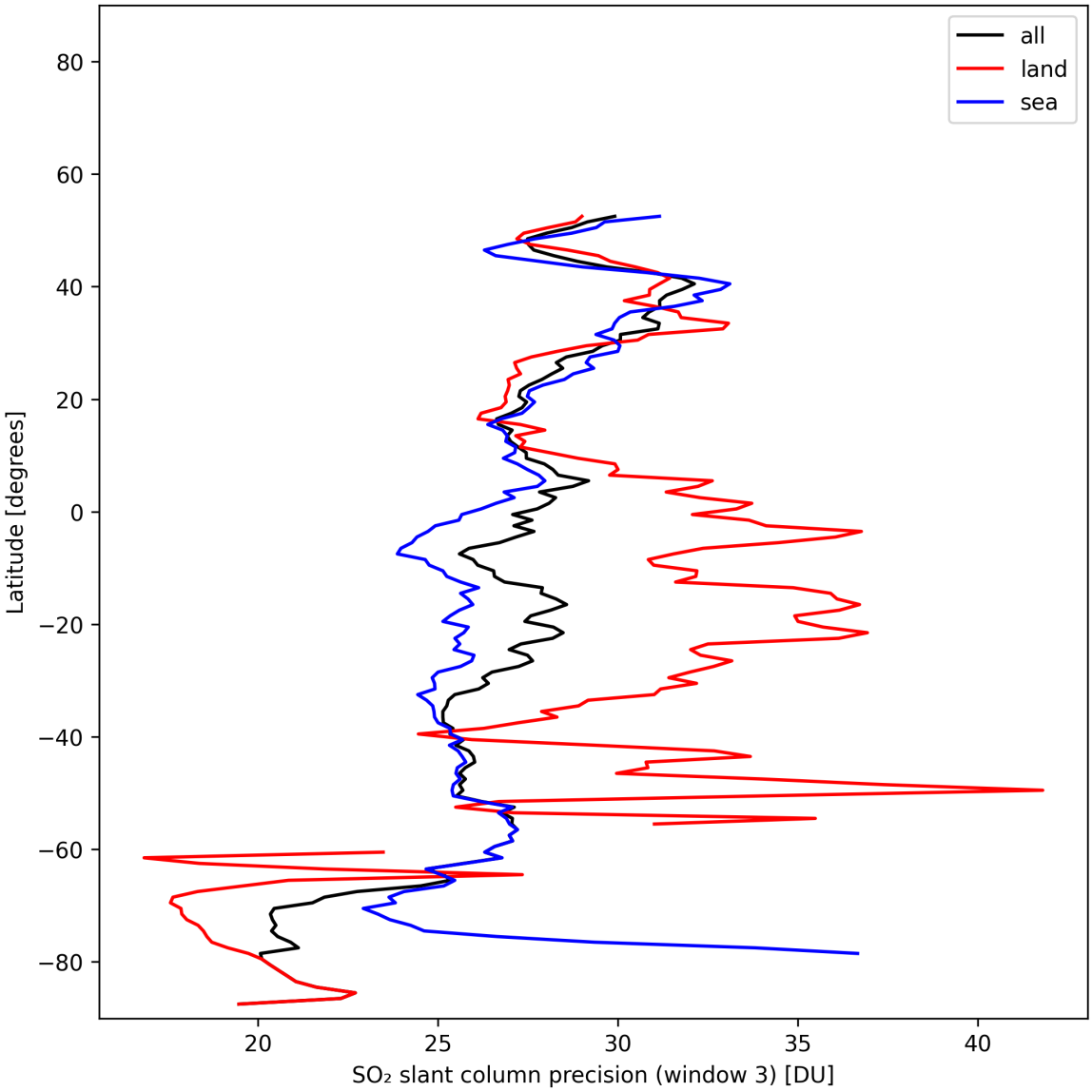

Figure 45: Zonal average of "SO_2 slant column precision (window 3)" for 2025-01-30 to 2025-01-31.

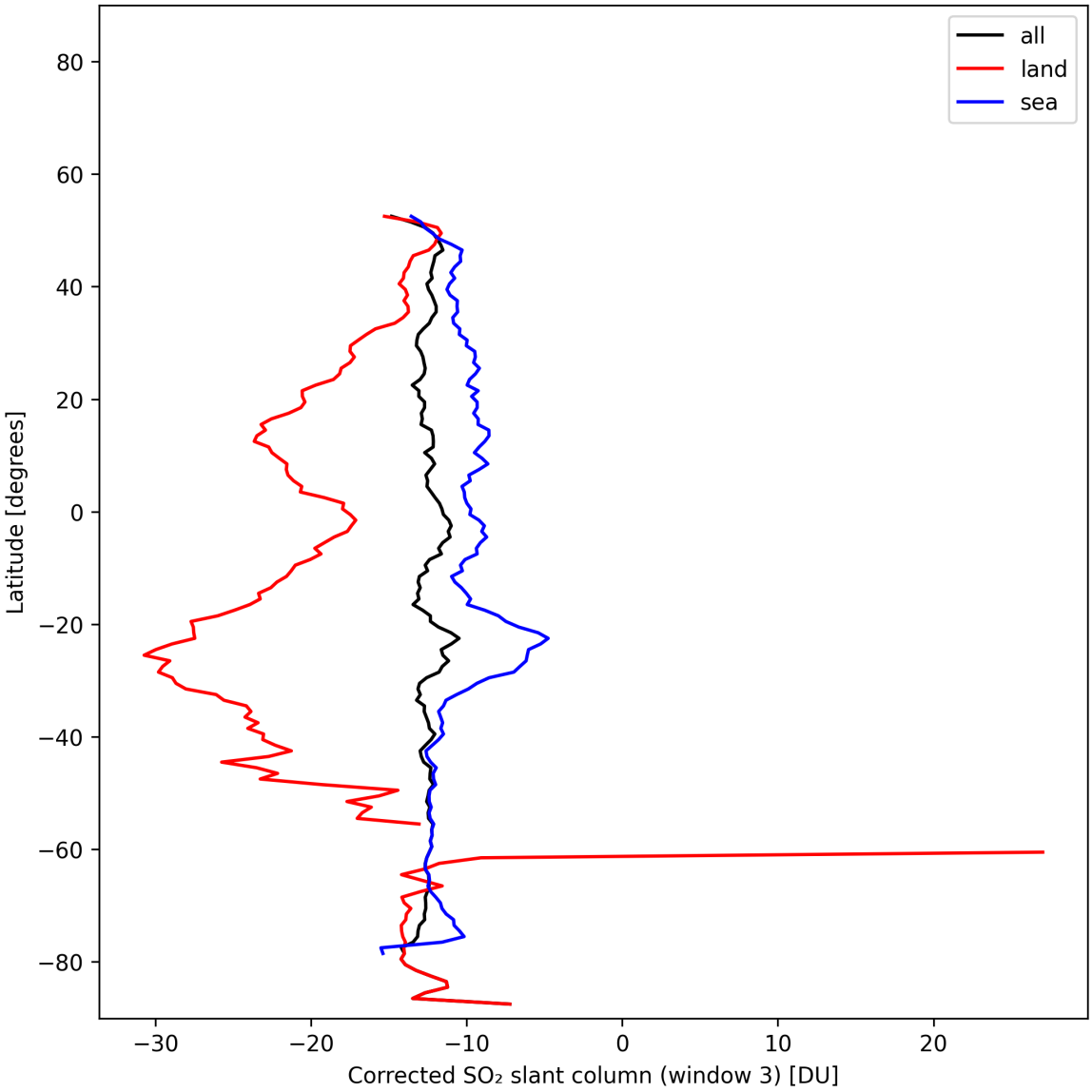

Figure 46: Zonal average of "Corrected SO_2 slant column (window 3)" for 2025-01-30 to 2025-01-31.

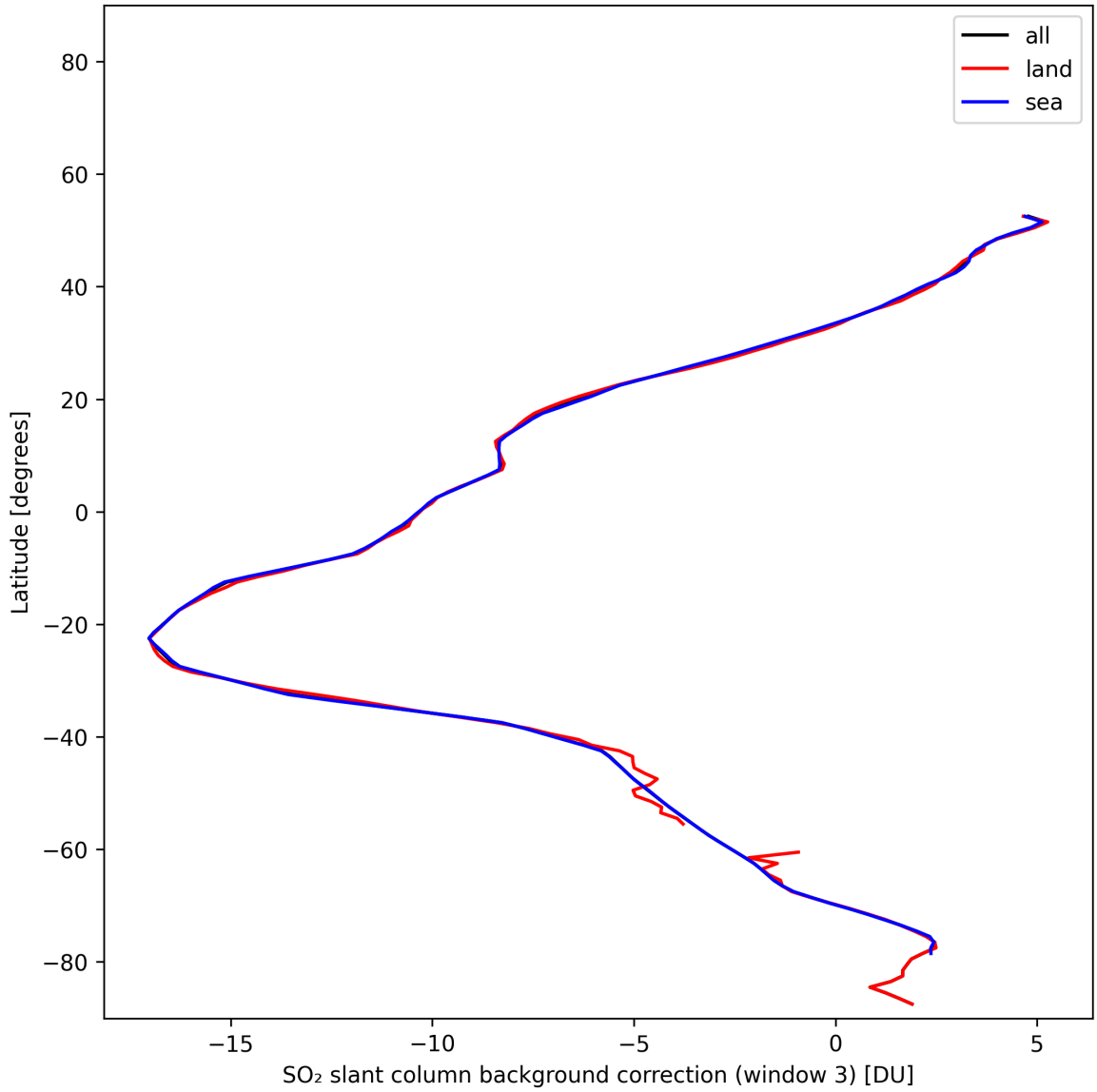

Figure 47: Zonal average of "SO_2 slant column background correction (window 3)" for 2025-01-30 to 2025-01-31.

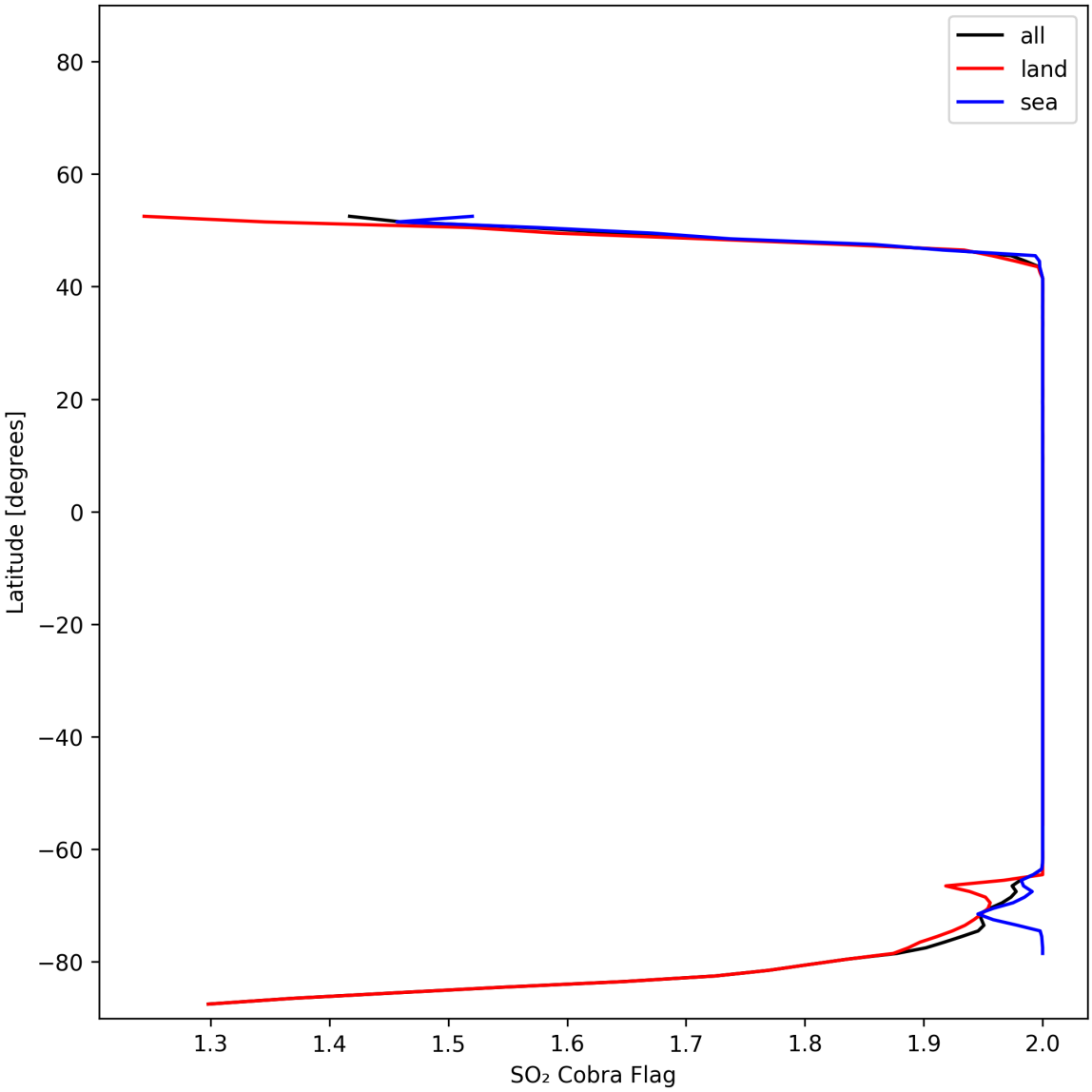

Figure 48: Zonal average of "SO_2 Cobra Flag" for 2025-01-30 to 2025-01-31.

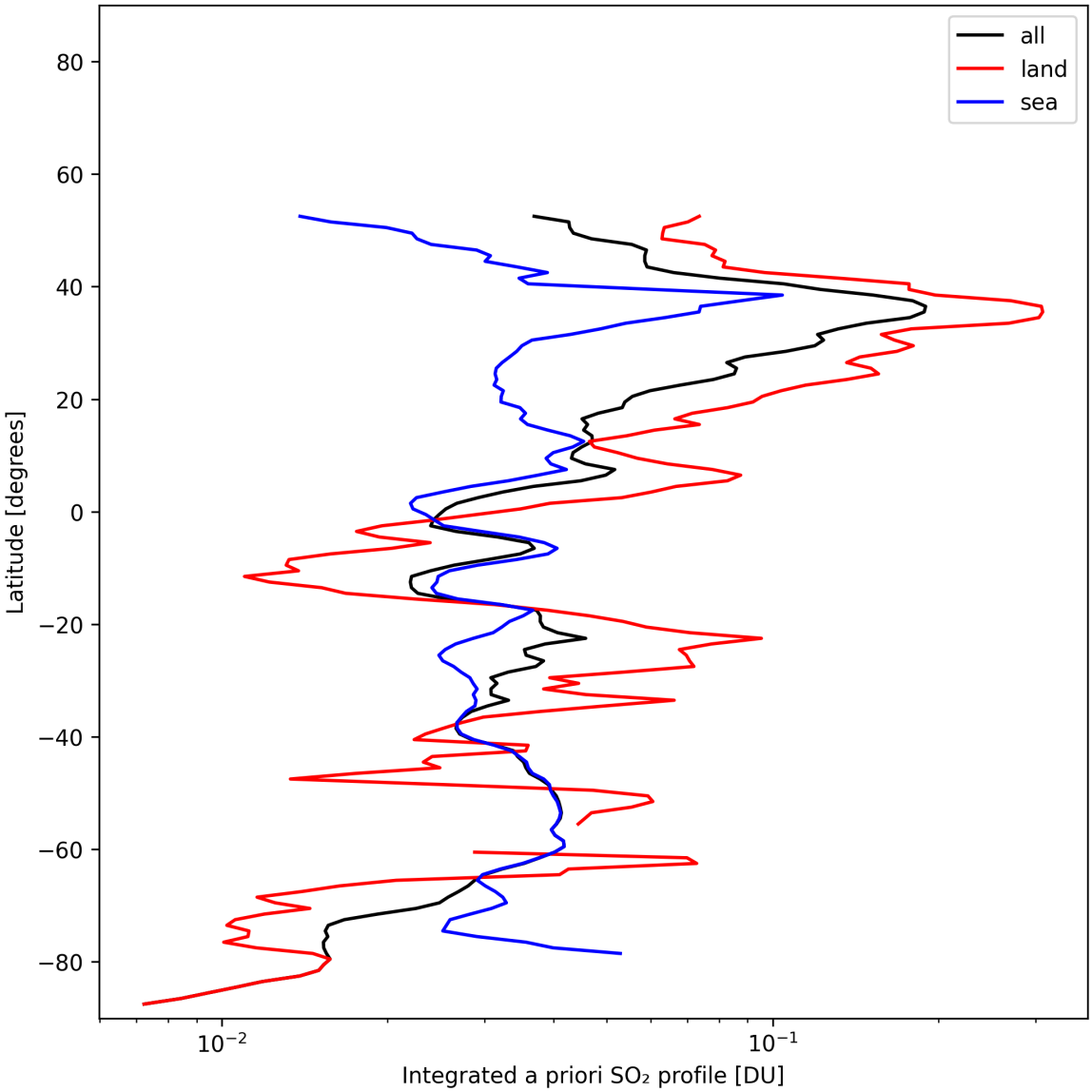

Figure 49: Zonal average of “Integrated a priori SO_2 profile” for 2025-01-30 to 2025-01-31.

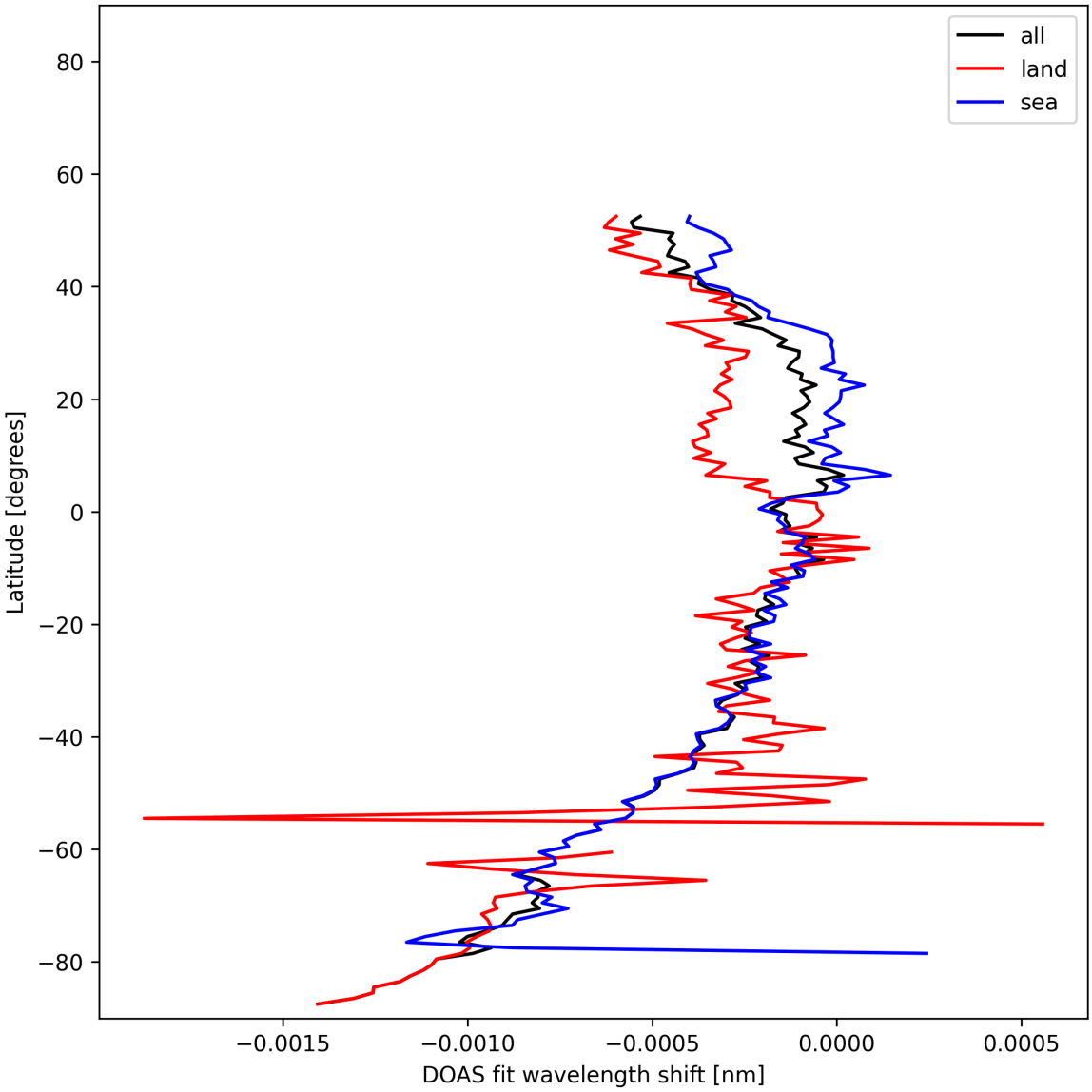

Figure 50: Zonal average of “DOAS fit wavelength shift” for 2025-01-30 to 2025-01-31.

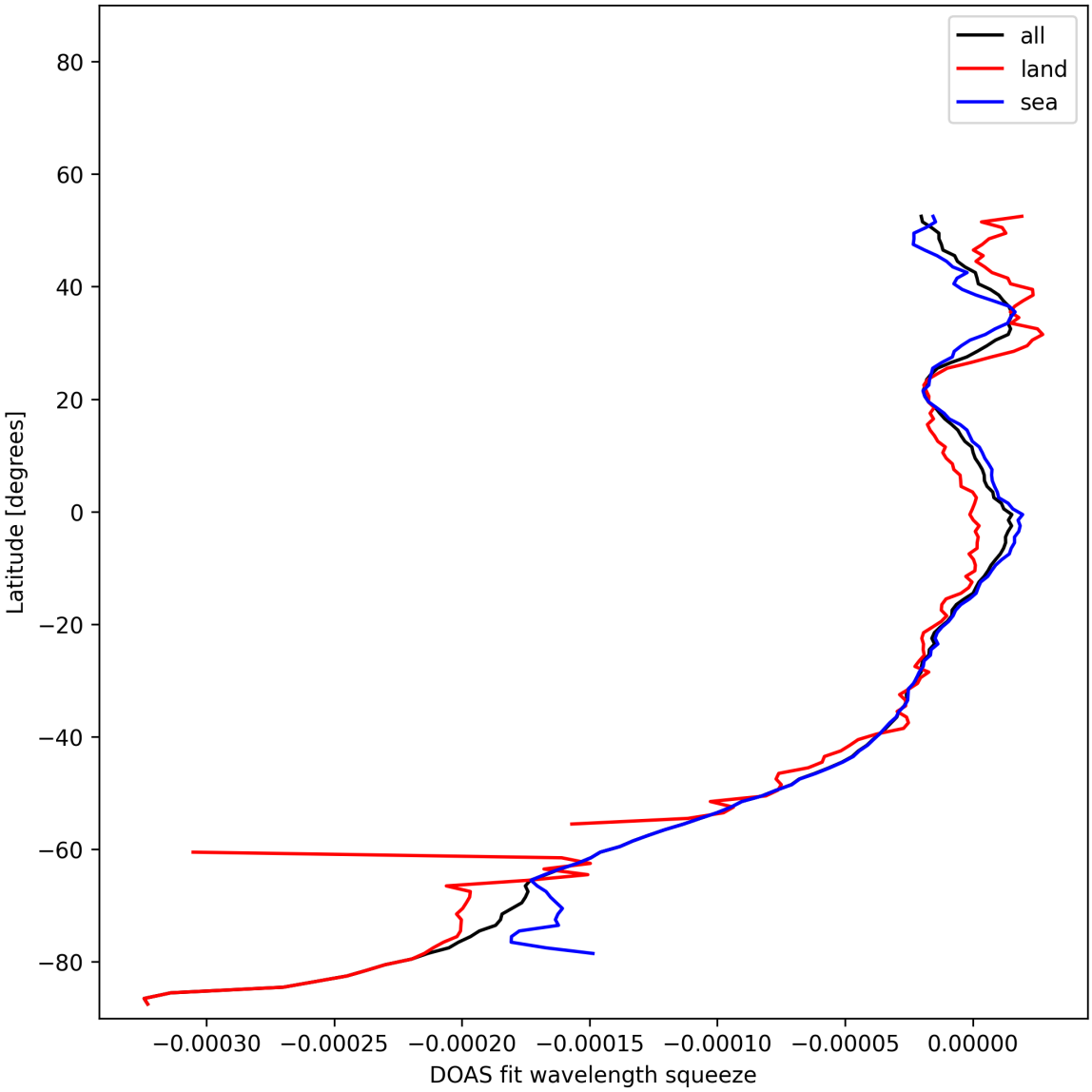

Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-01-30 to 2025-01-31.

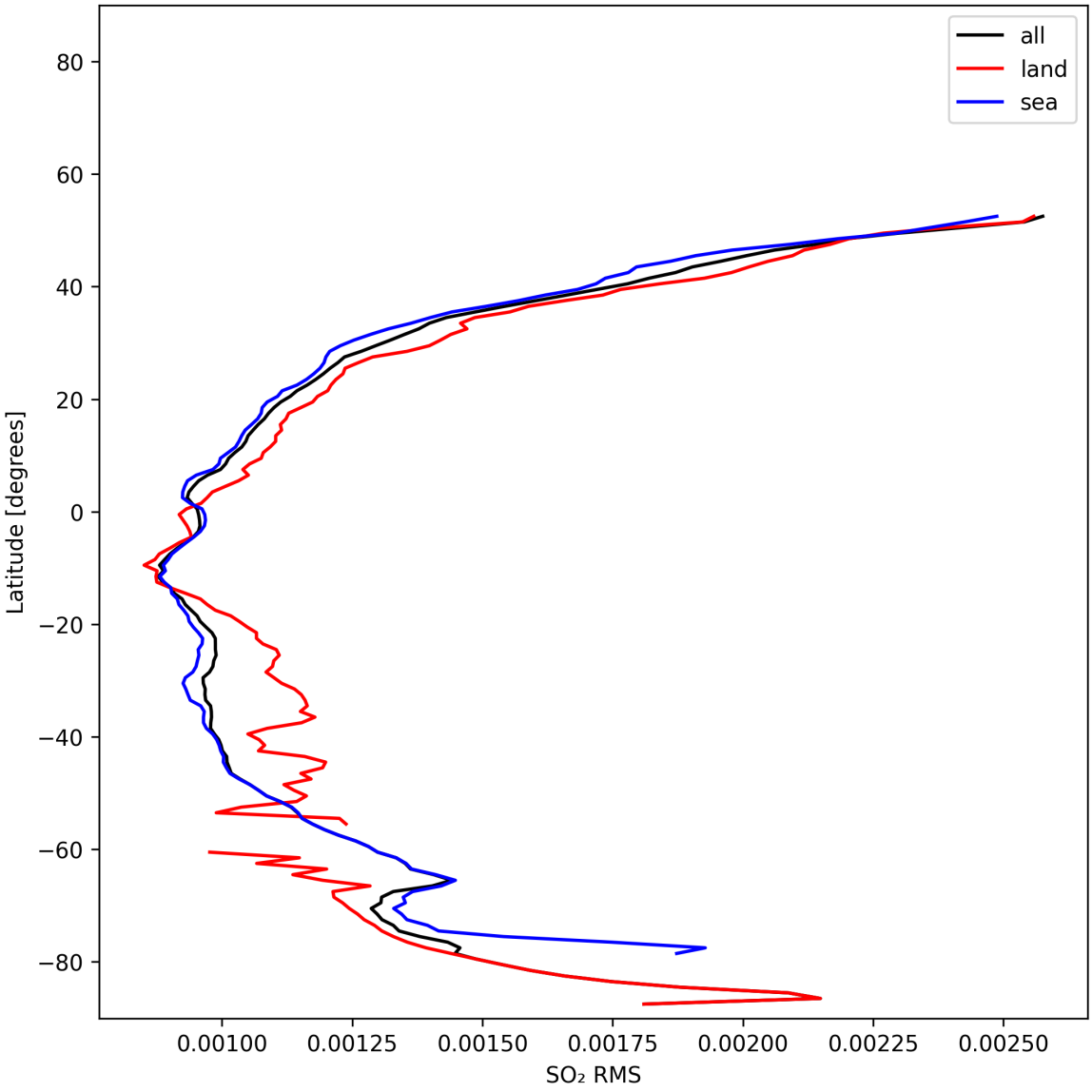

Figure 52: Zonal average of "SO_2 RMS" for 2025-01-30 to 2025-01-31.

