PyCAMA report generated by tropl2-proc

tropl2-proc

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1 Short Introduction

1.1 The list of parameters

You may want to keep the list given in table 1 at hand when viewing the results.

2 Definitions

The averages shown here are *unweighed* averages:

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

with N the number of observations in the dataset.

The spread of the measurements is indicated with the variance $V(x)$, or rather the standard deviation $\sigma(x) = \sqrt{V(x)}$.

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

We also report the more robust statistics median, minimum, maximum, various percentiles and inter quartile range.

The median m is the value of parameter x for which half of the observations of x is smaller than m:

$$P(x \leq m) = P(x \geq m) = \int_{-\infty}^{m} f(x)\,\mathrm{d}x = \frac{1}{2} \tag{3}$$

with $f(x)$ the probability density function.

The median is a special case of a percentile. Instead of ½ in equation 3, other threshold values can be used. We report results for 1 %, 5 %, 10 %, 15.9 %, 25 %, 75 %, 84.1 %, 90 %, 95 % and 99 %. The inter quartile range is the difference between the 75 % and 25 % percentiles. Similarly the minimum and maximum values correspond to the 0 % and 100 % percentiles respectively.

For normally distributed parameters the mean and median are the same, while the $\mu \pm \sigma$ values and the 15.9 % and 84.1 % percentiles coincide.

To get a measure for the relation of one variable $x_{(k)}$ with another $x_{(l)}$, we calculate the covariance matrix C_{kl}.

$$C_{kl} = C(x_{(k)}, x_{(l)}) = \frac{1}{N-1}\sum_{i=1}^{N}(x_{(k),i} - \overline{x_{(k)}})(x_{(l),i} - \overline{x_{(l)}}) \tag{4}$$

Rather than a dimensionally dependent covariance, it is often easier to interpret a correlation matrix R_{kl}, a matrix of Pearson's r coefficients:

$$R_{kl} = R(x_{(k)}, x_{(l)}) = \frac{C_{kl}}{\sqrt{C_{kk}C_{ll}}} = \frac{C_{kl}}{\sqrt{V(x_k)V(x_l)}} \tag{5}$$

The diagonal elements of the covariance matrix are the variances of the elements, $V(x_{(k)}) = C_{kk}$ and obviously $R_{kk} = 1$.

Table 1: Parameterlist and basic statistics for the analysis

Variable	mean $\pm\sigma$	Count	Mode	IQR	Median	Minimum	Maximum
qa value [1]	0.637 ± 0.405	17322397	0.995	0.780	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(3.055 \pm 100.502) \times 10^{-2}$	17322397	0.263	0.450	1.047×10^{-2}	-129	466
sulfurdioxide total vertical column precision [DU]	0.504 ± 0.721	17322397	0.197	0.322	0.323	4.262×10^{-2}	278
sulfurdioxide slant column density corrected [DU]	$(1.997 \pm 40.726) \times 10^{-2}$	17322397	0.276	0.379	9.494×10^{-3}	-23.5	130
sulfurdioxide slant column density cobra [DU]	$(1.969 \pm 38.465) \times 10^{-2}$	17322397	0.276	0.379	9.494×10^{-3}	-23.5	66.6
sulfurdioxide slant column density cobra precision [DU]	0.302 ± 0.131	17322397	0.213	0.135	0.266	8.703×10^{-2}	36.3
sulfurdioxide slant column density window1 [DU]	0.104 ± 0.700	17322397	0.125	0.752	0.109	-108	91.3
sulfurdioxide slant column density window1 precision [DU]	0.302 ± 0.131	17322397	0.213	0.135	0.266	8.703×10^{-2}	36.3
sulfurdioxide slant column density corrected win1 [DU]	$(-1.390 \pm 69.525) \times 10^{-2}$	17322397	-2.500×10^{-2}	0.744	-3.447×10^{-2}	-108	91.1
background so2 slant column offset window1 [DU]	-0.118 ± 0.136	17322397	-0.180	0.144	-0.144	-1.42	2.96
sulfurdioxide slant column density window2 [DU]	0.762 ± 9.118	17322397	0.750	11.6	0.667	-2.365×10^{3}	769
sulfurdioxide slant column density window2 precision [DU]	8.14 ± 2.33	17322397	7.43	2.56	7.78	2.41	1.094×10^{3}
sulfurdioxide slant column density corrected win2 [DU]	-0.606 ± 8.836	17322397	-0.250	11.1	-0.603	-2.372×10^{3}	769
background so2 slant column offset window2 [DU]	-1.37 ± 2.71	17322397	0.750	3.70	-0.529	-17.8	10.7
sulfurdioxide slant column density window3 [DU]	-4.54 ± 23.99	17322397	-6.16	29.8	-4.94	-4.425×10^{3}	5.790×10^{3}
sulfurdioxide slant column density window3 precision [DU]	29.2 ± 13.3	17322397	23.7	9.42	25.5	10.8	1.336×10^{3}
sulfurdioxide slant column density corrected win3 [DU]	1.56 ± 23.33	17322397	1.68	28.8	1.64	-4.425×10^{3}	5.792×10^{3}
background so2 slant column offset window3 [DU]	6.10 ± 6.03	17322397	0.560	10.4	5.82	-14.9	25.3
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.21	17322397	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(3.339 \pm 8.524) \times 10^{-2}$	17322397	1.423×10^{-2}	1.912×10^{-2}	1.355×10^{-2}	2.520×10^{-4}	2.79
fitted radiance shift [nm]	$(-2.305 \pm 26.310) \times 10^{-4}$	17322397	1.000×10^{-4}	1.692×10^{-3}	-2.158×10^{-4}	-7.927×10^{-2}	4.747×10^{-2}
fitted radiance squeeze [1]	$(-1.514 \pm 18.135) \times 10^{-5}$	17322397	-1.000×10^{-5}	2.079×10^{-4}	-1.014×10^{-5}	-2.842×10^{-2}	1.935×10^{-2}
fitted root mean square [1]	$(1.309 \pm 0.531) \times 10^{-3}$	17322397	9.750×10^{-4}	5.427×10^{-4}	1.165×10^{-3}	2.633×10^{-4}	7.730×10^{-2}
sulfurdioxide total air mass factor polluted [1]	0.908 ± 0.464	17322397	0.740	0.586	0.837	5.000×10^{-2}	2.92
sulfurdioxide total air mass factor polluted precision [1]	0.110 ± 0.118	17322397	3.500×10^{-2}	0.101	6.910×10^{-2}	2.648×10^{-3}	1.76
sulfurdioxide clear air mass factor polluted [1]	0.774 ± 0.333	17322397	0.700	0.426	0.736	4.591×10^{-2}	3.00
number of spectral points in retrieval [1]	73.4 ± 0.5	17322397	73.0	1.000	73.0	52.0	74.0

Table 2: Percentile ranges

Variable	1 %	5 %	10 %	15.9 %	25 %	75 %	84.1 %	90 %	95 %	99 %
qa value [1]	0.0	0.0	4.000×10^{-2}	0.1000	0.220	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	−2.14	−0.845	−0.523	−0.355	−0.211	0.239	0.393	0.579	0.942	2.48
sulfurdioxide total vertical column precision [DU]	0.101	0.138	0.165	0.188	0.218	0.540	0.718	0.932	1.34	3.17
sulfurdioxide slant column density corrected [DU]	−0.874	−0.508	−0.369	−0.276	−0.178	0.201	0.304	0.406	0.564	1.05
sulfurdioxide slant column density cobra [DU]	−0.874	−0.508	−0.369	−0.276	−0.178	0.201	0.304	0.406	0.564	1.05
sulfurdioxide slant column density cobra precision [DU]	0.150	0.176	0.190	0.201	0.216	0.351	0.402	0.454	0.547	0.777
sulfurdioxide slant column density window1 [DU]	−1.74	−0.967	−0.670	−0.474	−0.270	0.482	0.678	0.864	1.15	1.93
sulfurdioxide slant column density window1 precision [DU]	0.150	0.176	0.190	0.201	0.216	0.351	0.402	0.454	0.547	0.777
sulfurdioxide slant column density corrected win1 [DU]	−1.71	−1.03	−0.768	−0.590	−0.401	0.343	0.548	0.749	1.06	1.94
background so2 slant column offset window1 [DU]	−0.338	−0.276	−0.249	−0.232	−0.208	-6.435×10^{-2}	-1.224×10^{-2}	4.865×10^{-2}	0.145	0.351
sulfurdioxide slant column density window2 [DU]	−20.6	−13.8	−10.4	−7.91	−5.08	6.49	9.41	12.0	15.6	23.2
sulfurdioxide slant column density window2 precision [DU]	4.37	5.22	5.73	6.15	6.65	9.21	10.1	11.0	12.2	15.0
sulfurdioxide slant column density corrected win2 [DU]	−21.9	−14.8	−11.4	−8.95	−6.16	4.93	7.70	10.2	13.6	20.9
background so2 slant column offset window2 [DU]	−8.54	−6.81	−5.56	−4.42	−3.00	0.704	1.03	1.27	1.62	2.72
sulfurdioxide slant column density window3 [DU]	−63.5	−43.0	−33.6	−26.9	−19.5	10.3	18.3	25.5	35.3	54.6
sulfurdioxide slant column density window3 precision [DU]	15.4	17.7	19.4	20.6	22.1	31.5	36.1	42.0	54.2	86.9
sulfurdioxide slant column density corrected win3 [DU]	−57.2	−36.6	−27.0	−20.1	−12.7	16.1	23.5	30.2	39.4	58.3
background so2 slant column offset window3 [DU]	−5.46	−2.63	−1.31	−0.361	0.929	11.3	12.9	14.1	15.5	17.9
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]	5.332×10^{-4}	9.547×10^{-4}	1.448×10^{-3}	2.911×10^{-3}	6.346×10^{-3}	2.547×10^{-2}	3.948×10^{-2}	6.616×10^{-2}	0.129	0.381
fitted radiance shift [nm]	-8.349×10^{-3}	-4.098×10^{-3}	-2.612×10^{-3}	-1.778×10^{-3}	-1.098×10^{-3}	5.947×10^{-4}	1.257×10^{-3}	2.128×10^{-3}	3.684×10^{-3}	8.091×10^{-3}
fitted radiance squeeze [1]	-5.075×10^{-4}	-3.080×10^{-4}	-2.272×10^{-4}	-1.728×10^{-4}	-1.160×10^{-4}	9.188×10^{-5}	1.440×10^{-4}	1.922×10^{-4}	2.613×10^{-4}	4.257×10^{-4}
fitted root mean square [1]	6.138×10^{-4}	7.551×10^{-4}	8.334×10^{-4}	8.932×10^{-4}	9.663×10^{-4}	1.509×10^{-3}	1.737×10^{-3}	1.962×10^{-3}	2.303×10^{-3}	3.263×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.104	0.270	0.372	0.455	0.571	1.16	1.38	1.59	1.84	2.16
sulfurdioxide total air mass factor polluted precision [1]	1.200×10^{-2}	1.966×10^{-2}	2.526×10^{-2}	3.106×10^{-2}	3.928×10^{-2}	0.140	0.183	0.230	0.320	0.624
sulfurdioxide clear air mass factor polluted [1]	0.219	0.322	0.384	0.444	0.535	0.961	1.06	1.18	1.41	1.82
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]	0.588 ± 0.411	11204333	0.820	0.490	0.0	1.000	0.180	1.000
sulfurdioxide total vertical column [DU]	$(3.038 \pm 110.319) \times 10^{-2}$	11204333	0.430	8.765×10^{-3}	-129	466	-0.203	0.227
sulfurdioxide total vertical column precision [DU]	0.508 ± 0.819	11204333	0.322	0.307	4.262×10^{-2}	278	0.206	0.527
sulfurdioxide slant column density corrected [DU]	$(1.874 \pm 39.610) \times 10^{-2}$	11204333	0.371	8.181×10^{-3}	-10.9	109	-0.175	0.196
sulfurdioxide slant column density cobra [DU]	$(1.845 \pm 37.095) \times 10^{-2}$	11204333	0.371	8.181×10^{-3}	-10.9	66.6	-0.175	0.196
sulfurdioxide slant column density cobra precision [DU]	0.297 ± 0.131	11204333	0.134	0.260	8.703×10^{-2}	36.3	0.211	0.345
sulfurdioxide slant column density window1 [DU]	$(9.664 \pm 69.167) \times 10^{-2}$	11204333	0.739	0.105	-36.1	34.2	-0.269	0.470
sulfurdioxide slant column density window1 precision [DU]	0.297 ± 0.131	11204333	0.134	0.260	8.703×10^{-2}	36.3	0.211	0.345
sulfurdioxide slant column density corrected win1 [DU]	$(-1.379 \pm 68.544) \times 10^{-2}$	11204333	0.729	-3.521×10^{-2}	-36.1	34.0	-0.394	0.336
background so2 slant column offset window1 [DU]	-0.110 ± 0.147	11204333	0.162	-0.146	-0.554	1.47	-0.210	-4.861×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.13 ± 8.68	11204333	11.2	1.04	-2.365×10^{3}	115	-4.51	6.66
sulfurdioxide slant column density window2 precision [DU]	7.72 ± 2.09	11204333	2.28	7.42	2.41	1.094×10^{3}	6.38	8.66
sulfurdioxide slant column density corrected win2 [DU]	-0.717 ± 8.285	11204333	10.6	-0.681	-2.372×10^{3}	110	-5.99	4.58
background so2 slant column offset window2 [DU]	-1.85 ± 3.03	11204333	4.95	-1.08	-17.8	10.7	-4.19	0.753
sulfurdioxide slant column density window3 [DU]	-5.41 ± 22.47	11204333	27.9	-5.95	-4.425×10^{3}	2.719×10^{3}	-19.6	8.33
sulfurdioxide slant column density window3 precision [DU]	27.8 ± 12.9	11204333	7.62	24.3	10.8	1.175×10^{3}	21.3	29.0
sulfurdioxide slant column density corrected win3 [DU]	1.86 ± 21.66	11204333	26.8	1.90	-4.425×10^{3}	2.717×10^{3}	-11.5	15.3
background so2 slant column offset window3 [DU]	7.27 ± 6.25	11204333	11.0	8.50	-14.9	22.3	1.50	12.5
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.18	11204333	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(3.958 \pm 10.082) \times 10^{-2}$	11204333	2.730×10^{-2}	1.304×10^{-2}	2.520×10^{-4}	2.79	3.122×10^{-3}	3.042×10^{-2}
fitted radiance shift [nm]	$(-9.220 \pm 258.324) \times 10^{-5}$	11204333	1.538×10^{-3}	-1.061×10^{-4}	-4.346×10^{-2}	4.187×10^{-2}	-8.813×10^{-4}	6.567×10^{-4}
fitted radiance squeeze [1]	$(-3.637 \pm 17.634) \times 10^{-5}$	11204333	2.037×10^{-4}	-2.529×10^{-5}	-8.976×10^{-3}	8.896×10^{-3}	-1.314×10^{-4}	7.230×10^{-5}
fitted root mean square [1]	$(1.289 \pm 0.543) \times 10^{-3}$	11204333	5.346×10^{-4}	1.139×10^{-3}	3.365×10^{-4}	2.837×10^{-2}	9.435×10^{-4}	1.478×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.944 ± 0.511	11204333	0.710	0.861	5.000×10^{-2}	2.92	0.548	1.26
sulfurdioxide total air mass factor polluted precision [1]	0.120 ± 0.134	11204333	0.113	7.460×10^{-2}	2.648×10^{-3}	1.76	3.901×10^{-2}	0.152
sulfurdioxide clear air mass factor polluted [1]	0.784 ± 0.379	11204333	0.516	0.724	4.591×10^{-2}	3.00	0.487	1.00
number of spectral points in retrieval [1]	73.5 ± 0.5	11204333	1.000	73.0	52.0	74.0	73.0	74.0

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

Variable	mean $\pm\sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.728 ± 0.377	6118064	0.640	1.000	0.0	1.000	0.360	1.000
sulfurdioxide total vertical column [DU]	$(3.087 \pm 79.437) \times 10^{-2}$	6118064	0.489	1.405×10^{-2}	-100	132	-0.227	0.262
sulfurdioxide total vertical column precision [DU]	0.496 ± 0.495	6118064	0.317	0.349	5.834×10^{-2}	45.8	0.243	0.560
sulfurdioxide slant column density corrected [DU]	$(2.221 \pm 42.692) \times 10^{-2}$	6118064	0.395	1.208×10^{-2}	-23.5	130	-0.184	0.211
sulfurdioxide slant column density cobra [DU]	$(2.196 \pm 40.854) \times 10^{-2}$	6118064	0.395	1.208×10^{-2}	-23.5	49.6	-0.184	0.211
sulfurdioxide slant column density cobra precision [DU]	0.312 ± 0.132	6118064	0.135	0.277	9.525×10^{-2}	26.4	0.226	0.362
sulfurdioxide slant column density window1 [DU]	0.119 ± 0.714	6118064	0.778	0.117	-108	91.3	-0.273	0.505
sulfurdioxide slant column density window1 precision [DU]	0.312 ± 0.132	6118064	0.135	0.277	9.525×10^{-2}	26.4	0.226	0.362
sulfurdioxide slant column density corrected win1 [DU]	$(-1.410 \pm 71.285) \times 10^{-2}$	6118064	0.771	-3.302×10^{-2}	-108	91.1	-0.413	0.358
background so2 slant column offset window1 [DU]	-0.133 ± 0.113	6118064	0.121	-0.142	-1.42	2.96	-0.203	-8.162×10^{-2}
sulfurdioxide slant column density window2 [DU]	$(8.987 \pm 983.775) \times 10^{-2}$	6118064	12.3	-9.314×10^{-2}	-1.952×10^{3}	769	-6.15	6.11
sulfurdioxide slant column density window2 precision [DU]	8.89 ± 2.56	6118064	2.78	8.54	2.53	763	7.31	10.1
sulfurdioxide slant column density corrected win2 [DU]	-0.402 ± 9.762	6118064	12.2	-0.436	-1.952×10^{3}	769	-6.52	5.66
background so2 slant column offset window2 [DU]	-0.492 ± 1.674	6118064	1.97	-0.133	-13.6	4.78	-1.34	0.635
sulfurdioxide slant column density window3 [DU]	-2.95 ± 26.48	6118064	33.4	-2.70	-1.522×10^{3}	5.790×10^{3}	-19.4	14.0
sulfurdioxide slant column density window3 precision [DU]	31.9 ± 13.6	6118064	10.7	28.3	11.7	1.336×10^{3}	24.2	34.9
sulfurdioxide slant column density corrected win3 [DU]	1.00 ± 26.10	6118064	33.0	1.05	-1.521×10^{3}	5.792×10^{3}	-15.4	17.6
background so2 slant column offset window3 [DU]	3.96 ± 4.94	6118064	7.15	2.88	-11.4	25.3	0.334	7.48
sulfurdioxide slant column cobra flag [1]	1.96 ± 0.26	6118064	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.206 \pm 4.196) \times 10^{-2}$	6118064	1.324×10^{-2}	1.407×10^{-2}	1.128×10^{-3}	1.42	9.008×10^{-3}	2.225×10^{-2}
fitted radiance shift [nm]	$(-4.837 \pm 26.981) \times 10^{-4}$	6118064	1.930×10^{-3}	-4.631×10^{-4}	-7.927×10^{-2}	4.747×10^{-2}	-1.487×10^{-3}	4.428×10^{-4}
fitted radiance squeeze [1]	$(2.374 \pm 18.393) \times 10^{-5}$	6118064	2.145×10^{-4}	1.946×10^{-5}	-2.842×10^{-2}	1.935×10^{-2}	-8.598×10^{-5}	1.285×10^{-4}
fitted root mean square [1]	$(1.345 \pm 0.507) \times 10^{-3}$	6118064	5.496×10^{-4}	1.211×10^{-3}	2.633×10^{-4}	7.730×10^{-2}	1.012×10^{-3}	1.561×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.842 ± 0.354	6118064	0.437	0.810	5.000×10^{-2}	2.68	0.605	1.04
sulfurdioxide total air mass factor polluted precision [1]	$(9.144 \pm 7.823) \times 10^{-2}$	6118064	8.248×10^{-2}	6.078×10^{-2}	4.421×10^{-3}	1.29	3.957×10^{-2}	0.122
sulfurdioxide clear air mass factor polluted [1]	0.757 ± 0.225	6118064	0.301	0.749	9.999×10^{-2}	1.86	0.603	0.904
number of spectral points in retrieval [1]	73.4 ± 0.5	6118064	1.000	73.0	52.0	74.0	73.0	74.0

Table 5: Parameterlist and basic statistics for the analysis for observations over water

Variable	mean $\pm\sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.671 ± 0.393	11313908	0.750	1.000	0.0	1.000	0.250	1.000
sulfurdioxide total vertical column [DU]	$(2.253 \pm 85.033) \times 10^{-2}$	11313908	0.436	9.627×10^{-3}	-100	139	-0.206	0.230
sulfurdioxide total vertical column precision [DU]	0.464 ± 0.600	11313908	0.279	0.309	5.429×10^{-2}	45.8	0.219	0.497
sulfurdioxide slant column density corrected [DU]	$(1.627 \pm 37.026) \times 10^{-2}$	11313908	0.376	8.763×10^{-3}	-23.5	130	-0.178	0.198
sulfurdioxide slant column density cobra [DU]	$(1.623 \pm 36.652) \times 10^{-2}$	11313908	0.376	8.763×10^{-3}	-23.5	66.6	-0.178	0.198
sulfurdioxide slant column density cobra precision [DU]	0.302 ± 0.134	11313908	0.144	0.261	8.703×10^{-2}	36.3	0.213	0.357
sulfurdioxide slant column density window1 [DU]	0.102 ± 0.688	11313908	0.752	0.112	-65.9	91.3	-0.268	0.484
sulfurdioxide slant column density window1 precision [DU]	0.302 ± 0.134	11313908	0.144	0.261	8.703×10^{-2}	36.3	0.213	0.357
sulfurdioxide slant column density corrected win1 [DU]	$(-1.871 \pm 68.257) \times 10^{-2}$	11313908	0.743	-3.504×10^{-2}	-65.9	91.1	-0.402	0.342
background so2 slant column offset window1 [DU]	-0.121 ± 0.135	11313908	0.142	-0.145	-1.42	2.96	-0.209	-6.705×10^{-2}
sulfurdioxide slant column density window2 [DU]	0.560 ± 9.119	11313908	11.6	0.408	-2.365×10^{3}	769	-5.31	6.26
sulfurdioxide slant column density window2 precision [DU]	8.16 ± 2.24	11313908	2.52	7.82	2.41	1.094×10^{3}	6.71	9.23
sulfurdioxide slant column density corrected win2 [DU]	-0.578 ± 8.868	11313908	11.2	-0.581	-2.372×10^{3}	769	-6.18	5.00
background so2 slant column offset window2 [DU]	-1.14 ± 2.64	11313908	3.24	-0.294	-17.8	10.7	-2.46	0.779
sulfurdioxide slant column density window3 [DU]	-1.70 ± 24.17	11313908	30.5	-2.18	-1.522×10^{3}	5.790×10^{3}	-17.1	13.5
sulfurdioxide slant column density window3 precision [DU]	28.6 ± 12.0	11313908	8.83	25.3	10.8	1.336×10^{3}	22.2	31.0
sulfurdioxide slant column density corrected win3 [DU]	3.78 ± 23.24	11313908	29.2	3.57	-1.521×10^{3}	5.792×10^{3}	-10.8	18.3
background so2 slant column offset window3 [DU]	5.48 ± 5.93	11313908	9.95	4.50	-14.9	25.3	0.599	10.5
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.24	11313908	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.286 \pm 5.152) \times 10^{-2}$	11313908	1.415×10^{-2}	1.279×10^{-2}	2.520×10^{-4}	2.14	7.080×10^{-3}	2.123×10^{-2}
fitted radiance shift [nm]	$(-2.536 \pm 23.788) \times 10^{-4}$	11313908	1.672×10^{-3}	-2.188×10^{-4}	-4.685×10^{-2}	4.747×10^{-2}	-1.105×10^{-3}	5.672×10^{-4}
fitted radiance squeeze [1]	$(-6.933 \pm 181.782) \times 10^{-6}$	11313908	2.071×10^{-4}	-2.233×10^{-6}	-2.842×10^{-2}	1.935×10^{-2}	-1.075×10^{-4}	9.961×10^{-5}
fitted root mean square [1]	$(1.313 \pm 0.536) \times 10^{-3}$	11313908	5.917×10^{-4}	1.154×10^{-3}	3.419×10^{-4}	7.730×10^{-2}	9.555×10^{-4}	1.547×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.911 ± 0.410	11313908	0.500	0.869	5.000×10^{-2}	2.62	0.629	1.13
sulfurdioxide total air mass factor polluted precision [1]	0.102 ± 0.106	11313908	8.302×10^{-2}	6.674×10^{-2}	2.648×10^{-3}	1.76	4.233×10^{-2}	0.125
sulfurdioxide clear air mass factor polluted [1]	0.796 ± 0.309	11313908	0.374	0.773	5.510×10^{-2}	2.54	0.590	0.964
number of spectral points in retrieval [1]	73.4 ± 0.5	11313908	1.000	73.0	70.0	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]	0.626 ± 0.418	4195684	0.830	1.000	0.0	1.000	0.170	1.000
sulfurdioxide total vertical column [DU]	$(3.499 \pm 97.823) \times 10^{-2}$	4195684	0.474	1.065×10^{-2}	-111	104	-0.221	0.253
sulfurdioxide total vertical column precision [DU]	0.534 ± 0.684	4195684	0.391	0.356	4.620×10^{-2}	88.9	0.221	0.611
sulfurdioxide slant column density corrected [DU]	$(2.311 \pm 44.868) \times 10^{-2}$	4195684	0.373	9.373×10^{-3}	-14.8	71.0	-0.175	0.198
sulfurdioxide slant column density cobra [DU]	$(2.248 \pm 40.702) \times 10^{-2}$	4195684	0.373	9.373×10^{-3}	-14.8	39.8	-0.175	0.198
sulfurdioxide slant column density cobra precision [DU]	0.293 ± 0.120	4195684	0.114	0.264	9.366×10^{-2}	17.6	0.217	0.331
sulfurdioxide slant column density window1 [DU]	0.124 ± 0.694	4195684	0.728	0.119	-69.5	63.8	-0.246	0.482
sulfurdioxide slant column density window1 precision [DU]	0.293 ± 0.120	4195684	0.114	0.264	9.366×10^{-2}	17.6	0.217	0.331
sulfurdioxide slant column density corrected win1 [DU]	$(-1.177 \pm 69.172) \times 10^{-2}$	4195684	0.721	-3.609×10^{-2}	-69.5	63.8	-0.390	0.331
background so2 slant column offset window1 [DU]	-0.136 ± 0.121	4195684	0.131	-0.159	-0.590	1.84	-0.216	-8.469×10^{-2}
sulfurdioxide slant column density window2 [DU]	0.587 ± 9.196	4195684	11.6	0.556	-1.952×10^{3}	745	-5.23	6.35
sulfurdioxide slant column density window2 precision [DU]	8.23 ± 2.59	4195684	2.63	7.85	2.42	763	6.67	9.30
sulfurdioxide slant column density corrected win2 [DU]	-0.642 ± 8.929	4195684	11.1	-0.639	-1.952×10^{3}	742	-6.20	4.90
background so2 slant column offset window2 [DU]	-1.23 ± 2.59	4195684	3.42	-0.425	-17.7	5.20	-2.72	0.703
sulfurdioxide slant column density window3 [DU]	-9.85 ± 23.31	4195684	28.6	-9.52	-561	1.220×10^{3}	-23.9	4.65
sulfurdioxide slant column density window3 precision [DU]	31.3 ± 16.2	4195684	11.3	26.6	11.6	443	22.3	33.6
sulfurdioxide slant column density corrected win3 [DU]	-3.70 ± 23.52	4195684	29.0	-2.92	-558	1.223×10^{3}	-17.8	11.2
background so2 slant column offset window3 [DU]	6.15 ± 5.98	4195684	10.3	6.03	-12.9	22.3	1.01	11.3
sulfurdioxide slant column cobra flag [1]	1.99 ± 0.12	4195684	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(5.777 \pm 12.810) \times 10^{-2}$	4195684	4.687×10^{-2}	1.933×10^{-2}	2.538×10^{-4}	2.78	6.858×10^{-3}	5.372×10^{-2}
fitted radiance shift [nm]	$(-1.768 \pm 32.309) \times 10^{-4}$	4195684	1.789×10^{-3}	-2.083×10^{-4}	-7.927×10^{-2}	4.187×10^{-2}	-1.107×10^{-3}	6.824×10^{-4}
fitted radiance squeeze [1]	$(-2.017 \pm 17.438) \times 10^{-5}$	4195684	2.030×10^{-4}	-1.659×10^{-5}	-1.693×10^{-2}	1.806×10^{-2}	-1.194×10^{-4}	8.352×10^{-5}
fitted root mean square [1]	$(1.262 \pm 0.488) \times 10^{-3}$	4195684	4.398×10^{-4}	1.151×10^{-3}	2.633×10^{-4}	4.807×10^{-2}	9.699×10^{-4}	1.410×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.878 ± 0.534	4195684	0.694	0.714	5.000×10^{-2}	2.92	0.481	1.18
sulfurdioxide total air mass factor polluted precision [1]	0.122 ± 0.133	4195684	0.139	7.449×10^{-2}	3.216×10^{-3}	1.74	3.039×10^{-2}	0.170
sulfurdioxide clear air mass factor polluted [1]	0.725 ± 0.356	4195684	0.449	0.635	4.755×10^{-2}	3.00	0.464	0.913
number of spectral points in retrieval [1]	73.4 ± 0.5	4195684	1.000	73.0	52.0	74.0	73.0	74.0

3 Granule outlines

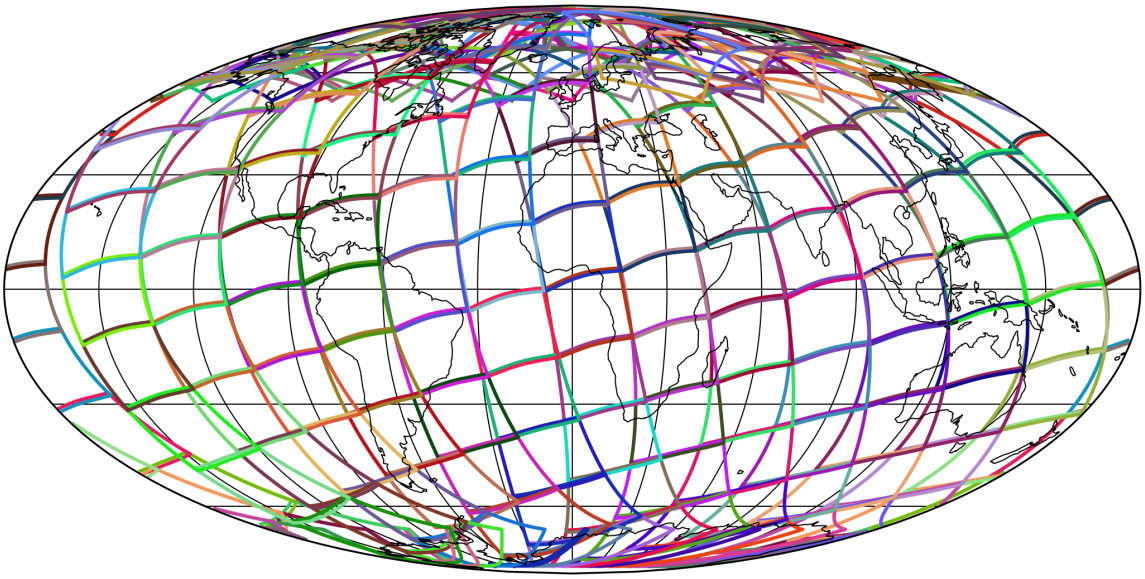

Figure 1: Outline of the granules.

4 Input data monitoring

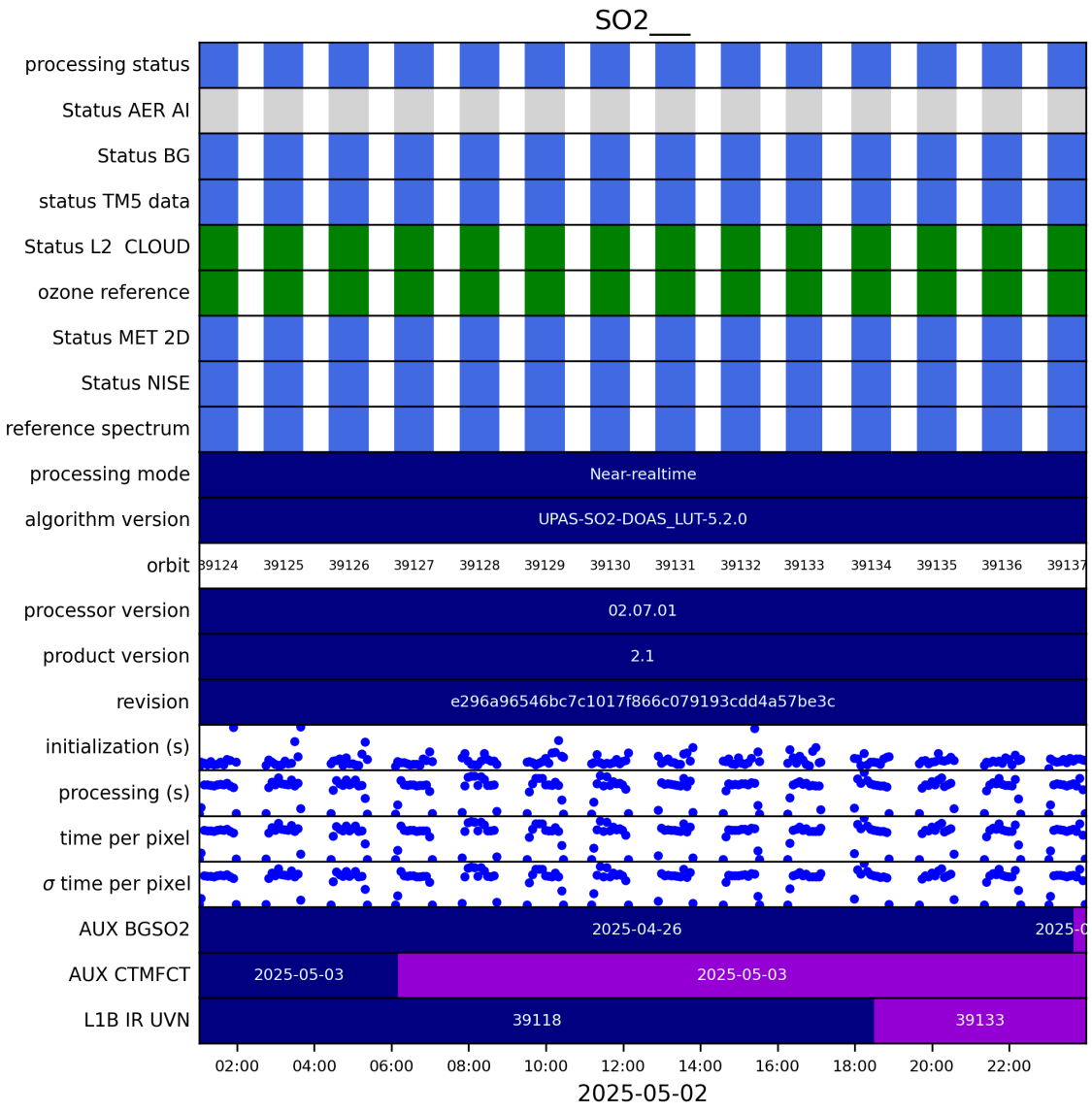

Figure 2: Input data per granule

5 Warnings and errors

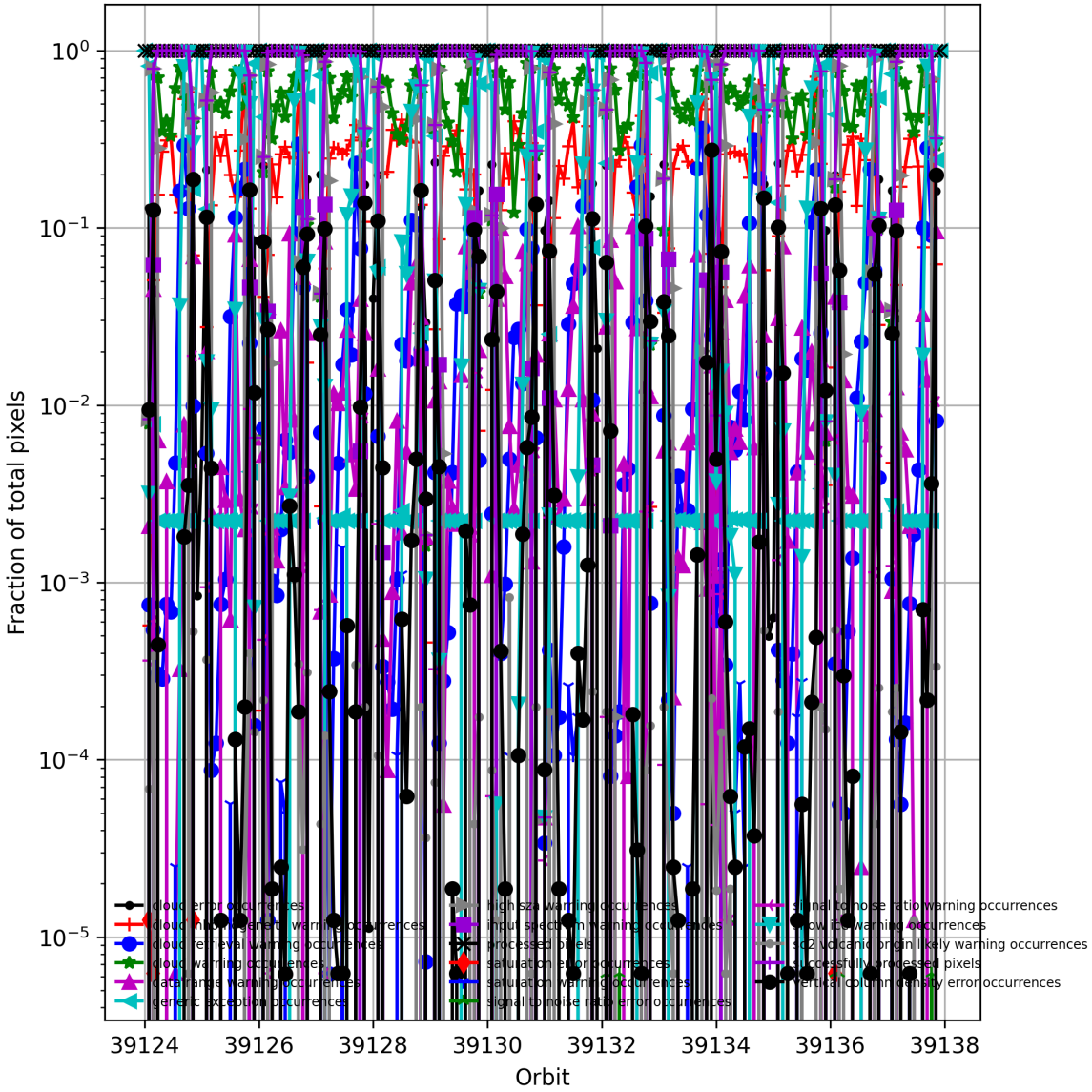

Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

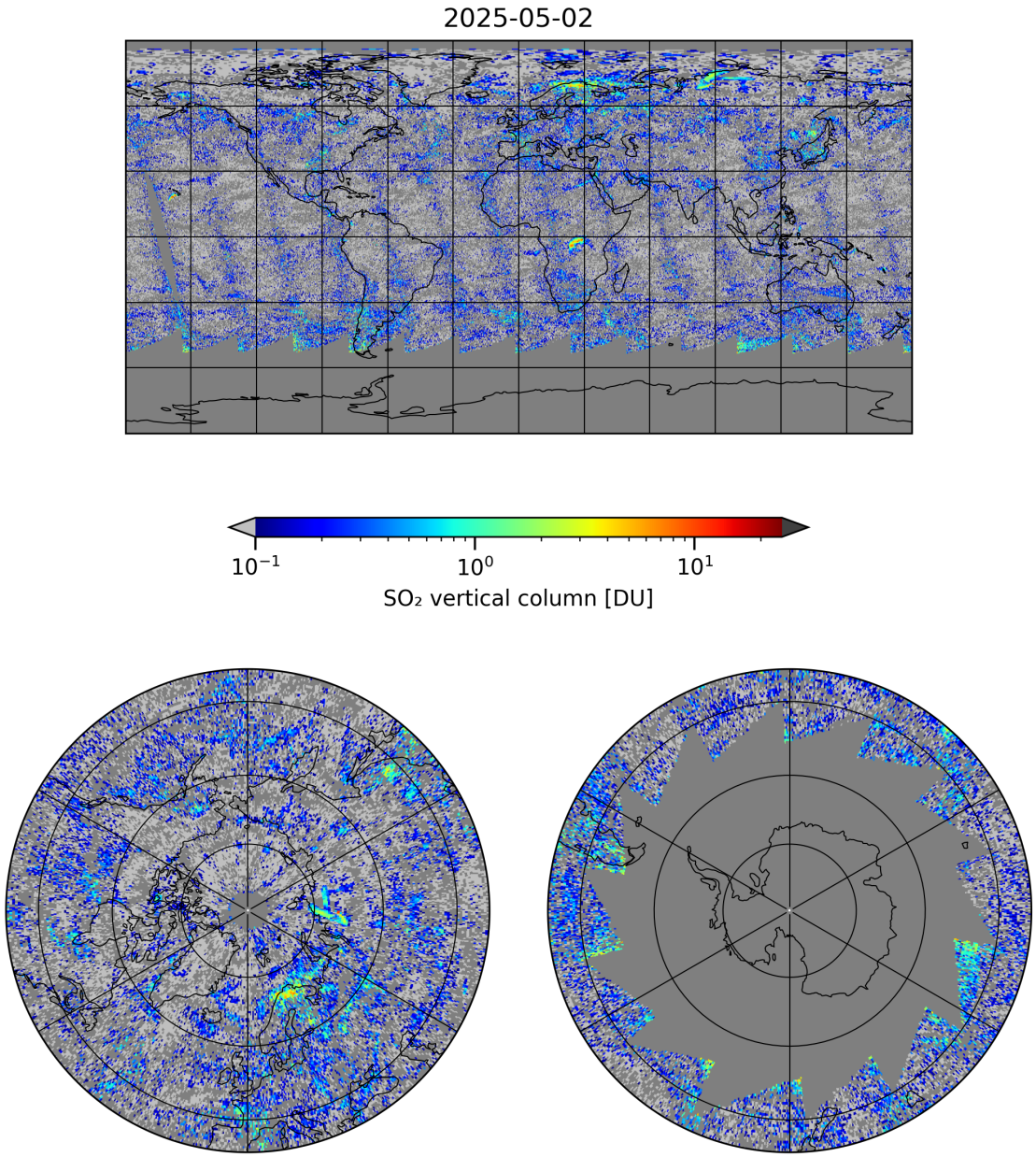

Figure 4: Map of "SO_2 vertical column" for 2025-05-02 to 2025-05-02

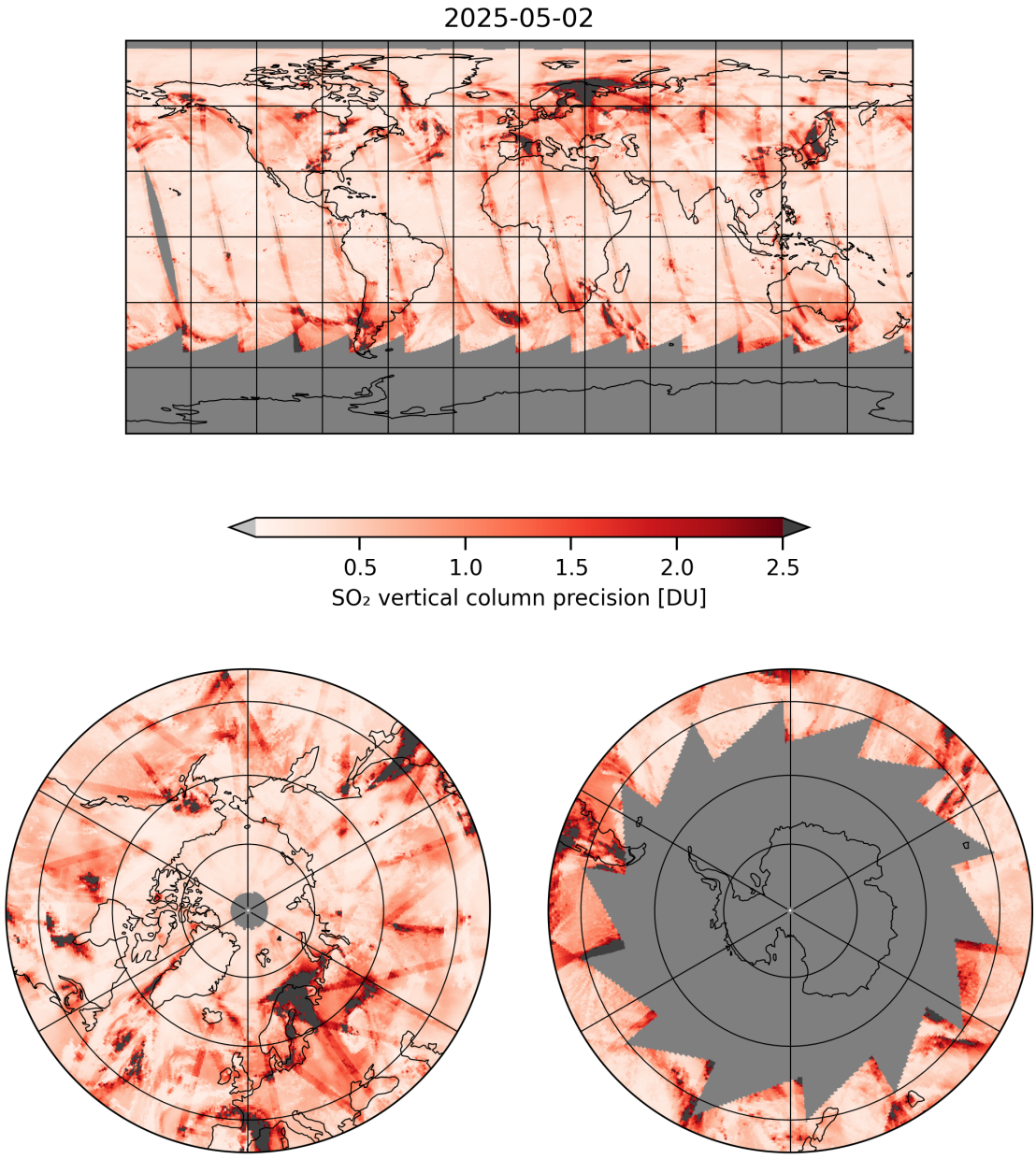

Figure 5: Map of "SO_2 vertical column precision" for 2025-05-02 to 2025-05-02

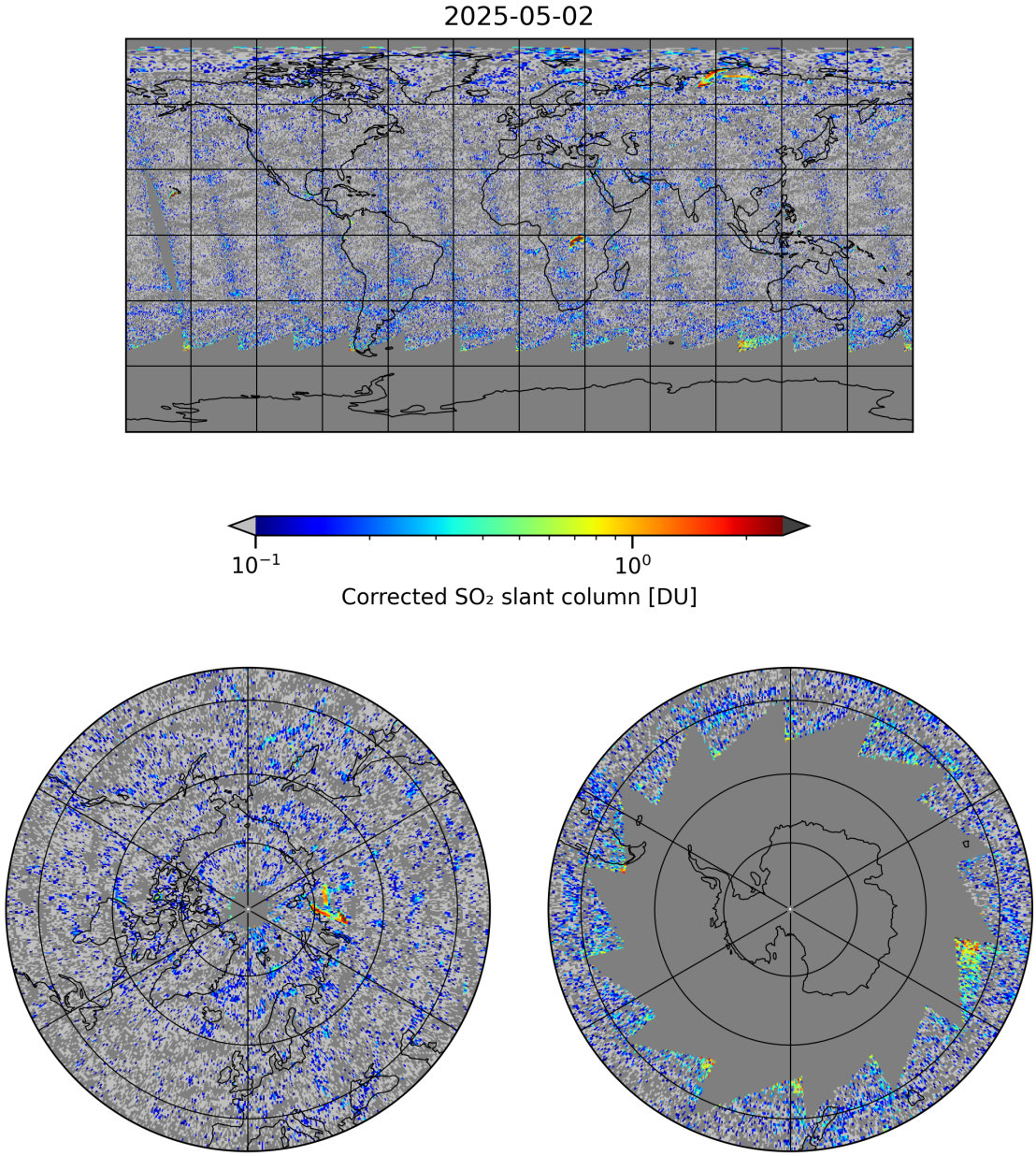

Figure 6: Map of “Corrected SO_2 slant column” for 2025-05-02 to 2025-05-02

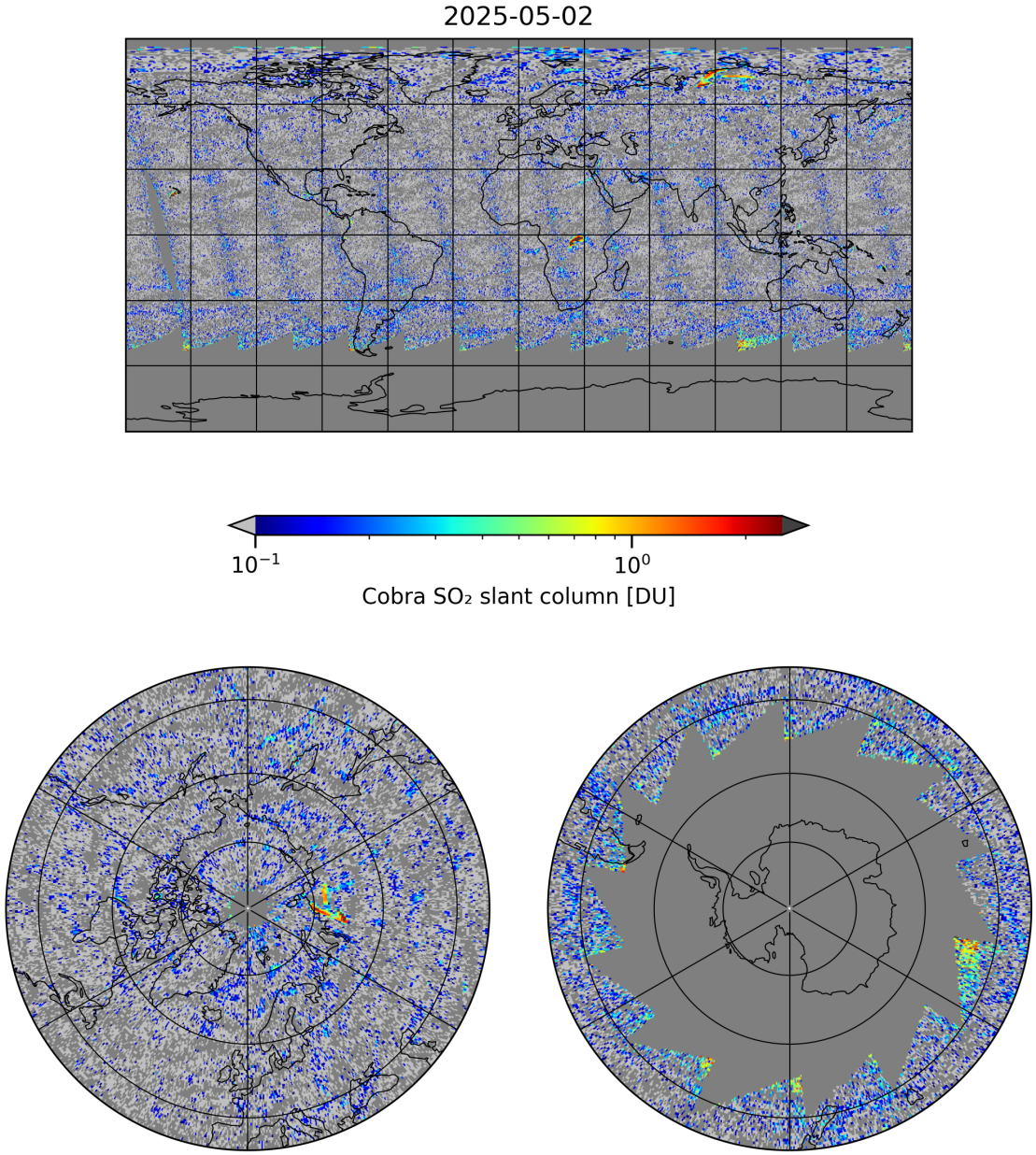

Figure 7: Map of "Cobra SO_2 slant column" for 2025-05-02 to 2025-05-02

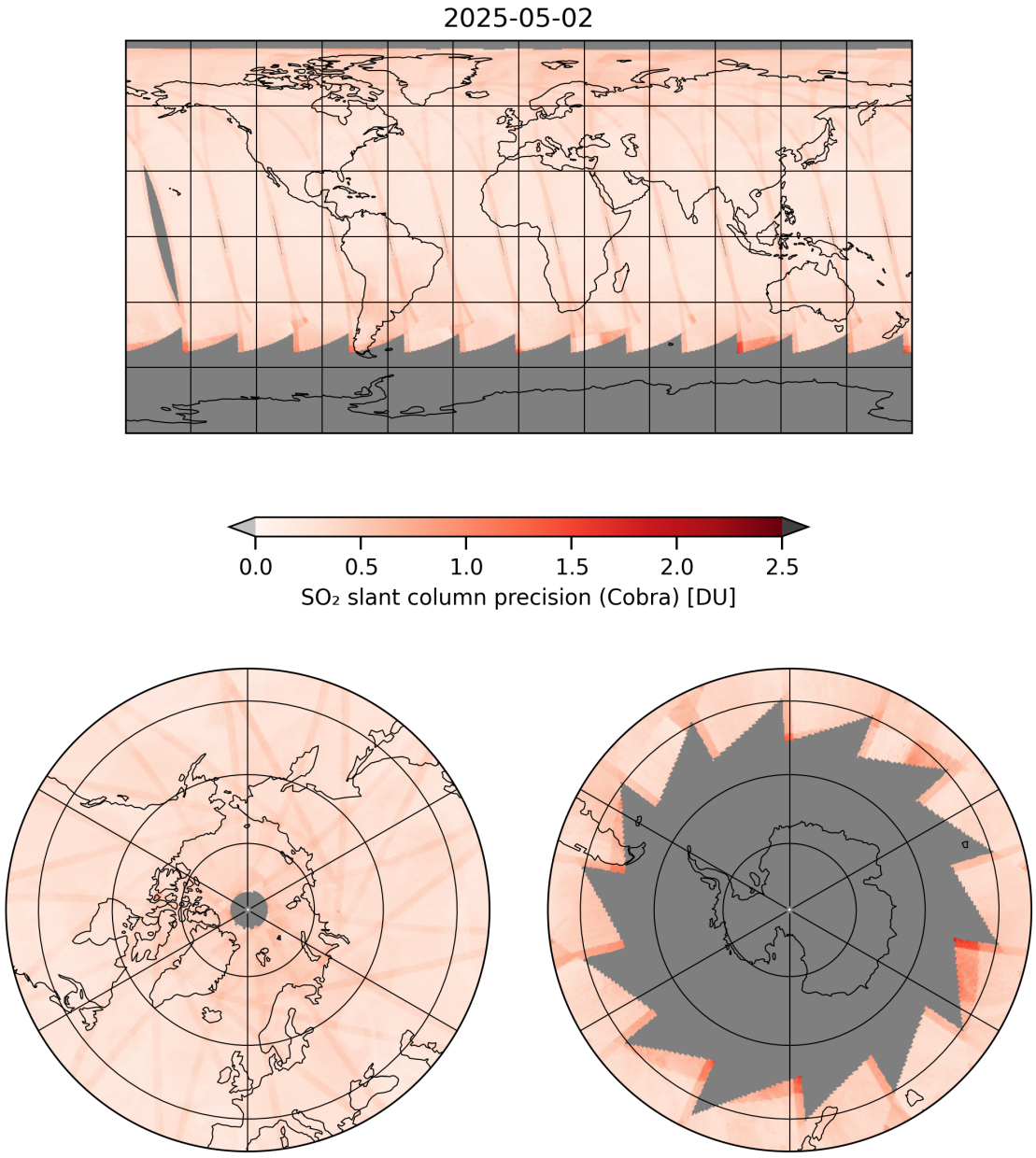

Figure 8: Map of "SO_2 slant column precision (Cobra)" for 2025-05-02 to 2025-05-02

