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 ± 0.400	17301926	0.995	0.770	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(3.975 \pm 125.474) \times 10^{-2}$	17301926	0.263	0.480	1.124×10^{-2}	-113	324
sulfurdioxide total vertical column precision [DU]	0.573 ± 0.805	17301926	0.222	0.398	0.345	3.885×10^{-2}	111
sulfurdioxide slant column density corrected [DU]	$(2.209 \pm 50.896) \times 10^{-2}$	17301926	0.267	0.367	9.426×10^{-3}	-13.2	226
sulfurdioxide slant column density cobra [DU]	$(2.124 \pm 39.440) \times 10^{-2}$	17301926	0.267	0.367	9.426×10^{-3}	-13.2	55.1
sulfurdioxide slant column density cobra precision [DU]	0.303 ± 0.153	17301926	0.213	0.162	0.253	7.877×10^{-2}	48.4
sulfurdioxide slant column density window1 [DU]	0.191 ± 0.735	17301926	0.225	0.746	0.214	-44.1	75.8
sulfurdioxide slant column density window1 precision [DU]	0.303 ± 0.153	17301926	0.213	0.162	0.253	7.877×10^{-2}	48.4
sulfurdioxide slant column density corrected win1 [DU]	$(4.615 \pm 721.531) \times 10^{-3}$	17301926	-2.500×10^{-2}	0.726	-2.009×10^{-2}	-44.1	76.0
background so2 slant column offset window1 [DU]	-0.186 ± 0.215	17301926	-0.340	0.222	-0.242	-1.47	3.50
sulfurdioxide slant column density window2 [DU]	1.000 ± 9.133	17301926	0.750	11.6	0.760	-882	809
sulfurdioxide slant column density window2 precision [DU]	8.18 ± 2.22	17301926	7.43	2.60	7.86	2.08	452
sulfurdioxide slant column density corrected win2 [DU]	-2.47 ± 8.80	17301926	-2.25	11.2	-2.44	-883	808
background so2 slant column offset window2 [DU]	-3.47 ± 2.76	17301926	-1.25	3.72	-2.52	-17.4	3.45
sulfurdioxide slant column density window3 [DU]	-8.36 ± 24.33	17301926	-8.40	30.8	-8.42	-1.062×10^{3}	841
sulfurdioxide slant column density window3 precision [DU]	28.7 ± 13.0	17301926	22.5	9.62	25.3	10.1	580
sulfurdioxide slant column density corrected win3 [DU]	10.2 ± 23.4	17301926	10.6	29.6	10.2	-1.054×10^{3}	851
background so2 slant column offset window3 [DU]	18.5 ± 7.2	17301926	12.9	12.1	18.1	-6.59	40.7
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.22	17301926	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(3.151 \pm 7.685) \times 10^{-2}$	17301926	1.664×10^{-2}	1.680×10^{-2}	1.689×10^{-2}	2.419×10^{-4}	1.52
fitted radiance shift [nm]	$(-4.120 \pm 26.054) \times 10^{-4}$	17301926	-5.000×10^{-4}	1.850×10^{-3}	-3.886×10^{-4}	-7.342×10^{-2}	6.790×10^{-2}
fitted radiance squeeze [1]	$(-3.397 \pm 20.371) \times 10^{-5}$	17301926	-1.000×10^{-5}	2.091×10^{-4}	-1.601×10^{-5}	-1.764×10^{-2}	1.694×10^{-2}
fitted root mean square [1]	$(1.318 \pm 0.630) \times 10^{-3}$	17301926	9.250×10^{-4}	6.265×10^{-4}	1.120×10^{-3}	2.994×10^{-4}	6.999×10^{-2}
sulfurdioxide total air mass factor polluted [1]	0.818 ± 0.418	17301926	0.700	0.521	0.755	5.000×10^{-2}	3.38
sulfurdioxide total air mass factor polluted precision [1]	0.105 ± 0.111	17301926	3.500×10^{-2}	0.106	6.197×10^{-2}	2.532×10^{-3}	1.86
sulfurdioxide clear air mass factor polluted [1]	0.709 ± 0.293	17301926	0.700	0.353	0.680	5.409×10^{-2}	3.38
number of spectral points in retrieval [1]	73.4 ± 0.5	17301926	73.0	1.000	73.0	52.0	156

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}	6.000×10^{-2}	0.130	0.230	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	−2.58	−0.978	−0.585	−0.387	−0.224	0.255	0.432	0.656	1.11	3.06
sulfurdioxide total vertical column precision [DU]	9.604×10^{-2}	0.134	0.163	0.189	0.226	0.624	0.845	1.11	1.64	3.95
sulfurdioxide slant column density corrected [DU]	−0.915	−0.511	−0.364	−0.269	−0.172	0.195	0.298	0.403	0.575	1.13
sulfurdioxide slant column density cobra [DU]	−0.915	−0.511	−0.364	−0.269	−0.172	0.195	0.298	0.403	0.575	1.13
sulfurdioxide slant column density cobra precision [DU]	0.135	0.163	0.176	0.187	0.202	0.364	0.425	0.483	0.575	0.878
sulfurdioxide slant column density window1 [DU]	−1.92	−0.941	−0.595	−0.381	−0.168	0.578	0.768	0.953	1.24	2.06
sulfurdioxide slant column density window1 precision [DU]	0.135	0.163	0.176	0.187	0.202	0.364	0.425	0.483	0.575	0.878
sulfurdioxide slant column density corrected win1 [DU]	−1.80	−1.02	−0.743	−0.564	−0.377	0.349	0.556	0.766	1.11	2.13
background so2 slant column offset window1 [DU]	−0.446	−0.394	−0.369	−0.353	−0.328	−0.106	-1.914×10^{-2}	6.562×10^{-2}	0.203	0.567
sulfurdioxide slant column density window2 [DU]	−20.1	−13.4	−10.1	−7.69	−4.92	6.66	9.70	12.5	16.3	24.1
sulfurdioxide slant column density window2 precision [DU]	4.32	5.24	5.78	6.20	6.71	9.31	10.1	11.0	12.1	14.7
sulfurdioxide slant column density corrected win2 [DU]	−23.9	−16.8	−13.4	−10.8	−8.03	3.13	5.90	8.38	11.7	18.7
background so2 slant column offset window2 [DU]	−11.1	−8.98	−7.67	−6.60	−5.14	−1.41	−1.12	−0.902	−0.534	0.890
sulfurdioxide slant column density window3 [DU]	−68.4	−48.2	−38.5	−31.5	−23.7	7.11	15.0	22.1	31.6	50.4
sulfurdioxide slant column density window3 precision [DU]	14.4	17.0	18.7	20.0	21.6	31.2	35.6	41.5	53.2	84.4
sulfurdioxide slant column density corrected win3 [DU]	−48.2	−28.3	−18.8	−12.0	−4.54	25.1	32.6	39.3	48.4	66.6
background so2 slant column offset window3 [DU]	4.95	8.33	9.68	10.9	12.4	24.5	26.7	28.4	30.2	33.3
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]	2.255×10^{-3}	4.053×10^{-3}	5.954×10^{-3}	7.936×10^{-3}	1.047×10^{-2}	2.727×10^{-2}	3.576×10^{-2}	4.947×10^{-2}	8.703×10^{-2}	0.311
fitted radiance shift [nm]	-8.250×10^{-3}	-4.312×10^{-3}	-2.917×10^{-3}	-2.097×10^{-3}	-1.371×10^{-3}	4.783×10^{-4}	1.180×10^{-3}	2.063×10^{-3}	3.574×10^{-3}	7.701×10^{-3}
fitted radiance squeeze [1]	-7.066×10^{-4}	-3.764×10^{-4}	-2.577×10^{-4}	-1.893×10^{-4}	-1.252×10^{-4}	8.389×10^{-5}	1.339×10^{-4}	1.799×10^{-4}	2.451×10^{-4}	3.966×10^{-4}
fitted root mean square [1]	5.799×10^{-4}	7.178×10^{-4}	7.920×10^{-4}	8.485×10^{-4}	9.186×10^{-4}	1.545×10^{-3}	1.816×10^{-3}	2.083×10^{-3}	2.503×10^{-3}	3.618×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.101	0.235	0.327	0.407	0.523	1.04	1.23	1.41	1.63	2.02
sulfurdioxide total air mass factor polluted precision [1]	1.031×10^{-2}	1.722×10^{-2}	2.287×10^{-2}	2.883×10^{-2}	3.545×10^{-2}	0.141	0.190	0.237	0.314	0.499
sulfurdioxide clear air mass factor polluted [1]	0.199	0.298	0.364	0.424	0.509	0.862	0.970	1.07	1.22	1.66
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]	0.652 ± 0.400	9068578	0.770	1.000	0.0	1.000	0.230	1.000
sulfurdioxide total vertical column [DU]	$(5.722 \pm 158.404) \times 10^{-2}$	9068578	0.552	1.240×10^{-2}	-113	324	-0.256	0.296
sulfurdioxide total vertical column precision [DU]	0.698 ± 0.988	9068578	0.542	0.408	3.885×10^{-2}	40.5	0.243	0.786
sulfurdioxide slant column density corrected [DU]	$(2.793 \pm 61.674) \times 10^{-2}$	9068578	0.387	9.835×10^{-3}	-13.2	226	-0.181	0.207
sulfurdioxide slant column density cobra [DU]	$(2.645 \pm 43.896) \times 10^{-2}$	9068578	0.387	9.835×10^{-3}	-13.2	55.1	-0.181	0.207
sulfurdioxide slant column density cobra precision [DU]	0.326 ± 0.175	9068578	0.196	0.271	8.095×10^{-2}	15.6	0.205	0.401
sulfurdioxide slant column density window1 [DU]	0.193 ± 0.817	9068578	0.789	0.224	-13.9	75.8	-0.181	0.608
sulfurdioxide slant column density window1 precision [DU]	0.326 ± 0.175	9068578	0.196	0.271	8.095×10^{-2}	15.6	0.205	0.401
sulfurdioxide slant column density corrected win1 [DU]	$(2.158 \pm 80.322) \times 10^{-2}$	9068578	0.770	-1.278×10^{-2}	-13.2	76.0	-0.388	0.382
background so2 slant column offset window1 [DU]	-0.171 ± 0.254	9068578	0.250	-0.245	-1.32	3.50	-0.337	-8.721×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.68 ± 9.25	9068578	11.8	1.37	-566	227	-4.40	7.44
sulfurdioxide slant column density window2 precision [DU]	8.16 ± 2.14	9068578	2.60	7.87	2.08	194	6.70	9.31
sulfurdioxide slant column density corrected win2 [DU]	-2.57 ± 8.77	9068578	11.2	-2.52	-572	226	-8.14	3.04
background so2 slant column offset window2 [DU]	-4.24 ± 3.19	9068578	5.37	-3.47	-17.4	3.45	-6.82	-1.45
sulfurdioxide slant column density window3 [DU]	-10.9 ± 23.7	9068578	30.1	-10.9	-299	393	-25.9	4.19
sulfurdioxide slant column density window3 precision [DU]	27.8 ± 12.1	9068578	8.61	24.8	10.3	376	21.4	30.0
sulfurdioxide slant column density corrected win3 [DU]	10.1 ± 22.8	9068578	28.8	10.3	-285	421	-4.15	24.7
background so2 slant column offset window3 [DU]	21.0 ± 7.0	9068578	12.5	21.8	-3.67	40.7	14.4	27.0
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.22	9068578	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(4.283 \pm 10.185) \times 10^{-2}$	9068578	2.671×10^{-2}	1.978×10^{-2}	2.419×10^{-4}	1.52	9.727×10^{-3}	3.644×10^{-2}
fitted radiance shift [nm]	$(-2.676 \pm 24.411) \times 10^{-4}$	9068578	1.663×10^{-3}	-2.571×10^{-4}	-6.108×10^{-2}	3.691×10^{-2}	-1.124×10^{-3}	5.386×10^{-4}
fitted radiance squeeze [1]	$(-5.198 \pm 23.226) \times 10^{-5}$	9068578	2.272×10^{-4}	-2.140×10^{-5}	-3.998×10^{-3}	1.406×10^{-2}	-1.440×10^{-4}	8.323×10^{-5}
fitted root mean square [1]	$(1.415 \pm 0.734) \times 10^{-3}$	9068578	7.606×10^{-4}	1.173×10^{-3}	2.994×10^{-4}	5.099×10^{-2}	9.318×10^{-4}	1.692×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.766 ± 0.426	9068578	0.571	0.705	5.000×10^{-2}	3.38	0.437	1.01
sulfurdioxide total air mass factor polluted precision [1]	$(9.703 \pm 11.923) \times 10^{-2}$	9068578	8.934×10^{-2}	5.458×10^{-2}	2.532×10^{-3}	1.86	3.062×10^{-2}	0.120
sulfurdioxide clear air mass factor polluted [1]	0.668 ± 0.312	9068578	0.449	0.627	5.409×10^{-2}	3.38	0.421	0.870
number of spectral points in retrieval [1]	73.5 ± 0.5	9068578	1.000	73.0	52.0	156	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]	0.673 ± 0.400	8233348	0.750	1.000	0.0	1.000	0.250	1.000
sulfurdioxide total vertical column [DU]	$(2.050 \pm 73.759) \times 10^{-2}$	8233348	0.419	1.021×10^{-2}	-71.9	108	-0.197	0.222
sulfurdioxide total vertical column precision [DU]	0.435 ± 0.499	8233348	0.278	0.305	4.987×10^{-2}	111	0.211	0.489
sulfurdioxide slant column density corrected [DU]	$(1.566 \pm 35.401) \times 10^{-2}$	8233348	0.346	9.018×10^{-3}	-10.5	132	-0.163	0.183
sulfurdioxide slant column density cobra [DU]	$(1.549 \pm 33.850) \times 10^{-2}$	8233348	0.346	9.018×10^{-3}	-10.5	35.2	-0.163	0.183
sulfurdioxide slant column density cobra precision [DU]	0.277 ± 0.120	8233348	0.125	0.241	7.877×10^{-2}	48.4	0.199	0.324
sulfurdioxide slant column density window1 [DU]	0.188 ± 0.632	8233348	0.704	0.203	-44.1	55.7	-0.157	0.548
sulfurdioxide slant column density window1 precision [DU]	0.277 ± 0.120	8233348	0.125	0.241	7.877×10^{-2}	48.4	0.199	0.324
sulfurdioxide slant column density corrected win1 [DU]	$(-1.407 \pm 61.867) \times 10^{-2}$	8233348	0.683	-2.732×10^{-2}	-44.1	55.9	-0.366	0.317
background so2 slant column offset window1 [DU]	-0.202 ± 0.159	8233348	0.194	-0.241	-1.47	2.14	-0.320	-0.126
sulfurdioxide slant column density window2 [DU]	0.253 ± 8.942	8233348	11.3	0.114	-882	809	-5.45	5.80
sulfurdioxide slant column density window2 precision [DU]	8.19 ± 2.31	8233348	2.61	7.85	2.25	452	6.71	9.32
sulfurdioxide slant column density corrected win2 [DU]	-2.36 ± 8.84	8233348	11.1	-2.34	-883	808	-7.92	3.22
background so2 slant column offset window2 [DU]	-2.61 ± 1.85	8233348	2.14	-2.13	-17.0	2.93	-3.52	-1.38
sulfurdioxide slant column density window3 [DU]	-5.52 ± 24.73	8233348	31.3	-5.61	-1.062×10^{3}	841	-21.1	10.2
sulfurdioxide slant column density window3 precision [DU]	29.7 ± 13.9	8233348	10.7	25.8	10.1	580	21.8	32.5
sulfurdioxide slant column density corrected win3 [DU]	10.3 ± 24.1	8233348	30.6	10.1	-1.054×10^{3}	851	-4.96	25.6
background so2 slant column offset window3 [DU]	15.8 ± 6.4	8233348	10.9	14.4	-6.59	38.7	10.5	21.4
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.22	8233348	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(1.905 \pm 2.624) \times 10^{-2}$	8233348	1.043×10^{-2}	1.556×10^{-2}	1.197×10^{-3}	1.27	1.093×10^{-2}	2.136×10^{-2}
fitted radiance shift [nm]	$(-5.710 \pm 27.664) \times 10^{-4}$	8233348	2.028×10^{-3}	-5.604×10^{-4}	-7.342×10^{-2}	6.790×10^{-2}	-1.638×10^{-3}	3.896×10^{-4}
fitted radiance squeeze [1]	$(-1.413 \pm 16.443) \times 10^{-5}$	8233348	1.934×10^{-4}	-1.078×10^{-5}	-1.764×10^{-2}	1.694×10^{-2}	-1.089×10^{-4}	8.457×10^{-5}
fitted root mean square [1]	$(1.211 \pm 0.469) \times 10^{-3}$	8233348	4.922×10^{-4}	1.080×10^{-3}	3.292×10^{-4}	6.999×10^{-2}	9.063×10^{-4}	1.399×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.875 ± 0.402	8233348	0.474	0.798	5.000×10^{-2}	2.58	0.613	1.09
sulfurdioxide total air mass factor polluted precision [1]	0.114 ± 0.099	8233348	0.122	7.470×10^{-2}	5.347×10^{-3}	1.64	3.948×10^{-2}	0.162
sulfurdioxide clear air mass factor polluted [1]	0.753 ± 0.264	8233348	0.262	0.706	0.136	2.48	0.594	0.856
number of spectral points in retrieval [1]	73.4 ± 0.5	8233348	1.000	73.0	52.0	156	73.0	74.0

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

Variable	mean $\pm\sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.695 ± 0.394	11980226	0.720	1.000	0.0	1.000	0.280	1.000
sulfurdioxide total vertical column [DU]	$(2.371 \pm 90.082) \times 10^{-2}$	11980226	0.445	9.147×10^{-3}	-82.2	189	-0.211	0.234
sulfurdioxide total vertical column precision [DU]	0.492 ± 0.616	11980226	0.320	0.318	4.225×10^{-2}	111	0.219	0.538
sulfurdioxide slant column density corrected [DU]	$(1.457 \pm 35.958) \times 10^{-2}$	11980226	0.349	7.697×10^{-3}	-10.5	126	-0.165	0.183
sulfurdioxide slant column density cobra [DU]	$(1.437 \pm 34.088) \times 10^{-2}$	11980226	0.349	7.697×10^{-3}	-10.5	35.0	-0.165	0.183
sulfurdioxide slant column density cobra precision [DU]	0.283 ± 0.130	11980226	0.137	0.239	8.177×10^{-2}	48.4	0.198	0.335
sulfurdioxide slant column density window1 [DU]	0.192 ± 0.657	11980226	0.711	0.210	-44.1	59.1	-0.153	0.558
sulfurdioxide slant column density window1 precision [DU]	0.283 ± 0.130	11980226	0.137	0.239	8.177×10^{-2}	48.4	0.198	0.335
sulfurdioxide slant column density corrected win1 [DU]	$(-1.128 \pm 64.422) \times 10^{-2}$	11980226	0.692	-2.792×10^{-2}	-44.1	58.8	-0.370	0.322
background so2 slant column offset window1 [DU]	-0.203 ± 0.178	11980226	0.203	-0.246	-1.47	3.27	-0.328	-0.125
sulfurdioxide slant column density window2 [DU]	0.522 ± 8.840	11980226	11.2	0.339	-882	809	-5.19	6.02
sulfurdioxide slant column density window2 precision [DU]	8.02 ± 2.13	11980226	2.52	7.70	2.25	452	6.60	9.11
sulfurdioxide slant column density corrected win2 [DU]	-2.49 ± 8.65	11980226	11.0	-2.47	-883	808	-7.98	3.01
background so2 slant column offset window2 [DU]	-3.01 ± 2.35	11980226	2.86	-2.29	-17.4	3.45	-4.22	-1.36
sulfurdioxide slant column density window3 [DU]	-5.25 ± 24.18	11980226	30.8	-5.38	-1.062×10^{3}	393	-20.6	10.2
sulfurdioxide slant column density window3 precision [DU]	28.1 ± 12.4	11980226	9.55	24.7	10.1	580	21.2	30.7
sulfurdioxide slant column density corrected win3 [DU]	12.3 ± 23.1	11980226	29.5	12.2	-1.054×10^{3}	421	-2.40	27.1
background so2 slant column offset window3 [DU]	17.6 ± 6.8	11980226	11.0	16.7	-6.59	40.5	12.1	23.1
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.19	11980226	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.466 \pm 5.227) \times 10^{-2}$	11980226	1.357×10^{-2}	1.674×10^{-2}	1.159×10^{-3}	1.51	1.133×10^{-2}	2.490×10^{-2}
fitted radiance shift [nm]	$(-4.108 \pm 24.582) \times 10^{-4}$	11980226	1.840×10^{-3}	-3.764×10^{-4}	-7.342×10^{-2}	6.790×10^{-2}	-1.361×10^{-3}	4.793×10^{-4}
fitted radiance squeeze [1]	$(-1.594 \pm 17.623) \times 10^{-5}$	11980226	1.958×10^{-4}	-7.745×10^{-6}	-1.720×10^{-2}	1.694×10^{-2}	-1.078×10^{-4}	8.799×10^{-5}
fitted root mean square [1]	$(1.237 \pm 0.531) \times 10^{-3}$	11980226	5.311×10^{-4}	1.074×10^{-3}	2.994×10^{-4}	6.999×10^{-2}	8.999×10^{-4}	1.431×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.825 ± 0.383	11980226	0.455	0.774	5.000×10^{-2}	2.93	0.574	1.03
sulfurdioxide total air mass factor polluted precision [1]	0.104 ± 0.094	11980226	0.105	6.496×10^{-2}	4.008×10^{-3}	1.38	3.784×10^{-2}	0.143
sulfurdioxide clear air mass factor polluted [1]	0.719 ± 0.251	11980226	0.296	0.695	6.236×10^{-2}	2.93	0.559	0.856
number of spectral points in retrieval [1]	73.5 ± 0.5	11980226	1.000	73.0	52.0	156	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]	0.632 ± 0.406	3864374	0.790	1.000	0.0	1.000	0.210	1.000
sulfurdioxide total vertical column [DU]	$(6.239 \pm 157.044) \times 10^{-2}$	3864374	0.545	1.454×10^{-2}	-113	324	-0.248	0.298
sulfurdioxide total vertical column precision [DU]	0.699 ± 1.011	3864374	0.550	0.414	3.885×10^{-2}	40.5	0.240	0.790
sulfurdioxide slant column density corrected [DU]	$(3.311 \pm 61.281) \times 10^{-2}$	3864374	0.389	1.220×10^{-2}	-13.2	226	-0.179	0.210
sulfurdioxide slant column density cobra [DU]	$(3.165 \pm 45.092) \times 10^{-2}$	3864374	0.389	1.220×10^{-2}	-13.2	55.1	-0.179	0.210
sulfurdioxide slant column density cobra precision [DU]	0.323 ± 0.173	3864374	0.179	0.274	7.877×10^{-2}	15.6	0.209	0.388
sulfurdioxide slant column density window1 [DU]	0.215 ± 0.806	3864374	0.782	0.241	-18.3	75.8	-0.160	0.622
sulfurdioxide slant column density window1 precision [DU]	0.323 ± 0.173	3864374	0.179	0.274	7.877×10^{-2}	15.6	0.209	0.388
sulfurdioxide slant column density corrected win1 [DU]	$(2.844 \pm 79.156) \times 10^{-2}$	3864374	0.762	-4.759×10^{-3}	-18.3	76.0	-0.377	0.385
background so2 slant column offset window1 [DU]	-0.187 ± 0.240	3864374	0.227	-0.258	-0.961	2.48	-0.339	-0.112
sulfurdioxide slant column density window2 [DU]	1.42 ± 9.50	3864374	12.0	1.17	-607	623	-4.72	7.32
sulfurdioxide slant column density window2 precision [DU]	8.45 ± 2.42	3864374	2.64	8.16	2.08	333	6.95	9.59
sulfurdioxide slant column density corrected win2 [DU]	-2.44 ± 9.06	3864374	11.4	-2.39	-607	621	-8.13	3.30
background so2 slant column offset window2 [DU]	-3.86 ± 3.06	3864374	4.79	-2.70	-17.4	3.45	-6.21	-1.42
sulfurdioxide slant column density window3 [DU]	-15.1 ± 23.5	3864374	29.6	-14.7	-311	841	-29.7	-0.108
sulfurdioxide slant column density window3 precision [DU]	30.6 ± 14.9	3864374	9.97	26.5	10.4	391	22.6	32.6
sulfurdioxide slant column density corrected win3 [DU]	4.35 ± 23.65	3864374	29.8	4.89	-301	851	-10.3	19.5
background so2 slant column offset window3 [DU]	19.5 ± 7.6	3864374	13.4	19.6	-6.59	40.7	12.7	26.1
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.23	3864374	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(4.592 \pm 10.345) \times 10^{-2}$	3864374	3.181×10^{-2}	1.803×10^{-2}	2.419×10^{-4}	1.52	8.489×10^{-3}	4.030×10^{-2}
fitted radiance shift [nm]	$(-3.838 \pm 30.533) \times 10^{-4}$	3864374	1.854×10^{-3}	-3.872×10^{-4}	-6.108×10^{-2}	3.912×10^{-2}	-1.359×10^{-3}	4.949×10^{-4}
fitted radiance squeeze [1]	$(-5.072 \pm 22.240) \times 10^{-5}$	3864374	2.244×10^{-4}	-2.615×10^{-5}	-1.764×10^{-2}	1.406×10^{-2}	-1.456×10^{-4}	7.885×10^{-5}
fitted root mean square [1]	$(1.394 \pm 0.701) \times 10^{-3}$	3864374	6.738×10^{-4}	1.186×10^{-3}	3.215×10^{-4}	5.099×10^{-2}	9.516×10^{-4}	1.625×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.800 ± 0.484	3864374	0.660	0.698	5.000×10^{-2}	2.95	0.420	1.08
sulfurdioxide total air mass factor polluted precision [1]	0.112 ± 0.148	3864374	0.113	5.373×10^{-2}	2.588×10^{-3}	1.85	2.857×10^{-2}	0.142
sulfurdioxide clear air mass factor polluted [1]	0.681 ± 0.352	3864374	0.476	0.620	5.409×10^{-2}	3.01	0.400	0.876
number of spectral points in retrieval [1]	73.4 ± 0.5	3864374	1.000	73.0	52.0	74.0	73.0	74.0

3 Granule outlines

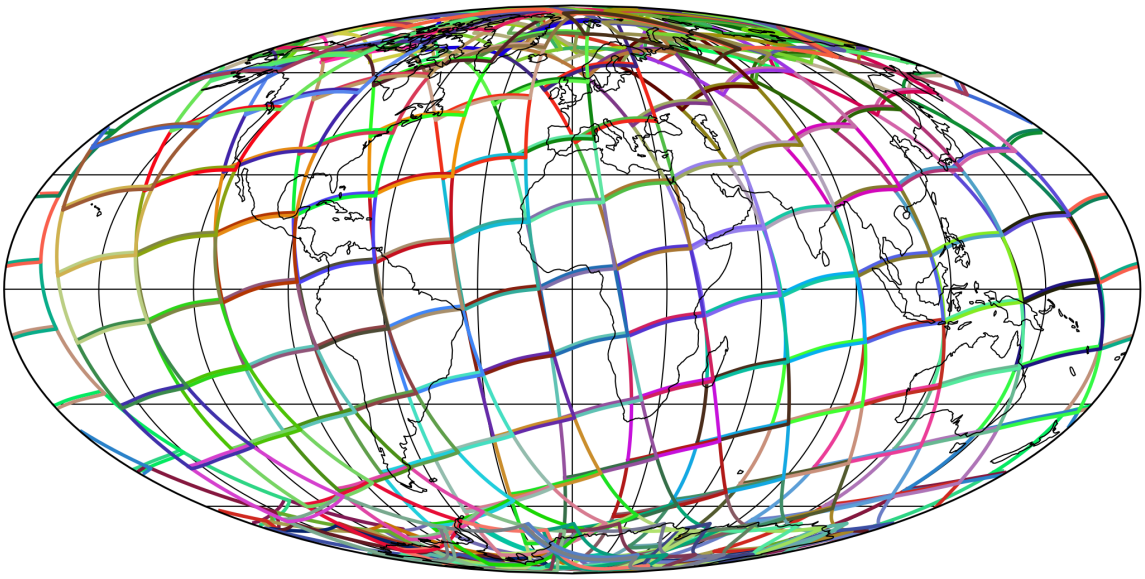

Figure 1: Outline of the granules.

4 Input data monitoring

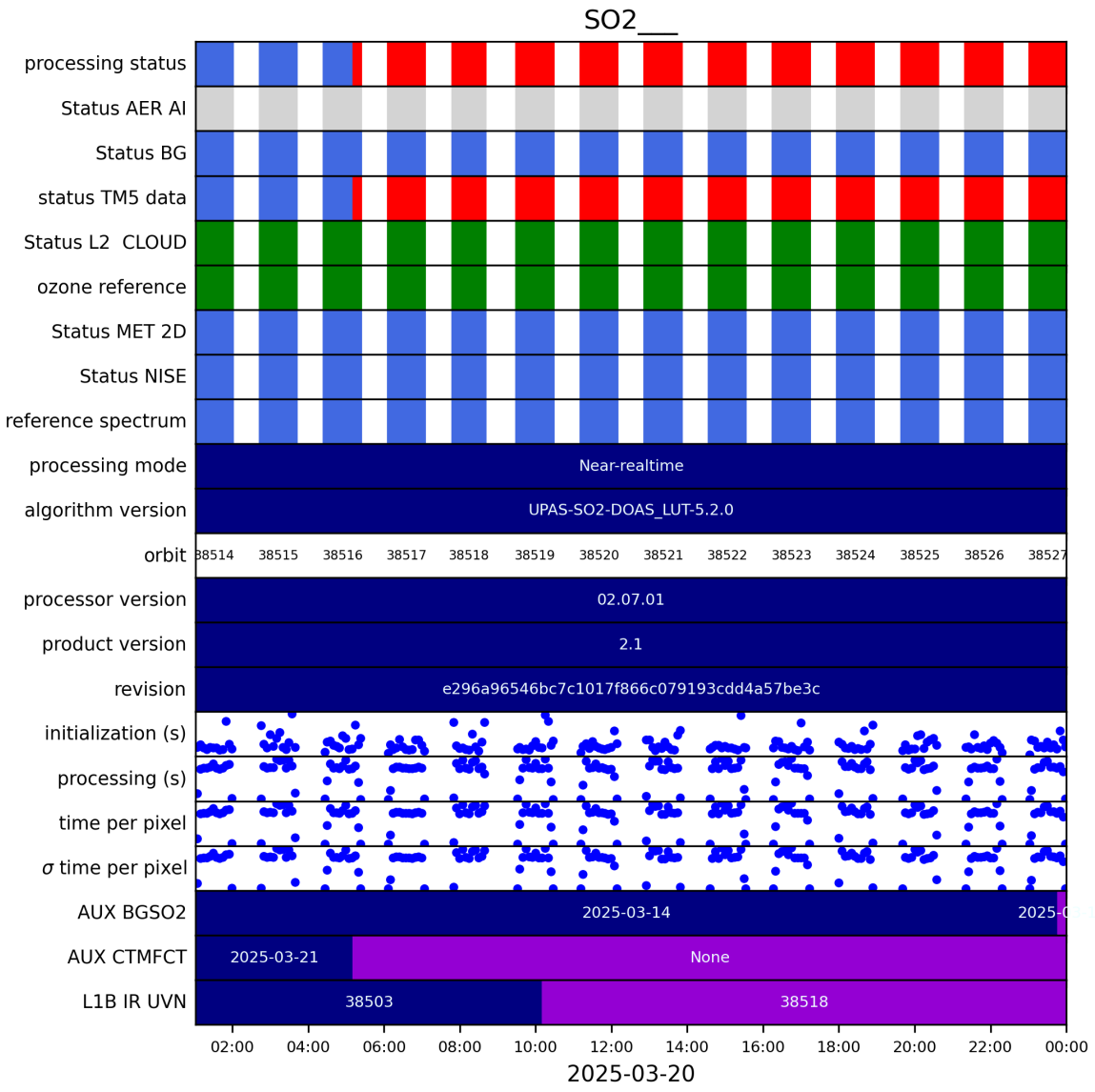

Figure 2: Input data per granule

5 Warnings and errors

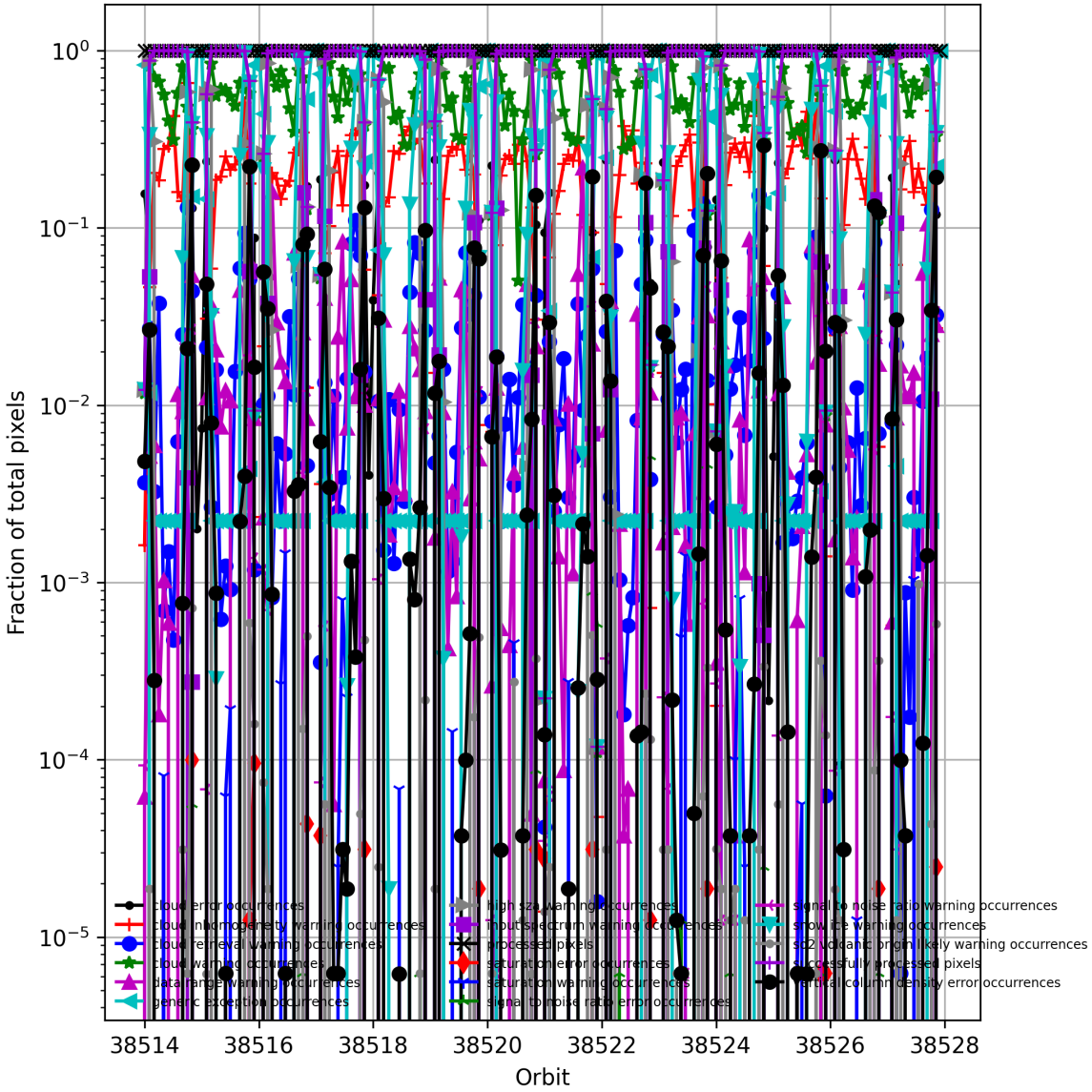

Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

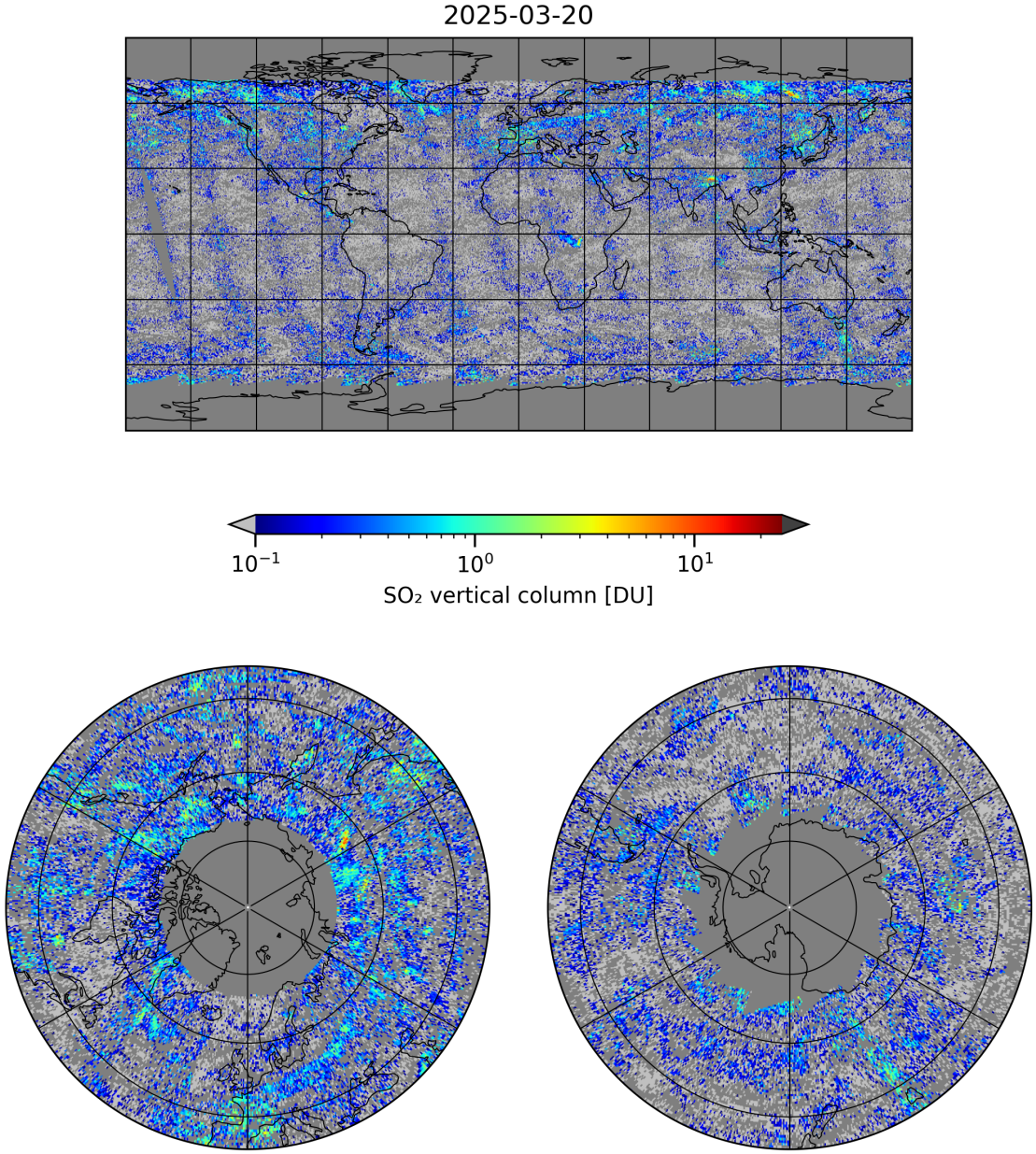

Figure 4: Map of "SO_2 vertical column" for 2025-03-20 to 2025-03-21

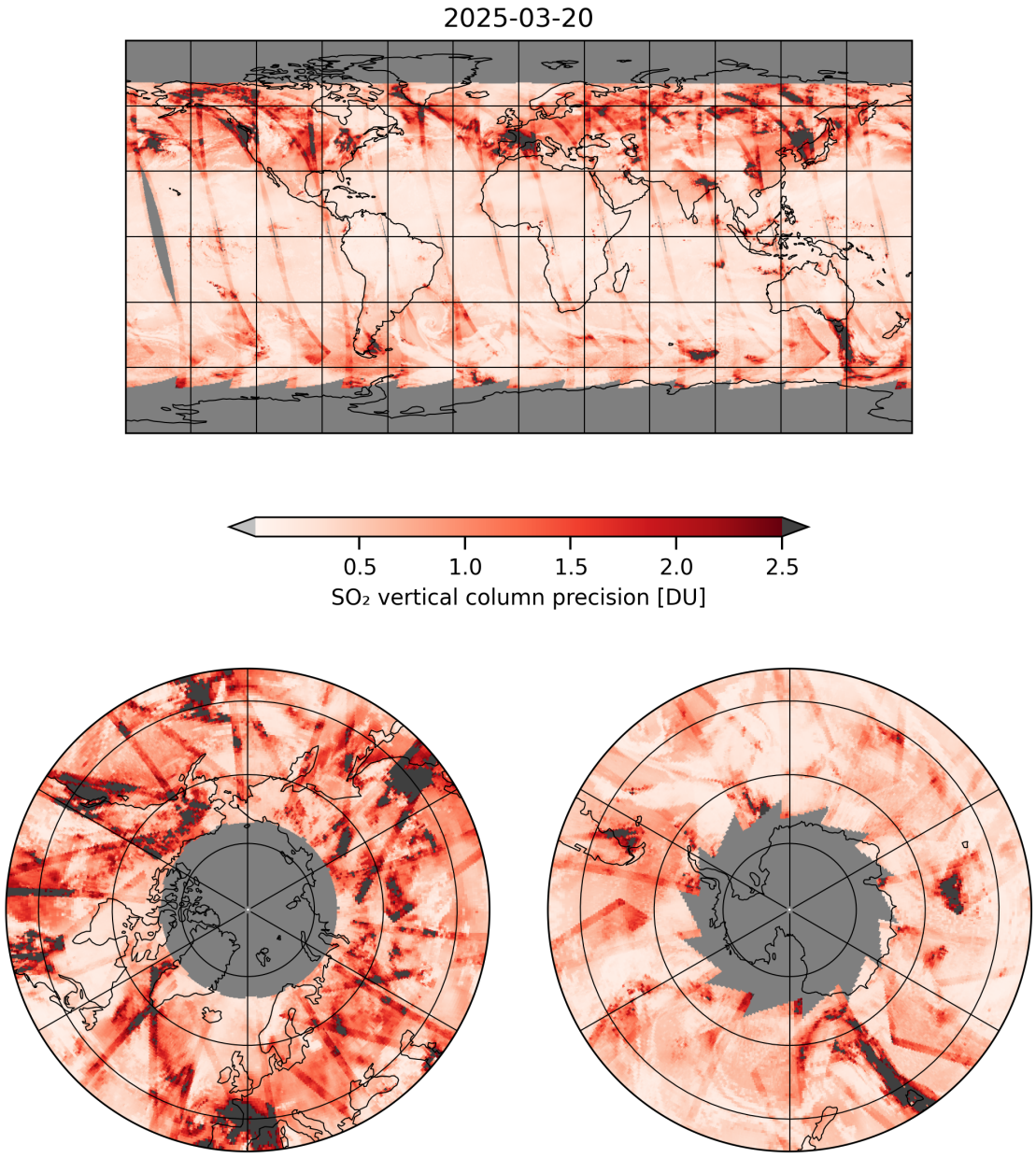

Figure 5: Map of "SO_2 vertical column precision" for 2025-03-20 to 2025-03-21

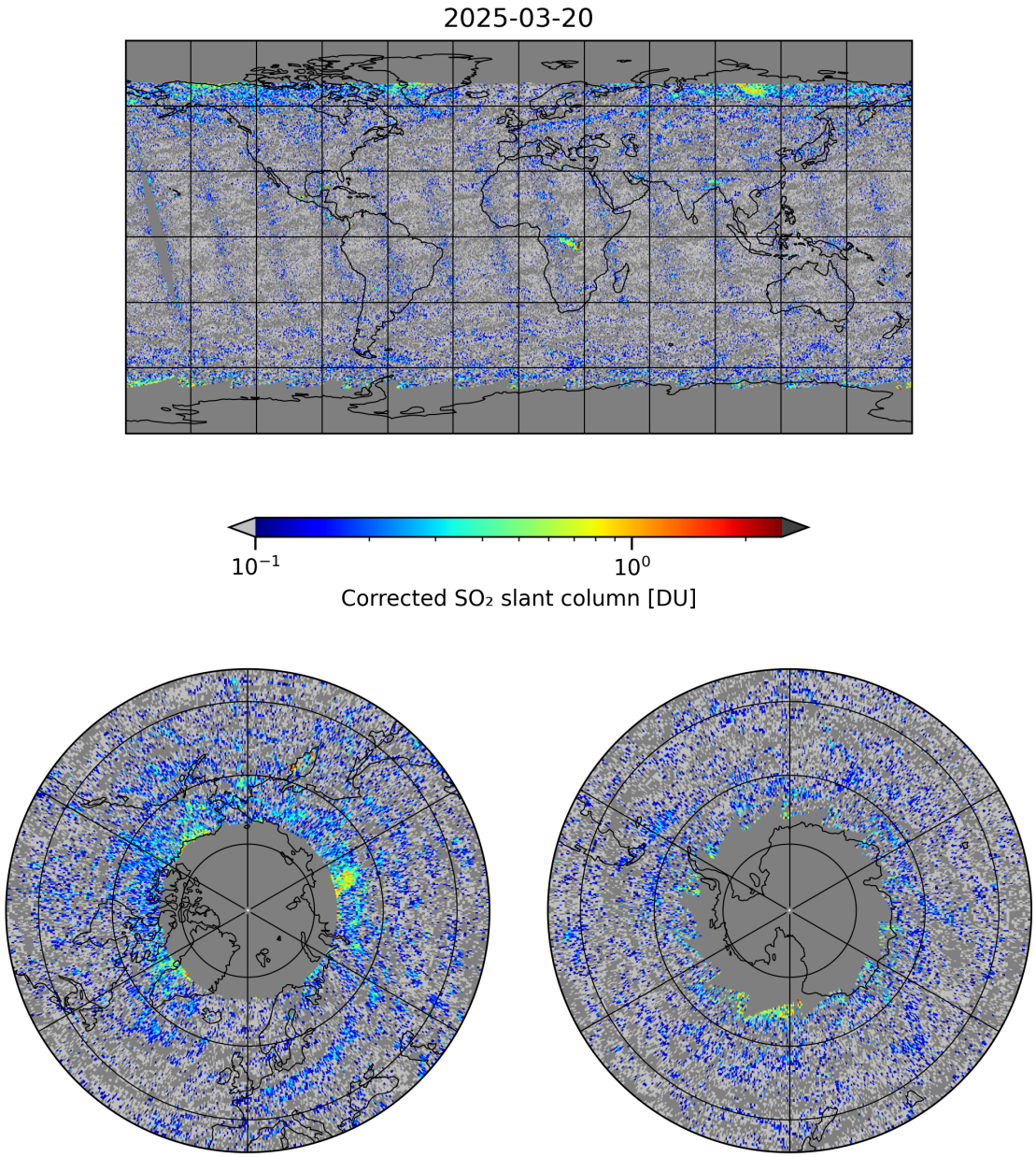

Figure 6: Map of "Corrected SO_2 slant column" for 2025-03-20 to 2025-03-21

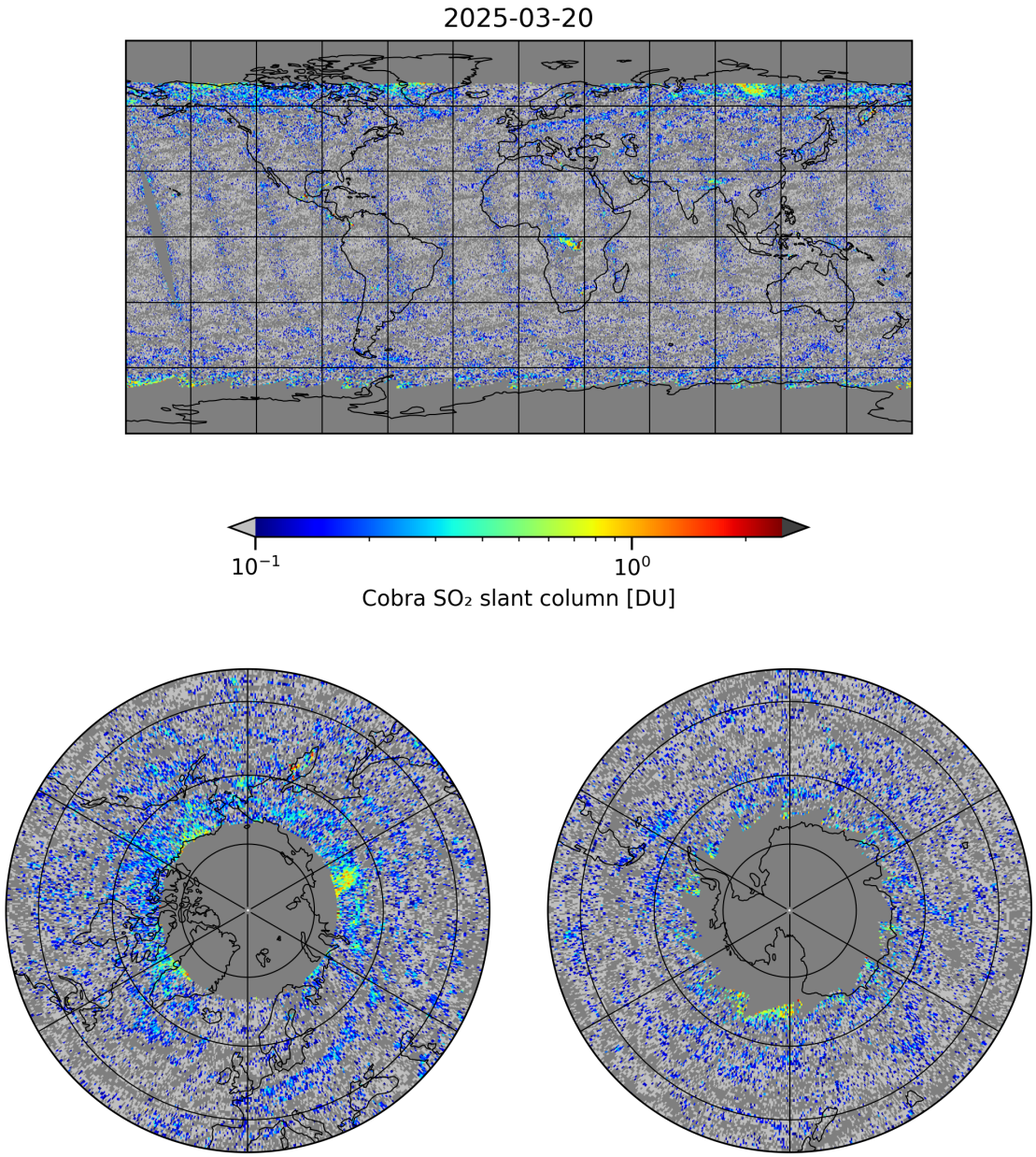

Figure 7: Map of "Cobra SO_2 slant column" for 2025-03-20 to 2025-03-21

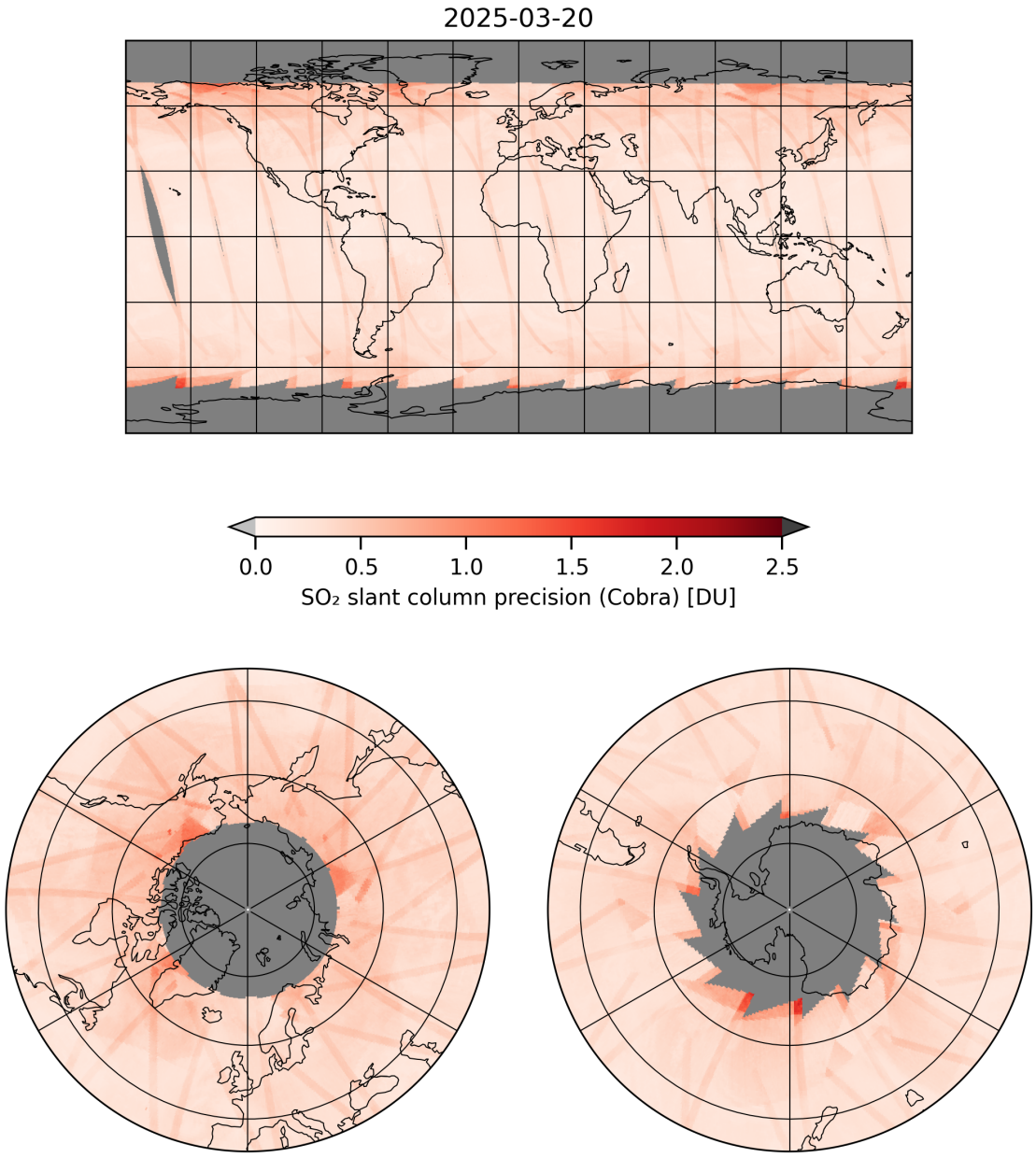

Figure 8: Map of "SO_2 slant column precision (Cobra)" for 2025-03-20 to 2025-03-21