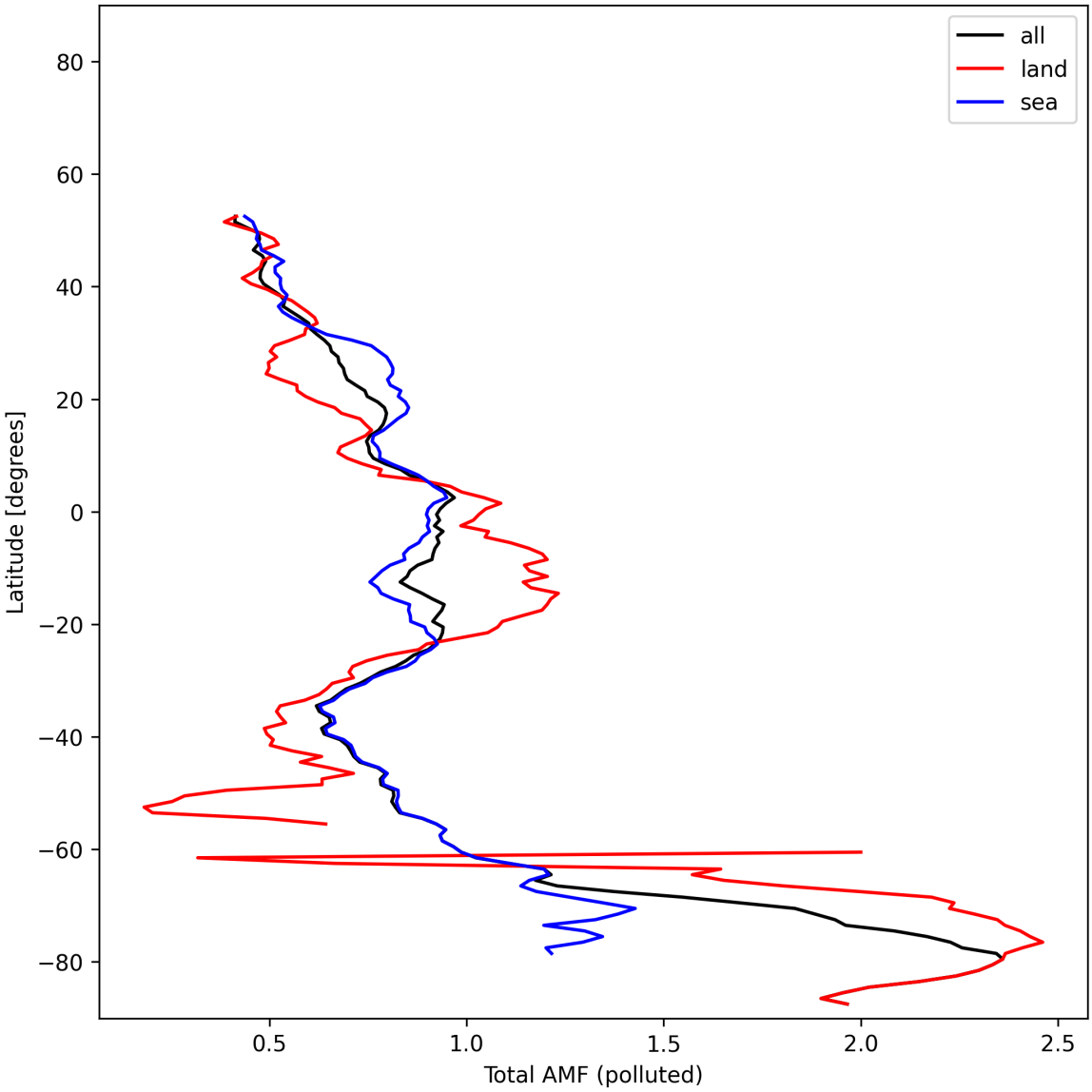

Figure 53: Zonal average of “Total AMF (polluted)” for 2025-01-30 to 2025-01-31.

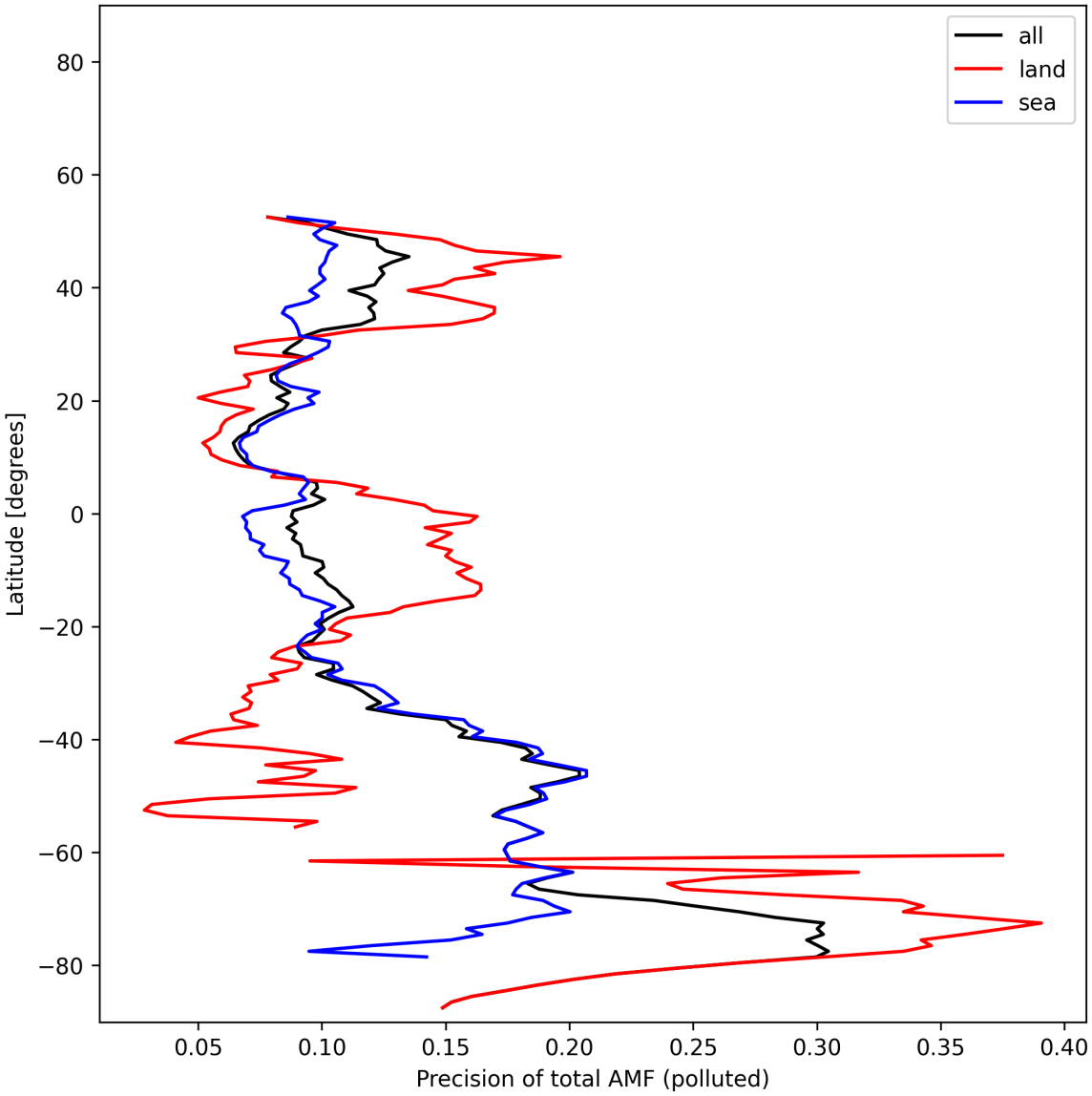

Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-01-30 to 2025-01-31.

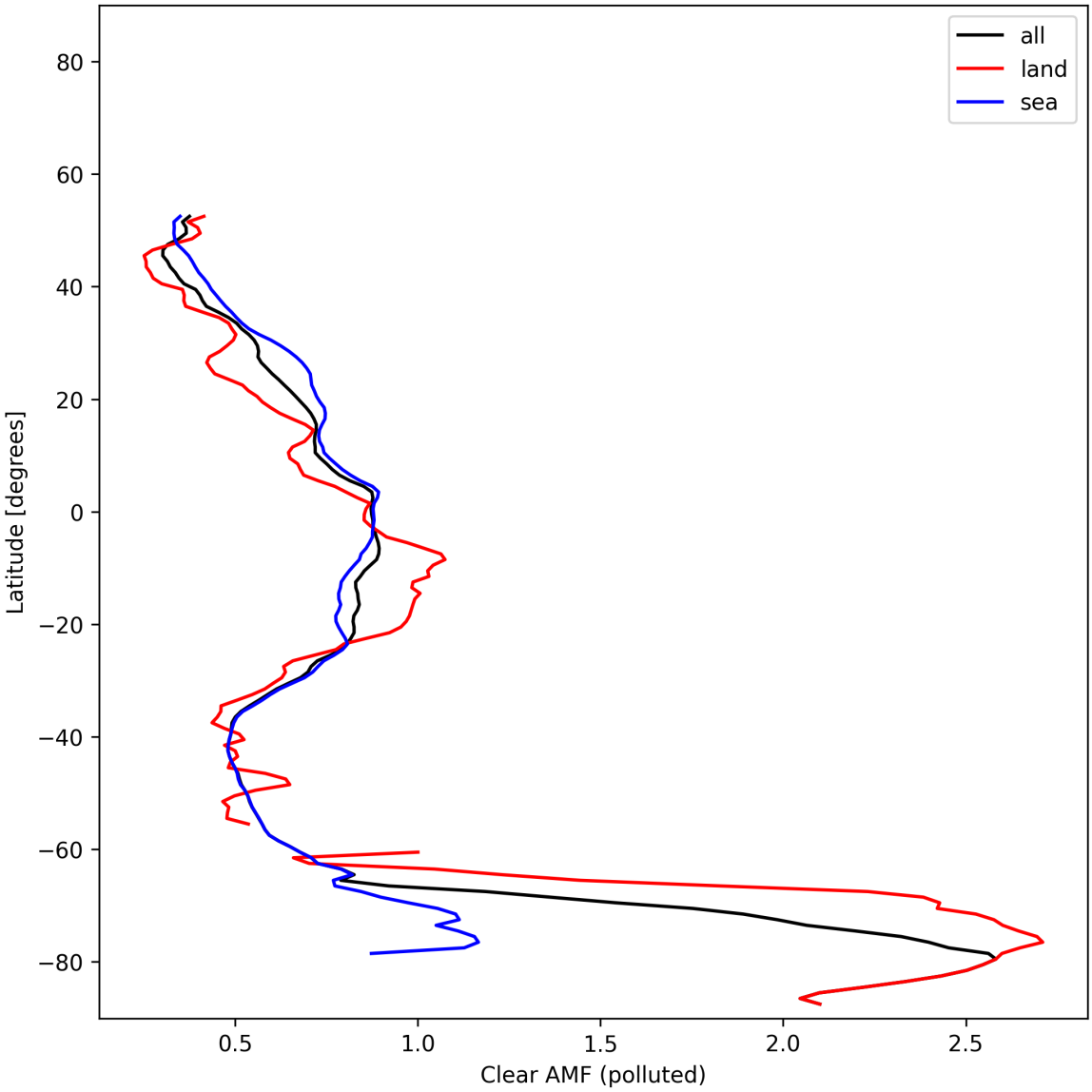

Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-01-30 to 2025-01-31.

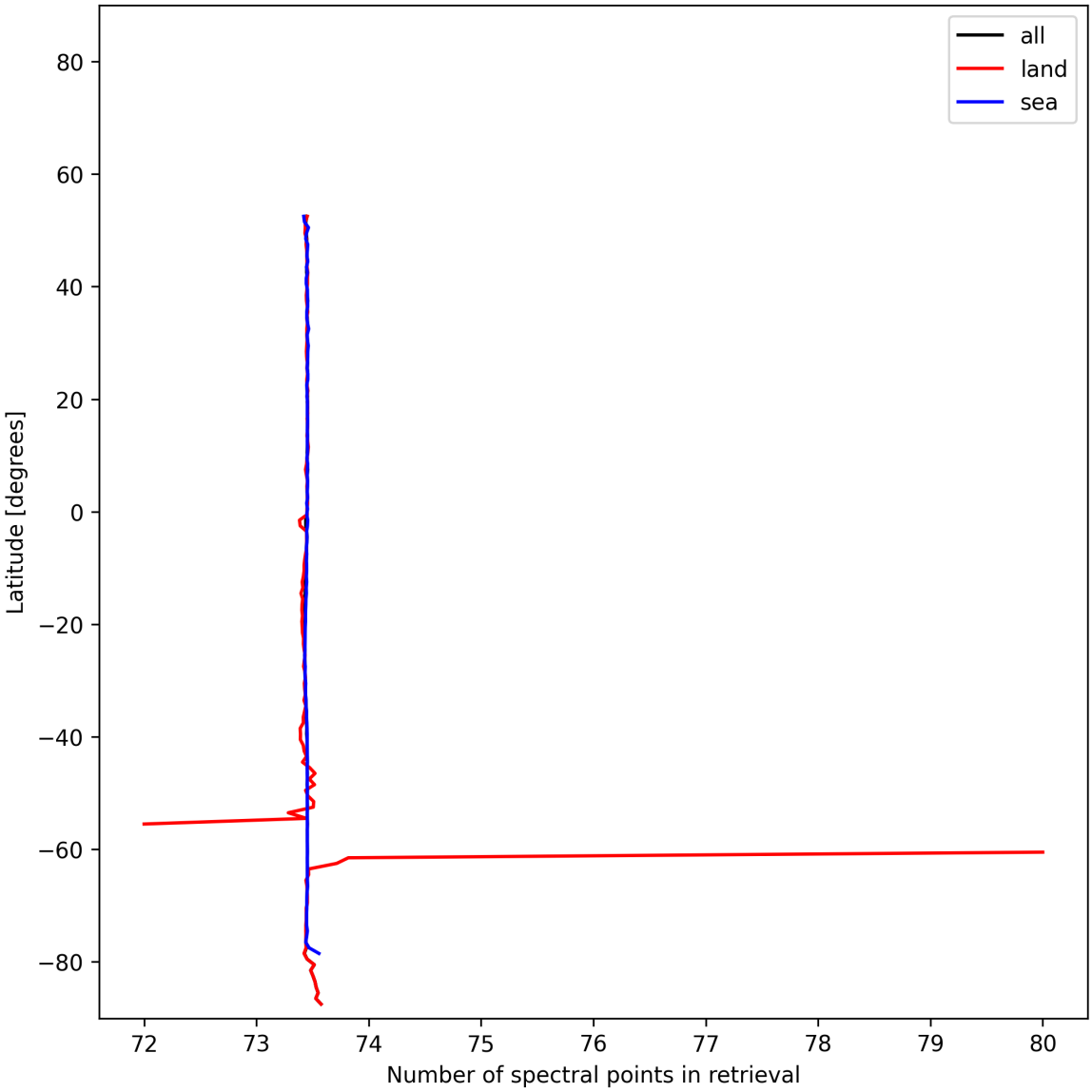

Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-01-30 to 2025-01-31.

8 Histograms

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

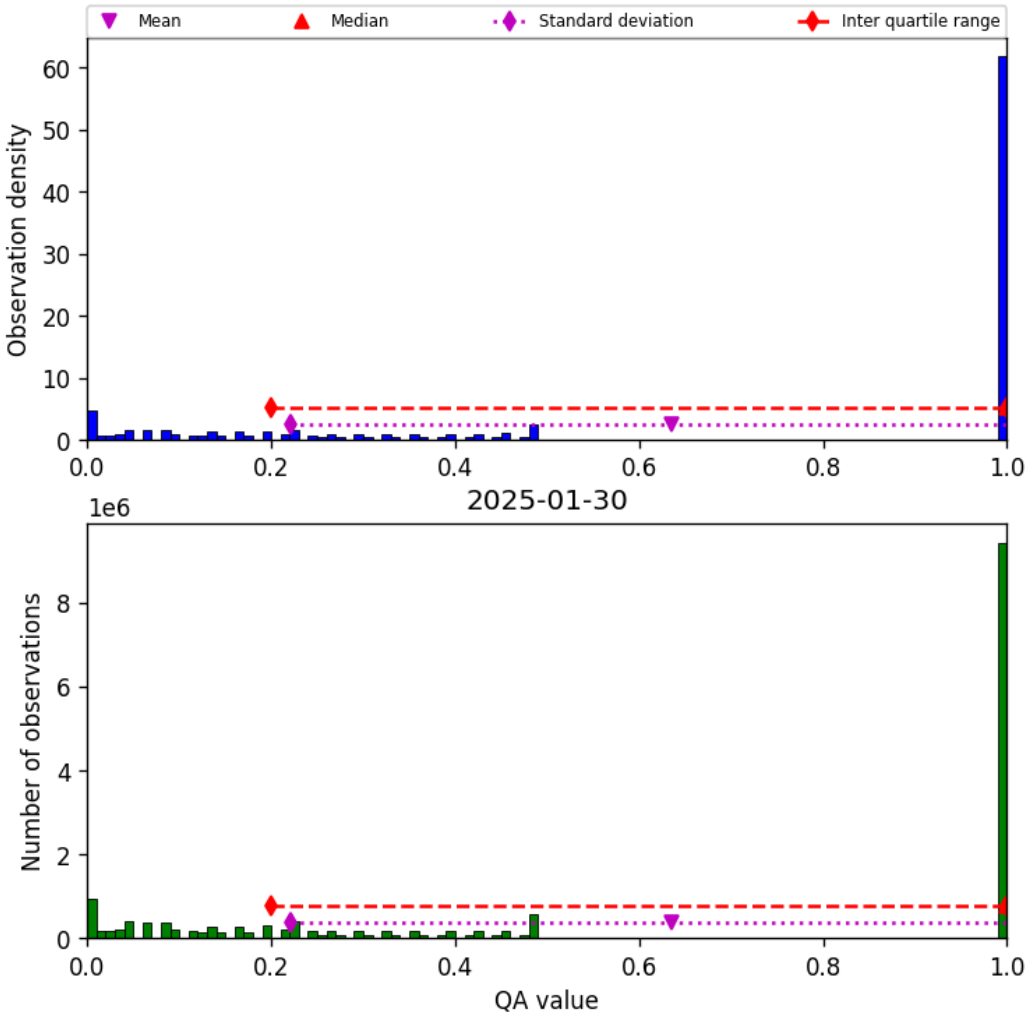

Figure 57: Histogram of “QA value” for 2025-01-30 to 2025-01-31

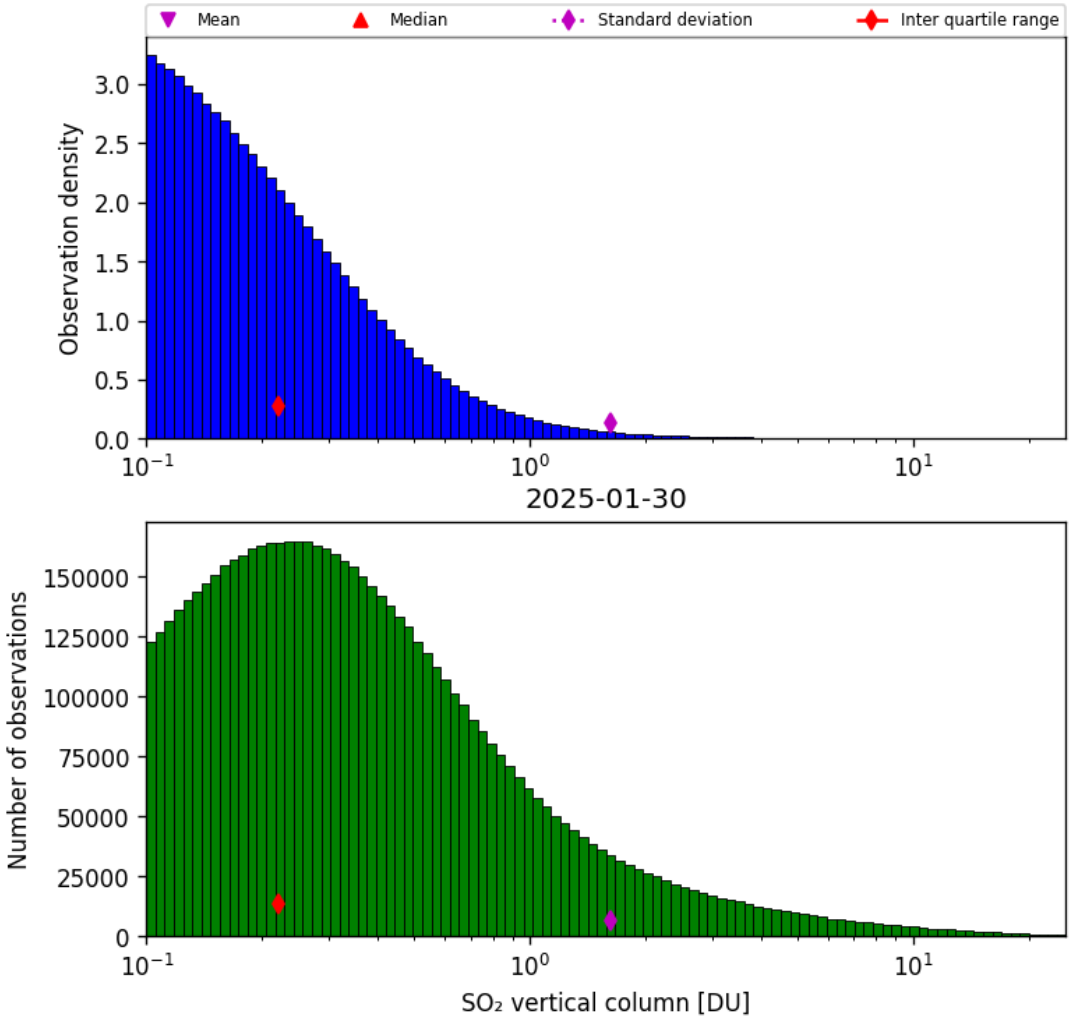

Figure 58: Histogram of "SO_2 vertical column" for 2025-01-30 to 2025-01-31

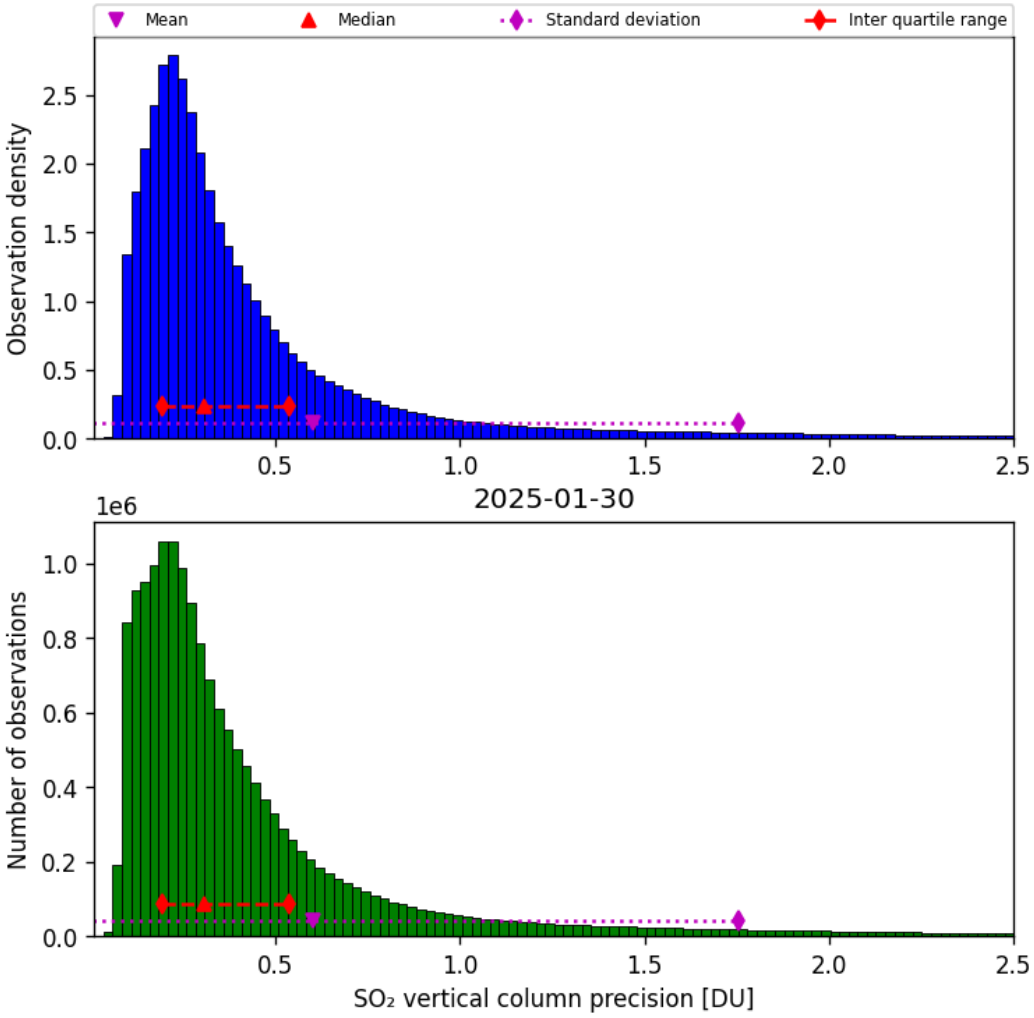

Figure 59: Histogram of "SO_2 vertical column precision" for 2025-01-30 to 2025-01-31

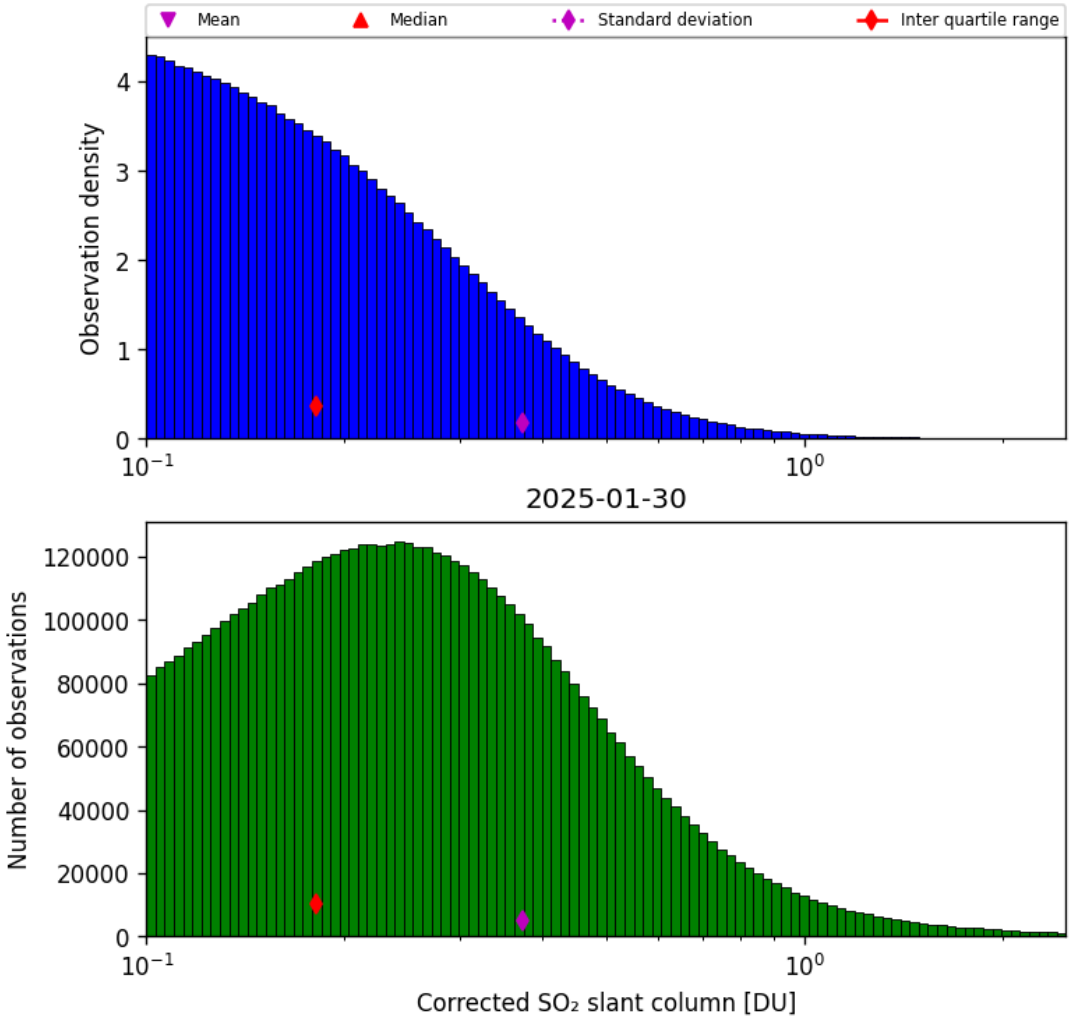

Figure 60: Histogram of "Corrected SO_2 slant column" for 2025-01-30 to 2025-01-31

