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]	0.662 ± 0.398	12694124	0.995	0.760	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(4.679 \pm 126.977) \times 10^{-2}$	12694124	0.249	0.469	1.142×10^{-2}	-152	120
sulfurdioxide total vertical column precision [DU]	0.577 ± 0.884	12694124	0.197	0.396	0.341	4.382×10^{-2}	57.4
sulfurdioxide slant column density corrected [DU]	$(2.846 \pm 49.218) \times 10^{-2}$	12694124	0.250	0.366	9.831×10^{-3}	-12.4	61.4
sulfurdioxide slant column density cobra [DU]	$(2.808 \pm 47.521) \times 10^{-2}$	12694124	0.250	0.366	9.831×10^{-3}	-12.4	61.4
sulfurdioxide slant column density cobra precision [DU]	0.300 ± 0.149	12694124	0.213	0.155	0.252	7.903×10^{-2}	21.2
sulfurdioxide slant column density window1 [DU]	0.183 ± 0.778	12694124	0.225	0.743	0.197	-78.7	61.0
sulfurdioxide slant column density window1 precision [DU]	0.300 ± 0.149	12694124	0.213	0.155	0.252	7.903×10^{-2}	21.2
sulfurdioxide slant column density corrected win1 [DU]	$(2.965 \pm 766.442) \times 10^{-3}$	12694124	-2.500×10^{-2}	0.725	-2.927×10^{-2}	-78.7	61.4
background so2 slant column offset window1 [DU]	-0.180 ± 0.213	12694124	-0.340	0.219	-0.233	-1.44	5.20
sulfurdioxide slant column density window2 [DU]	0.479 ± 9.202	12694124	-0.250	11.6	0.217	-1.160×10^{3}	1.539×10^{3}
sulfurdioxide slant column density window2 precision [DU]	8.24 ± 2.25	12694124	7.43	2.60	7.93	2.30	722
sulfurdioxide slant column density corrected win2 [DU]	-2.24 ± 8.88	12694124	-2.25	11.2	-2.25	-1.165×10^{3}	1.532×10^{3}
background so2 slant column offset window2 [DU]	-2.72 ± 2.68	12694124	-0.750	3.33	-1.83	-19.9	4.63
sulfurdioxide slant column density window3 [DU]	-4.98 ± 24.58	12694124	-5.04	31.2	-5.02	-1.114×10^{3}	403
sulfurdioxide slant column density window3 precision [DU]	29.4 ± 13.1	12694124	23.7	9.64	25.9	10.6	352
sulfurdioxide slant column density corrected win3 [DU]	10.4 ± 23.6	12694124	10.6	29.9	10.4	-1.110×10^{3}	431
background so2 slant column offset window3 [DU]	15.3 ± 7.3	12694124	9.52	12.1	14.7	-8.53	37.7
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.21	12694124	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(3.480 \pm 7.771) \times 10^{-2}$	12694124	1.946×10^{-2}	1.879×10^{-2}	1.653×10^{-2}	8.292×10^{-4}	3.90
fitted radiance shift [nm]	$(-3.932 \pm 26.586) \times 10^{-4}$	12694124	-5.000×10^{-4}	1.857×10^{-3}	-3.648×10^{-4}	-0.106	6.059×10^{-2}
fitted radiance squeeze [1]	$(-3.009 \pm 19.982) \times 10^{-5}$	12694124	-1.000×10^{-5}	2.070×10^{-4}	-1.406×10^{-5}	-1.586×10^{-2}	2.229×10^{-2}
fitted root mean square [1]	$(1.312 \pm 0.619) \times 10^{-3}$	12694124	9.250×10^{-4}	6.100×10^{-4}	1.123×10^{-3}	2.451×10^{-4}	7.260×10^{-2}
sulfurdioxide total air mass factor polluted [1]	0.835 ± 0.431	12694124	0.620	0.554	0.773	5.000×10^{-2}	3.45
sulfurdioxide total air mass factor polluted precision [1]	0.107 ± 0.115	12694124	3.500×10^{-2}	0.108	6.263×10^{-2}	2.651×10^{-3}	1.92
sulfurdioxide clear air mass factor polluted [1]	0.720 ± 0.303	12694124	0.660	0.370	0.684	4.120×10^{-2}	3.45
number of spectral points in retrieval [1]	73.4 ± 0.5	12694124	73.0	1.000	73.0	51.0	74.0

Table 2: Percentile ranges

Variable	1 %	5 %	10 %	15.9 %	25 %	75 %	84.1 %	90 %	95 %	99 %
qa value [1]	0.0	1.000×10^{-2}	7.000×10^{-2}	0.130	0.240	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	−2.63	−0.972	−0.575	−0.378	−0.218	0.251	0.428	0.655	1.13	3.22
sulfurdioxide total vertical column precision [DU]	9.153×10^{-2}	0.129	0.157	0.182	0.216	0.612	0.838	1.12	1.64	4.18
sulfurdioxide slant column density corrected [DU]	−0.899	−0.505	−0.360	−0.267	−0.171	0.195	0.298	0.403	0.575	1.17
sulfurdioxide slant column density cobra [DU]	−0.899	−0.505	−0.360	−0.267	−0.171	0.195	0.298	0.403	0.575	1.17
sulfurdioxide slant column density cobra precision [DU]	0.136	0.162	0.176	0.187	0.202	0.358	0.417	0.476	0.569	0.848
sulfurdioxide slant column density window1 [DU]	−1.89	−0.937	−0.602	−0.392	−0.182	0.561	0.752	0.937	1.23	2.09
sulfurdioxide slant column density window1 precision [DU]	0.136	0.162	0.176	0.187	0.202	0.358	0.417	0.476	0.569	0.848
sulfurdioxide slant column density corrected win1 [DU]	−1.77	−1.02	−0.748	−0.570	−0.384	0.340	0.548	0.759	1.11	2.16
background so2 slant column offset window1 [DU]	−0.441	−0.386	−0.363	−0.345	−0.321	−0.102	-1.624×10^{-2}	6.673×10^{-2}	0.205	0.569
sulfurdioxide slant column density window2 [DU]	−20.6	−14.0	−10.7	−8.26	−5.48	6.16	9.23	12.0	15.8	23.8
sulfurdioxide slant column density window2 precision [DU]	4.35	5.28	5.83	6.26	6.77	9.37	10.2	11.0	12.2	14.8
sulfurdioxide slant column density corrected win2 [DU]	−23.7	−16.6	−13.2	−10.7	−7.87	3.37	6.19	8.71	12.1	19.2
background so2 slant column offset window2 [DU]	−10.4	−8.21	−6.82	−5.64	−4.15	−0.823	−0.484	−0.192	0.215	1.47
sulfurdioxide slant column density window3 [DU]	−65.6	−45.3	−35.5	−28.4	−20.5	10.7	18.7	25.8	35.4	54.3
sulfurdioxide slant column density window3 precision [DU]	15.2	17.8	19.4	20.6	22.2	31.8	36.4	42.5	54.4	85.6
sulfurdioxide slant column density corrected win3 [DU]	−48.4	−28.4	−18.9	−12.1	−4.52	25.4	33.0	39.8	48.9	67.4
background so2 slant column offset window3 [DU]	2.10	4.86	6.34	7.55	9.21	21.3	23.6	25.4	27.4	30.6
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]	2.608×10^{-3}	3.928×10^{-3}	5.369×10^{-3}	7.280×10^{-3}	9.772×10^{-3}	2.856×10^{-2}	4.153×10^{-2}	6.221×10^{-2}	0.122	0.377
fitted radiance shift [nm]	-8.386×10^{-3}	-4.365×10^{-3}	-2.942×10^{-3}	-2.107×10^{-3}	-1.364×10^{-3}	4.930×10^{-4}	1.205×10^{-3}	2.116×10^{-3}	3.684×10^{-3}	7.944×10^{-3}
fitted radiance squeeze [1]	-6.842×10^{-4}	-3.593×10^{-4}	-2.483×10^{-4}	-1.837×10^{-4}	-1.216×10^{-4}	8.540×10^{-5}	1.354×10^{-4}	1.812×10^{-4}	2.459×10^{-4}	3.971×10^{-4}
fitted root mean square [1]	5.824×10^{-4}	7.178×10^{-4}	7.927×10^{-4}	8.497×10^{-4}	9.207×10^{-4}	1.531×10^{-3}	1.790×10^{-3}	2.051×10^{-3}	2.474×10^{-3}	3.582×10^{-3}
sulfurdioxide total air mass factor polluted [1]	9.979×10^{-2}	0.231	0.313	0.406	0.527	1.08	1.26	1.43	1.66	2.03
sulfurdioxide total air mass factor polluted precision [1]	1.034×10^{-2}	1.597×10^{-2}	2.233×10^{-2}	2.834×10^{-2}	3.531×10^{-2}	0.144	0.191	0.236	0.316	0.533
sulfurdioxide clear air mass factor polluted [1]	0.185	0.275	0.350	0.430	0.522	0.892	0.998	1.10	1.27	1.62
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]	0.660 ± 0.396	6082297	0.770	1.000	0.0	1.000	0.230	1.000
sulfurdioxide total vertical column [DU]	$(5.600 \pm 156.299) \times 10^{-2}$	6082297	0.540	1.182×10^{-2}	-152	120	-0.248	0.292
sulfurdioxide total vertical column precision [DU]	0.730 ± 1.117	6082297	0.589	0.409	4.382×10^{-2}	53.9	0.225	0.813
sulfurdioxide slant column density corrected [DU]	$(2.593 \pm 43.571) \times 10^{-2}$	6082297	0.380	9.693×10^{-3}	-12.4	61.4	-0.177	0.203
sulfurdioxide slant column density cobra [DU]	$(2.569 \pm 42.573) \times 10^{-2}$	6082297	0.380	9.693×10^{-3}	-12.4	61.4	-0.177	0.203
sulfurdioxide slant column density cobra precision [DU]	0.321 ± 0.176	6082297	0.193	0.264	7.967×10^{-2}	16.1	0.201	0.394
sulfurdioxide slant column density window1 [DU]	0.187 ± 0.797	6082297	0.772	0.215	-16.9	61.0	-0.179	0.593
sulfurdioxide slant column density window1 precision [DU]	0.321 ± 0.176	6082297	0.193	0.264	7.967×10^{-2}	16.1	0.201	0.394
sulfurdioxide slant column density corrected win1 [DU]	$(1.645 \pm 78.607) \times 10^{-2}$	6082297	0.757	-2.075×10^{-2}	-16.9	61.4	-0.388	0.369
background so2 slant column offset window1 [DU]	-0.170 ± 0.258	6082297	0.241	-0.247	-1.40	5.20	-0.335	-9.402×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.07 ± 9.30	6082297	11.9	0.731	-1.160×10^{3}	134	-5.04	6.84
sulfurdioxide slant column density window2 precision [DU]	8.17 ± 2.15	6082297	2.60	7.88	2.37	381	6.72	9.32
sulfurdioxide slant column density corrected win2 [DU]	-2.37 ± 8.79	6082297	11.2	-2.35	-1.165×10^{3}	132	-7.96	3.24
background so2 slant column offset window2 [DU]	-3.44 ± 3.21	6082297	5.15	-2.40	-19.9	4.63	-5.97	-0.825
sulfurdioxide slant column density window3 [DU]	-7.39 ± 24.13	6082297	30.7	-7.38	-190	151	-22.7	8.01
sulfurdioxide slant column density window3 precision [DU]	28.4 ± 12.2	6082297	8.60	25.4	11.0	249	21.9	30.5
sulfurdioxide slant column density corrected win3 [DU]	10.4 ± 23.1	6082297	29.1	10.5	-172	174	-4.07	25.0
background so2 slant column offset window3 [DU]	17.8 ± 7.3	6082297	12.7	18.1	-5.49	37.6	11.2	23.9
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.22	6082297	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(5.231 \pm 10.287) \times 10^{-2}$	6082297	3.943×10^{-2}	2.221×10^{-2}	9.826×10^{-4}	3.90	9.797×10^{-3}	4.923×10^{-2}
fitted radiance shift [nm]	$(-2.225 \pm 24.958) \times 10^{-4}$	6082297	1.594×10^{-3}	-2.120×10^{-4}	-4.506×10^{-2}	3.739×10^{-2}	-1.053×10^{-3}	5.413×10^{-4}
fitted radiance squeeze [1]	$(-5.061 \pm 22.860) \times 10^{-5}$	6082297	2.213×10^{-4}	-2.129×10^{-5}	-9.766×10^{-3}	1.248×10^{-2}	-1.401×10^{-4}	8.125×10^{-5}
fitted root mean square [1]	$(1.398 \pm 0.736) \times 10^{-3}$	6082297	7.401×10^{-4}	1.158×10^{-3}	3.313×10^{-4}	3.098×10^{-2}	9.186×10^{-4}	1.659×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.772 ± 0.447	6082297	0.610	0.694	5.000×10^{-2}	3.45	0.424	1.03
sulfurdioxide total air mass factor polluted precision [1]	$(9.758 \pm 12.936) \times 10^{-2}$	6082297	8.612×10^{-2}	5.314×10^{-2}	2.651×10^{-3}	1.92	2.861×10^{-2}	0.115
sulfurdioxide clear air mass factor polluted [1]	0.671 ± 0.326	6082297	0.510	0.620	4.120×10^{-2}	3.45	0.406	0.916
number of spectral points in retrieval [1]	73.5 ± 0.5	6082297	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]	0.663 ± 0.399	6611827	0.750	1.000	0.0	1.000	0.250	1.000
sulfurdioxide total vertical column [DU]	$(3.831 \pm 92.089) \times 10^{-2}$	6611827	0.420	1.110×10^{-2}	-47.5	103	-0.196	0.224
sulfurdioxide total vertical column precision [DU]	0.437 ± 0.558	6611827	0.276	0.304	4.929×10^{-2}	57.4	0.210	0.486
sulfurdioxide slant column density corrected [DU]	$(3.079 \pm 53.892) \times 10^{-2}$	6611827	0.354	9.957×10^{-3}	-12.1	48.4	-0.165	0.188
sulfurdioxide slant column density cobra [DU]	$(3.028 \pm 51.654) \times 10^{-2}$	6611827	0.354	9.957×10^{-3}	-12.1	39.5	-0.165	0.188
sulfurdioxide slant column density cobra precision [DU]	0.280 ± 0.116	6611827	0.126	0.246	7.903×10^{-2}	21.2	0.204	0.329
sulfurdioxide slant column density window1 [DU]	0.179 ± 0.761	6611827	0.717	0.181	-78.7	52.1	-0.185	0.532
sulfurdioxide slant column density window1 precision [DU]	0.280 ± 0.116	6611827	0.126	0.246	7.903×10^{-2}	21.2	0.204	0.329
sulfurdioxide slant column density corrected win1 [DU]	$(-9.440 \pm 747.719) \times 10^{-3}$	6611827	0.697	-3.655×10^{-2}	-78.7	52.6	-0.381	0.316
background so2 slant column offset window1 [DU]	-0.189 ± 0.159	6611827	0.202	-0.224	-1.44	1.30	-0.309	-0.108
sulfurdioxide slant column density window2 [DU]	$(-6.754 \pm 908.039) \times 10^{-2}$	6611827	11.4	-0.238	-1.006×10^{3}	1.539×10^{3}	-5.87	5.54
sulfurdioxide slant column density window2 precision [DU]	8.29 ± 2.34	6611827	2.61	7.97	2.30	722	6.81	9.42
sulfurdioxide slant column density corrected win2 [DU]	-2.12 ± 8.97	6611827	11.3	-2.15	-1.004×10^{3}	1.532×10^{3}	-7.79	3.50
background so2 slant column offset window2 [DU]	-2.06 ± 1.85	6611827	2.19	-1.61	-13.9	4.45	-3.01	-0.822
sulfurdioxide slant column density window3 [DU]	-2.76 ± 24.78	6611827	31.4	-2.79	-1.114×10^{3}	403	-18.4	13.0
sulfurdioxide slant column density window3 precision [DU]	30.3 ± 13.8	6611827	10.6	26.5	10.6	352	22.5	33.1
sulfurdioxide slant column density corrected win3 [DU]	10.3 ± 24.2	6611827	30.7	10.3	-1.110×10^{3}	431	-4.94	25.8
background so2 slant column offset window3 [DU]	13.1 ± 6.6	6611827	11.0	12.1	-8.53	37.7	7.63	18.7
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.20	6611827	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(1.870 \pm 3.631) \times 10^{-2}$	6611827	1.073×10^{-2}	1.479×10^{-2}	8.292×10^{-4}	2.50	9.760×10^{-3}	2.049×10^{-2}
fitted radiance shift [nm]	$(-5.503 \pm 27.909) \times 10^{-4}$	6611827	2.077×10^{-3}	-5.400×10^{-4}	-0.106	6.059×10^{-2}	-1.646×10^{-3}	4.307×10^{-4}
fitted radiance squeeze [1]	$(-1.122 \pm 16.686) \times 10^{-5}$	6611827	1.967×10^{-4}	-7.949×10^{-6}	-1.586×10^{-2}	2.229×10^{-2}	-1.077×10^{-4}	8.902×10^{-5}
fitted root mean square [1]	$(1.232 \pm 0.475) \times 10^{-3}$	6611827	5.027×10^{-4}	1.102×10^{-3}	2.451×10^{-4}	7.260×10^{-2}	9.224×10^{-4}	1.425×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.892 ± 0.407	6611827	0.516	0.821	5.000×10^{-2}	2.68	0.616	1.13
sulfurdioxide total air mass factor polluted precision [1]	0.115 ± 0.099	6611827	0.122	7.799×10^{-2}	6.524×10^{-3}	1.43	4.060×10^{-2}	0.163
sulfurdioxide clear air mass factor polluted [1]	0.765 ± 0.272	6611827	0.280	0.716	0.149	2.51	0.594	0.875
number of spectral points in retrieval [1]	73.4 ± 0.6	6611827	1.000	73.0	51.0	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]	0.691 ± 0.394	8501505	0.720	1.000	0.0	1.000	0.280	1.000
sulfurdioxide total vertical column [DU]	$(3.148 \pm 94.597) \times 10^{-2}$	8501505	0.422	8.983×10^{-3}	-50.2	103	-0.199	0.223
sulfurdioxide total vertical column precision [DU]	0.467 ± 0.662	8501505	0.292	0.303	4.382×10^{-2}	57.4	0.207	0.500
sulfurdioxide slant column density corrected [DU]	$(2.255 \pm 47.080) \times 10^{-2}$	8501505	0.348	7.923×10^{-3}	-7.59	50.0	-0.164	0.184
sulfurdioxide slant column density cobra [DU]	$(2.225 \pm 45.663) \times 10^{-2}$	8501505	0.348	7.923×10^{-3}	-7.59	33.4	-0.164	0.184
sulfurdioxide slant column density cobra precision [DU]	0.279 ± 0.123	8501505	0.128	0.241	7.903×10^{-2}	17.8	0.199	0.327
sulfurdioxide slant column density window1 [DU]	0.184 ± 0.719	8501505	0.709	0.192	-37.2	34.3	-0.169	0.540
sulfurdioxide slant column density window1 precision [DU]	0.279 ± 0.123	8501505	0.128	0.241	7.903×10^{-2}	17.8	0.199	0.327
sulfurdioxide slant column density corrected win1 [DU]	$(-1.434 \pm 70.769) \times 10^{-2}$	8501505	0.692	-3.840×10^{-2}	-37.2	33.9	-0.380	0.312
background so2 slant column offset window1 [DU]	-0.198 ± 0.173	8501505	0.200	-0.239	-0.928	2.59	-0.320	-0.120
sulfurdioxide slant column density window2 [DU]	$(-2.762 \pm 886.141) \times 10^{-2}$	8501505	11.3	-0.217	-1.006×10^{3}	1.539×10^{3}	-5.76	5.49
sulfurdioxide slant column density window2 precision [DU]	8.05 ± 2.11	8501505	2.49	7.74	2.30	722	6.65	9.13
sulfurdioxide slant column density corrected win2 [DU]	-2.24 ± 8.69	8501505	11.1	-2.25	-1.004×10^{3}	1.532×10^{3}	-7.77	3.28
background so2 slant column offset window2 [DU]	-2.21 ± 2.15	8501505	2.50	-1.63	-19.9	4.63	-3.27	-0.773
sulfurdioxide slant column density window3 [DU]	-1.58 ± 24.33	8501505	31.1	-1.70	-384	403	-17.0	14.0
sulfurdioxide slant column density window3 precision [DU]	28.3 ± 11.9	8501505	9.13	25.1	10.6	352	21.6	30.7
sulfurdioxide slant column density corrected win3 [DU]	12.7 ± 23.3	8501505	29.7	12.5	-370	431	-2.21	27.5
background so2 slant column offset window3 [DU]	14.2 ± 6.6	8501505	10.7	13.3	-8.53	37.7	8.86	19.6
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.20	8501505	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.297 \pm 4.306) \times 10^{-2}$	8501505	1.360×10^{-2}	1.625×10^{-2}	8.592×10^{-4}	3.80	1.076×10^{-2}	2.436×10^{-2}
fitted radiance shift [nm]	$(-4.160 \pm 24.161) \times 10^{-4}$	8501505	1.796×10^{-3}	-3.666×10^{-4}	-4.900×10^{-2}	6.059×10^{-2}	-1.346×10^{-3}	4.494×10^{-4}
fitted radiance squeeze [1]	$(-1.292 \pm 16.963) \times 10^{-5}$	8501505	1.934×10^{-4}	-6.817×10^{-6}	-1.465×10^{-2}	1.374×10^{-2}	-1.053×10^{-4}	8.808×10^{-5}
fitted root mean square [1]	$(1.226 \pm 0.502) \times 10^{-3}$	8501505	5.094×10^{-4}	1.079×10^{-3}	2.451×10^{-4}	6.278×10^{-2}	9.041×10^{-4}	1.413×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.867 ± 0.394	8501505	0.492	0.820	5.000×10^{-2}	2.57	0.598	1.09
sulfurdioxide total air mass factor polluted precision [1]	0.105 ± 0.094	8501505	0.107	6.642×10^{-2}	4.550×10^{-3}	1.27	3.952×10^{-2}	0.147
sulfurdioxide clear air mass factor polluted [1]	0.755 ± 0.270	8501505	0.325	0.717	0.103	2.51	0.580	0.905
number of spectral points in retrieval [1]	73.4 ± 0.5	8501505	1.000	73.0	52.0	74.0	73.0	74.0

Table 6: Parameterlist and basic statistics for the analysis for observations over land

Variable	mean $\pm\sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.630 ± 0.402	3087912	0.780	1.000	0.0	1.000	0.220	1.000
sulfurdioxide total vertical column [DU]	$(6.640 \pm 161.396) \times 10^{-2}$	3087912	0.564	1.464×10^{-2}	-152	108	-0.255	0.308
sulfurdioxide total vertical column precision [DU]	0.746 ± 1.121	3087912	0.600	0.436	4.440×10^{-2}	49.1	0.242	0.842
sulfurdioxide slant column density corrected [DU]	$(3.373 \pm 48.923) \times 10^{-2}$	3087912	0.385	1.202×10^{-2}	-12.4	48.3	-0.177	0.208
sulfurdioxide slant column density cobra [DU]	$(3.329 \pm 46.938) \times 10^{-2}$	3087912	0.385	1.202×10^{-2}	-12.4	27.7	-0.177	0.208
sulfurdioxide slant column density cobra precision [DU]	0.320 ± 0.169	3087912	0.185	0.269	7.967×10^{-2}	11.8	0.206	0.391
sulfurdioxide slant column density window1 [DU]	0.201 ± 0.811	3087912	0.770	0.220	-64.9	52.1	-0.172	0.598
sulfurdioxide slant column density window1 precision [DU]	0.320 ± 0.169	3087912	0.185	0.269	7.967×10^{-2}	11.8	0.206	0.391
sulfurdioxide slant column density corrected win1 [DU]	$(2.438 \pm 79.866) \times 10^{-2}$	3087912	0.751	-1.408×10^{-2}	-64.9	52.6	-0.379	0.372
background so2 slant column offset window1 [DU]	-0.176 ± 0.238	3087912	0.227	-0.244	-0.718	4.51	-0.329	-0.102
sulfurdioxide slant column density window2 [DU]	0.920 ± 9.564	3087912	12.1	0.644	-529	863	-5.25	6.82
sulfurdioxide slant column density window2 precision [DU]	8.52 ± 2.52	3087912	2.68	8.23	2.39	484	6.99	9.67
sulfurdioxide slant column density corrected win2 [DU]	-2.32 ± 9.13	3087912	11.5	-2.32	-530	861	-8.06	3.41
background so2 slant column offset window2 [DU]	-3.24 ± 3.05	3087912	4.78	-2.07	-18.2	4.51	-5.63	-0.848
sulfurdioxide slant column density window3 [DU]	-11.5 ± 23.8	3087912	29.8	-11.1	-1.114×10^{3}	246	-26.3	3.59
sulfurdioxide slant column density window3 precision [DU]	32.3 ± 15.8	3087912	10.8	27.6	11.0	247	23.7	34.5
sulfurdioxide slant column density corrected win3 [DU]	5.10 ± 23.90	3087912	30.0	5.61	-1.110×10^{3}	251	-9.66	20.3
background so2 slant column offset window3 [DU]	16.6 ± 8.0	3087912	14.1	16.7	-8.53	37.2	9.55	23.6
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.20	3087912	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(5.971 \pm 11.556) \times 10^{-2}$	3087912	4.701×10^{-2}	1.980×10^{-2}	8.292×10^{-4}	3.79	7.647×10^{-3}	5.465×10^{-2}
fitted radiance shift [nm]	$(-3.126 \pm 32.513) \times 10^{-4}$	3087912	2.045×10^{-3}	-3.279×10^{-4}	-4.506×10^{-2}	4.352×10^{-2}	-1.388×10^{-3}	6.567×10^{-4}
fitted radiance squeeze [1]	$(-4.490 \pm 21.862) \times 10^{-5}$	3087912	2.230×10^{-4}	-2.250×10^{-5}	-1.586×10^{-2}	2.229×10^{-2}	-1.407×10^{-4}	8.232×10^{-5}
fitted root mean square [1]	$(1.384 \pm 0.697) \times 10^{-3}$	3087912	6.781×10^{-4}	1.179×10^{-3}	2.757×10^{-4}	7.260×10^{-2}	9.424×10^{-4}	1.621×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.777 ± 0.494	3087912	0.645	0.649	5.000×10^{-2}	2.97	0.405	1.05
sulfurdioxide total air mass factor polluted precision [1]	0.116 ± 0.156	3087912	0.120	5.584×10^{-2}	2.651×10^{-3}	1.92	2.754×10^{-2}	0.147
sulfurdioxide clear air mass factor polluted [1]	0.648 ± 0.336	3087912	0.434	0.591	4.120×10^{-2}	2.35	0.391	0.825
number of spectral points in retrieval [1]	73.4 ± 0.5	3087912	1.000	73.0	51.0	74.0	73.0	74.0

3 Granule outlines

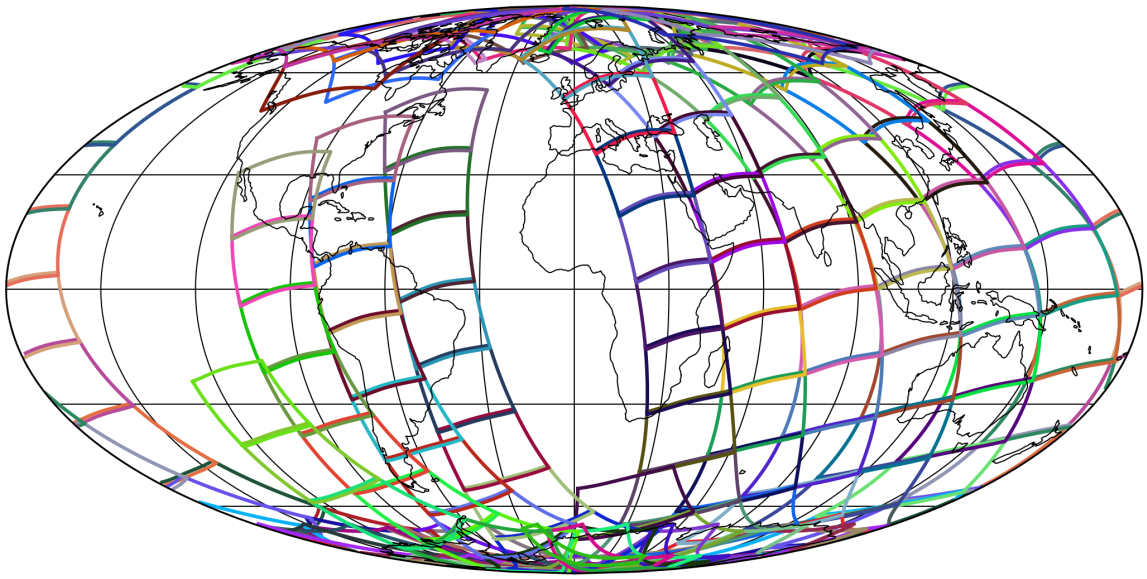

Figure 1: Outline of the granules.

4 Input data monitoring

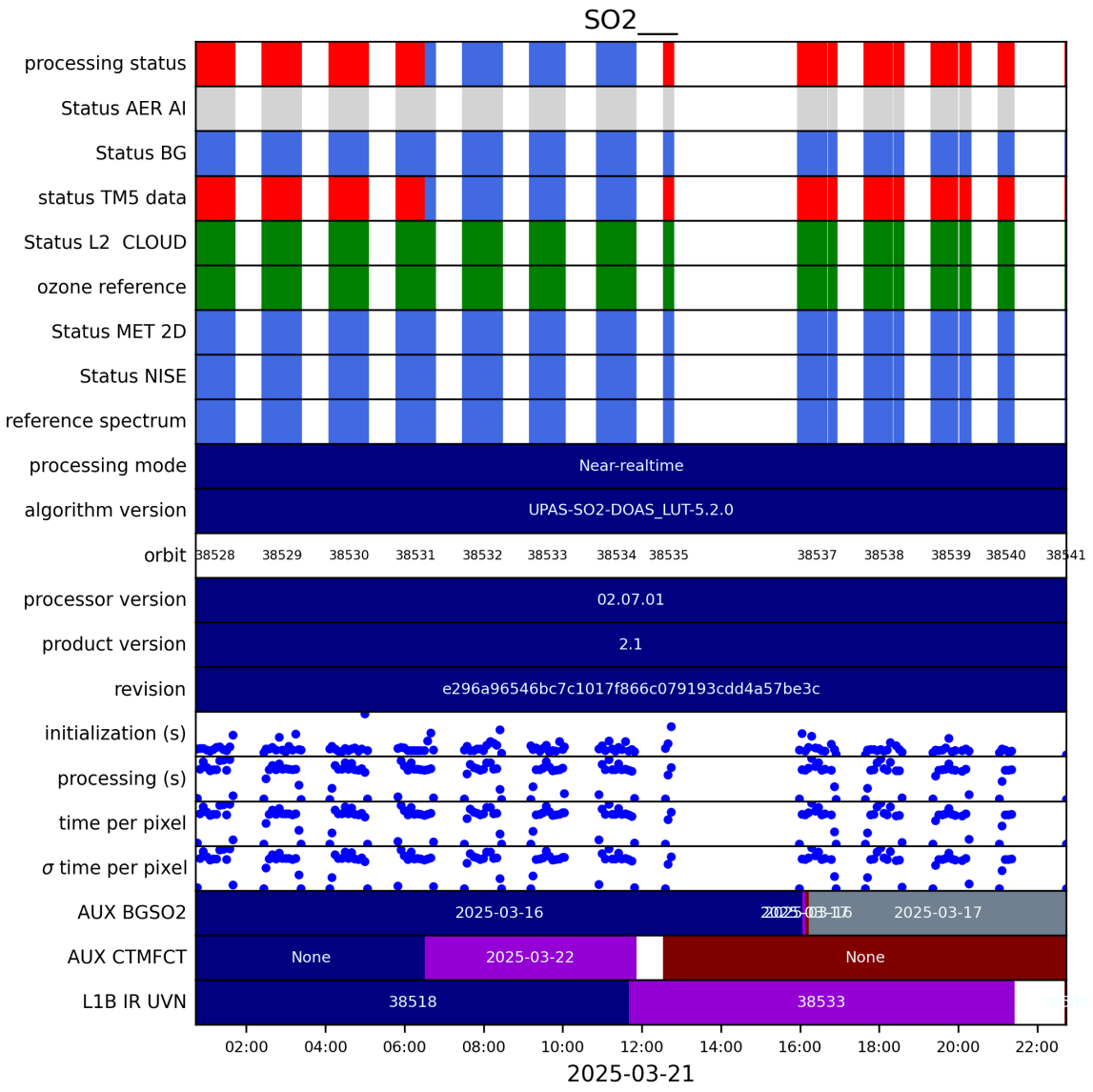

Figure 2: Input data per granule

5 Warnings and errors

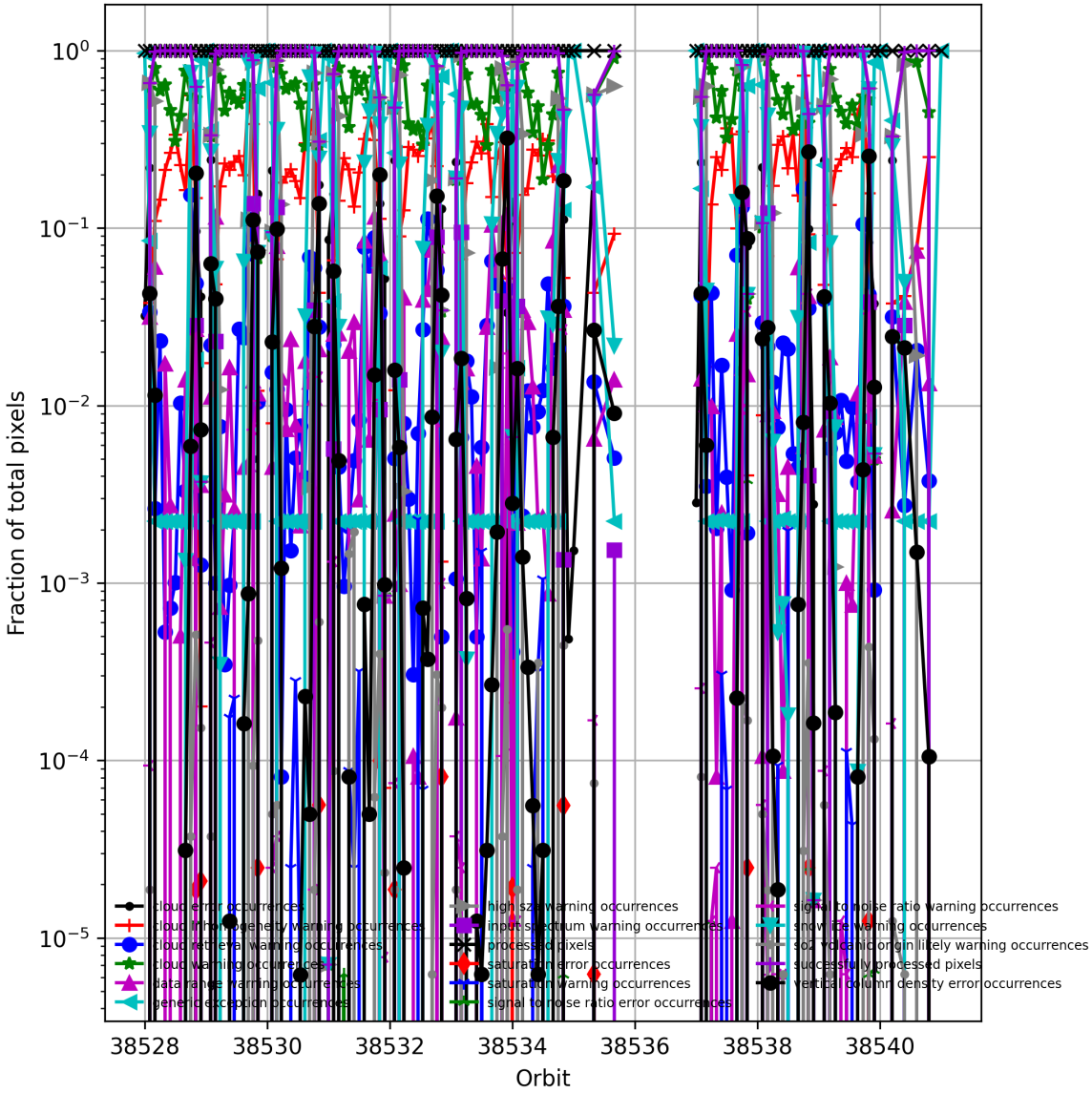

Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

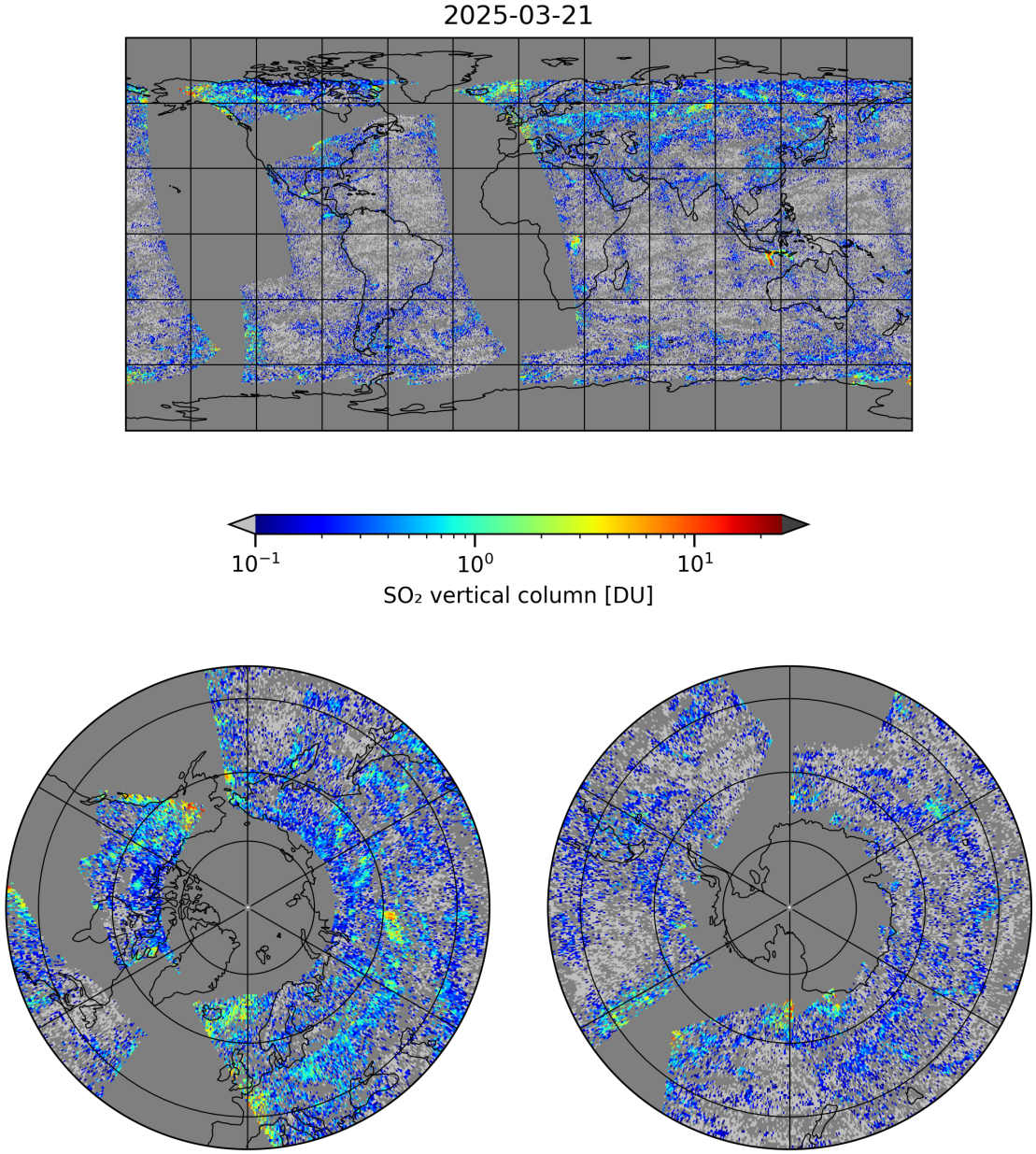

Figure 4: Map of "SO_2 vertical column" for 2025-03-21 to 2025-03-21

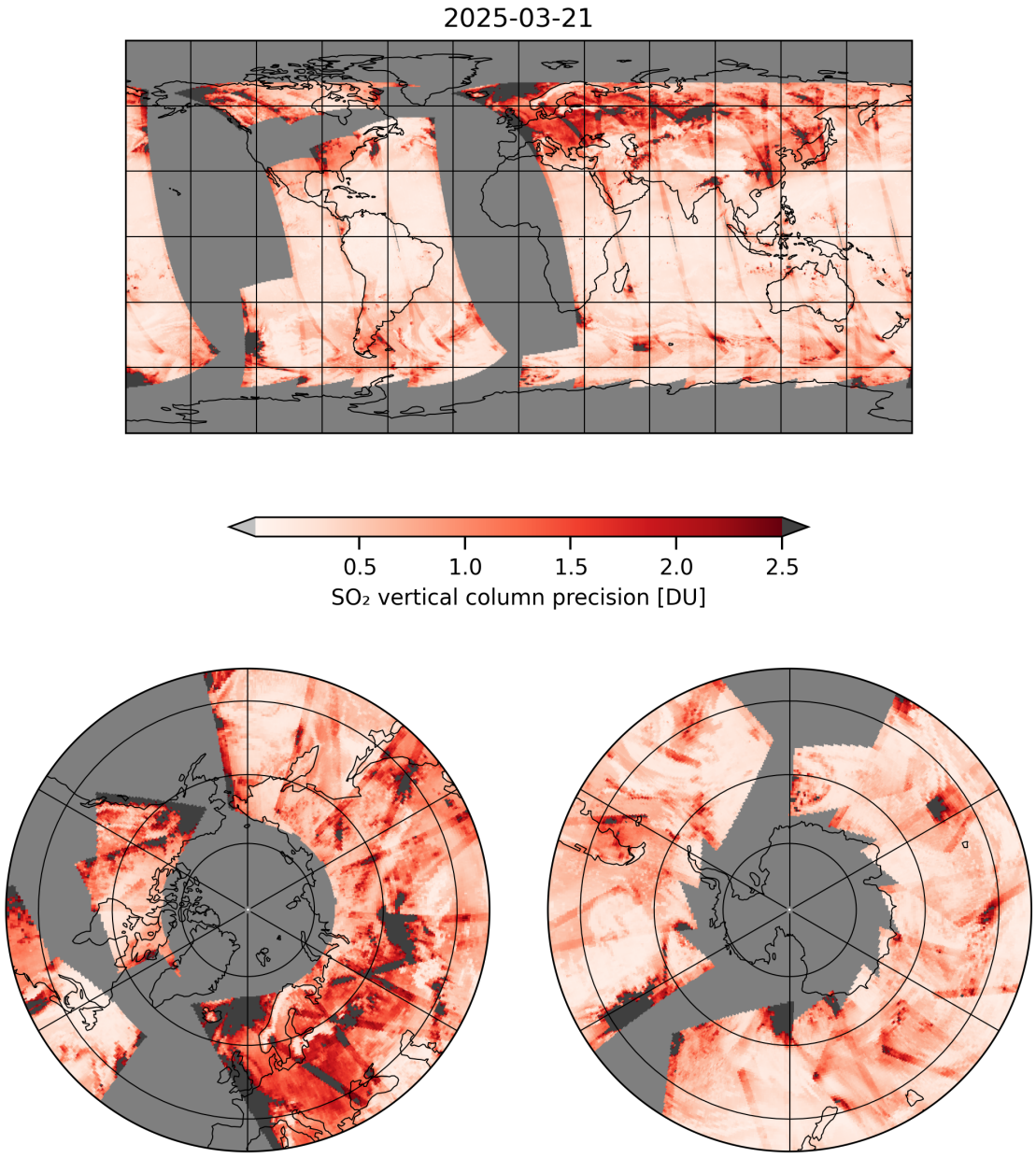

Figure 5: Map of "SO_2 vertical column precision" for 2025-03-21 to 2025-03-21

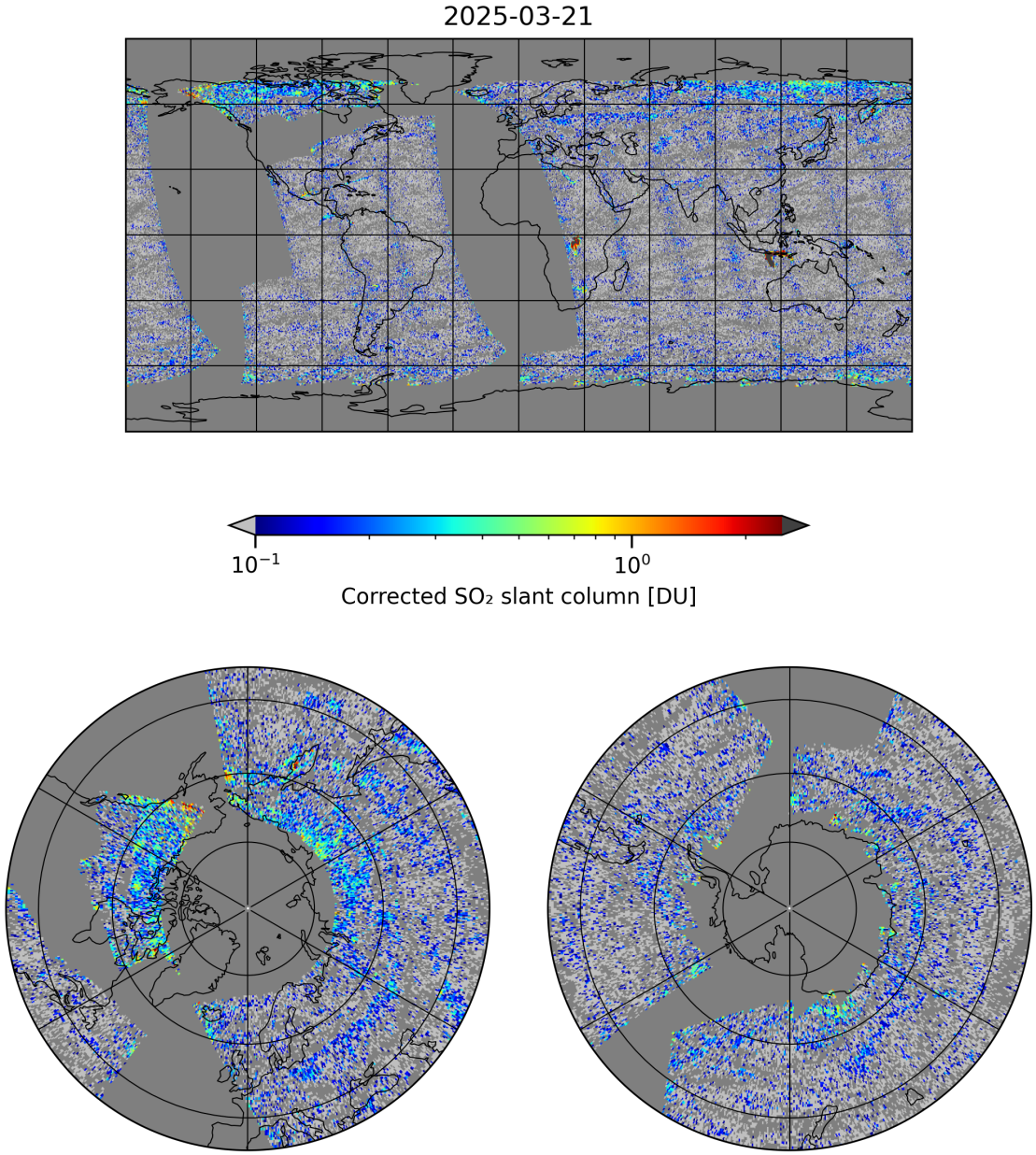

Figure 6: Map of “Corrected SO_2 slant column” for 2025-03-21 to 2025-03-21

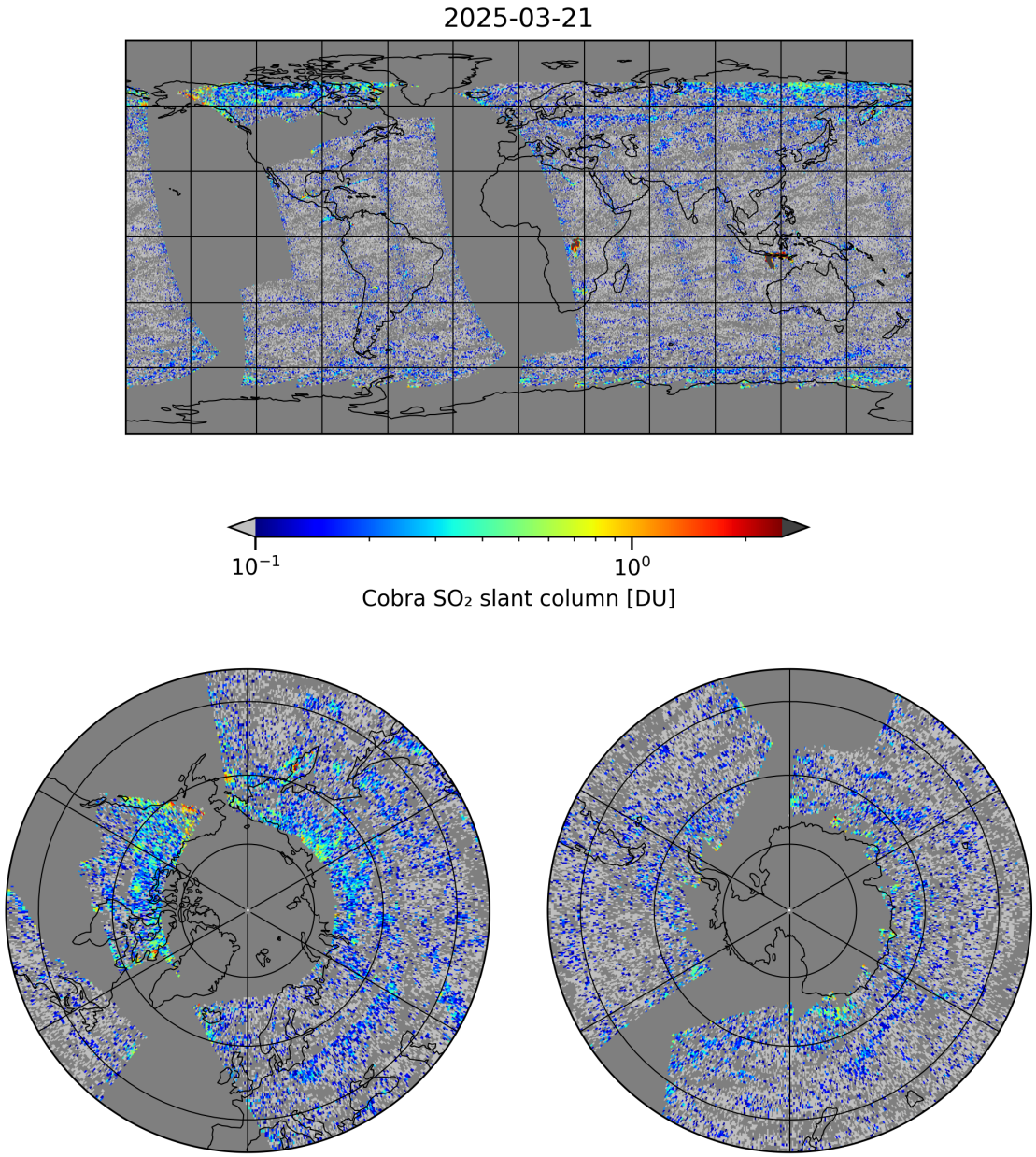

Figure 7: Map of "Cobra SO_2 slant column" for 2025-03-21 to 2025-03-21

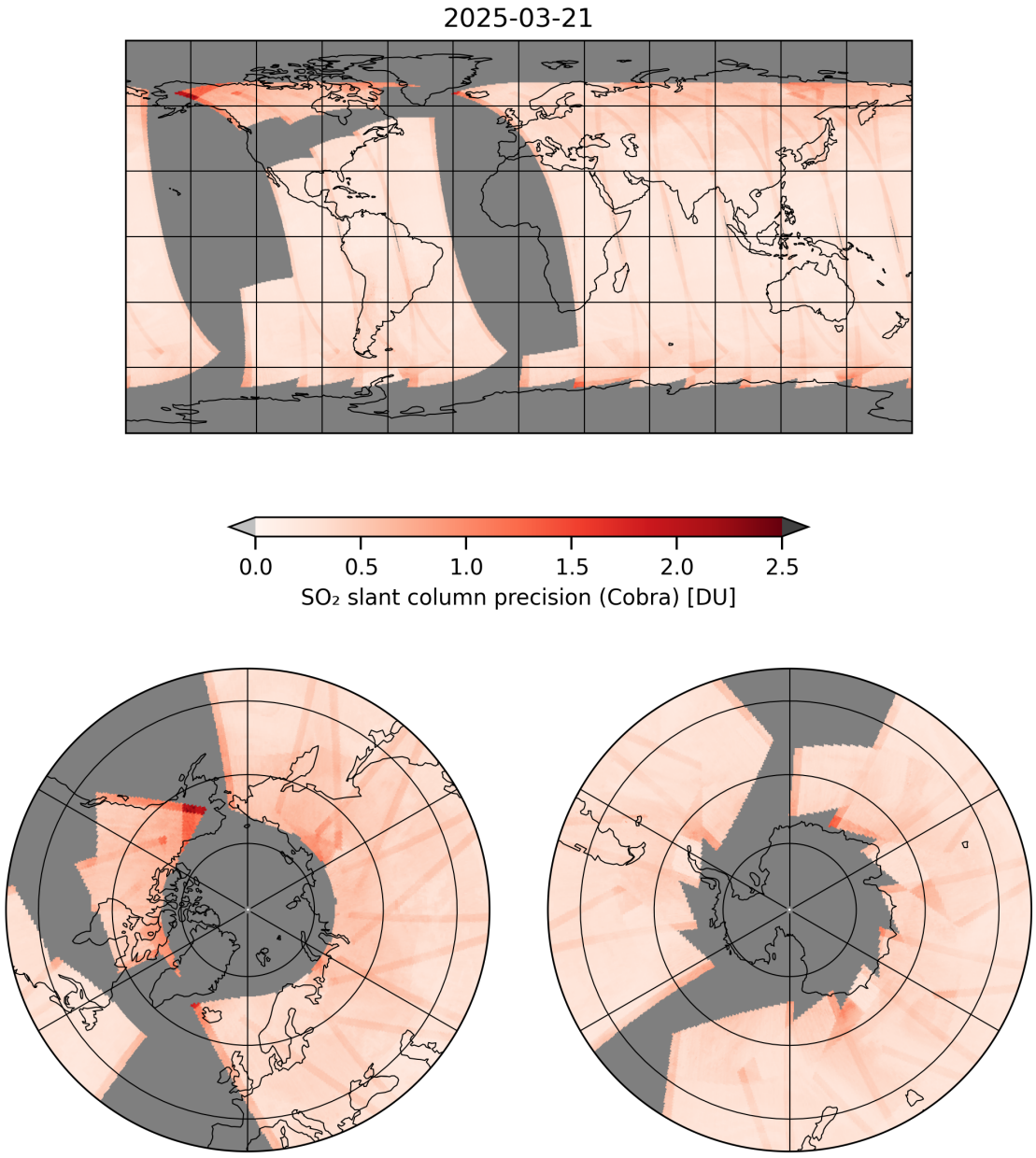

Figure 8: Map of "SO_2 slant column precision (Cobra)" for 2025-03-21 to 2025-03-21

