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:

$$\bar{x} = \frac{1}{N}\sum_{i=1}^{N} x_i \tag{1}$$

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 $\sigma(x) = \sqrt{V(x)}$.

$$V(x) = \frac{1}{N-1}\sum_{i=1}^{N}(x_i - \bar{x})^2 \tag{2}$$

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]	0.666 ± 0.403	17310922	0.995	0.770	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(4.110 \pm 139.570) \times 10^{-2}$	17310922	0.263	0.468	1.115×10^{-2}	-145	601
sulfurdioxide total vertical column precision [DU]	0.618 ± 1.025	17310922	0.222	0.395	0.331	4.812×10^{-2}	268
sulfurdioxide slant column density corrected [DU]	$(1.906 \pm 37.743) \times 10^{-2}$	17310922	0.250	0.356	9.303×10^{-3}	-18.3	395
sulfurdioxide slant column density cobra [DU]	$(1.889 \pm 35.675) \times 10^{-2}$	17310922	0.250	0.356	9.303×10^{-3}	-18.3	45.1
sulfurdioxide slant column density cobra precision [DU]	0.289 ± 0.136	17310922	0.188	0.142	0.247	8.352×10^{-2}	28.4
sulfurdioxide slant column density window1 [DU]	0.197 ± 0.685	17310922	0.225	0.734	0.209	-97.0	62.3
sulfurdioxide slant column density window1 precision [DU]	0.289 ± 0.136	17310922	0.188	0.142	0.247	8.352×10^{-2}	28.4
sulfurdioxide slant column density corrected win1 [DU]	$(4.940 \pm 67.140) \times 10^{-2}$	17310922	2.500×10^{-2}	0.713	2.951×10^{-2}	-97.0	62.5
background so2 slant column offset window1 [DU]	-0.147 ± 0.186	17310922	-0.300	0.211	-0.181	-1.26	8.01
sulfurdioxide slant column density window2 [DU]	1.76 ± 9.04	17310922	0.750	11.5	1.53	-1.220×10^{3}	695
sulfurdioxide slant column density window2 precision [DU]	8.05 ± 2.14	17310922	7.43	2.49	7.74	2.11	507
sulfurdioxide slant column density corrected win2 [DU]	0.267 ± 8.761	17310922	0.250	11.1	0.282	-1.224×10^{3}	696
background so2 slant column offset window2 [DU]	-1.49 ± 2.81	17310922	0.750	3.55	-0.494	-19.8	5.71
sulfurdioxide slant column density window3 [DU]	-12.8 ± 24.2	17310922	-12.9	30.7	-12.9	-3.022×10^{3}	3.784×10^{3}
sulfurdioxide slant column density window3 precision [DU]	27.7 ± 12.8	17310922	22.5	9.14	24.3	9.49	1.707×10^{3}
sulfurdioxide slant column density corrected win3 [DU]	-7.28 ± 23.20	17310922	-8.40	29.4	-7.28	-3.007×10^{3}	3.784×10^{3}
background so2 slant column offset window3 [DU]	5.55 ± 7.49	17310922	0.560	12.1	4.90	-18.8	32.3
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.21	17310922	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(3.895 \pm 10.588) \times 10^{-2}$	17310922	1.800×10^{-2}	2.066×10^{-2}	1.765×10^{-2}	2.743×10^{-4}	3.36
fitted radiance shift [nm]	$(-4.546 \pm 25.198) \times 10^{-4}$	17310922	-5.000×10^{-4}	1.781×10^{-3}	-4.526×10^{-4}	-6.589×10^{-2}	4.285×10^{-2}
fitted radiance squeeze [1]	$(-2.143 \pm 18.778) \times 10^{-5}$	17310922	-1.000×10^{-5}	2.056×10^{-4}	-1.605×10^{-5}	-1.663×10^{-2}	1.293×10^{-2}
fitted root mean square [1]	$(1.270 \pm 0.559) \times 10^{-3}$	17310922	9.250×10^{-4}	5.691×10^{-4}	1.104×10^{-3}	3.118×10^{-4}	6.075×10^{-2}
sulfurdioxide total air mass factor polluted [1]	0.816 ± 0.450	17310922	0.700	0.556	0.748	5.000×10^{-2}	2.91
sulfurdioxide total air mass factor polluted precision [1]	0.116 ± 0.134	17310922	3.500×10^{-2}	0.118	6.351×10^{-2}	2.572×10^{-3}	1.90
sulfurdioxide clear air mass factor polluted [1]	0.707 ± 0.355	17310922	0.500	0.391	0.664	4.464×10^{-2}	2.97
number of spectral points in retrieval [1]	73.4 ± 0.5	17310922	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	6.000×10^{-2}	0.120	0.230	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	−3.04	−1.01	−0.582	−0.379	−0.219	0.249	0.425	0.653	1.15	3.60
sulfurdioxide total vertical column precision [DU]	9.773×10^{-2}	0.133	0.159	0.184	0.217	0.612	0.864	1.21	1.91	5.12
sulfurdioxide slant column density corrected [DU]	−0.847	−0.485	−0.349	−0.260	−0.167	0.190	0.288	0.387	0.543	1.02
sulfurdioxide slant column density cobra [DU]	−0.847	−0.485	−0.349	−0.260	−0.167	0.190	0.288	0.387	0.543	1.02
sulfurdioxide slant column density cobra precision [DU]	0.137	0.162	0.175	0.186	0.200	0.341	0.393	0.445	0.537	0.784
sulfurdioxide slant column density window1 [DU]	−1.69	−0.865	−0.561	−0.365	−0.163	0.570	0.759	0.941	1.22	1.98
sulfurdioxide slant column density window1 precision [DU]	0.137	0.162	0.175	0.186	0.200	0.341	0.393	0.445	0.537	0.784
sulfurdioxide slant column density corrected win1 [DU]	−1.63	−0.931	−0.674	−0.503	−0.321	0.392	0.591	0.788	1.10	1.97
background so2 slant column offset window1 [DU]	−0.498	−0.347	−0.316	−0.296	−0.273	-6.250×10^{-2}	1.387×10^{-2}	8.824×10^{-2}	0.189	0.416
sulfurdioxide slant column density window2 [DU]	−19.2	−12.5	−9.27	−6.84	−4.10	7.36	10.4	13.1	16.9	24.8
sulfurdioxide slant column density window2 precision [DU]	4.32	5.22	5.74	6.15	6.63	9.13	9.95	10.8	11.9	14.5
sulfurdioxide slant column density corrected win2 [DU]	−21.1	−14.0	−10.6	−8.07	−5.28	5.83	8.59	11.1	14.5	21.6
background so2 slant column offset window2 [DU]	−9.55	−7.39	−5.88	−4.53	−3.00	0.550	0.793	1.01	1.37	2.85
sulfurdioxide slant column density window3 [DU]	−72.1	−52.3	−42.8	−35.8	−28.2	2.55	10.4	17.5	26.9	45.4
sulfurdioxide slant column density window3 precision [DU]	13.5	16.3	18.0	19.3	20.8	29.9	34.4	40.1	51.5	82.5
sulfurdioxide slant column density corrected win3 [DU]	−65.0	−45.3	−36.0	−29.2	−21.9	7.49	14.9	21.6	30.6	48.5
background so2 slant column offset window3 [DU]	−8.35	−5.26	−3.92	−2.53	−0.525	11.6	13.9	15.7	17.8	21.7
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]	1.224×10^{-3}	3.446×10^{-3}	5.703×10^{-3}	7.700×10^{-3}	1.046×10^{-2}	3.112×10^{-2}	4.510×10^{-2}	6.219×10^{-2}	0.124	0.436
fitted radiance shift [nm]	-8.030×10^{-3}	-4.179×10^{-3}	-2.830×10^{-3}	-2.057×10^{-3}	-1.385×10^{-3}	3.957×10^{-4}	1.080×10^{-3}	1.935×10^{-3}	3.409×10^{-3}	7.463×10^{-3}
fitted radiance squeeze [1]	-5.534×10^{-4}	-3.219×10^{-4}	-2.345×10^{-4}	-1.780×10^{-4}	-1.207×10^{-4}	8.491×10^{-5}	1.374×10^{-4}	1.875×10^{-4}	2.626×10^{-4}	4.526×10^{-4}
fitted root mean square [1]	5.843×10^{-4}	7.162×10^{-4}	7.883×10^{-4}	8.433×10^{-4}	9.113×10^{-4}	1.480×10^{-3}	1.709×10^{-3}	1.936×10^{-3}	2.319×10^{-3}	3.312×10^{-3}
sulfurdioxide total air mass factor polluted [1]	7.151×10^{-2}	0.195	0.298	0.385	0.494	1.05	1.26	1.45	1.70	2.12
sulfurdioxide total air mass factor polluted precision [1]	8.667×10^{-3}	1.597×10^{-2}	2.173×10^{-2}	2.690×10^{-2}	3.445×10^{-2}	0.153	0.209	0.268	0.367	0.664
sulfurdioxide clear air mass factor polluted [1]	0.160	0.260	0.336	0.400	0.478	0.869	0.968	1.06	1.24	2.25
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]	0.677 ± 0.398	8050681	0.750	1.000	0.0	1.000	0.250	1.000
sulfurdioxide total vertical column [DU]	$(6.709 \pm 189.314) \times 10^{-2}$	8050681	0.594	1.458×10^{-2}	-145	601	-0.273	0.321
sulfurdioxide total vertical column precision [DU]	0.848 ± 1.358	8050681	0.626	0.440	5.263×10^{-2}	55.3	0.252	0.878
sulfurdioxide slant column density corrected [DU]	$(2.579 \pm 42.171) \times 10^{-2}$	8050681	0.388	1.089×10^{-2}	-12.5	66.6	-0.180	0.208
sulfurdioxide slant column density cobra [DU]	$(2.551 \pm 40.885) \times 10^{-2}$	8050681	0.388	1.089×10^{-2}	-12.5	28.5	-0.180	0.208
sulfurdioxide slant column density cobra precision [DU]	0.319 ± 0.159	8050681	0.170	0.275	8.352×10^{-2}	12.2	0.210	0.381
sulfurdioxide slant column density window1 [DU]	0.235 ± 0.766	8050681	0.789	0.247	-13.4	32.9	-0.150	0.638
sulfurdioxide slant column density window1 precision [DU]	0.319 ± 0.159	8050681	0.170	0.275	8.352×10^{-2}	12.2	0.210	0.381
sulfurdioxide slant column density corrected win1 [DU]	$(7.552 \pm 75.627) \times 10^{-2}$	8050681	0.775	4.823×10^{-2}	-12.5	32.9	-0.330	0.445
background so2 slant column offset window1 [DU]	-0.159 ± 0.199	8050681	0.204	-0.199	-1.26	8.01	-0.284	-7.994×10^{-2}
sulfurdioxide slant column density window2 [DU]	2.45 ± 9.43	8050681	12.0	2.13	-307	105	-3.74	8.30
sulfurdioxide slant column density window2 precision [DU]	8.30 ± 2.14	8050681	2.60	7.99	2.32	223	6.83	9.44
sulfurdioxide slant column density corrected win2 [DU]	$(4.285 \pm 904.356) \times 10^{-2}$	8050681	11.5	7.955×10^{-2}	-315	96.5	-5.69	5.81
background so2 slant column offset window2 [DU]	-2.41 ± 3.39	8050681	5.68	-1.24	-19.8	5.64	-5.21	0.466
sulfurdioxide slant column density window3 [DU]	-15.8 ± 24.1	8050681	30.8	-15.7	-3.022×10^{3}	165	-31.1	-0.289
sulfurdioxide slant column density window3 precision [DU]	27.9 ± 12.2	8050681	8.98	24.8	9.87	1.707×10^{3}	21.3	30.3
sulfurdioxide slant column density corrected win3 [DU]	-7.30 ± 23.38	8050681	29.6	-7.17	-3.007×10^{3}	163	-22.0	7.64
background so2 slant column offset window3 [DU]	8.52 ± 7.05	8050681	12.1	8.50	-12.7	32.3	2.22	14.3
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.22	8050681	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(6.046 \pm 15.045) \times 10^{-2}$	8050681	3.826×10^{-2}	2.049×10^{-2}	2.743×10^{-4}	3.36	1.103×10^{-2}	4.929×10^{-2}
fitted radiance shift [nm]	$(-2.740 \pm 24.337) \times 10^{-4}$	8050681	1.664×10^{-3}	-2.964×10^{-4}	-3.604×10^{-2}	3.735×10^{-2}	-1.129×10^{-3}	5.350×10^{-4}
fitted radiance squeeze [1]	$(-3.583 \pm 213.140) \times 10^{-6}$	8050681	2.232×10^{-4}	1.947×10^{-6}	-2.848×10^{-3}	2.074×10^{-3}	-1.103×10^{-4}	1.128×10^{-4}
fitted root mean square [1]	$(1.388 \pm 0.655) \times 10^{-3}$	8050681	6.830×10^{-4}	1.192×10^{-3}	3.118×10^{-4}	1.585×10^{-2}	9.534×10^{-4}	1.636×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.704 ± 0.409	8050681	0.519	0.640	5.000×10^{-2}	2.67	0.403	0.922
sulfurdioxide total air mass factor polluted precision [1]	0.103 ± 0.144	8050681	9.265×10^{-2}	4.828×10^{-2}	2.572×10^{-3}	1.90	2.700×10^{-2}	0.120
sulfurdioxide clear air mass factor polluted [1]	0.600 ± 0.277	8050681	0.423	0.567	4.464×10^{-2}	2.33	0.381	0.804
number of spectral points in retrieval [1]	73.4 ± 0.5	8050681	1.000	73.0	53.0	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]	0.657 ± 0.407	9260241	0.780	1.000	0.0	1.000	0.220	1.000
sulfurdioxide total vertical column [DU]	$(1.851 \pm 72.428) \times 10^{-2}$	9260241	0.392	8.999×10^{-3}	-49.5	274	-0.186	0.207
sulfurdioxide total vertical column precision [DU]	0.418 ± 0.522	9260241	0.261	0.279	4.812×10^{-2}	268	0.198	0.459
sulfurdioxide slant column density corrected [DU]	$(1.322 \pm 33.409) \times 10^{-2}$	9260241	0.333	8.119×10^{-3}	-18.3	395	-0.157	0.176
sulfurdioxide slant column density cobra [DU]	$(1.314 \pm 30.417) \times 10^{-2}$	9260241	0.333	8.119×10^{-3}	-18.3	45.1	-0.157	0.176
sulfurdioxide slant column density cobra precision [DU]	0.263 ± 0.105	9260241	0.115	0.230	8.660×10^{-2}	28.4	0.193	0.309
sulfurdioxide slant column density window1 [DU]	0.164 ± 0.604	9260241	0.689	0.179	-97.0	62.3	-0.173	0.516
sulfurdioxide slant column density window1 precision [DU]	0.263 ± 0.105	9260241	0.115	0.230	8.660×10^{-2}	28.4	0.193	0.309
sulfurdioxide slant column density corrected win1 [DU]	$(2.668 \pm 58.679) \times 10^{-2}$	9260241	0.665	1.531×10^{-2}	-97.0	62.5	-0.314	0.351
background so2 slant column offset window1 [DU]	-0.137 ± 0.173	9260241	0.217	-0.168	-1.06	2.79	-0.264	-4.648×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.16 ± 8.63	9260241	11.0	1.04	-1.220×10^{3}	695	-4.38	6.57
sulfurdioxide slant column density window2 precision [DU]	7.83 ± 2.12	9260241	2.36	7.54	2.11	507	6.48	8.84
sulfurdioxide slant column density corrected win2 [DU]	0.461 ± 8.502	9260241	10.8	0.446	-1.224×10^{3}	696	-4.94	5.84
background so2 slant column offset window2 [DU]	-0.696 ± 1.847	9260241	2.38	-0.144	-9.81	5.71	-1.78	0.595
sulfurdioxide slant column density window3 [DU]	-10.3 ± 23.9	9260241	30.3	-10.6	-431	3.784×10^{3}	-25.5	4.86
sulfurdioxide slant column density window3 precision [DU]	27.4 ± 13.2	9260241	9.20	23.9	9.49	995	20.3	29.5
sulfurdioxide slant column density corrected win3 [DU]	-7.27 ± 23.05	9260241	29.1	-7.37	-432	3.784×10^{3}	-21.8	7.35
background so2 slant column offset window3 [DU]	2.98 ± 6.88	9260241	11.7	1.87	-18.8	27.0	-2.85	8.80
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.19	9260241	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.025 \pm 2.291) \times 10^{-2}$	9260241	1.398×10^{-2}	1.628×10^{-2}	8.554×10^{-4}	1.65	1.013×10^{-2}	2.411×10^{-2}
fitted radiance shift [nm]	$(-6.117 \pm 25.820) \times 10^{-4}$	9260241	1.844×10^{-3}	-6.016×10^{-4}	-6.589×10^{-2}	4.285×10^{-2}	-1.589×10^{-3}	2.549×10^{-4}
fitted radiance squeeze [1]	$(-3.694 \pm 16.095) \times 10^{-5}$	9260241	1.911×10^{-4}	-2.958×10^{-5}	-1.663×10^{-2}	1.293×10^{-2}	-1.281×10^{-4}	6.305×10^{-5}
fitted root mean square [1]	$(1.167 \pm 0.433) \times 10^{-3}$	9260241	4.697×10^{-4}	1.047×10^{-3}	3.167×10^{-4}	6.075×10^{-2}	8.834×10^{-4}	1.353×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.915 ± 0.461	9260241	0.570	0.836	5.000×10^{-2}	2.91	0.597	1.17
sulfurdioxide total air mass factor polluted precision [1]	0.128 ± 0.124	9260241	0.136	8.337×10^{-2}	5.548×10^{-3}	1.55	4.118×10^{-2}	0.177
sulfurdioxide clear air mass factor polluted [1]	0.800 ± 0.389	9260241	0.368	0.719	0.126	2.97	0.557	0.926
number of spectral points in retrieval [1]	73.4 ± 0.5	9260241	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]	0.695 ± 0.396	12496526	0.720	1.000	0.0	1.000	0.280	1.000
sulfurdioxide total vertical column [DU]	$(2.985 \pm 114.542) \times 10^{-2}$	12496526	0.437	9.597×10^{-3}	-145	274	-0.206	0.231
sulfurdioxide total vertical column precision [DU]	0.530 ± 0.818	12496526	0.325	0.303	5.218×10^{-2}	55.3	0.213	0.538
sulfurdioxide slant column density corrected [DU]	$(1.569 \pm 35.867) \times 10^{-2}$	12496526	0.341	8.047×10^{-3}	-12.5	395	-0.161	0.180
sulfurdioxide slant column density cobra [DU]	$(1.554 \pm 33.342) \times 10^{-2}$	12496526	0.341	8.047×10^{-3}	-12.5	30.0	-0.161	0.180
sulfurdioxide slant column density cobra precision [DU]	0.276 ± 0.128	12496526	0.129	0.234	8.352×10^{-2}	19.3	0.195	0.324
sulfurdioxide slant column density window1 [DU]	0.187 ± 0.648	12496526	0.703	0.201	-87.4	62.3	-0.156	0.546
sulfurdioxide slant column density window1 precision [DU]	0.276 ± 0.128	12496526	0.129	0.234	8.352×10^{-2}	19.3	0.195	0.324
sulfurdioxide slant column density corrected win1 [DU]	$(3.534 \pm 63.405) \times 10^{-2}$	12496526	0.683	2.027×10^{-2}	-87.4	62.5	-0.317	0.366
background so2 slant column offset window1 [DU]	-0.152 ± 0.177	12496526	0.206	-0.181	-1.26	8.01	-0.273	-6.750×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.41 ± 8.80	12496526	11.1	1.20	-1.220×10^{3}	475	-4.28	6.85
sulfurdioxide slant column density window2 precision [DU]	7.90 ± 2.07	12496526	2.42	7.59	2.11	451	6.52	8.94
sulfurdioxide slant column density corrected win2 [DU]	0.324 ± 8.573	12496526	10.9	0.323	-1.224×10^{3}	476	-5.13	5.77
background so2 slant column offset window2 [DU]	-1.09 ± 2.42	12496526	2.84	-0.312	-19.7	5.71	-2.25	0.582
sulfurdioxide slant column density window3 [DU]	-10.0 ± 23.9	12496526	30.5	-10.2	-3.022×10^{3}	165	-25.2	5.23
sulfurdioxide slant column density window3 precision [DU]	27.2 ± 12.3	12496526	8.88	23.9	9.49	1.707×10^{3}	20.5	29.4
sulfurdioxide slant column density corrected win3 [DU]	-5.20 ± 22.67	12496526	28.9	-5.45	-3.007×10^{3}	163	-19.7	9.24
background so2 slant column offset window3 [DU]	4.82 ± 7.08	12496526	11.1	4.10	-18.8	31.5	-0.795	10.3
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.17	12496526	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.592 \pm 4.523) \times 10^{-2}$	12496526	1.527×10^{-2}	1.702×10^{-2}	2.897×10^{-4}	2.05	1.104×10^{-2}	2.631×10^{-2}
fitted radiance shift [nm]	$(-4.526 \pm 24.258) \times 10^{-4}$	12496526	1.785×10^{-3}	-4.299×10^{-4}	-4.519×10^{-2}	4.285×10^{-2}	-1.383×10^{-3}	4.015×10^{-4}
fitted radiance squeeze [1]	$(-2.794 \pm 17.473) \times 10^{-5}$	12496526	1.955×10^{-4}	-1.988×10^{-5}	-1.663×10^{-2}	1.293×10^{-2}	-1.203×10^{-4}	7.525×10^{-5}
fitted root mean square [1]	$(1.215 \pm 0.527) \times 10^{-3}$	12496526	5.098×10^{-4}	1.056×10^{-3}	3.118×10^{-4}	6.075×10^{-2}	8.877×10^{-4}	1.397×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.827 ± 0.407	12496526	0.511	0.784	5.000×10^{-2}	2.52	0.538	1.05
sulfurdioxide total air mass factor polluted precision [1]	0.111 ± 0.113	12496526	0.112	6.645×10^{-2}	2.808×10^{-3}	1.55	3.791×10^{-2}	0.149
sulfurdioxide clear air mass factor polluted [1]	0.714 ± 0.274	12496526	0.358	0.694	5.051×10^{-2}	2.58	0.518	0.876
number of spectral points in retrieval [1]	73.4 ± 0.5	12496526	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]	0.621 ± 0.411	3755597	0.800	1.000	0.0	1.000	0.200	1.000
sulfurdioxide total vertical column [DU]	$(5.376 \pm 165.126) \times 10^{-2}$	3755597	0.537	1.341×10^{-2}	-96.1	601	-0.247	0.290
sulfurdioxide total vertical column precision [DU]	0.749 ± 1.221	3755597	0.536	0.396	4.812×10^{-2}	35.6	0.231	0.768
sulfurdioxide slant column density corrected [DU]	$(2.333 \pm 39.126) \times 10^{-2}$	3755597	0.387	1.136×10^{-2}	-18.3	50.4	-0.180	0.208
sulfurdioxide slant column density cobra [DU]	$(2.321 \pm 38.480) \times 10^{-2}$	3755597	0.387	1.136×10^{-2}	-18.3	28.5	-0.180	0.208
sulfurdioxide slant column density cobra precision [DU]	0.309 ± 0.137	3755597	0.142	0.277	9.046×10^{-2}	28.4	0.217	0.359
sulfurdioxide slant column density window1 [DU]	0.229 ± 0.725	3755597	0.796	0.236	-97.0	32.9	-0.166	0.630
sulfurdioxide slant column density window1 precision [DU]	0.309 ± 0.137	3755597	0.142	0.277	9.046×10^{-2}	28.4	0.217	0.359
sulfurdioxide slant column density corrected win1 [DU]	$(8.068 \pm 71.014) \times 10^{-2}$	3755597	0.770	5.438×10^{-2}	-97.0	32.9	-0.322	0.448
background so2 slant column offset window1 [DU]	-0.149 ± 0.191	3755597	0.215	-0.192	-1.06	2.79	-0.279	-6.388×10^{-2}
sulfurdioxide slant column density window2 [DU]	2.25 ± 9.41	3755597	12.0	2.09	-595	695	-3.85	8.19
sulfurdioxide slant column density window2 precision [DU]	8.39 ± 2.28	3755597	2.53	8.06	2.30	450	6.93	9.47
sulfurdioxide slant column density corrected win2 [DU]	0.145 ± 9.142	3755597	11.6	0.193	-595	696	-5.61	5.96
background so2 slant column offset window2 [DU]	-2.10 ± 3.21	3755597	5.13	-0.857	-19.8	5.71	-4.61	0.514
sulfurdioxide slant column density window3 [DU]	-20.1 ± 23.4	3755597	29.6	-19.7	-416	228	-34.7	-5.15
sulfurdioxide slant column density window3 precision [DU]	29.1 ± 14.0	3755597	9.63	25.4	9.76	325	21.5	31.1
sulfurdioxide slant column density corrected win3 [DU]	-13.5 ± 23.8	3755597	29.9	-12.9	-419	222	-28.1	1.78
background so2 slant column offset window3 [DU]	6.62 ± 8.01	3755597	13.7	6.66	-18.8	32.3	-0.233	13.5
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.26	3755597	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(7.215 \pm 18.185) \times 10^{-2}$	3755597	4.652×10^{-2}	2.296×10^{-2}	2.743×10^{-4}	3.36	8.658×10^{-3}	5.518×10^{-2}
fitted radiance shift [nm]	$(-4.662 \pm 27.967) \times 10^{-4}$	3755597	1.702×10^{-3}	-5.266×10^{-4}	-6.497×10^{-2}	4.057×10^{-2}	-1.372×10^{-3}	3.303×10^{-4}
fitted radiance squeeze [1]	$(2.964 \pm 200.039) \times 10^{-6}$	3755597	2.256×10^{-4}	-4.694×10^{-7}	-1.215×10^{-2}	1.185×10^{-2}	-1.119×10^{-4}	1.137×10^{-4}
fitted root mean square [1]	$(1.351 \pm 0.545) \times 10^{-3}$	3755597	5.810×10^{-4}	1.216×10^{-3}	3.372×10^{-4}	5.716×10^{-2}	9.909×10^{-4}	1.572×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.820 ± 0.561	3755597	0.665	0.651	5.000×10^{-2}	2.91	0.422	1.09
sulfurdioxide total air mass factor polluted precision [1]	0.130 ± 0.176	3755597	0.138	5.225×10^{-2}	2.685×10^{-3}	1.90	2.689×10^{-2}	0.165
sulfurdioxide clear air mass factor polluted [1]	0.729 ± 0.541	3755597	0.464	0.585	4.670×10^{-2}	2.97	0.389	0.853
number of spectral points in retrieval [1]	73.4 ± 0.5	3755597	1.000	73.0	53.0	74.0	73.0	74.0

3 Granule outlines

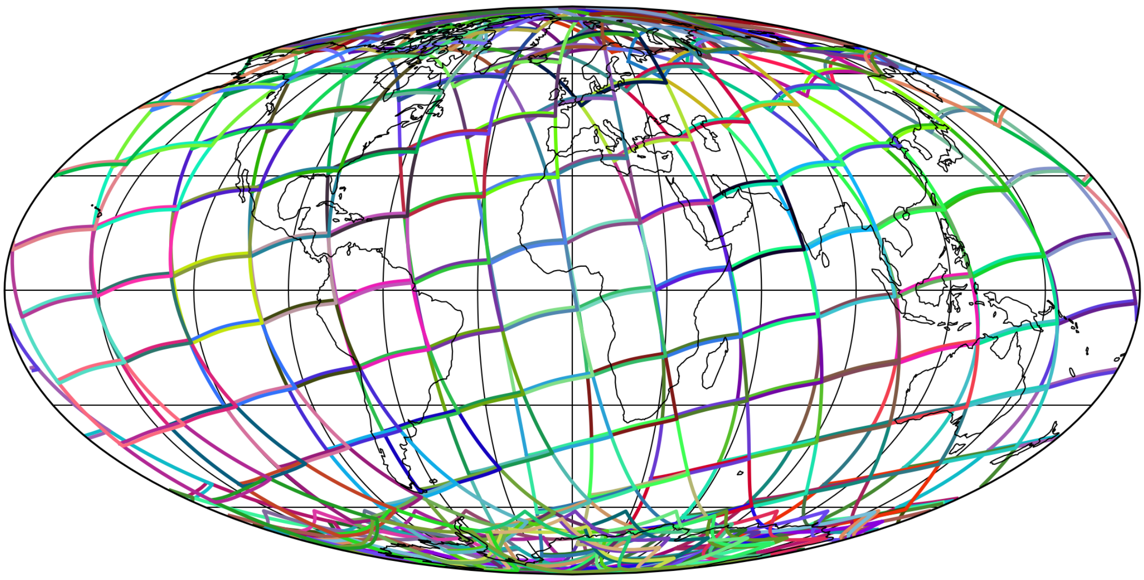


Figure 1: Outline of the granules.

4 Input data monitoring

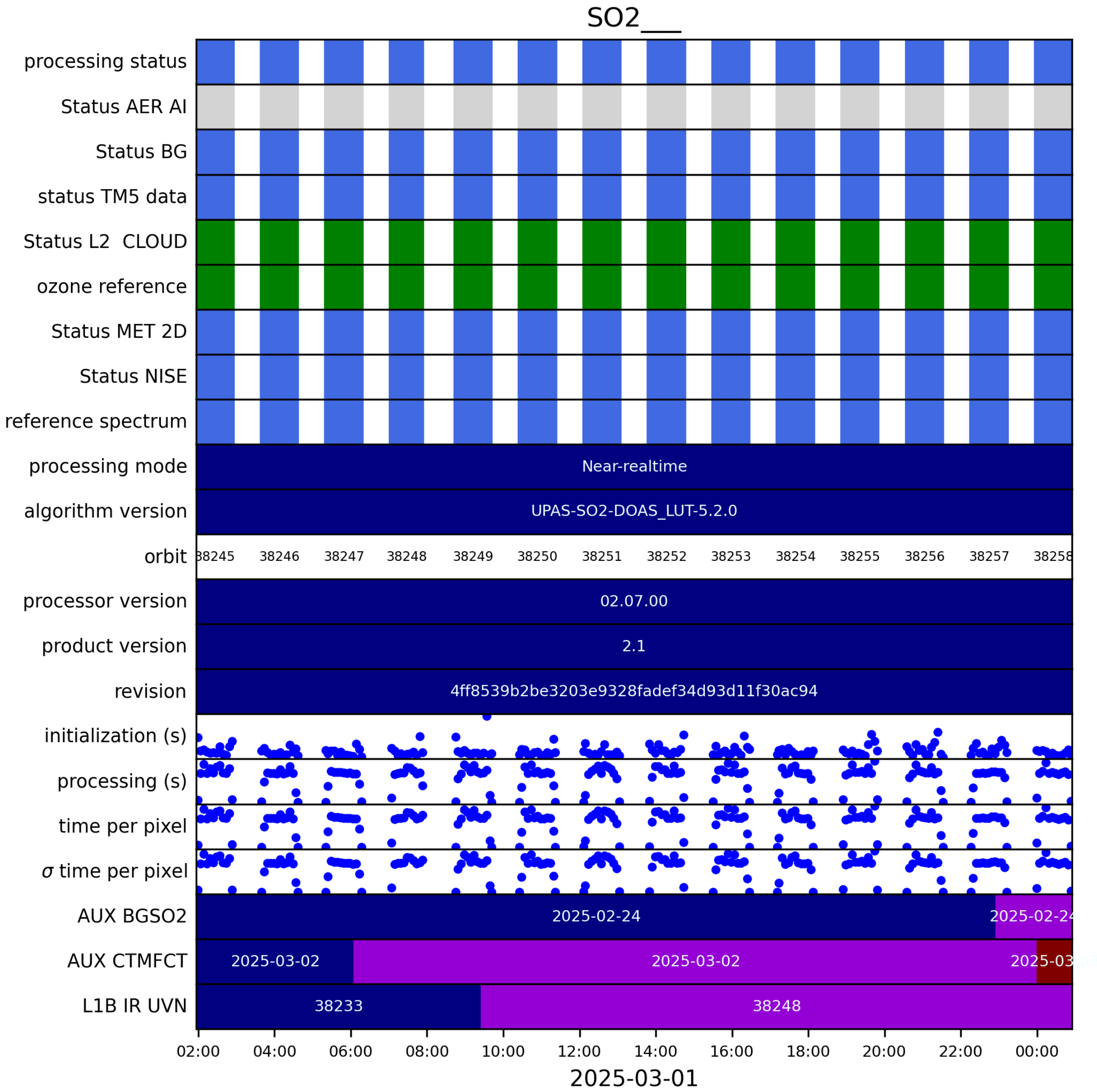


Figure 2: Input data per granule

5 Warnings and errors

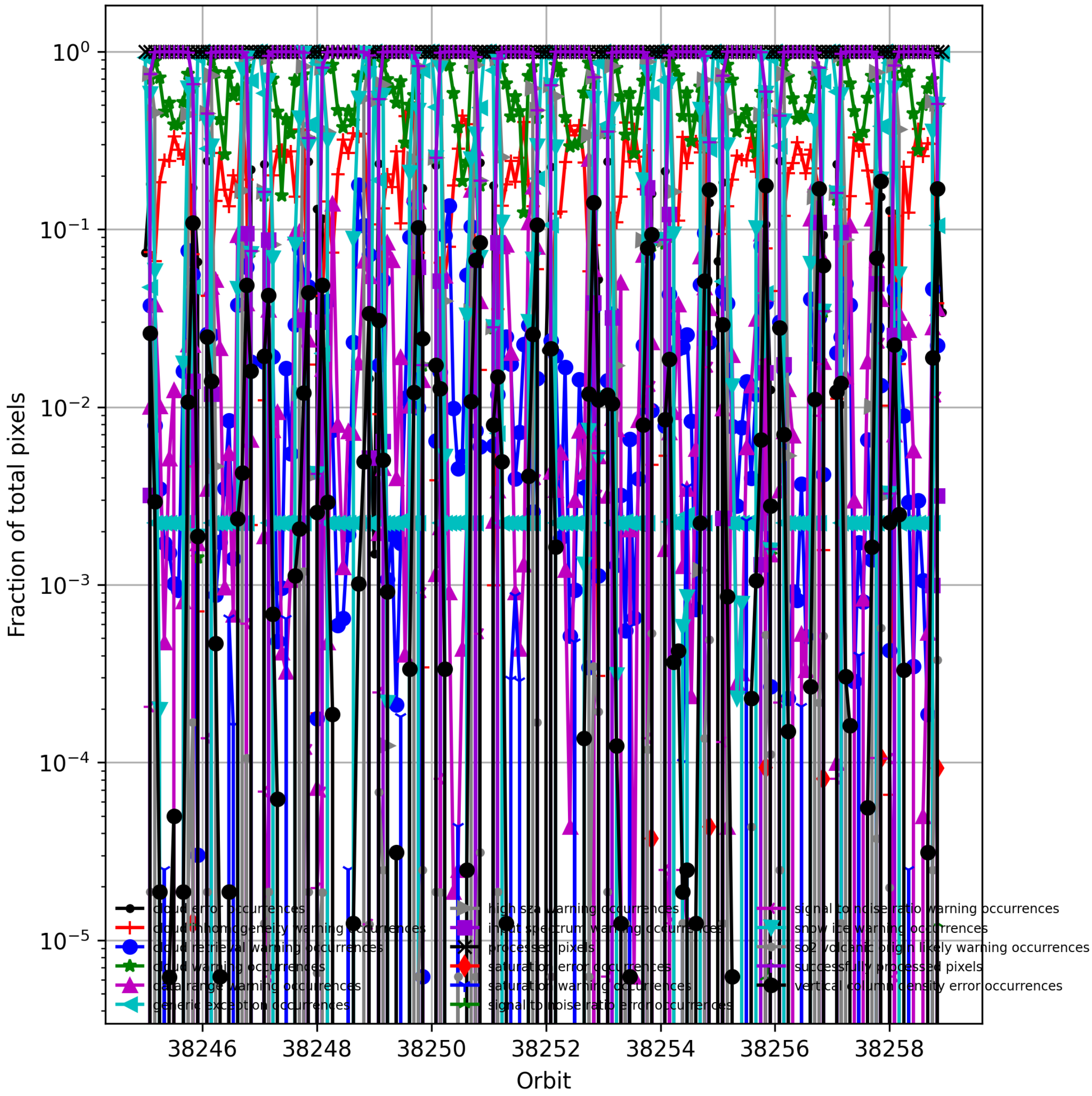


Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

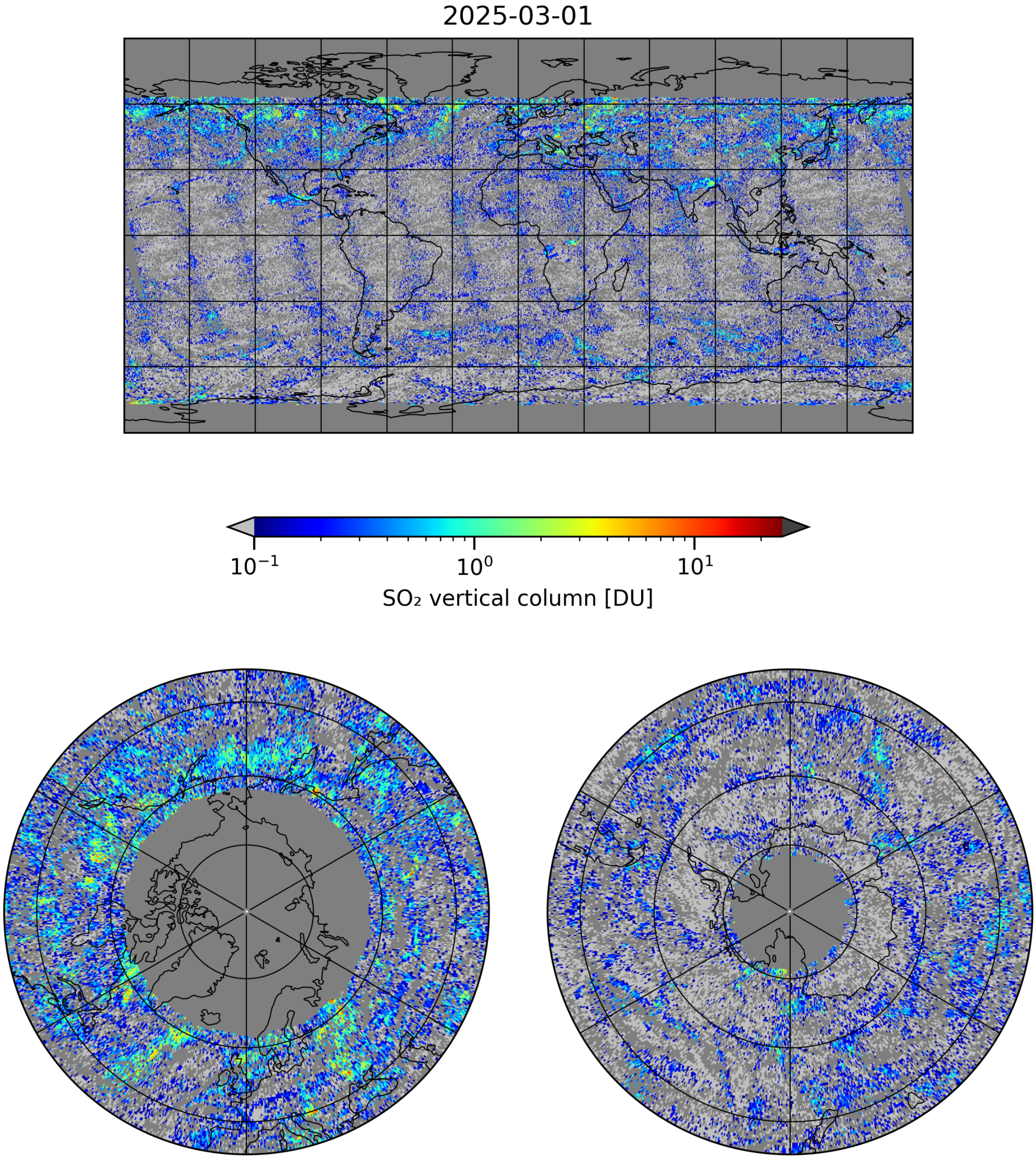


Figure 4: Map of "SO_2 vertical column" for 2025-03-01 to 2025-03-02

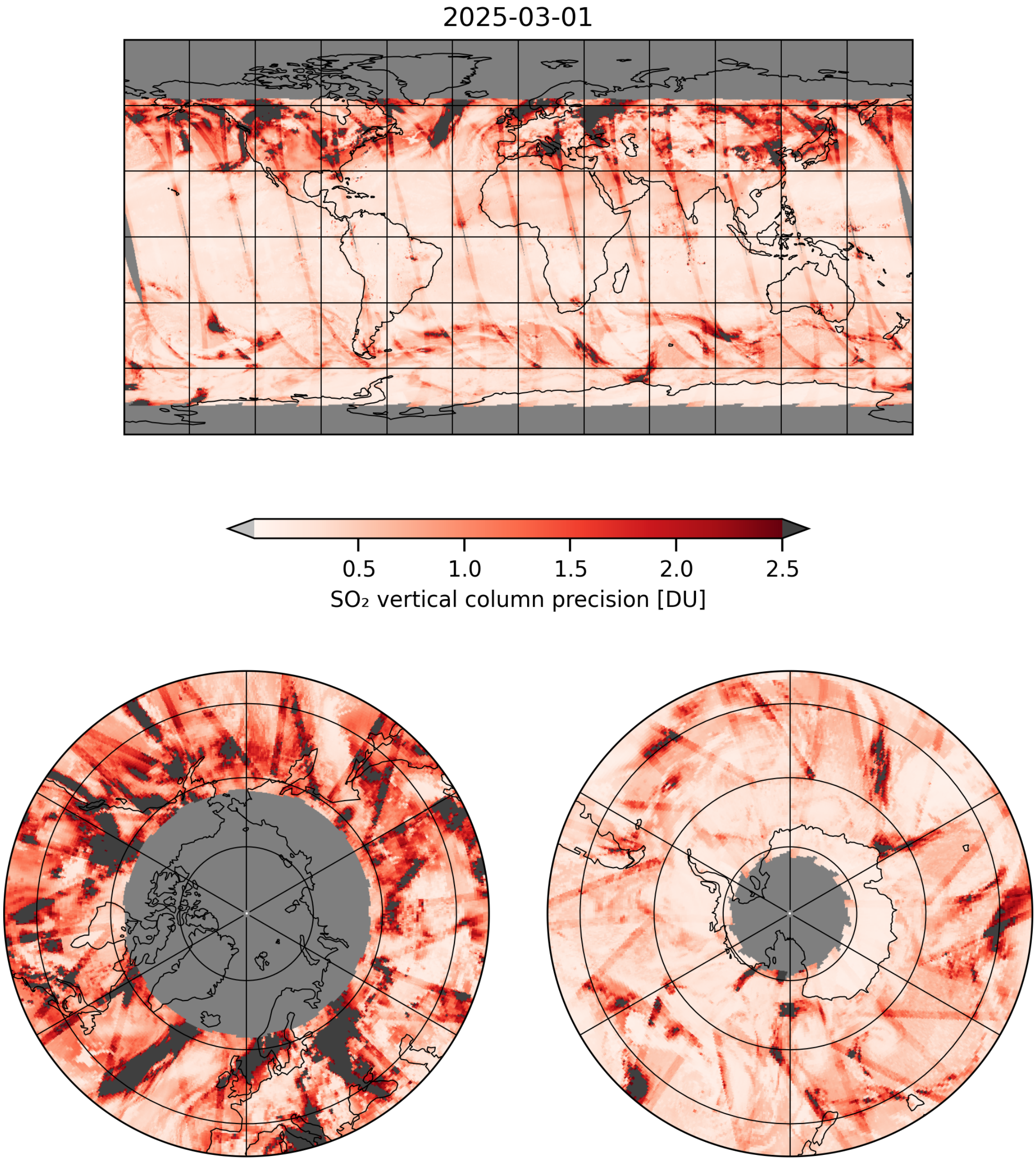


Figure 5: Map of “SO_2 vertical column precision” for 2025-03-01 to 2025-03-02

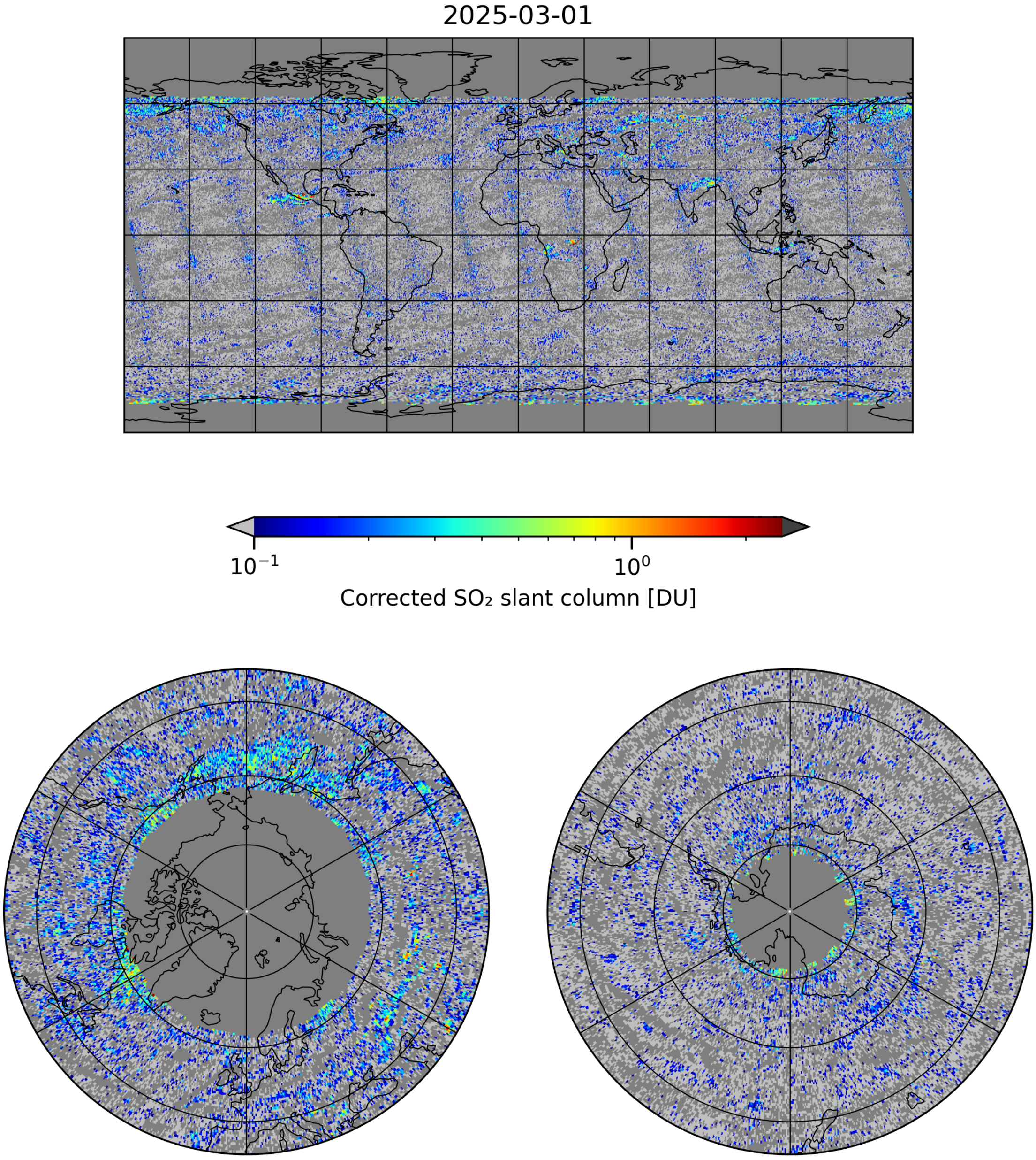


Figure 6: Map of "Corrected SO_2 slant column" for 2025-03-01 to 2025-03-02

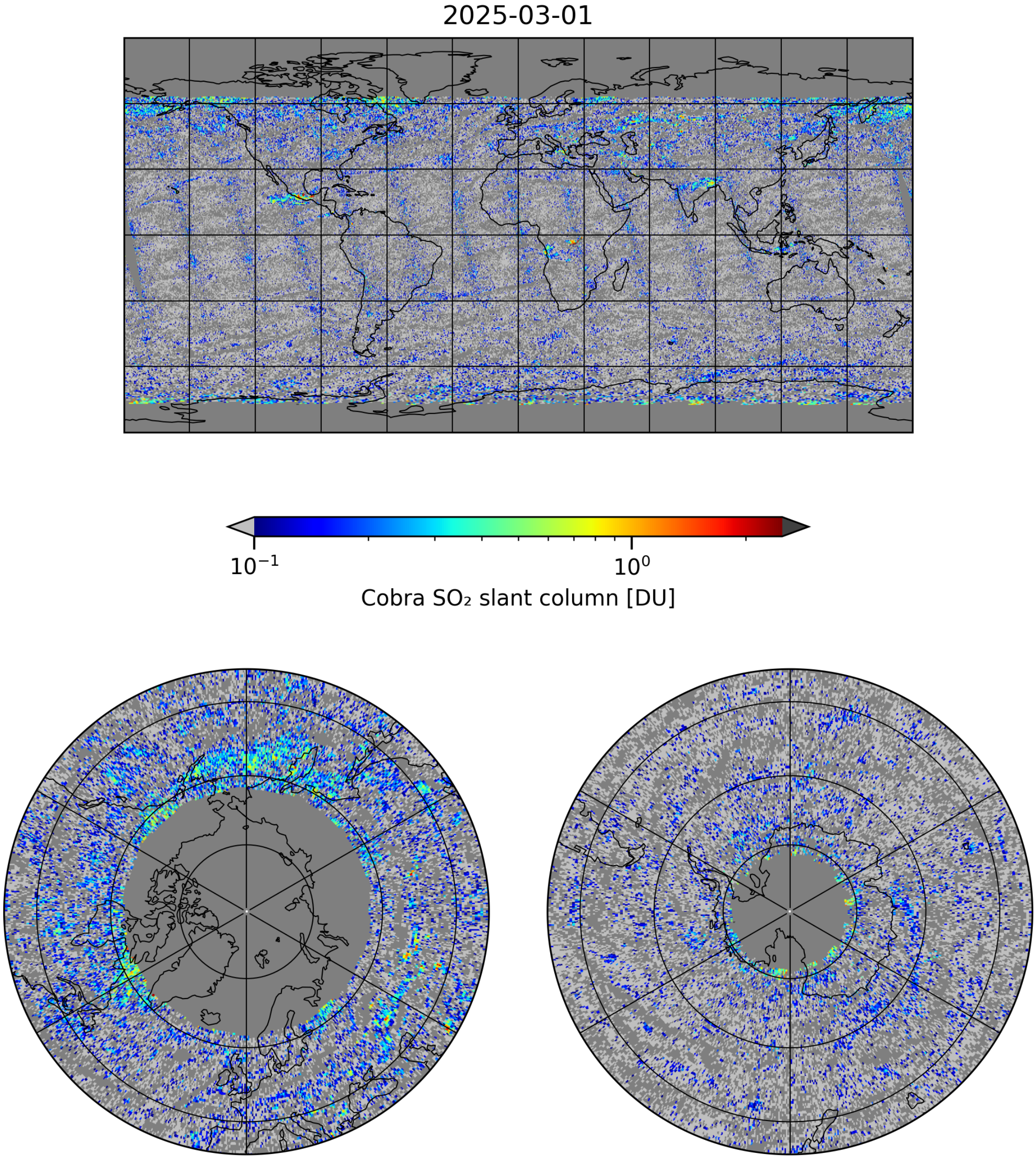


Figure 7: Map of “Cobra SO_2 slant column” for 2025-03-01 to 2025-03-02

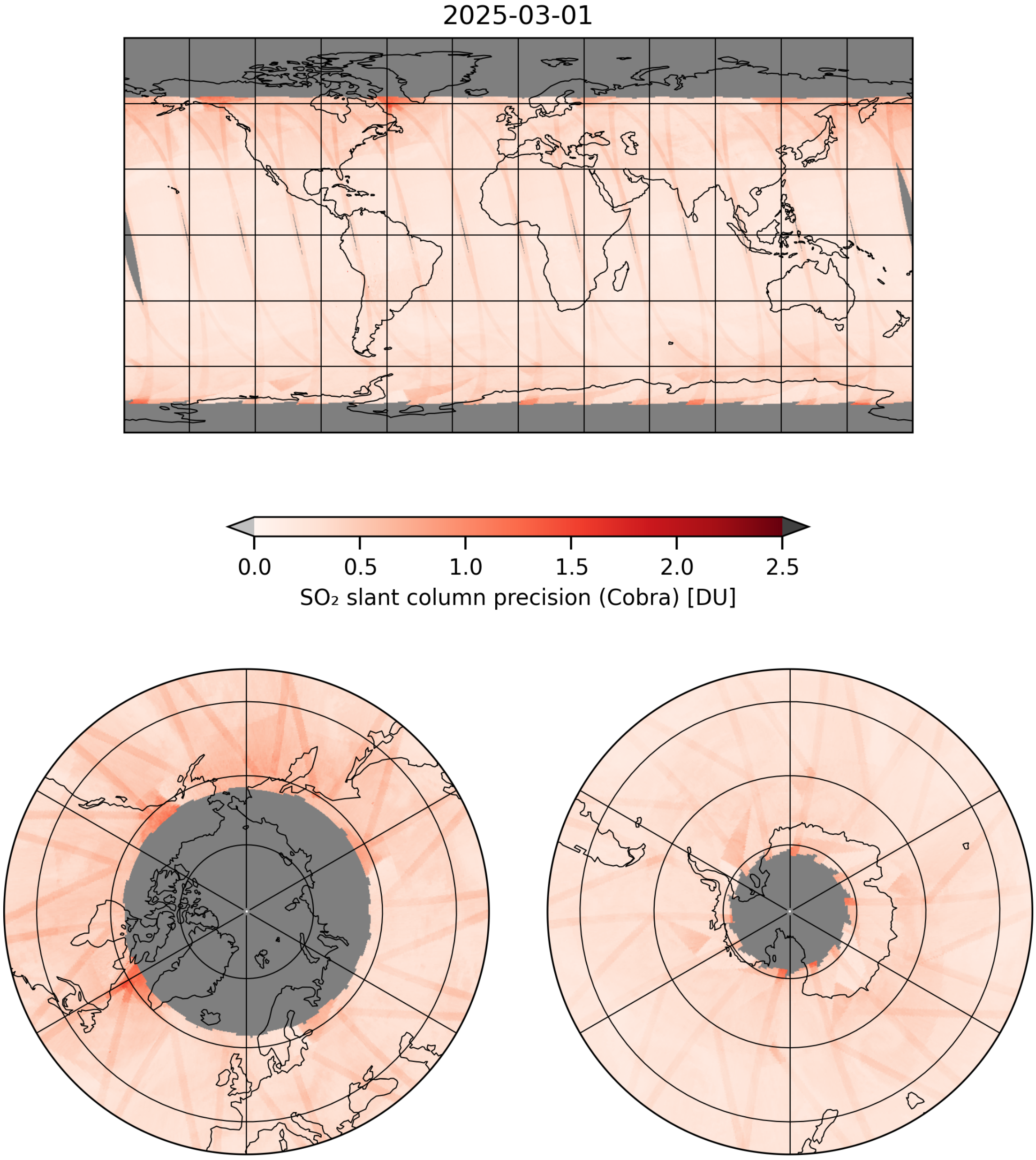


Figure 8: Map of “SO_2 slant column precision (Cobra)” for 2025-03-01 to 2025-03-02

