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]	0.654 ± 0.404	17138296	0.995	0.780	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(4.348 \pm 124.524) \times 10^{-2}$	17138296	0.263	0.456	1.119×10^{-2}	-385	320
sulfurdioxide total vertical column precision [DU]	0.579 ± 0.897	17138296	0.197	0.379	0.329	4.772×10^{-2}	180
sulfurdioxide slant column density corrected [DU]	$(2.159 \pm 39.704) \times 10^{-2}$	17138296	0.235	0.359	9.637×10^{-3}	-142	319
sulfurdioxide slant column density cobra [DU]	$(2.135 \pm 37.624) \times 10^{-2}$	17138296	0.235	0.359	9.637×10^{-3}	-142	30.5
sulfurdioxide slant column density cobra precision [DU]	0.294 ± 0.147	17138296	0.188	0.146	0.245	8.145×10^{-2}	34.6
sulfurdioxide slant column density window1 [DU]	0.197 ± 0.705	17138296	0.225	0.733	0.216	-145	41.0
sulfurdioxide slant column density window1 precision [DU]	0.294 ± 0.147	17138296	0.188	0.146	0.245	8.145×10^{-2}	34.6
sulfurdioxide slant column density corrected win1 [DU]	$(6.226 \pm 69.270) \times 10^{-2}$	17138296	2.500×10^{-2}	0.714	4.199×10^{-2}	-145	40.8
background so2 slant column offset window1 [DU]	-0.135 ± 0.203	17138296	-0.260	0.210	-0.186	-0.961	4.02
sulfurdioxide slant column density window2 [DU]	2.89 ± 9.15	17138296	1.75	11.6	2.61	-862	758
sulfurdioxide slant column density window2 precision [DU]	8.14 ± 2.21	17138296	7.43	2.54	7.79	2.28	553
sulfurdioxide slant column density corrected win2 [DU]	2.09 ± 8.83	17138296	2.25	11.2	2.04	-861	758
background so2 slant column offset window2 [DU]	-0.796 ± 2.629	17138296	1.25	3.52	4.876×10^{-2}	-16.7	13.9
sulfurdioxide slant column density window3 [DU]	-14.4 ± 24.2	17138296	-14.0	30.8	-14.6	-960	1.926×10^{3}
sulfurdioxide slant column density window3 precision [DU]	28.3 ± 13.4	17138296	22.5	9.50	24.6	9.40	1.856×10^{3}
sulfurdioxide slant column density corrected win3 [DU]	-8.93 ± 23.21	17138296	-8.40	29.5	-8.96	-960	1.927×10^{3}
background so2 slant column offset window3 [DU]	5.49 ± 7.62	17138296	-0.560	12.5	4.86	-21.4	32.7
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.21	17138296	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(3.271 \pm 7.918) \times 10^{-2}$	17138296	1.664×10^{-2}	1.566×10^{-2}	1.484×10^{-2}	1.329×10^{-4}	1.89
fitted radiance shift [nm]	$(-3.990 \pm 26.604) \times 10^{-4}$	17138296	-5.000×10^{-4}	1.874×10^{-3}	-3.793×10^{-4}	-4.455×10^{-2}	4.496×10^{-2}
fitted radiance squeeze [1]	$(-3.558 \pm 20.551) \times 10^{-5}$	17138296	-1.000×10^{-5}	2.101×10^{-4}	-1.858×10^{-5}	-2.338×10^{-2}	1.548×10^{-2}
fitted root mean square [1]	$(1.294 \pm 0.607) \times 10^{-3}$	17138296	9.250×10^{-4}	5.753×10^{-4}	1.102×10^{-3}	3.351×10^{-4}	8.921×10^{-2}
sulfurdioxide total air mass factor polluted [1]	0.838 ± 0.431	17138296	0.580	0.569	0.783	5.000×10^{-2}	2.82
sulfurdioxide total air mass factor polluted precision [1]	0.117 ± 0.126	17138296	3.500×10^{-2}	0.121	6.892×10^{-2}	2.500×10^{-3}	1.76
sulfurdioxide clear air mass factor polluted [1]	0.706 ± 0.315	17138296	0.580	0.394	0.659	4.922×10^{-2}	2.72
number of spectral points in retrieval [1]	73.4 ± 0.5	17138296	73.0	1.000	73.0	52.0	74.0

Table 2: Percentile ranges

Variable	1 %	5 %	10 %	15.9 %	25 %	75 %	84.1 %	90 %	95 %	99 %
qa value [1]	0.0	0.0	6.000×10^{-2}	0.120	0.220	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	−2.77	−0.948	−0.558	−0.367	−0.212	0.244	0.414	0.633	1.10	3.40
sulfurdioxide total vertical column precision [DU]	9.782×10^{-2}	0.130	0.155	0.178	0.210	0.589	0.804	1.10	1.77	4.59
sulfurdioxide slant column density corrected [DU]	−0.878	−0.492	−0.352	−0.261	−0.168	0.191	0.291	0.392	0.557	1.11
sulfurdioxide slant column density cobra [DU]	−0.878	−0.492	−0.352	−0.261	−0.168	0.191	0.291	0.392	0.557	1.11
sulfurdioxide slant column density cobra precision [DU]	0.142	0.164	0.176	0.186	0.200	0.346	0.405	0.467	0.569	0.824
sulfurdioxide slant column density window1 [DU]	−1.82	−0.890	−0.565	−0.362	−0.157	0.576	0.763	0.942	1.22	2.01
sulfurdioxide slant column density window1 precision [DU]	0.142	0.164	0.176	0.186	0.200	0.346	0.405	0.467	0.569	0.824
sulfurdioxide slant column density corrected win1 [DU]	−1.68	−0.934	−0.668	−0.494	−0.310	0.404	0.603	0.802	1.12	2.10
background so2 slant column offset window1 [DU]	−0.404	−0.336	−0.307	−0.287	−0.266	-5.545×10^{-2}	2.362×10^{-2}	0.108	0.233	0.545
sulfurdioxide slant column density window2 [DU]	−18.0	−11.5	−8.24	−5.82	−3.07	8.51	11.6	14.3	18.2	26.5
sulfurdioxide slant column density window2 precision [DU]	4.41	5.30	5.80	6.20	6.68	9.22	10.1	10.9	12.1	14.9
sulfurdioxide slant column density corrected win2 [DU]	−19.0	−12.1	−8.78	−6.31	−3.54	7.64	10.4	13.0	16.4	23.9
background so2 slant column offset window2 [DU]	−7.78	−5.89	−4.73	−3.75	−2.44	1.07	1.37	1.63	2.11	3.82
sulfurdioxide slant column density window3 [DU]	−73.5	−53.8	−44.4	−37.5	−29.9	0.973	8.94	16.1	25.6	44.4
sulfurdioxide slant column density window3 precision [DU]	13.9	16.5	18.1	19.4	21.0	30.5	35.5	41.8	54.1	85.8
sulfurdioxide slant column density corrected win3 [DU]	−66.2	−46.9	−37.7	−31.0	−23.6	5.86	13.3	20.1	29.1	47.1
background so2 slant column offset window3 [DU]	−9.45	−5.18	−3.73	−2.42	−0.769	11.7	14.1	15.9	17.9	21.6
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]	1.537×10^{-3}	3.126×10^{-3}	4.977×10^{-3}	6.636×10^{-3}	8.956×10^{-3}	2.462×10^{-2}	3.338×10^{-2}	5.265×10^{-2}	0.119	0.381
fitted radiance shift [nm]	-8.430×10^{-3}	-4.371×10^{-3}	-2.944×10^{-3}	-2.112×10^{-3}	-1.369×10^{-3}	5.049×10^{-4}	1.217×10^{-3}	2.114×10^{-3}	3.667×10^{-3}	7.918×10^{-3}
fitted radiance squeeze [1]	-7.255×10^{-4}	-3.731×10^{-4}	-2.572×10^{-4}	-1.907×10^{-4}	-1.276×10^{-4}	8.247×10^{-5}	1.332×10^{-4}	1.800×10^{-4}	2.465×10^{-4}	4.021×10^{-4}
fitted root mean square [1]	6.029×10^{-4}	7.319×10^{-4}	7.983×10^{-4}	8.507×10^{-4}	9.164×10^{-4}	1.492×10^{-3}	1.757×10^{-3}	2.021×10^{-3}	2.453×10^{-3}	3.538×10^{-3}
sulfurdioxide total air mass factor polluted [1]	7.623×10^{-2}	0.222	0.329	0.415	0.525	1.09	1.27	1.44	1.65	2.03
sulfurdioxide total air mass factor polluted precision [1]	9.607×10^{-3}	1.750×10^{-2}	2.307×10^{-2}	2.844×10^{-2}	3.585×10^{-2}	0.156	0.209	0.267	0.370	0.578
sulfurdioxide clear air mass factor polluted [1]	0.187	0.285	0.350	0.409	0.490	0.884	0.993	1.09	1.23	1.78
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]	0.658 ± 0.402	8467859	0.770	1.000	0.0	1.000	0.230	1.000
sulfurdioxide total vertical column [DU]	$(6.903 \pm 164.315) \times 10^{-2}$	8467859	0.555	1.432×10^{-2}	-385	190	-0.254	0.301
sulfurdioxide total vertical column precision [DU]	0.767 ± 1.162	8467859	0.555	0.413	4.772×10^{-2}	180	0.236	0.792
sulfurdioxide slant column density corrected [DU]	$(2.890 \pm 44.594) \times 10^{-2}$	8467859	0.384	1.132×10^{-2}	-142	58.0	-0.177	0.206
sulfurdioxide slant column density cobra [DU]	$(2.853 \pm 42.852) \times 10^{-2}$	8467859	0.384	1.132×10^{-2}	-142	14.5	-0.177	0.206
sulfurdioxide slant column density cobra precision [DU]	0.319 ± 0.171	8467859	0.173	0.265	8.670×10^{-2}	34.6	0.206	0.379
sulfurdioxide slant column density window1 [DU]	0.214 ± 0.789	8467859	0.782	0.238	-17.2	20.4	-0.159	0.623
sulfurdioxide slant column density window1 precision [DU]	0.319 ± 0.171	8467859	0.173	0.265	8.670×10^{-2}	34.6	0.206	0.379
sulfurdioxide slant column density corrected win1 [DU]	$(8.301 \pm 77.771) \times 10^{-2}$	8467859	0.766	5.460×10^{-2}	-17.0	20.2	-0.321	0.445
background so2 slant column offset window1 [DU]	-0.131 ± 0.237	8467859	0.222	-0.195	-0.961	4.02	-0.276	-5.473×10^{-2}
sulfurdioxide slant column density window2 [DU]	3.54 ± 9.41	8467859	12.0	3.21	-279	673	-2.65	9.36
sulfurdioxide slant column density window2 precision [DU]	8.25 ± 2.18	8467859	2.59	7.90	2.35	526	6.77	9.37
sulfurdioxide slant column density corrected win2 [DU]	2.02 ± 8.97	8467859	11.4	1.98	-277	667	-3.72	7.68
background so2 slant column offset window2 [DU]	-1.52 ± 3.04	8467859	4.99	-0.811	-16.7	13.9	-3.97	1.02
sulfurdioxide slant column density window3 [DU]	-17.1 ± 24.0	8467859	30.6	-17.3	-960	1.926×10^{3}	-32.4	-1.84
sulfurdioxide slant column density window3 precision [DU]	27.8 ± 12.7	8467859	8.88	24.3	9.40	1.856×10^{3}	21.0	29.9
sulfurdioxide slant column density corrected win3 [DU]	-8.90 ± 23.07	8467859	29.2	-8.78	-960	1.927×10^{3}	-23.4	5.80
background so2 slant column offset window3 [DU]	8.24 ± 7.43	8467859	13.2	8.55	-16.6	32.7	1.37	14.5
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.22	8467859	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(4.800 \pm 10.705) \times 10^{-2}$	8467859	2.753×10^{-2}	1.651×10^{-2}	1.329×10^{-4}	1.89	7.947×10^{-3}	3.547×10^{-2}
fitted radiance shift [nm]	$(-2.288 \pm 25.132) \times 10^{-4}$	8467859	1.668×10^{-3}	-2.349×10^{-4}	-3.719×10^{-2}	3.705×10^{-2}	-1.077×10^{-3}	5.913×10^{-4}
fitted radiance squeeze [1]	$(-4.123 \pm 24.095) \times 10^{-5}$	8467859	2.302×10^{-4}	-1.280×10^{-5}	-4.292×10^{-3}	1.468×10^{-2}	-1.345×10^{-4}	9.572×10^{-5}
fitted root mean square [1]	$(1.401 \pm 0.715) \times 10^{-3}$	8467859	6.807×10^{-4}	1.165×10^{-3}	3.470×10^{-4}	2.492×10^{-2}	9.452×10^{-4}	1.626×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.753 ± 0.431	8467859	0.574	0.684	5.000×10^{-2}	2.80	0.429	1.00
sulfurdioxide total air mass factor polluted precision [1]	0.106 ± 0.137	8467859	0.101	5.441×10^{-2}	2.500×10^{-3}	1.76	2.900×10^{-2}	0.130
sulfurdioxide clear air mass factor polluted [1]	0.629 ± 0.296	8467859	0.433	0.582	4.922×10^{-2}	2.51	0.397	0.830
number of spectral points in retrieval [1]	73.5 ± 0.5	8467859	1.000	73.0	52.0	74.0	73.0	74.0

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

Variable	mean $\pm\sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.649 ± 0.406	8670437	0.780	1.000	0.0	1.000	0.220	1.000
sulfurdioxide total vertical column [DU]	$(1.852 \pm 65.336) \times 10^{-2}$	8670437	0.387	8.886×10^{-3}	-43.4	320	-0.183	0.204
sulfurdioxide total vertical column precision [DU]	0.397 ± 0.454	8670437	0.254	0.281	5.001×10^{-2}	23.1	0.194	0.448
sulfurdioxide slant column density corrected [DU]	$(1.445 \pm 34.246) \times 10^{-2}$	8670437	0.337	8.201×10^{-3}	-9.07	319	-0.159	0.178
sulfurdioxide slant column density cobra [DU]	$(1.434 \pm 31.681) \times 10^{-2}$	8670437	0.337	8.201×10^{-3}	-9.07	30.5	-0.159	0.178
sulfurdioxide slant column density cobra precision [DU]	0.269 ± 0.113	8670437	0.119	0.232	8.145×10^{-2}	25.4	0.195	0.314
sulfurdioxide slant column density window1 [DU]	0.180 ± 0.612	8670437	0.690	0.196	-145	41.0	-0.156	0.534
sulfurdioxide slant column density window1 precision [DU]	0.269 ± 0.113	8670437	0.119	0.232	8.145×10^{-2}	25.4	0.195	0.314
sulfurdioxide slant column density corrected win1 [DU]	$(4.200 \pm 59.744) \times 10^{-2}$	8670437	0.670	3.104×10^{-2}	-145	40.8	-0.301	0.369
background so2 slant column offset window1 [DU]	-0.138 ± 0.163	8670437	0.199	-0.177	-0.844	1.90	-0.256	-5.619×10^{-2}
sulfurdioxide slant column density window2 [DU]	2.25 ± 8.85	8670437	11.1	2.06	-862	758	-3.44	7.71
sulfurdioxide slant column density window2 precision [DU]	8.02 ± 2.23	8670437	2.48	7.68	2.28	553	6.59	9.07
sulfurdioxide slant column density corrected win2 [DU]	2.17 ± 8.69	8670437	11.0	2.10	-861	758	-3.36	7.59
background so2 slant column offset window2 [DU]	$(-8.670 \pm 190.897) \times 10^{-2}$	8670437	2.20	0.360	-10.6	13.4	-1.09	1.11
sulfurdioxide slant column density window3 [DU]	-11.8 ± 24.1	8670437	30.7	-12.1	-330	376	-27.2	3.52
sulfurdioxide slant column density window3 precision [DU]	28.7 ± 14.1	8670437	10.2	24.8	9.84	254	20.9	31.1
sulfurdioxide slant column density corrected win3 [DU]	-8.97 ± 23.34	8670437	29.8	-9.13	-331	371	-23.8	5.92
background so2 slant column offset window3 [DU]	2.81 ± 6.80	8670437	11.4	1.47	-21.4	24.7	-2.75	8.61
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.20	8670437	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(1.778 \pm 2.741) \times 10^{-2}$	8670437	1.042×10^{-2}	1.403×10^{-2}	7.500×10^{-4}	1.60	9.489×10^{-3}	1.990×10^{-2}
fitted radiance shift [nm]	$(-5.652 \pm 27.867) \times 10^{-4}$	8670437	2.042×10^{-3}	-5.501×10^{-4}	-4.455×10^{-2}	4.496×10^{-2}	-1.642×10^{-3}	3.992×10^{-4}
fitted radiance squeeze [1]	$(-3.007 \pm 16.347) \times 10^{-5}$	8670437	1.930×10^{-4}	-2.340×10^{-5}	-2.338×10^{-2}	1.548×10^{-2}	-1.224×10^{-4}	7.061×10^{-5}
fitted root mean square [1]	$(1.189 \pm 0.455) \times 10^{-3}$	8670437	4.741×10^{-4}	1.056×10^{-3}	3.351×10^{-4}	8.921×10^{-2}	8.932×10^{-4}	1.367×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.921 ± 0.414	8670437	0.549	0.867	5.000×10^{-2}	2.82	0.618	1.17
sulfurdioxide total air mass factor polluted precision [1]	0.129 ± 0.114	8670437	0.132	8.916×10^{-2}	3.836×10^{-3}	1.36	4.419×10^{-2}	0.177
sulfurdioxide clear air mass factor polluted [1]	0.782 ± 0.315	8670437	0.357	0.711	0.109	2.72	0.573	0.930
number of spectral points in retrieval [1]	73.4 ± 0.5	8670437	1.000	73.0	52.0	74.0	73.0	74.0

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

Variable	mean $\pm\sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.694 ± 0.394	12128409	0.720	1.000	0.0	1.000	0.280	1.000
sulfurdioxide total vertical column [DU]	$(2.813 \pm 90.851) \times 10^{-2}$	12128409	0.421	9.714×10^{-3}	-209	115	-0.198	0.223
sulfurdioxide total vertical column precision [DU]	0.478 ± 0.661	12128409	0.303	0.300	5.502×10^{-2}	52.0	0.205	0.508
sulfurdioxide slant column density corrected [DU]	$(1.637 \pm 34.245) \times 10^{-2}$	12128409	0.346	8.532×10^{-3}	-142	49.7	-0.163	0.183
sulfurdioxide slant column density cobra [DU]	$(1.629 \pm 33.795) \times 10^{-2}$	12128409	0.346	8.532×10^{-3}	-142	22.3	-0.163	0.183
sulfurdioxide slant column density cobra precision [DU]	0.279 ± 0.125	12128409	0.134	0.235	8.849×10^{-2}	34.6	0.197	0.331
sulfurdioxide slant column density window1 [DU]	0.195 ± 0.649	12128409	0.710	0.212	-145	30.5	-0.149	0.561
sulfurdioxide slant column density window1 precision [DU]	0.279 ± 0.125	12128409	0.134	0.235	8.849×10^{-2}	34.6	0.197	0.331
sulfurdioxide slant column density corrected win1 [DU]	$(5.187 \pm 63.641) \times 10^{-2}$	12128409	0.692	3.742×10^{-2}	-145	30.6	-0.305	0.387
background so2 slant column offset window1 [DU]	-0.143 ± 0.179	12128409	0.202	-0.186	-0.844	4.02	-0.265	-6.258×10^{-2}
sulfurdioxide slant column density window2 [DU]	2.53 ± 8.91	12128409	11.3	2.30	-831	758	-3.27	8.03
sulfurdioxide slant column density window2 precision [DU]	8.00 ± 2.10	12128409	2.42	7.65	2.39	553	6.61	9.02
sulfurdioxide slant column density corrected win2 [DU]	2.09 ± 8.67	12128409	11.0	2.04	-831	758	-3.45	7.56
background so2 slant column offset window2 [DU]	-0.435 ± 2.310	12128409	2.80	0.214	-16.4	13.9	-1.69	1.11
sulfurdioxide slant column density window3 [DU]	-11.5 ± 24.2	12128409	31.0	-11.8	-258	314	-27.0	3.92
sulfurdioxide slant column density window3 precision [DU]	27.6 ± 12.5	12128409	9.07	24.2	9.81	244	20.8	29.9
sulfurdioxide slant column density corrected win3 [DU]	-6.92 ± 22.94	12128409	29.4	-7.12	-258	301	-21.7	7.74
background so2 slant column offset window3 [DU]	4.63 ± 7.14	12128409	11.3	3.75	-21.4	31.9	-1.06	10.3
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.18	12128409	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.176 \pm 3.986) \times 10^{-2}$	12128409	1.226×10^{-2}	1.462×10^{-2}	5.105×10^{-4}	1.63	9.657×10^{-3}	2.192×10^{-2}
fitted radiance shift [nm]	$(-4.097 \pm 24.561) \times 10^{-4}$	12128409	1.821×10^{-3}	-3.738×10^{-4}	-4.455×10^{-2}	4.496×10^{-2}	-1.351×10^{-3}	4.702×10^{-4}
fitted radiance squeeze [1]	$(-2.958 \pm 18.098) \times 10^{-5}$	12128409	1.994×10^{-4}	-1.869×10^{-5}	-2.338×10^{-2}	1.387×10^{-2}	-1.214×10^{-4}	7.792×10^{-5}
fitted root mean square [1]	$(1.232 \pm 0.521) \times 10^{-3}$	12128409	5.141×10^{-4}	1.067×10^{-3}	3.351×10^{-4}	5.273×10^{-2}	9.020×10^{-4}	1.416×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.863 ± 0.395	12128409	0.519	0.827	5.000×10^{-2}	2.60	0.580	1.10
sulfurdioxide total air mass factor polluted precision [1]	0.114 ± 0.107	12128409	0.113	7.231×10^{-2}	3.102×10^{-3}	1.54	4.038×10^{-2}	0.153
sulfurdioxide clear air mass factor polluted [1]	0.732 ± 0.287	12128409	0.361	0.686	5.374×10^{-2}	2.59	0.538	0.899
number of spectral points in retrieval [1]	73.4 ± 0.5	12128409	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]	0.593 ± 0.415	3746581	0.830	0.490	0.0	1.000	0.170	1.000
sulfurdioxide total vertical column [DU]	$(6.567 \pm 164.748) \times 10^{-2}$	3746581	0.527	1.288×10^{-2}	-330	320	-0.241	0.286
sulfurdioxide total vertical column precision [DU]	0.747 ± 1.174	3746581	0.544	0.402	4.772×10^{-2}	165	0.225	0.769
sulfurdioxide slant column density corrected [DU]	$(2.884 \pm 48.007) \times 10^{-2}$	3746581	0.374	1.077×10^{-2}	-16.5	319	-0.174	0.201
sulfurdioxide slant column density cobra [DU]	$(2.827 \pm 42.315) \times 10^{-2}$	3746581	0.374	1.077×10^{-2}	-16.5	30.5	-0.174	0.201
sulfurdioxide slant column density cobra precision [DU]	0.311 ± 0.170	3746581	0.151	0.259	8.145×10^{-2}	22.4	0.207	0.357
sulfurdioxide slant column density window1 [DU]	0.218 ± 0.762	3746581	0.757	0.236	-17.2	41.0	-0.149	0.608
sulfurdioxide slant column density window1 precision [DU]	0.311 ± 0.170	3746581	0.151	0.259	8.145×10^{-2}	22.4	0.207	0.357
sulfurdioxide slant column density corrected win1 [DU]	$(7.905 \pm 75.127) \times 10^{-2}$	3746581	0.736	5.067×10^{-2}	-17.0	40.8	-0.311	0.425
background so2 slant column offset window1 [DU]	-0.139 ± 0.223	3746581	0.204	-0.201	-0.961	2.73	-0.274	-6.963×10^{-2}
sulfurdioxide slant column density window2 [DU]	3.23 ± 9.50	3746581	12.0	2.93	-862	603	-2.93	9.05
sulfurdioxide slant column density window2 precision [DU]	8.41 ± 2.43	3746581	2.72	8.07	2.28	409	6.84	9.56
sulfurdioxide slant column density corrected win2 [DU]	2.05 ± 9.10	3746581	11.4	1.99	-861	604	-3.72	7.72
background so2 slant column offset window2 [DU]	-1.18 ± 2.93	3746581	4.52	-0.110	-16.5	12.8	-3.45	1.07
sulfurdioxide slant column density window3 [DU]	-21.0 ± 23.1	3746581	29.0	-20.6	-653	1.926×10^{3}	-35.3	-6.33
sulfurdioxide slant column density window3 precision [DU]	30.3 ± 16.0	3746581	11.0	25.8	9.66	1.856×10^{3}	21.5	32.4
sulfurdioxide slant column density corrected win3 [DU]	-14.6 ± 23.4	3746581	29.4	-14.1	-653	1.927×10^{3}	-29.0	0.367
background so2 slant column offset window3 [DU]	6.38 ± 8.12	3746581	14.0	5.99	-21.4	32.7	-0.551	13.5
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.24	3746581	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(5.857 \pm 12.132) \times 10^{-2}$	3746581	4.079×10^{-2}	1.731×10^{-2}	1.329×10^{-4}	1.84	6.818×10^{-3}	4.761×10^{-2}
fitted radiance shift [nm]	$(-3.718 \pm 32.372) \times 10^{-4}$	3746581	2.008×10^{-3}	-4.014×10^{-4}	-4.129×10^{-2}	4.476×10^{-2}	-1.413×10^{-3}	5.952×10^{-4}
fitted radiance squeeze [1]	$(-3.515 \pm 22.776) \times 10^{-5}$	3746581	2.246×10^{-4}	-1.306×10^{-5}	-1.288×10^{-2}	1.548×10^{-2}	-1.299×10^{-4}	9.463×10^{-5}
fitted root mean square [1]	$(1.360 \pm 0.682) \times 10^{-3}$	3746581	6.064×10^{-4}	1.155×10^{-3}	3.478×10^{-4}	8.921×10^{-2}	9.463×10^{-4}	1.553×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.799 ± 0.510	3746581	0.670	0.662	5.000×10^{-2}	2.82	0.426	1.10
sulfurdioxide total air mass factor polluted precision [1]	0.129 ± 0.166	3746581	0.145	6.041×10^{-2}	2.500×10^{-3}	1.65	2.738×10^{-2}	0.172
sulfurdioxide clear air mass factor polluted [1]	0.660 ± 0.370	3746581	0.423	0.584	4.922×10^{-2}	2.72	0.399	0.822
number of spectral points in retrieval [1]	73.4 ± 0.5	3746581	1.000	73.0	52.0	74.0	73.0	74.0

3 Granule outlines

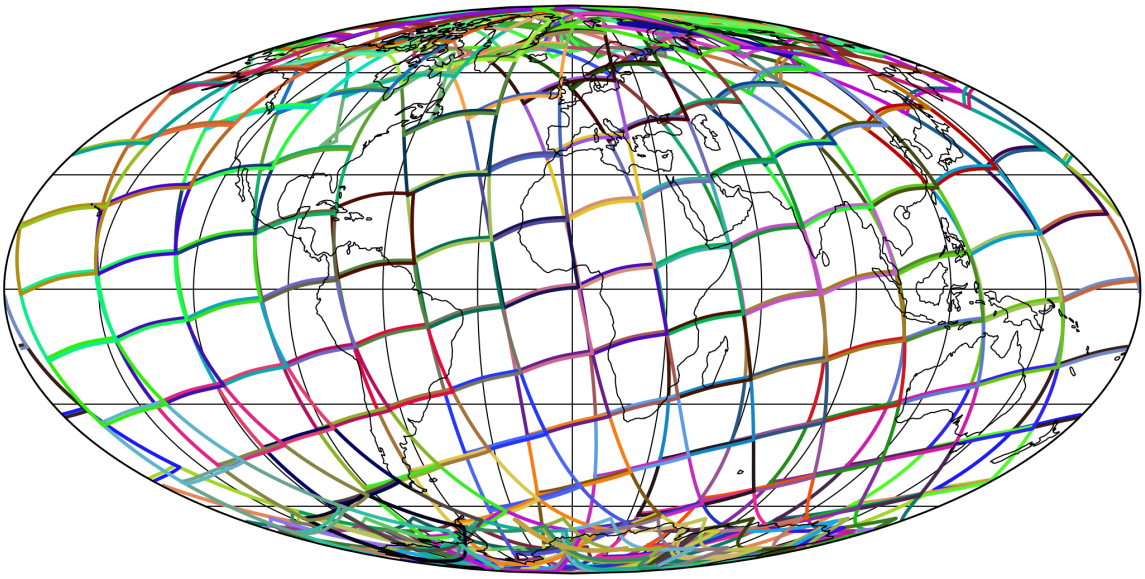


Figure 1: Outline of the granules.

4 Input data monitoring

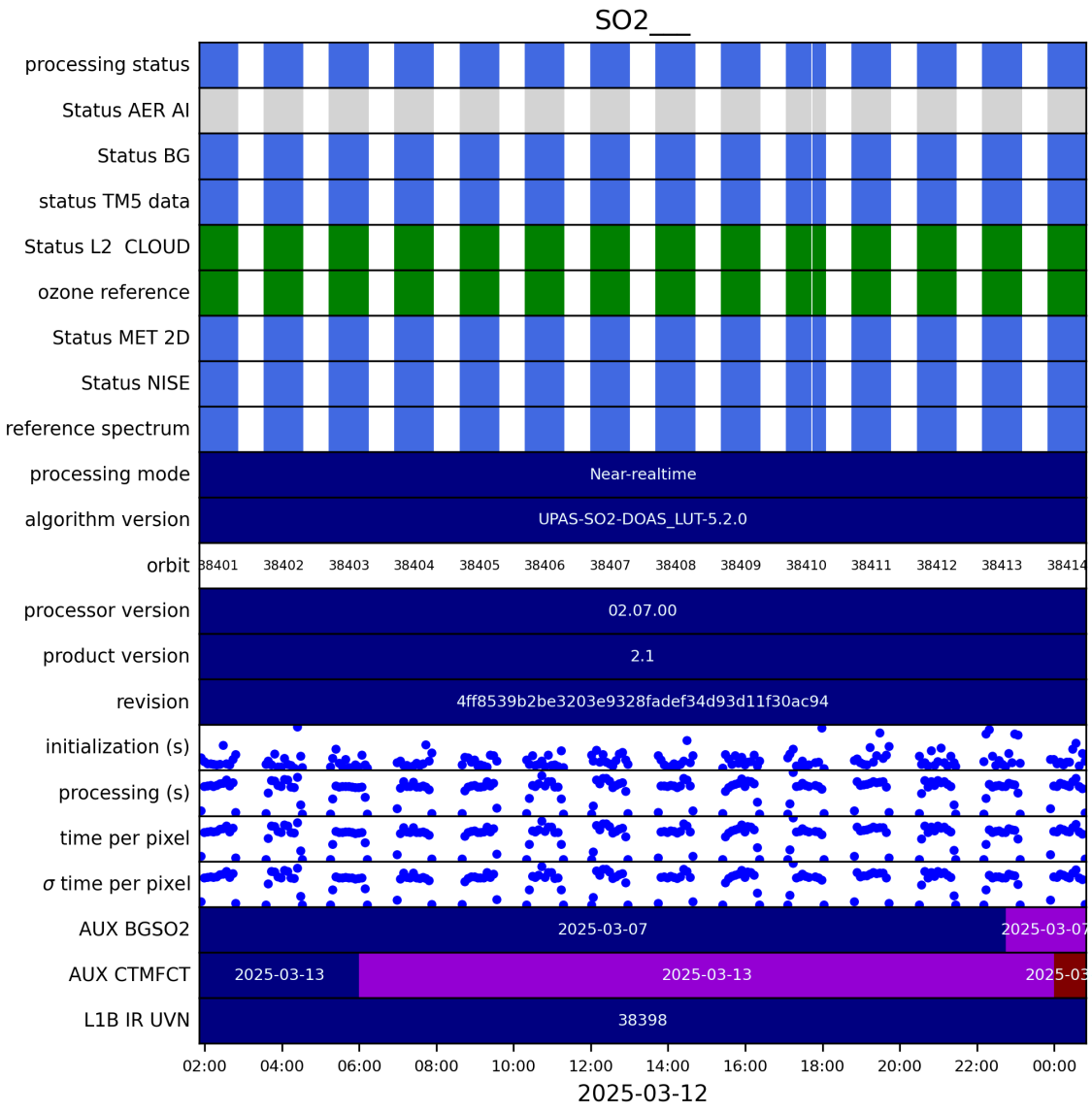


Figure 2: Input data per granule

5 Warnings and errors

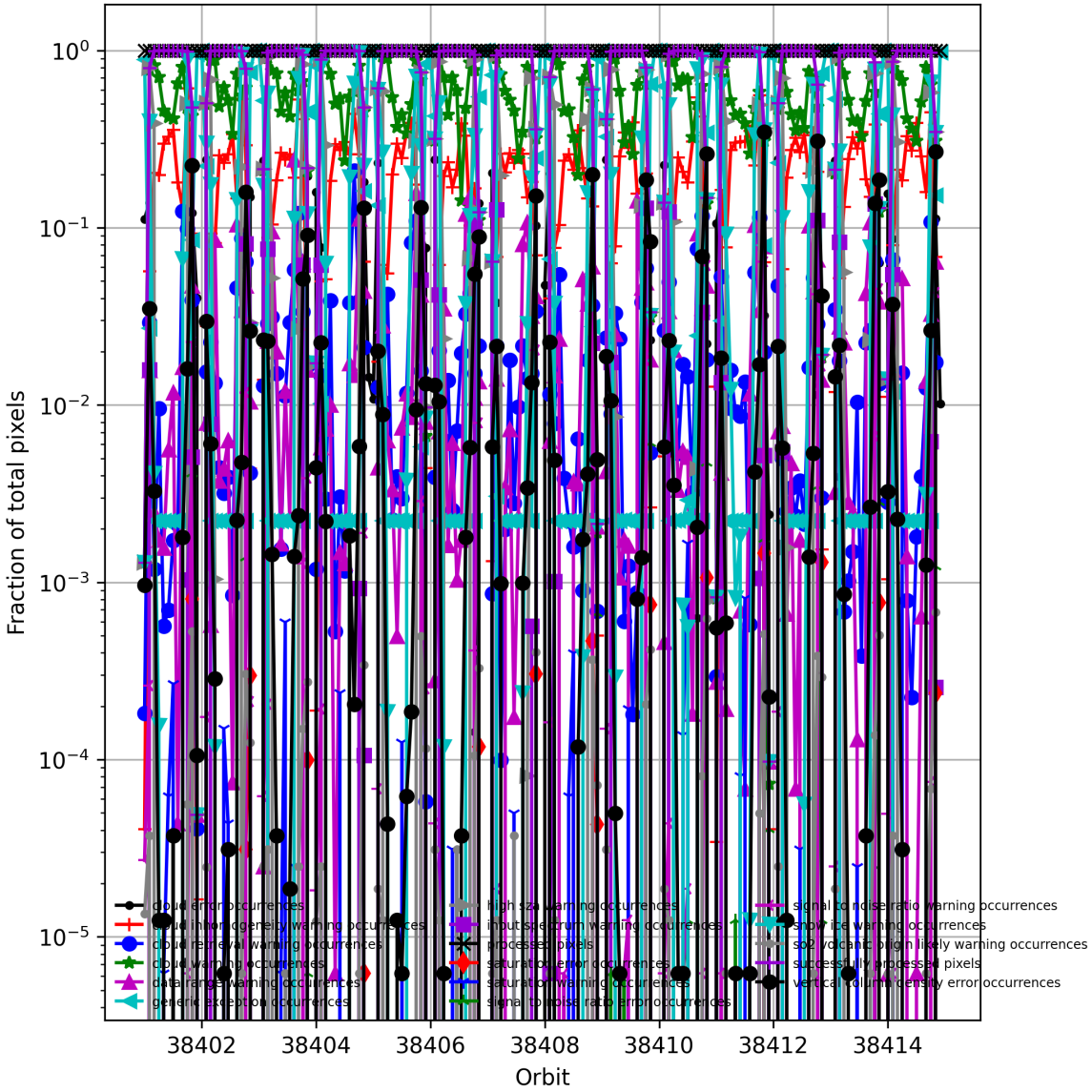


Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

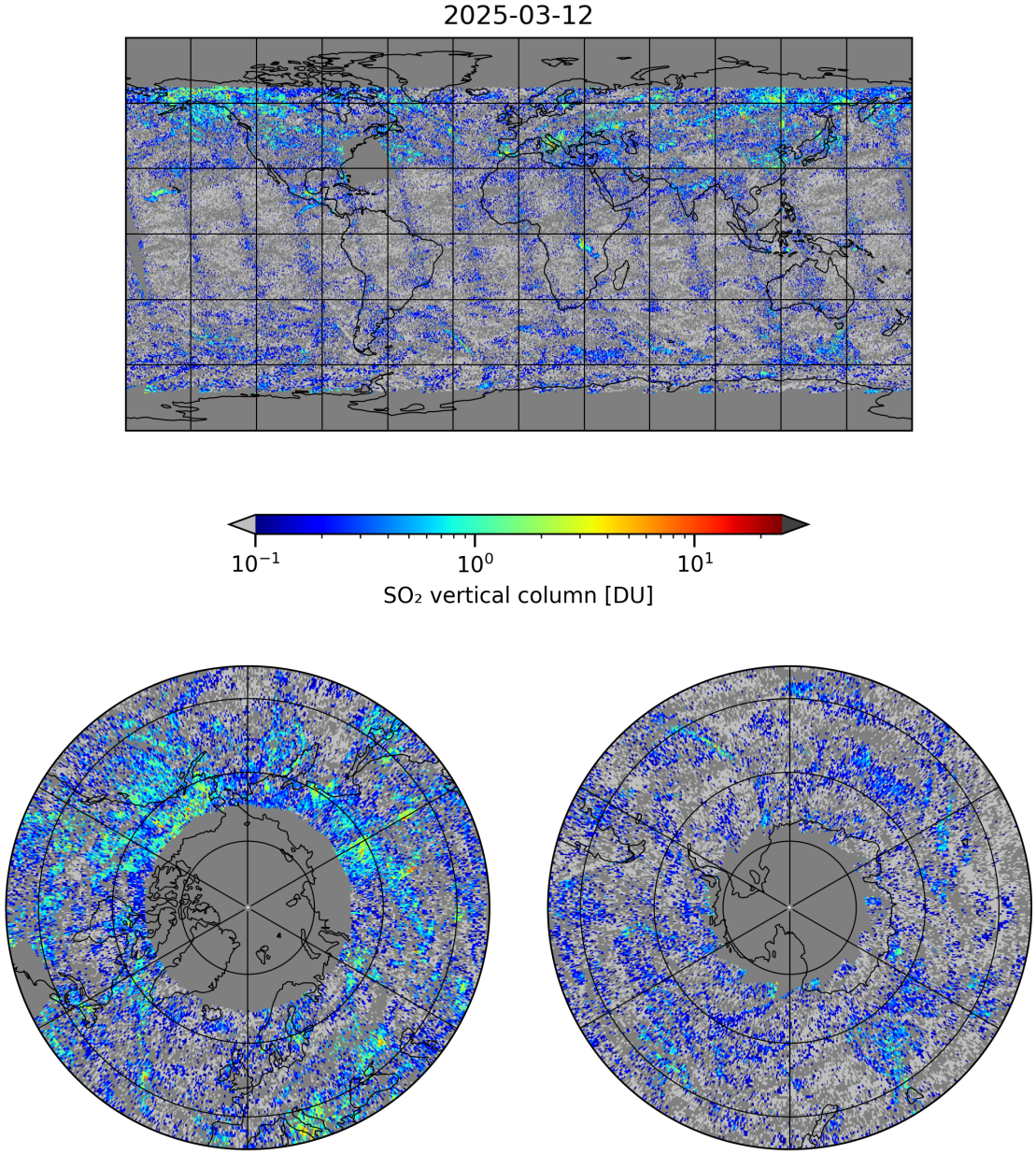


Figure 4: Map of "SO_2 vertical column" for 2025-03-12 to 2025-03-13

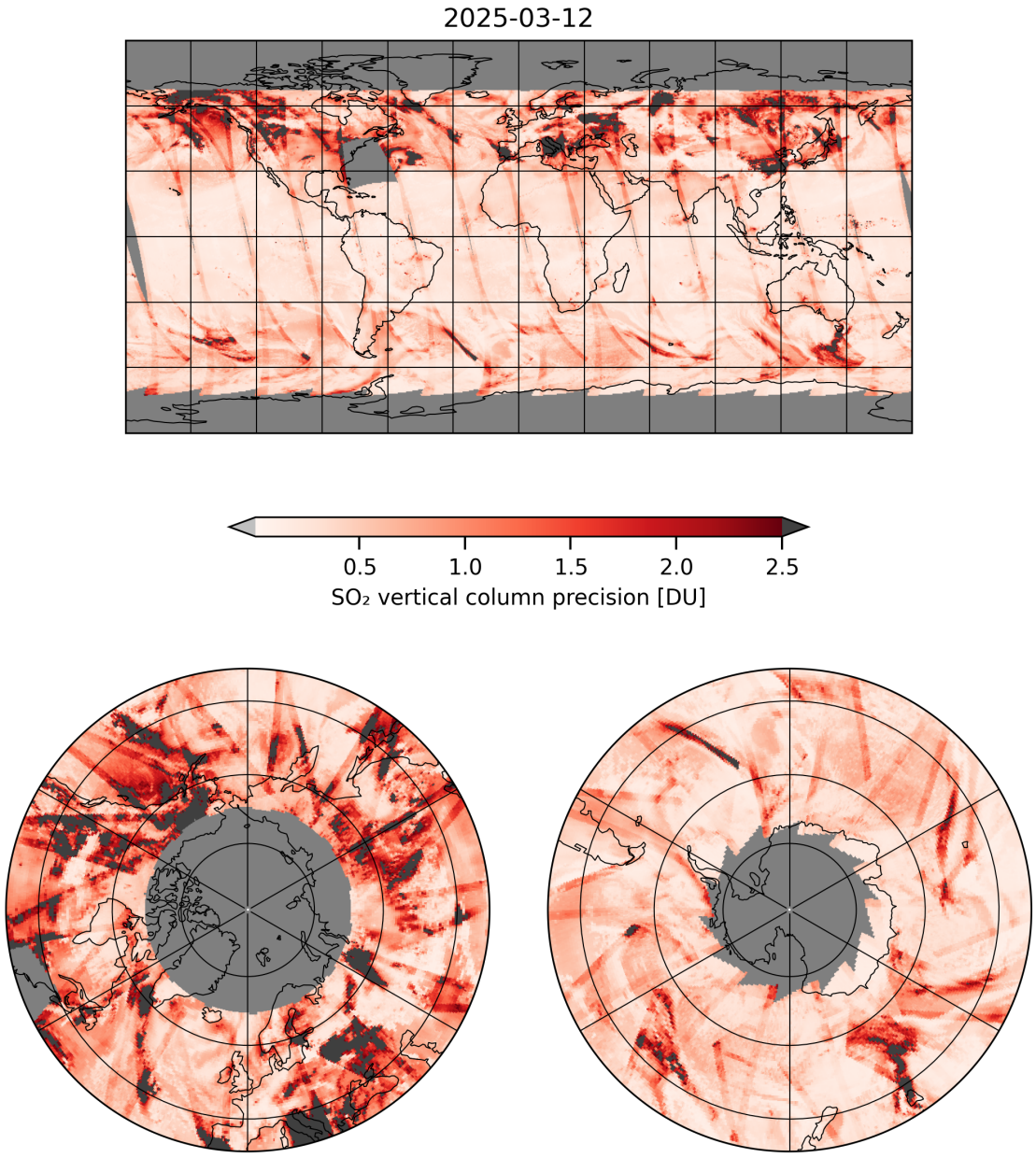


Figure 5: Map of "SO_2 vertical column precision" for 2025-03-12 to 2025-03-13

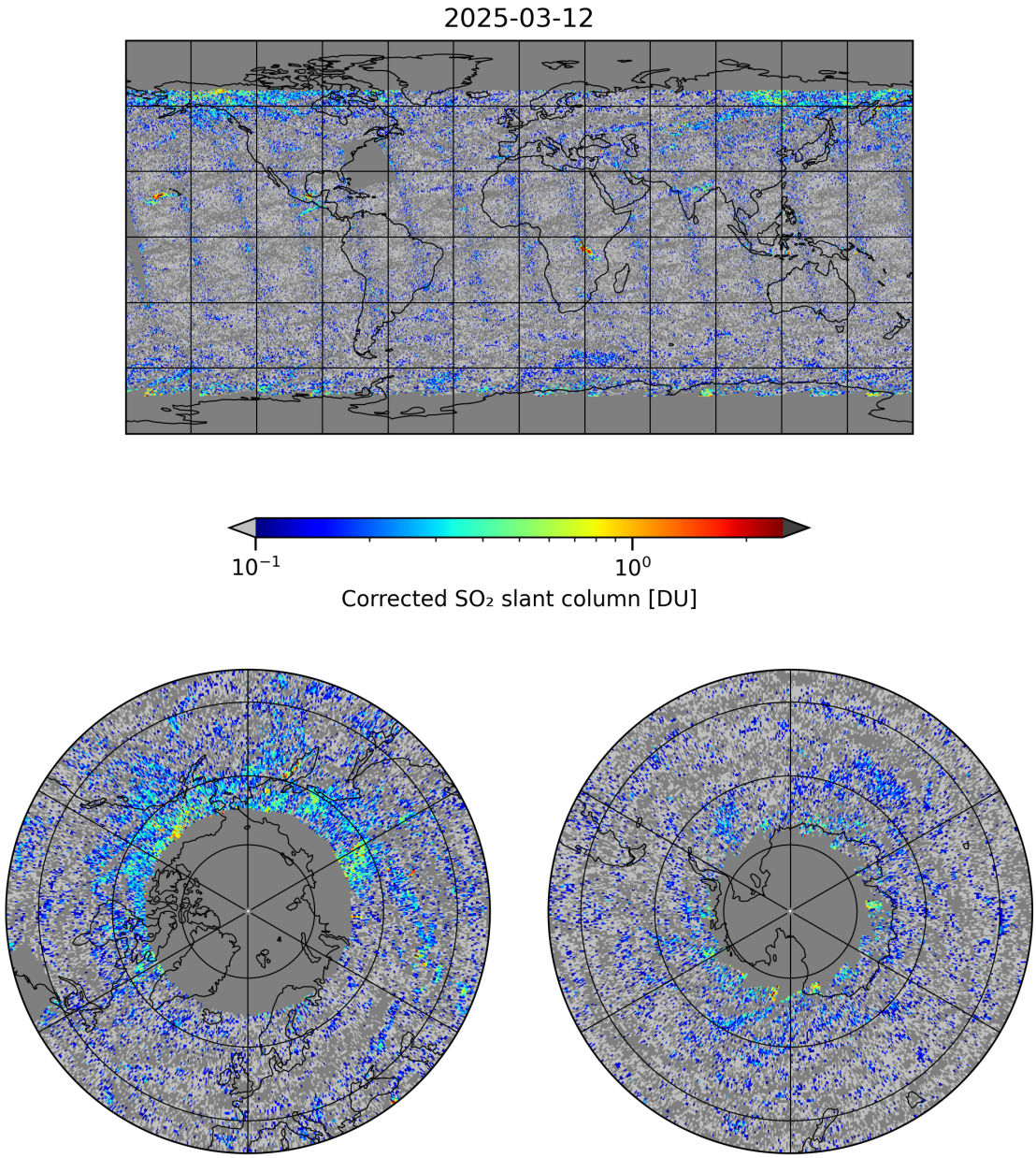


Figure 6: Map of "Corrected SO_2 slant column" for 2025-03-12 to 2025-03-13

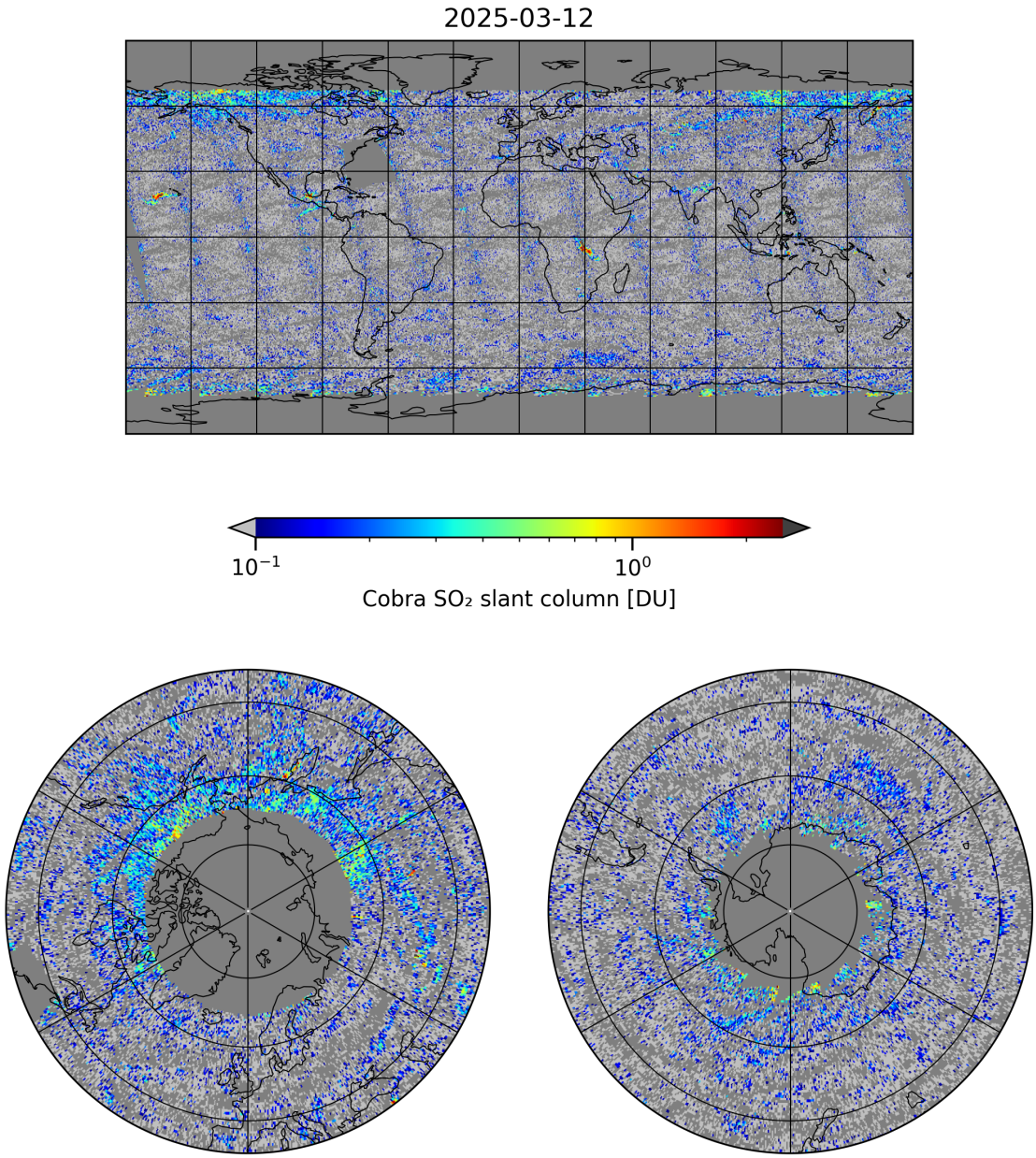


Figure 7: Map of "Cobra SO_2 slant column" for 2025-03-12 to 2025-03-13

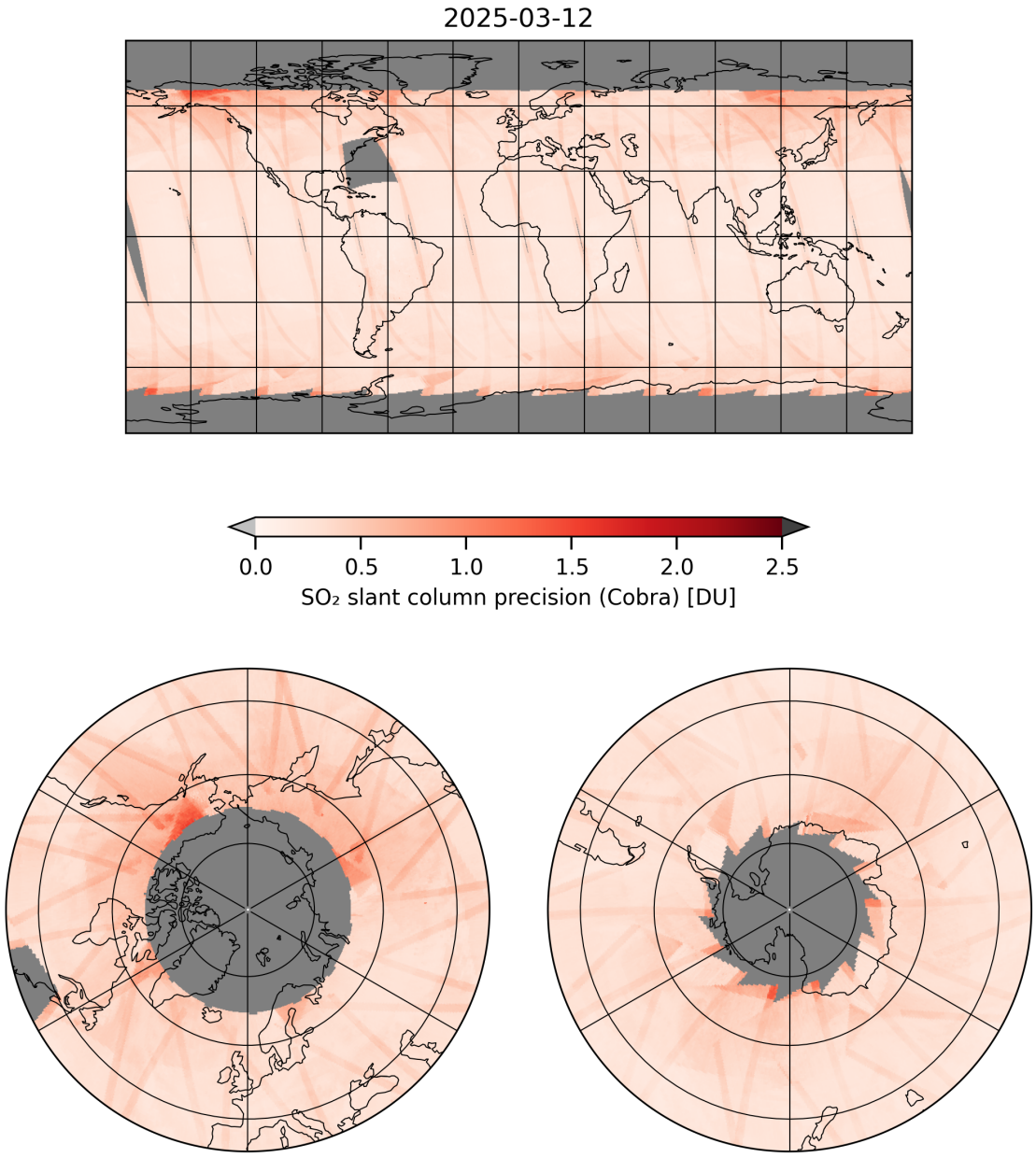


Figure 8: Map of "SO_2 slant column precision (Cobra)" for 2025-03-12 to 2025-03-13