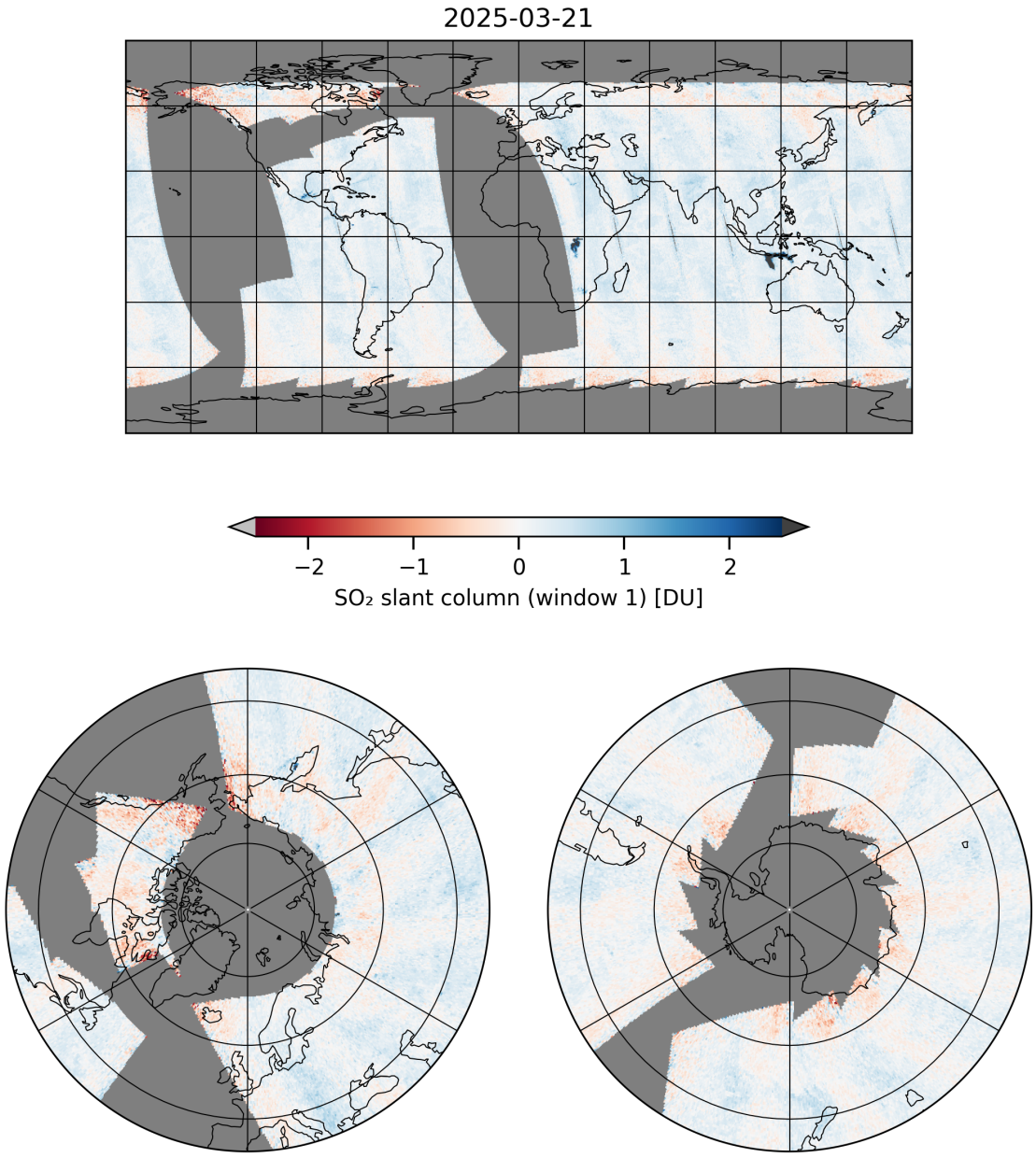

Figure 9: Map of "SO_2 slant column (window 1)" for 2025-03-21 to 2025-03-21

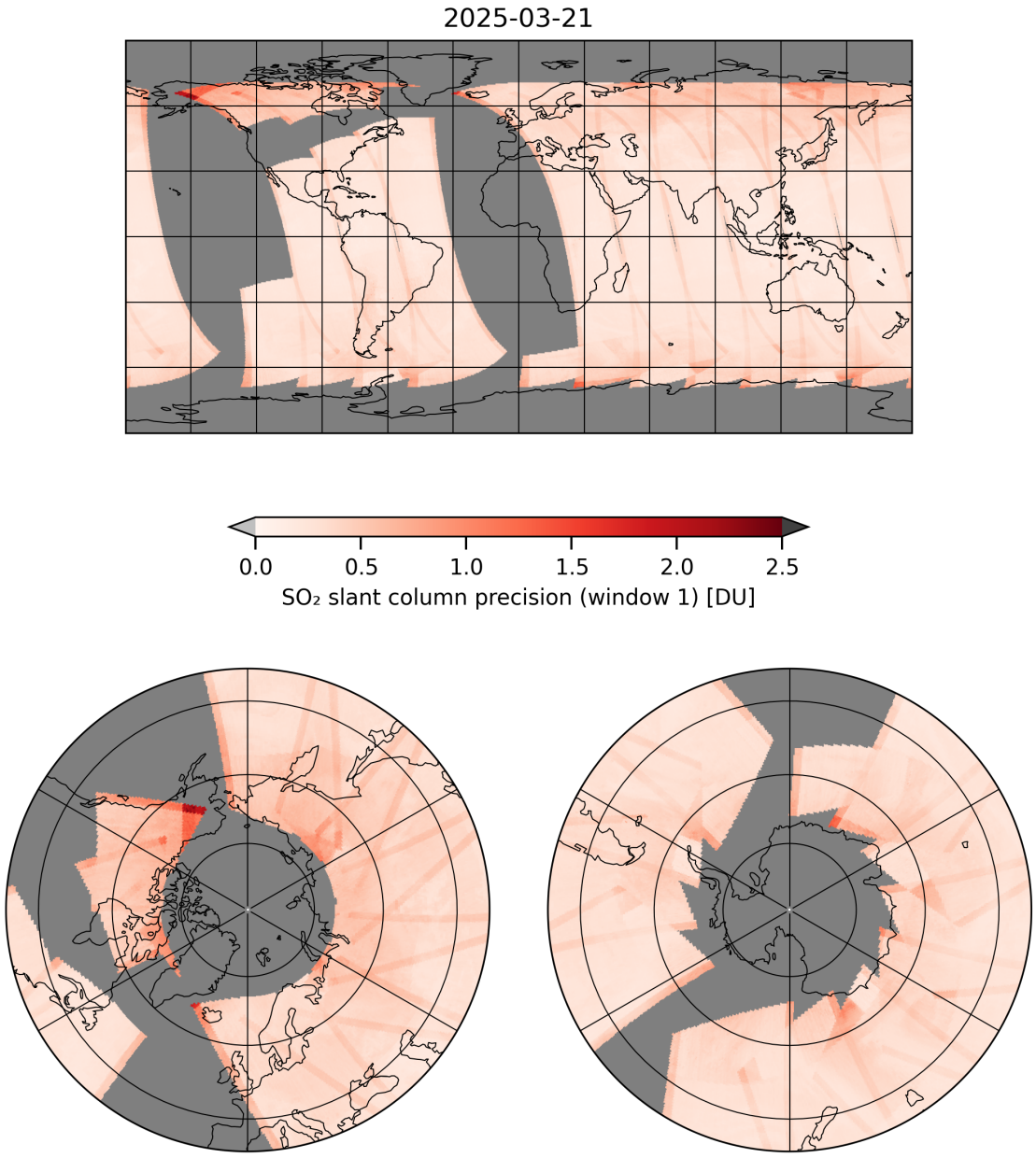

Figure 10: Map of "SO_2 slant column precision (window 1)" for 2025-03-21 to 2025-03-21

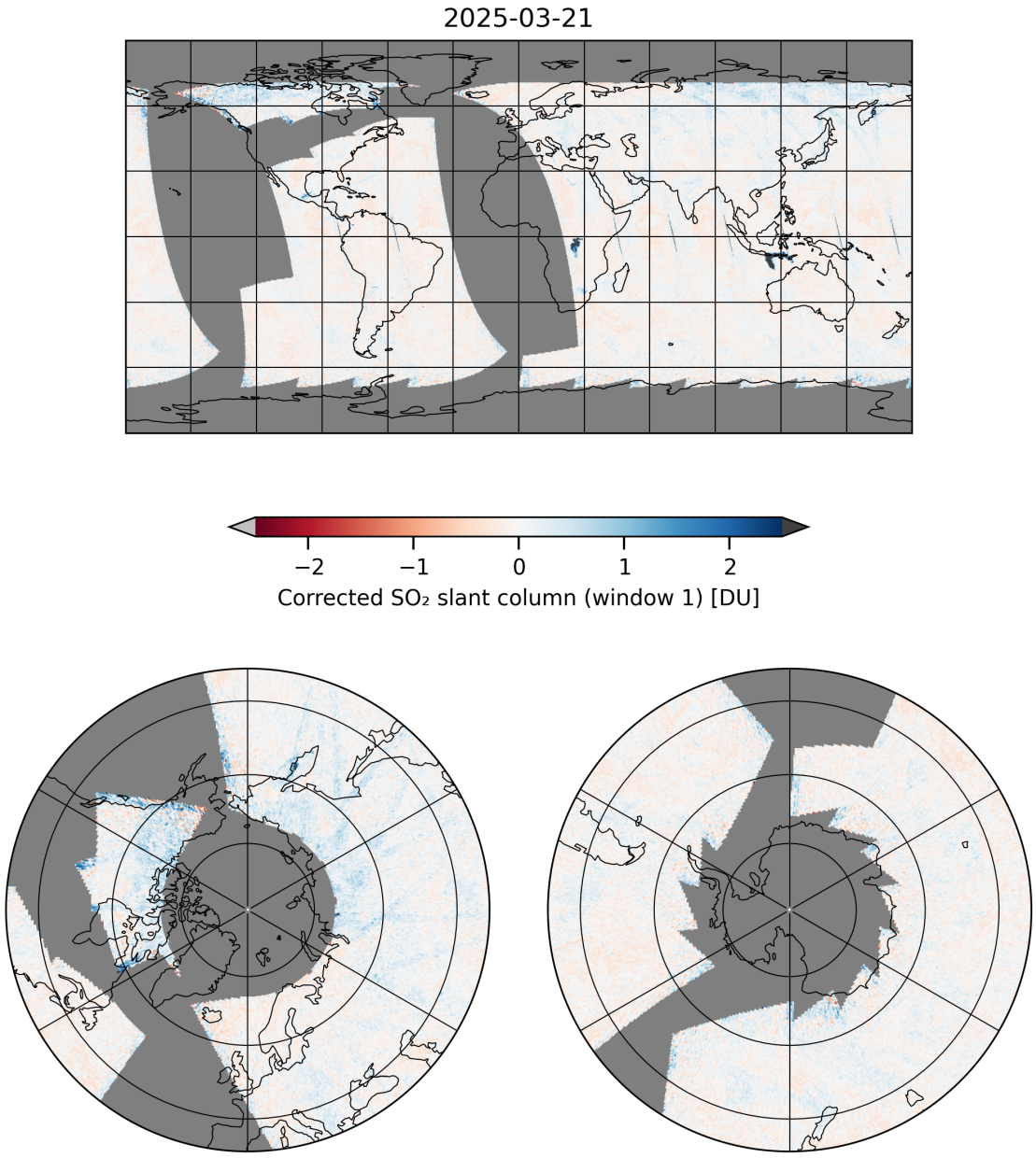

Figure 11: Map of “Corrected SO_2 slant column (window 1)” for 2025-03-21 to 2025-03-21

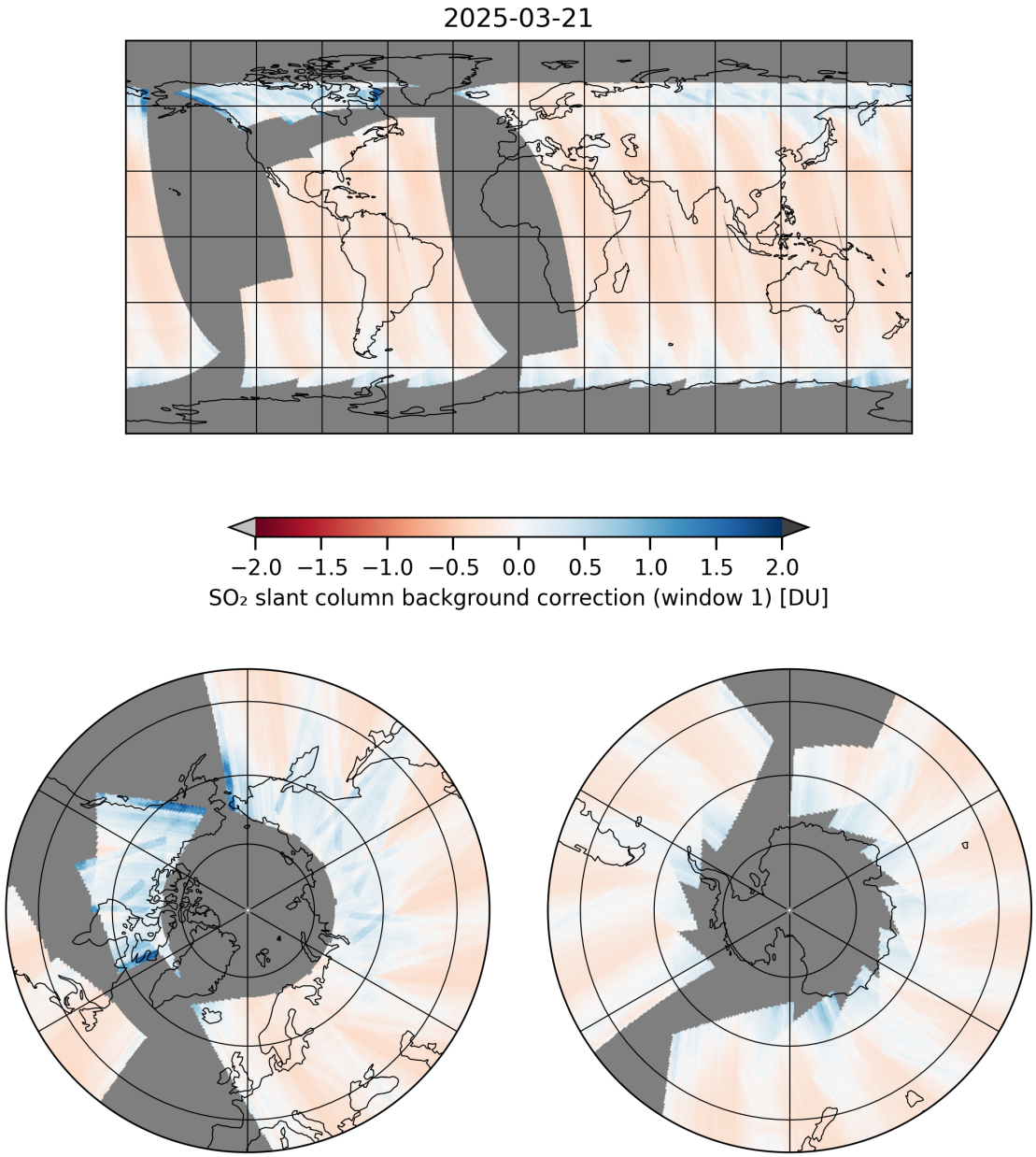

Figure 12: Map of "SO_2 slant column background correction (window 1)" for 2025-03-21 to 2025-03-21

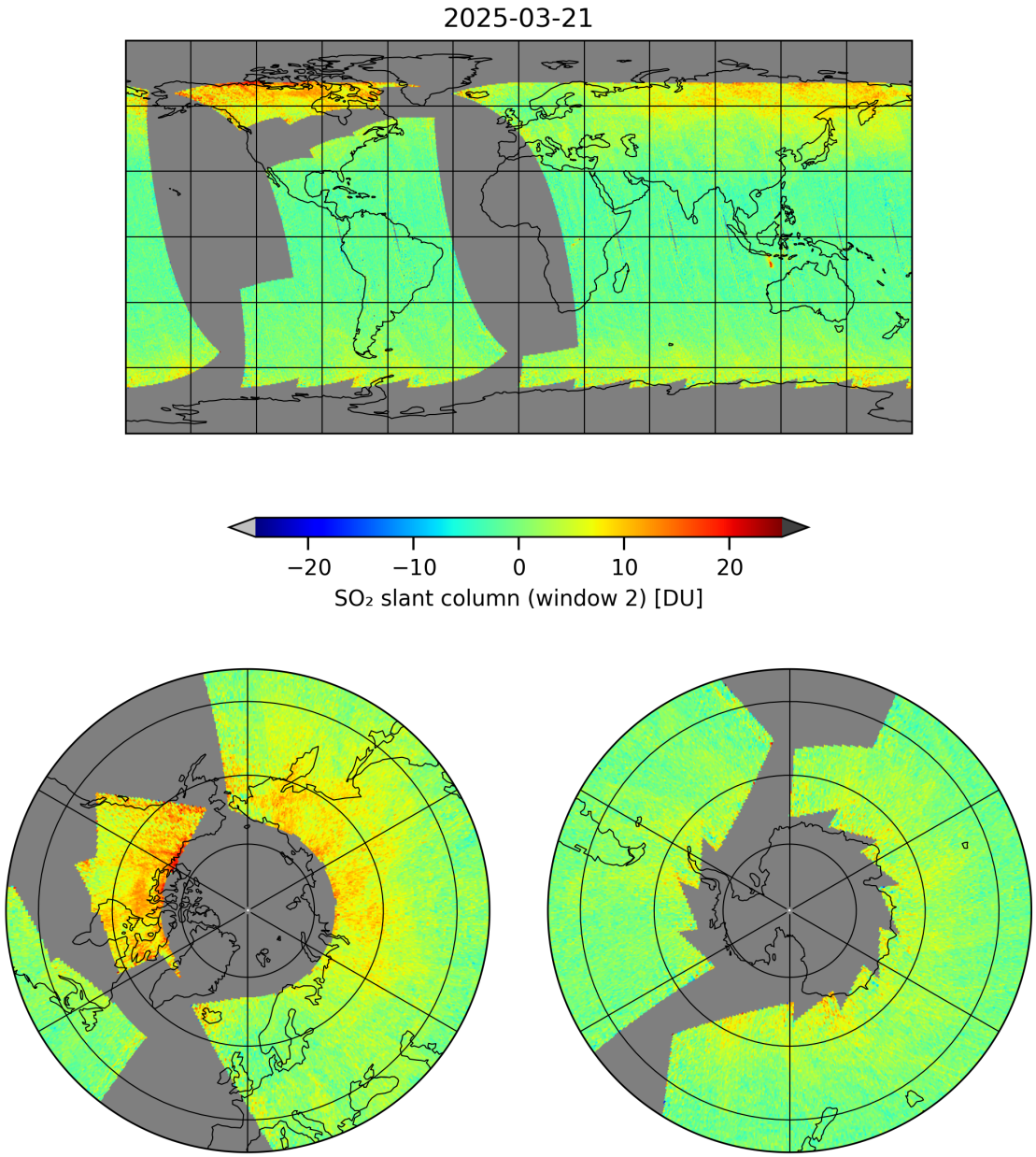

Figure 13: Map of "SO_2 slant column (window 2)" for 2025-03-21 to 2025-03-21

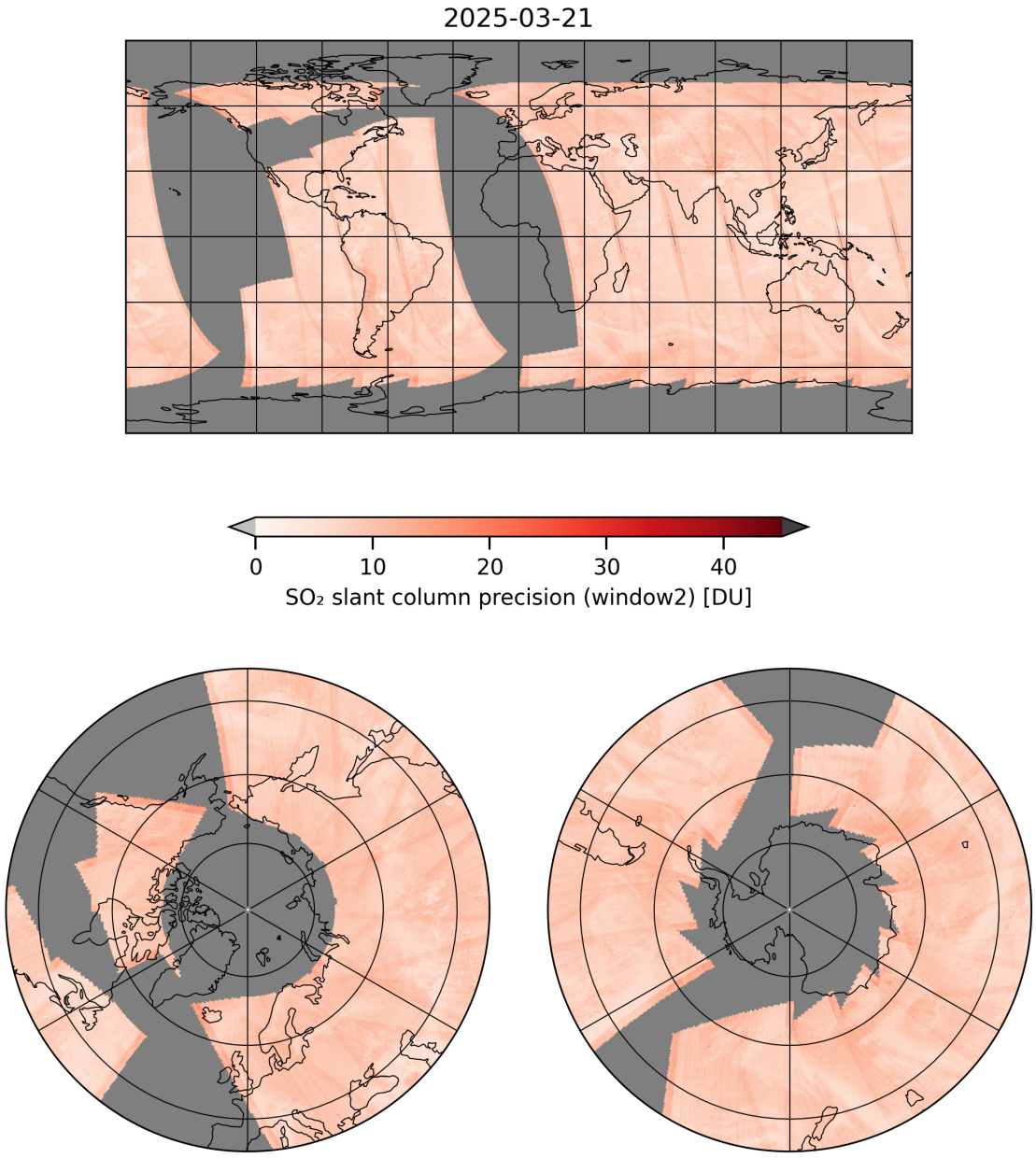

Figure 14: Map of "SO_2 slant column precision (window2)" for 2025-03-21 to 2025-03-21

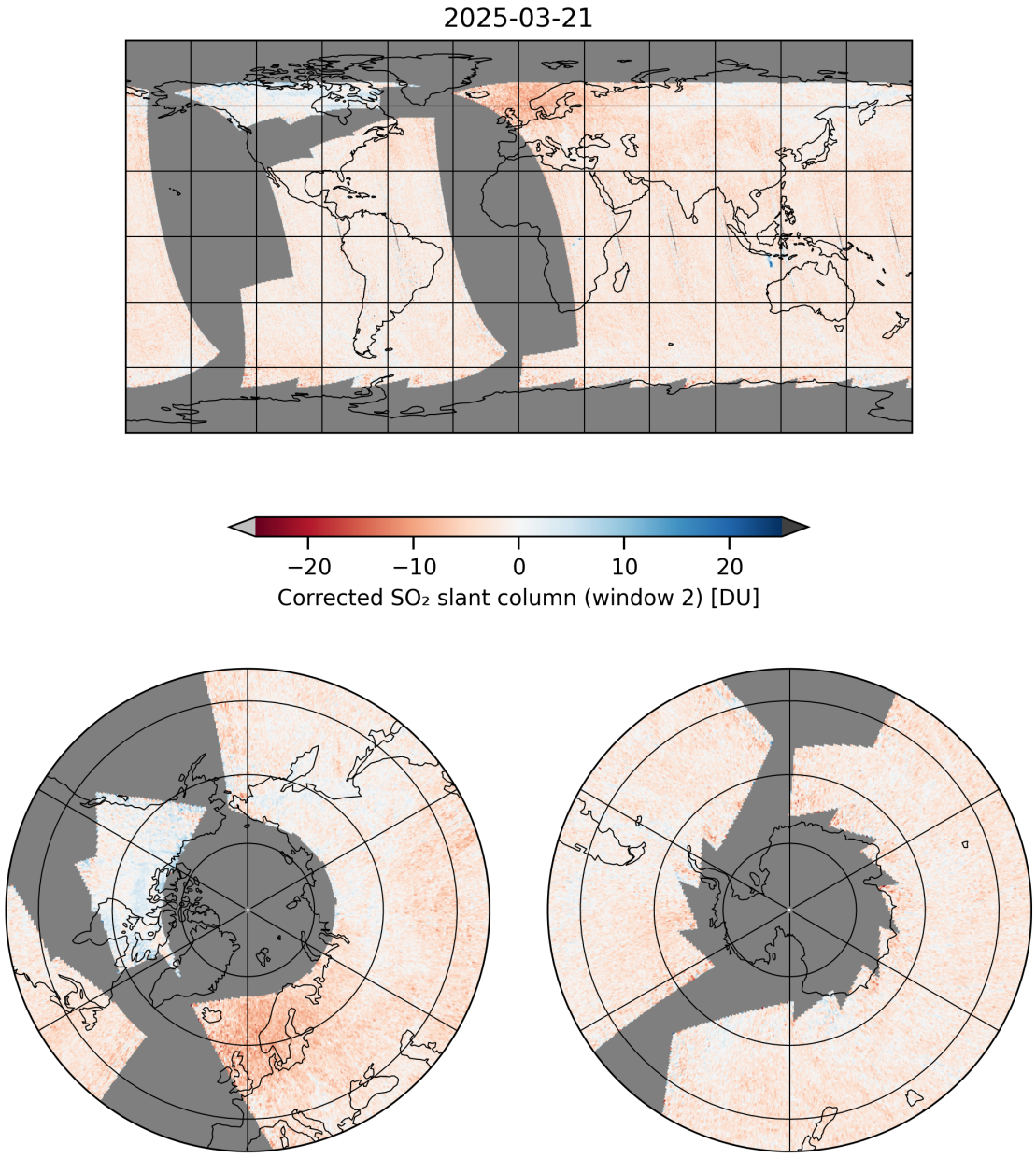

Figure 15: Map of “Corrected SO_2 slant column (window 2)” for 2025-03-21 to 2025-03-21

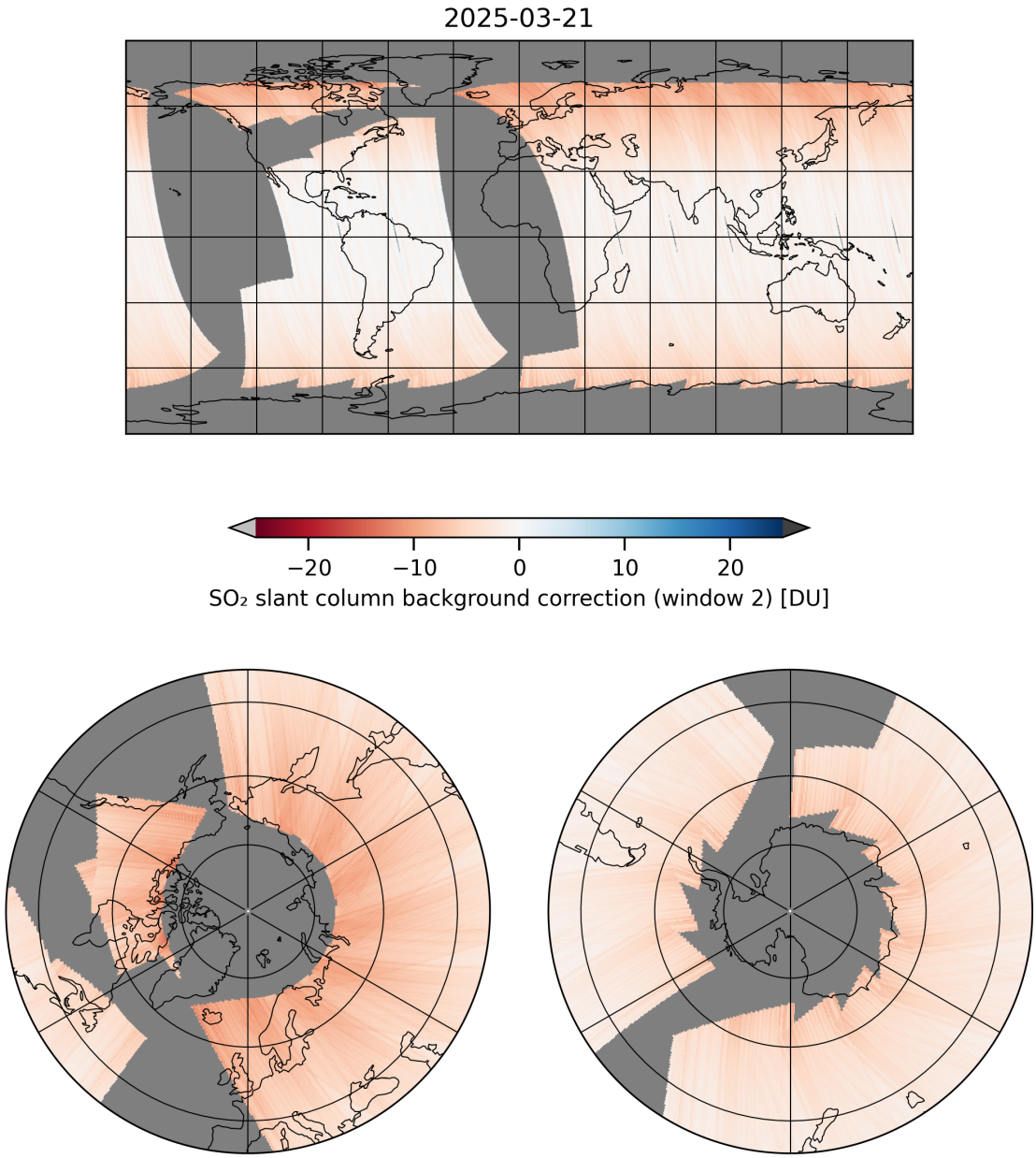

Figure 16: Map of "SO_2 slant column background correction (window 2)" for 2025-03-21 to 2025-03-21

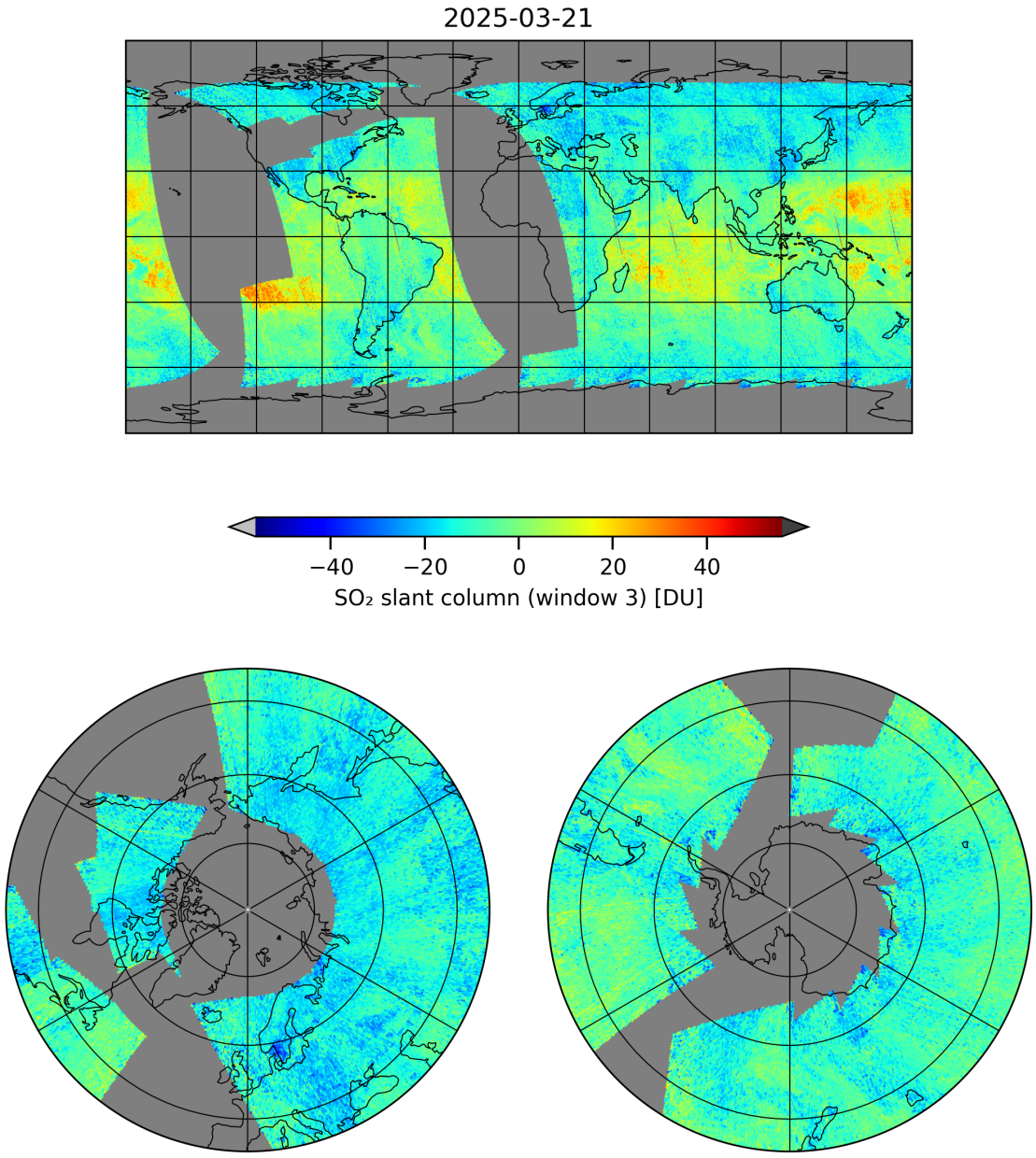

Figure 17: Map of "SO_2 slant column (window 3)" for 2025-03-21 to 2025-03-21

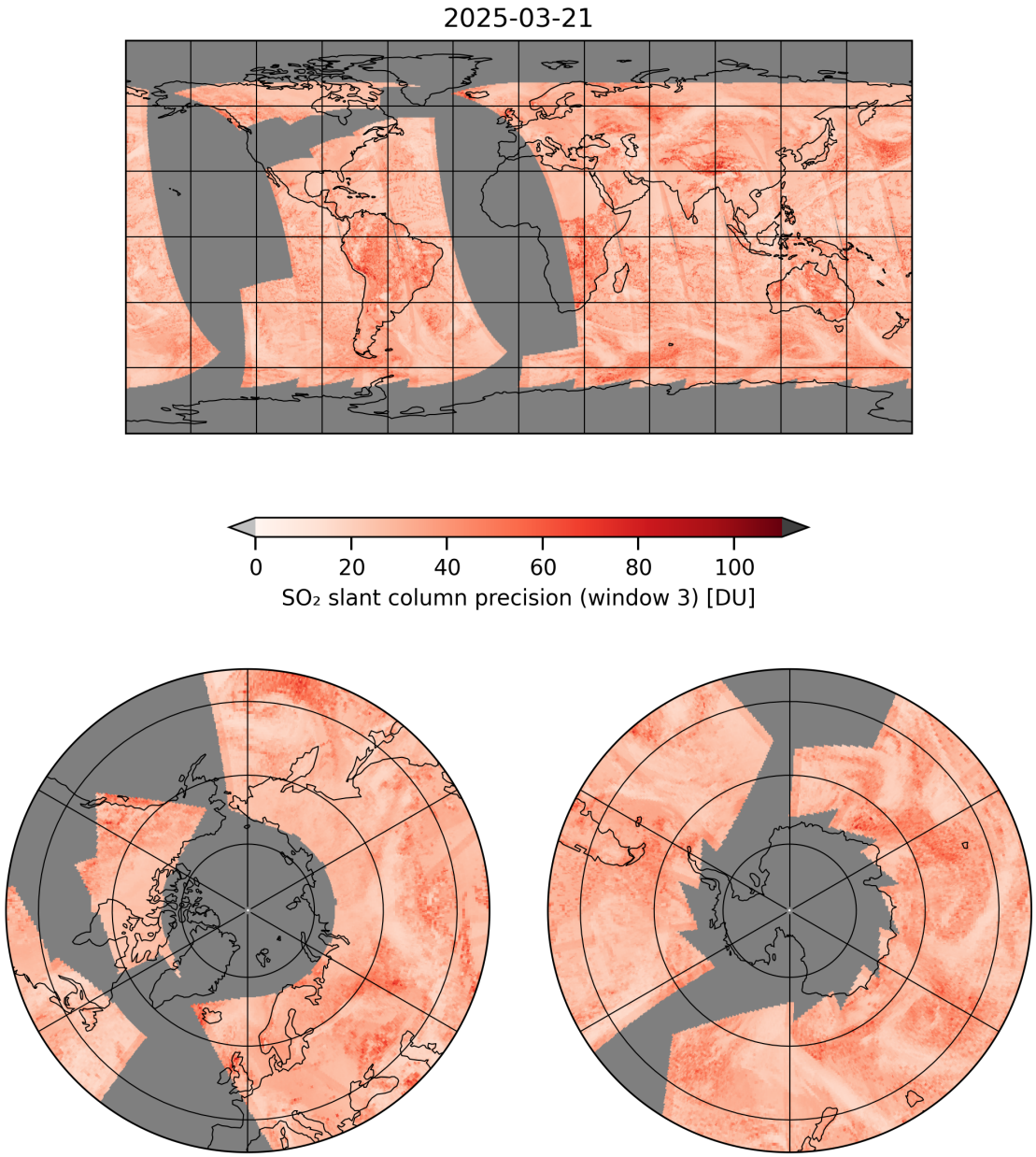

Figure 18: Map of "SO_2 slant column precision (window 3)" for 2025-03-21 to 2025-03-21

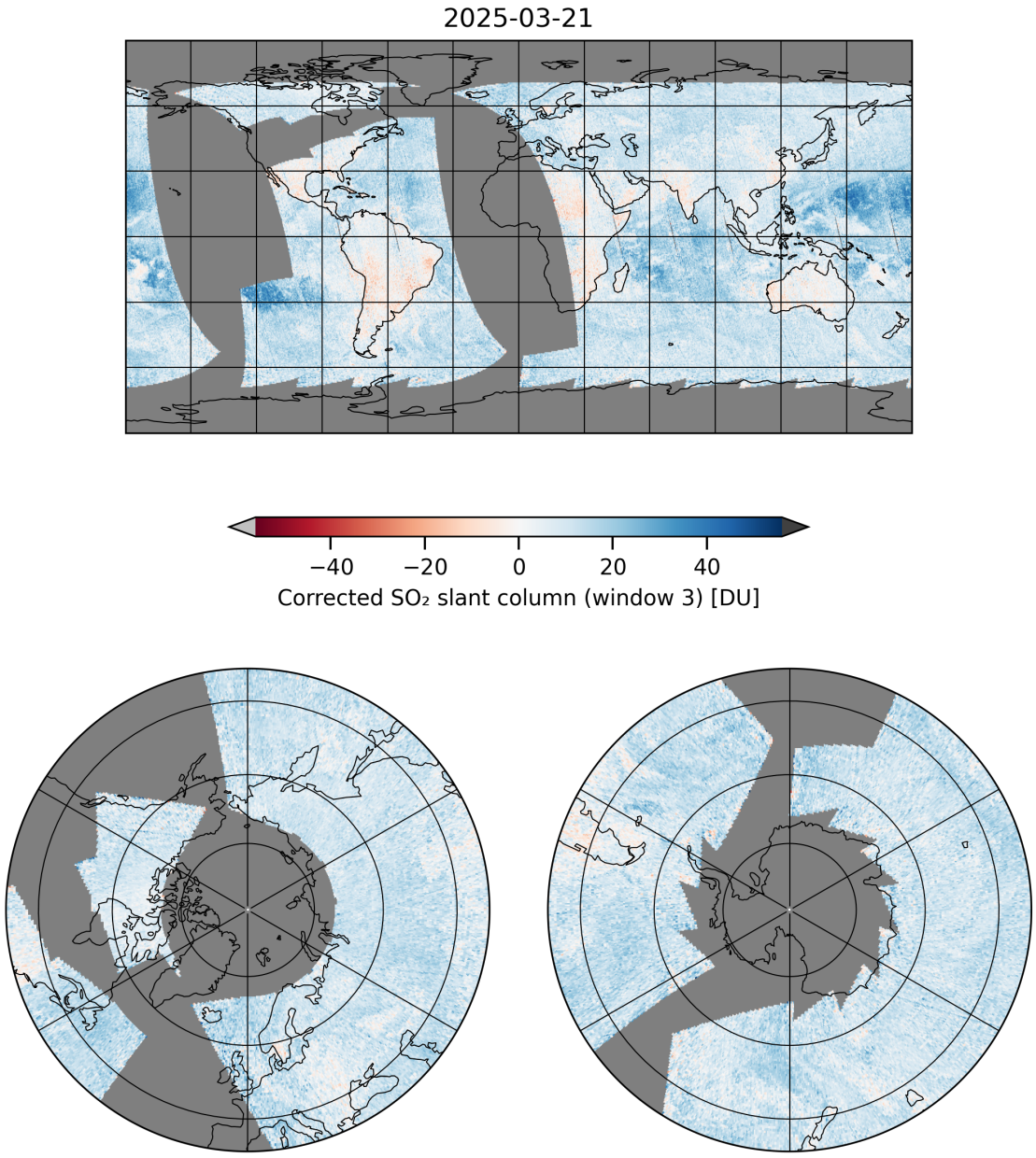

Figure 19: Map of "Corrected SO_2 slant column (window 3)" for 2025-03-21 to 2025-03-21

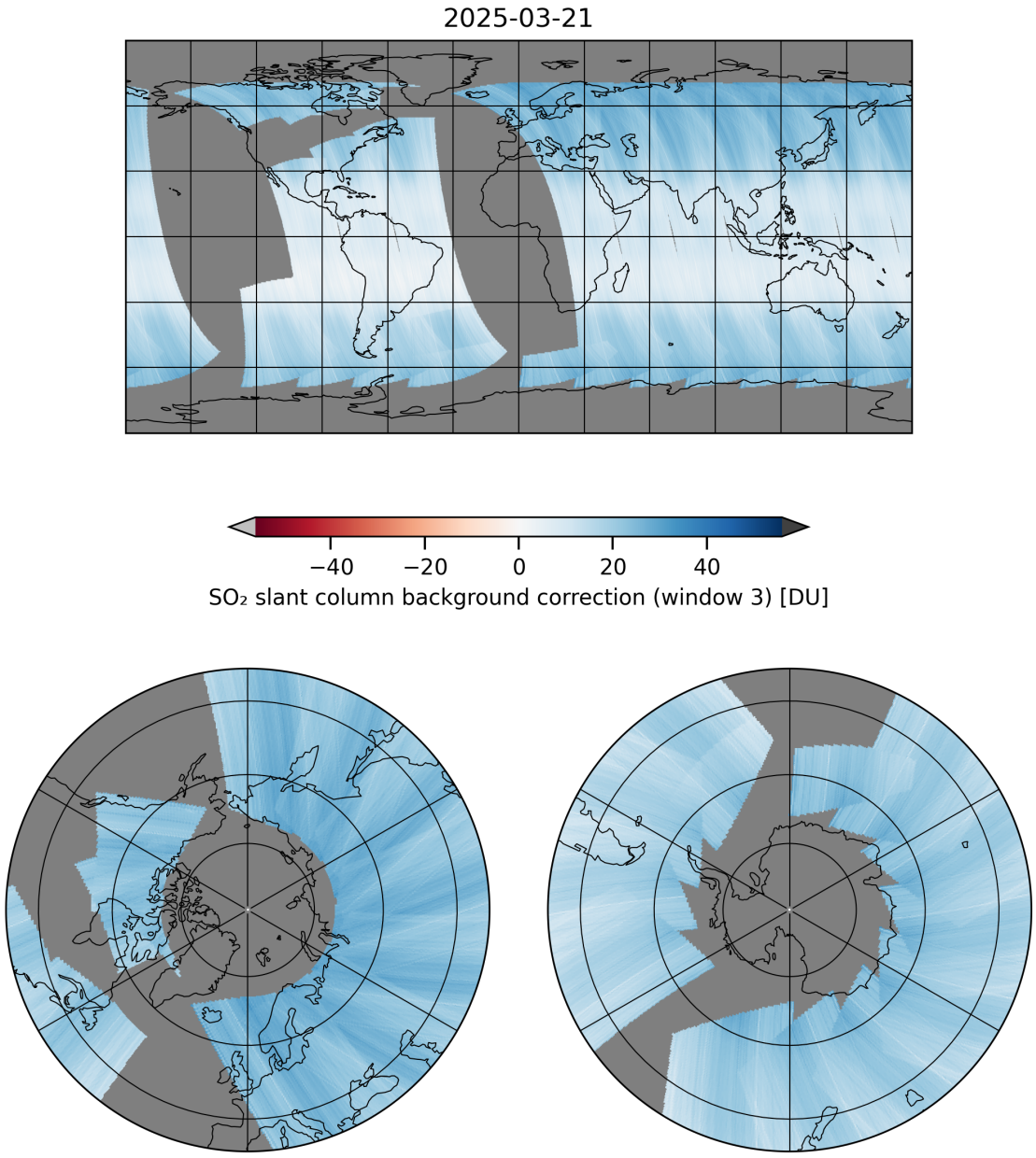

Figure 20: Map of "SO_2 slant column background correction (window 3)" for 2025-03-21 to 2025-03-21

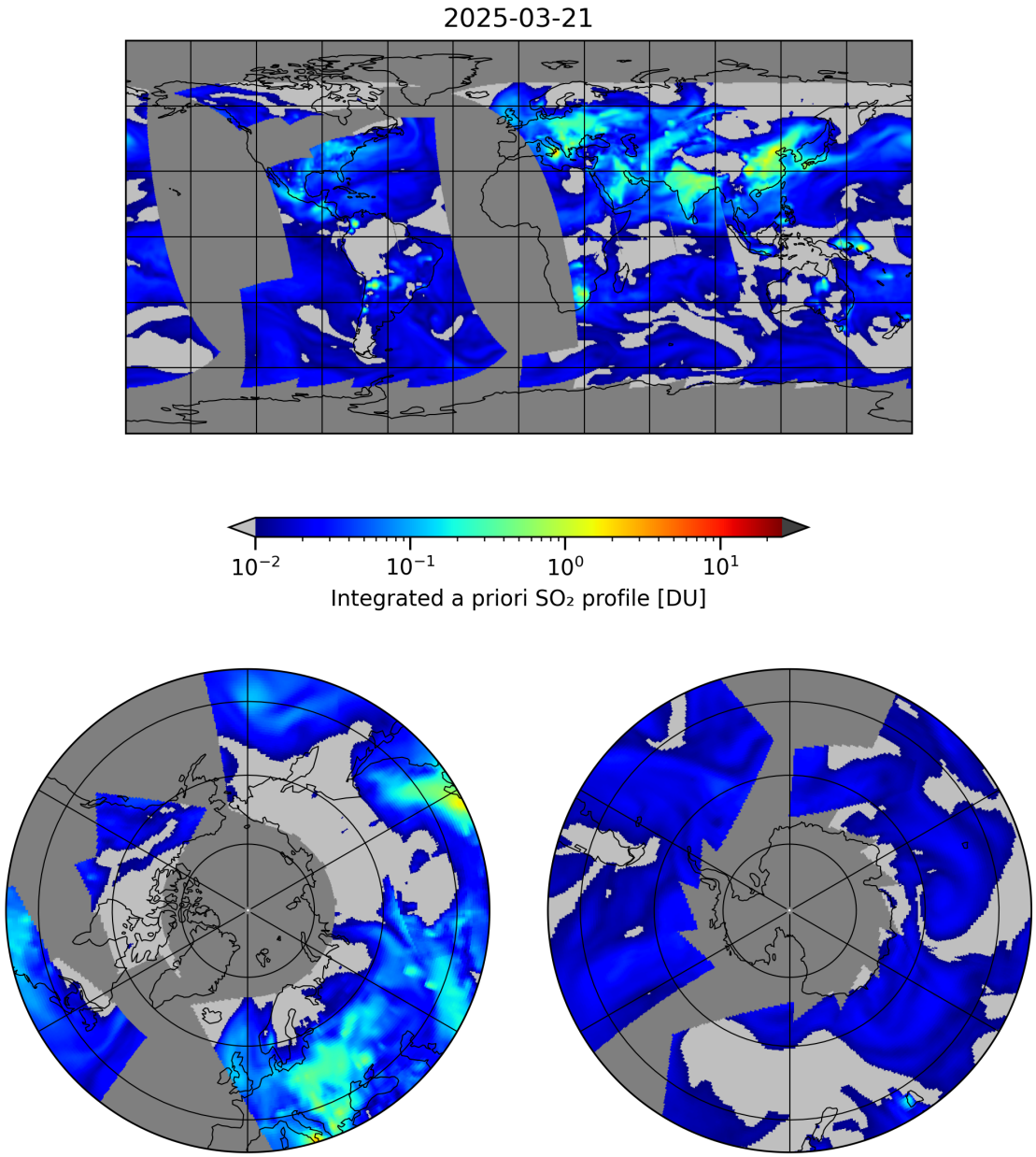

Figure 21: Map of “Integrated a priori SO_2 profile” for 2025-03-21 to 2025-03-21