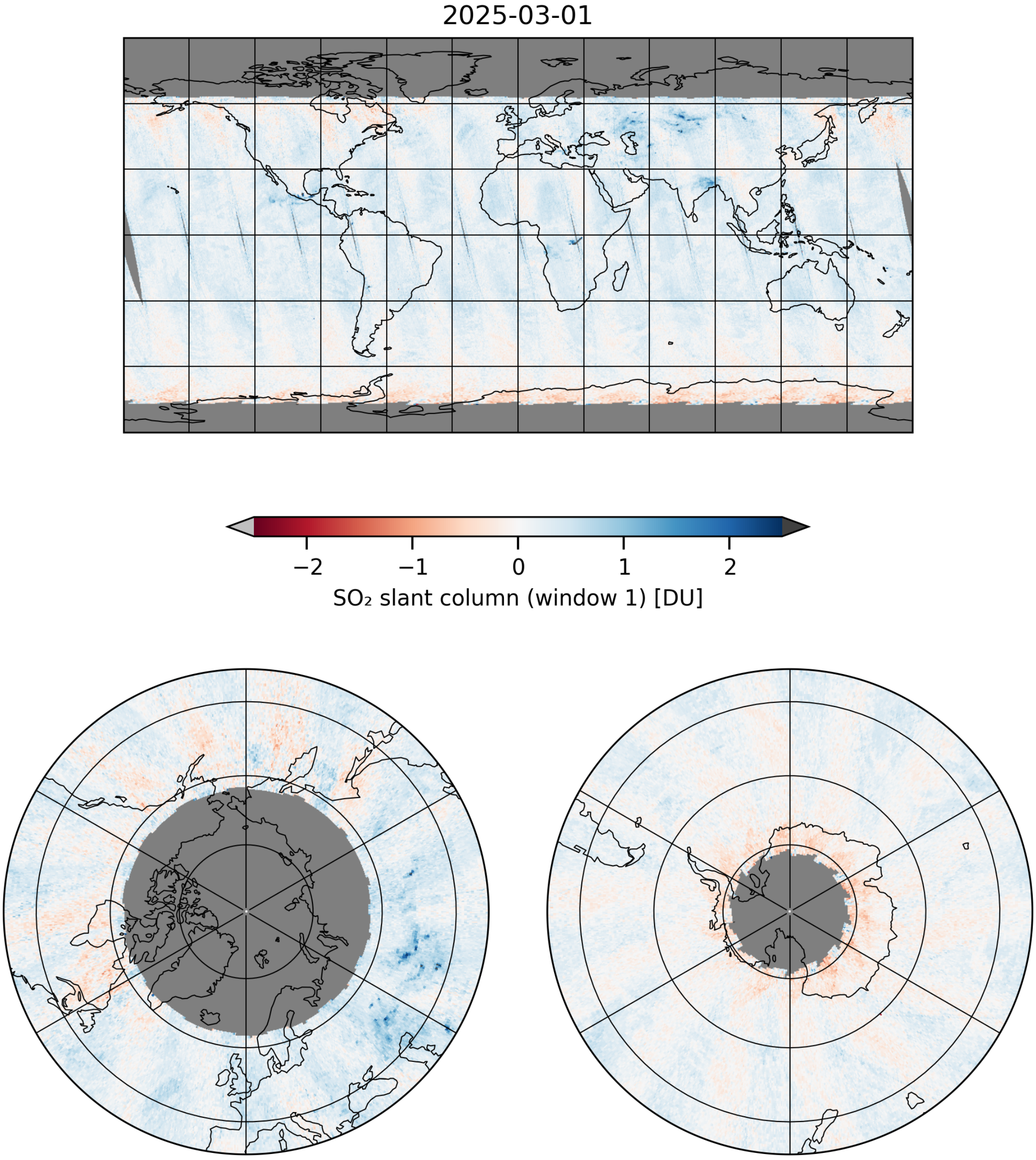


Figure 9: Map of “SO_2 slant column (window 1)” for 2025-03-01 to 2025-03-02

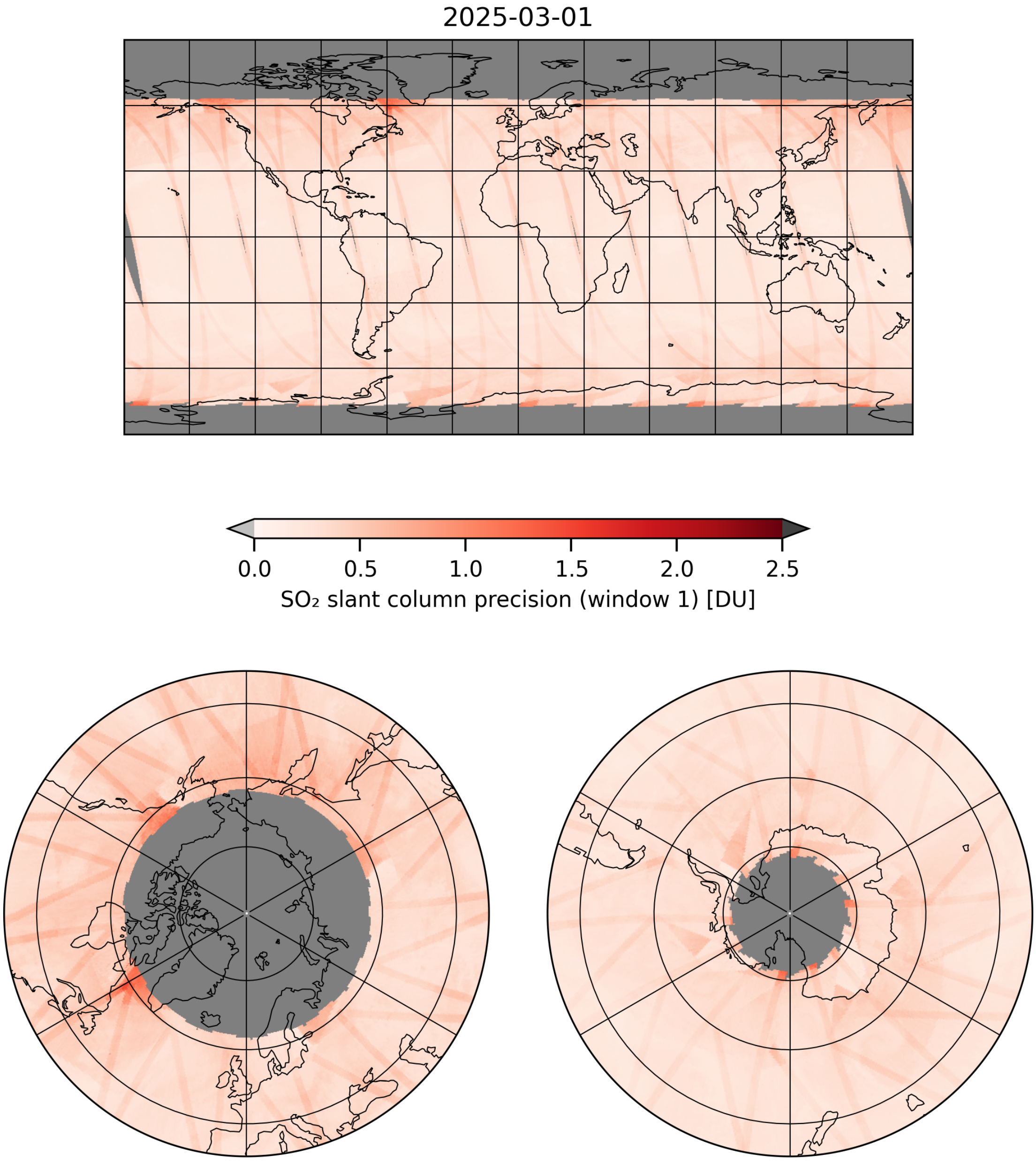


Figure 10: Map of “SO_2 slant column precision (window 1)” for 2025-03-01 to 2025-03-02

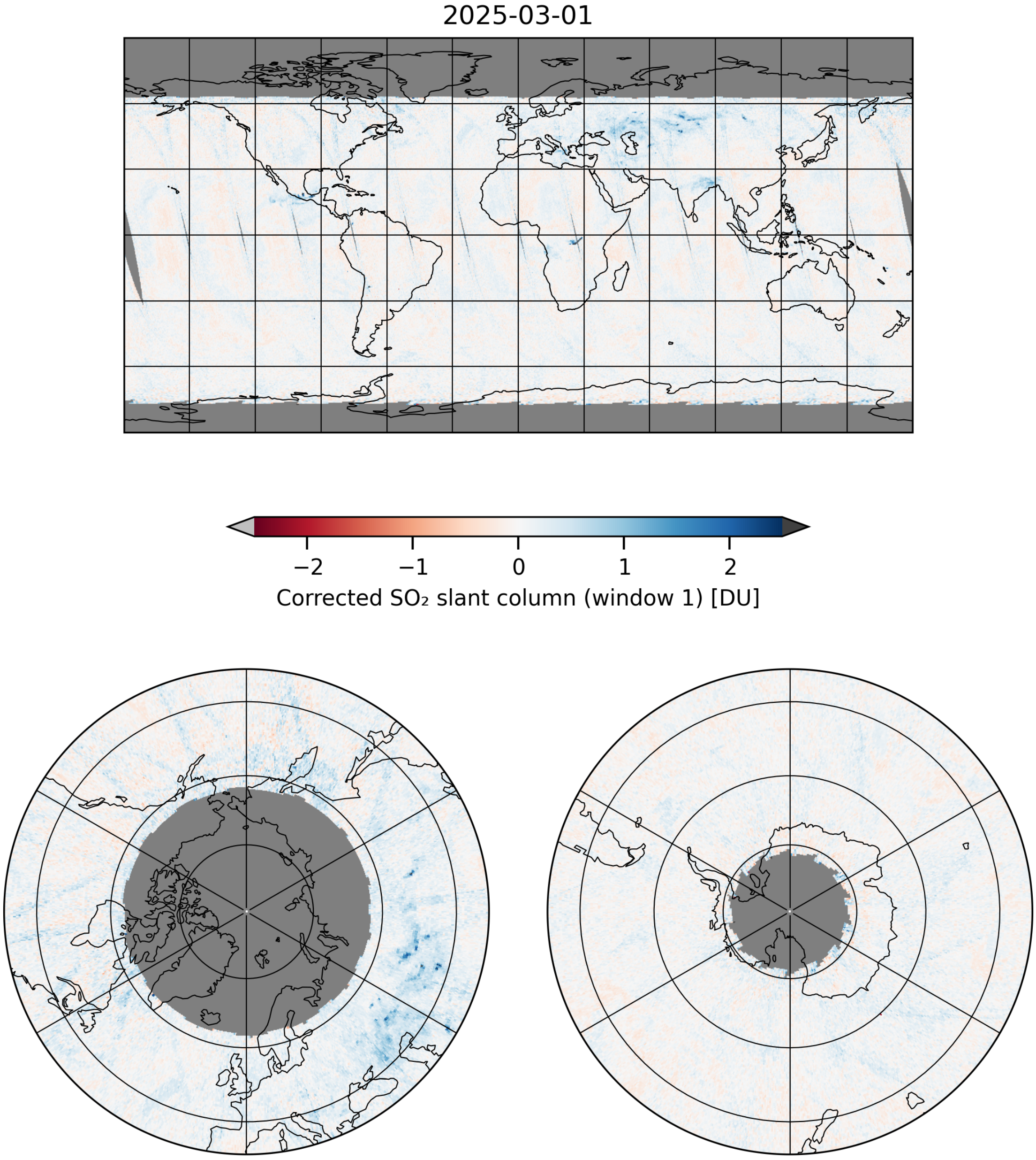


Figure 11: Map of “Corrected SO_2 slant column (window 1)” for 2025-03-01 to 2025-03-02

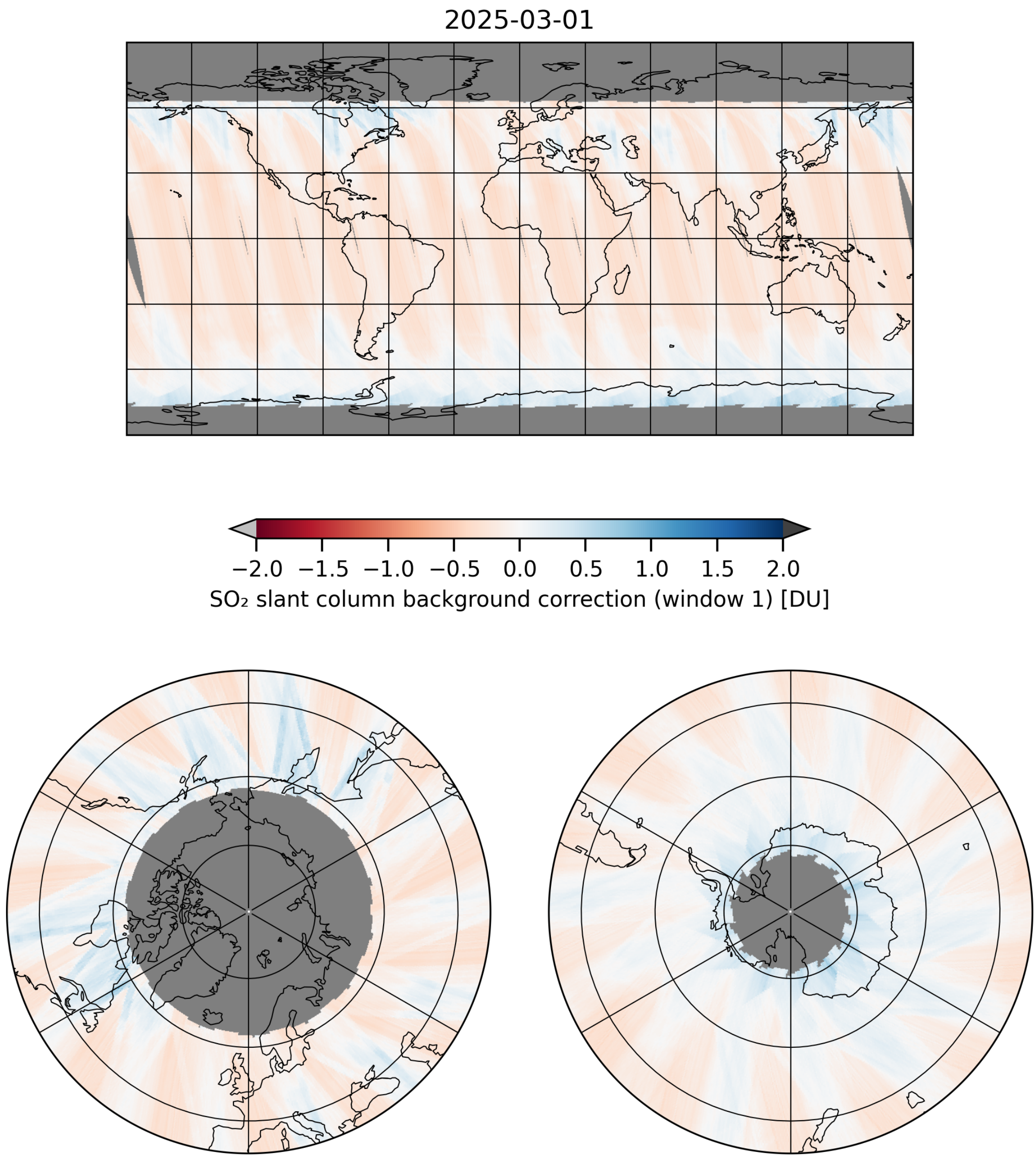


Figure 12: Map of “SO_2 slant column background correction (window 1)” for 2025-03-01 to 2025-03-02

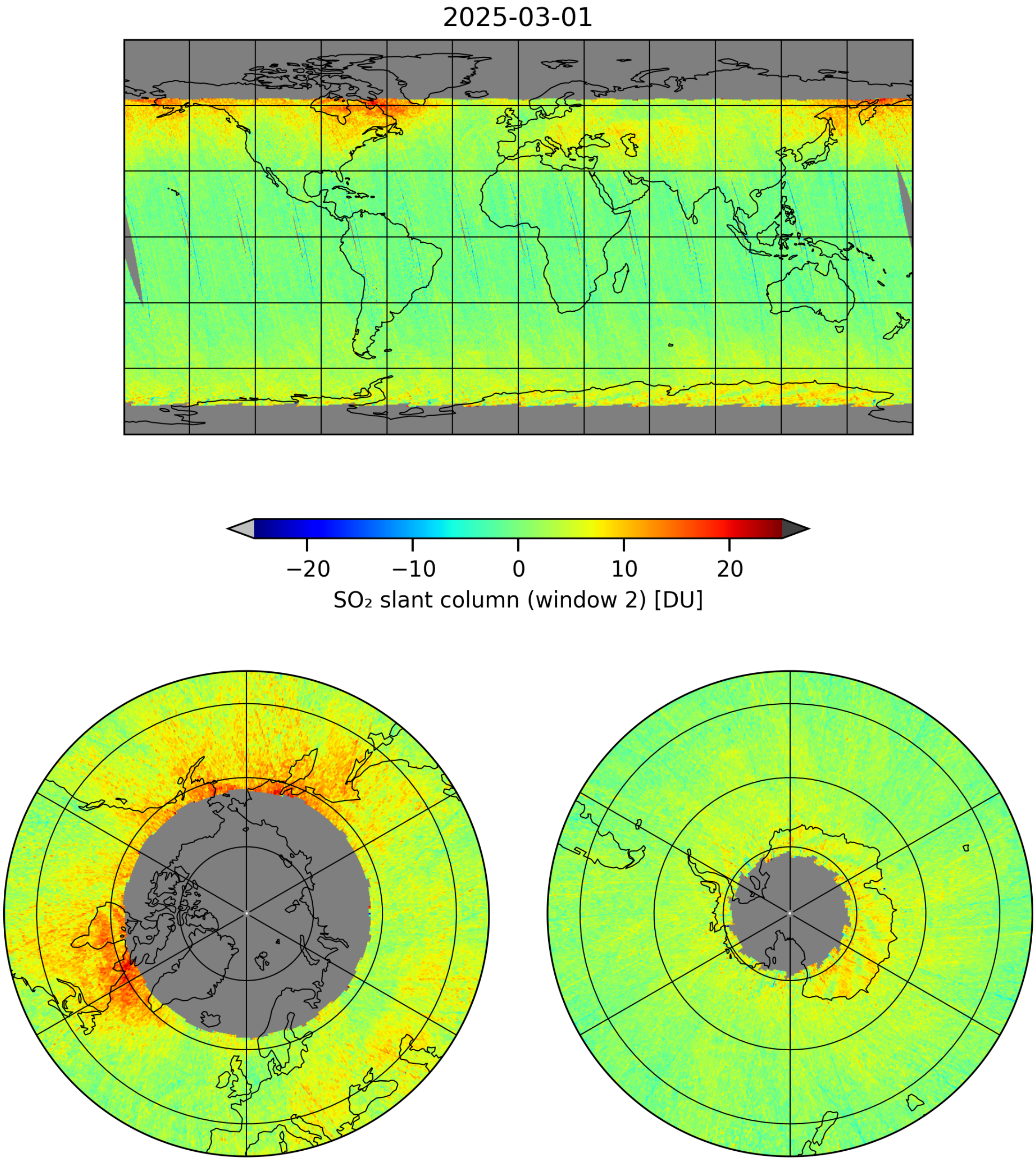


Figure 13: Map of "SO_2 slant column (window 2)" for 2025-03-01 to 2025-03-02

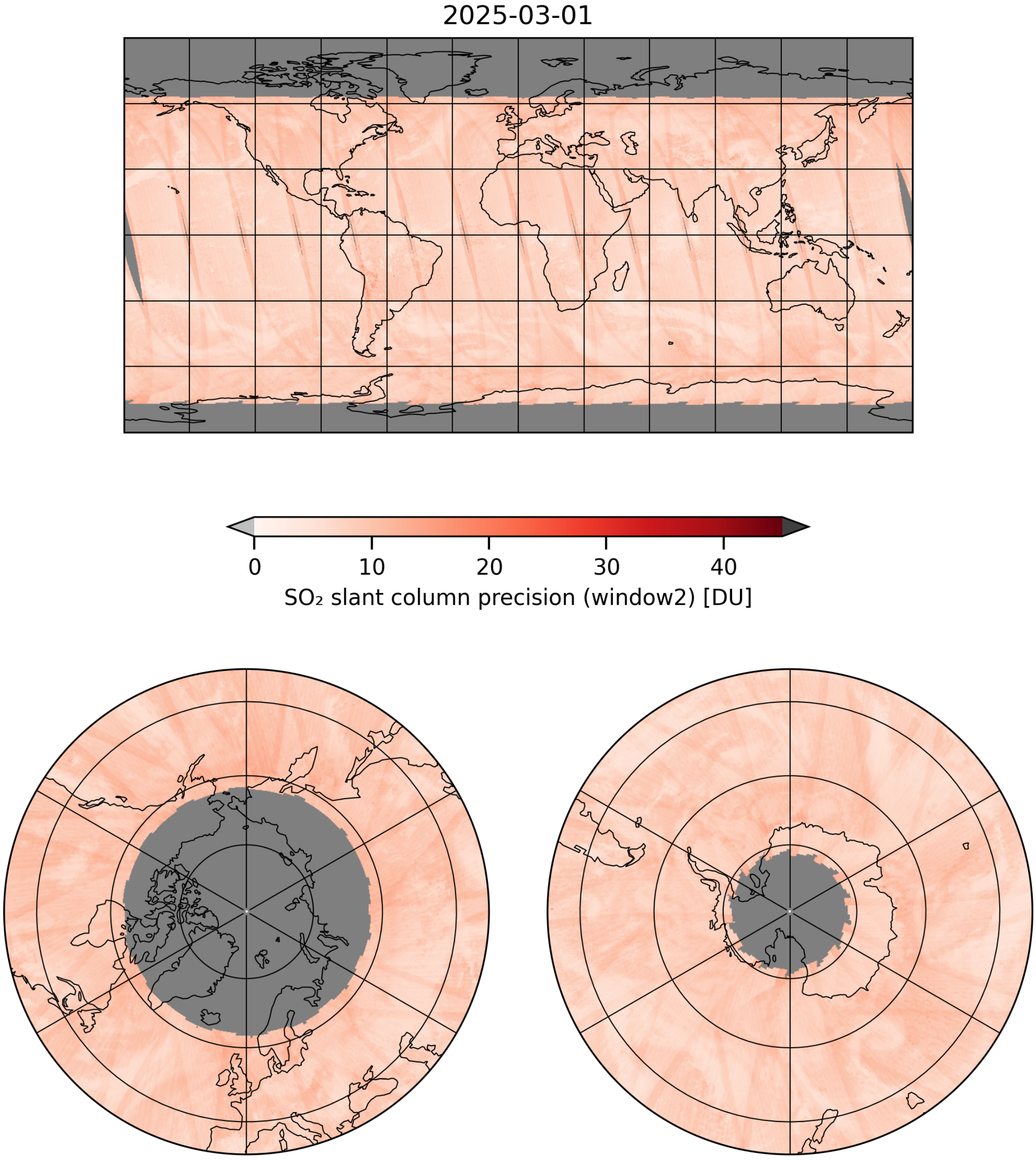


Figure 14: Map of "SO_2 slant column precision (window2)" for 2025-03-01 to 2025-03-02

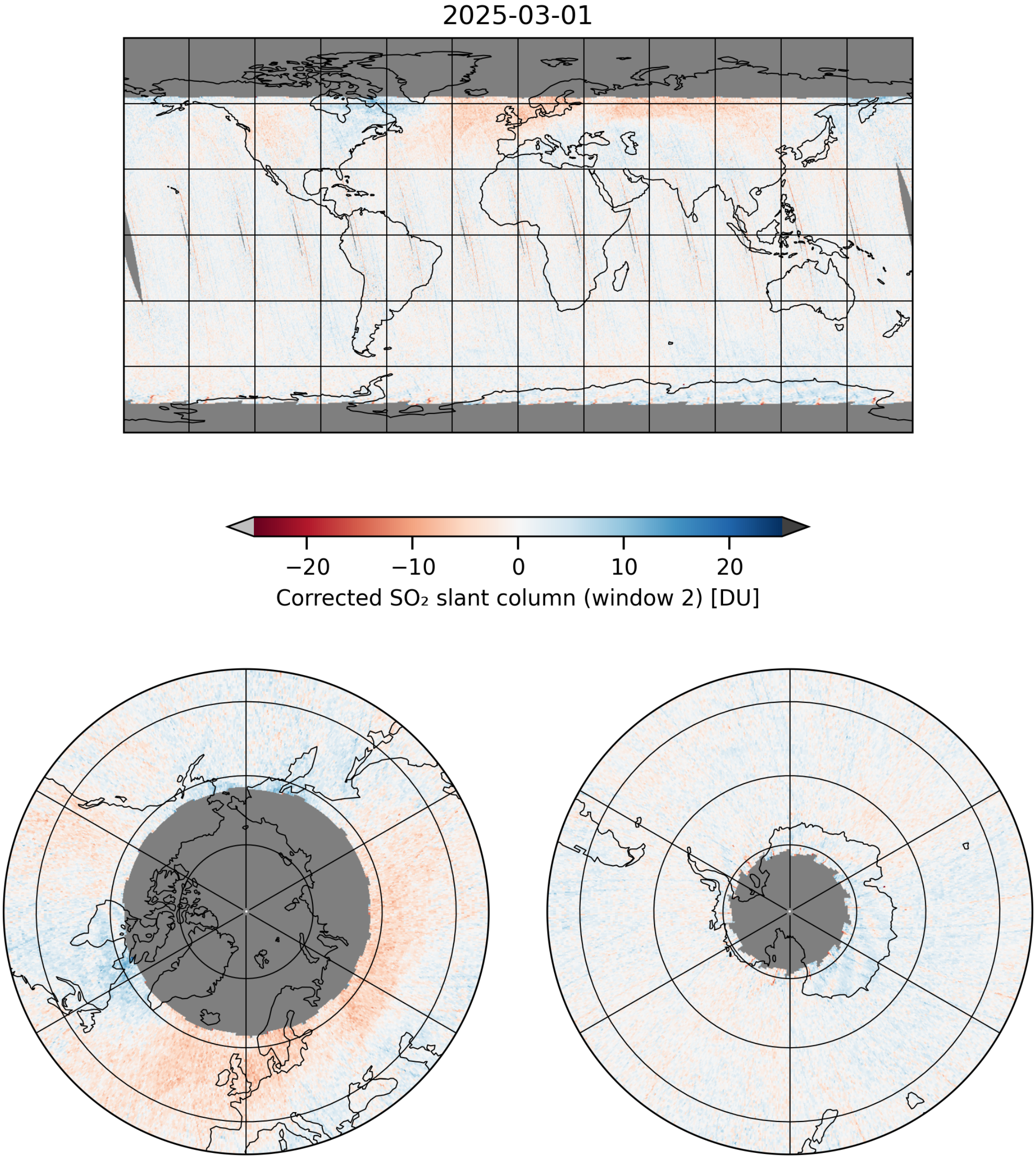


Figure 15: Map of “Corrected SO_2 slant column (window 2)” for 2025-03-01 to 2025-03-02

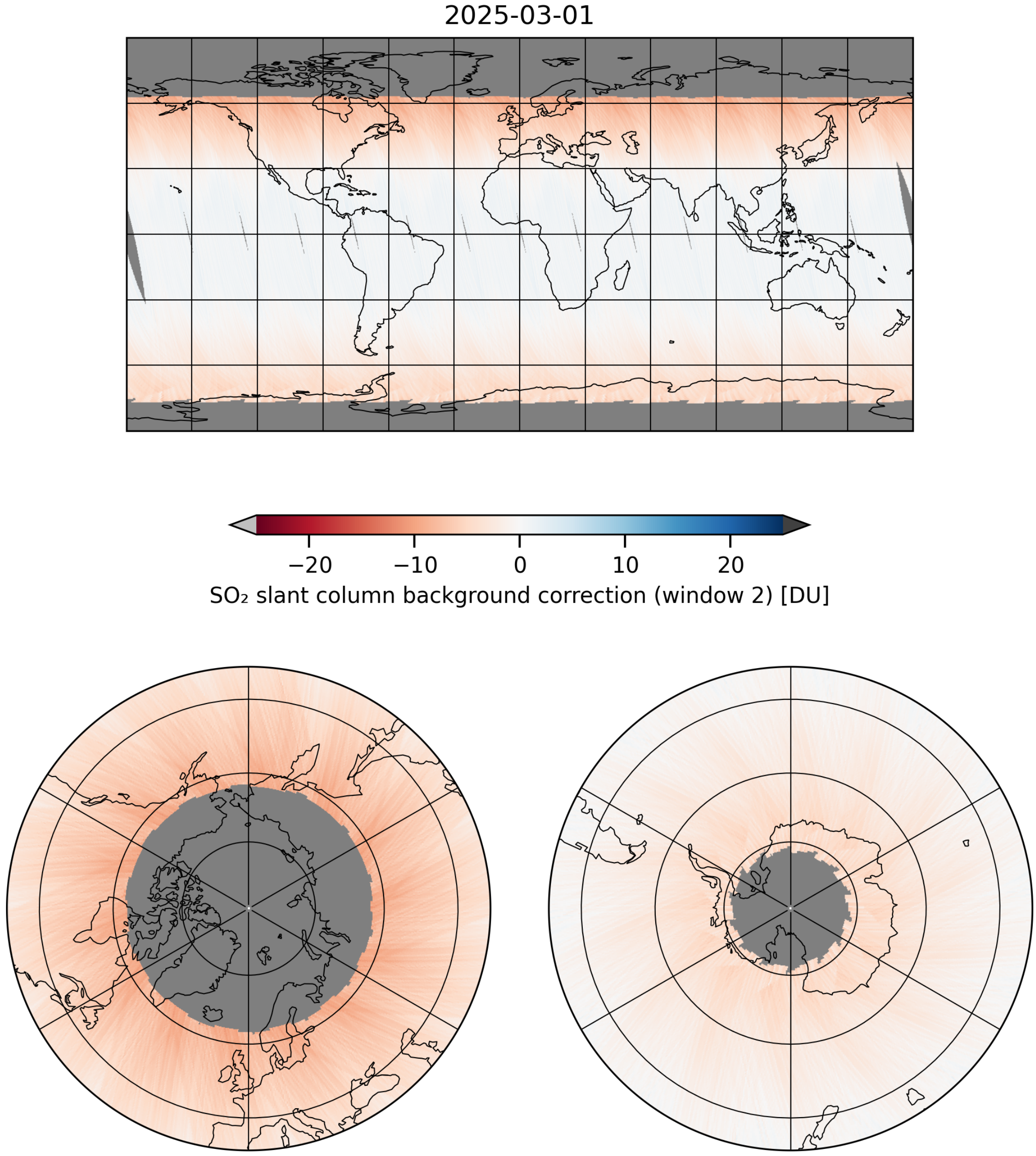


Figure 16: Map of "SO_2 slant column background correction (window 2)" for 2025-03-01 to 2025-03-02

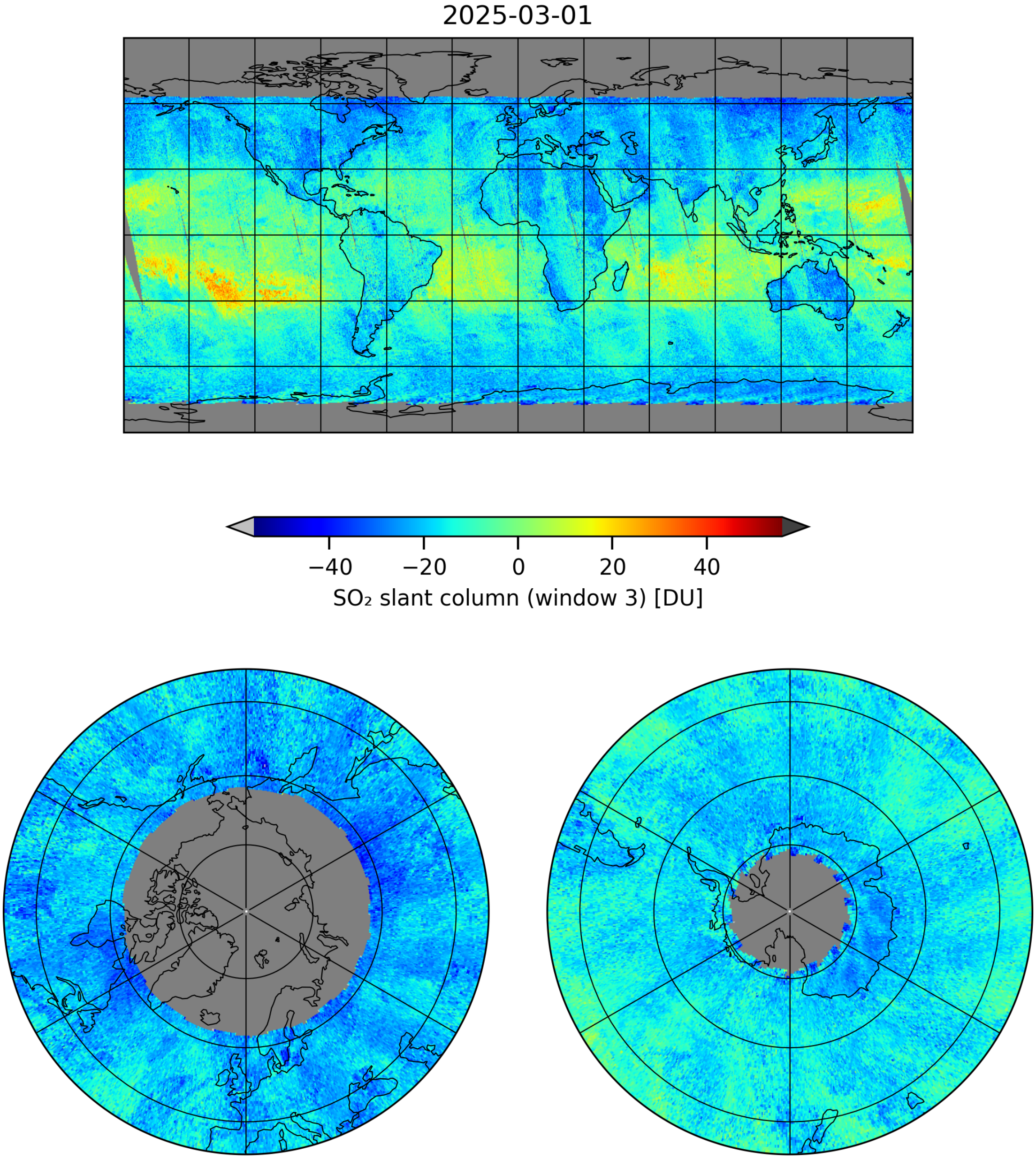


Figure 17: Map of “SO_2 slant column (window 3)” for 2025-03-01 to 2025-03-02

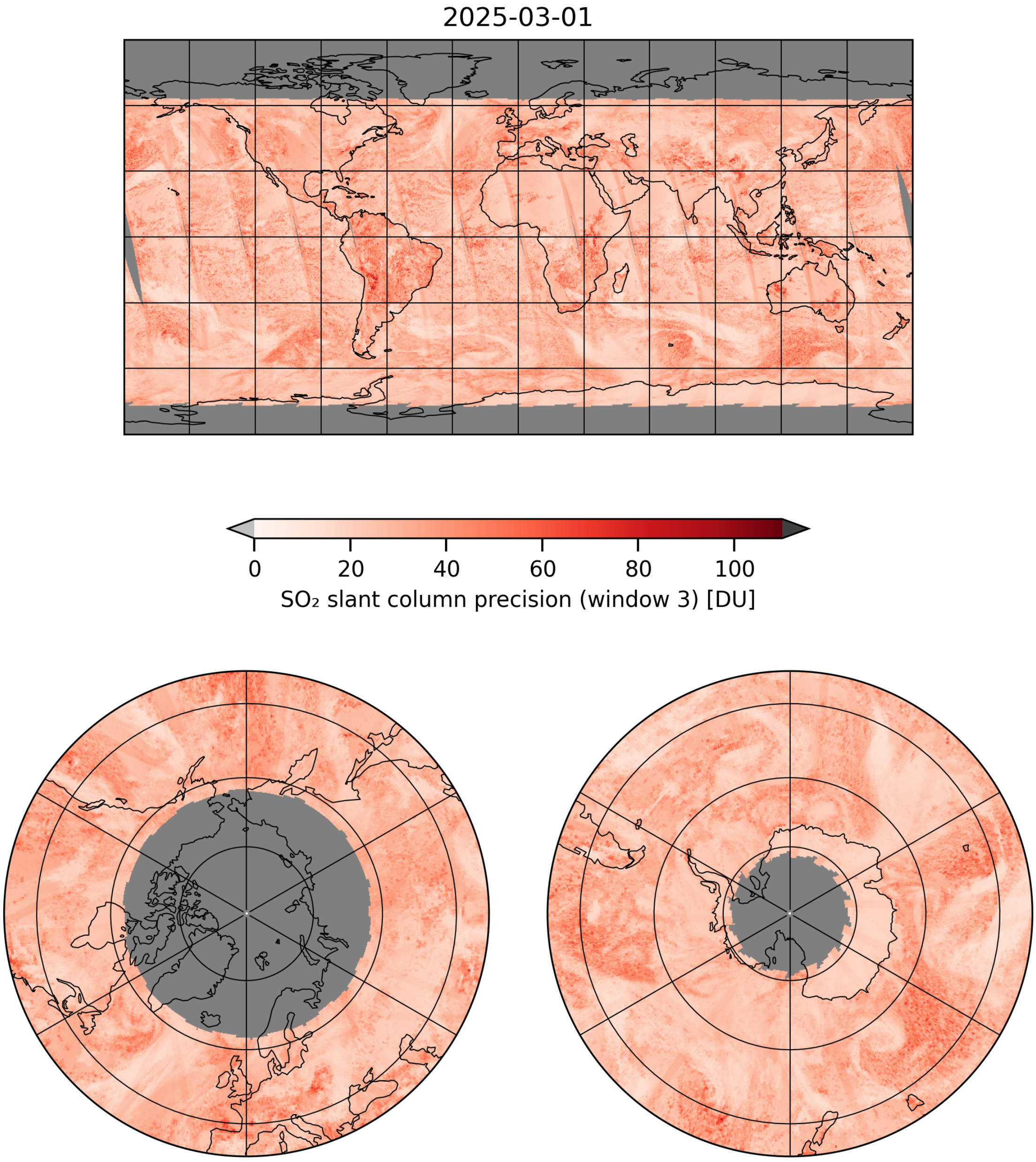


Figure 18: Map of “SO_2 slant column precision (window 3)” for 2025-03-01 to 2025-03-02

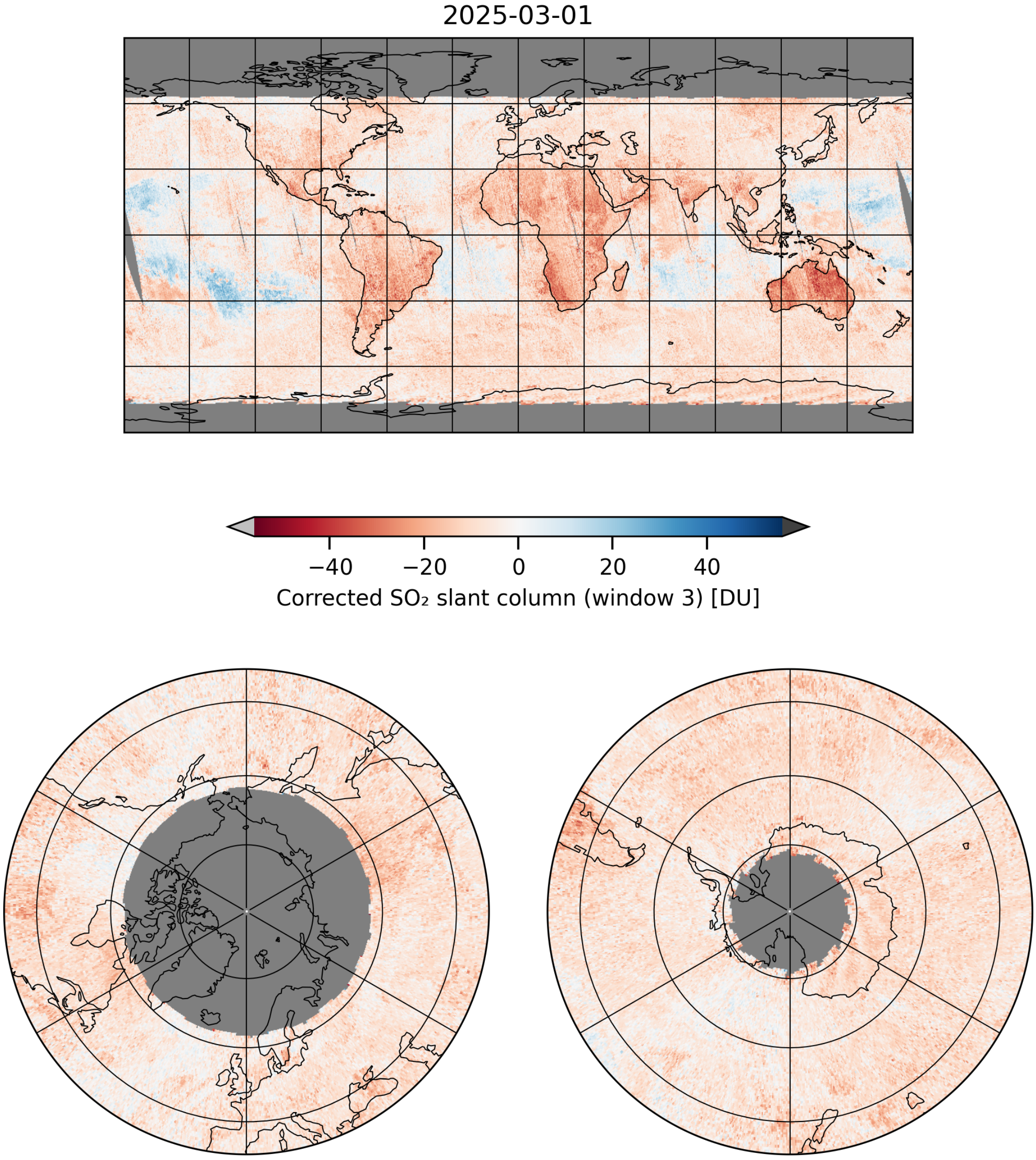


Figure 19: Map of "Corrected SO_2 slant column (window 3)" for 2025-03-01 to 2025-03-02

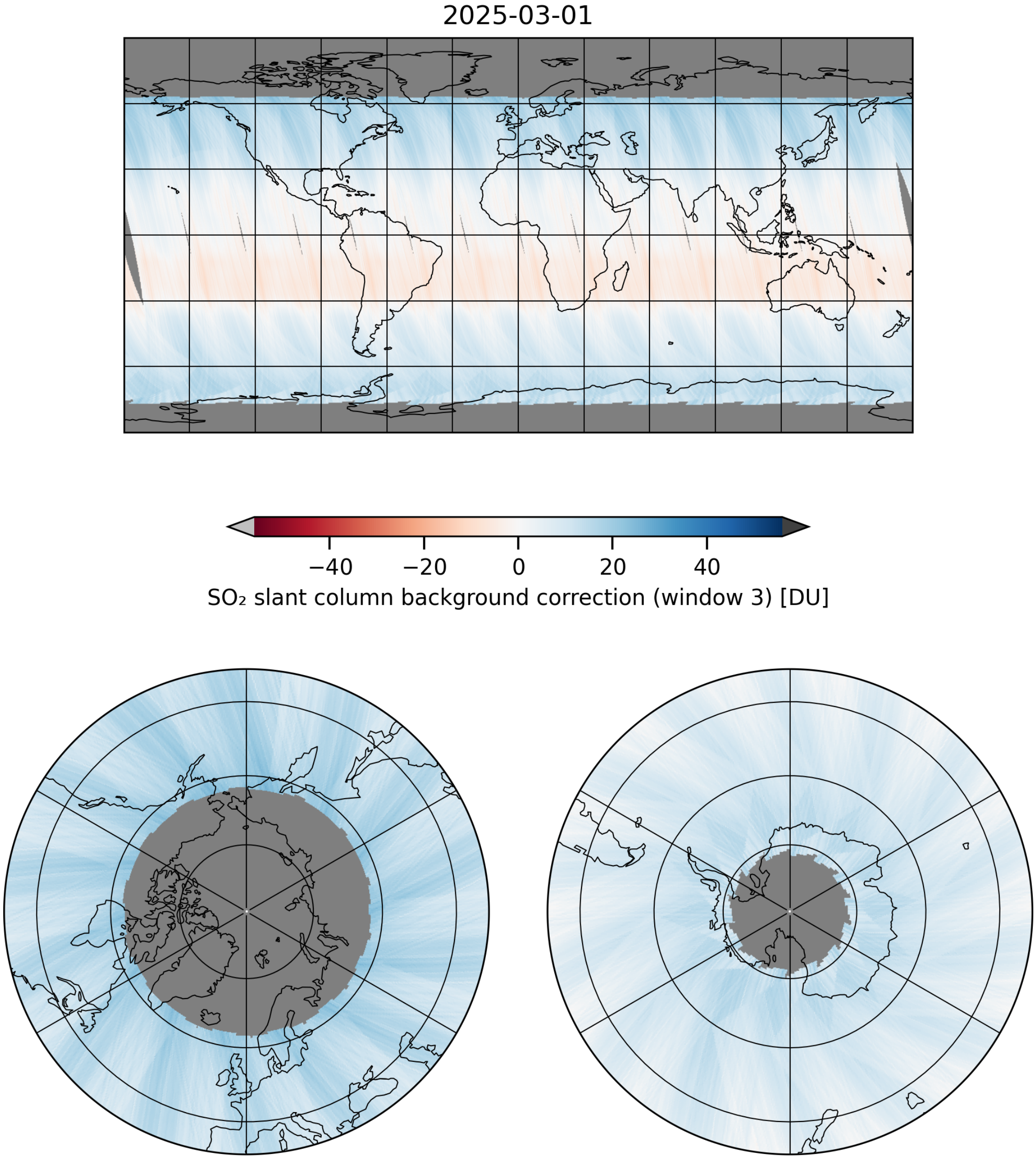


Figure 20: Map of "SO_2 slant column background correction (window 3)" for 2025-03-01 to 2025-03-02

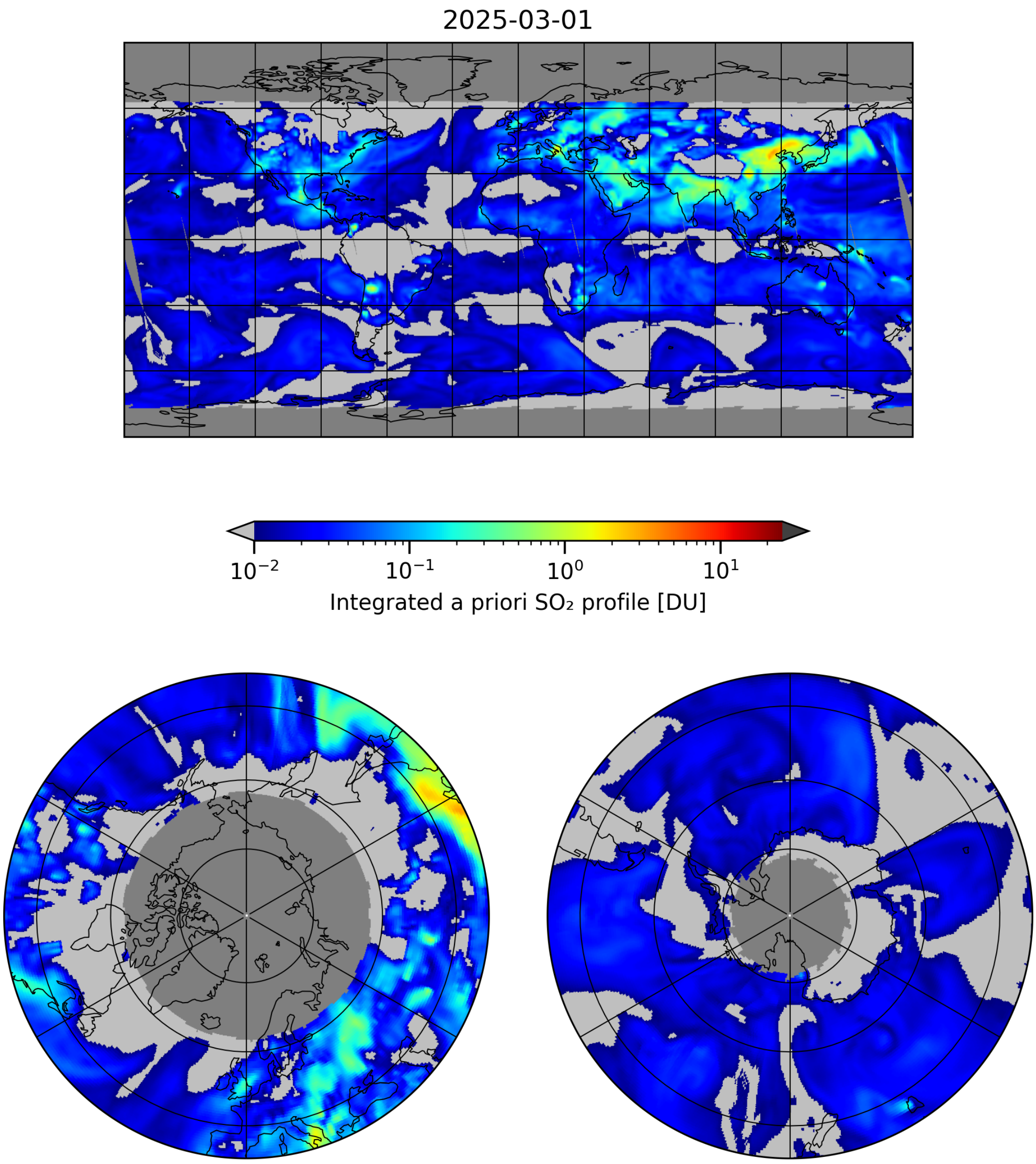


Figure 21: Map of "Integrated a priori SO_2 profile" for 2025-03-01 to 2025-03-02