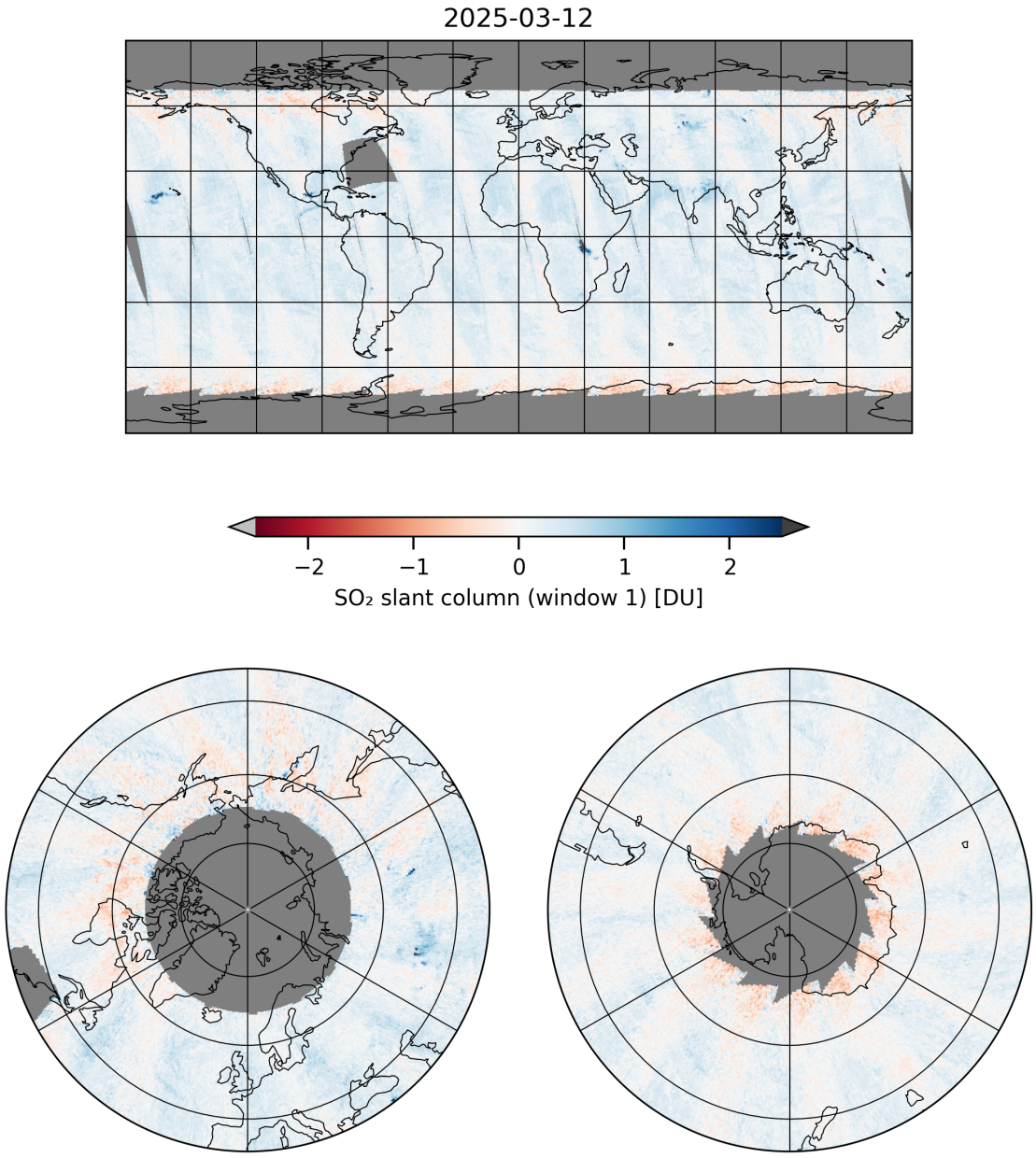


Figure 9: Map of "SO_2 slant column (window 1)" for 2025-03-12 to 2025-03-13

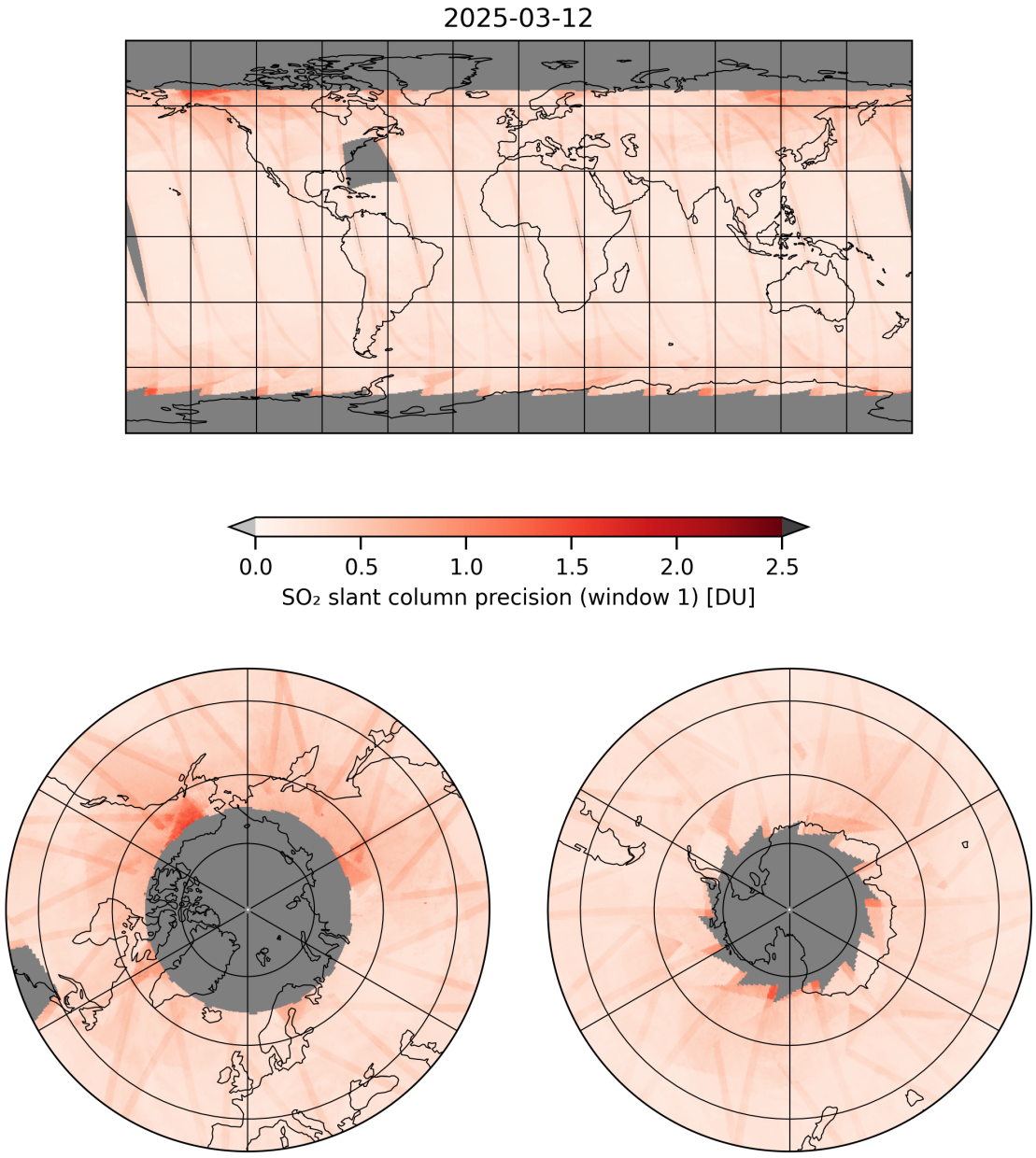


Figure 10: Map of "SO_2 slant column precision (window 1)" for 2025-03-12 to 2025-03-13

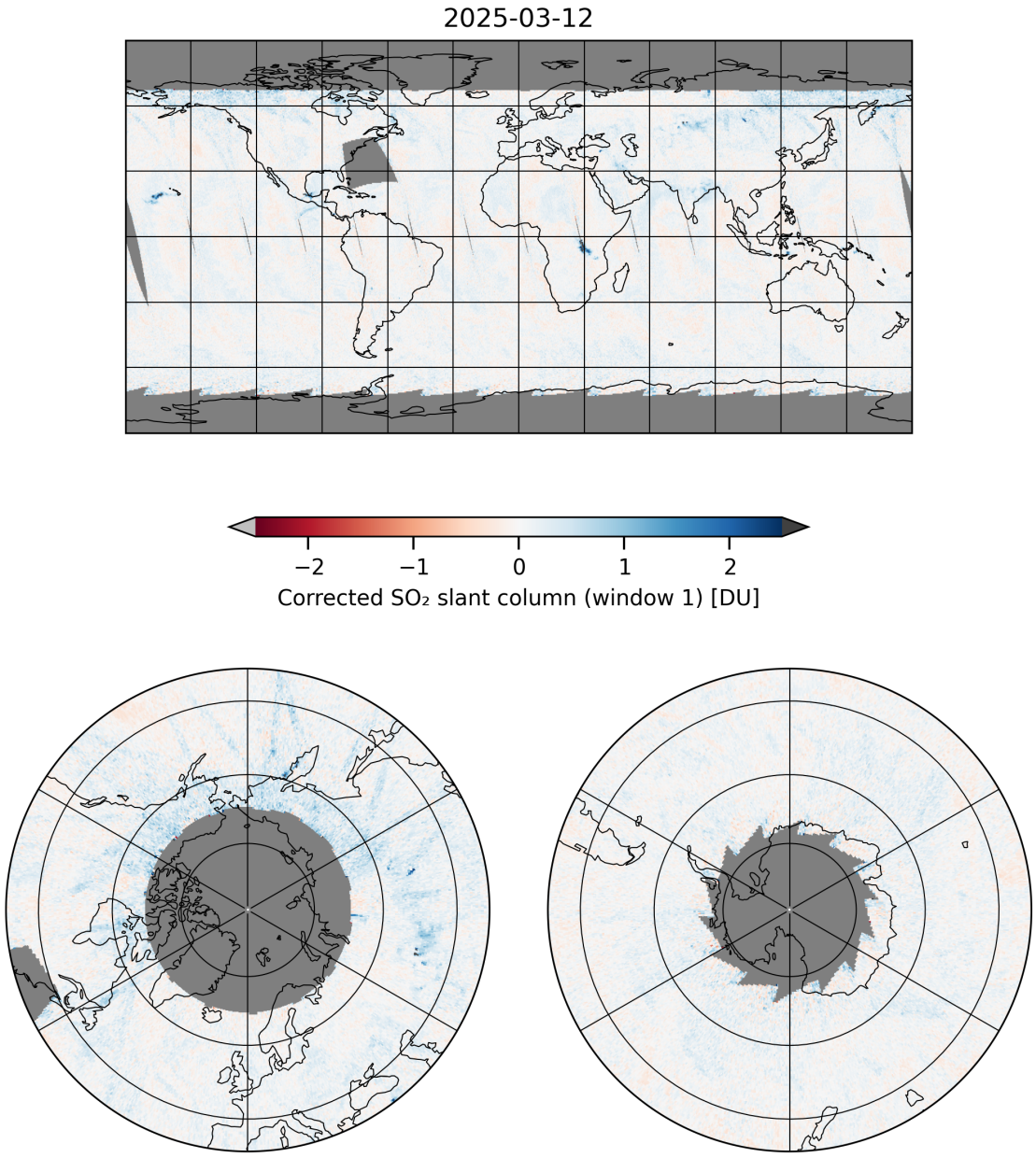


Figure 11: Map of “Corrected SO_2 slant column (window 1)” for 2025-03-12 to 2025-03-13

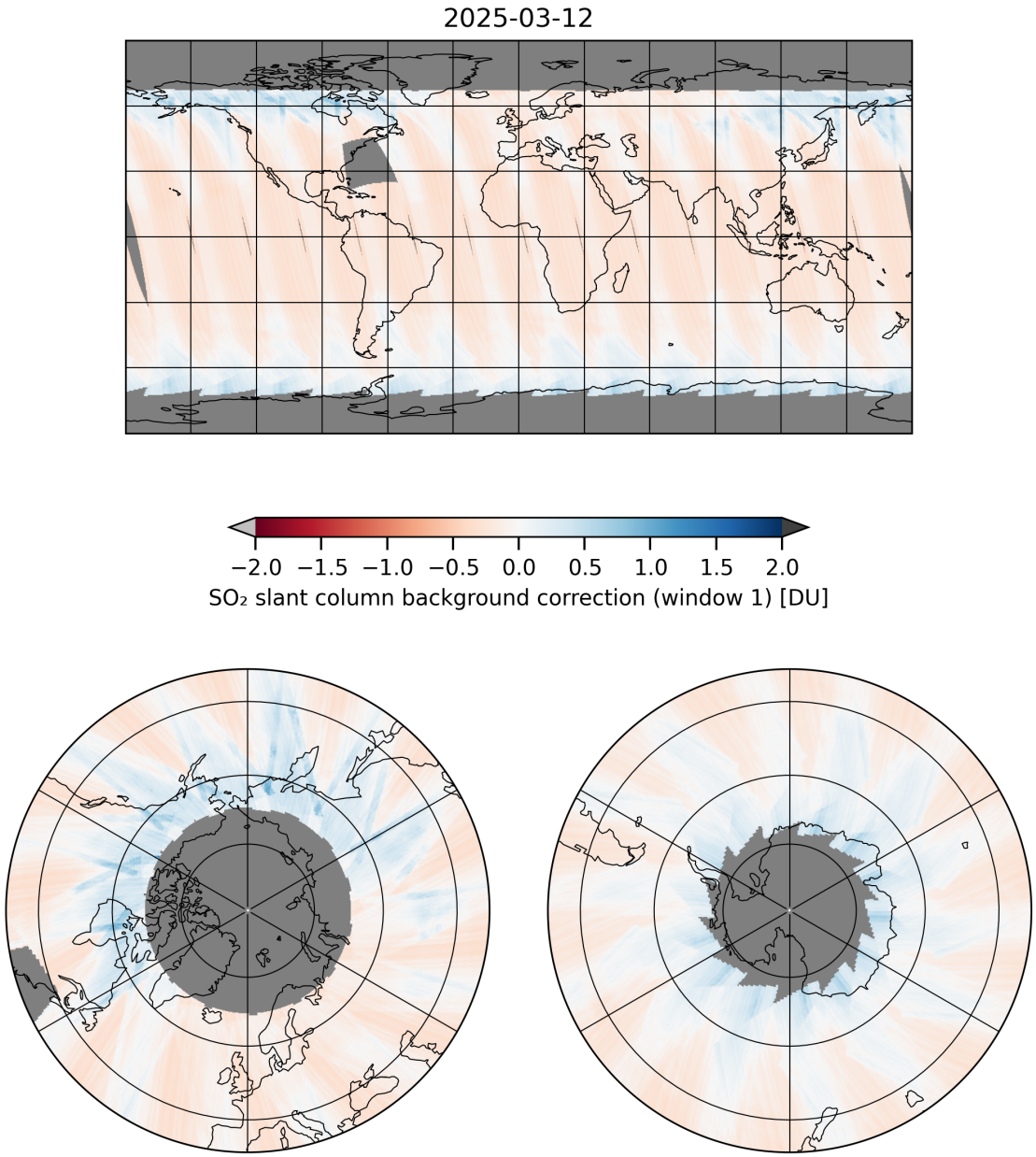


Figure 12: Map of "SO_2 slant column background correction (window 1)" for 2025-03-12 to 2025-03-13

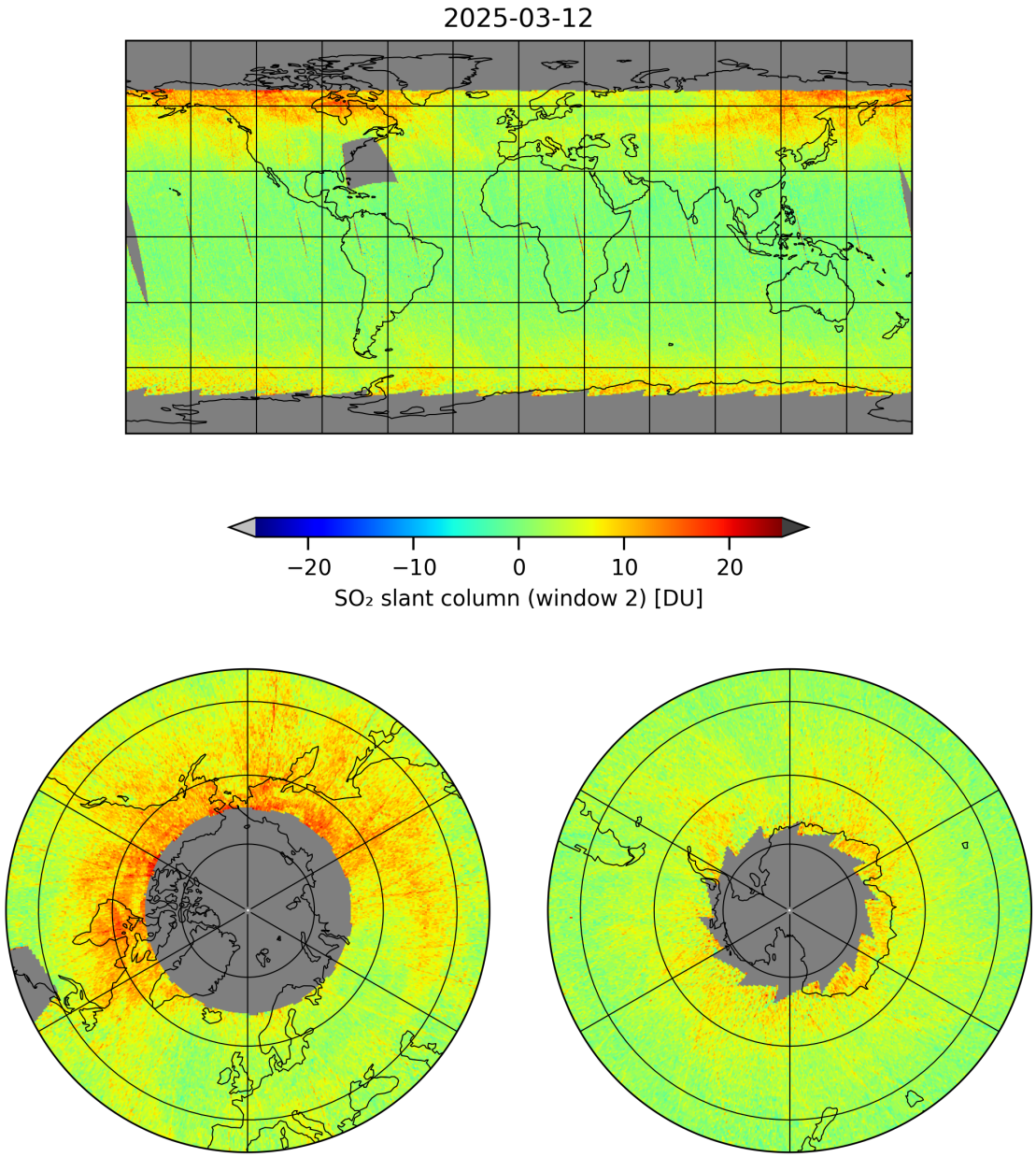


Figure 13: Map of "SO_2 slant column (window 2)" for 2025-03-12 to 2025-03-13

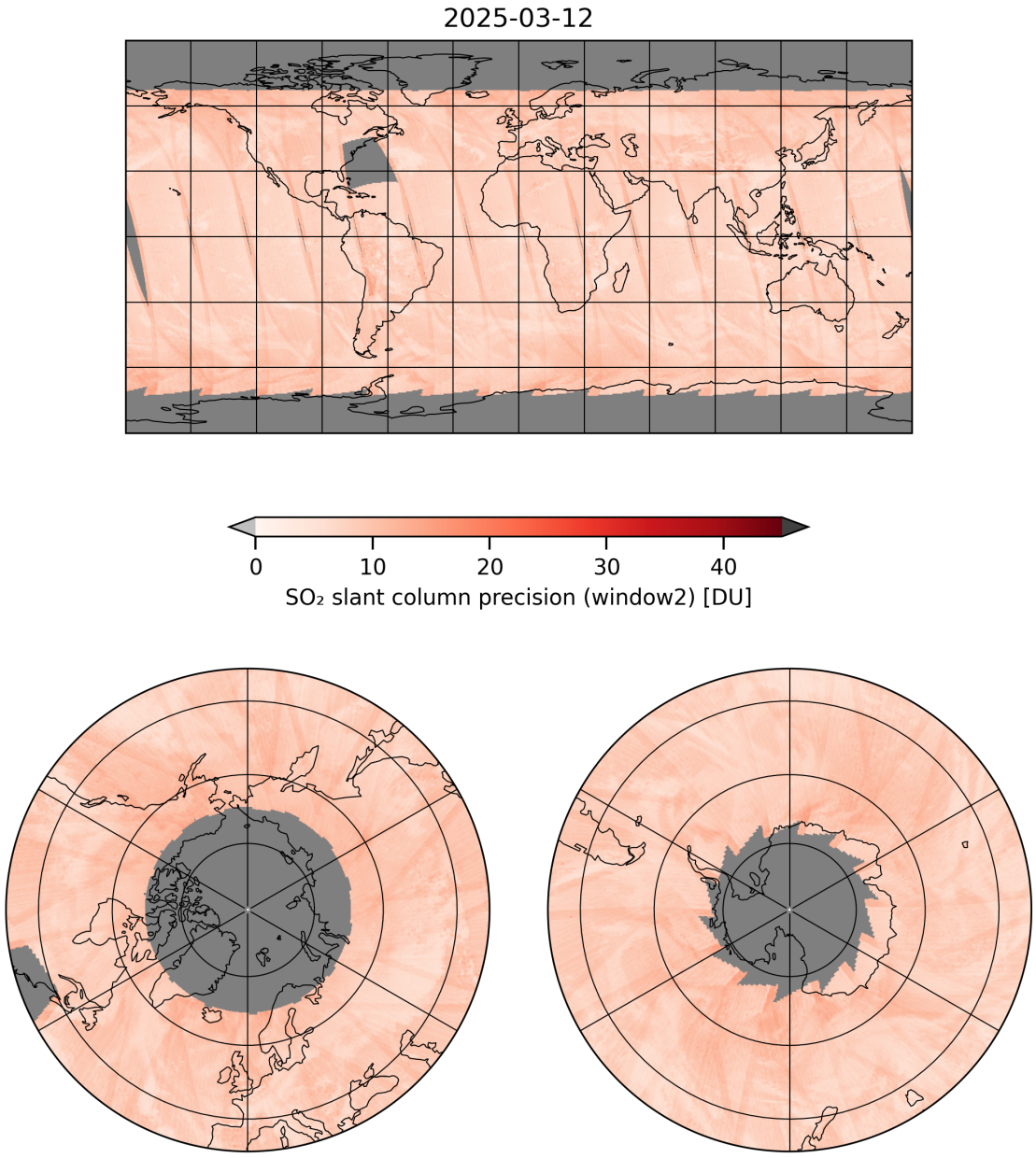


Figure 14: Map of "SO_2 slant column precision (window2)" for 2025-03-12 to 2025-03-13

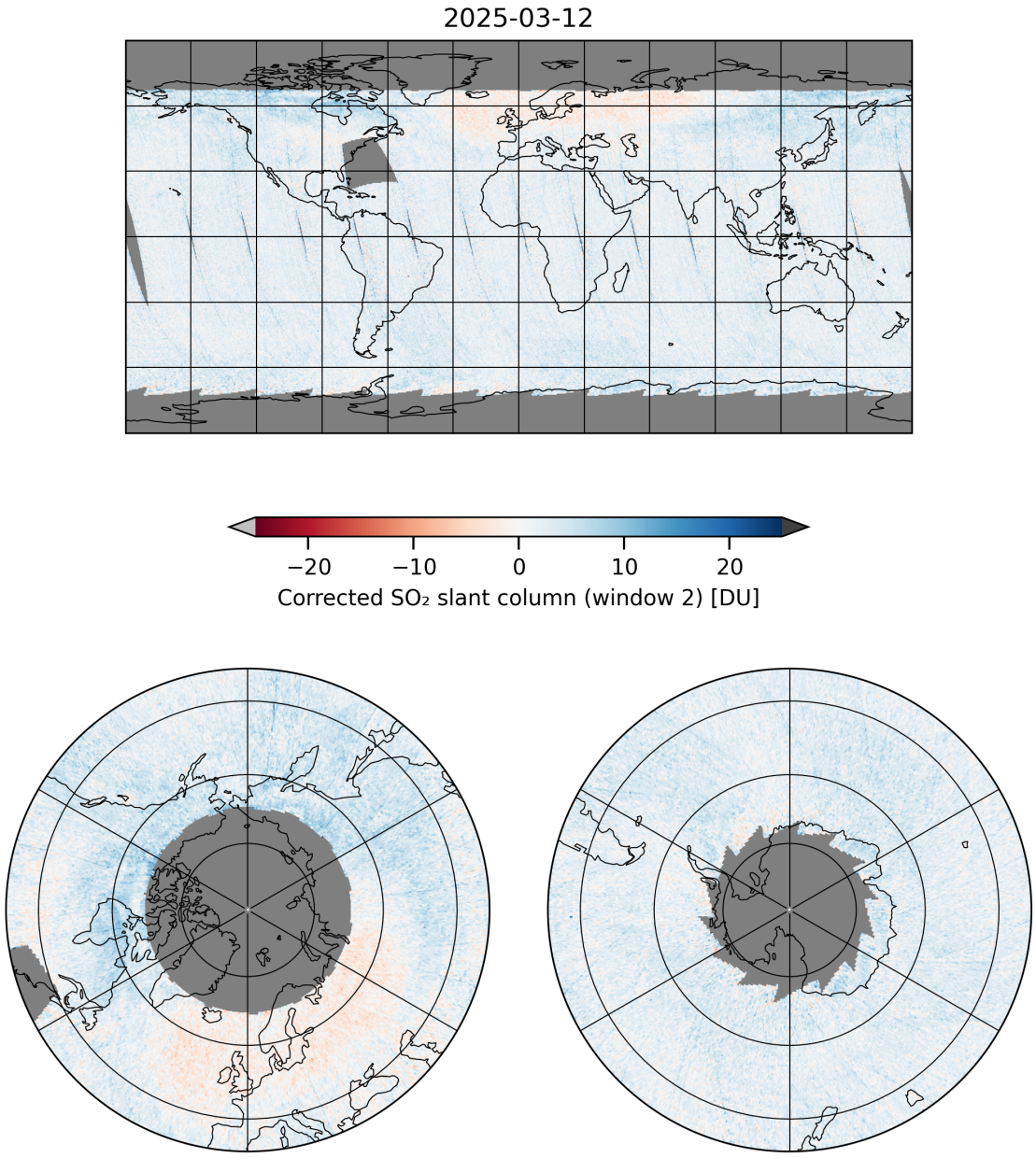


Figure 15: Map of "Corrected SO_2 slant column (window 2)" for 2025-03-12 to 2025-03-13

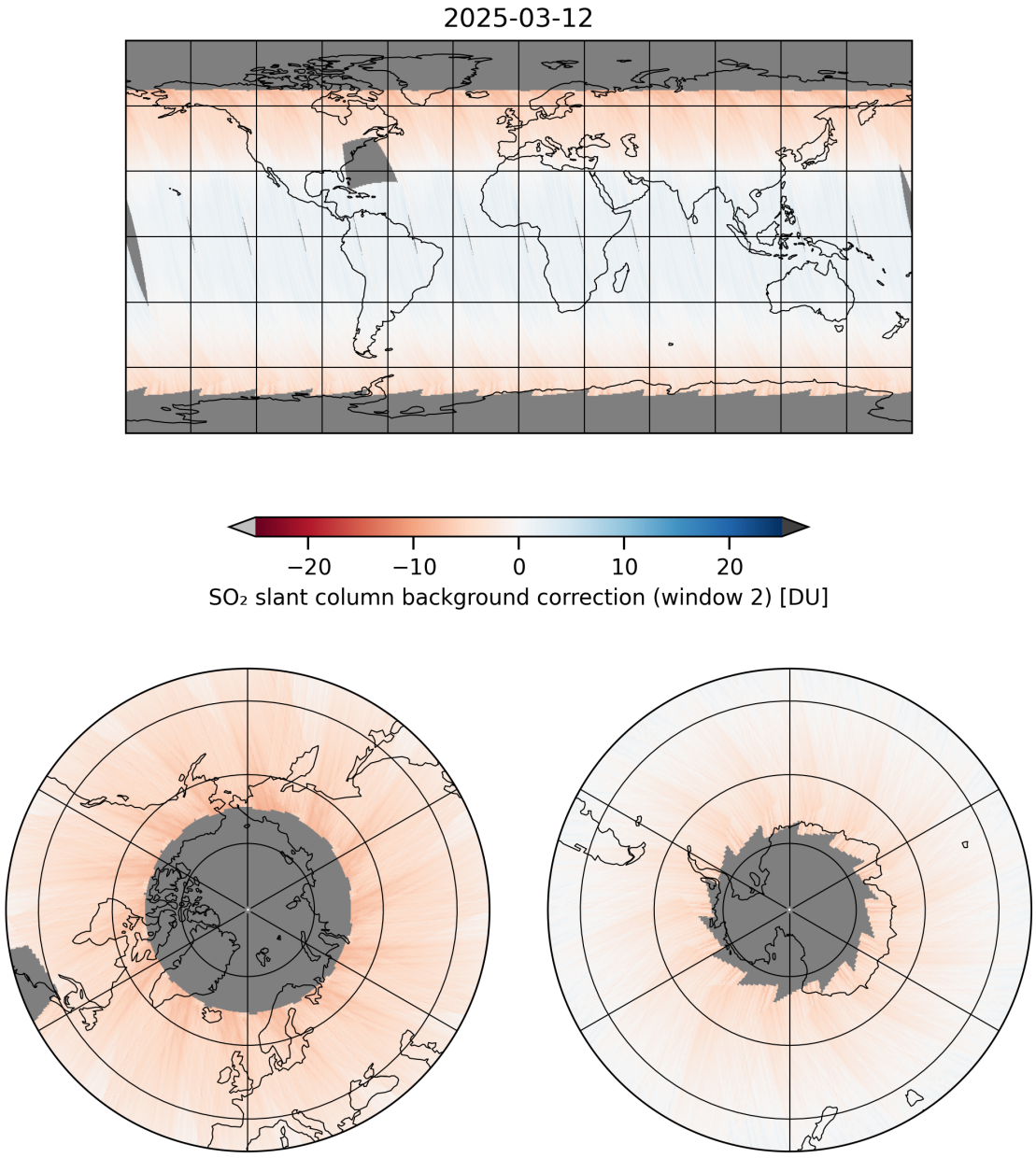


Figure 16: Map of "SO_2 slant column background correction (window 2)" for 2025-03-12 to 2025-03-13

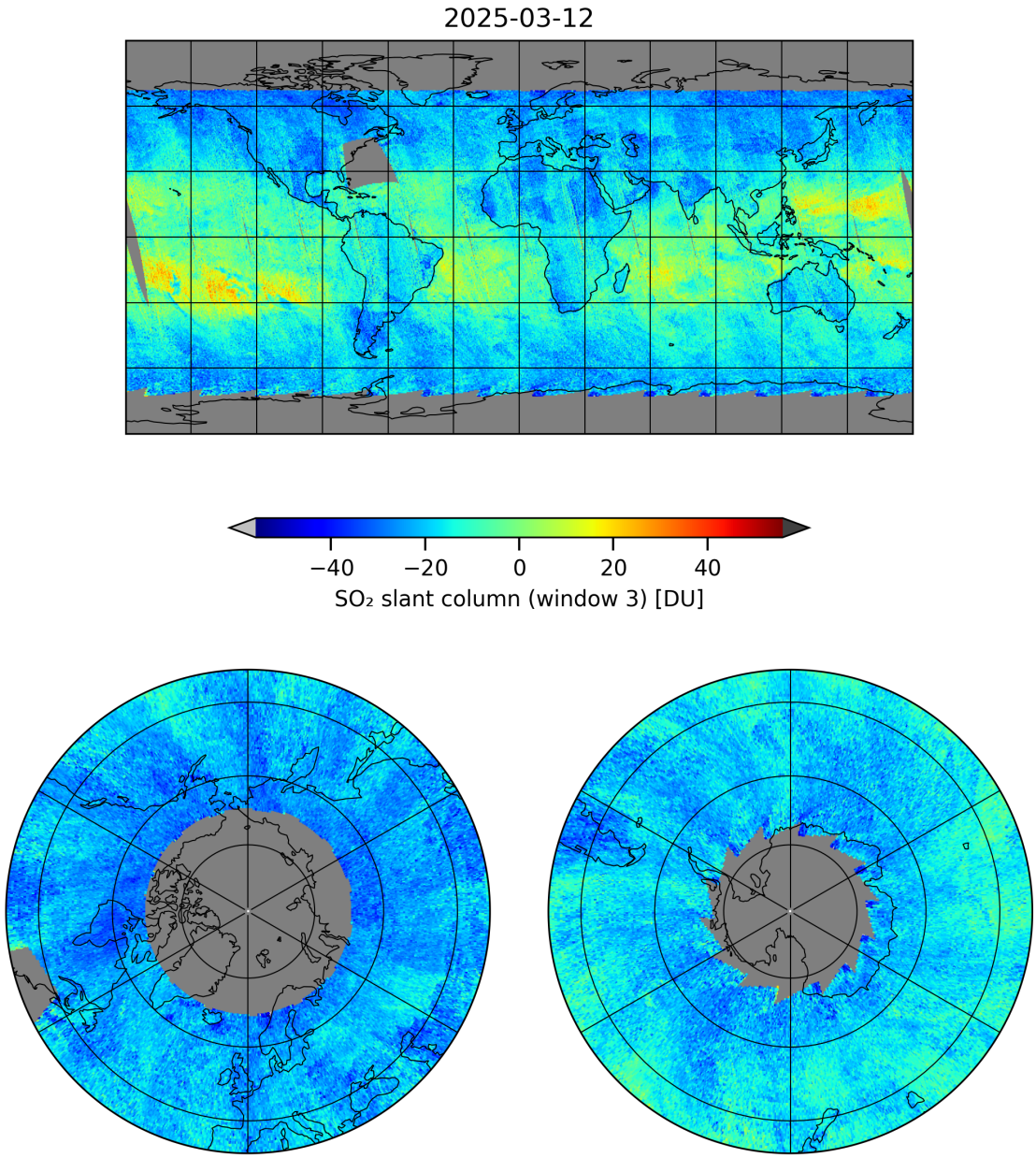


Figure 17: Map of "SO_2 slant column (window 3)" for 2025-03-12 to 2025-03-13

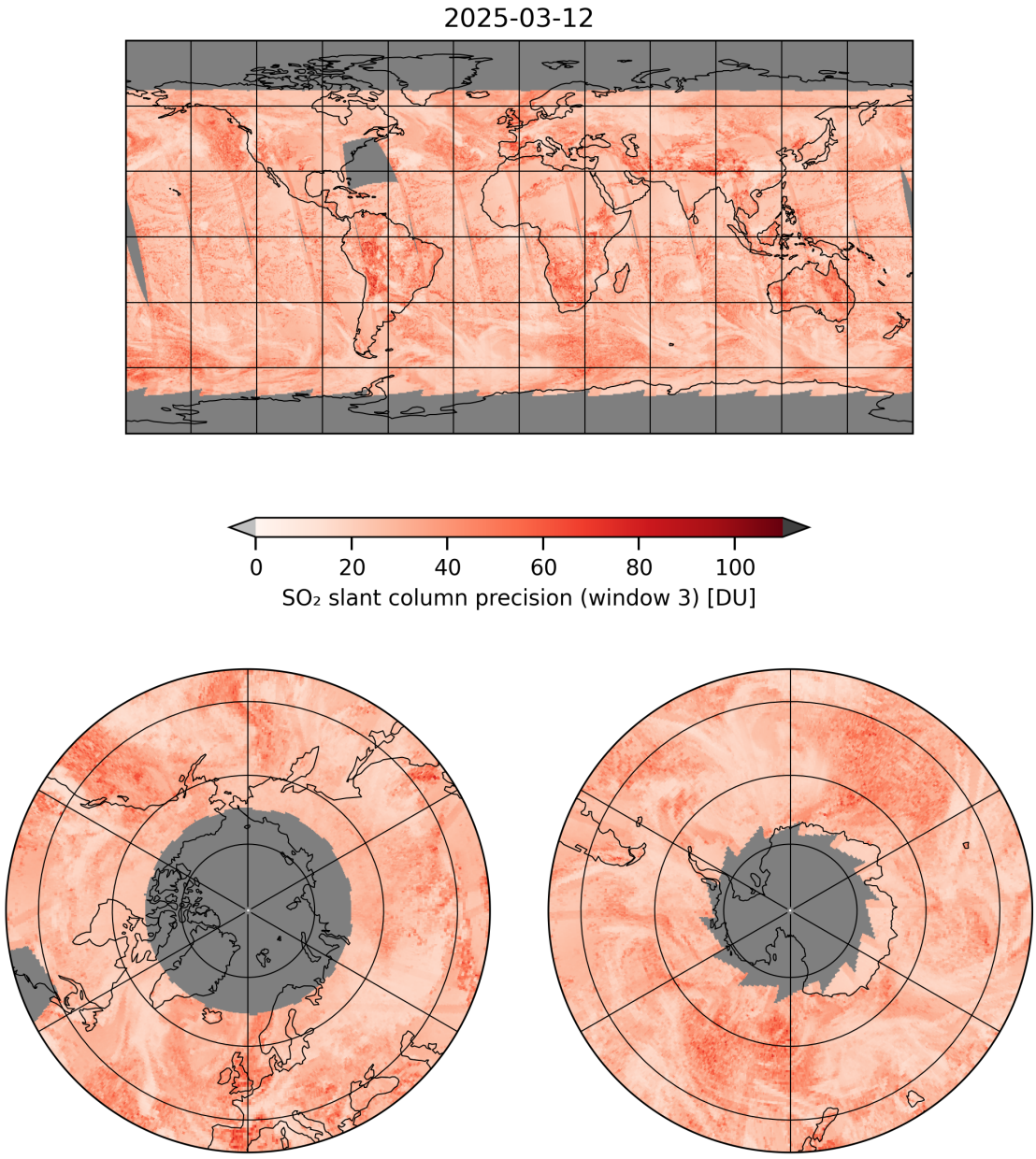


Figure 18: Map of "SO_2 slant column precision (window 3)" for 2025-03-12 to 2025-03-13

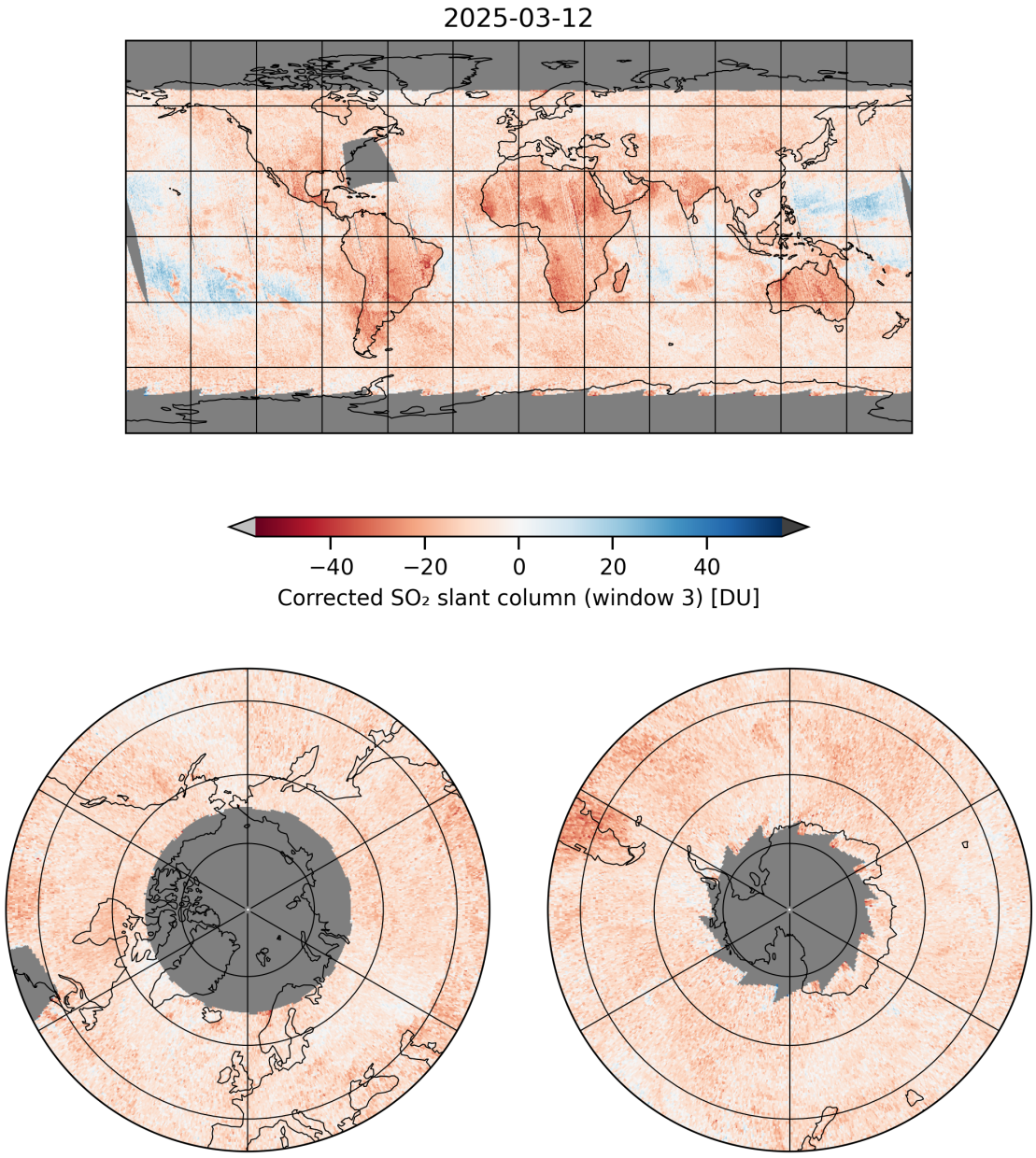


Figure 19: Map of "Corrected SO_2 slant column (window 3)" for 2025-03-12 to 2025-03-13

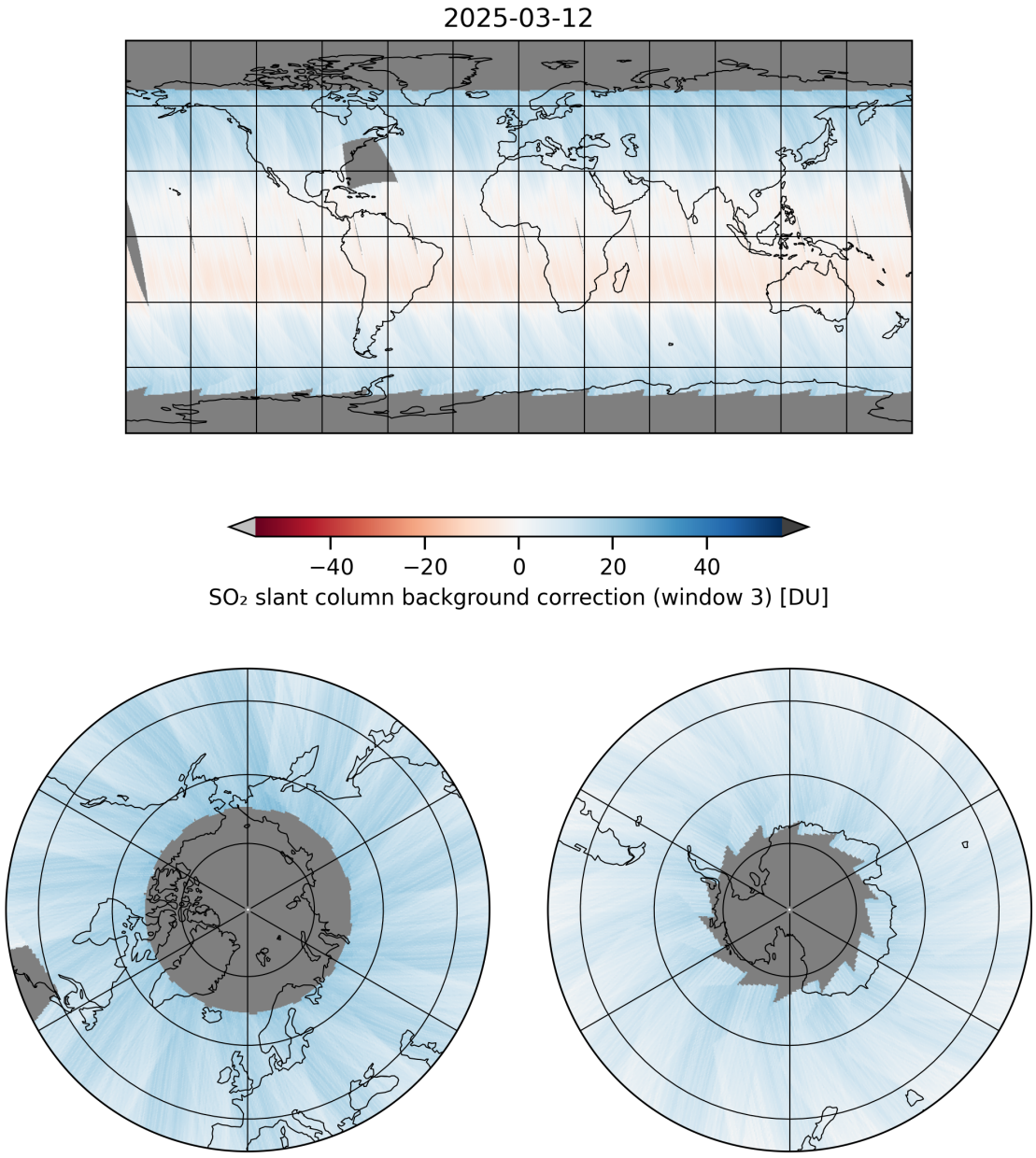


Figure 20: Map of "SO_2 slant column background correction (window 3)" for 2025-03-12 to 2025-03-13

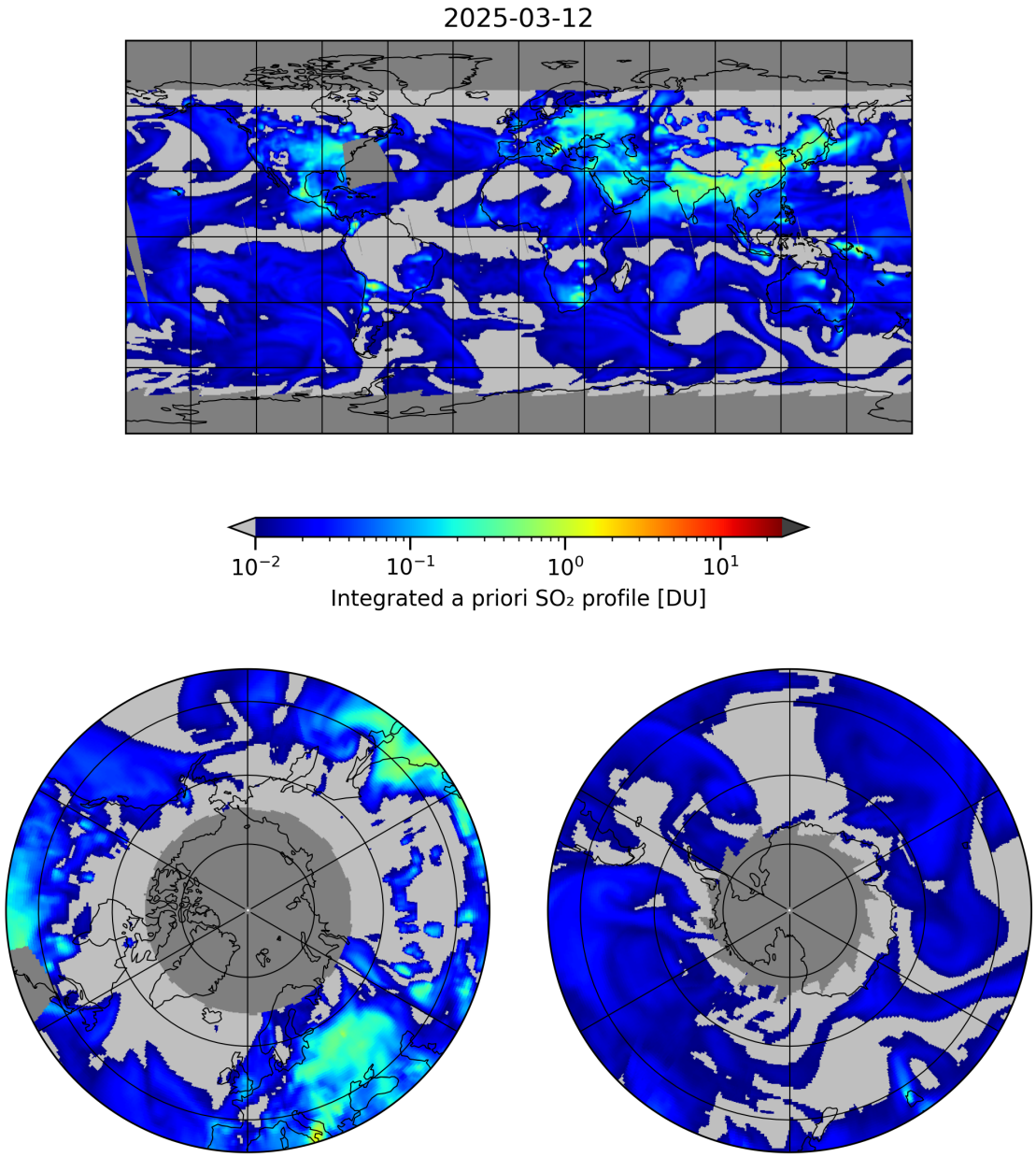


Figure 21: Map of “Integrated a priori SO_2 profile” for 2025-03-12 to 2025-03-13