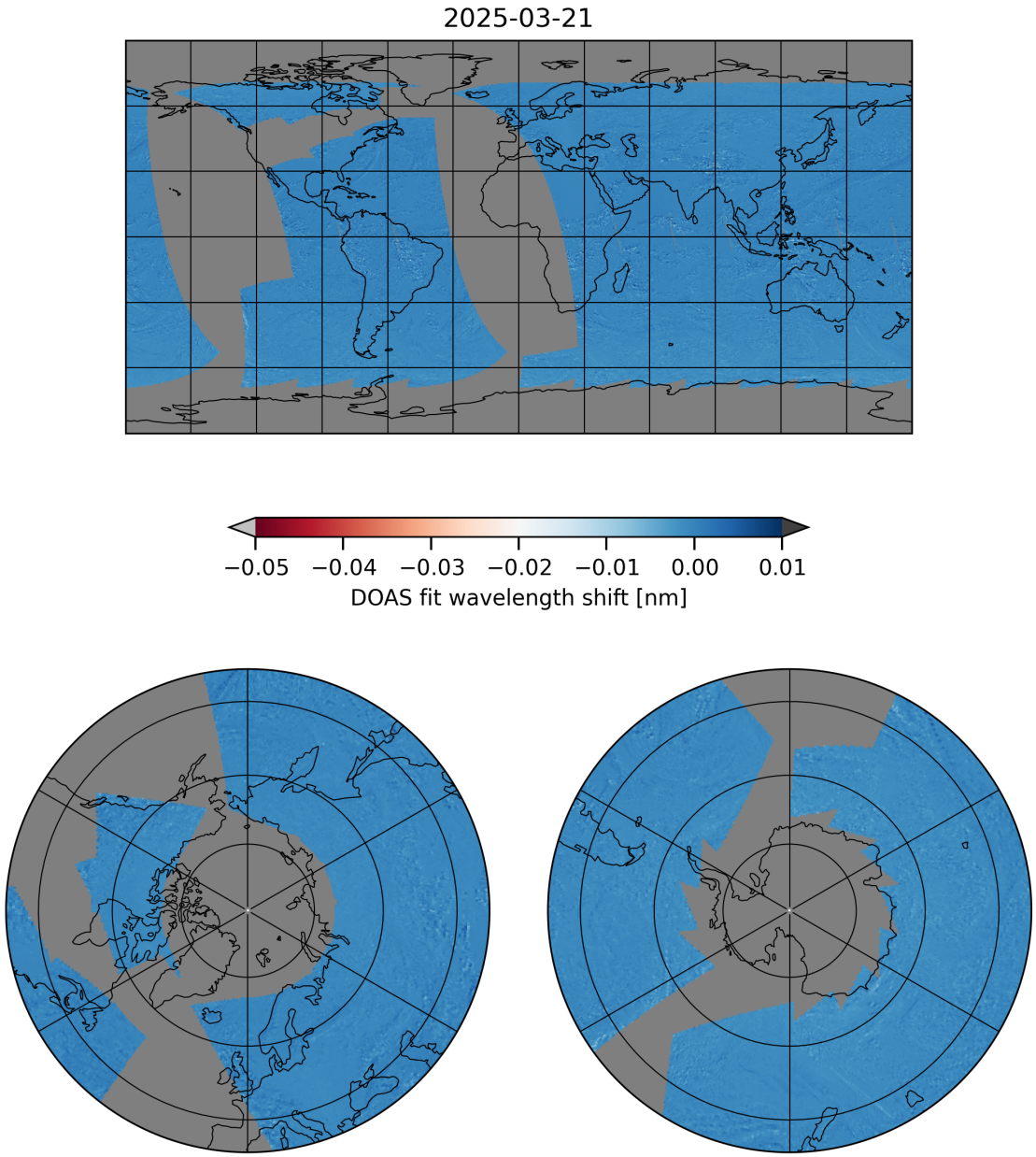

Figure 22: Map of “DOAS fit wavelength shift” for 2025-03-21 to 2025-03-21

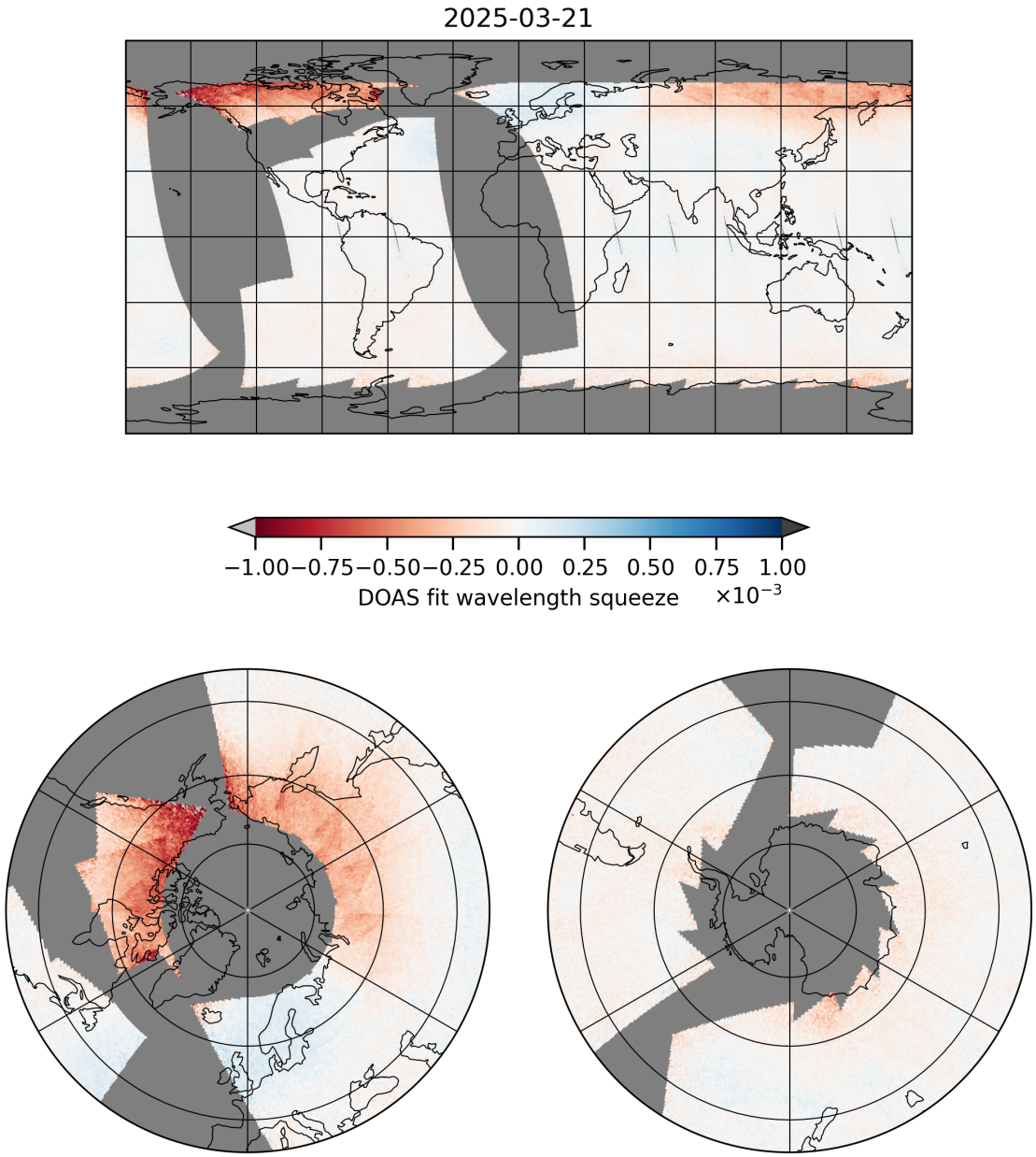

Figure 23: Map of “DOAS fit wavelength squeeze” for 2025-03-21 to 2025-03-21

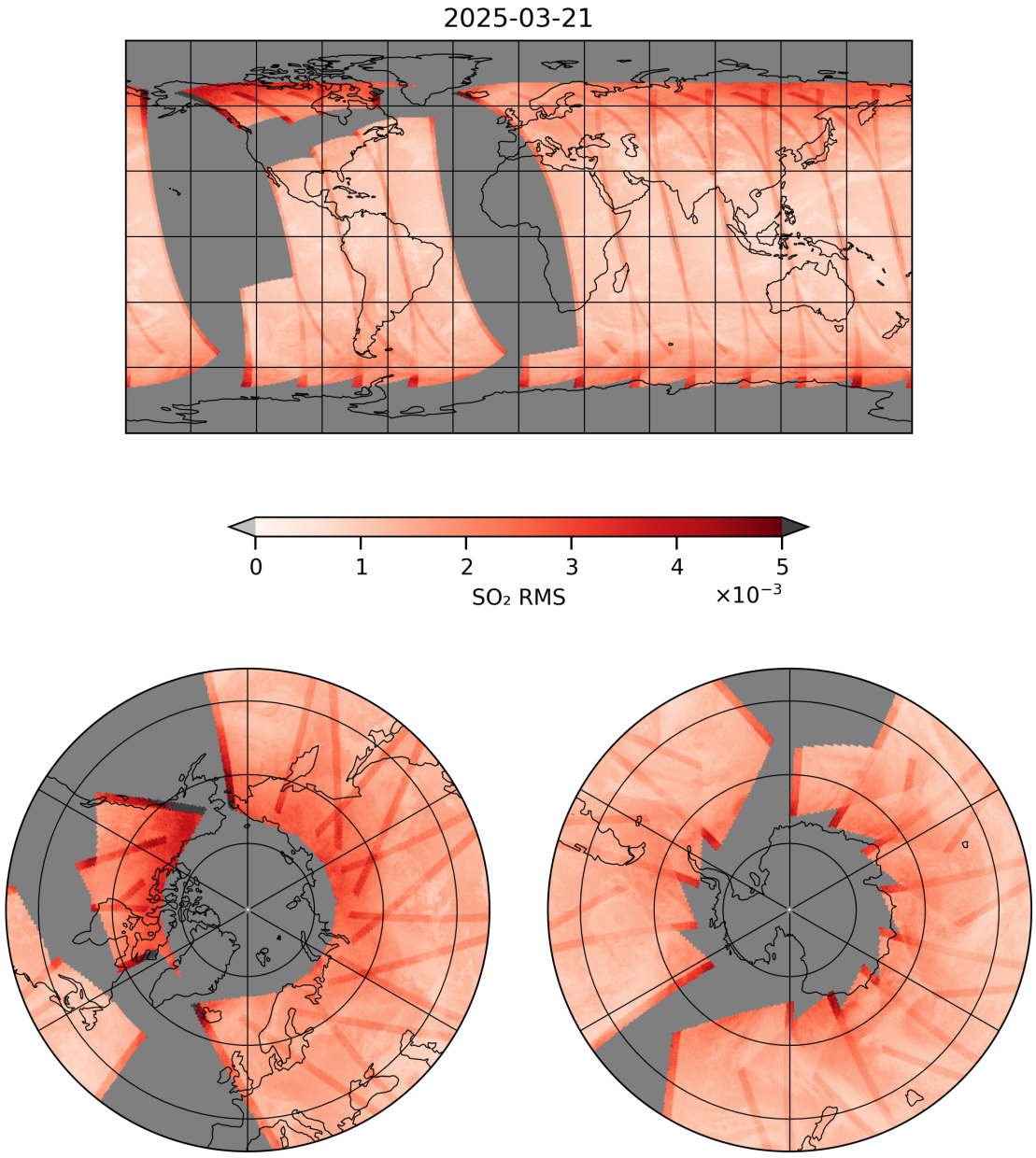

Figure 24: Map of "SO_2 RMS" for 2025-03-21 to 2025-03-21

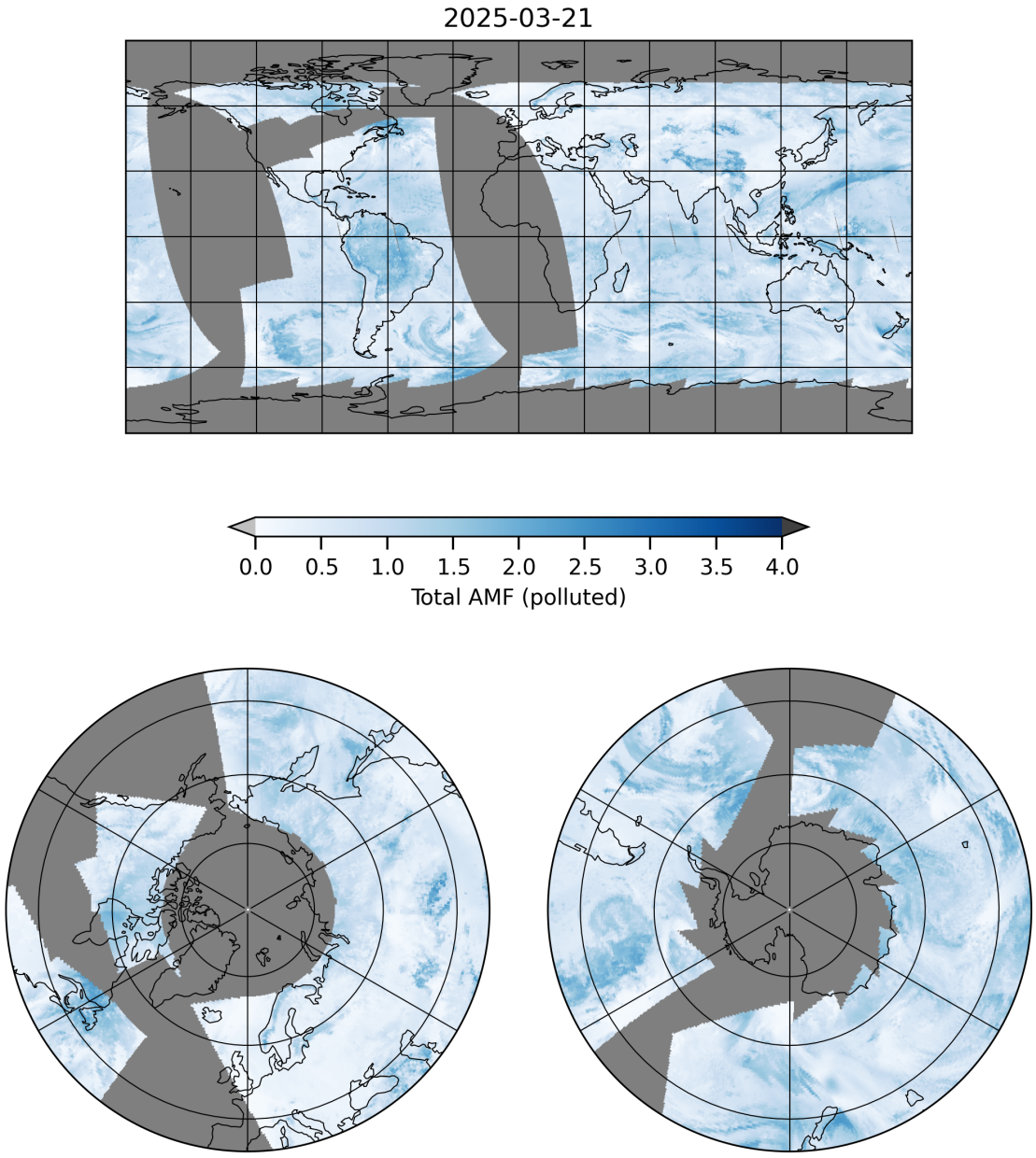

Figure 25: Map of “Total AMF (polluted)” for 2025-03-21 to 2025-03-21

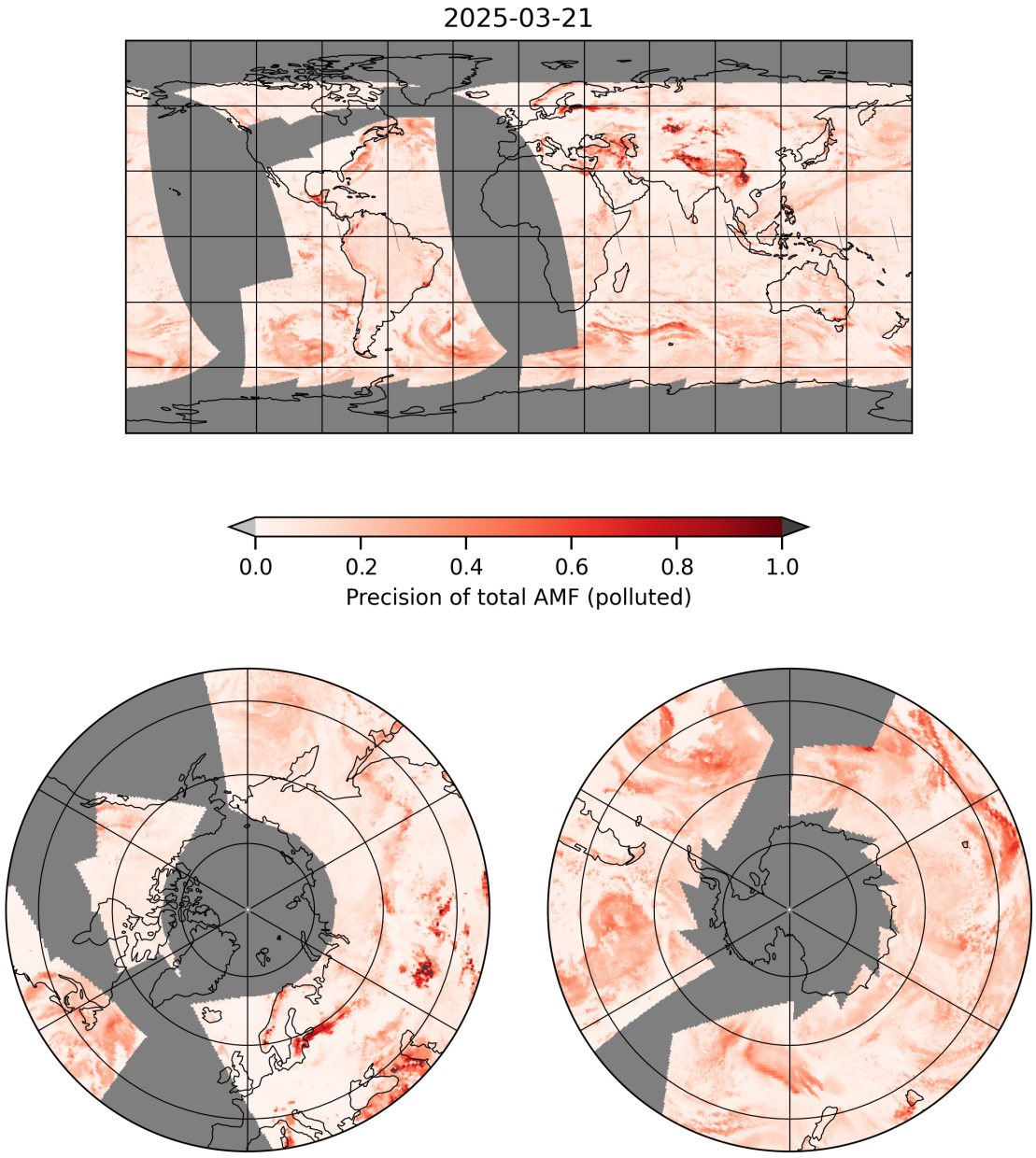

Figure 26: Map of “Precision of total AMF (polluted)” for 2025-03-21 to 2025-03-21

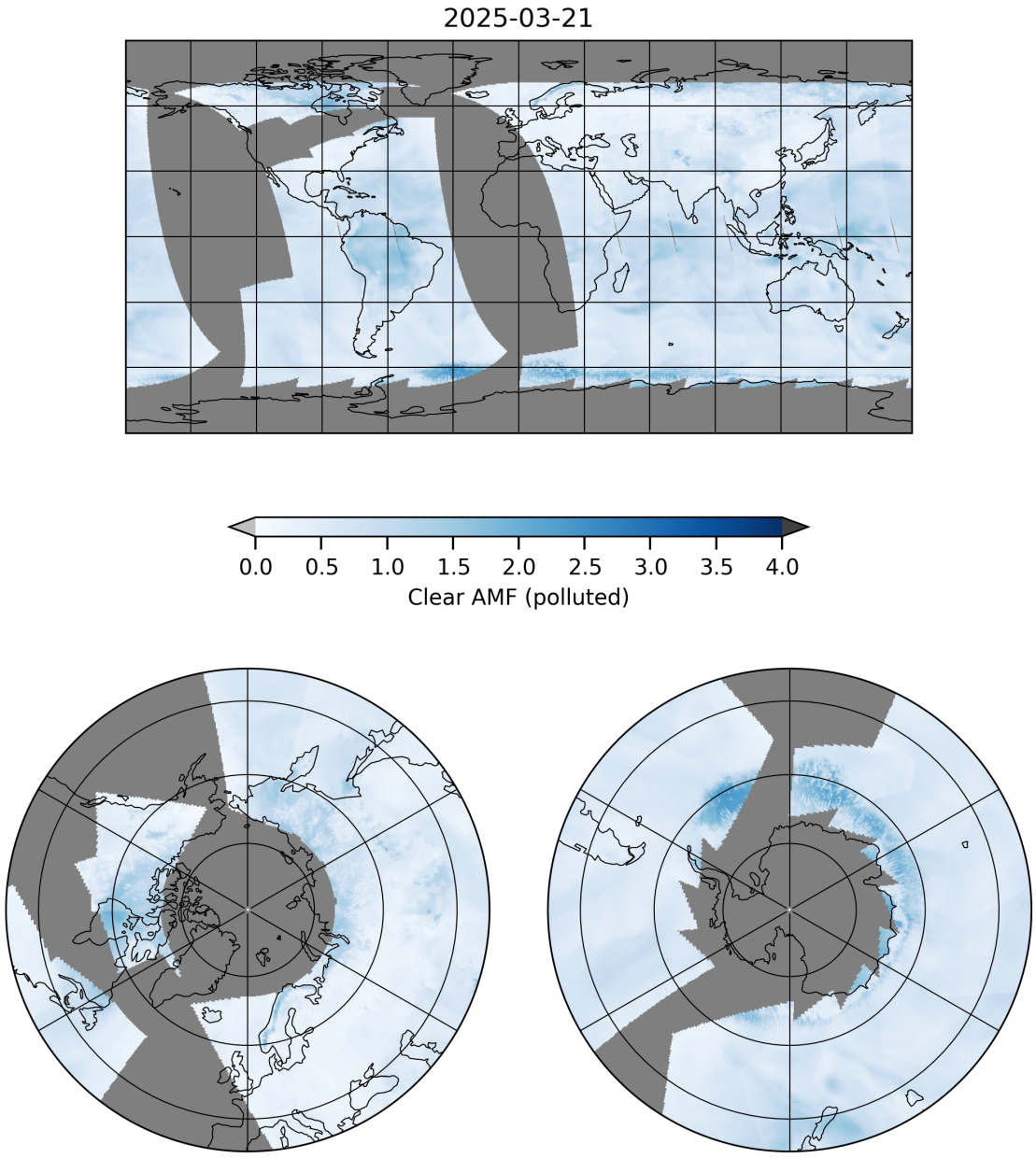

Figure 27: Map of “Clear AMF (polluted)” for 2025-03-21 to 2025-03-21

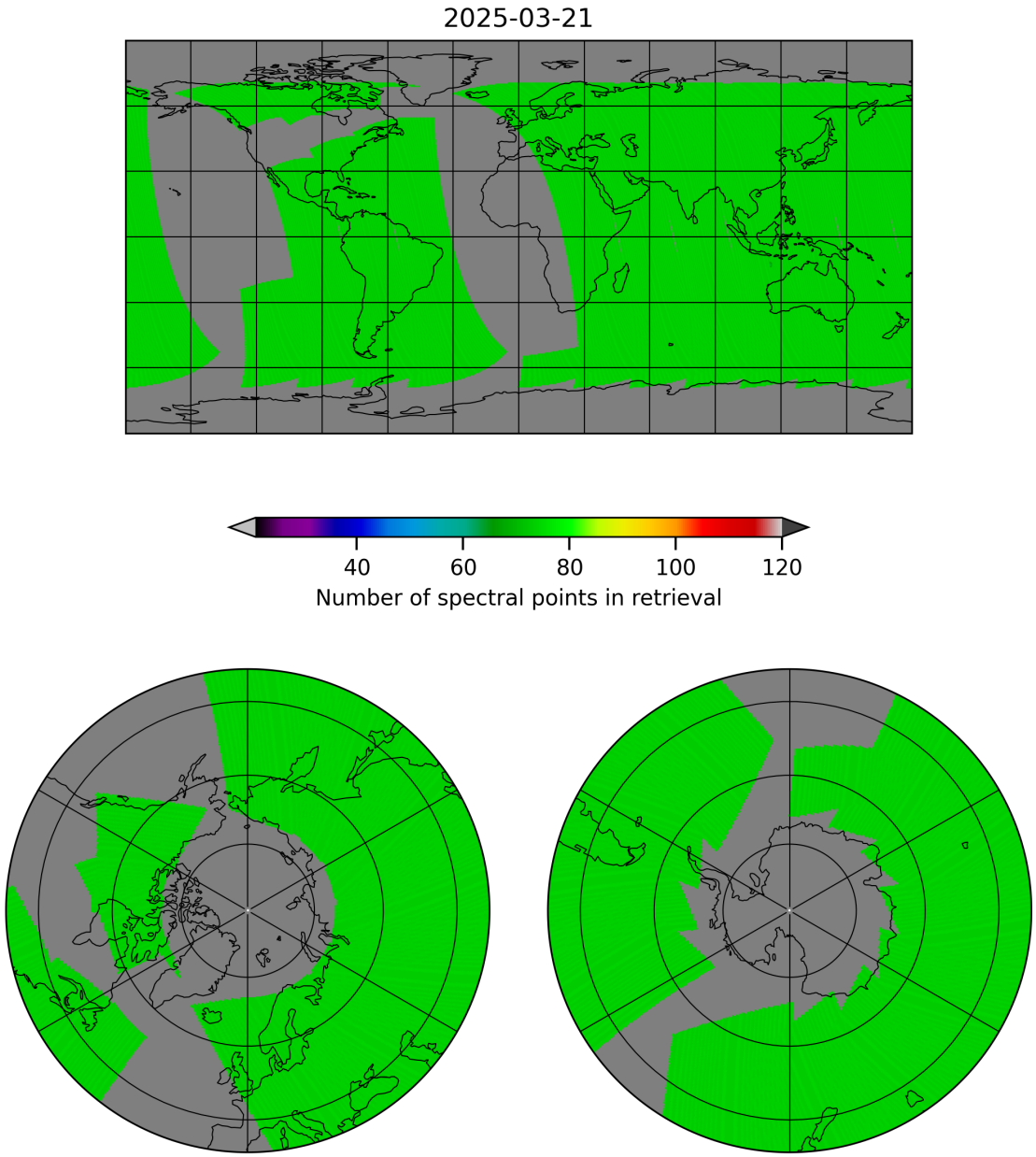

Figure 28: Map of “Number of spectral points in retrieval” for 2025-03-21 to 2025-03-21

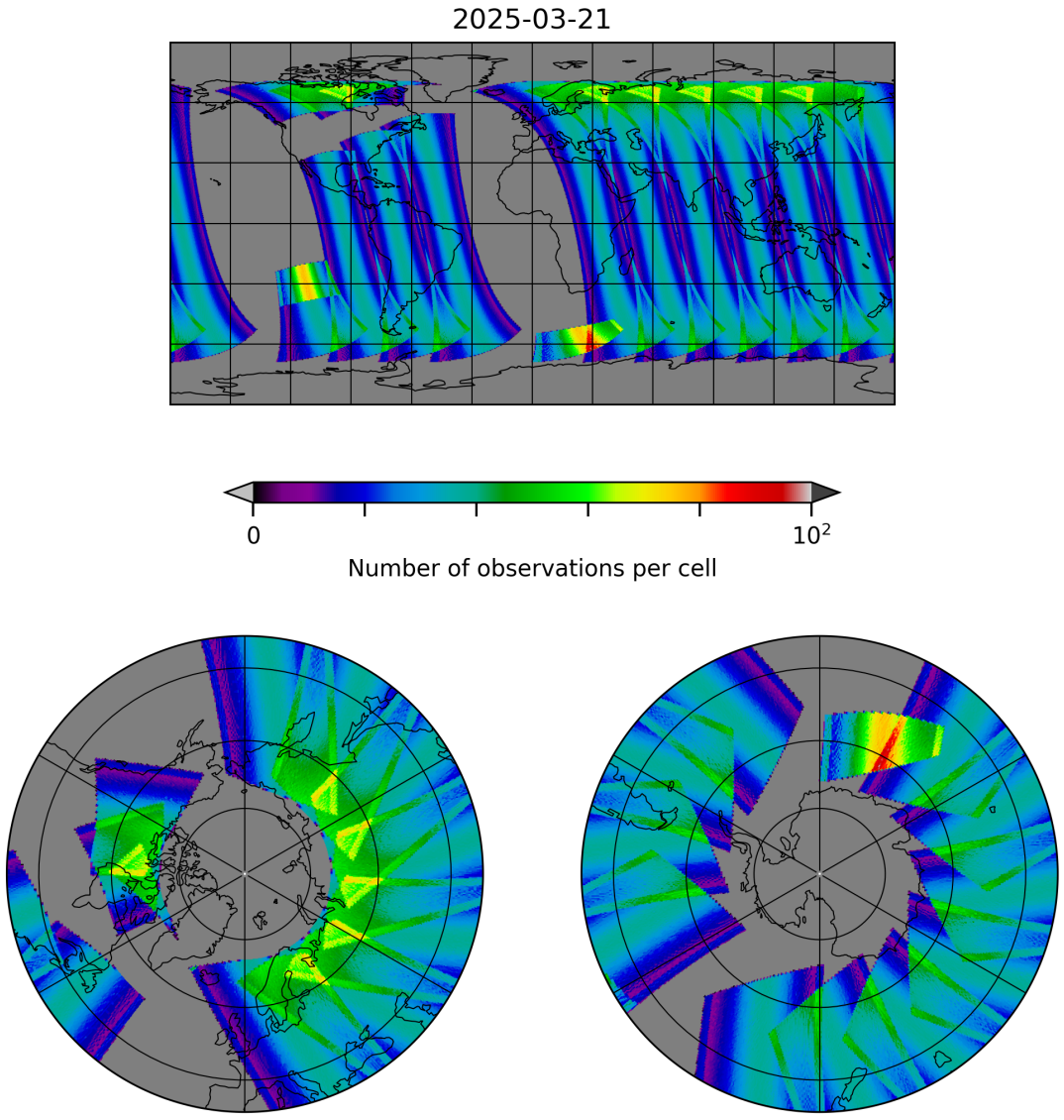

Figure 29: Map of the number of observations for 2025-03-21 to 2025-03-21

7 Zonal average

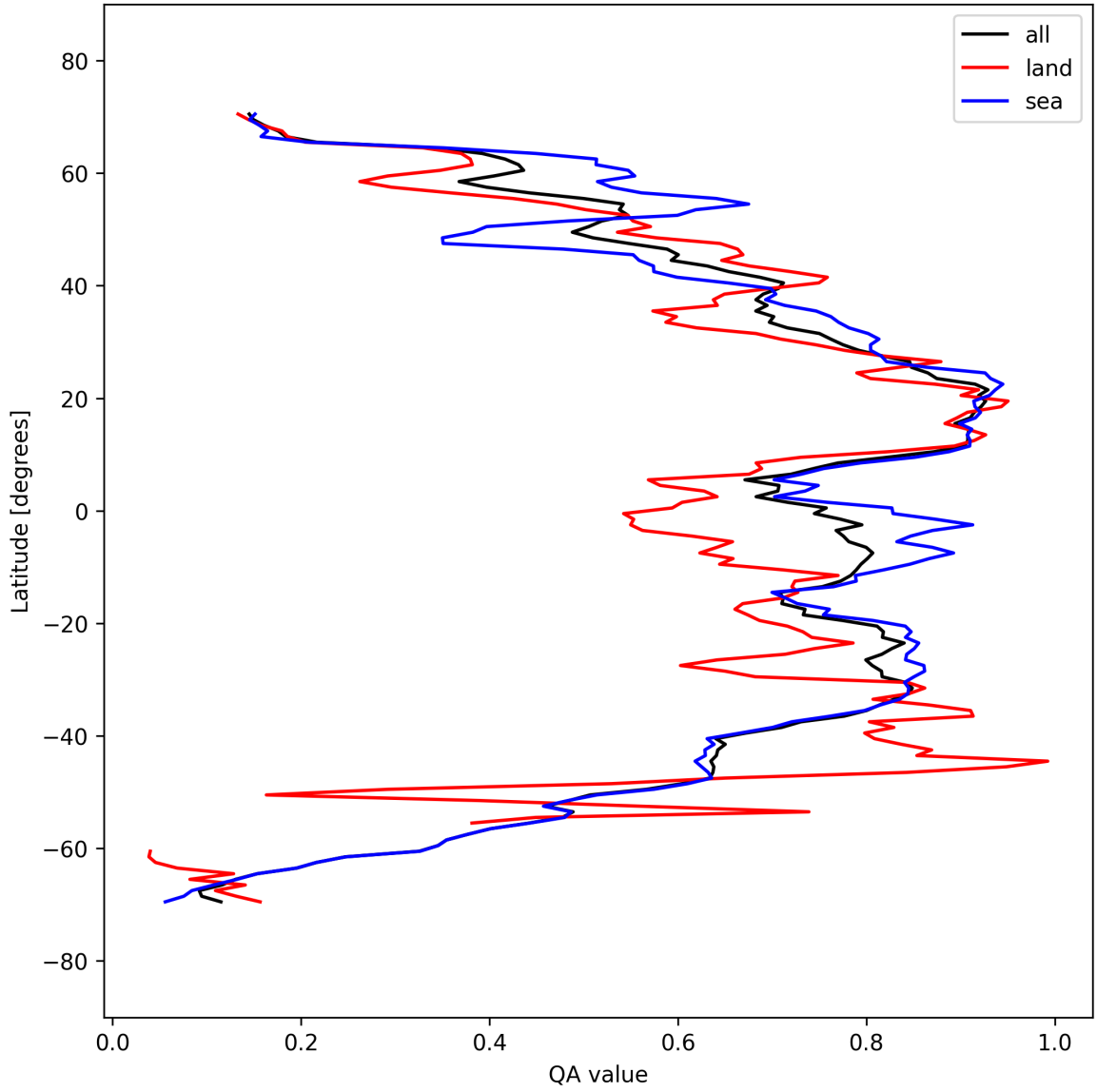

Figure 30: Zonal average of “QA value” for 2025-03-21 to 2025-03-21.

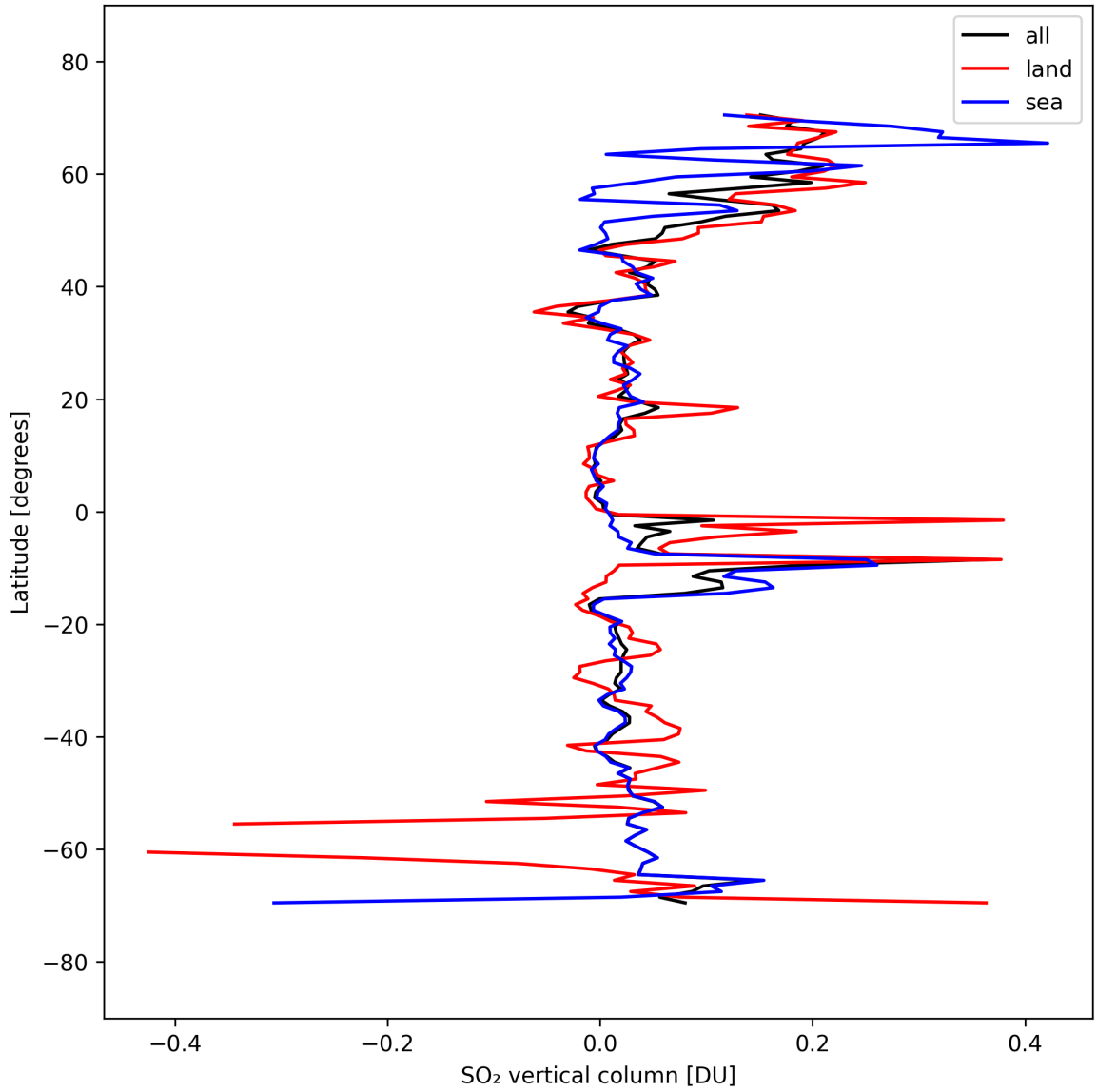

Figure 31: Zonal average of "SO_2 vertical column" for 2025-03-21 to 2025-03-21.

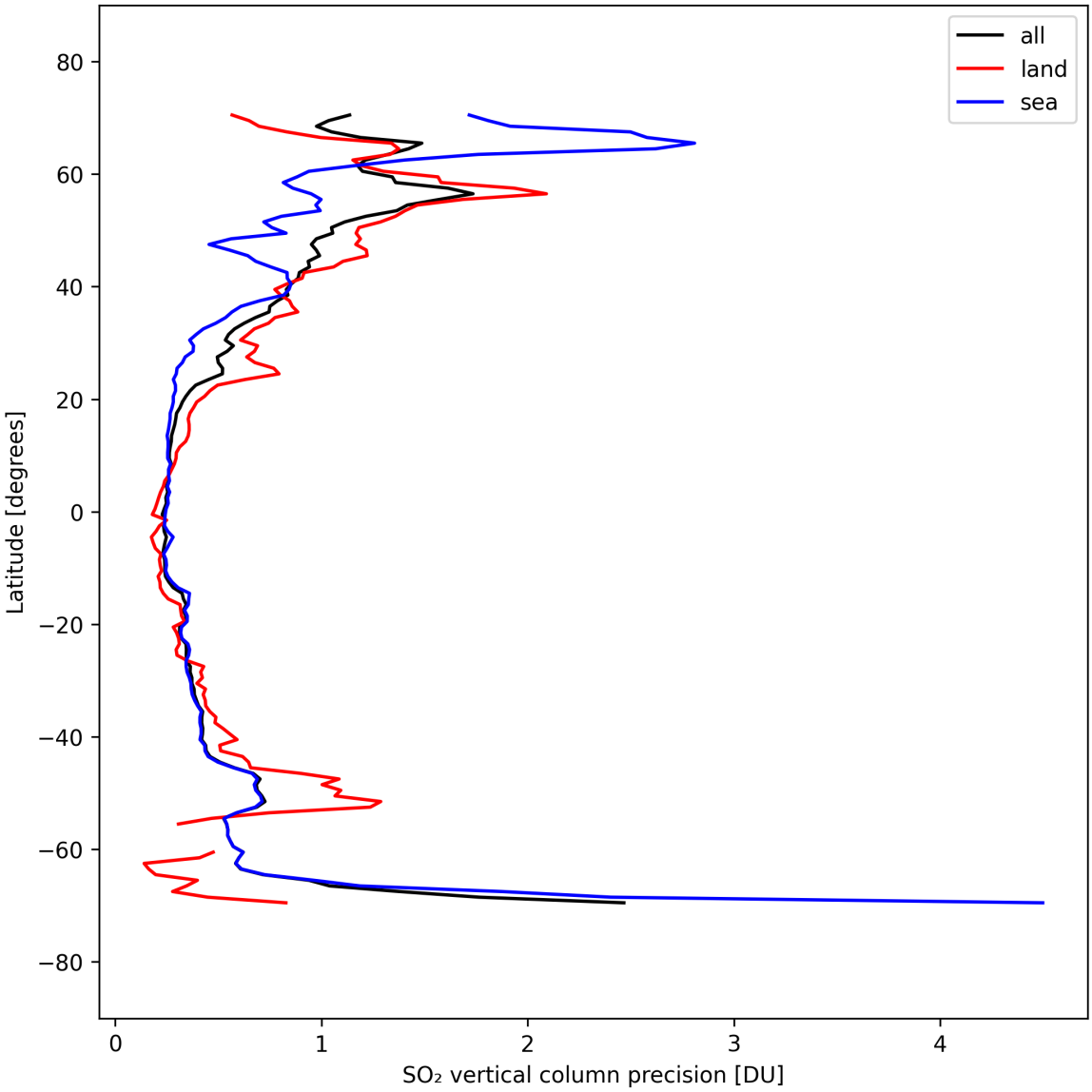

Figure 32: Zonal average of "SO_2 vertical column precision" for 2025-03-21 to 2025-03-21.

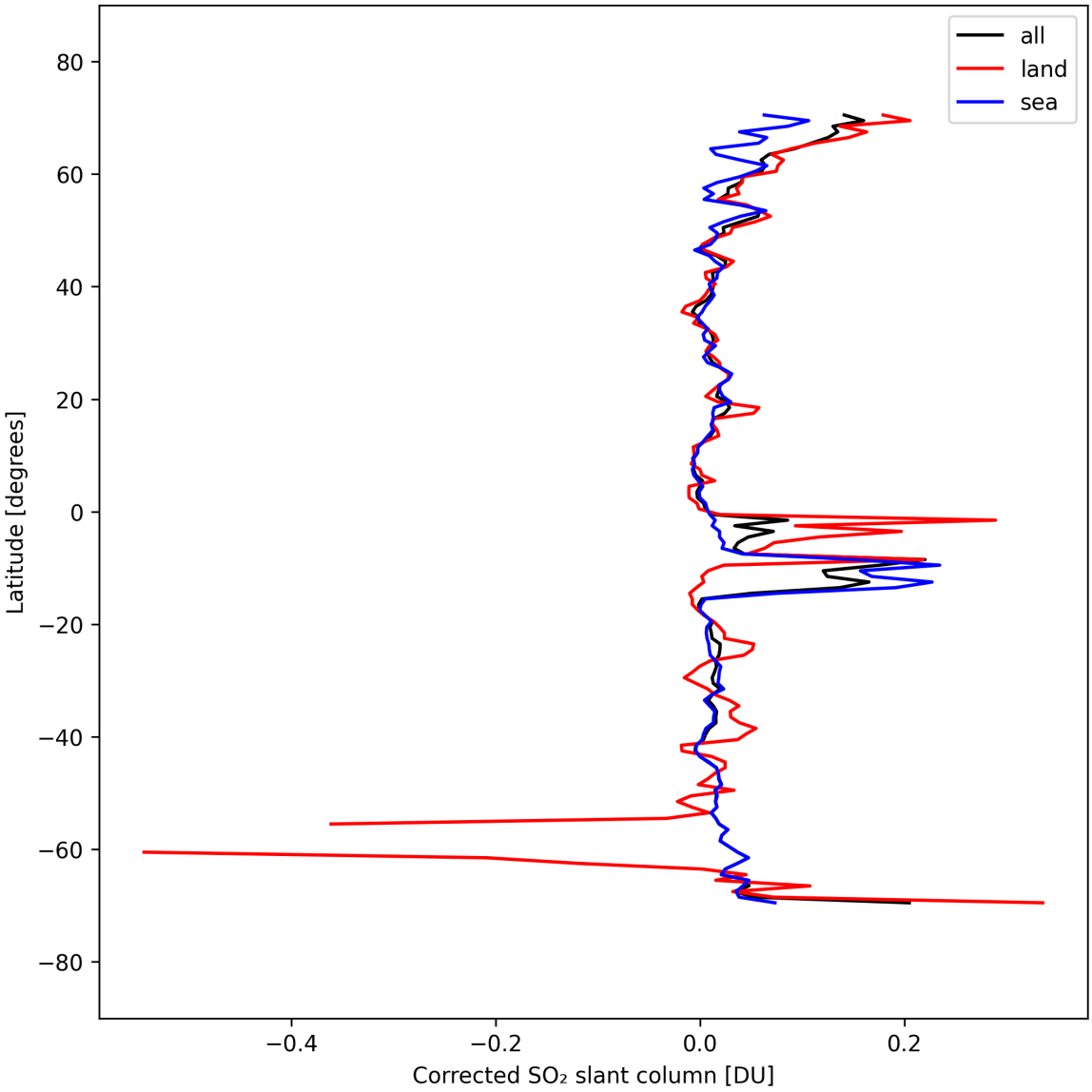

Figure 33: Zonal average of “Corrected SO_2 slant column” for 2025-03-21 to 2025-03-21.

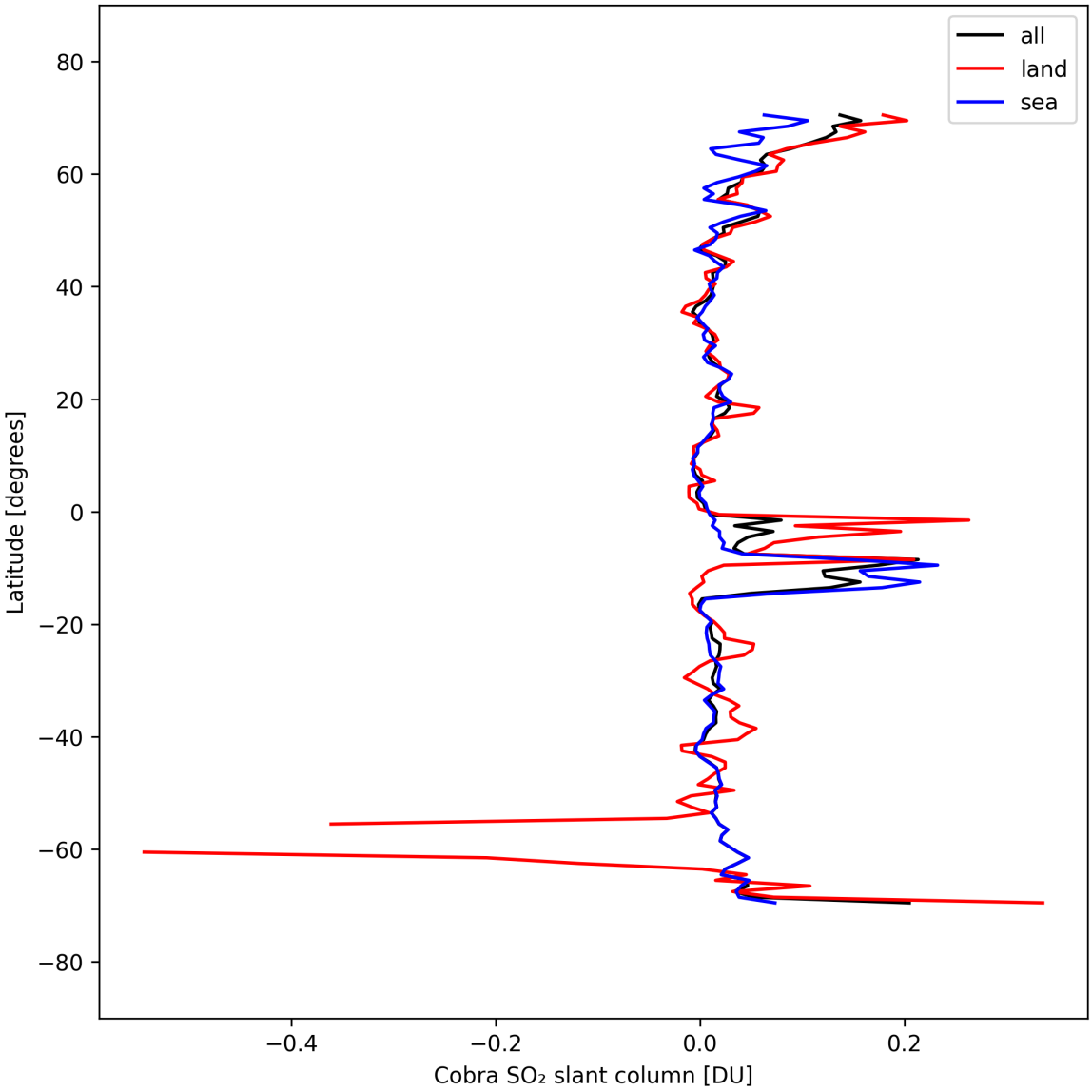

Figure 34: Zonal average of “Cobra SO_2 slant column” for 2025-03-21 to 2025-03-21.

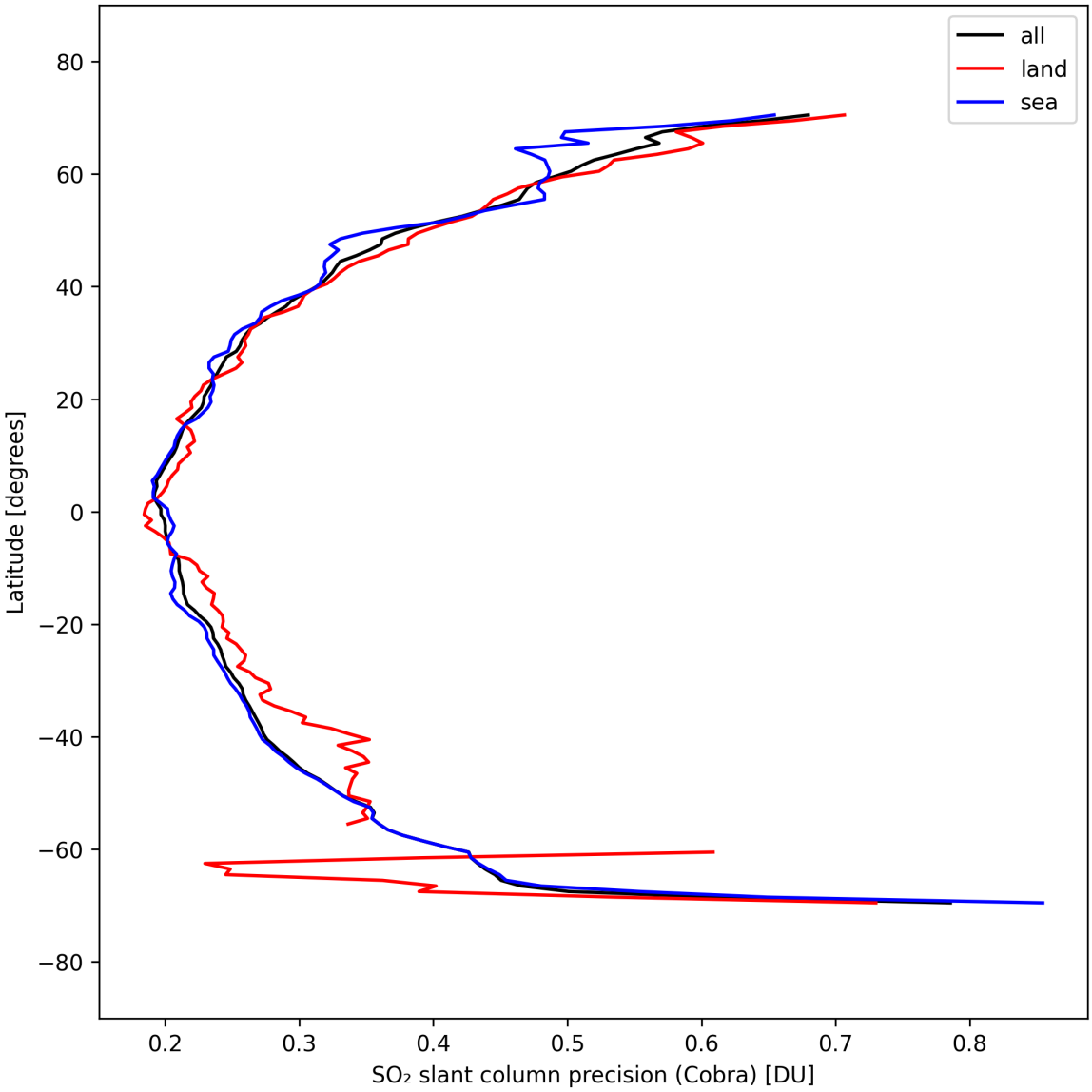

Figure 35: Zonal average of "SO_2 slant column precision (Cobra)" for 2025-03-21 to 2025-03-21.

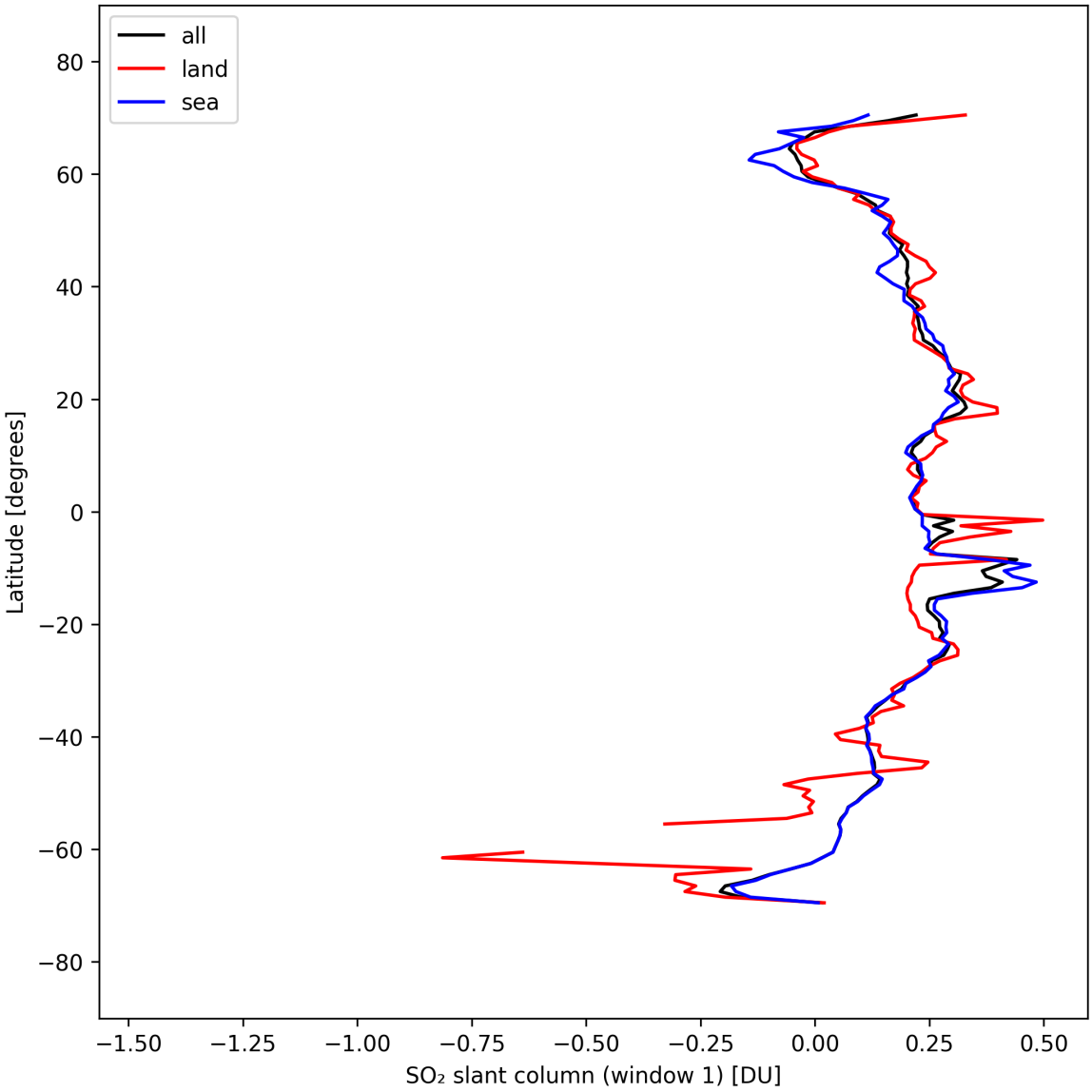

Figure 36: Zonal average of "SO_2 slant column (window 1)" for 2025-03-21 to 2025-03-21.

