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]	0.631 ± 0.413	17311440	0.995	0.800	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(4.924 \pm 163.780) \times 10^{-2}$	17311440	0.235	0.422	9.630×10^{-3}	-166	666
sulfurdioxide total vertical column precision [DU]	0.605 ± 1.166	17311440	0.197	0.341	0.302	3.583×10^{-2}	128
sulfurdioxide slant column density corrected [DU]	$(1.828 \pm 36.378) \times 10^{-2}$	17311440	0.235	0.344	8.672×10^{-3}	-13.2	257
sulfurdioxide slant column density cobra [DU]	$(1.816 \pm 35.063) \times 10^{-2}$	17311440	0.235	0.344	8.672×10^{-3}	-13.2	38.4
sulfurdioxide slant column density cobra precision [DU]	0.279 ± 0.132	17311440	0.188	0.127	0.238	7.694×10^{-2}	14.6
sulfurdioxide slant column density window1 [DU]	0.119 ± 0.671	17311440	0.125	0.713	0.130	-167	42.9
sulfurdioxide slant column density window1 precision [DU]	0.279 ± 0.132	17311440	0.188	0.127	0.238	7.694×10^{-2}	14.6
sulfurdioxide slant column density corrected win1 [DU]	$(7.737 \pm 655.200) \times 10^{-3}$	17311440	-2.500×10^{-2}	0.687	-9.287×10^{-3}	-167	42.8
background so2 slant column offset window1 [DU]	-0.111 ± 0.175	17311440	-0.180	0.201	-0.155	-1.28	2.74
sulfurdioxide slant column density window2 [DU]	-0.668 ± 8.800	17311440	-1.25	11.1	-0.872	-1.603×10^{3}	1.662×10^{3}
sulfurdioxide slant column density window2 precision [DU]	7.92 ± 2.17	17311440	6.97	2.47	7.58	2.18	533
sulfurdioxide slant column density corrected win2 [DU]	-1.46 ± 8.52	17311440	-1.75	10.8	-1.41	-1.603×10^{3}	1.663×10^{3}
background so2 slant column offset window2 [DU]	-0.795 ± 2.754	17311440	1.25	3.03	0.103	-23.1	9.05
sulfurdioxide slant column density window3 [DU]	1.07 ± 23.64	17311440	-0.560	29.8	0.899	-639	672
sulfurdioxide slant column density window3 precision [DU]	28.7 ± 12.7	17311440	22.5	9.03	25.2	11.8	325
sulfurdioxide slant column density corrected win3 [DU]	3.23 ± 22.63	17311440	2.80	28.5	3.18	-647	667
background so2 slant column offset window3 [DU]	2.16 ± 7.02	17311440	6.16	10.9	2.17	-21.7	38.6
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.21	17311440	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(4.013 \pm 12.582) \times 10^{-2}$	17311440	1.800×10^{-2}	1.886×10^{-2}	1.729×10^{-2}	4.277×10^{-4}	3.42
fitted radiance shift [nm]	$(-3.255 \pm 25.421) \times 10^{-4}$	17311440	-5.000×10^{-4}	1.760×10^{-3}	-3.404×10^{-4}	-5.040×10^{-2}	4.522×10^{-2}
fitted radiance squeeze [1]	$(-2.644 \pm 18.220) \times 10^{-5}$	17311440	-1.000×10^{-5}	2.045×10^{-4}	-1.933×10^{-5}	-1.609×10^{-2}	1.513×10^{-2}
fitted root mean square [1]	$(1.237 \pm 0.553) \times 10^{-3}$	17311440	9.250×10^{-4}	5.212×10^{-4}	1.071×10^{-3}	2.551×10^{-4}	4.973×10^{-2}
sulfurdioxide total air mass factor polluted [1]	0.882 ± 0.523	17311440	0.740	0.610	0.791	5.000×10^{-2}	3.04
sulfurdioxide total air mass factor polluted precision [1]	0.135 ± 0.144	17311440	3.500×10^{-2}	0.151	7.875×10^{-2}	2.500×10^{-3}	1.84
sulfurdioxide clear air mass factor polluted [1]	0.765 ± 0.483	17311440	0.580	0.400	0.676	2.253×10^{-2}	3.06
number of spectral points in retrieval [1]	73.4 ± 0.5	17311440	73.0	1.000	73.0	52.0	74.0

Table 2: Percentile ranges

Variable	1 %	5 %	10 %	15.9 %	25 %	75 %	84.1 %	90 %	95 %	99 %
qa value [1]	0.0	0.0	4.000×10^{-2}	0.1000	0.200	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	−3.19	−0.947	−0.530	−0.344	−0.198	0.224	0.383	0.594	1.09	3.90
sulfurdioxide total vertical column precision [DU]	8.840×10^{-2}	0.115	0.139	0.163	0.196	0.537	0.796	1.19	2.02	5.35
sulfurdioxide slant column density corrected [DU]	−0.832	−0.469	−0.337	−0.251	−0.162	0.182	0.277	0.371	0.522	1.01
sulfurdioxide slant column density cobra [DU]	−0.832	−0.469	−0.337	−0.251	−0.162	0.182	0.277	0.371	0.522	1.01
sulfurdioxide slant column density cobra precision [DU]	0.133	0.158	0.171	0.181	0.195	0.322	0.382	0.442	0.532	0.780
sulfurdioxide slant column density window1 [DU]	−1.71	−0.911	−0.619	−0.429	−0.233	0.480	0.662	0.838	1.11	1.89
sulfurdioxide slant column density window1 precision [DU]	0.133	0.158	0.171	0.181	0.195	0.322	0.382	0.442	0.532	0.780
sulfurdioxide slant column density corrected win1 [DU]	−1.64	−0.942	−0.692	−0.525	−0.349	0.338	0.528	0.715	1.01	1.90
background so2 slant column offset window1 [DU]	−0.380	−0.312	−0.281	−0.258	−0.231	-2.945×10^{-2}	5.247×10^{-2}	0.128	0.225	0.418
sulfurdioxide slant column density window2 [DU]	−21.1	−14.6	−11.4	−9.01	−6.33	4.75	7.64	10.3	13.9	21.8
sulfurdioxide slant column density window2 precision [DU]	4.26	5.10	5.61	6.01	6.49	8.96	9.82	10.7	11.9	14.5
sulfurdioxide slant column density corrected win2 [DU]	−22.4	−15.3	−12.0	−9.55	−6.83	3.95	6.62	9.01	12.2	19.0
background so2 slant column offset window2 [DU]	−9.30	−6.81	−4.80	−3.37	−1.95	1.08	1.35	1.56	1.88	3.74
sulfurdioxide slant column density window3 [DU]	−57.2	−37.4	−28.0	−21.3	−13.8	16.0	23.7	30.7	40.2	58.8
sulfurdioxide slant column density window3 precision [DU]	16.0	18.1	19.4	20.5	21.8	30.8	35.2	40.8	52.3	83.8
sulfurdioxide slant column density corrected win3 [DU]	−53.3	−33.7	−24.6	−18.1	−11.0	17.5	24.8	31.4	40.3	58.3
background so2 slant column offset window3 [DU]	−11.6	−9.06	−7.32	−5.56	−3.27	7.63	9.79	11.5	13.3	16.3
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]	1.891×10^{-3}	4.124×10^{-3}	6.071×10^{-3}	7.904×10^{-3}	1.044×10^{-2}	2.930×10^{-2}	4.100×10^{-2}	6.192×10^{-2}	0.125	0.462
fitted radiance shift [nm]	-7.936×10^{-3}	-4.016×10^{-3}	-2.656×10^{-3}	-1.893×10^{-3}	-1.255×10^{-3}	5.057×10^{-4}	1.198×10^{-3}	2.067×10^{-3}	3.568×10^{-3}	7.701×10^{-3}
fitted radiance squeeze [1]	-5.378×10^{-4}	-3.227×10^{-4}	-2.383×10^{-4}	-1.821×10^{-4}	-1.244×10^{-4}	8.010×10^{-5}	1.307×10^{-4}	1.778×10^{-4}	2.464×10^{-4}	4.176×10^{-4}
fitted root mean square [1]	5.770×10^{-4}	7.024×10^{-4}	7.742×10^{-4}	8.282×10^{-4}	8.933×10^{-4}	1.415×10^{-3}	1.661×10^{-3}	1.904×10^{-3}	2.292×10^{-3}	3.346×10^{-3}
sulfurdioxide total air mass factor polluted [1]	7.425×10^{-2}	0.189	0.298	0.397	0.519	1.13	1.36	1.59	1.95	2.53
sulfurdioxide total air mass factor polluted precision [1]	8.049×10^{-3}	1.567×10^{-2}	2.251×10^{-2}	2.852×10^{-2}	3.726×10^{-2}	0.188	0.254	0.319	0.423	0.660
sulfurdioxide clear air mass factor polluted [1]	0.134	0.249	0.331	0.404	0.490	0.890	1.01	1.14	1.79	2.78
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]	0.680 ± 0.402	7124831	0.760	1.000	0.0	1.000	0.240	1.000
sulfurdioxide total vertical column [DU]	$(9.828 \pm 244.044) \times 10^{-2}$	7124831	0.601	1.577×10^{-2}	-166	666	-0.275	0.325
sulfurdioxide total vertical column precision [DU]	0.952 ± 1.679	7124831	0.678	0.418	4.759×10^{-2}	128	0.259	0.937
sulfurdioxide slant column density corrected [DU]	$(2.743 \pm 42.637) \times 10^{-2}$	7124831	0.391	1.179×10^{-2}	-13.2	51.4	-0.181	0.210
sulfurdioxide slant column density cobra [DU]	$(2.728 \pm 41.843) \times 10^{-2}$	7124831	0.391	1.179×10^{-2}	-13.2	27.6	-0.181	0.210
sulfurdioxide slant column density cobra precision [DU]	0.324 ± 0.161	7124831	0.179	0.273	8.003×10^{-2}	12.4	0.212	0.392
sulfurdioxide slant column density window1 [DU]	0.174 ± 0.782	7124831	0.791	0.186	-13.5	39.7	-0.214	0.577
sulfurdioxide slant column density window1 precision [DU]	0.324 ± 0.161	7124831	0.179	0.273	8.003×10^{-2}	12.4	0.212	0.392
sulfurdioxide slant column density corrected win1 [DU]	$(3.294 \pm 77.541) \times 10^{-2}$	7124831	0.778	6.308×10^{-3}	-13.2	39.7	-0.375	0.403
background so2 slant column offset window1 [DU]	-0.141 ± 0.181	7124831	0.180	-0.175	-1.28	2.74	-0.254	-7.402×10^{-2}
sulfurdioxide slant column density window2 [DU]	0.119 ± 9.559	7124831	12.2	-0.240	-65.8	313	-6.17	6.03
sulfurdioxide slant column density window2 precision [DU]	8.49 ± 2.23	7124831	2.70	8.15	2.27	399	6.96	9.67
sulfurdioxide slant column density corrected win2 [DU]	-1.59 ± 9.10	7124831	11.6	-1.56	-74.7	314	-7.38	4.24
background so2 slant column offset window2 [DU]	-1.71 ± 3.44	7124831	5.11	-0.306	-23.1	9.05	-4.18	0.931
sulfurdioxide slant column density window3 [DU]	-1.93 ± 24.60	7124831	31.4	-1.61	-180	199	-17.5	14.0
sulfurdioxide slant column density window3 precision [DU]	30.2 ± 12.7	7124831	9.07	26.9	11.8	229	23.4	32.4
sulfurdioxide slant column density corrected win3 [DU]	3.05 ± 23.91	7124831	30.4	3.26	-171	208	-12.0	18.4
background so2 slant column offset window3 [DU]	4.97 ± 6.09	7124831	10.1	4.67	-21.7	38.6	-0.191	9.93
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.23	7124831	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(6.865 \pm 18.906) \times 10^{-2}$	7124831	3.999×10^{-2}	2.201×10^{-2}	4.277×10^{-4}	3.42	1.193×10^{-2}	5.191×10^{-2}
fitted radiance shift [nm]	$(-1.658 \pm 25.605) \times 10^{-4}$	7124831	1.663×10^{-3}	-1.732×10^{-4}	-4.294×10^{-2}	3.785×10^{-2}	-1.022×10^{-3}	6.414×10^{-4}
fitted radiance squeeze [1]	$(6.228 \pm 204.437) \times 10^{-6}$	7124831	2.166×10^{-4}	1.284×10^{-5}	-4.082×10^{-3}	1.513×10^{-2}	-9.626×10^{-5}	1.203×10^{-4}
fitted root mean square [1]	$(1.413 \pm 0.683) \times 10^{-3}$	7124831	7.333×10^{-4}	1.183×10^{-3}	2.551×10^{-4}	3.071×10^{-2}	9.589×10^{-4}	1.692×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.690 ± 0.400	7124831	0.523	0.650	5.000×10^{-2}	2.77	0.385	0.909
sulfurdioxide total air mass factor polluted precision [1]	0.102 ± 0.138	7124831	9.753×10^{-2}	4.952×10^{-2}	2.500×10^{-3}	1.84	2.768×10^{-2}	0.125
sulfurdioxide clear air mass factor polluted [1]	0.590 ± 0.285	7124831	0.446	0.578	2.253×10^{-2}	2.17	0.354	0.800
number of spectral points in retrieval [1]	73.4 ± 0.5	7124831	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]	0.596 ± 0.417	10186609	0.830	0.490	0.0	1.000	0.170	1.000
sulfurdioxide total vertical column [DU]	$(1.493 \pm 62.451) \times 10^{-2}$	10186609	0.343	6.943×10^{-3}	-38.3	387	-0.163	0.180
sulfurdioxide total vertical column precision [DU]	0.362 ± 0.442	10186609	0.233	0.247	3.583×10^{-2}	19.1	0.171	0.405
sulfurdioxide slant column density corrected [DU]	$(1.189 \pm 31.250) \times 10^{-2}$	10186609	0.317	6.870×10^{-3}	-7.96	257	-0.150	0.166
sulfurdioxide slant column density cobra [DU]	$(1.179 \pm 29.390) \times 10^{-2}$	10186609	0.317	6.870×10^{-3}	-7.96	38.4	-0.150	0.166
sulfurdioxide slant column density cobra precision [DU]	0.248 ± 0.096	10186609	9.495×10^{-2}	0.221	7.694×10^{-2}	14.6	0.187	0.282
sulfurdioxide slant column density window1 [DU]	$(8.025 \pm 57.675) \times 10^{-2}$	10186609	0.663	9.652×10^{-2}	-167	42.9	-0.244	0.420
sulfurdioxide slant column density window1 precision [DU]	0.248 ± 0.096	10186609	9.495×10^{-2}	0.221	7.694×10^{-2}	14.6	0.187	0.282
sulfurdioxide slant column density corrected win1 [DU]	$(-9.891 \pm 555.205) \times 10^{-3}$	10186609	0.634	-1.835×10^{-2}	-167	42.8	-0.334	0.301
background so2 slant column offset window1 [DU]	$(-9.014 \pm 16.786) \times 10^{-2}$	10186609	0.220	-0.142	-1.09	1.70	-0.212	8.722×10^{-3}
sulfurdioxide slant column density window2 [DU]	-1.22 ± 8.18	10186609	10.4	-1.25	-1.603×10^{3}	1.662×10^{3}	-6.43	3.96
sulfurdioxide slant column density window2 precision [DU]	7.52 ± 2.03	10186609	2.18	7.23	2.18	533	6.24	8.42
sulfurdioxide slant column density corrected win2 [DU]	-1.37 ± 8.10	10186609	10.2	-1.33	-1.603×10^{3}	1.663×10^{3}	-6.47	3.78
background so2 slant column offset window2 [DU]	-0.154 ± 1.898	10186609	2.42	0.329	-13.6	8.67	-1.26	1.17
sulfurdioxide slant column density window3 [DU]	3.17 ± 22.71	10186609	28.7	2.49	-639	672	-11.4	17.2
sulfurdioxide slant column density window3 precision [DU]	27.7 ± 12.5	10186609	8.33	24.0	11.9	325	21.0	29.3
sulfurdioxide slant column density corrected win3 [DU]	3.35 ± 21.69	10186609	27.2	3.12	-647	667	-10.3	16.9
background so2 slant column offset window3 [DU]	0.187 ± 6.960	10186609	11.6	4.408×10^{-2}	-21.4	22.7	-5.75	5.84
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.20	10186609	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.019 \pm 3.064) \times 10^{-2}$	10186609	1.336×10^{-2}	1.567×10^{-2}	5.414×10^{-4}	2.03	9.649×10^{-3}	2.300×10^{-2}
fitted radiance shift [nm]	$(-4.371 \pm 25.231) \times 10^{-4}$	10186609	1.777×10^{-3}	-4.688×10^{-4}	-5.040×10^{-2}	4.522×10^{-2}	-1.385×10^{-3}	3.920×10^{-4}
fitted radiance squeeze [1]	$(-4.929 \pm 16.098) \times 10^{-5}$	10186609	1.935×10^{-4}	-3.937×10^{-5}	-1.609×10^{-2}	1.420×10^{-2}	-1.405×10^{-4}	5.301×10^{-5}
fitted root mean square [1]	$(1.114 \pm 0.396) \times 10^{-3}$	10186609	4.111×10^{-4}	1.011×10^{-3}	3.175×10^{-4}	4.973×10^{-2}	8.605×10^{-4}	1.272×10^{-3}
sulfurdioxide total air mass factor polluted [1]	1.02 ± 0.56	10186609	0.675	0.906	5.000×10^{-2}	3.04	0.620	1.30
sulfurdioxide total air mass factor polluted precision [1]	0.158 ± 0.144	10186609	0.179	0.111	4.470×10^{-3}	1.49	4.729×10^{-2}	0.226
sulfurdioxide clear air mass factor polluted [1]	0.888 ± 0.551	10186609	0.409	0.733	0.145	3.06	0.560	0.969
number of spectral points in retrieval [1]	73.4 ± 0.5	10186609	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]	0.669 ± 0.404	12445114	0.760	1.000	0.0	1.000	0.240	1.000
sulfurdioxide total vertical column [DU]	$(3.292 \pm 126.274) \times 10^{-2}$	12445114	0.407	8.908×10^{-3}	-153	387	-0.192	0.215
sulfurdioxide total vertical column precision [DU]	0.510 ± 0.875	12445114	0.285	0.288	4.447×10^{-2}	45.1	0.198	0.483
sulfurdioxide slant column density corrected [DU]	$(1.440 \pm 32.585) \times 10^{-2}$	12445114	0.328	7.724×10^{-3}	-13.2	257	-0.155	0.173
sulfurdioxide slant column density cobra [DU]	$(1.434 \pm 31.413) \times 10^{-2}$	12445114	0.328	7.724×10^{-3}	-13.2	27.6	-0.155	0.173
sulfurdioxide slant column density cobra precision [DU]	0.264 ± 0.118	12445114	0.109	0.225	7.694×10^{-2}	8.55	0.190	0.300
sulfurdioxide slant column density window1 [DU]	0.118 ± 0.615	12445114	0.675	0.128	-65.5	39.7	-0.214	0.461
sulfurdioxide slant column density window1 precision [DU]	0.264 ± 0.118	12445114	0.109	0.225	7.694×10^{-2}	8.55	0.190	0.300
sulfurdioxide slant column density corrected win1 [DU]	$(-7.014 \pm 602.742) \times 10^{-3}$	12445114	0.655	-1.876×10^{-2}	-65.5	39.7	-0.344	0.312
background so2 slant column offset window1 [DU]	-0.125 ± 0.154	12445114	0.183	-0.157	-1.21	2.51	-0.231	-4.786×10^{-2}
sulfurdioxide slant column density window2 [DU]	-1.11 ± 8.46	12445114	10.7	-1.25	-1.528×10^{3}	689	-6.56	4.16
sulfurdioxide slant column density window2 precision [DU]	7.73 ± 2.03	12445114	2.34	7.42	2.18	533	6.38	8.72
sulfurdioxide slant column density corrected win2 [DU]	-1.48 ± 8.30	12445114	10.6	-1.43	-1.528×10^{3}	690	-6.74	3.83
background so2 slant column offset window2 [DU]	-0.378 ± 2.370	12445114	2.41	0.300	-23.1	9.05	-1.28	1.13
sulfurdioxide slant column density window3 [DU]	4.02 ± 23.26	12445114	29.5	3.66	-272	611	-10.8	18.7
sulfurdioxide slant column density window3 precision [DU]	28.1 ± 12.0	12445114	8.77	24.7	11.8	225	21.5	30.2
sulfurdioxide slant column density corrected win3 [DU]	5.27 ± 22.16	12445114	28.2	4.97	-278	604	-8.88	19.3
background so2 slant column offset window3 [DU]	1.25 ± 6.53	12445114	9.80	1.28	-21.7	38.6	-3.68	6.13
sulfurdioxide slant column cobra flag [1]	1.99 ± 0.13	12445114	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.569 \pm 6.452) \times 10^{-2}$	12445114	1.466×10^{-2}	1.680×10^{-2}	4.719×10^{-4}	2.85	1.090×10^{-2}	2.557×10^{-2}
fitted radiance shift [nm]	$(-3.027 \pm 23.988) \times 10^{-4}$	12445114	1.763×10^{-3}	-2.947×10^{-4}	-5.040×10^{-2}	4.239×10^{-2}	-1.218×10^{-3}	5.453×10^{-4}
fitted radiance squeeze [1]	$(-2.905 \pm 17.064) \times 10^{-5}$	12445114	1.930×10^{-4}	-2.062×10^{-5}	-1.268×10^{-2}	1.513×10^{-2}	-1.198×10^{-4}	7.324×10^{-5}
fitted root mean square [1]	$(1.168 \pm 0.501) \times 10^{-3}$	12445114	4.260×10^{-4}	1.020×10^{-3}	3.175×10^{-4}	3.729×10^{-2}	8.714×10^{-4}	1.297×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.848 ± 0.418	12445114	0.531	0.804	5.000×10^{-2}	2.57	0.554	1.08
sulfurdioxide total air mass factor polluted precision [1]	0.125 ± 0.120	12445114	0.137	7.773×10^{-2}	2.500×10^{-3}	1.53	4.026×10^{-2}	0.177
sulfurdioxide clear air mass factor polluted [1]	0.707 ± 0.274	12445114	0.349	0.682	3.907×10^{-2}	2.64	0.519	0.868
number of spectral points in retrieval [1]	73.4 ± 0.5	12445114	1.000	73.0	71.0	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]	0.537 ± 0.422	4037778	0.900	0.490	0.0	1.000	0.1000	1.000
sulfurdioxide total vertical column [DU]	$(7.614 \pm 219.006) \times 10^{-2}$	4037778	0.436	1.001×10^{-2}	-166	252	-0.201	0.236
sulfurdioxide total vertical column precision [DU]	0.778 ± 1.584	4037778	0.514	0.327	3.583×10^{-2}	128	0.168	0.683
sulfurdioxide slant column density corrected [DU]	$(2.517 \pm 43.341) \times 10^{-2}$	4037778	0.387	1.058×10^{-2}	-9.07	53.4	-0.180	0.206
sulfurdioxide slant column density cobra [DU]	$(2.490 \pm 41.761) \times 10^{-2}$	4037778	0.387	1.058×10^{-2}	-9.07	38.4	-0.180	0.206
sulfurdioxide slant column density cobra precision [DU]	0.312 ± 0.148	4037778	0.149	0.271	8.463×10^{-2}	14.6	0.217	0.365
sulfurdioxide slant column density window1 [DU]	0.112 ± 0.768	4037778	0.819	0.128	-167	42.9	-0.295	0.524
sulfurdioxide slant column density window1 precision [DU]	0.312 ± 0.148	4037778	0.149	0.271	8.463×10^{-2}	14.6	0.217	0.365
sulfurdioxide slant column density corrected win1 [DU]	$(3.908 \pm 74.191) \times 10^{-2}$	4037778	0.768	1.619×10^{-2}	-167	42.8	-0.363	0.406
background so2 slant column offset window1 [DU]	$(-7.297 \pm 21.607) \times 10^{-2}$	4037778	0.286	-0.147	-0.774	2.67	-0.231	5.517×10^{-2}
sulfurdioxide slant column density window2 [DU]	0.226 ± 9.373	4037778	11.8	6.251×10^{-2}	-1.603×10^{3}	1.662×10^{3}	-5.76	6.05
sulfurdioxide slant column density window2 precision [DU]	8.31 ± 2.39	4037778	2.62	7.95	2.22	515	6.79	9.41
sulfurdioxide slant column density corrected win2 [DU]	-1.42 ± 8.99	4037778	11.2	-1.36	-1.603×10^{3}	1.663×10^{3}	-7.00	4.23
background so2 slant column offset window2 [DU]	-1.64 ± 3.13	4037778	4.66	-0.905	-22.3	9.05	-3.72	0.942
sulfurdioxide slant column density window3 [DU]	-6.48 ± 22.74	4037778	28.4	-6.18	-639	672	-20.5	7.87
sulfurdioxide slant column density window3 precision [DU]	30.0 ± 14.1	4037778	9.07	26.3	11.9	325	22.5	31.6
sulfurdioxide slant column density corrected win3 [DU]	-2.22 ± 22.86	4037778	28.4	-1.67	-647	667	-16.1	12.3
background so2 slant column offset window3 [DU]	4.26 ± 7.64	4037778	12.7	5.81	-21.5	36.9	-2.14	10.6
sulfurdioxide slant column cobra flag [1]	1.94 ± 0.34	4037778	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(7.021 \pm 19.322) \times 10^{-2}$	4037778	4.490×10^{-2}	1.883×10^{-2}	4.277×10^{-4}	3.42	8.072×10^{-3}	5.298×10^{-2}
fitted radiance shift [nm]	$(-4.046 \pm 28.794) \times 10^{-4}$	4037778	1.665×10^{-3}	-4.932×10^{-4}	-4.066×10^{-2}	3.683×10^{-2}	-1.327×10^{-3}	3.377×10^{-4}
fitted radiance squeeze [1]	$(-2.620 \pm 20.365) \times 10^{-5}$	4037778	2.384×10^{-4}	-2.077×10^{-5}	-1.609×10^{-2}	1.420×10^{-2}	-1.442×10^{-4}	9.420×10^{-5}
fitted root mean square [1]	$(1.378 \pm 0.586) \times 10^{-3}$	4037778	6.105×10^{-4}	1.238×10^{-3}	2.551×10^{-4}	4.973×10^{-2}	9.984×10^{-4}	1.609×10^{-3}
sulfurdioxide total air mass factor polluted [1]	1.03 ± 0.75	4037778	1.08	0.772	5.000×10^{-2}	3.04	0.443	1.52
sulfurdioxide total air mass factor polluted precision [1]	0.168 ± 0.197	4037778	0.207	9.243×10^{-2}	2.500×10^{-3}	1.84	2.969×10^{-2}	0.236
sulfurdioxide clear air mass factor polluted [1]	0.990 ± 0.820	4037778	0.781	0.689	2.253×10^{-2}	3.06	0.408	1.19
number of spectral points in retrieval [1]	73.4 ± 0.5	4037778	1.000	73.0	52.0	74.0	73.0	74.0