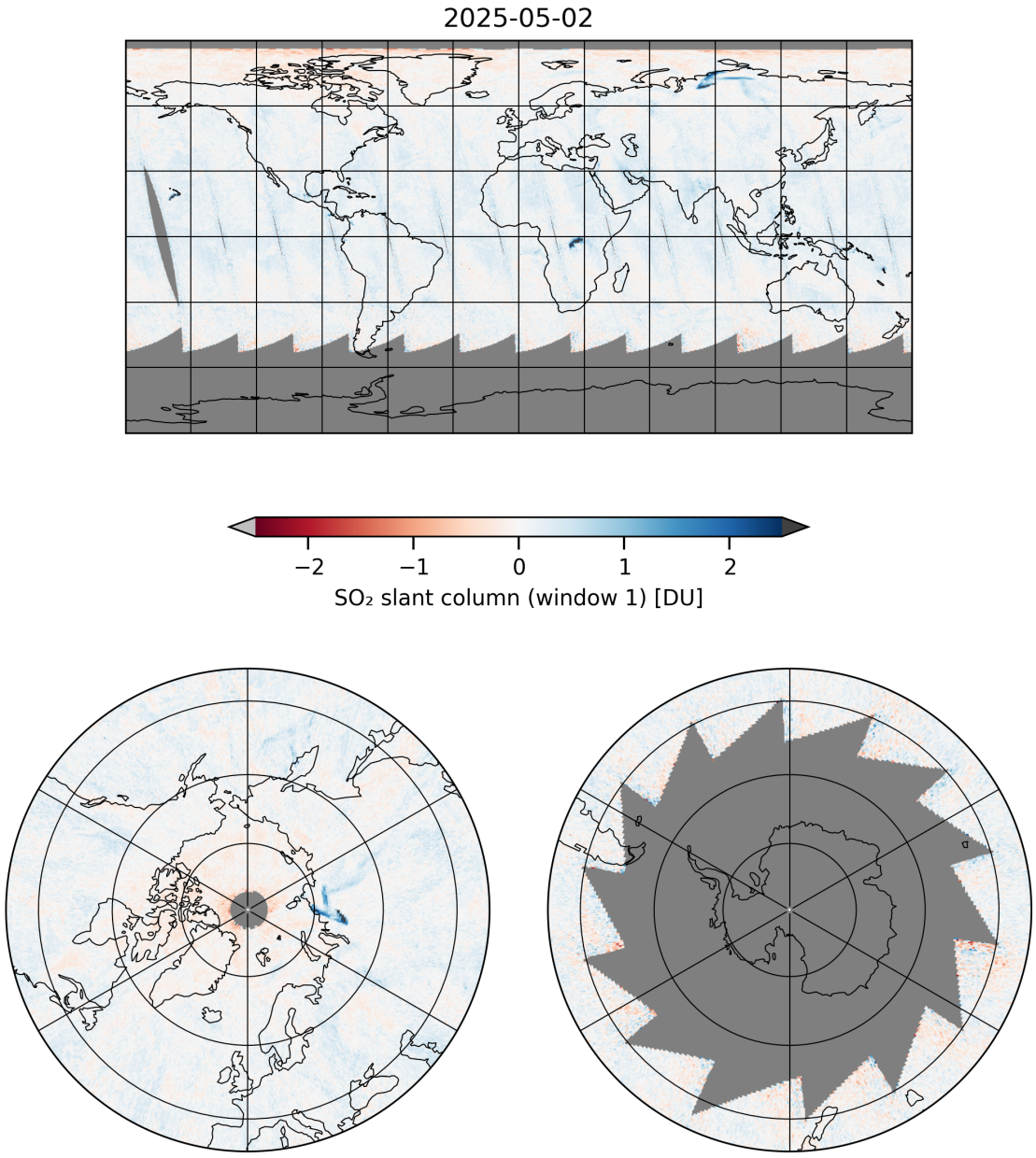

Figure 9: Map of "SO_2 slant column (window 1)" for 2025-05-02 to 2025-05-02

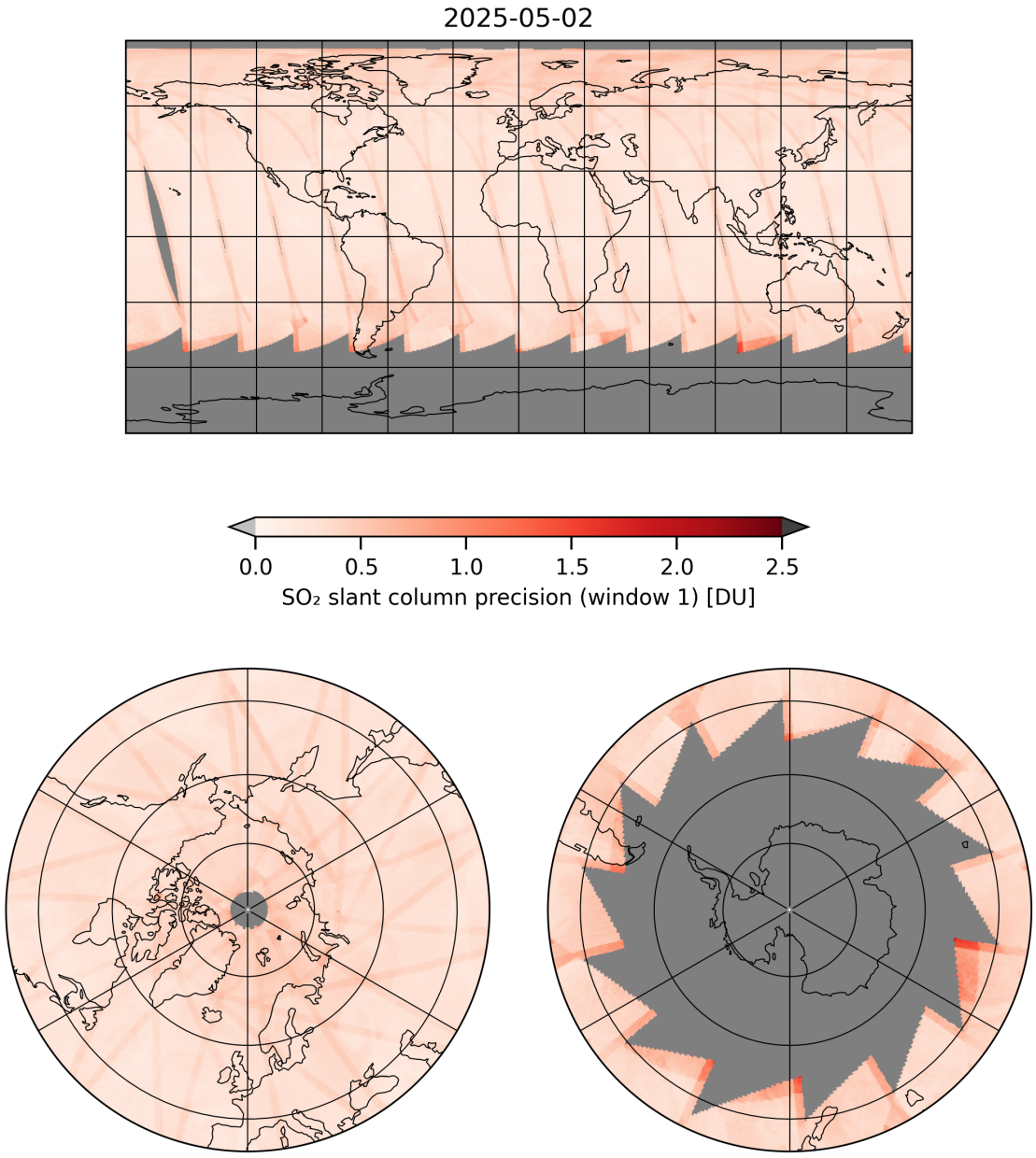

Figure 10: Map of "SO_2 slant column precision (window 1)" for 2025-05-02 to 2025-05-02

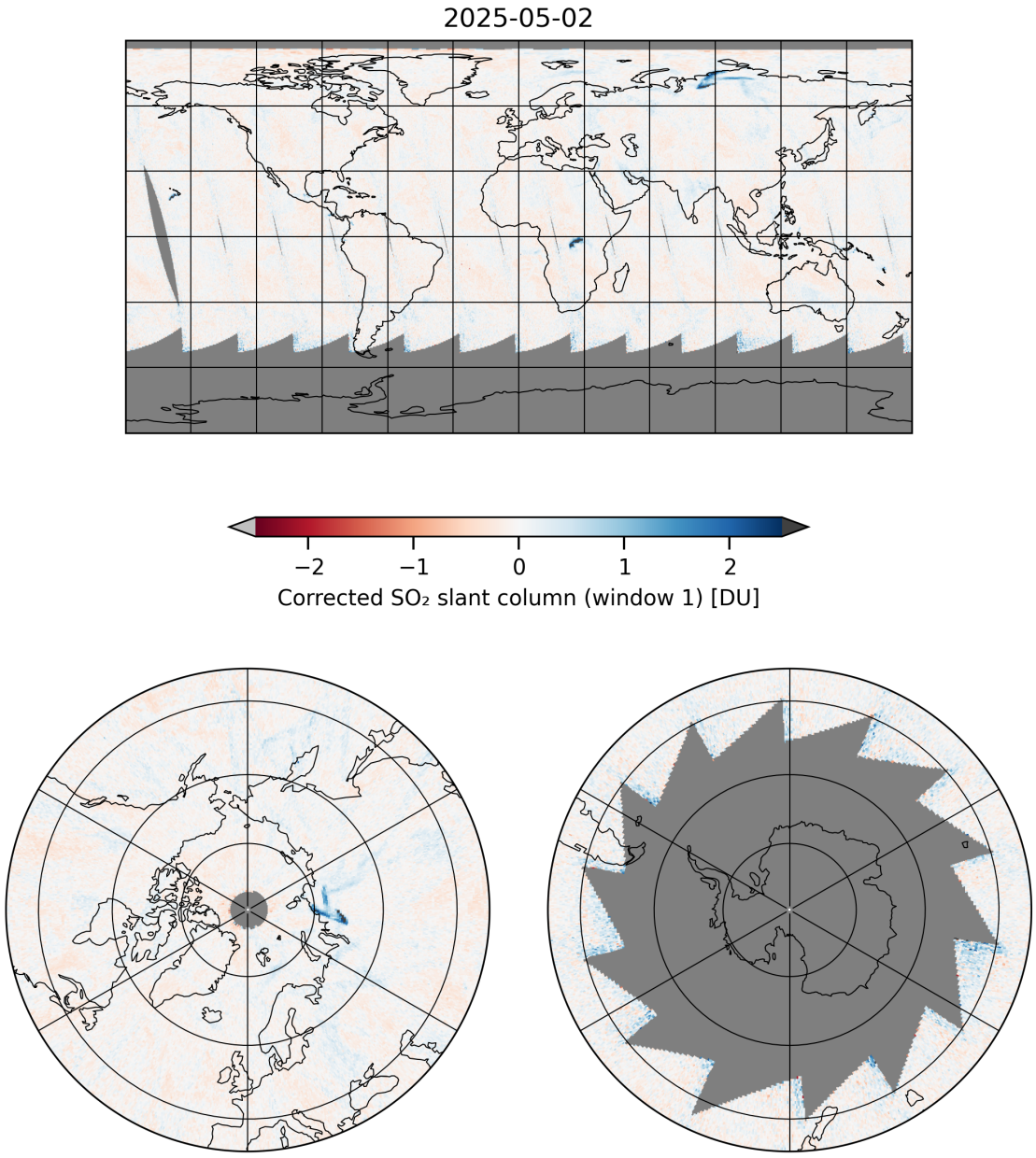

Figure 11: Map of “Corrected SO_2 slant column (window 1)” for 2025-05-02 to 2025-05-02

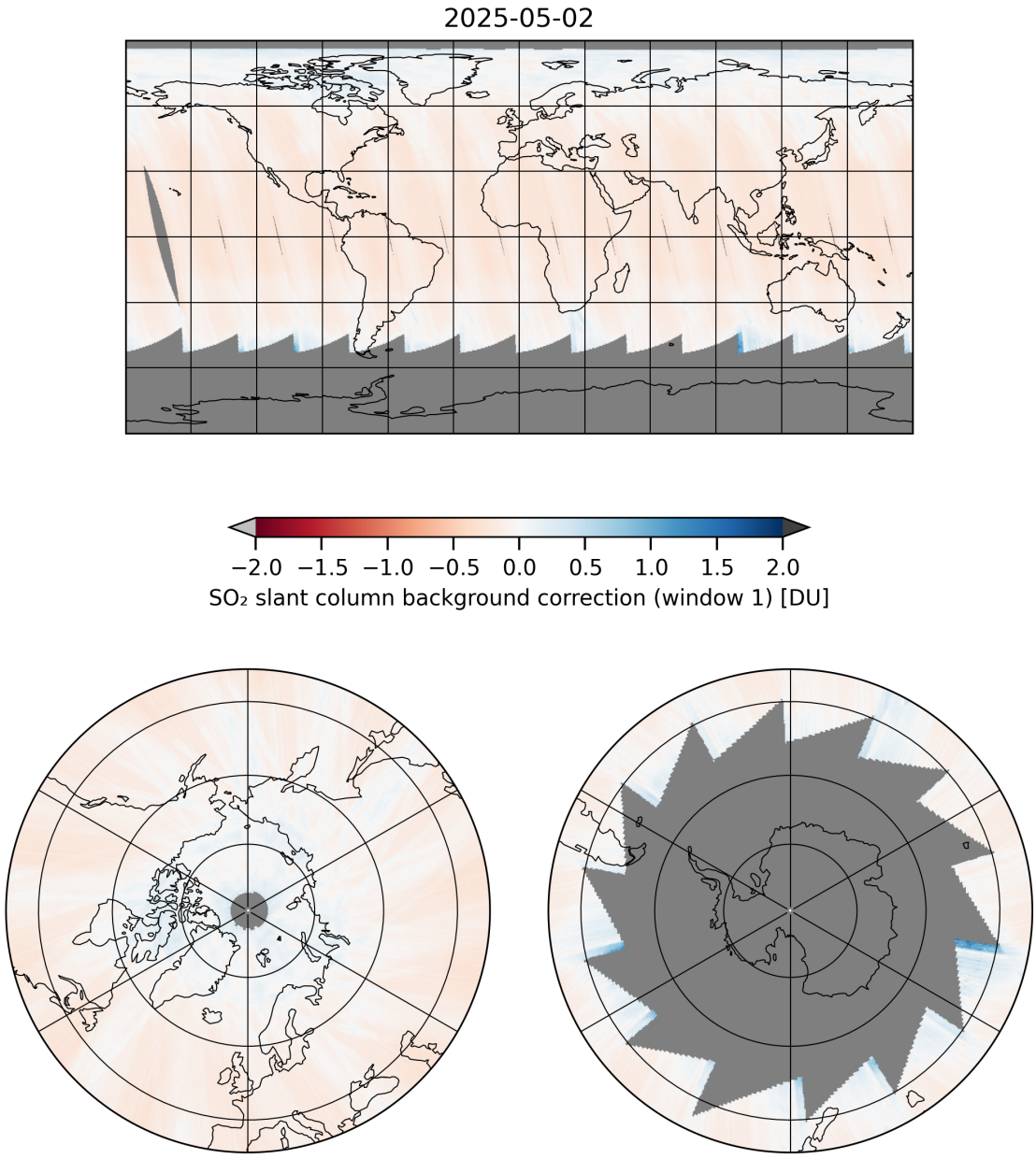

Figure 12: Map of "SO_2 slant column background correction (window 1)" for 2025-05-02 to 2025-05-02

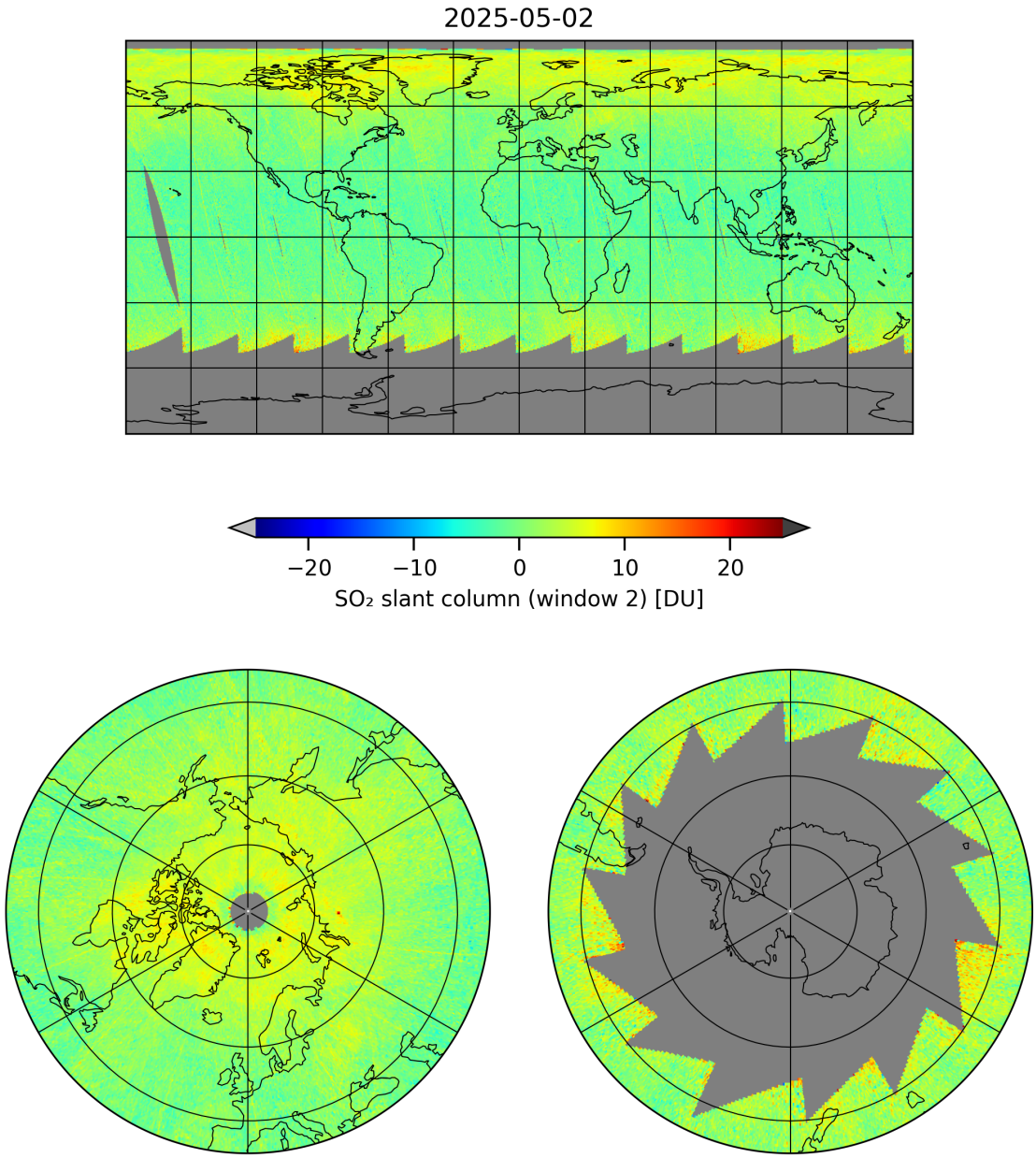

Figure 13: Map of "SO_2 slant column (window 2)" for 2025-05-02 to 2025-05-02

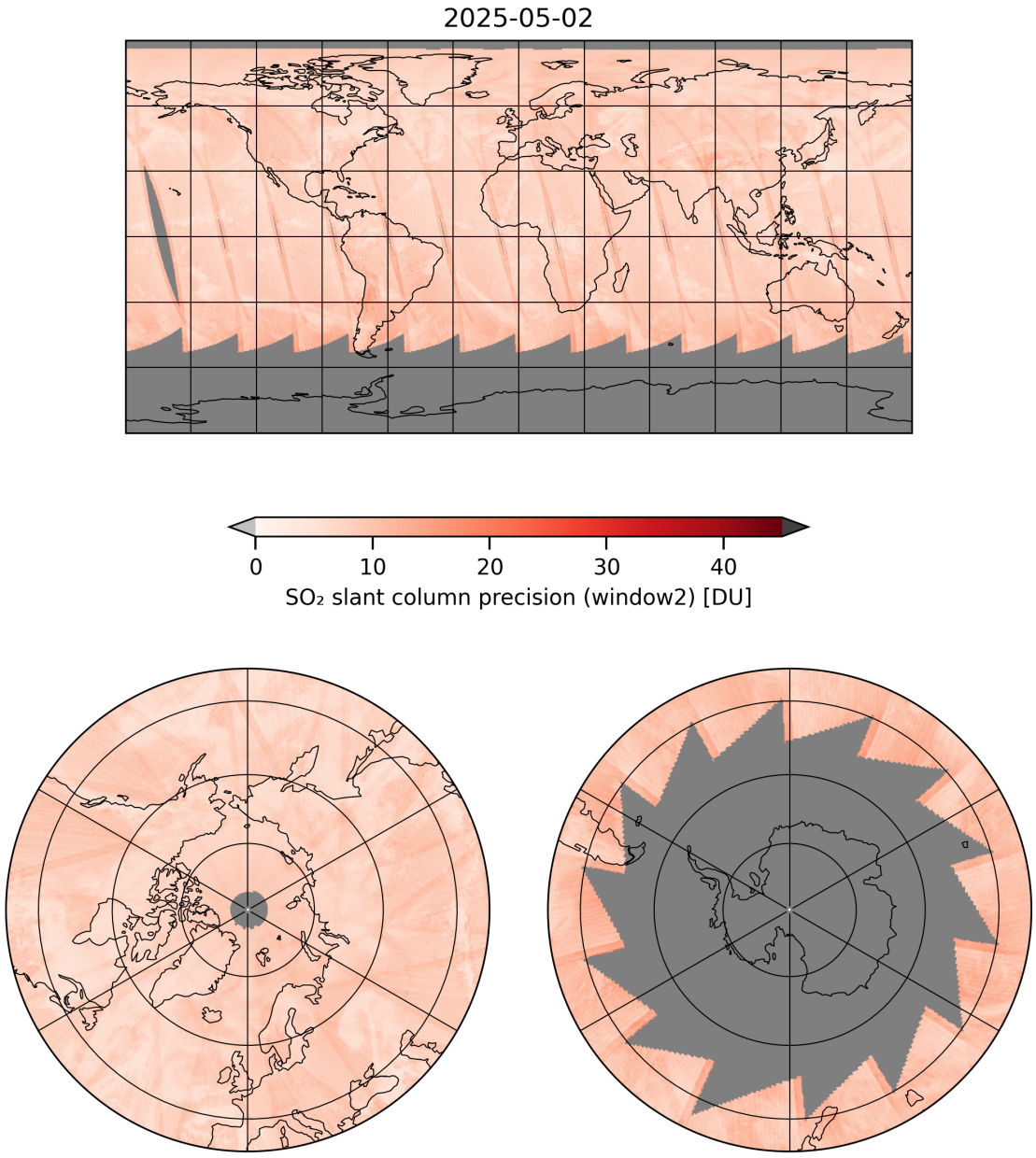

Figure 14: Map of "SO_2 slant column precision (window2)" for 2025-05-02 to 2025-05-02

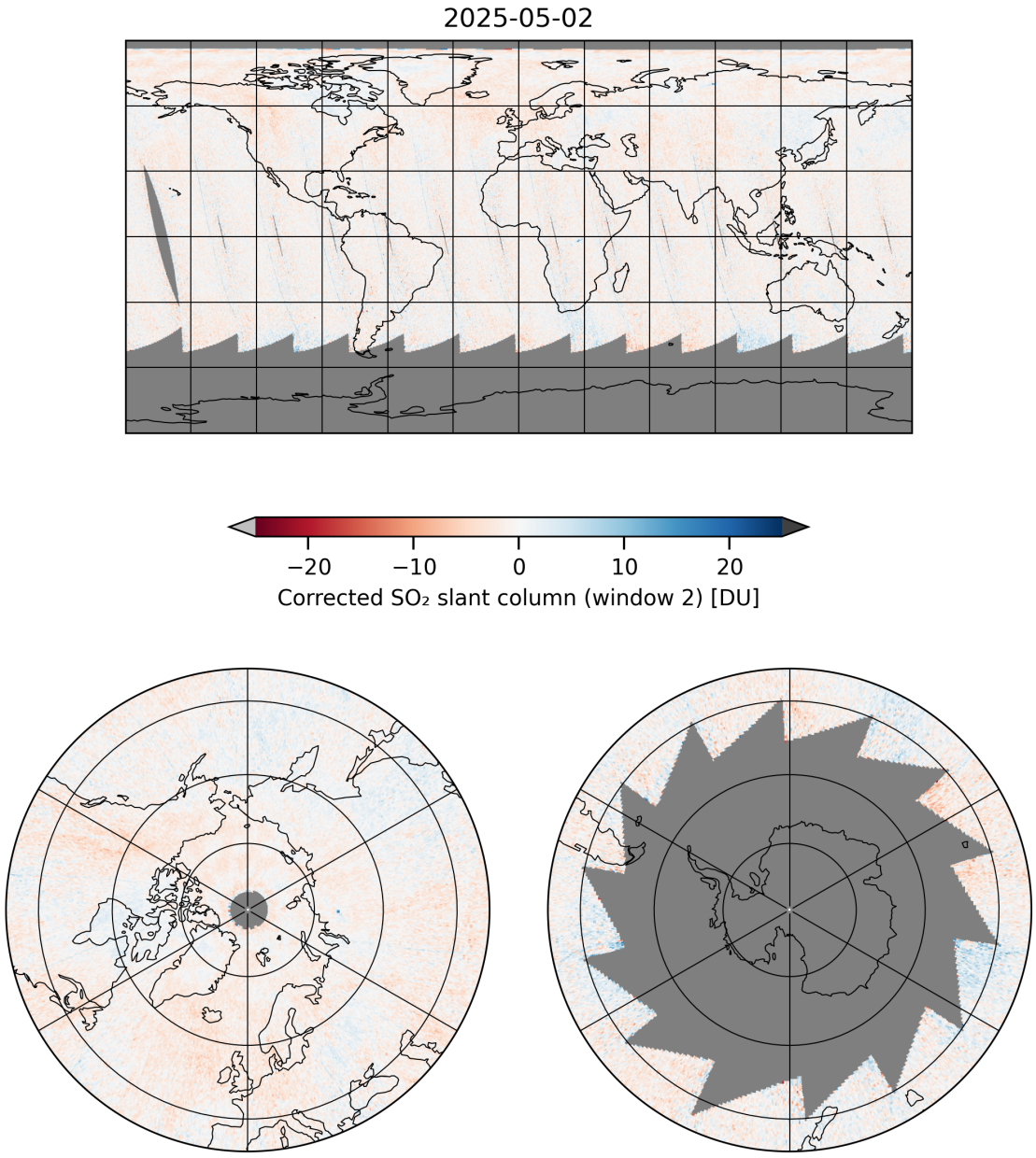

Figure 15: Map of “Corrected SO_2 slant column (window 2)” for 2025-05-02 to 2025-05-02

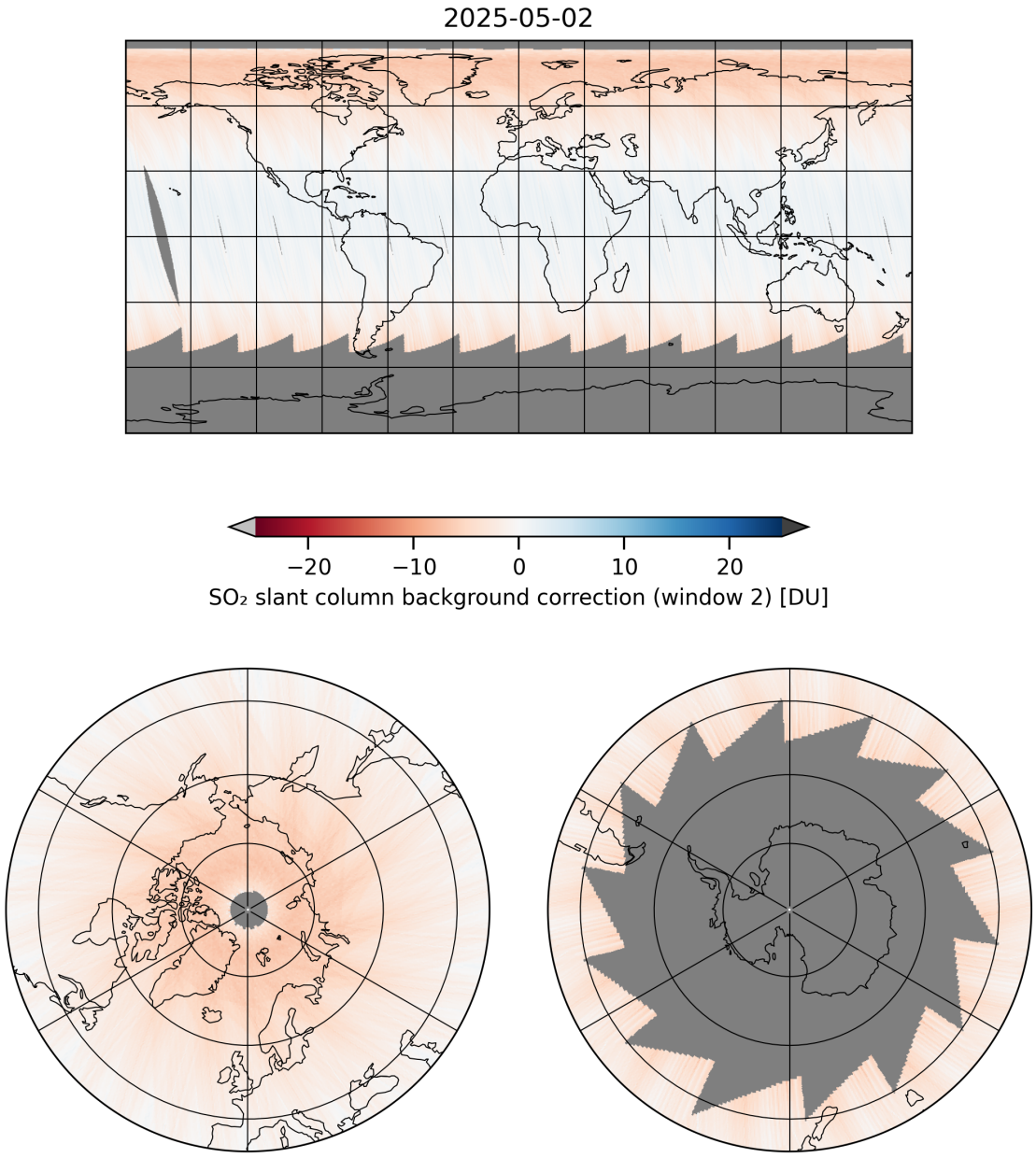

Figure 16: Map of "SO_2 slant column background correction (window 2)" for 2025-05-02 to 2025-05-02

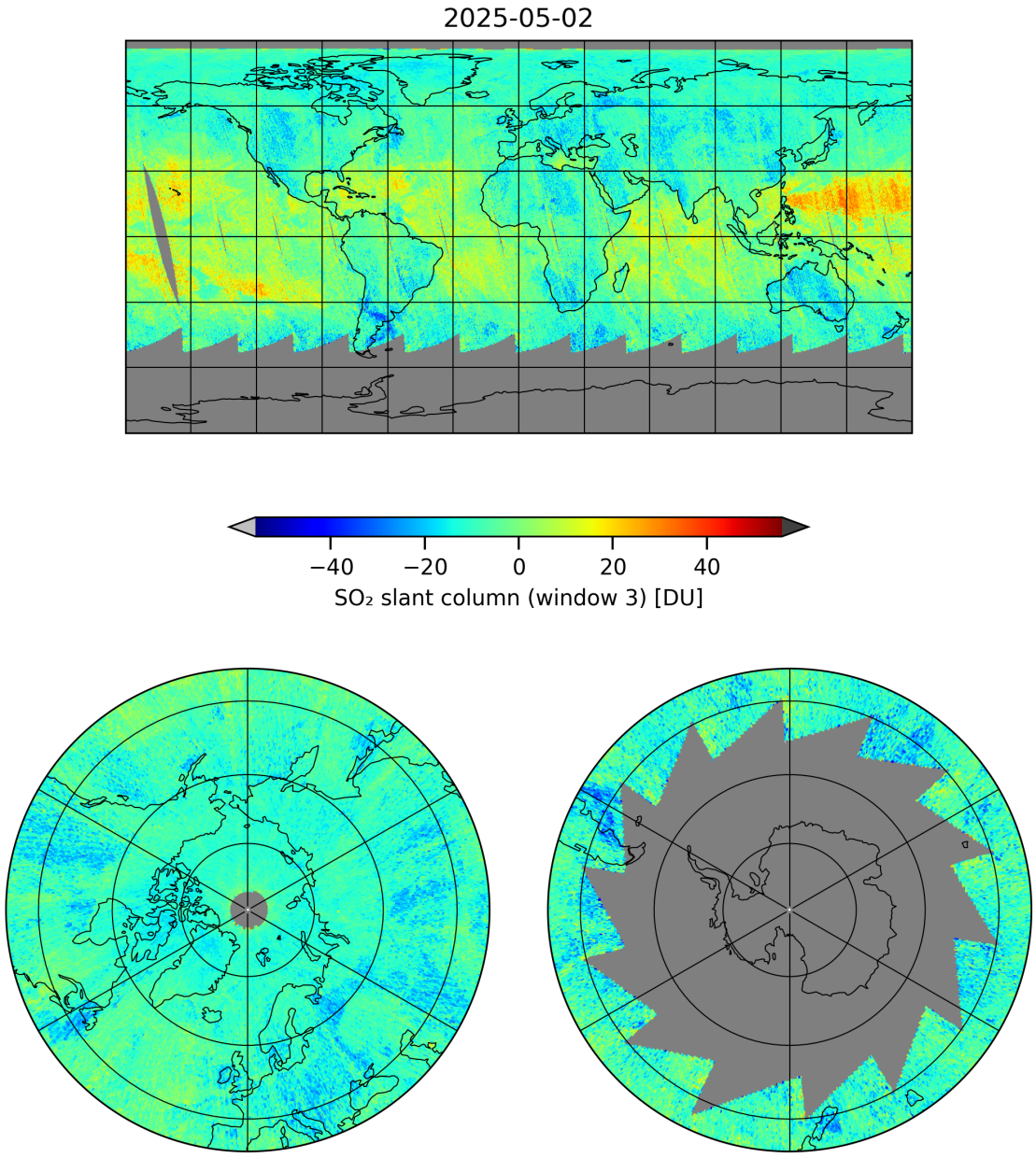

Figure 17: Map of "SO_2 slant column (window 3)" for 2025-05-02 to 2025-05-02

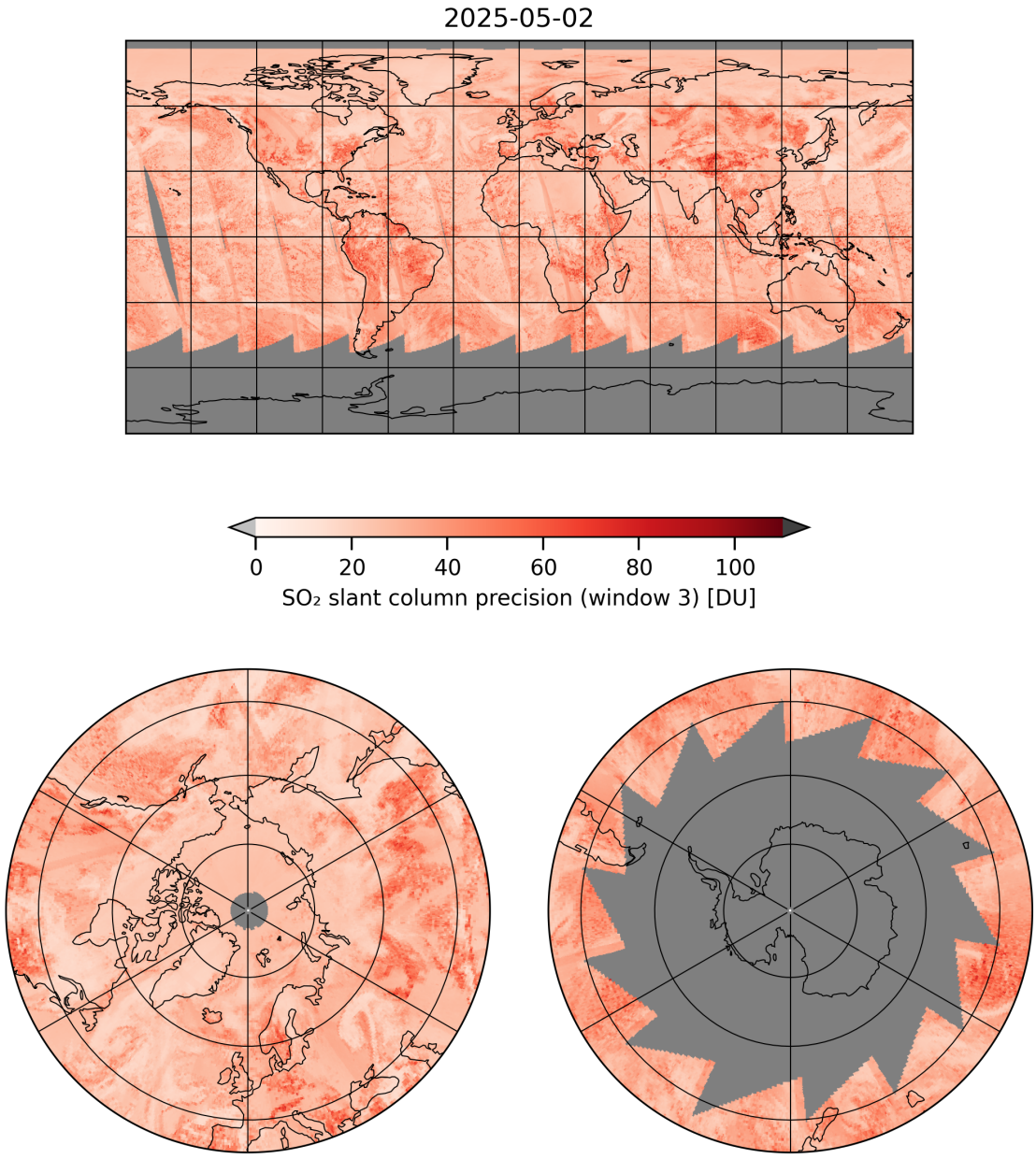

Figure 18: Map of "SO_2 slant column precision (window 3)" for 2025-05-02 to 2025-05-02

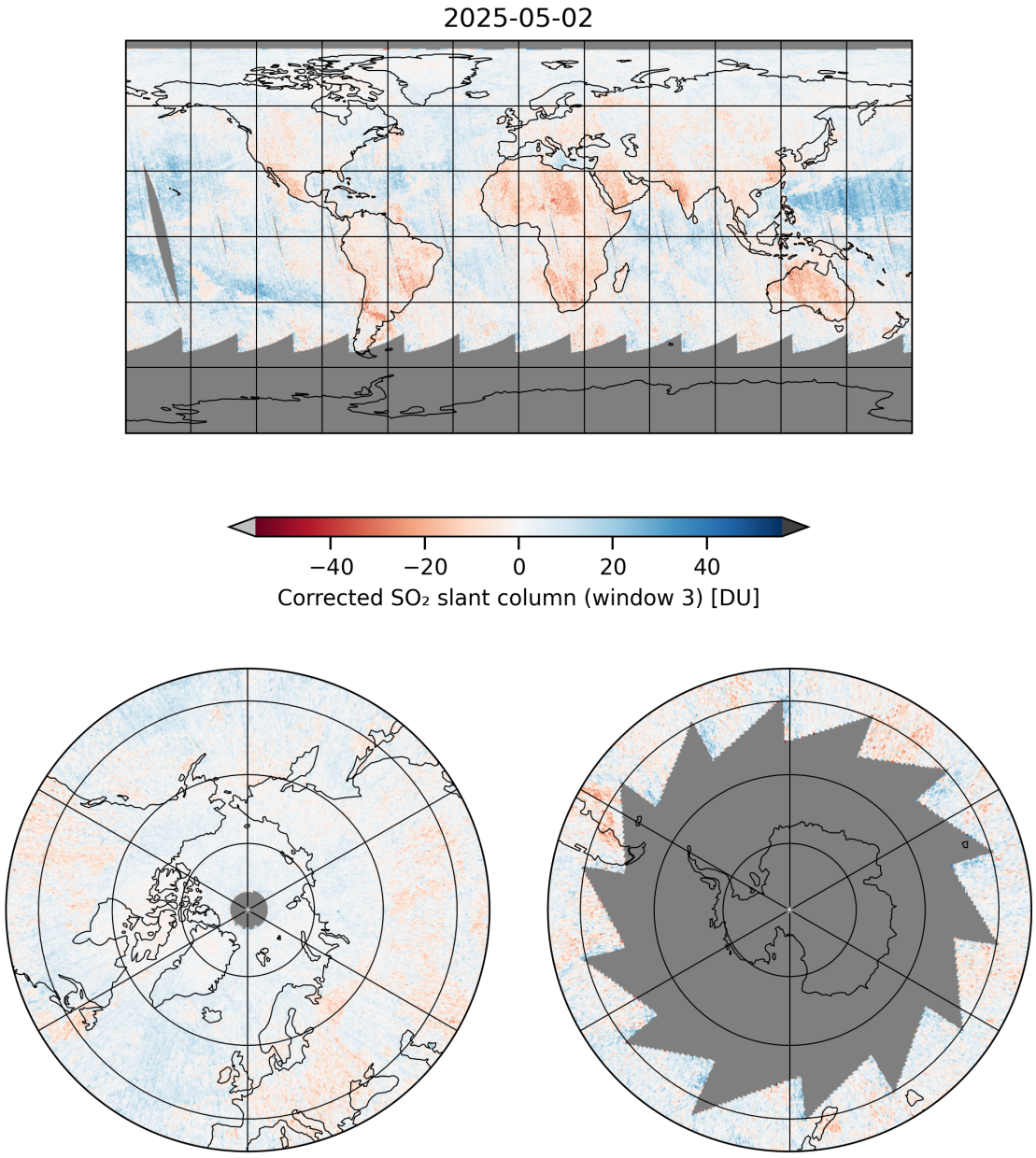

Figure 19: Map of "Corrected SO_2 slant column (window 3)" for 2025-05-02 to 2025-05-02

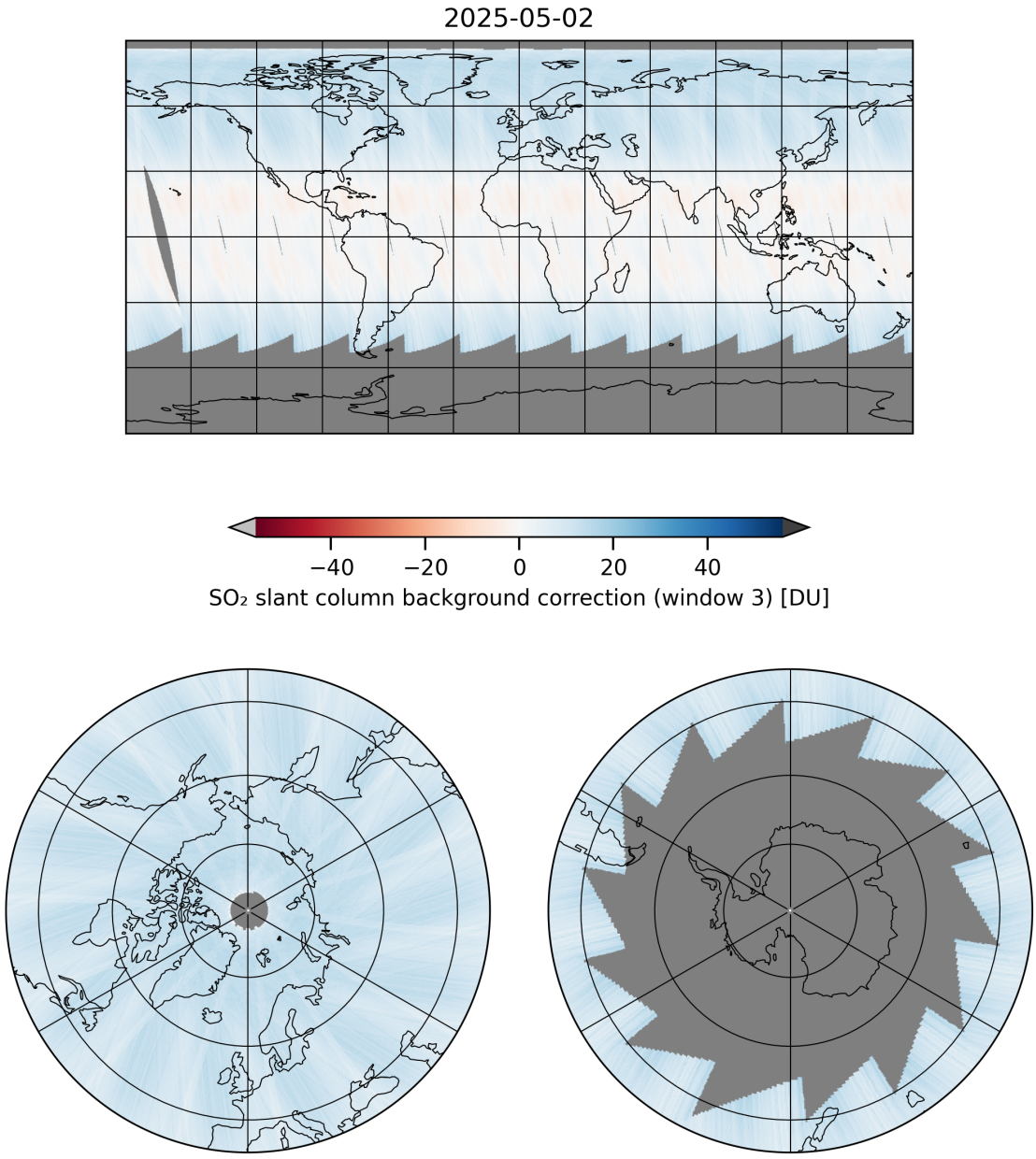

Figure 20: Map of "SO_2 slant column background correction (window 3)" for 2025-05-02 to 2025-05-02

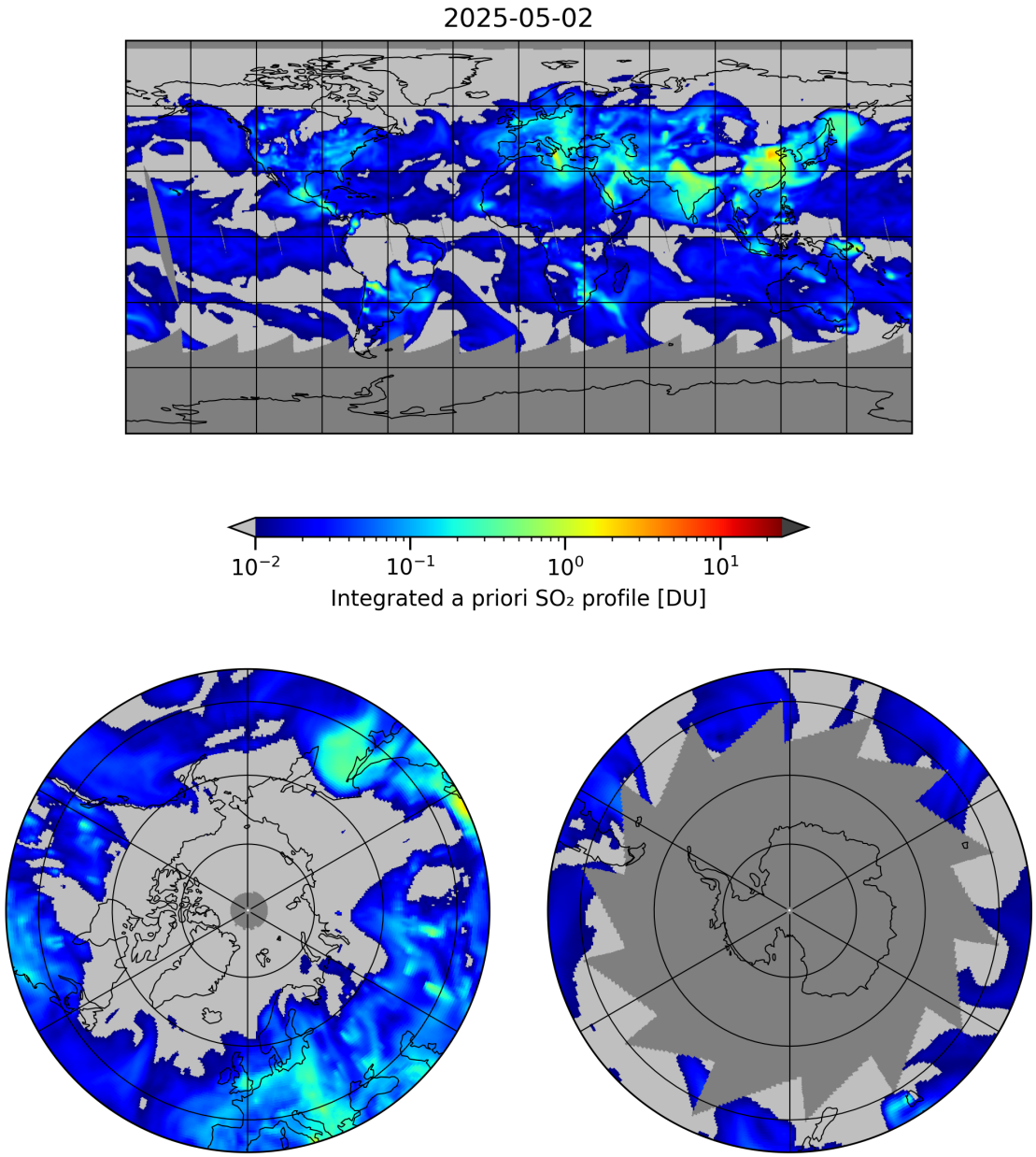

Figure 21: Map of “Integrated a priori SO_2 profile” for 2025-05-02 to 2025-05-02

