PyCAMA report generated by tropl2-proc

tropl2-proc

2025-02-26 (04:47)

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]	0.652 ± 0.408	17270246	0.995	0.780	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(5.305 \pm 177.815) \times 10^{-2}$	17270246	0.263	0.459	1.054×10^{-2}	-144	899
sulfurdioxide total vertical column precision [DU]	0.696 ± 1.344	17270246	0.197	0.408	0.320	4.231×10^{-2}	985
sulfurdioxide slant column density corrected [DU]	$(1.914 \pm 37.954) \times 10^{-2}$	17270246	0.242	0.355	9.029×10^{-3}	-14.7	293
sulfurdioxide slant column density cobra [DU]	$(1.898 \pm 36.181) \times 10^{-2}$	17270246	0.242	0.355	9.029×10^{-3}	-14.7	29.6
sulfurdioxide slant column density cobra precision [DU]	0.291 ± 0.141	17270246	0.188	0.150	0.243	7.937×10^{-2}	15.3
sulfurdioxide slant column density window1 [DU]	0.177 ± 0.695	17270246	0.225	0.735	0.189	-54.8	59.6
sulfurdioxide slant column density window1 precision [DU]	0.291 ± 0.141	17270246	0.188	0.150	0.243	7.937×10^{-2}	15.3
sulfurdioxide slant column density corrected win1 [DU]	$(2.620 \pm 68.270) \times 10^{-2}$	17270246	-2.500×10^{-2}	0.712	4.597×10^{-3}	-54.8	59.6
background so2 slant column offset window1 [DU]	-0.151 ± 0.190	17270246	-0.300	0.223	-0.188	-1.41	5.05
sulfurdioxide slant column density window2 [DU]	1.45 ± 9.06	17270246	0.750	11.5	1.18	-1.052×10^{3}	684
sulfurdioxide slant column density window2 precision [DU]	8.06 ± 2.23	17270246	6.97	2.56	7.70	2.19	642
sulfurdioxide slant column density corrected win2 [DU]	0.193 ± 8.635	17270246	0.250	11.0	0.198	-1.051×10^{3}	683
background so2 slant column offset window2 [DU]	-1.26 ± 2.78	17270246	0.750	3.29	-0.219	-21.6	5.49
sulfurdioxide slant column density window3 [DU]	-3.13 ± 24.31	17270246	-2.80	30.7	-3.23	-607	526
sulfurdioxide slant column density window3 precision [DU]	28.3 ± 13.5	17270246	21.5	9.84	24.6	9.10	305
sulfurdioxide slant column density corrected win3 [DU]	3.56 ± 23.28	17270246	2.80	29.4	3.60	-596	531
background so2 slant column offset window3 [DU]	6.69 ± 7.32	17270246	1.68	11.5	6.16	-29.5	60.4
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.21	17270246	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(3.706 \pm 9.061) \times 10^{-2}$	17270246	1.664×10^{-2}	2.054×10^{-2}	1.738×10^{-2}	3.283×10^{-4}	3.17
fitted radiance shift [nm]	$(-3.351 \pm 26.360) \times 10^{-4}$	17270246	-5.000×10^{-4}	1.873×10^{-3}	-3.219×10^{-4}	-5.326×10^{-2}	5.217×10^{-2}
fitted radiance squeeze [1]	$(-3.646 \pm 18.255) \times 10^{-5}$	17270246	-1.000×10^{-5}	2.042×10^{-4}	-2.742×10^{-5}	-1.781×10^{-2}	2.001×10^{-2}
fitted root mean square [1]	$(1.279 \pm 0.586) \times 10^{-3}$	17270246	9.250×10^{-4}	5.882×10^{-4}	1.092×10^{-3}	3.093×10^{-4}	5.280×10^{-2}
sulfurdioxide total air mass factor polluted [1]	0.826 ± 0.473	17270246	0.580	0.576	0.765	5.000×10^{-2}	2.96
sulfurdioxide total air mass factor polluted precision [1]	0.119 ± 0.132	17270246	3.500×10^{-2}	0.127	6.622×10^{-2}	2.500×10^{-3}	1.85
sulfurdioxide clear air mass factor polluted [1]	0.719 ± 0.390	17270246	0.580	0.403	0.669	2.815×10^{-2}	2.98
number of spectral points in retrieval [1]	73.5 ± 0.5	17270246	73.0	1.000	73.0	53.0	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}	0.110	0.220	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	−3.85	−1.10	−0.592	−0.377	−0.215	0.244	0.423	0.671	1.27	4.69
sulfurdioxide total vertical column precision [DU]	9.155×10^{-2}	0.126	0.152	0.177	0.210	0.617	0.941	1.39	2.40	6.60
sulfurdioxide slant column density corrected [DU]	−0.871	−0.490	−0.350	−0.260	−0.167	0.189	0.288	0.387	0.549	1.06
sulfurdioxide slant column density cobra [DU]	−0.871	−0.490	−0.350	−0.260	−0.167	0.189	0.288	0.387	0.549	1.06
sulfurdioxide slant column density cobra precision [DU]	0.136	0.161	0.173	0.184	0.197	0.347	0.406	0.465	0.552	0.806
sulfurdioxide slant column density window1 [DU]	−1.75	−0.898	−0.587	−0.387	−0.184	0.551	0.741	0.925	1.21	2.02
sulfurdioxide slant column density window1 precision [DU]	0.136	0.161	0.173	0.184	0.197	0.347	0.406	0.465	0.552	0.806
sulfurdioxide slant column density corrected win1 [DU]	−1.70	−0.964	−0.700	−0.527	−0.345	0.367	0.567	0.768	1.09	2.03
background so2 slant column offset window1 [DU]	−0.478	−0.352	−0.326	−0.309	−0.285	-6.205×10^{-2}	1.901×10^{-2}	9.638×10^{-2}	0.194	0.434
sulfurdioxide slant column density window2 [DU]	−19.3	−12.8	−9.58	−7.16	−4.43	7.03	10.0	12.8	16.6	24.7
sulfurdioxide slant column density window2 precision [DU]	4.31	5.20	5.71	6.12	6.60	9.16	10.0	10.9	12.1	14.7
sulfurdioxide slant column density corrected win2 [DU]	−20.8	−13.8	−10.5	−8.03	−5.29	5.68	8.41	10.9	14.2	21.1
background so2 slant column offset window2 [DU]	−9.33	−7.24	−5.65	−4.21	−2.58	0.708	0.966	1.18	1.48	2.69
sulfurdioxide slant column density window3 [DU]	−63.2	−42.9	−33.2	−26.2	−18.5	12.3	20.2	27.3	36.9	55.9
sulfurdioxide slant column density window3 precision [DU]	14.1	16.6	18.1	19.4	20.8	30.7	35.5	41.7	53.9	86.0
sulfurdioxide slant column density corrected win3 [DU]	−54.7	−34.7	−25.2	−18.4	−11.0	18.3	25.8	32.5	41.5	59.8
background so2 slant column offset window3 [DU]	−7.60	−4.05	−2.39	−0.904	0.983	12.5	14.9	16.7	18.6	21.5
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]	1.712×10^{-3}	3.925×10^{-3}	6.186×10^{-3}	8.159×10^{-3}	1.044×10^{-2}	3.098×10^{-2}	4.431×10^{-2}	6.425×10^{-2}	0.118	0.390
fitted radiance shift [nm]	-8.288×10^{-3}	-4.250×10^{-3}	-2.832×10^{-3}	-2.021×10^{-3}	-1.316×10^{-3}	5.566×10^{-4}	1.266×10^{-3}	2.168×10^{-3}	3.730×10^{-3}	7.935×10^{-3}
fitted radiance squeeze [1]	-5.595×10^{-4}	-3.361×10^{-4}	-2.490×10^{-4}	-1.916×10^{-4}	-1.331×10^{-4}	7.120×10^{-5}	1.206×10^{-4}	1.662×10^{-4}	2.320×10^{-4}	3.982×10^{-4}
fitted root mean square [1]	5.831×10^{-4}	7.141×10^{-4}	7.851×10^{-4}	8.389×10^{-4}	9.049×10^{-4}	1.493×10^{-3}	1.748×10^{-3}	2.001×10^{-3}	2.402×10^{-3}	3.432×10^{-3}
sulfurdioxide total air mass factor polluted [1]	5.980×10^{-2}	0.168	0.267	0.370	0.491	1.07	1.27	1.47	1.75	2.26
sulfurdioxide total air mass factor polluted precision [1]	6.845×10^{-3}	1.405×10^{-2}	2.096×10^{-2}	2.659×10^{-2}	3.481×10^{-2}	0.162	0.221	0.279	0.372	0.610
sulfurdioxide clear air mass factor polluted [1]	0.124	0.231	0.318	0.395	0.480	0.883	0.982	1.07	1.26	2.50
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]	0.673 ± 0.404	7751724	0.770	1.000	0.0	1.000	0.230	1.000
sulfurdioxide total vertical column [DU]	$(9.636 \pm 252.708) \times 10^{-2}$	7751724	0.617	1.471×10^{-2}	-144	348	-0.283	0.335
sulfurdioxide total vertical column precision [DU]	1.06 ± 1.83	7751724	0.817	0.455	4.231×10^{-2}	73.9	0.245	1.06
sulfurdioxide slant column density corrected [DU]	$(2.730 \pm 43.916) \times 10^{-2}$	7751724	0.393	1.111×10^{-2}	-10.6	57.9	-0.183	0.211
sulfurdioxide slant column density cobra [DU]	$(2.704 \pm 42.738) \times 10^{-2}$	7751724	0.393	1.111×10^{-2}	-10.6	14.5	-0.183	0.211
sulfurdioxide slant column density cobra precision [DU]	0.329 ± 0.169	7751724	0.202	0.281	8.886×10^{-2}	9.03	0.206	0.409
sulfurdioxide slant column density window1 [DU]	0.214 ± 0.801	7751724	0.804	0.226	-19.1	46.8	-0.179	0.625
sulfurdioxide slant column density window1 precision [DU]	0.329 ± 0.169	7751724	0.202	0.281	8.886×10^{-2}	9.03	0.206	0.409
sulfurdioxide slant column density corrected win1 [DU]	$(5.649 \pm 79.646) \times 10^{-2}$	7751724	0.791	2.358×10^{-2}	-18.3	46.9	-0.361	0.430
background so2 slant column offset window1 [DU]	-0.157 ± 0.206	7751724	0.217	-0.200	-1.41	5.05	-0.292	-7.494×10^{-2}
sulfurdioxide slant column density window2 [DU]	2.38 ± 9.65	7751724	12.3	1.98	-524	85.0	-3.99	8.33
sulfurdioxide slant column density window2 precision [DU]	8.44 ± 2.28	7751724	2.83	8.06	2.42	138	6.86	9.68
sulfurdioxide slant column density corrected win2 [DU]	0.153 ± 9.017	7751724	11.5	0.153	-525	80.7	-5.59	5.89
background so2 slant column offset window2 [DU]	-2.23 ± 3.40	7751724	5.64	-0.937	-21.6	5.18	-5.04	0.602
sulfurdioxide slant column density window3 [DU]	-6.01 ± 24.63	7751724	31.3	-5.74	-279	166	-21.4	9.83
sulfurdioxide slant column density window3 precision [DU]	29.0 ± 13.2	7751724	10.0	25.5	10.3	228	21.7	31.7
sulfurdioxide slant column density corrected win3 [DU]	3.31 ± 23.78	7751724	30.0	3.52	-276	184	-11.6	18.5
background so2 slant column offset window3 [DU]	9.32 ± 6.83	7751724	11.5	9.24	-27.3	60.4	3.52	15.0
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.23	7751724	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(5.792 \pm 12.920) \times 10^{-2}$	7751724	3.799×10^{-2}	2.154×10^{-2}	3.283×10^{-4}	3.17	1.258×10^{-2}	5.058×10^{-2}
fitted radiance shift [nm]	$(-1.864 \pm 25.857) \times 10^{-4}$	7751724	1.772×10^{-3}	-1.710×10^{-4}	-3.821×10^{-2}	3.868×10^{-2}	-1.102×10^{-3}	6.698×10^{-4}
fitted radiance squeeze [1]	$(-2.618 \pm 20.458) \times 10^{-5}$	7751724	2.177×10^{-4}	-1.536×10^{-5}	-1.496×10^{-2}	1.246×10^{-2}	-1.276×10^{-4}	9.007×10^{-5}
fitted root mean square [1]	$(1.434 \pm 0.711) \times 10^{-3}$	7751724	8.009×10^{-4}	1.193×10^{-3}	3.400×10^{-4}	4.053×10^{-2}	9.459×10^{-4}	1.747×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.688 ± 0.426	7751724	0.573	0.628	5.000×10^{-2}	2.84	0.361	0.934
sulfurdioxide total air mass factor polluted precision [1]	$(9.876 \pm 14.151) \times 10^{-2}$	7751724	8.927×10^{-2}	4.841×10^{-2}	2.500×10^{-3}	1.85	2.548×10^{-2}	0.115
sulfurdioxide clear air mass factor polluted [1]	0.595 ± 0.297	7751724	0.465	0.560	2.815×10^{-2}	2.33	0.357	0.822
number of spectral points in retrieval [1]	73.5 ± 0.5	7751724	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]	0.635 ± 0.411	9518522	0.790	1.000	0.0	1.000	0.210	1.000
sulfurdioxide total vertical column [DU]	$(1.778 \pm 73.024) \times 10^{-2}$	9518522	0.378	8.202×10^{-3}	-43.9	899	-0.179	0.199
sulfurdioxide total vertical column precision [DU]	0.399 ± 0.587	9518522	0.244	0.273	4.343×10^{-2}	985	0.191	0.435
sulfurdioxide slant column density corrected [DU]	$(1.250 \pm 32.281) \times 10^{-2}$	9518522	0.329	7.585×10^{-3}	-14.7	293	-0.156	0.173
sulfurdioxide slant column density cobra [DU]	$(1.242 \pm 29.777) \times 10^{-2}$	9518522	0.329	7.585×10^{-3}	-14.7	29.6	-0.156	0.173
sulfurdioxide slant column density cobra precision [DU]	0.259 ± 0.102	9518522	0.108	0.228	7.937×10^{-2}	15.3	0.192	0.301
sulfurdioxide slant column density window1 [DU]	0.148 ± 0.592	9518522	0.685	0.163	-54.8	59.6	-0.187	0.498
sulfurdioxide slant column density window1 precision [DU]	0.259 ± 0.102	9518522	0.108	0.228	7.937×10^{-2}	15.3	0.192	0.301
sulfurdioxide slant column density corrected win1 [DU]	$(1.529 \pm 572.438) \times 10^{-3}$	9518522	0.658	-8.427×10^{-3}	-54.8	59.6	-0.335	0.323
background so2 slant column offset window1 [DU]	-0.146 ± 0.176	9518522	0.228	-0.179	-1.21	2.68	-0.278	-4.993×10^{-2}
sulfurdioxide slant column density window2 [DU]	0.688 ± 8.478	9518522	10.8	0.610	-1.052×10^{3}	684	-4.75	6.05
sulfurdioxide slant column density window2 precision [DU]	7.76 ± 2.14	9518522	2.31	7.45	2.19	642	6.42	8.73
sulfurdioxide slant column density corrected win2 [DU]	0.225 ± 8.310	9518522	10.6	0.233	-1.051×10^{3}	683	-5.06	5.52
background so2 slant column offset window2 [DU]	-0.463 ± 1.777	9518522	2.20	7.365×10^{-2}	-10.5	5.49	-1.42	0.773
sulfurdioxide slant column density window3 [DU]	-0.789 ± 23.784	9518522	30.2	-1.28	-607	526	-16.0	14.1
sulfurdioxide slant column density window3 precision [DU]	27.7 ± 13.6	9518522	9.41	23.8	9.10	305	20.3	29.7
sulfurdioxide slant column density corrected win3 [DU]	3.76 ± 22.85	9518522	28.8	3.67	-596	531	-10.6	18.2
background so2 slant column offset window3 [DU]	4.55 ± 7.00	9518522	11.3	3.50	-29.5	26.2	-1.04	10.2
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.20	9518522	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.008 \pm 2.569) \times 10^{-2}$	9518522	1.499×10^{-2}	1.499×10^{-2}	8.415×10^{-4}	2.38	9.517×10^{-3}	2.451×10^{-2}
fitted radiance shift [nm]	$(-4.562 \pm 26.702) \times 10^{-4}$	9518522	1.915×10^{-3}	-4.552×10^{-4}	-5.326×10^{-2}	5.217×10^{-2}	-1.468×10^{-3}	4.471×10^{-4}
fitted radiance squeeze [1]	$(-4.484 \pm 16.194) \times 10^{-5}$	9518522	1.936×10^{-4}	-3.619×10^{-5}	-1.781×10^{-2}	2.001×10^{-2}	-1.368×10^{-4}	5.683×10^{-5}
fitted root mean square [1]	$(1.152 \pm 0.419) \times 10^{-3}$	9518522	4.510×10^{-4}	1.038×10^{-3}	3.093×10^{-4}	5.280×10^{-2}	8.794×10^{-4}	1.330×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.939 ± 0.478	9518522	0.573	0.857	5.000×10^{-2}	2.96	0.606	1.18
sulfurdioxide total air mass factor polluted precision [1]	0.136 ± 0.122	9518522	0.152	9.464×10^{-2}	5.586×10^{-3}	1.45	4.304×10^{-2}	0.195
sulfurdioxide clear air mass factor polluted [1]	0.820 ± 0.425	9518522	0.361	0.724	0.132	2.98	0.568	0.929
number of spectral points in retrieval [1]	73.4 ± 0.5	9518522	1.000	73.0	53.0	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]	0.690 ± 0.398	12506718	0.730	1.000	0.0	1.000	0.270	1.000
sulfurdioxide total vertical column [DU]	$(3.394 \pm 133.751) \times 10^{-2}$	12506718	0.424	8.708×10^{-3}	-144	899	-0.201	0.223
sulfurdioxide total vertical column precision [DU]	0.539 ± 0.987	12506718	0.314	0.295	4.231×10^{-2}	985	0.206	0.520
sulfurdioxide slant column density corrected [DU]	$(1.520 \pm 36.024) \times 10^{-2}$	12506718	0.340	7.515×10^{-3}	-14.7	293	-0.161	0.179
sulfurdioxide slant column density cobra [DU]	$(1.505 \pm 33.854) \times 10^{-2}$	12506718	0.340	7.515×10^{-3}	-14.7	29.6	-0.161	0.179
sulfurdioxide slant column density cobra precision [DU]	0.277 ± 0.132	12506718	0.131	0.231	7.937×10^{-2}	15.3	0.194	0.325
sulfurdioxide slant column density window1 [DU]	0.170 ± 0.652	12506718	0.704	0.183	-37.3	59.6	-0.175	0.529
sulfurdioxide slant column density window1 precision [DU]	0.277 ± 0.132	12506718	0.131	0.231	7.937×10^{-2}	15.3	0.194	0.325
sulfurdioxide slant column density corrected win1 [DU]	$(9.858 \pm 638.935) \times 10^{-3}$	12506718	0.683	-5.080×10^{-3}	-37.3	59.6	-0.342	0.341
background so2 slant column offset window1 [DU]	-0.160 ± 0.176	12506718	0.214	-0.190	-1.41	5.05	-0.285	-7.141×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.01 ± 8.77	12506718	11.1	0.785	-1.052×10^{3}	684	-4.68	6.42
sulfurdioxide slant column density window2 precision [DU]	7.91 ± 2.11	12506718	2.45	7.55	2.19	482	6.50	8.95
sulfurdioxide slant column density corrected win2 [DU]	0.171 ± 8.457	12506718	10.8	0.175	-1.051×10^{3}	683	-5.22	5.56
background so2 slant column offset window2 [DU]	-0.837 ± 2.382	12506718	2.52	-5.360×10^{-2}	-21.6	5.49	-1.78	0.749
sulfurdioxide slant column density window3 [DU]	-0.381 ± 24.090	12506718	30.6	-0.610	-607	526	-15.7	14.9
sulfurdioxide slant column density window3 precision [DU]	27.8 ± 13.0	12506718	9.52	24.1	9.85	272	20.7	30.2
sulfurdioxide slant column density corrected win3 [DU]	5.49 ± 22.83	12506718	29.1	5.26	-596	531	-9.09	20.0
background so2 slant column offset window3 [DU]	5.87 ± 6.86	12506718	10.5	5.32	-29.5	59.7	0.687	11.1
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.19	12506718	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.499 \pm 4.146) \times 10^{-2}$	12506718	1.636×10^{-2}	1.654×10^{-2}	5.332×10^{-4}	3.17	1.066×10^{-2}	2.701×10^{-2}
fitted radiance shift [nm]	$(-3.051 \pm 25.172) \times 10^{-4}$	12506718	1.852×10^{-3}	-2.687×10^{-4}	-5.326×10^{-2}	5.217×10^{-2}	-1.266×10^{-3}	5.862×10^{-4}
fitted radiance squeeze [1]	$(-3.885 \pm 17.436) \times 10^{-5}$	12506718	1.966×10^{-4}	-2.861×10^{-5}	-1.781×10^{-2}	2.001×10^{-2}	-1.305×10^{-4}	6.604×10^{-5}
fitted root mean square [1]	$(1.219 \pm 0.544) \times 10^{-3}$	12506718	5.032×10^{-4}	1.047×10^{-3}	3.093×10^{-4}	4.762×10^{-2}	8.860×10^{-4}	1.389×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.840 ± 0.411	12506718	0.507	0.801	5.000×10^{-2}	2.58	0.554	1.06
sulfurdioxide total air mass factor polluted precision [1]	0.115 ± 0.112	12506718	0.120	6.870×10^{-2}	2.500×10^{-3}	1.45	3.908×10^{-2}	0.159
sulfurdioxide clear air mass factor polluted [1]	0.717 ± 0.276	12506718	0.359	0.696	3.904×10^{-2}	2.63	0.528	0.887
number of spectral points in retrieval [1]	73.5 ± 0.5	12506718	1.000	73.0	53.0	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]	0.582 ± 0.419	3781109	0.850	0.490	0.0	1.000	0.150	1.000
sulfurdioxide total vertical column [DU]	$(8.685 \pm 228.096) \times 10^{-2}$	3781109	0.547	1.413×10^{-2}	-123	223	-0.249	0.298
sulfurdioxide total vertical column precision [DU]	0.974 ± 1.727	3781109	0.715	0.399	4.343×10^{-2}	41.6	0.214	0.930
sulfurdioxide slant column density corrected [DU]	$(2.641 \pm 40.436) \times 10^{-2}$	3781109	0.391	1.235×10^{-2}	-8.30	46.1	-0.180	0.211
sulfurdioxide slant column density cobra [DU]	$(2.626 \pm 39.730) \times 10^{-2}$	3781109	0.391	1.235×10^{-2}	-8.30	29.0	-0.180	0.211
sulfurdioxide slant column density cobra precision [DU]	0.318 ± 0.148	3781109	0.174	0.281	8.458×10^{-2}	14.4	0.211	0.384
sulfurdioxide slant column density window1 [DU]	0.198 ± 0.766	3781109	0.808	0.209	-54.8	42.4	-0.202	0.607
sulfurdioxide slant column density window1 precision [DU]	0.318 ± 0.148	3781109	0.174	0.281	8.458×10^{-2}	14.4	0.211	0.384
sulfurdioxide slant column density corrected win1 [DU]	$(6.157 \pm 75.225) \times 10^{-2}$	3781109	0.778	3.004×10^{-2}	-54.8	42.4	-0.349	0.430
background so2 slant column offset window1 [DU]	-0.136 ± 0.216	3781109	0.243	-0.189	-1.39	3.35	-0.286	-4.302×10^{-2}
sulfurdioxide slant column density window2 [DU]	2.25 ± 9.57	3781109	12.2	2.02	-638	611	-3.97	8.25
sulfurdioxide slant column density window2 precision [DU]	8.44 ± 2.48	3781109	2.70	8.06	2.23	642	6.89	9.59
sulfurdioxide slant column density corrected win2 [DU]	0.268 ± 9.038	3781109	11.4	0.281	-637	612	-5.43	6.00
background so2 slant column offset window2 [DU]	-1.98 ± 3.17	3781109	5.07	-0.773	-20.2	4.60	-4.44	0.638
sulfurdioxide slant column density window3 [DU]	-10.4 ± 23.4	3781109	29.4	-9.96	-319	250	-24.9	4.54
sulfurdioxide slant column density window3 precision [DU]	29.7 ± 14.8	3781109	10.4	25.8	9.10	250	21.5	31.8
sulfurdioxide slant column density corrected win3 [DU]	-2.16 ± 23.76	3781109	29.8	-1.43	-303	252	-16.7	13.1
background so2 slant column offset window3 [DU]	8.24 ± 7.95	3781109	13.6	8.48	-29.5	60.4	1.57	15.2
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.25	3781109	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(6.442 \pm 14.594) \times 10^{-2}$	3781109	4.356×10^{-2}	2.147×10^{-2}	3.428×10^{-4}	2.61	9.148×10^{-3}	5.271×10^{-2}
fitted radiance shift [nm]	$(-4.349 \pm 29.715) \times 10^{-4}$	3781109	1.848×10^{-3}	-4.985×10^{-4}	-4.722×10^{-2}	3.868×10^{-2}	-1.439×10^{-3}	4.088×10^{-4}
fitted radiance squeeze [1]	$(-3.192 \pm 19.541) \times 10^{-5}$	3781109	2.223×10^{-4}	-2.559×10^{-5}	-1.589×10^{-2}	1.753×10^{-2}	-1.400×10^{-4}	8.233×10^{-5}
fitted root mean square [1]	$(1.394 \pm 0.622) \times 10^{-3}$	3781109	6.758×10^{-4}	1.228×10^{-3}	3.613×10^{-4}	5.280×10^{-2}	9.740×10^{-4}	1.650×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.832 ± 0.625	3781109	0.786	0.647	5.000×10^{-2}	2.96	0.368	1.15
sulfurdioxide total air mass factor polluted precision [1]	0.133 ± 0.176	3781109	0.150	5.813×10^{-2}	2.500×10^{-3}	1.85	2.439×10^{-2}	0.175
sulfurdioxide clear air mass factor polluted [1]	0.770 ± 0.630	3781109	0.527	0.591	2.815×10^{-2}	2.98	0.366	0.893
number of spectral points in retrieval [1]	73.4 ± 0.5	3781109	1.000	73.0	71.0	74.0	73.0	74.0

3 Granule outlines

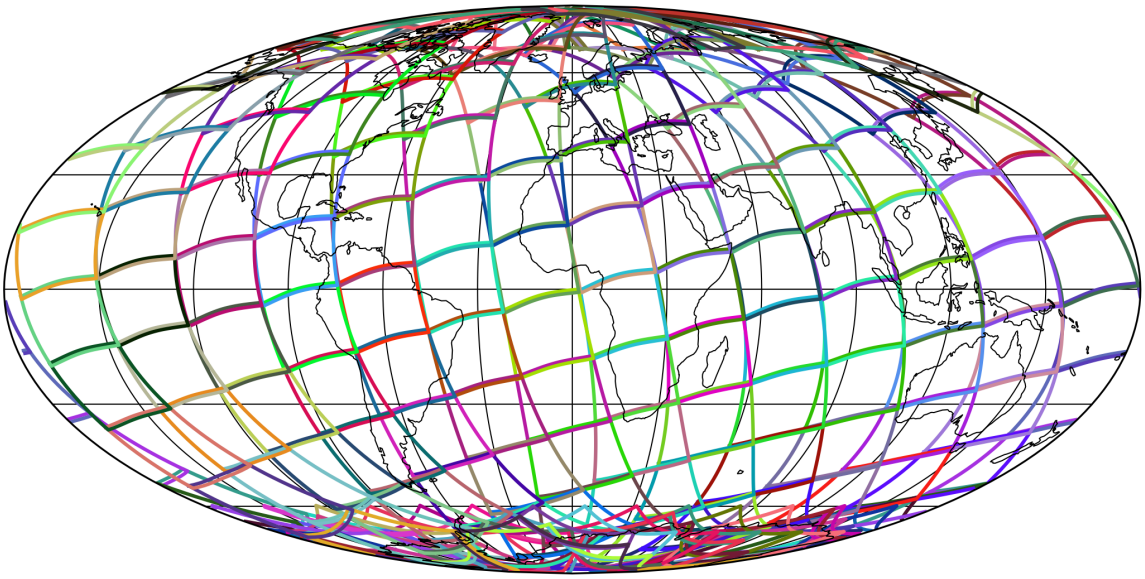


Figure 1: Outline of the granules.

4 Input data monitoring

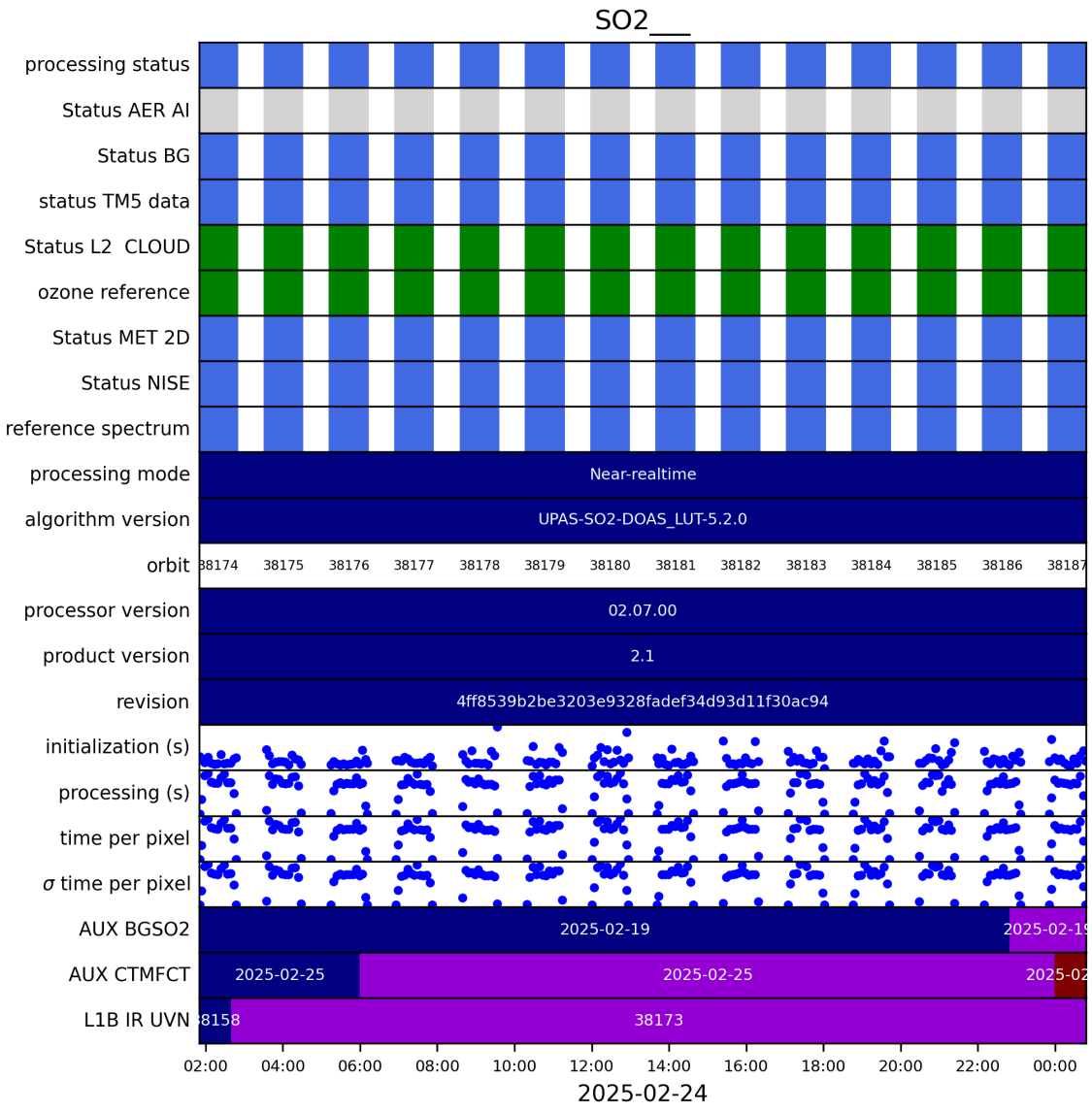


Figure 2: Input data per granule

5 Warnings and errors

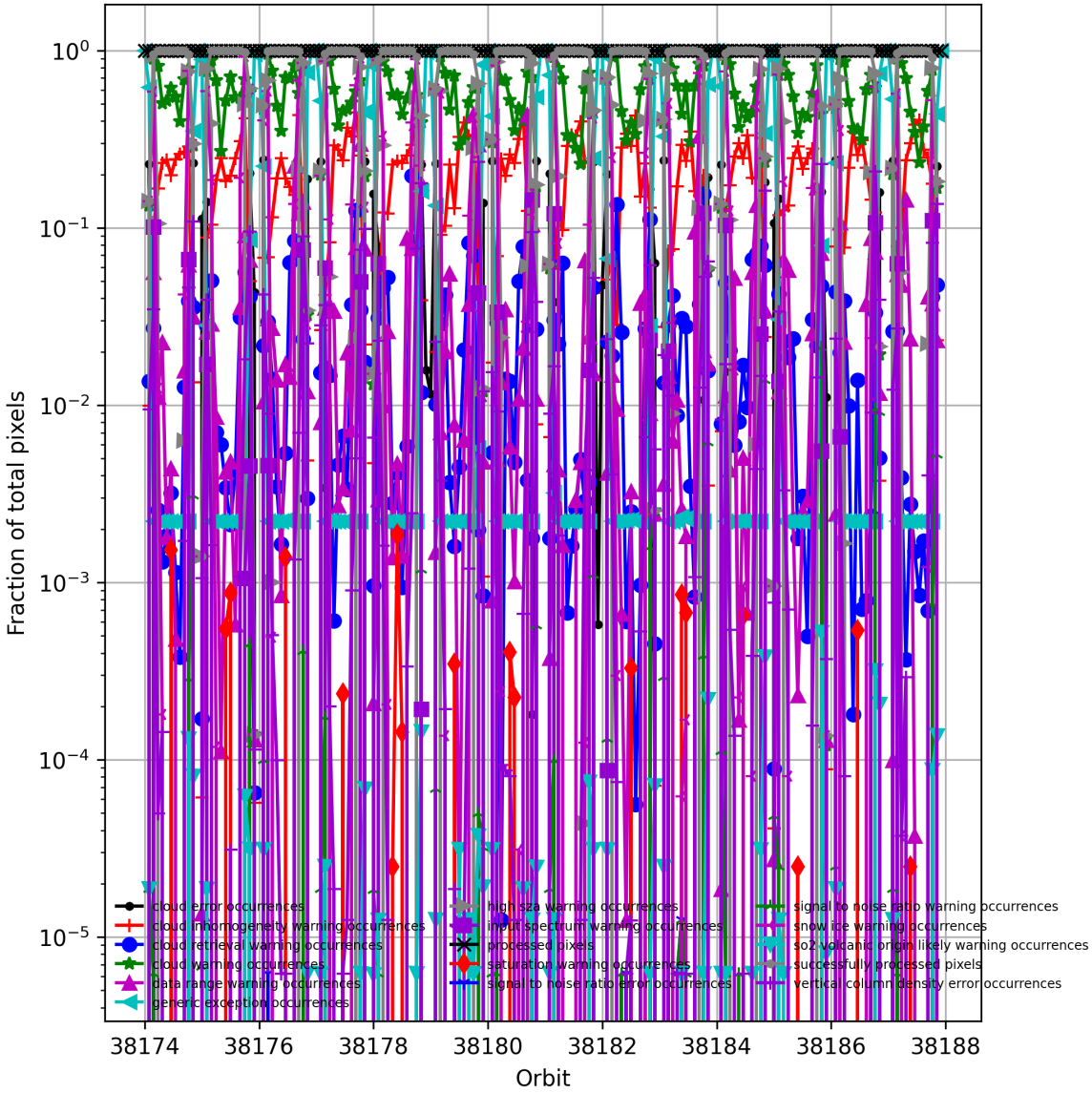


Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

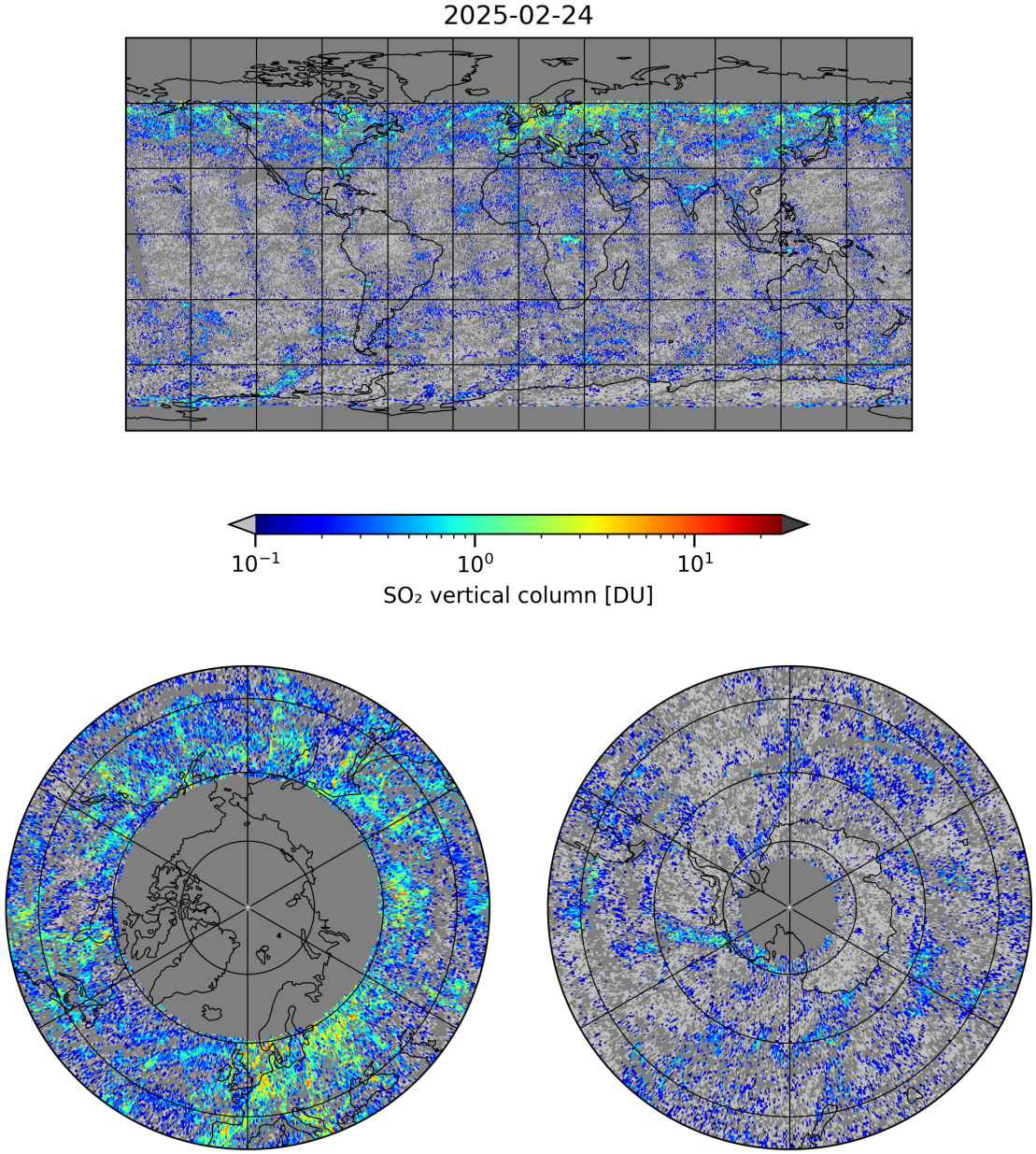


Figure 4: Map of "SO_2 vertical column" for 2025-02-24 to 2025-02-25

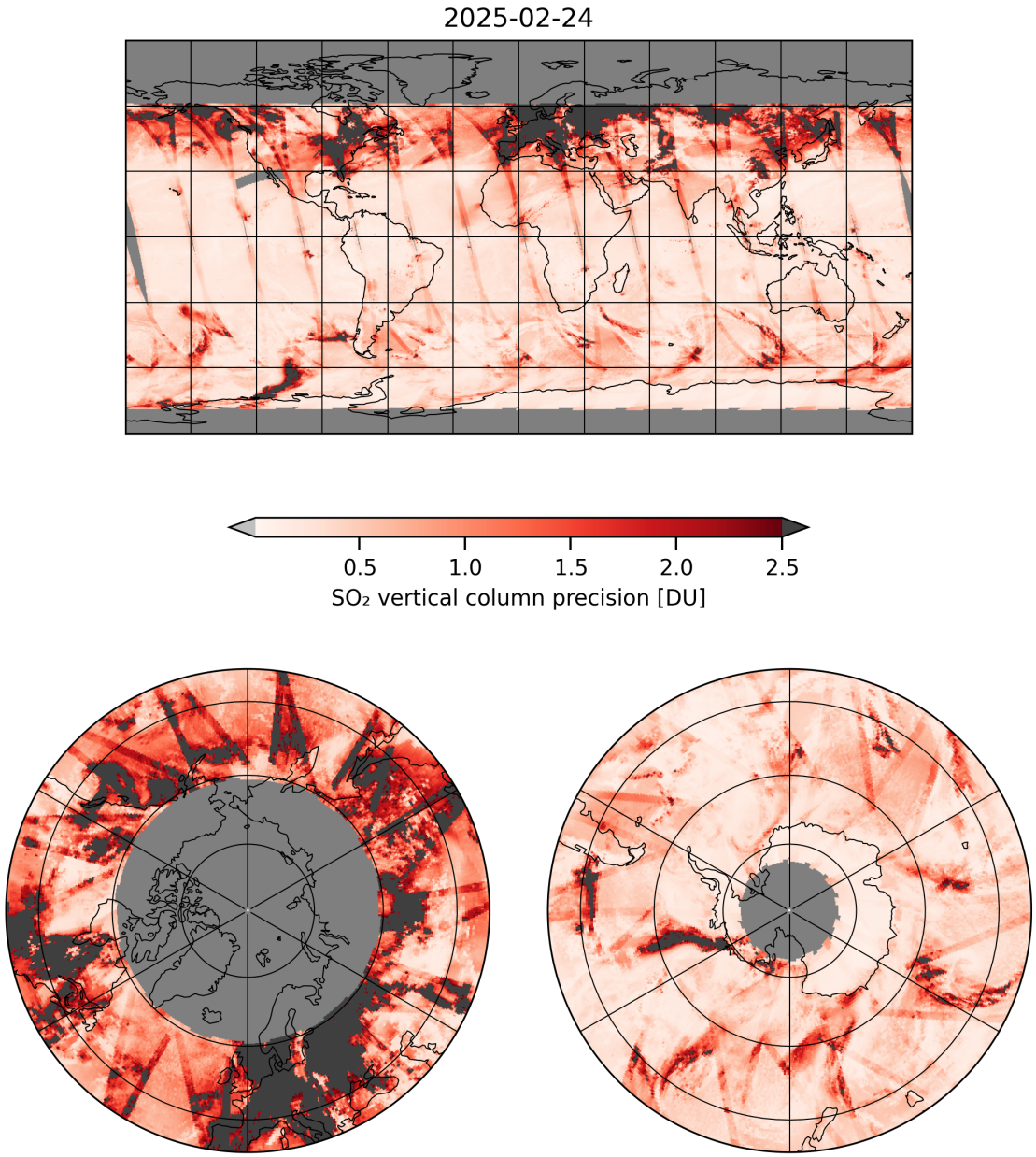


Figure 5: Map of "SO_2 vertical column precision" for 2025-02-24 to 2025-02-25

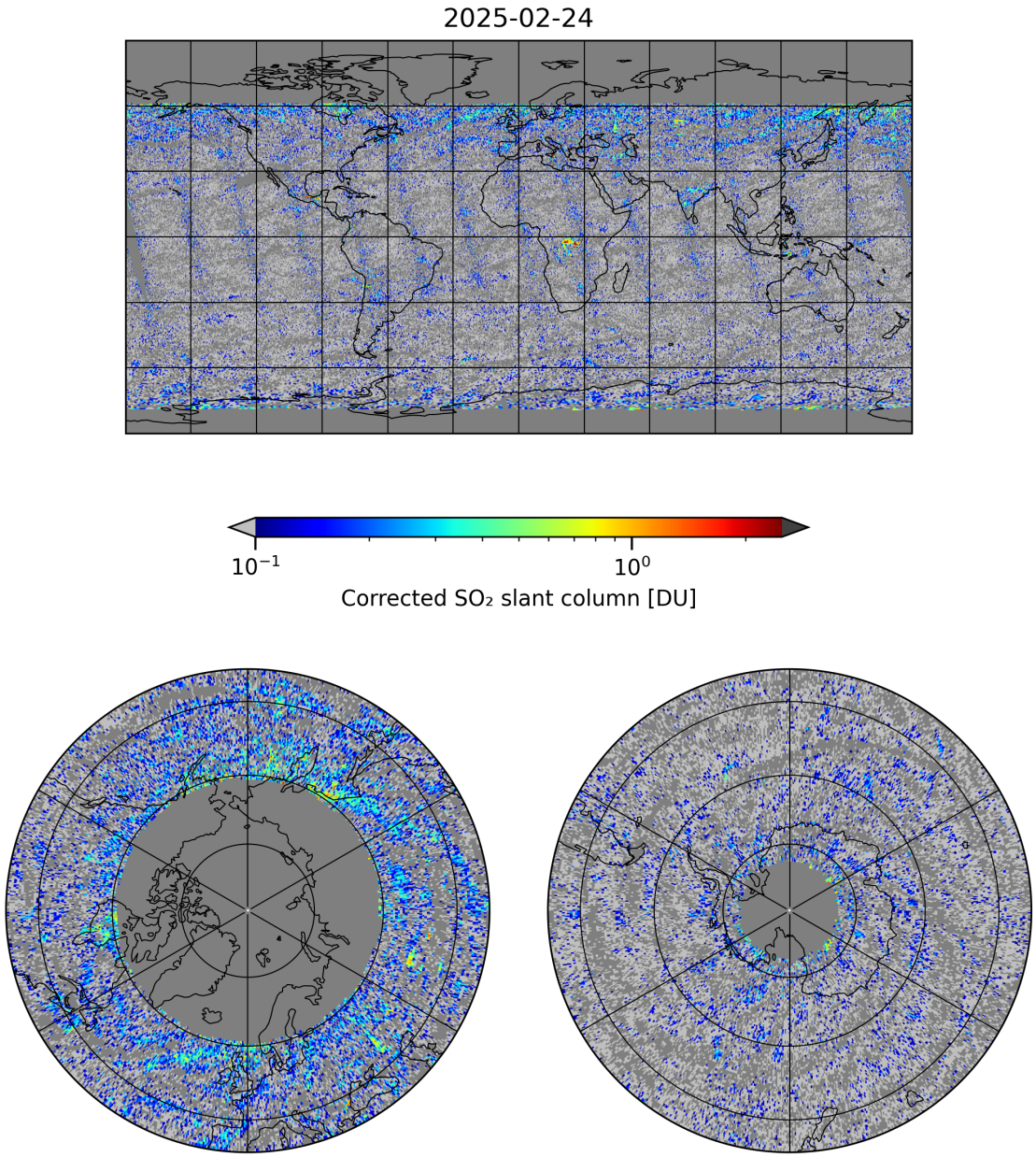


Figure 6: Map of "Corrected SO_2 slant column" for 2025-02-24 to 2025-02-25

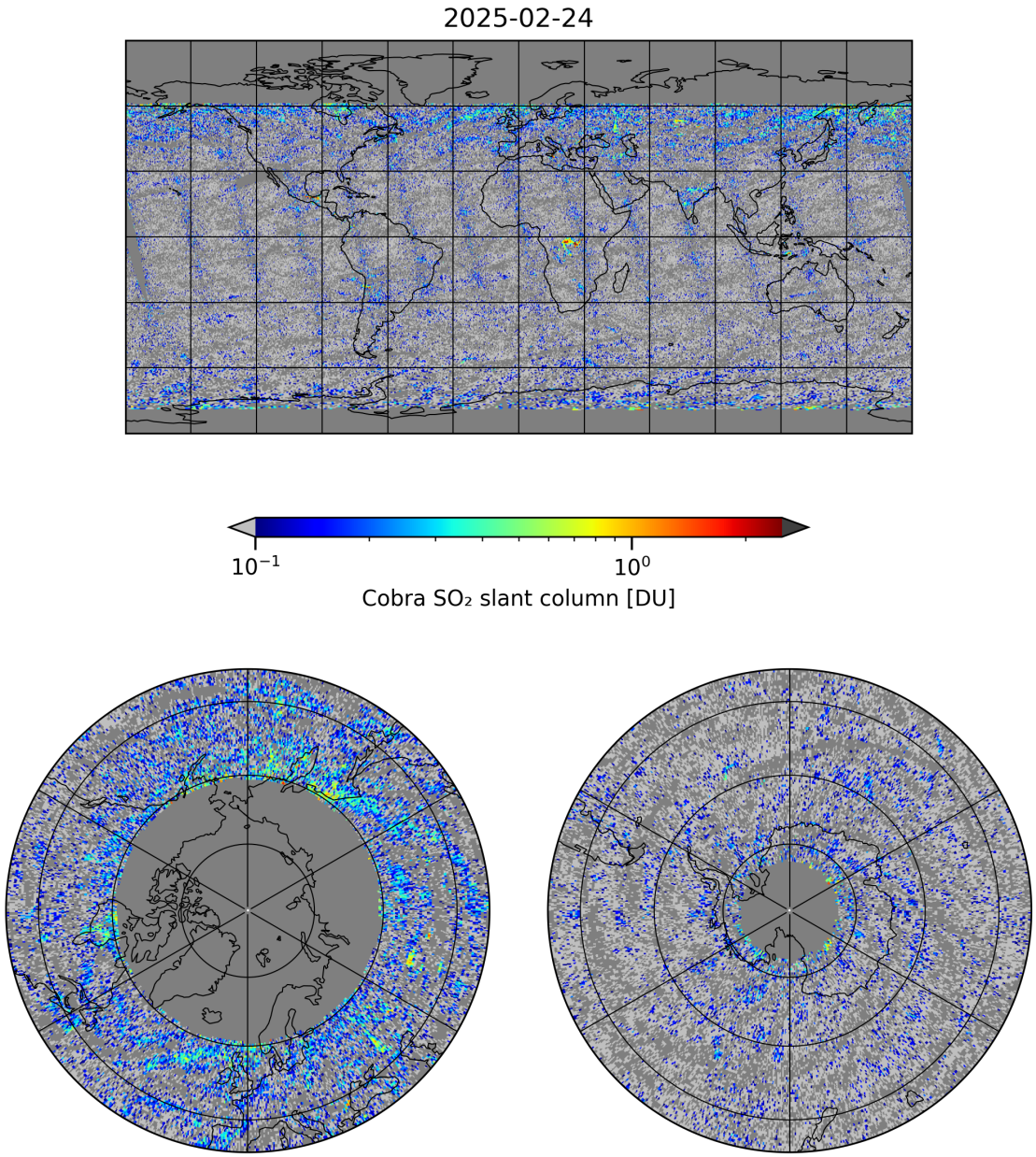


Figure 7: Map of "Cobra SO_2 slant column" for 2025-02-24 to 2025-02-25

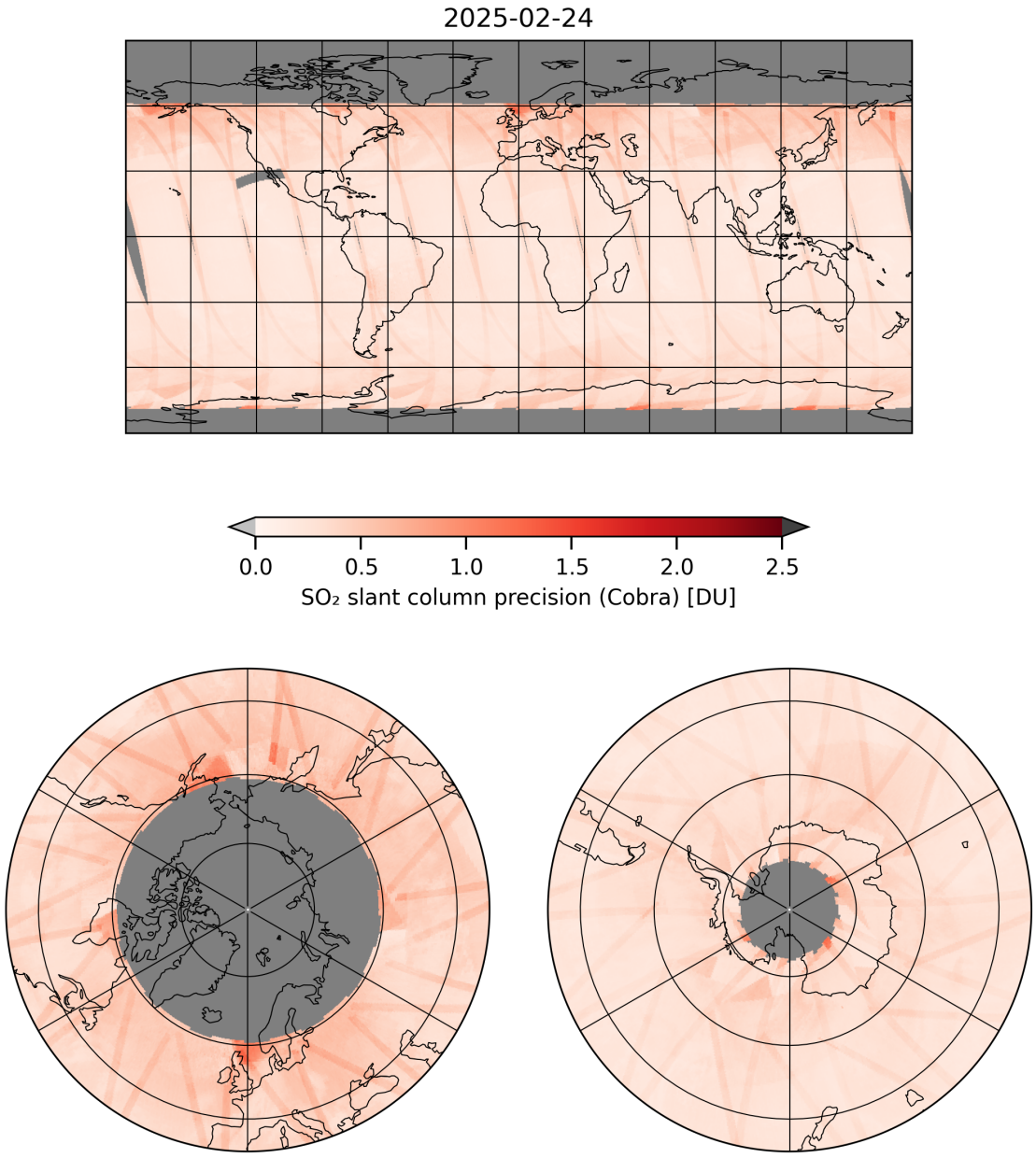


Figure 8: Map of "SO_2 slant column precision (Cobra)" for 2025-02-24 to 2025-02-25