3 Granule outlines

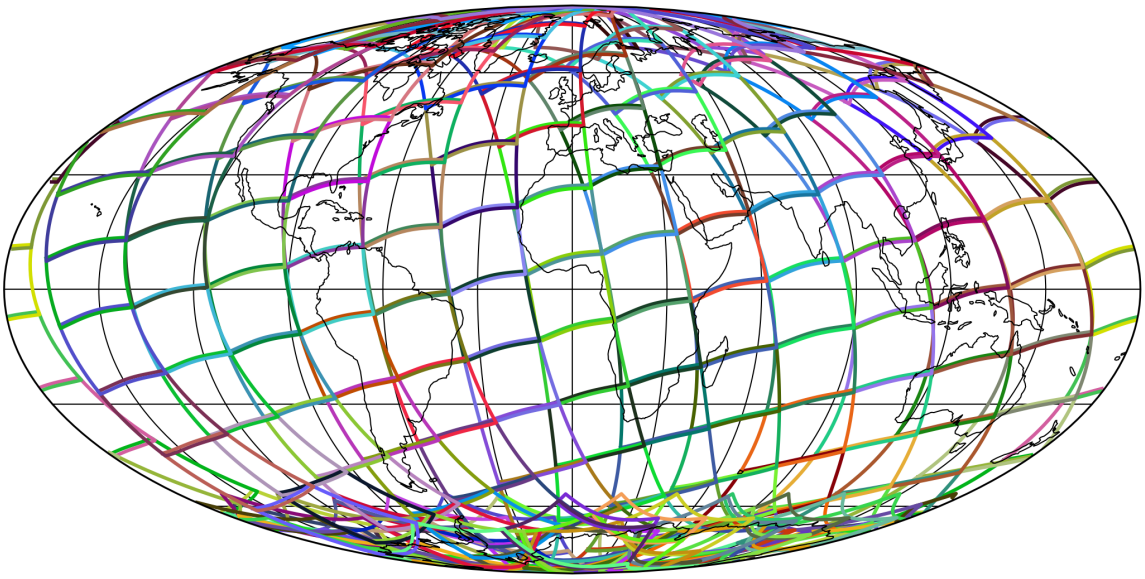

Figure 1: Outline of the granules.