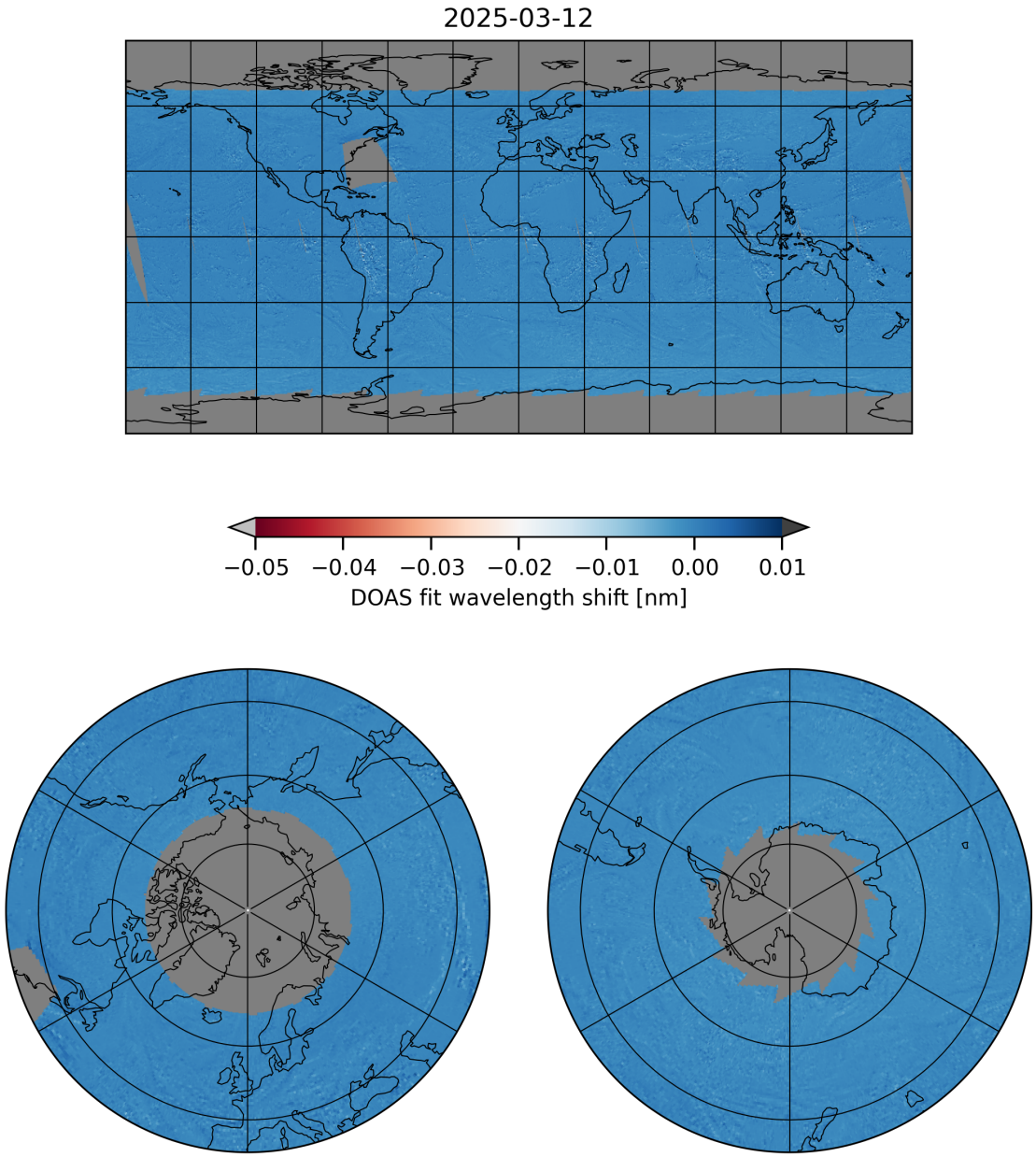


Figure 22: Map of “DOAS fit wavelength shift” for 2025-03-12 to 2025-03-13

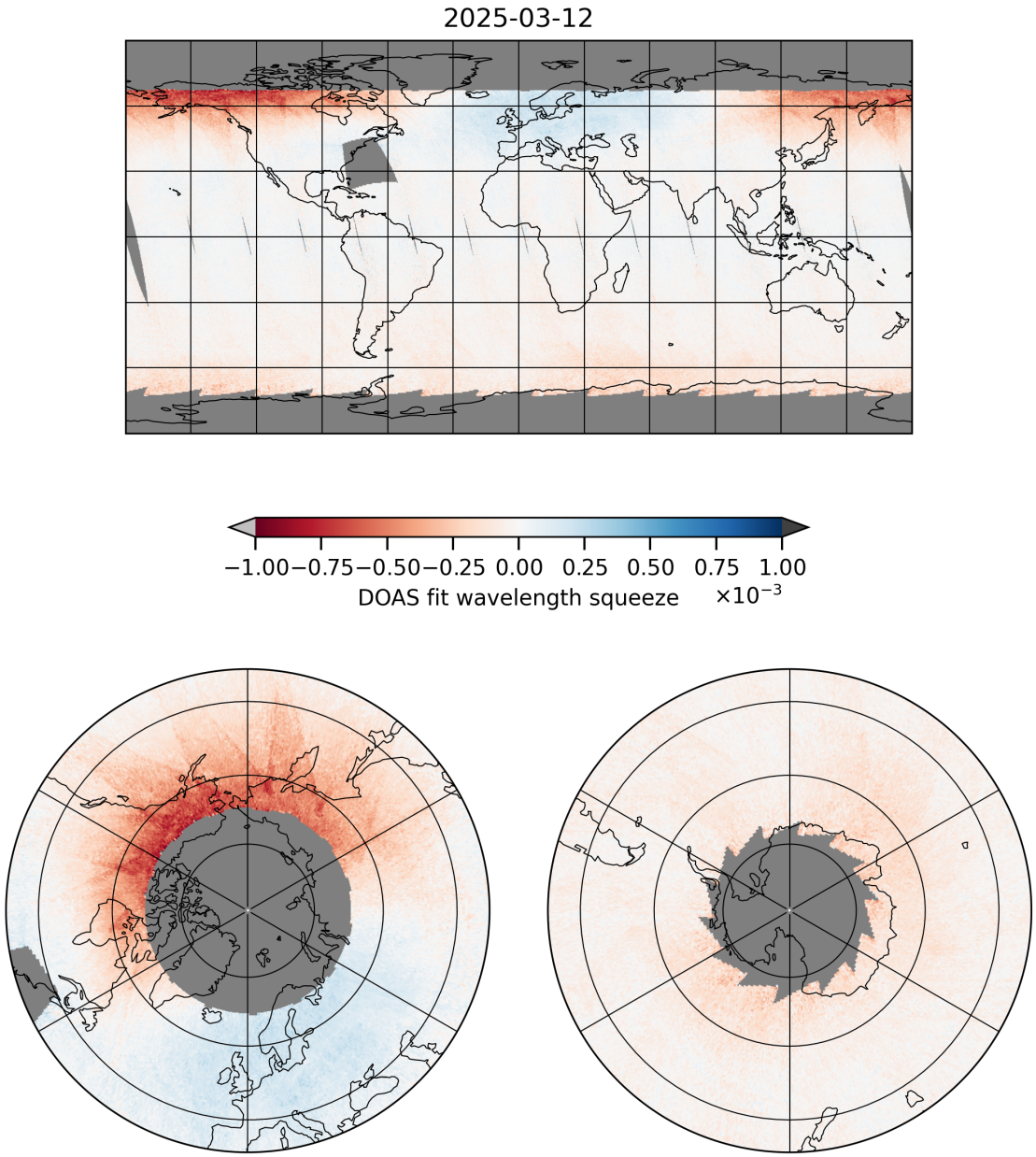


Figure 23: Map of “DOAS fit wavelength squeeze” for 2025-03-12 to 2025-03-13

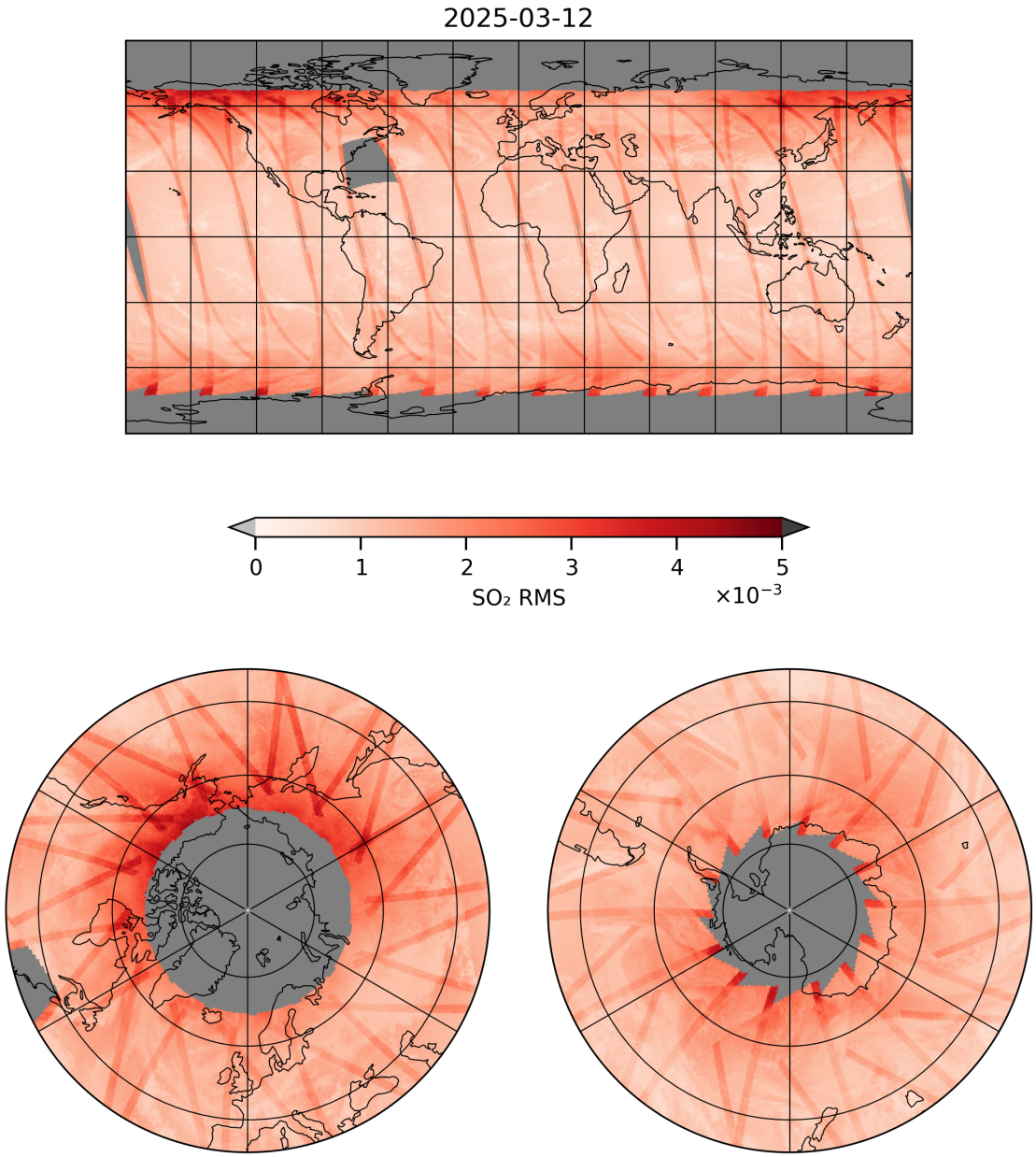


Figure 24: Map of "SO_2 RMS" for 2025-03-12 to 2025-03-13

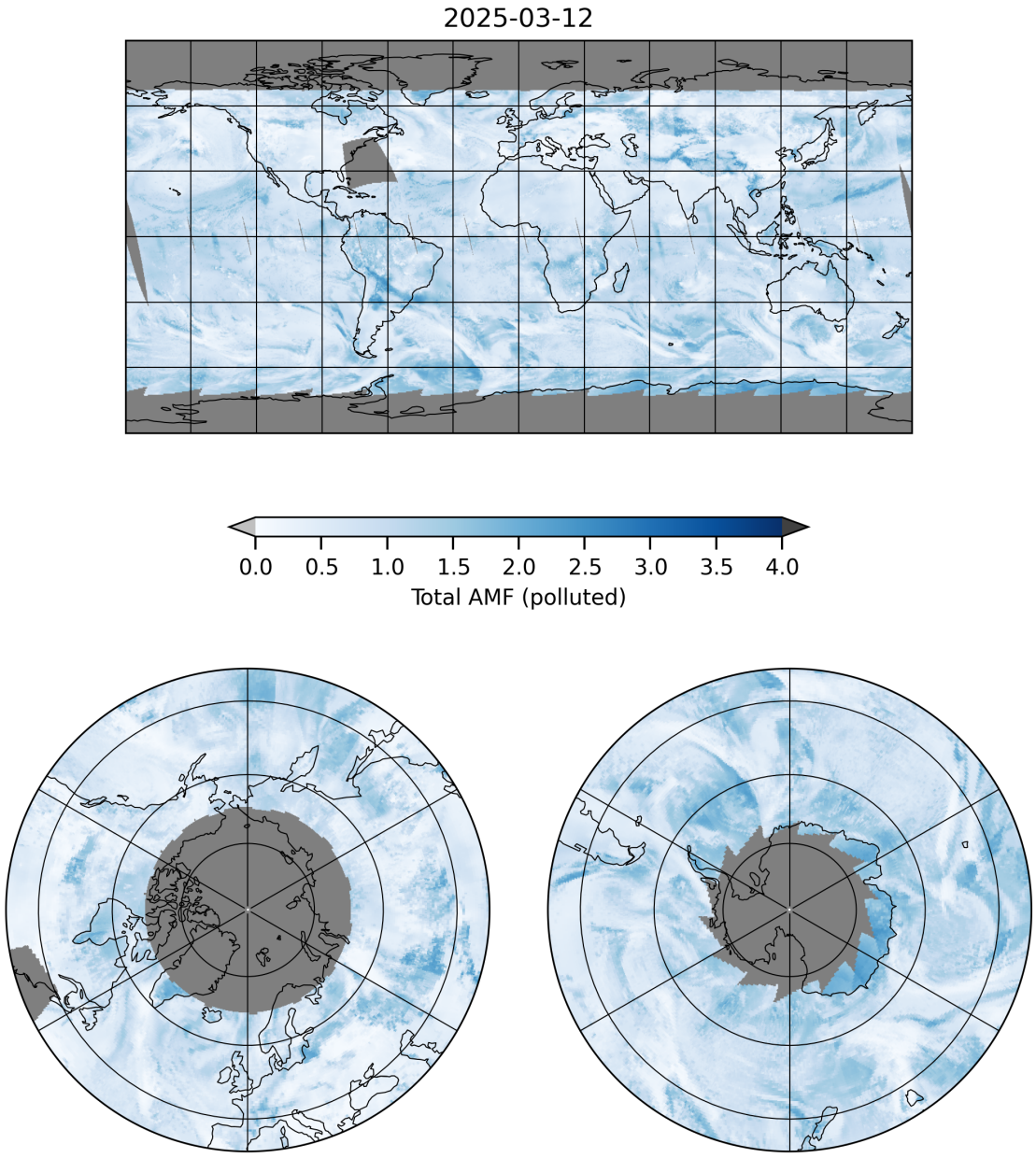


Figure 25: Map of “Total AMF (polluted)” for 2025-03-12 to 2025-03-13

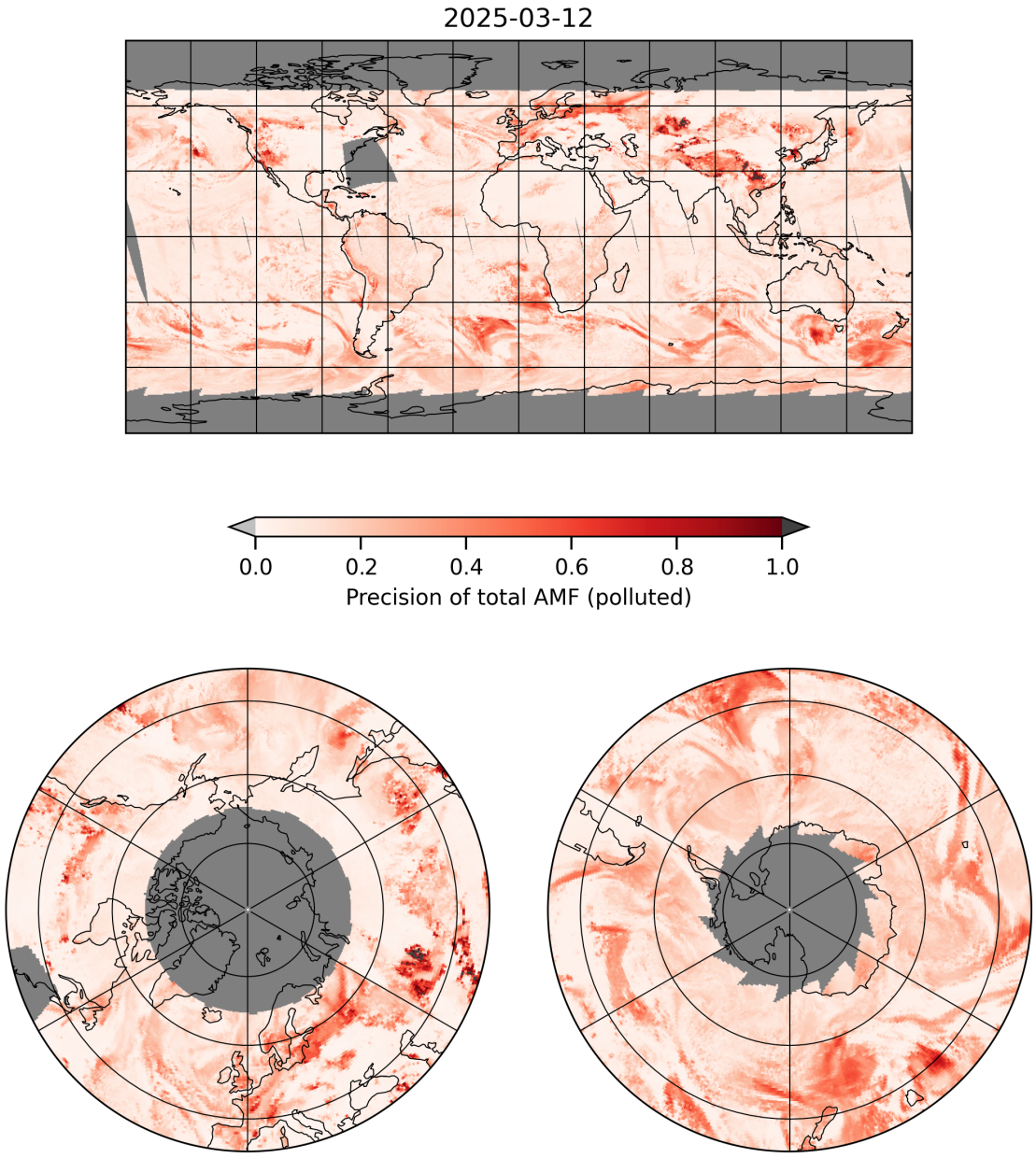


Figure 26: Map of “Precision of total AMF (polluted)” for 2025-03-12 to 2025-03-13

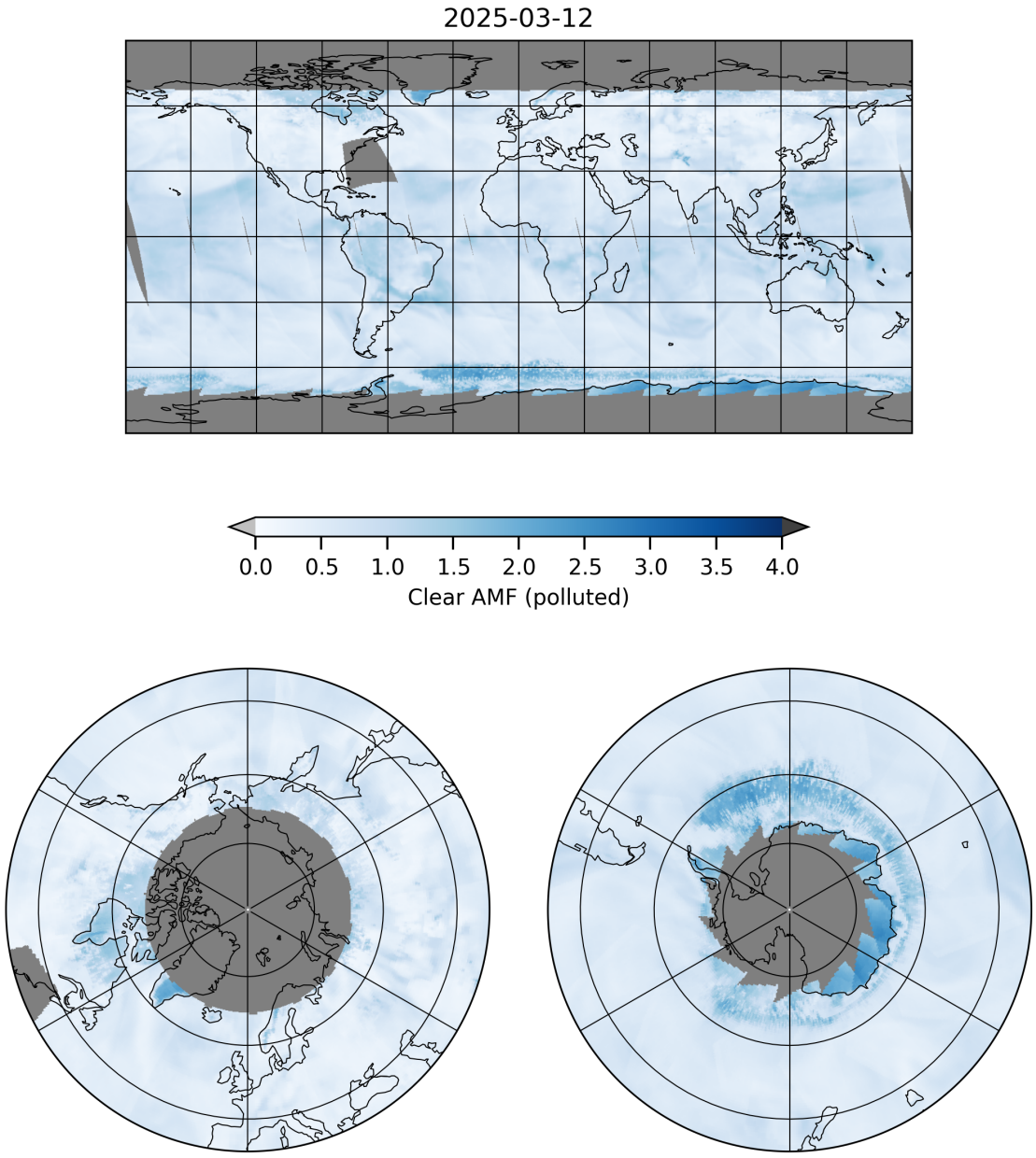


Figure 27: Map of “Clear AMF (polluted)” for 2025-03-12 to 2025-03-13

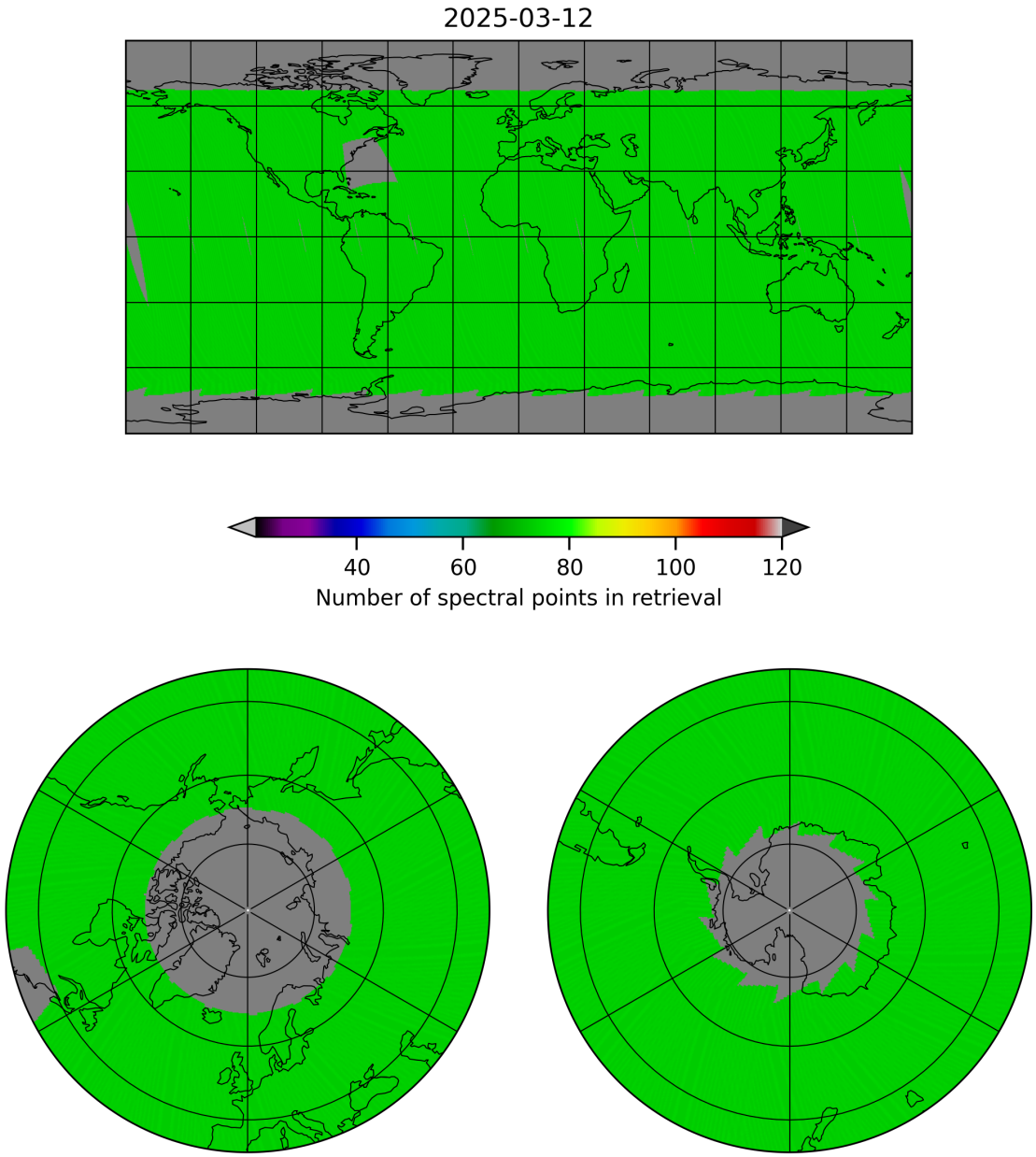


Figure 28: Map of “Number of spectral points in retrieval” for 2025-03-12 to 2025-03-13

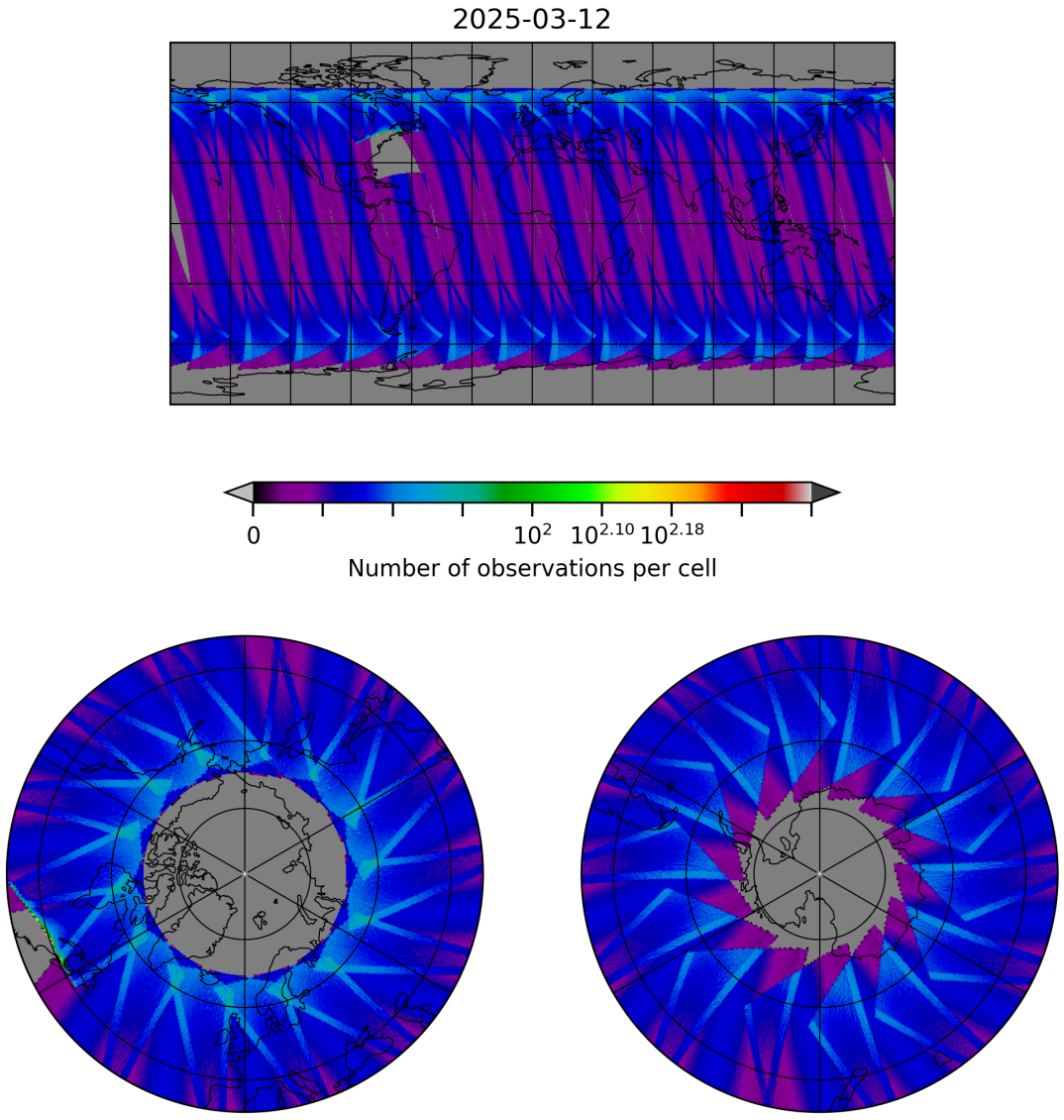


Figure 29: Map of the number of observations for 2025-03-12 to 2025-03-13

7 Zonal average

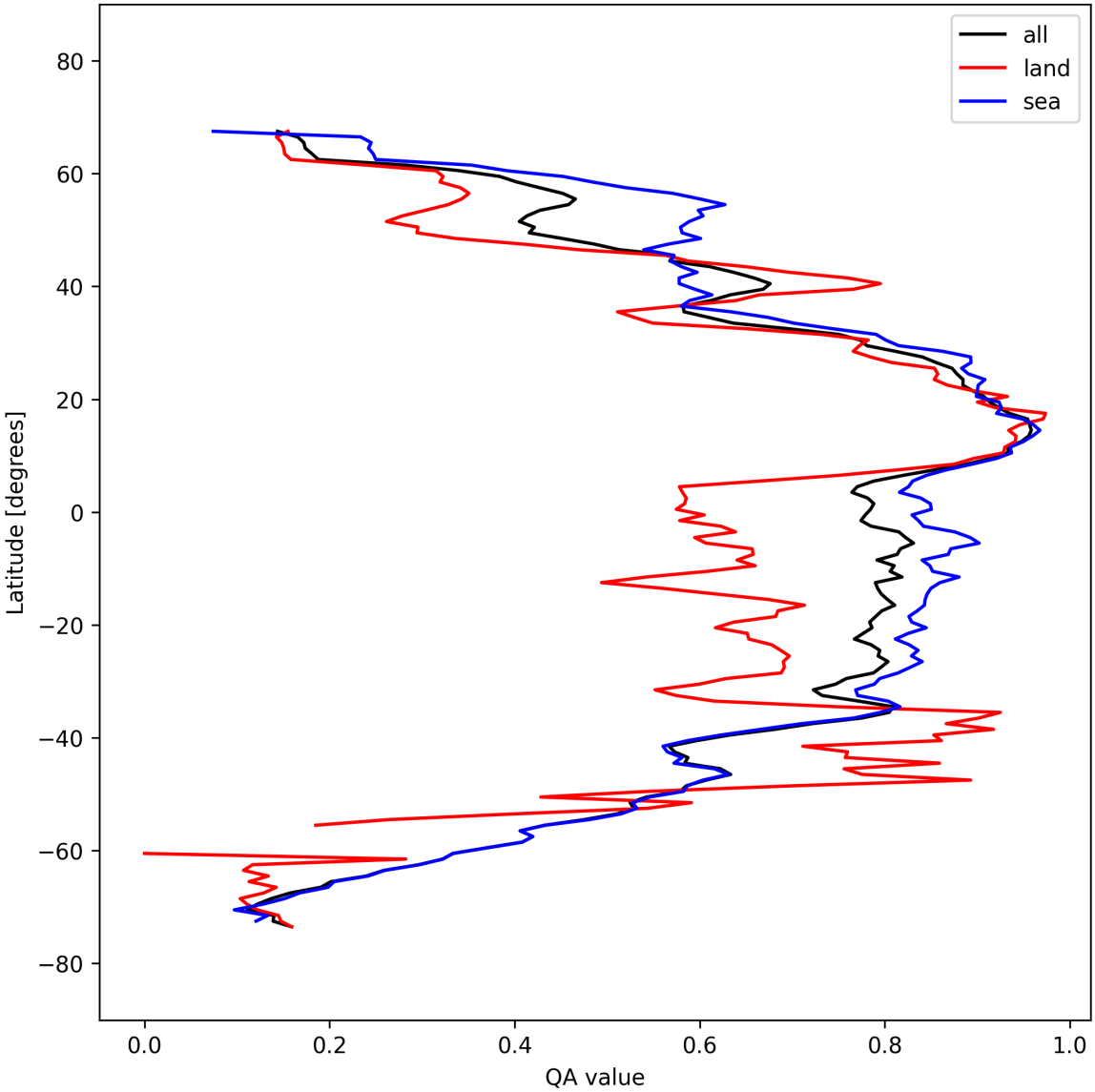


Figure 30: Zonal average of “QA value” for 2025-03-12 to 2025-03-13.

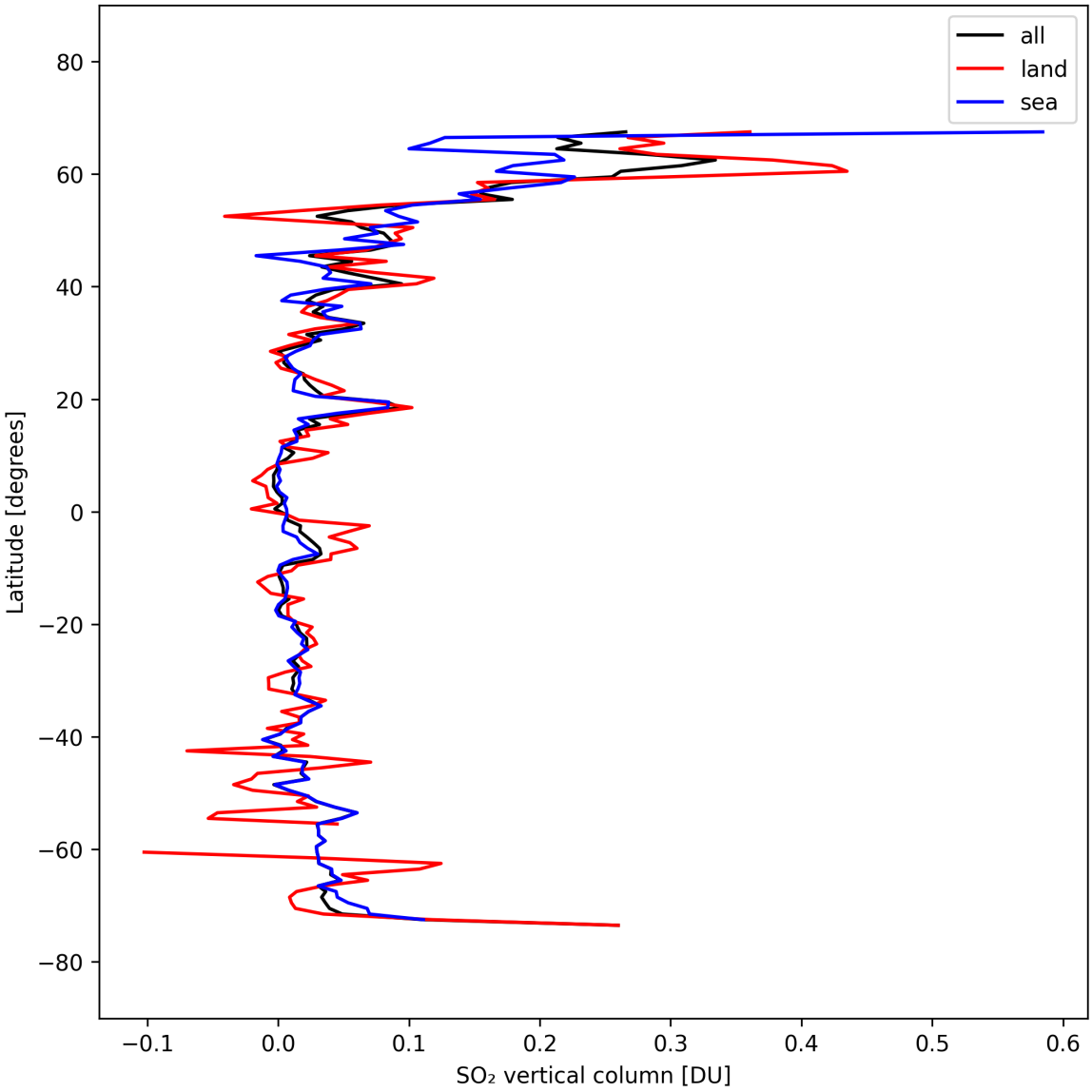


Figure 31: Zonal average of "SO_2 vertical column" for 2025-03-12 to 2025-03-13.

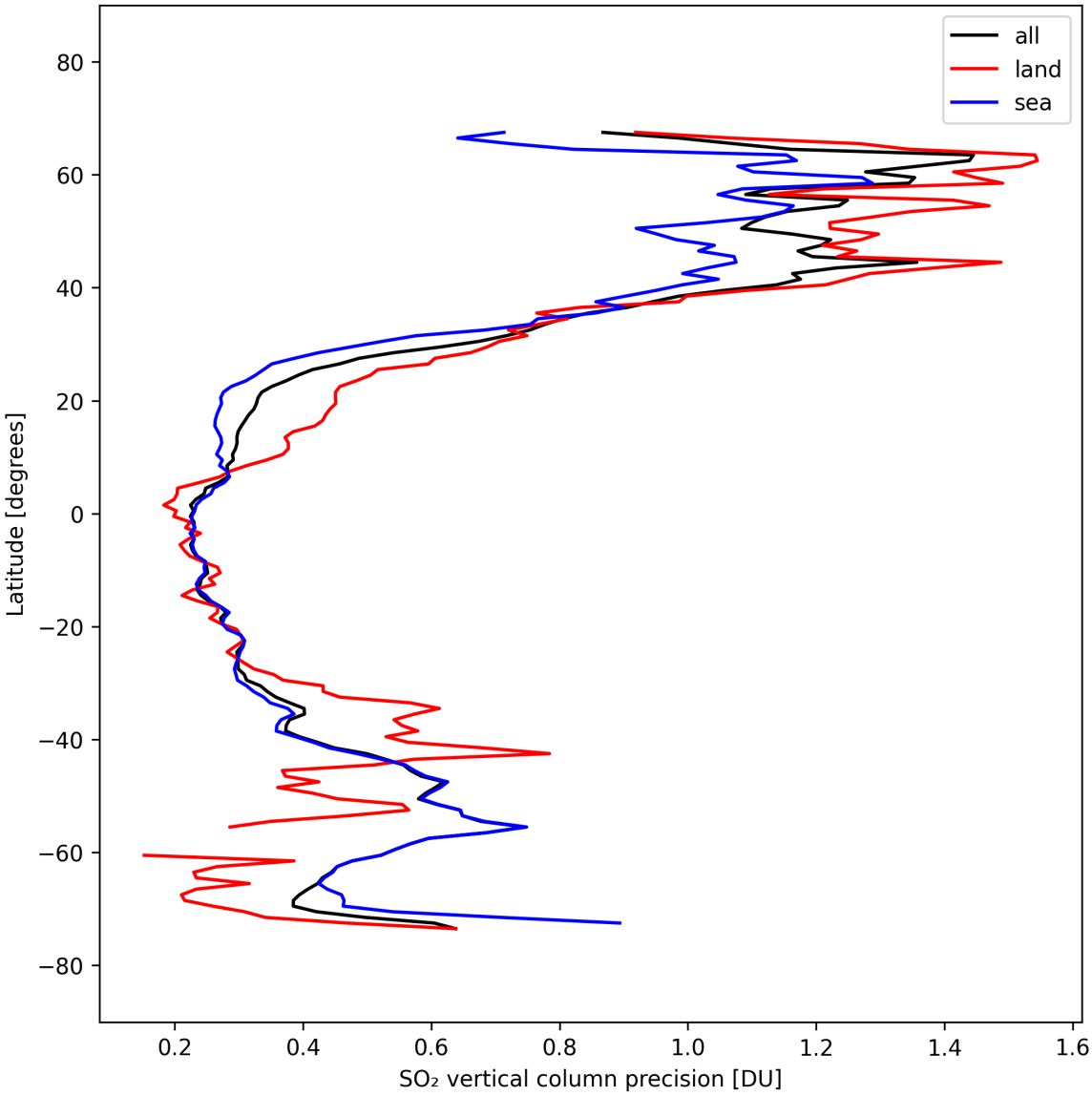


Figure 32: Zonal average of "SO_2 vertical column precision" for 2025-03-12 to 2025-03-13.

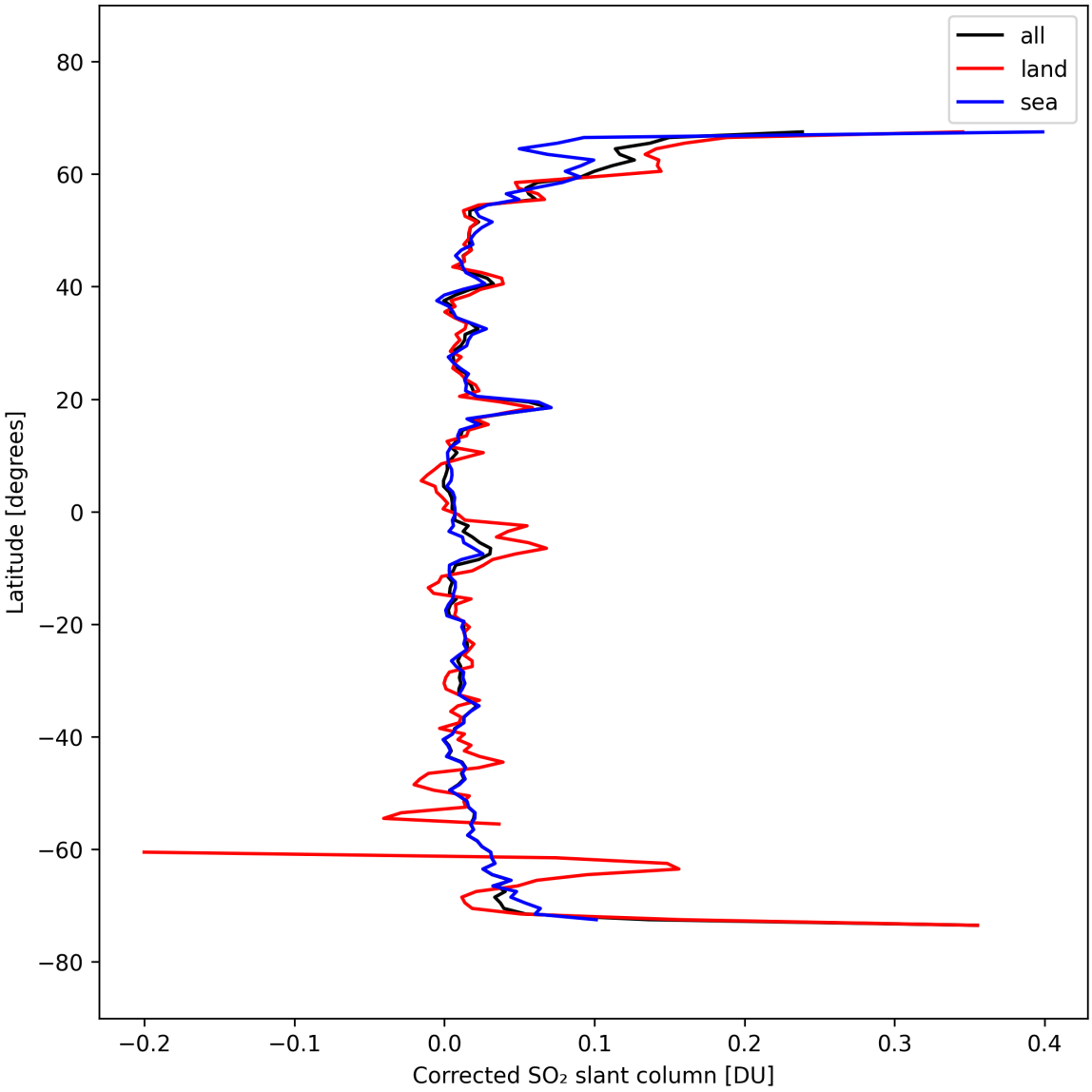


Figure 33: Zonal average of “Corrected SO_2 slant column” for 2025-03-12 to 2025-03-13.

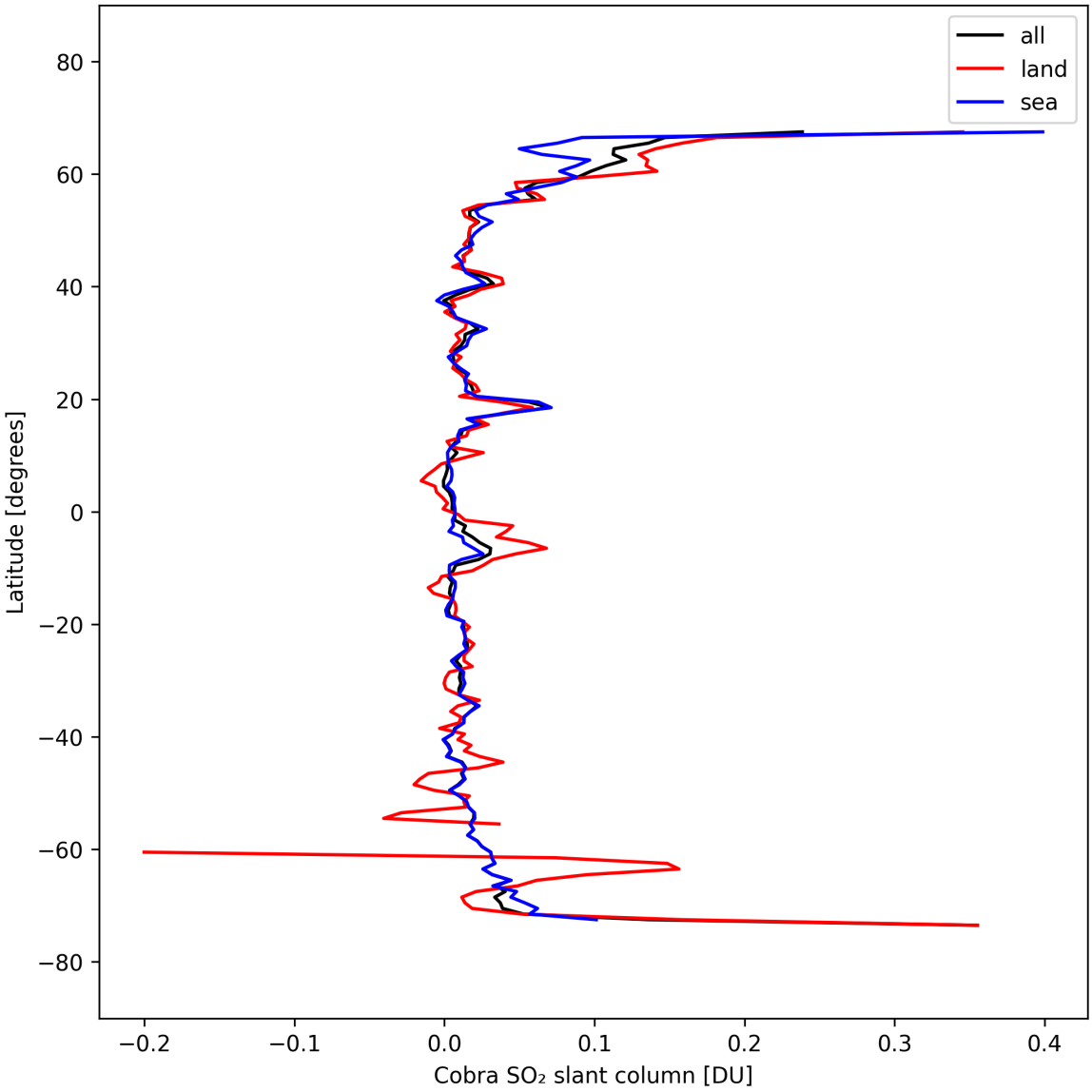


Figure 34: Zonal average of “Cobra SO_2 slant column” for 2025-03-12 to 2025-03-13.

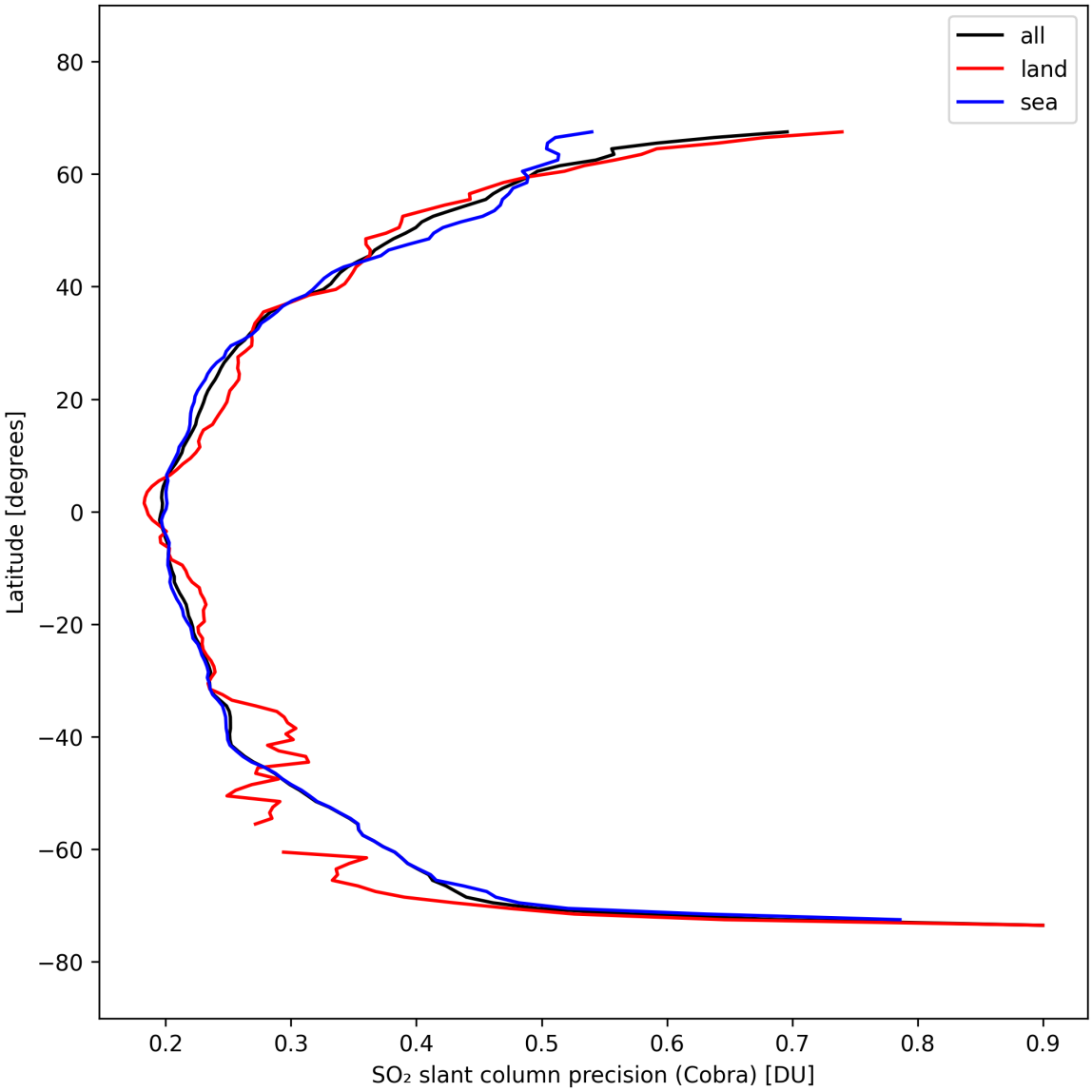


Figure 35: Zonal average of "SO_2 slant column precision (Cobra)" for 2025-03-12 to 2025-03-13.

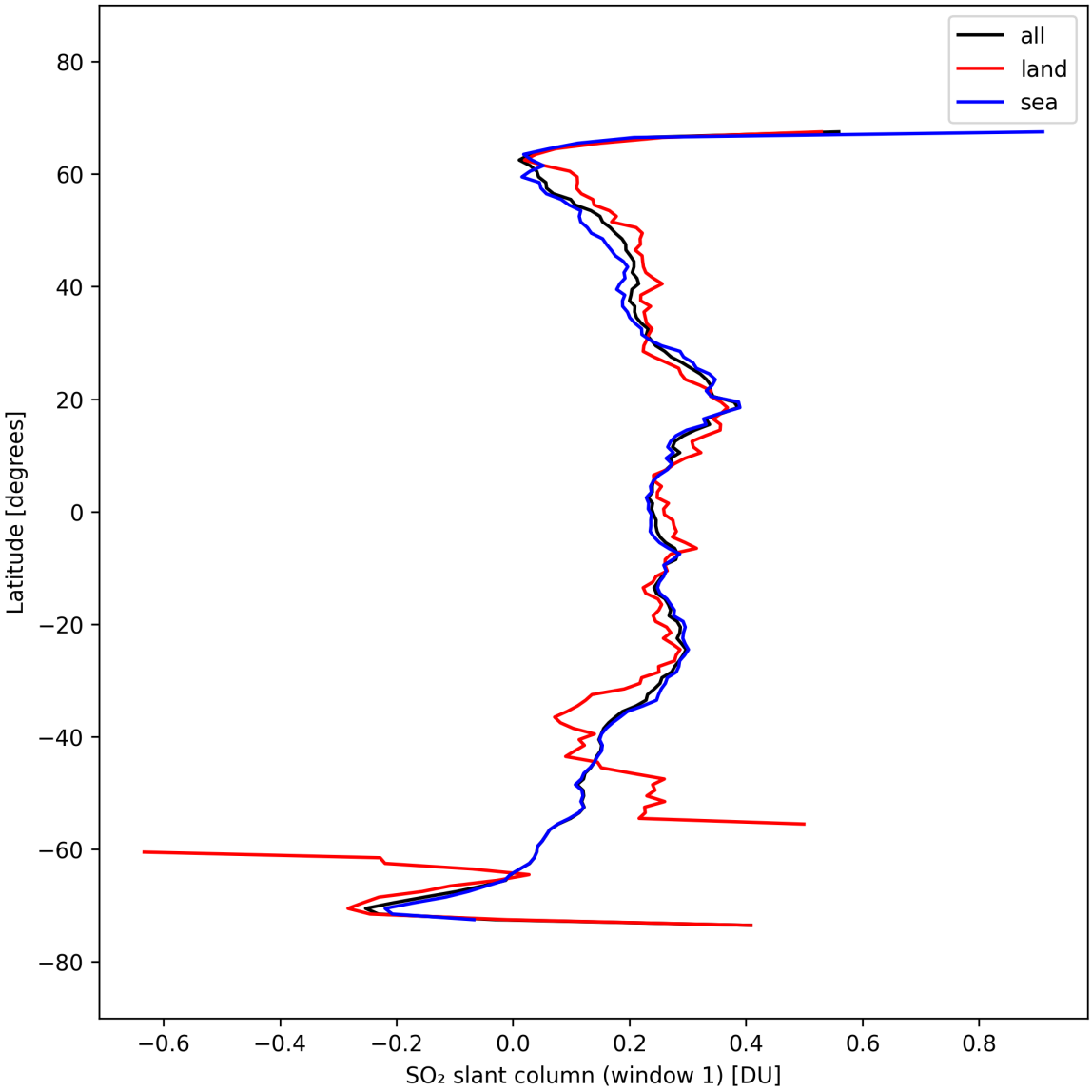


Figure 36: Zonal average of "SO_2 slant column (window 1)" for 2025-03-12 to 2025-03-13.