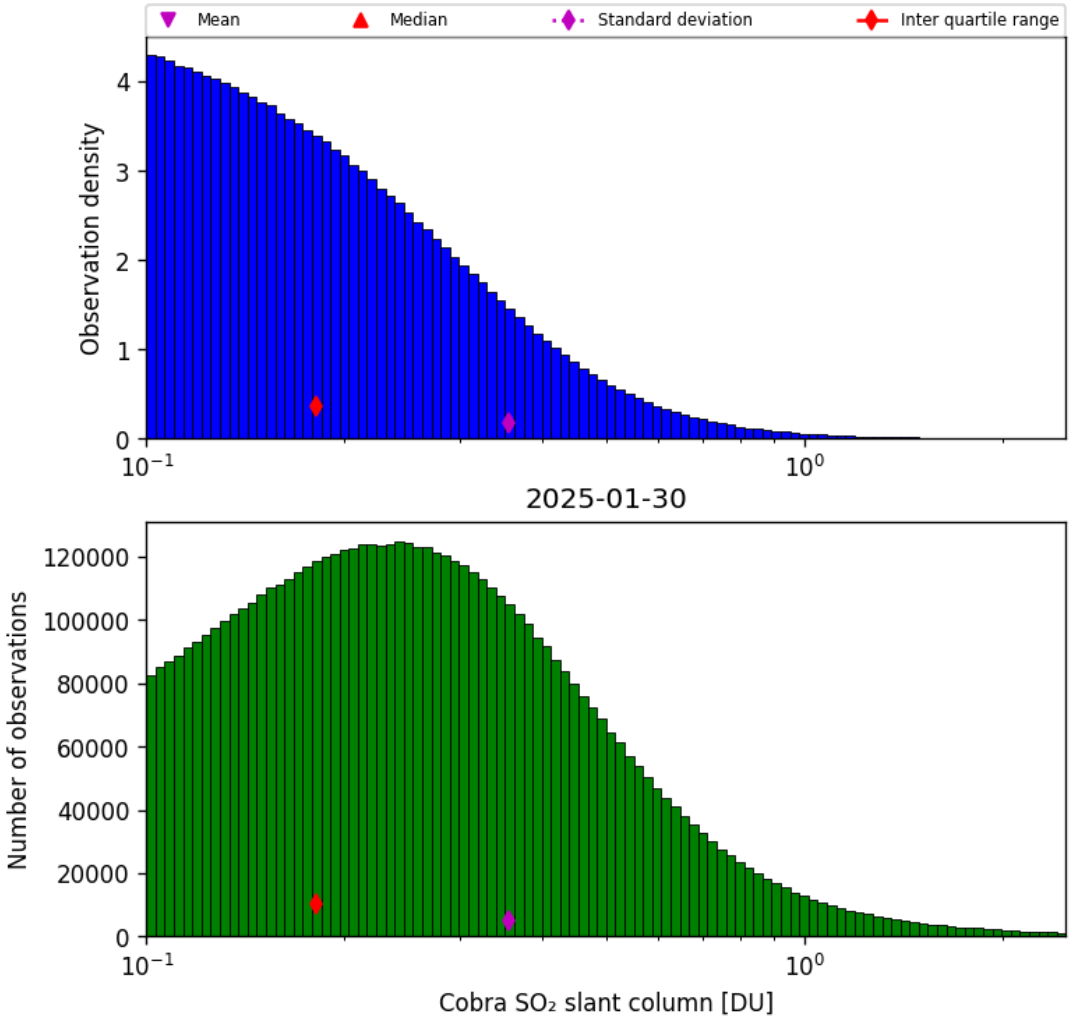

Figure 61: Histogram of "Cobra SO_2 slant column" for 2025-01-30 to 2025-01-31

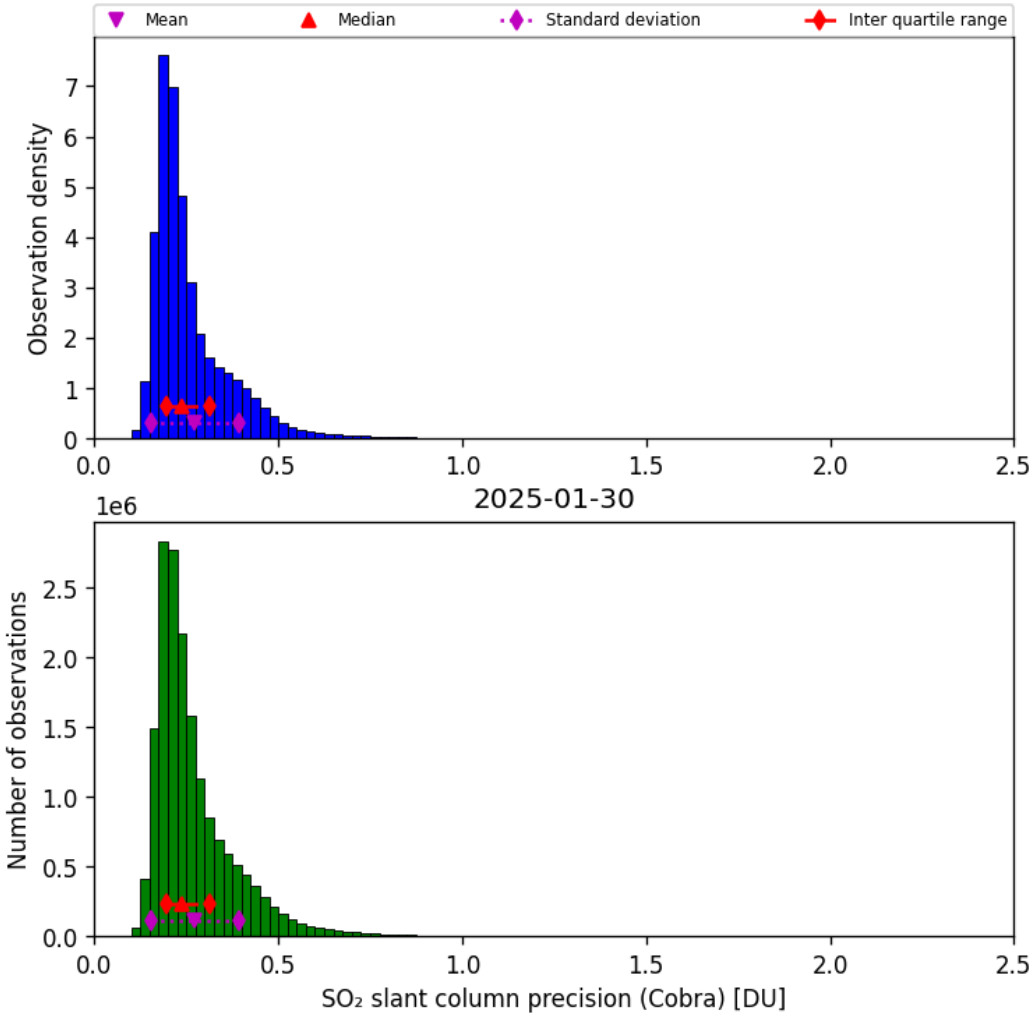

Figure 62: Histogram of "SO_2 slant column precision (Cobra)" for 2025-01-30 to 2025-01-31

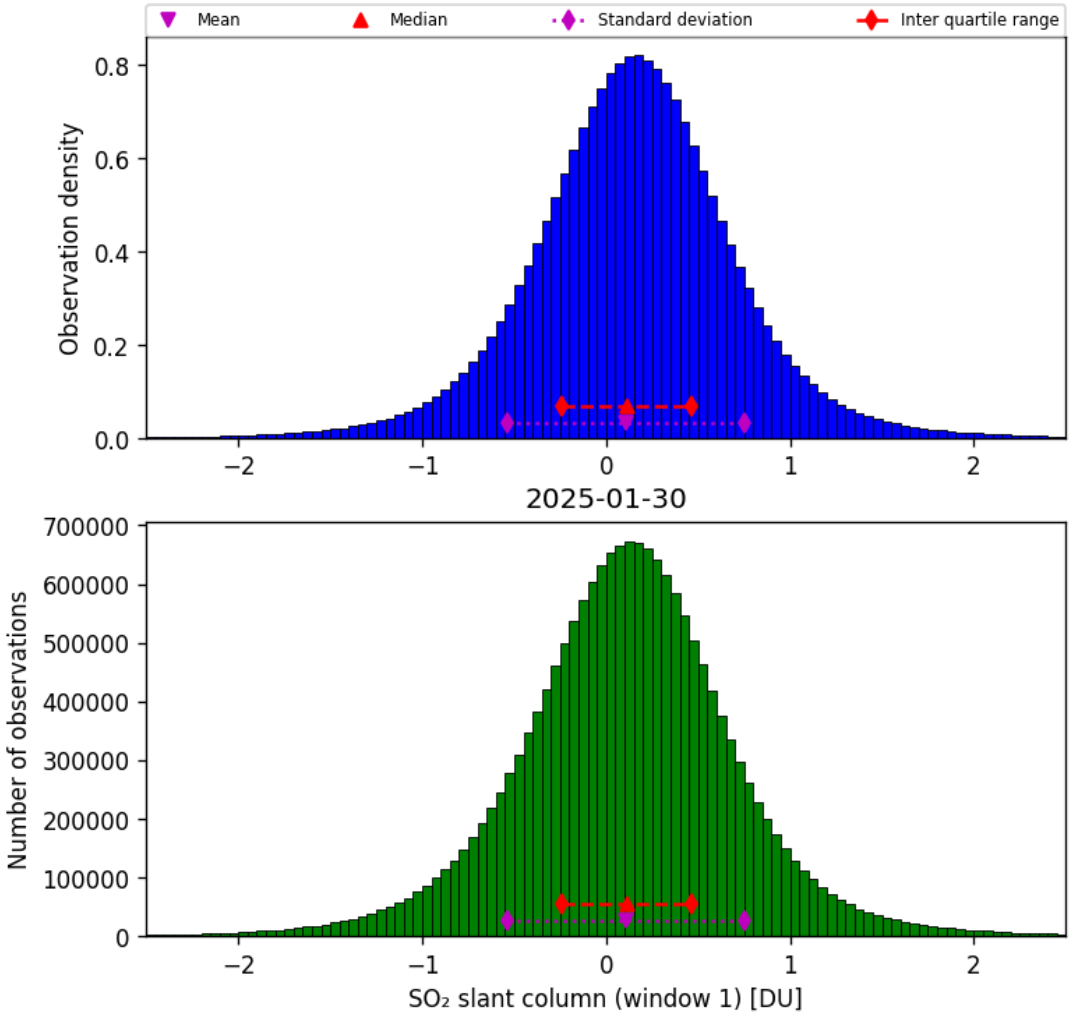

Figure 63: Histogram of "SO_2 slant column (window 1)" for 2025-01-30 to 2025-01-31

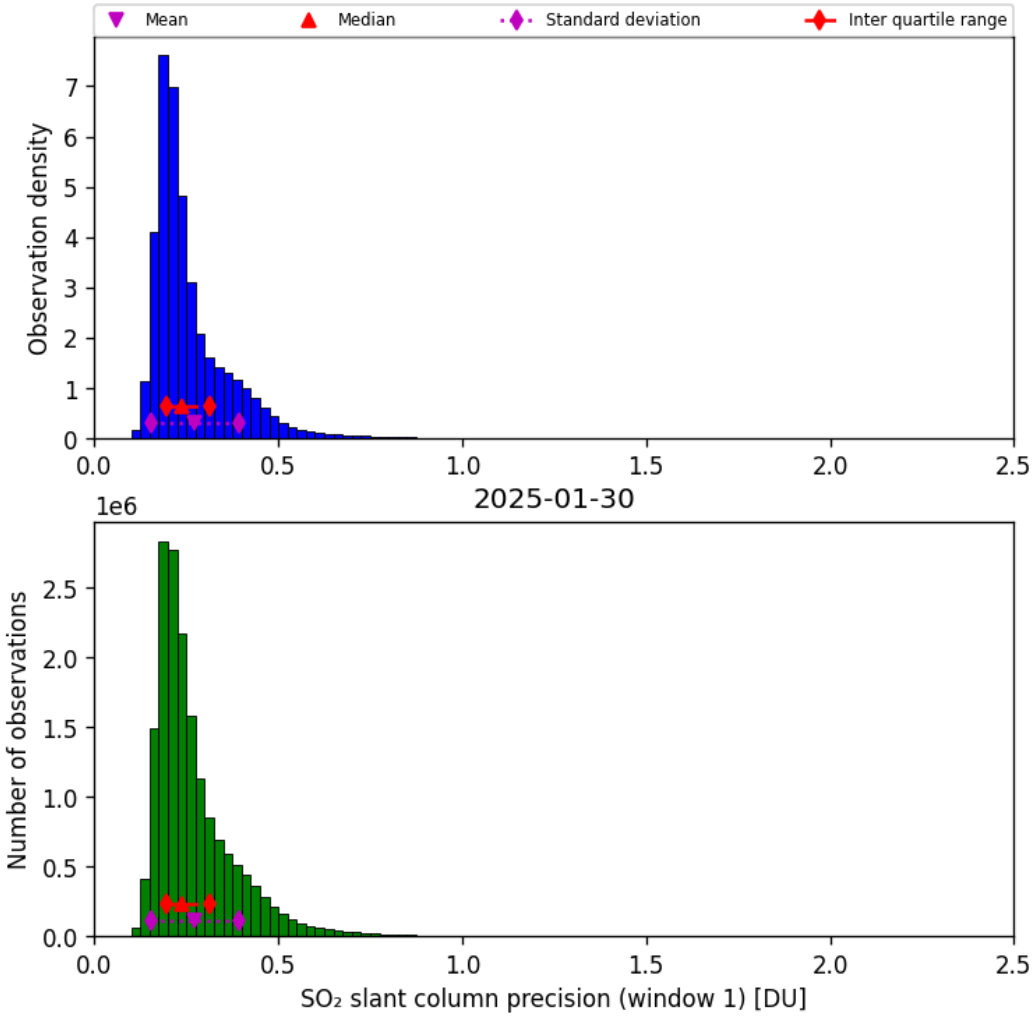

Figure 64: Histogram of "SO_2 slant column precision (window 1)" for 2025-01-30 to 2025-01-31

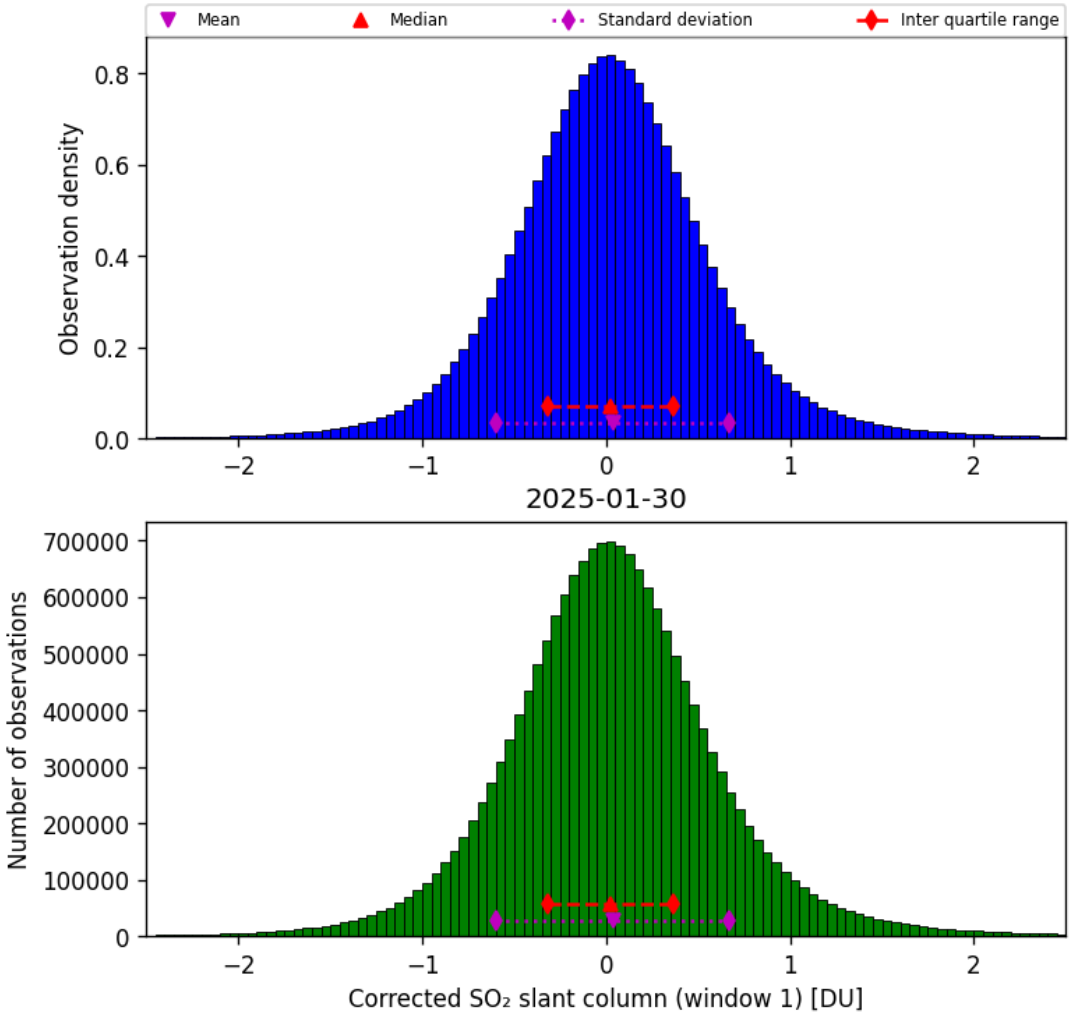

Figure 65: Histogram of "Corrected SO_2 slant column (window 1)" for 2025-01-30 to 2025-01-31

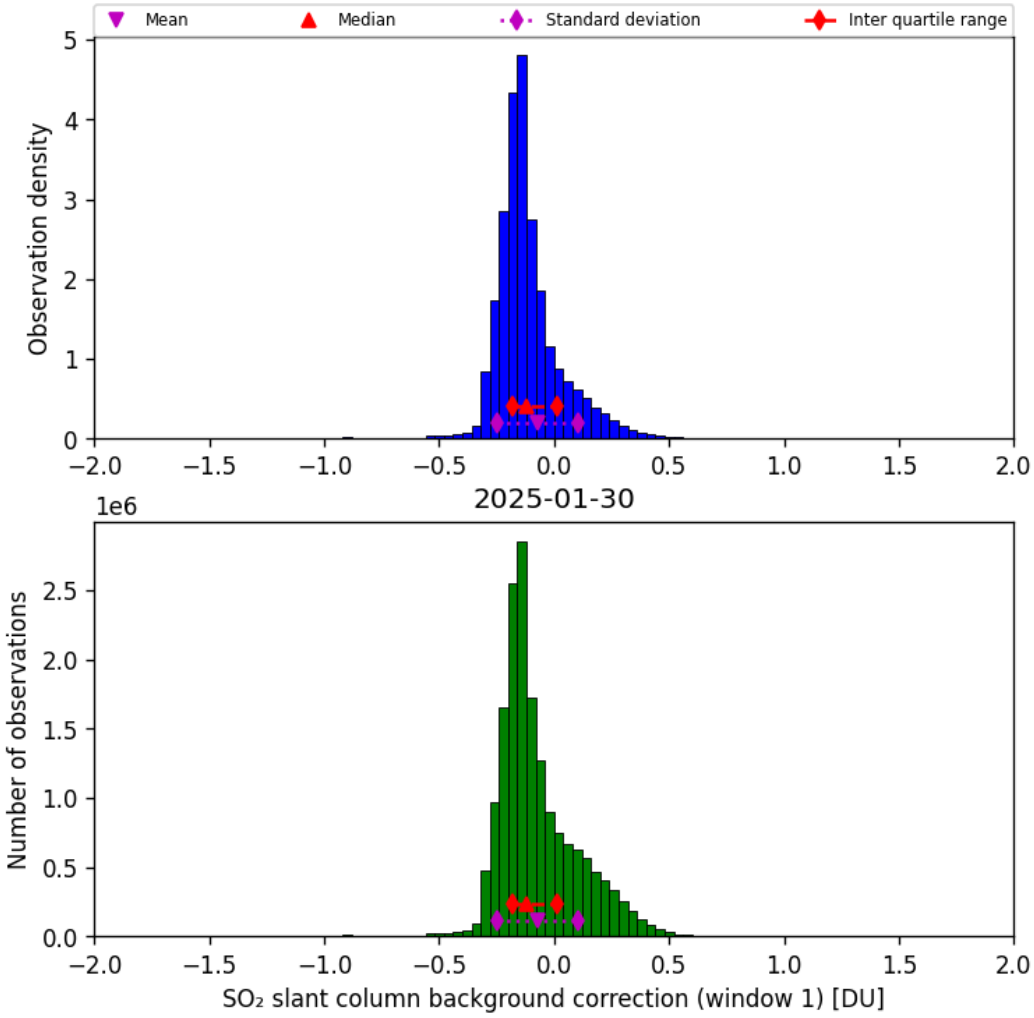

Figure 66: Histogram of "SO_2 slant column background correction (window 1)" for 2025-01-30 to 2025-01-31

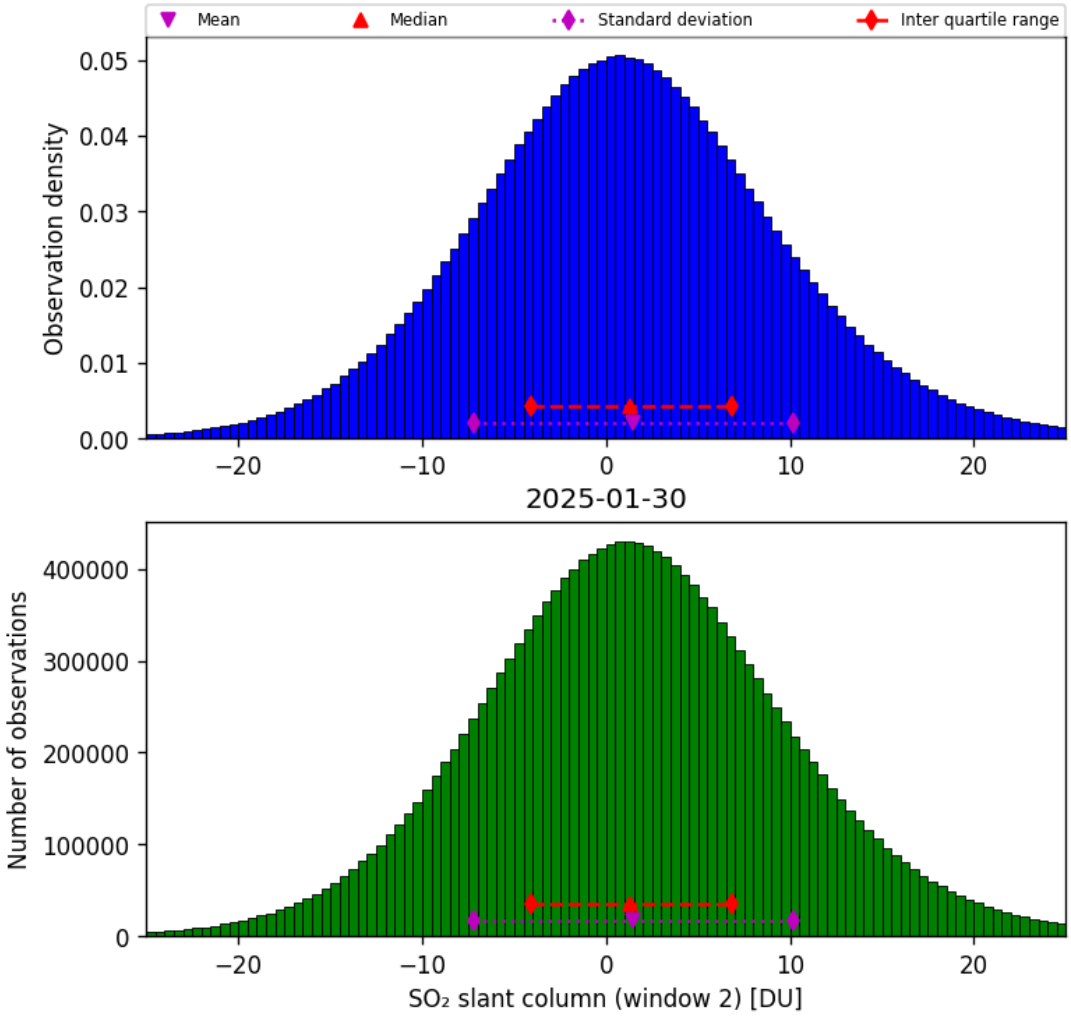

Figure 67: Histogram of "SO_2 slant column (window 2)" for 2025-01-30 to 2025-01-31

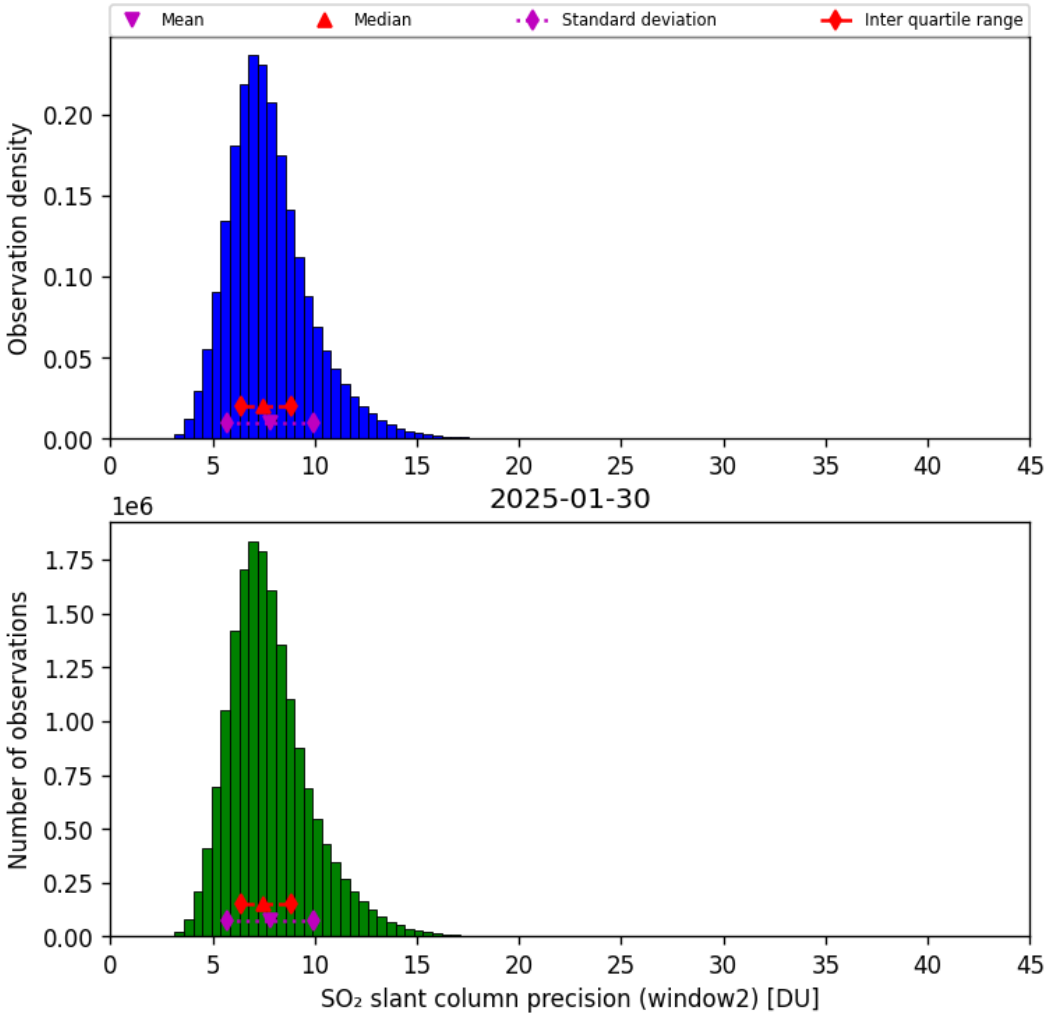

Figure 68: Histogram of "SO_2 slant column precision (window2)" for 2025-01-30 to 2025-01-31

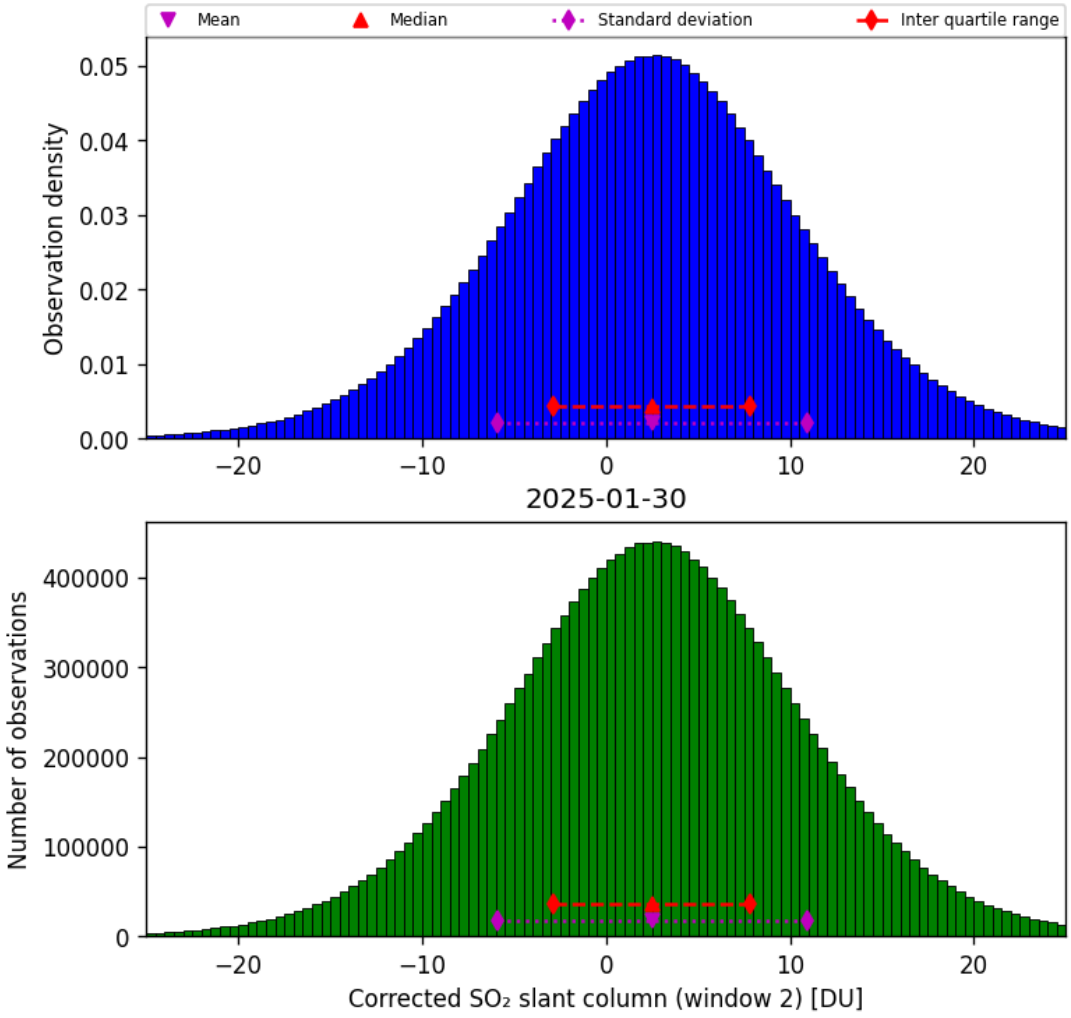

Figure 69: Histogram of "Corrected SO_2 slant column (window 2)" for 2025-01-30 to 2025-01-31