4 Input data monitoring

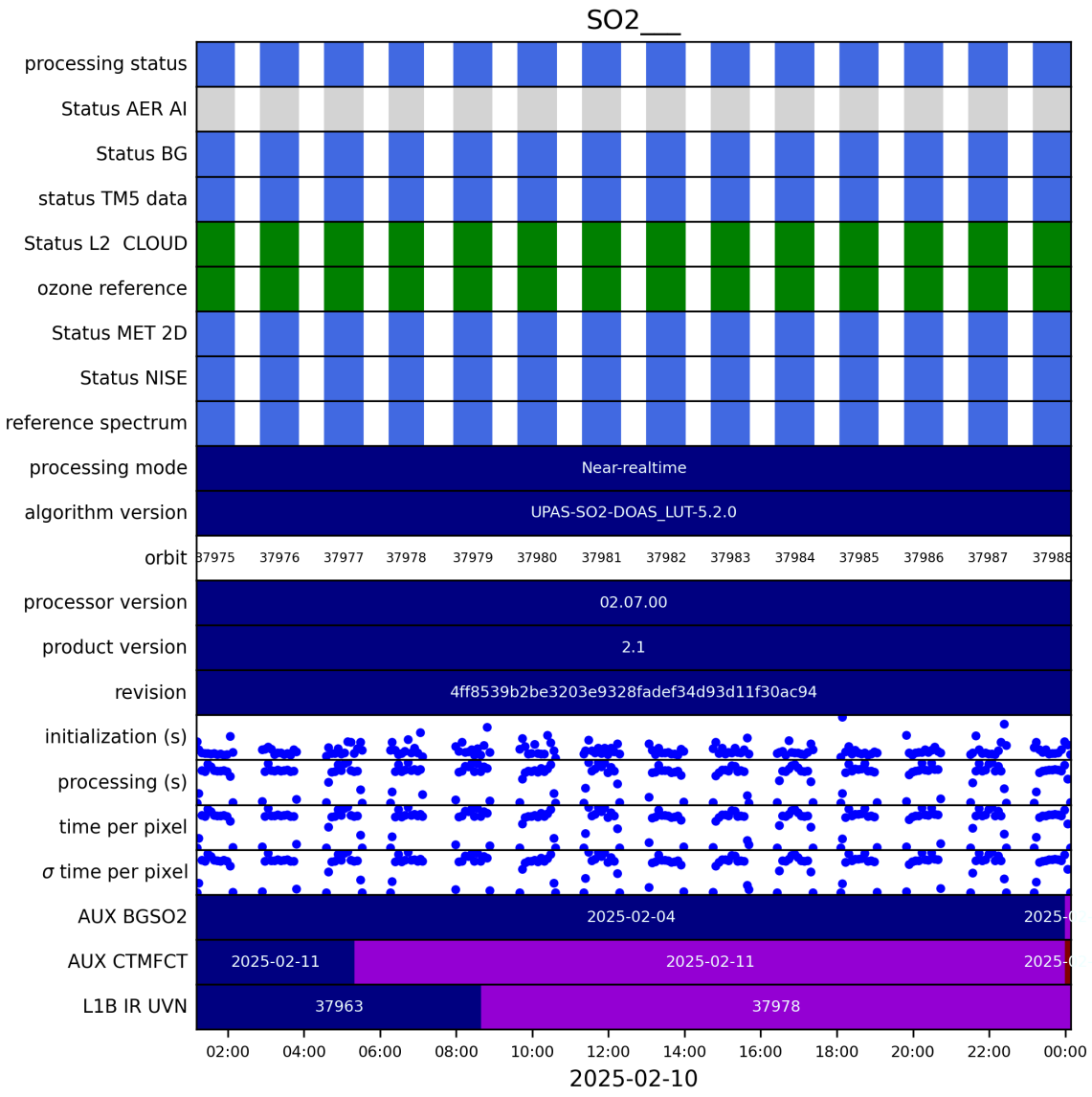

Figure 2: Input data per granule

5 Warnings and errors

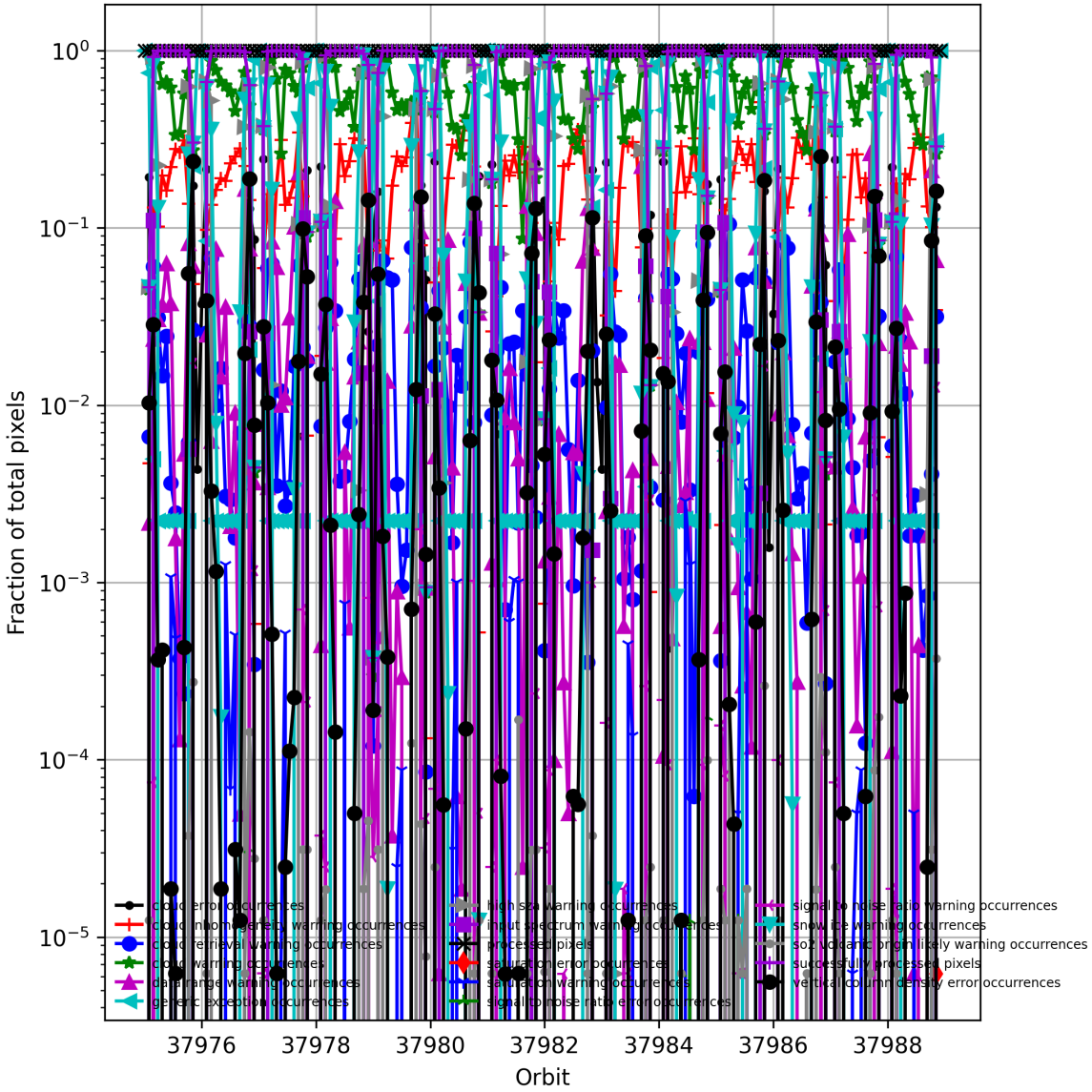

Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

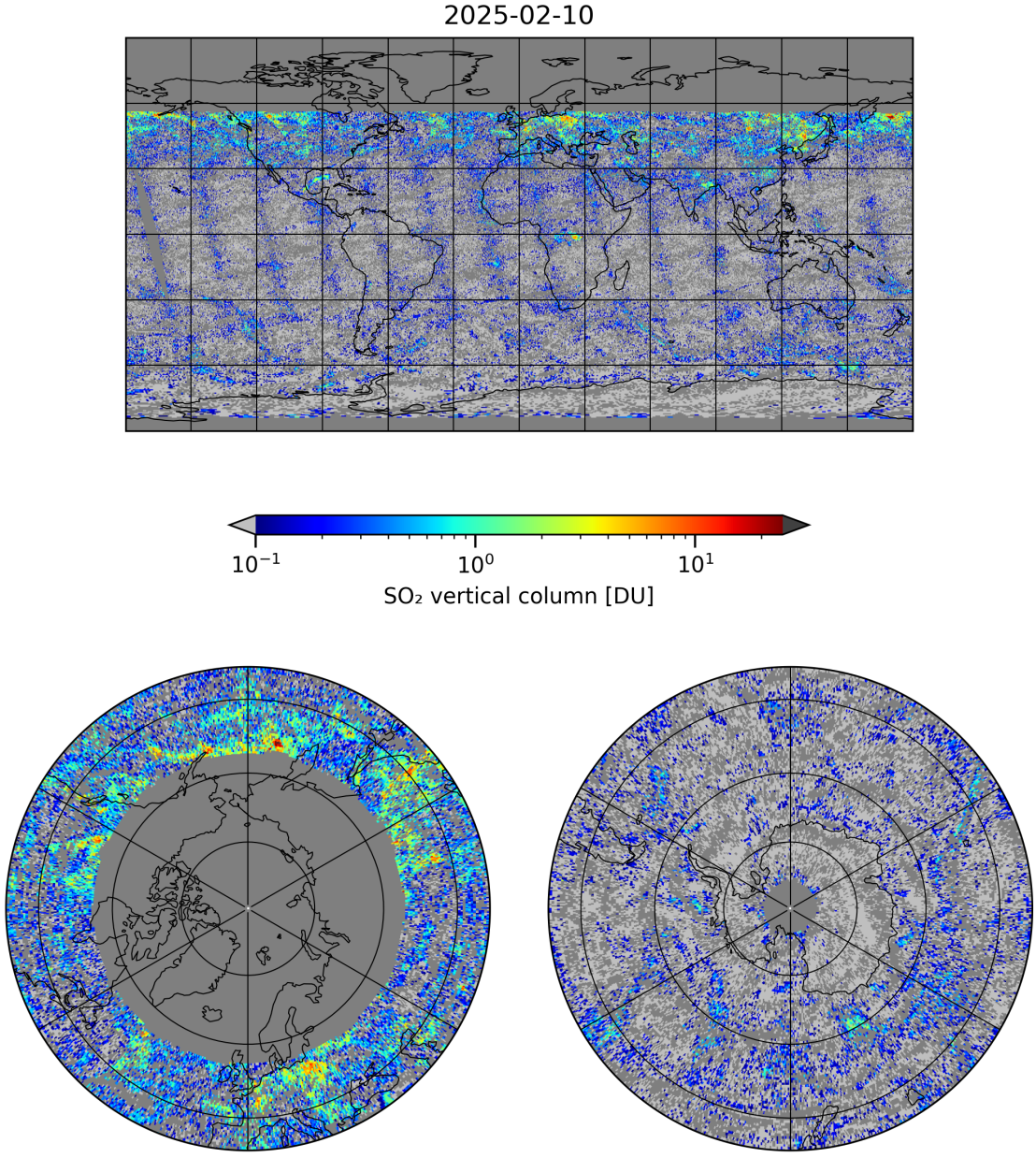

Figure 4: Map of "SO_2 vertical column" for 2025-02-10 to 2025-02-11

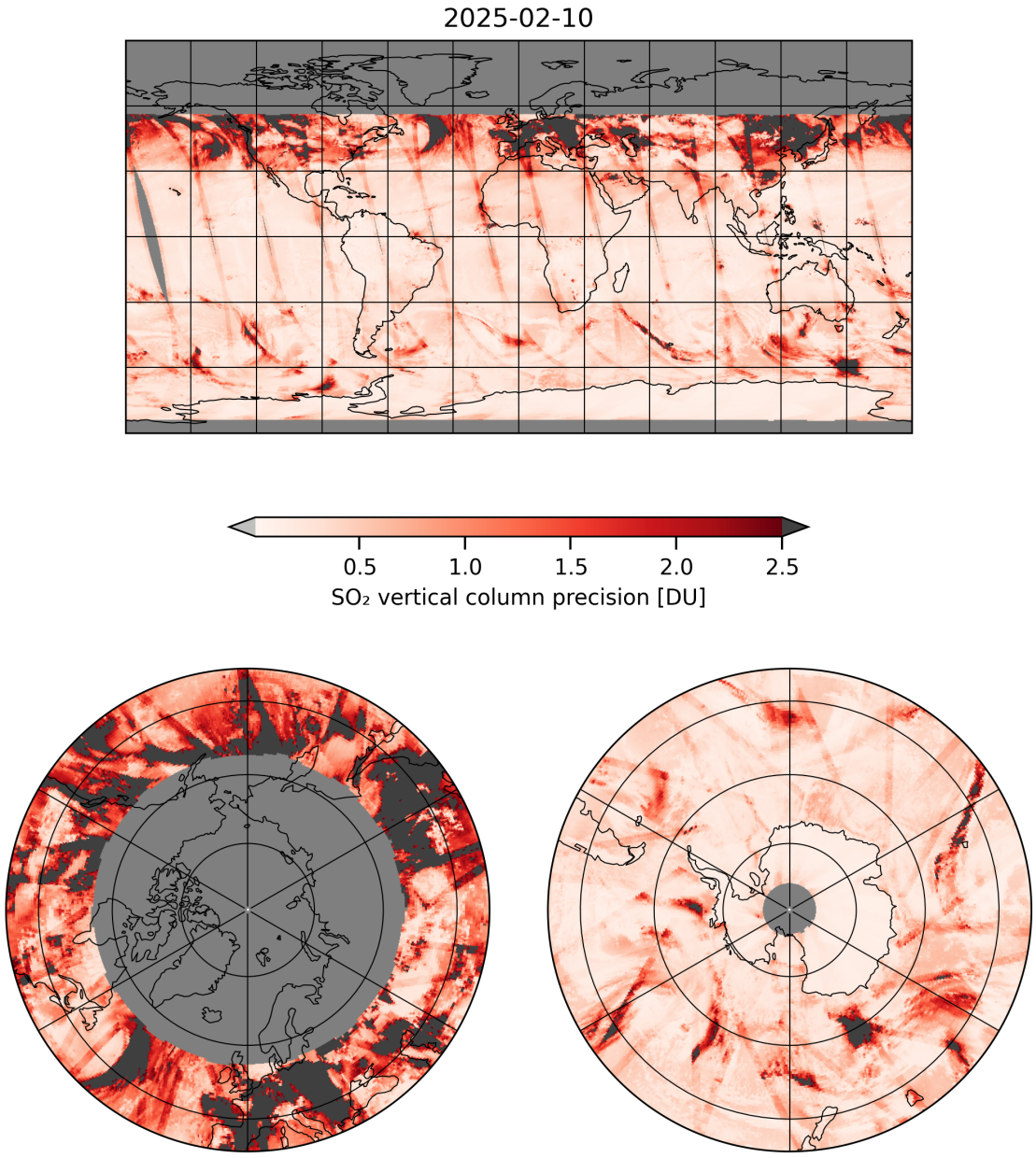

Figure 5: Map of "SO_2 vertical column precision" for 2025-02-10 to 2025-02-11

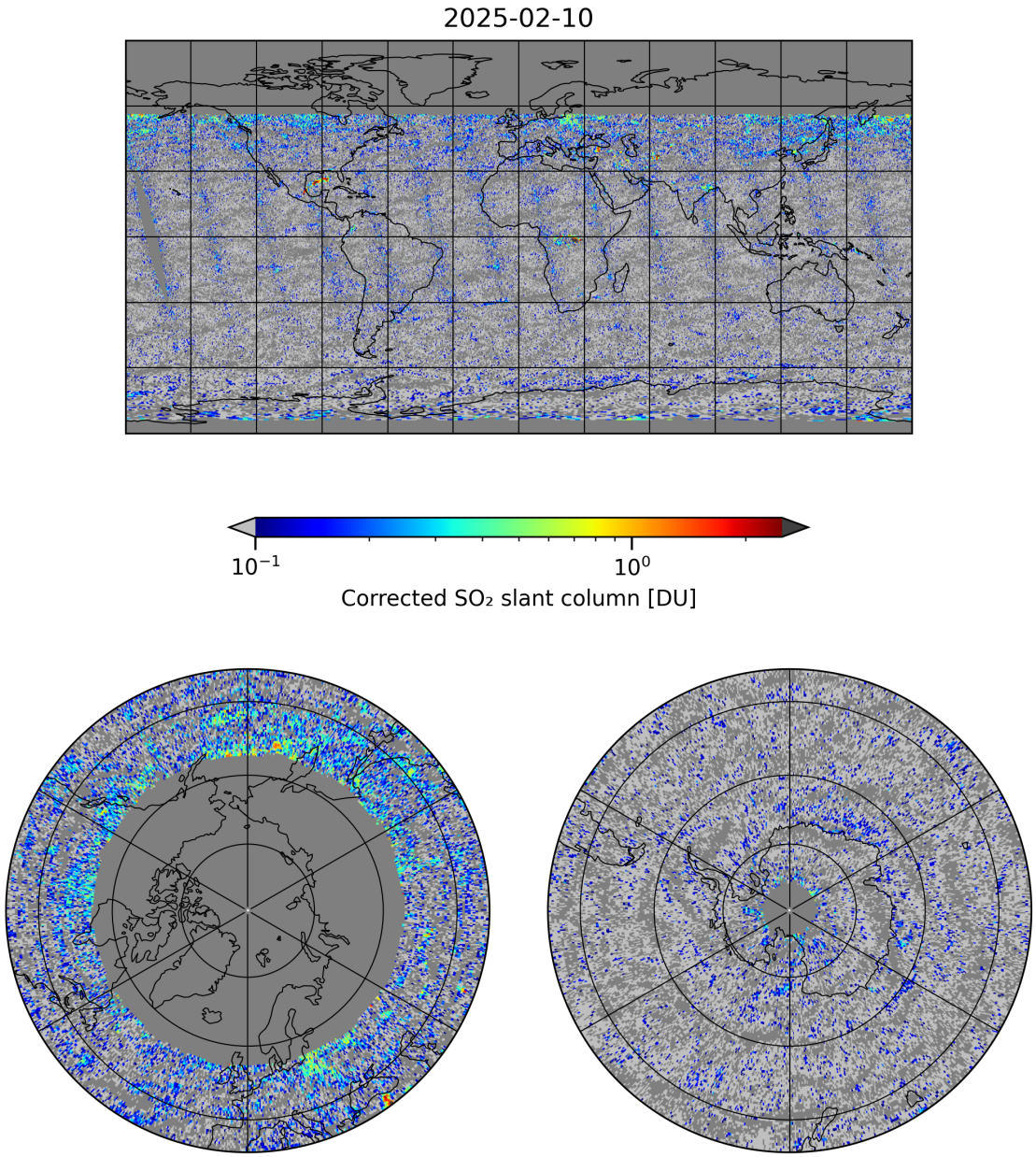

Figure 6: Map of "Corrected SO_2 slant column" for 2025-02-10 to 2025-02-11

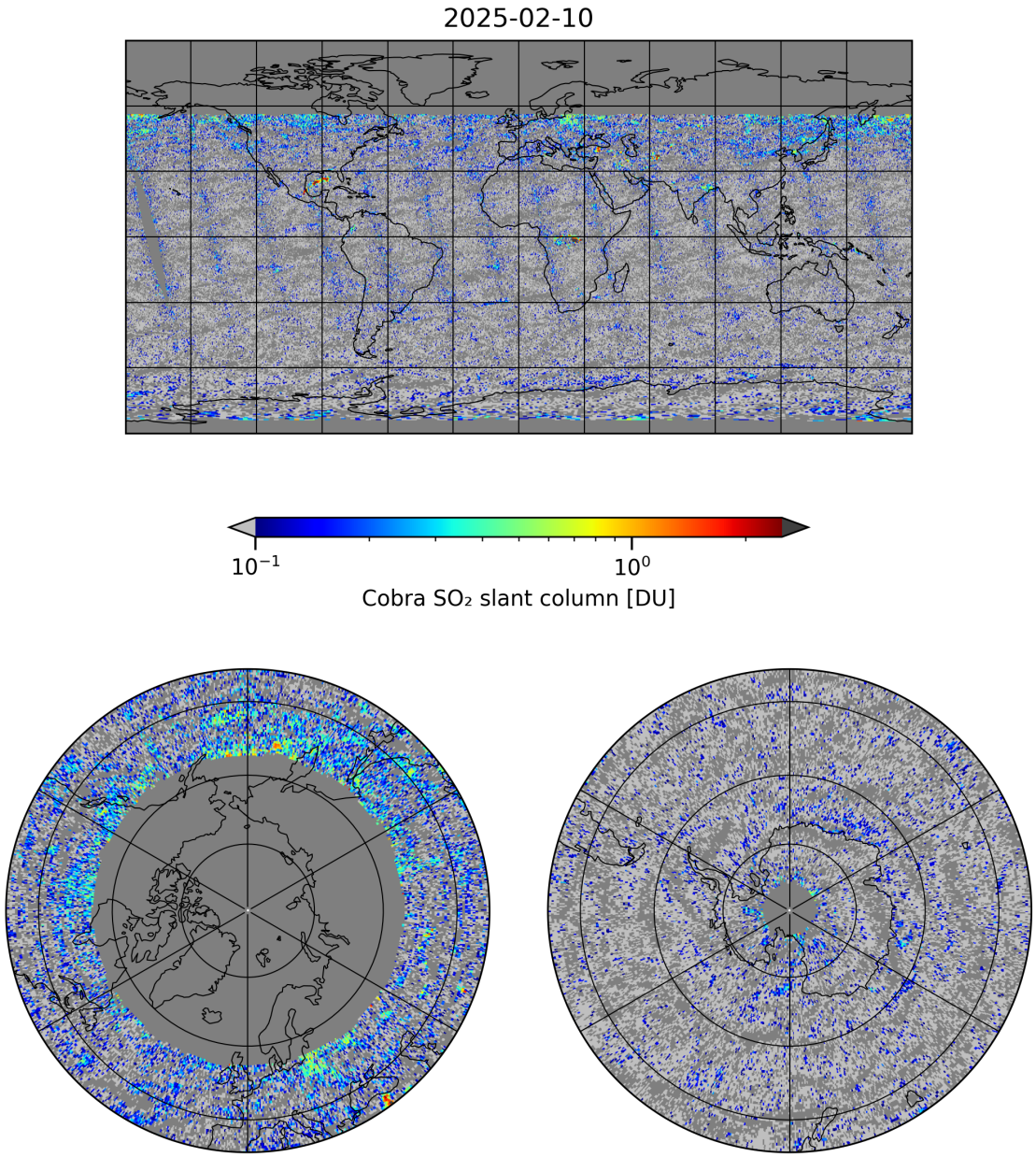

Figure 7: Map of "Cobra SO_2 slant column" for 2025-02-10 to 2025-02-11

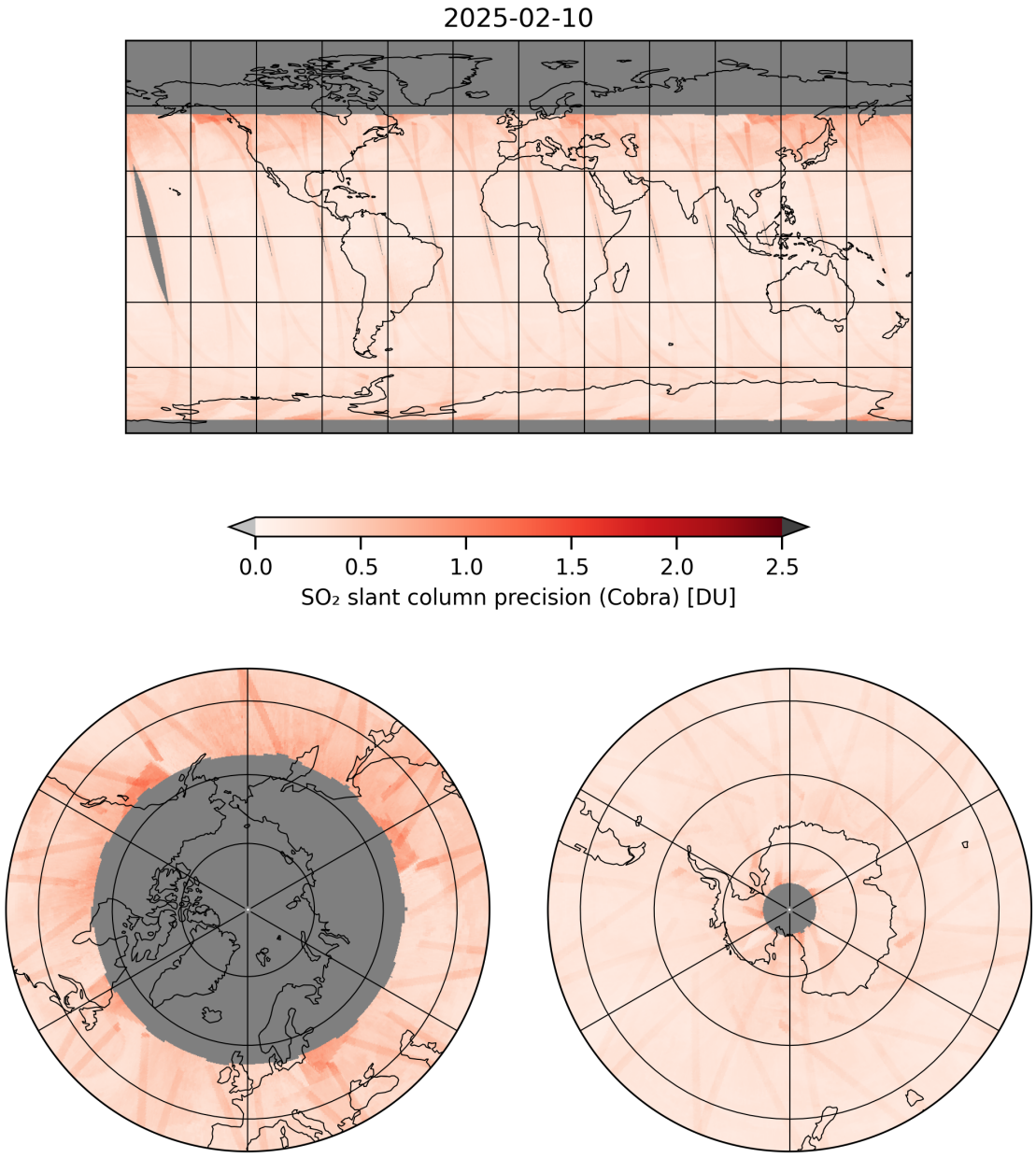

Figure 8: Map of "SO_2 slant column precision (Cobra)" for 2025-02-10 to 2025-02-11

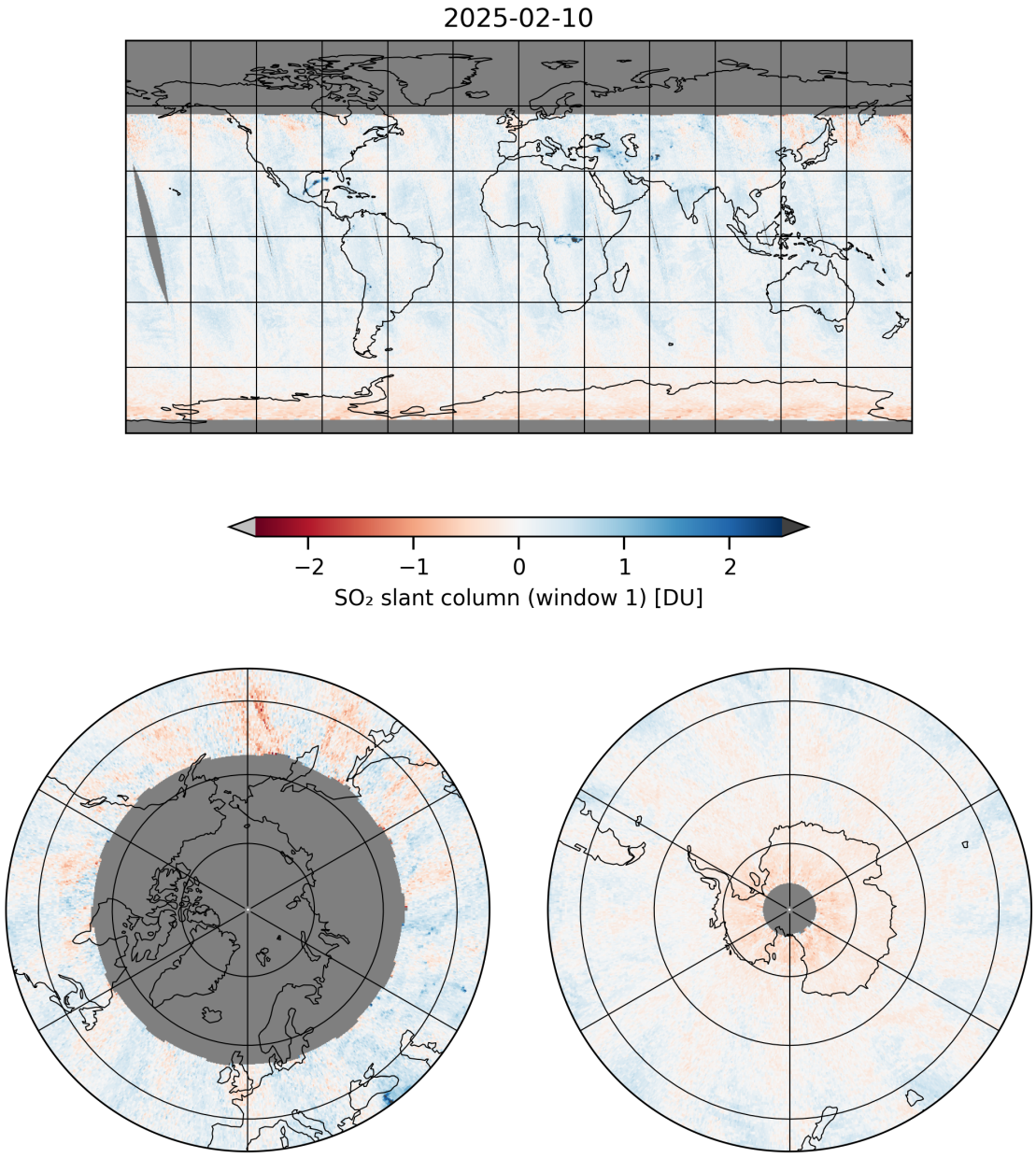

Figure 9: Map of "SO_2 slant column (window 1)" for 2025-02-10 to 2025-02-11

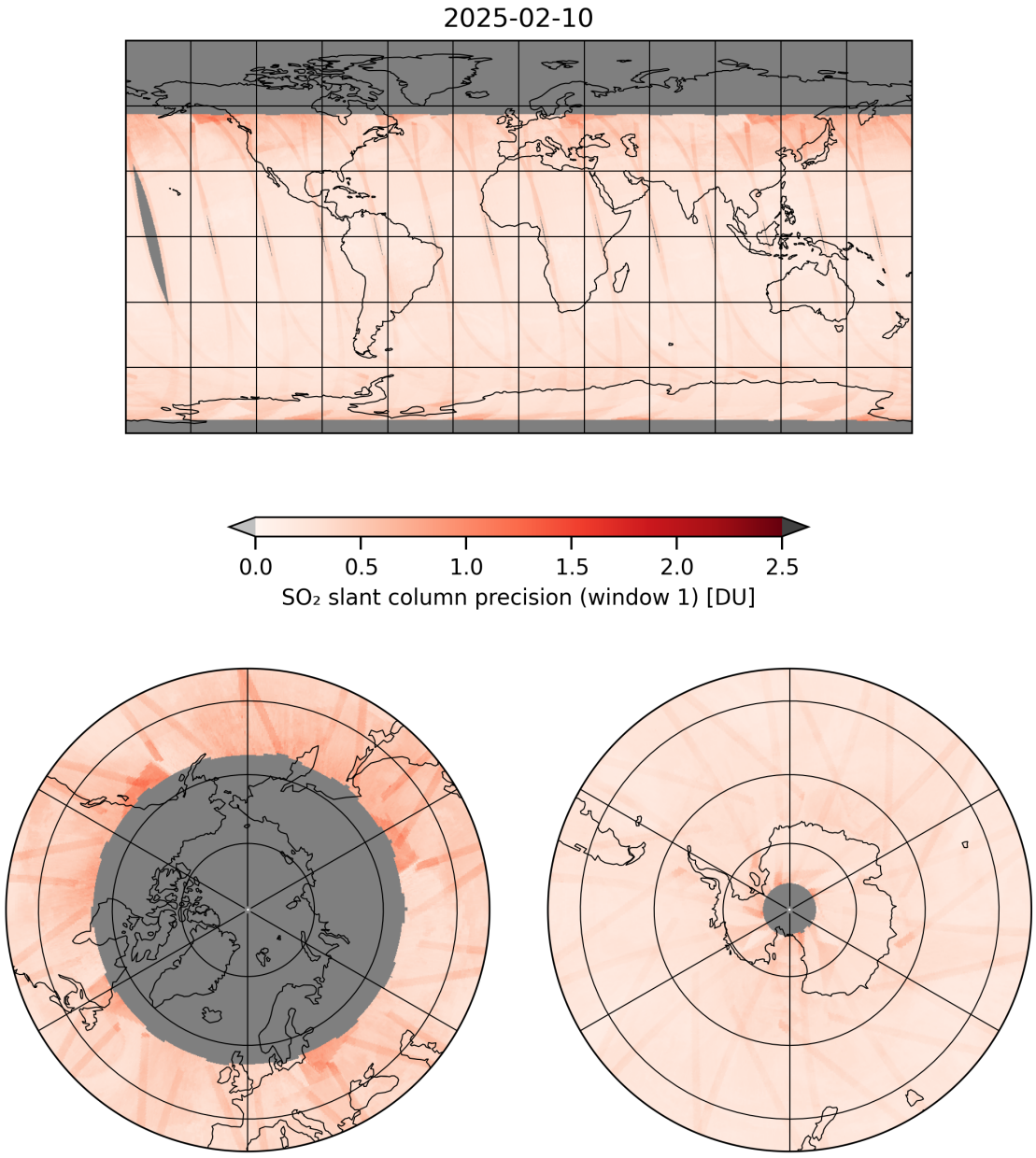

Figure 10: Map of "SO_2 slant column precision (window 1)" for 2025-02-10 to 2025-02-11