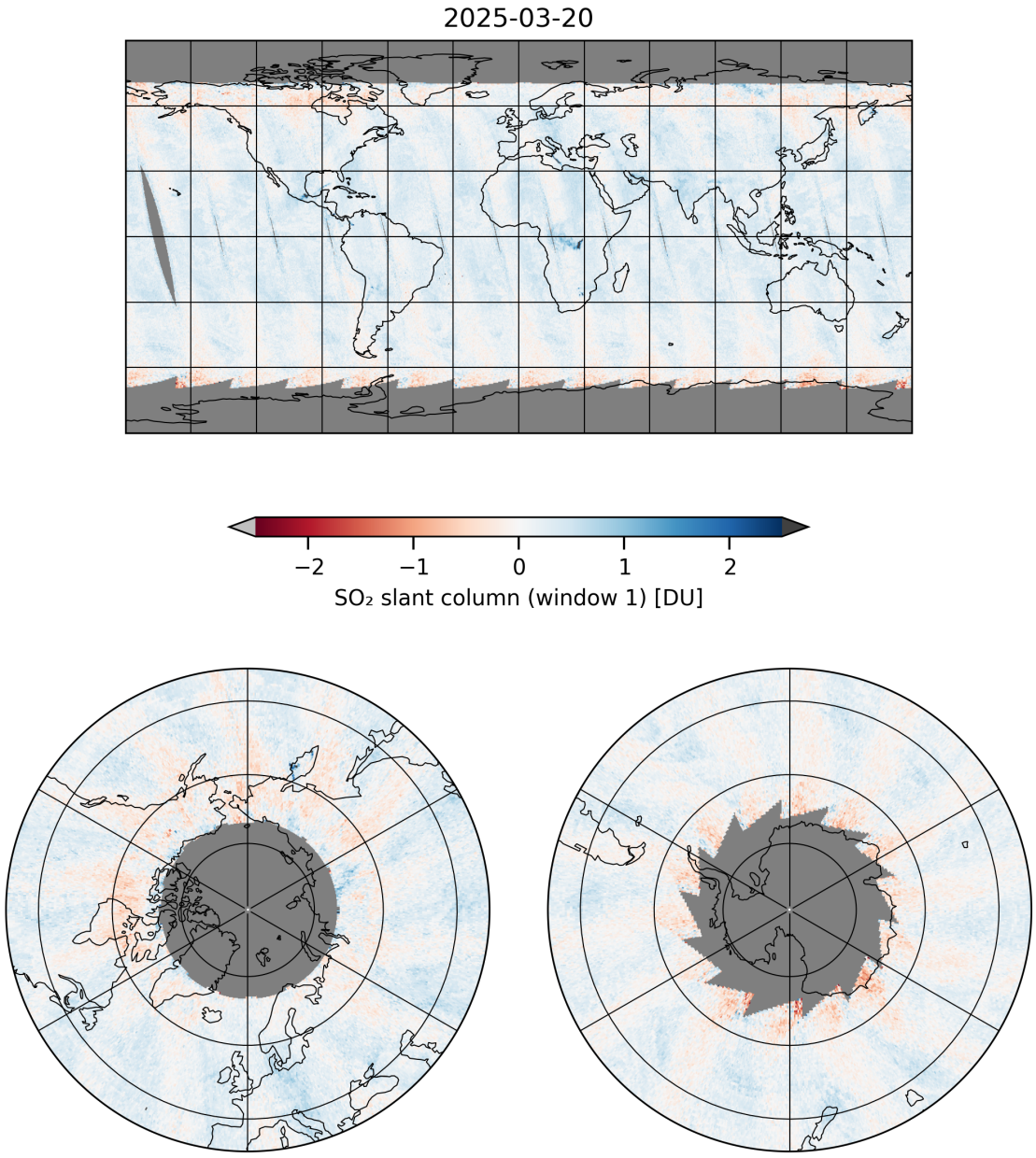

Figure 9: Map of "SO_2 slant column (window 1)" for 2025-03-20 to 2025-03-21

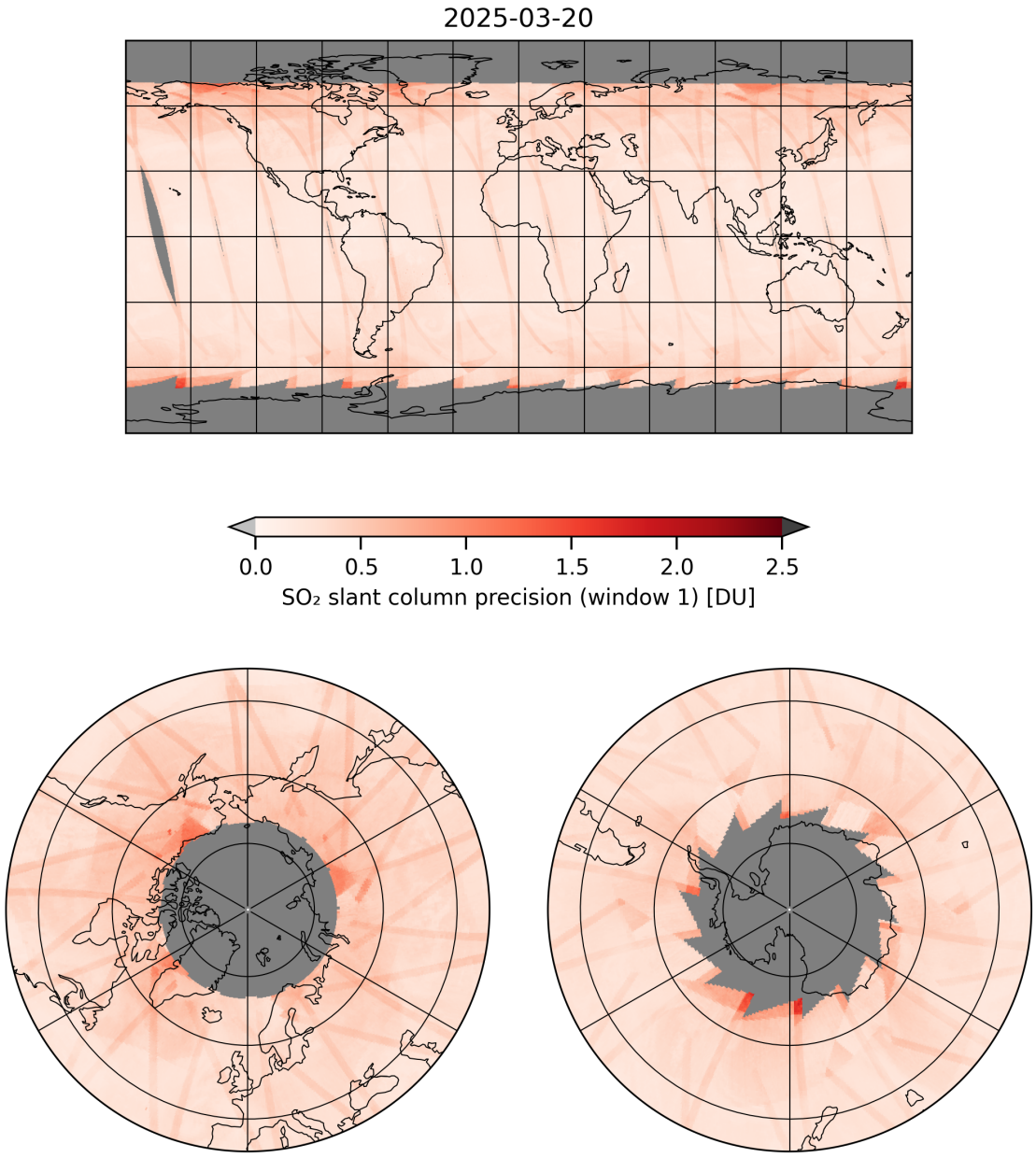

Figure 10: Map of "SO_2 slant column precision (window 1)" for 2025-03-20 to 2025-03-21

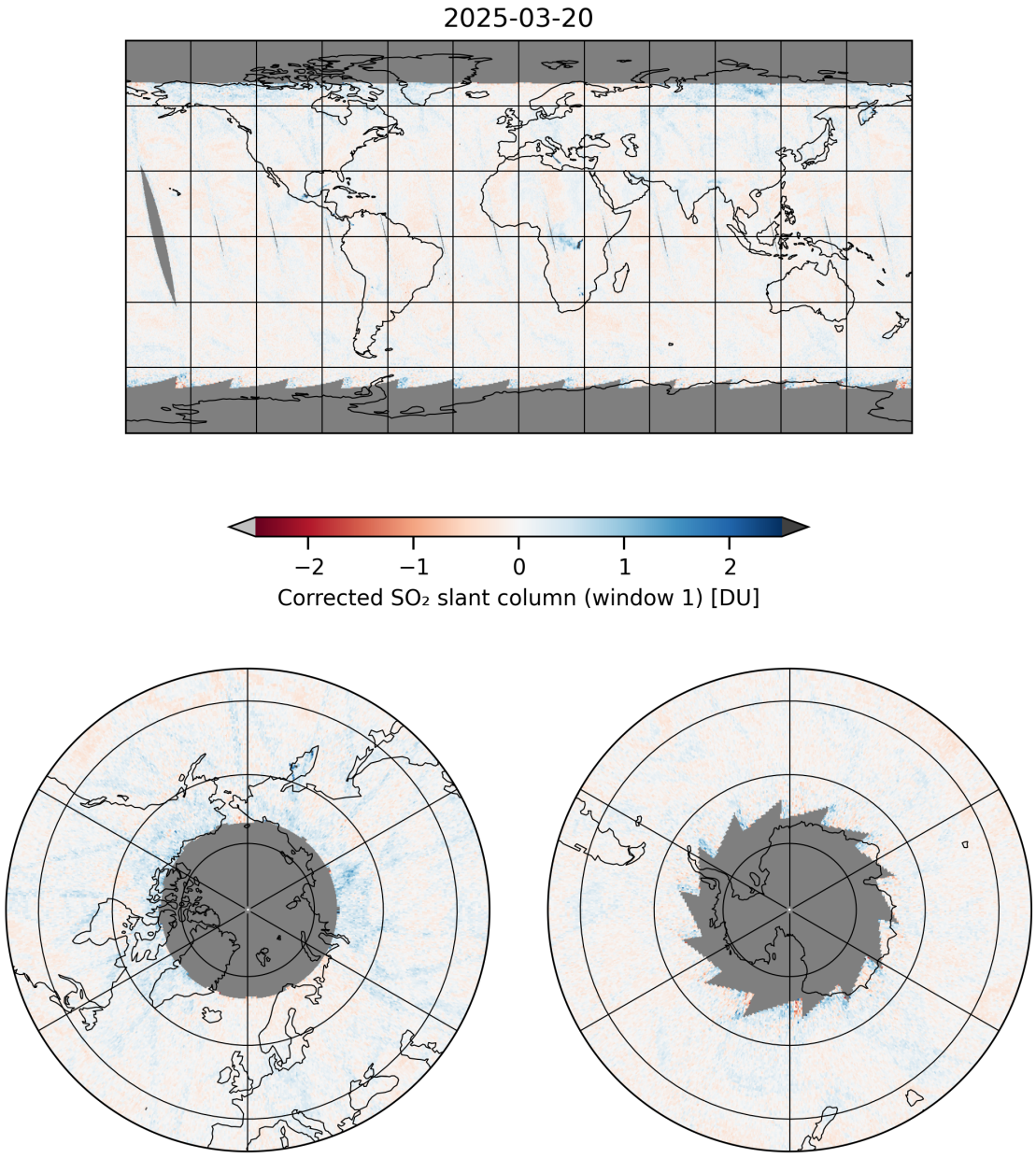

Figure 11: Map of “Corrected SO_2 slant column (window 1)” for 2025-03-20 to 2025-03-21

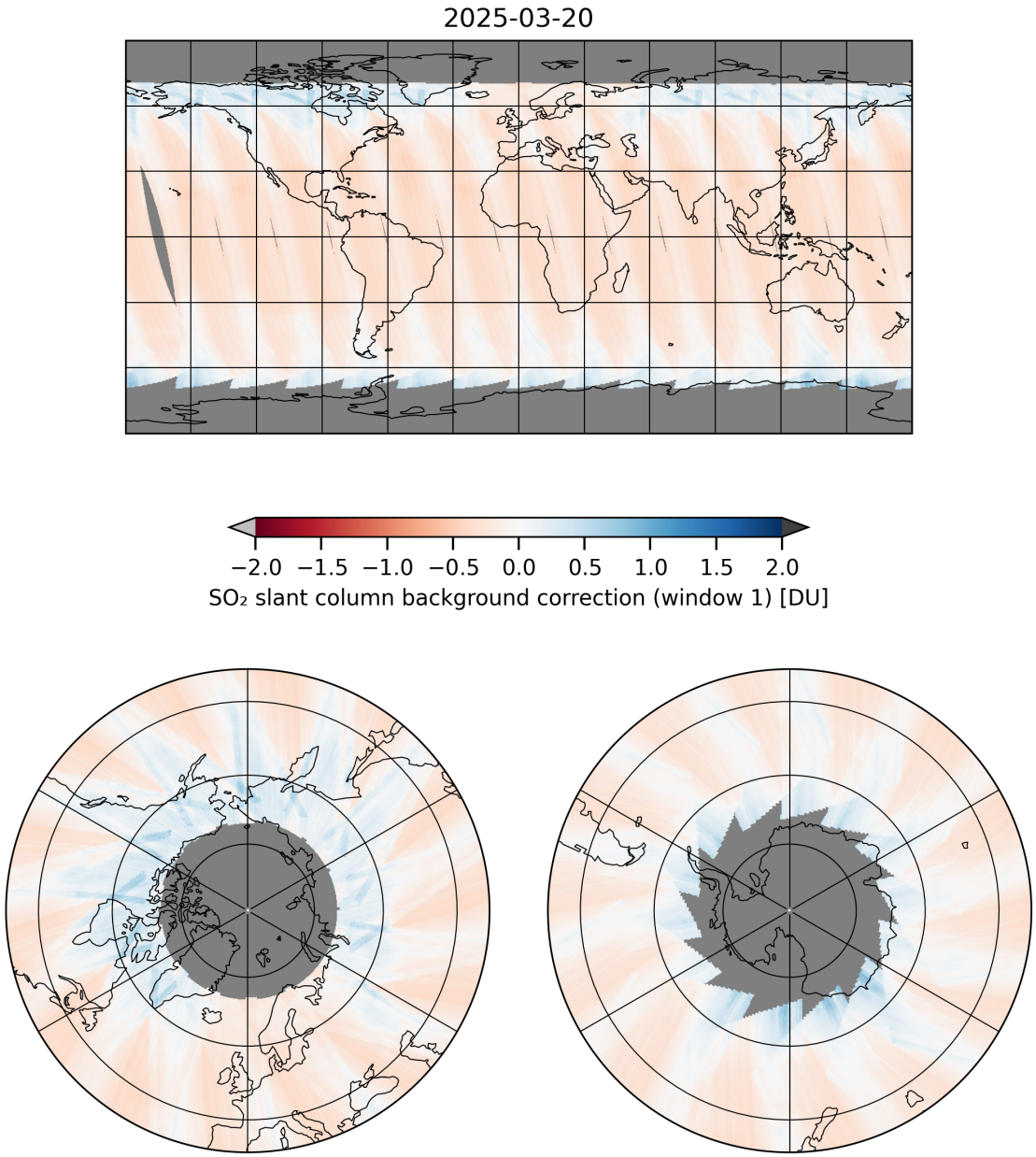

Figure 12: Map of "SO_2 slant column background correction (window 1)" for 2025-03-20 to 2025-03-21

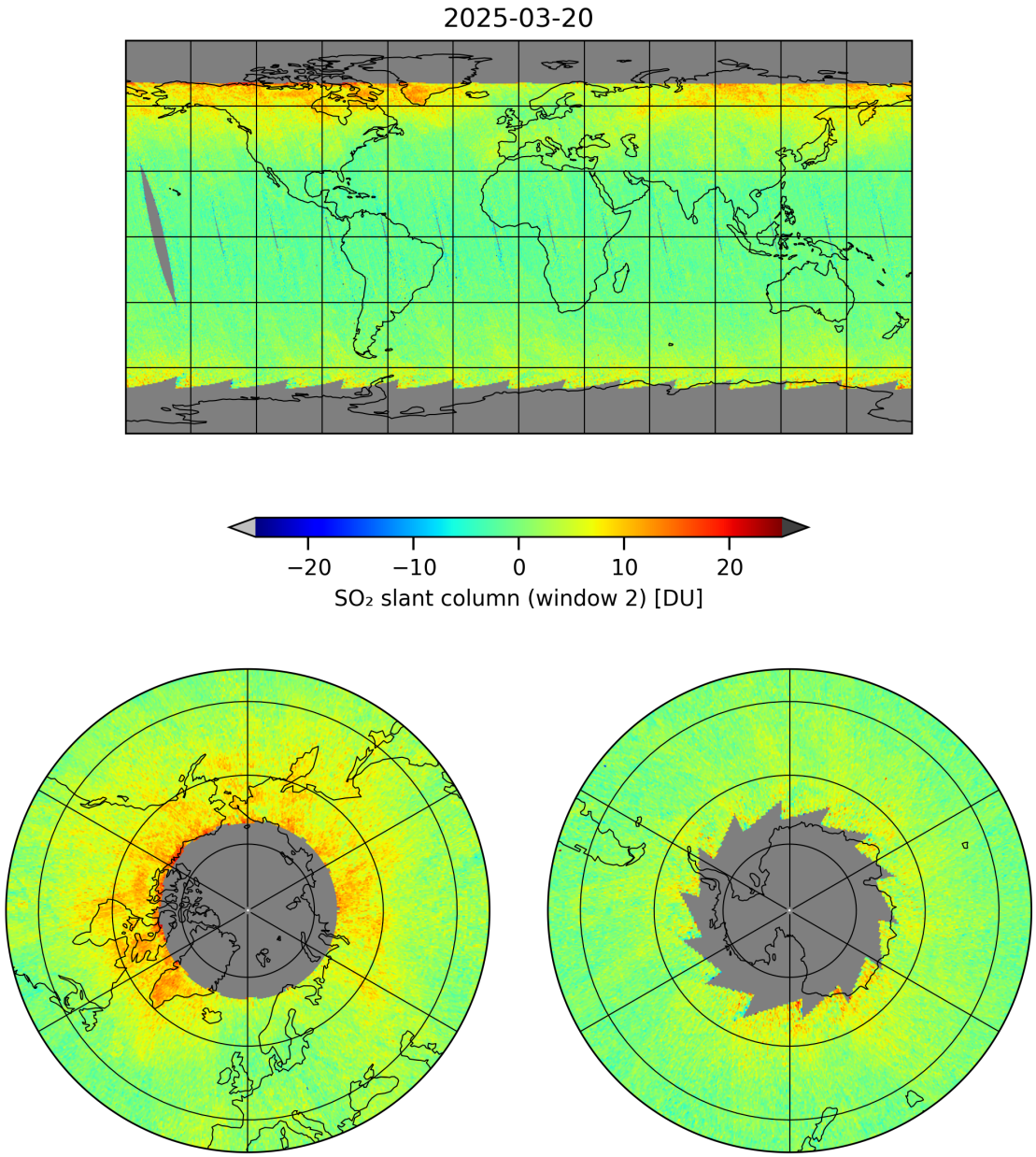

Figure 13: Map of "SO_2 slant column (window 2)" for 2025-03-20 to 2025-03-21

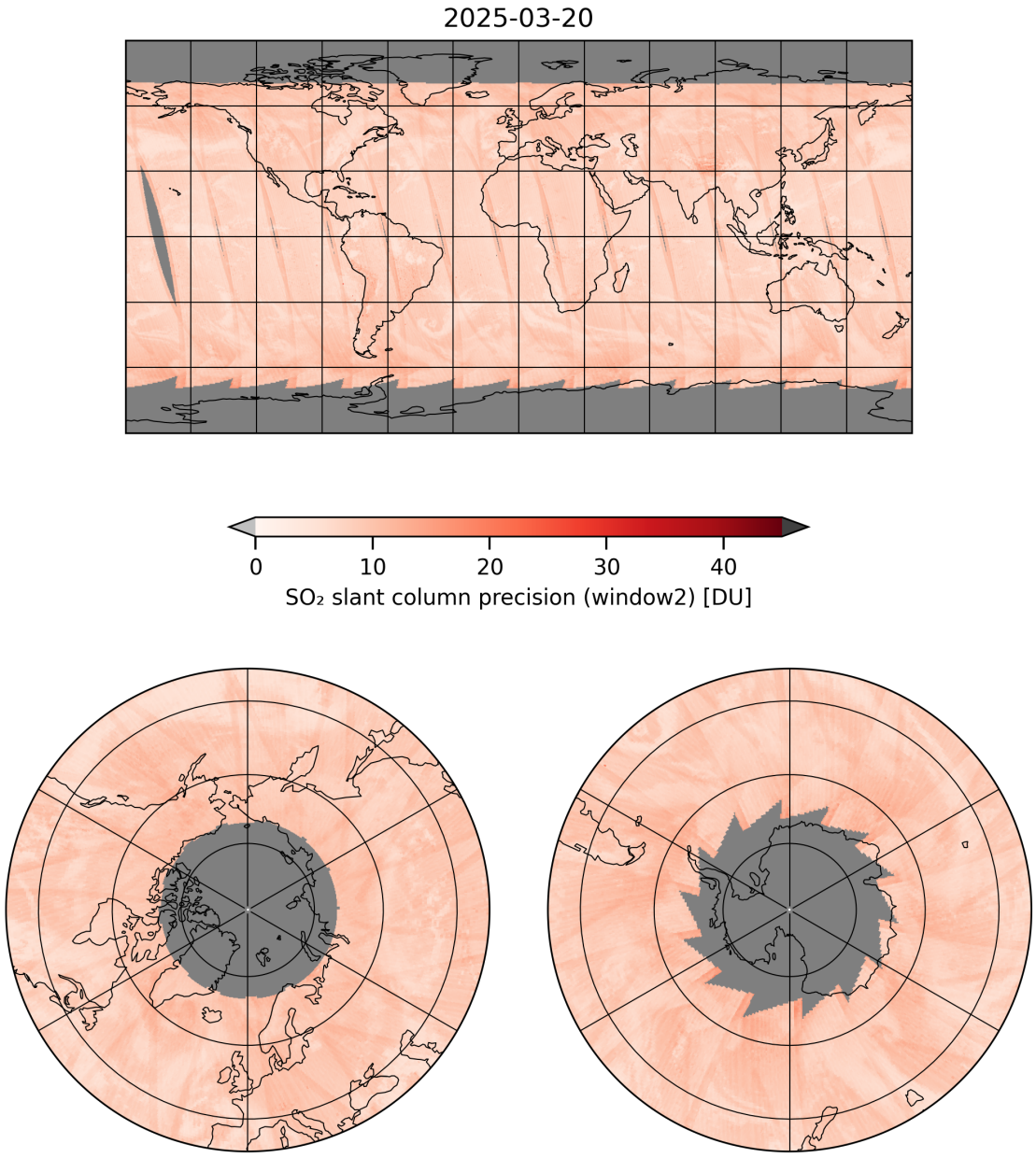

Figure 14: Map of "SO_2 slant column precision (window2)" for 2025-03-20 to 2025-03-21

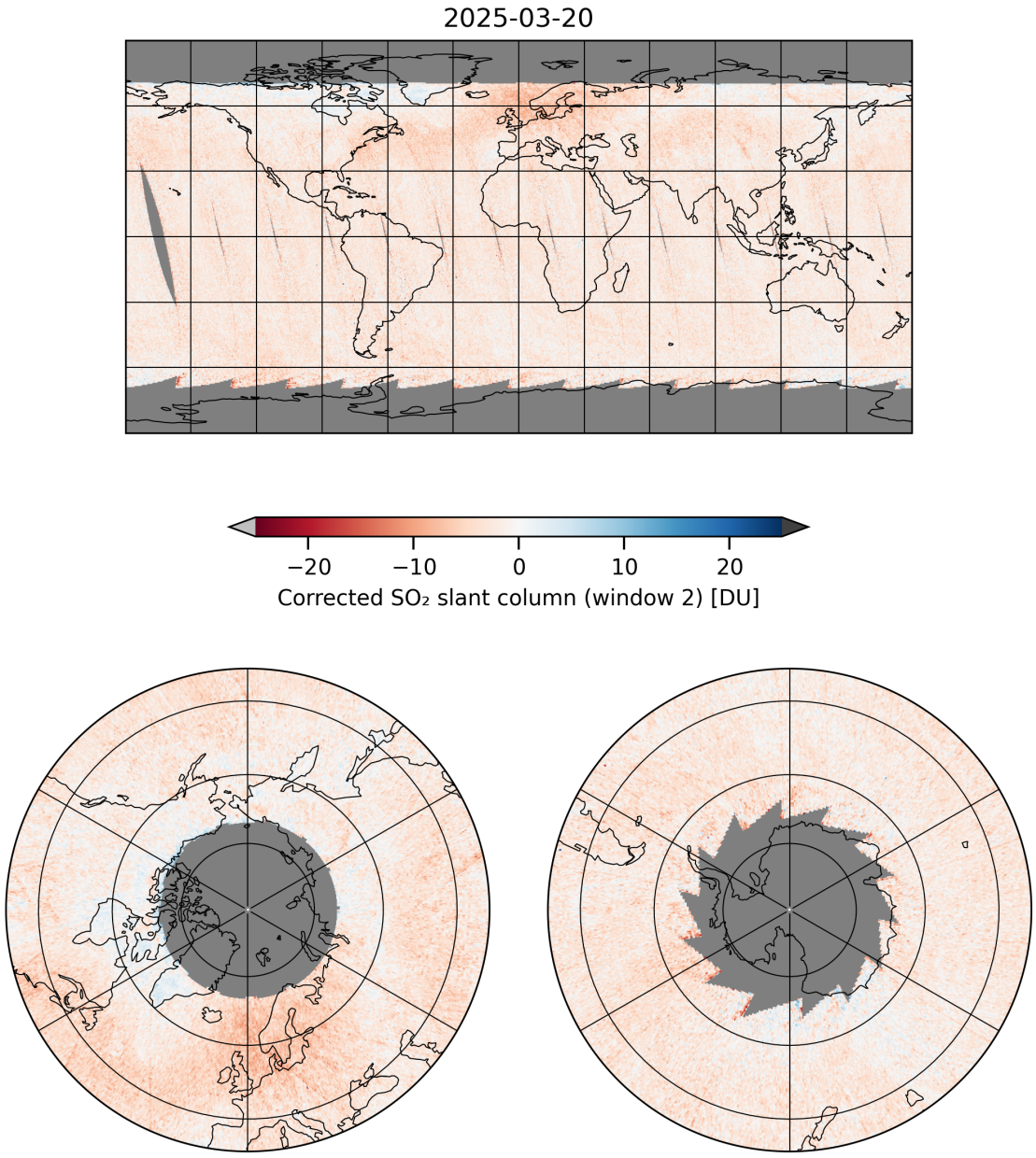

Figure 15: Map of "Corrected SO_2 slant column (window 2)" for 2025-03-20 to 2025-03-21

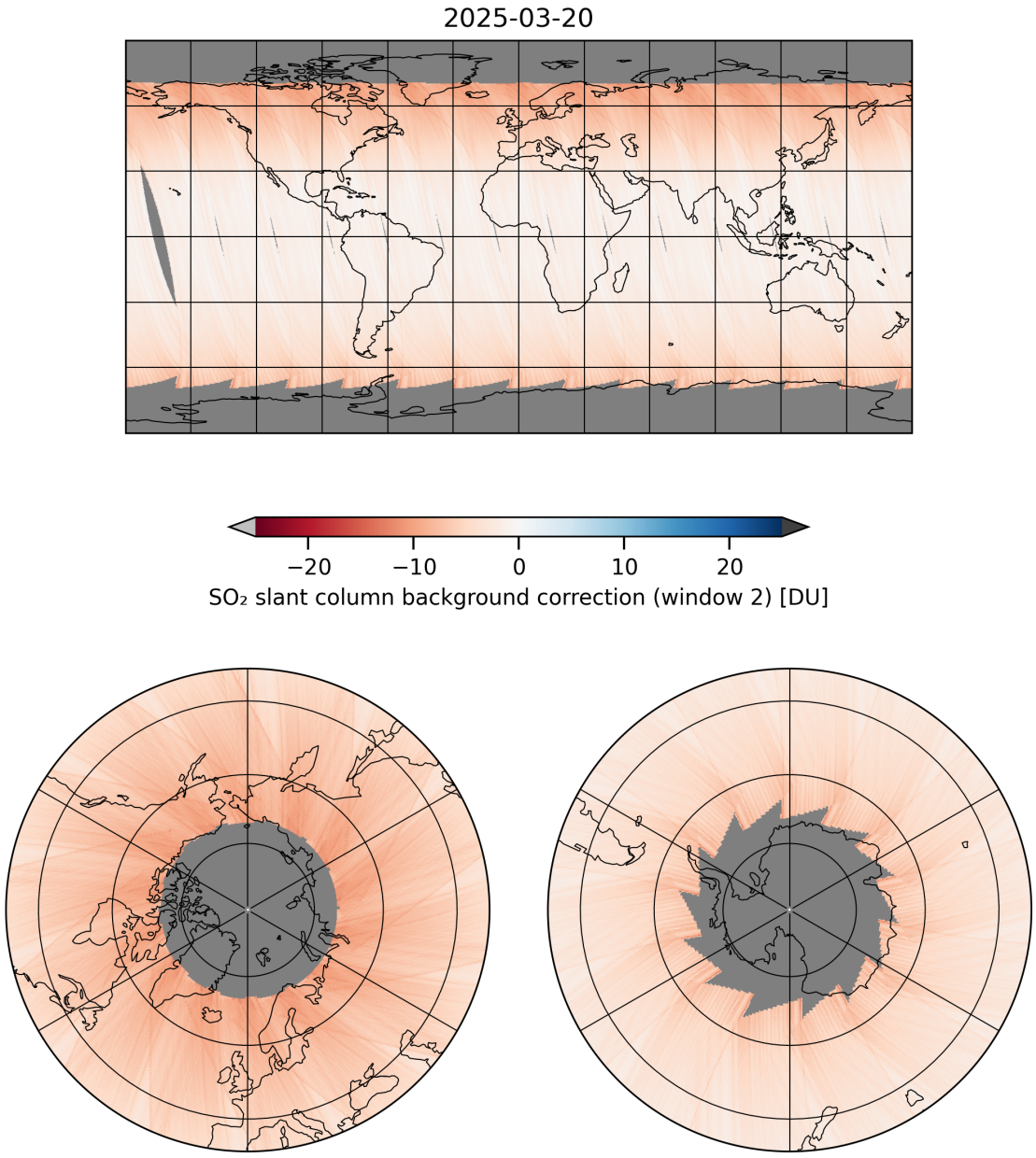

Figure 16: Map of "SO_2 slant column background correction (window 2)" for 2025-03-20 to 2025-03-21

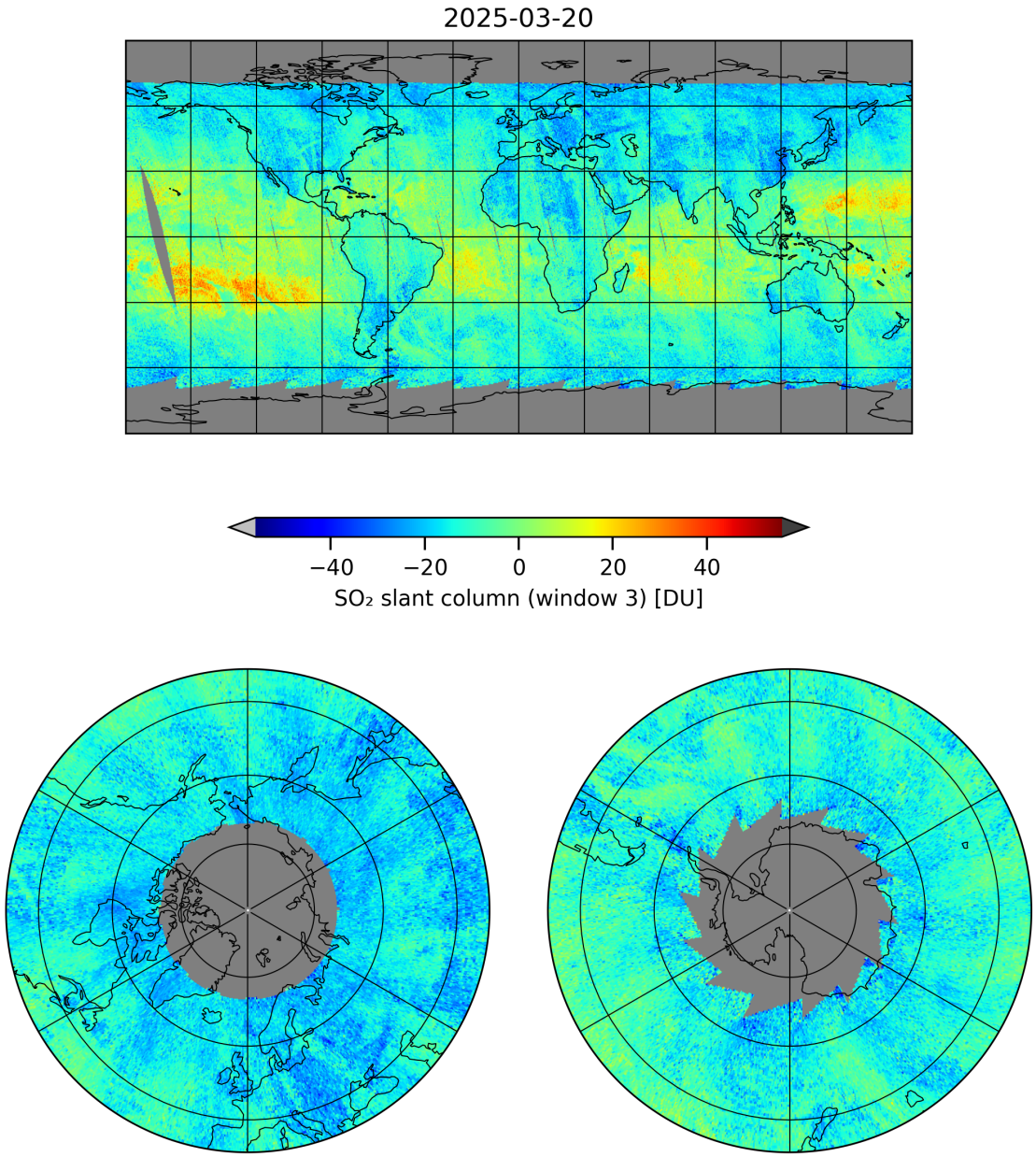

Figure 17: Map of "SO_2 slant column (window 3)" for 2025-03-20 to 2025-03-21

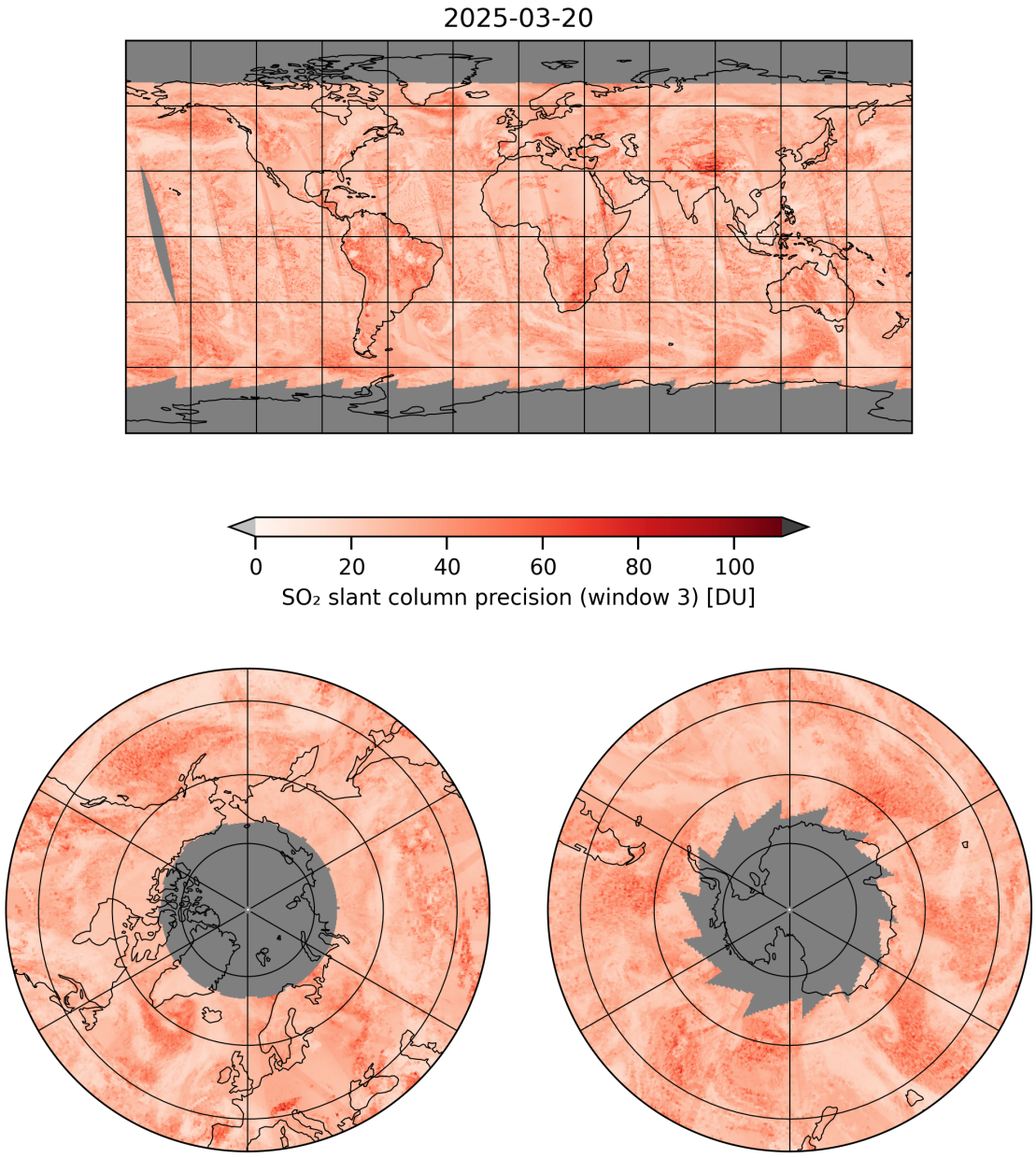

Figure 18: Map of "SO_2 slant column precision (window 3)" for 2025-03-20 to 2025-03-21

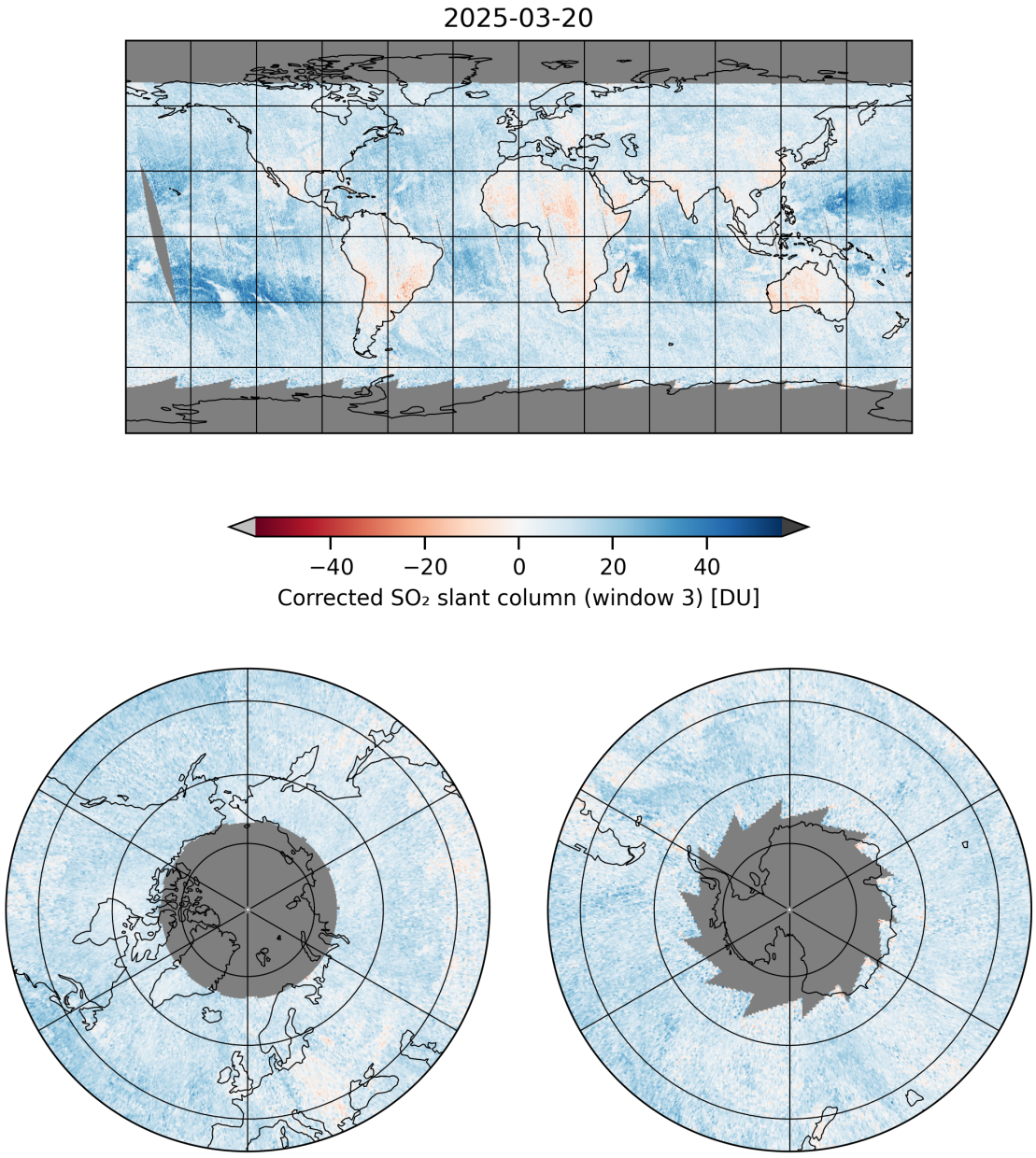

Figure 19: Map of “Corrected SO_2 slant column (window 3)” for 2025-03-20 to 2025-03-21

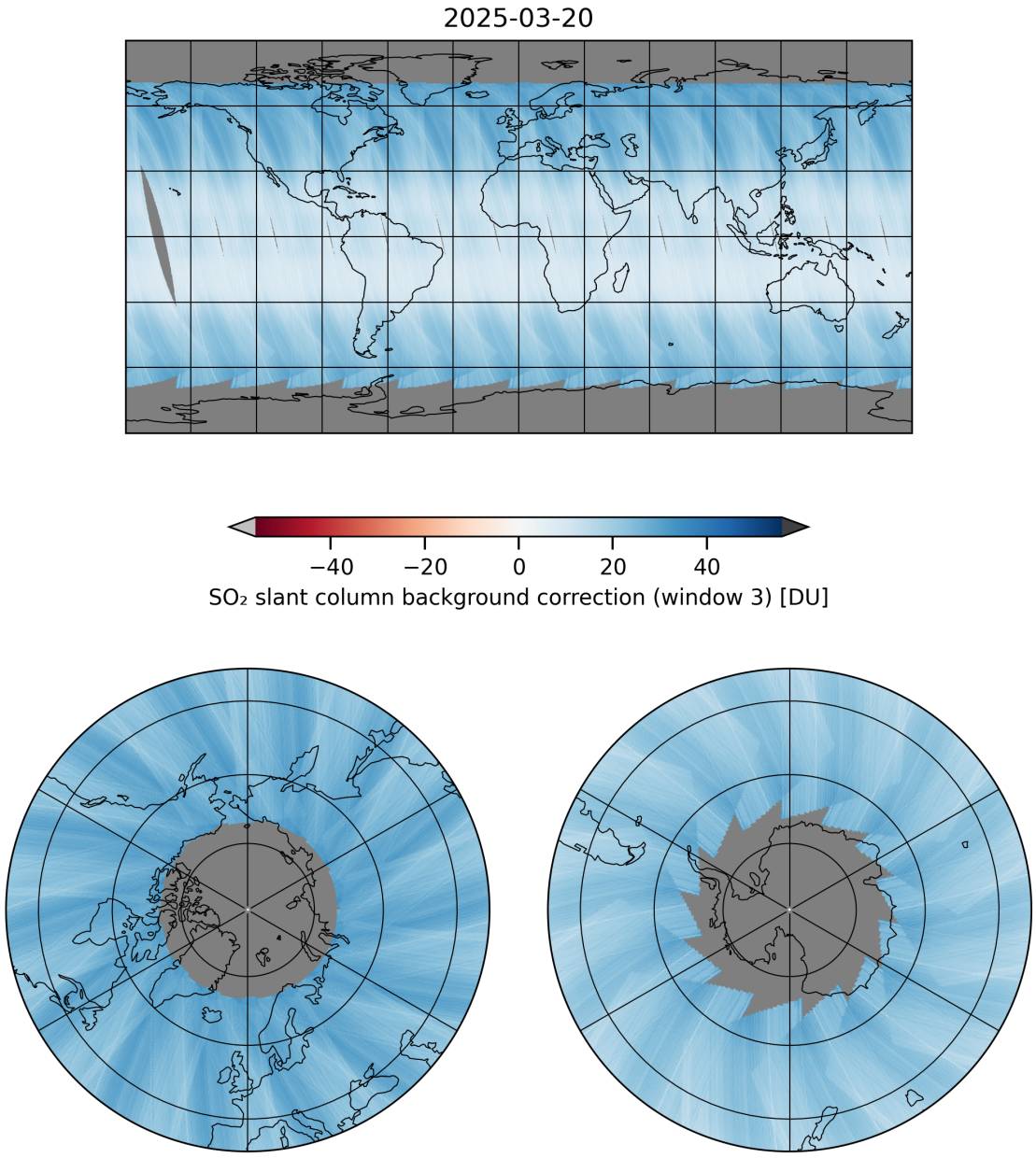

Figure 20: Map of "SO_2 slant column background correction (window 3)" for 2025-03-20 to 2025-03-21

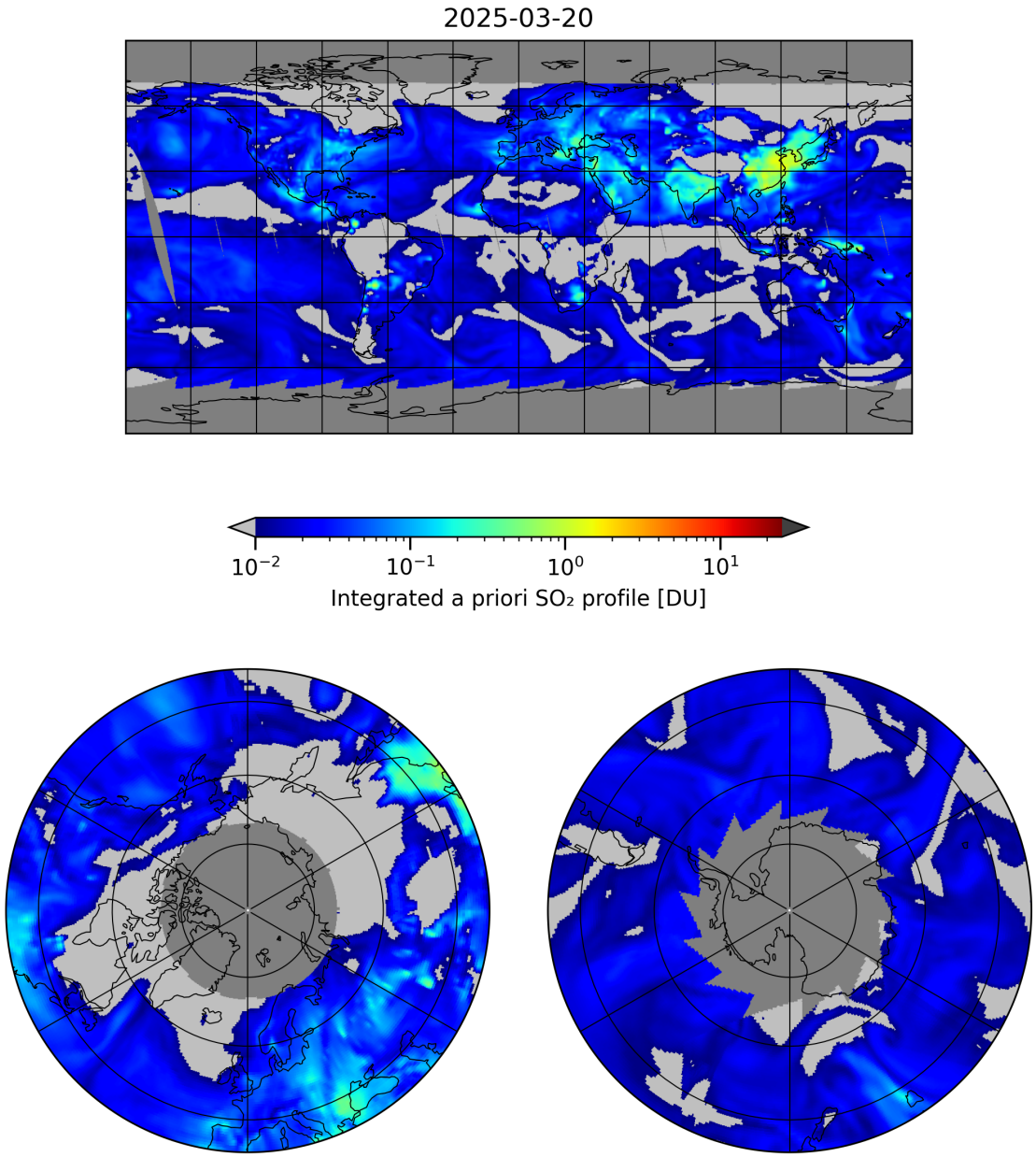

Figure 21: Map of “Integrated a priori SO_2 profile” for 2025-03-20 to 2025-03-21