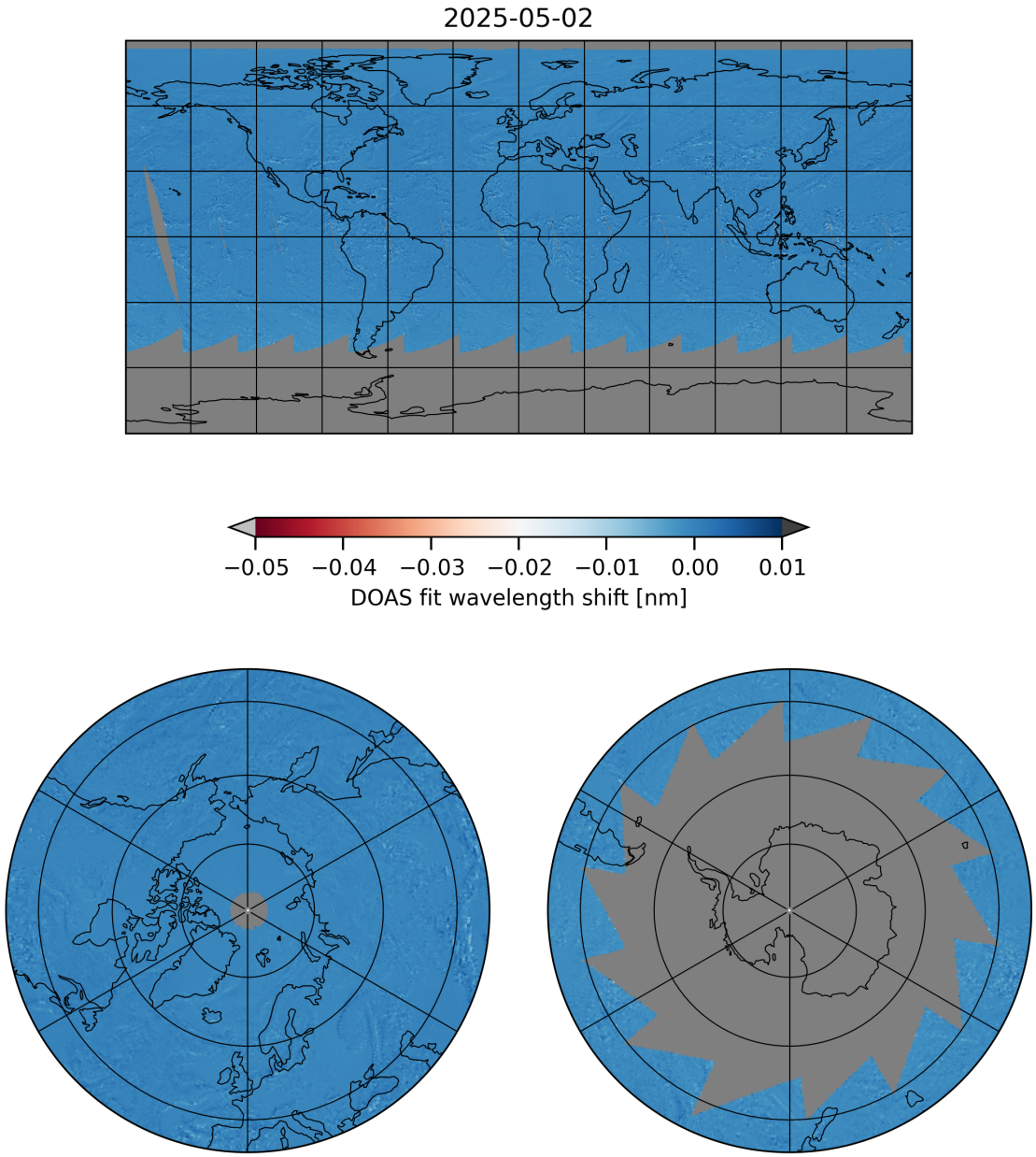

Figure 22: Map of “DOAS fit wavelength shift” for 2025-05-02 to 2025-05-02

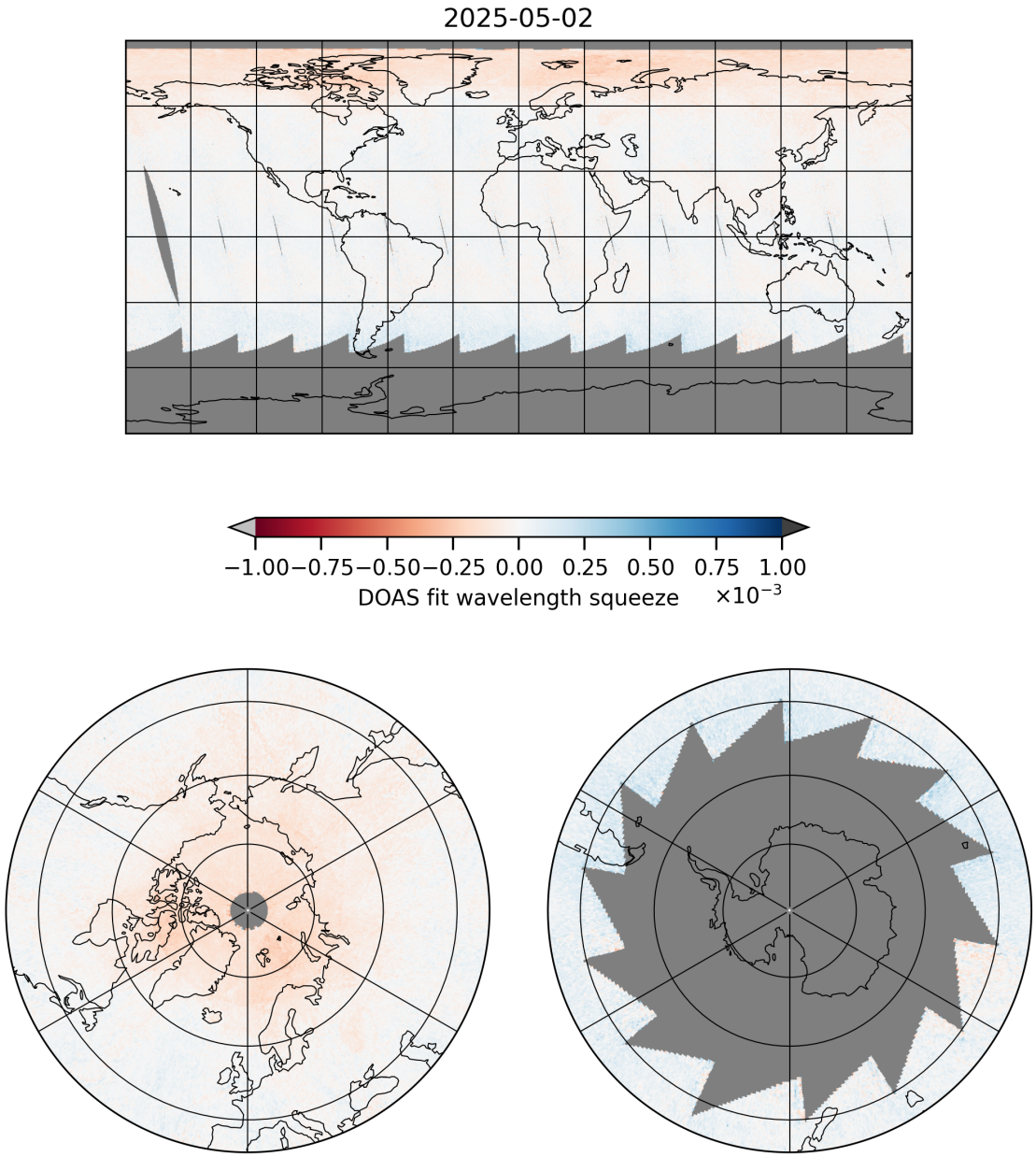

Figure 23: Map of “DOAS fit wavelength squeeze” for 2025-05-02 to 2025-05-02

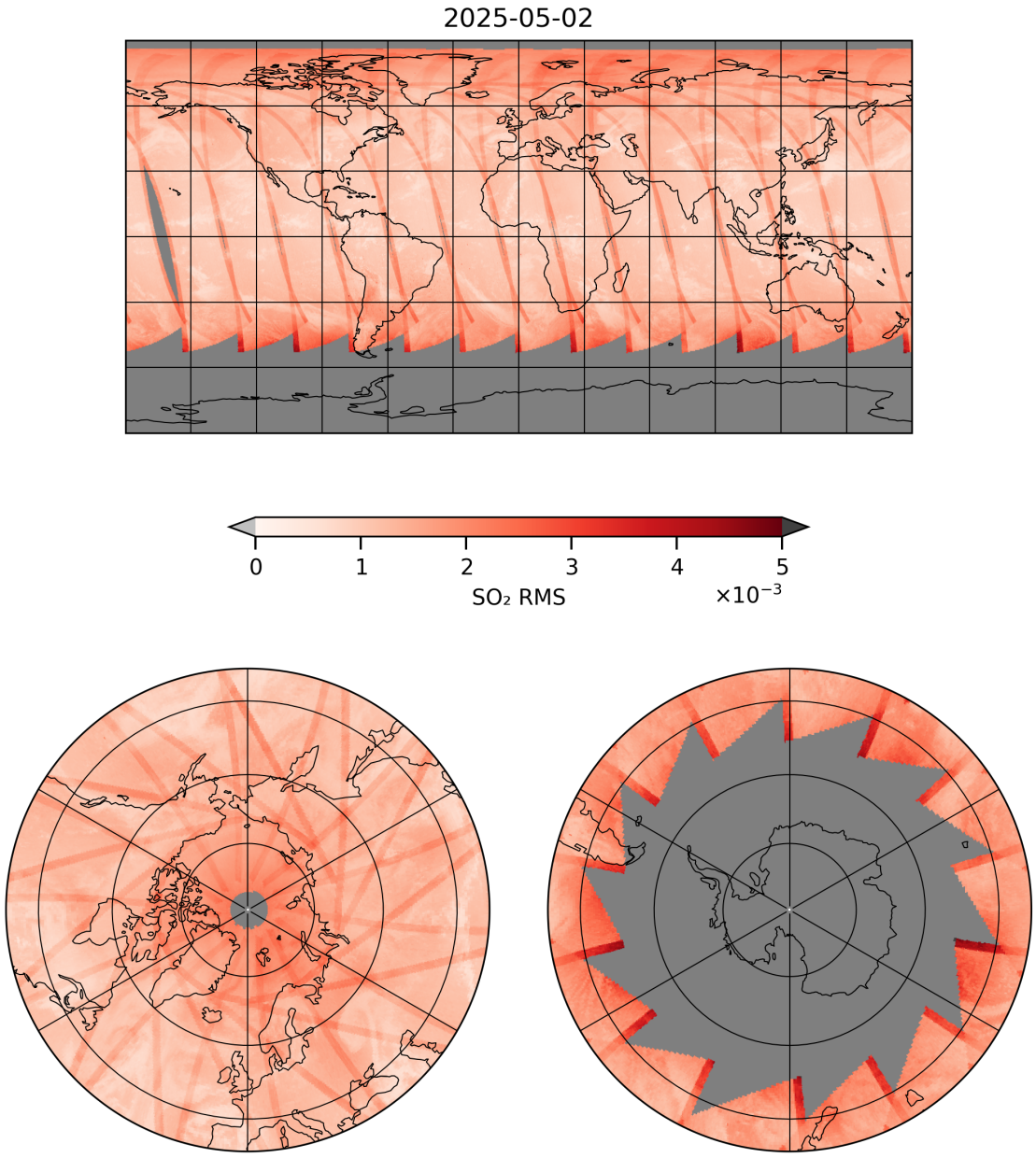

Figure 24: Map of "SO_2 RMS" for 2025-05-02 to 2025-05-02

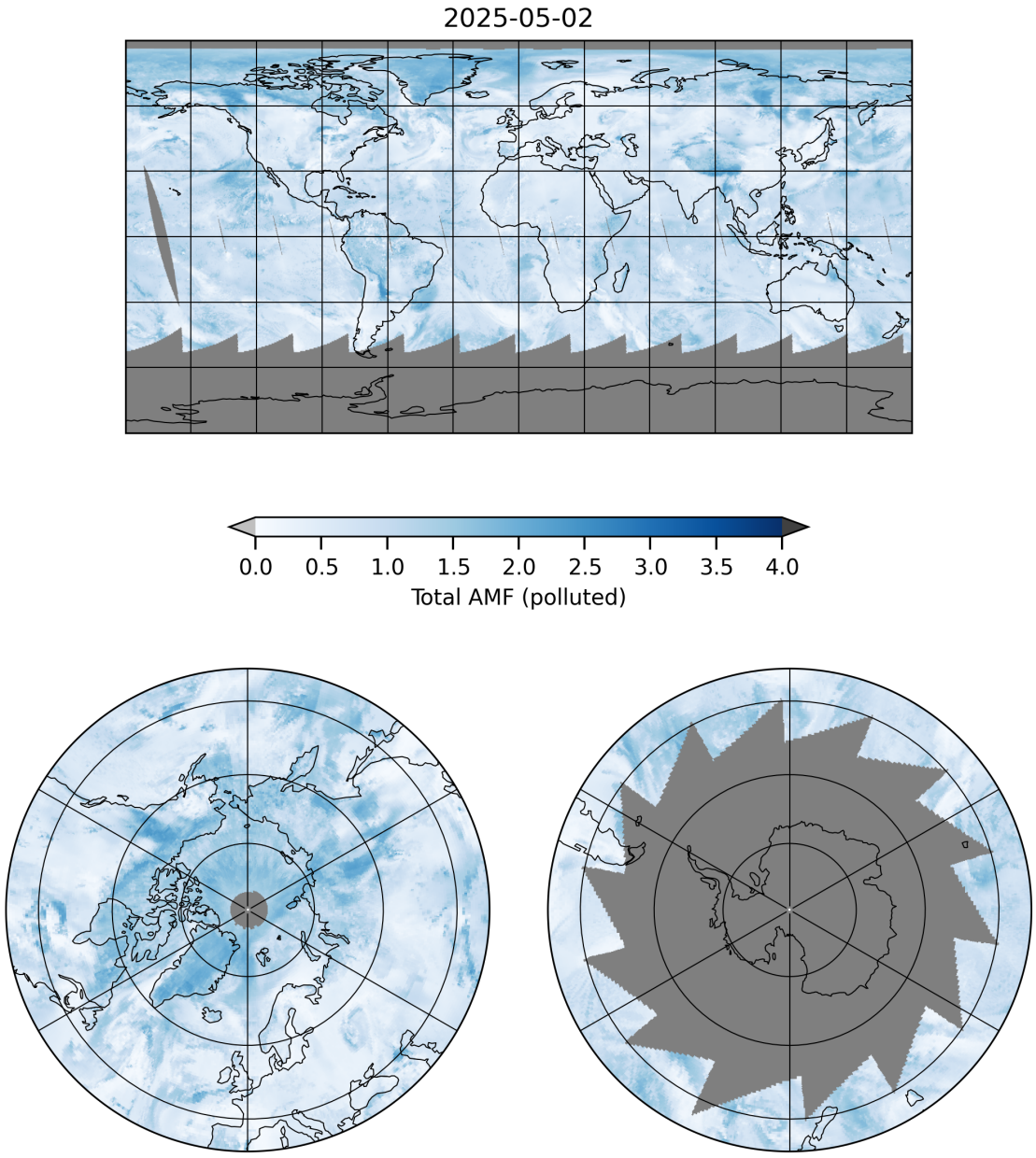

Figure 25: Map of “Total AMF (polluted)” for 2025-05-02 to 2025-05-02

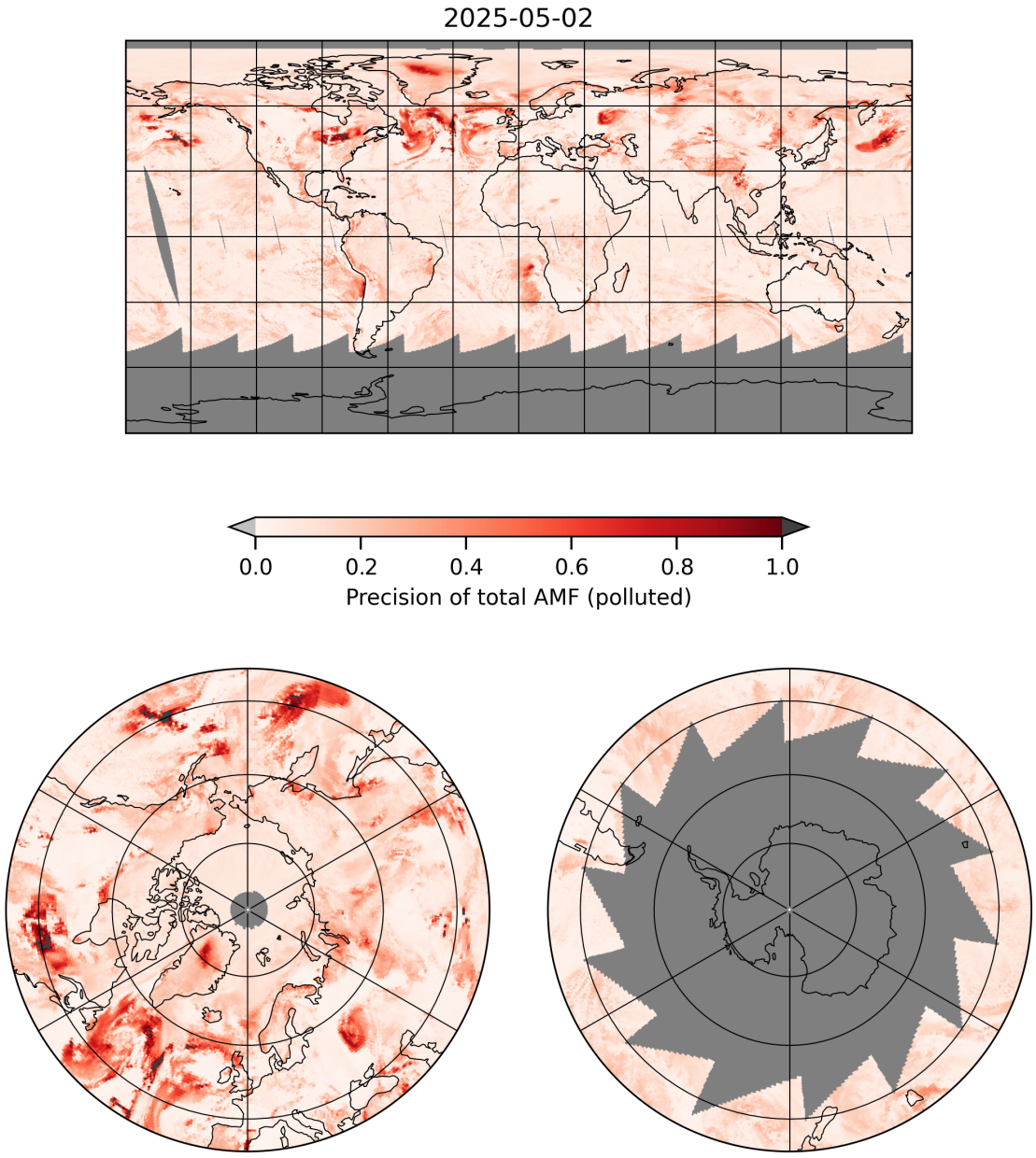

Figure 26: Map of “Precision of total AMF (polluted)” for 2025-05-02 to 2025-05-02

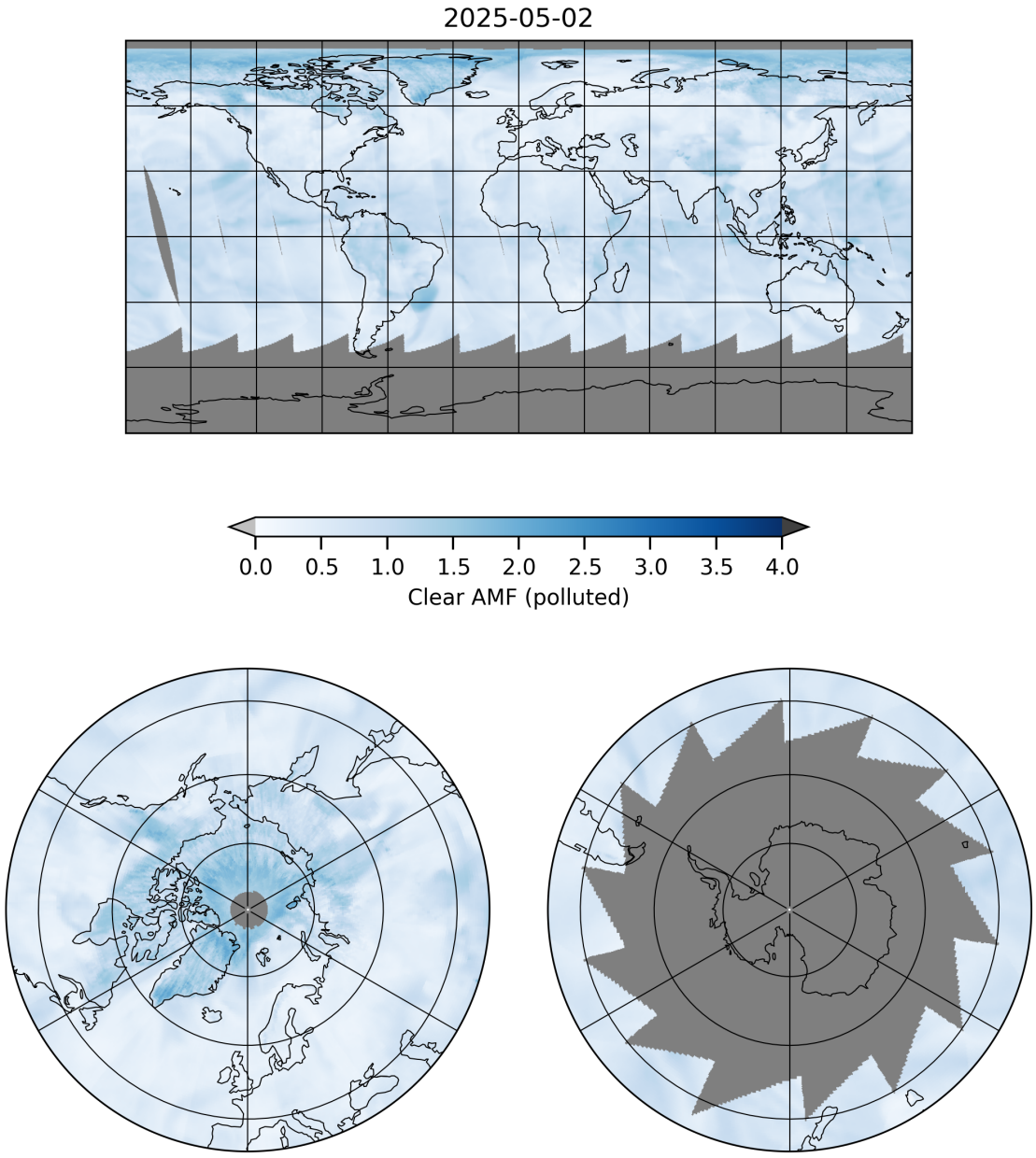

Figure 27: Map of “Clear AMF (polluted)” for 2025-05-02 to 2025-05-02

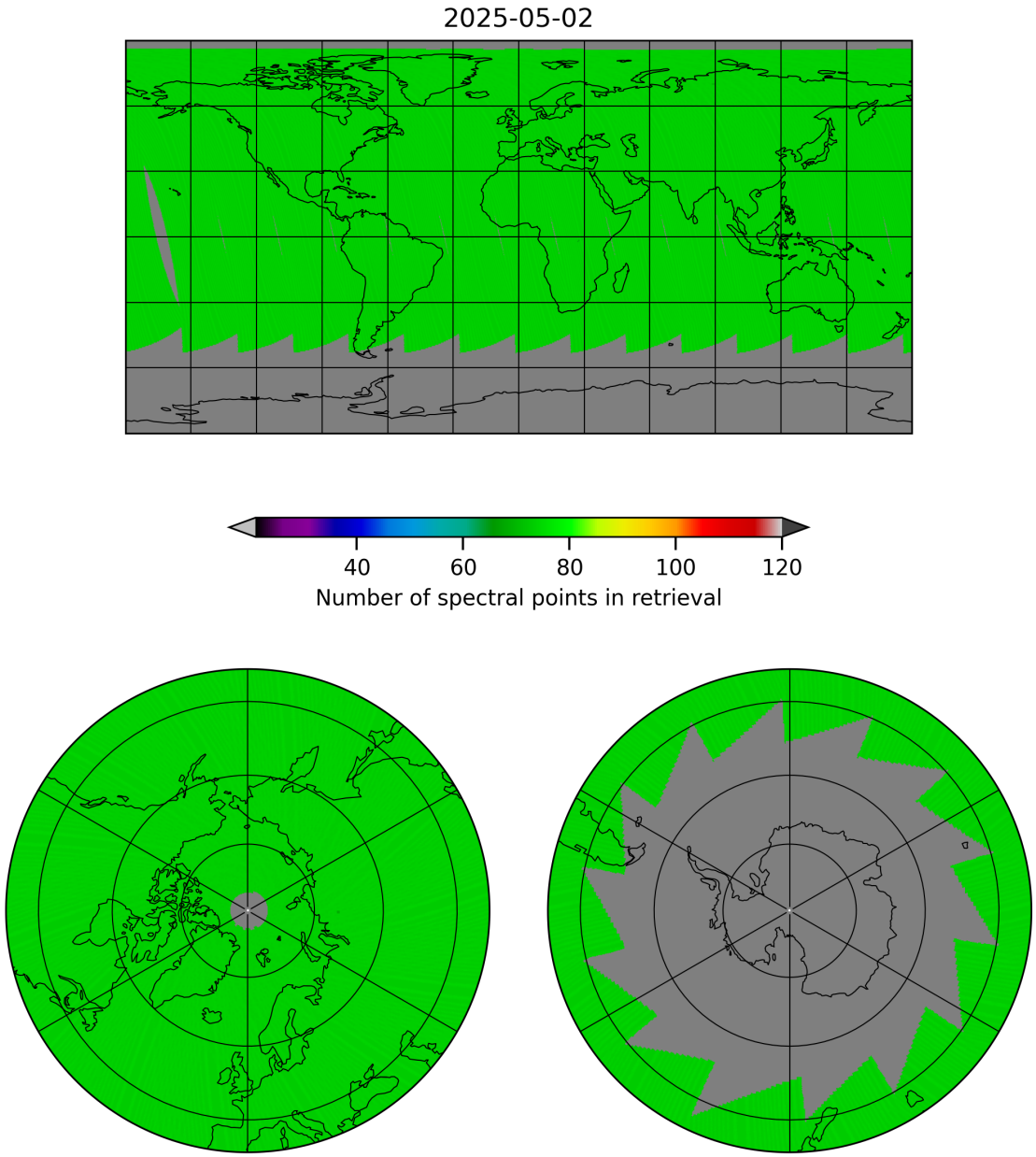

Figure 28: Map of “Number of spectral points in retrieval” for 2025-05-02 to 2025-05-02

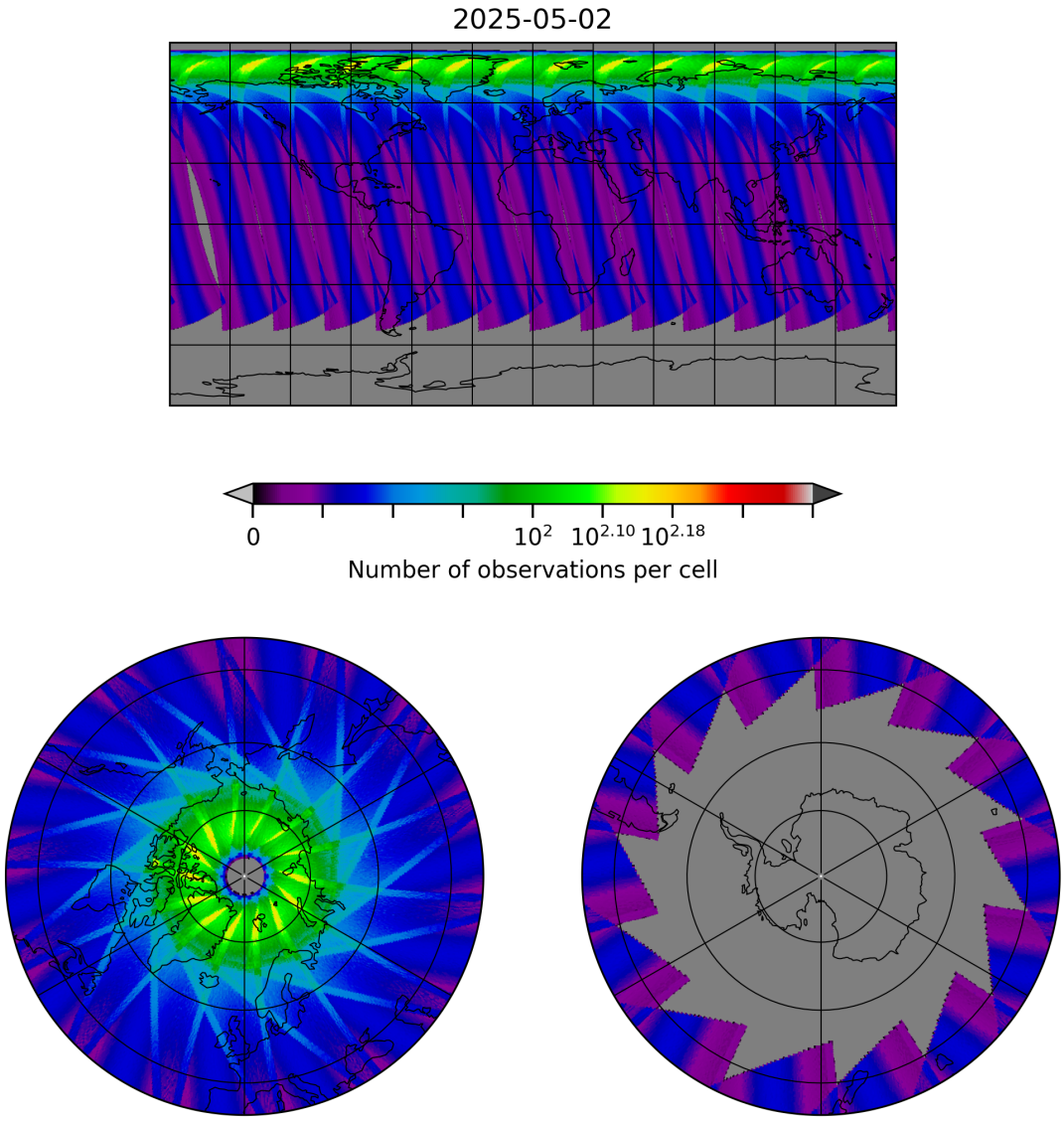

Figure 29: Map of the number of observations for 2025-05-02 to 2025-05-02

7 Zonal average

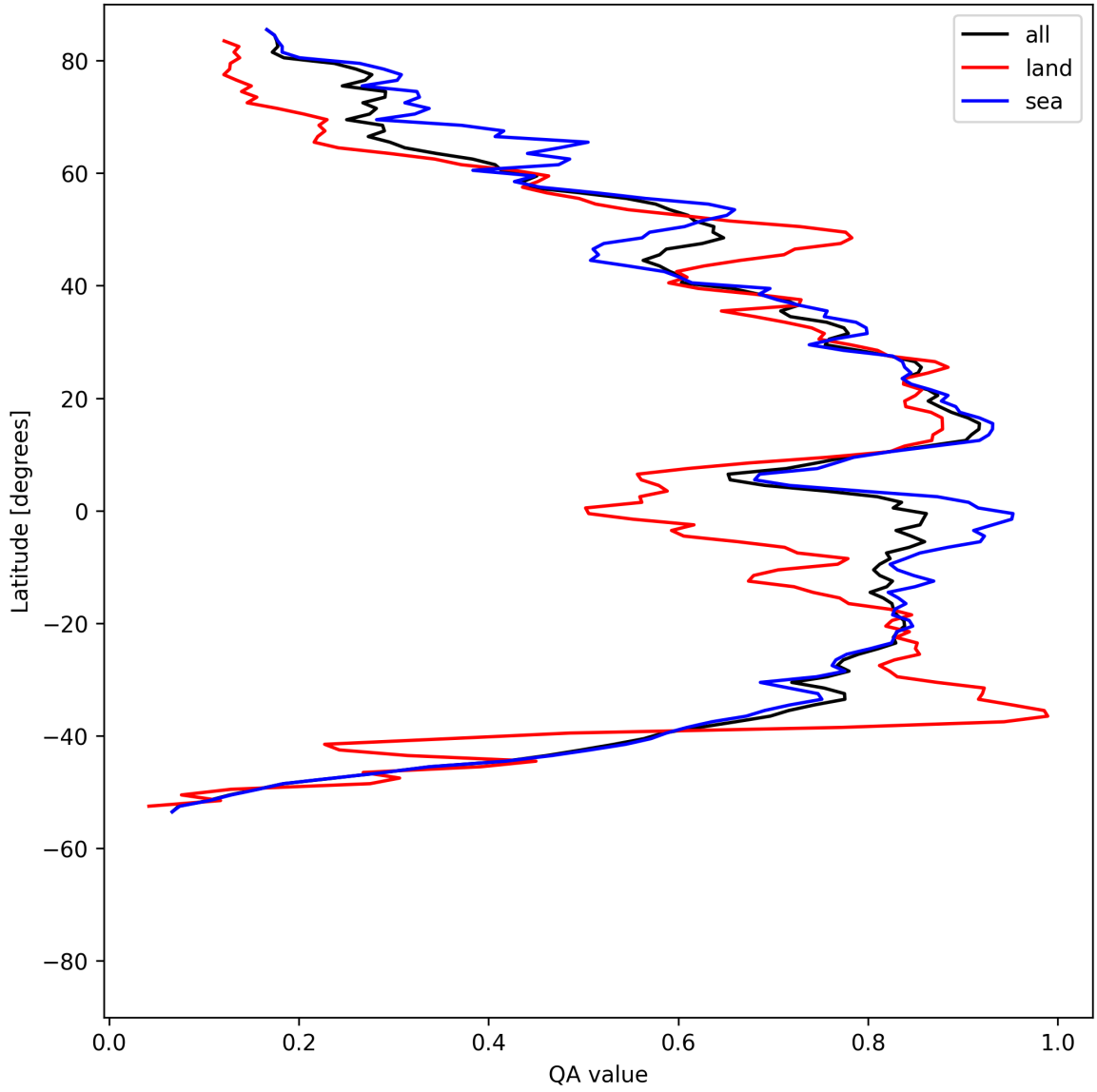

Figure 30: Zonal average of “QA value” for 2025-05-02 to 2025-05-02.

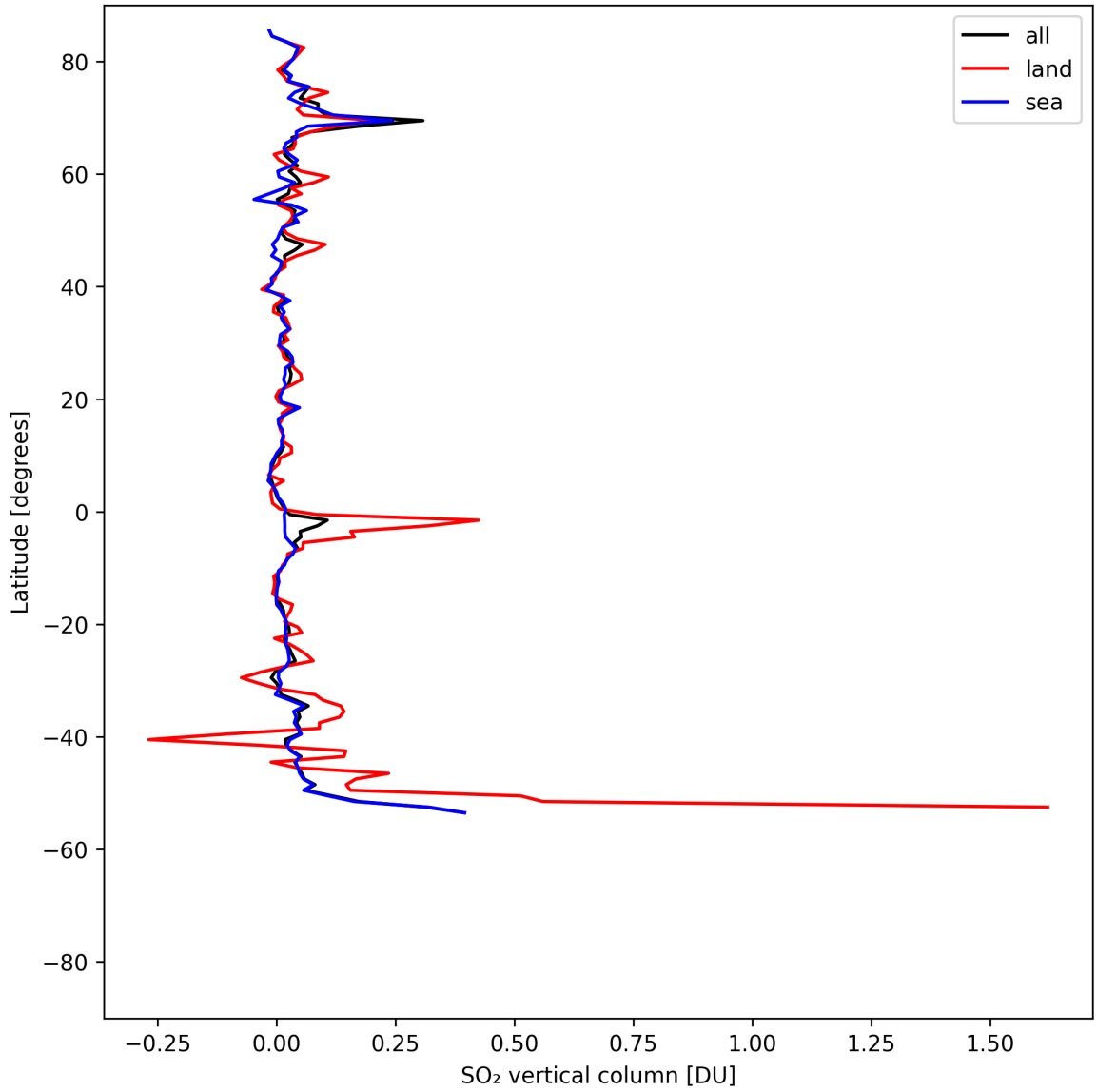

Figure 31: Zonal average of "SO_2 vertical column" for 2025-05-02 to 2025-05-02.

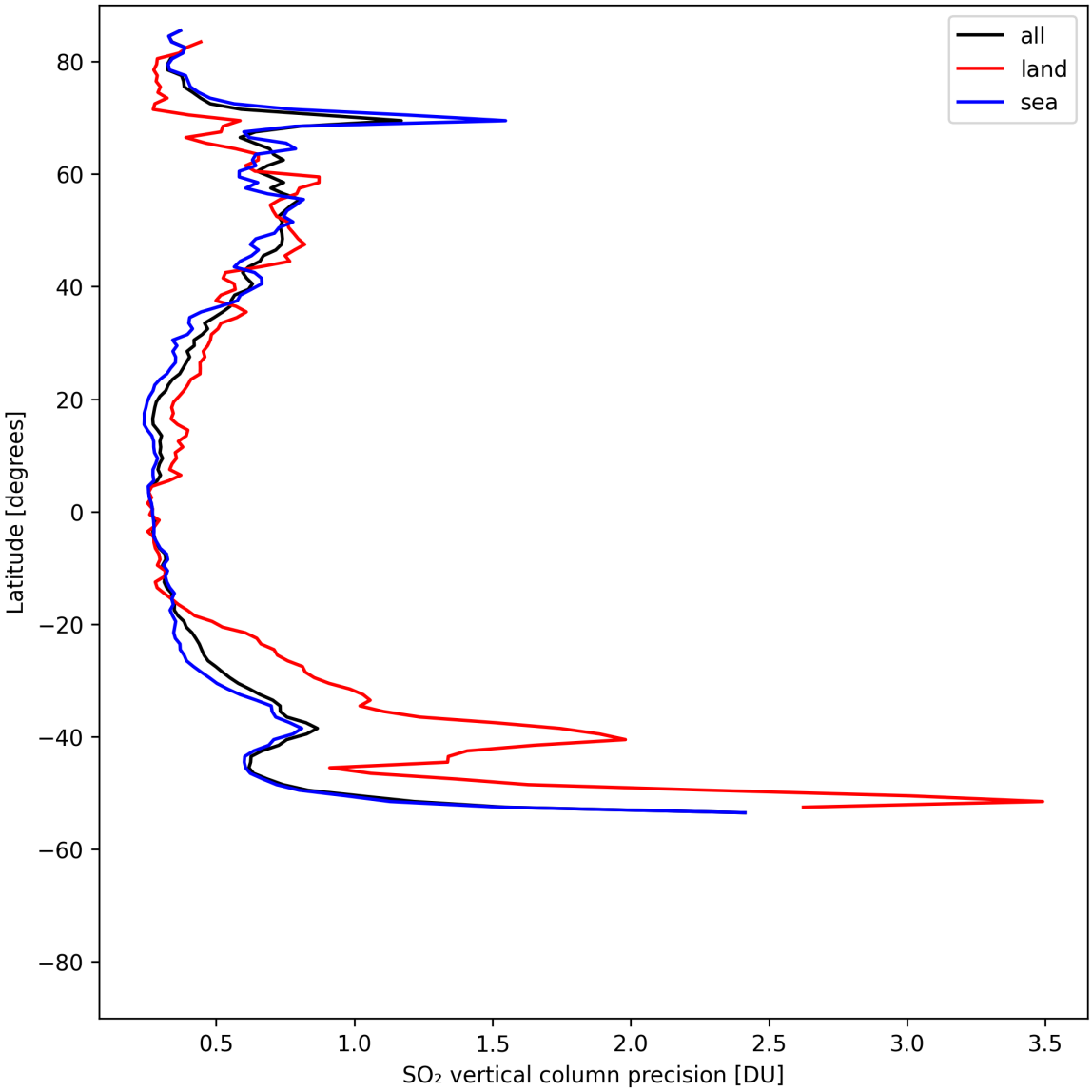

Figure 32: Zonal average of "SO_2 vertical column precision" for 2025-05-02 to 2025-05-02.

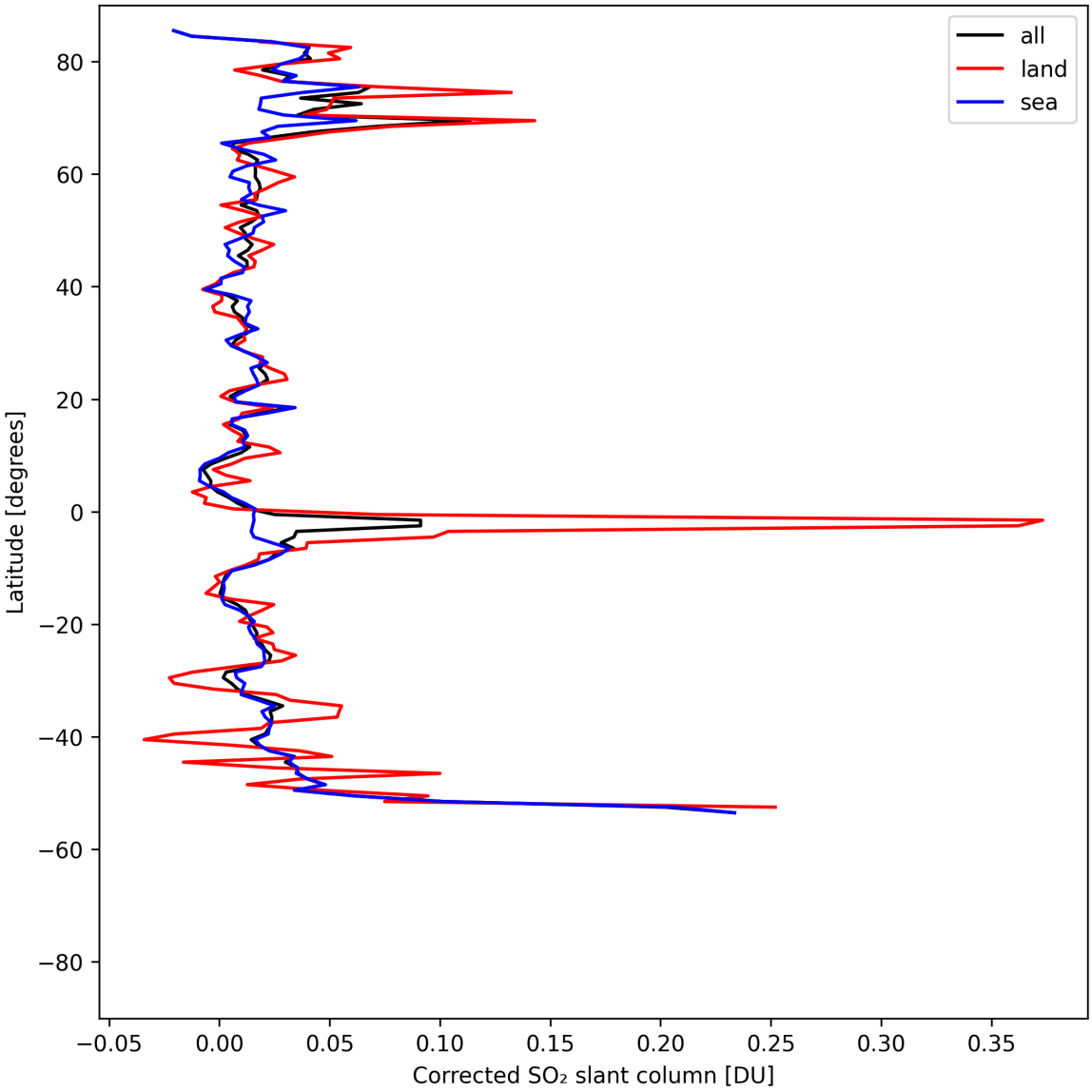

Figure 33: Zonal average of “Corrected SO_2 slant column” for 2025-05-02 to 2025-05-02.

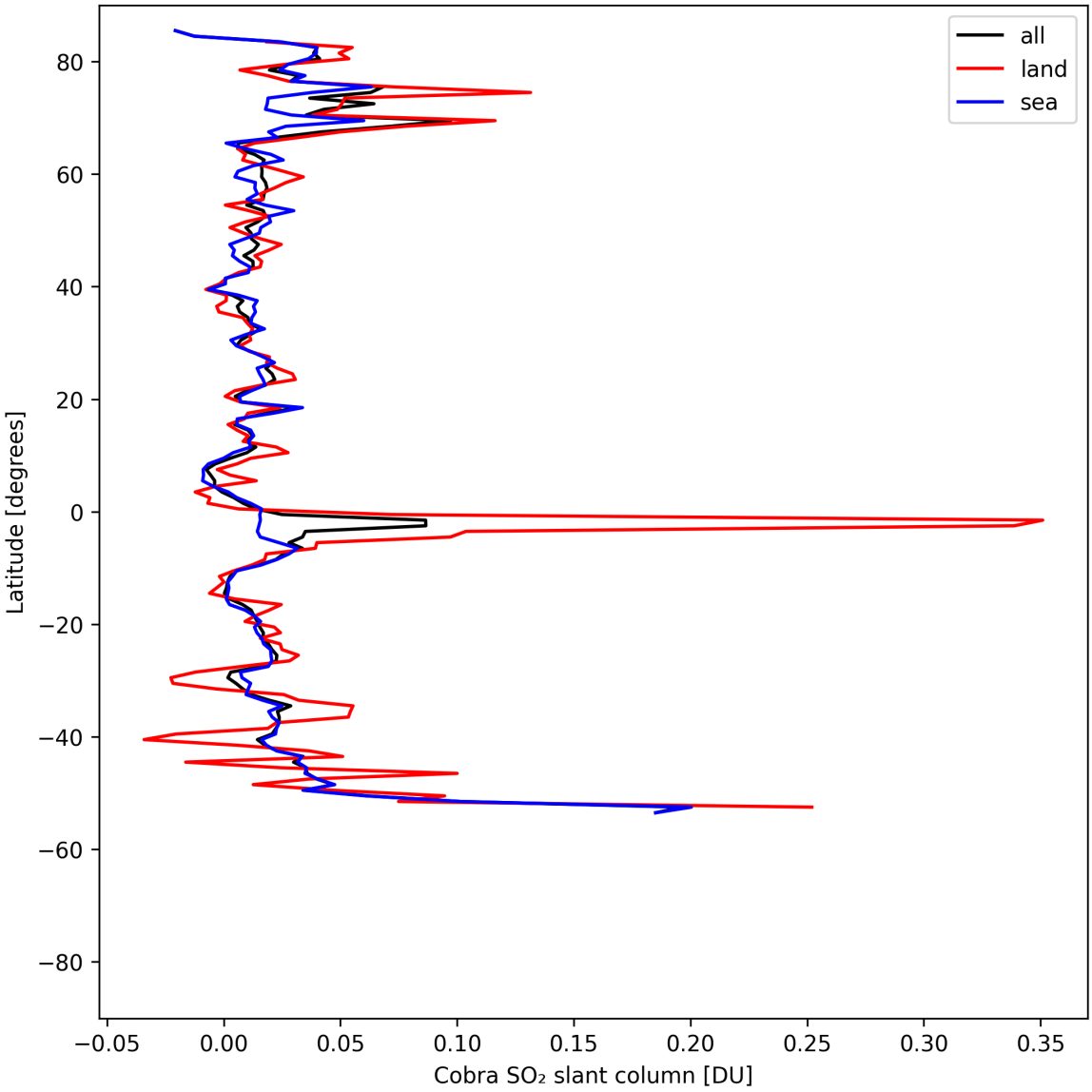

Figure 34: Zonal average of “Cobra SO_2 slant column” for 2025-05-02 to 2025-05-02.

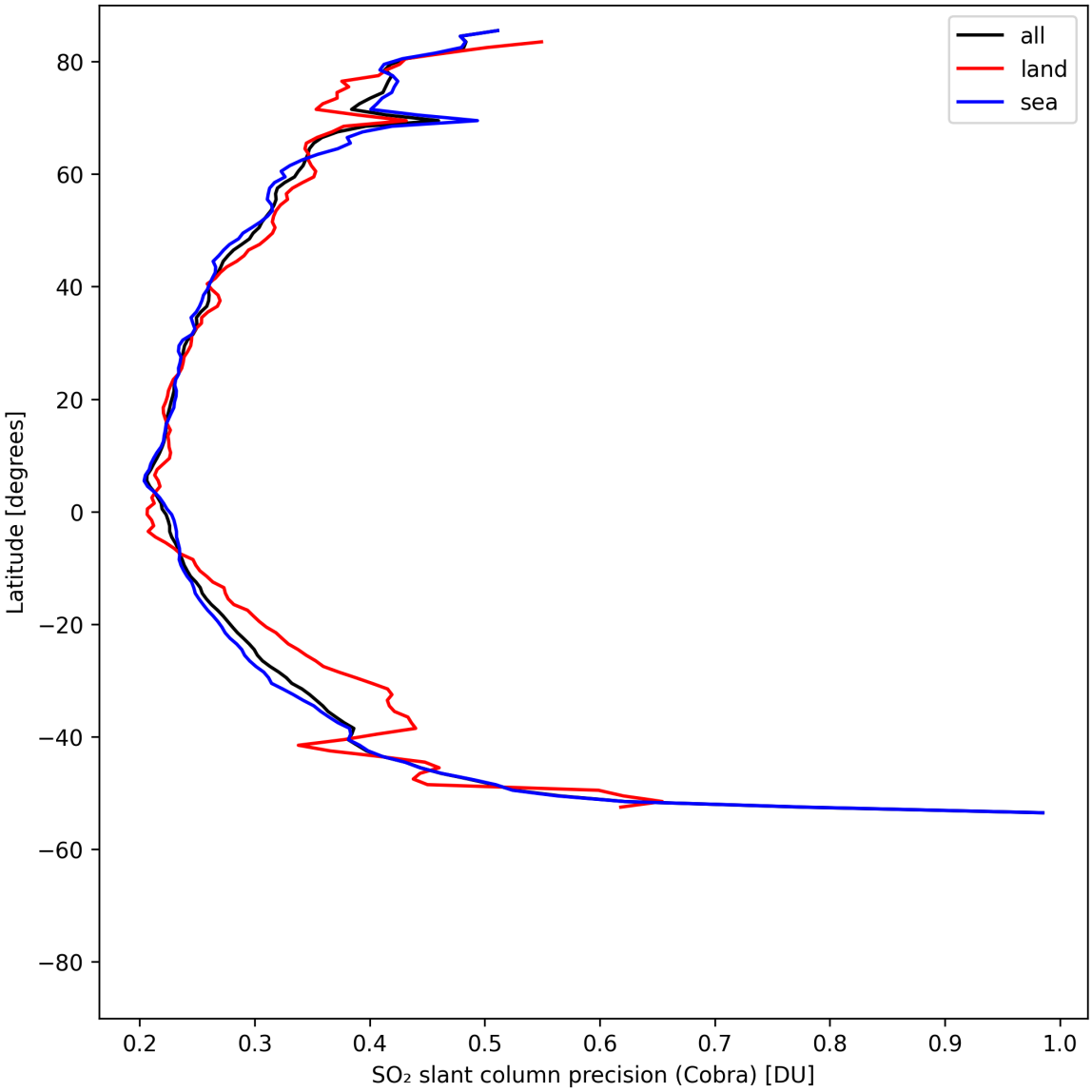

Figure 35: Zonal average of "SO_2 slant column precision (Cobra)" for 2025-05-02 to 2025-05-02.

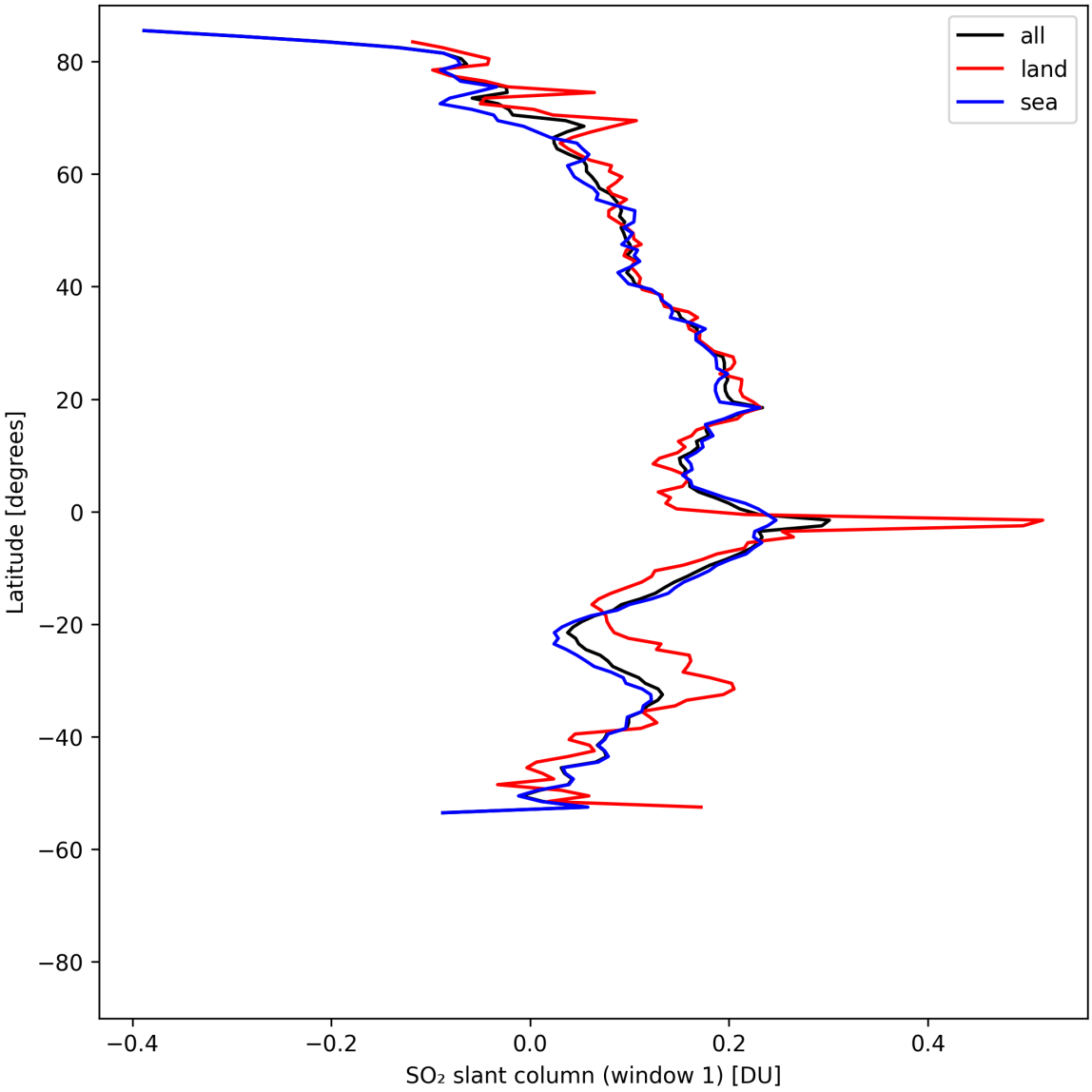

Figure 36: Zonal average of "SO_2 slant column (window 1)" for 2025-05-02 to 2025-05-02.