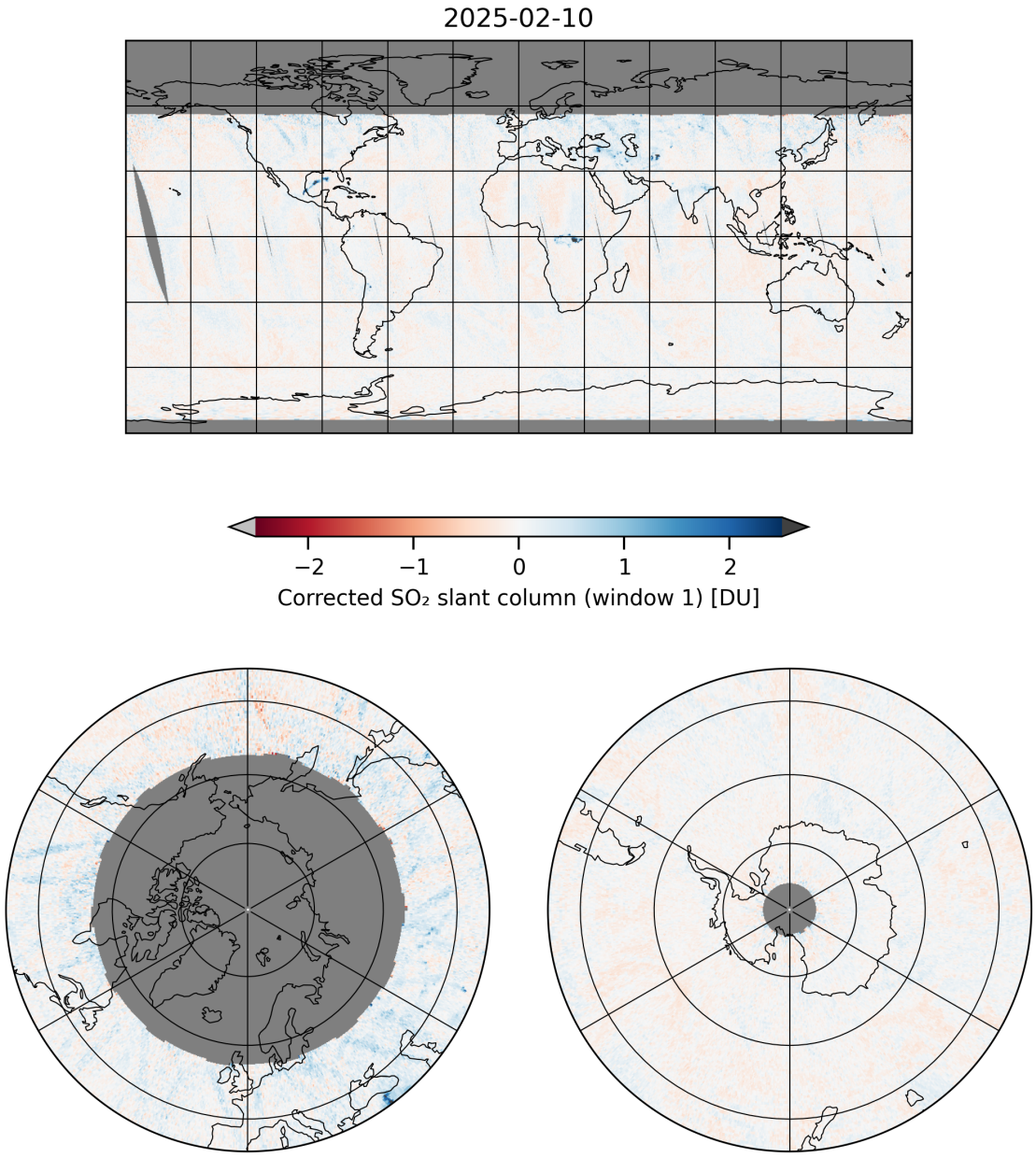

Figure 11: Map of “Corrected SO_2 slant column (window 1)” for 2025-02-10 to 2025-02-11

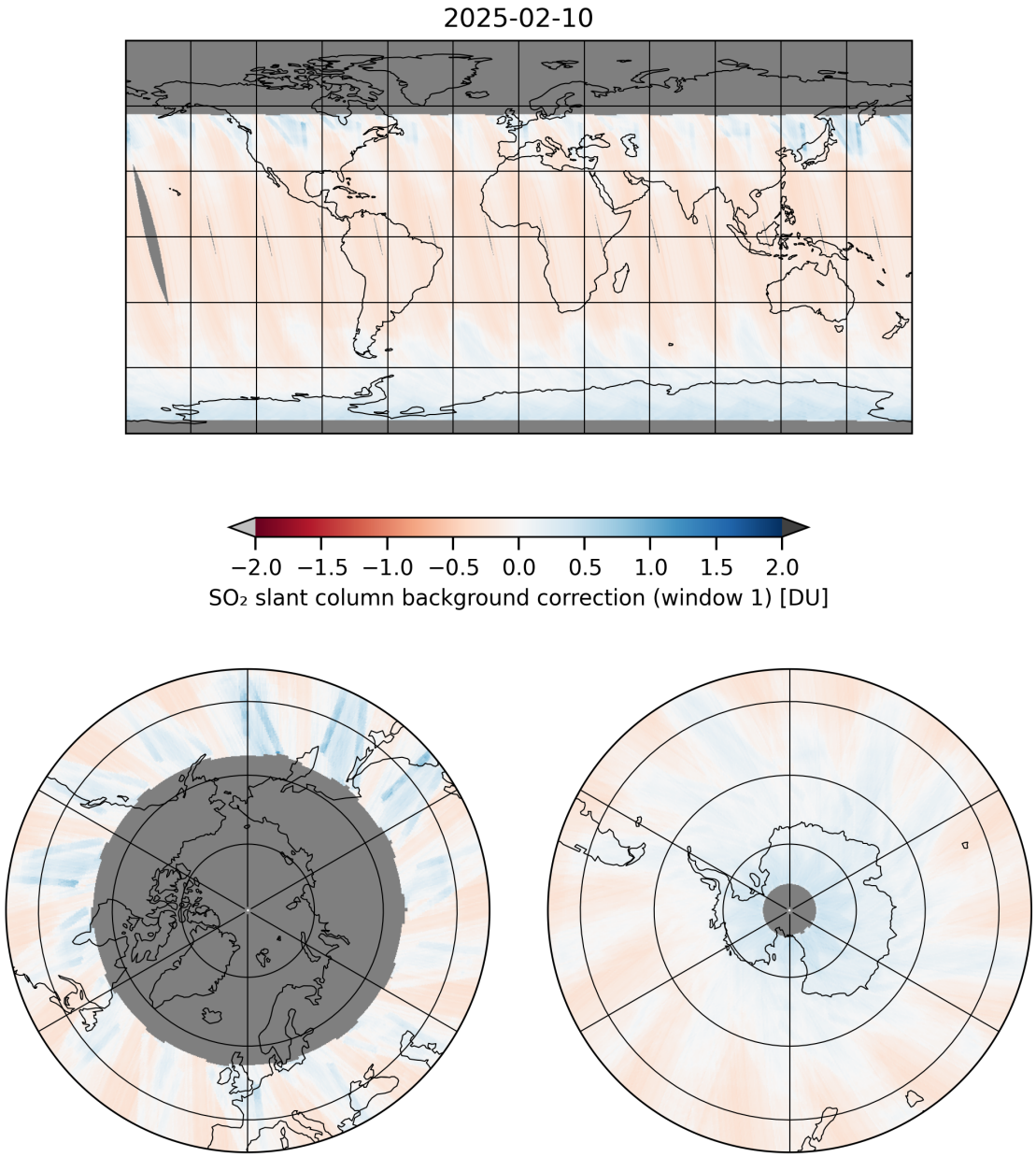

Figure 12: Map of "SO_2 slant column background correction (window 1)" for 2025-02-10 to 2025-02-11

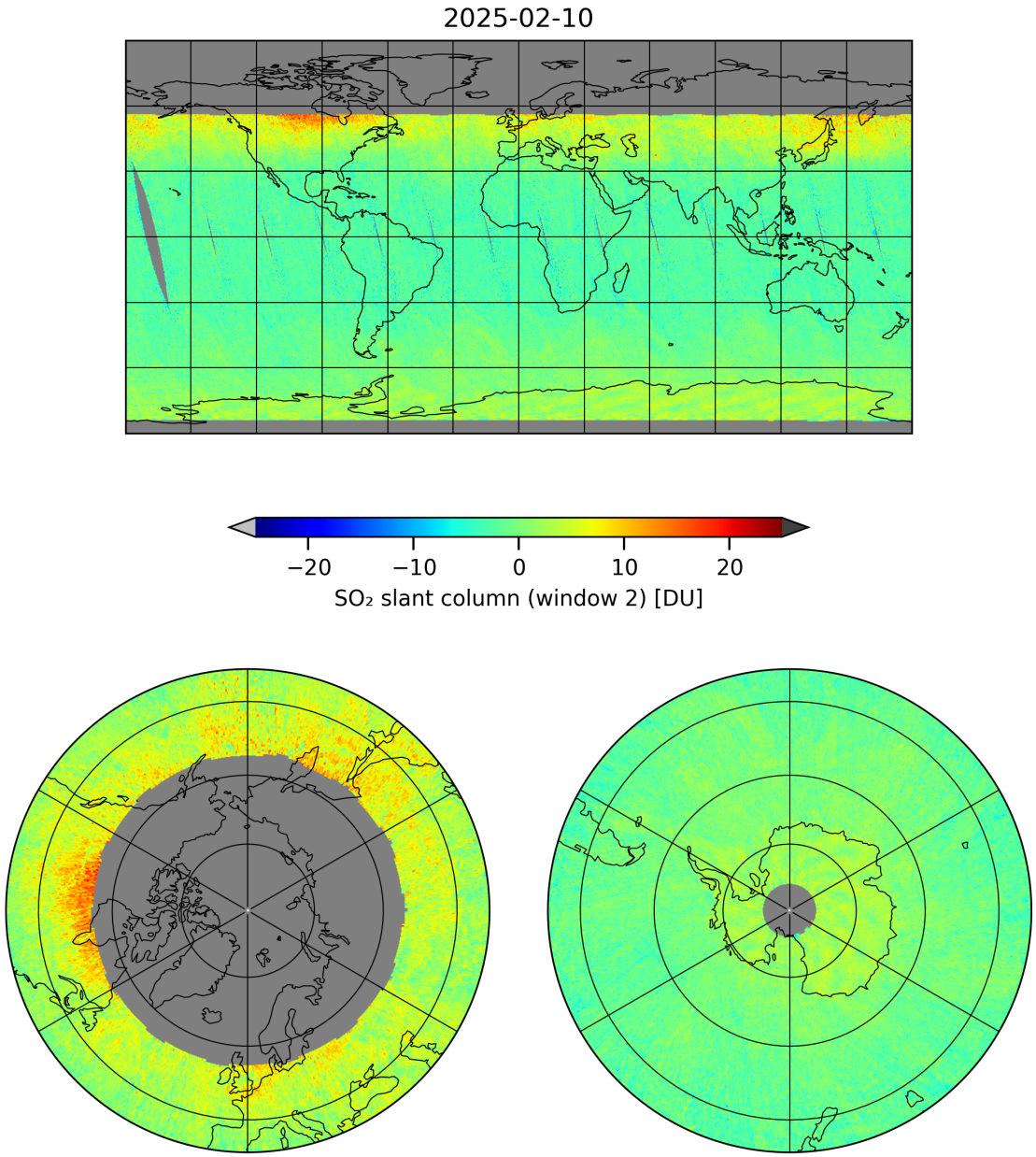

Figure 13: Map of "SO_2 slant column (window 2)" for 2025-02-10 to 2025-02-11

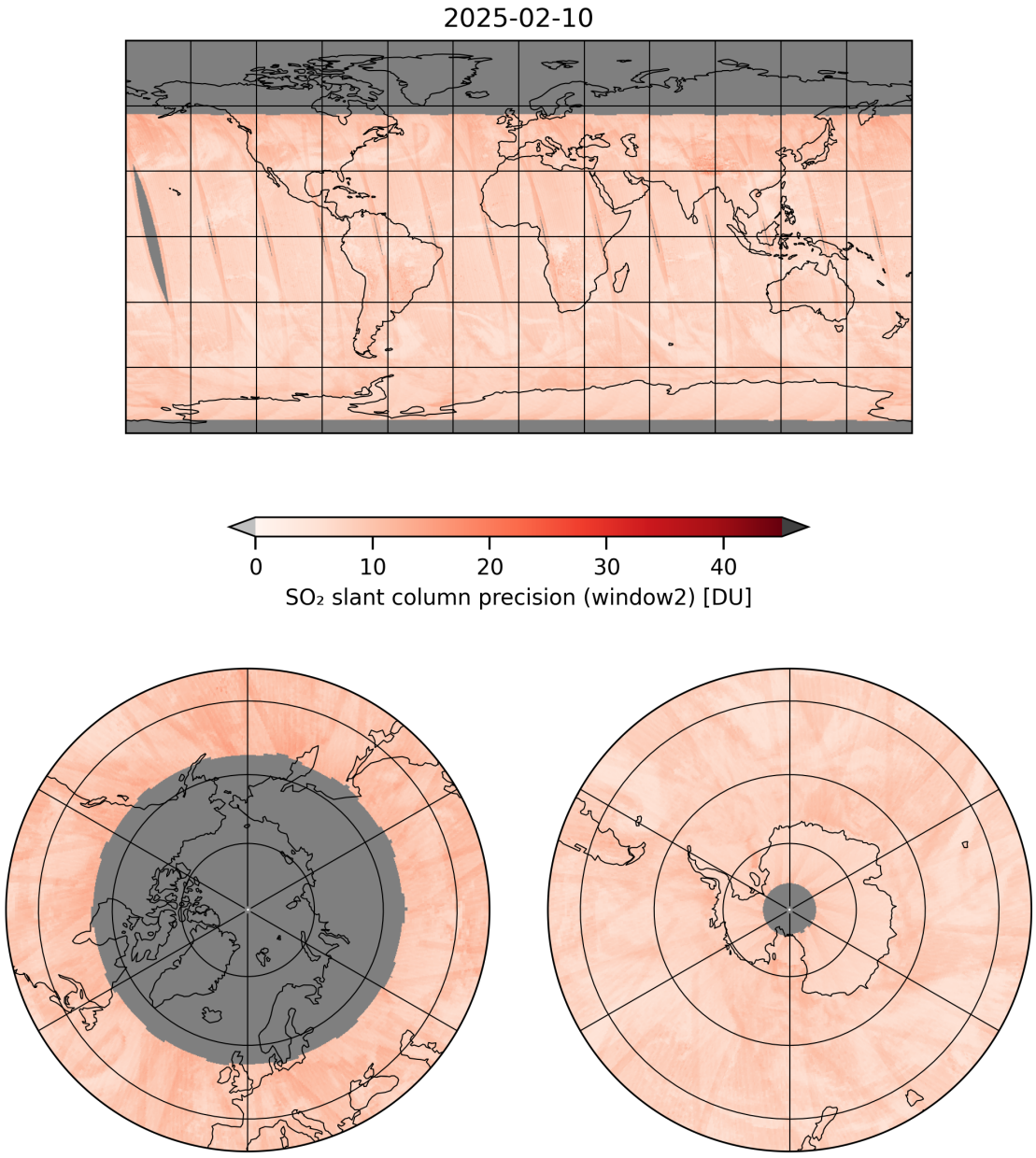

Figure 14: Map of "SO_2 slant column precision (window2)" for 2025-02-10 to 2025-02-11

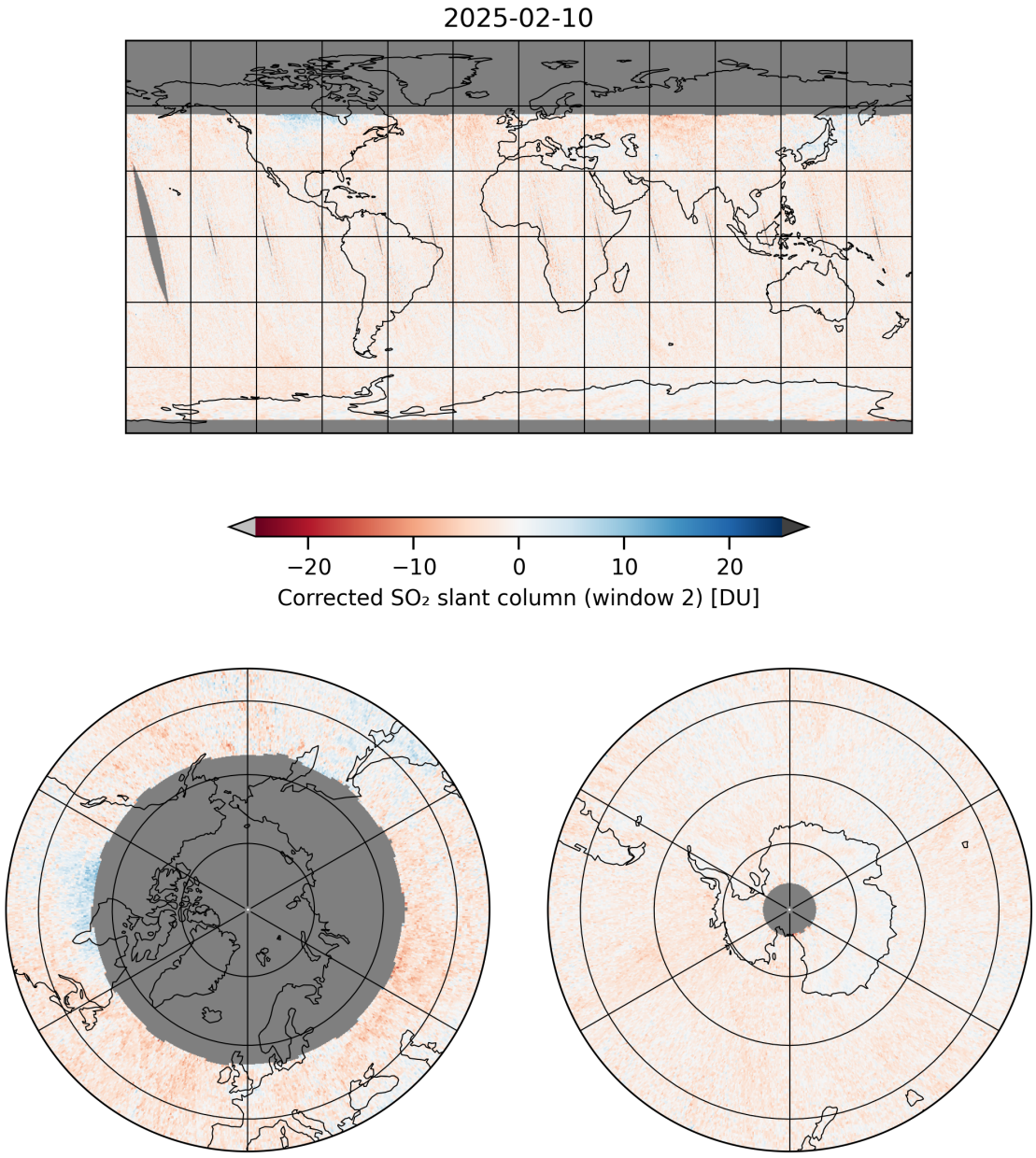

Figure 15: Map of "Corrected SO_2 slant column (window 2)" for 2025-02-10 to 2025-02-11