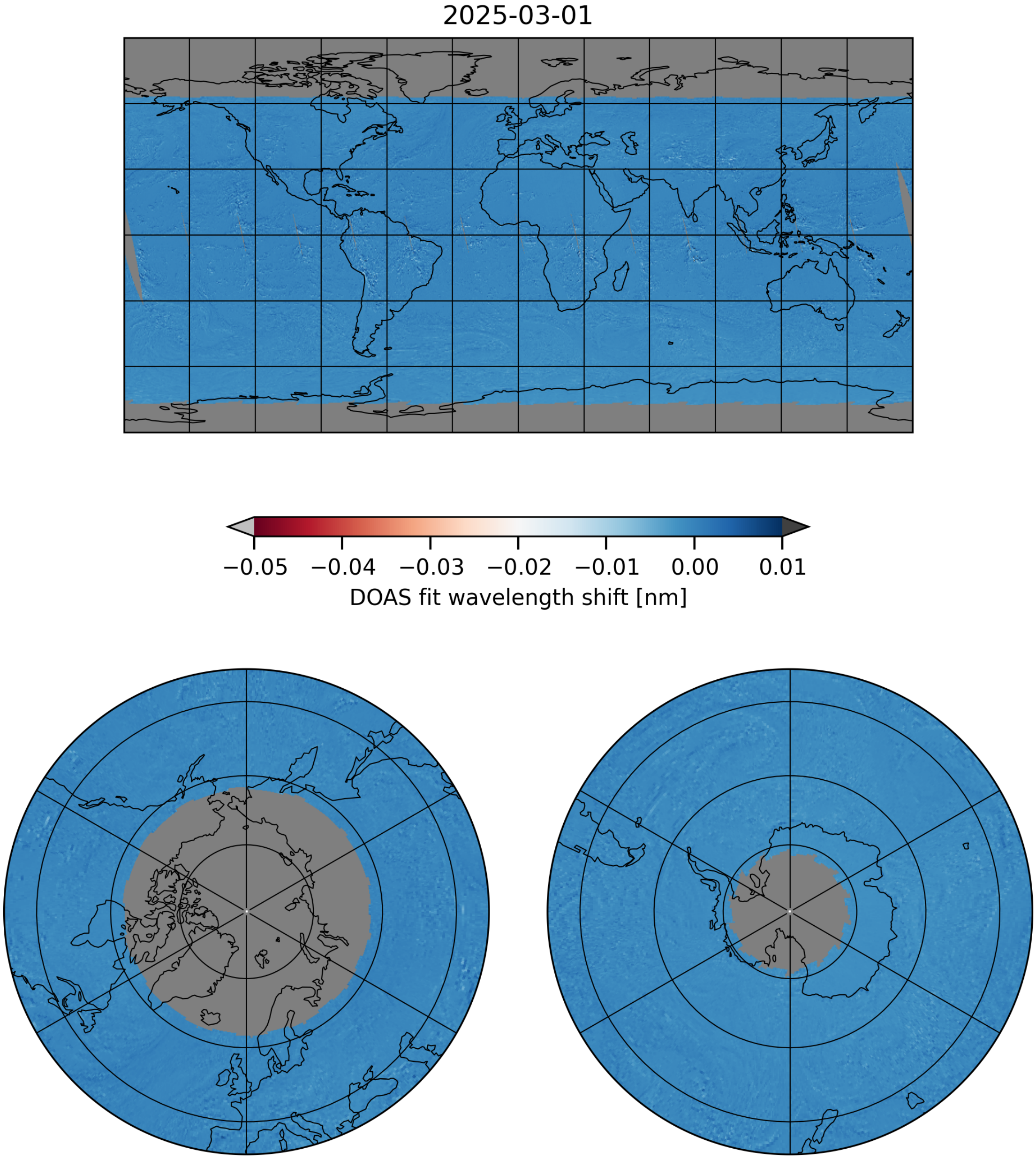


Figure 22: Map of “DOAS fit wavelength shift” for 2025-03-01 to 2025-03-02

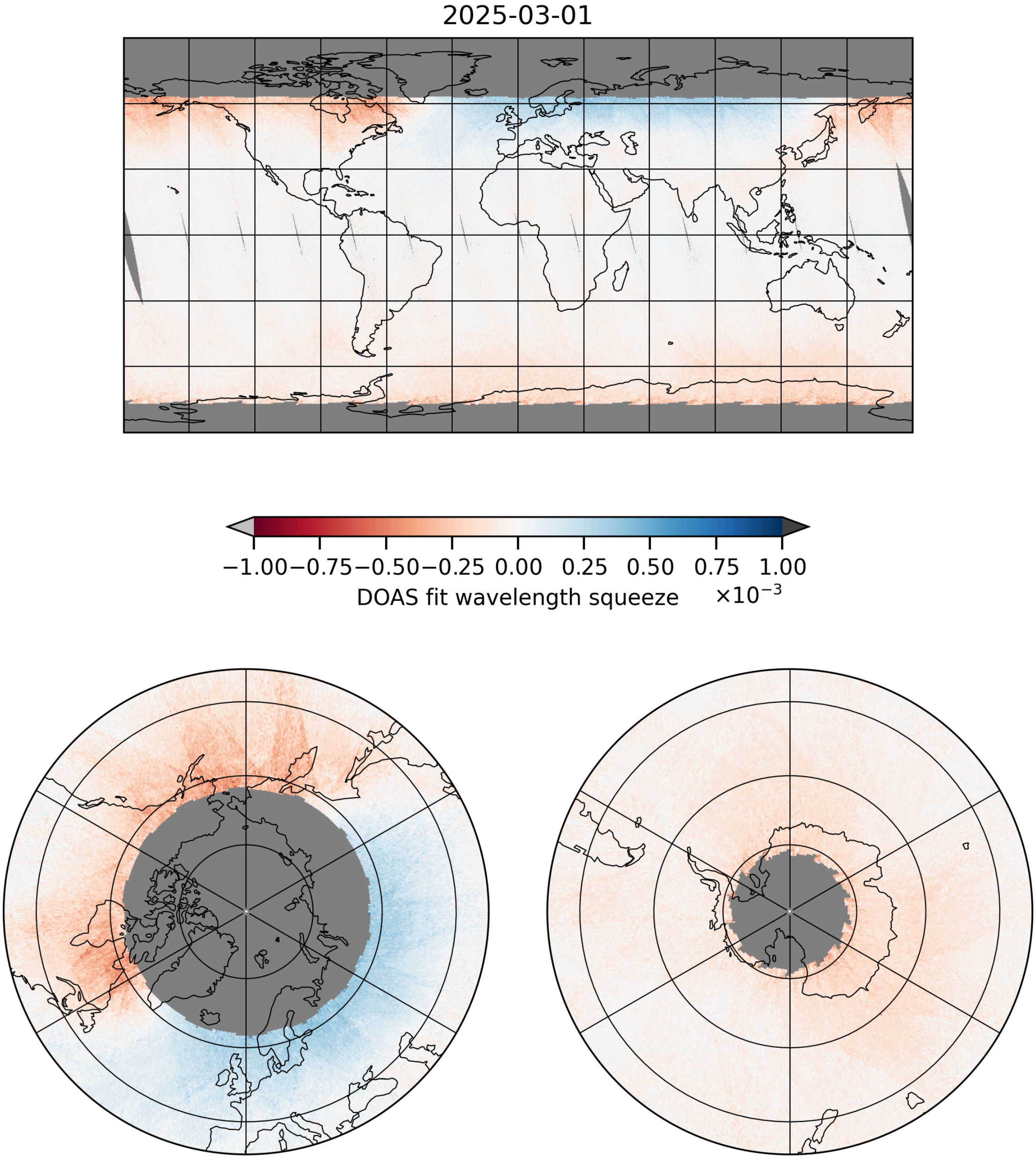


Figure 23: Map of “DOAS fit wavelength squeeze” for 2025-03-01 to 2025-03-02

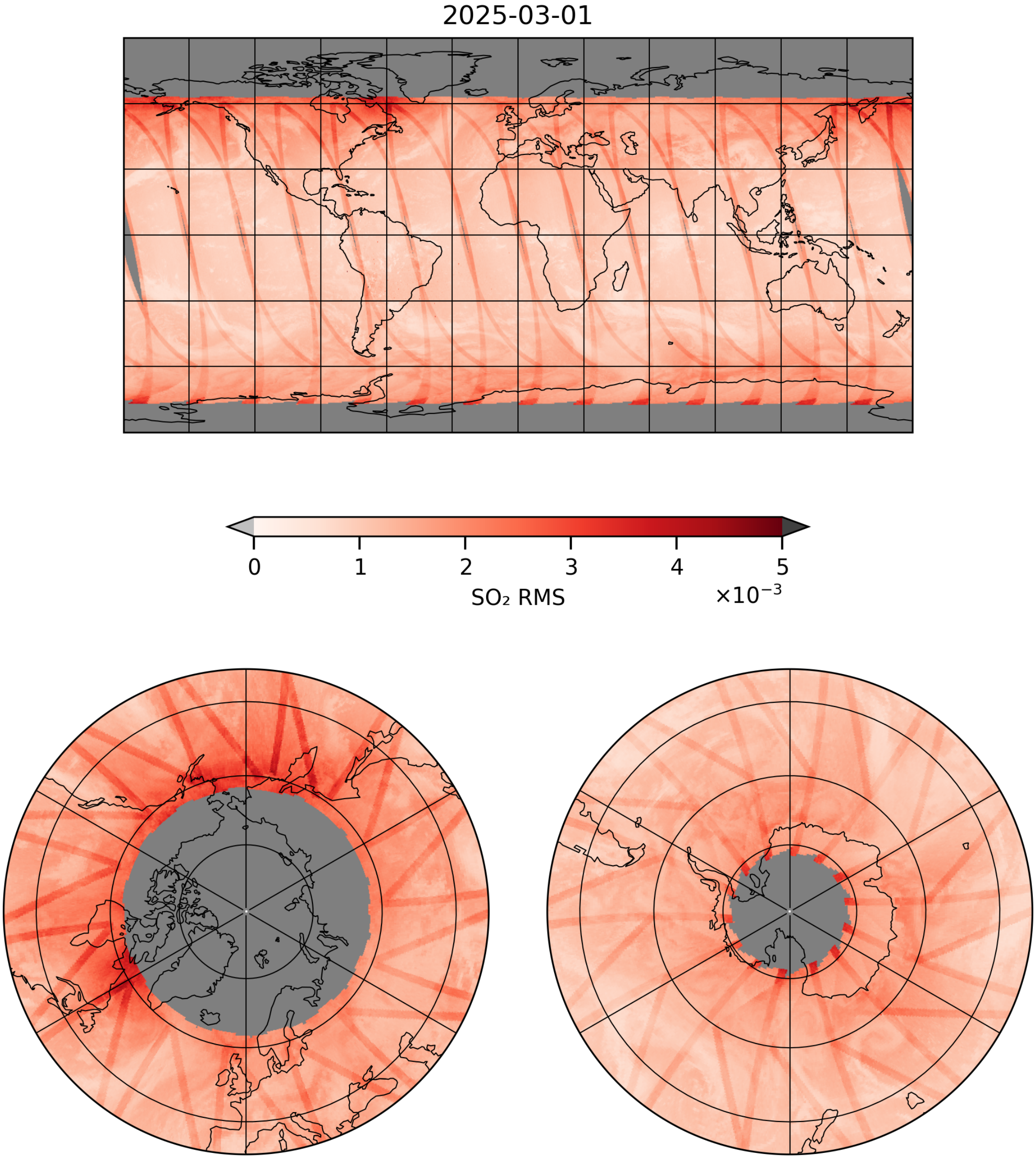


Figure 24: Map of "SO_2 RMS" for 2025-03-01 to 2025-03-02

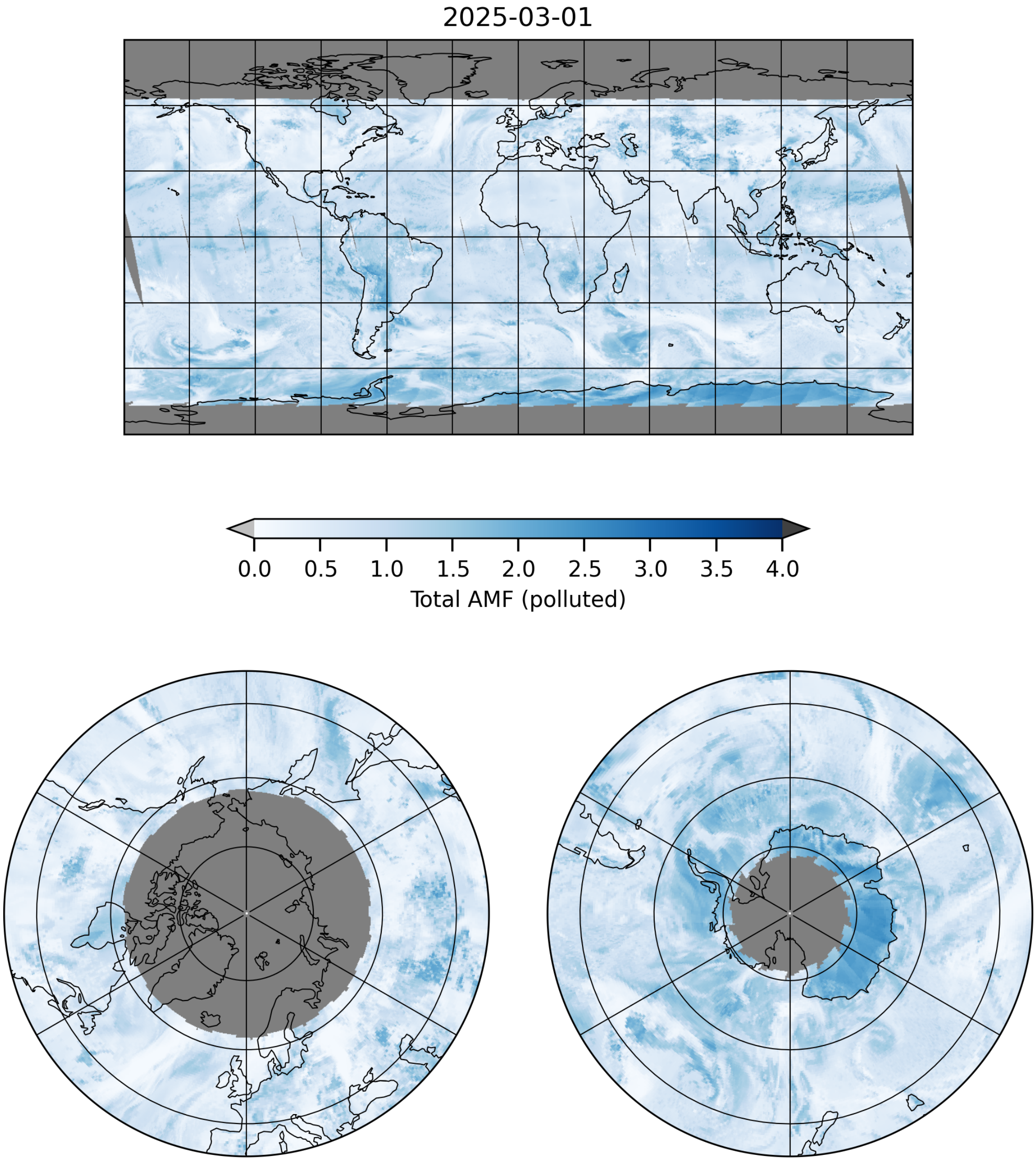


Figure 25: Map of “Total AMF (polluted)” for 2025-03-01 to 2025-03-02

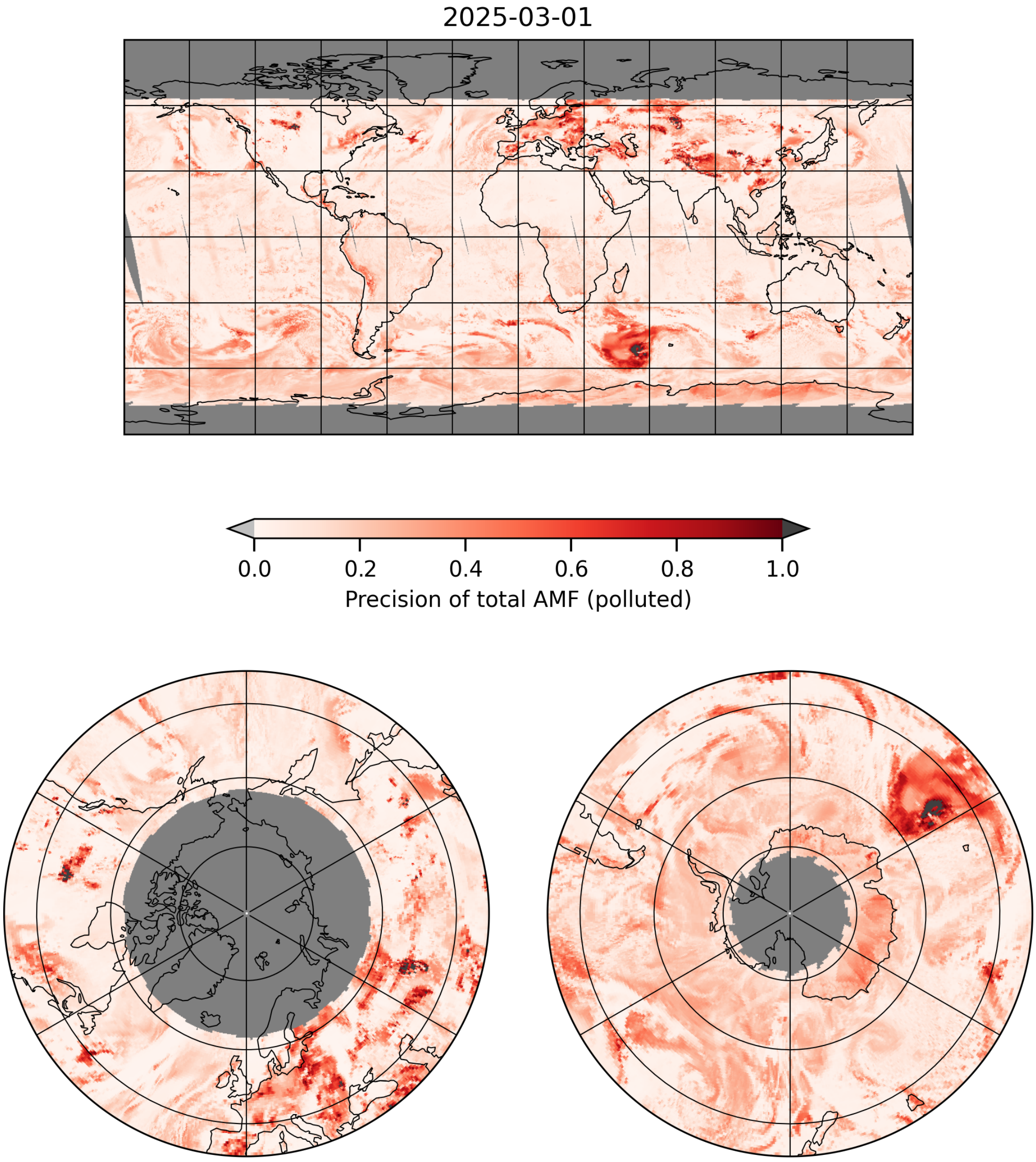


Figure 26: Map of “Precision of total AMF (polluted)” for 2025-03-01 to 2025-03-02

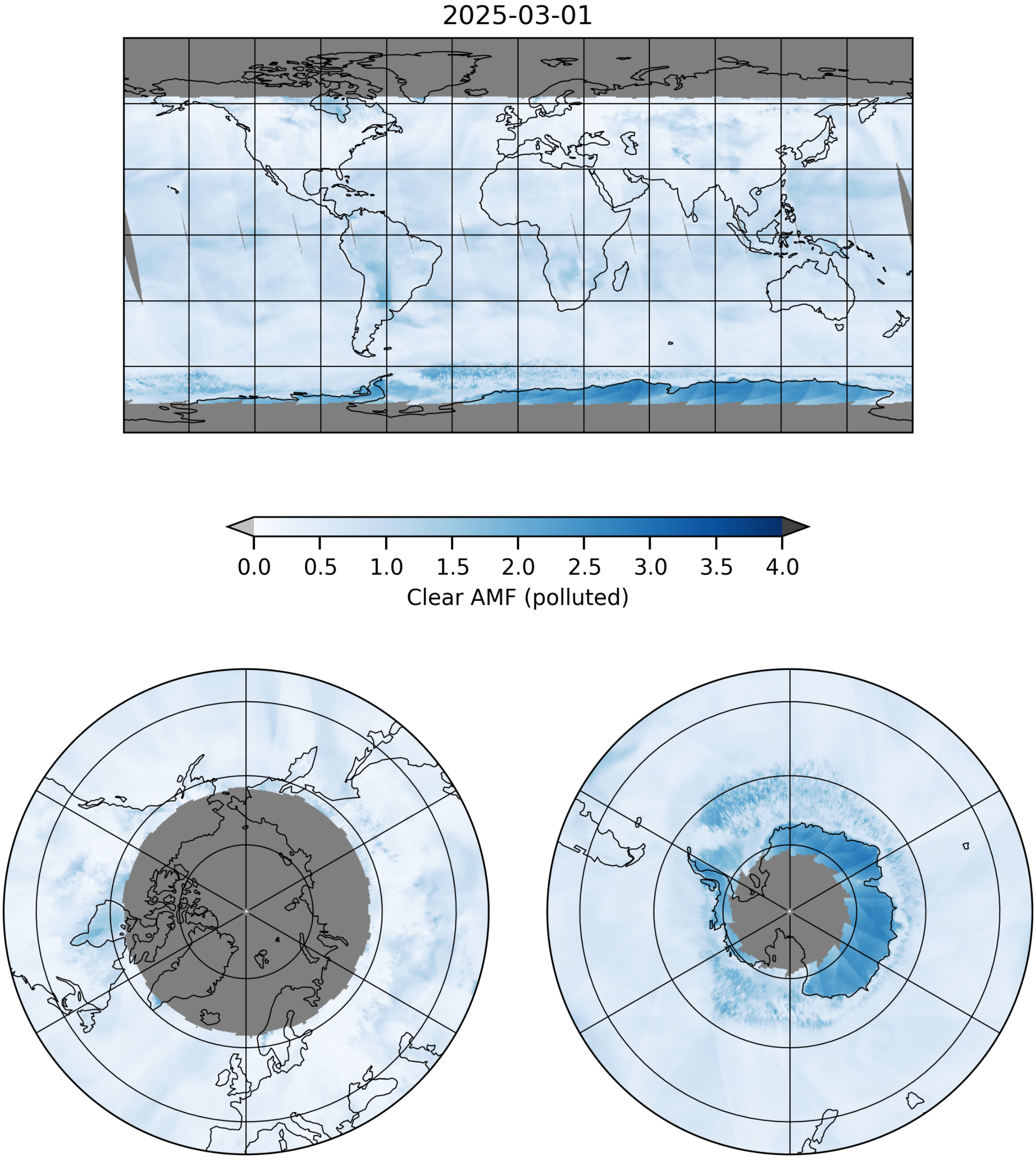


Figure 27: Map of “Clear AMF (polluted)” for 2025-03-01 to 2025-03-02

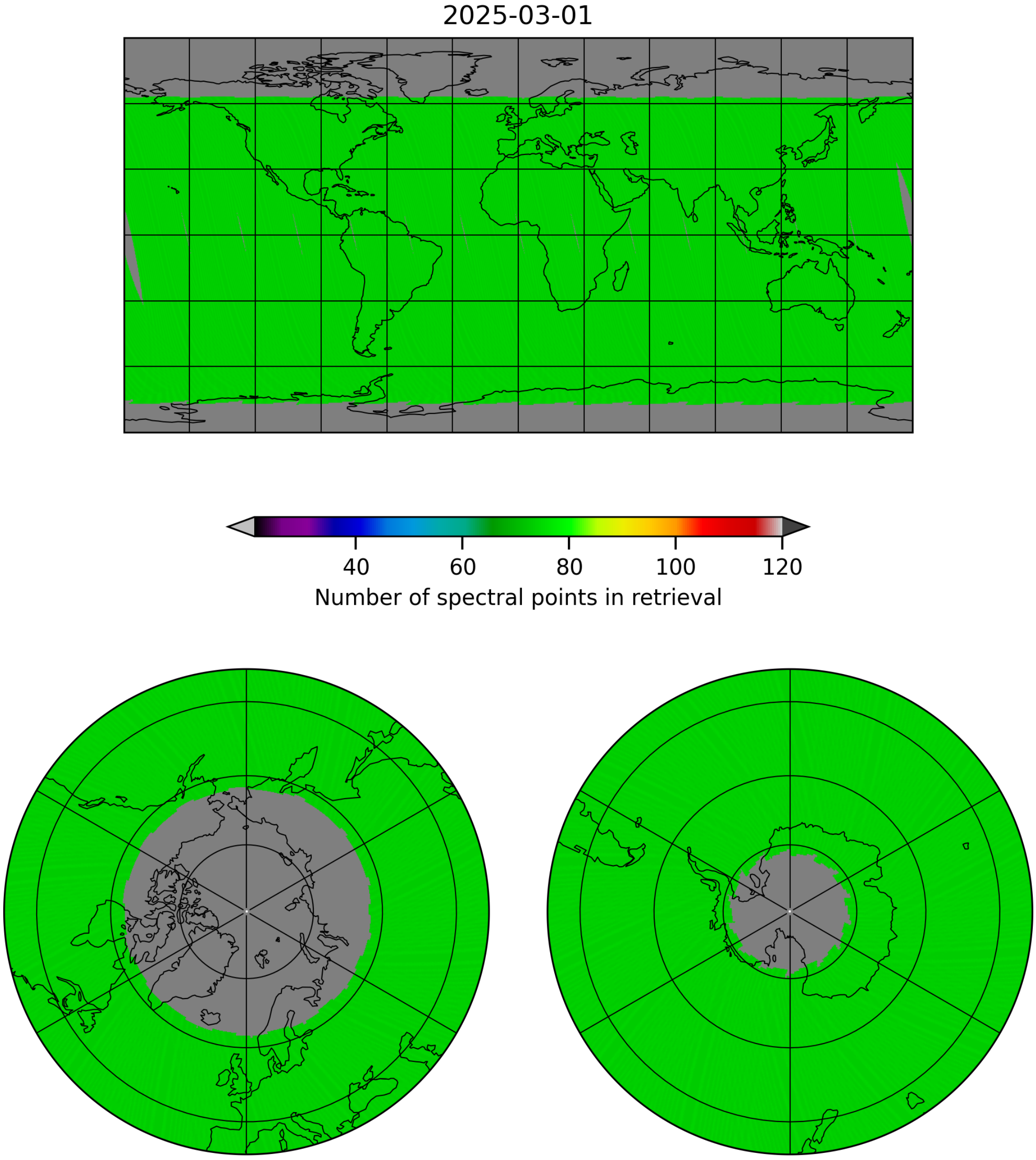


Figure 28: Map of “Number of spectral points in retrieval” for 2025-03-01 to 2025-03-02

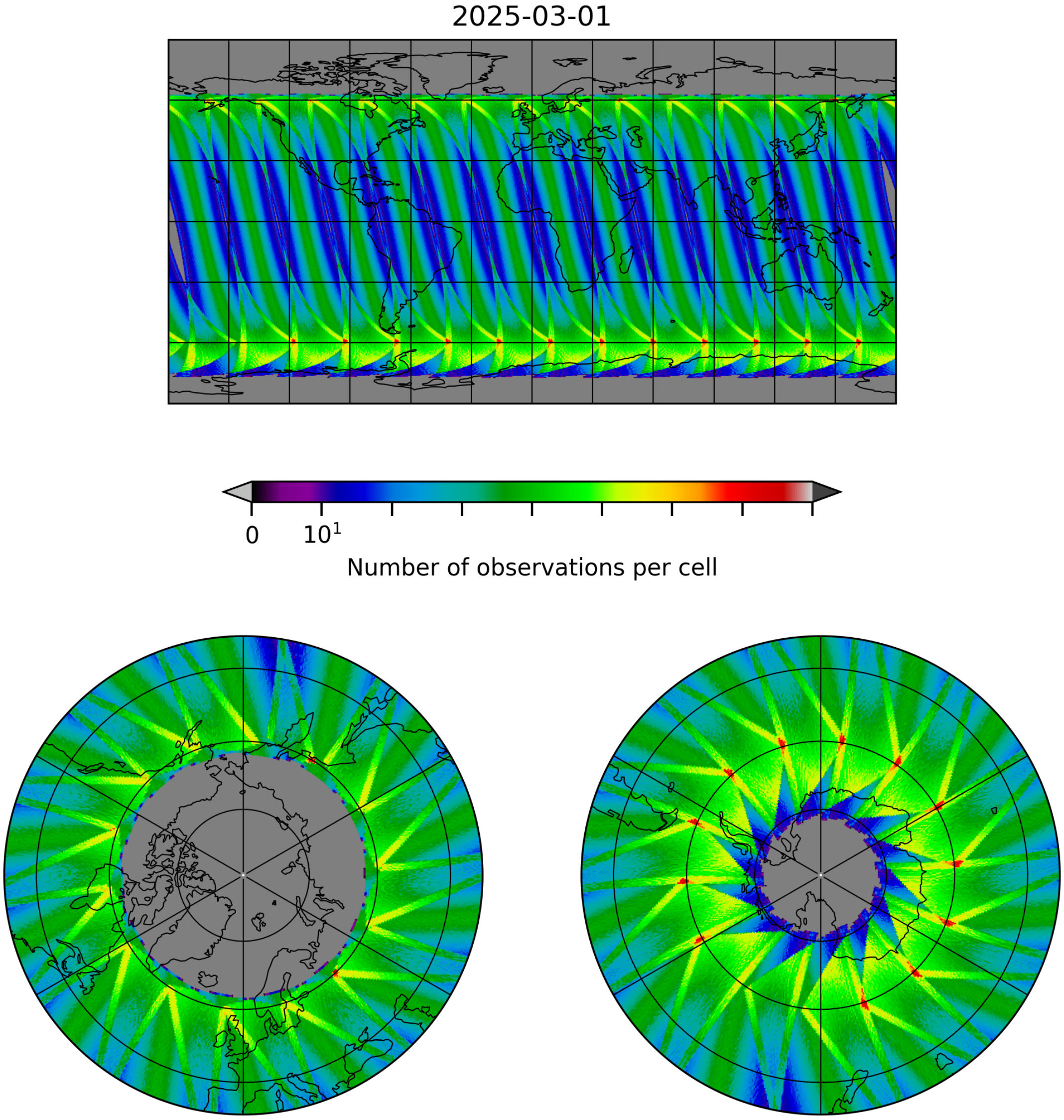


Figure 29: Map of the number of observations for 2025-03-01 to 2025-03-02

7 Zonal average

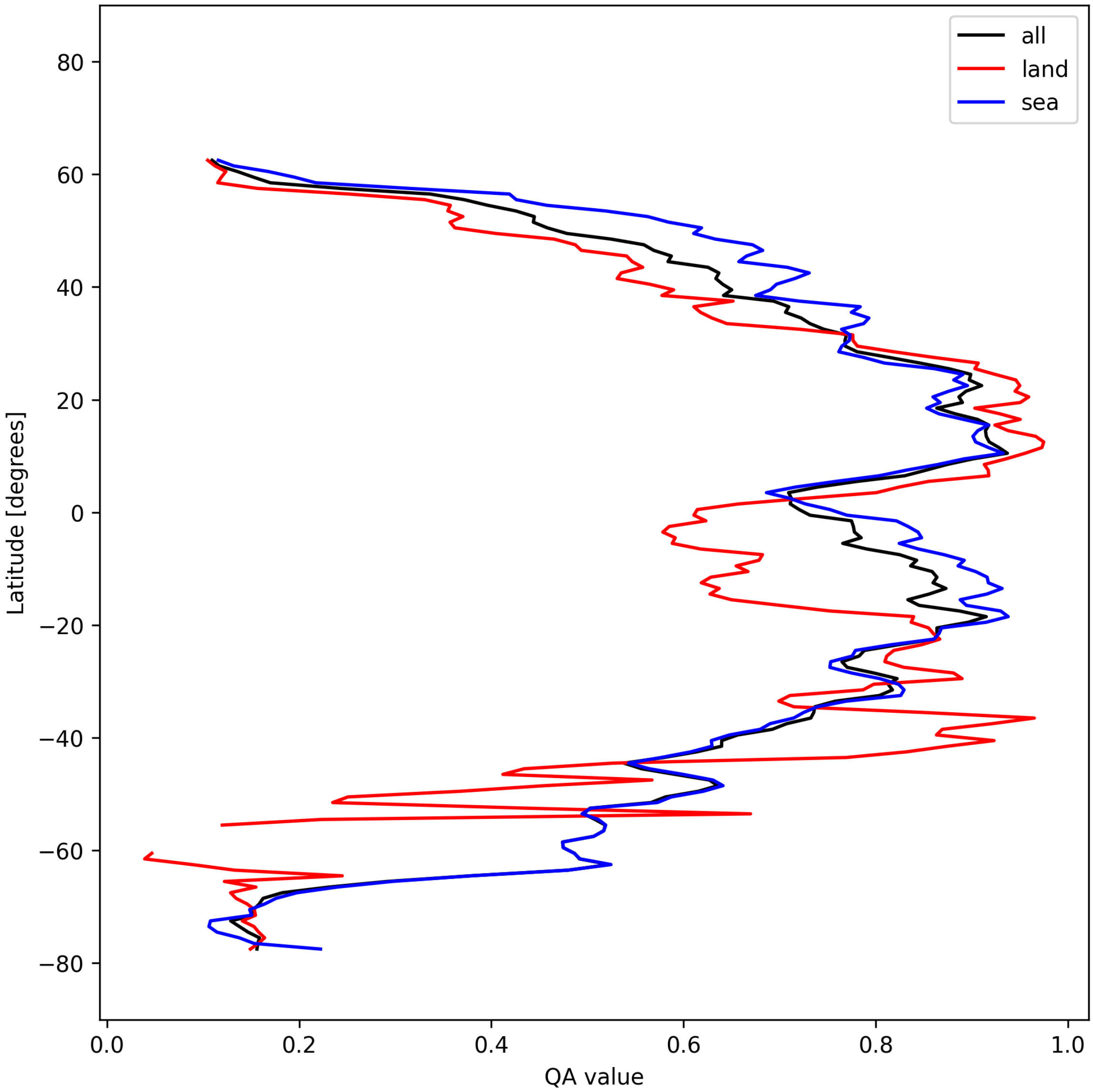


Figure 30: Zonal average of “QA value” for 2025-03-01 to 2025-03-02.

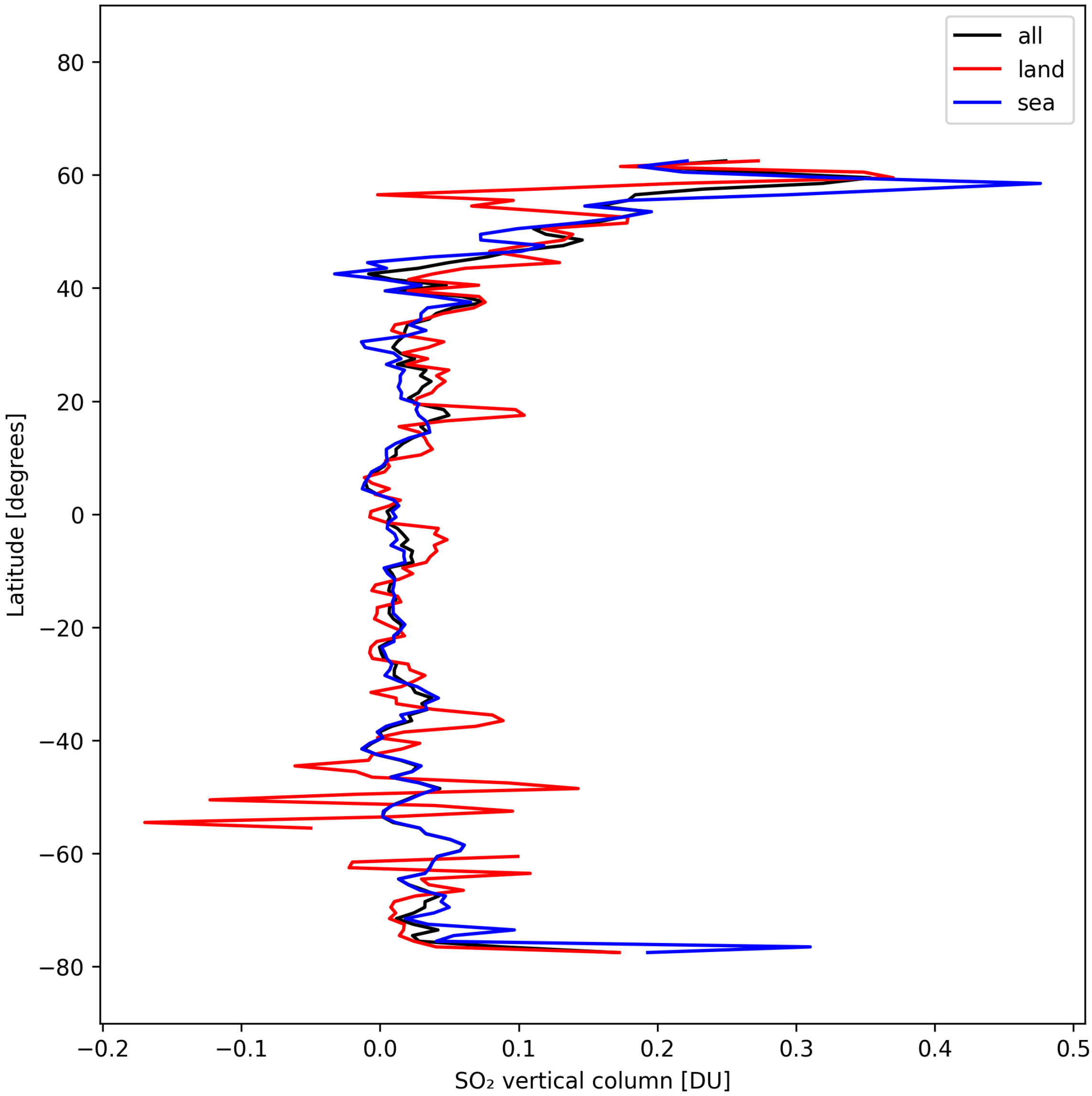


Figure 31: Zonal average of "SO_2 vertical column" for 2025-03-01 to 2025-03-02.

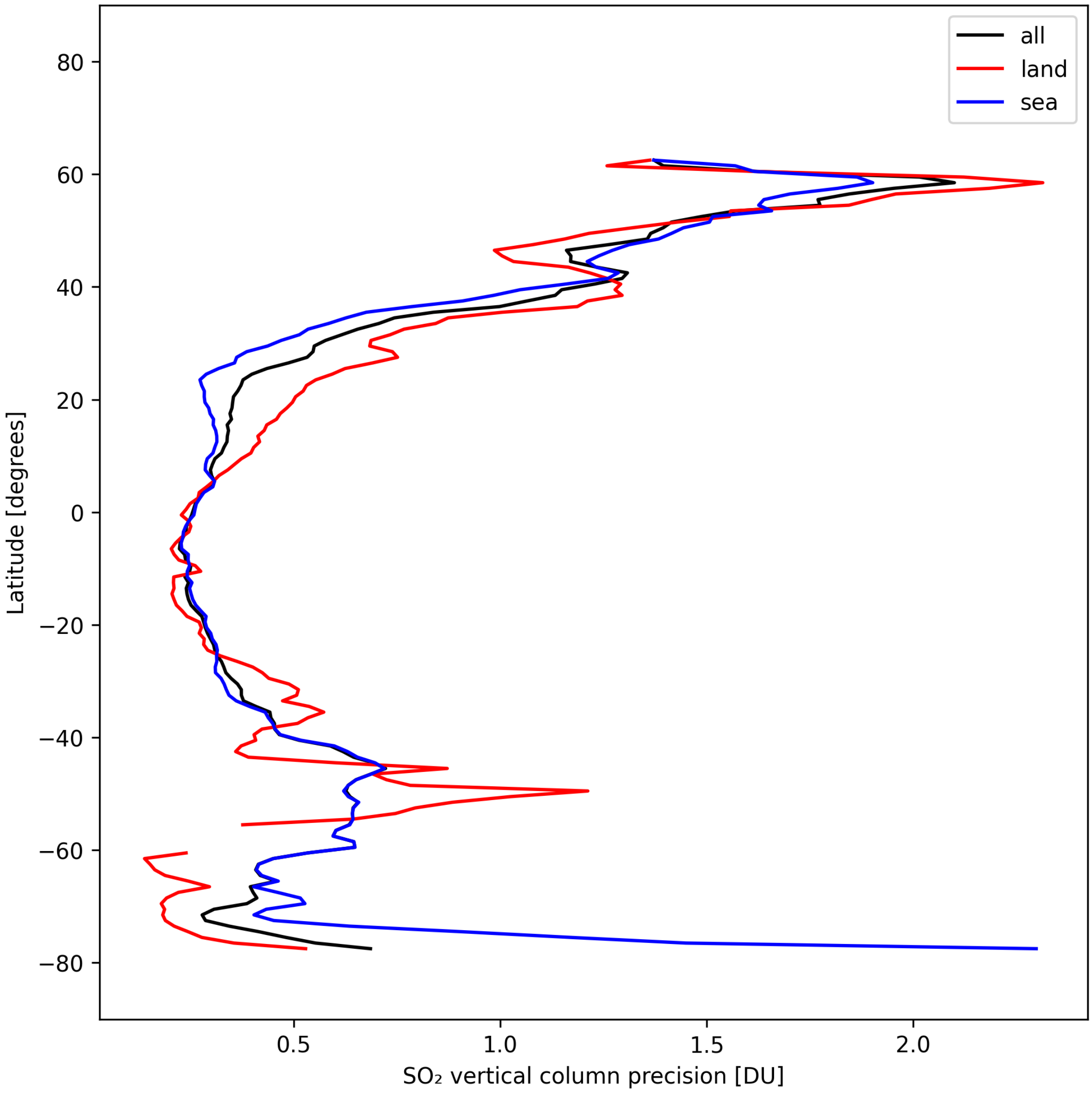


Figure 32: Zonal average of "SO_2 vertical column precision" for 2025-03-01 to 2025-03-02.

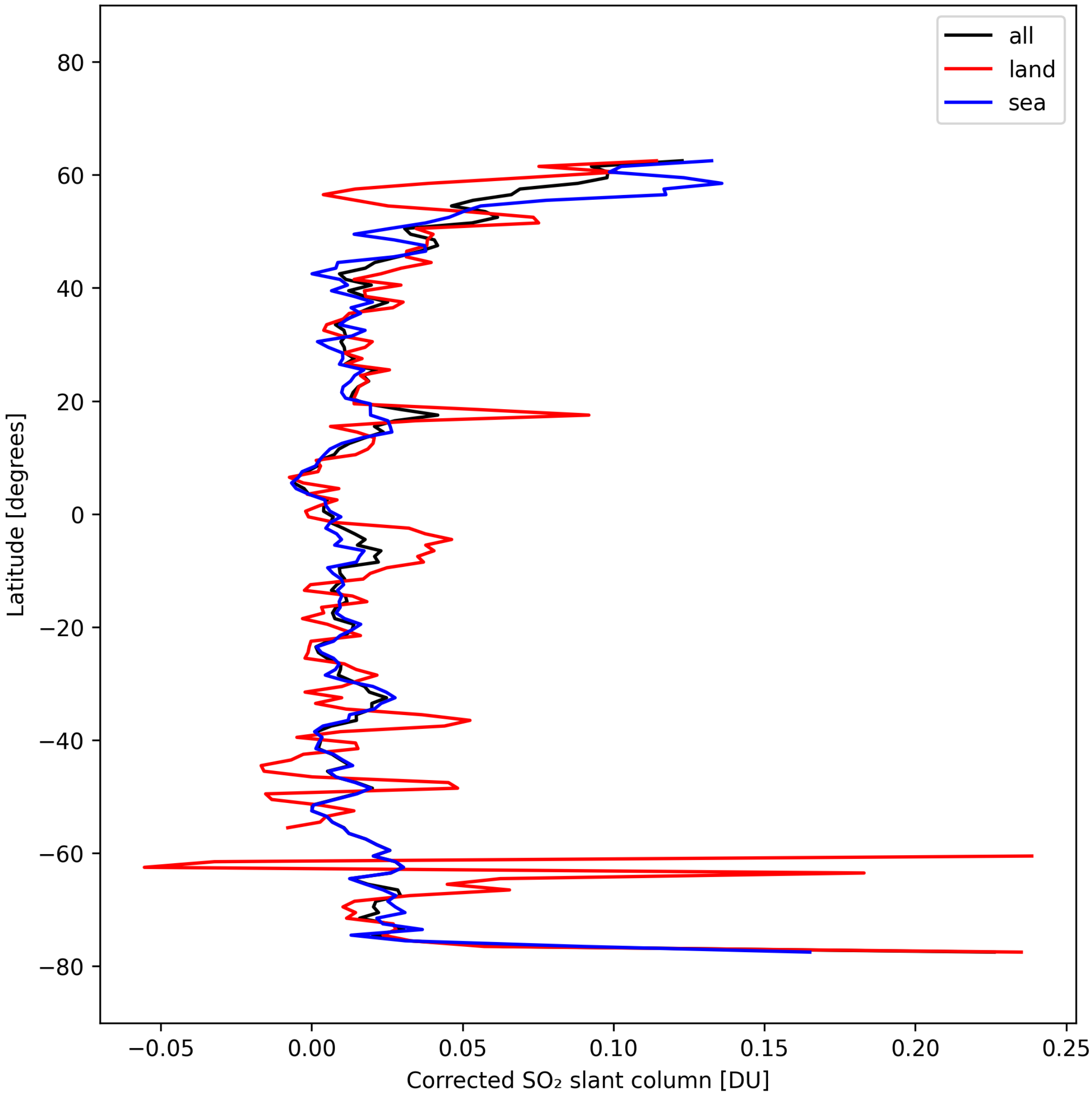


Figure 33: Zonal average of “Corrected SO_2 slant column” for 2025-03-01 to 2025-03-02.

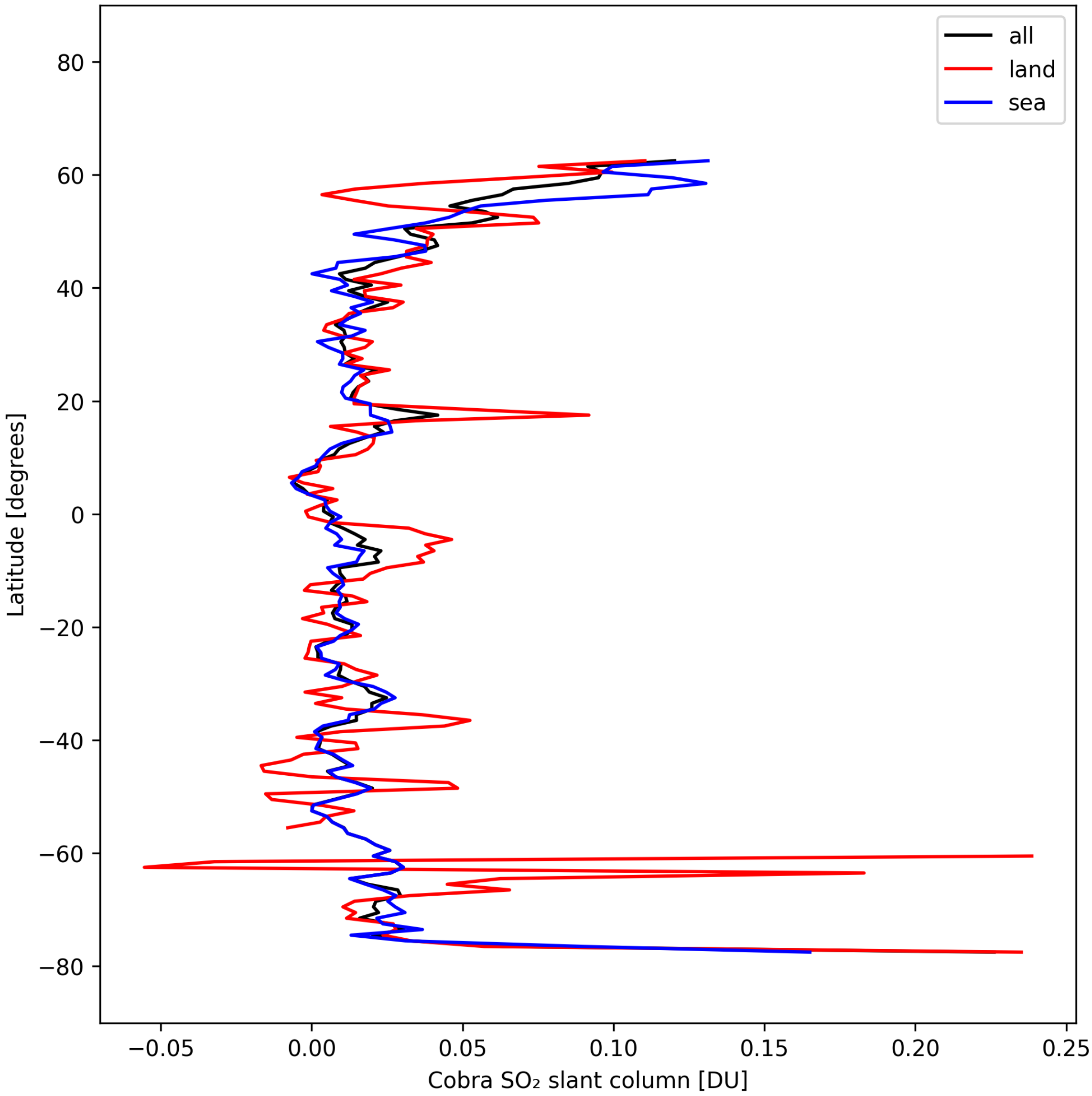


Figure 34: Zonal average of “Cobra SO_2 slant column” for 2025-03-01 to 2025-03-02.

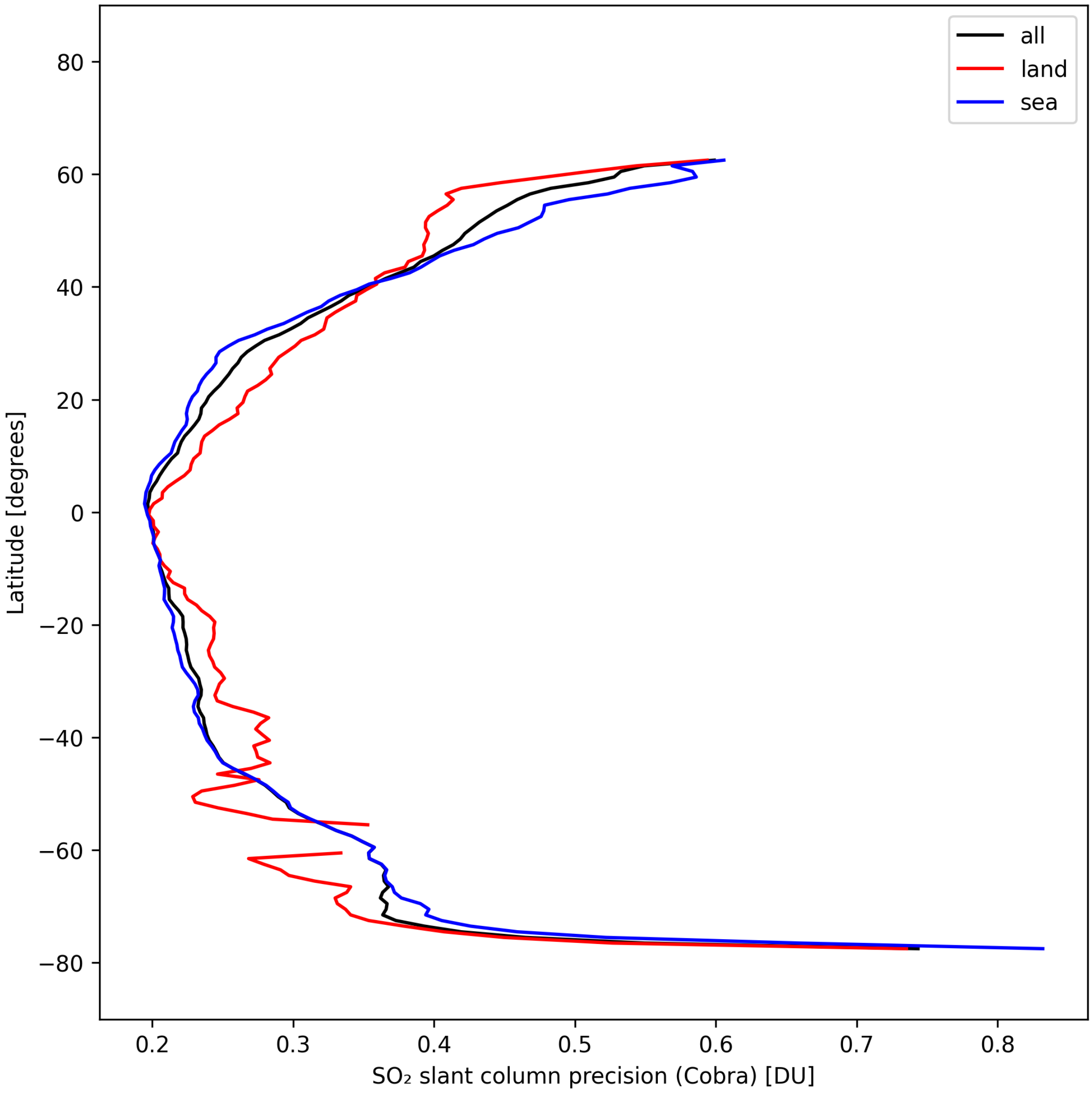


Figure 35: Zonal average of "SO_2 slant column precision (Cobra)" for 2025-03-01 to 2025-03-02.

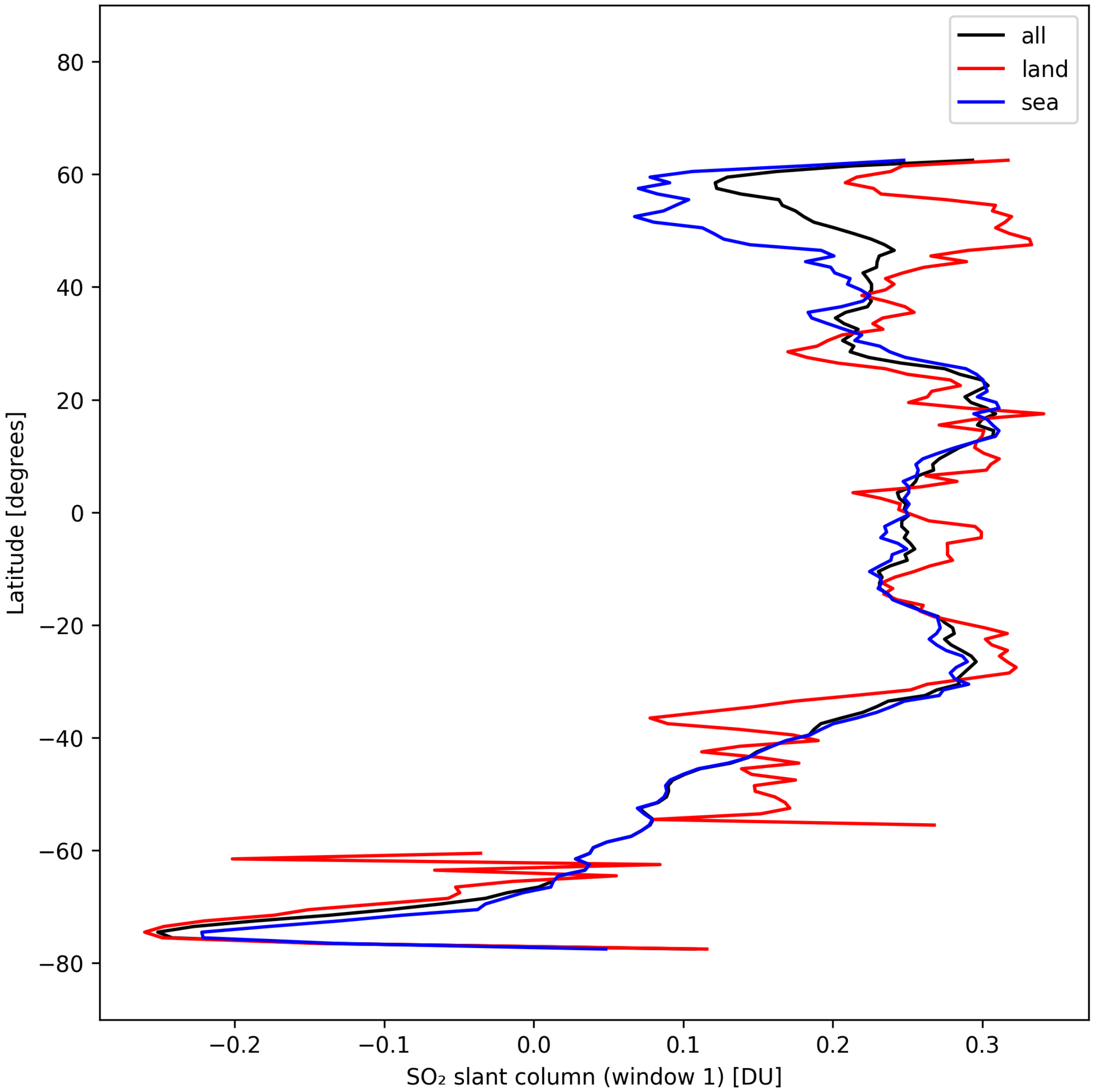


Figure 36: Zonal average of "SO_2 slant column (window 1)" for 2025-03-01 to 2025-03-02.