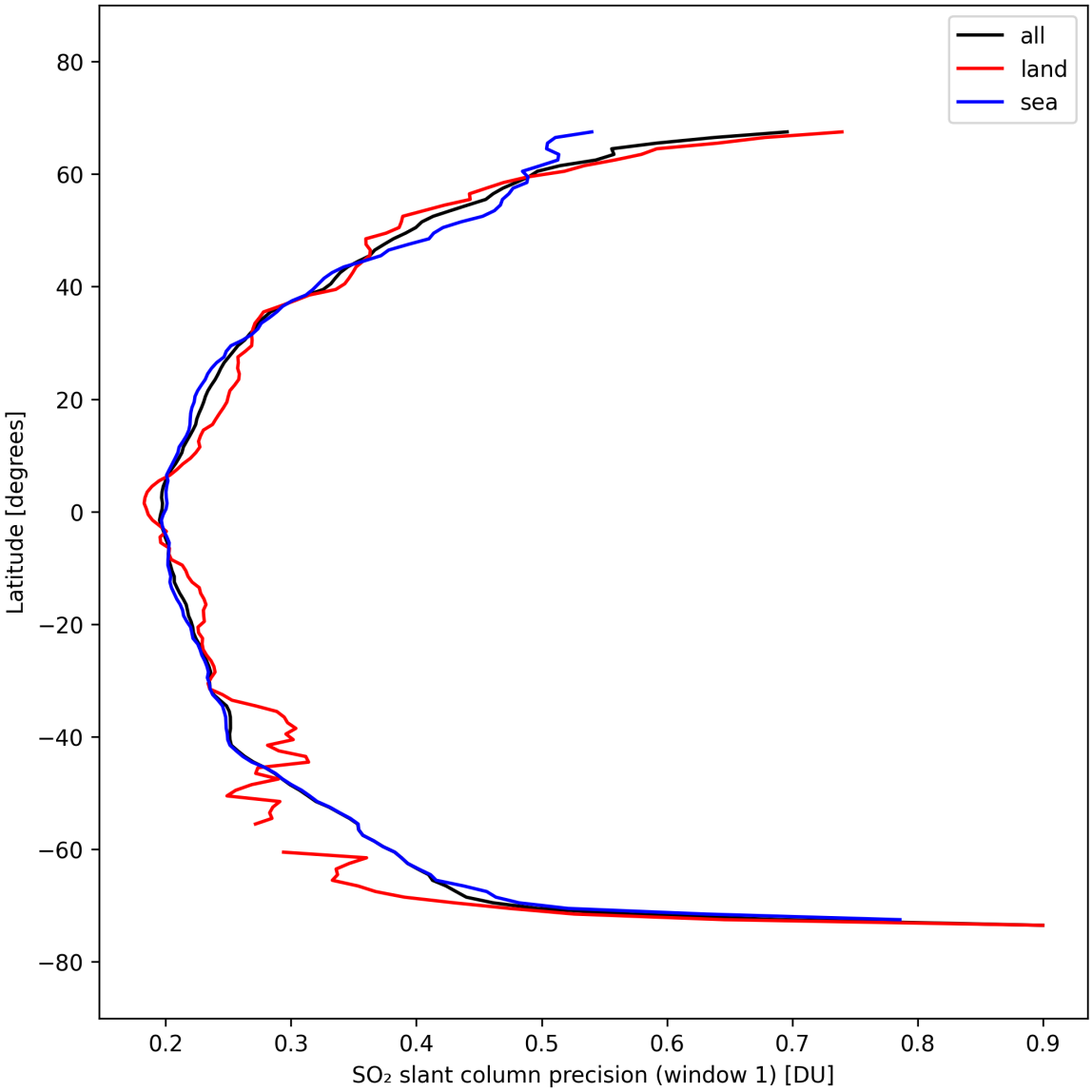


Figure 37: Zonal average of "SO_2 slant column precision (window 1)" for 2025-03-12 to 2025-03-13.

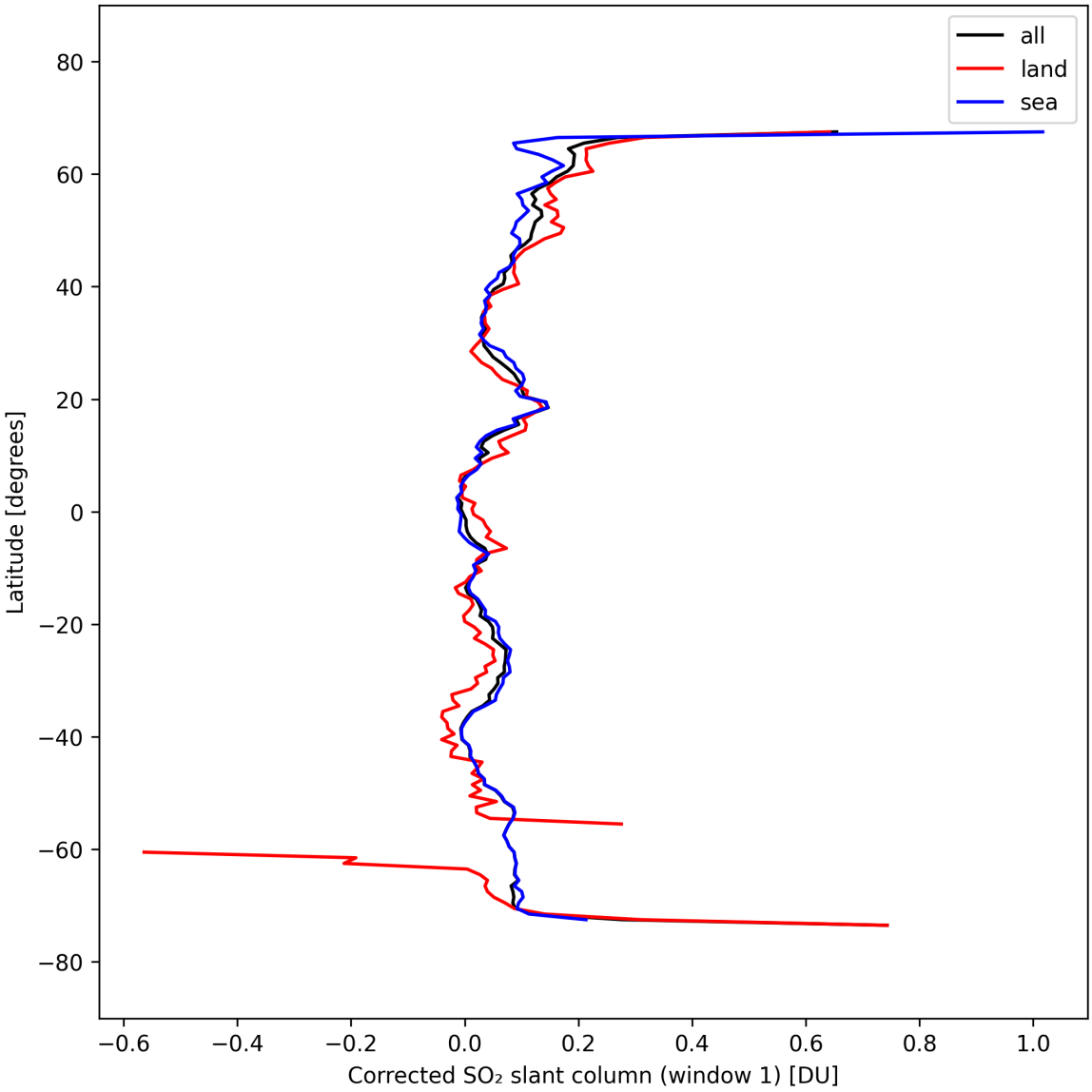


Figure 38: Zonal average of "Corrected SO_2 slant column (window 1)" for 2025-03-12 to 2025-03-13.

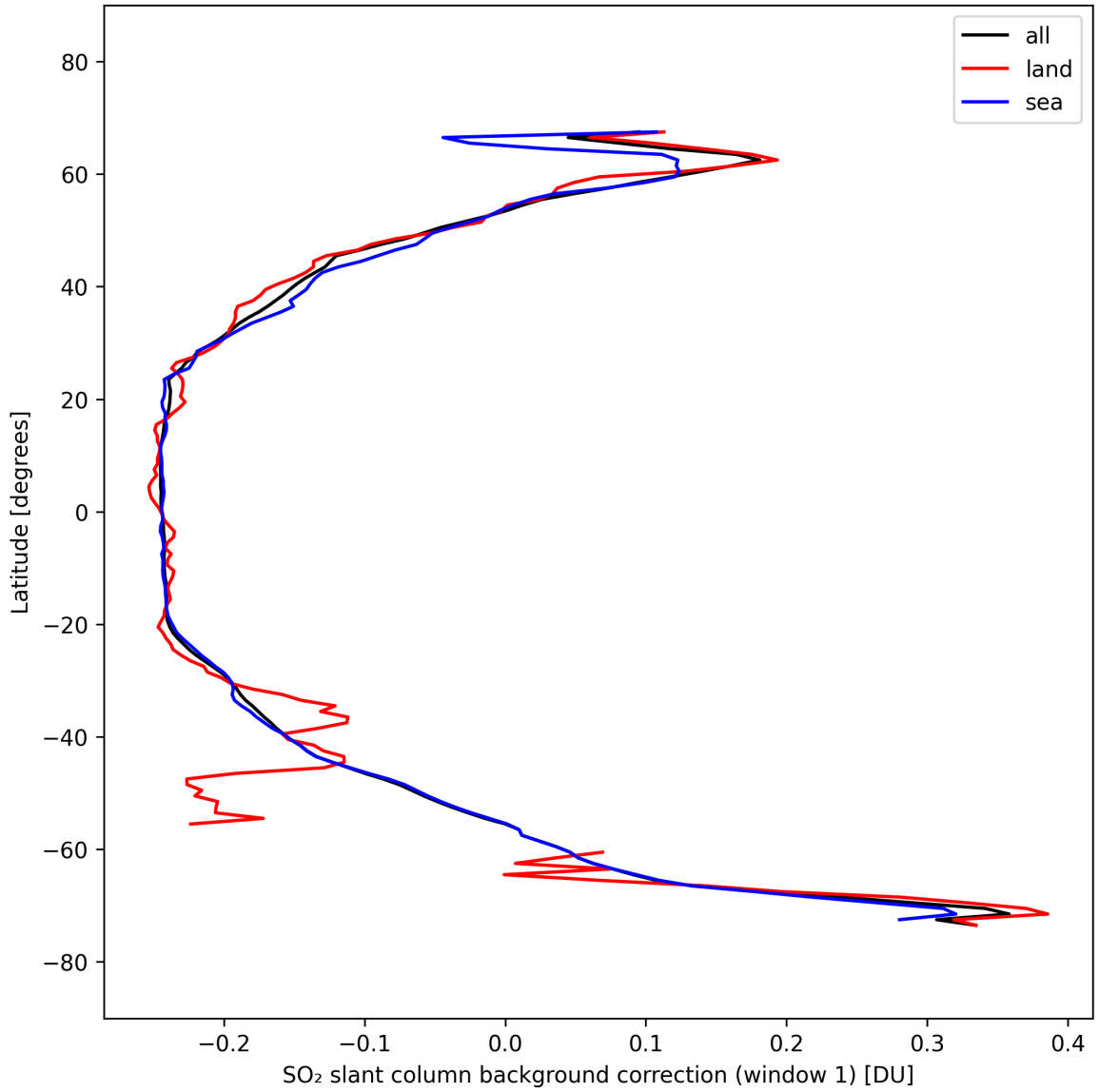


Figure 39: Zonal average of "SO_2 slant column background correction (window 1)" for 2025-03-12 to 2025-03-13.

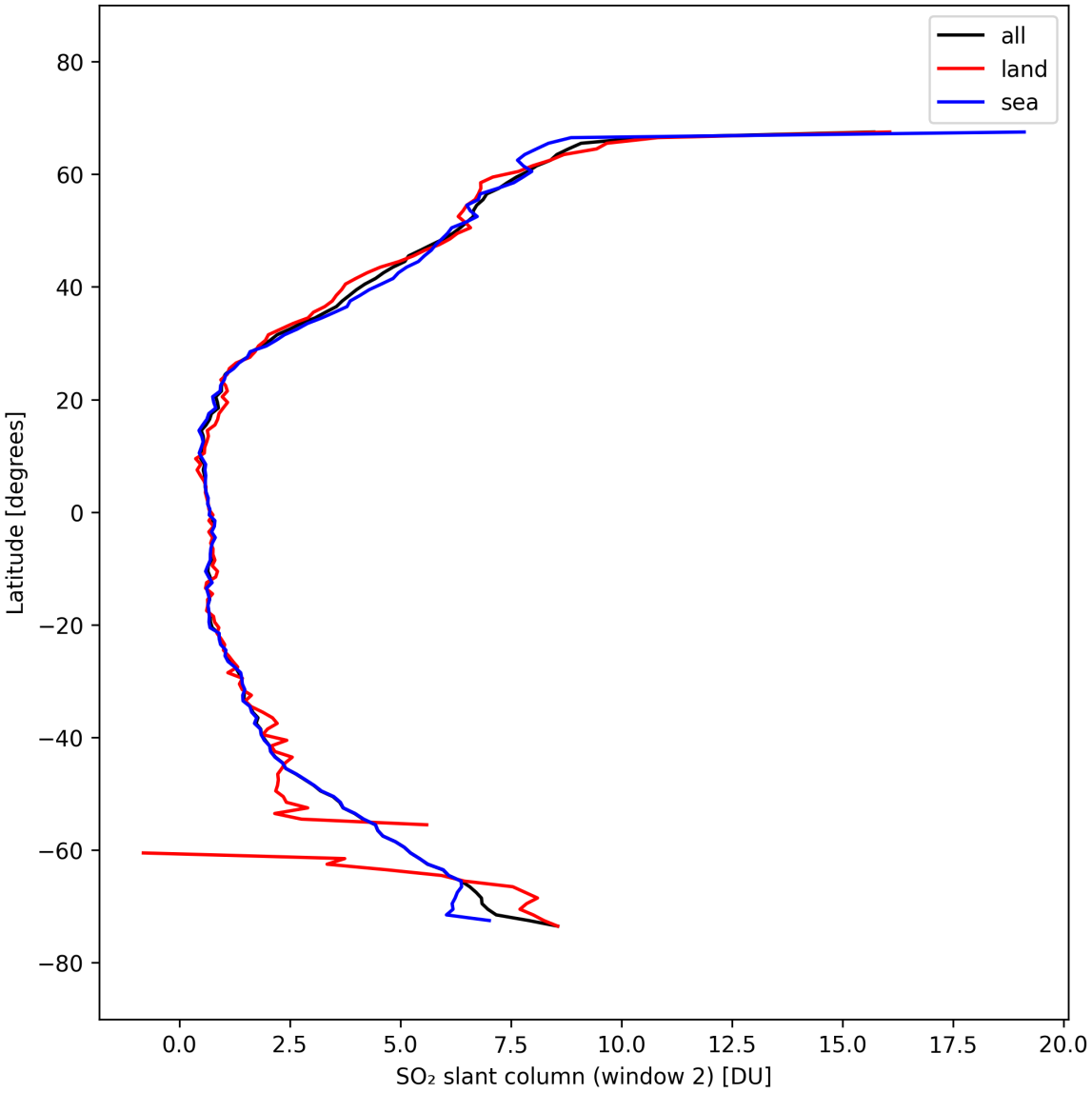


Figure 40: Zonal average of "SO_2 slant column (window 2)" for 2025-03-12 to 2025-03-13.

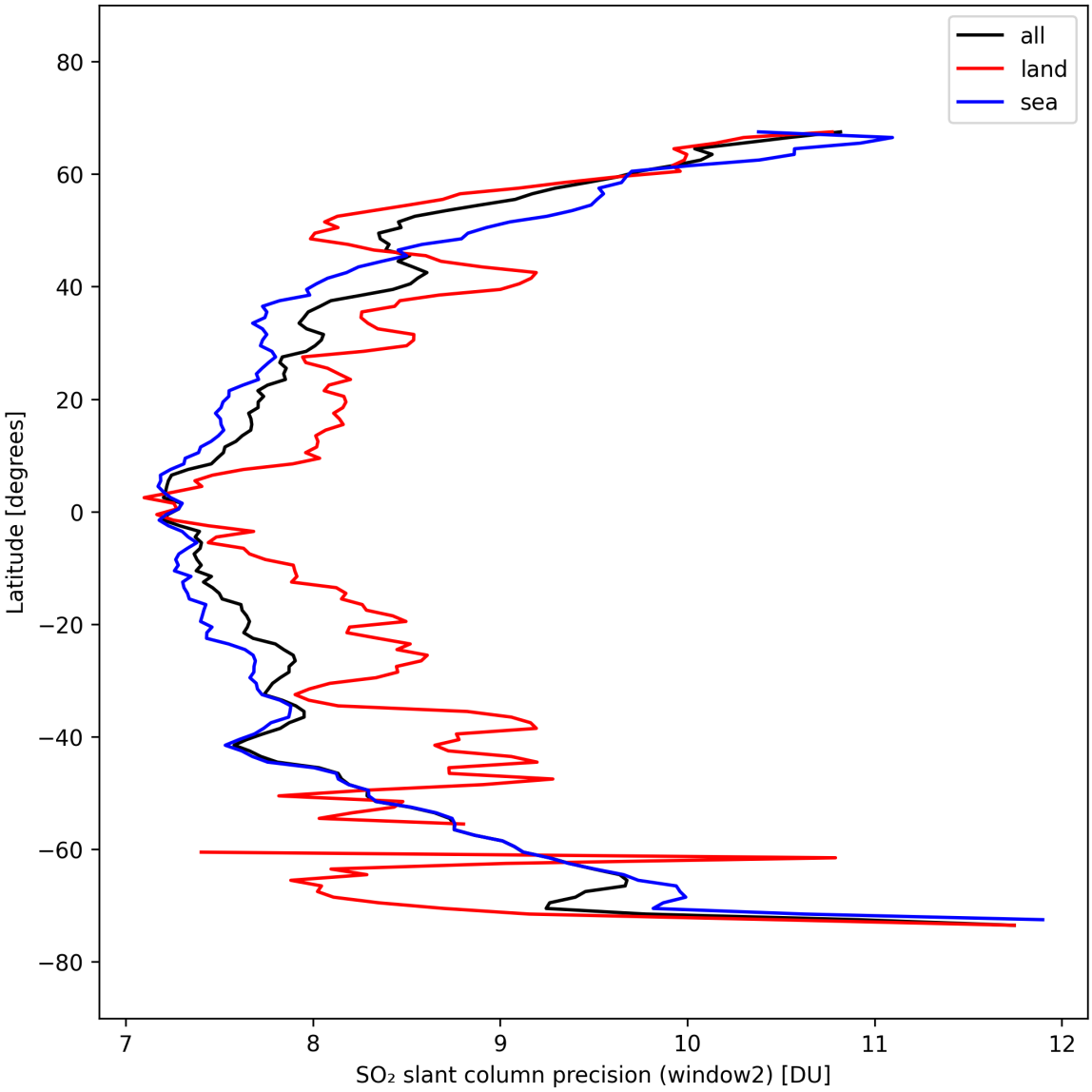


Figure 41: Zonal average of "SO_2 slant column precision (window2)" for 2025-03-12 to 2025-03-13.

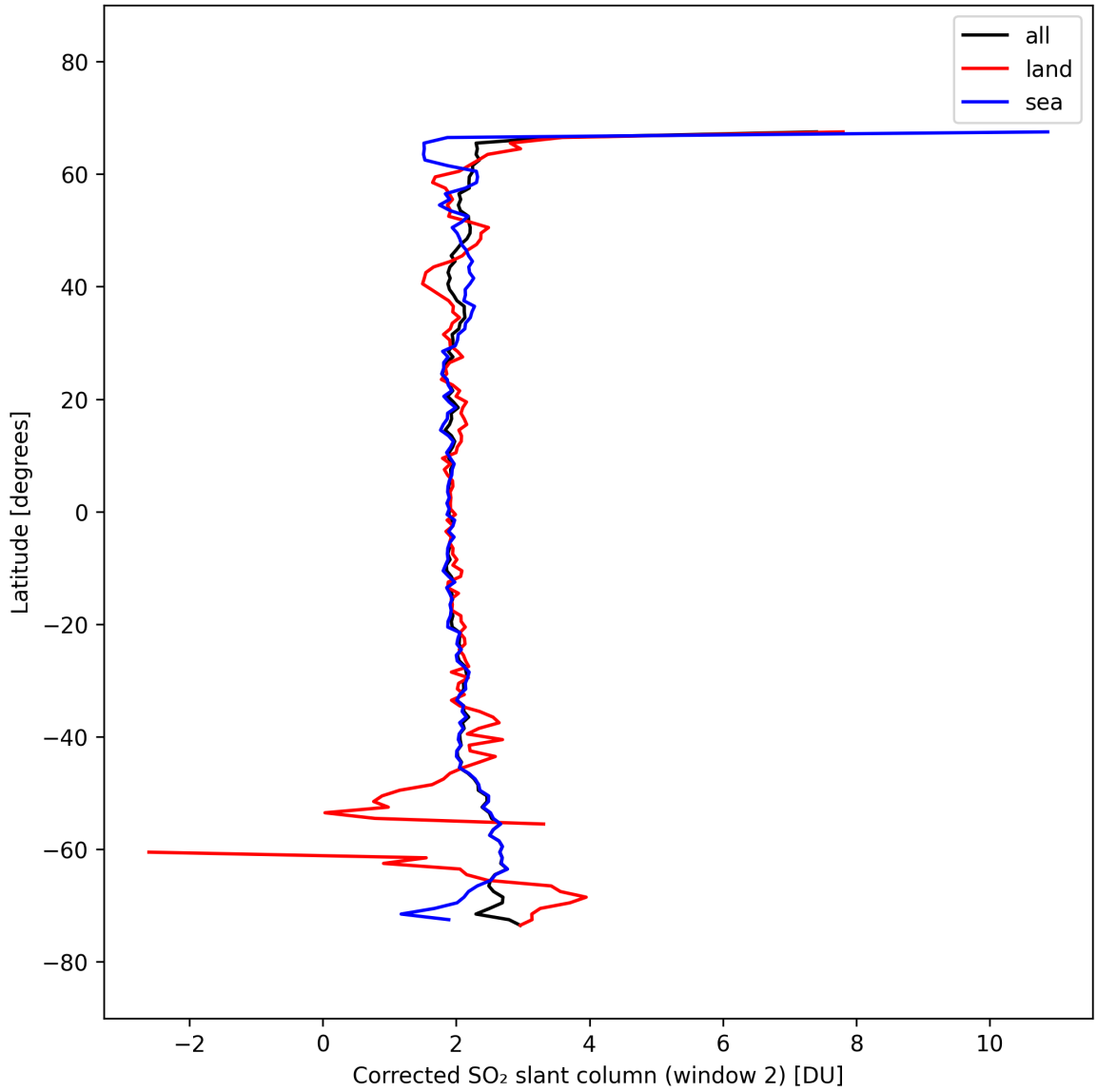


Figure 42: Zonal average of "Corrected SO_2 slant column (window 2)" for 2025-03-12 to 2025-03-13.

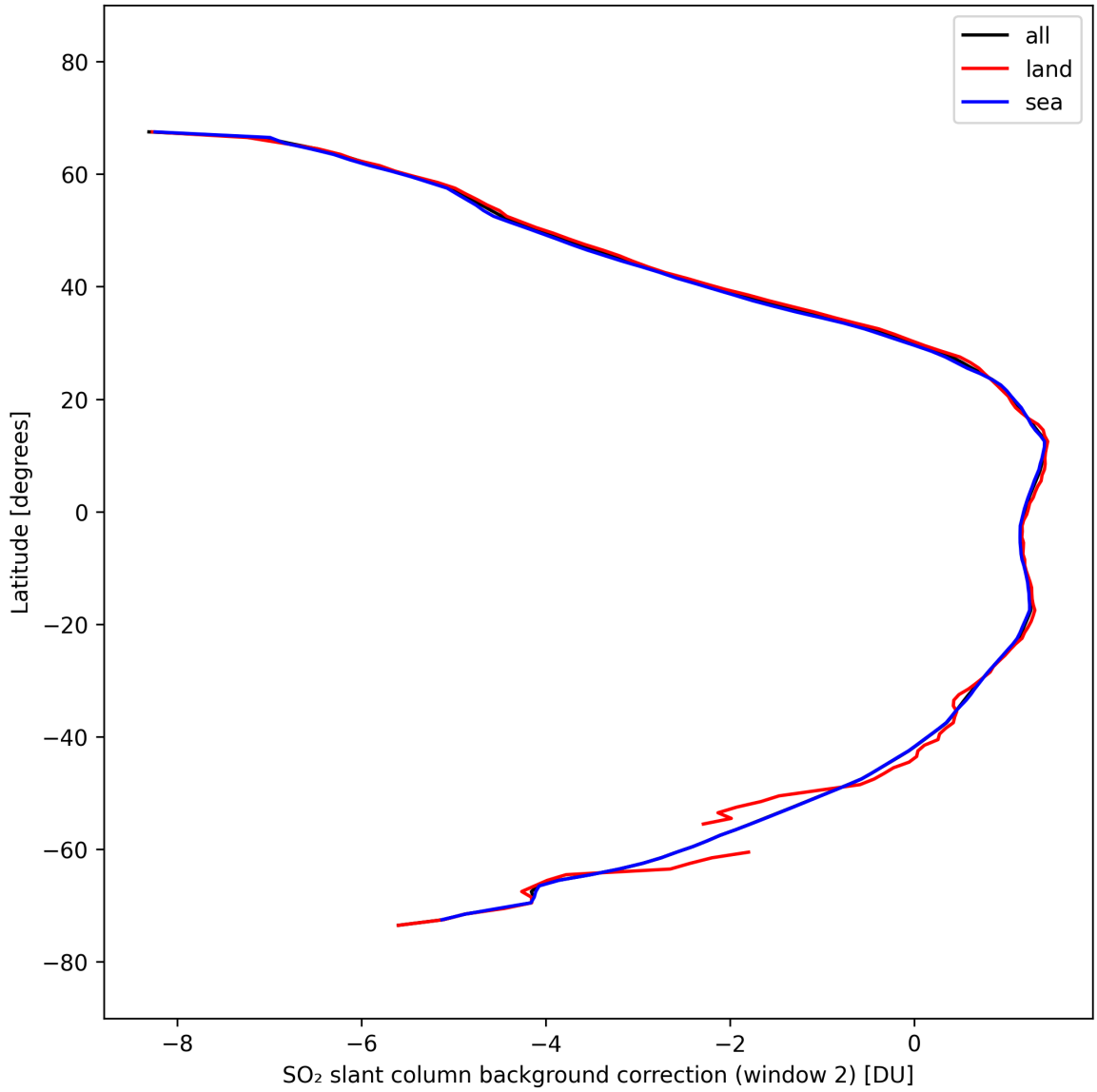


Figure 43: Zonal average of "SO_2 slant column background correction (window 2)" for 2025-03-12 to 2025-03-13.

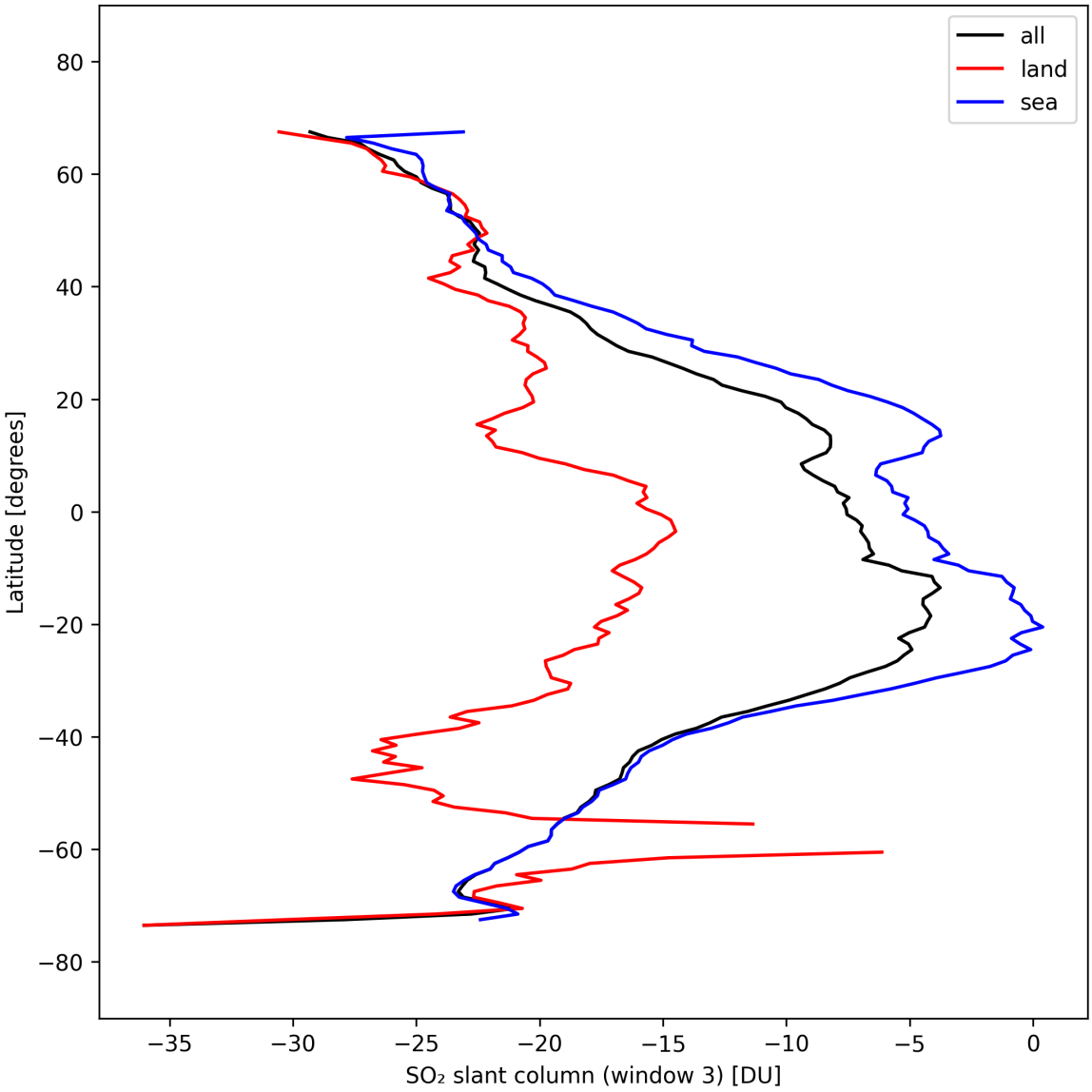


Figure 44: Zonal average of "SO_2 slant column (window 3)" for 2025-03-12 to 2025-03-13.

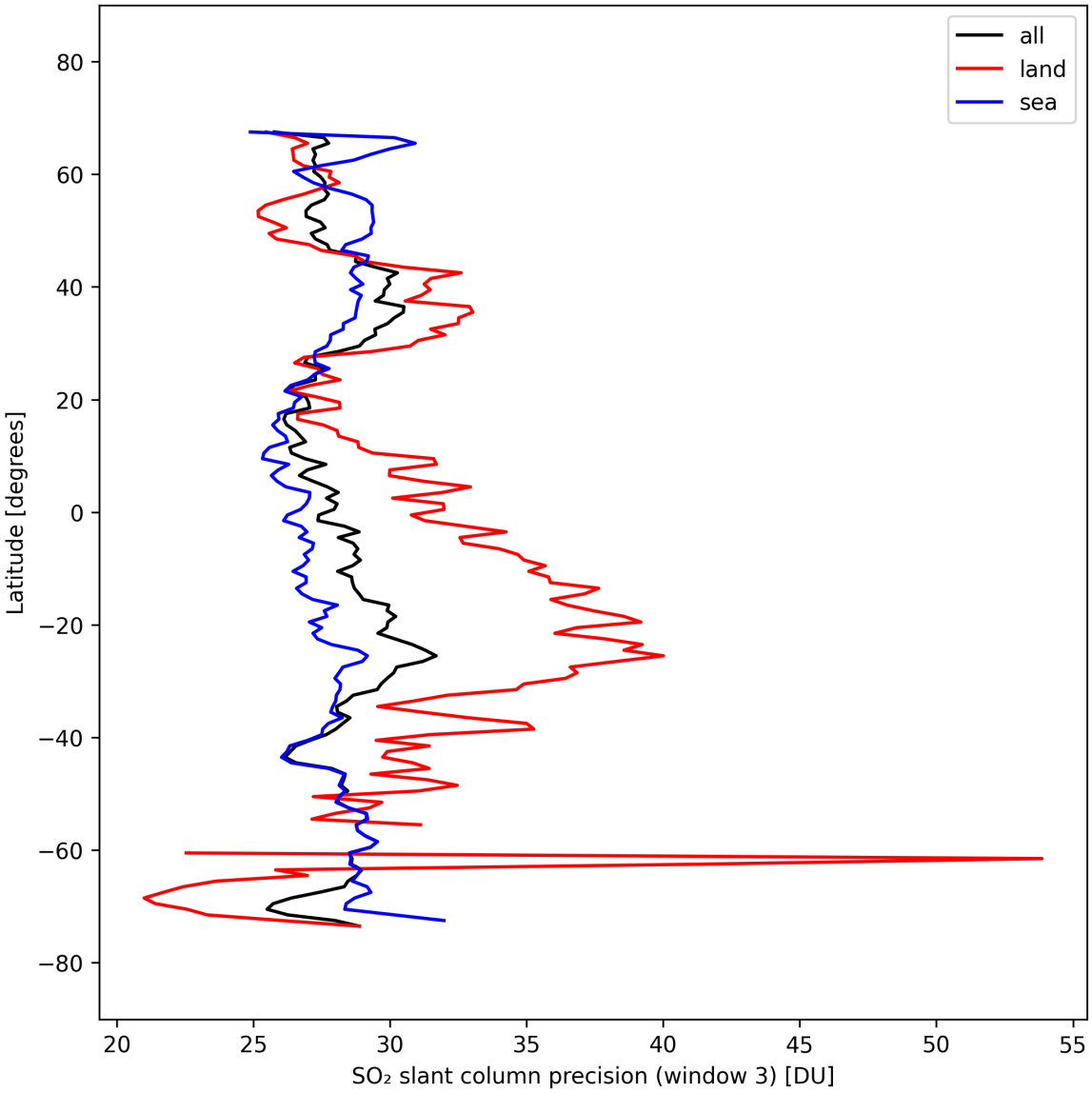


Figure 45: Zonal average of "SO_2 slant column precision (window 3)" for 2025-03-12 to 2025-03-13.

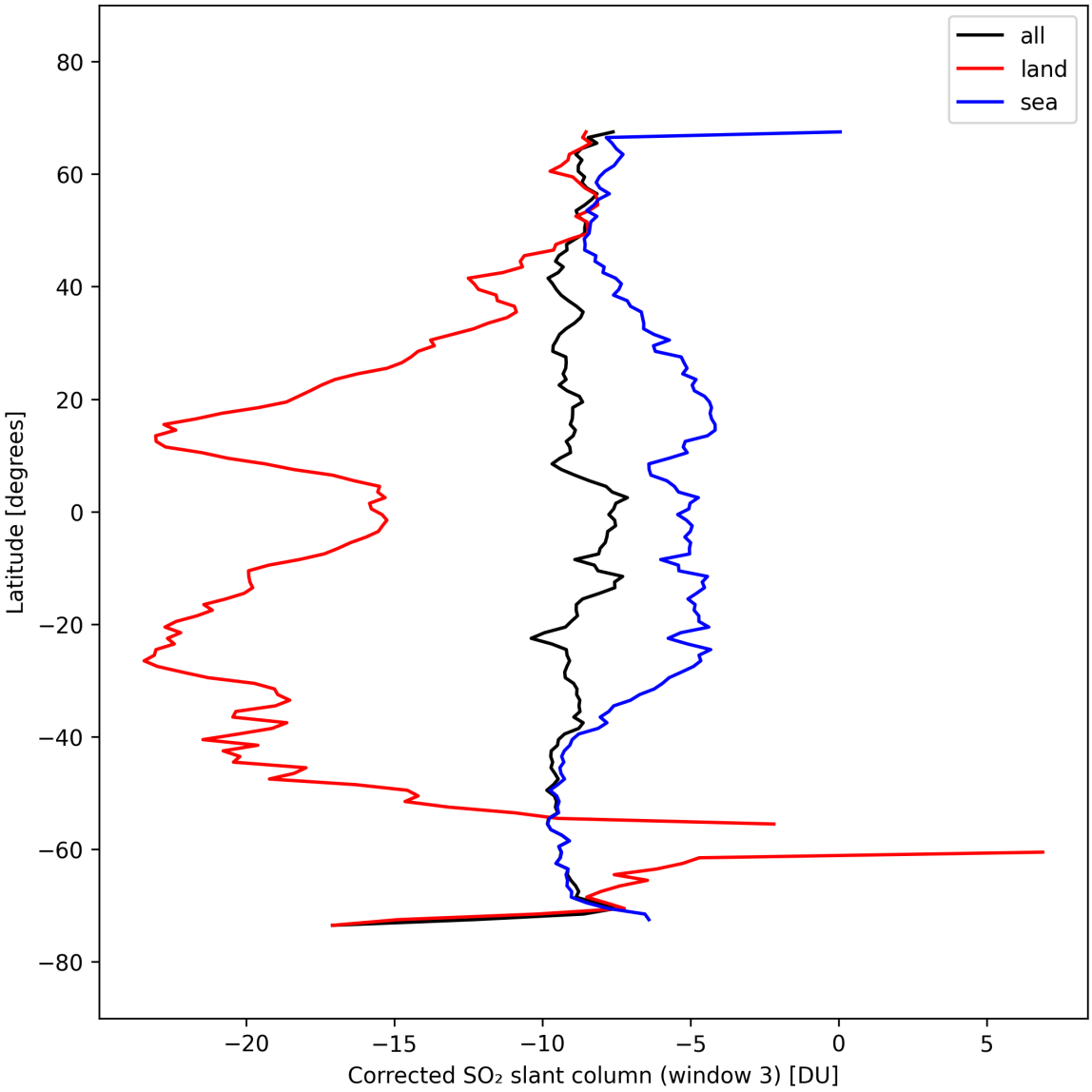


Figure 46: Zonal average of "Corrected SO_2 slant column (window 3)" for 2025-03-12 to 2025-03-13.

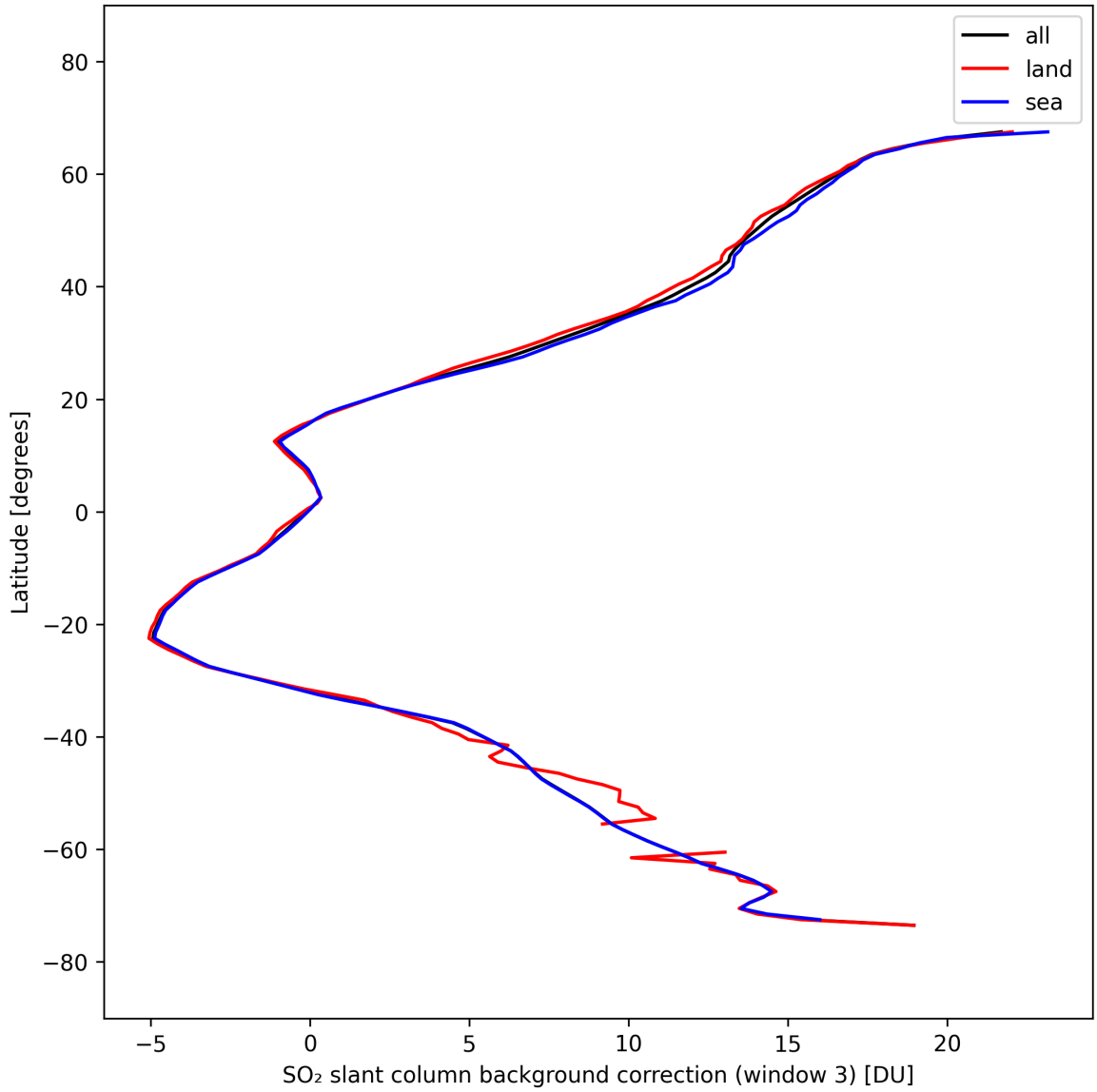


Figure 47: Zonal average of "SO_2 slant column background correction (window 3)" for 2025-03-12 to 2025-03-13.

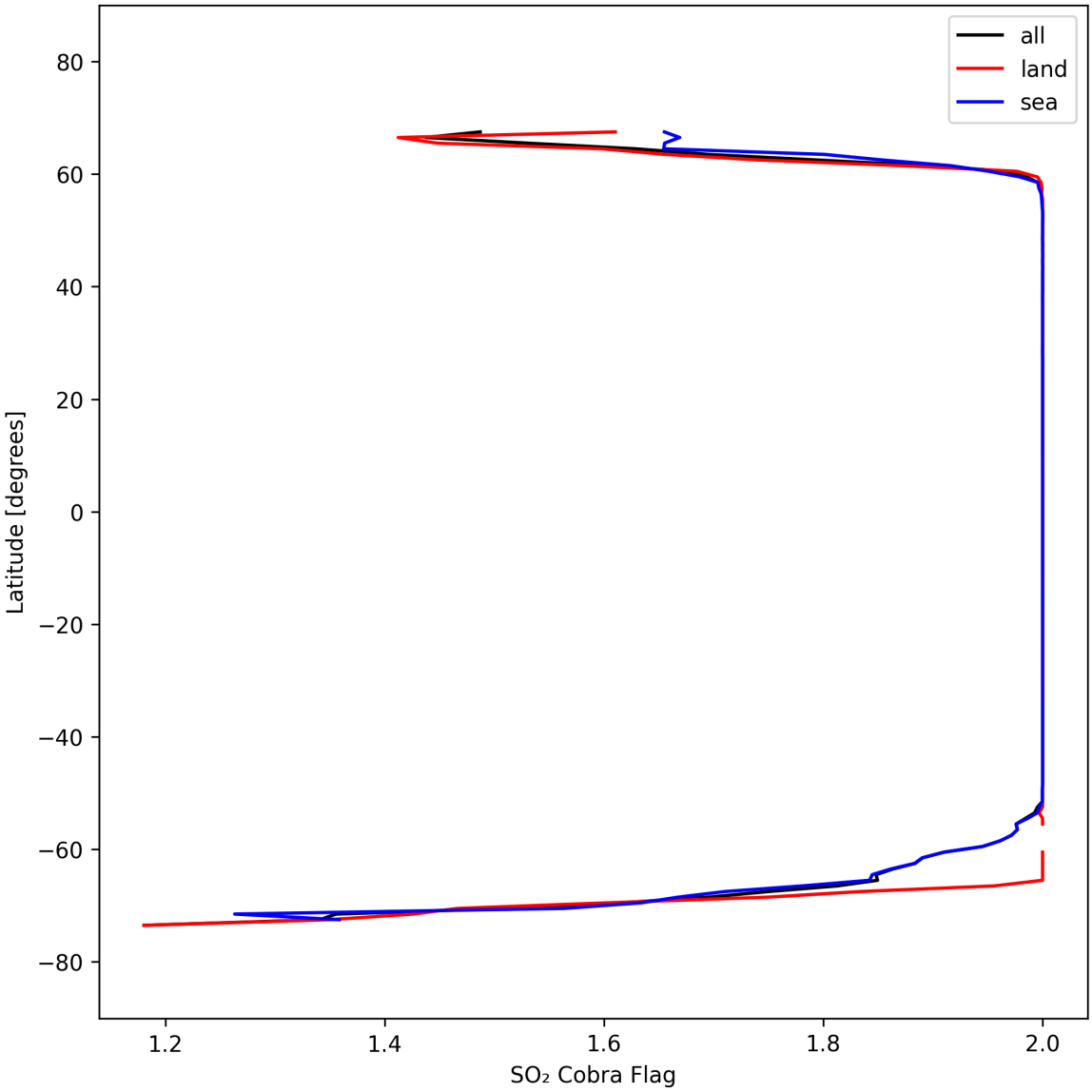


Figure 48: Zonal average of "SO_2 Cobra Flag" for 2025-03-12 to 2025-03-13.

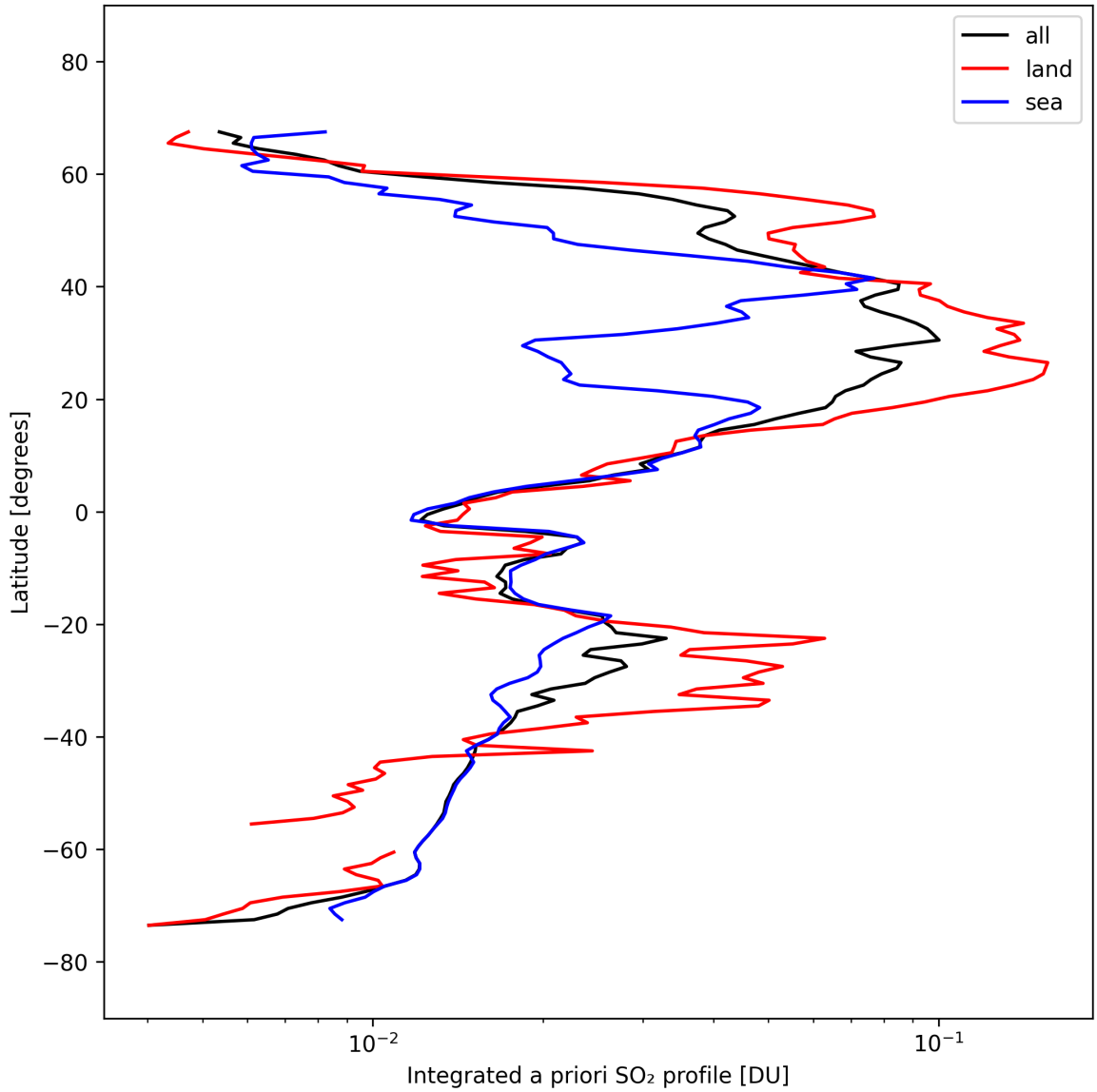


Figure 49: Zonal average of “Integrated a priori SO_2 profile” for 2025-03-12 to 2025-03-13.

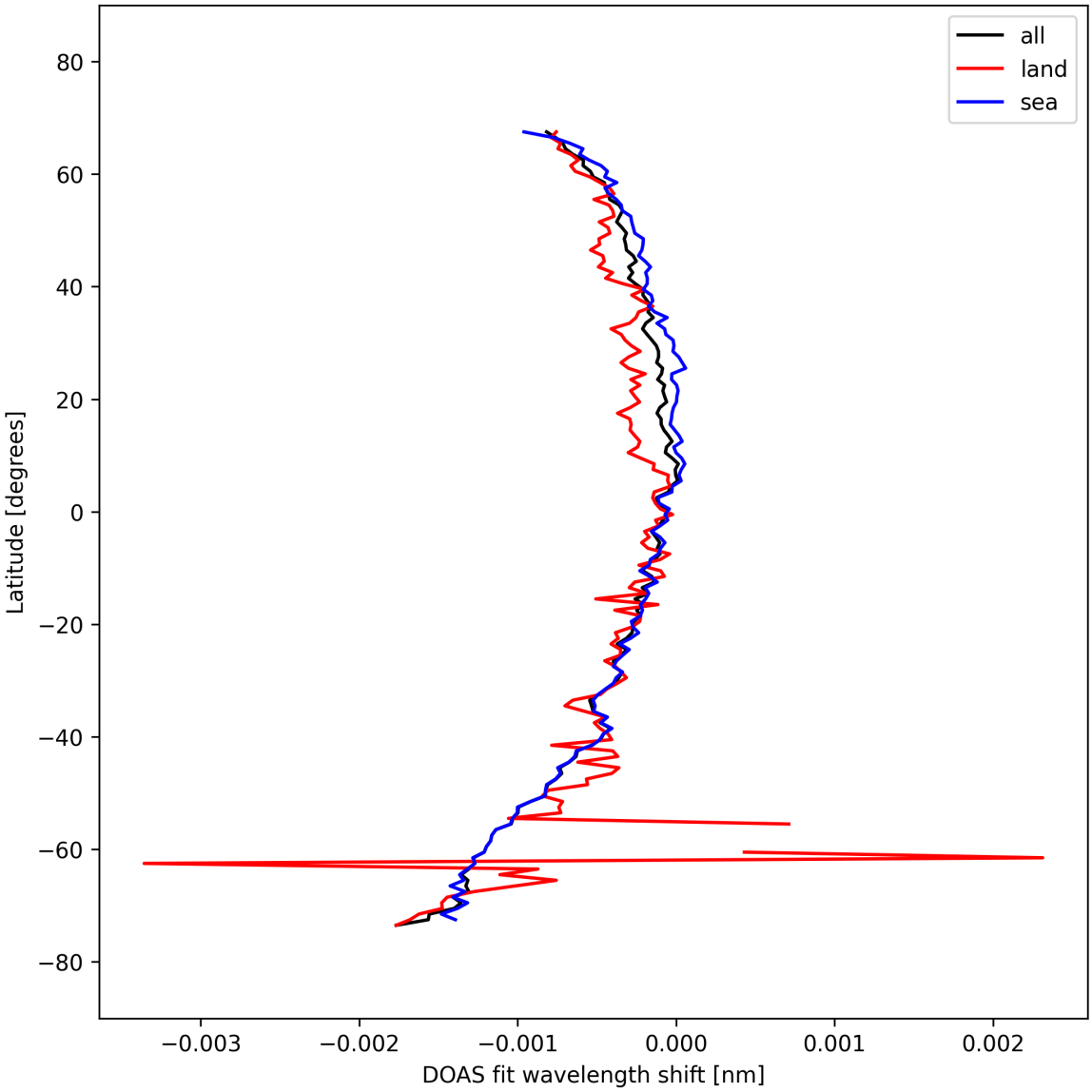


Figure 50: Zonal average of “DOAS fit wavelength shift” for 2025-03-12 to 2025-03-13.

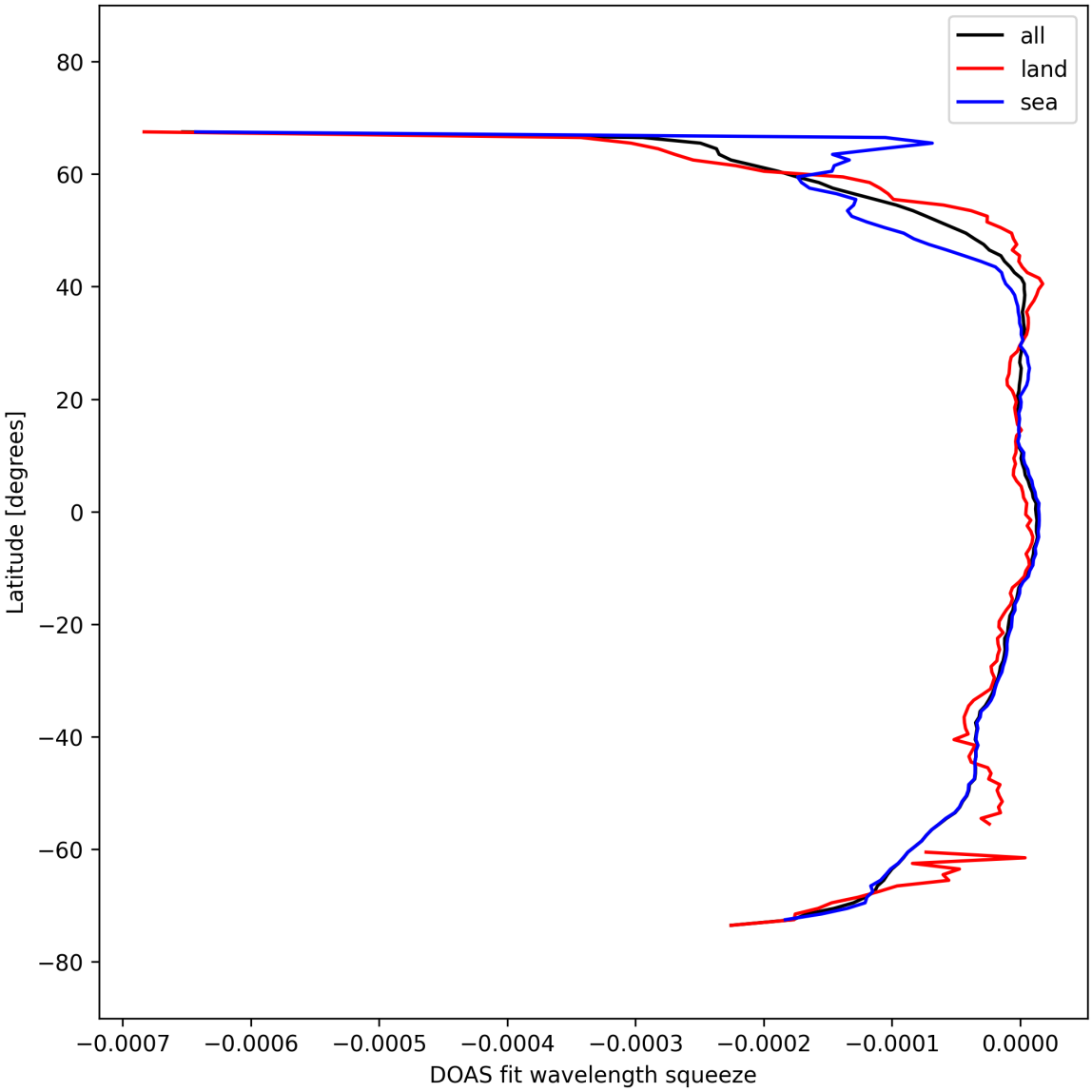


Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-03-12 to 2025-03-13.