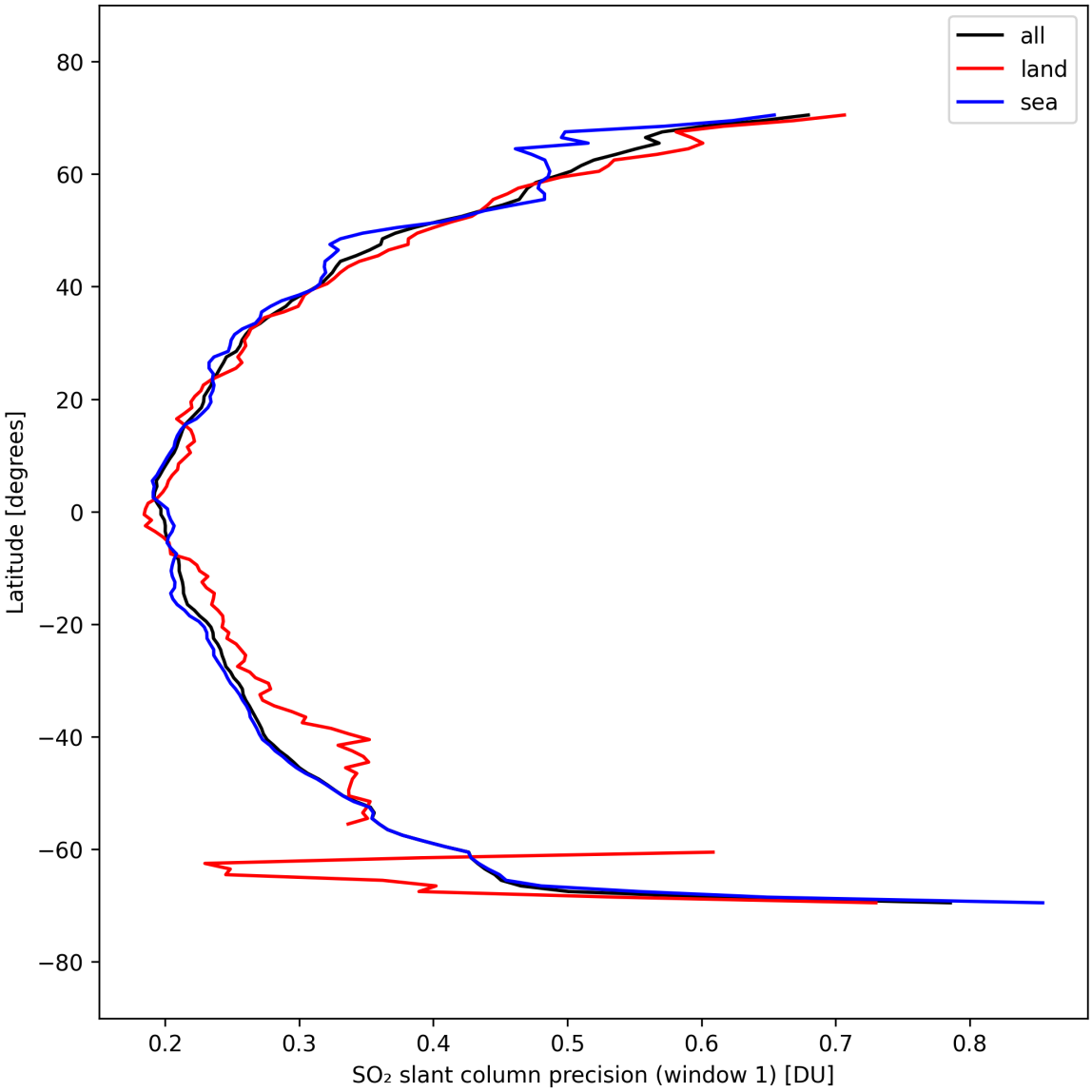

Figure 37: Zonal average of "SO_2 slant column precision (window 1)" for 2025-03-21 to 2025-03-21.

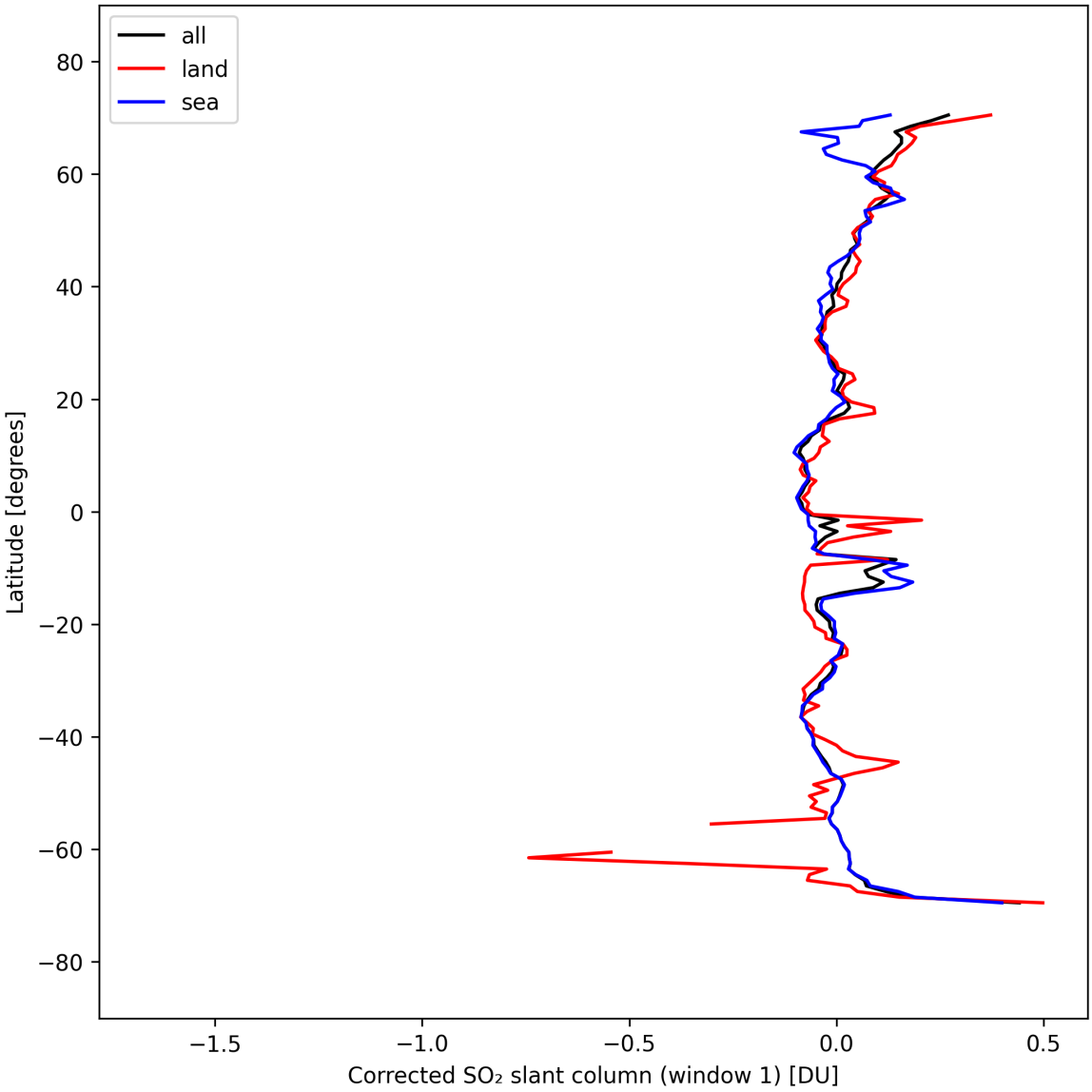

Figure 38: Zonal average of "Corrected SO_2 slant column (window 1)" for 2025-03-21 to 2025-03-21.

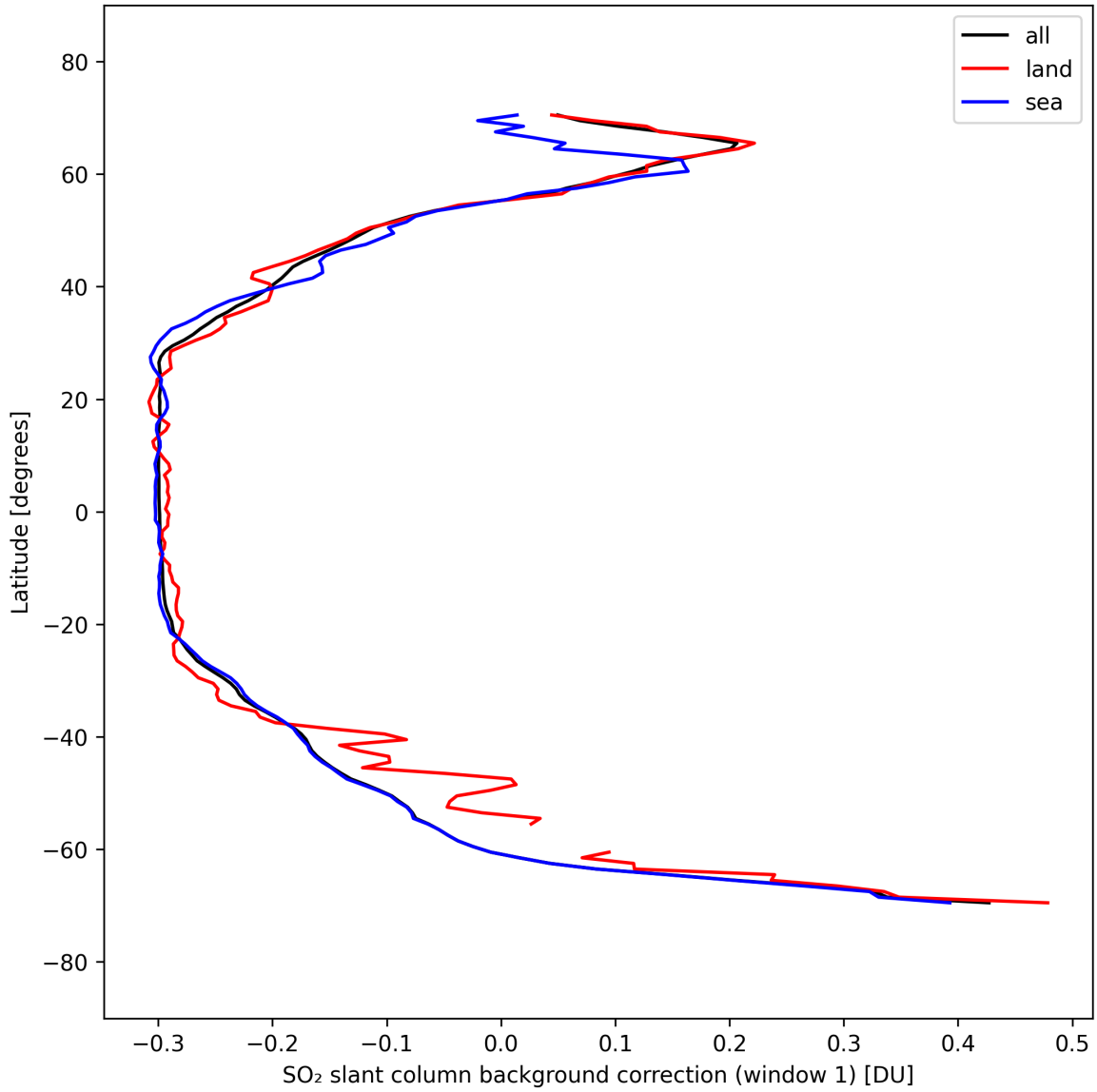

Figure 39: Zonal average of "SO_2 slant column background correction (window 1)" for 2025-03-21 to 2025-03-21.

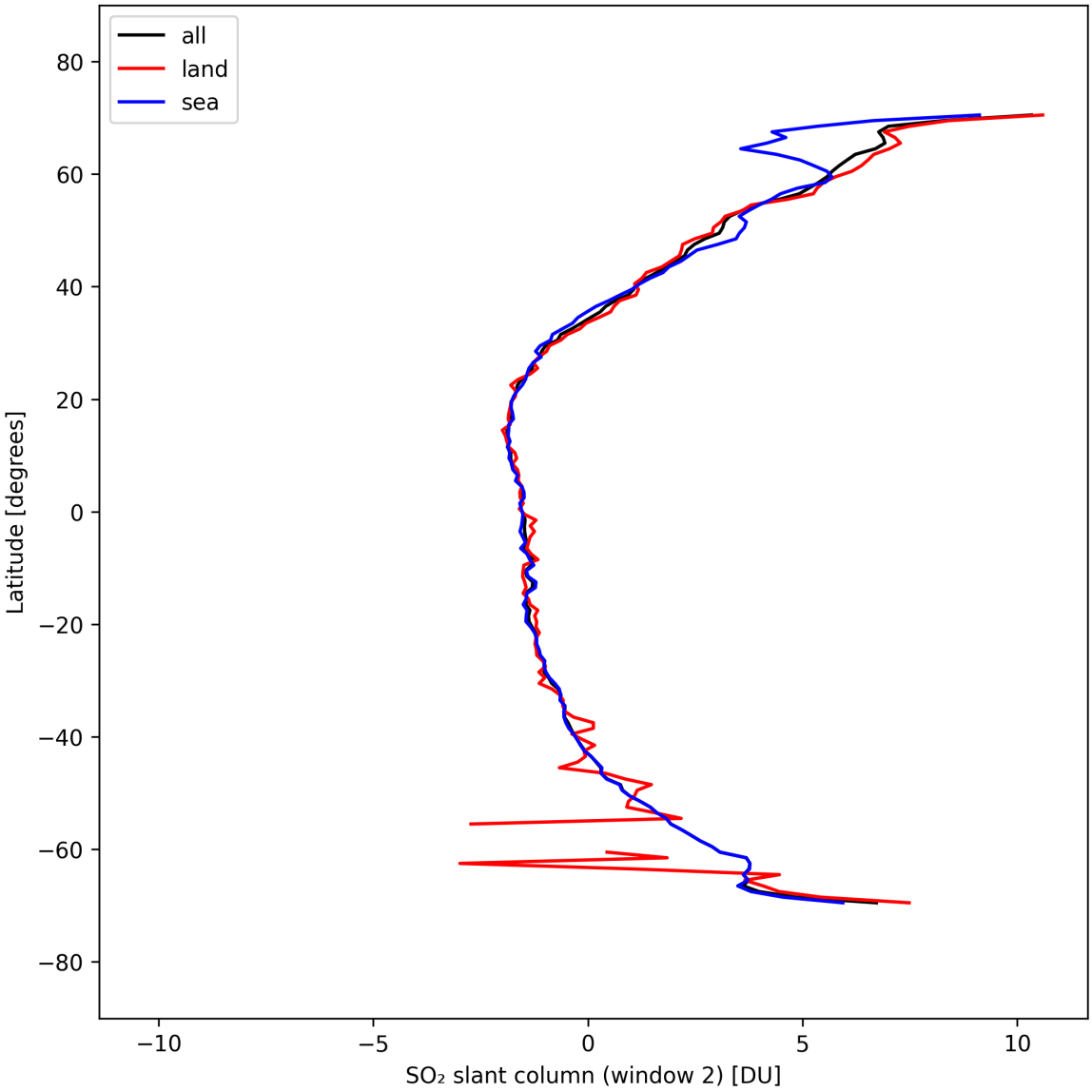

Figure 40: Zonal average of "SO_2 slant column (window 2)" for 2025-03-21 to 2025-03-21.

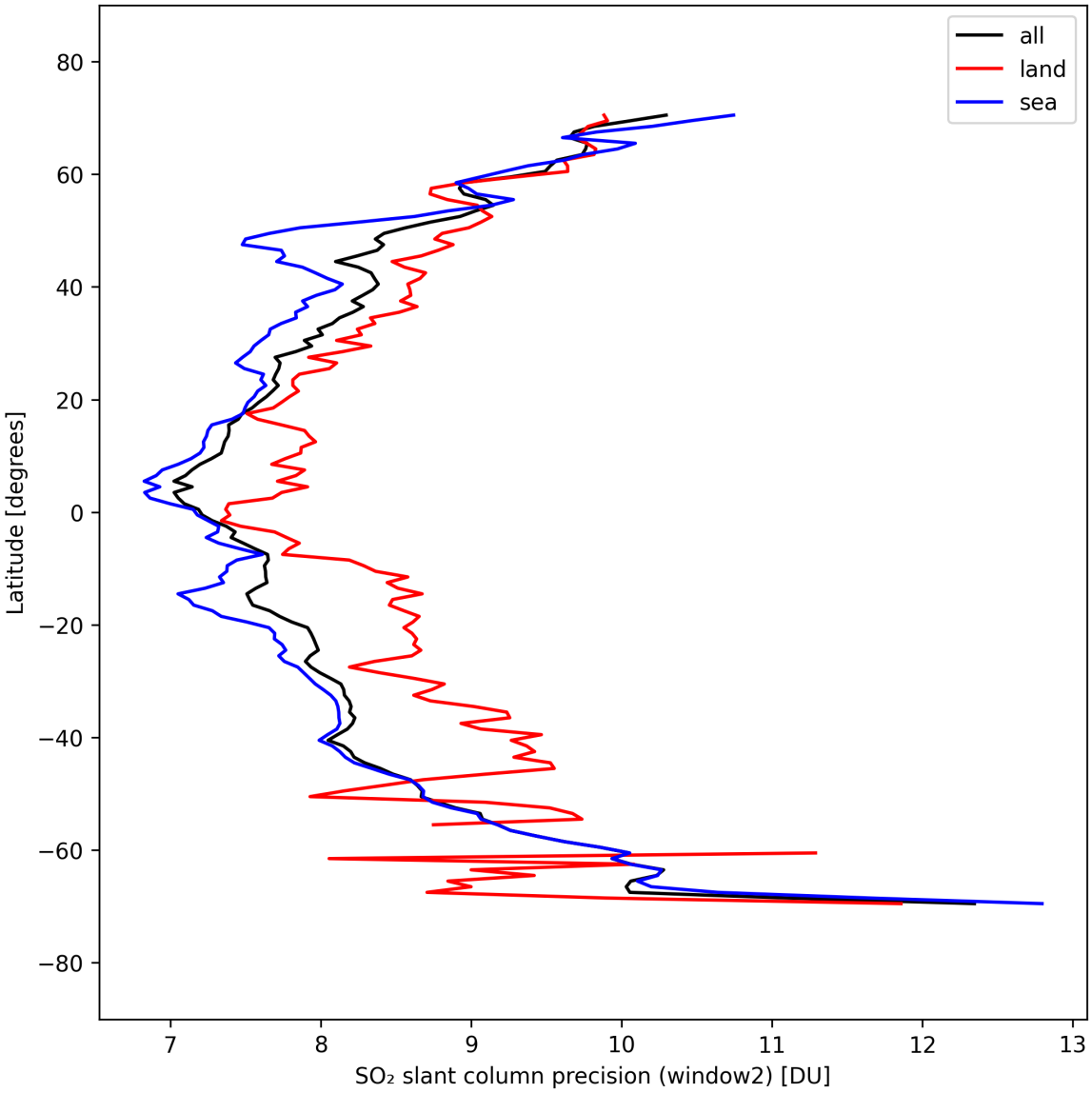

Figure 41: Zonal average of "SO_2 slant column precision (window2)" for 2025-03-21 to 2025-03-21.

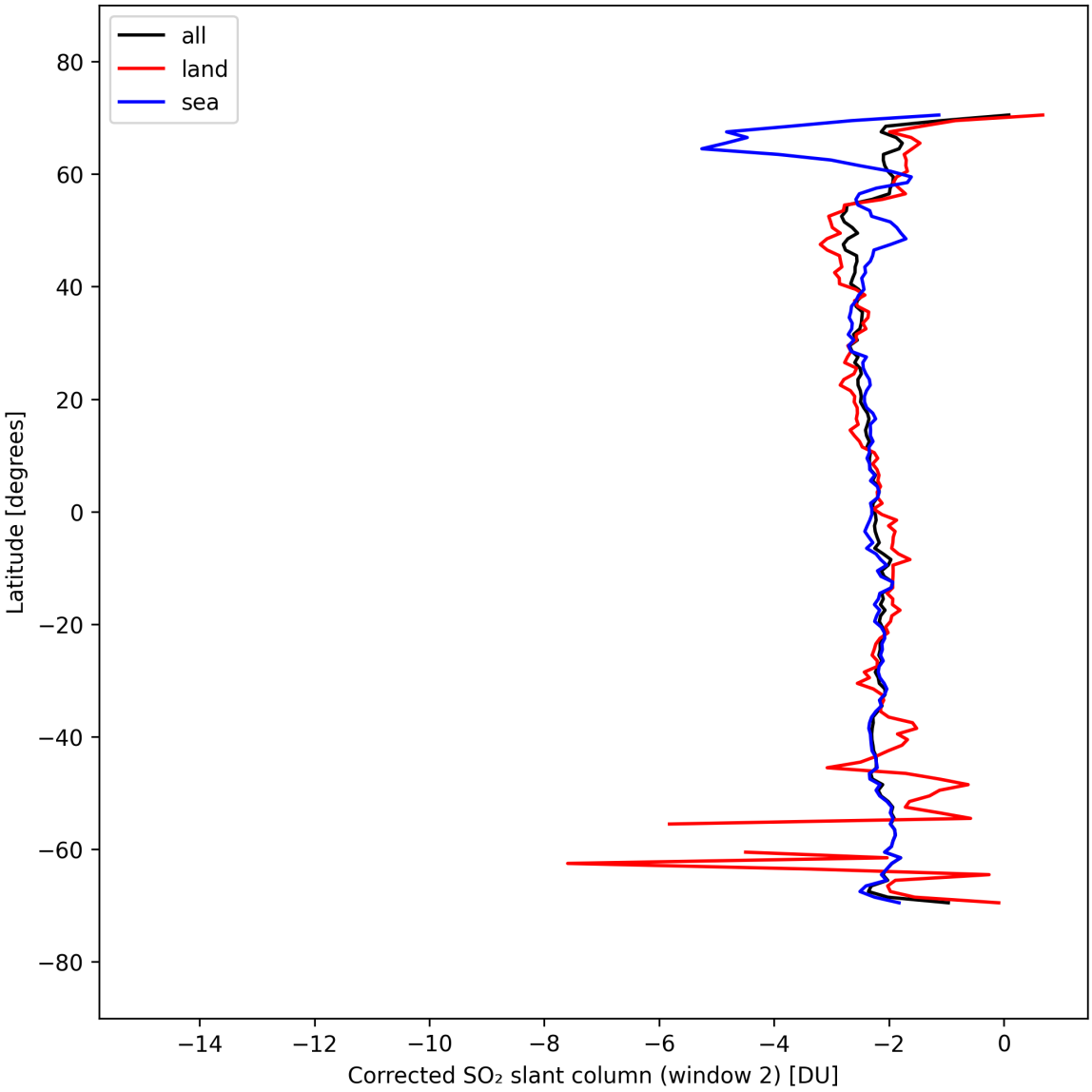

Figure 42: Zonal average of “Corrected SO_2 slant column (window 2)” for 2025-03-21 to 2025-03-21.

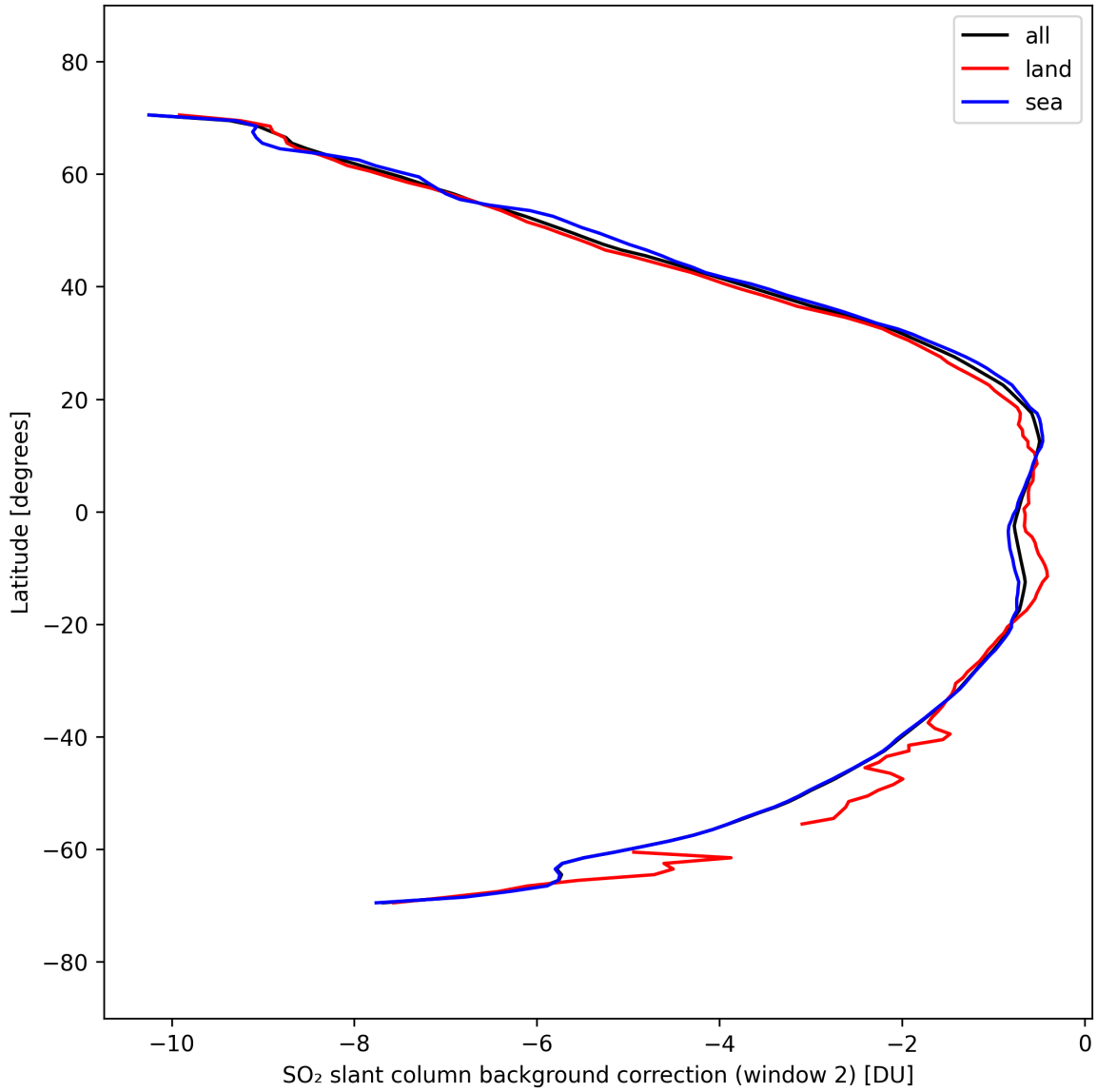

Figure 43: Zonal average of "SO_2 slant column background correction (window 2)" for 2025-03-21 to 2025-03-21.

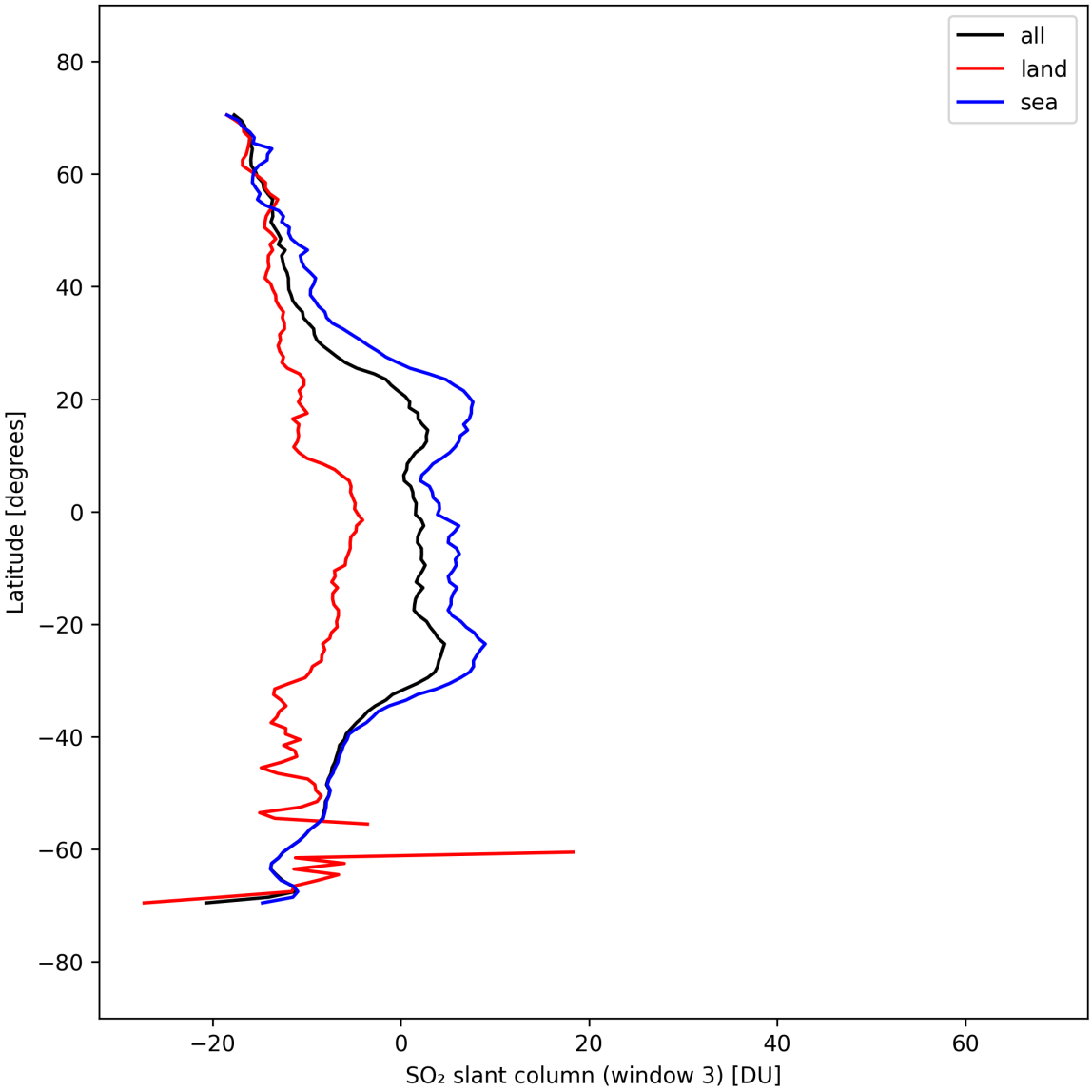

Figure 44: Zonal average of "SO_2 slant column (window 3)" for 2025-03-21 to 2025-03-21.

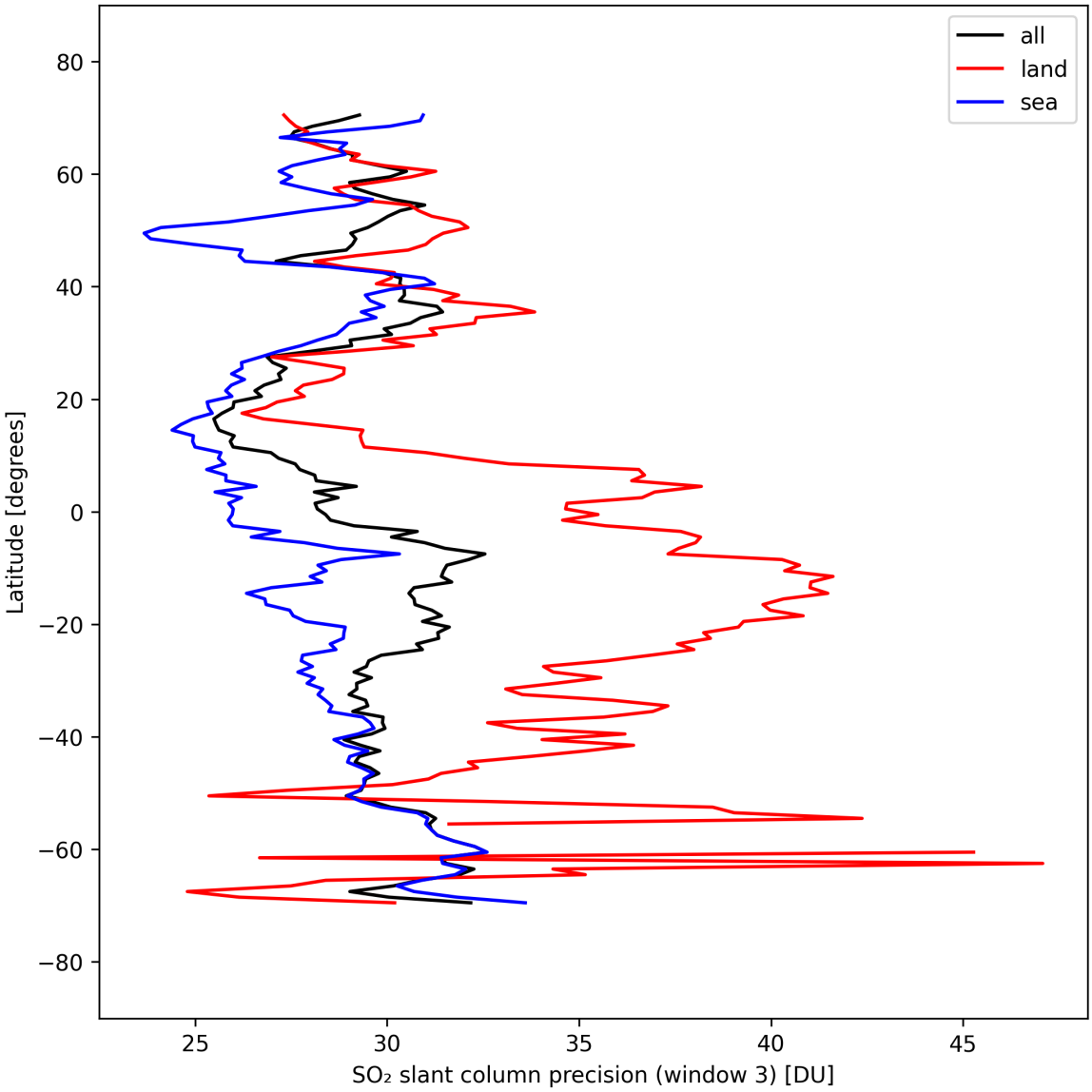

Figure 45: Zonal average of "SO_2 slant column precision (window 3)" for 2025-03-21 to 2025-03-21.

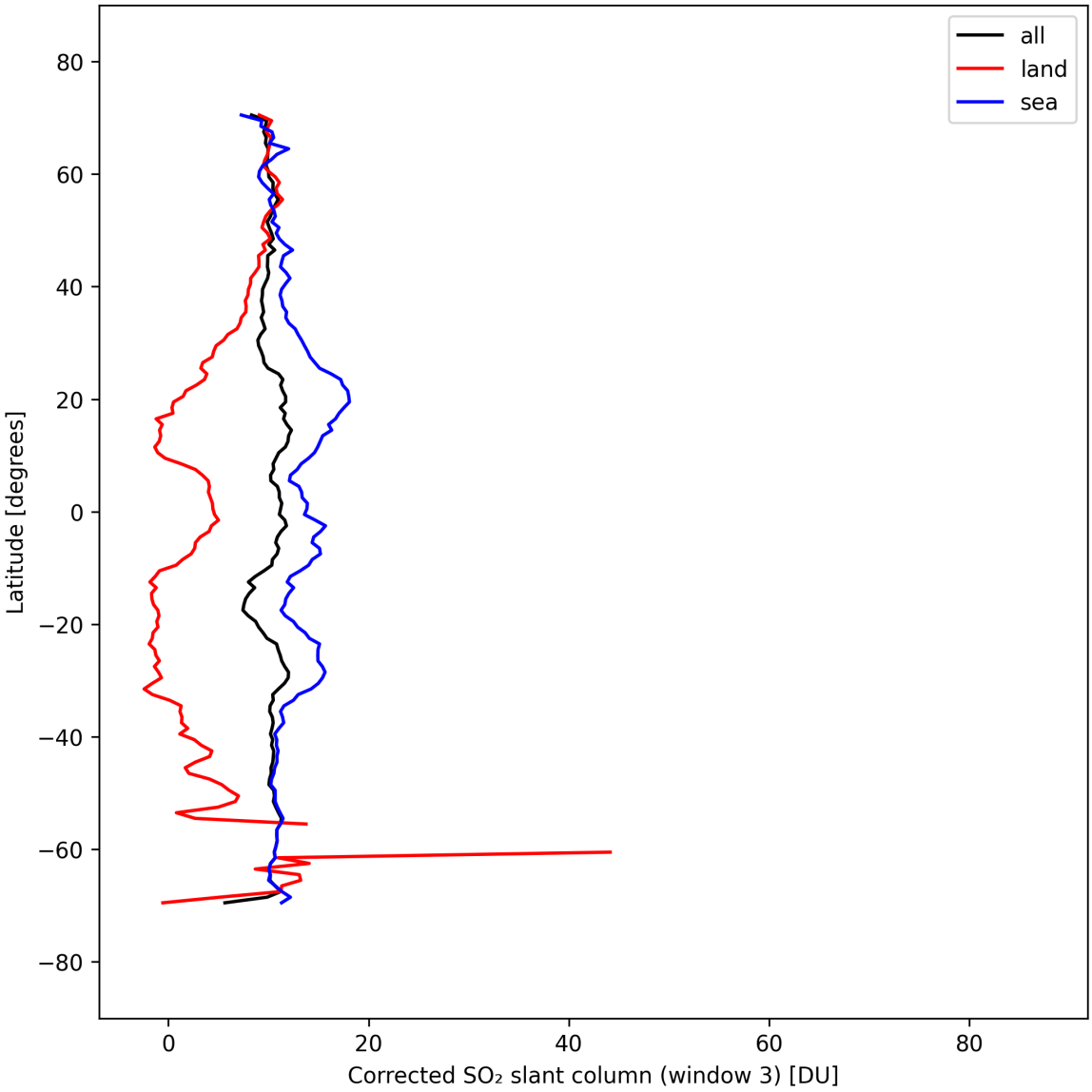

Figure 46: Zonal average of "Corrected SO_2 slant column (window 3)" for 2025-03-21 to 2025-03-21.

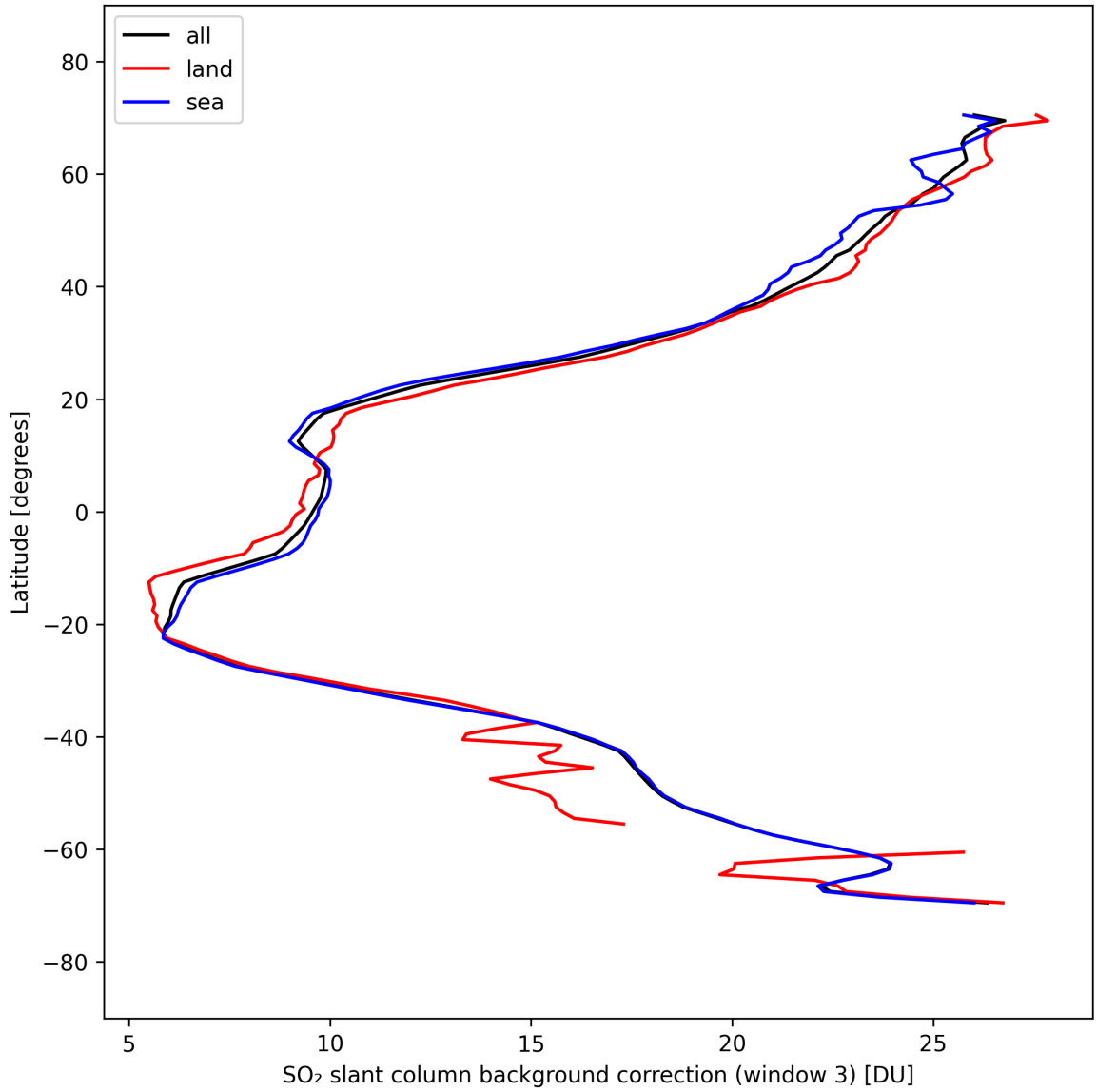

Figure 47: Zonal average of "SO_2 slant column background correction (window 3)" for 2025-03-21 to 2025-03-21.

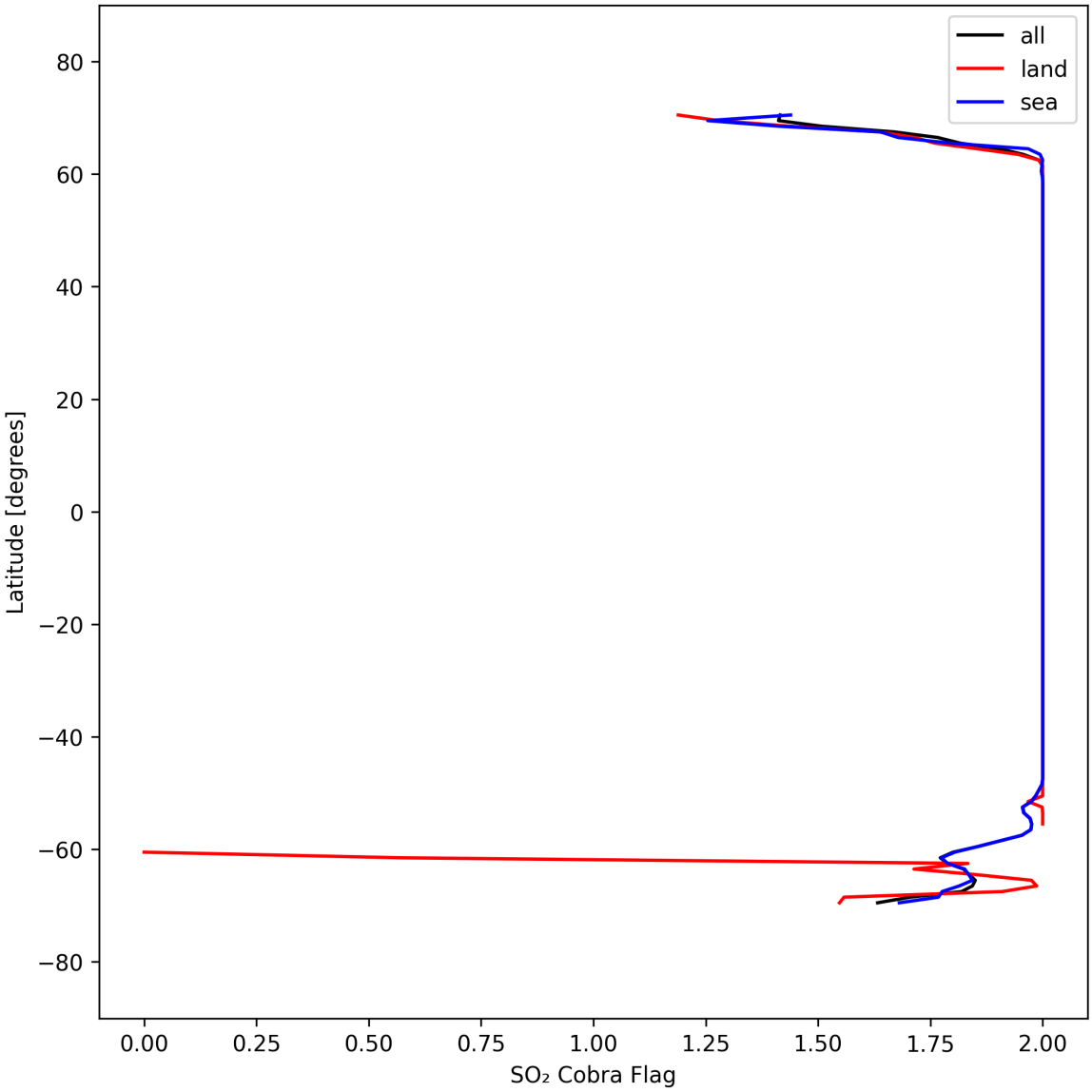

Figure 48: Zonal average of "SO_2 Cobra Flag" for 2025-03-21 to 2025-03-21.

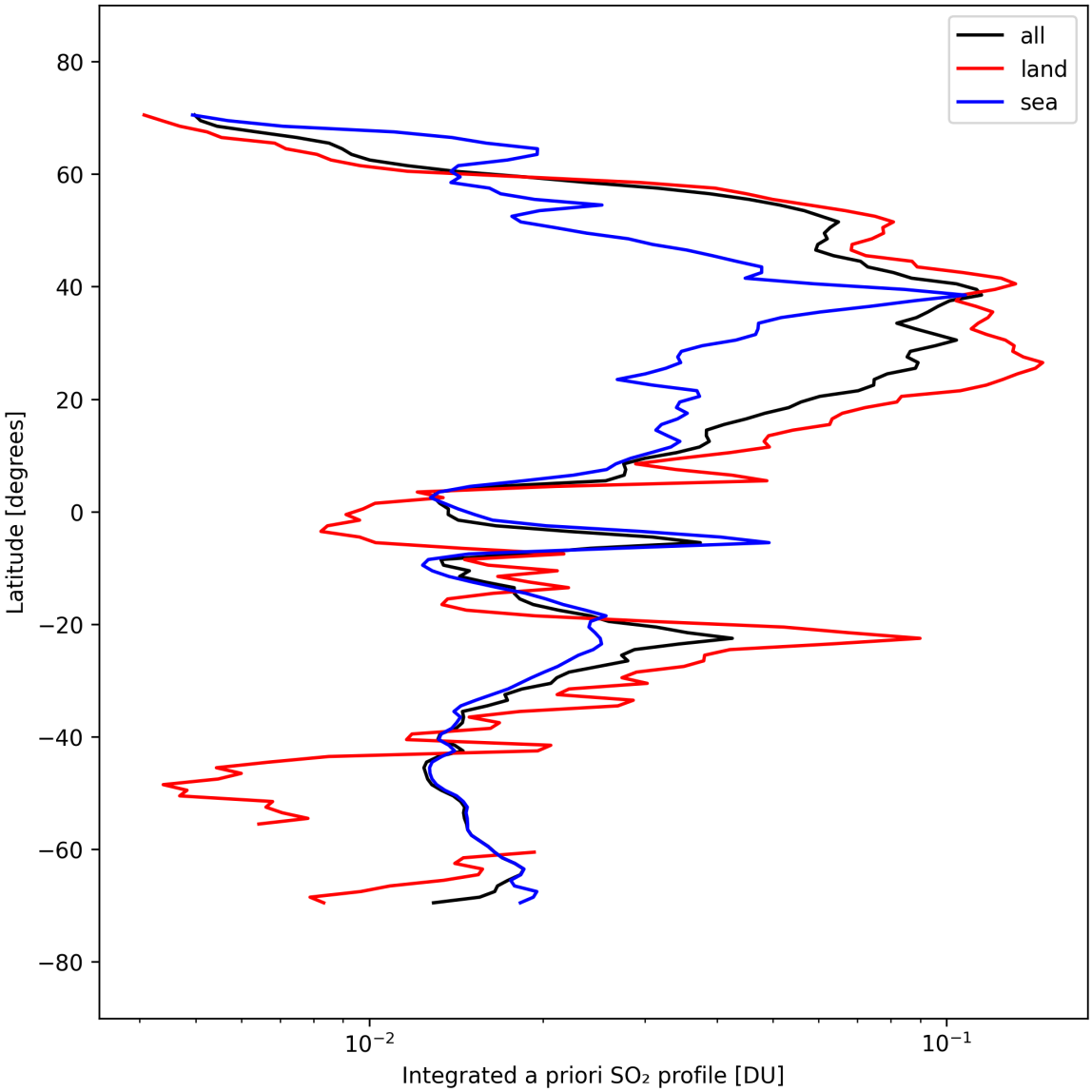

Figure 49: Zonal average of “Integrated a priori SO_2 profile” for 2025-03-21 to 2025-03-21.

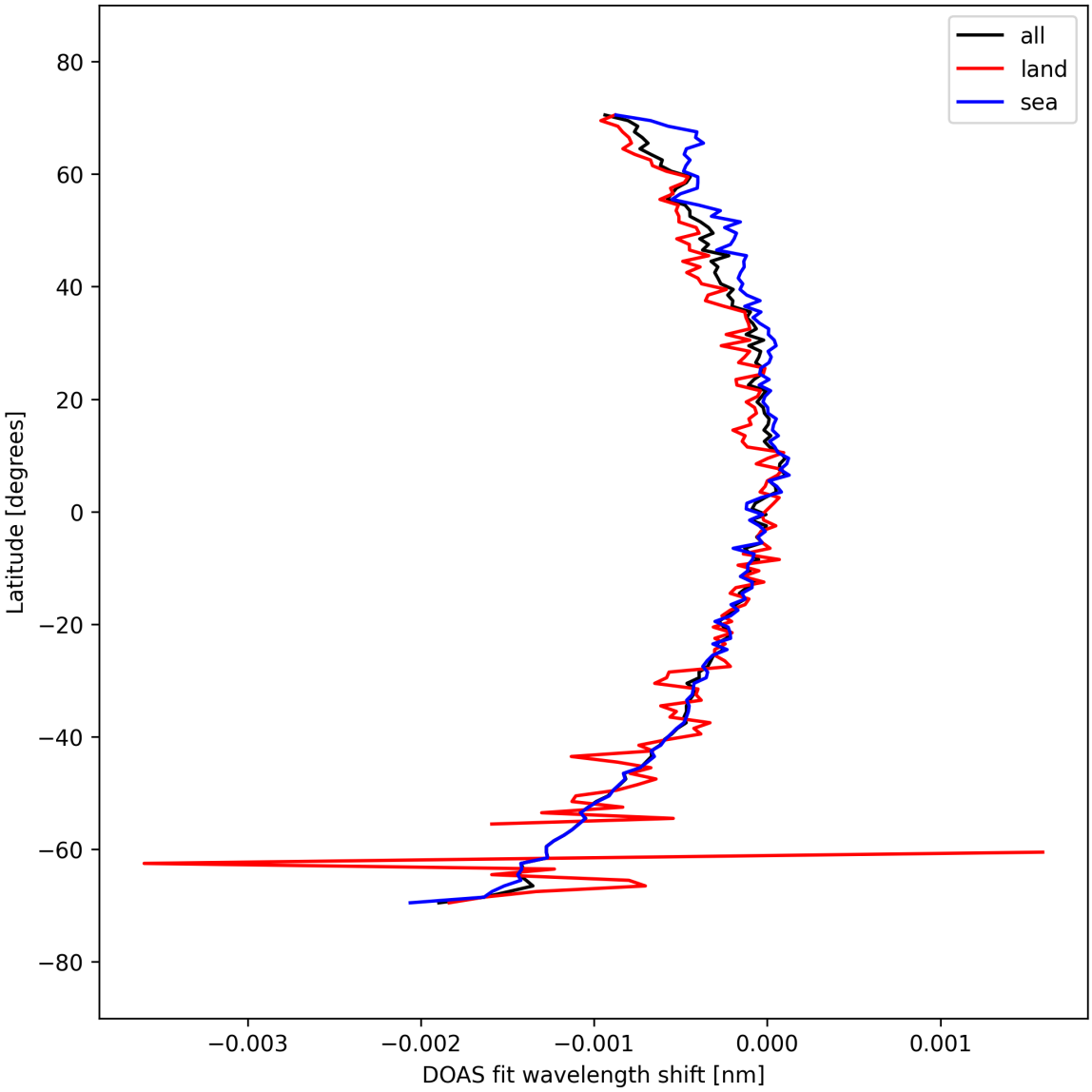

Figure 50: Zonal average of “DOAS fit wavelength shift” for 2025-03-21 to 2025-03-21.

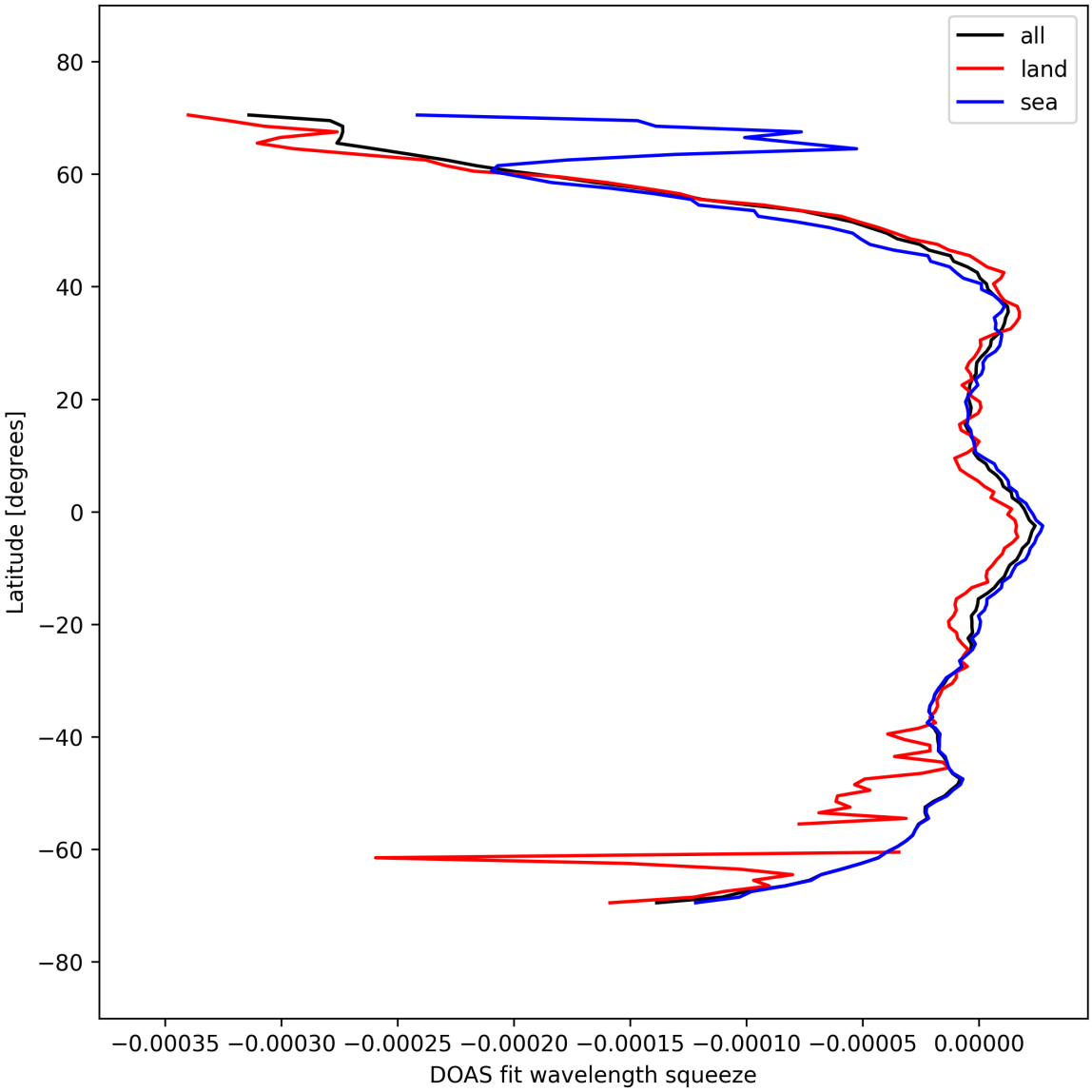

Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-03-21 to 2025-03-21.