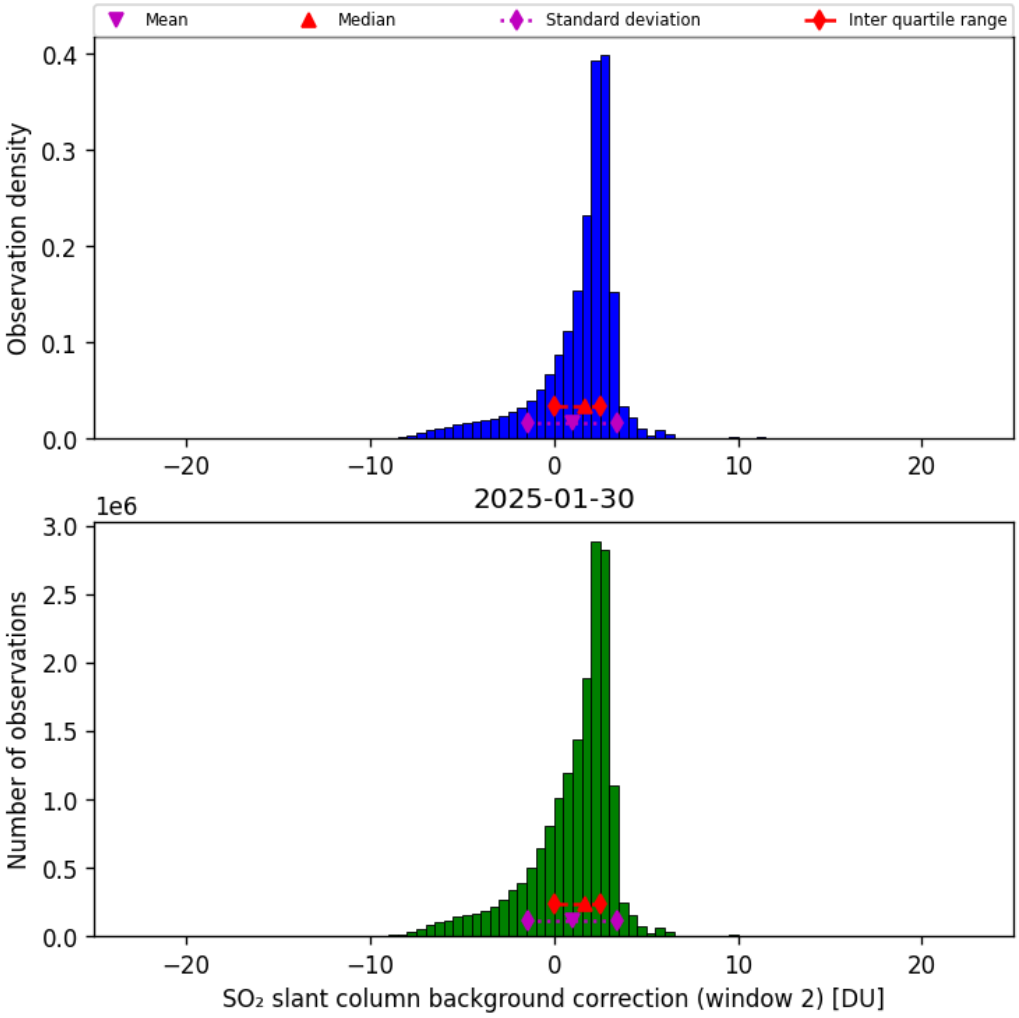

Figure 70: Histogram of "SO_2 slant column background correction (window 2)" for 2025-01-30 to 2025-01-31

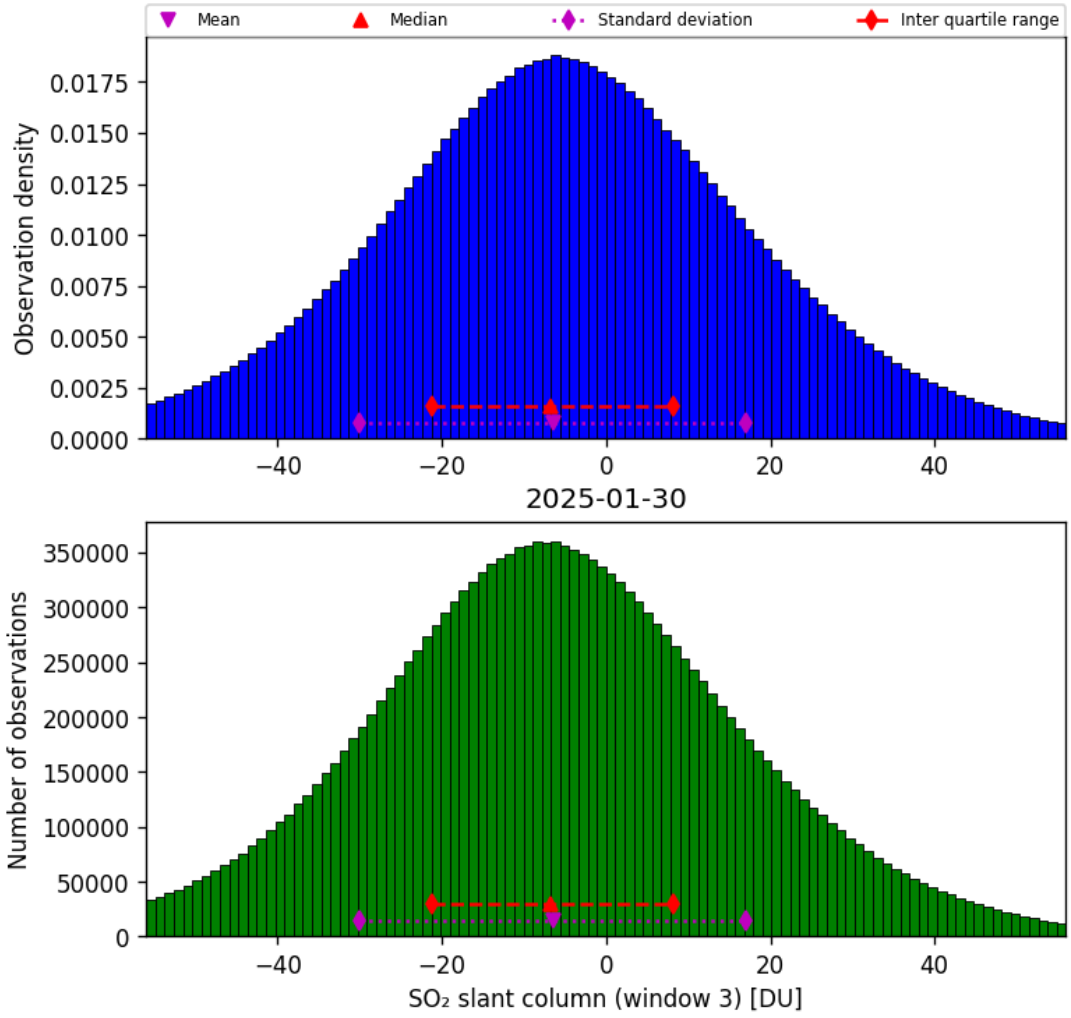

Figure 71: Histogram of "SO_2 slant column (window 3)" for 2025-01-30 to 2025-01-31

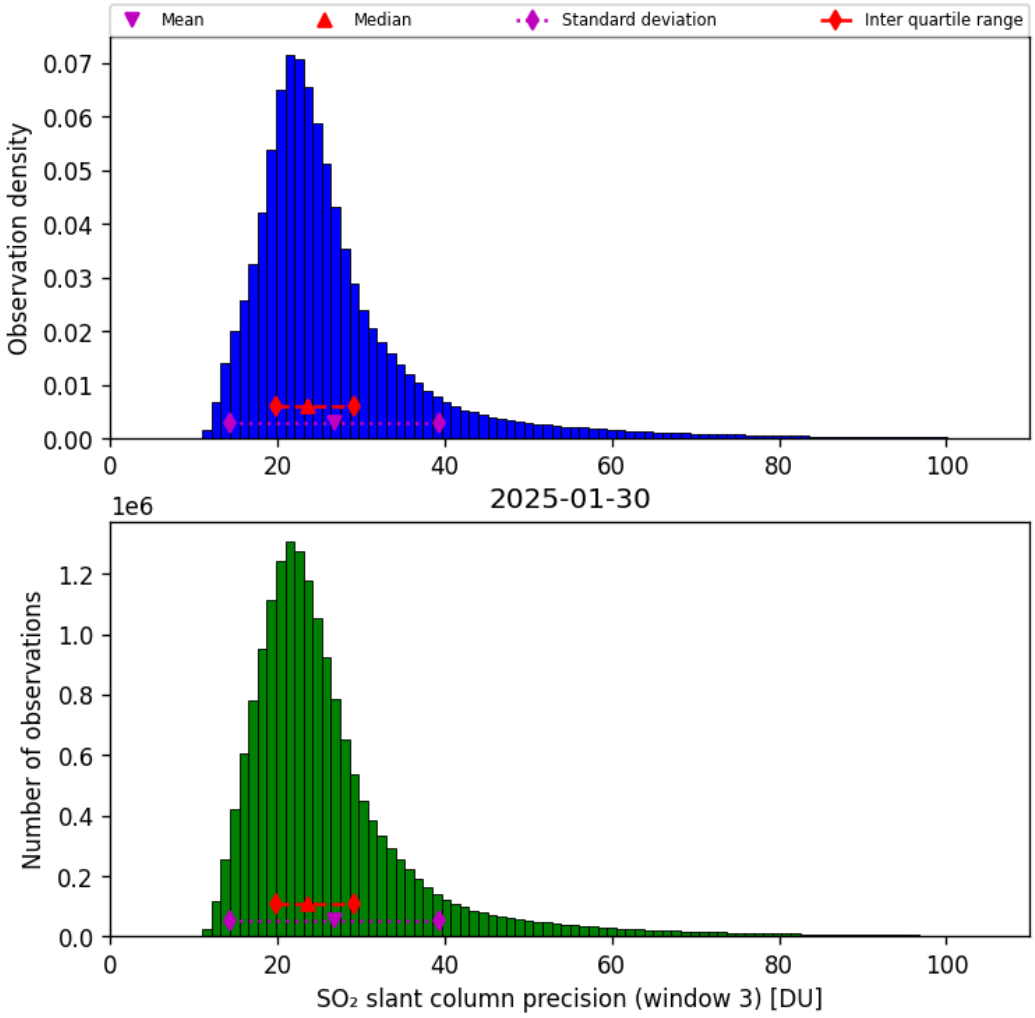

Figure 72: Histogram of "SO_2 slant column precision (window 3)" for 2025-01-30 to 2025-01-31

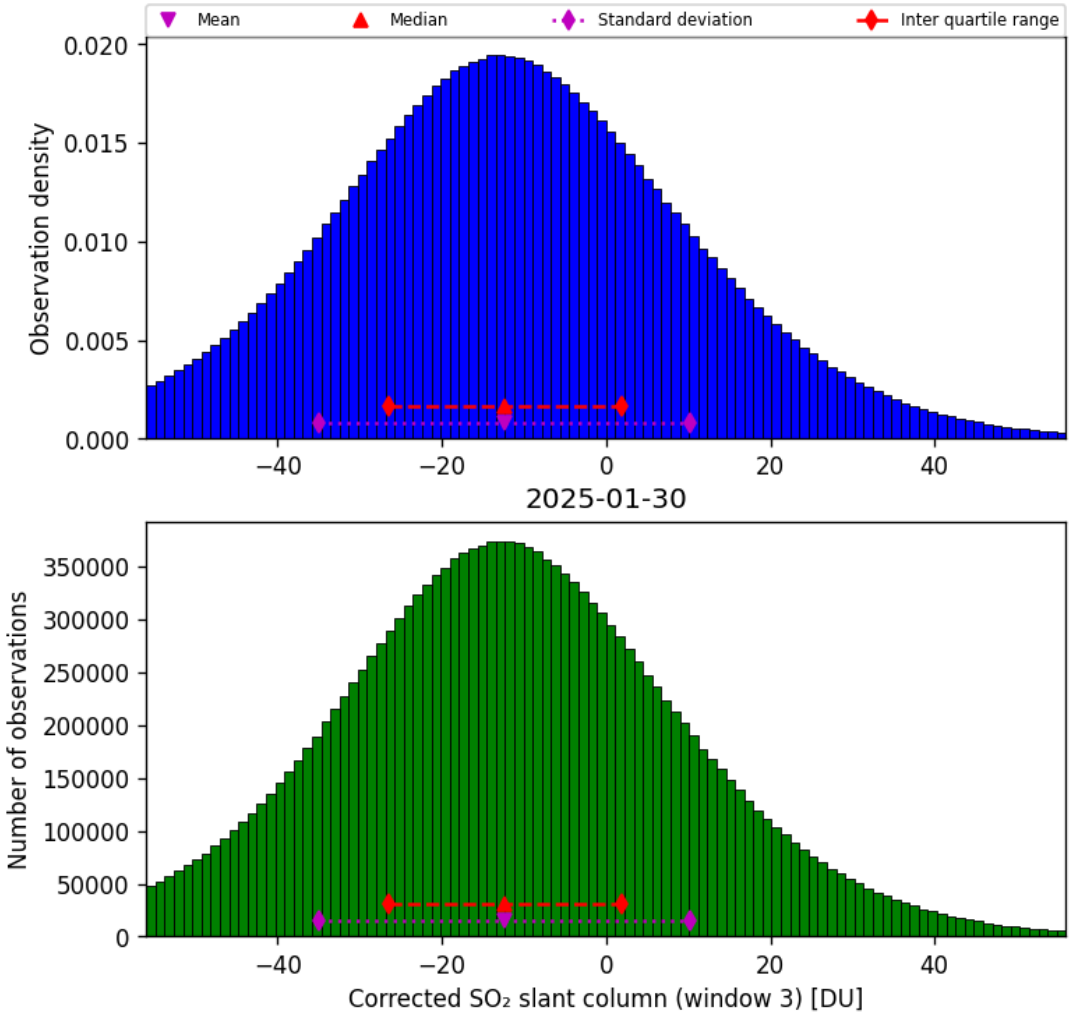

Figure 73: Histogram of "Corrected SO_2 slant column (window 3)" for 2025-01-30 to 2025-01-31

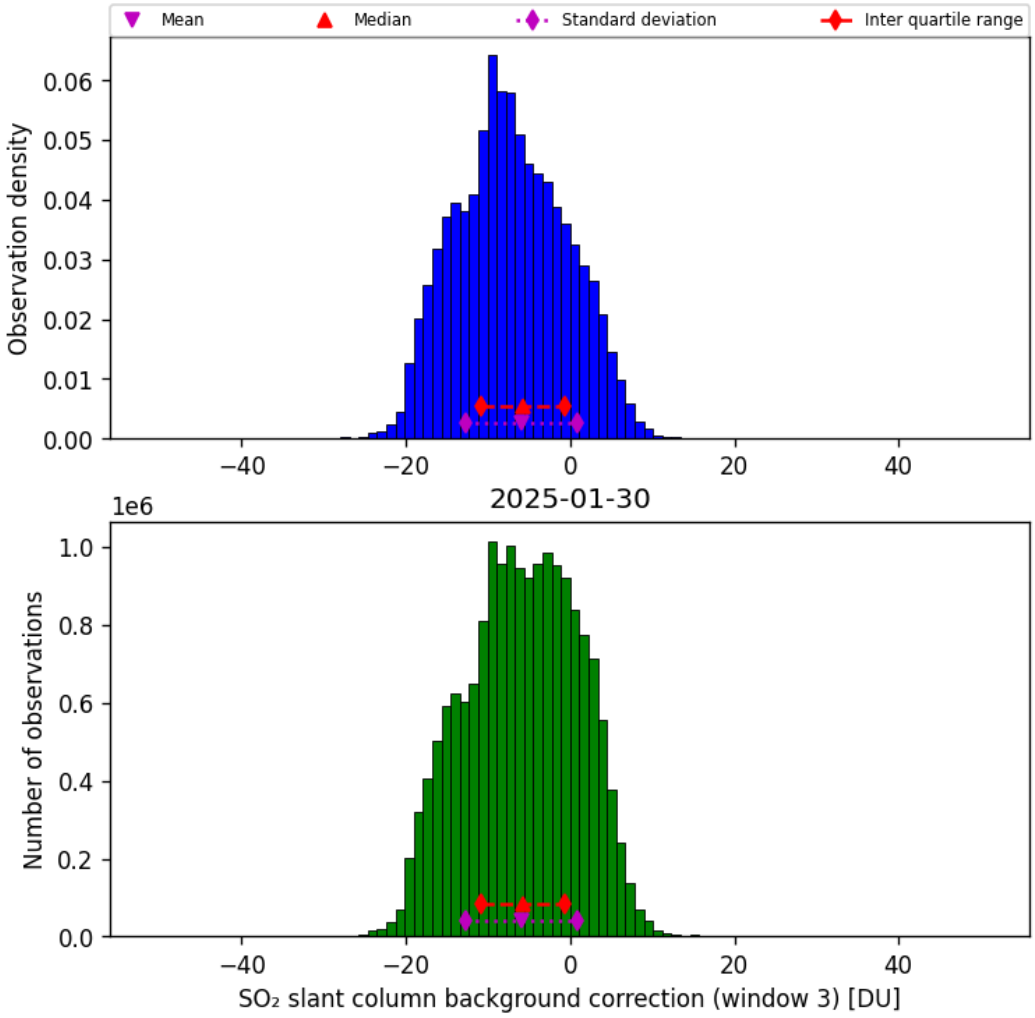

Figure 74: Histogram of "SO_2 slant column background correction (window 3)" for 2025-01-30 to 2025-01-31

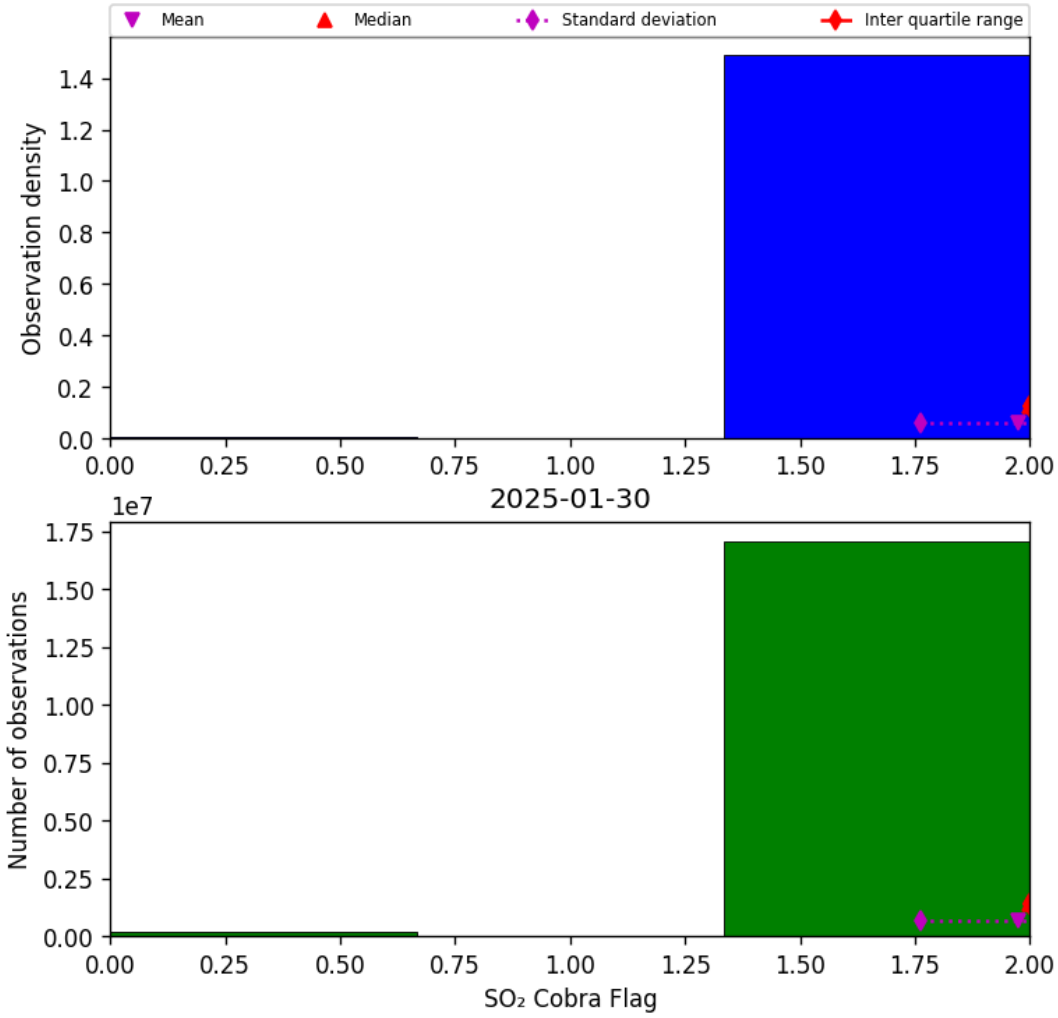

Figure 75: Histogram of "SO_2 Cobra Flag" for 2025-01-30 to 2025-01-31

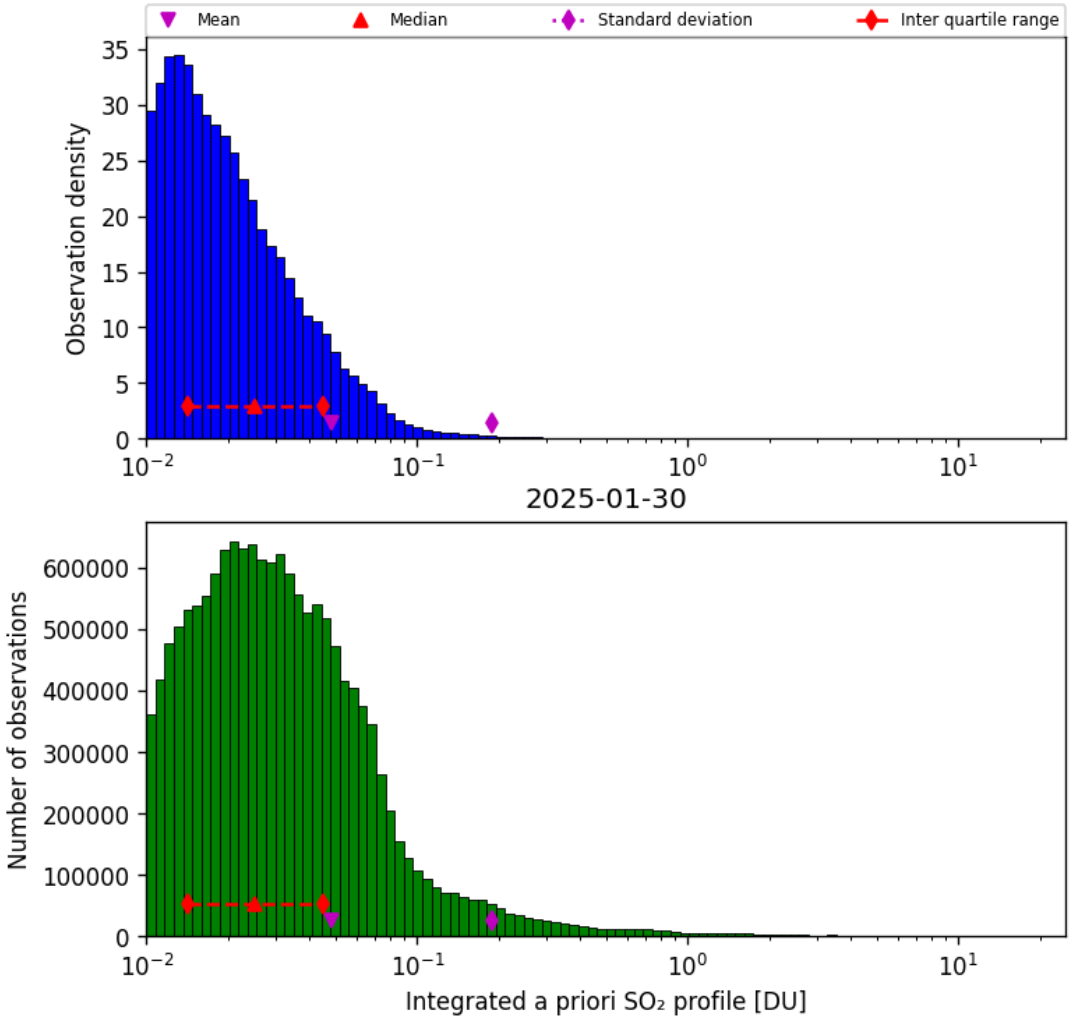

Figure 76: Histogram of “Integrated a priori SO_2 profile” for 2025-01-30 to 2025-01-31