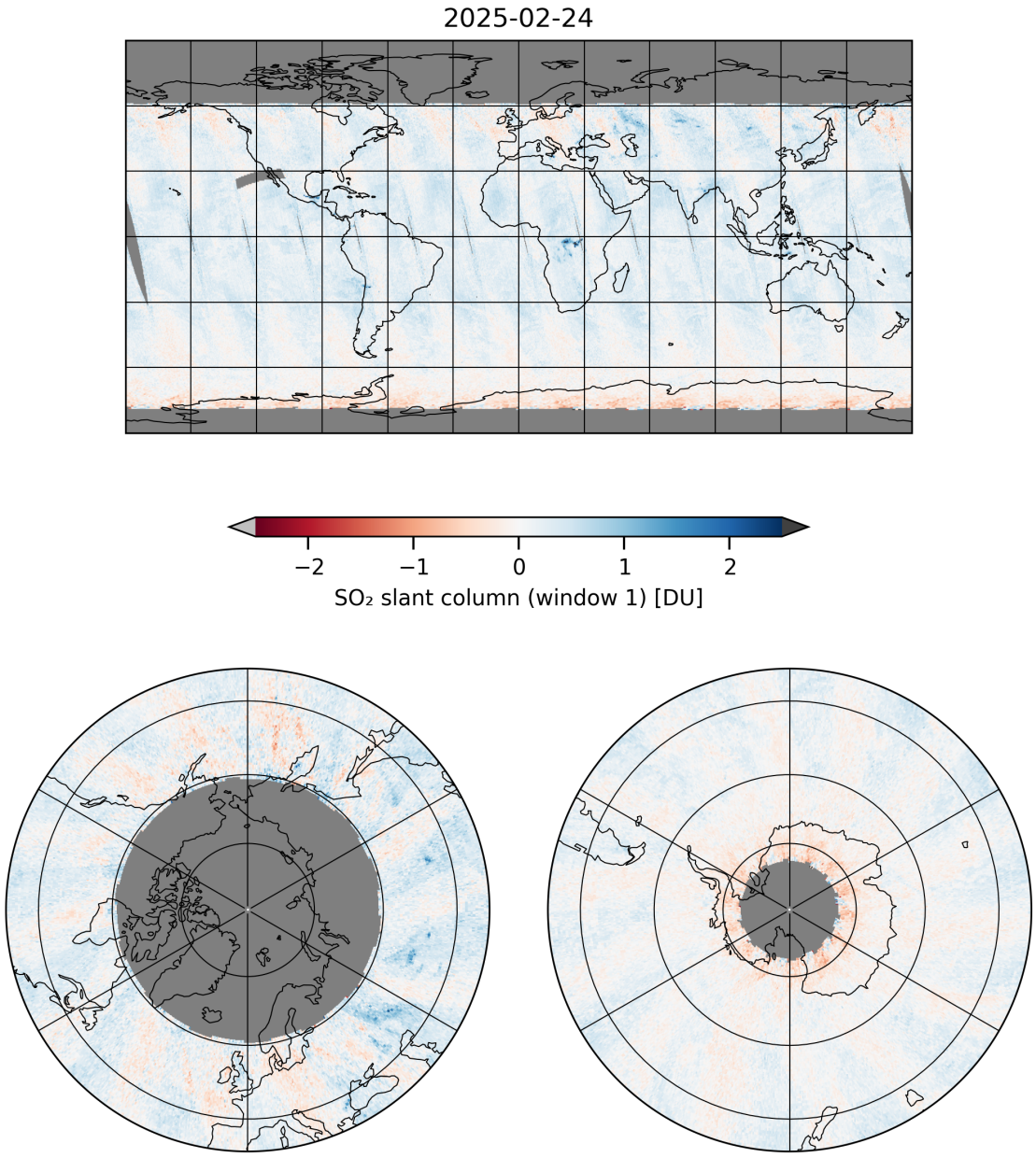


Figure 9: Map of "SO_2 slant column (window 1)" for 2025-02-24 to 2025-02-25

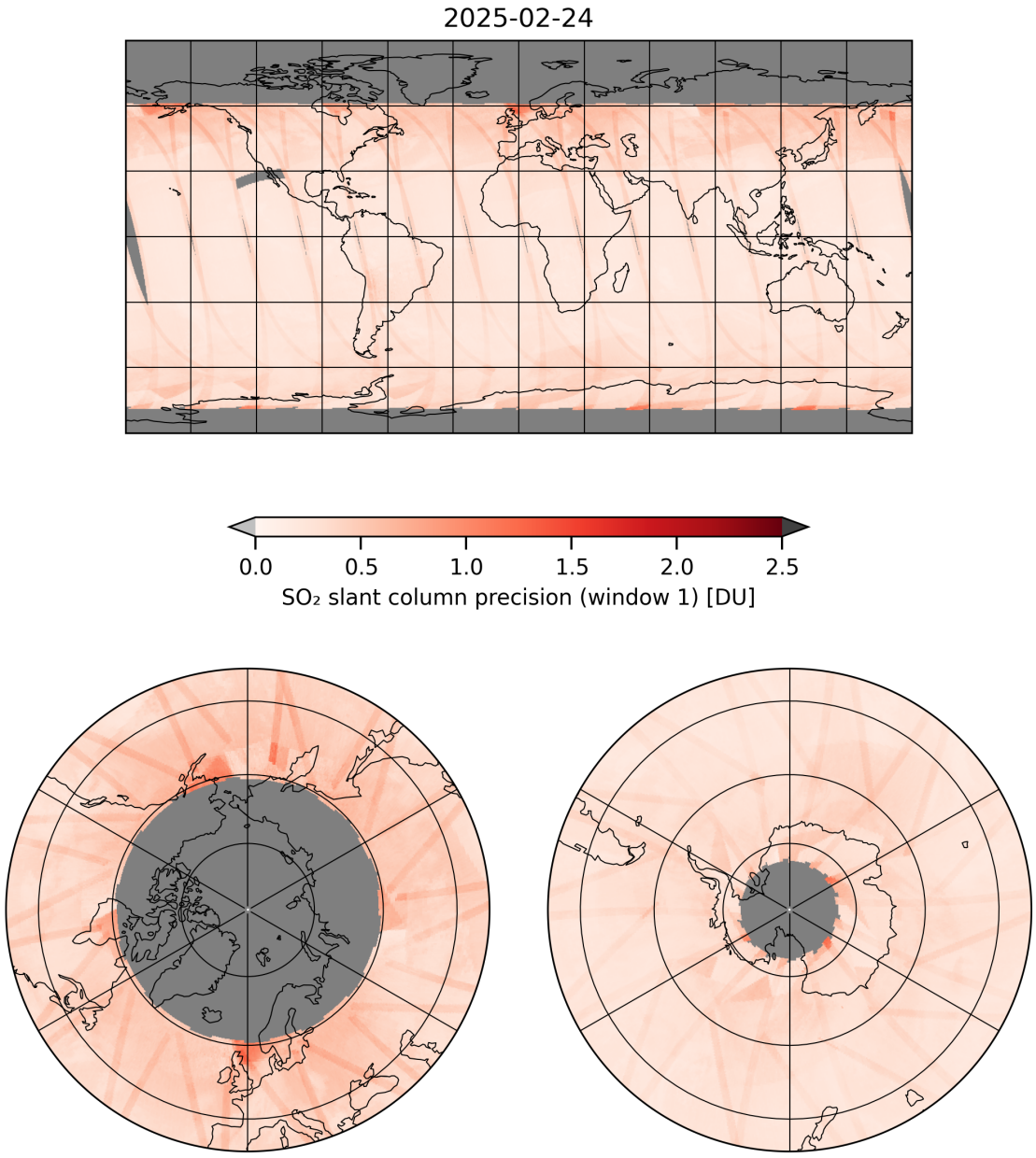


Figure 10: Map of "SO_2 slant column precision (window 1)" for 2025-02-24 to 2025-02-25

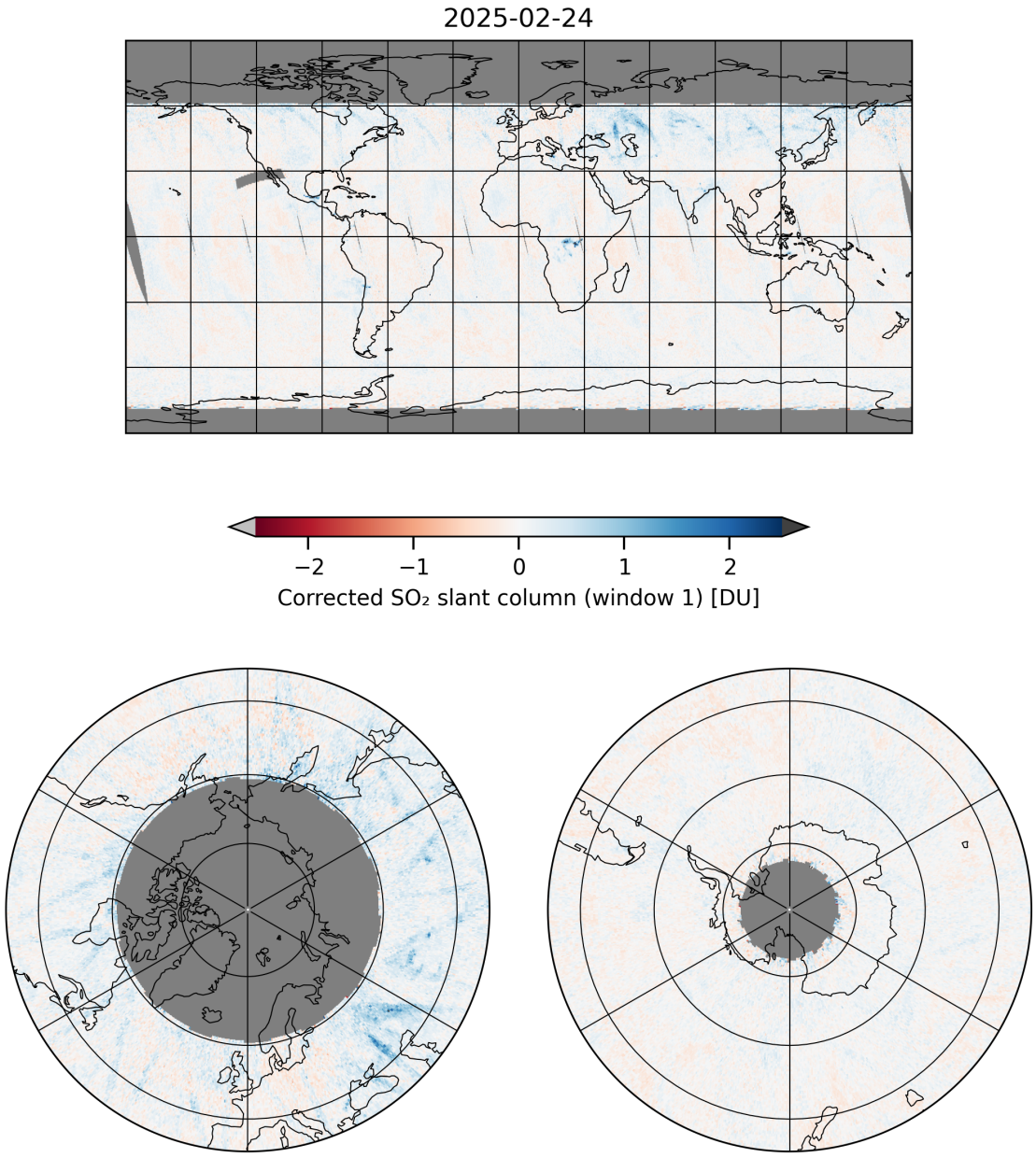


Figure 11: Map of “Corrected SO_2 slant column (window 1)” for 2025-02-24 to 2025-02-25

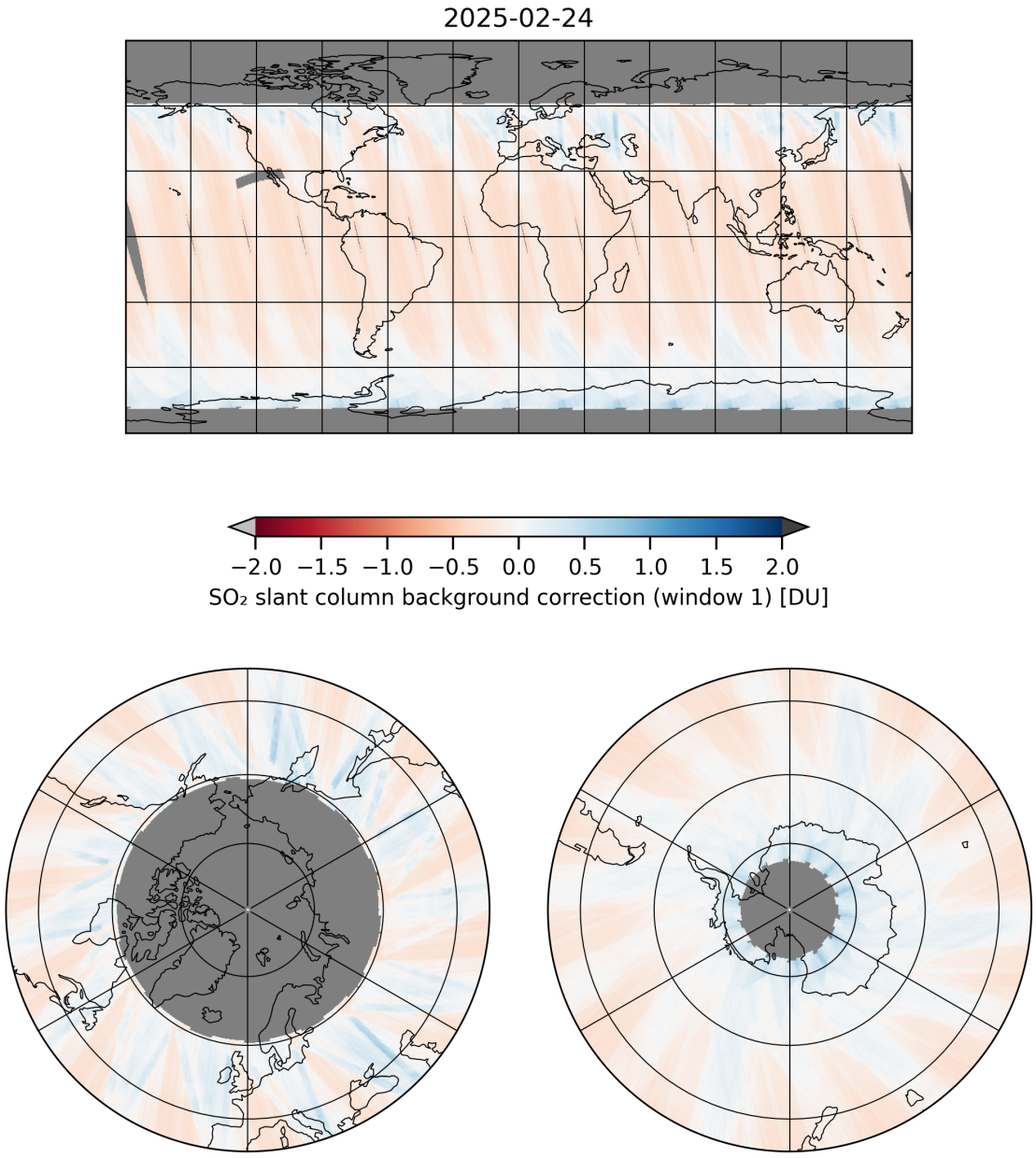


Figure 12: Map of "SO_2 slant column background correction (window 1)" for 2025-02-24 to 2025-02-25

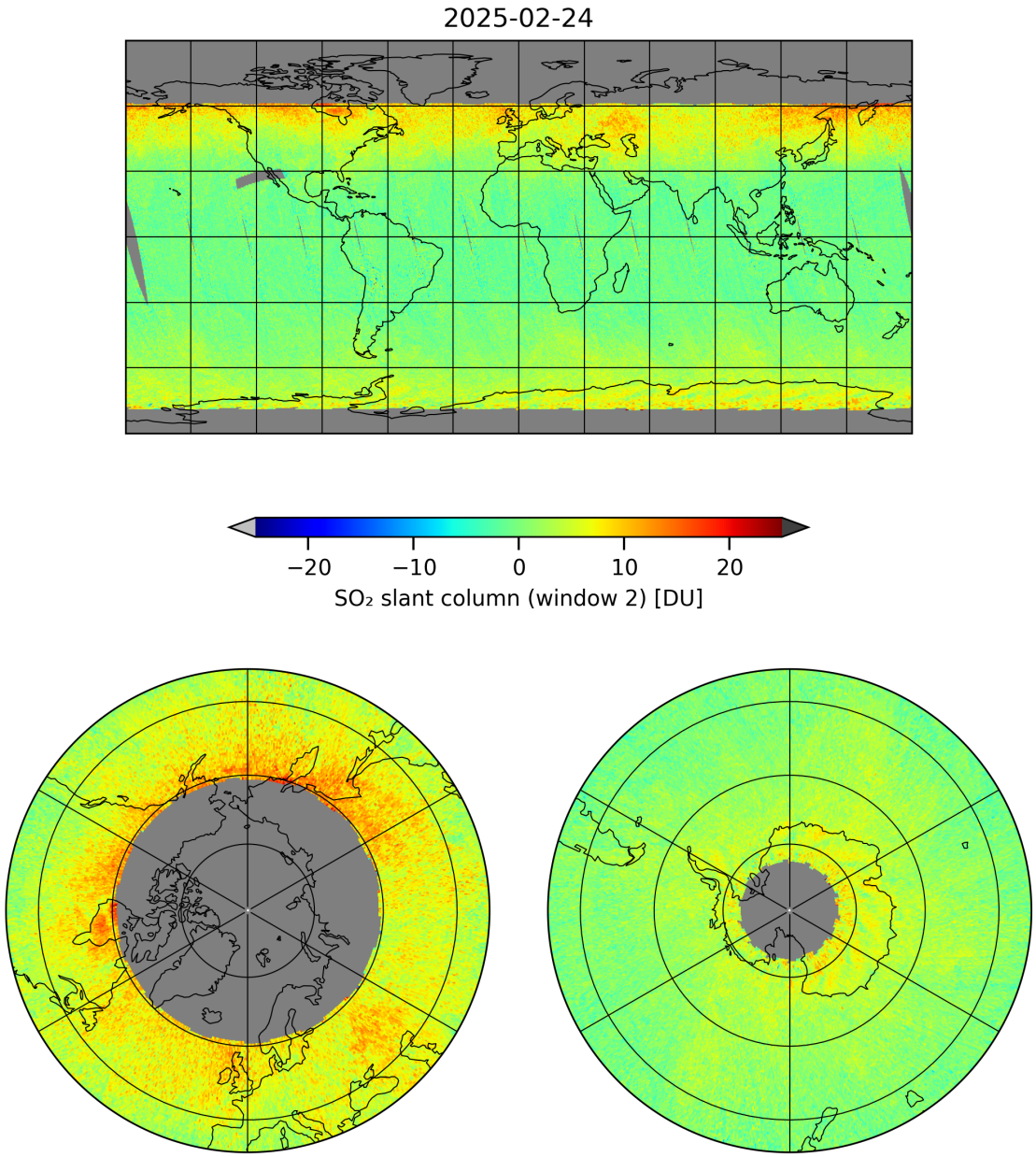


Figure 13: Map of "SO_2 slant column (window 2)" for 2025-02-24 to 2025-02-25

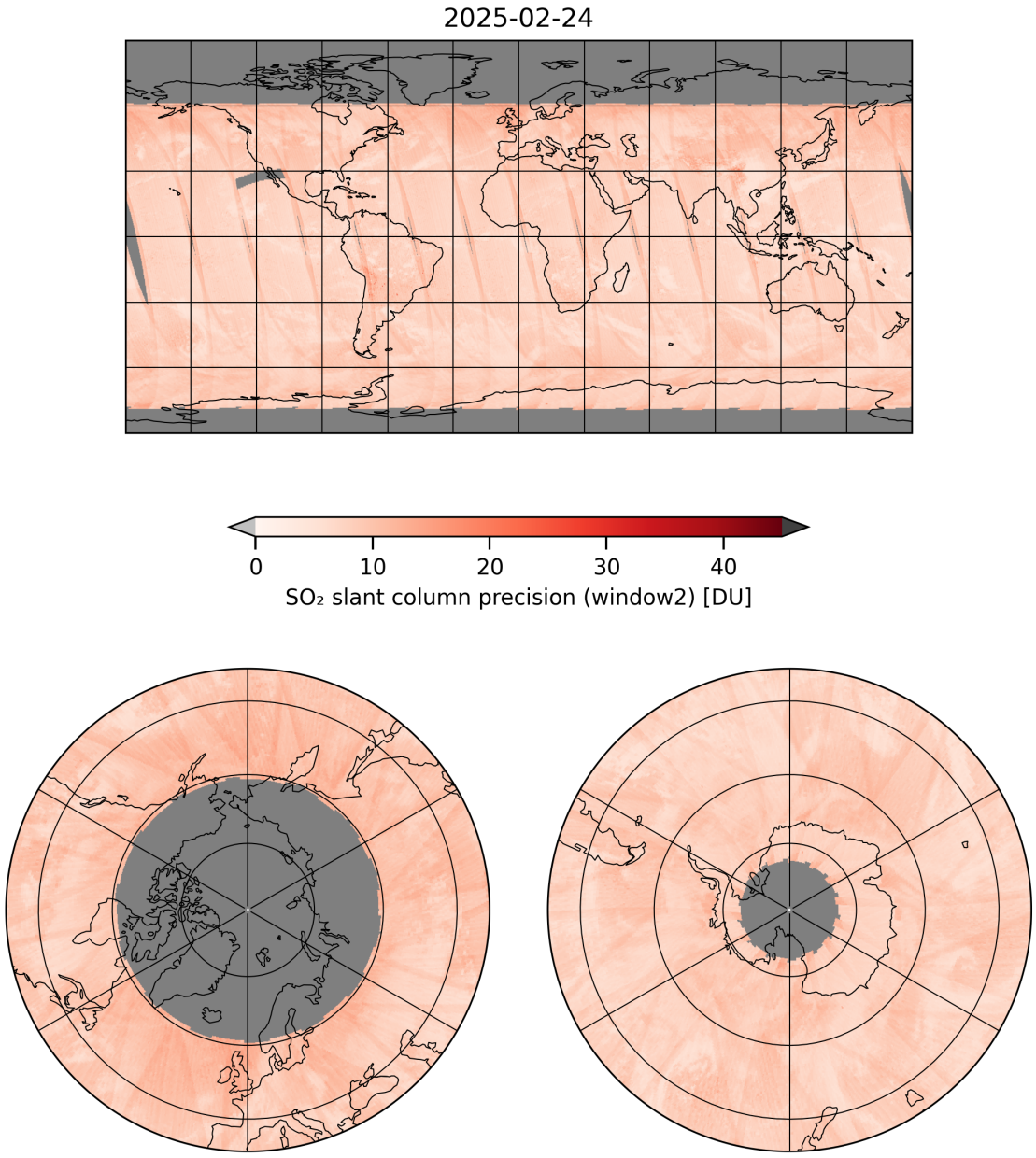


Figure 14: Map of "SO_2 slant column precision (window2)" for 2025-02-24 to 2025-02-25

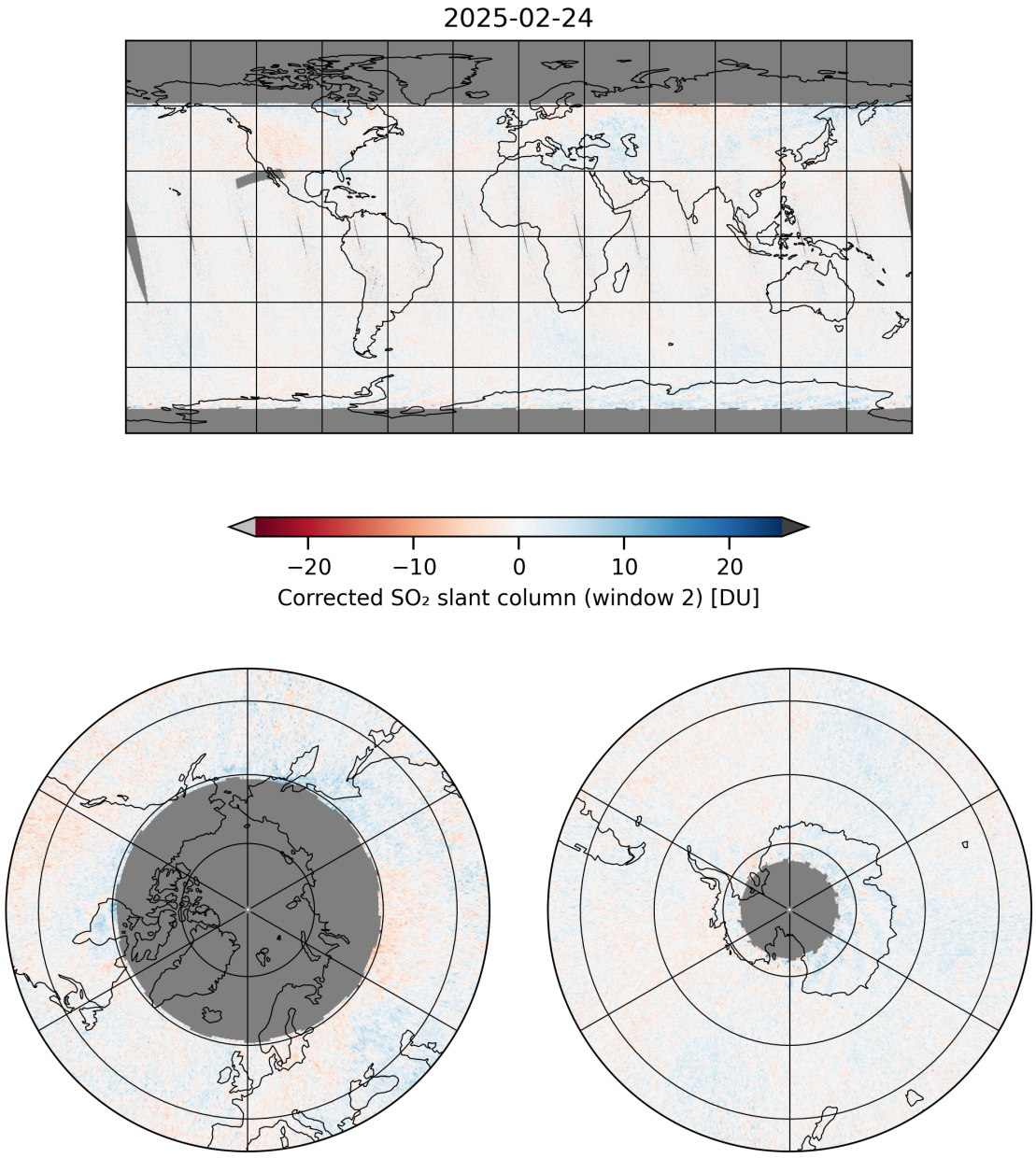


Figure 15: Map of "Corrected SO_2 slant column (window 2)" for 2025-02-24 to 2025-02-25

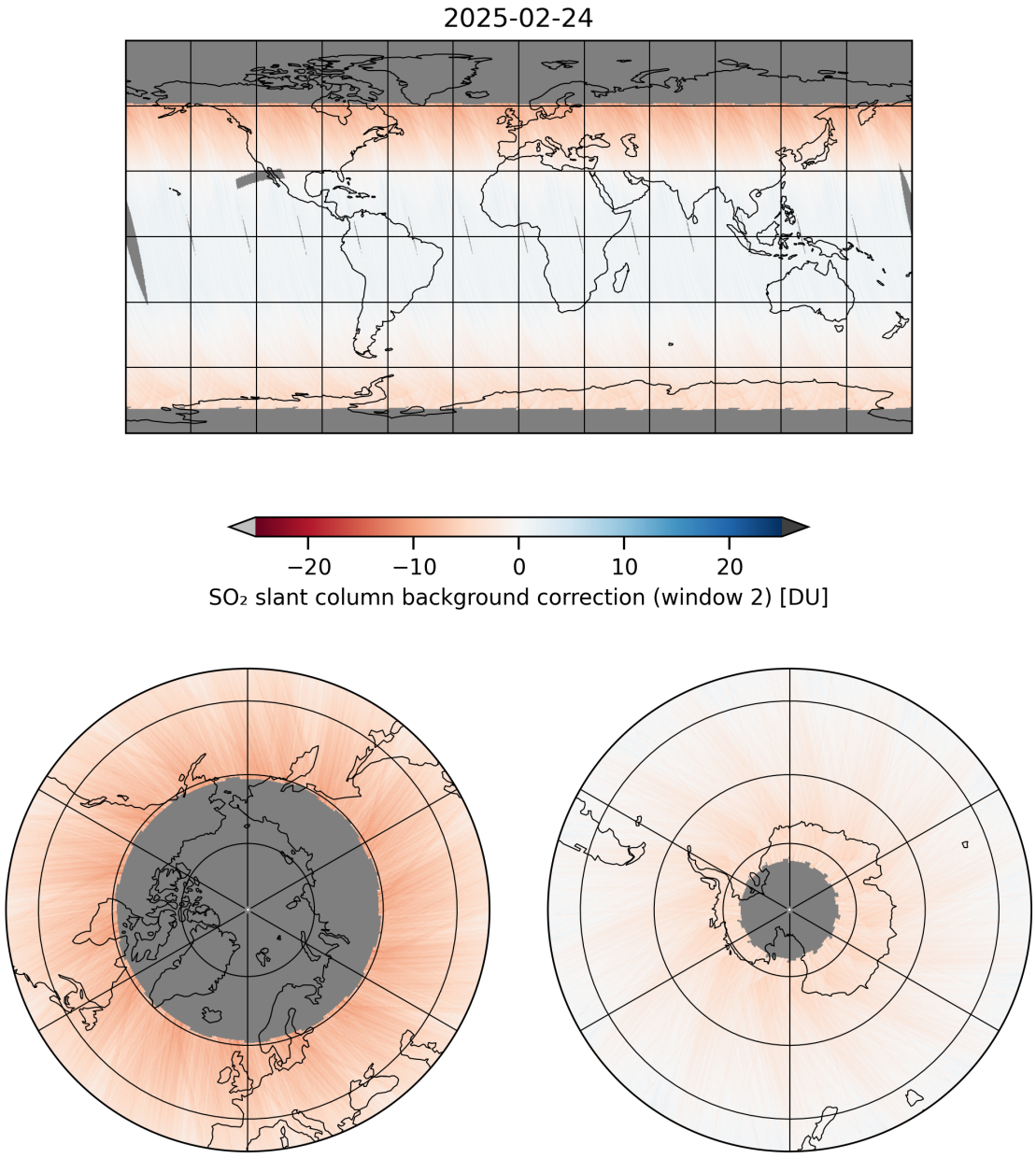


Figure 16: Map of "SO_2 slant column background correction (window 2)" for 2025-02-24 to 2025-02-25

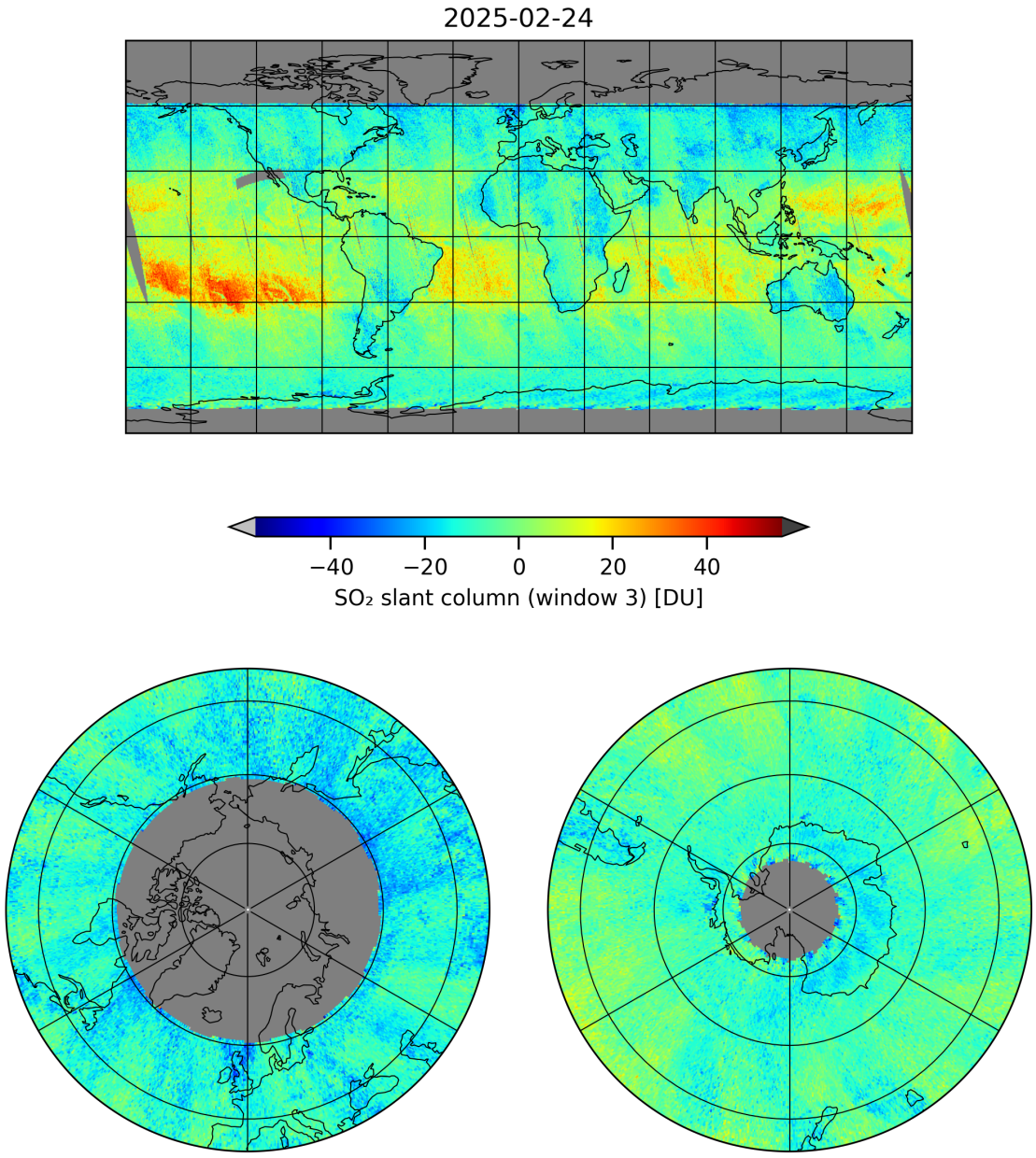


Figure 17: Map of "SO_2 slant column (window 3)" for 2025-02-24 to 2025-02-25

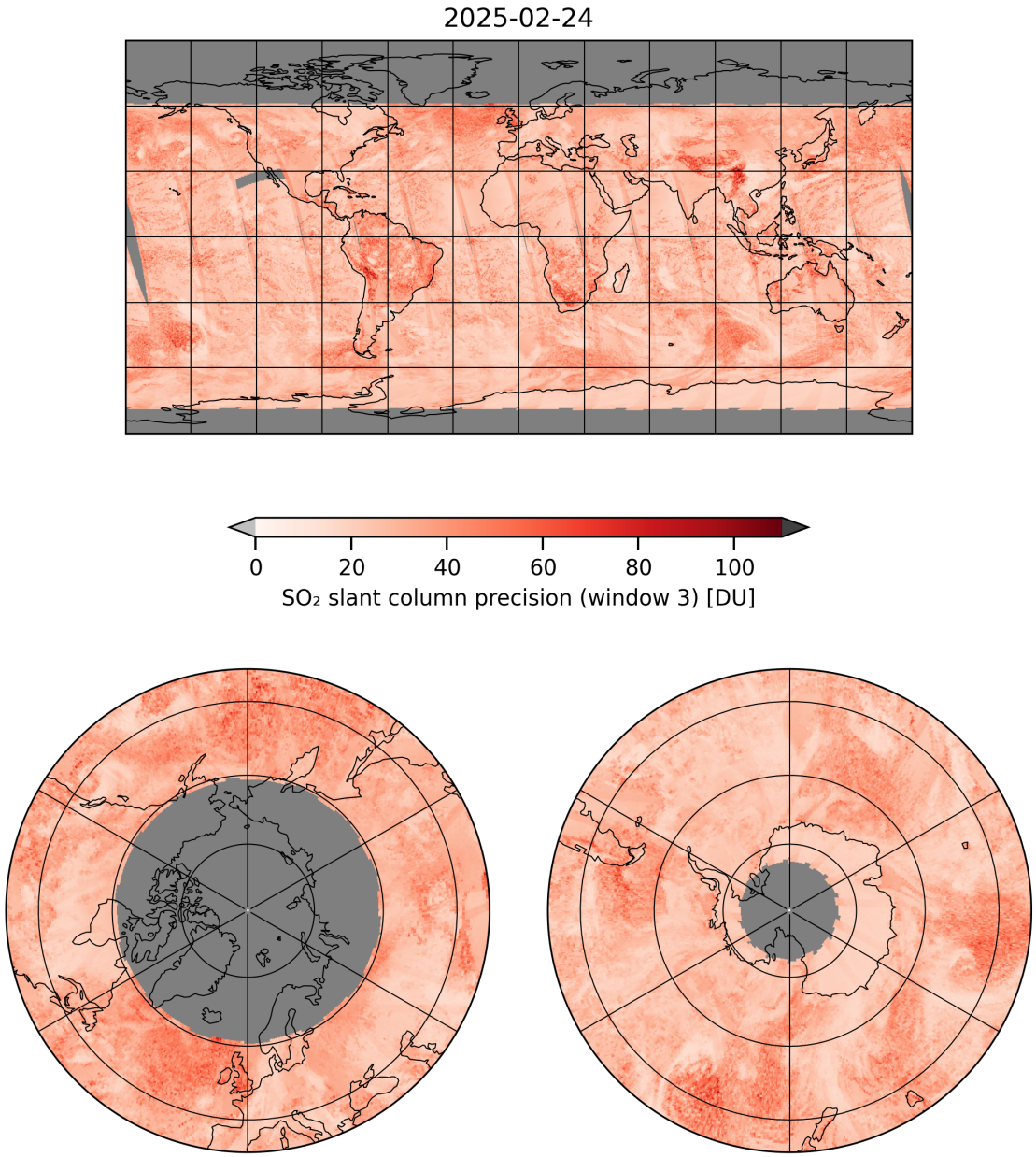


Figure 18: Map of "SO_2 slant column precision (window 3)" for 2025-02-24 to 2025-02-25

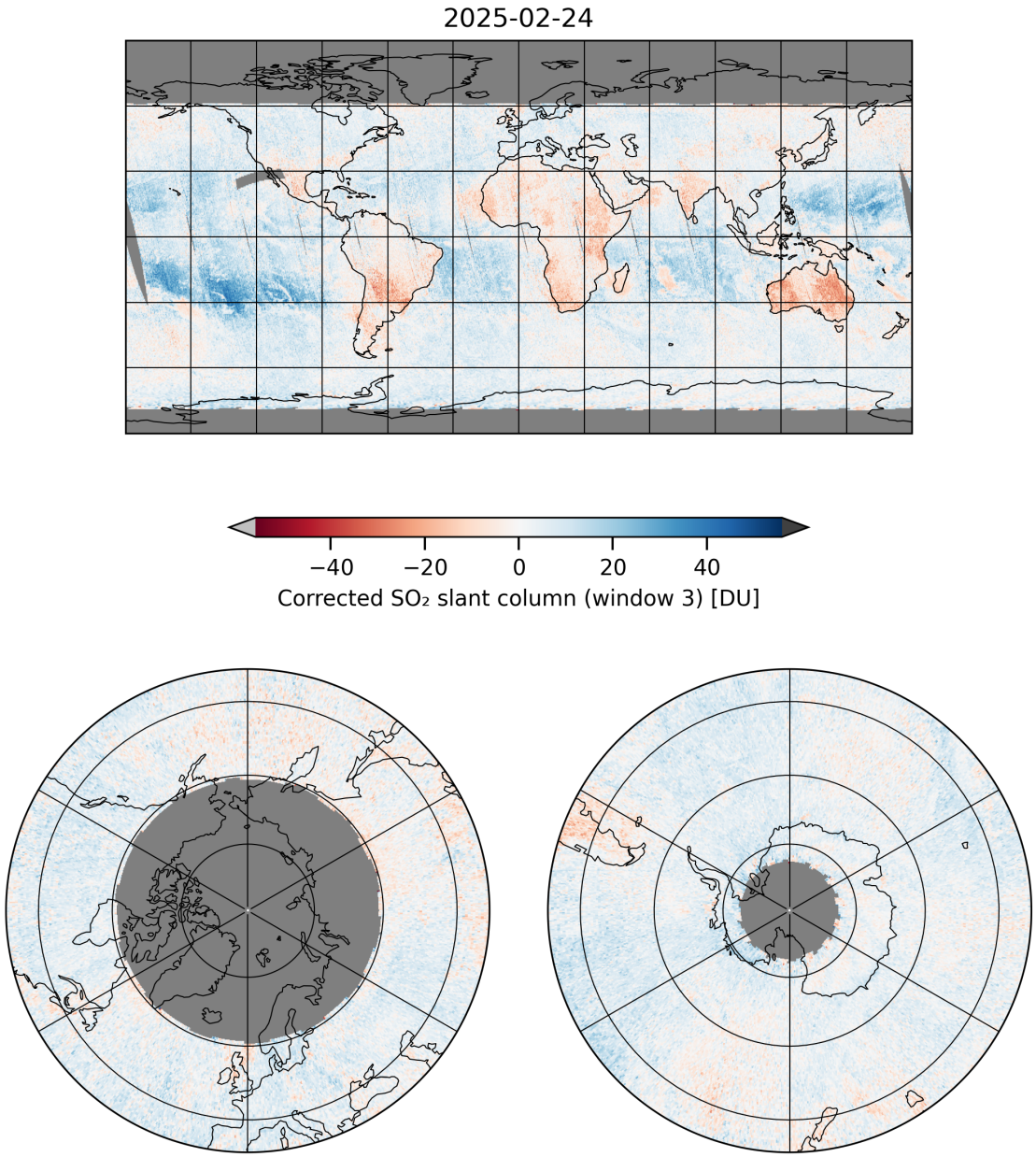


Figure 19: Map of "Corrected SO_2 slant column (window 3)" for 2025-02-24 to 2025-02-25

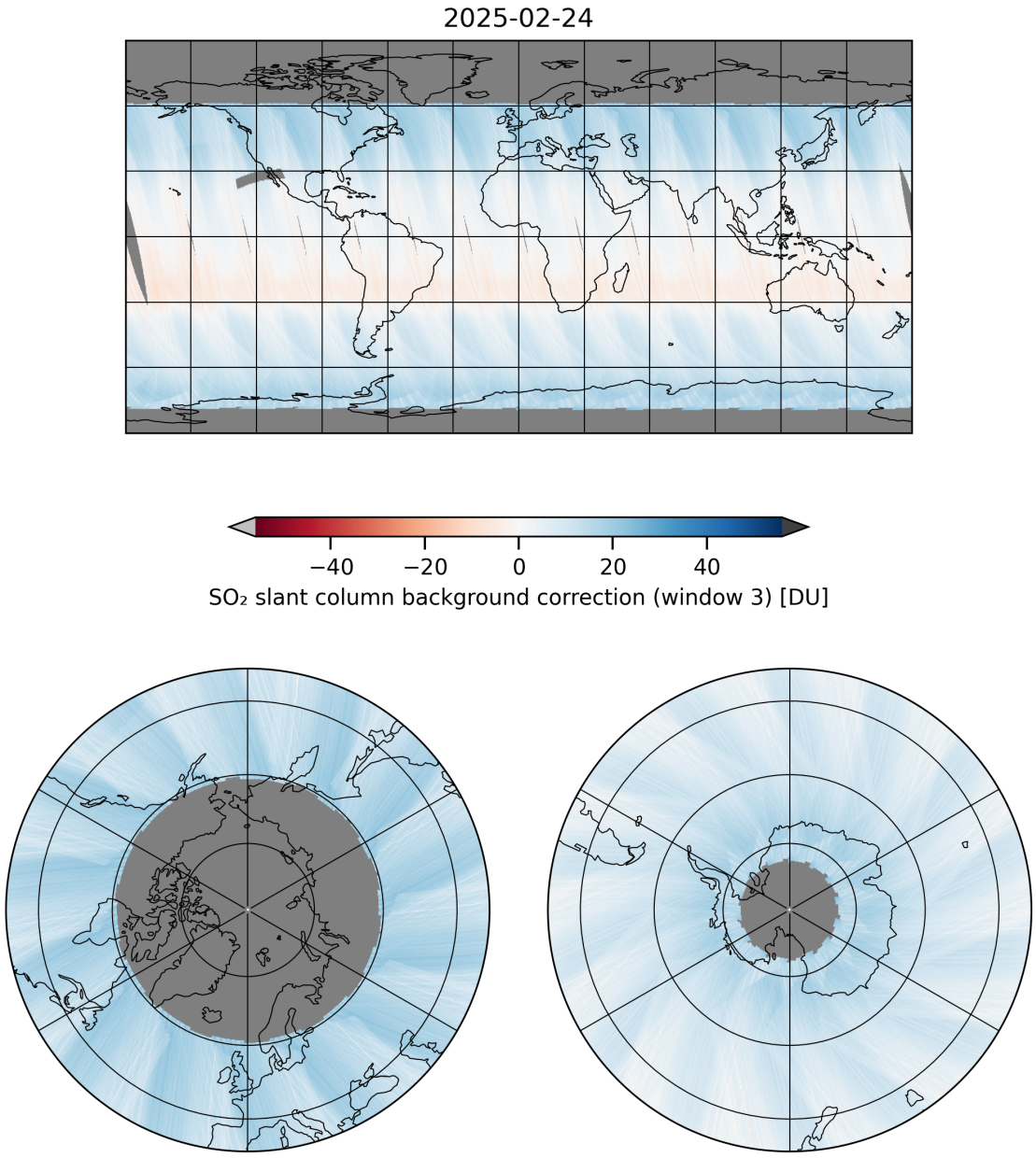


Figure 20: Map of "SO_2 slant column background correction (window 3)" for 2025-02-24 to 2025-02-25

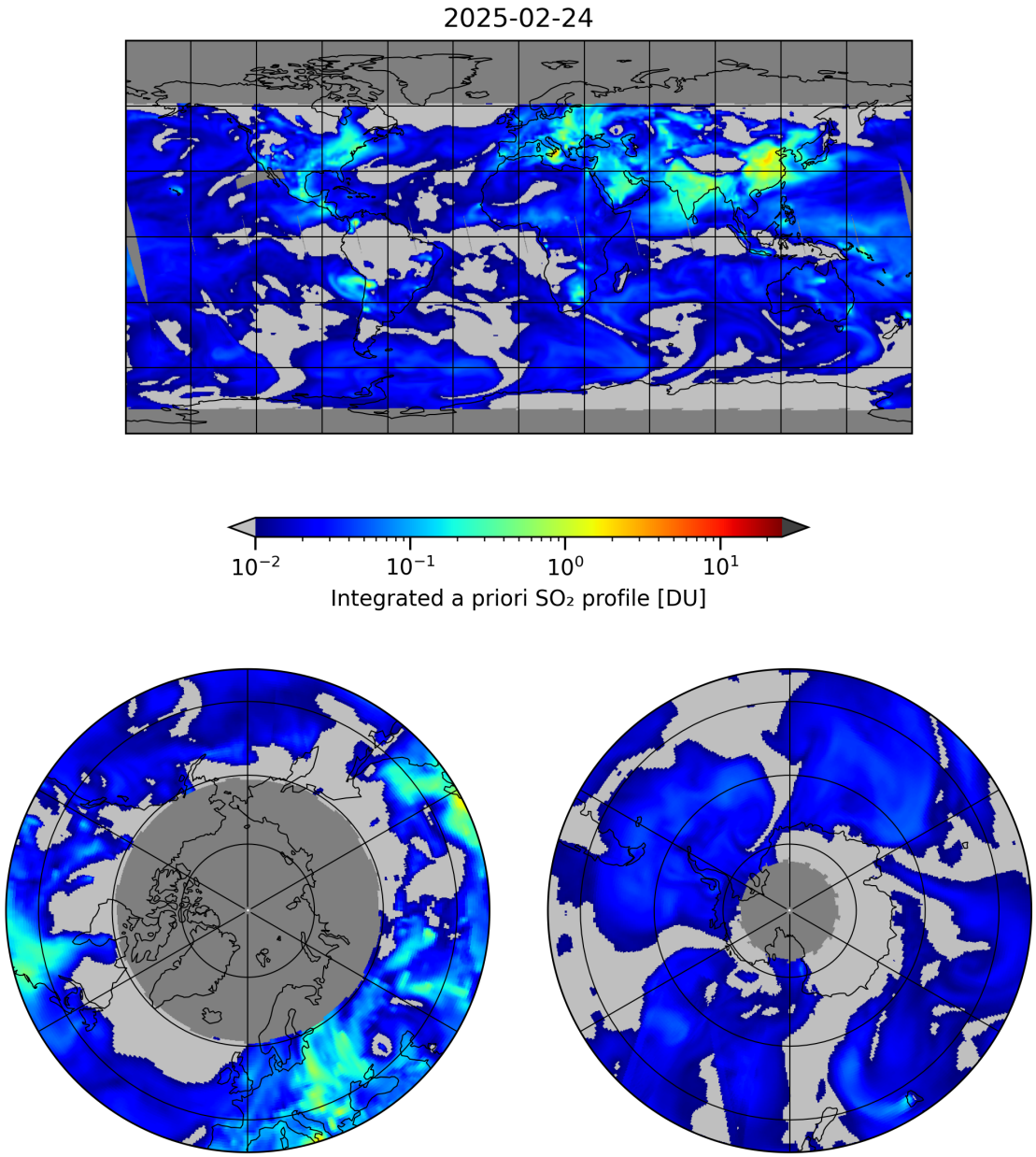


Figure 21: Map of “Integrated a priori SO_2 profile” for 2025-02-24 to 2025-02-25