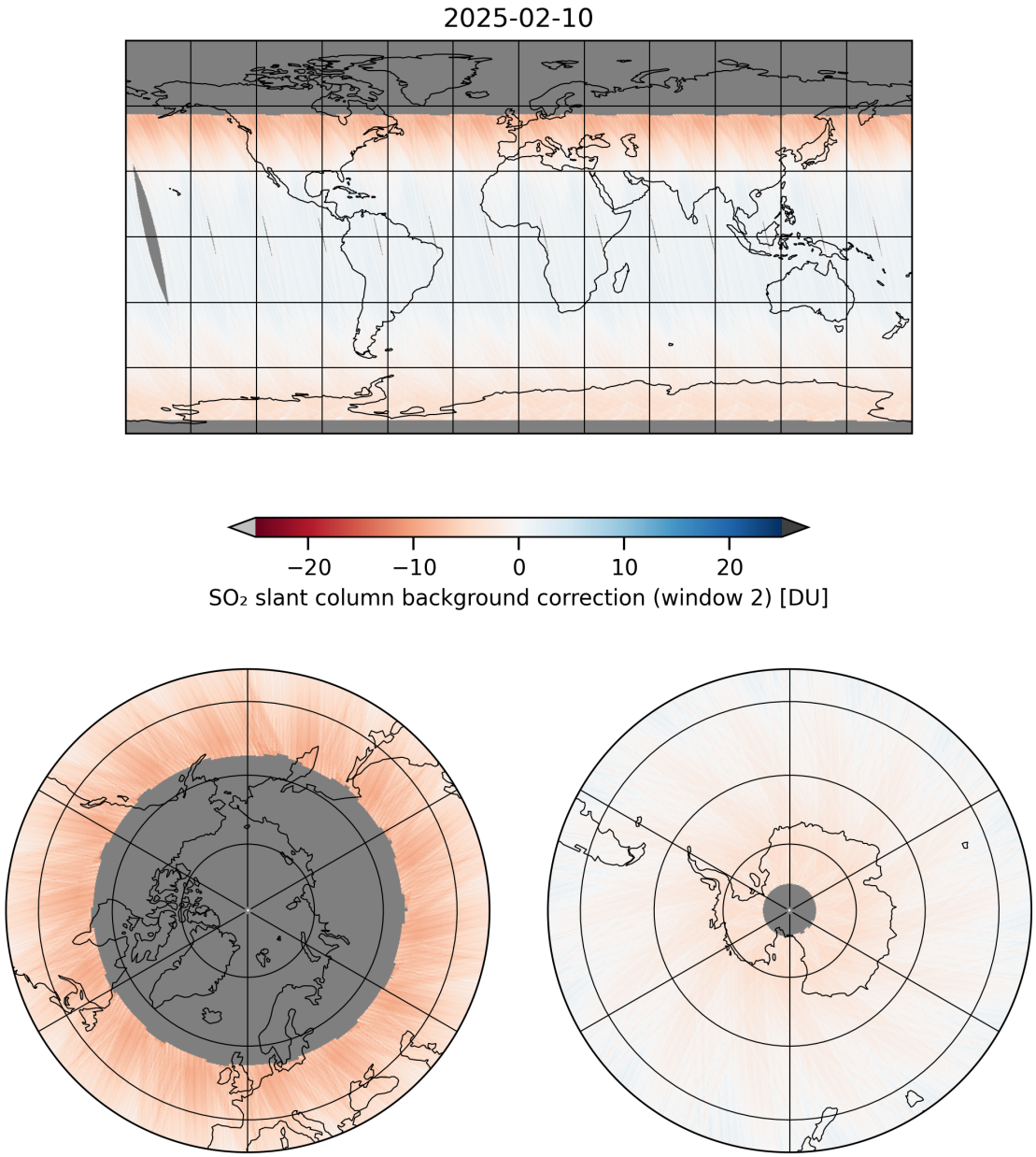

Figure 16: Map of "SO_2 slant column background correction (window 2)" for 2025-02-10 to 2025-02-11

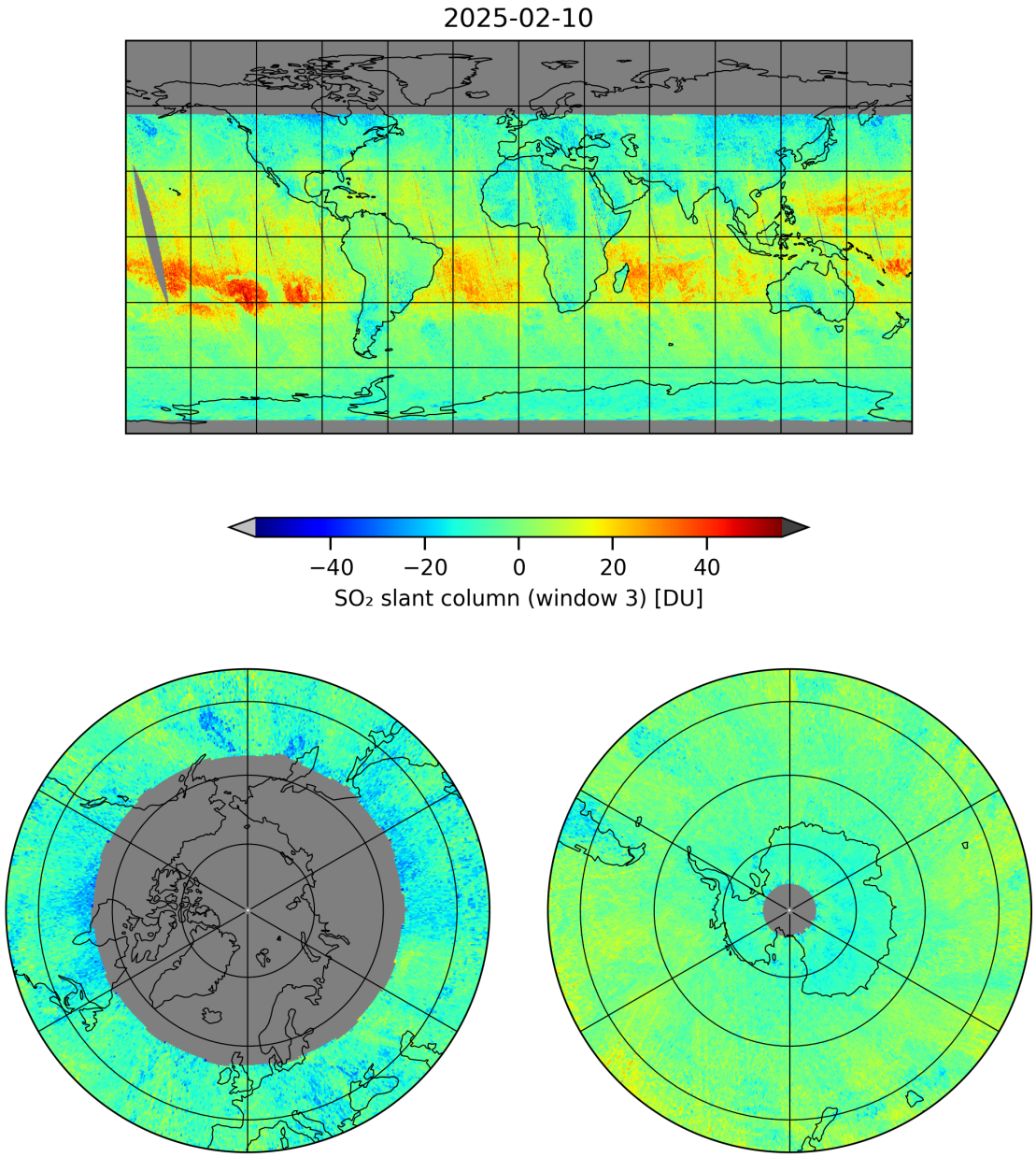

Figure 17: Map of "SO_2 slant column (window 3)" for 2025-02-10 to 2025-02-11

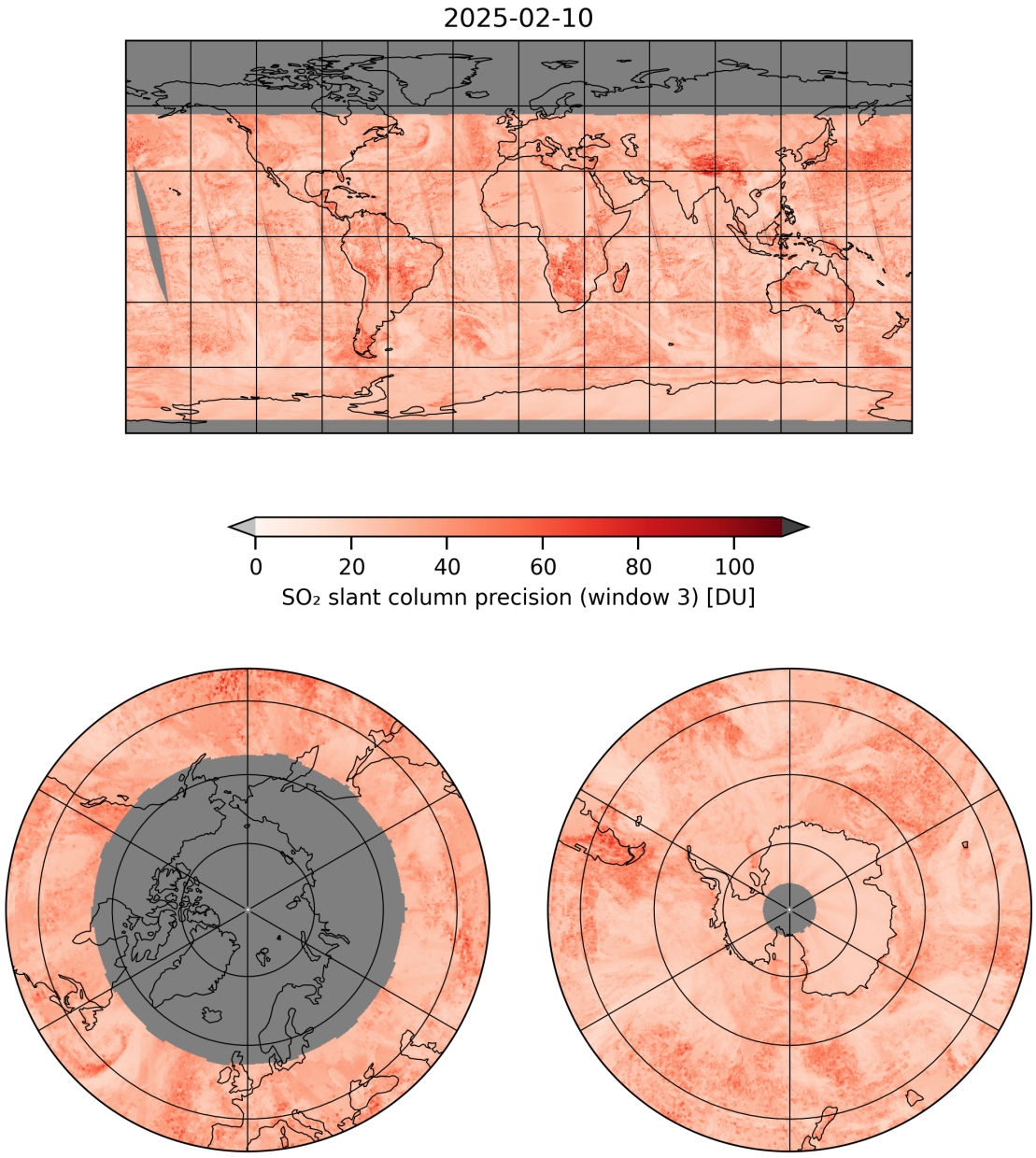

Figure 18: Map of "SO_2 slant column precision (window 3)" for 2025-02-10 to 2025-02-11

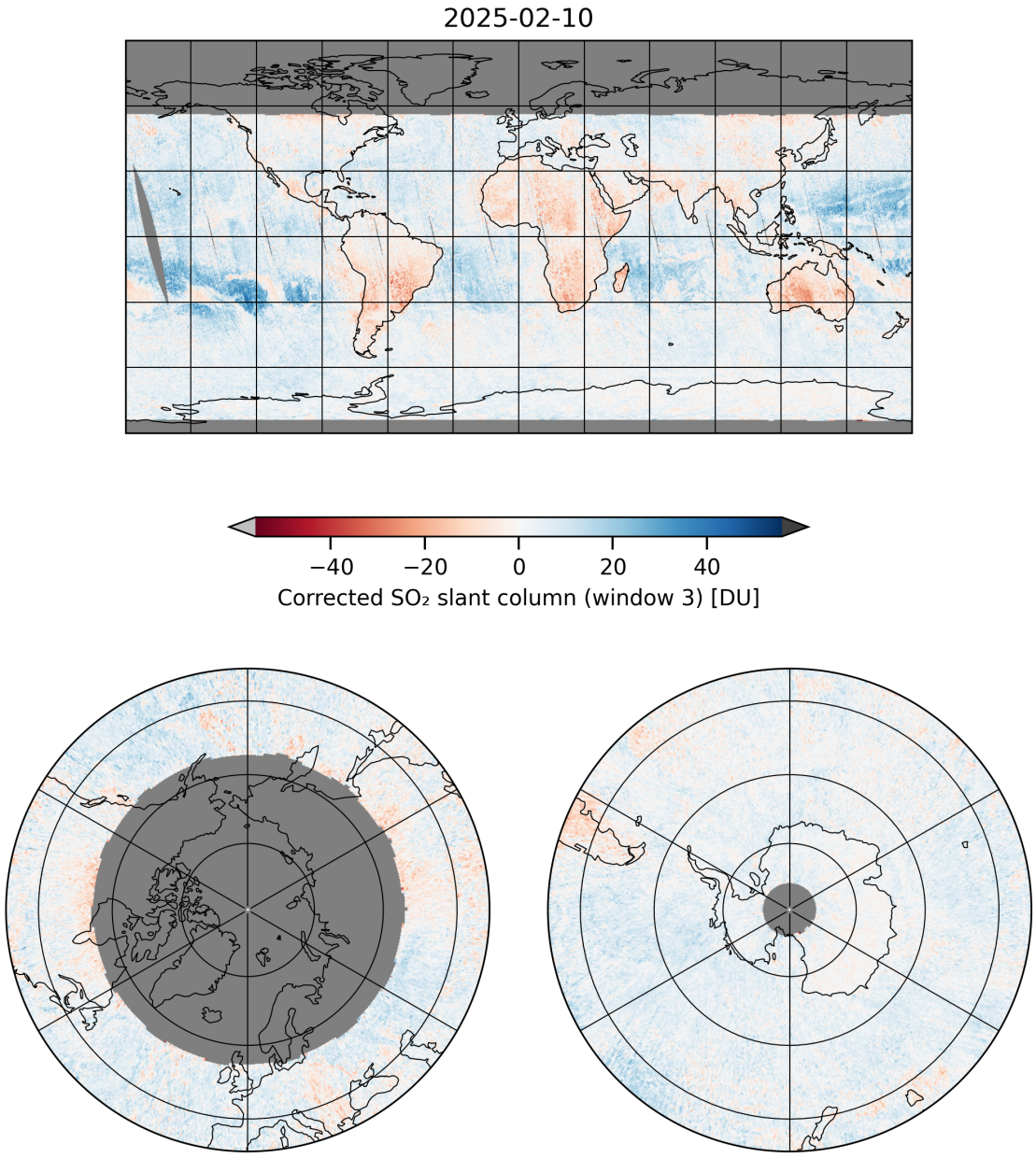

Figure 19: Map of "Corrected SO_2 slant column (window 3)" for 2025-02-10 to 2025-02-11

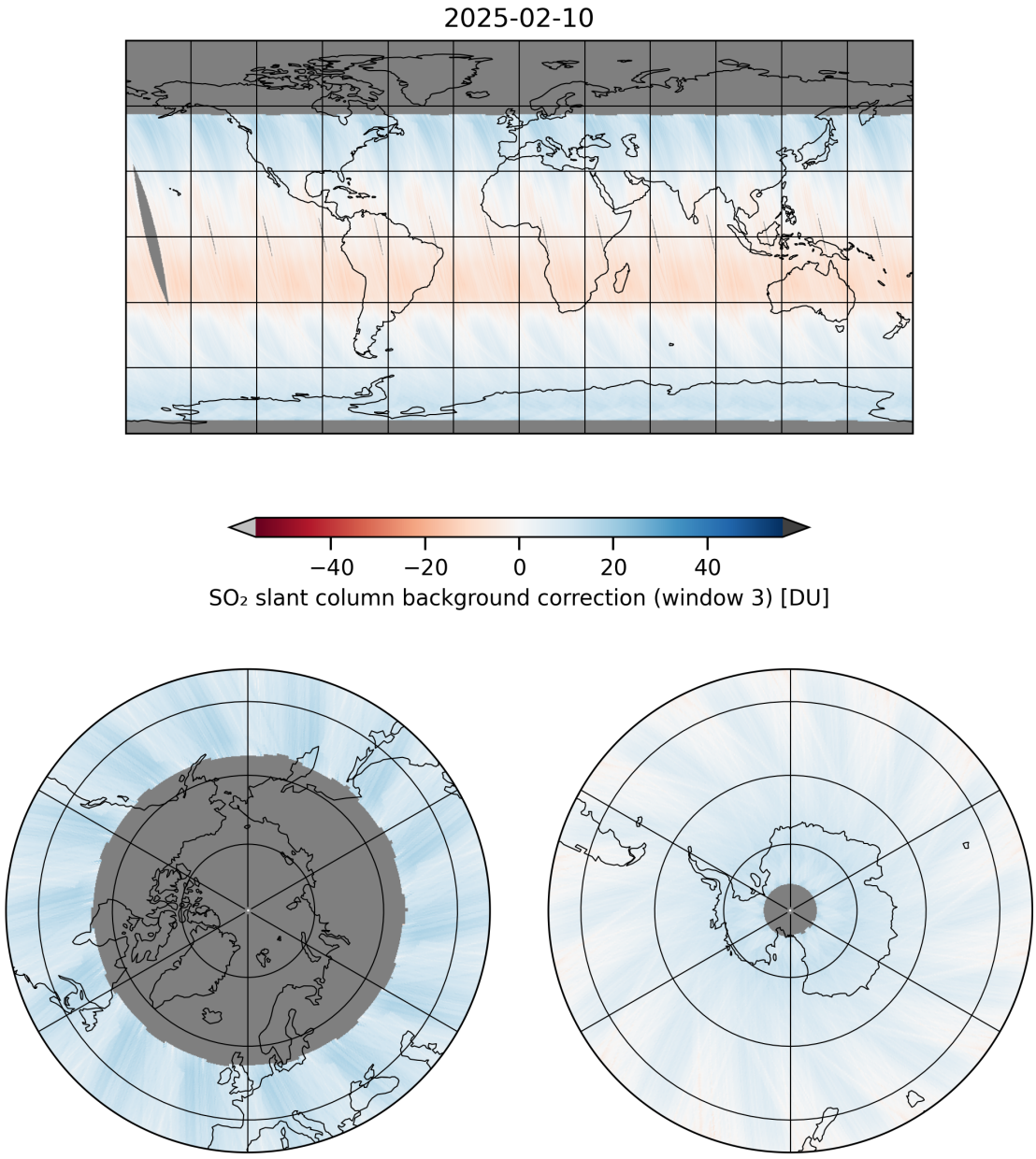

Figure 20: Map of "SO_2 slant column background correction (window 3)" for 2025-02-10 to 2025-02-11

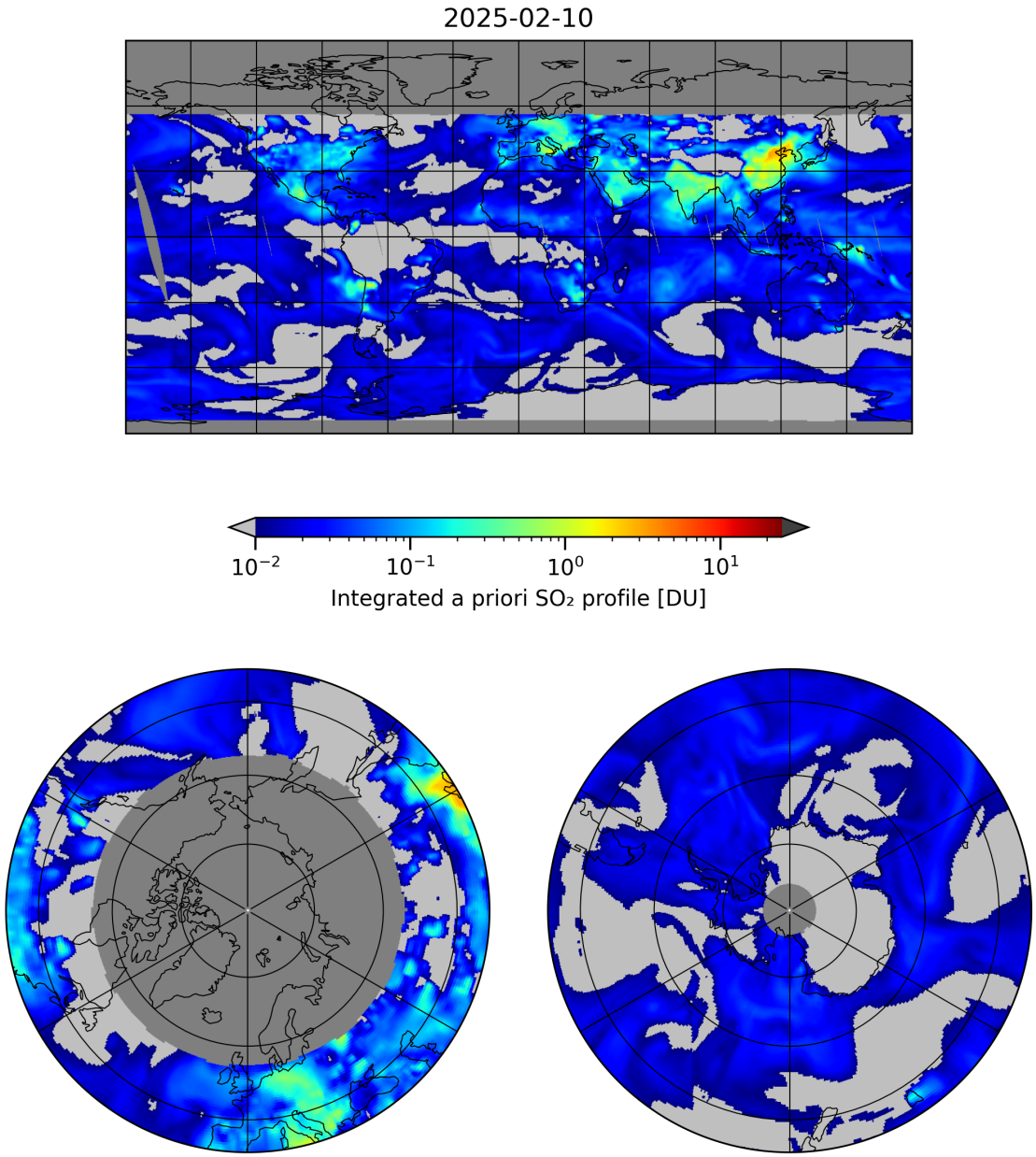

Figure 21: Map of “Integrated a priori SO_2 profile” for 2025-02-10 to 2025-02-11