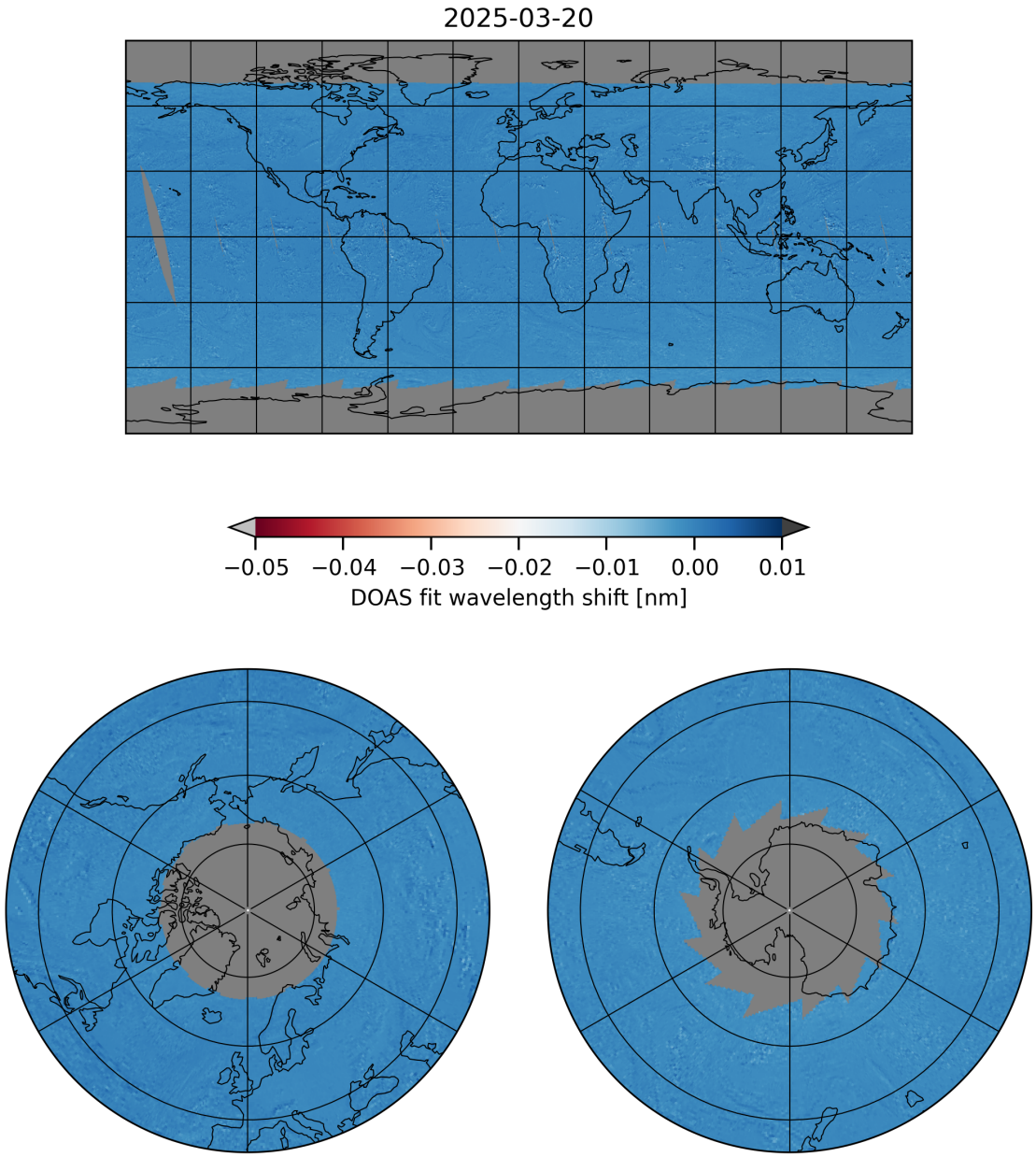

Figure 22: Map of “DOAS fit wavelength shift” for 2025-03-20 to 2025-03-21

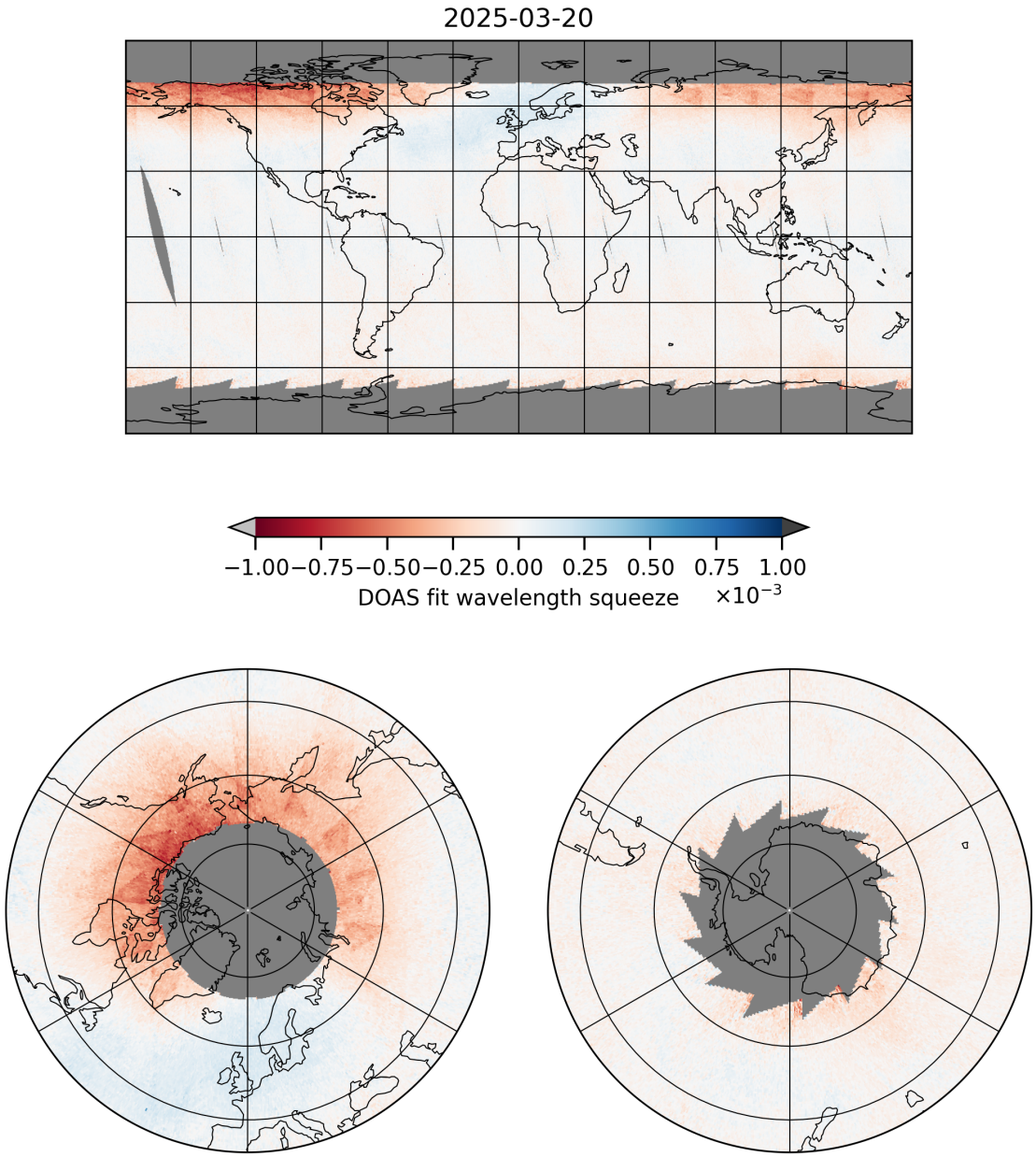

Figure 23: Map of “DOAS fit wavelength squeeze” for 2025-03-20 to 2025-03-21

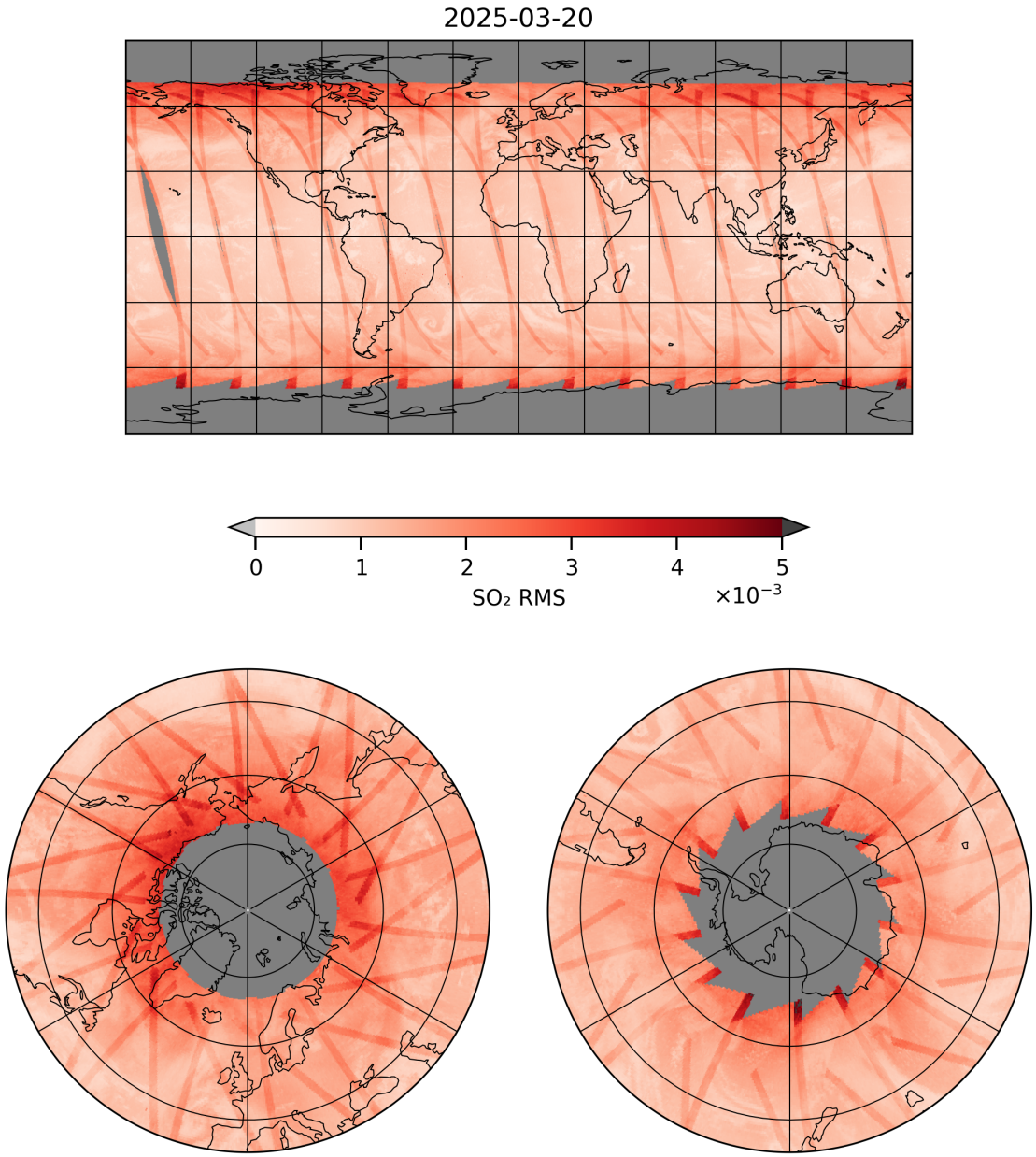

Figure 24: Map of "SO_2 RMS" for 2025-03-20 to 2025-03-21

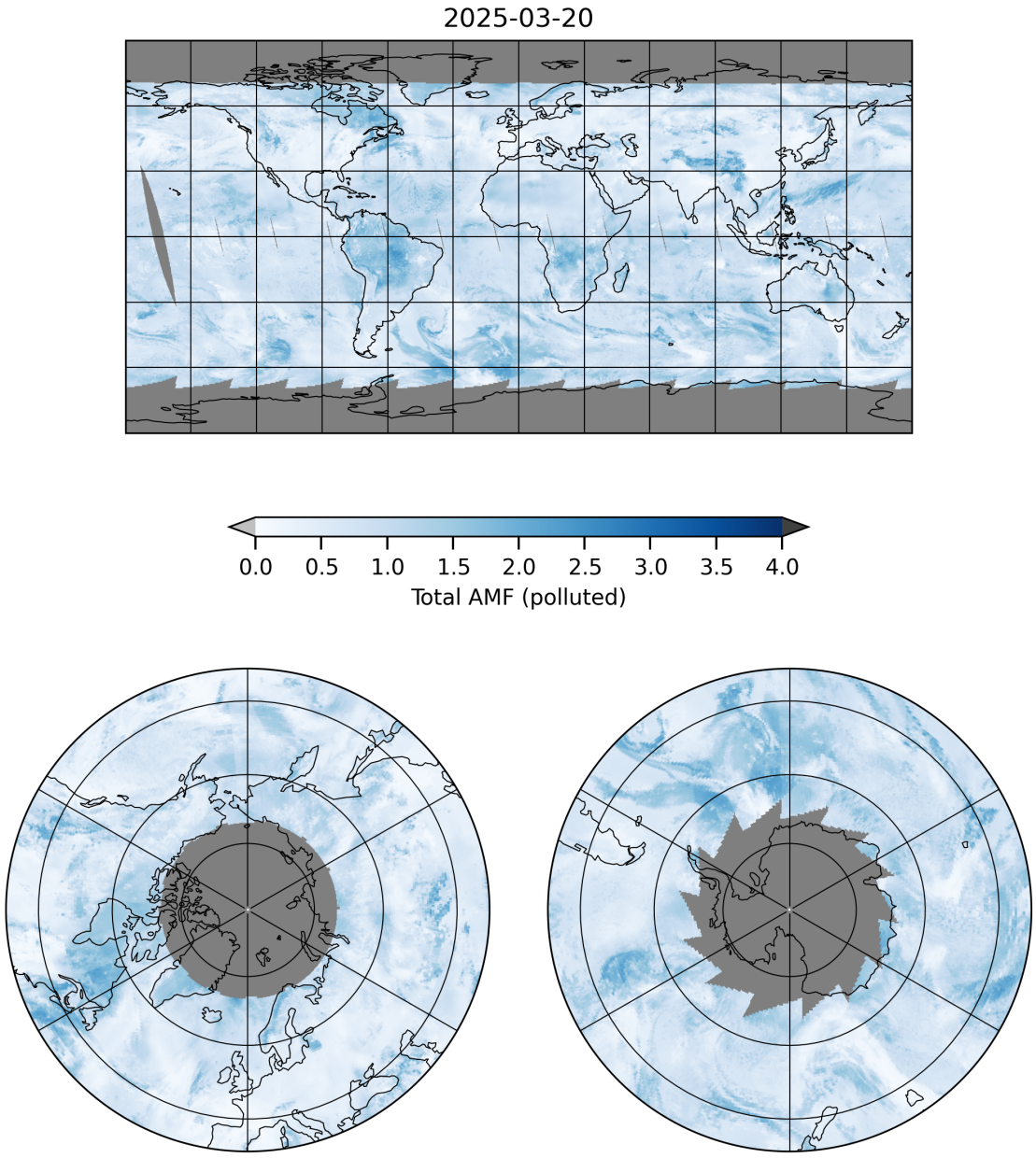

Figure 25: Map of “Total AMF (polluted)” for 2025-03-20 to 2025-03-21

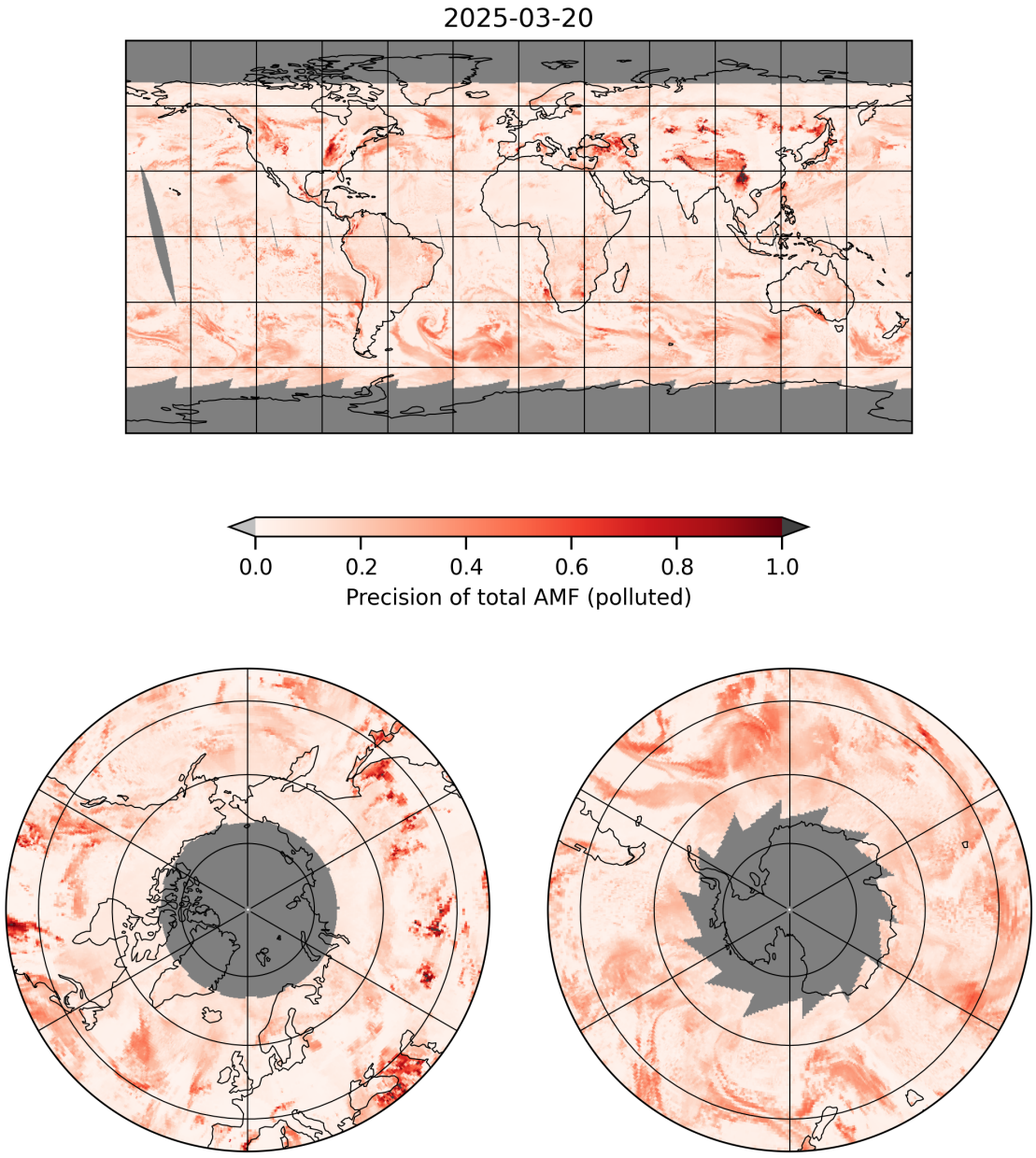

Figure 26: Map of “Precision of total AMF (polluted)” for 2025-03-20 to 2025-03-21

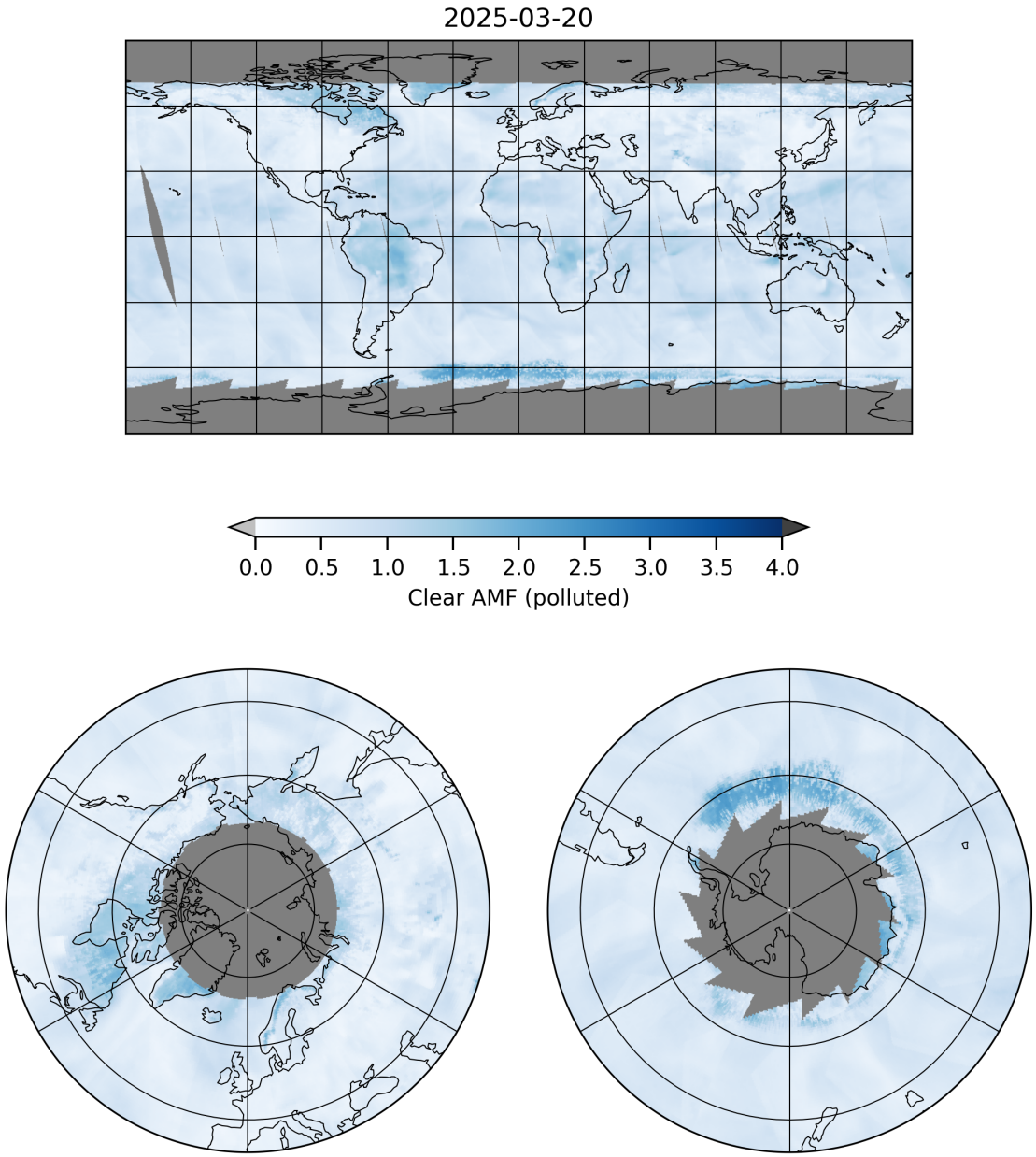

Figure 27: Map of “Clear AMF (polluted)” for 2025-03-20 to 2025-03-21

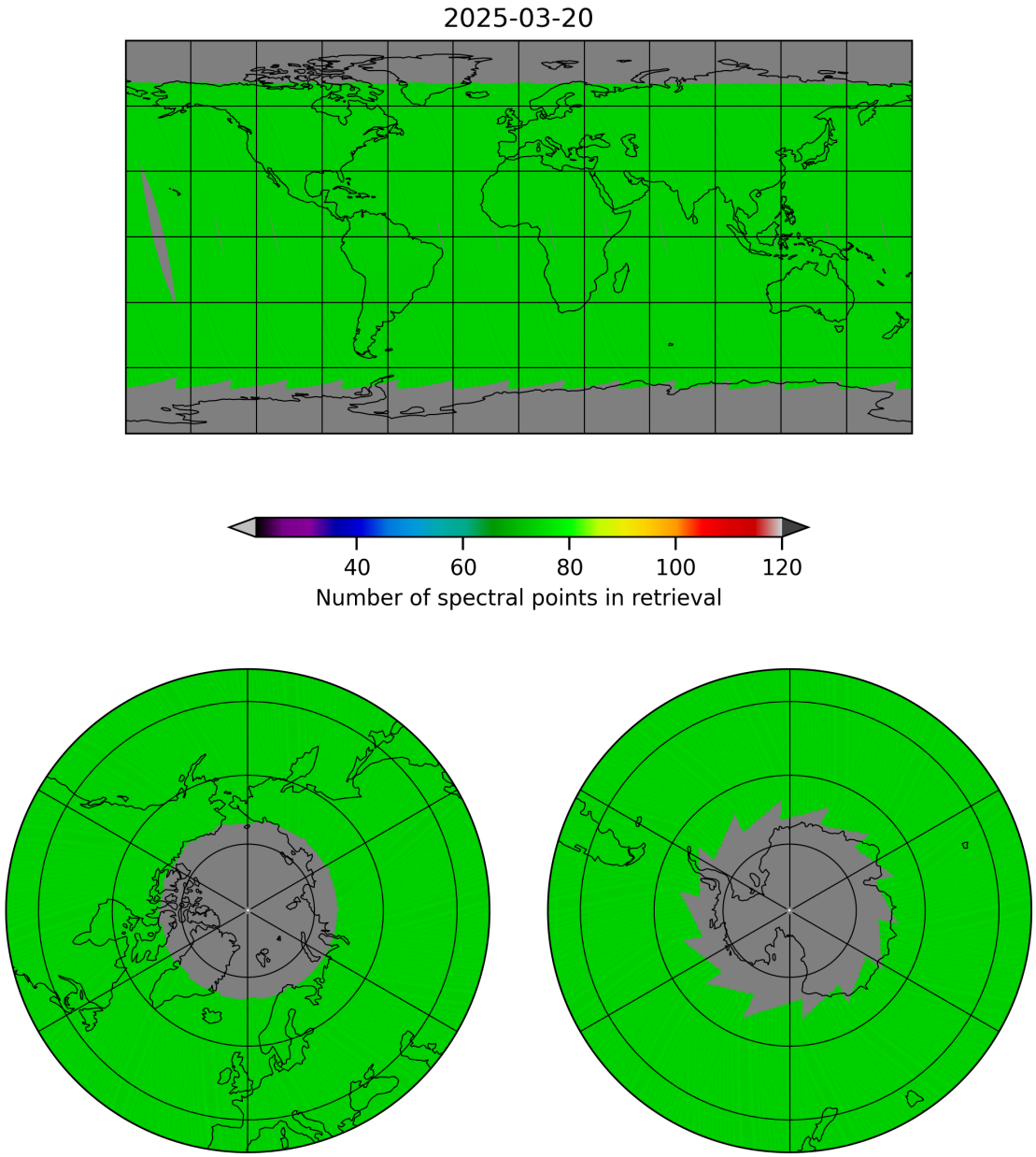

Figure 28: Map of “Number of spectral points in retrieval” for 2025-03-20 to 2025-03-21

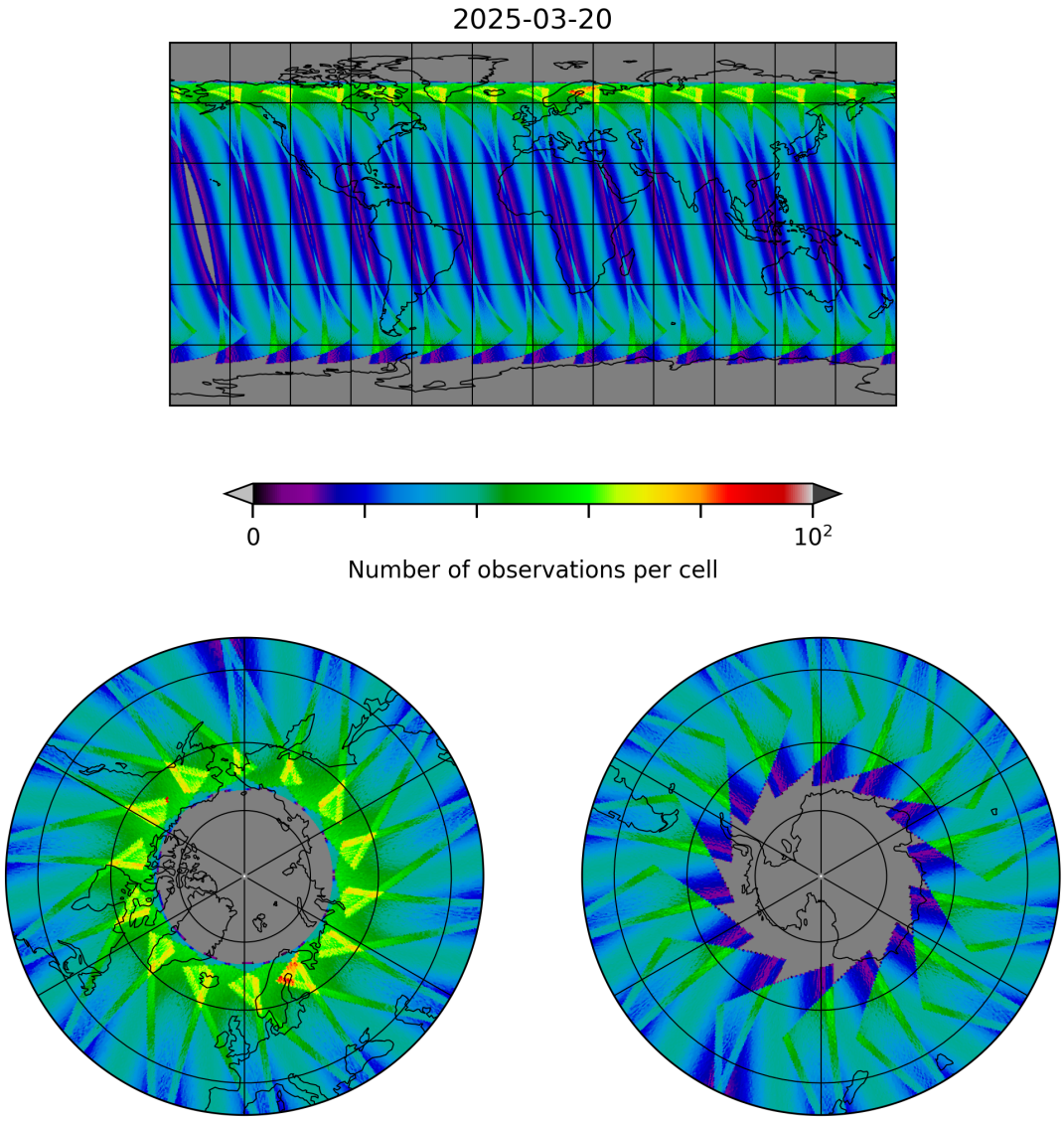

Figure 29: Map of the number of observations for 2025-03-20 to 2025-03-21

7 Zonal average

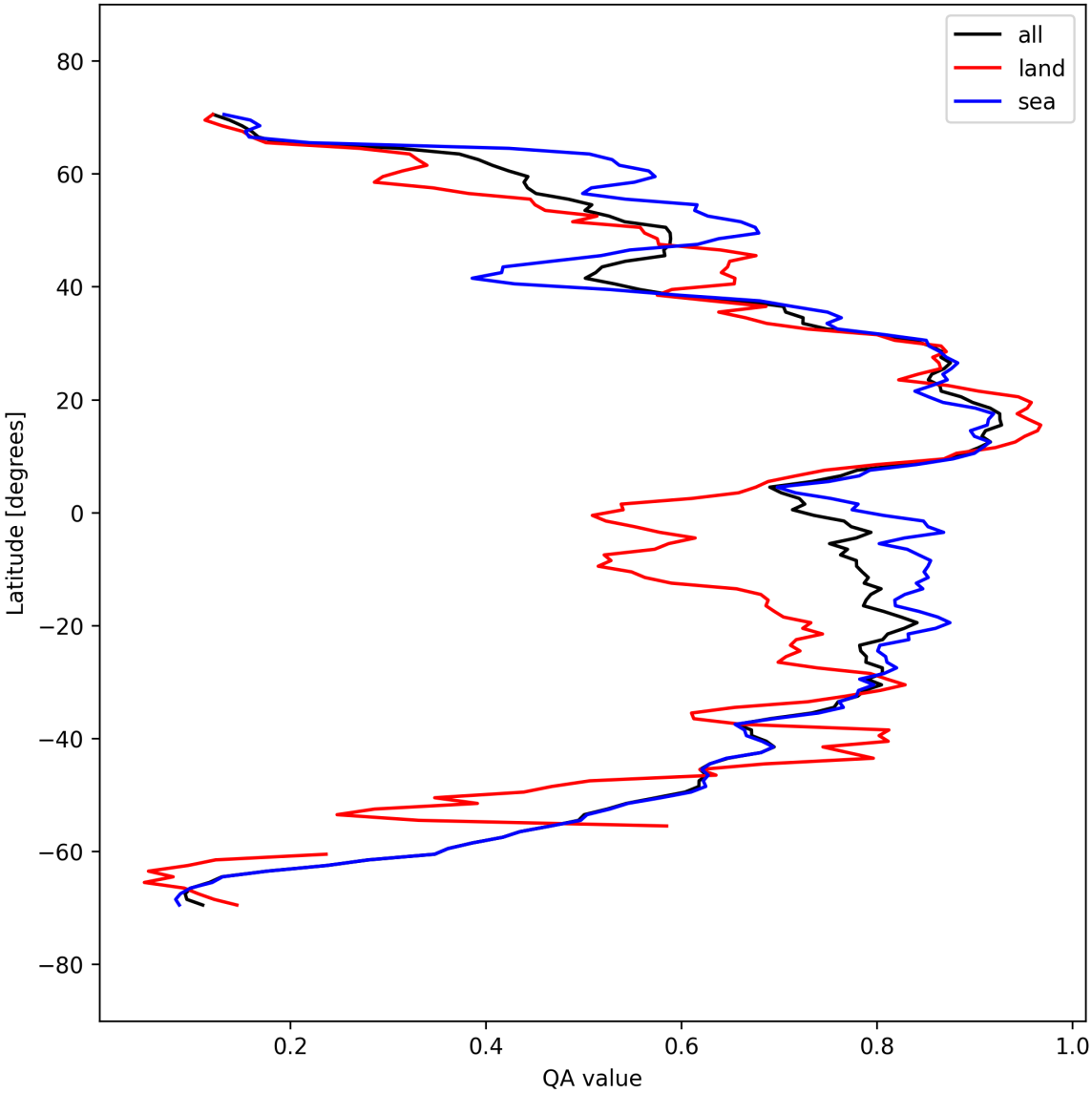

Figure 30: Zonal average of “QA value” for 2025-03-20 to 2025-03-21.

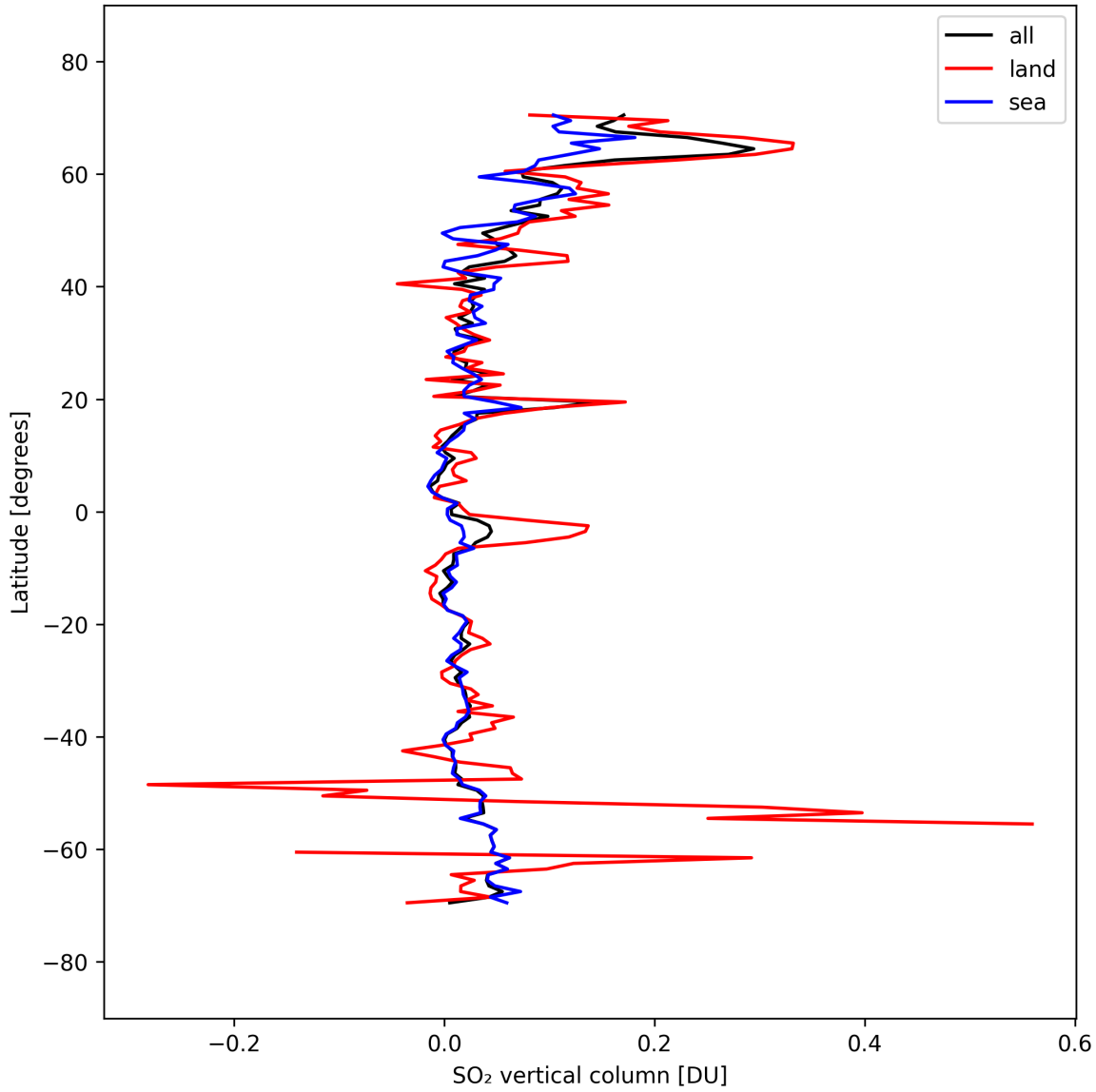

Figure 31: Zonal average of "SO_2 vertical column" for 2025-03-20 to 2025-03-21.

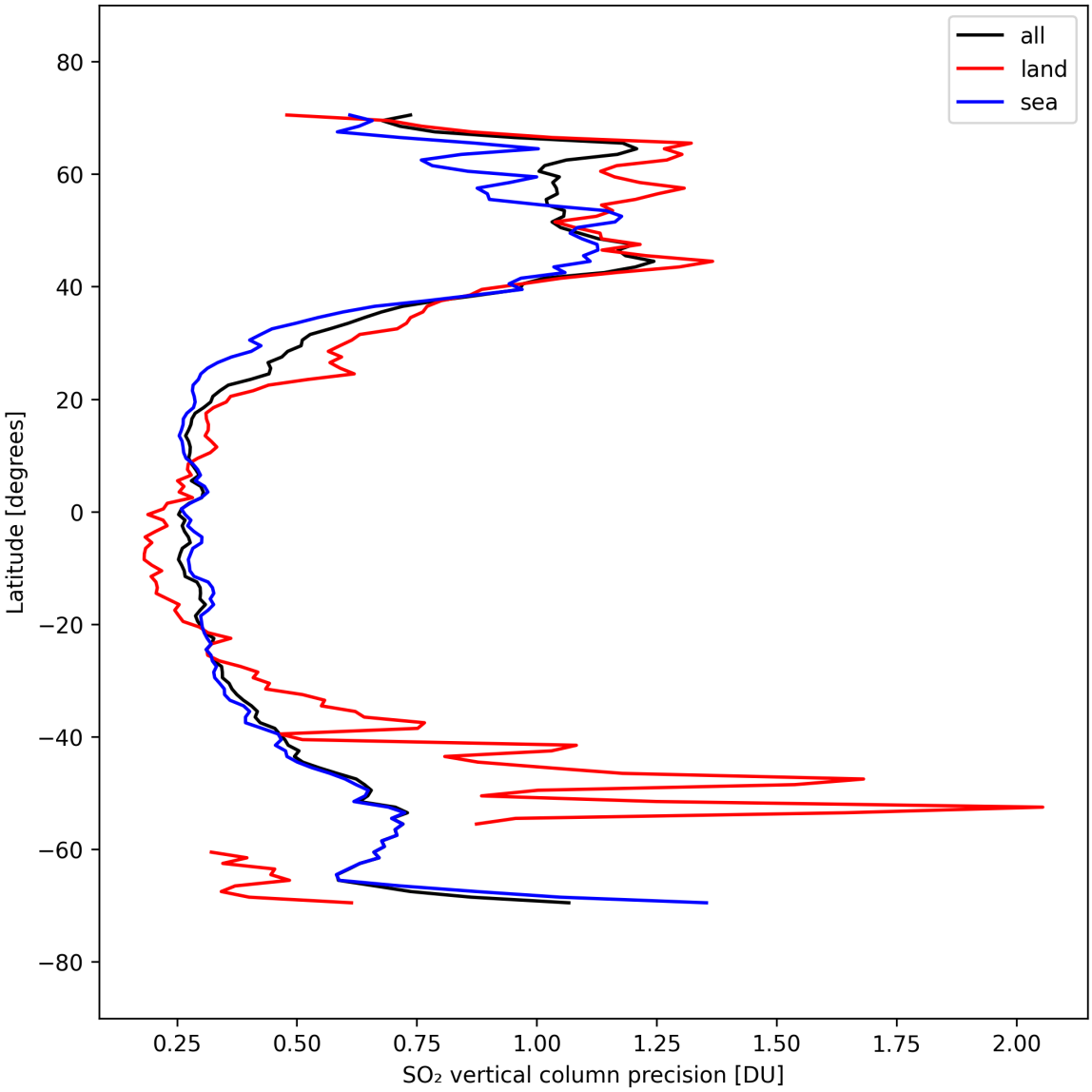

Figure 32: Zonal average of "SO_2 vertical column precision" for 2025-03-20 to 2025-03-21.

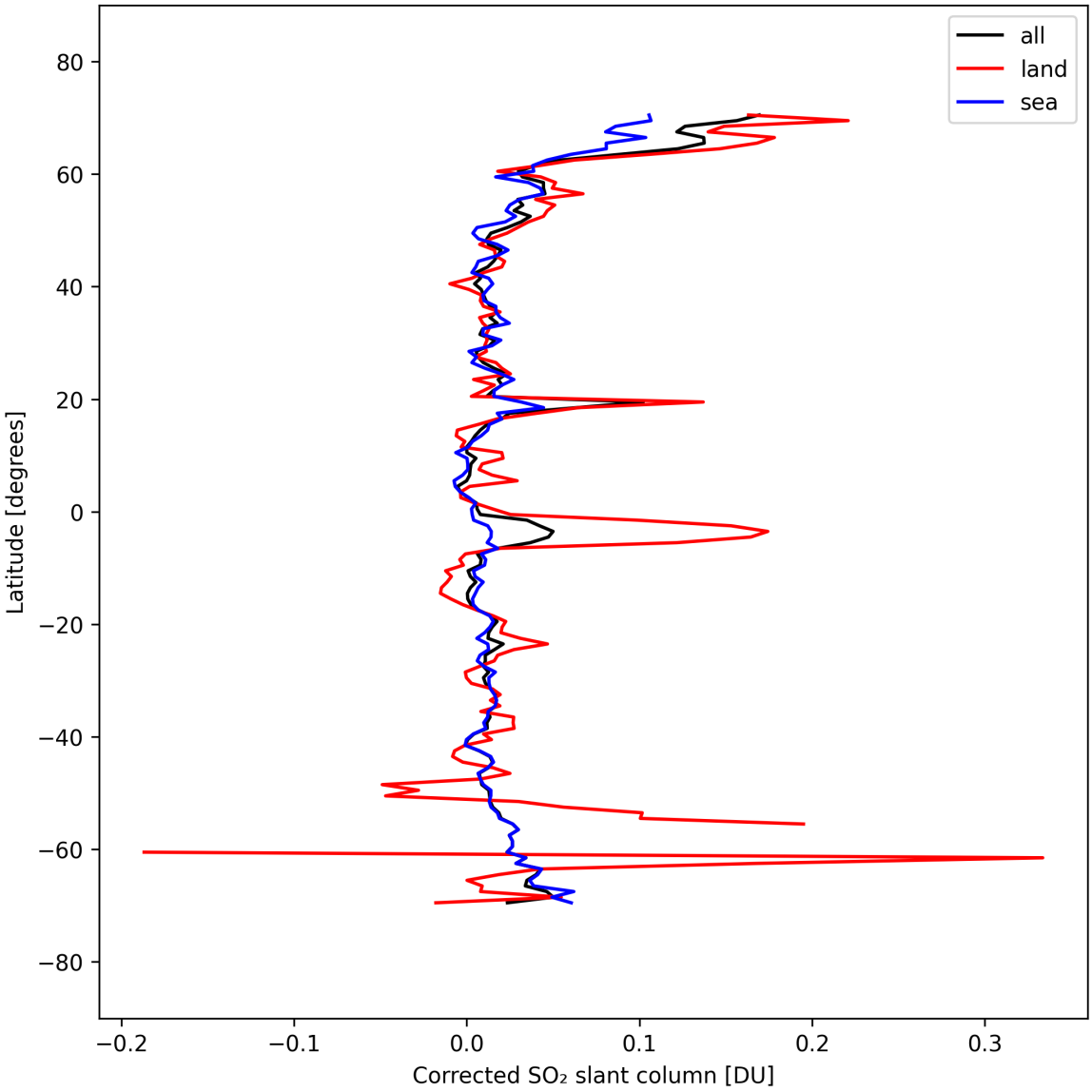

Figure 33: Zonal average of “Corrected SO_2 slant column” for 2025-03-20 to 2025-03-21.

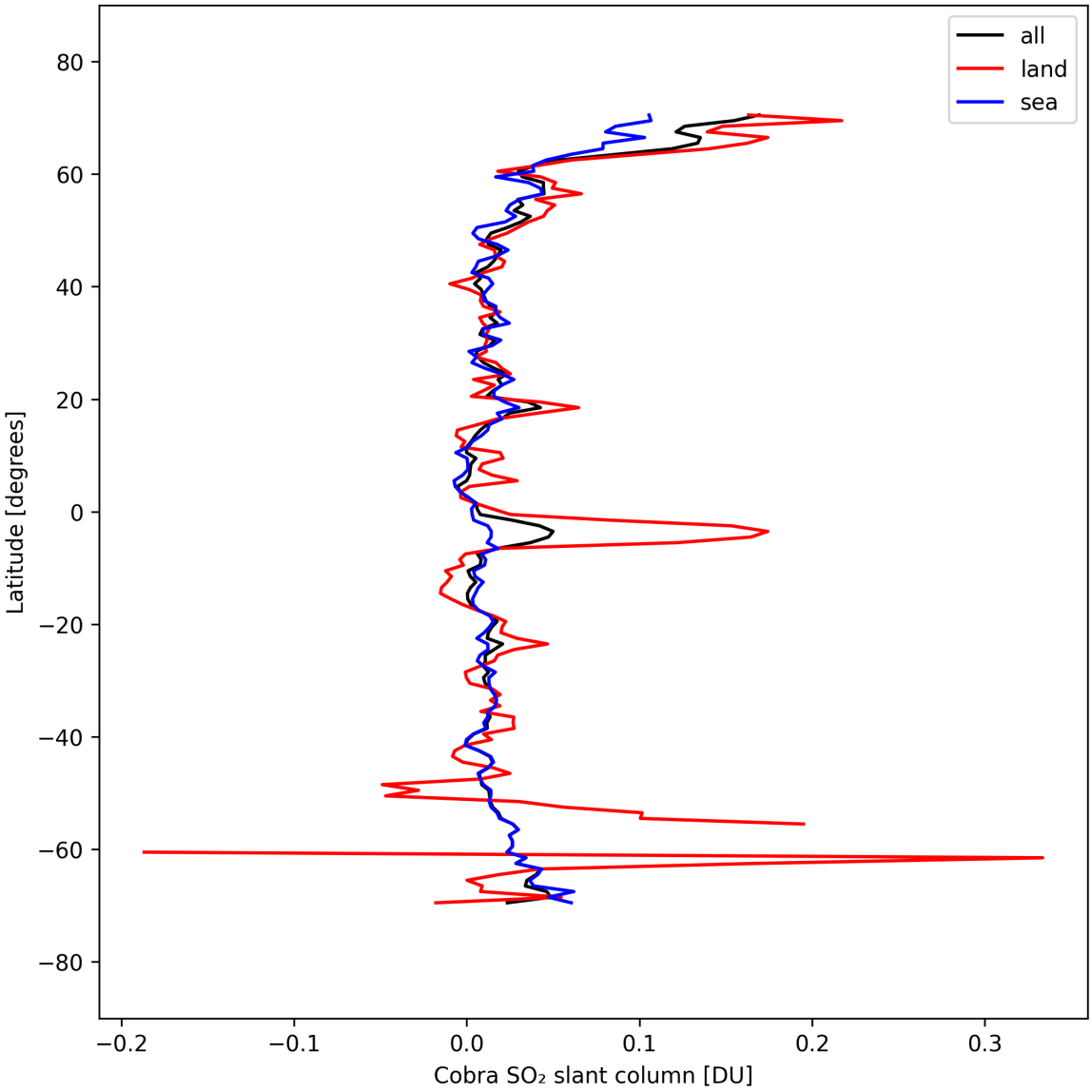

Figure 34: Zonal average of “Cobra SO_2 slant column” for 2025-03-20 to 2025-03-21.

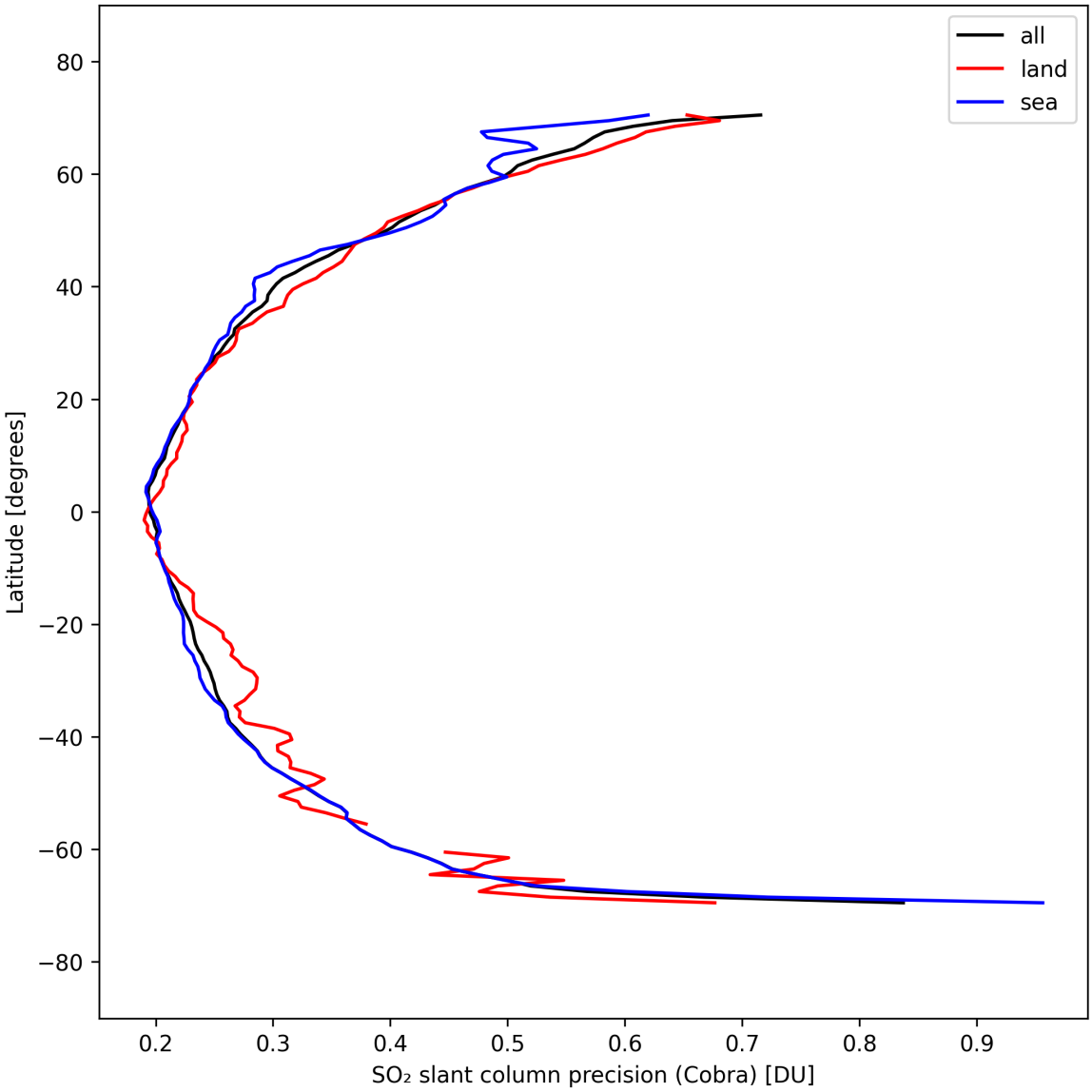

Figure 35: Zonal average of "SO_2 slant column precision (Cobra)" for 2025-03-20 to 2025-03-21.

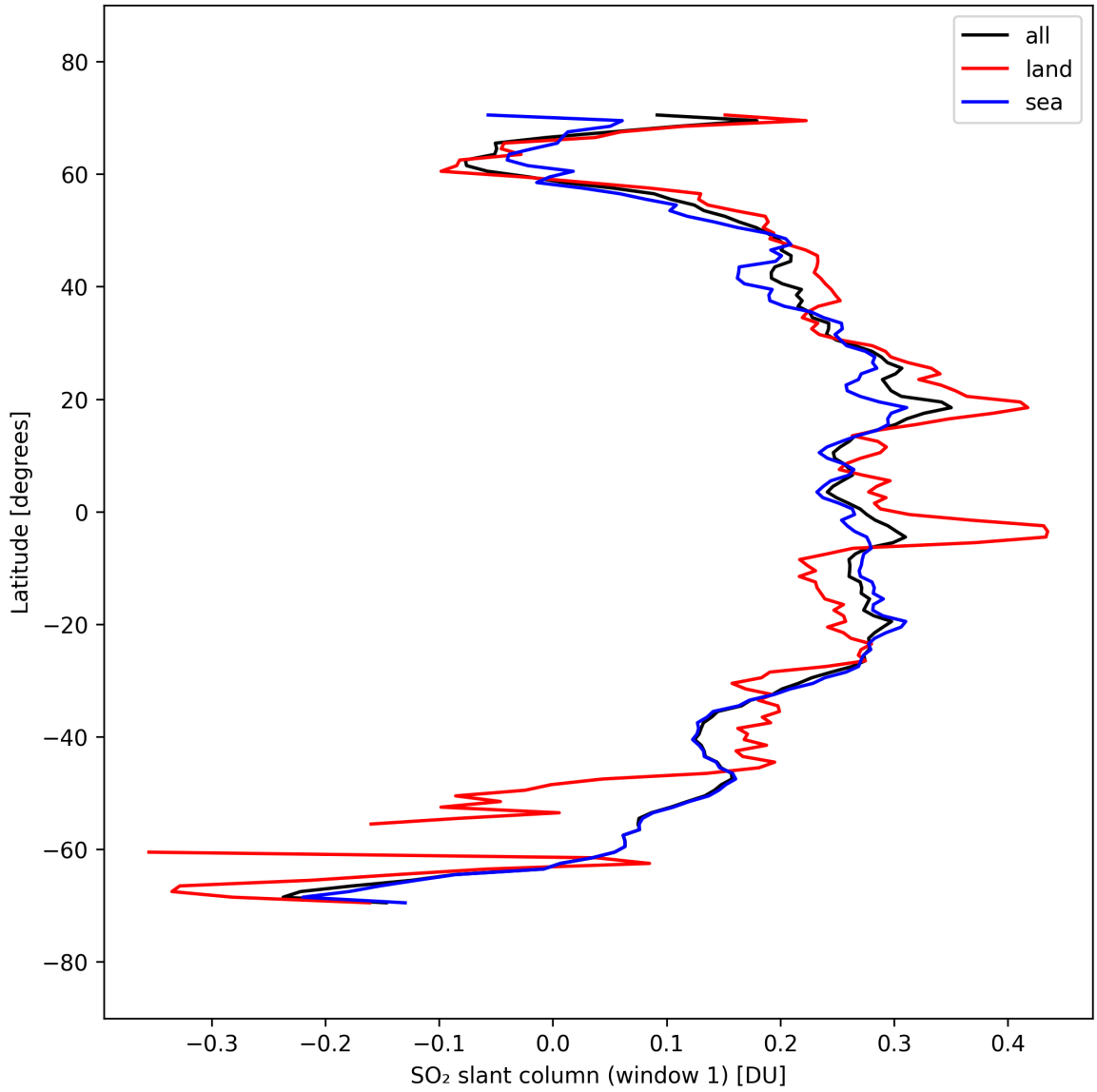

Figure 36: Zonal average of "SO_2 slant column (window 1)" for 2025-03-20 to 2025-03-21.

