PyCAMA report generated by tropl2-proc

tropl2-proc

2025-03-16 (05:16)

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]	0.661 ± 0.405	17301593	0.995	0.770	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(4.867 \pm 137.089) \times 10^{-2}$	17301593	0.278	0.477	1.201×10^{-2}	-84.7	155
sulfurdioxide total vertical column precision [DU]	0.625 ± 1.023	17301593	0.197	0.407	0.342	4.422×10^{-2}	47.0
sulfurdioxide slant column density corrected [DU]	$(2.320 \pm 39.193) \times 10^{-2}$	17301593	0.258	0.362	1.004×10^{-2}	-11.3	56.4
sulfurdioxide slant column density cobra [DU]	$(2.298 \pm 38.025) \times 10^{-2}$	17301593	0.258	0.362	1.004×10^{-2}	-11.3	42.0
sulfurdioxide slant column density cobra precision [DU]	0.297 ± 0.148	17301593	0.213	0.151	0.248	8.247×10^{-2}	21.9
sulfurdioxide slant column density window1 [DU]	0.226 ± 0.718	17301593	0.275	0.740	0.246	-172	57.4
sulfurdioxide slant column density window1 precision [DU]	0.297 ± 0.148	17301593	0.213	0.151	0.248	8.247×10^{-2}	21.9
sulfurdioxide slant column density corrected win1 [DU]	$(8.551 \pm 70.633) \times 10^{-2}$	17301593	7.500×10^{-2}	0.720	6.300×10^{-2}	-172	57.8
background so2 slant column offset window1 [DU]	-0.141 ± 0.210	17301593	-0.260	0.208	-0.194	-1.07	3.29
sulfurdioxide slant column density window2 [DU]	3.65 ± 9.17	17301593	3.25	11.6	3.37	-1.185×10^{3}	1.149×10^{3}
sulfurdioxide slant column density window2 precision [DU]	8.15 ± 2.21	17301593	7.43	2.59	7.81	2.22	533
sulfurdioxide slant column density corrected win2 [DU]	1.89 ± 8.78	17301593	1.75	11.1	1.85	-1.190×10^{3}	1.148×10^{3}
background so2 slant column offset window2 [DU]	-1.77 ± 2.63	17301593	0.250	3.63	-0.889	-20.0	9.60
sulfurdioxide slant column density window3 [DU]	-20.3 ± 24.5	17301593	-21.8	31.1	-20.5	-582	508
sulfurdioxide slant column density window3 precision [DU]	28.6 ± 13.4	17301593	22.5	9.56	25.0	9.66	338
sulfurdioxide slant column density corrected win3 [DU]	-10.5 ± 23.4	17301593	-11.8	29.7	-10.6	-575	507
background so2 slant column offset window3 [DU]	9.75 ± 7.49	17301593	3.92	12.4	9.13	-18.2	35.8
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.22	17301593	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(3.268 \pm 7.521) \times 10^{-2}$	17301593	1.217×10^{-2}	1.688×10^{-2}	1.485×10^{-2}	4.243×10^{-4}	1.87
fitted radiance shift [nm]	$(-4.781 \pm 26.466) \times 10^{-4}$	17301593	-5.000×10^{-4}	1.863×10^{-3}	-4.584×10^{-4}	-3.823×10^{-2}	3.972×10^{-2}
fitted radiance squeeze [1]	$(-3.974 \pm 20.654) \times 10^{-5}$	17301593	-1.000×10^{-5}	2.093×10^{-4}	-2.183×10^{-5}	-1.440×10^{-2}	1.377×10^{-2}
fitted root mean square [1]	$(1.308 \pm 0.624) \times 10^{-3}$	17301593	9.250×10^{-4}	5.989×10^{-4}	1.107×10^{-3}	3.099×10^{-4}	5.342×10^{-2}
sulfurdioxide total air mass factor polluted [1]	0.811 ± 0.425	17301593	0.620	0.543	0.760	5.000×10^{-2}	2.97
sulfurdioxide total air mass factor polluted precision [1]	0.113 ± 0.128	17301593	3.500×10^{-2}	0.112	6.449×10^{-2}	2.500×10^{-3}	2.01
sulfurdioxide clear air mass factor polluted [1]	0.695 ± 0.309	17301593	0.580	0.397	0.652	3.165×10^{-2}	3.10
number of spectral points in retrieval [1]	73.5 ± 0.5	17301593	73.0	1.000	73.0	52.0	74.0

Table 2: Percentile ranges

Variable	1 %	5 %	10 %	15.9 %	25 %	75 %	84.1 %	90 %	95 %	99 %
qa value [1]	0.0	0.0	5.000×10^{-2}	0.110	0.230	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	−3.06	−1.03	−0.592	−0.385	−0.222	0.255	0.436	0.673	1.19	3.75
sulfurdioxide total vertical column precision [DU]	9.767×10^{-2}	0.133	0.161	0.186	0.219	0.625	0.876	1.21	1.92	5.09
sulfurdioxide slant column density corrected [DU]	−0.889	−0.498	−0.356	−0.264	−0.169	0.193	0.295	0.398	0.568	1.14
sulfurdioxide slant column density cobra [DU]	−0.889	−0.498	−0.356	−0.264	−0.169	0.193	0.295	0.398	0.568	1.14
sulfurdioxide slant column density cobra precision [DU]	0.138	0.163	0.176	0.187	0.200	0.352	0.410	0.473	0.576	0.849
sulfurdioxide slant column density window1 [DU]	−1.84	−0.880	−0.546	−0.338	−0.131	0.609	0.798	0.980	1.26	2.07
sulfurdioxide slant column density window1 precision [DU]	0.138	0.163	0.176	0.187	0.200	0.352	0.410	0.473	0.576	0.849
sulfurdioxide slant column density corrected win1 [DU]	−1.69	−0.924	−0.654	−0.477	−0.292	0.428	0.630	0.833	1.17	2.18
background so2 slant column offset window1 [DU]	−0.414	−0.343	−0.315	−0.296	−0.273	-6.482×10^{-2}	1.768×10^{-2}	0.106	0.234	0.587
sulfurdioxide slant column density window2 [DU]	−17.2	−10.7	−7.50	−5.07	−2.31	9.30	12.4	15.2	19.0	27.1
sulfurdioxide slant column density window2 precision [DU]	4.34	5.25	5.77	6.19	6.68	9.27	10.1	11.0	12.1	14.7
sulfurdioxide slant column density corrected win2 [DU]	−19.2	−12.3	−8.95	−6.48	−3.71	7.44	10.2	12.7	16.2	23.3
background so2 slant column offset window2 [DU]	−8.96	−6.81	−5.67	−4.72	−3.46	0.161	0.445	0.694	1.10	2.45
sulfurdioxide slant column density window3 [DU]	−80.1	−60.2	−50.6	−43.6	−35.8	−4.74	3.30	10.5	20.2	39.1
sulfurdioxide slant column density window3 precision [DU]	14.1	16.5	18.3	19.7	21.3	30.9	35.8	42.1	54.3	86.1
sulfurdioxide slant column density corrected win3 [DU]	−68.6	−48.9	−39.5	−32.8	−25.3	4.37	11.9	18.7	27.9	46.3
background so2 slant column offset window3 [DU]	−4.96	−0.376	0.885	1.98	3.45	15.8	18.2	20.0	22.0	25.5
sulfurdioxide slant column cobra flag [1]	0.0	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
integrated so2 profile apriori [DU]	1.542×10^{-3}	3.014×10^{-3}	4.683×10^{-3}	6.559×10^{-3}	8.880×10^{-3}	2.576×10^{-2}	3.523×10^{-2}	5.788×10^{-2}	0.123	0.366
fitted radiance shift [nm]	-8.483×10^{-3}	-4.444×10^{-3}	-3.013×10^{-3}	-2.179×10^{-3}	-1.441×10^{-3}	4.223×10^{-4}	1.129×10^{-3}	2.021×10^{-3}	3.570×10^{-3}	7.805×10^{-3}
fitted radiance squeeze [1]	-7.380×10^{-4}	-3.806×10^{-4}	-2.616×10^{-4}	-1.941×10^{-4}	-1.307×10^{-4}	7.859×10^{-5}	1.290×10^{-4}	1.754×10^{-4}	2.412×10^{-4}	3.964×10^{-4}
fitted root mean square [1]	5.914×10^{-4}	7.274×10^{-4}	7.973×10^{-4}	8.512×10^{-4}	9.181×10^{-4}	1.517×10^{-3}	1.785×10^{-3}	2.060×10^{-3}	2.509×10^{-3}	3.601×10^{-3}
sulfurdioxide total air mass factor polluted [1]	6.202×10^{-2}	0.200	0.305	0.396	0.507	1.05	1.23	1.40	1.62	2.01
sulfurdioxide total air mass factor polluted precision [1]	8.522×10^{-3}	1.613×10^{-2}	2.248×10^{-2}	2.767×10^{-2}	3.475×10^{-2}	0.146	0.199	0.258	0.357	0.585
sulfurdioxide clear air mass factor polluted [1]	0.169	0.268	0.338	0.402	0.481	0.878	0.978	1.07	1.21	1.70
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]	0.661 ± 0.404	8739111	0.770	1.000	0.0	1.000	0.230	1.000
sulfurdioxide total vertical column [DU]	$(7.440 \pm 177.806) \times 10^{-2}$	8739111	0.577	1.419×10^{-2}	-84.7	155	-0.266	0.312
sulfurdioxide total vertical column precision [DU]	0.823 ± 1.315	8739111	0.607	0.424	4.422×10^{-2}	47.0	0.247	0.854
sulfurdioxide slant column density corrected [DU]	$(2.917 \pm 44.190) \times 10^{-2}$	8739111	0.384	1.077×10^{-2}	-10.4	56.4	-0.178	0.206
sulfurdioxide slant column density cobra [DU]	$(2.877 \pm 42.422) \times 10^{-2}$	8739111	0.384	1.077×10^{-2}	-10.4	14.4	-0.178	0.206
sulfurdioxide slant column density cobra precision [DU]	0.322 ± 0.171	8739111	0.177	0.269	8.636×10^{-2}	11.6	0.206	0.383
sulfurdioxide slant column density window1 [DU]	0.235 ± 0.796	8739111	0.784	0.261	-172	57.4	-0.139	0.645
sulfurdioxide slant column density window1 precision [DU]	0.322 ± 0.171	8739111	0.177	0.269	8.636×10^{-2}	11.6	0.206	0.383
sulfurdioxide slant column density corrected win1 [DU]	0.102 ± 0.787	8739111	0.767	6.854×10^{-2}	-172	57.8	-0.307	0.461
background so2 slant column offset window1 [DU]	-0.134 ± 0.249	8739111	0.226	-0.204	-0.934	3.29	-0.284	-5.872×10^{-2}
sulfurdioxide slant column density window2 [DU]	4.35 ± 9.36	8739111	12.0	4.01	-57.5	86.4	-1.83	10.2
sulfurdioxide slant column density window2 precision [DU]	8.20 ± 2.12	8739111	2.57	7.89	2.28	301	6.76	9.32
sulfurdioxide slant column density corrected win2 [DU]	1.90 ± 8.82	8739111	11.3	1.86	-61.7	80.0	-3.78	7.53
background so2 slant column offset window2 [DU]	-2.45 ± 3.03	8739111	4.97	-1.73	-20.0	9.60	-4.85	0.120
sulfurdioxide slant column density window3 [DU]	-23.0 ± 24.0	8739111	30.6	-23.1	-193	427	-38.4	-7.72
sulfurdioxide slant column density window3 precision [DU]	27.8 ± 12.5	8739111	8.46	24.5	9.75	338	21.2	29.7
sulfurdioxide slant column density corrected win3 [DU]	-10.7 ± 23.1	8739111	29.3	-10.6	-183	429	-25.2	4.04
background so2 slant column offset window3 [DU]	12.3 ± 7.4	8739111	13.2	12.7	-14.5	35.8	5.40	18.6
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.23	8739111	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(4.628 \pm 10.004) \times 10^{-2}$	8739111	2.844×10^{-2}	1.643×10^{-2}	4.243×10^{-4}	1.87	8.085×10^{-3}	3.653×10^{-2}
fitted radiance shift [nm]	$(-3.204 \pm 24.779) \times 10^{-4}$	8739111	1.650×10^{-3}	-3.292×10^{-4}	-3.679×10^{-2}	3.693×10^{-2}	-1.167×10^{-3}	4.831×10^{-4}
fitted radiance squeeze [1]	$(-4.936 \pm 23.911) \times 10^{-5}$	8739111	2.268×10^{-4}	-2.011×10^{-5}	-1.355×10^{-2}	1.167×10^{-2}	-1.405×10^{-4}	8.631×10^{-5}
fitted root mean square [1]	$(1.409 \pm 0.727) \times 10^{-3}$	8739111	6.982×10^{-4}	1.169×10^{-3}	3.446×10^{-4}	5.342×10^{-2}	9.431×10^{-4}	1.641×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.725 ± 0.418	8739111	0.540	0.663	5.000×10^{-2}	2.97	0.419	0.959
sulfurdioxide total air mass factor polluted precision [1]	0.105 ± 0.144	8739111	9.599×10^{-2}	5.097×10^{-2}	2.500×10^{-3}	2.01	2.844×10^{-2}	0.124
sulfurdioxide clear air mass factor polluted [1]	0.617 ± 0.296	8739111	0.434	0.561	3.165×10^{-2}	2.97	0.389	0.823
number of spectral points in retrieval [1]	73.5 ± 0.5	8739111	1.000	73.0	71.0	74.0	73.0	74.0

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

Variable	mean $\pm\sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.660 ± 0.406	8562482	0.770	1.000	0.0	1.000	0.230	1.000
sulfurdioxide total vertical column [DU]	$(2.241 \pm 75.458) \times 10^{-2}$	8562482	0.403	1.036×10^{-2}	-83.9	89.9	-0.189	0.214
sulfurdioxide total vertical column precision [DU]	0.423 ± 0.521	8562482	0.277	0.288	4.425×10^{-2}	40.2	0.200	0.477
sulfurdioxide slant column density corrected [DU]	$(1.712 \pm 33.318) \times 10^{-2}$	8562482	0.342	9.361×10^{-3}	-11.3	55.7	-0.160	0.182
sulfurdioxide slant column density cobra [DU]	$(1.706 \pm 32.928) \times 10^{-2}$	8562482	0.342	9.361×10^{-3}	-11.3	42.0	-0.160	0.182
sulfurdioxide slant column density cobra precision [DU]	0.272 ± 0.116	8562482	0.124	0.234	8.247×10^{-2}	21.9	0.196	0.320
sulfurdioxide slant column density window1 [DU]	0.217 ± 0.628	8562482	0.698	0.233	-96.9	46.7	-0.123	0.575
sulfurdioxide slant column density window1 precision [DU]	0.272 ± 0.116	8562482	0.124	0.234	8.247×10^{-2}	21.9	0.196	0.320
sulfurdioxide slant column density corrected win1 [DU]	$(6.910 \pm 61.294) \times 10^{-2}$	8562482	0.676	5.791×10^{-2}	-96.9	46.5	-0.277	0.398
background so2 slant column offset window1 [DU]	-0.148 ± 0.160	8562482	0.192	-0.188	-1.07	2.69	-0.263	-7.072×10^{-2}
sulfurdioxide slant column density window2 [DU]	2.94 ± 8.92	8562482	11.2	2.76	-1.185×10^{3}	1.149×10^{3}	-2.76	8.43
sulfurdioxide slant column density window2 precision [DU]	8.09 ± 2.30	8562482	2.62	7.73	2.22	533	6.60	9.21
sulfurdioxide slant column density corrected win2 [DU]	1.87 ± 8.73	8562482	11.0	1.84	-1.190×10^{3}	1.148×10^{3}	-3.64	7.35
background so2 slant column offset window2 [DU]	-1.07 ± 1.89	8562482	2.24	-0.567	-13.0	8.87	-2.05	0.189
sulfurdioxide slant column density window3 [DU]	-17.5 ± 24.6	8562482	31.1	-17.7	-582	508	-33.0	-1.87
sulfurdioxide slant column density window3 precision [DU]	29.5 ± 14.2	8562482	10.7	25.6	9.66	249	21.5	32.1
sulfurdioxide slant column density corrected win3 [DU]	-10.3 ± 23.8	8562482	30.1	-10.5	-575	507	-25.4	4.73
background so2 slant column offset window3 [DU]	7.12 ± 6.57	8562482	11.0	5.59	-18.2	27.3	1.77	12.8
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.21	8562482	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(1.879 \pm 2.885) \times 10^{-2}$	8562482	1.178×10^{-2}	1.394×10^{-2}	6.967×10^{-4}	0.993	9.398×10^{-3}	2.118×10^{-2}
fitted radiance shift [nm]	$(-6.391 \pm 27.992) \times 10^{-4}$	8562482	2.070×10^{-3}	-6.179×10^{-4}	-3.823×10^{-2}	3.972×10^{-2}	-1.727×10^{-3}	3.423×10^{-4}
fitted radiance squeeze [1]	$(-2.993 \pm 16.631) \times 10^{-5}$	8562482	1.942×10^{-4}	-2.340×10^{-5}	-1.440×10^{-2}	1.377×10^{-2}	-1.228×10^{-4}	7.135×10^{-5}
fitted root mean square [1]	$(1.205 \pm 0.477) \times 10^{-3}$	8562482	4.950×10^{-4}	1.059×10^{-3}	3.099×10^{-4}	5.235×10^{-2}	8.974×10^{-4}	1.392×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.899 ± 0.414	8562482	0.523	0.846	5.000×10^{-2}	2.90	0.608	1.13
sulfurdioxide total air mass factor polluted precision [1]	0.121 ± 0.108	8562482	0.123	8.108×10^{-2}	4.575×10^{-3}	1.44	4.269×10^{-2}	0.165
sulfurdioxide clear air mass factor polluted [1]	0.775 ± 0.302	8562482	0.356	0.715	0.133	3.10	0.572	0.928
number of spectral points in retrieval [1]	73.4 ± 0.5	8562482	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]	0.702 ± 0.393	12189198	0.710	1.000	0.0	1.000	0.290	1.000
sulfurdioxide total vertical column [DU]	$(2.960 \pm 96.145) \times 10^{-2}$	12189198	0.436	9.989×10^{-3}	-83.9	111	-0.205	0.231
sulfurdioxide total vertical column precision [DU]	0.500 ± 0.686	12189198	0.333	0.309	5.232×10^{-2}	32.6	0.210	0.543
sulfurdioxide slant column density corrected [DU]	$(1.671 \pm 34.091) \times 10^{-2}$	12189198	0.348	8.550×10^{-3}	-9.33	48.1	-0.164	0.184
sulfurdioxide slant column density cobra [DU]	$(1.666 \pm 33.786) \times 10^{-2}$	12189198	0.348	8.550×10^{-3}	-9.33	32.5	-0.164	0.184
sulfurdioxide slant column density cobra precision [DU]	0.283 ± 0.130	12189198	0.138	0.236	8.658×10^{-2}	11.7	0.197	0.335
sulfurdioxide slant column density window1 [DU]	0.224 ± 0.659	12189198	0.712	0.241	-63.3	57.4	-0.121	0.591
sulfurdioxide slant column density window1 precision [DU]	0.283 ± 0.130	12189198	0.138	0.236	8.658×10^{-2}	11.7	0.197	0.335
sulfurdioxide slant column density corrected win1 [DU]	$(7.294 \pm 64.691) \times 10^{-2}$	12189198	0.694	5.671×10^{-2}	-63.3	57.8	-0.286	0.408
background so2 slant column offset window1 [DU]	-0.151 ± 0.183	12189198	0.197	-0.195	-1.07	2.86	-0.271	-7.375×10^{-2}
sulfurdioxide slant column density window2 [DU]	3.26 ± 8.92	12189198	11.3	3.03	-1.185×10^{3}	1.004×10^{3}	-2.54	8.78
sulfurdioxide slant column density window2 precision [DU]	8.03 ± 2.13	12189198	2.52	7.69	2.28	441	6.60	9.12
sulfurdioxide slant column density corrected win2 [DU]	1.87 ± 8.63	12189198	11.0	1.84	-1.190×10^{3}	1.003×10^{3}	-3.65	7.35
background so2 slant column offset window2 [DU]	-1.39 ± 2.28	12189198	2.90	-0.703	-19.1	9.60	-2.70	0.199
sulfurdioxide slant column density window3 [DU]	-17.4 ± 24.5	12189198	31.2	-17.6	-406	427	-32.9	-1.71
sulfurdioxide slant column density window3 precision [DU]	28.3 ± 12.7	12189198	9.41	24.8	9.80	338	21.3	30.7
sulfurdioxide slant column density corrected win3 [DU]	-8.55 ± 23.23	12189198	29.6	-8.79	-406	429	-23.4	6.22
background so2 slant column offset window3 [DU]	8.80 ± 6.92	12189198	11.2	7.89	-18.2	35.3	3.20	14.4
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.19	12189198	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.106 \pm 3.355) \times 10^{-2}$	12189198	1.281×10^{-2}	1.437×10^{-2}	5.466×10^{-4}	1.22	9.462×10^{-3}	2.227×10^{-2}
fitted radiance shift [nm]	$(-4.778 \pm 25.054) \times 10^{-4}$	12189198	1.853×10^{-3}	-4.387×10^{-4}	-3.564×10^{-2}	3.972×10^{-2}	-1.437×10^{-3}	4.158×10^{-4}
fitted radiance squeeze [1]	$(-3.098 \pm 18.446) \times 10^{-5}$	12189198	1.996×10^{-4}	-1.948×10^{-5}	-1.440×10^{-2}	1.212×10^{-2}	-1.224×10^{-4}	7.728×10^{-5}
fitted root mean square [1]	$(1.245 \pm 0.545) \times 10^{-3}$	12189198	5.418×10^{-4}	1.066×10^{-3}	3.424×10^{-4}	4.303×10^{-2}	9.005×10^{-4}	1.442×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.838 ± 0.391	12189198	0.499	0.801	5.000×10^{-2}	2.56	0.561	1.06
sulfurdioxide total air mass factor polluted precision [1]	0.108 ± 0.103	12189198	0.105	6.791×10^{-2}	2.500×10^{-3}	1.93	3.900×10^{-2}	0.144
sulfurdioxide clear air mass factor polluted [1]	0.726 ± 0.285	12189198	0.370	0.687	3.719×10^{-2}	2.51	0.527	0.897
number of spectral points in retrieval [1]	73.5 ± 0.5	12189198	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]	0.605 ± 0.417	3785413	0.830	1.000	0.0	1.000	0.170	1.000
sulfurdioxide total vertical column [DU]	$(7.932 \pm 189.667) \times 10^{-2}$	3785413	0.561	1.524×10^{-2}	-84.7	120	-0.255	0.306
sulfurdioxide total vertical column precision [DU]	0.842 ± 1.432	3785413	0.574	0.405	4.448×10^{-2}	47.0	0.249	0.823
sulfurdioxide slant column density corrected [DU]	$(3.213 \pm 44.356) \times 10^{-2}$	3785413	0.380	1.214×10^{-2}	-11.3	55.7	-0.175	0.205
sulfurdioxide slant column density cobra [DU]	$(3.172 \pm 42.442) \times 10^{-2}$	3785413	0.380	1.214×10^{-2}	-11.3	42.0	-0.175	0.205
sulfurdioxide slant column density cobra precision [DU]	0.311 ± 0.161	3785413	0.153	0.263	8.247×10^{-2}	21.9	0.210	0.363
sulfurdioxide slant column density window1 [DU]	0.251 ± 0.780	3785413	0.771	0.272	-172	42.0	-0.122	0.649
sulfurdioxide slant column density window1 precision [DU]	0.311 ± 0.161	3785413	0.153	0.263	8.247×10^{-2}	21.9	0.210	0.363
sulfurdioxide slant column density corrected win1 [DU]	0.105 ± 0.768	3785413	0.748	7.558×10^{-2}	-172	42.1	-0.293	0.455
background so2 slant column offset window1 [DU]	-0.146 ± 0.231	3785413	0.204	-0.212	-0.934	2.99	-0.284	-8.009×10^{-2}
sulfurdioxide slant column density window2 [DU]	4.00 ± 9.49	3785413	12.0	3.70	-913	1.149×10^{3}	-2.13	9.83
sulfurdioxide slant column density window2 precision [DU]	8.35 ± 2.41	3785413	2.63	8.06	2.22	533	6.86	9.49
sulfurdioxide slant column density corrected win2 [DU]	1.85 ± 9.02	3785413	11.4	1.81	-912	1.148×10^{3}	-3.86	7.52
background so2 slant column offset window2 [DU]	-2.15 ± 2.93	3785413	4.60	-1.06	-20.0	9.60	-4.44	0.160
sulfurdioxide slant column density window3 [DU]	-26.9 ± 23.2	3785413	29.2	-26.5	-582	508	-41.3	-12.1
sulfurdioxide slant column density window3 precision [DU]	29.9 ± 15.5	3785413	10.2	25.6	9.66	303	21.6	31.8
sulfurdioxide slant column density corrected win3 [DU]	-16.1 ± 23.5	3785413	29.7	-15.5	-575	507	-30.6	-0.908
background so2 slant column offset window3 [DU]	10.8 ± 8.1	3785413	14.1	10.6	-18.2	35.7	3.68	17.8
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.22	3785413	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(6.032 \pm 12.457) \times 10^{-2}$	3785413	4.566×10^{-2}	1.888×10^{-2}	4.243×10^{-4}	1.87	7.393×10^{-3}	5.305×10^{-2}
fitted radiance shift [nm]	$(-4.679 \pm 30.753) \times 10^{-4}$	3785413	1.856×10^{-3}	-5.059×10^{-4}	-3.677×10^{-2}	3.568×10^{-2}	-1.423×10^{-3}	4.326×10^{-4}
fitted radiance squeeze [1]	$(-4.594 \pm 22.512) \times 10^{-5}$	3785413	2.203×10^{-4}	-2.260×10^{-5}	-1.198×10^{-2}	1.377×10^{-2}	-1.379×10^{-4}	8.240×10^{-5}
fitted root mean square [1]	$(1.370 \pm 0.689) \times 10^{-3}$	3785413	5.995×10^{-4}	1.164×10^{-3}	3.099×10^{-4}	5.342×10^{-2}	9.600×10^{-4}	1.560×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.763 ± 0.493	3785413	0.608	0.650	5.000×10^{-2}	2.90	0.408	1.02
sulfurdioxide total air mass factor polluted precision [1]	0.126 ± 0.176	3785413	0.134	5.143×10^{-2}	2.500×10^{-3}	2.01	2.689×10^{-2}	0.161
sulfurdioxide clear air mass factor polluted [1]	0.630 ± 0.341	3785413	0.427	0.566	3.342×10^{-2}	3.10	0.381	0.808
number of spectral points in retrieval [1]	73.4 ± 0.5	3785413	1.000	73.0	52.0	74.0	73.0	74.0

3 Granule outlines

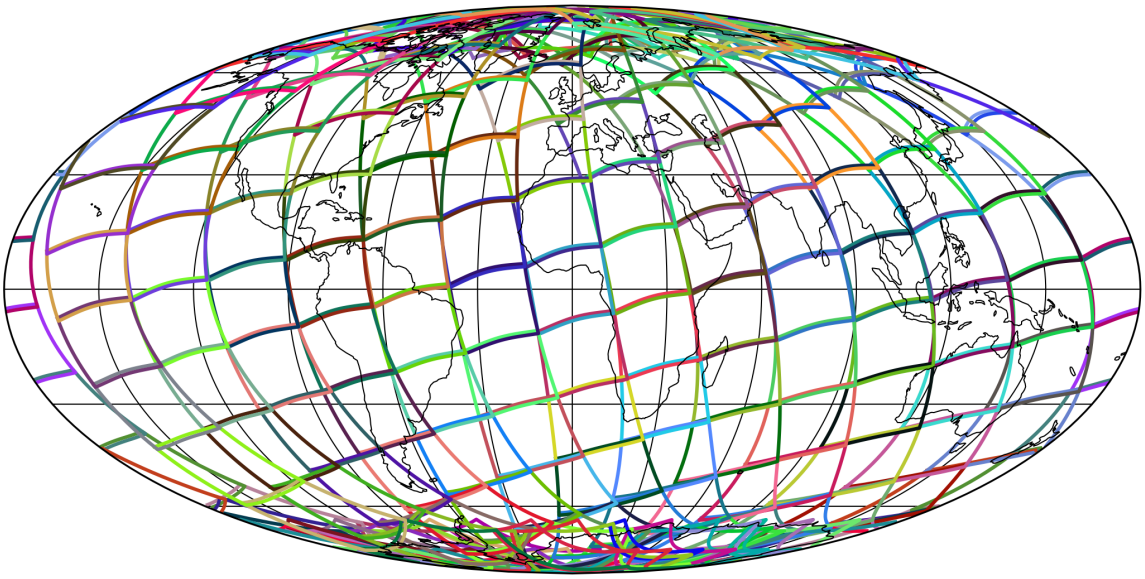

Figure 1: Outline of the granules.

4 Input data monitoring

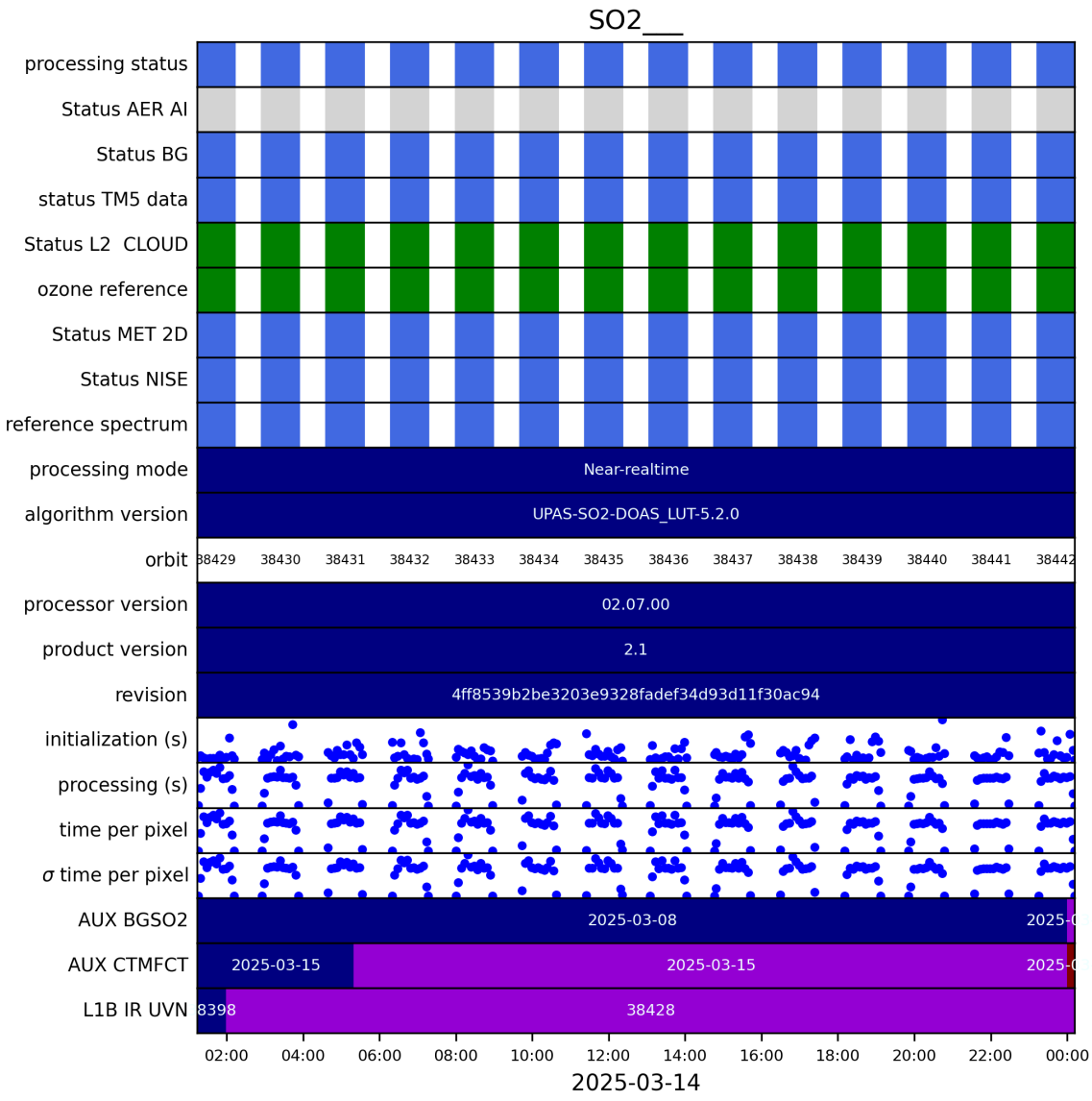

Figure 2: Input data per granule

5 Warnings and errors

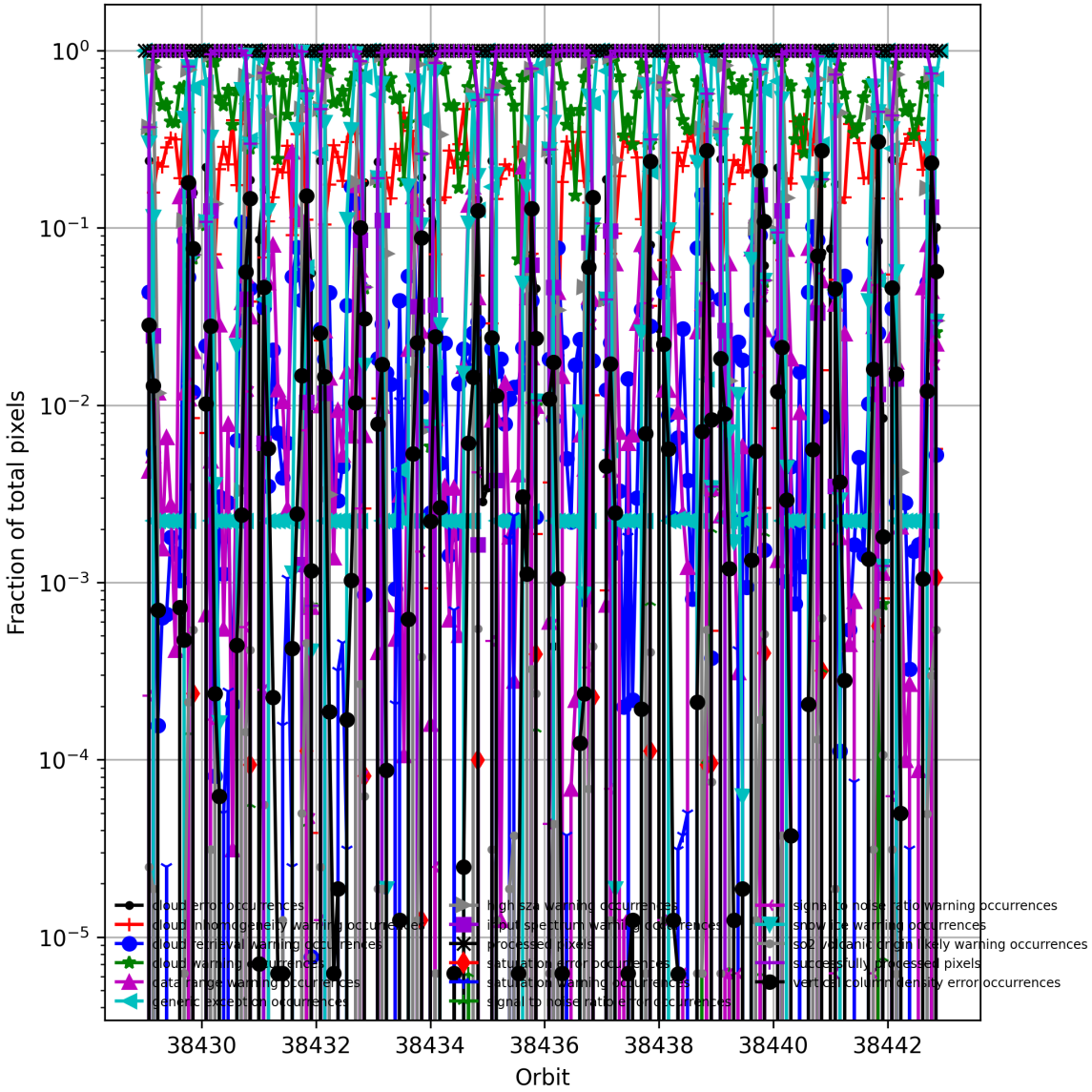

Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

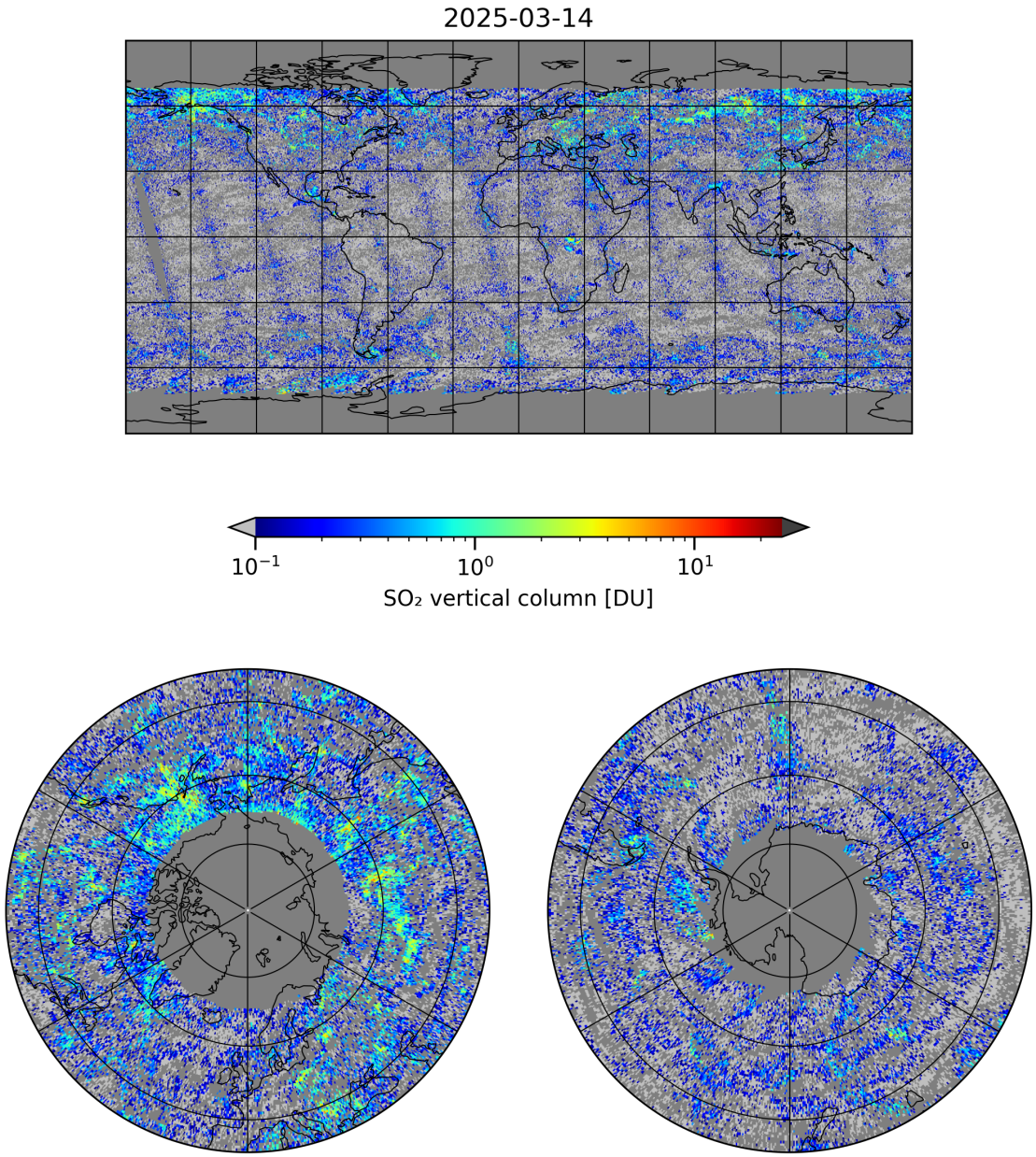

Figure 4: Map of "SO_2 vertical column" for 2025-03-14 to 2025-03-15

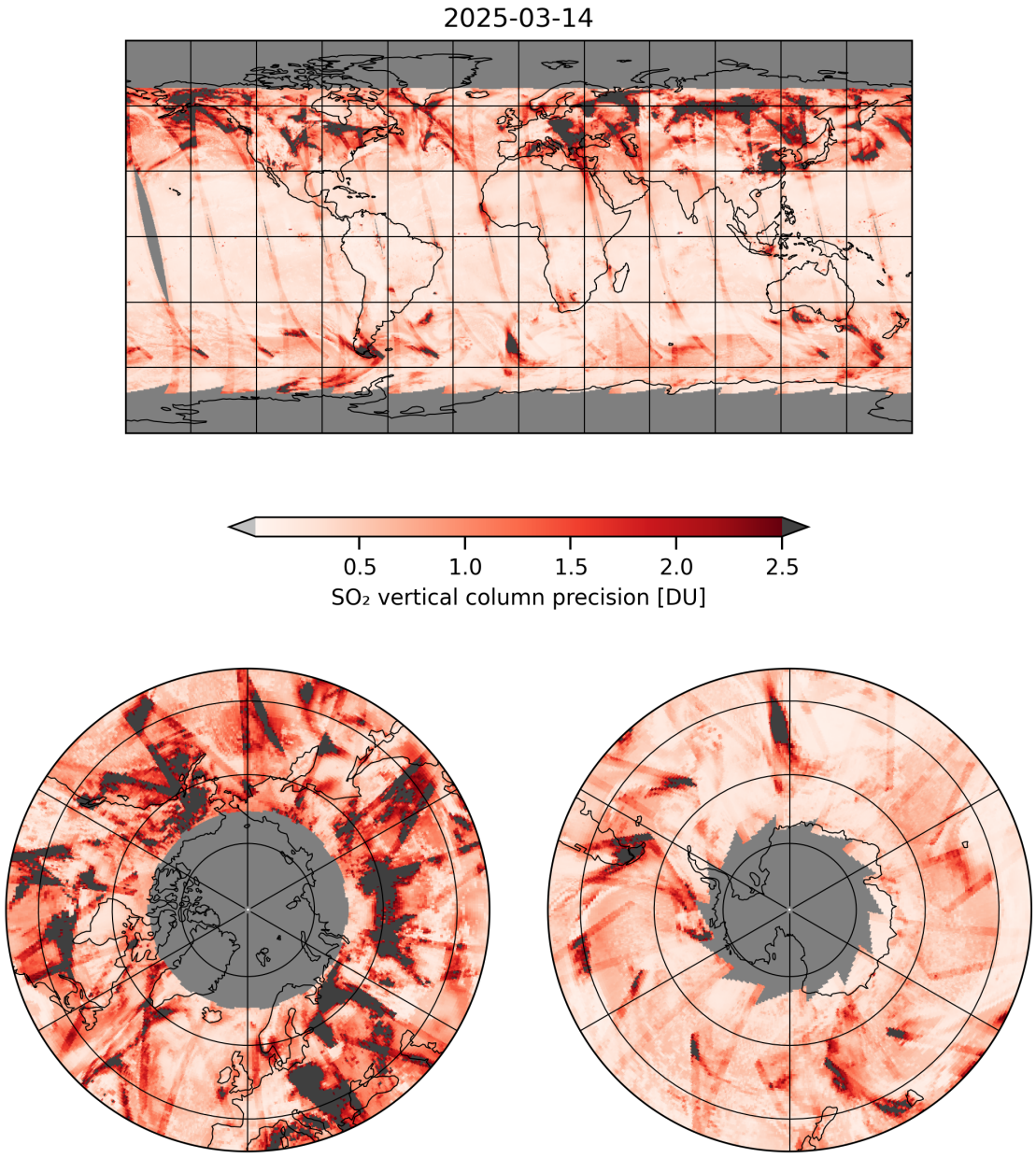

Figure 5: Map of "SO_2 vertical column precision" for 2025-03-14 to 2025-03-15

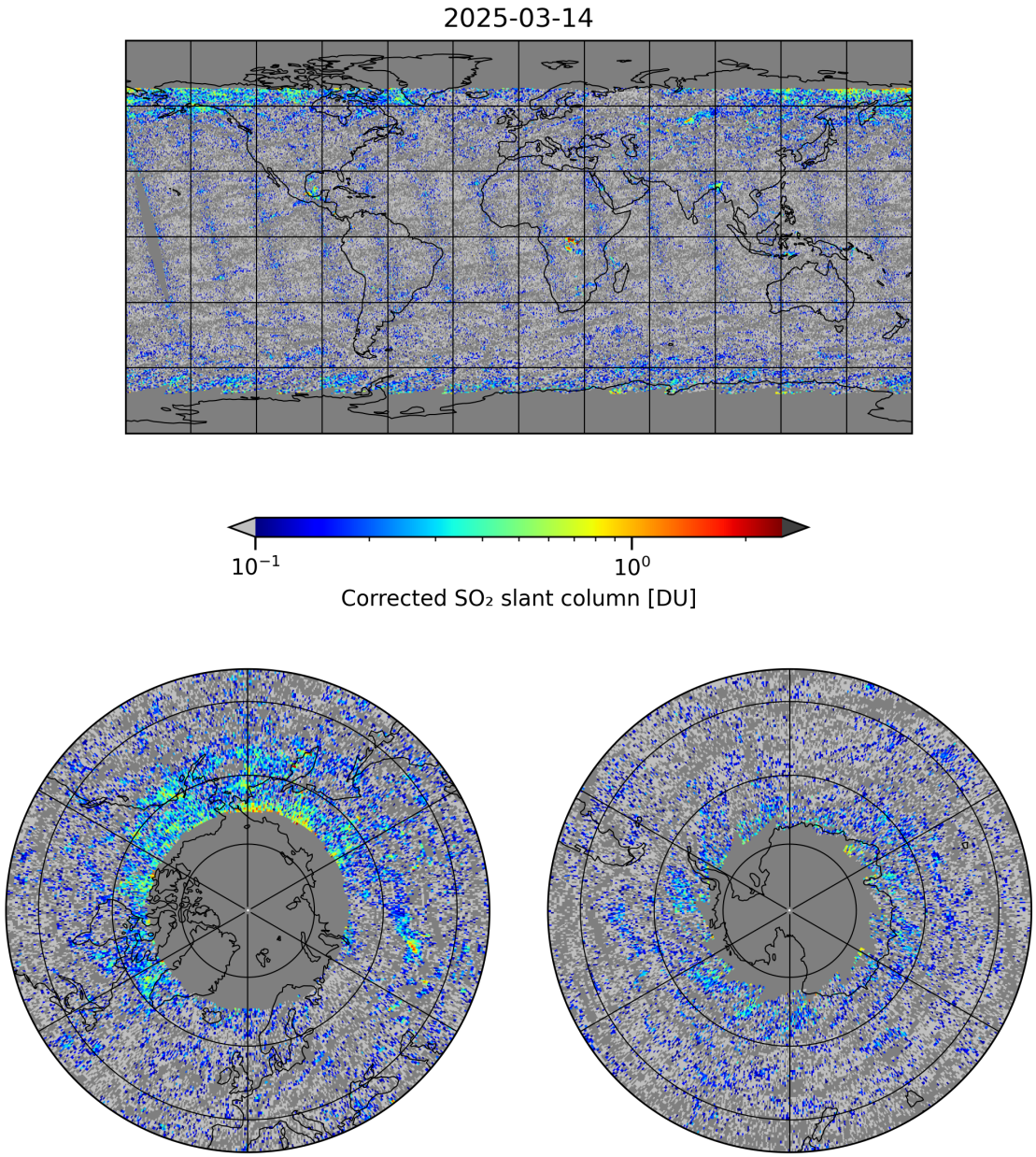

Figure 6: Map of “Corrected SO_2 slant column” for 2025-03-14 to 2025-03-15

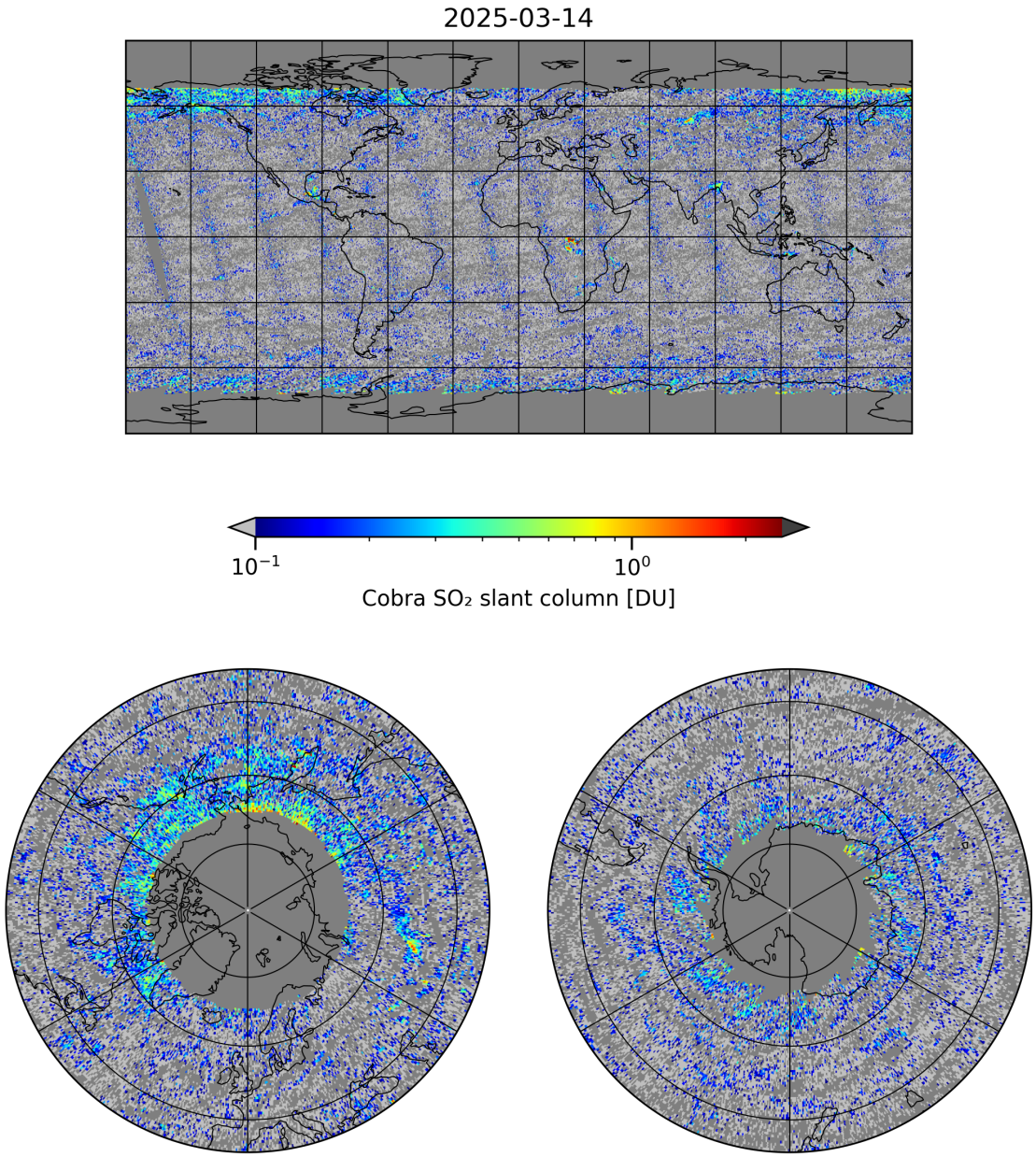

Figure 7: Map of "Cobra SO_2 slant column" for 2025-03-14 to 2025-03-15

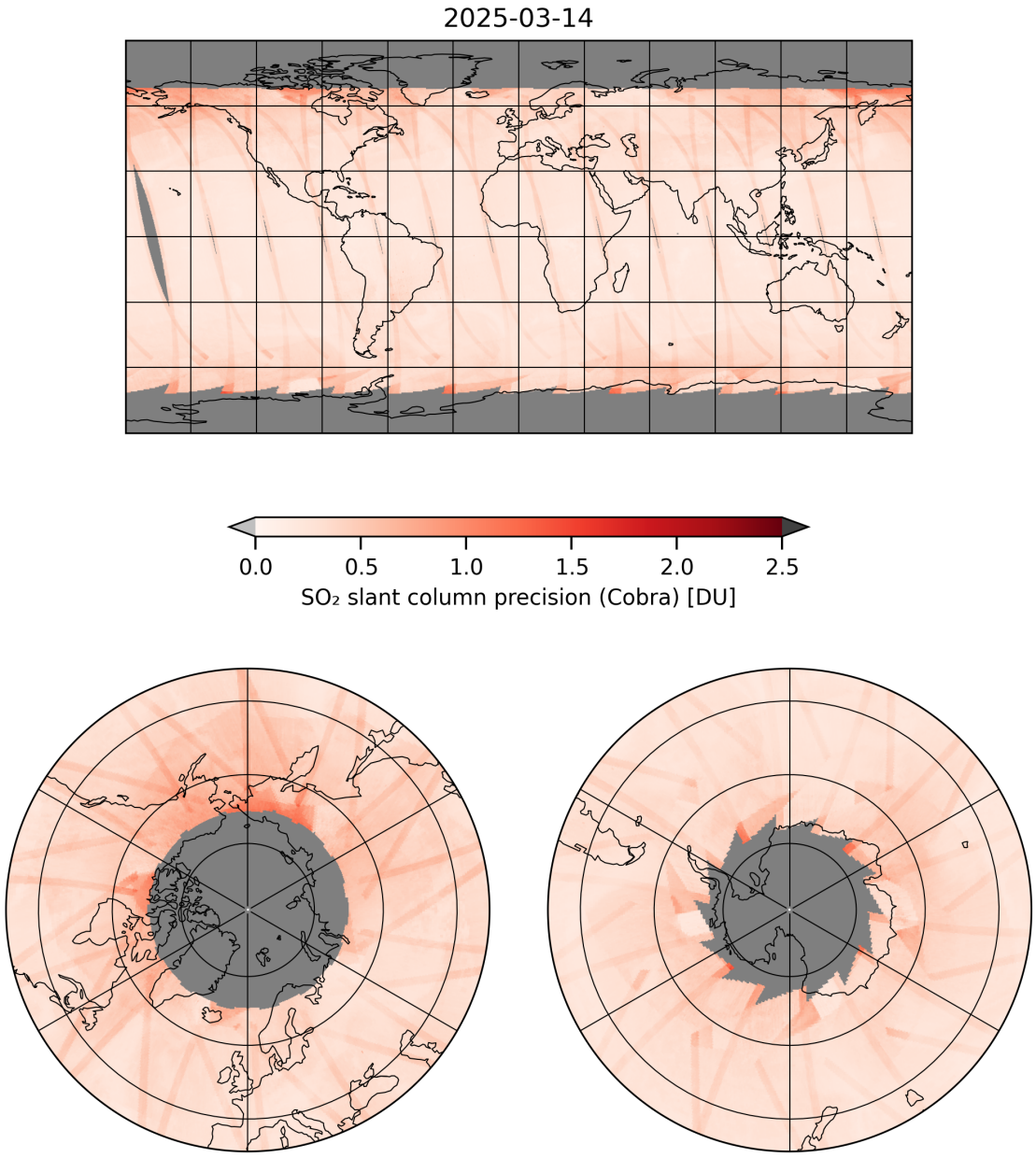

Figure 8: Map of "SO_2 slant column precision (Cobra)" for 2025-03-14 to 2025-03-15