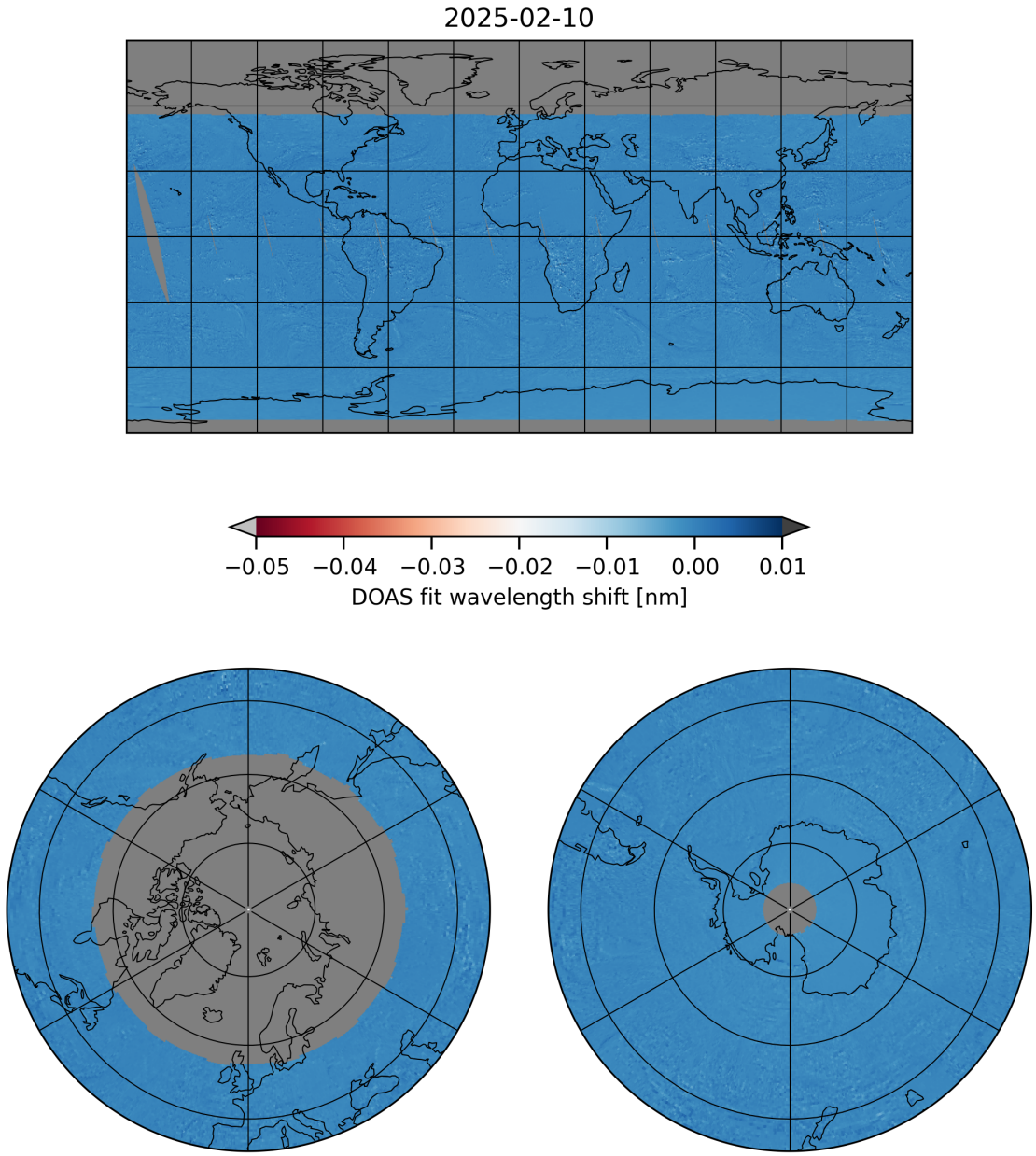

Figure 22: Map of “DOAS fit wavelength shift” for 2025-02-10 to 2025-02-11

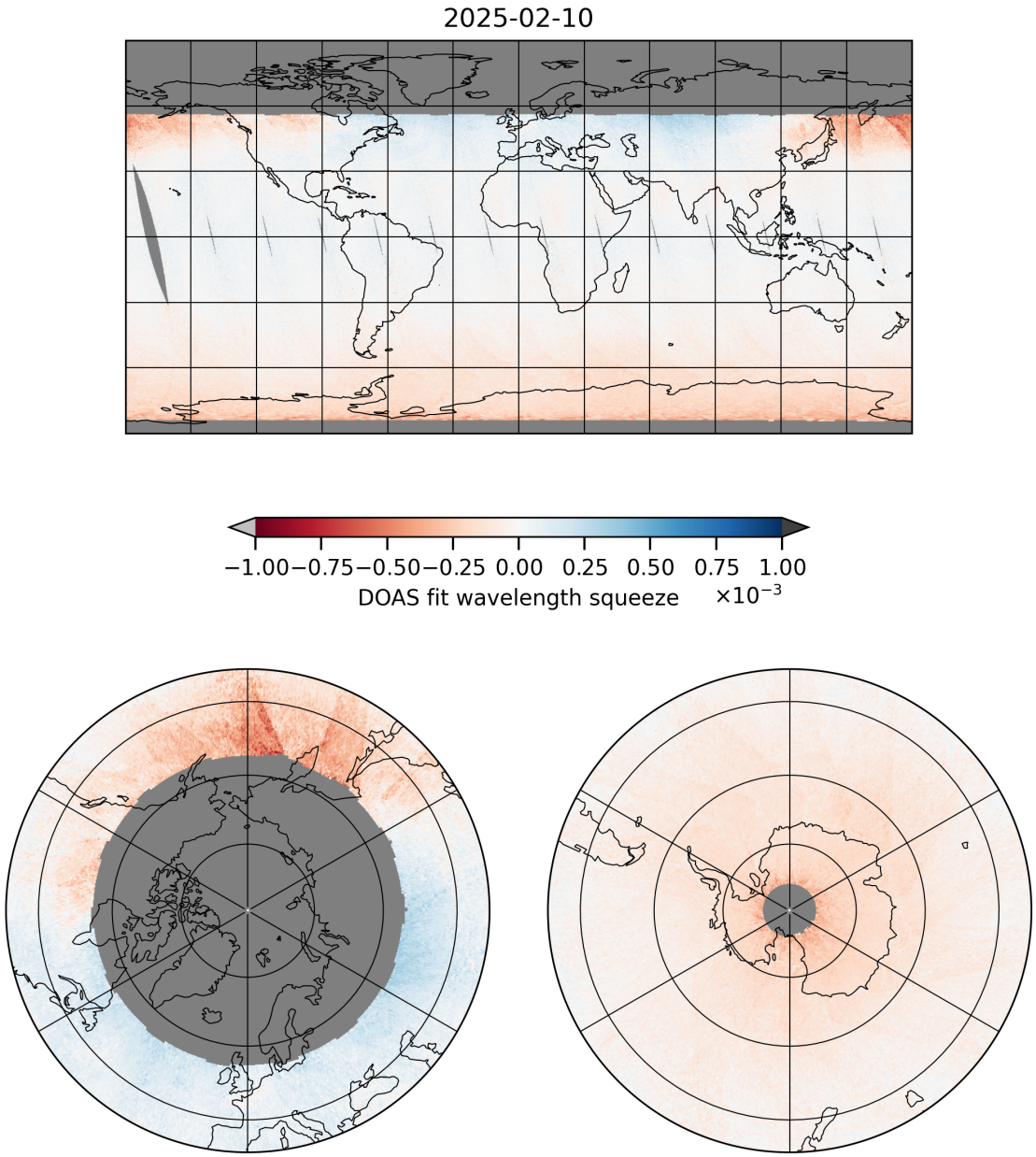

Figure 23: Map of “DOAS fit wavelength squeeze” for 2025-02-10 to 2025-02-11

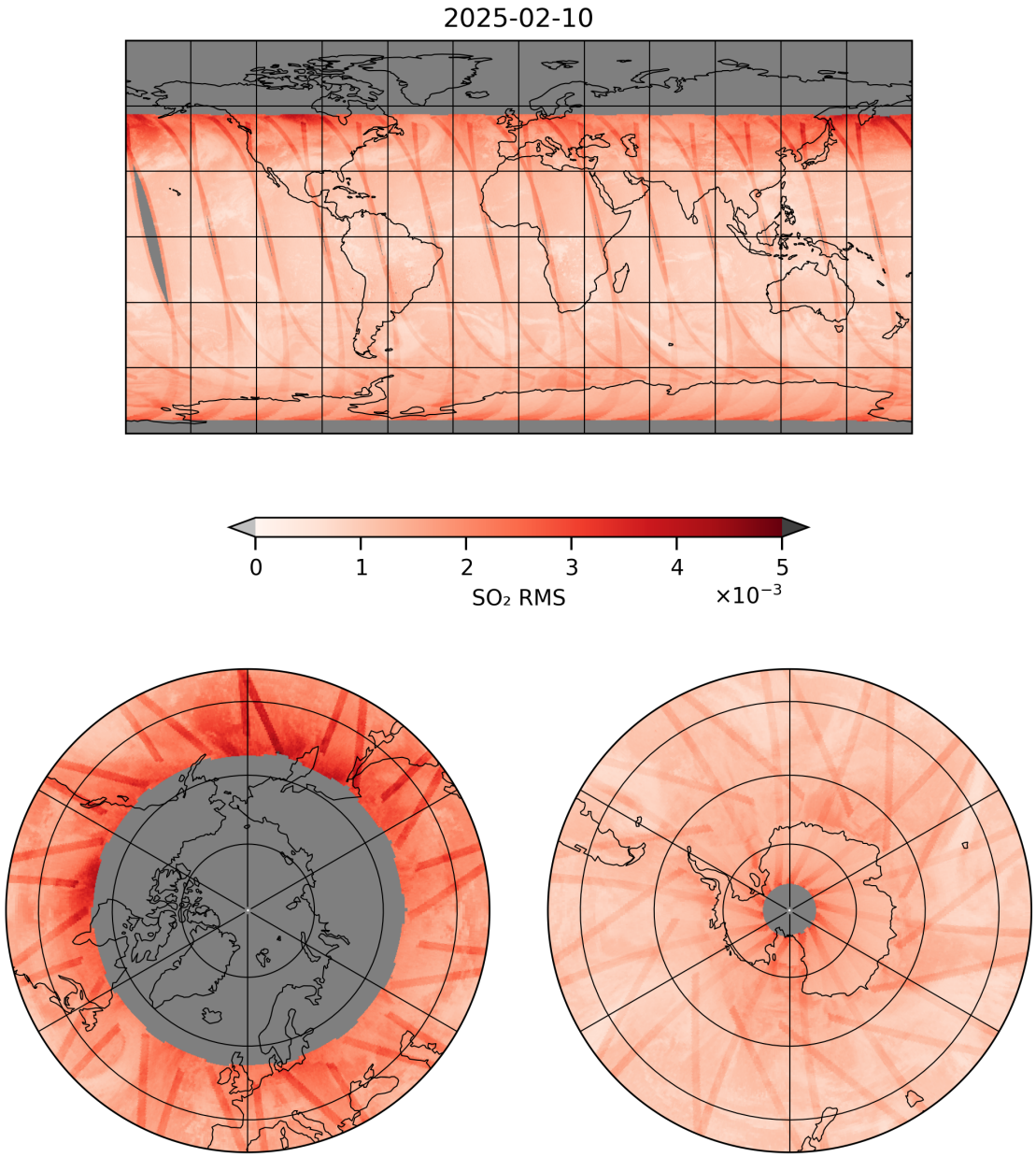

Figure 24: Map of "SO_2 RMS" for 2025-02-10 to 2025-02-11

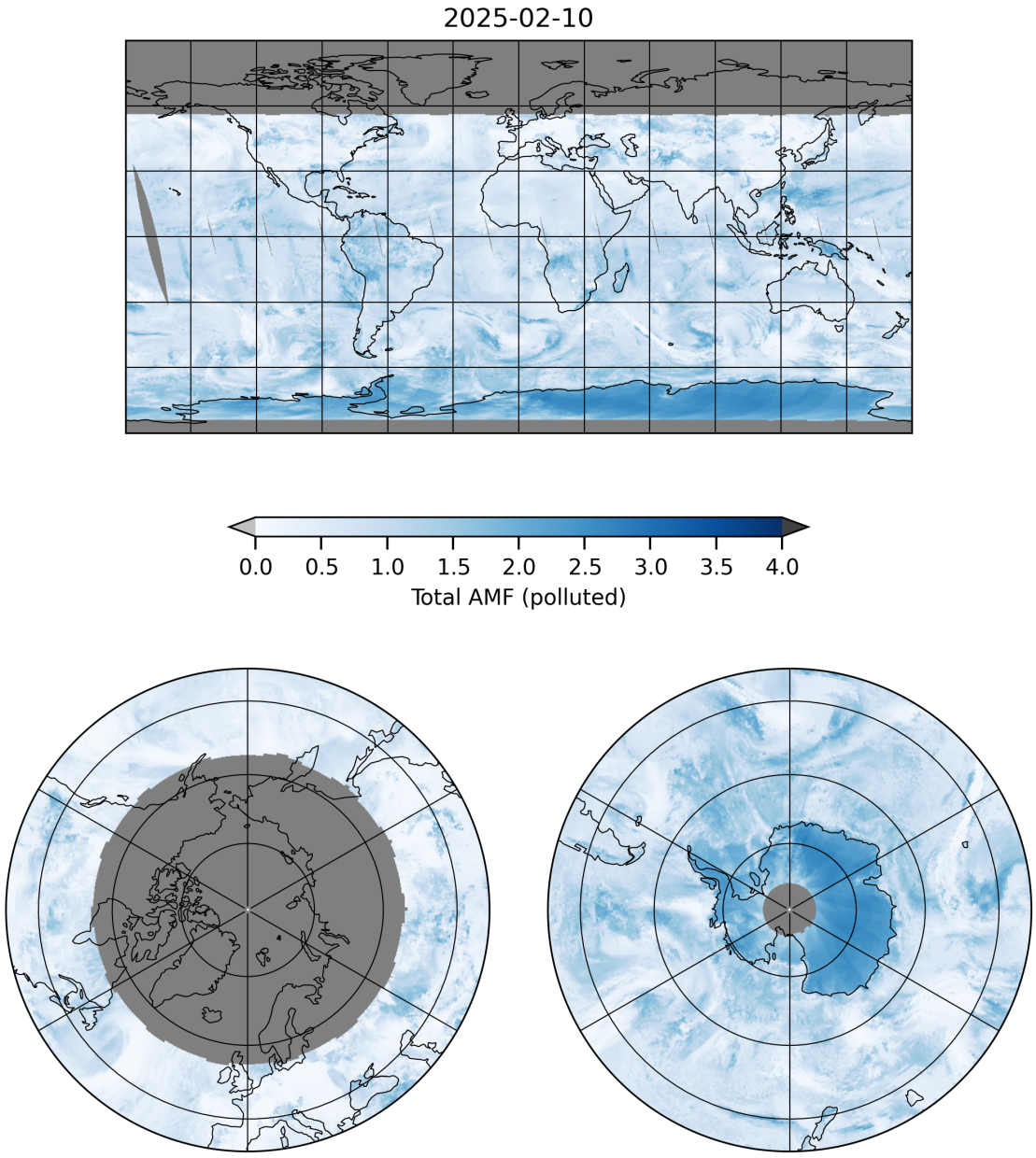

Figure 25: Map of “Total AMF (polluted)” for 2025-02-10 to 2025-02-11

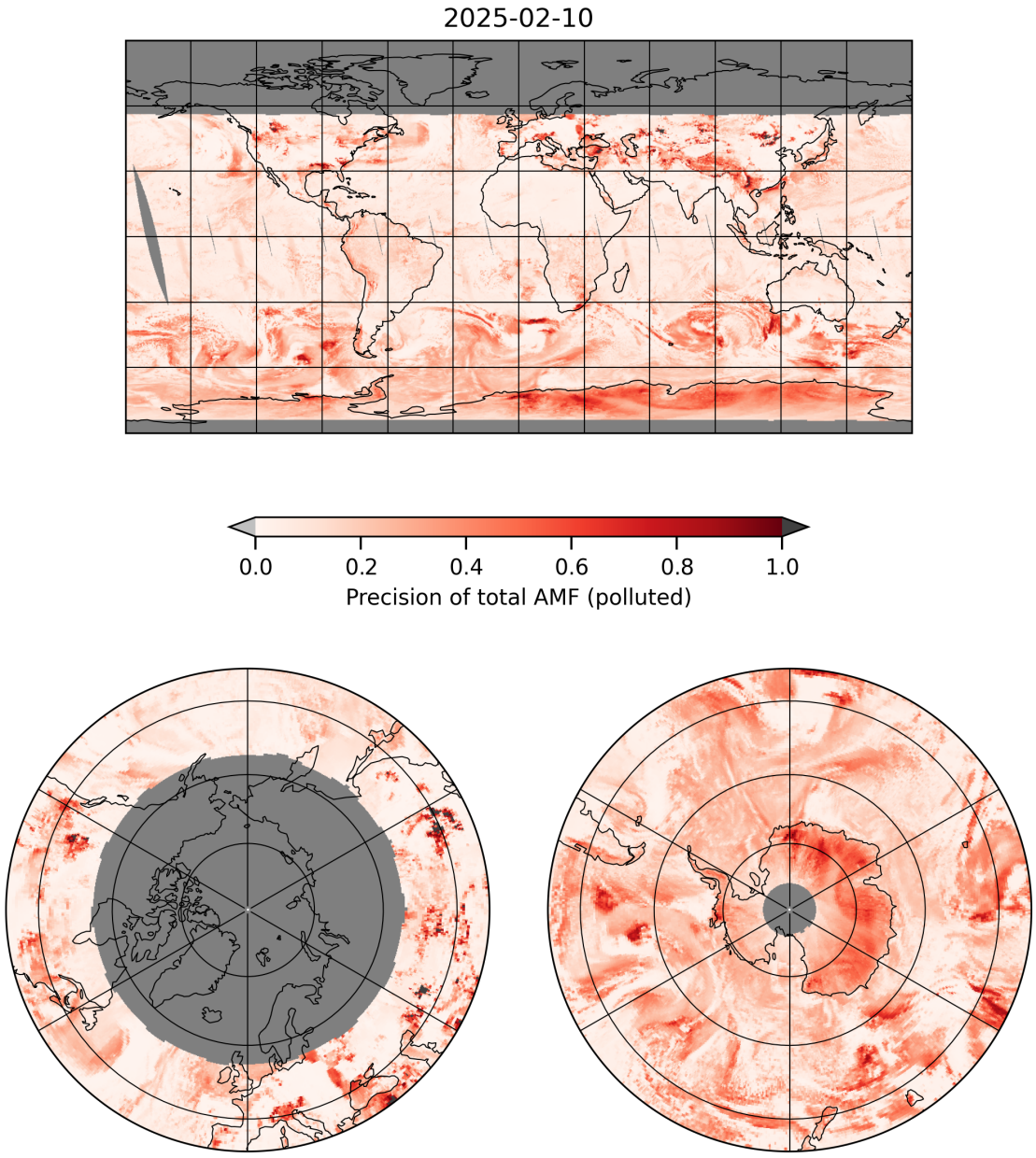

Figure 26: Map of “Precision of total AMF (polluted)” for 2025-02-10 to 2025-02-11