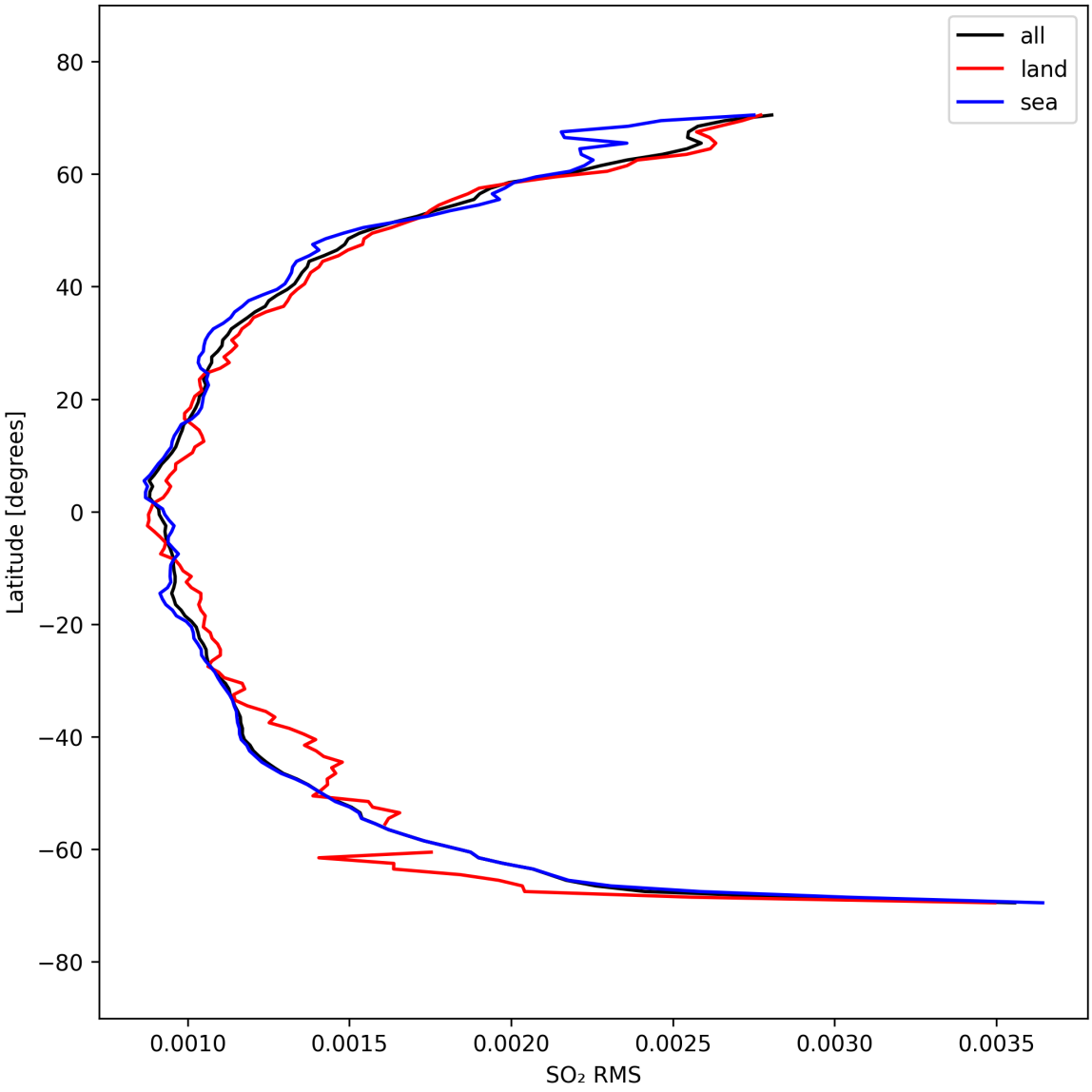

Figure 52: Zonal average of "SO_2 RMS" for 2025-03-21 to 2025-03-21.

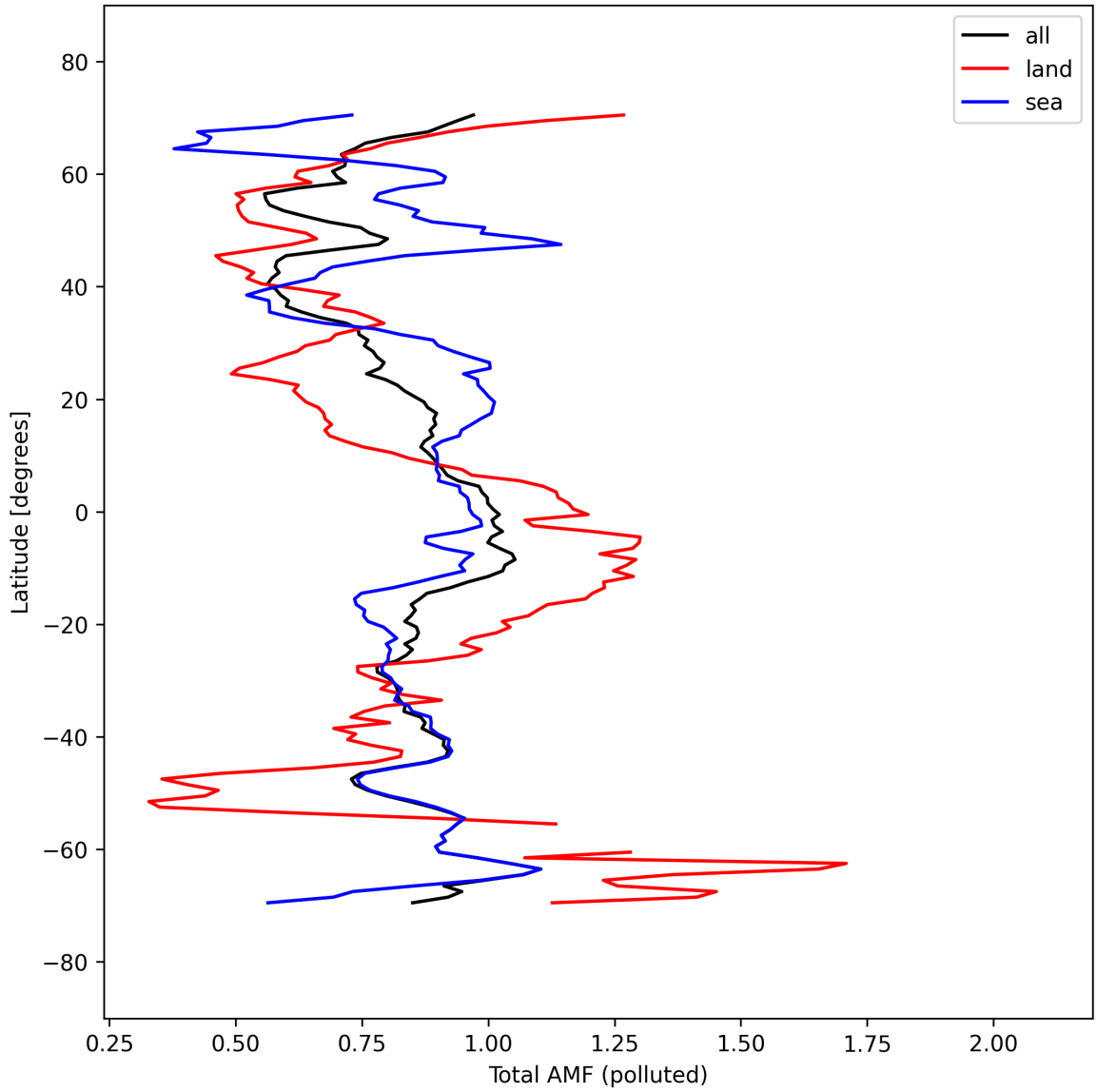

Figure 53: Zonal average of “Total AMF (polluted)” for 2025-03-21 to 2025-03-21.

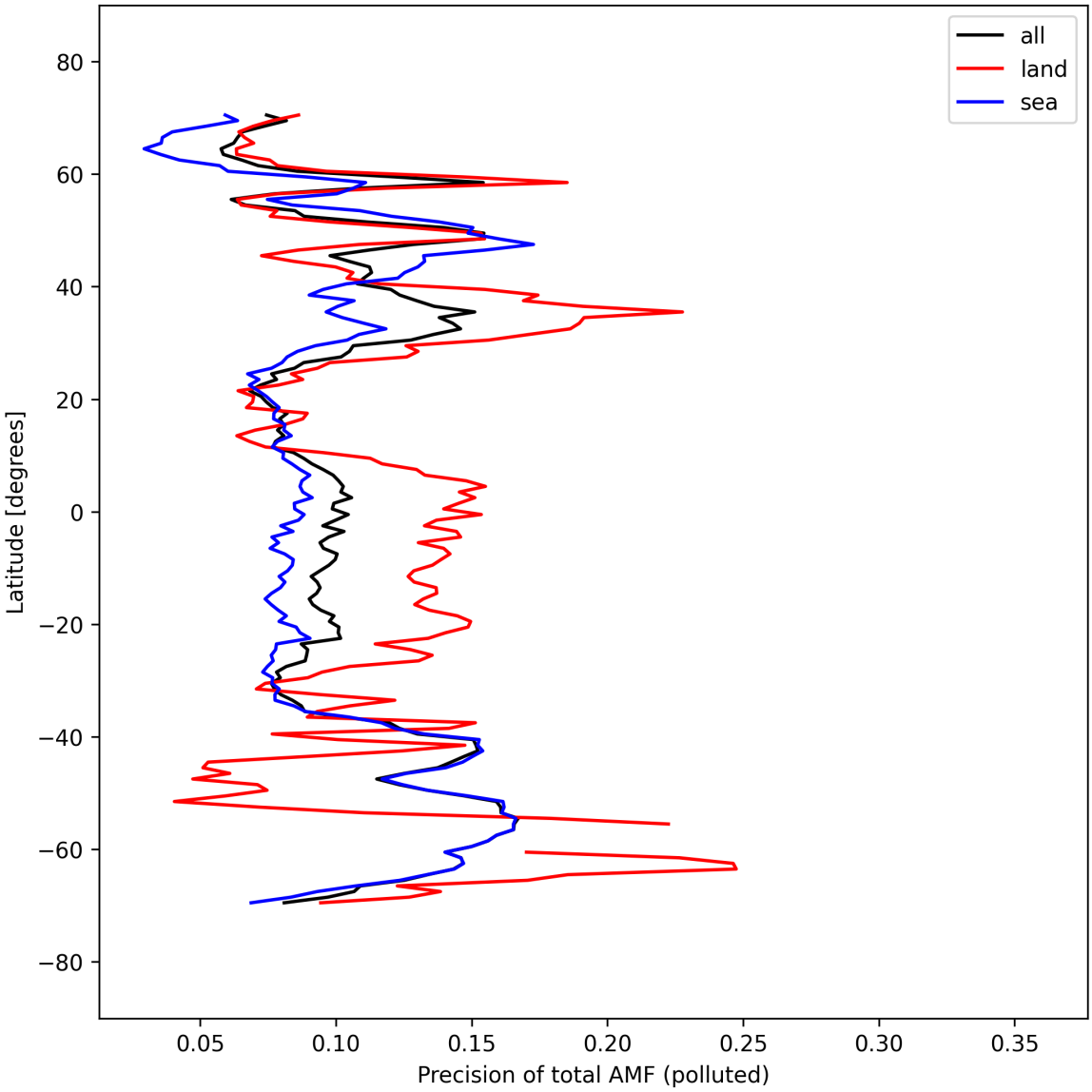

Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-03-21 to 2025-03-21.

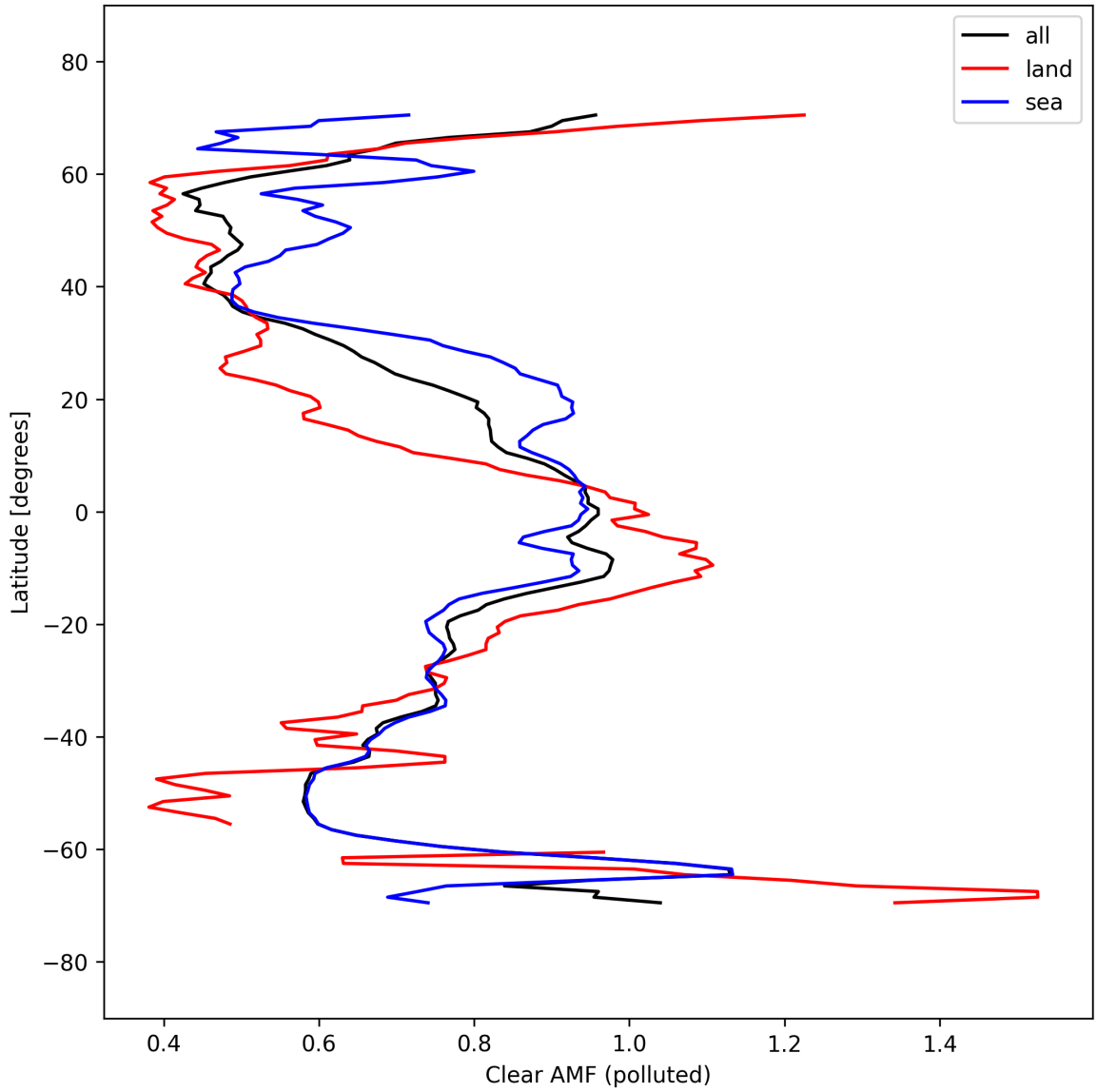

Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-03-21 to 2025-03-21.

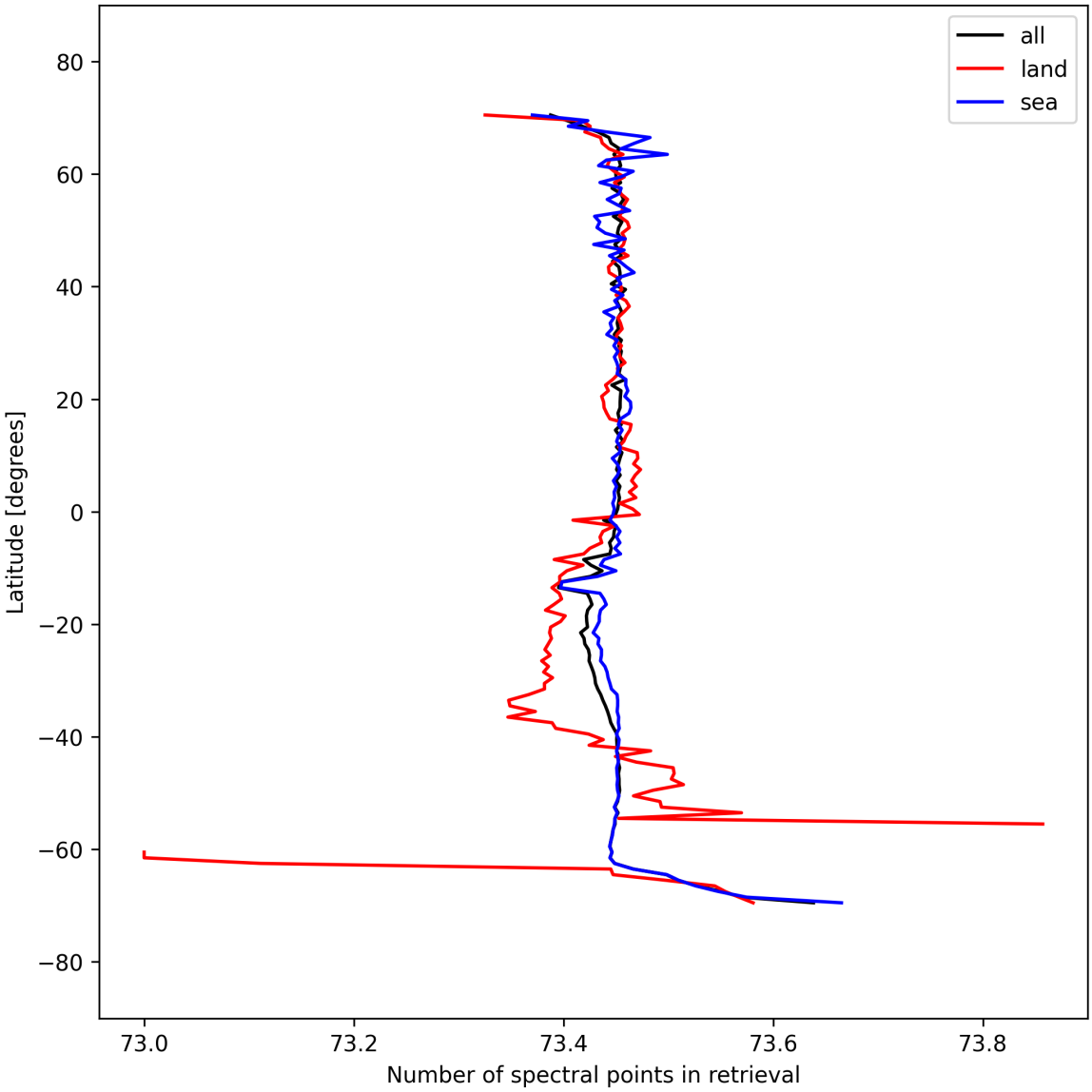

Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-03-21 to 2025-03-21.

8 Histograms

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

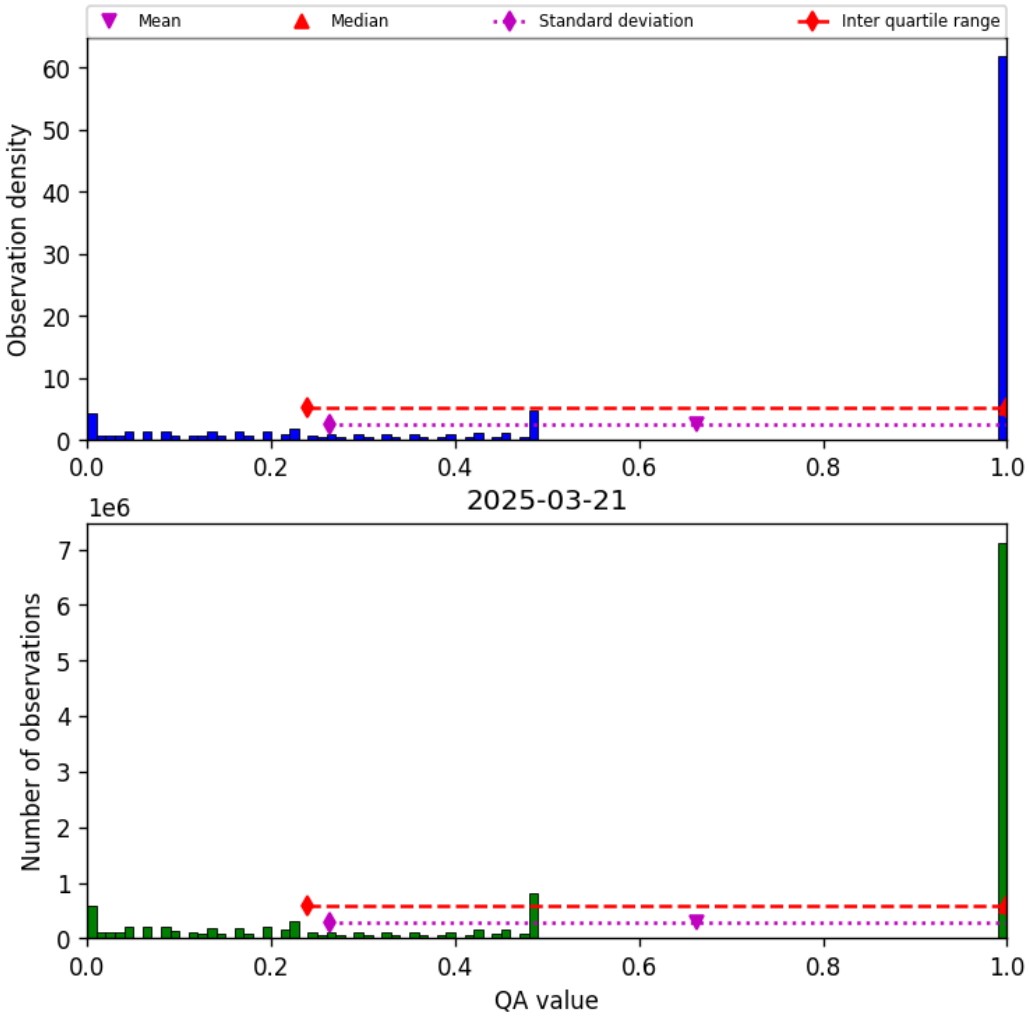

Figure 57: Histogram of “QA value” for 2025-03-21 to 2025-03-21

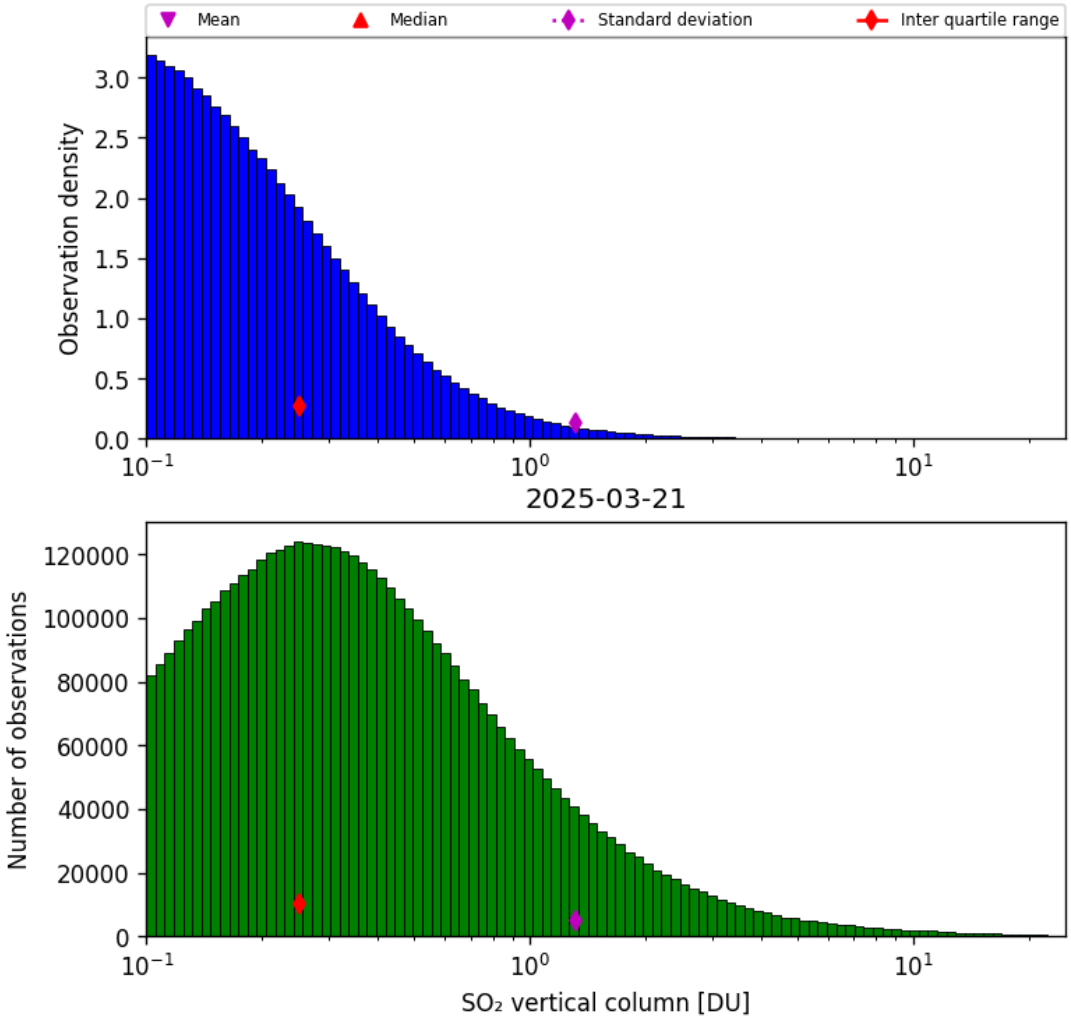

Figure 58: Histogram of "SO_2 vertical column" for 2025-03-21 to 2025-03-21

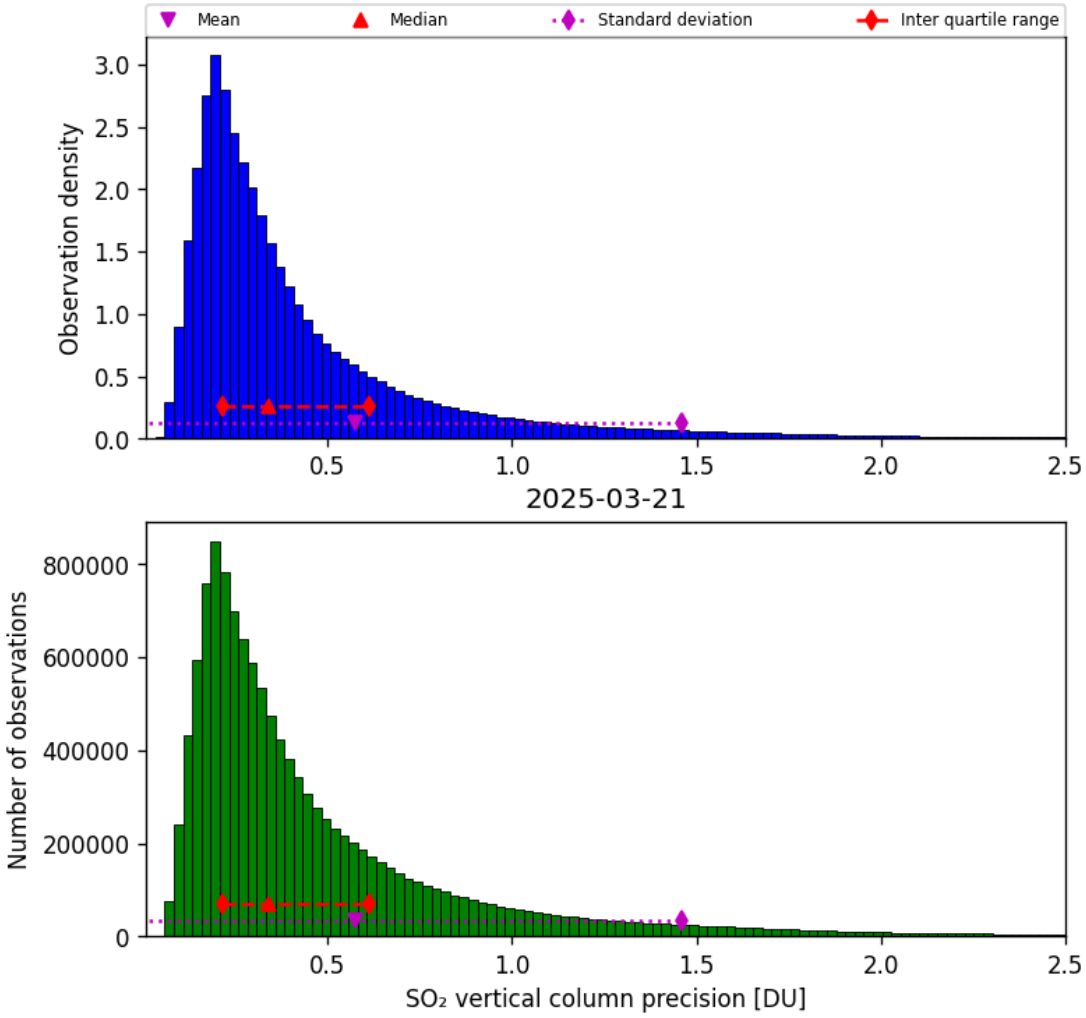

Figure 59: Histogram of "SO_2 vertical column precision" for 2025-03-21 to 2025-03-21

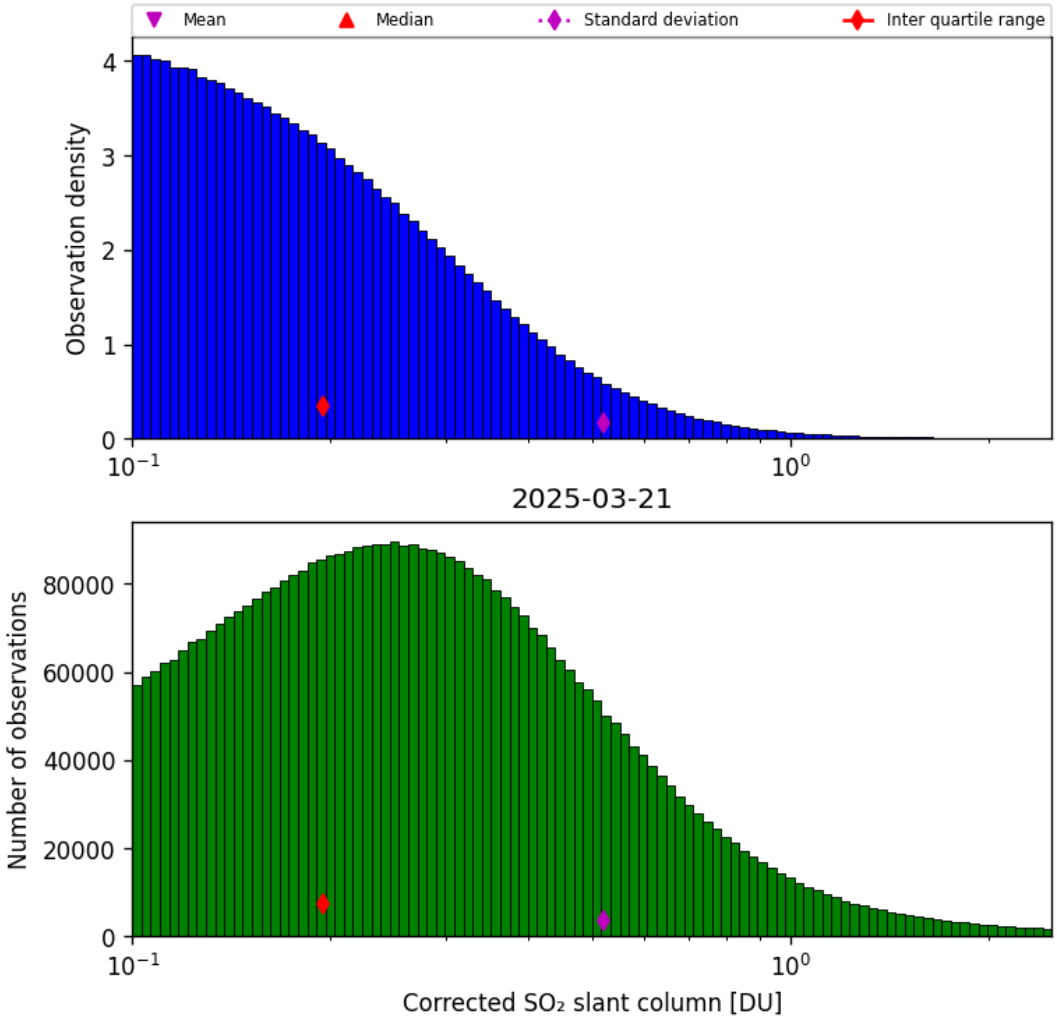

Figure 60: Histogram of "Corrected SO_2 slant column" for 2025-03-21 to 2025-03-21

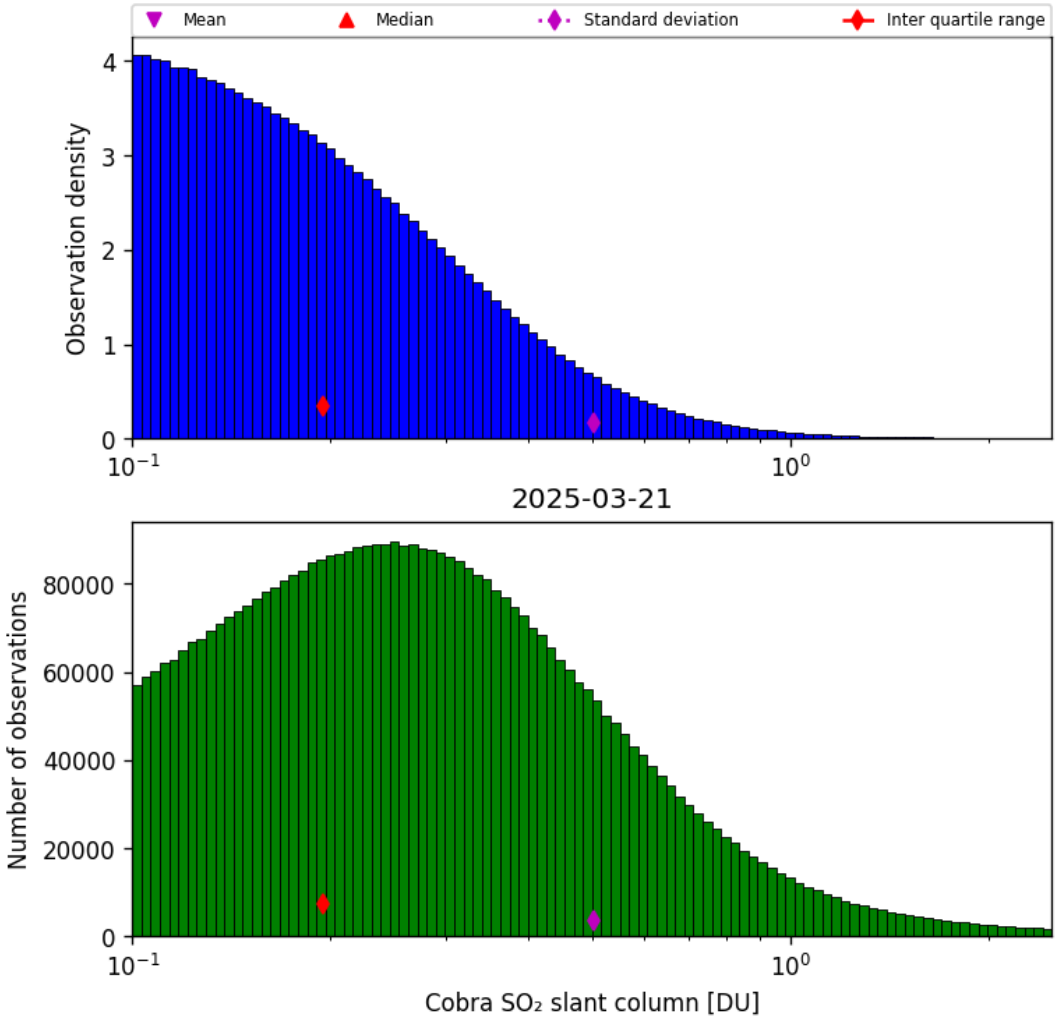

Figure 61: Histogram of "Cobra SO_2 slant column" for 2025-03-21 to 2025-03-21

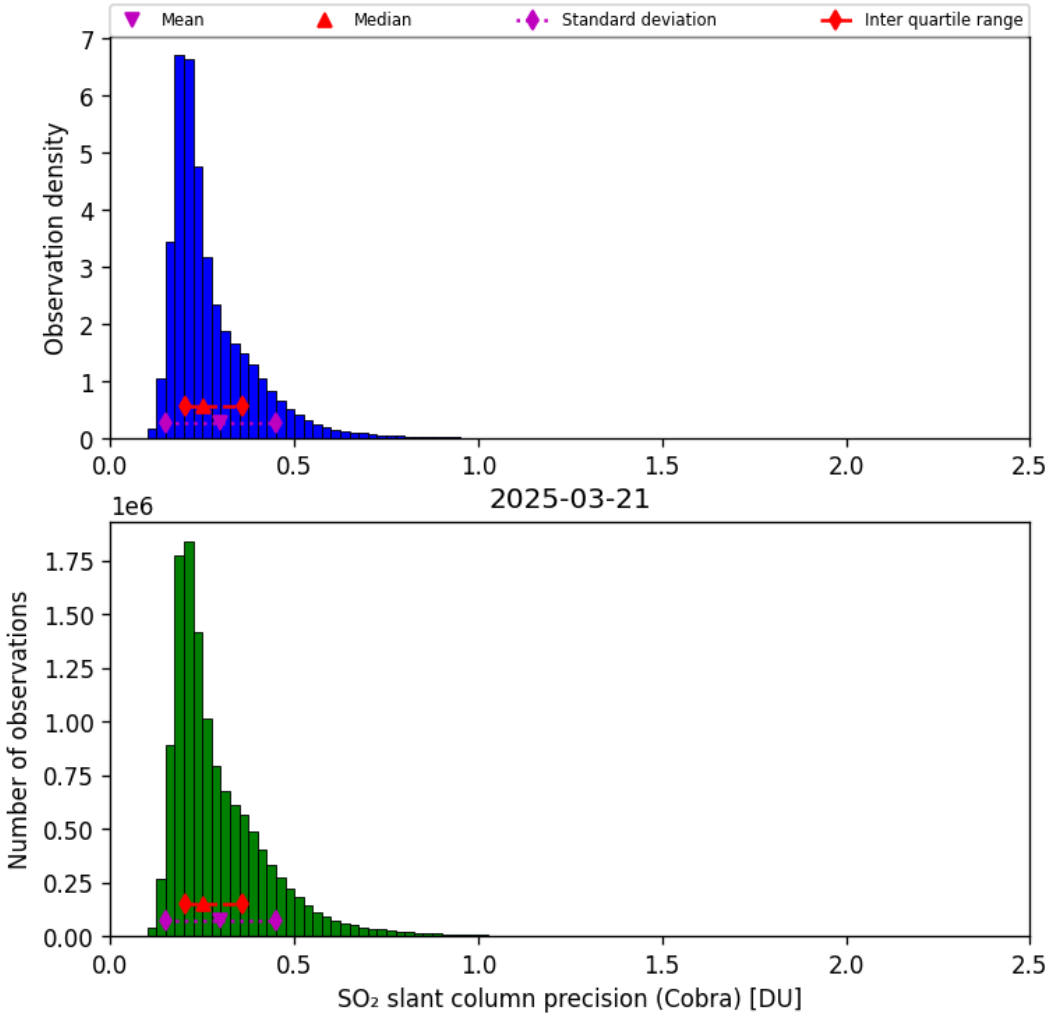

Figure 62: Histogram of "SO_2 slant column precision (Cobra)" for 2025-03-21 to 2025-03-21

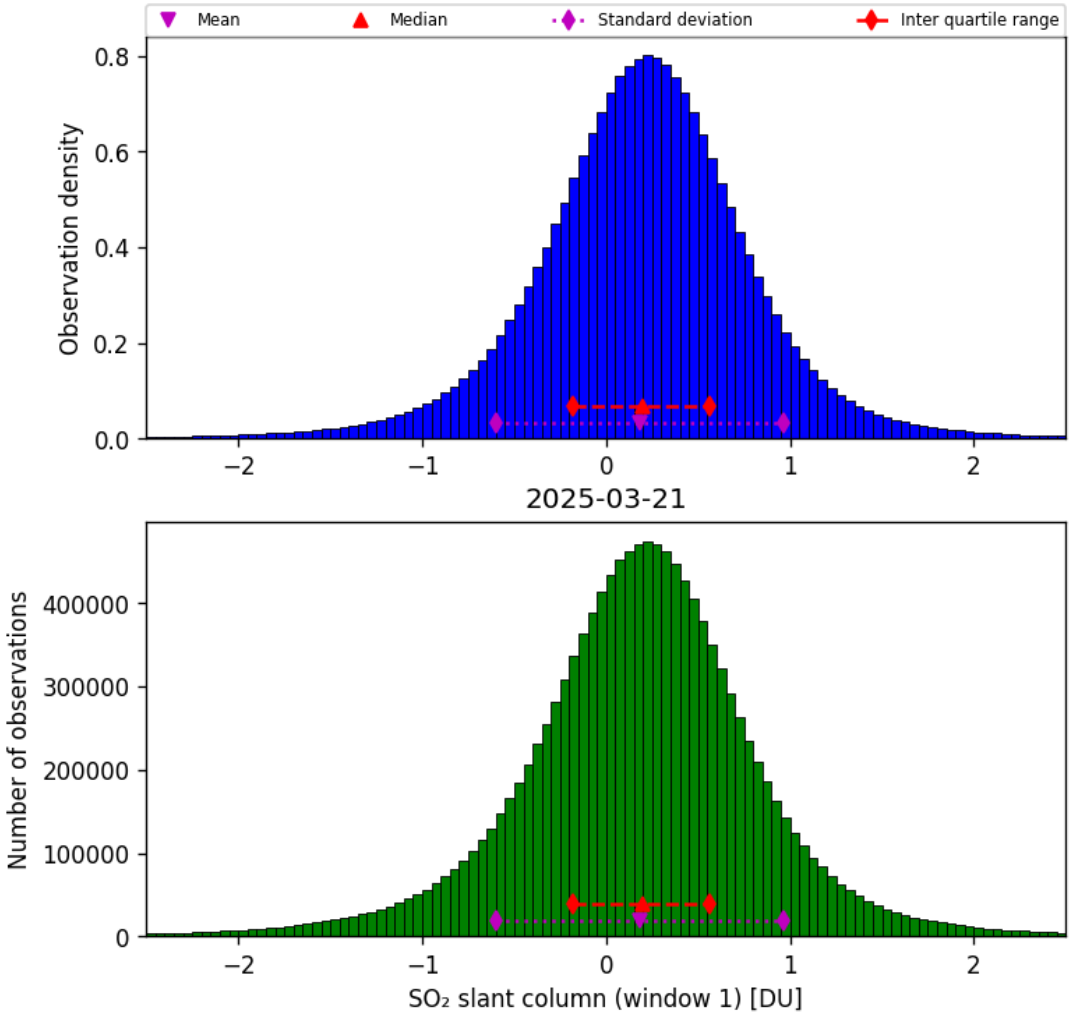

Figure 63: Histogram of "SO_2 slant column (window 1)" for 2025-03-21 to 2025-03-21

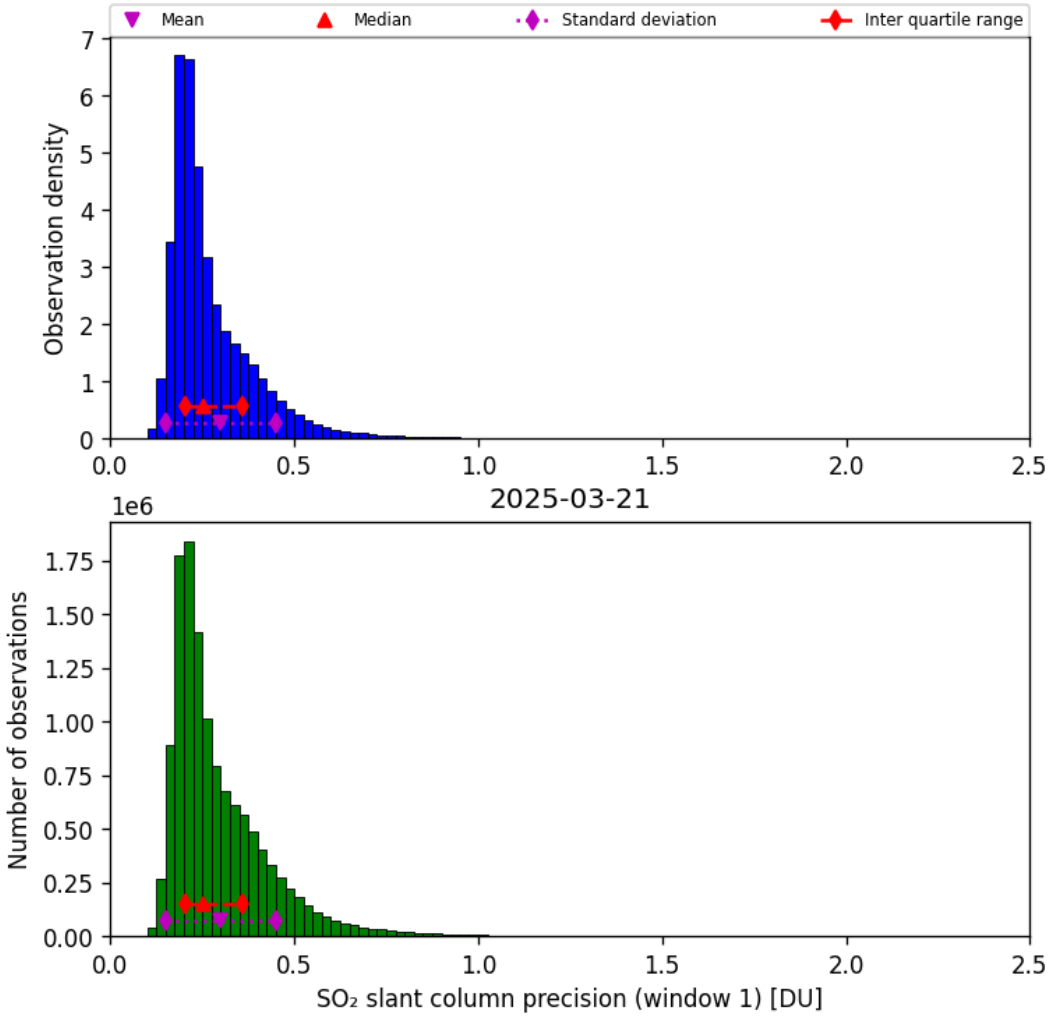

Figure 64: Histogram of "SO_2 slant column precision (window 1)" for 2025-03-21 to 2025-03-21

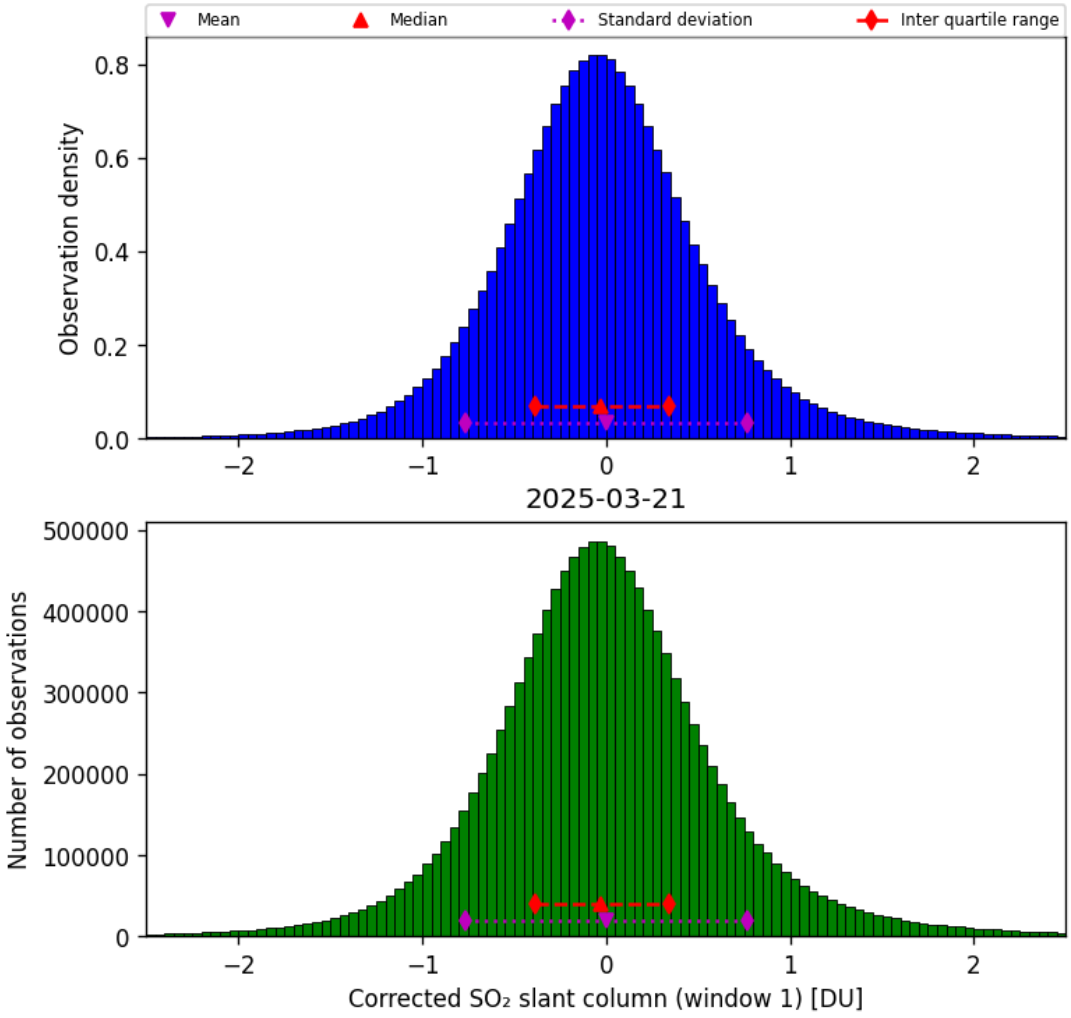

Figure 65: Histogram of “Corrected SO_2 slant column (window 1)” for 2025-03-21 to 2025-03-21

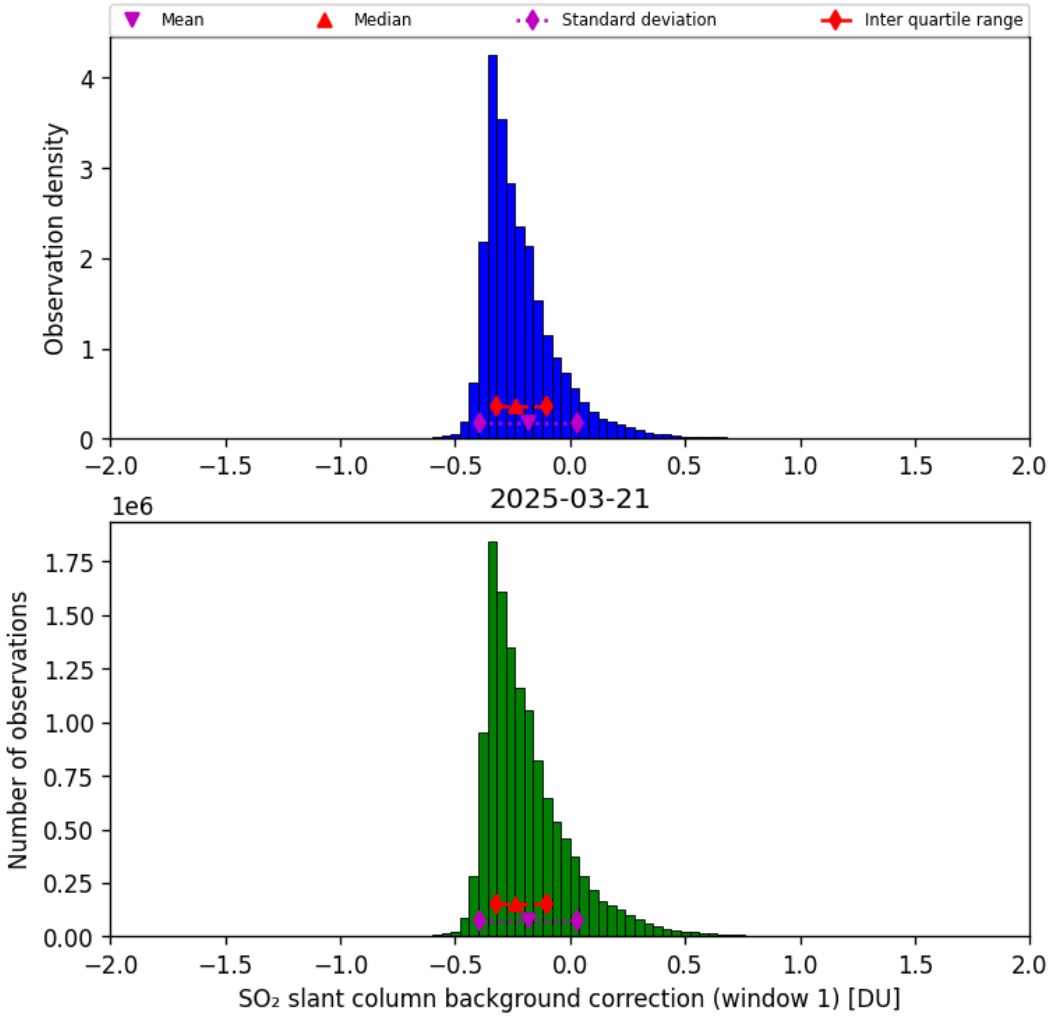

Figure 66: Histogram of "SO_2 slant column background correction (window 1)" for 2025-03-21 to 2025-03-21