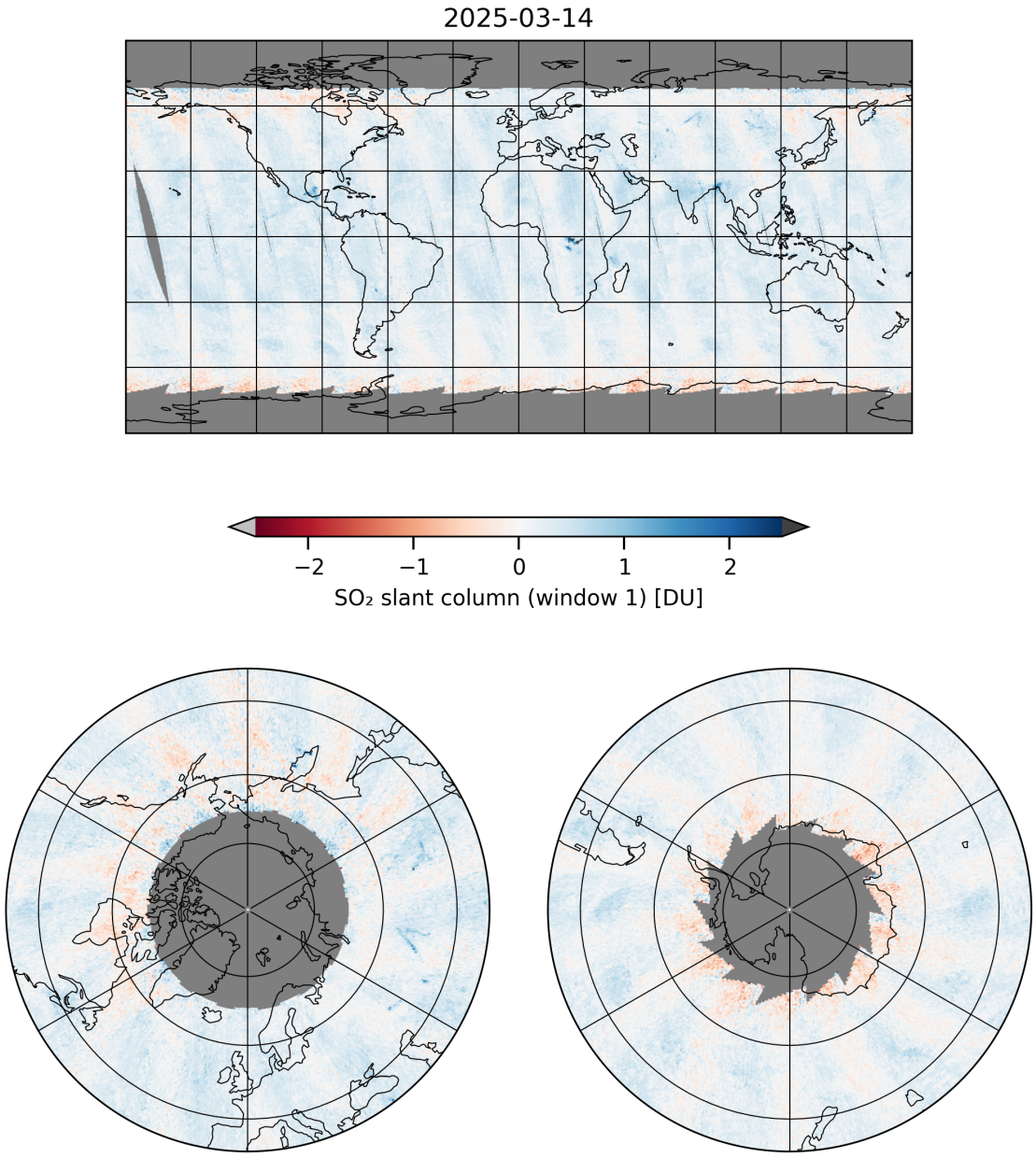

Figure 9: Map of "SO_2 slant column (window 1)" for 2025-03-14 to 2025-03-15

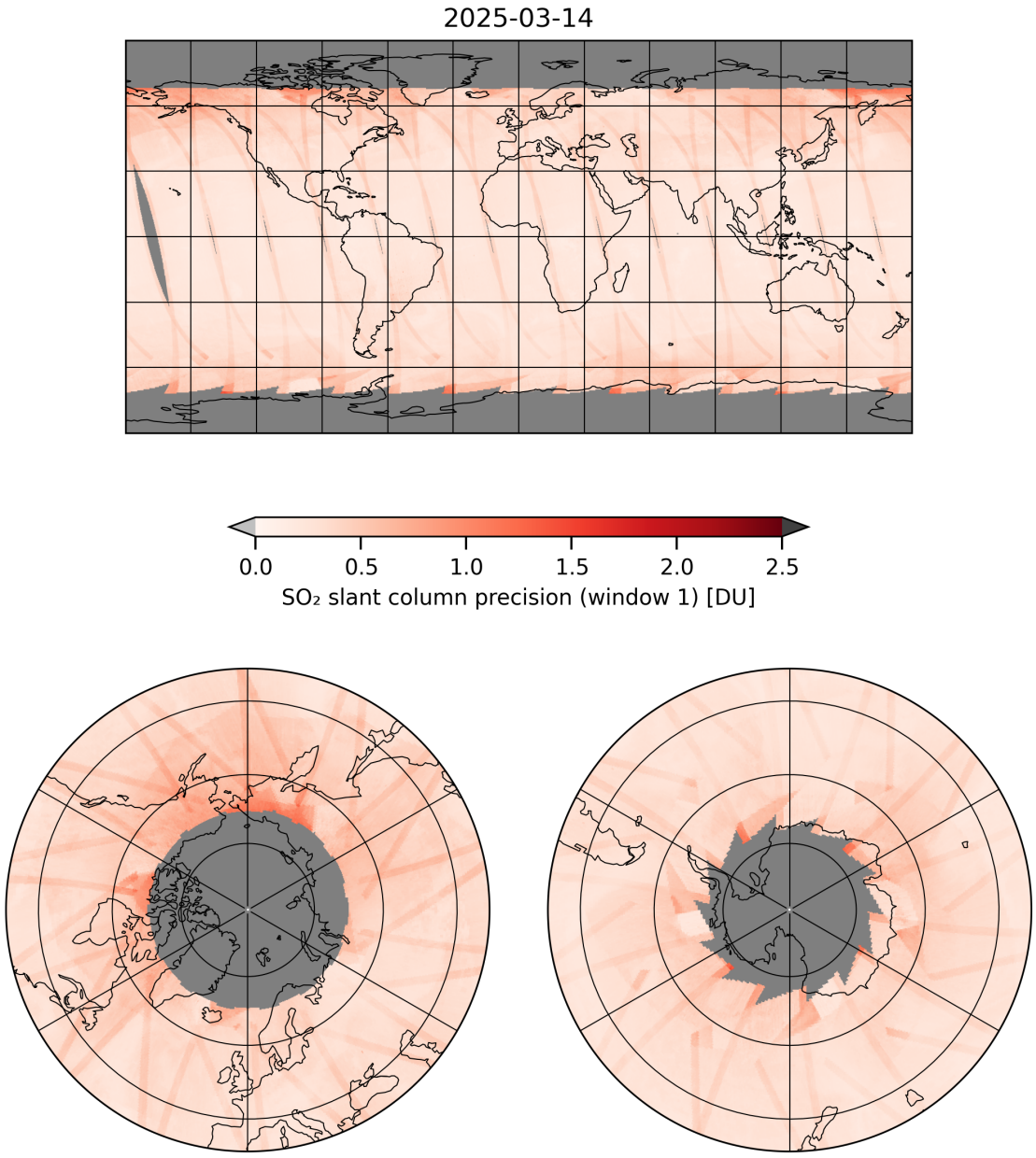

Figure 10: Map of "SO_2 slant column precision (window 1)" for 2025-03-14 to 2025-03-15

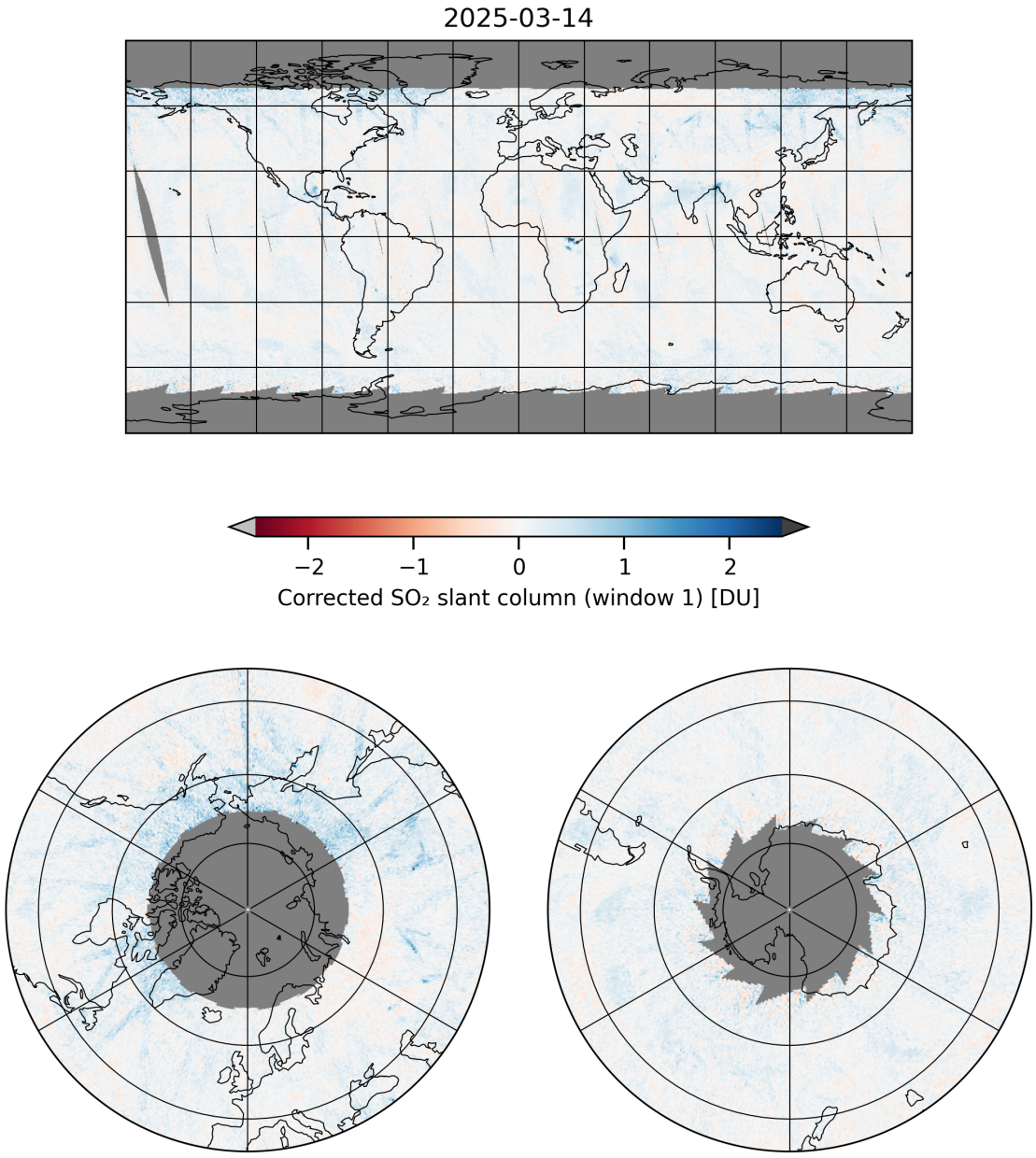

Figure 11: Map of “Corrected SO_2 slant column (window 1)” for 2025-03-14 to 2025-03-15

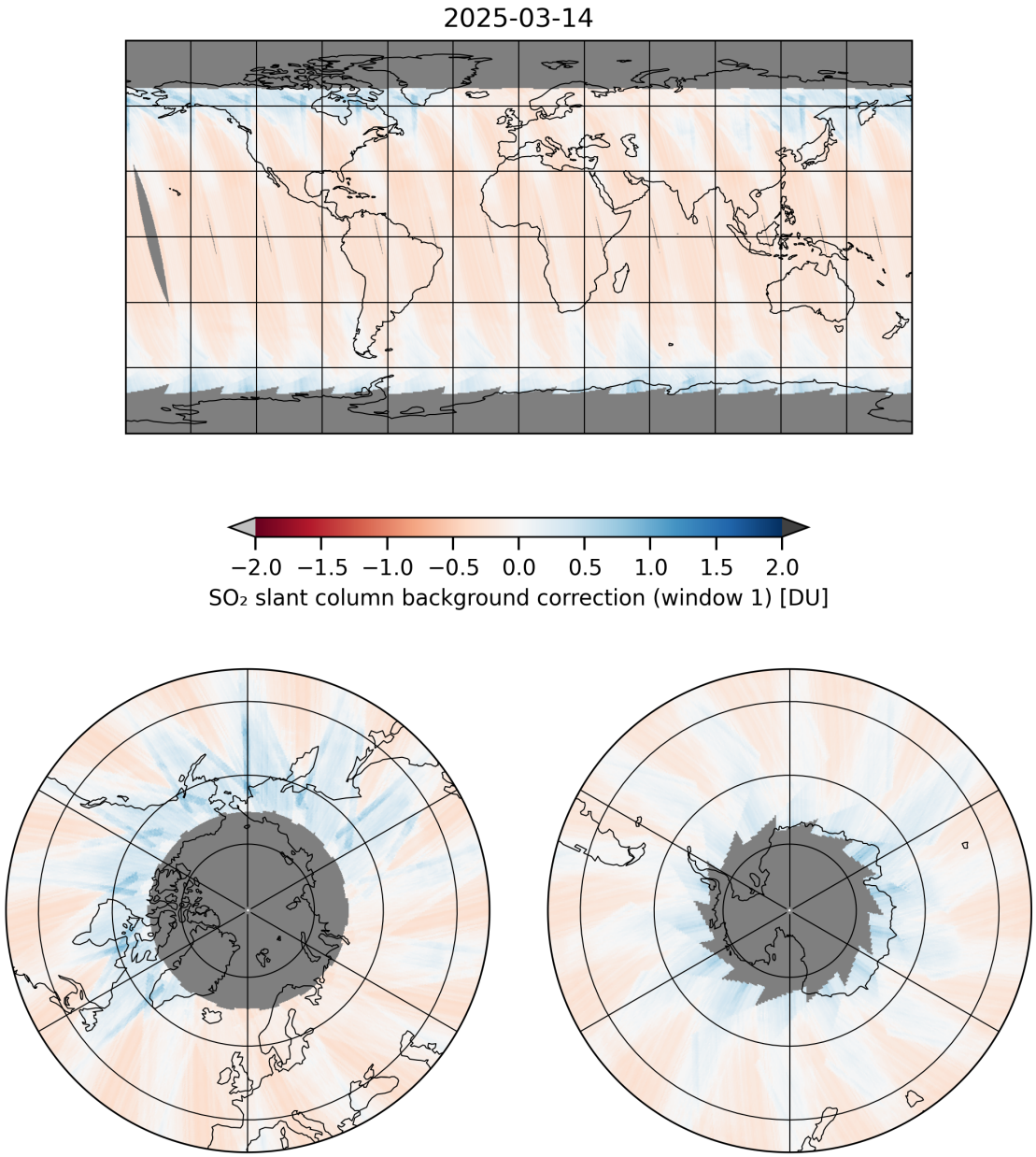

Figure 12: Map of "SO_2 slant column background correction (window 1)" for 2025-03-14 to 2025-03-15

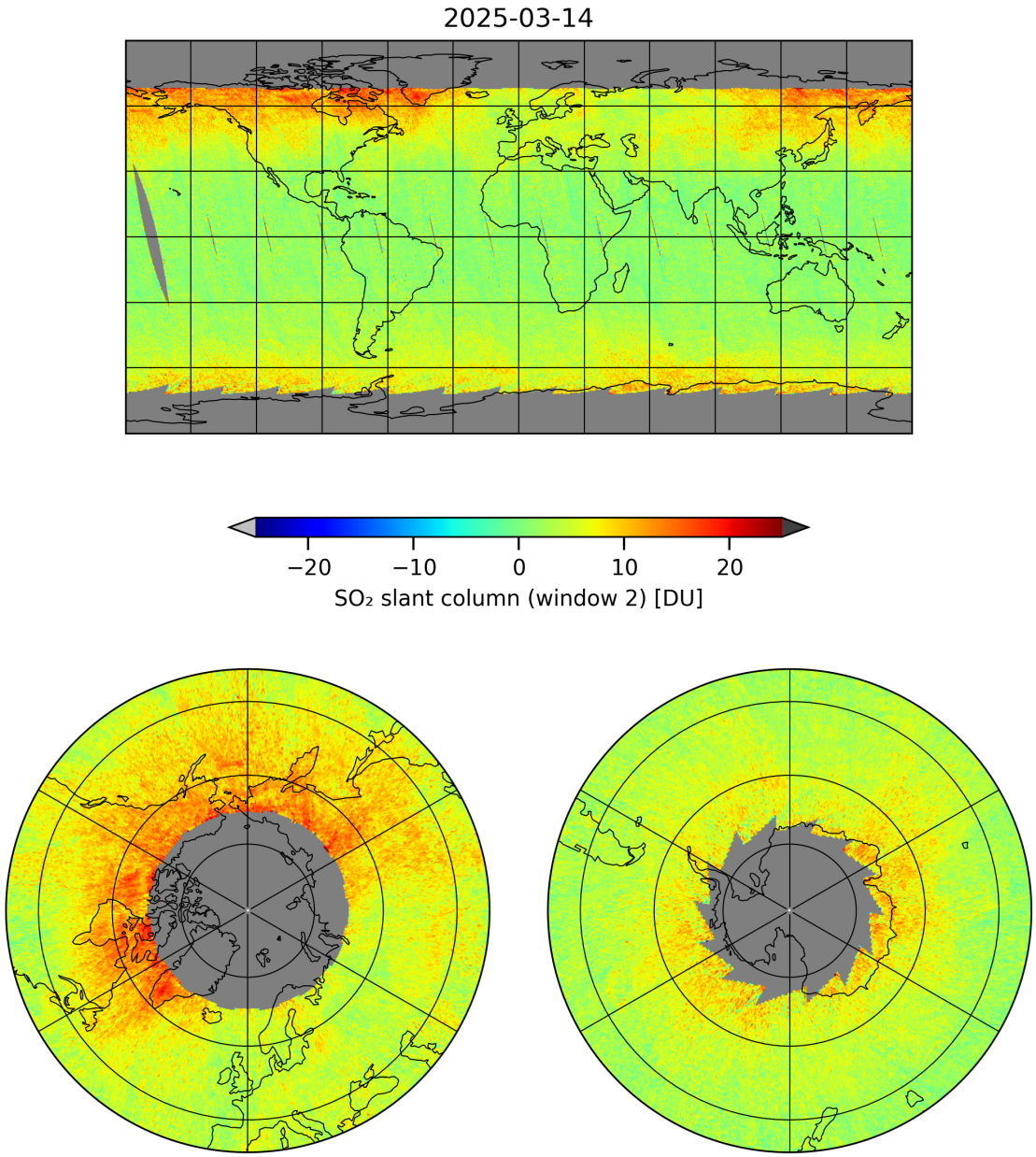

Figure 13: Map of "SO_2 slant column (window 2)" for 2025-03-14 to 2025-03-15

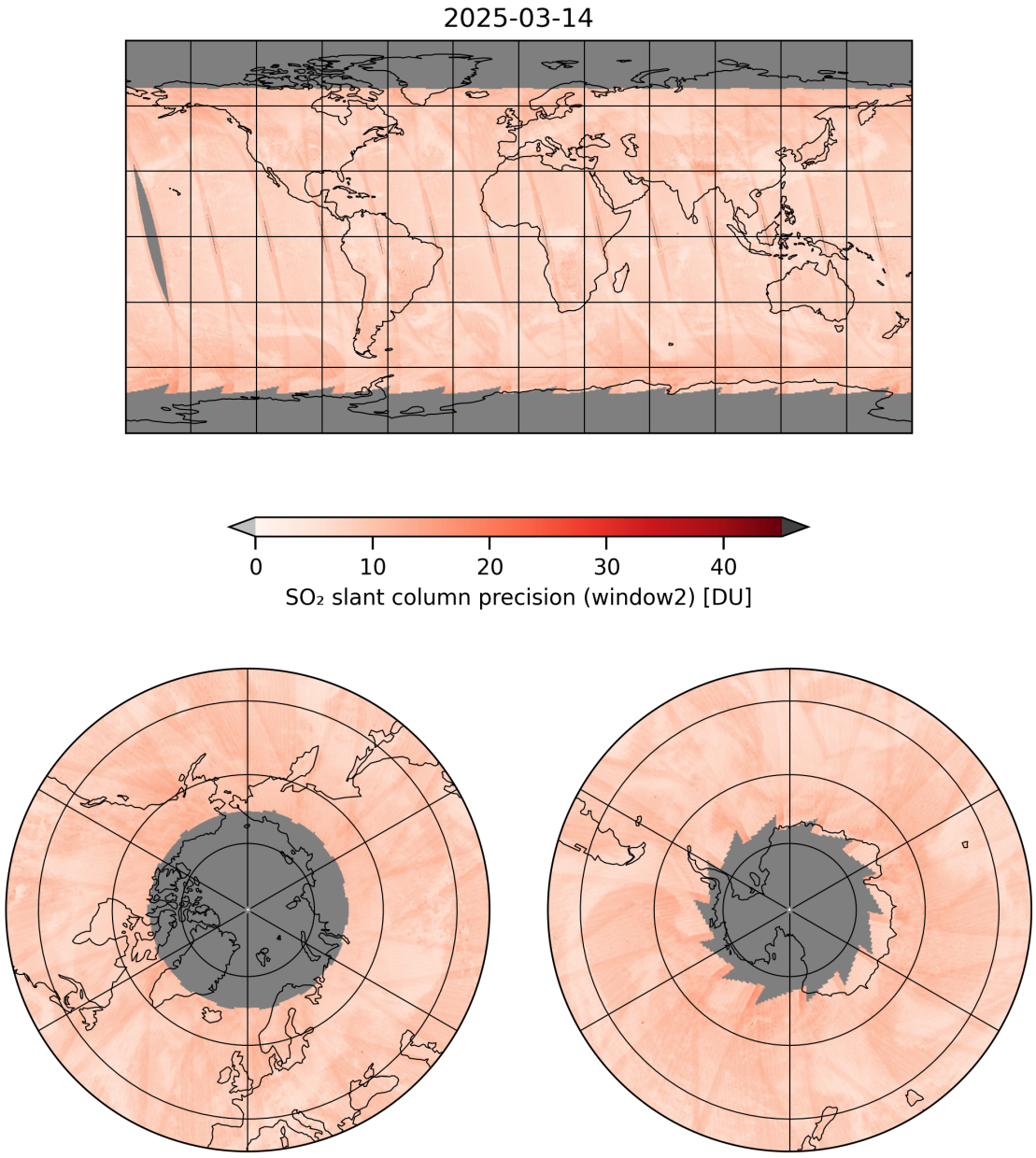

Figure 14: Map of "SO_2 slant column precision (window2)" for 2025-03-14 to 2025-03-15

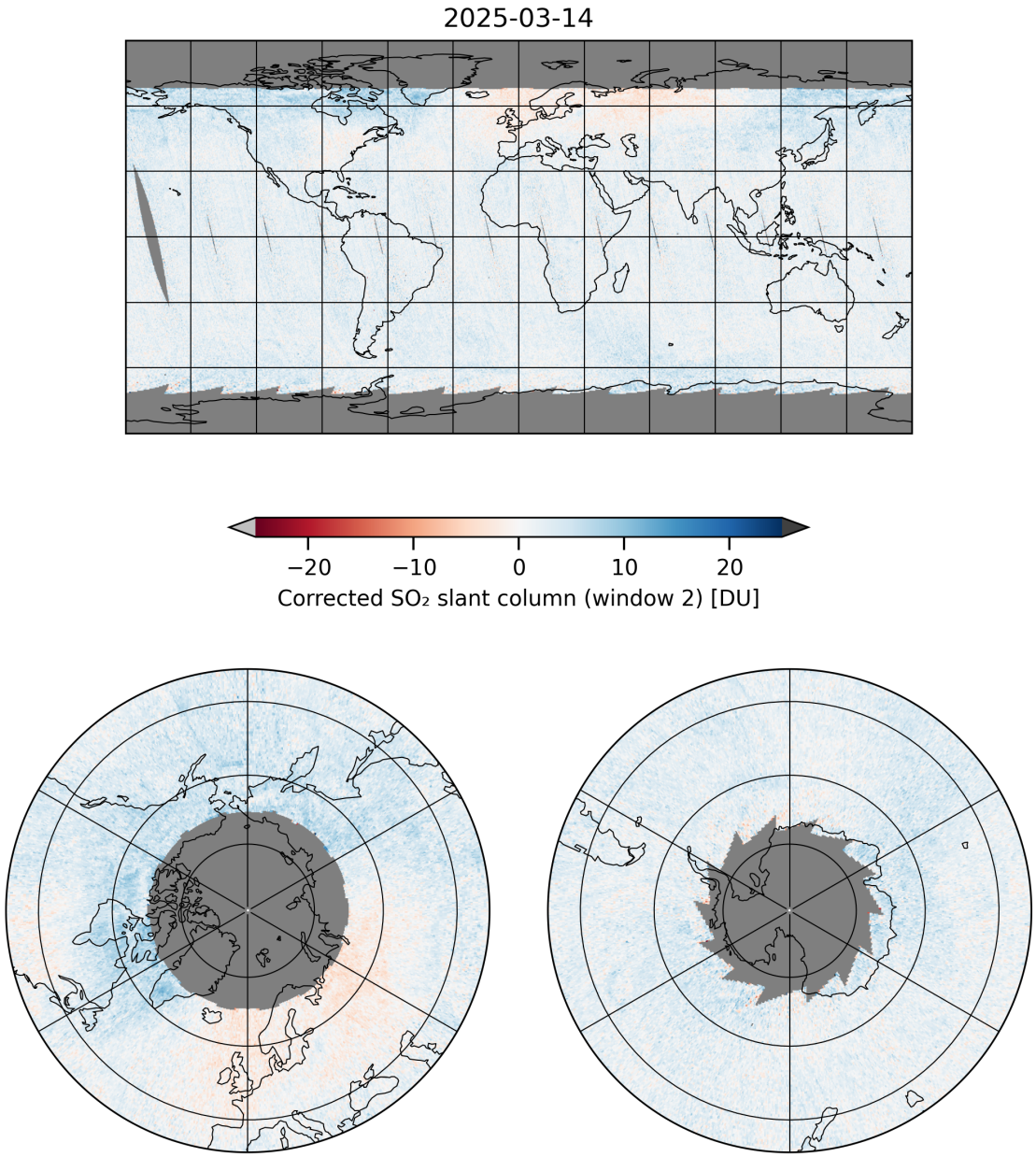

Figure 15: Map of “Corrected SO_2 slant column (window 2)” for 2025-03-14 to 2025-03-15

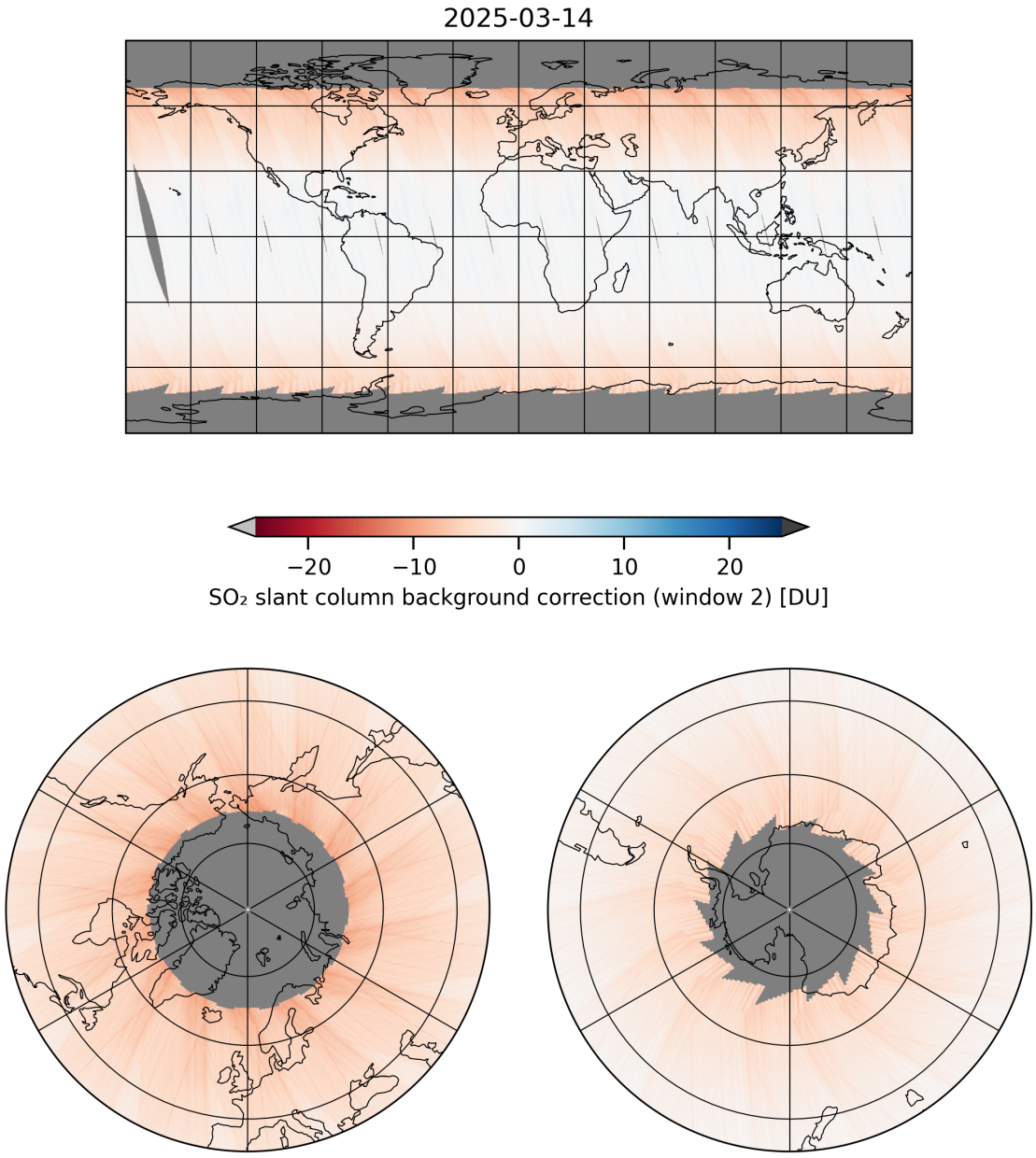

Figure 16: Map of "SO_2 slant column background correction (window 2)" for 2025-03-14 to 2025-03-15

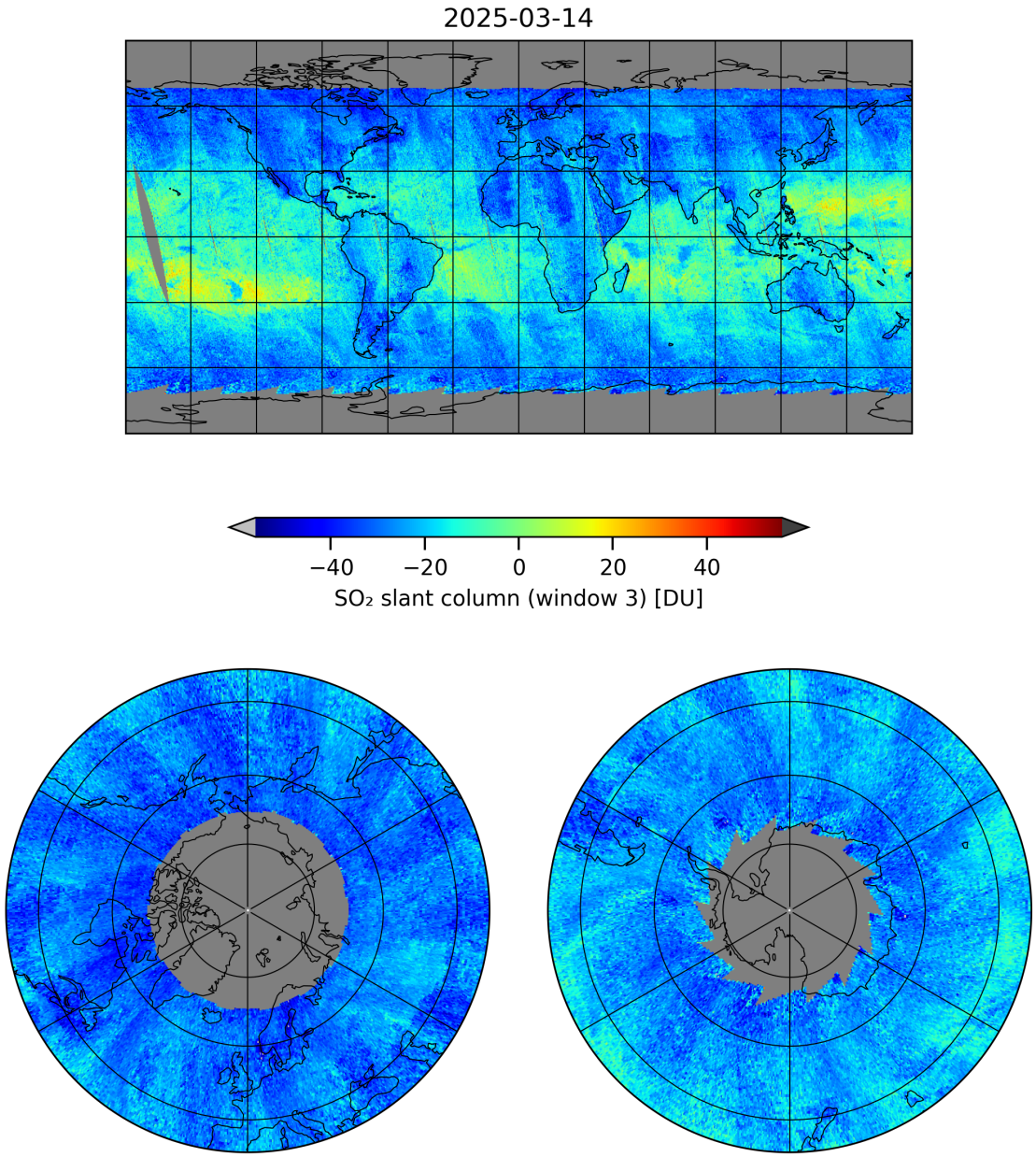

Figure 17: Map of "SO_2 slant column (window 3)" for 2025-03-14 to 2025-03-15

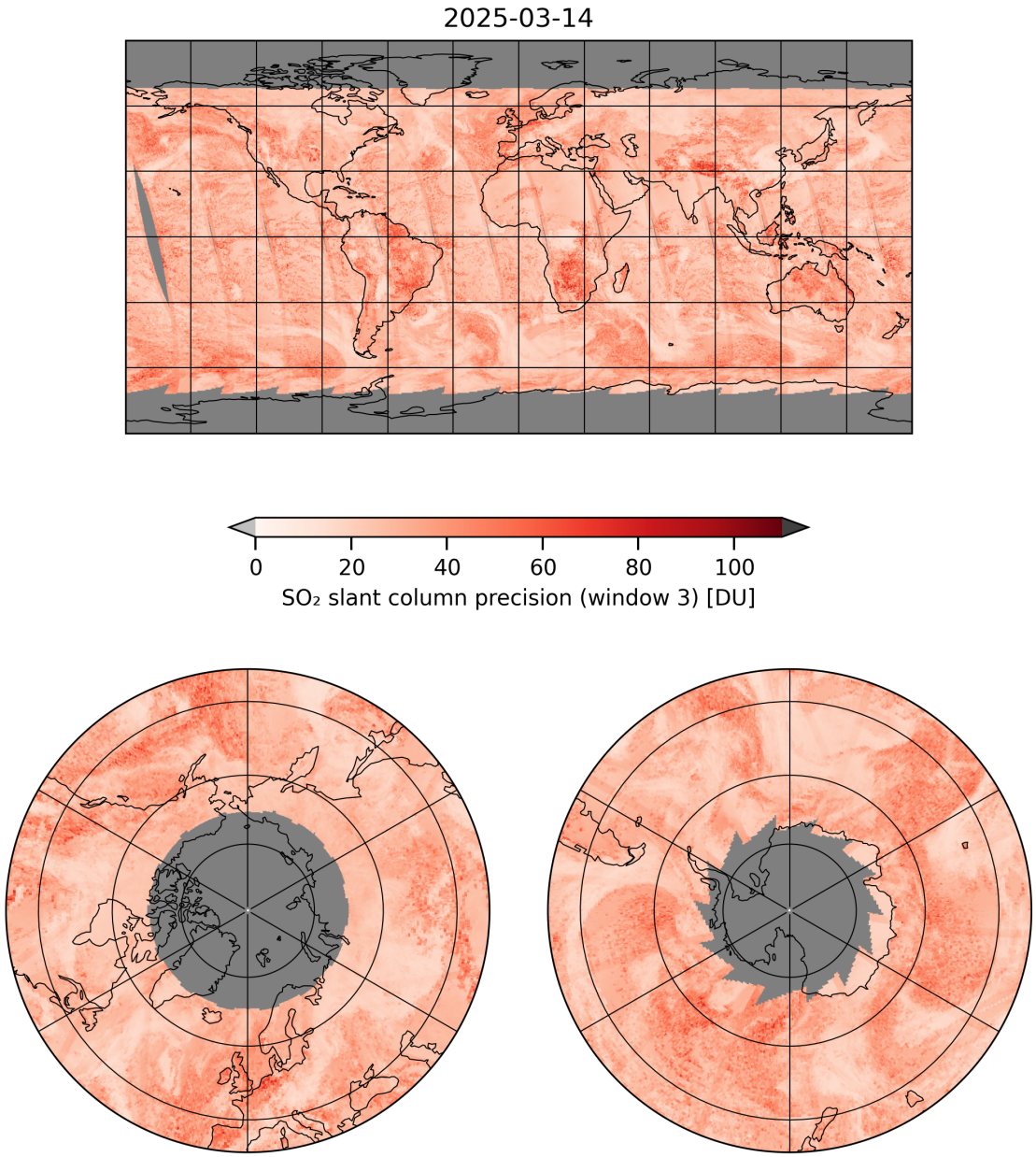

Figure 18: Map of "SO_2 slant column precision (window 3)" for 2025-03-14 to 2025-03-15

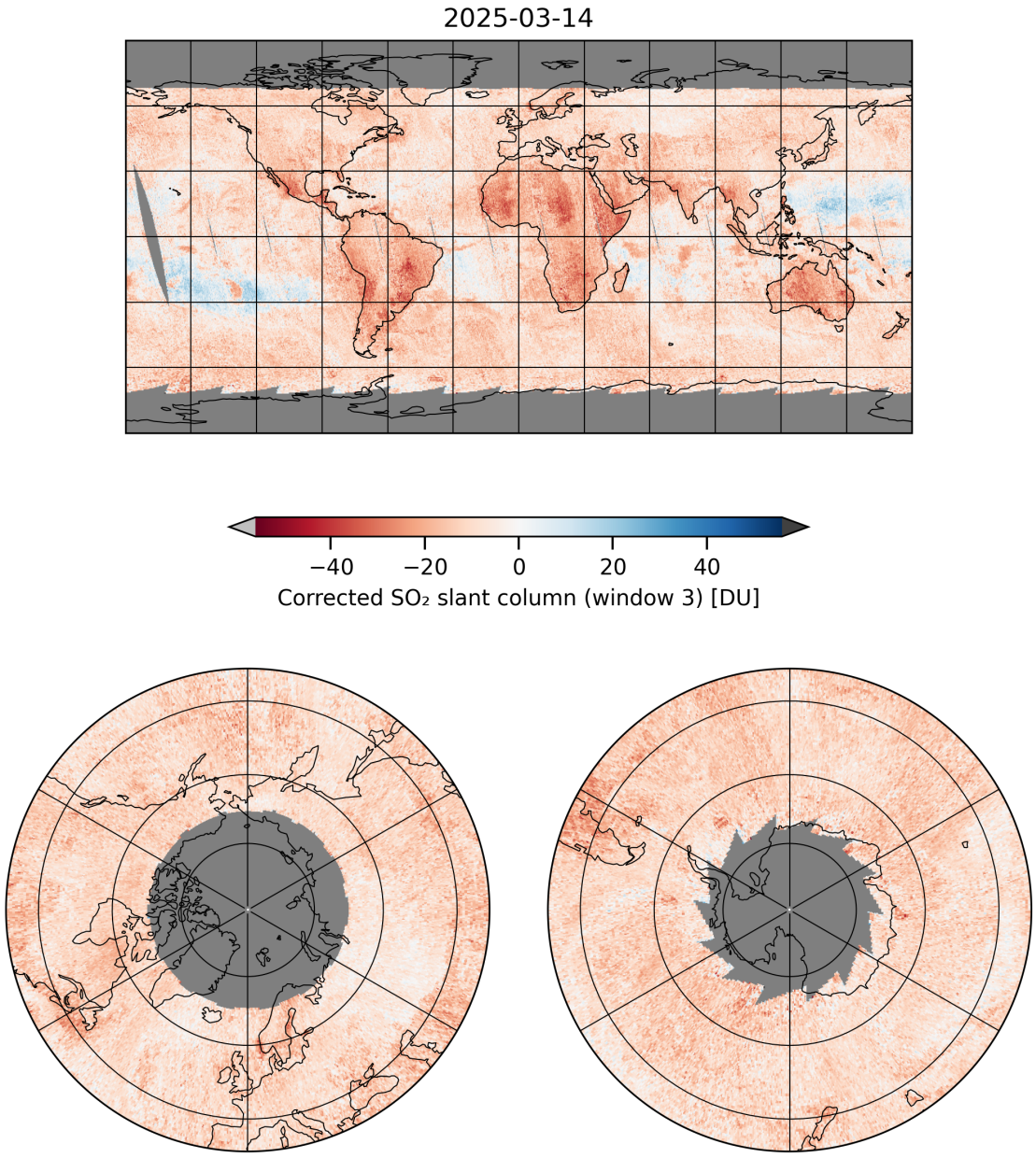

Figure 19: Map of "Corrected SO_2 slant column (window 3)" for 2025-03-14 to 2025-03-15

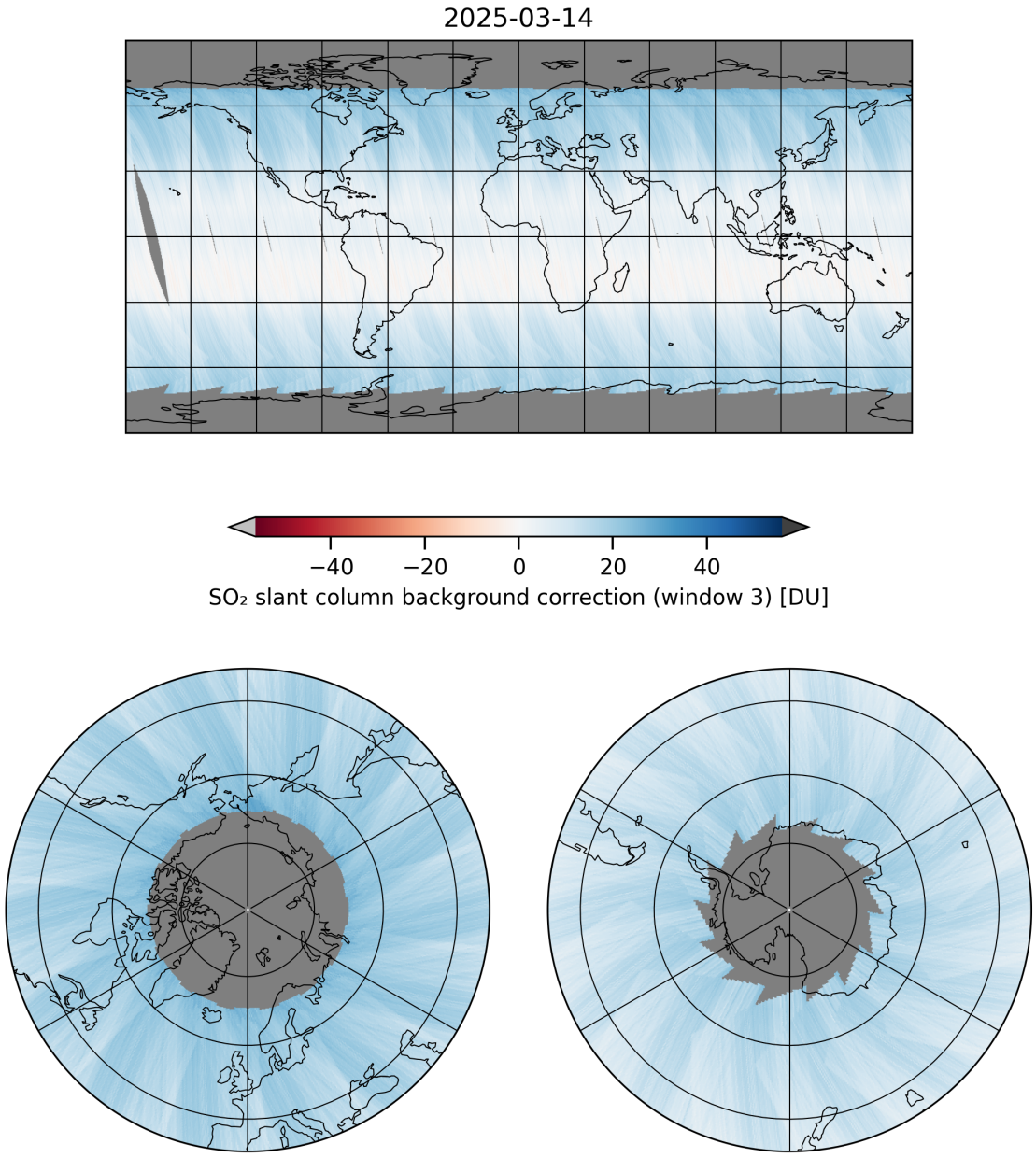

Figure 20: Map of "SO_2 slant column background correction (window 3)" for 2025-03-14 to 2025-03-15

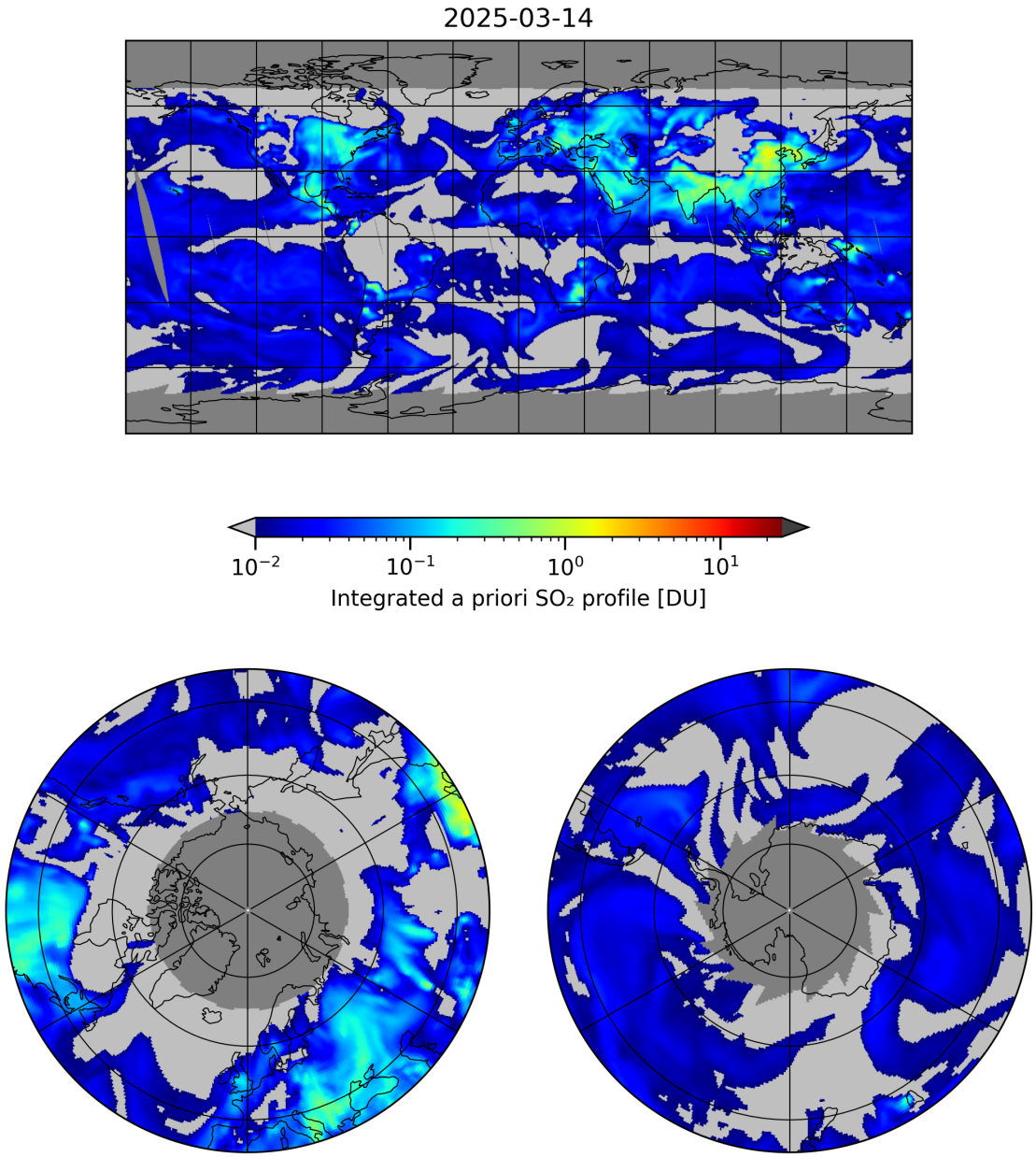

Figure 21: Map of “Integrated a priori SO_2 profile” for 2025-03-14 to 2025-03-15