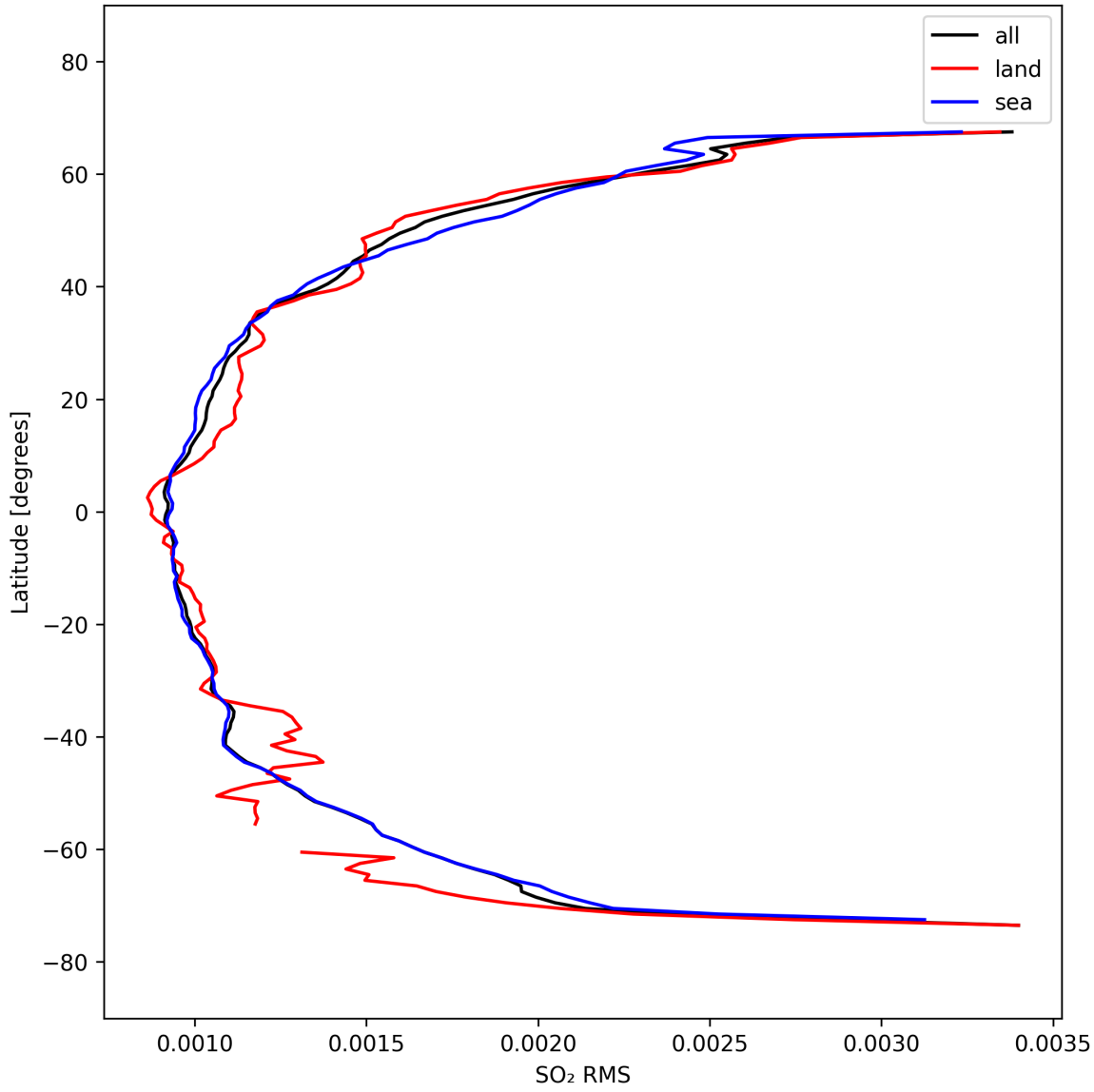


Figure 52: Zonal average of "SO_2 RMS" for 2025-03-12 to 2025-03-13.

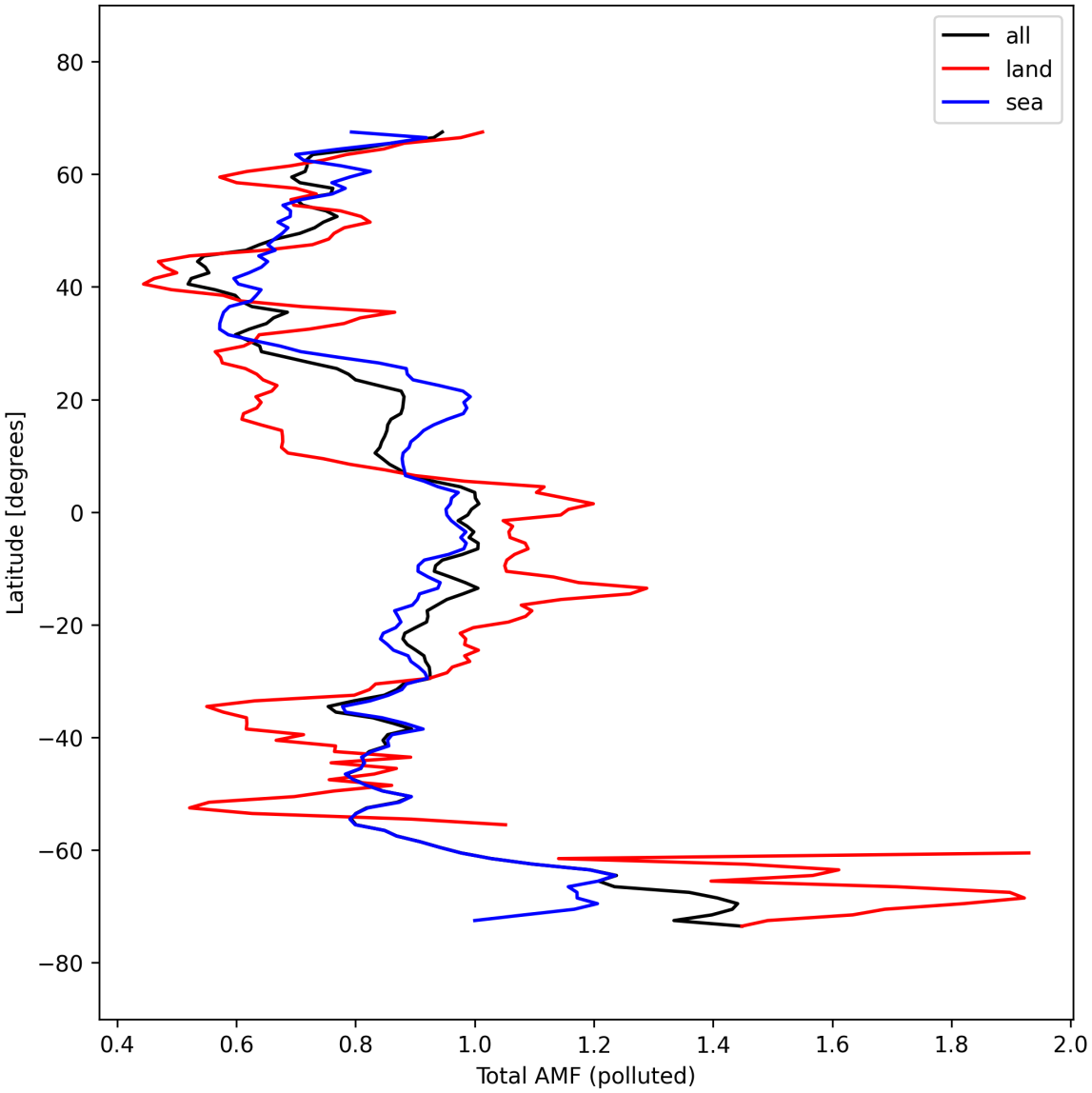


Figure 53: Zonal average of “Total AMF (polluted)” for 2025-03-12 to 2025-03-13.

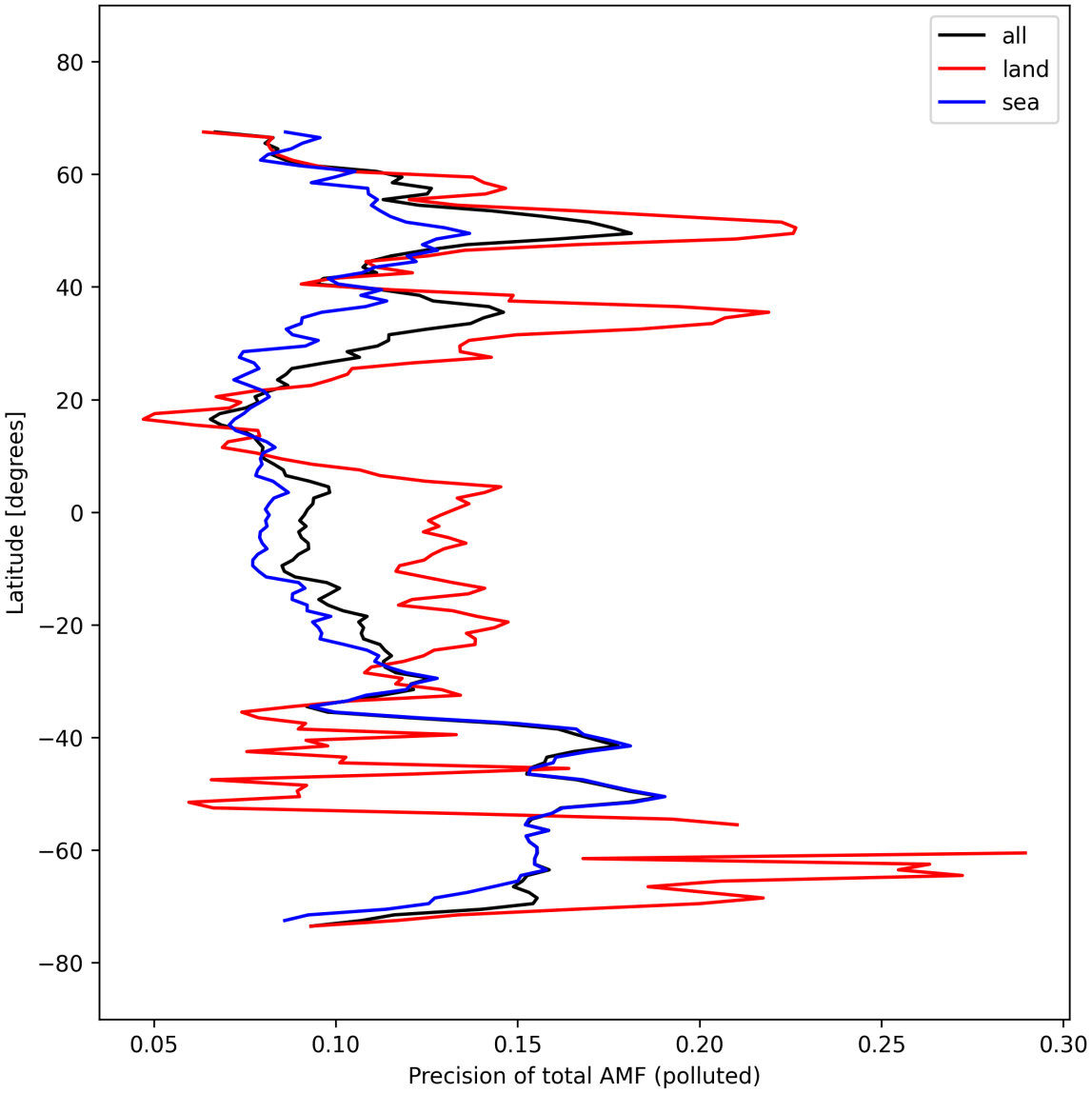


Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-03-12 to 2025-03-13.

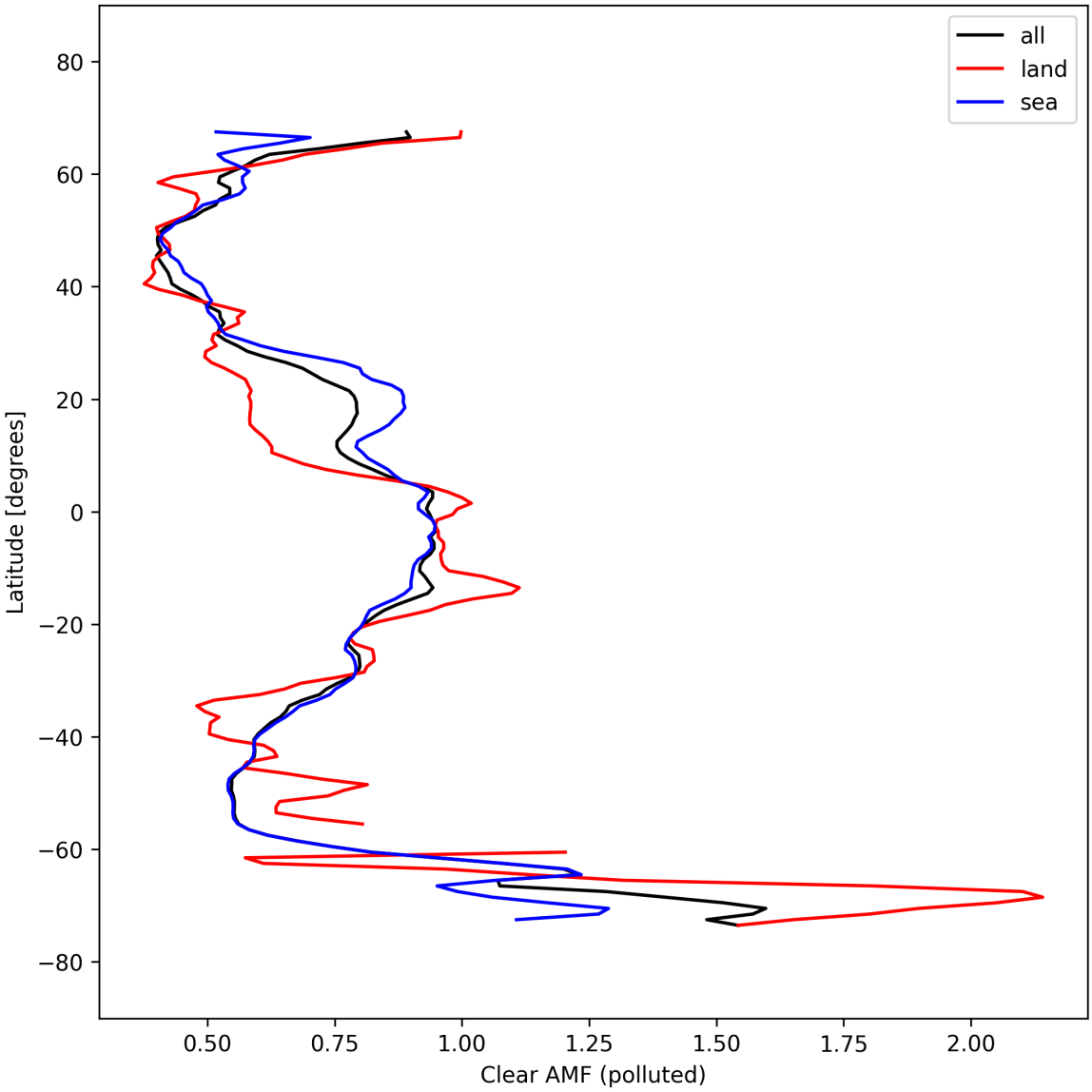


Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-03-12 to 2025-03-13.

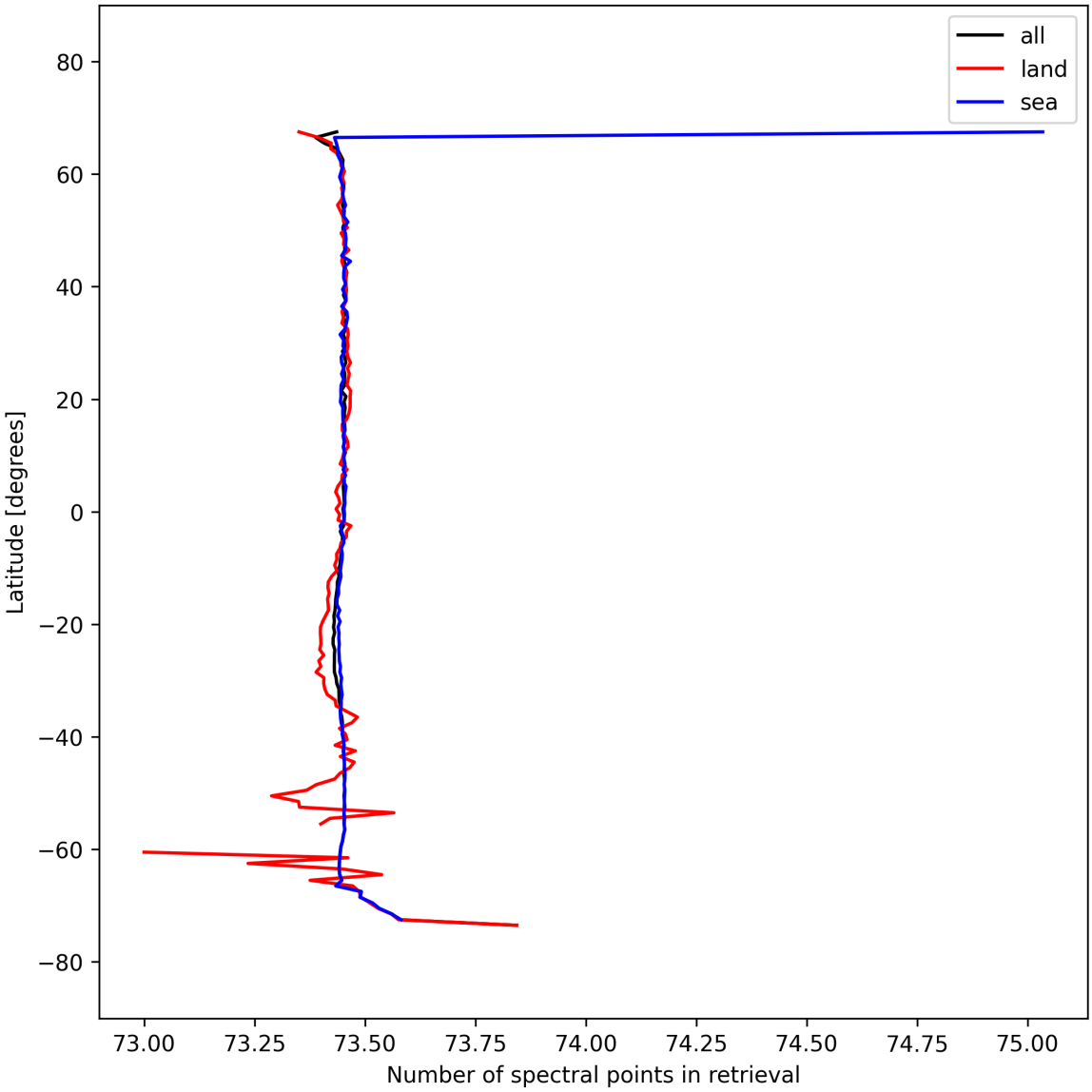


Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-03-12 to 2025-03-13.

8 Histograms

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

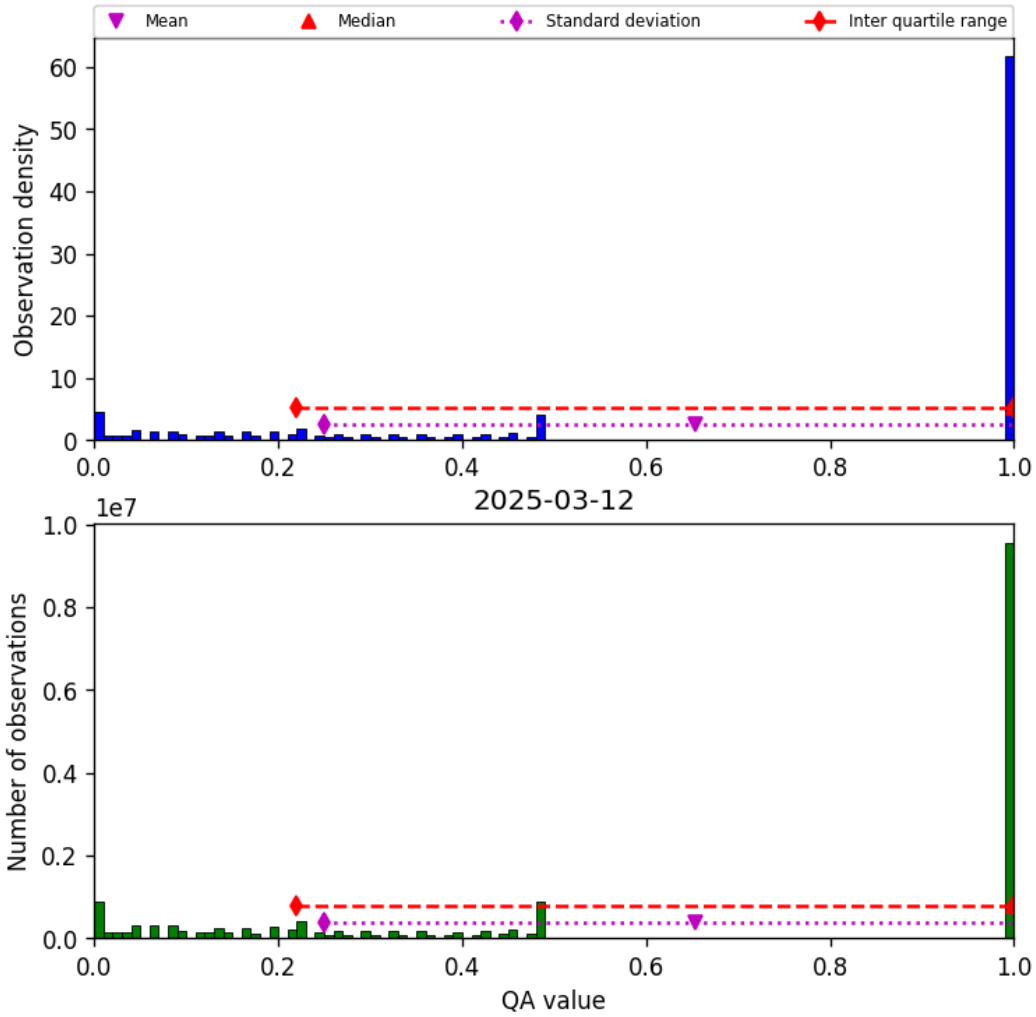


Figure 57: Histogram of “QA value” for 2025-03-12 to 2025-03-13

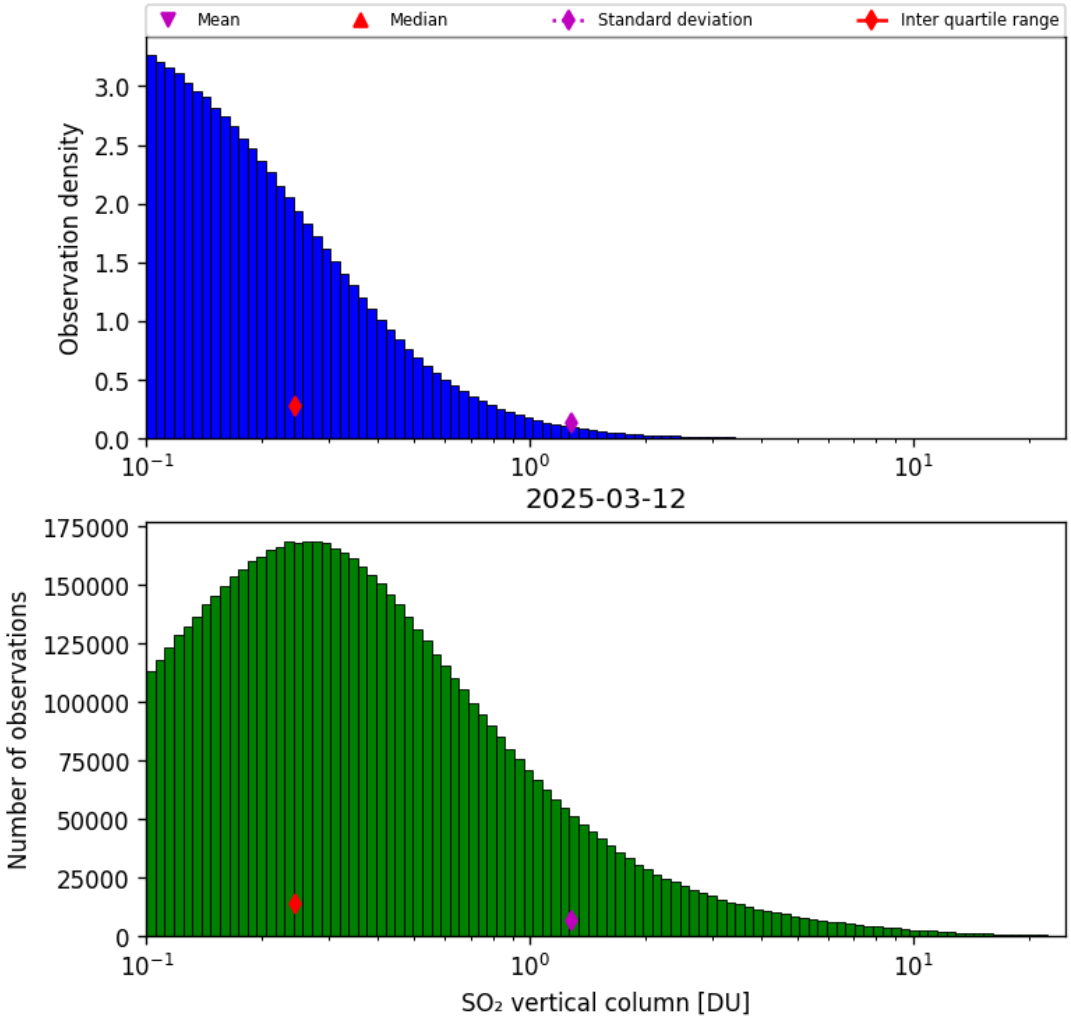


Figure 58: Histogram of "SO_2 vertical column" for 2025-03-12 to 2025-03-13

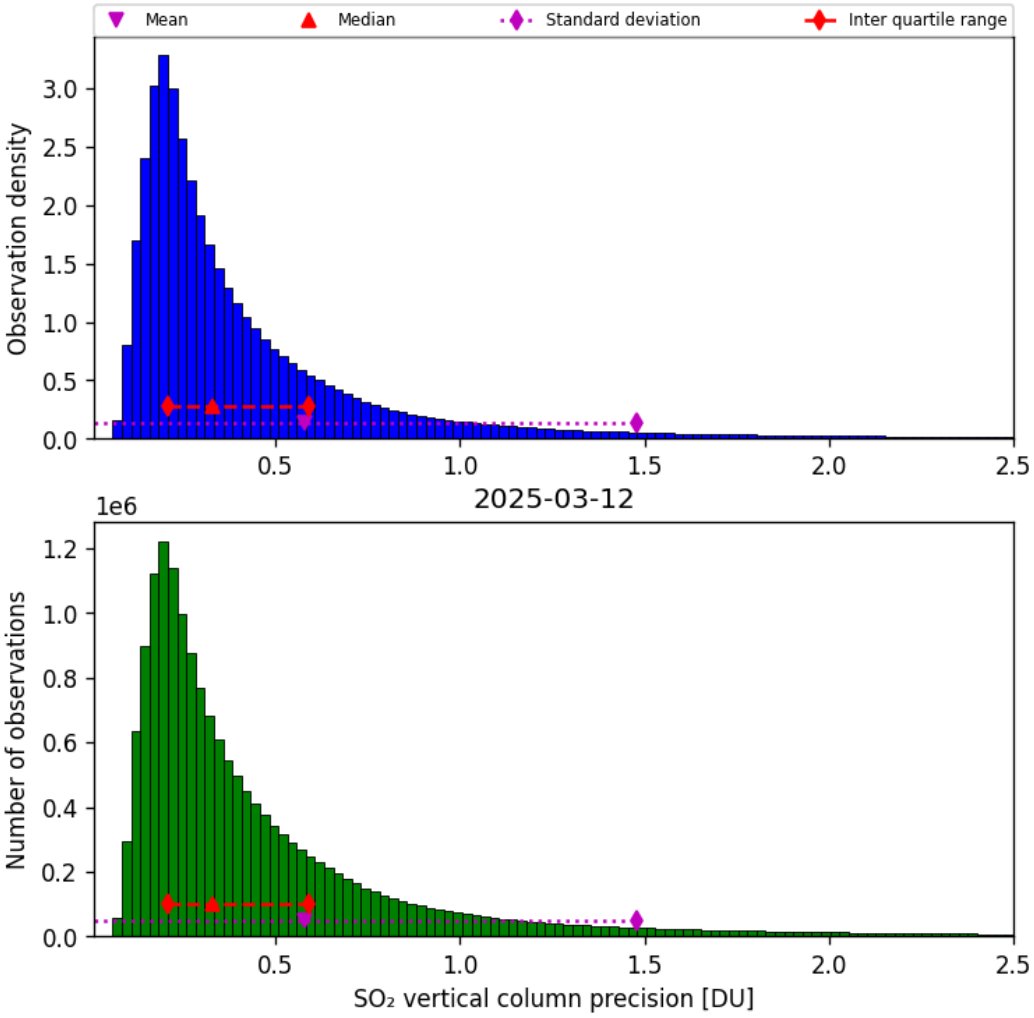


Figure 59: Histogram of "SO_2 vertical column precision" for 2025-03-12 to 2025-03-13

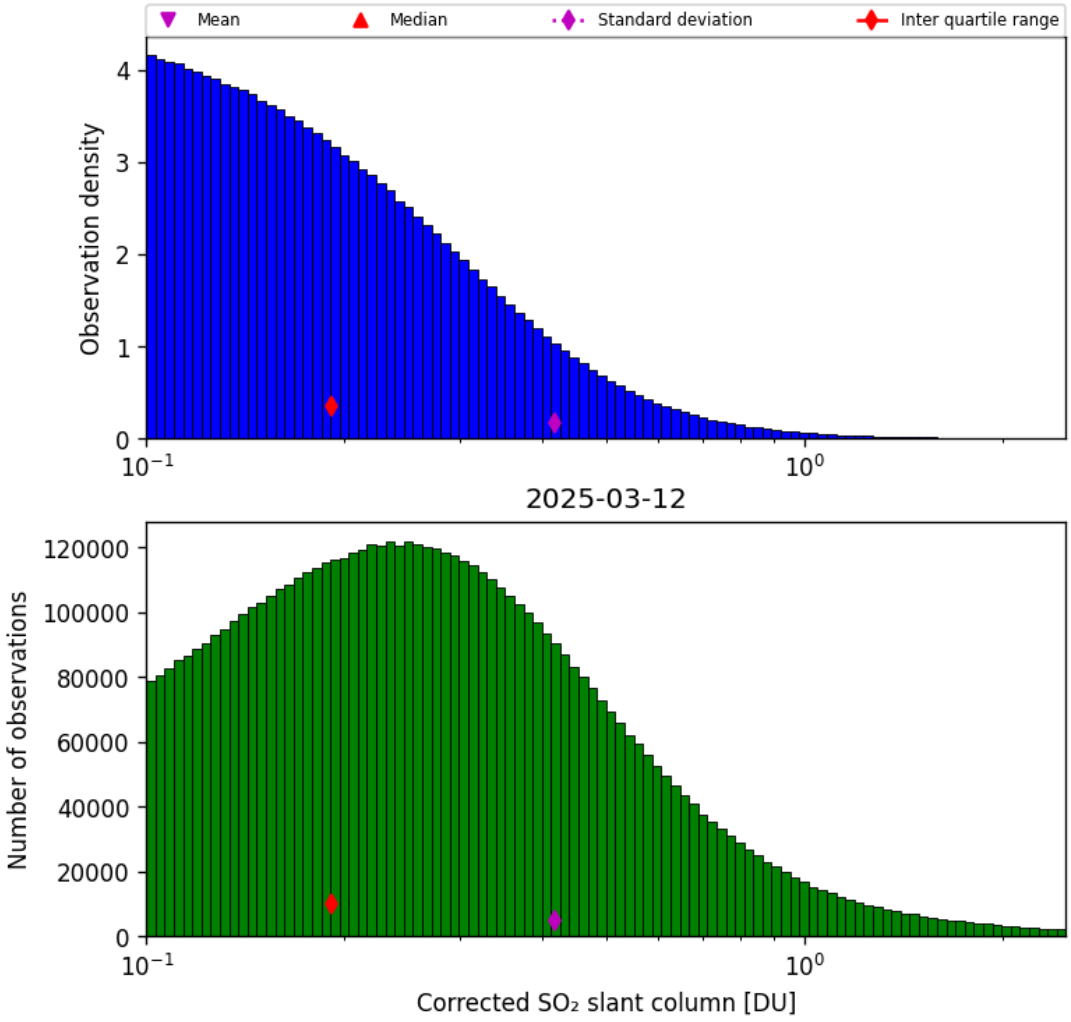


Figure 60: Histogram of "Corrected SO_2 slant column" for 2025-03-12 to 2025-03-13

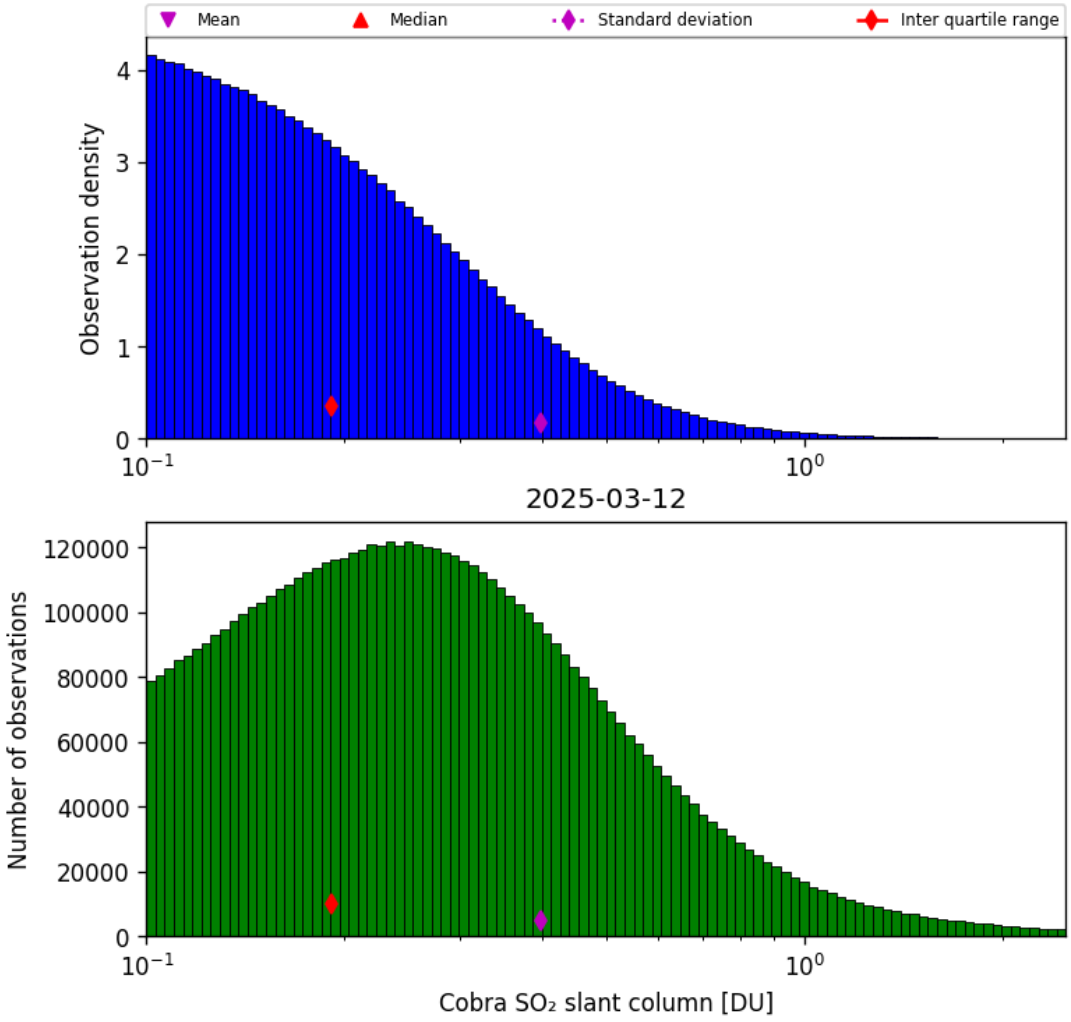


Figure 61: Histogram of "Cobra SO_2 slant column" for 2025-03-12 to 2025-03-13

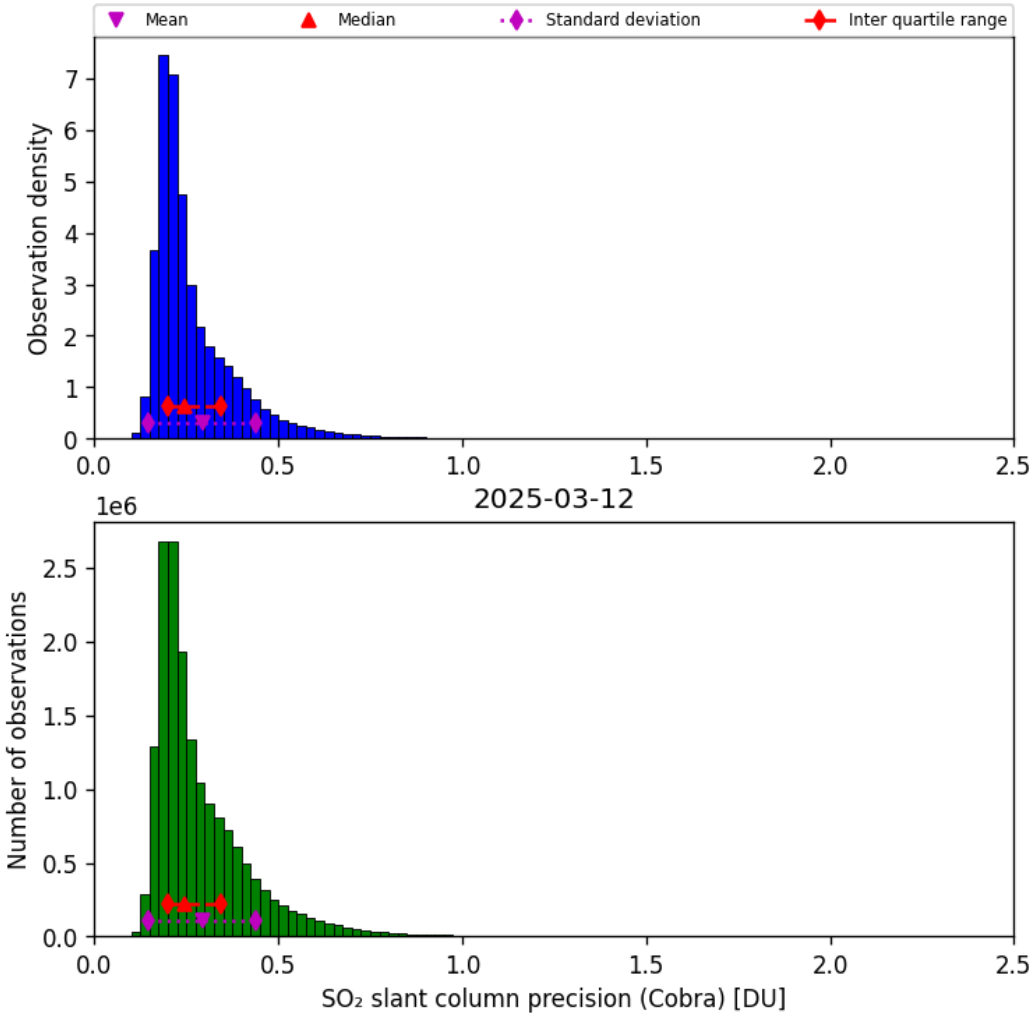


Figure 62: Histogram of "SO_2 slant column precision (Cobra)" for 2025-03-12 to 2025-03-13

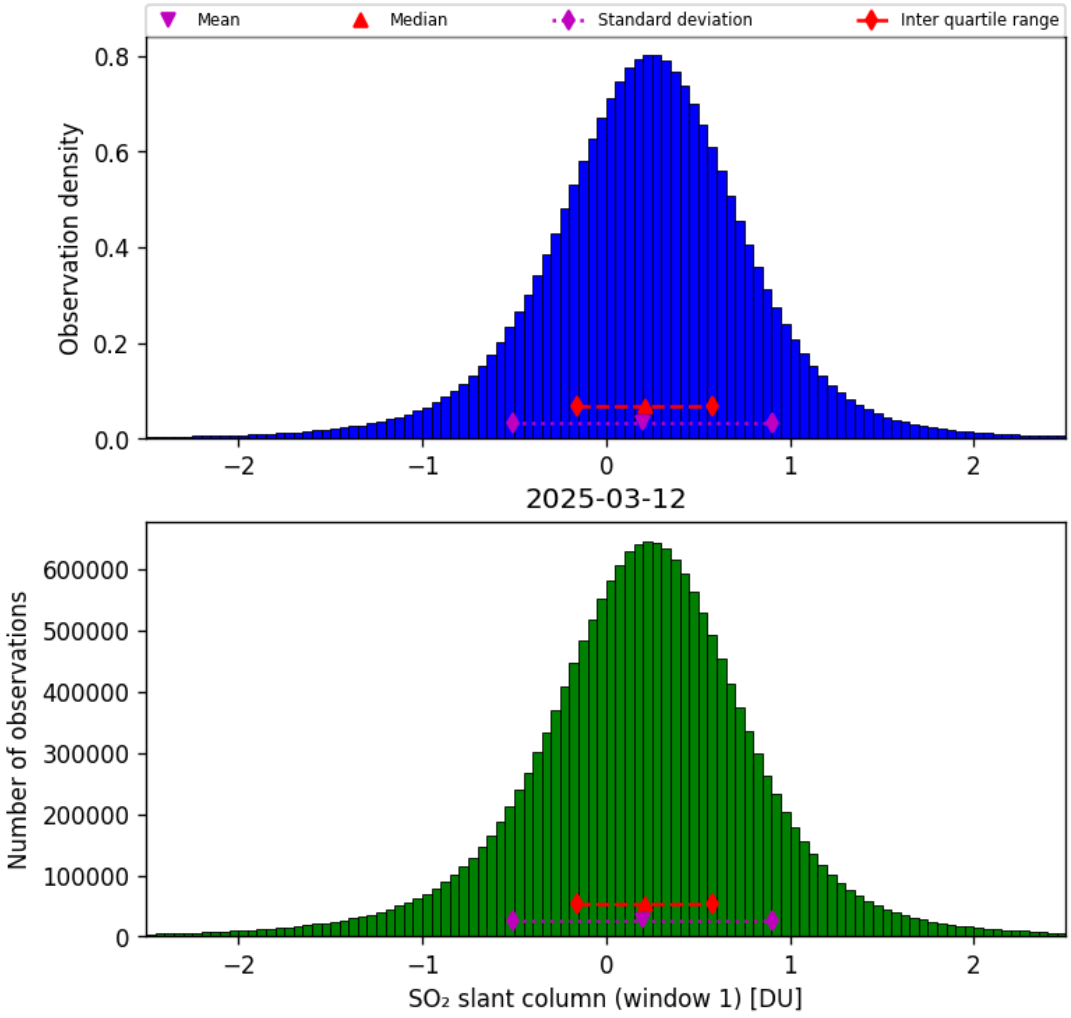


Figure 63: Histogram of "SO_2 slant column (window 1)" for 2025-03-12 to 2025-03-13

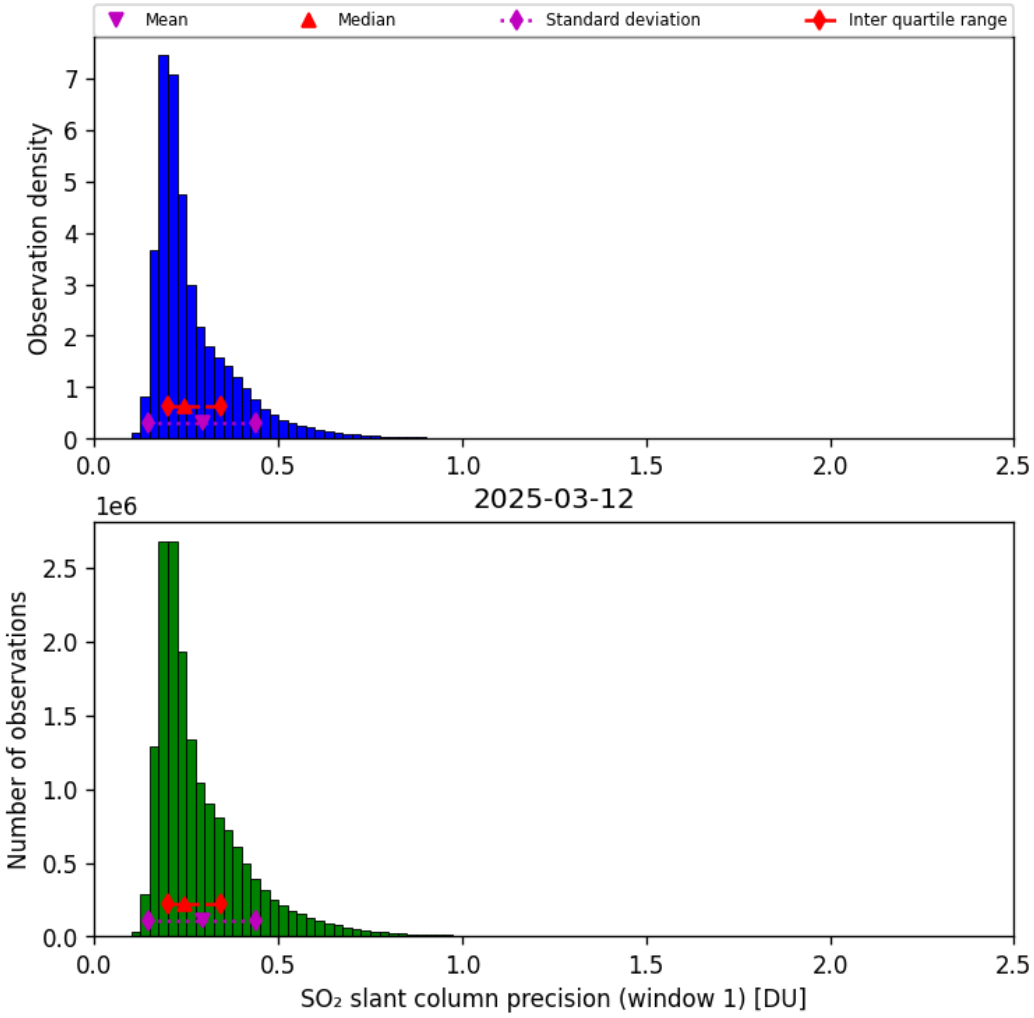


Figure 64: Histogram of "SO_2 slant column precision (window 1)" for 2025-03-12 to 2025-03-13

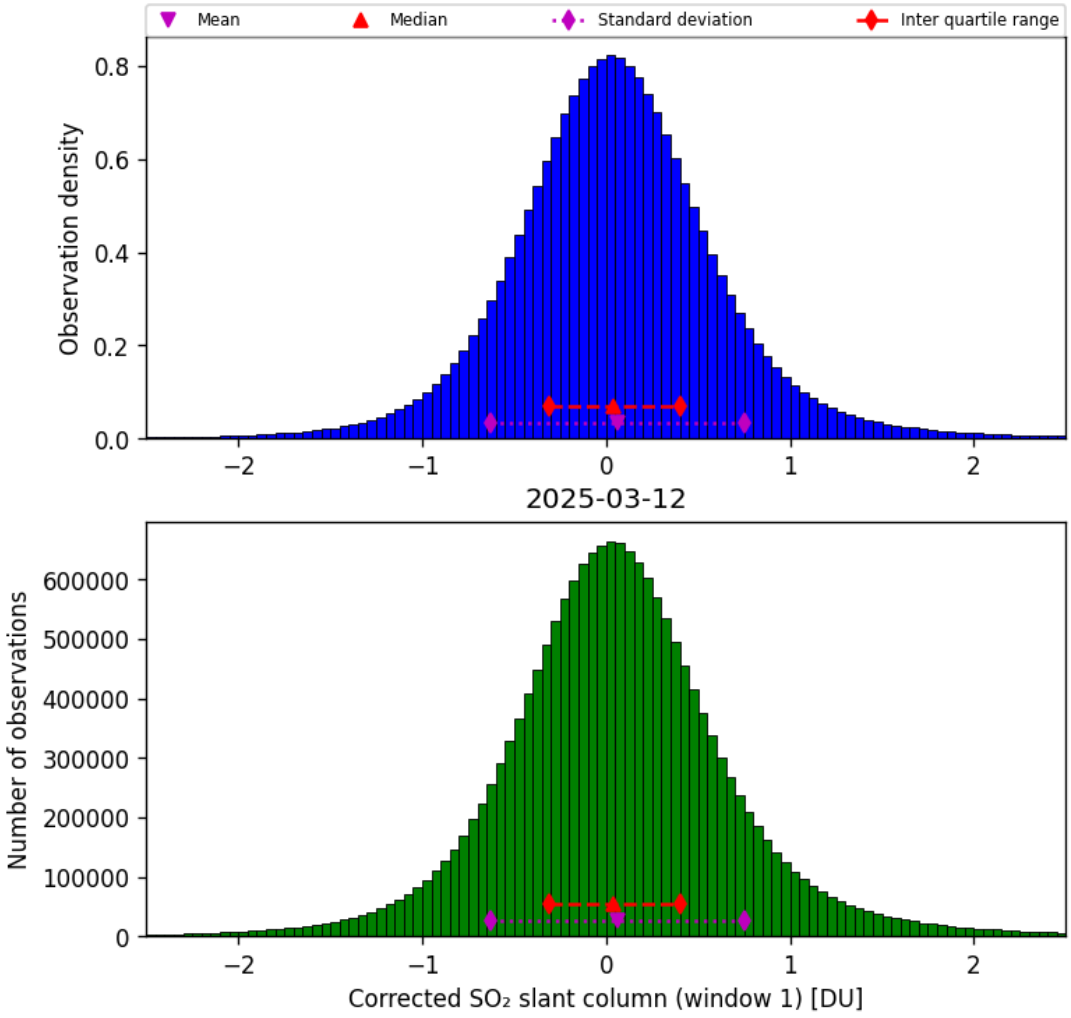


Figure 65: Histogram of "Corrected SO_2 slant column (window 1)" for 2025-03-12 to 2025-03-13

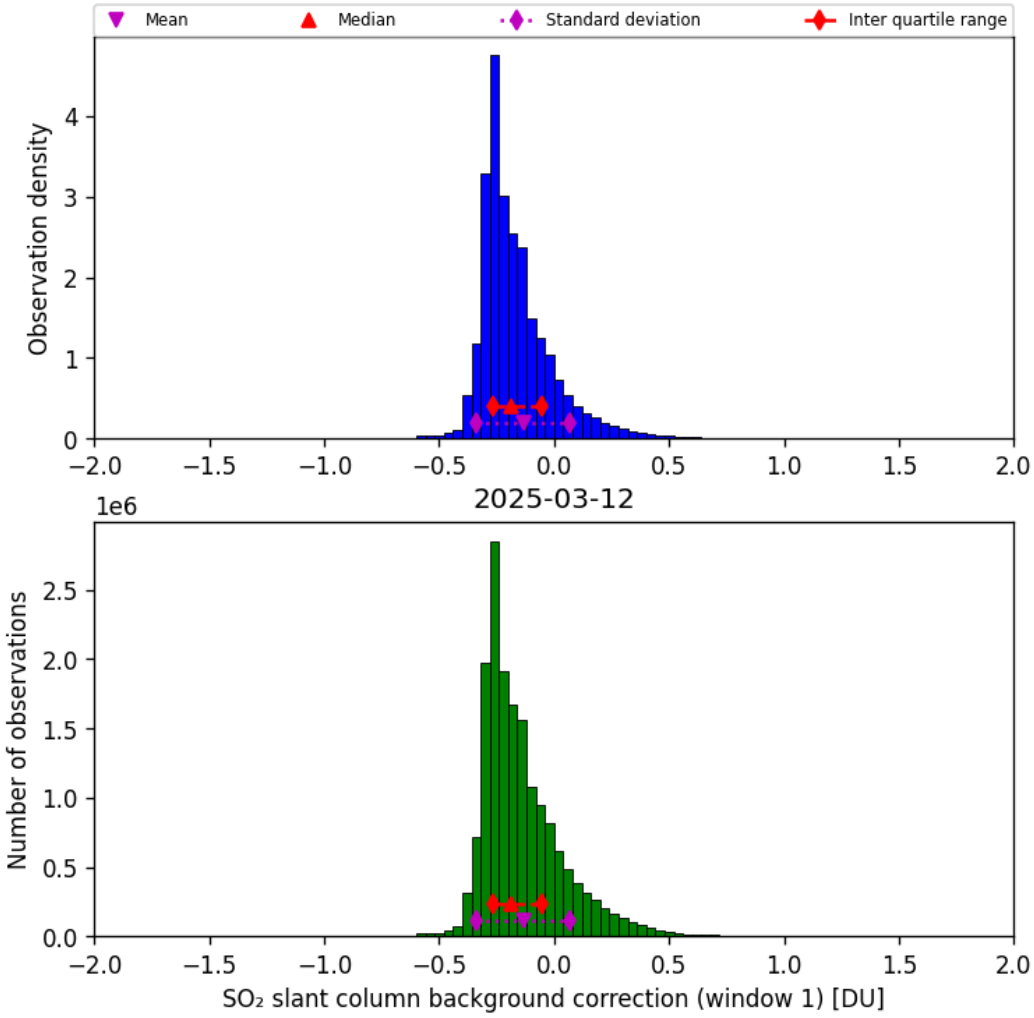


Figure 66: Histogram of "SO_2 slant column background correction (window 1)" for 2025-03-12 to 2025-03-13