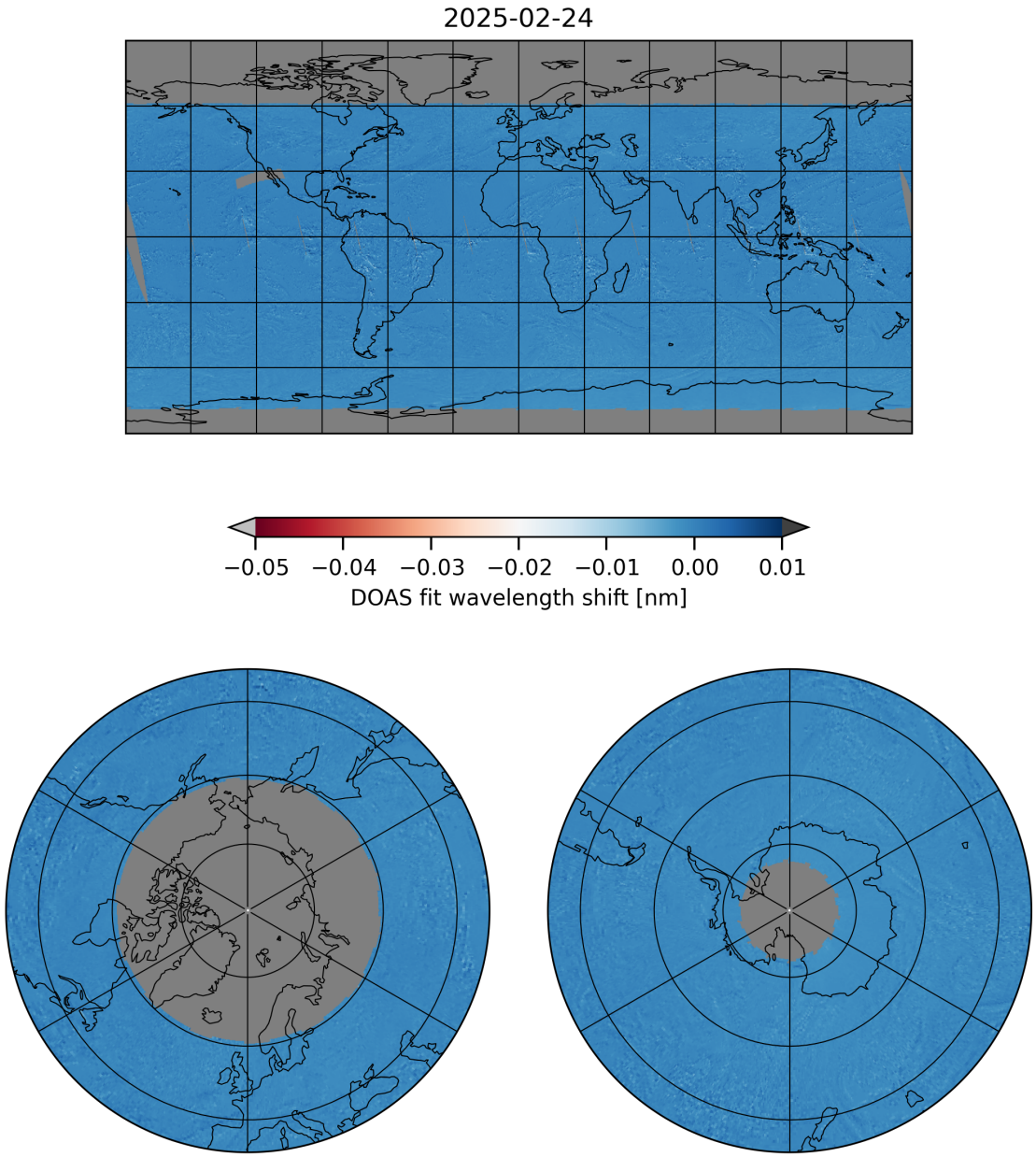


Figure 22: Map of “DOAS fit wavelength shift” for 2025-02-24 to 2025-02-25

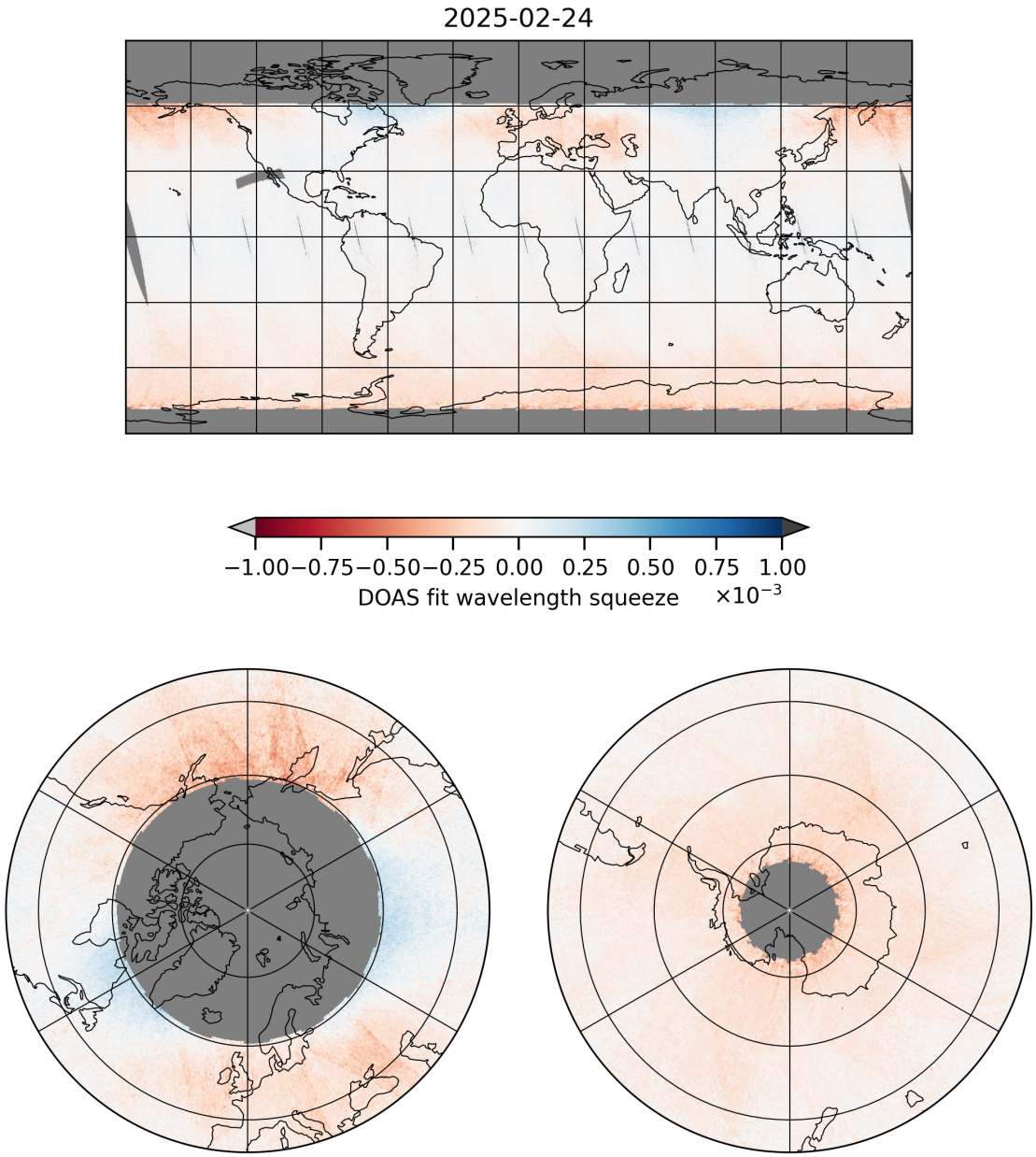


Figure 23: Map of “DOAS fit wavelength squeeze” for 2025-02-24 to 2025-02-25

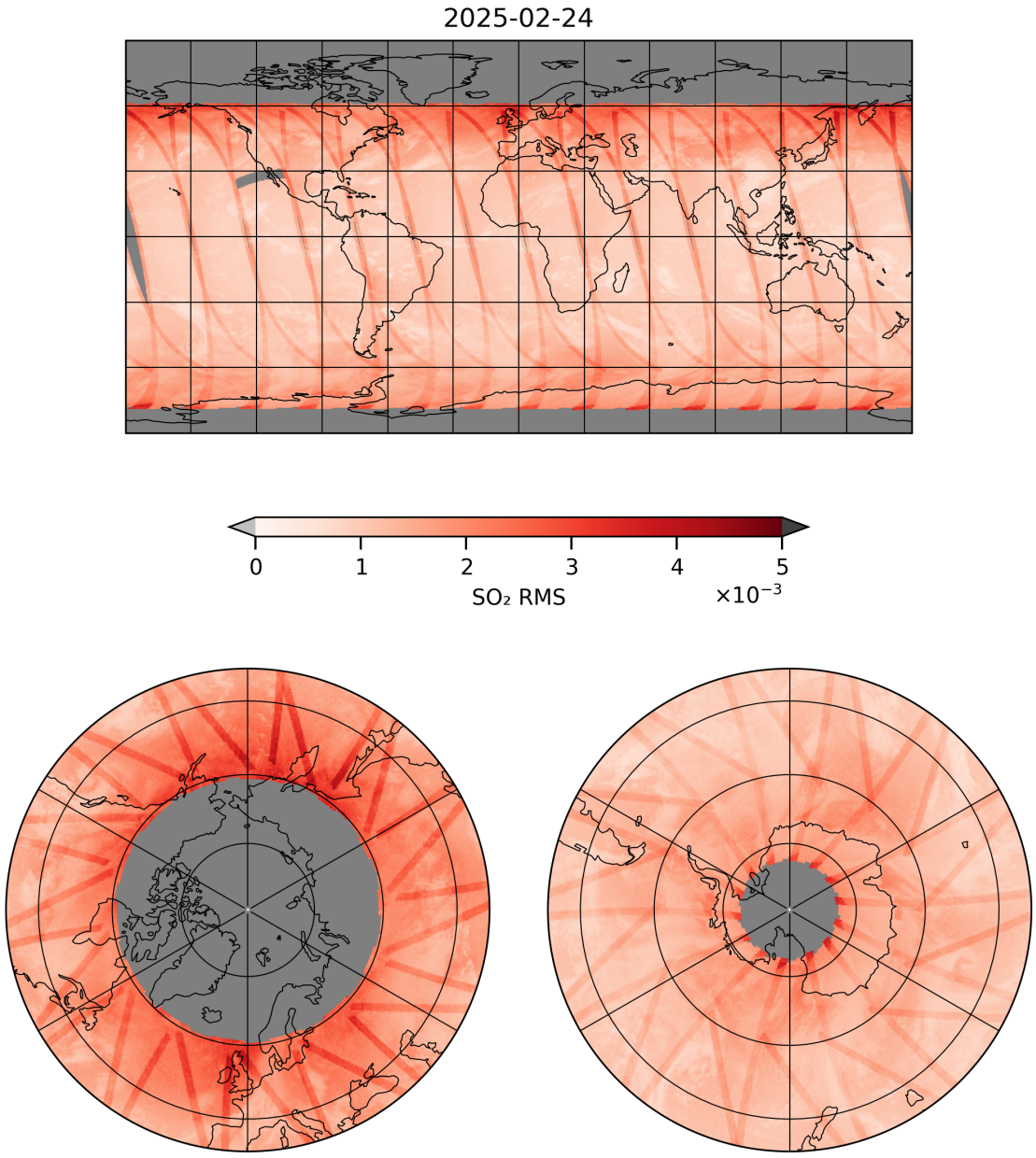


Figure 24: Map of "SO_2 RMS" for 2025-02-24 to 2025-02-25

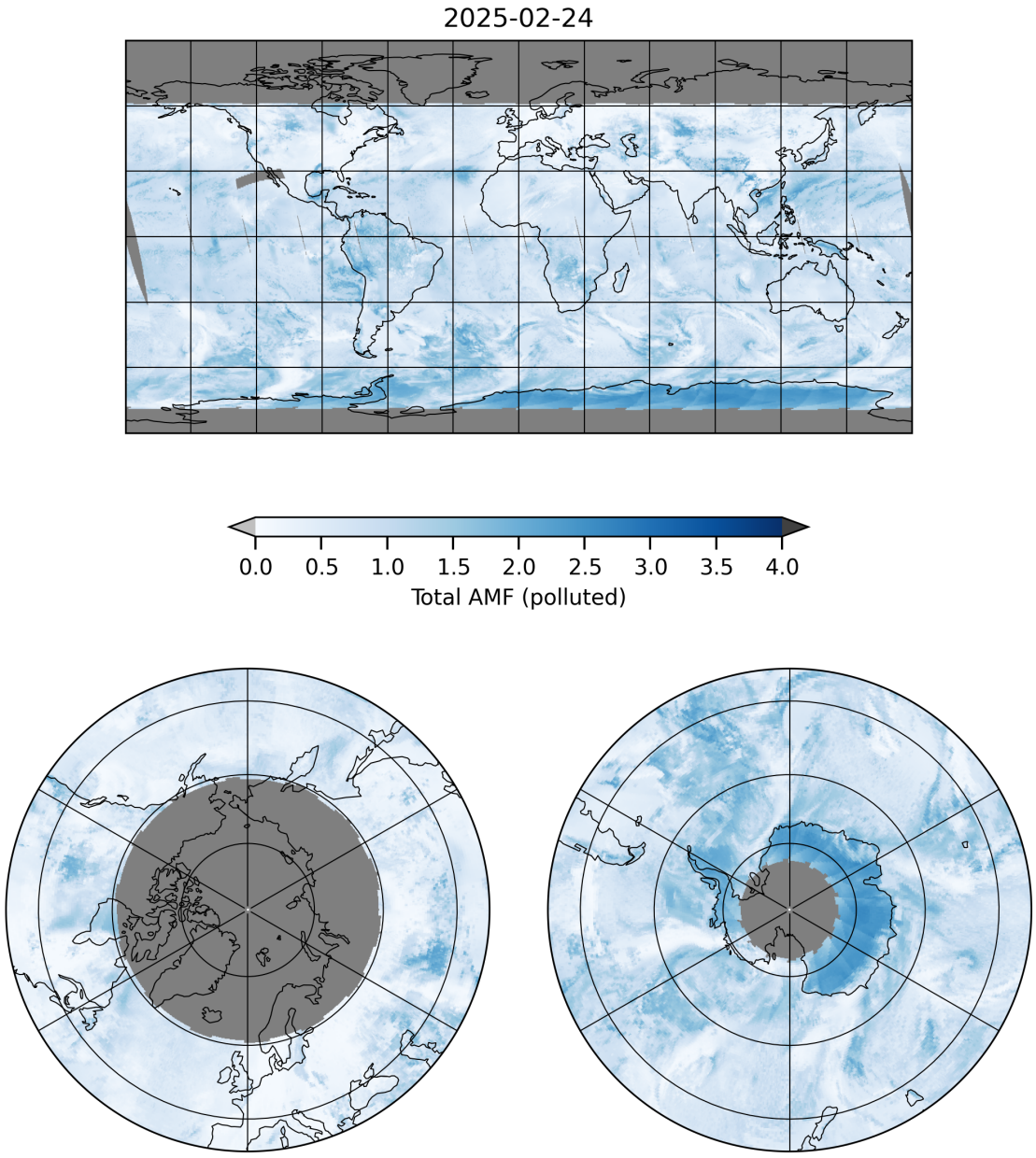


Figure 25: Map of “Total AMF (polluted)” for 2025-02-24 to 2025-02-25

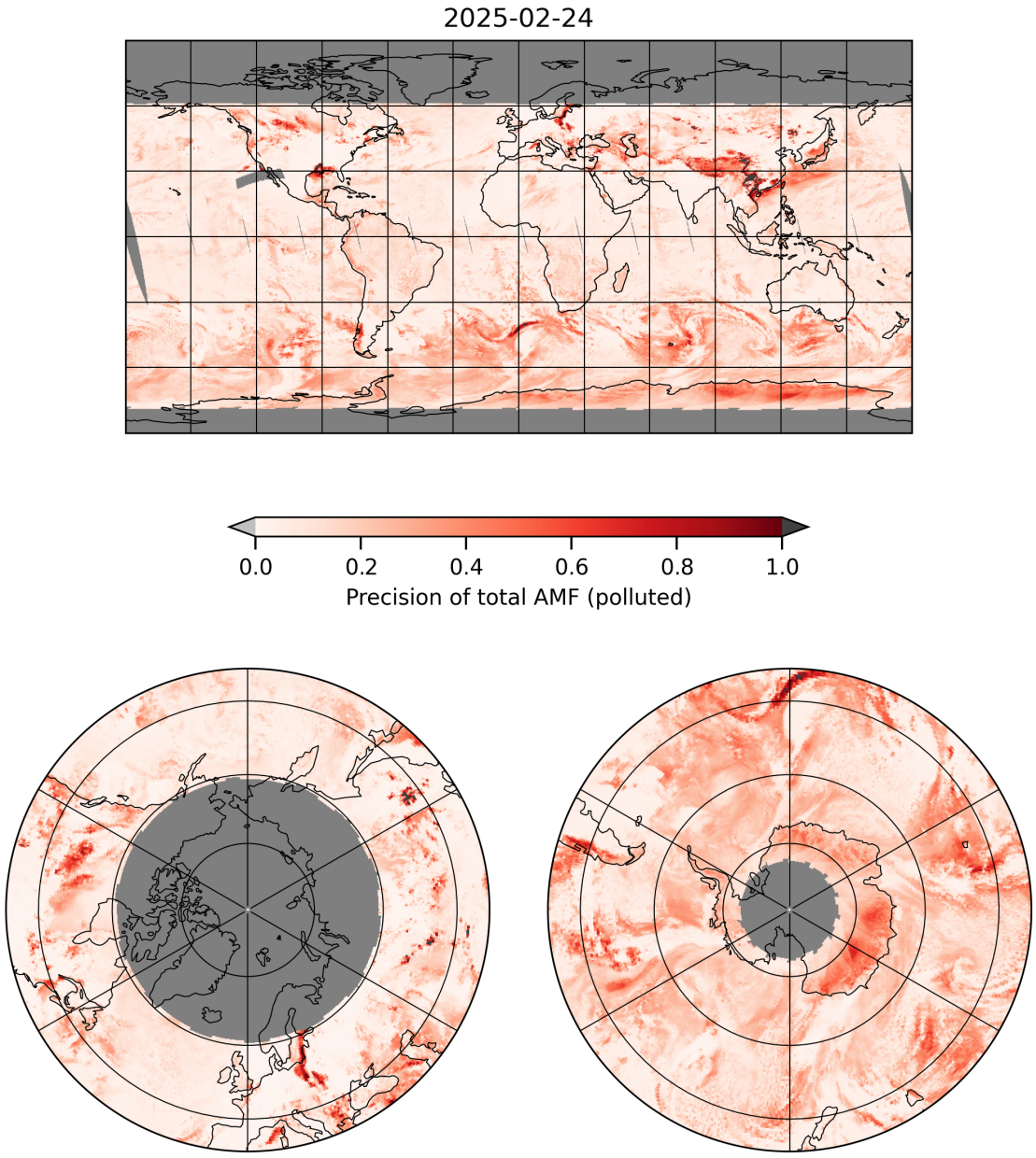


Figure 26: Map of “Precision of total AMF (polluted)” for 2025-02-24 to 2025-02-25

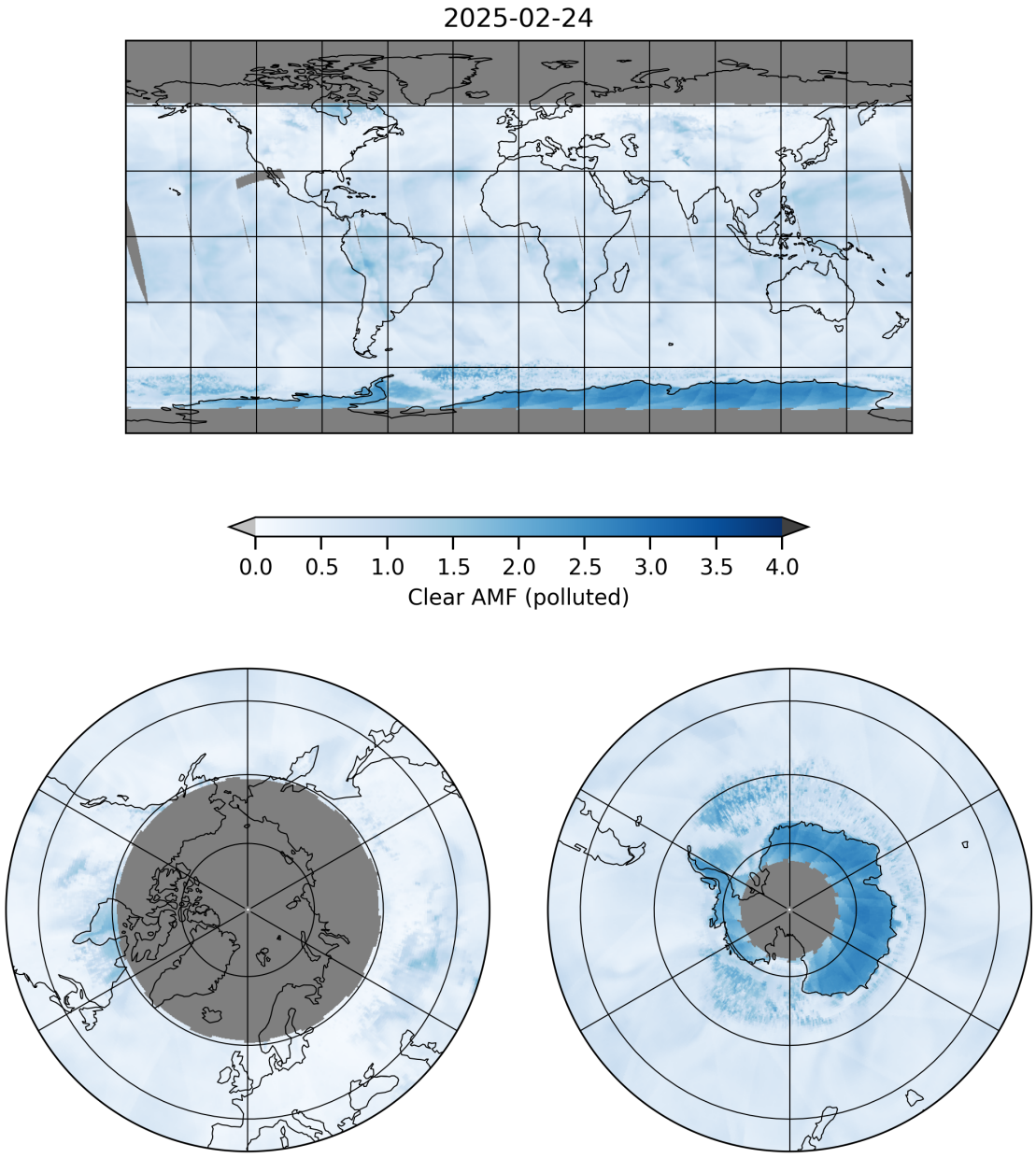


Figure 27: Map of “Clear AMF (polluted)” for 2025-02-24 to 2025-02-25

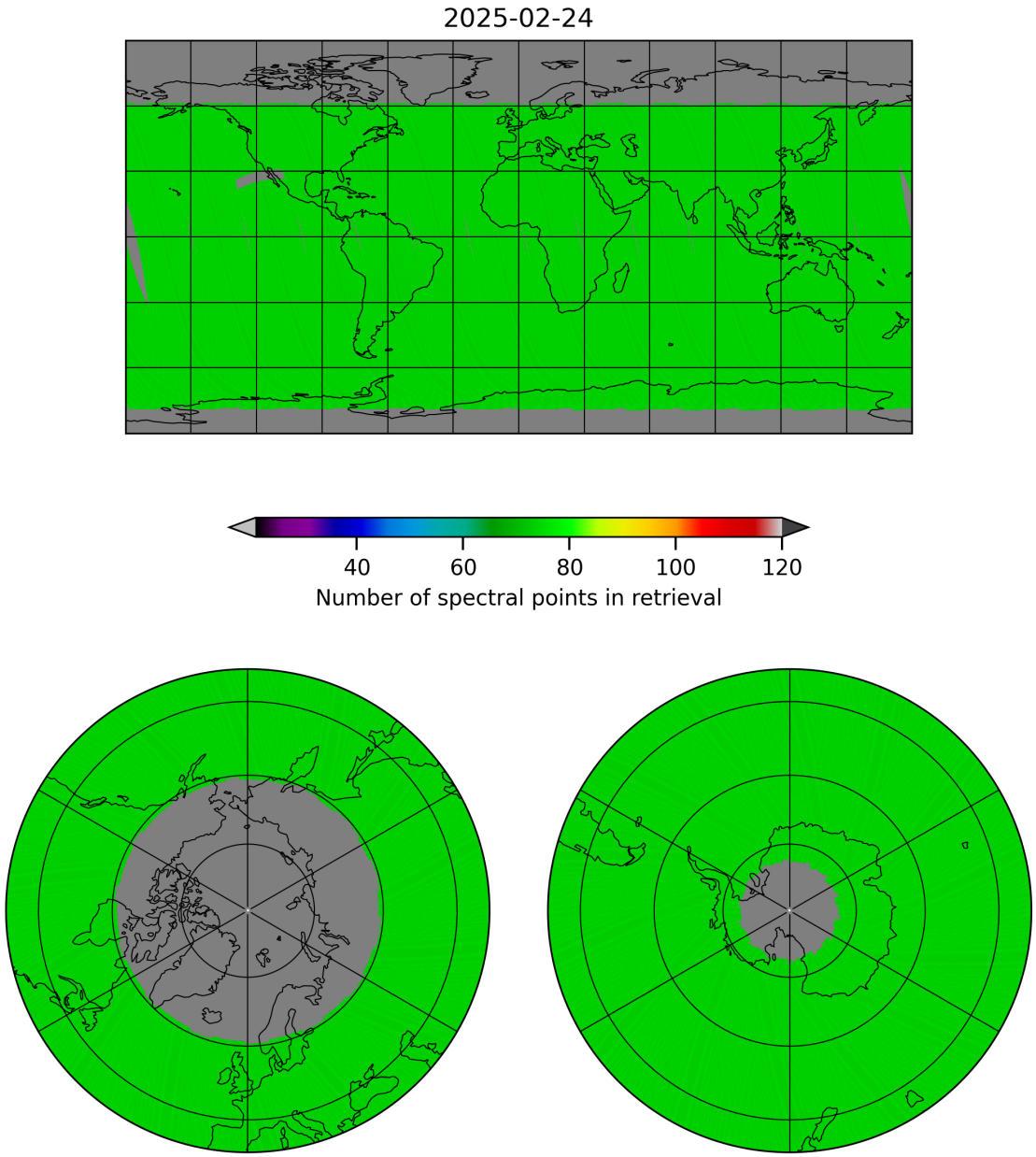


Figure 28: Map of “Number of spectral points in retrieval” for 2025-02-24 to 2025-02-25

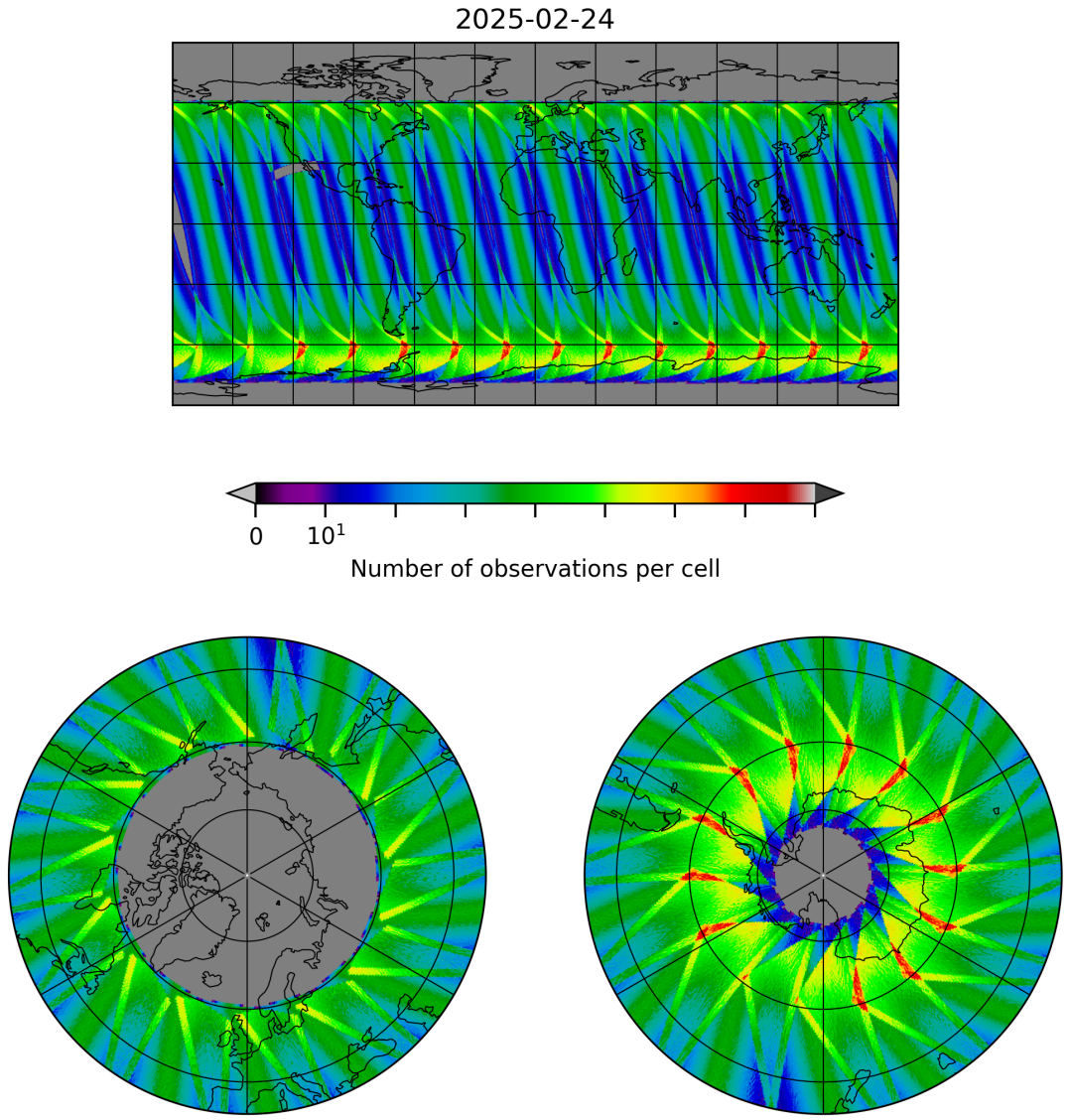


Figure 29: Map of the number of observations for 2025-02-24 to 2025-02-25

7 Zonal average

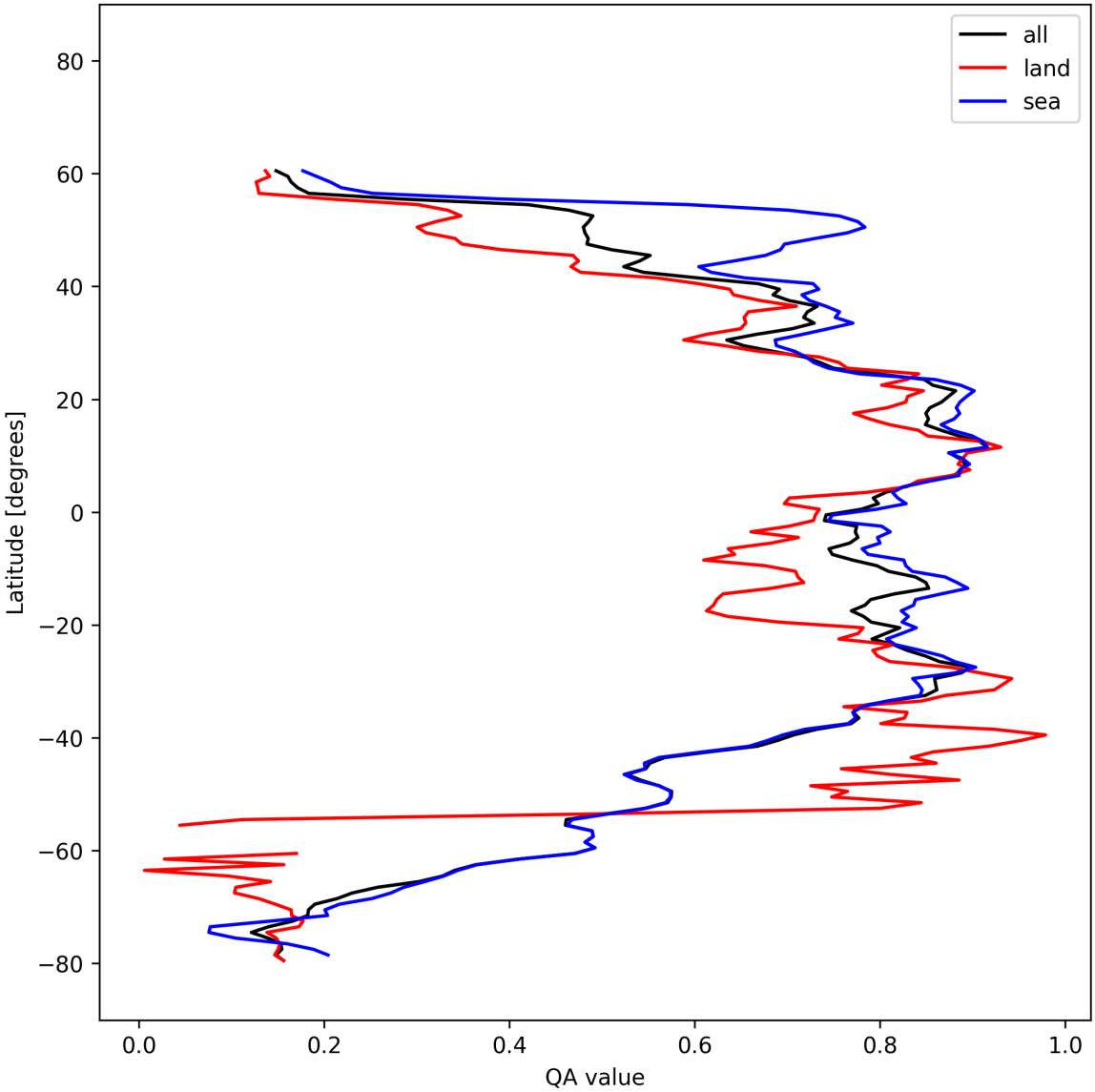


Figure 30: Zonal average of “QA value” for 2025-02-24 to 2025-02-25.

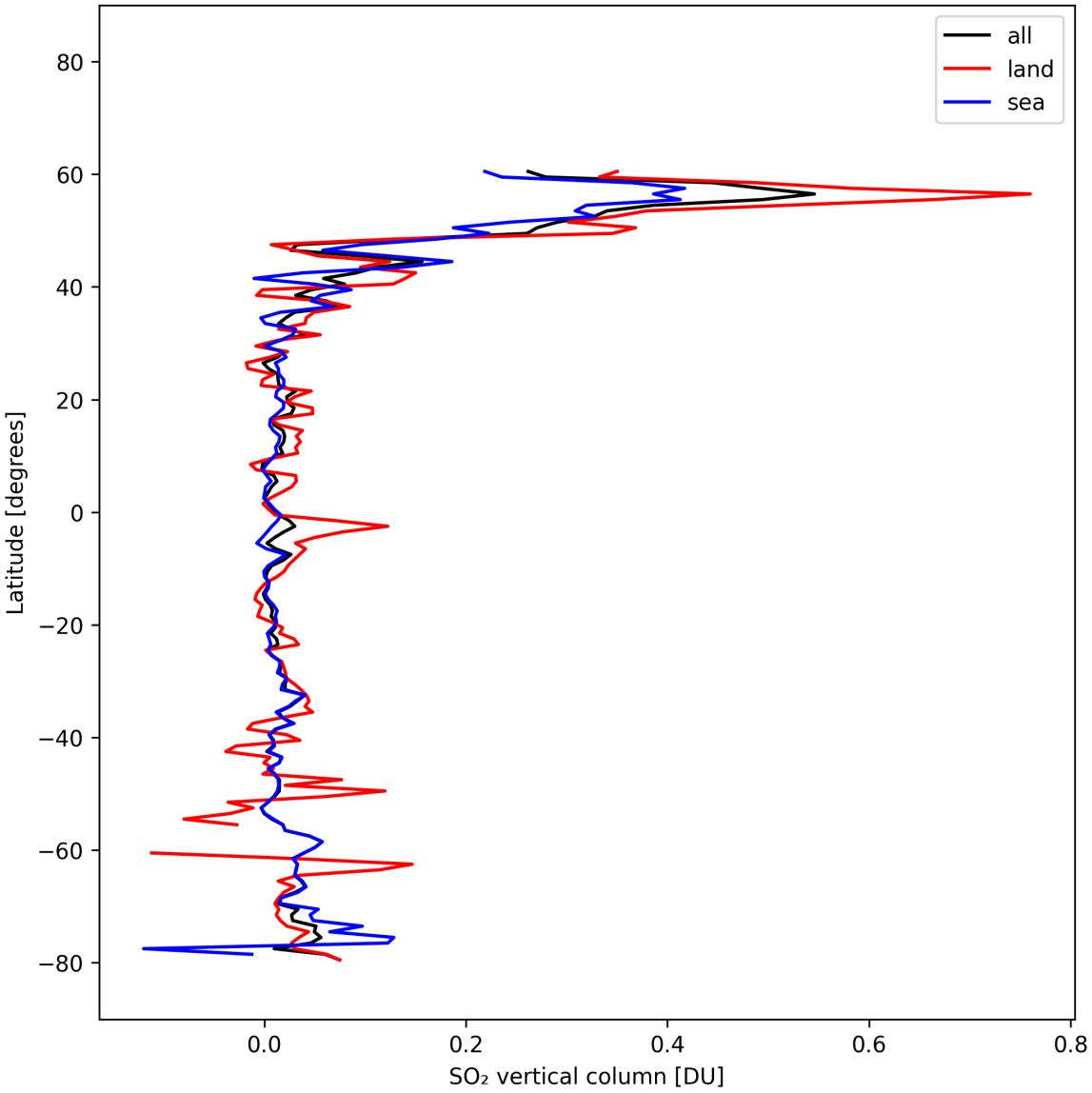


Figure 31: Zonal average of "SO_2 vertical column" for 2025-02-24 to 2025-02-25.

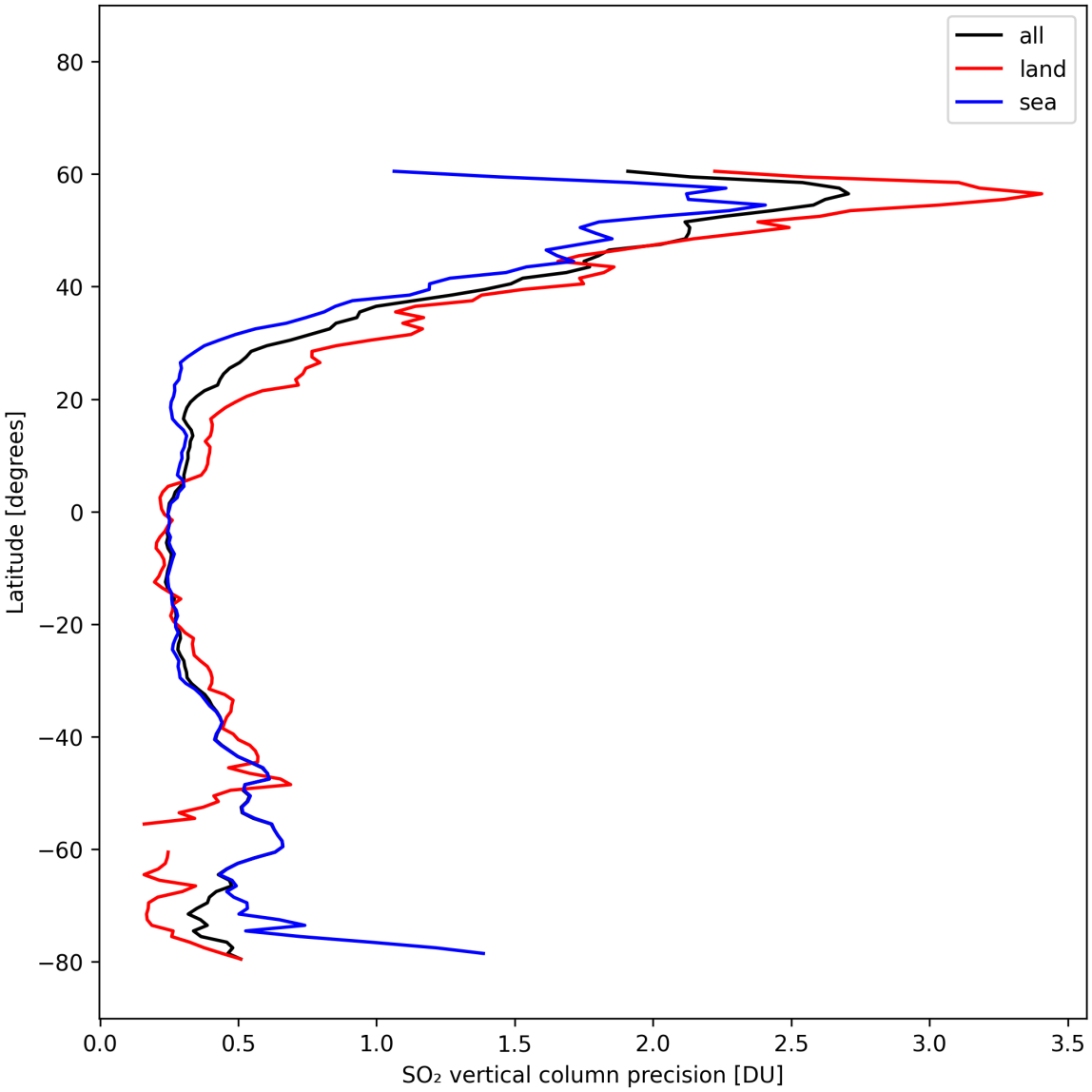


Figure 32: Zonal average of "SO_2 vertical column precision" for 2025-02-24 to 2025-02-25.

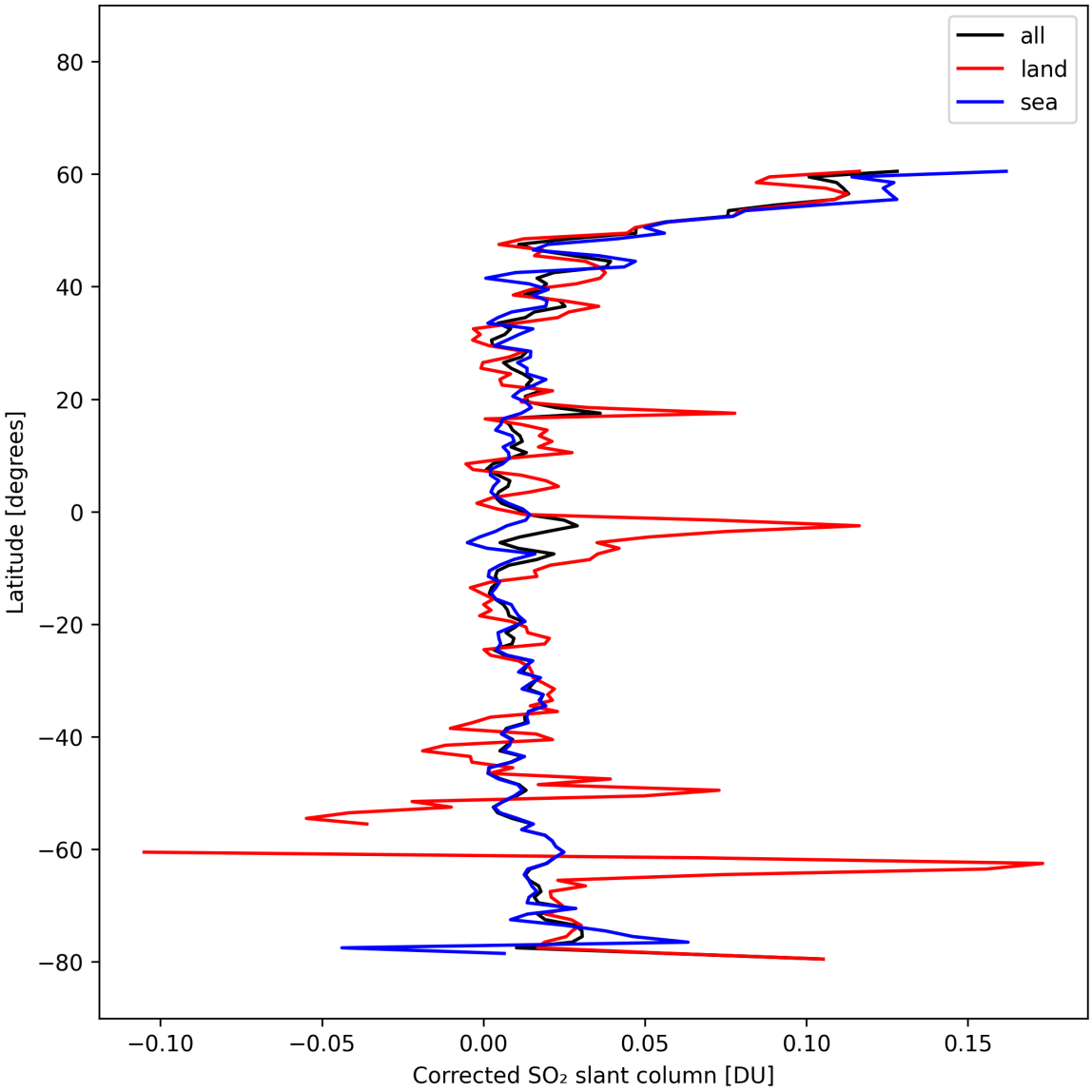


Figure 33: Zonal average of “Corrected SO_2 slant column” for 2025-02-24 to 2025-02-25.

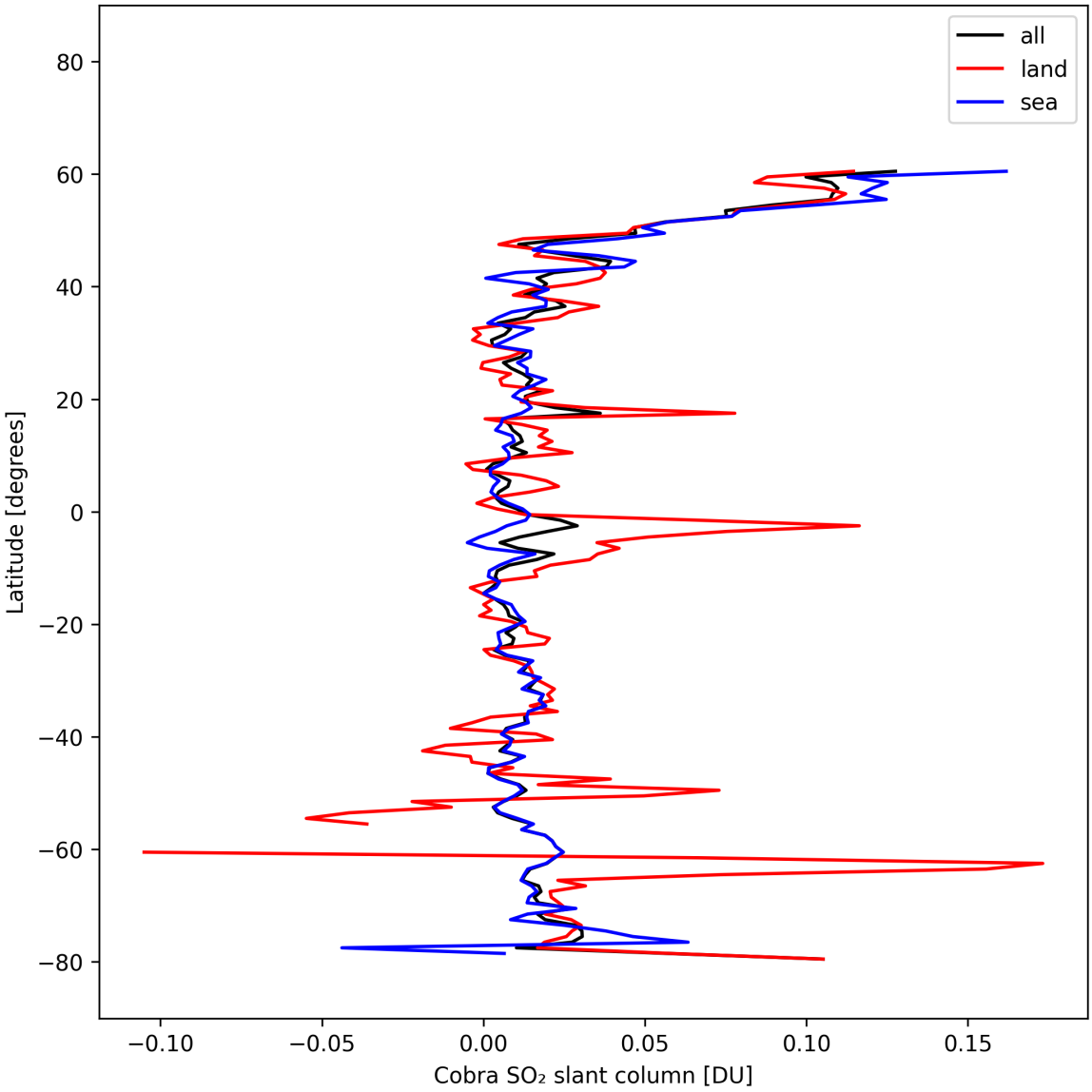


Figure 34: Zonal average of “Cobra SO_2 slant column” for 2025-02-24 to 2025-02-25.

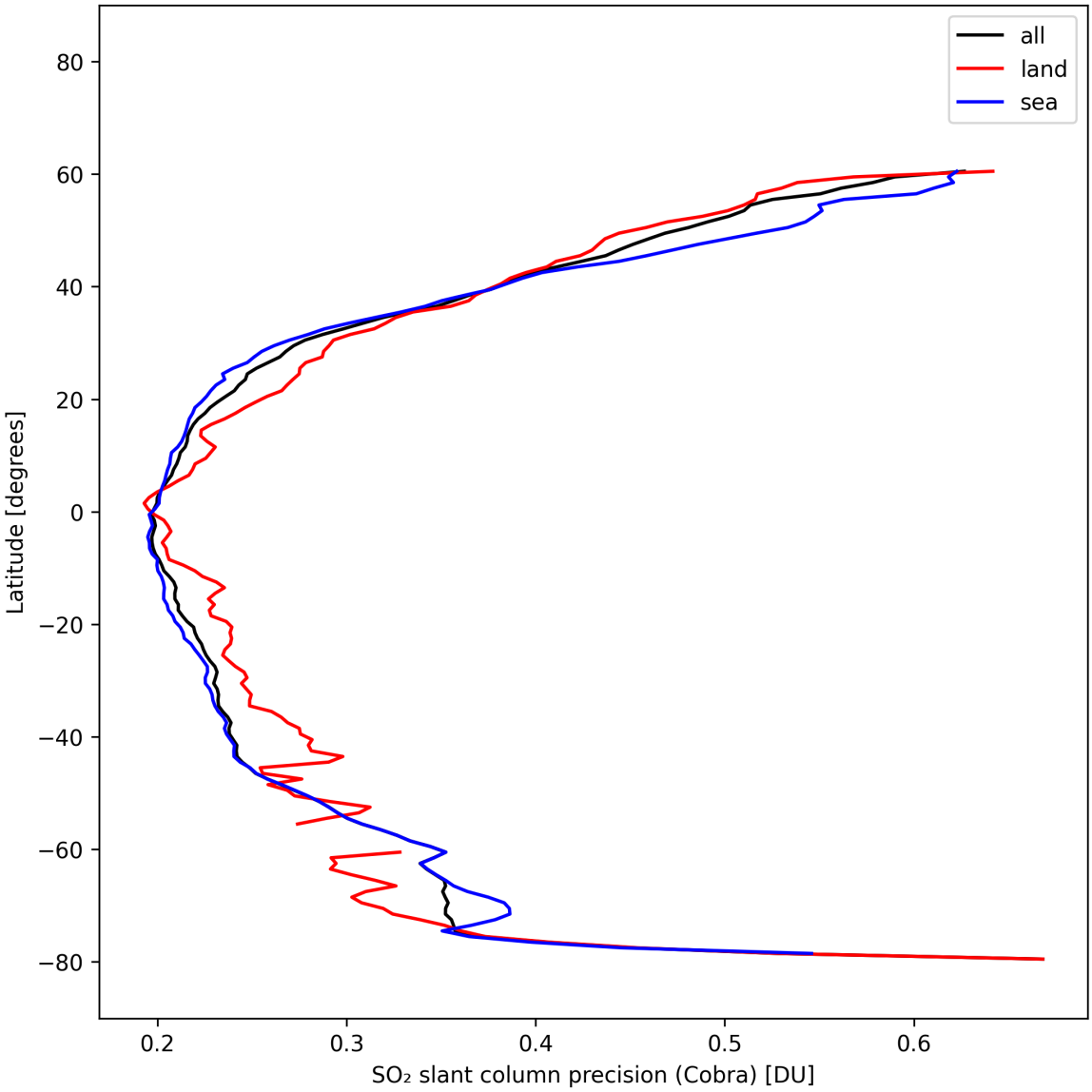


Figure 35: Zonal average of "SO_2 slant column precision (Cobra)" for 2025-02-24 to 2025-02-25.

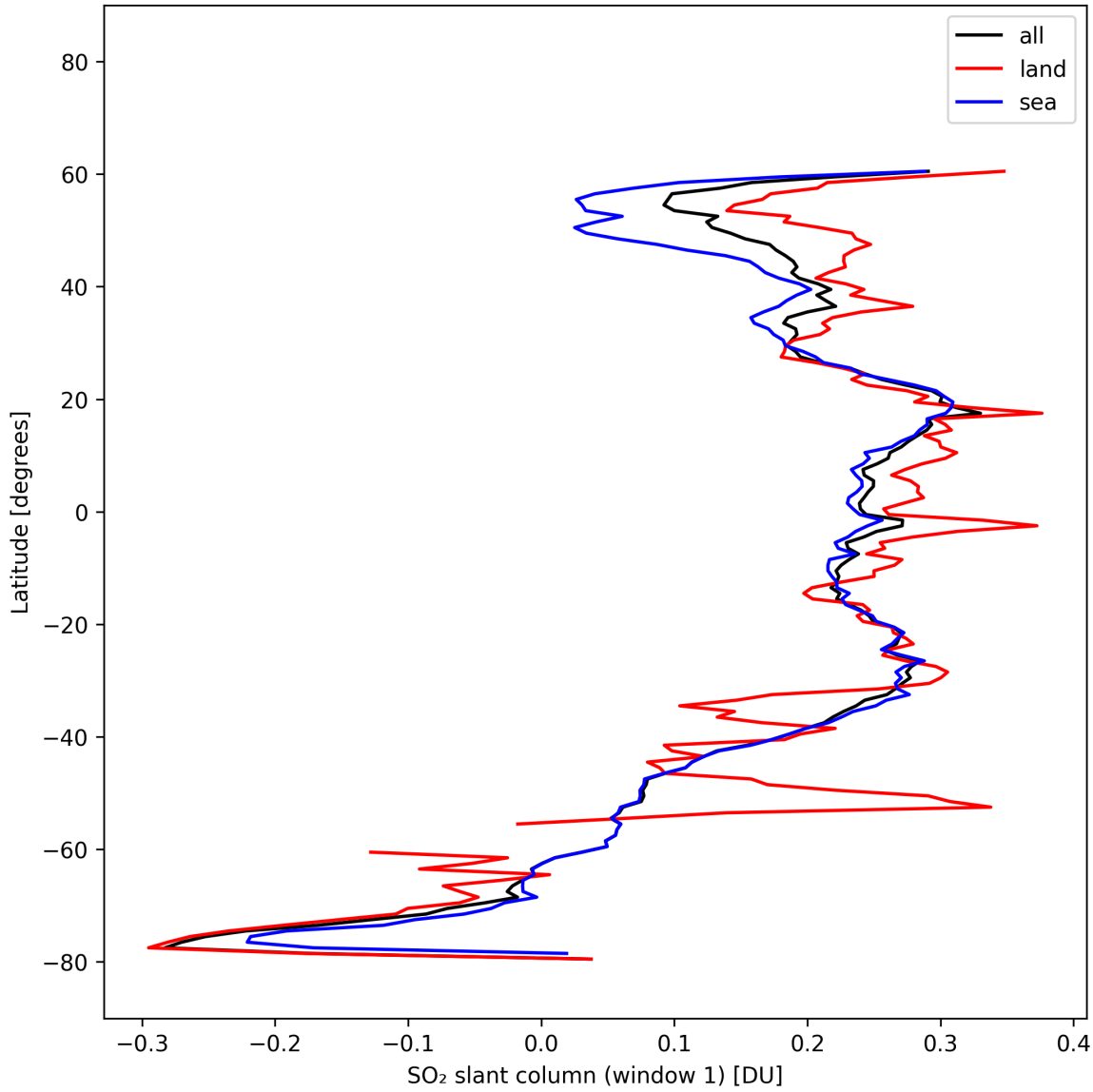


Figure 36: Zonal average of "SO_2 slant column (window 1)" for 2025-02-24 to 2025-02-25.