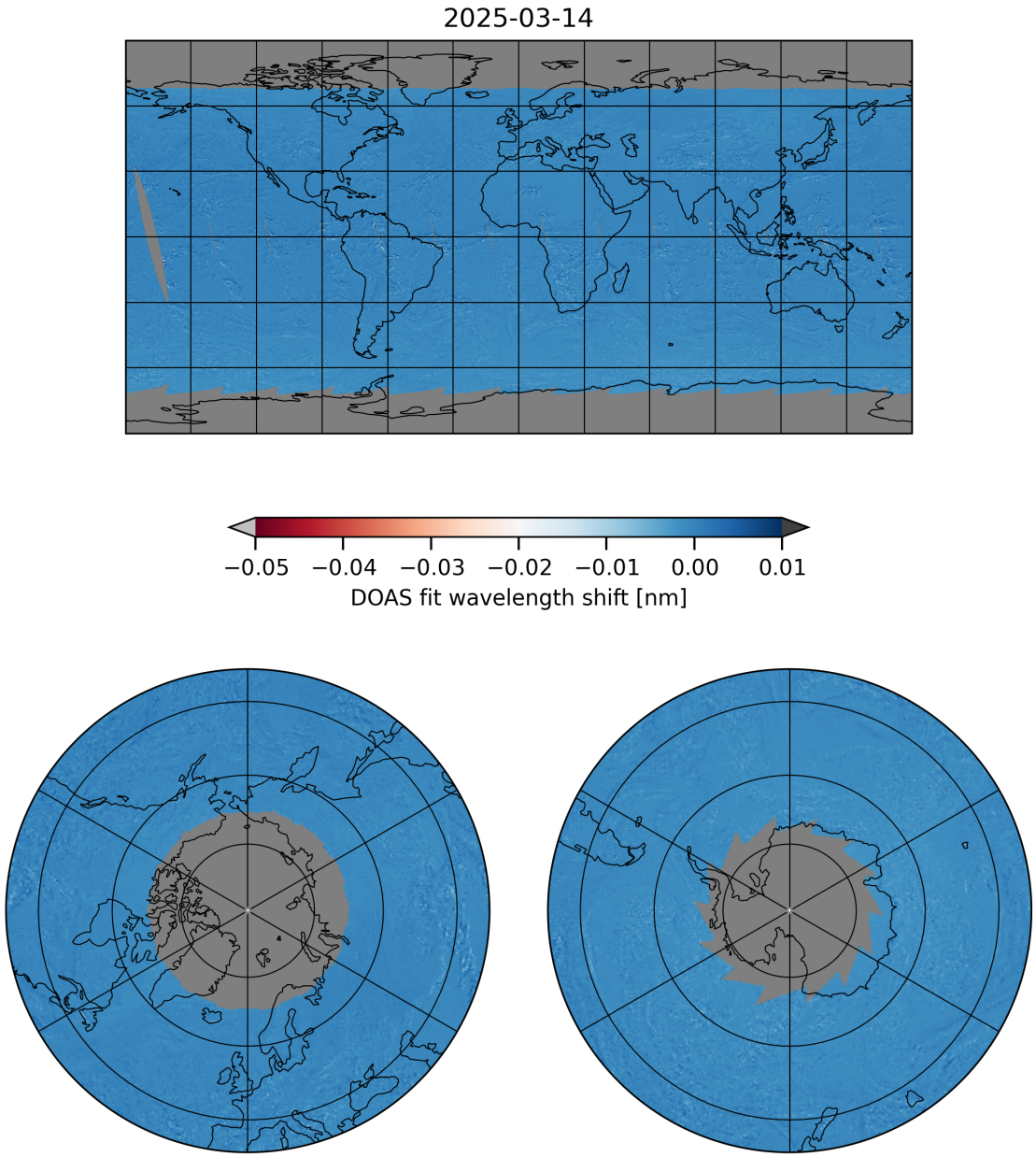

Figure 22: Map of “DOAS fit wavelength shift” for 2025-03-14 to 2025-03-15

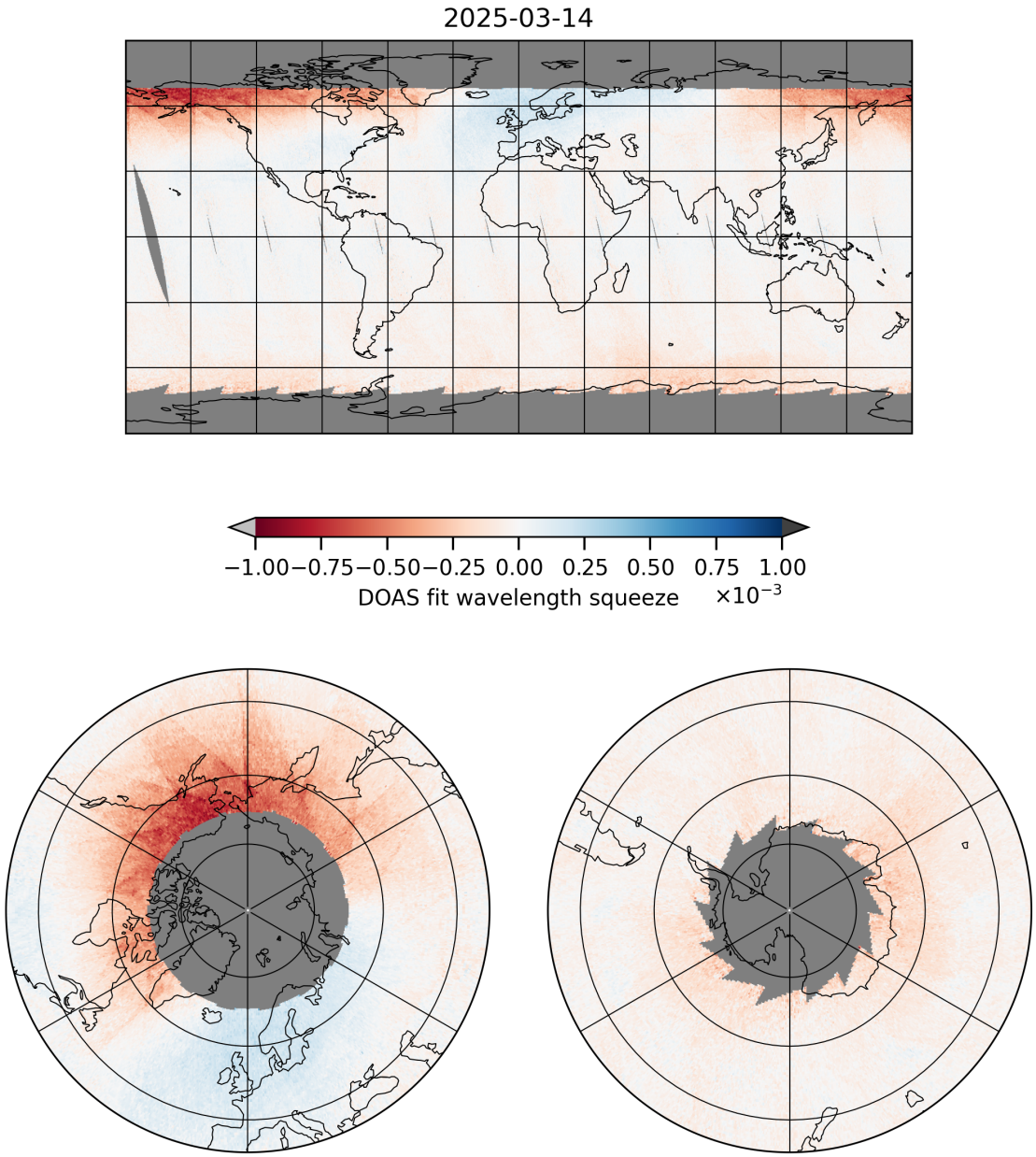

Figure 23: Map of “DOAS fit wavelength squeeze” for 2025-03-14 to 2025-03-15

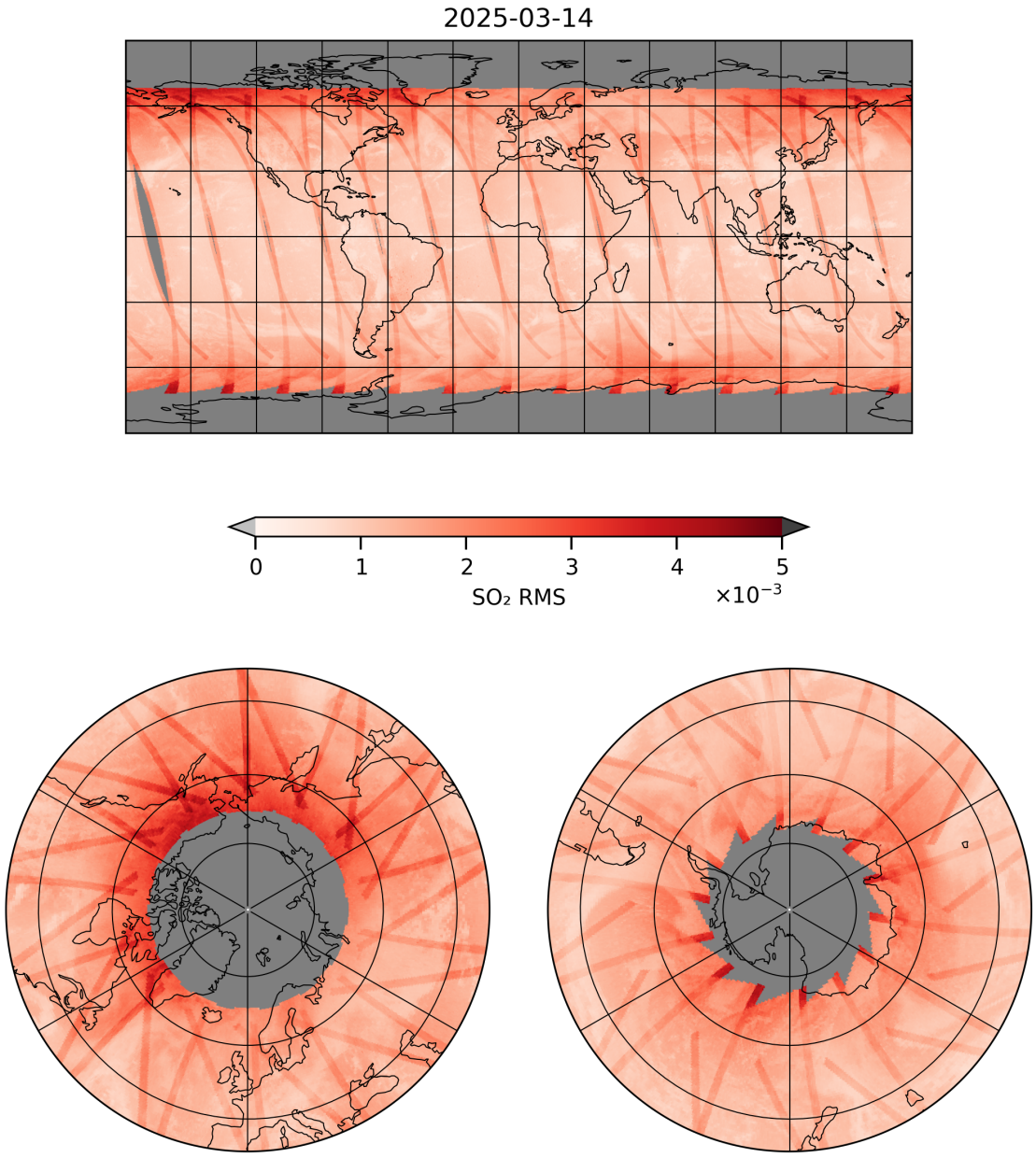

Figure 24: Map of "SO_2 RMS" for 2025-03-14 to 2025-03-15

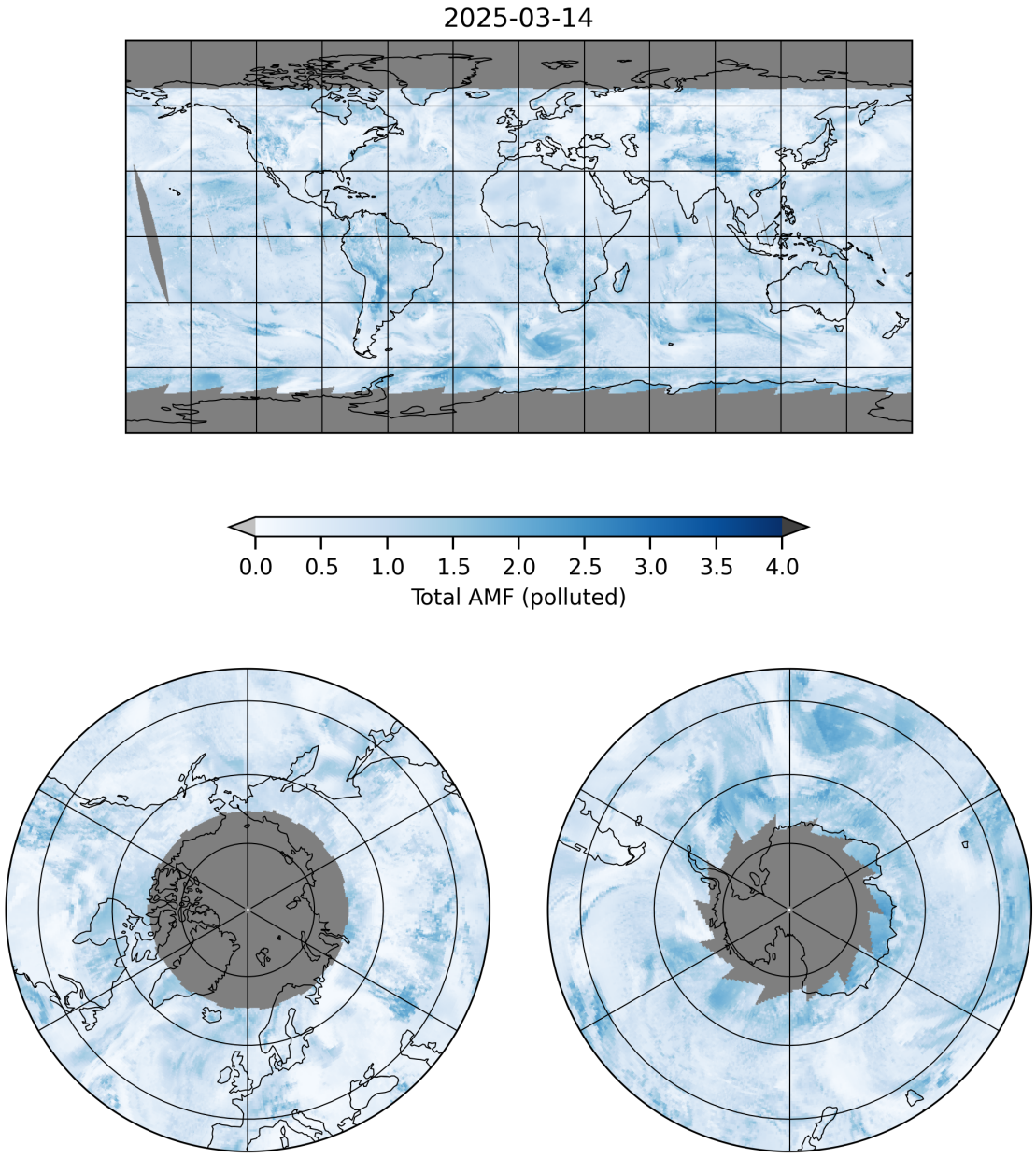

Figure 25: Map of “Total AMF (polluted)” for 2025-03-14 to 2025-03-15

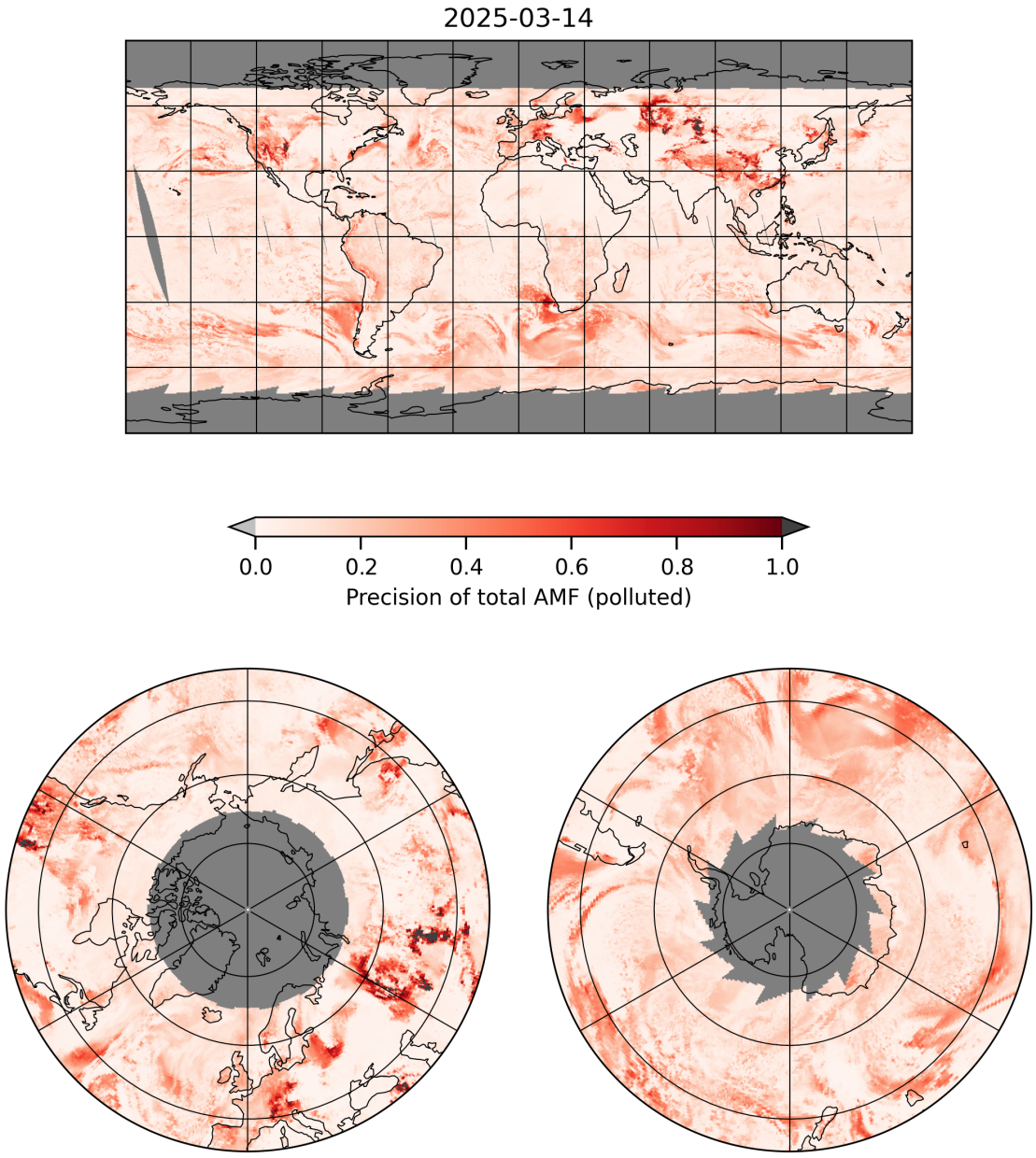

Figure 26: Map of “Precision of total AMF (polluted)” for 2025-03-14 to 2025-03-15

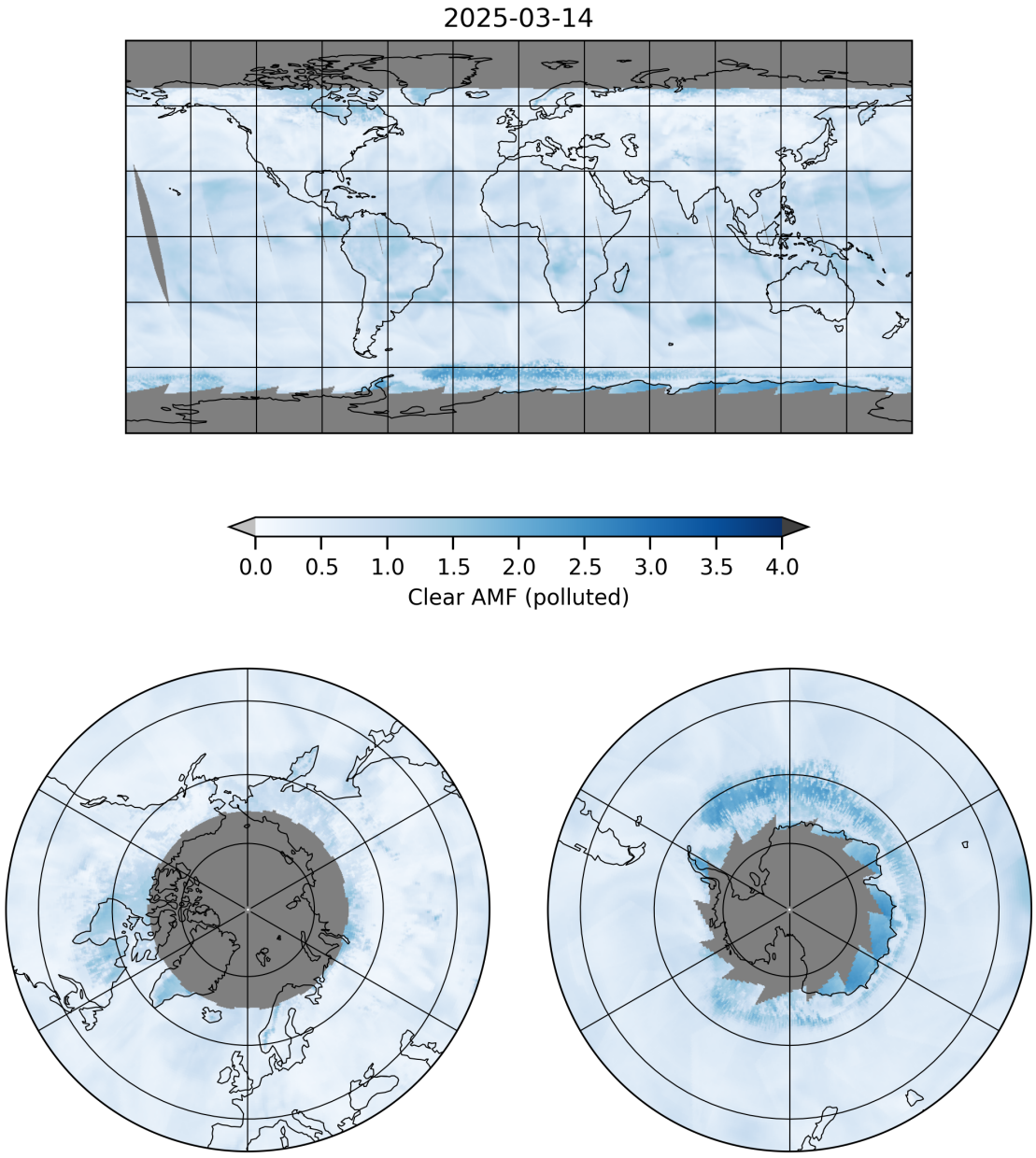

Figure 27: Map of “Clear AMF (polluted)” for 2025-03-14 to 2025-03-15

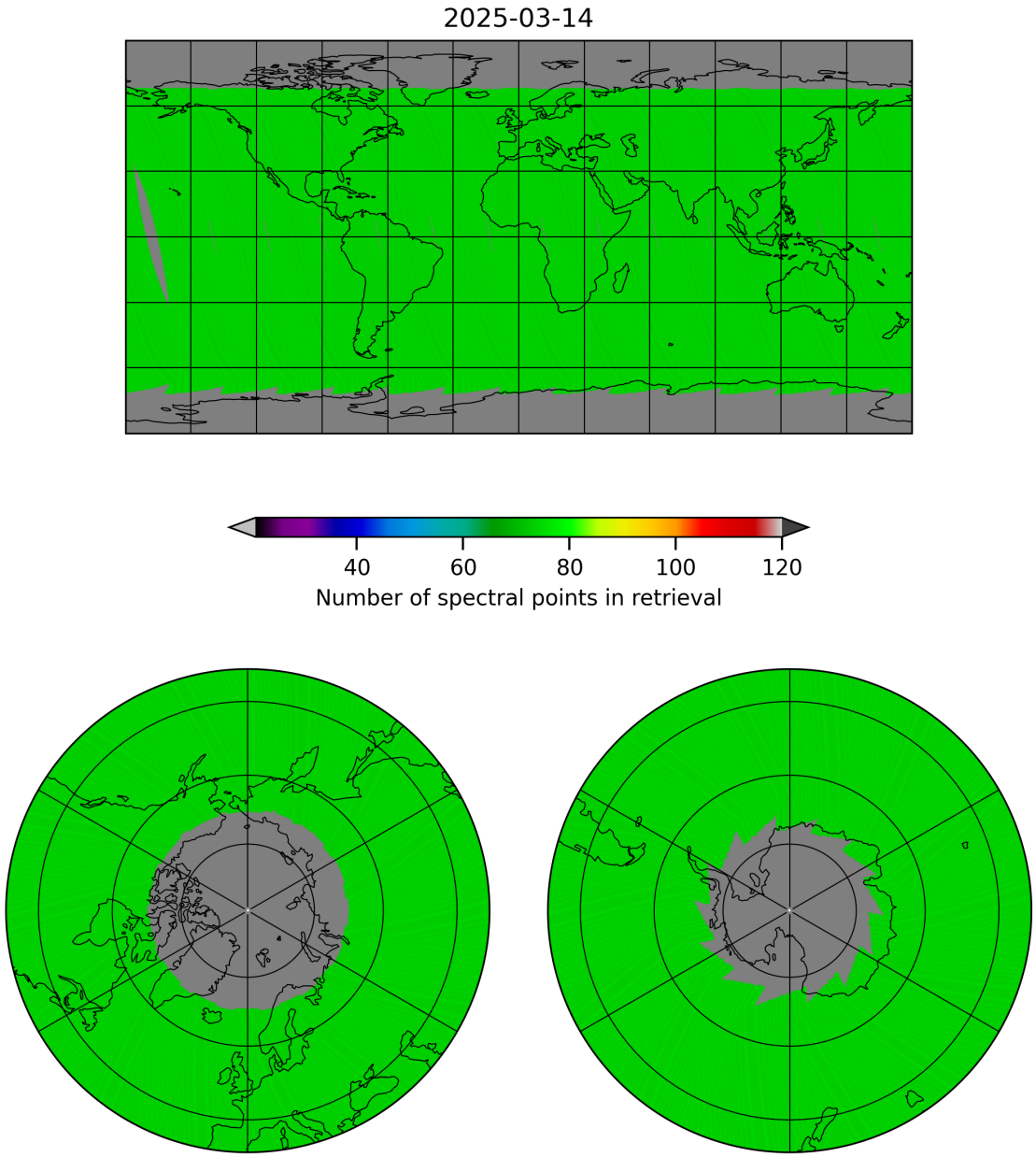

Figure 28: Map of “Number of spectral points in retrieval” for 2025-03-14 to 2025-03-15

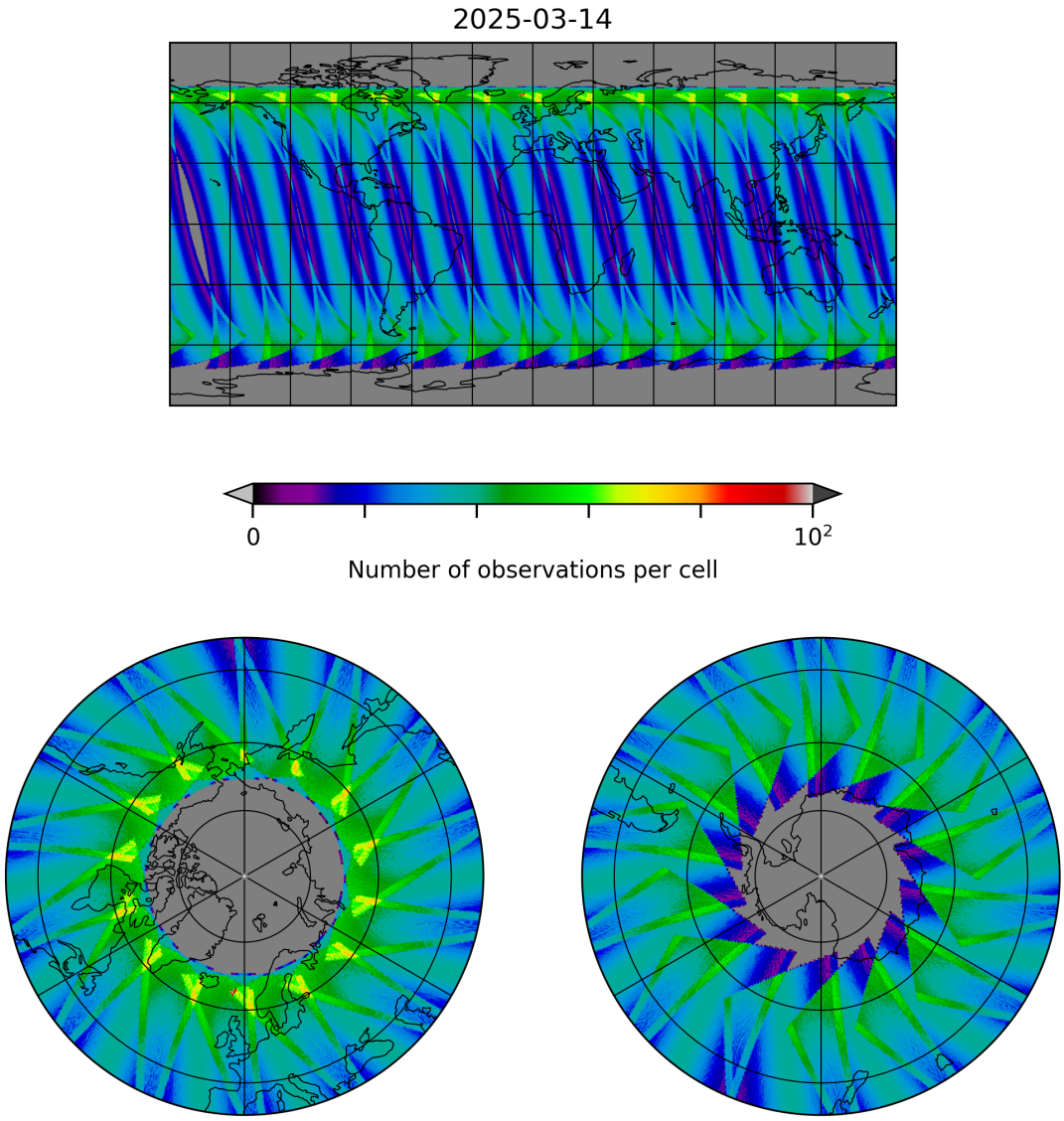

Figure 29: Map of the number of observations for 2025-03-14 to 2025-03-15

7 Zonal average

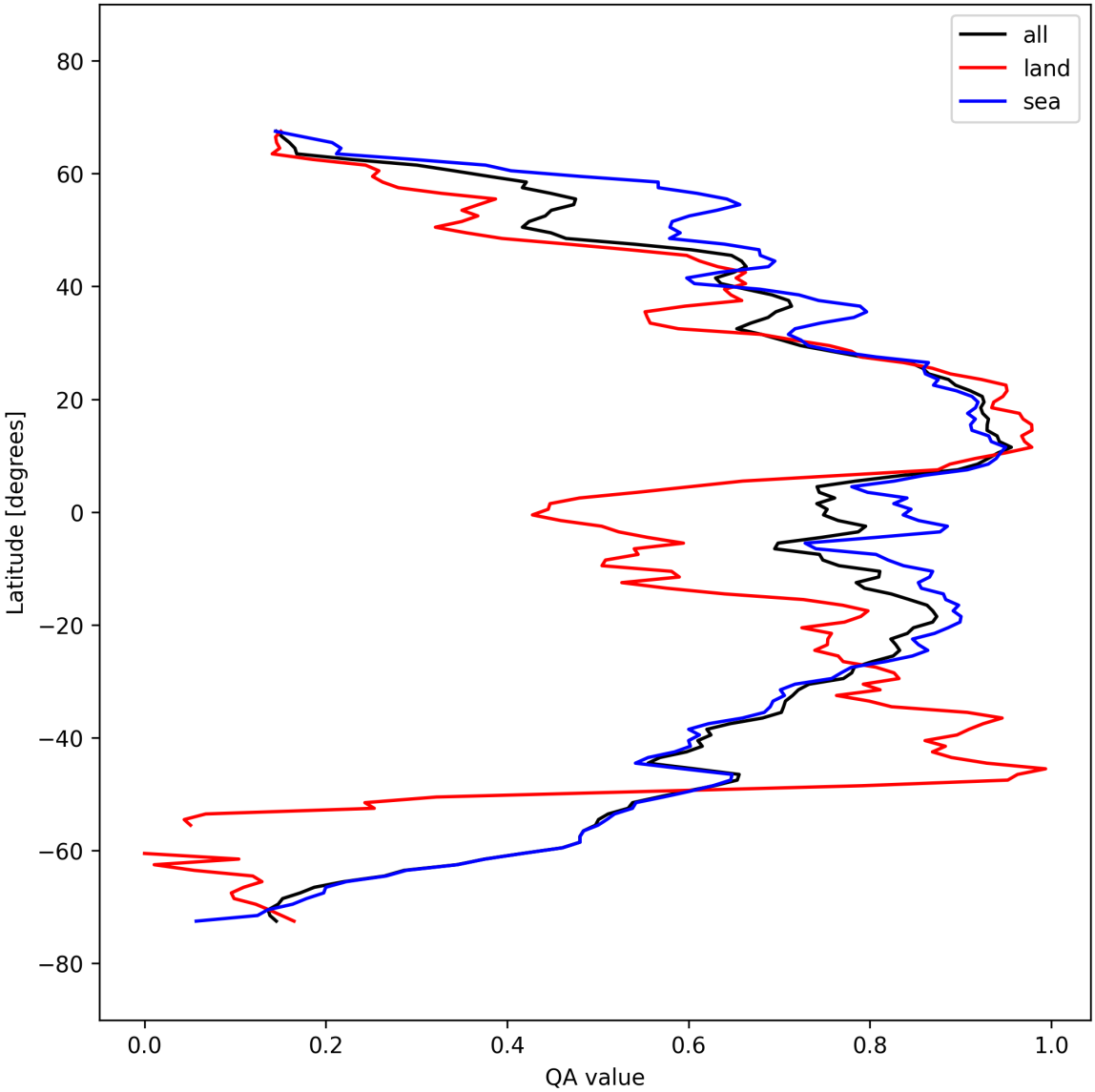

Figure 30: Zonal average of “QA value” for 2025-03-14 to 2025-03-15.

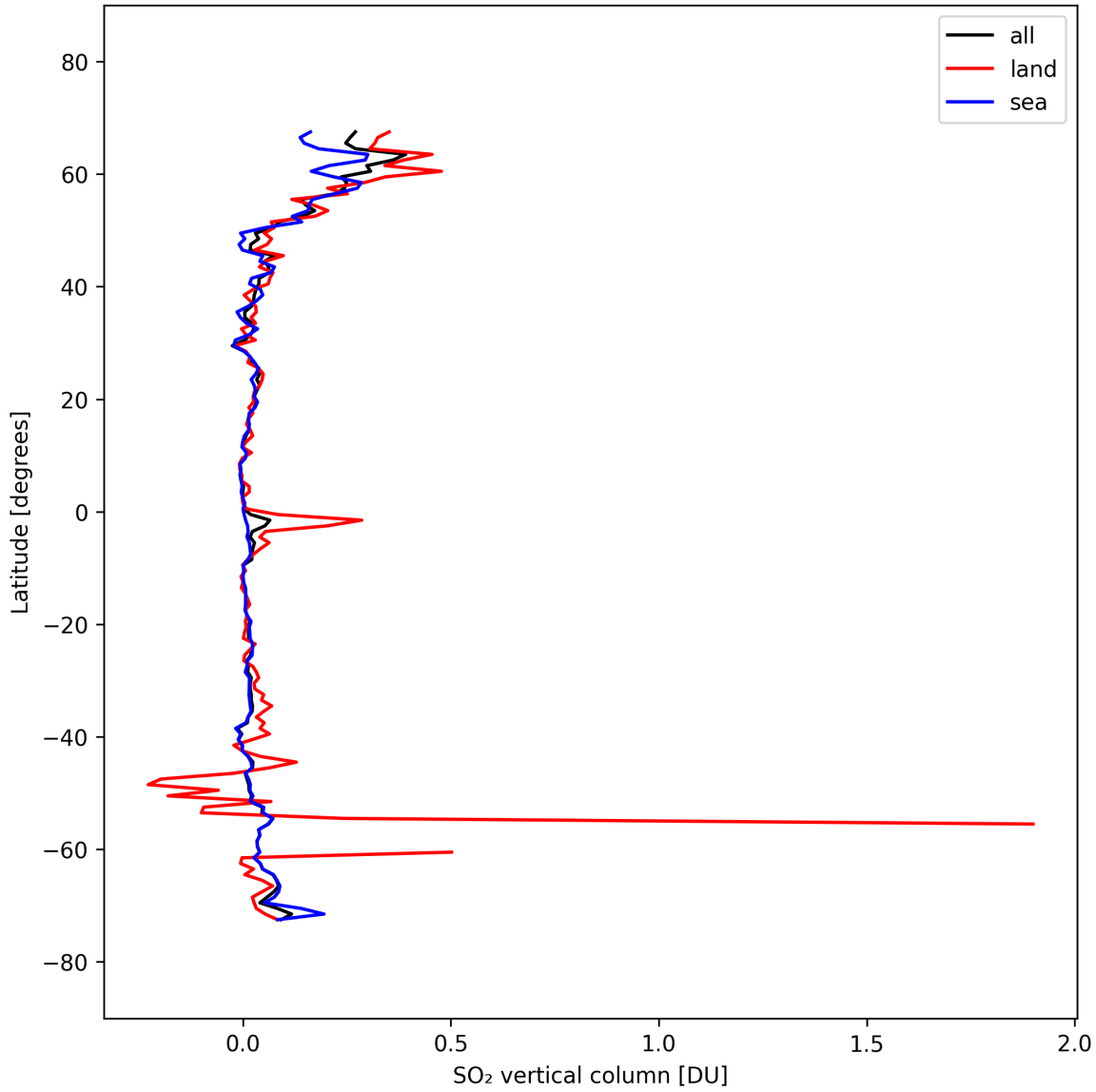

Figure 31: Zonal average of "SO_2 vertical column" for 2025-03-14 to 2025-03-15.

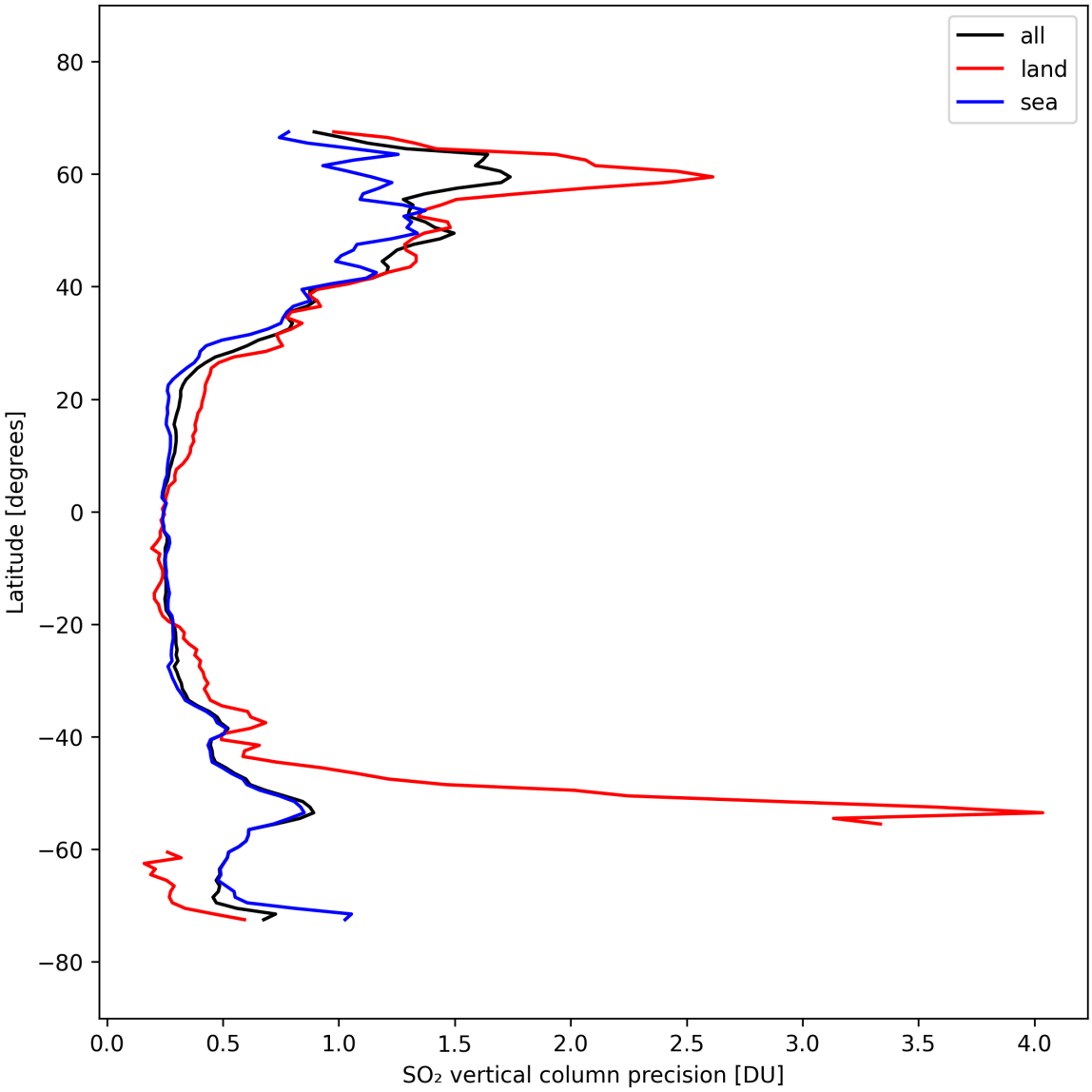

Figure 32: Zonal average of "SO_2 vertical column precision" for 2025-03-14 to 2025-03-15.

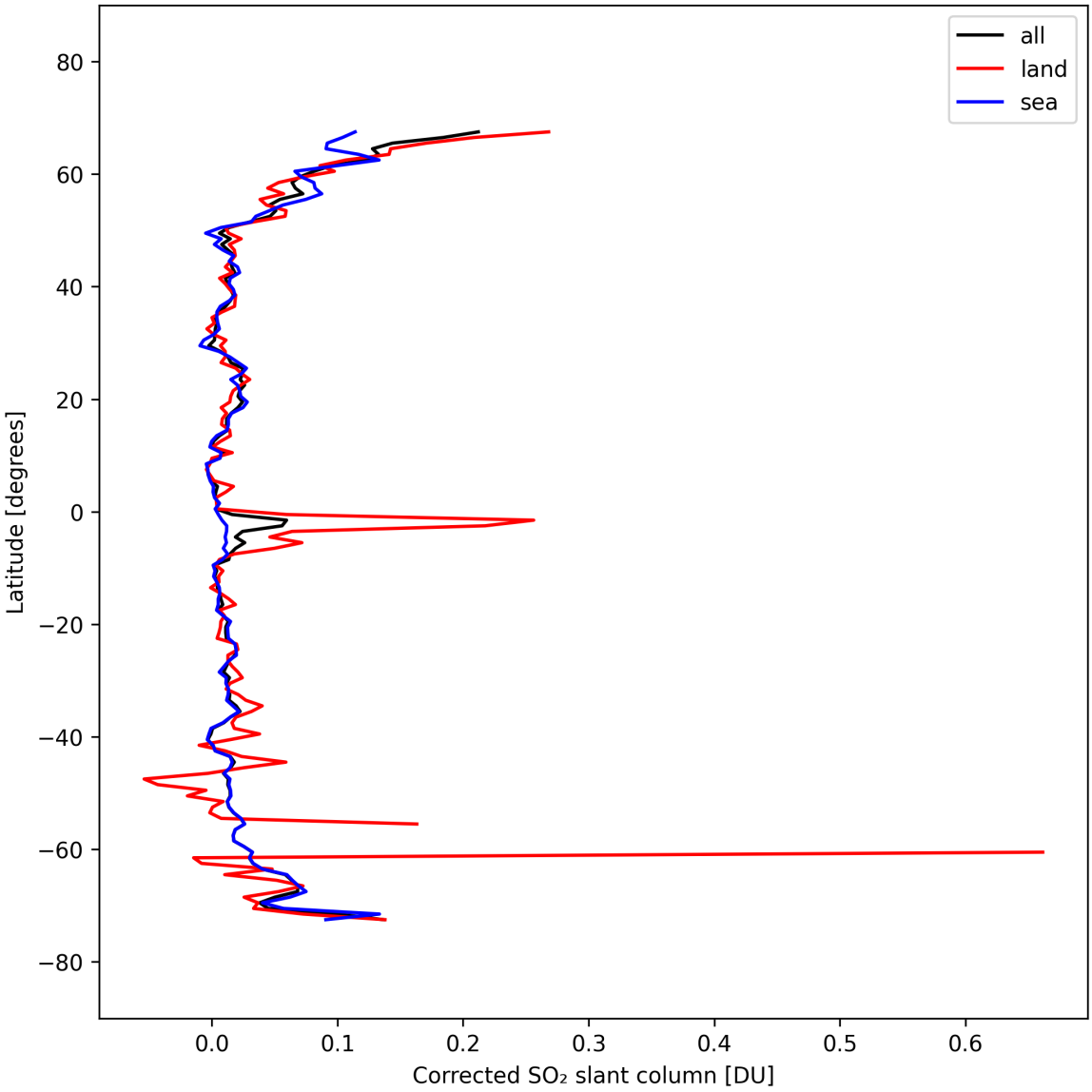

Figure 33: Zonal average of "Corrected SO_2 slant column" for 2025-03-14 to 2025-03-15.

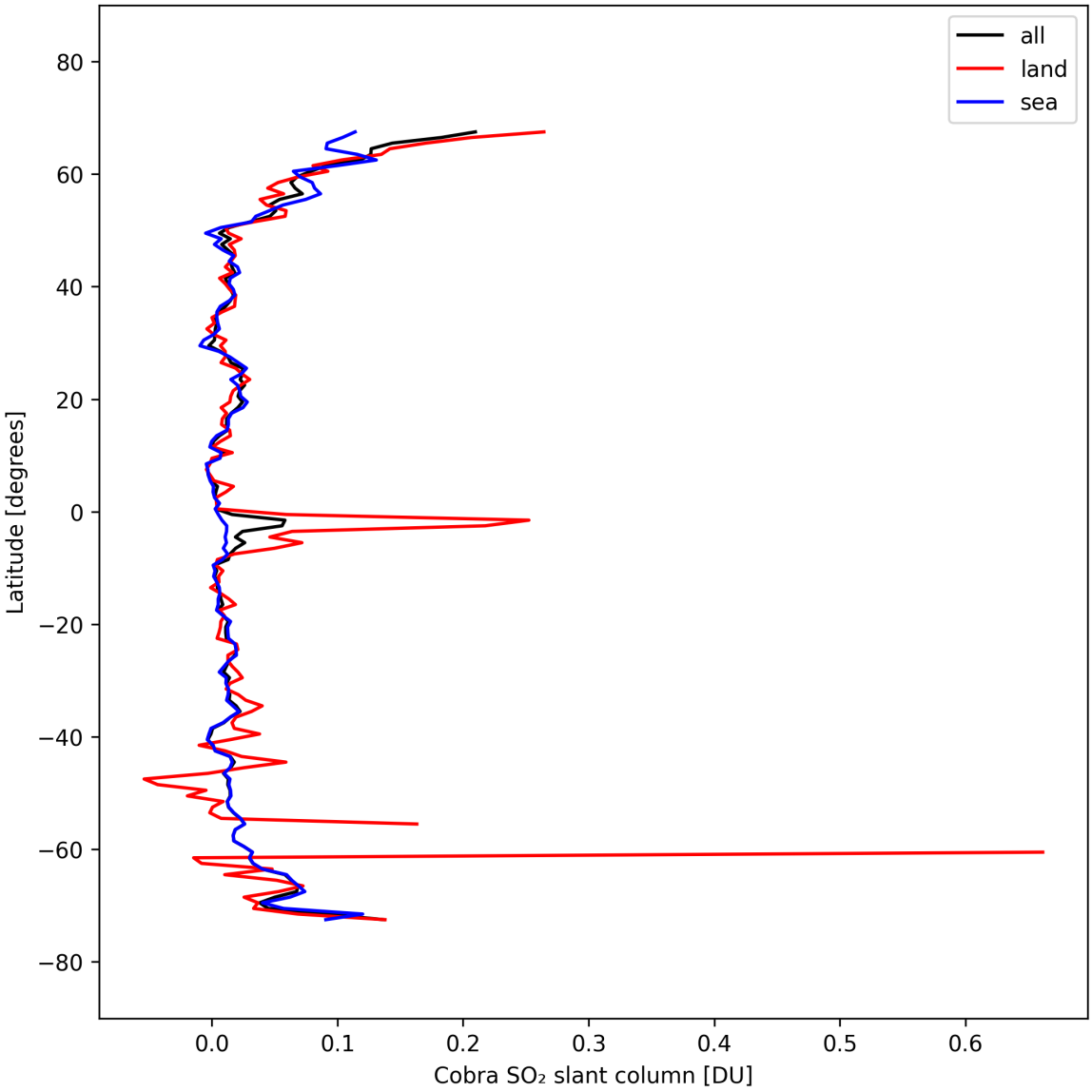

Figure 34: Zonal average of "Cobra SO_2 slant column" for 2025-03-14 to 2025-03-15.

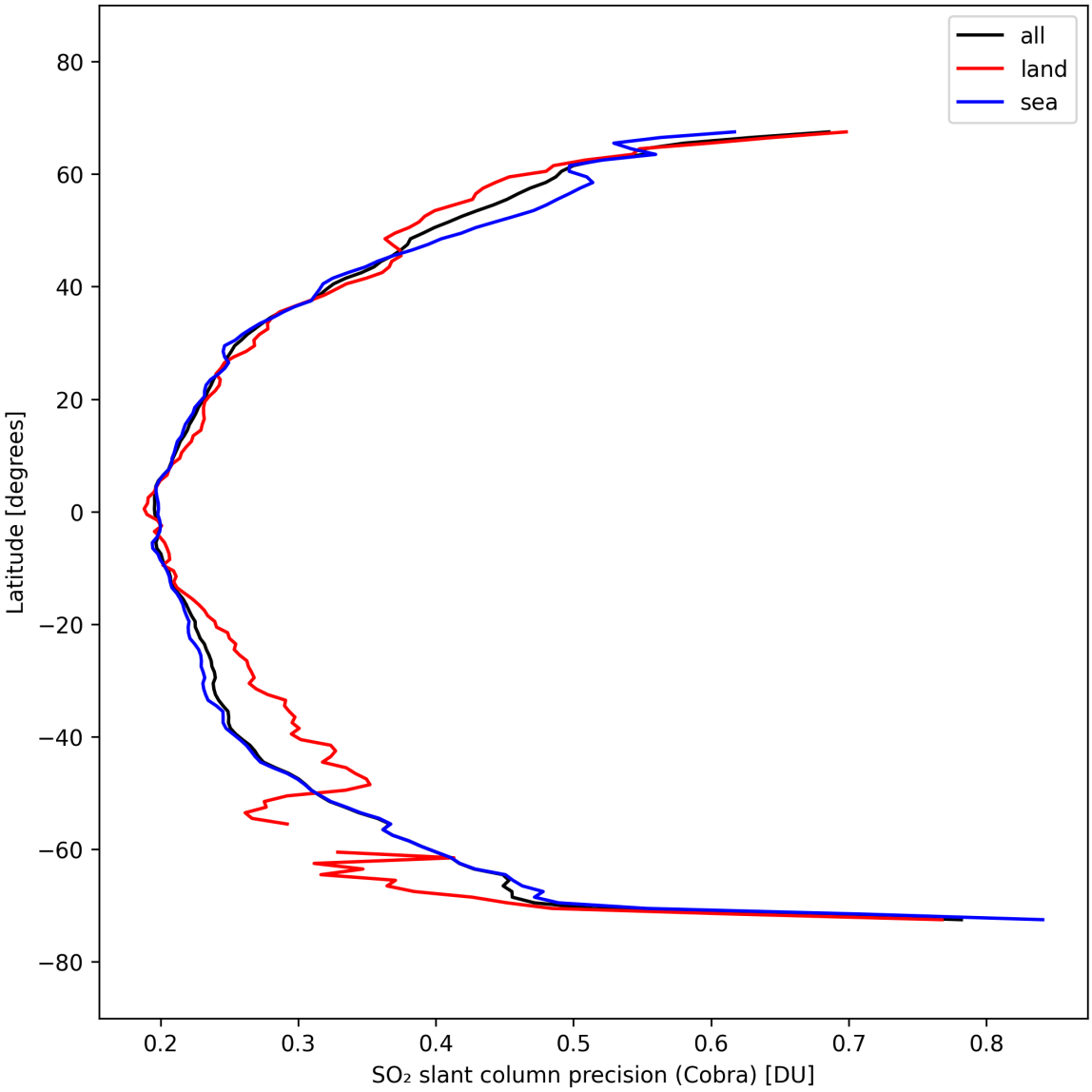

Figure 35: Zonal average of "SO_2 slant column precision (Cobra)" for 2025-03-14 to 2025-03-15.

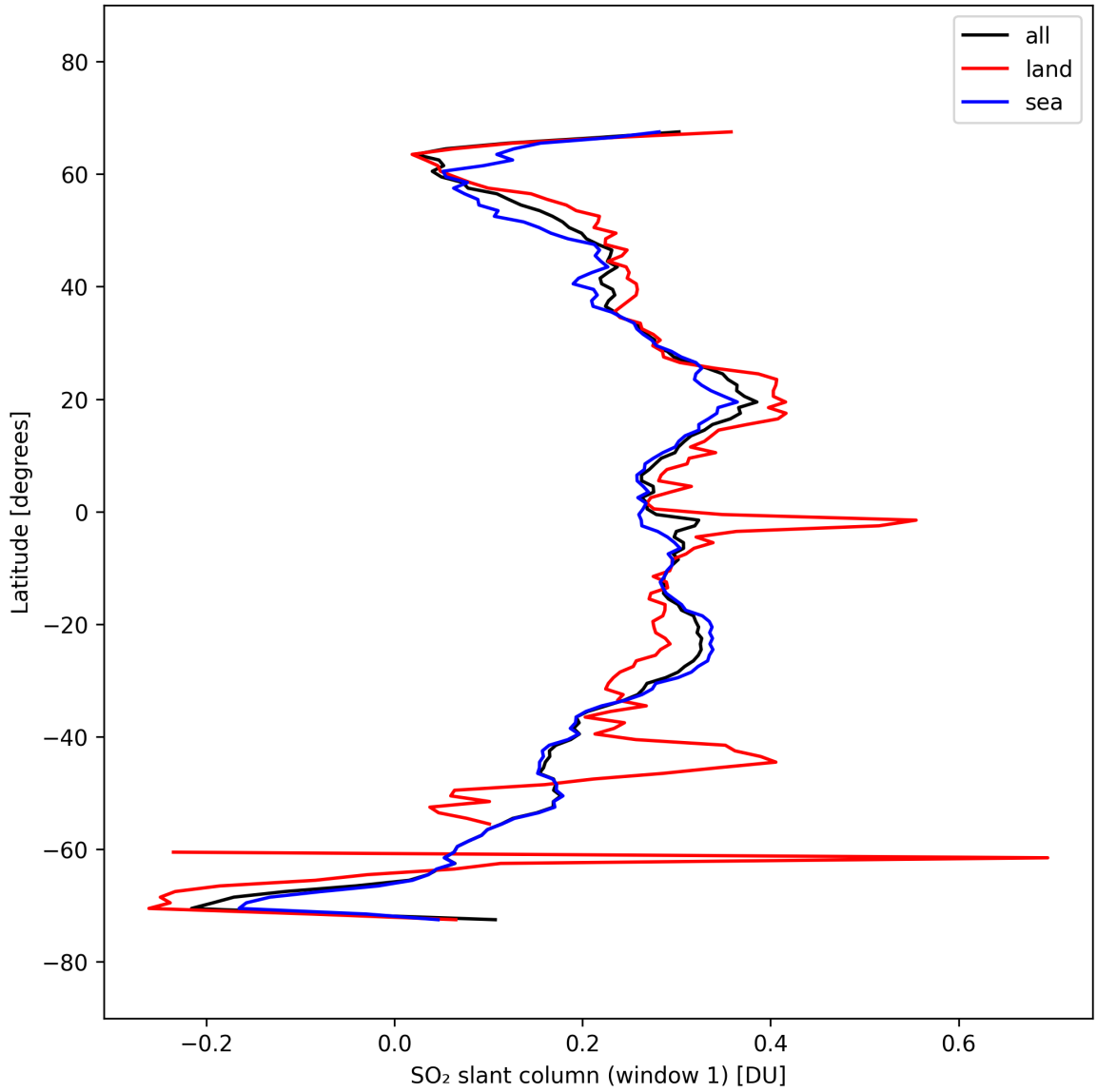

Figure 36: Zonal average of "SO_2 slant column (window 1)" for 2025-03-14 to 2025-03-15.