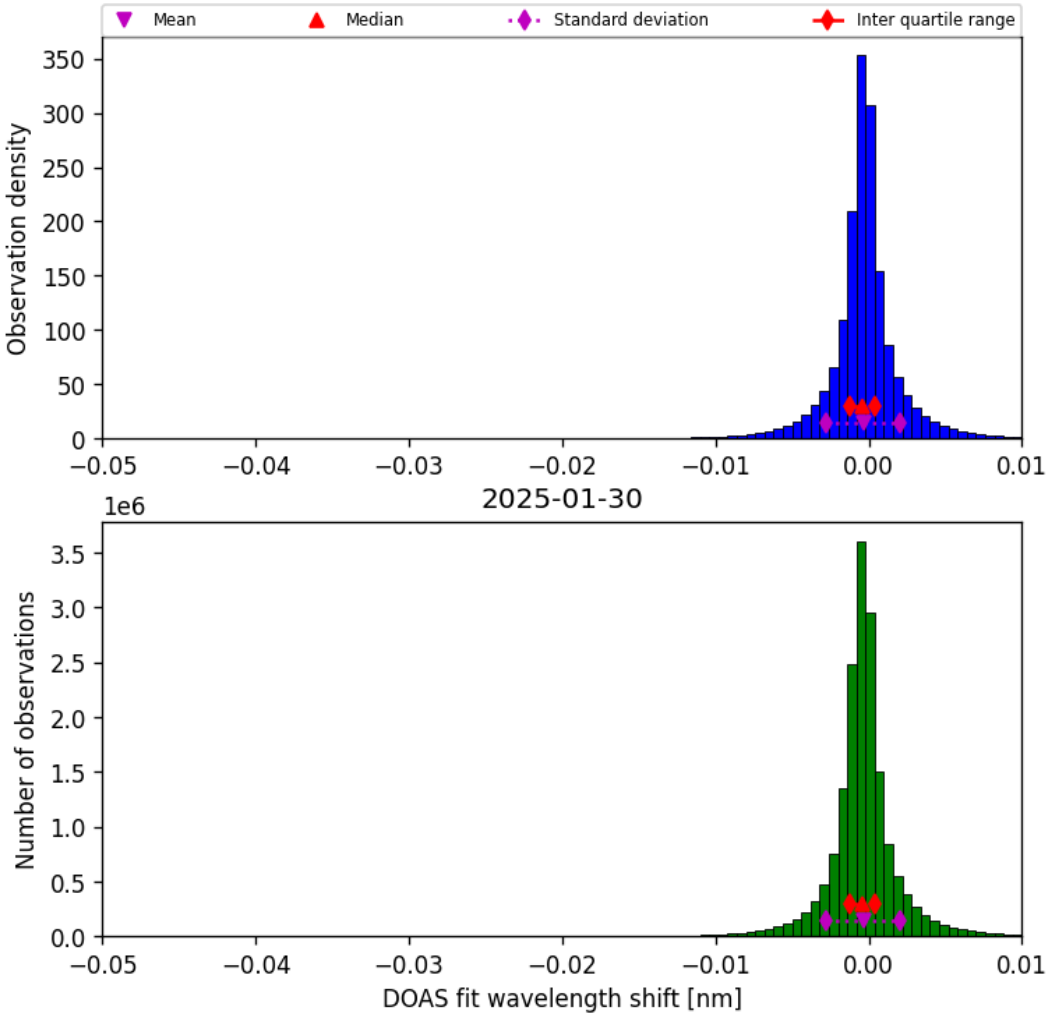

Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-01-30 to 2025-01-31

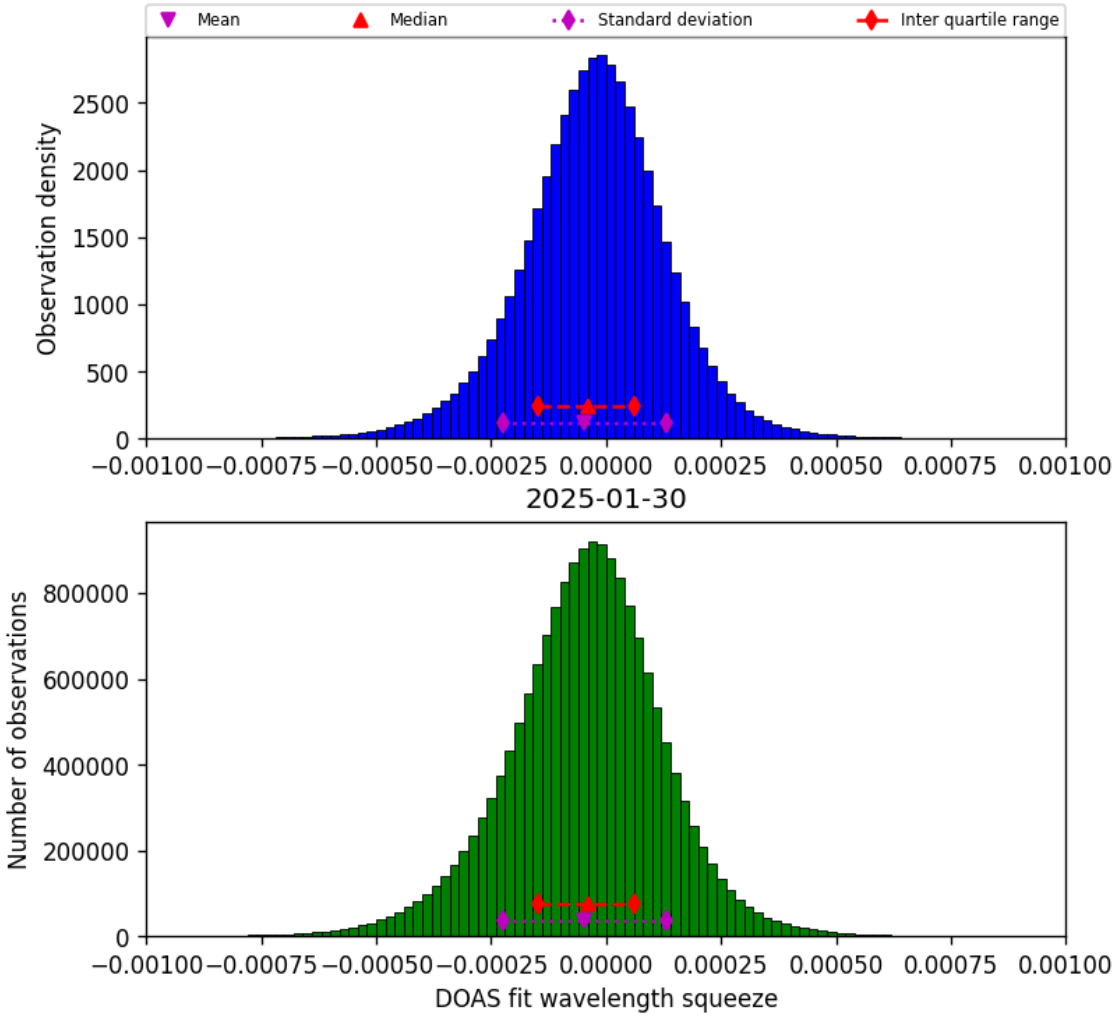

Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-01-30 to 2025-01-31

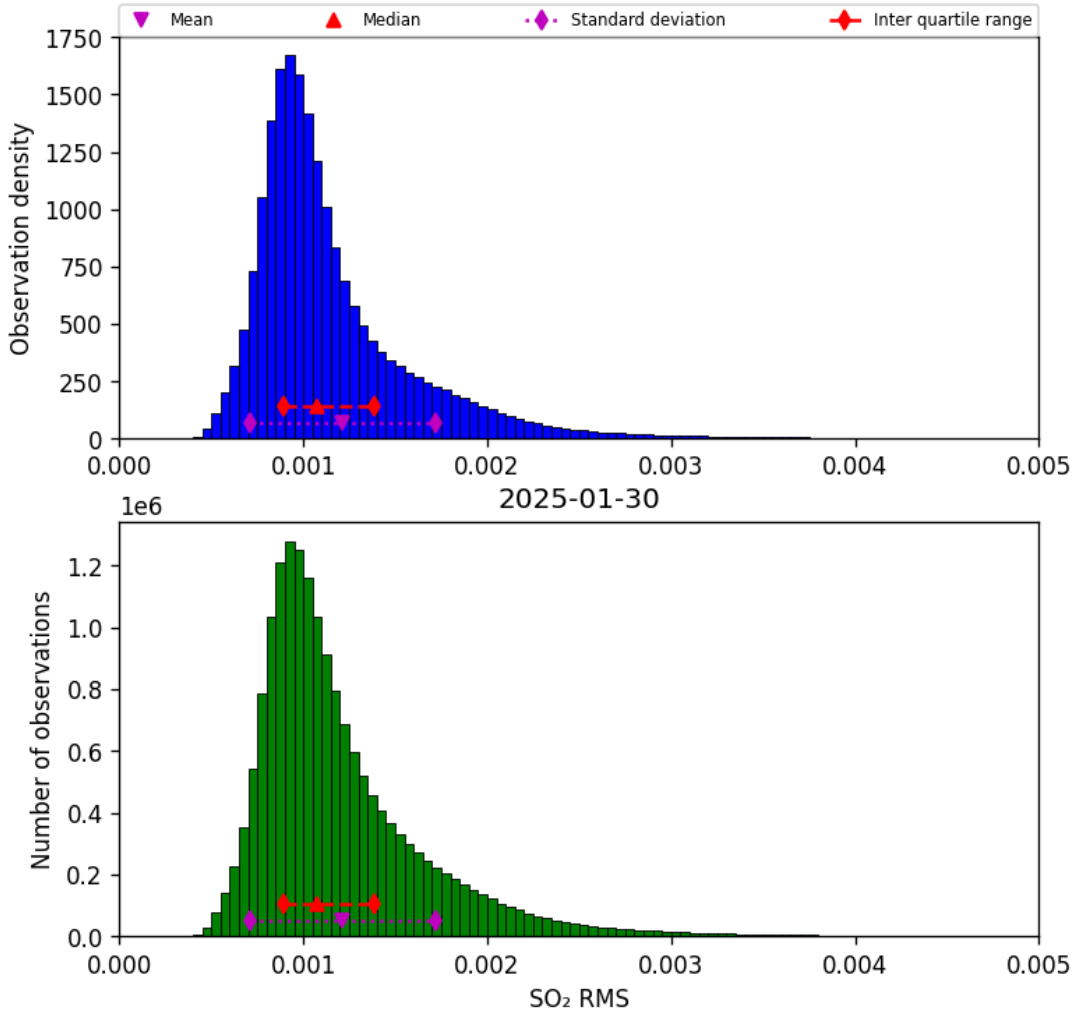

Figure 79: Histogram of "SO_2 RMS" for 2025-01-30 to 2025-01-31

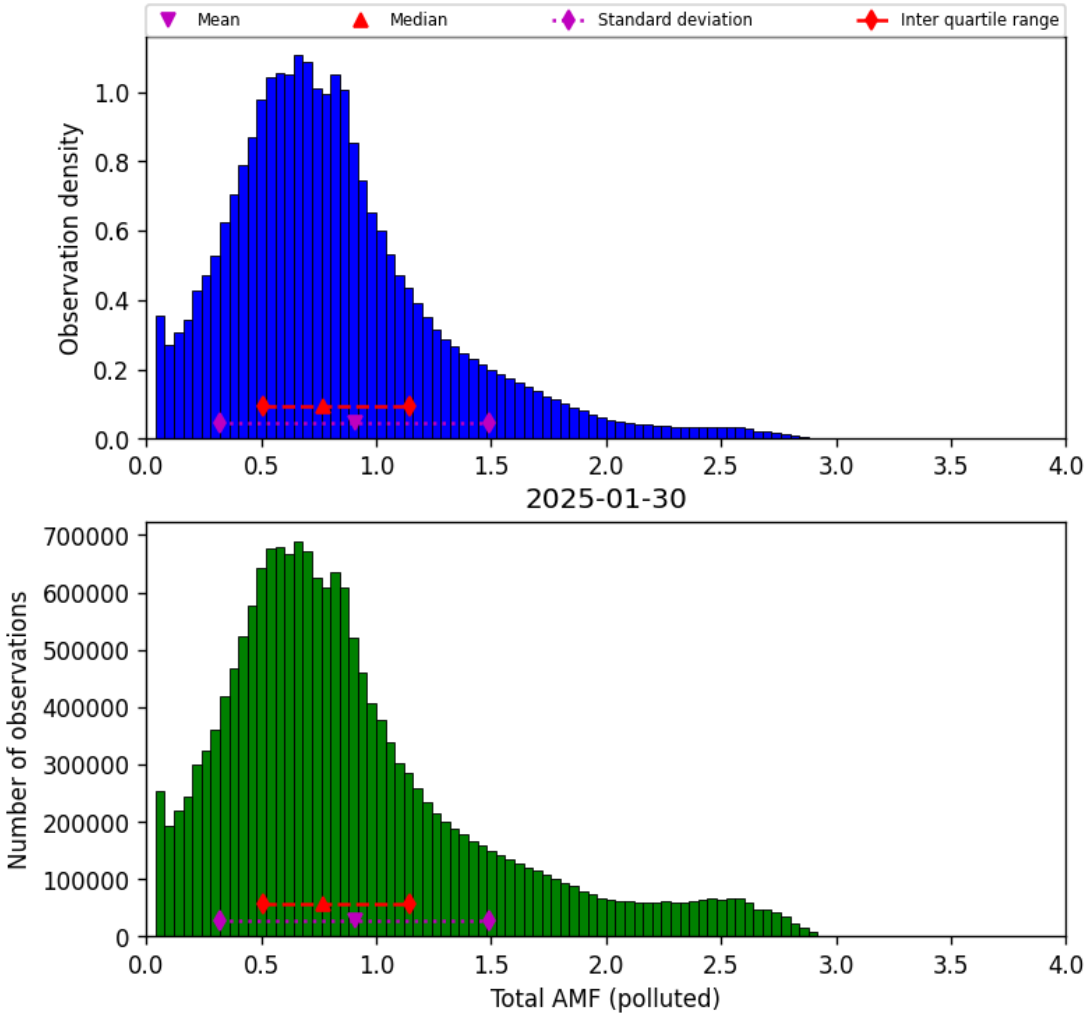

Figure 80: Histogram of “Total AMF (polluted)” for 2025-01-30 to 2025-01-31

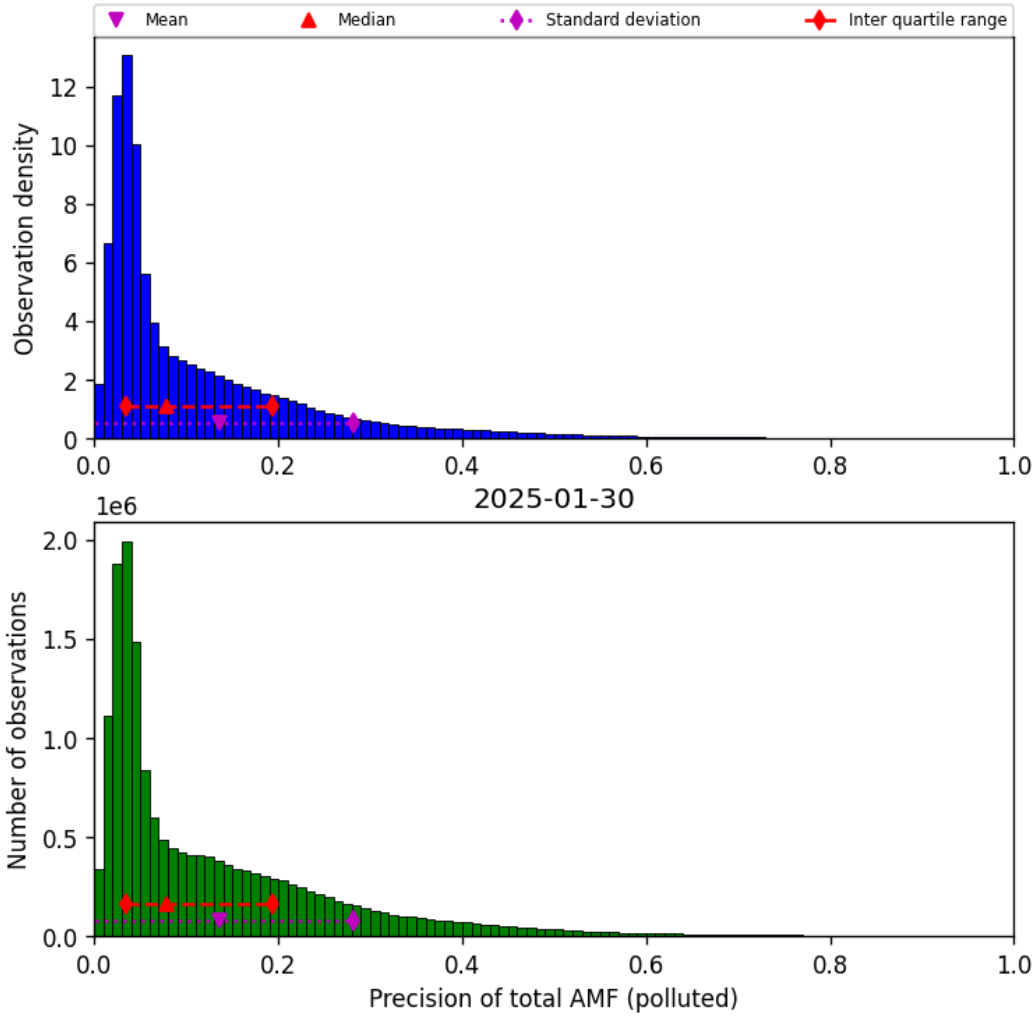

Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-01-30 to 2025-01-31

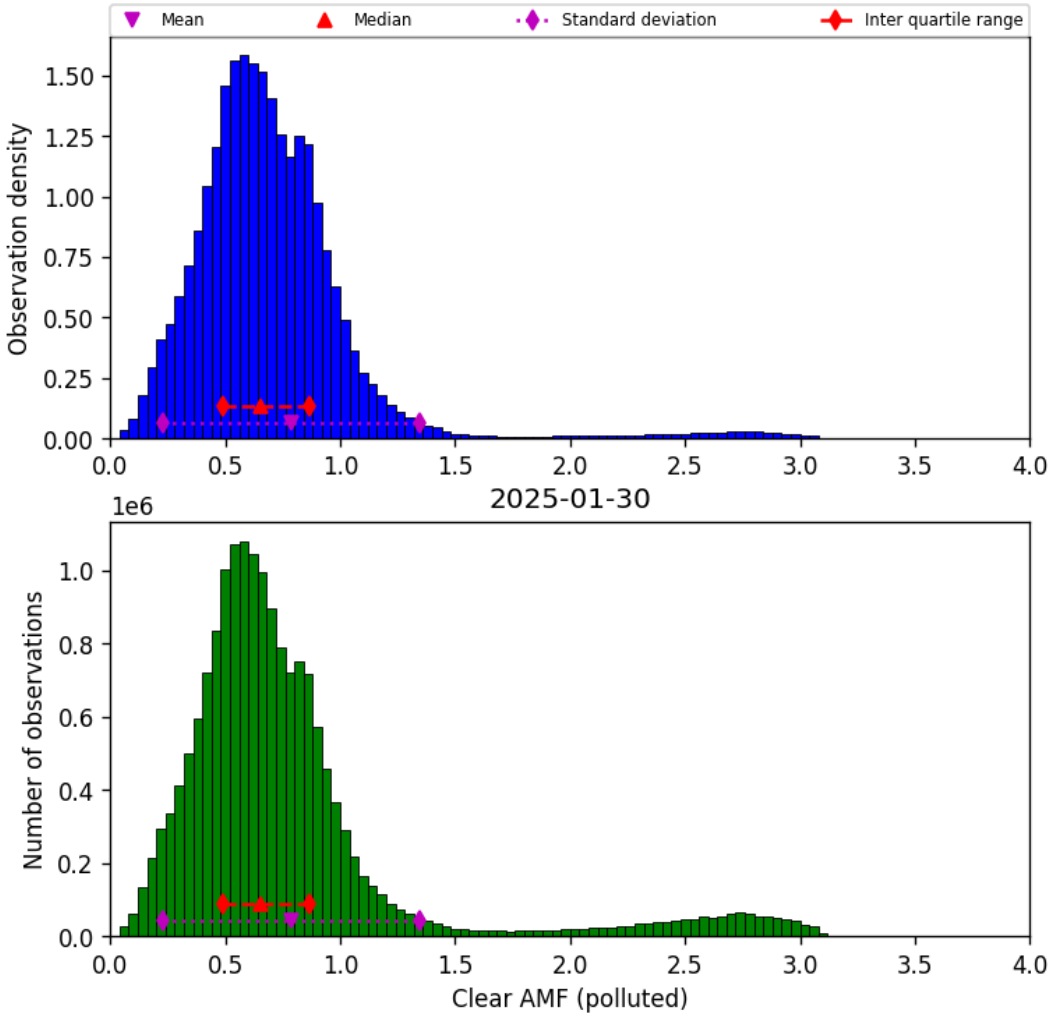

Figure 82: Histogram of “Clear AMF (polluted)” for 2025-01-30 to 2025-01-31

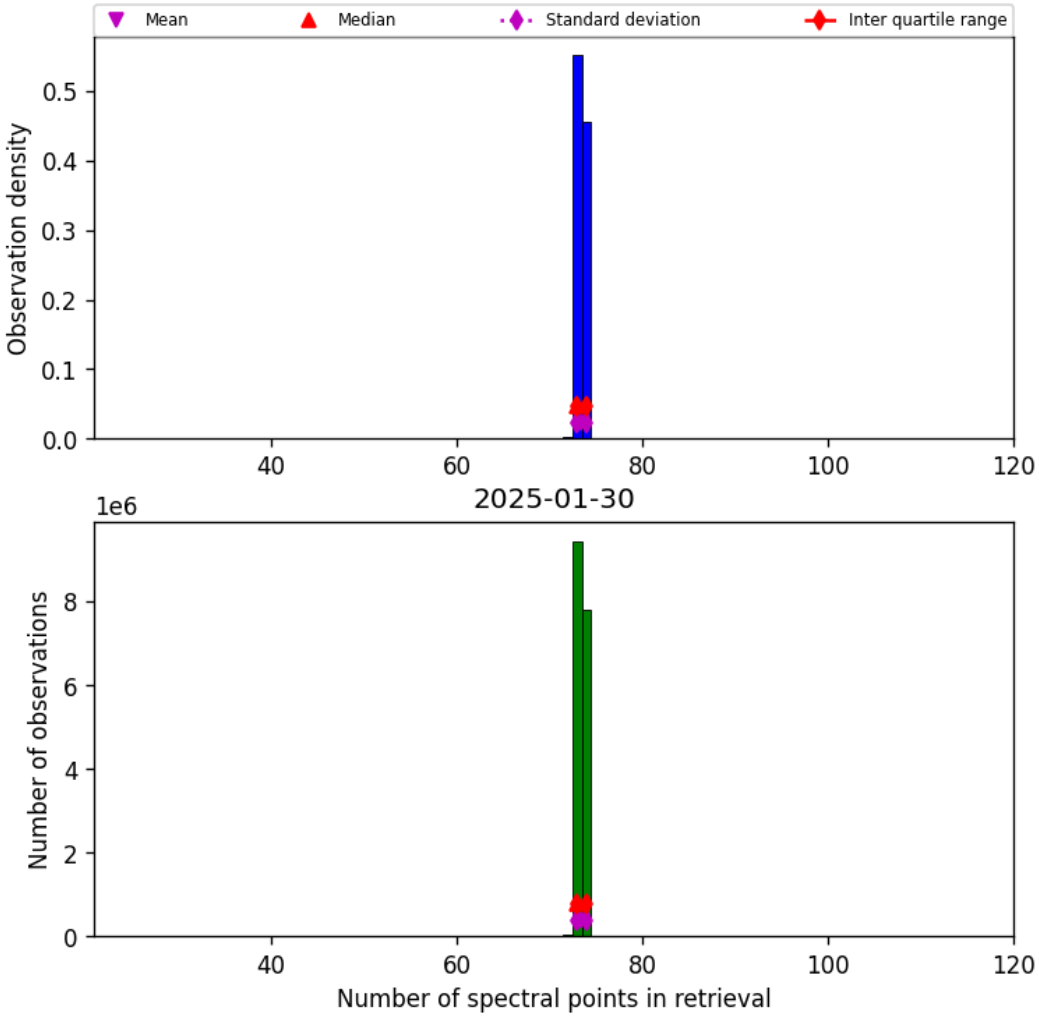

Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-01-30 to 2025-01-31

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.

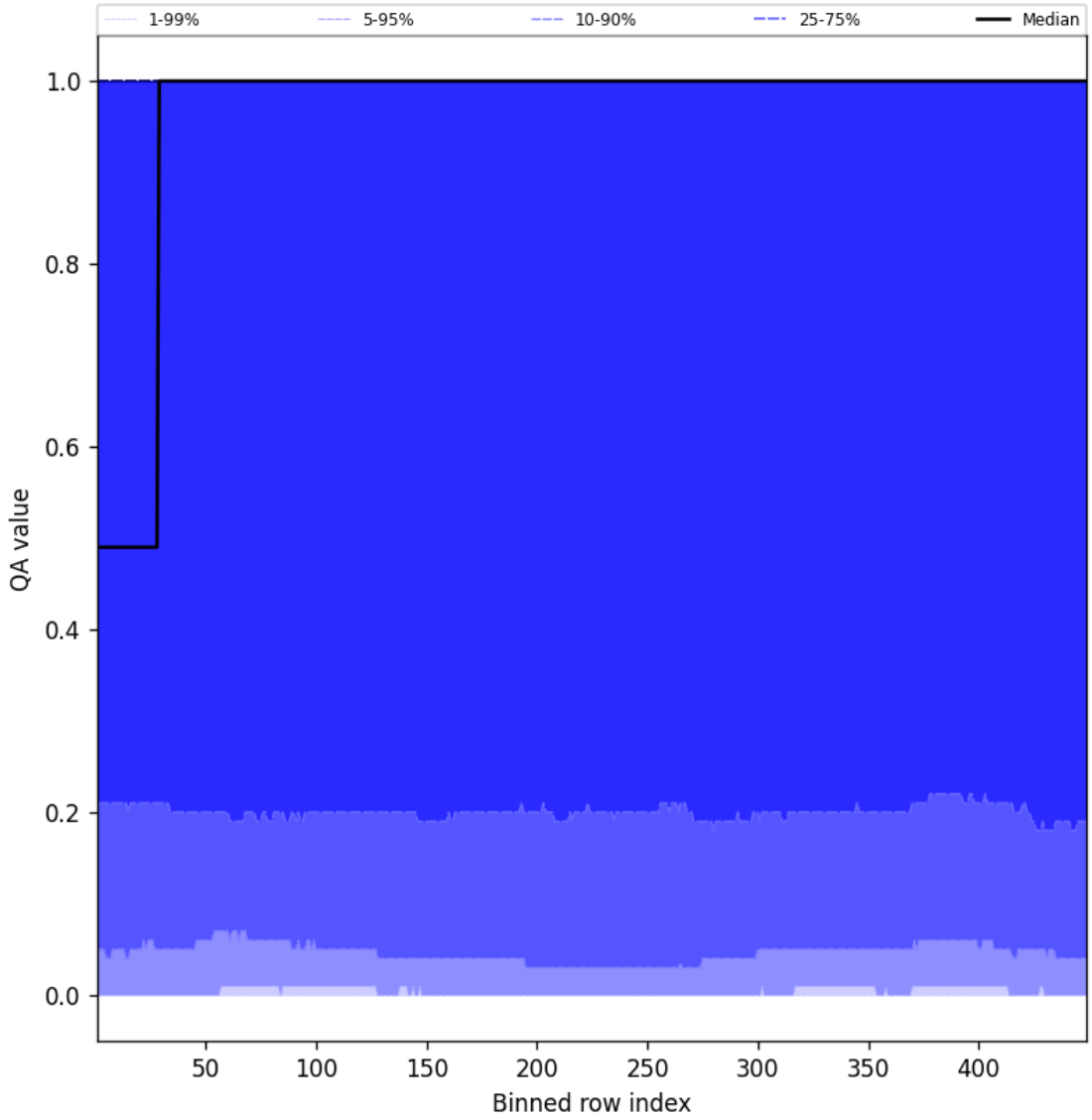

Figure 84: Along track statistics of “QA value” for 2025-01-30 to 2025-01-31

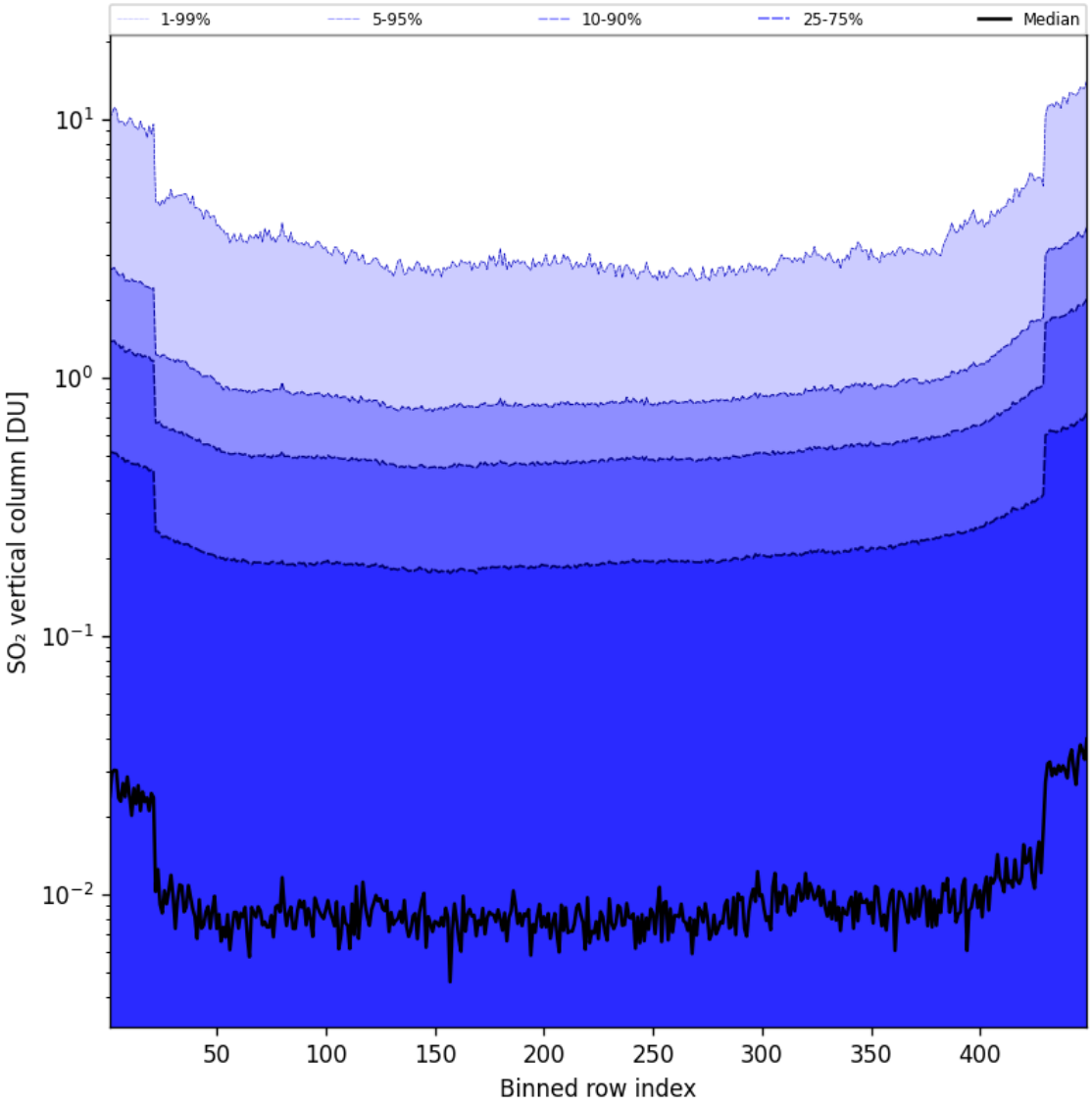

Figure 85: Along track statistics of "SO_2 vertical column" for 2025-01-30 to 2025-01-31

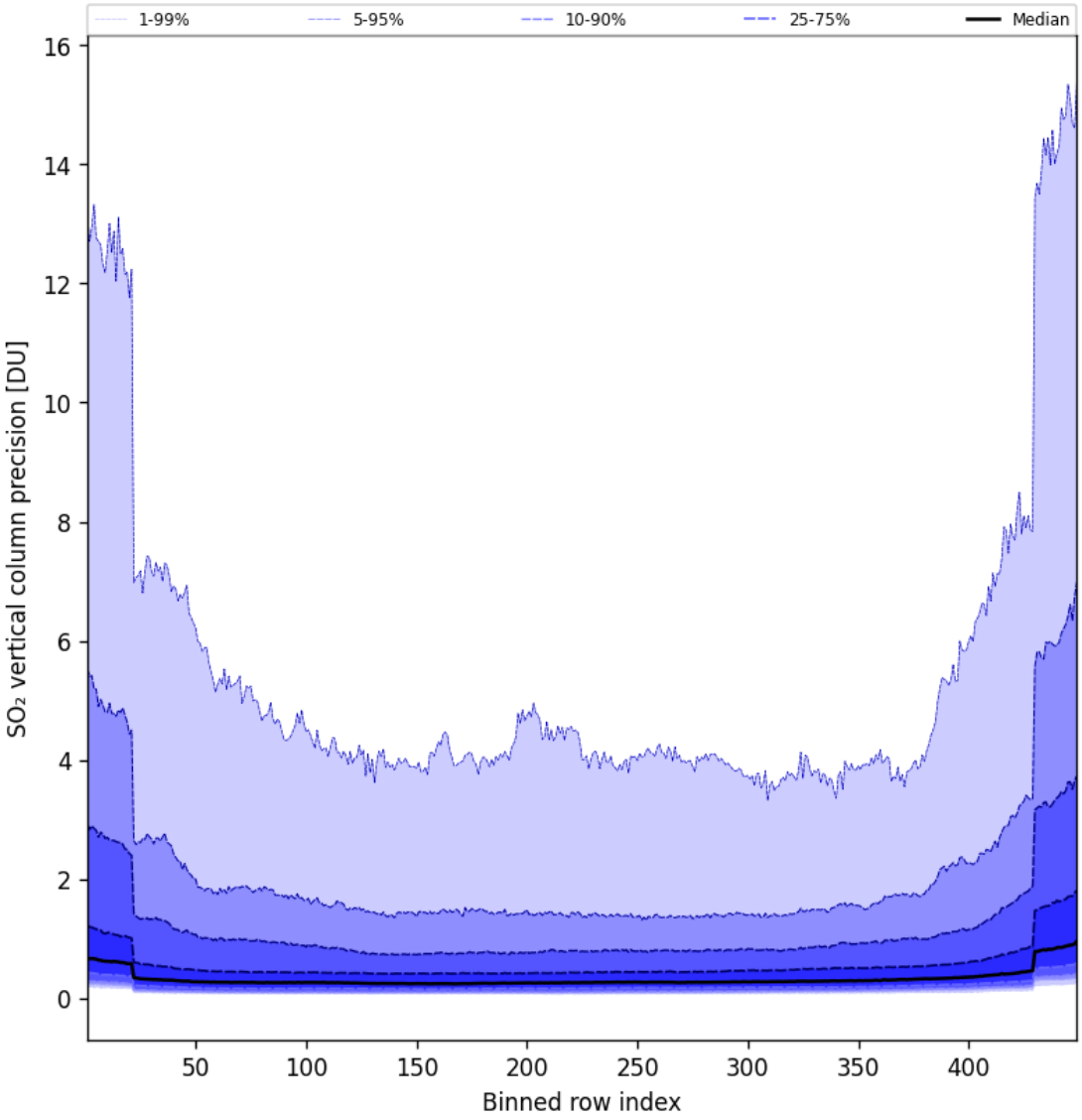

Figure 86: Along track statistics of "SO_2 vertical column precision" for 2025-01-30 to 2025-01-31