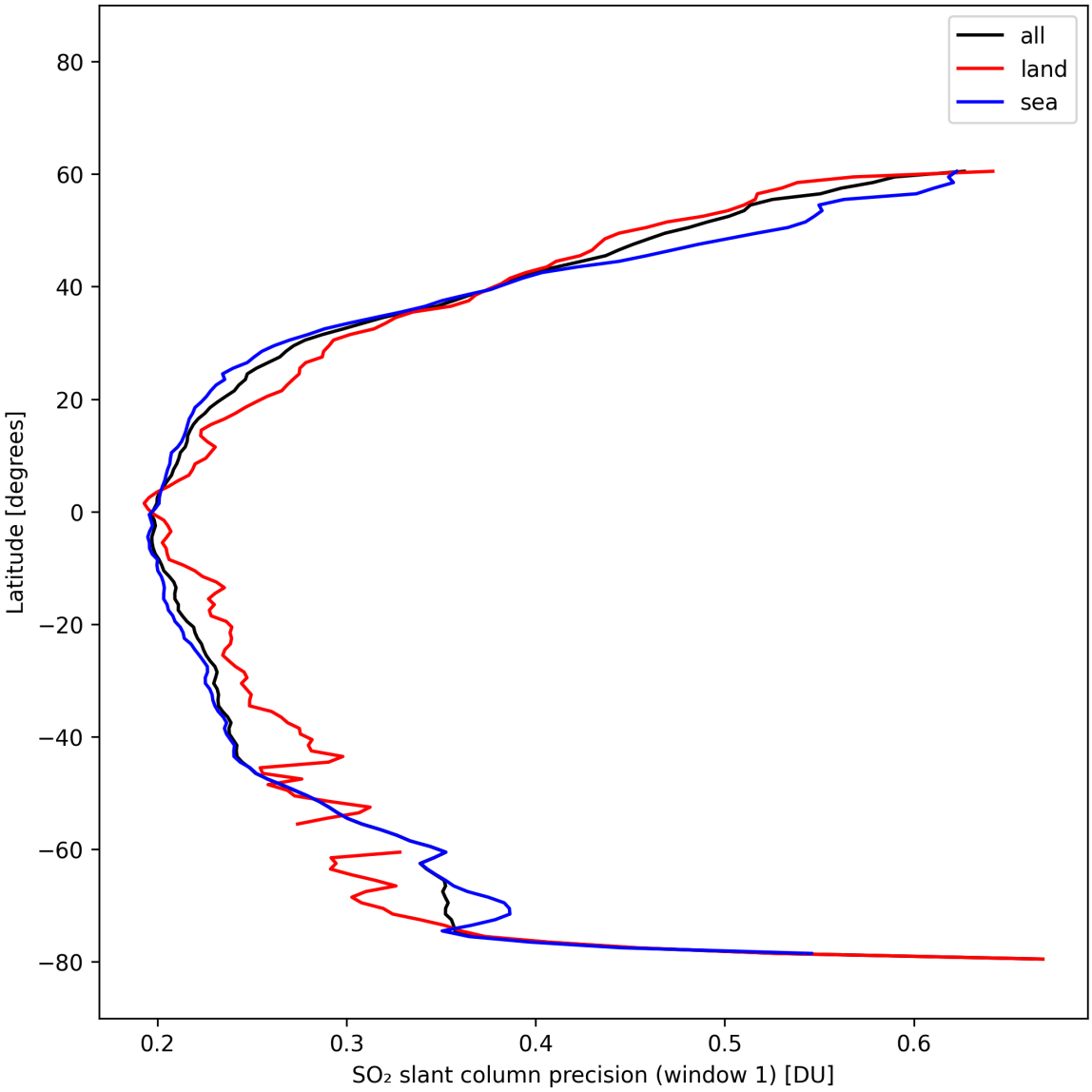


Figure 37: Zonal average of "SO_2 slant column precision (window 1)" for 2025-02-24 to 2025-02-25.

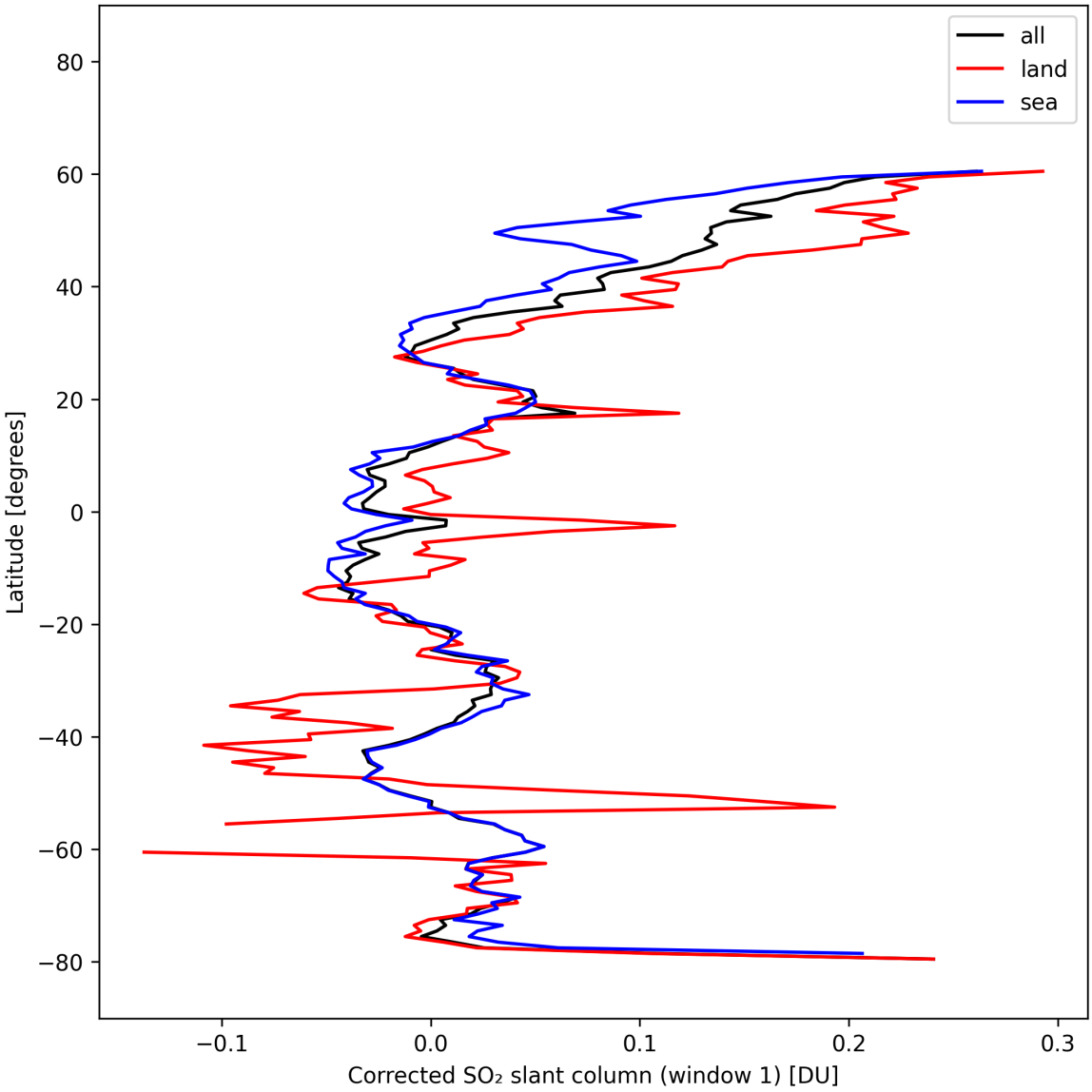


Figure 38: Zonal average of "Corrected SO_2 slant column (window 1)" for 2025-02-24 to 2025-02-25.

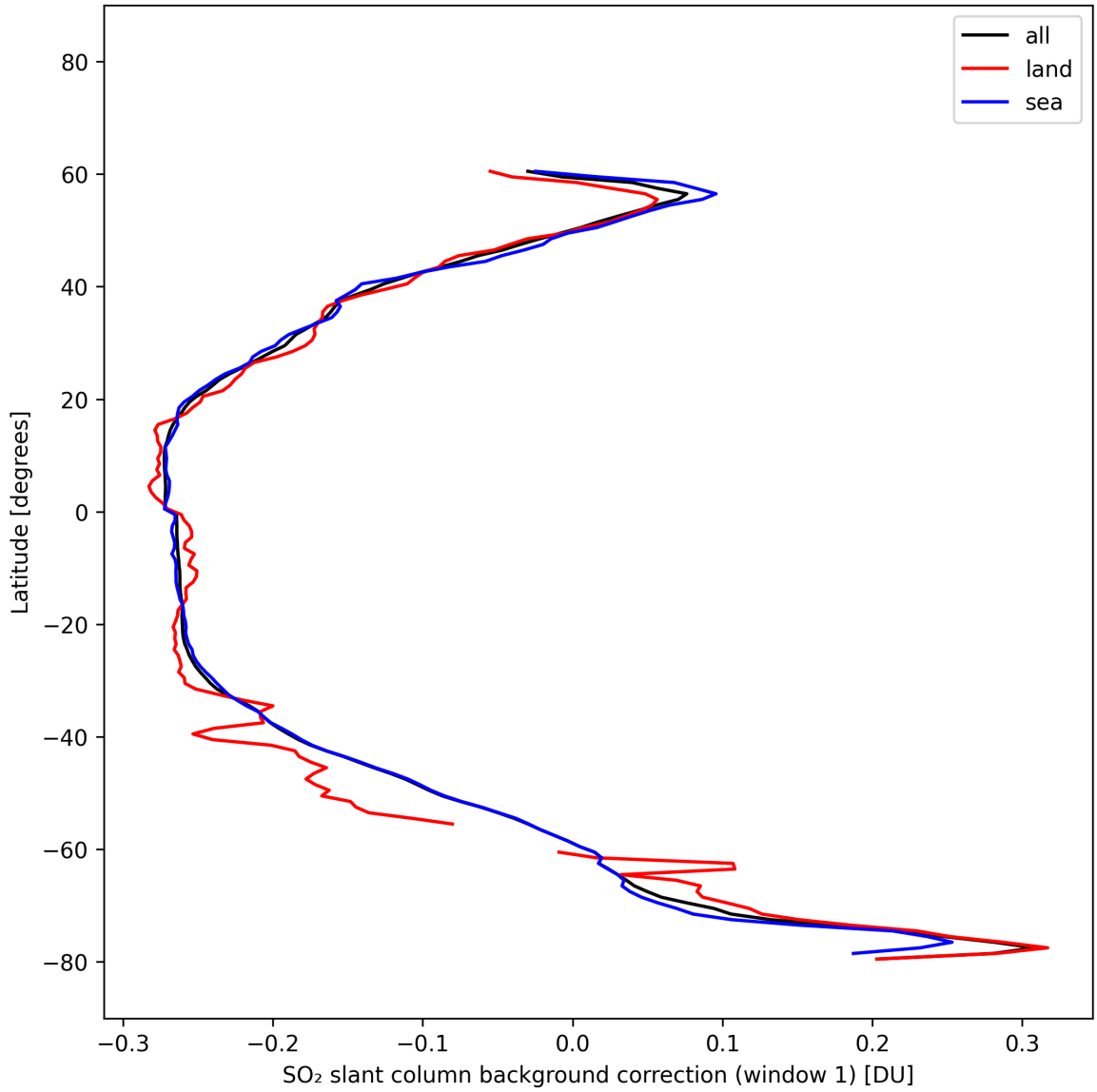


Figure 39: Zonal average of "SO_2 slant column background correction (window 1)" for 2025-02-24 to 2025-02-25.

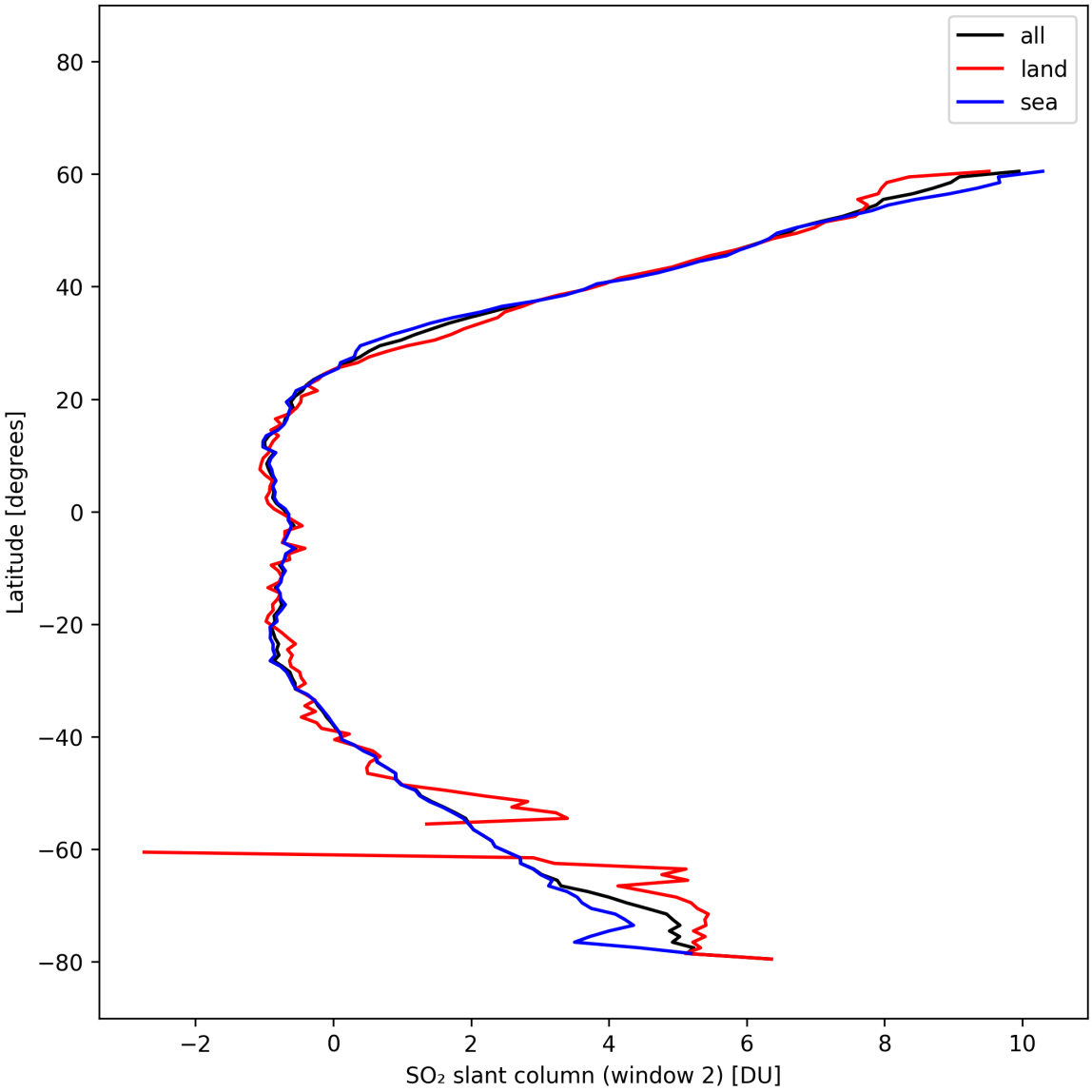


Figure 40: Zonal average of "SO_2 slant column (window 2)" for 2025-02-24 to 2025-02-25.

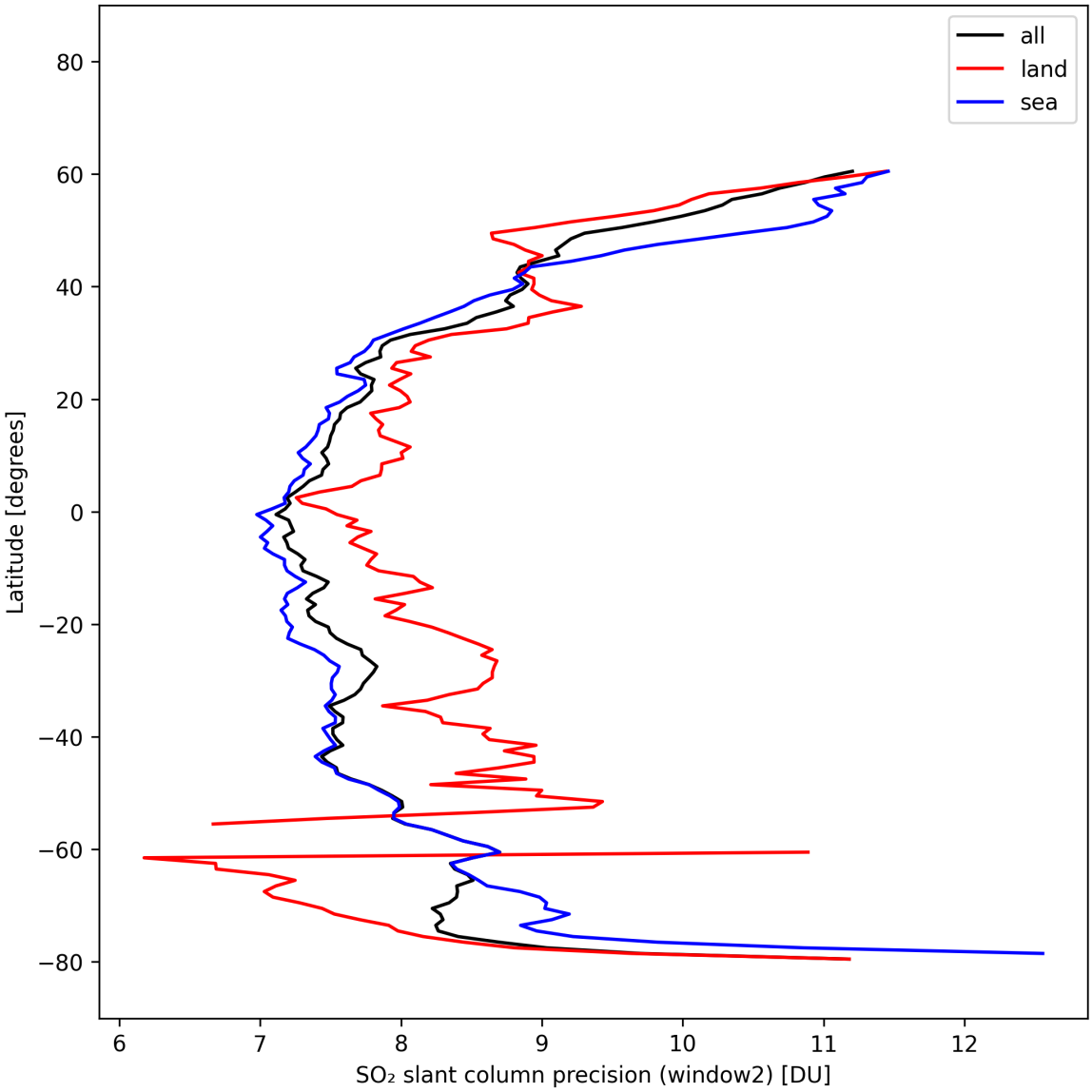


Figure 41: Zonal average of "SO_2 slant column precision (window2)" for 2025-02-24 to 2025-02-25.

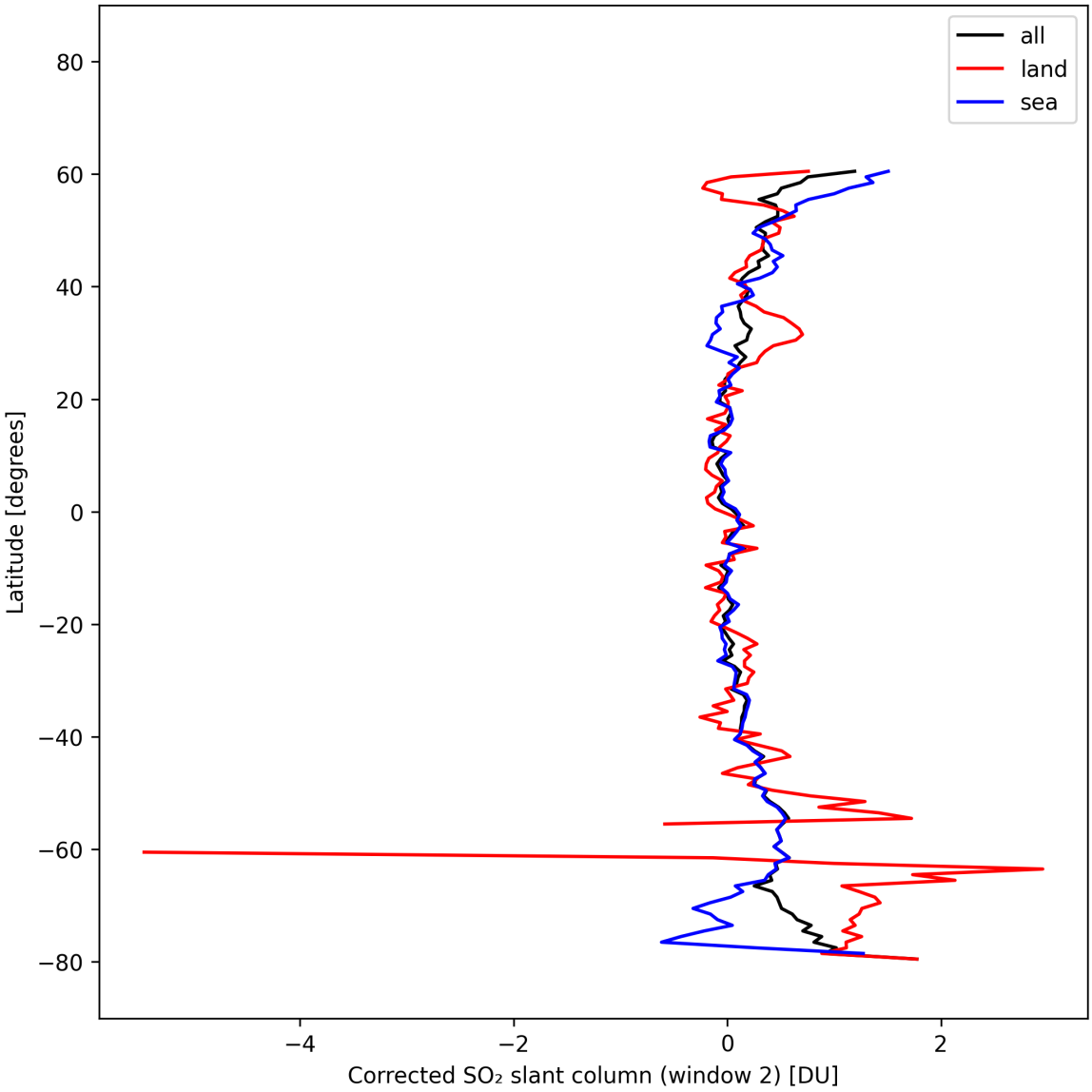


Figure 42: Zonal average of "Corrected SO_2 slant column (window 2)" for 2025-02-24 to 2025-02-25.

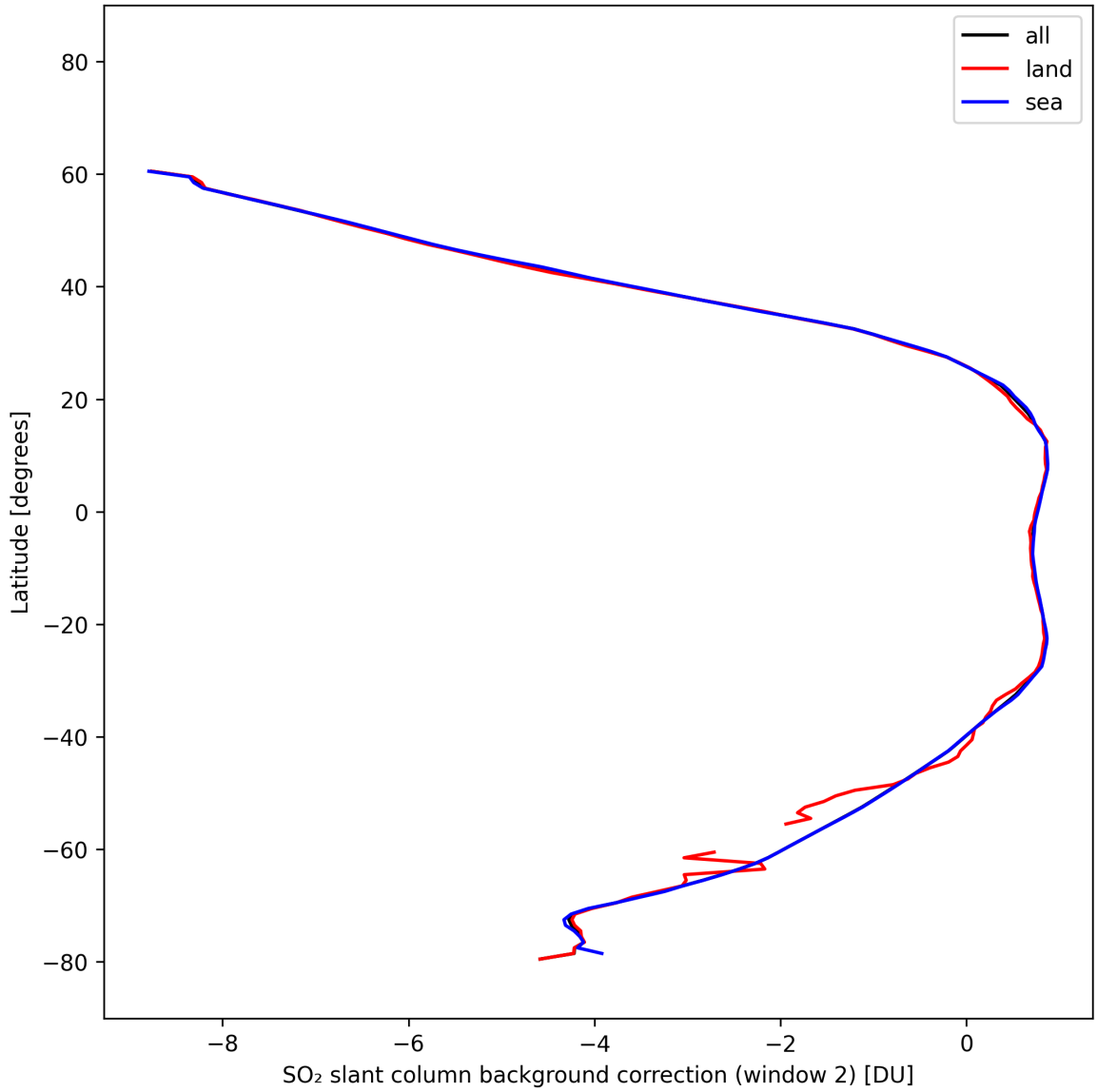


Figure 43: Zonal average of "SO_2 slant column background correction (window 2)" for 2025-02-24 to 2025-02-25.

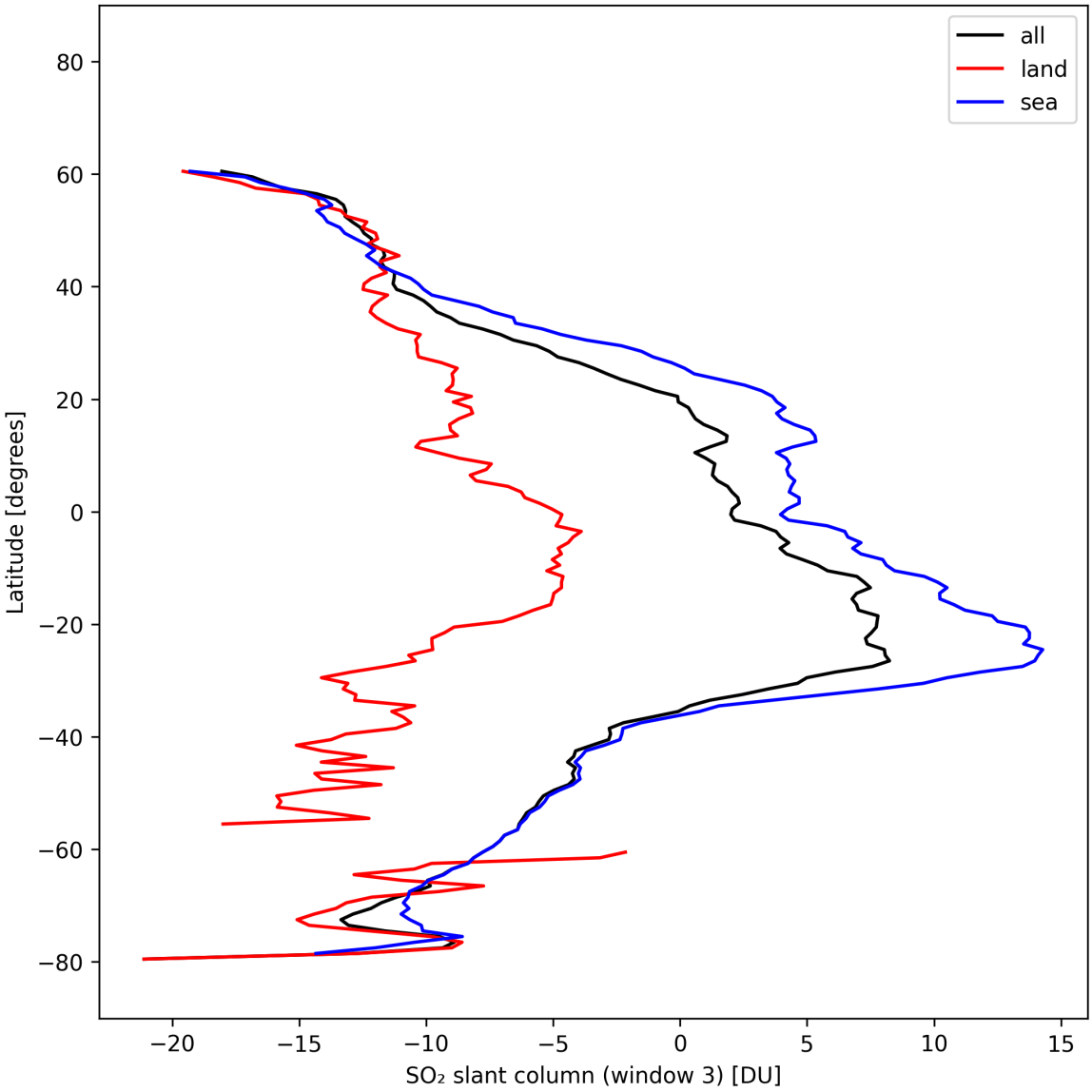


Figure 44: Zonal average of "SO_2 slant column (window 3)" for 2025-02-24 to 2025-02-25.

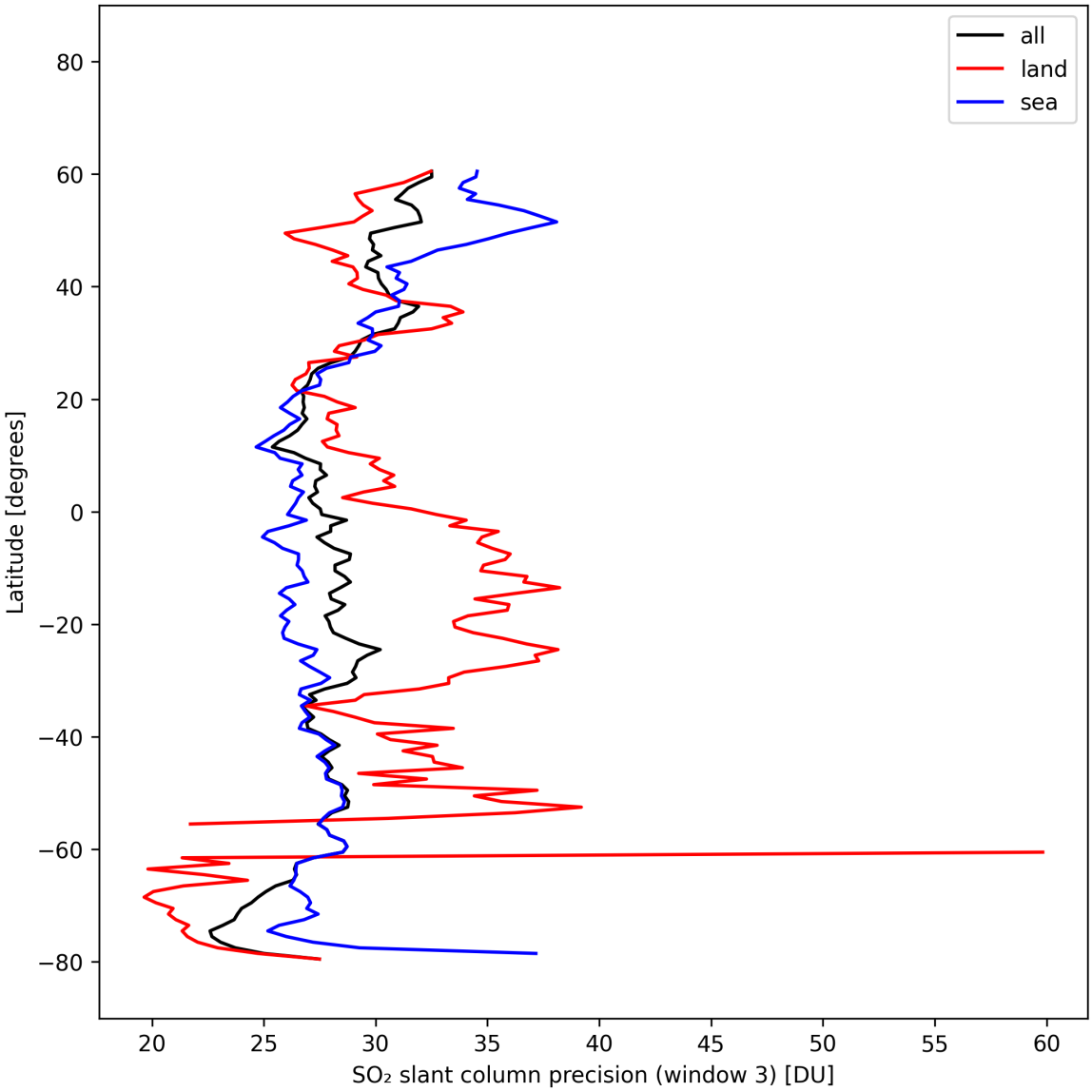


Figure 45: Zonal average of "SO_2 slant column precision (window 3)" for 2025-02-24 to 2025-02-25.

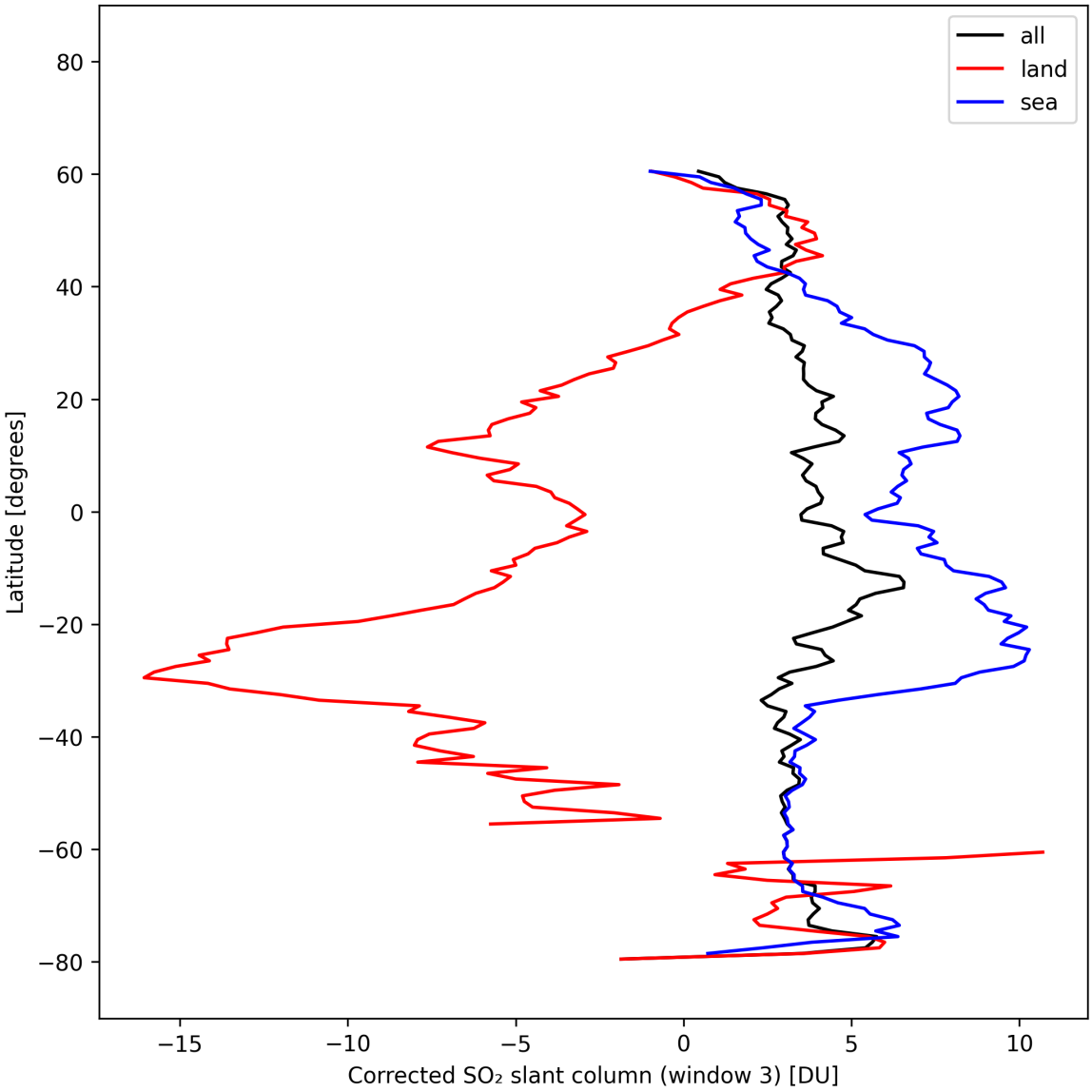


Figure 46: Zonal average of "Corrected SO_2 slant column (window 3)" for 2025-02-24 to 2025-02-25.

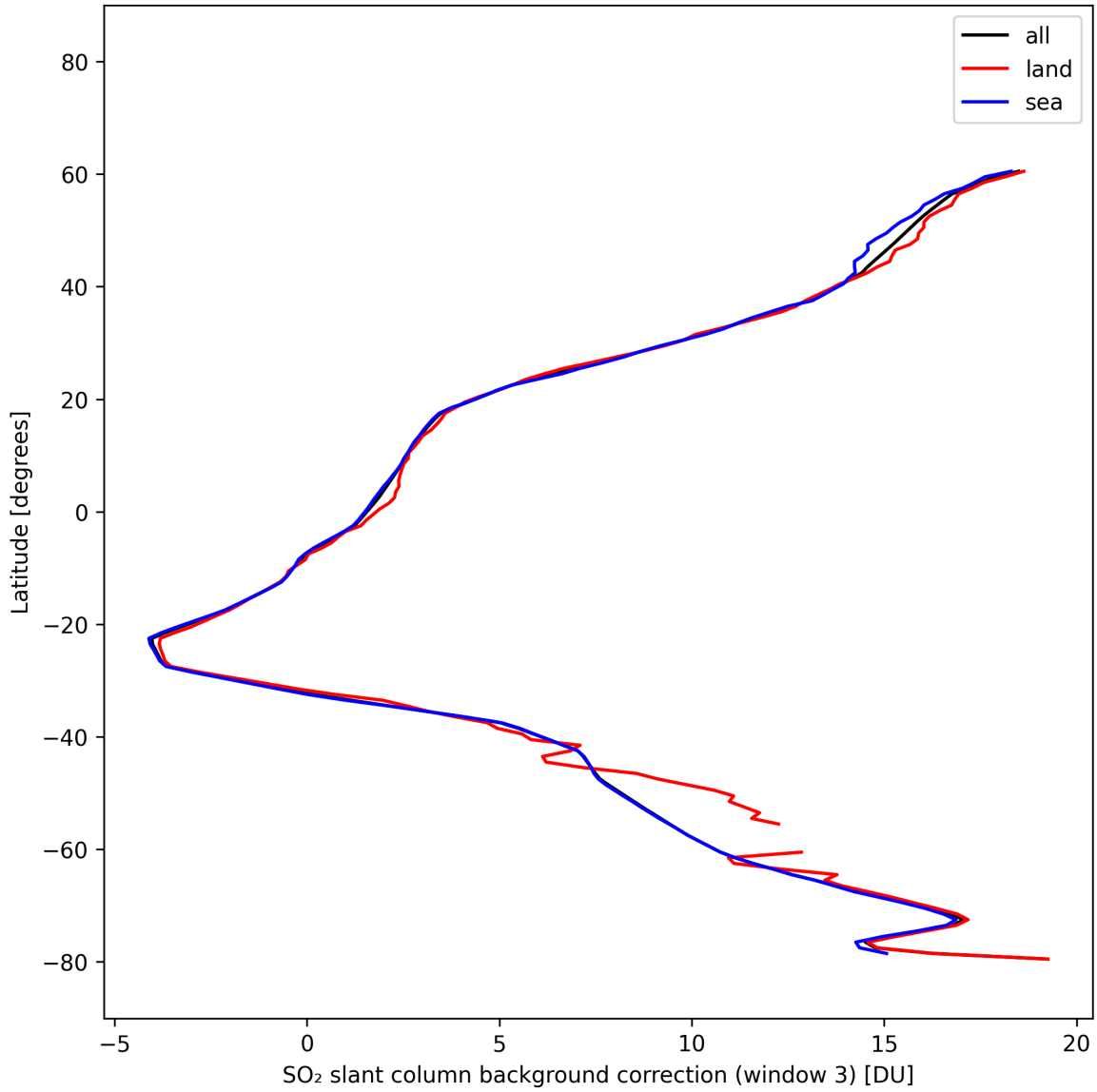


Figure 47: Zonal average of "SO_2 slant column background correction (window 3)" for 2025-02-24 to 2025-02-25.

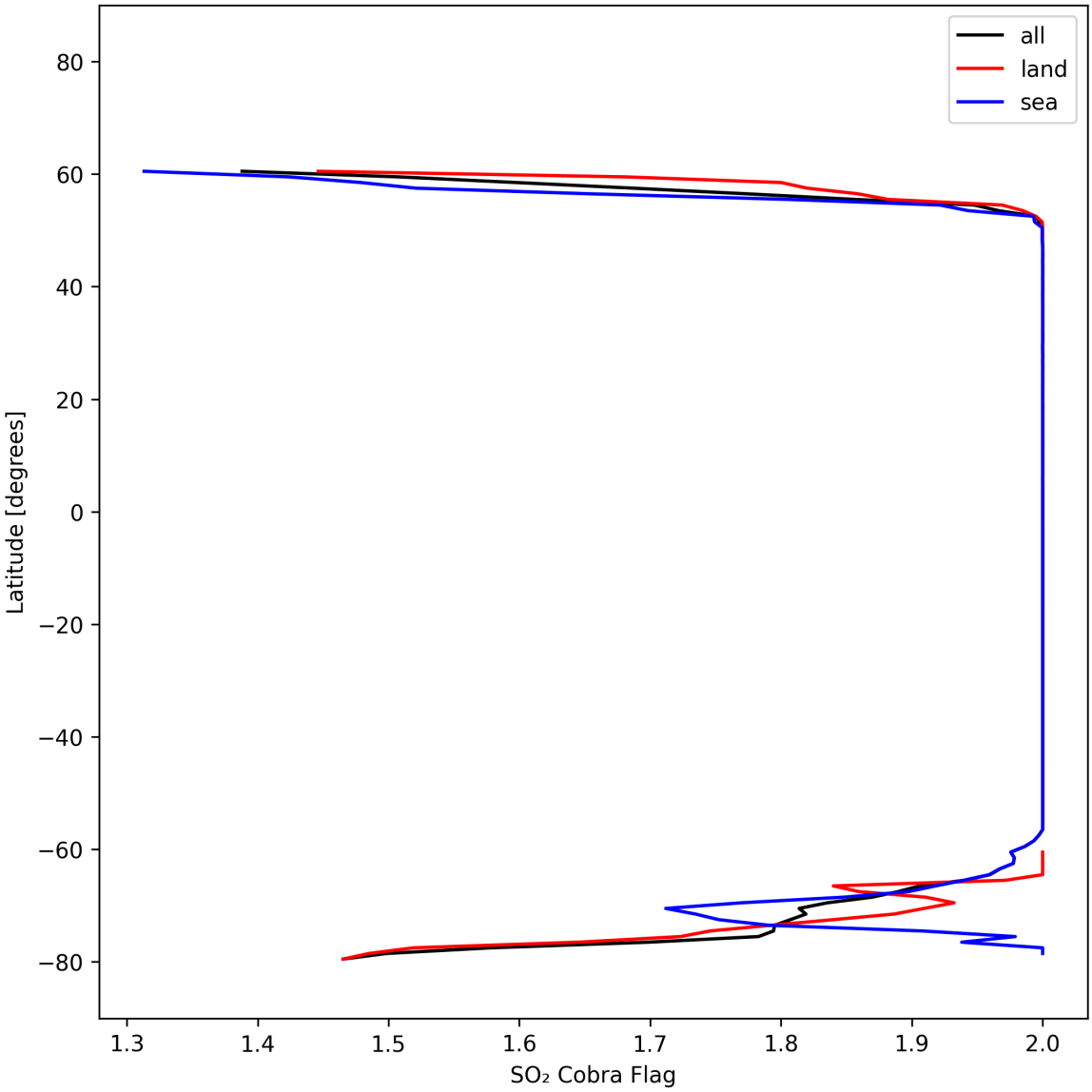


Figure 48: Zonal average of "SO_2 Cobra Flag" for 2025-02-24 to 2025-02-25.

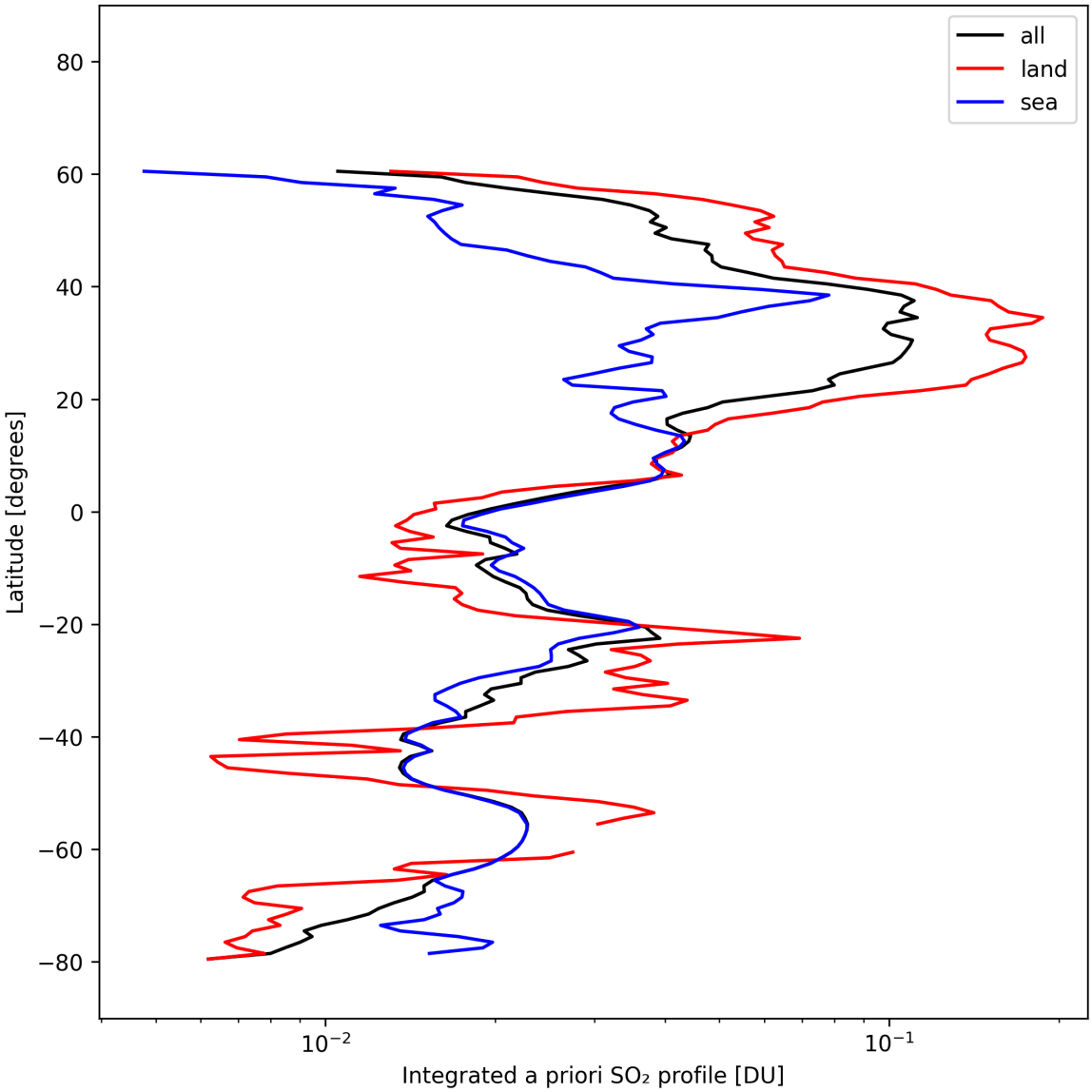


Figure 49: Zonal average of “Integrated a priori SO_2 profile” for 2025-02-24 to 2025-02-25.

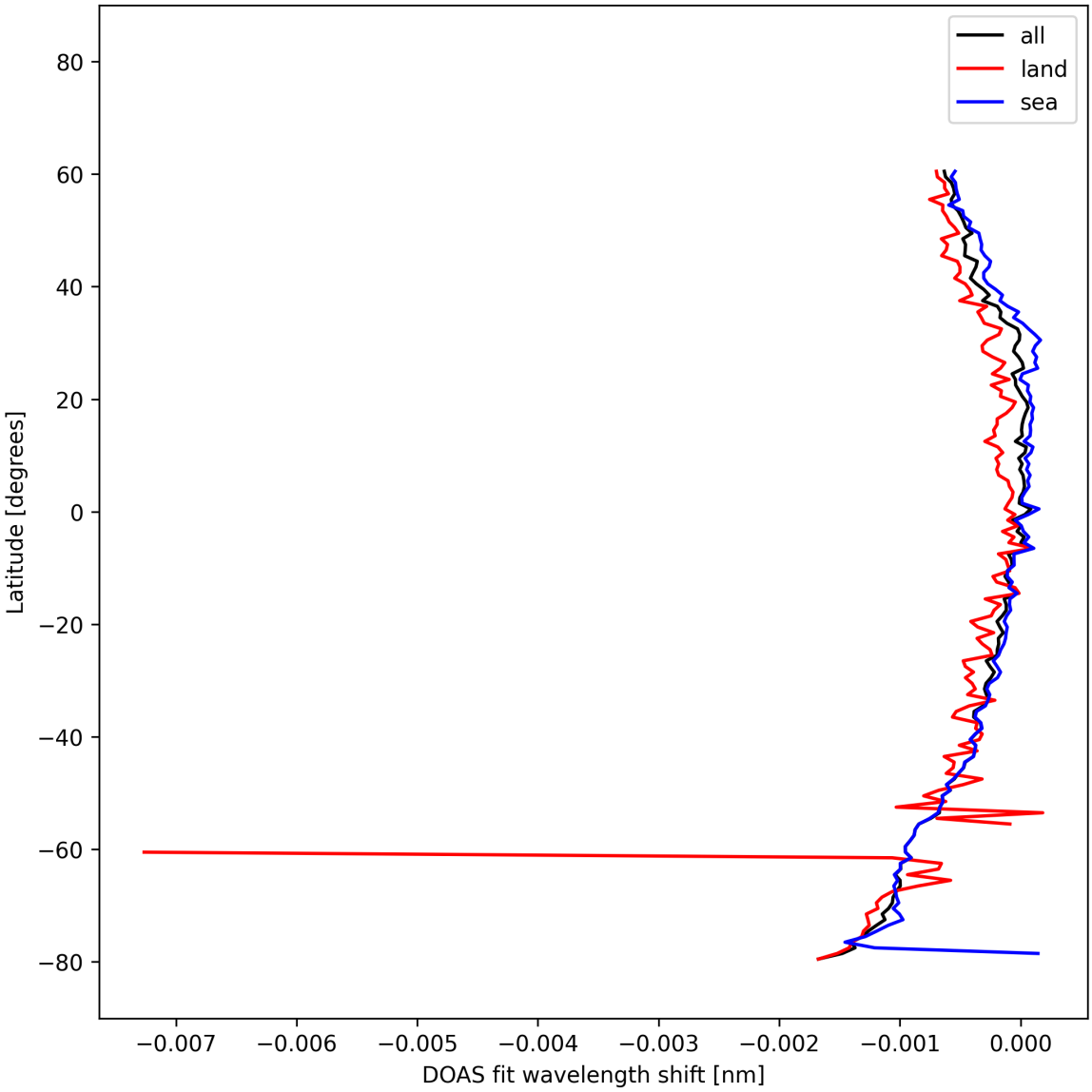


Figure 50: Zonal average of “DOAS fit wavelength shift” for 2025-02-24 to 2025-02-25.

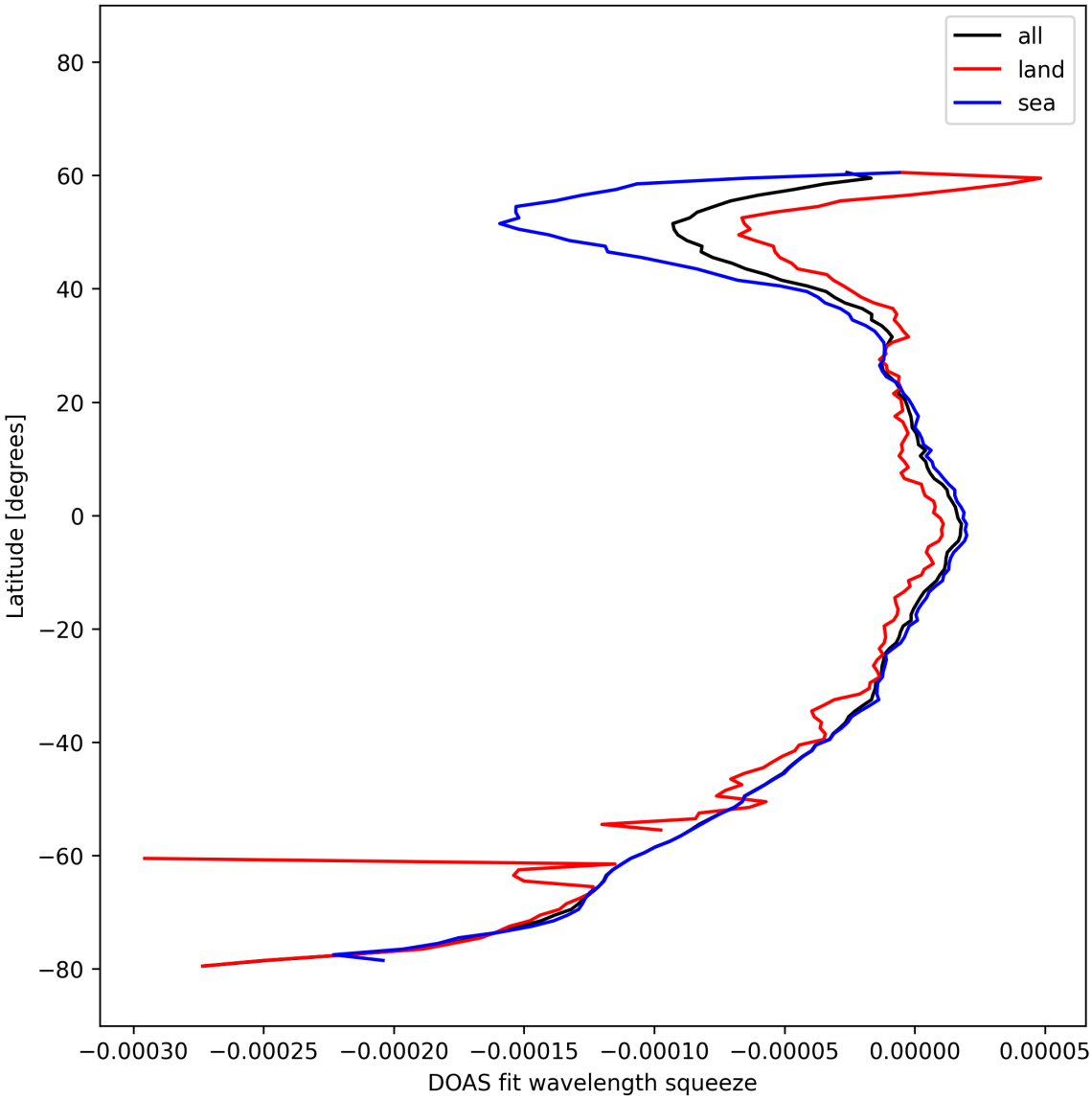


Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-02-24 to 2025-02-25.