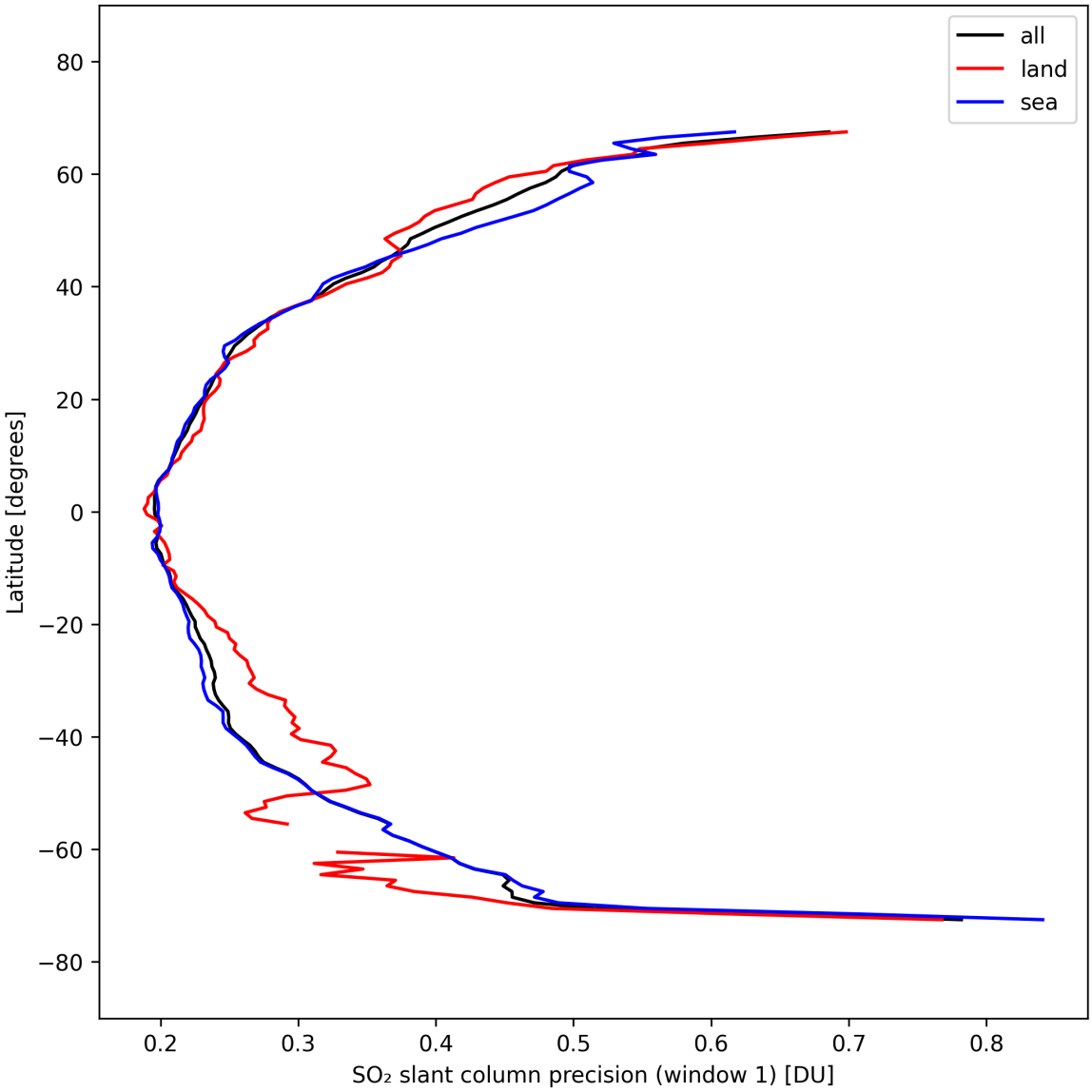

Figure 37: Zonal average of "SO_2 slant column precision (window 1)" for 2025-03-14 to 2025-03-15.

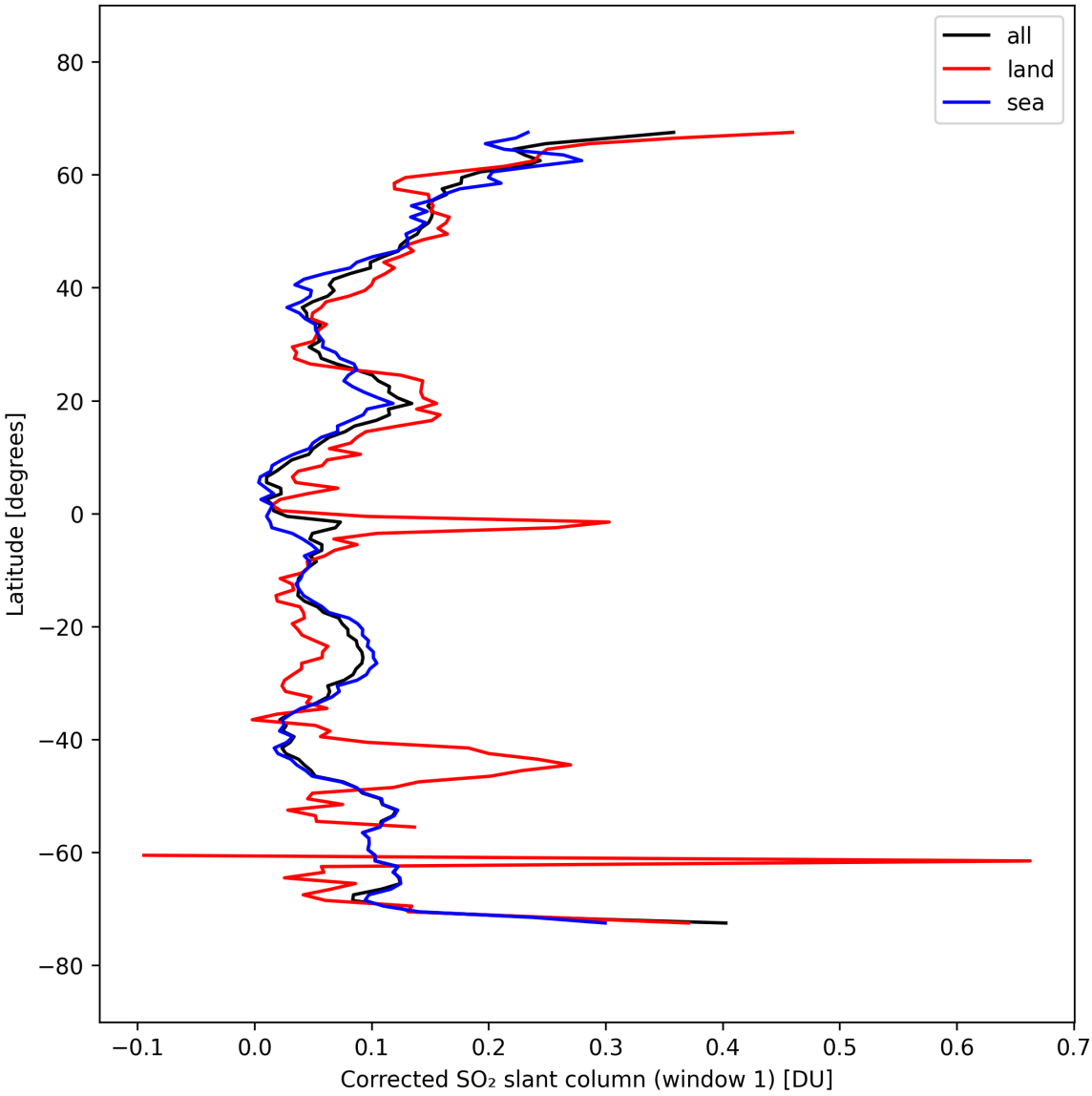

Figure 38: Zonal average of "Corrected SO_2 slant column (window 1)" for 2025-03-14 to 2025-03-15.

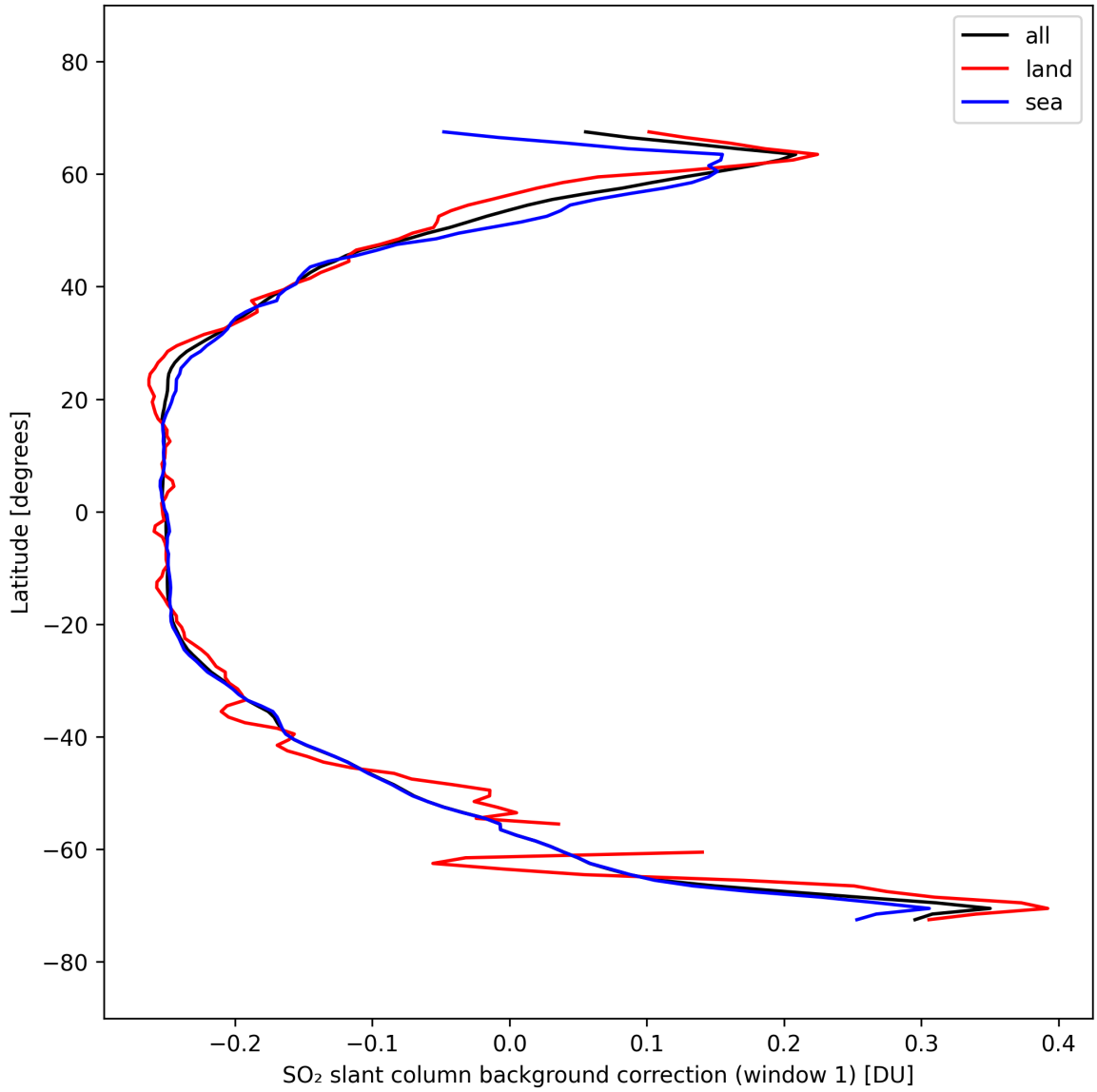

Figure 39: Zonal average of "SO_2 slant column background correction (window 1)" for 2025-03-14 to 2025-03-15.

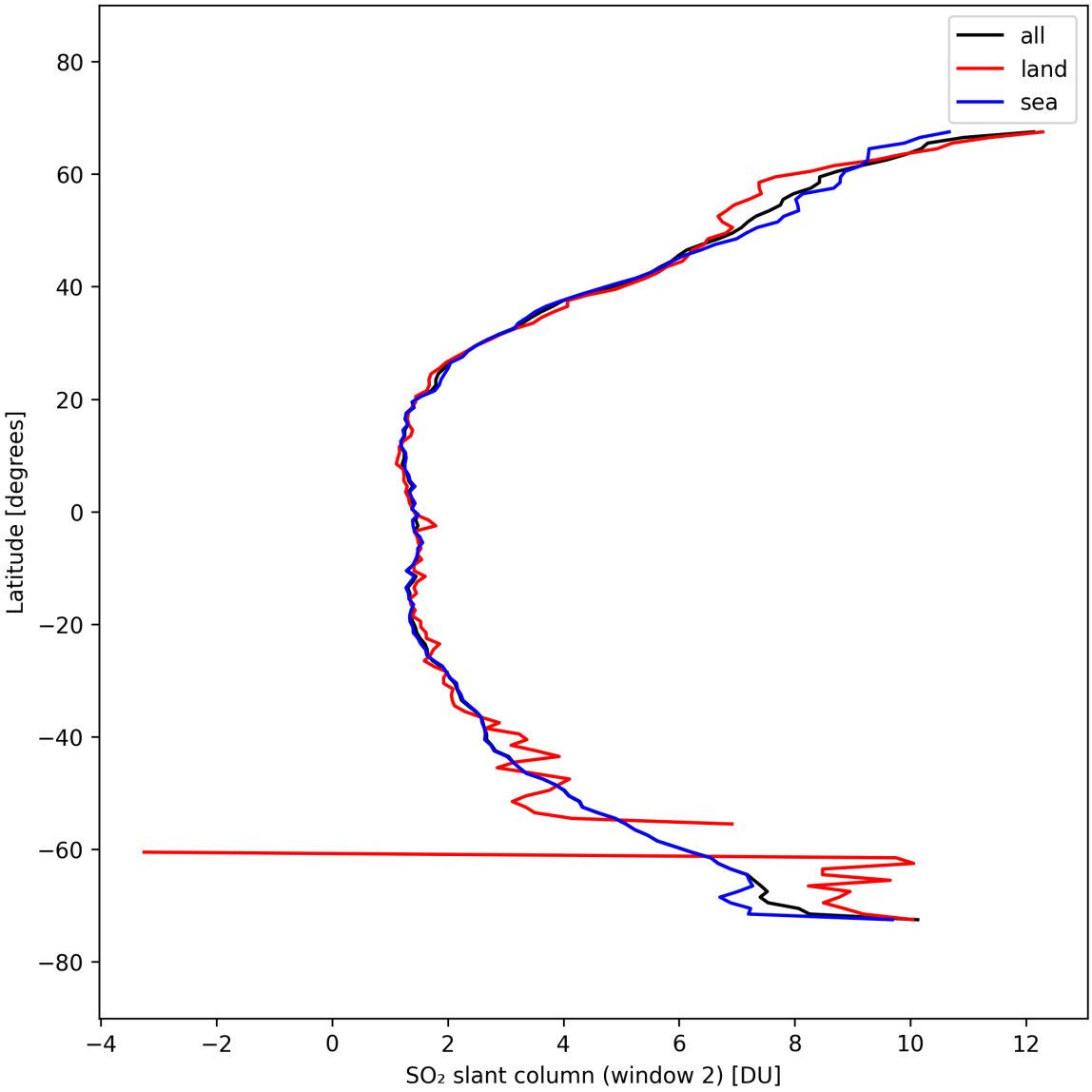

Figure 40: Zonal average of "SO_2 slant column (window 2)" for 2025-03-14 to 2025-03-15.

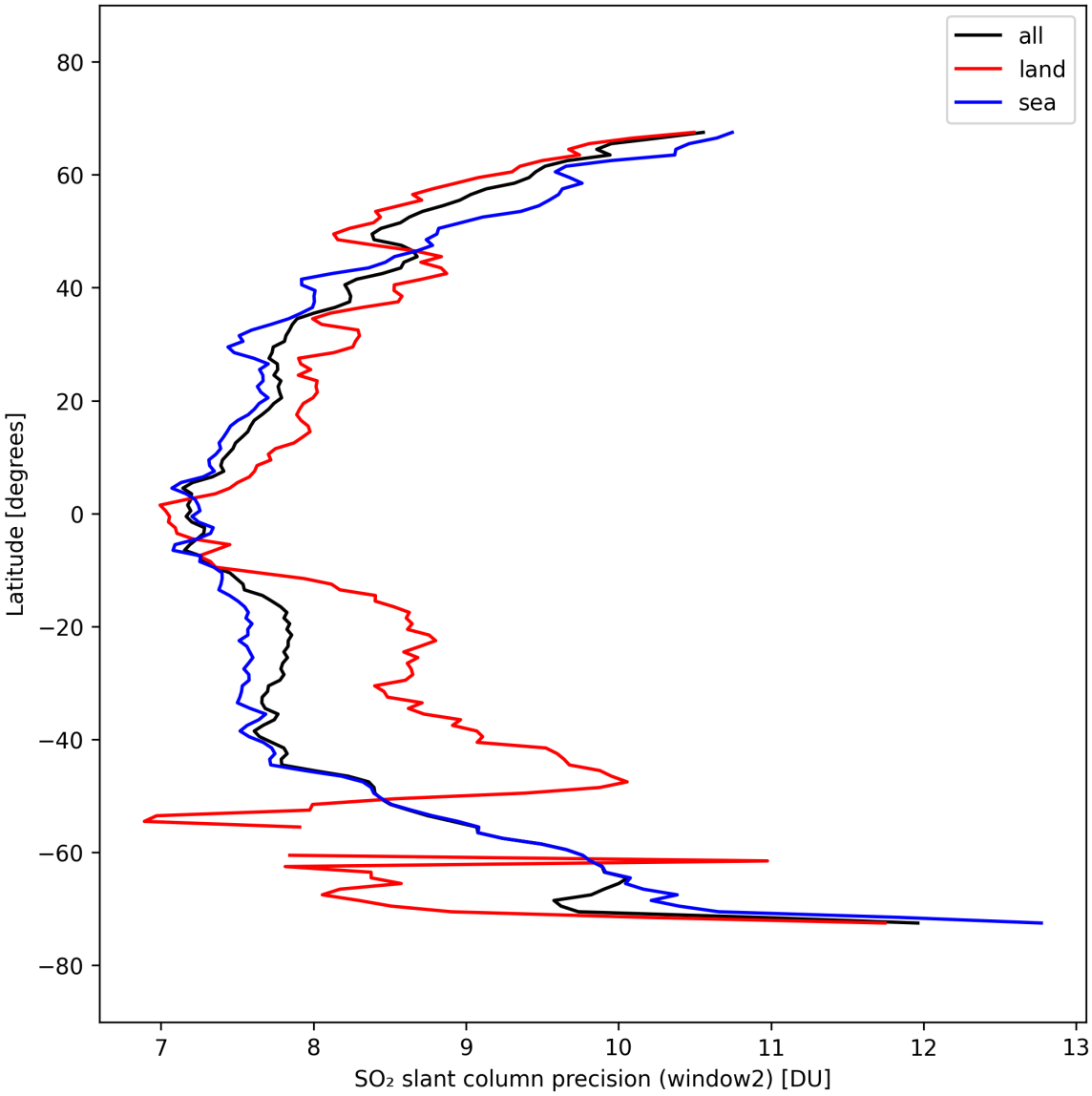

Figure 41: Zonal average of "SO_2 slant column precision (window2)" for 2025-03-14 to 2025-03-15.

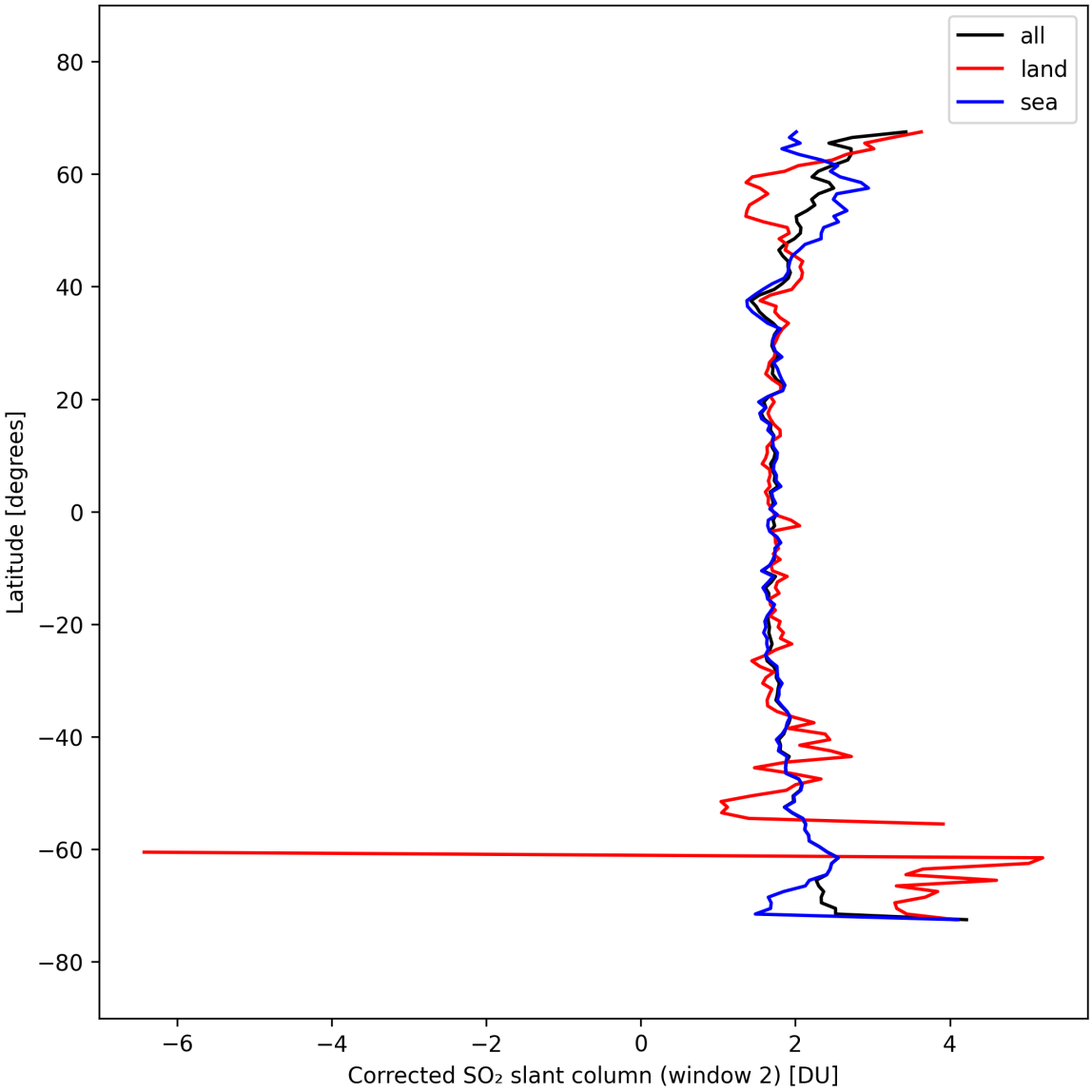

Figure 42: Zonal average of "Corrected SO_2 slant column (window 2)" for 2025-03-14 to 2025-03-15.

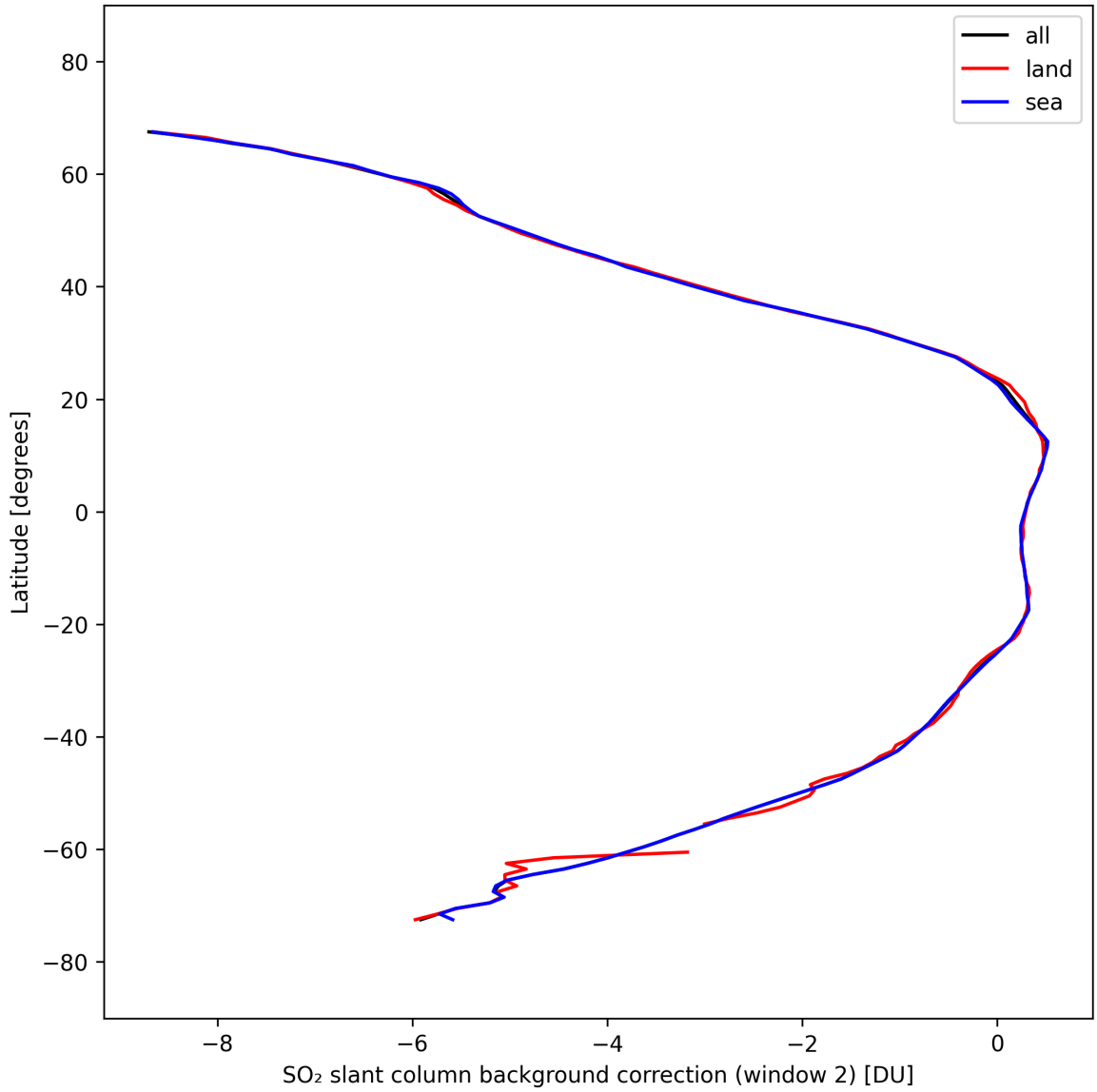

Figure 43: Zonal average of "SO_2 slant column background correction (window 2)" for 2025-03-14 to 2025-03-15.

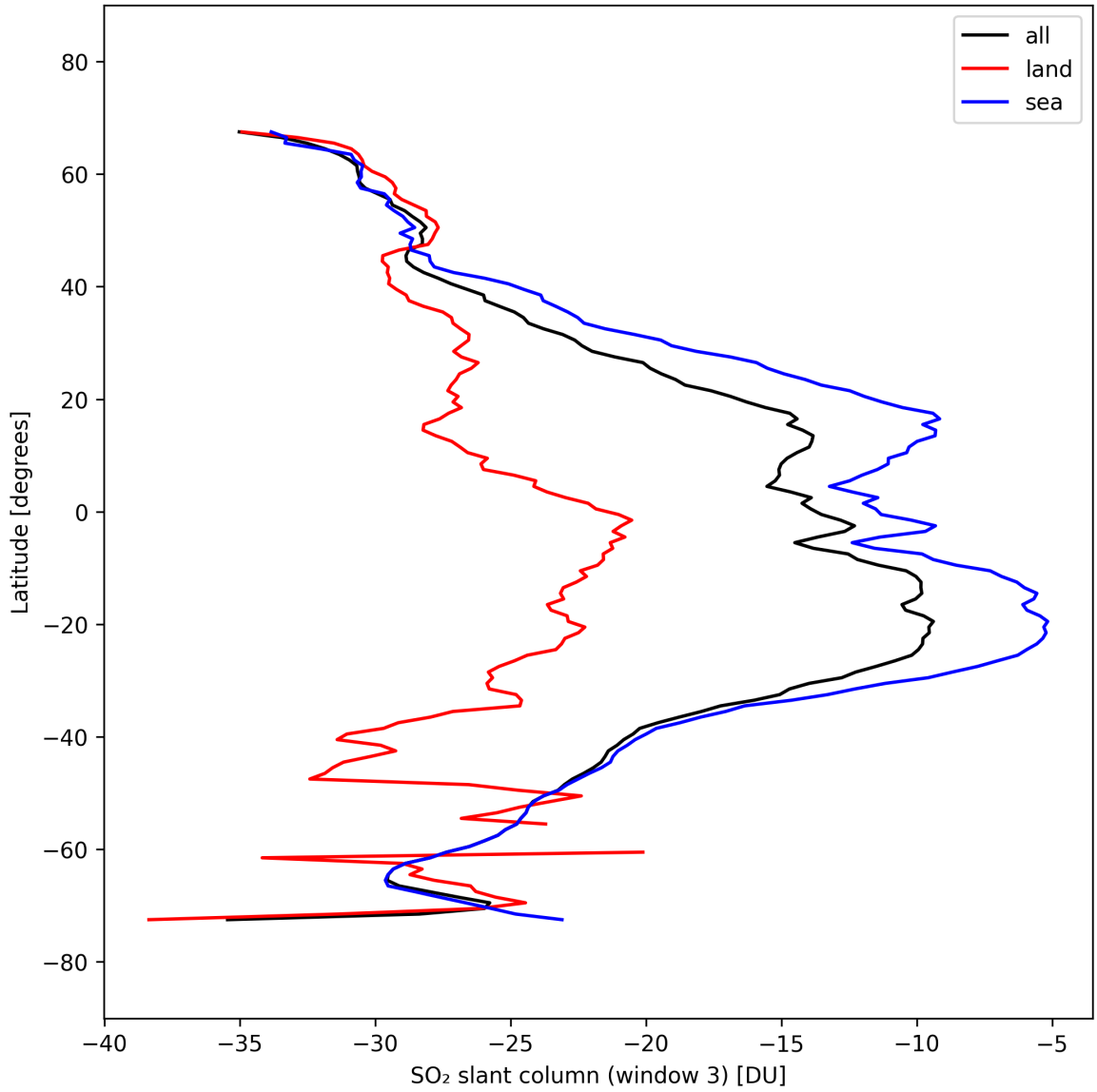

Figure 44: Zonal average of "SO_2 slant column (window 3)" for 2025-03-14 to 2025-03-15.

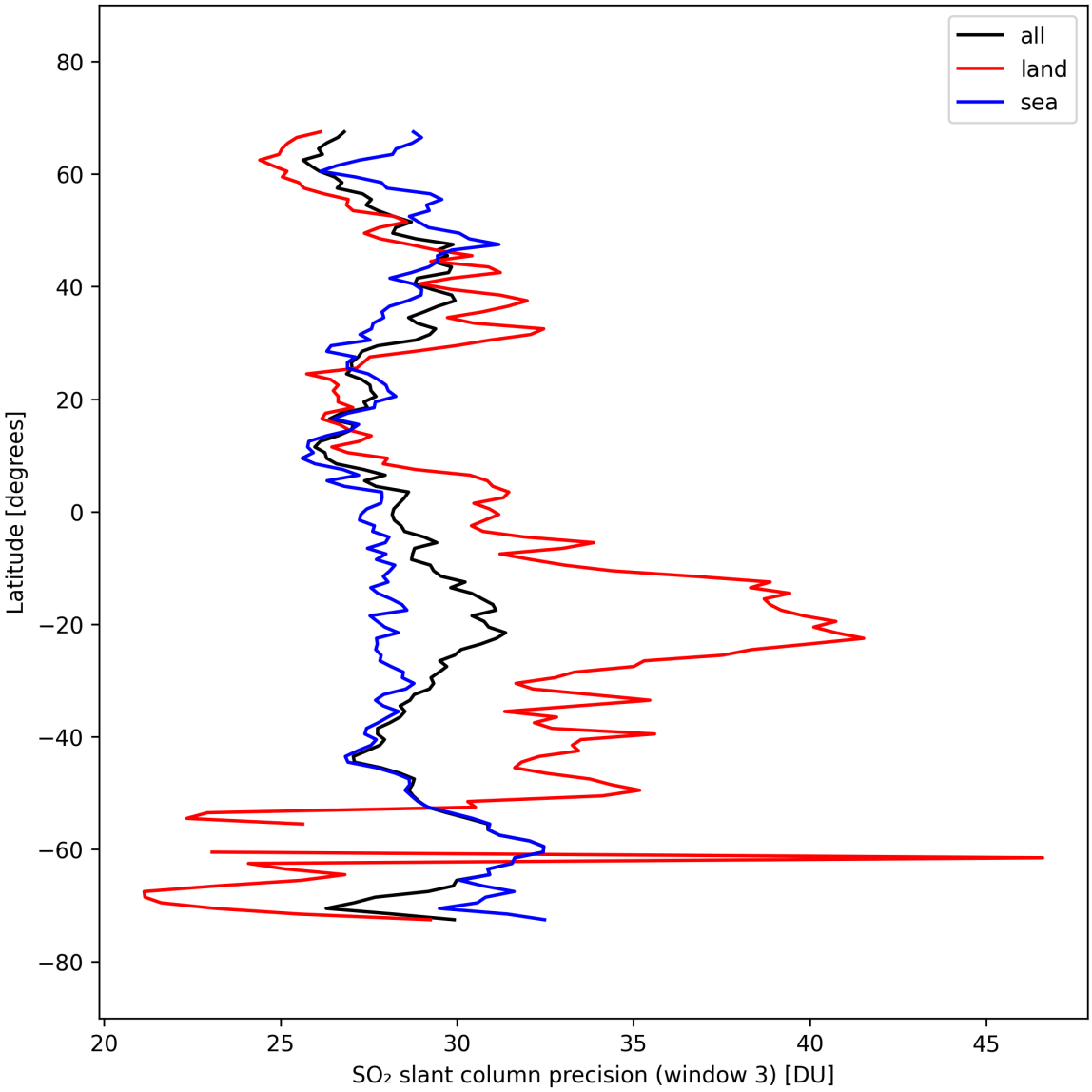

Figure 45: Zonal average of "SO_2 slant column precision (window 3)" for 2025-03-14 to 2025-03-15.

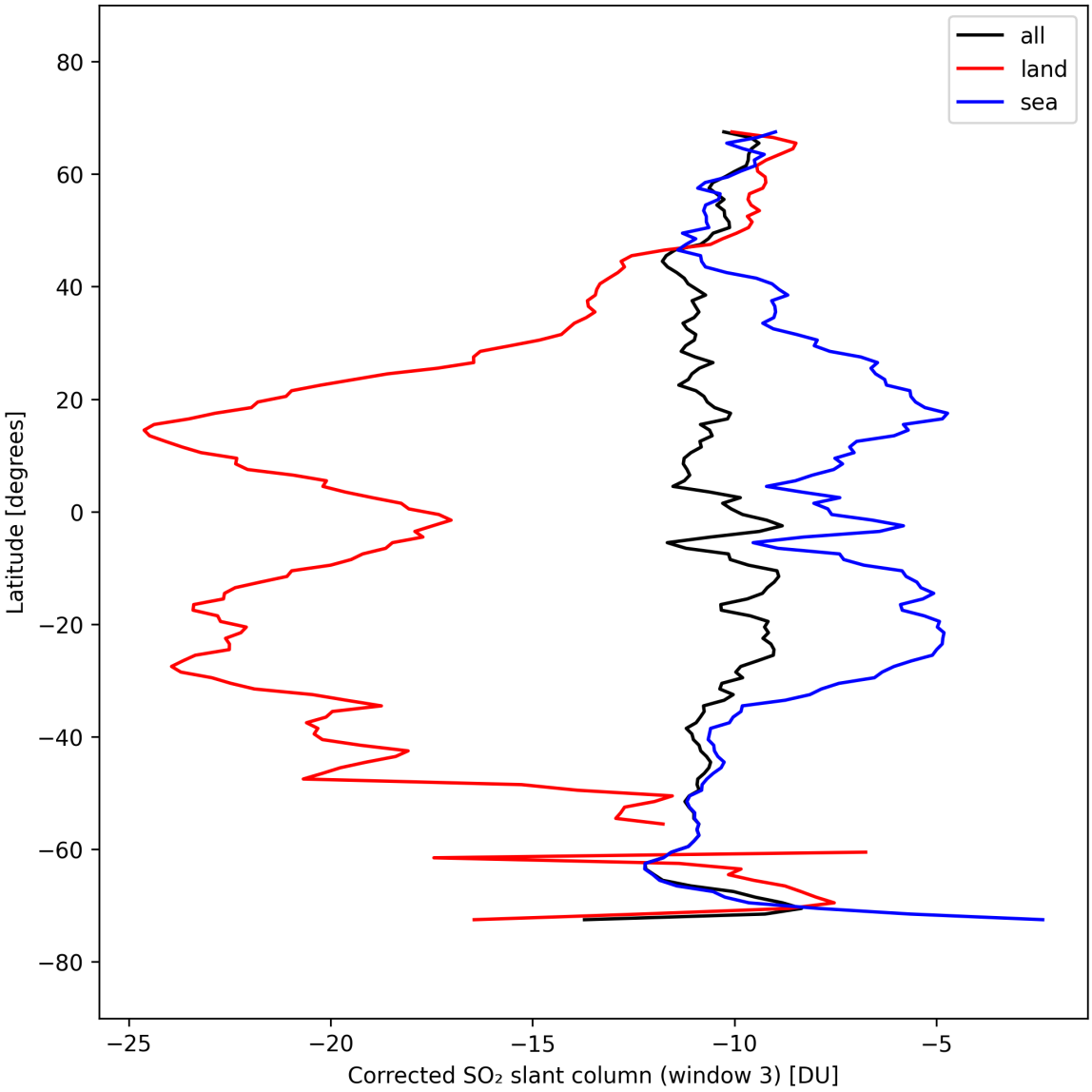

Figure 46: Zonal average of "Corrected SO_2 slant column (window 3)" for 2025-03-14 to 2025-03-15.

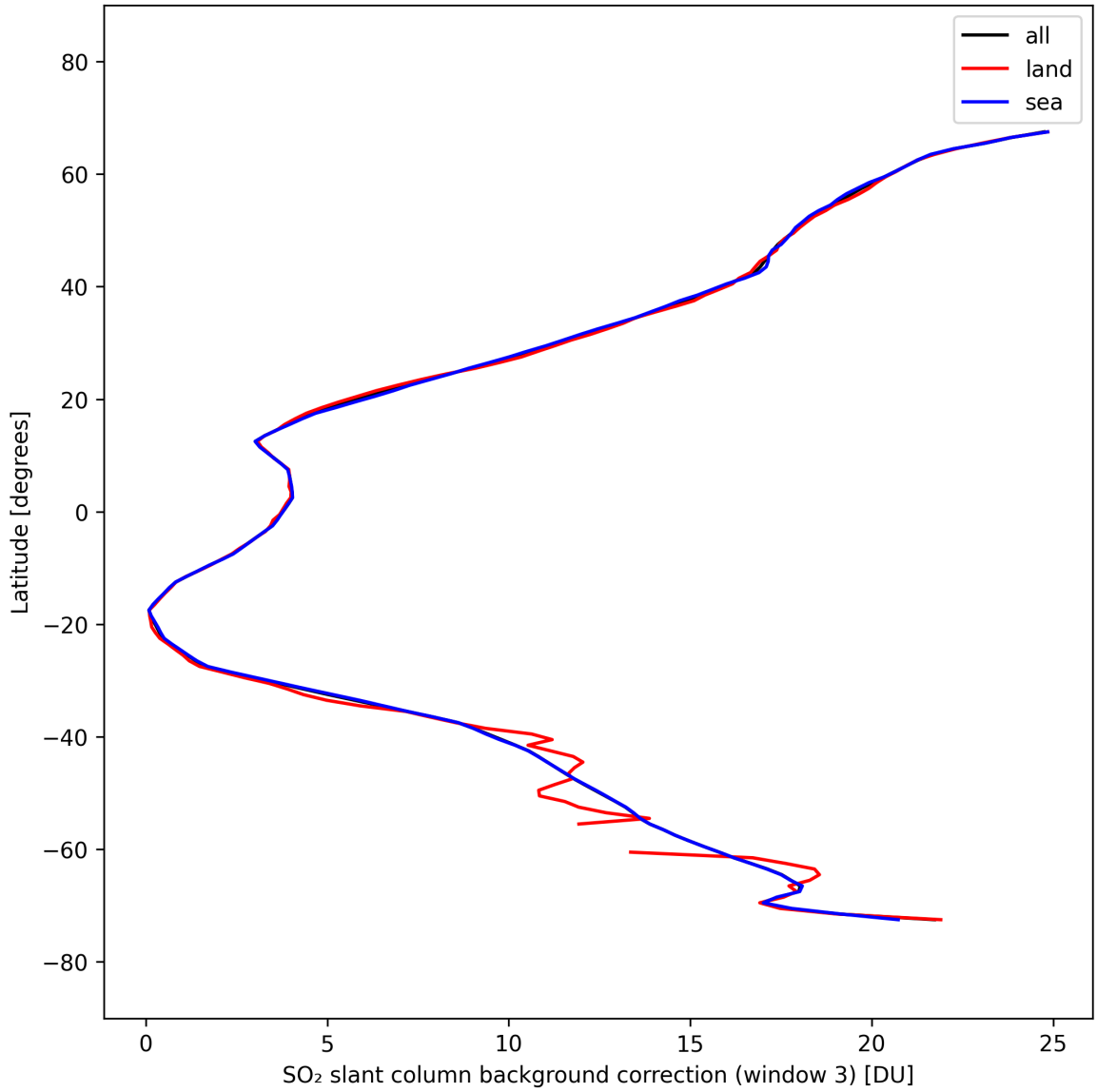

Figure 47: Zonal average of "SO_2 slant column background correction (window 3)" for 2025-03-14 to 2025-03-15.

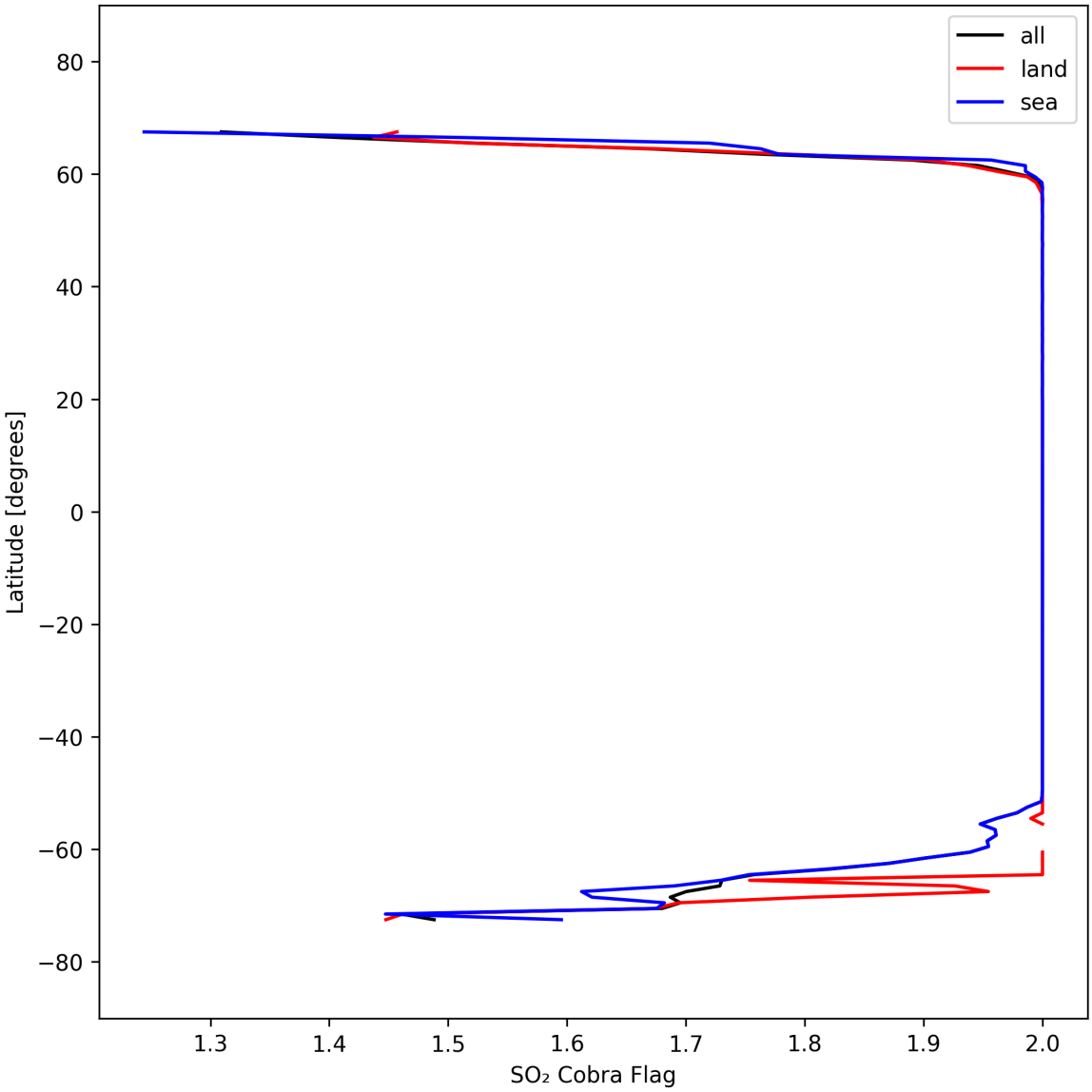

Figure 48: Zonal average of "SO_2 Cobra Flag" for 2025-03-14 to 2025-03-15.

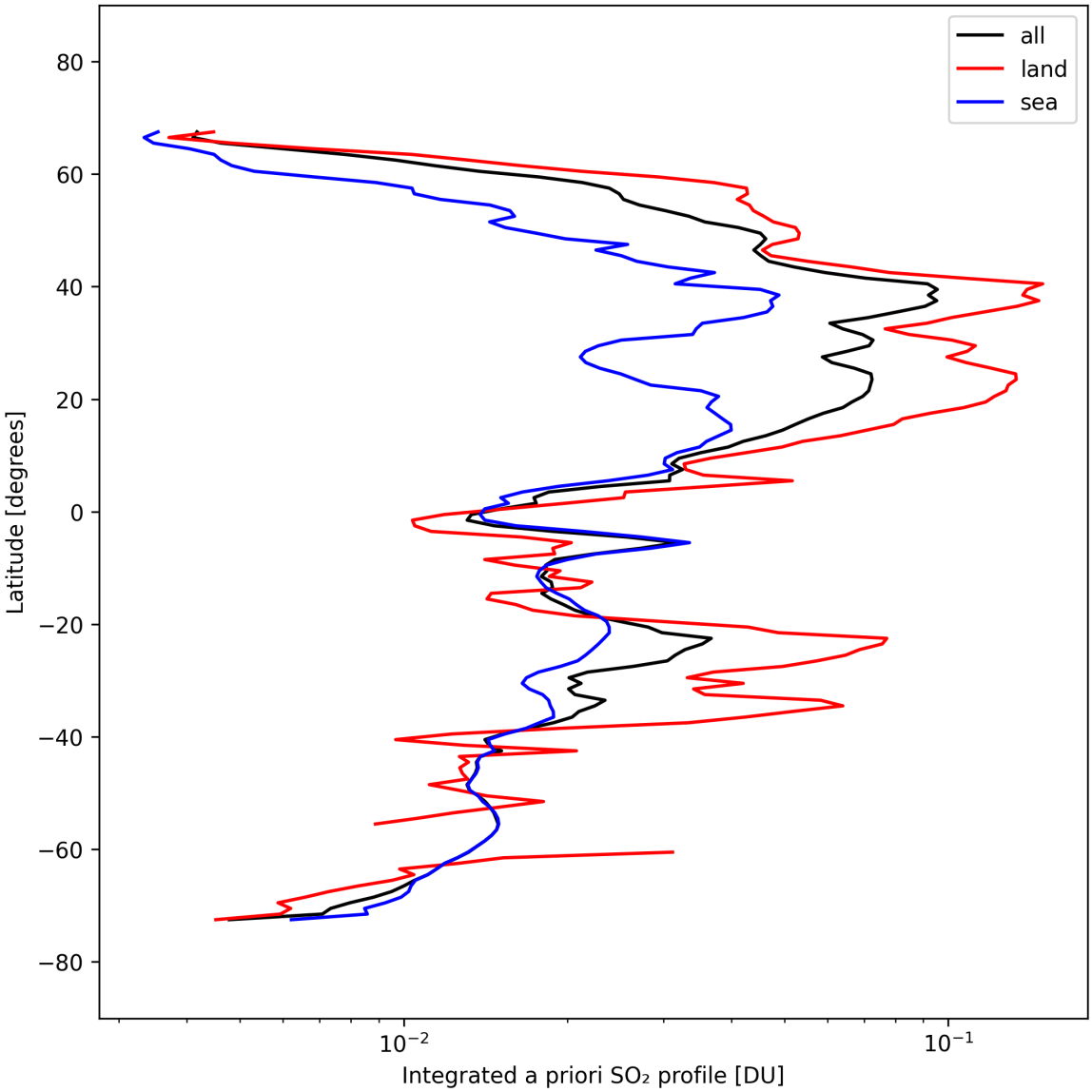

Figure 49: Zonal average of “Integrated a priori SO_2 profile” for 2025-03-14 to 2025-03-15.

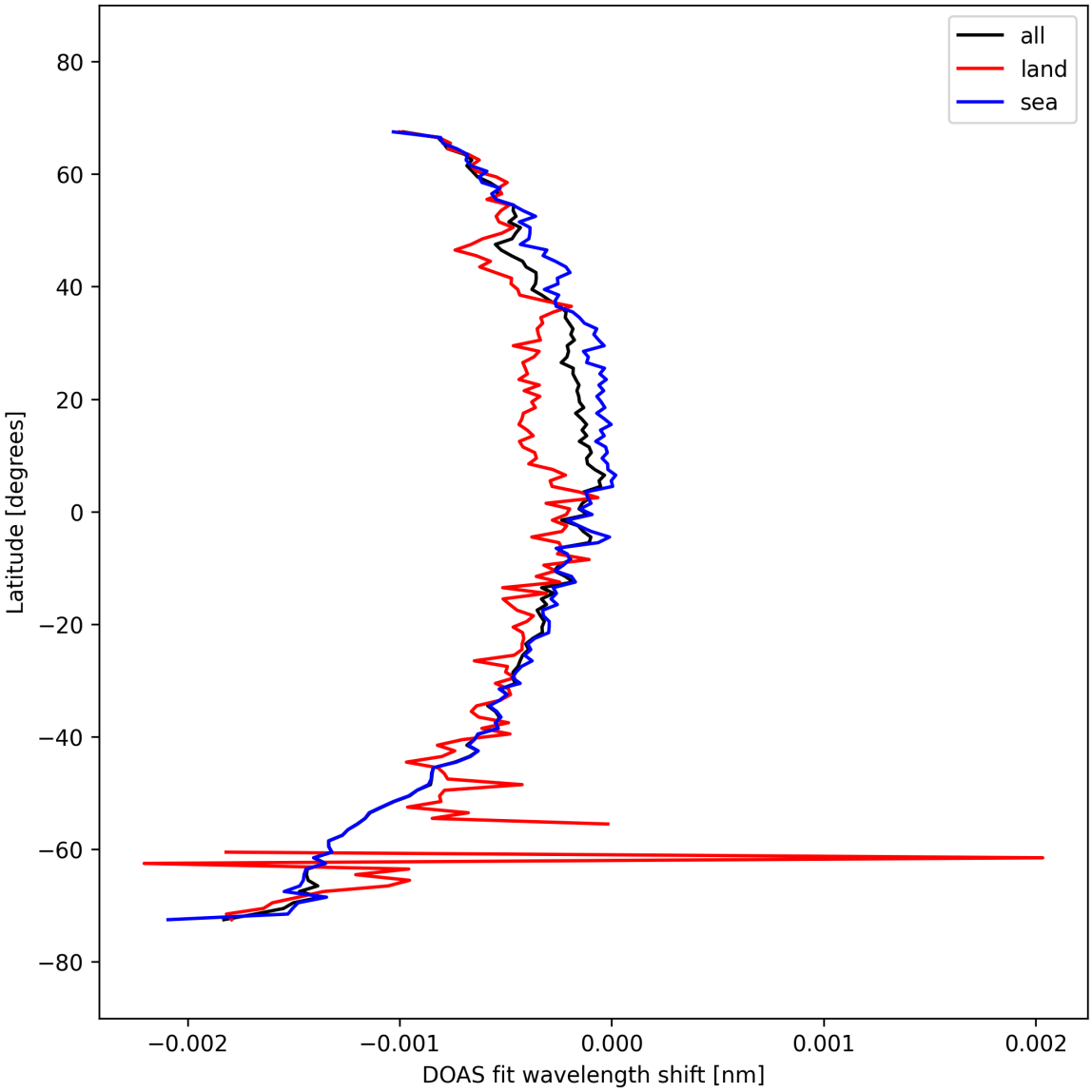

Figure 50: Zonal average of “DOAS fit wavelength shift” for 2025-03-14 to 2025-03-15.

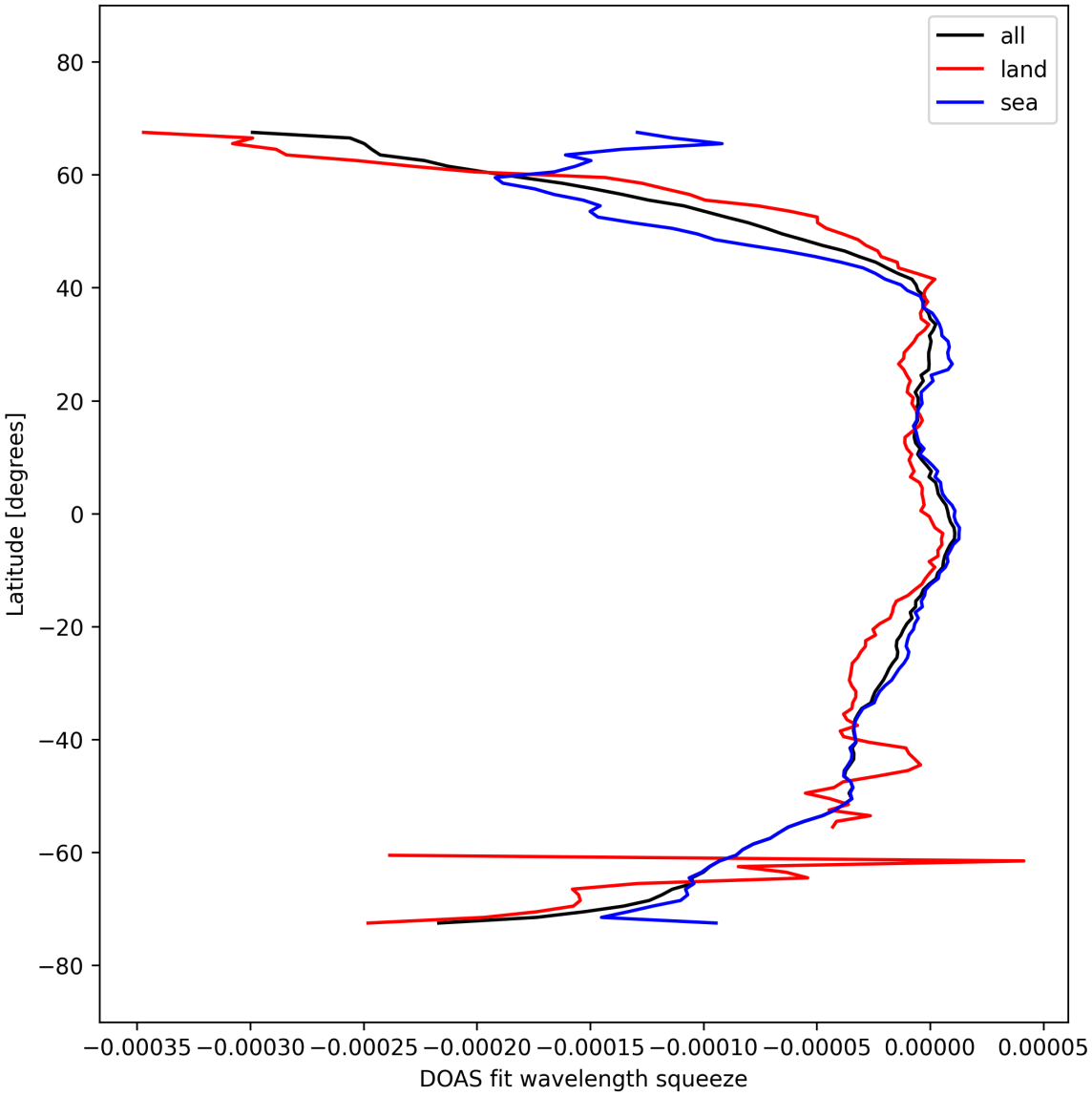

Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-03-14 to 2025-03-15.