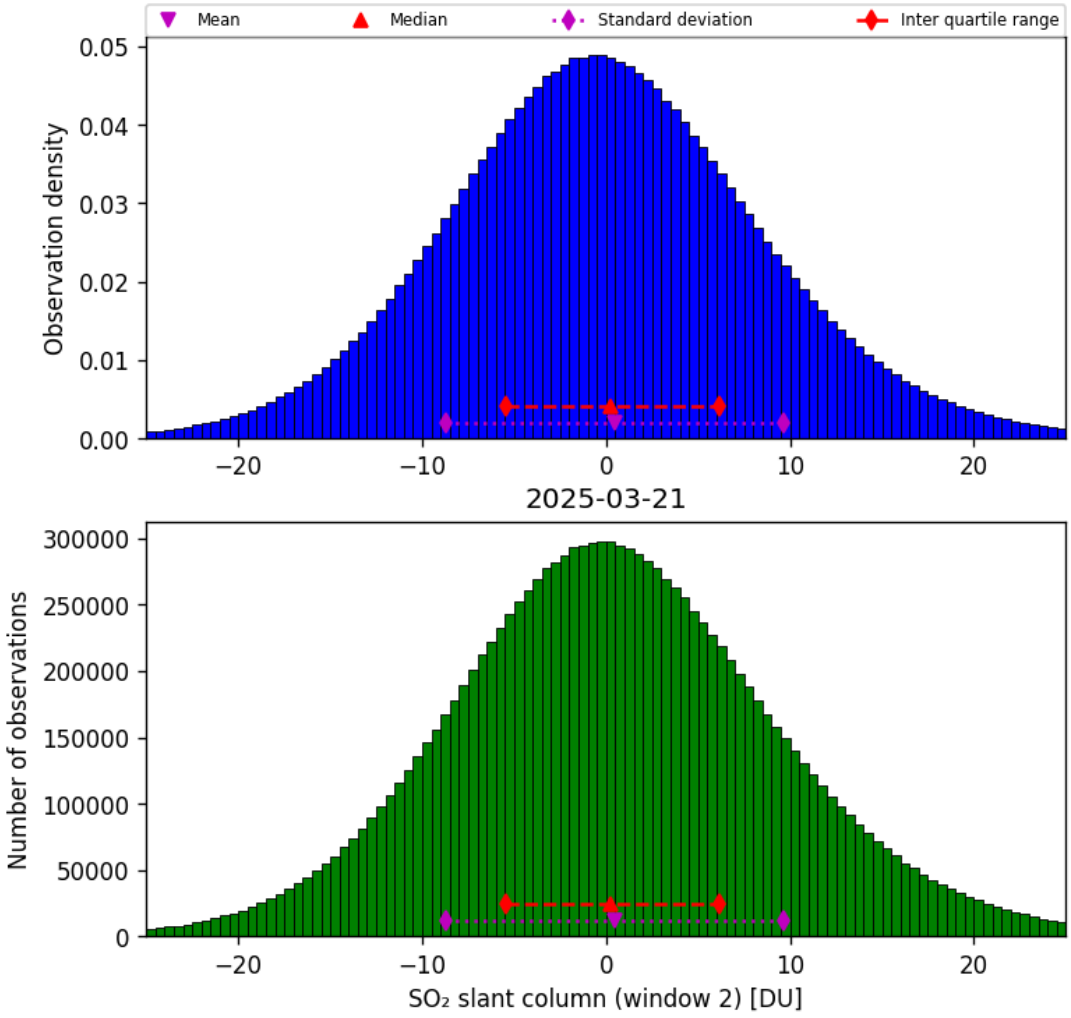

Figure 67: Histogram of "SO_2 slant column (window 2)" for 2025-03-21 to 2025-03-21

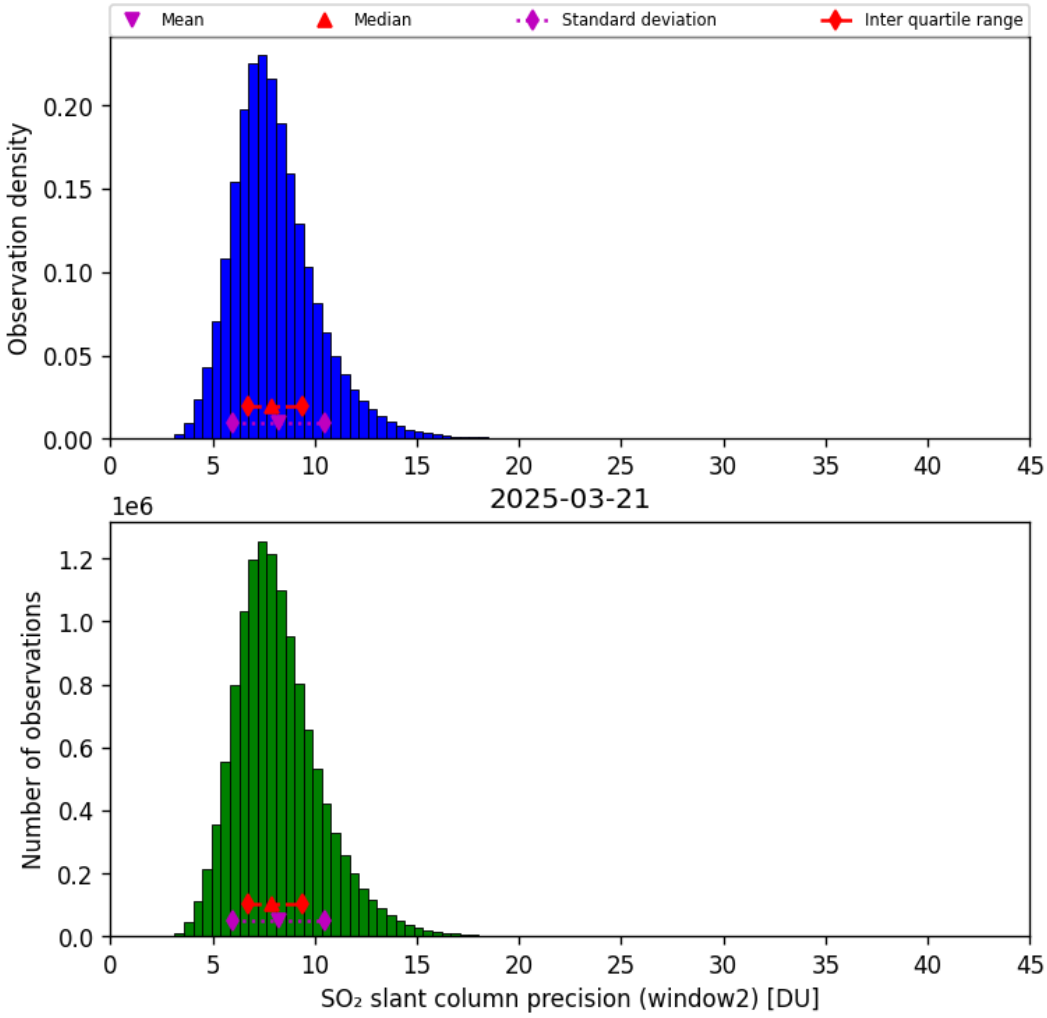

Figure 68: Histogram of "SO_2 slant column precision (window2)" for 2025-03-21 to 2025-03-21

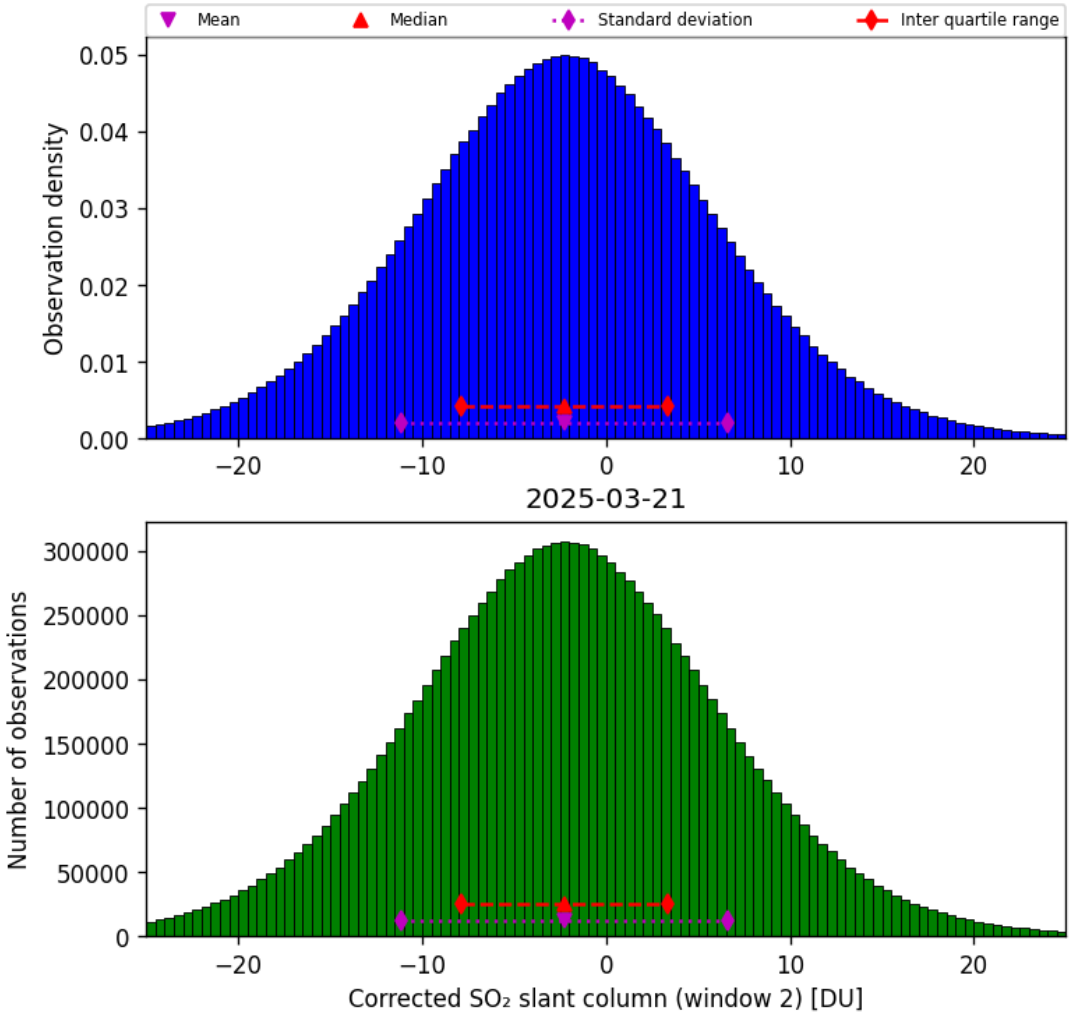

Figure 69: Histogram of "Corrected SO_2 slant column (window 2)" for 2025-03-21 to 2025-03-21

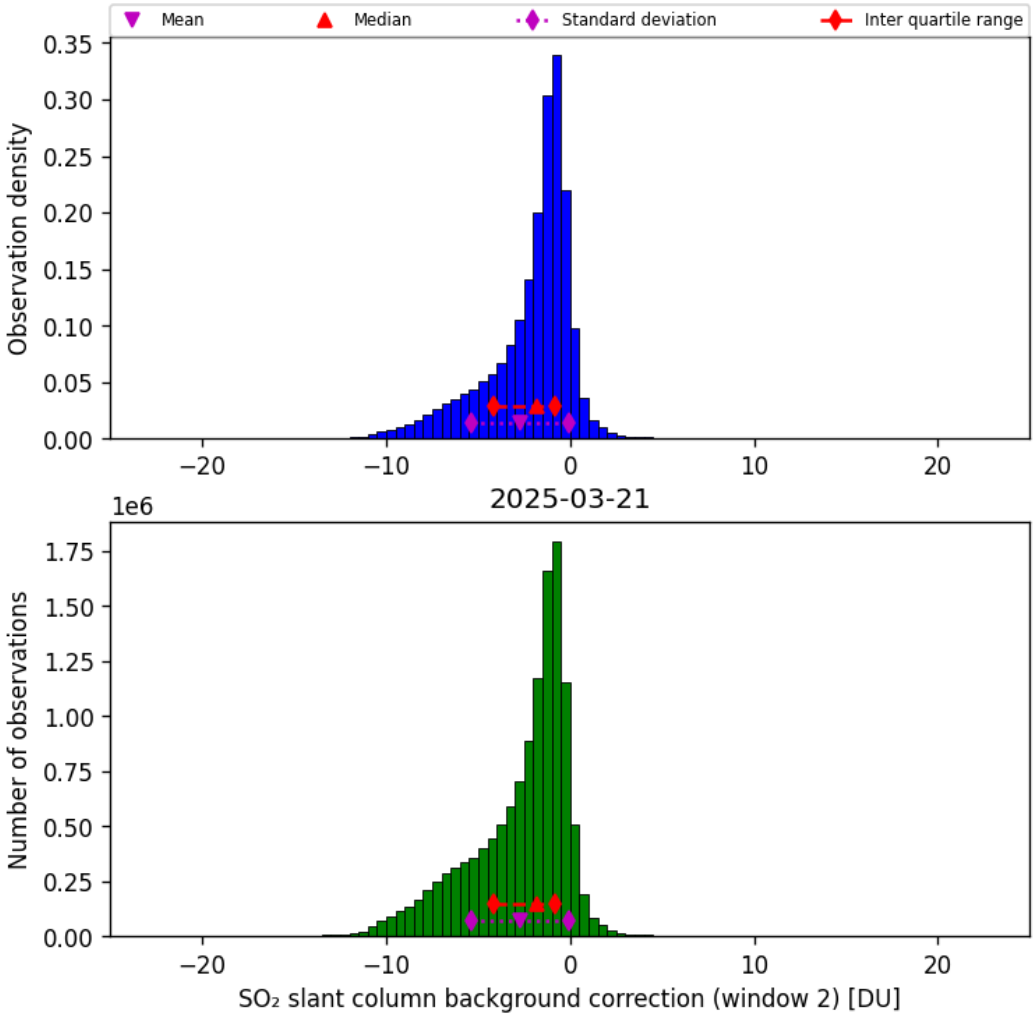

Figure 70: Histogram of "SO_2 slant column background correction (window 2)" for 2025-03-21 to 2025-03-21

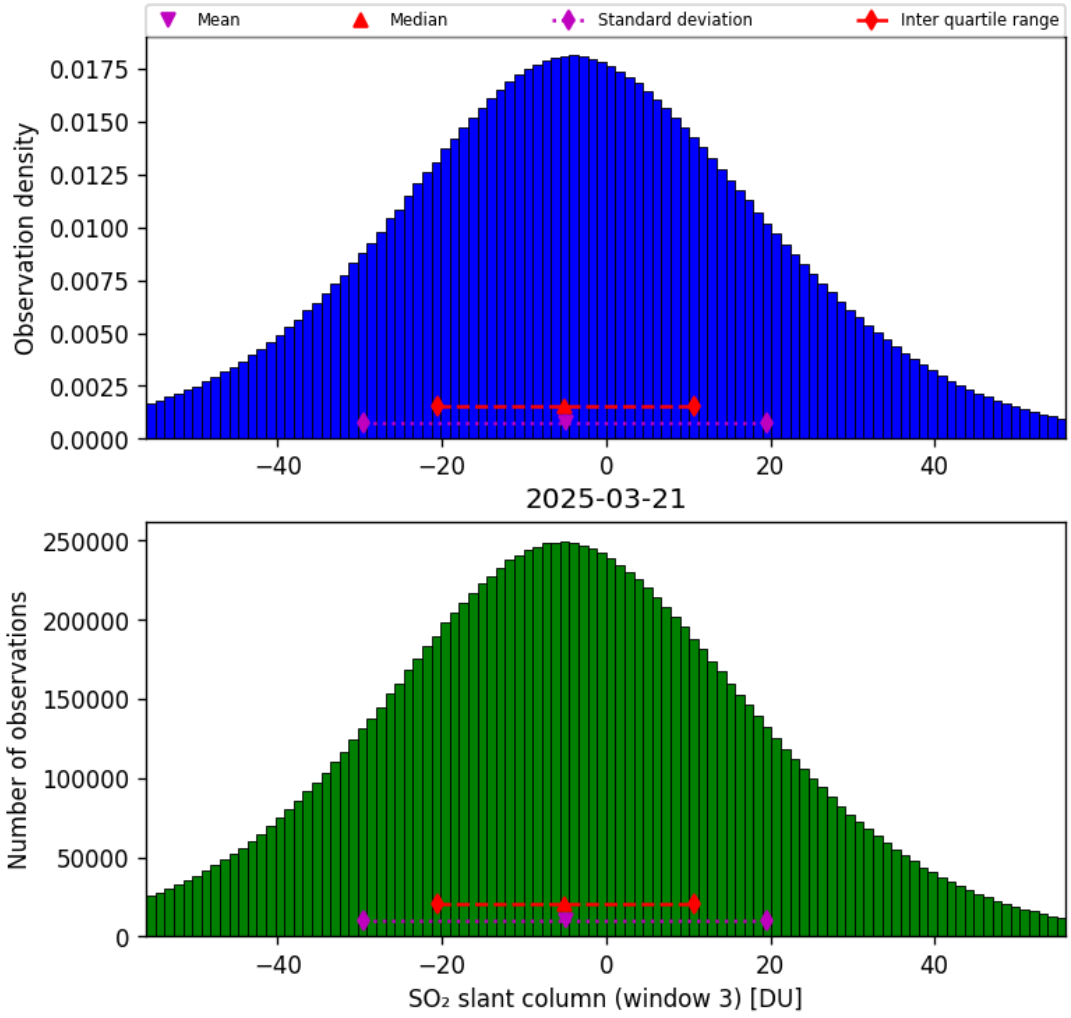

Figure 71: Histogram of "SO_2 slant column (window 3)" for 2025-03-21 to 2025-03-21

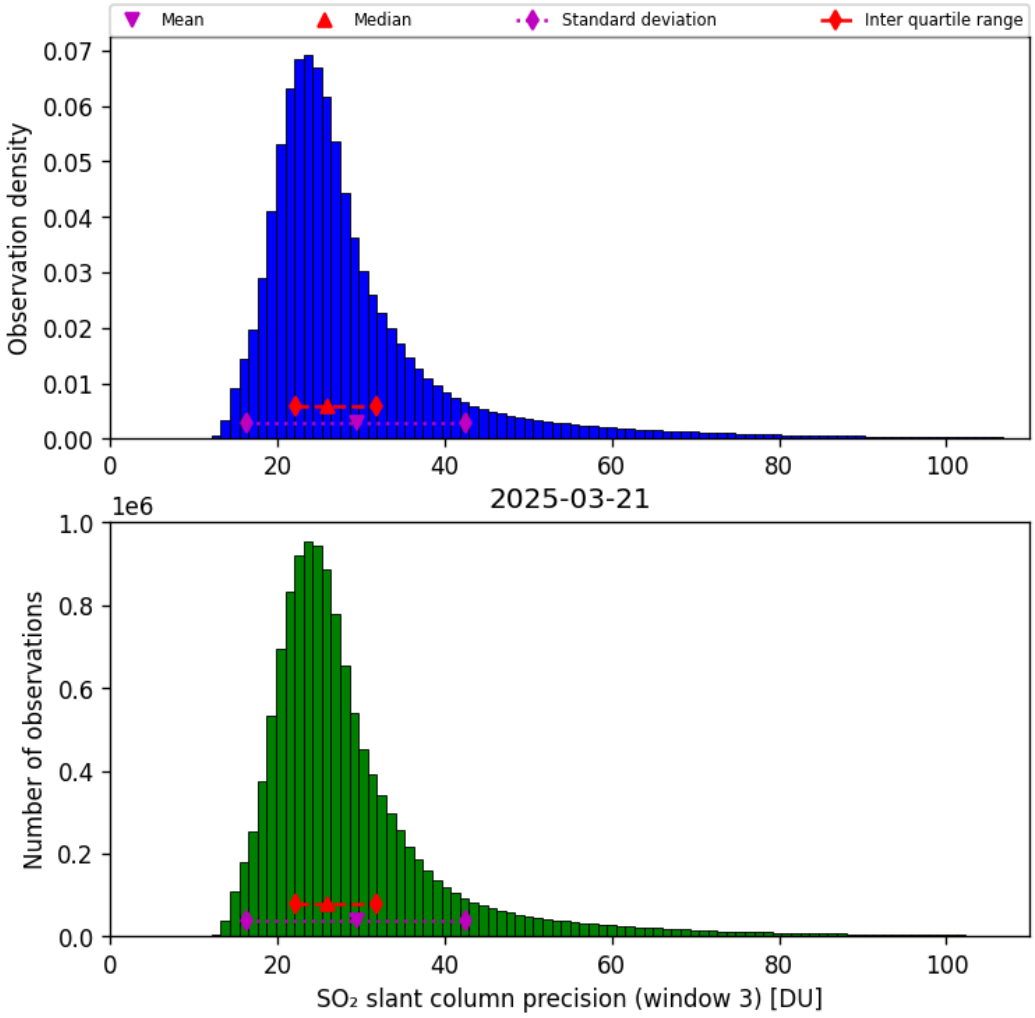

Figure 72: Histogram of "SO_2 slant column precision (window 3)" for 2025-03-21 to 2025-03-21

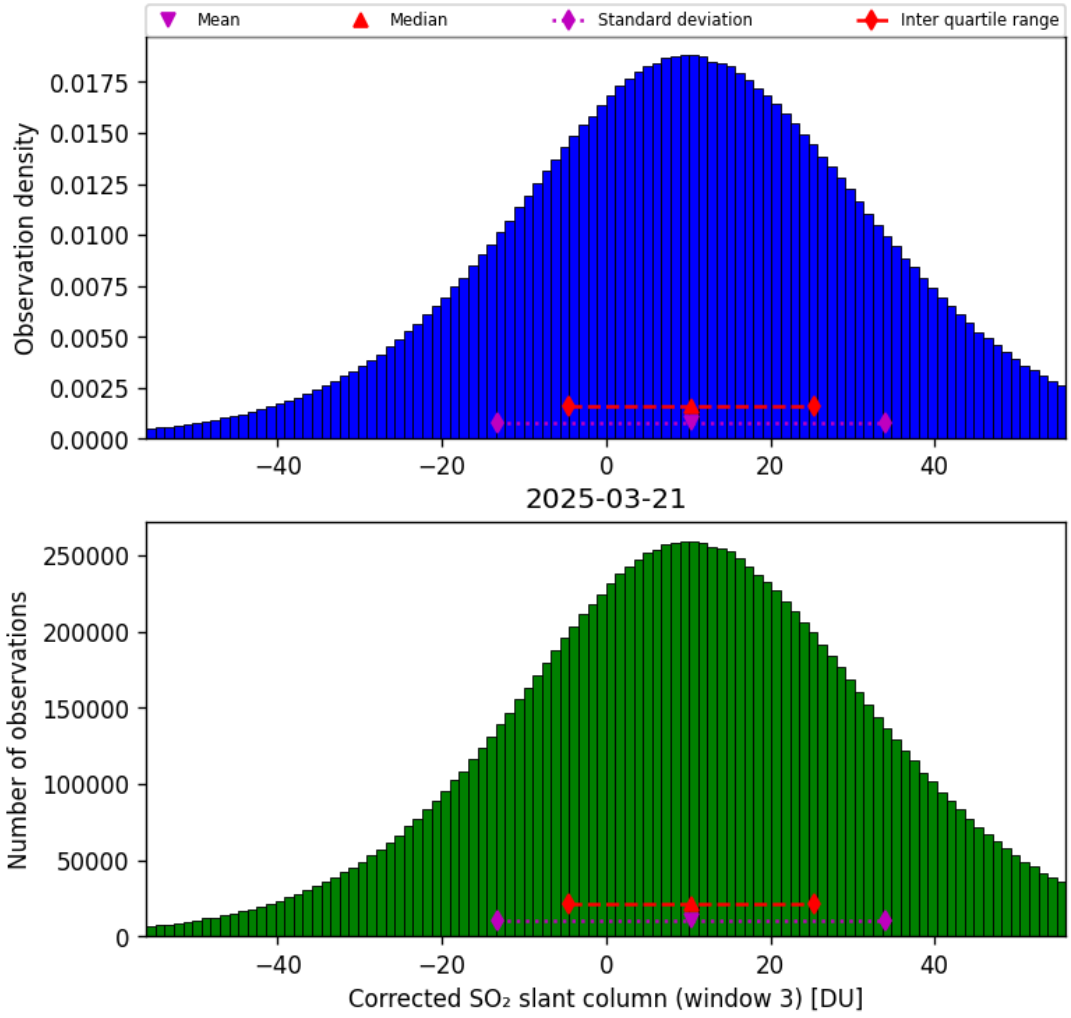

Figure 73: Histogram of "Corrected SO_2 slant column (window 3)" for 2025-03-21 to 2025-03-21

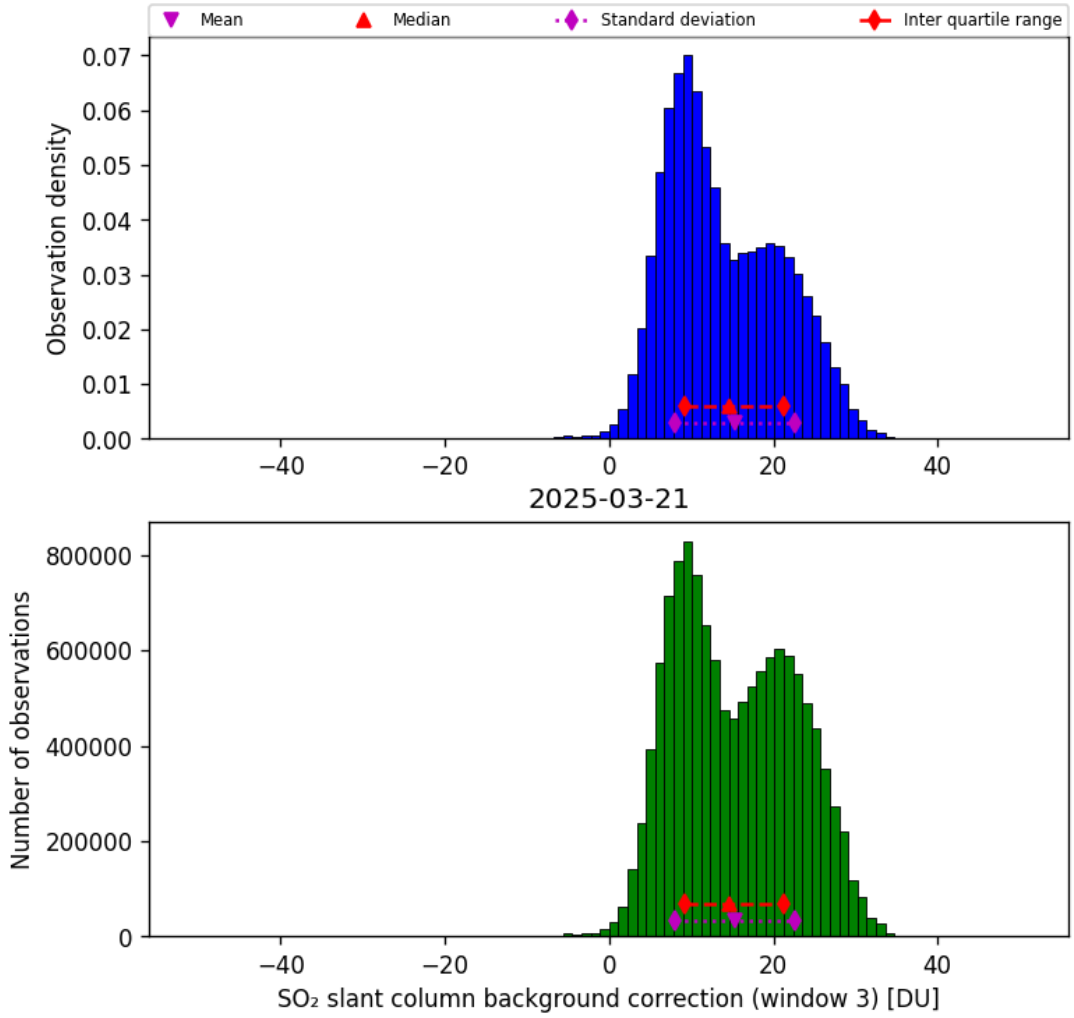

Figure 74: Histogram of "SO_2 slant column background correction (window 3)" for 2025-03-21 to 2025-03-21

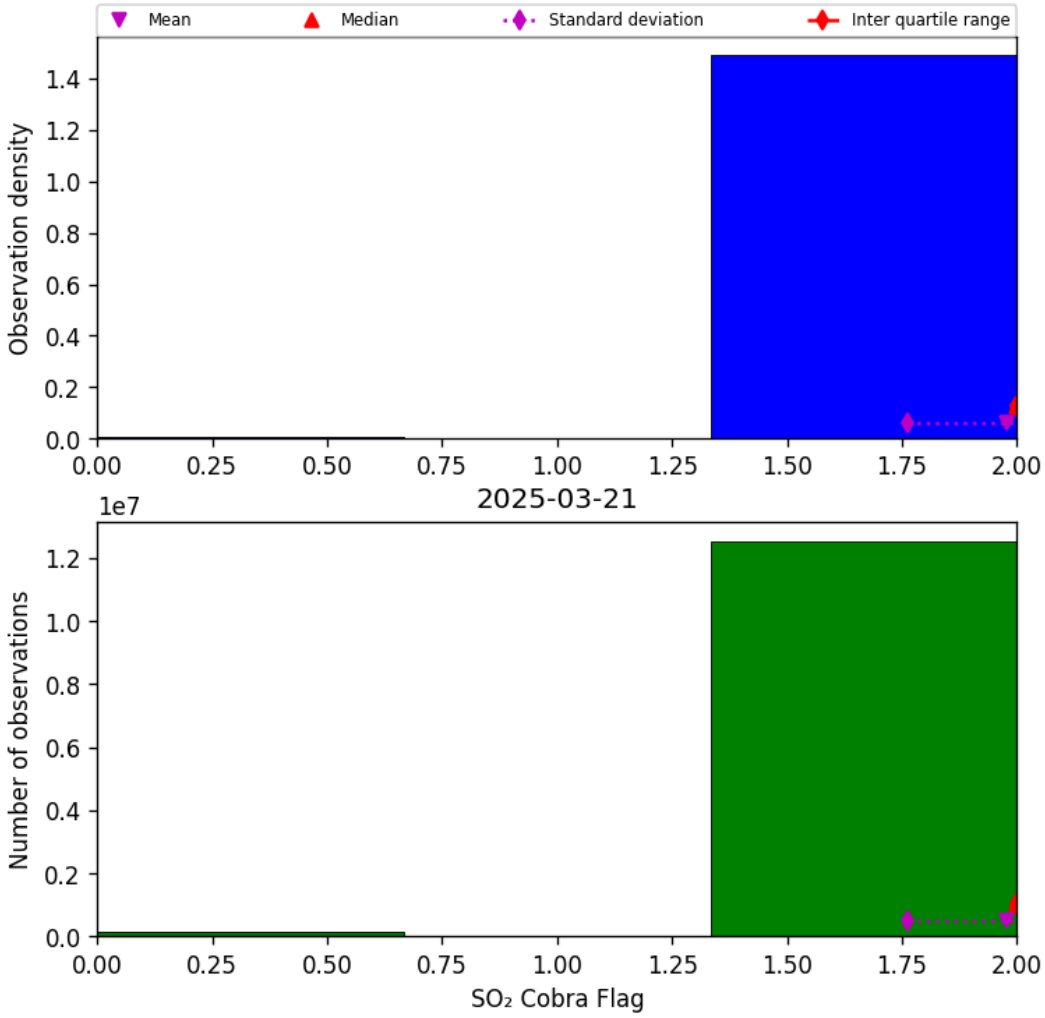

Figure 75: Histogram of "SO_2 Cobra Flag" for 2025-03-21 to 2025-03-21

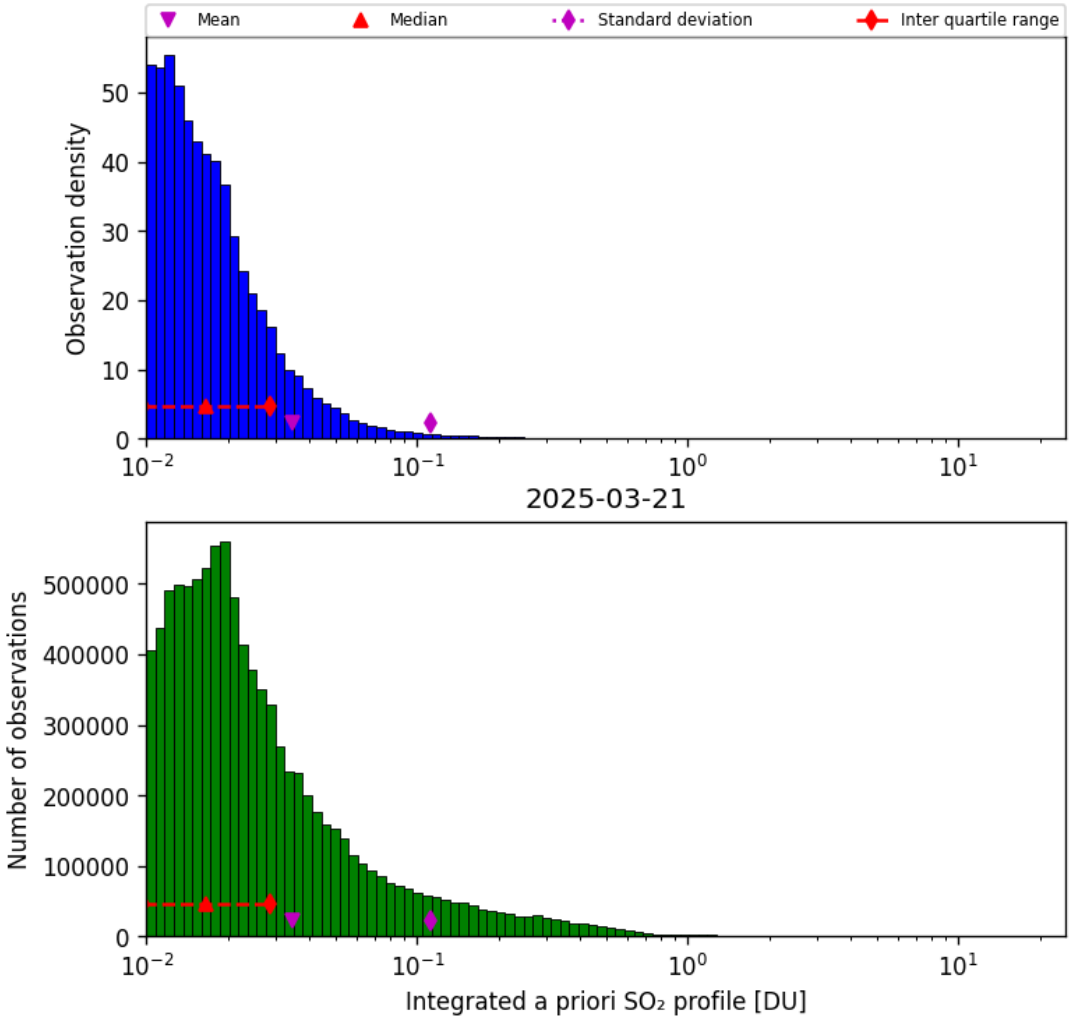

Figure 76: Histogram of “Integrated a priori SO_2 profile” for 2025-03-21 to 2025-03-21

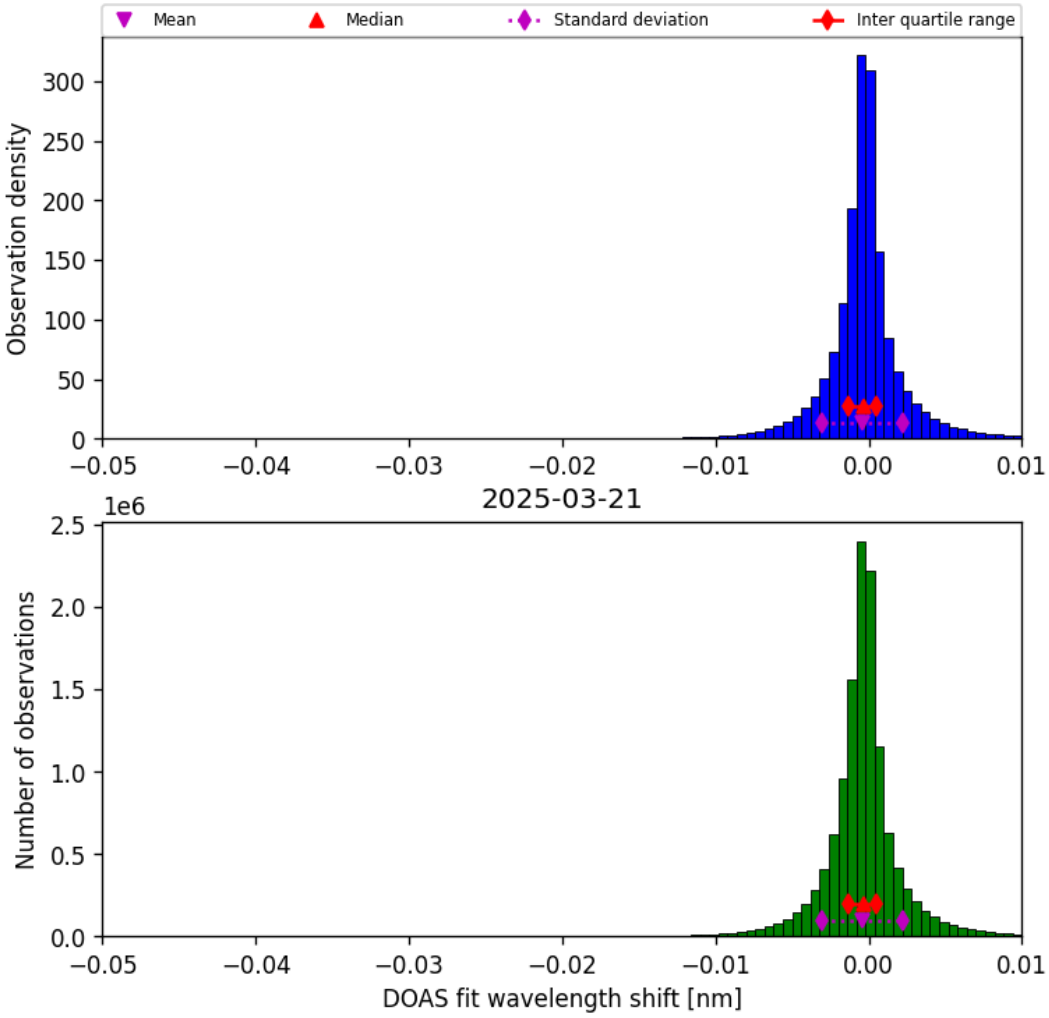

Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-03-21 to 2025-03-21

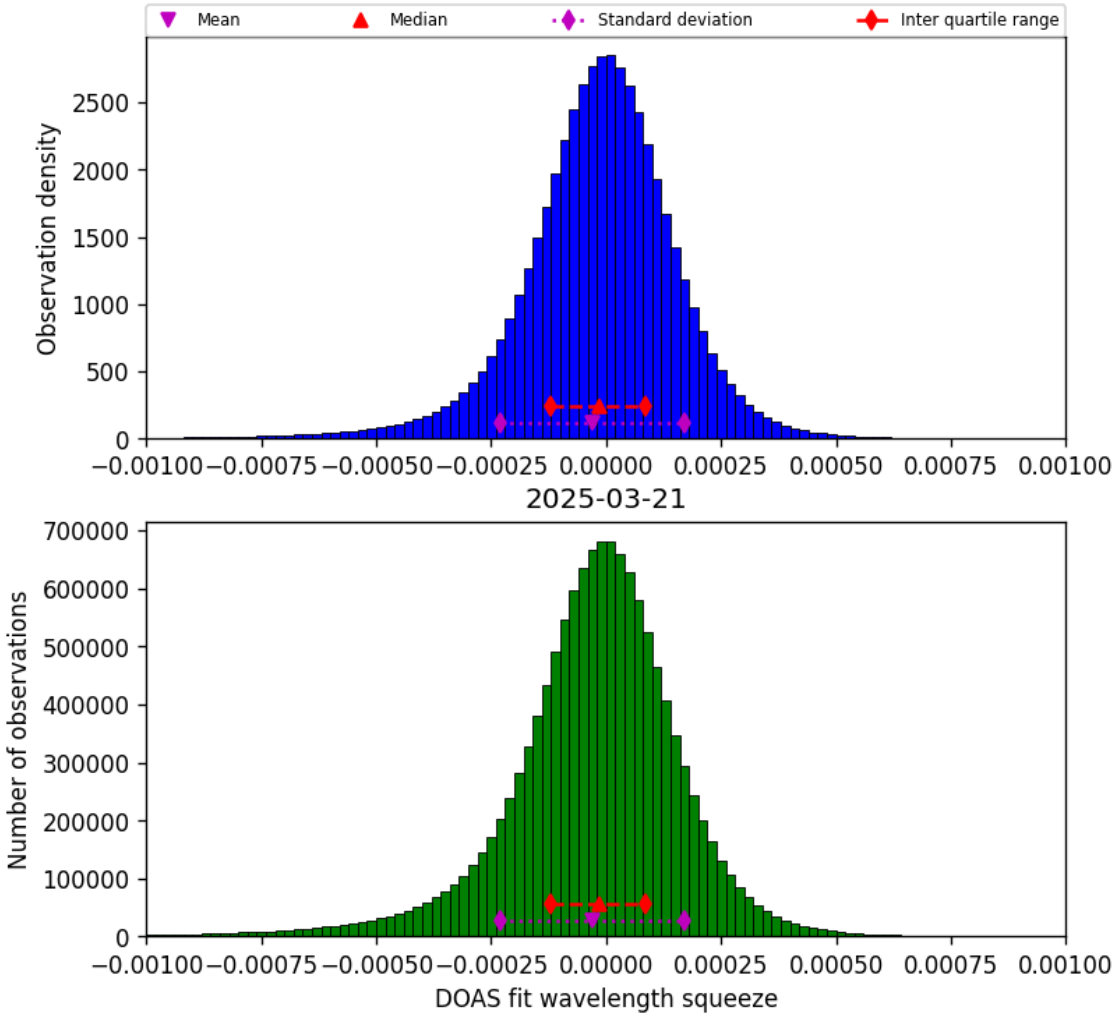

Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-03-21 to 2025-03-21

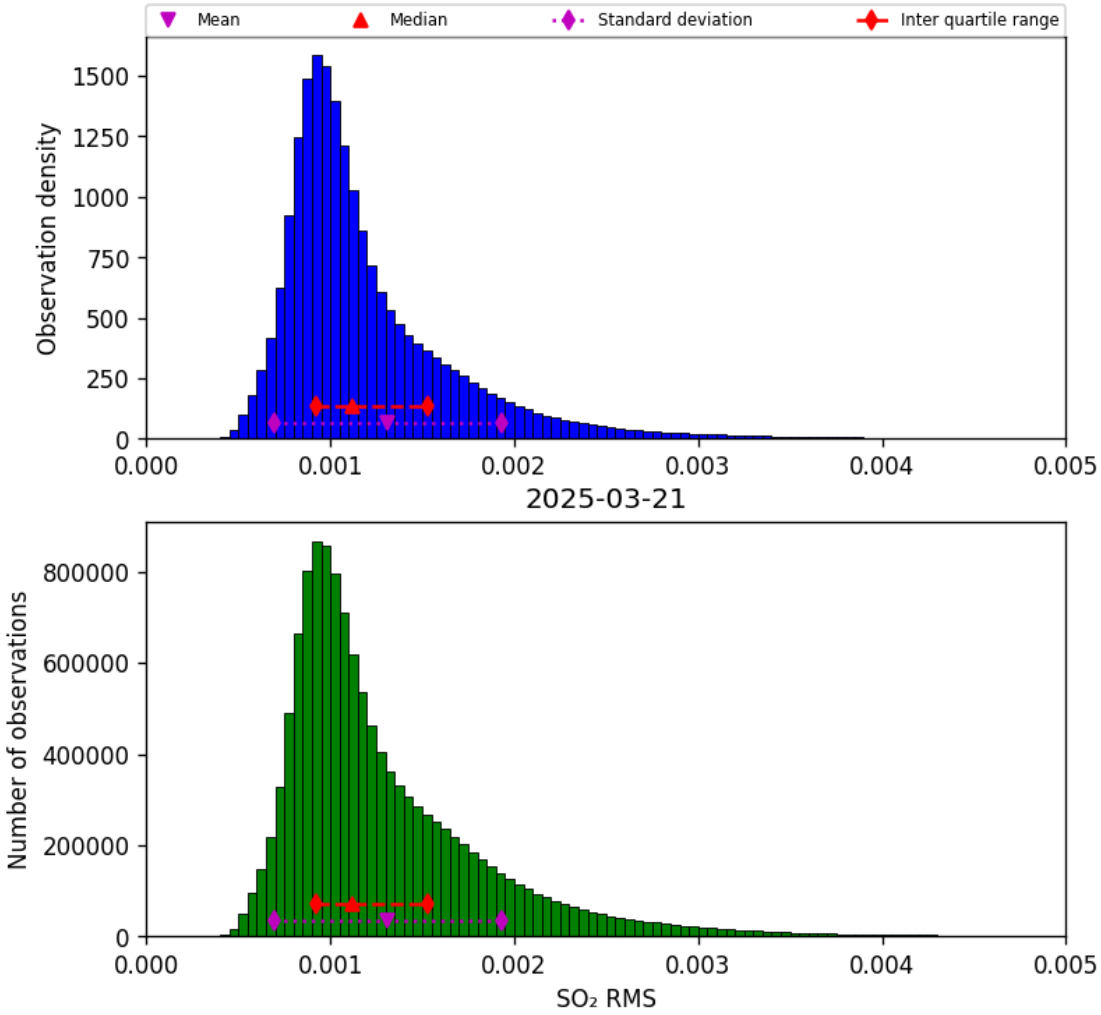

Figure 79: Histogram of "SO_2 RMS" for 2025-03-21 to 2025-03-21

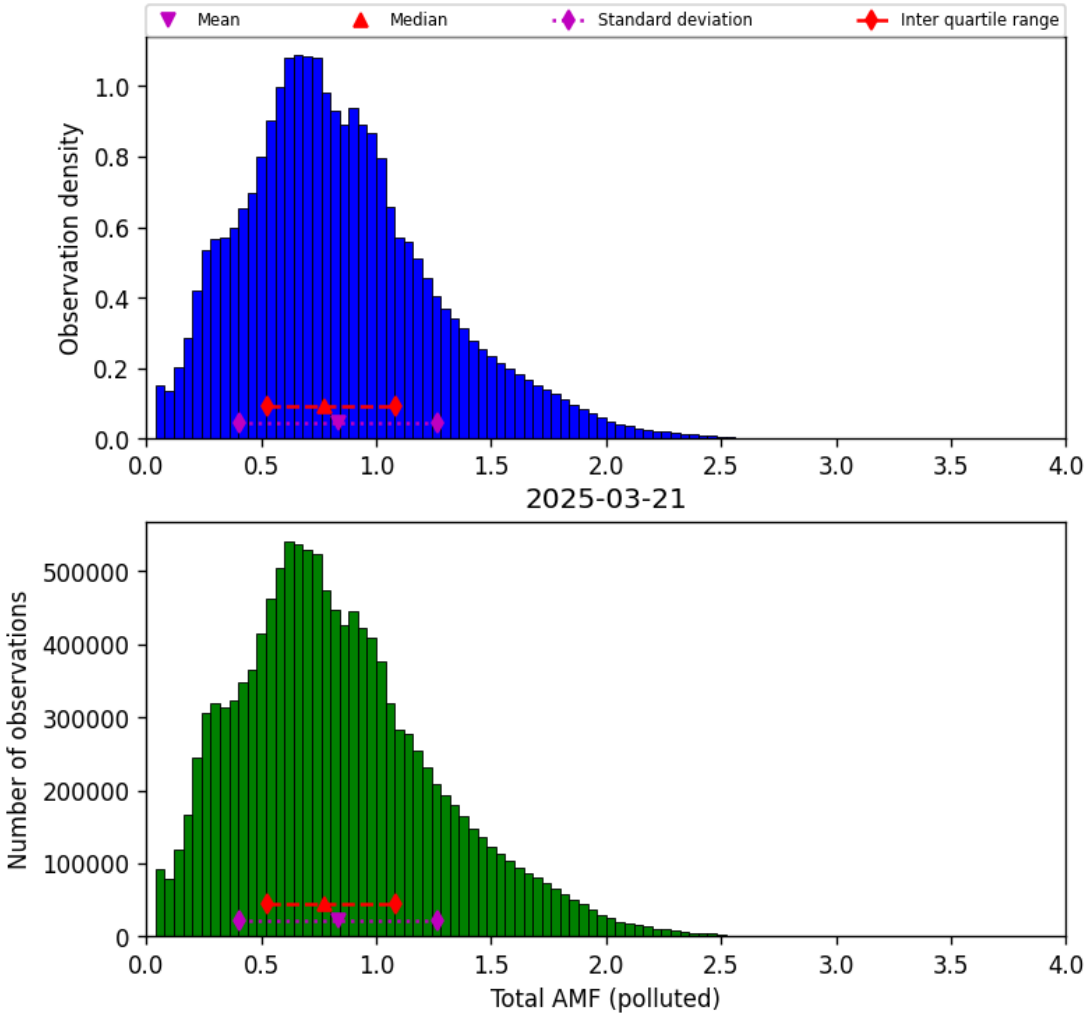

Figure 80: Histogram of “Total AMF (polluted)” for 2025-03-21 to 2025-03-21

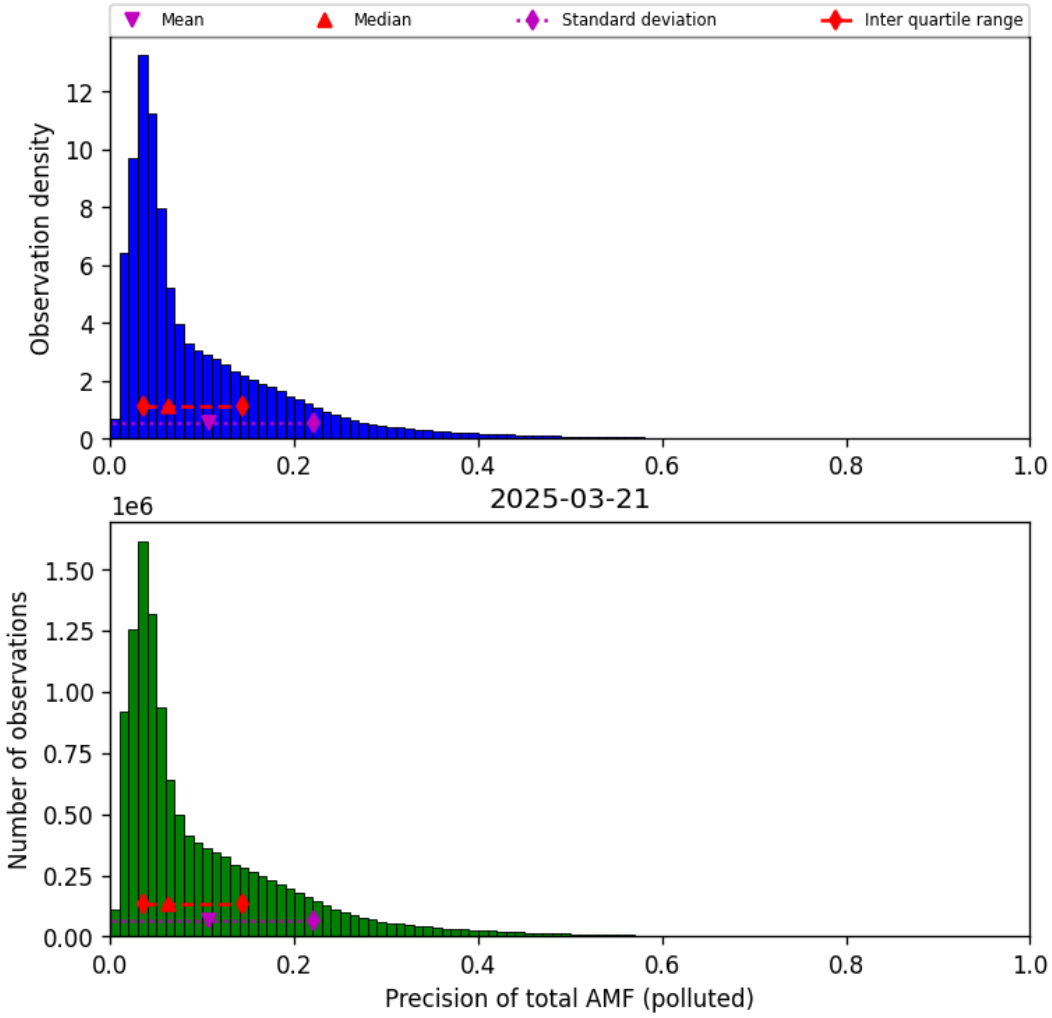

Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-03-21 to 2025-03-21

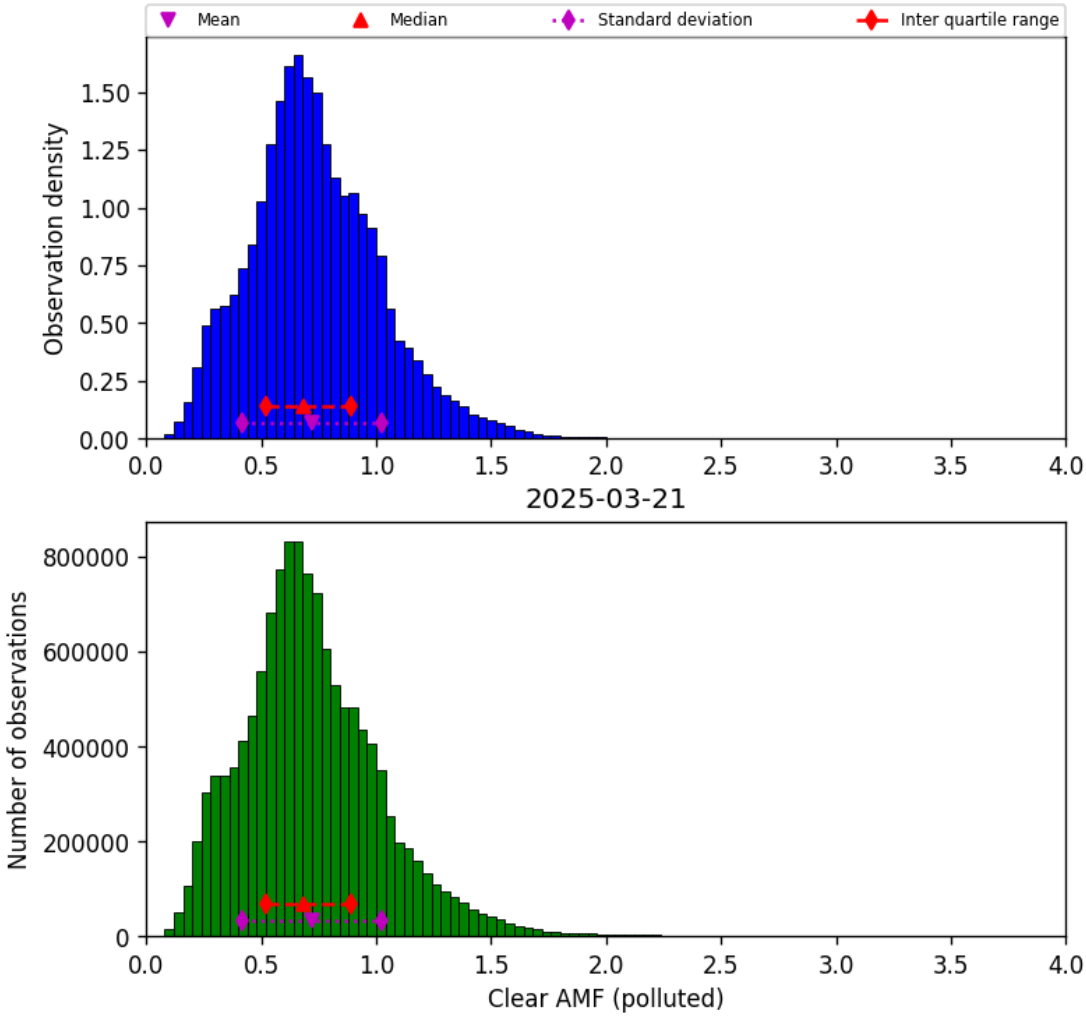

Figure 82: Histogram of “Clear AMF (polluted)” for 2025-03-21 to 2025-03-21

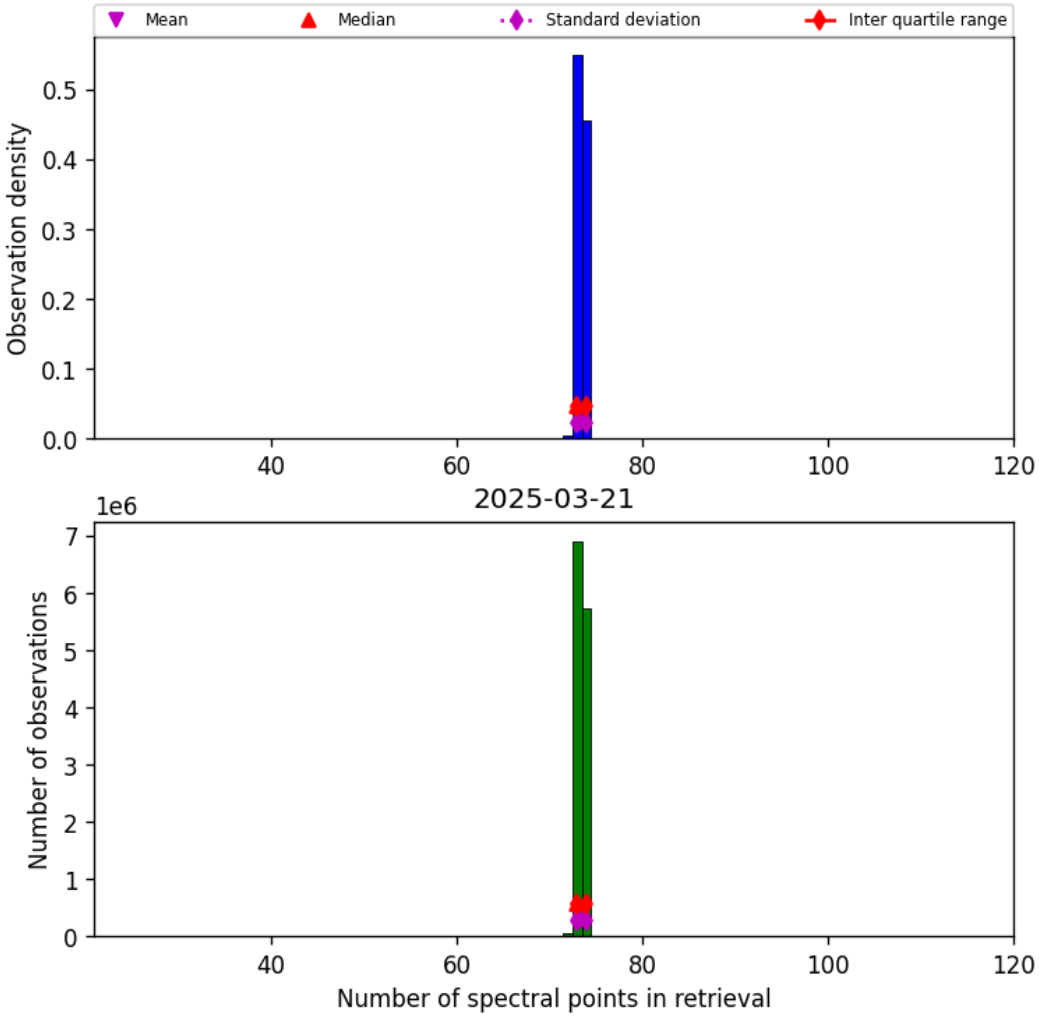

Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-03-21 to 2025-03-21

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.