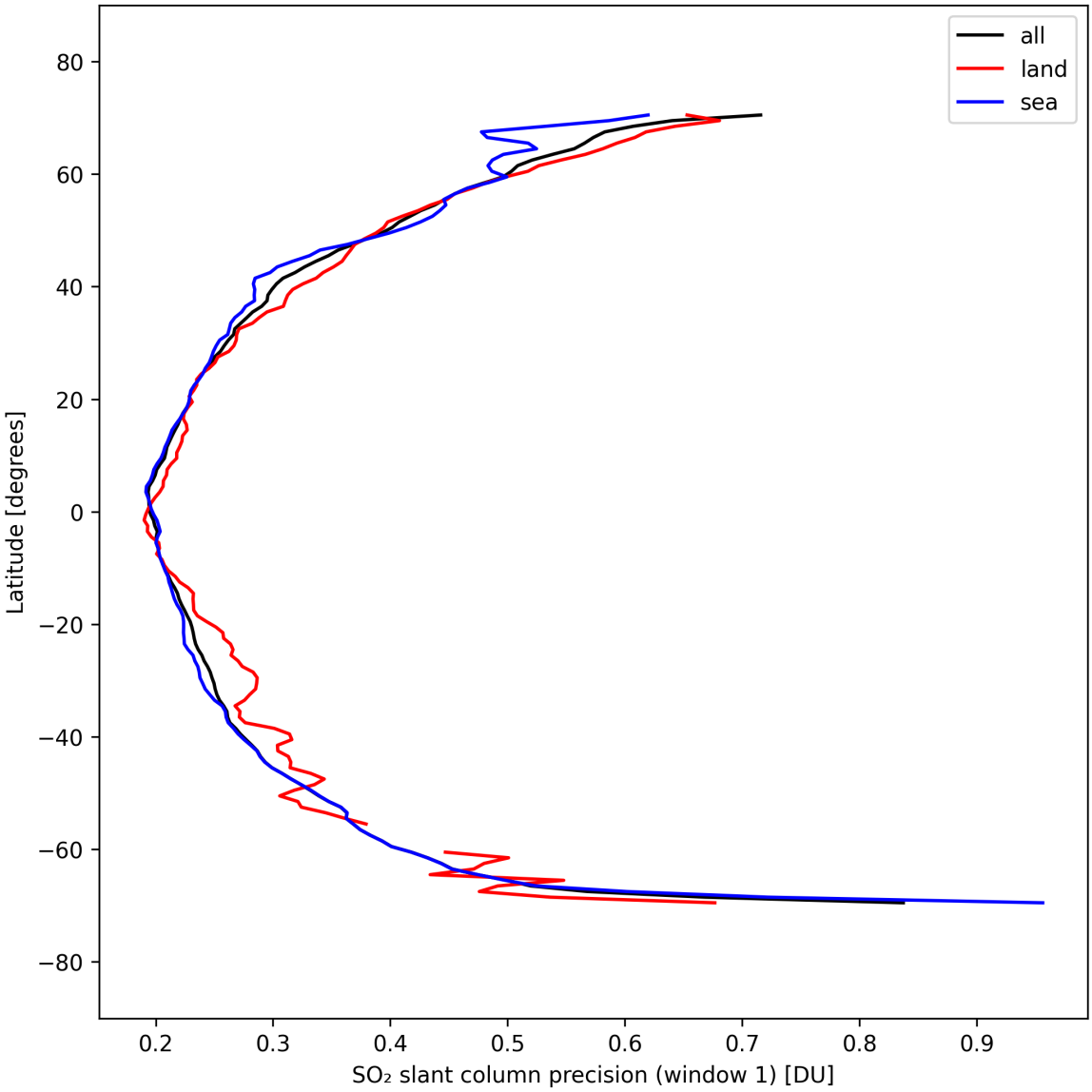

Figure 37: Zonal average of "SO_2 slant column precision (window 1)" for 2025-03-20 to 2025-03-21.

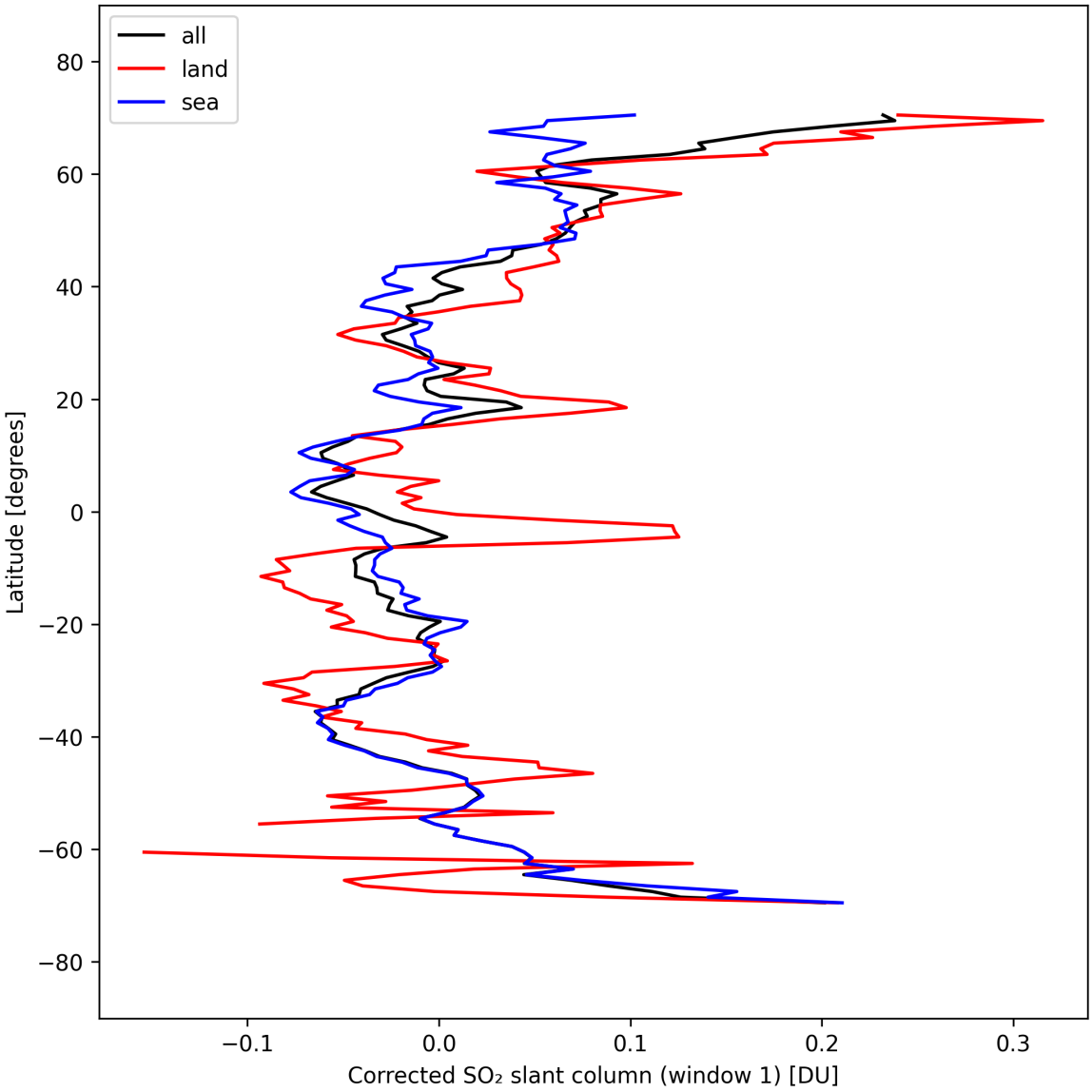

Figure 38: Zonal average of “Corrected SO_2 slant column (window 1)” for 2025-03-20 to 2025-03-21.

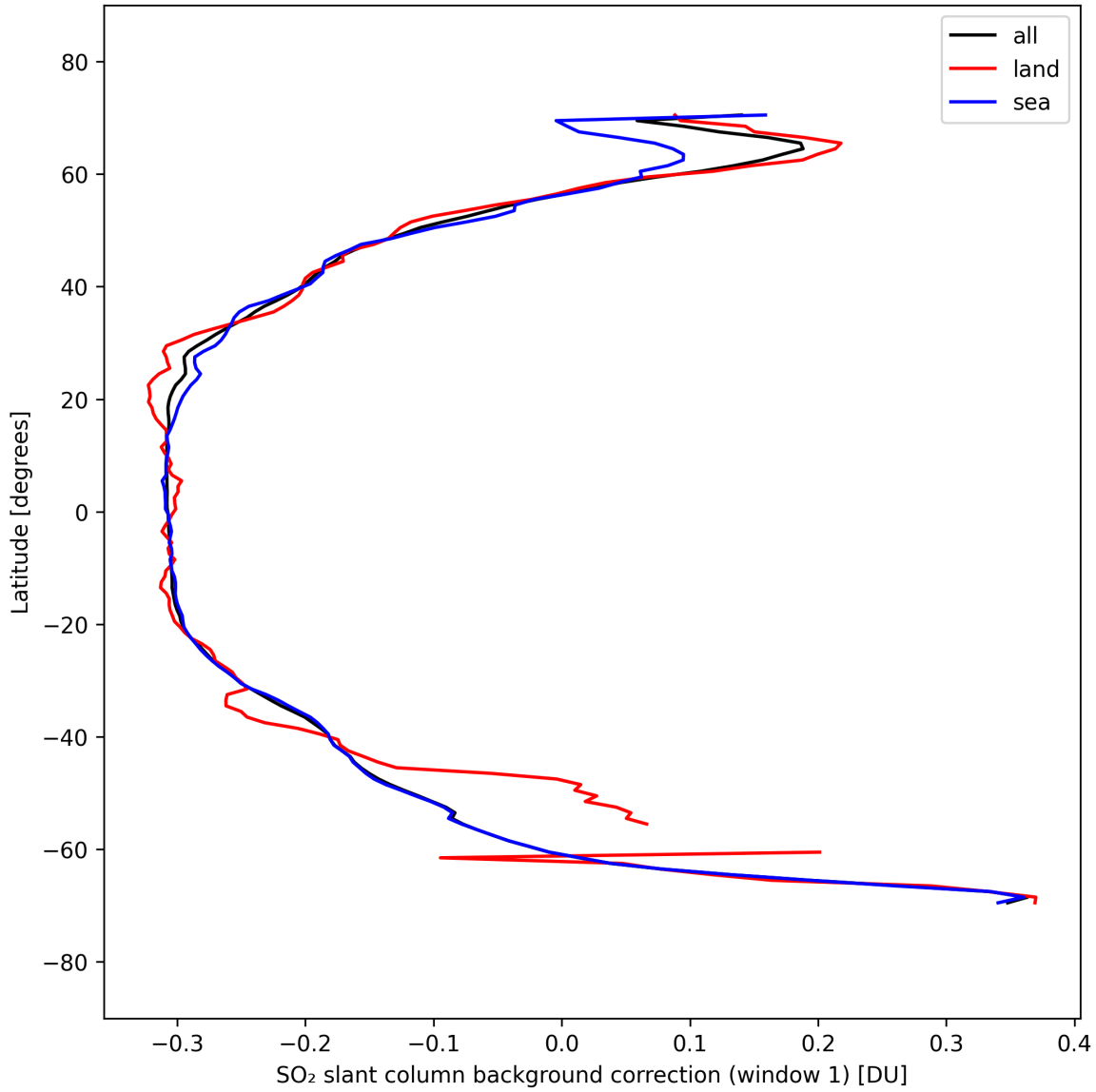

Figure 39: Zonal average of "SO_2 slant column background correction (window 1)" for 2025-03-20 to 2025-03-21.

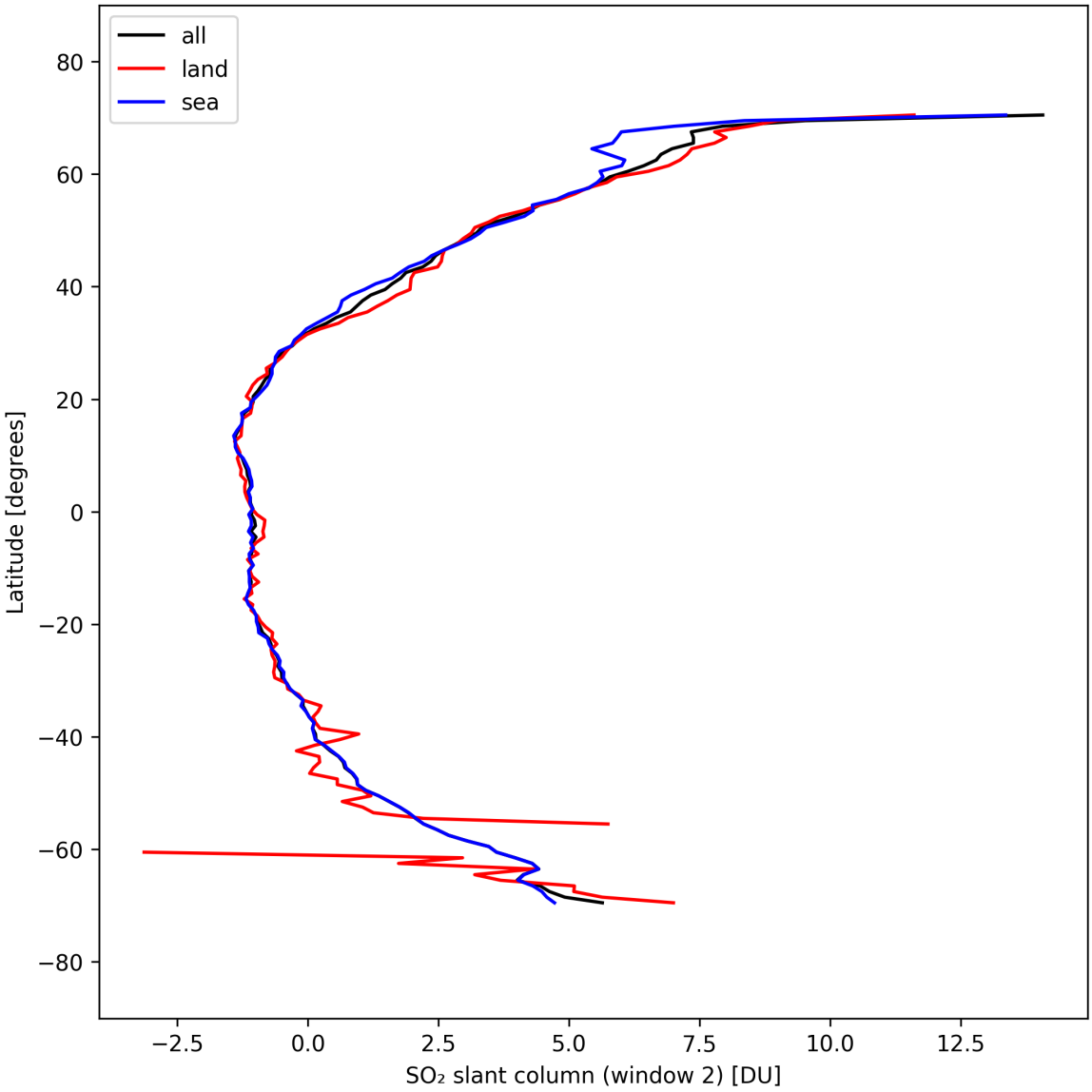

Figure 40: Zonal average of "SO_2 slant column (window 2)" for 2025-03-20 to 2025-03-21.

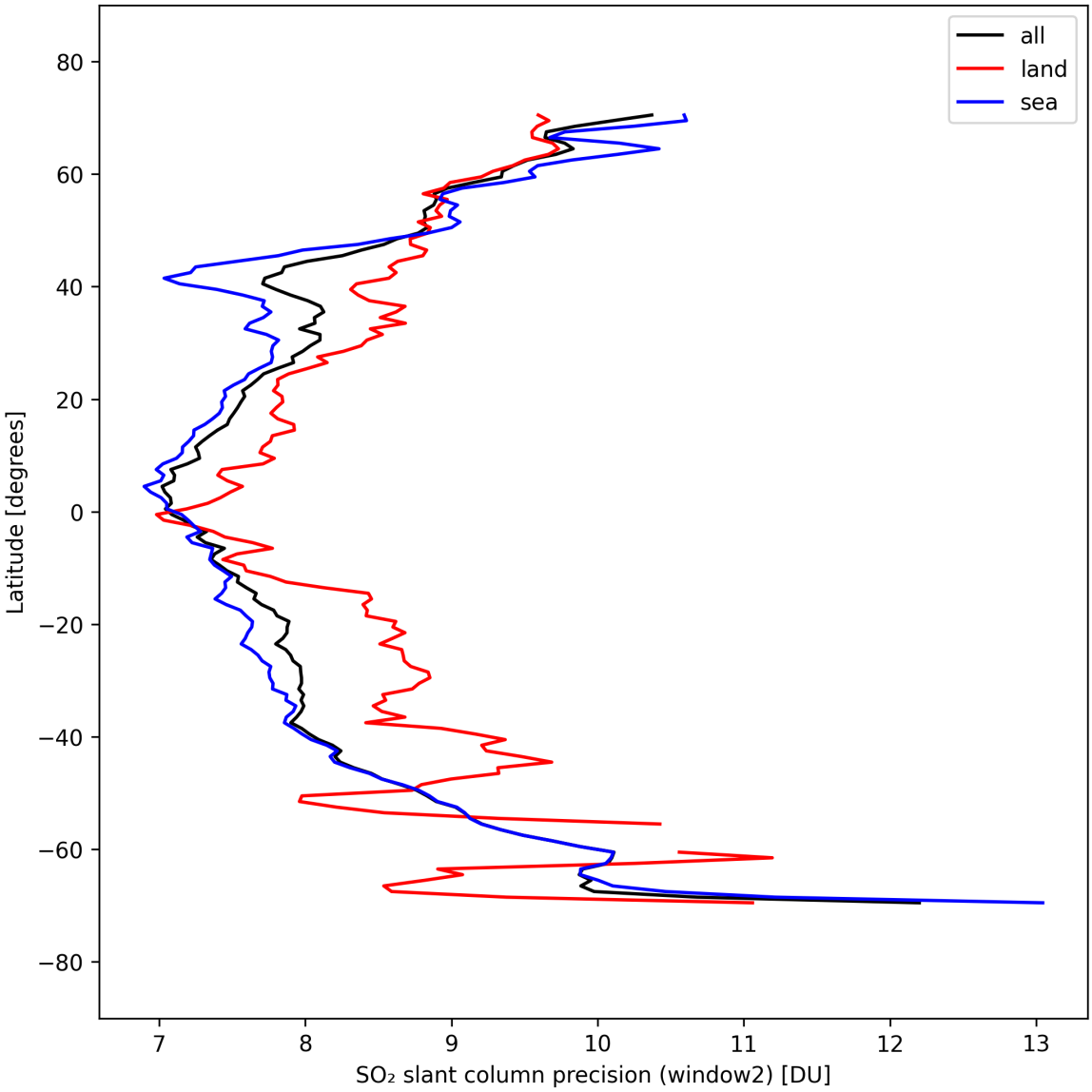

Figure 41: Zonal average of "SO_2 slant column precision (window2)" for 2025-03-20 to 2025-03-21.

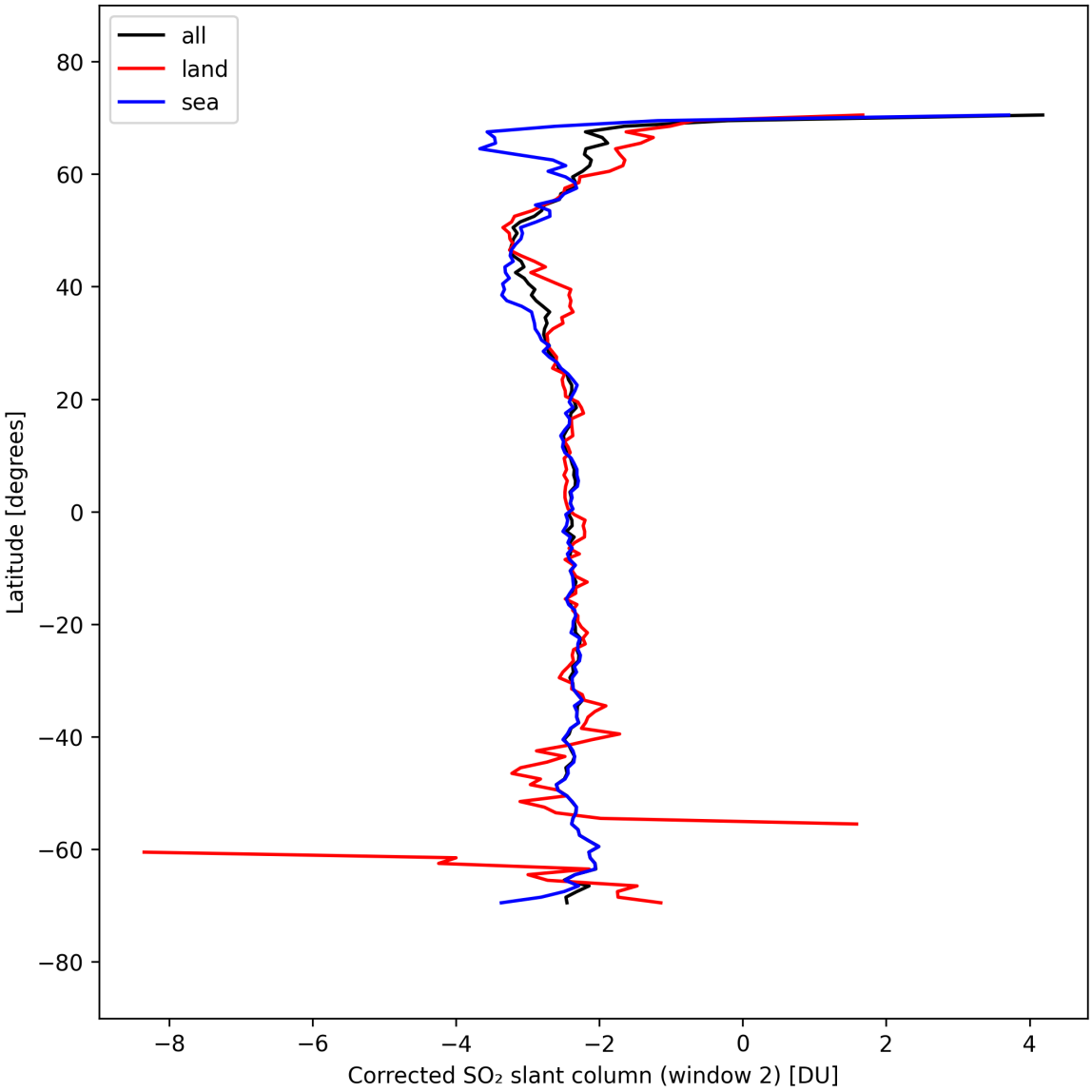

Figure 42: Zonal average of "Corrected SO_2 slant column (window 2)" for 2025-03-20 to 2025-03-21.

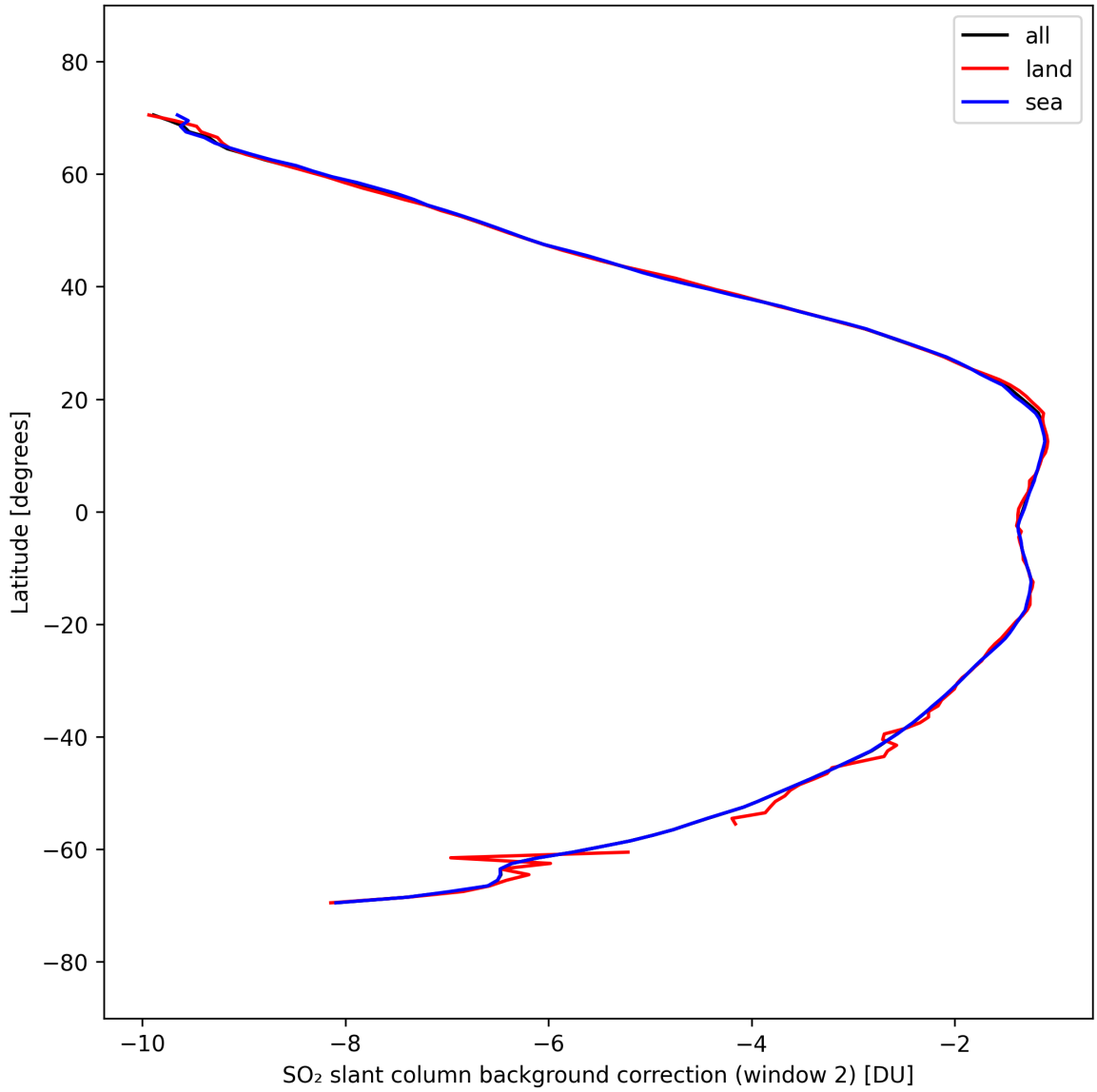

Figure 43: Zonal average of "SO_2 slant column background correction (window 2)" for 2025-03-20 to 2025-03-21.

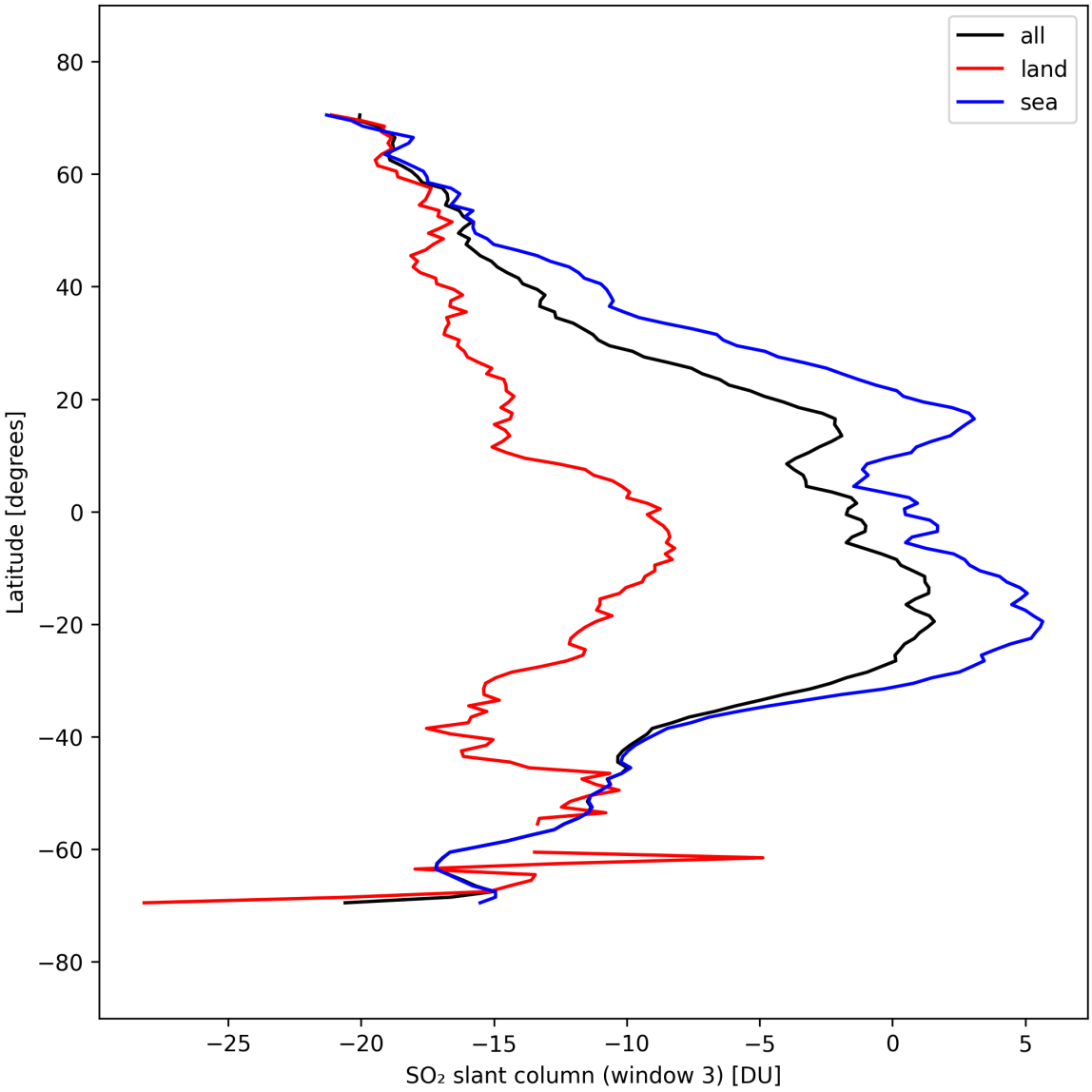

Figure 44: Zonal average of "SO_2 slant column (window 3)" for 2025-03-20 to 2025-03-21.

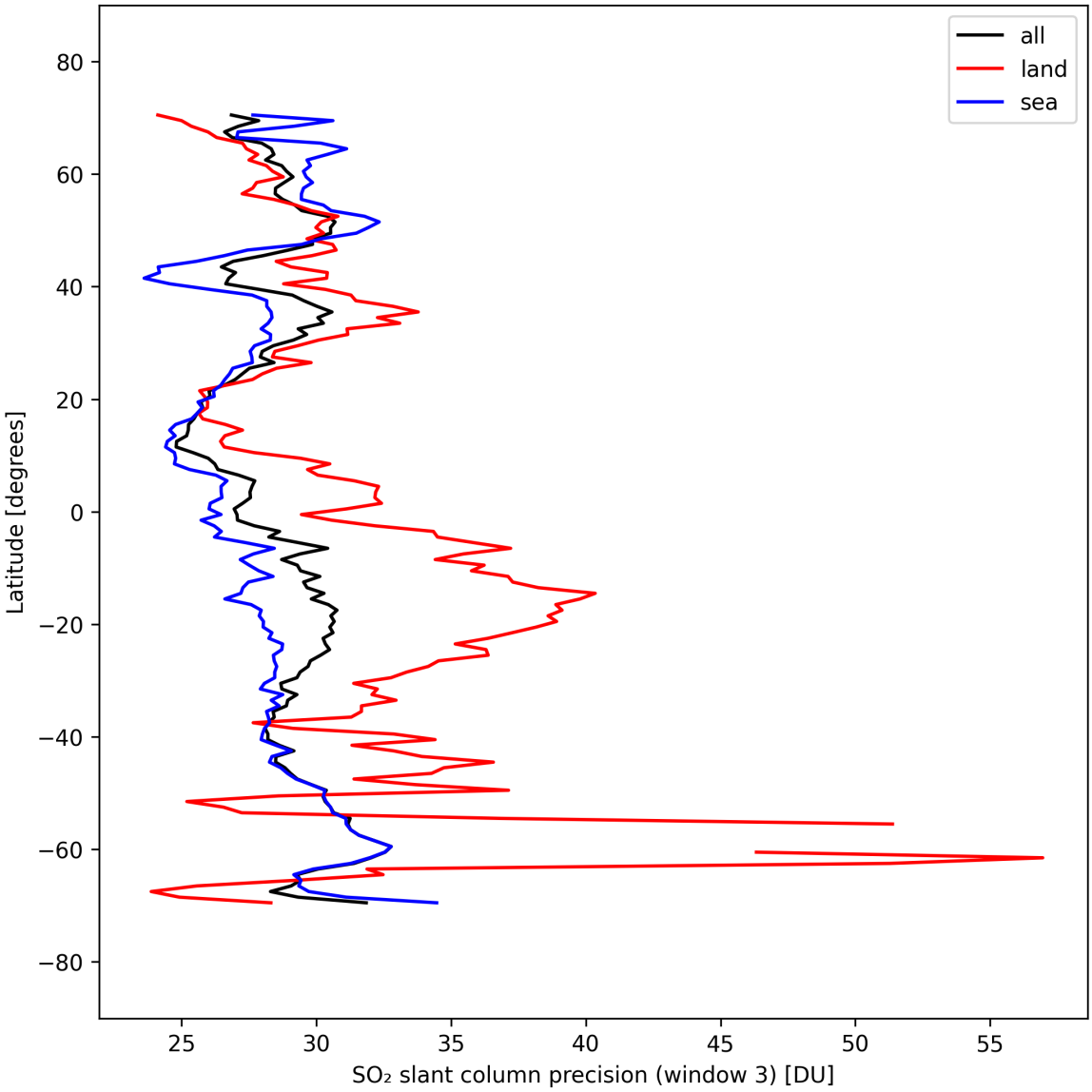

Figure 45: Zonal average of "SO_2 slant column precision (window 3)" for 2025-03-20 to 2025-03-21.

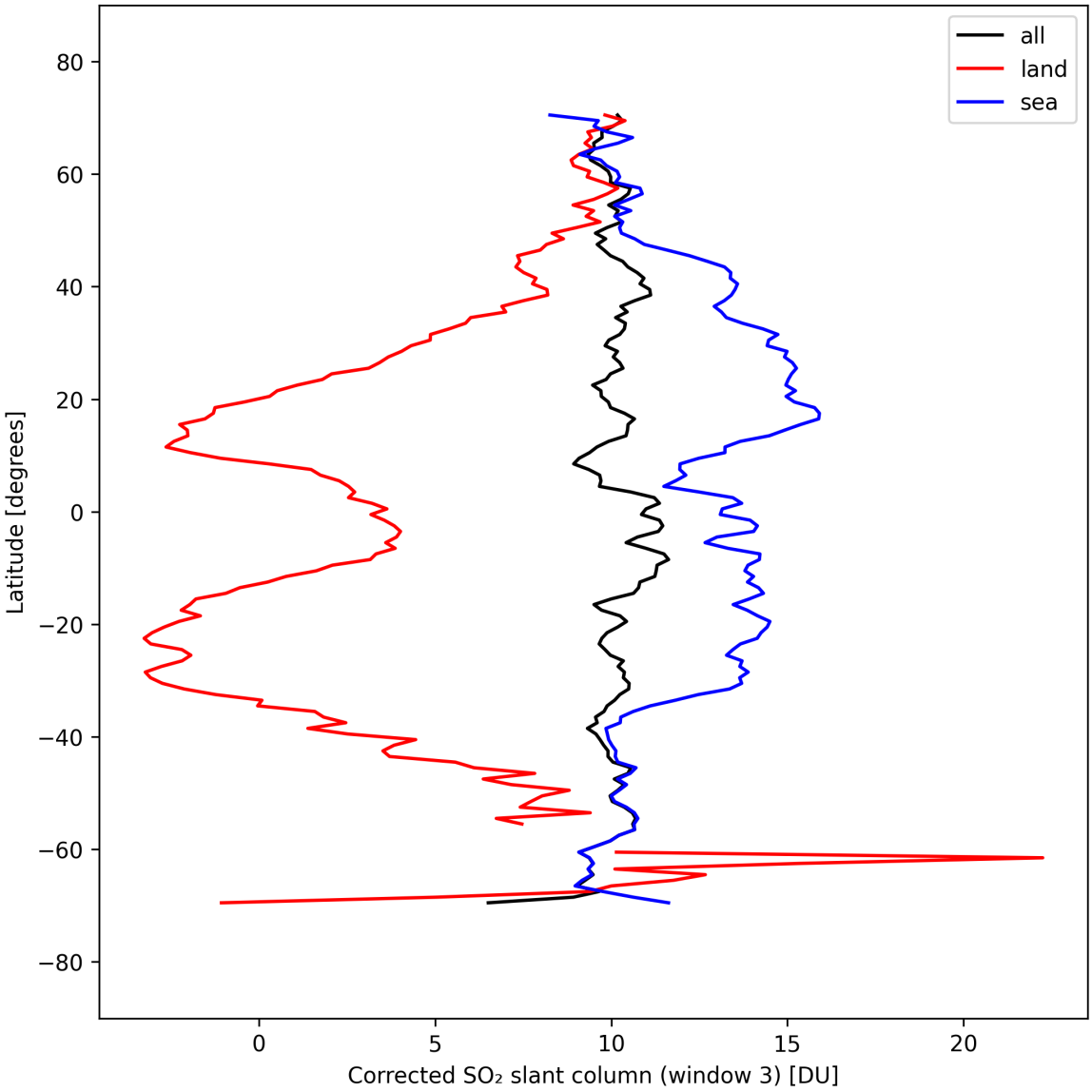

Figure 46: Zonal average of "Corrected SO_2 slant column (window 3)" for 2025-03-20 to 2025-03-21.

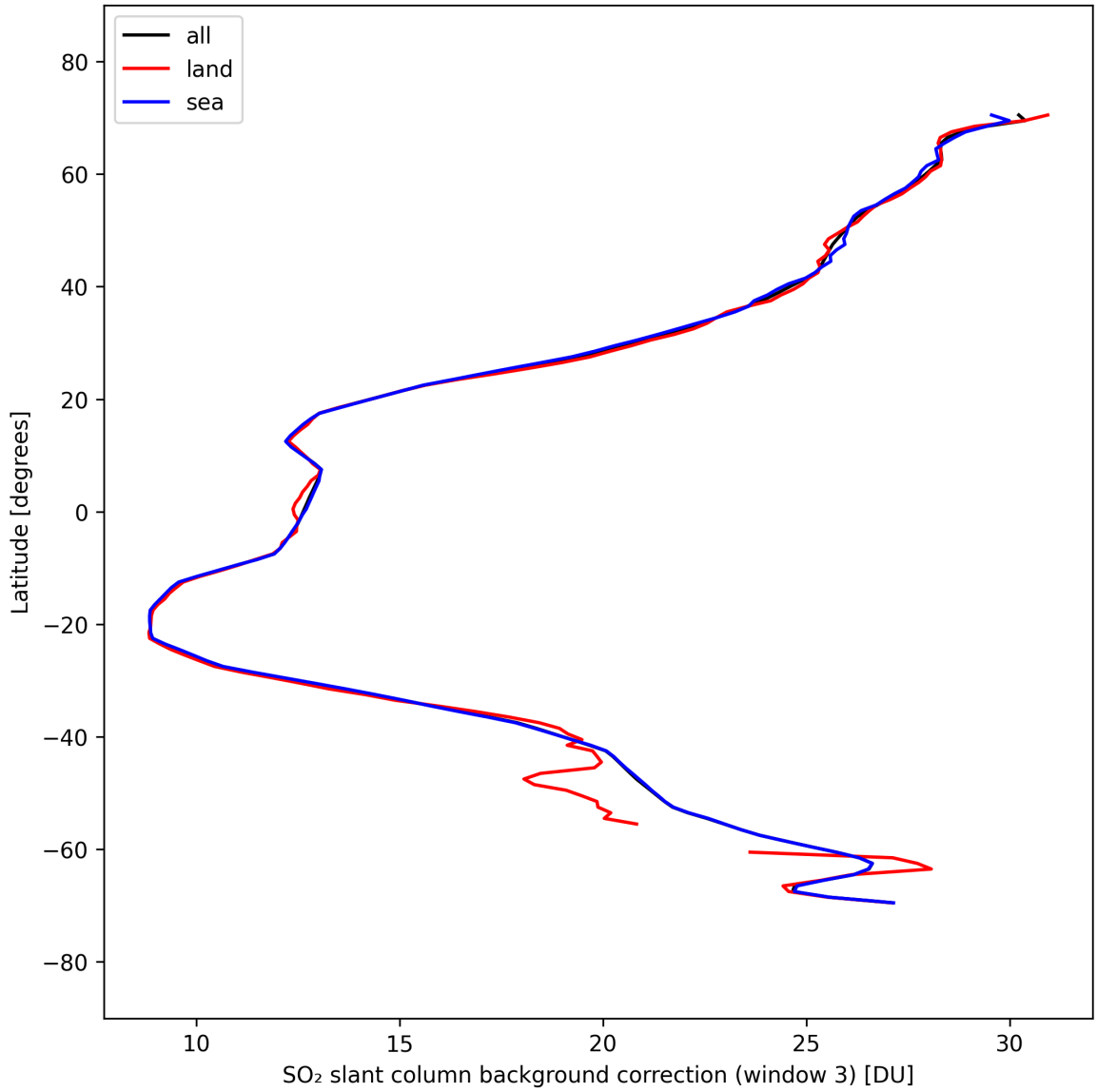

Figure 47: Zonal average of "SO_2 slant column background correction (window 3)" for 2025-03-20 to 2025-03-21.

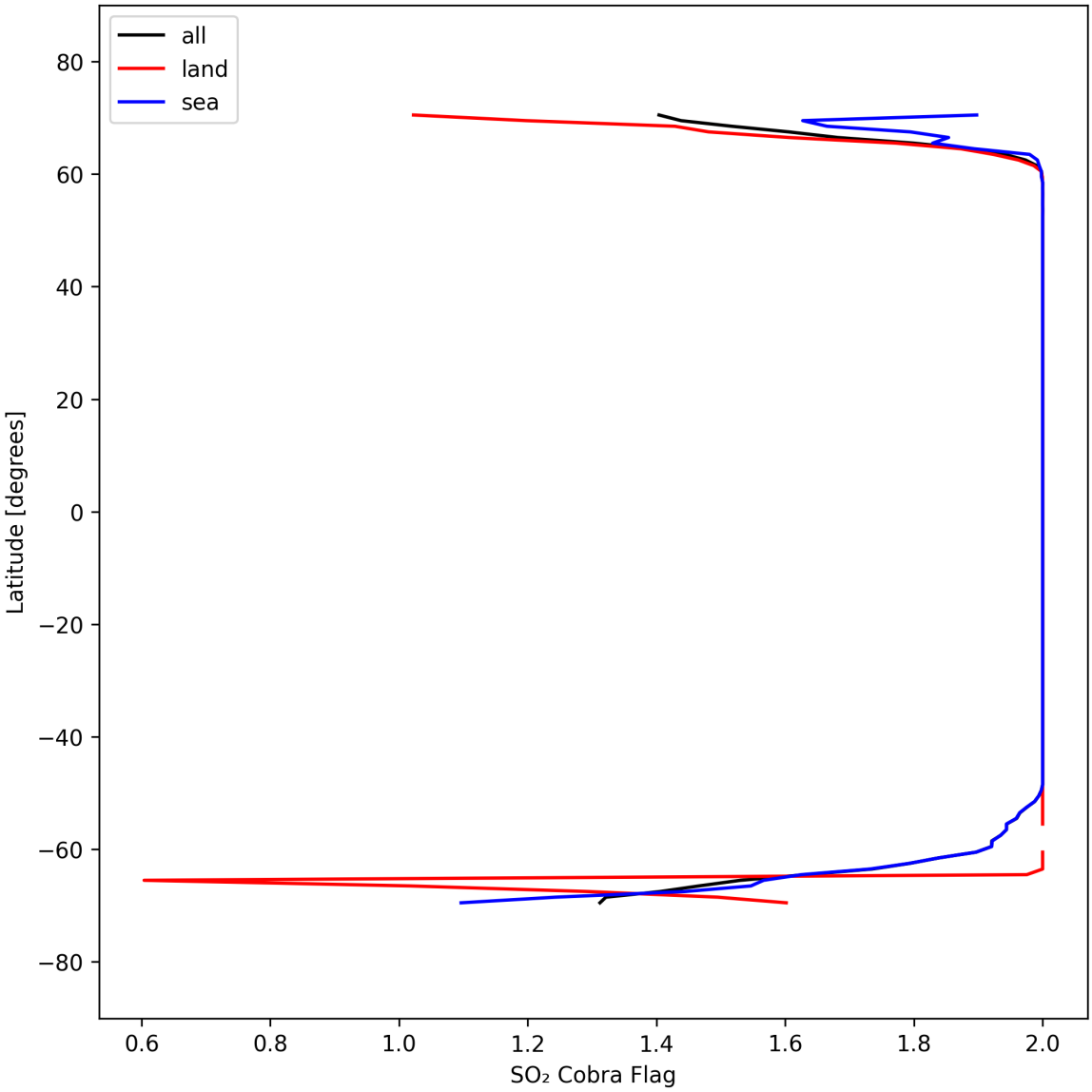

Figure 48: Zonal average of "SO_2 Cobra Flag" for 2025-03-20 to 2025-03-21.

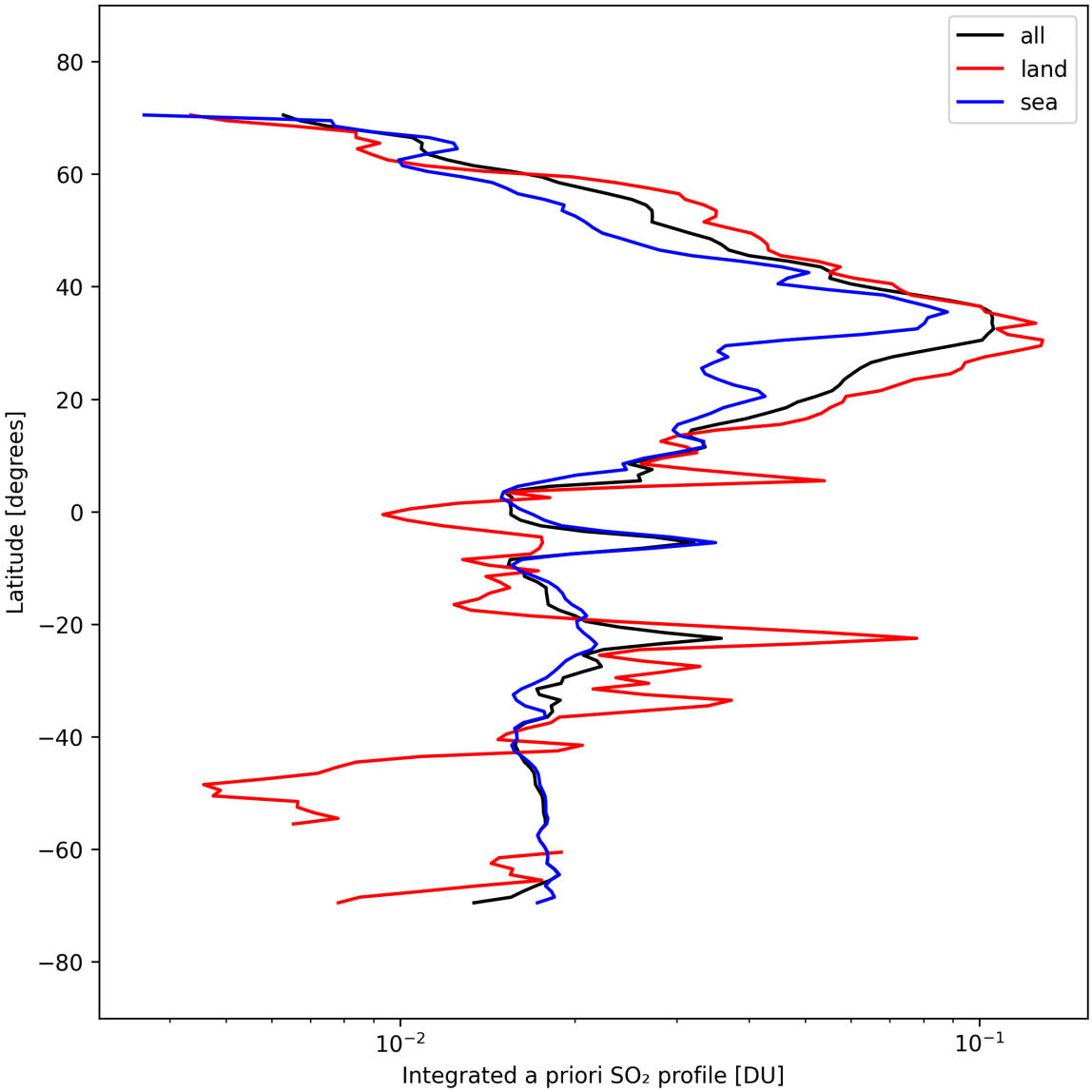

Figure 49: Zonal average of "Integrated a priori SO_2 profile" for 2025-03-20 to 2025-03-21.

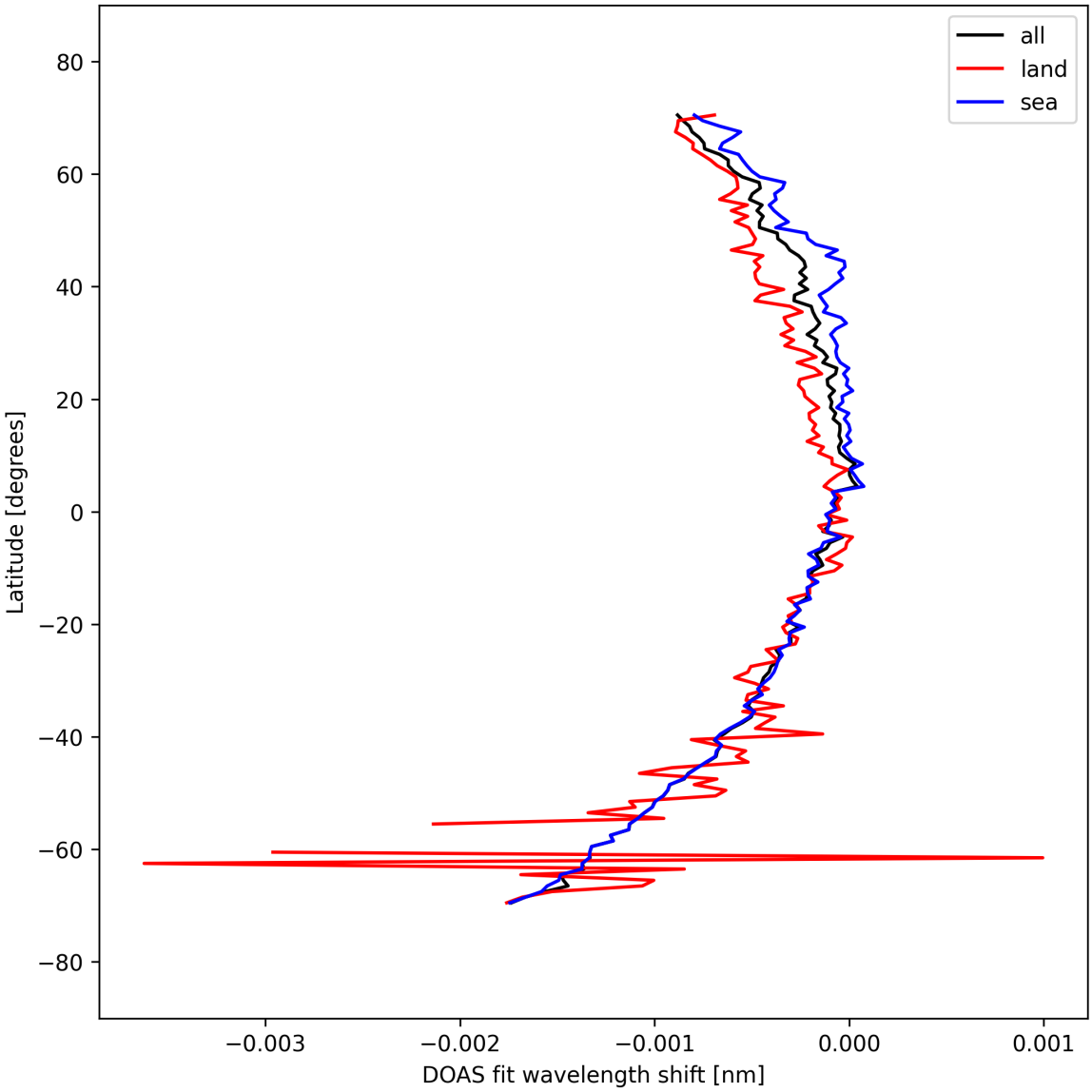

Figure 50: Zonal average of “DOAS fit wavelength shift” for 2025-03-20 to 2025-03-21.

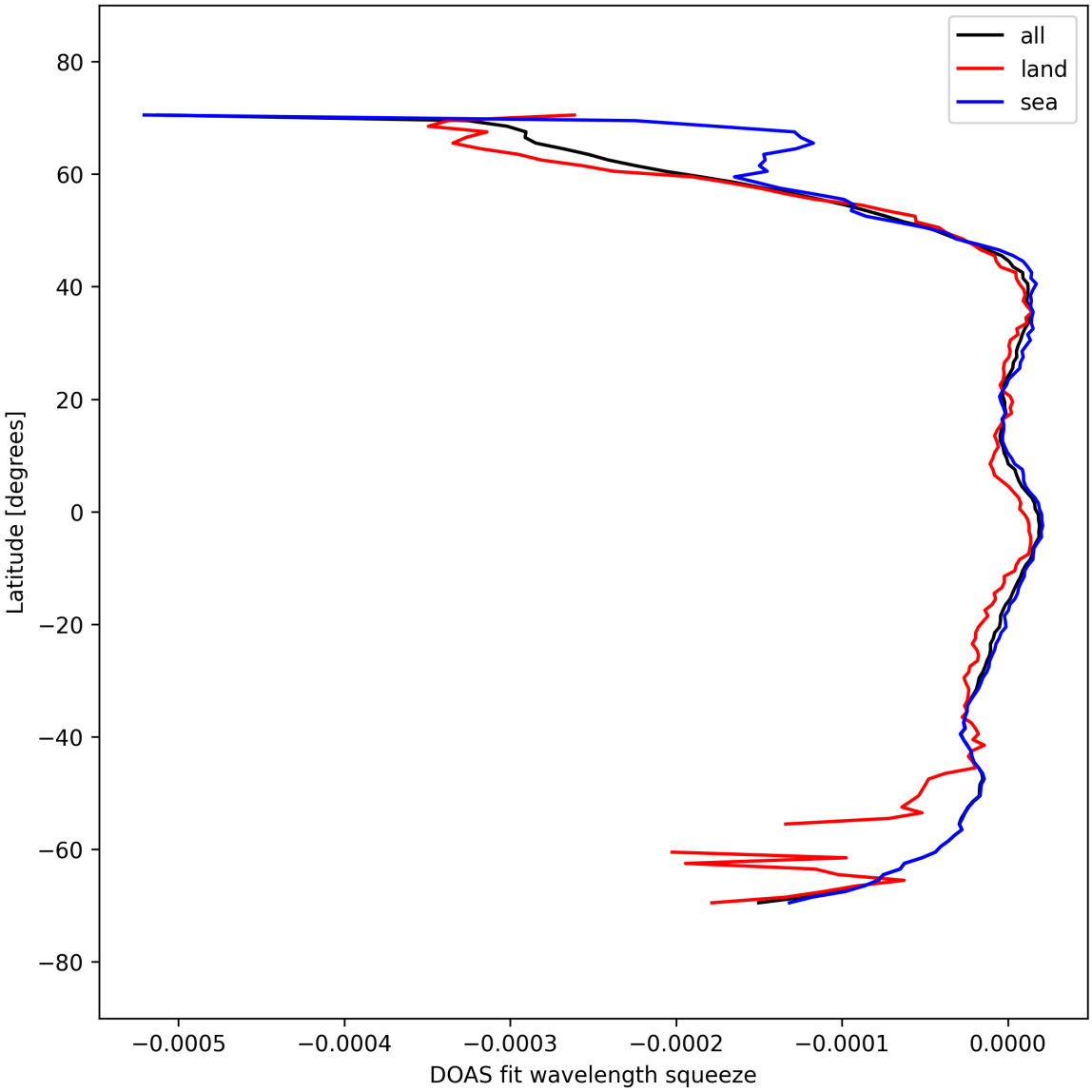

Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-03-20 to 2025-03-21.