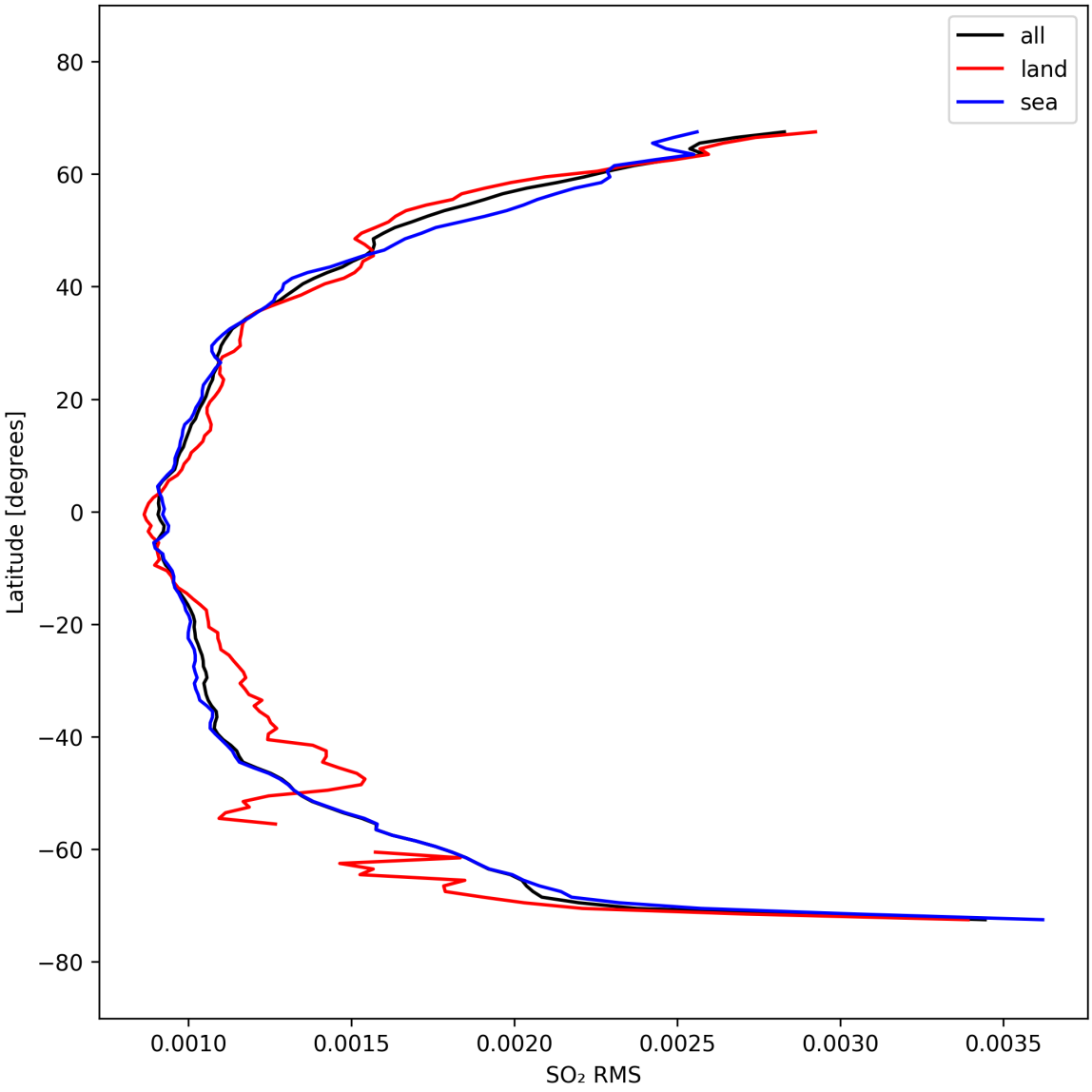

Figure 52: Zonal average of "SO_2 RMS" for 2025-03-14 to 2025-03-15.

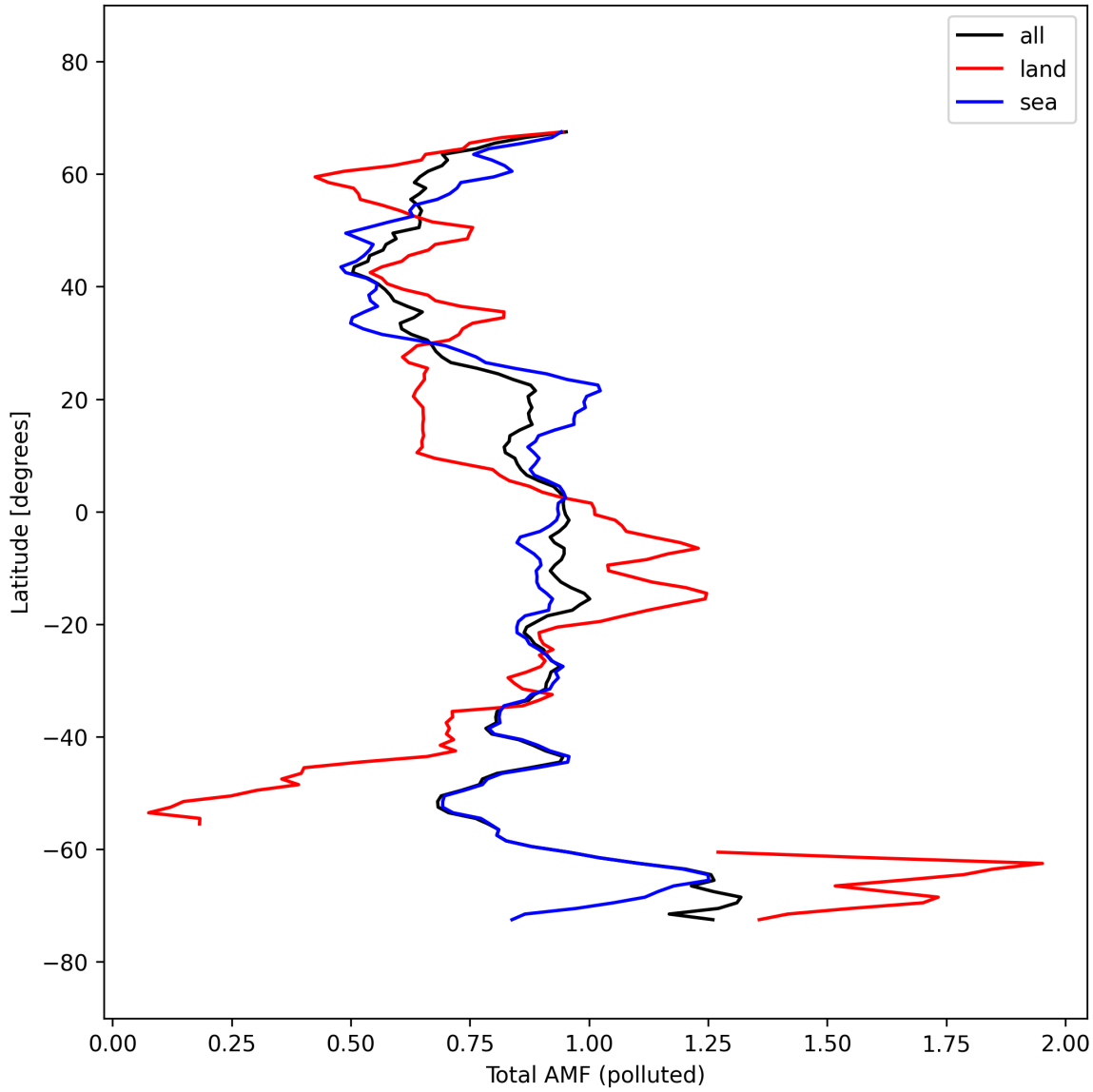

Figure 53: Zonal average of “Total AMF (polluted)” for 2025-03-14 to 2025-03-15.

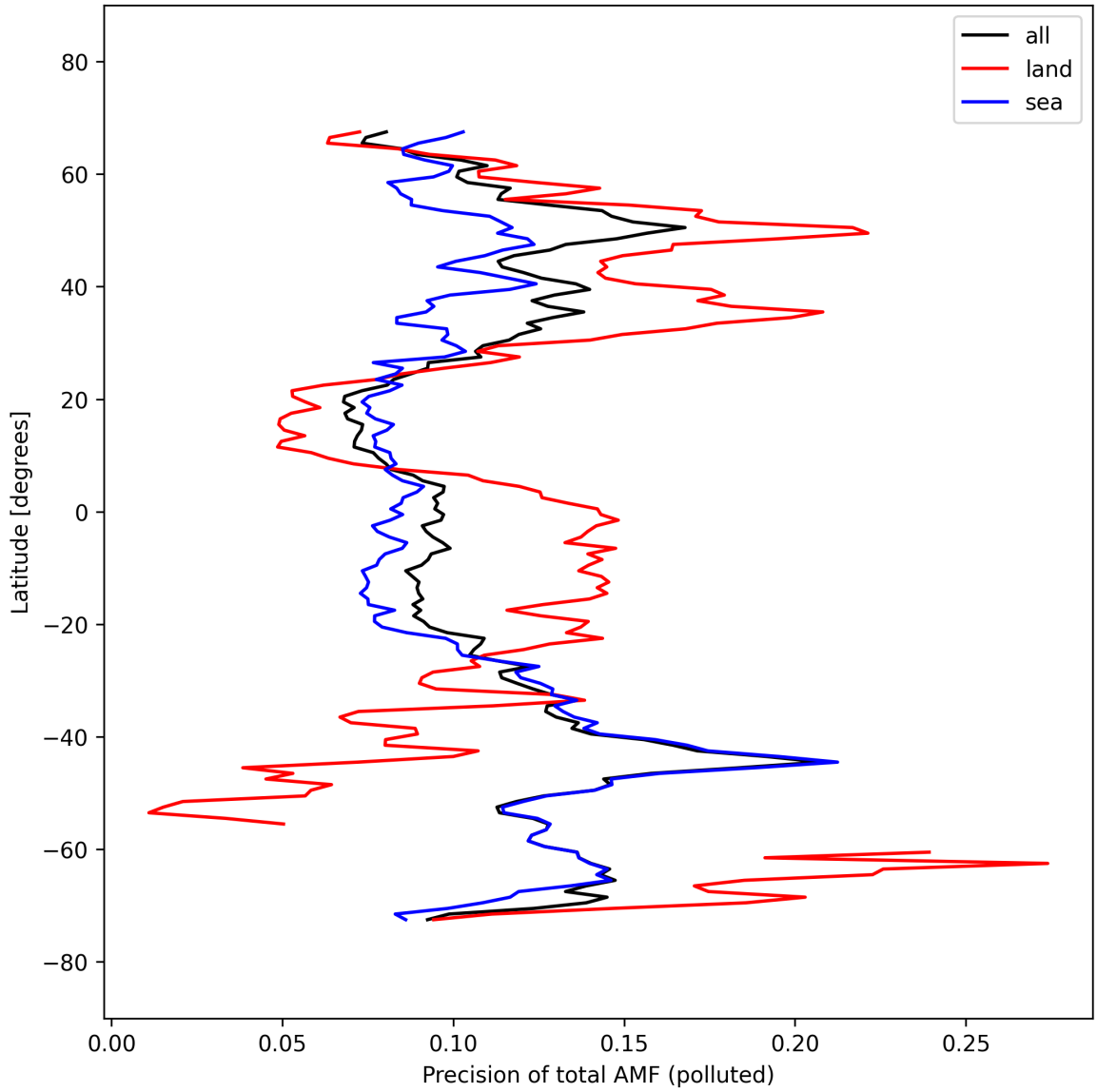

Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-03-14 to 2025-03-15.

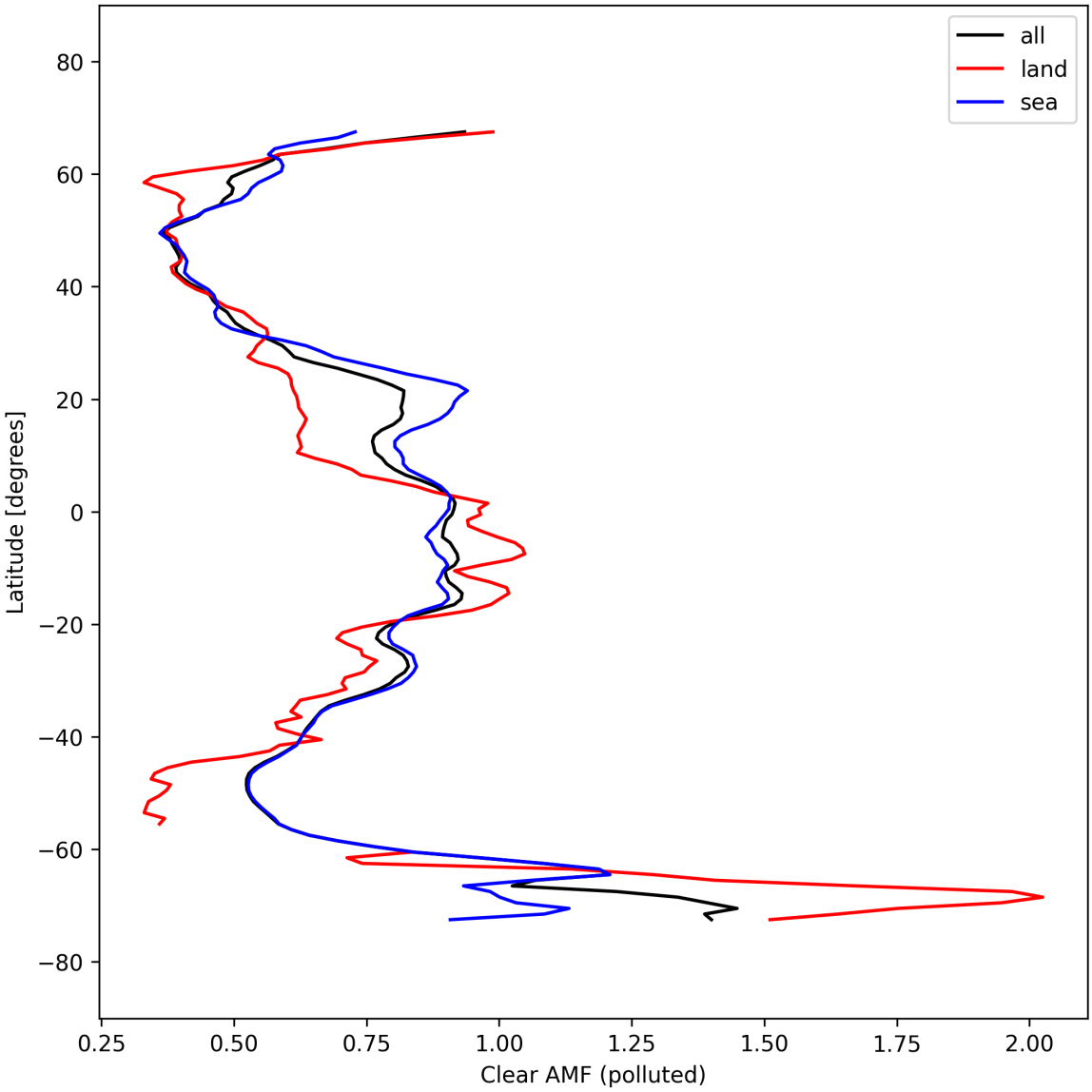

Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-03-14 to 2025-03-15.

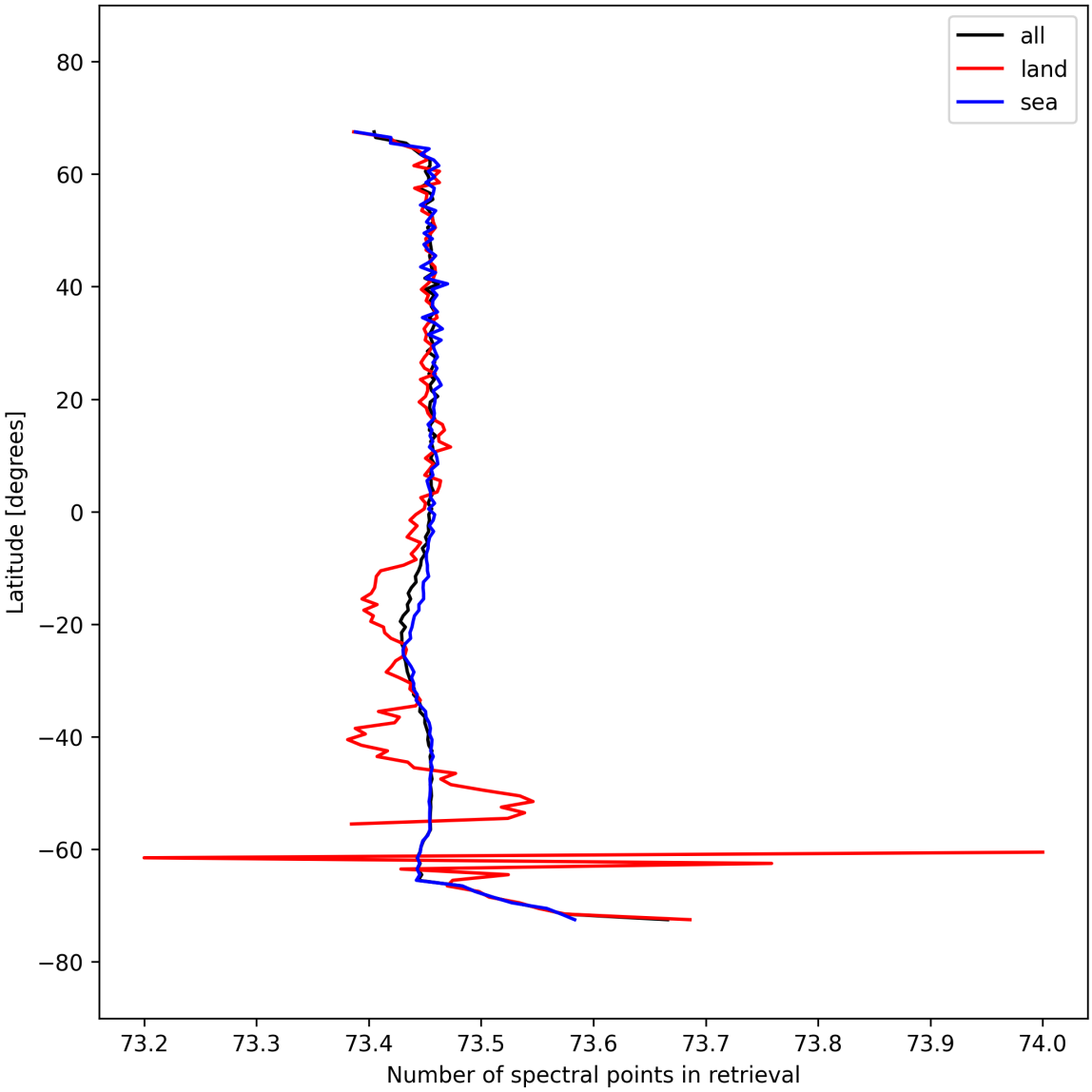

Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-03-14 to 2025-03-15.

8 Histograms

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

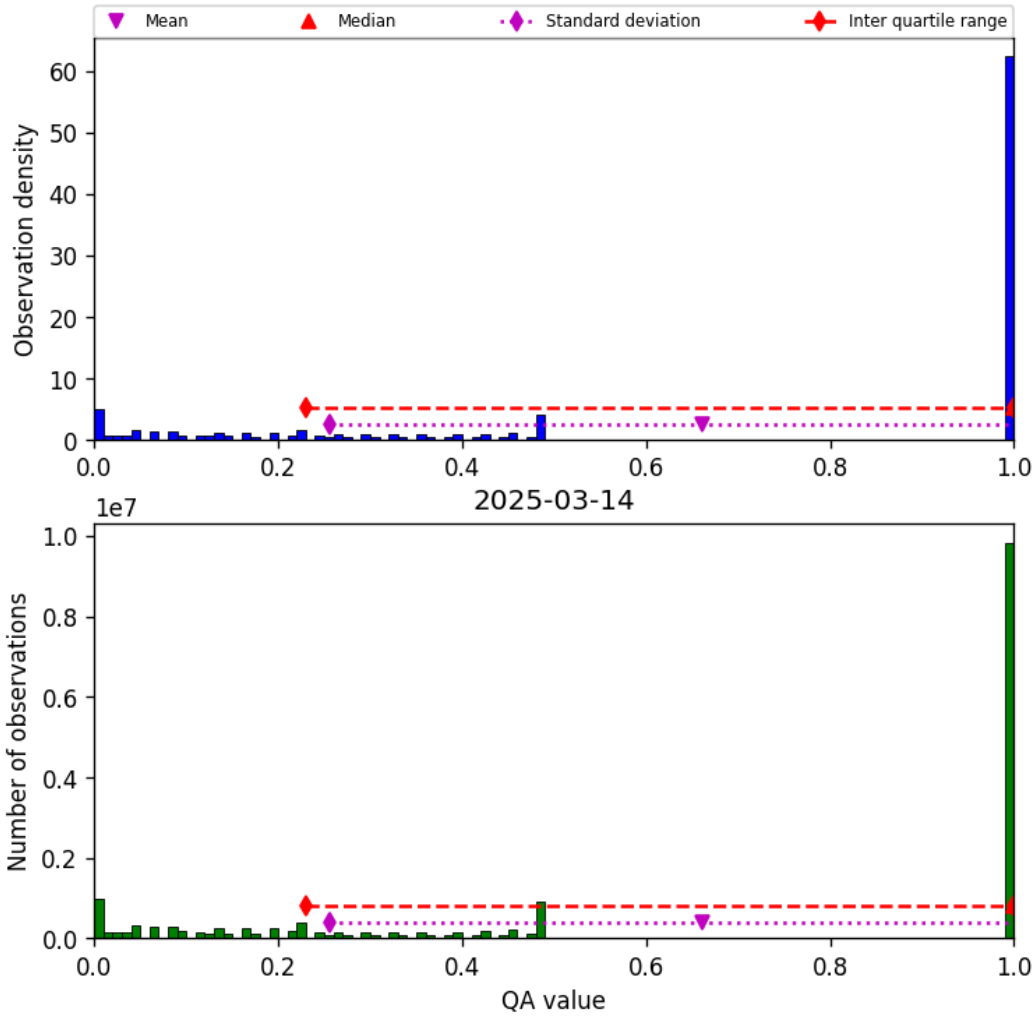

Figure 57: Histogram of “QA value” for 2025-03-14 to 2025-03-15

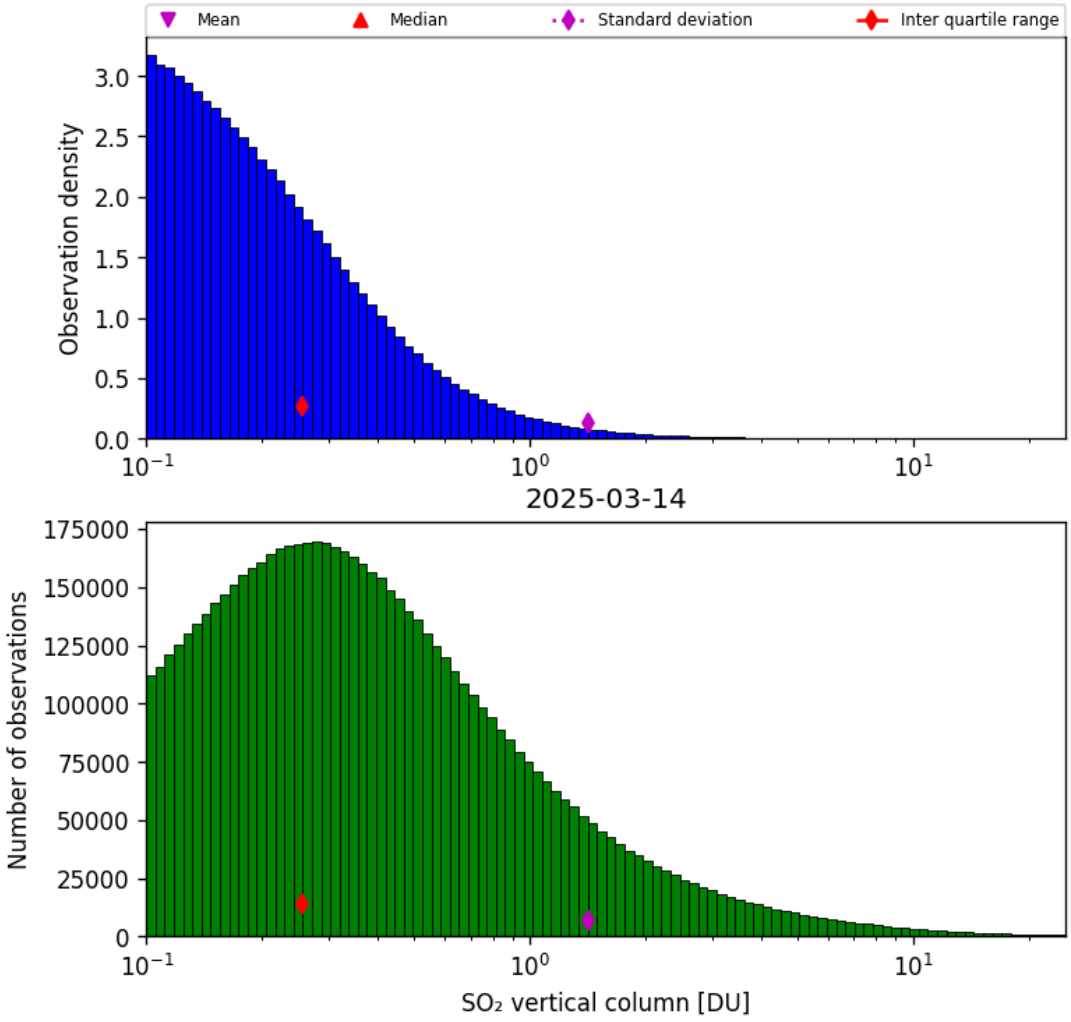

Figure 58: Histogram of "SO_2 vertical column" for 2025-03-14 to 2025-03-15

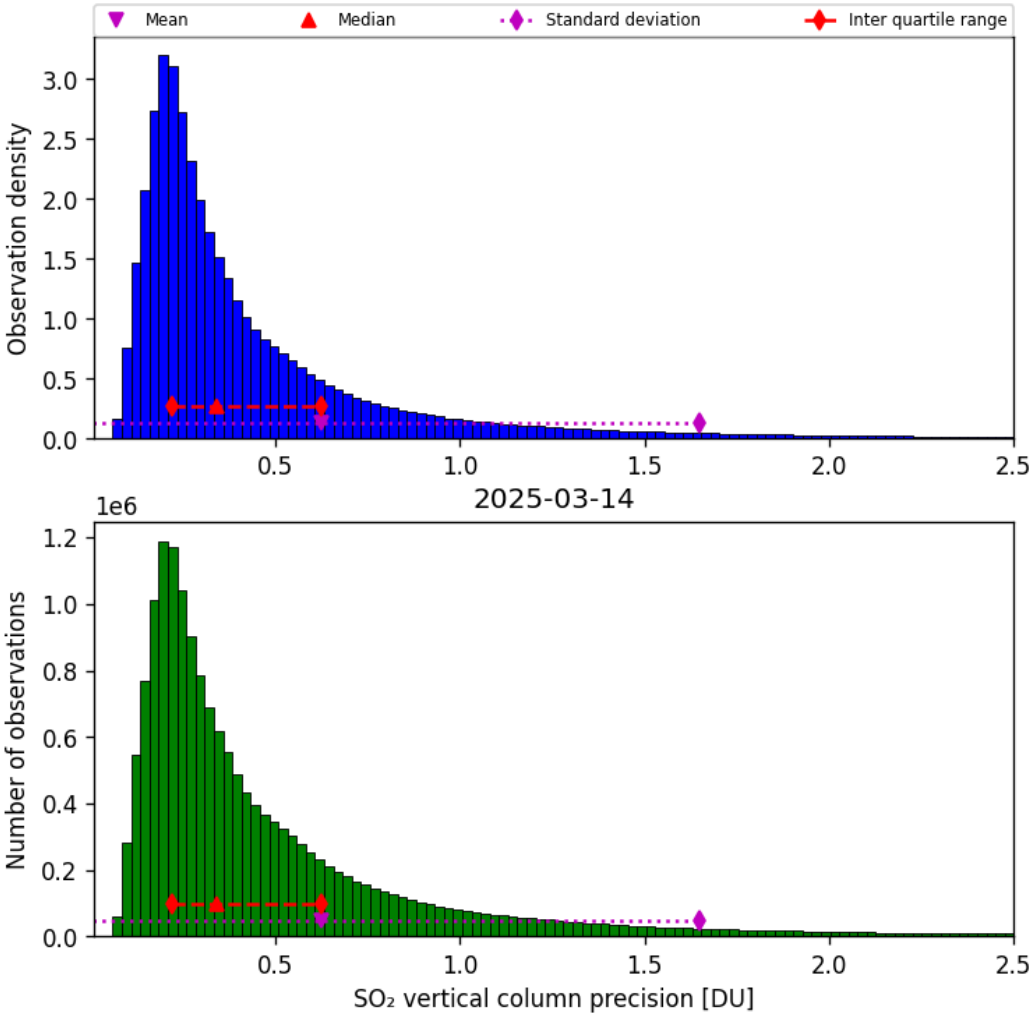

Figure 59: Histogram of "SO_2 vertical column precision" for 2025-03-14 to 2025-03-15

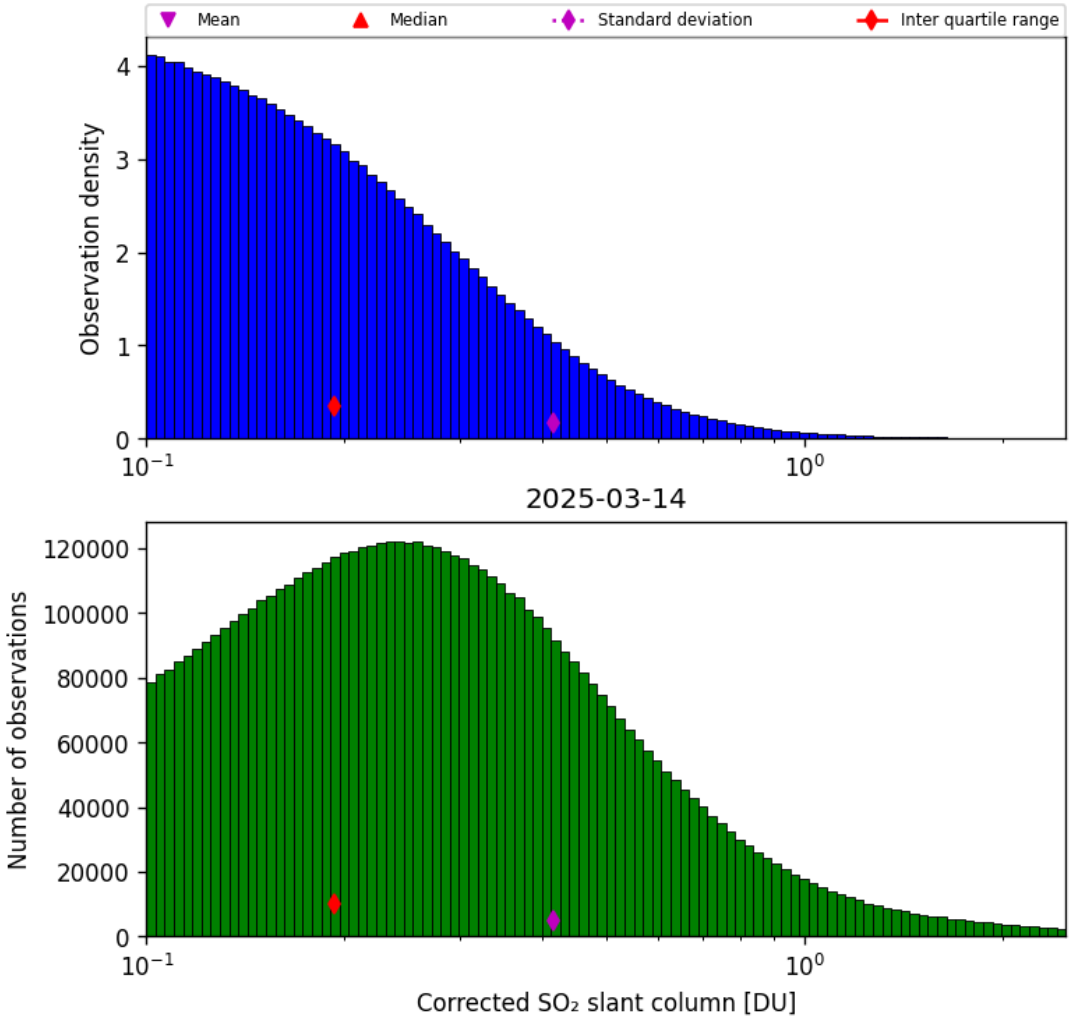

Figure 60: Histogram of "Corrected SO_2 slant column" for 2025-03-14 to 2025-03-15

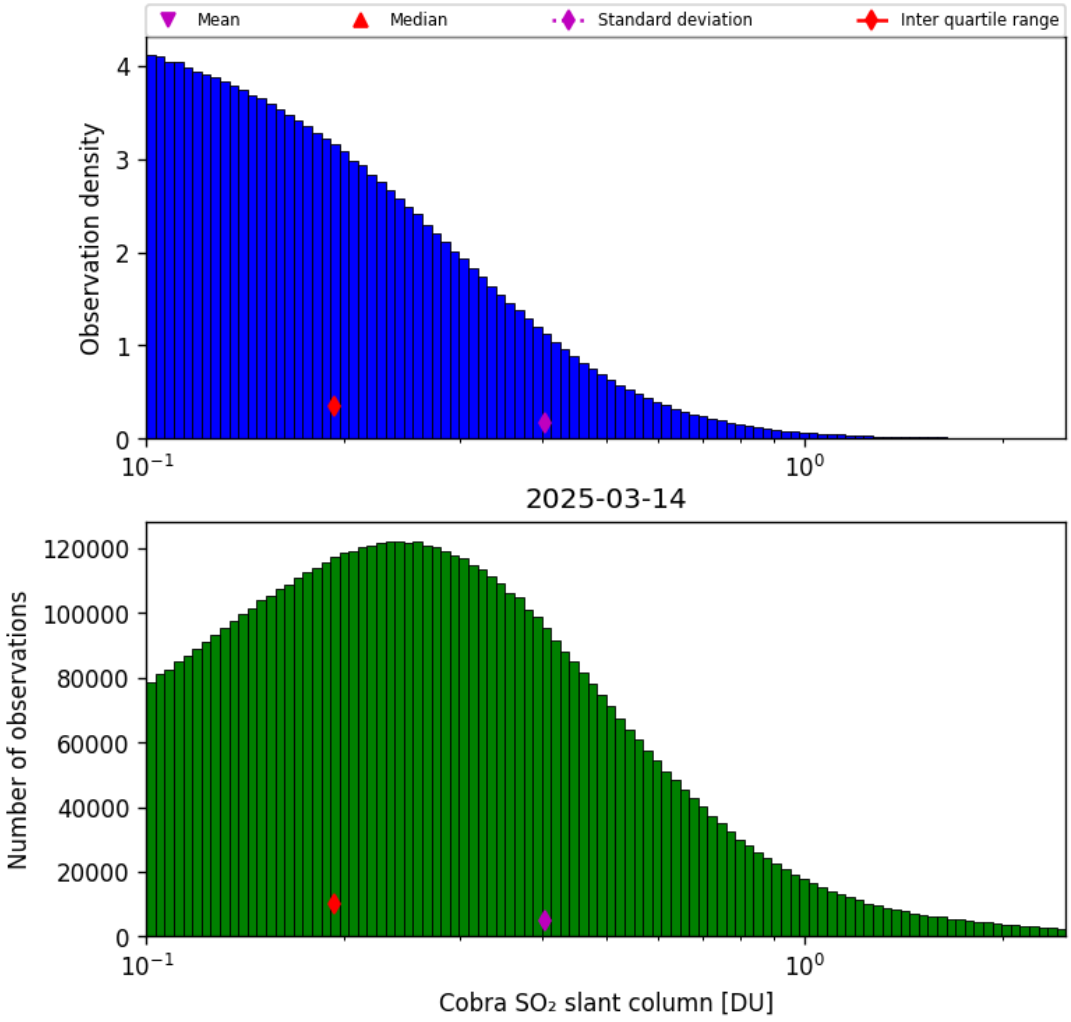

Figure 61: Histogram of "Cobra SO_2 slant column" for 2025-03-14 to 2025-03-15

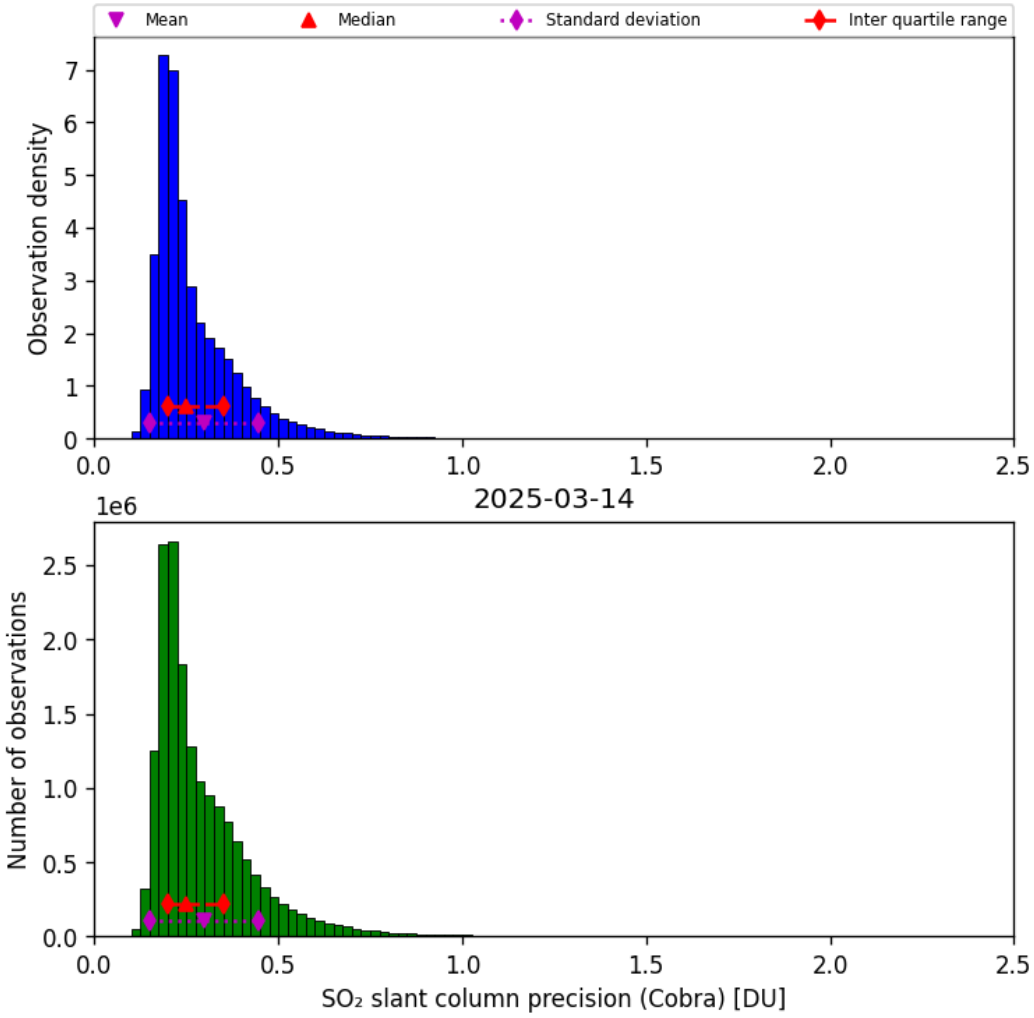

Figure 62: Histogram of "SO_2 slant column precision (Cobra)" for 2025-03-14 to 2025-03-15

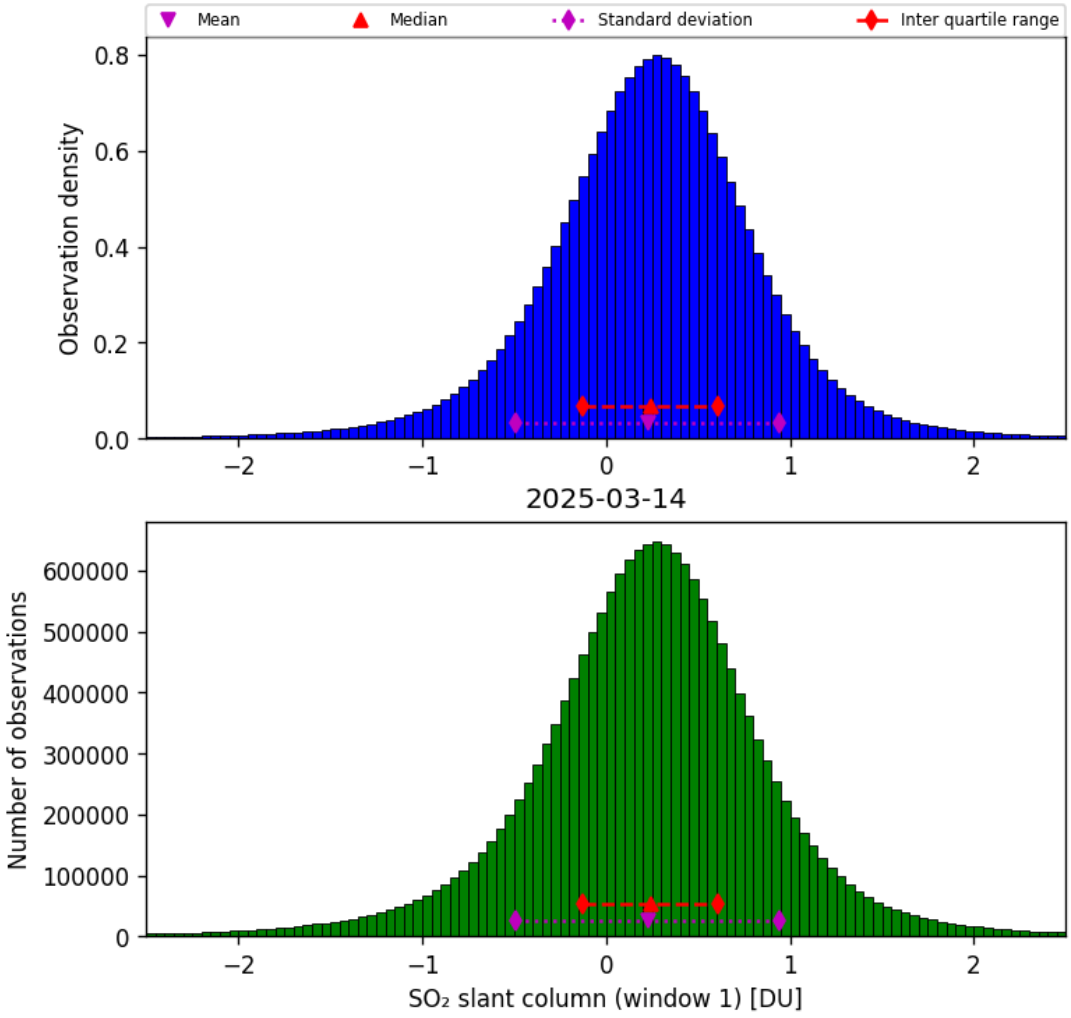

Figure 63: Histogram of "SO_2 slant column (window 1)" for 2025-03-14 to 2025-03-15

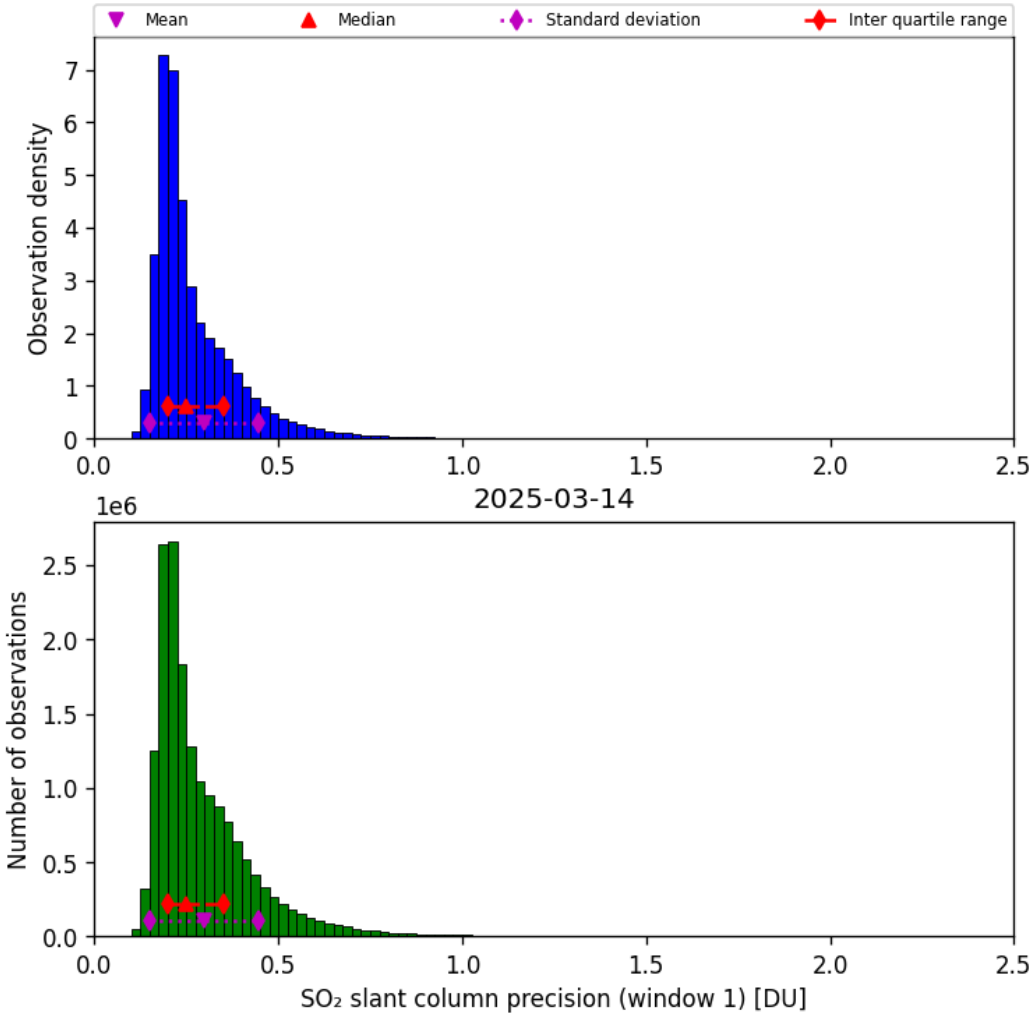

Figure 64: Histogram of "SO_2 slant column precision (window 1)" for 2025-03-14 to 2025-03-15

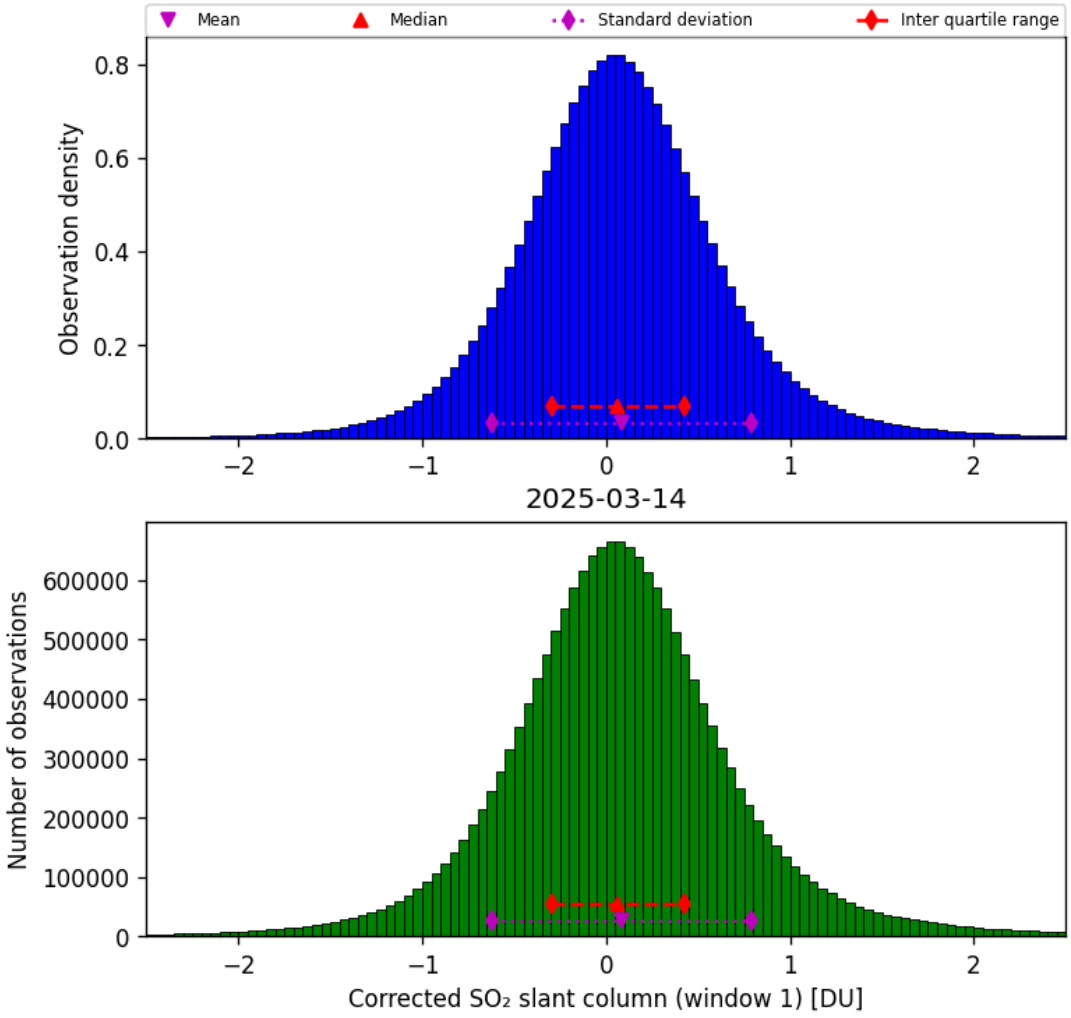

Figure 65: Histogram of "Corrected SO_2 slant column (window 1)" for 2025-03-14 to 2025-03-15

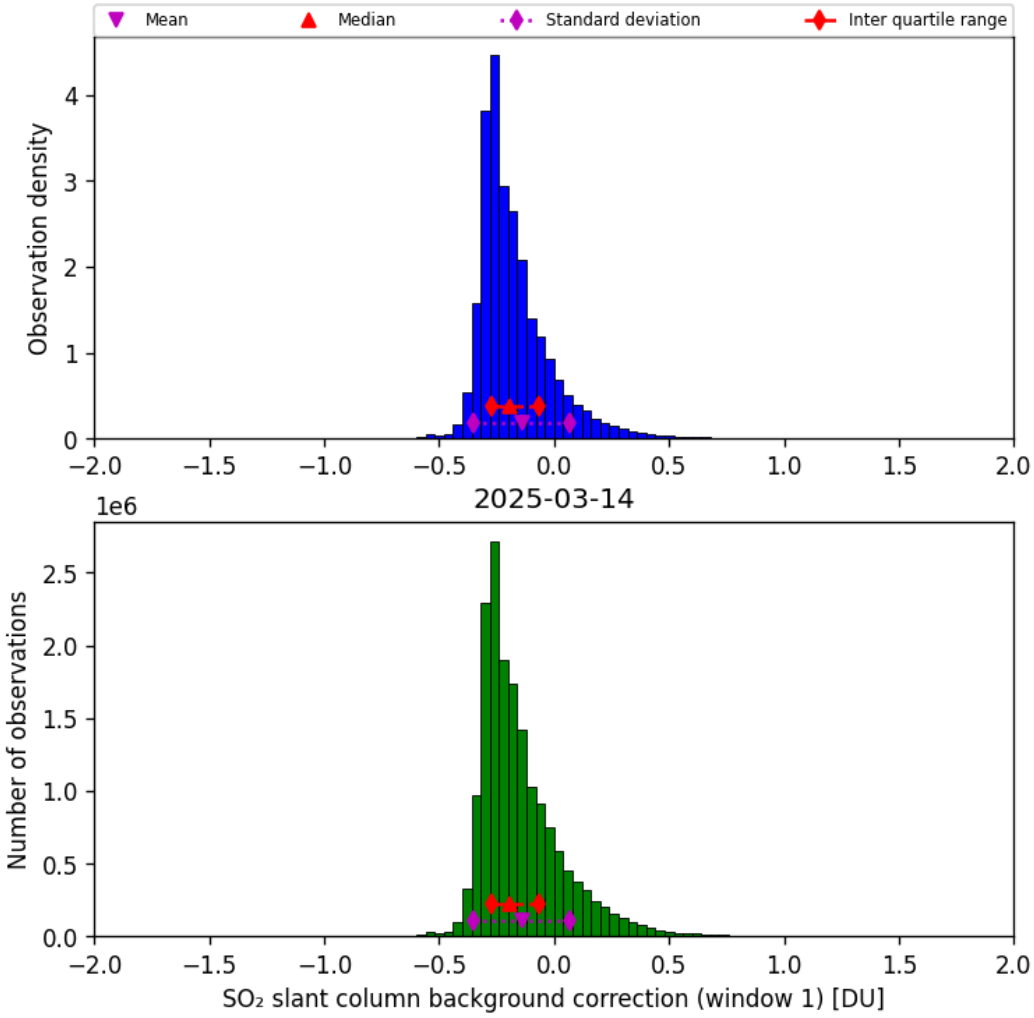

Figure 66: Histogram of "SO_2 slant column background correction (window 1)" for 2025-03-14 to 2025-03-15