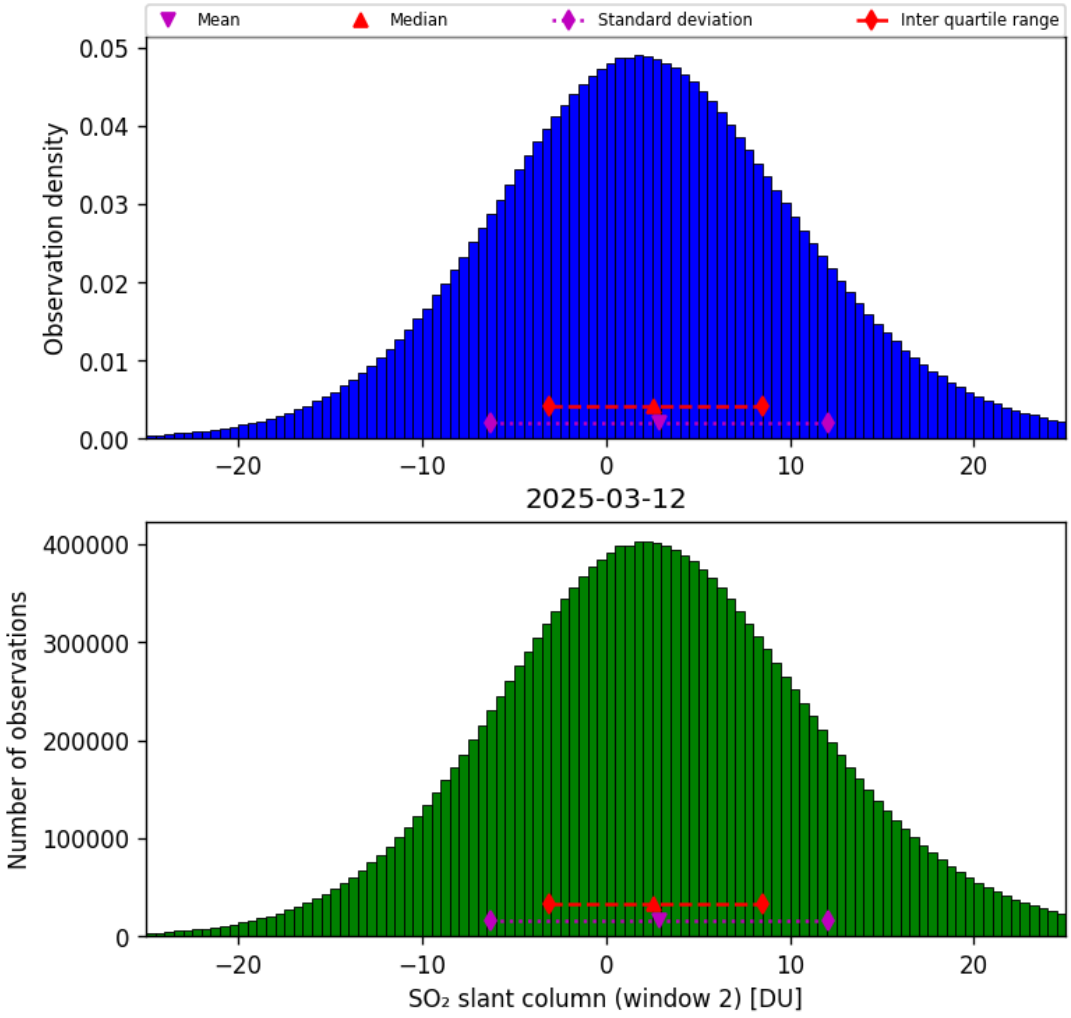


Figure 67: Histogram of "SO_2 slant column (window 2)" for 2025-03-12 to 2025-03-13

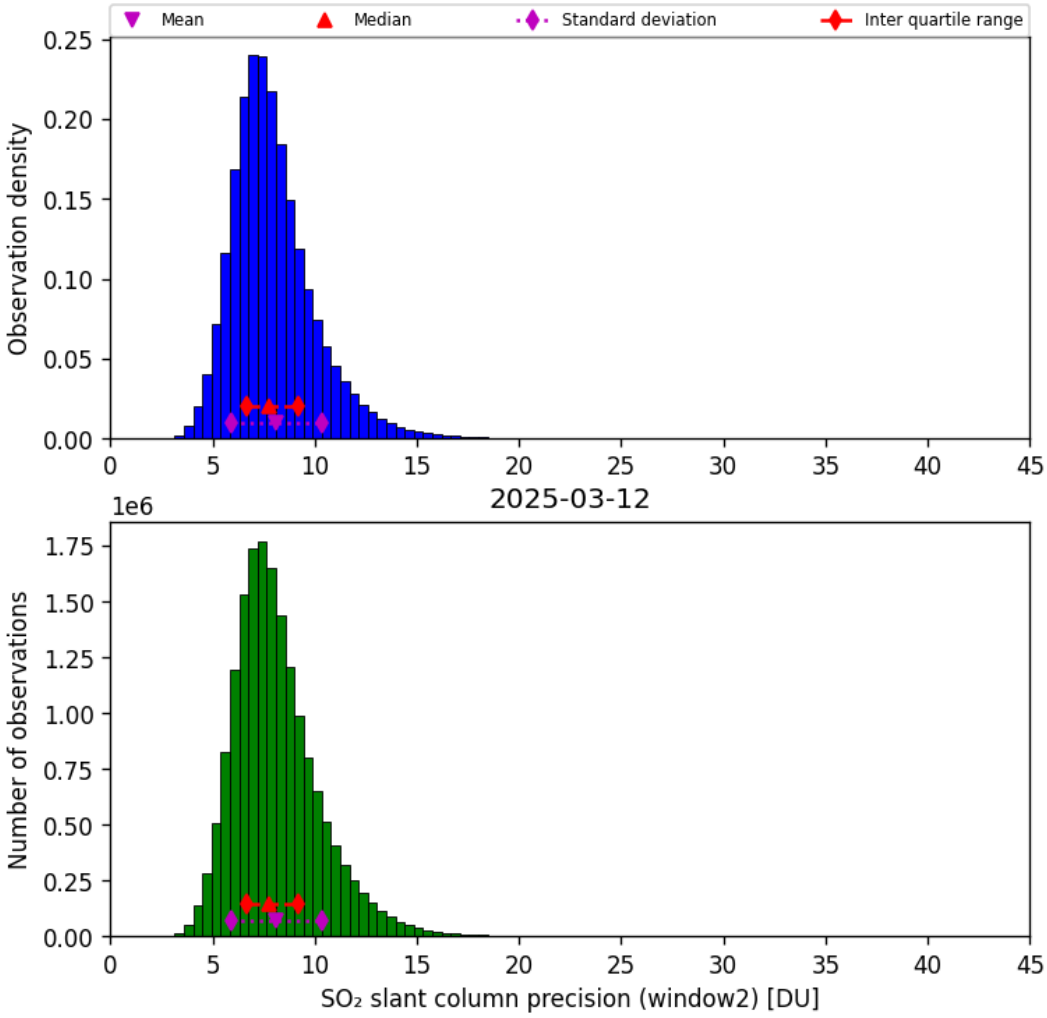


Figure 68: Histogram of "SO_2 slant column precision (window2)" for 2025-03-12 to 2025-03-13

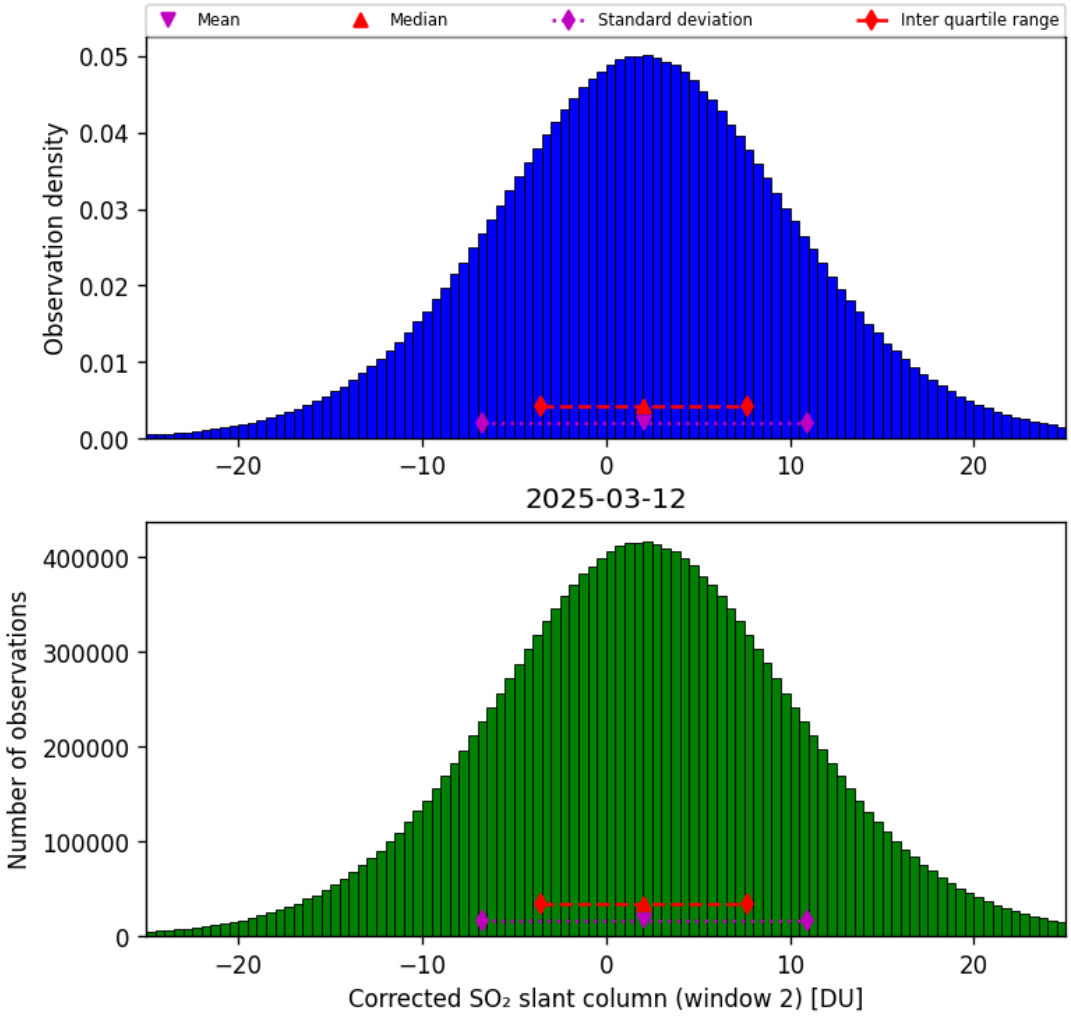


Figure 69: Histogram of "Corrected SO_2 slant column (window 2)" for 2025-03-12 to 2025-03-13

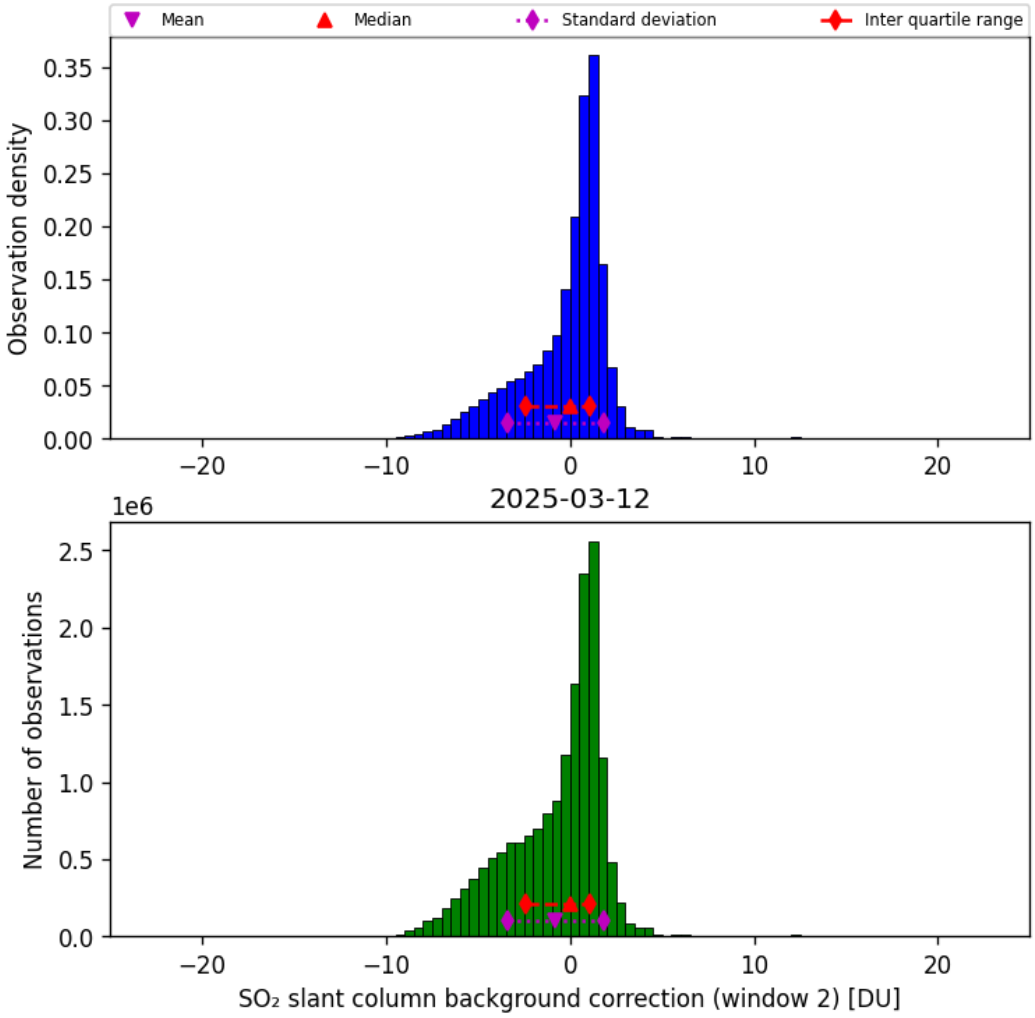


Figure 70: Histogram of "SO_2 slant column background correction (window 2)" for 2025-03-12 to 2025-03-13

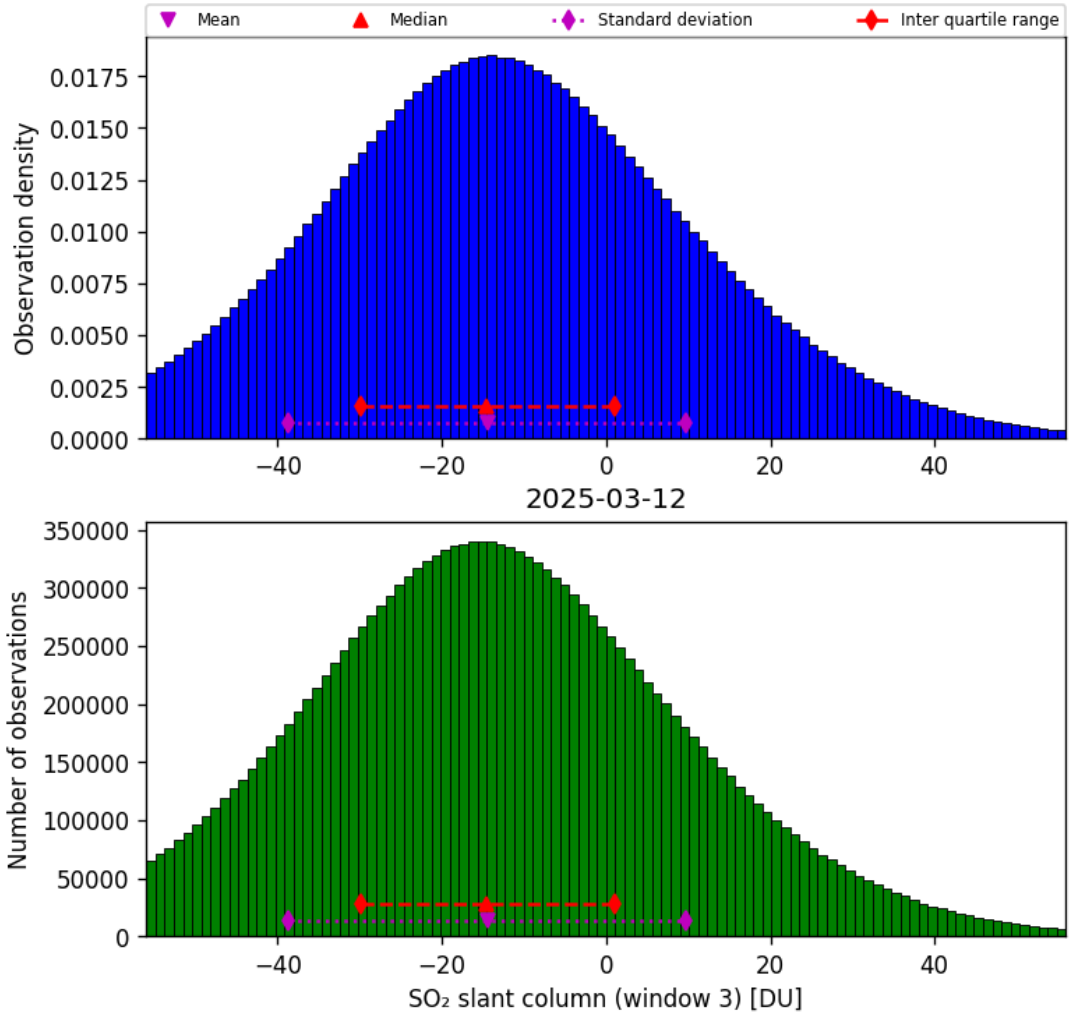


Figure 71: Histogram of "SO_2 slant column (window 3)" for 2025-03-12 to 2025-03-13

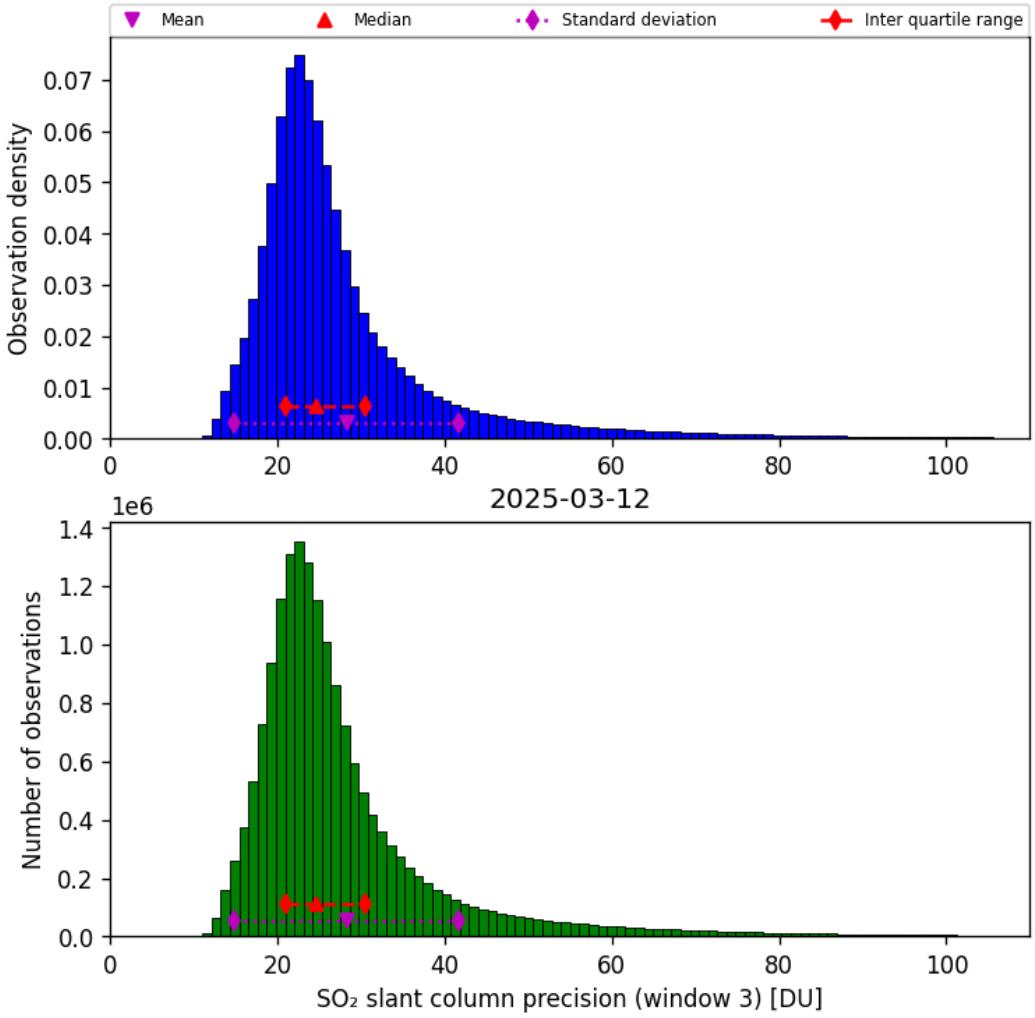


Figure 72: Histogram of "SO_2 slant column precision (window 3)" for 2025-03-12 to 2025-03-13

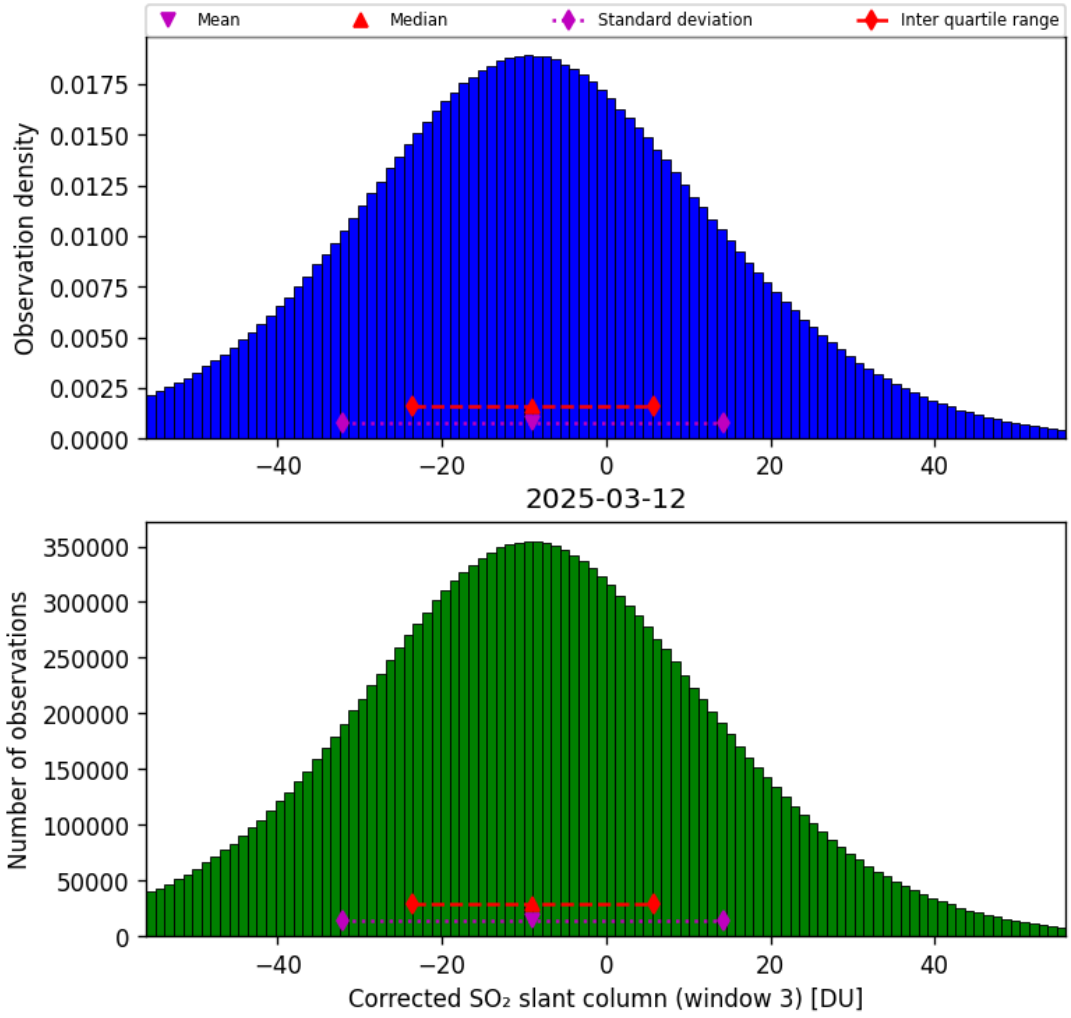


Figure 73: Histogram of "Corrected SO_2 slant column (window 3)" for 2025-03-12 to 2025-03-13

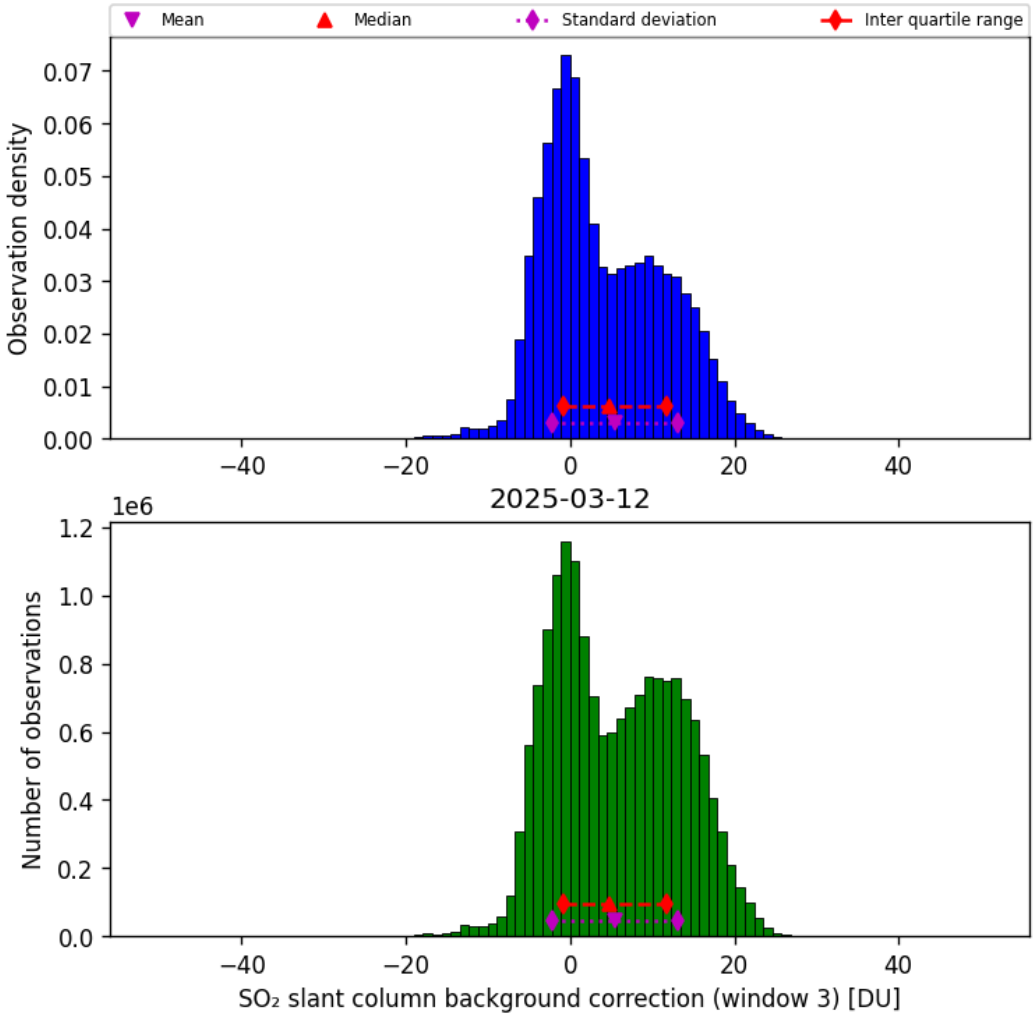


Figure 74: Histogram of "SO_2 slant column background correction (window 3)" for 2025-03-12 to 2025-03-13

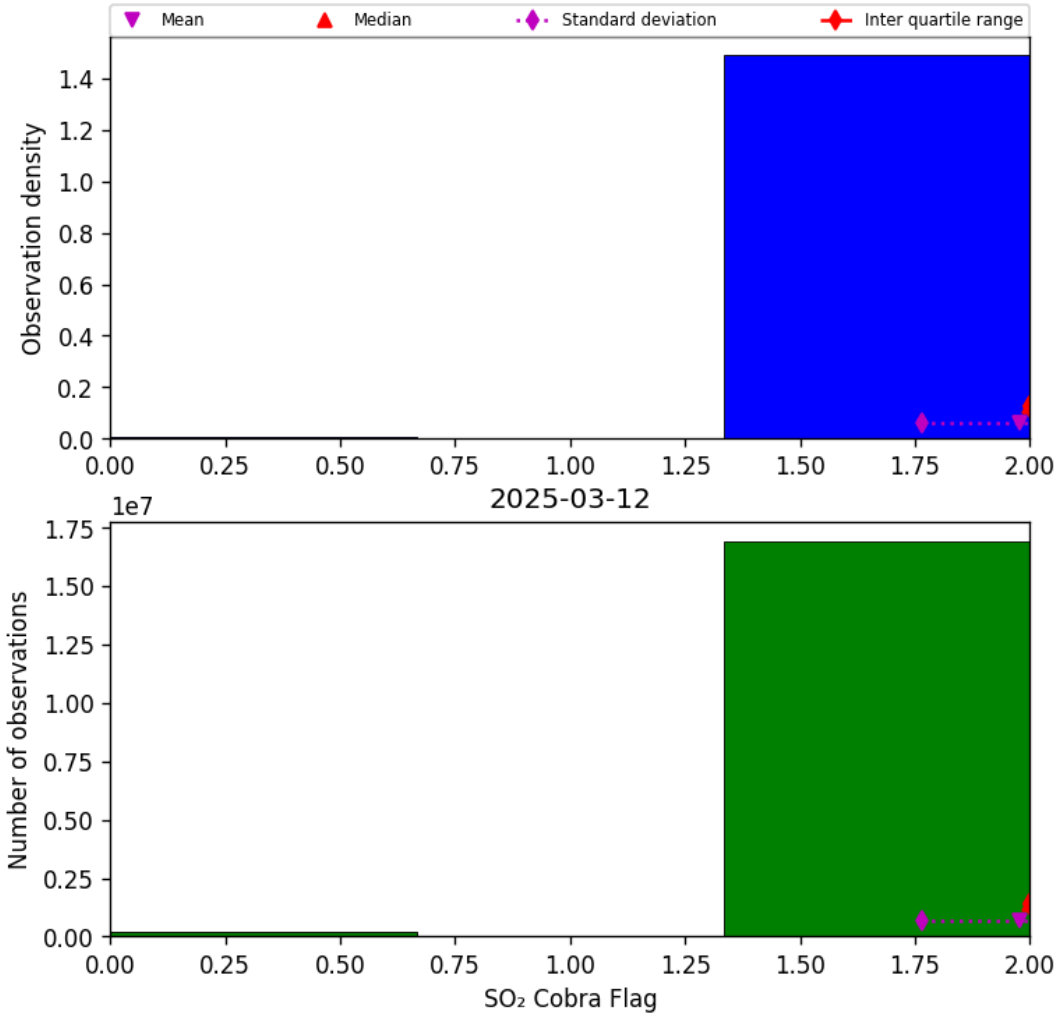


Figure 75: Histogram of "SO_2 Cobra Flag" for 2025-03-12 to 2025-03-13

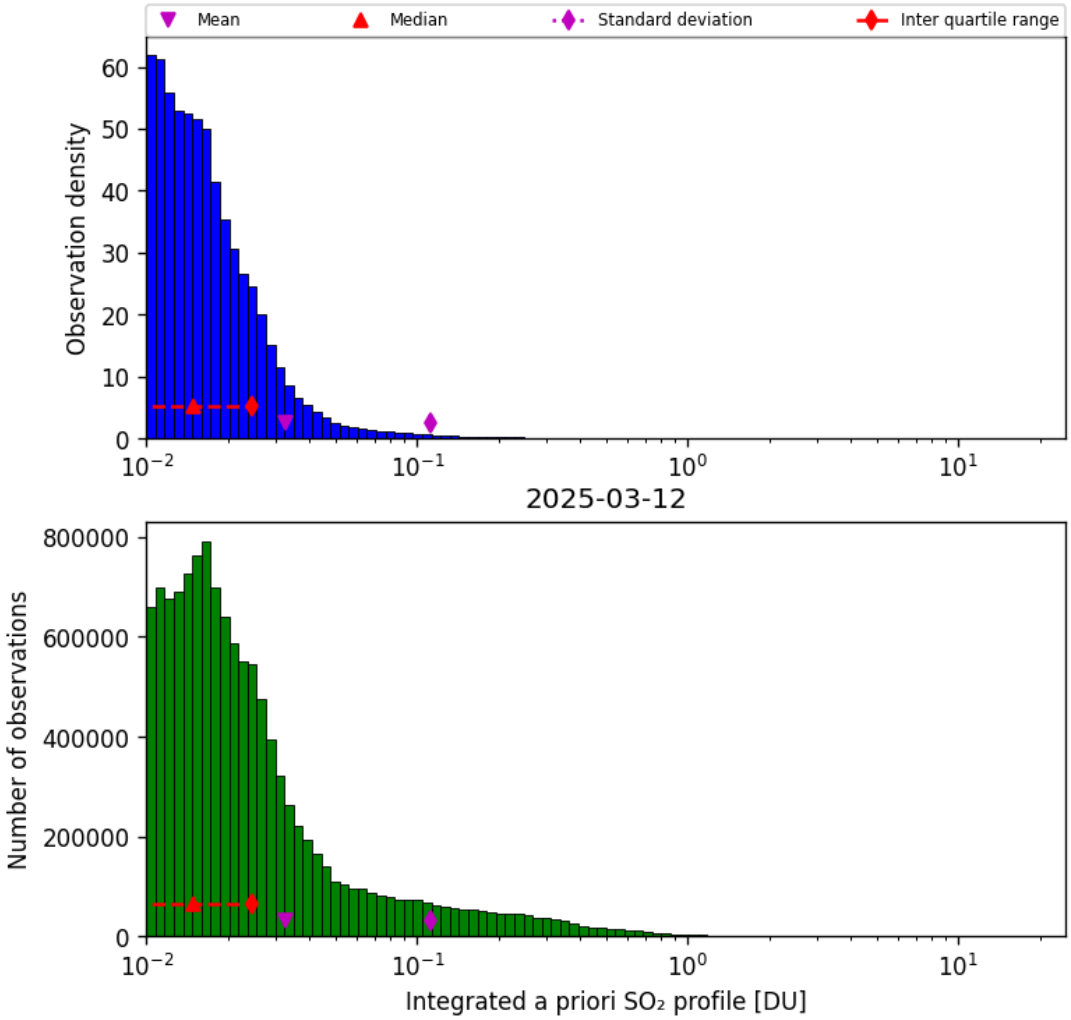


Figure 76: Histogram of "Integrated a priori SO_2 profile" for 2025-03-12 to 2025-03-13

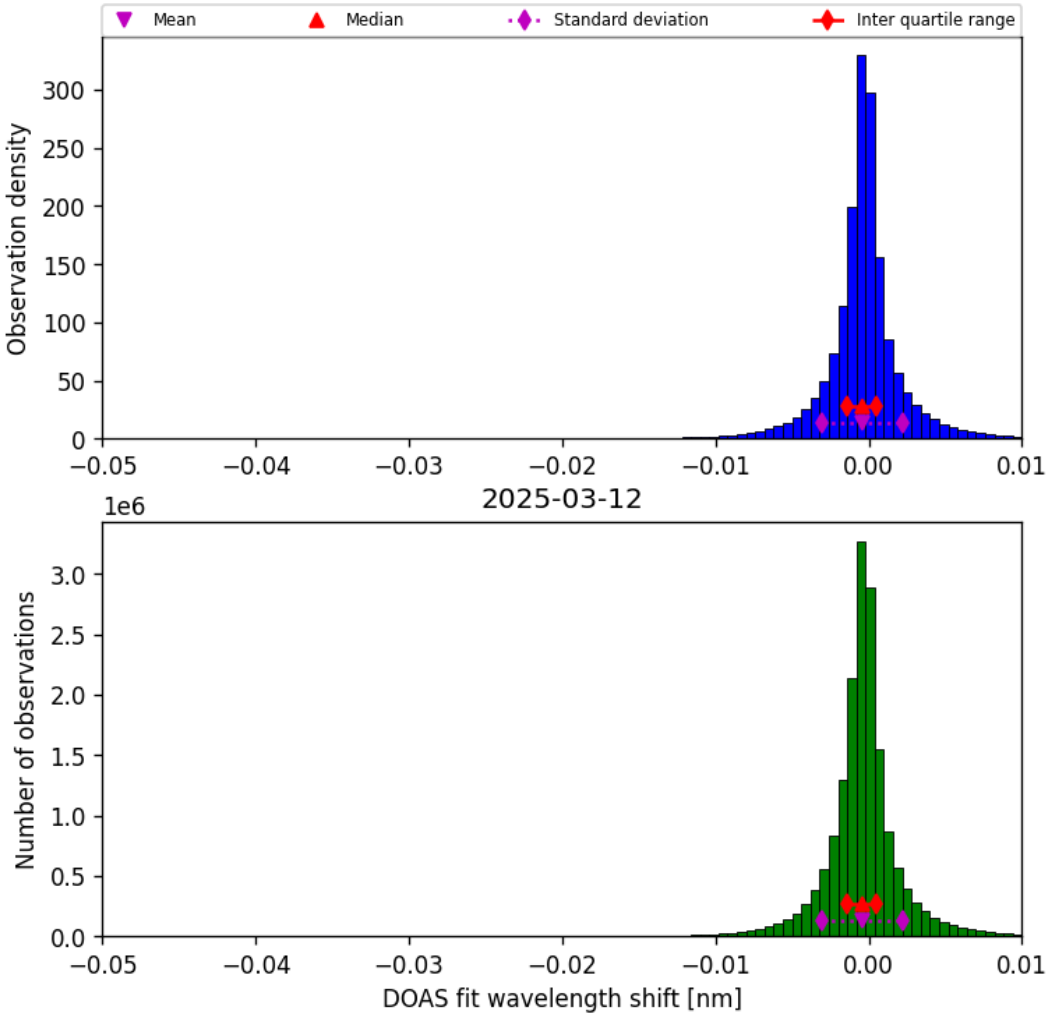


Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-03-12 to 2025-03-13

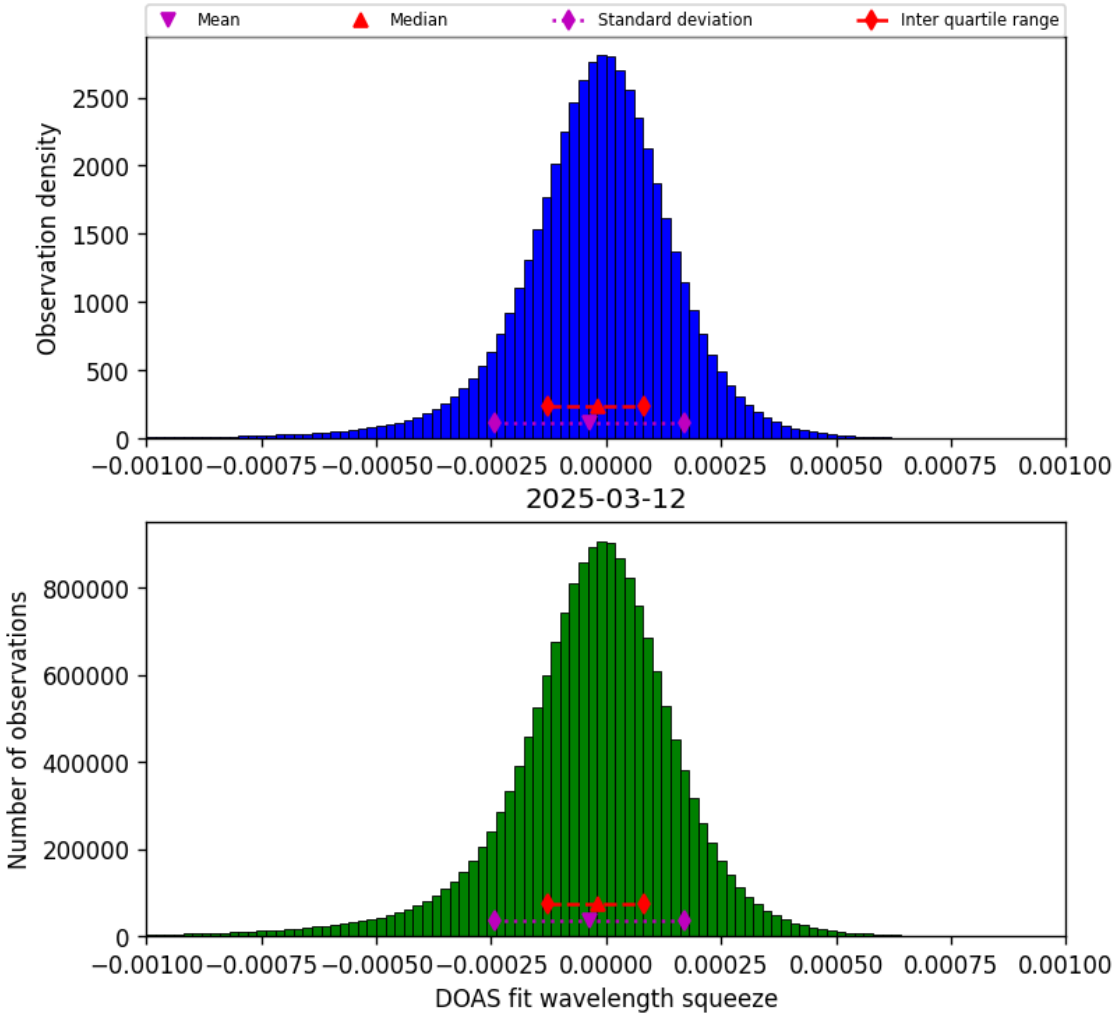


Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-03-12 to 2025-03-13

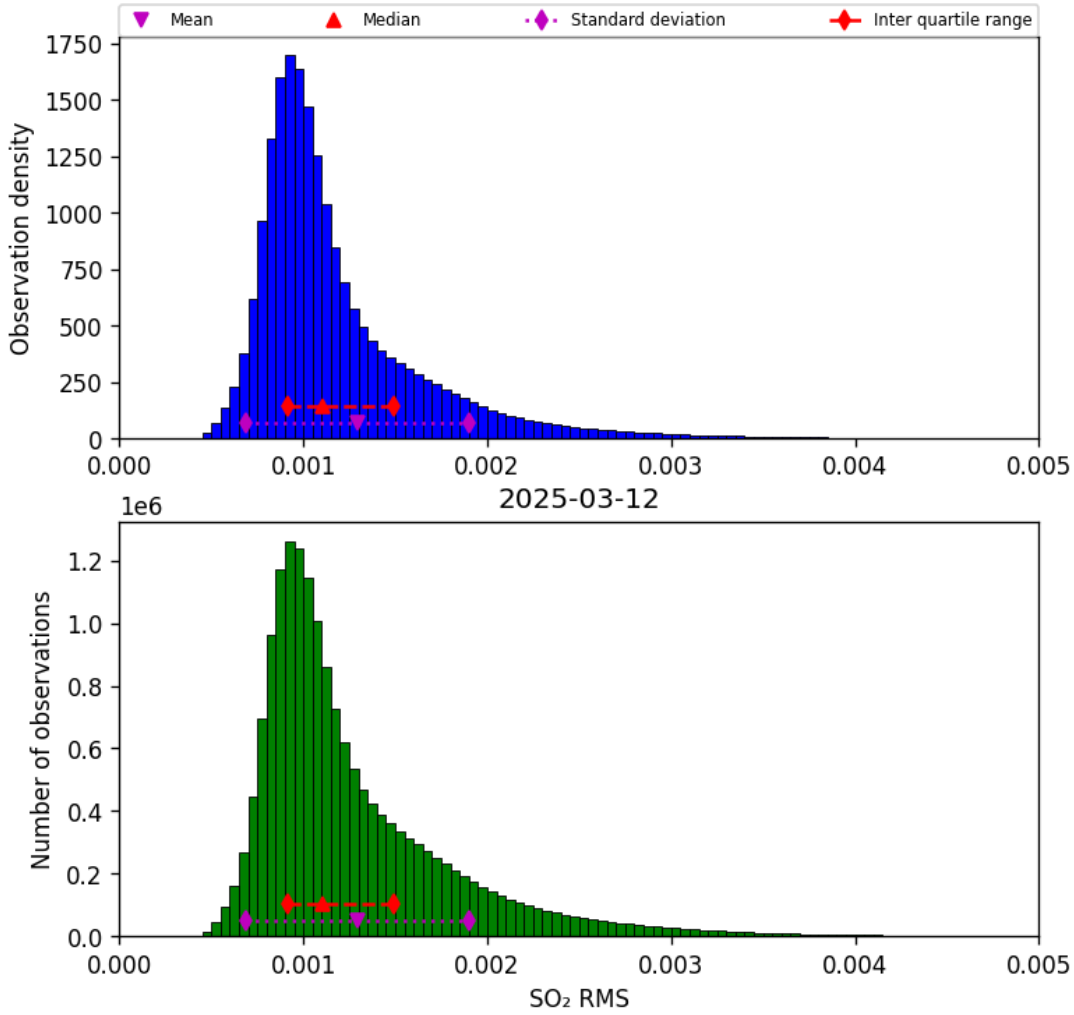


Figure 79: Histogram of "SO_2 RMS" for 2025-03-12 to 2025-03-13

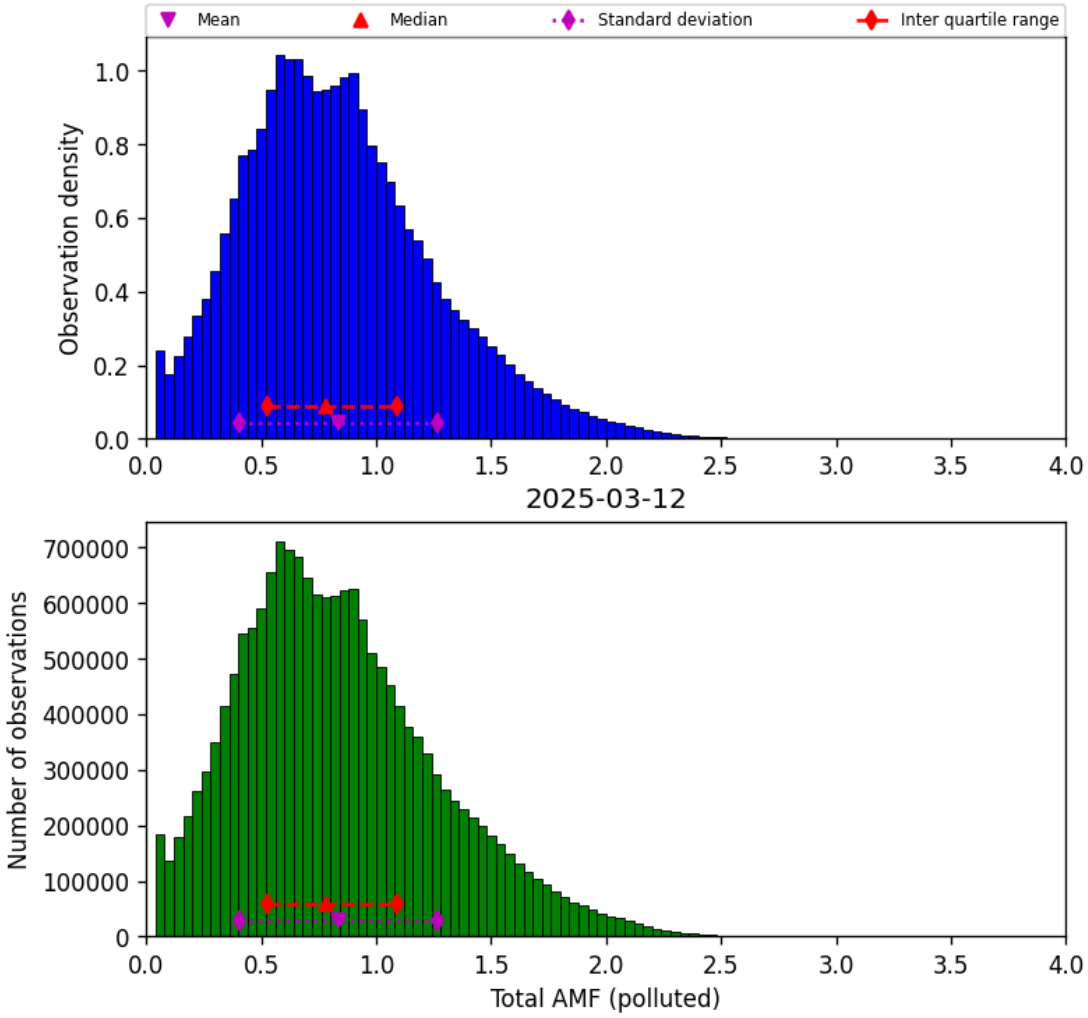


Figure 80: Histogram of “Total AMF (polluted)” for 2025-03-12 to 2025-03-13

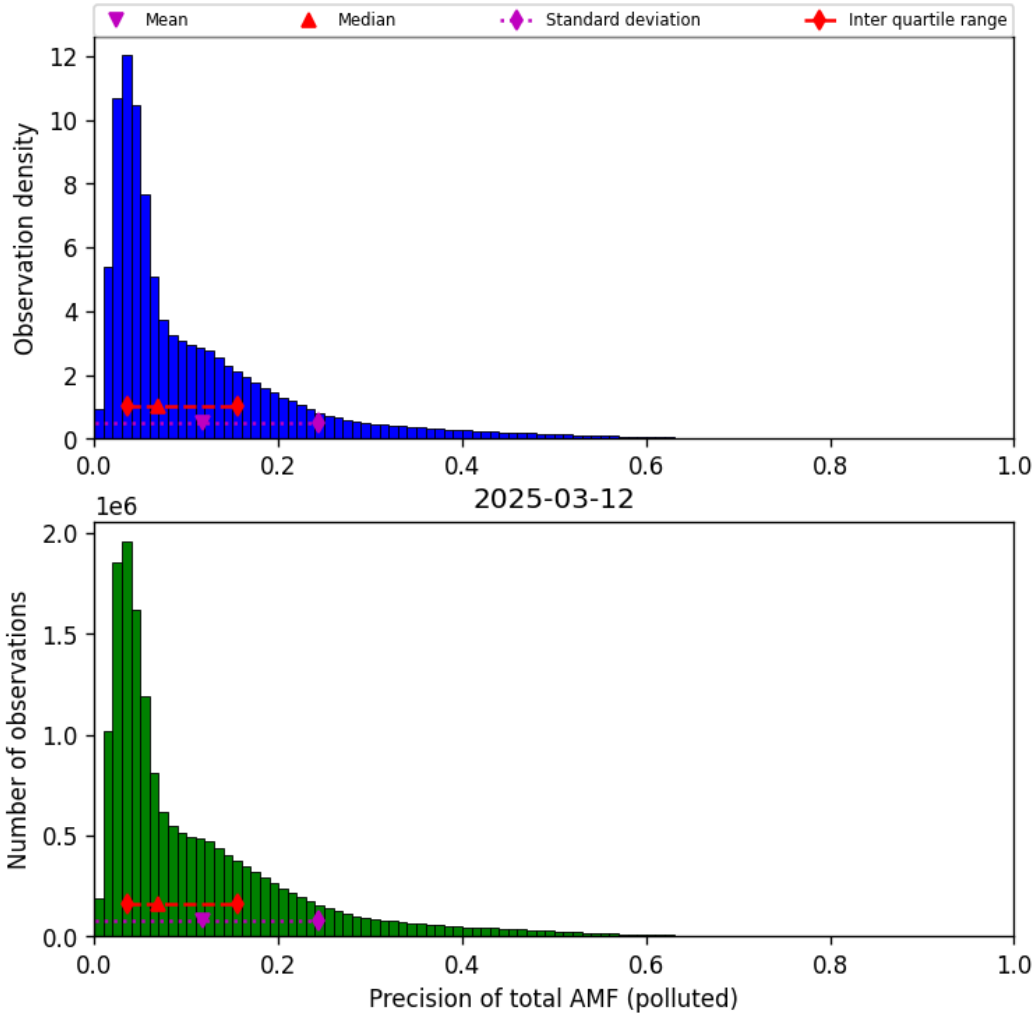


Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-03-12 to 2025-03-13

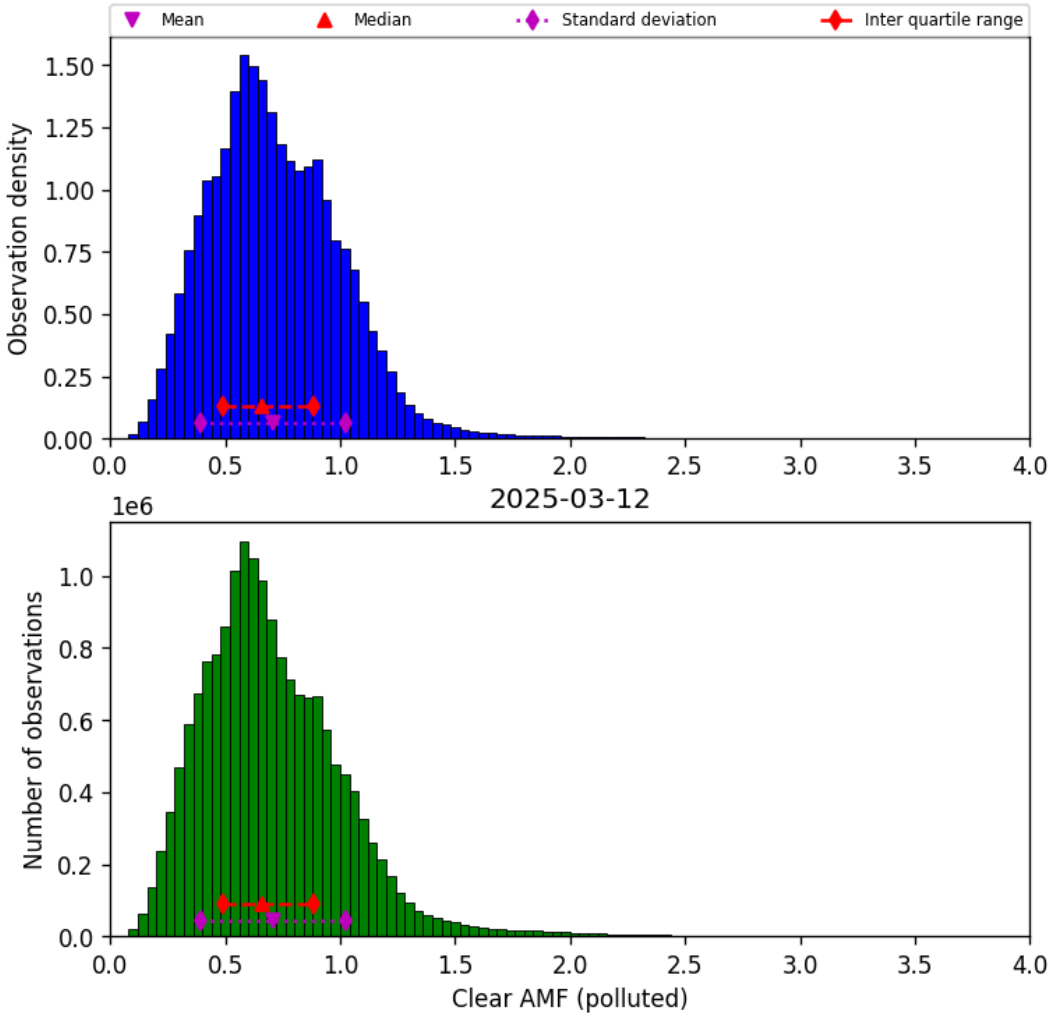


Figure 82: Histogram of “Clear AMF (polluted)” for 2025-03-12 to 2025-03-13

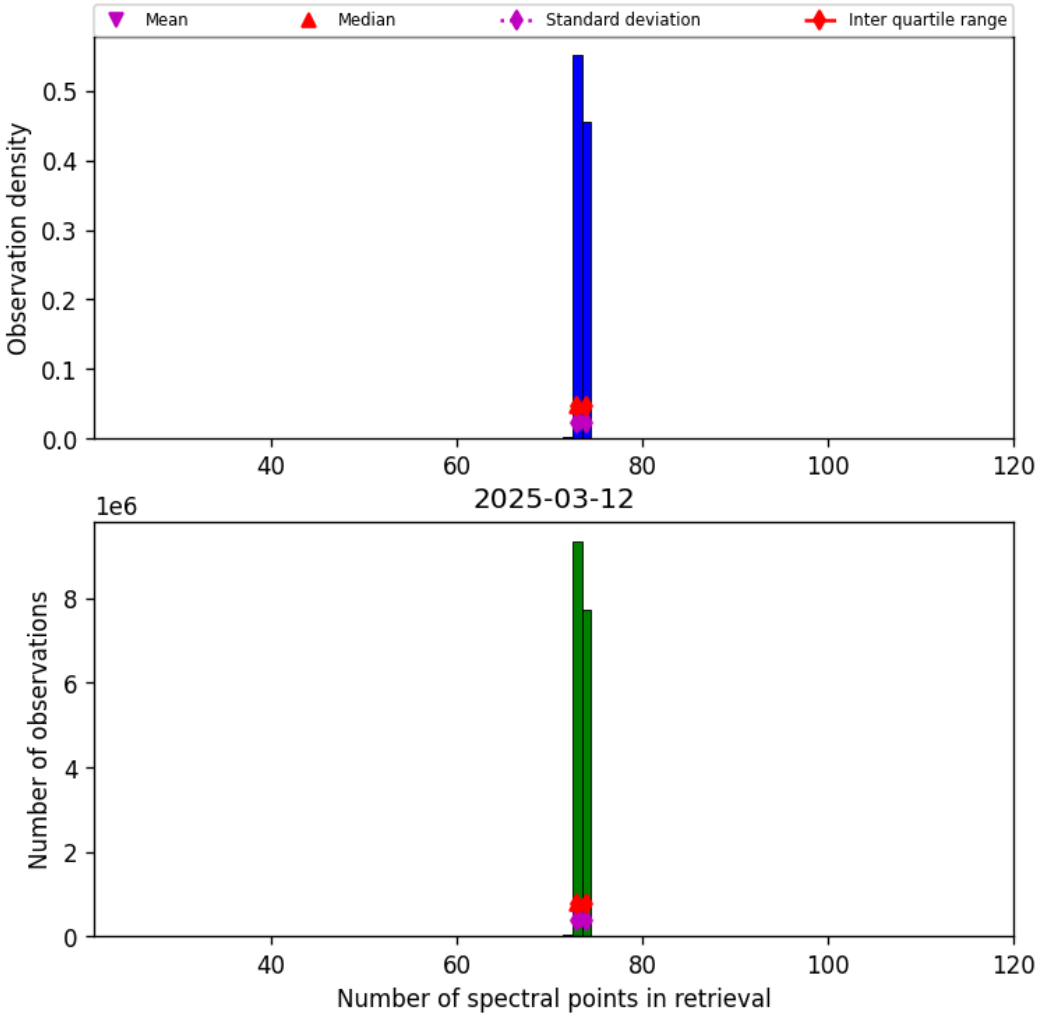


Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-03-12 to 2025-03-13

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.