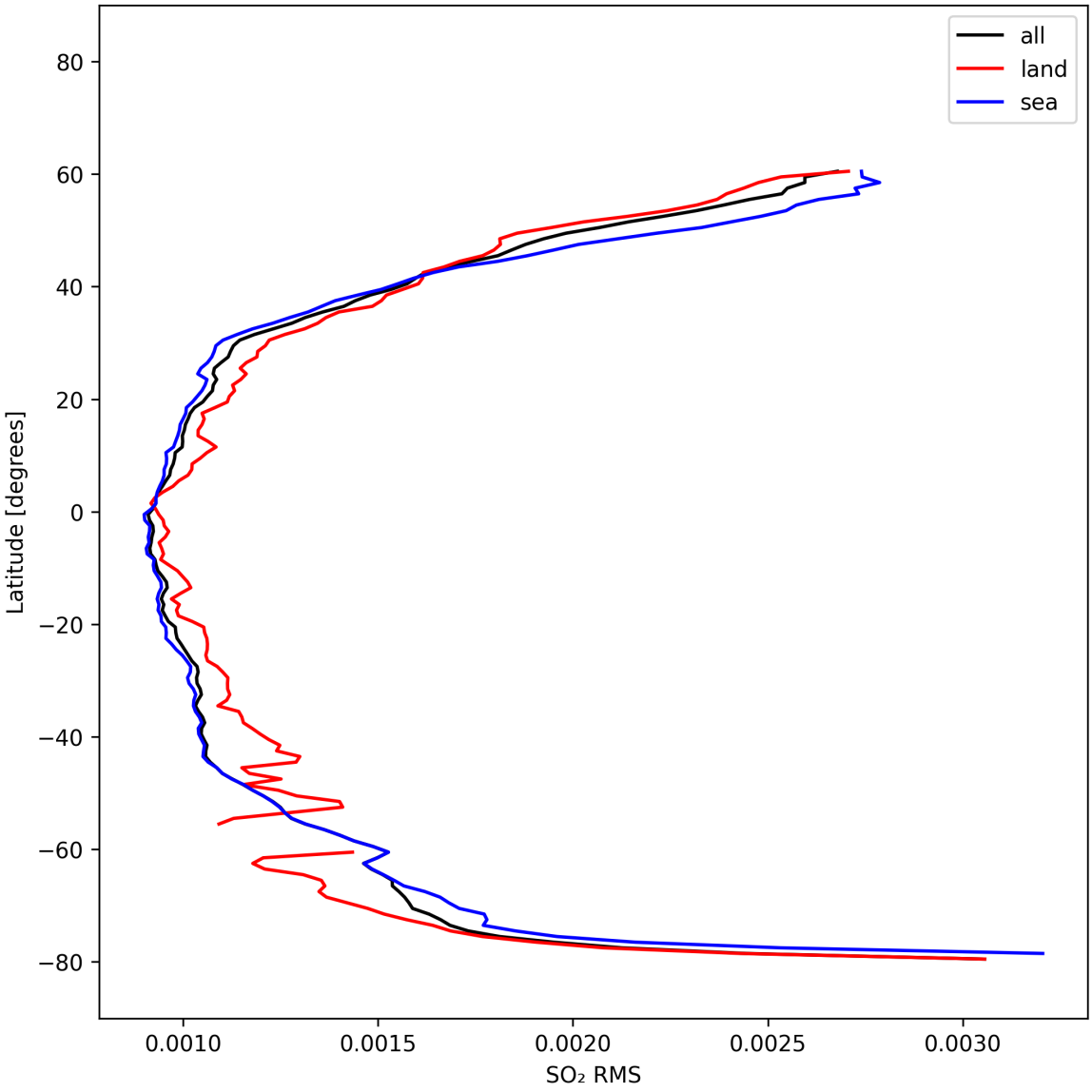


Figure 52: Zonal average of "SO_2 RMS" for 2025-02-24 to 2025-02-25.

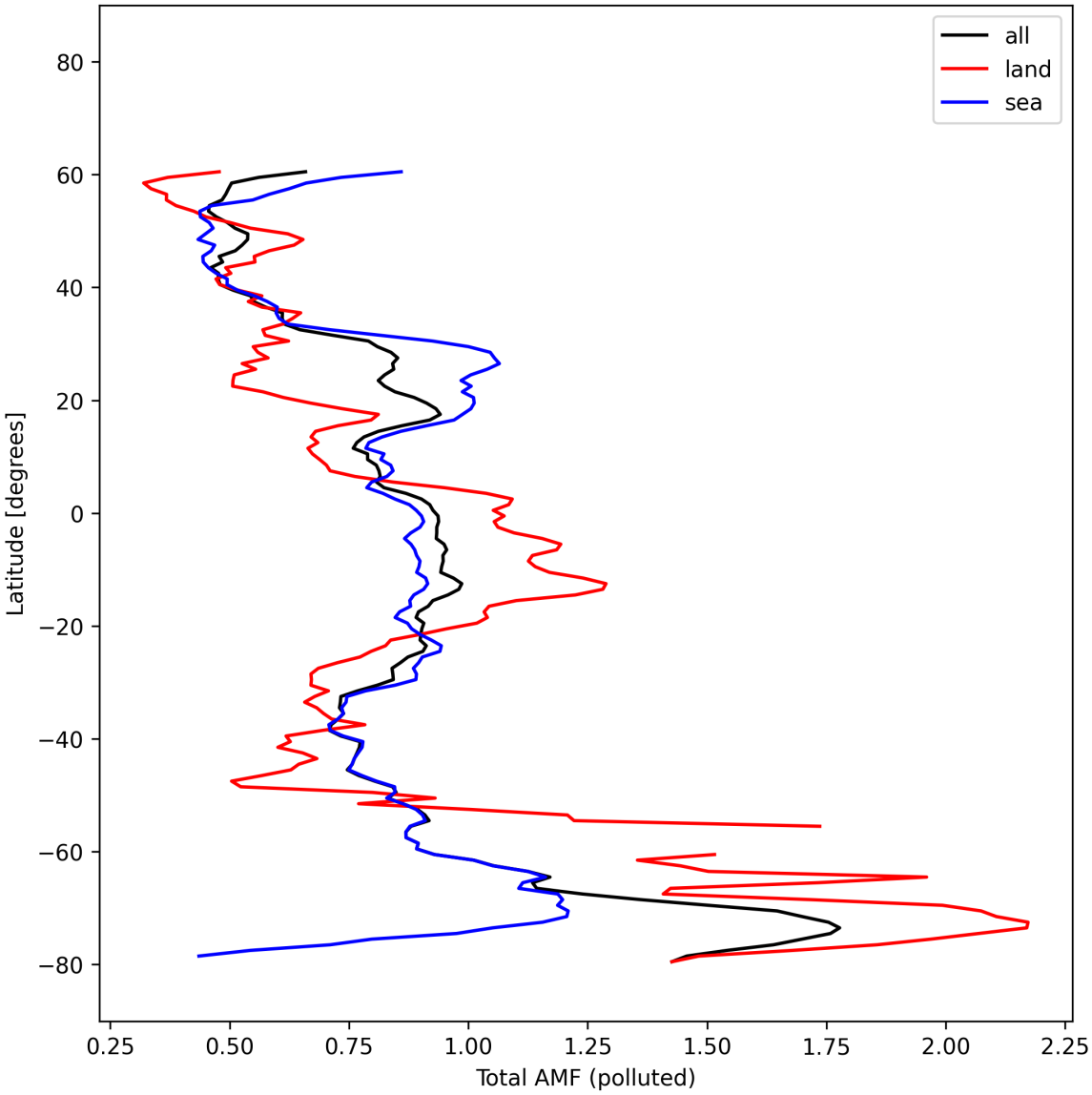


Figure 53: Zonal average of “Total AMF (polluted)” for 2025-02-24 to 2025-02-25.

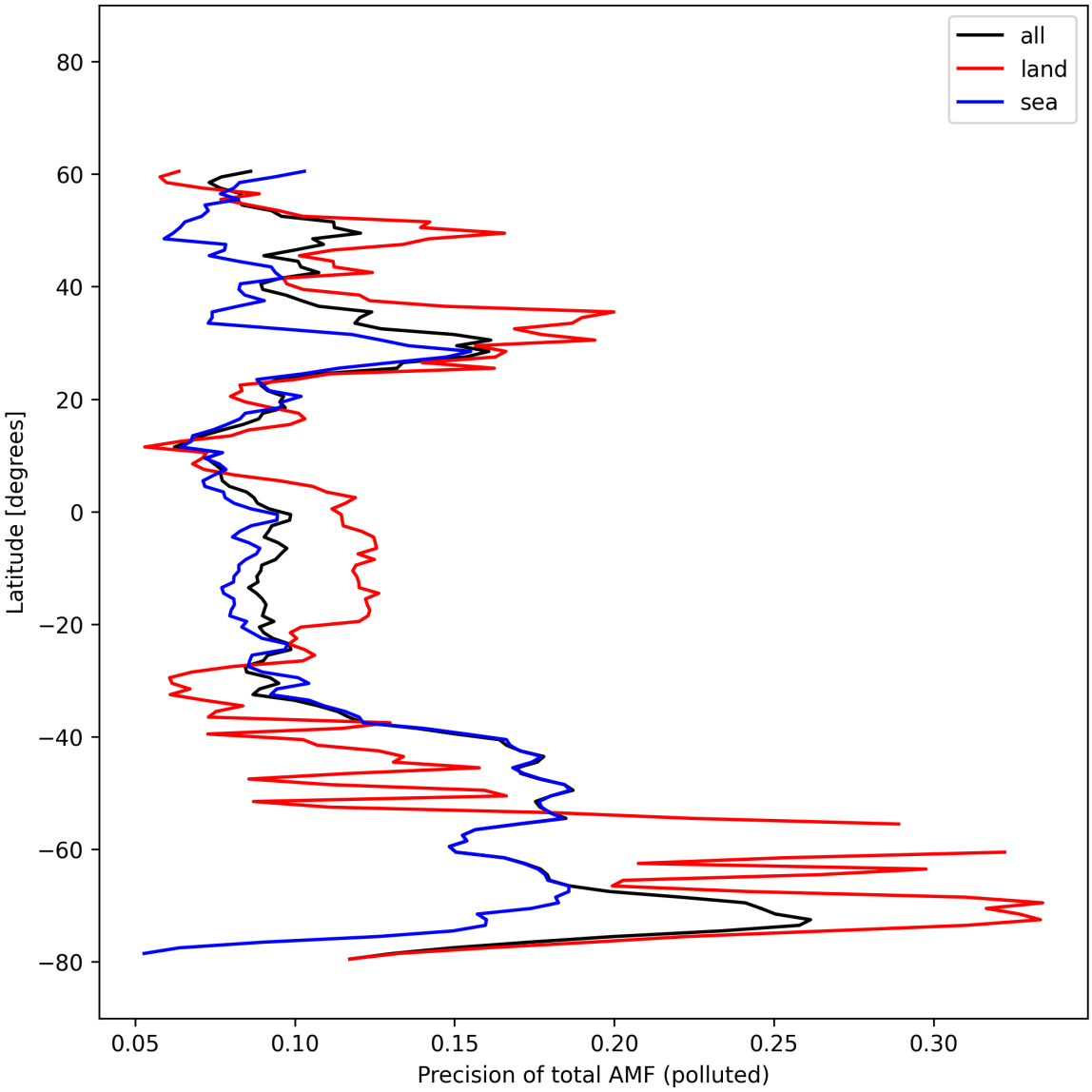


Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-02-24 to 2025-02-25.

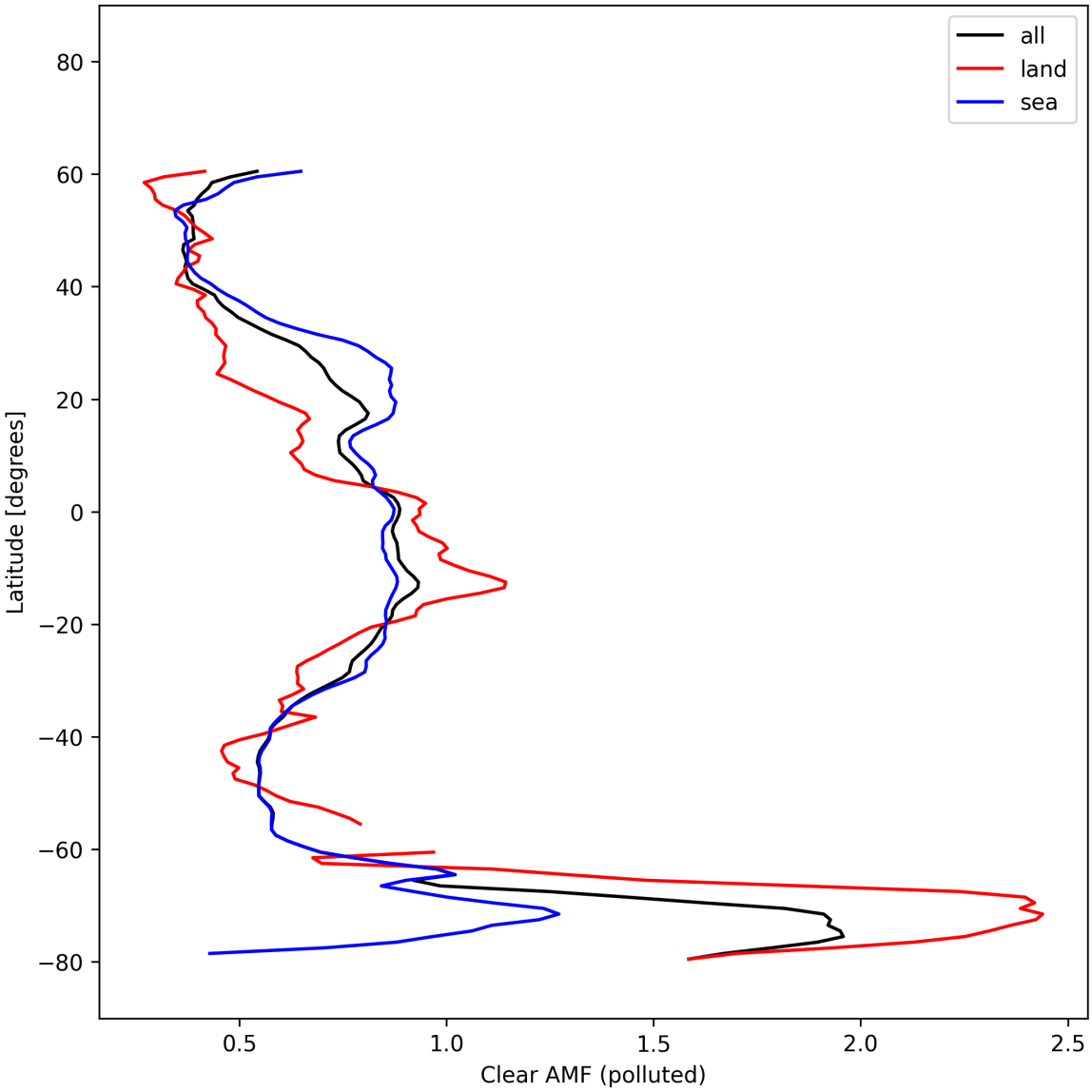


Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-02-24 to 2025-02-25.

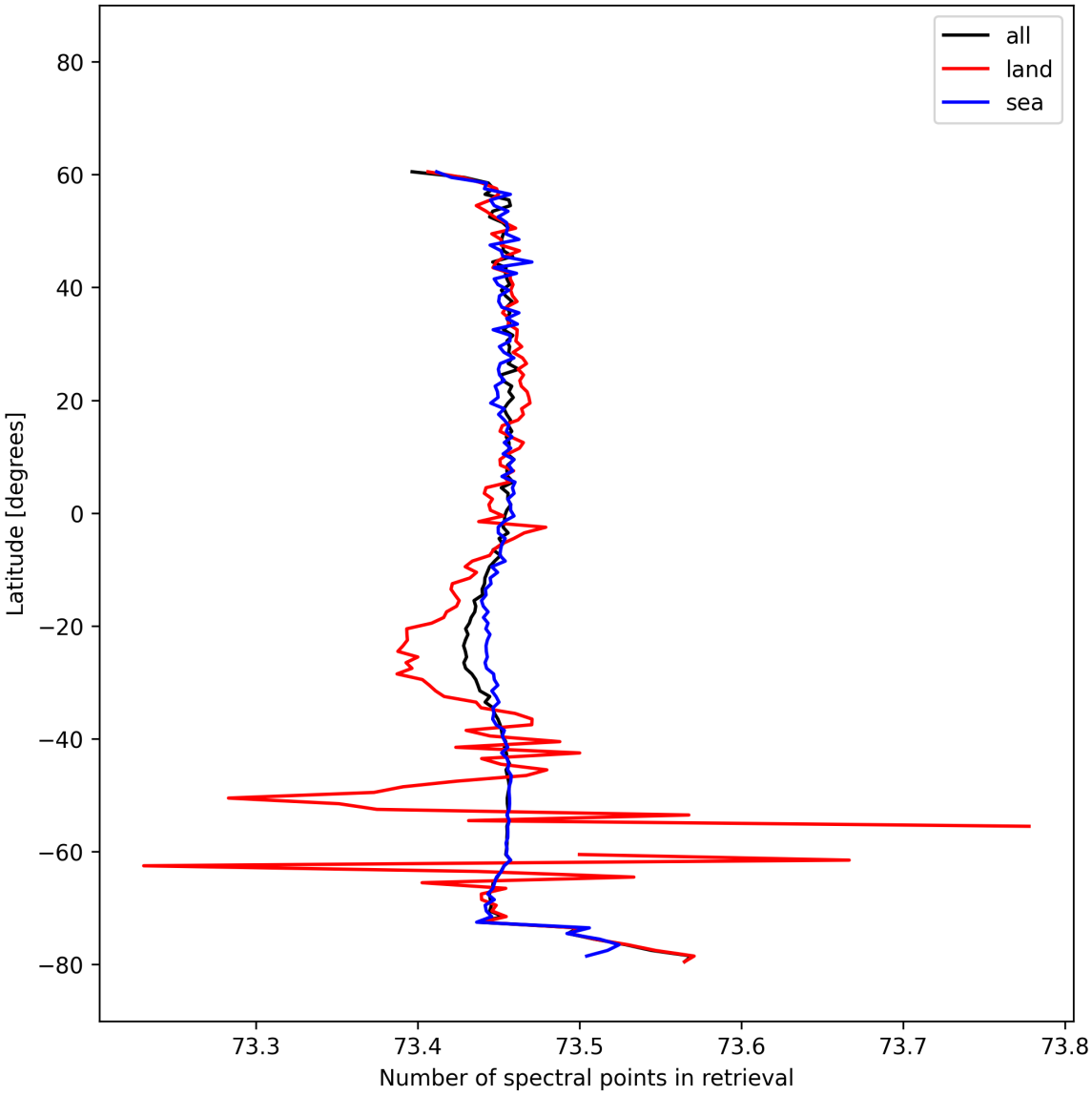


Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-02-24 to 2025-02-25.

8 Histograms

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

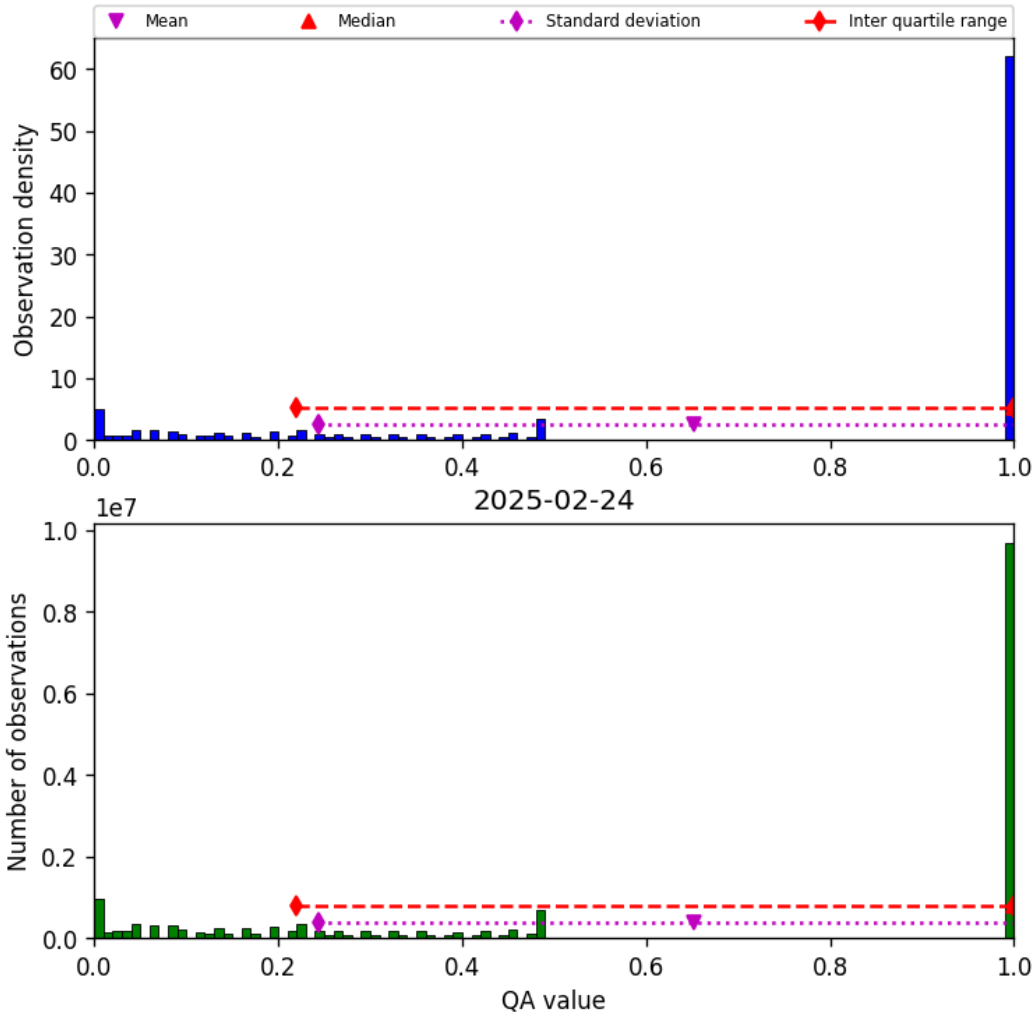


Figure 57: Histogram of “QA value” for 2025-02-24 to 2025-02-25

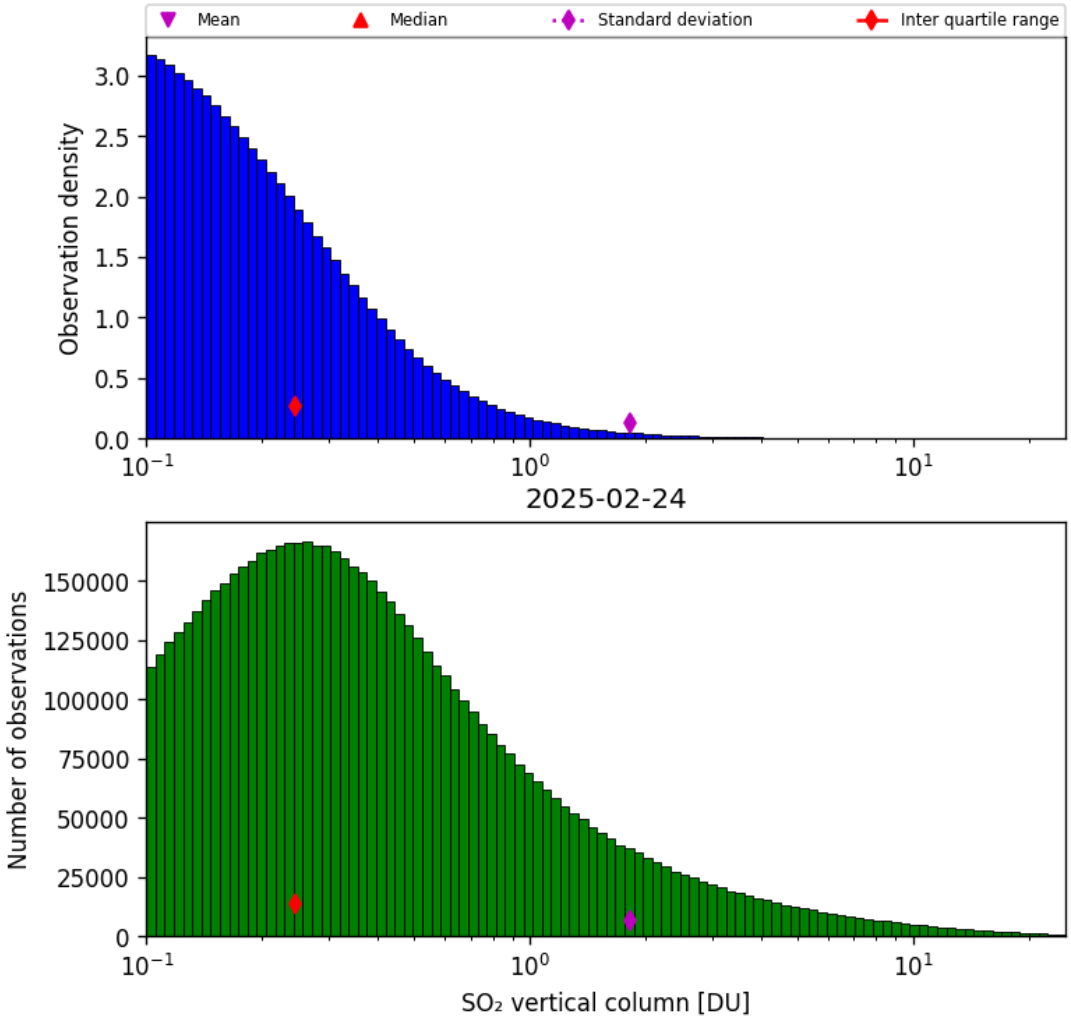


Figure 58: Histogram of "SO_2 vertical column" for 2025-02-24 to 2025-02-25

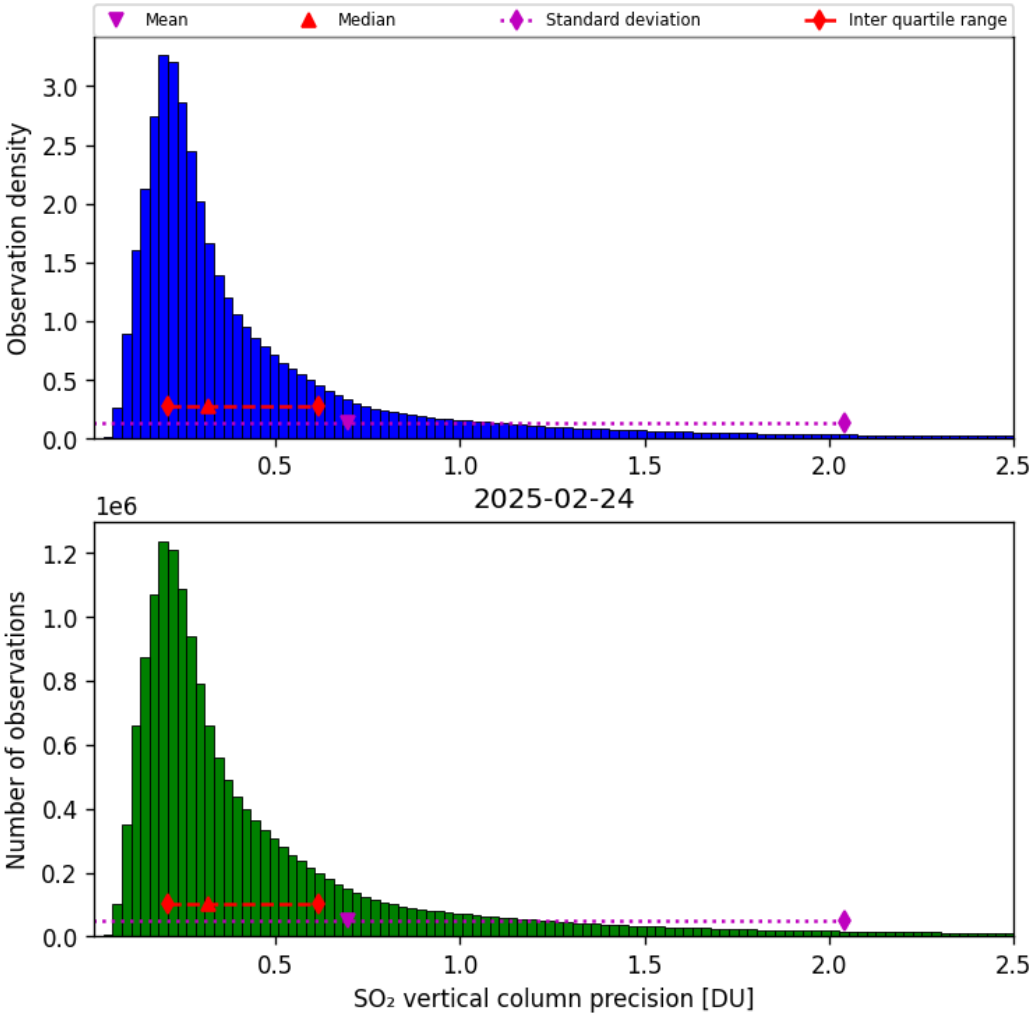


Figure 59: Histogram of "SO_2 vertical column precision" for 2025-02-24 to 2025-02-25

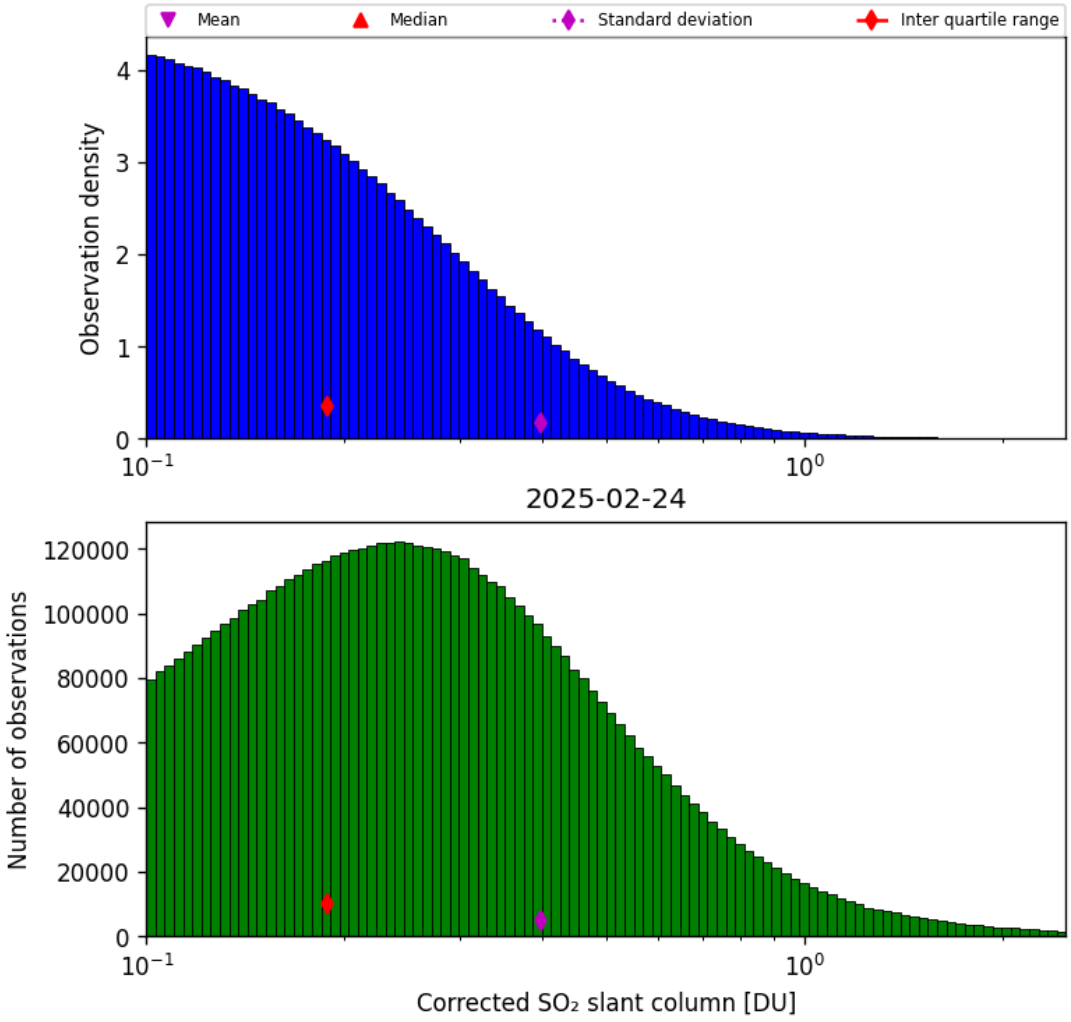


Figure 60: Histogram of "Corrected SO_2 slant column" for 2025-02-24 to 2025-02-25

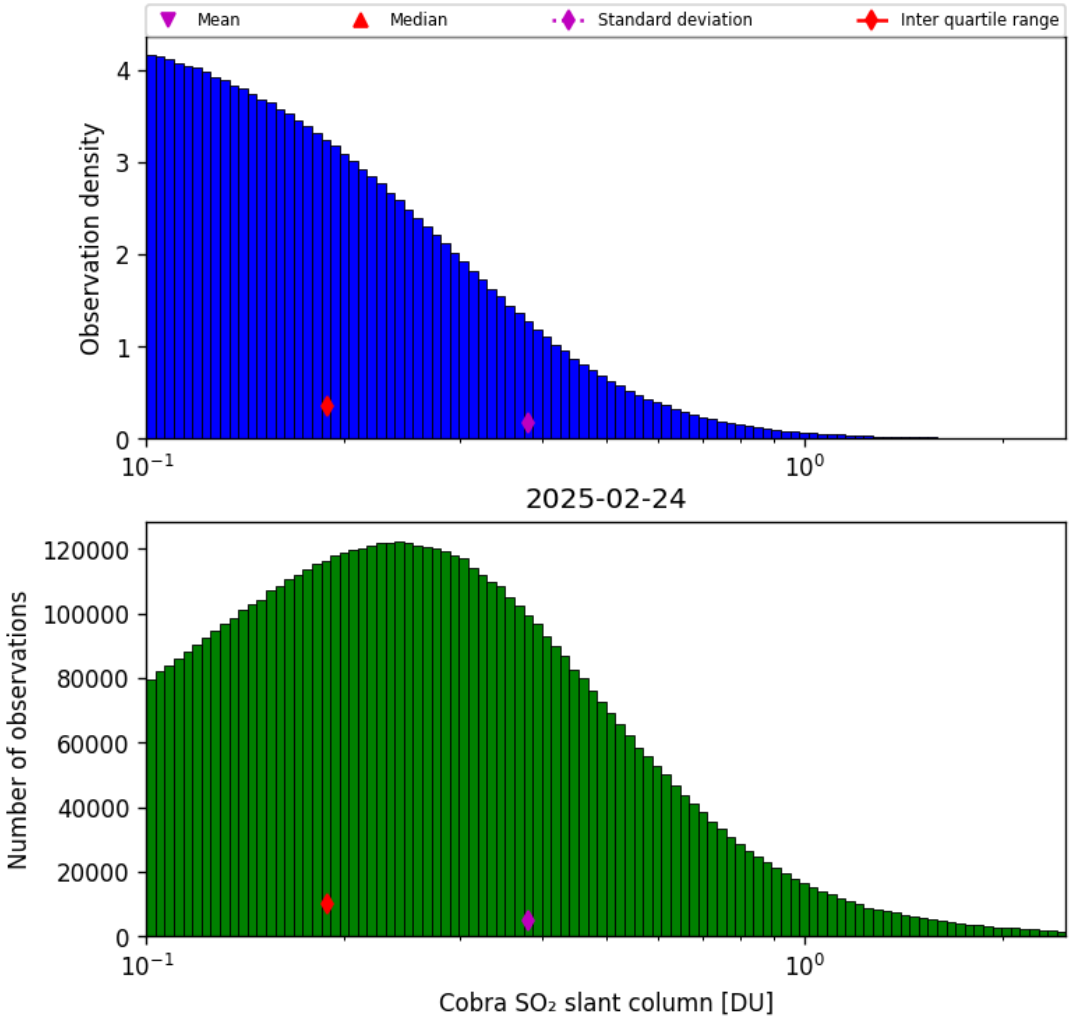


Figure 61: Histogram of "Cobra SO_2 slant column" for 2025-02-24 to 2025-02-25

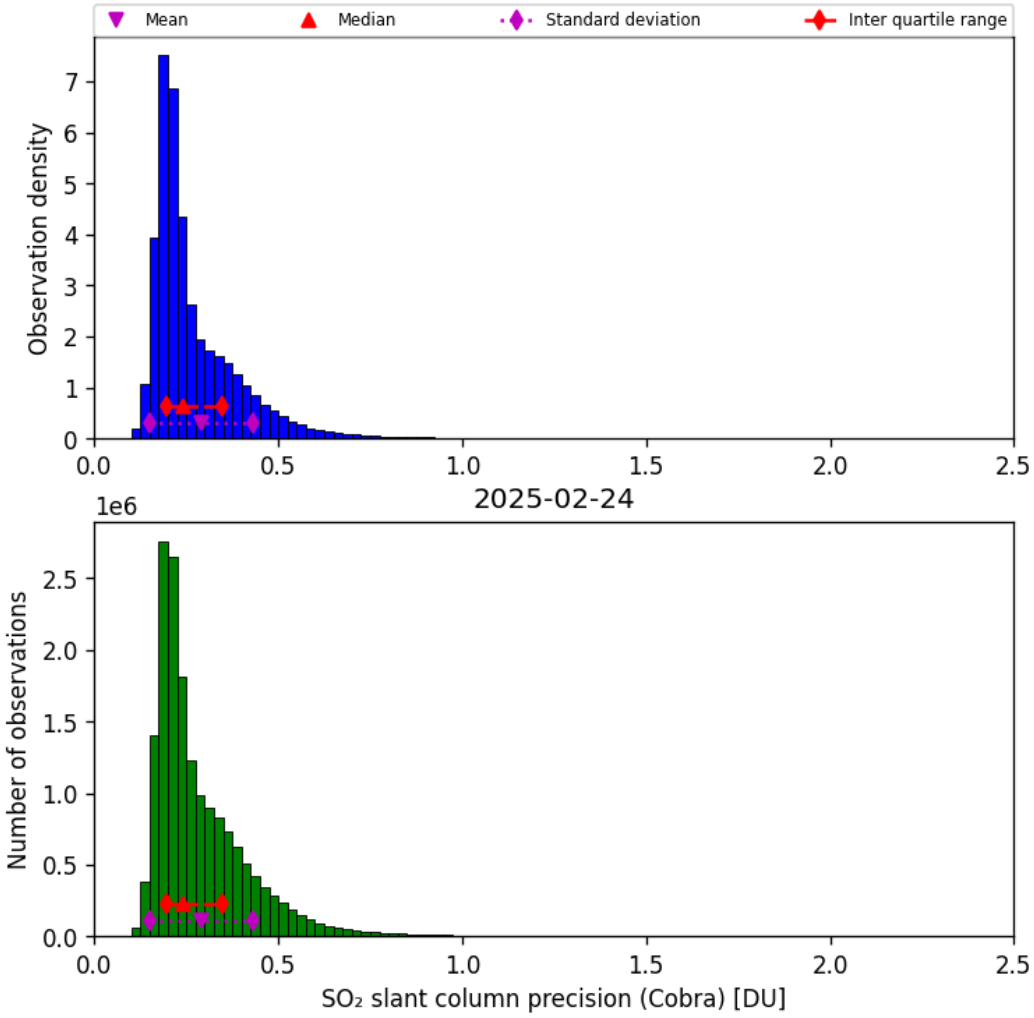


Figure 62: Histogram of "SO_2 slant column precision (Cobra)" for 2025-02-24 to 2025-02-25

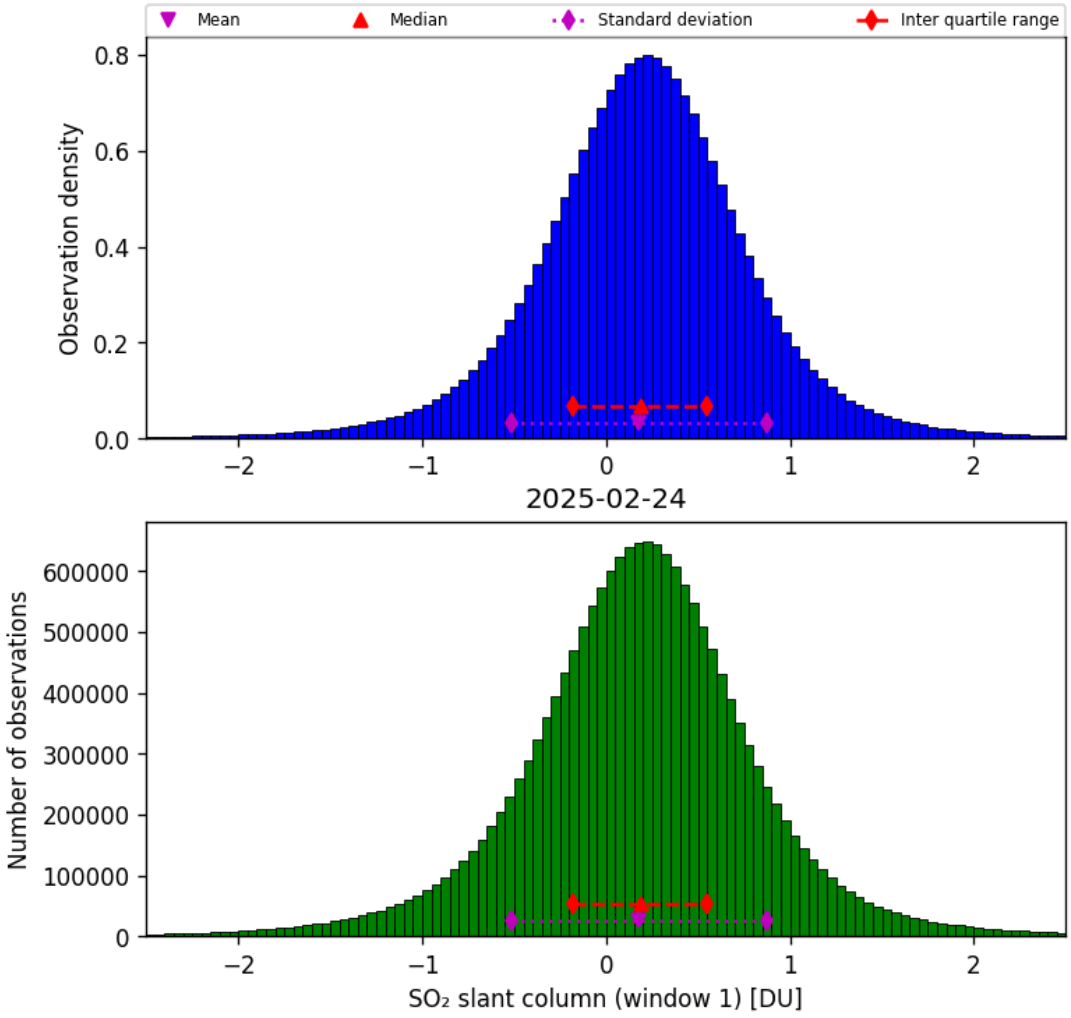


Figure 63: Histogram of "SO_2 slant column (window 1)" for 2025-02-24 to 2025-02-25

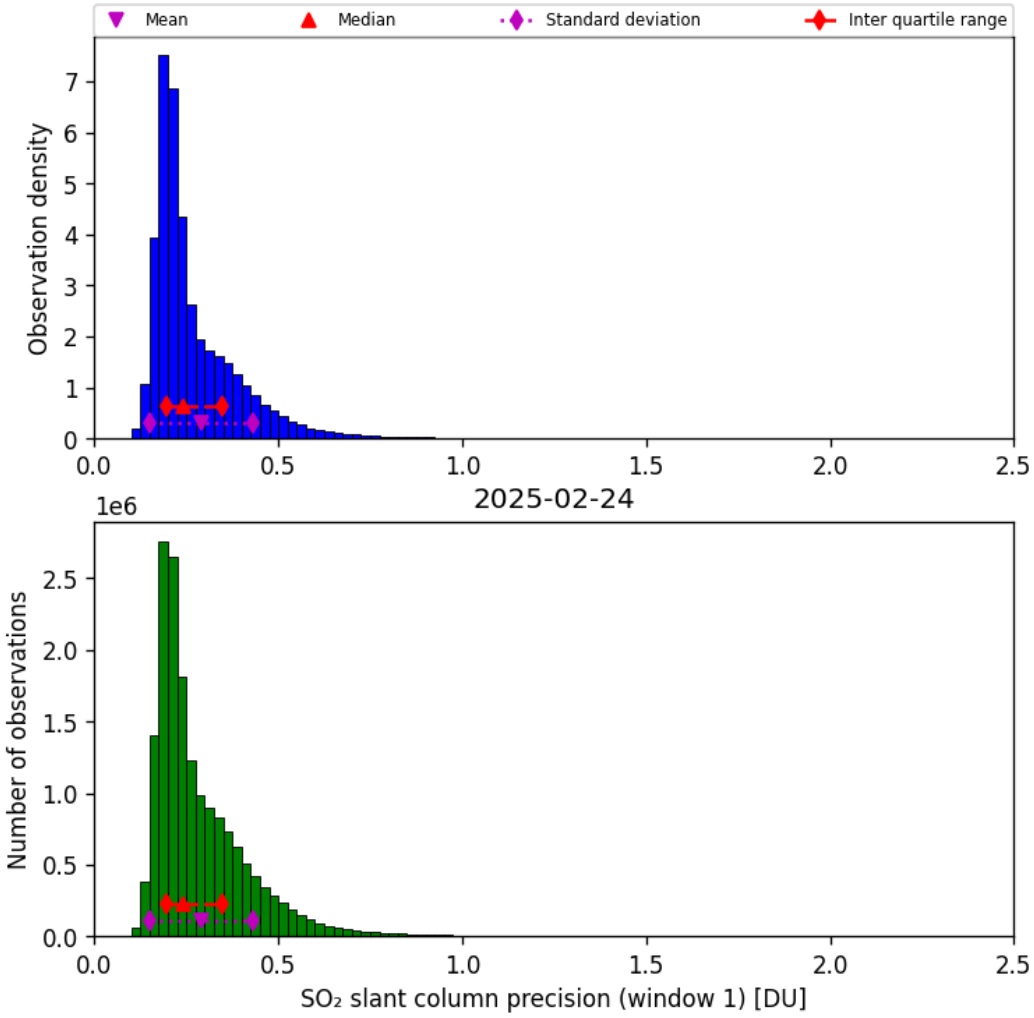


Figure 64: Histogram of "SO_2 slant column precision (window 1)" for 2025-02-24 to 2025-02-25

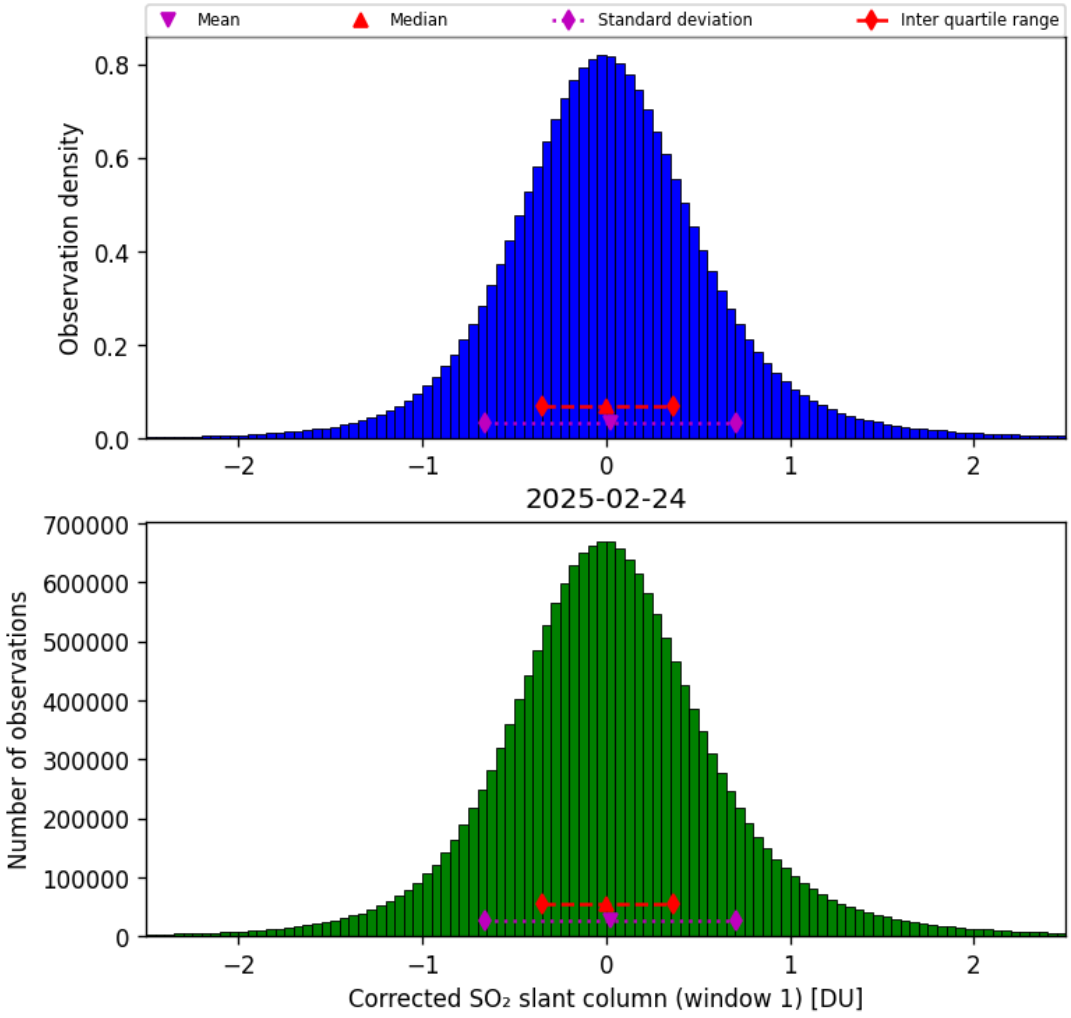


Figure 65: Histogram of "Corrected SO_2 slant column (window 1)" for 2025-02-24 to 2025-02-25

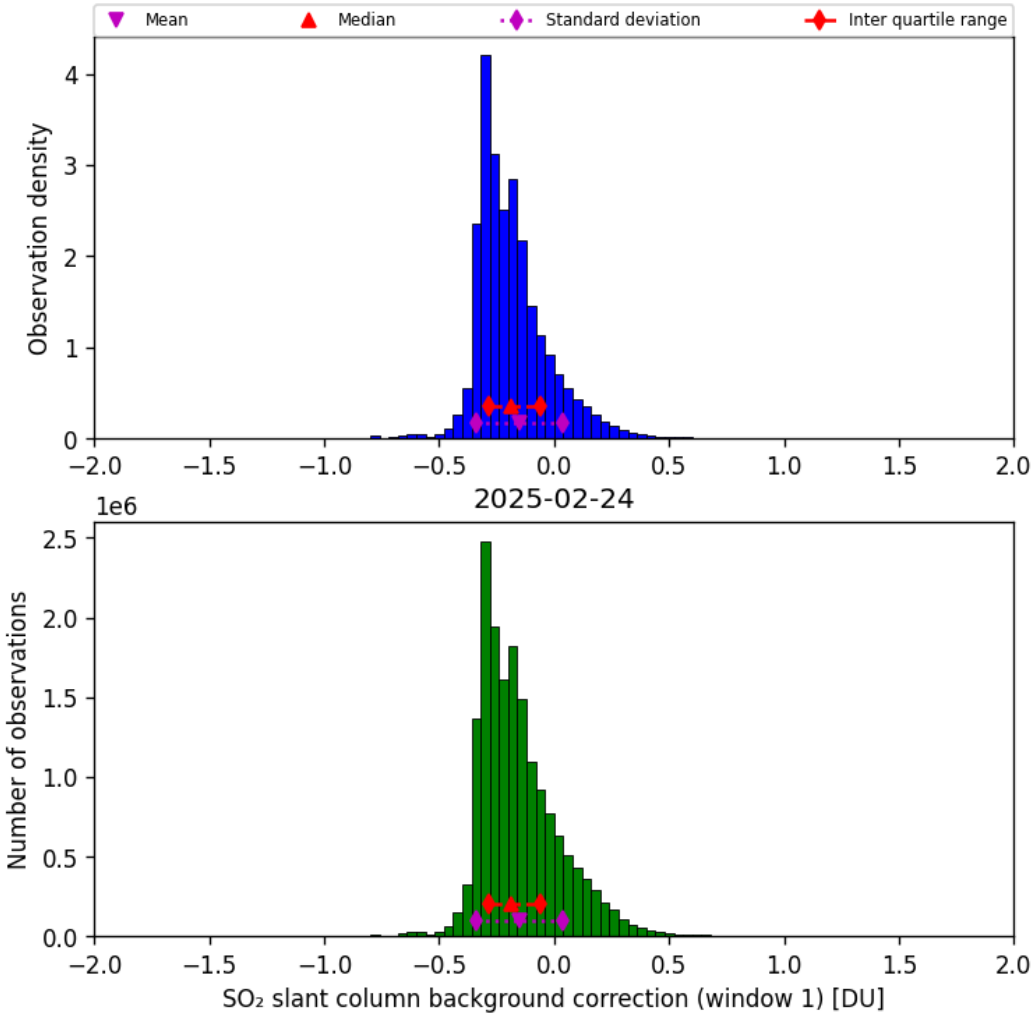


Figure 66: Histogram of "SO_2 slant column background correction (window 1)" for 2025-02-24 to 2025-02-25