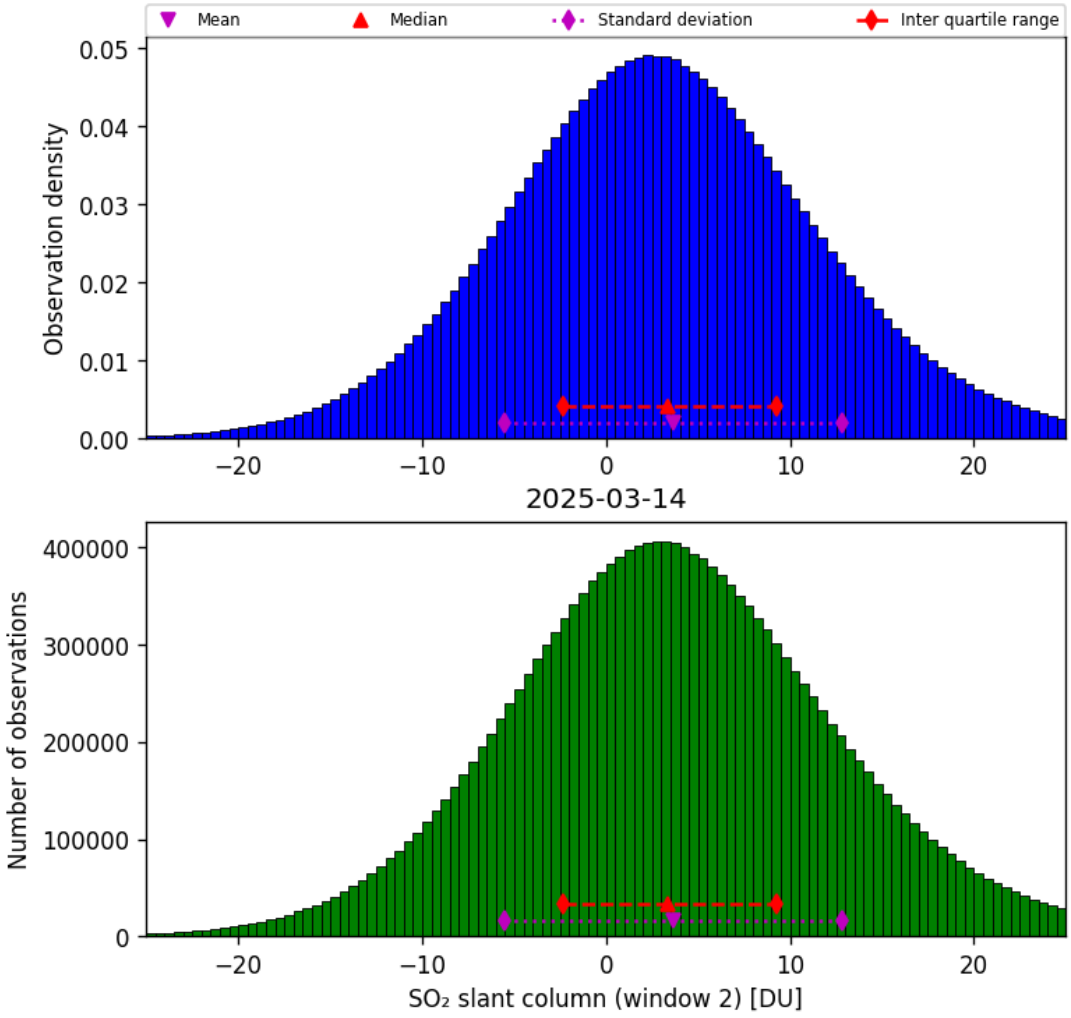

Figure 67: Histogram of "SO_2 slant column (window 2)" for 2025-03-14 to 2025-03-15

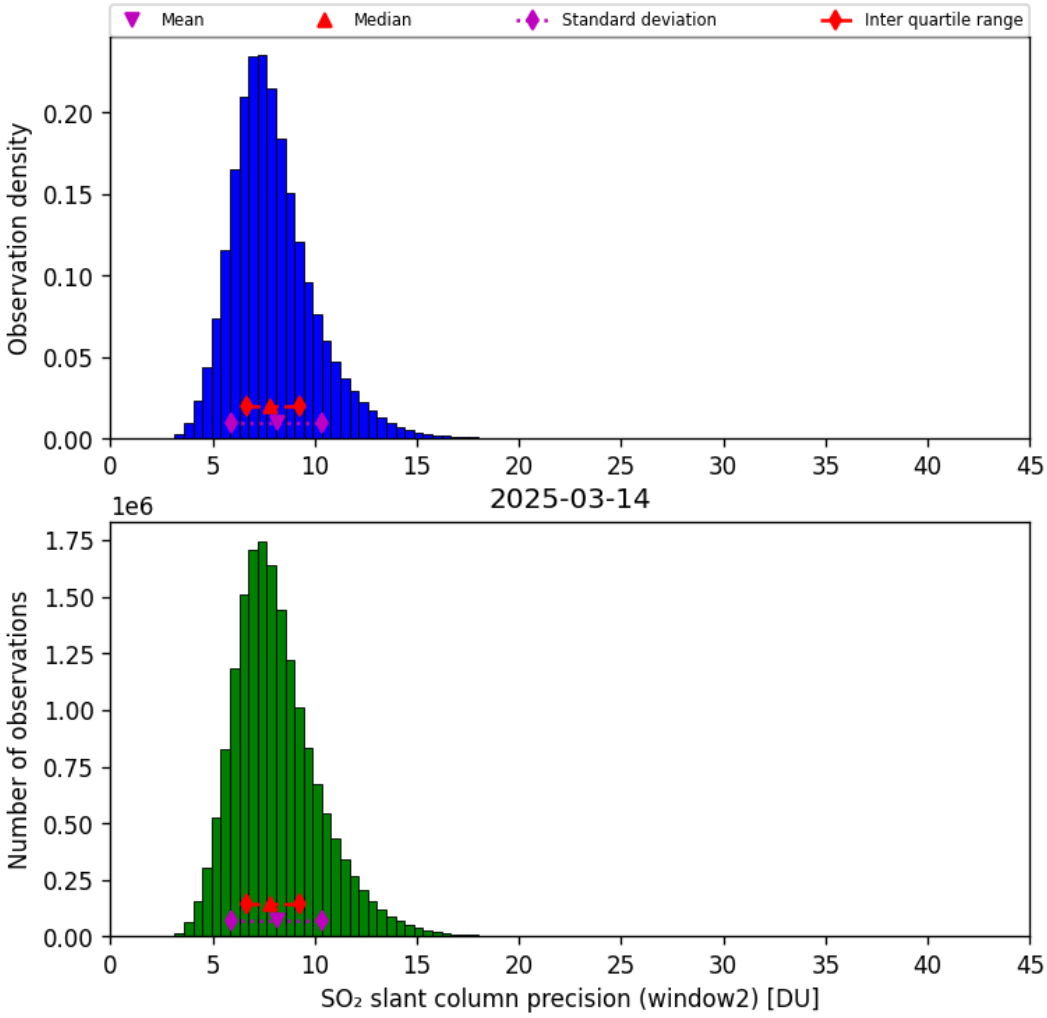

Figure 68: Histogram of "SO_2 slant column precision (window2)" for 2025-03-14 to 2025-03-15

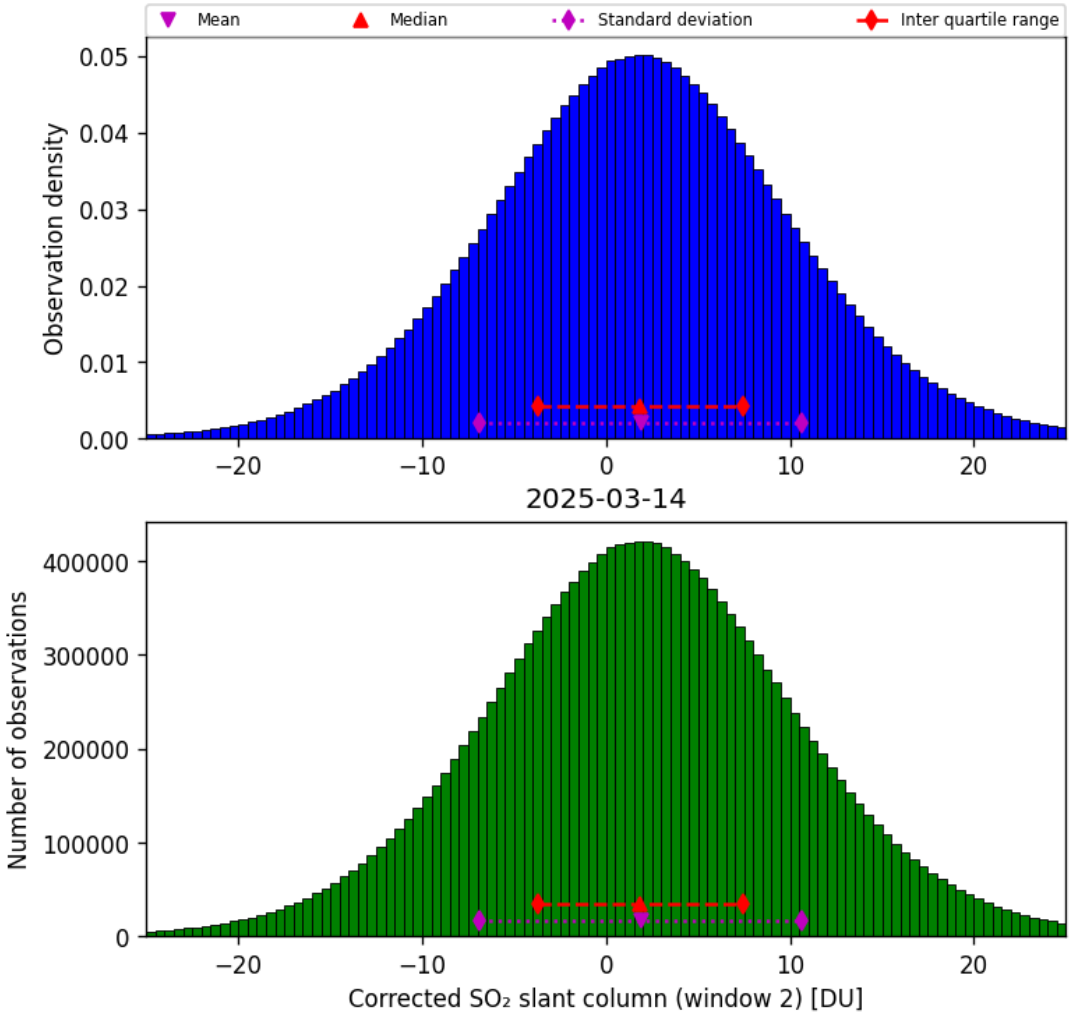

Figure 69: Histogram of "Corrected SO_2 slant column (window 2)" for 2025-03-14 to 2025-03-15

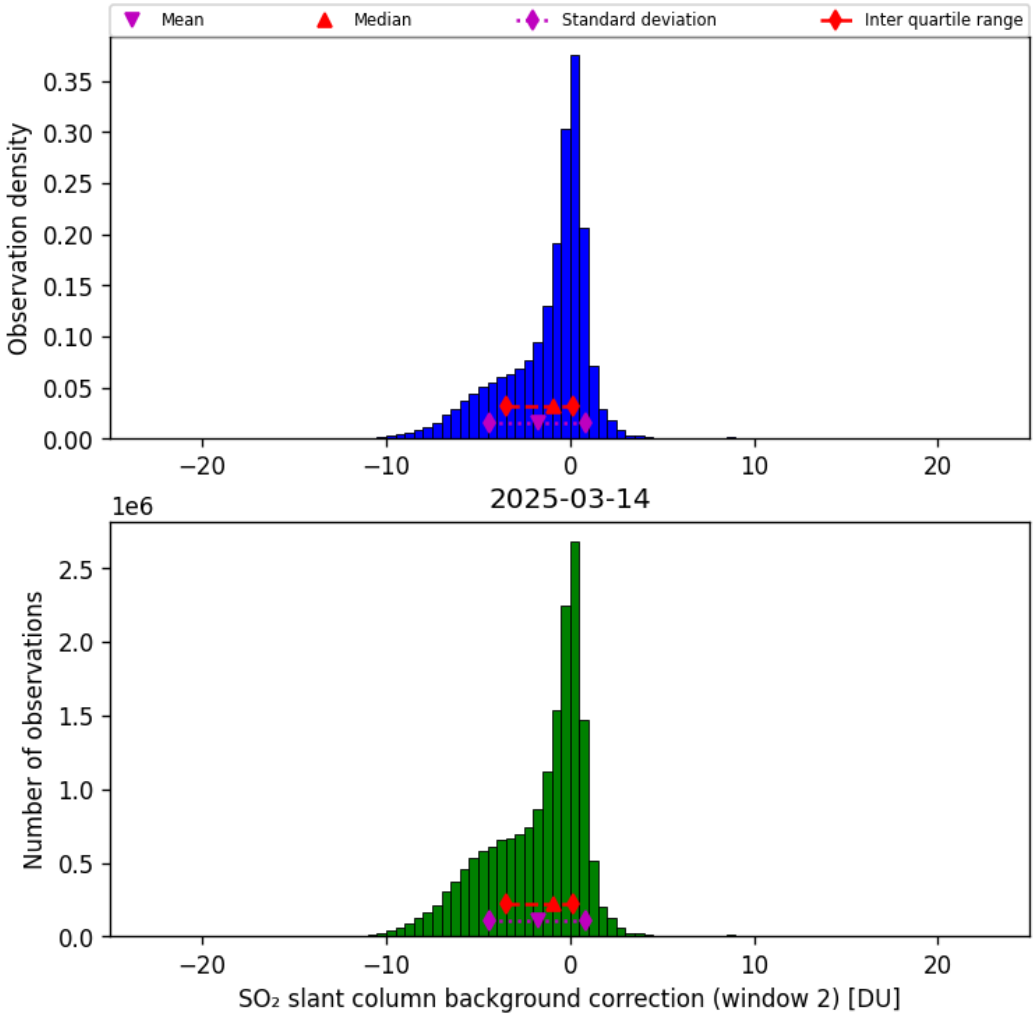

Figure 70: Histogram of "SO_2 slant column background correction (window 2)" for 2025-03-14 to 2025-03-15

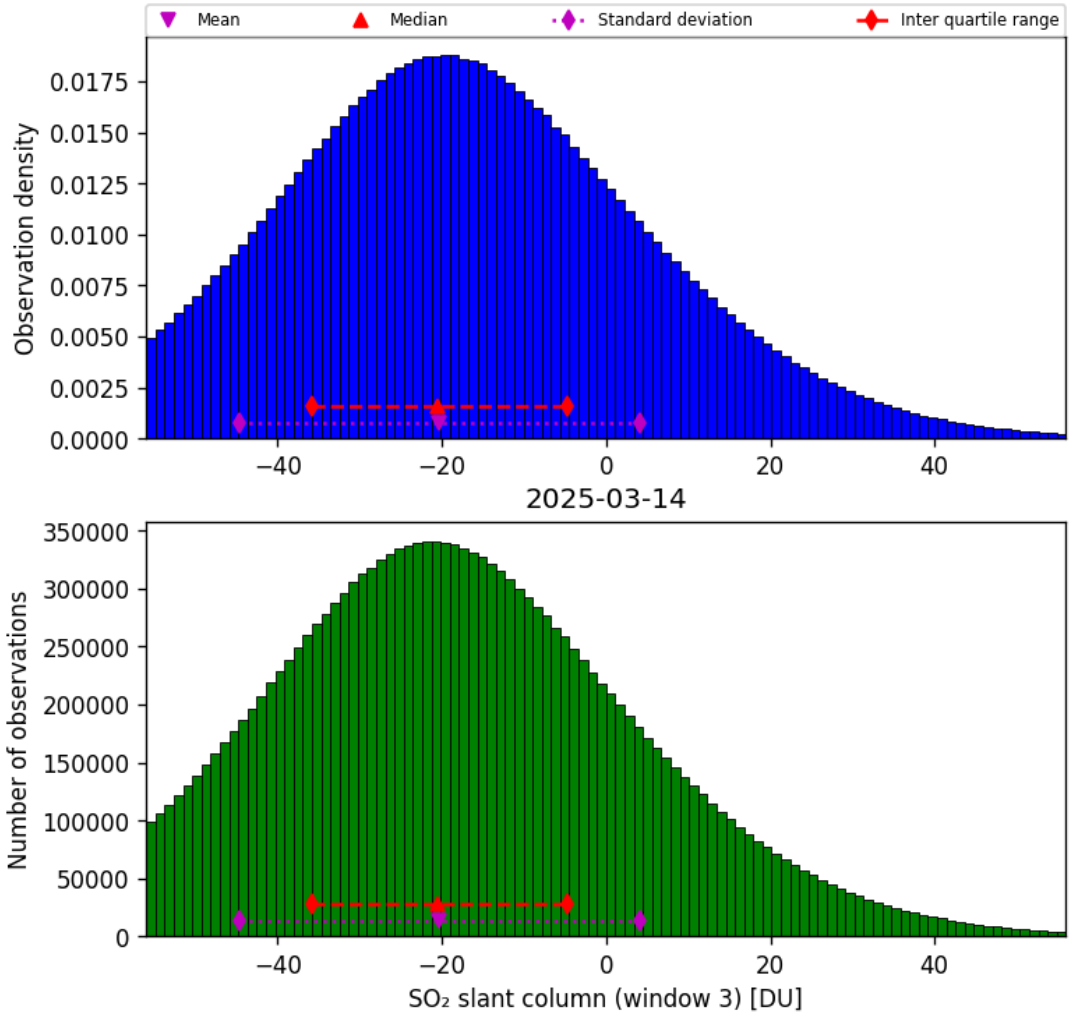

Figure 71: Histogram of "SO_2 slant column (window 3)" for 2025-03-14 to 2025-03-15

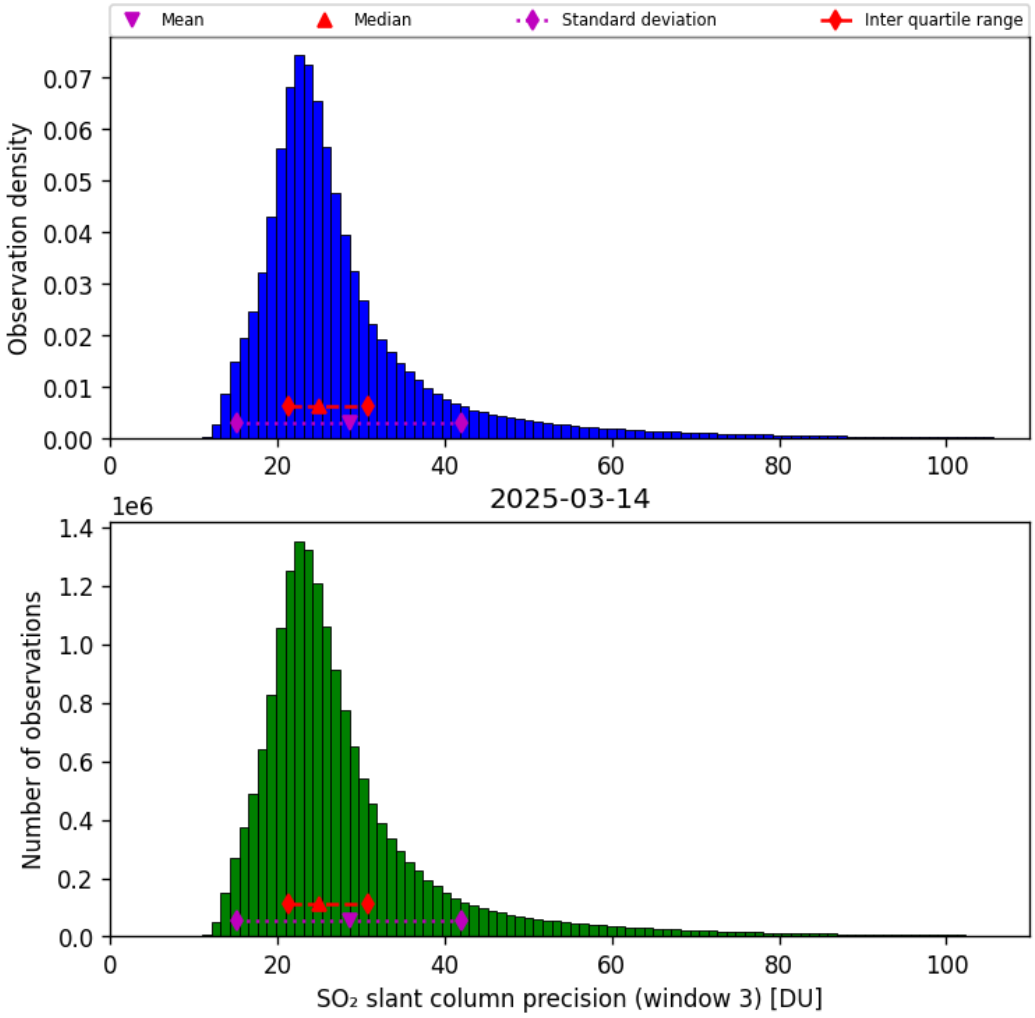

Figure 72: Histogram of "SO_2 slant column precision (window 3)" for 2025-03-14 to 2025-03-15

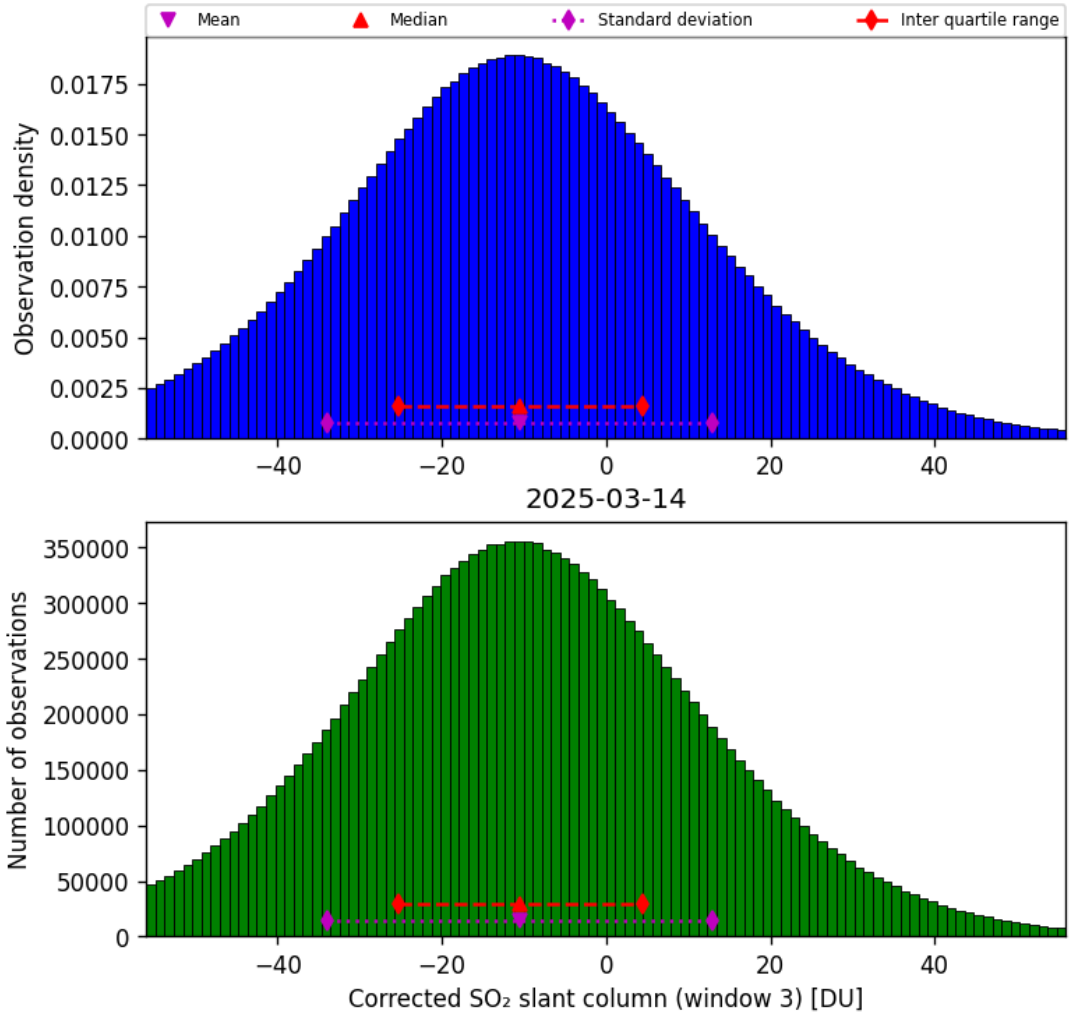

Figure 73: Histogram of "Corrected SO_2 slant column (window 3)" for 2025-03-14 to 2025-03-15

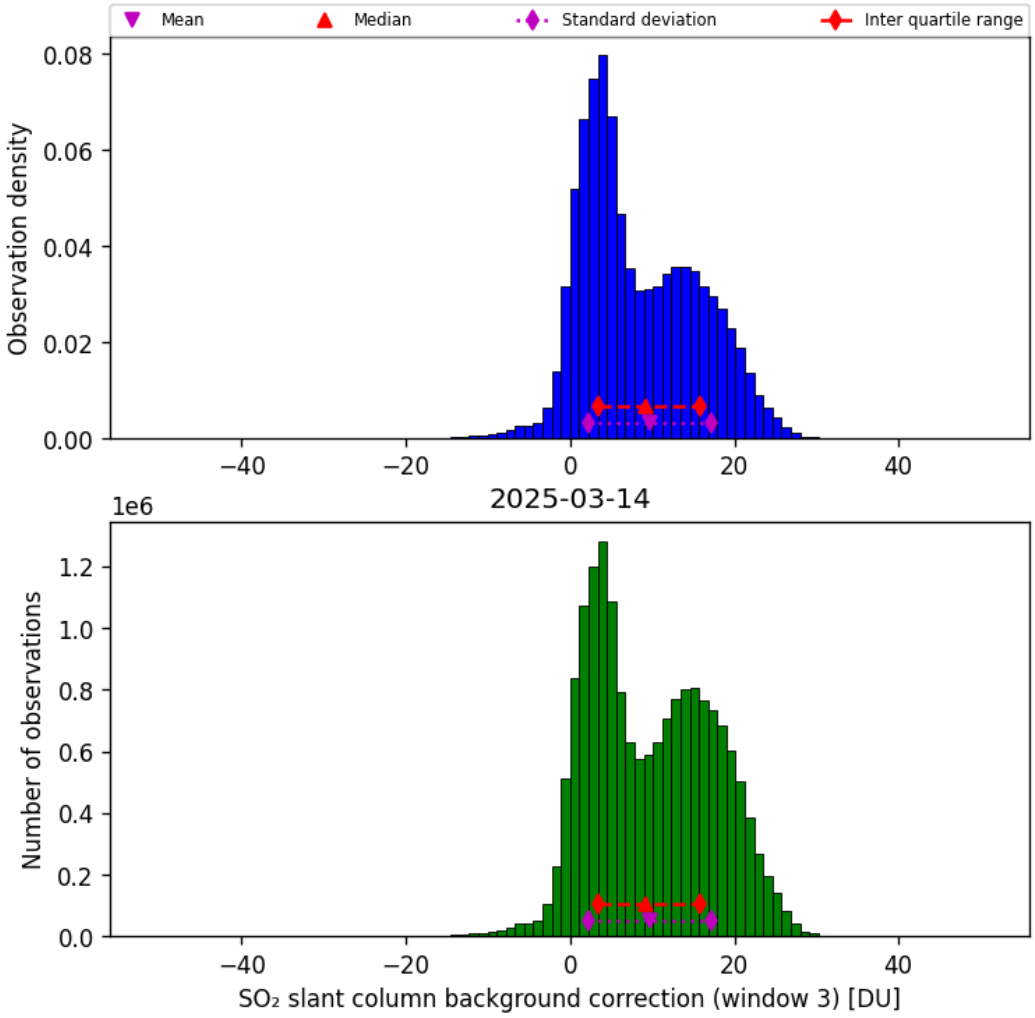

Figure 74: Histogram of "SO_2 slant column background correction (window 3)" for 2025-03-14 to 2025-03-15

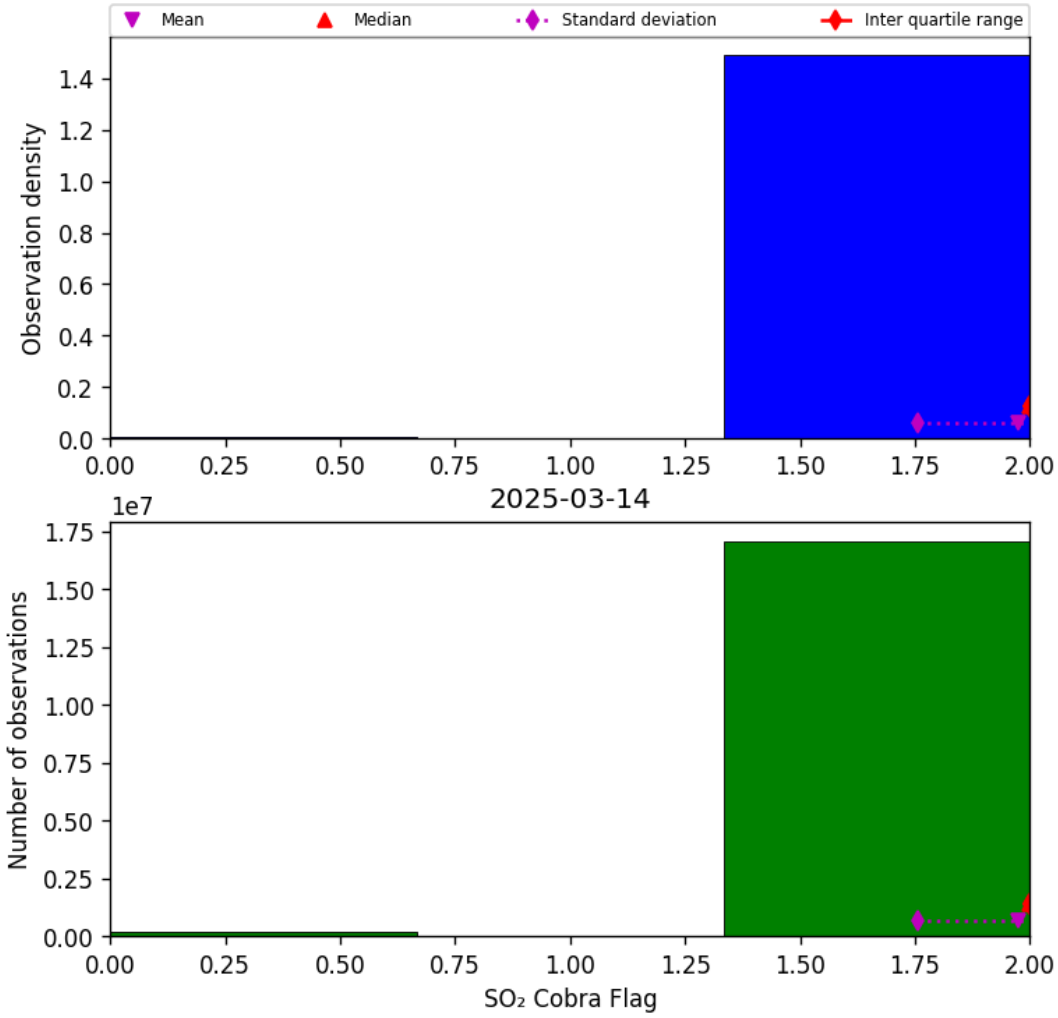

Figure 75: Histogram of "SO_2 Cobra Flag" for 2025-03-14 to 2025-03-15

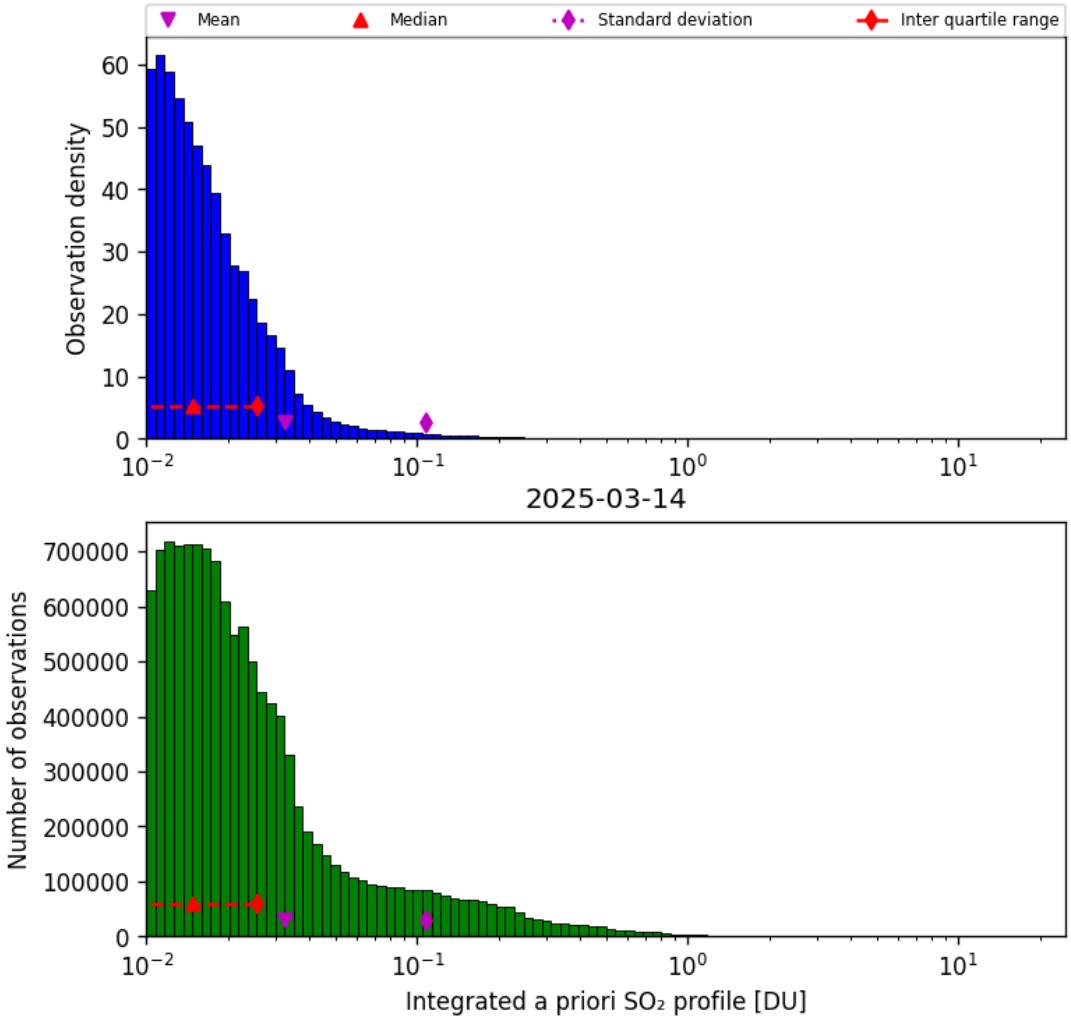

Figure 76: Histogram of "Integrated a priori SO_2 profile" for 2025-03-14 to 2025-03-15

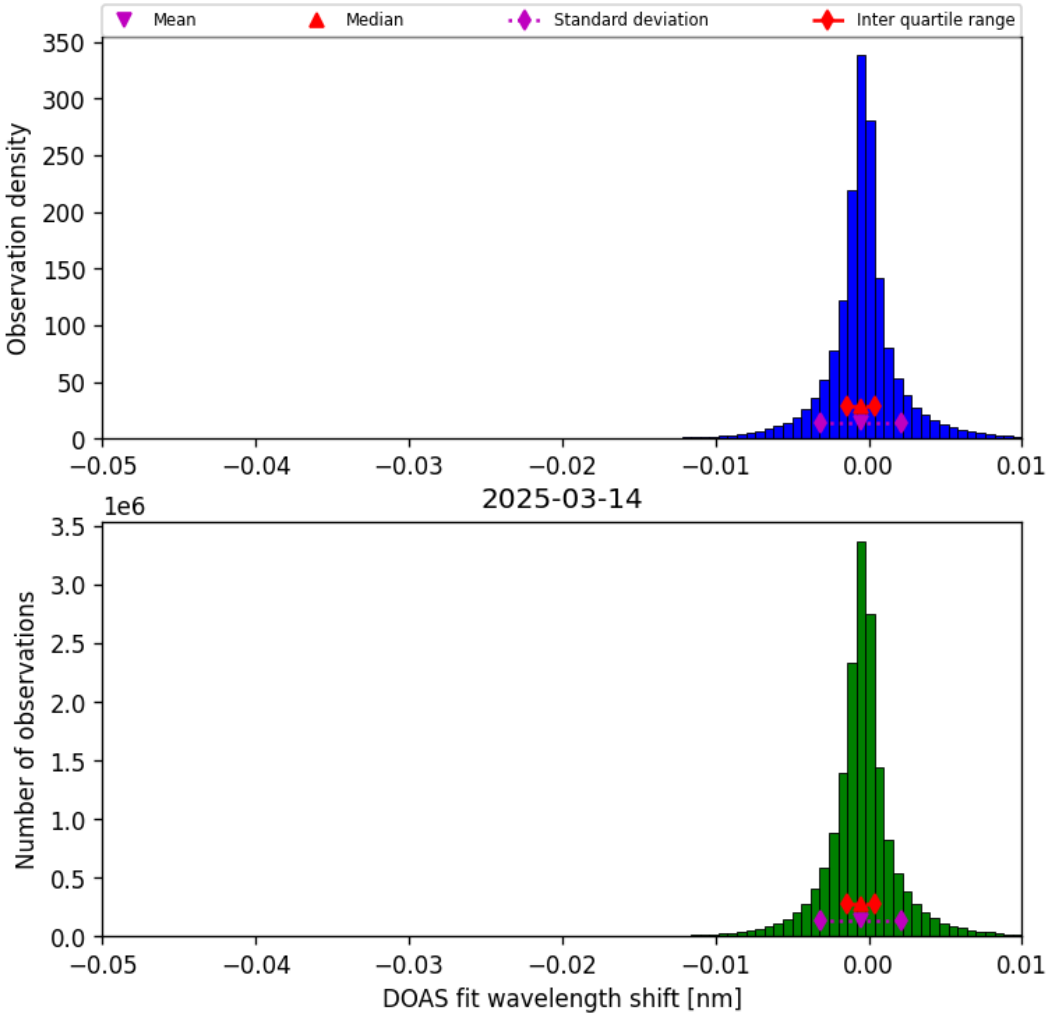

Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-03-14 to 2025-03-15

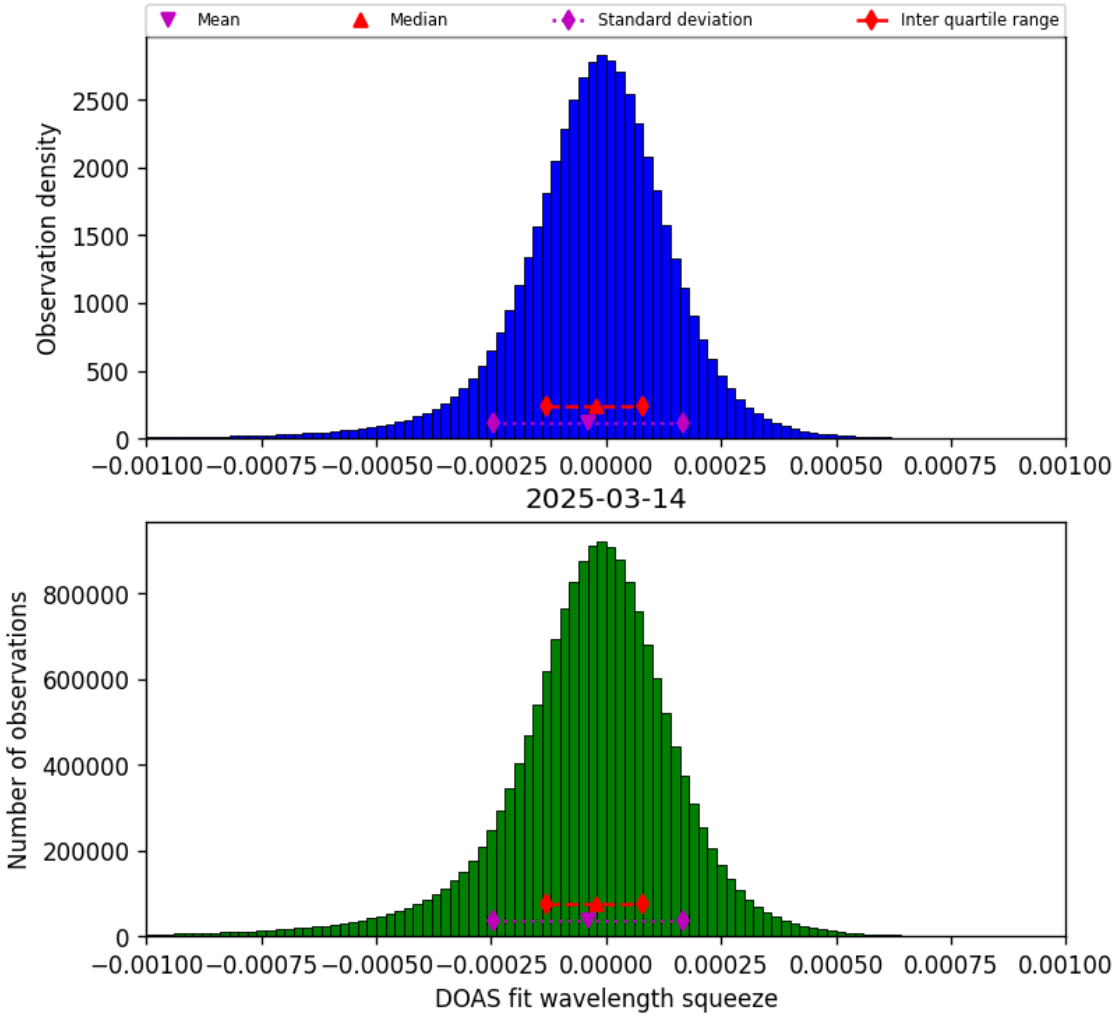

Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-03-14 to 2025-03-15

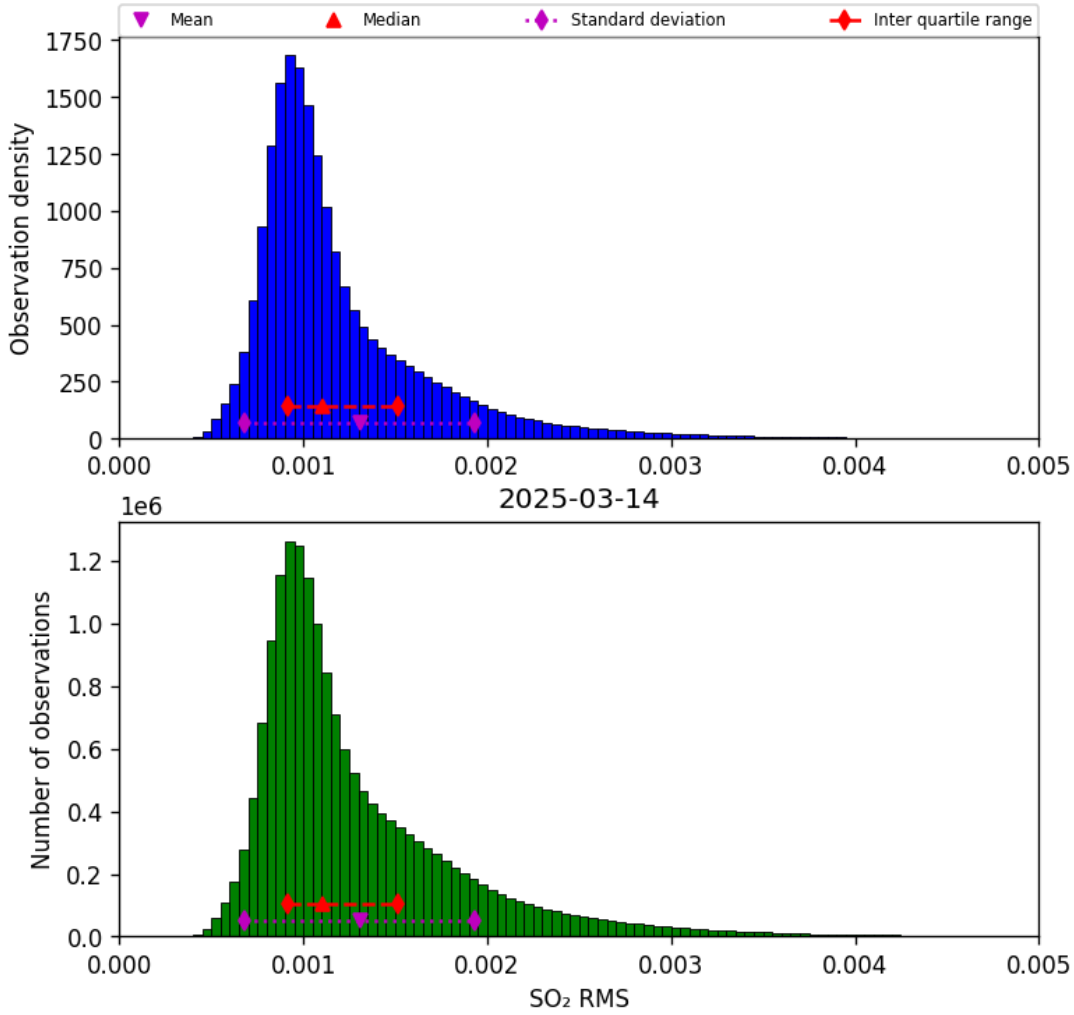

Figure 79: Histogram of "SO_2 RMS" for 2025-03-14 to 2025-03-15

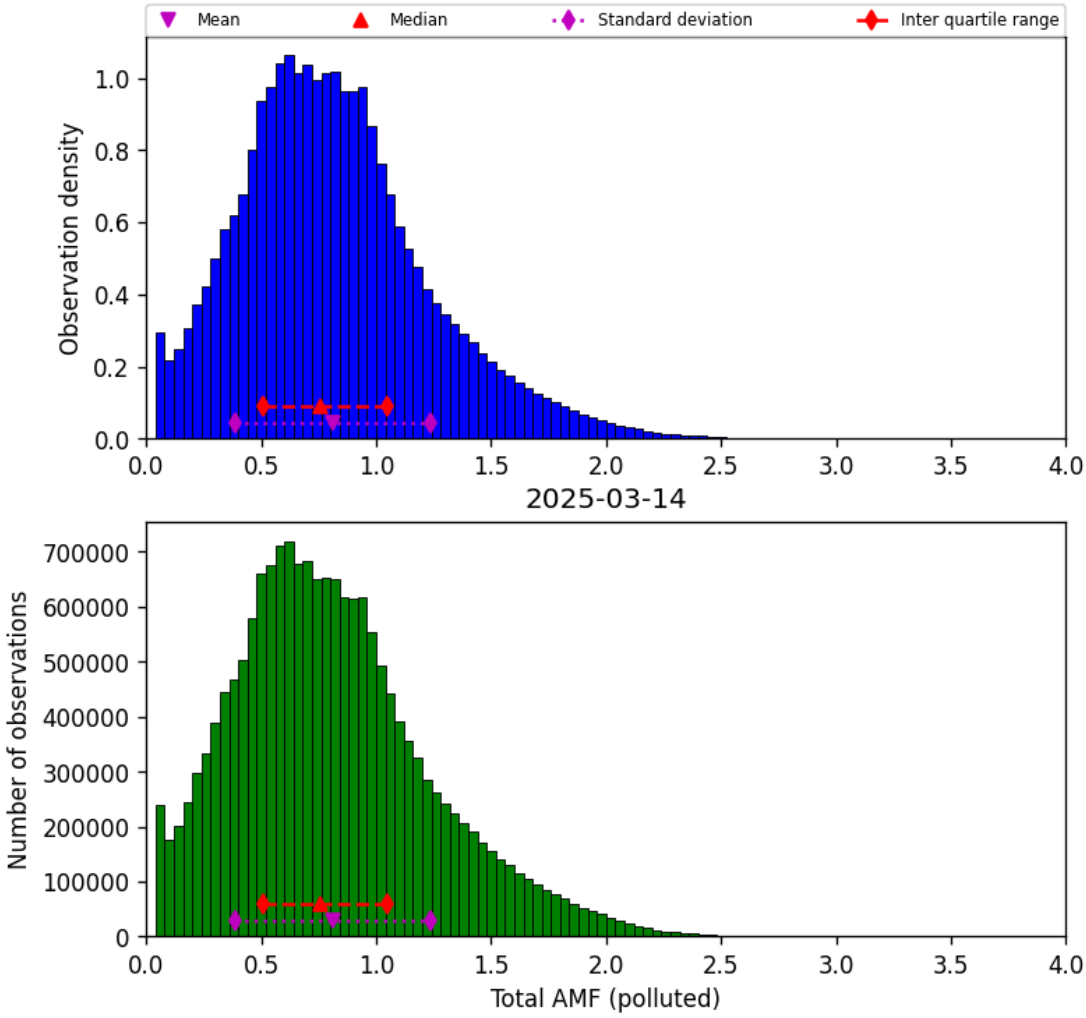

Figure 80: Histogram of “Total AMF (polluted)” for 2025-03-14 to 2025-03-15

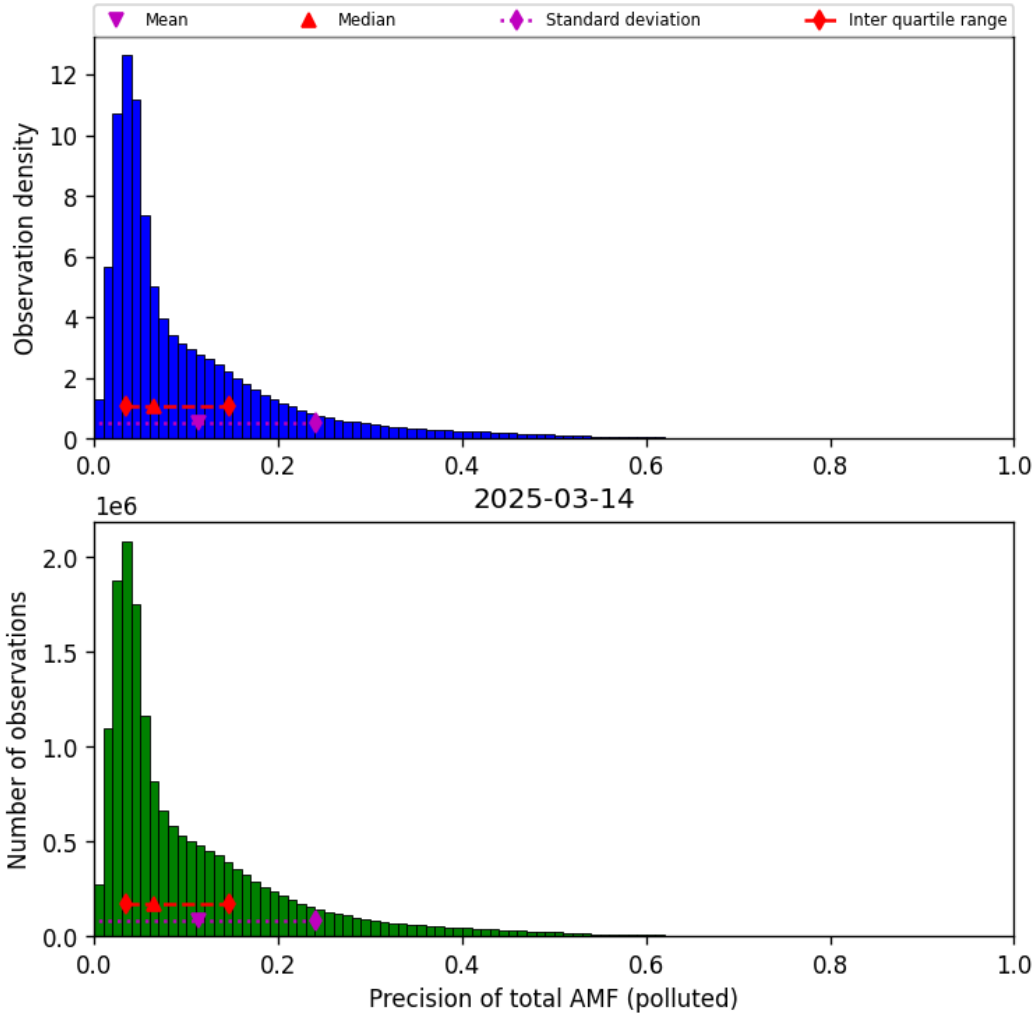

Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-03-14 to 2025-03-15

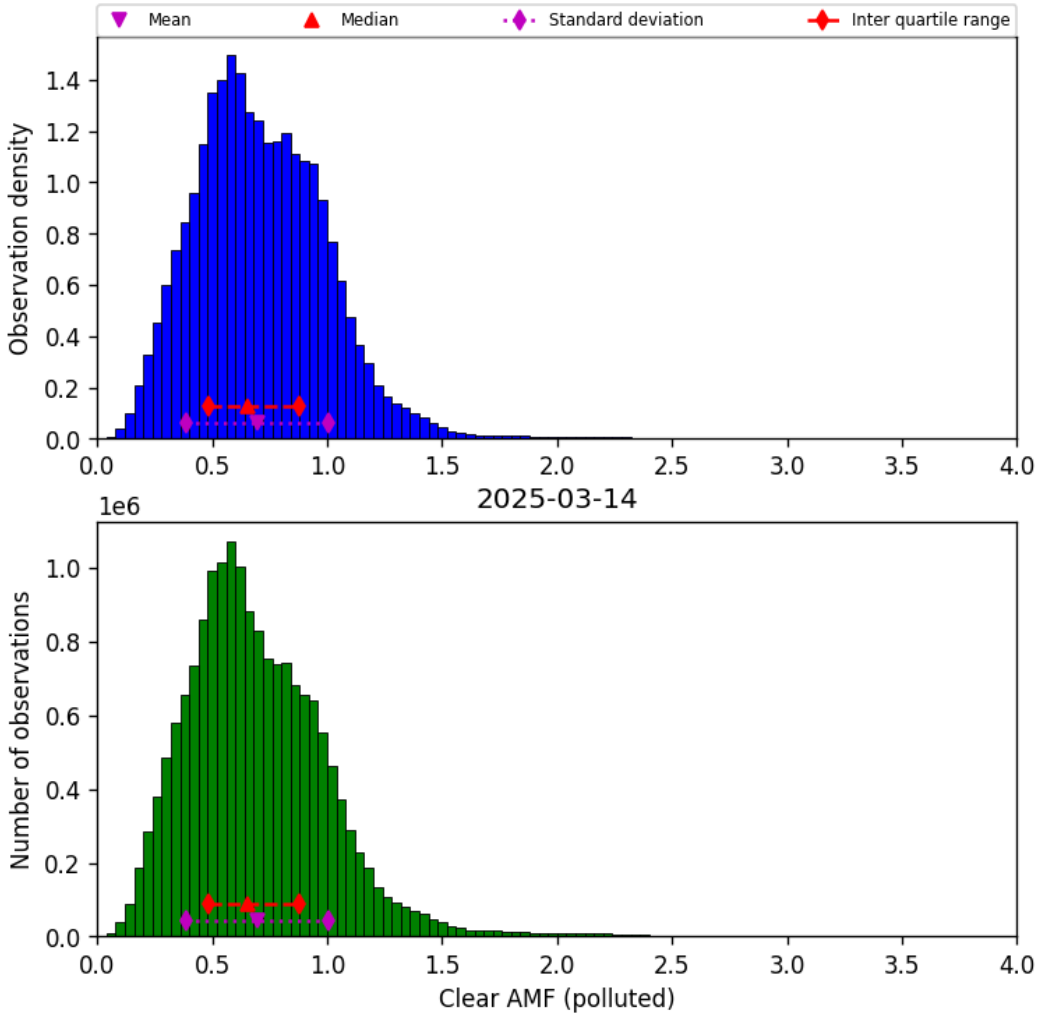

Figure 82: Histogram of “Clear AMF (polluted)” for 2025-03-14 to 2025-03-15

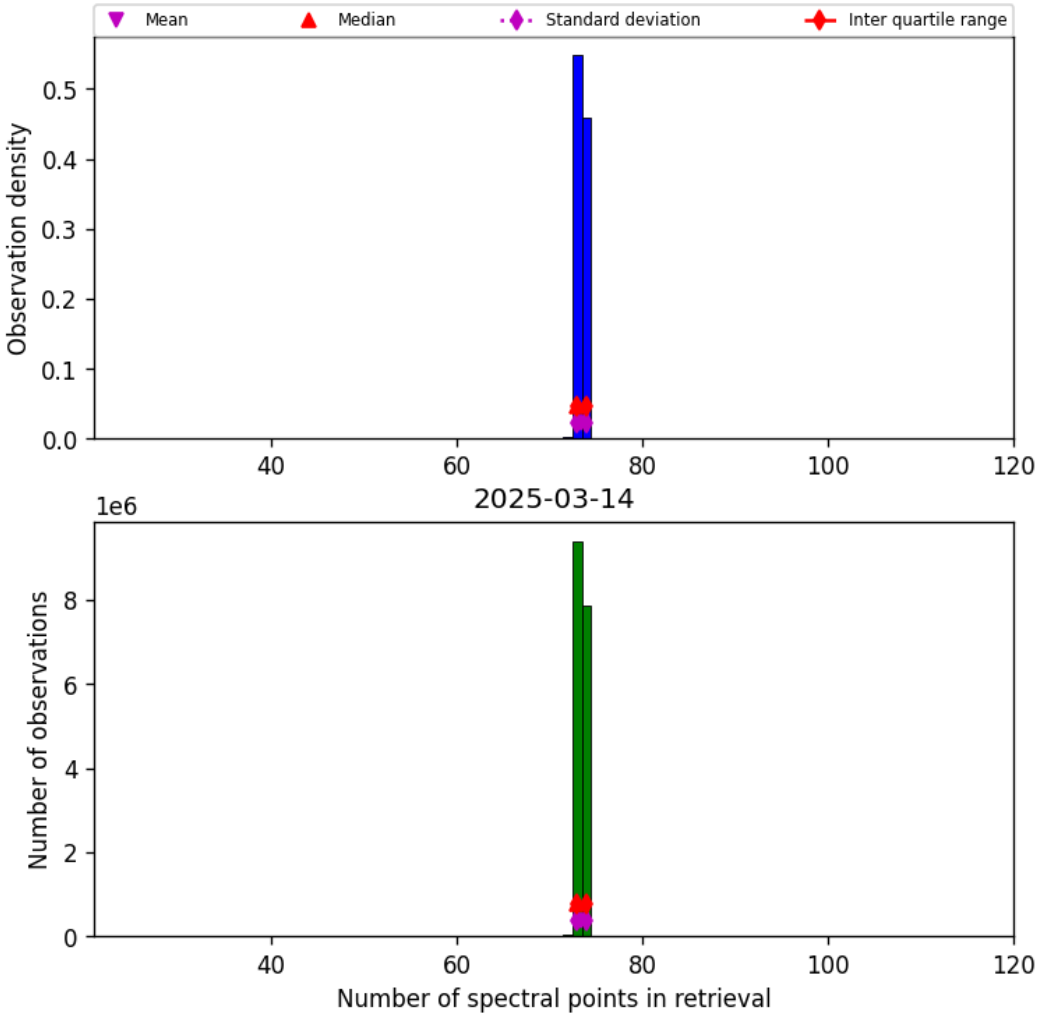

Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-03-14 to 2025-03-15

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.