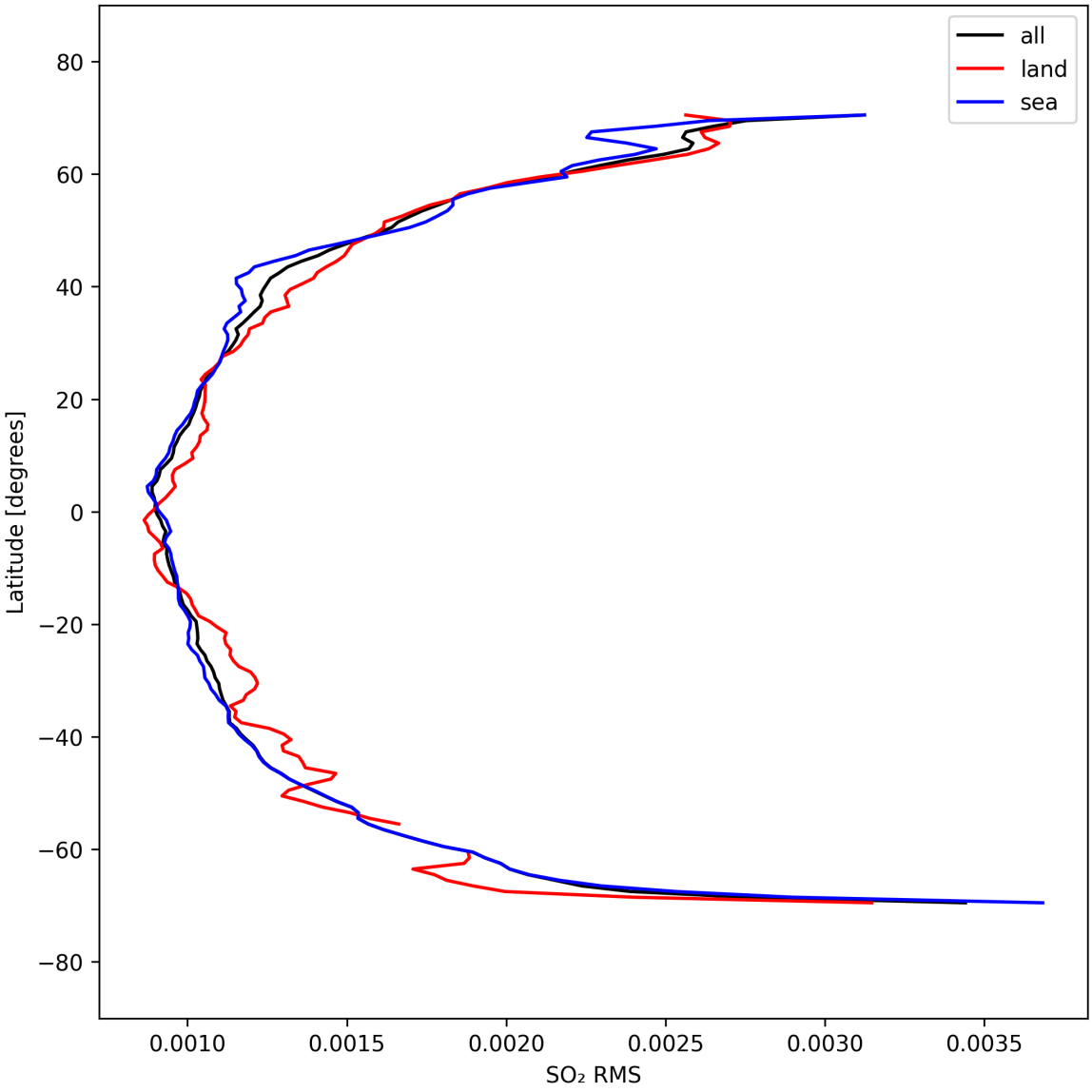

Figure 52: Zonal average of "SO_2 RMS" for 2025-03-20 to 2025-03-21.

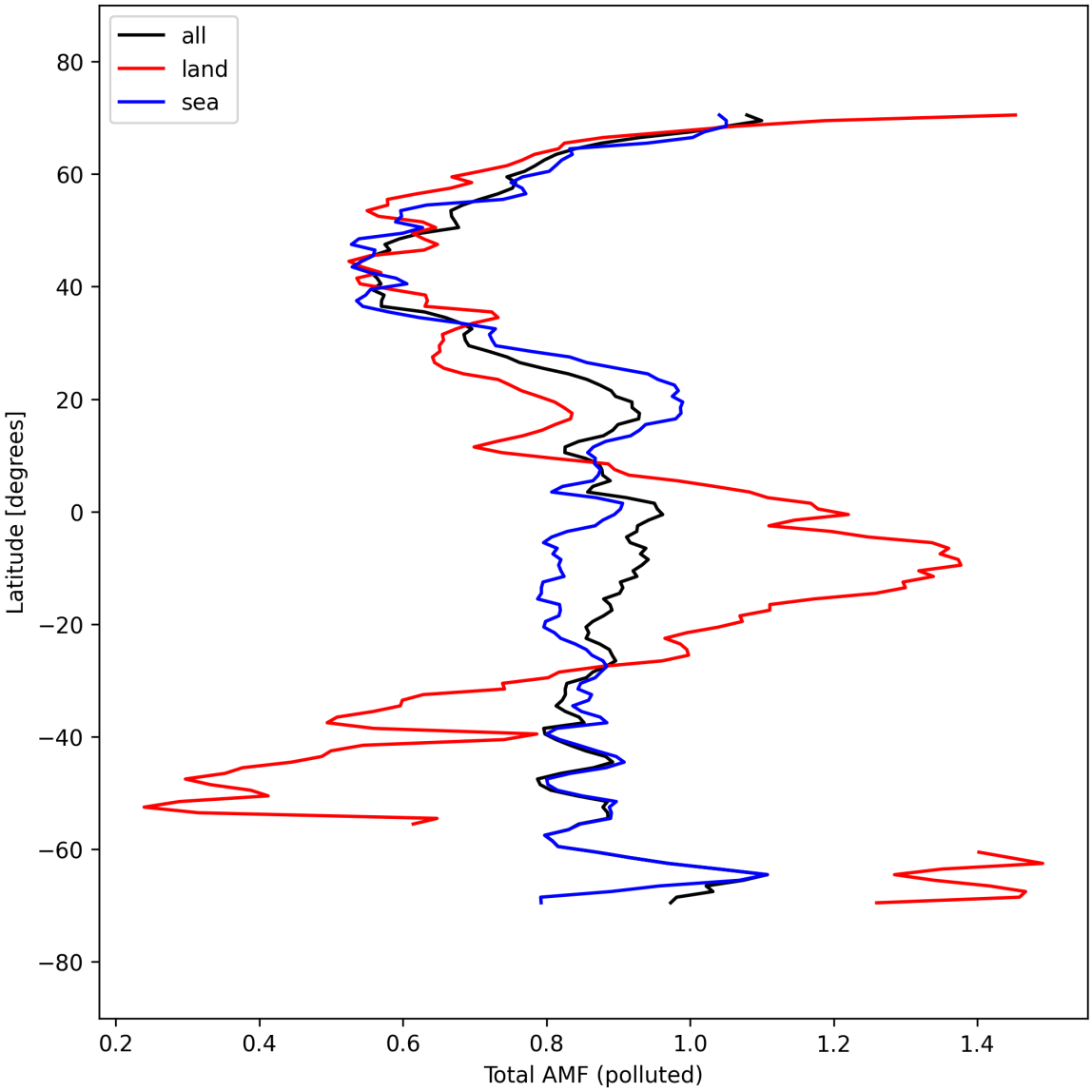

Figure 53: Zonal average of “Total AMF (polluted)” for 2025-03-20 to 2025-03-21.

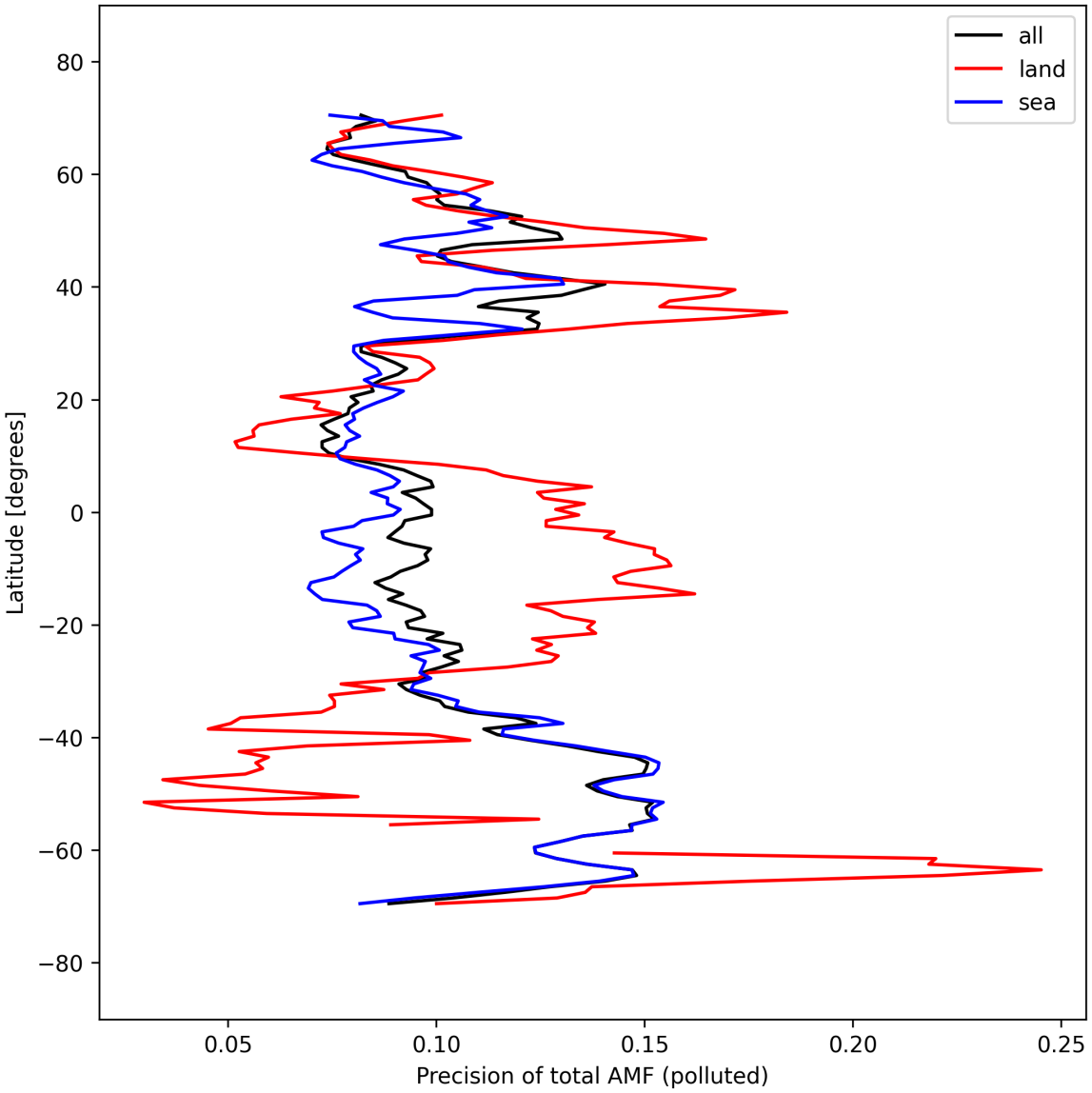

Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-03-20 to 2025-03-21.

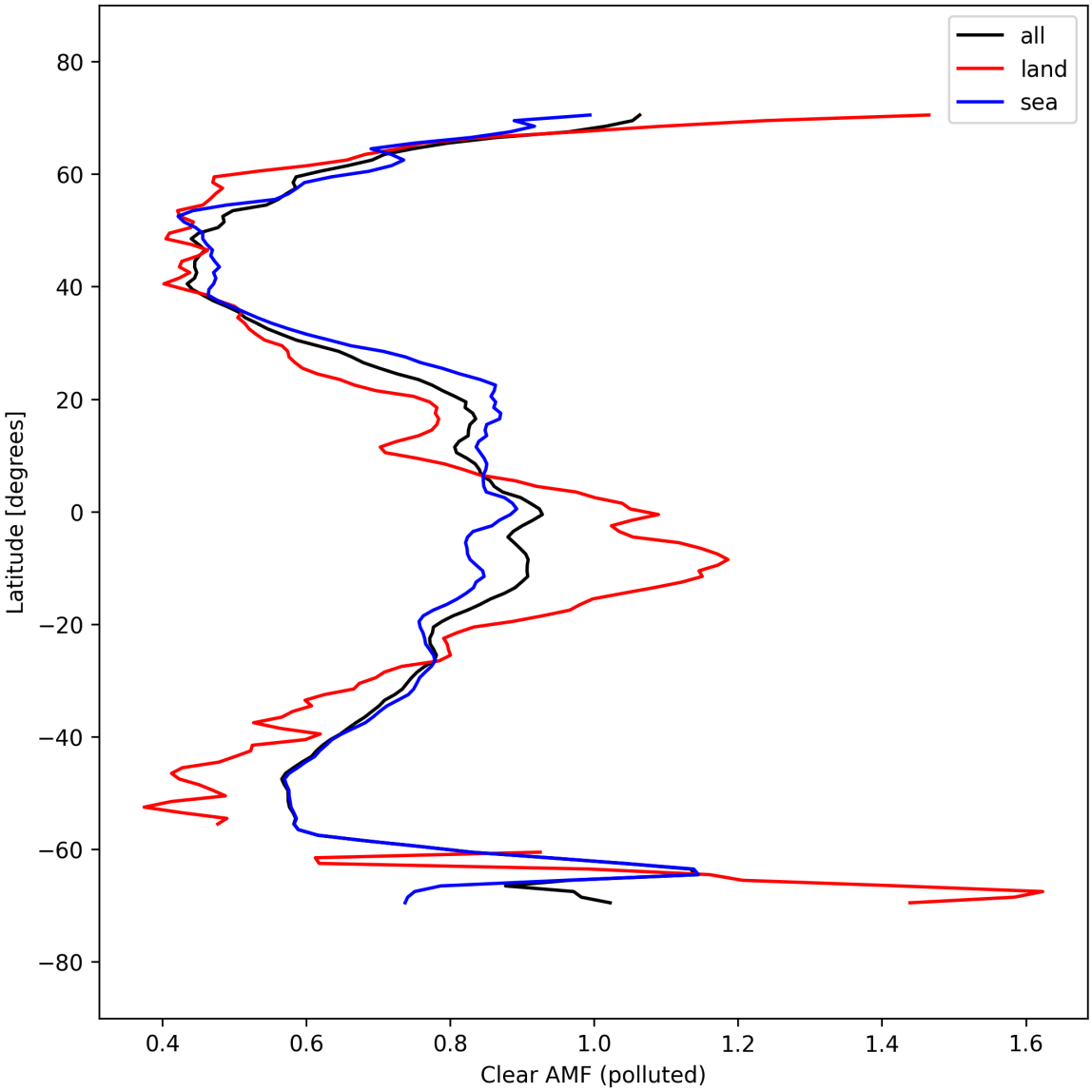

Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-03-20 to 2025-03-21.

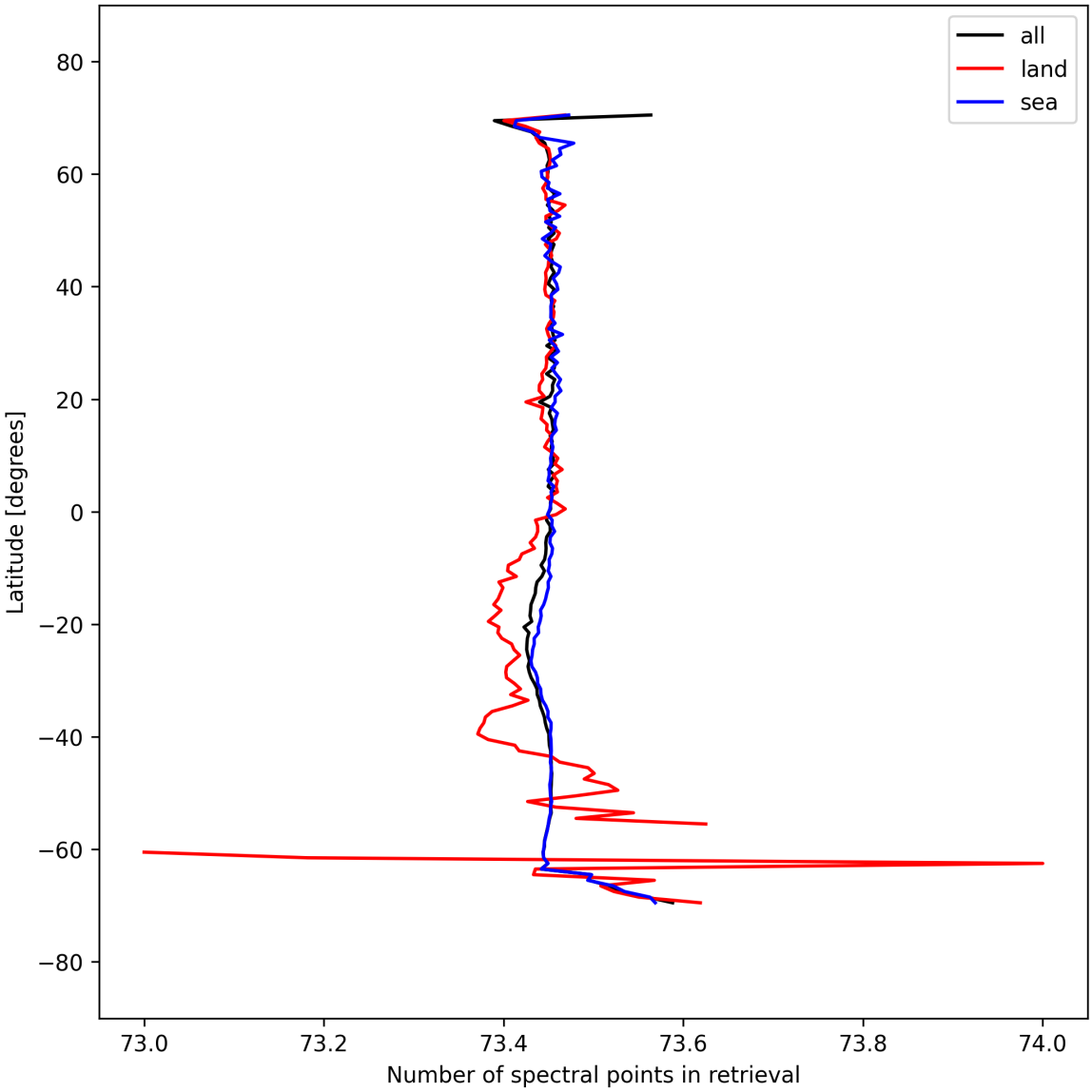

Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-03-20 to 2025-03-21.

8 Histograms

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

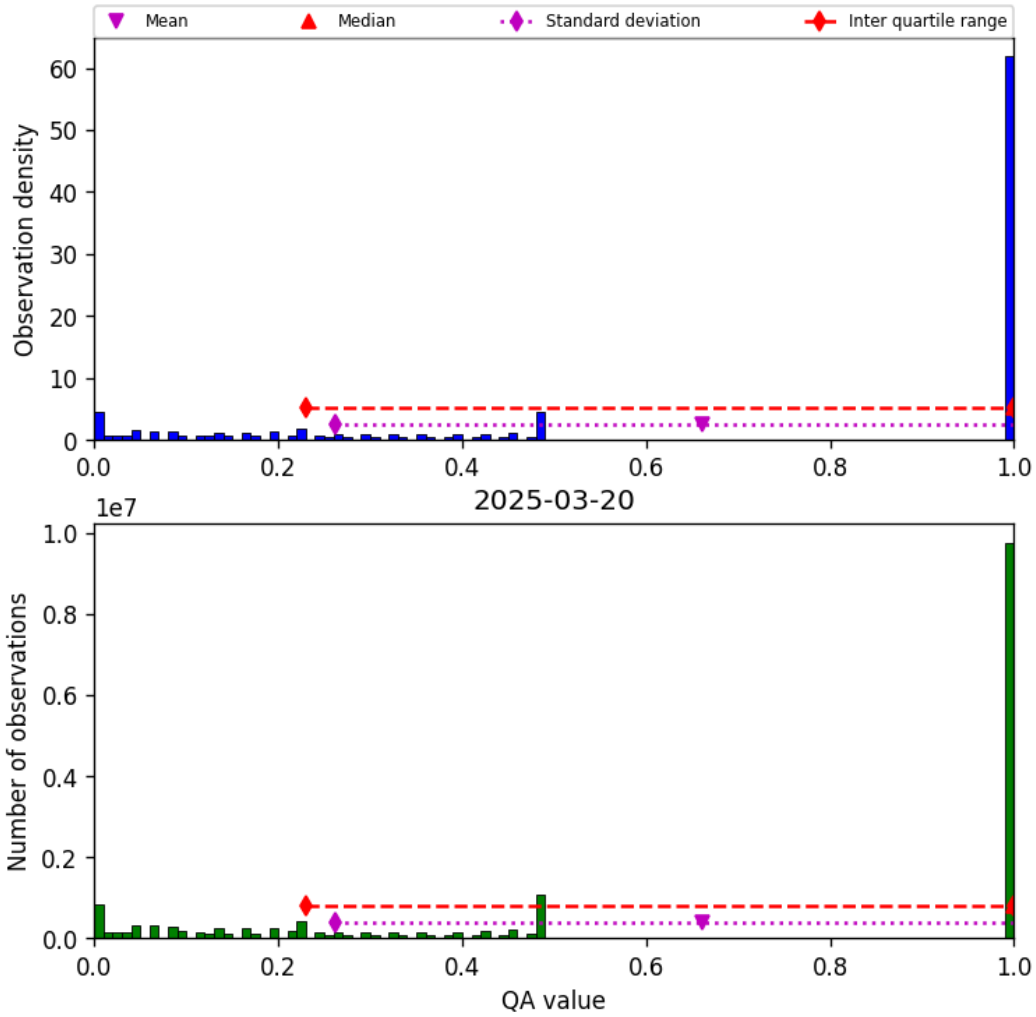

Figure 57: Histogram of “QA value” for 2025-03-20 to 2025-03-21

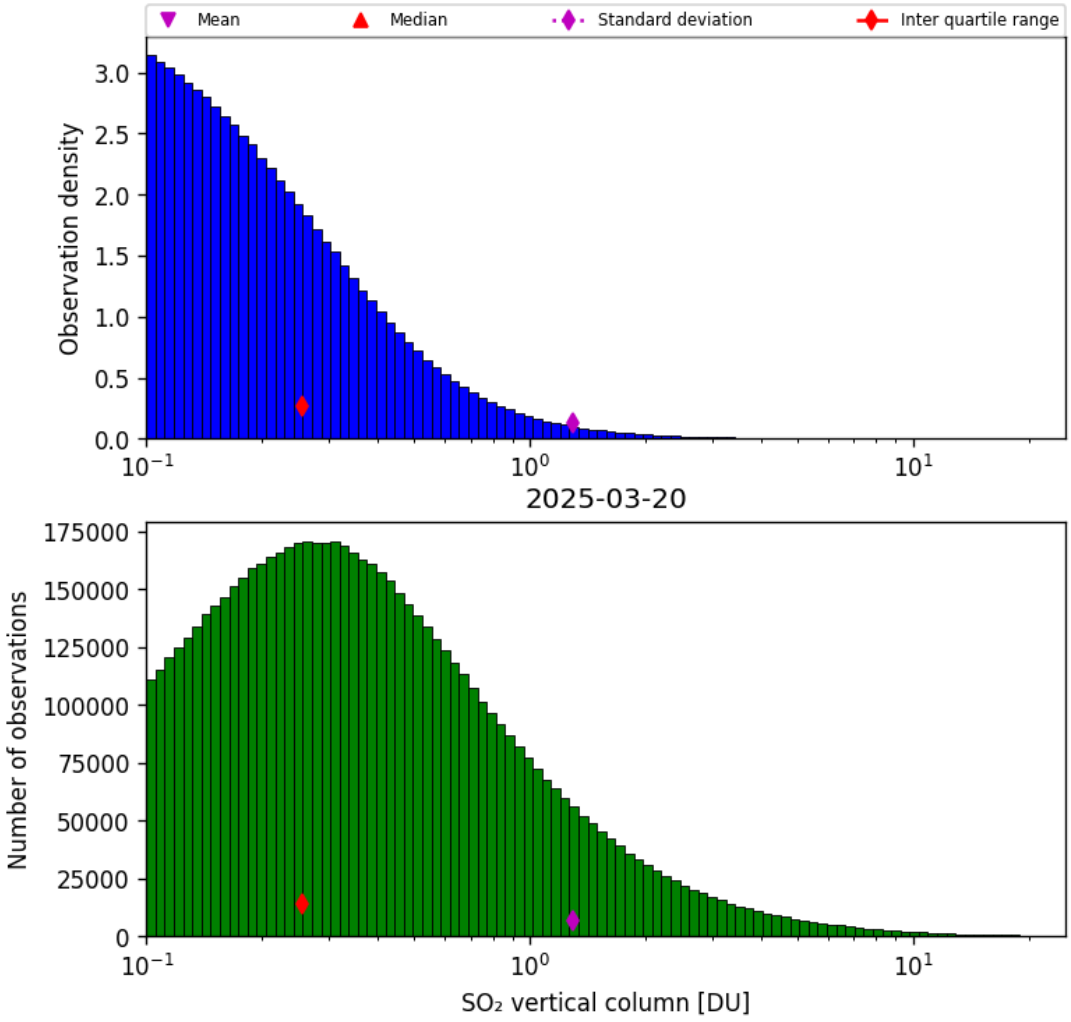

Figure 58: Histogram of "SO_2 vertical column" for 2025-03-20 to 2025-03-21

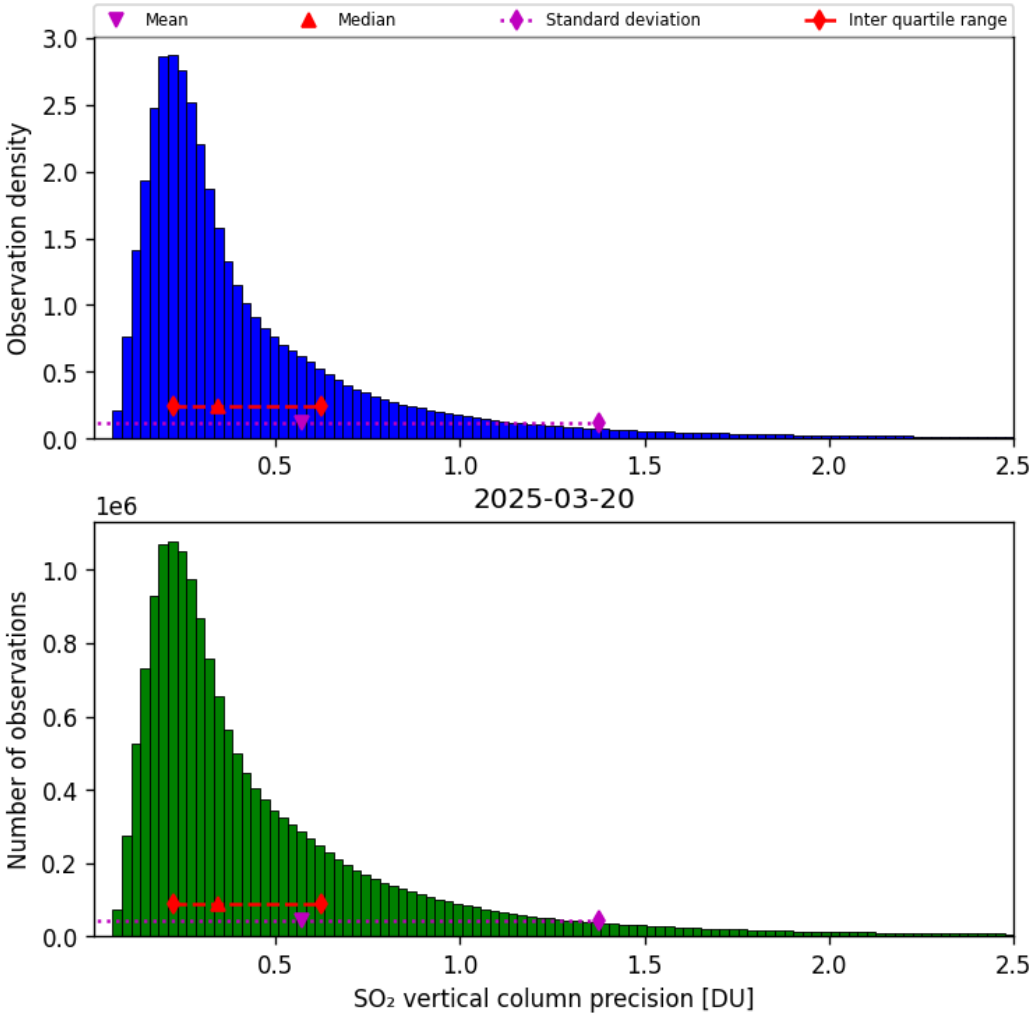

Figure 59: Histogram of "SO_2 vertical column precision" for 2025-03-20 to 2025-03-21

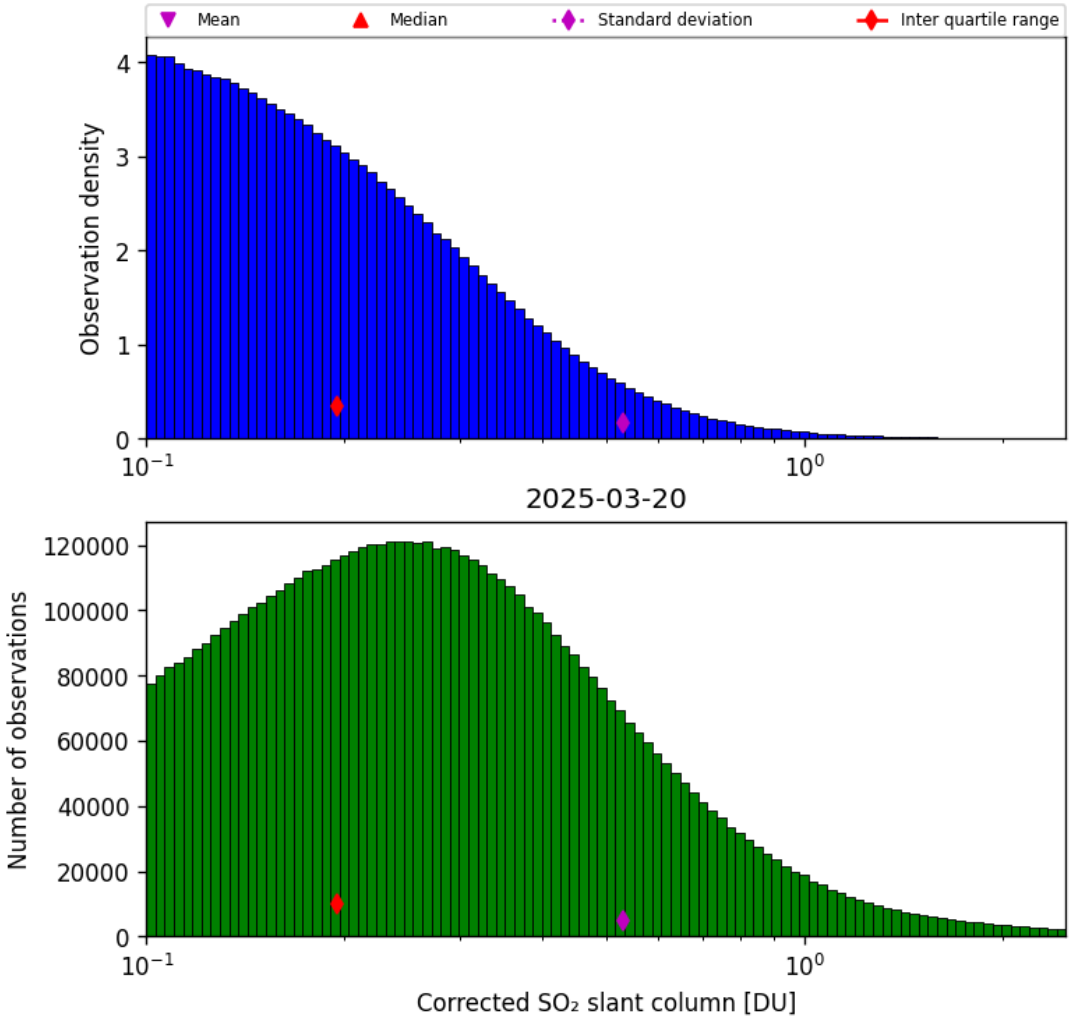

Figure 60: Histogram of "Corrected SO_2 slant column" for 2025-03-20 to 2025-03-21

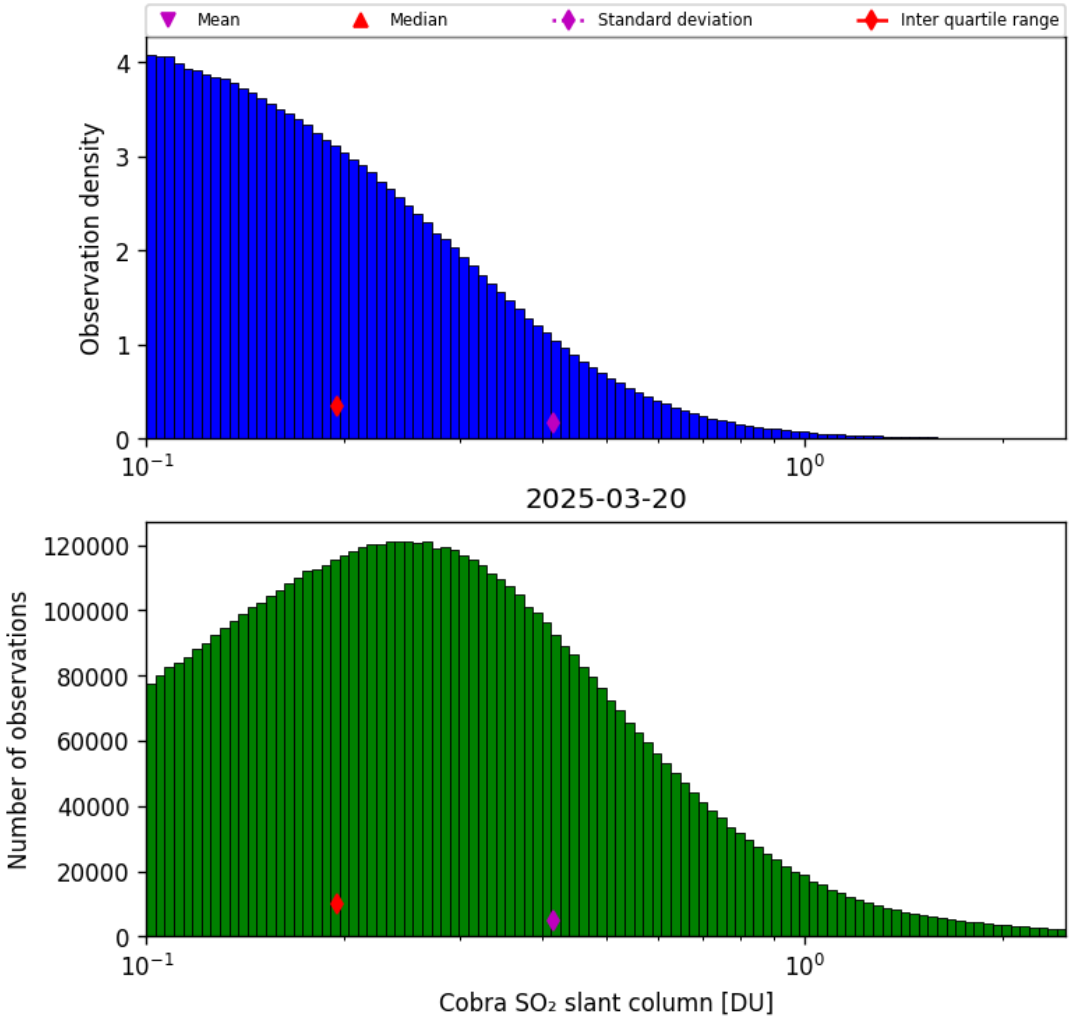

Figure 61: Histogram of "Cobra SO_2 slant column" for 2025-03-20 to 2025-03-21

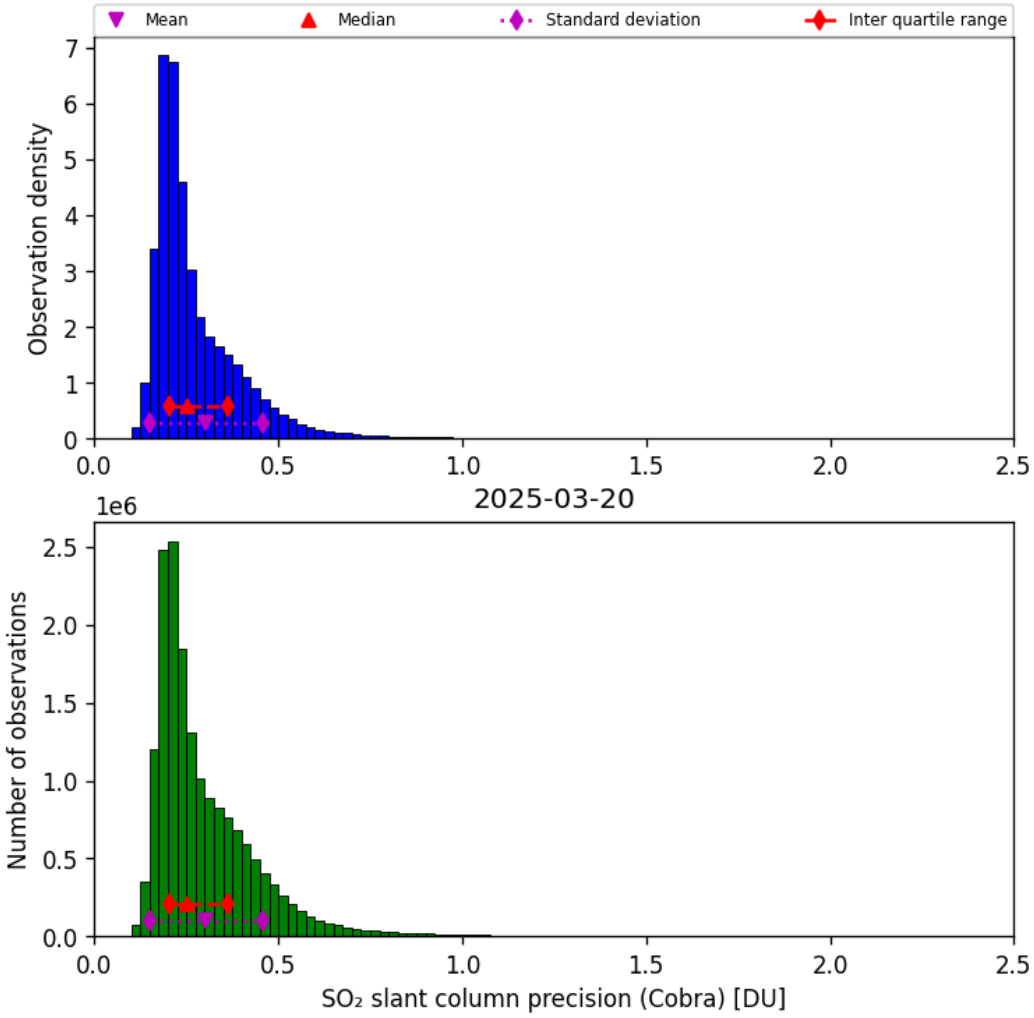

Figure 62: Histogram of "SO_2 slant column precision (Cobra)" for 2025-03-20 to 2025-03-21

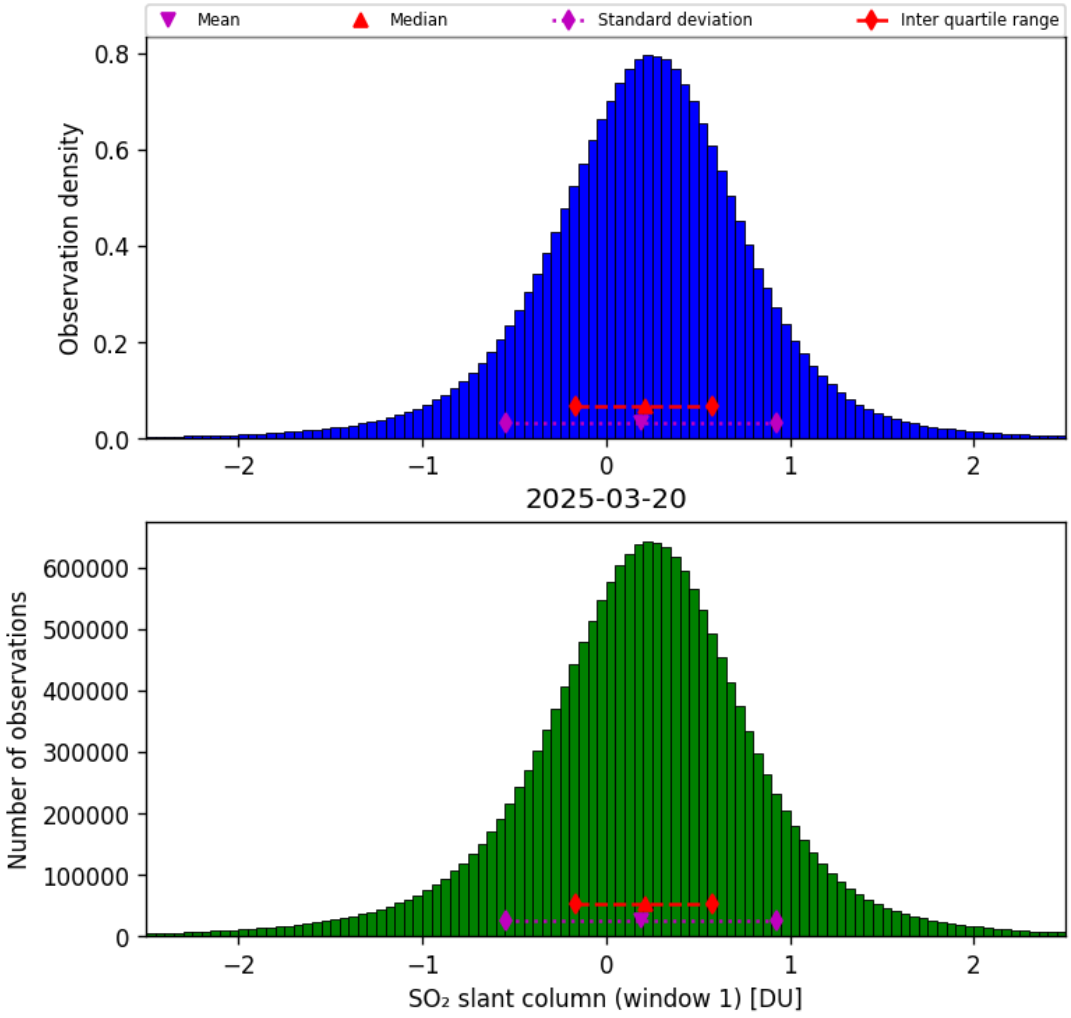

Figure 63: Histogram of "SO_2 slant column (window 1)" for 2025-03-20 to 2025-03-21

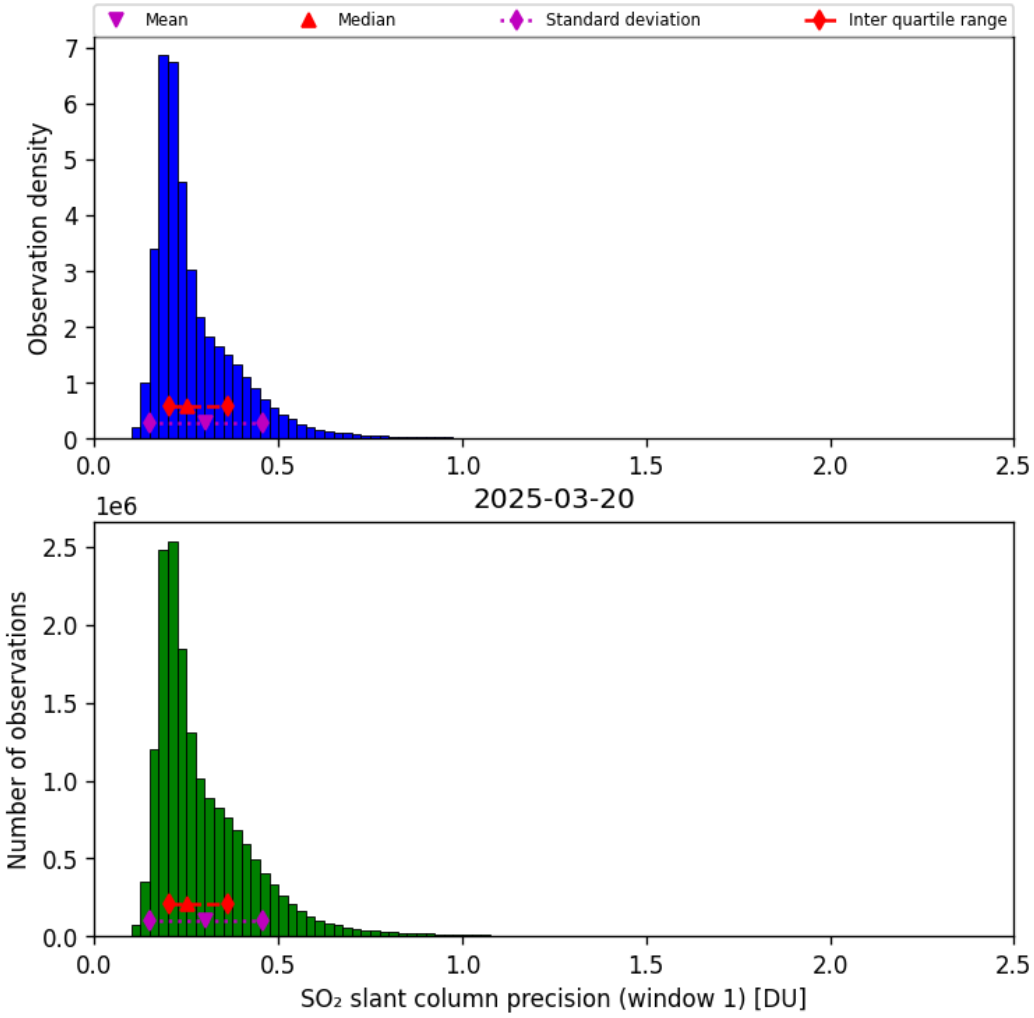

Figure 64: Histogram of "SO_2 slant column precision (window 1)" for 2025-03-20 to 2025-03-21

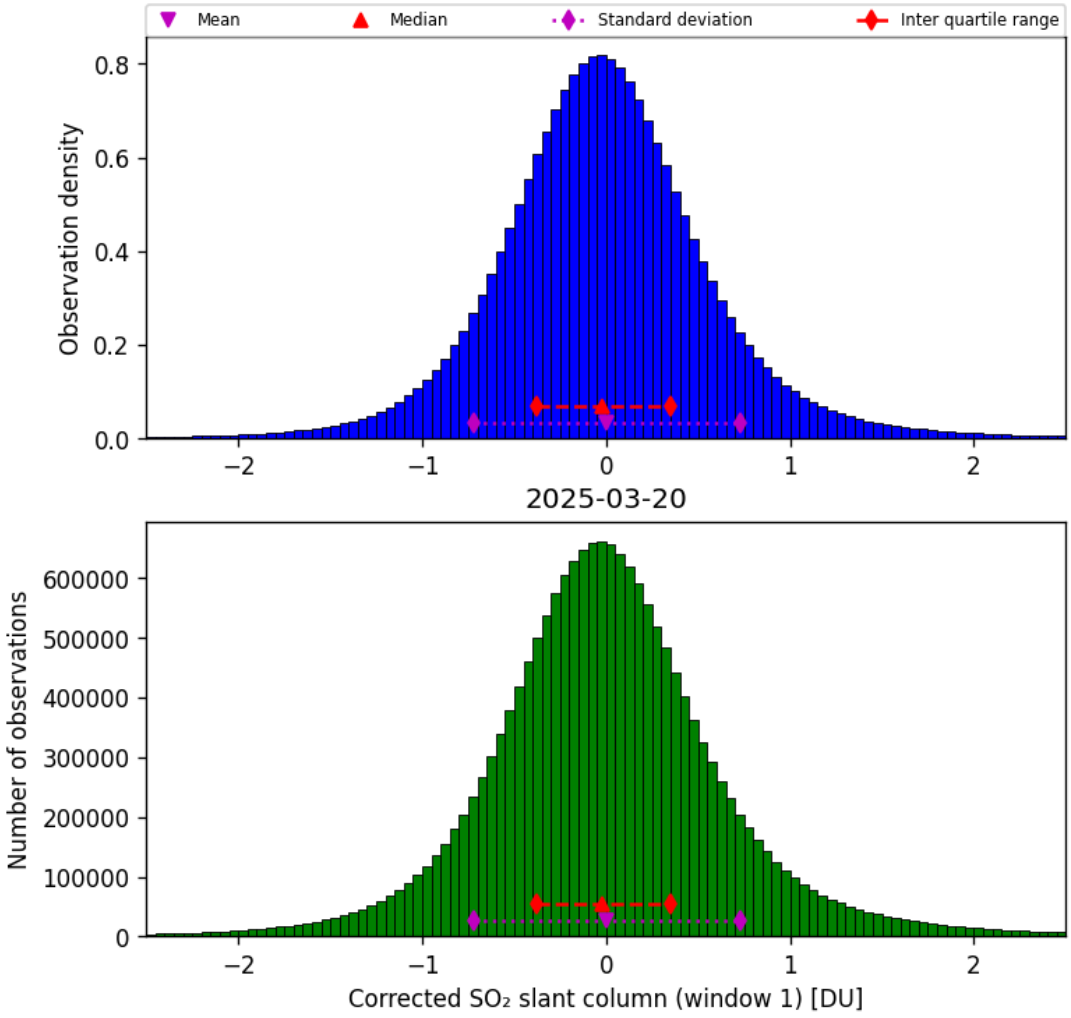

Figure 65: Histogram of "Corrected SO_2 slant column (window 1)" for 2025-03-20 to 2025-03-21

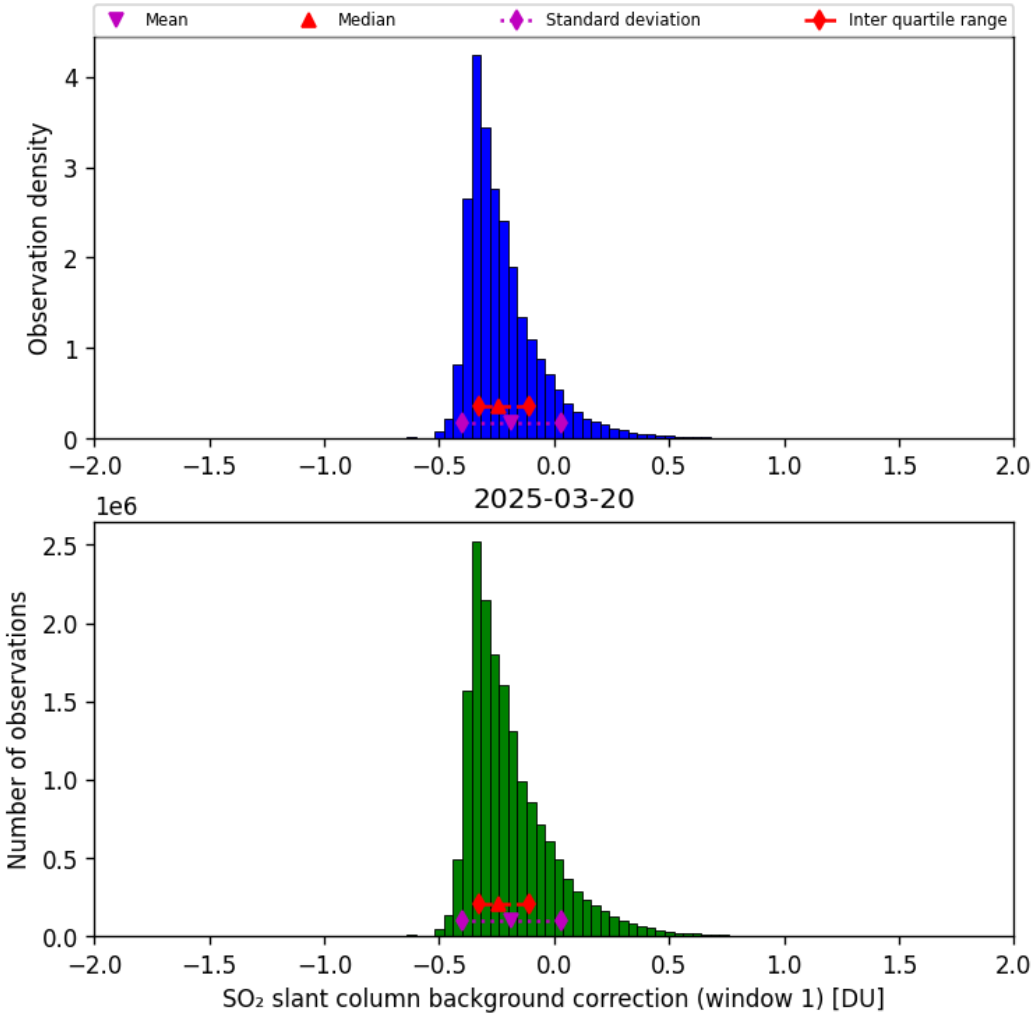

Figure 66: Histogram of "SO_2 slant column background correction (window 1)" for 2025-03-20 to 2025-03-21