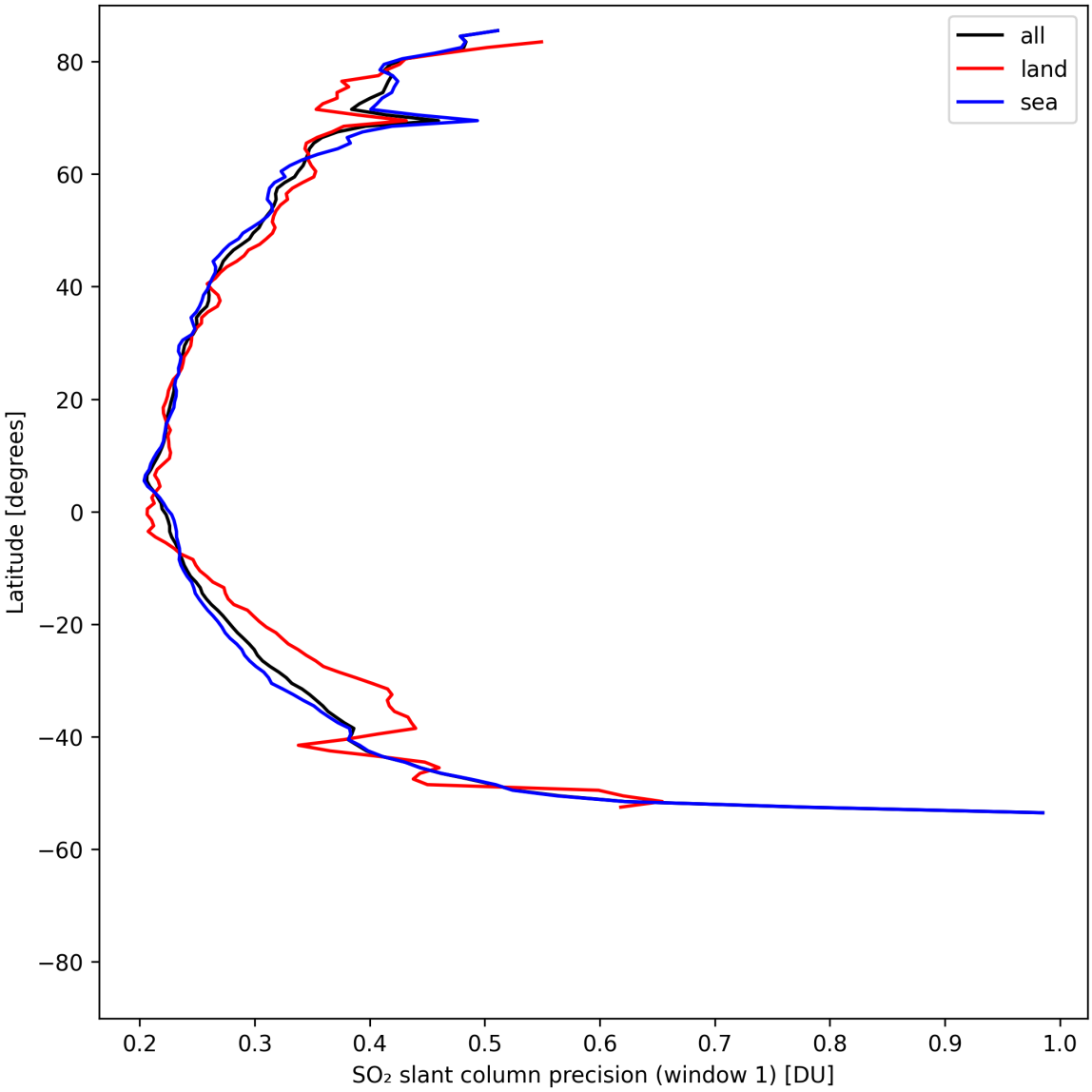

Figure 37: Zonal average of "SO_2 slant column precision (window 1)" for 2025-05-02 to 2025-05-02.

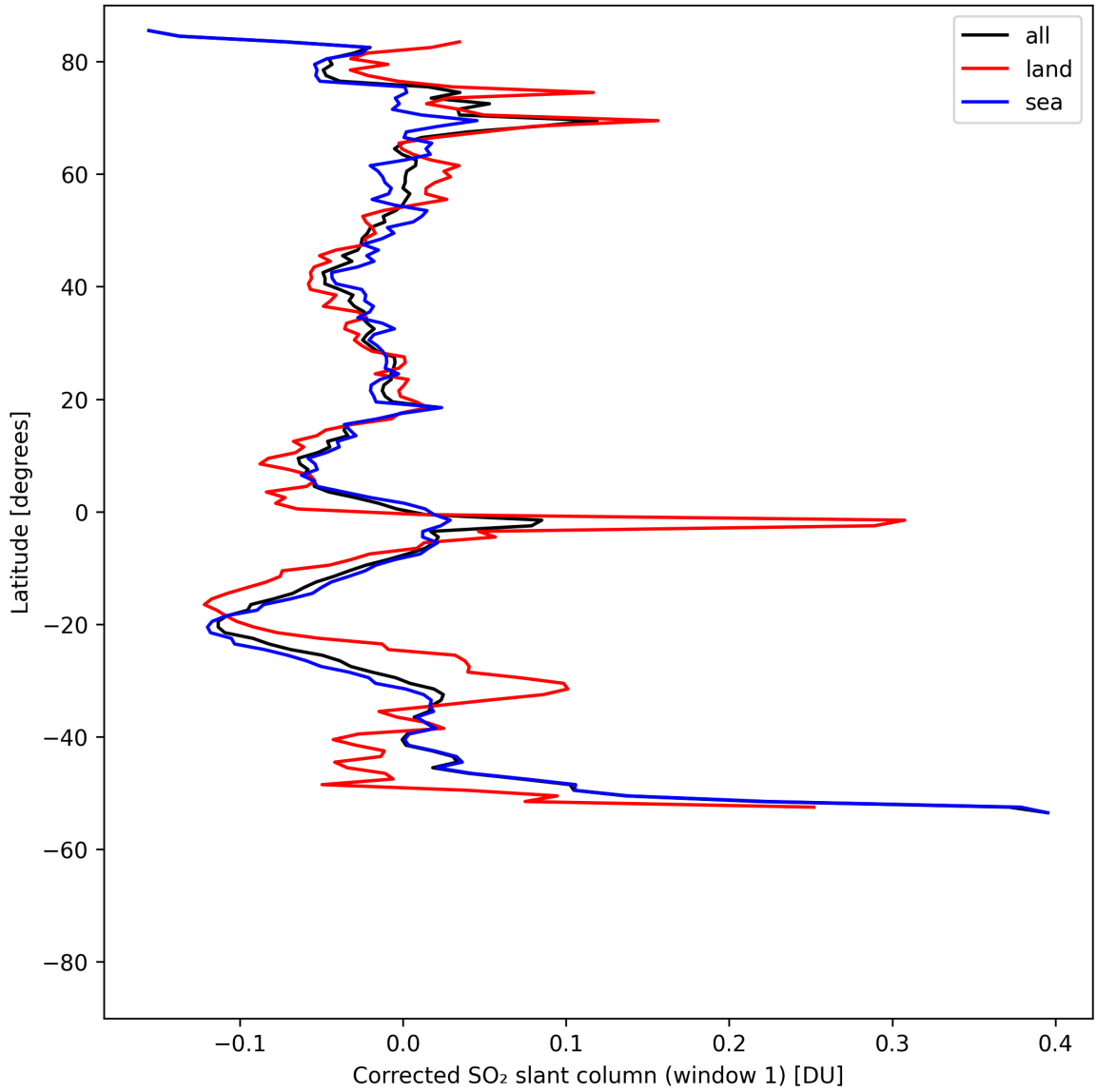

Figure 38: Zonal average of "Corrected SO_2 slant column (window 1)" for 2025-05-02 to 2025-05-02.

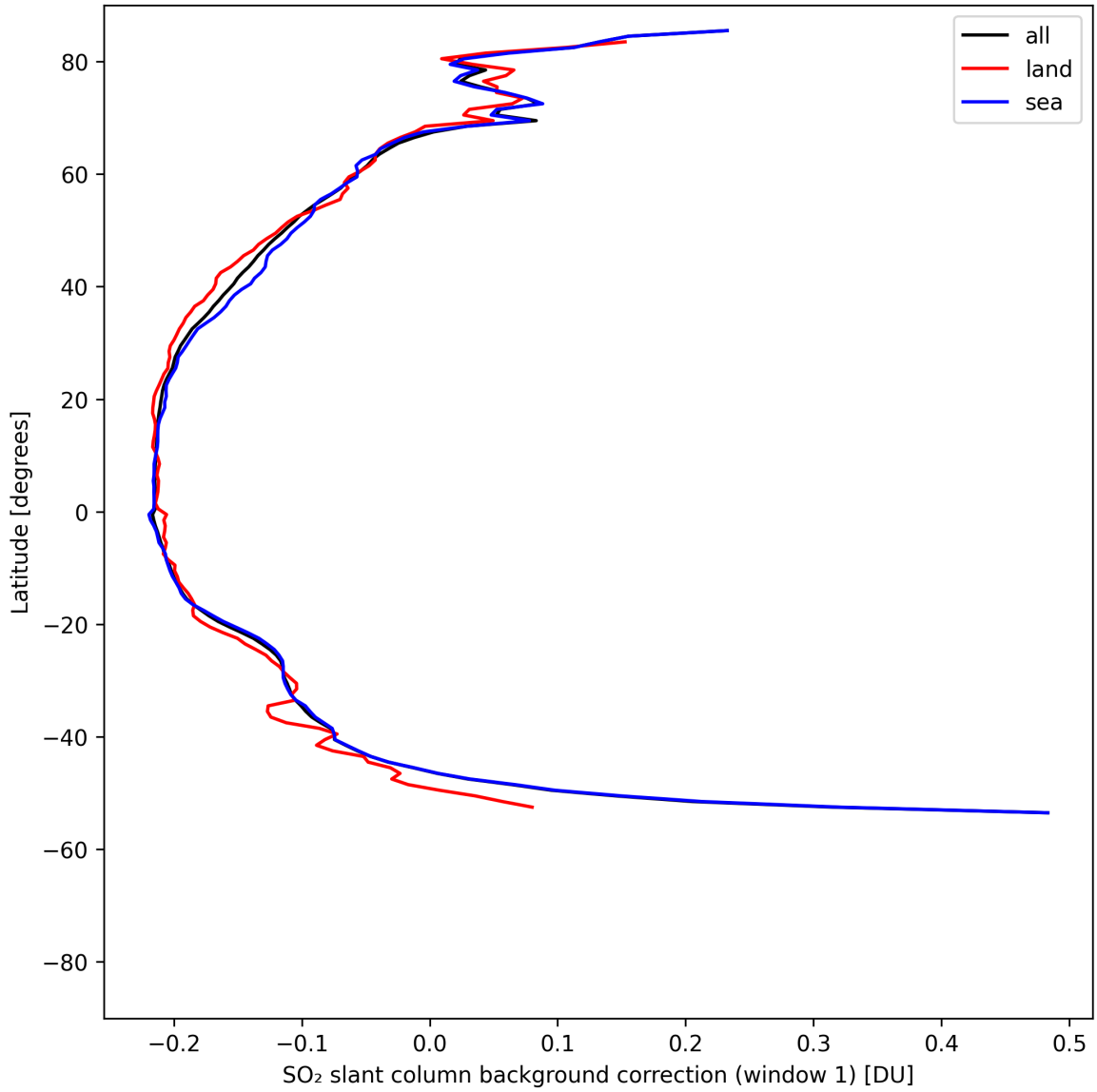

Figure 39: Zonal average of "SO_2 slant column background correction (window 1)" for 2025-05-02 to 2025-05-02.

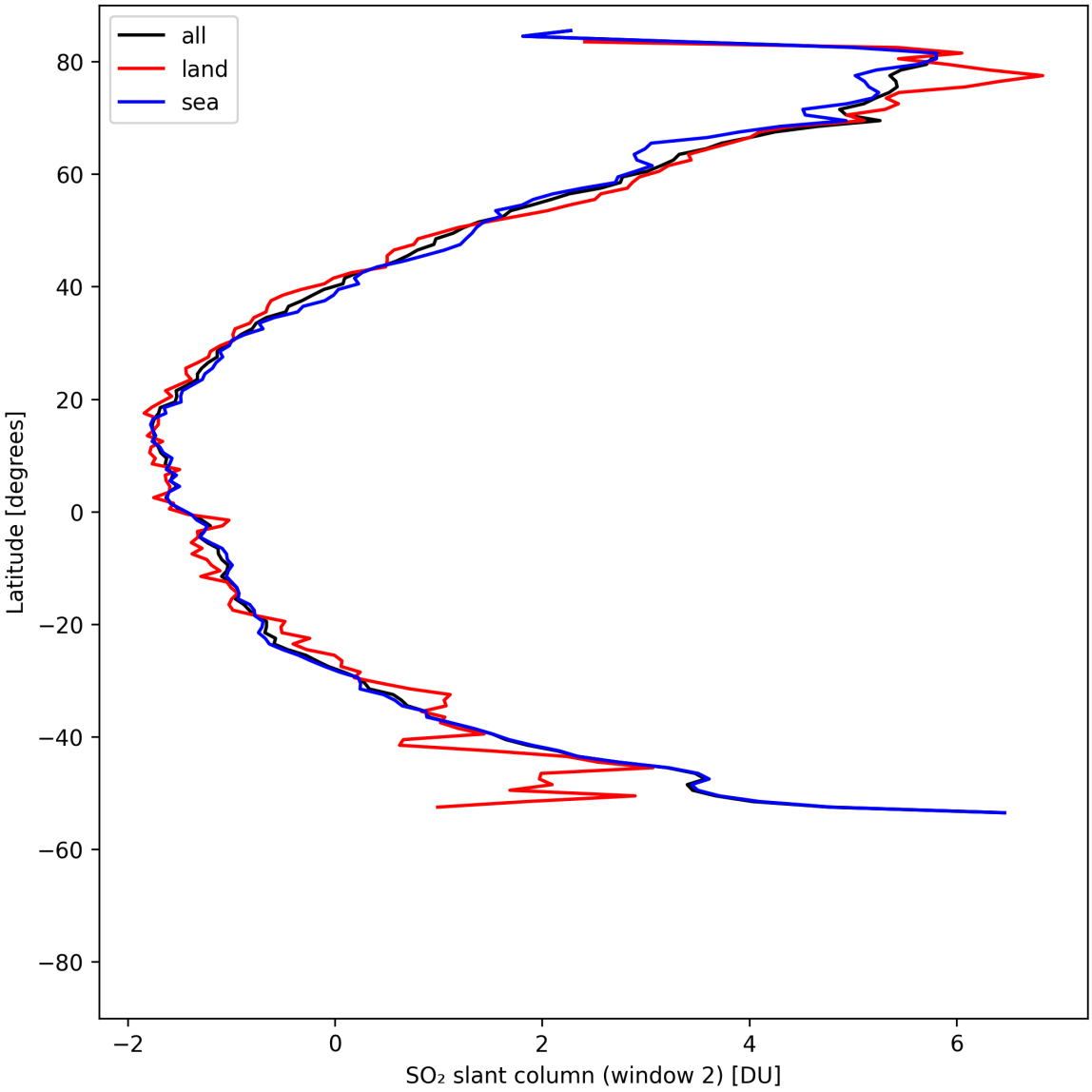

Figure 40: Zonal average of "SO_2 slant column (window 2)" for 2025-05-02 to 2025-05-02.

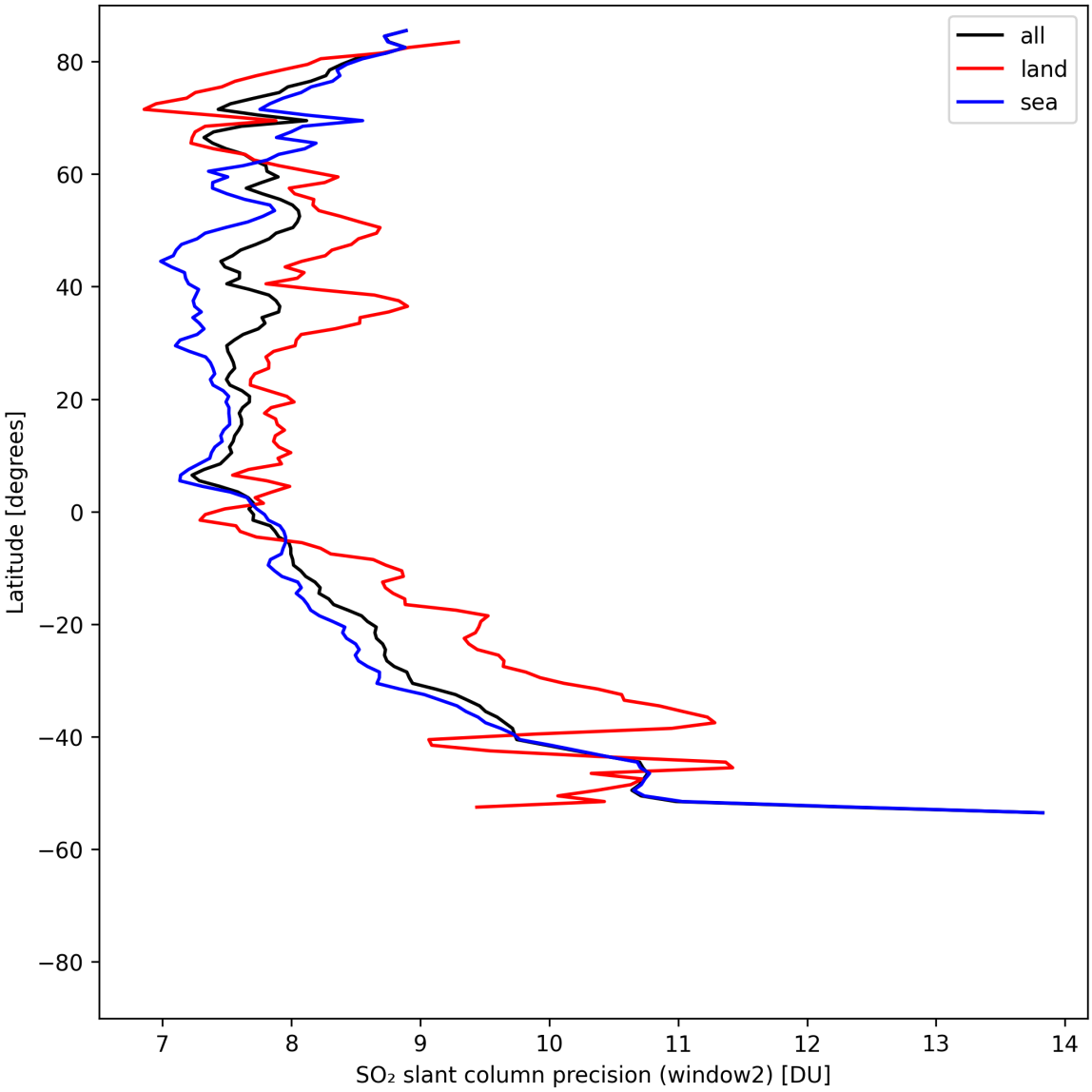

Figure 41: Zonal average of "SO_2 slant column precision (window2)" for 2025-05-02 to 2025-05-02.

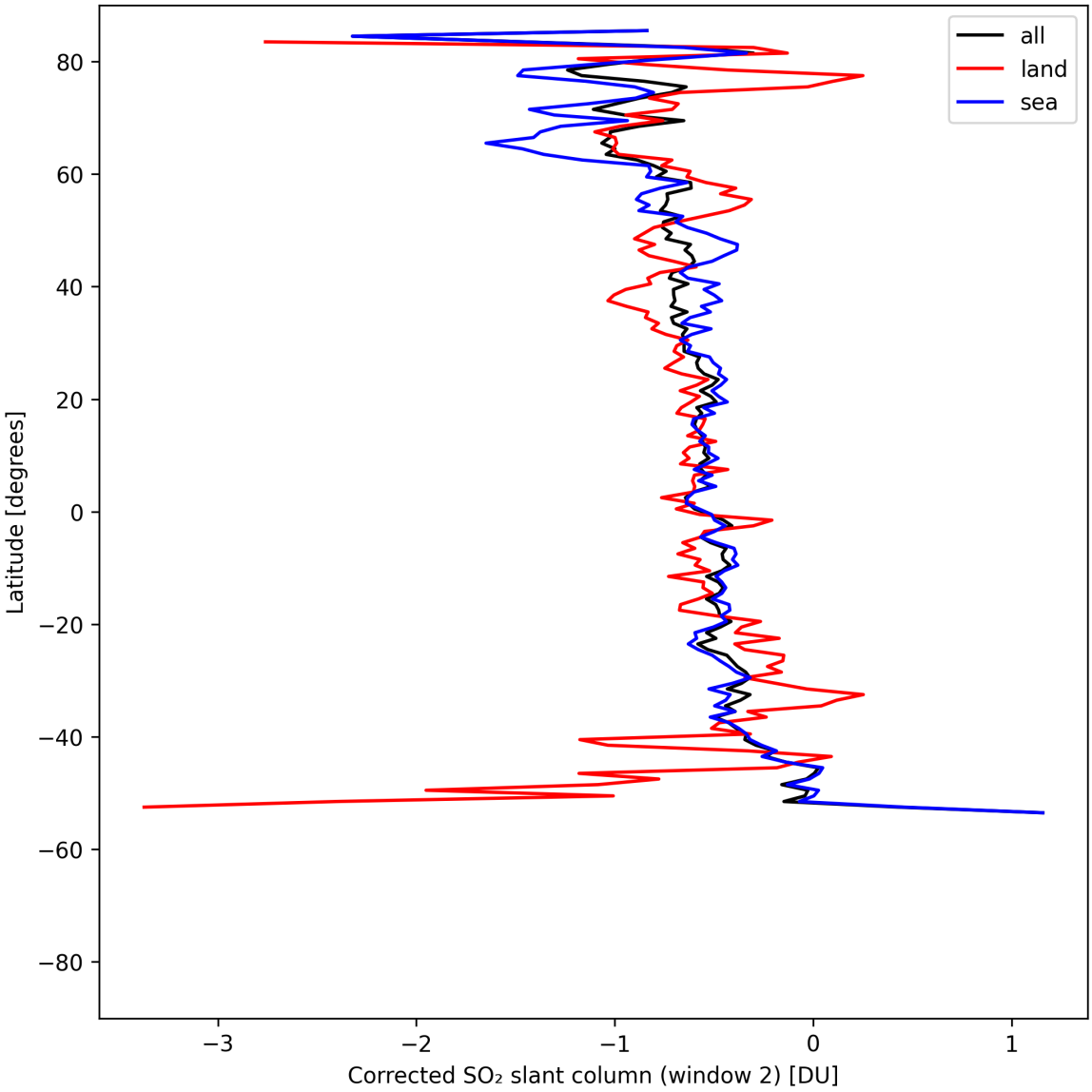

Figure 42: Zonal average of “Corrected SO_2 slant column (window 2)” for 2025-05-02 to 2025-05-02.

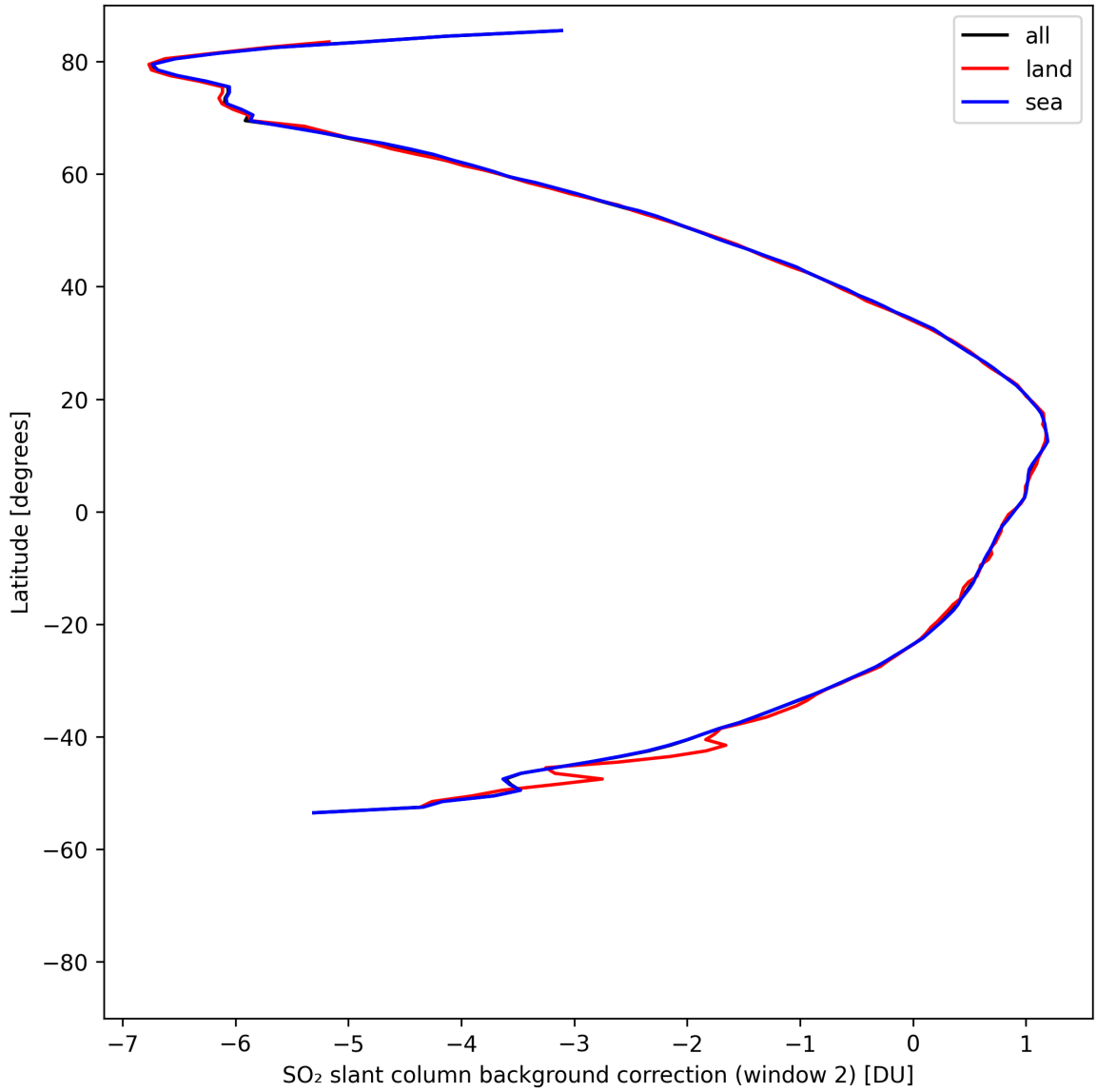

Figure 43: Zonal average of "SO_2 slant column background correction (window 2)" for 2025-05-02 to 2025-05-02.

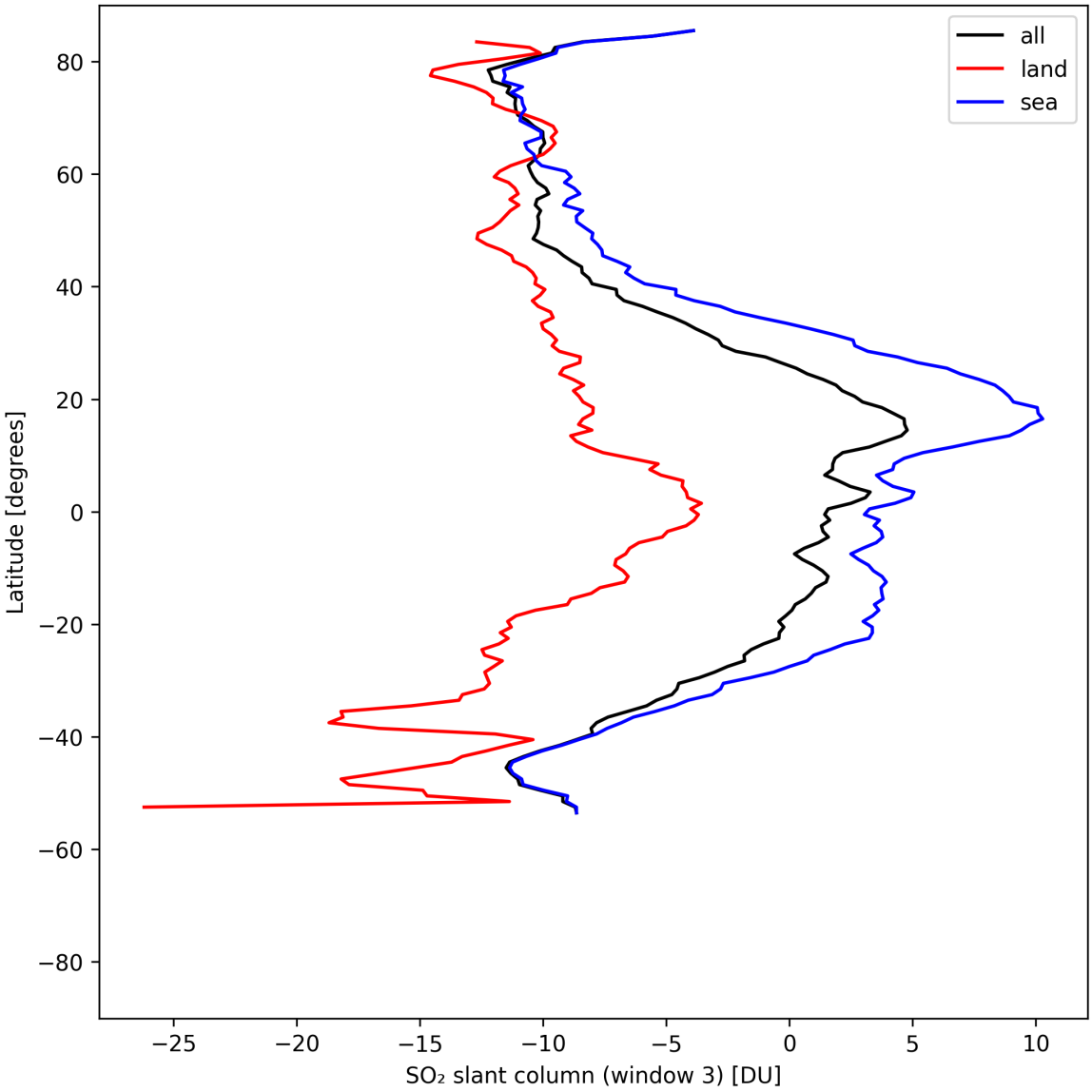

Figure 44: Zonal average of "SO_2 slant column (window 3)" for 2025-05-02 to 2025-05-02.

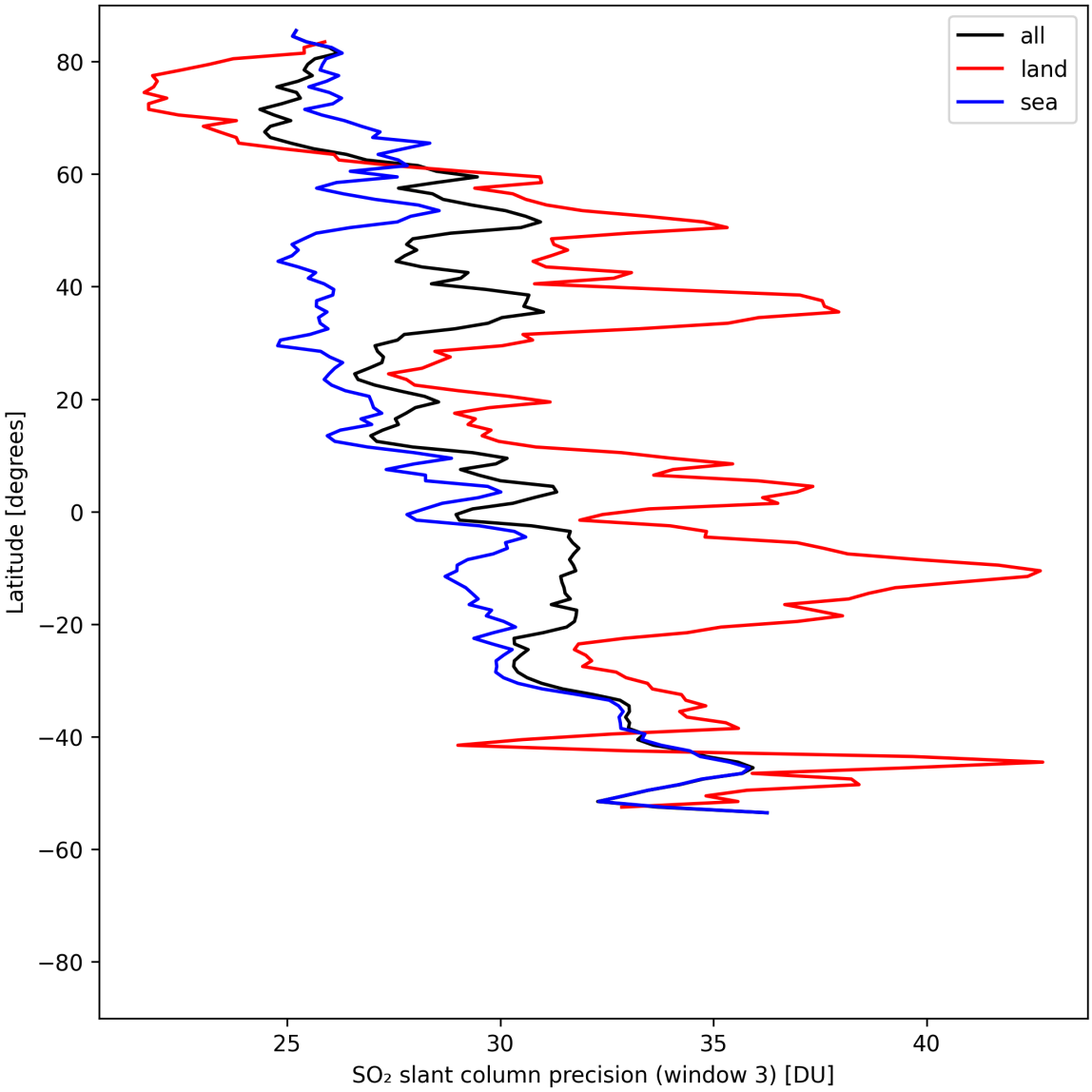

Figure 45: Zonal average of "SO_2 slant column precision (window 3)" for 2025-05-02 to 2025-05-02.

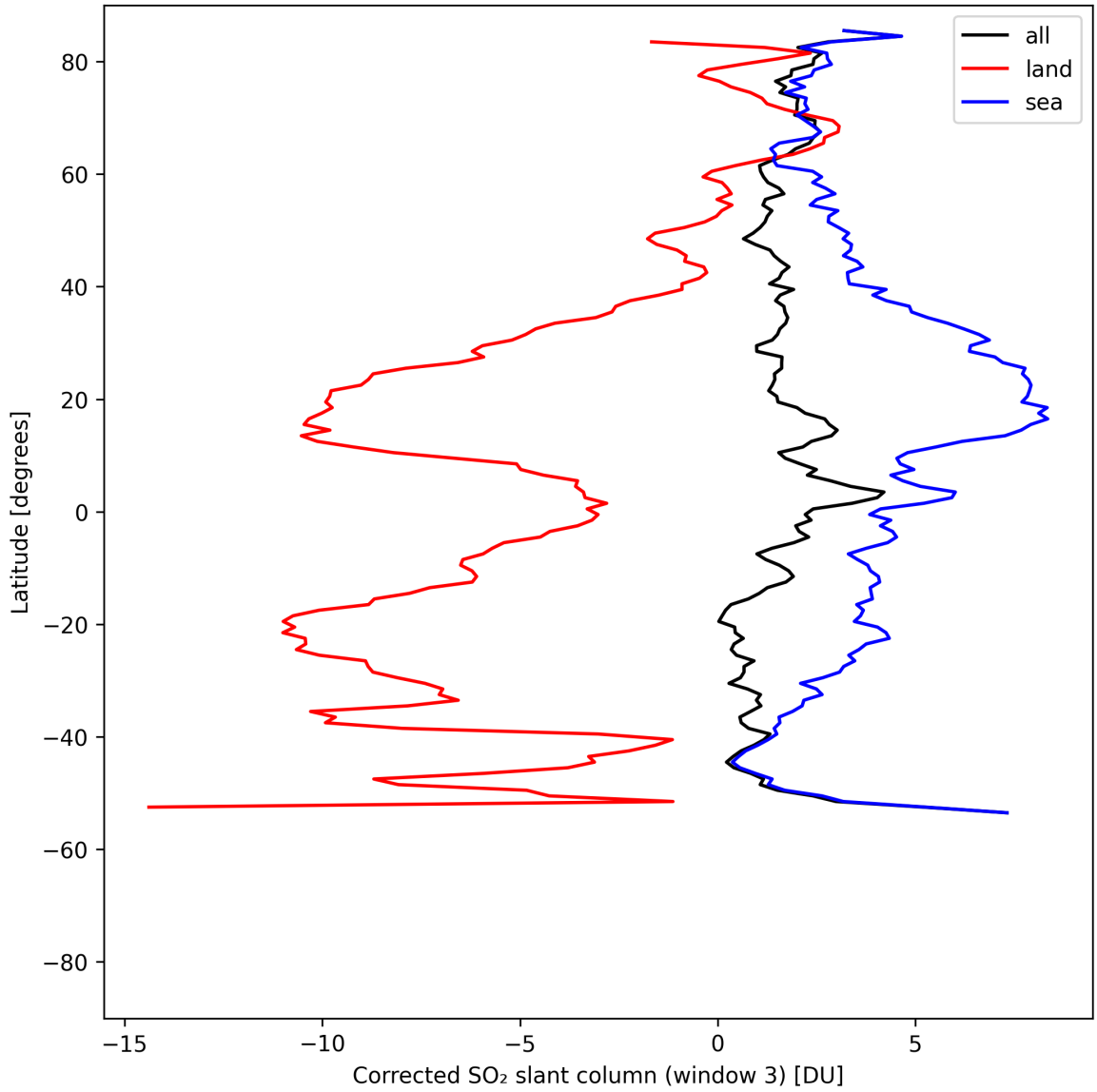

Figure 46: Zonal average of “Corrected SO_2 slant column (window 3)” for 2025-05-02 to 2025-05-02.

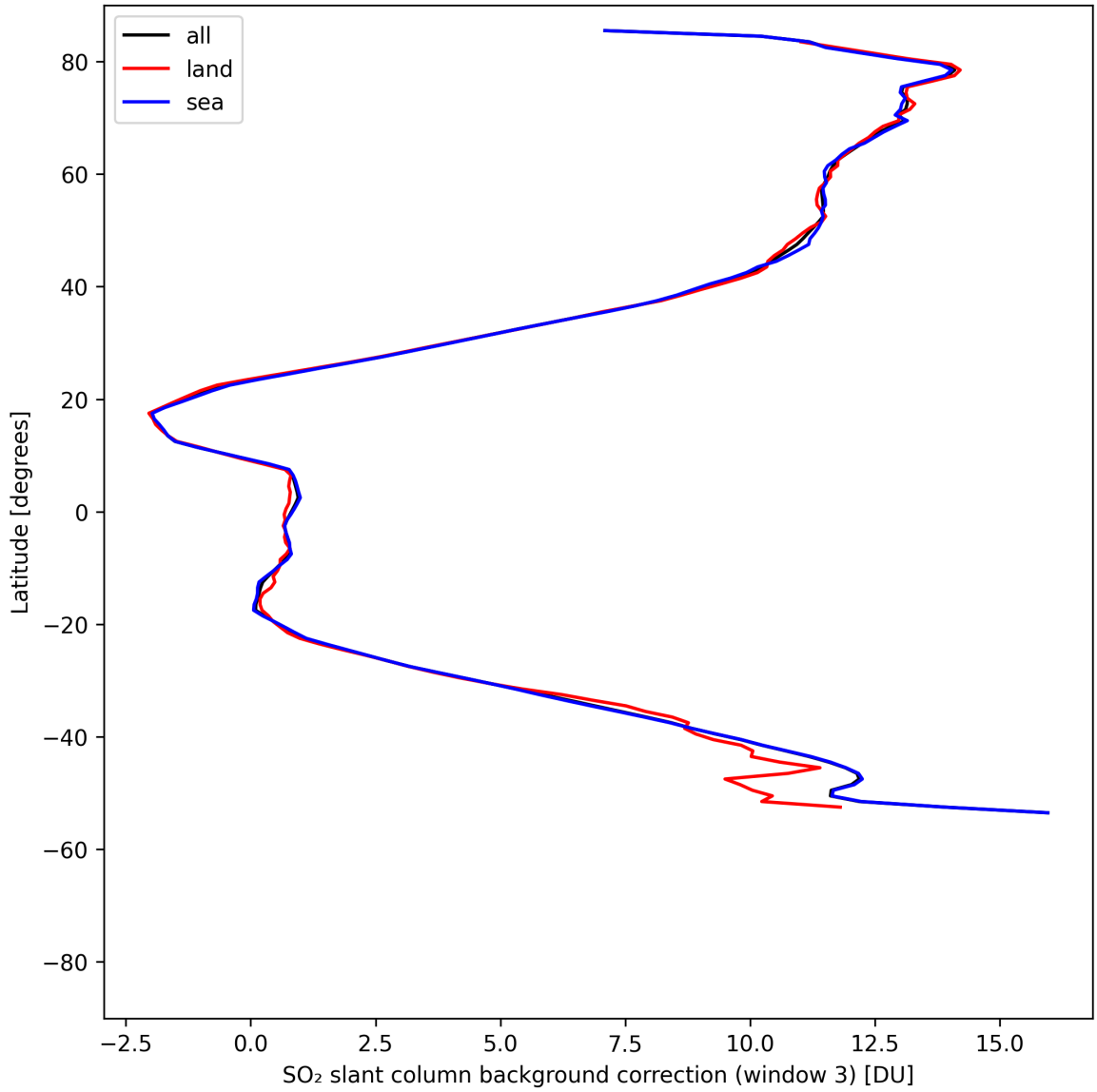

Figure 47: Zonal average of "SO_2 slant column background correction (window 3)" for 2025-05-02 to 2025-05-02.

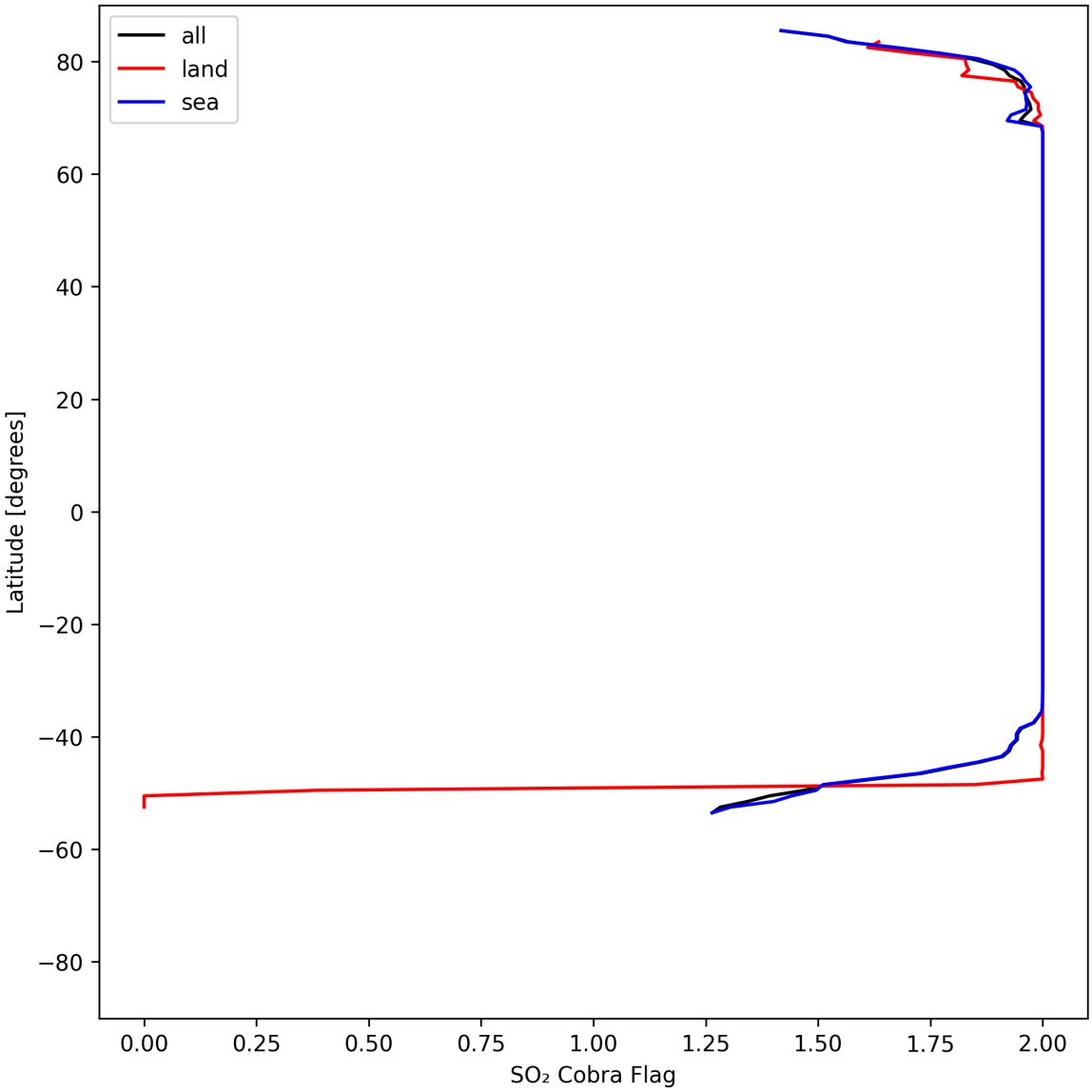

Figure 48: Zonal average of "SO_2 Cobra Flag" for 2025-05-02 to 2025-05-02.

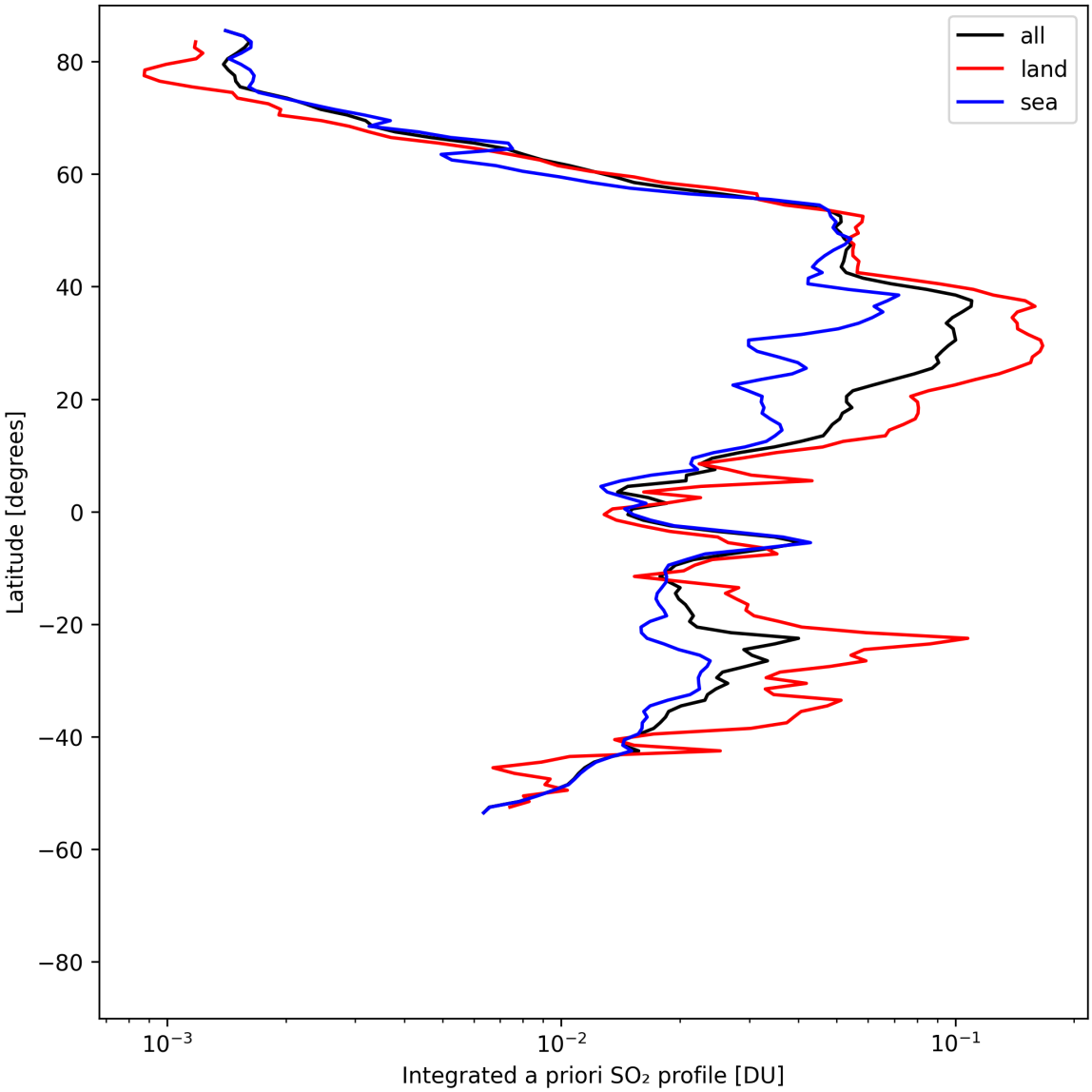

Figure 49: Zonal average of “Integrated a priori SO_2 profile” for 2025-05-02 to 2025-05-02.

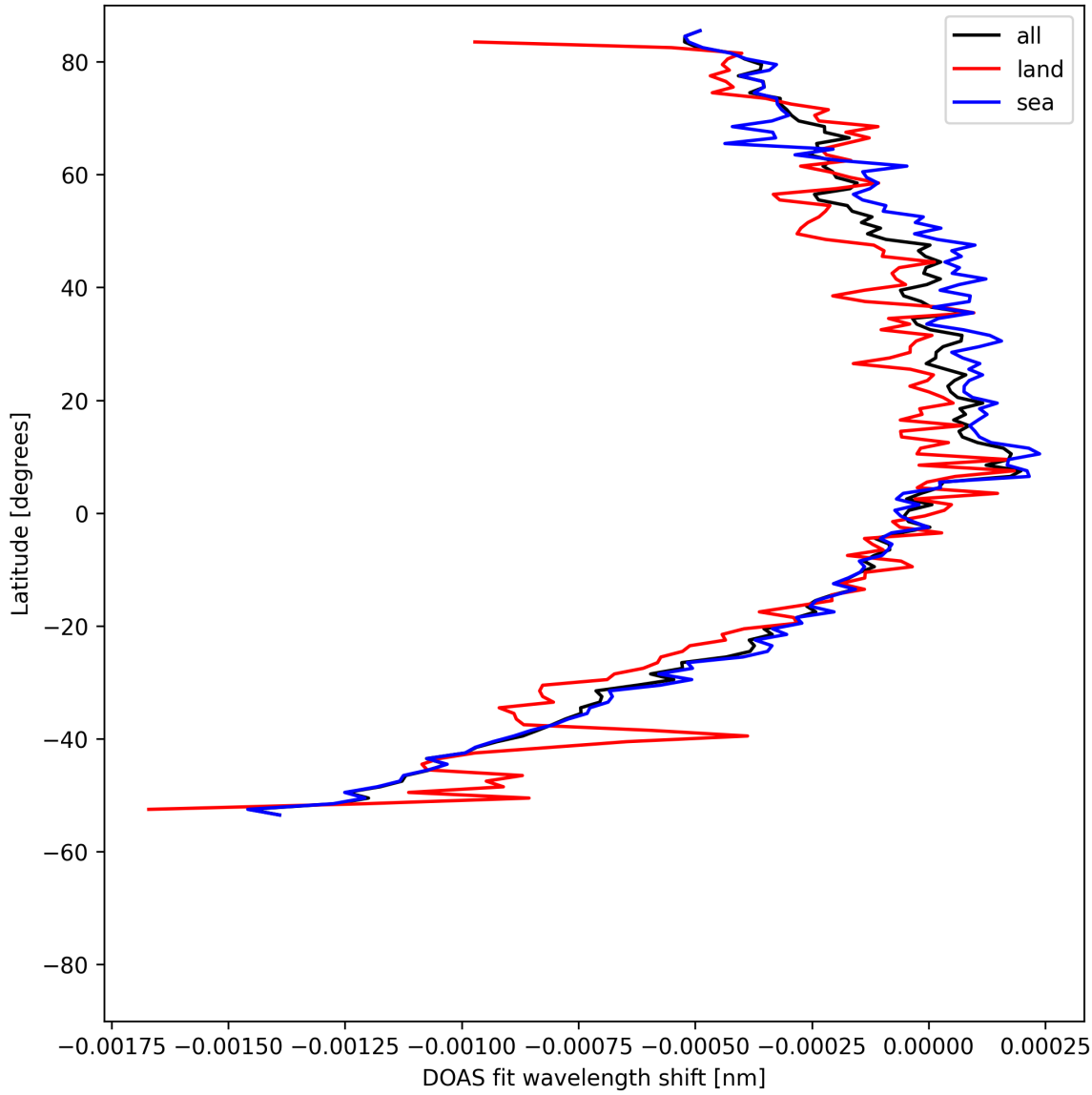

Figure 50: Zonal average of “DOAS fit wavelength shift” for 2025-05-02 to 2025-05-02.