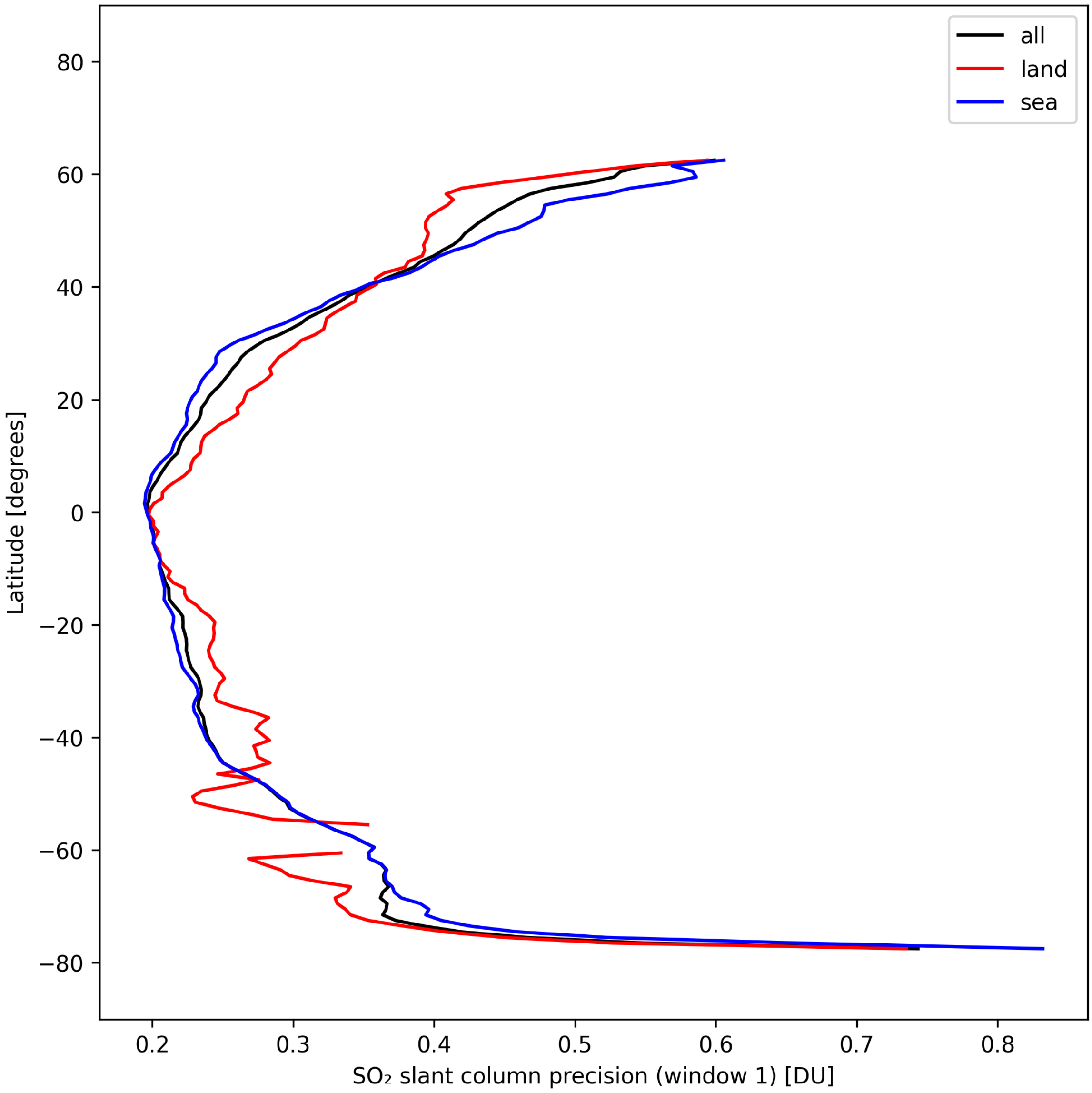


Figure 37: Zonal average of "SO_2 slant column precision (window 1)" for 2025-03-01 to 2025-03-02.

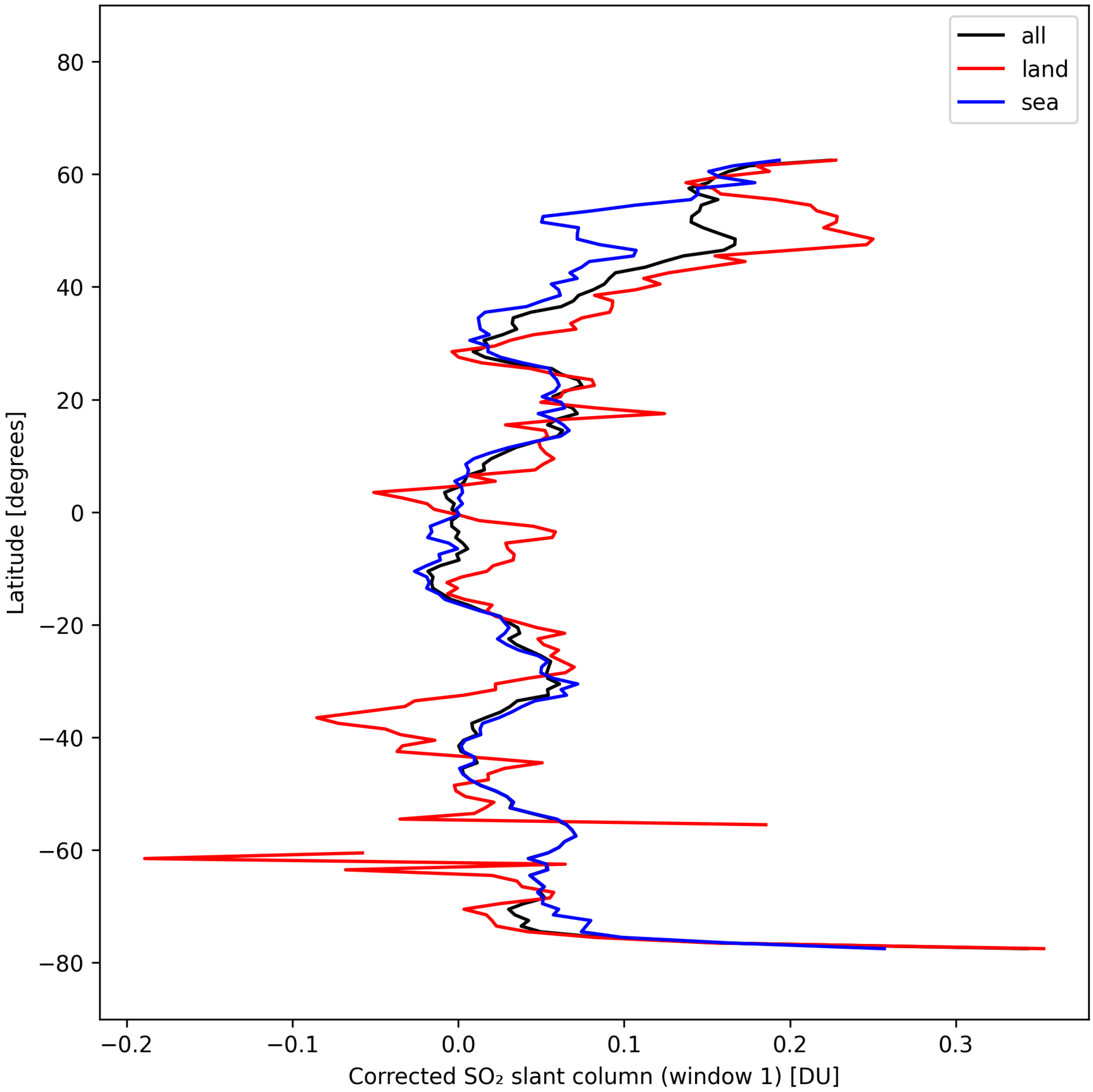


Figure 38: Zonal average of "Corrected SO_2 slant column (window 1)" for 2025-03-01 to 2025-03-02.

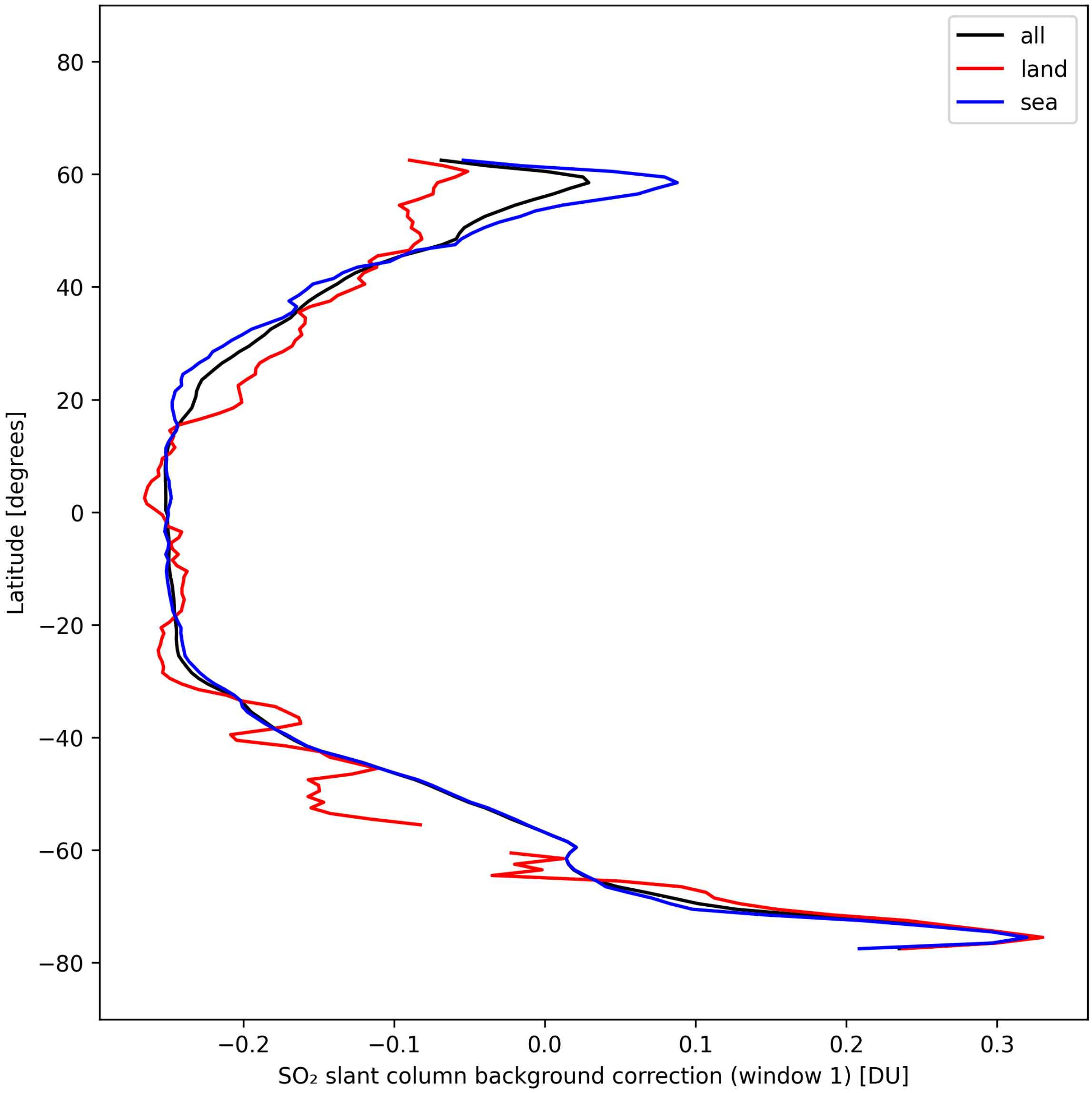


Figure 39: Zonal average of “SO_2 slant column background correction (window 1)” for 2025-03-01 to 2025-03-02.

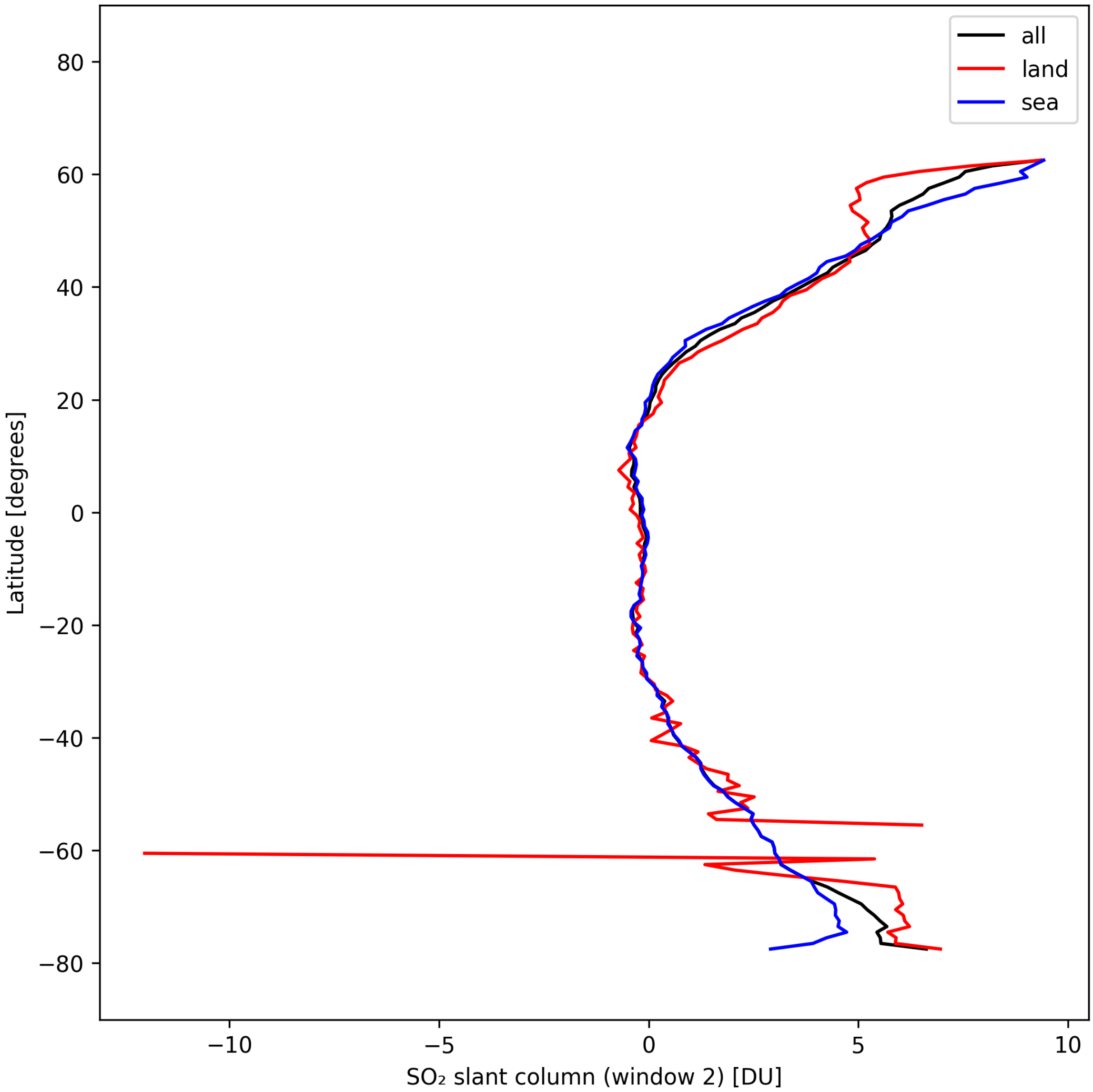


Figure 40: Zonal average of “SO_2 slant column (window 2)” for 2025-03-01 to 2025-03-02.

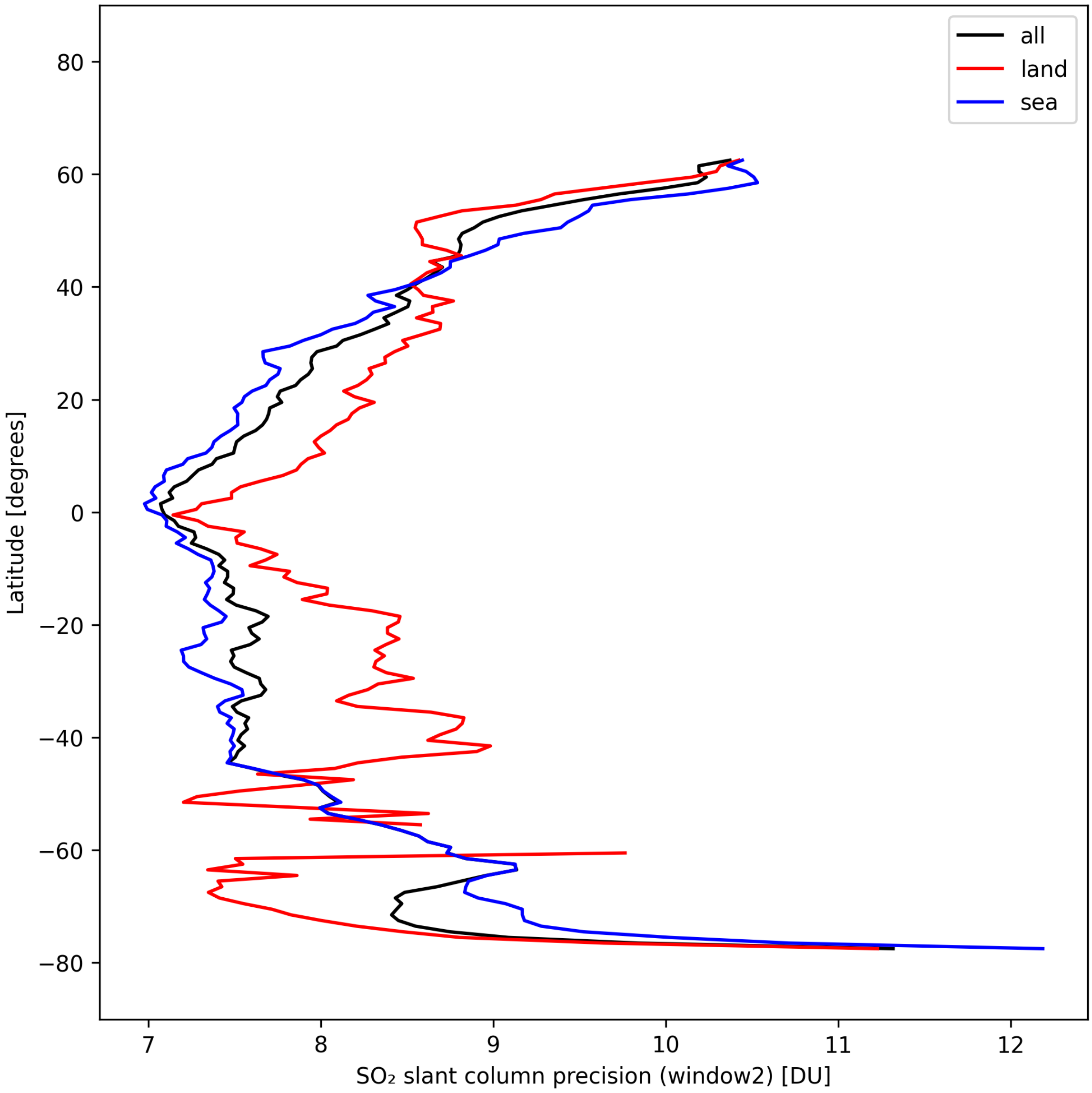


Figure 41: Zonal average of “SO_2 slant column precision (window2)” for 2025-03-01 to 2025-03-02.

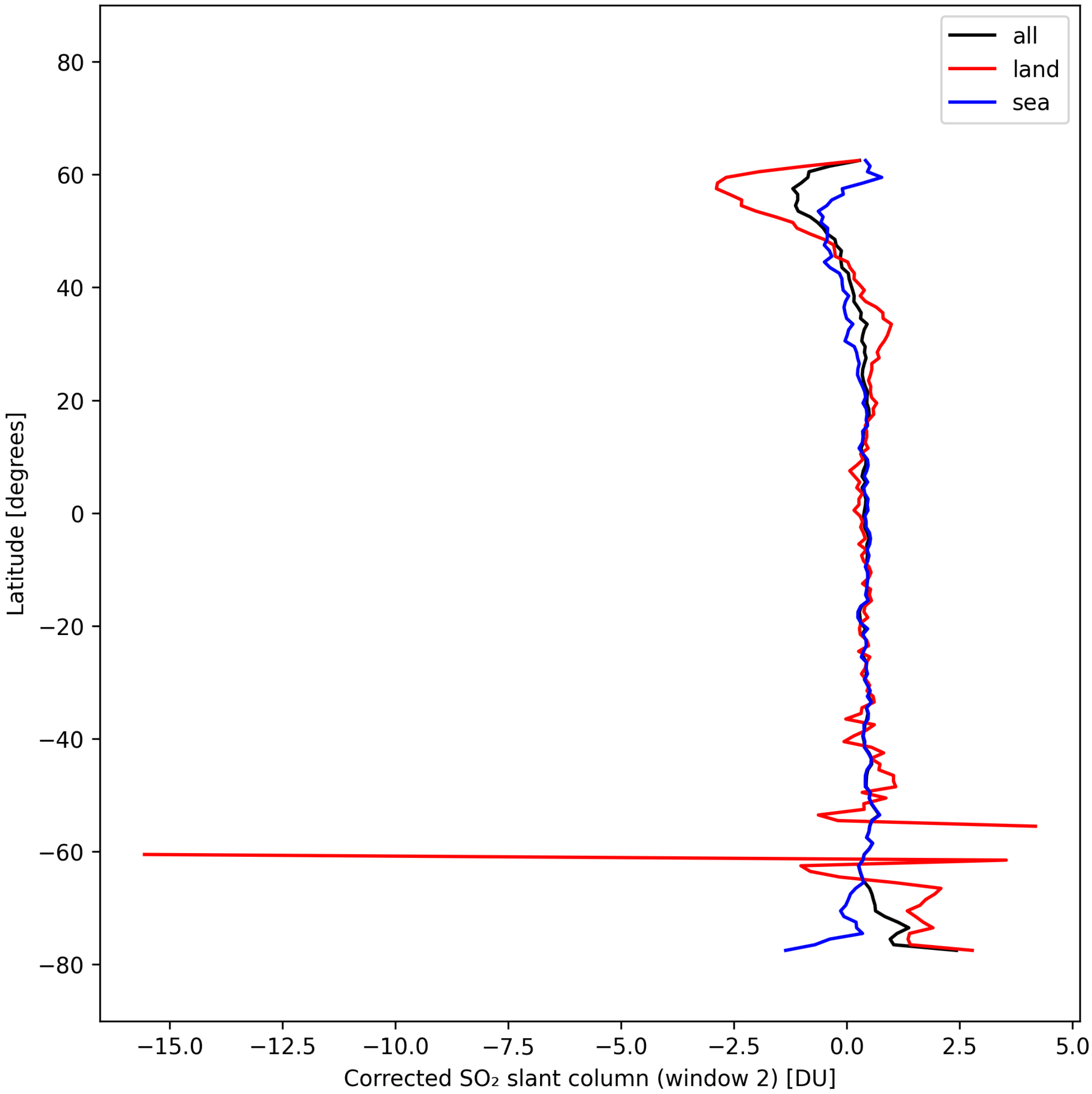


Figure 42: Zonal average of "Corrected SO_2 slant column (window 2)" for 2025-03-01 to 2025-03-02.

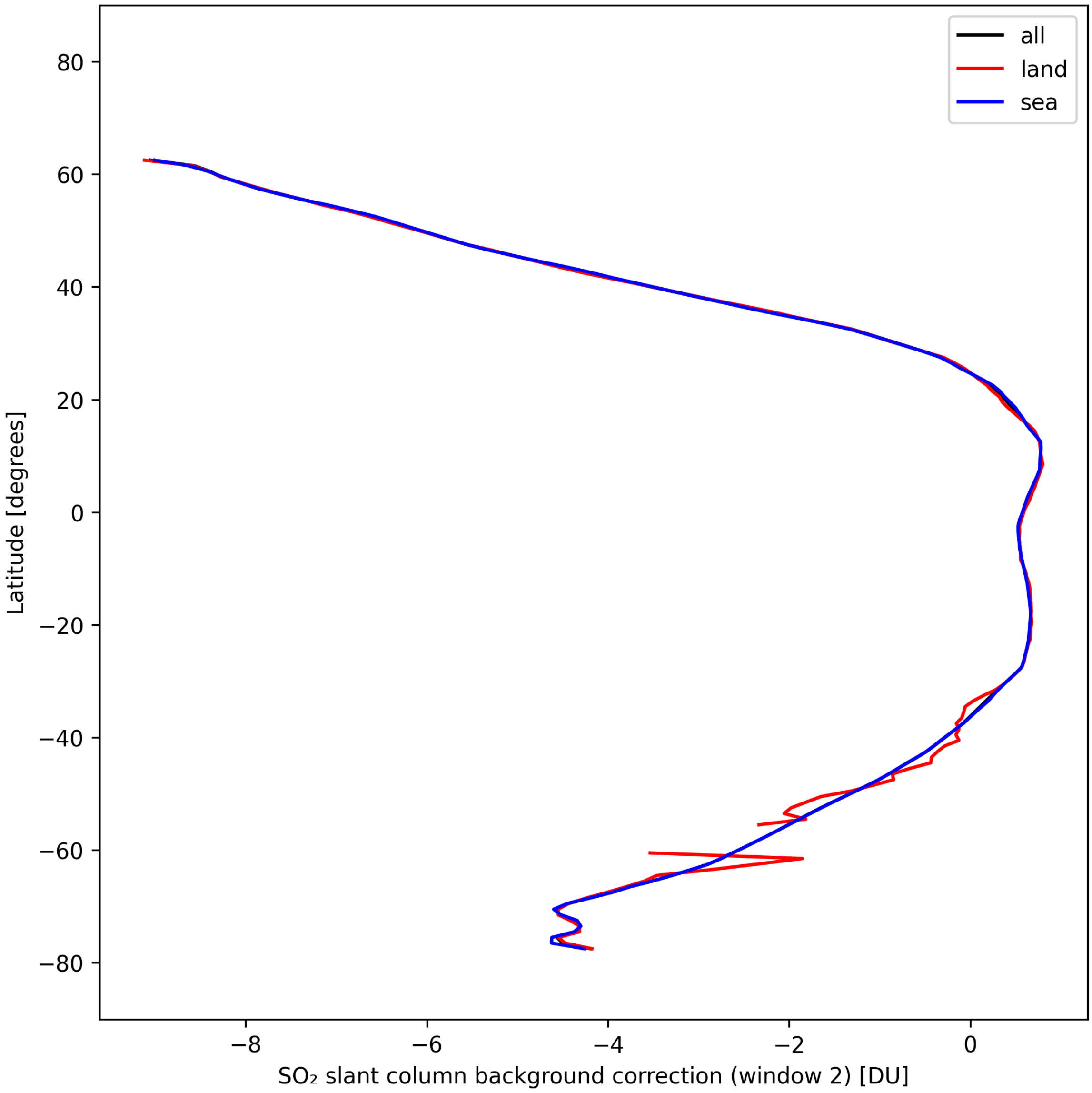


Figure 43: Zonal average of “SO_2 slant column background correction (window 2)” for 2025-03-01 to 2025-03-02.

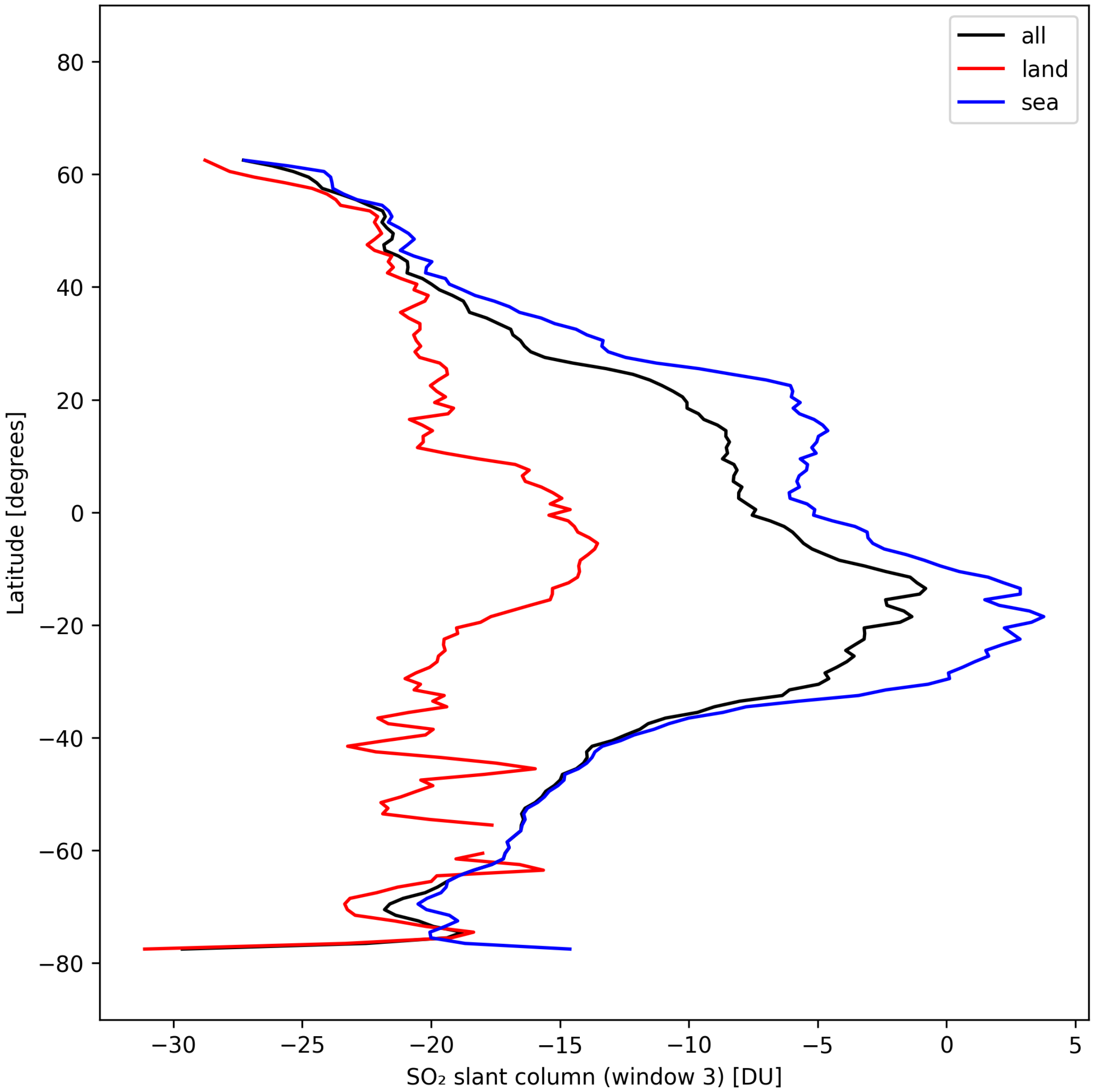


Figure 44: Zonal average of “SO_2 slant column (window 3)” for 2025-03-01 to 2025-03-02.

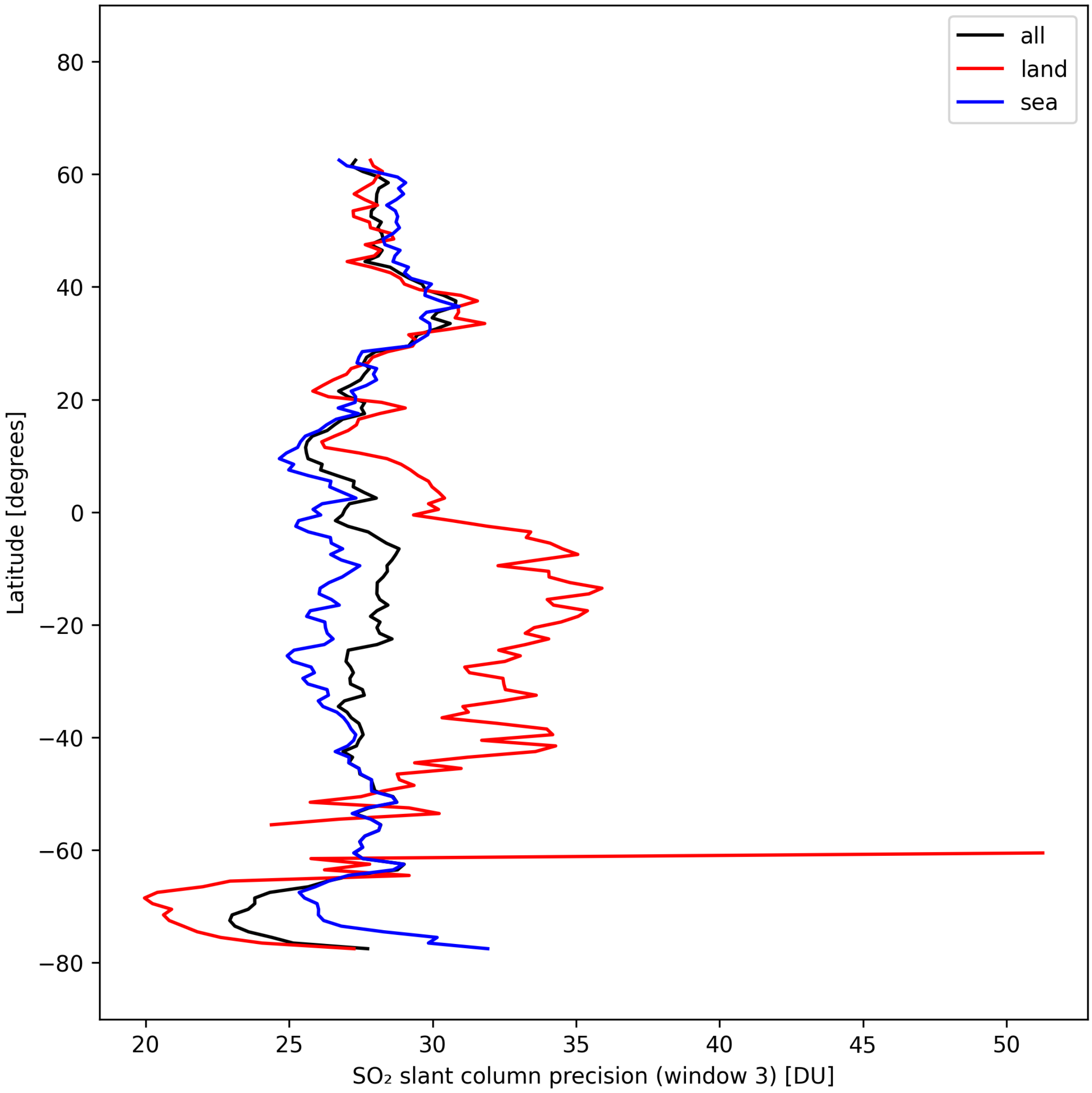


Figure 45: Zonal average of “SO_2 slant column precision (window 3)” for 2025-03-01 to 2025-03-02.

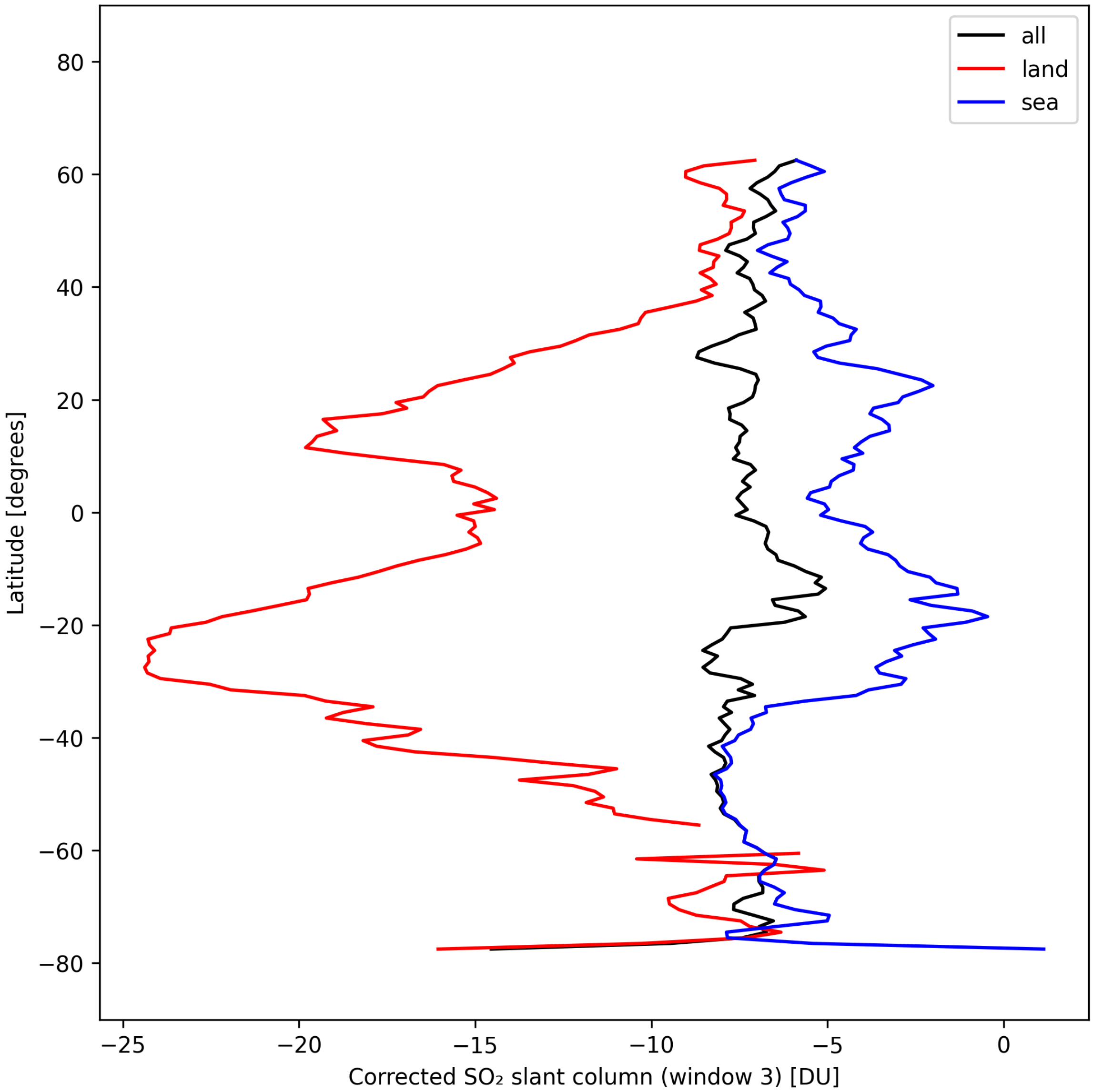


Figure 46: Zonal average of “Corrected SO_2 slant column (window 3)” for 2025-03-01 to 2025-03-02.

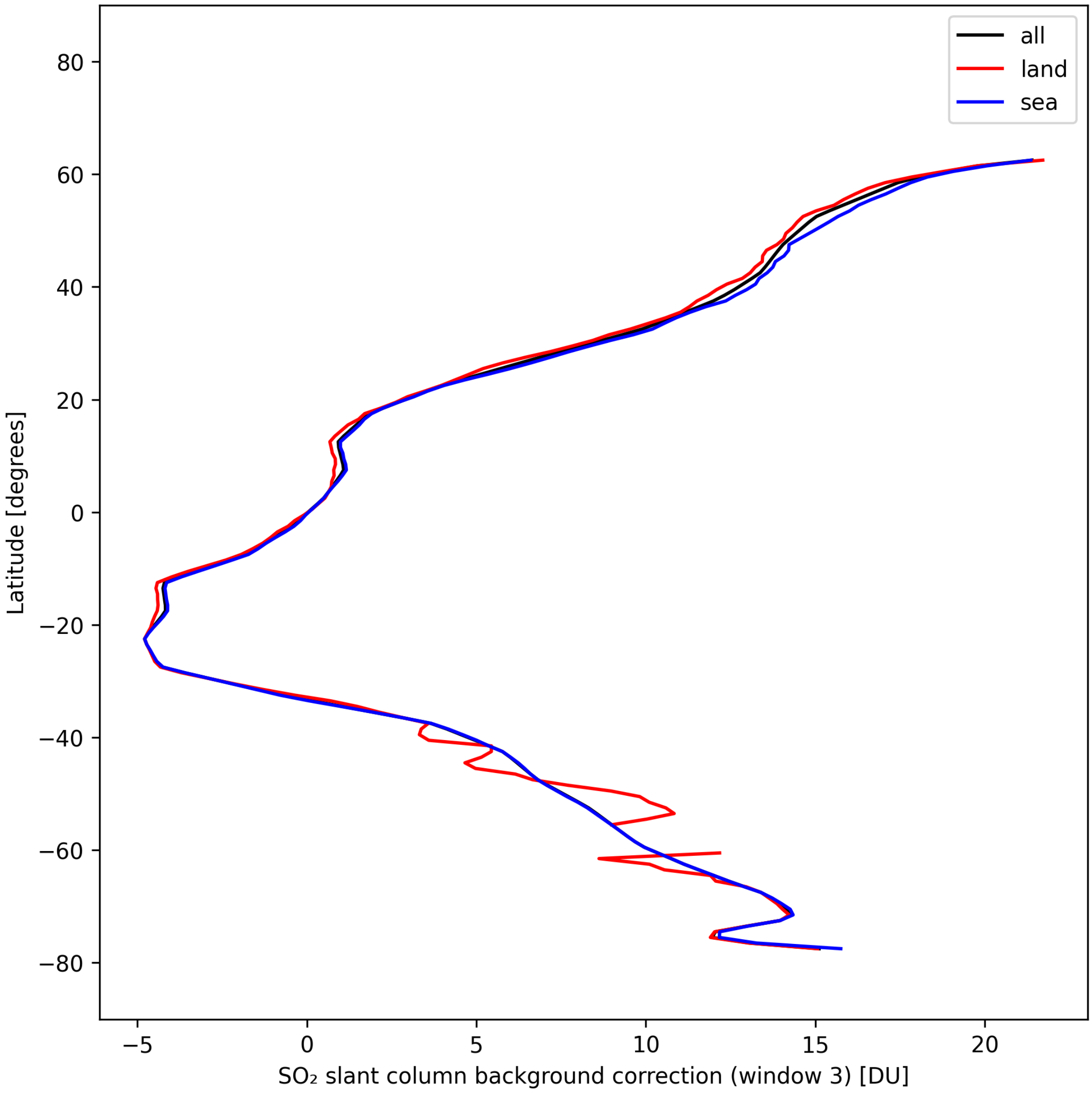


Figure 47: Zonal average of “SO_2 slant column background correction (window 3)” for 2025-03-01 to 2025-03-02.

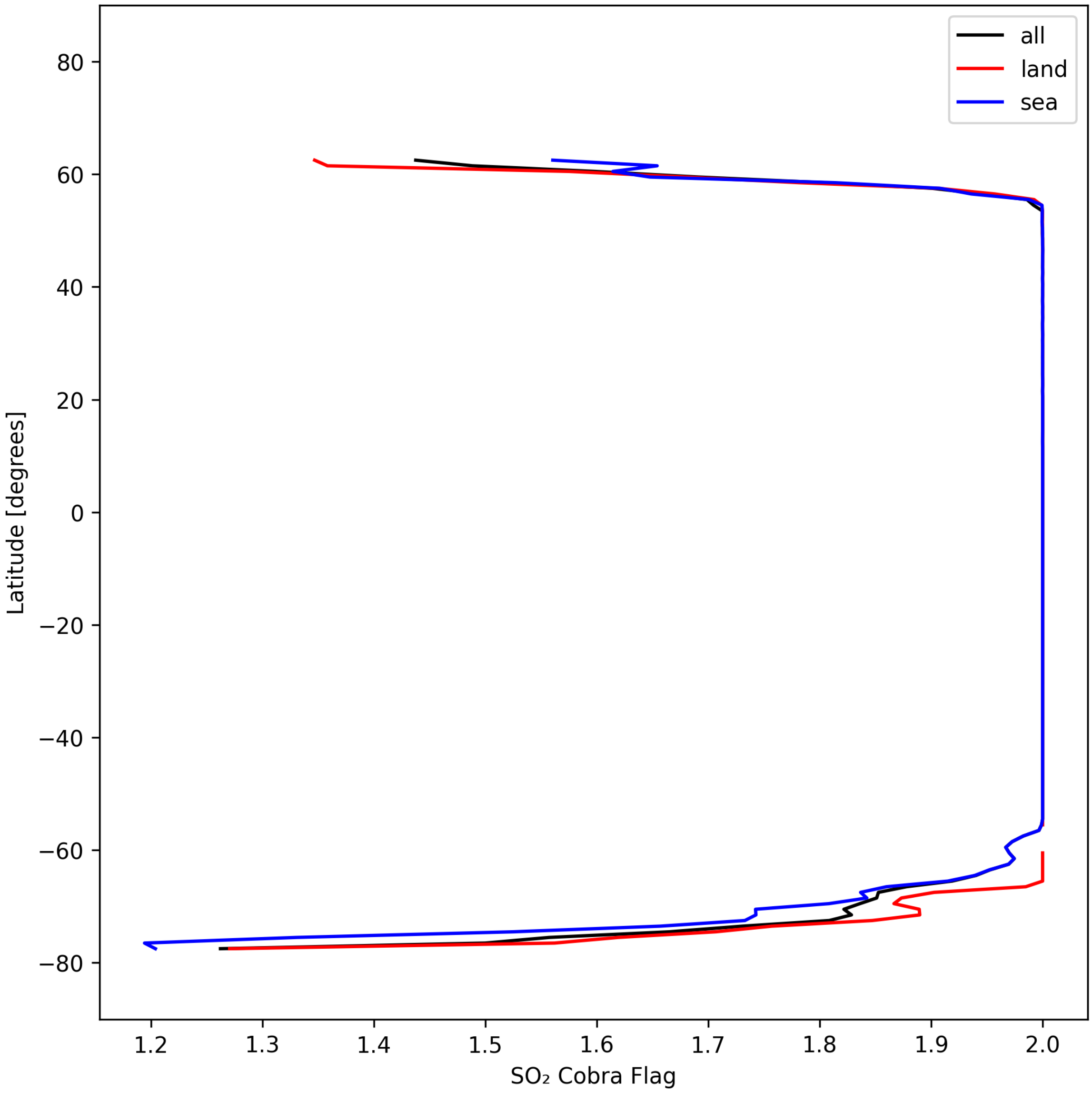


Figure 48: Zonal average of “SO_2 Cobra Flag” for 2025-03-01 to 2025-03-02.

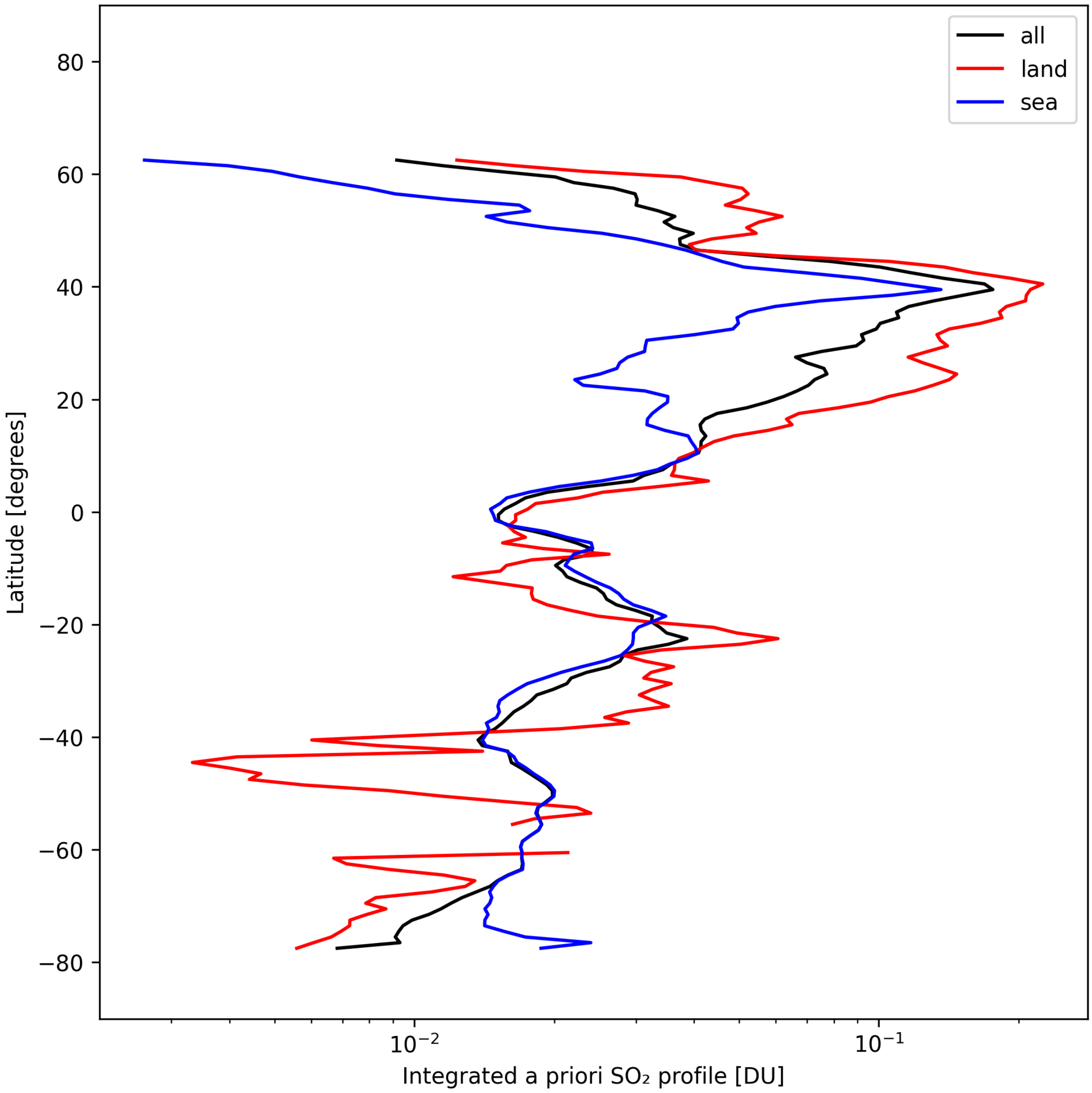


Figure 49: Zonal average of “Integrated a priori SO_2 profile” for 2025-03-01 to 2025-03-02.

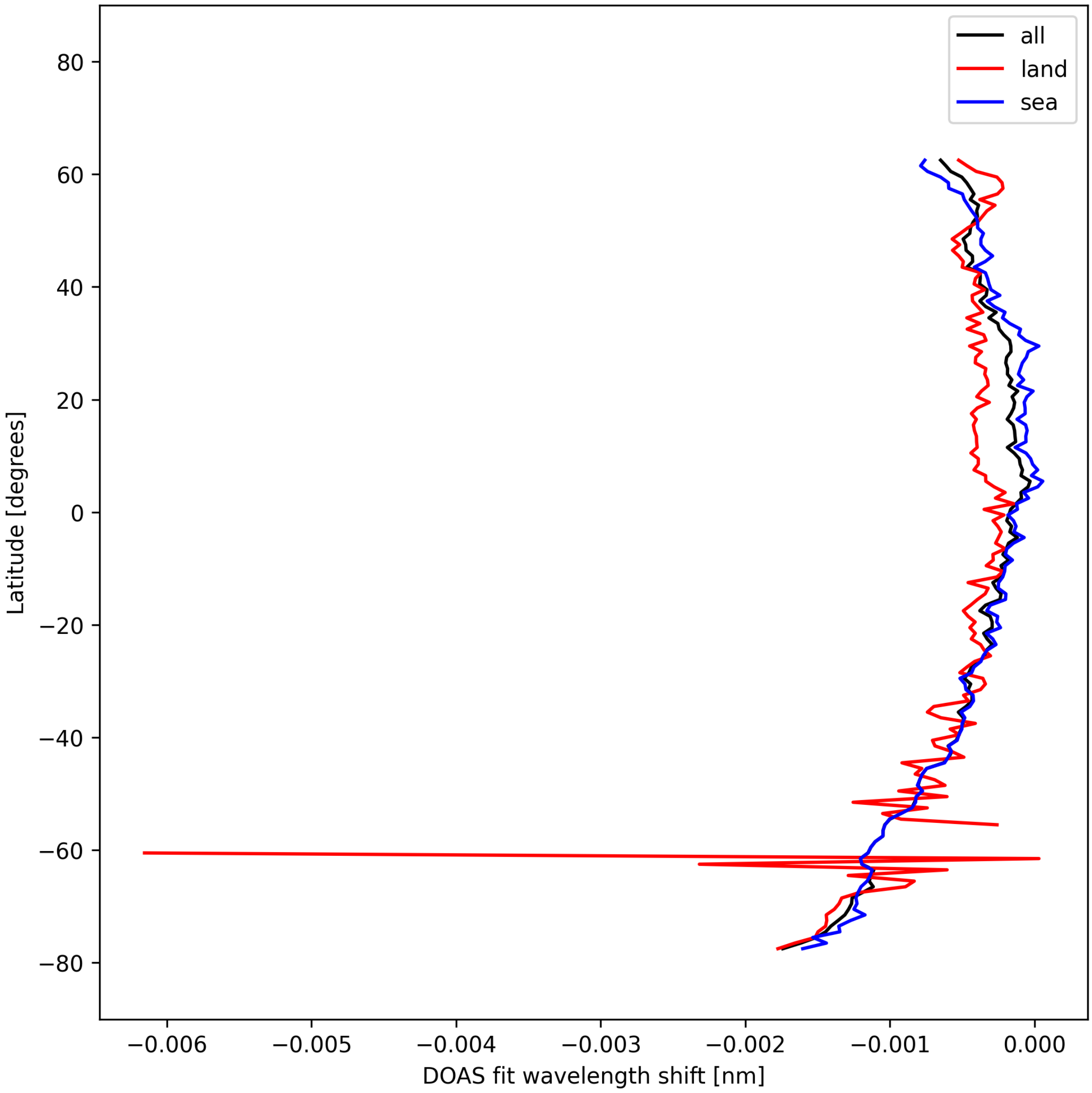


Figure 50: Zonal average of “DOAS fit wavelength shift” for 2025-03-01 to 2025-03-02.

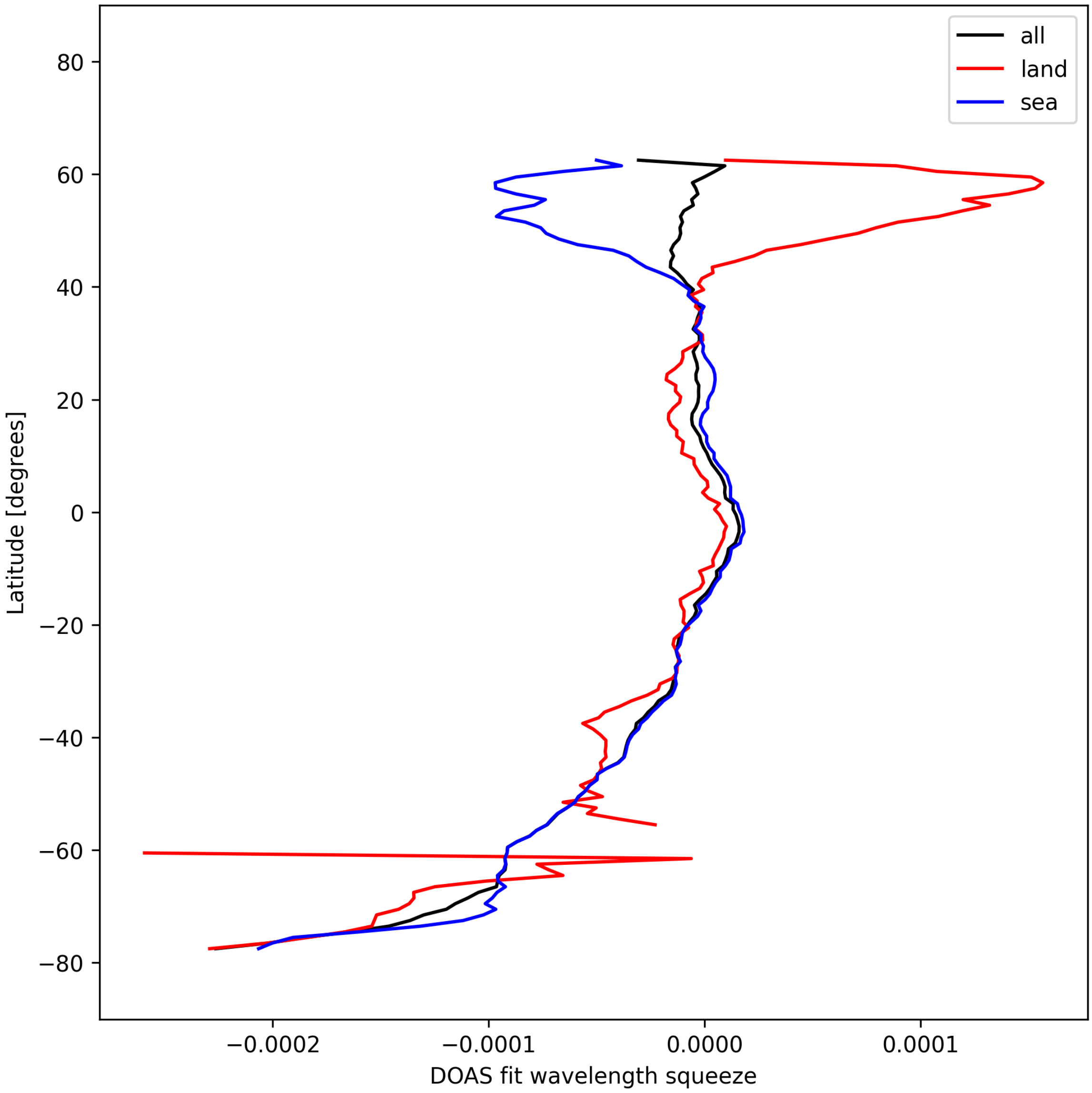


Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-03-01 to 2025-03-02.