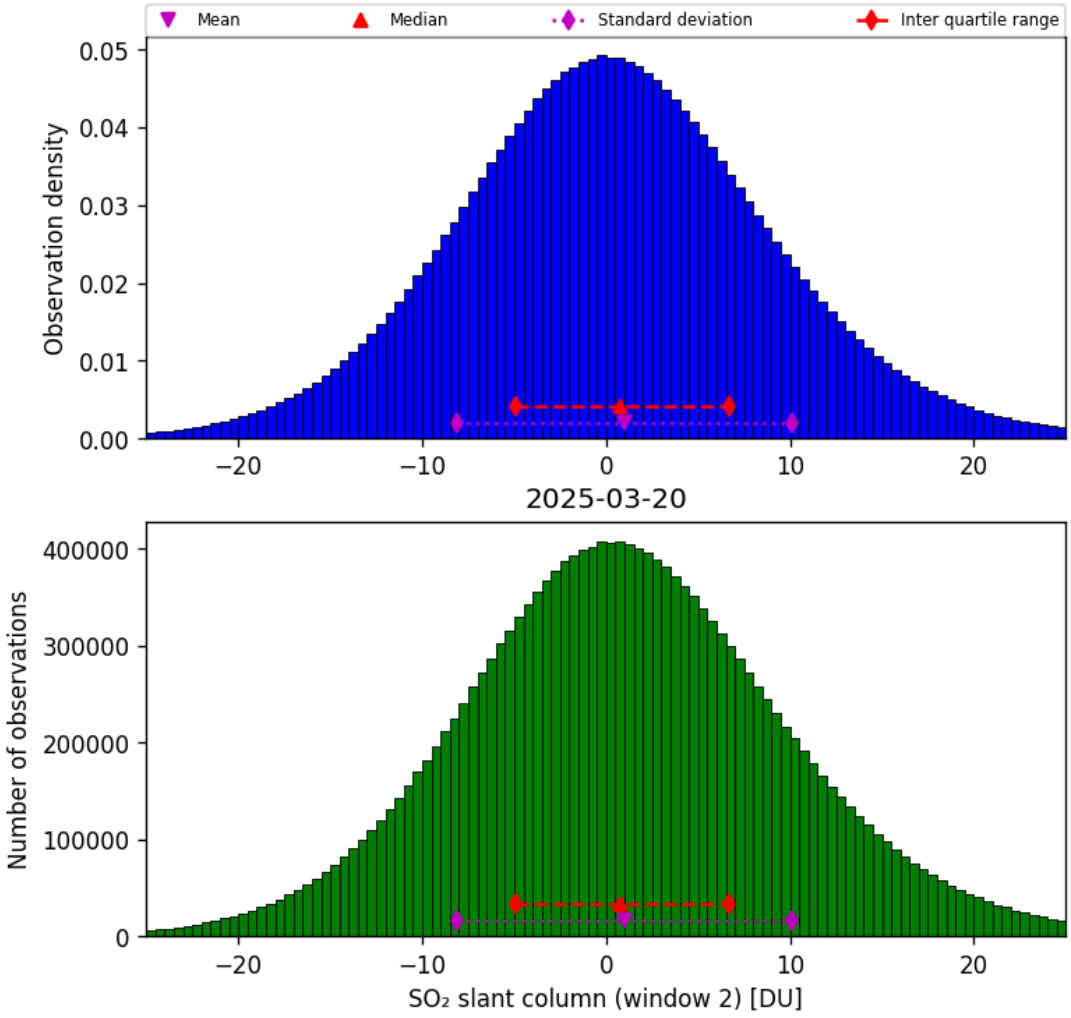

Figure 67: Histogram of "SO_2 slant column (window 2)" for 2025-03-20 to 2025-03-21

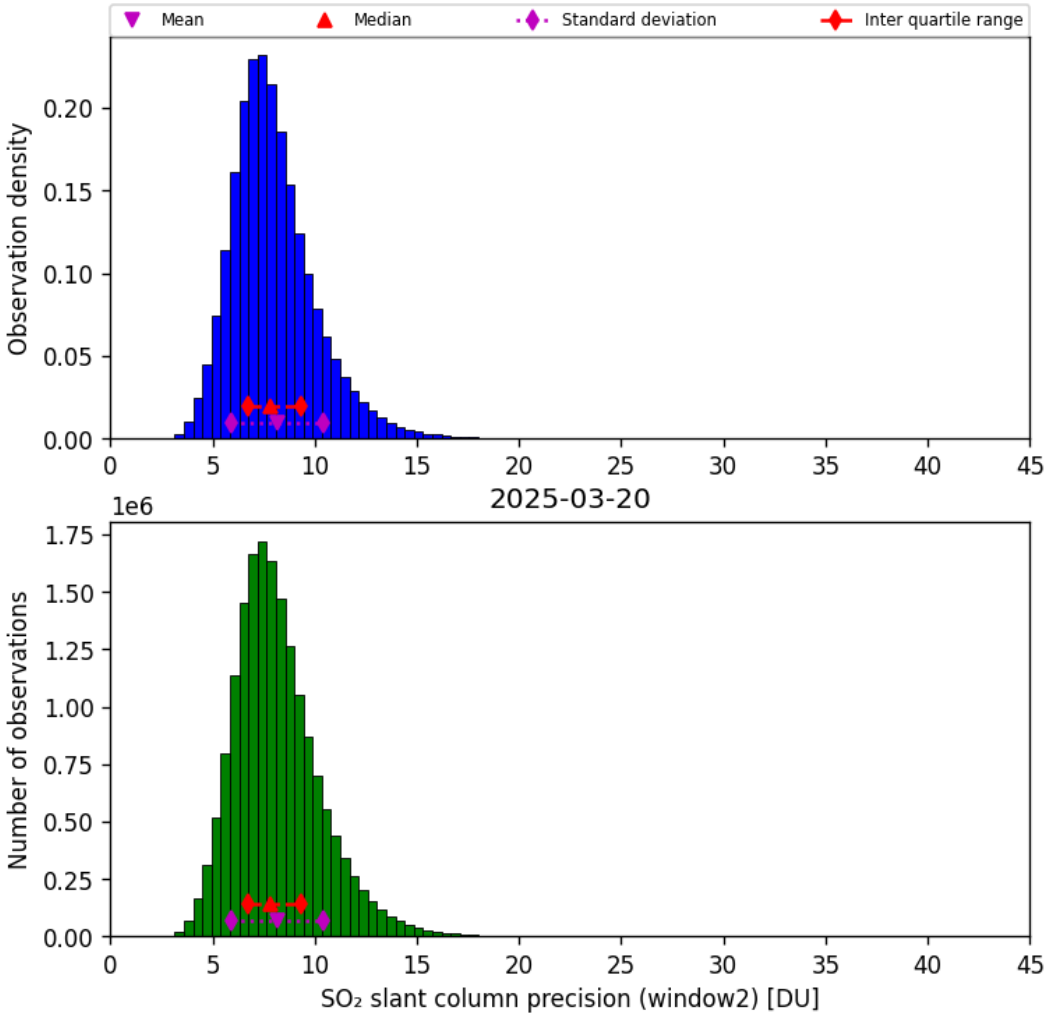

Figure 68: Histogram of "SO_2 slant column precision (window2)" for 2025-03-20 to 2025-03-21

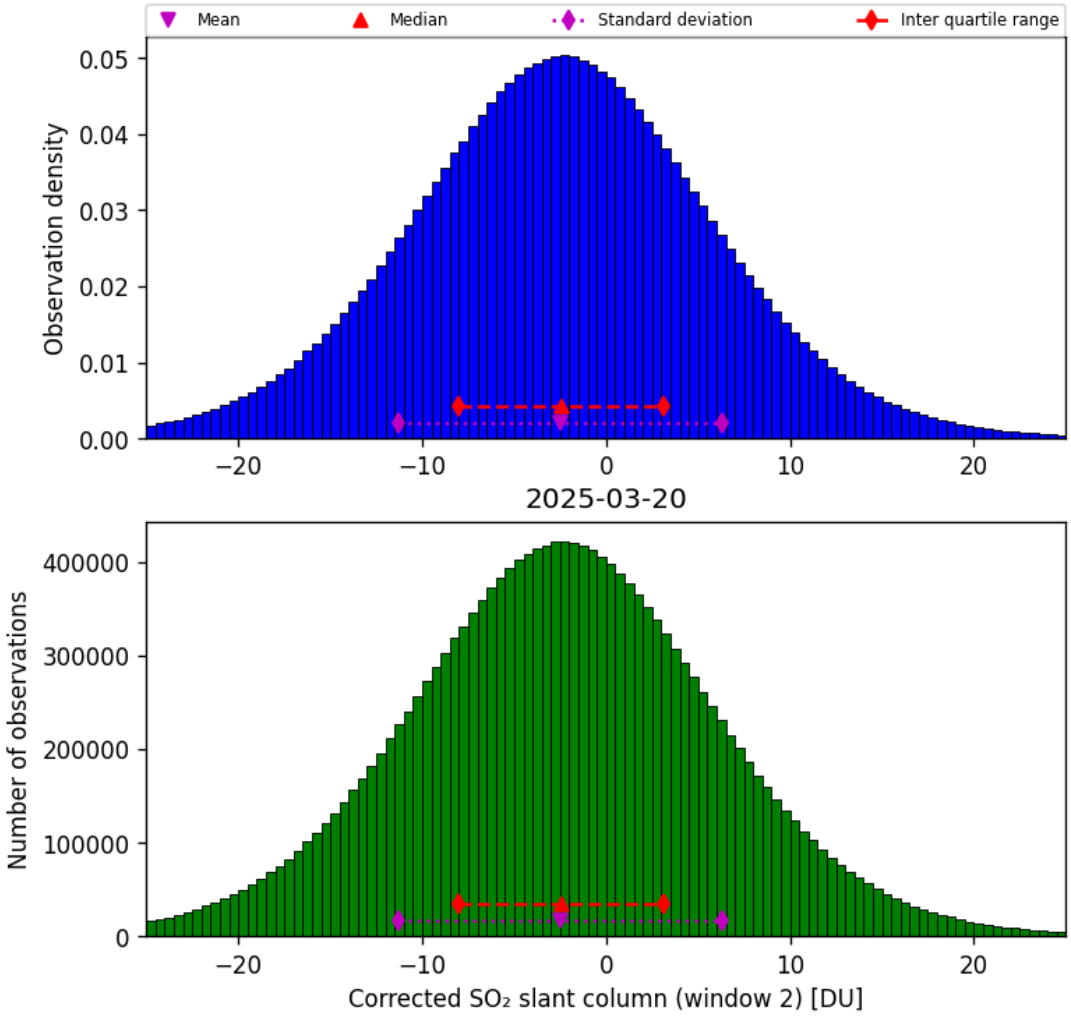

Figure 69: Histogram of "Corrected SO_2 slant column (window 2)" for 2025-03-20 to 2025-03-21

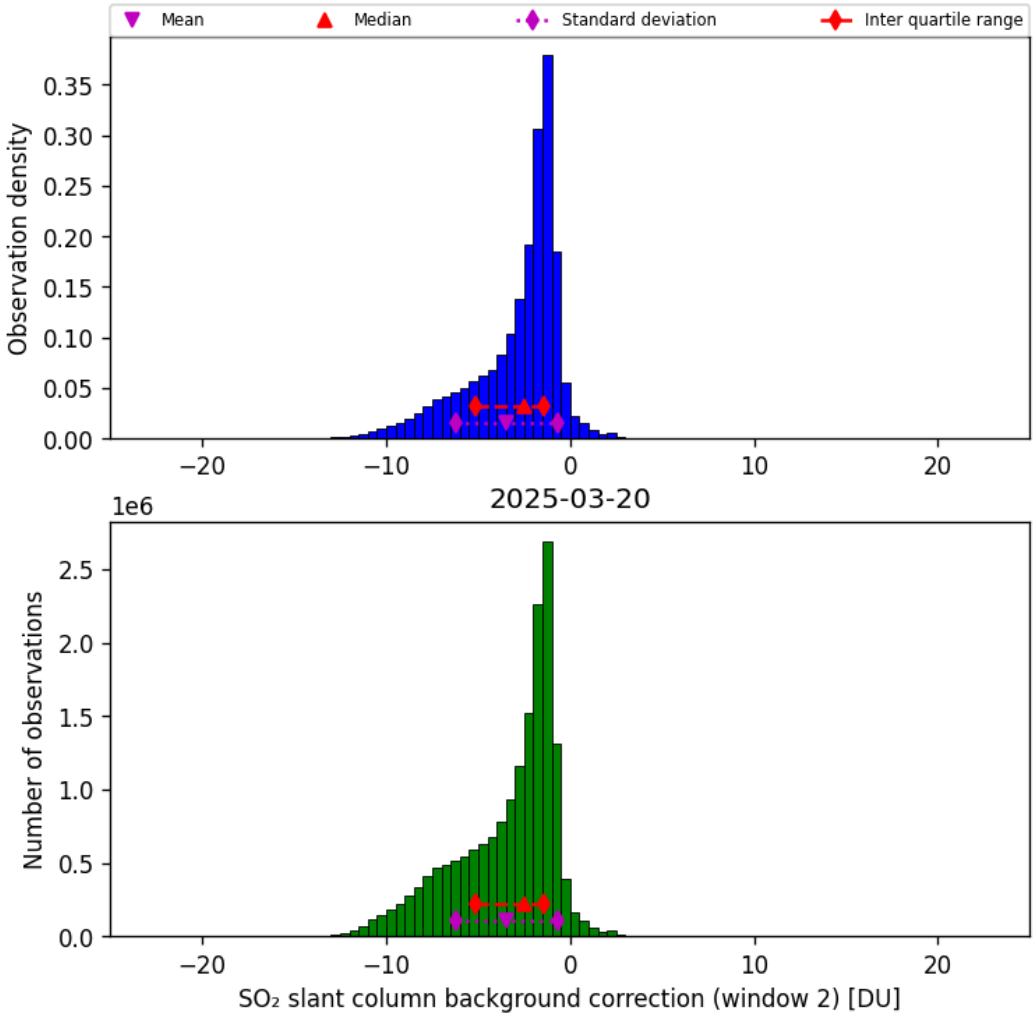

Figure 70: Histogram of "SO_2 slant column background correction (window 2)" for 2025-03-20 to 2025-03-21

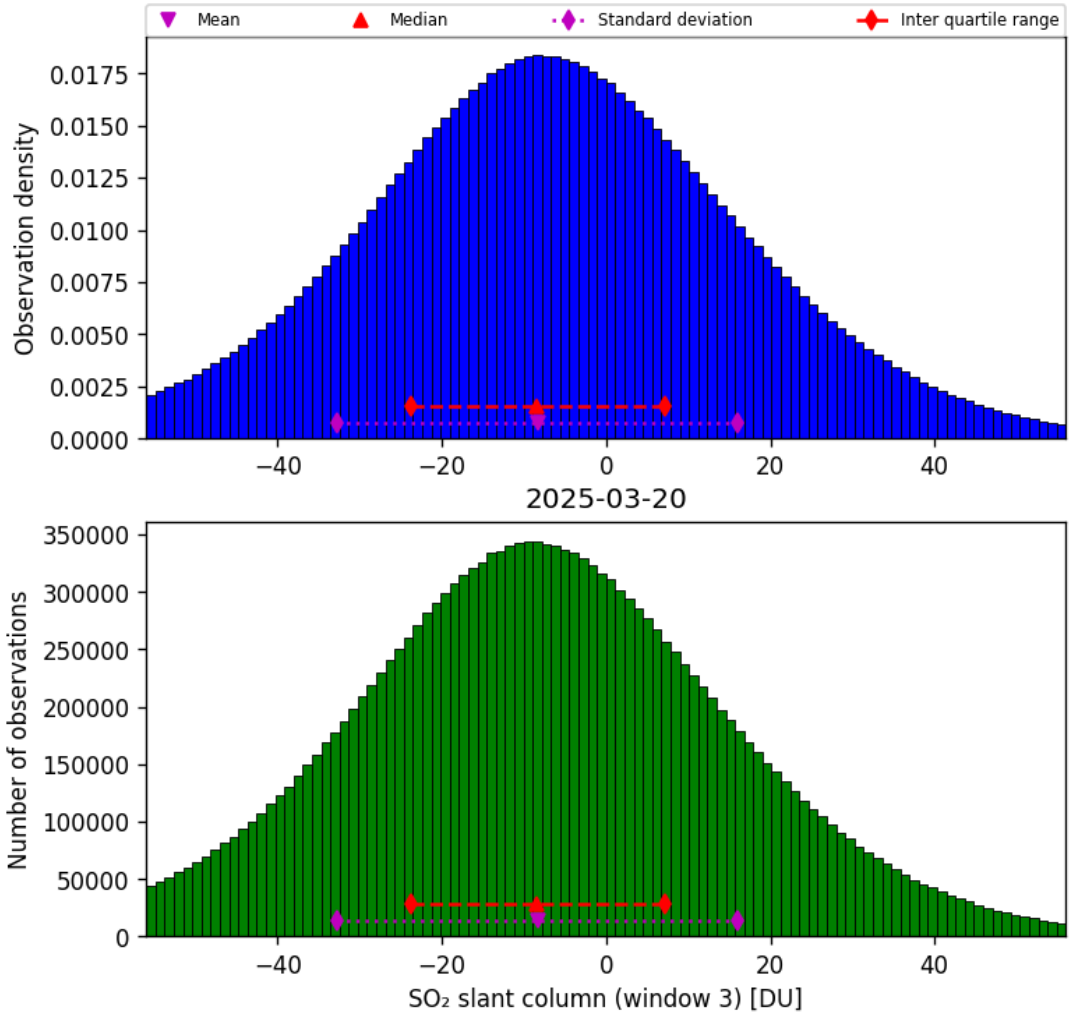

Figure 71: Histogram of "SO_2 slant column (window 3)" for 2025-03-20 to 2025-03-21

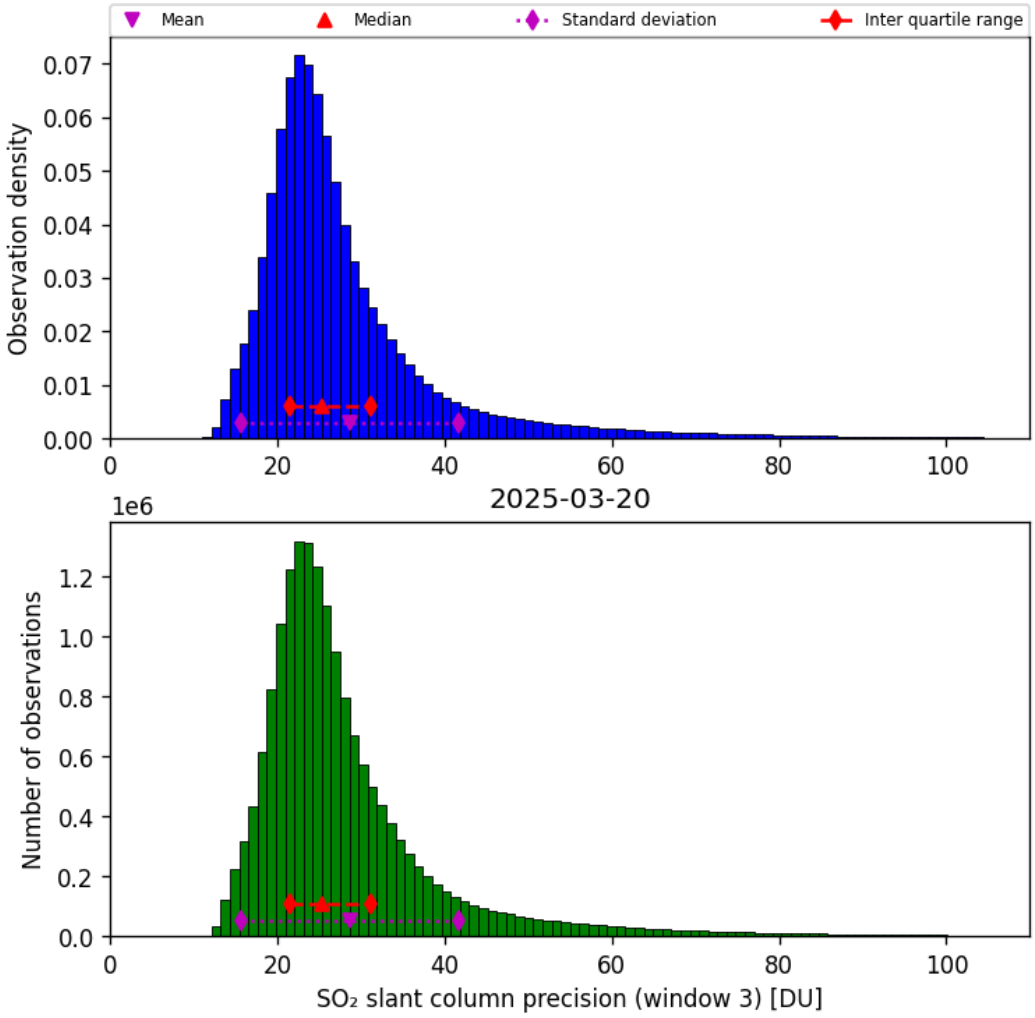

Figure 72: Histogram of "SO_2 slant column precision (window 3)" for 2025-03-20 to 2025-03-21

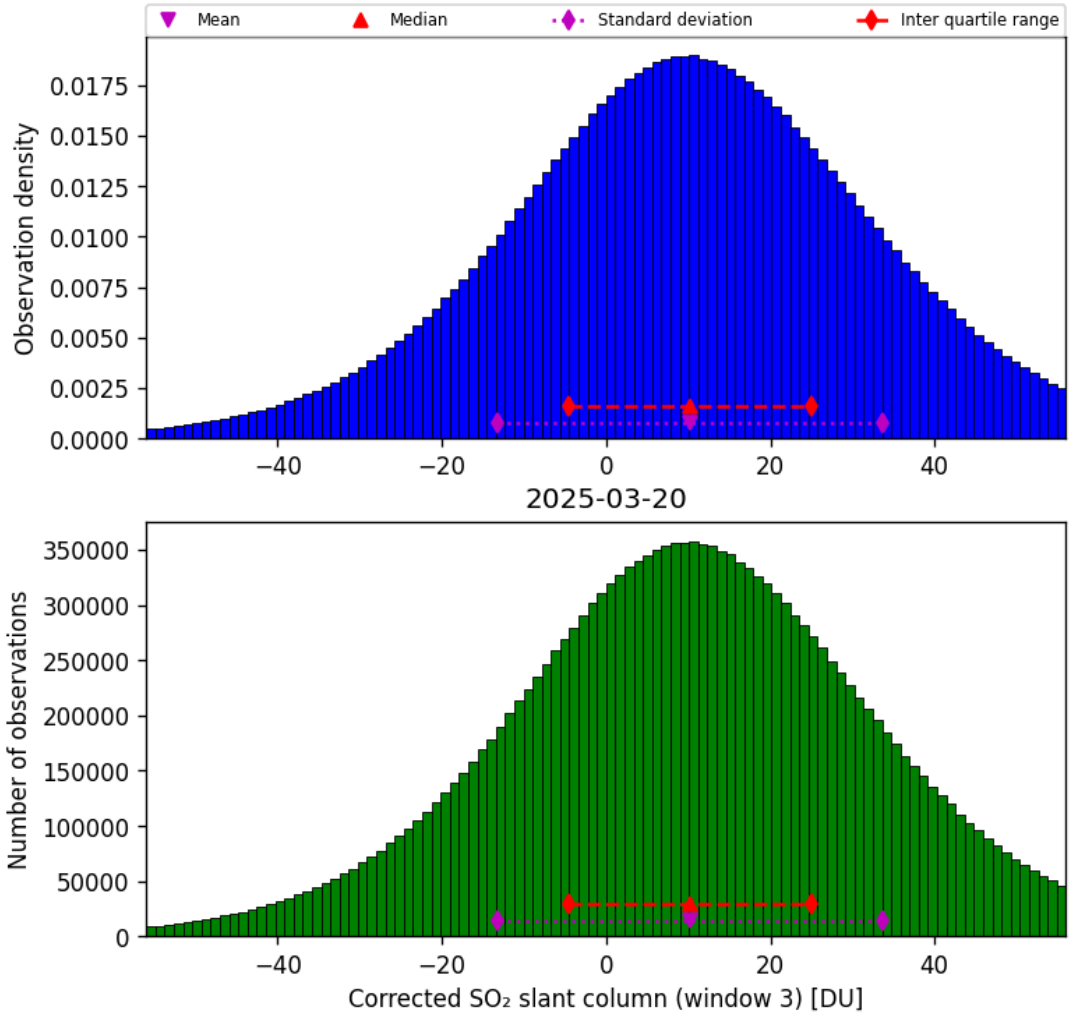

Figure 73: Histogram of "Corrected SO_2 slant column (window 3)" for 2025-03-20 to 2025-03-21

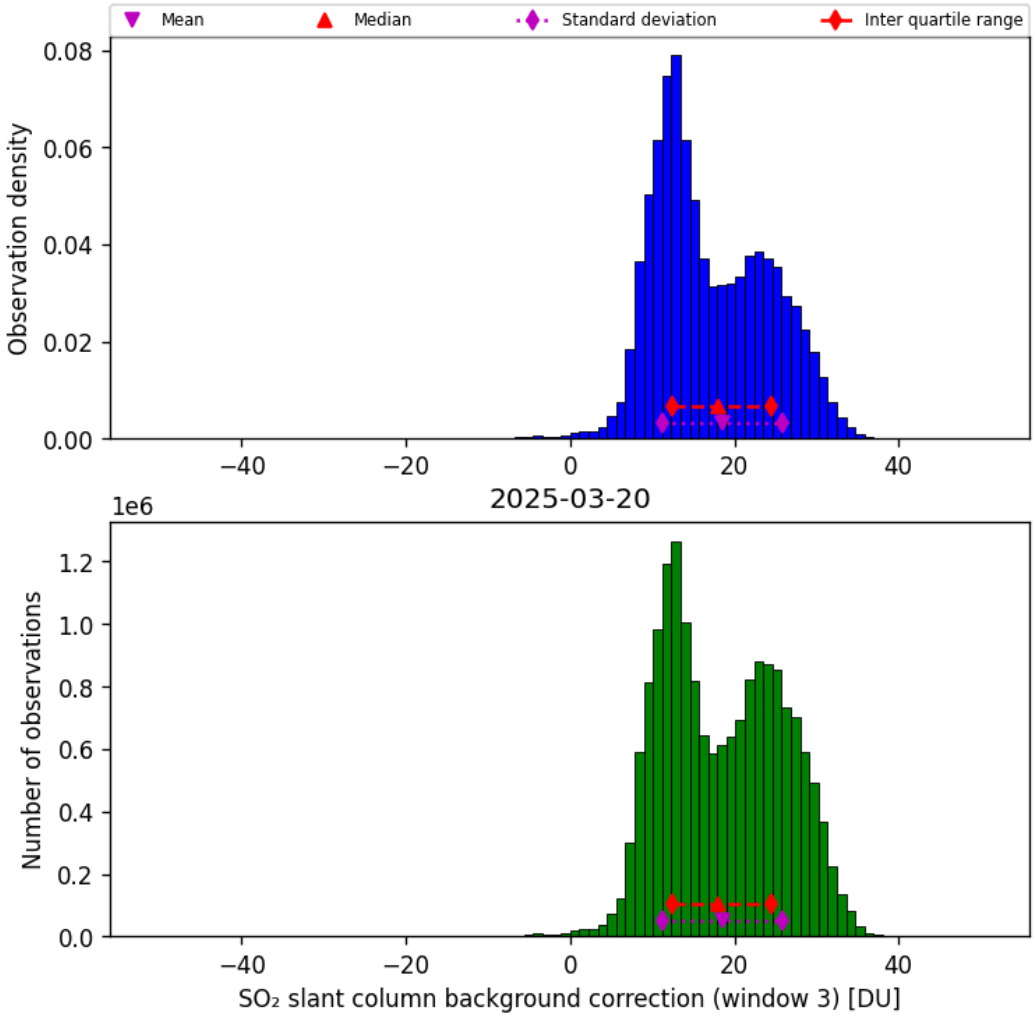

Figure 74: Histogram of "SO_2 slant column background correction (window 3)" for 2025-03-20 to 2025-03-21

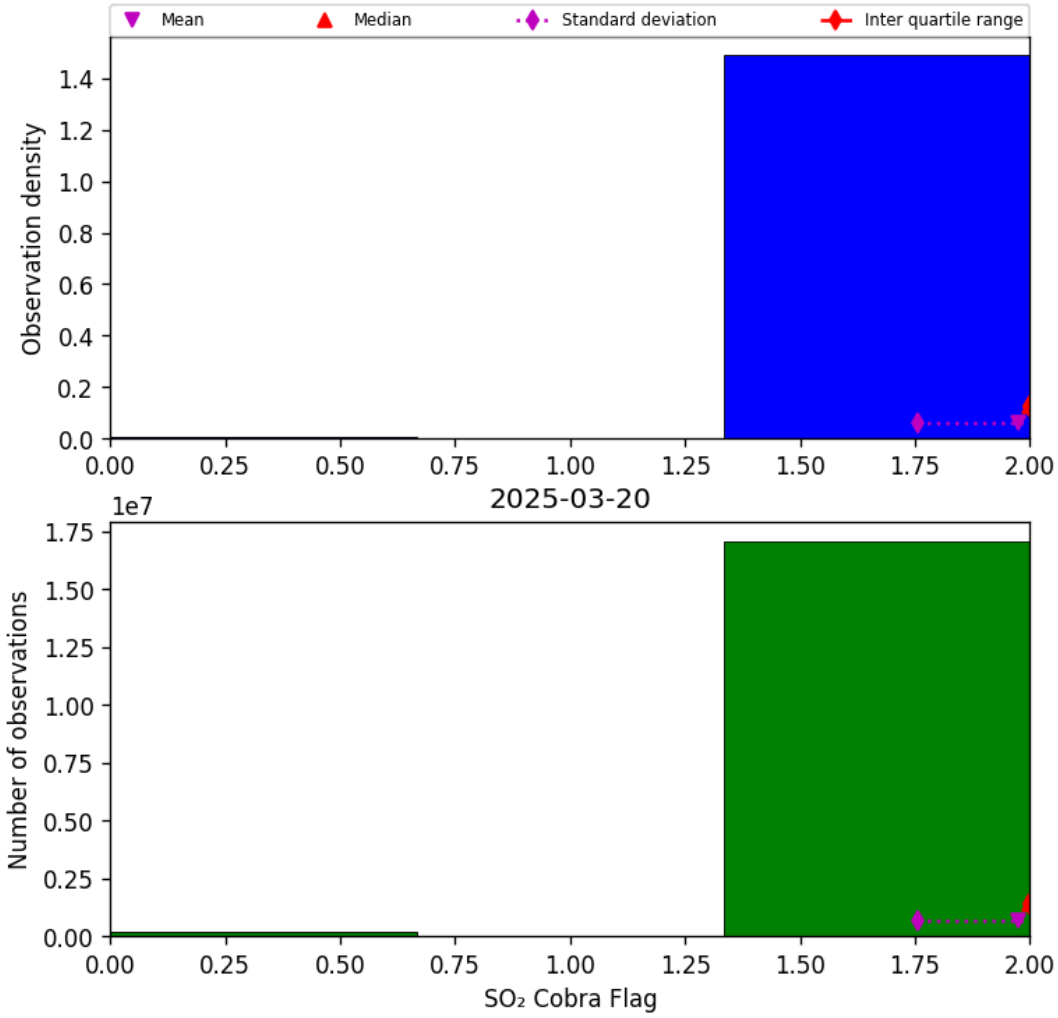

Figure 75: Histogram of "SO_2 Cobra Flag" for 2025-03-20 to 2025-03-21

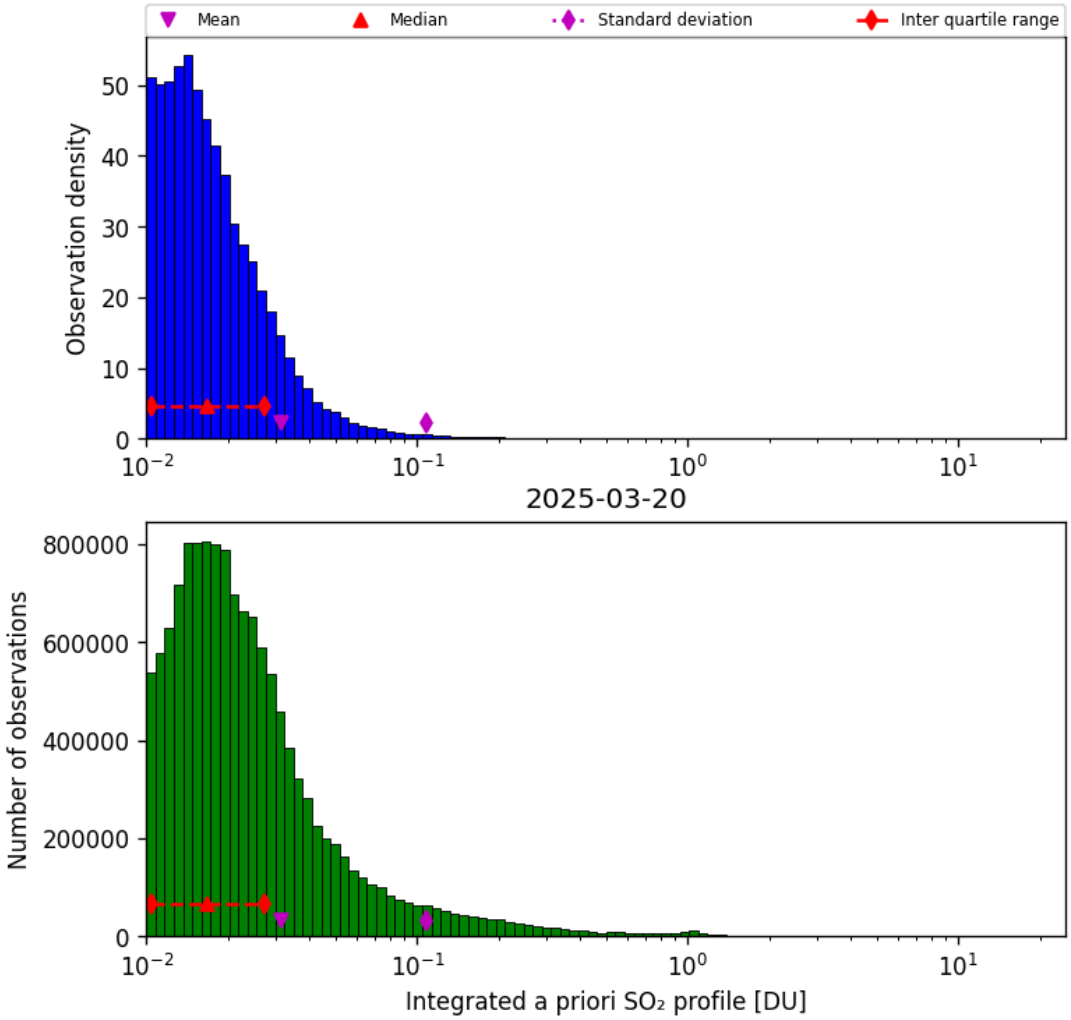

Figure 76: Histogram of "Integrated a priori SO_2 profile" for 2025-03-20 to 2025-03-21

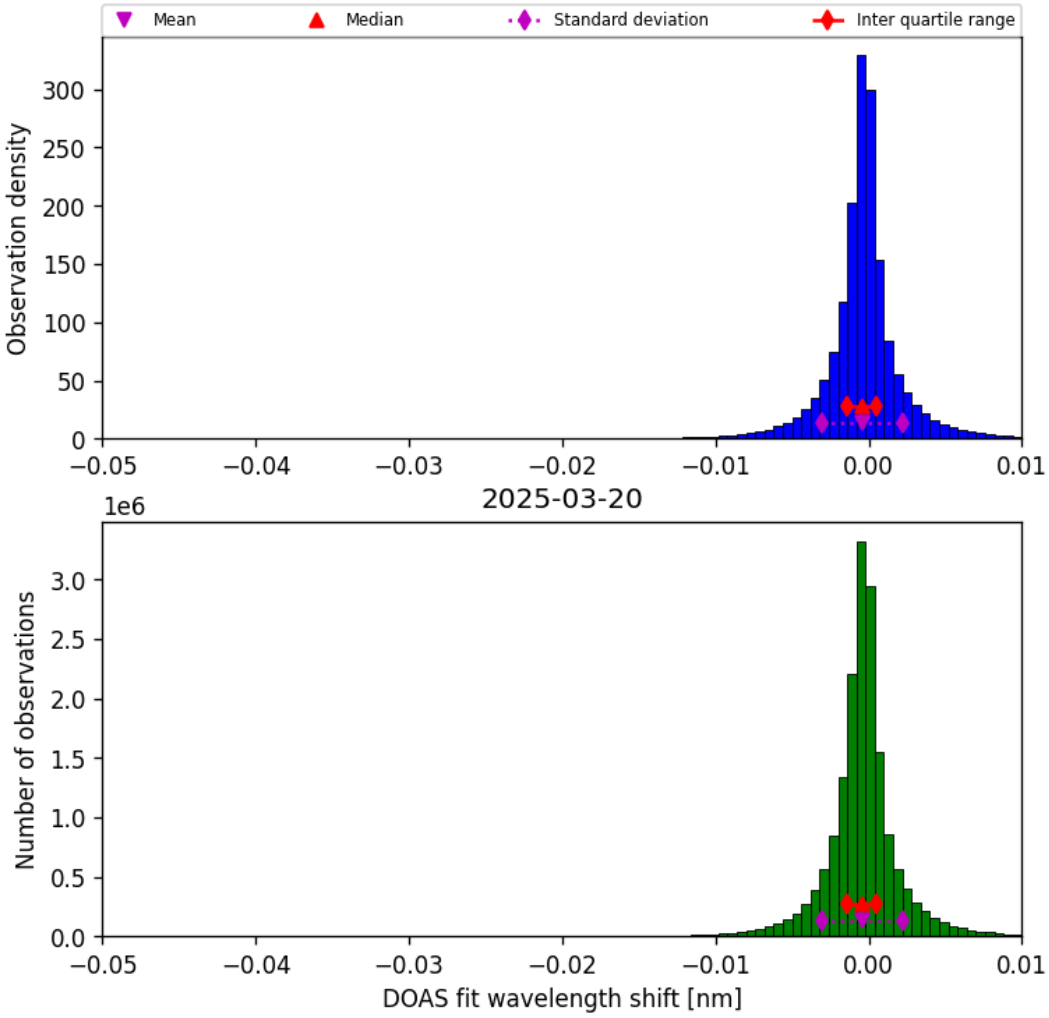

Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-03-20 to 2025-03-21

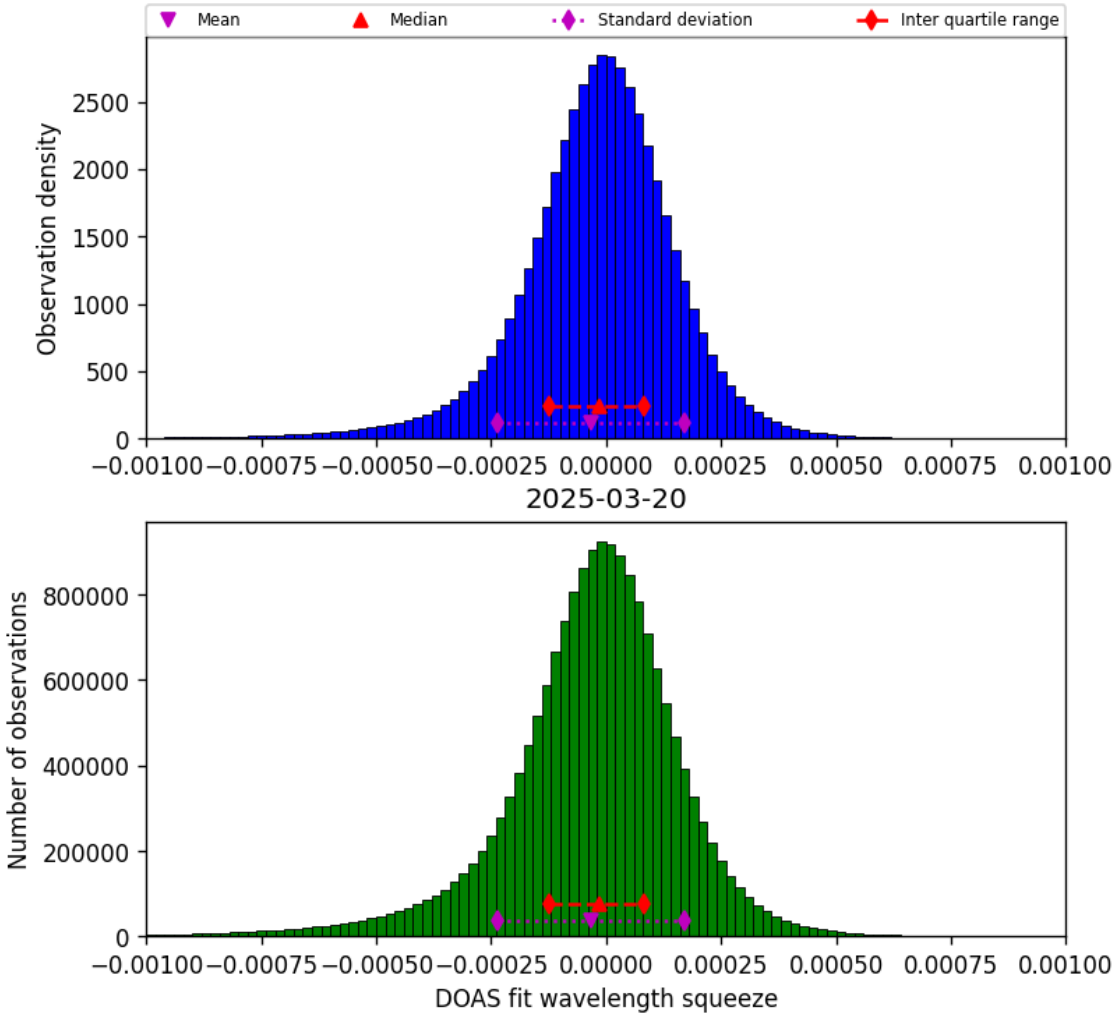

Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-03-20 to 2025-03-21

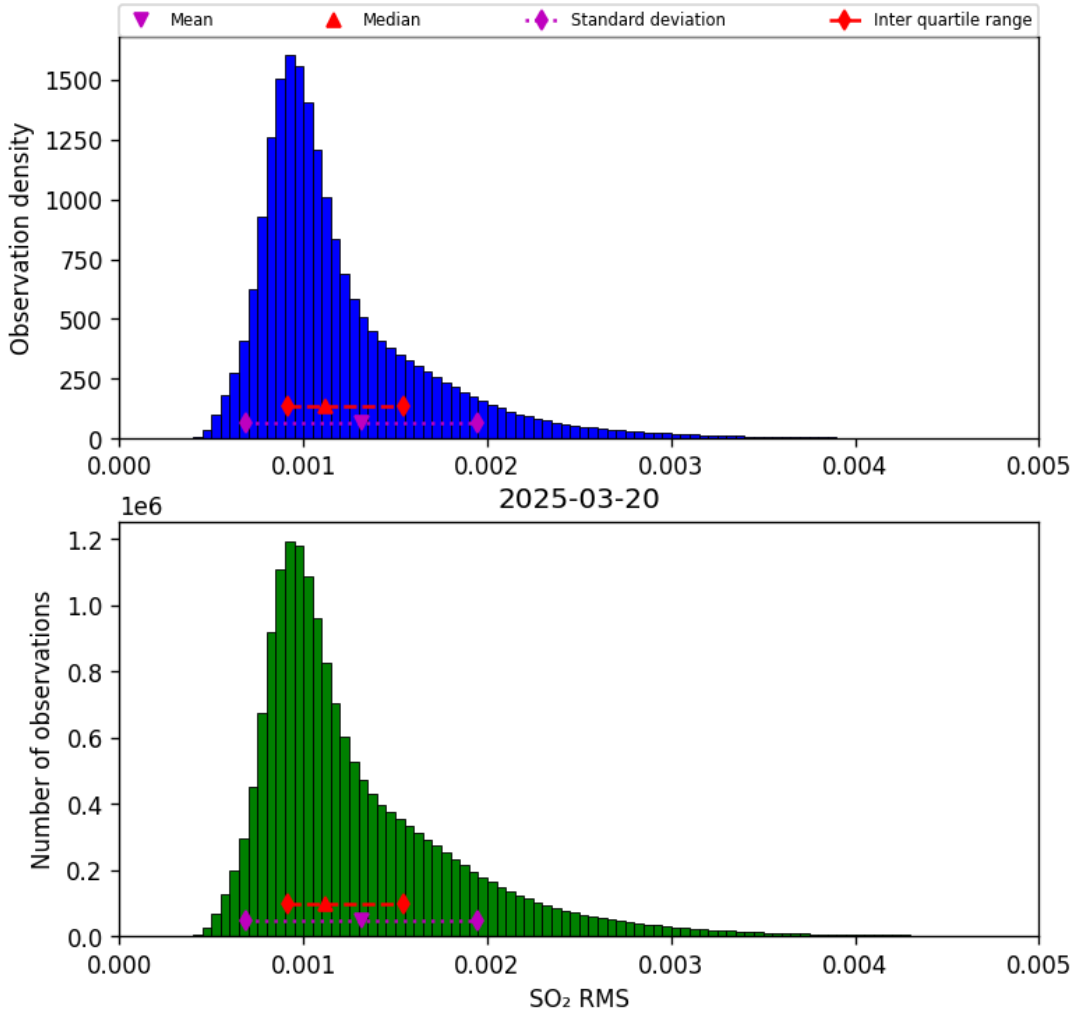

Figure 79: Histogram of "SO_2 RMS" for 2025-03-20 to 2025-03-21

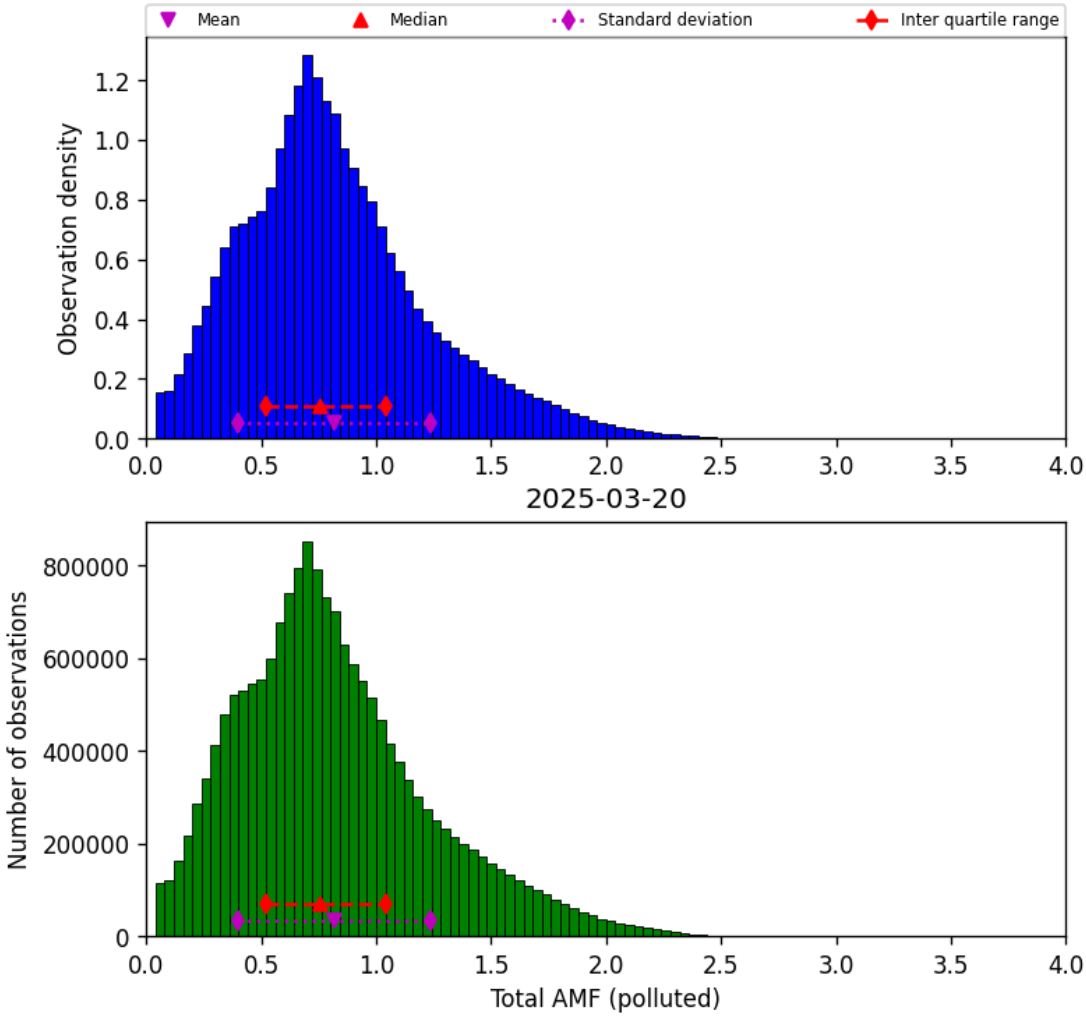

Figure 80: Histogram of “Total AMF (polluted)” for 2025-03-20 to 2025-03-21

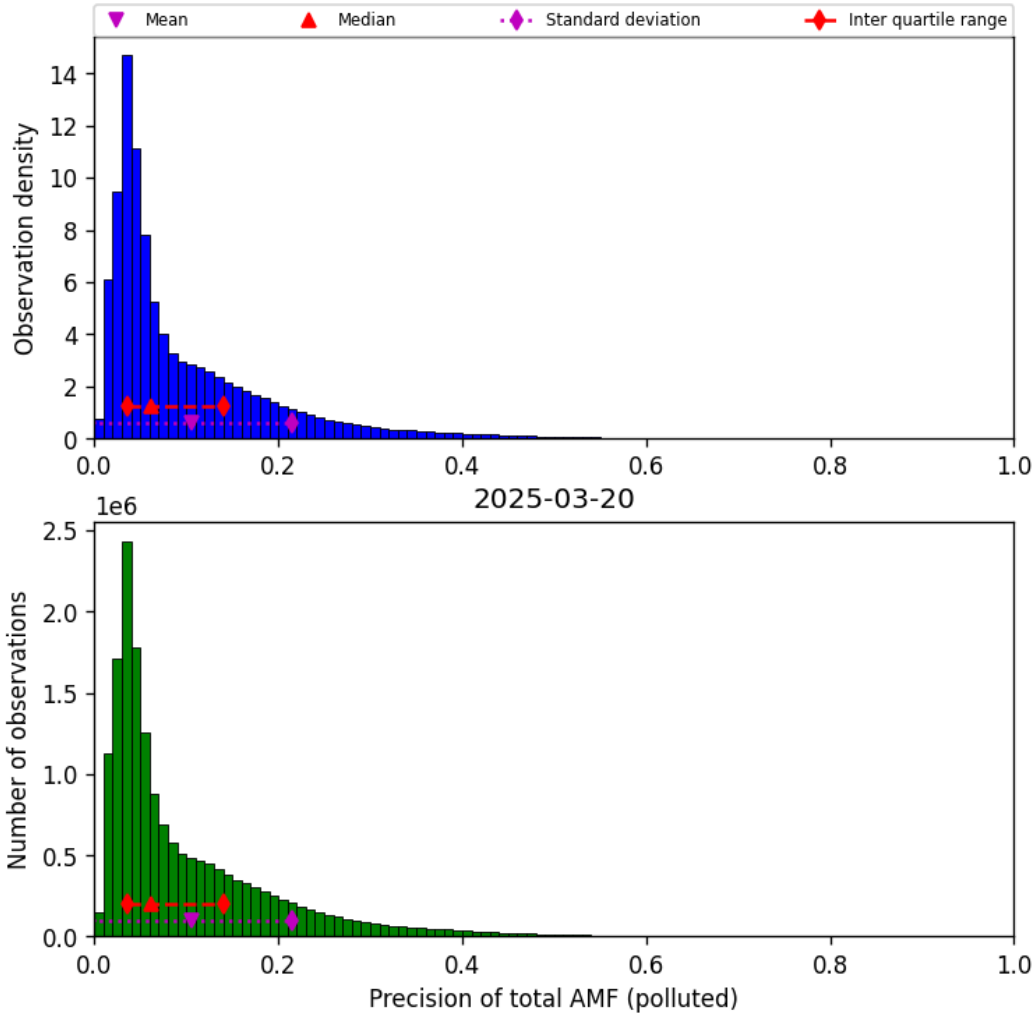

Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-03-20 to 2025-03-21

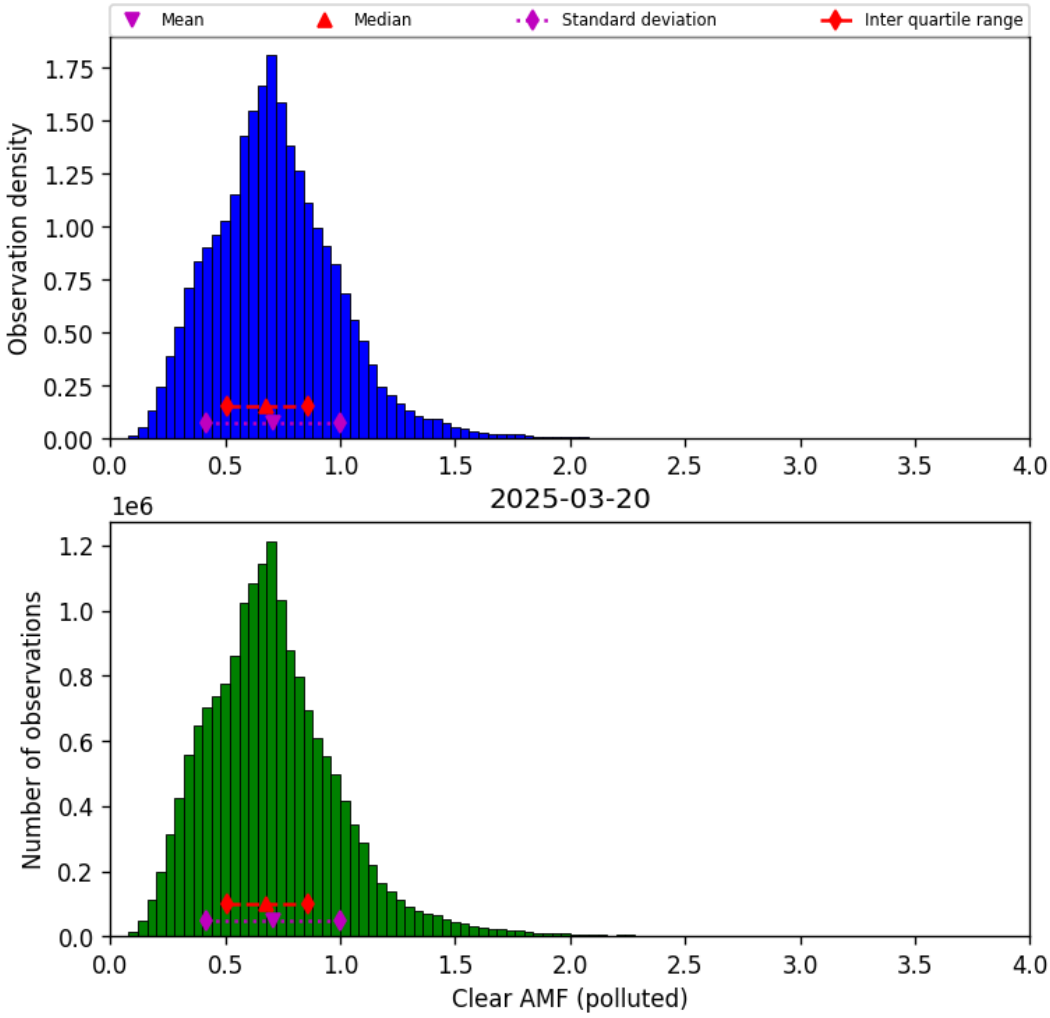

Figure 82: Histogram of “Clear AMF (polluted)” for 2025-03-20 to 2025-03-21

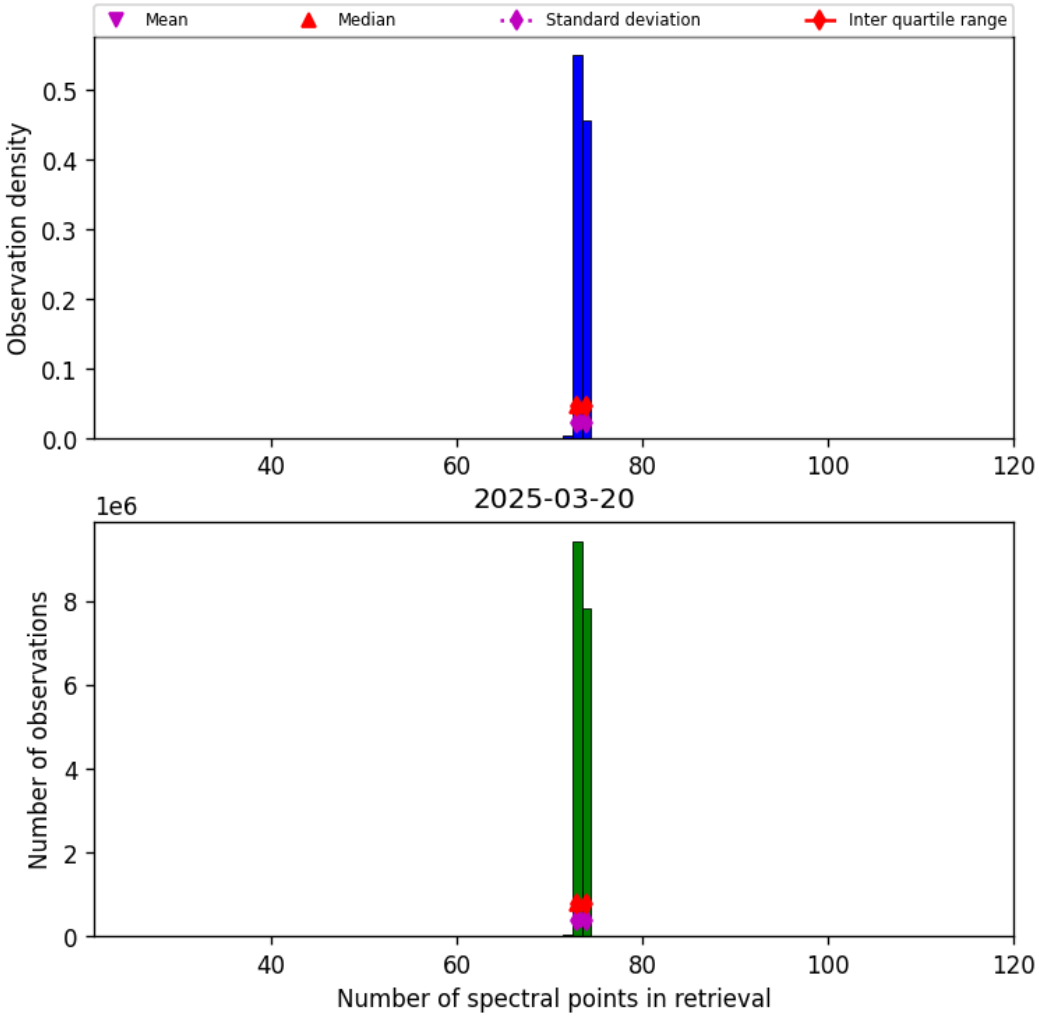

Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-03-20 to 2025-03-21

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.