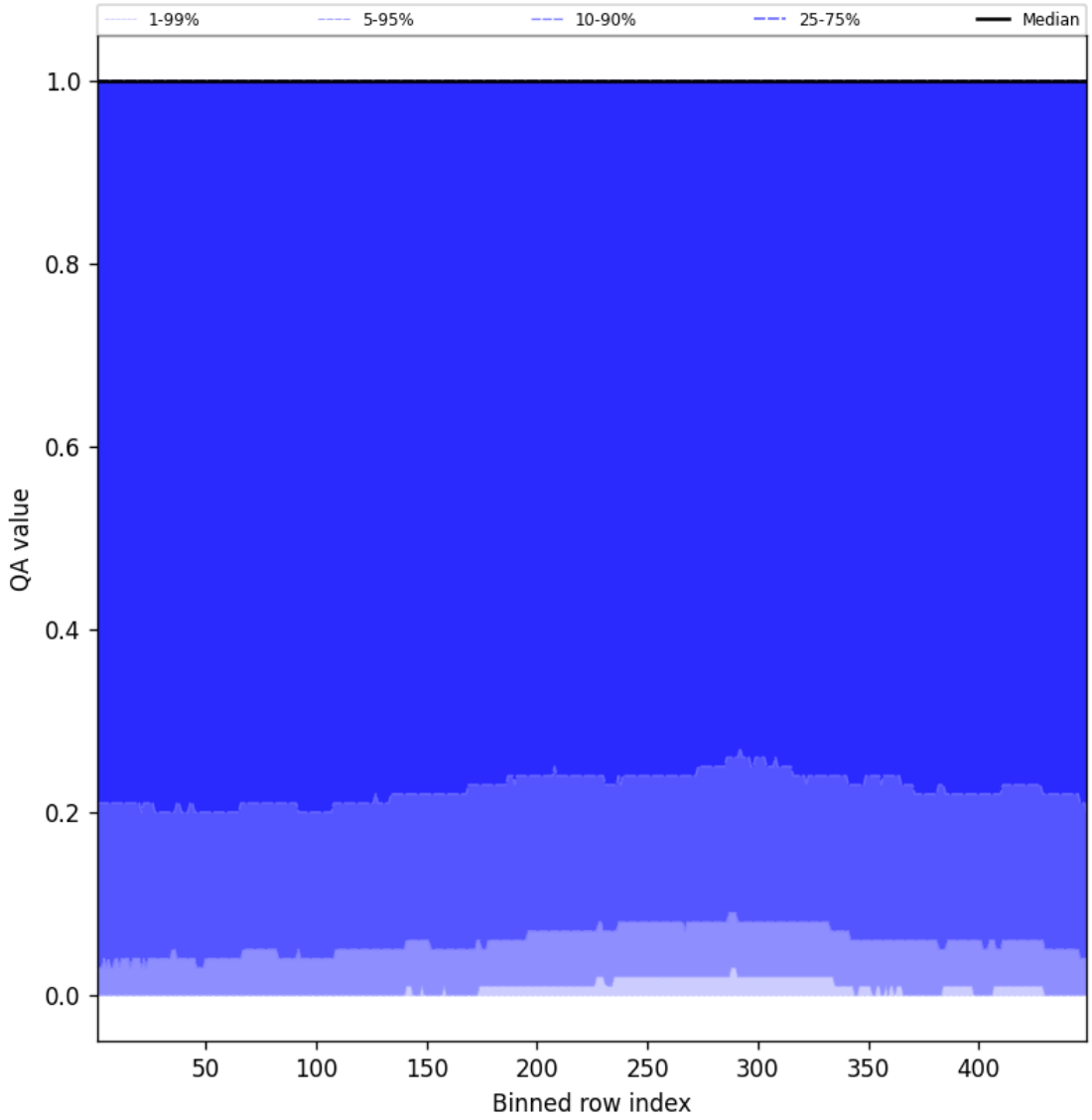


Figure 84: Along track statistics of “QA value” for 2025-03-12 to 2025-03-13

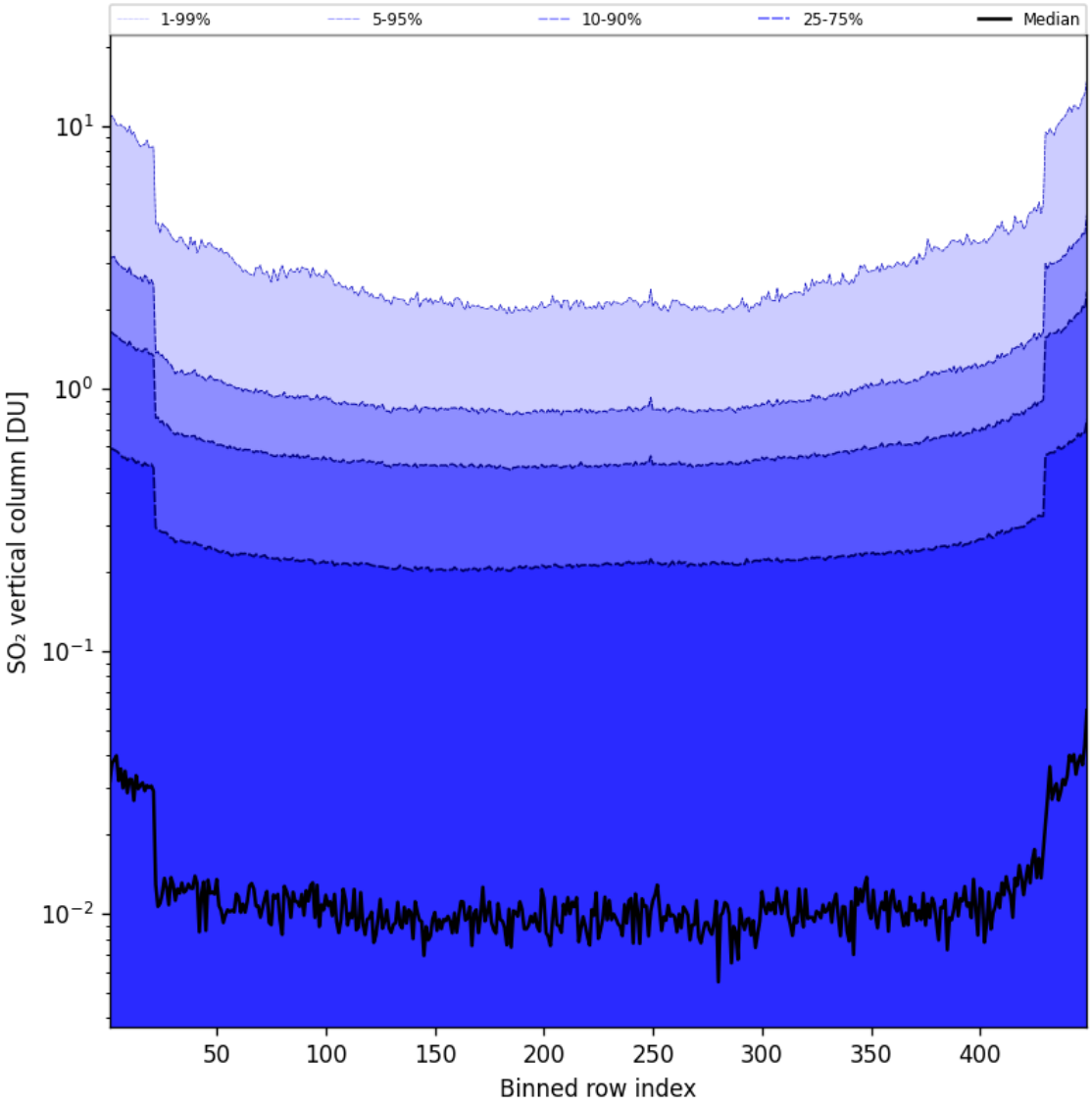


Figure 85: Along track statistics of "SO_2 vertical column" for 2025-03-12 to 2025-03-13

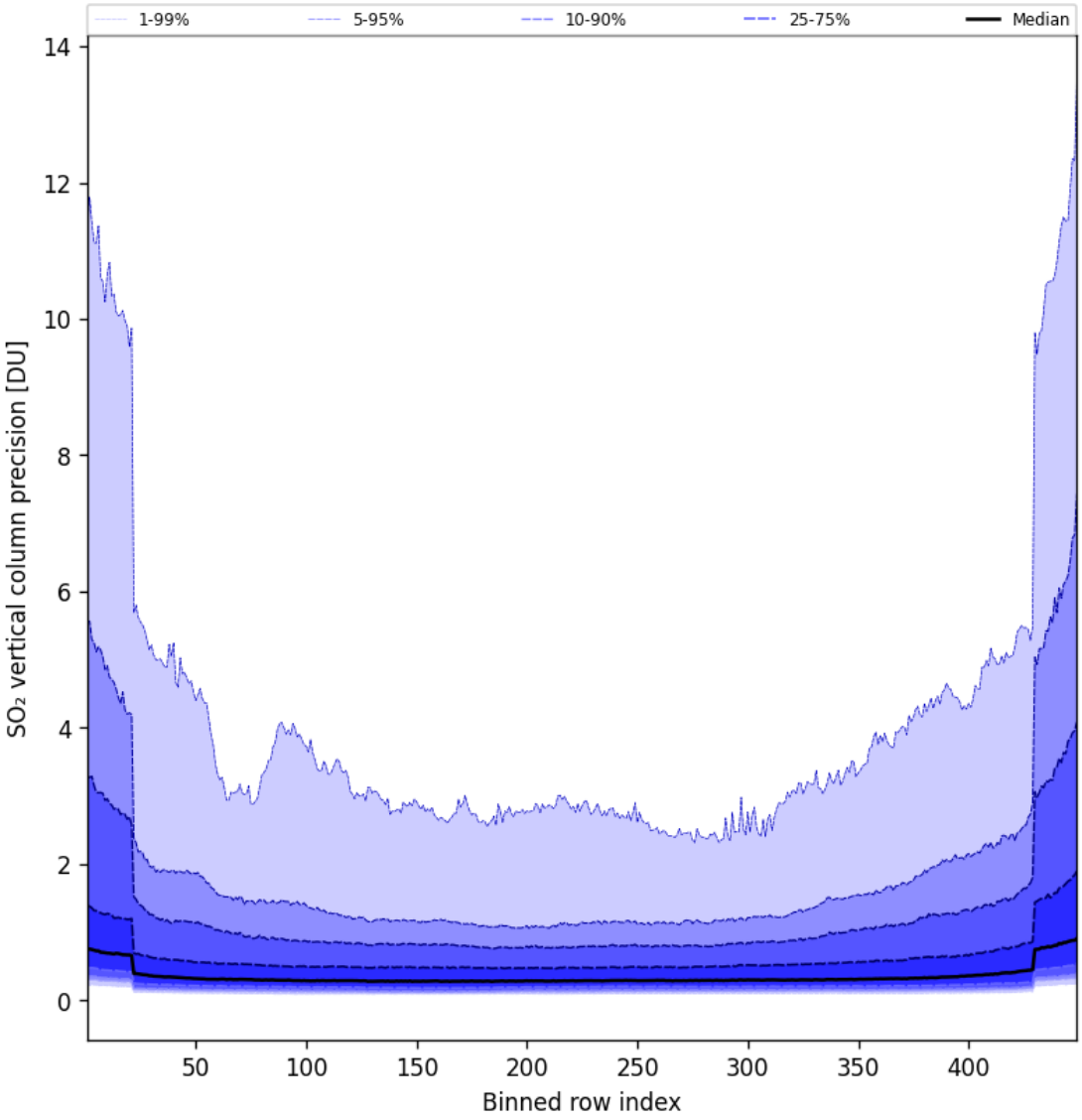


Figure 86: Along track statistics of "SO_2 vertical column precision" for 2025-03-12 to 2025-03-13

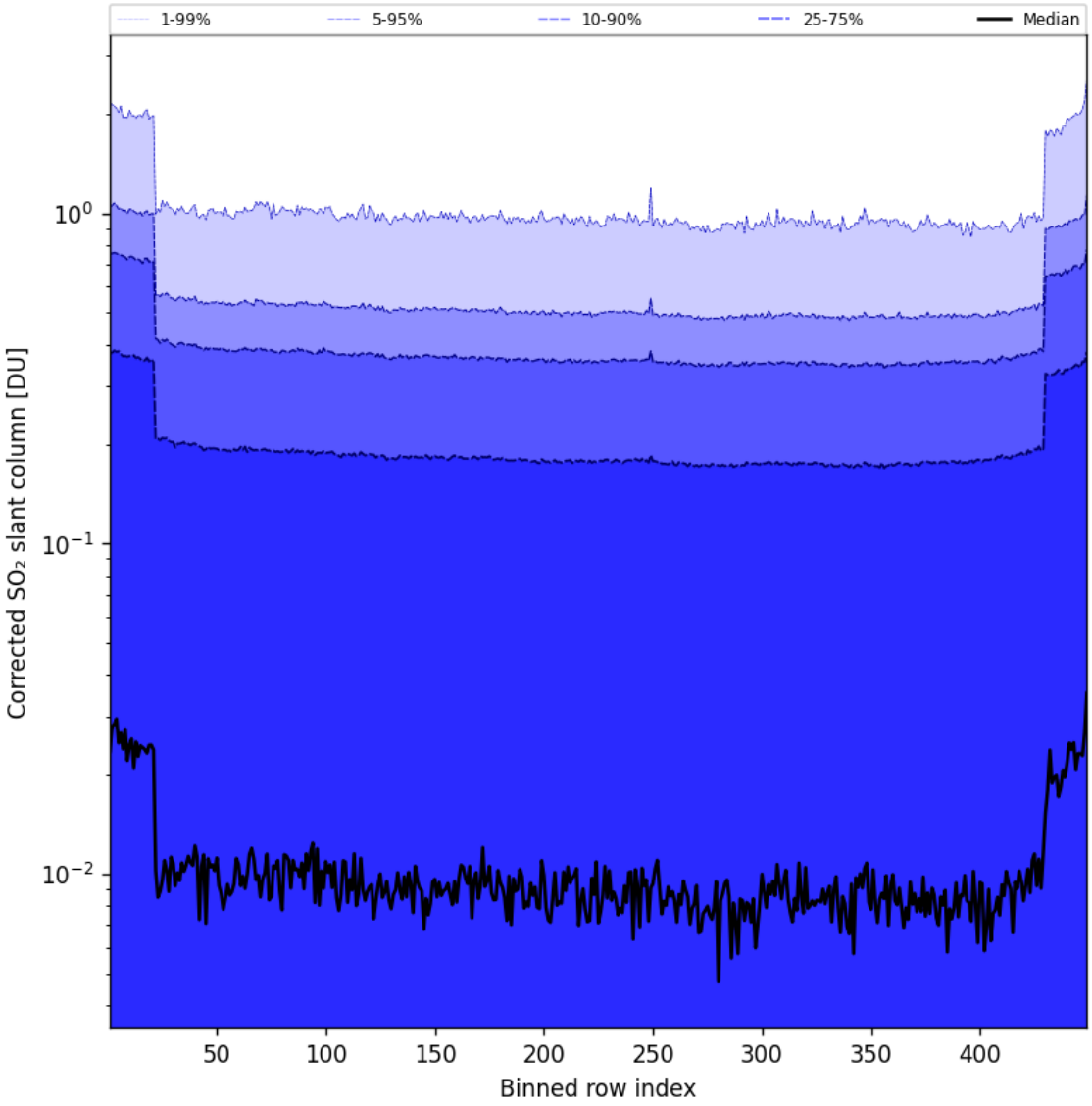


Figure 87: Along track statistics of "Corrected SO_2 slant column" for 2025-03-12 to 2025-03-13

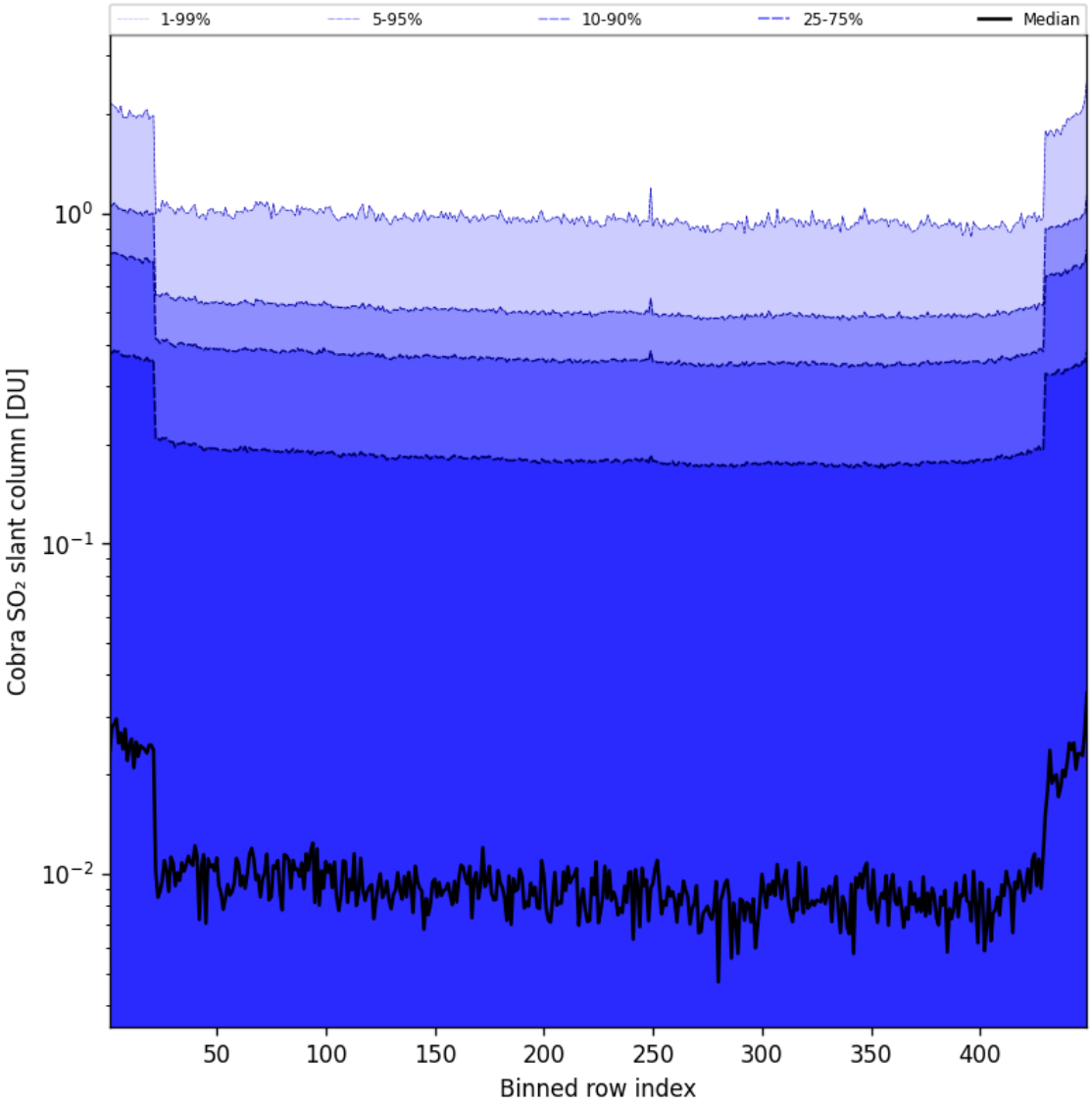


Figure 88: Along track statistics of "Cobra SO_2 slant column" for 2025-03-12 to 2025-03-13

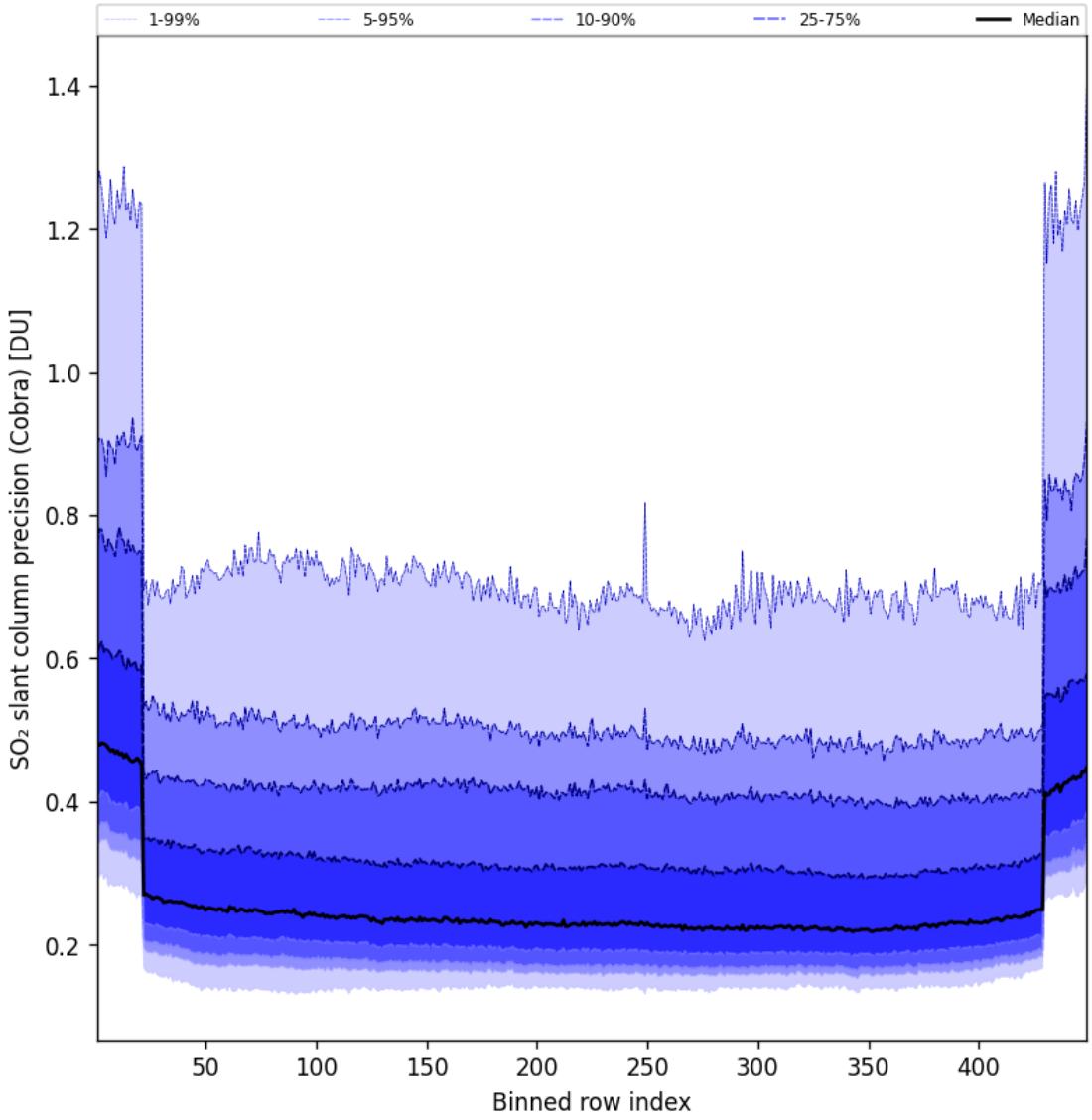


Figure 89: Along track statistics of "SO_2 slant column precision (Cobra)" for 2025-03-12 to 2025-03-13

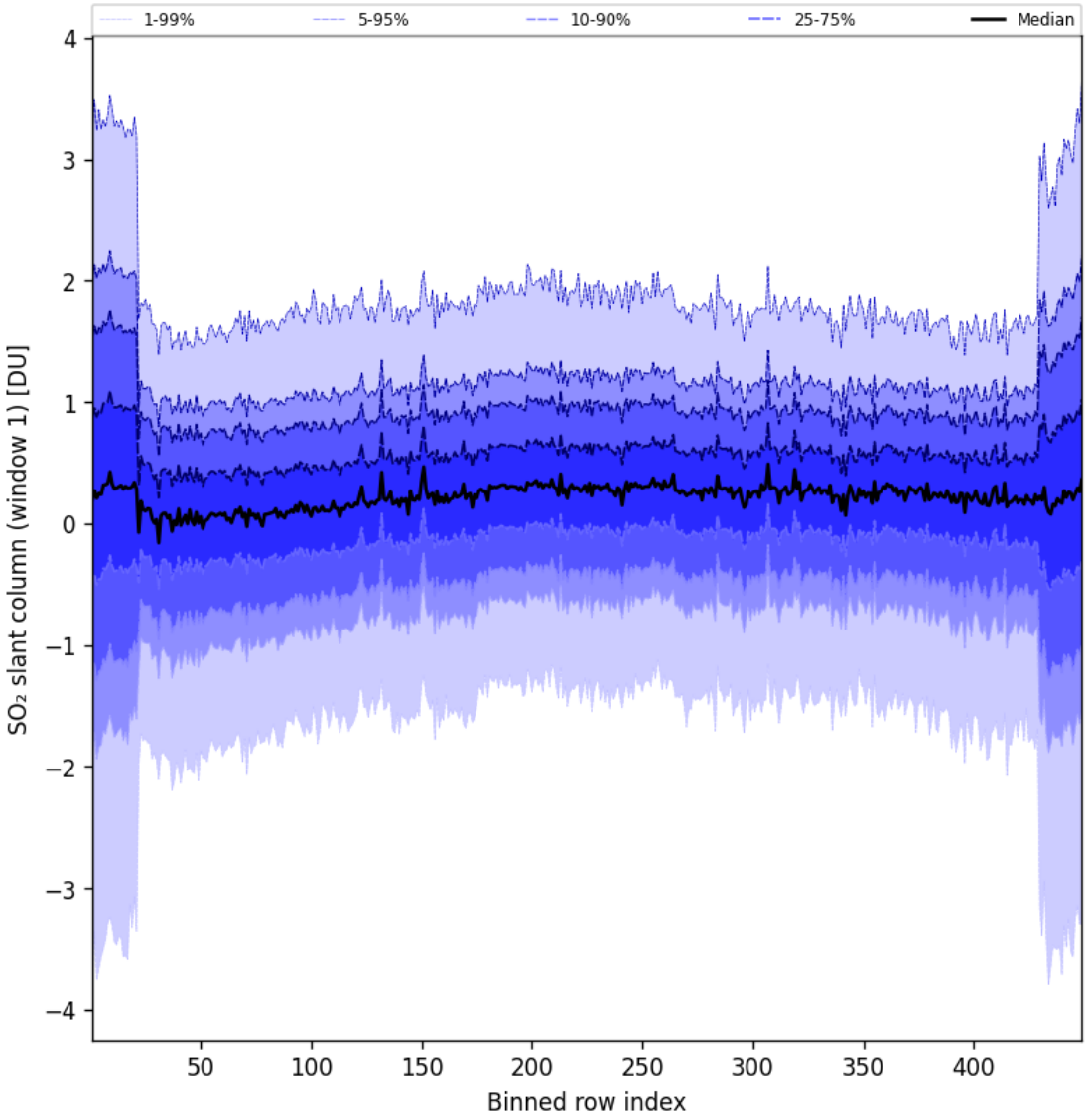


Figure 90: Along track statistics of "SO_2 slant column (window 1)" for 2025-03-12 to 2025-03-13

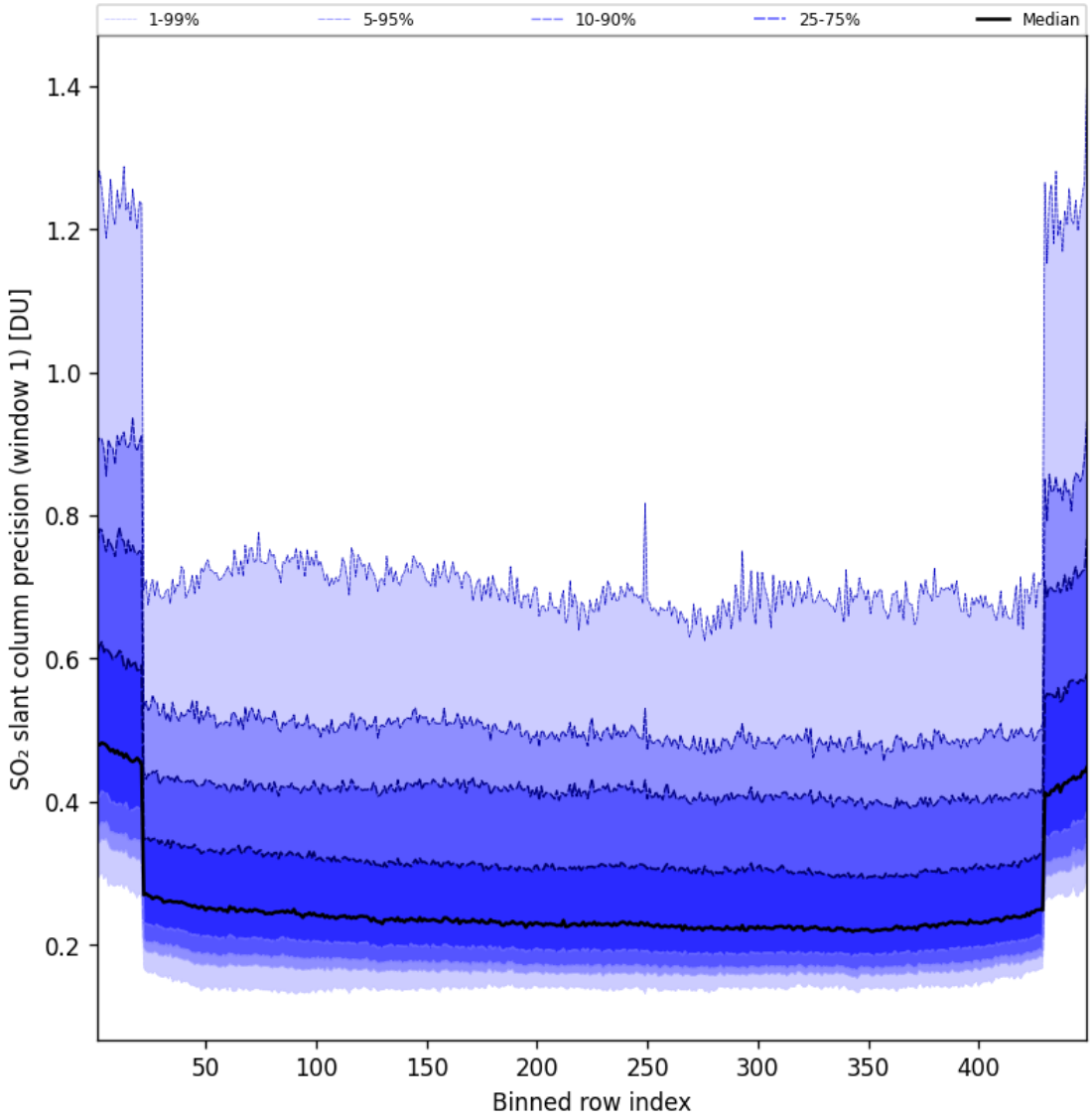


Figure 91: Along track statistics of "SO_2 slant column precision (window 1)" for 2025-03-12 to 2025-03-13

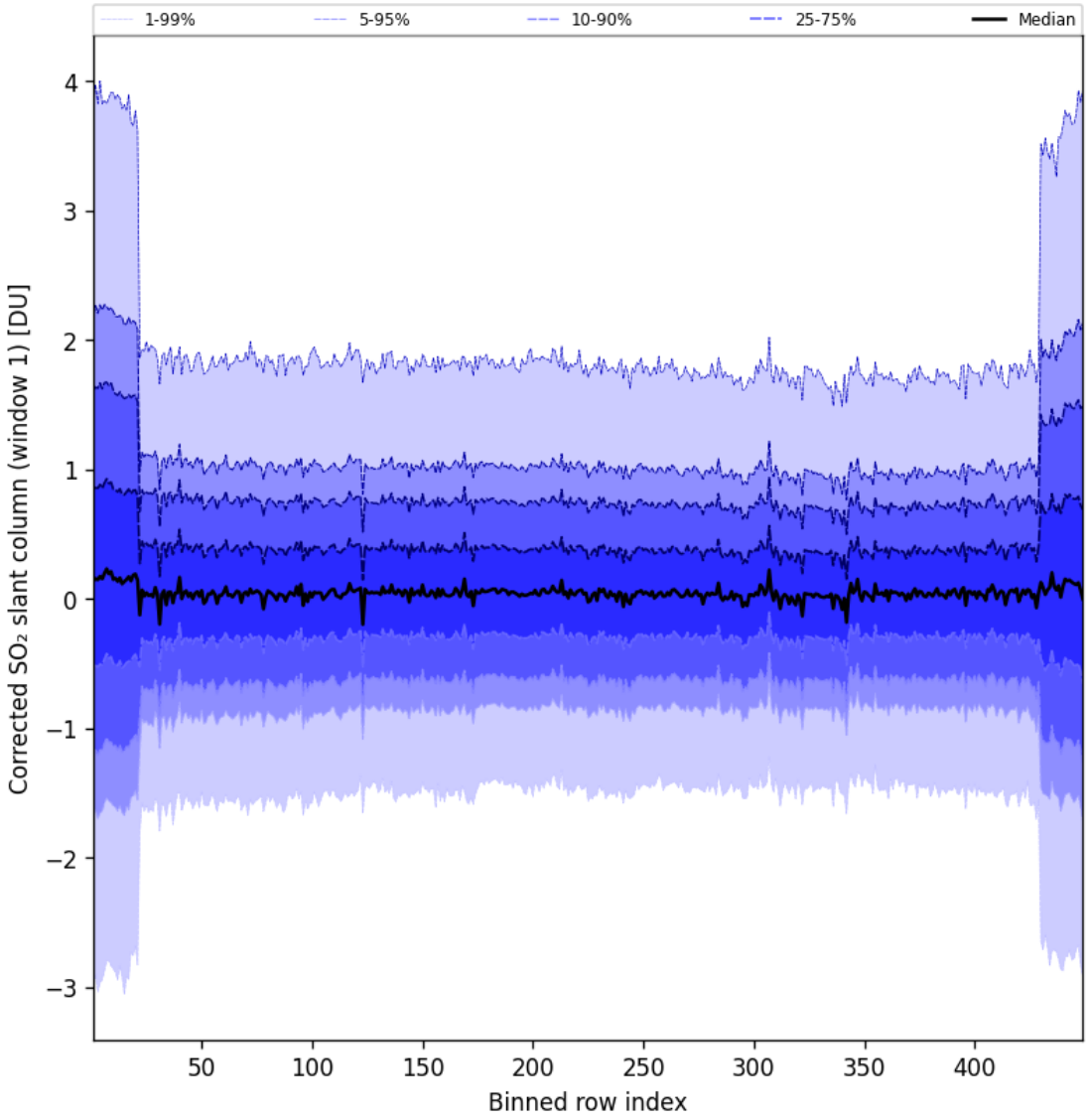


Figure 92: Along track statistics of “Corrected SO_2 slant column (window 1)” for 2025-03-12 to 2025-03-13

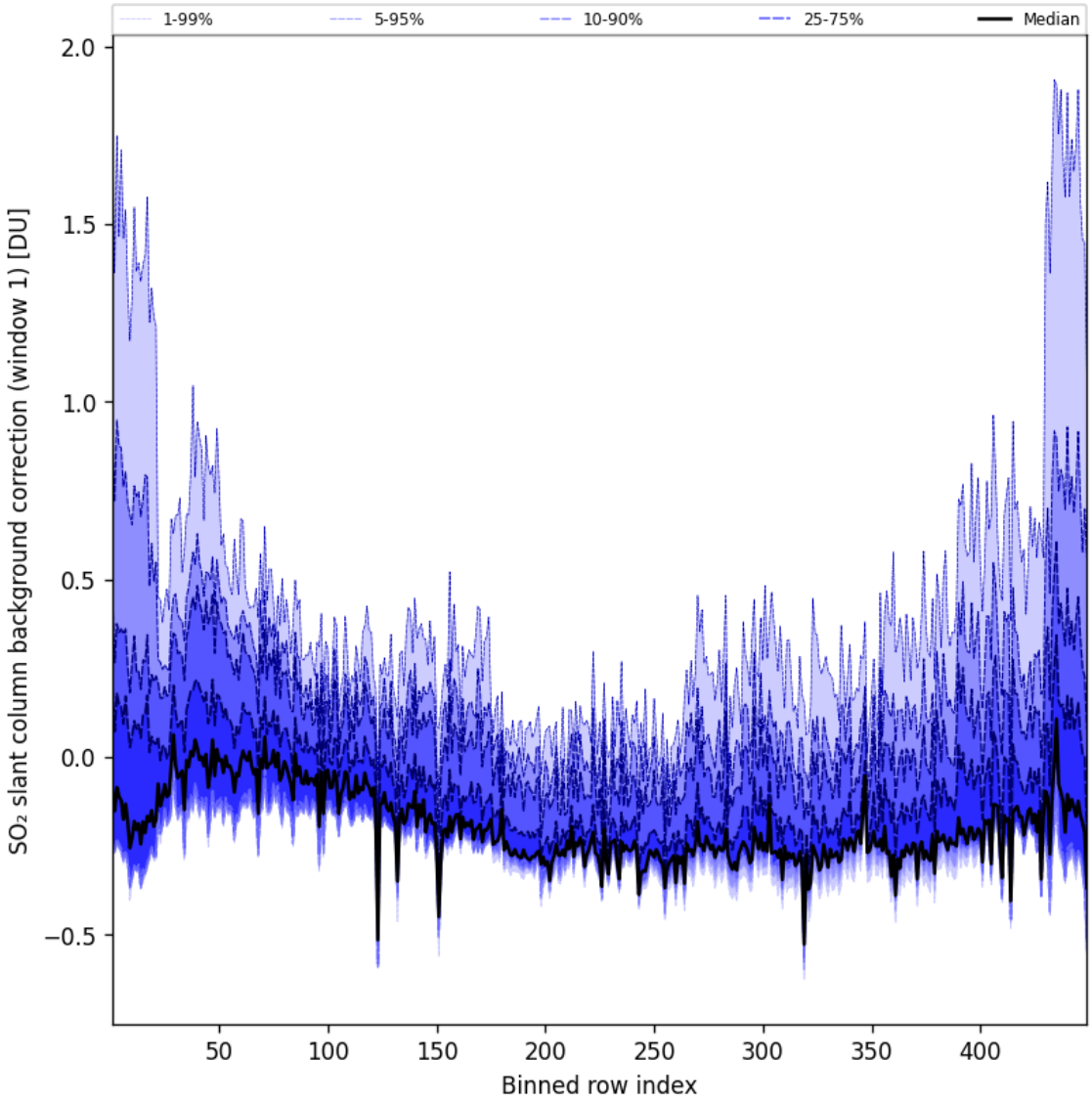


Figure 93: Along track statistics of "SO_2 slant column background correction (window 1)" for 2025-03-12 to 2025-03-13

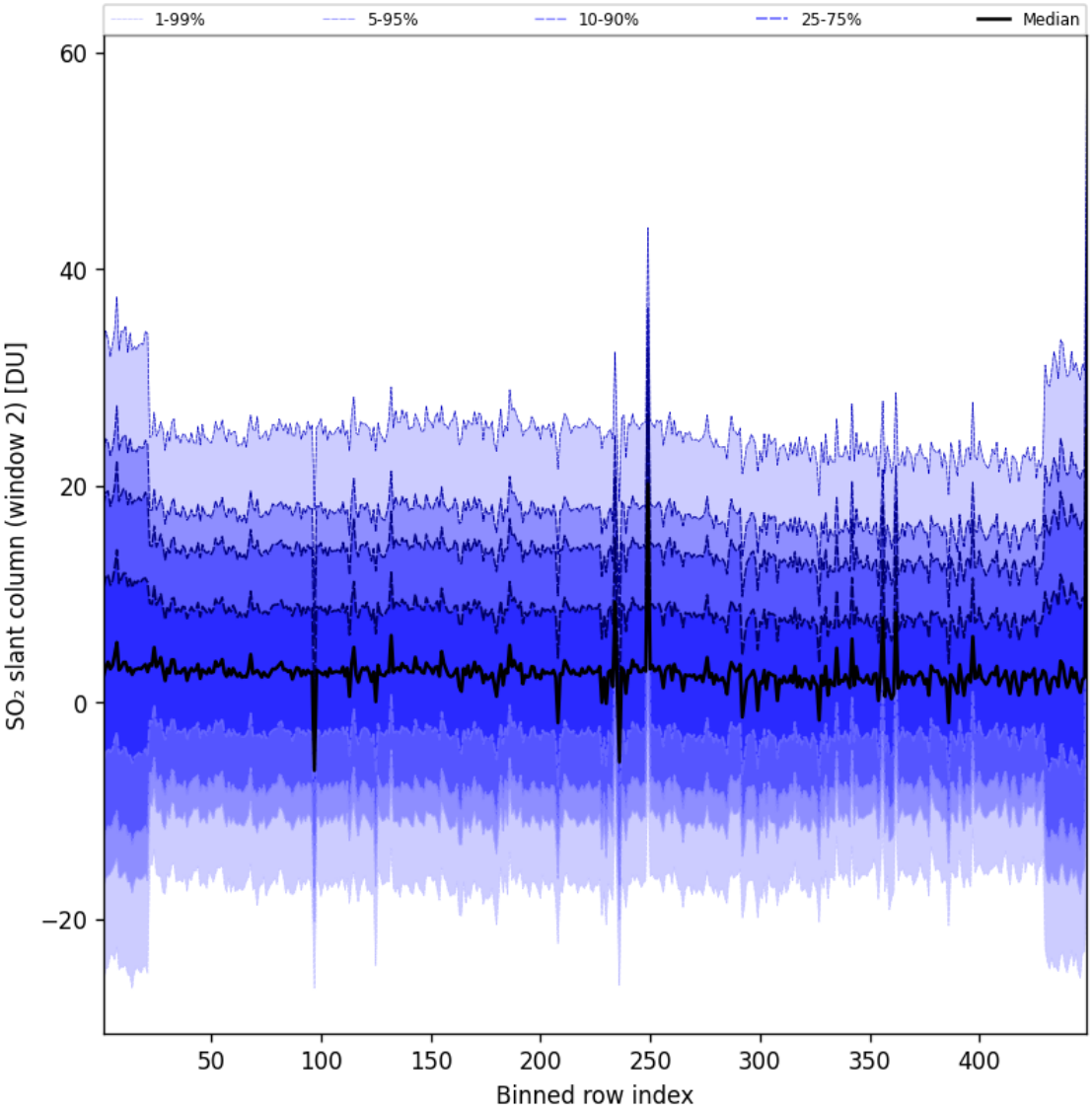


Figure 94: Along track statistics of "SO_2 slant column (window 2)" for 2025-03-12 to 2025-03-13

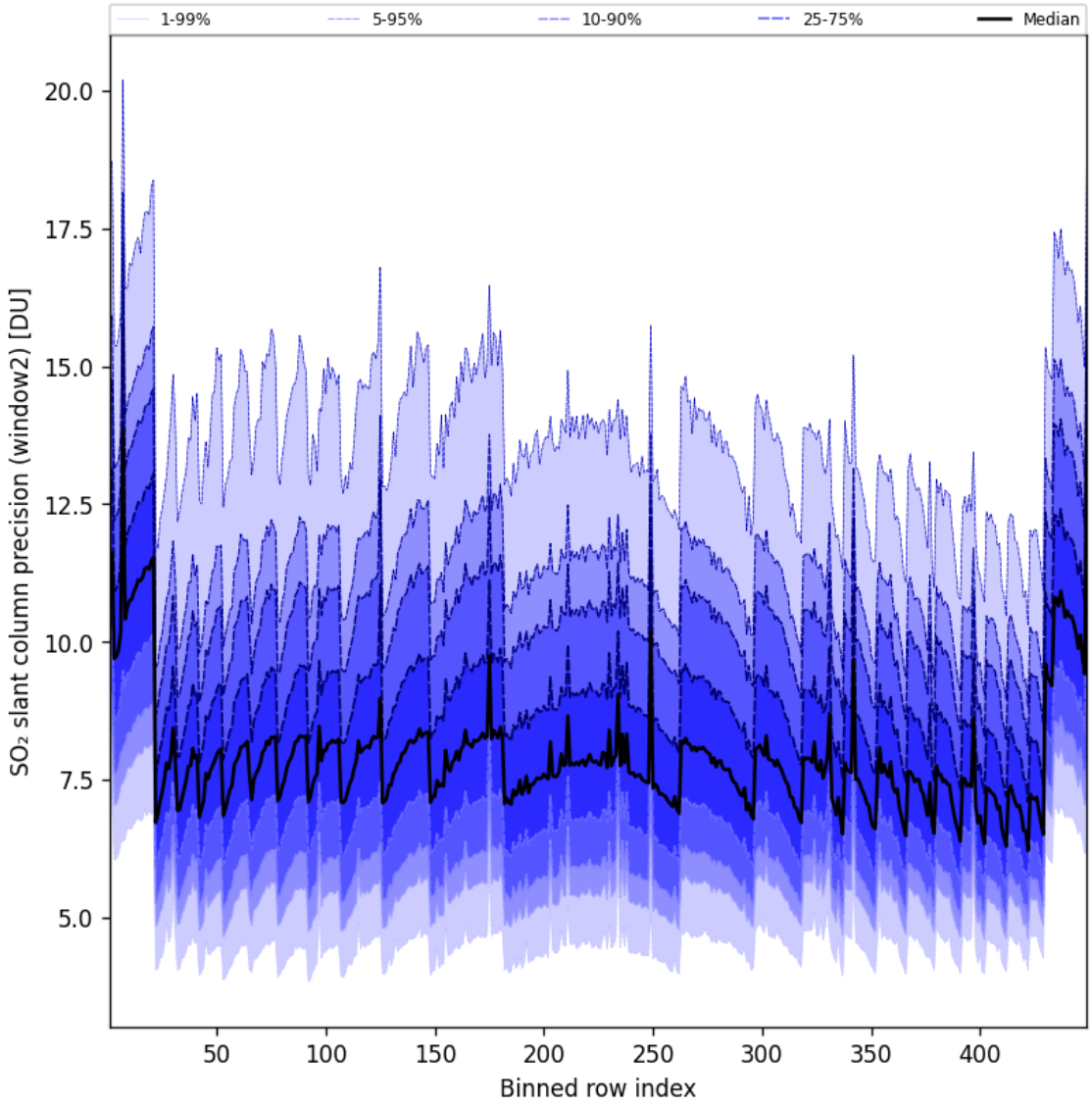


Figure 95: Along track statistics of "SO_2 slant column precision (window2)" for 2025-03-12 to 2025-03-13

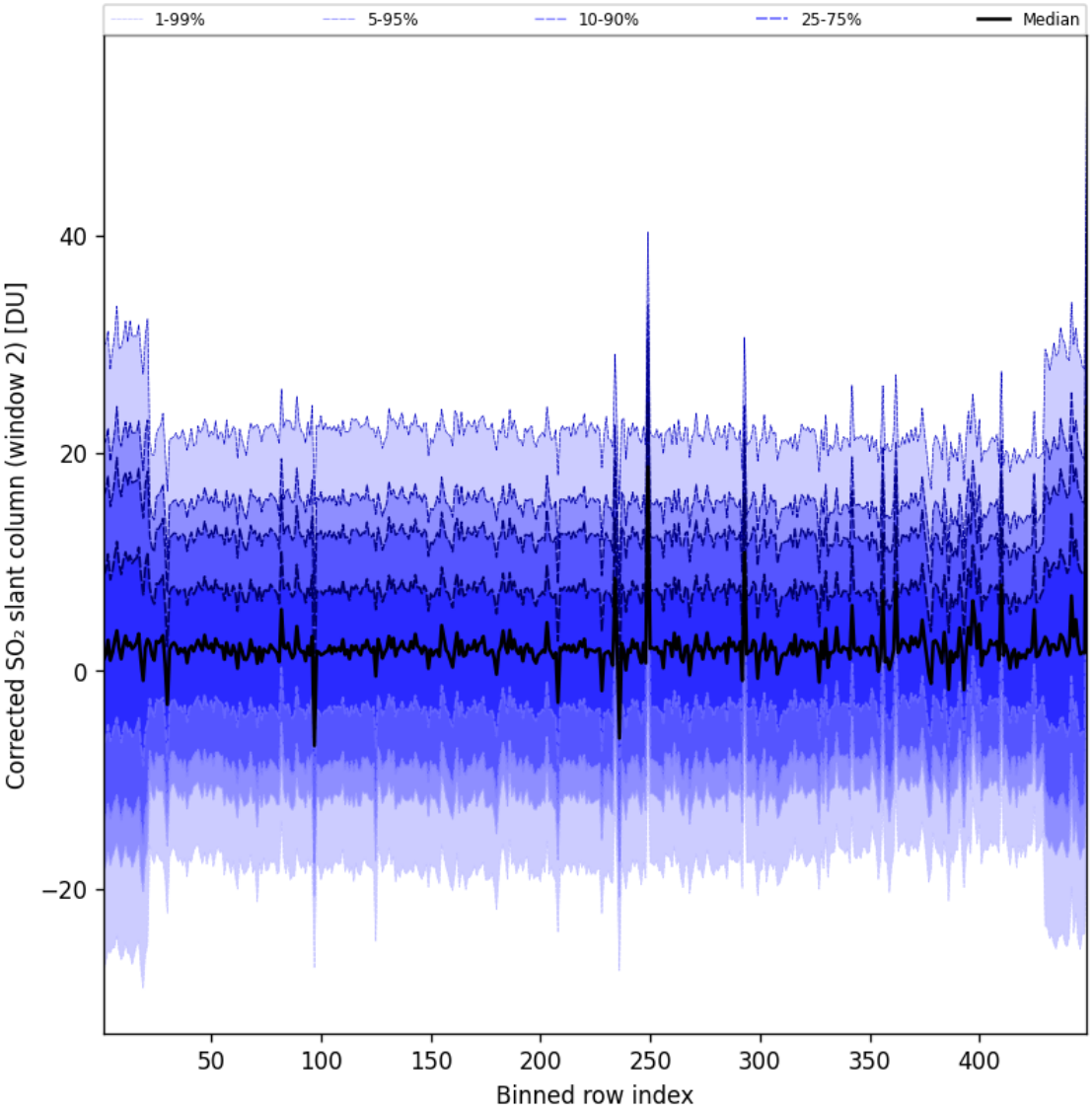


Figure 96: Along track statistics of "Corrected SO_2 slant column (window 2)" for 2025-03-12 to 2025-03-13