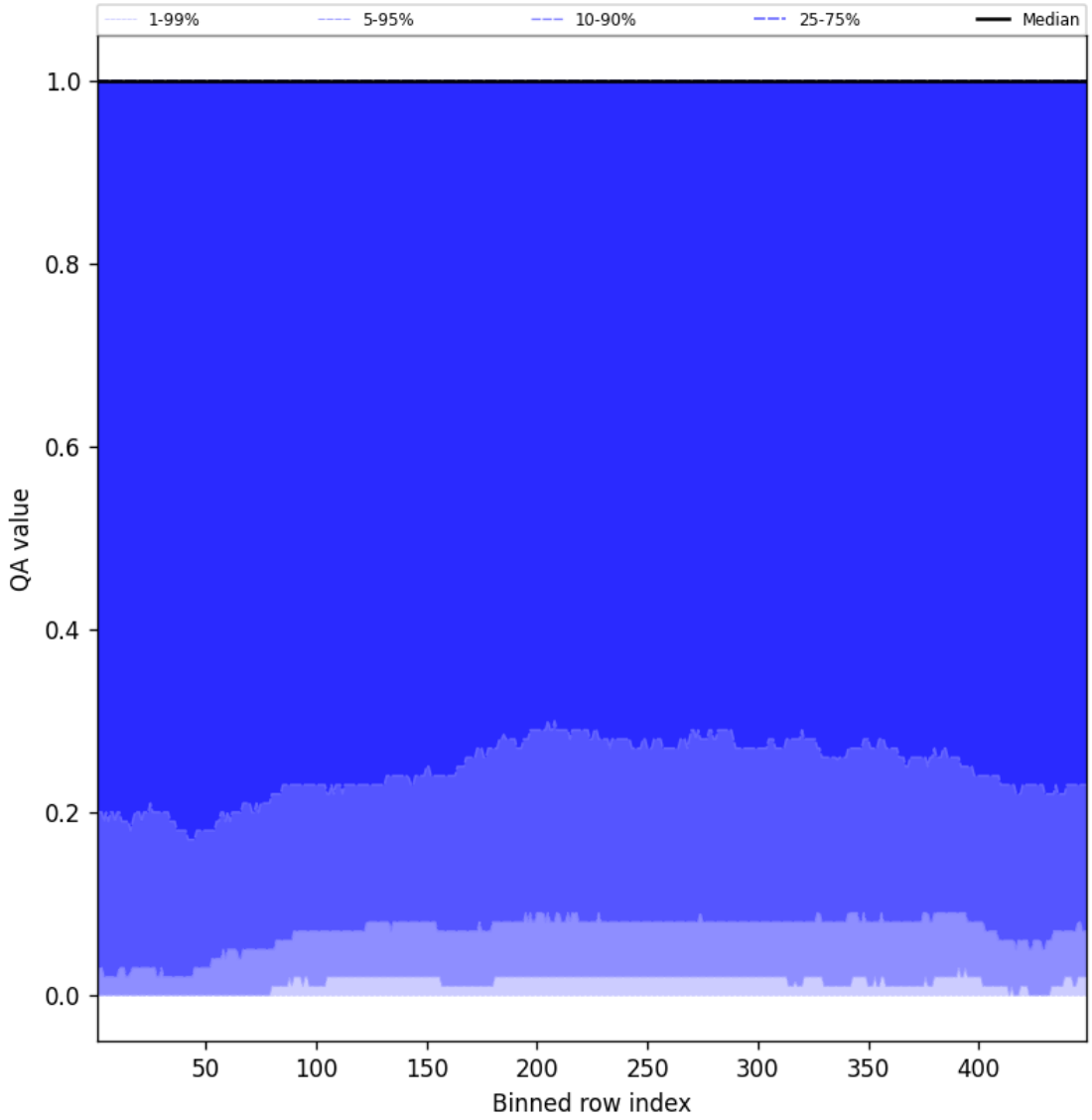

Figure 84: Along track statistics of “QA value” for 2025-03-21 to 2025-03-21

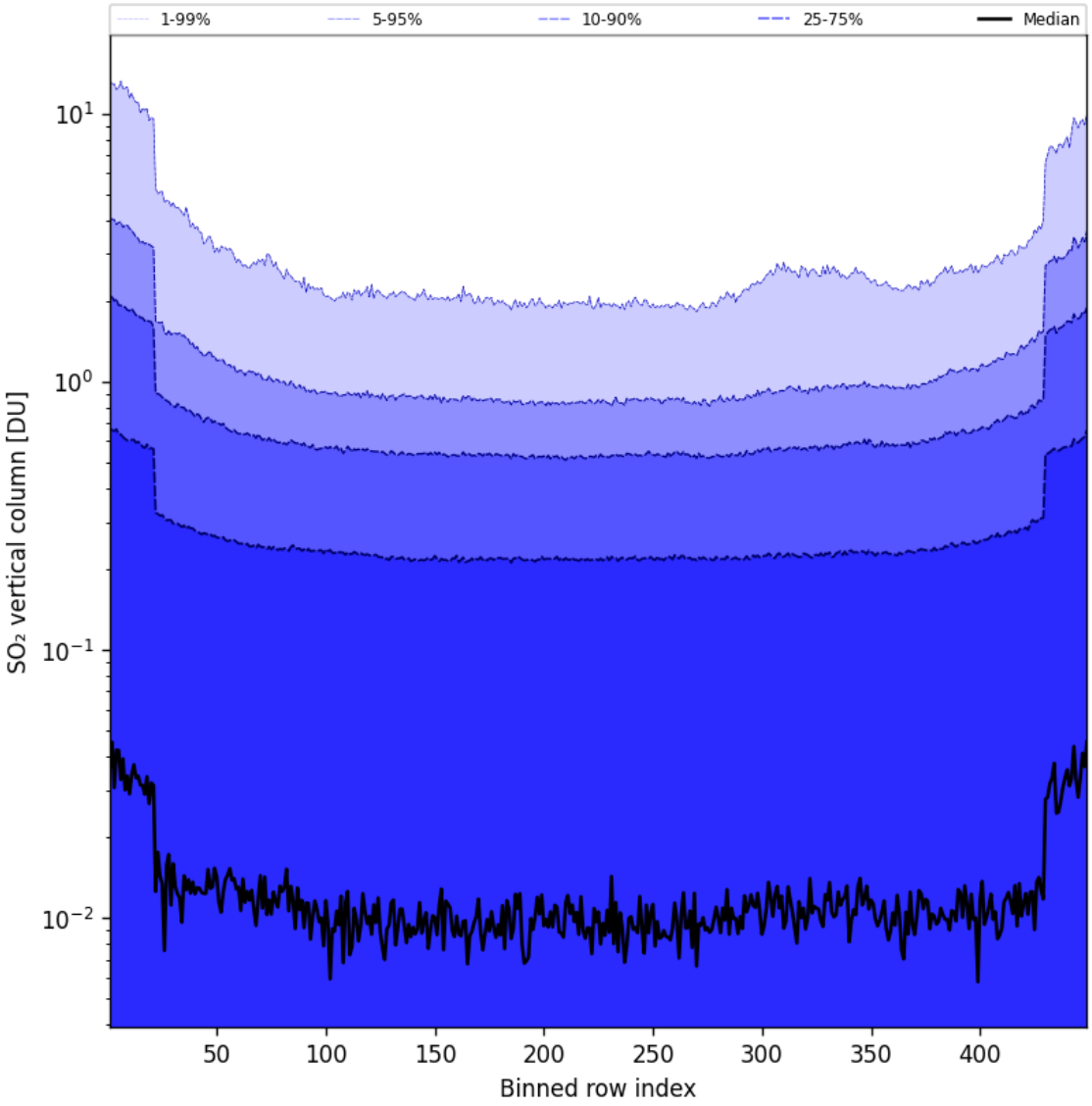

Figure 85: Along track statistics of "SO_2 vertical column" for 2025-03-21 to 2025-03-21

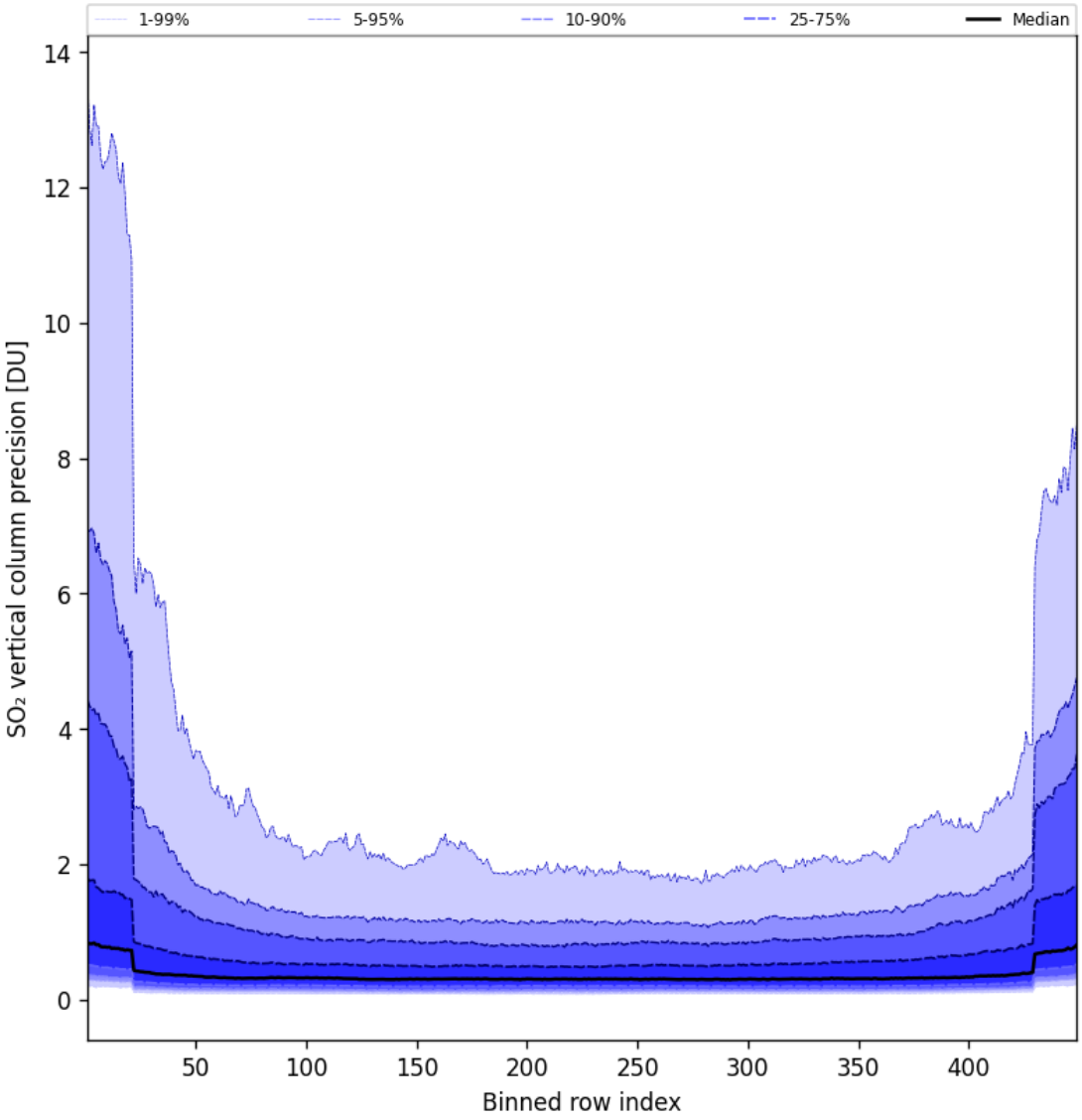

Figure 86: Along track statistics of "SO_2 vertical column precision" for 2025-03-21 to 2025-03-21

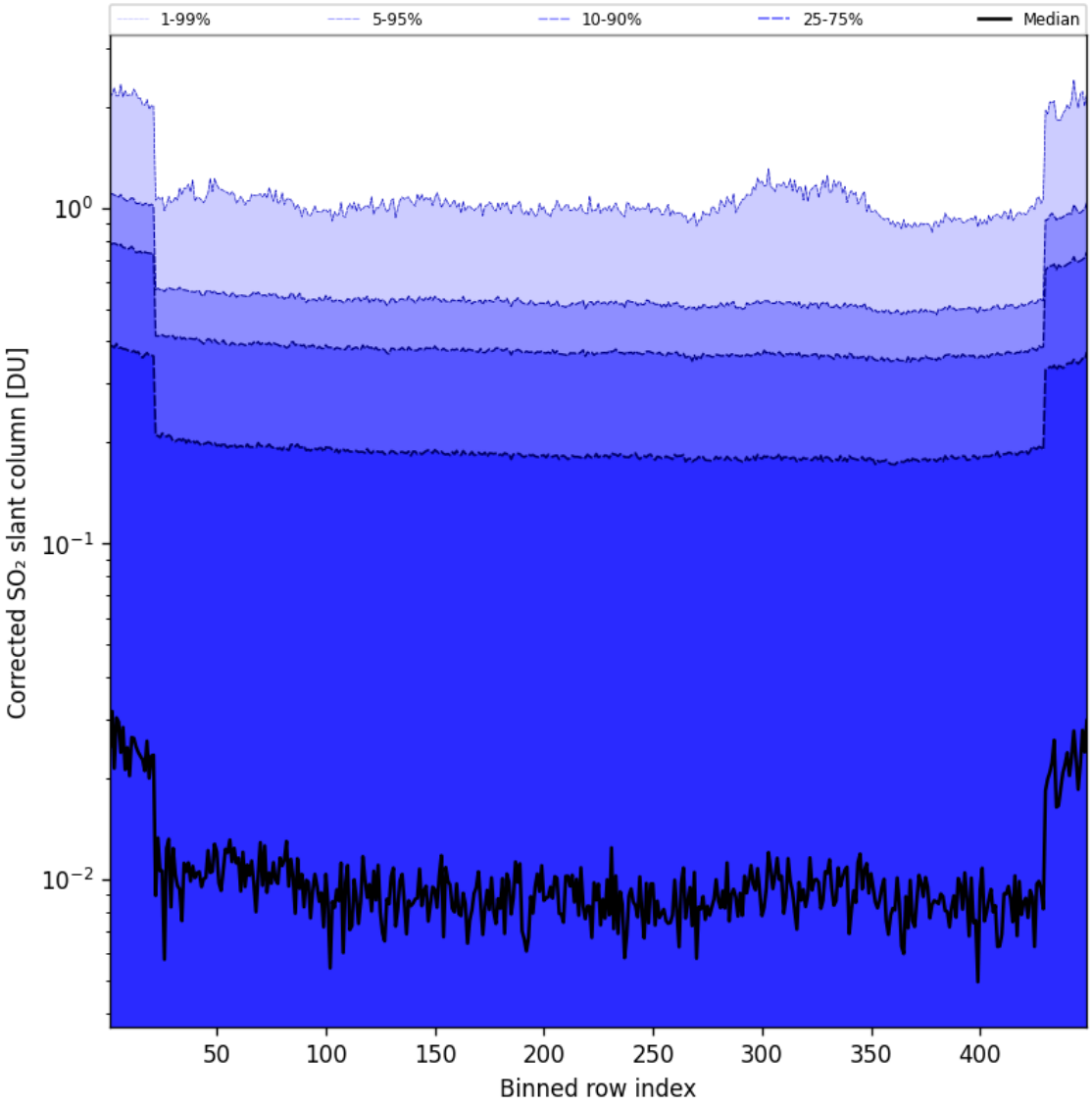

Figure 87: Along track statistics of "Corrected SO_2 slant column" for 2025-03-21 to 2025-03-21

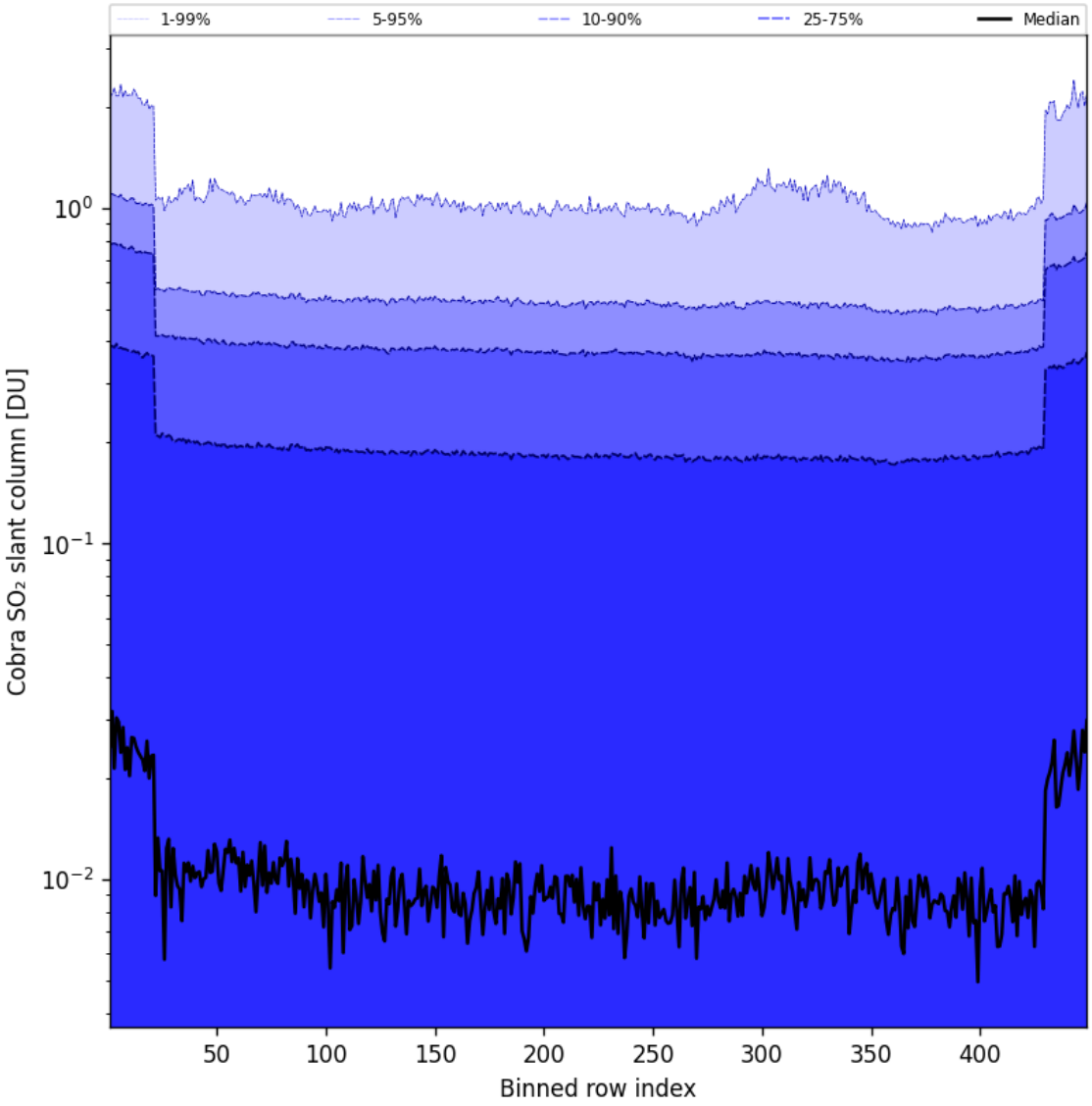

Figure 88: Along track statistics of "Cobra SO_2 slant column" for 2025-03-21 to 2025-03-21

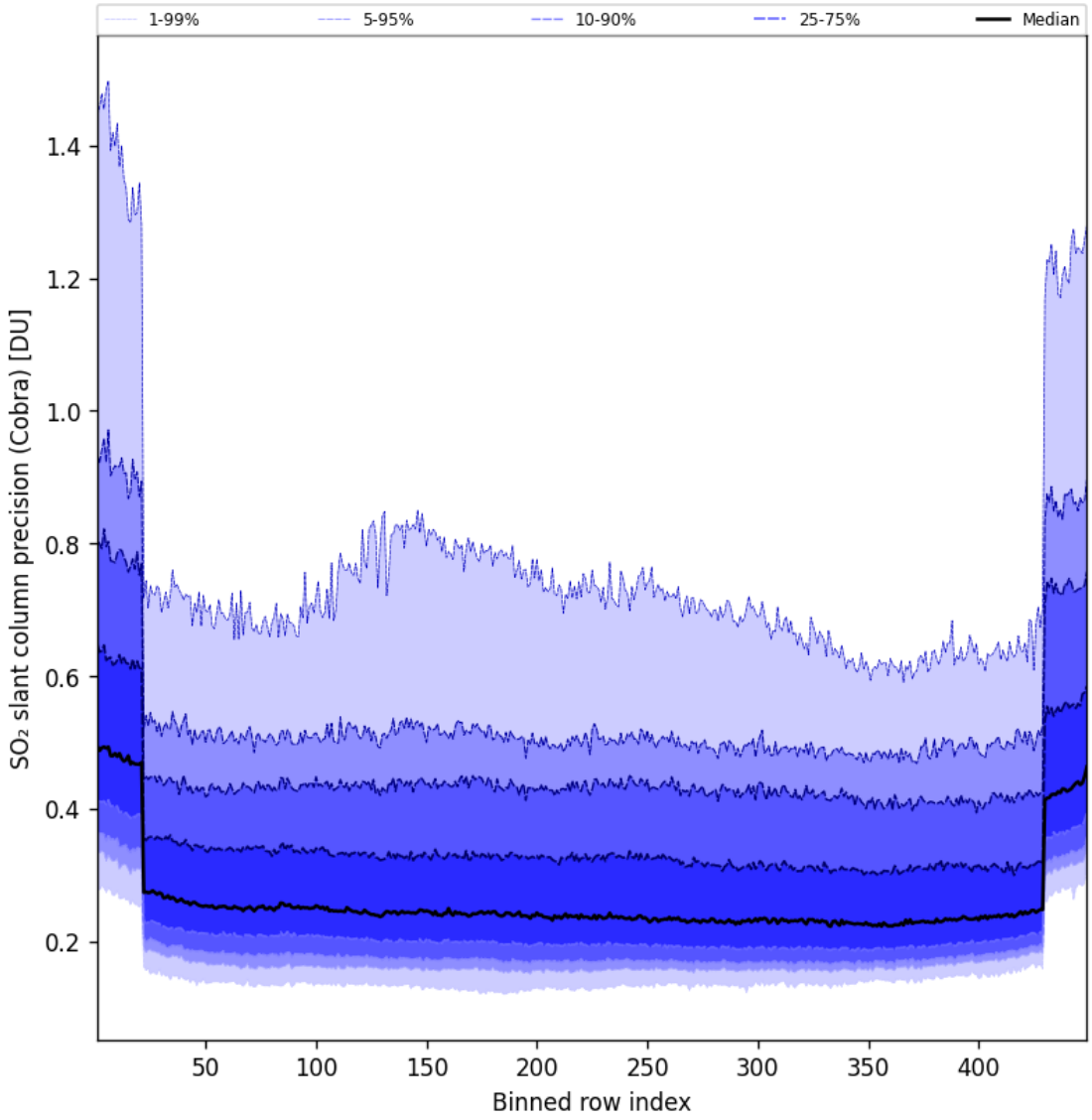

Figure 89: Along track statistics of "SO_2 slant column precision (Cobra)" for 2025-03-21 to 2025-03-21

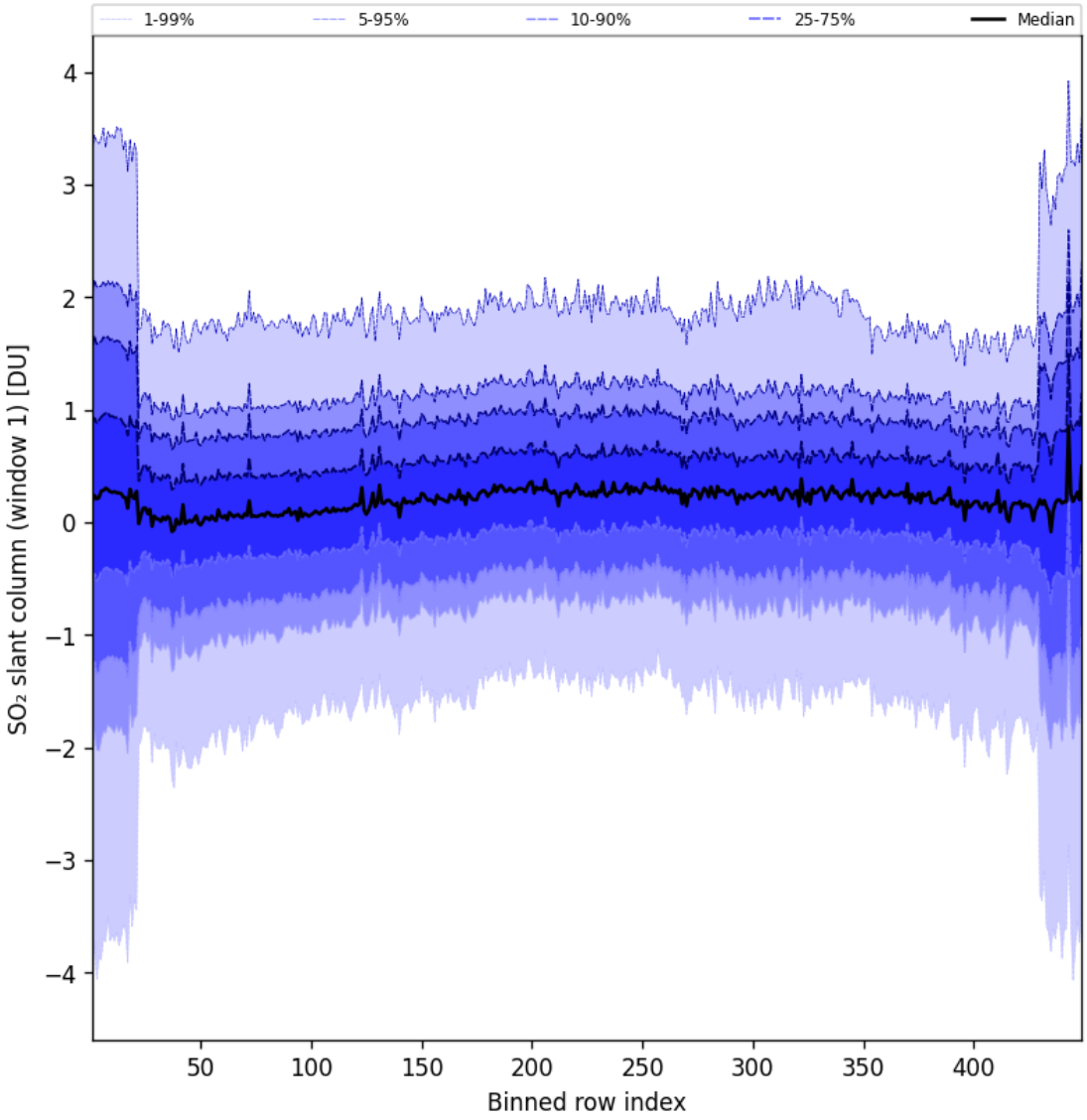

Figure 90: Along track statistics of "SO_2 slant column (window 1)" for 2025-03-21 to 2025-03-21

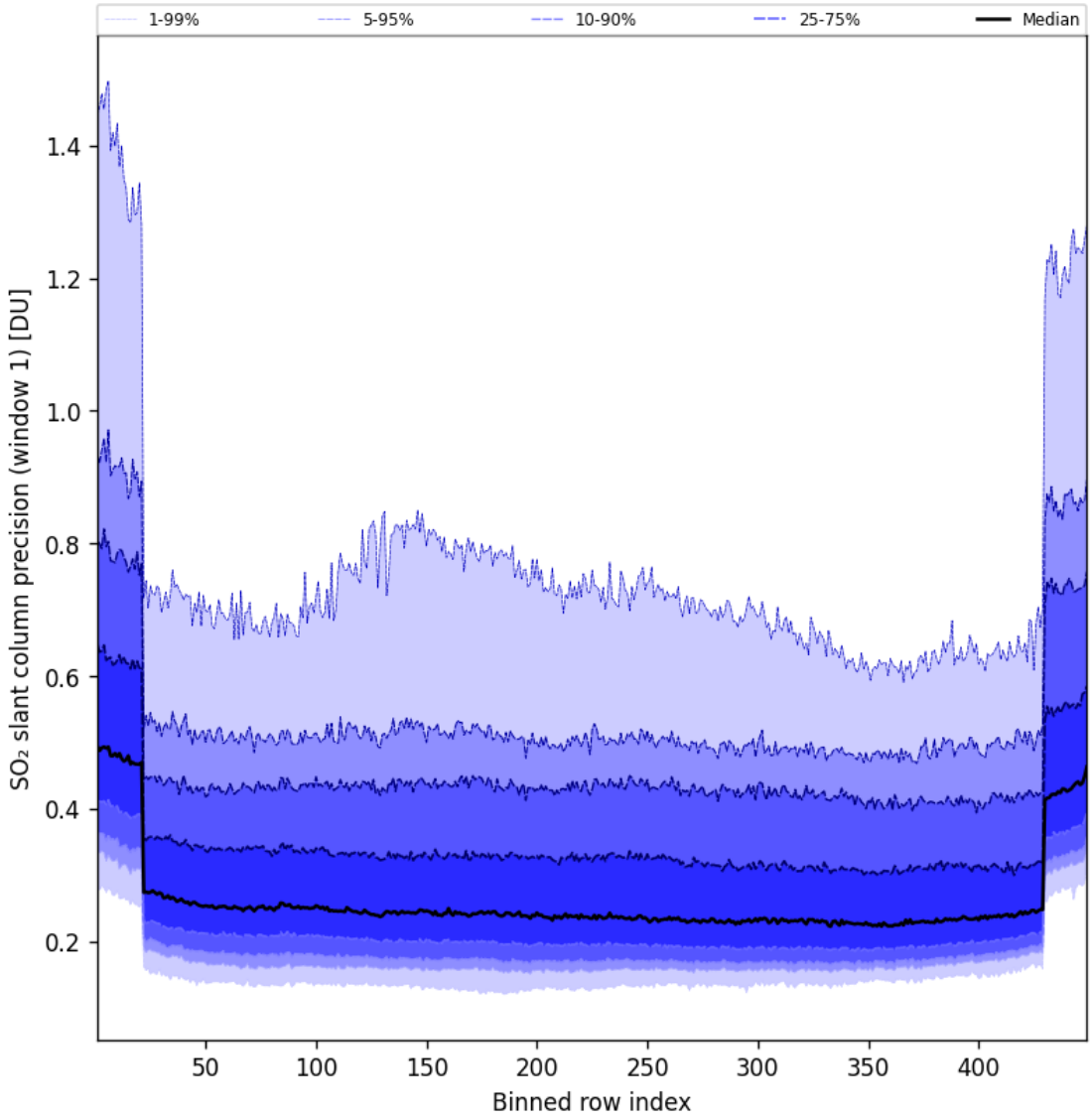

Figure 91: Along track statistics of "SO_2 slant column precision (window 1)" for 2025-03-21 to 2025-03-21

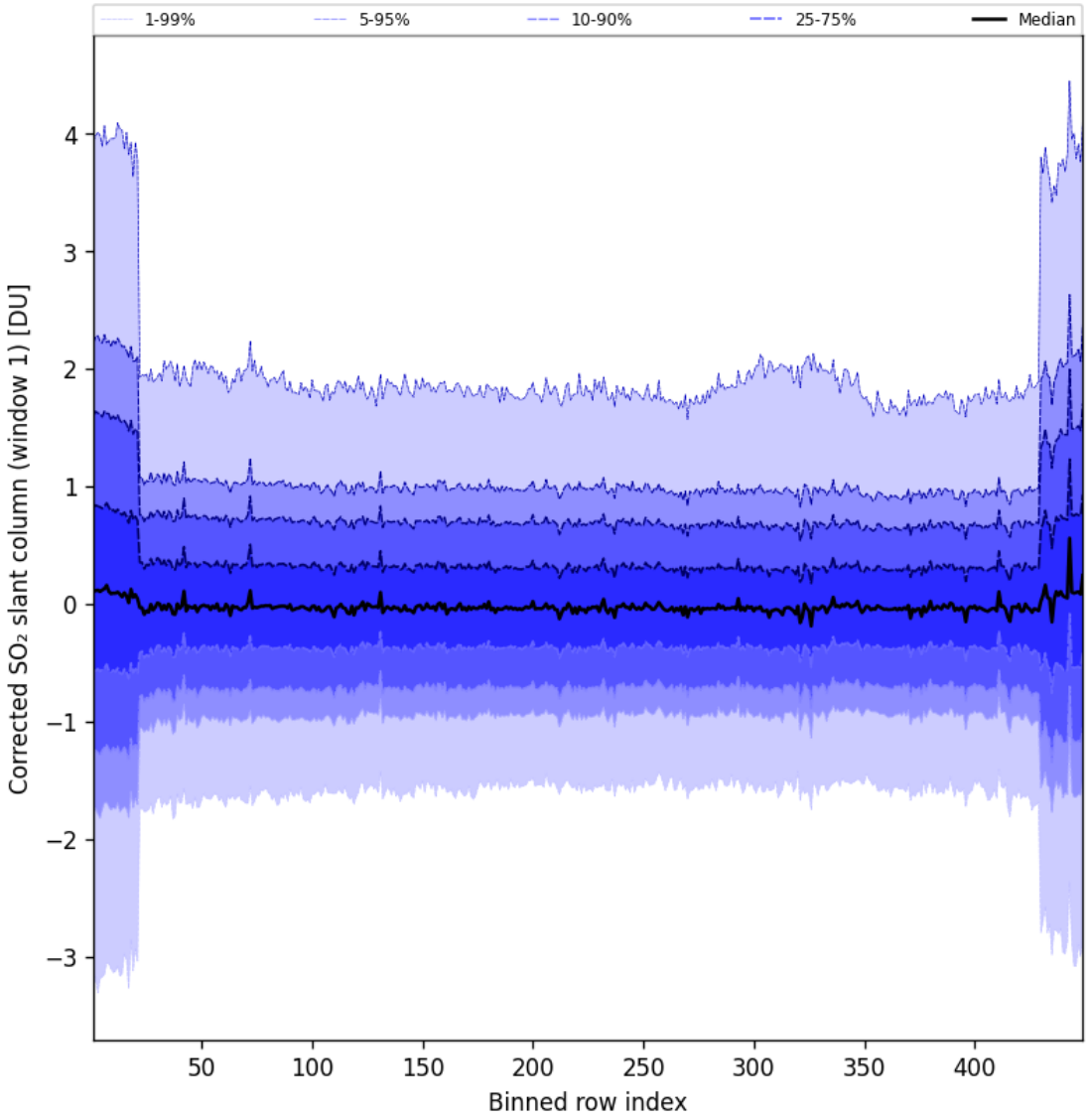

Figure 92: Along track statistics of “Corrected SO_2 slant column (window 1)” for 2025-03-21 to 2025-03-21

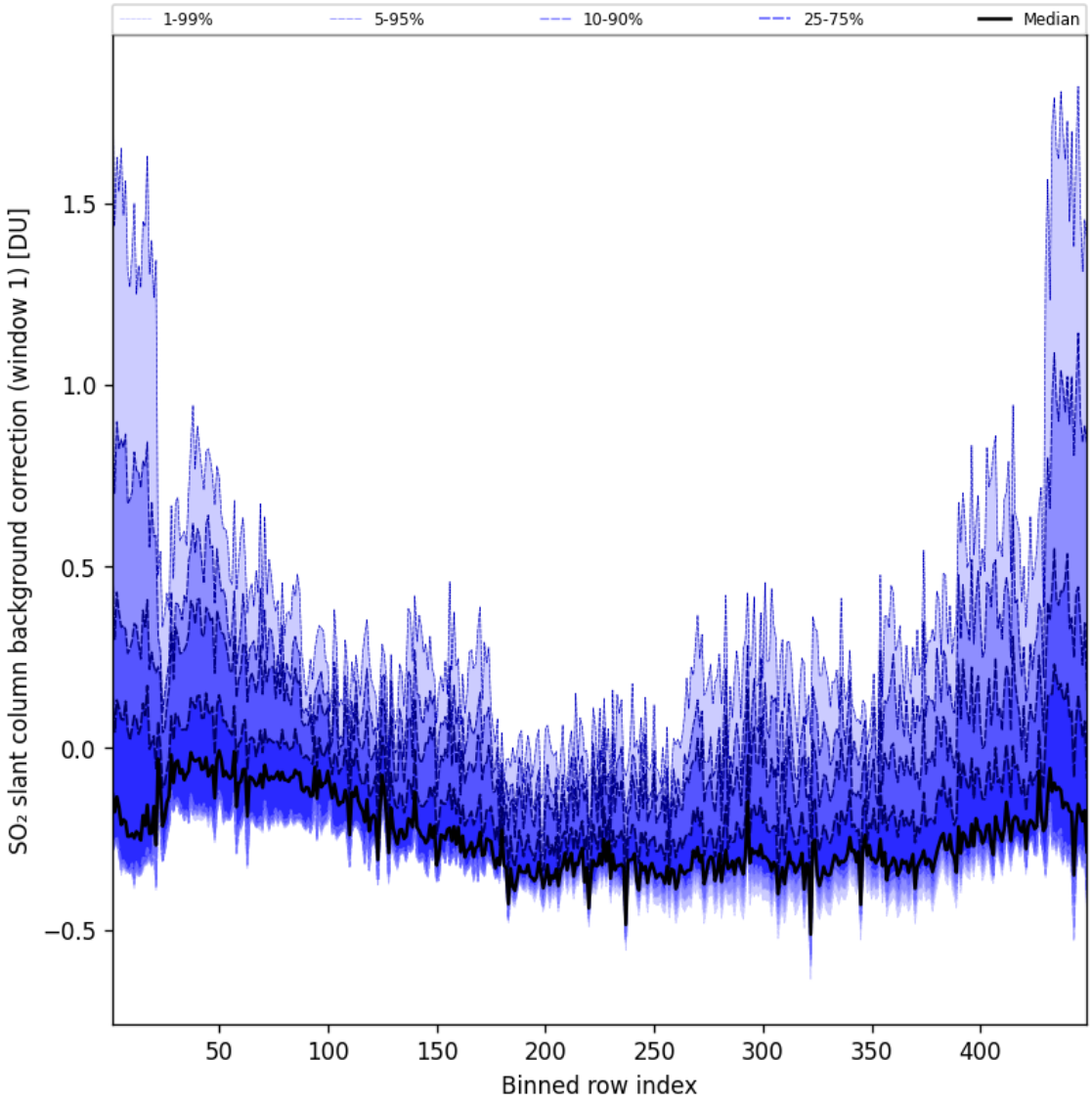

Figure 93: Along track statistics of "SO_2 slant column background correction (window 1)" for 2025-03-21 to 2025-03-21

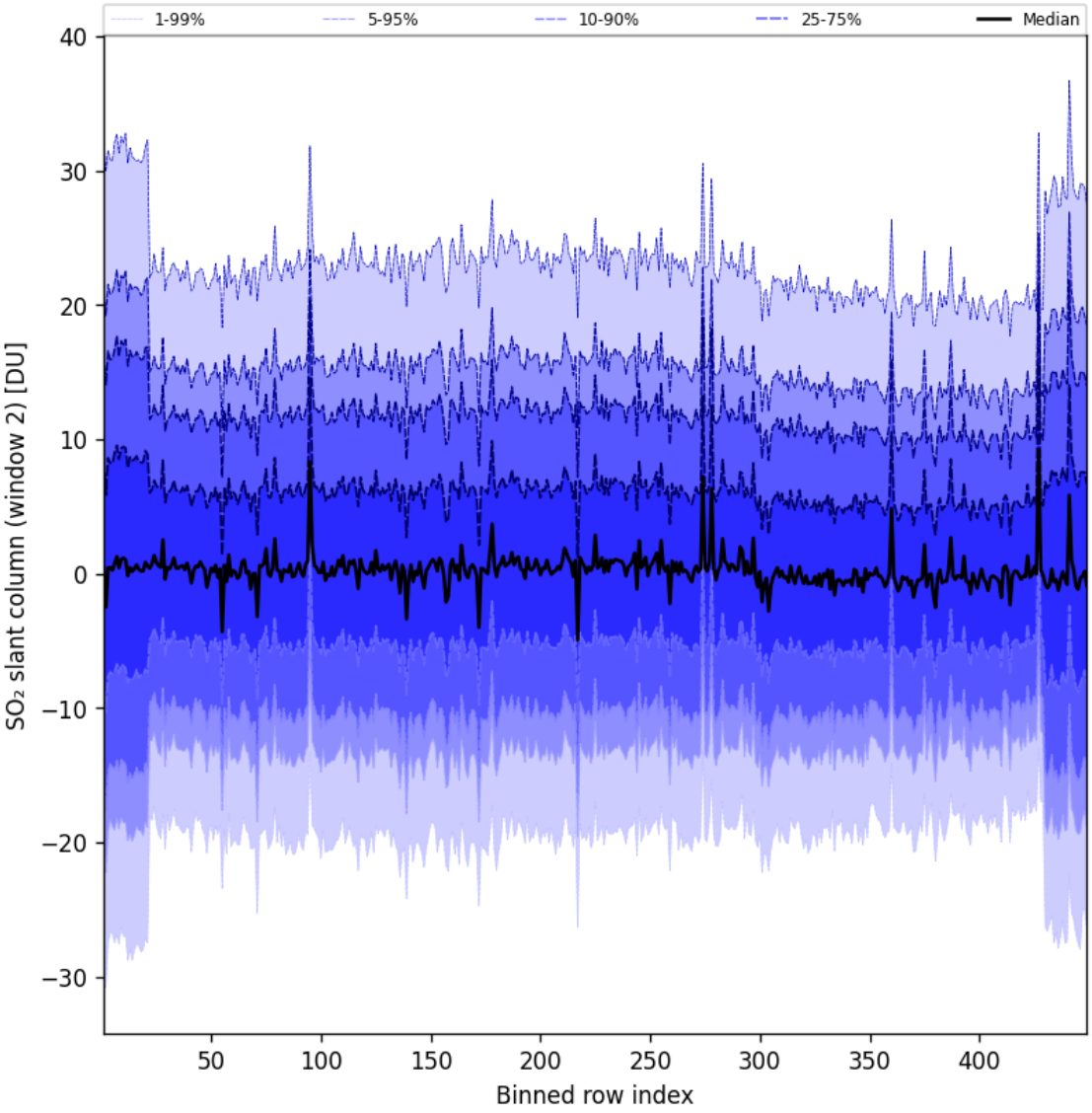

Figure 94: Along track statistics of "SO_2 slant column (window 2)" for 2025-03-21 to 2025-03-21

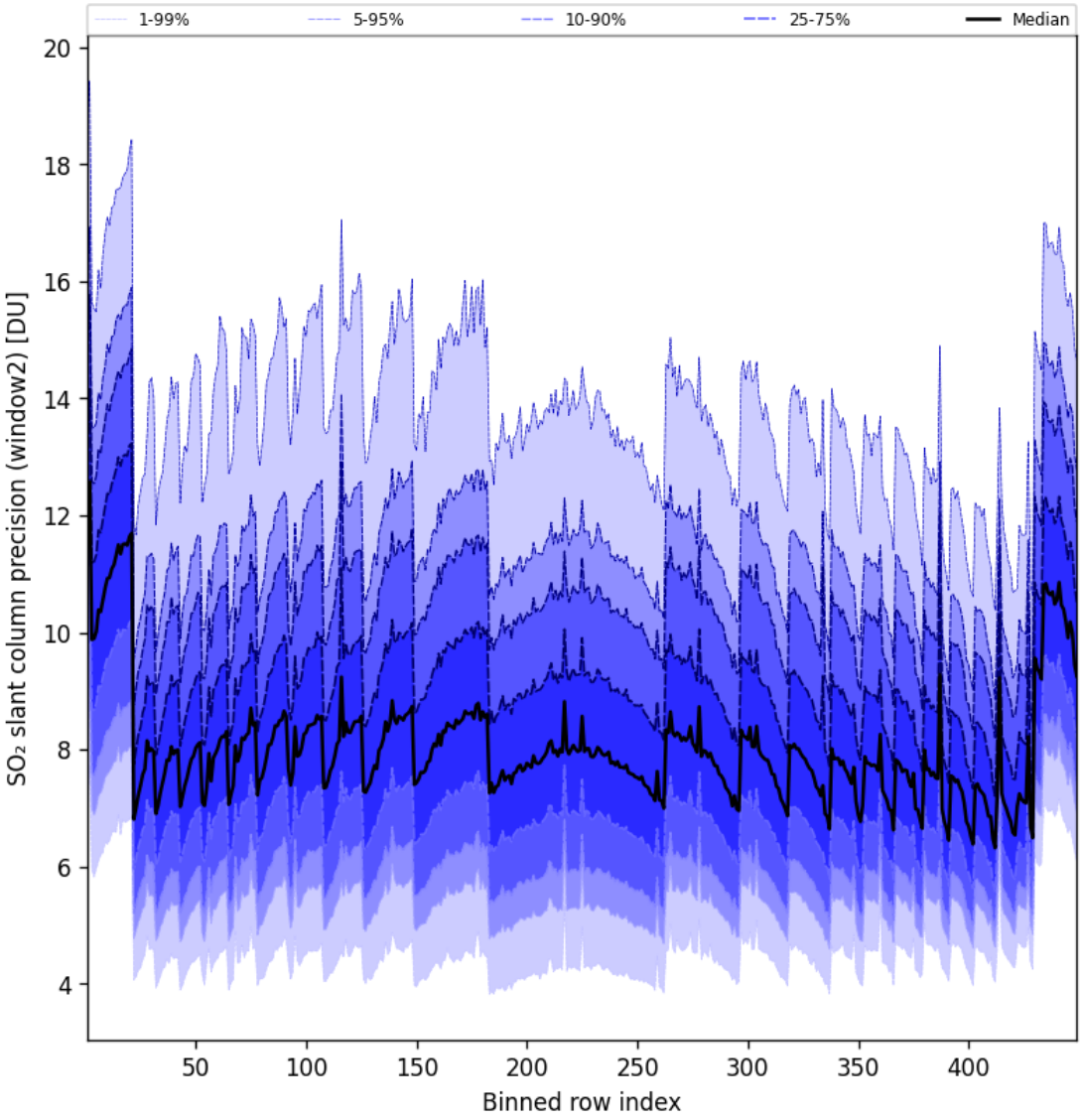

Figure 95: Along track statistics of "SO_2 slant column precision (window2)" for 2025-03-21 to 2025-03-21

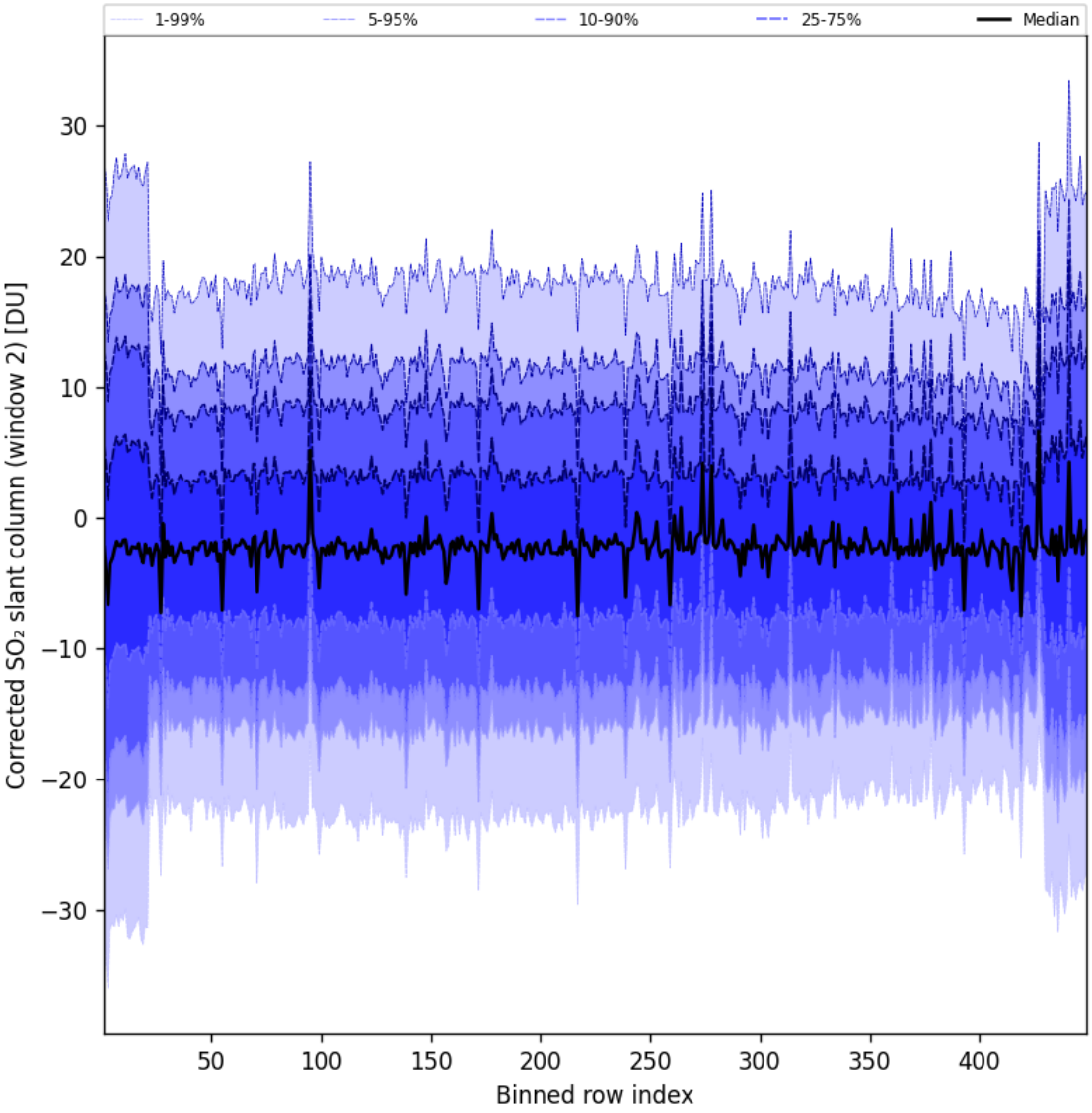

Figure 96: Along track statistics of “Corrected SO_2 slant column (window 2)” for 2025-03-21 to 2025-03-21