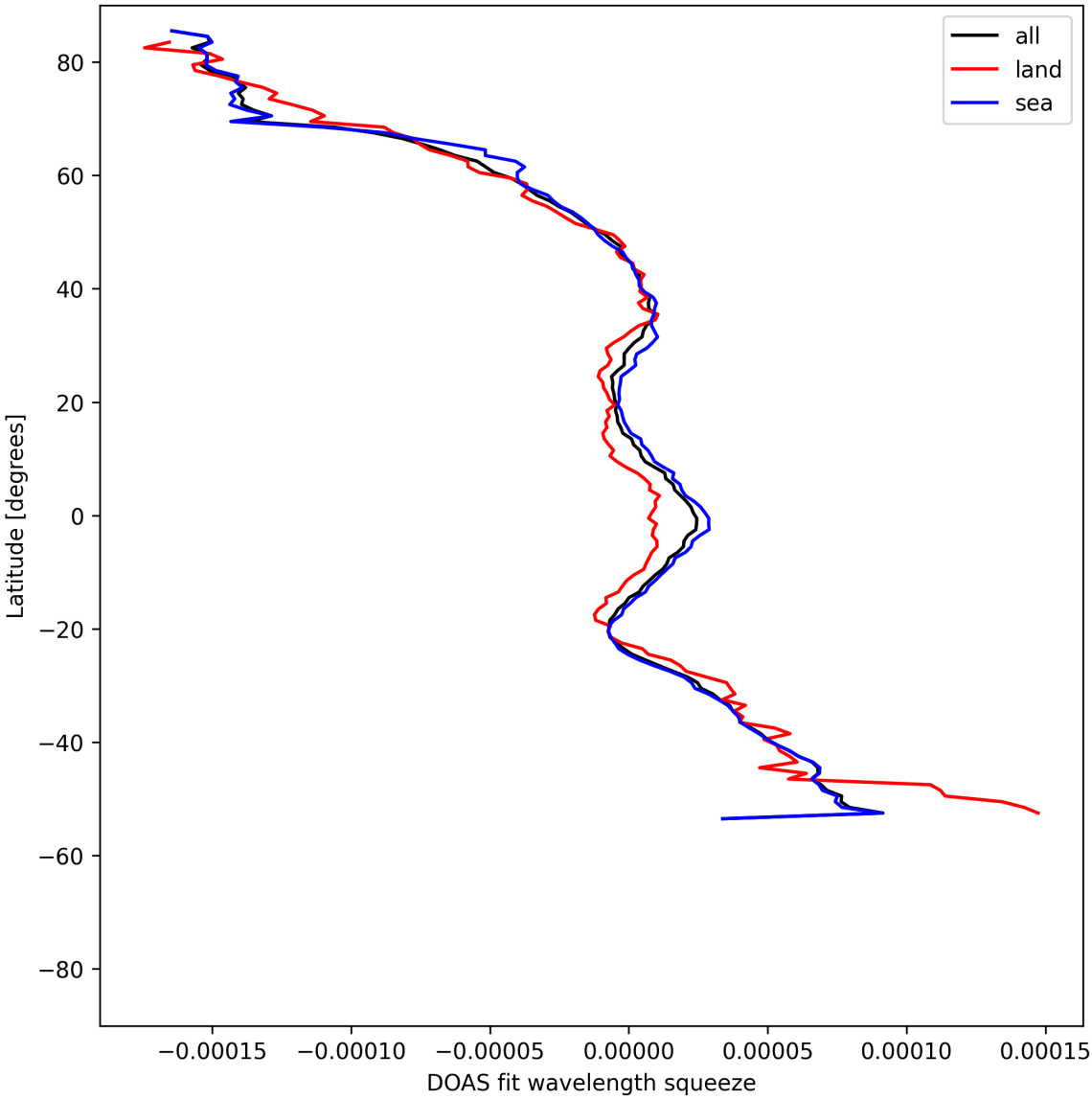

Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-05-02 to 2025-05-02.

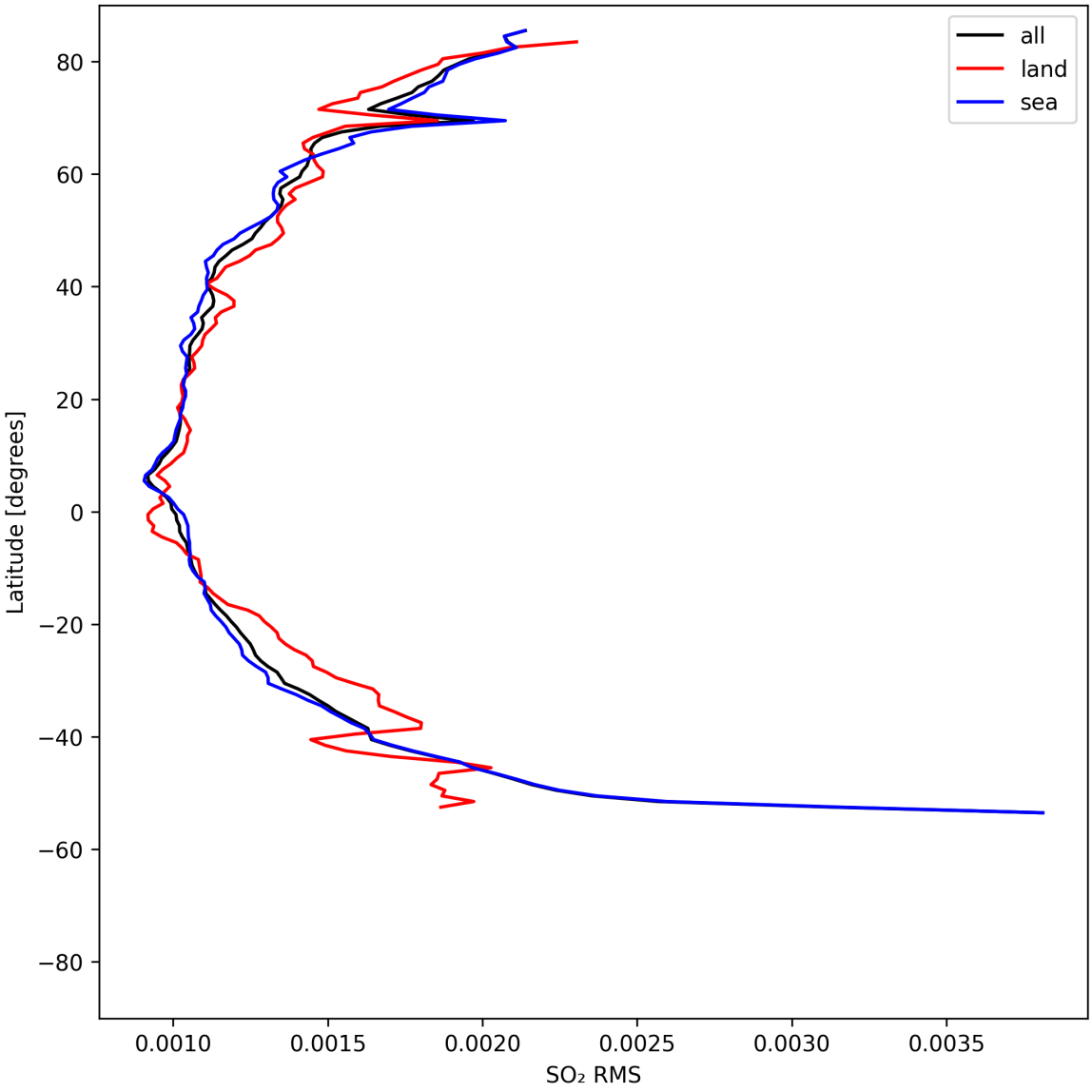

Figure 52: Zonal average of "SO_2 RMS" for 2025-05-02 to 2025-05-02.

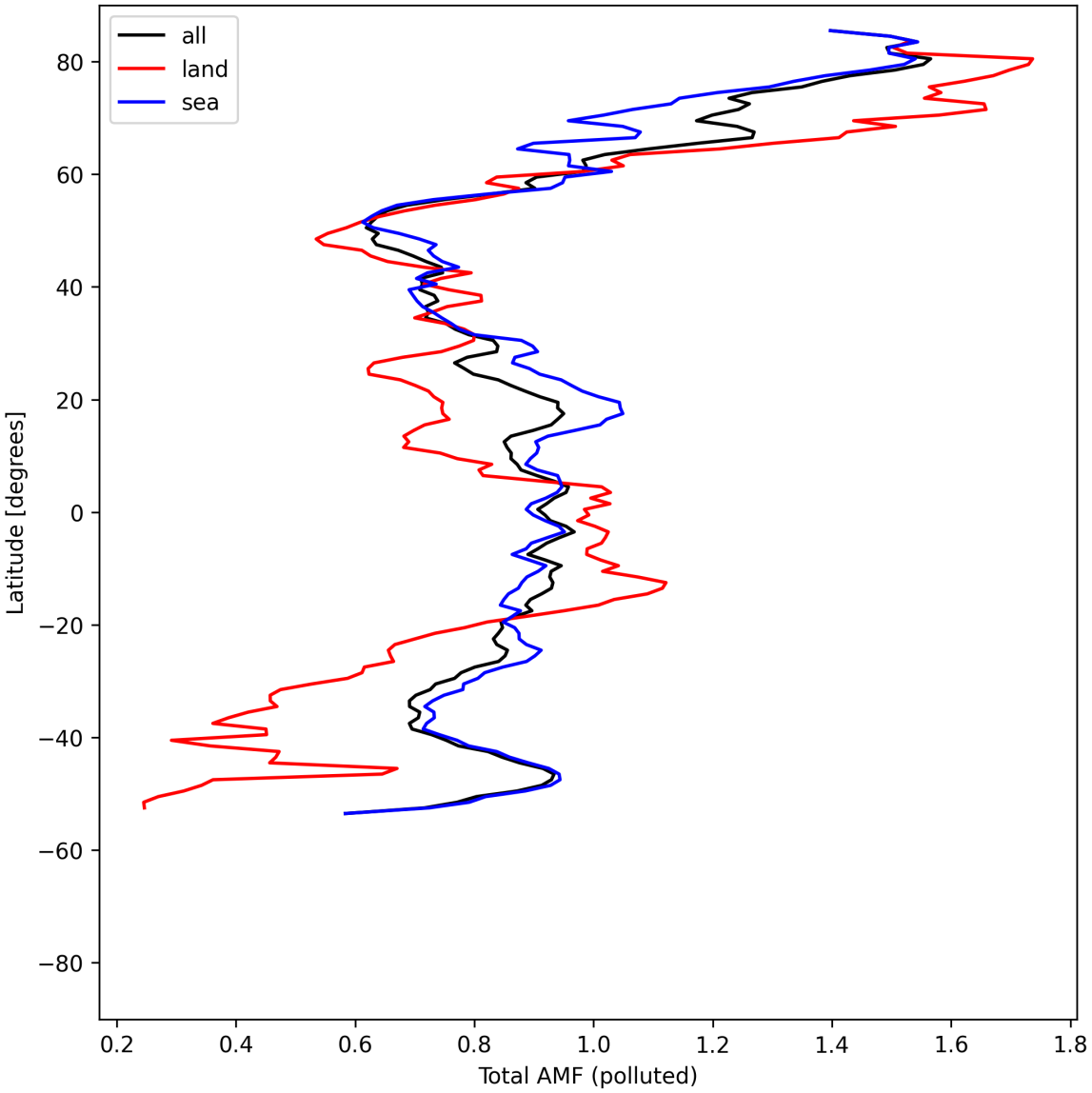

Figure 53: Zonal average of “Total AMF (polluted)” for 2025-05-02 to 2025-05-02.

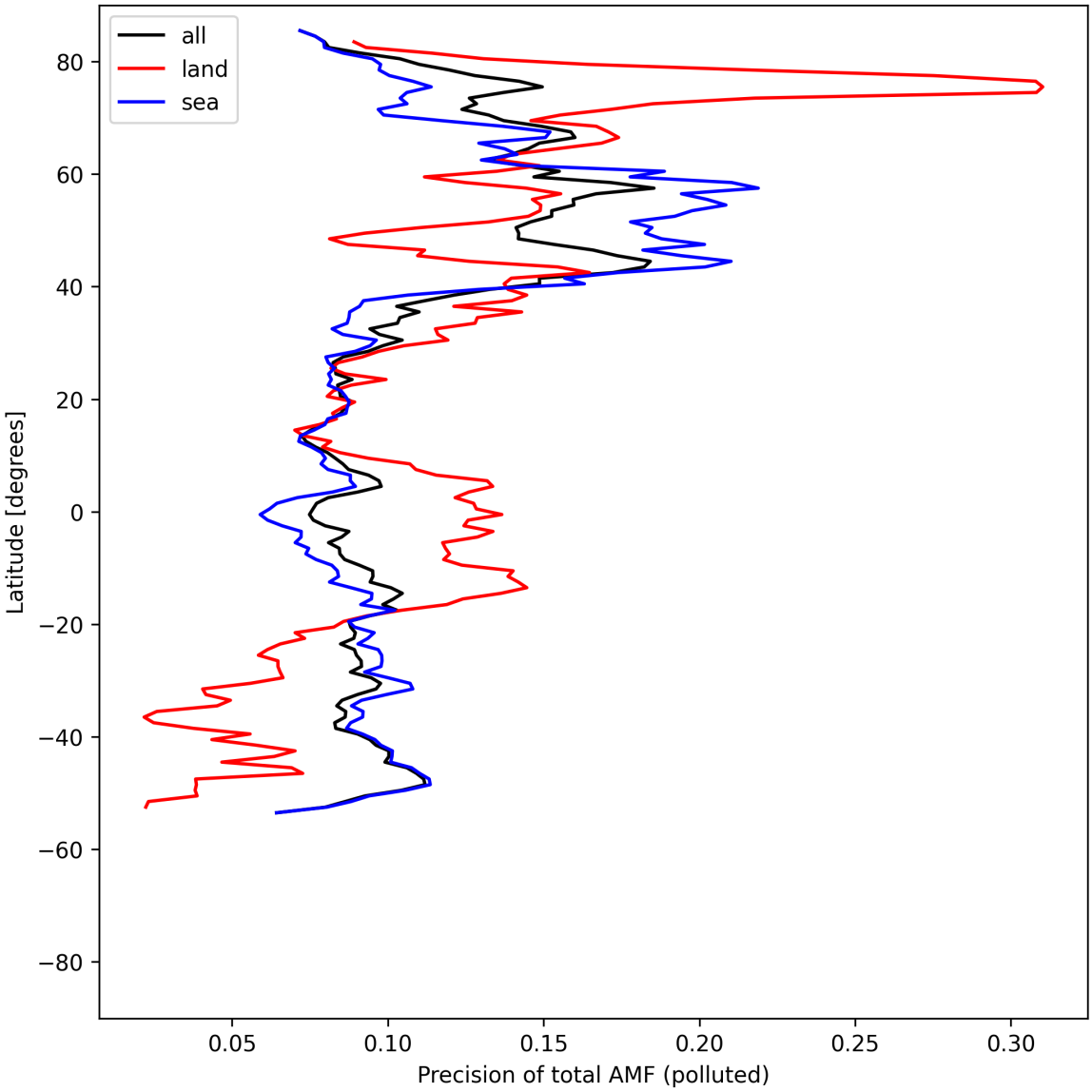

Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-05-02 to 2025-05-02.

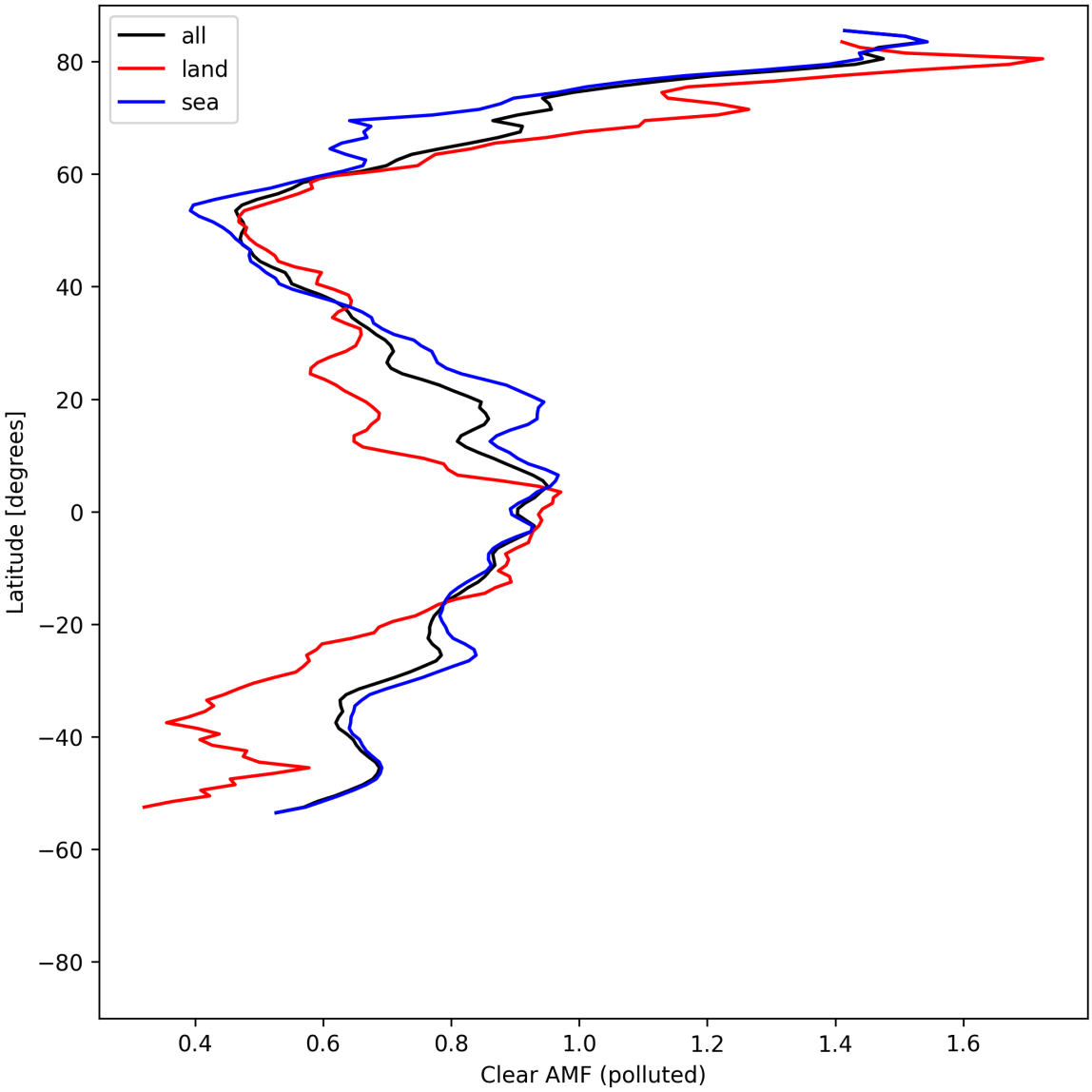

Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-05-02 to 2025-05-02.

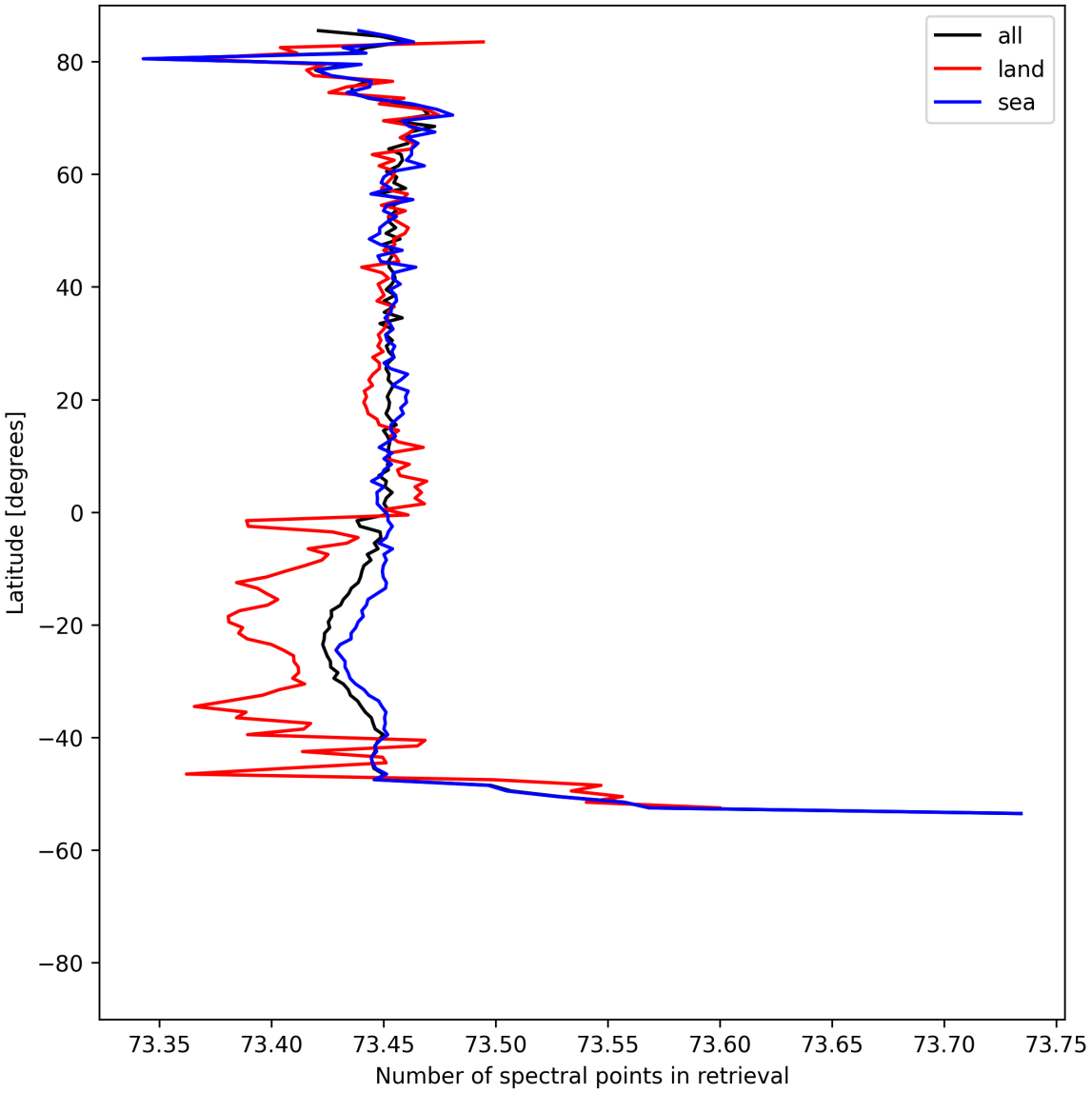

Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-05-02 to 2025-05-02.

8 Histograms

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

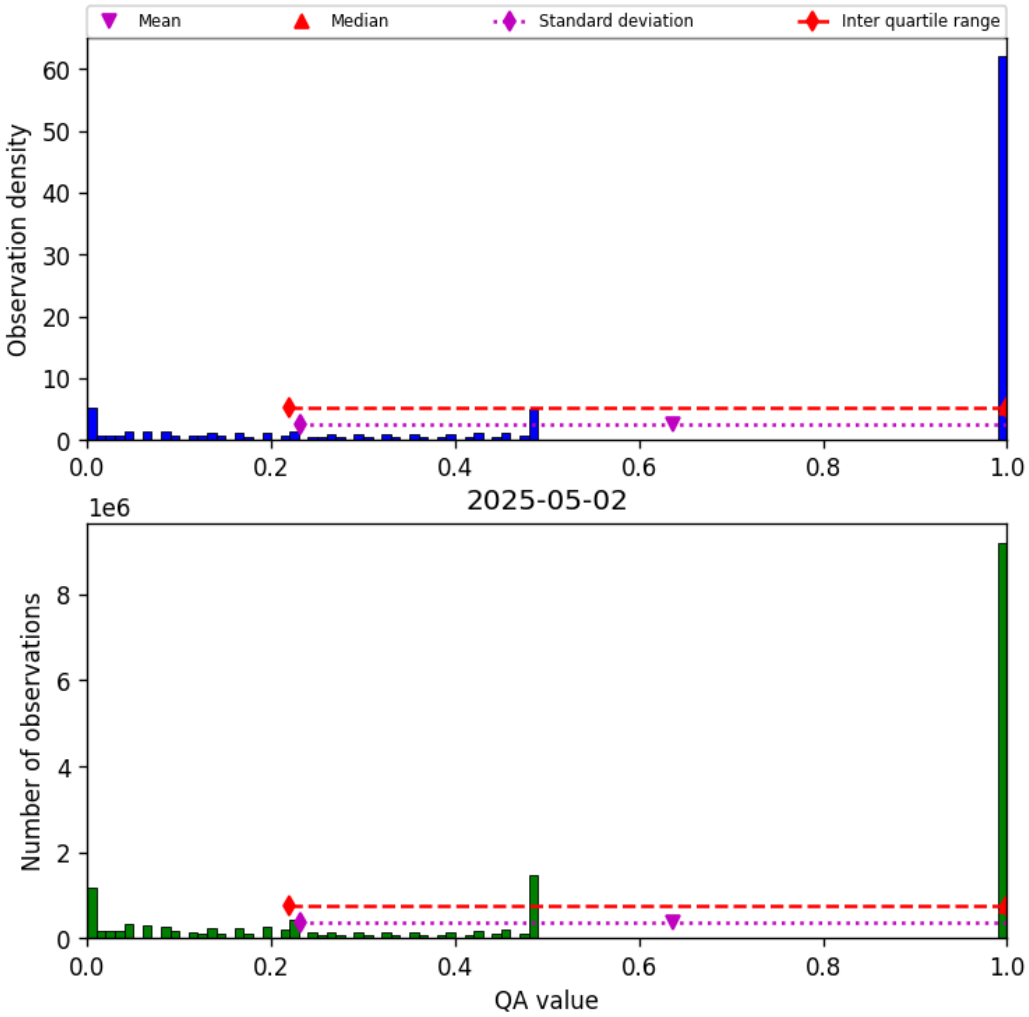

Figure 57: Histogram of “QA value” for 2025-05-02 to 2025-05-02

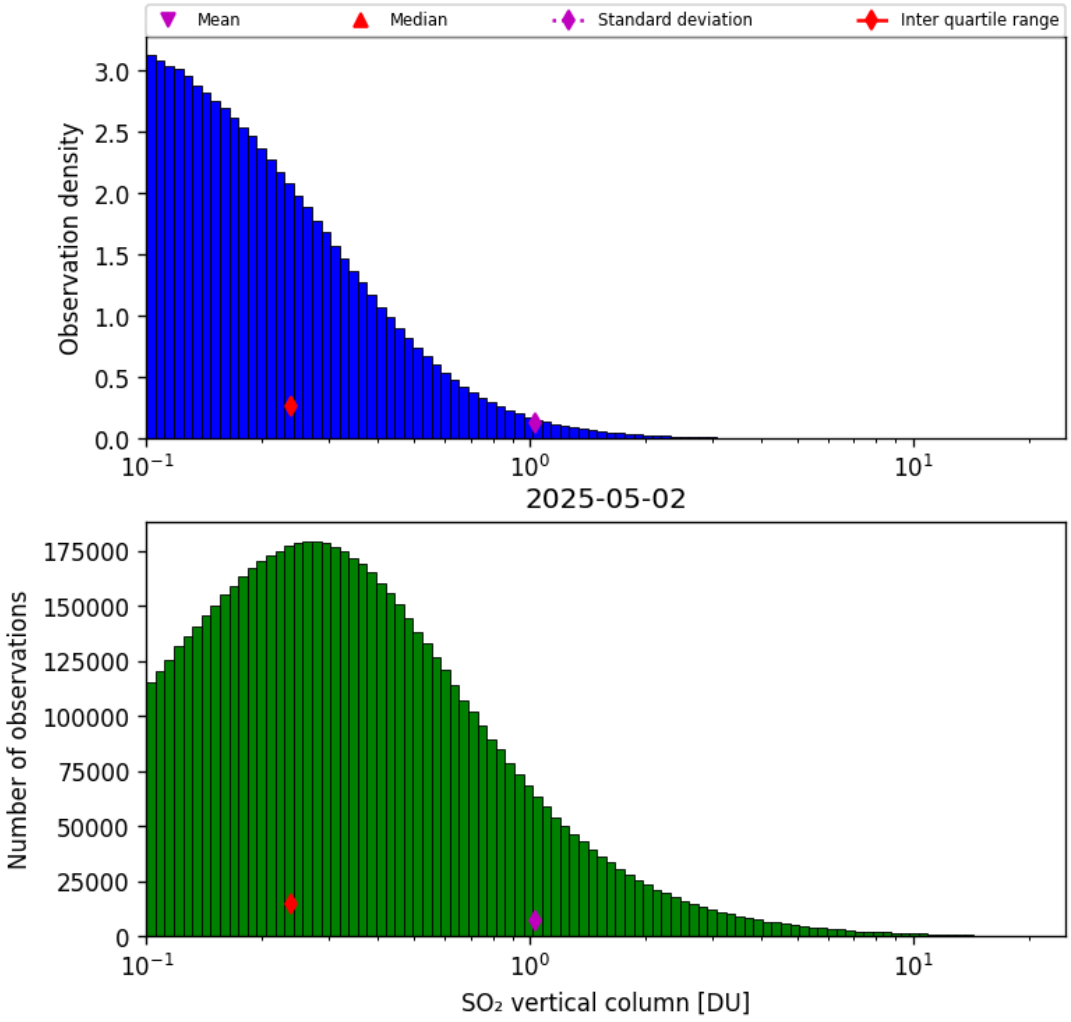

Figure 58: Histogram of "SO_2 vertical column" for 2025-05-02 to 2025-05-02

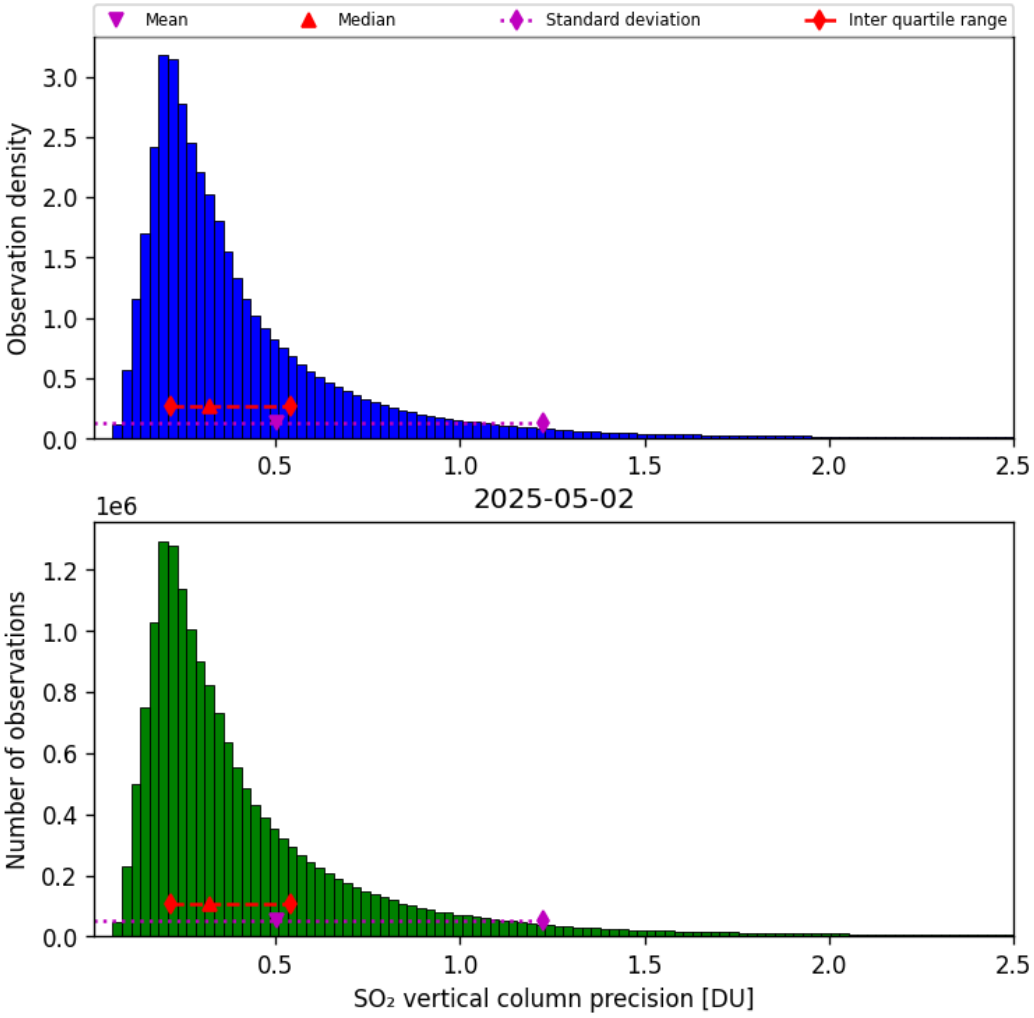

Figure 59: Histogram of "SO_2 vertical column precision" for 2025-05-02 to 2025-05-02

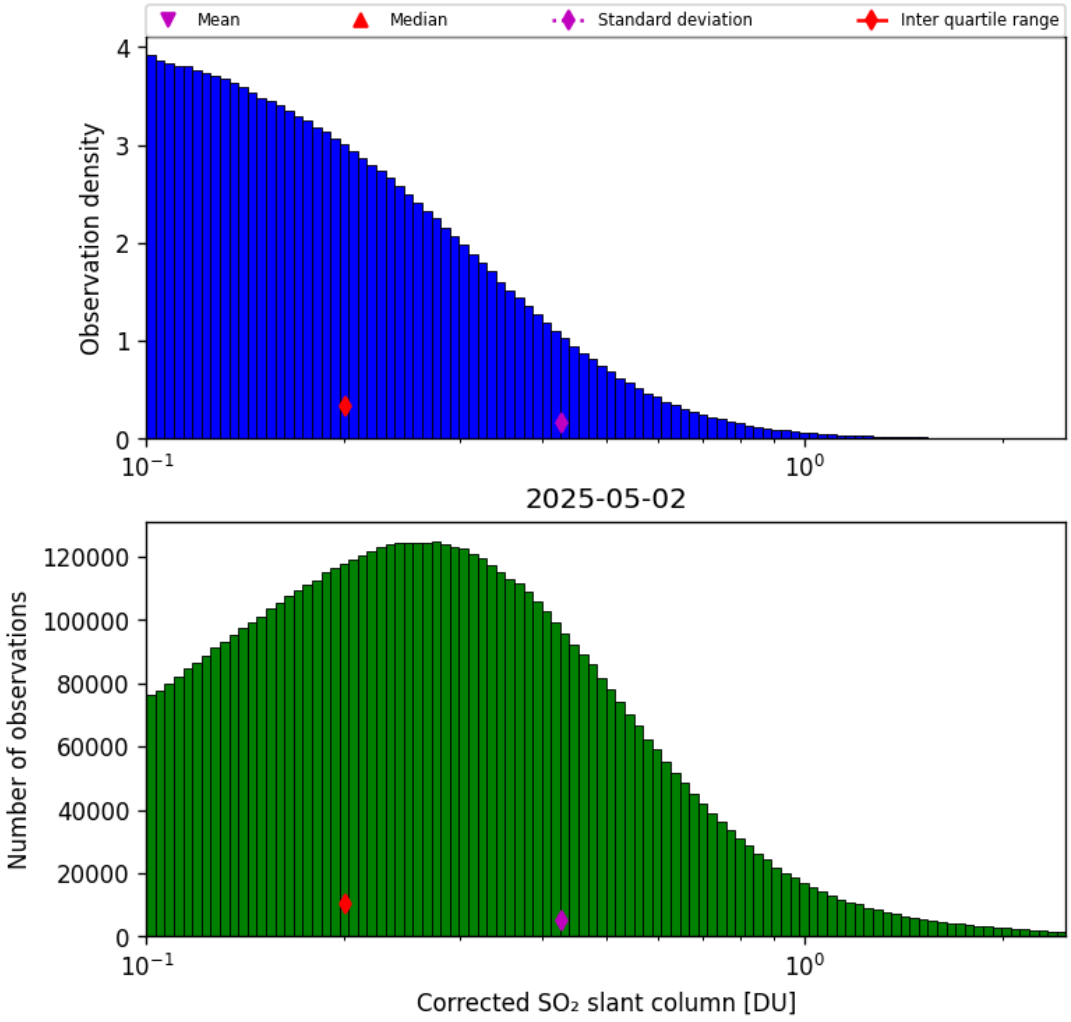

Figure 60: Histogram of "Corrected SO_2 slant column" for 2025-05-02 to 2025-05-02

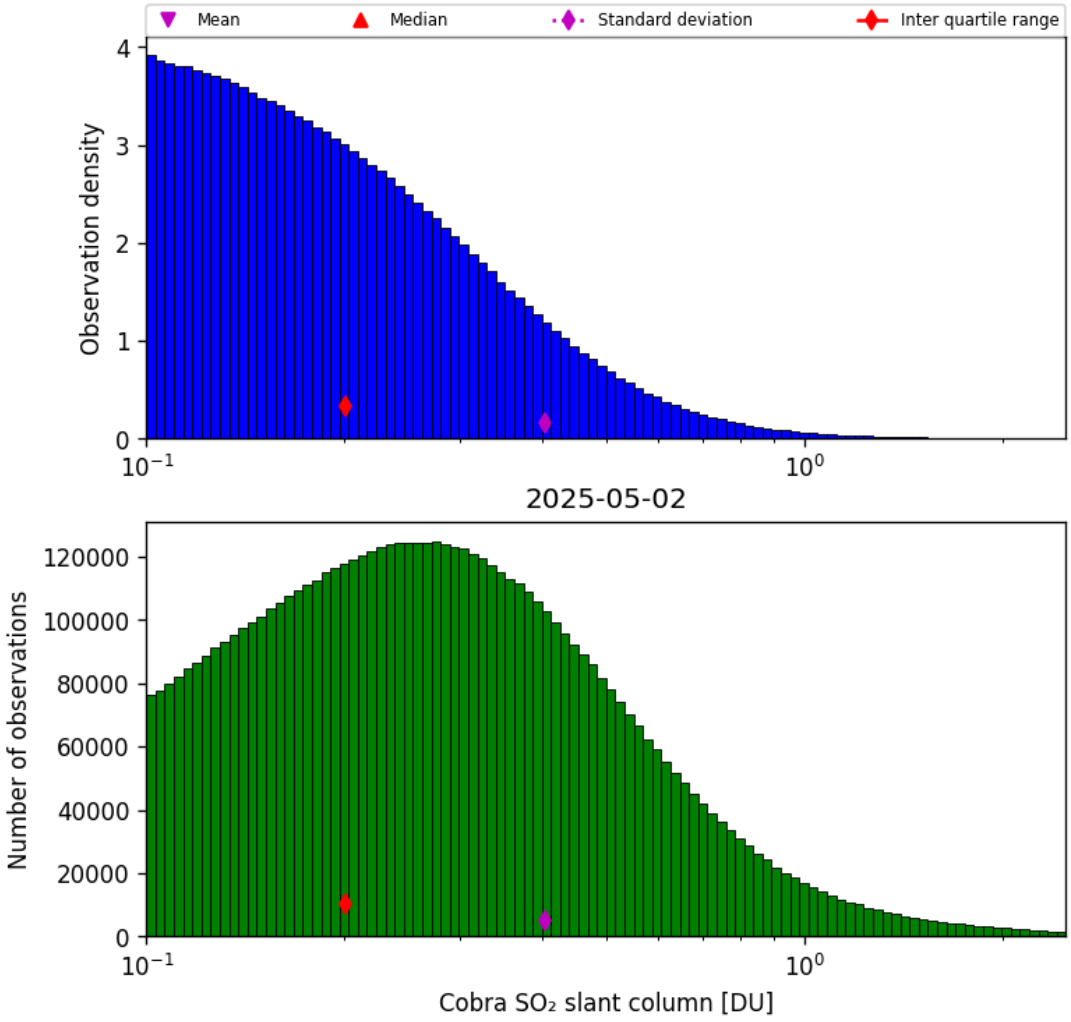

Figure 61: Histogram of "Cobra SO_2 slant column" for 2025-05-02 to 2025-05-02

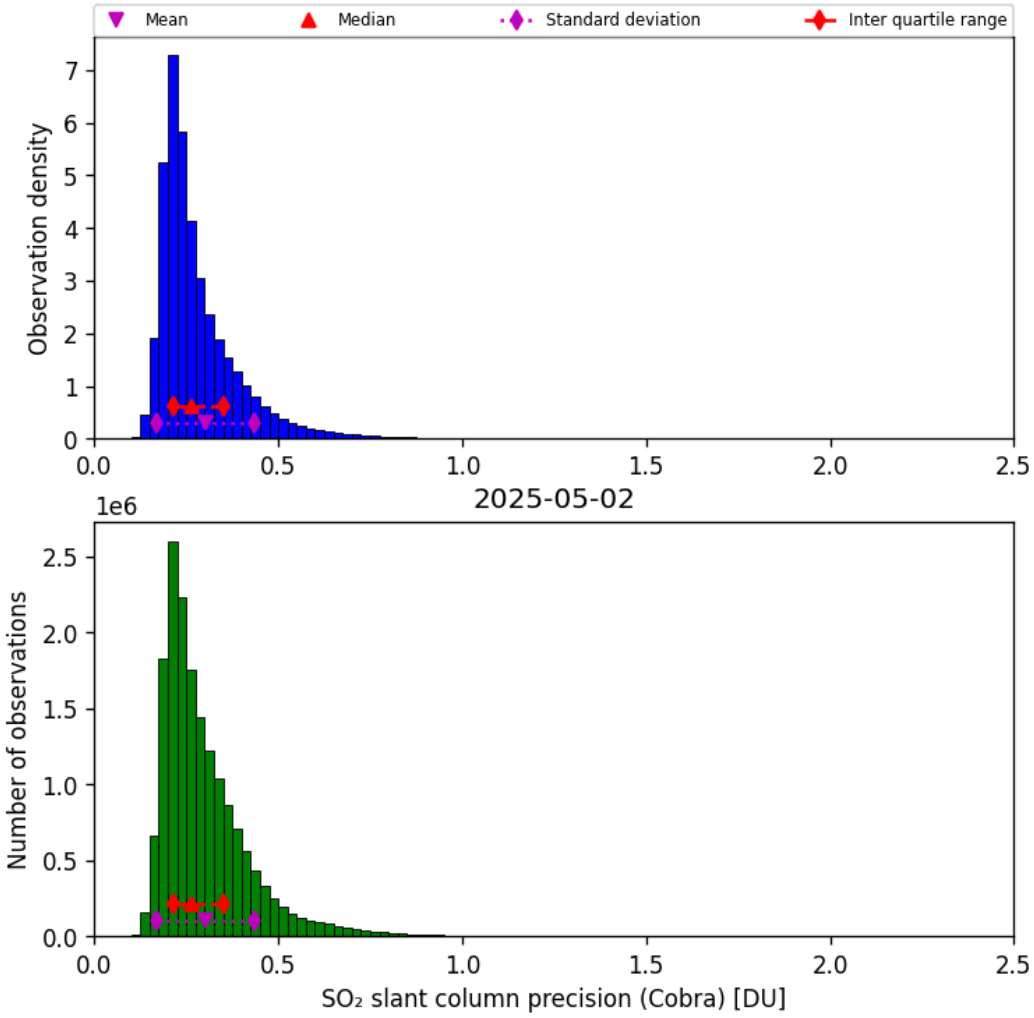

Figure 62: Histogram of "SO_2 slant column precision (Cobra)" for 2025-05-02 to 2025-05-02

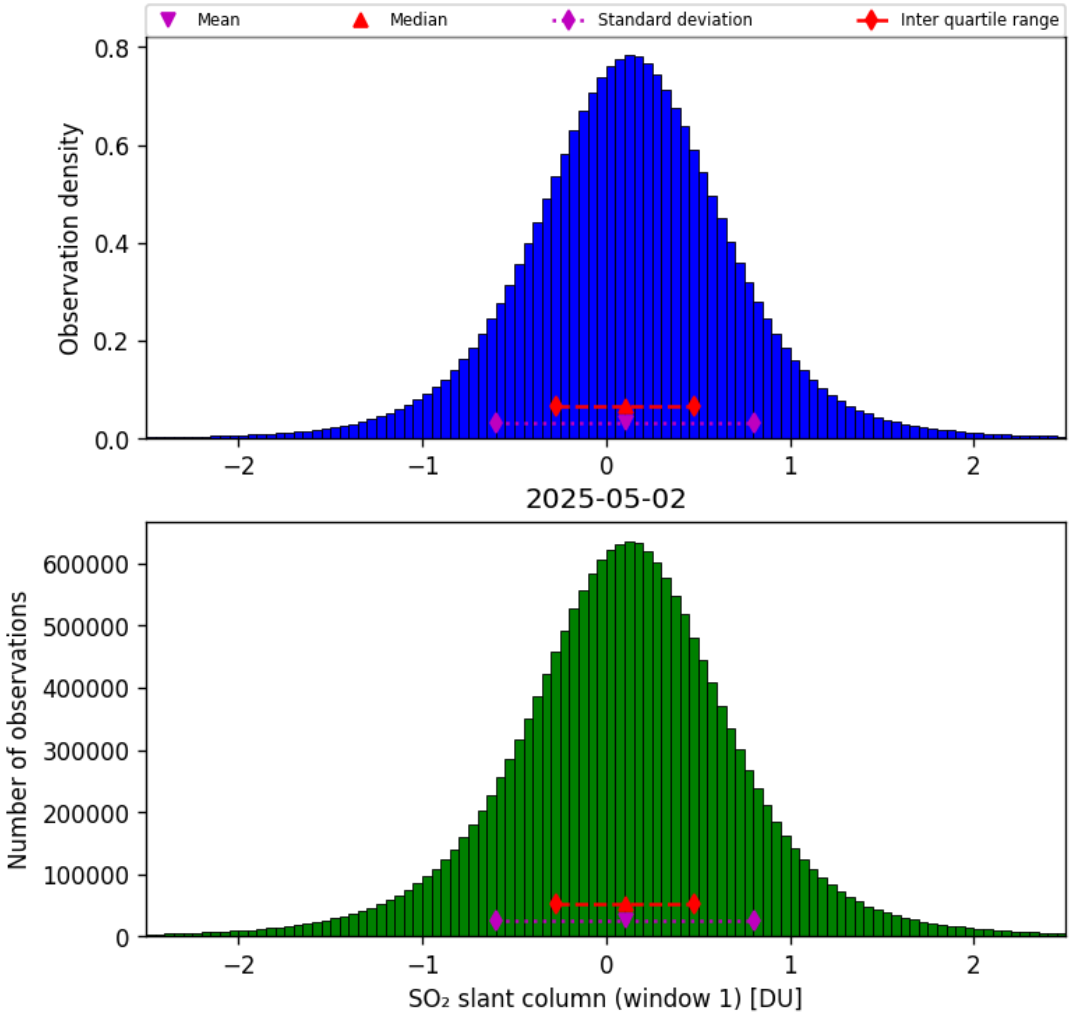

Figure 63: Histogram of "SO_2 slant column (window 1)" for 2025-05-02 to 2025-05-02

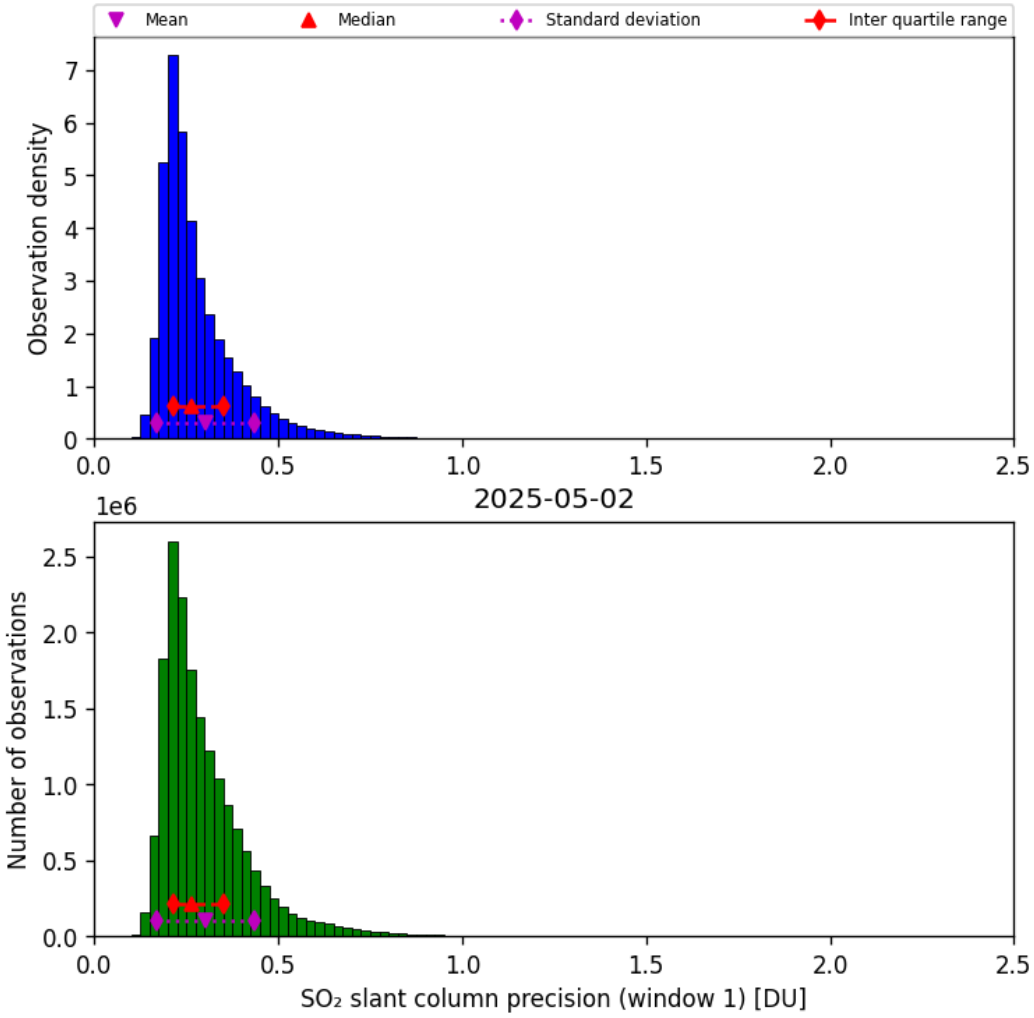

Figure 64: Histogram of "SO_2 slant column precision (window 1)" for 2025-05-02 to 2025-05-02

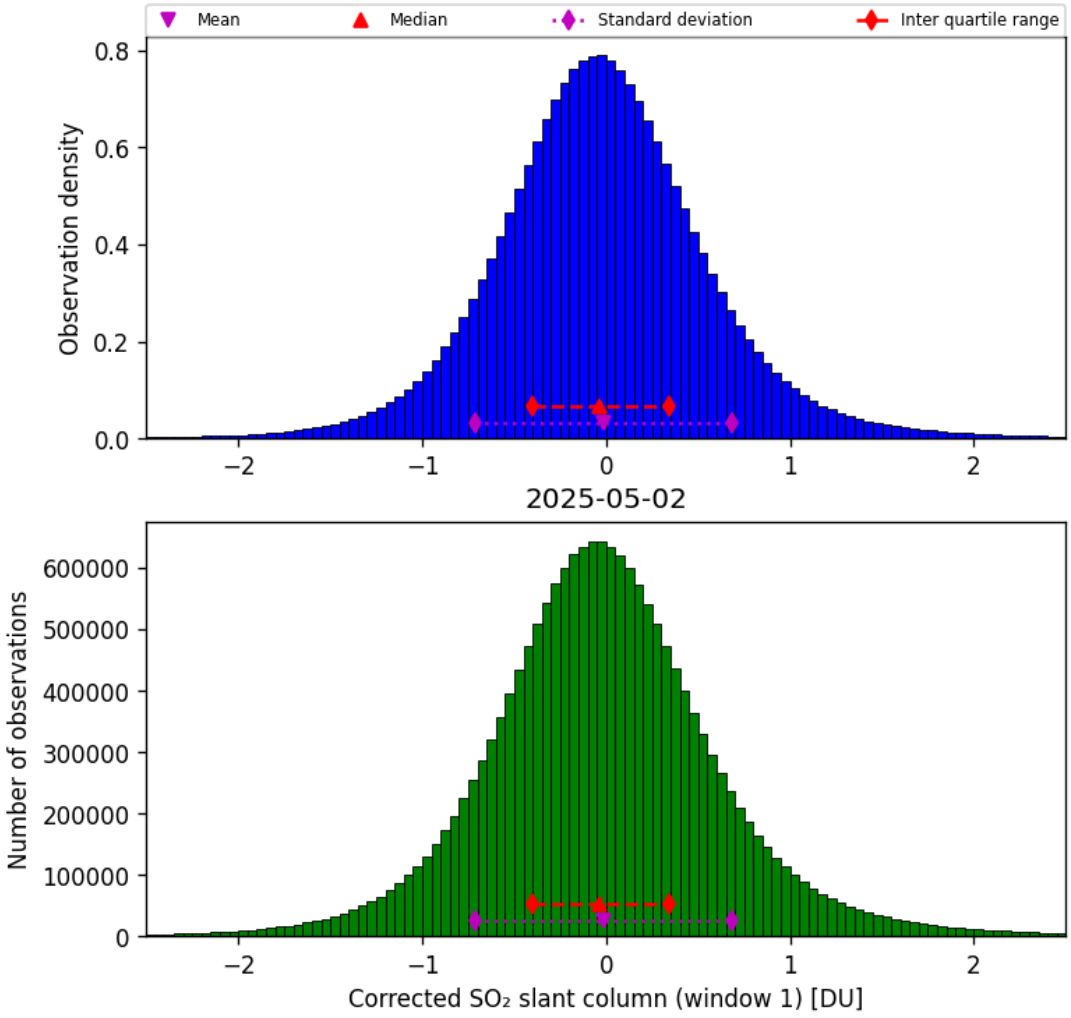

Figure 65: Histogram of "Corrected SO_2 slant column (window 1)" for 2025-05-02 to 2025-05-02

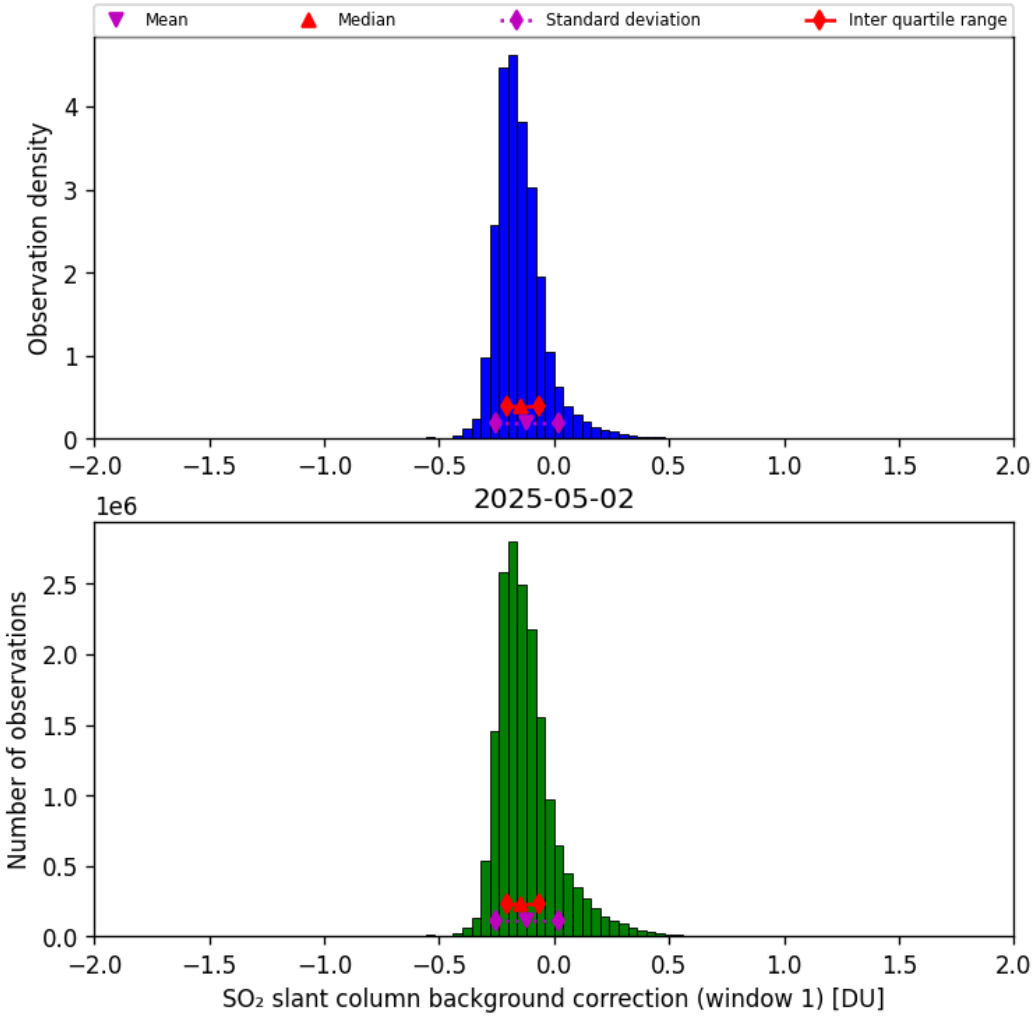

Figure 66: Histogram of "SO_2 slant column background correction (window 1)" for 2025-05-02 to 2025-05-02