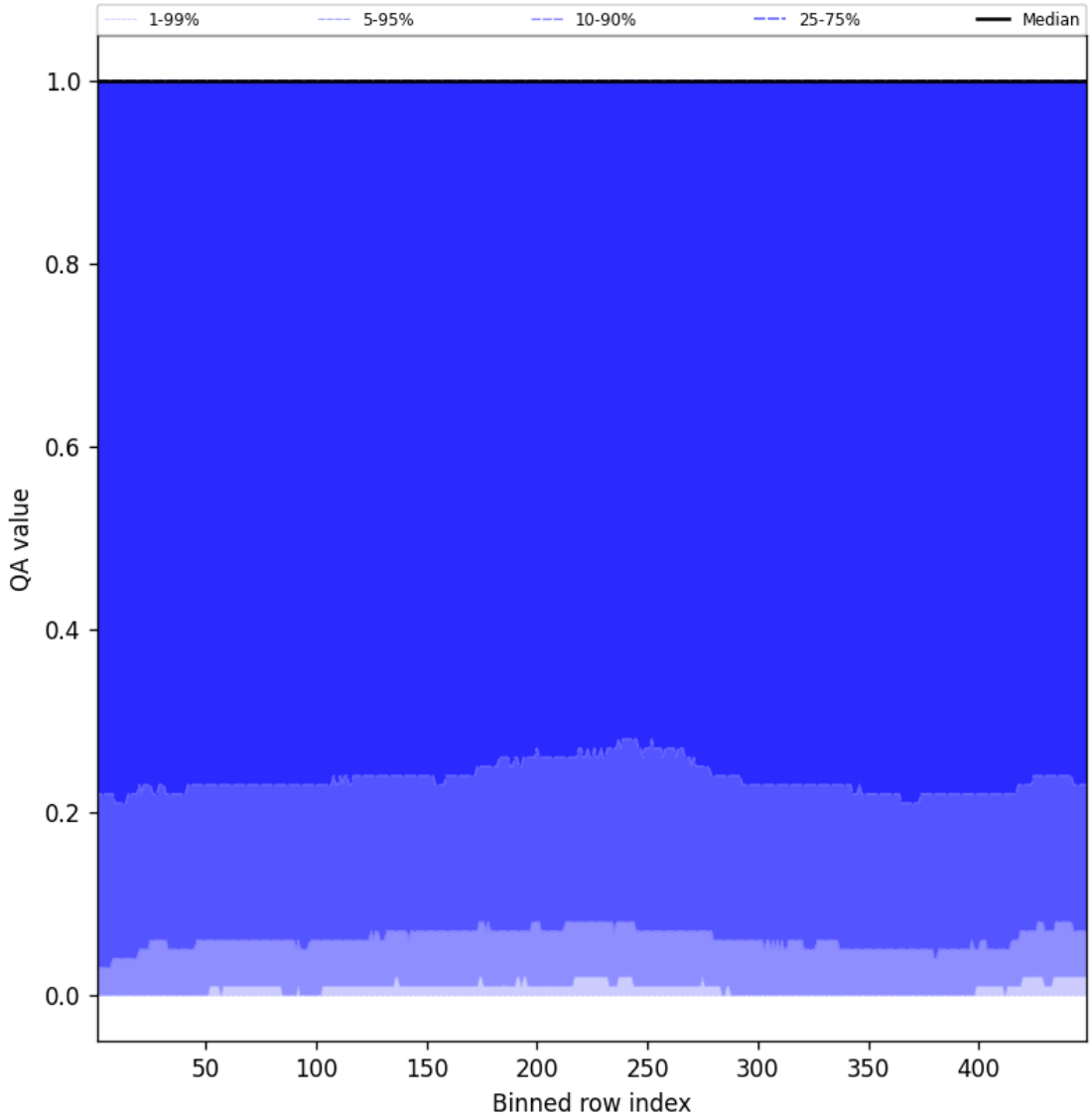

Figure 84: Along track statistics of “QA value” for 2025-03-20 to 2025-03-21

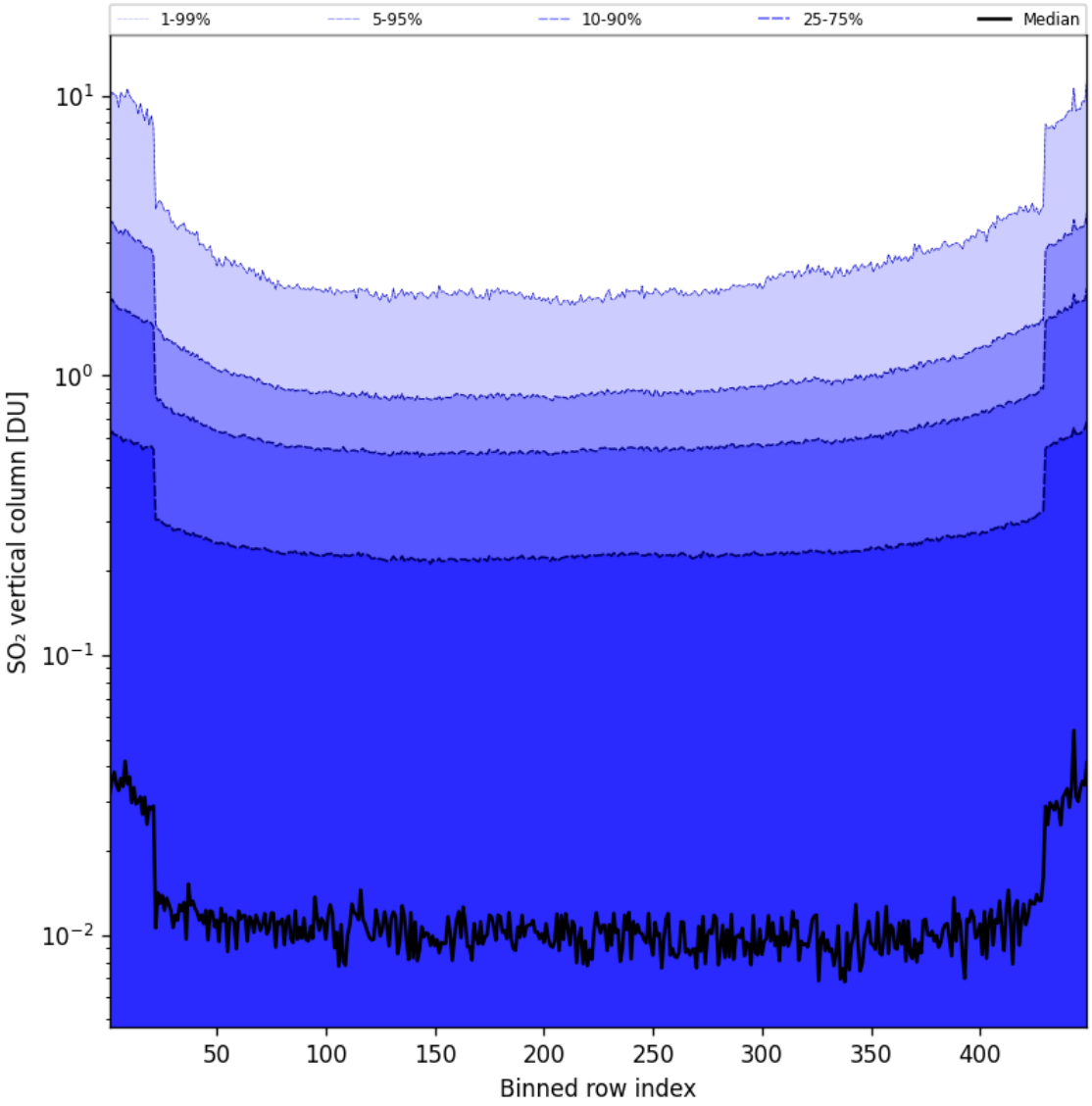

Figure 85: Along track statistics of "SO_2 vertical column" for 2025-03-20 to 2025-03-21

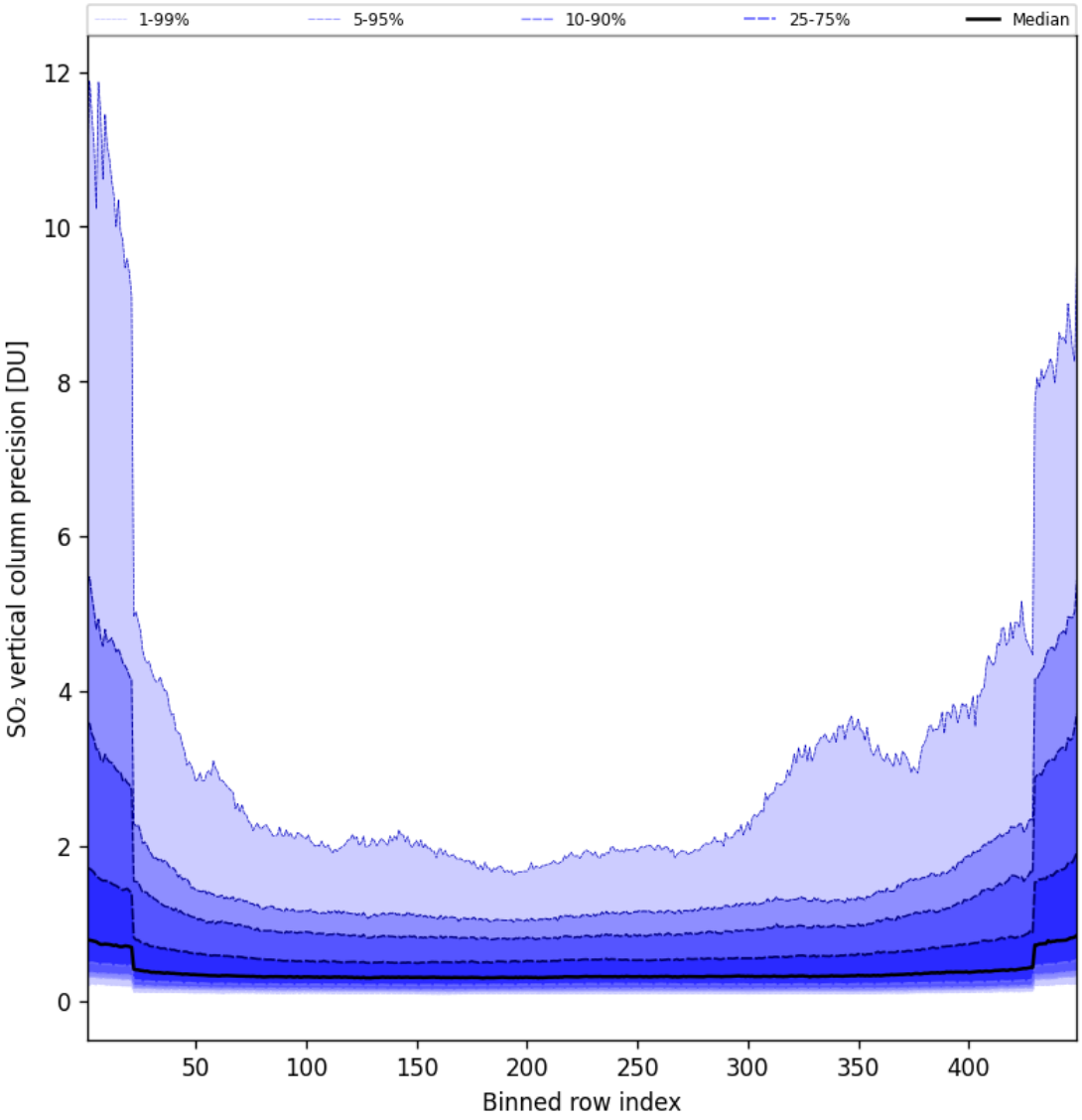

Figure 86: Along track statistics of "SO_2 vertical column precision" for 2025-03-20 to 2025-03-21

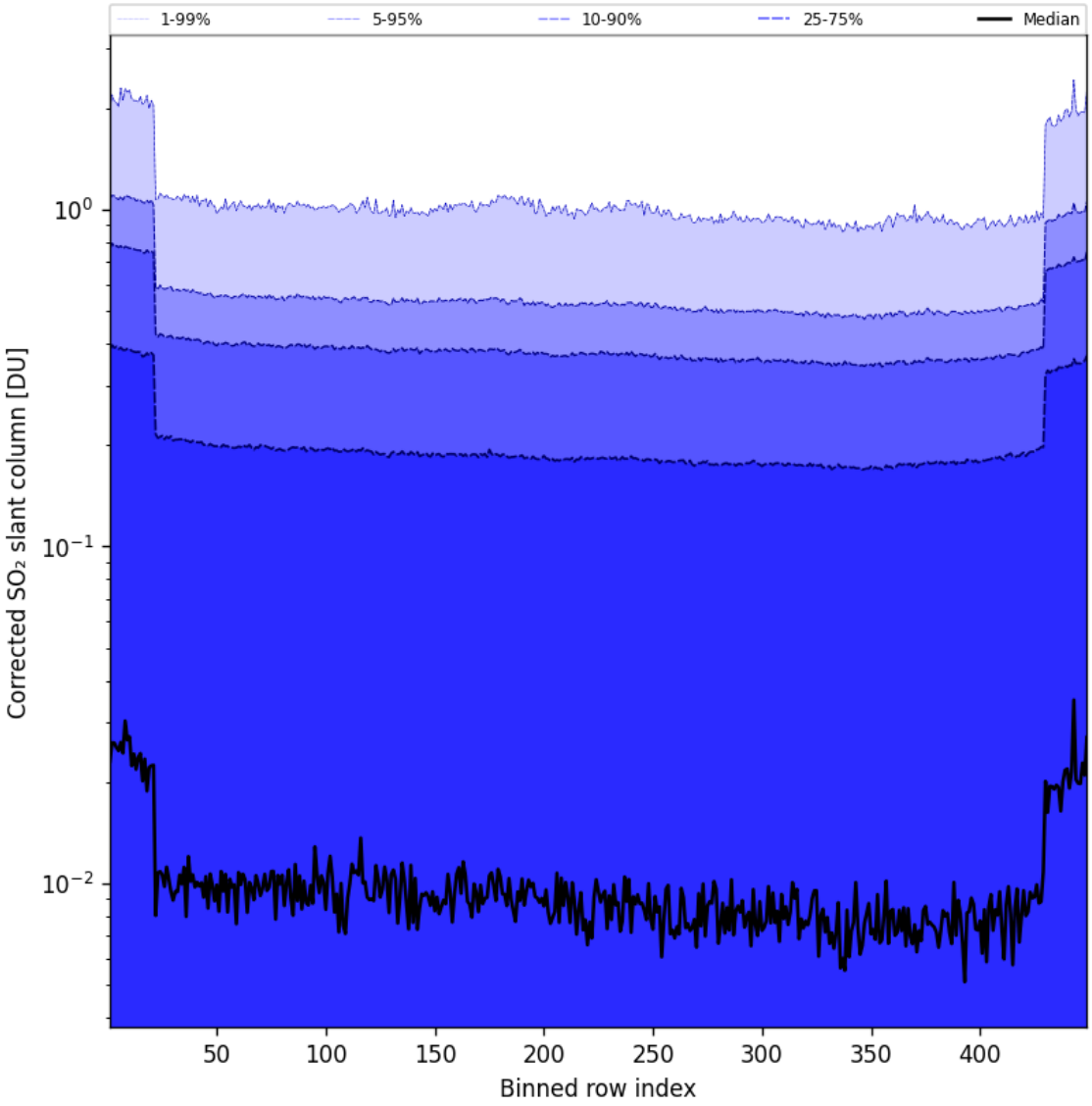

Figure 87: Along track statistics of "Corrected SO_2 slant column" for 2025-03-20 to 2025-03-21

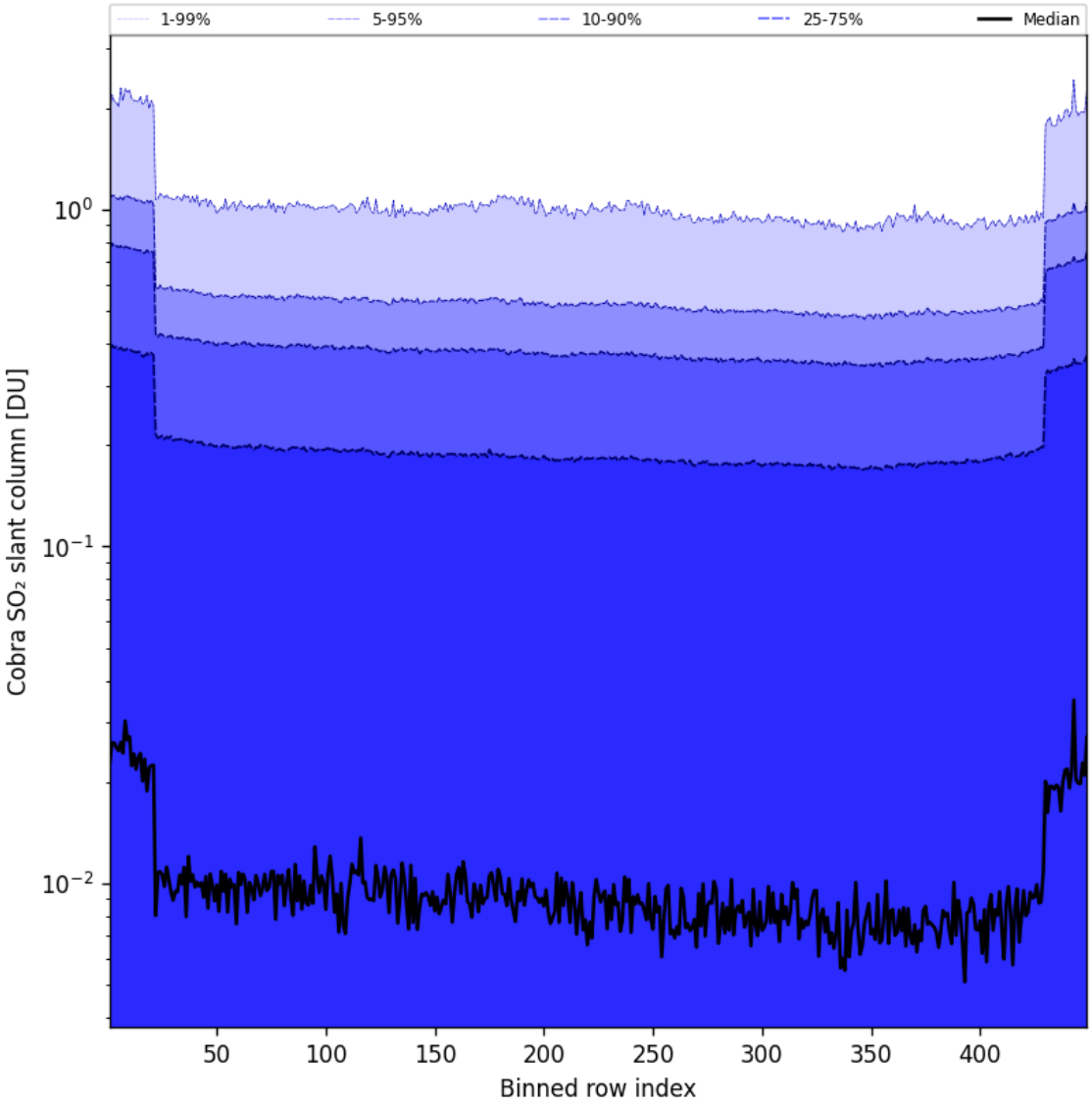

Figure 88: Along track statistics of "Cobra SO_2 slant column" for 2025-03-20 to 2025-03-21

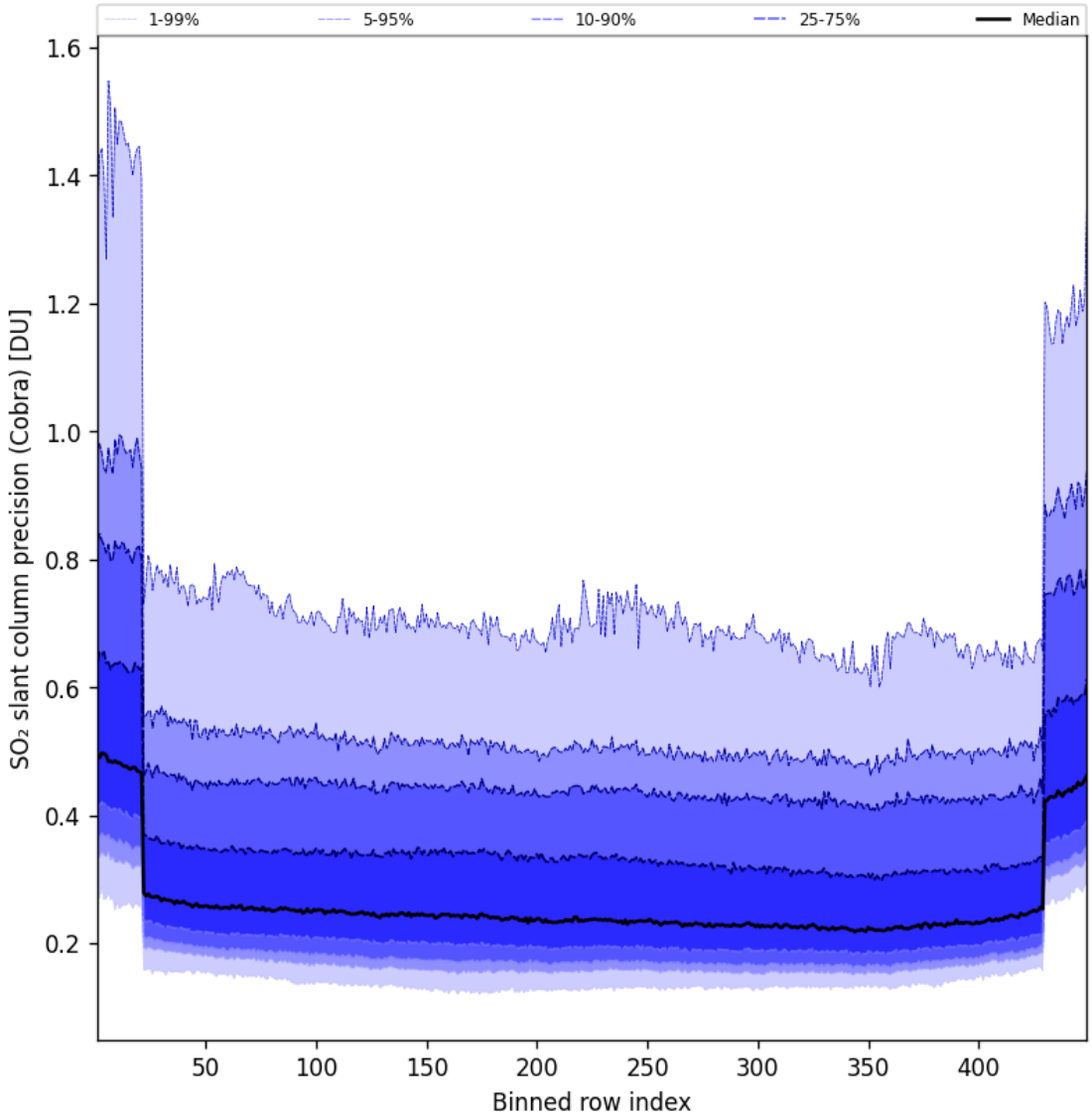

Figure 89: Along track statistics of "SO_2 slant column precision (Cobra)" for 2025-03-20 to 2025-03-21

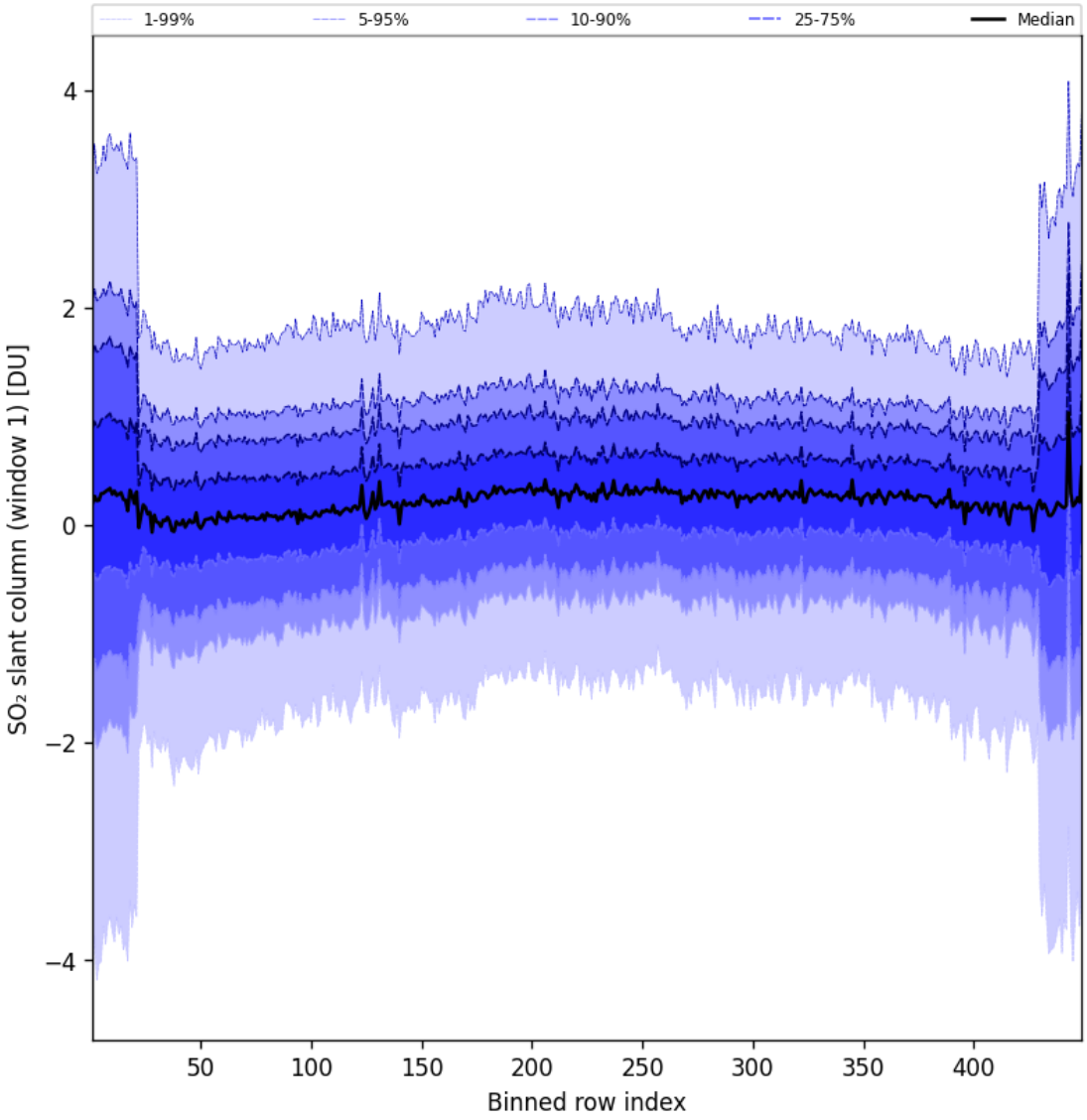

Figure 90: Along track statistics of "SO_2 slant column (window 1)" for 2025-03-20 to 2025-03-21

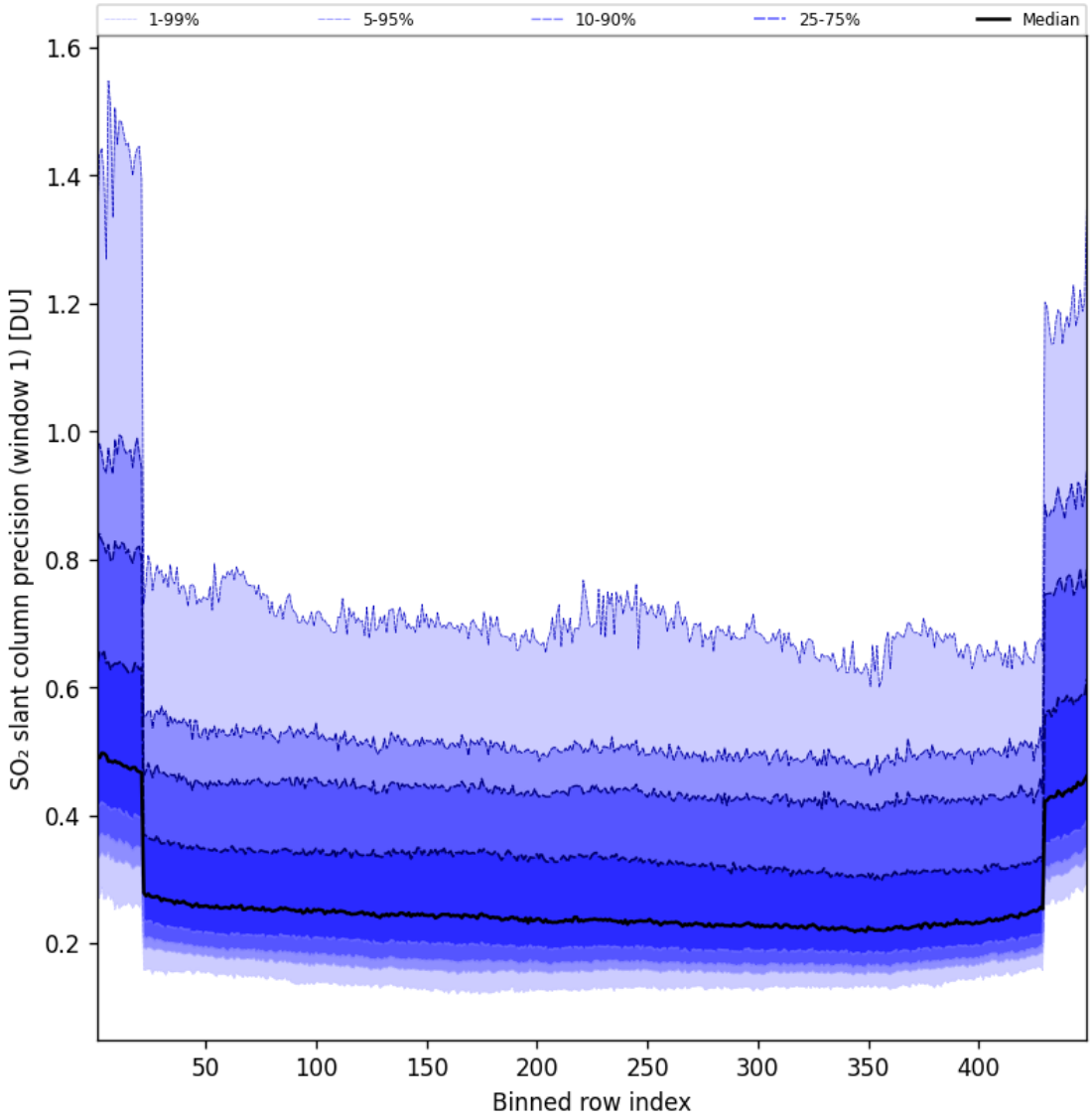

Figure 91: Along track statistics of "SO_2 slant column precision (window 1)" for 2025-03-20 to 2025-03-21

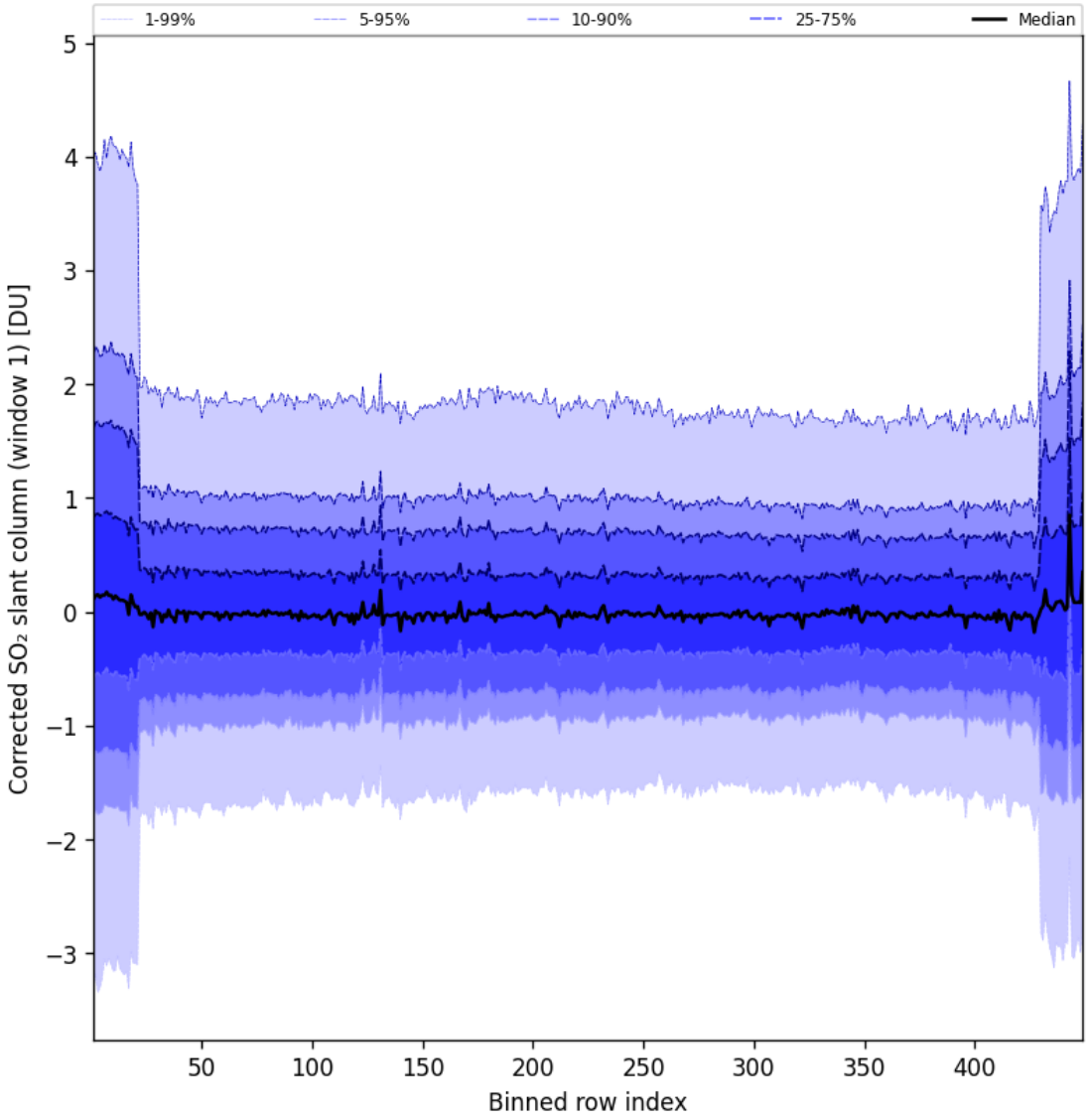

Figure 92: Along track statistics of "Corrected SO_2 slant column (window 1)" for 2025-03-20 to 2025-03-21

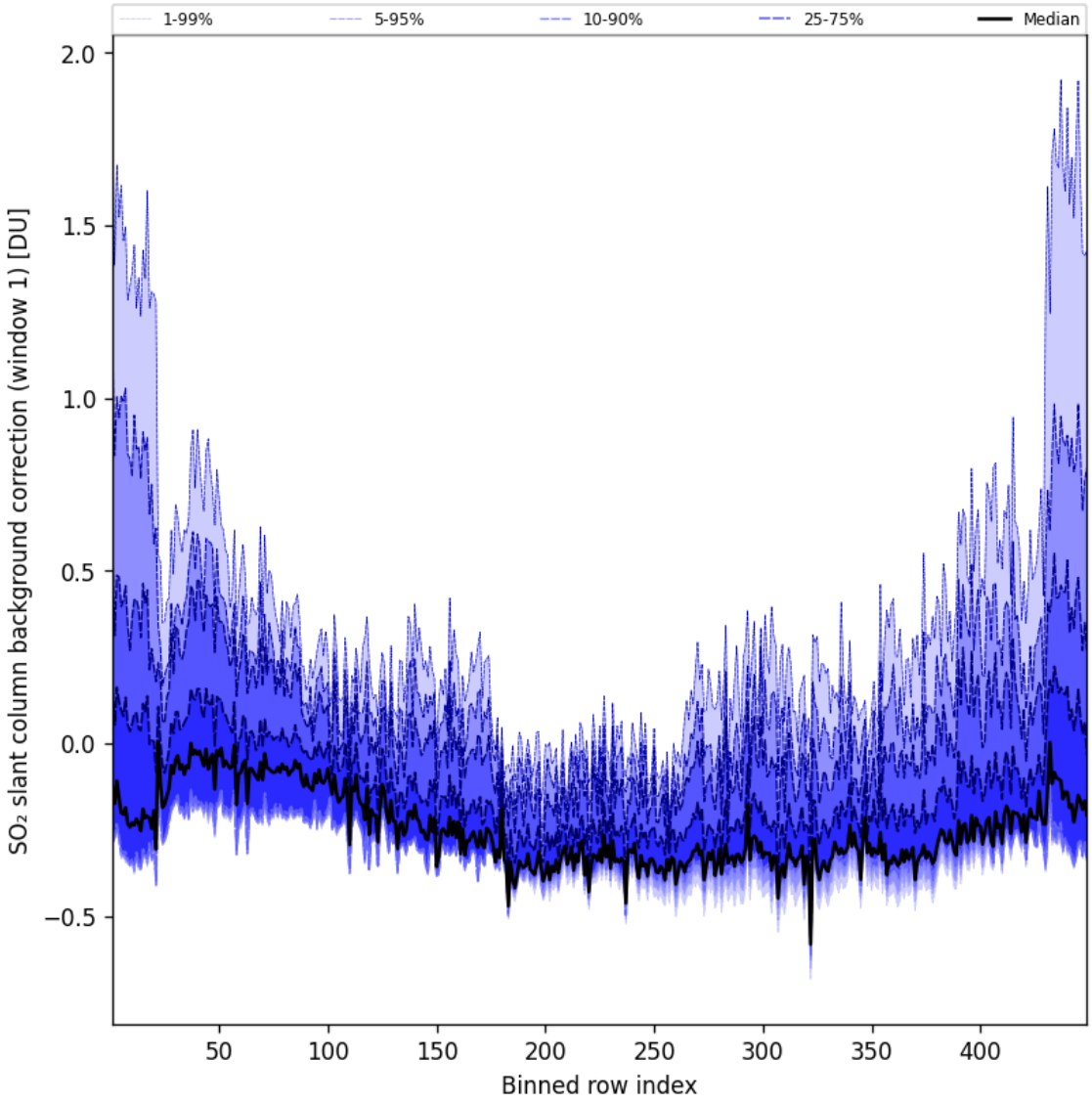

Figure 93: Along track statistics of "SO_2 slant column background correction (window 1)" for 2025-03-20 to 2025-03-21

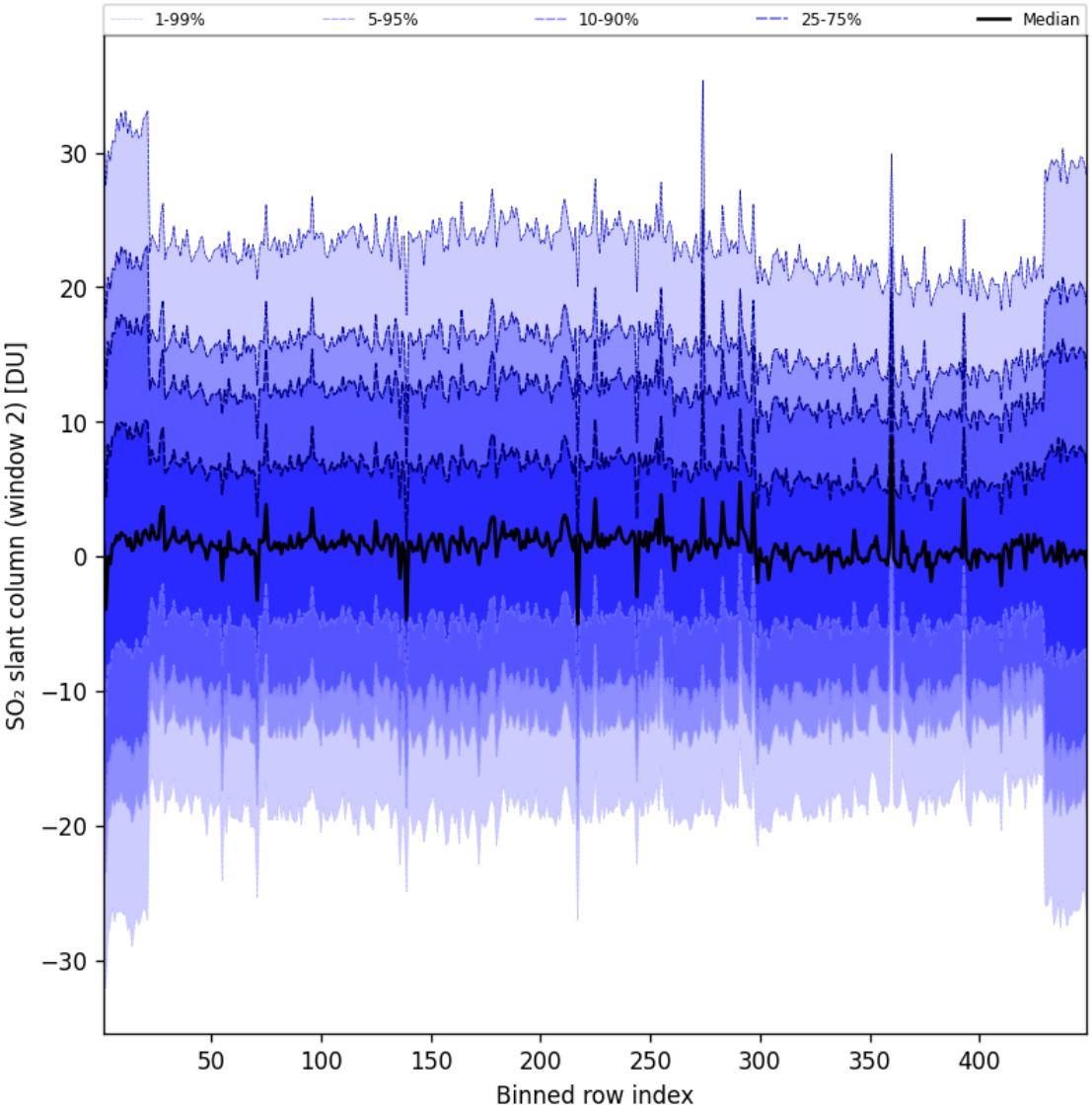

Figure 94: Along track statistics of "SO_2 slant column (window 2)" for 2025-03-20 to 2025-03-21

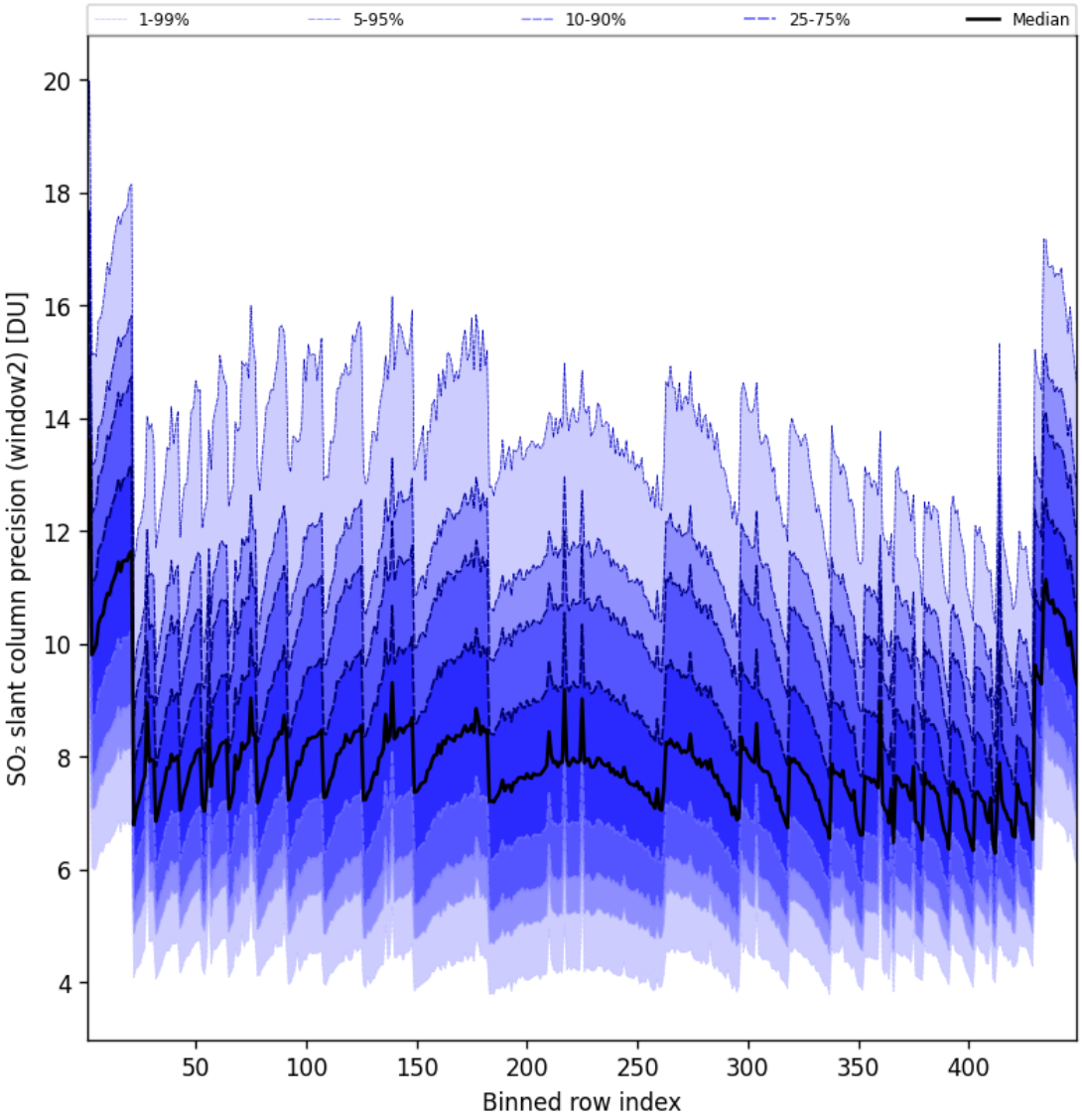

Figure 95: Along track statistics of "SO_2 slant column precision (window2)" for 2025-03-20 to 2025-03-21

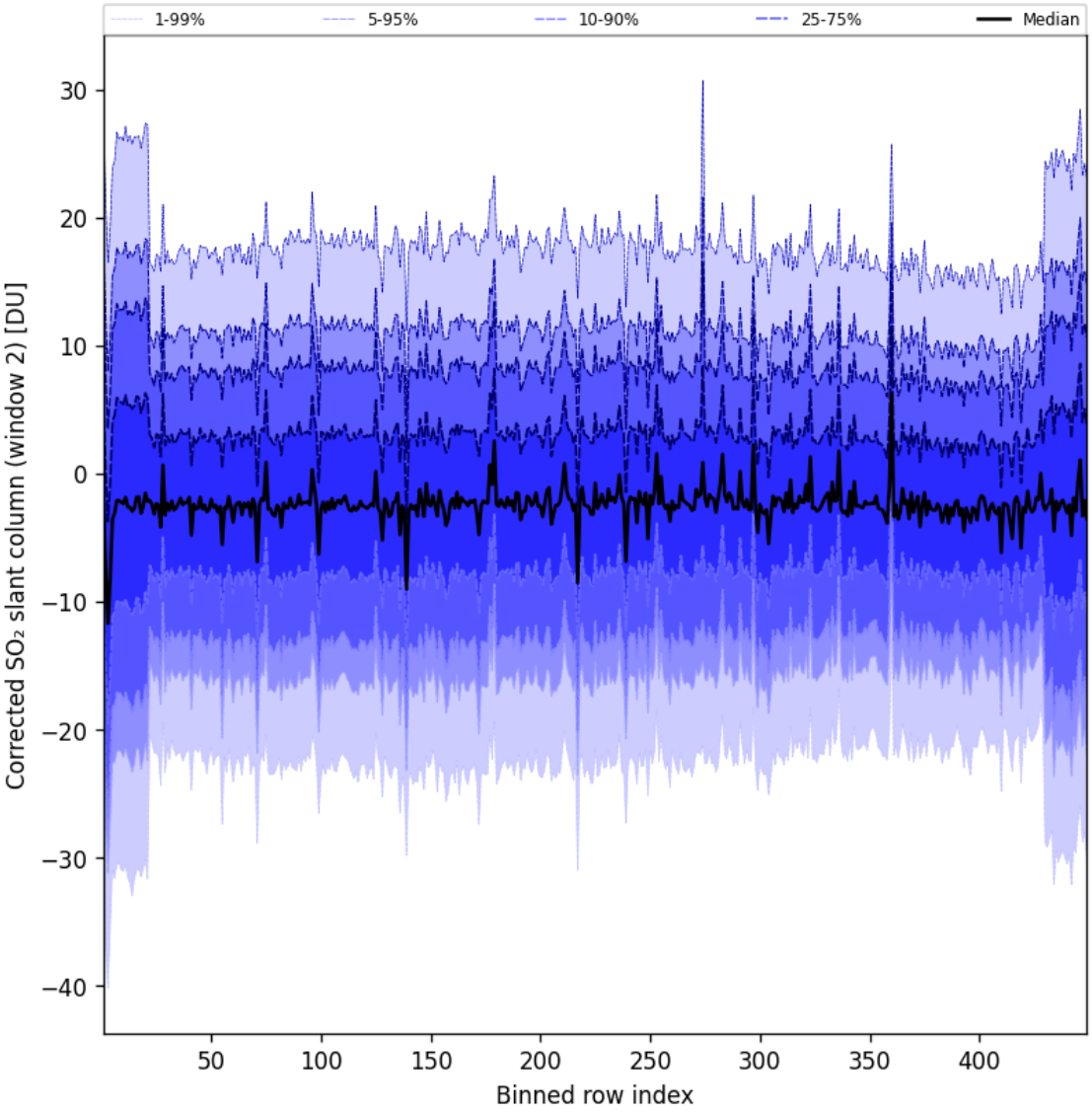

Figure 96: Along track statistics of "Corrected SO_2 slant column (window 2)" for 2025-03-20 to 2025-03-21