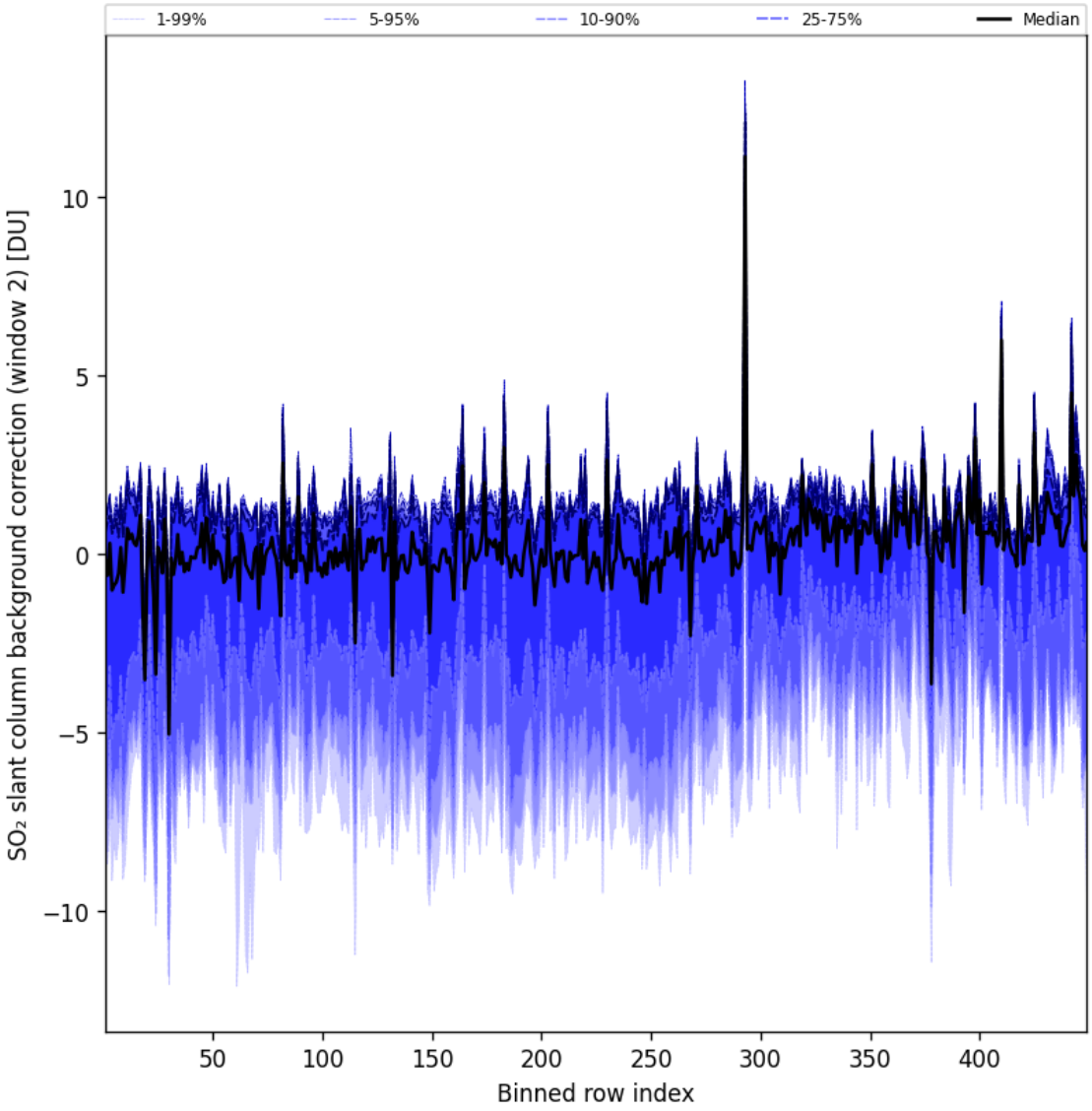


Figure 97: Along track statistics of "SO_2 slant column background correction (window 2)" for 2025-03-12 to 2025-03-13

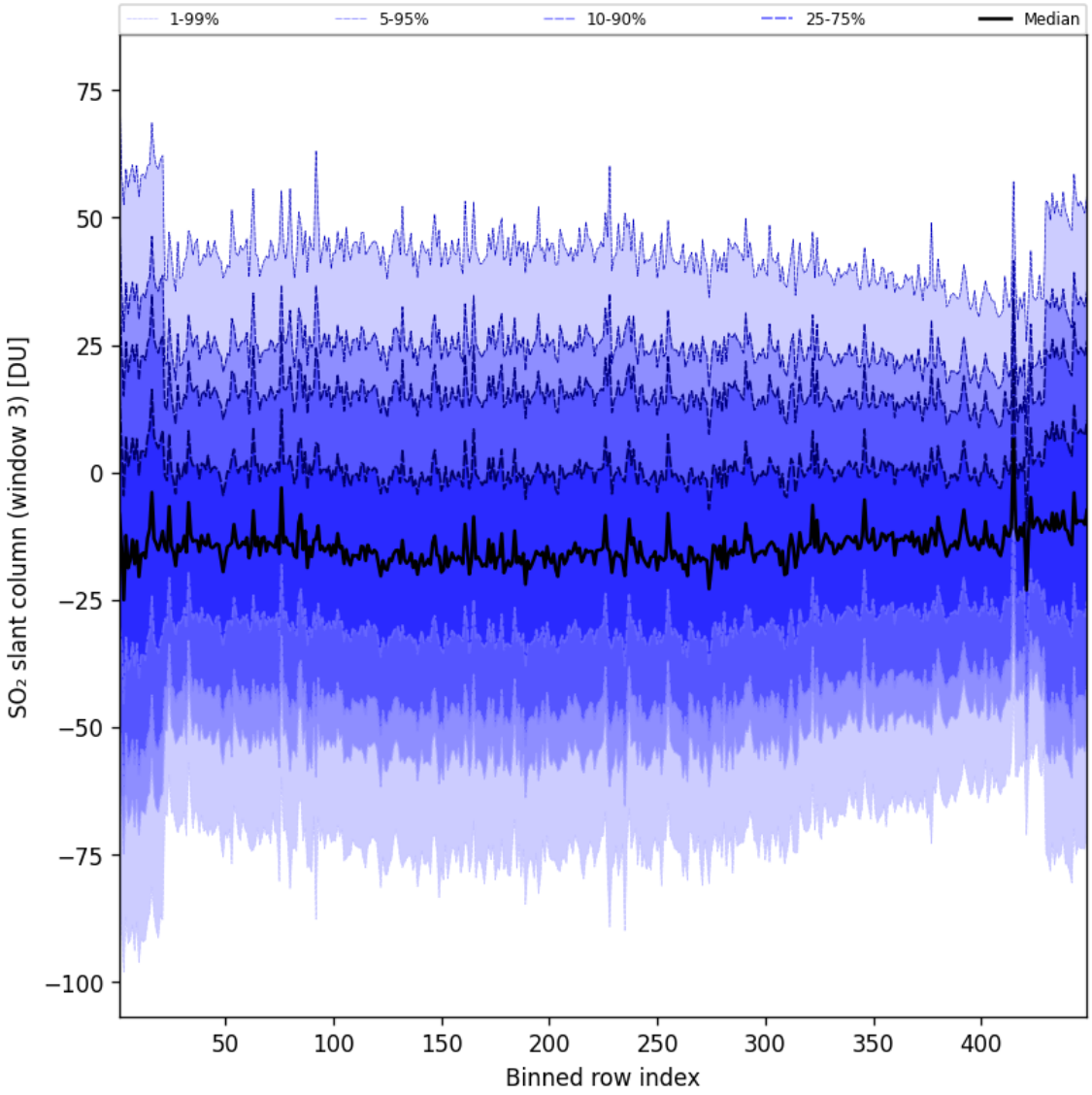


Figure 98: Along track statistics of "SO_2 slant column (window 3)" for 2025-03-12 to 2025-03-13

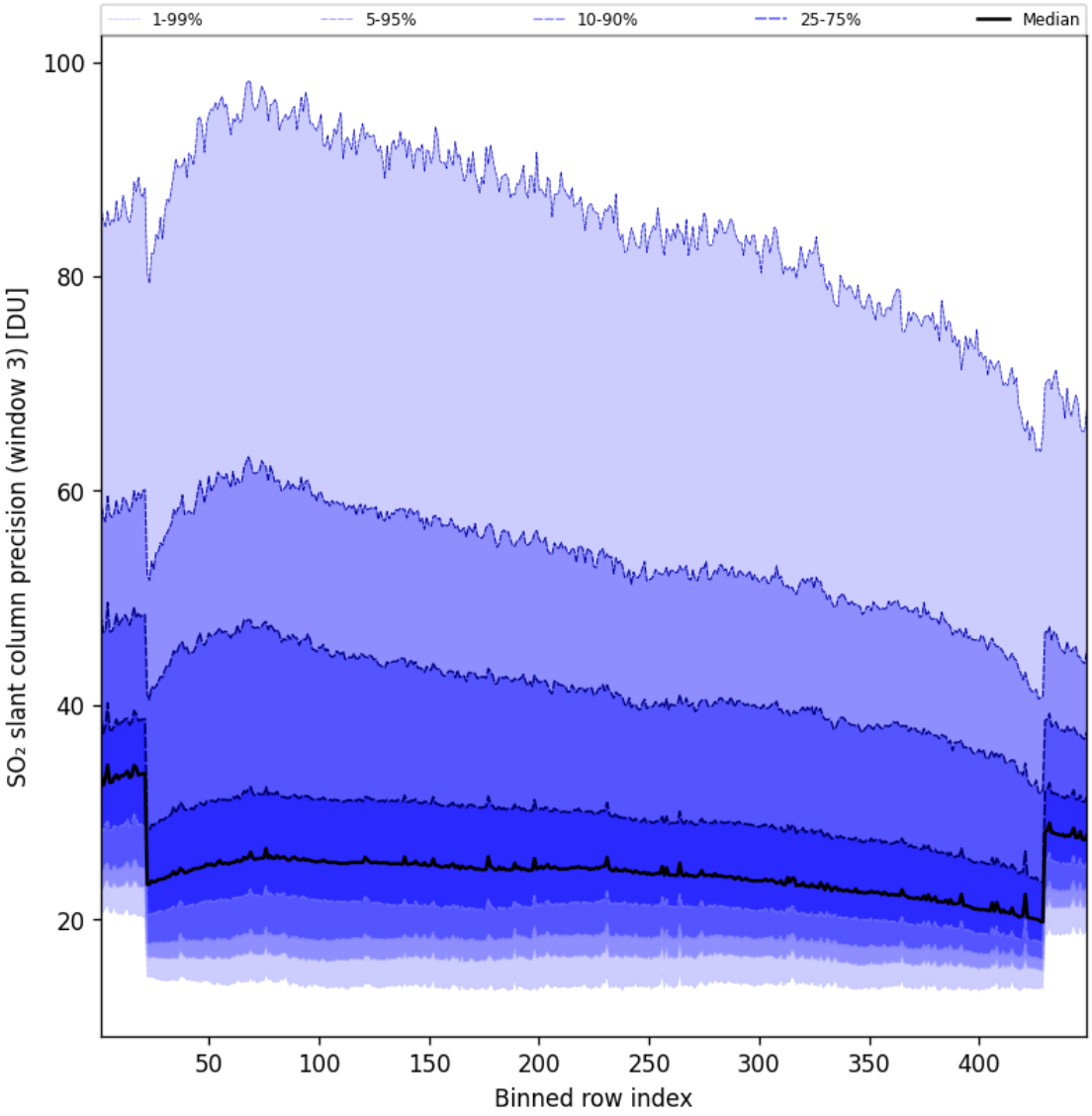


Figure 99: Along track statistics of "SO_2 slant column precision (window 3)" for 2025-03-12 to 2025-03-13

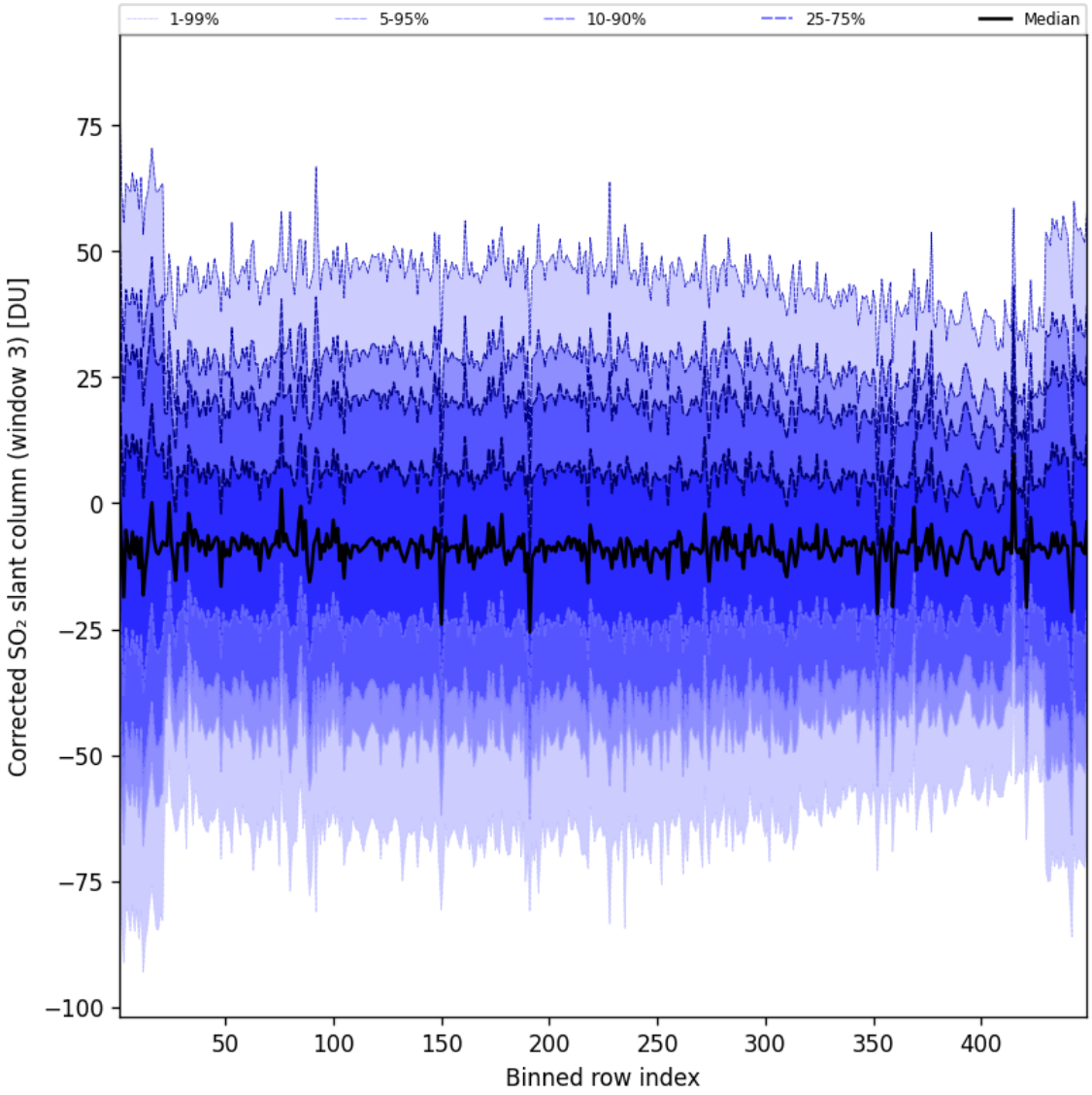


Figure 100: Along track statistics of “Corrected SO_2 slant column (window 3)” for 2025-03-12 to 2025-03-13

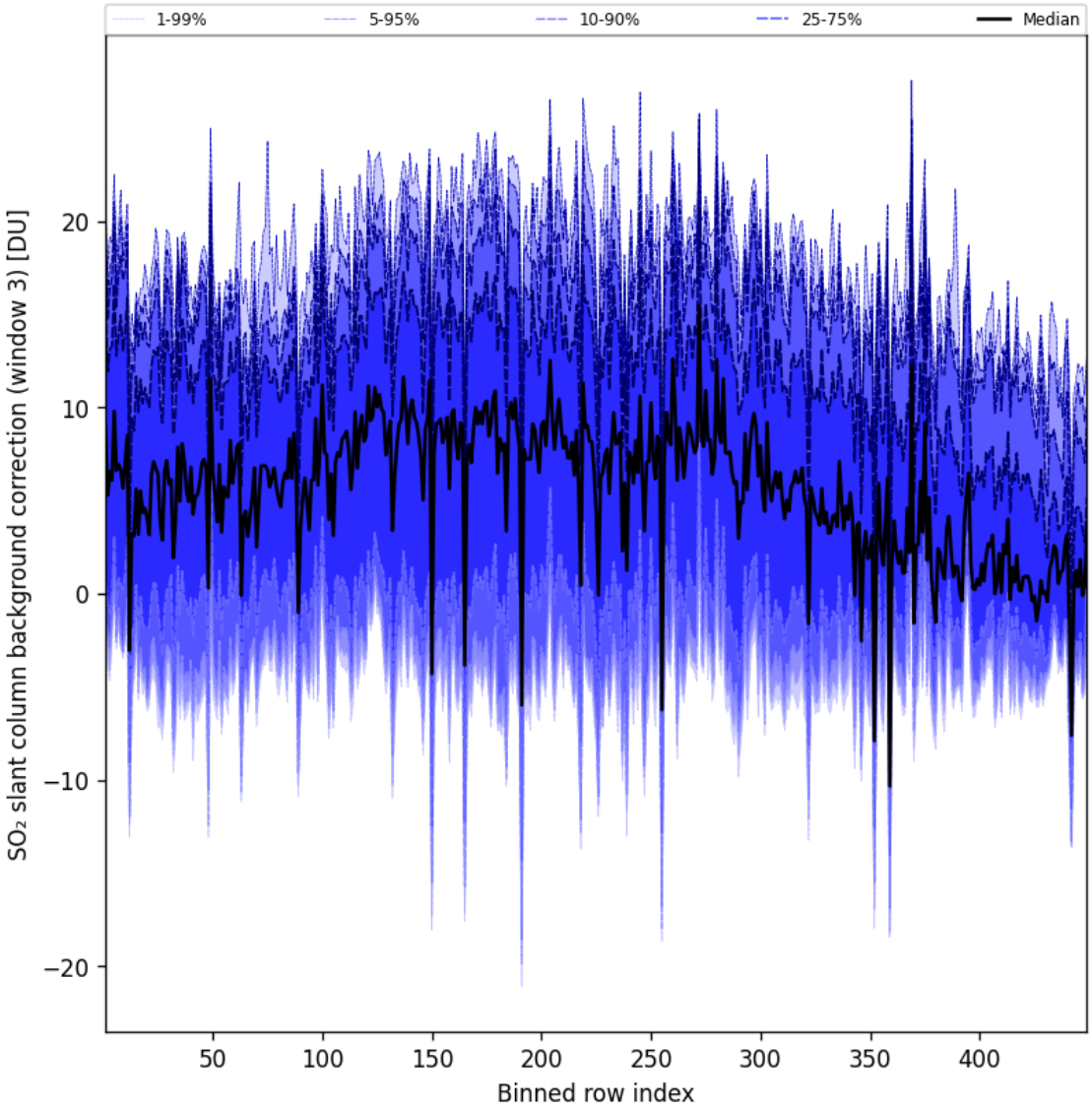


Figure 101: Along track statistics of "SO_2 slant column background correction (window 3)" for 2025-03-12 to 2025-03-13

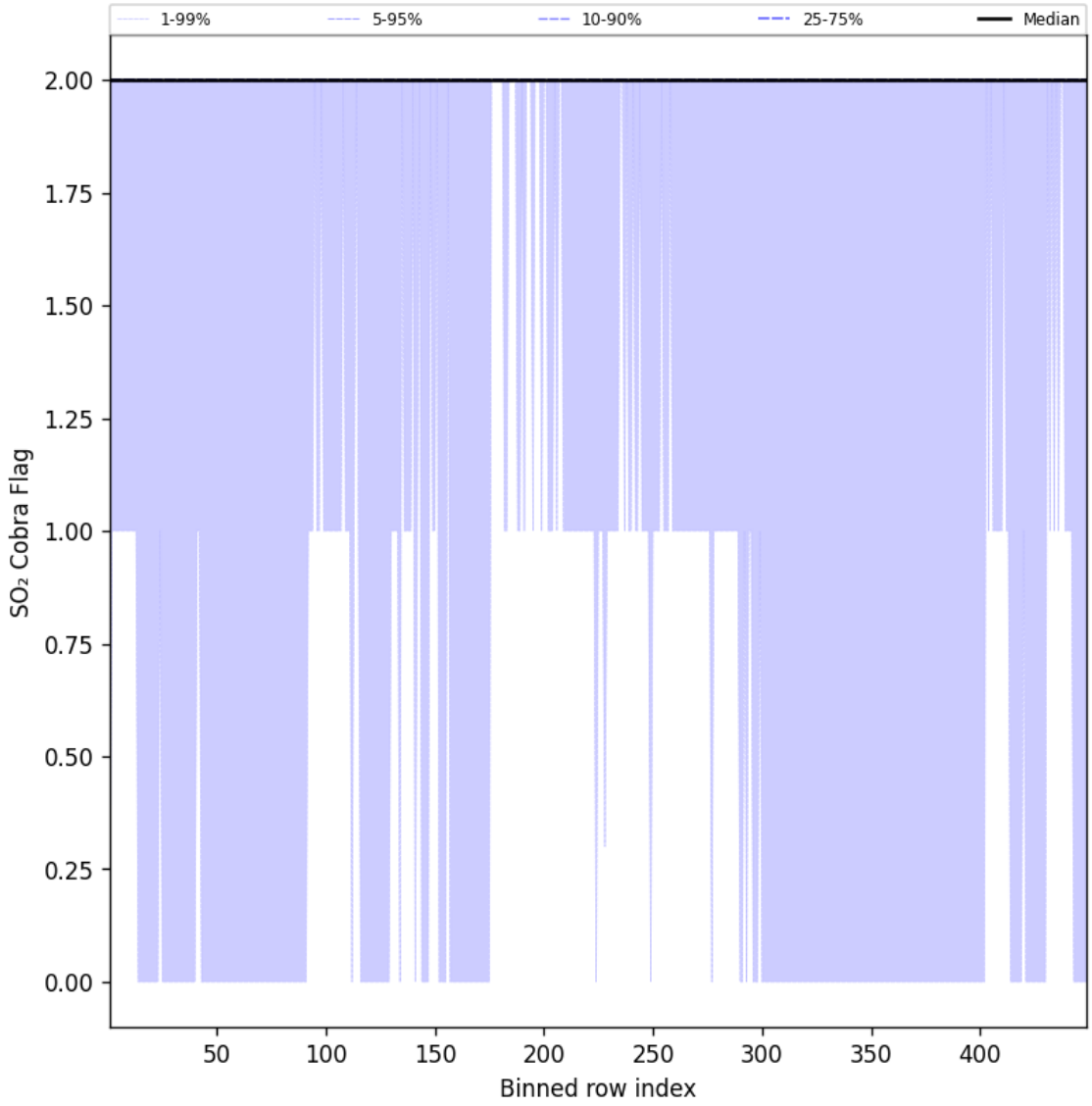


Figure 102: Along track statistics of "SO_2 Cobra Flag" for 2025-03-12 to 2025-03-13

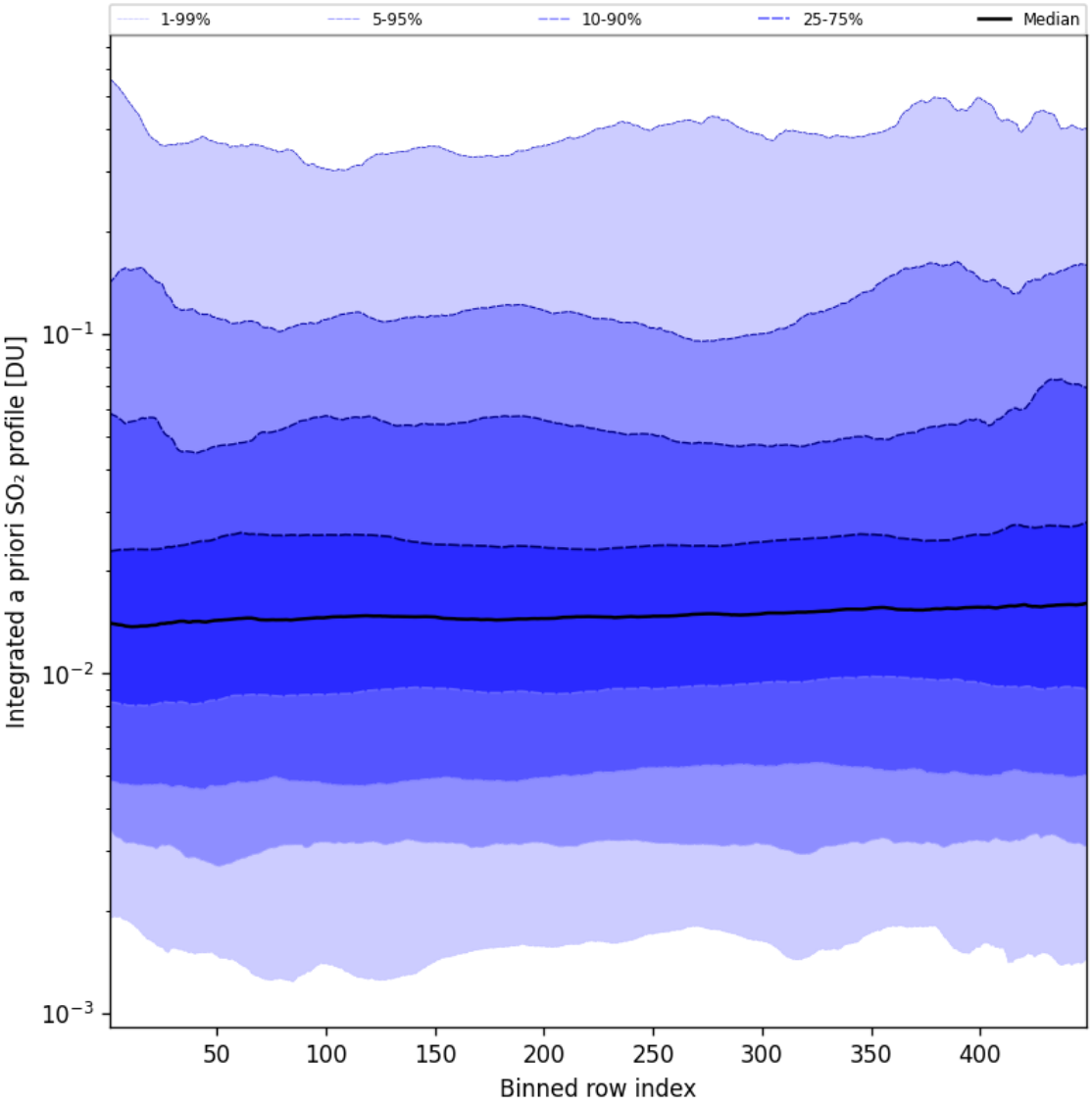
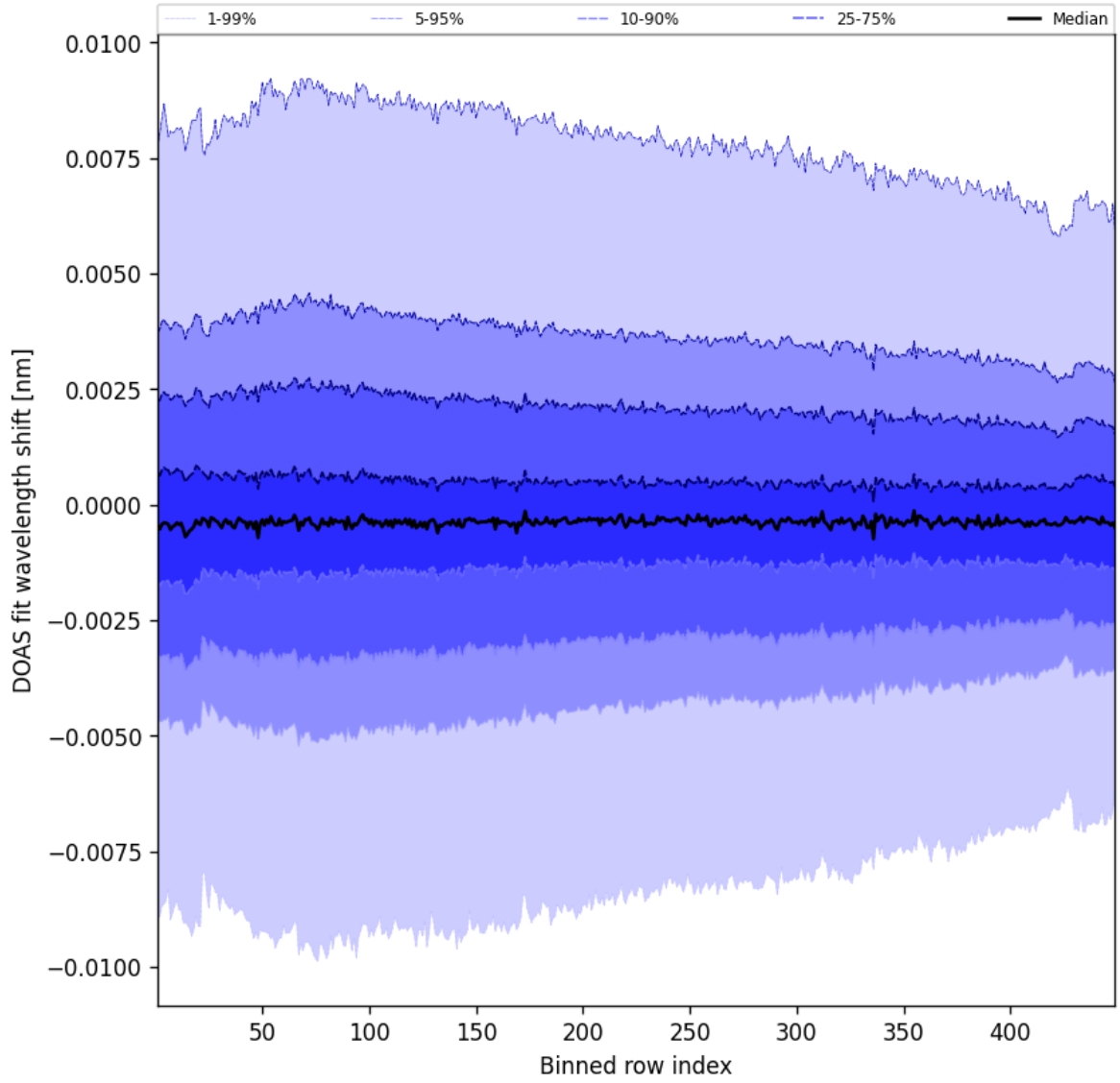


Figure 103: Along track statistics of “Integrated a priori SO_2 profile” for 2025-03-12 to 2025-03-13



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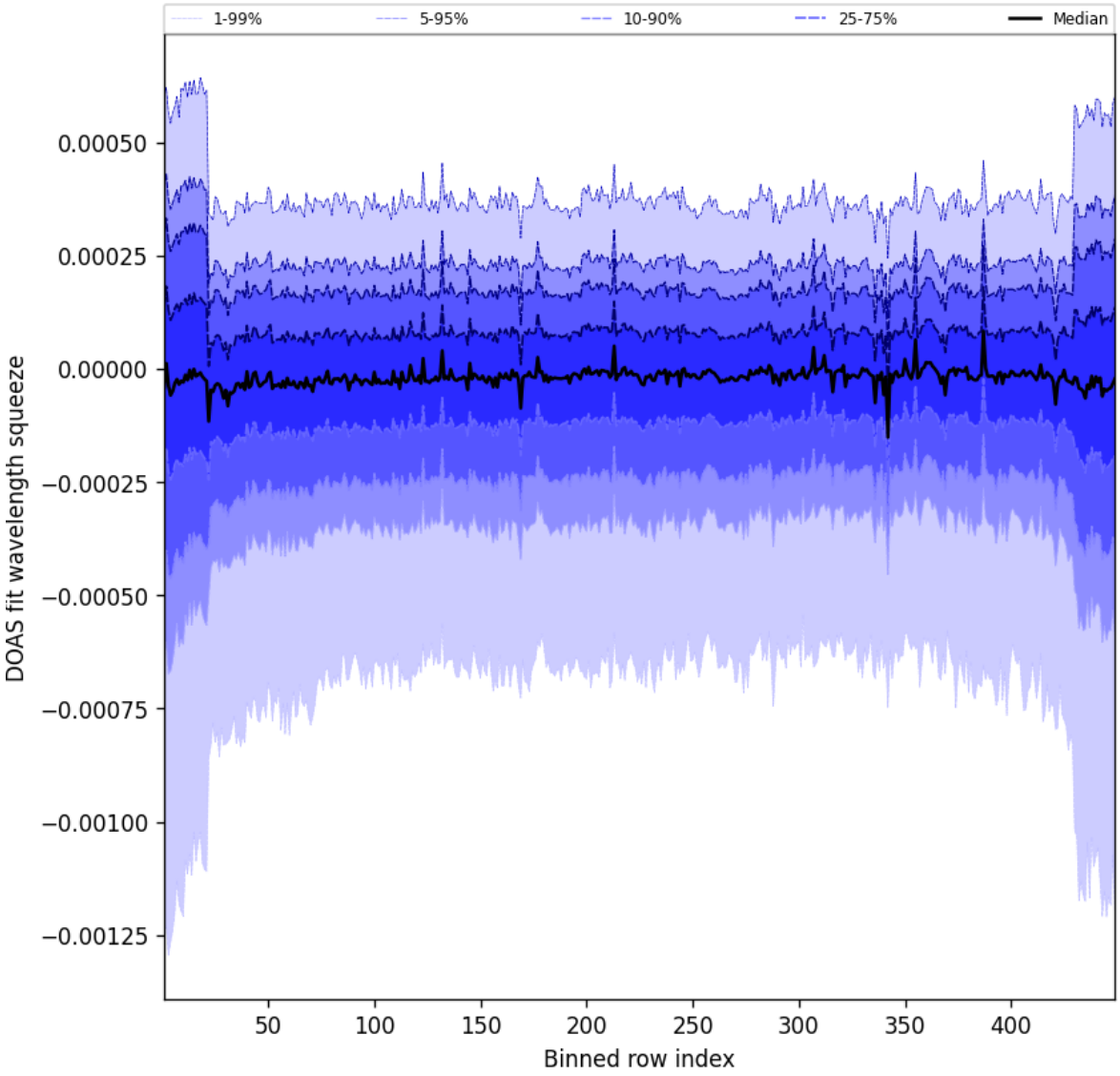

Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2025-03-12 to 2025-03-13

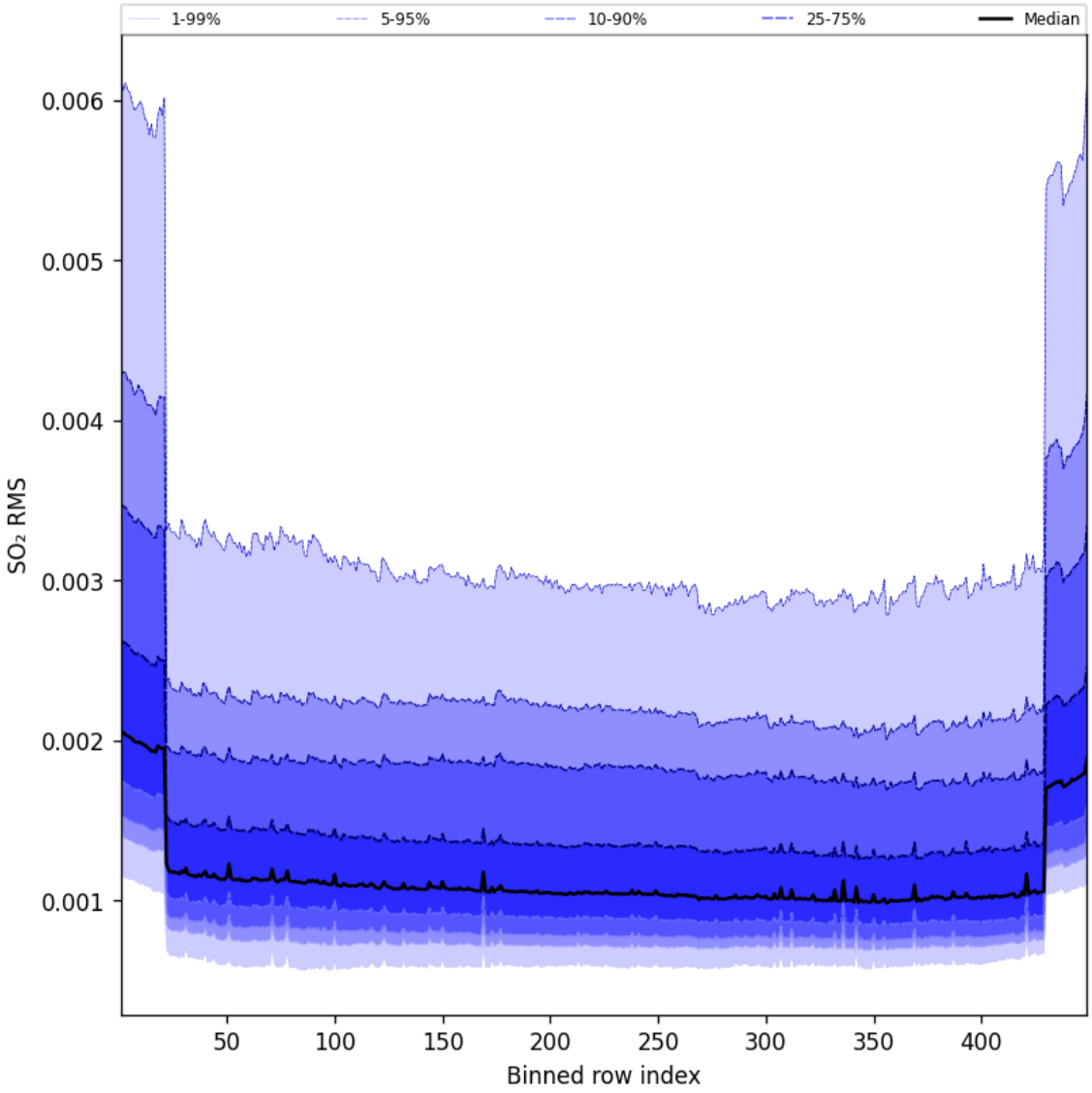

Figure 106: Along track statistics of "SO_2 RMS" for 2025-03-12 to 2025-03-13

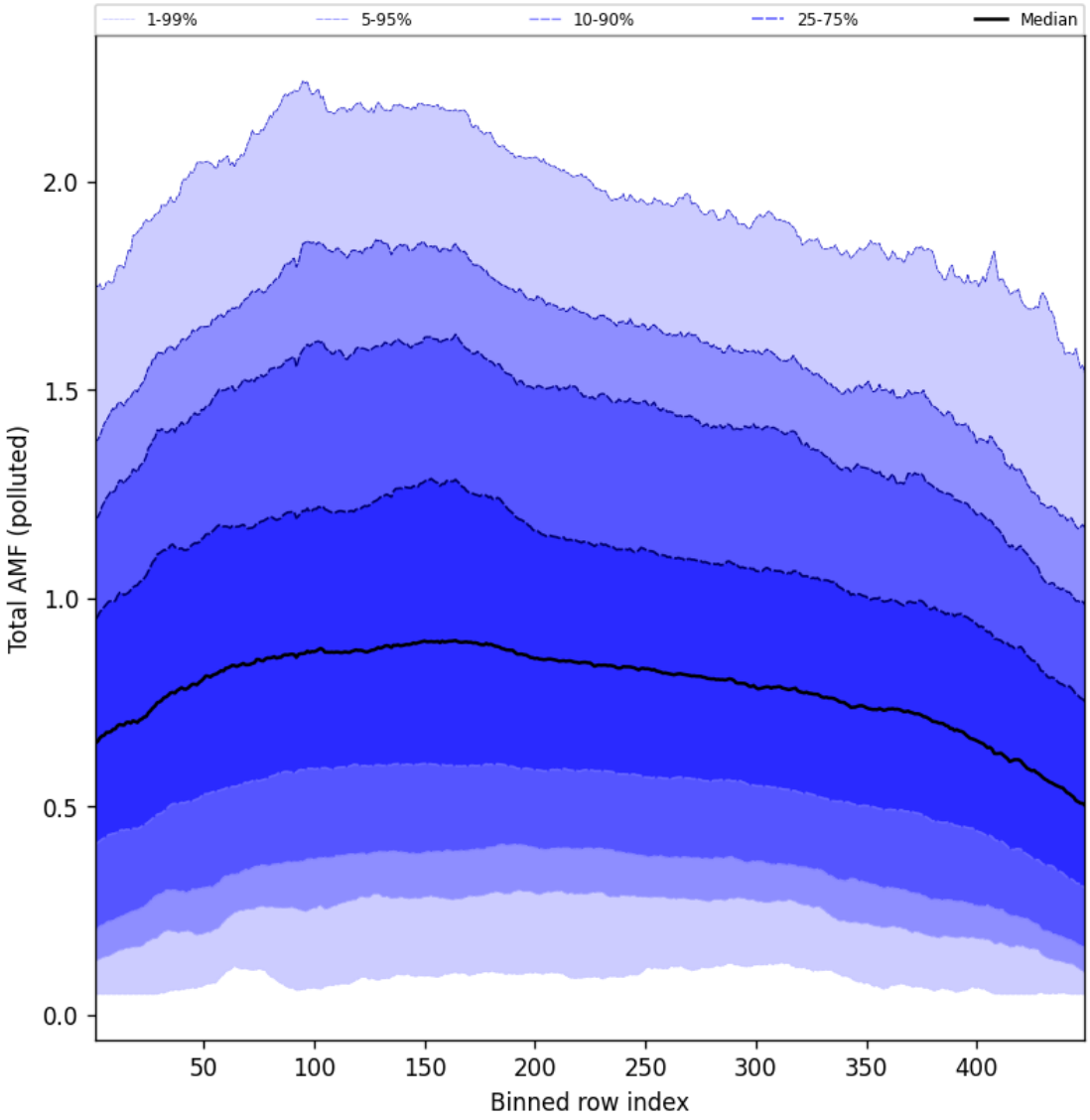

Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-03-12 to 2025-03-13

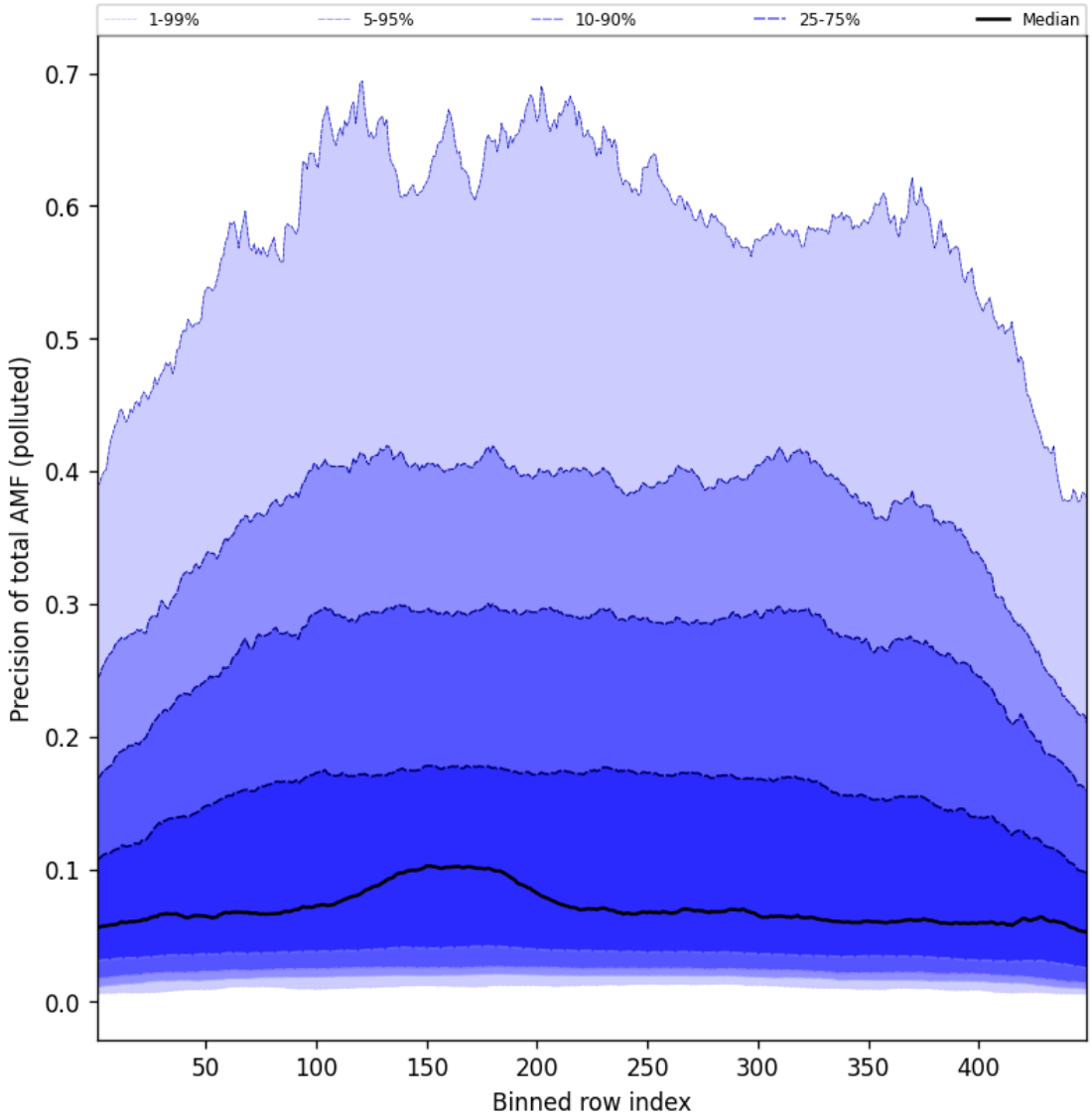

Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-03-12 to 2025-03-13

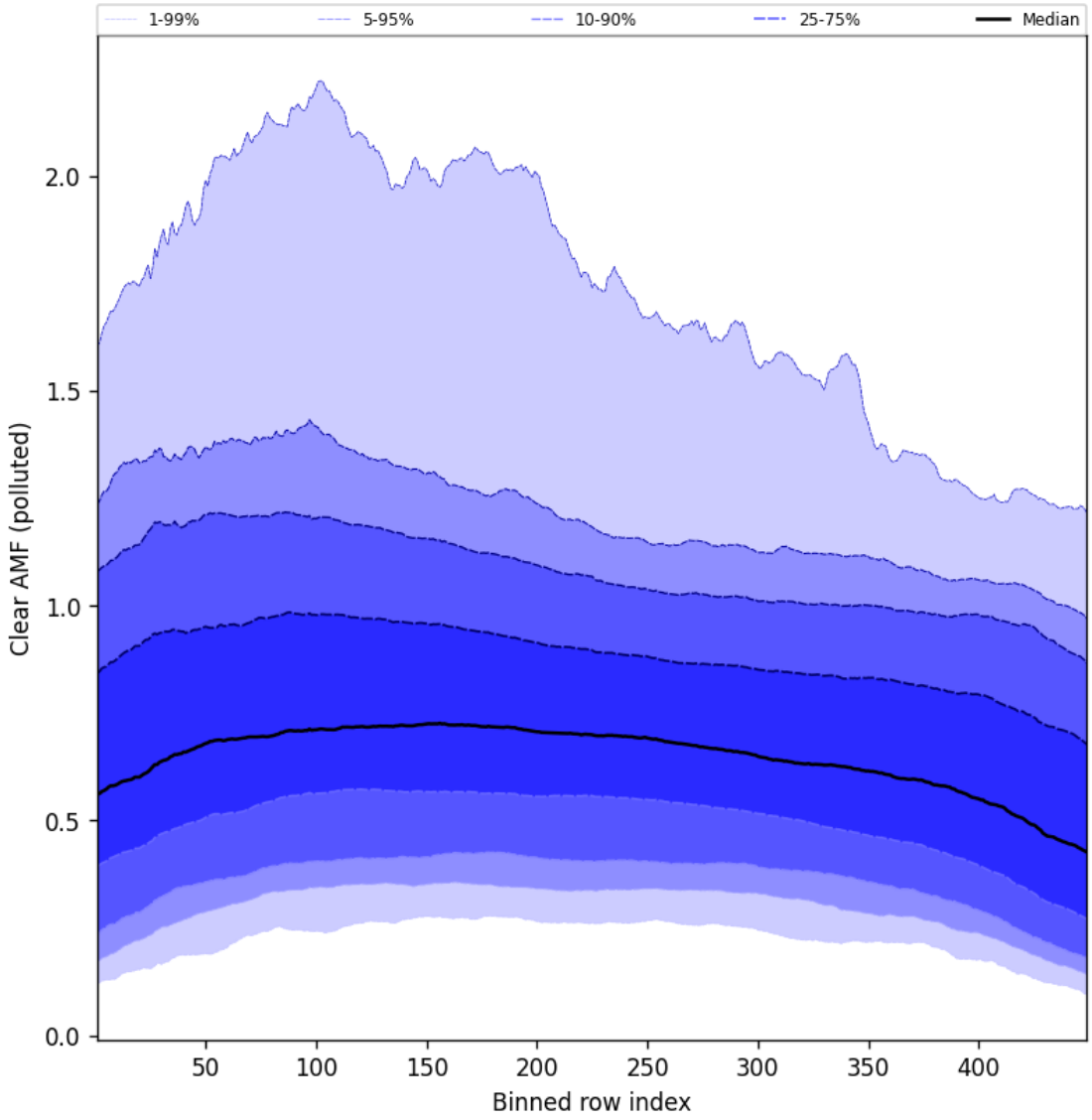

Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-03-12 to 2025-03-13

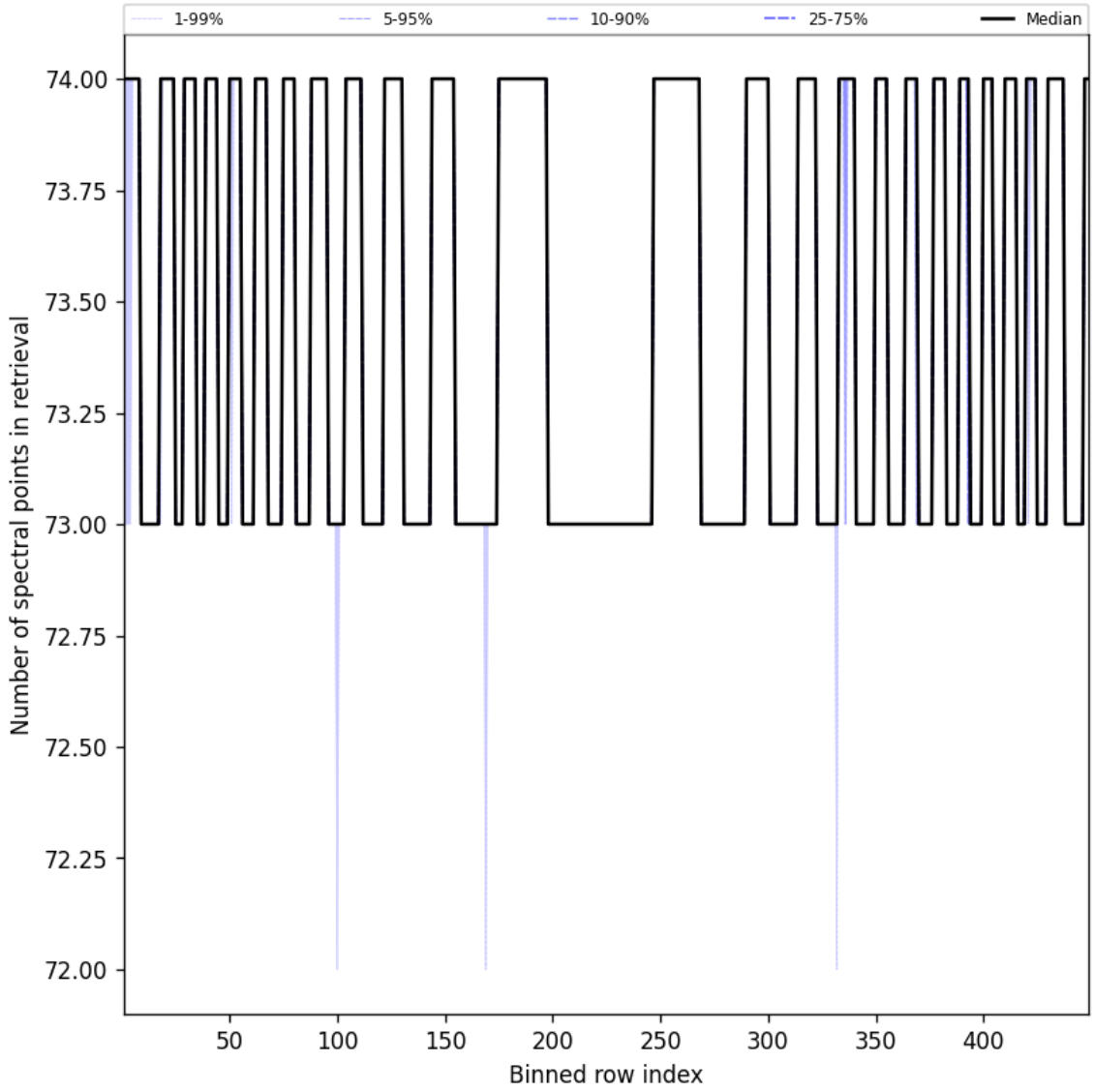

Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-03-12 to 2025-03-13

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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