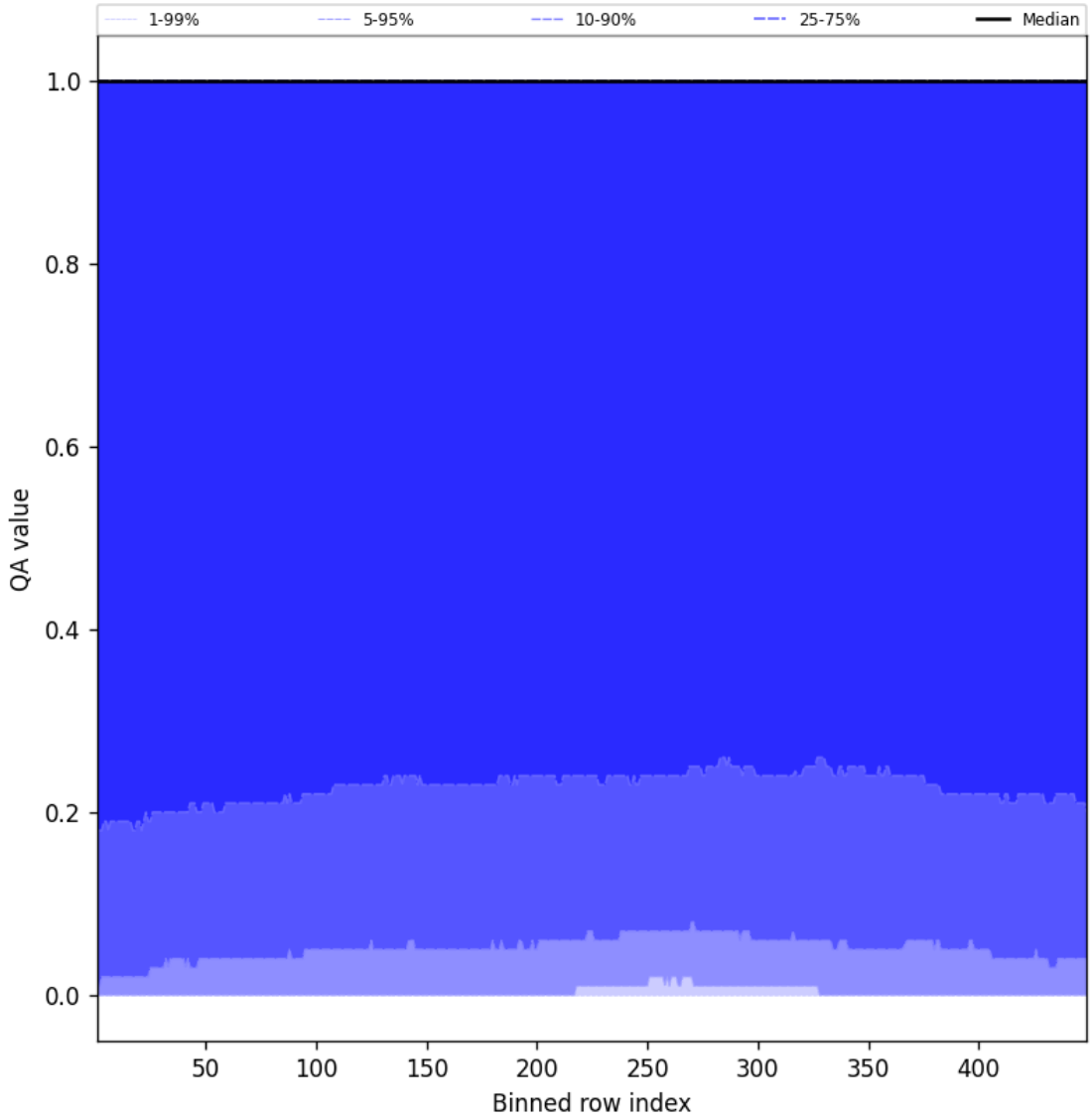

Figure 84: Along track statistics of “QA value” for 2025-03-14 to 2025-03-15

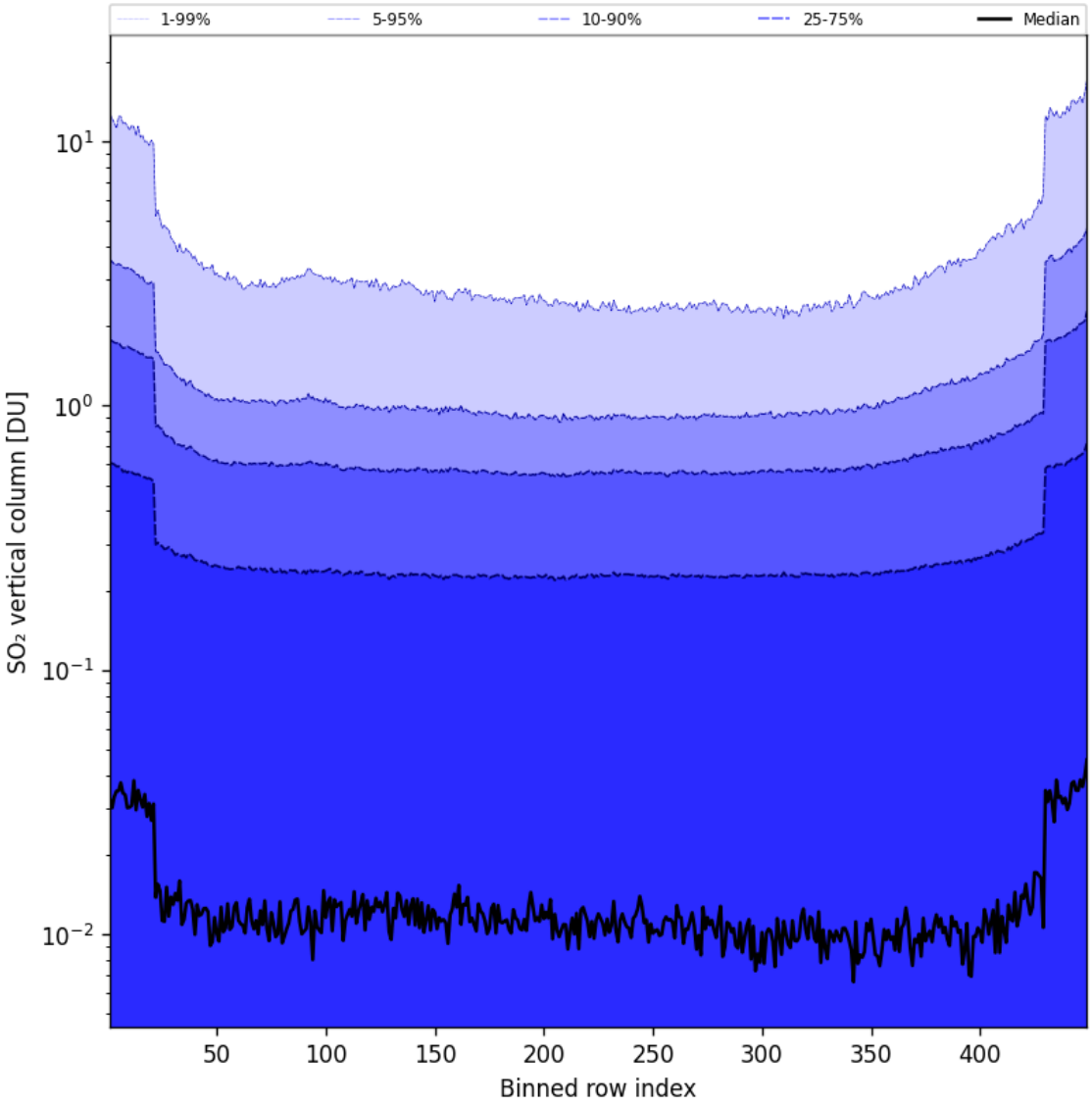

Figure 85: Along track statistics of "SO_2 vertical column" for 2025-03-14 to 2025-03-15

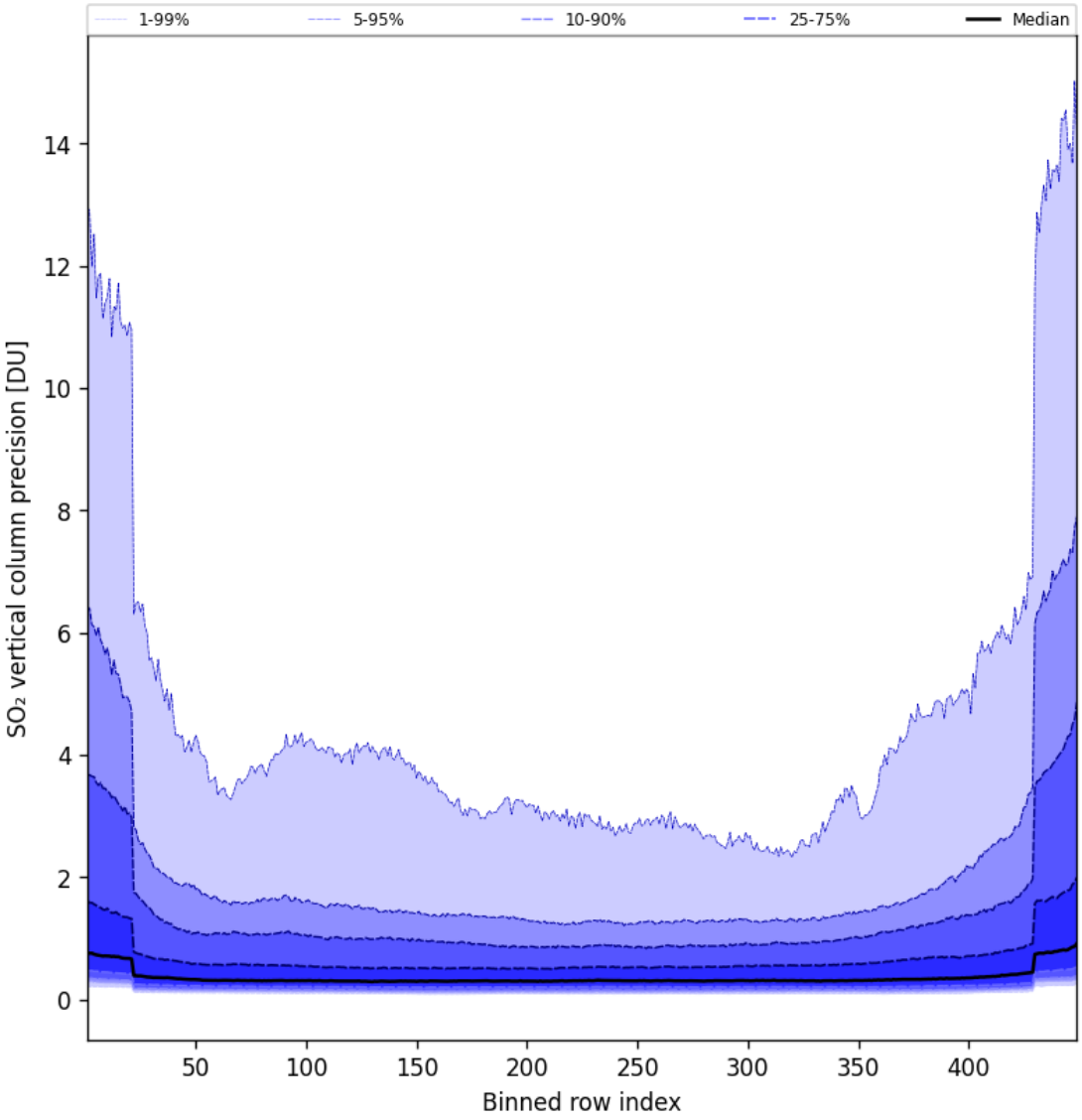

Figure 86: Along track statistics of "SO_2 vertical column precision" for 2025-03-14 to 2025-03-15

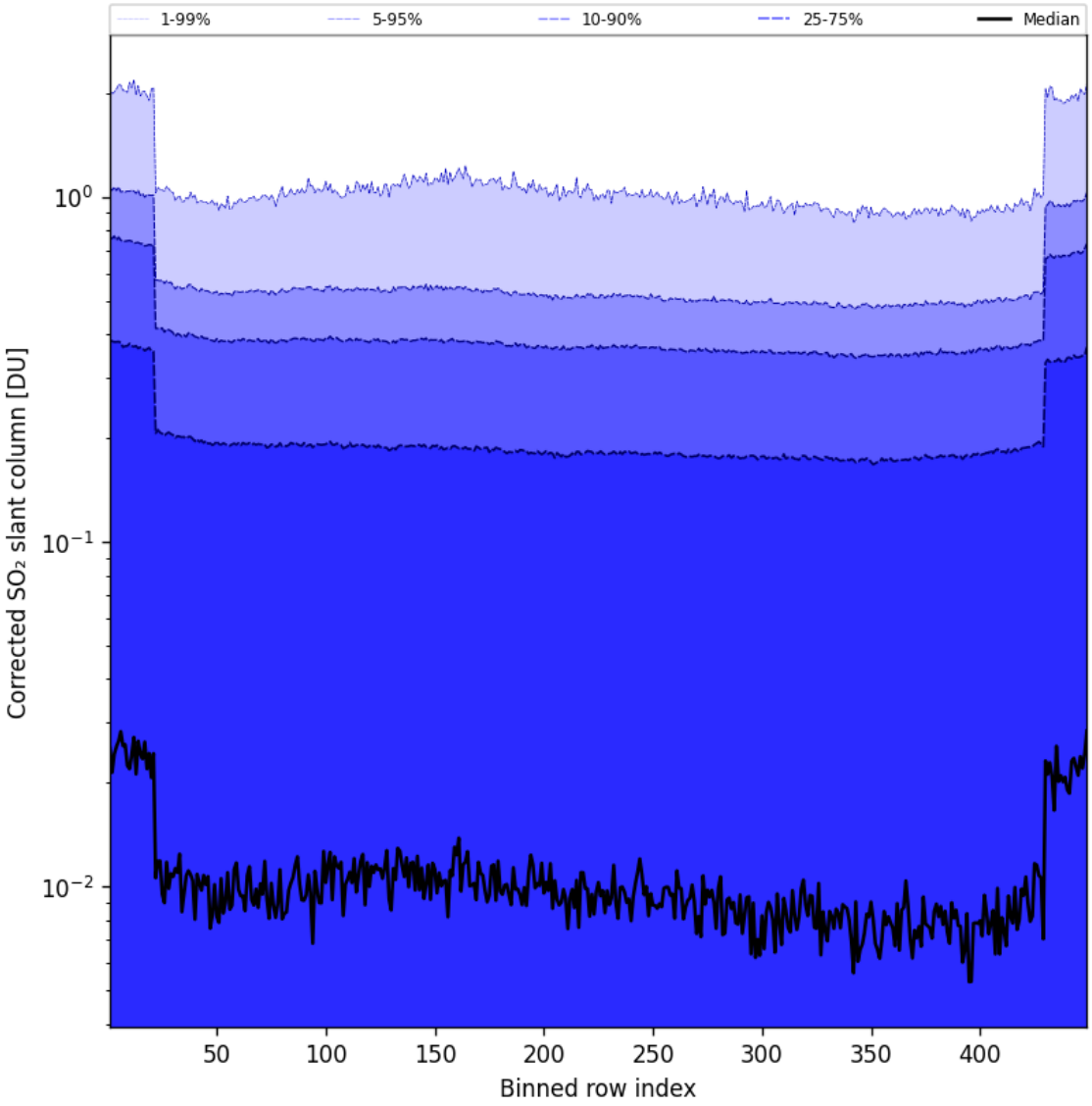

Figure 87: Along track statistics of “Corrected SO_2 slant column” for 2025-03-14 to 2025-03-15

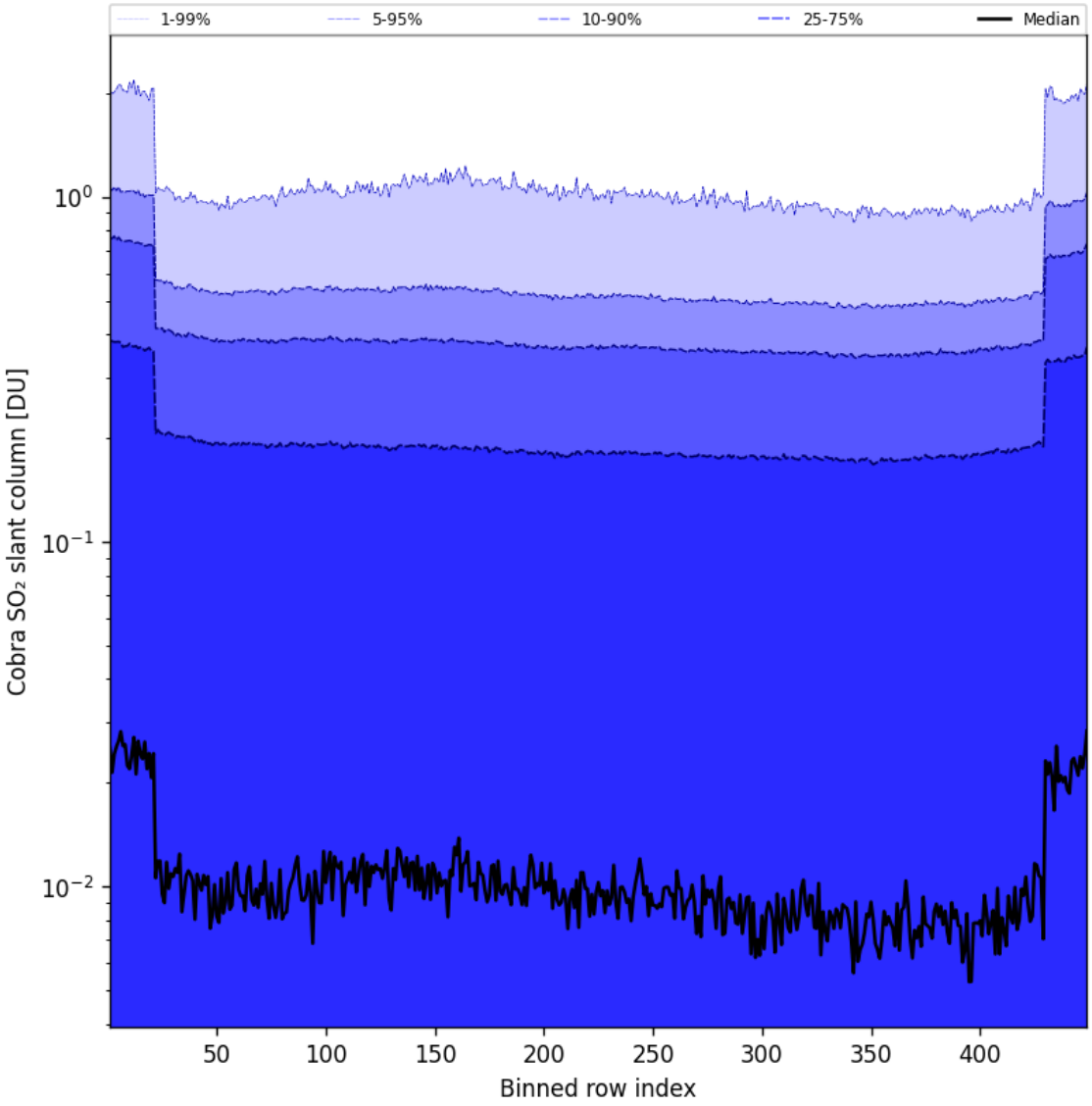

Figure 88: Along track statistics of “Cobra SO_2 slant column” for 2025-03-14 to 2025-03-15

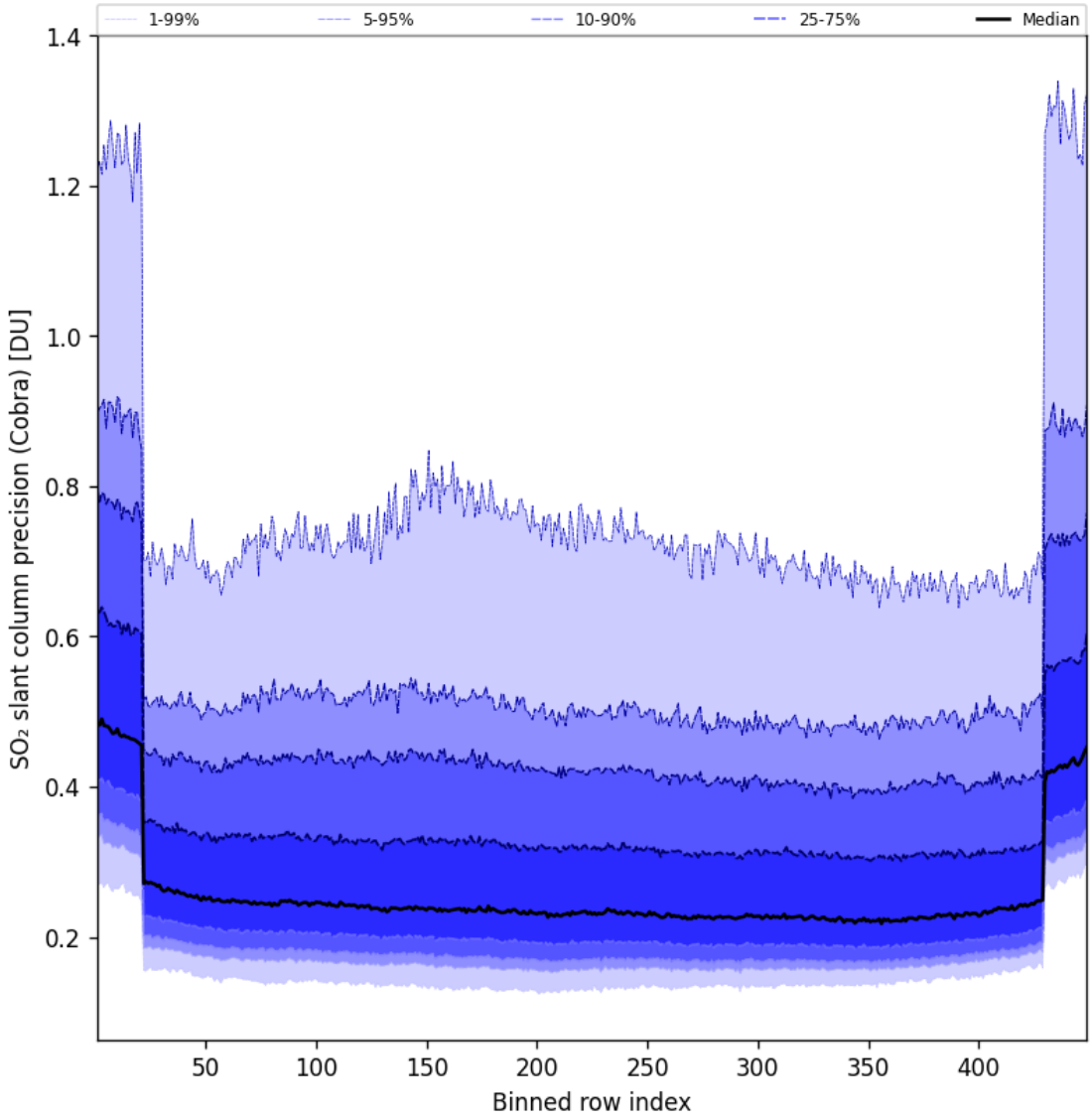

Figure 89: Along track statistics of "SO_2 slant column precision (Cobra)" for 2025-03-14 to 2025-03-15

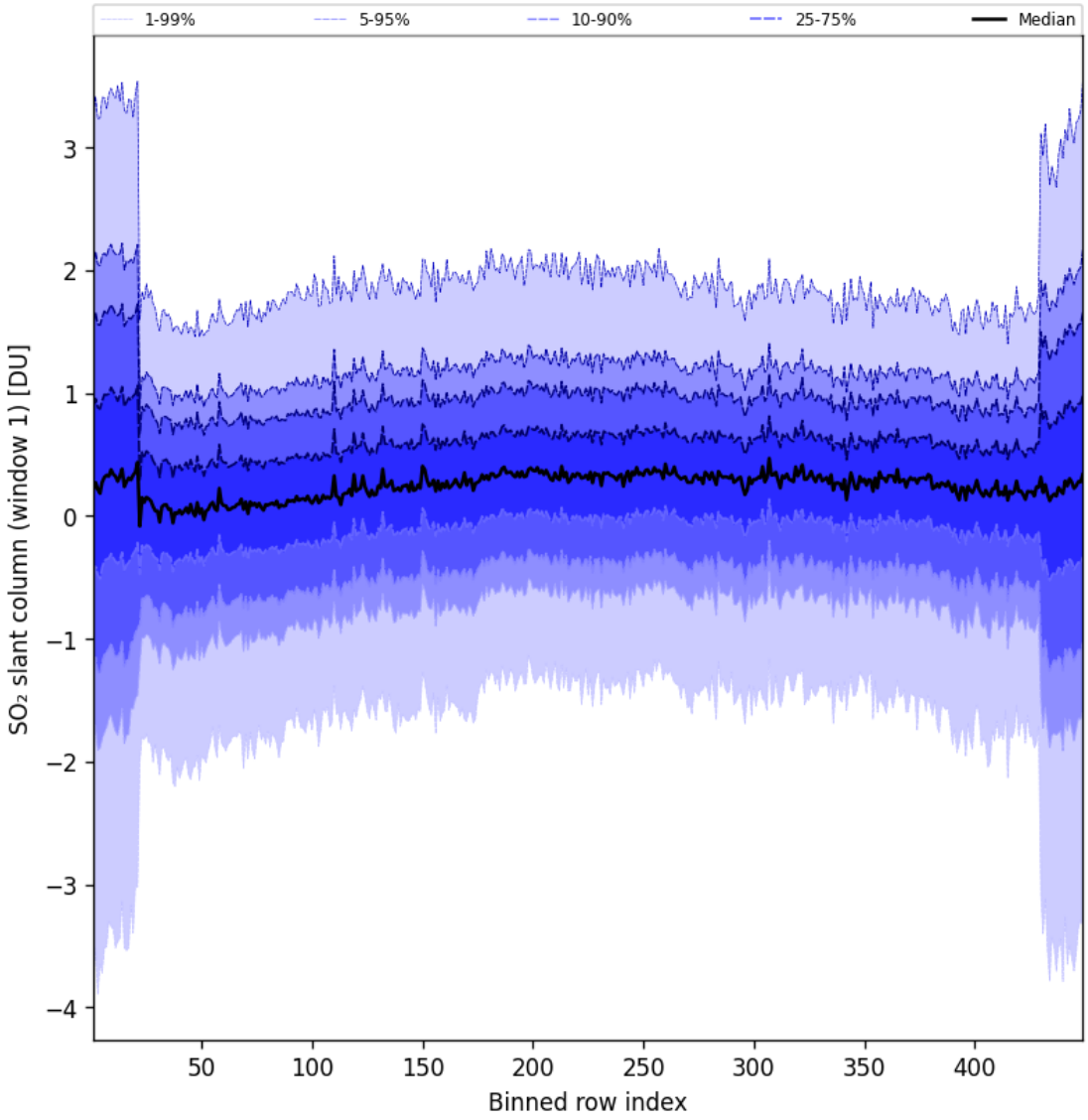

Figure 90: Along track statistics of "SO_2 slant column (window 1)" for 2025-03-14 to 2025-03-15

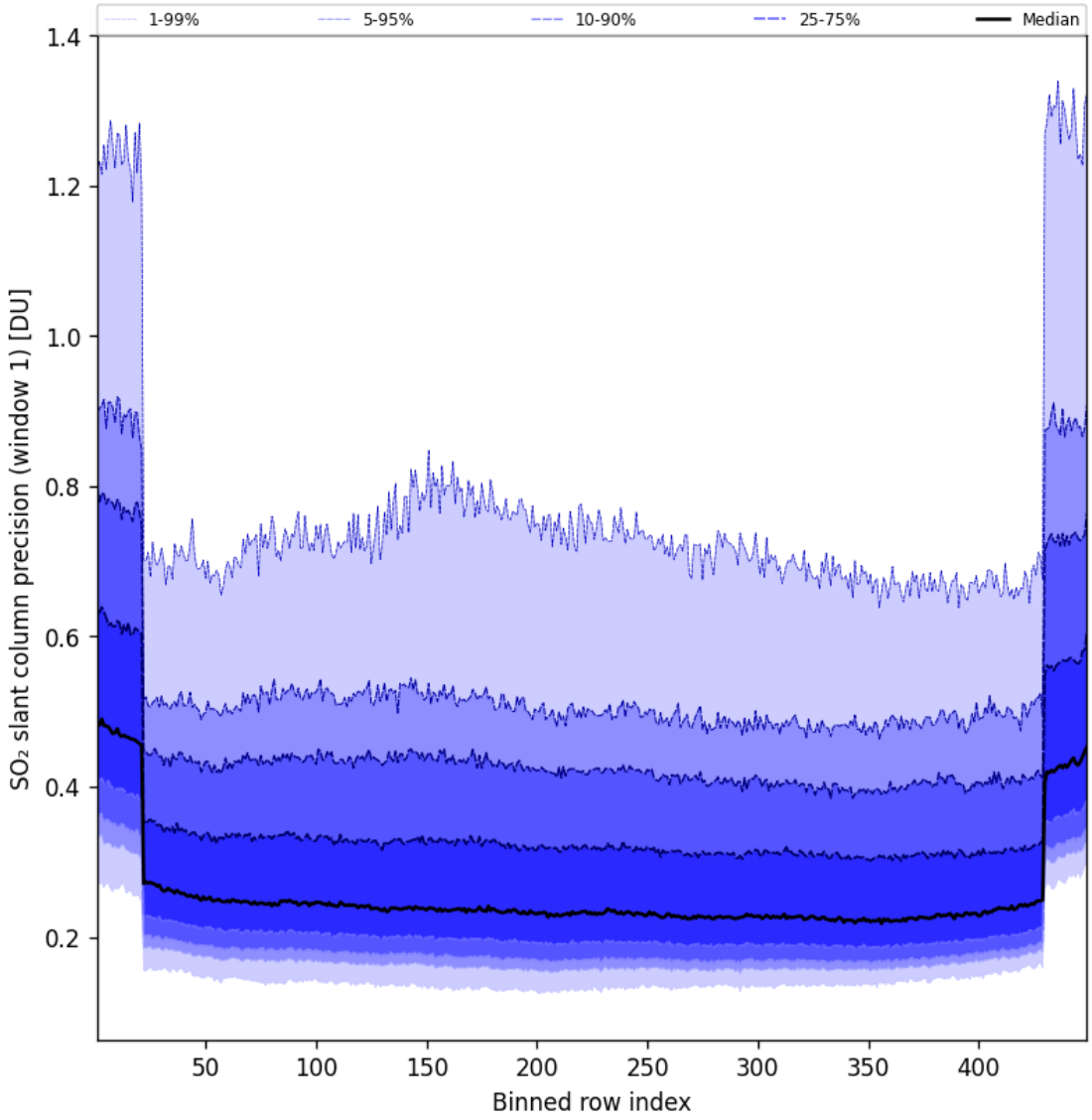

Figure 91: Along track statistics of "SO_2 slant column precision (window 1)" for 2025-03-14 to 2025-03-15

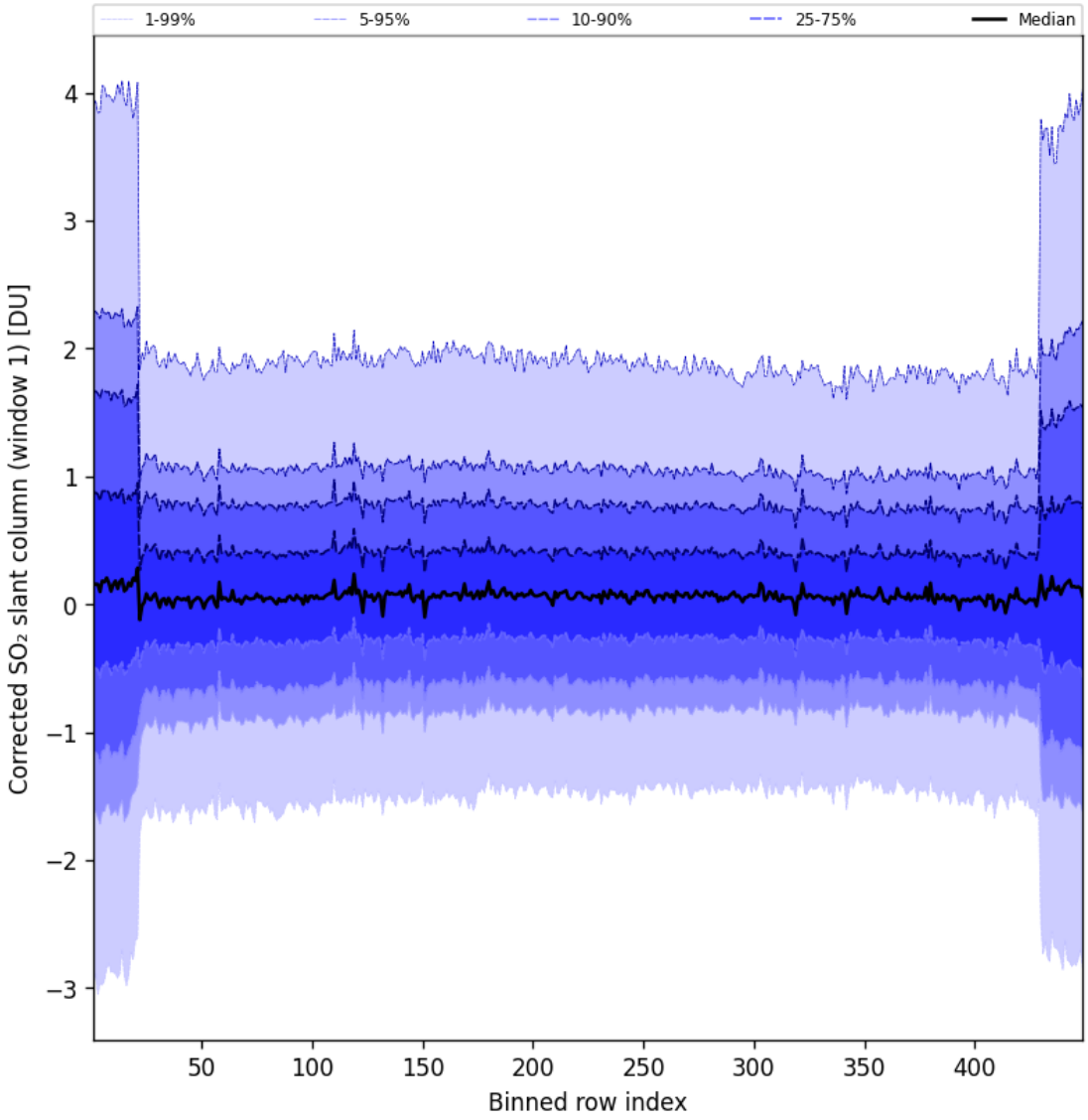

Figure 92: Along track statistics of “Corrected SO_2 slant column (window 1)” for 2025-03-14 to 2025-03-15

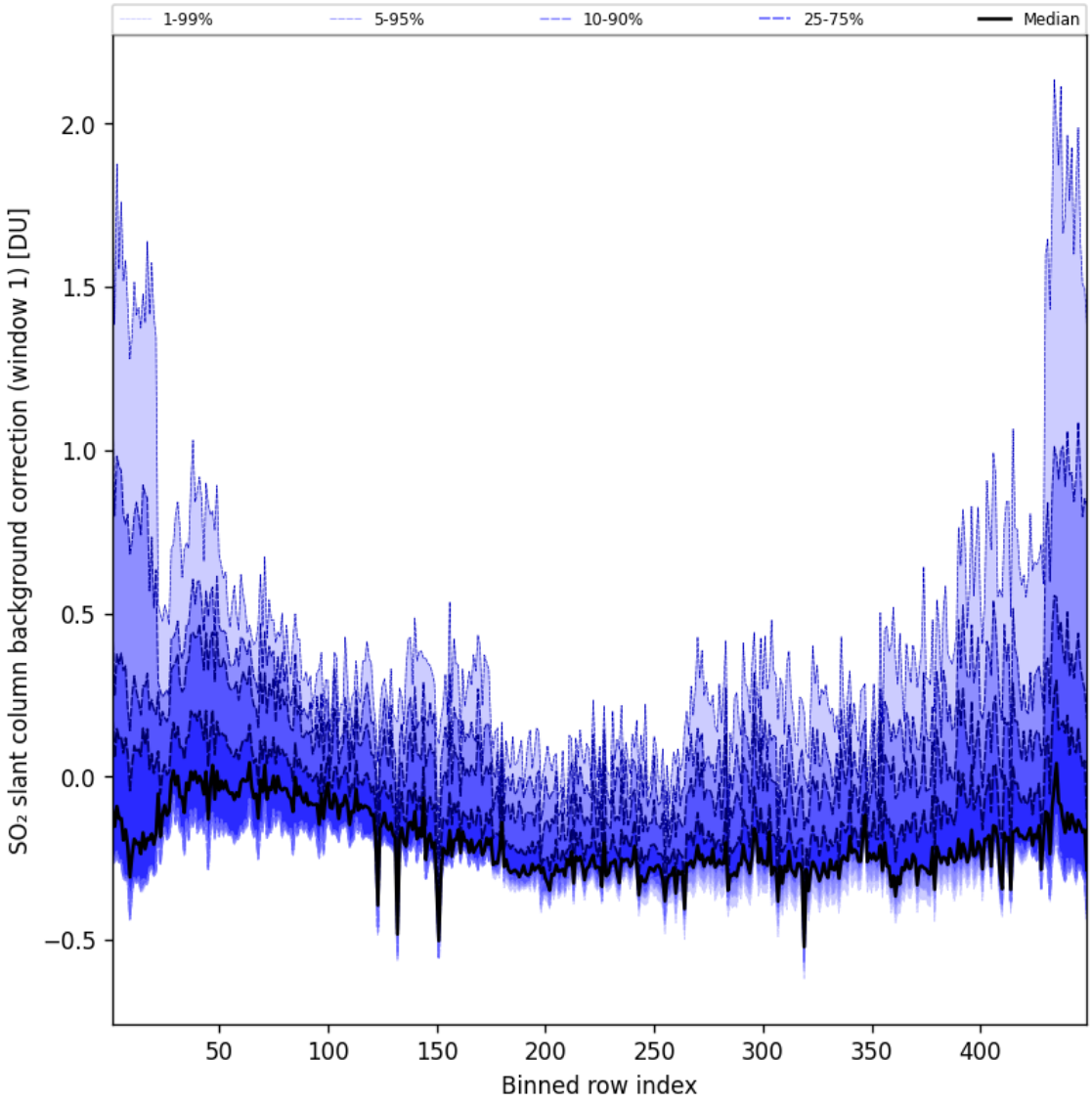

Figure 93: Along track statistics of "SO_2 slant column background correction (window 1)" for 2025-03-14 to 2025-03-15

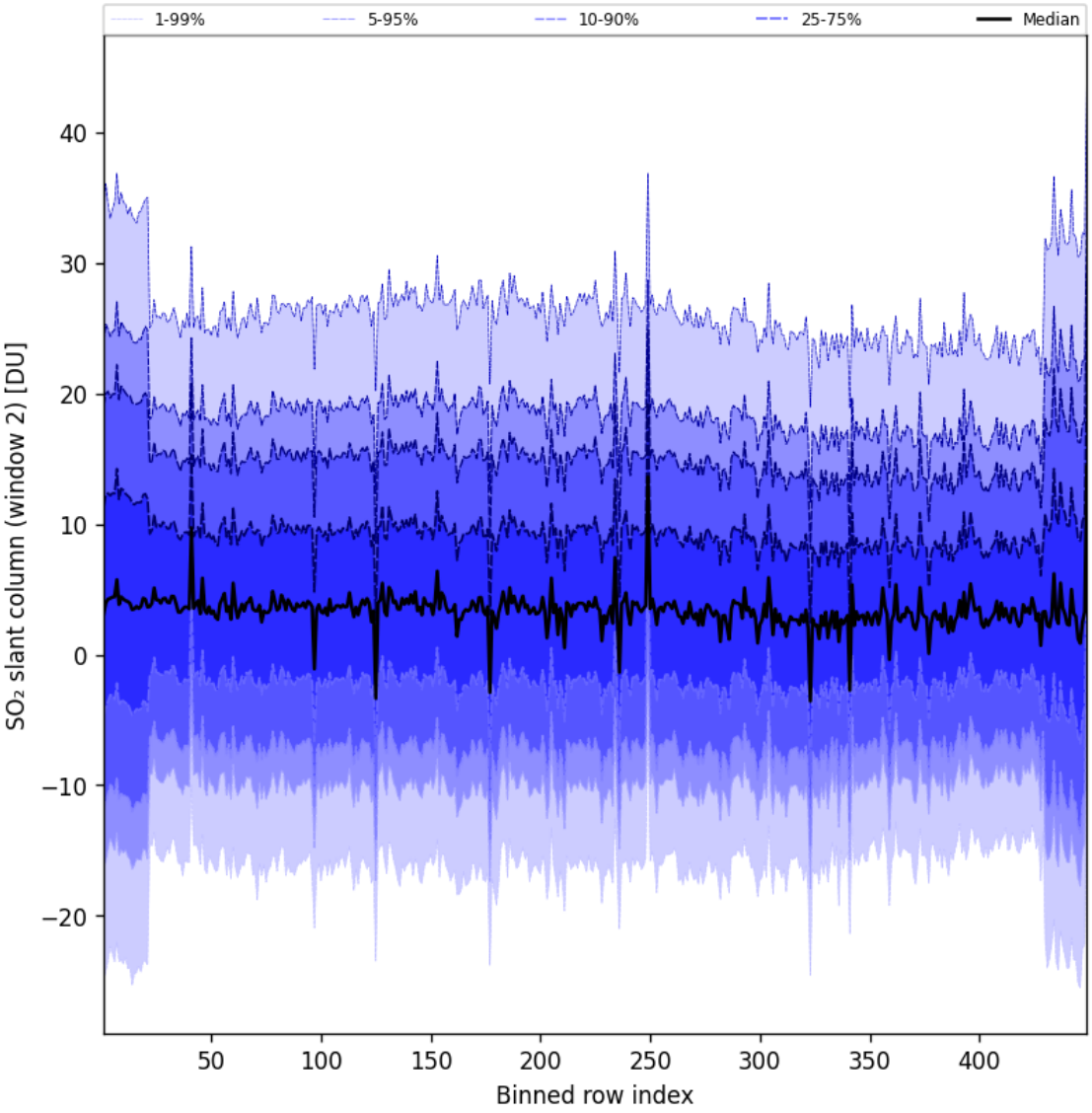

Figure 94: Along track statistics of "SO_2 slant column (window 2)" for 2025-03-14 to 2025-03-15

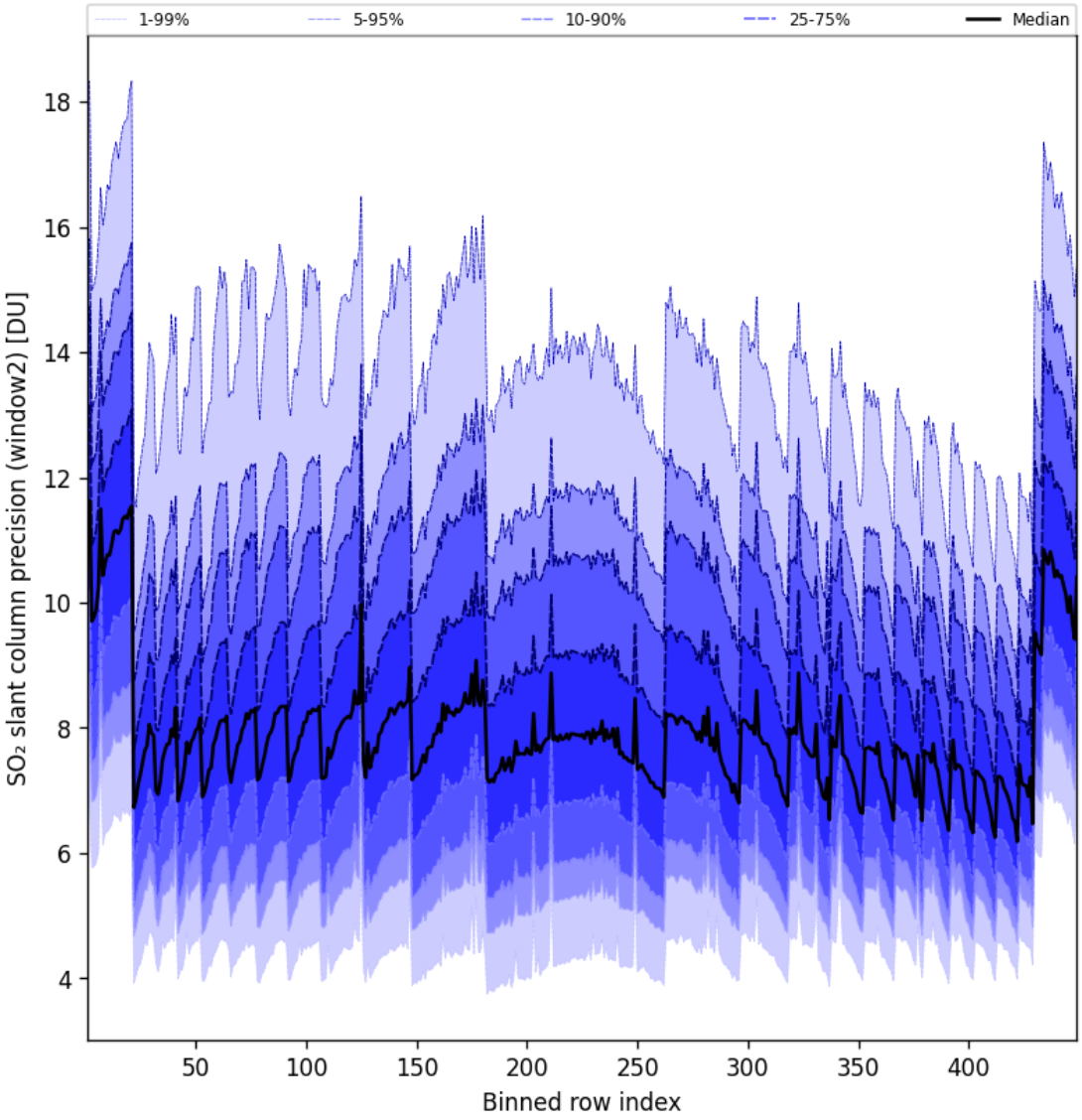

Figure 95: Along track statistics of "SO_2 slant column precision (window2)" for 2025-03-14 to 2025-03-15

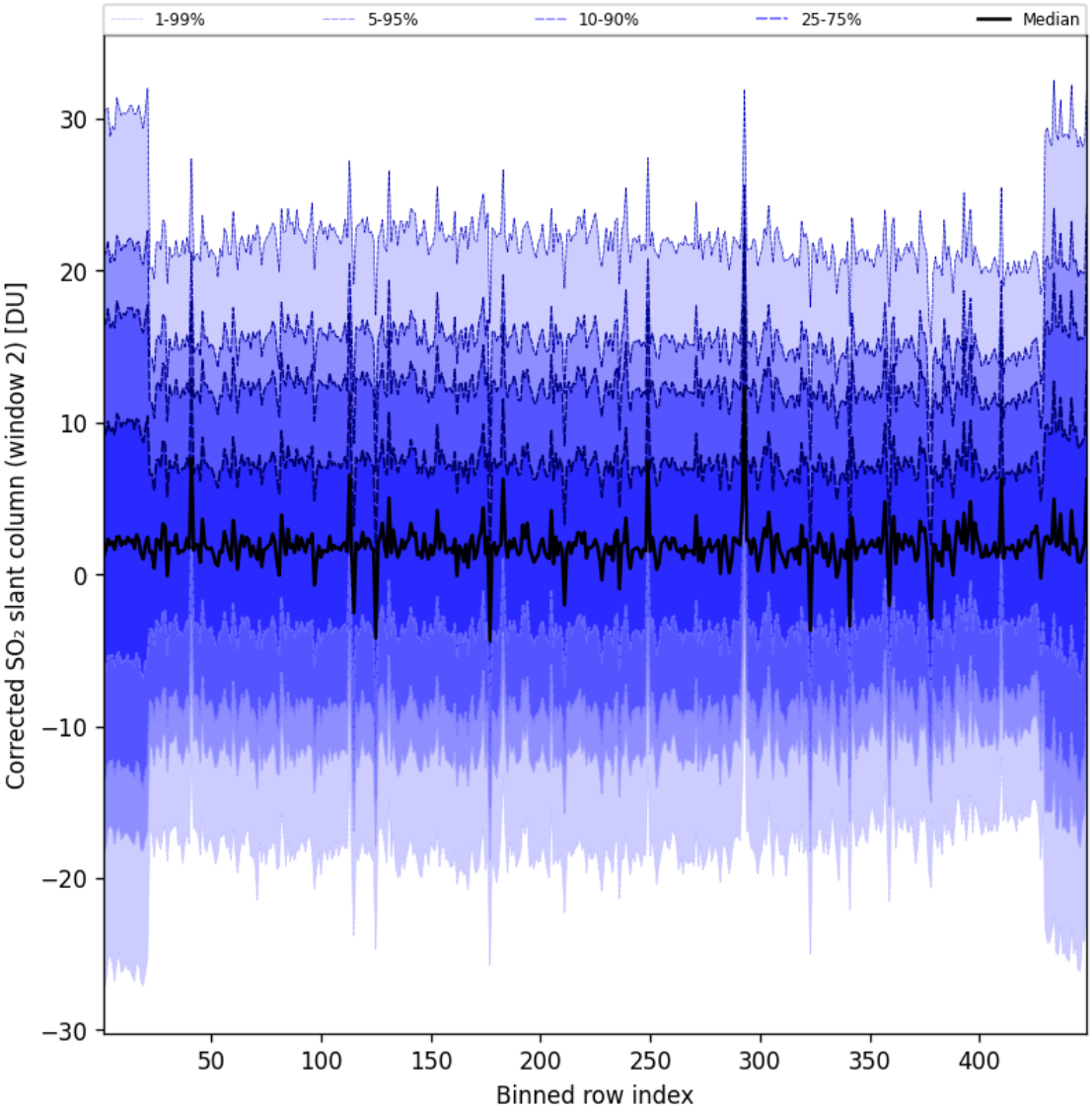

Figure 96: Along track statistics of “Corrected SO_2 slant column (window 2)” for 2025-03-14 to 2025-03-15