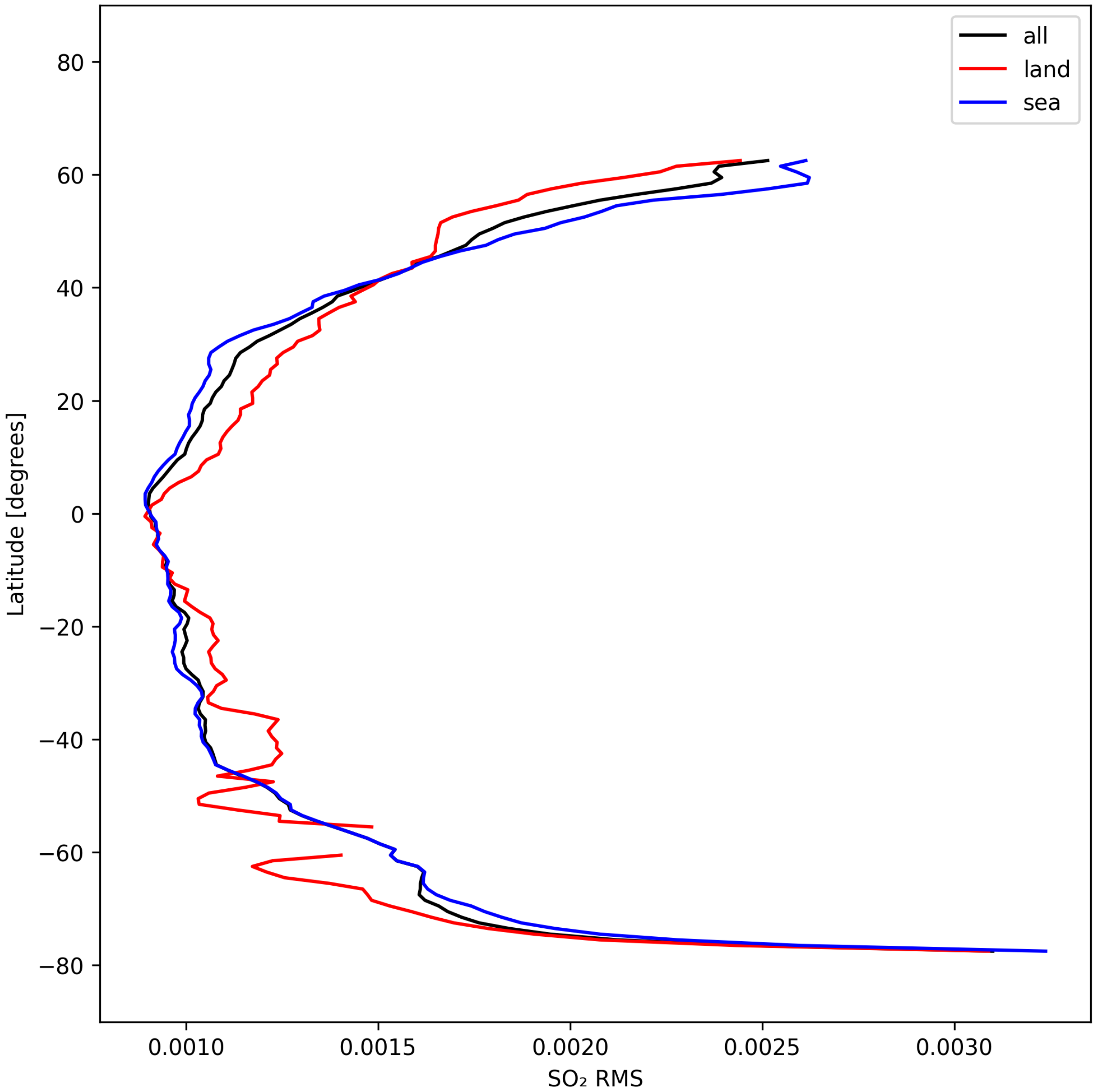


Figure 52: Zonal average of “SO_2 RMS” for 2025-03-01 to 2025-03-02.

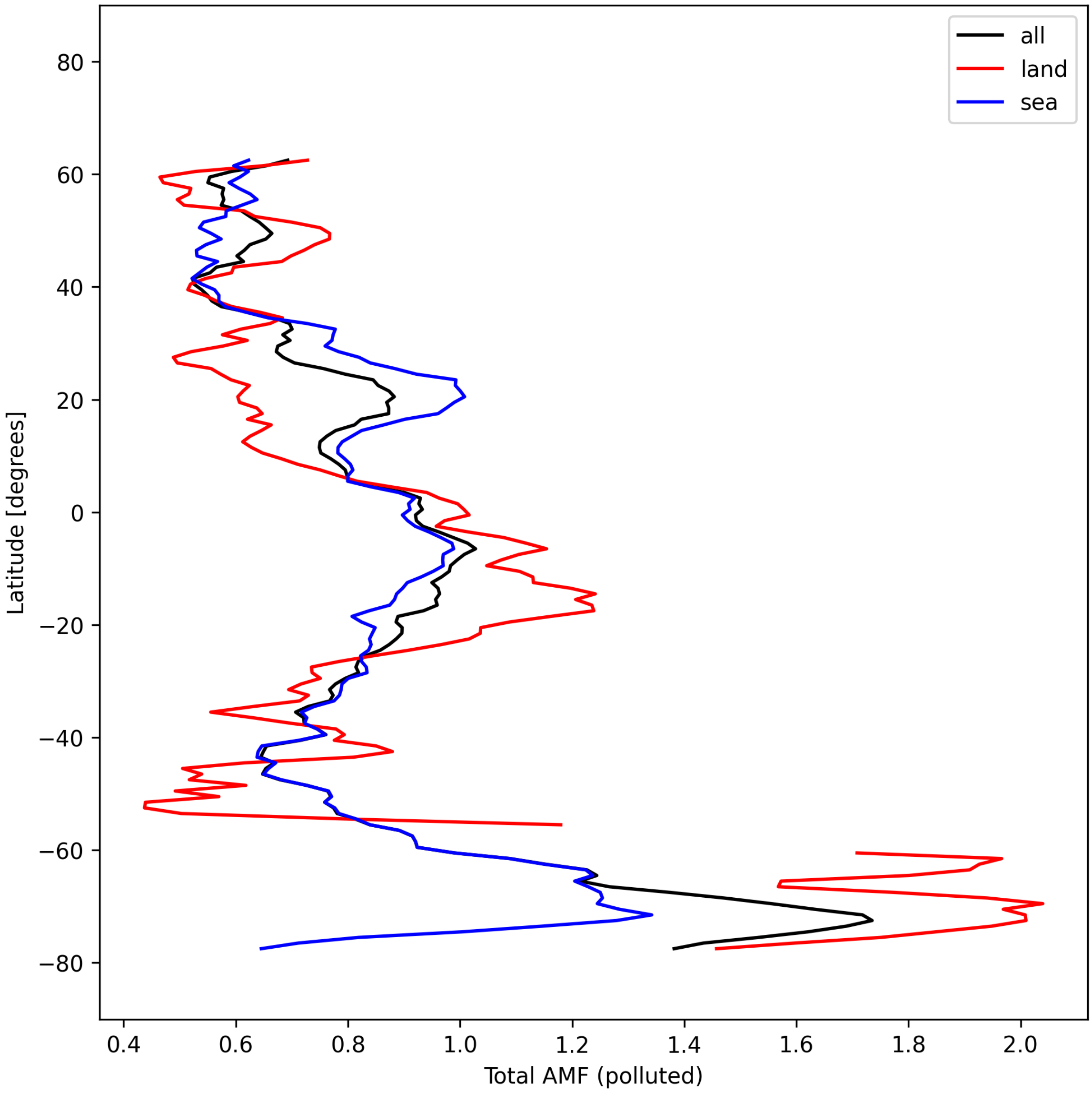


Figure 53: Zonal average of “Total AMF (polluted)” for 2025-03-01 to 2025-03-02.

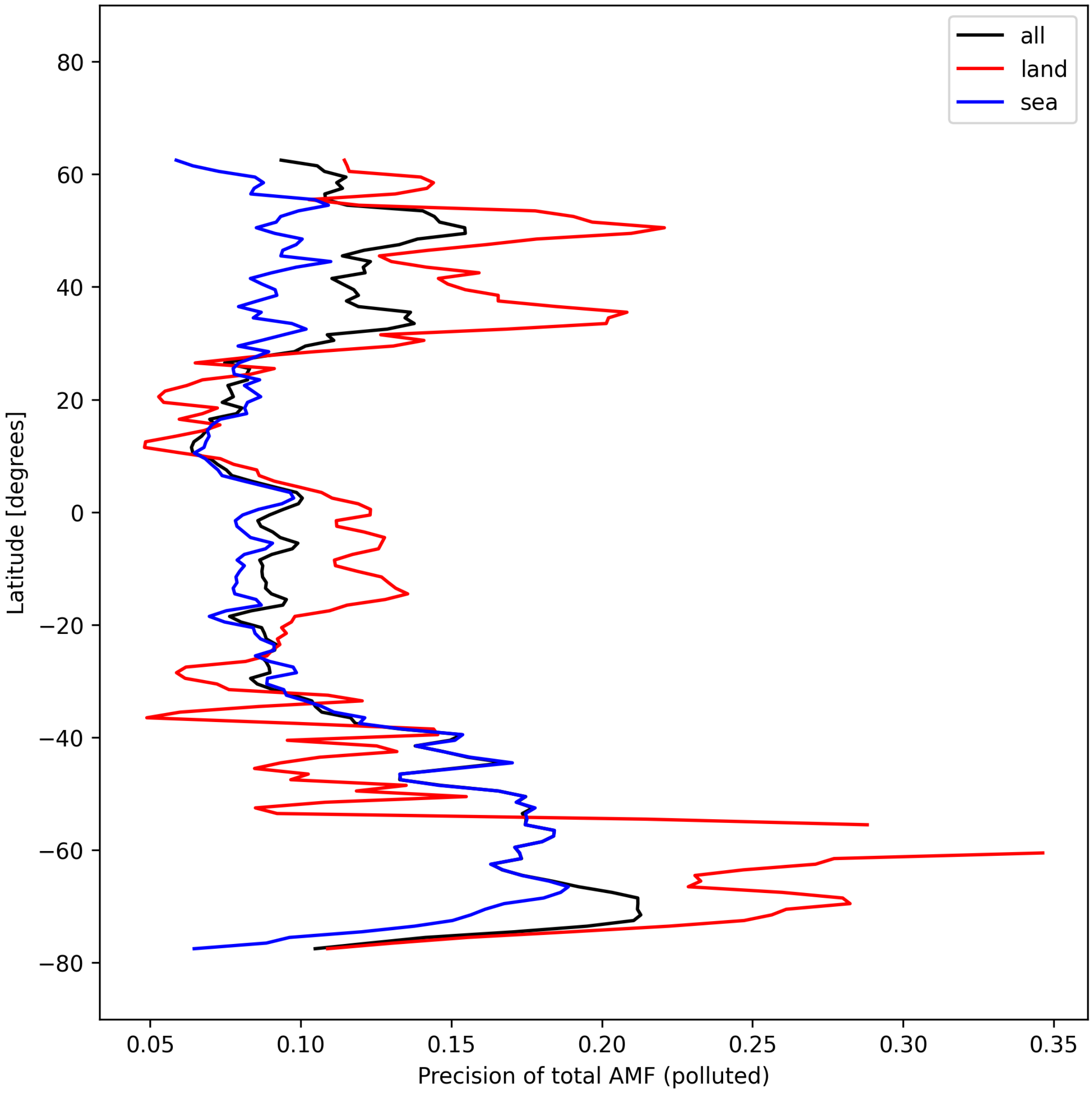


Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-03-01 to 2025-03-02.

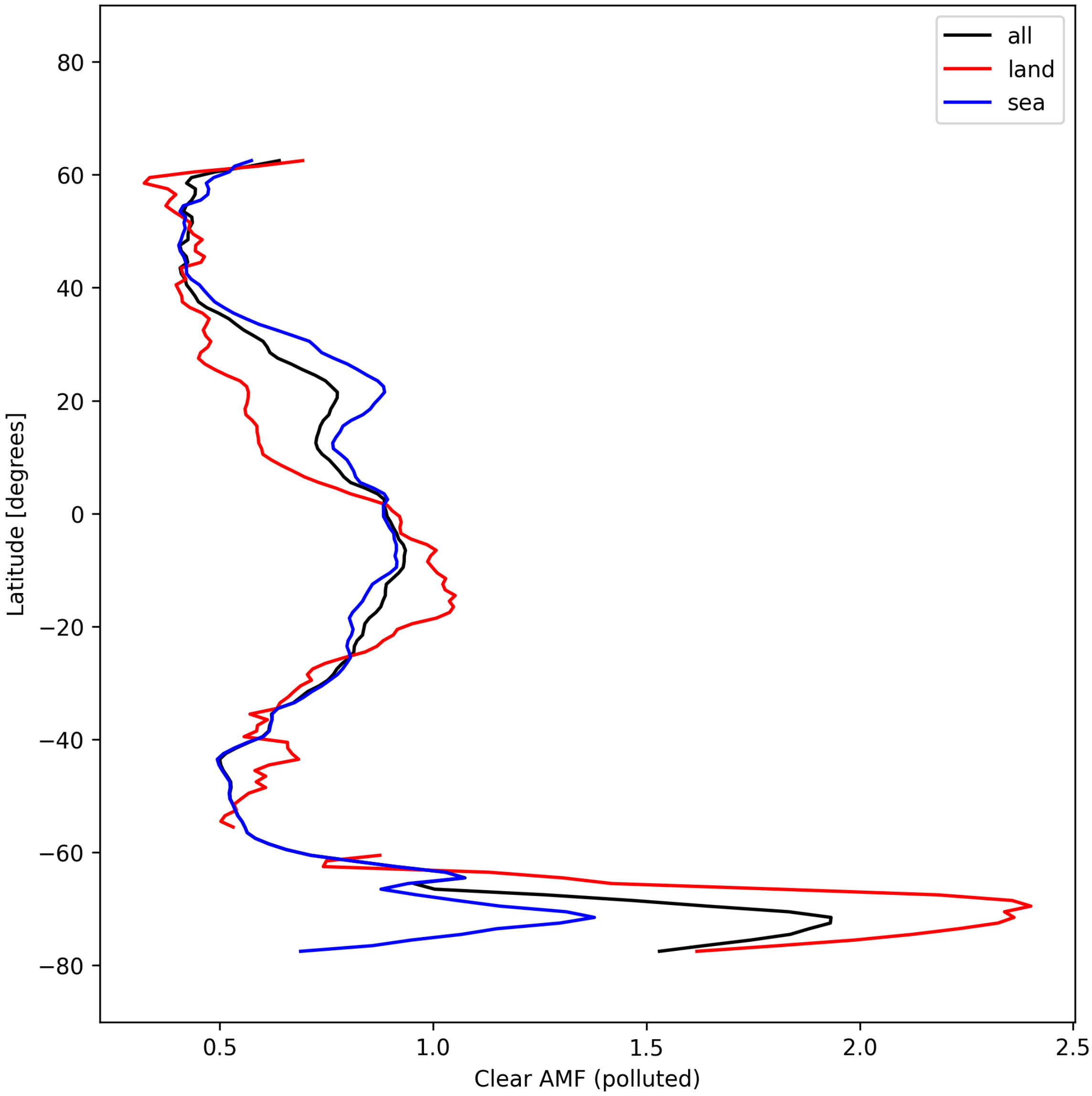


Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-03-01 to 2025-03-02.

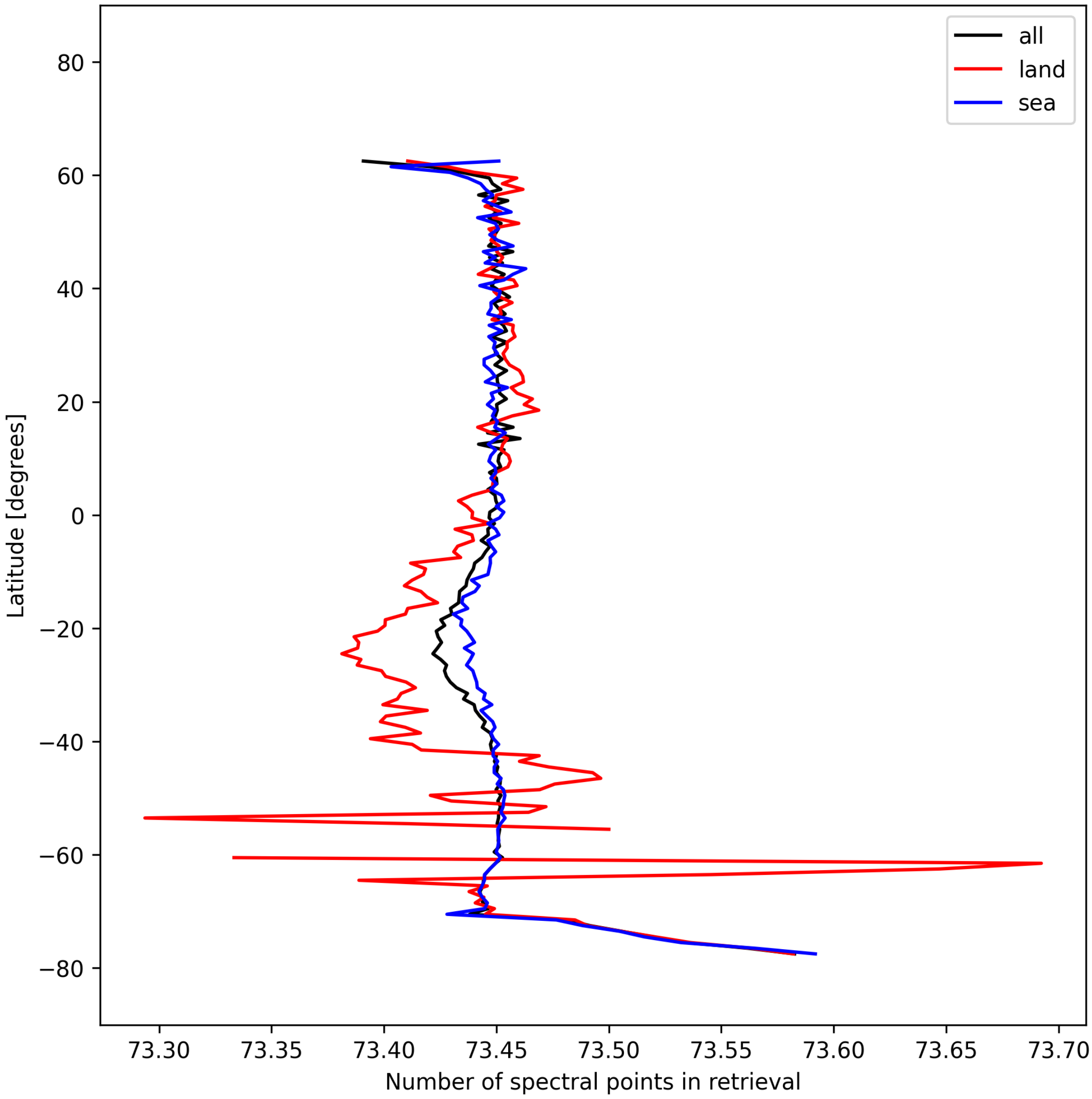


Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-03-01 to 2025-03-02.

8 Histograms

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

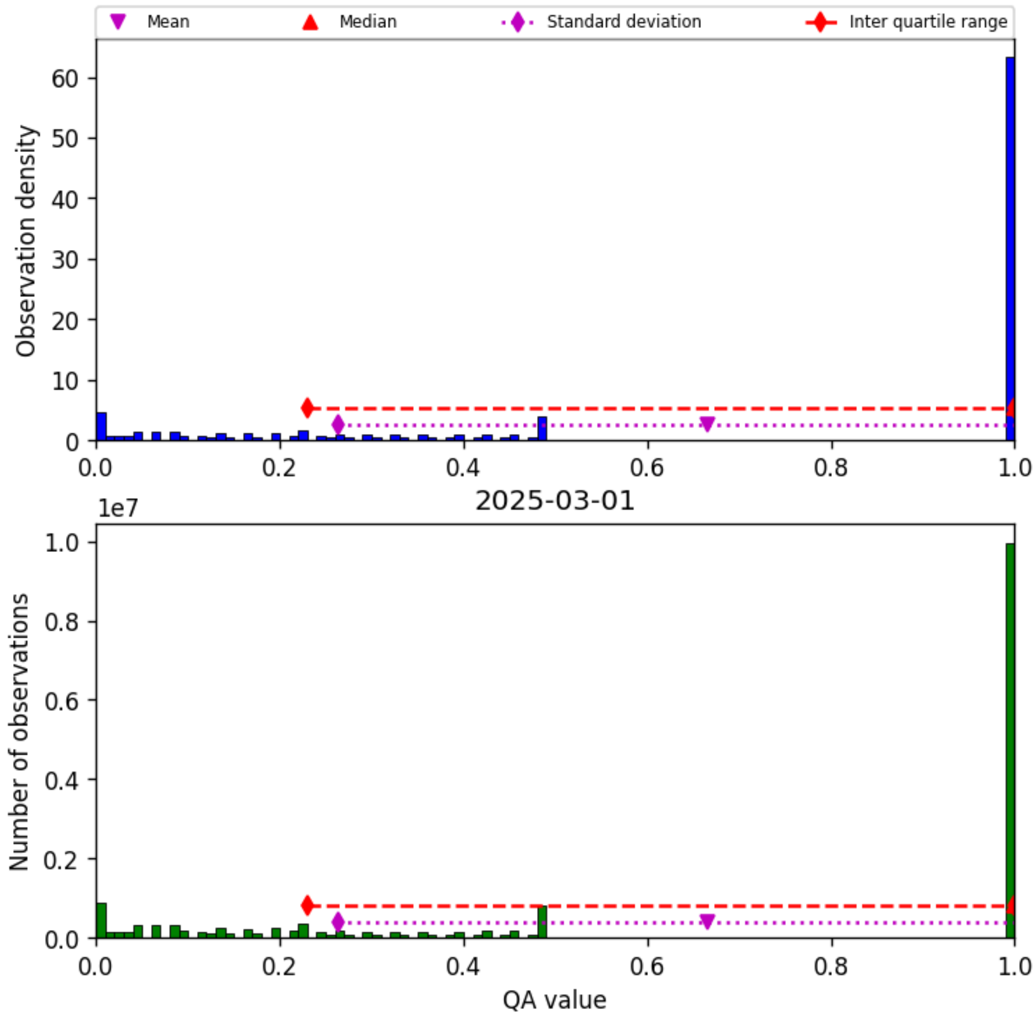


Figure 57: Histogram of “QA value” for 2025-03-01 to 2025-03-02

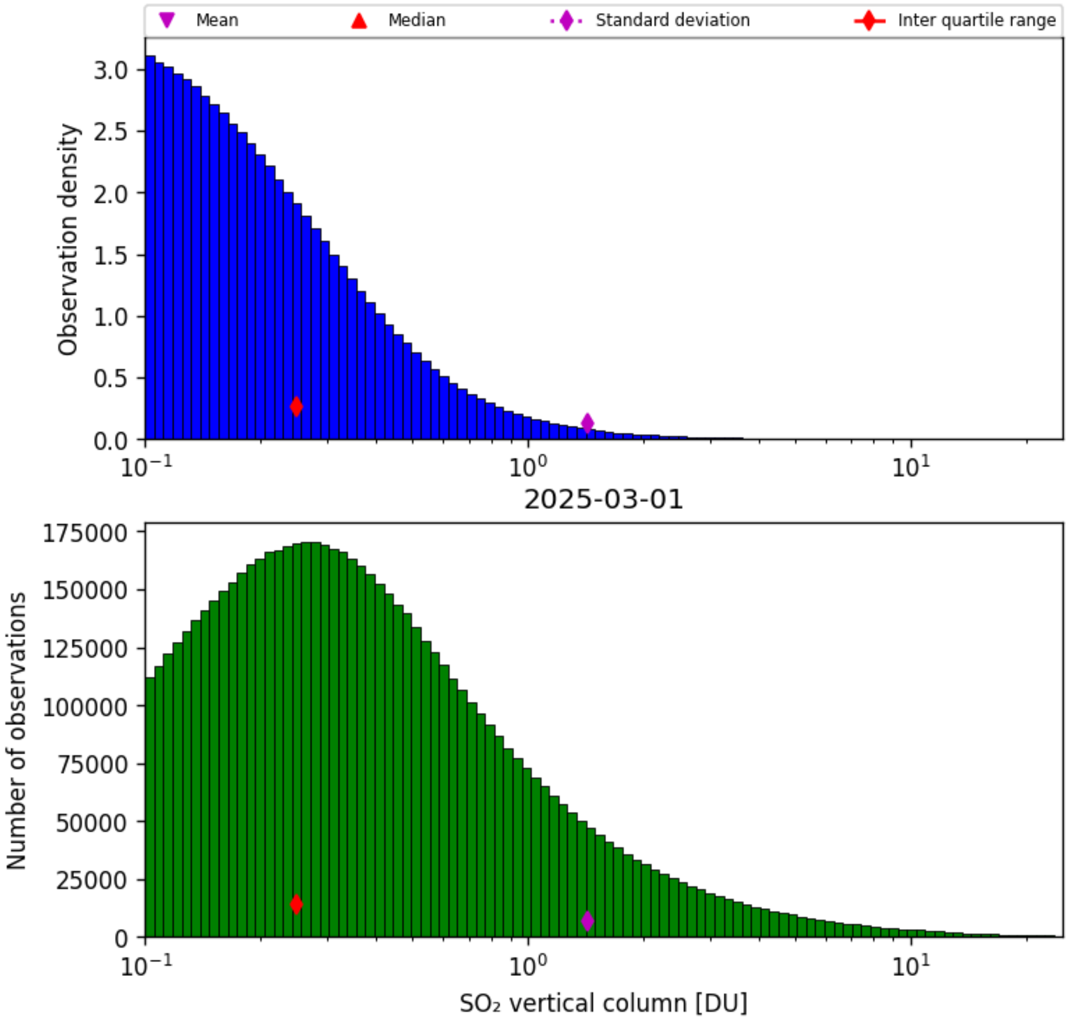


Figure 58: Histogram of “SO_2 vertical column” for 2025-03-01 to 2025-03-02

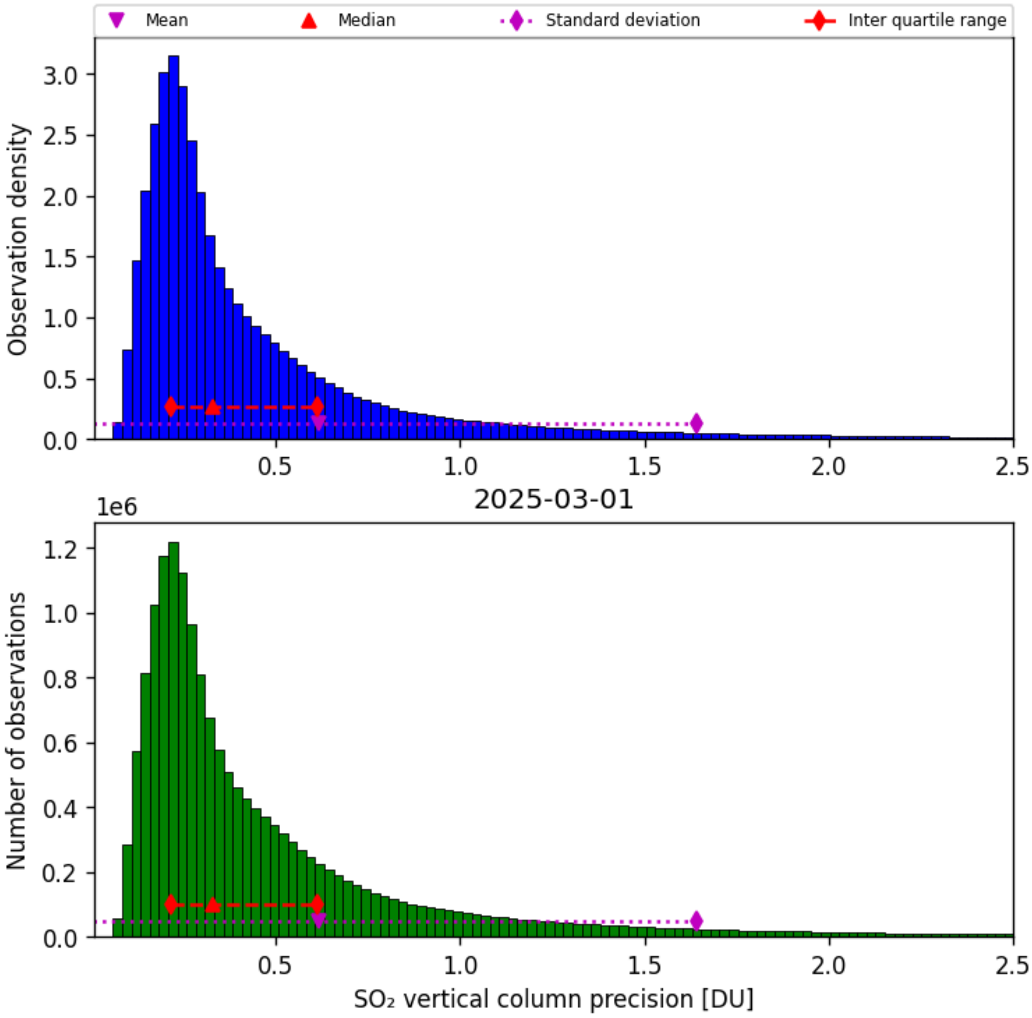


Figure 59: Histogram of “SO_2 vertical column precision” for 2025-03-01 to 2025-03-02

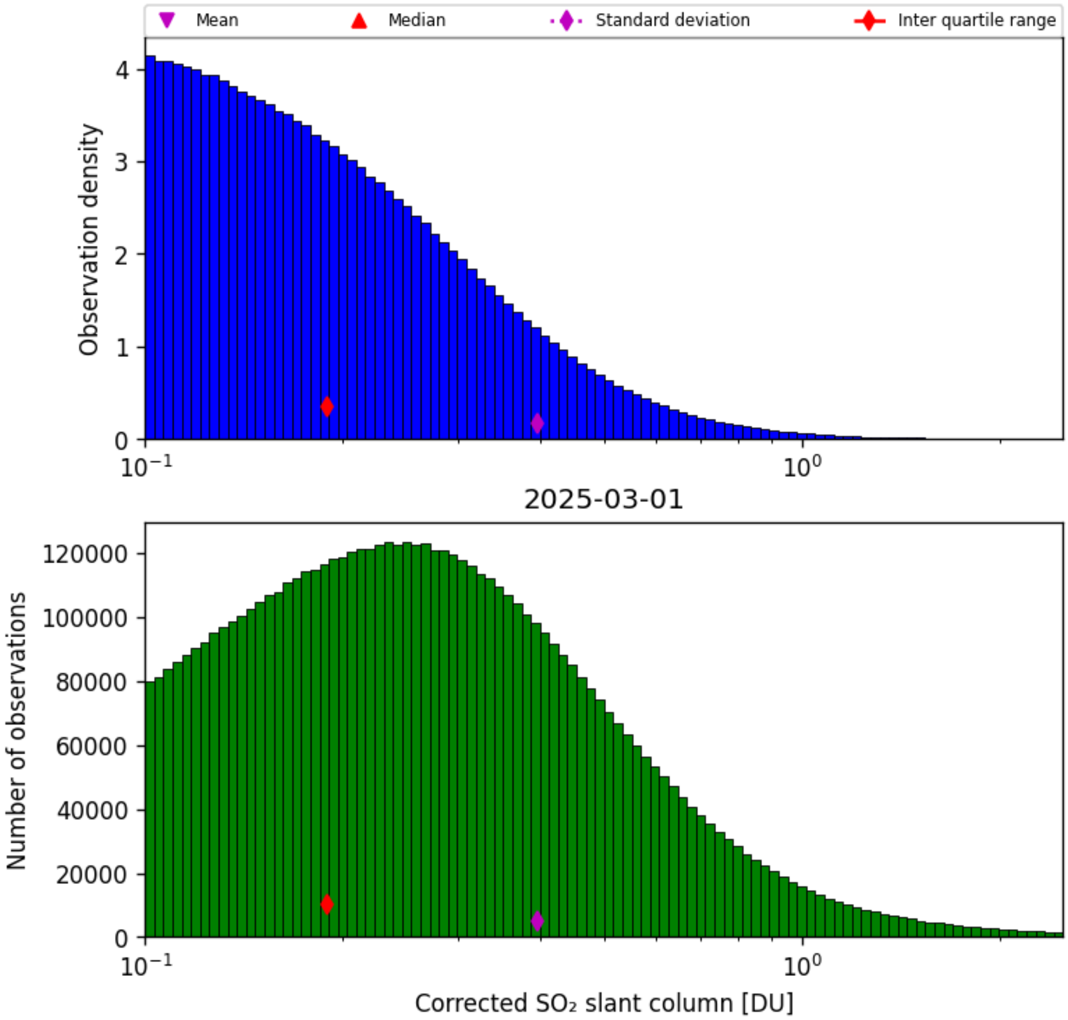


Figure 60: Histogram of “Corrected SO_2 slant column” for 2025-03-01 to 2025-03-02

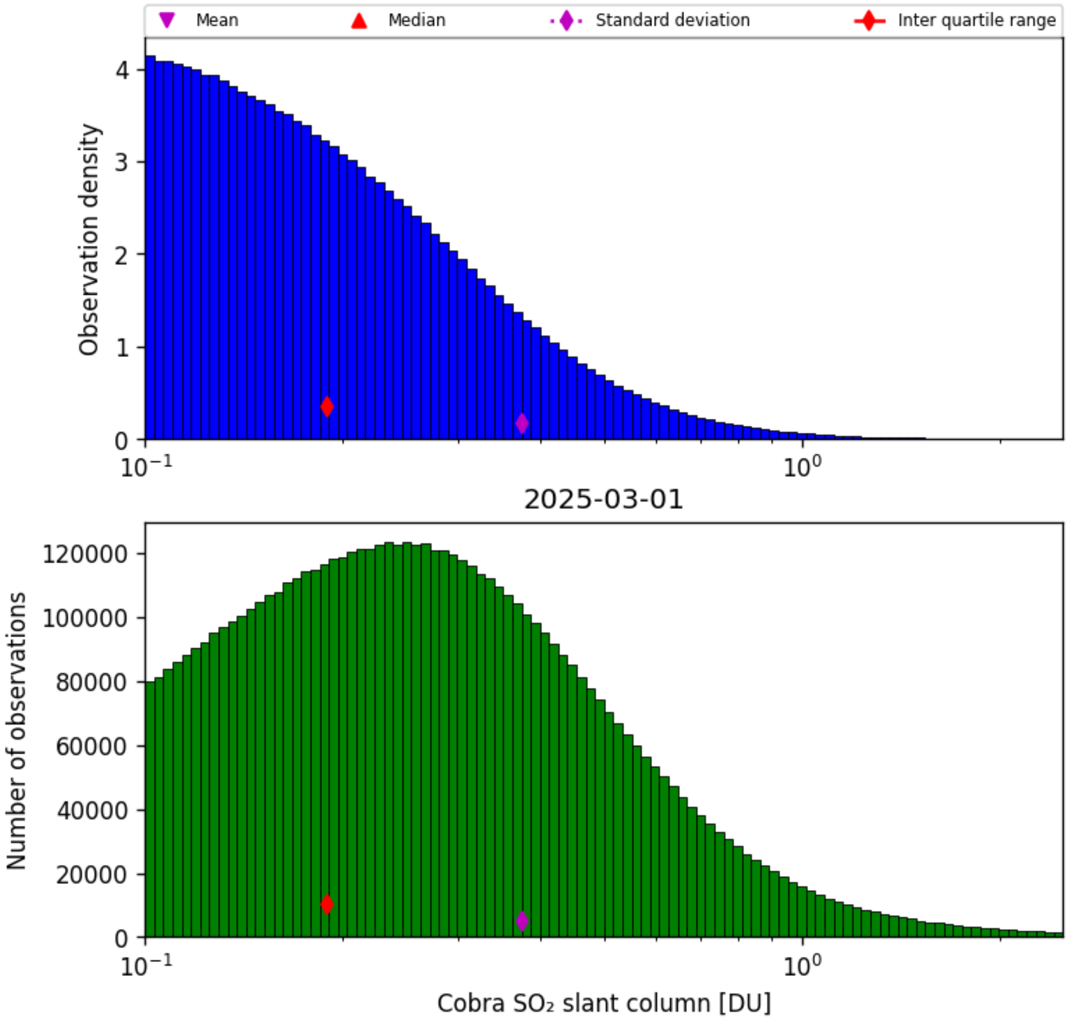


Figure 61: Histogram of “Cobra SO_2 slant column” for 2025-03-01 to 2025-03-02

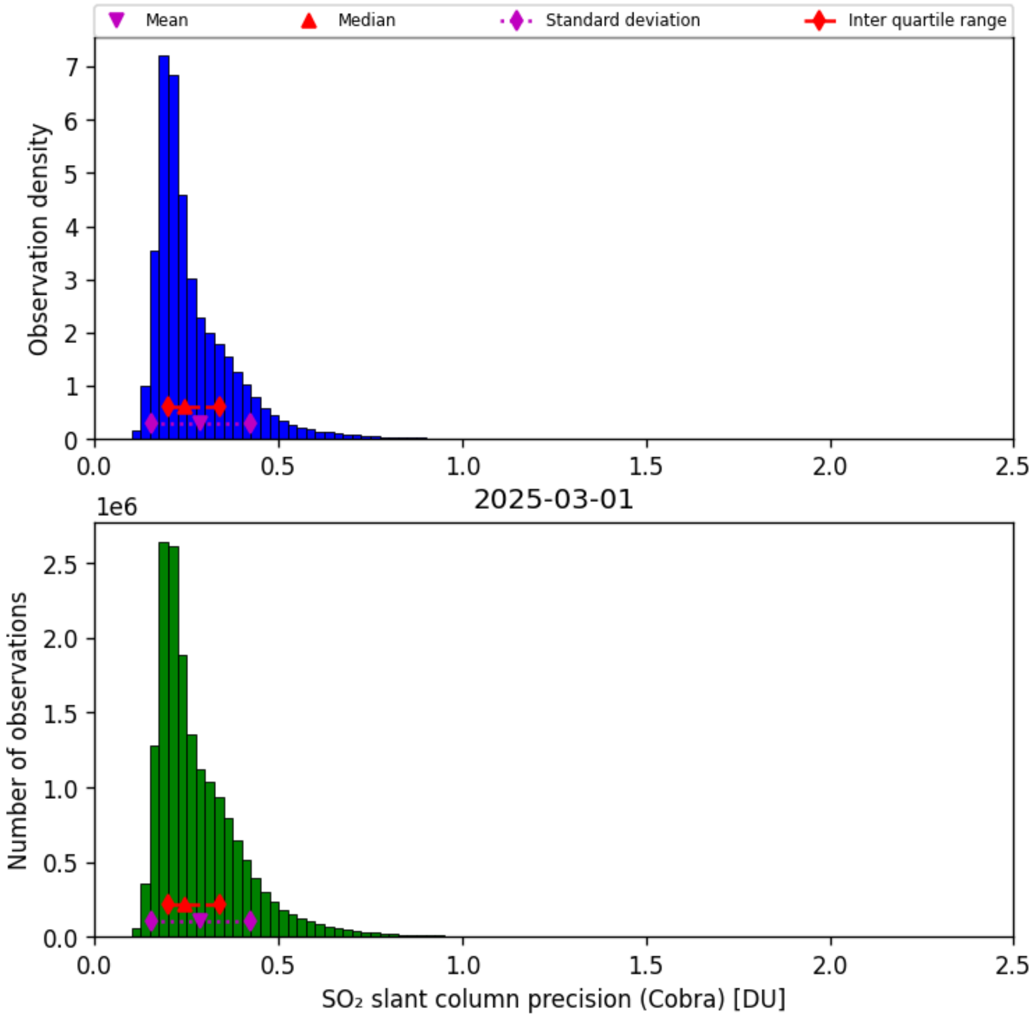


Figure 62: Histogram of "SO_2 slant column precision (Cobra)" for 2025-03-01 to 2025-03-02

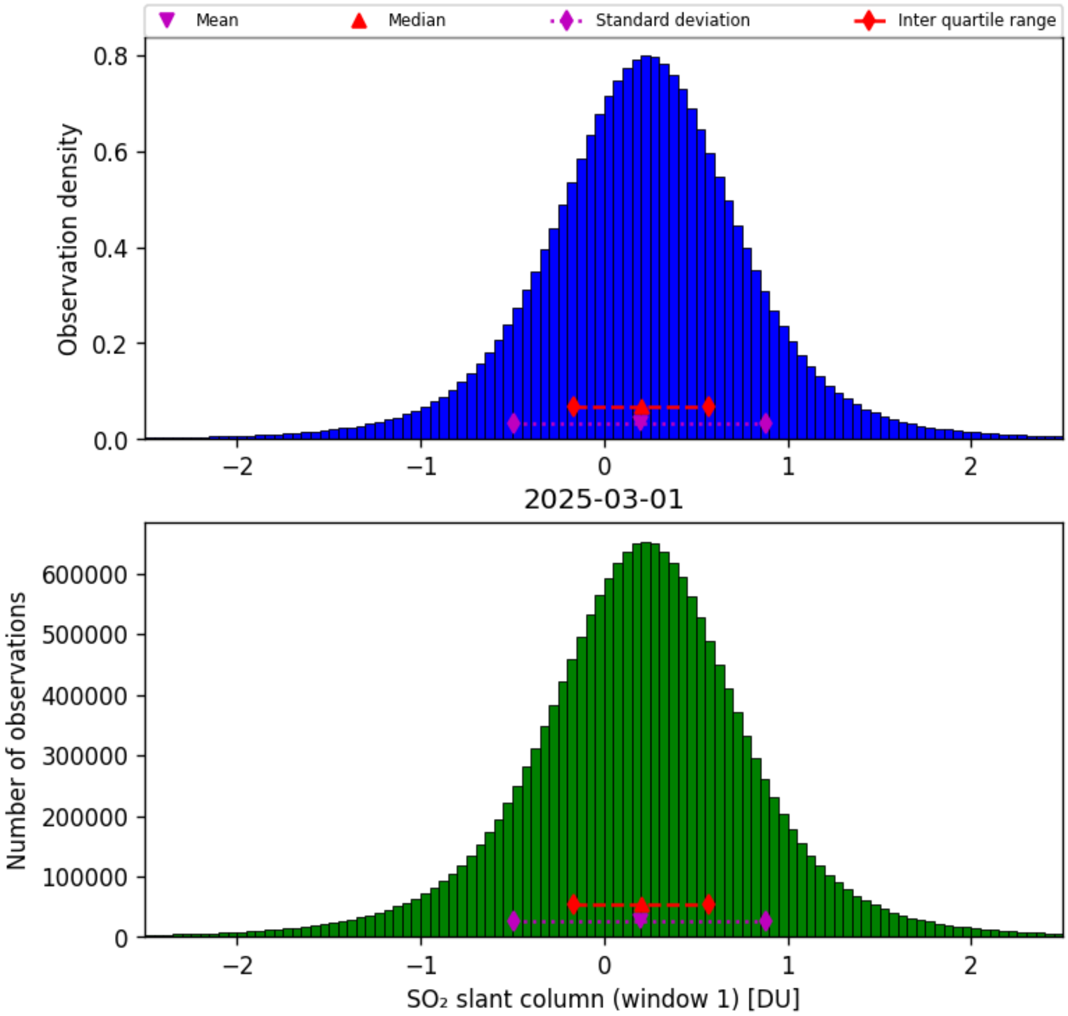


Figure 63: Histogram of “SO_2 slant column (window 1)” for 2025-03-01 to 2025-03-02

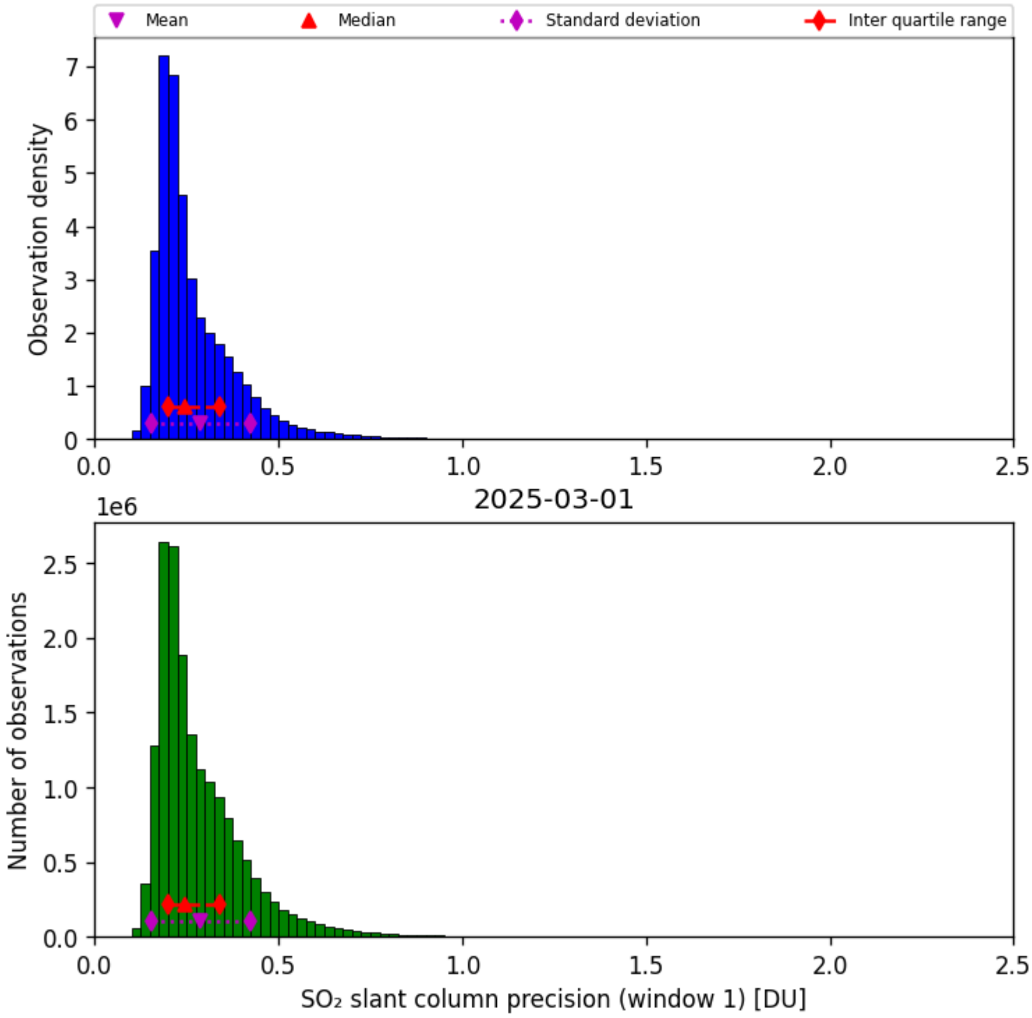


Figure 64: Histogram of "SO_2 slant column precision (window 1)" for 2025-03-01 to 2025-03-02

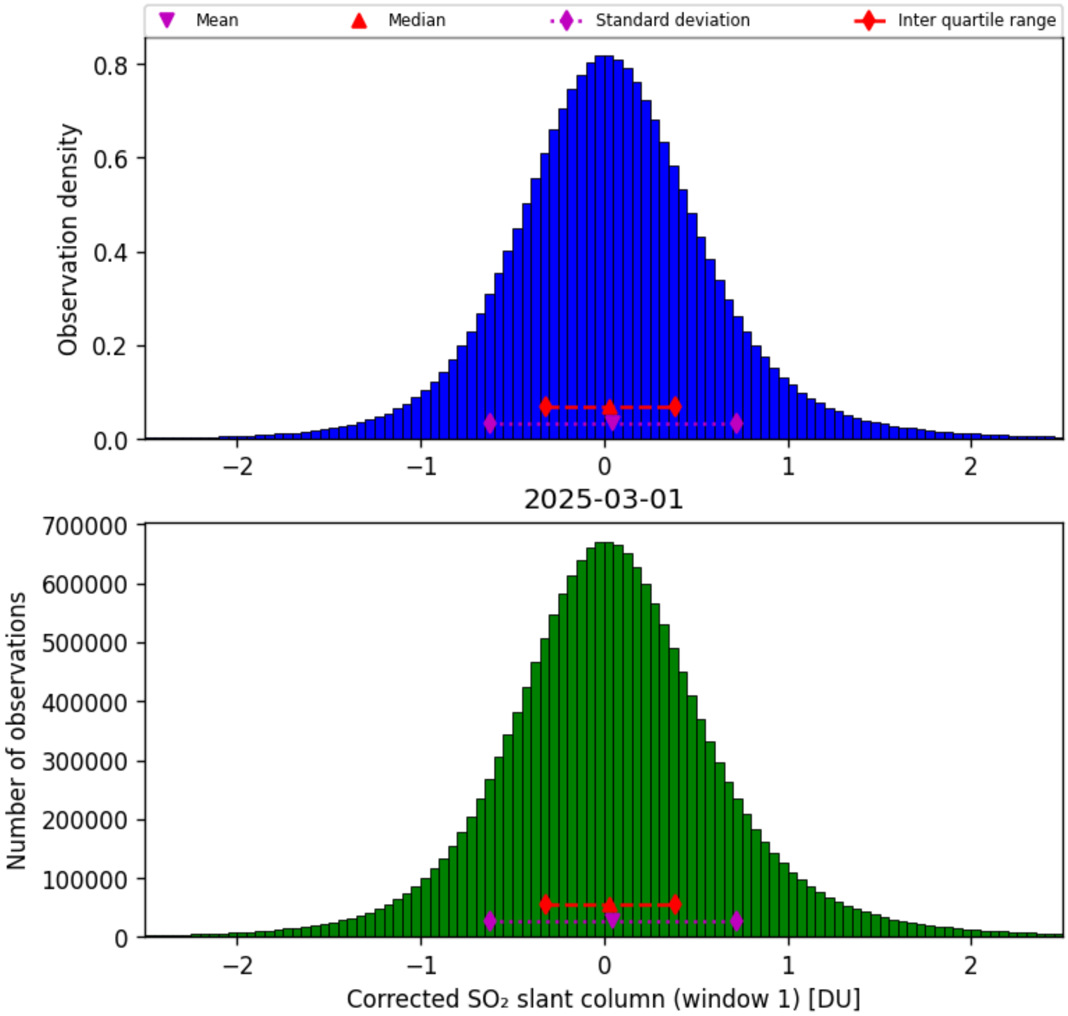


Figure 65: Histogram of “Corrected SO_2 slant column (window 1)” for 2025-03-01 to 2025-03-02

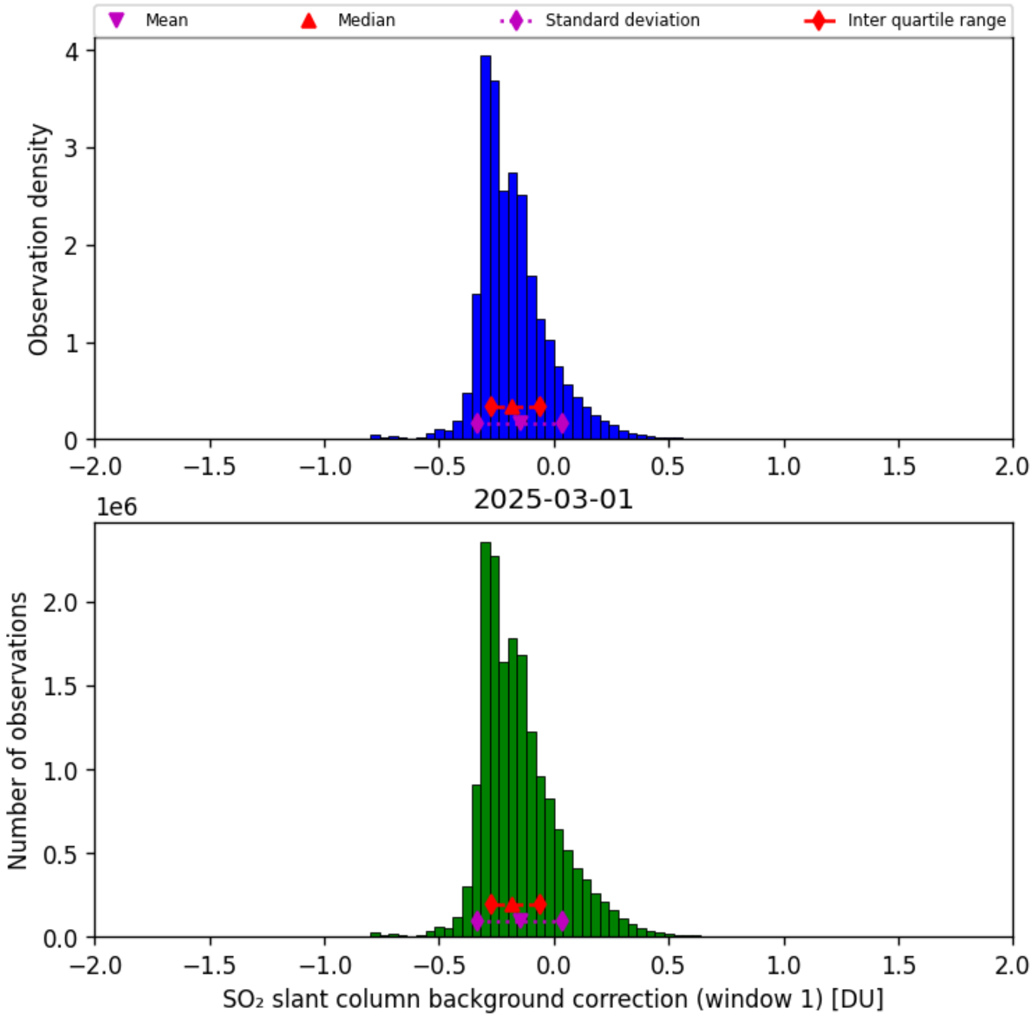


Figure 66: Histogram of "SO_2 slant column background correction (window 1)" for 2025-03-01 to 2025-03-02