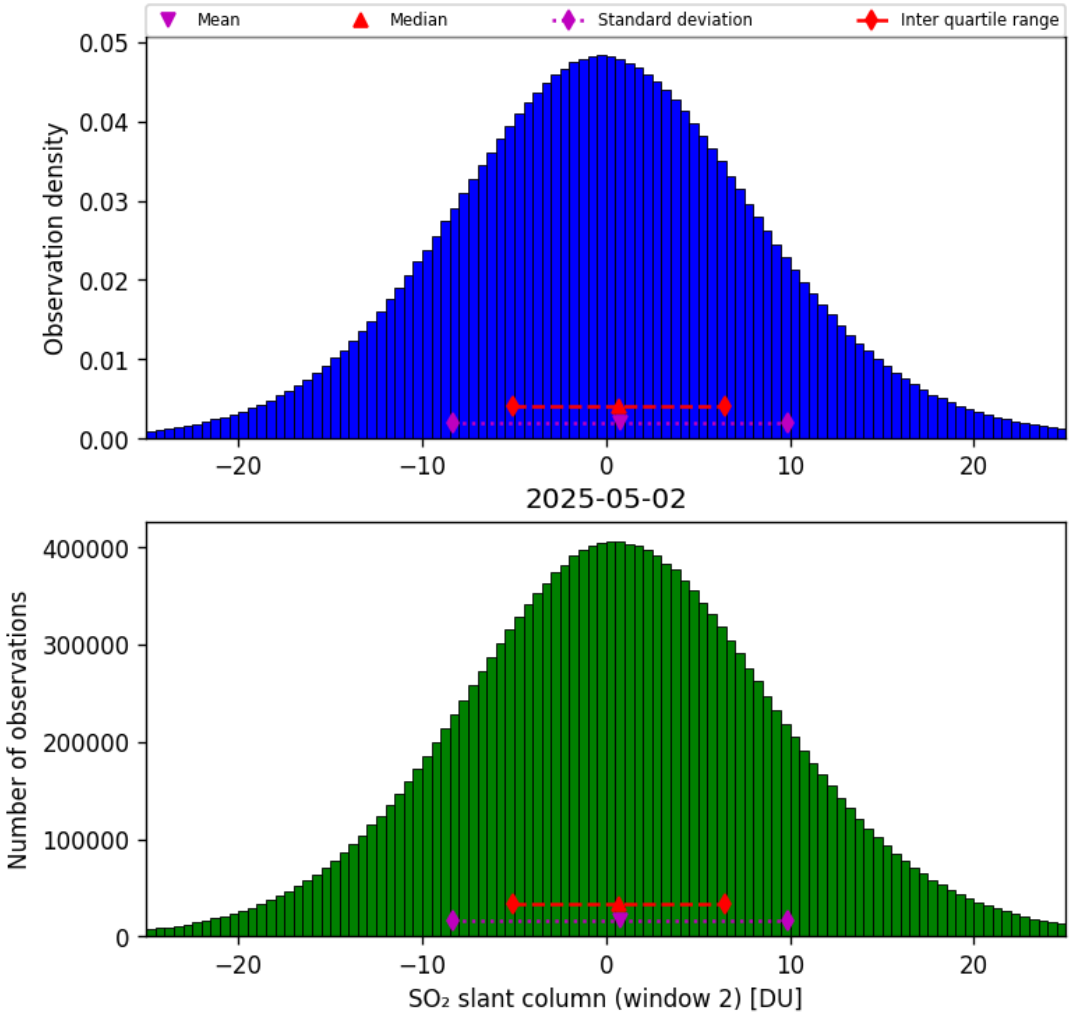

Figure 67: Histogram of "SO_2 slant column (window 2)" for 2025-05-02 to 2025-05-02

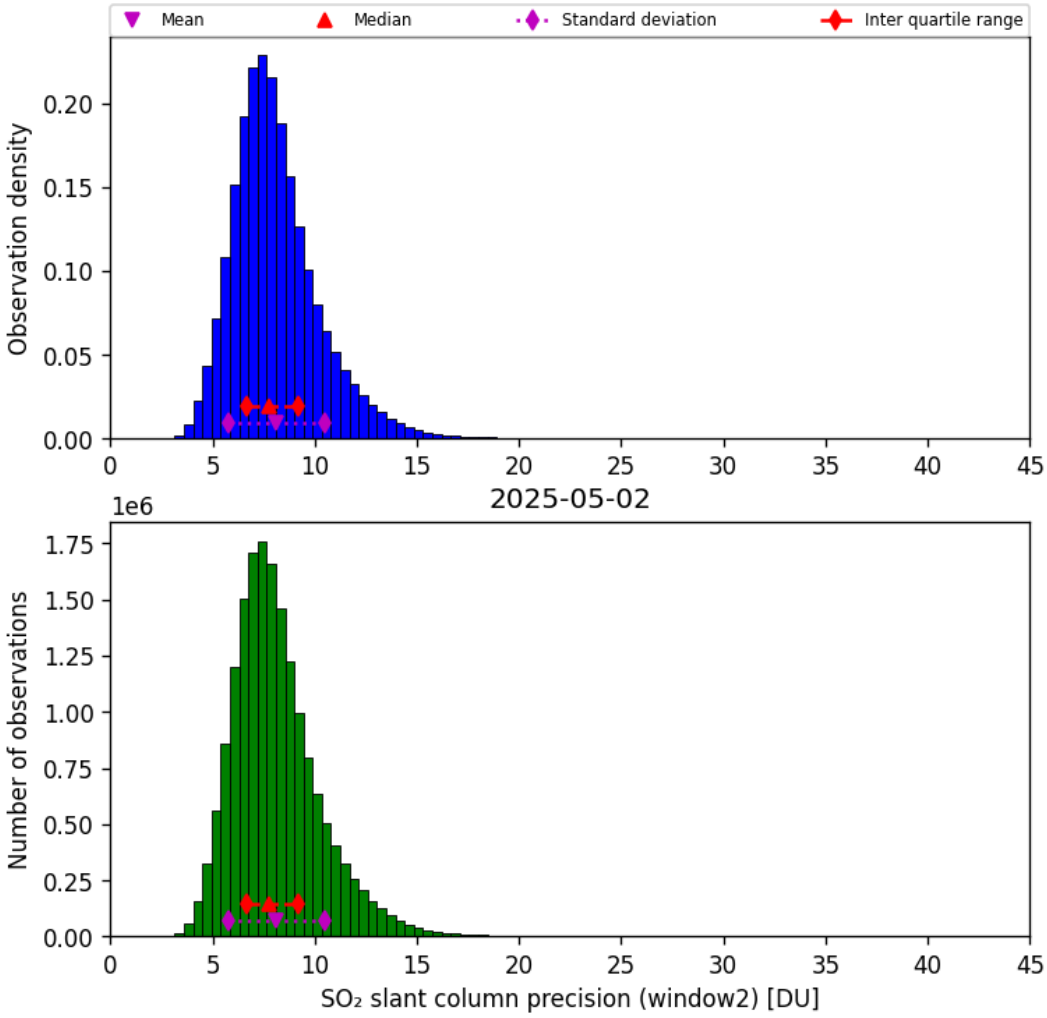

Figure 68: Histogram of "SO_2 slant column precision (window2)" for 2025-05-02 to 2025-05-02

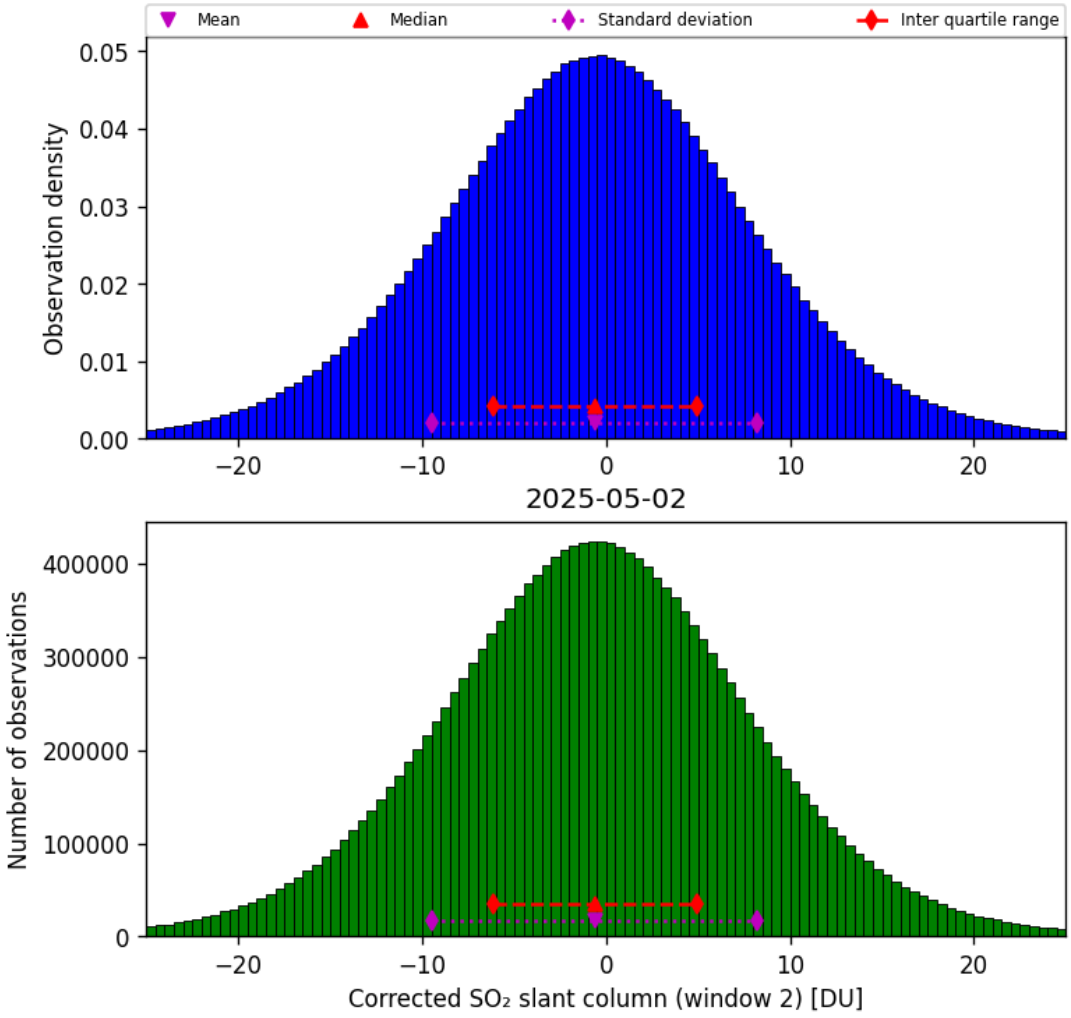

Figure 69: Histogram of "Corrected SO_2 slant column (window 2)" for 2025-05-02 to 2025-05-02

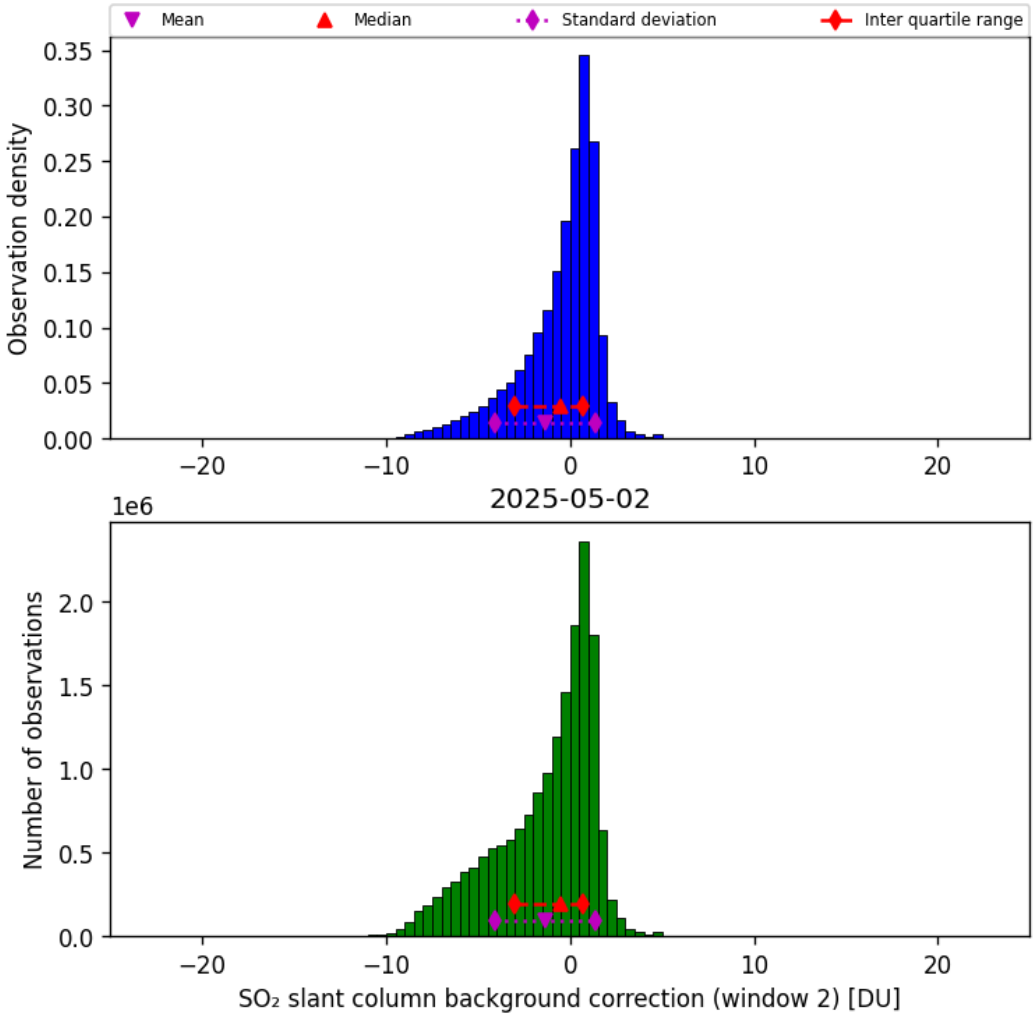

Figure 70: Histogram of "SO_2 slant column background correction (window 2)" for 2025-05-02 to 2025-05-02

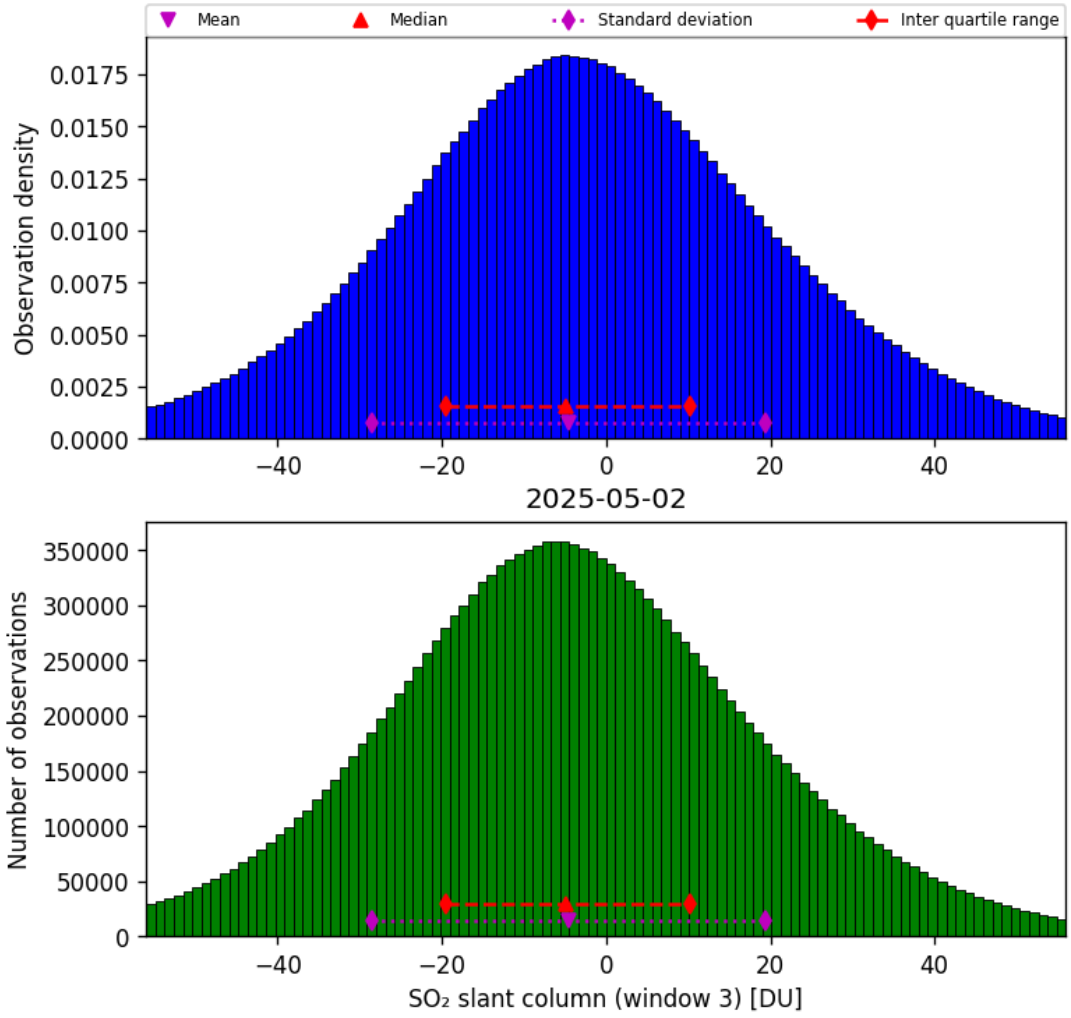

Figure 71: Histogram of "SO_2 slant column (window 3)" for 2025-05-02 to 2025-05-02

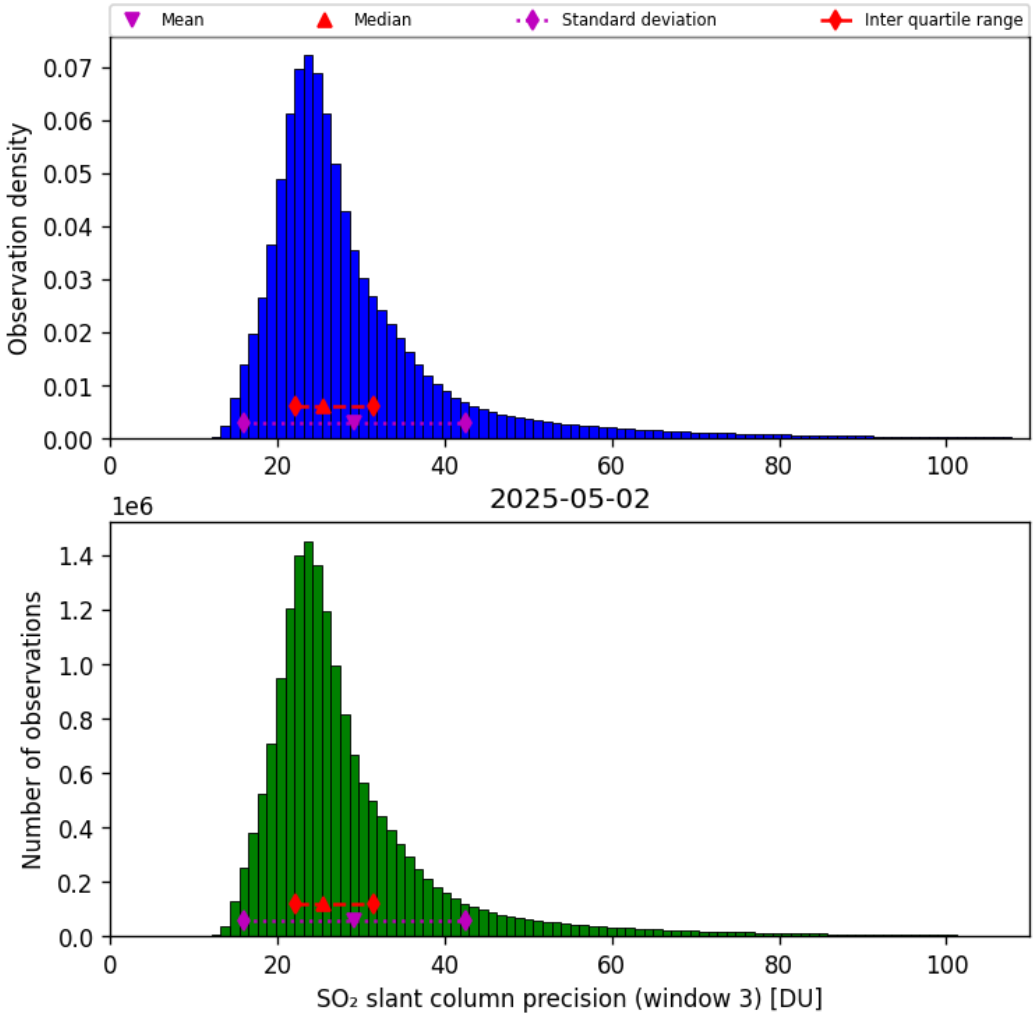

Figure 72: Histogram of "SO_2 slant column precision (window 3)" for 2025-05-02 to 2025-05-02

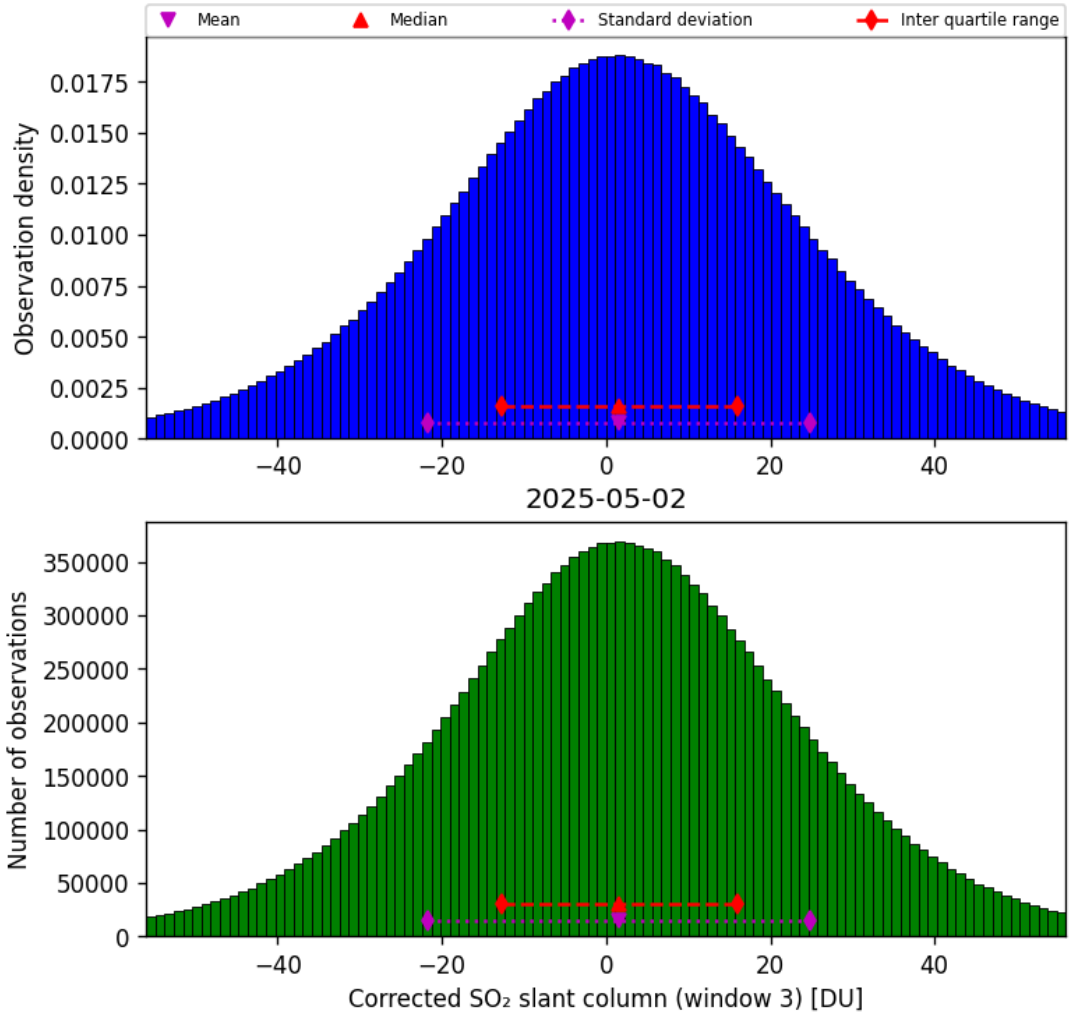

Figure 73: Histogram of "Corrected SO_2 slant column (window 3)" for 2025-05-02 to 2025-05-02

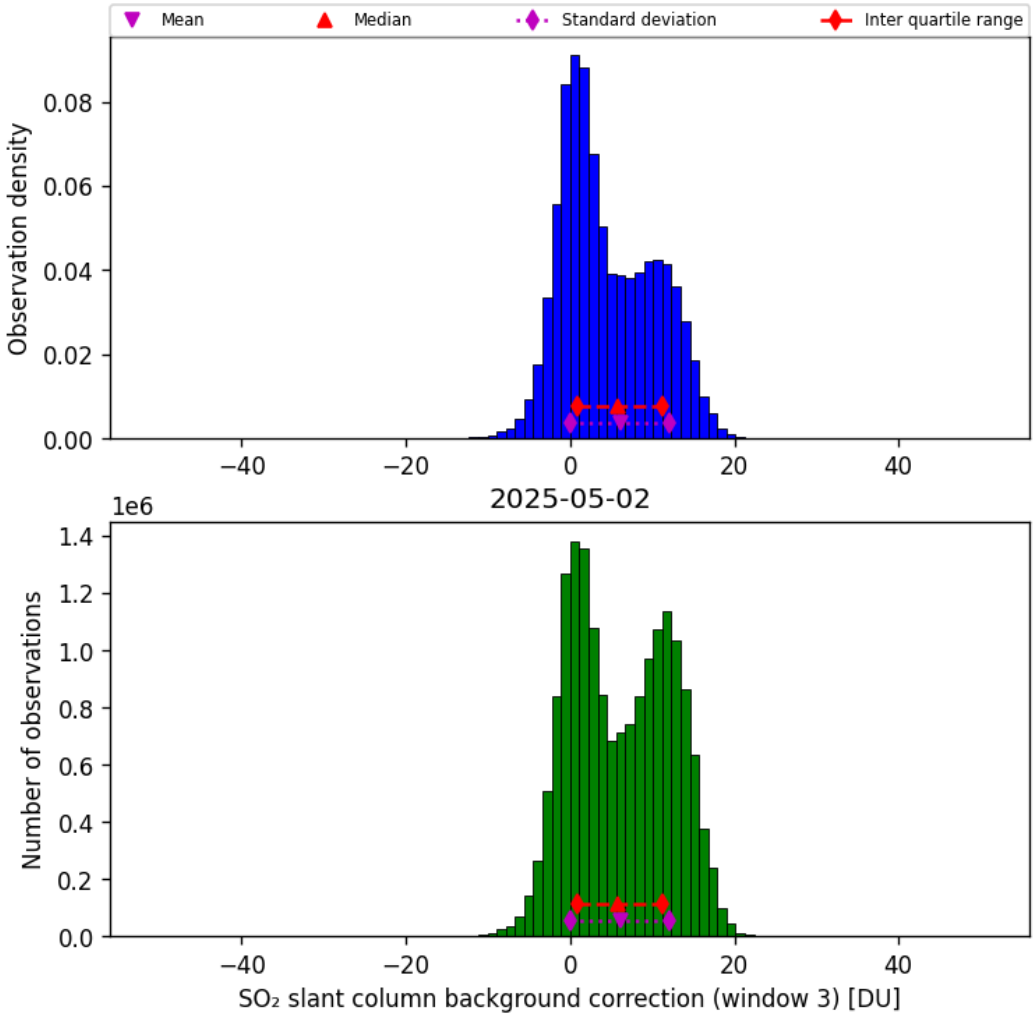

Figure 74: Histogram of "SO_2 slant column background correction (window 3)" for 2025-05-02 to 2025-05-02

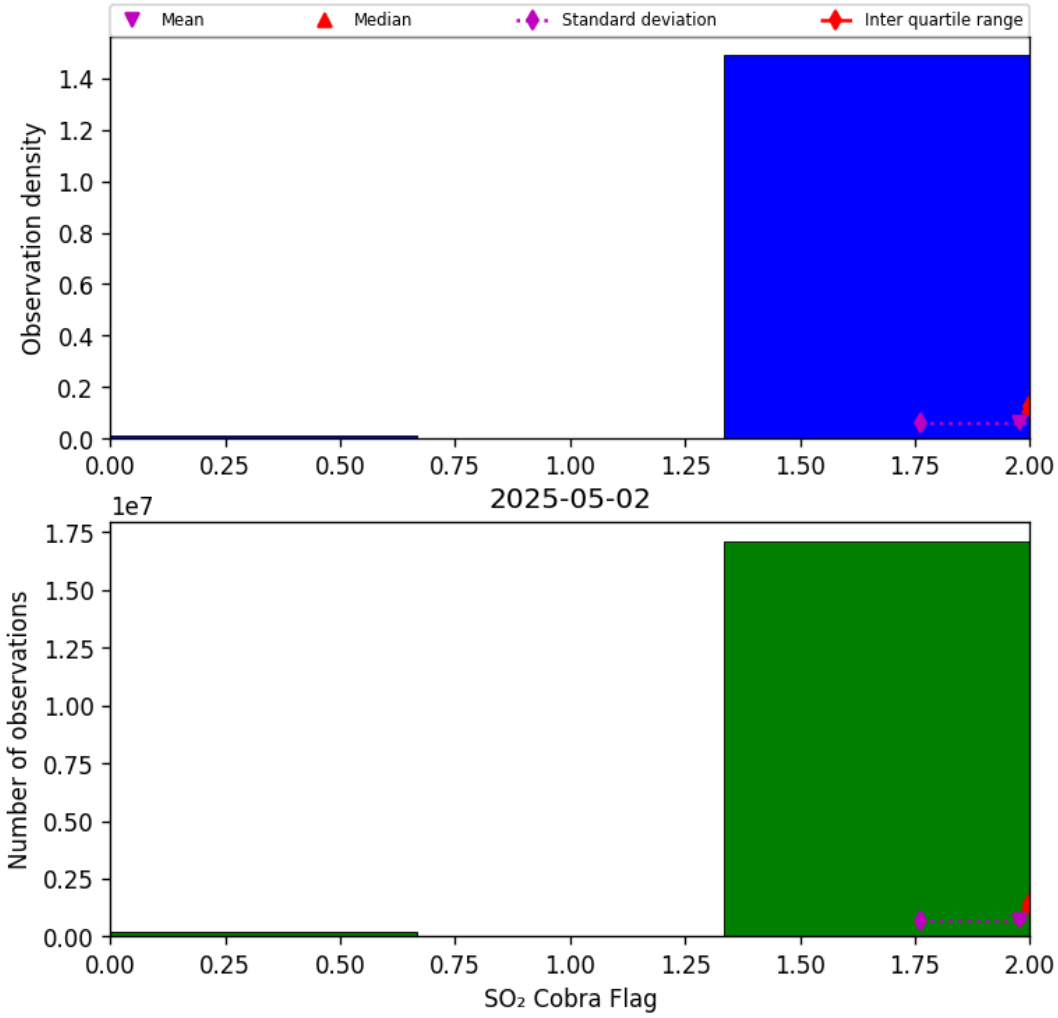

Figure 75: Histogram of "SO_2 Cobra Flag" for 2025-05-02 to 2025-05-02

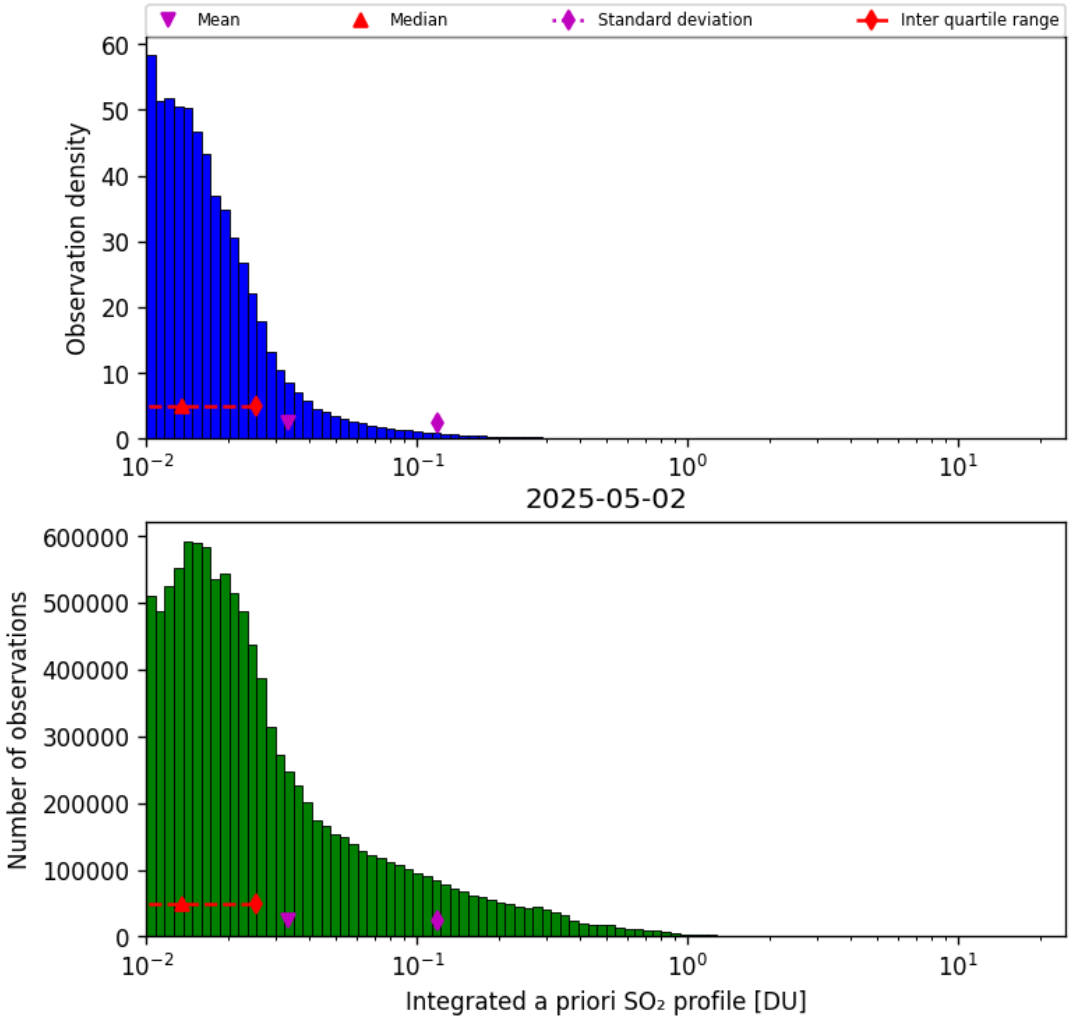

Figure 76: Histogram of “Integrated a priori SO_2 profile” for 2025-05-02 to 2025-05-02

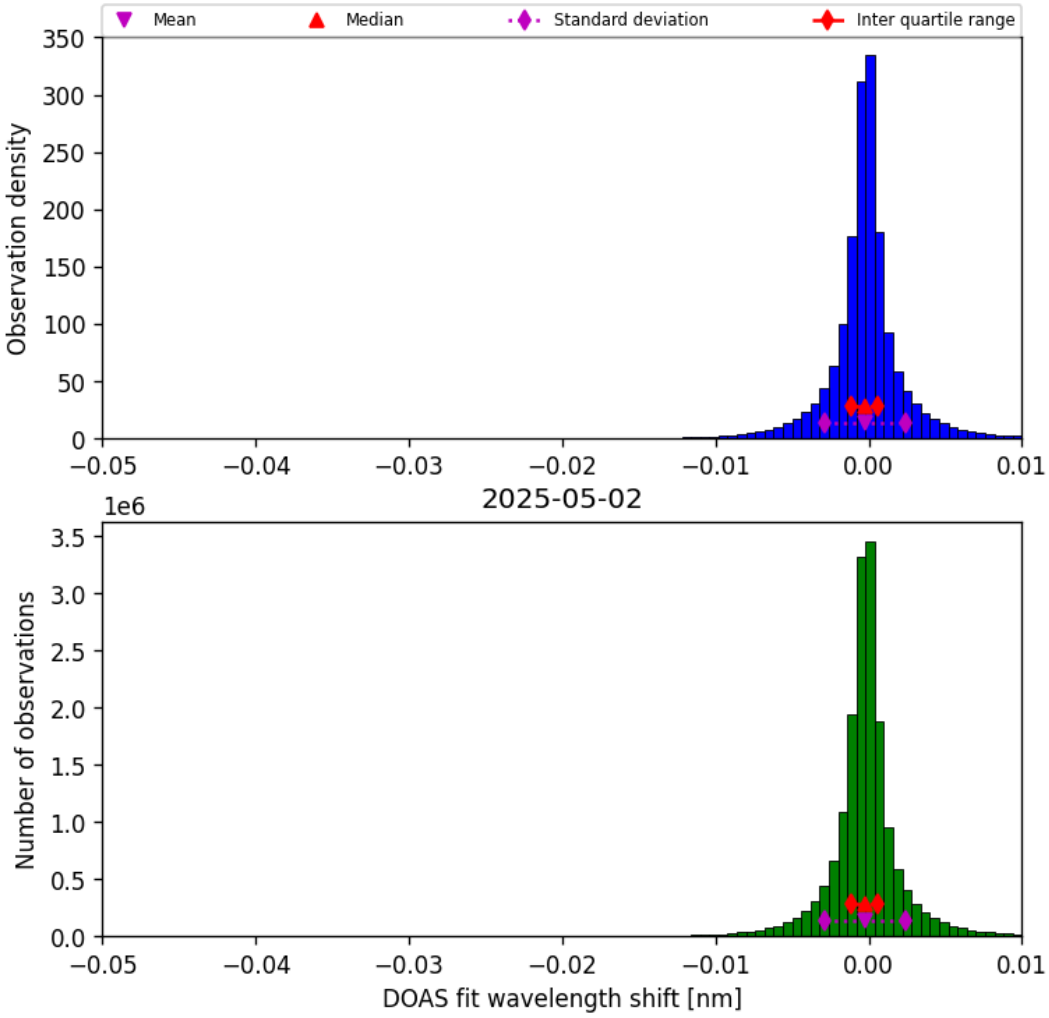

Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-05-02 to 2025-05-02

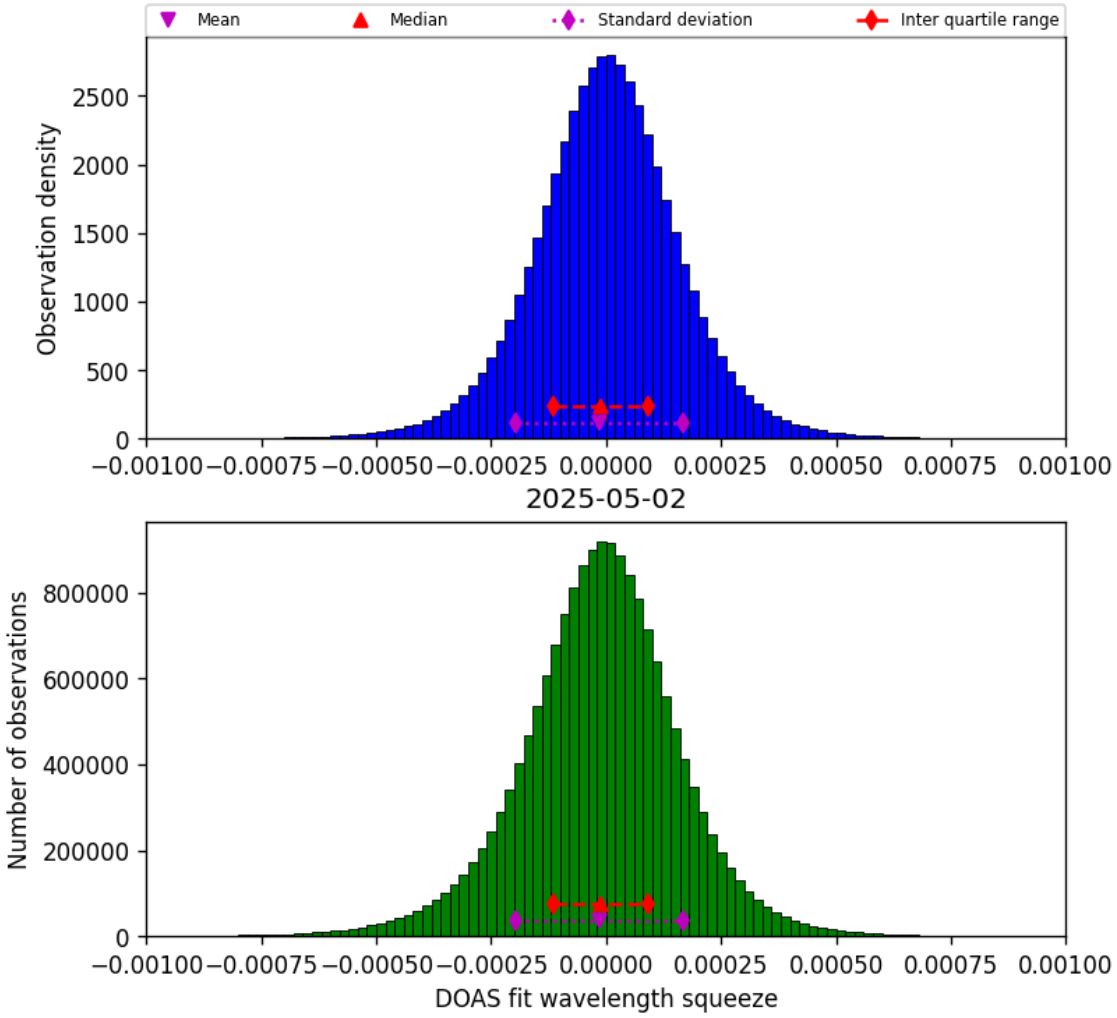

Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-05-02 to 2025-05-02

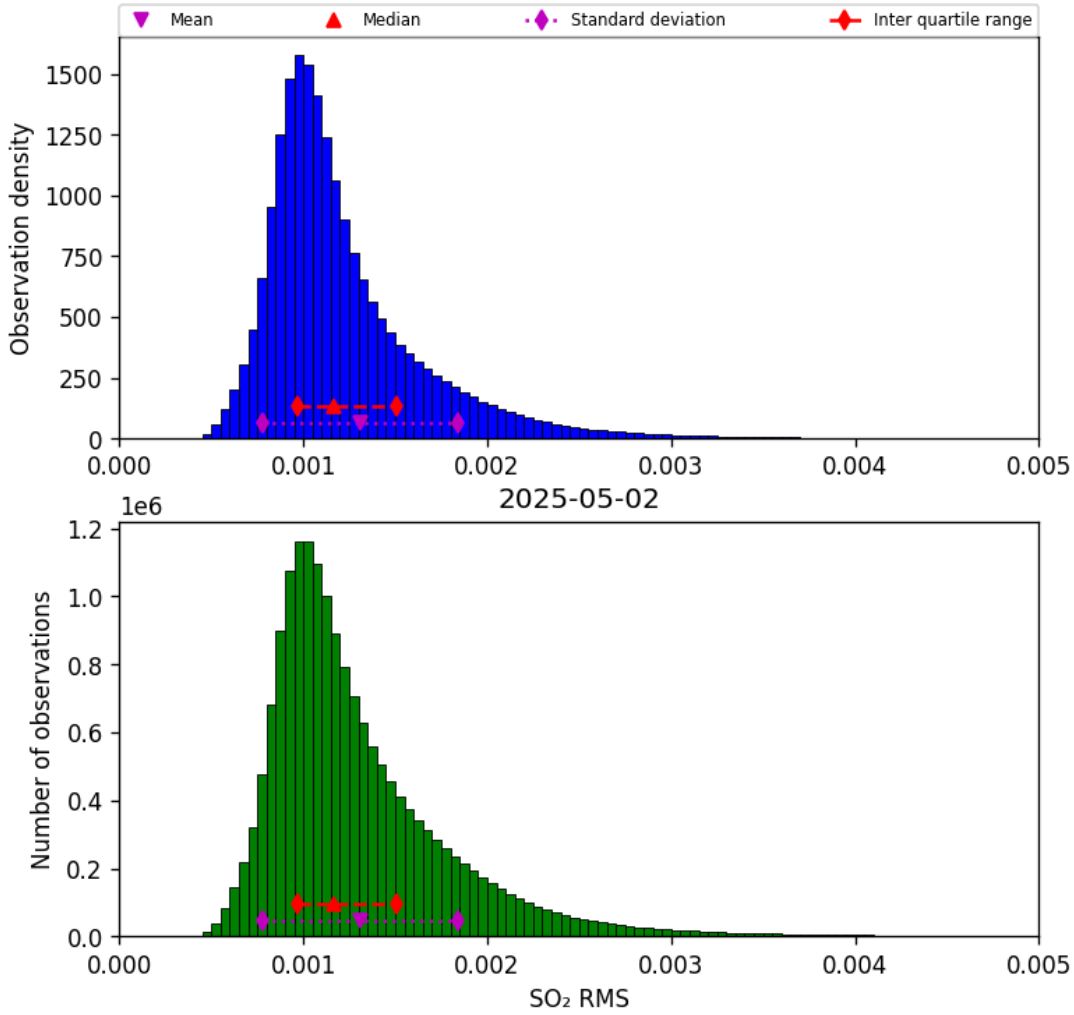

Figure 79: Histogram of "SO_2 RMS" for 2025-05-02 to 2025-05-02

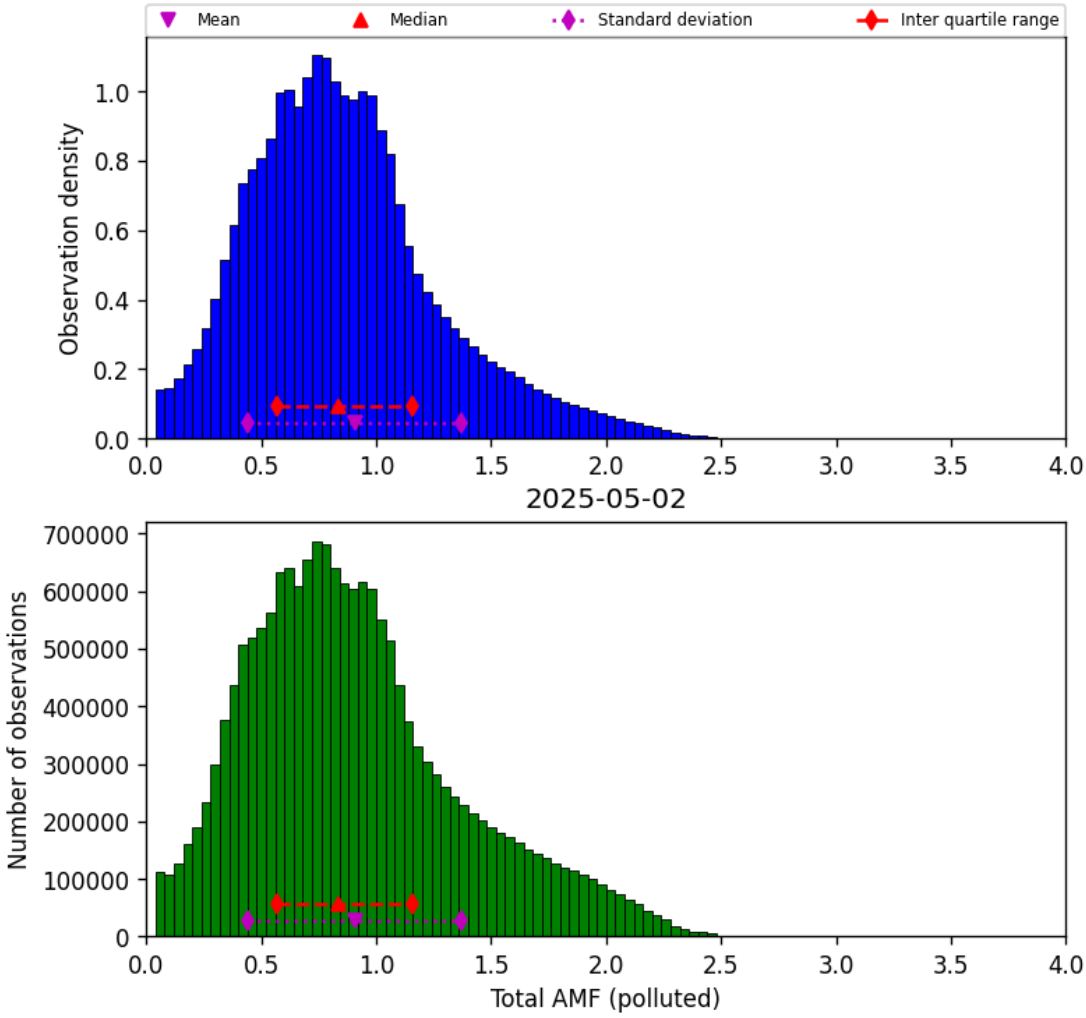

Figure 80: Histogram of “Total AMF (polluted)” for 2025-05-02 to 2025-05-02

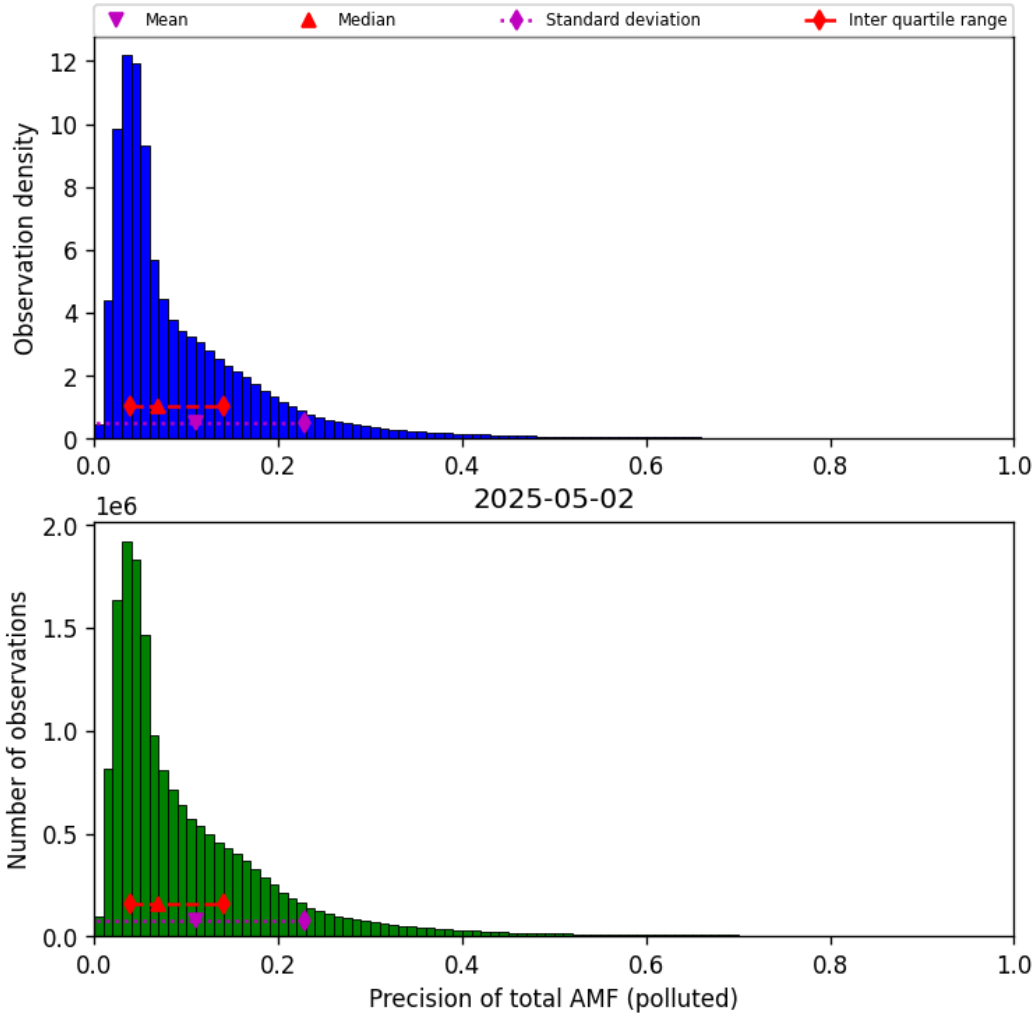

Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-05-02 to 2025-05-02

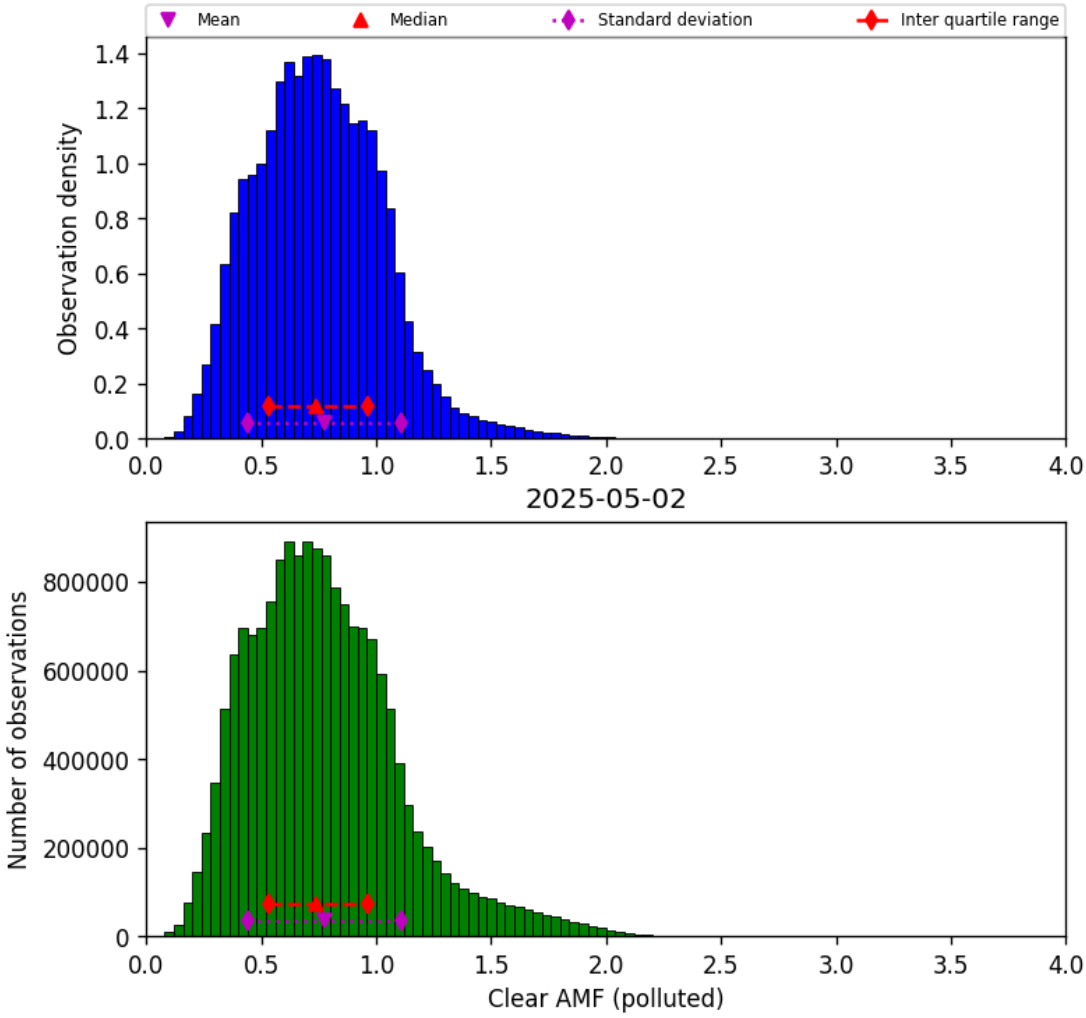

Figure 82: Histogram of “Clear AMF (polluted)” for 2025-05-02 to 2025-05-02

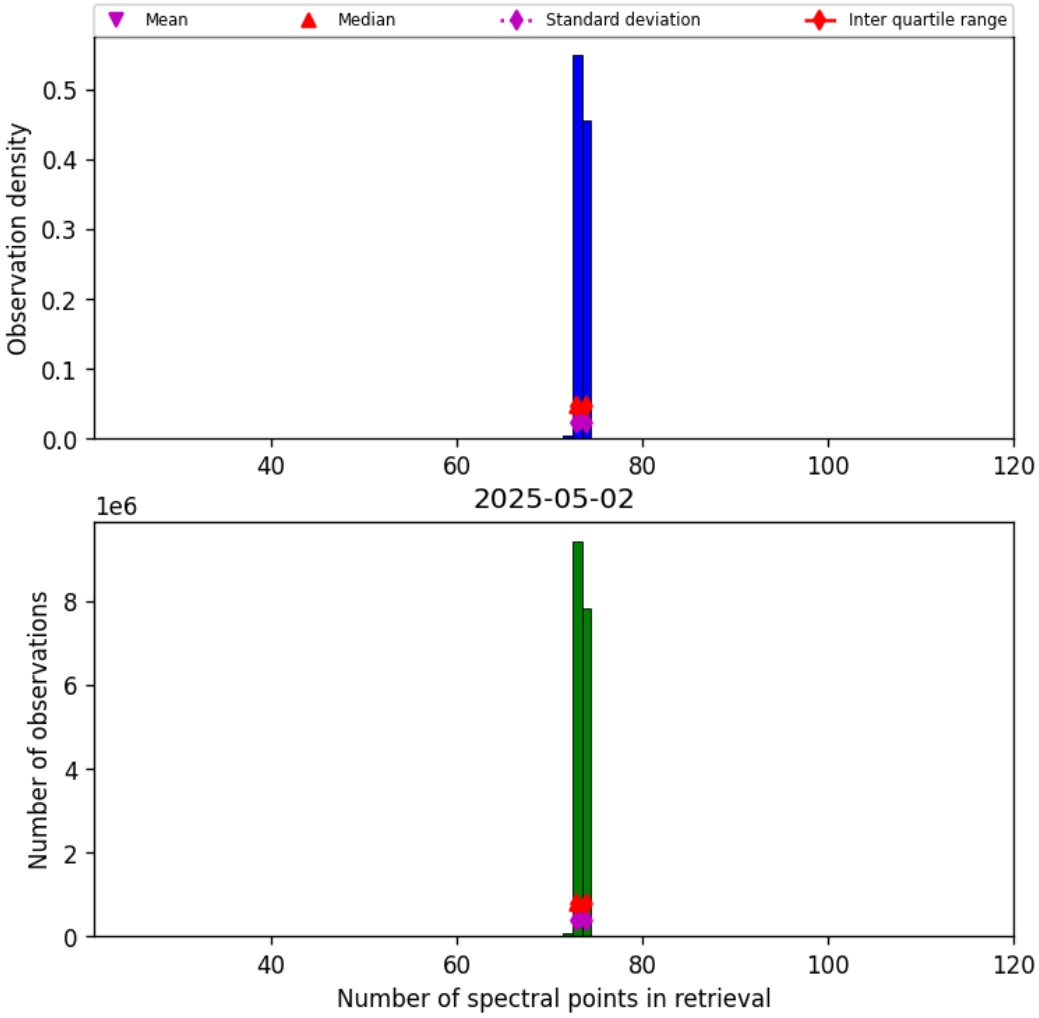

Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-05-02 to 2025-05-02

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.