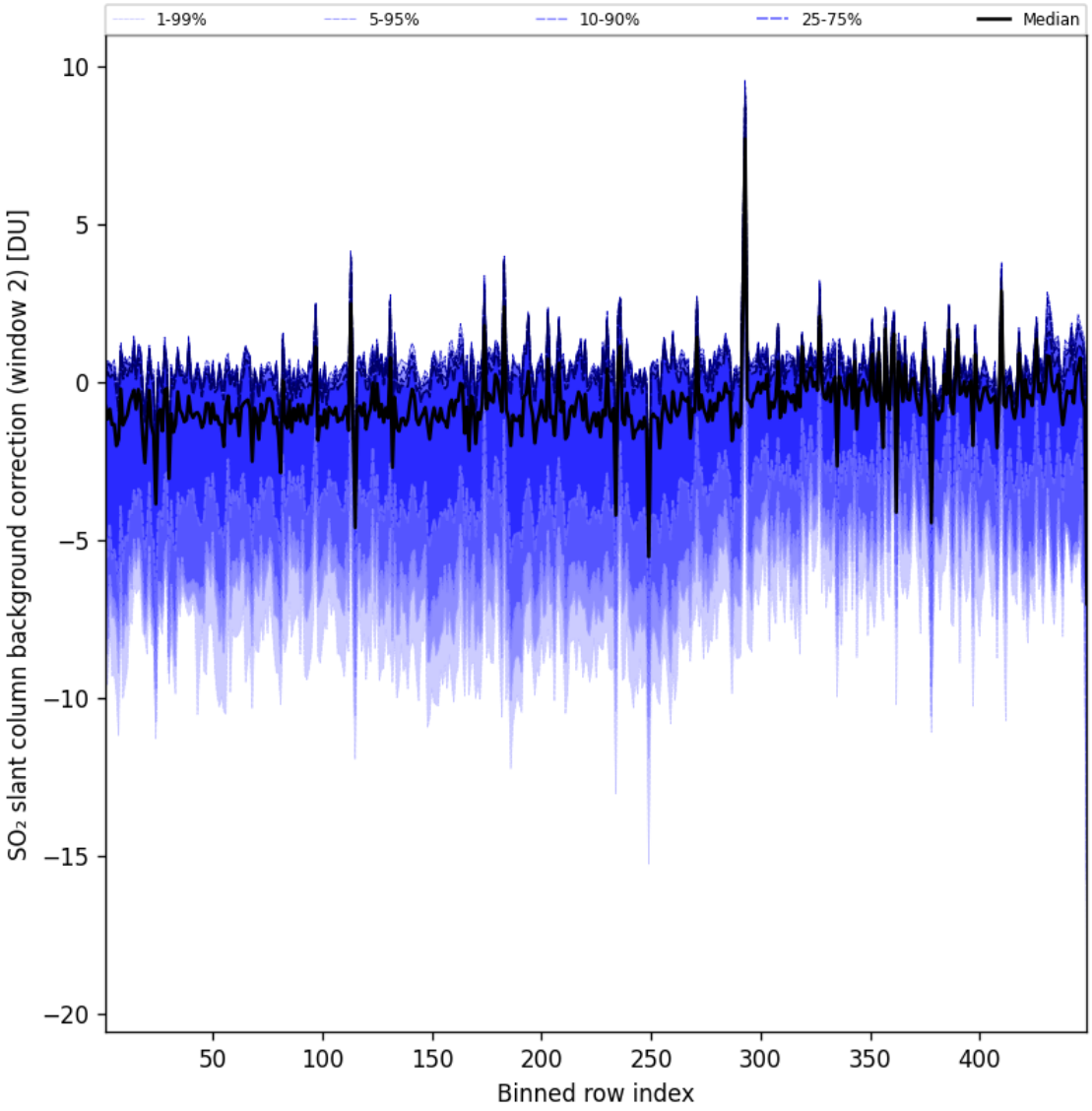

Figure 97: Along track statistics of "SO_2 slant column background correction (window 2)" for 2025-03-14 to 2025-03-15

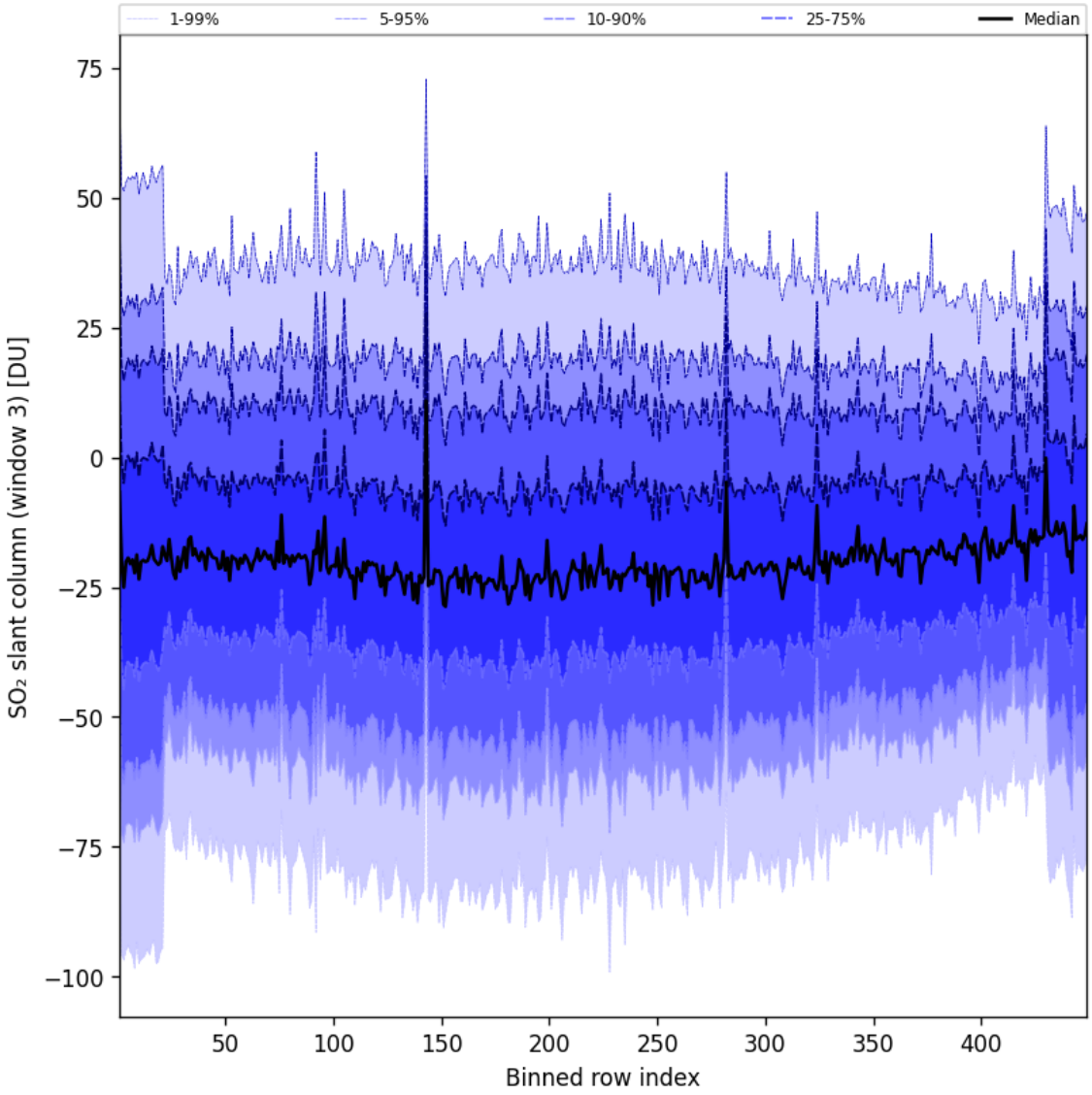

Figure 98: Along track statistics of "SO_2 slant column (window 3)" for 2025-03-14 to 2025-03-15

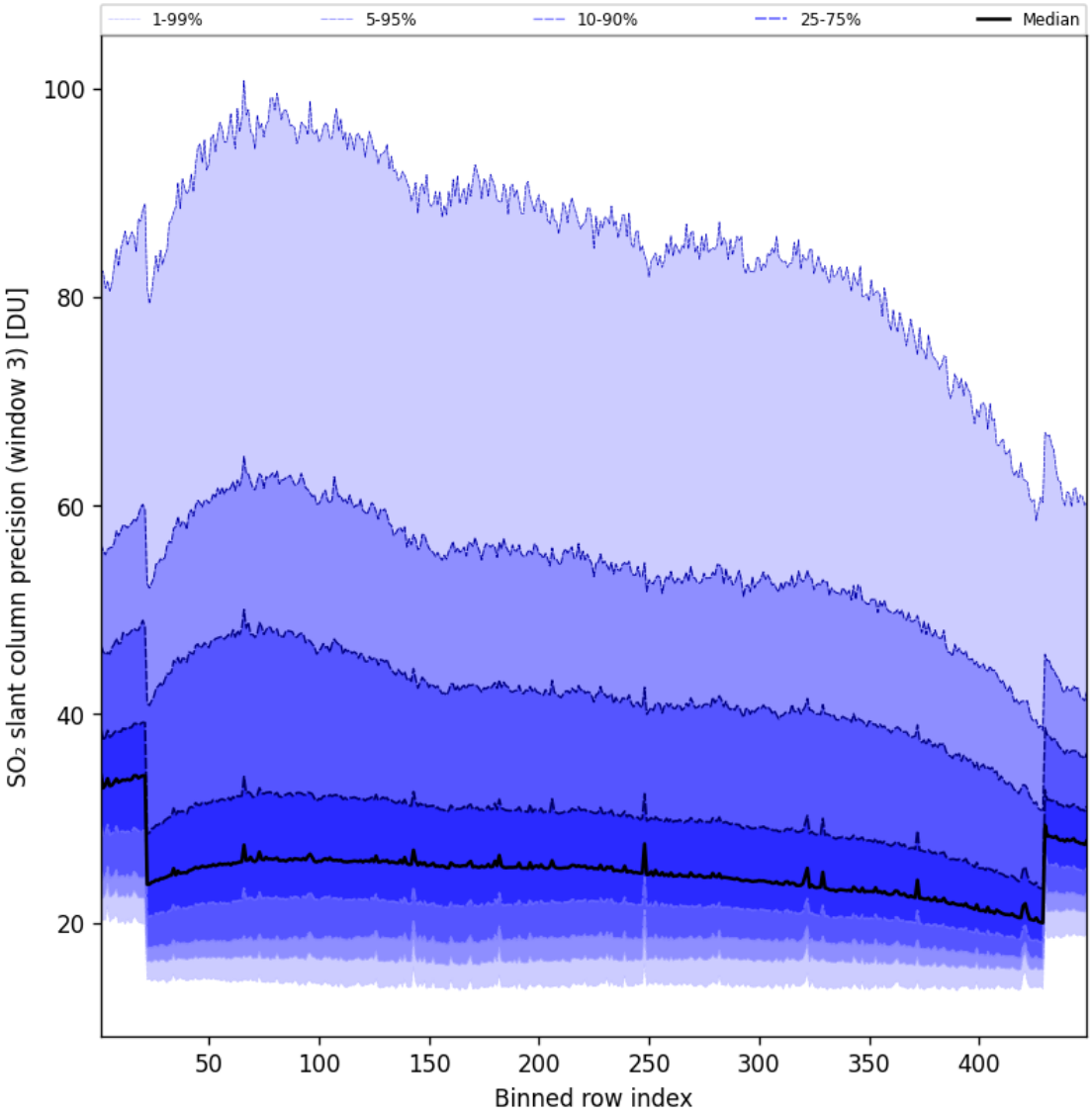

Figure 99: Along track statistics of "SO_2 slant column precision (window 3)" for 2025-03-14 to 2025-03-15

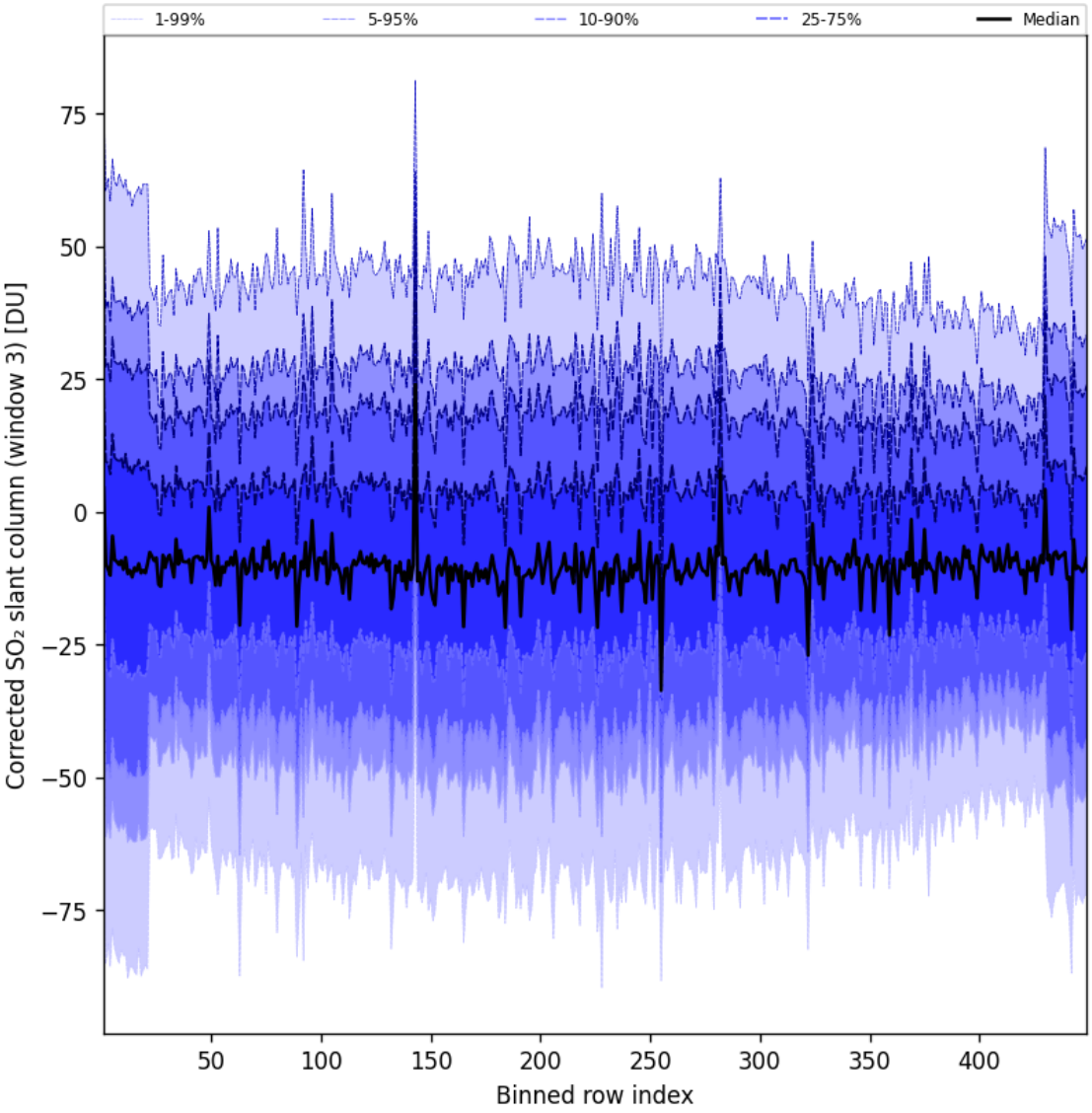

Figure 100: Along track statistics of “Corrected SO_2 slant column (window 3)” for 2025-03-14 to 2025-03-15

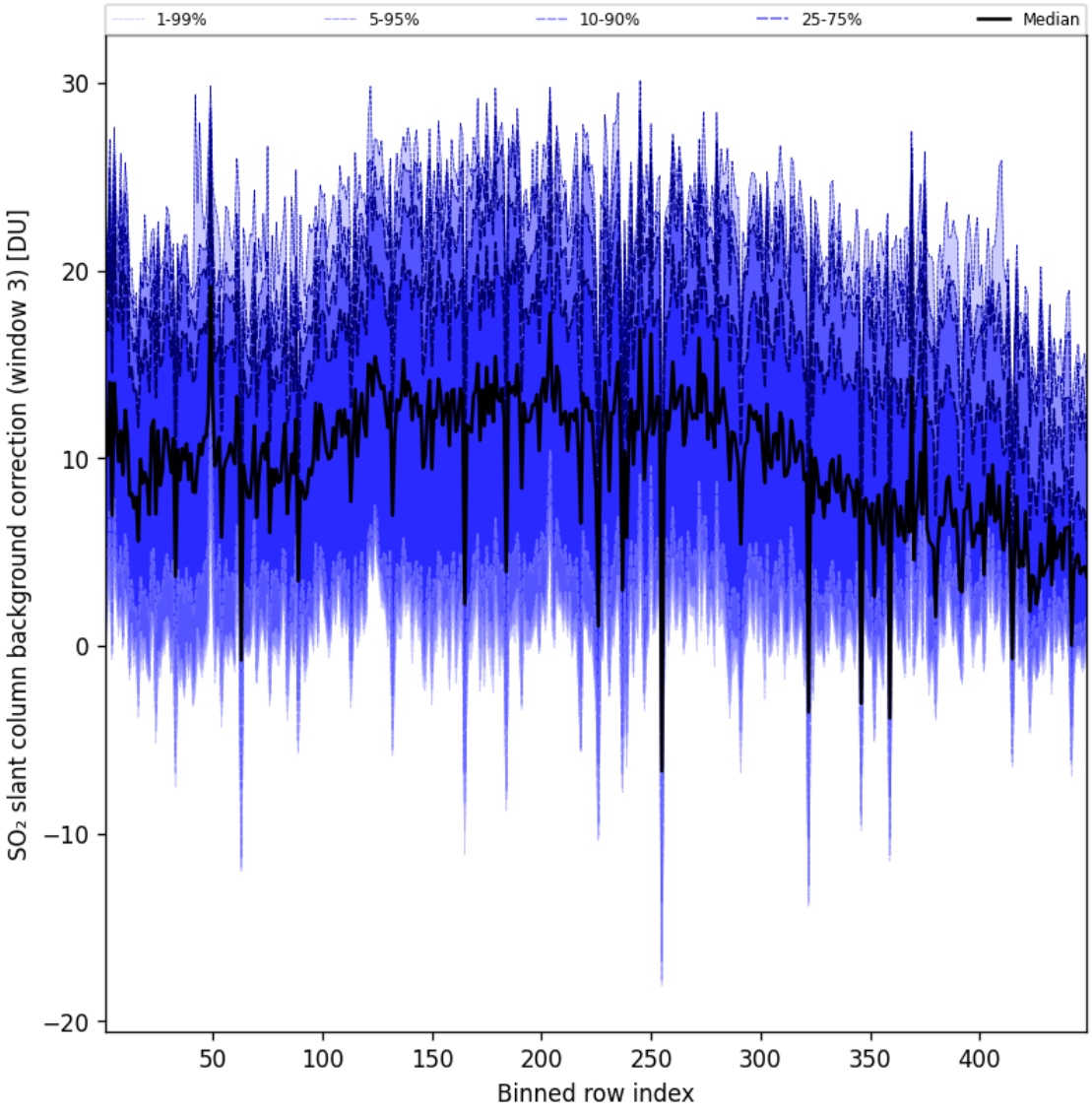

Figure 101: Along track statistics of "SO_2 slant column background correction (window 3)" for 2025-03-14 to 2025-03-15

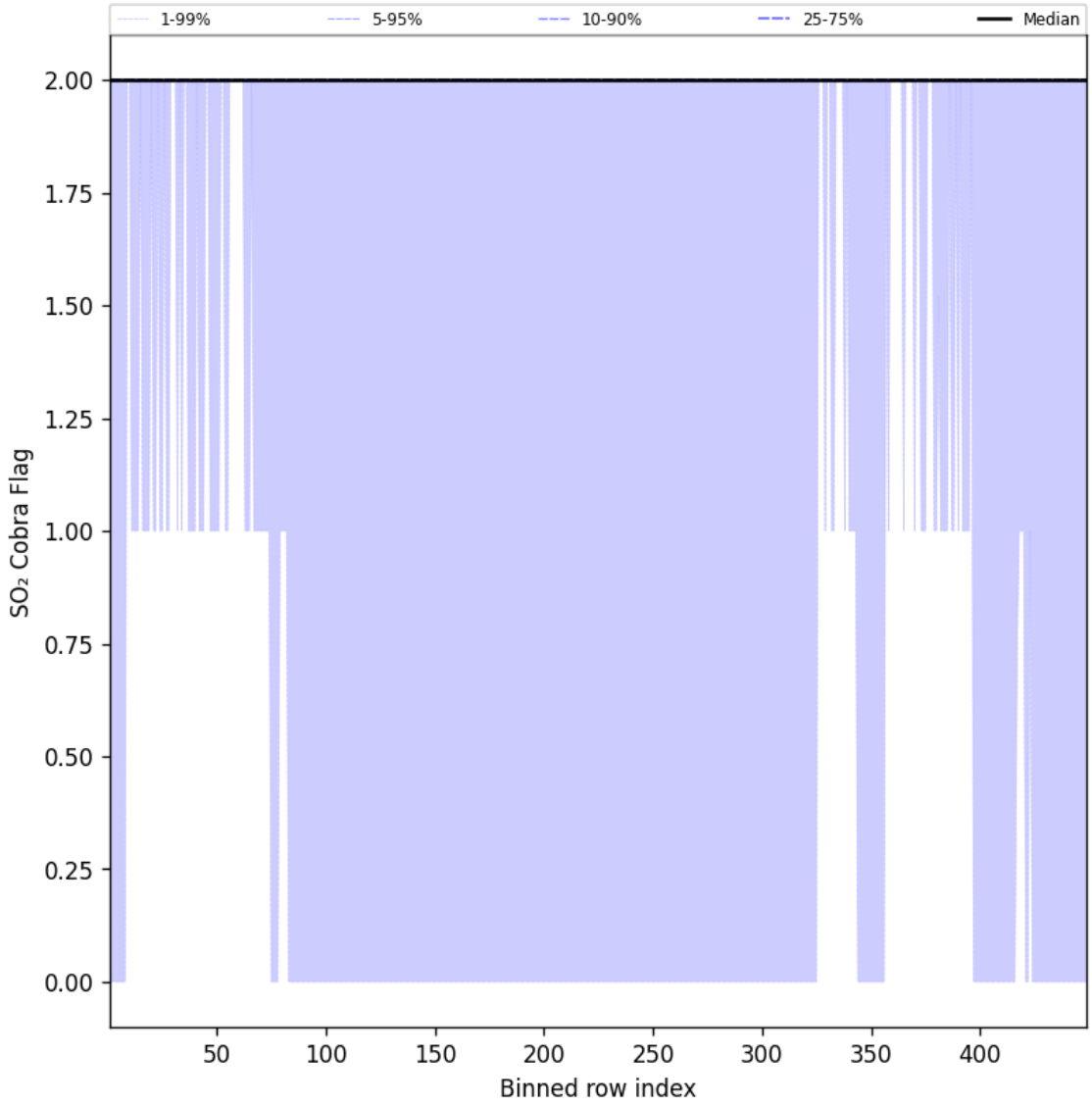

Figure 102: Along track statistics of "SO_2 Cobra Flag" for 2025-03-14 to 2025-03-15

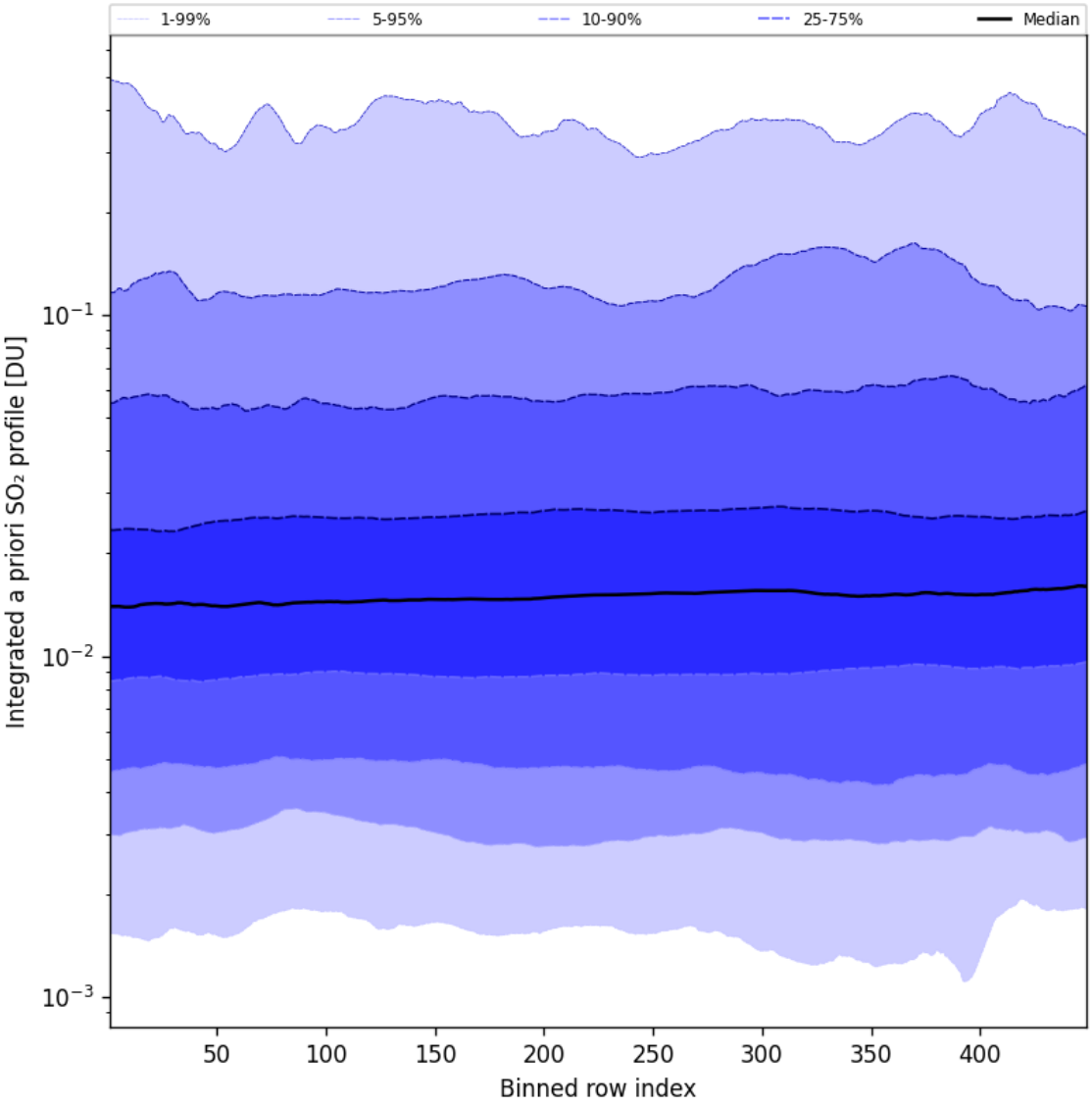

Figure 103: Along track statistics of “Integrated a priori SO_2 profile” for 2025-03-14 to 2025-03-15

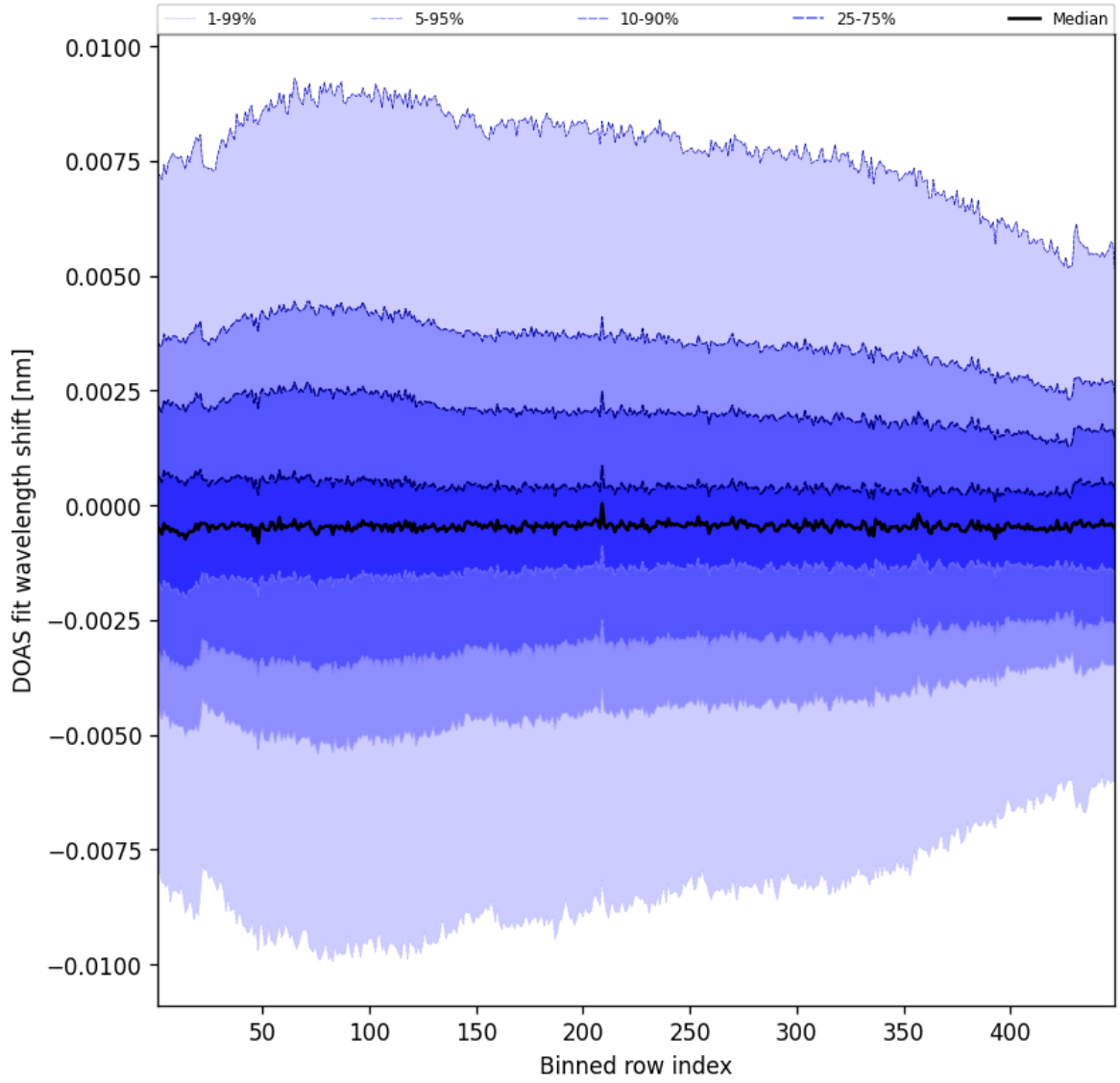

Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2025-03-14 to 2025-03-15

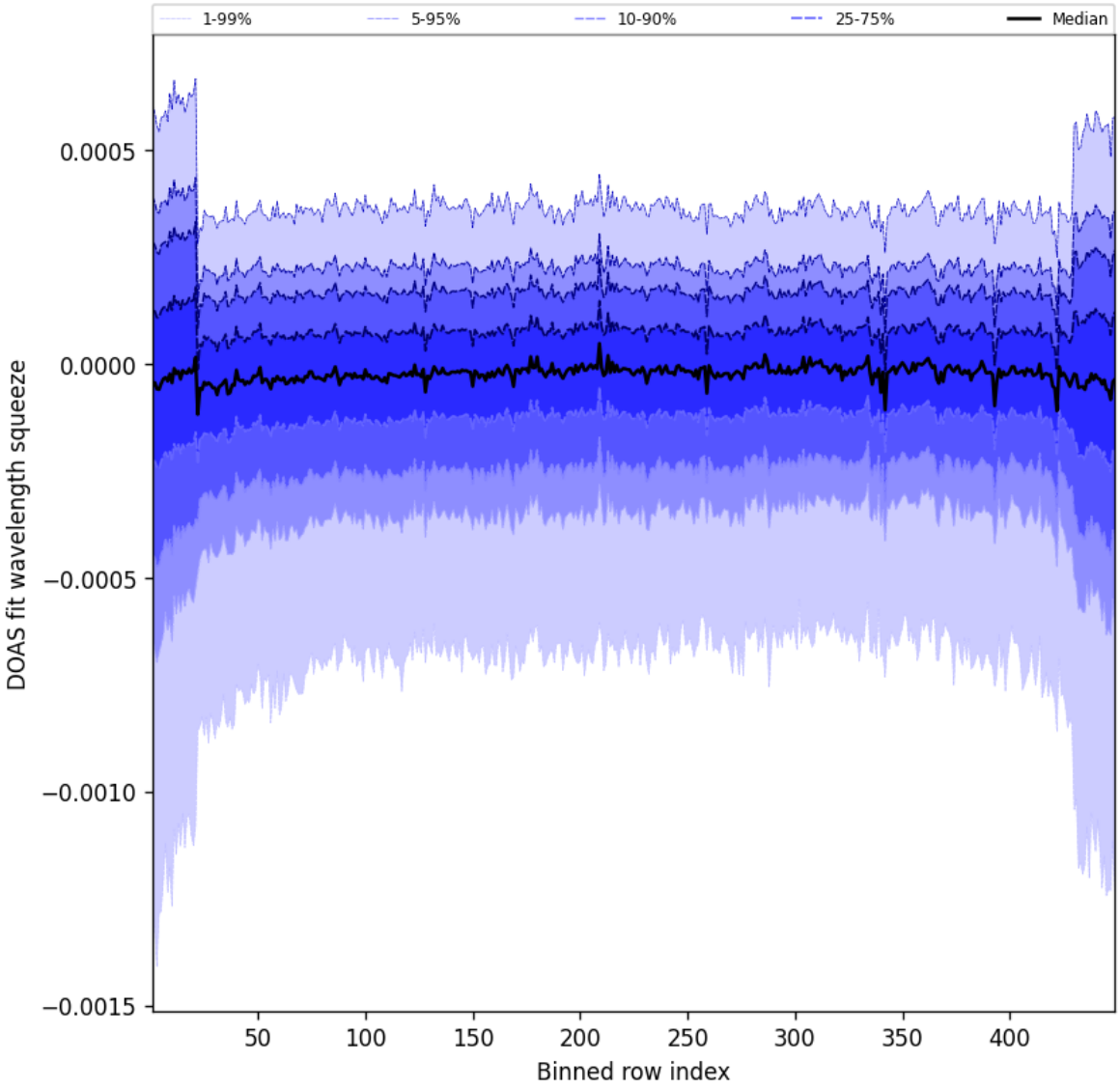

Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2025-03-14 to 2025-03-15

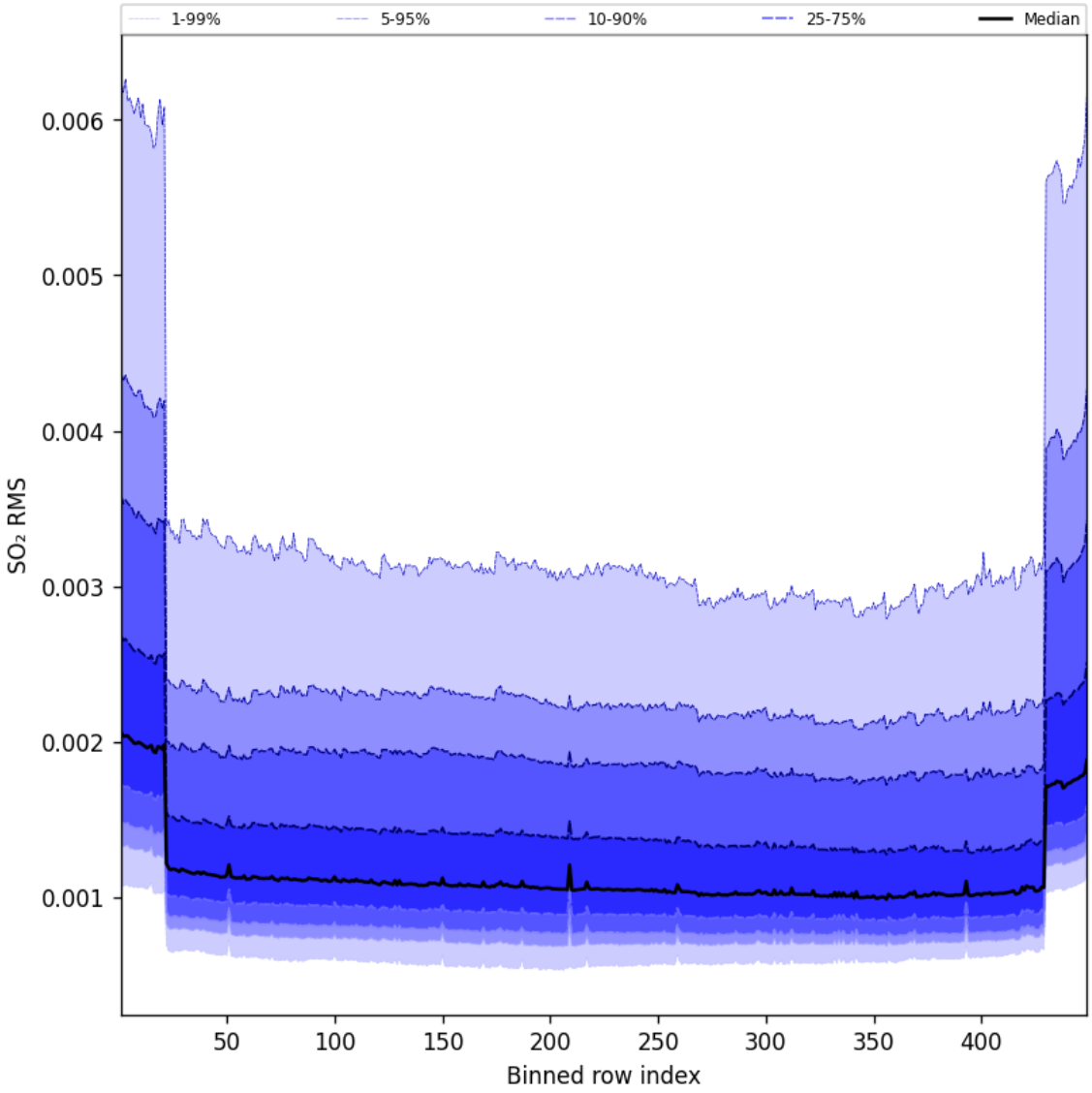

Figure 106: Along track statistics of "SO_2 RMS" for 2025-03-14 to 2025-03-15

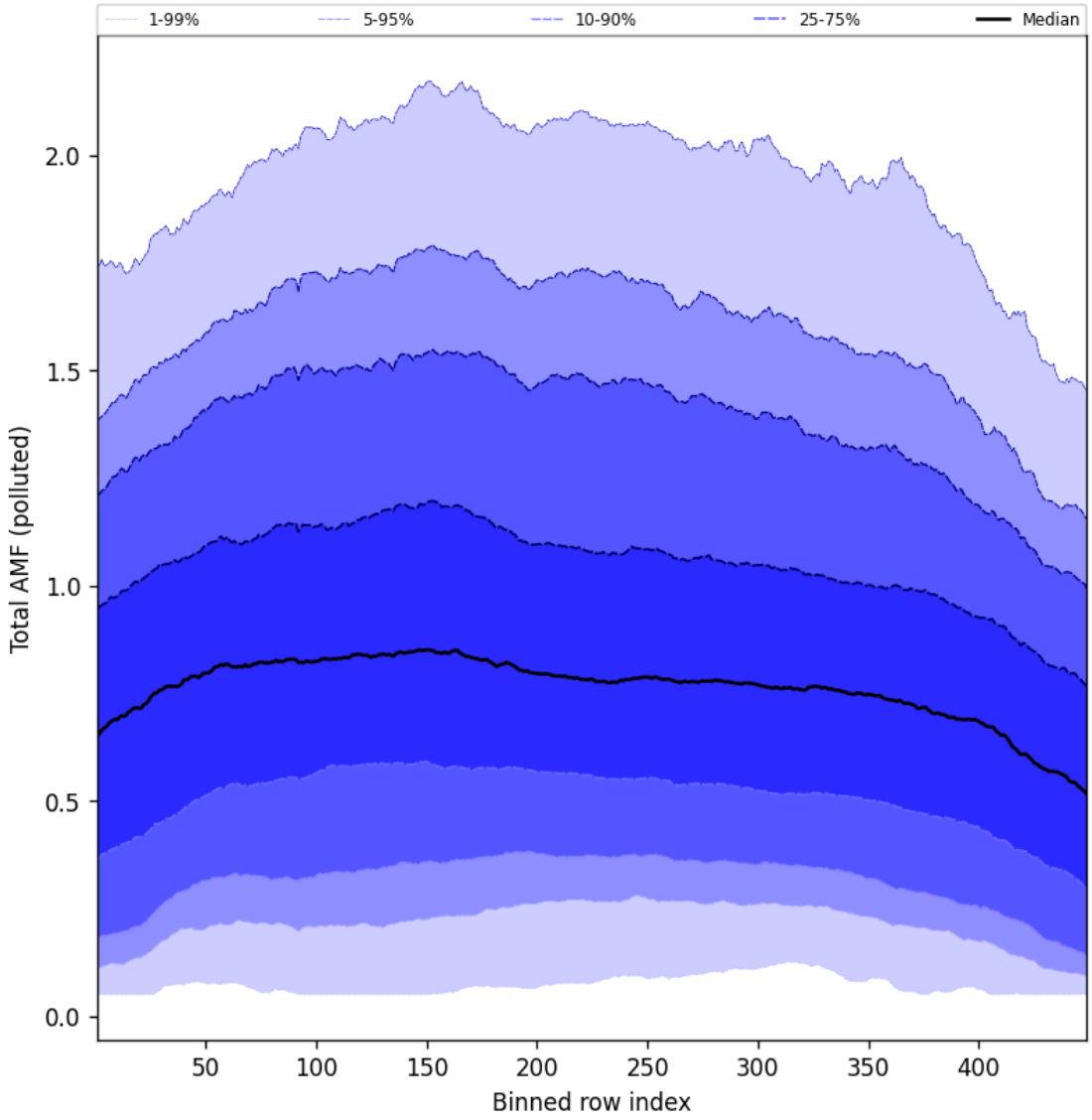

Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-03-14 to 2025-03-15

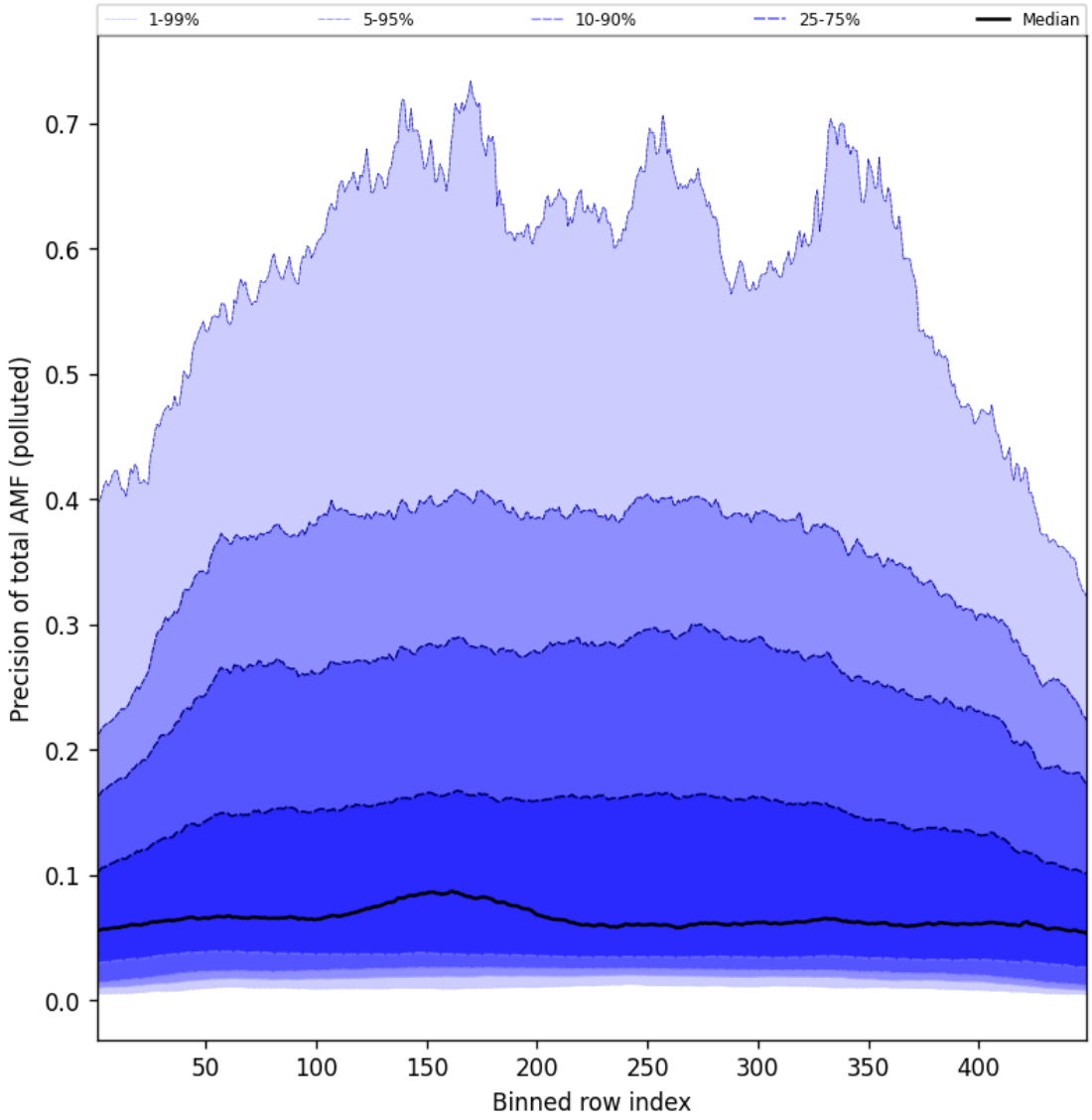

Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-03-14 to 2025-03-15

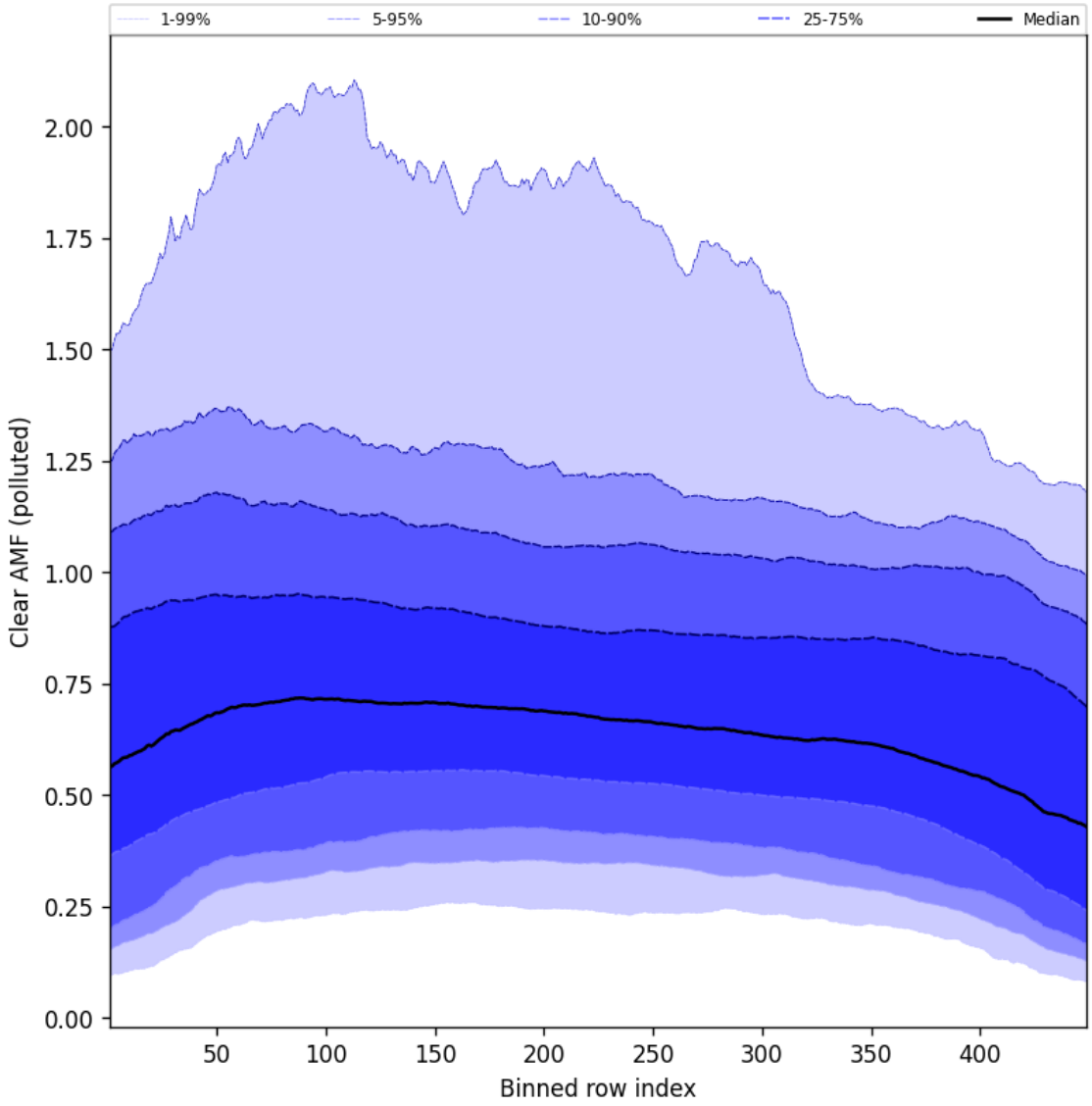

Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-03-14 to 2025-03-15

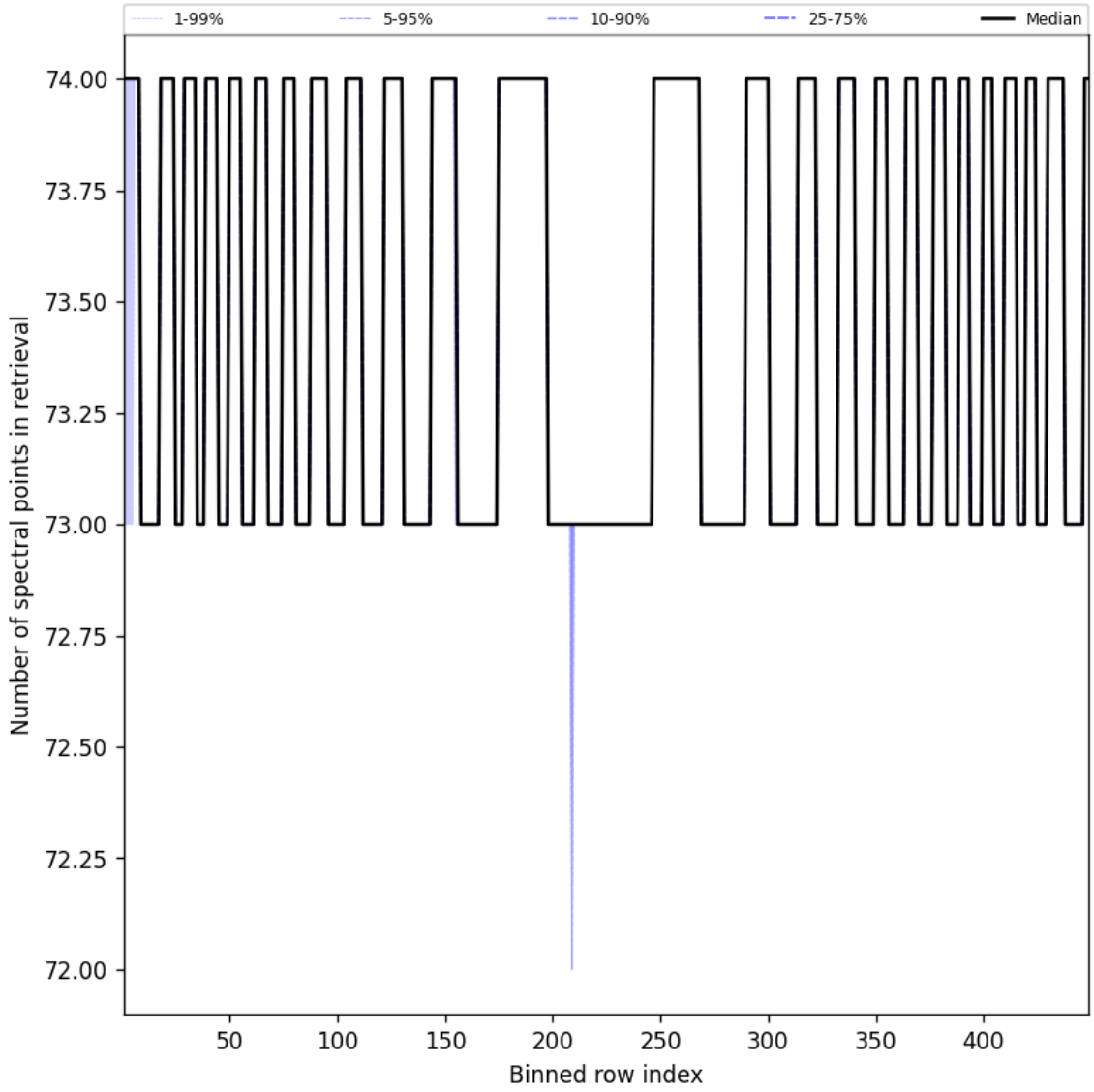

Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-03-14 to 2025-03-15

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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