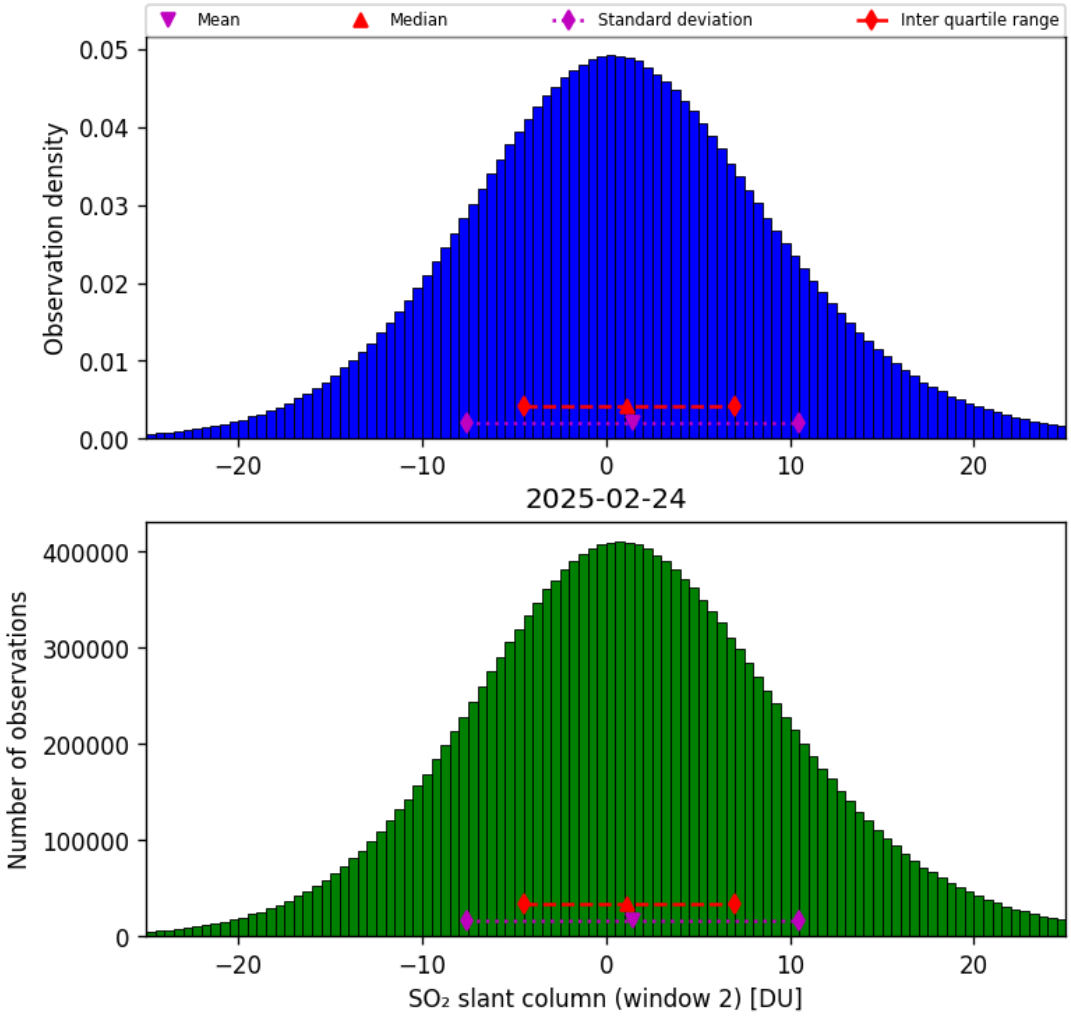


Figure 67: Histogram of "SO_2 slant column (window 2)" for 2025-02-24 to 2025-02-25

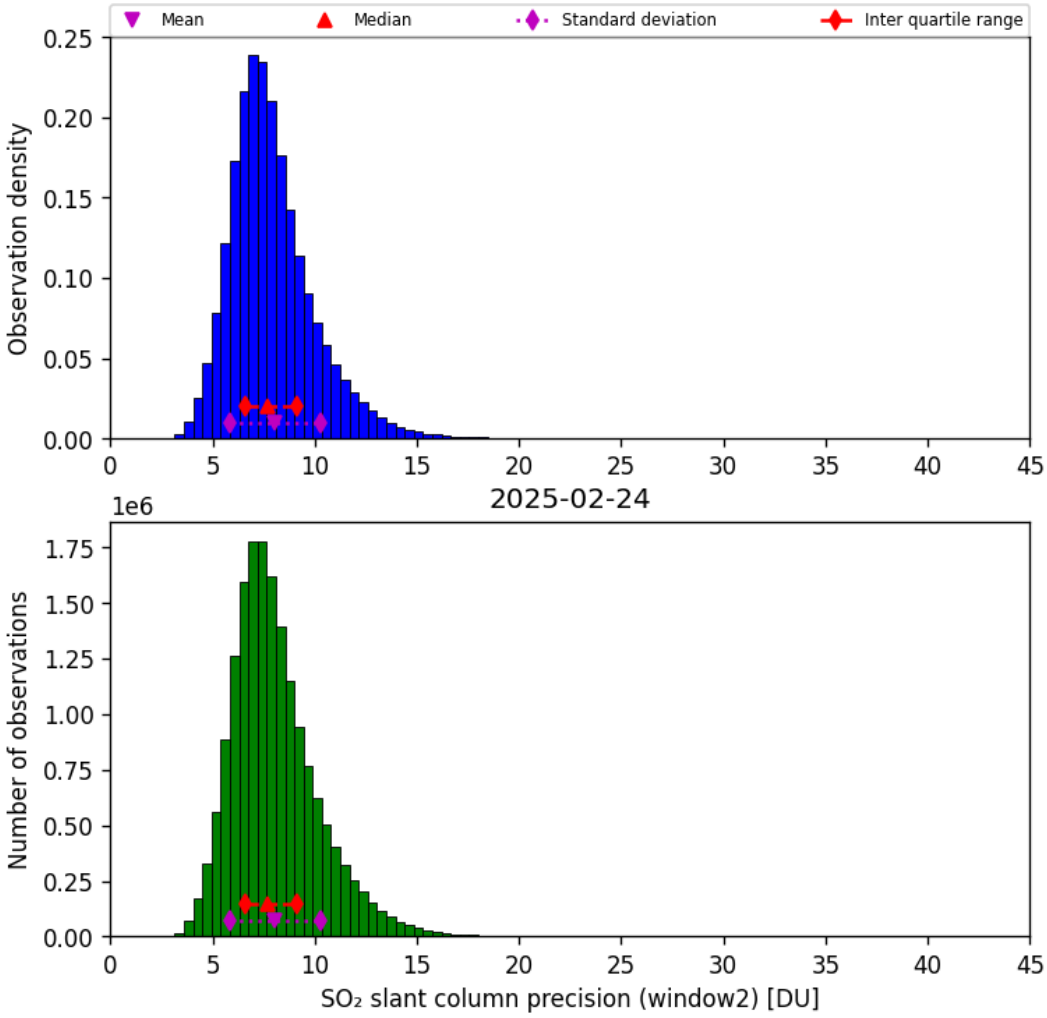


Figure 68: Histogram of "SO_2 slant column precision (window2)" for 2025-02-24 to 2025-02-25

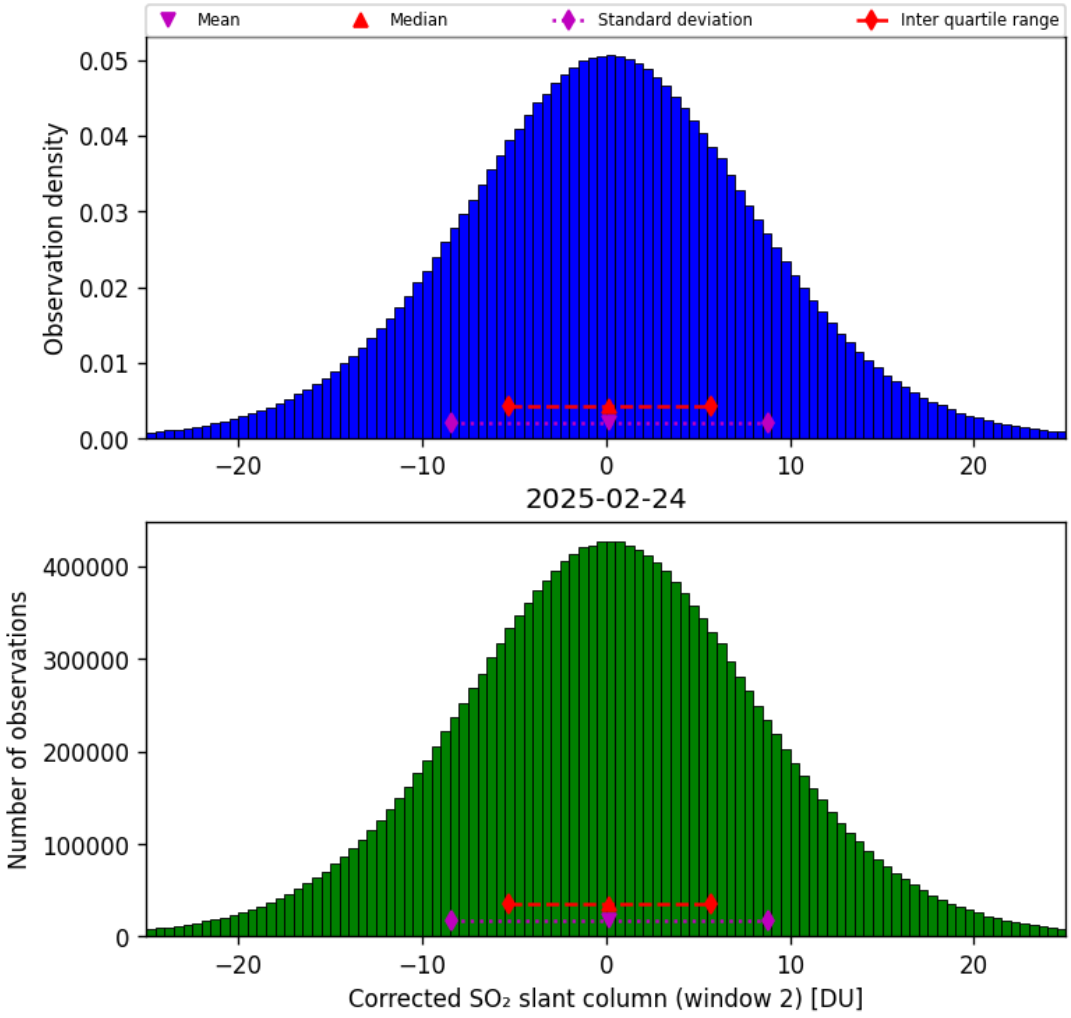


Figure 69: Histogram of "Corrected SO_2 slant column (window 2)" for 2025-02-24 to 2025-02-25

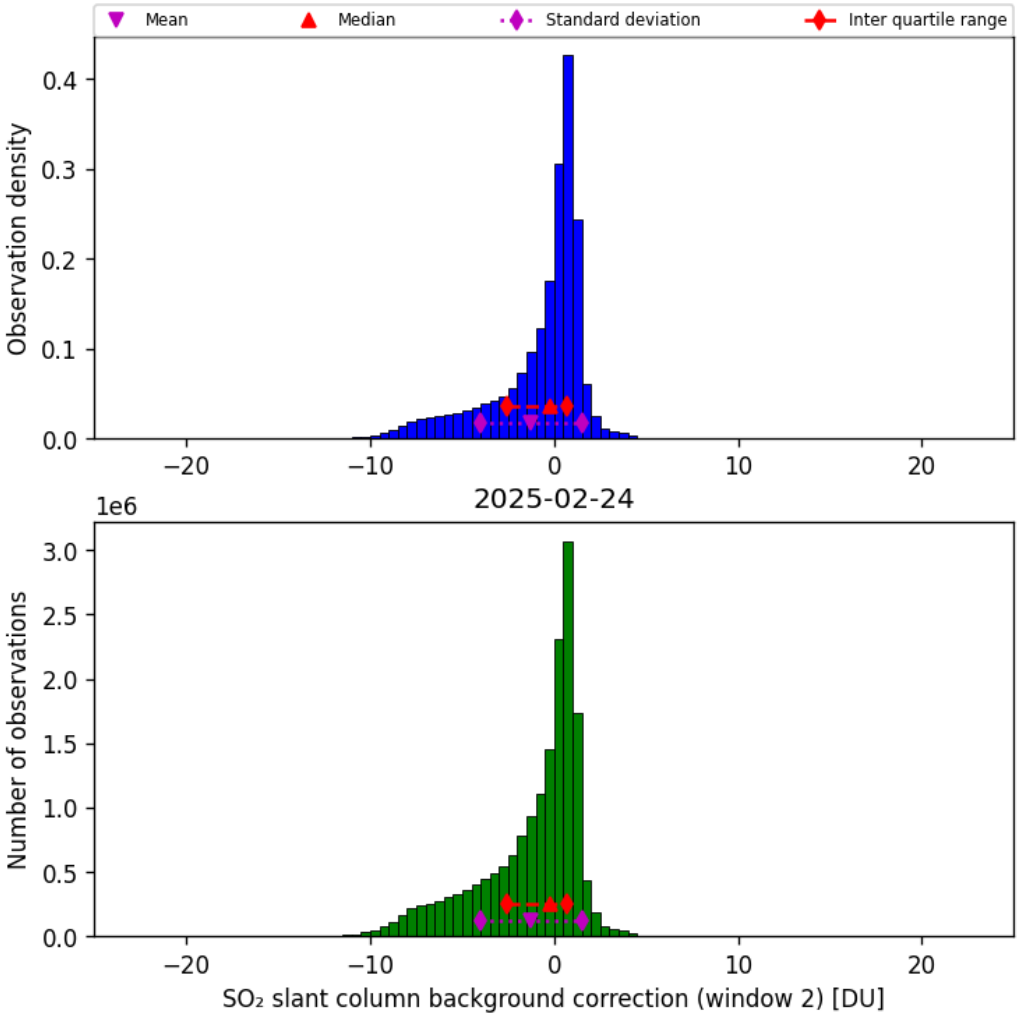


Figure 70: Histogram of "SO_2 slant column background correction (window 2)" for 2025-02-24 to 2025-02-25

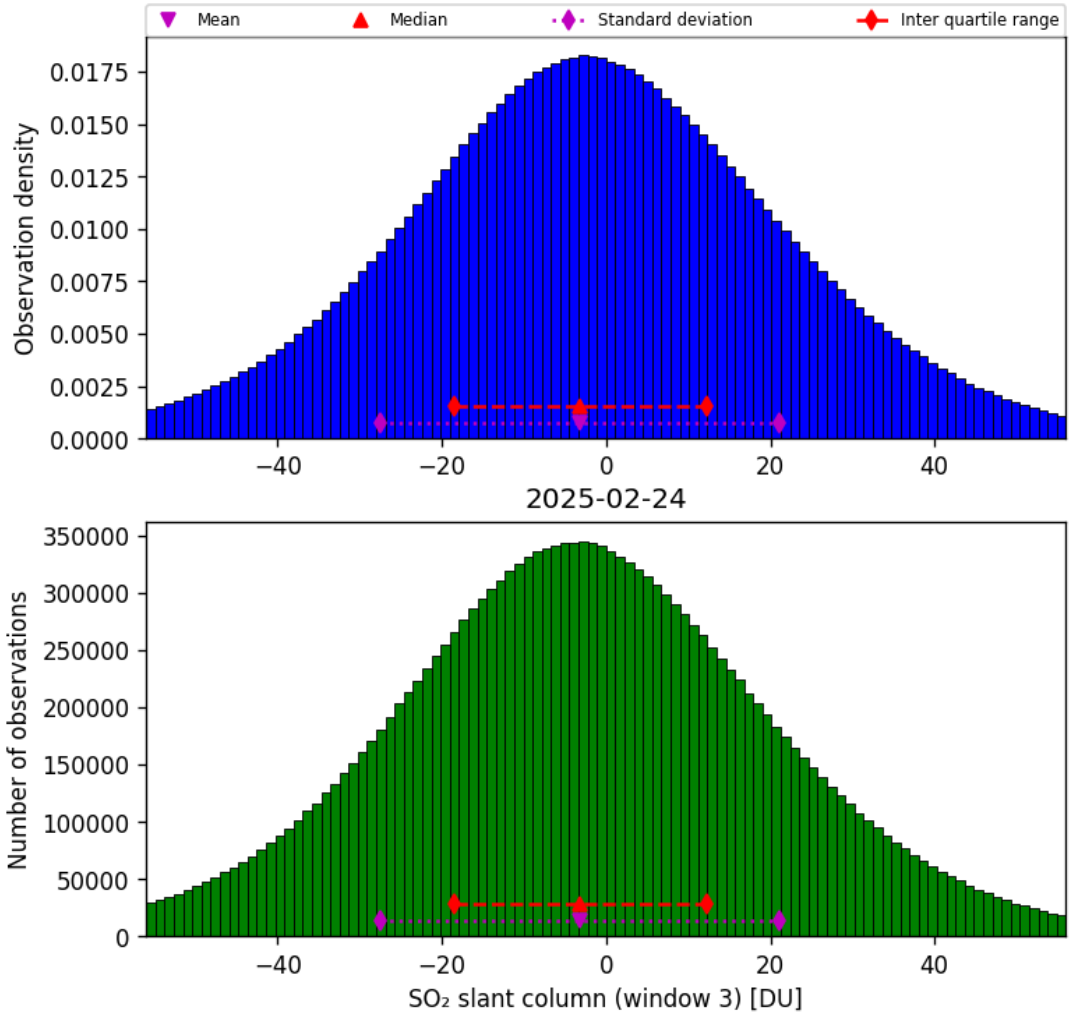


Figure 71: Histogram of "SO_2 slant column (window 3)" for 2025-02-24 to 2025-02-25

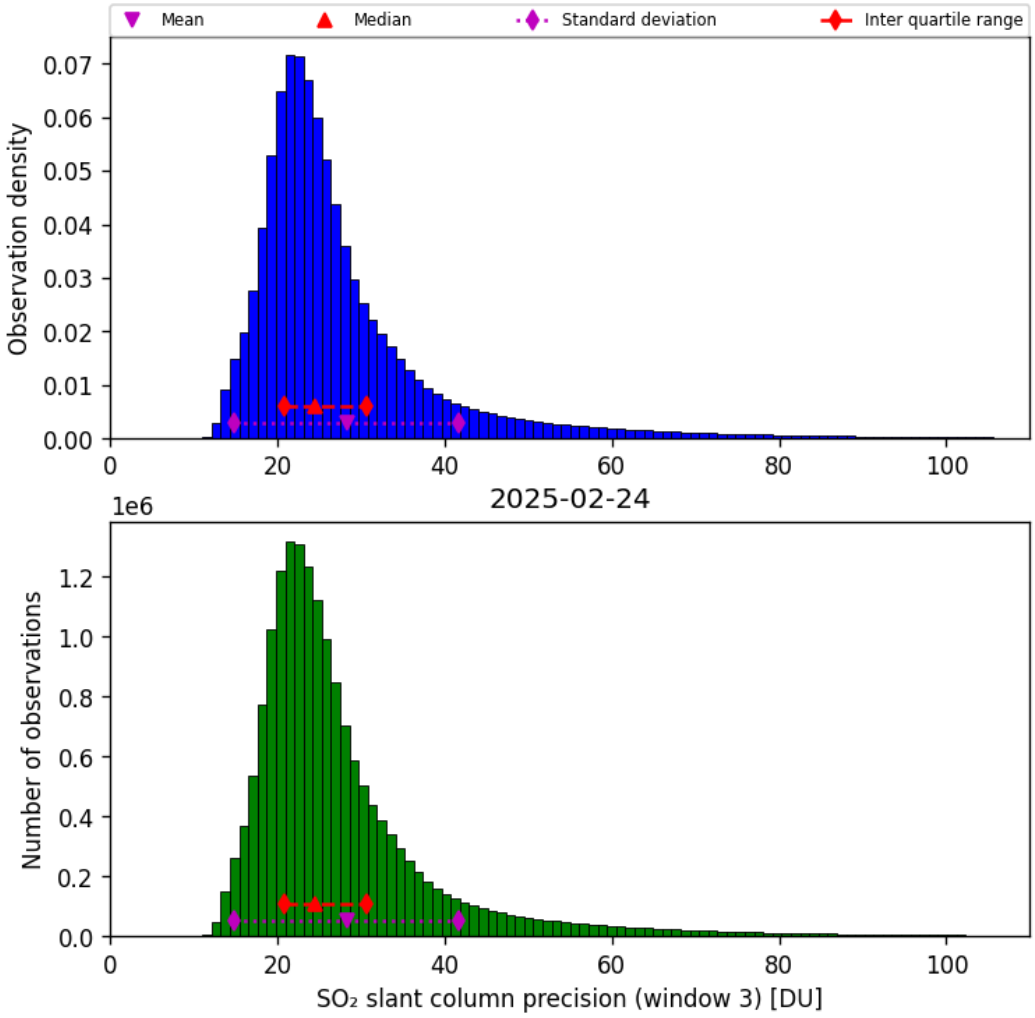


Figure 72: Histogram of "SO_2 slant column precision (window 3)" for 2025-02-24 to 2025-02-25

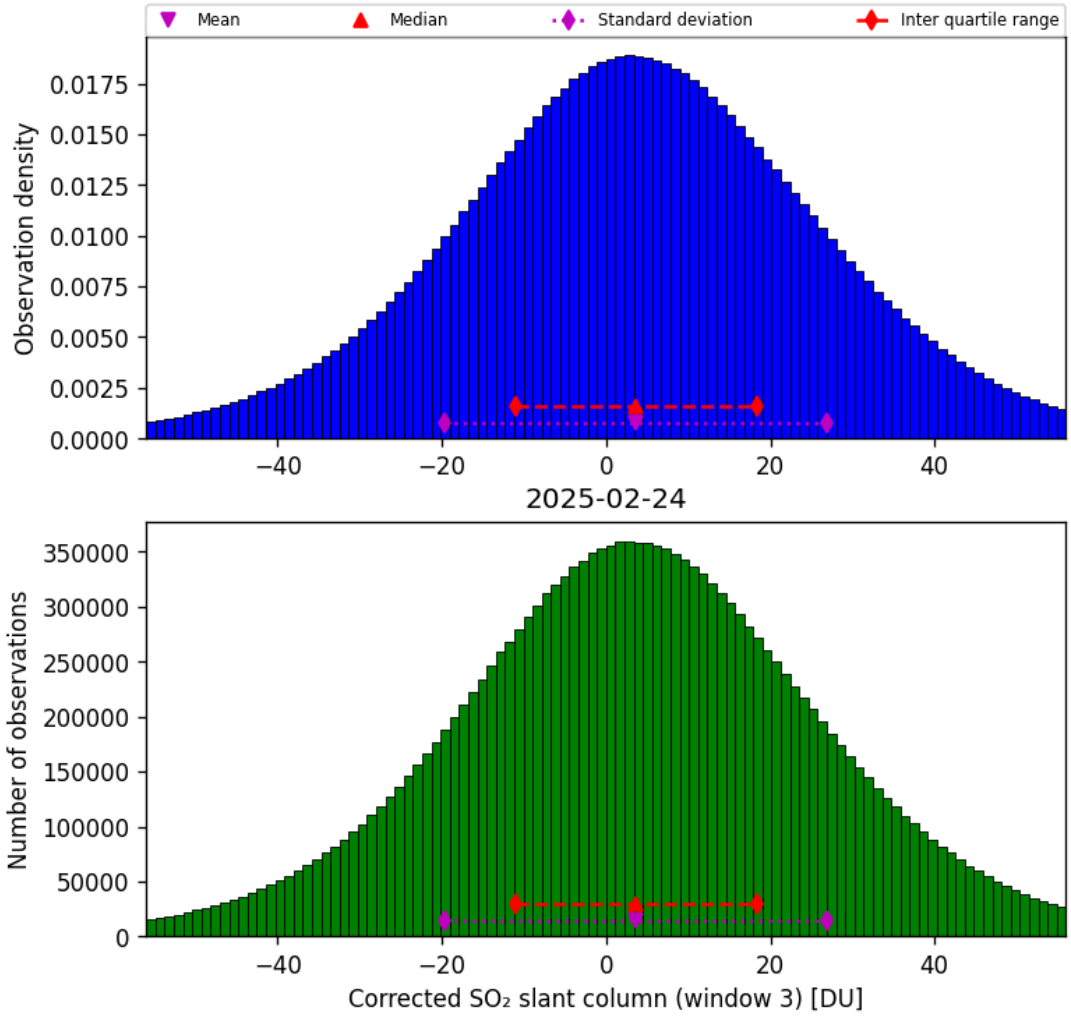


Figure 73: Histogram of "Corrected SO_2 slant column (window 3)" for 2025-02-24 to 2025-02-25

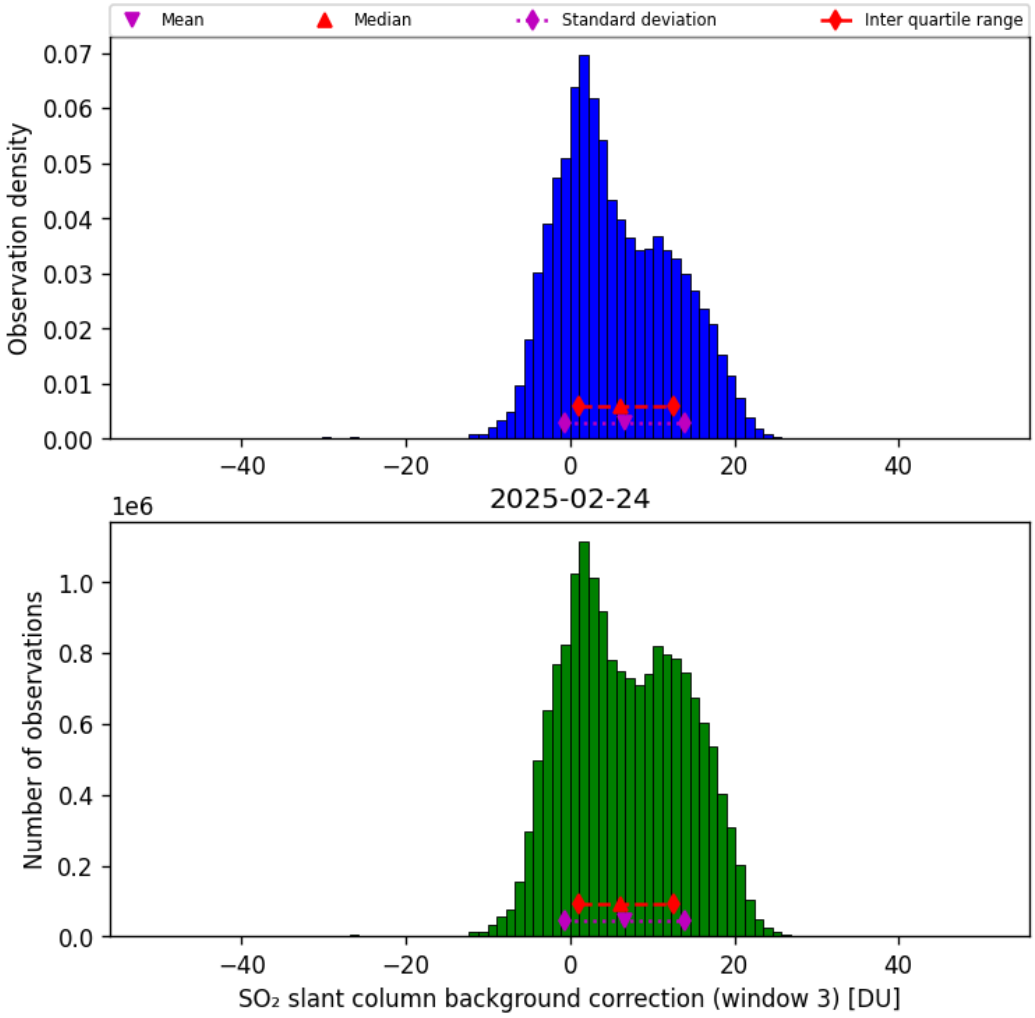


Figure 74: Histogram of "SO_2 slant column background correction (window 3)" for 2025-02-24 to 2025-02-25

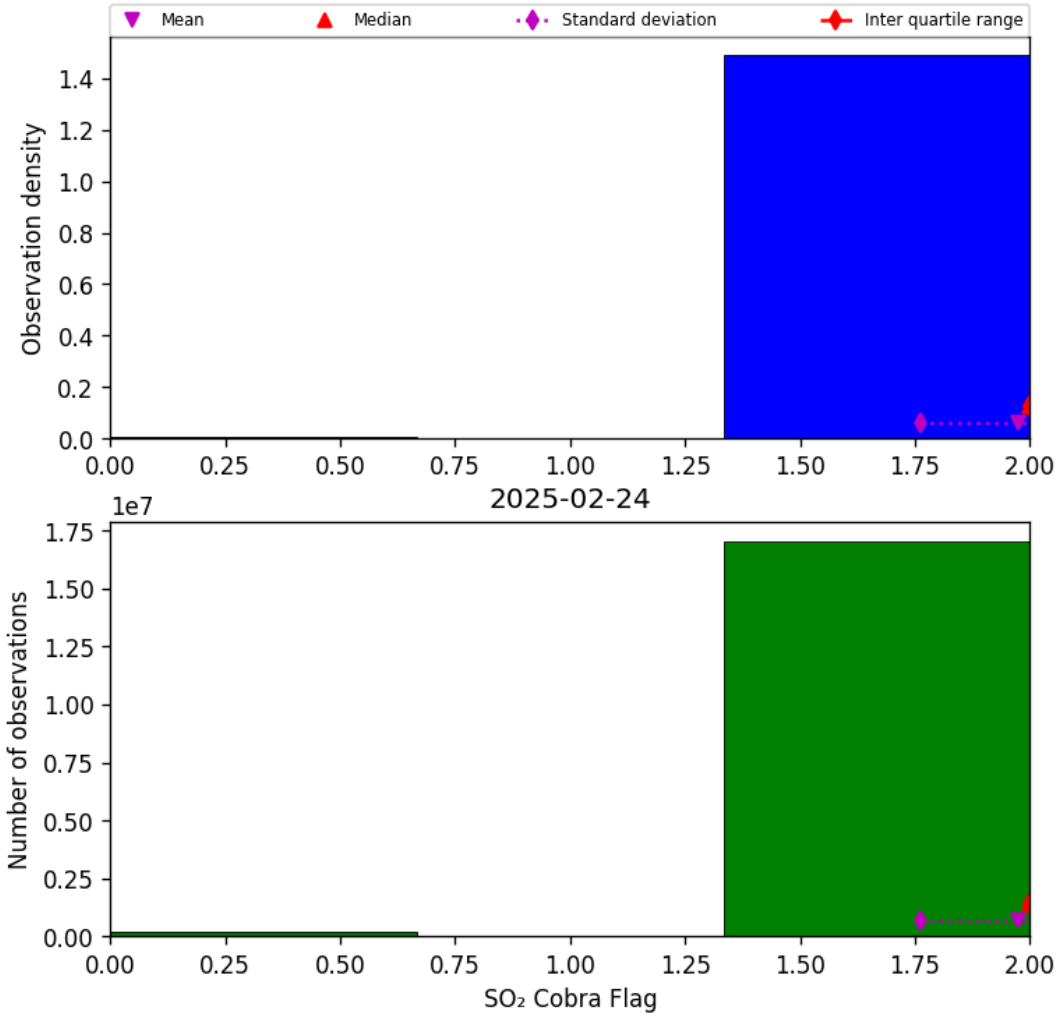


Figure 75: Histogram of "SO_2 Cobra Flag" for 2025-02-24 to 2025-02-25

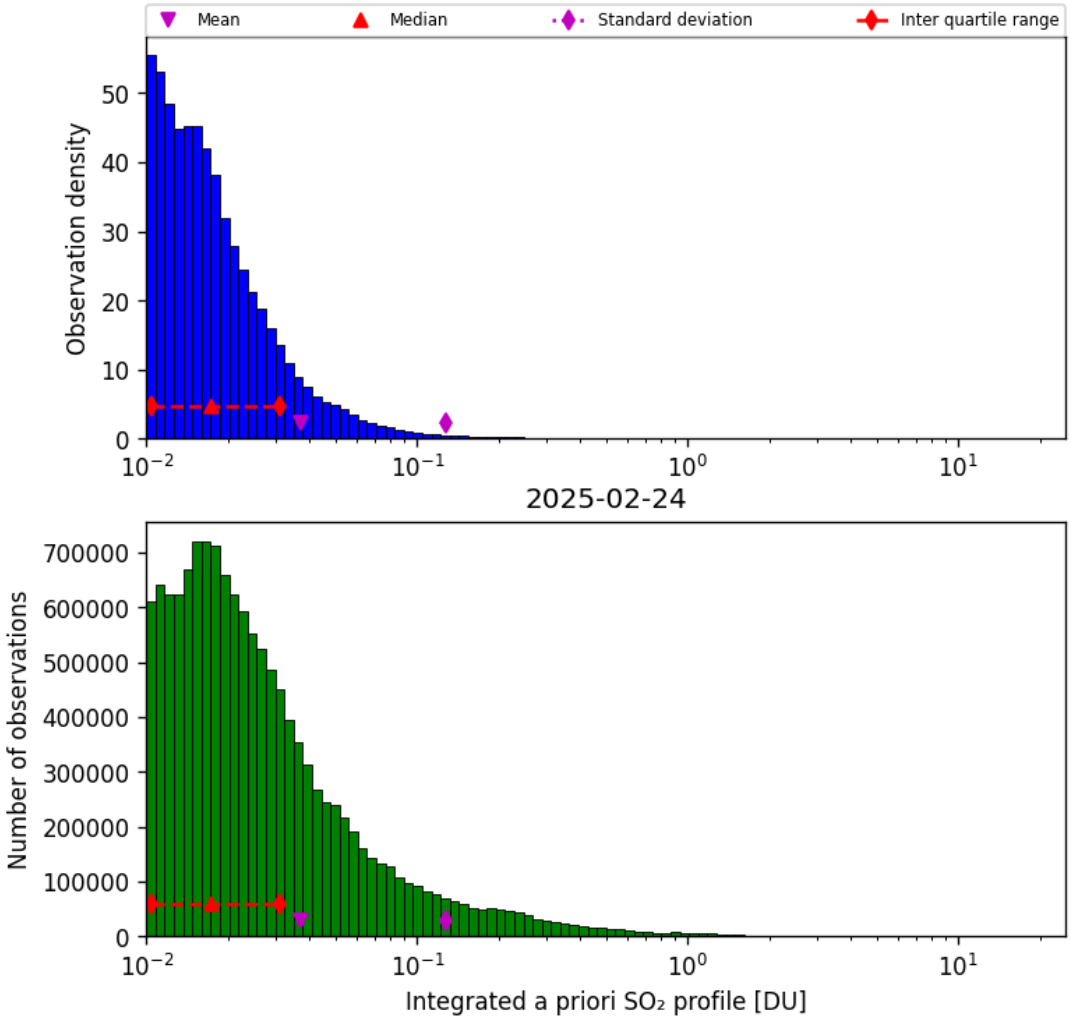


Figure 76: Histogram of "Integrated a priori SO_2 profile" for 2025-02-24 to 2025-02-25

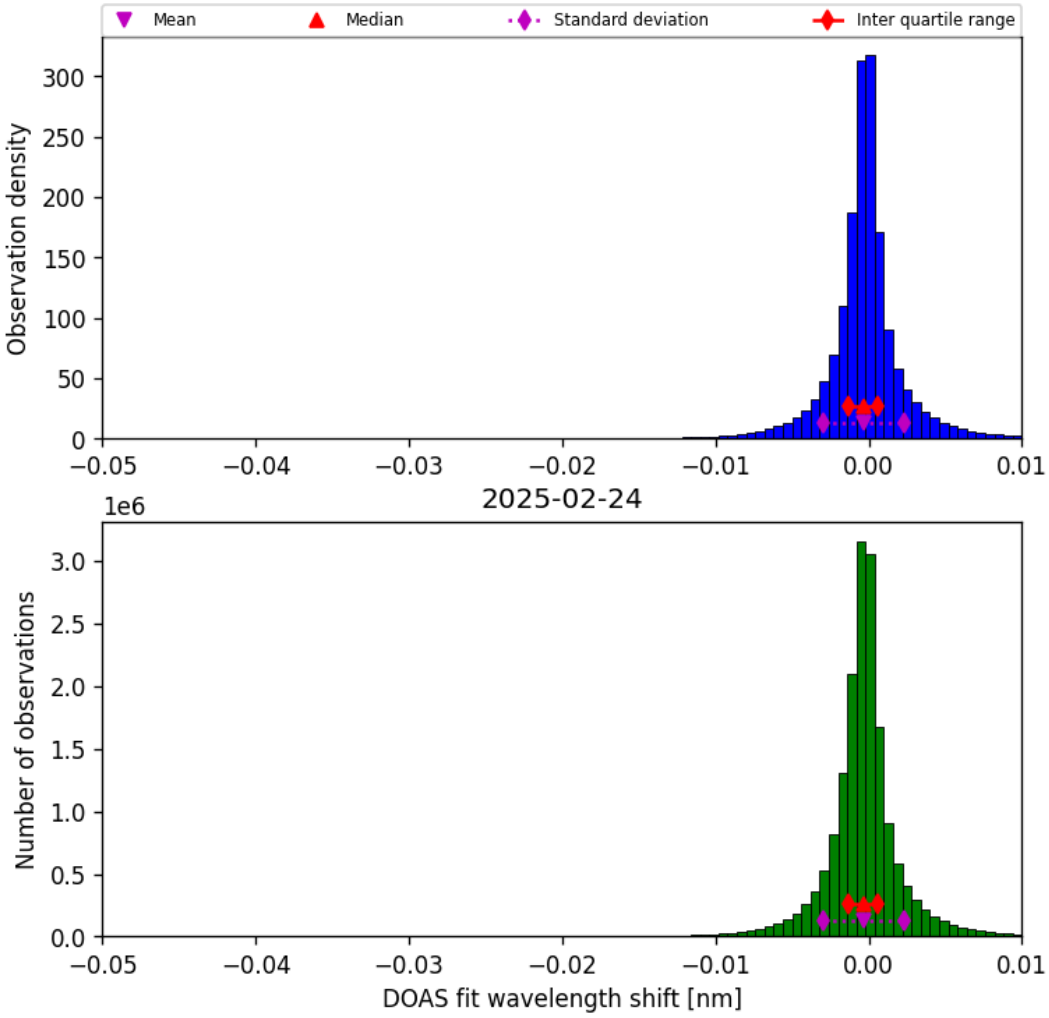


Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-02-24 to 2025-02-25

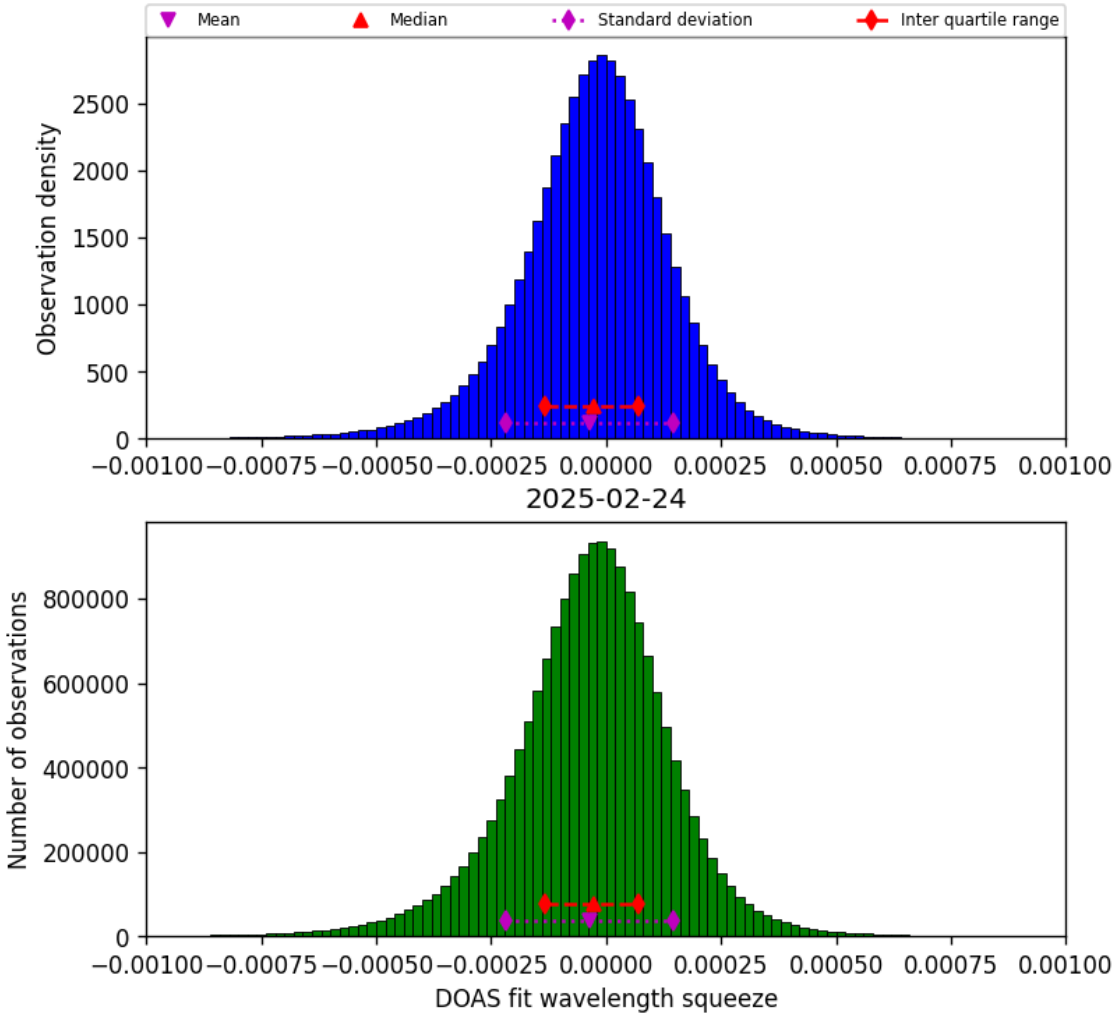


Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-02-24 to 2025-02-25

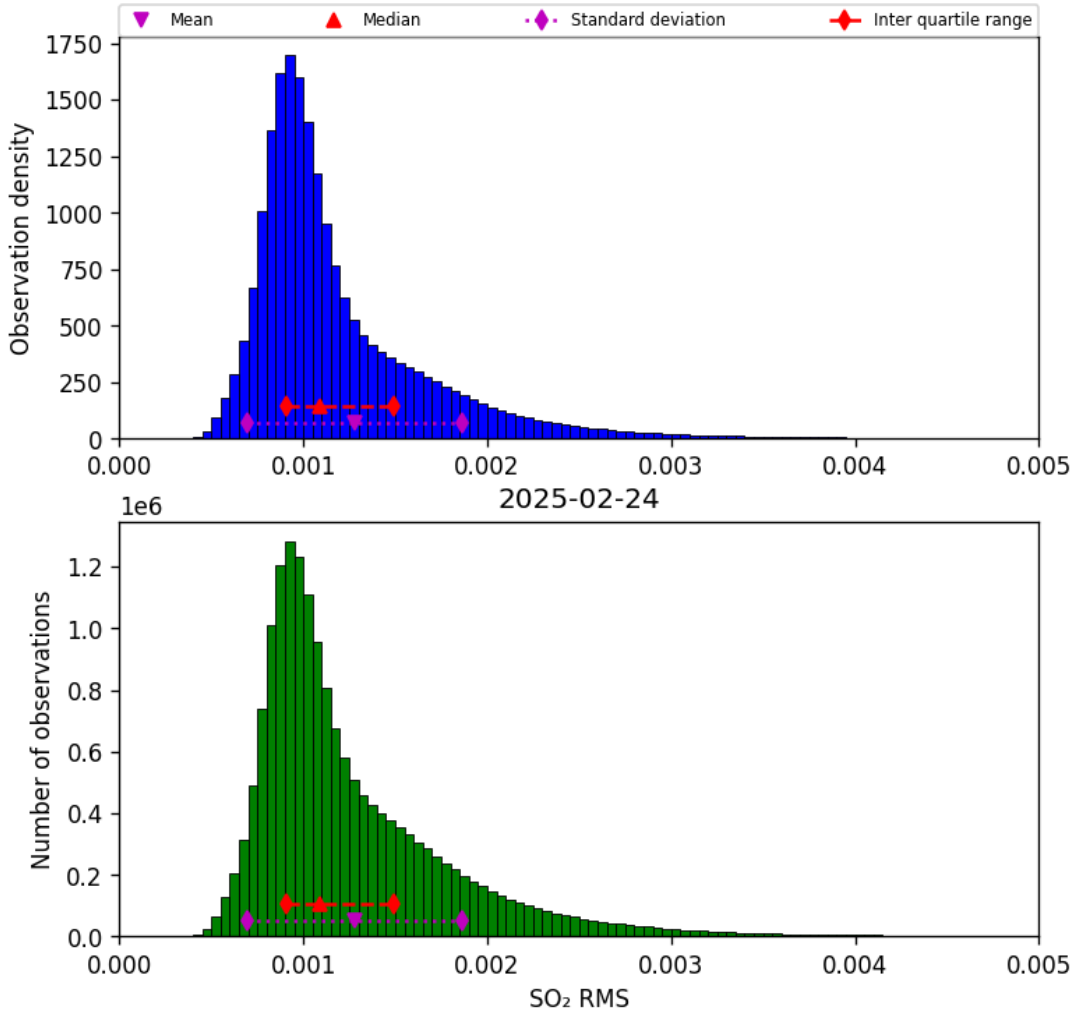


Figure 79: Histogram of "SO_2 RMS" for 2025-02-24 to 2025-02-25

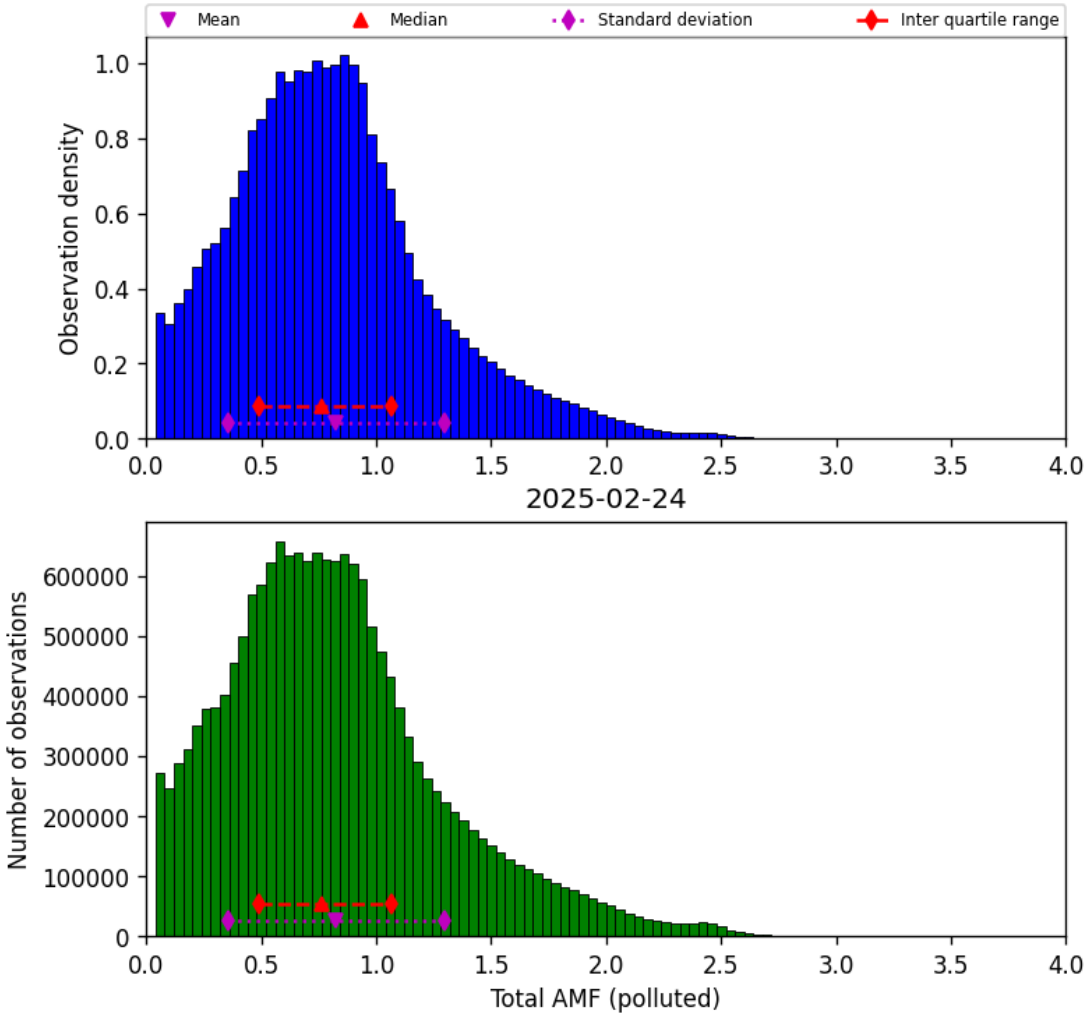


Figure 80: Histogram of “Total AMF (polluted)” for 2025-02-24 to 2025-02-25

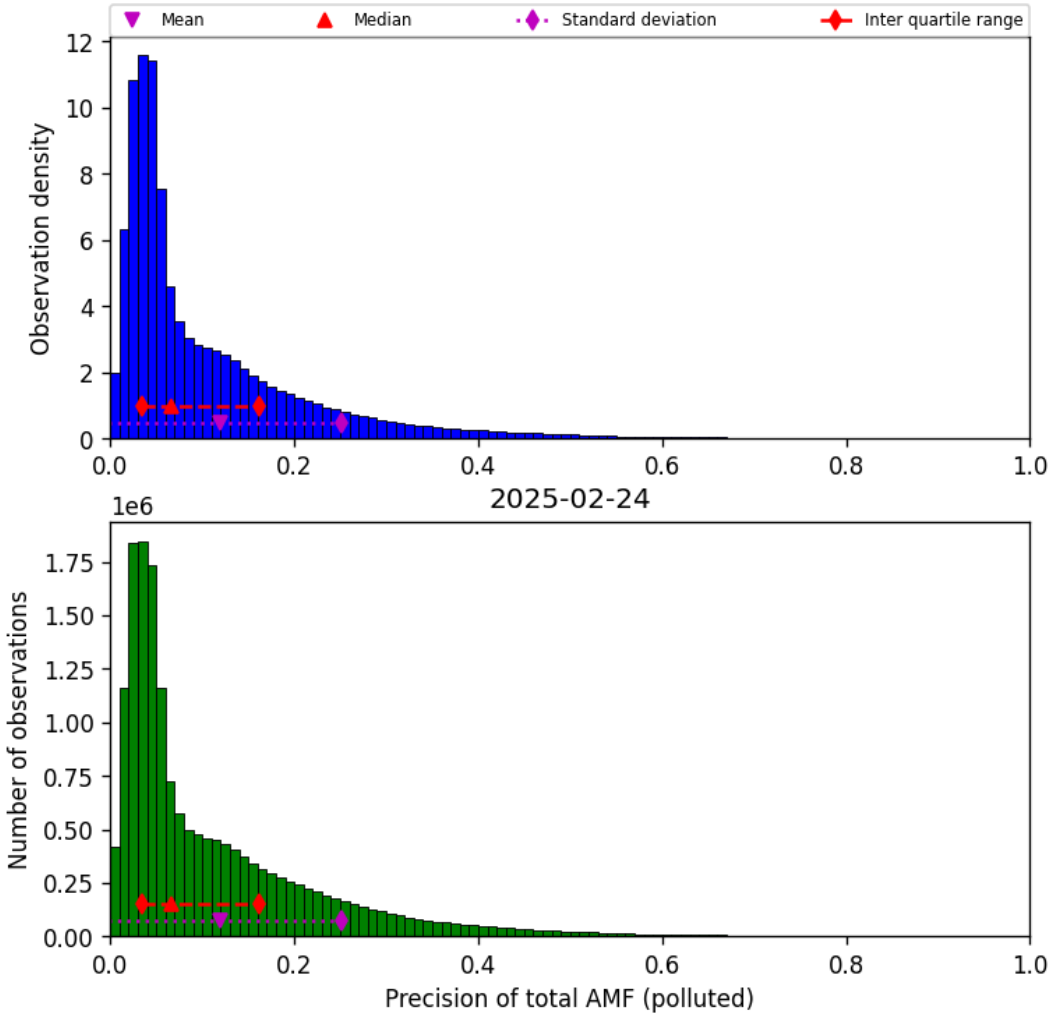


Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-02-24 to 2025-02-25

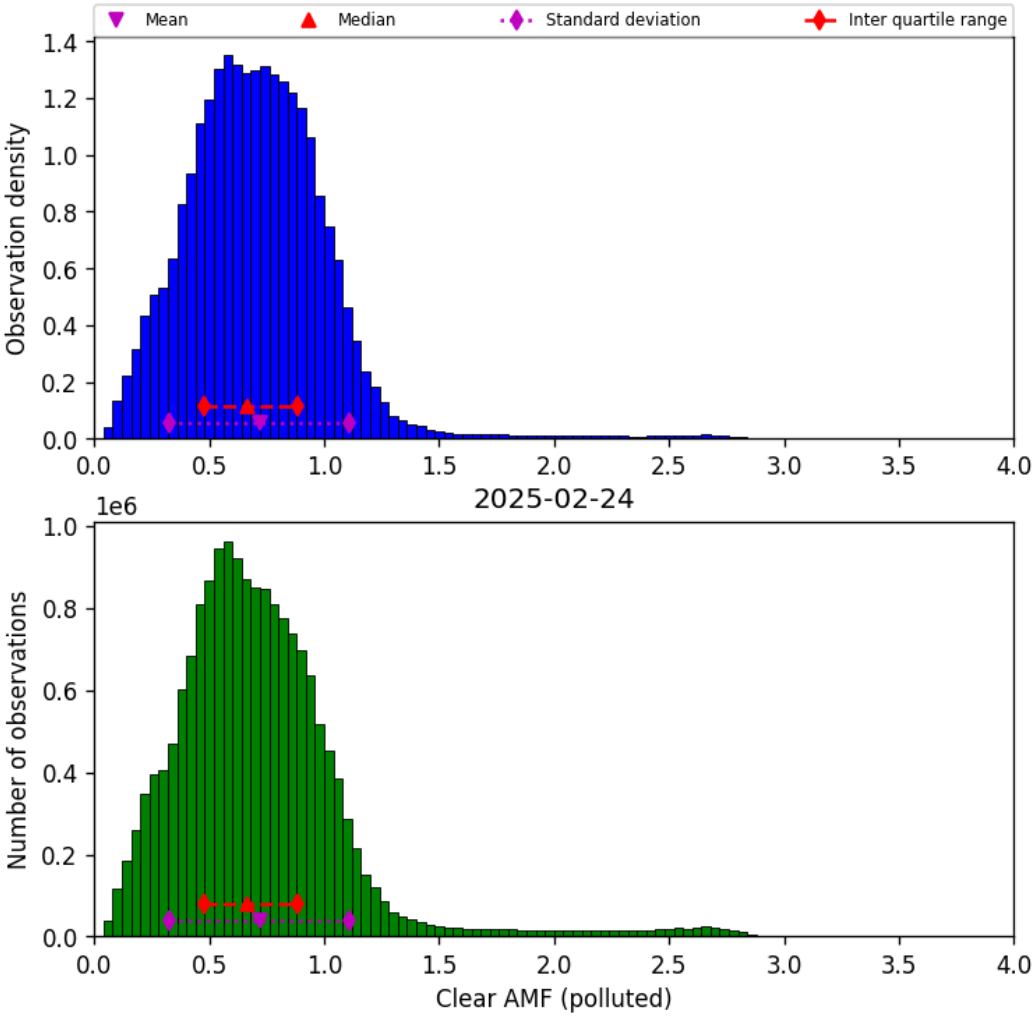


Figure 82: Histogram of “Clear AMF (polluted)” for 2025-02-24 to 2025-02-25

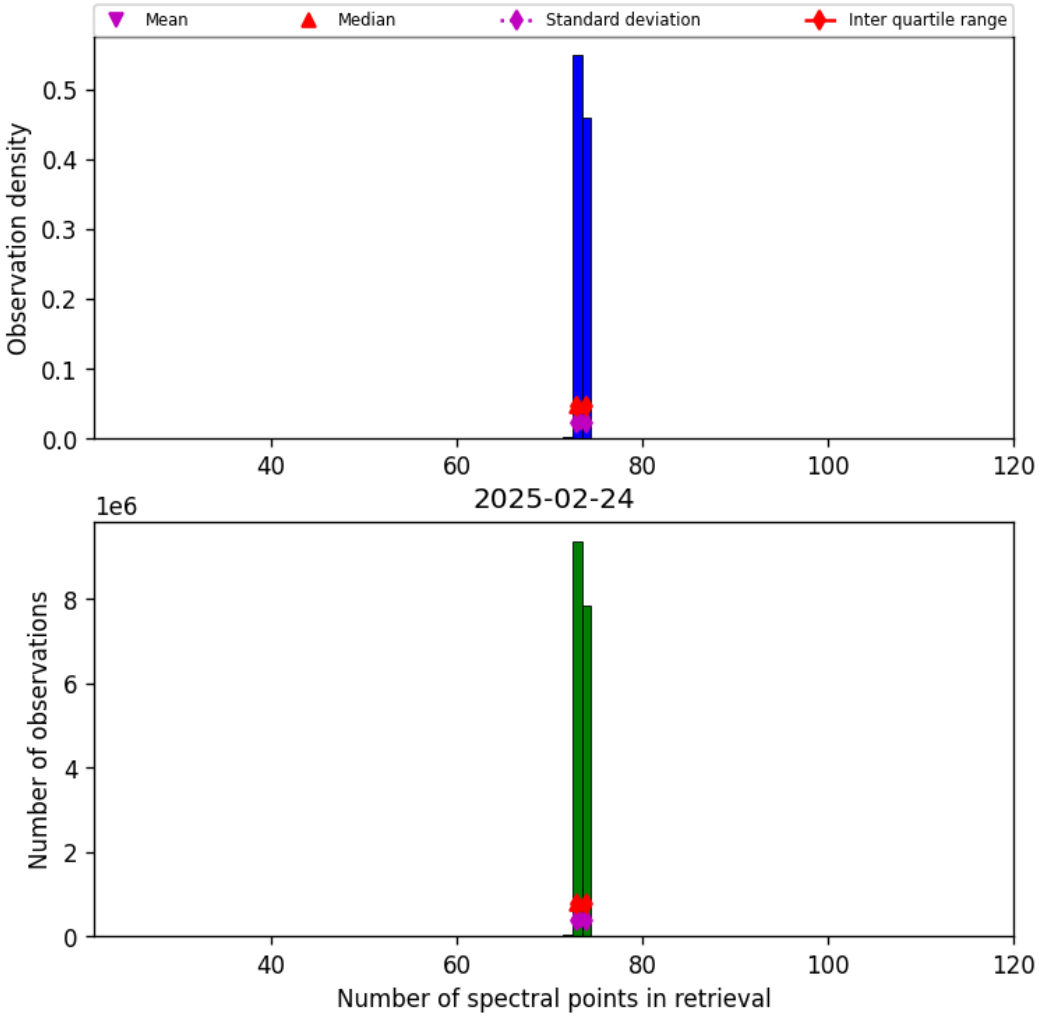


Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-02-24 to 2025-02-25

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.