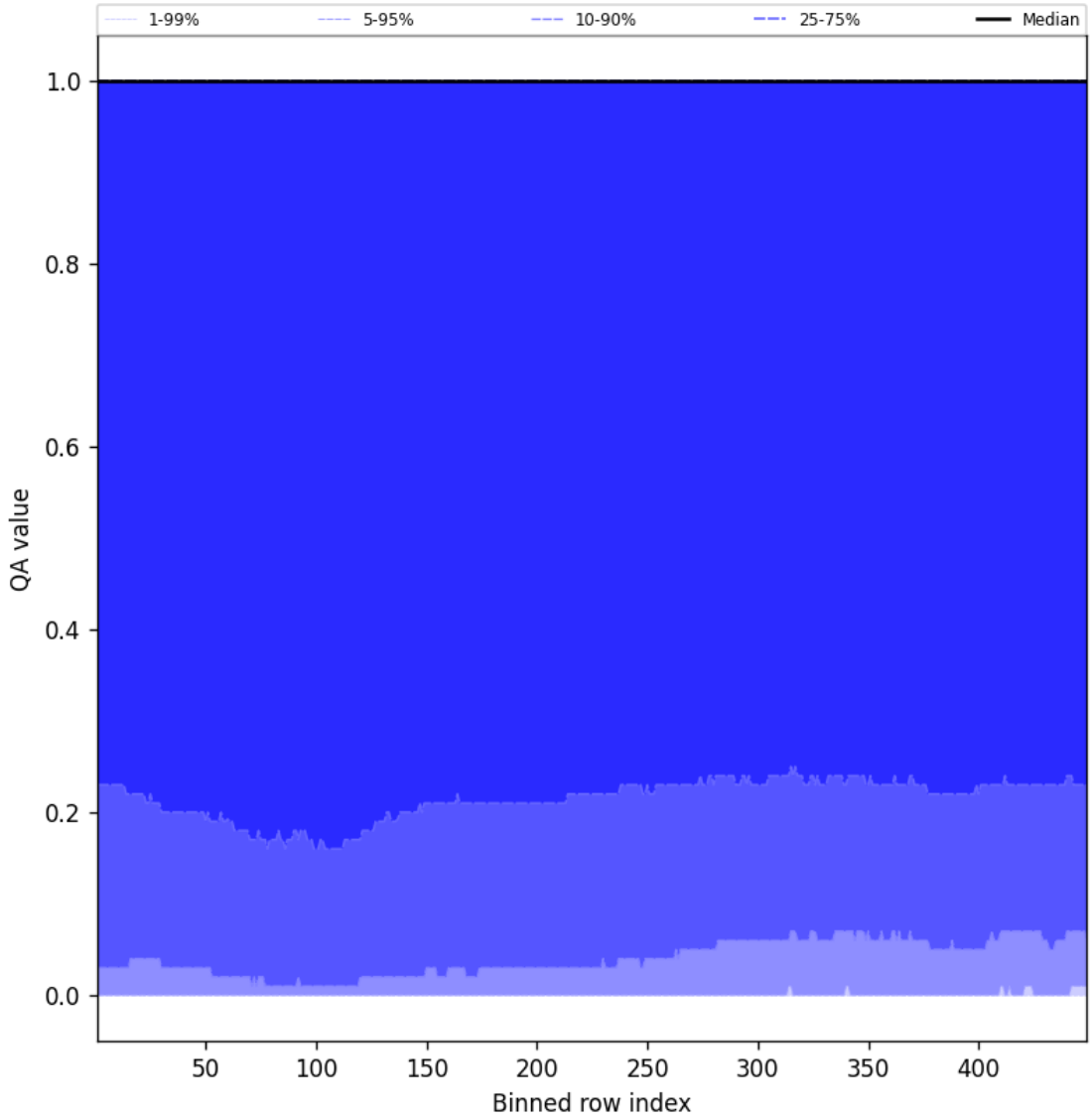

Figure 84: Along track statistics of “QA value” for 2025-05-02 to 2025-05-02

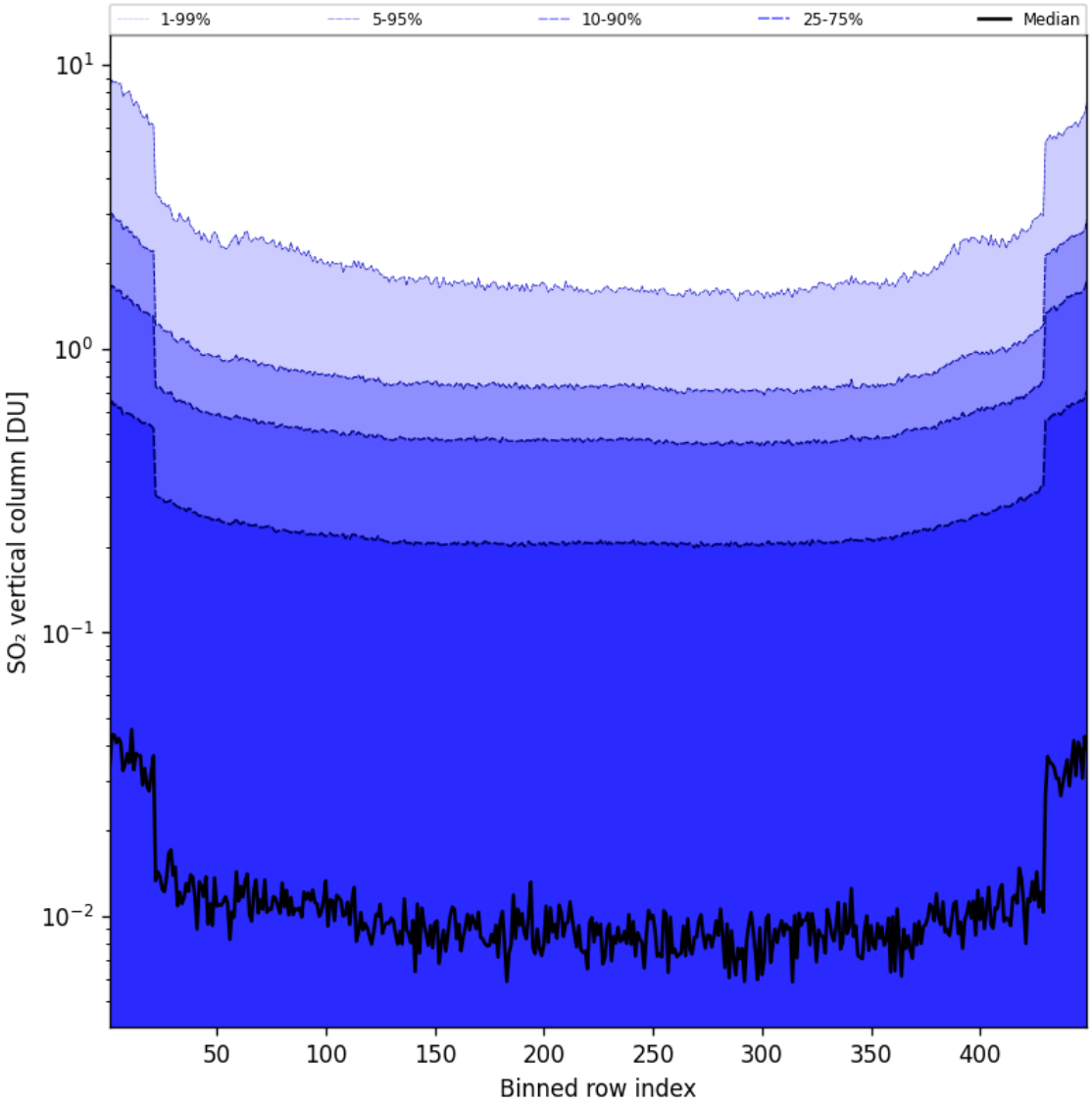

Figure 85: Along track statistics of "SO_2 vertical column" for 2025-05-02 to 2025-05-02

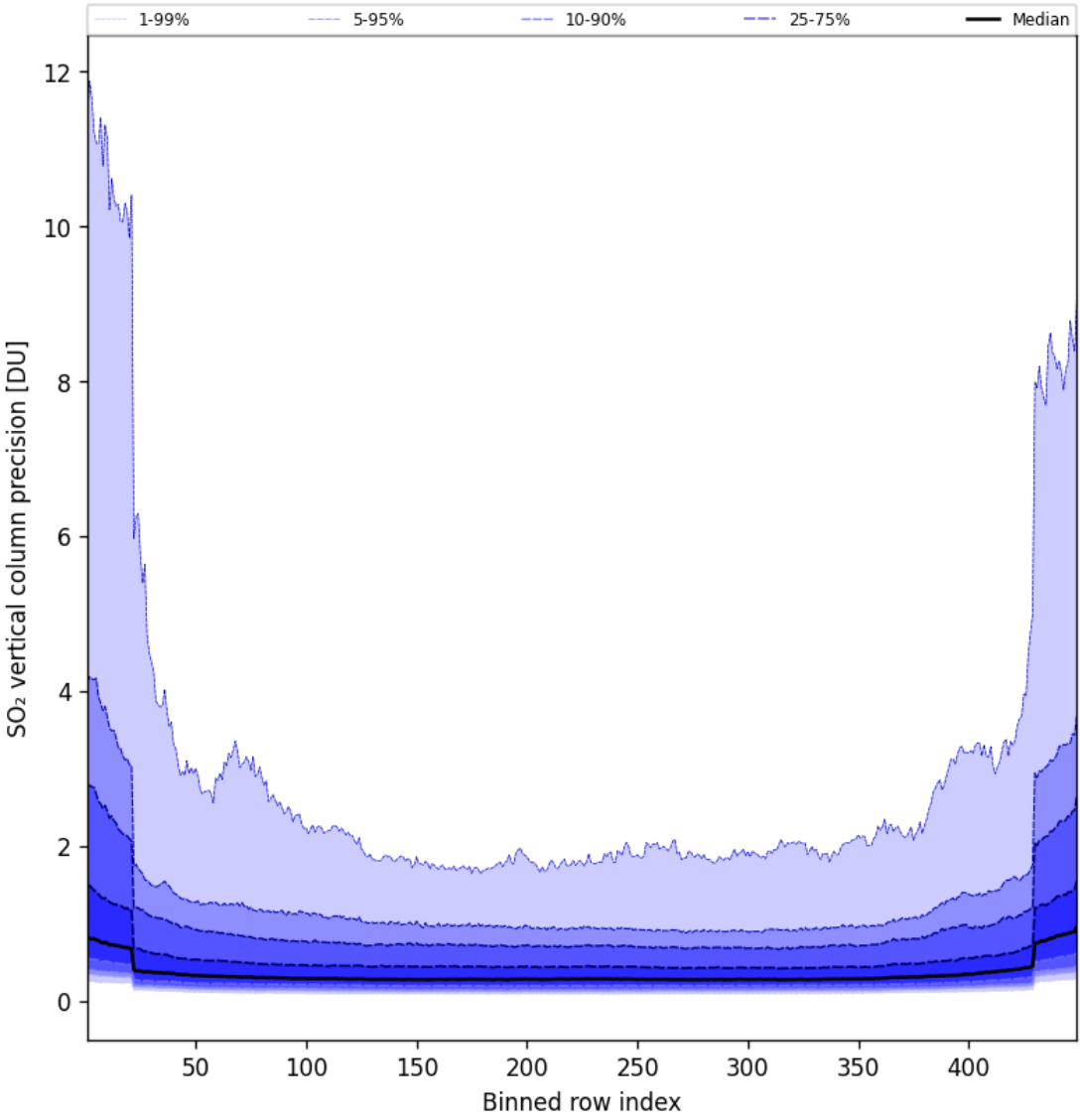

Figure 86: Along track statistics of "SO_2 vertical column precision" for 2025-05-02 to 2025-05-02

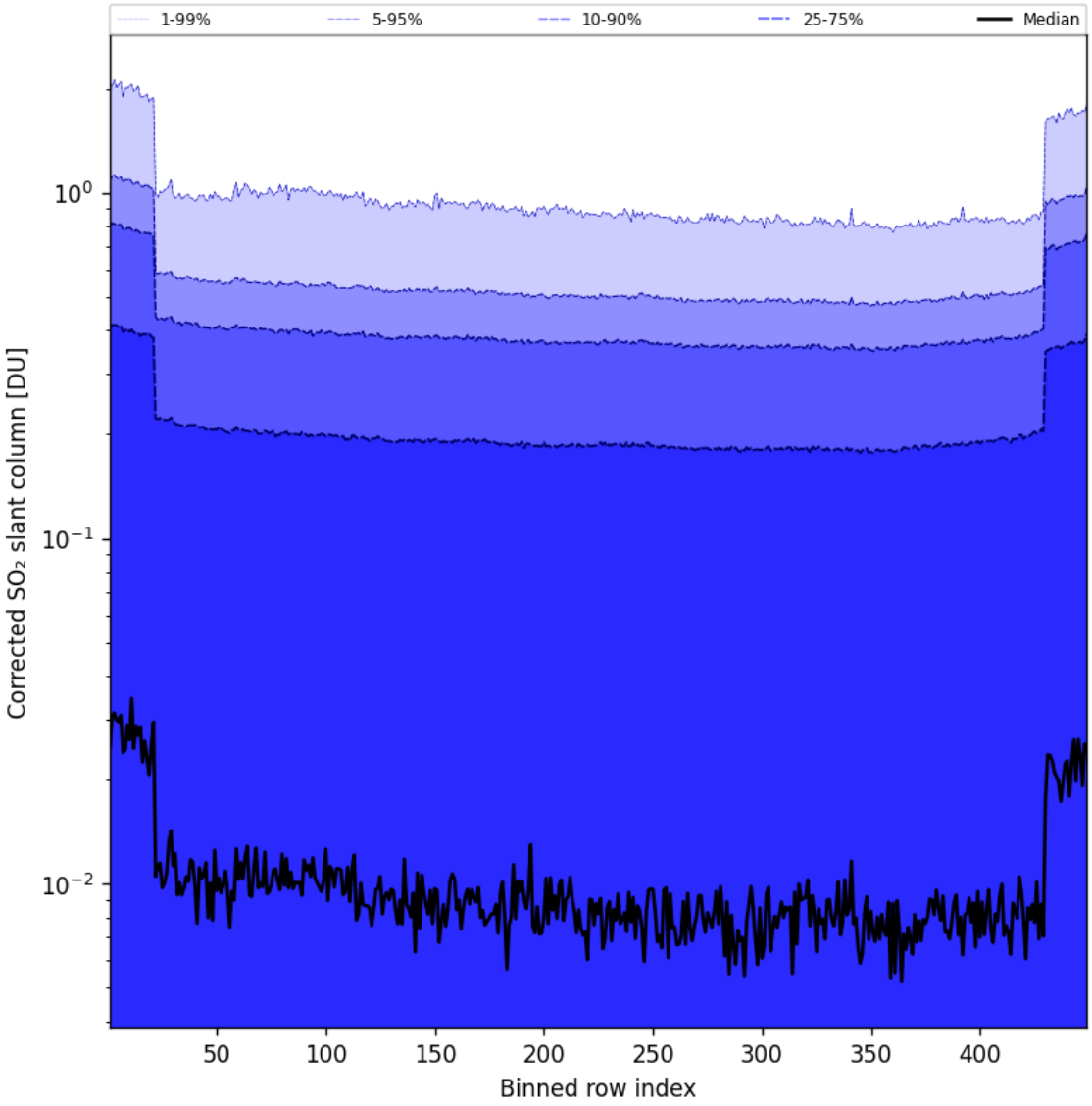

Figure 87: Along track statistics of "Corrected SO_2 slant column" for 2025-05-02 to 2025-05-02

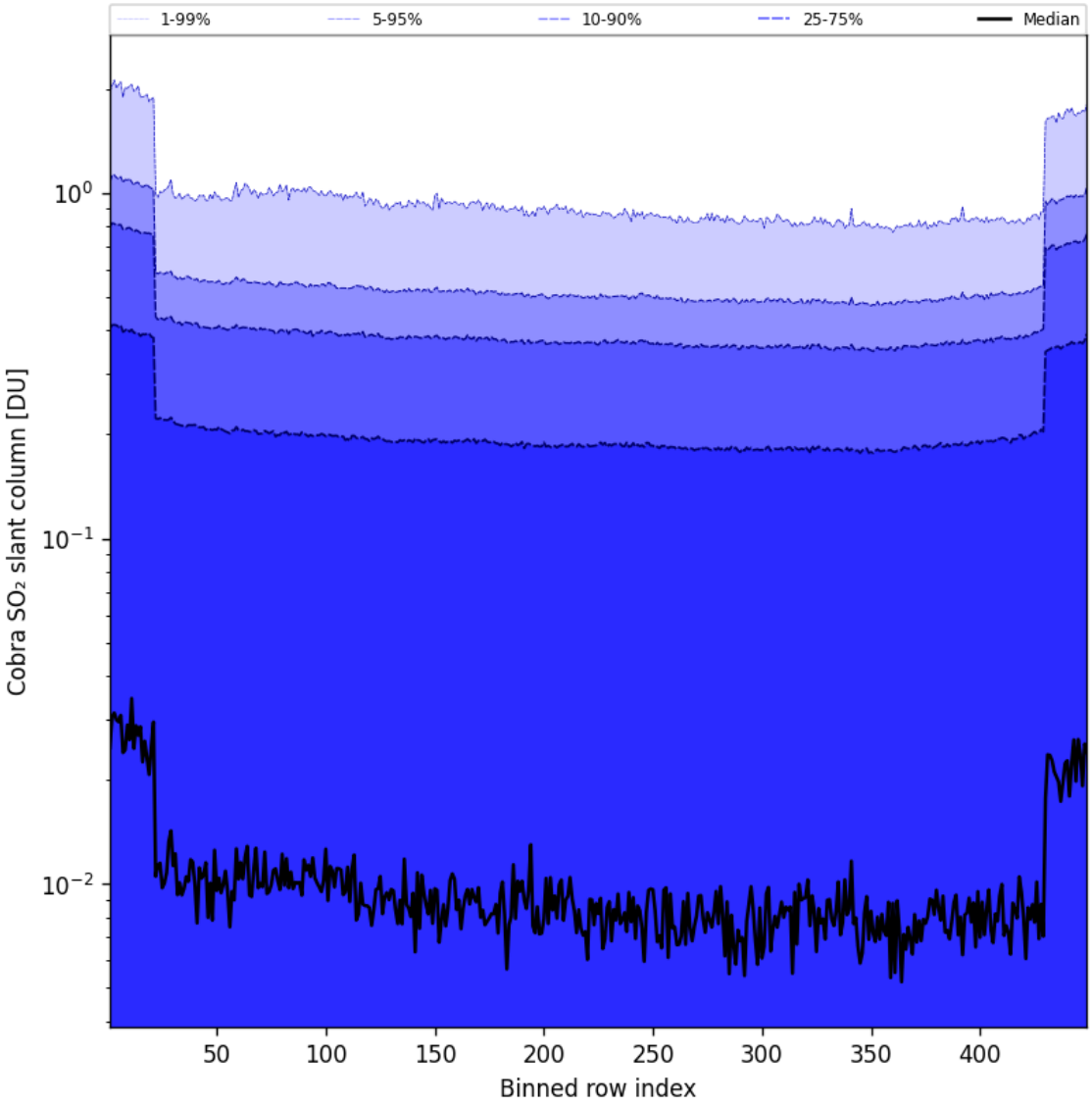

Figure 88: Along track statistics of “Cobra SO_2 slant column” for 2025-05-02 to 2025-05-02

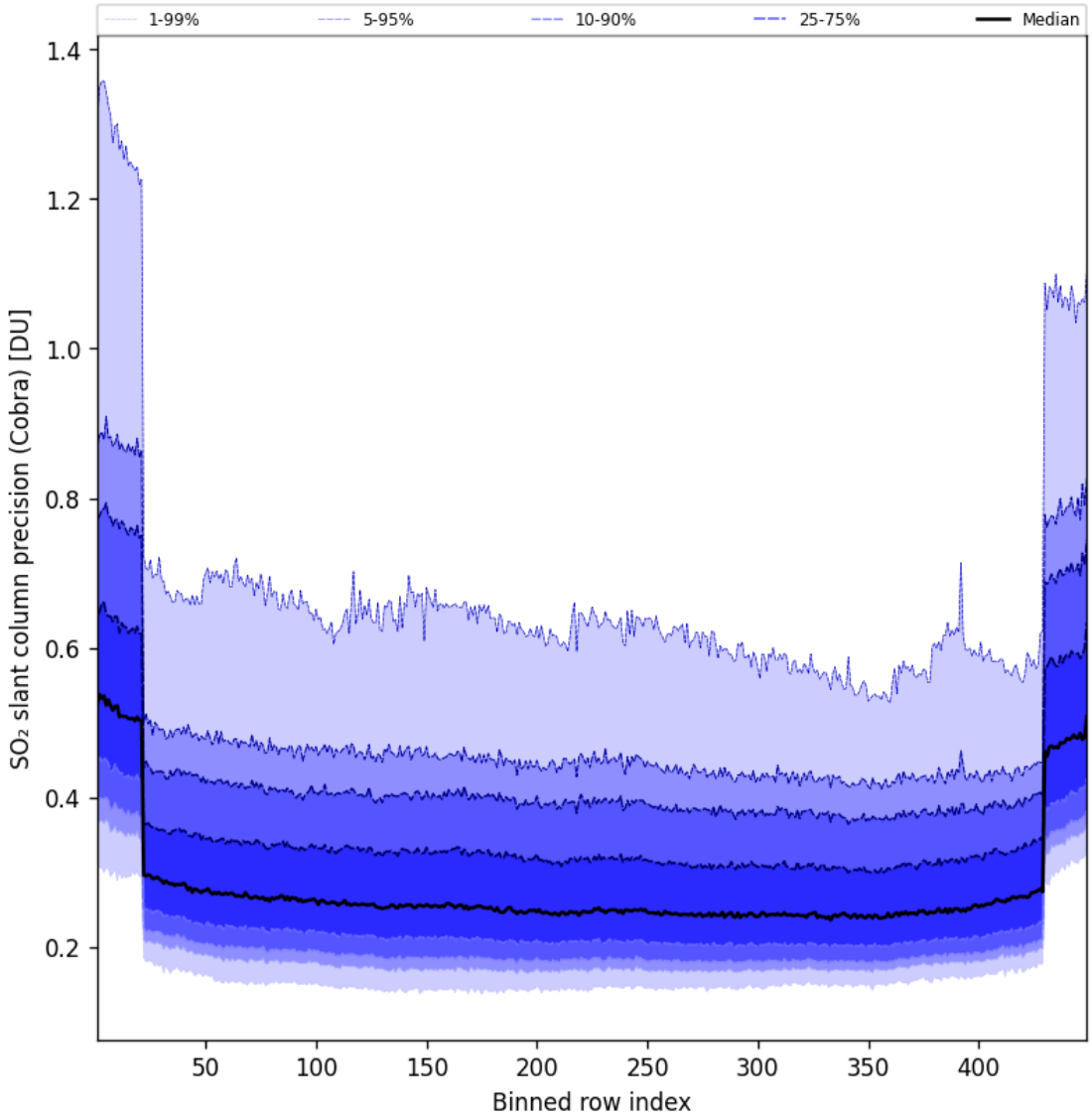

Figure 89: Along track statistics of "SO_2 slant column precision (Cobra)" for 2025-05-02 to 2025-05-02

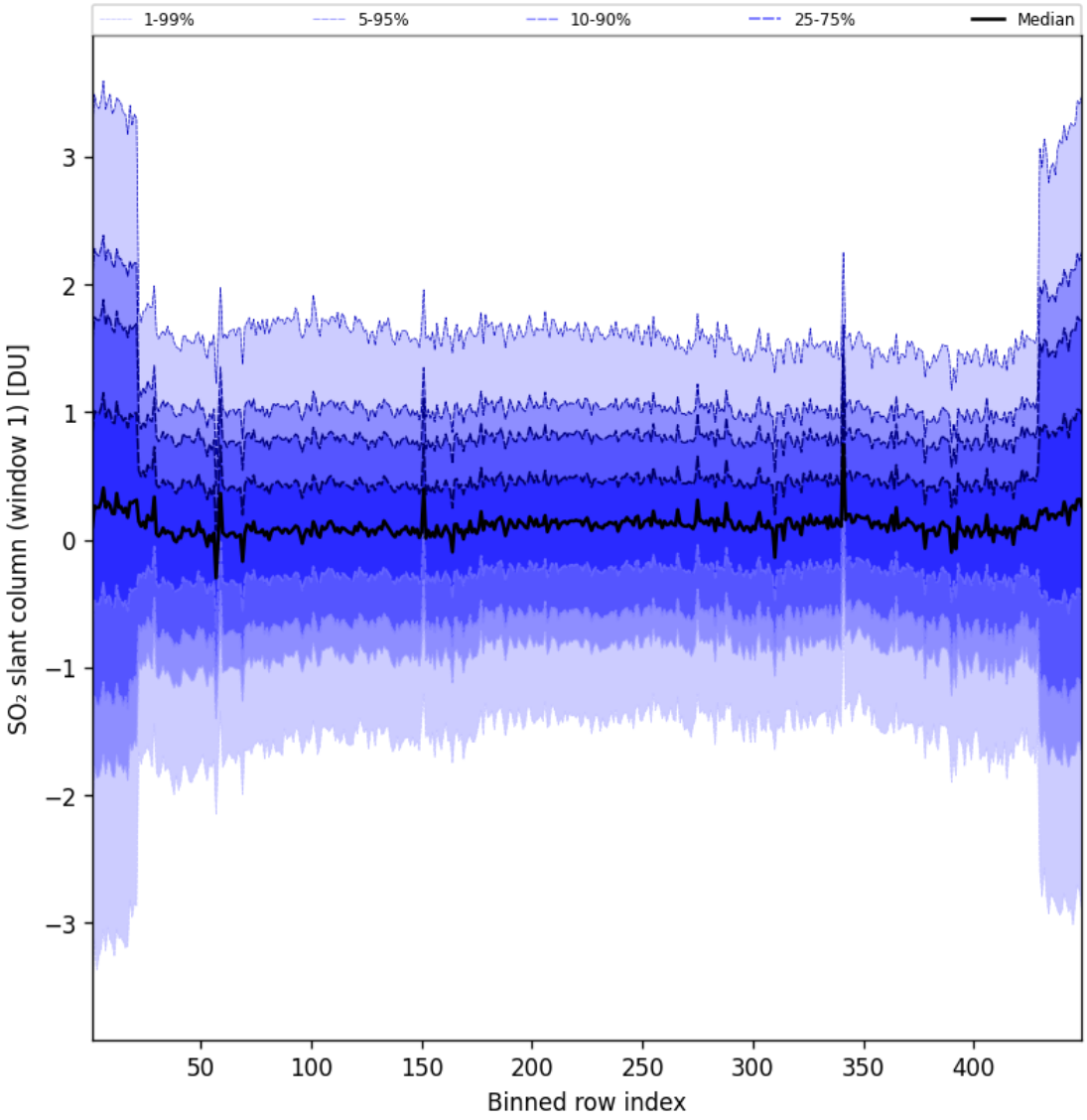

Figure 90: Along track statistics of "SO_2 slant column (window 1)" for 2025-05-02 to 2025-05-02

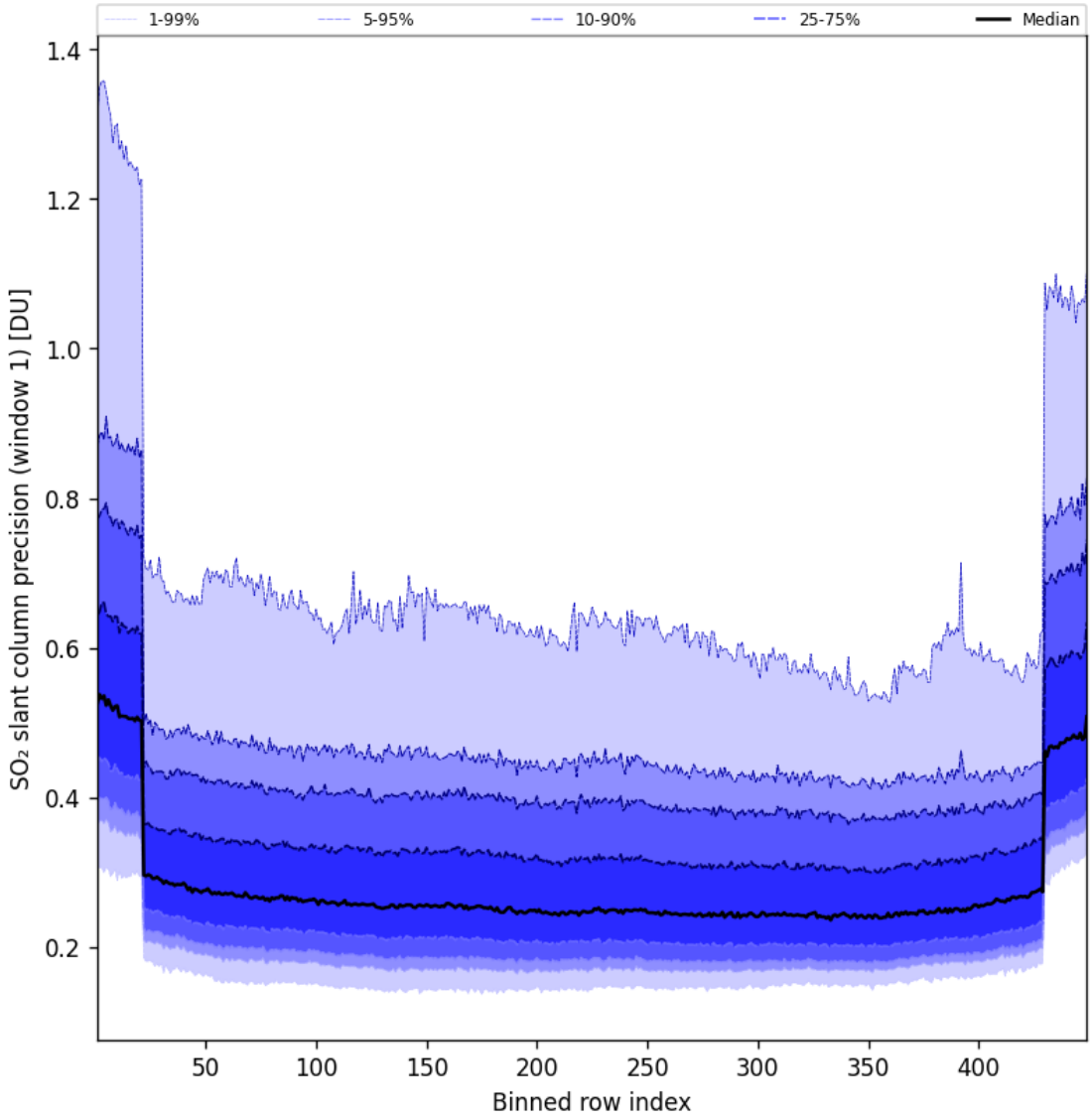

Figure 91: Along track statistics of "SO_2 slant column precision (window 1)" for 2025-05-02 to 2025-05-02

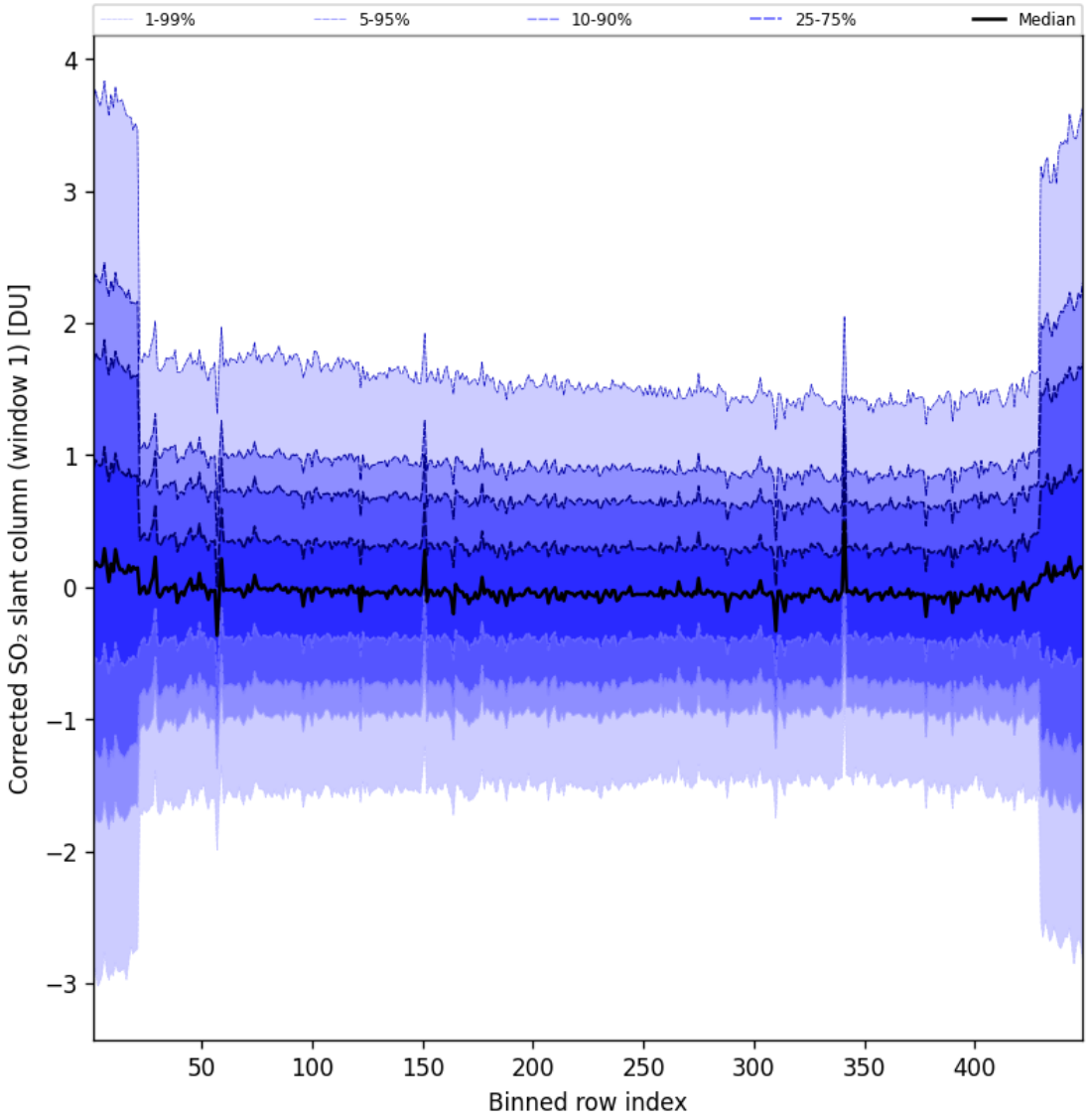

Figure 92: Along track statistics of “Corrected SO_2 slant column (window 1)” for 2025-05-02 to 2025-05-02

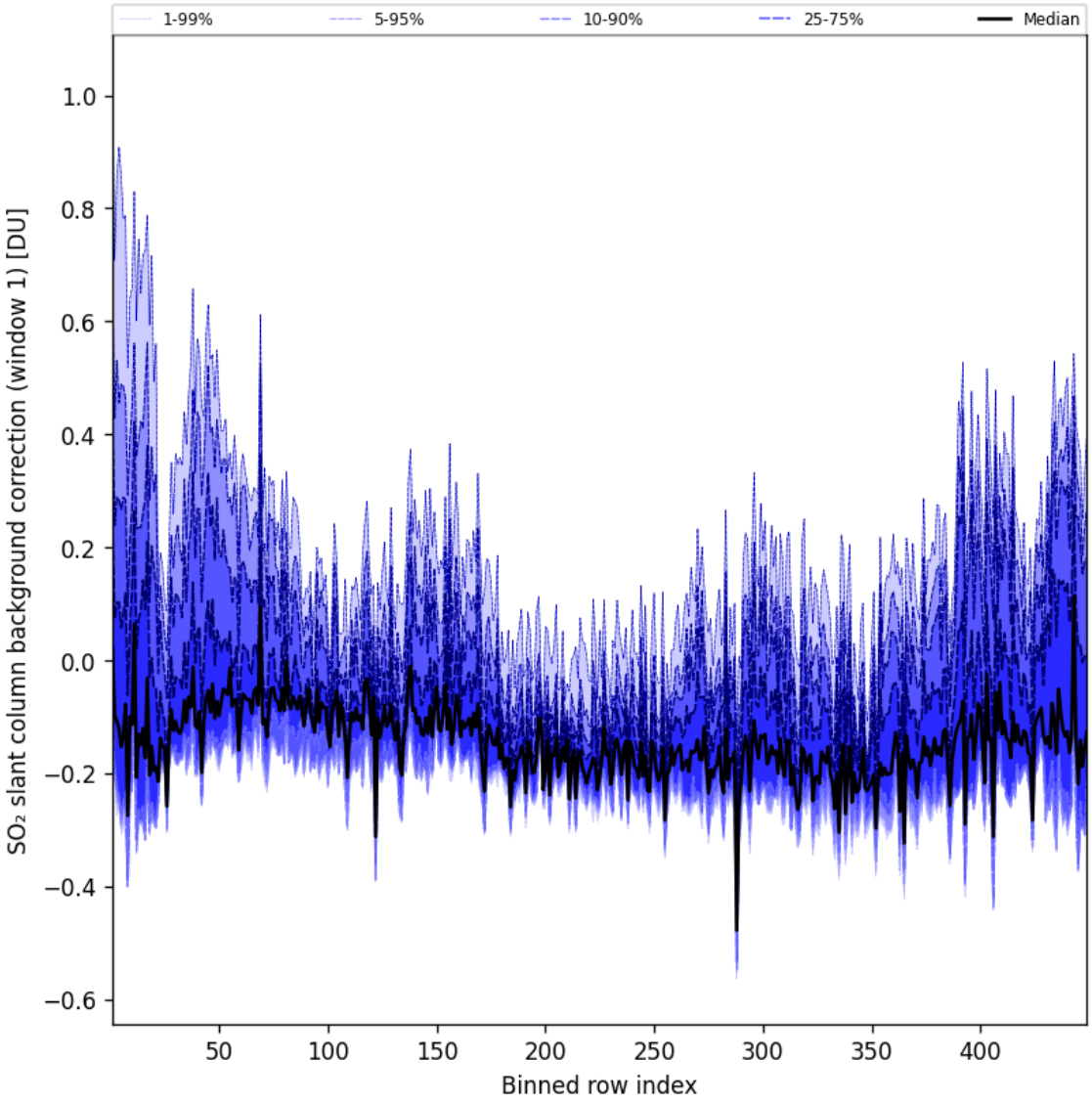

Figure 93: Along track statistics of "SO_2 slant column background correction (window 1)" for 2025-05-02 to 2025-05-02

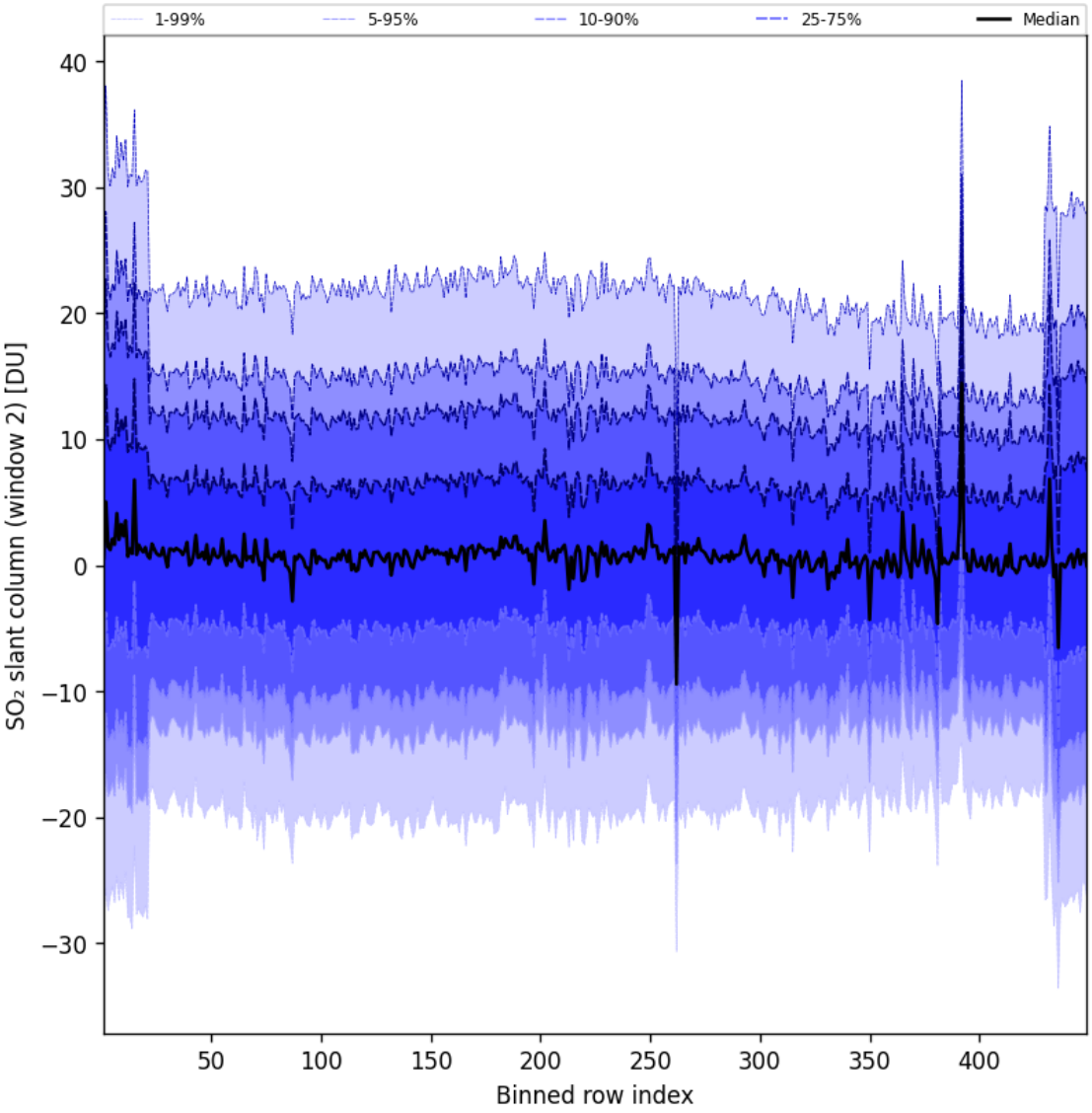

Figure 94: Along track statistics of "SO_2 slant column (window 2)" for 2025-05-02 to 2025-05-02

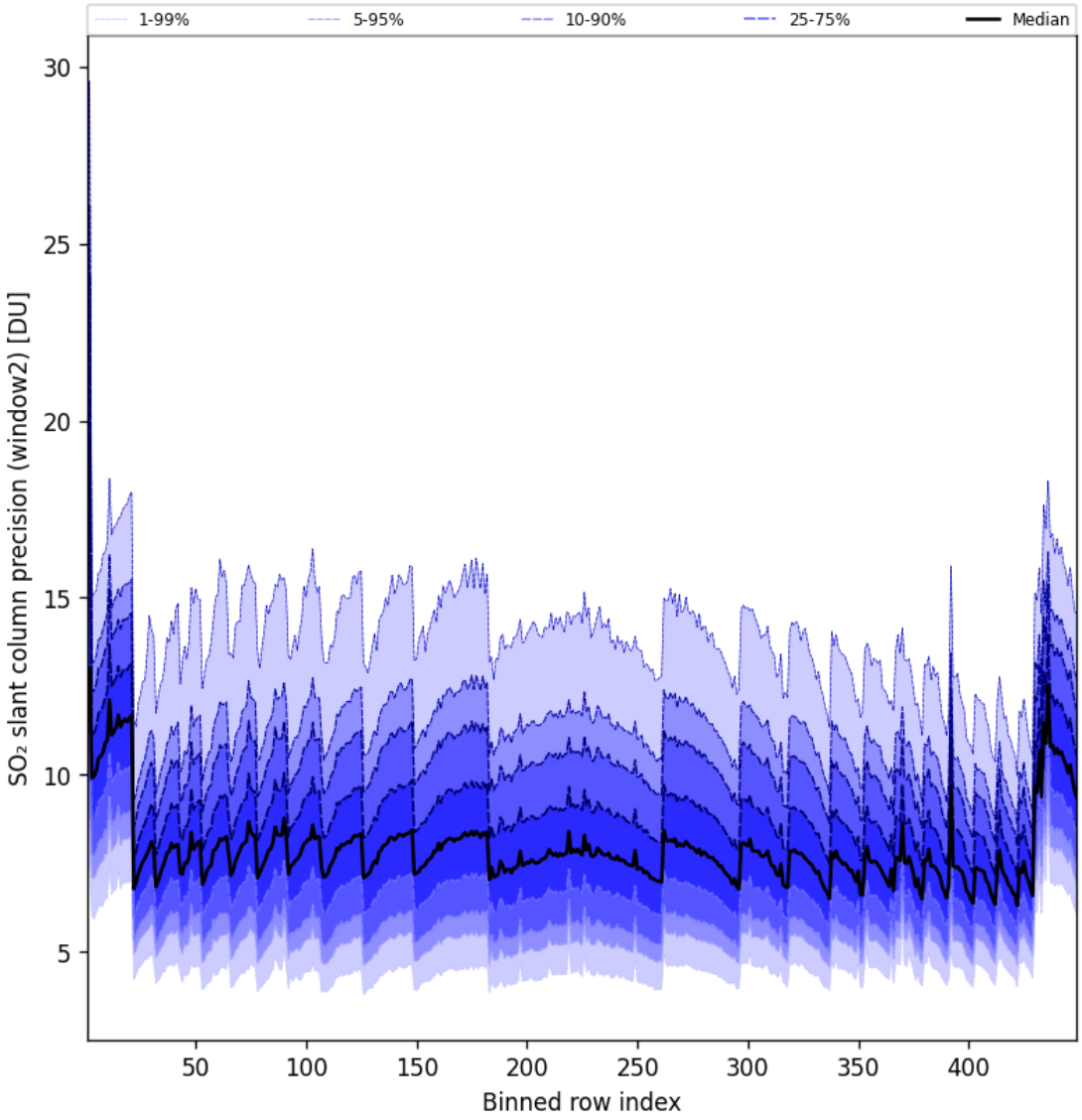

Figure 95: Along track statistics of "SO_2 slant column precision (window2)" for 2025-05-02 to 2025-05-02

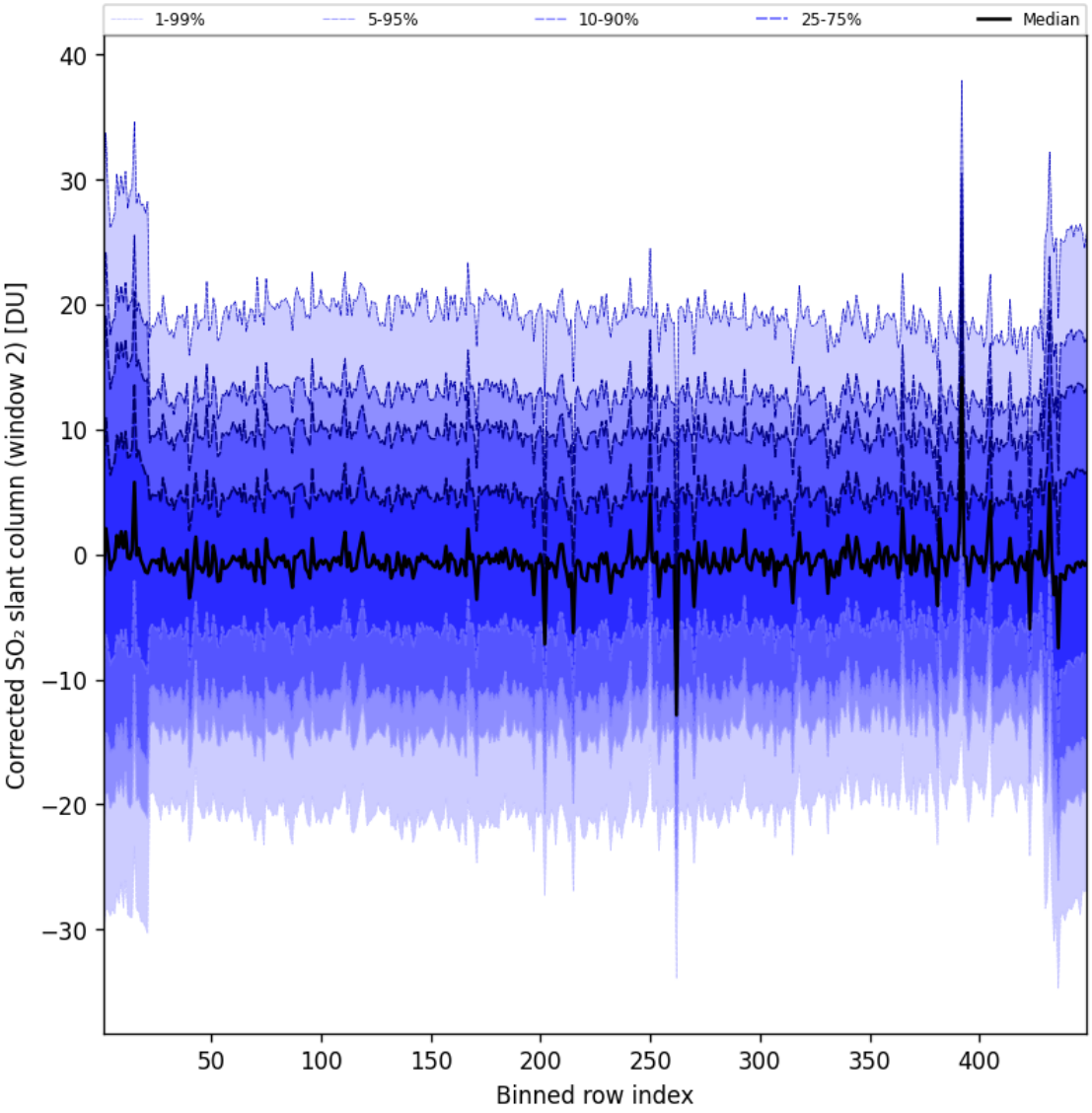

Figure 96: Along track statistics of “Corrected SO_2 slant column (window 2)” for 2025-05-02 to 2025-05-02