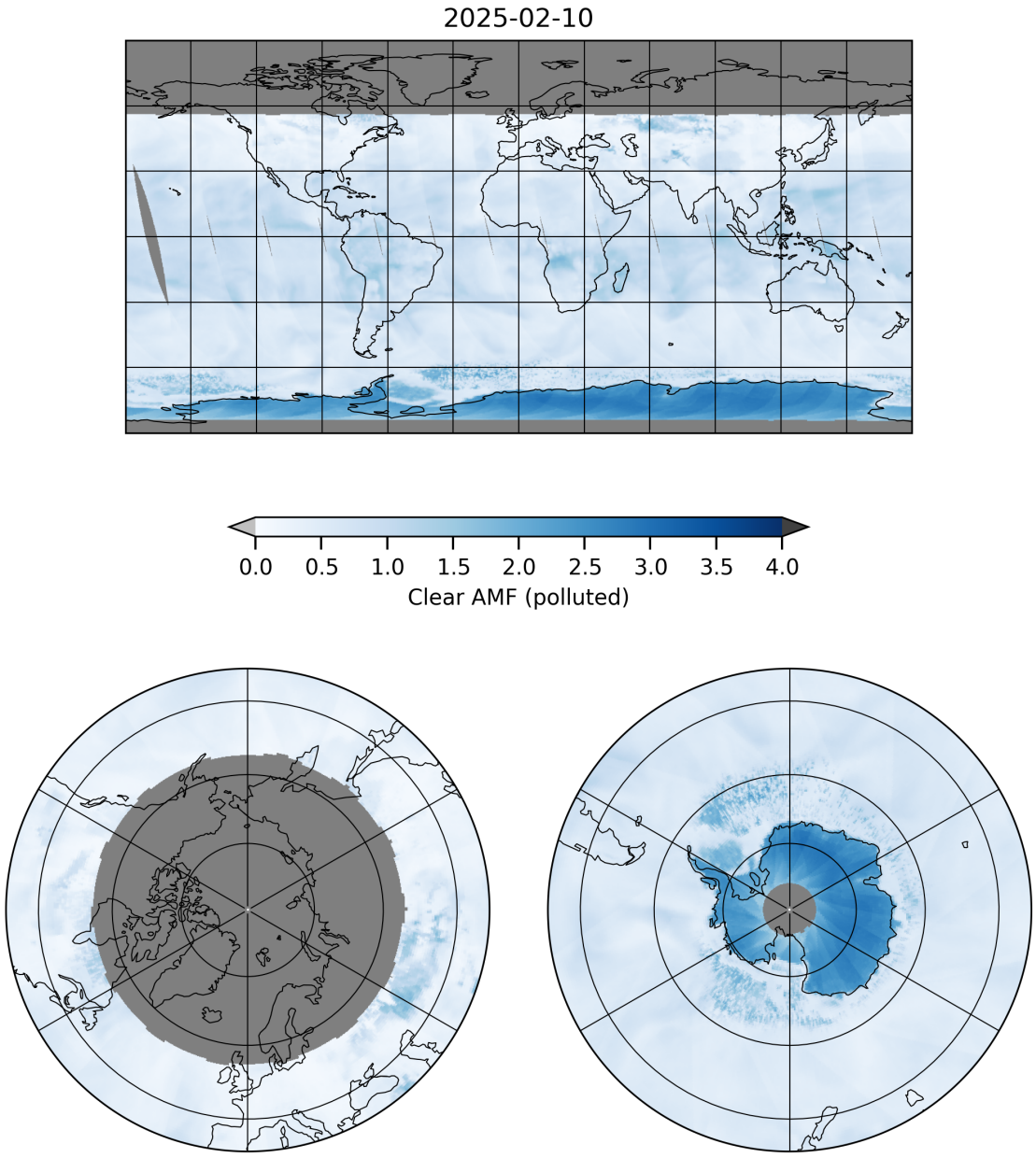

Figure 27: Map of “Clear AMF (polluted)” for 2025-02-10 to 2025-02-11

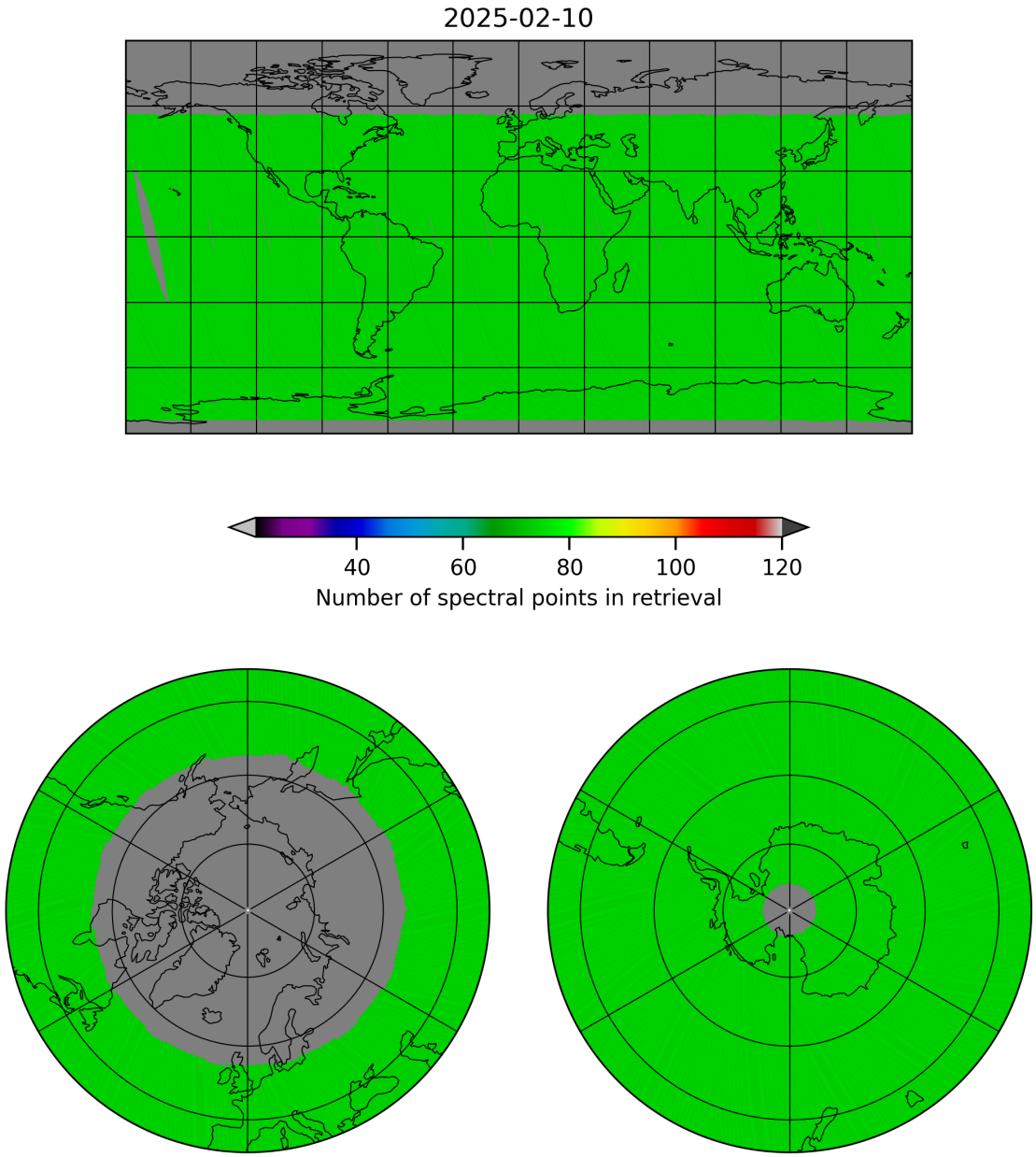

Figure 28: Map of “Number of spectral points in retrieval” for 2025-02-10 to 2025-02-11

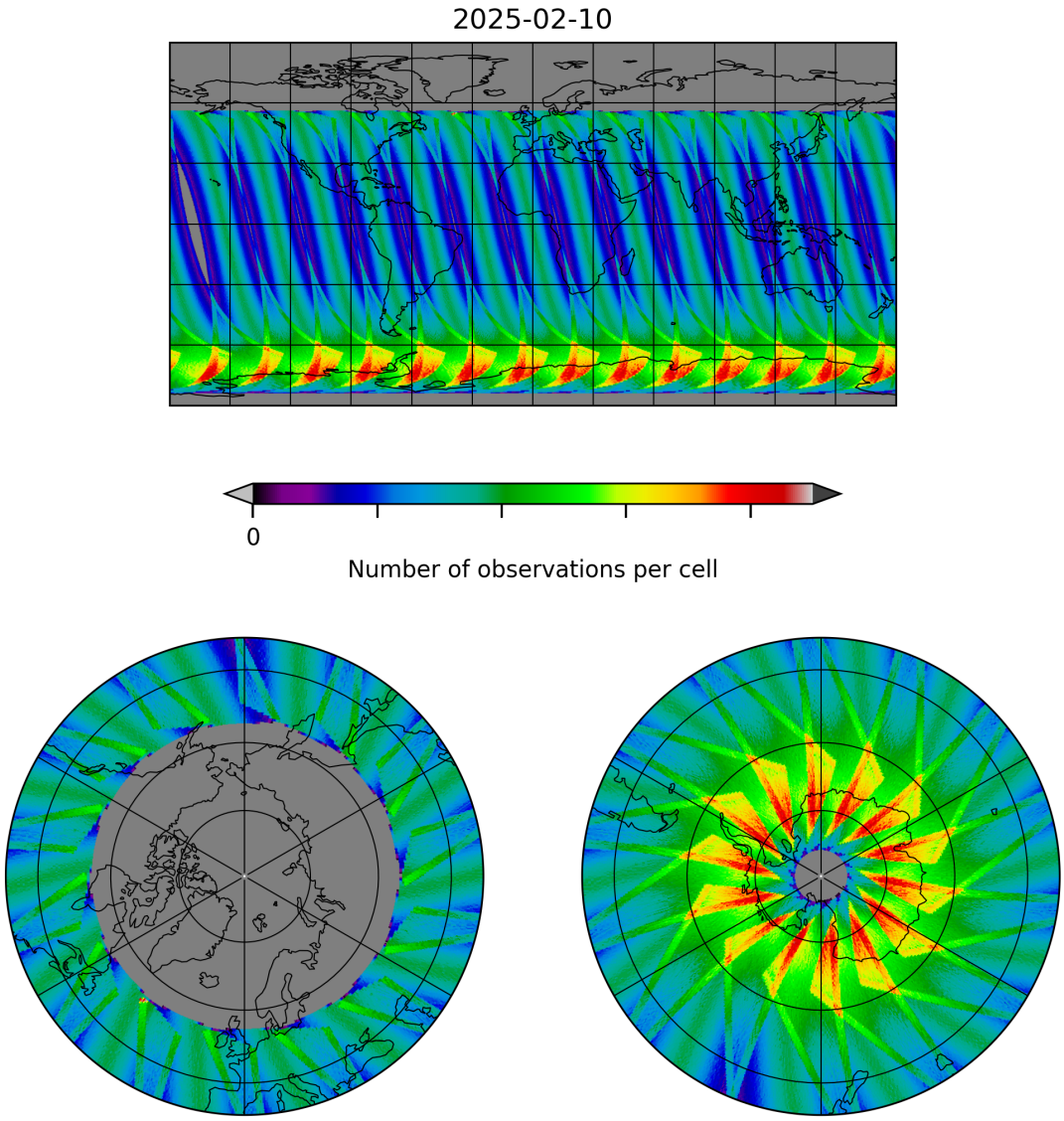

Figure 29: Map of the number of observations for 2025-02-10 to 2025-02-11

7 Zonal average

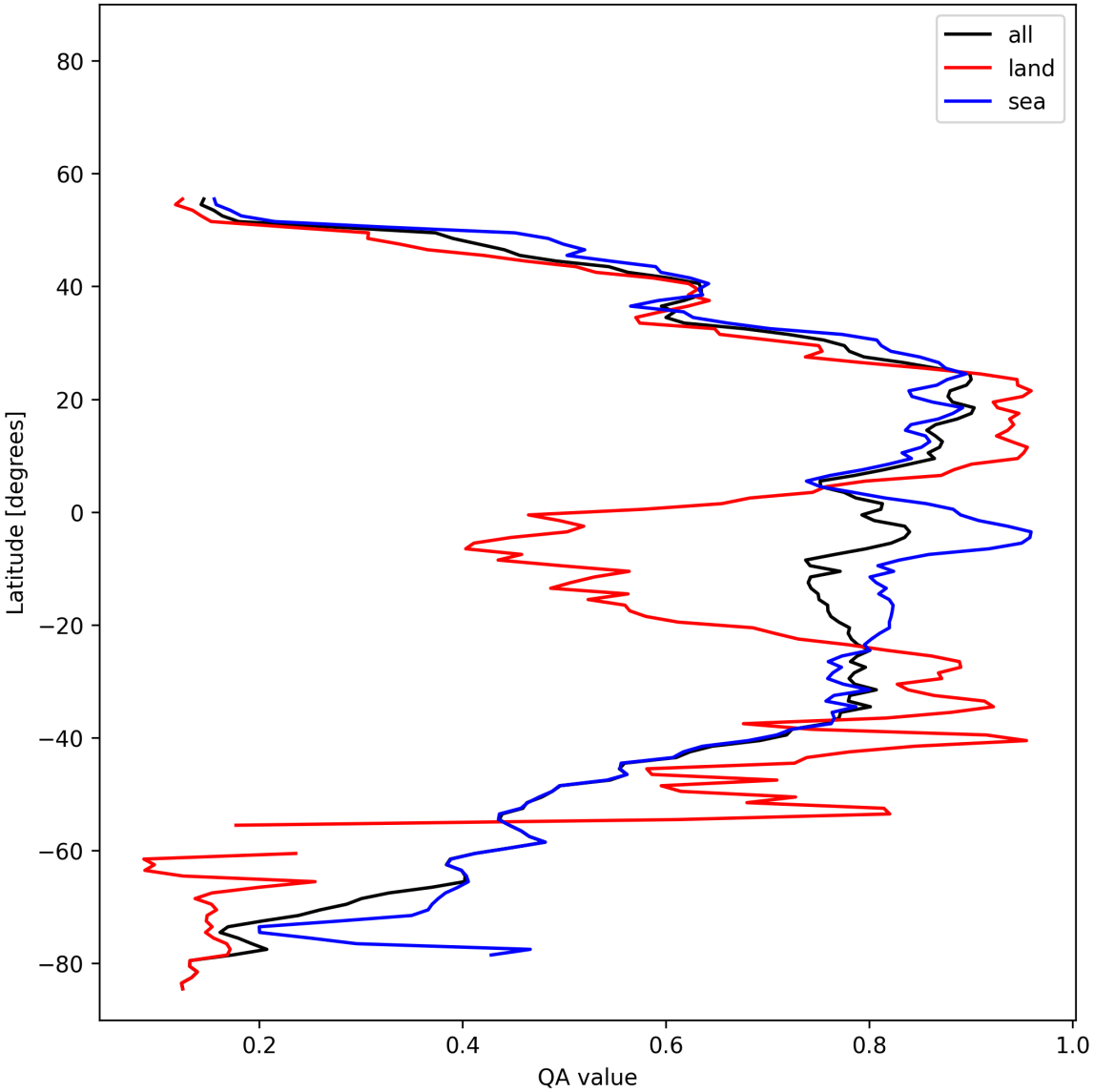

Figure 30: Zonal average of “QA value” for 2025-02-10 to 2025-02-11.

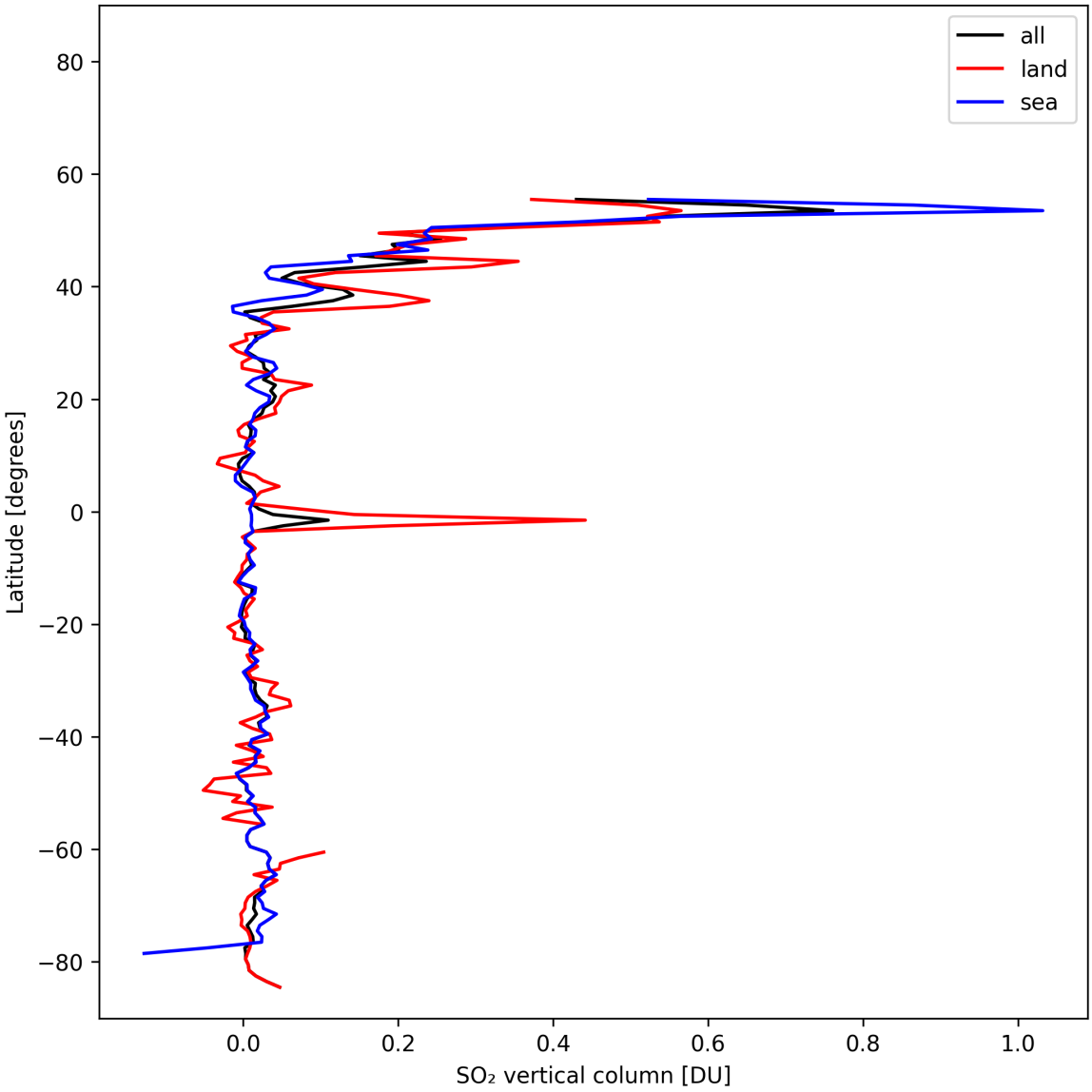

Figure 31: Zonal average of "SO_2 vertical column" for 2025-02-10 to 2025-02-11.