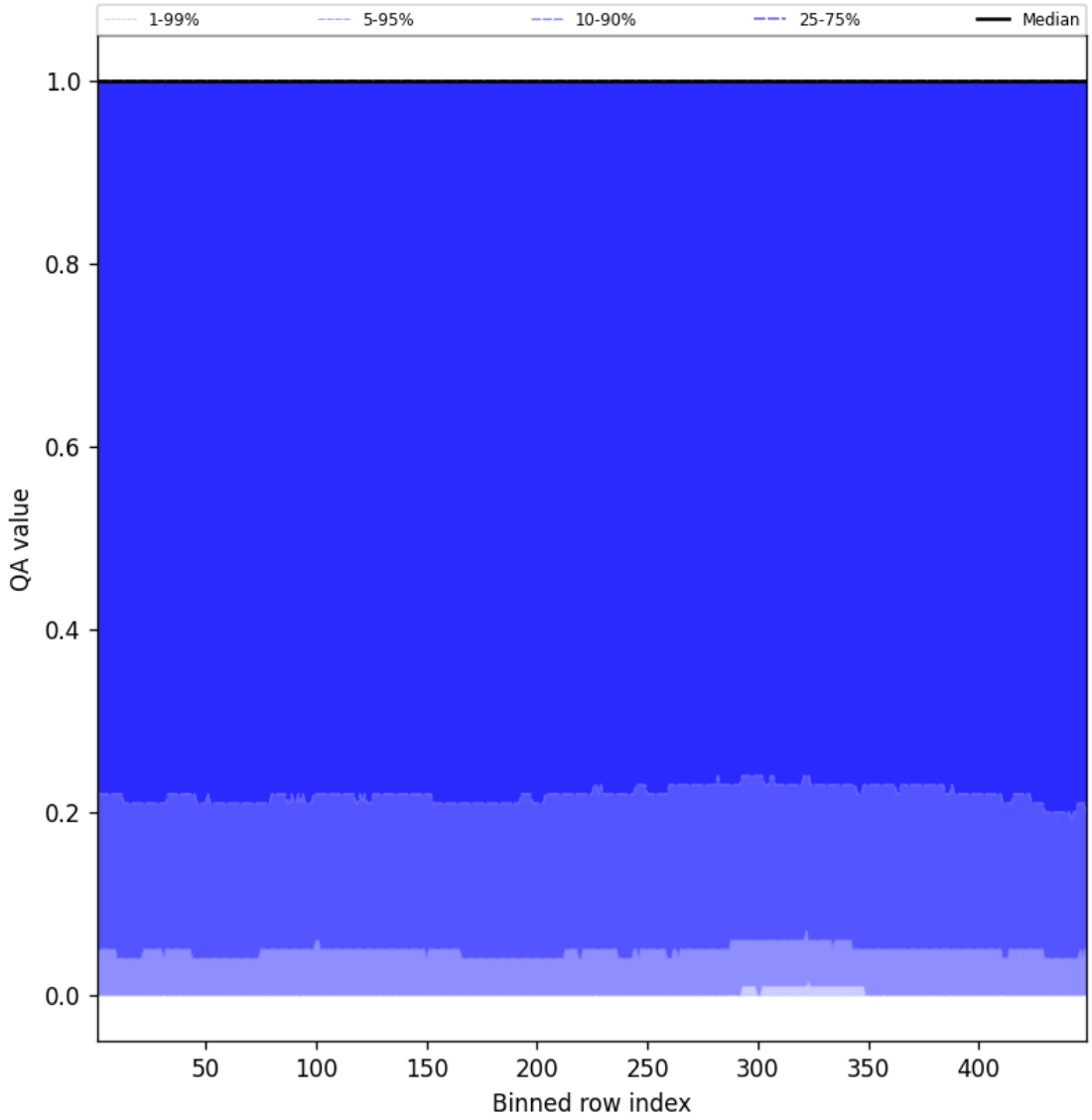


Figure 84: Along track statistics of “QA value” for 2025-02-24 to 2025-02-25

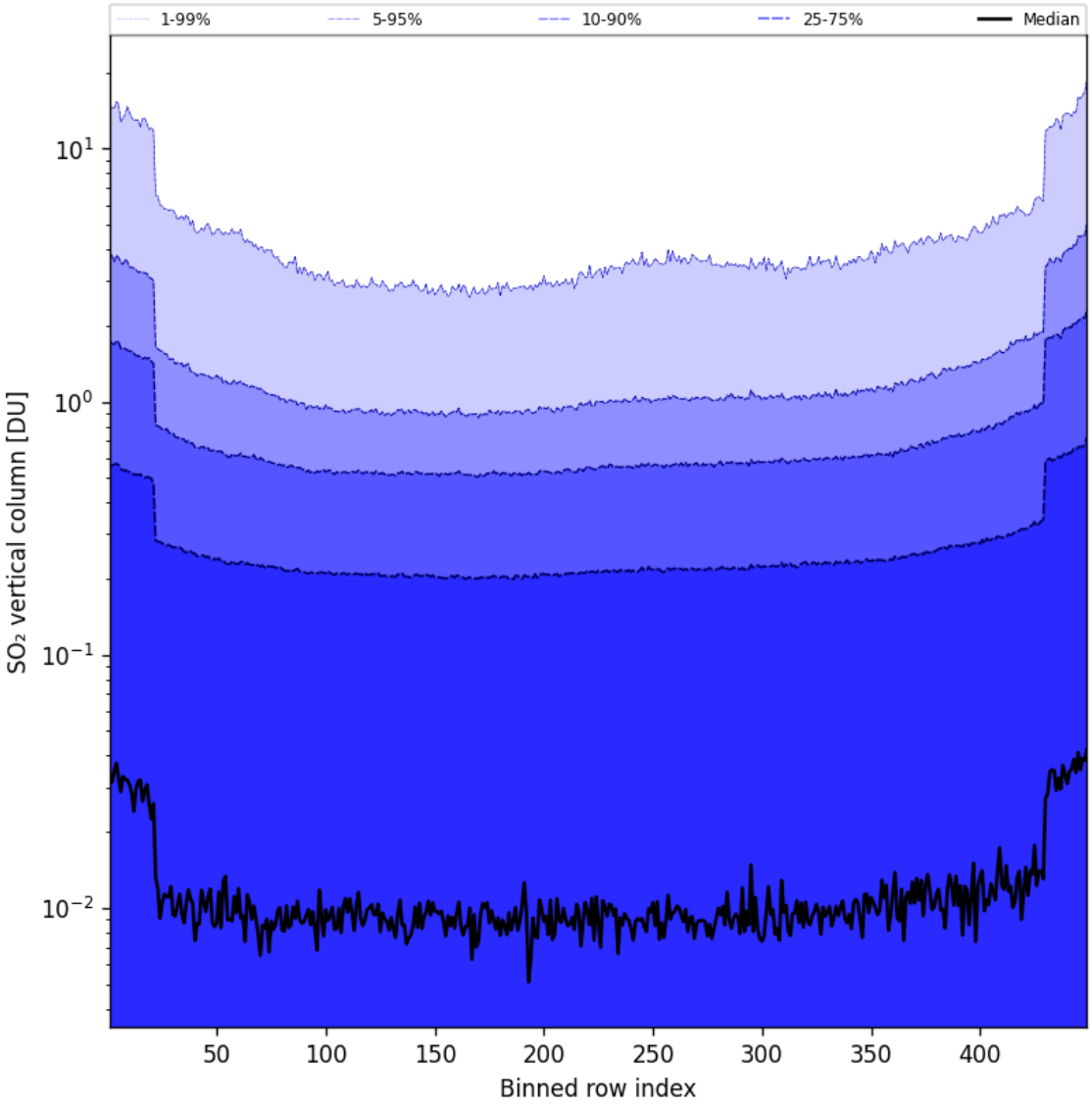


Figure 85: Along track statistics of "SO_2 vertical column" for 2025-02-24 to 2025-02-25

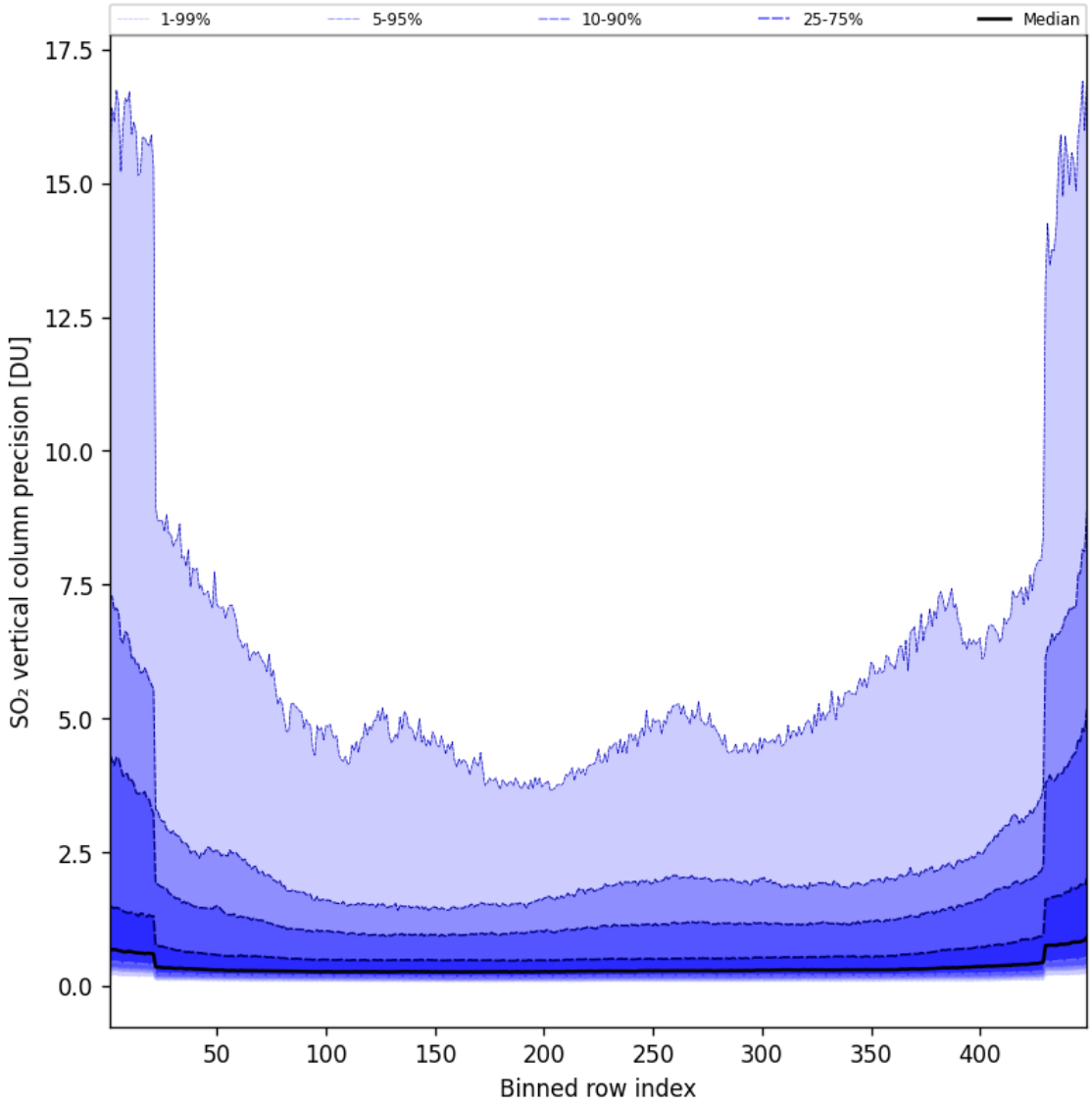


Figure 86: Along track statistics of "SO_2 vertical column precision" for 2025-02-24 to 2025-02-25

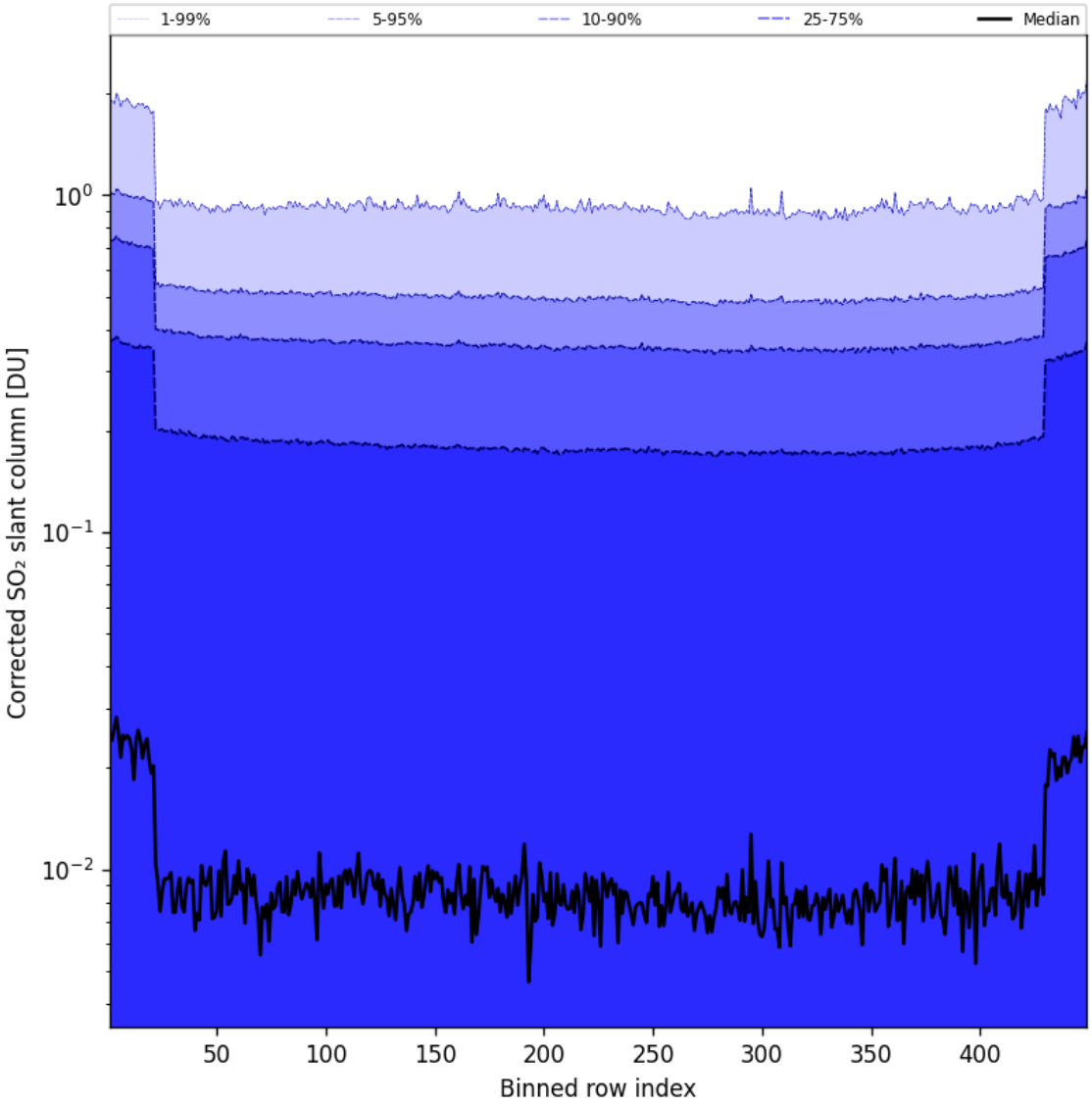


Figure 87: Along track statistics of "Corrected SO_2 slant column" for 2025-02-24 to 2025-02-25

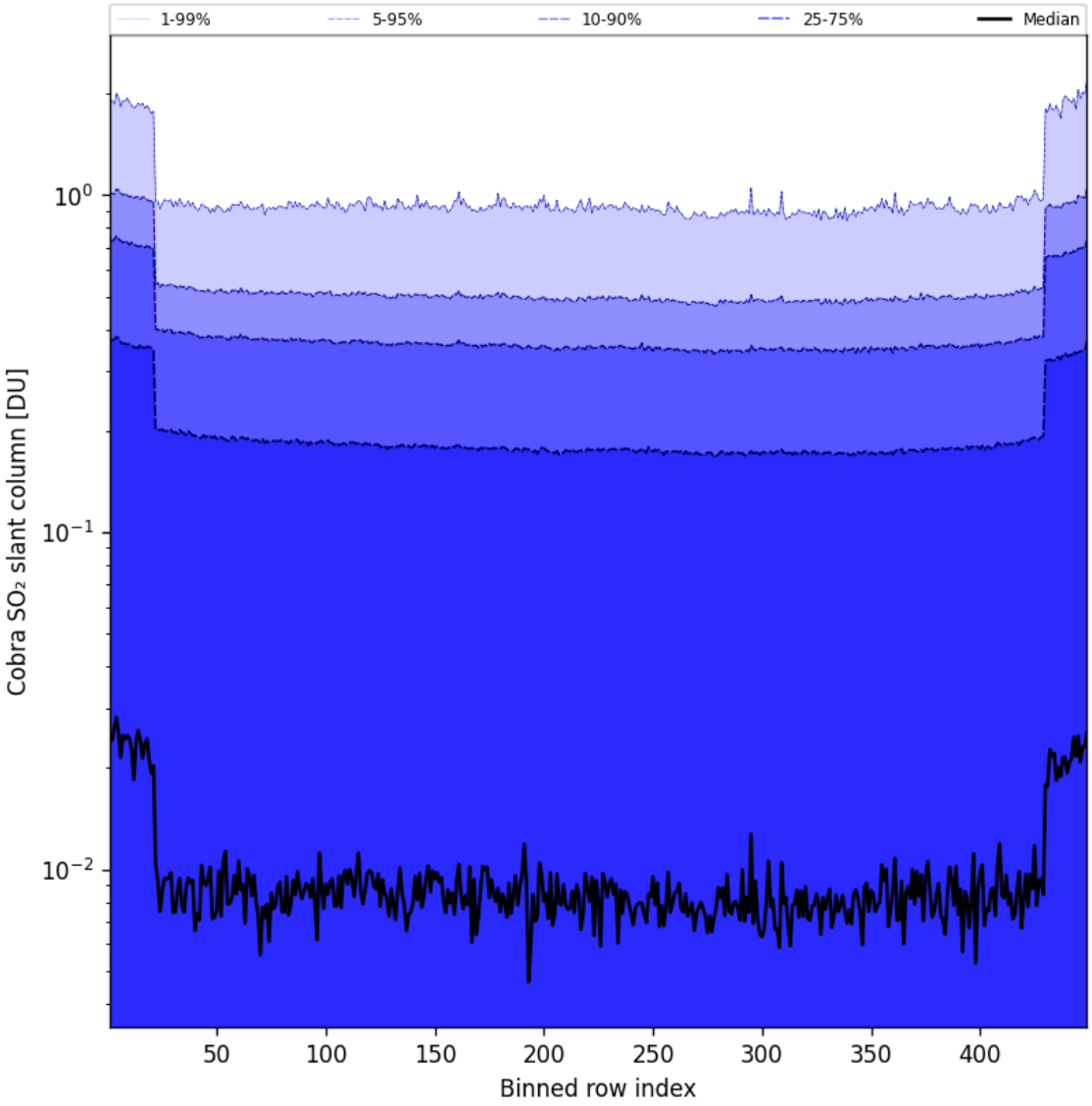


Figure 88: Along track statistics of "Cobra SO_2 slant column" for 2025-02-24 to 2025-02-25

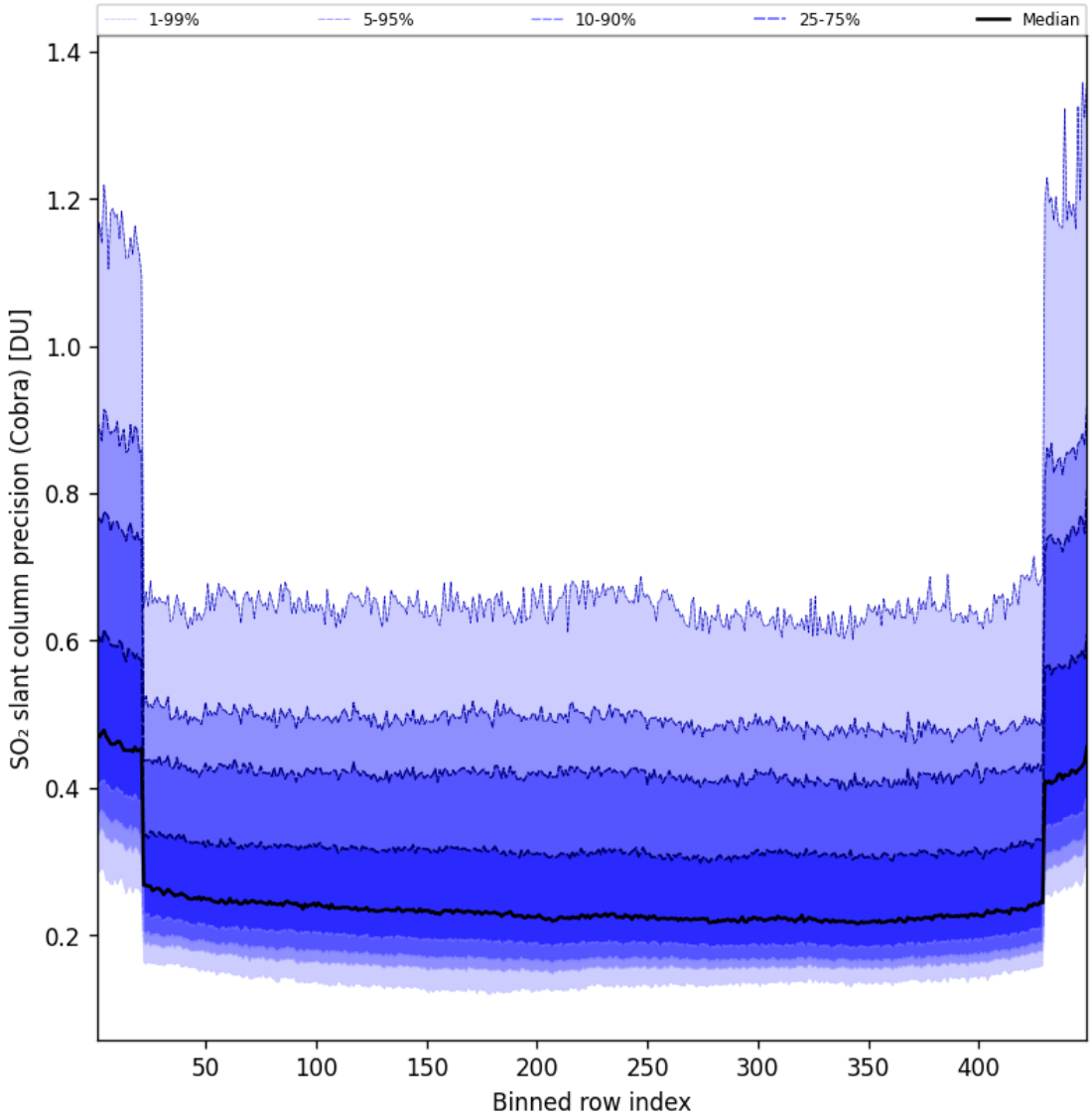


Figure 89: Along track statistics of "SO_2 slant column precision (Cobra)" for 2025-02-24 to 2025-02-25

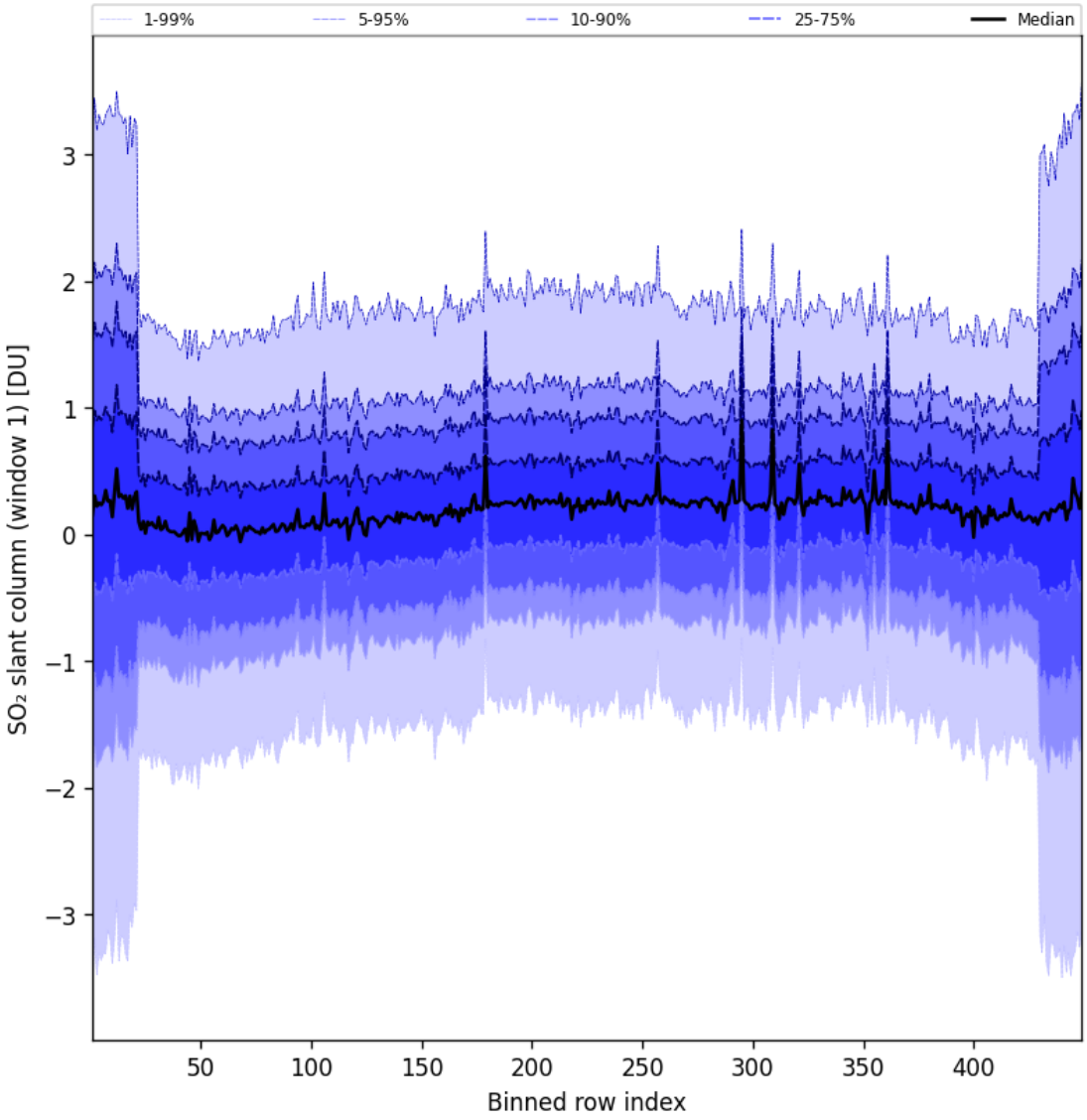


Figure 90: Along track statistics of "SO_2 slant column (window 1)" for 2025-02-24 to 2025-02-25

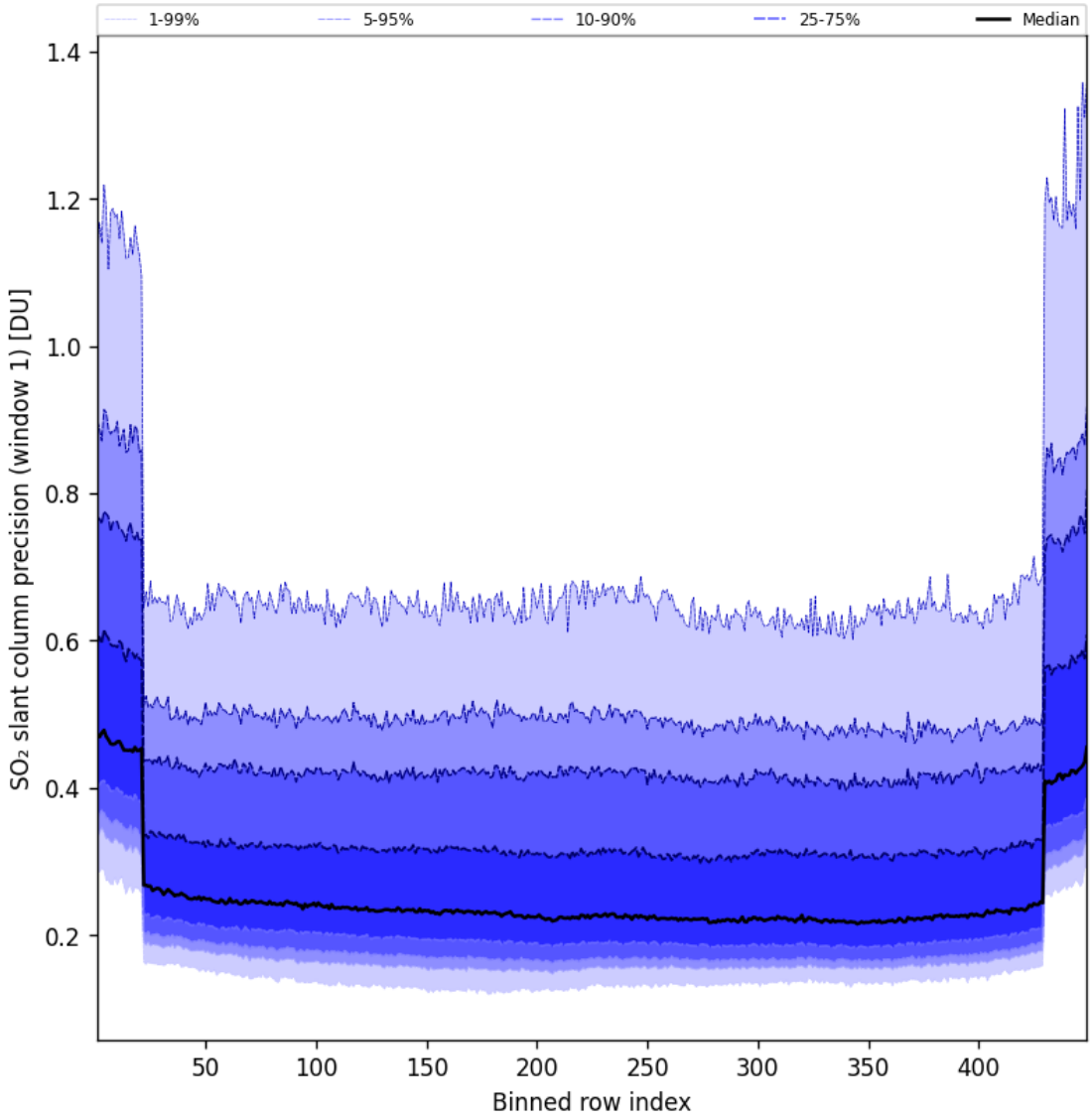


Figure 91: Along track statistics of "SO_2 slant column precision (window 1)" for 2025-02-24 to 2025-02-25

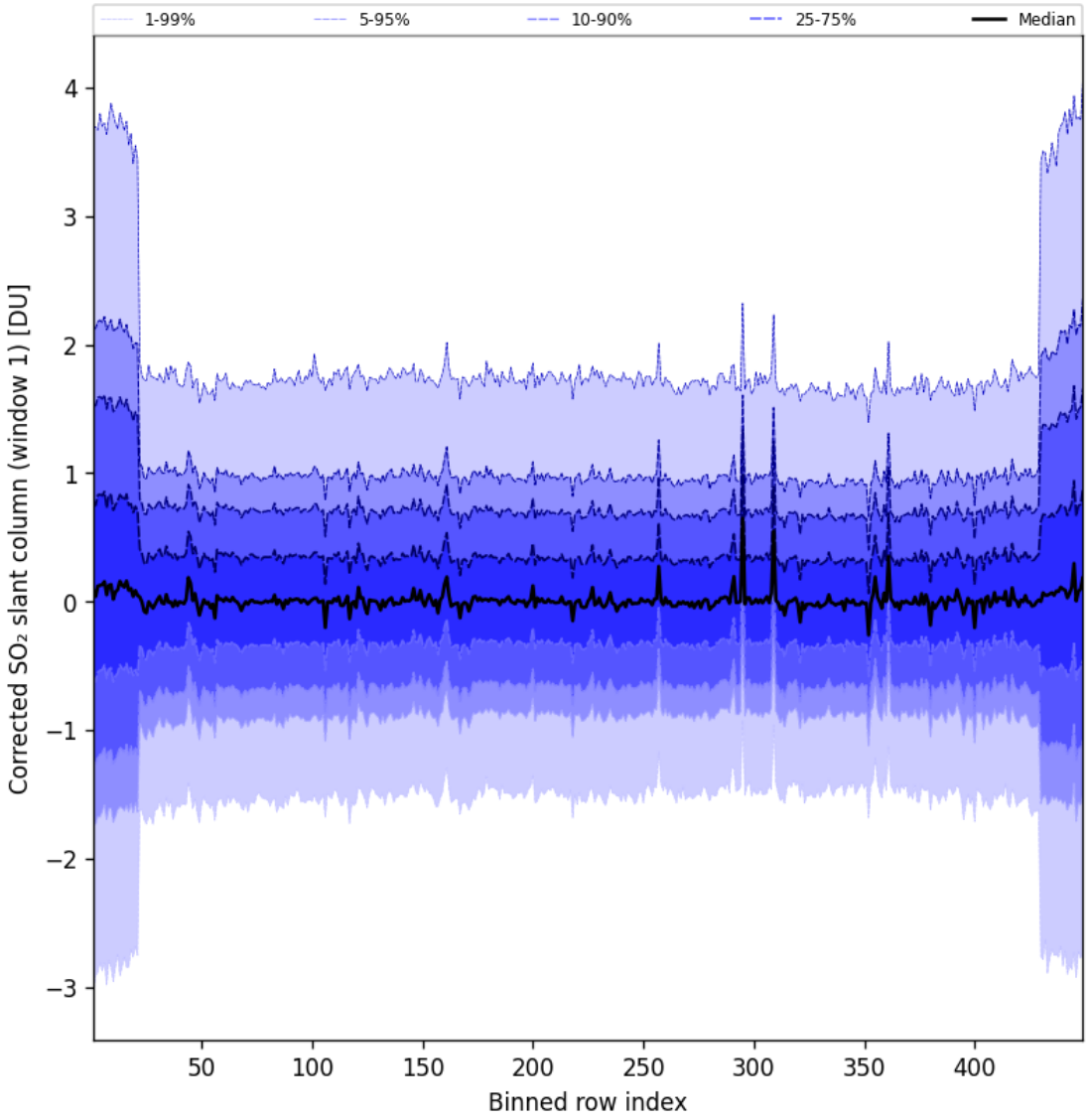


Figure 92: Along track statistics of “Corrected SO_2 slant column (window 1)” for 2025-02-24 to 2025-02-25

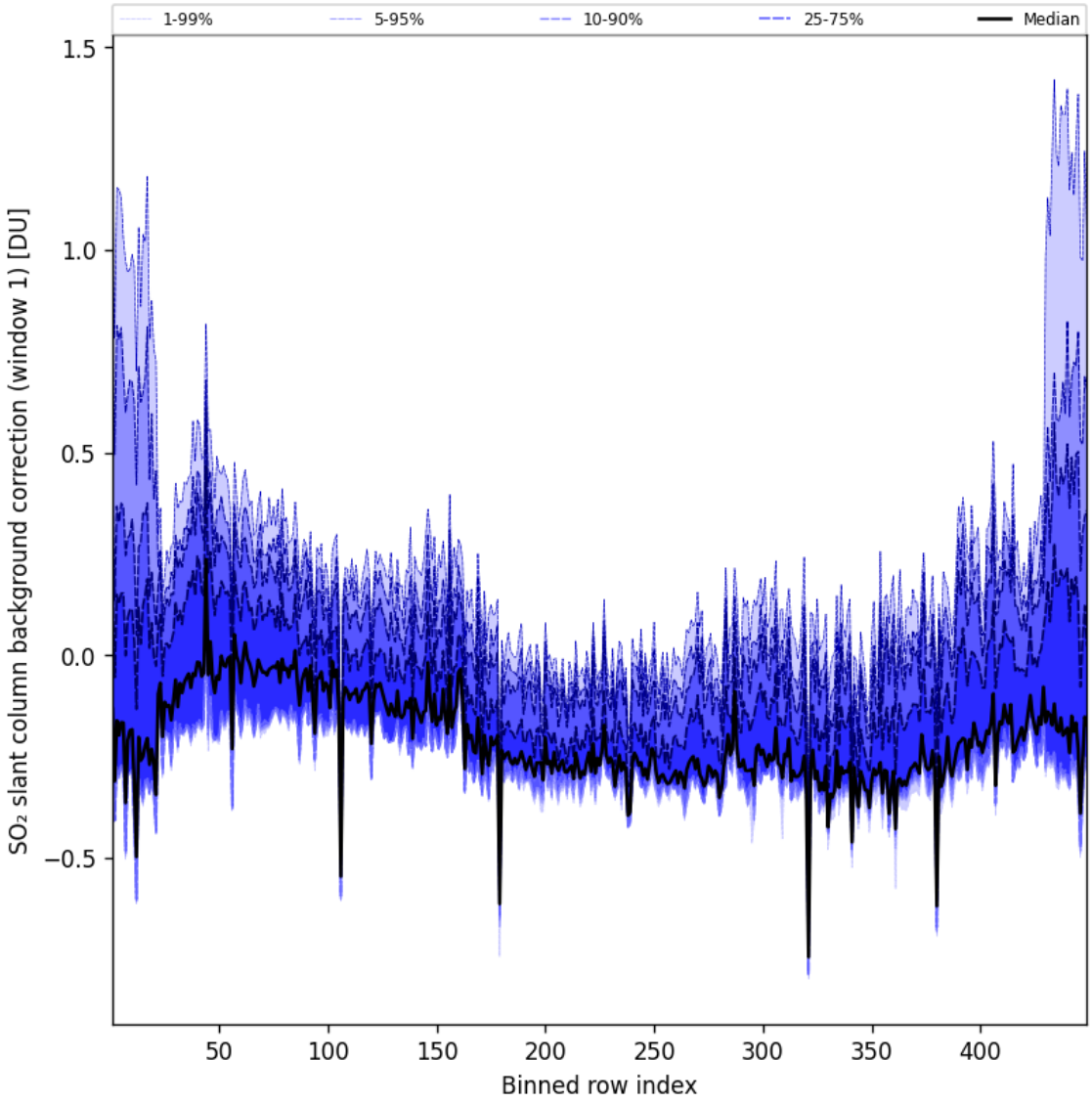


Figure 93: Along track statistics of "SO_2 slant column background correction (window 1)" for 2025-02-24 to 2025-02-25

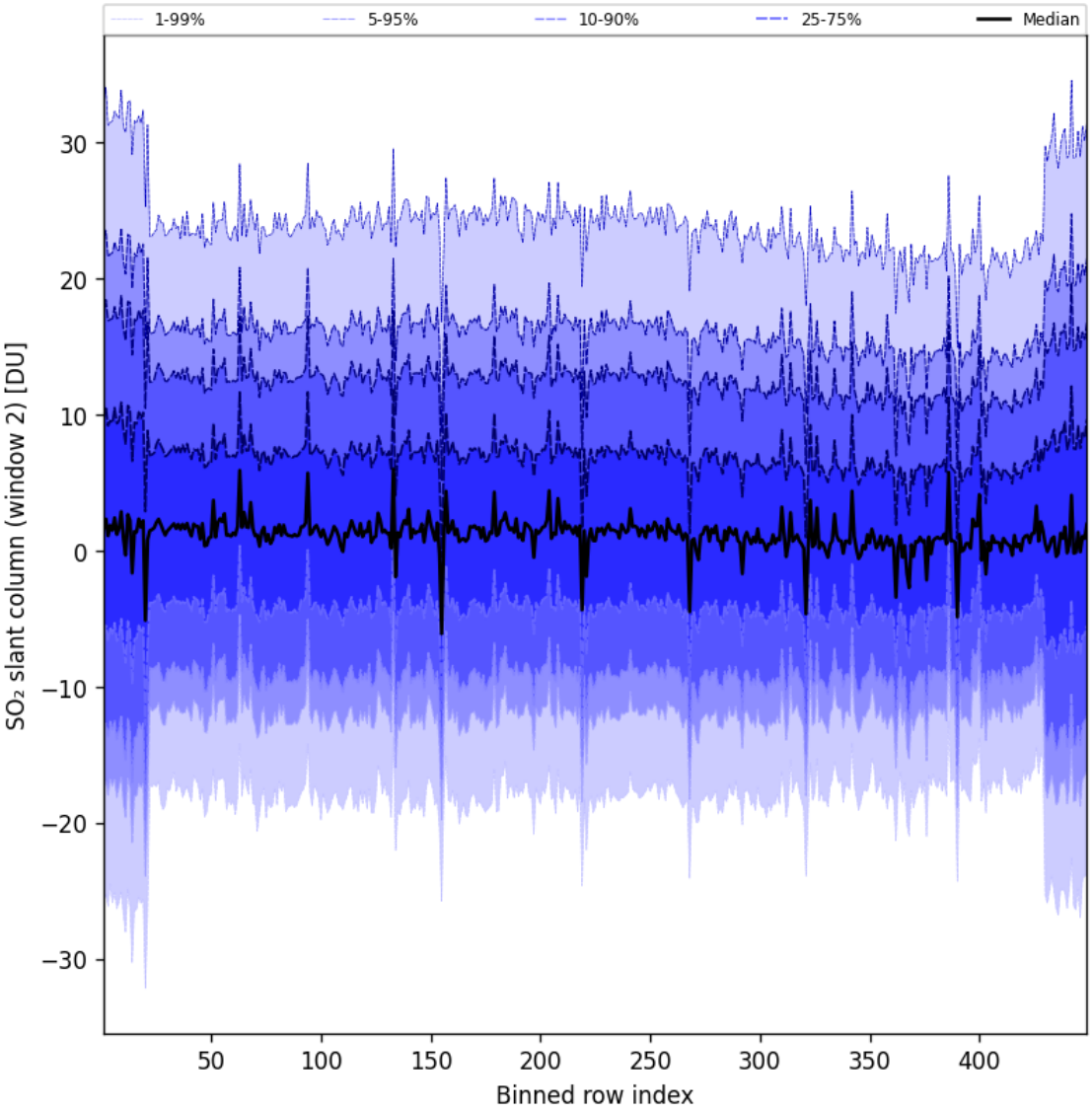


Figure 94: Along track statistics of "SO_2 slant column (window 2)" for 2025-02-24 to 2025-02-25

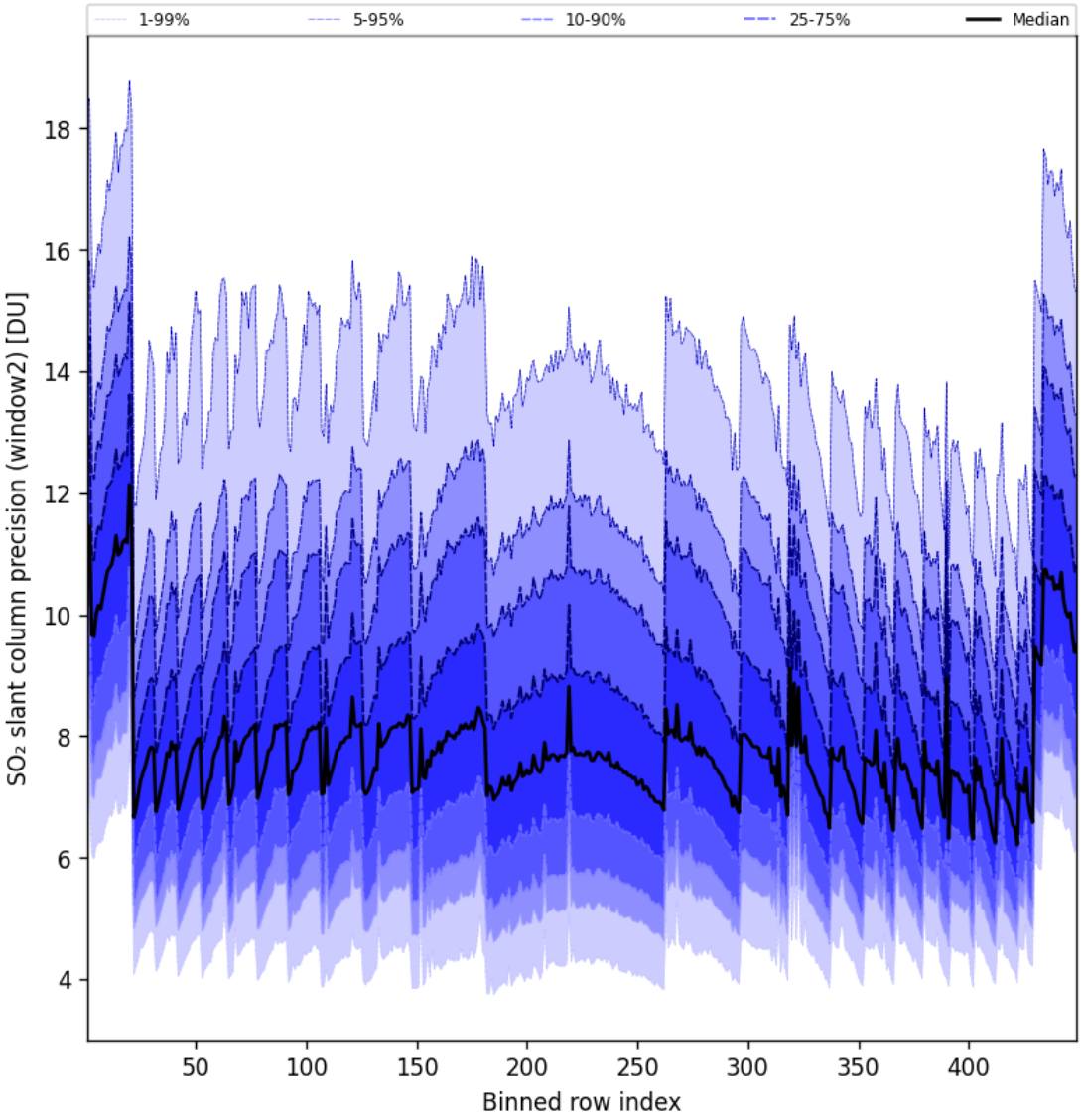


Figure 95: Along track statistics of "SO_2 slant column precision (window2)" for 2025-02-24 to 2025-02-25

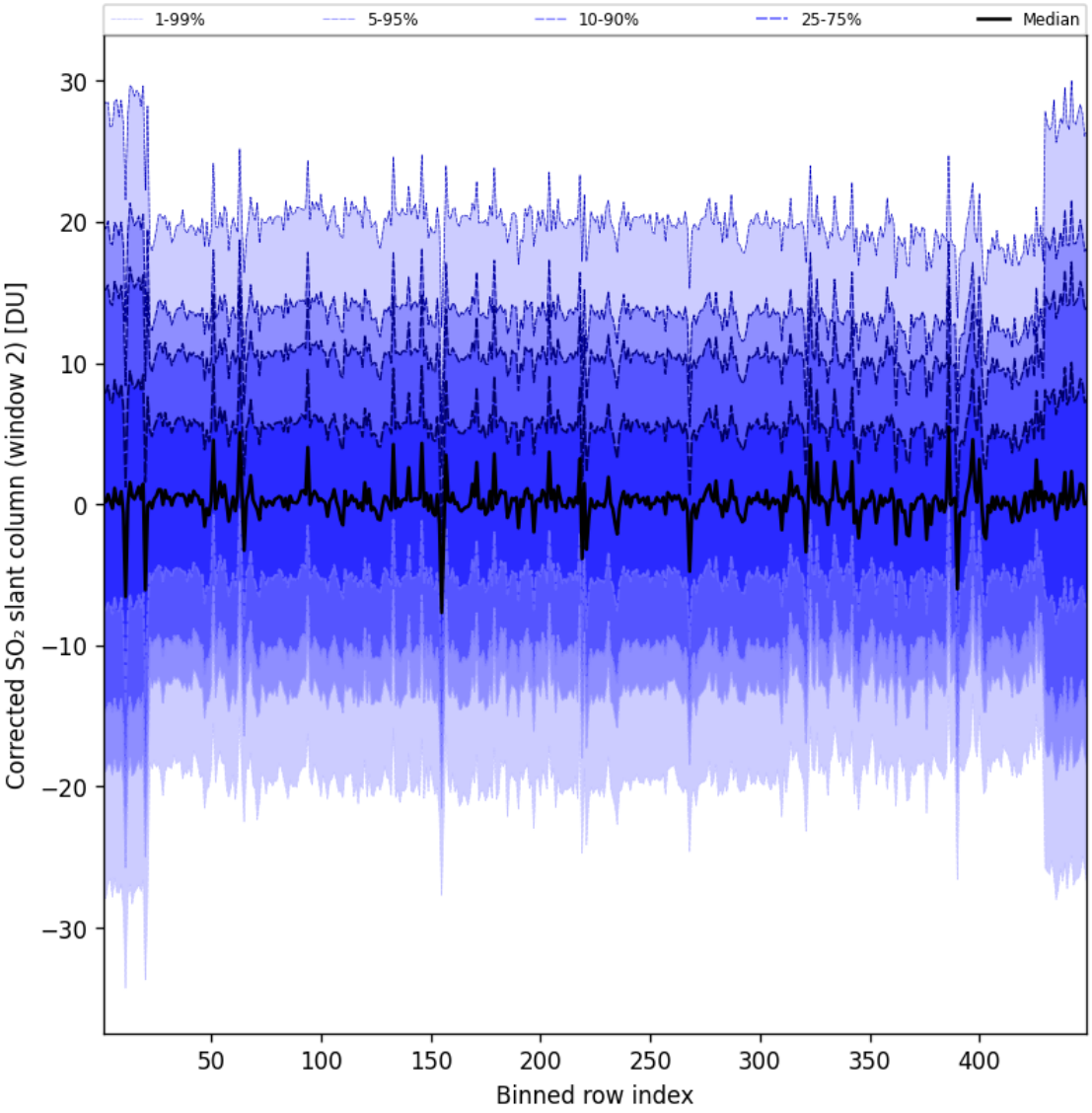


Figure 96: Along track statistics of “Corrected SO_2 slant column (window 2)” for 2025-02-24 to 2025-02-25