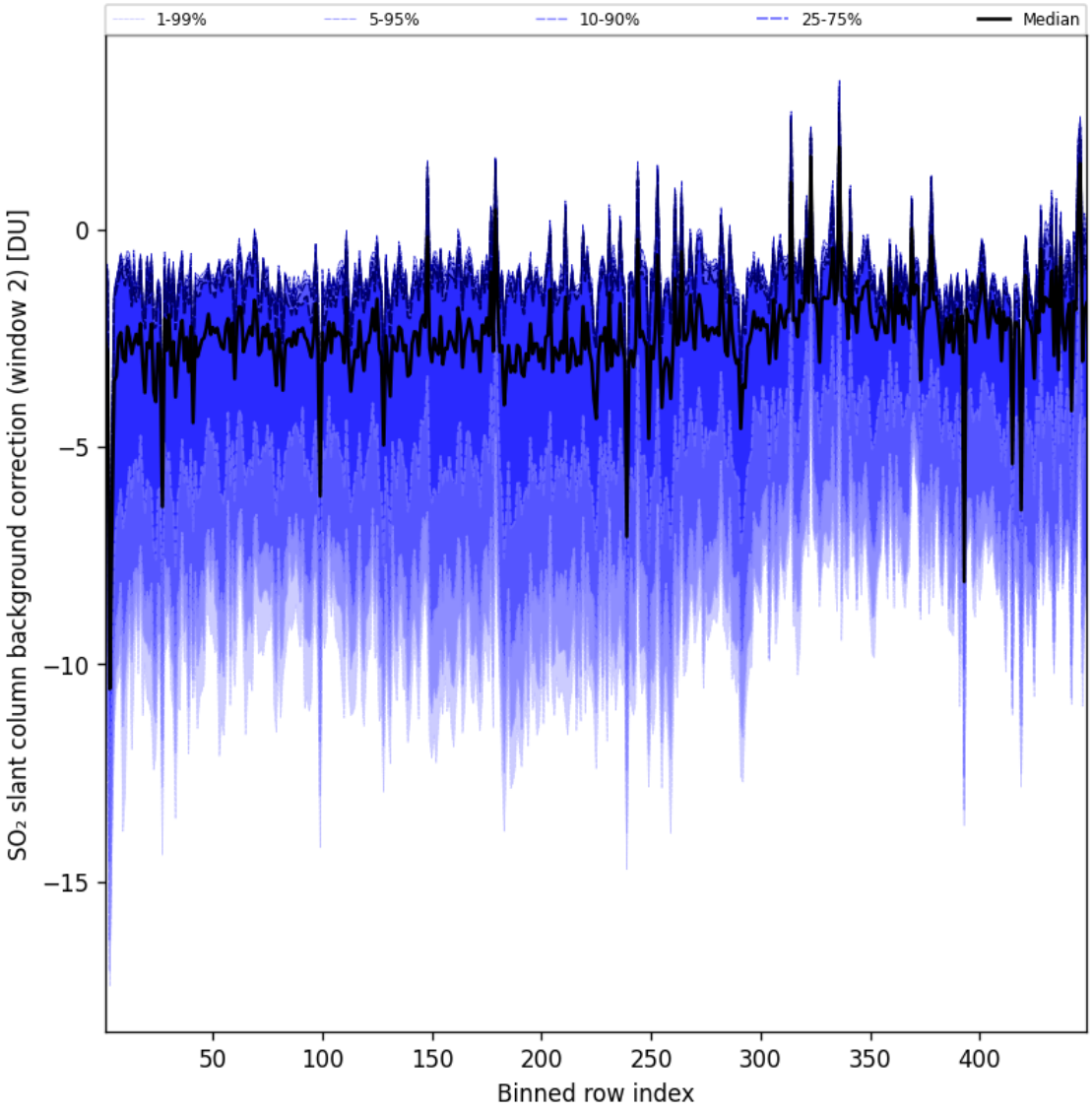

Figure 97: Along track statistics of "SO_2 slant column background correction (window 2)" for 2025-03-20 to 2025-03-21

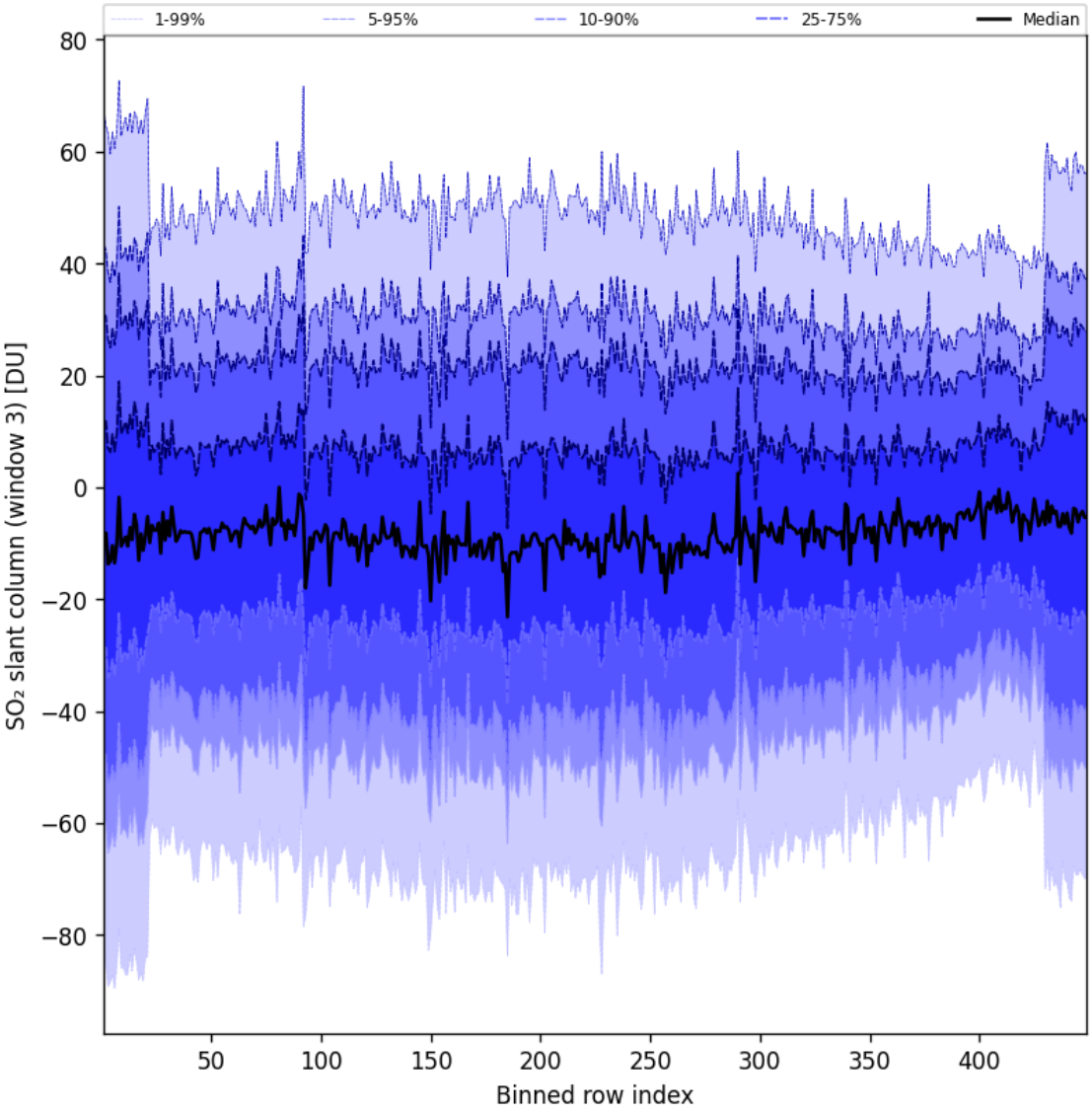

Figure 98: Along track statistics of "SO_2 slant column (window 3)" for 2025-03-20 to 2025-03-21

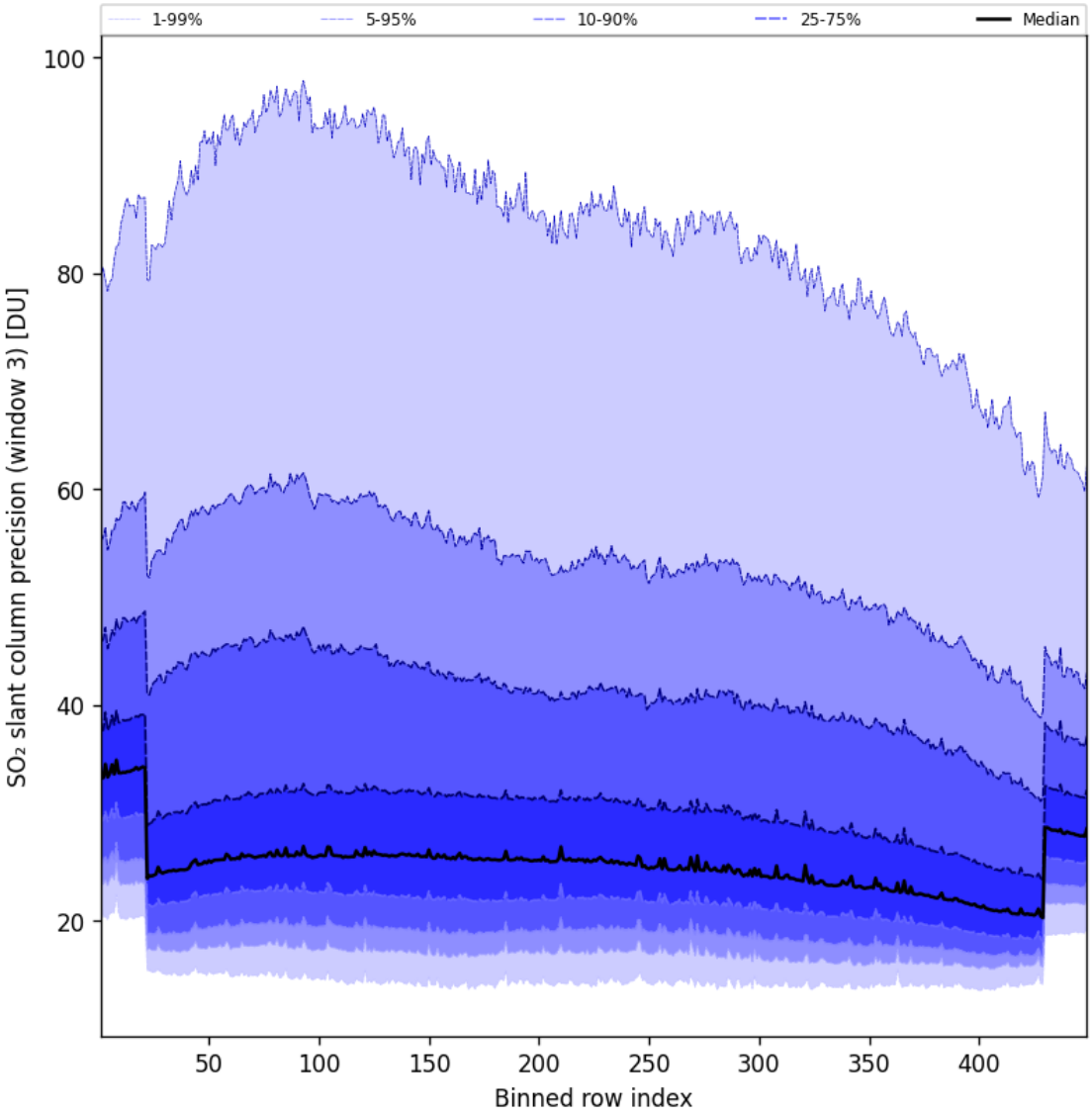

Figure 99: Along track statistics of "SO_2 slant column precision (window 3)" for 2025-03-20 to 2025-03-21

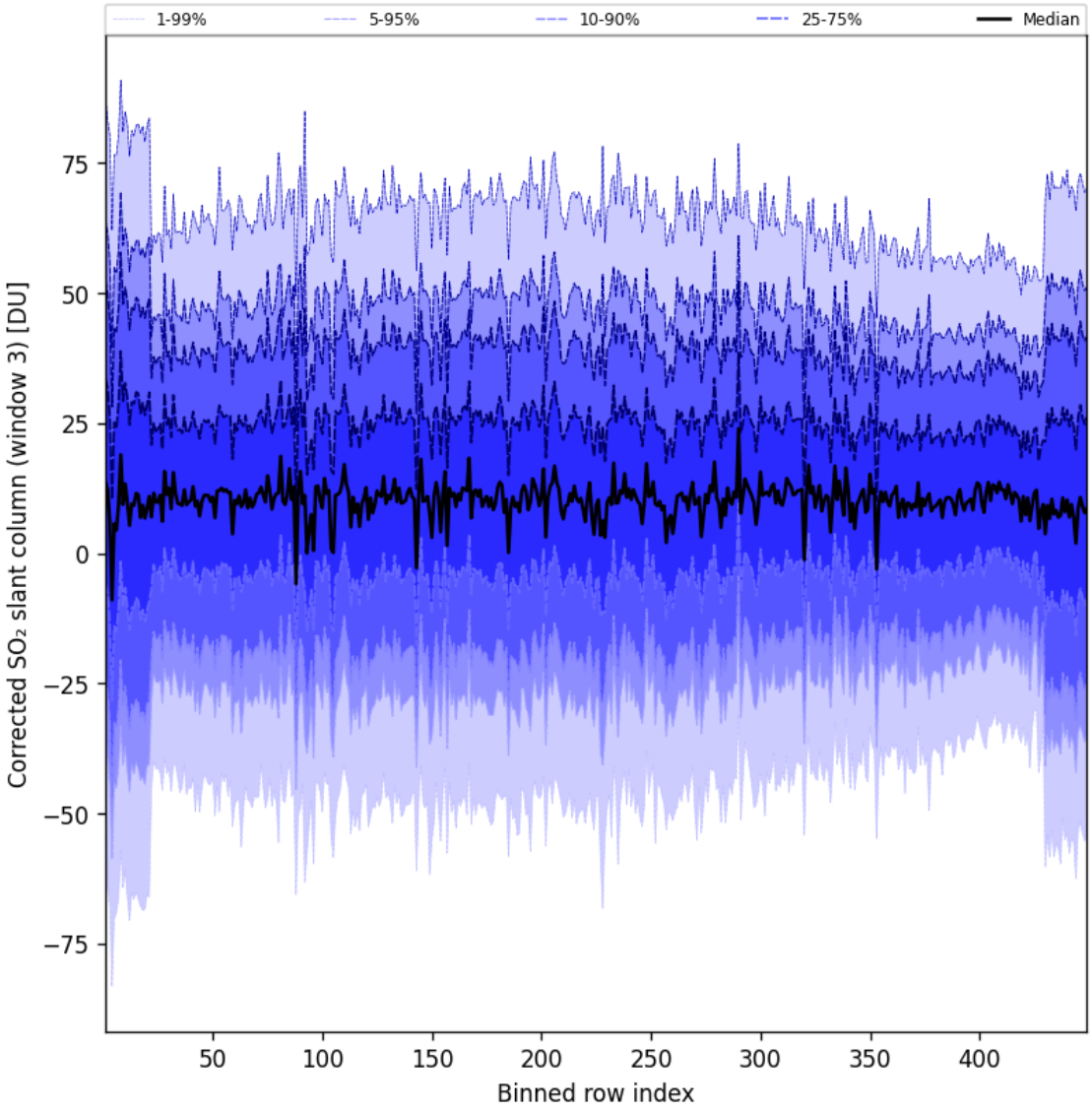

Figure 100: Along track statistics of “Corrected SO_2 slant column (window 3)” for 2025-03-20 to 2025-03-21

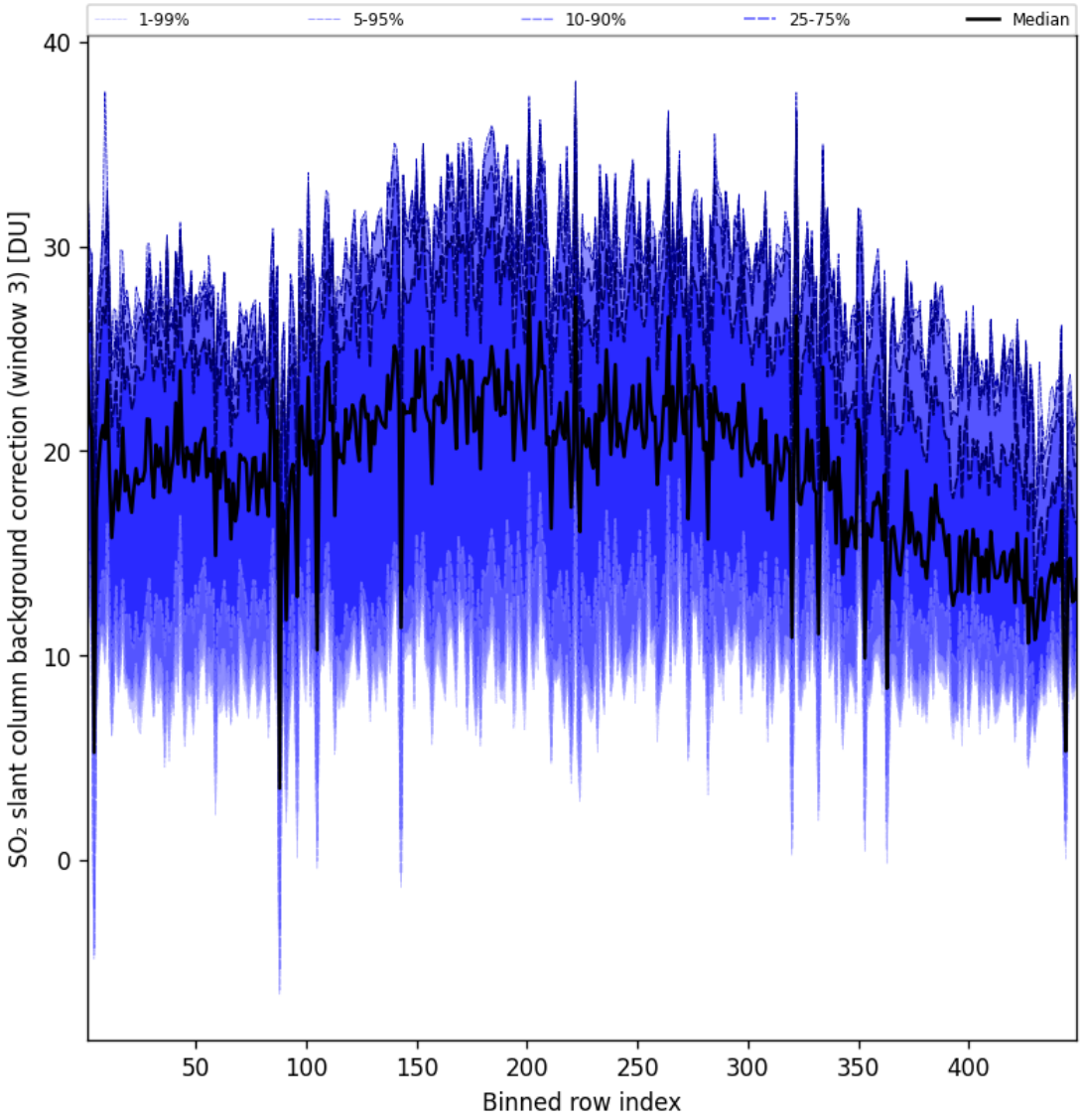

Figure 101: Along track statistics of "SO_2 slant column background correction (window 3)" for 2025-03-20 to 2025-03-21

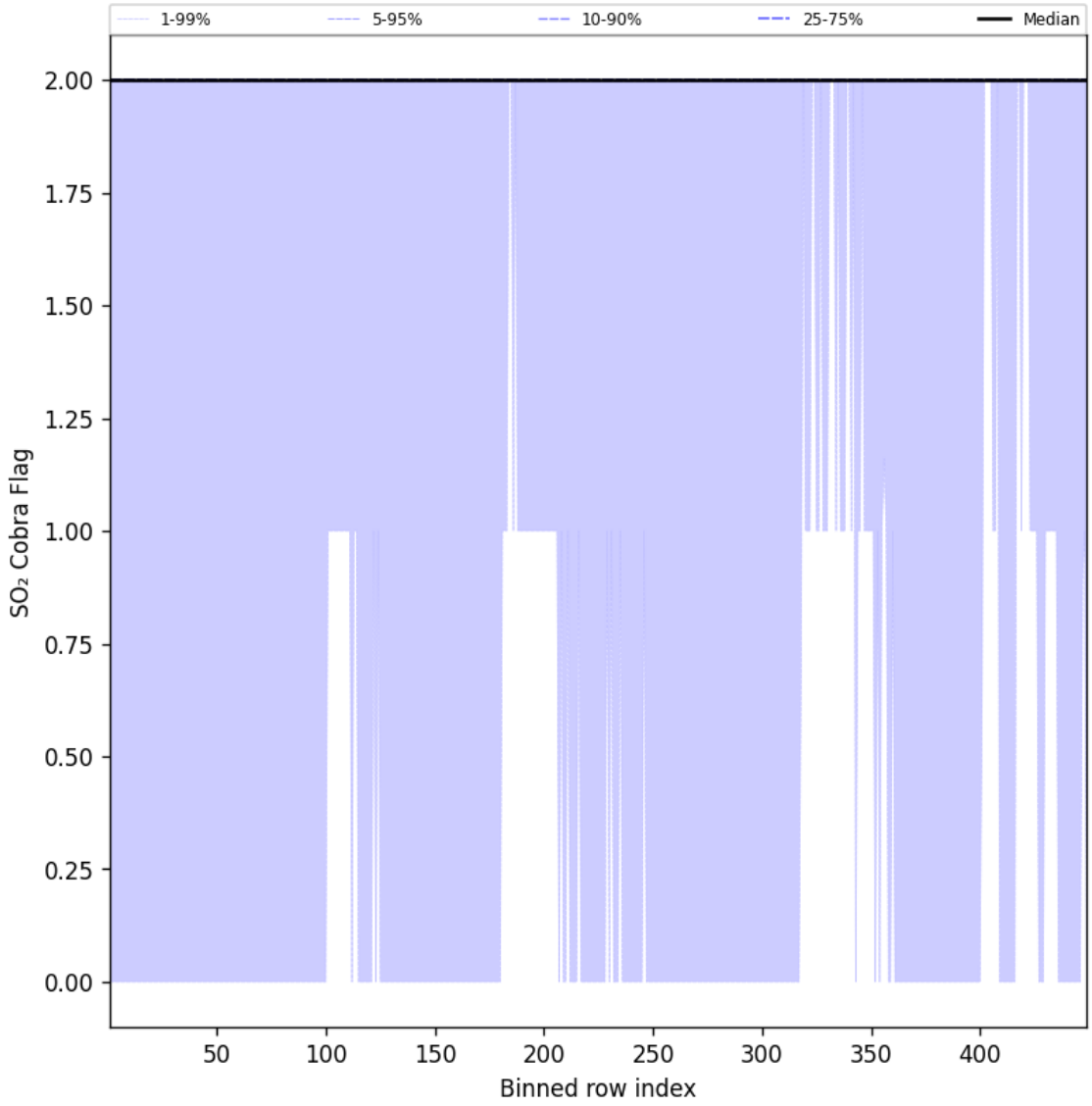

Figure 102: Along track statistics of "SO_2 Cobra Flag" for 2025-03-20 to 2025-03-21

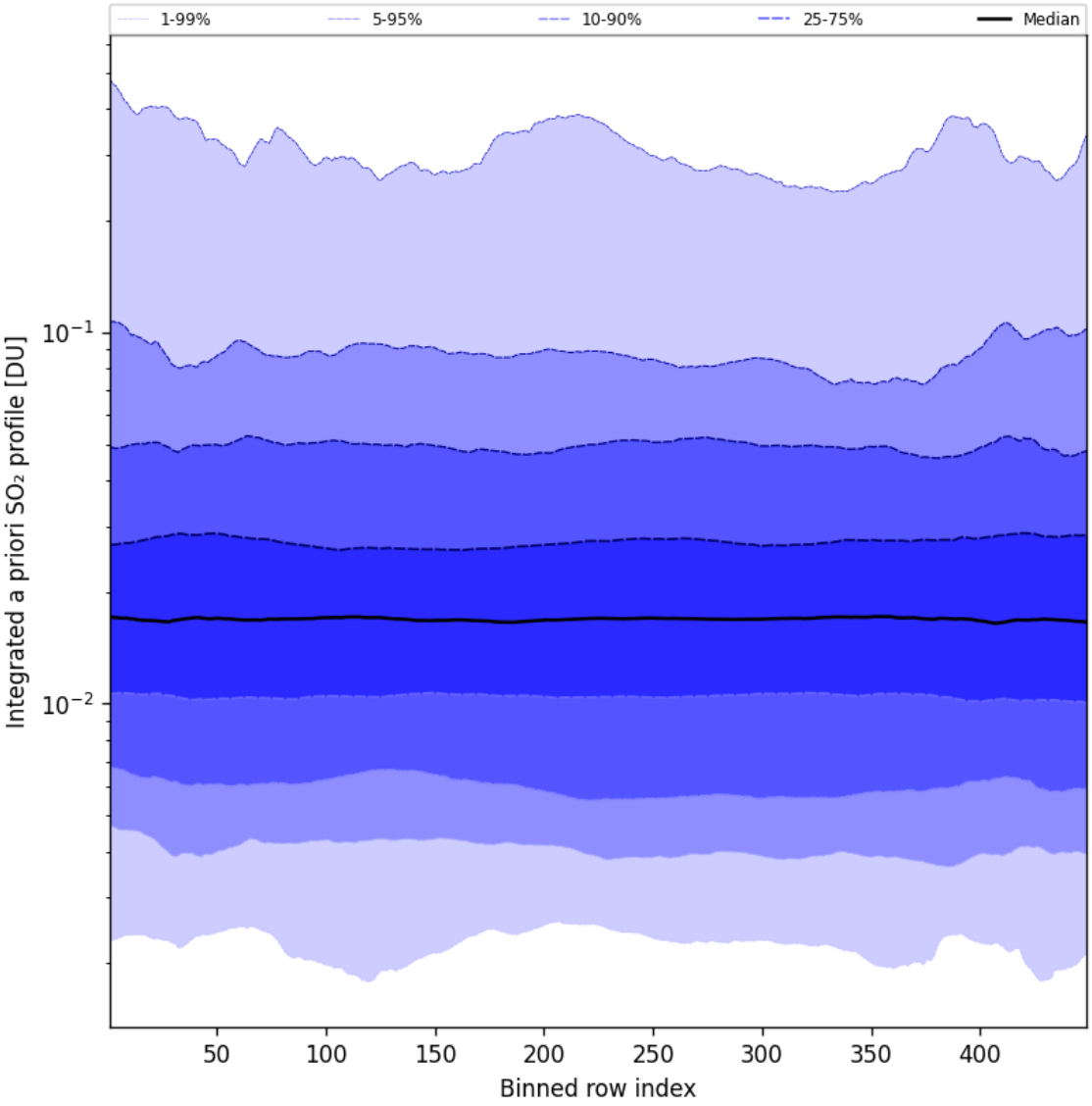

Figure 103: Along track statistics of “Integrated a priori SO_2 profile” for 2025-03-20 to 2025-03-21

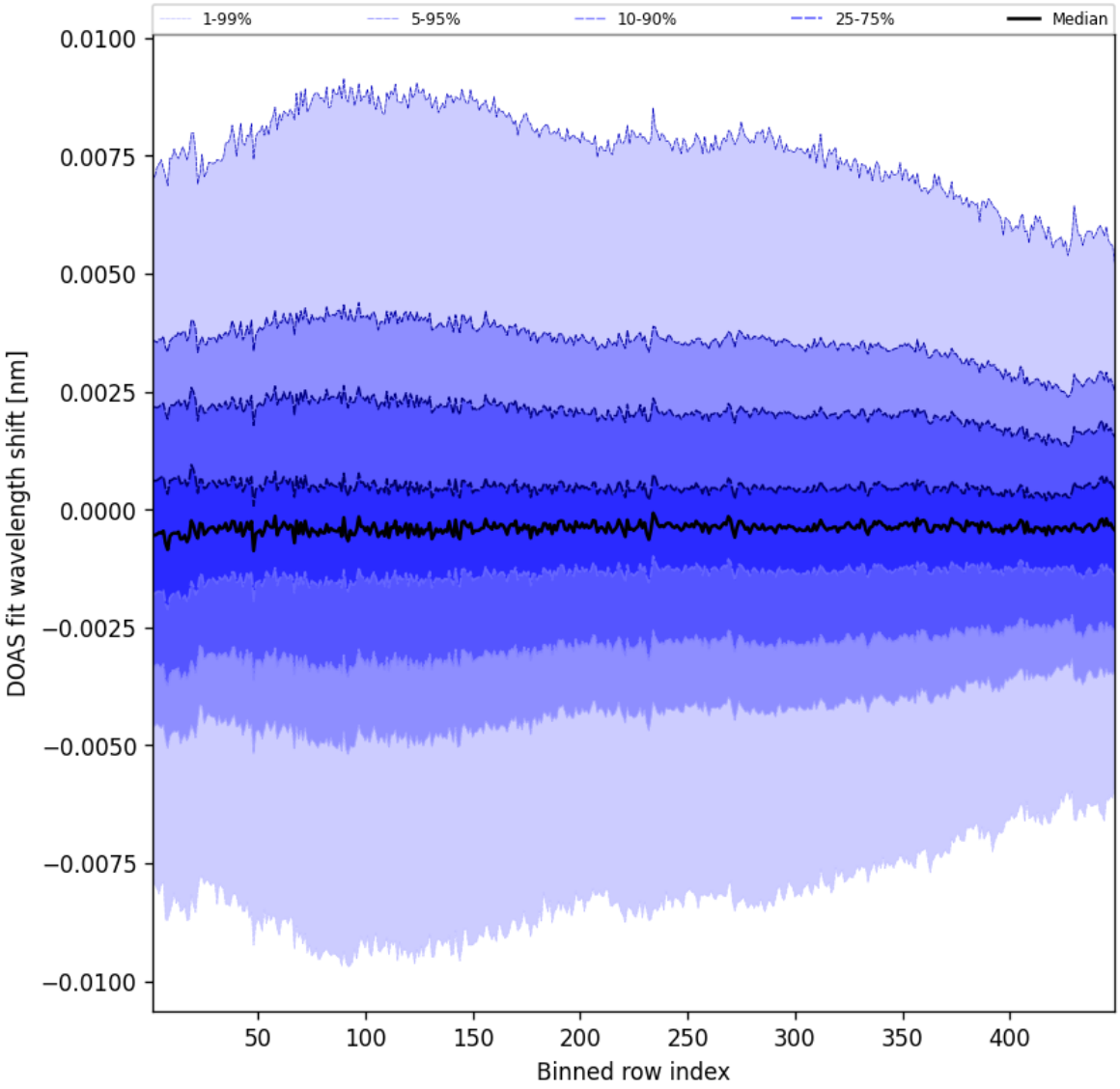

Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2025-03-20 to 2025-03-21

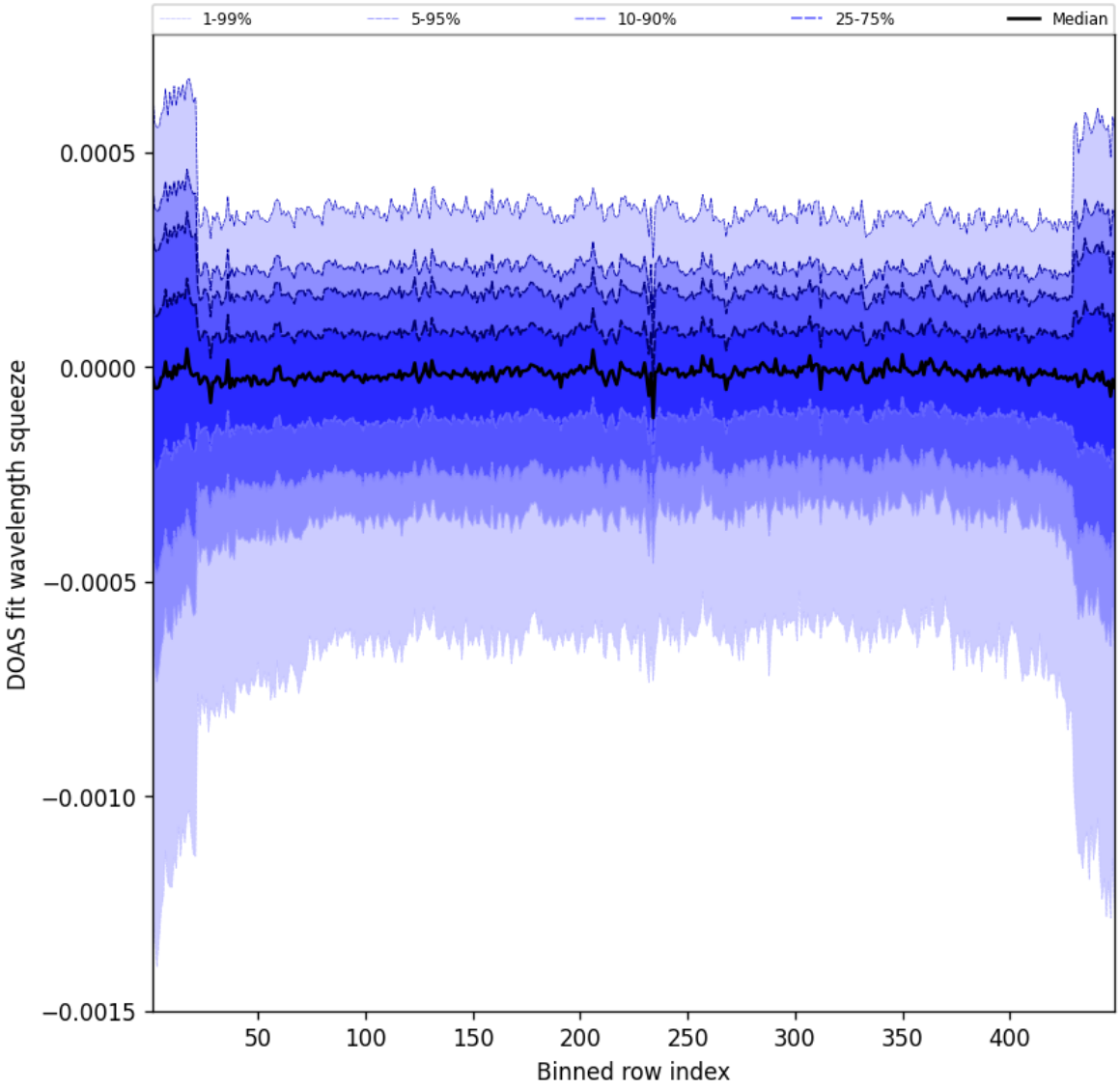

Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2025-03-20 to 2025-03-21

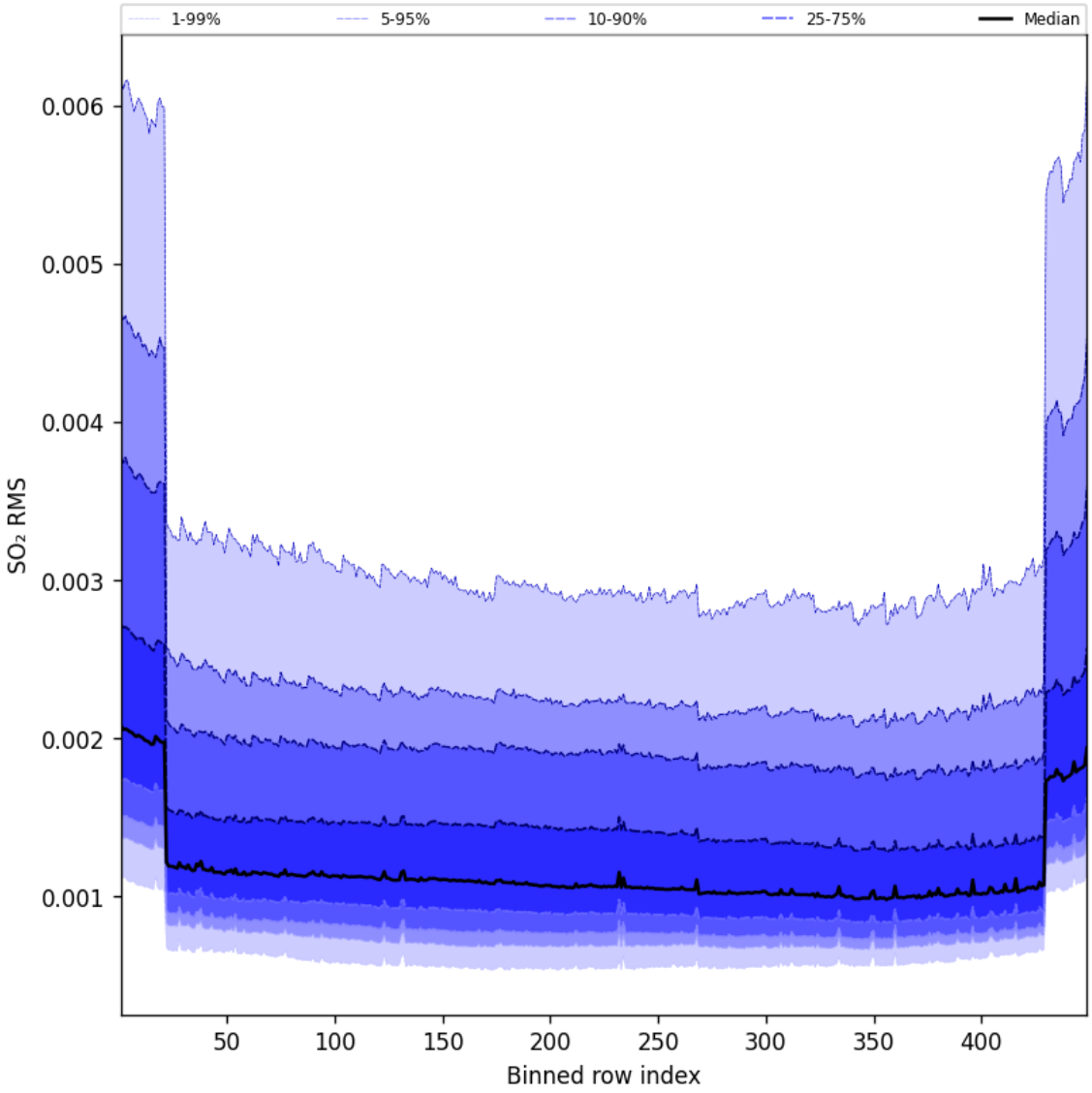

Figure 106: Along track statistics of "SO_2 RMS" for 2025-03-20 to 2025-03-21

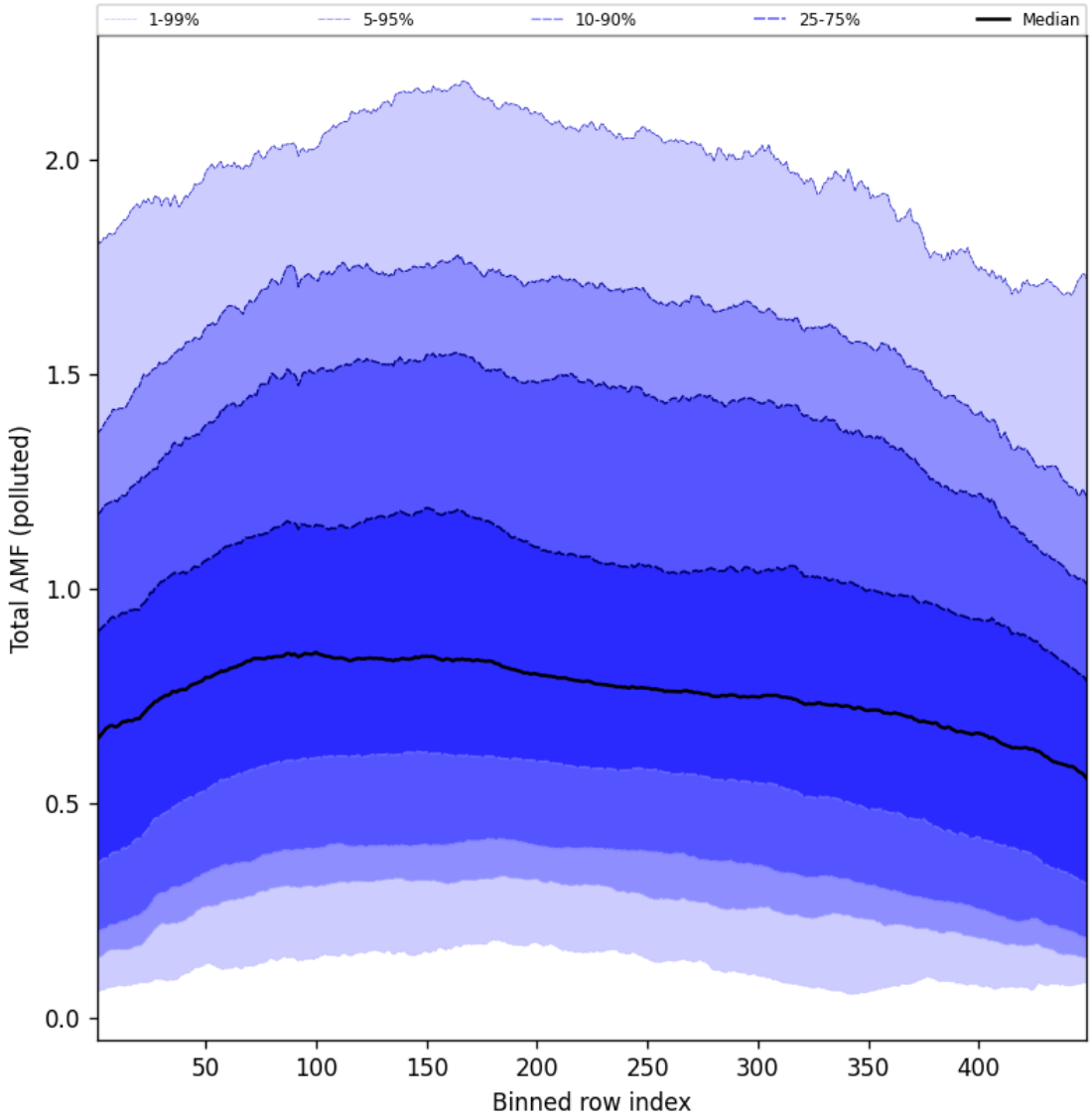

Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-03-20 to 2025-03-21

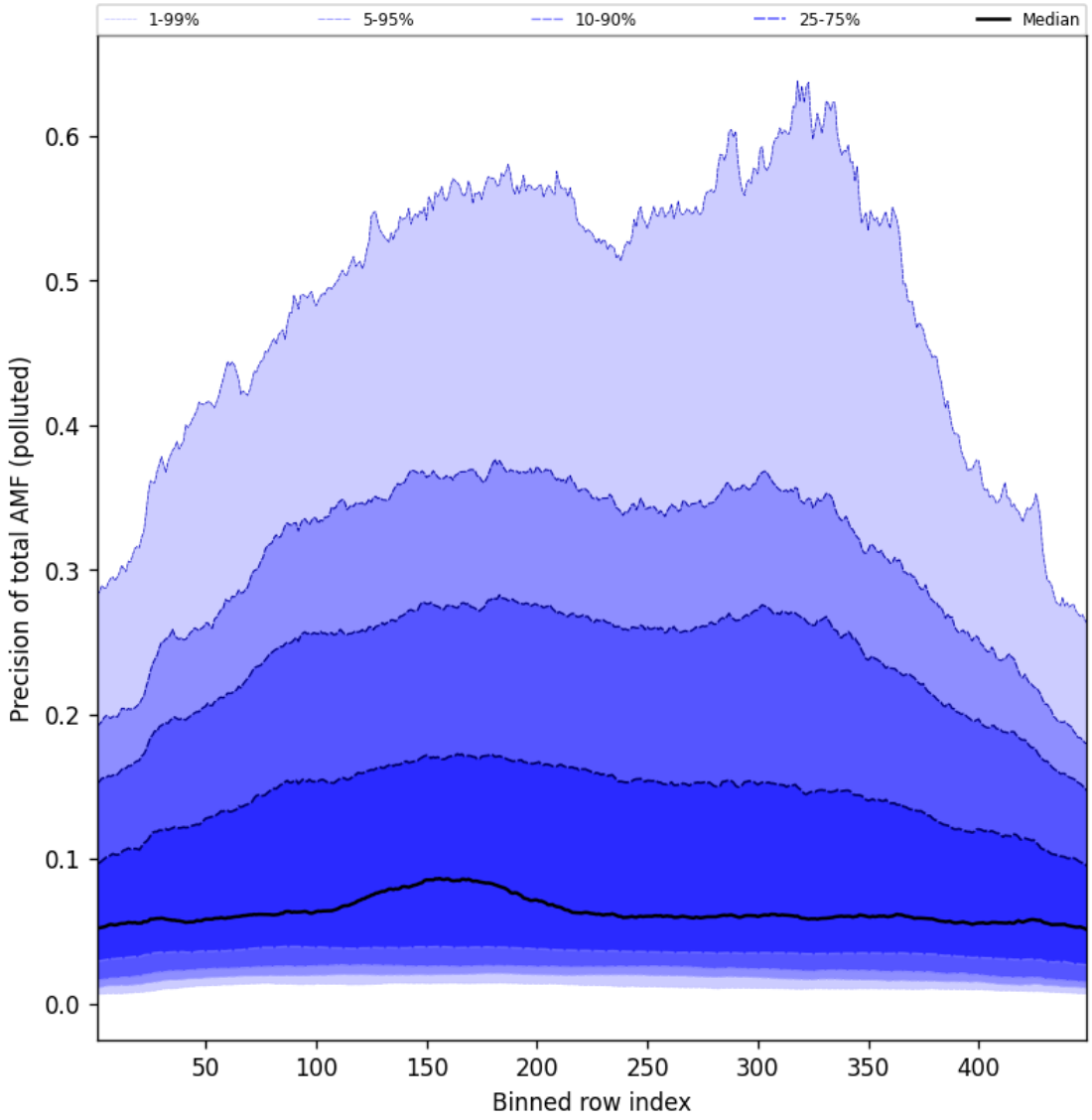

Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-03-20 to 2025-03-21

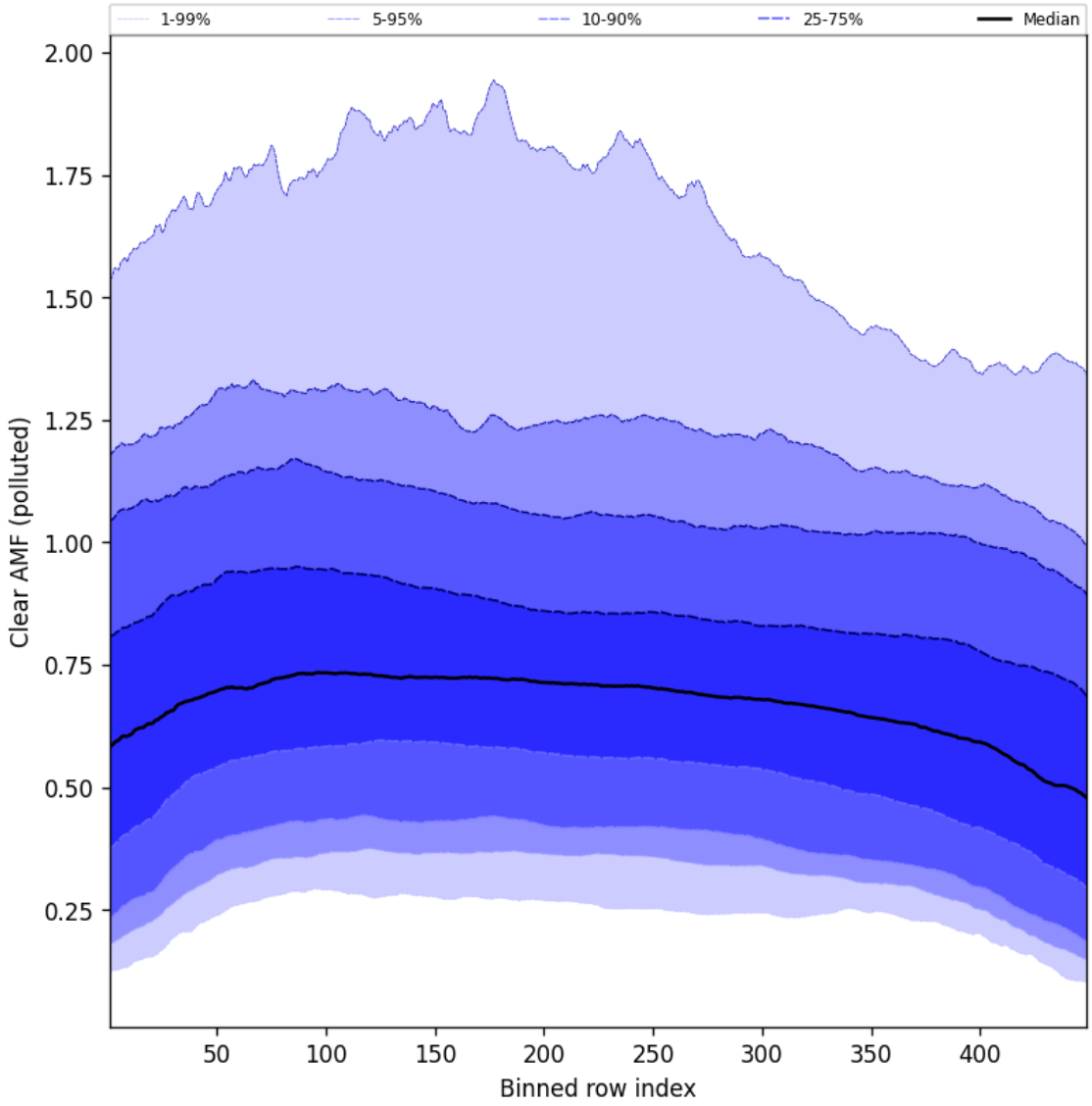

Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-03-20 to 2025-03-21

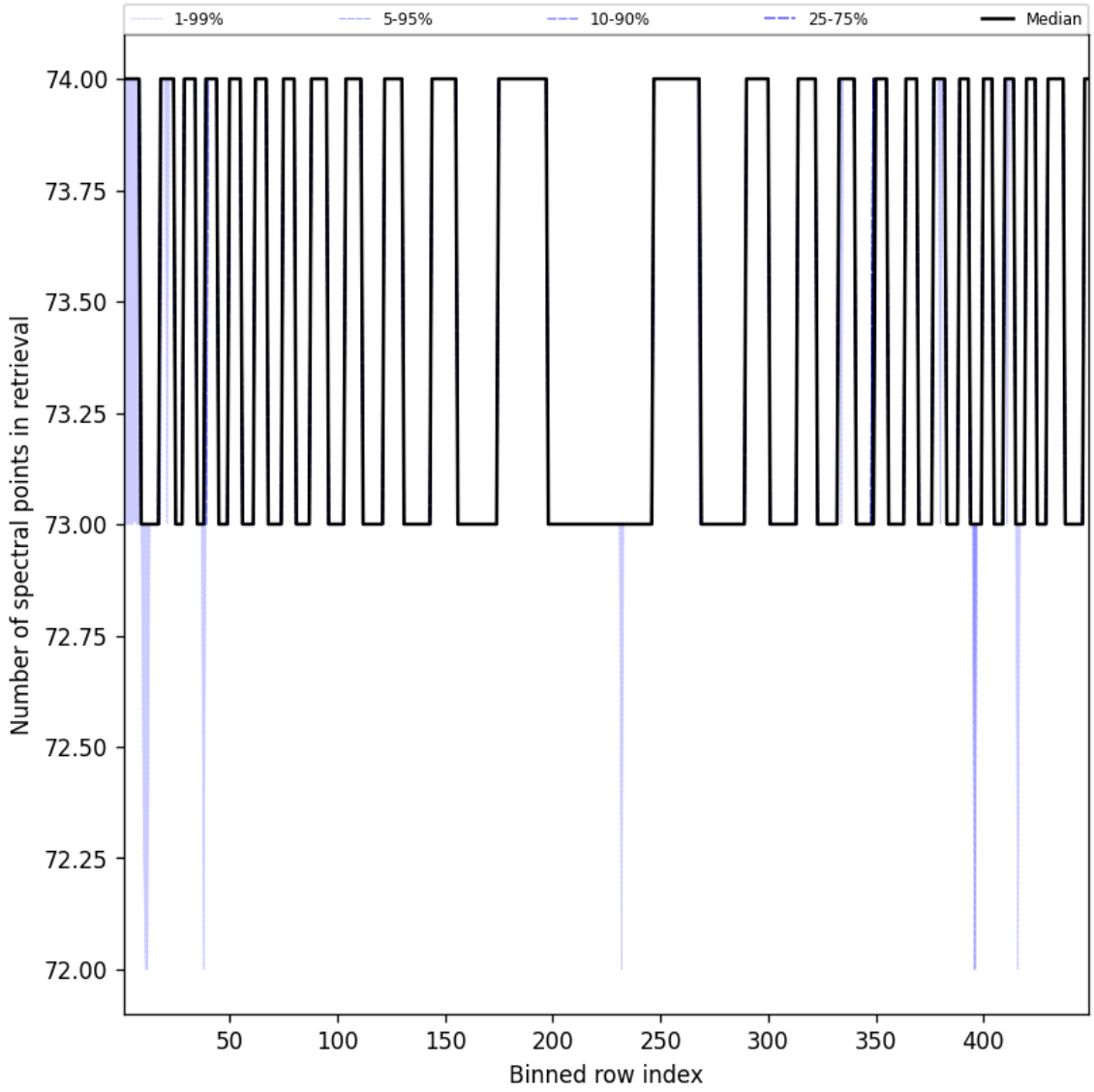

Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-03-20 to 2025-03-21

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.

Contents

List of Figures

List of Tables

11 Copyright information of 'PyCAMA'

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