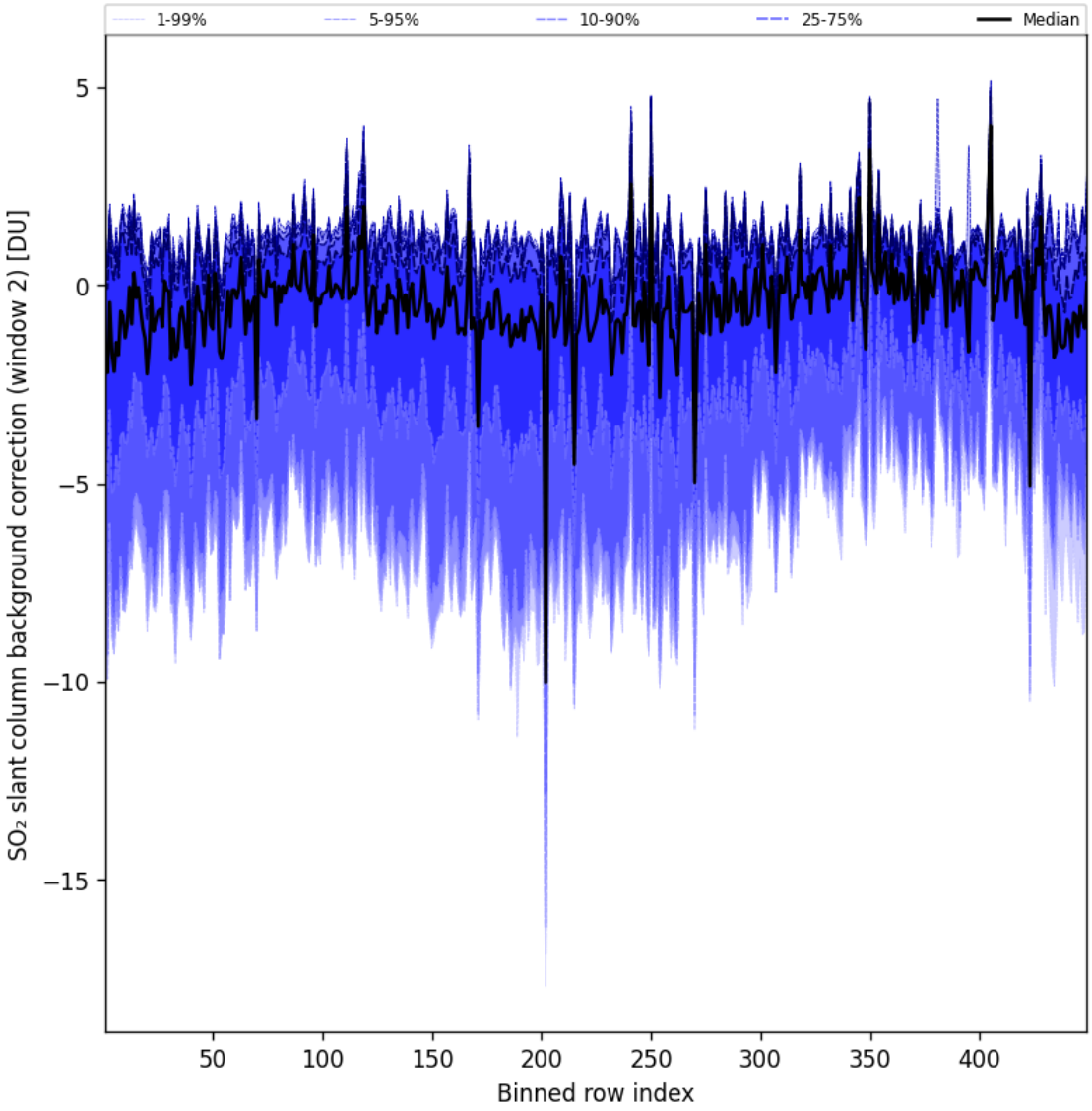

Figure 97: Along track statistics of "SO_2 slant column background correction (window 2)" for 2025-05-02 to 2025-05-02

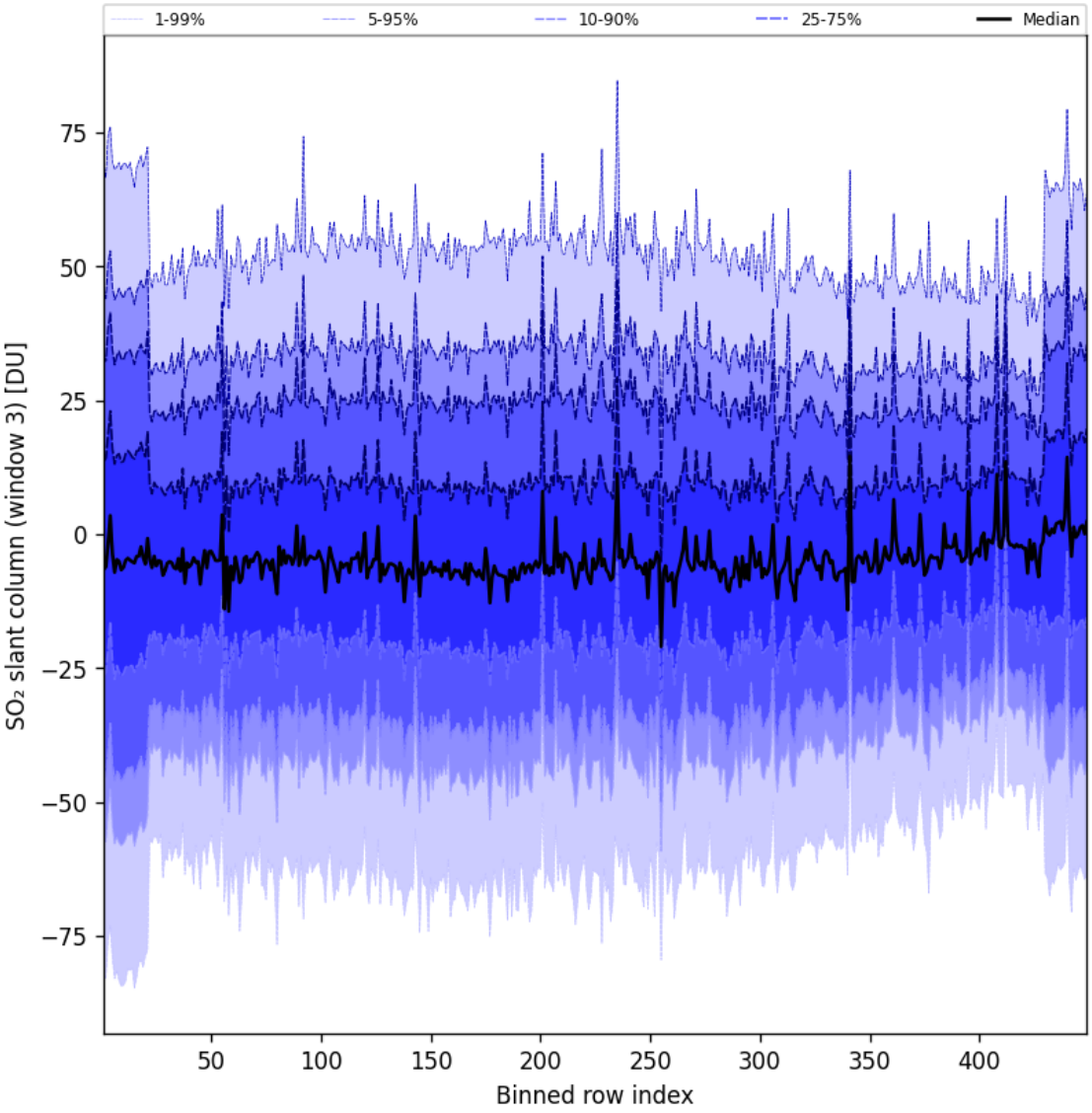

Figure 98: Along track statistics of "SO_2 slant column (window 3)" for 2025-05-02 to 2025-05-02

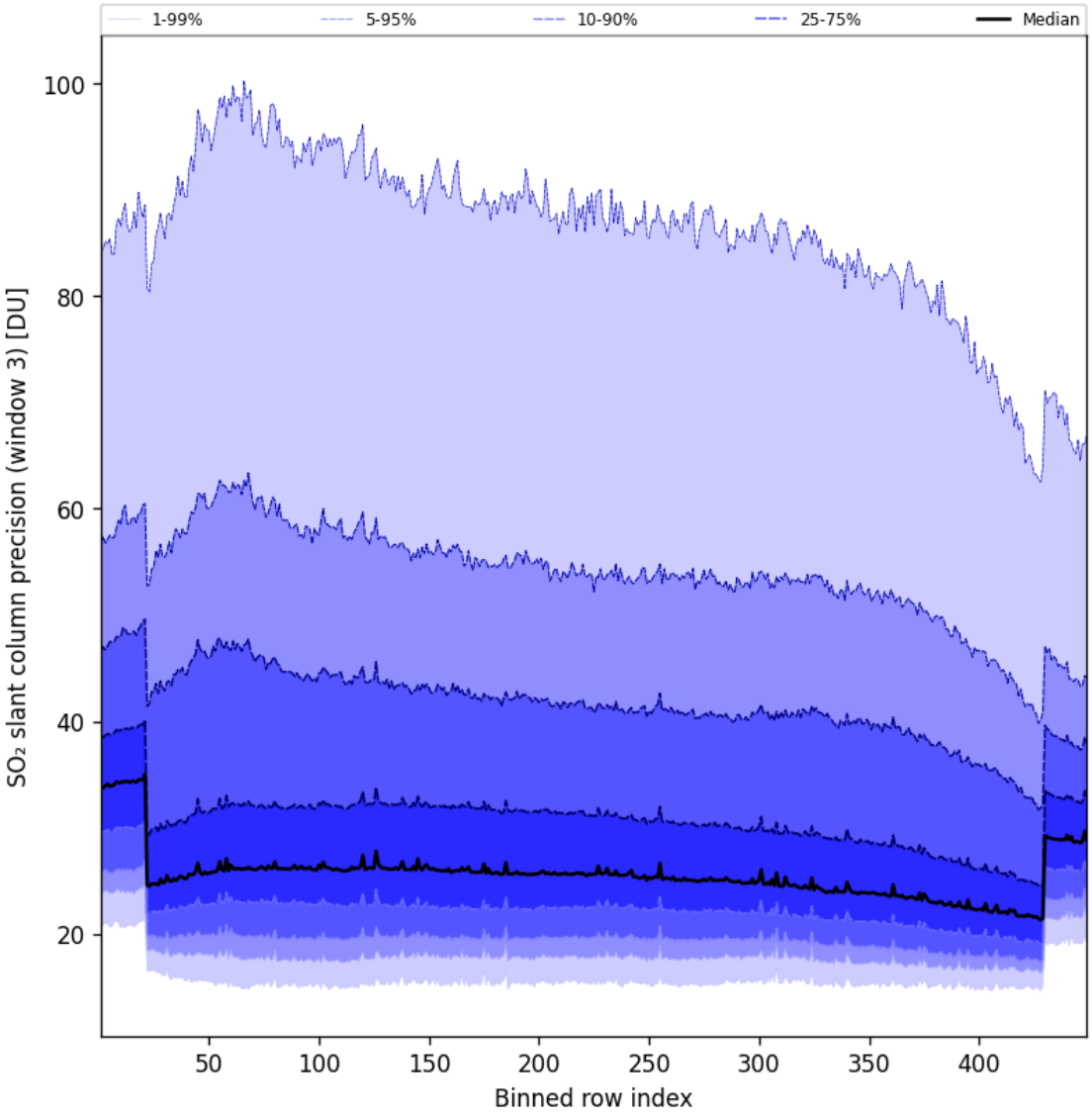

Figure 99: Along track statistics of "SO_2 slant column precision (window 3)" for 2025-05-02 to 2025-05-02

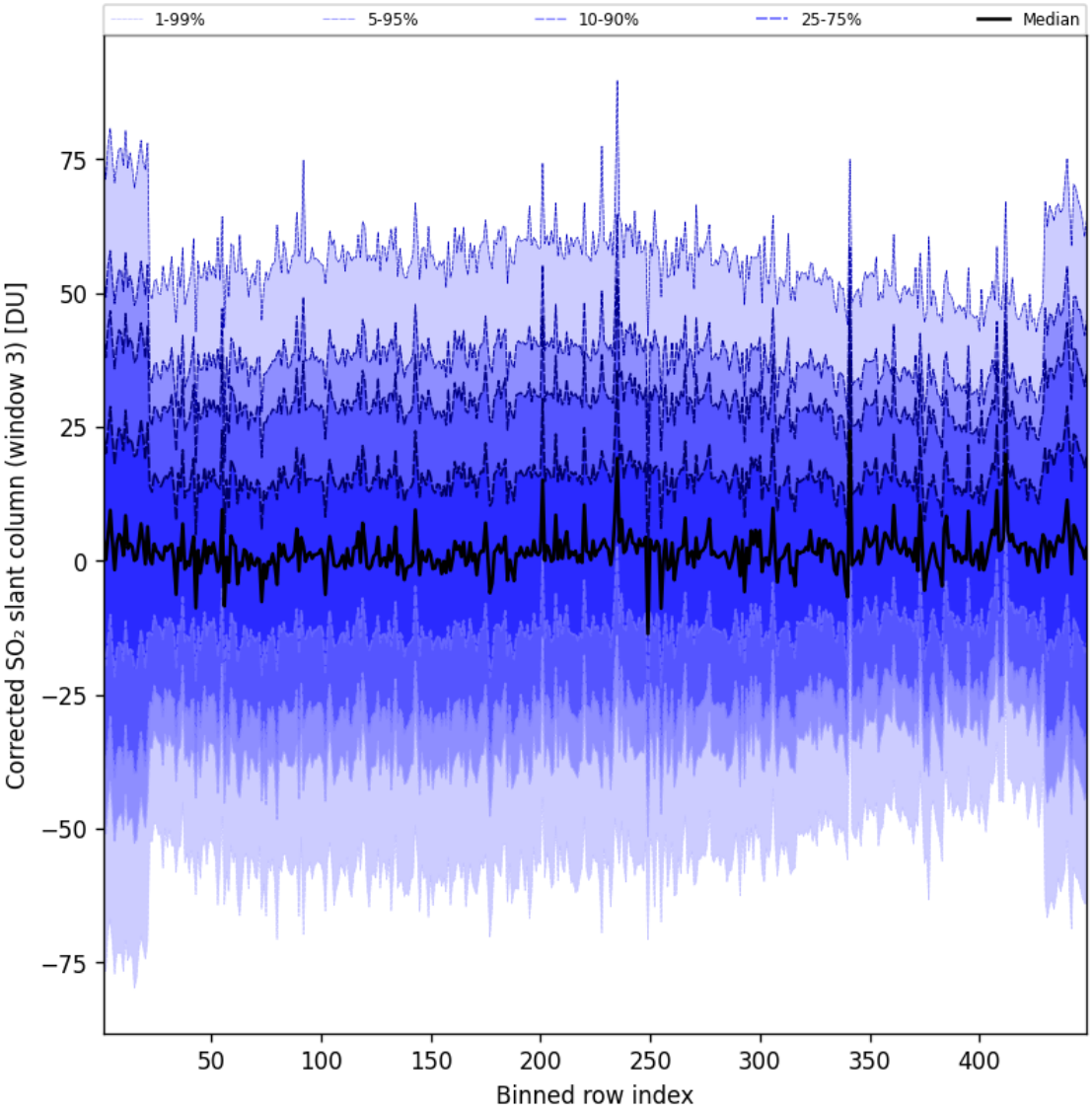

Figure 100: Along track statistics of “Corrected SO_2 slant column (window 3)” for 2025-05-02 to 2025-05-02

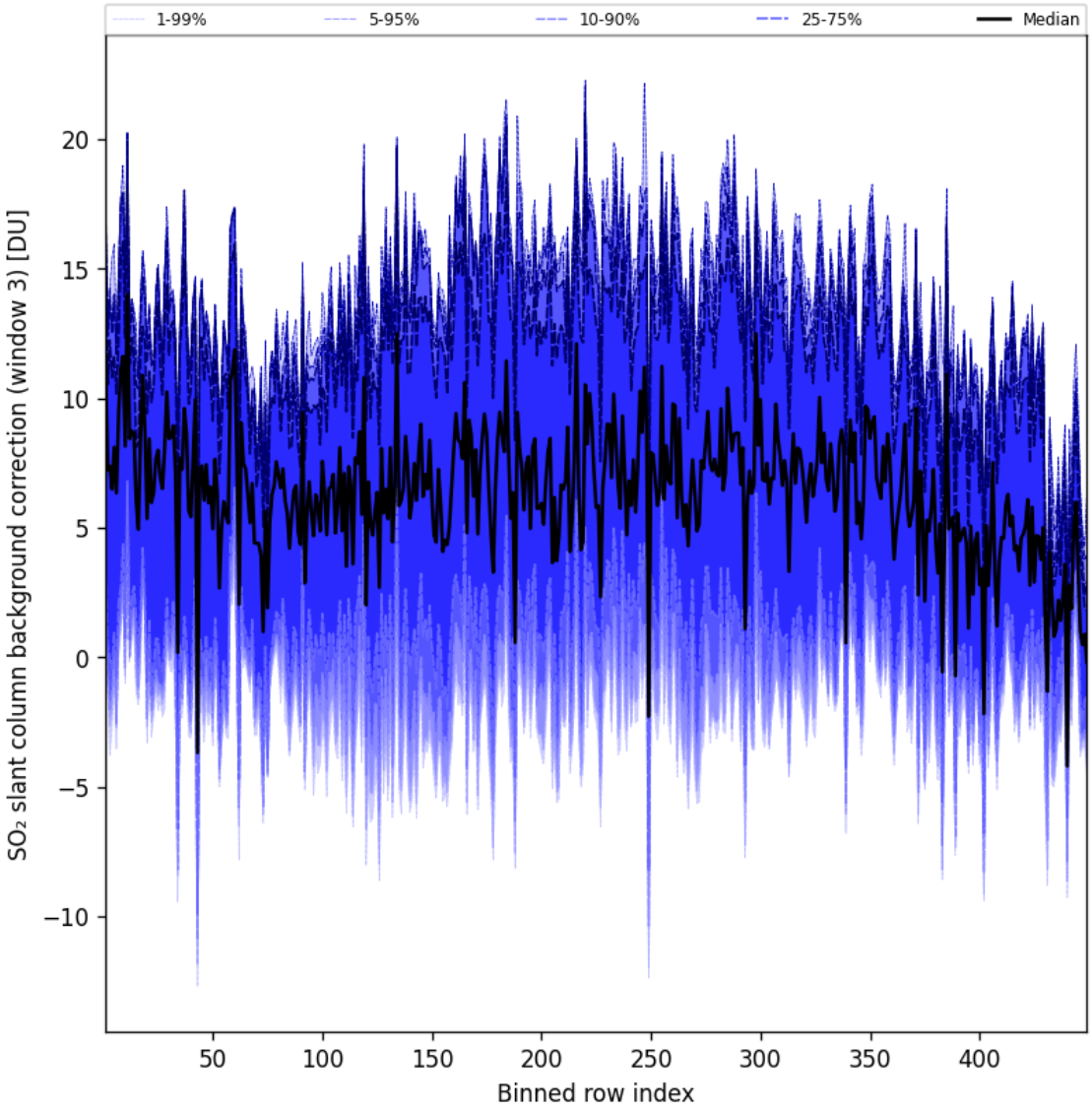

Figure 101: Along track statistics of "SO_2 slant column background correction (window 3)" for 2025-05-02 to 2025-05-02

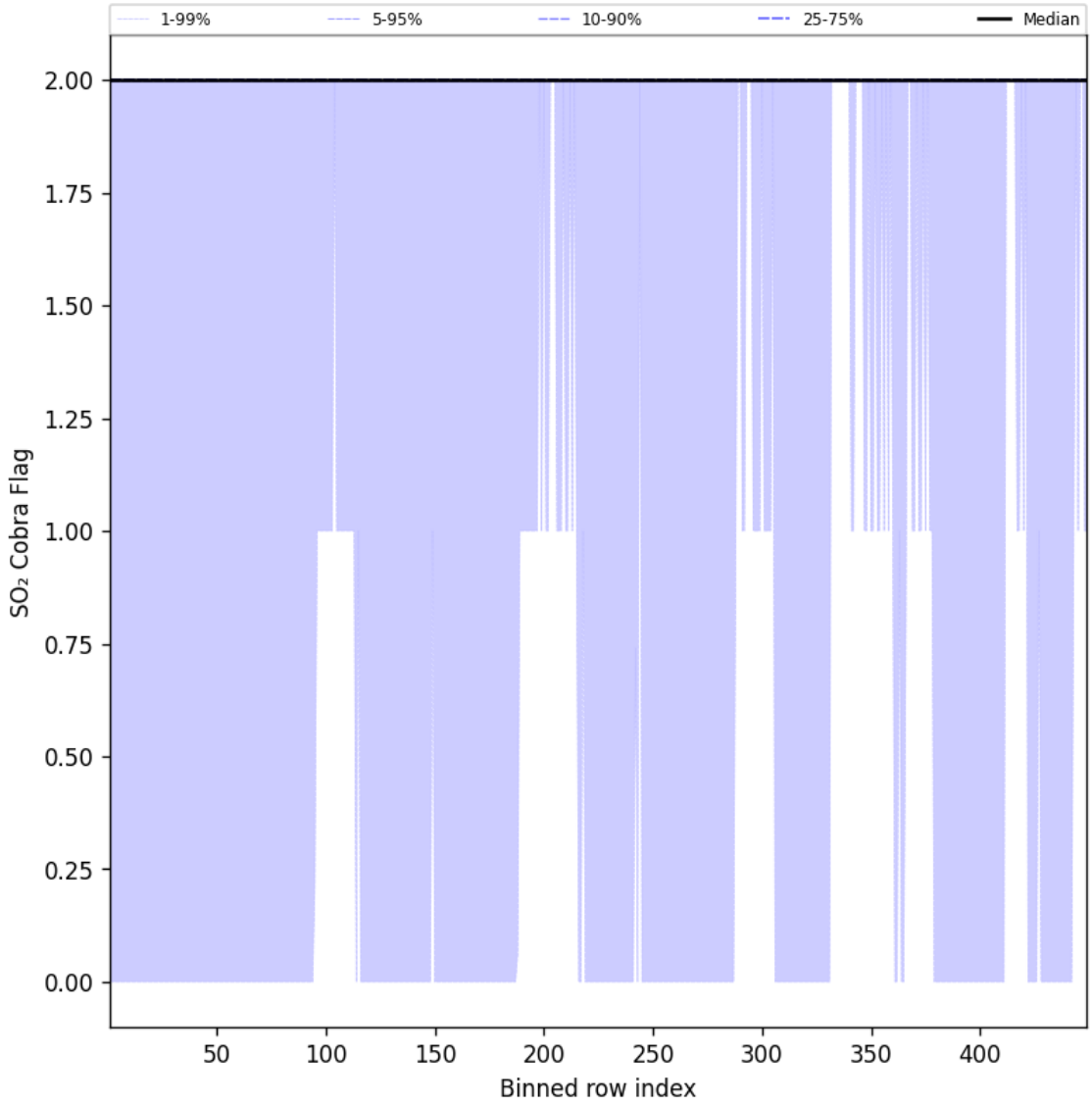

Figure 102: Along track statistics of "SO_2 Cobra Flag" for 2025-05-02 to 2025-05-02

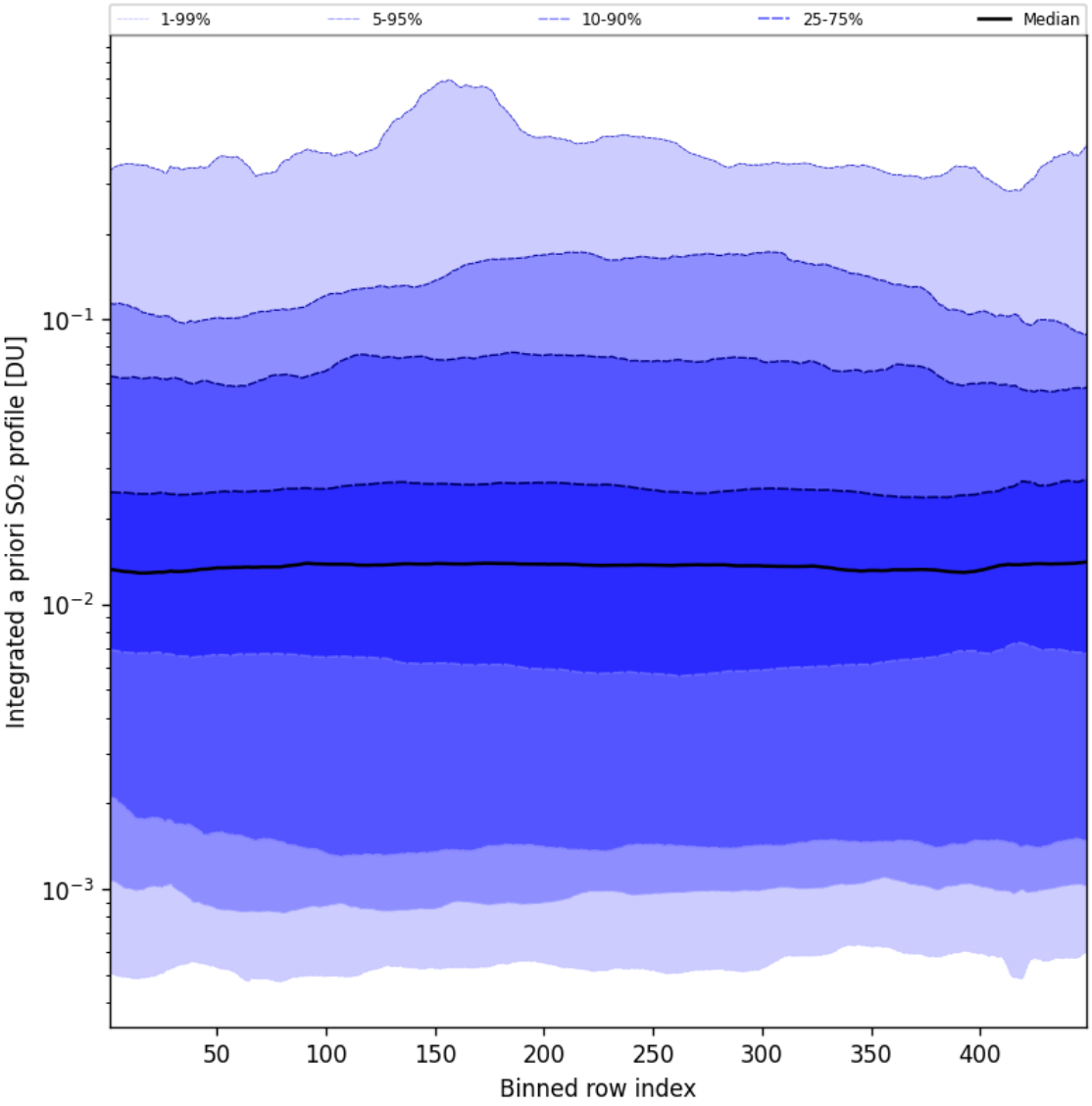

Figure 103: Along track statistics of “Integrated a priori SO_2 profile” for 2025-05-02 to 2025-05-02

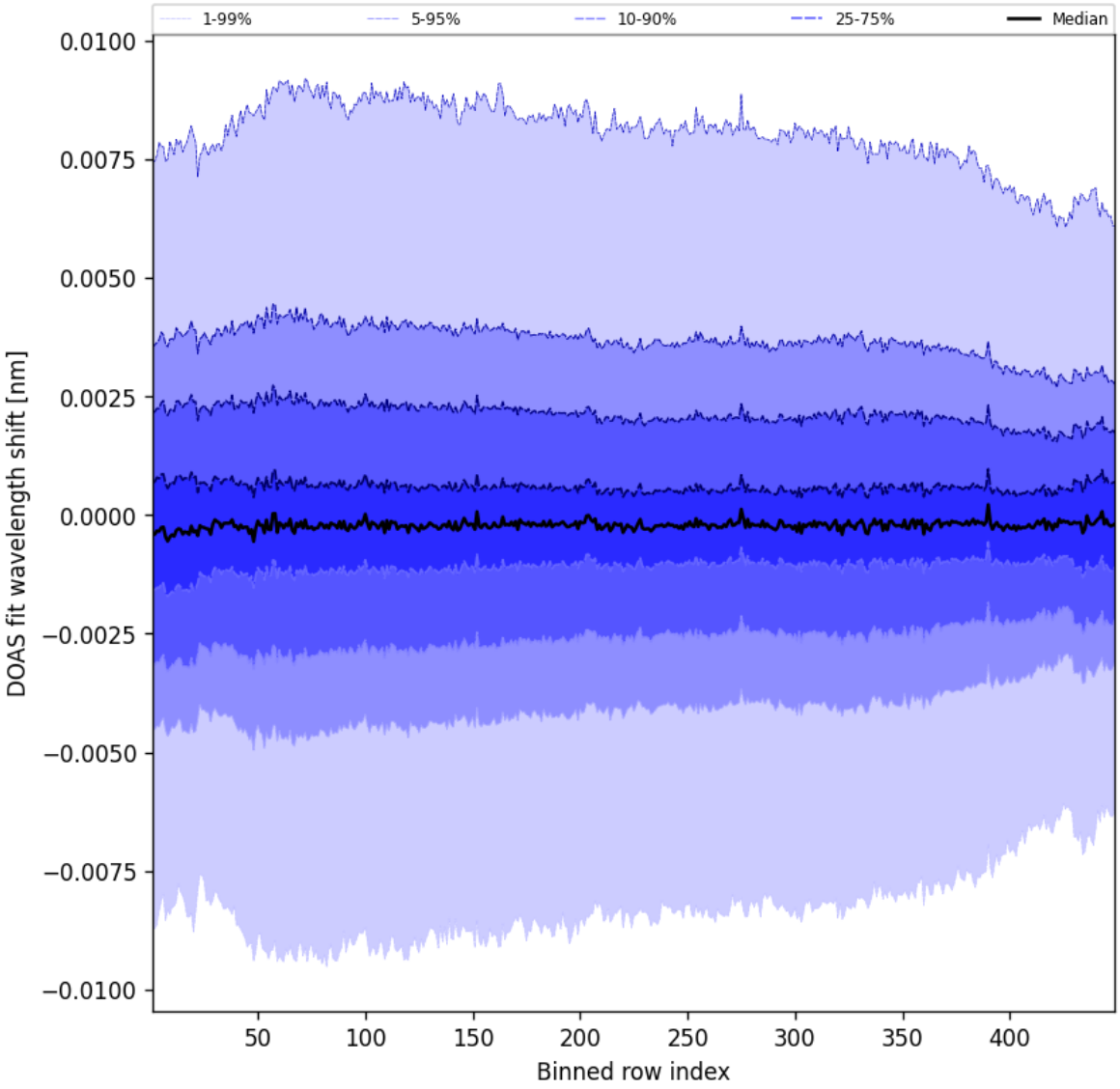

Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2025-05-02 to 2025-05-02

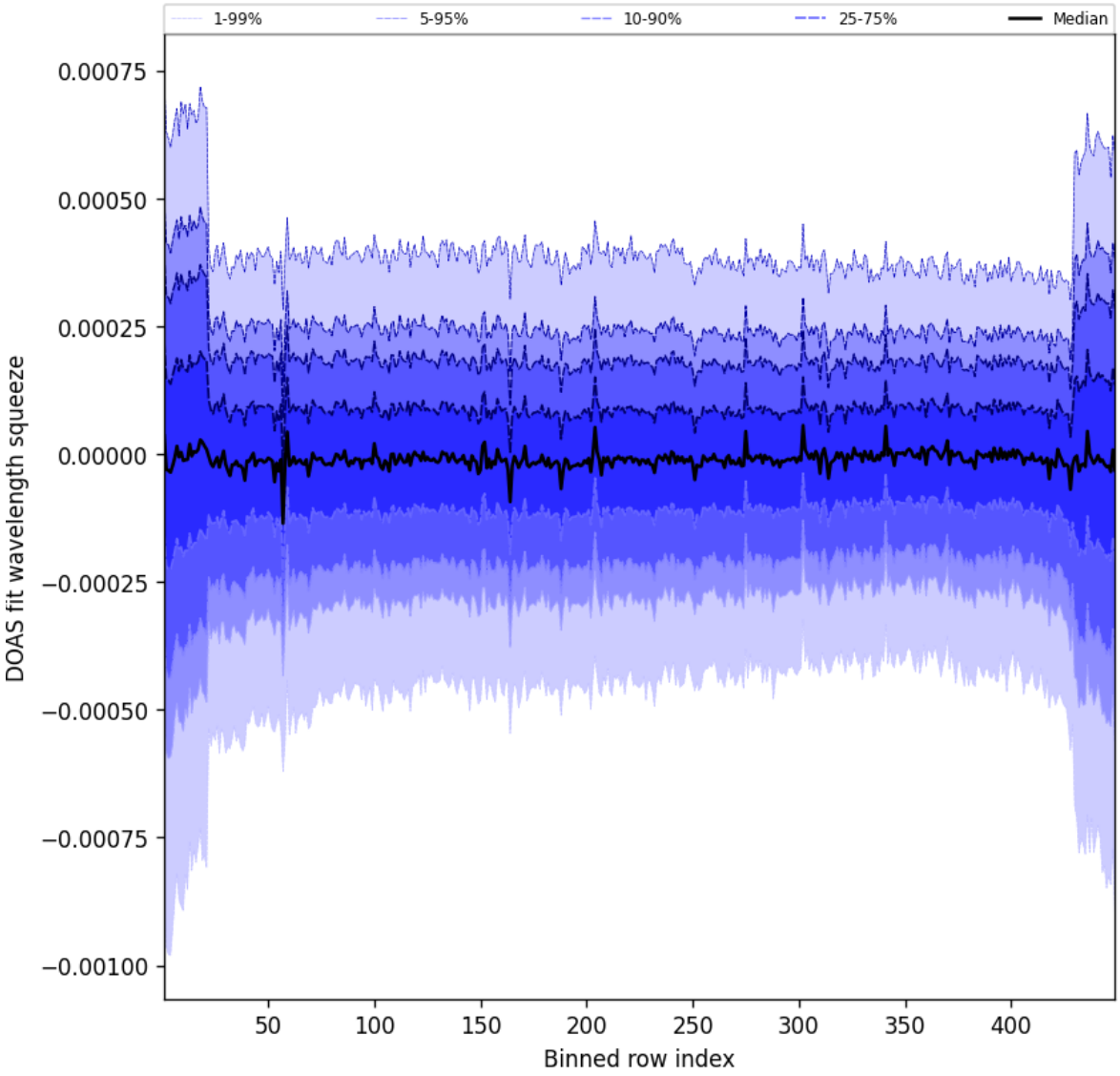

Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2025-05-02 to 2025-05-02

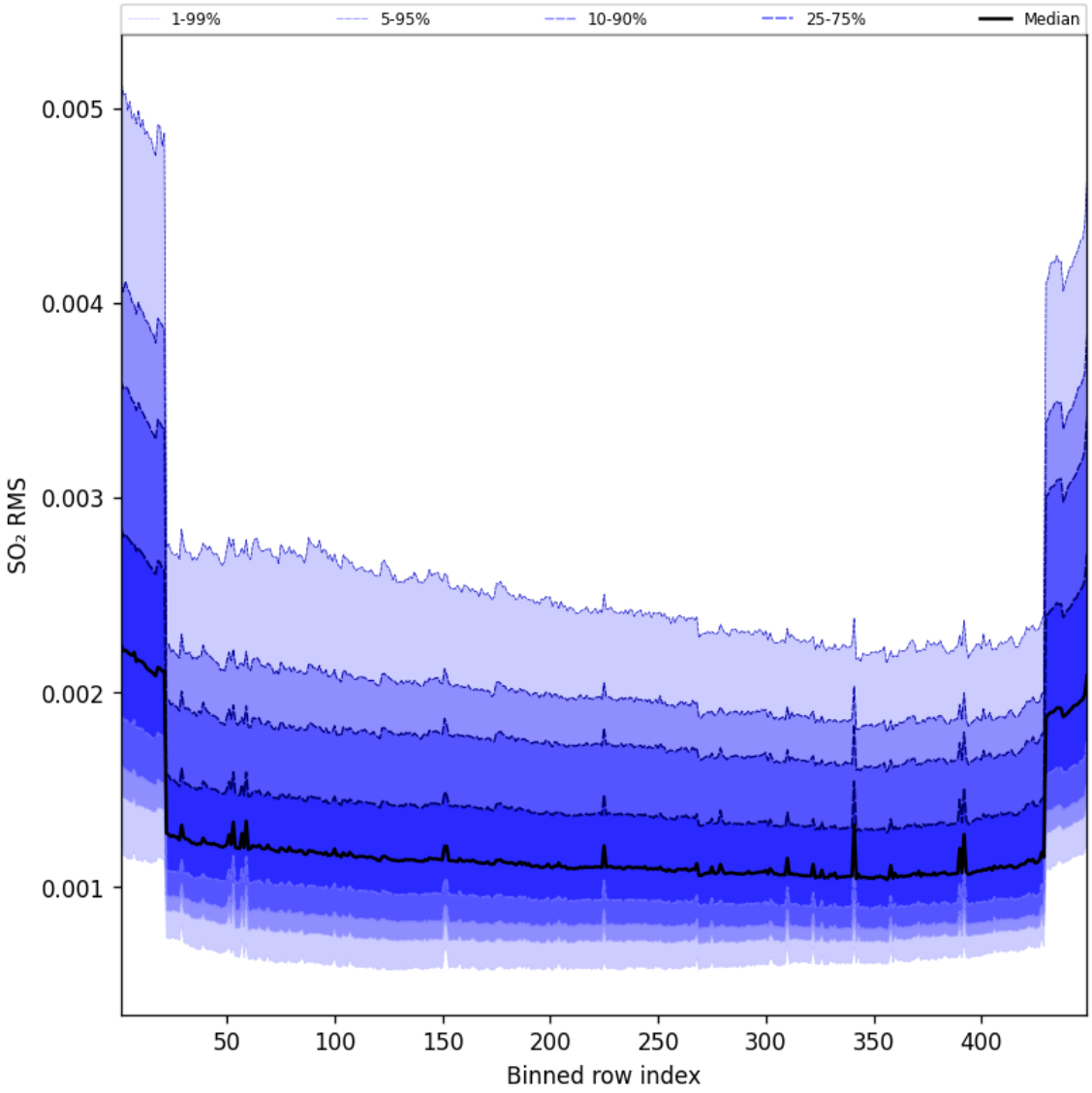

Figure 106: Along track statistics of "SO_2 RMS" for 2025-05-02 to 2025-05-02

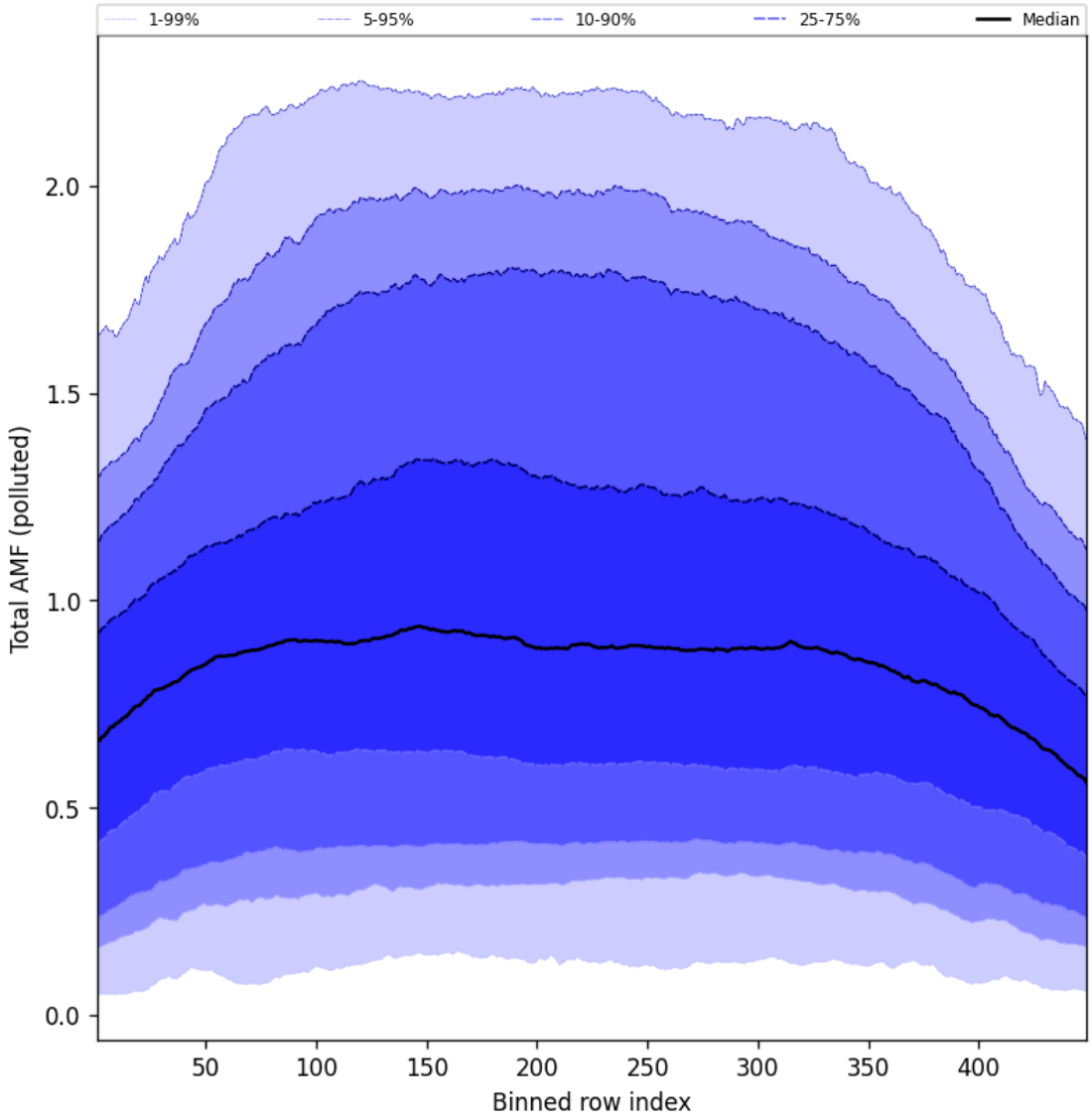

Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-05-02 to 2025-05-02

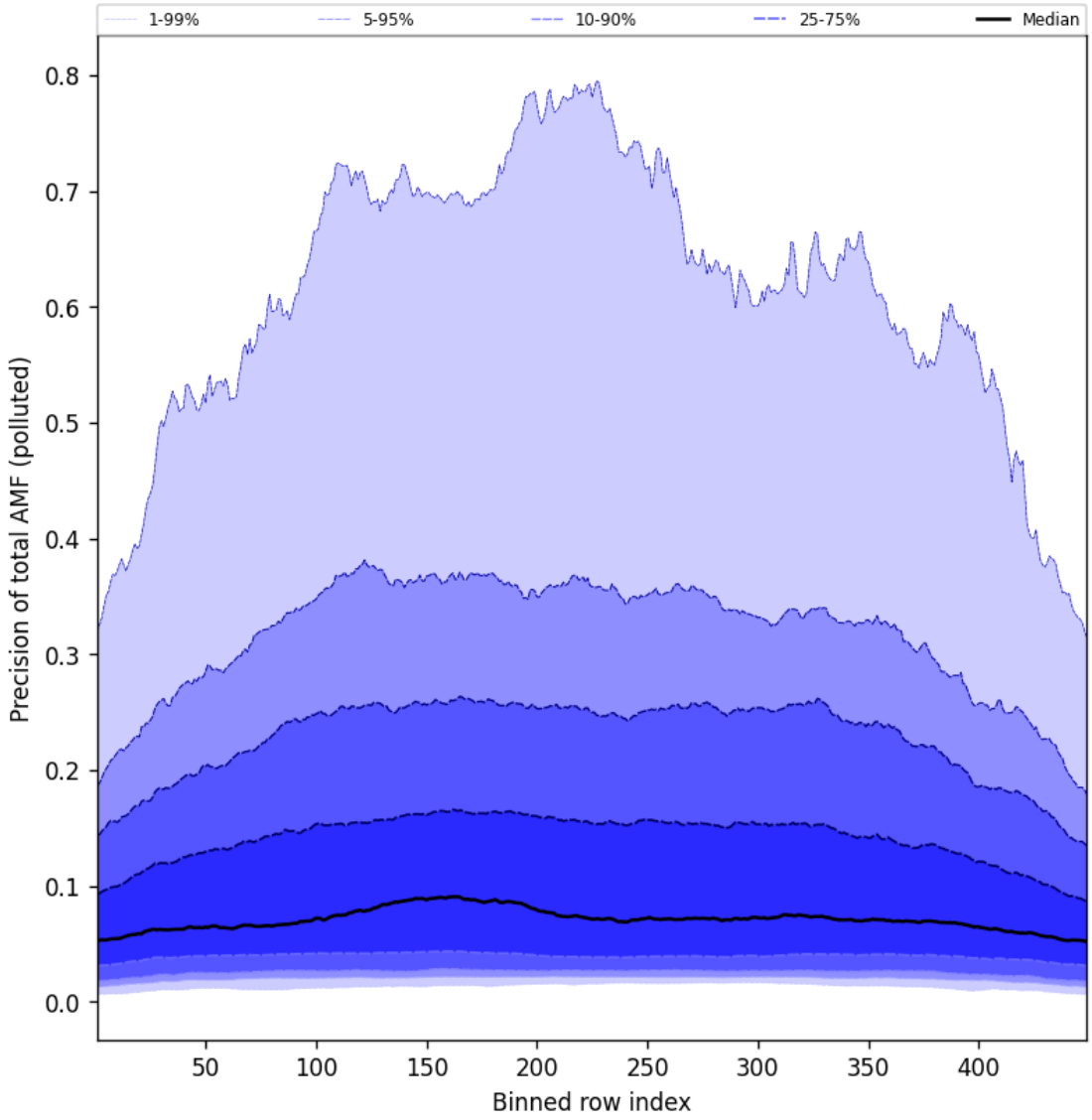

Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-05-02 to 2025-05-02

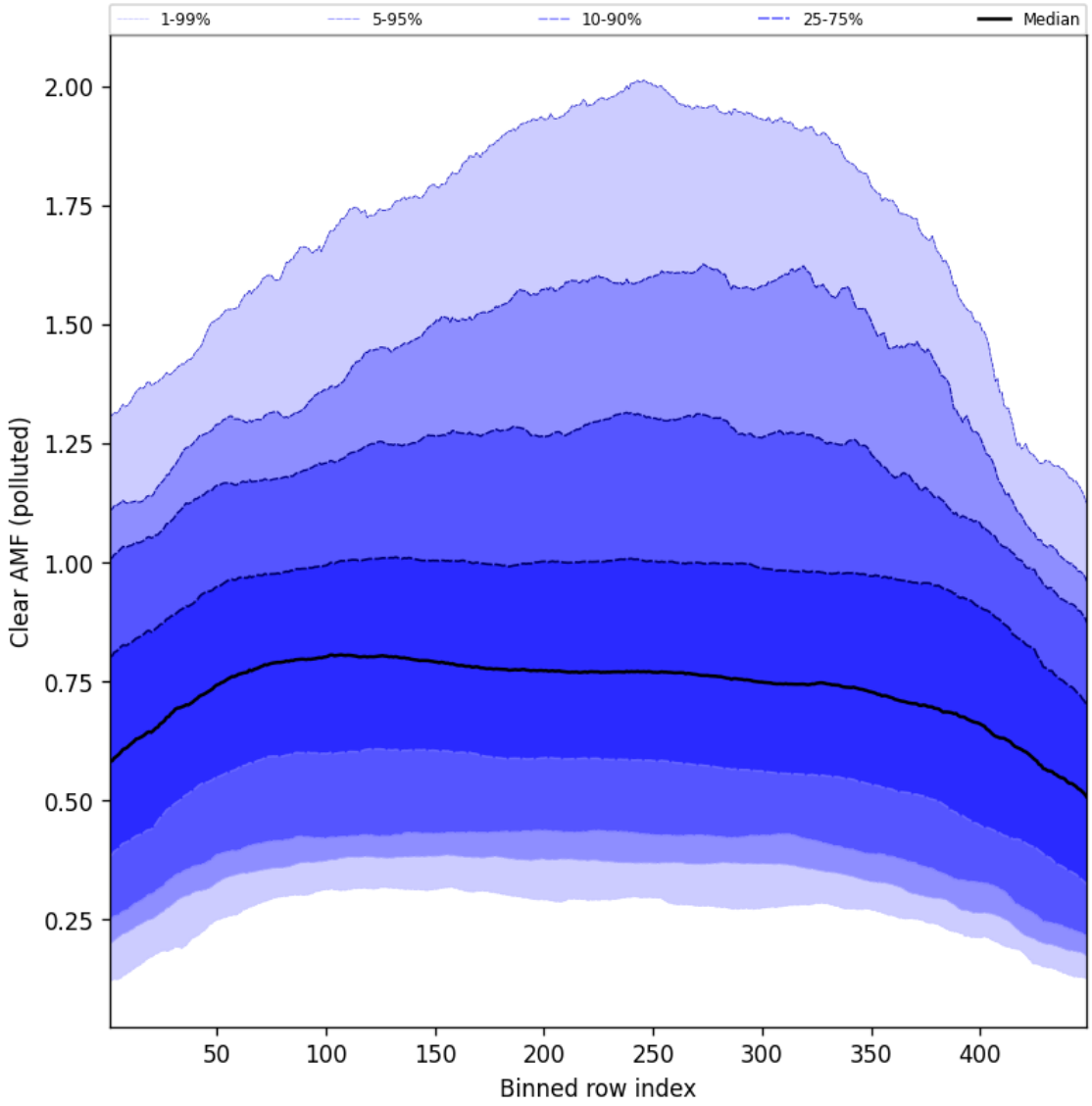

Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-05-02 to 2025-05-02

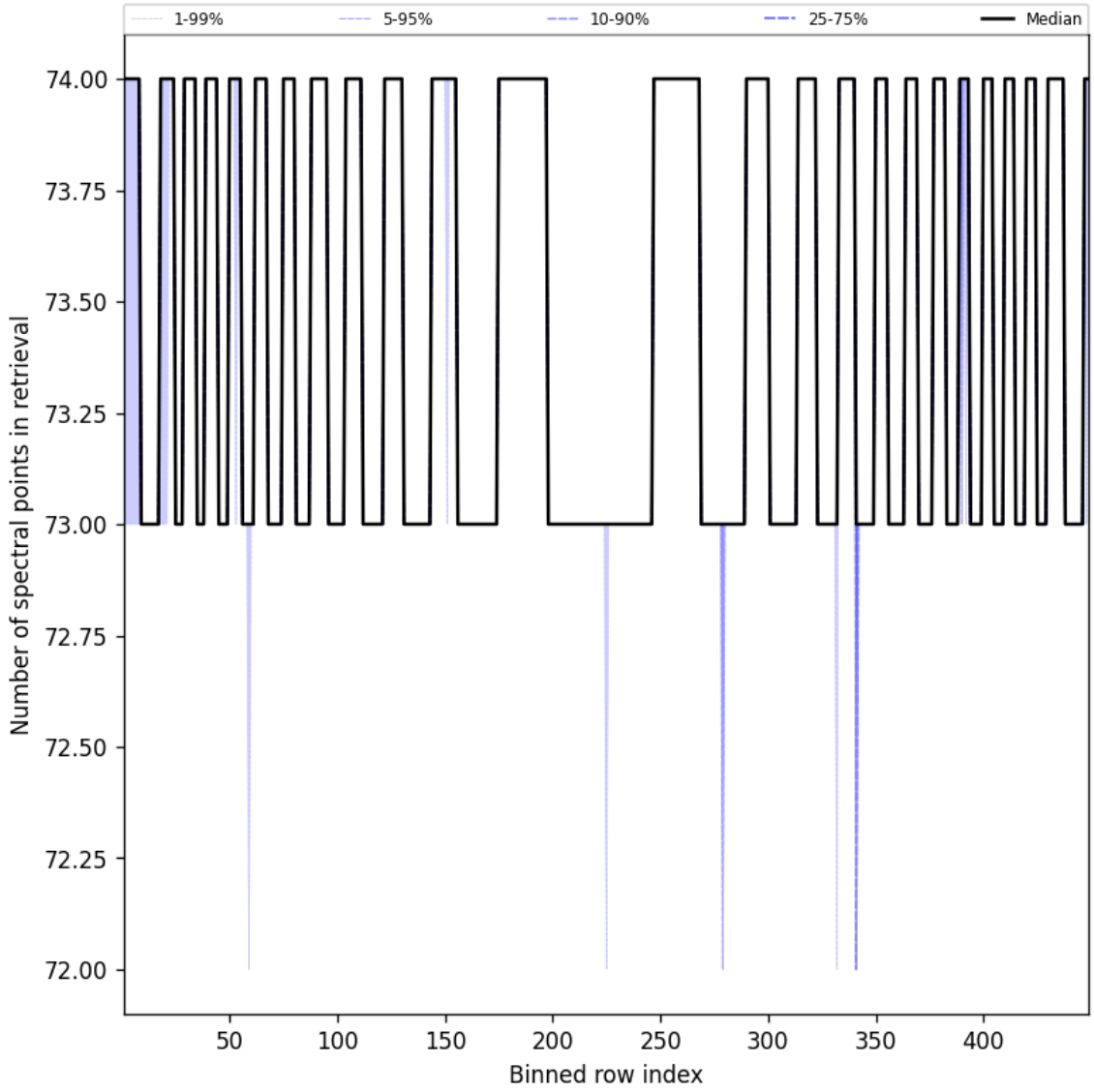

Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-05-02 to 2025-05-02

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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