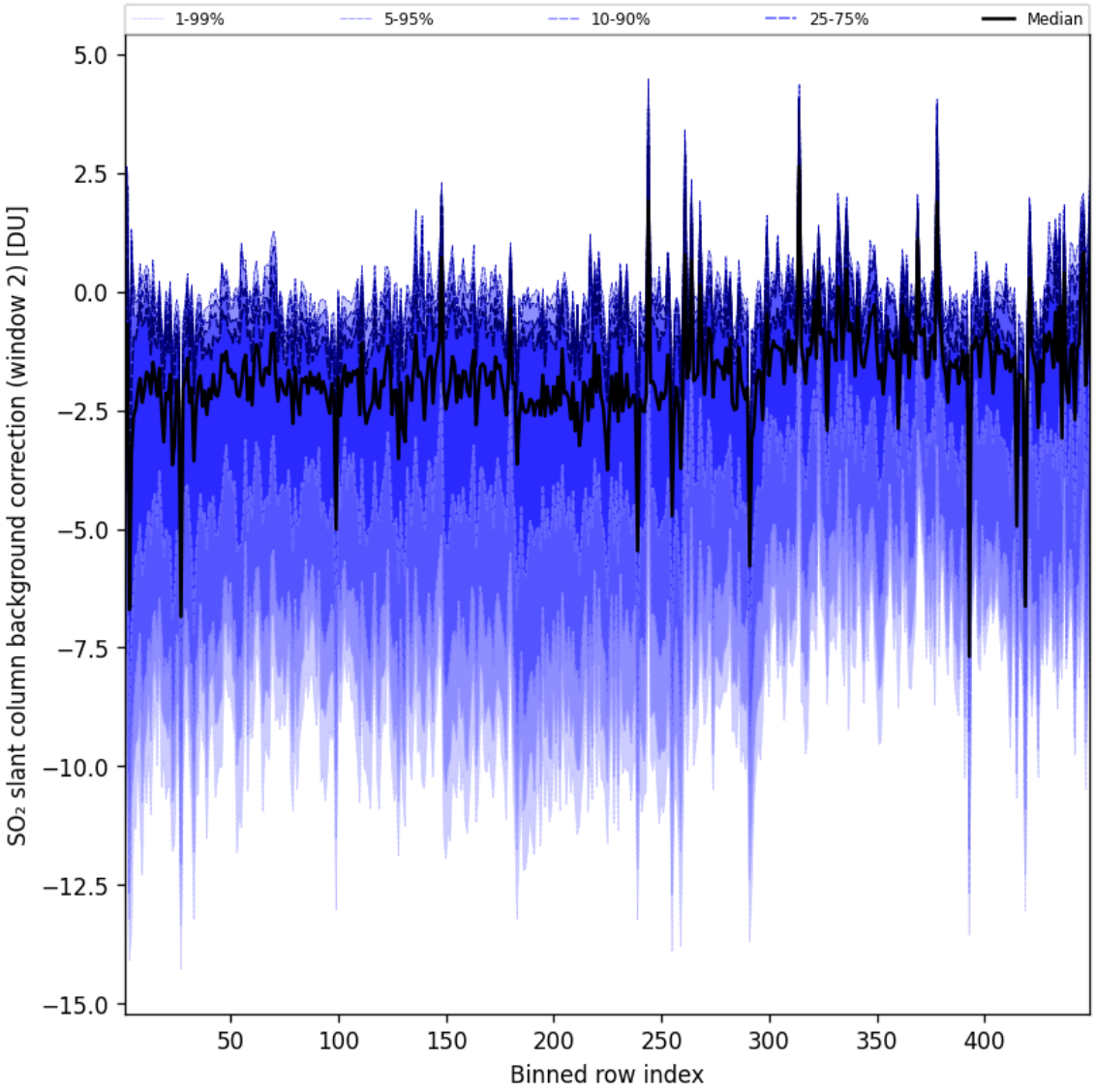

Figure 97: Along track statistics of "SO_2 slant column background correction (window 2)" for 2025-03-21 to 2025-03-21

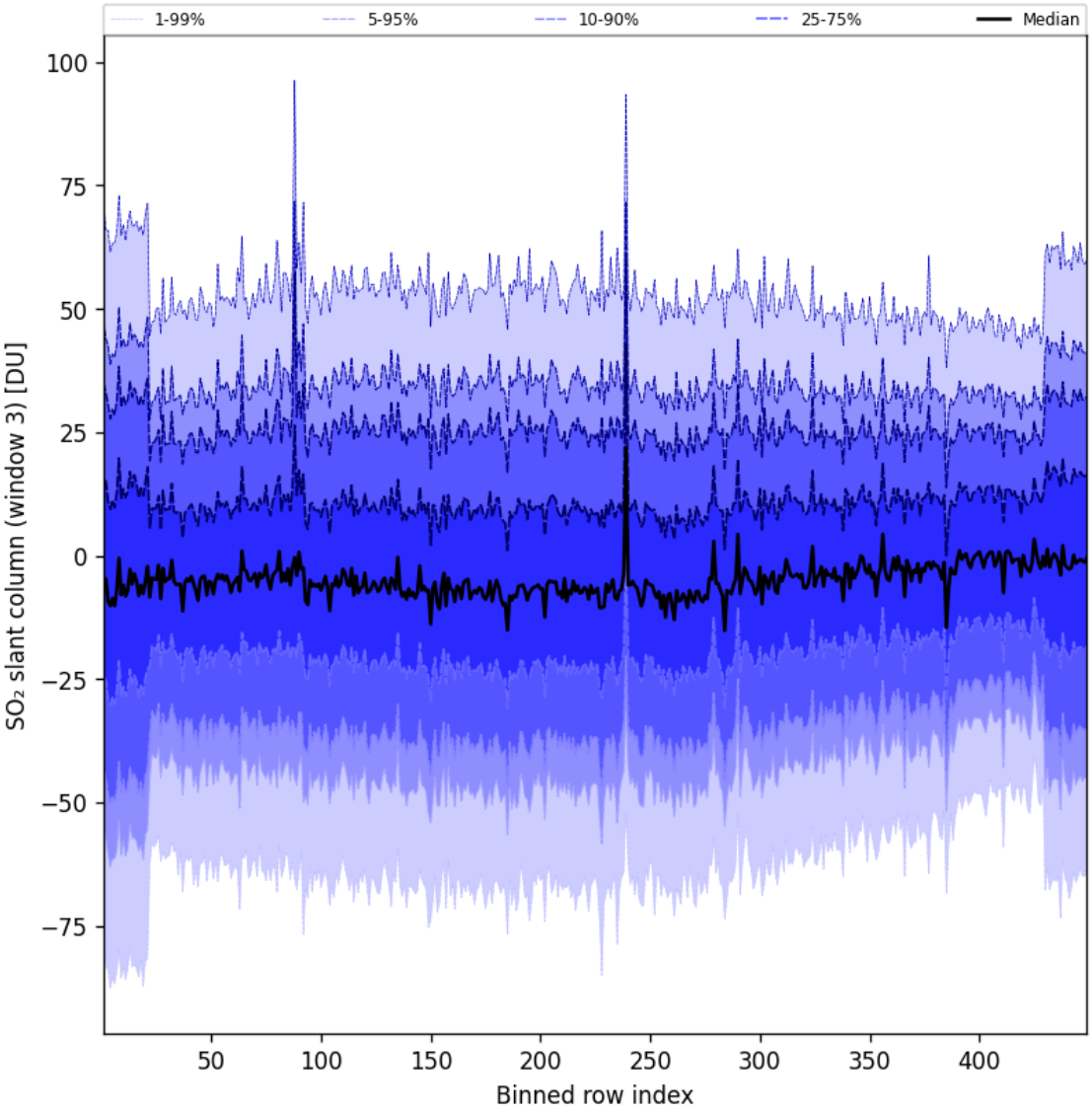

Figure 98: Along track statistics of "SO_2 slant column (window 3)" for 2025-03-21 to 2025-03-21

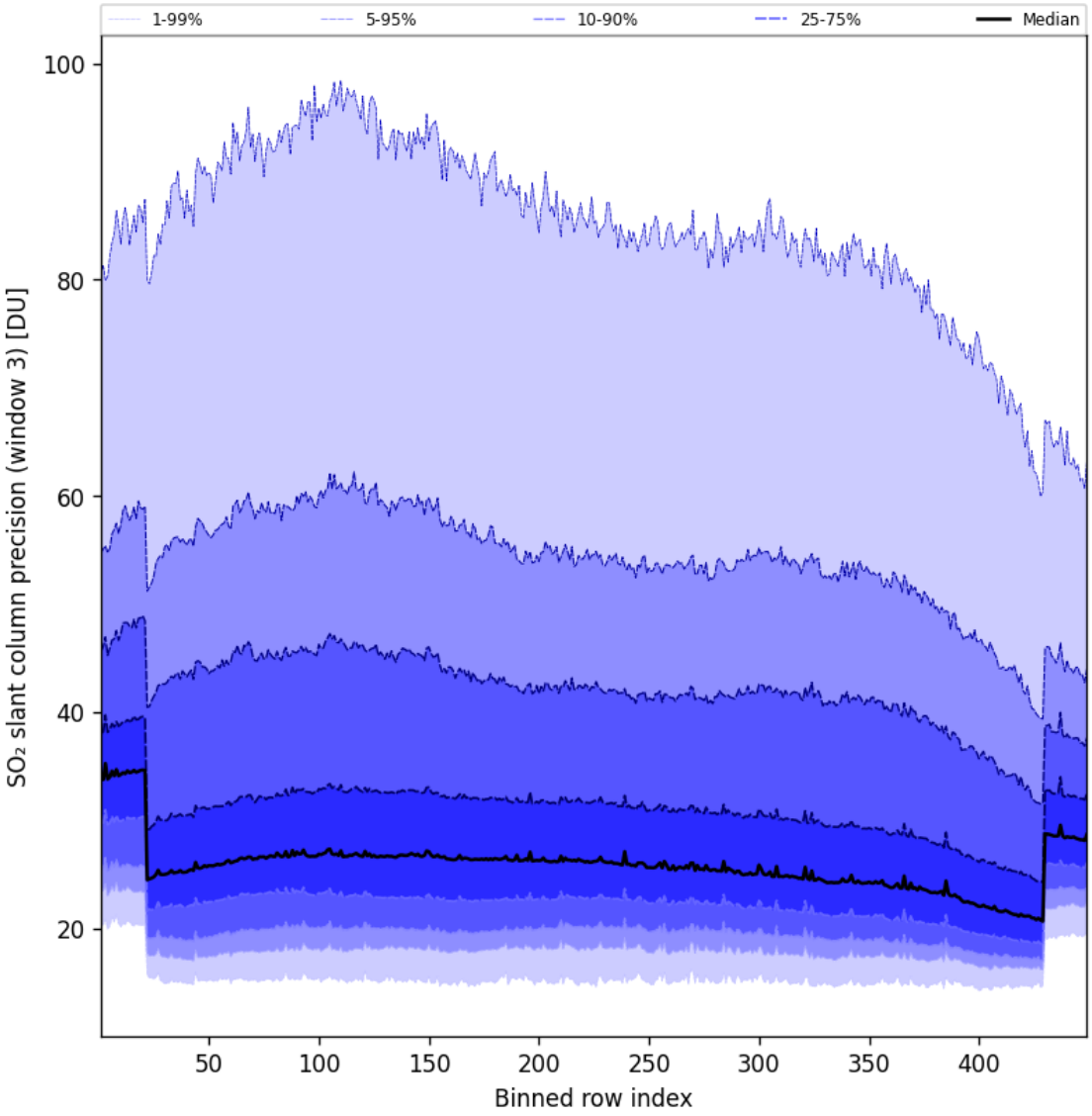

Figure 99: Along track statistics of "SO_2 slant column precision (window 3)" for 2025-03-21 to 2025-03-21

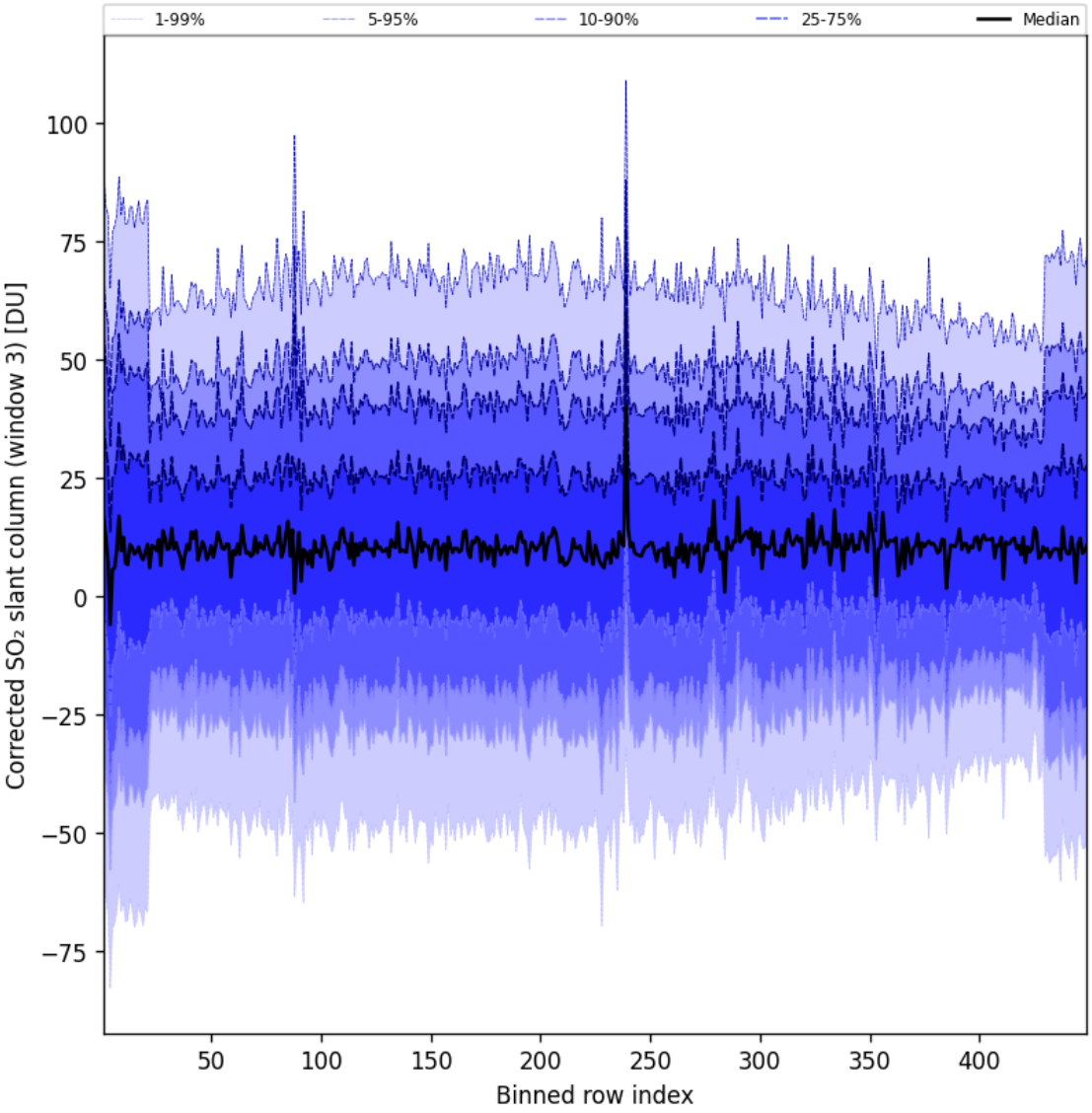

Figure 100: Along track statistics of “Corrected SO_2 slant column (window 3)” for 2025-03-21 to 2025-03-21

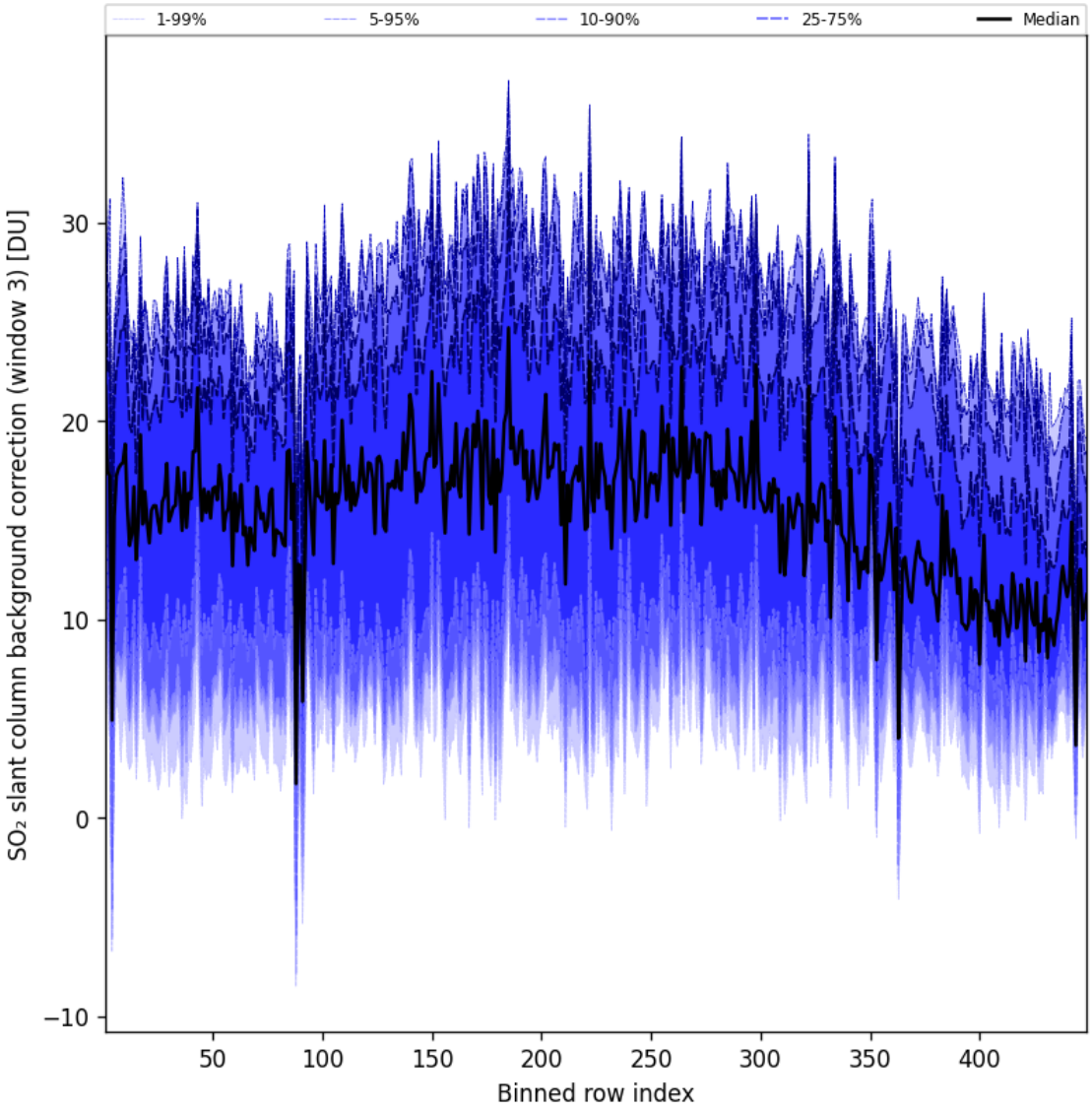

Figure 101: Along track statistics of "SO_2 slant column background correction (window 3)" for 2025-03-21 to 2025-03-21

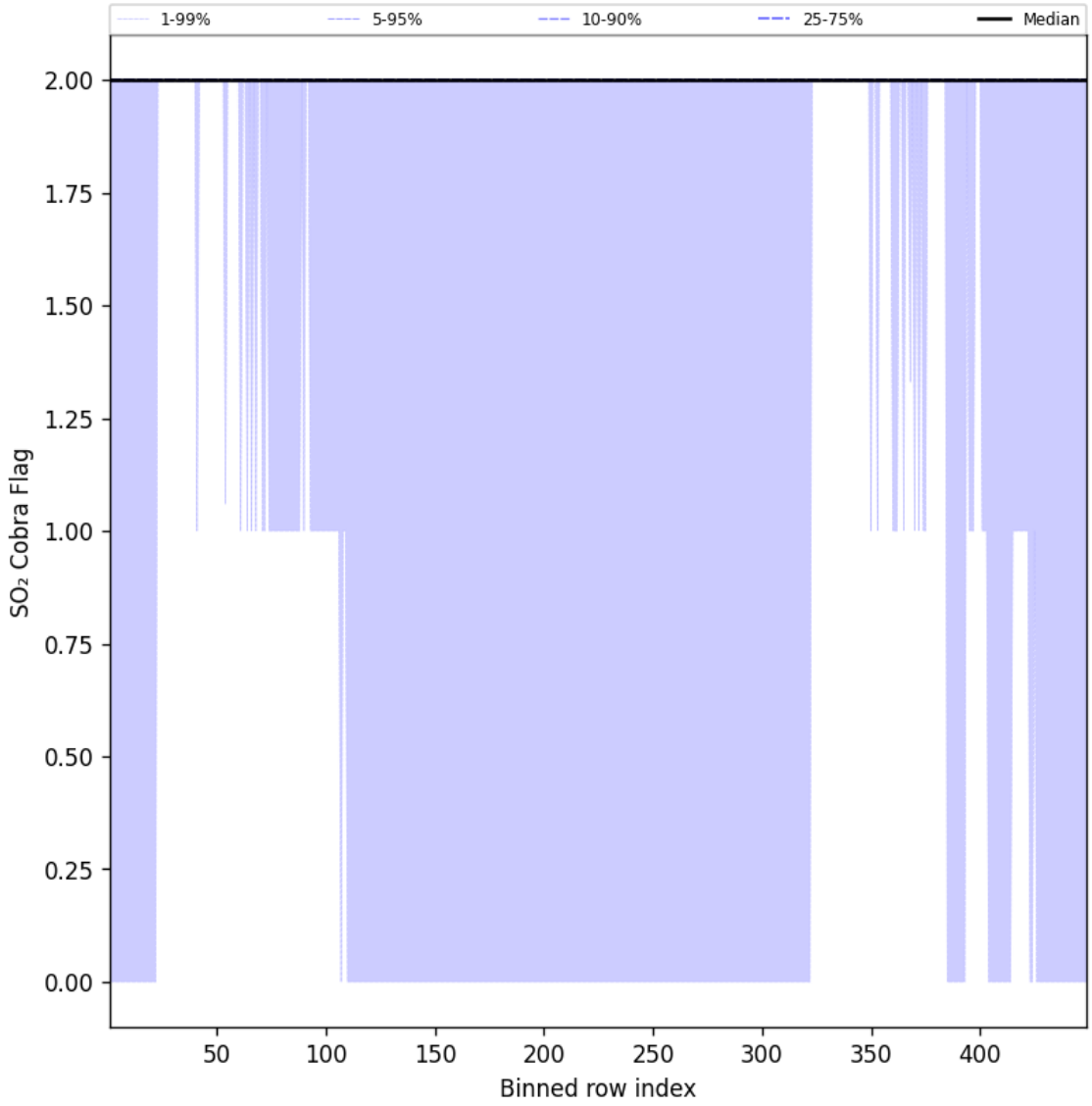

Figure 102: Along track statistics of "SO_2 Cobra Flag" for 2025-03-21 to 2025-03-21

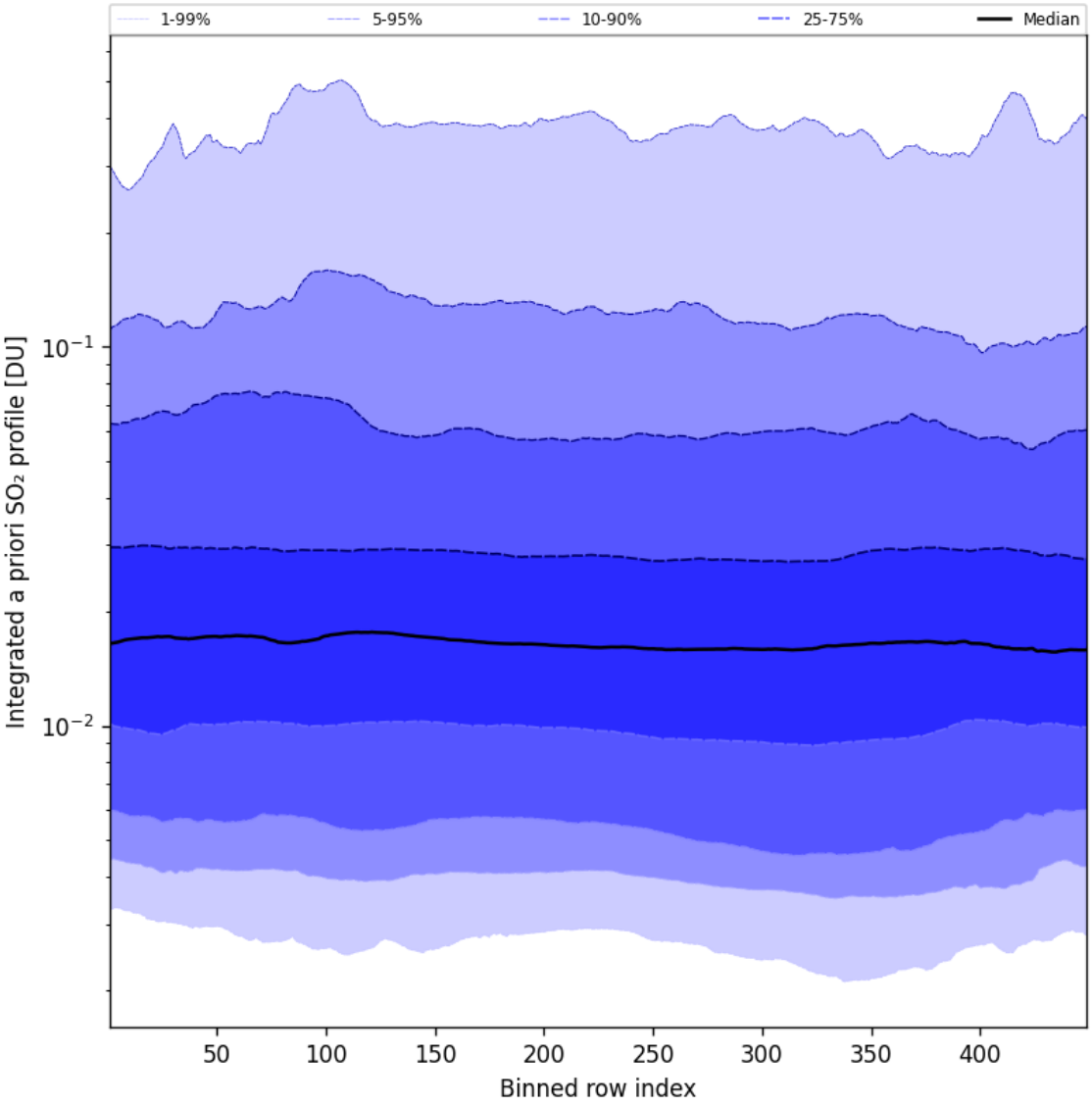

Figure 103: Along track statistics of “Integrated a priori SO_2 profile” for 2025-03-21 to 2025-03-21

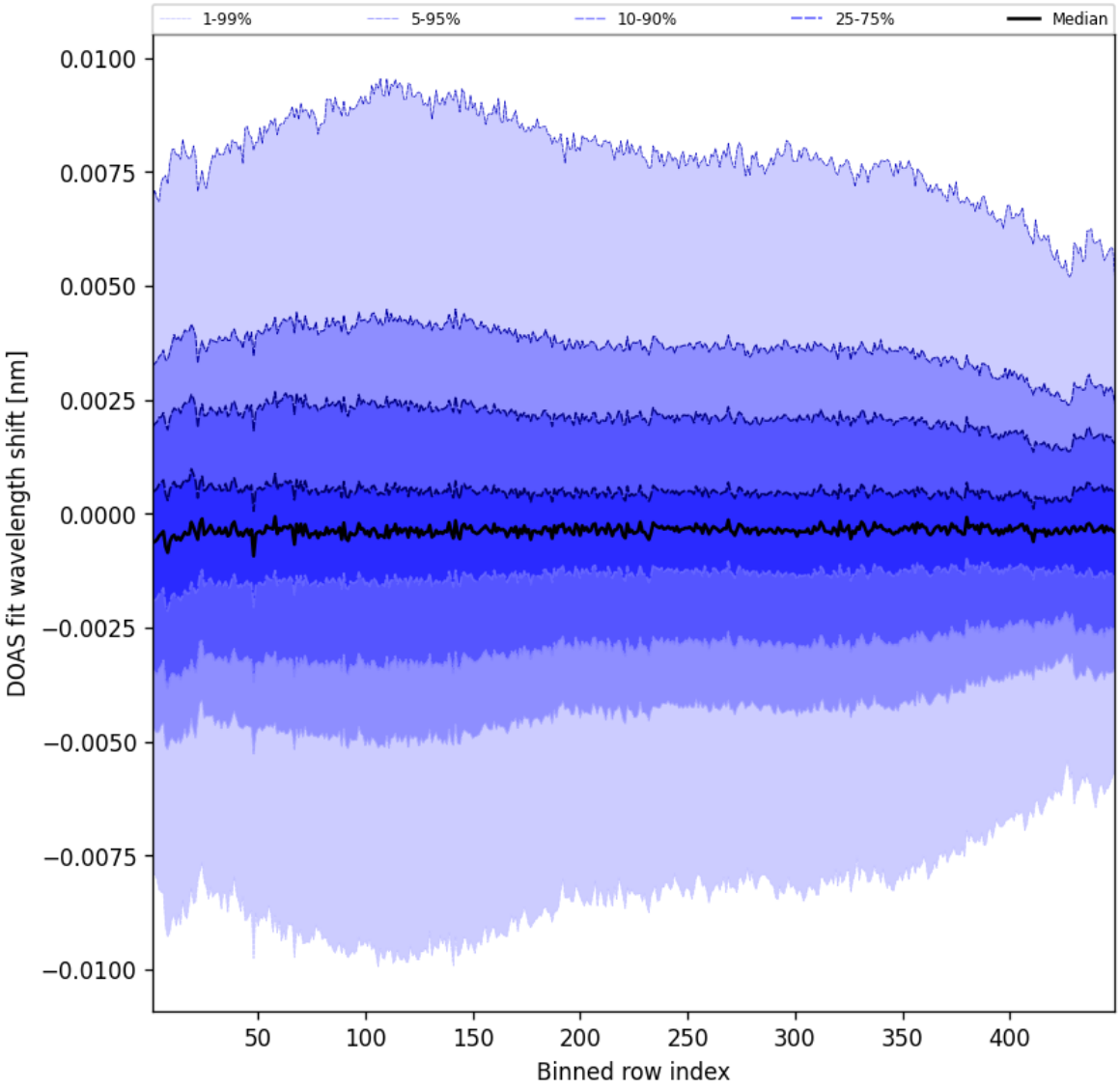

Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2025-03-21 to 2025-03-21

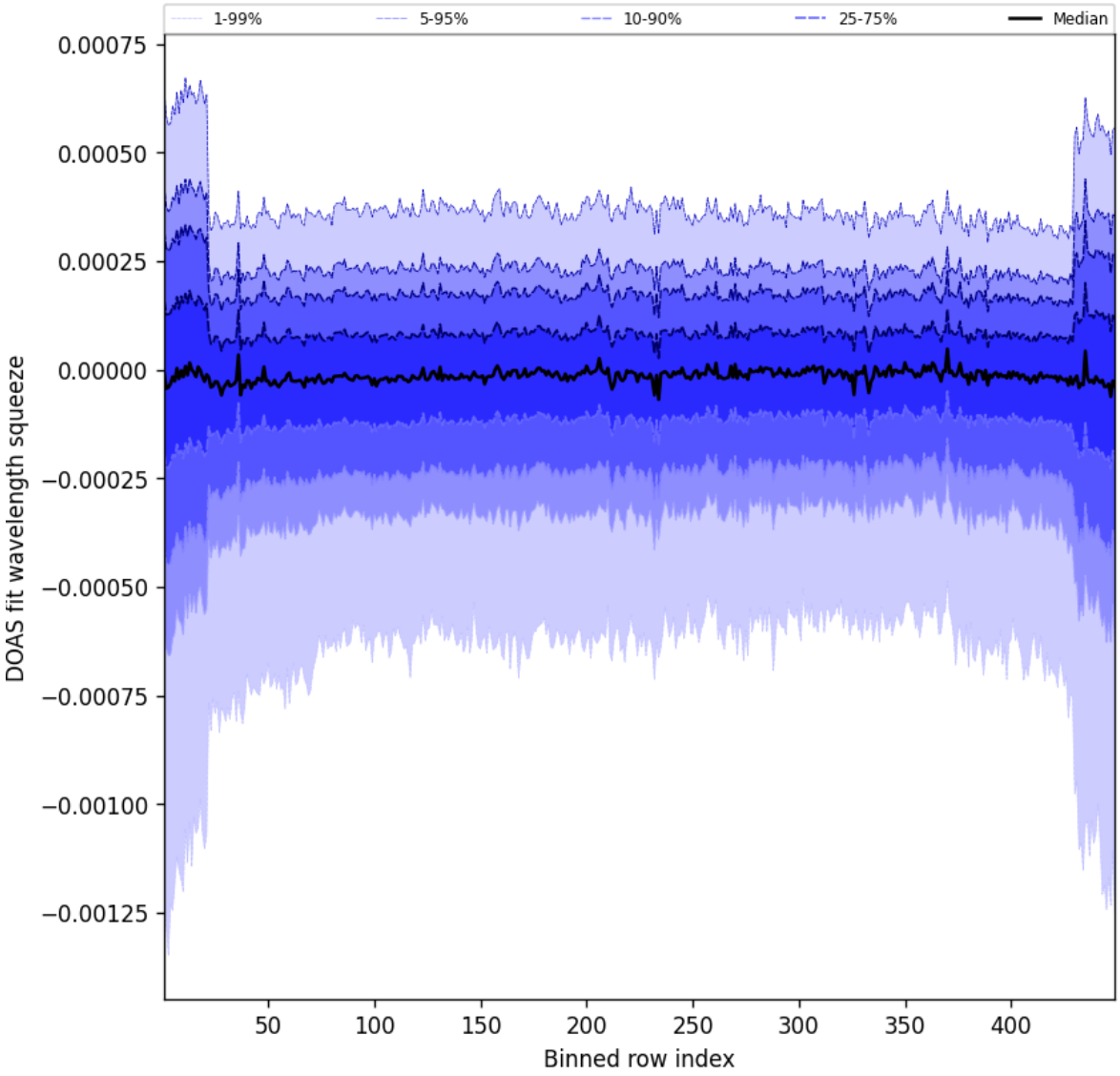

Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2025-03-21 to 2025-03-21

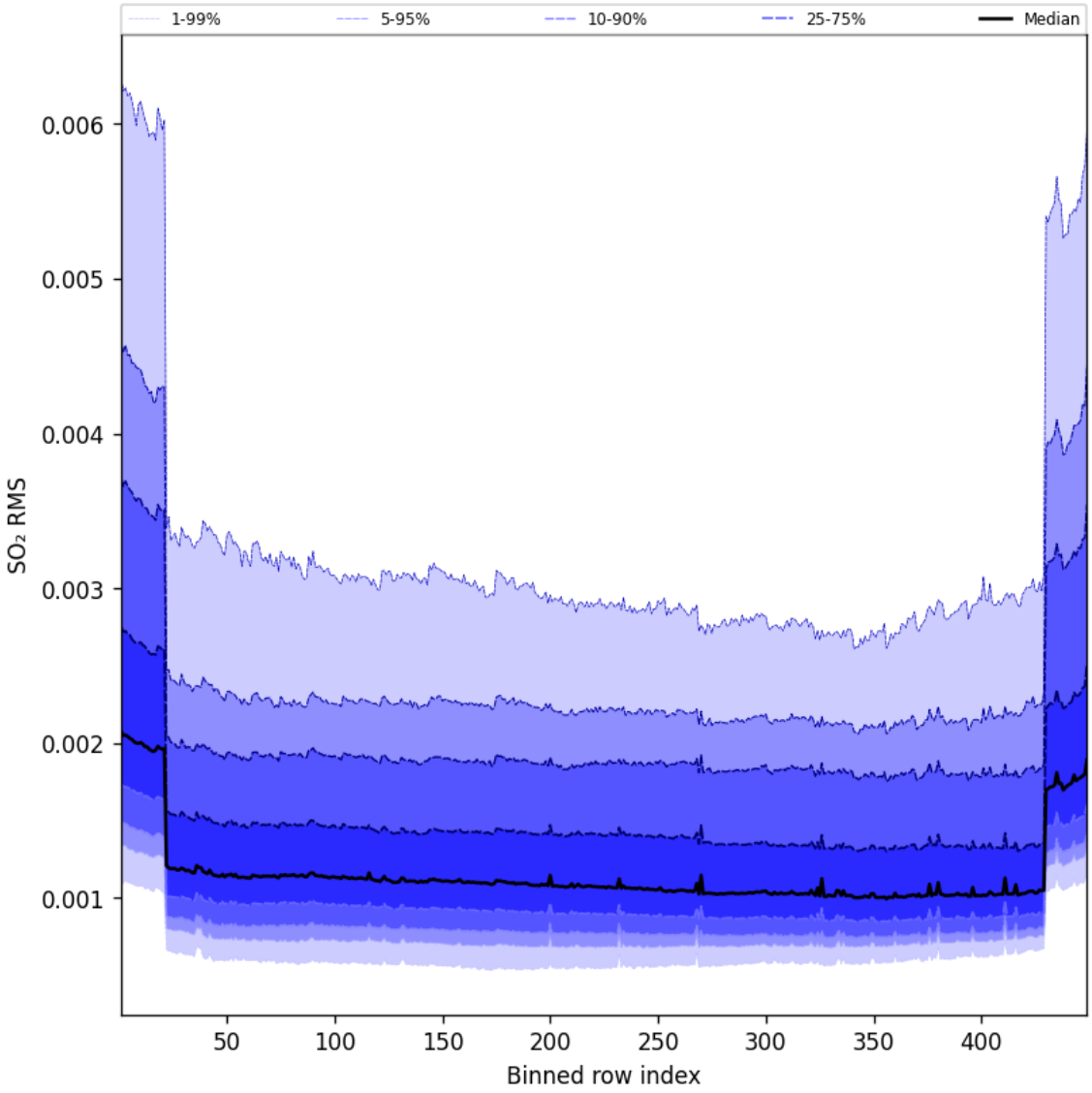

Figure 106: Along track statistics of "SO_2 RMS" for 2025-03-21 to 2025-03-21

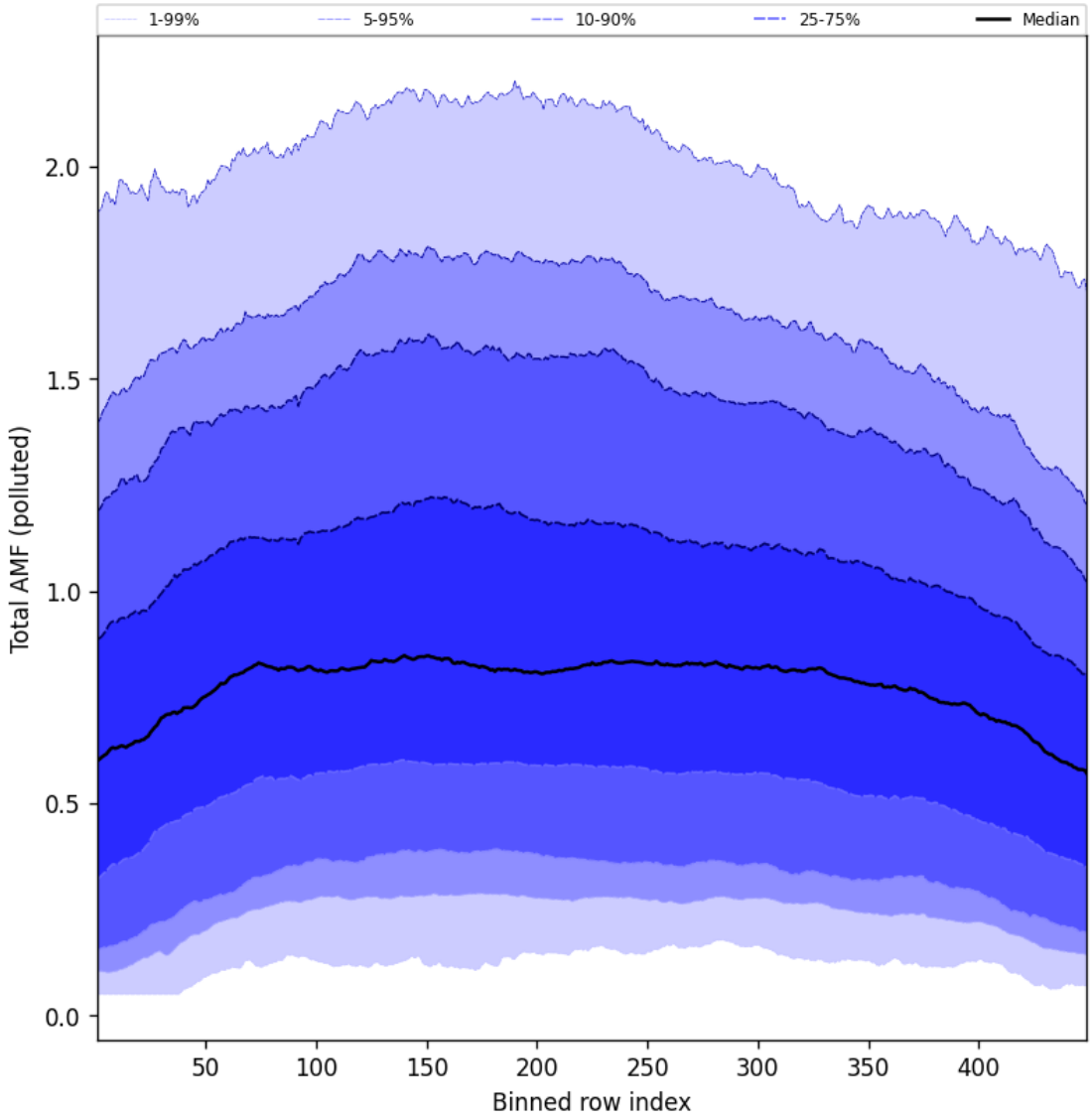

Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-03-21 to 2025-03-21

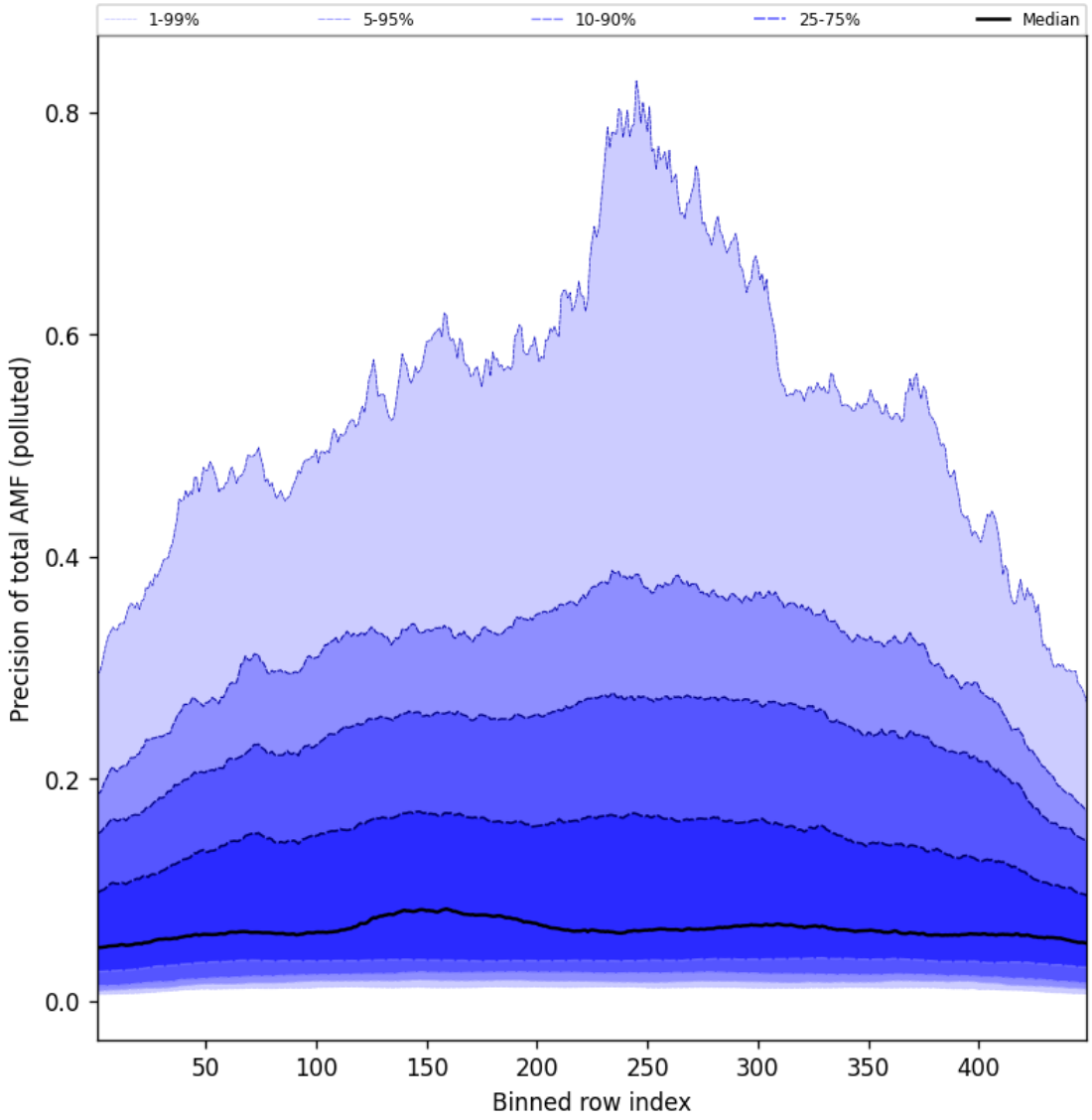

Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-03-21 to 2025-03-21

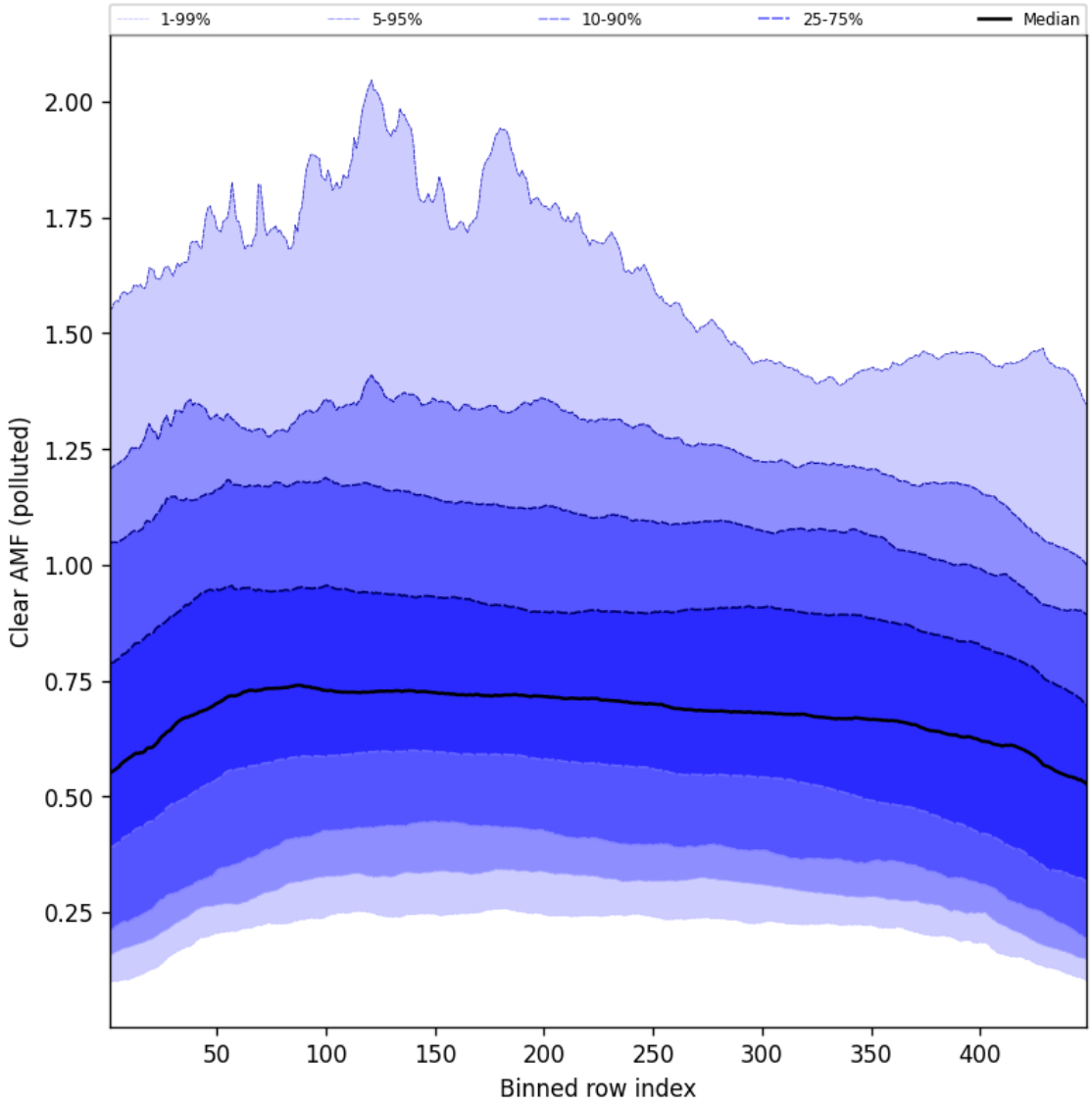

Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-03-21 to 2025-03-21

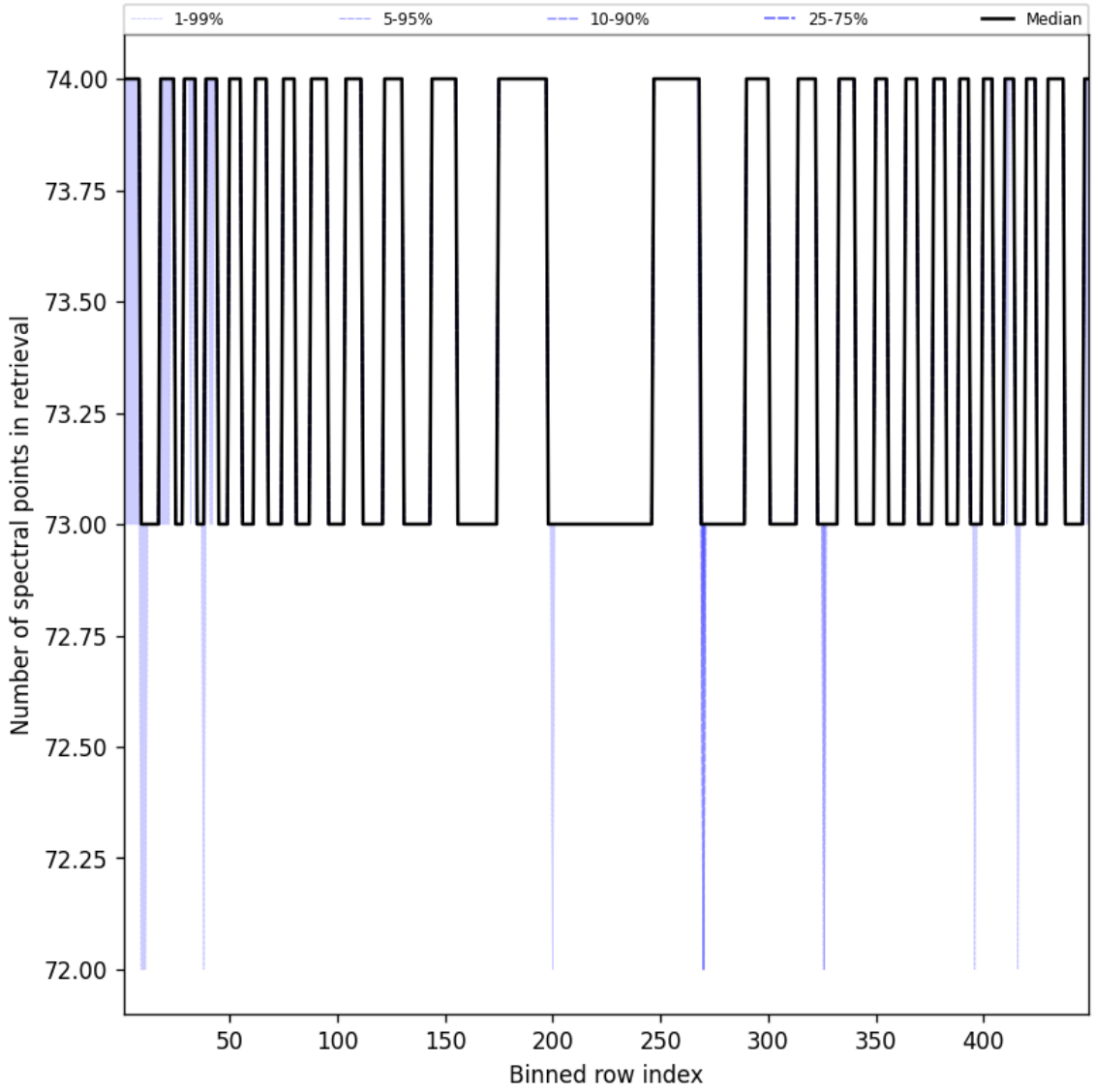

Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-03-21 to 2025-03-21

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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