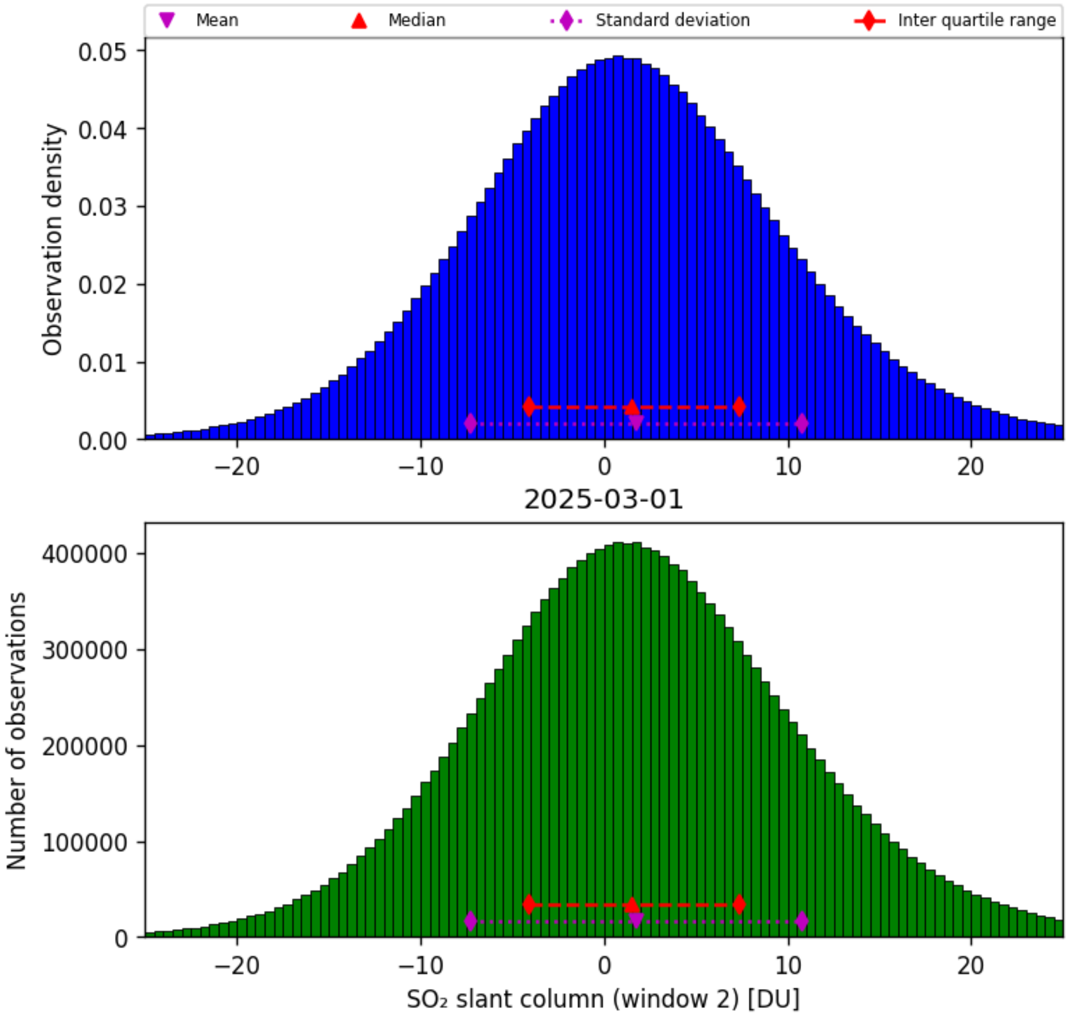


Figure 67: Histogram of “SO_2 slant column (window 2)” for 2025-03-01 to 2025-03-02

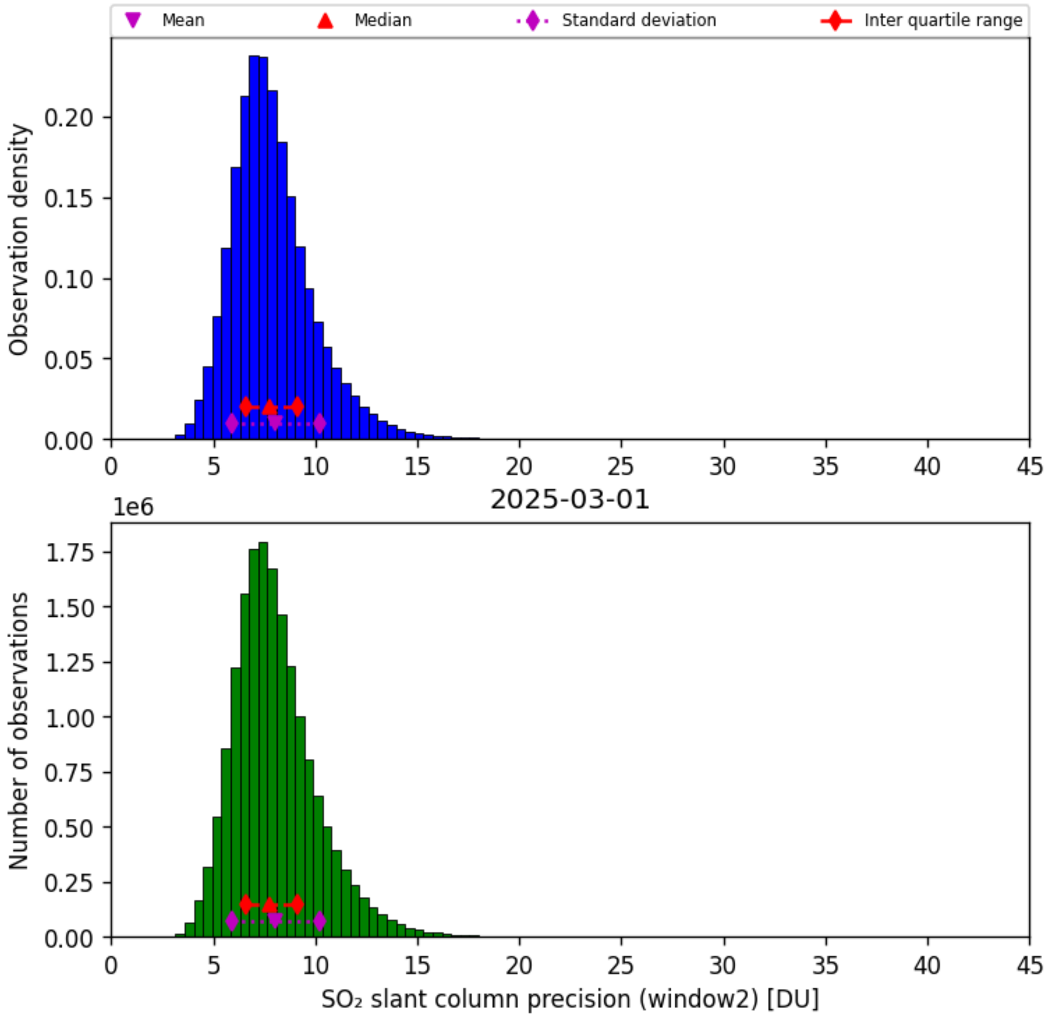


Figure 68: Histogram of “SO_2 slant column precision (window2)” for 2025-03-01 to 2025-03-02

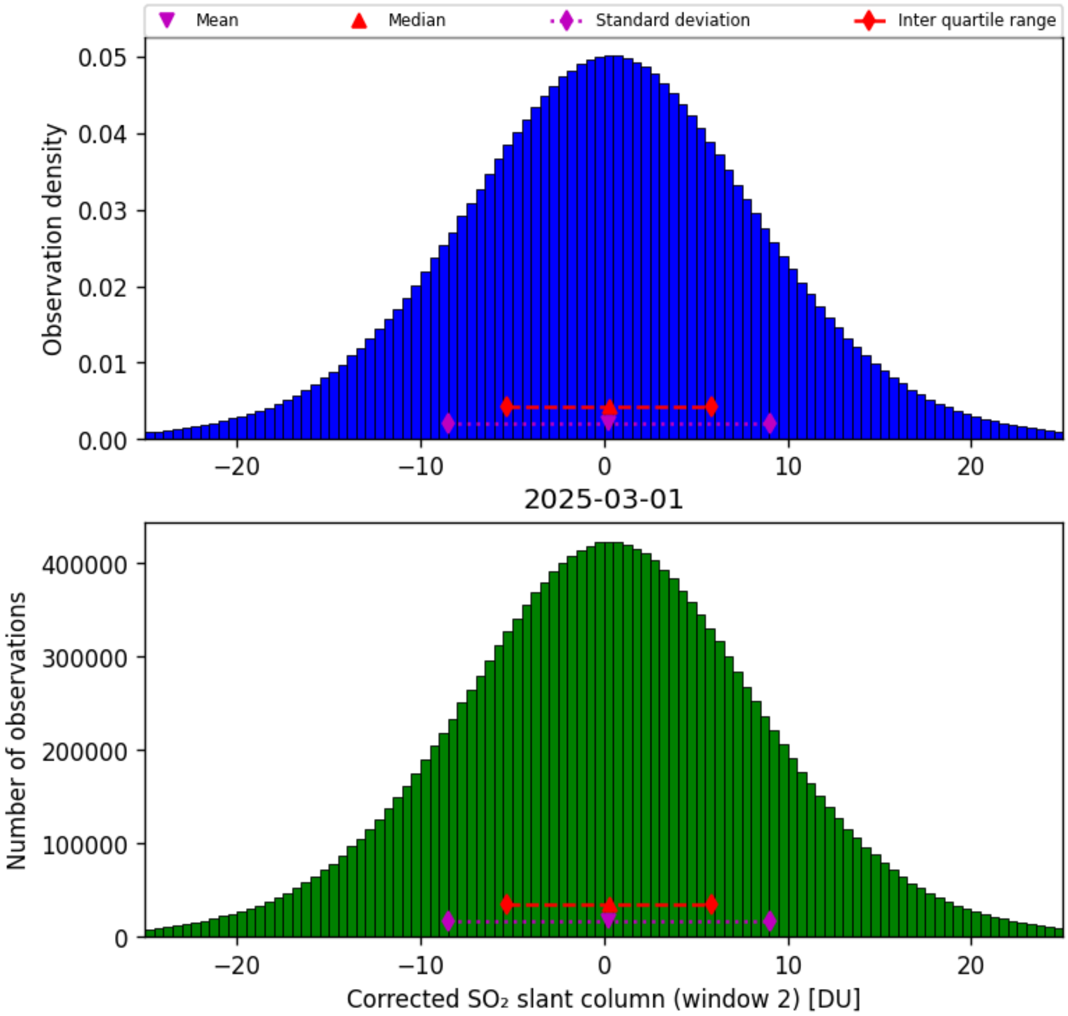


Figure 69: Histogram of “Corrected SO_2 slant column (window 2)” for 2025-03-01 to 2025-03-02

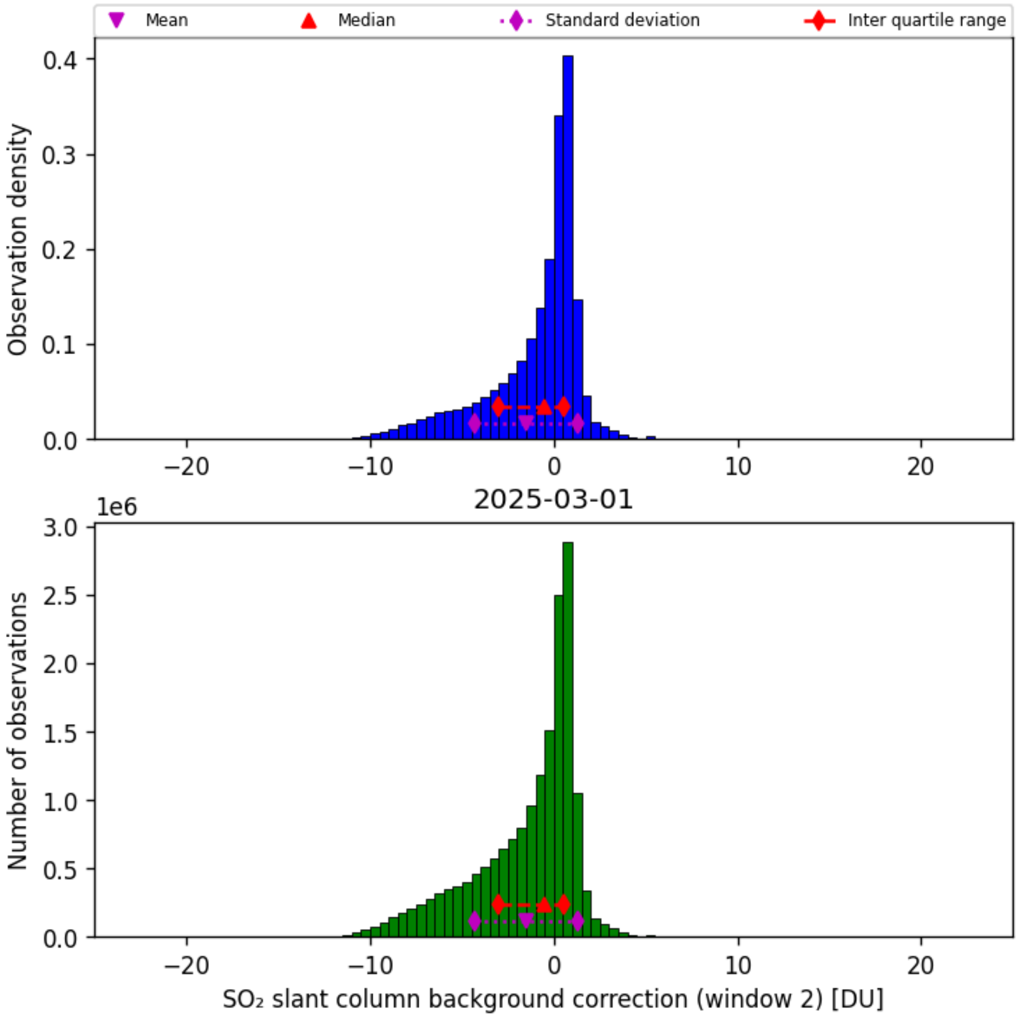


Figure 70: Histogram of “SO_2 slant column background correction (window 2)” for 2025-03-01 to 2025-03-02

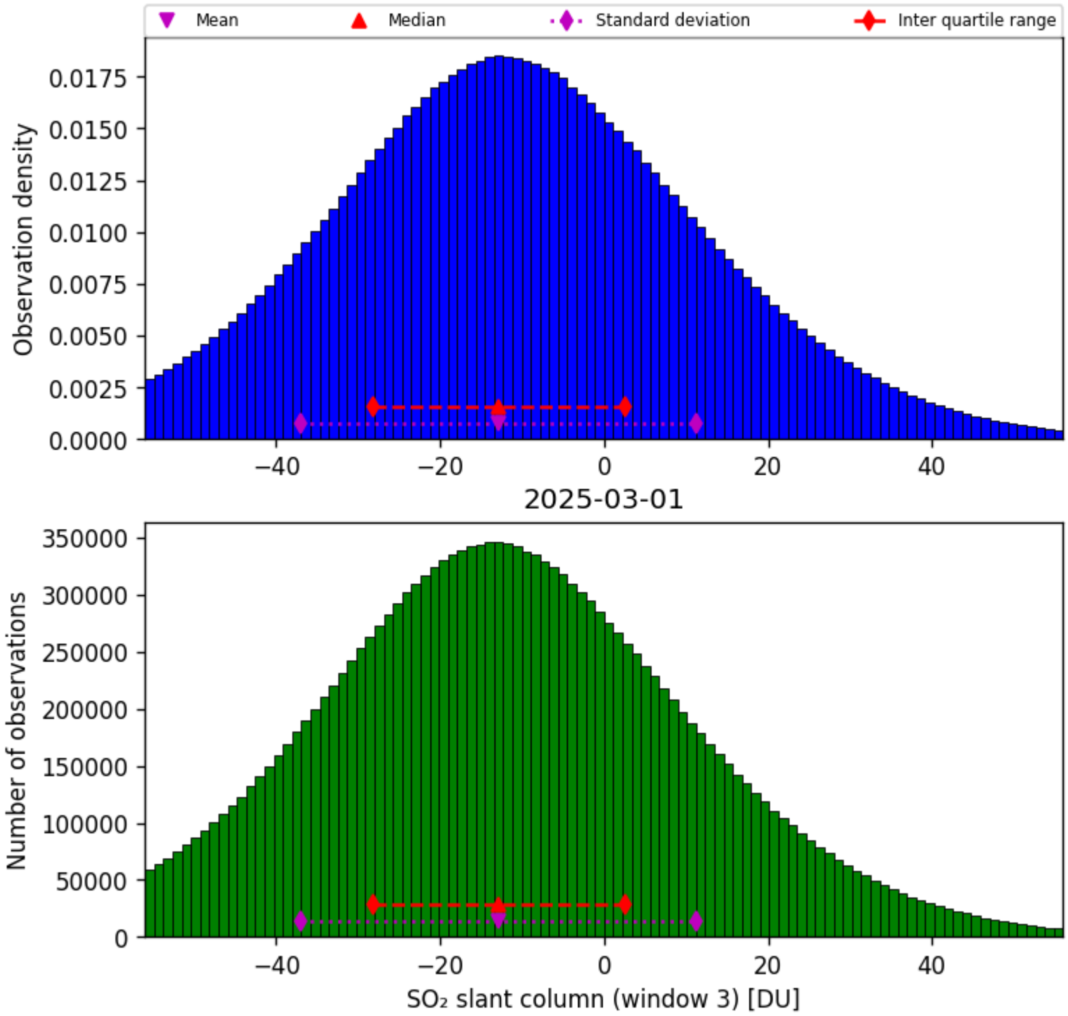


Figure 71: Histogram of “SO_2 slant column (window 3)” for 2025-03-01 to 2025-03-02

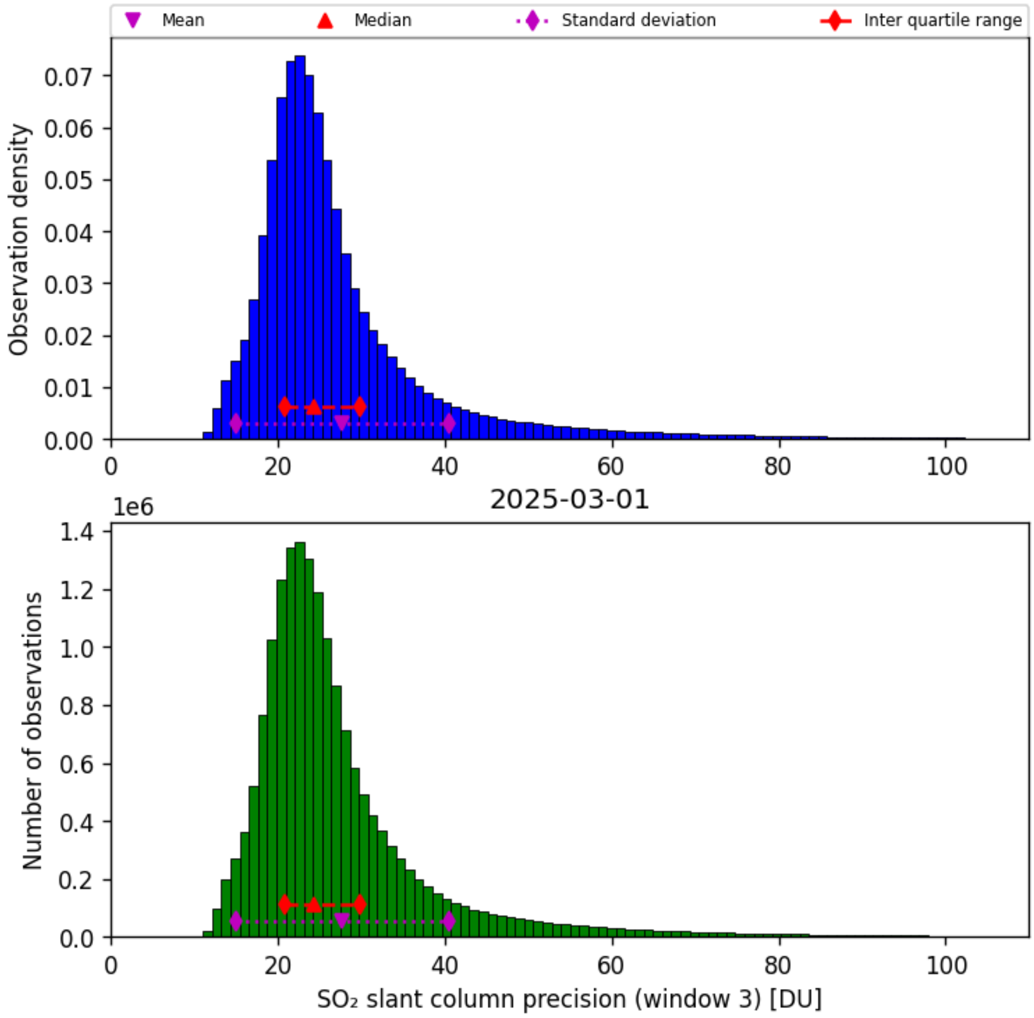


Figure 72: Histogram of “SO_2 slant column precision (window 3)” for 2025-03-01 to 2025-03-02

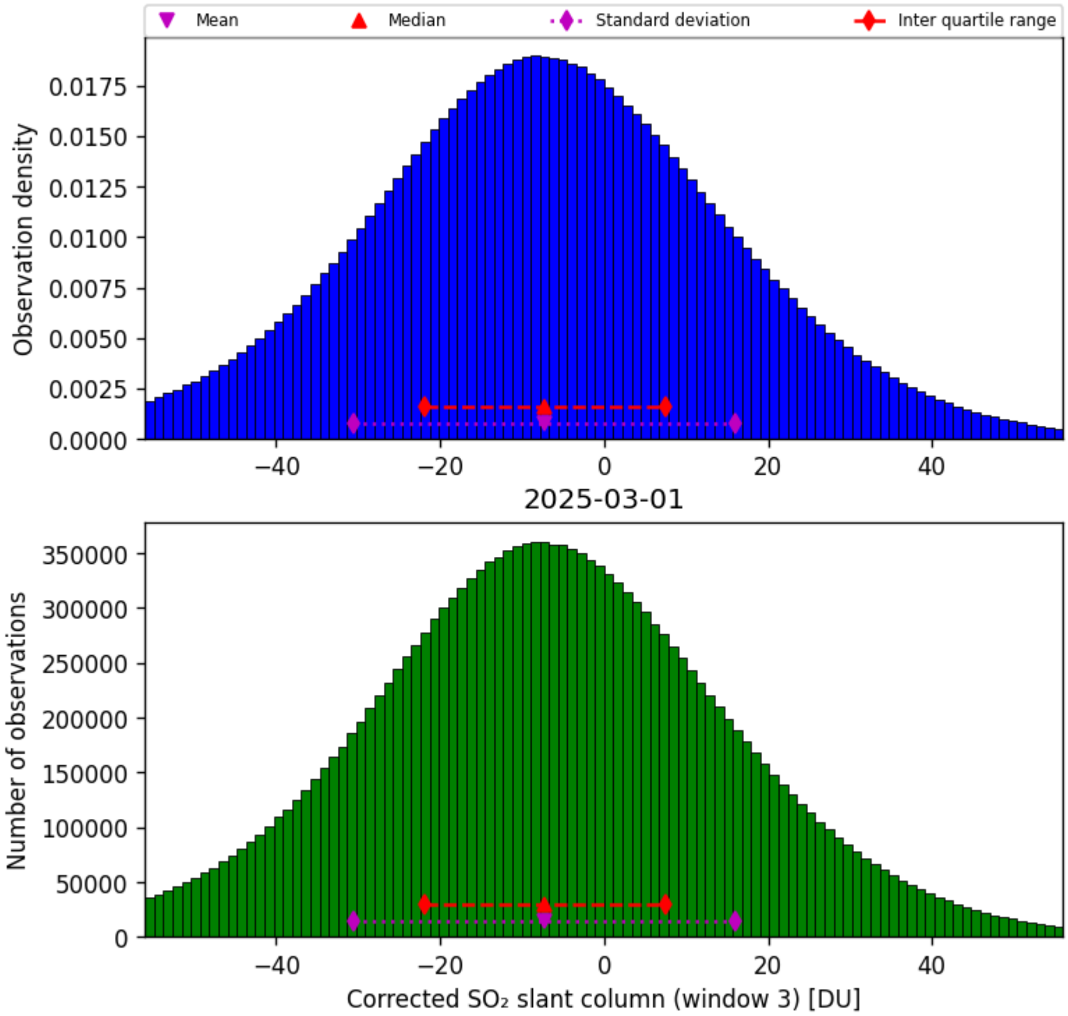


Figure 73: Histogram of “Corrected SO_2 slant column (window 3)” for 2025-03-01 to 2025-03-02

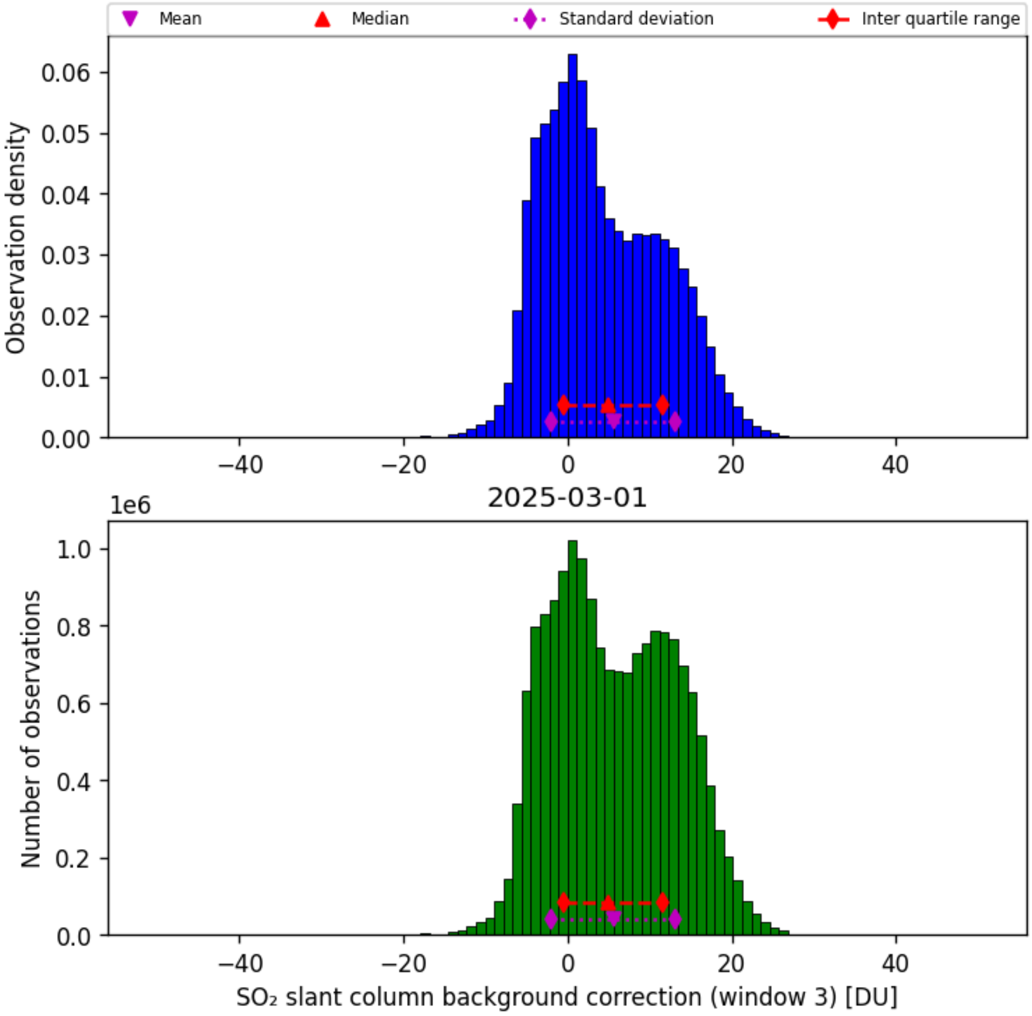


Figure 74: Histogram of “SO_2 slant column background correction (window 3)” for 2025-03-01 to 2025-03-02

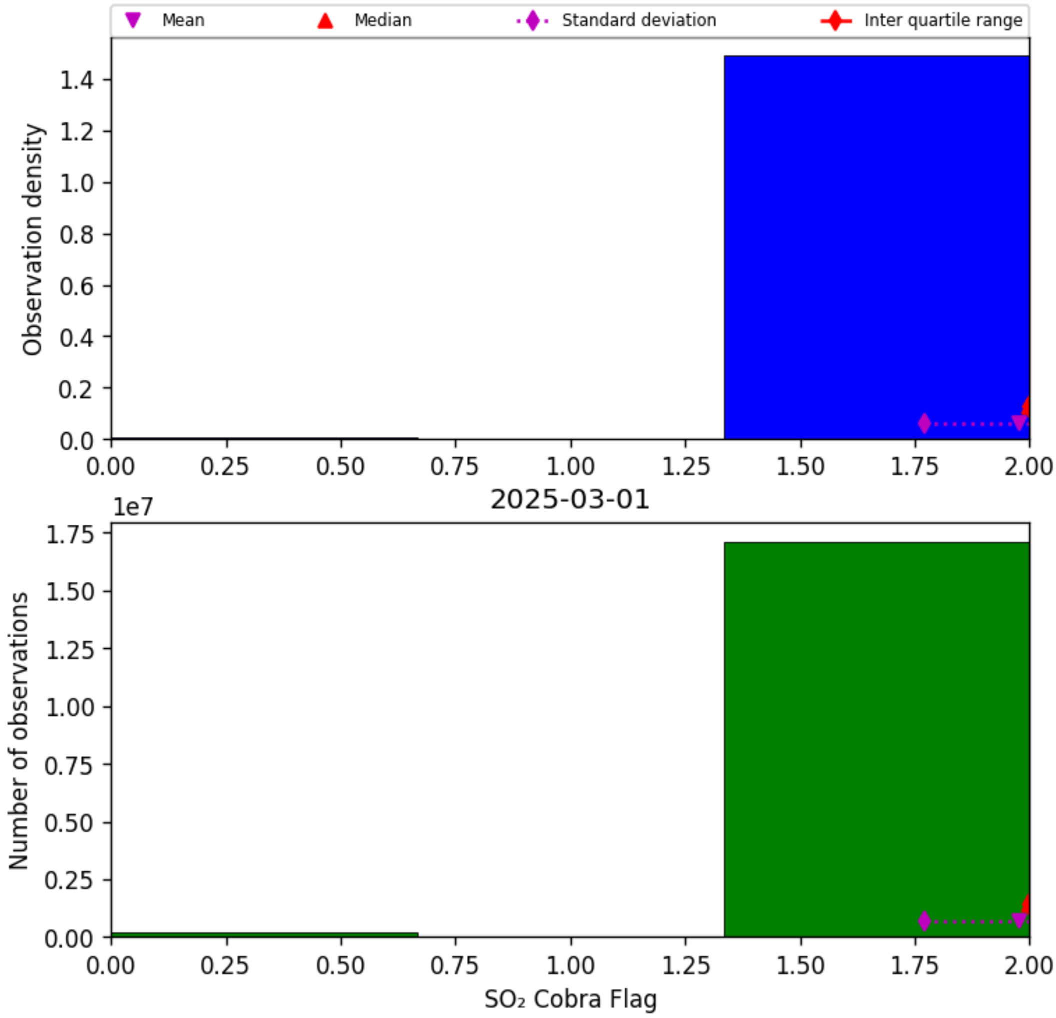


Figure 75: Histogram of “SO_2 Cobra Flag” for 2025-03-01 to 2025-03-02

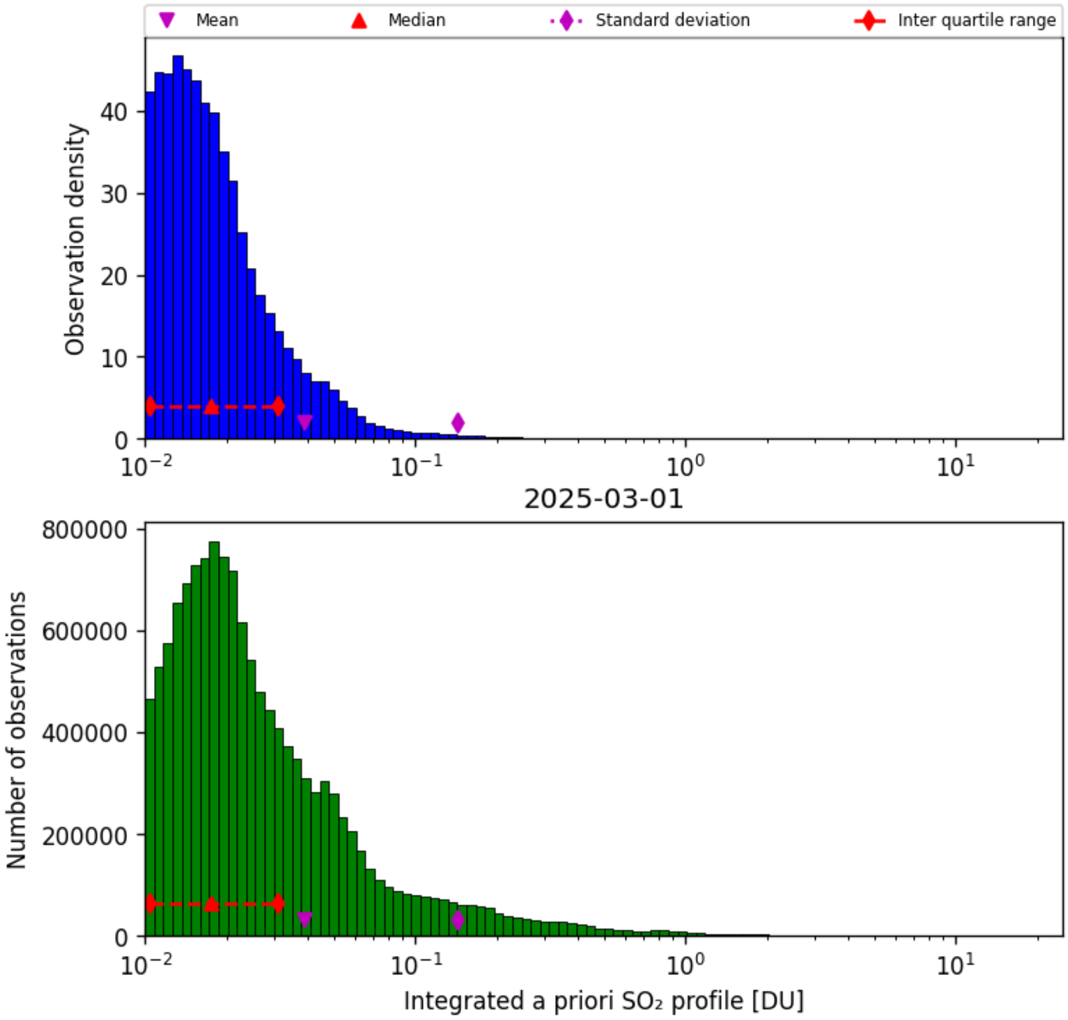


Figure 76: Histogram of “Integrated a priori SO_2 profile” for 2025-03-01 to 2025-03-02

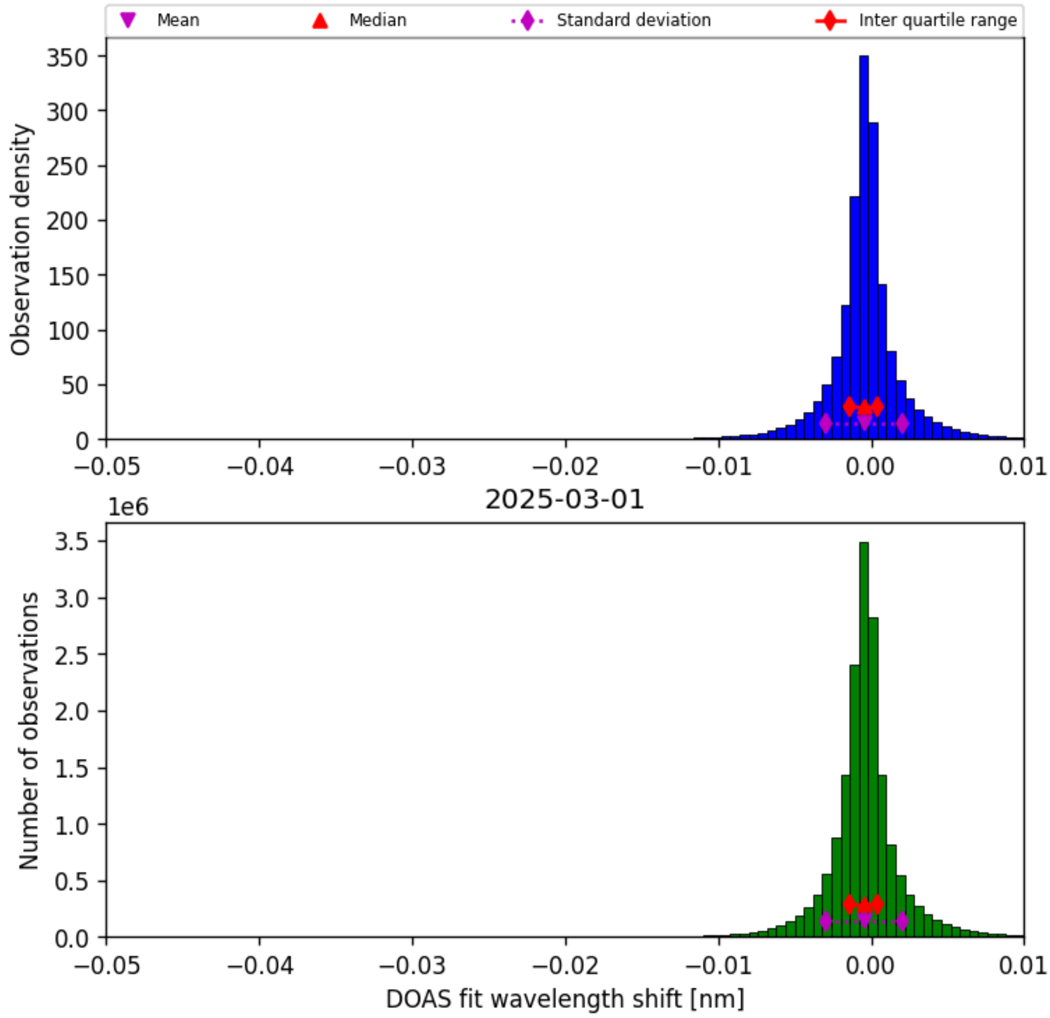


Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-03-01 to 2025-03-02

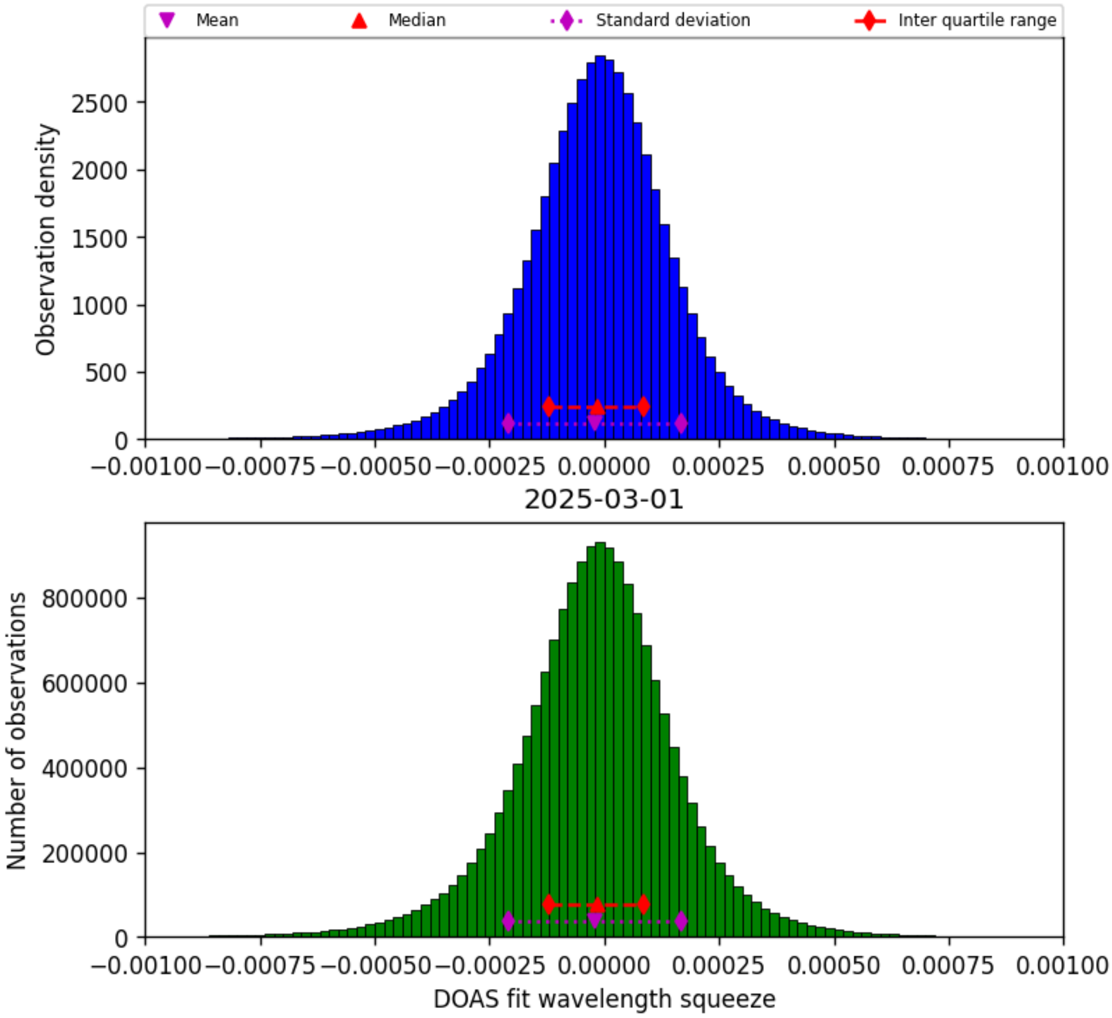


Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-03-01 to 2025-03-02

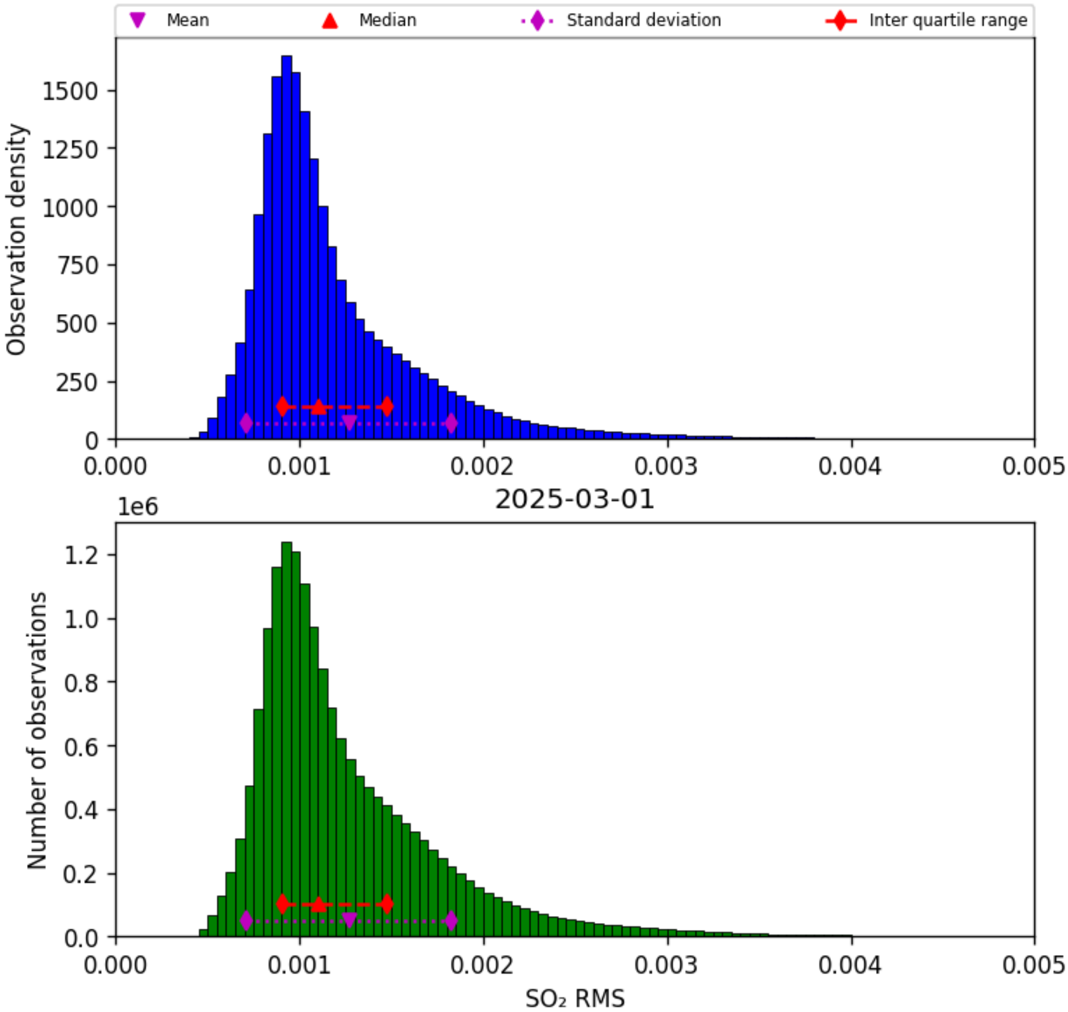


Figure 79: Histogram of “SO_2 RMS” for 2025-03-01 to 2025-03-02

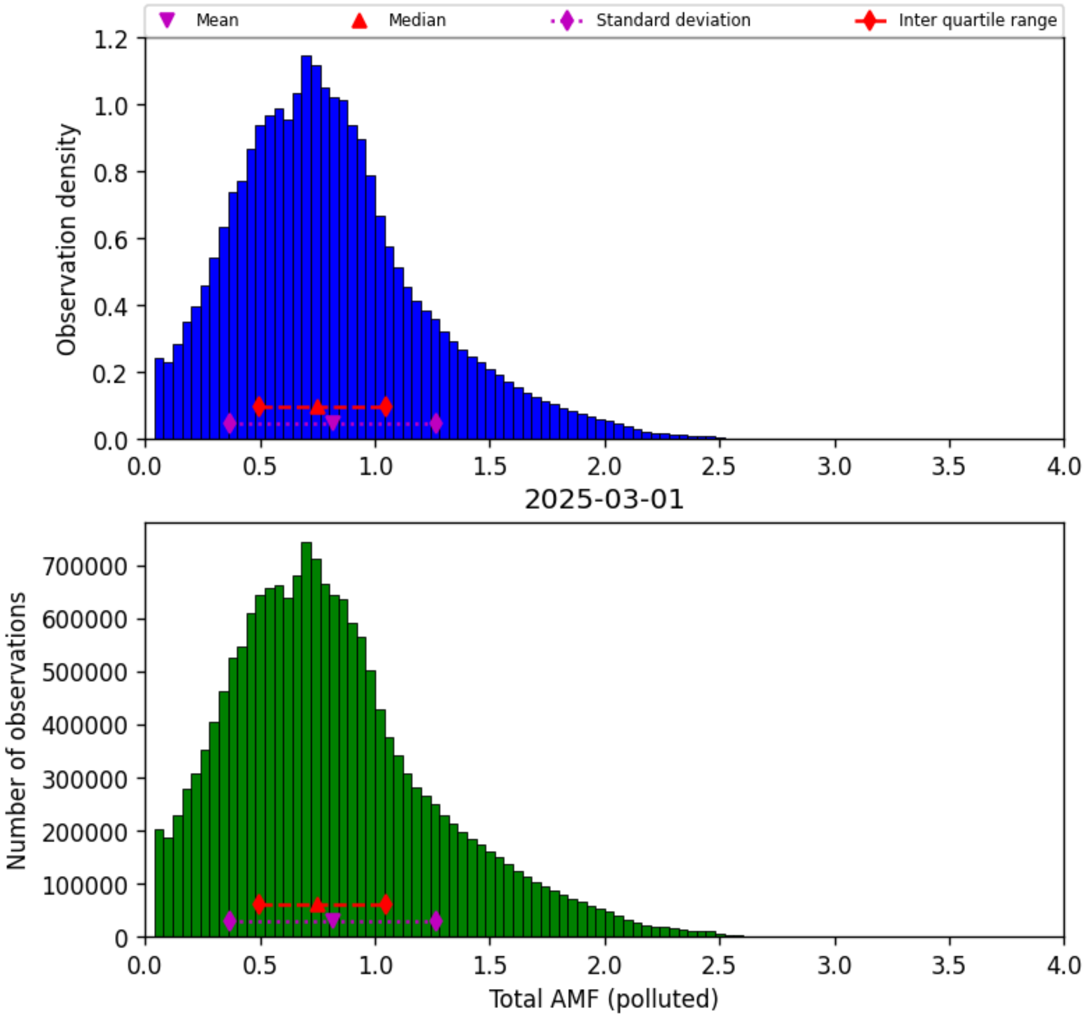


Figure 80: Histogram of “Total AMF (polluted)” for 2025-03-01 to 2025-03-02

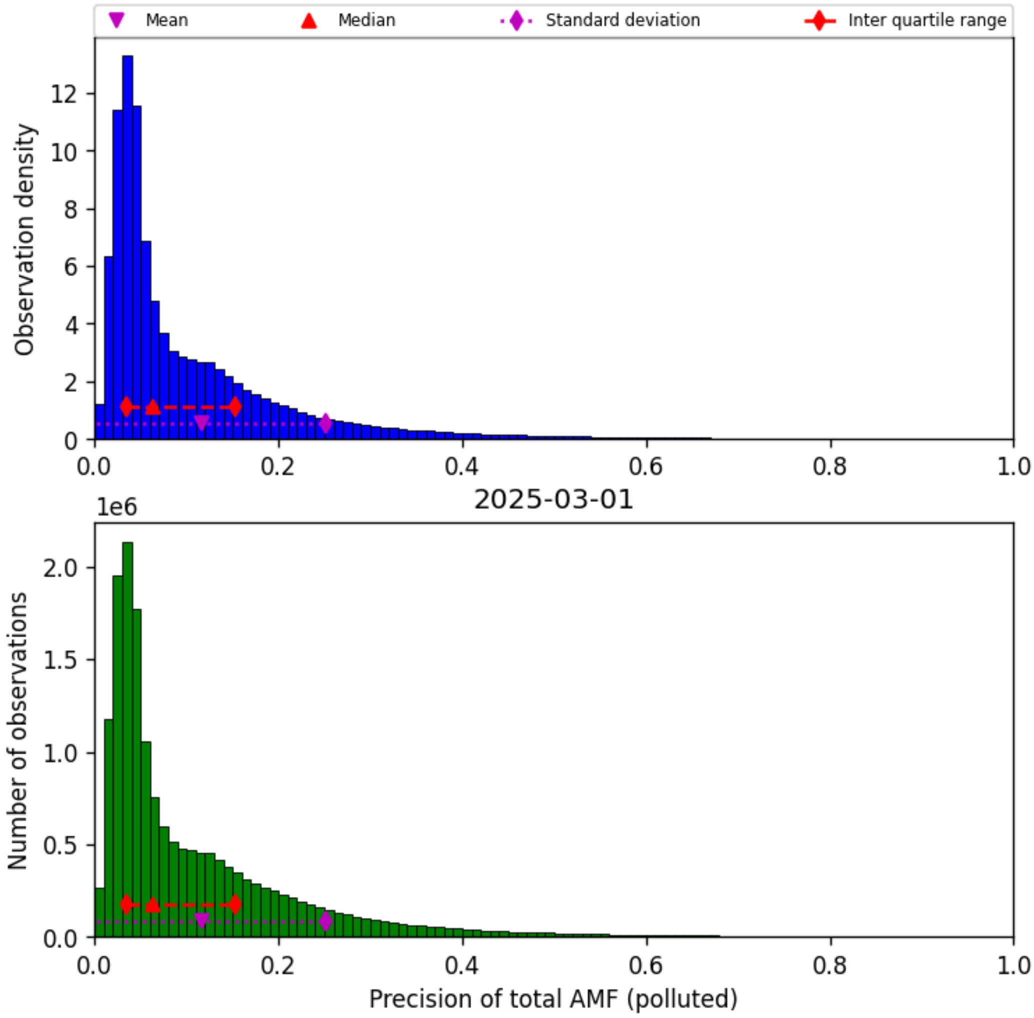


Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-03-01 to 2025-03-02

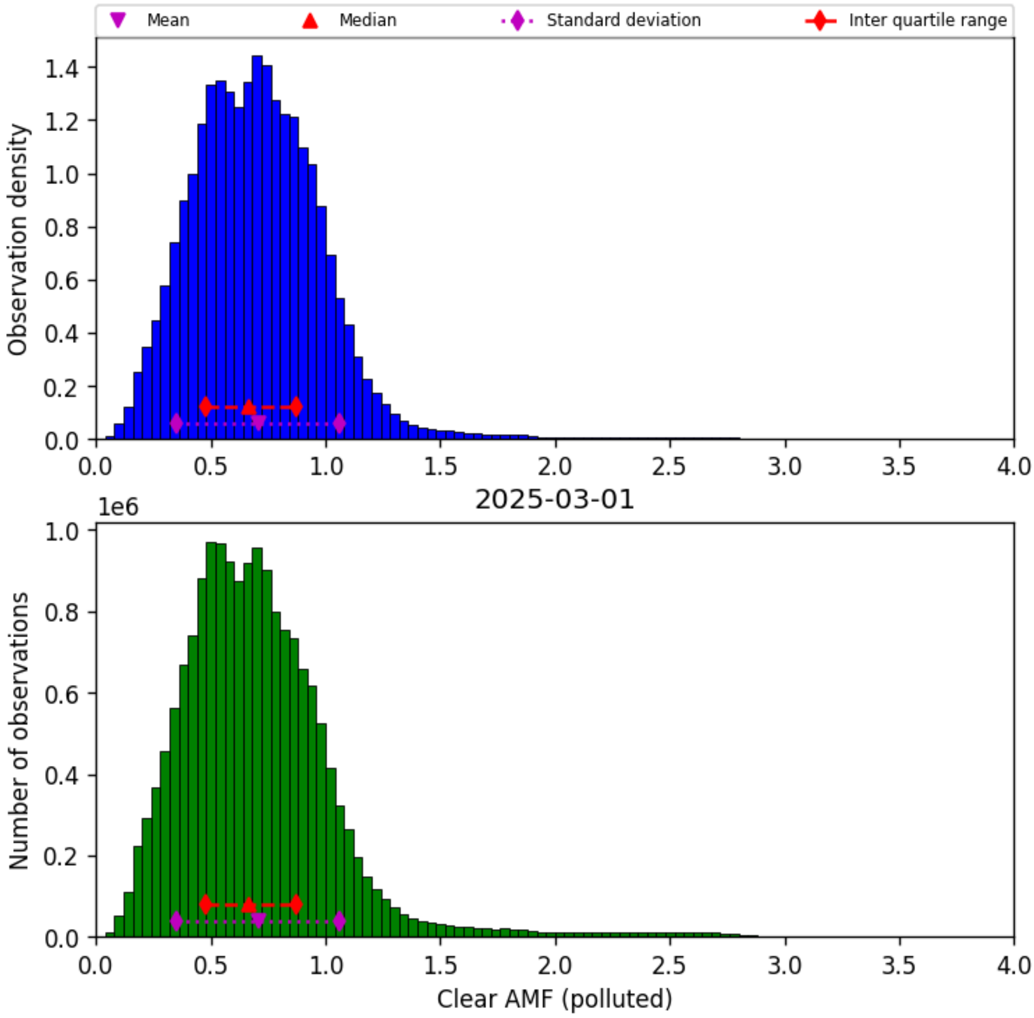


Figure 82: Histogram of “Clear AMF (polluted)” for 2025-03-01 to 2025-03-02

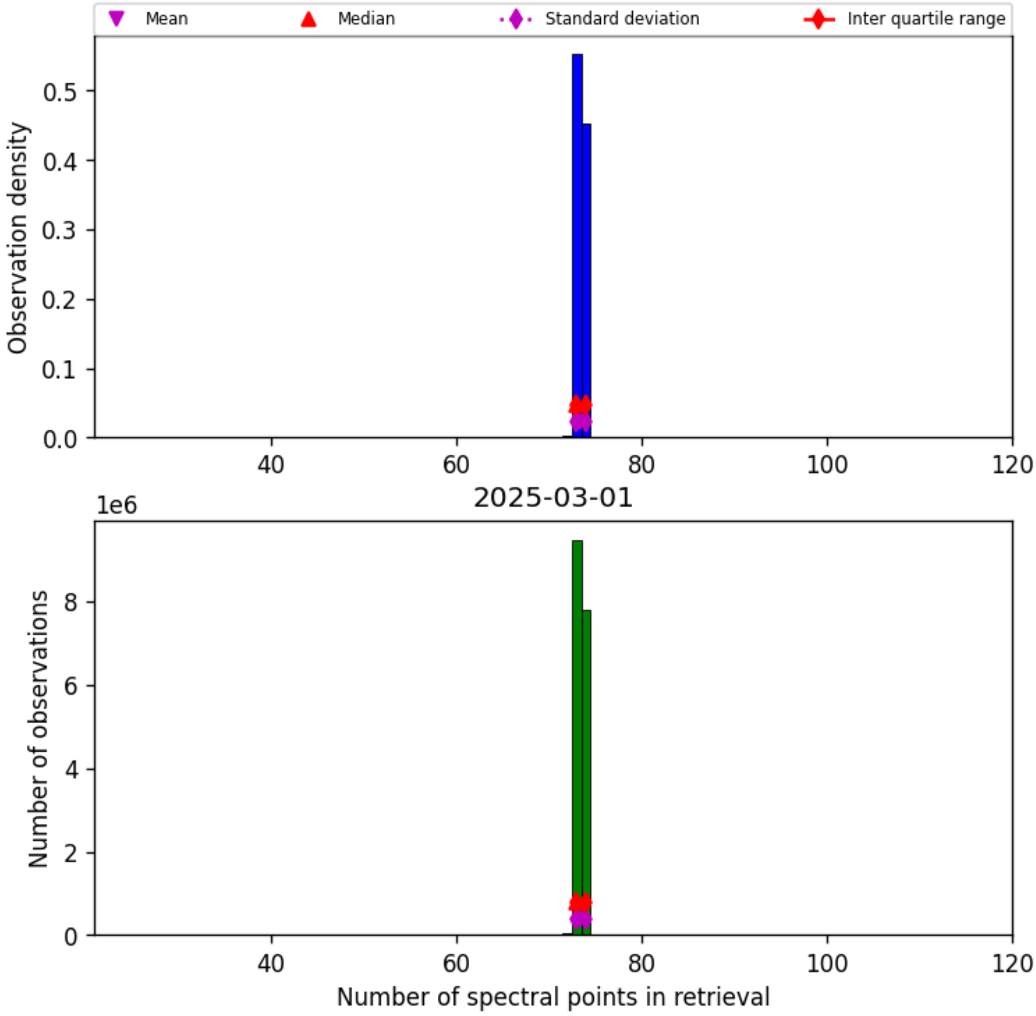


Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-03-01 to 2025-03-02

9 Along track statistics

The TROPOMI instrument uses different binned detector rows for different viewing directions. In this section statistics are presented for each of the binned rows in the instrument.