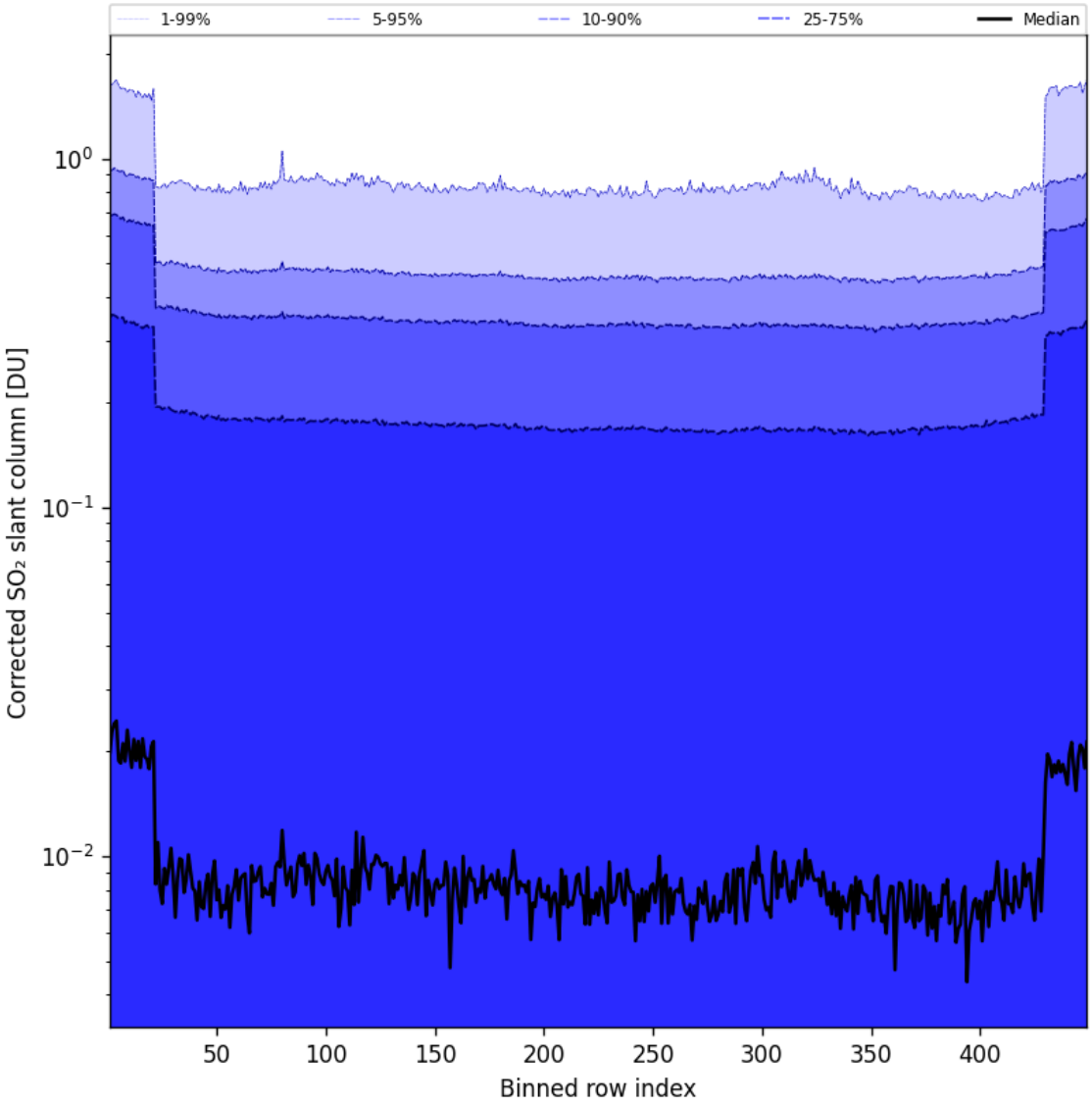

Figure 87: Along track statistics of "Corrected SO_2 slant column" for 2025-01-30 to 2025-01-31

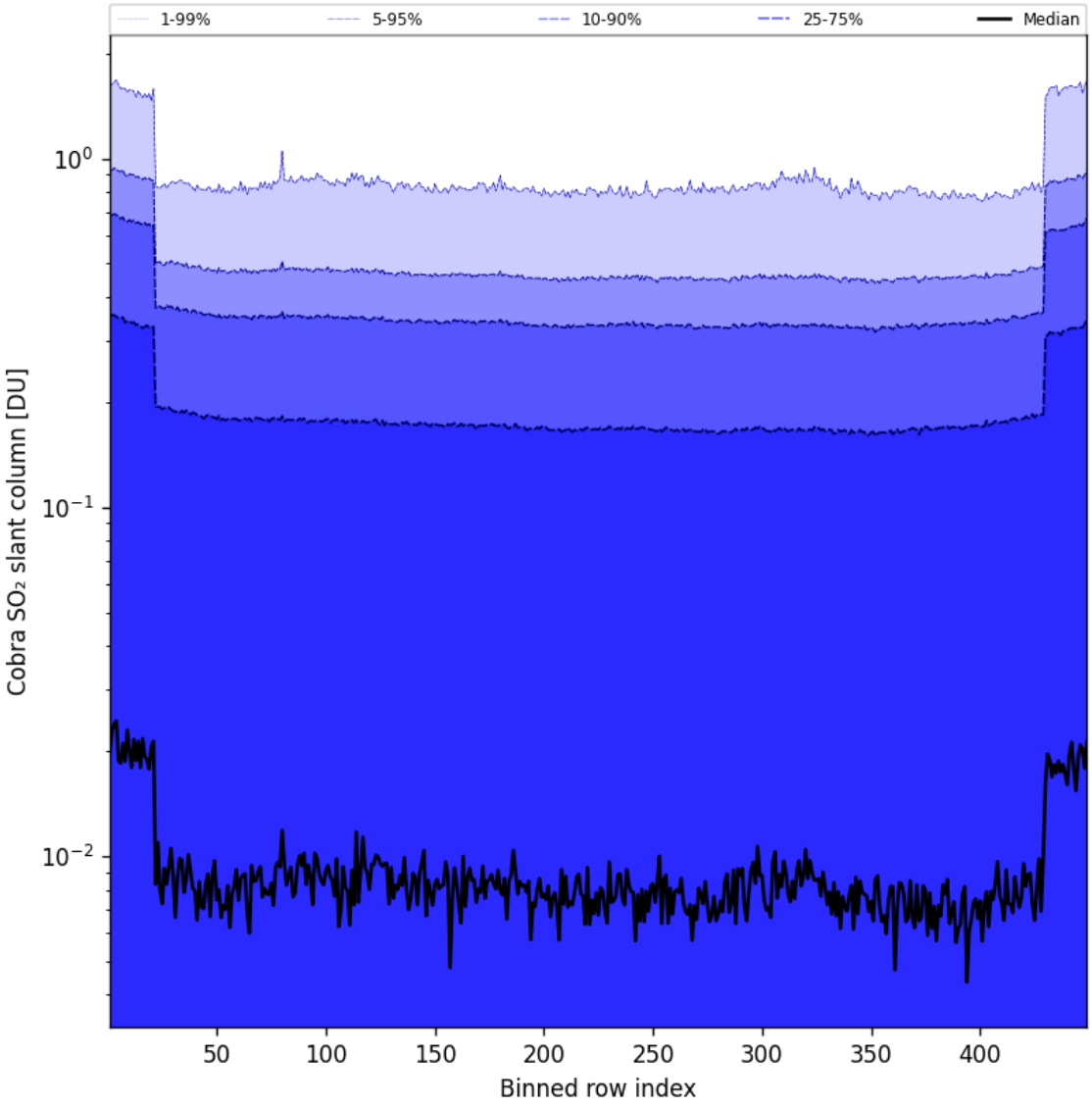

Figure 88: Along track statistics of "Cobra SO_2 slant column" for 2025-01-30 to 2025-01-31

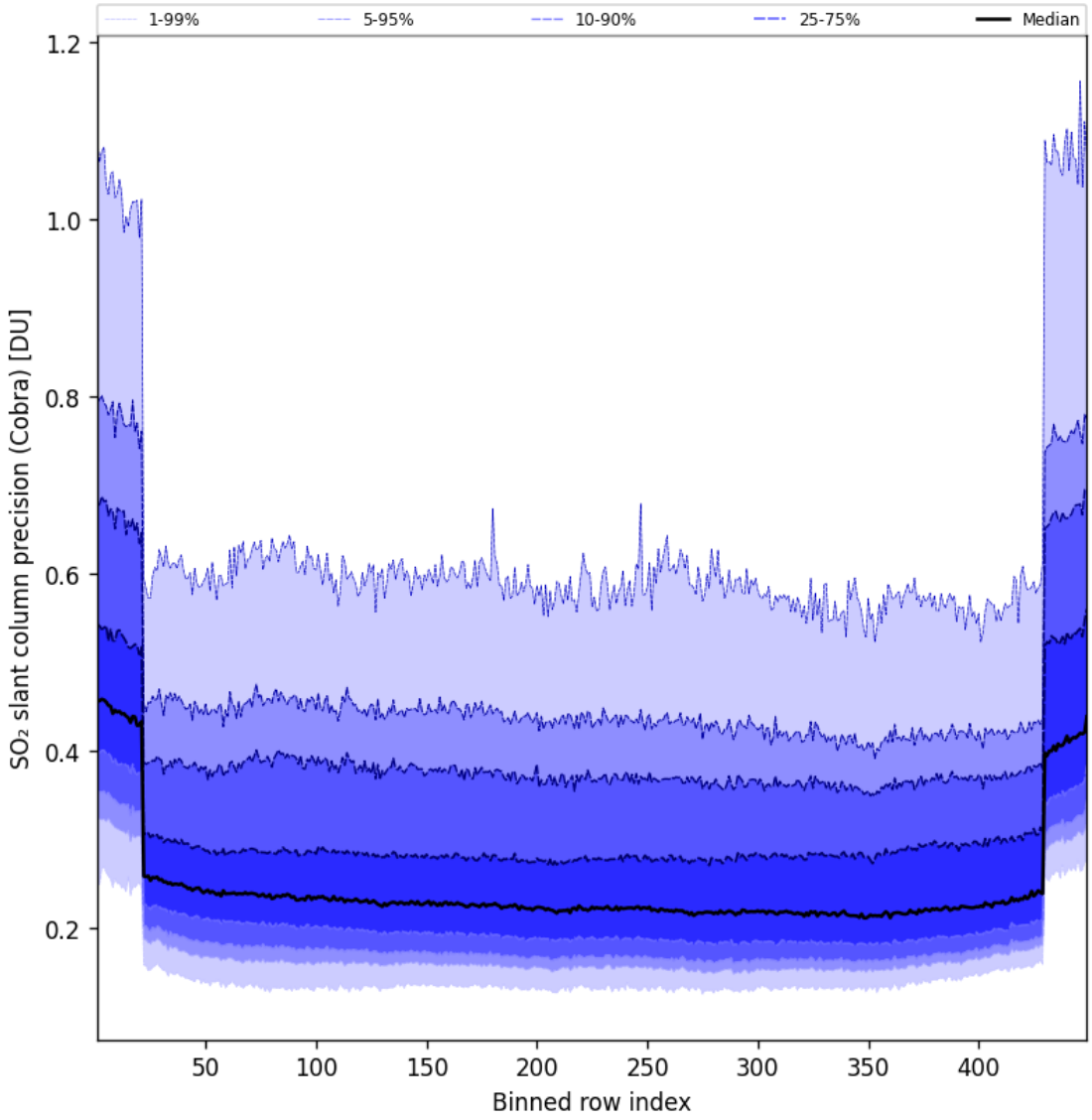

Figure 89: Along track statistics of "SO_2 slant column precision (Cobra)" for 2025-01-30 to 2025-01-31

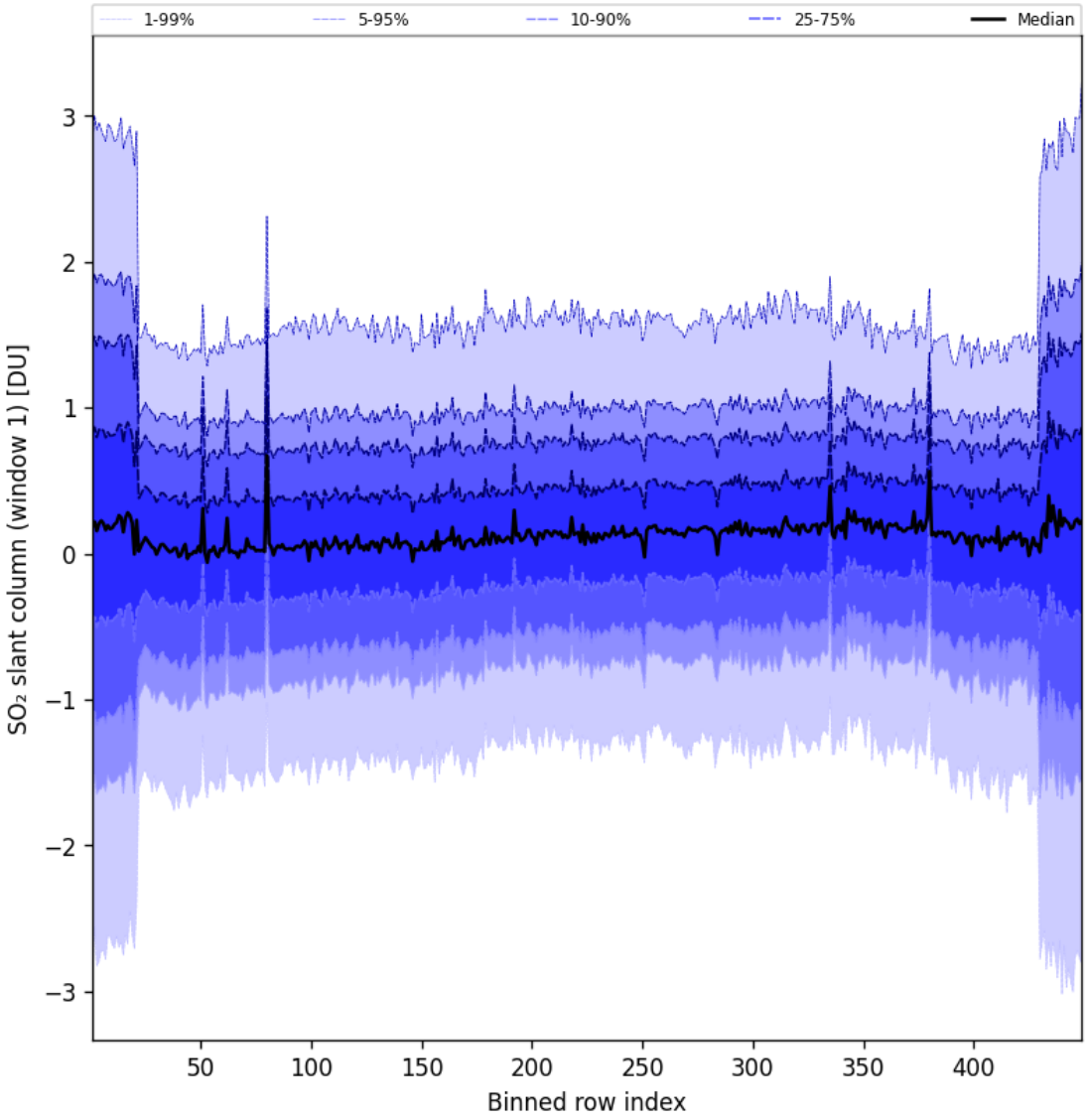

Figure 90: Along track statistics of "SO_2 slant column (window 1)" for 2025-01-30 to 2025-01-31

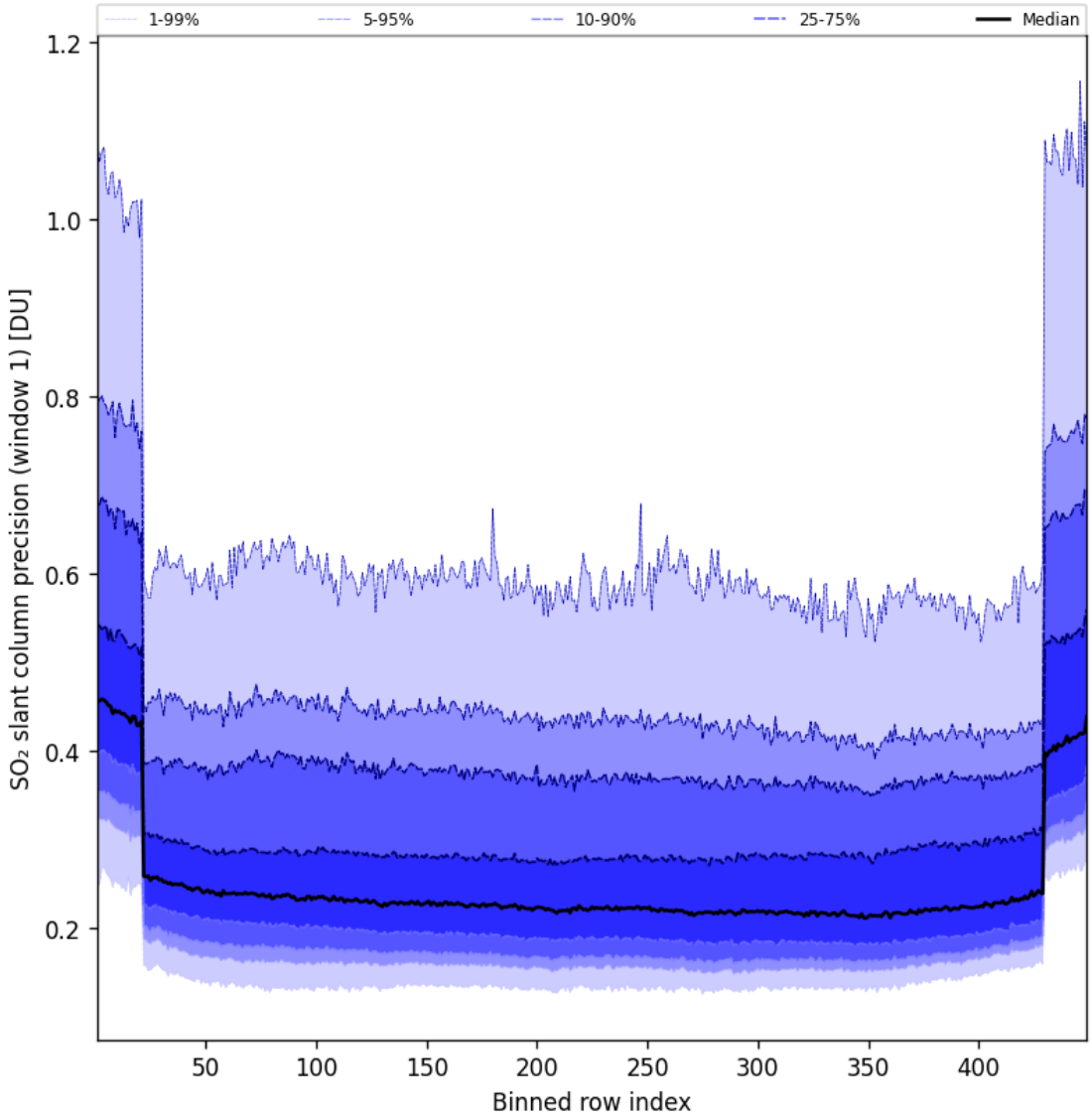

Figure 91: Along track statistics of "SO_2 slant column precision (window 1)" for 2025-01-30 to 2025-01-31

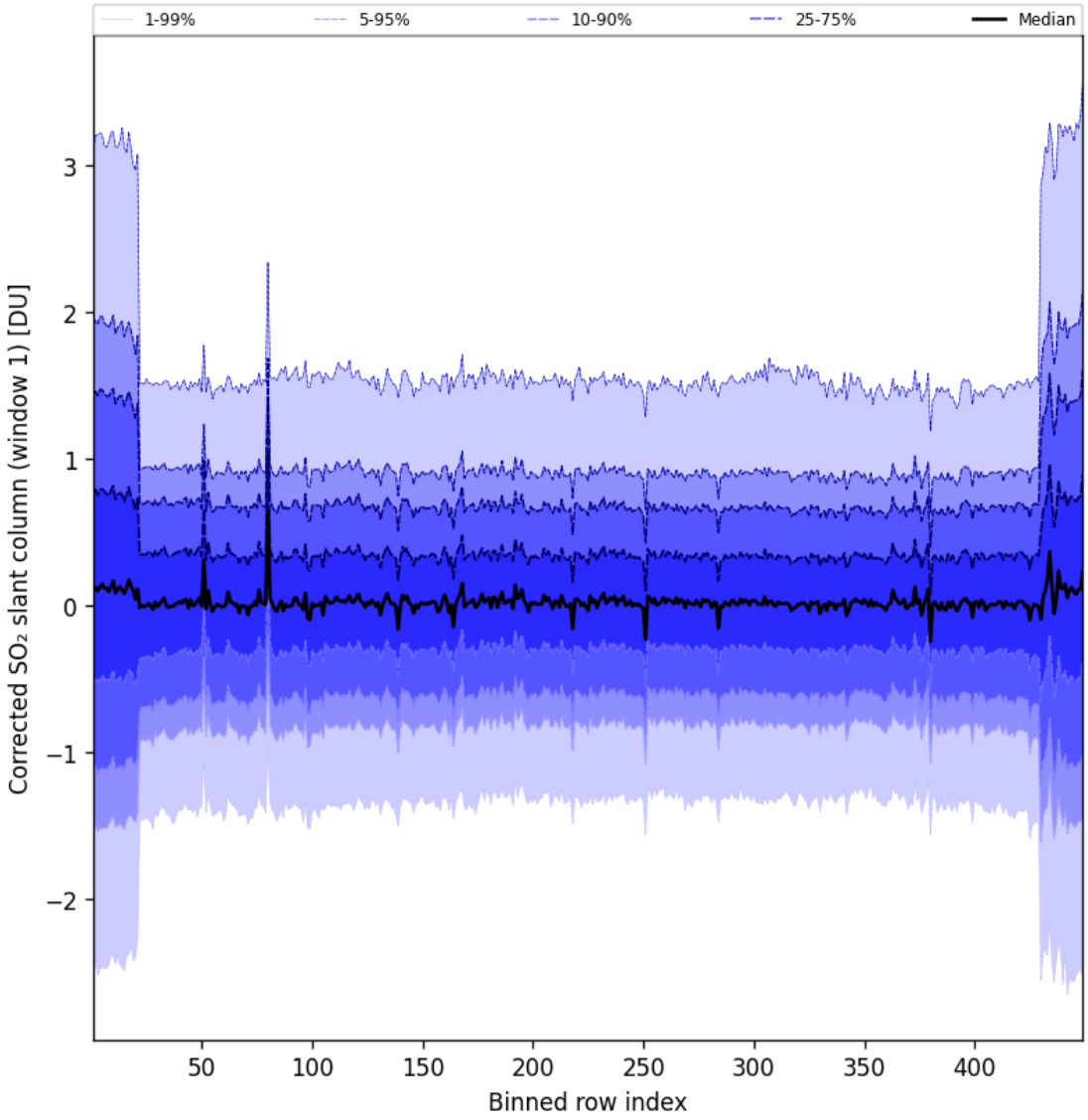

Figure 92: Along track statistics of “Corrected SO_2 slant column (window 1)” for 2025-01-30 to 2025-01-31

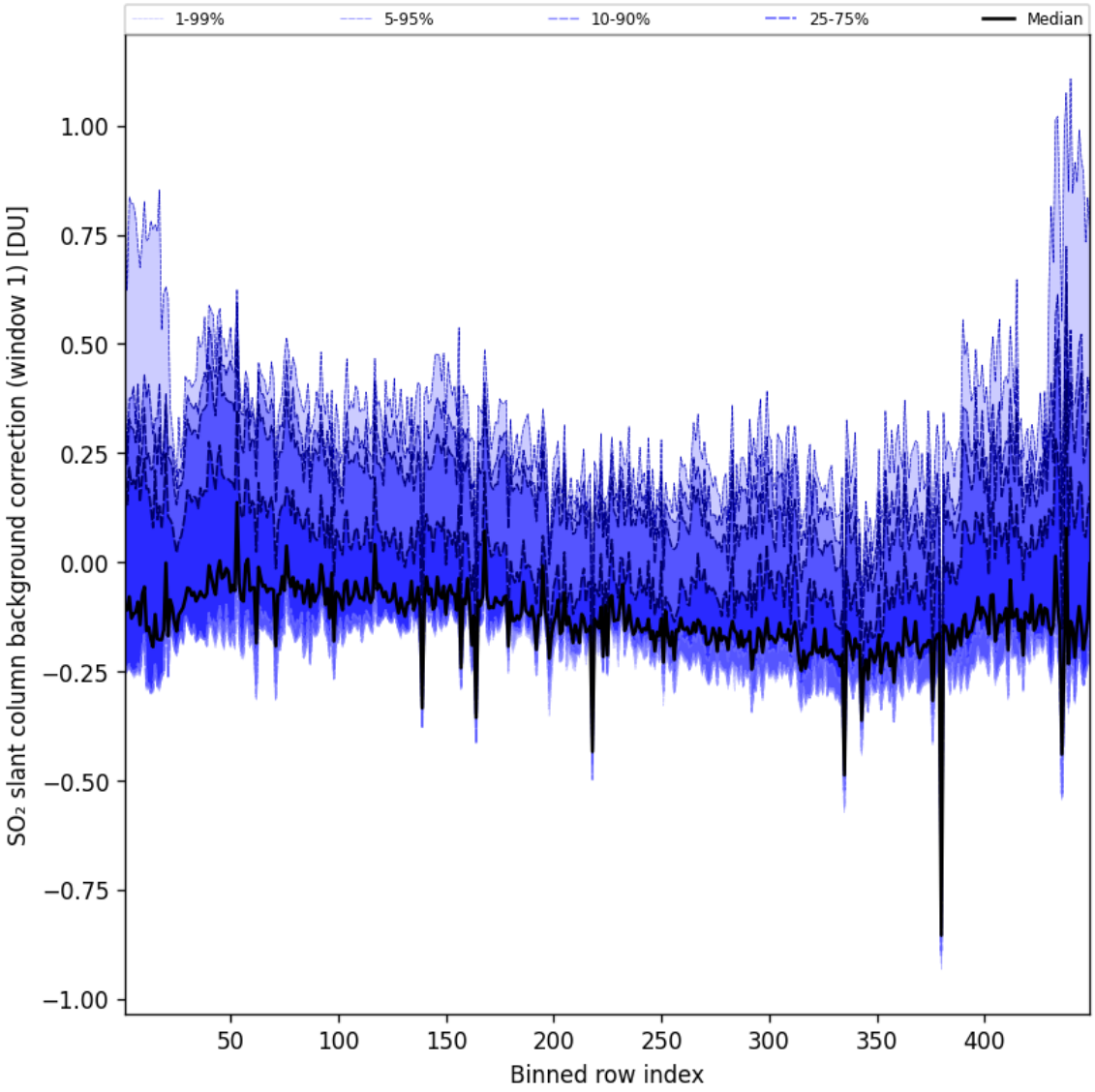

Figure 93: Along track statistics of "SO_2 slant column background correction (window 1)" for 2025-01-30 to 2025-01-31

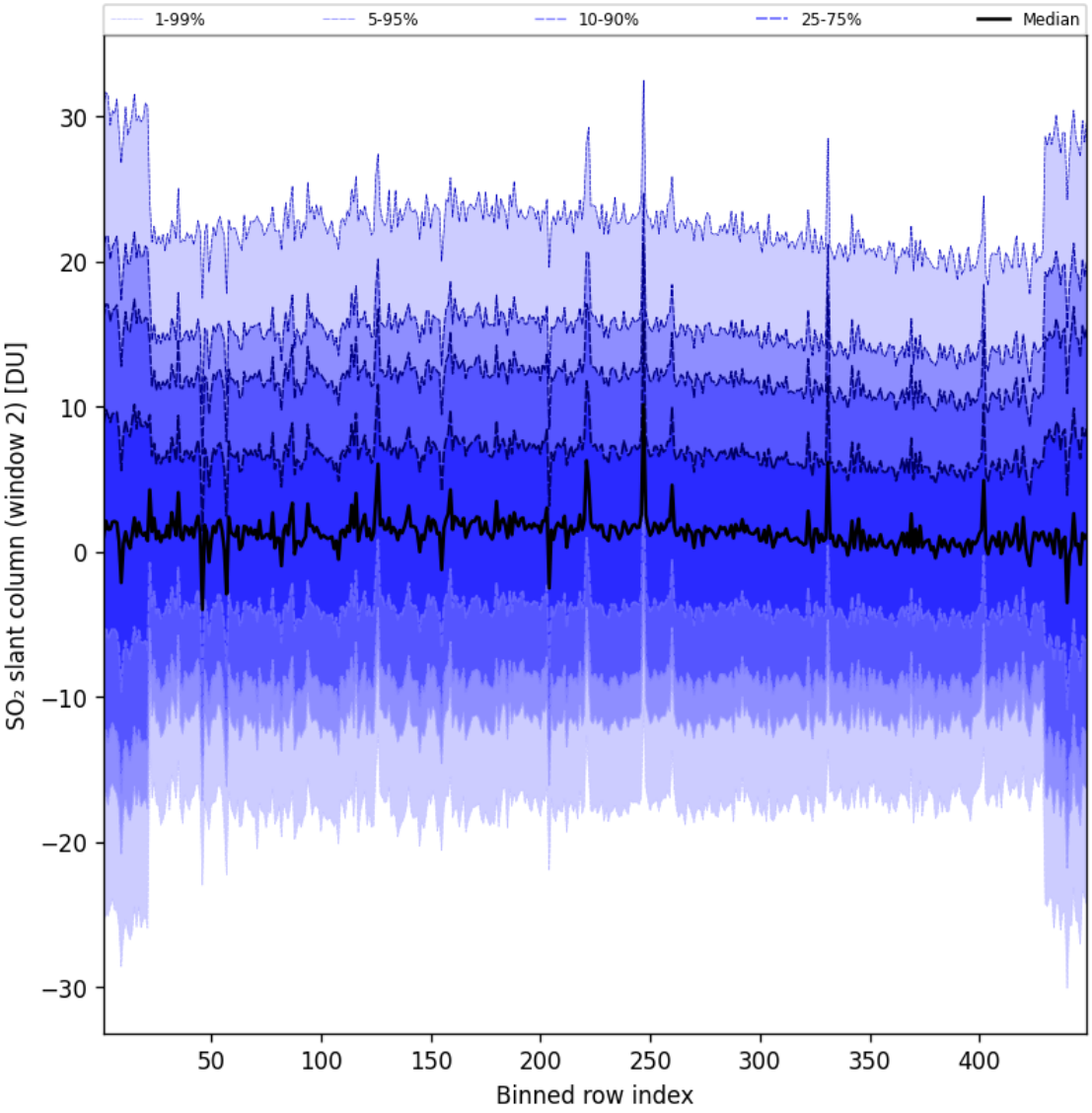

Figure 94: Along track statistics of "SO_2 slant column (window 2)" for 2025-01-30 to 2025-01-31