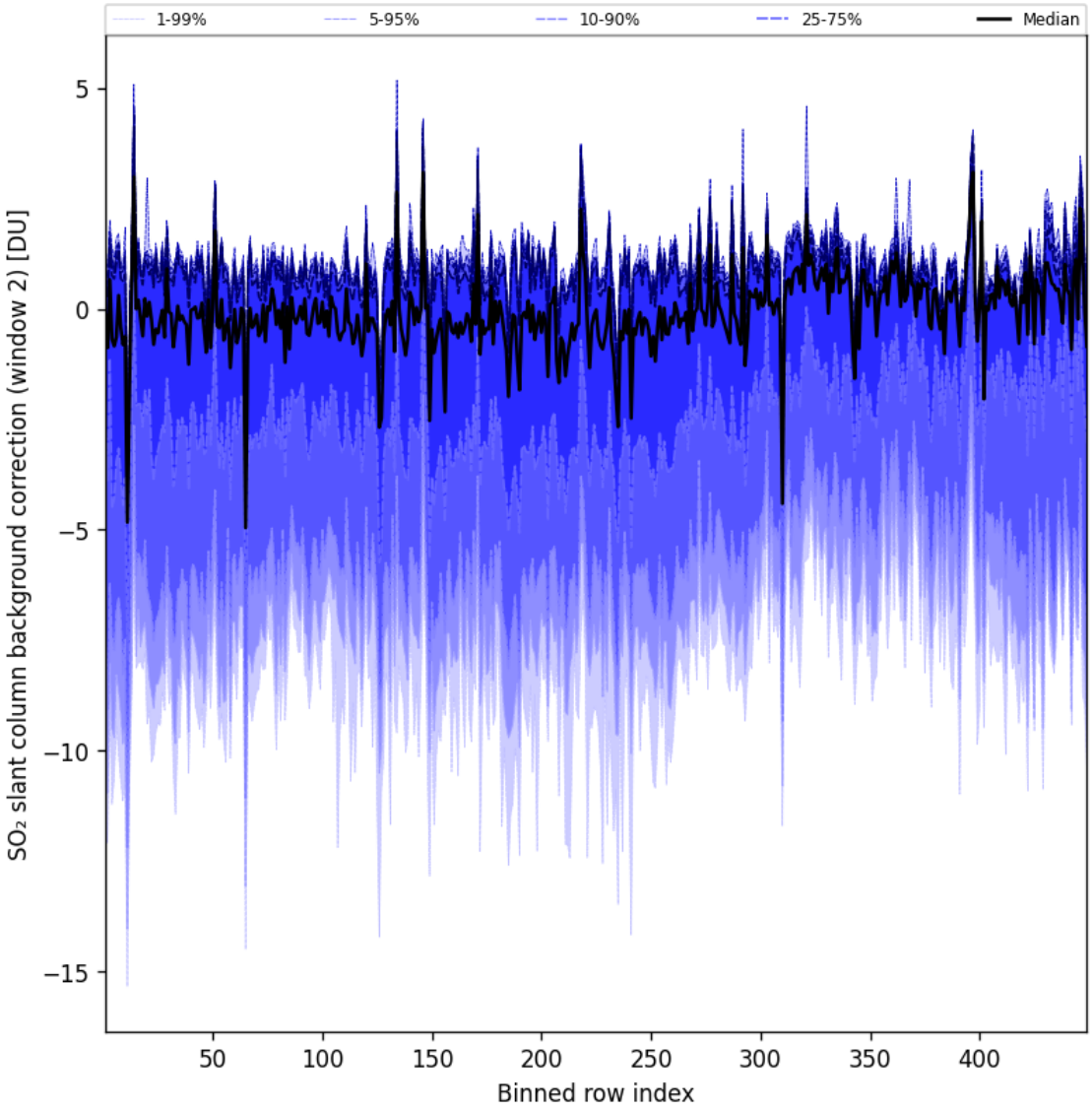


Figure 97: Along track statistics of "SO_2 slant column background correction (window 2)" for 2025-02-24 to 2025-02-25

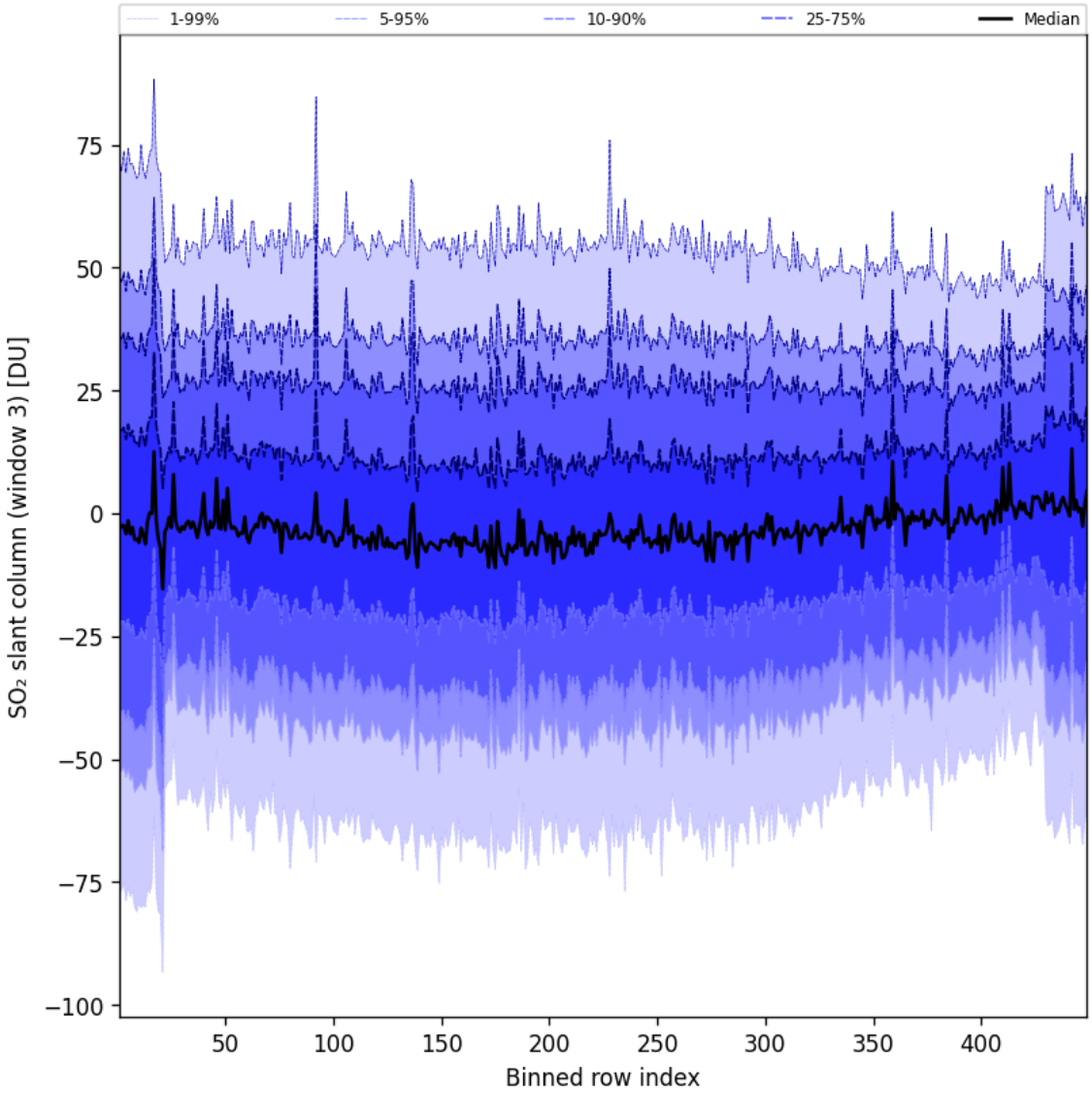


Figure 98: Along track statistics of "SO_2 slant column (window 3)" for 2025-02-24 to 2025-02-25

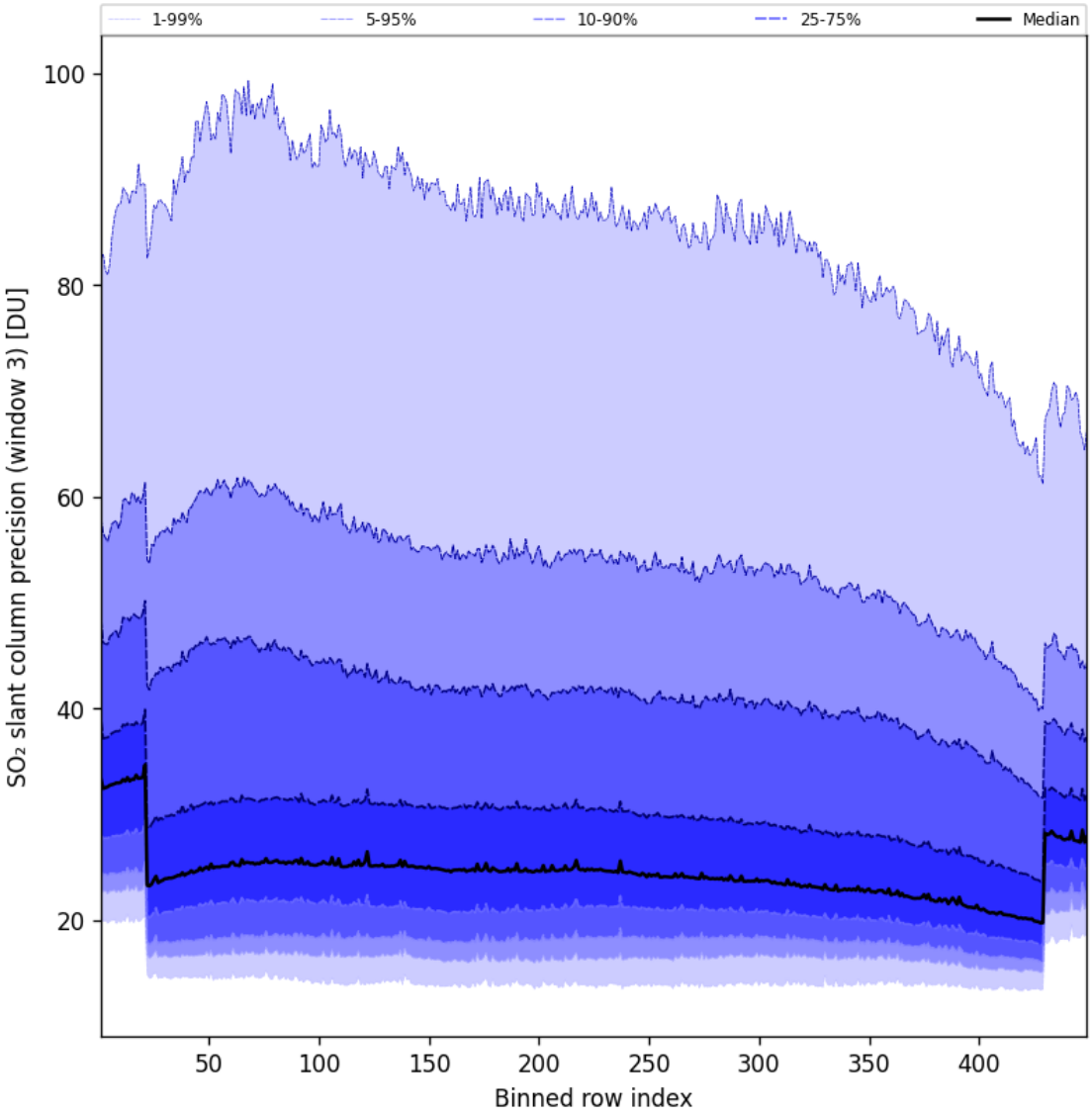


Figure 99: Along track statistics of "SO_2 slant column precision (window 3)" for 2025-02-24 to 2025-02-25

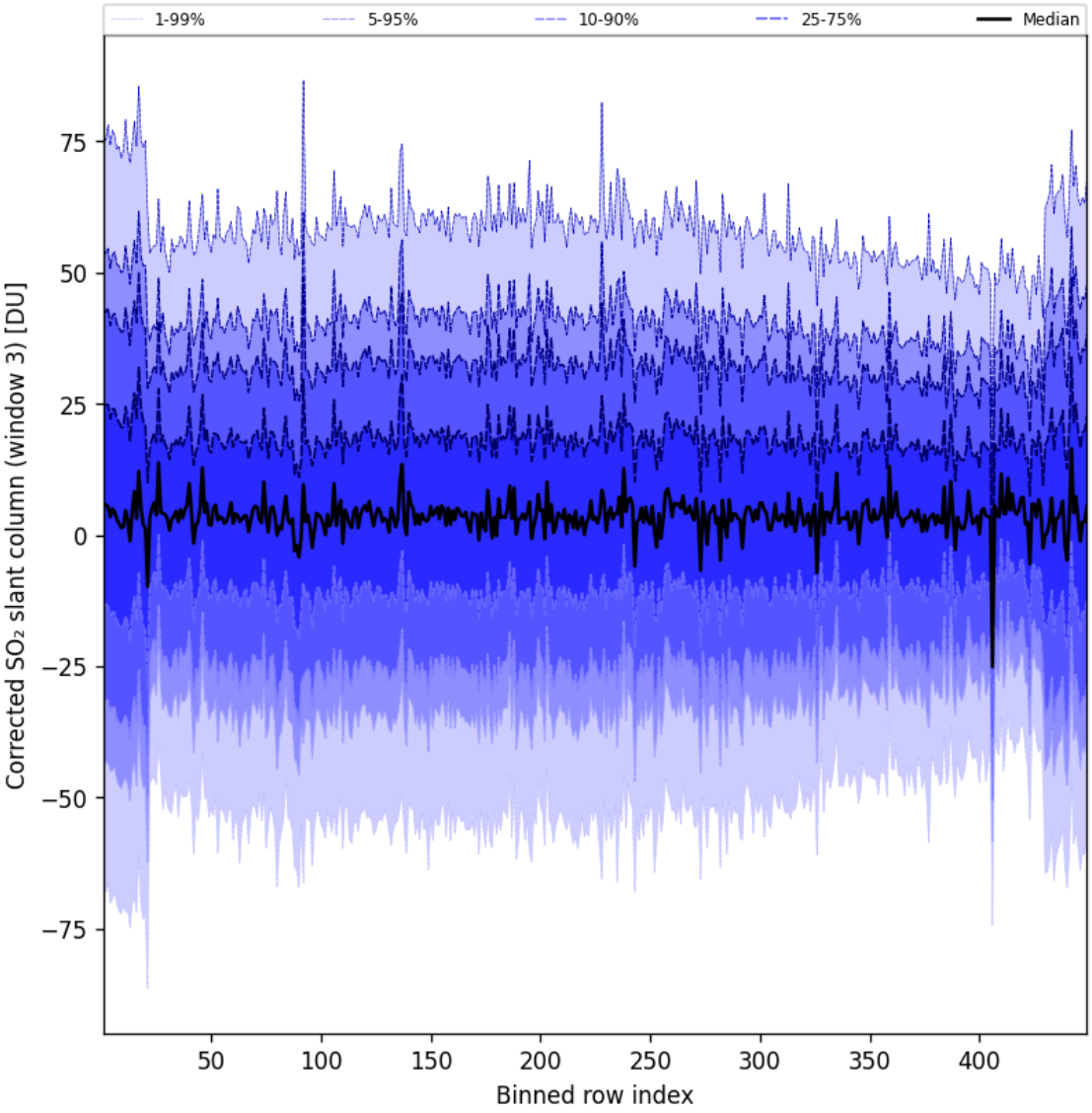


Figure 100: Along track statistics of “Corrected SO_2 slant column (window 3)” for 2025-02-24 to 2025-02-25

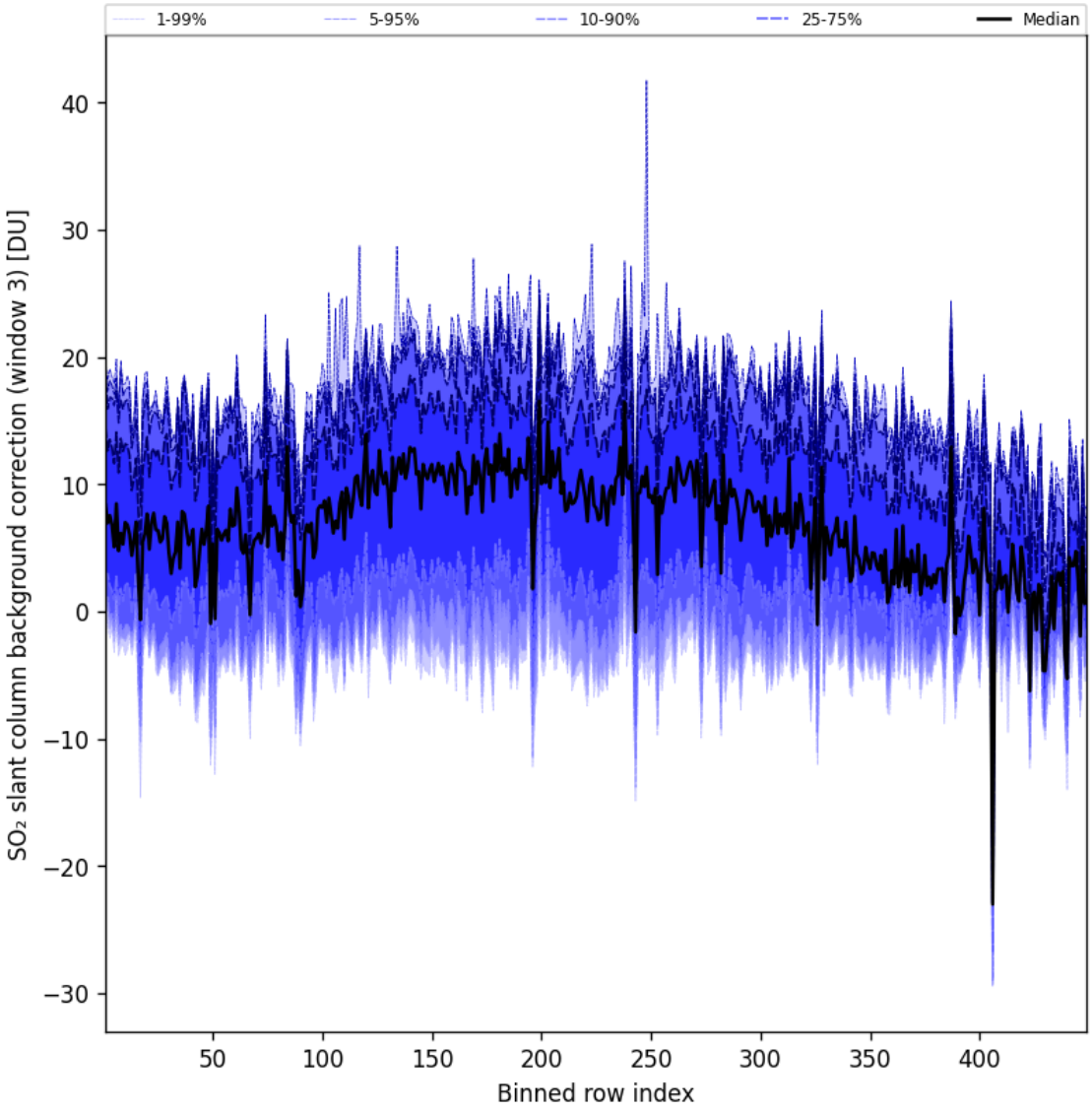
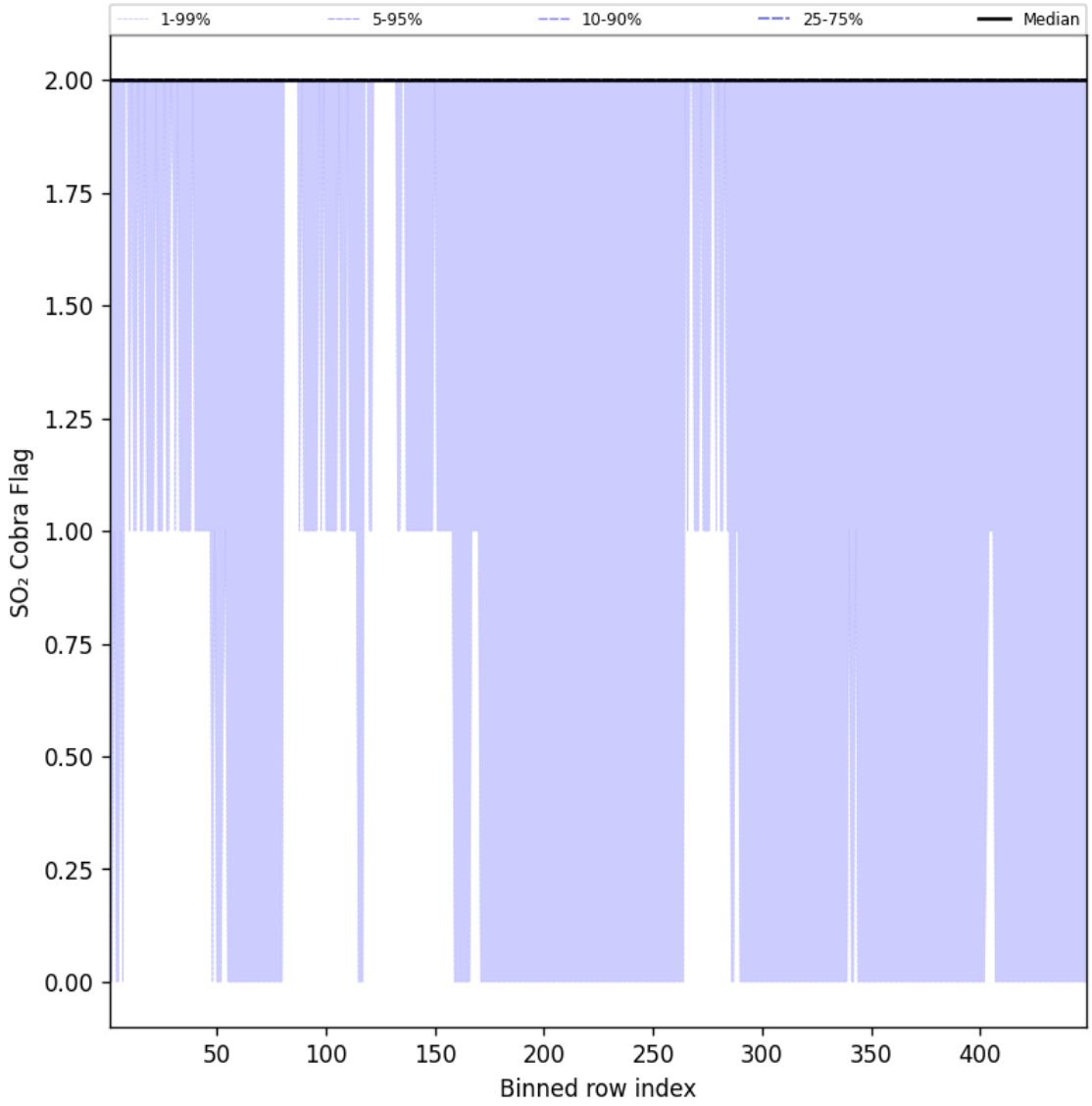


Figure 101: Along track statistics of "SO_2 slant column background correction (window 3)" for 2025-02-24 to 2025-02-25



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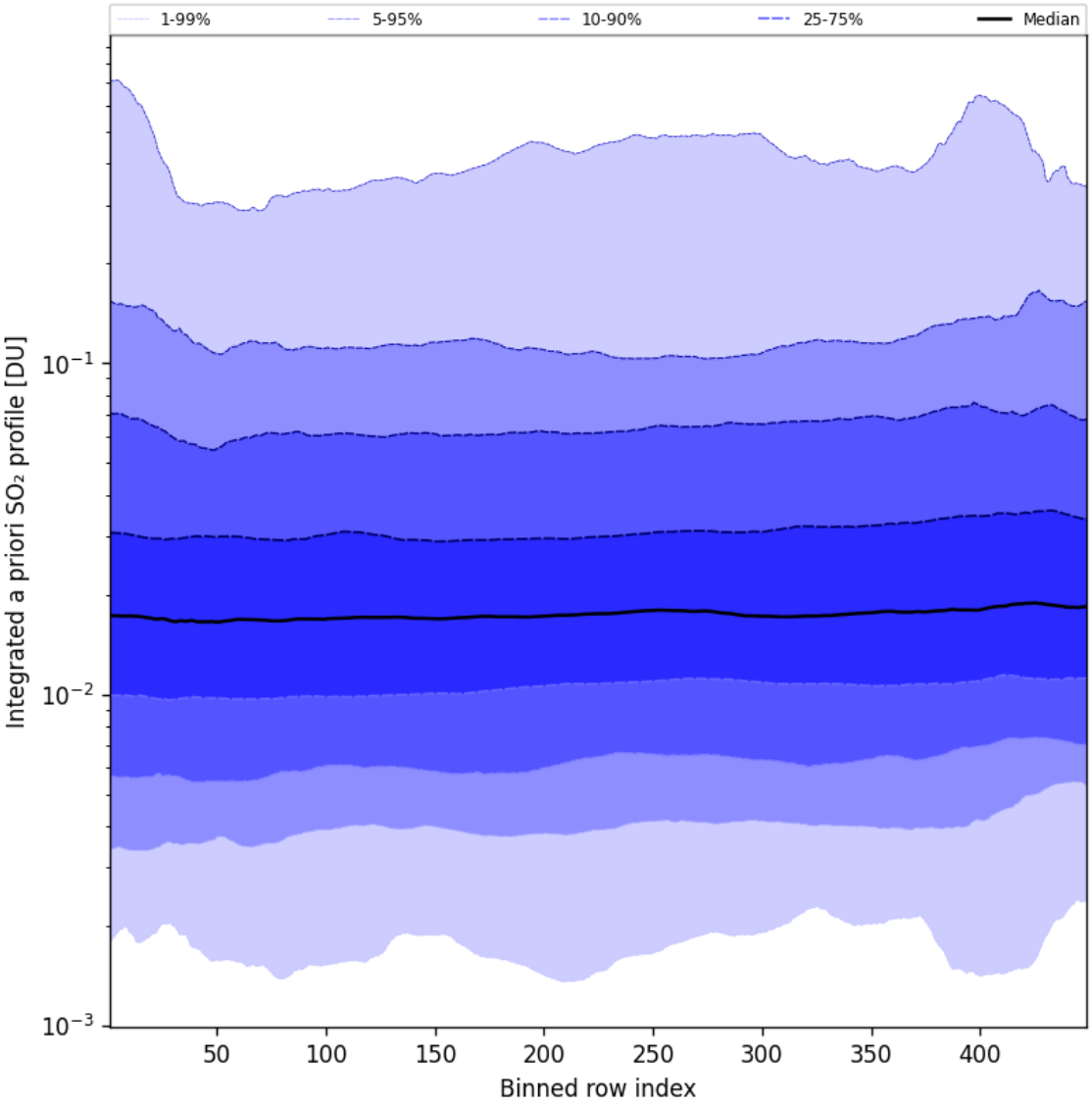
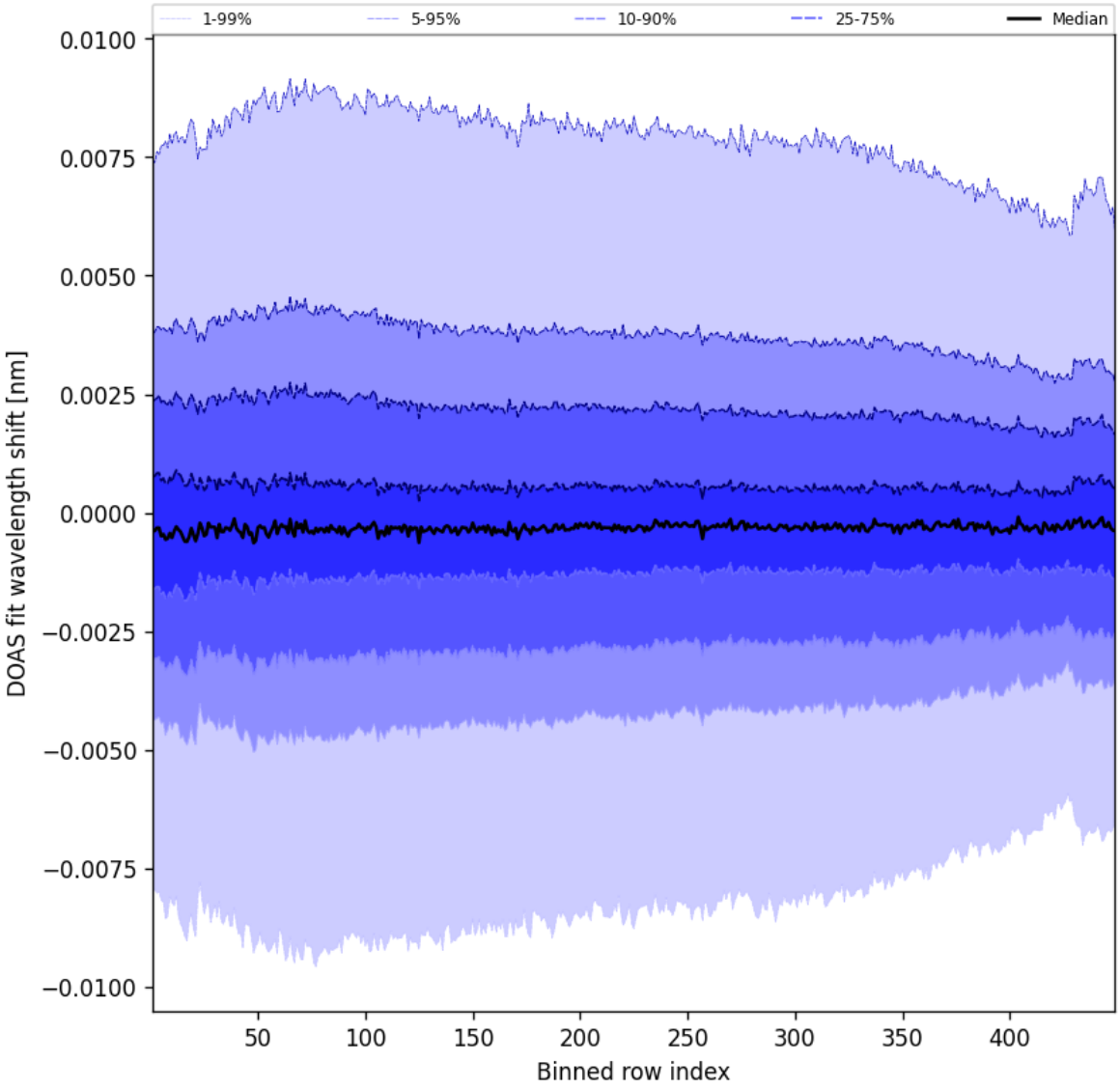


Figure 103: Along track statistics of “Integrated a priori SO_2 profile” for 2025-02-24 to 2025-02-25



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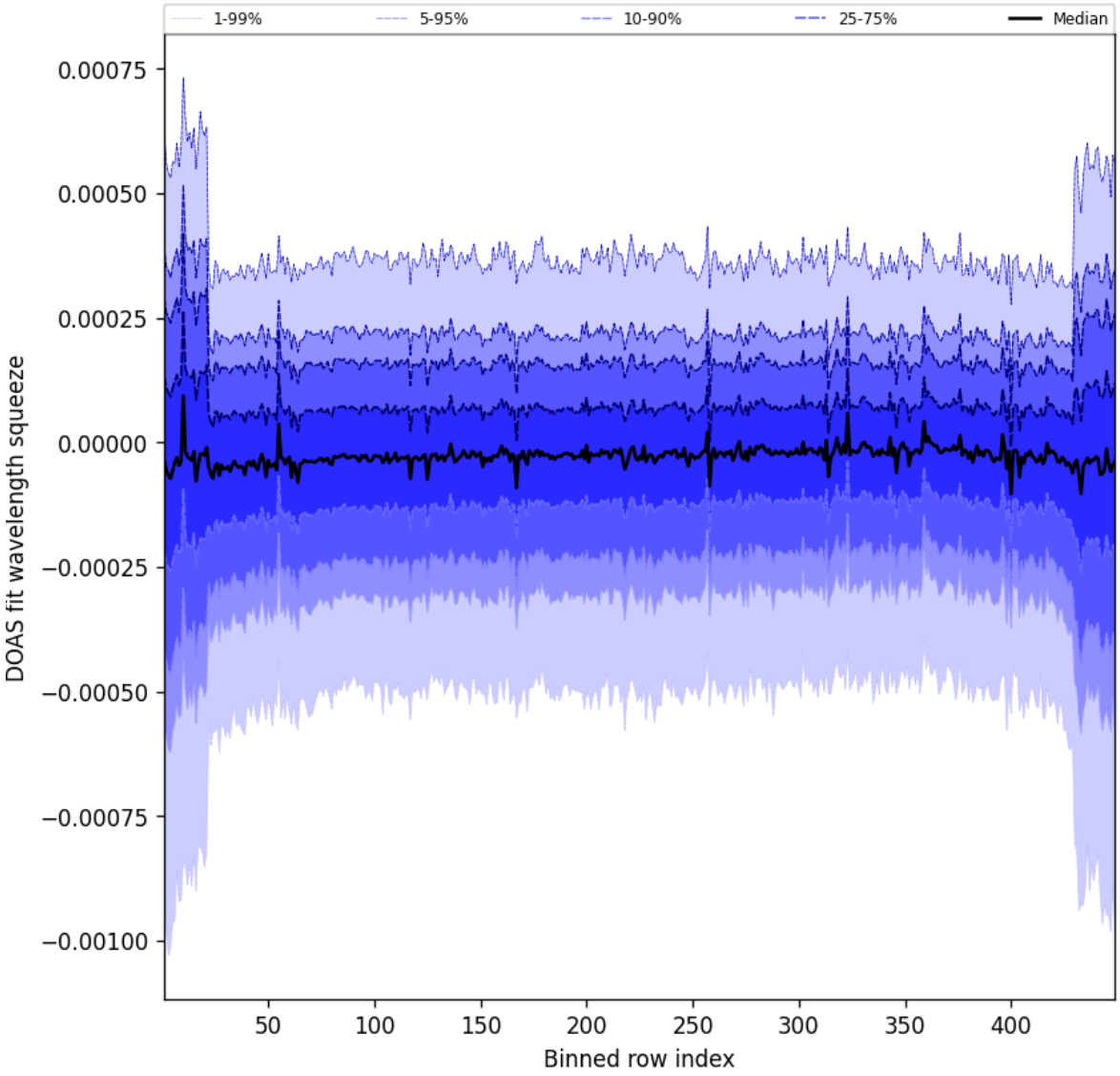

Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2025-02-24 to 2025-02-25

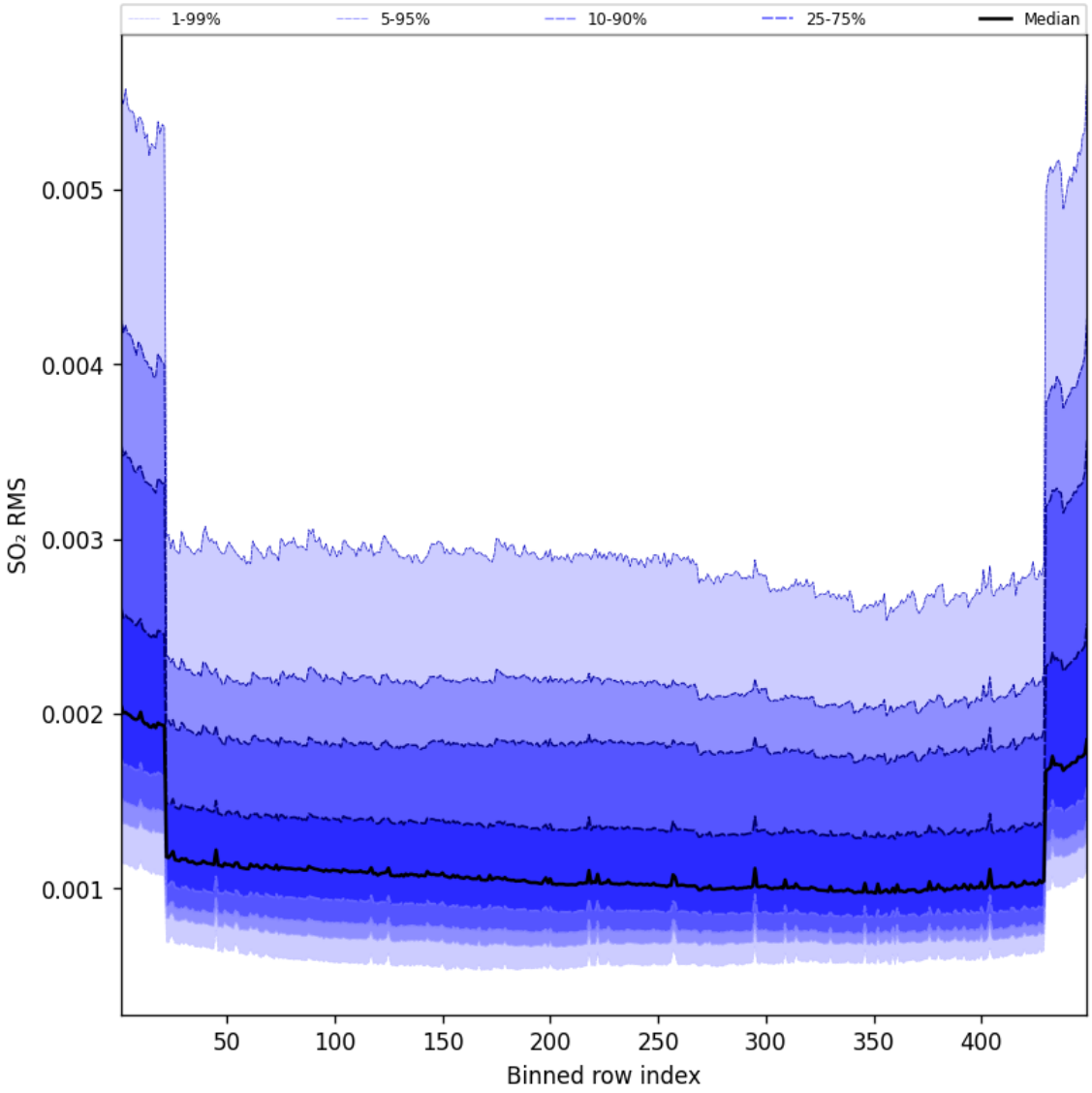

Figure 106: Along track statistics of "SO_2 RMS" for 2025-02-24 to 2025-02-25

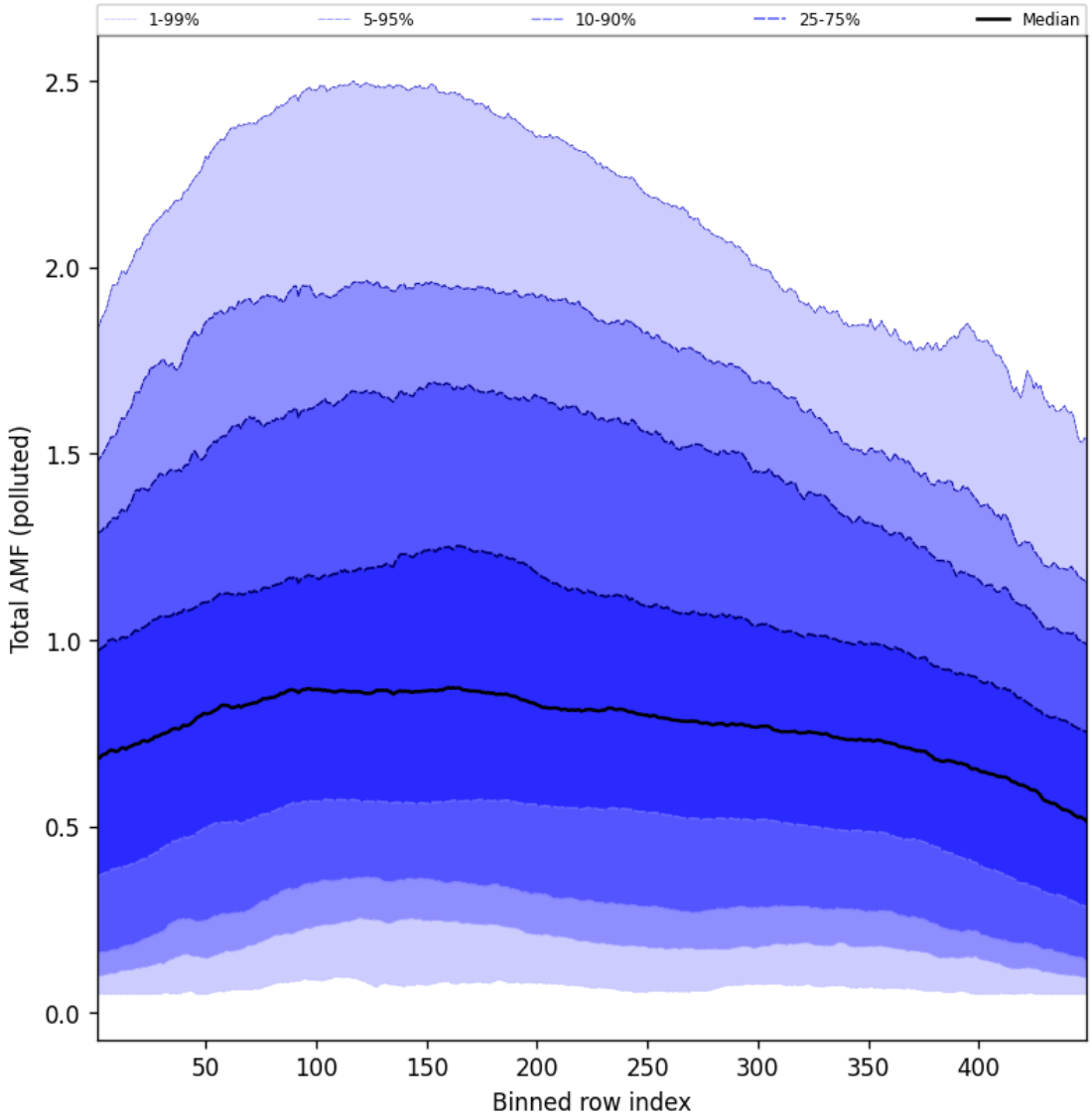

Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-02-24 to 2025-02-25

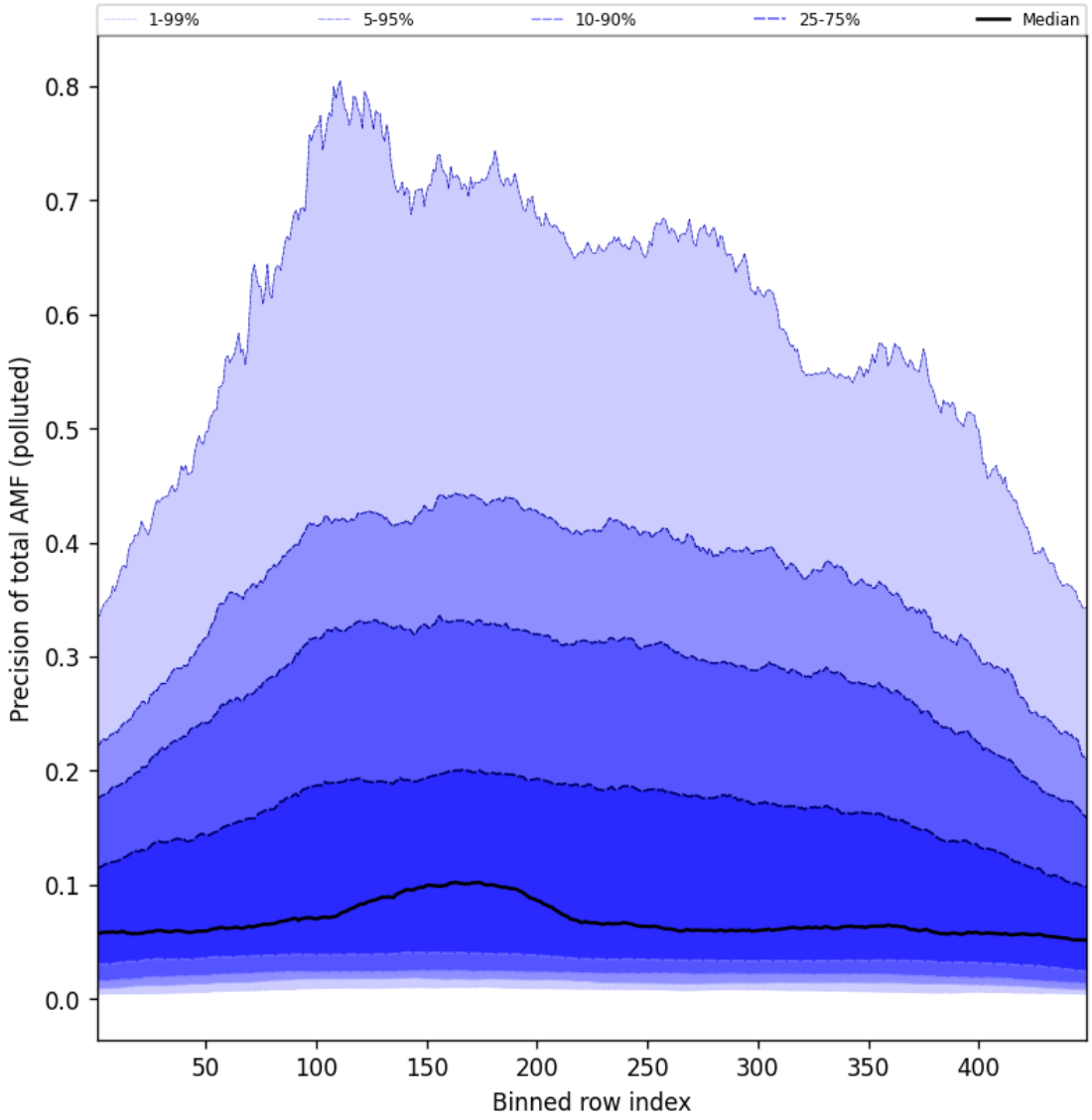

Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-02-24 to 2025-02-25

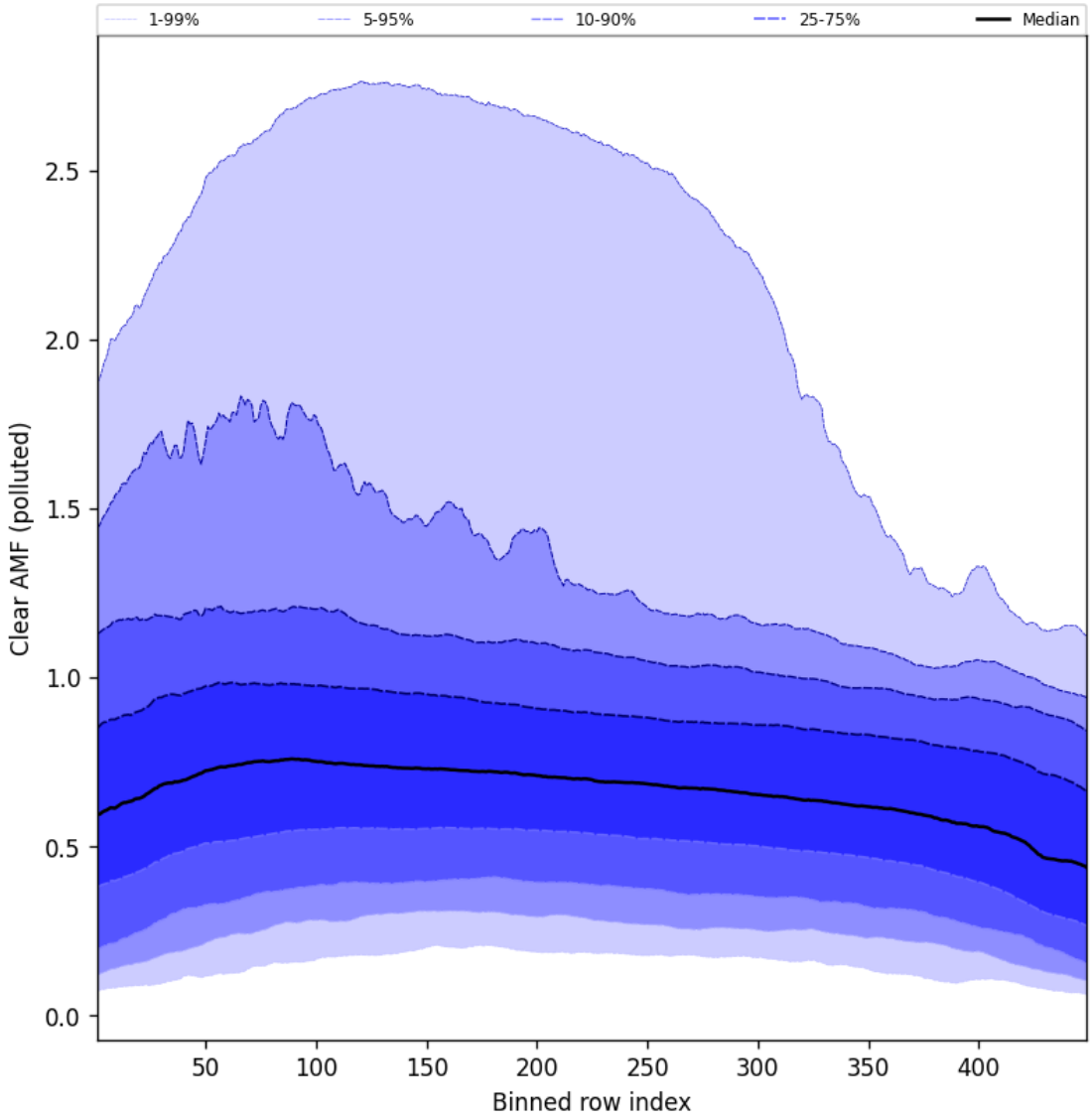

Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-02-24 to 2025-02-25

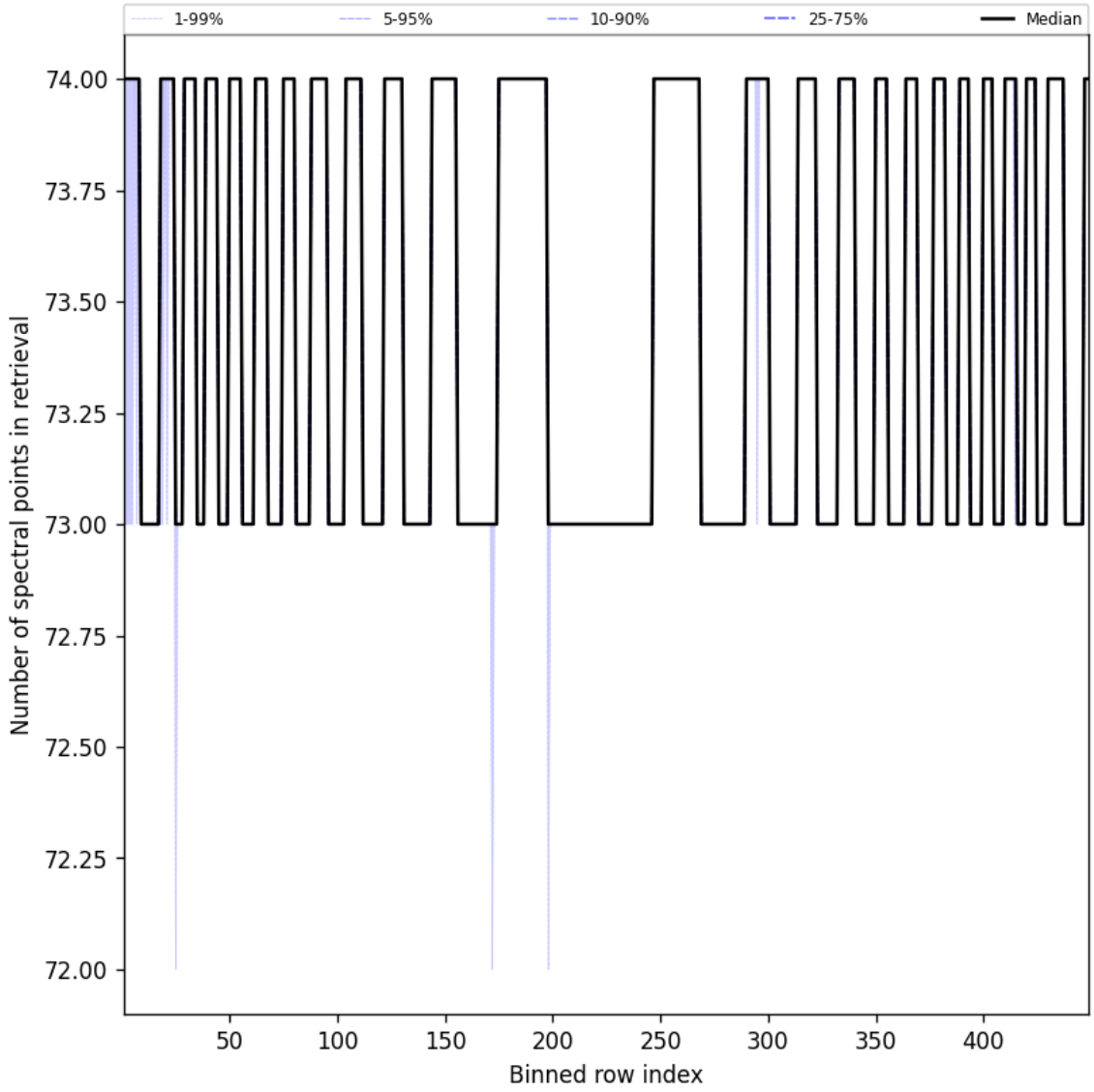

Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-02-24 to 2025-02-25

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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