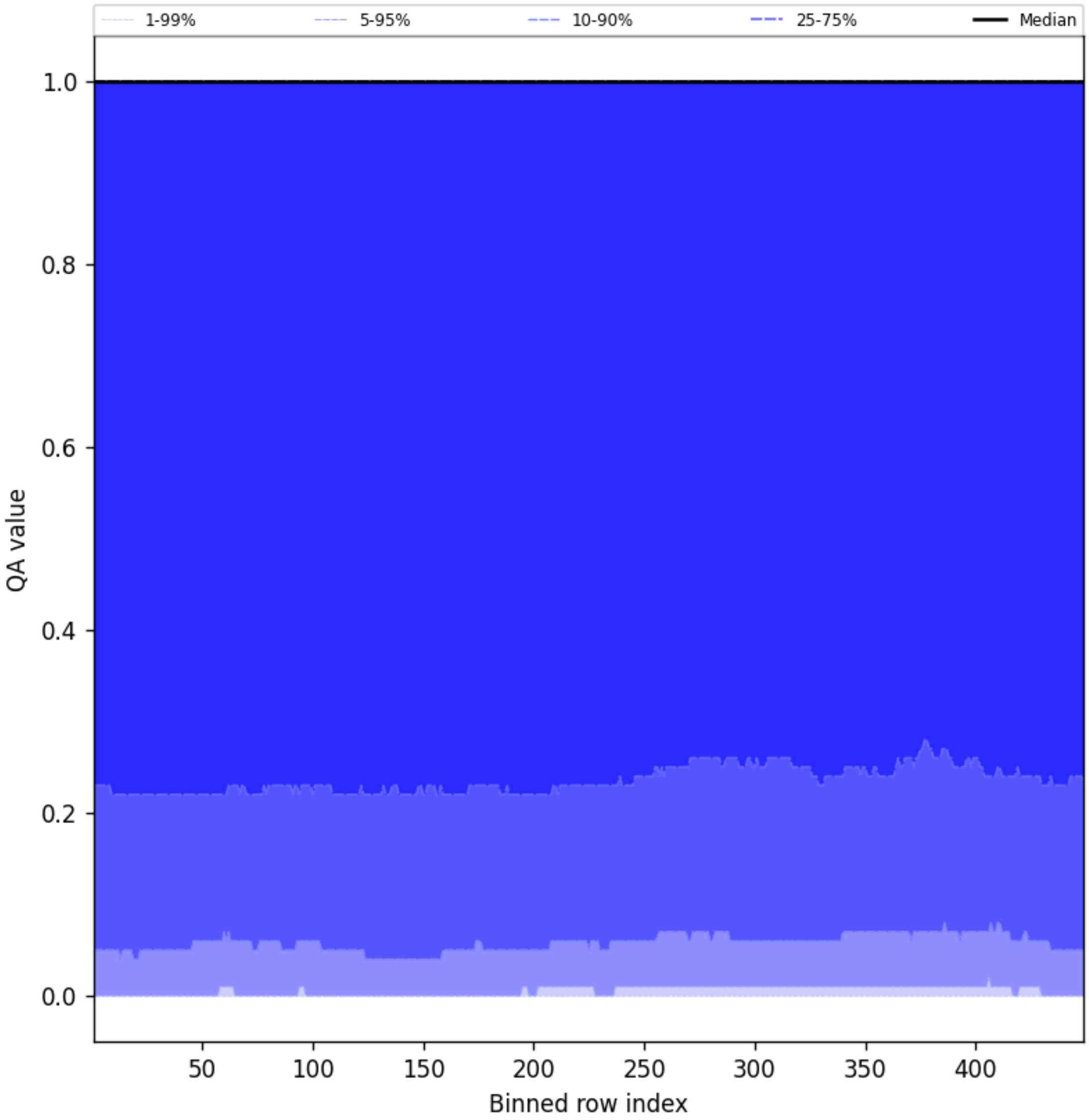


Figure 84: Along track statistics of “QA value” for 2025-03-01 to 2025-03-02

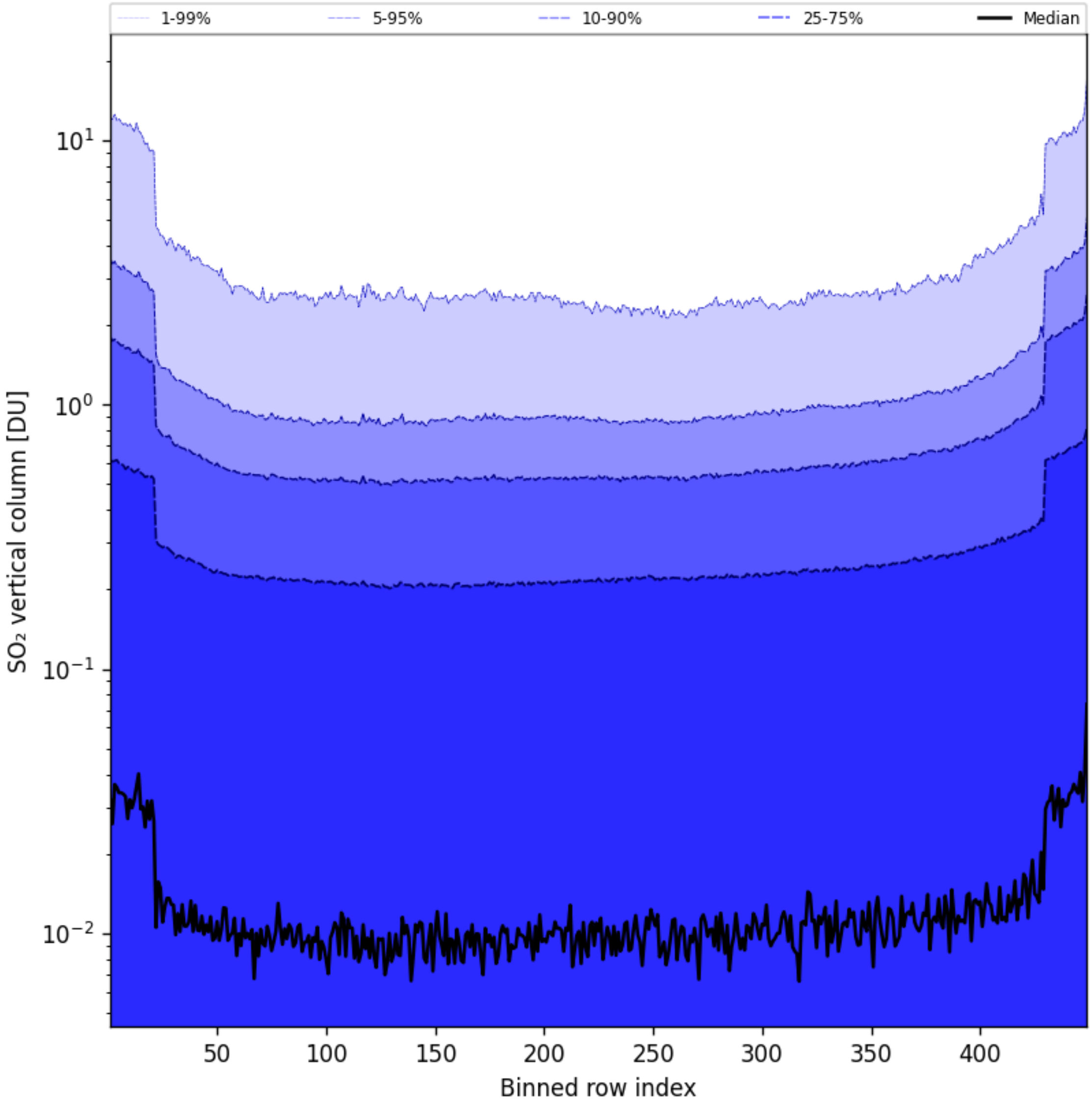


Figure 85: Along track statistics of “SO_2 vertical column” for 2025-03-01 to 2025-03-02

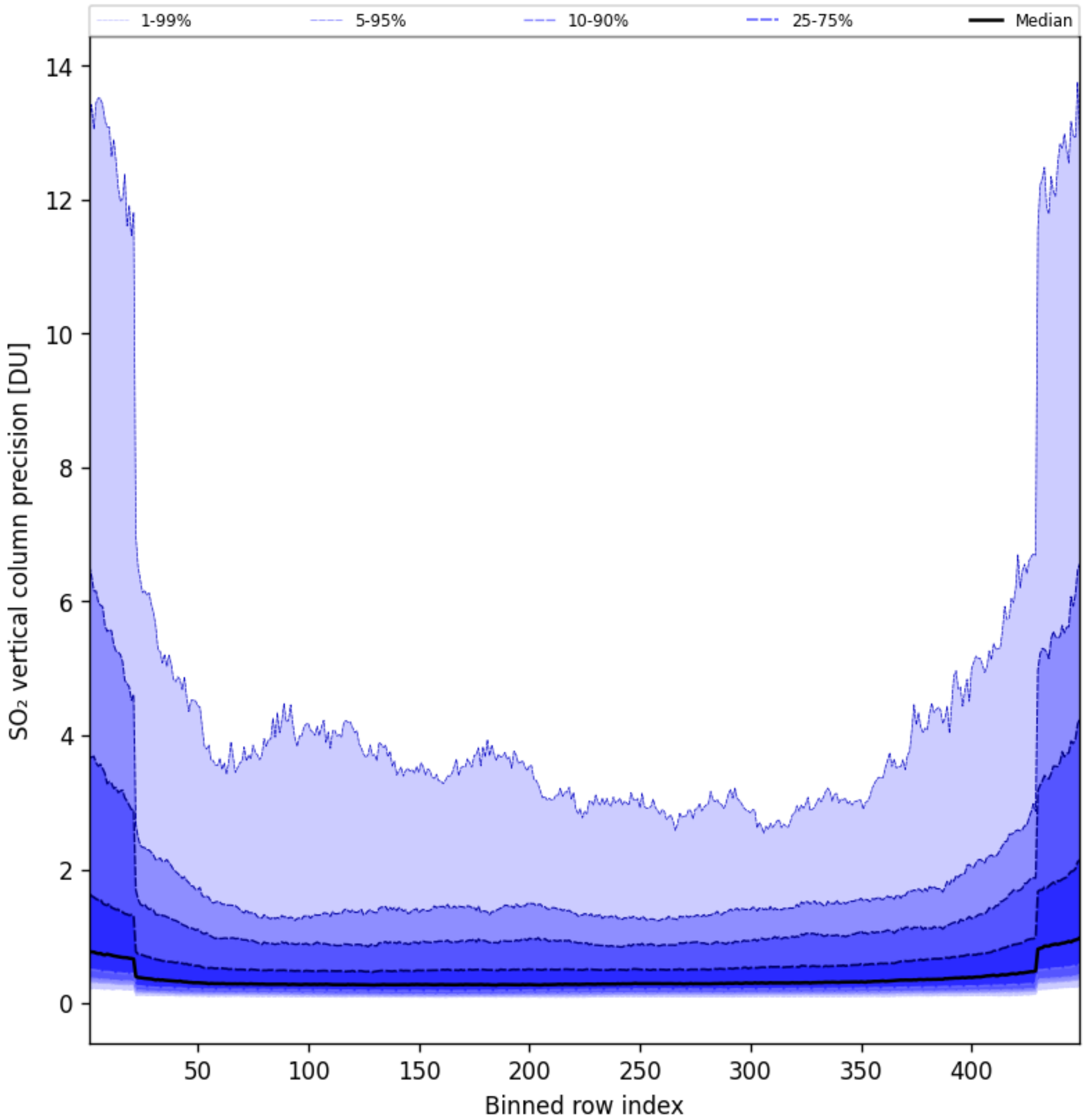


Figure 86: Along track statistics of “SO_2 vertical column precision” for 2025-03-01 to 2025-03-02

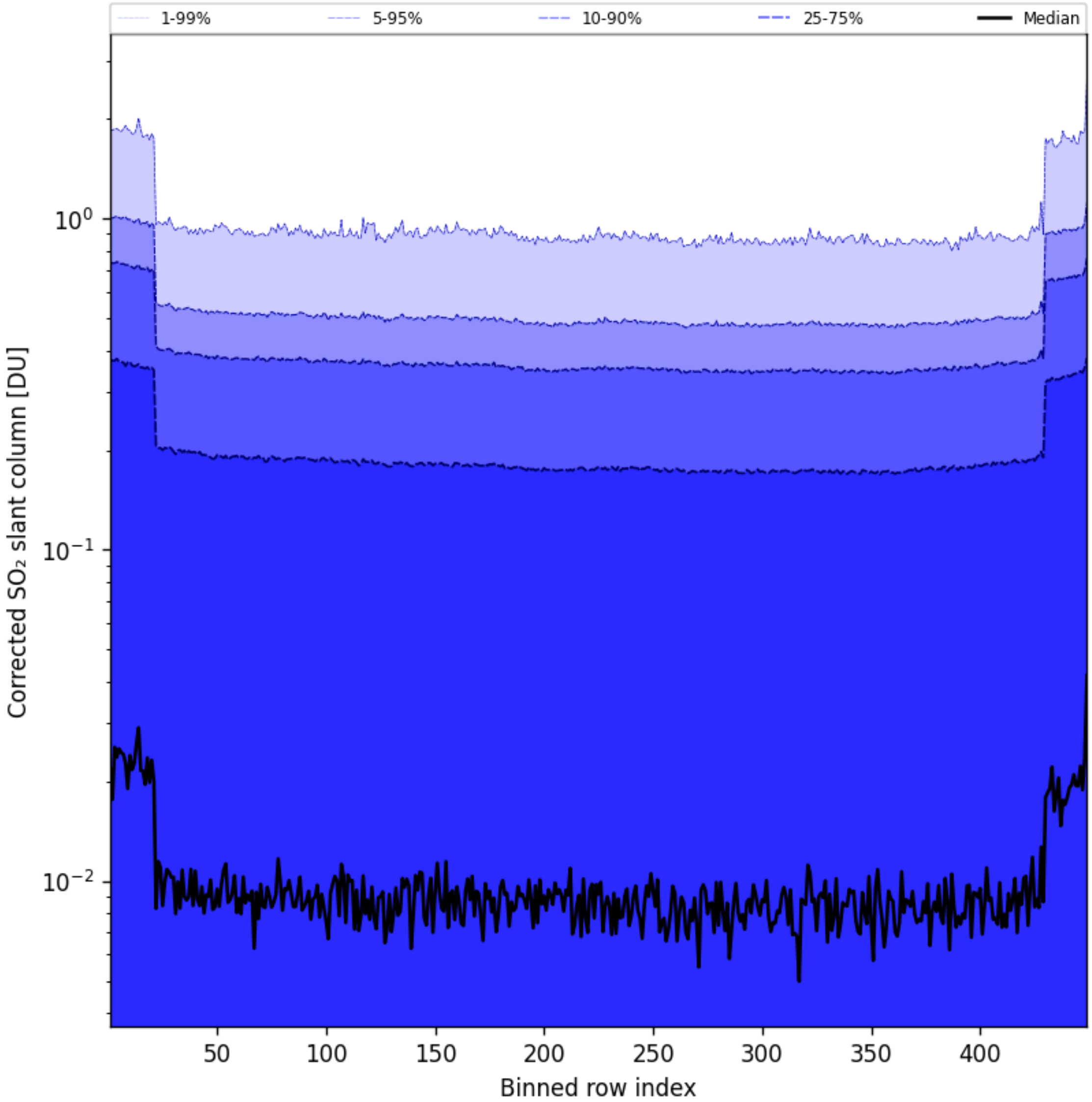


Figure 87: Along track statistics of “Corrected SO_2 slant column” for 2025-03-01 to 2025-03-02

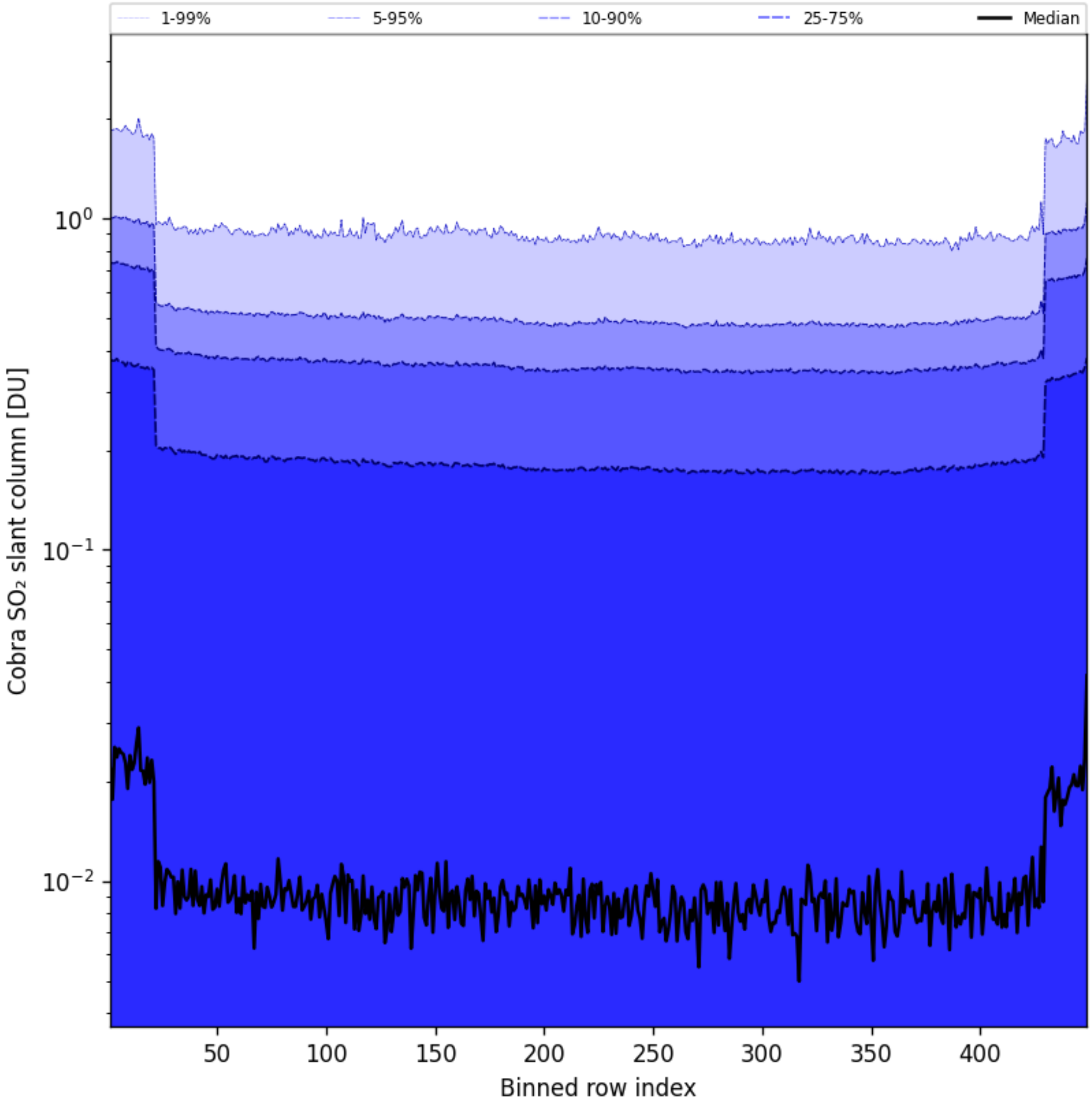


Figure 88: Along track statistics of “Cobra SO_2 slant column” for 2025-03-01 to 2025-03-02

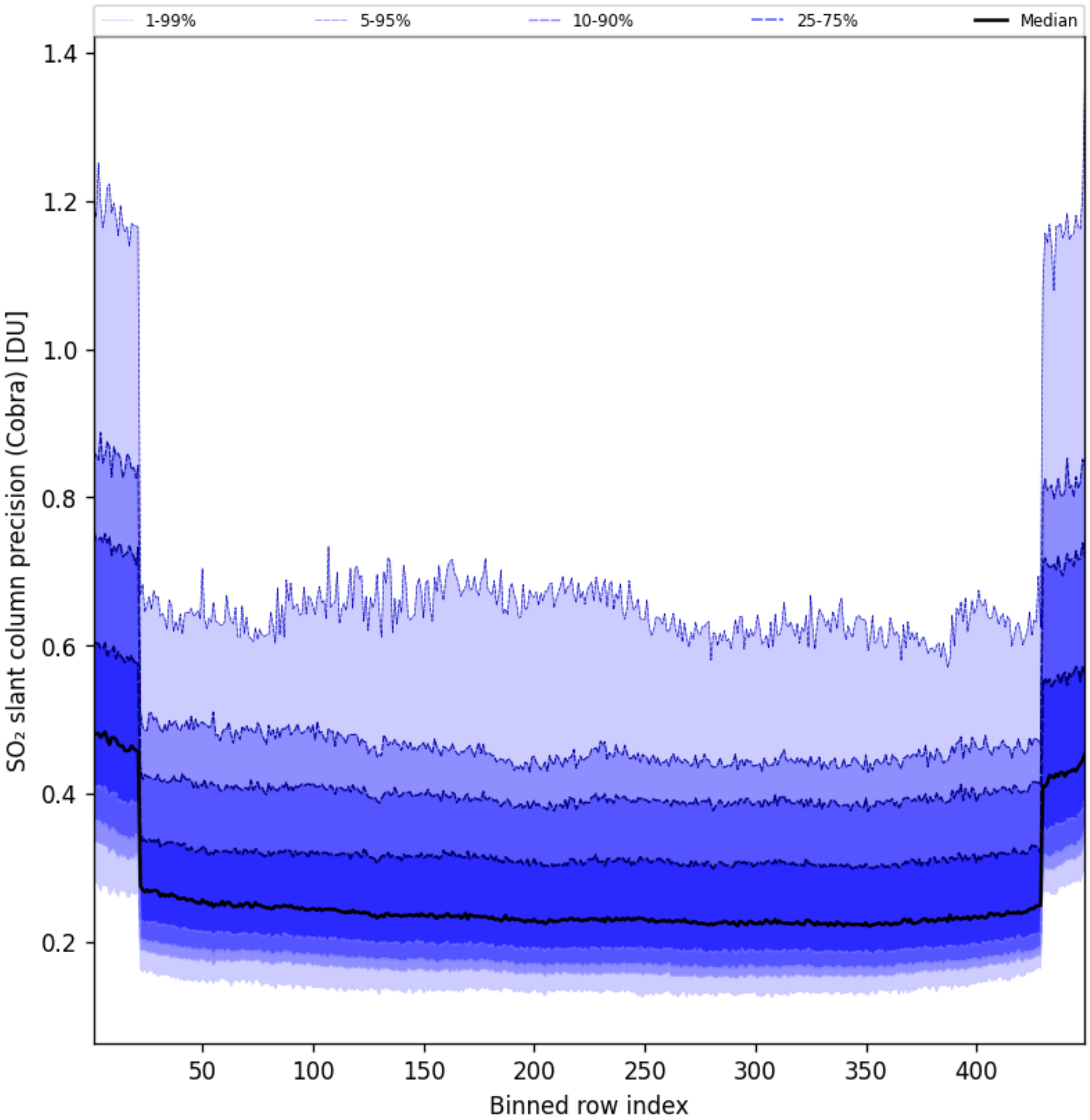


Figure 89: Along track statistics of “SO_2 slant column precision (Cobra)” for 2025-03-01 to 2025-03-02

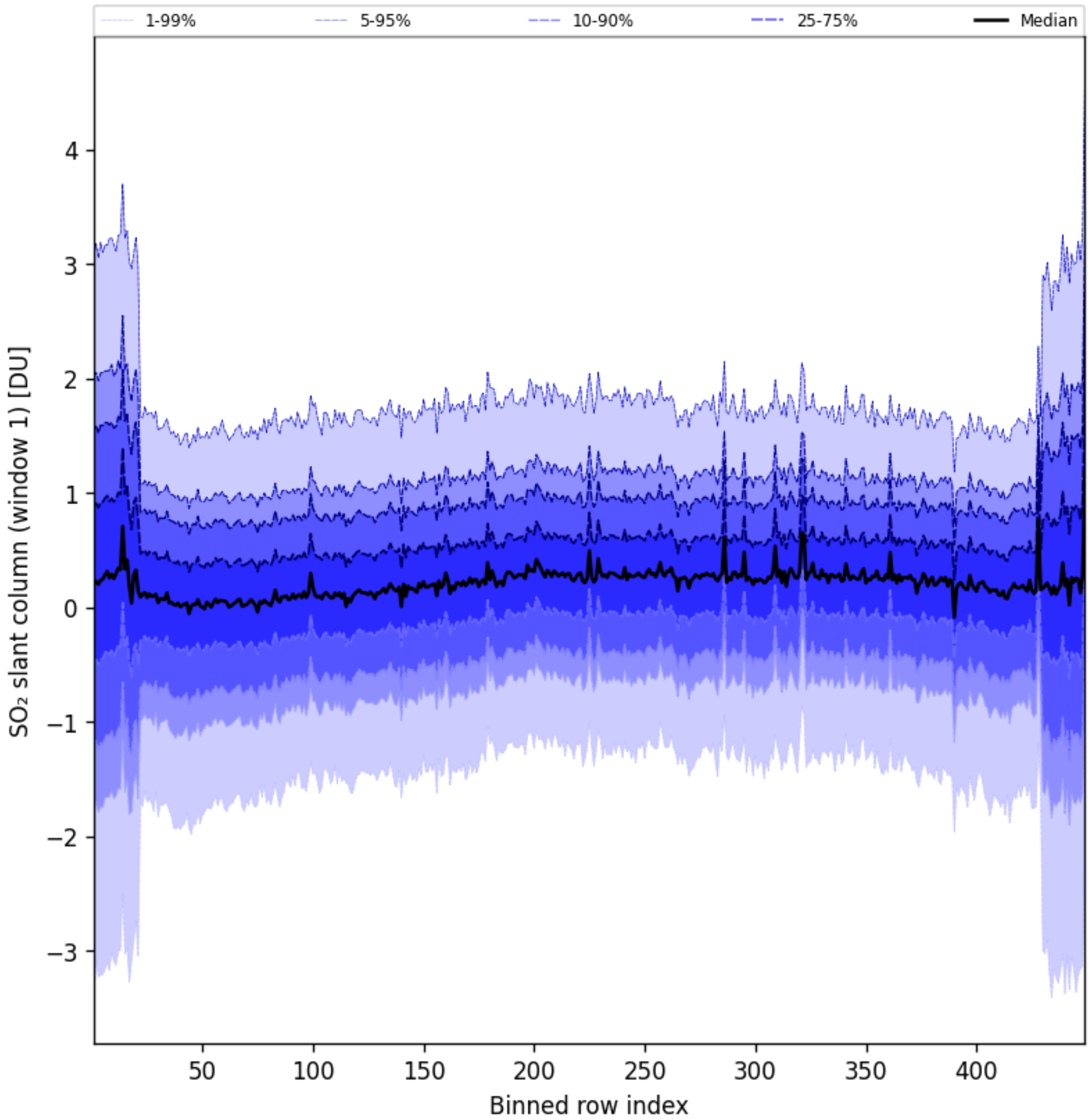


Figure 90: Along track statistics of “SO_2 slant column (window 1)” for 2025-03-01 to 2025-03-02

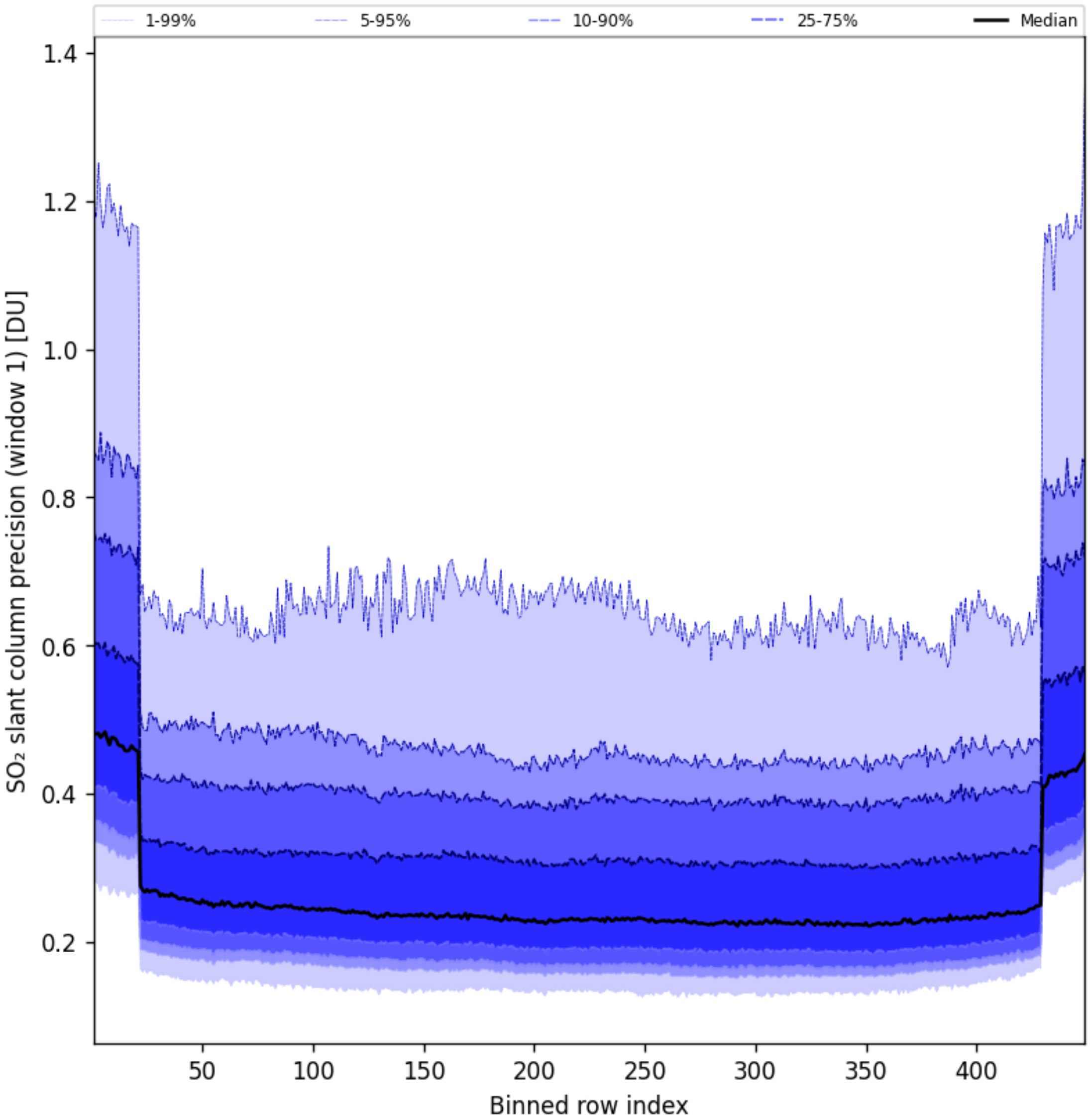


Figure 91: Along track statistics of "SO_2 slant column precision (window 1)" for 2025-03-01 to 2025-03-02

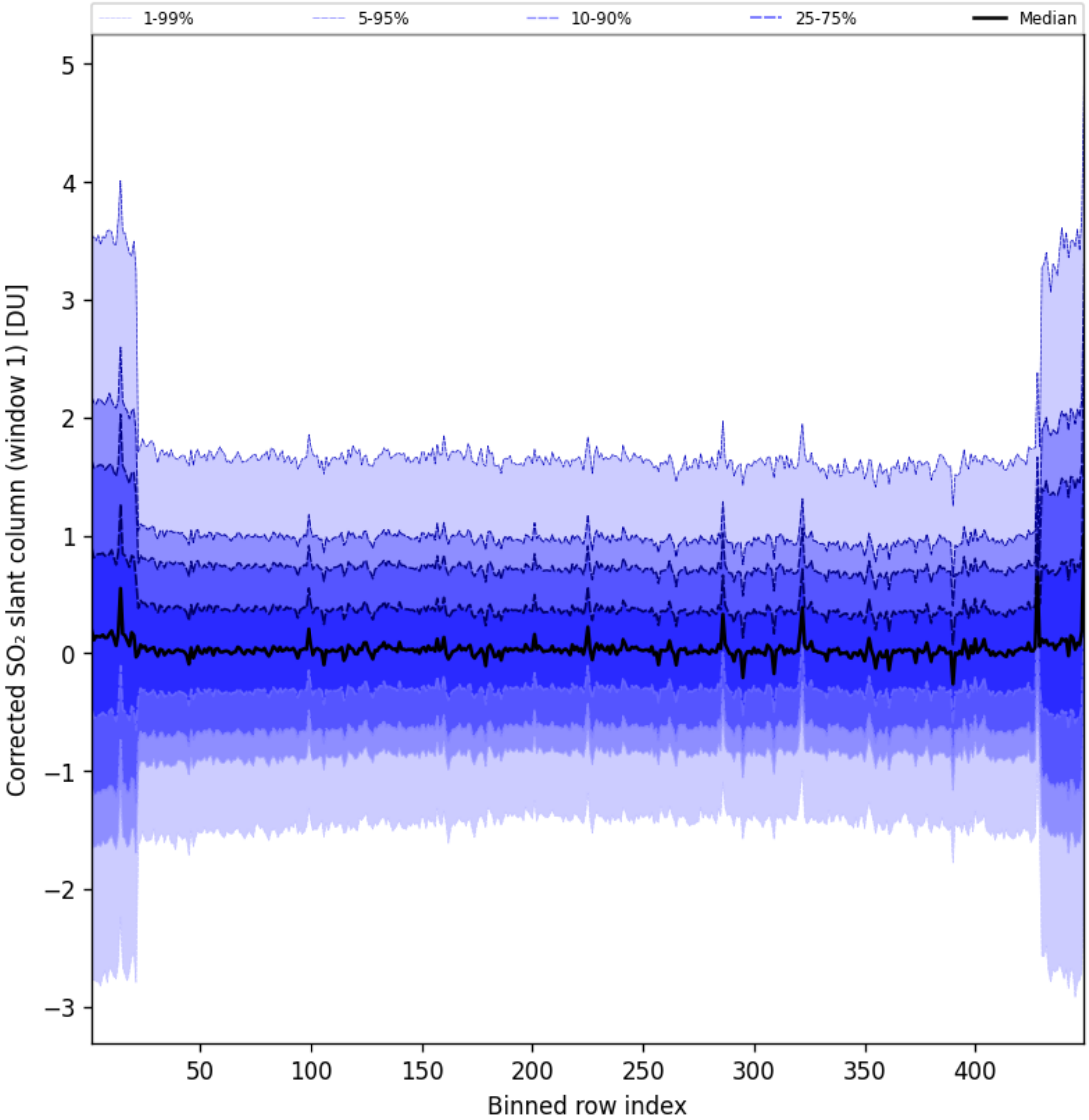


Figure 92: Along track statistics of “Corrected SO_2 slant column (window 1)” for 2025-03-01 to 2025-03-02

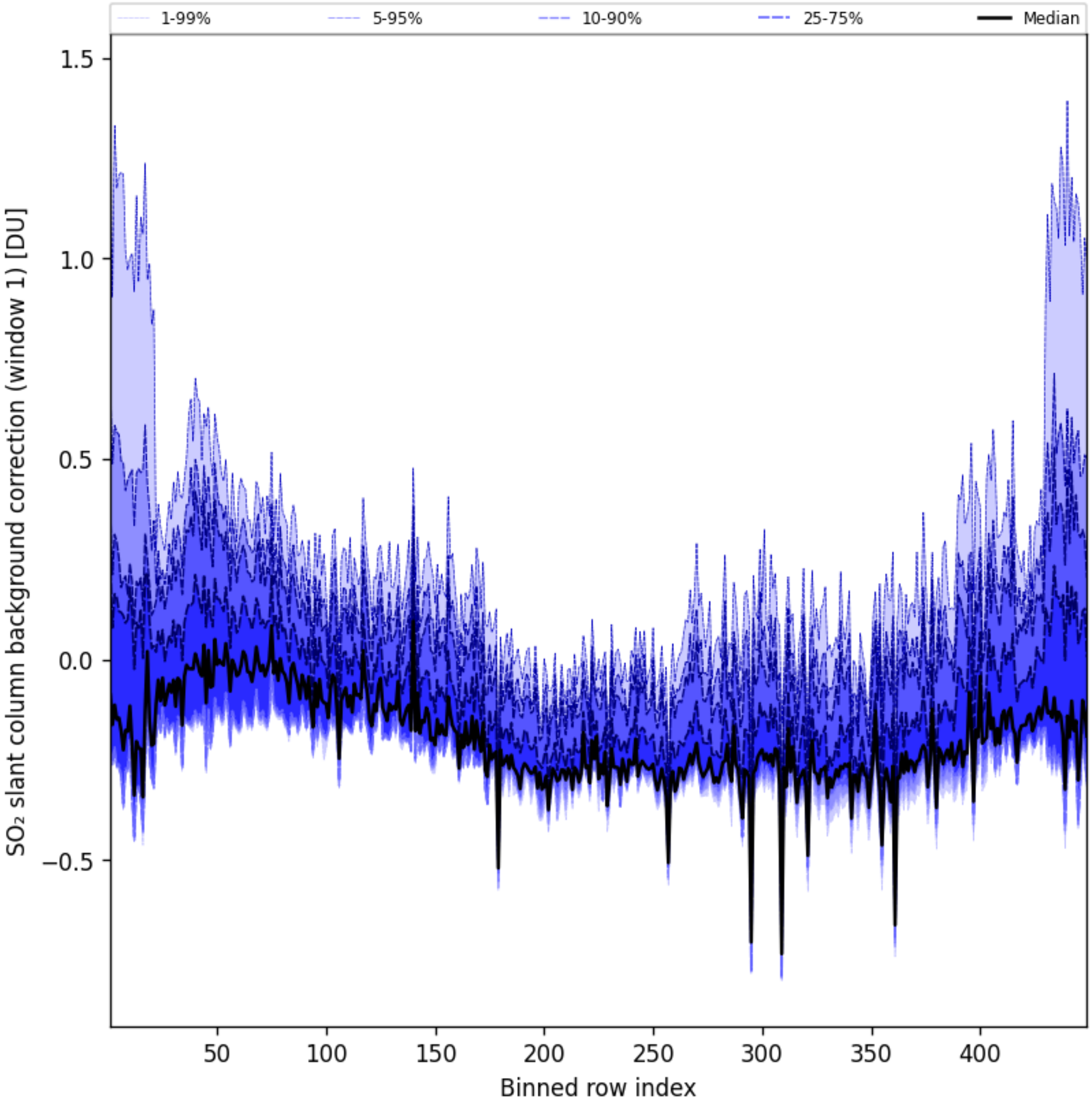


Figure 93: Along track statistics of “SO_2 slant column background correction (window 1)” for 2025-03-01 to 2025-03-02

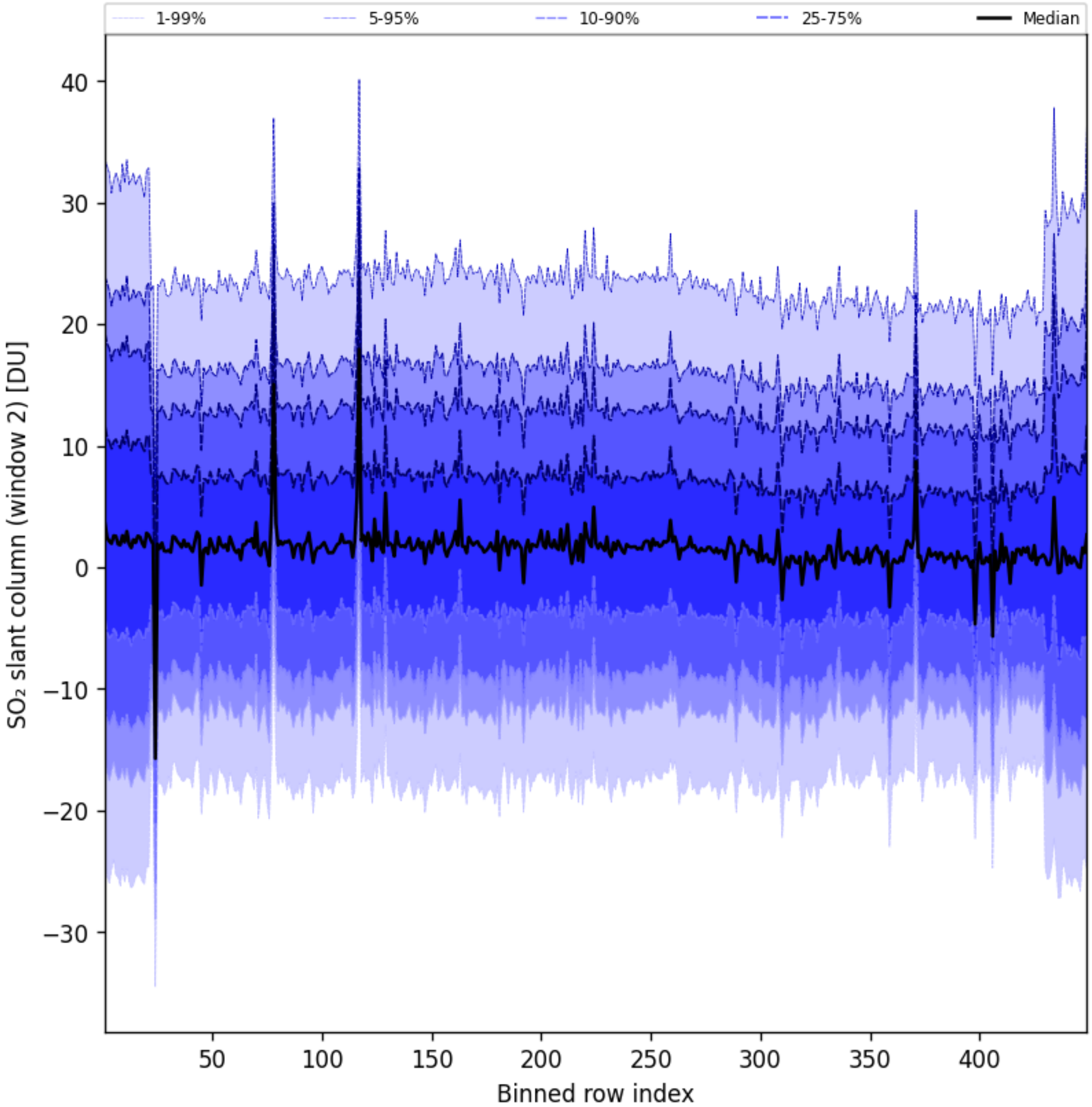


Figure 94: Along track statistics of “SO_2 slant column (window 2)” for 2025-03-01 to 2025-03-02

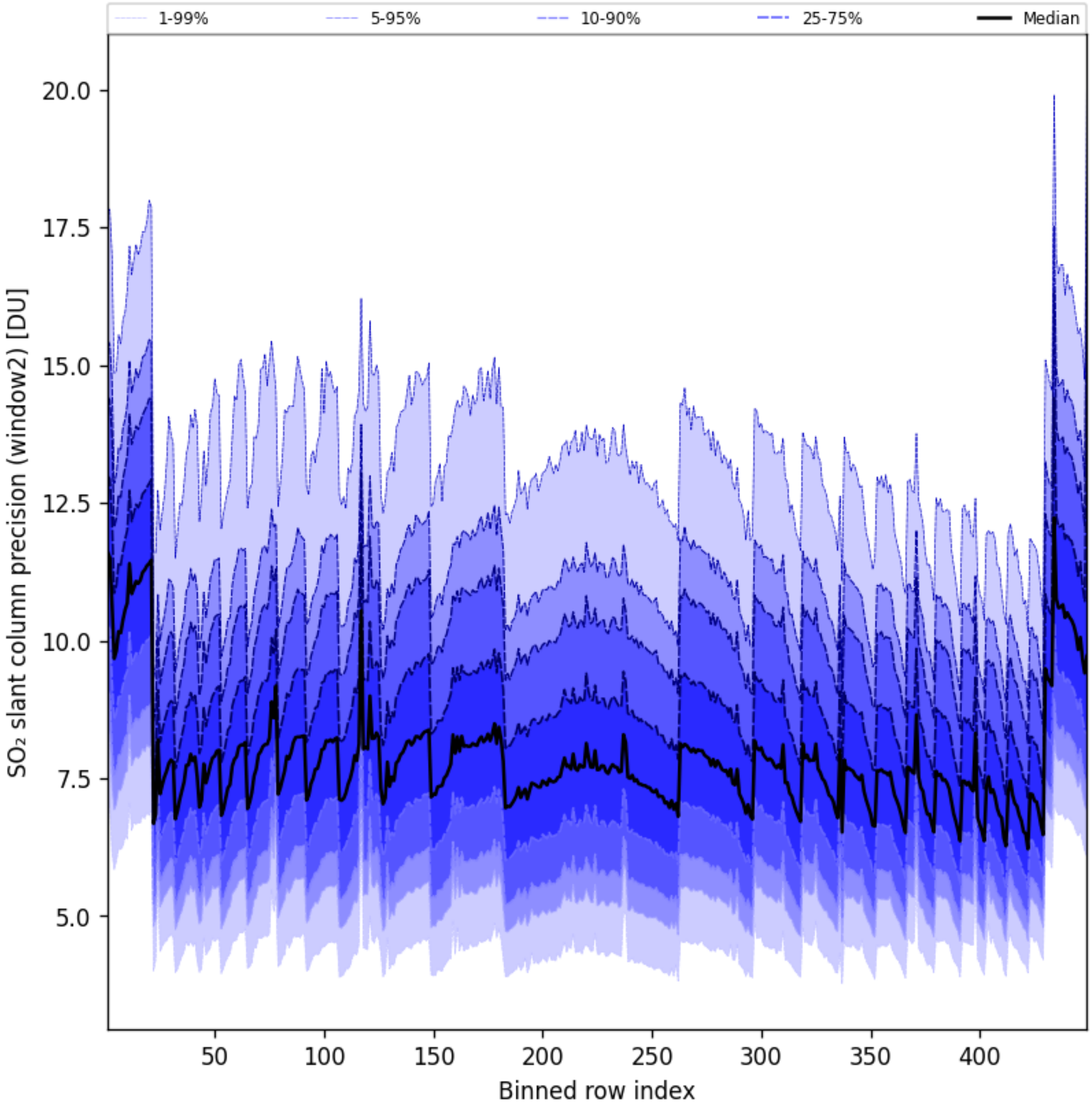


Figure 95: Along track statistics of “SO_2 slant column precision (window2)” for 2025-03-01 to 2025-03-02

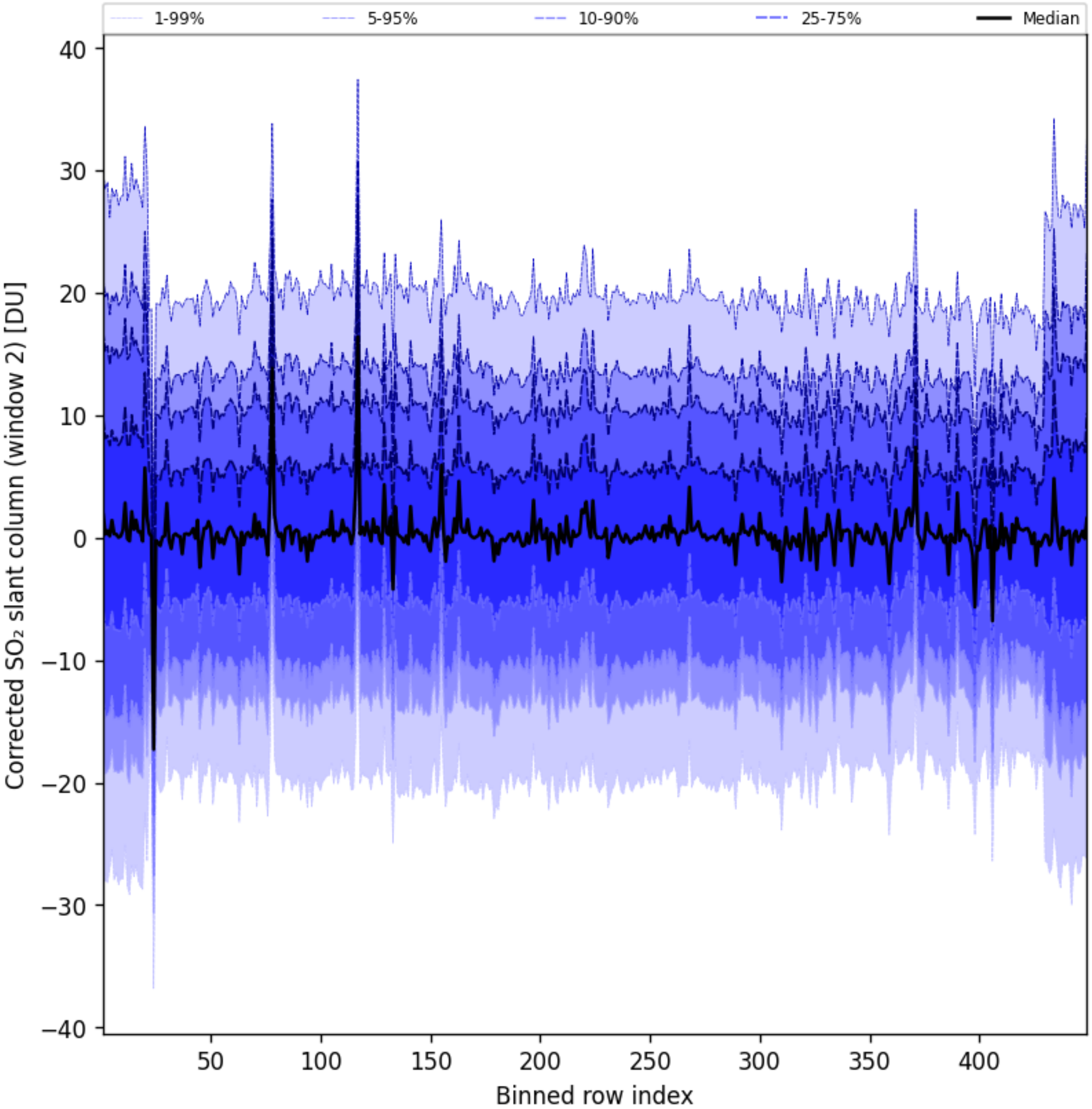


Figure 96: Along track statistics of “Corrected SO_2 slant column (window 2)” for 2025-03-01 to 2025-03-02