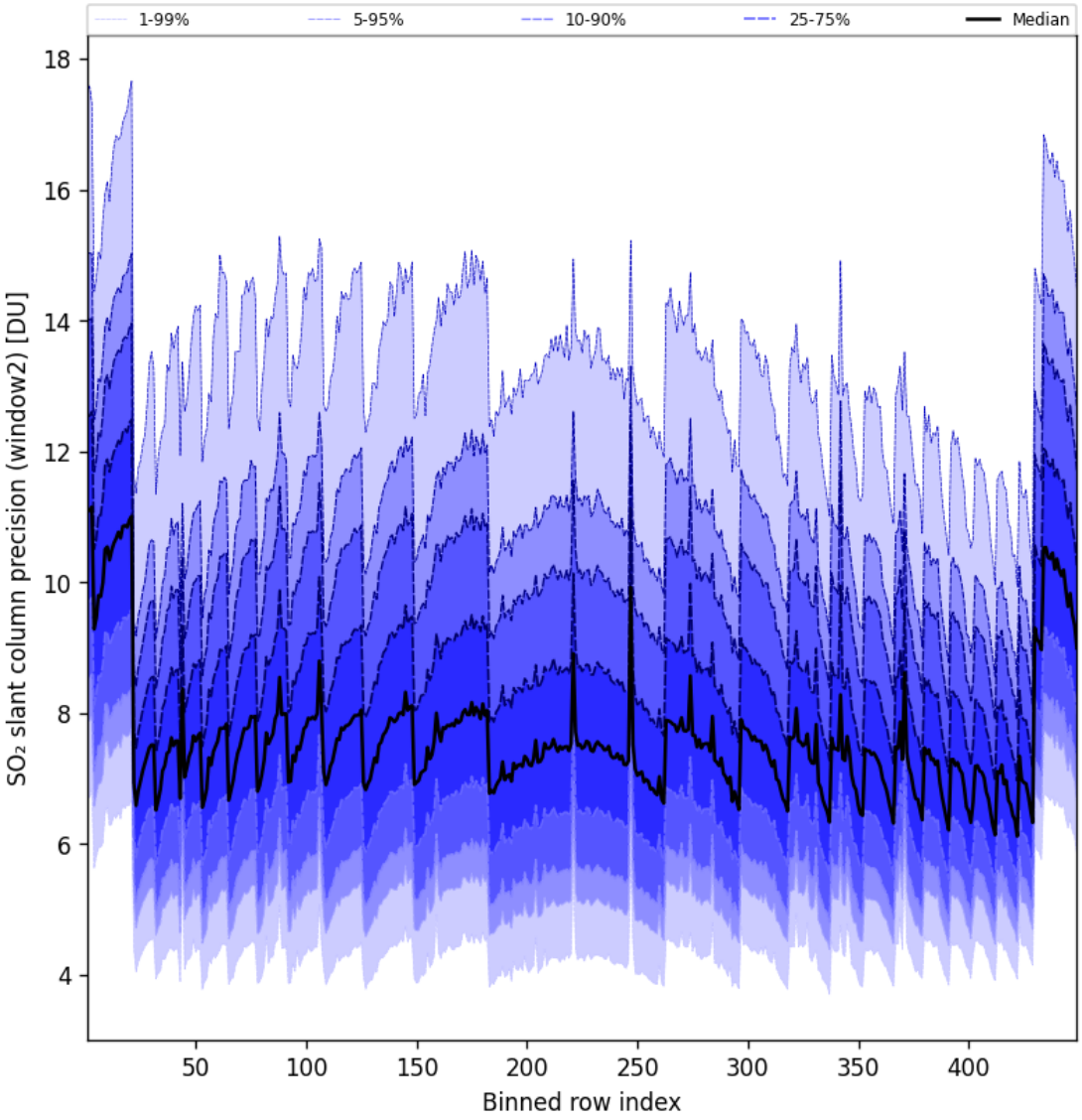

Figure 95: Along track statistics of "SO_2 slant column precision (window2)" for 2025-01-30 to 2025-01-31

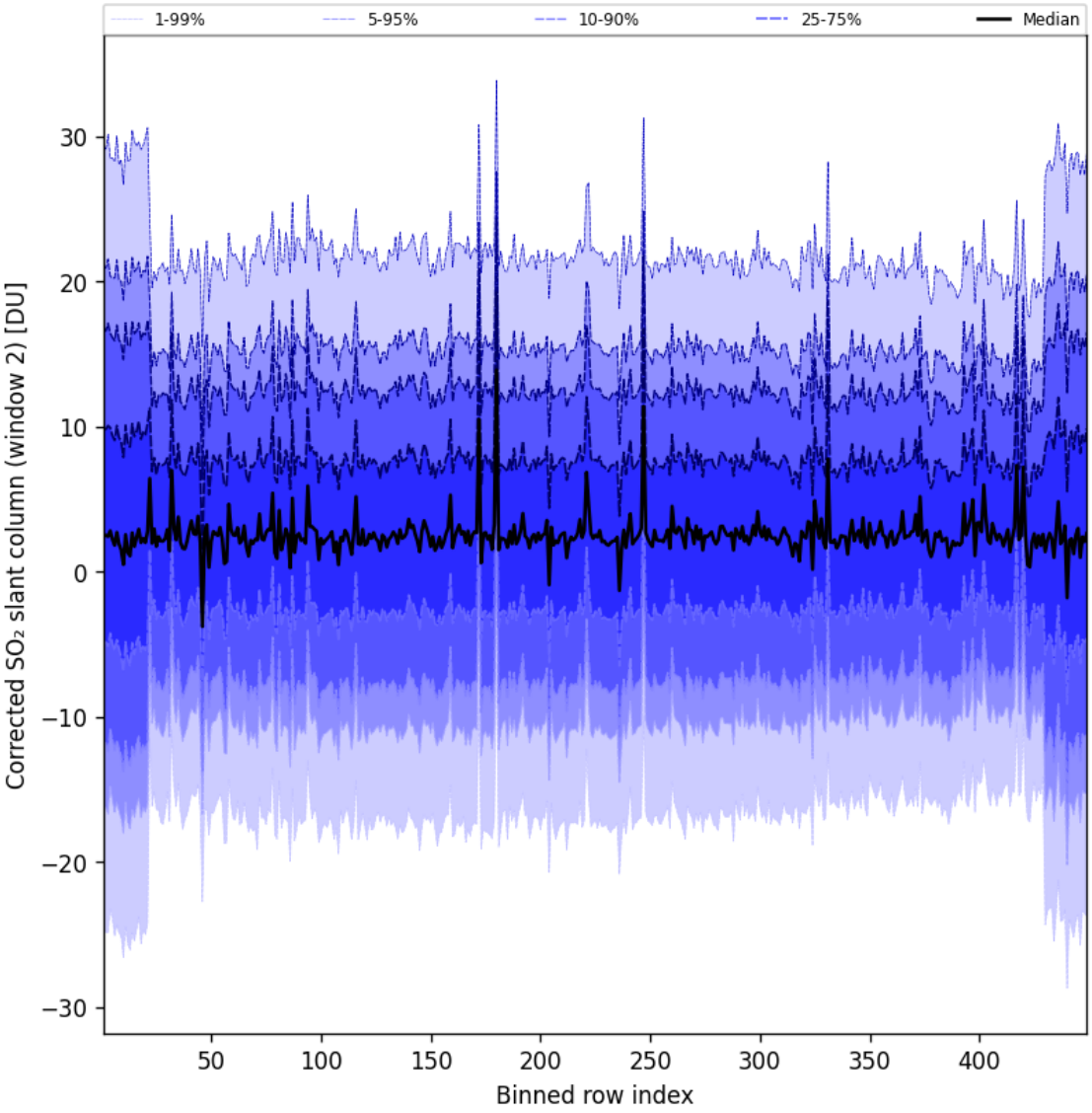

Figure 96: Along track statistics of “Corrected SO_2 slant column (window 2)” for 2025-01-30 to 2025-01-31

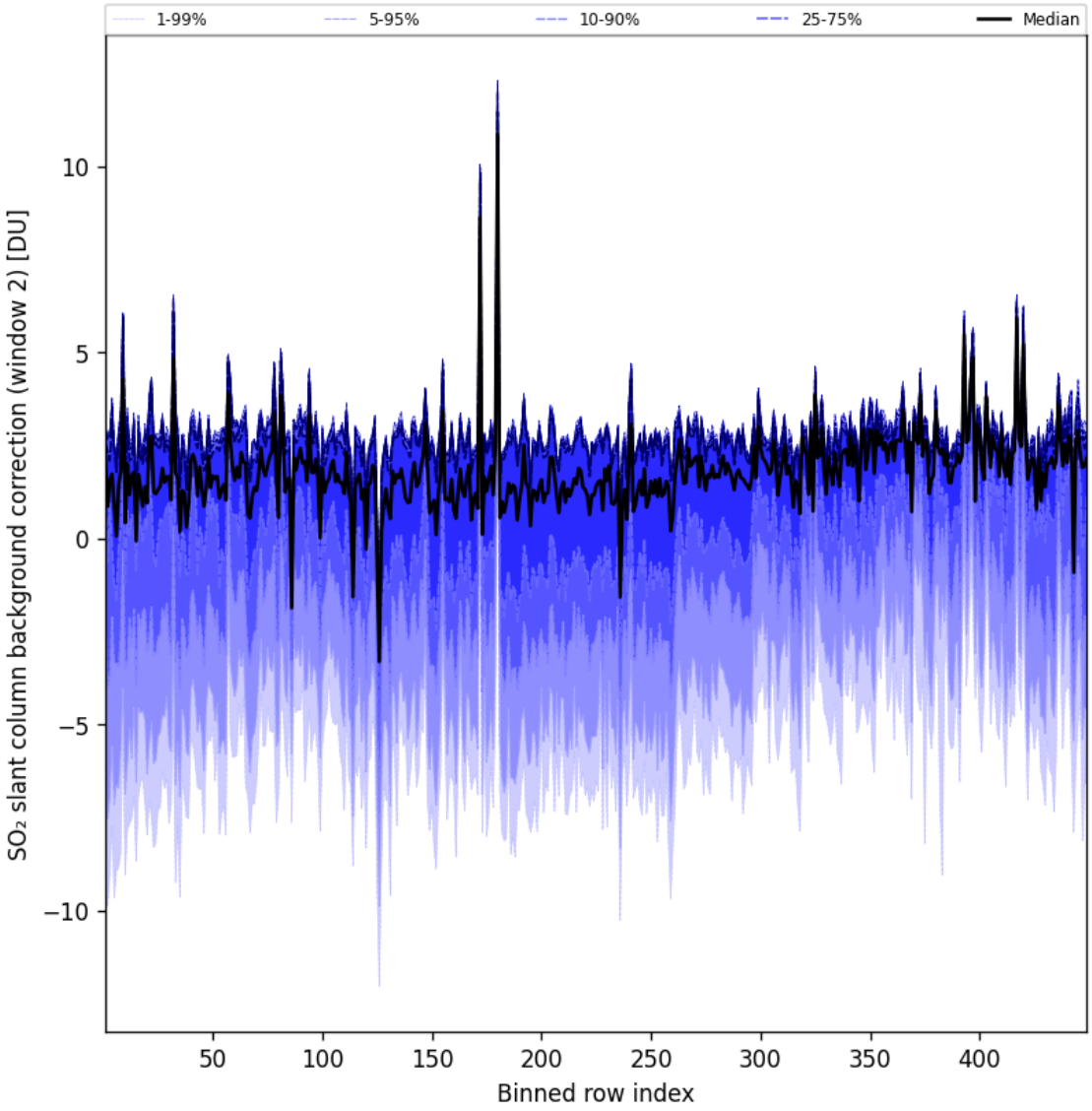

Figure 97: Along track statistics of "SO_2 slant column background correction (window 2)" for 2025-01-30 to 2025-01-31

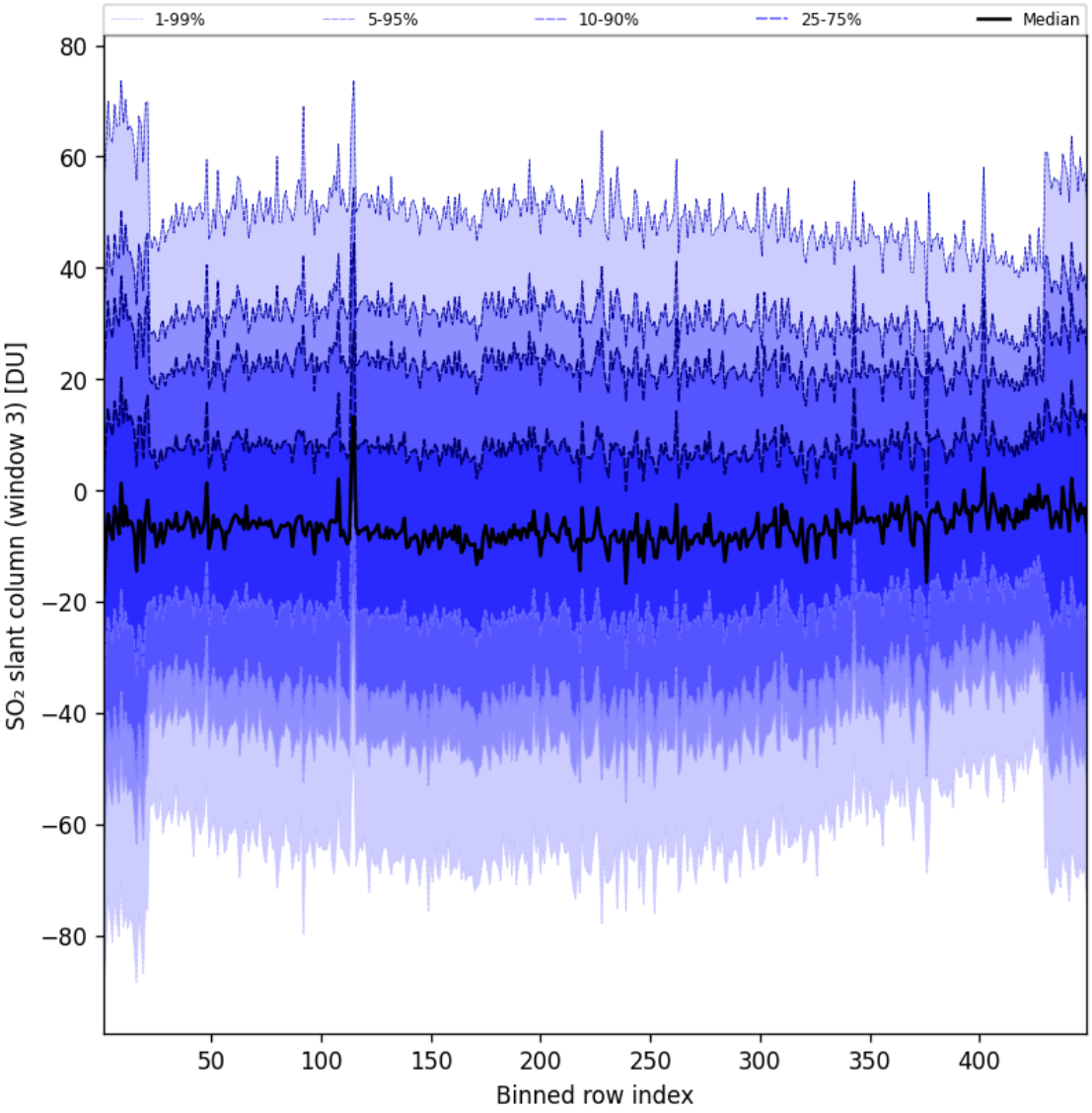

Figure 98: Along track statistics of "SO_2 slant column (window 3)" for 2025-01-30 to 2025-01-31

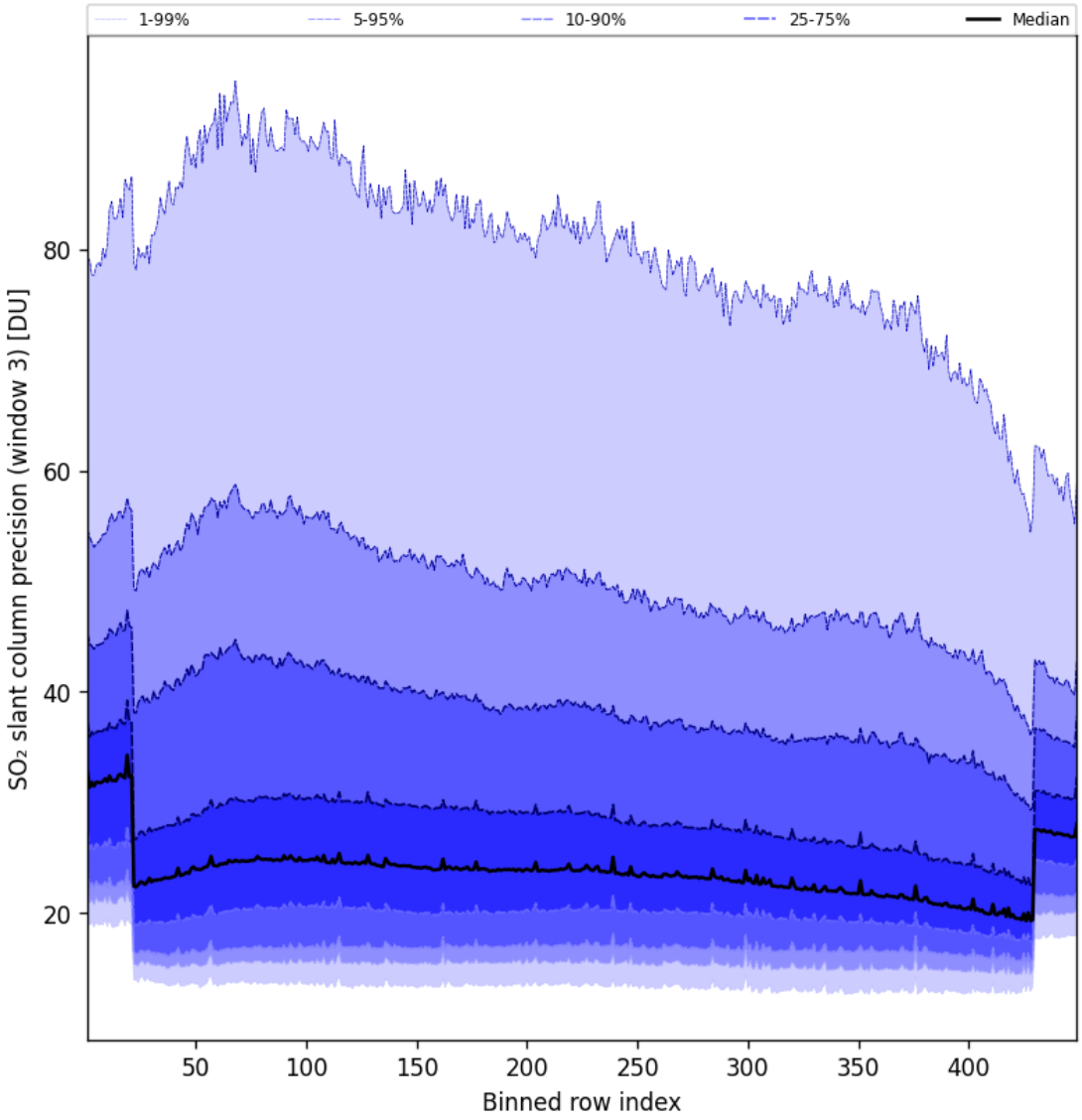

Figure 99: Along track statistics of "SO_2 slant column precision (window 3)" for 2025-01-30 to 2025-01-31

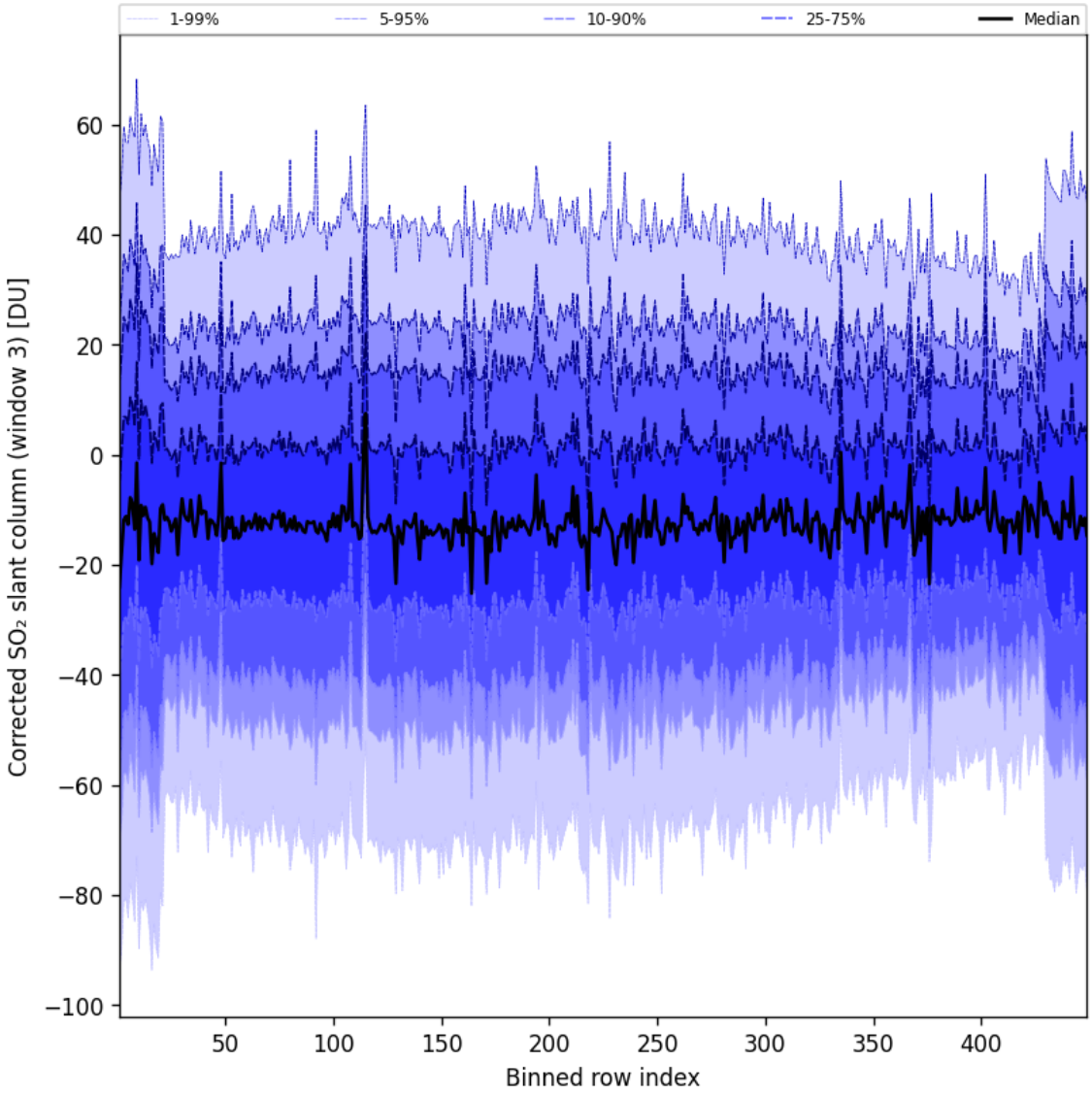

Figure 100: Along track statistics of “Corrected SO_2 slant column (window 3)” for 2025-01-30 to 2025-01-31

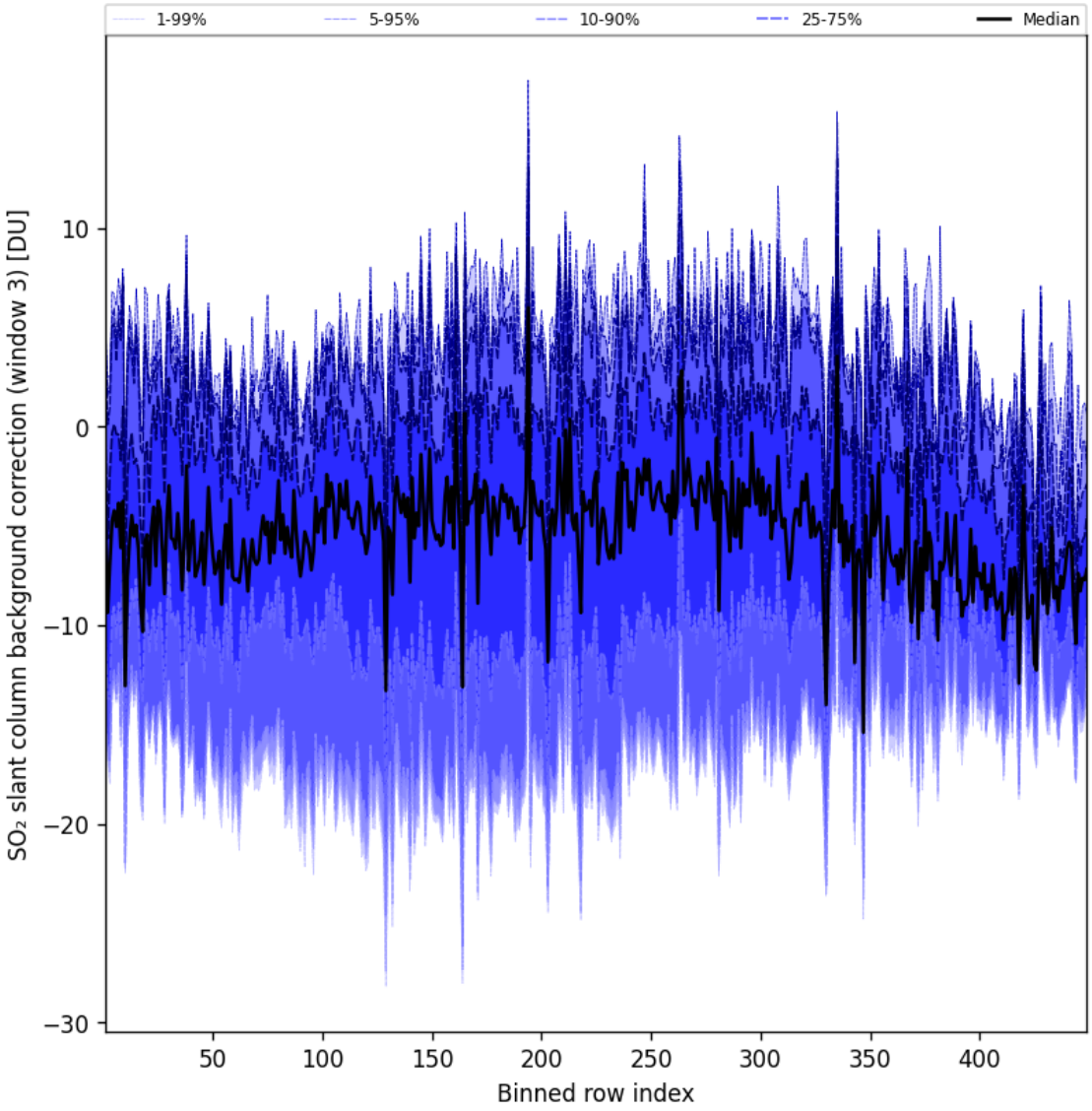

Figure 101: Along track statistics of "SO_2 slant column background correction (window 3)" for 2025-01-30 to 2025-01-31

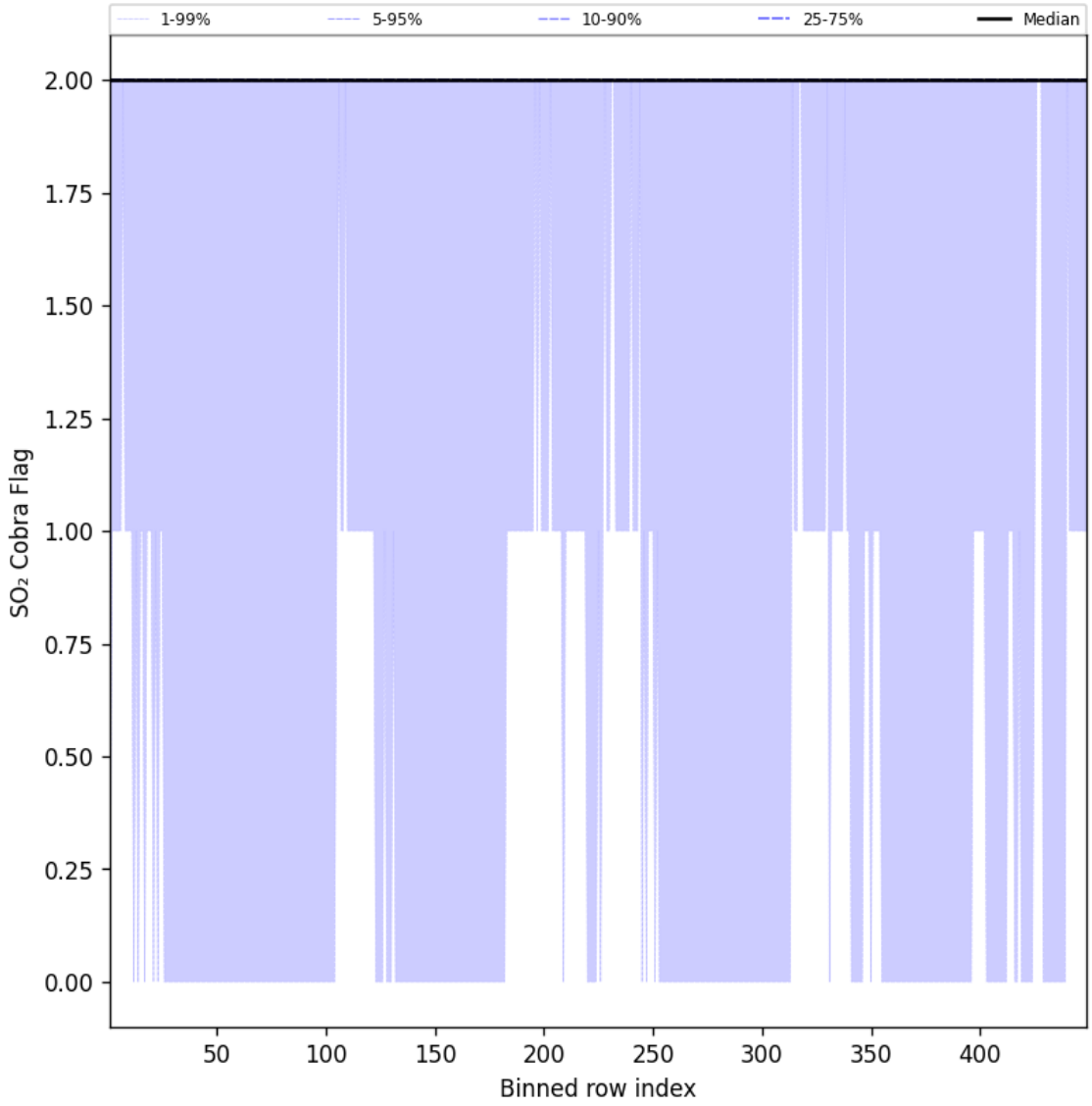

Figure 102: Along track statistics of "SO_2 Cobra Flag" for 2025-01-30 to 2025-01-31