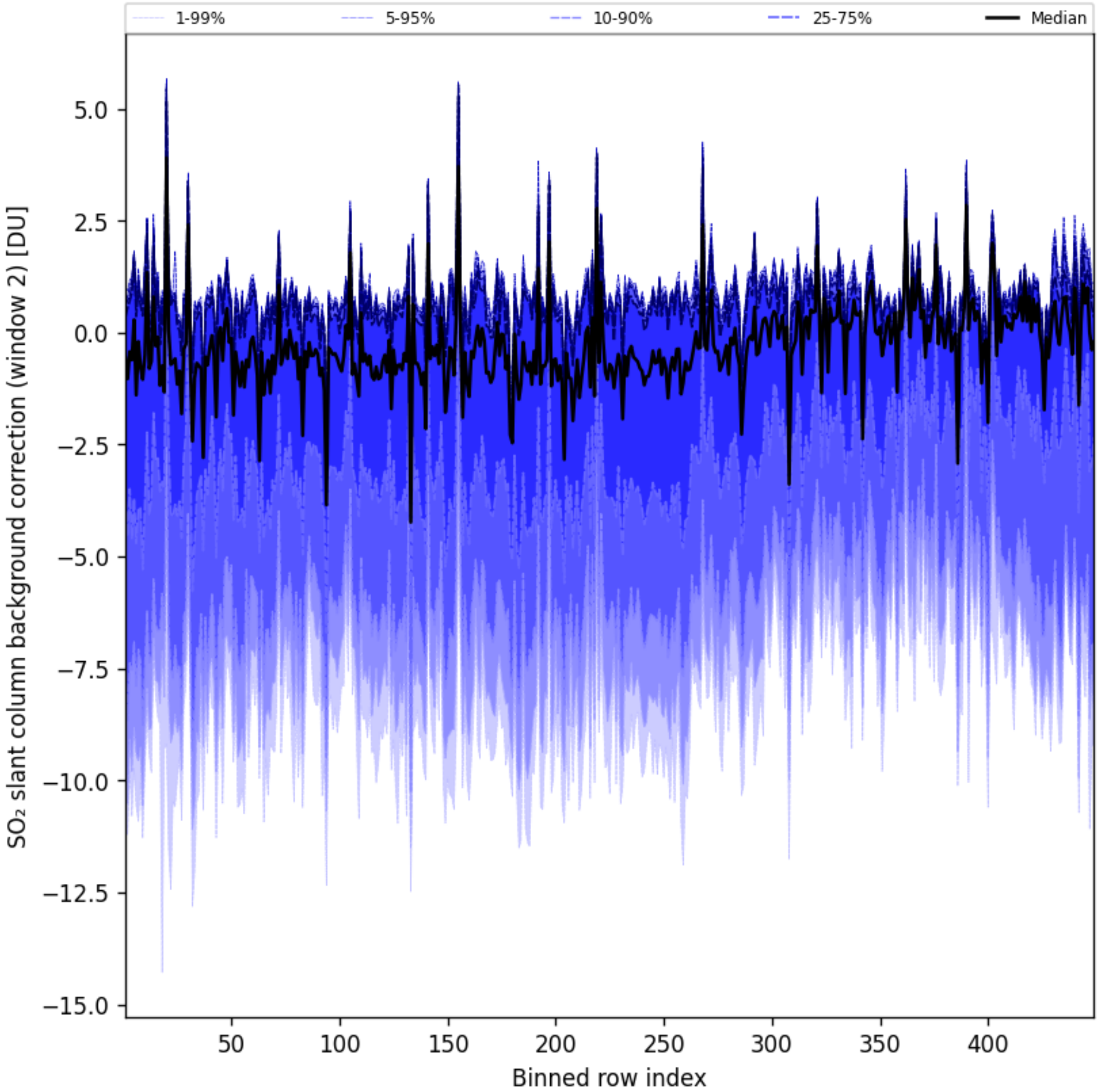


Figure 97: Along track statistics of “SO_2 slant column background correction (window 2)” for 2025-03-01 to 2025-03-02

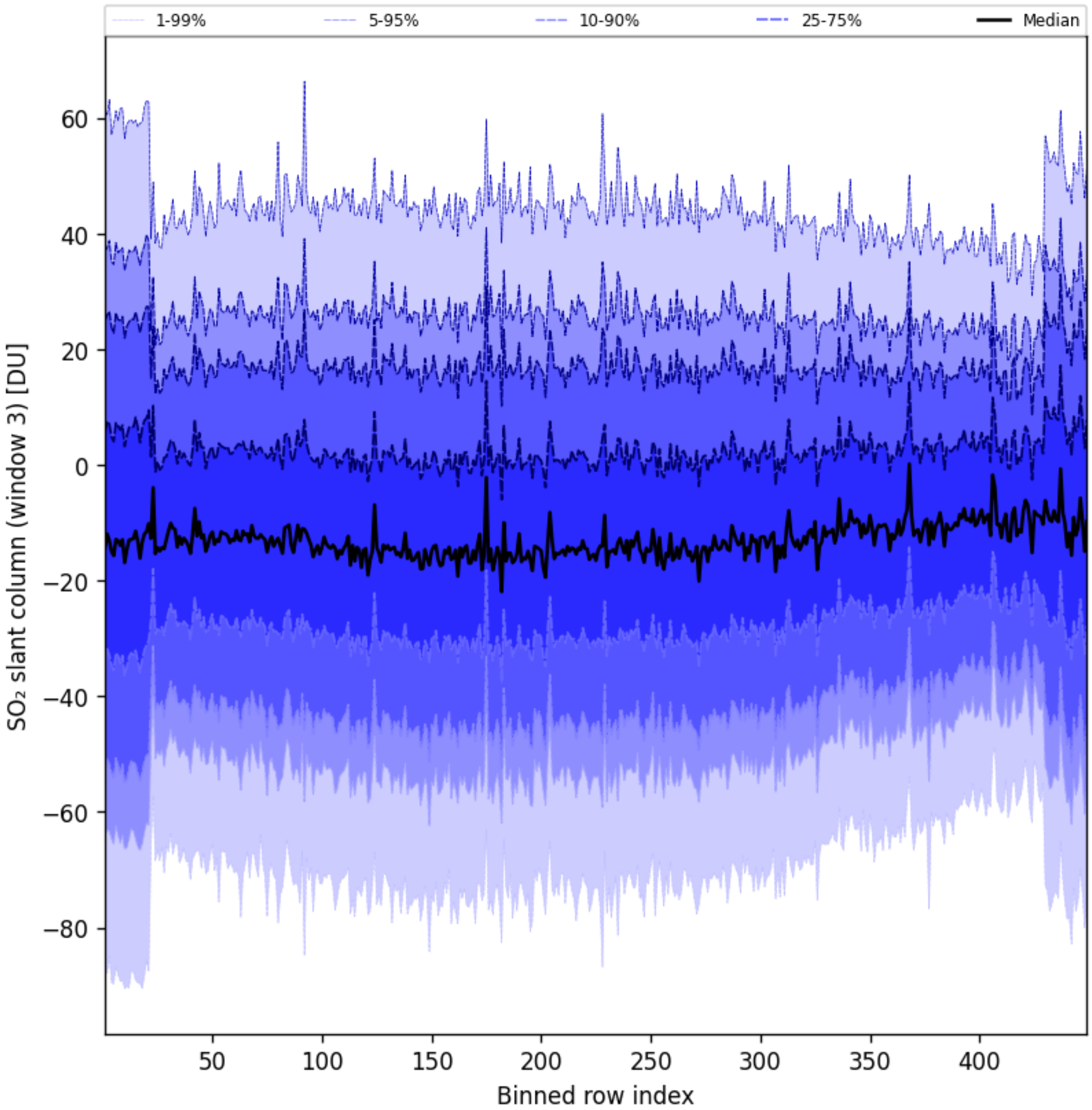


Figure 98: Along track statistics of “SO_2 slant column (window 3)” for 2025-03-01 to 2025-03-02

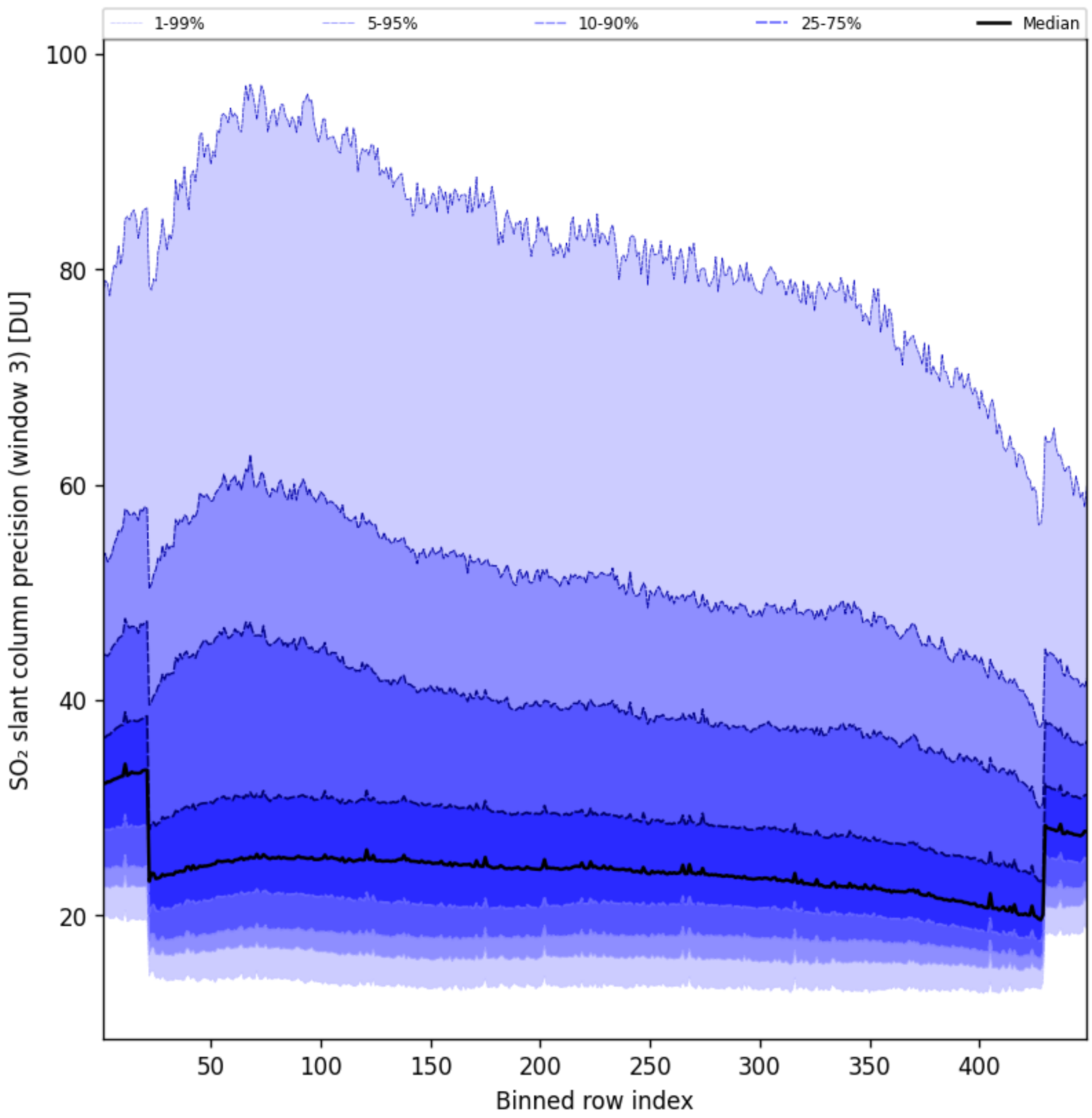


Figure 99: Along track statistics of "SO_2 slant column precision (window 3)" for 2025-03-01 to 2025-03-02

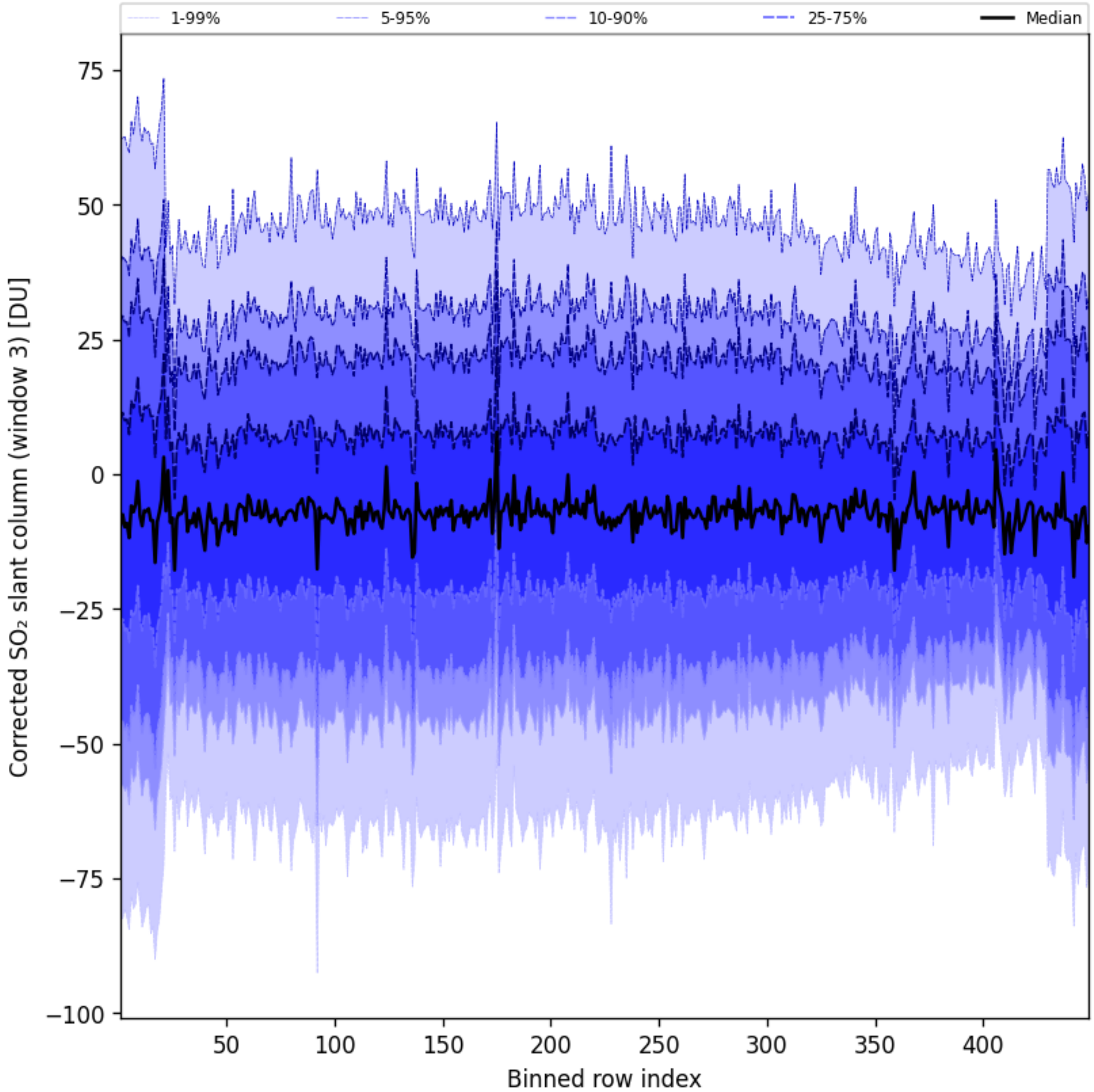


Figure 100: Along track statistics of “Corrected SO_2 slant column (window 3)” for 2025-03-01 to 2025-03-02

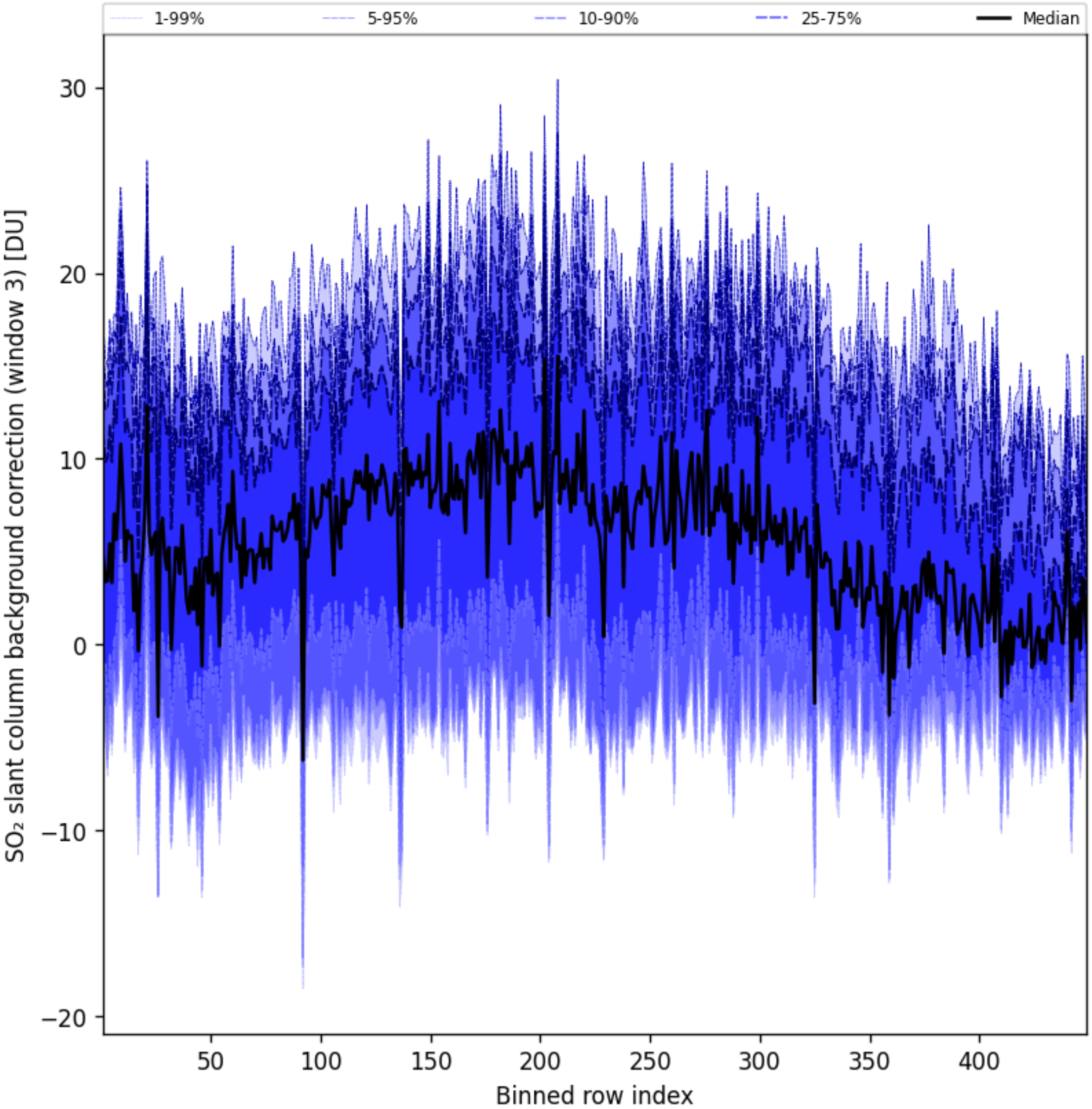


Figure 101: Along track statistics of “SO_2 slant column background correction (window 3)” for 2025-03-01 to 2025-03-02

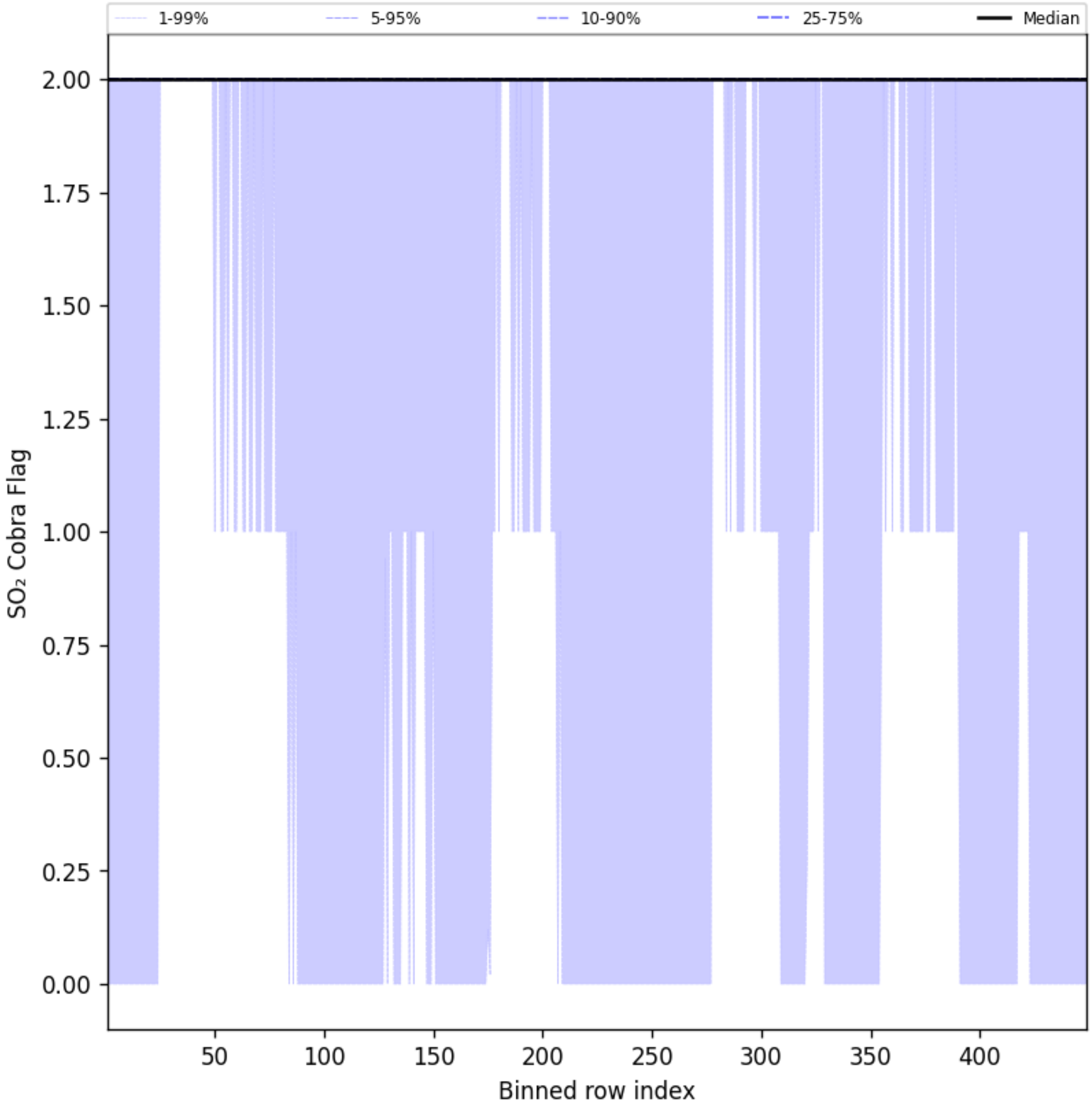


Figure 102: Along track statistics of “SO_2 Cobra Flag” for 2025-03-01 to 2025-03-02

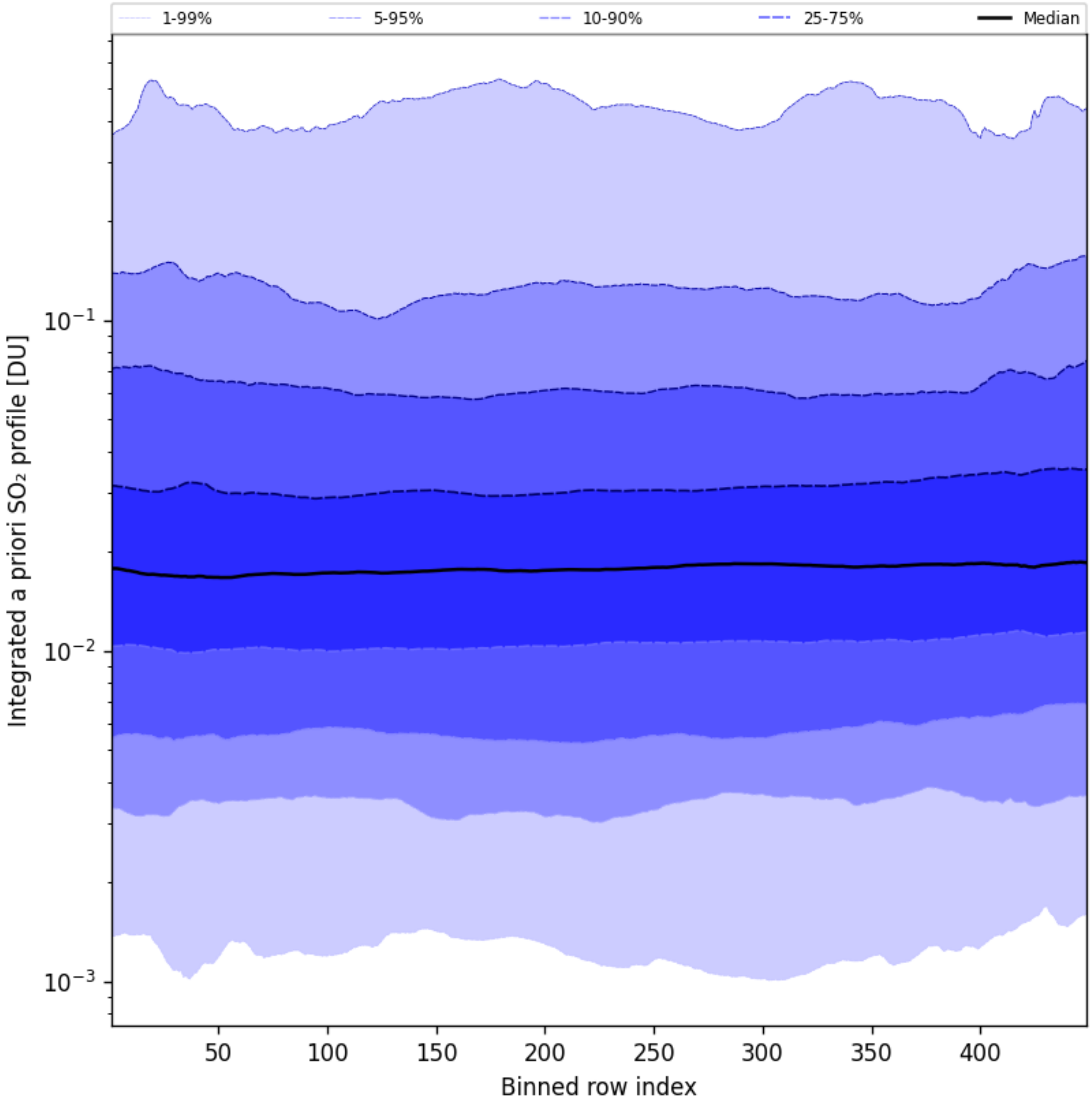
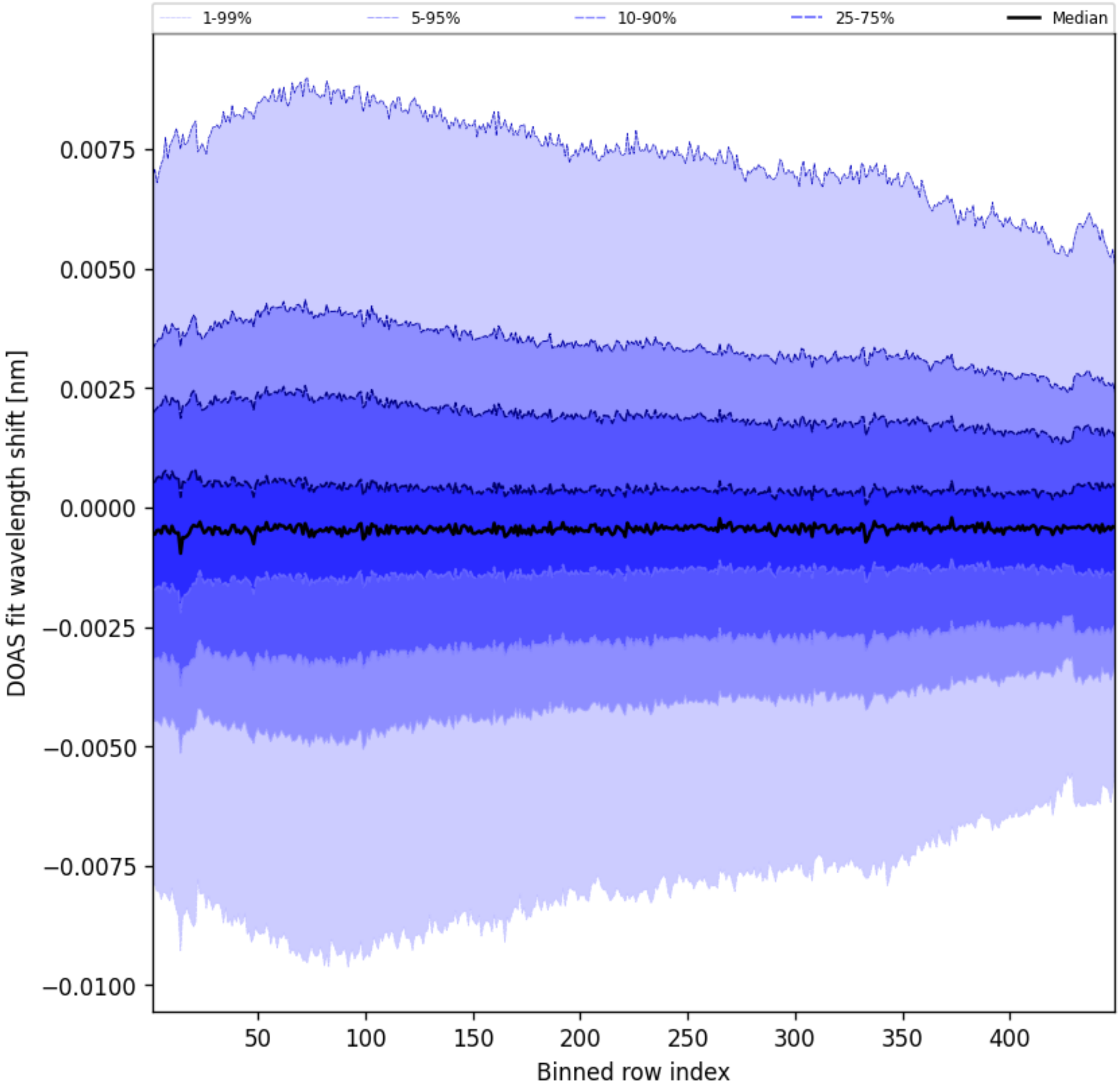


Figure 103: Along track statistics of “Integrated a priori SO_2 profile” for 2025-03-01 to 2025-03-02



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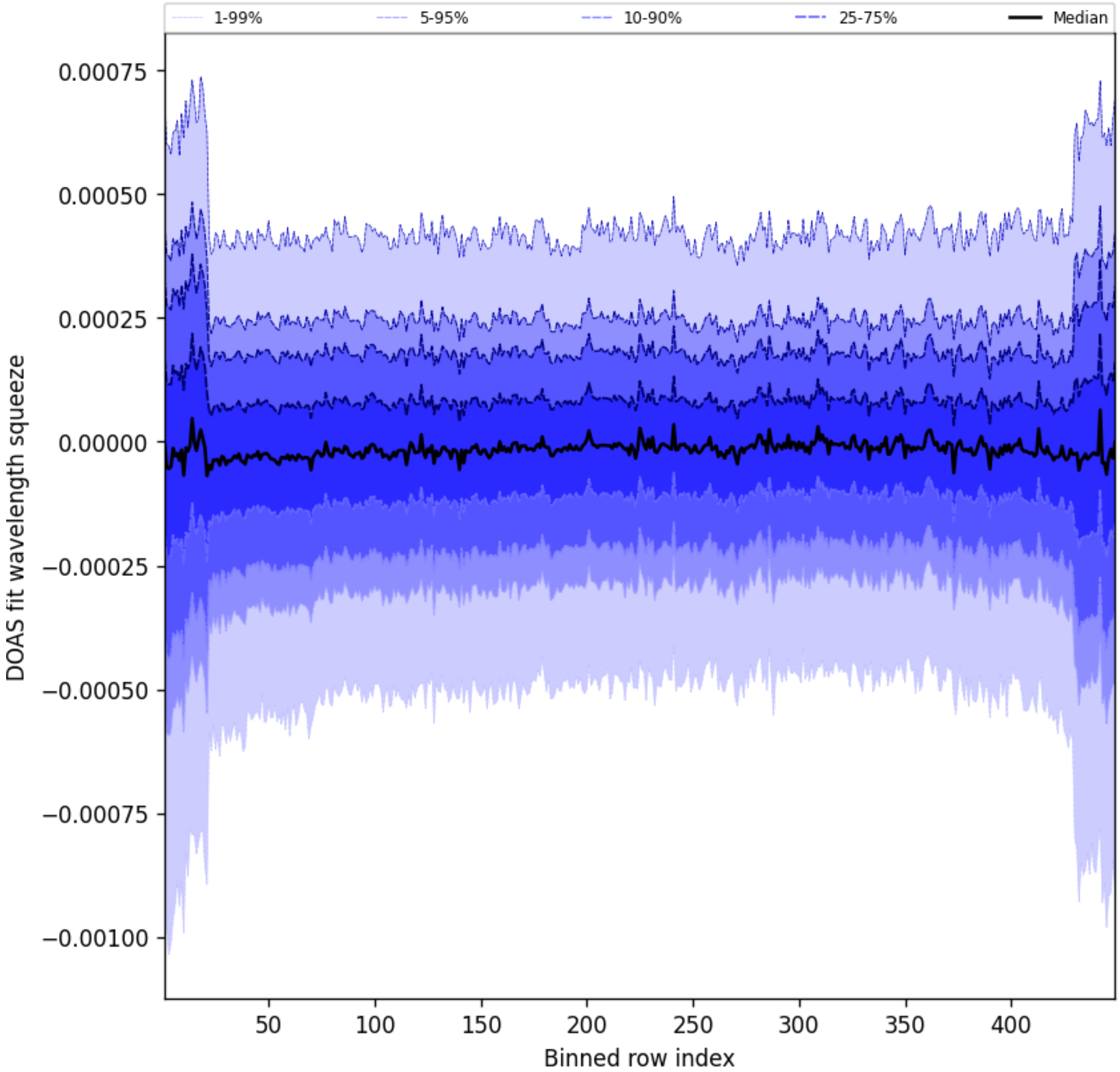

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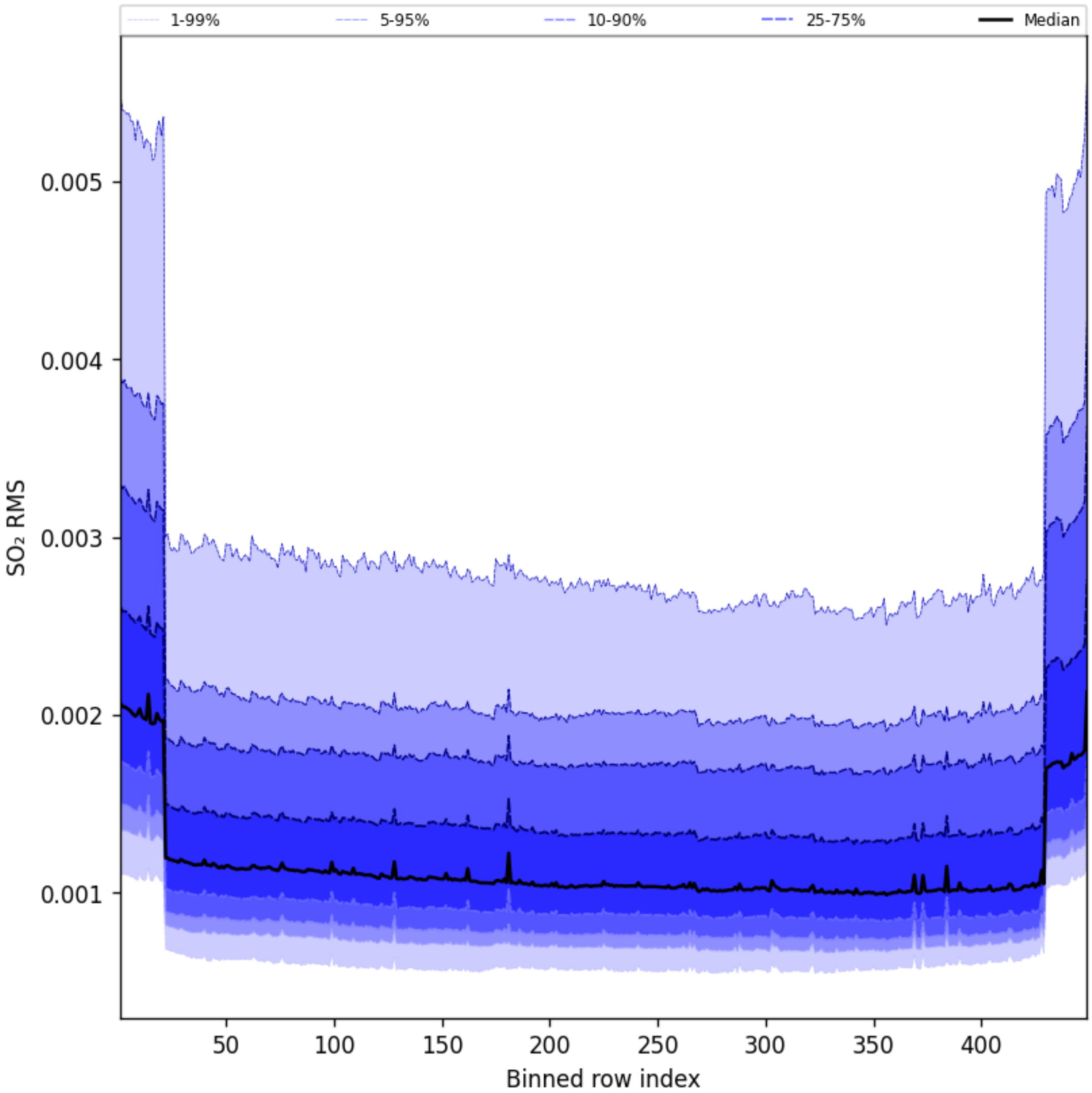

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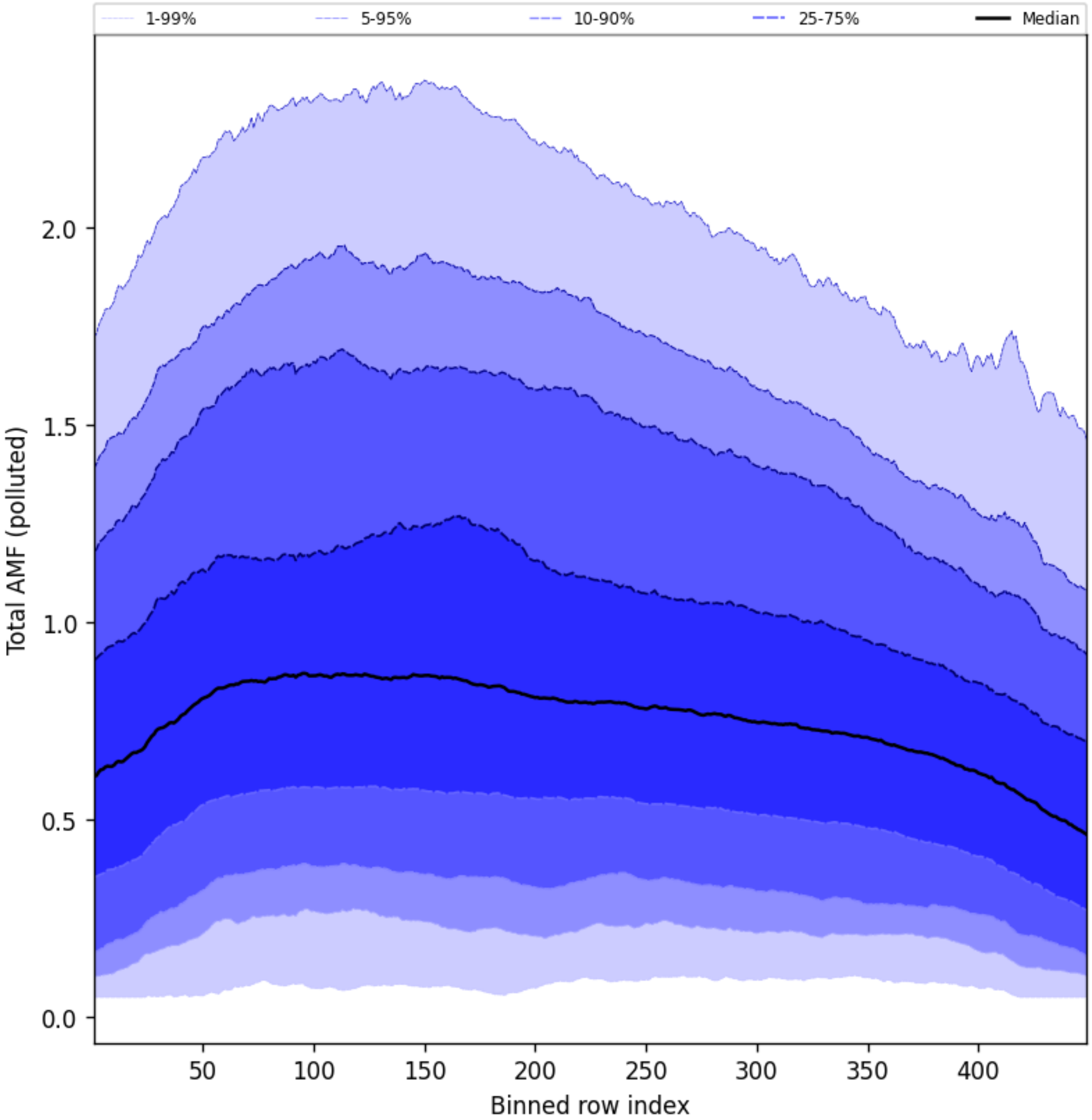
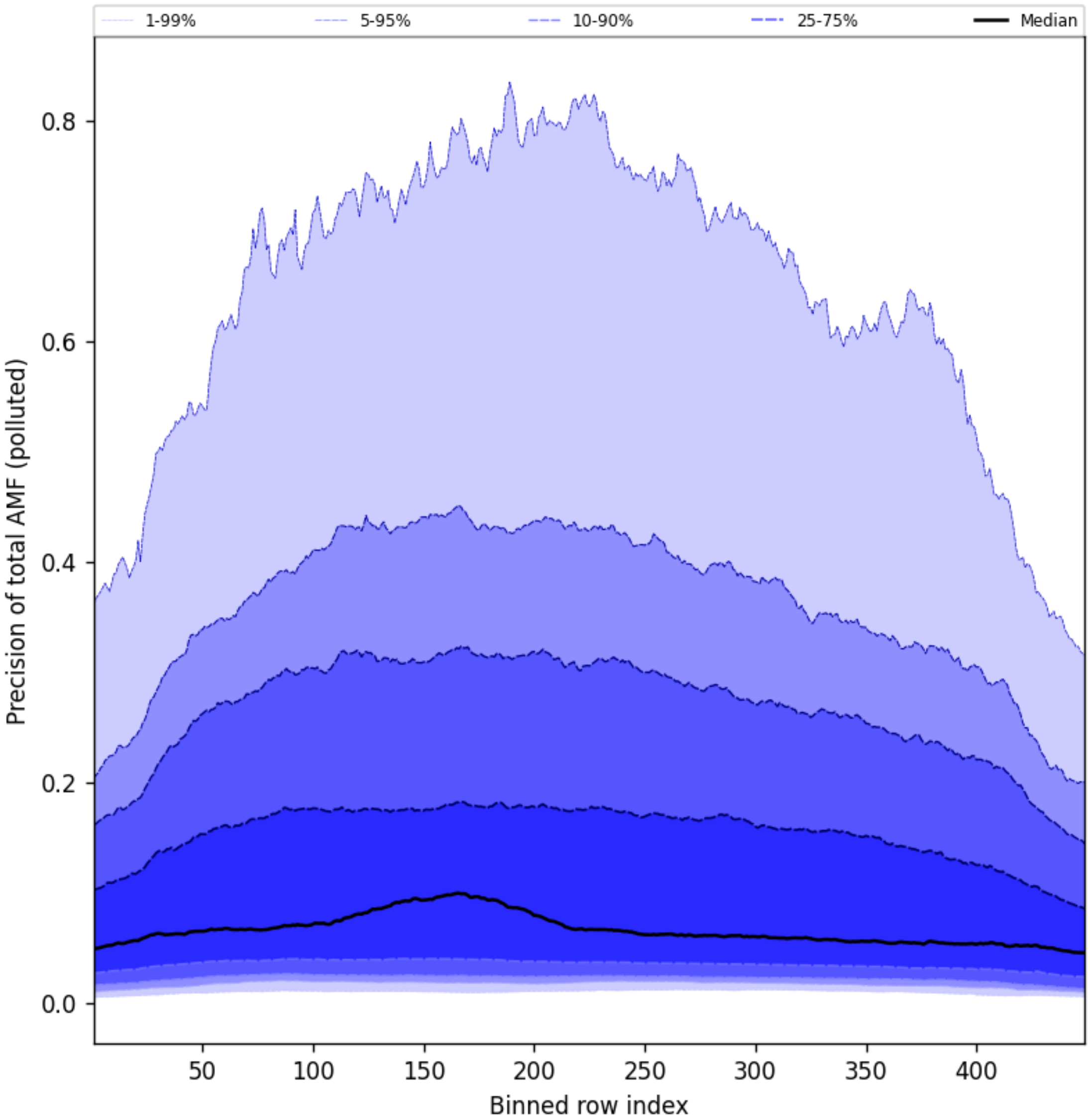


Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-03-01 to 2025-03-02



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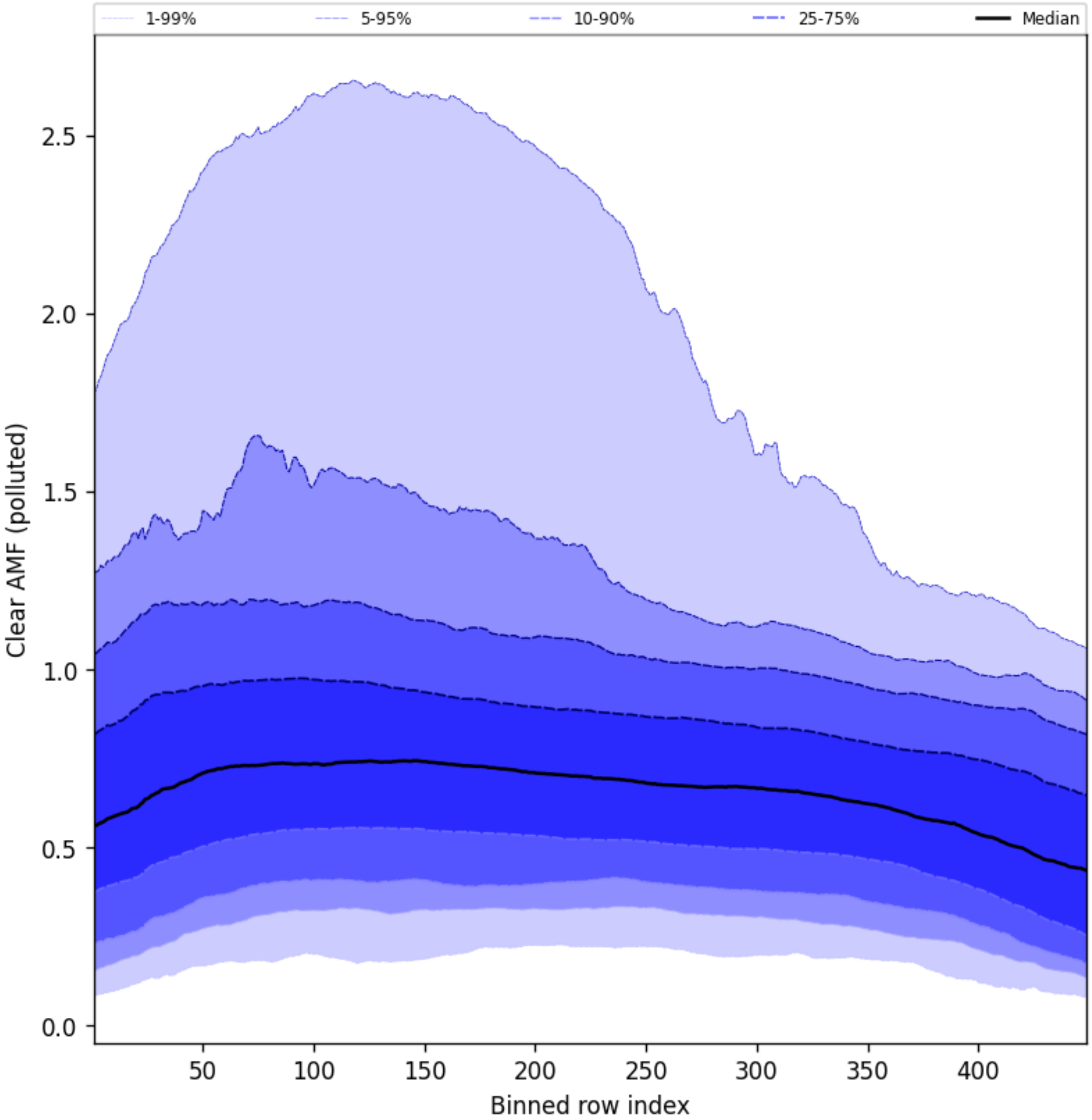

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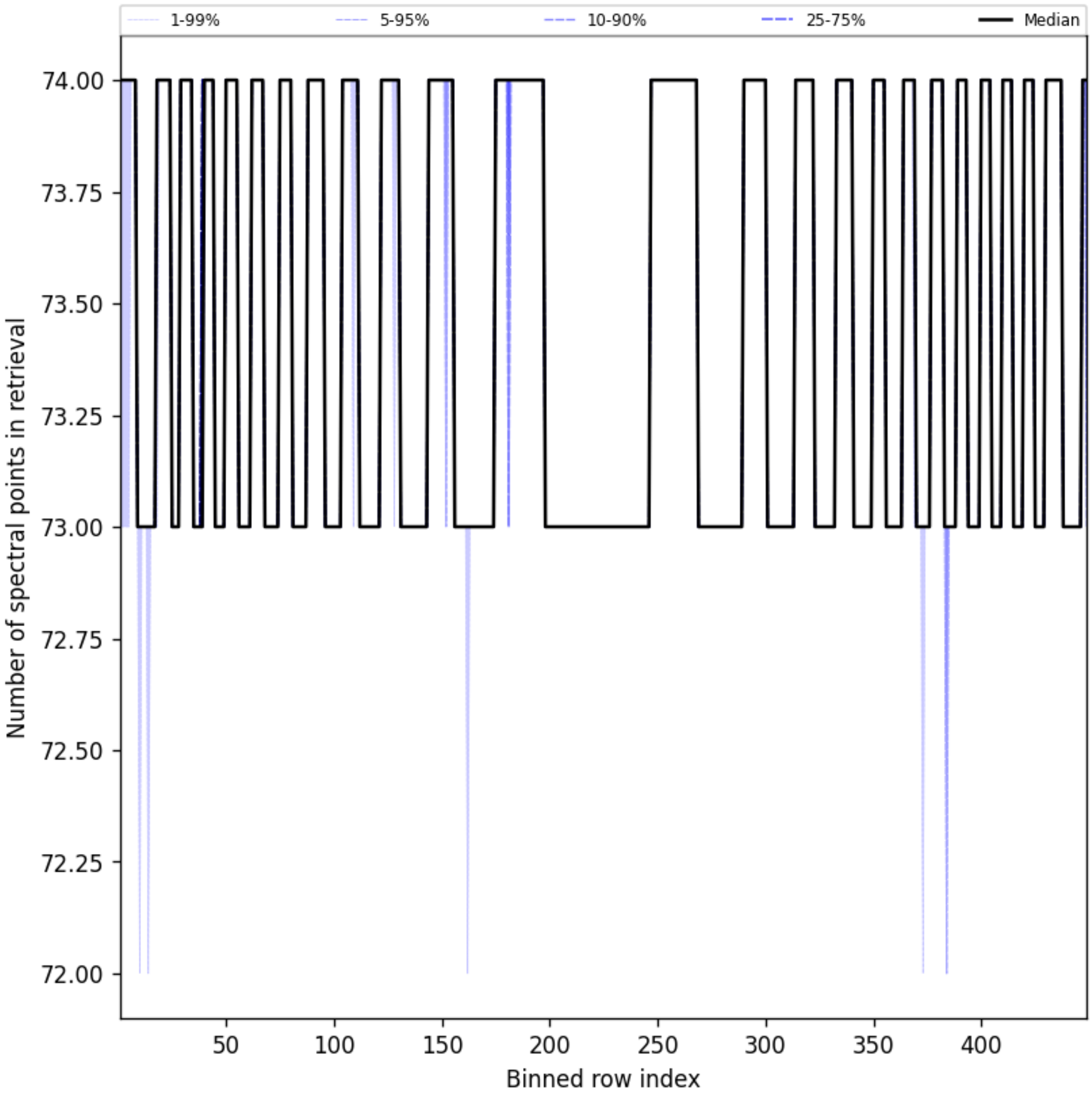

Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-03-01 to 2025-03-02

10 Coincidence density

To investigate the relation between parameters scatter density plots are produced. These include some 'hidden' parameters, latitude and the solar- and viewing geometries, in addition to all configured parameters. All combinations of pairs of parameters are included *once*, in one direction alone.

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11 Copyright information of ‘PyCAMA’

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