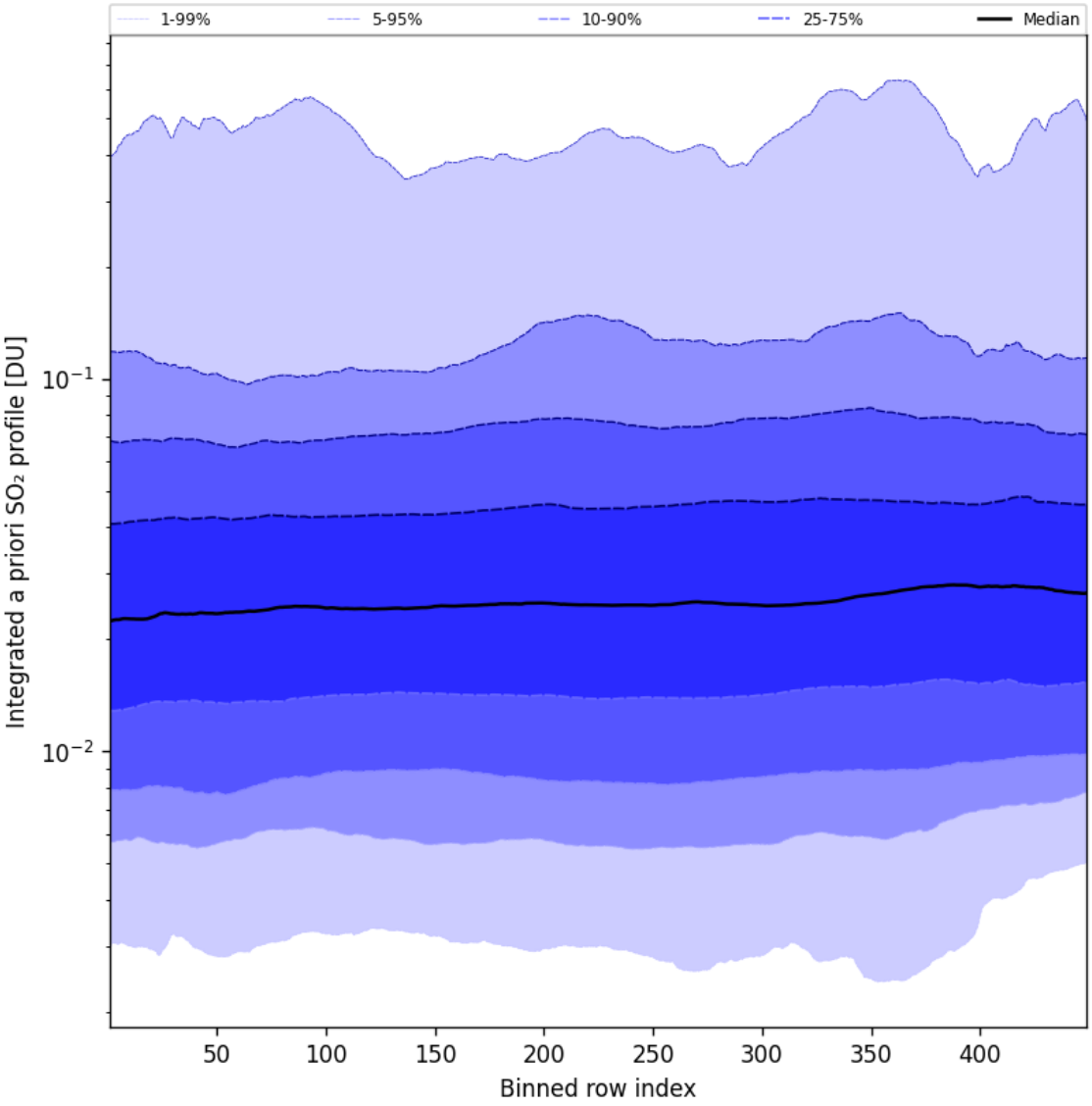

Figure 103: Along track statistics of “Integrated a priori SO_2 profile” for 2025-01-30 to 2025-01-31

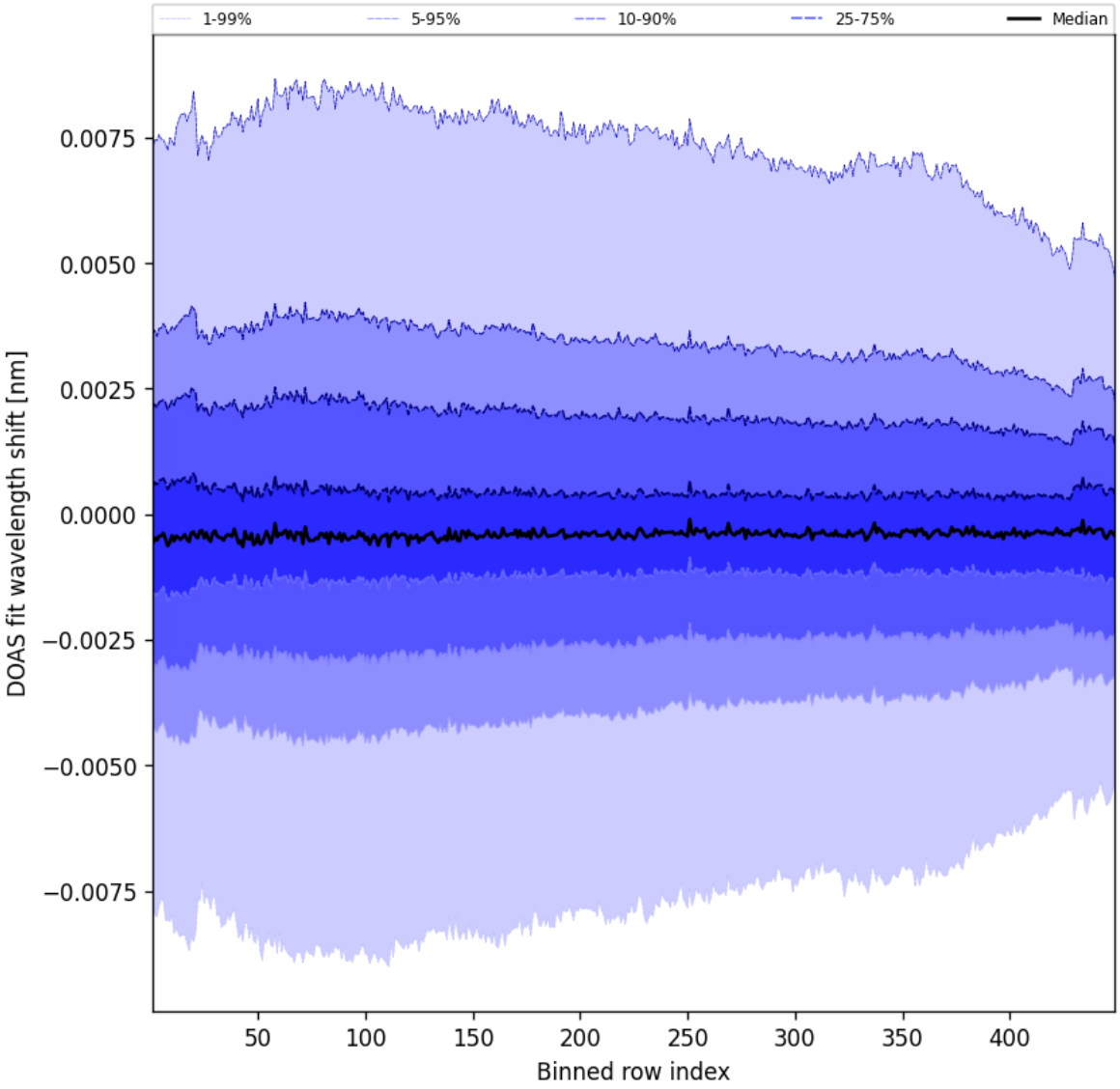

Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2025-01-30 to 2025-01-31

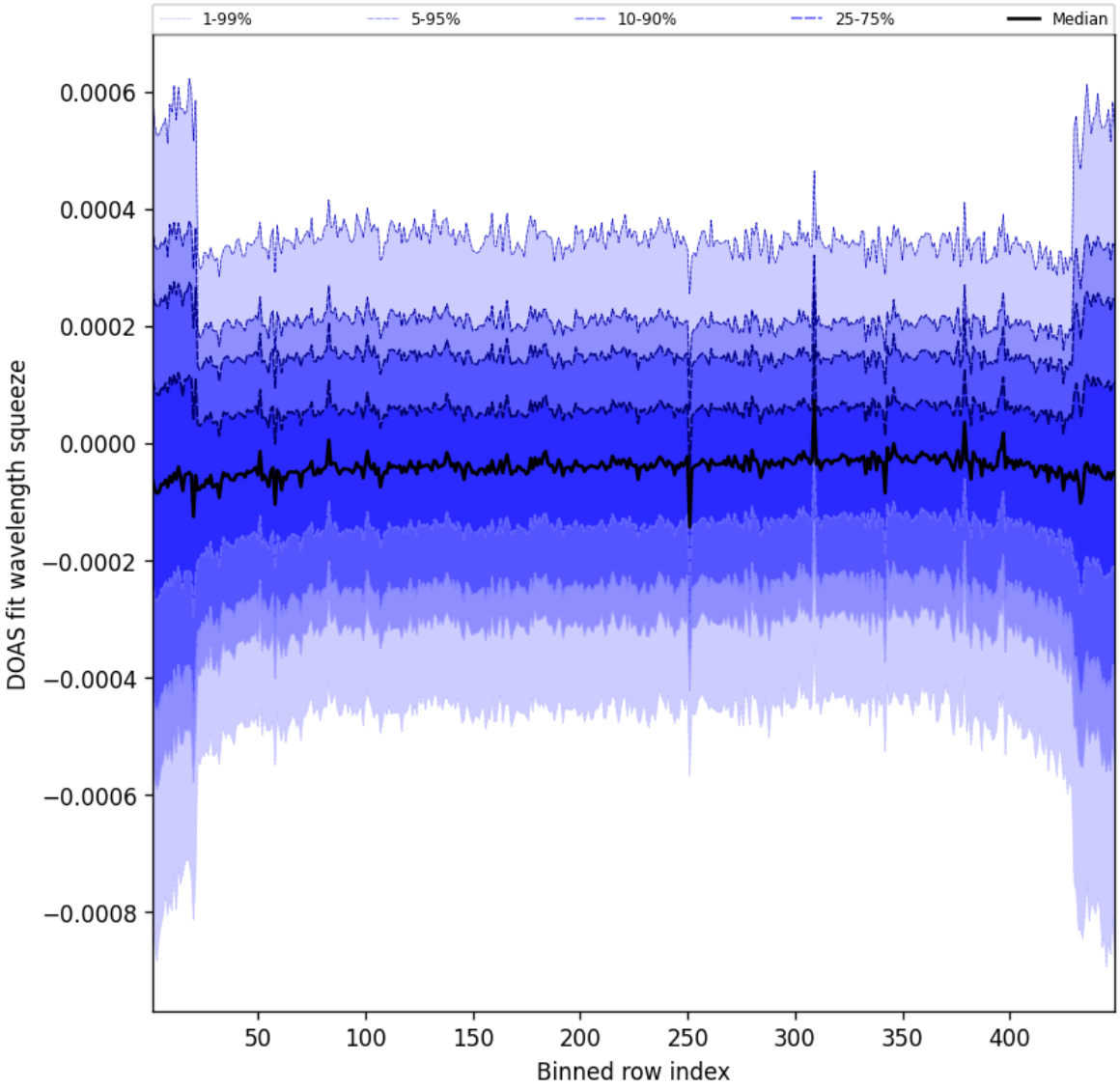

Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2025-01-30 to 2025-01-31

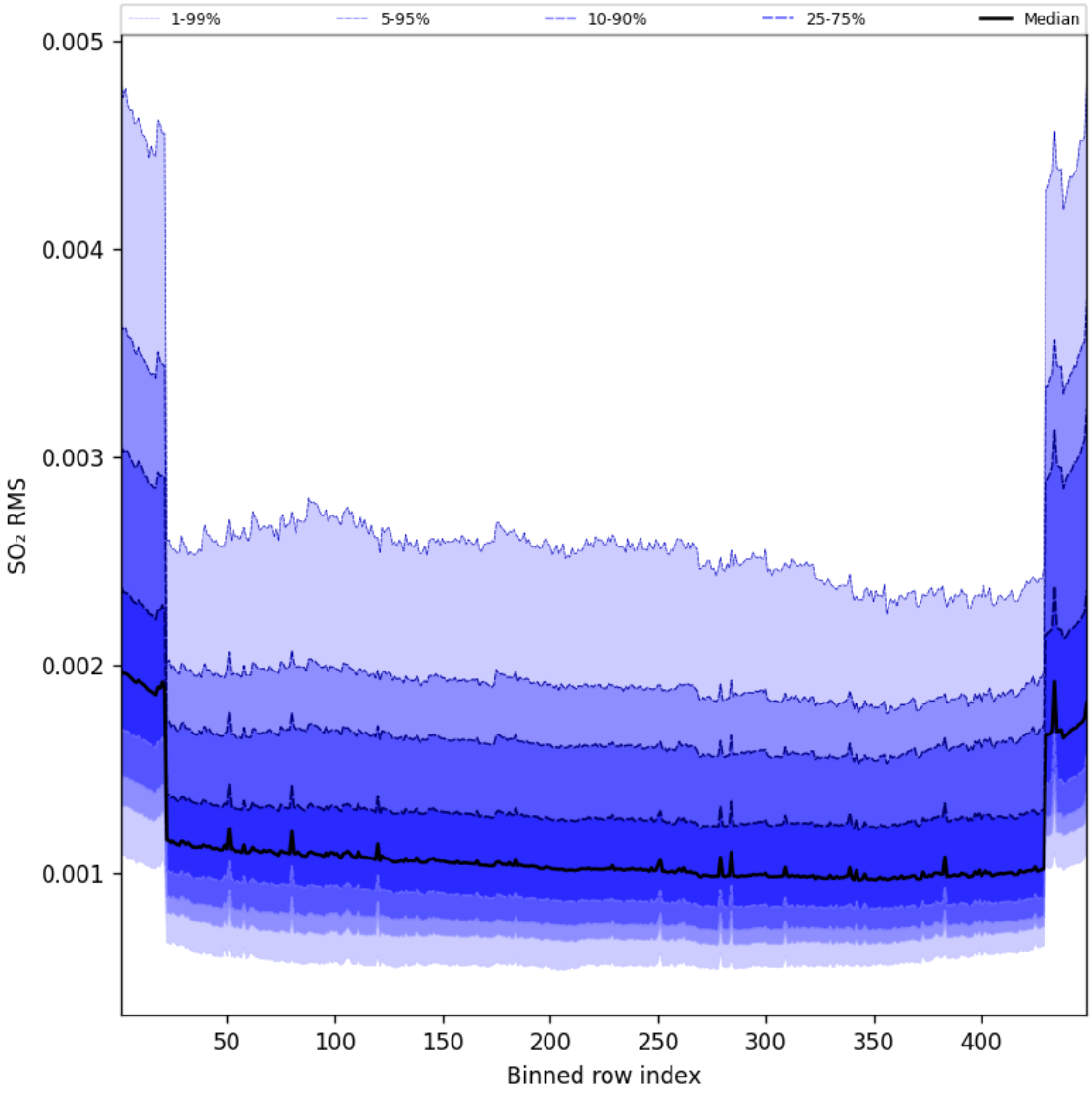

Figure 106: Along track statistics of "SO_2 RMS" for 2025-01-30 to 2025-01-31

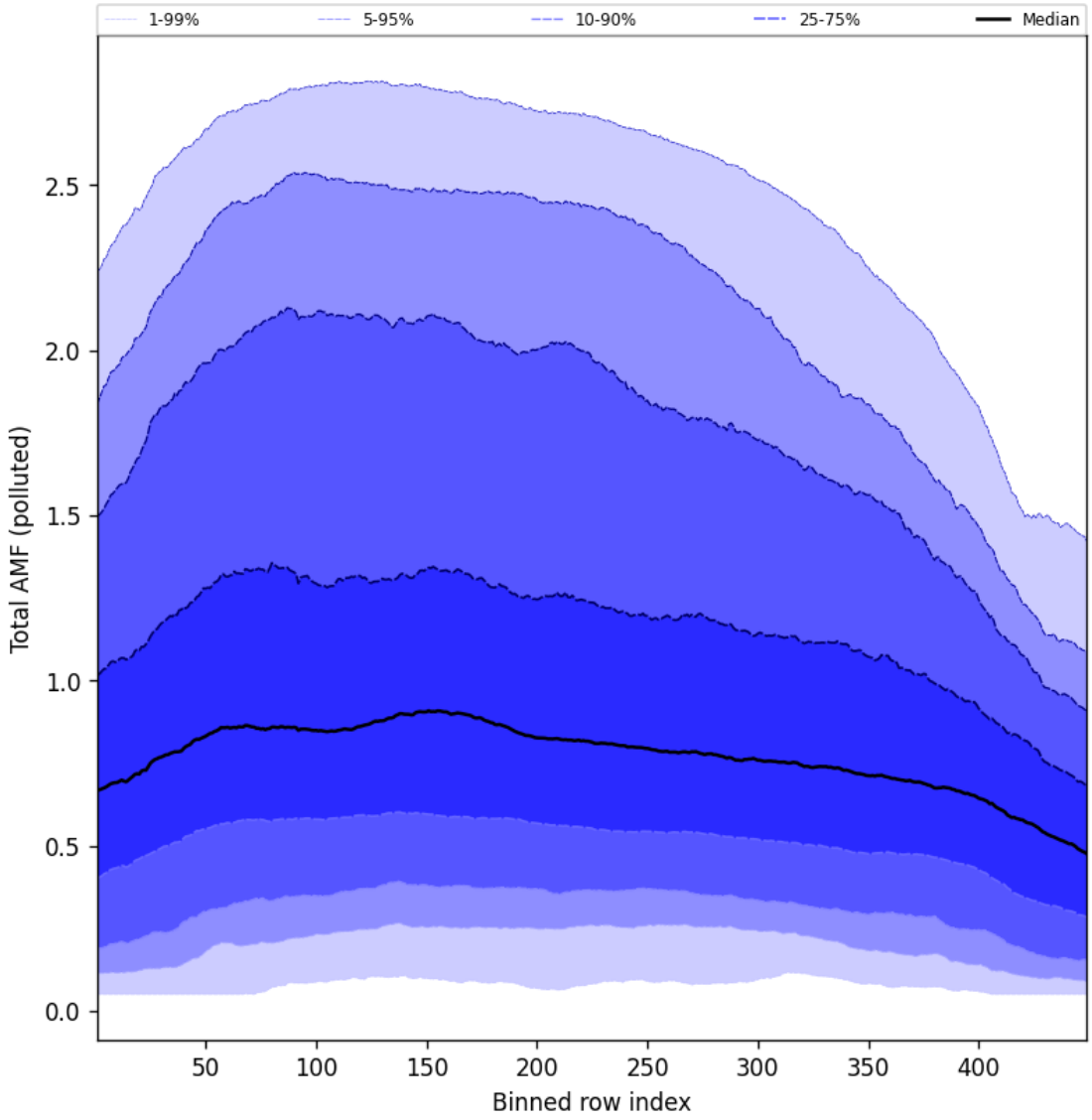

Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-01-30 to 2025-01-31

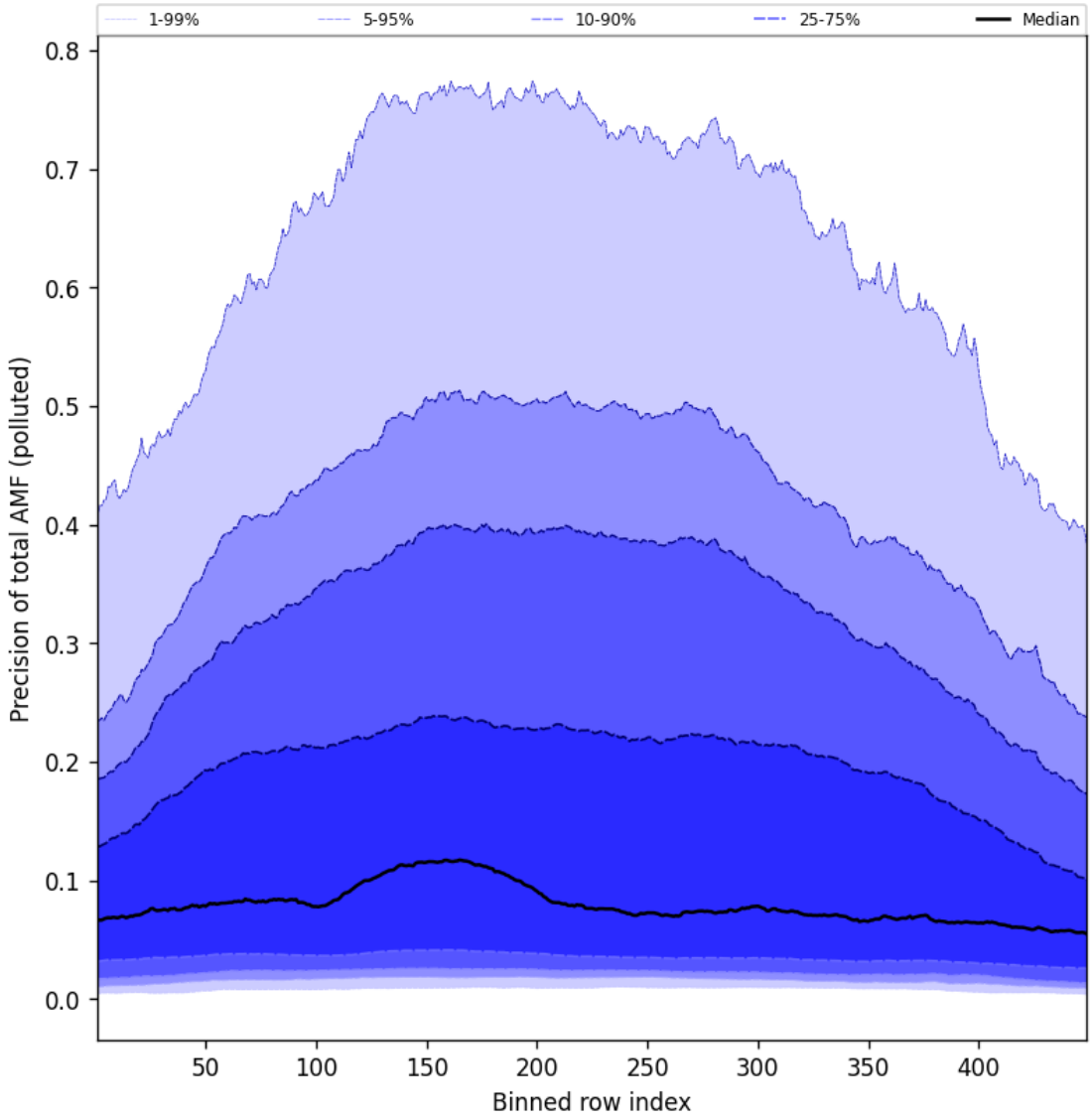

Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-01-30 to 2025-01-31

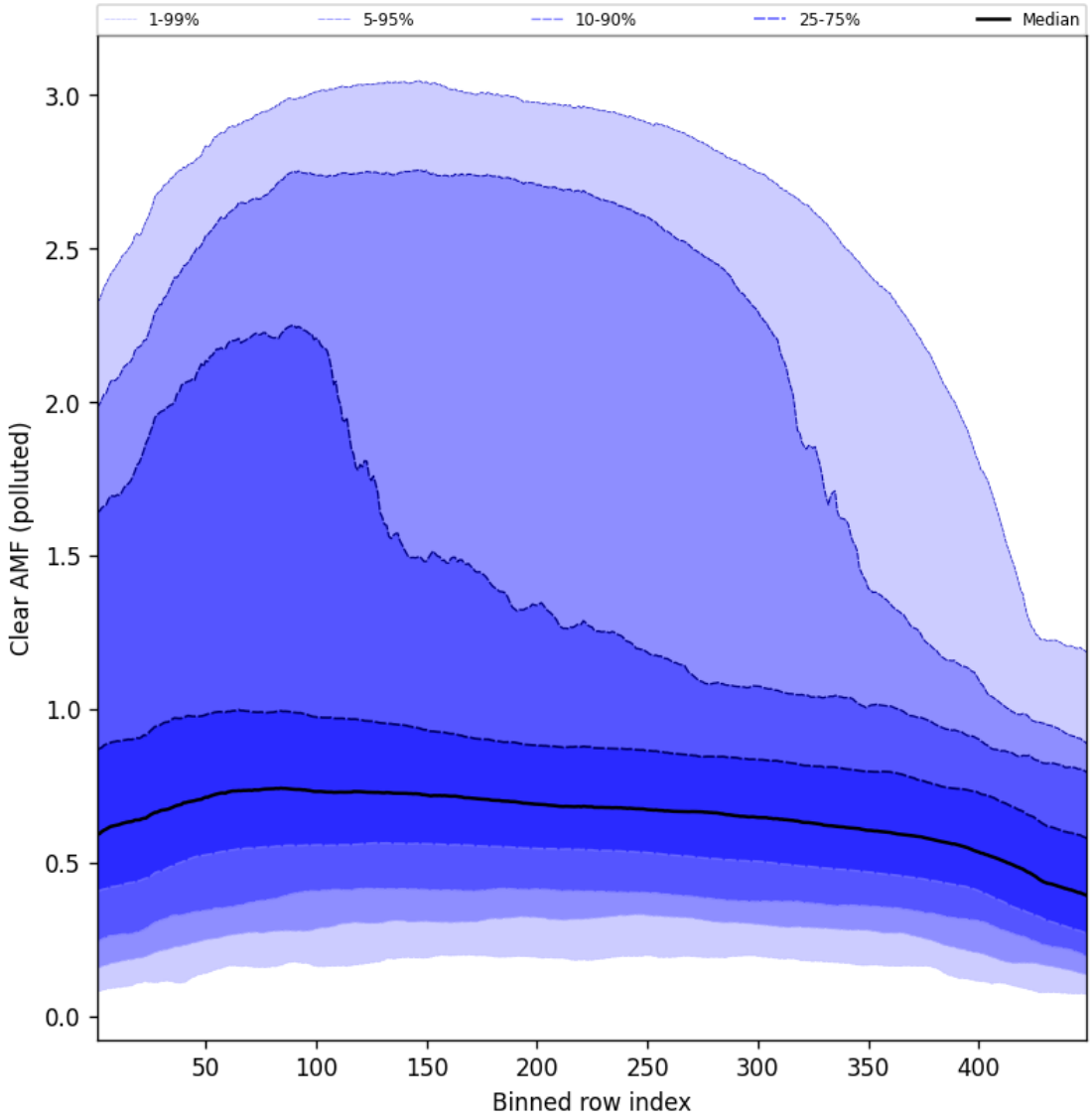

Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-01-30 to 2025-01-31

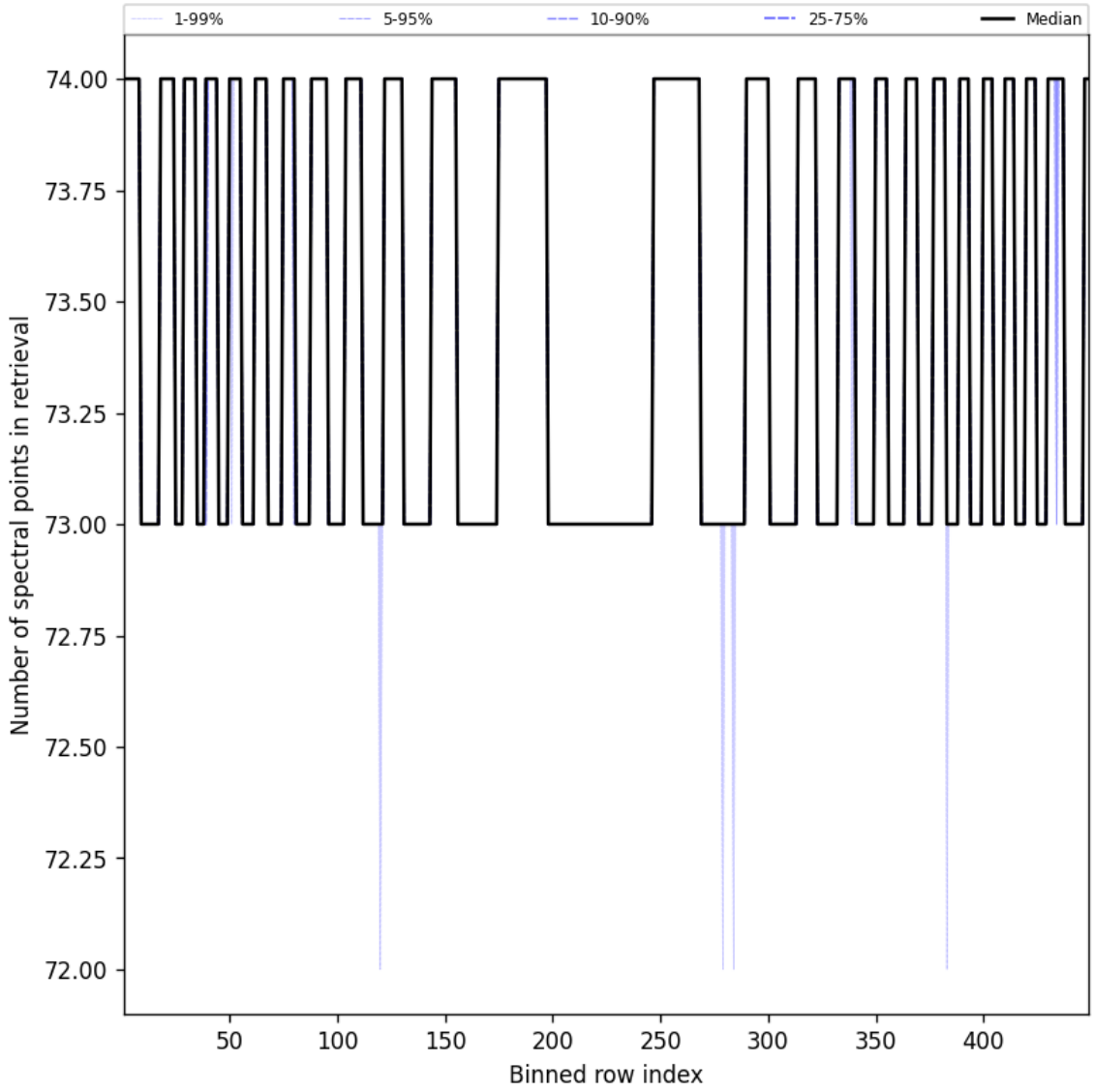

Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-01-30 to 2025-01-31

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.

Contents

List of Figures

List of Tables

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Maarten Sneep (maarten.sneep@knmi.nl).