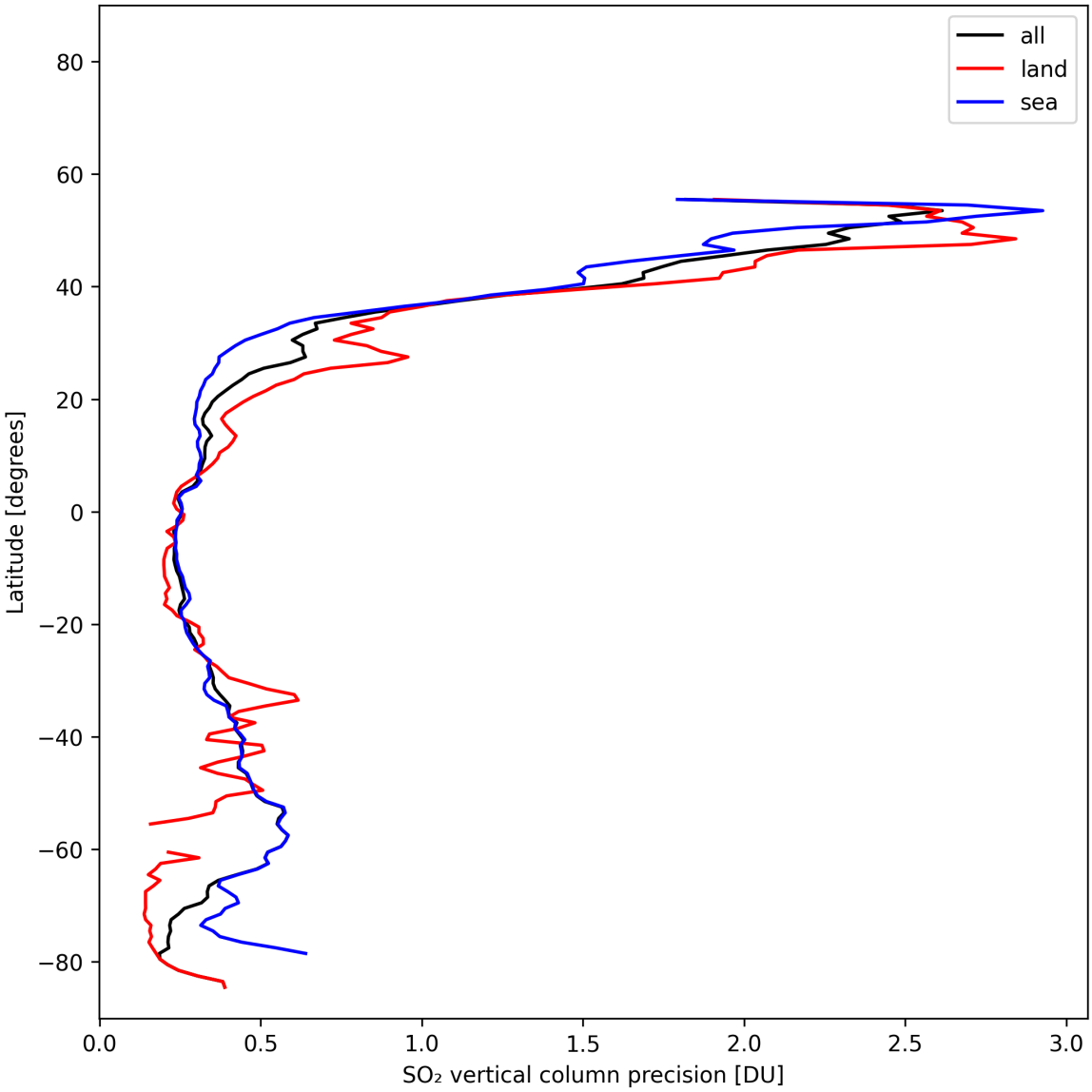

Figure 32: Zonal average of "SO_2 vertical column precision" for 2025-02-10 to 2025-02-11.

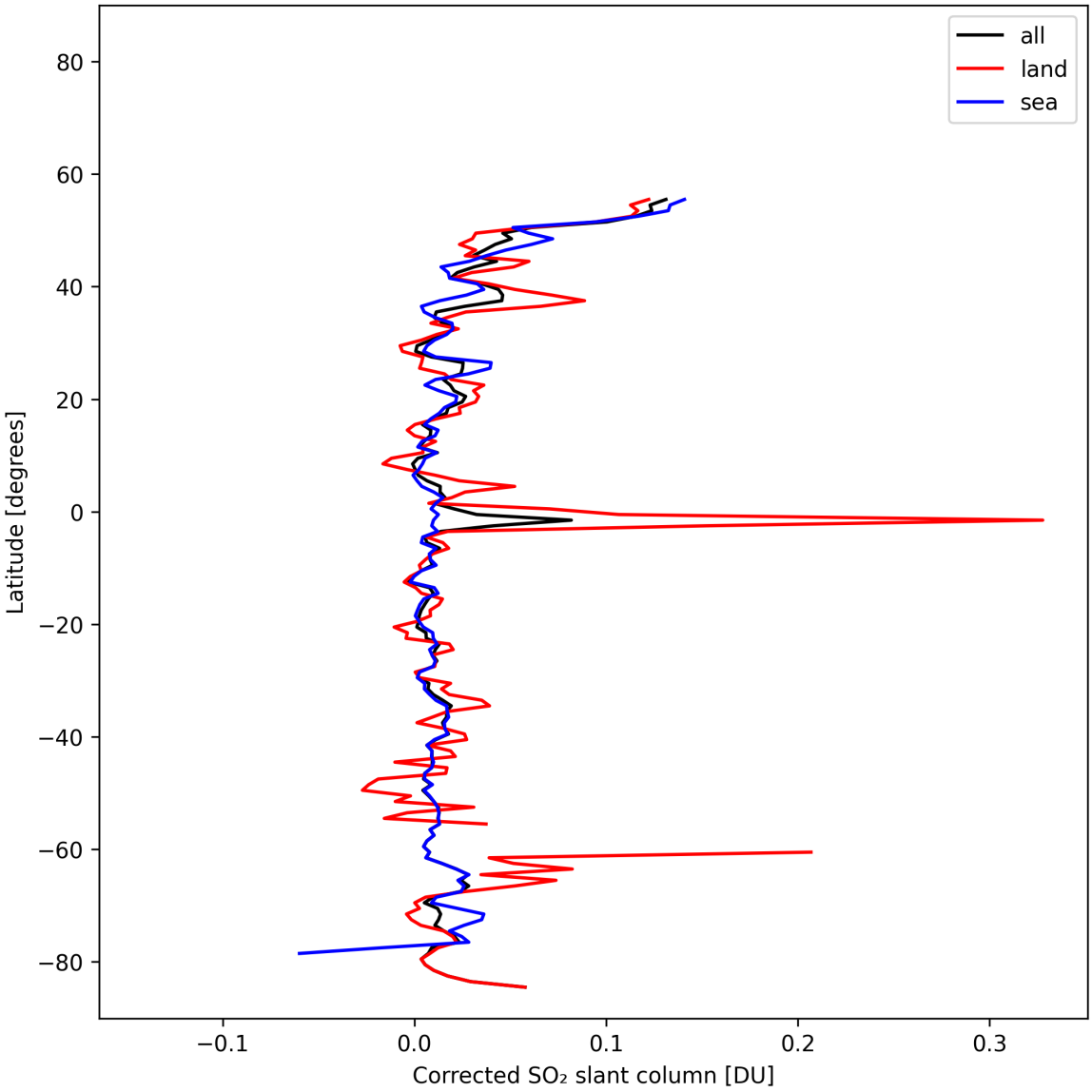

Figure 33: Zonal average of “Corrected SO_2 slant column” for 2025-02-10 to 2025-02-11.

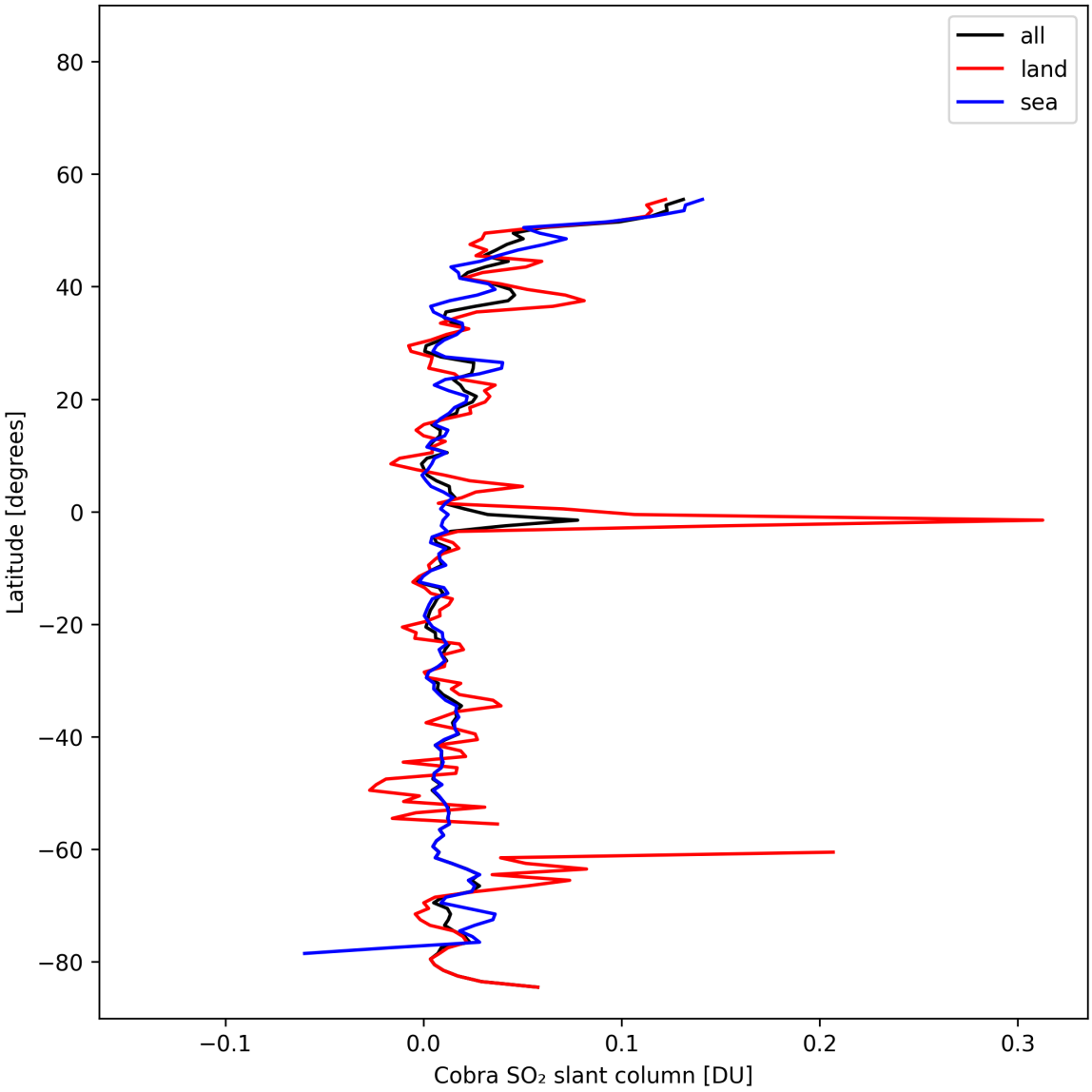

Figure 34: Zonal average of “Cobra SO_2 slant column” for 2025-02-10 to 2025-02-11.

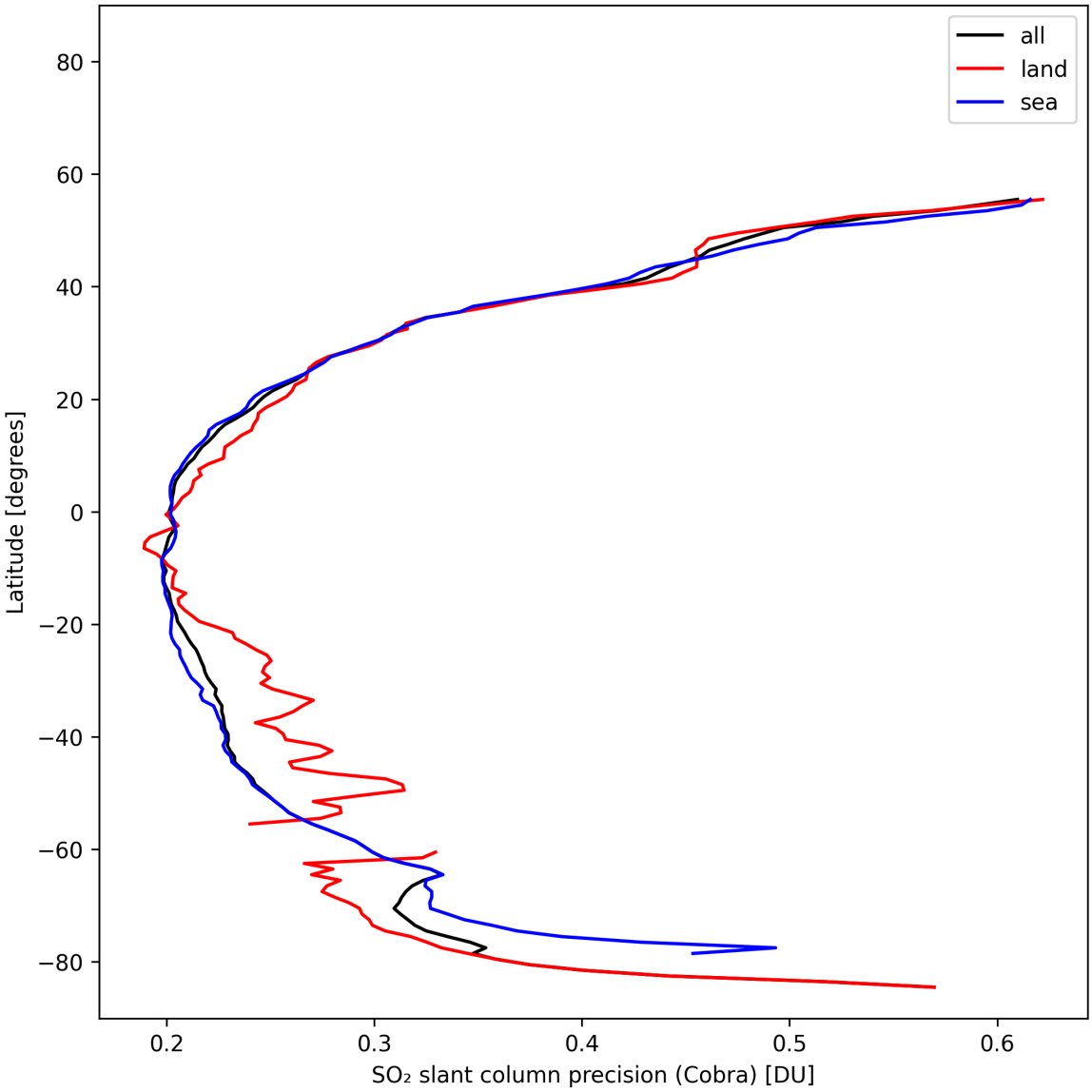

Figure 35: Zonal average of "SO_2 slant column precision (Cobra)" for 2025-02-10 to 2025-02-11.

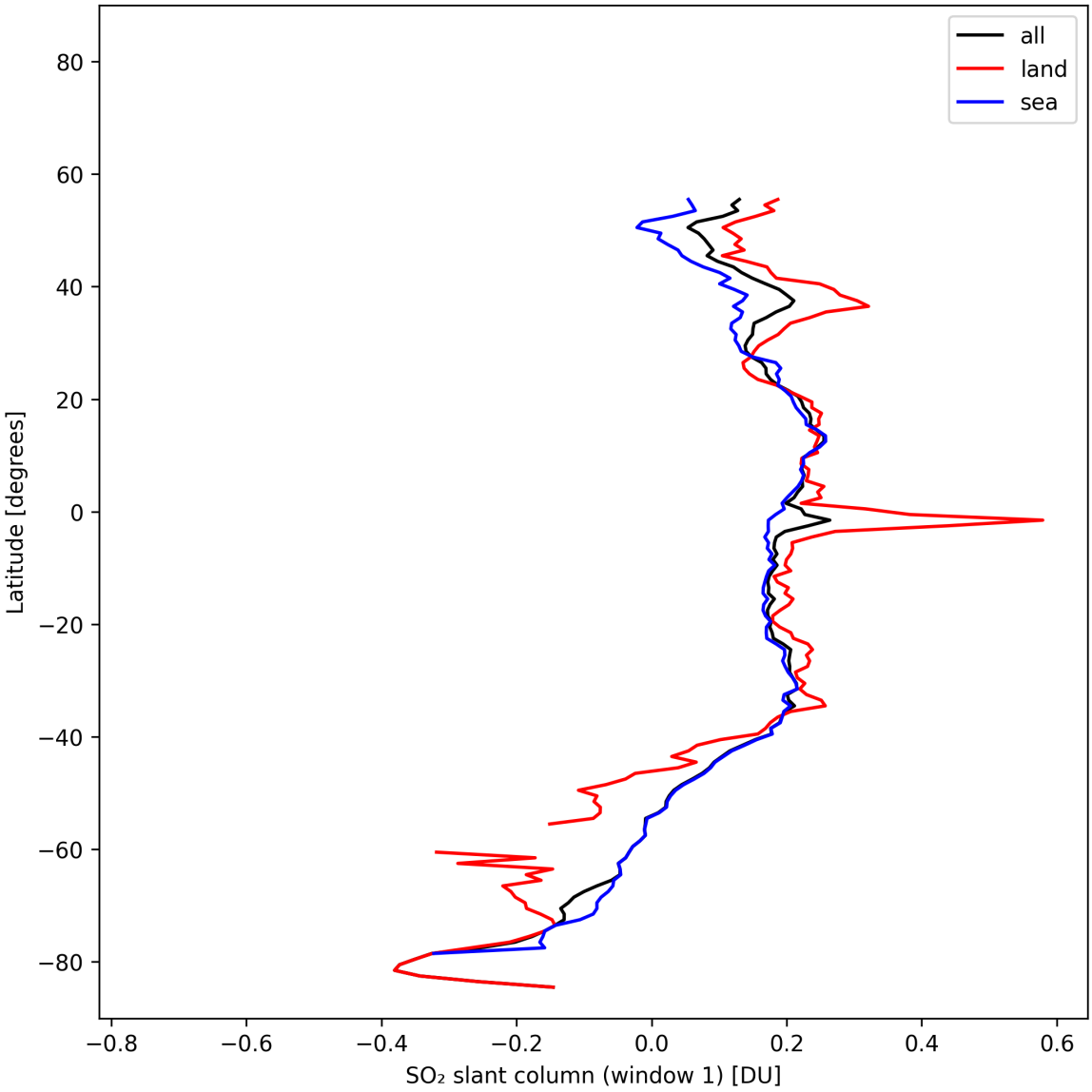

Figure 36: Zonal average of "SO_2 slant column (window 1)" for 2025-02-10 to 2025-02-11.

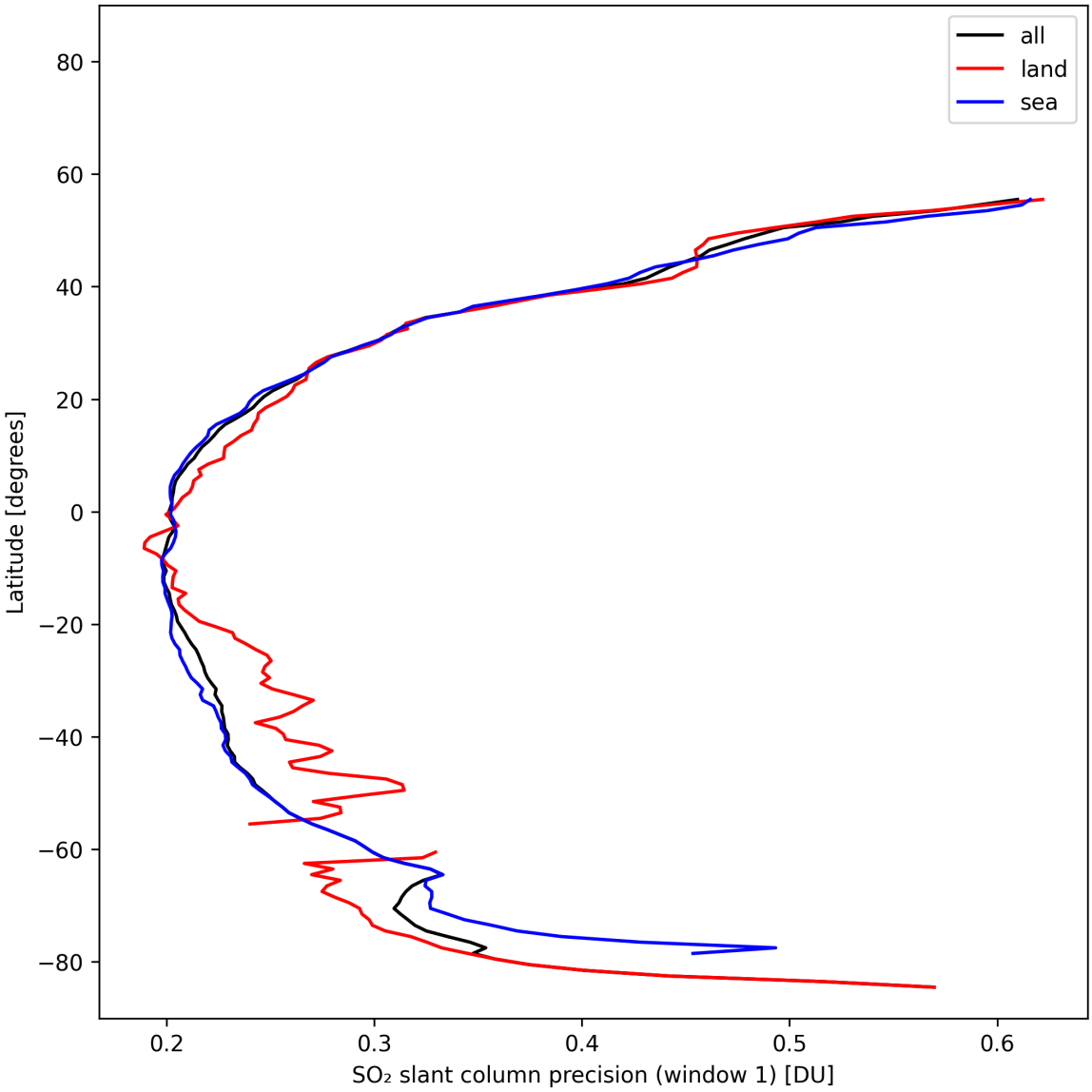

Figure 37: Zonal average of "SO_2 slant column precision (window 1)" for 2025-02-10 to 2025-02-11.

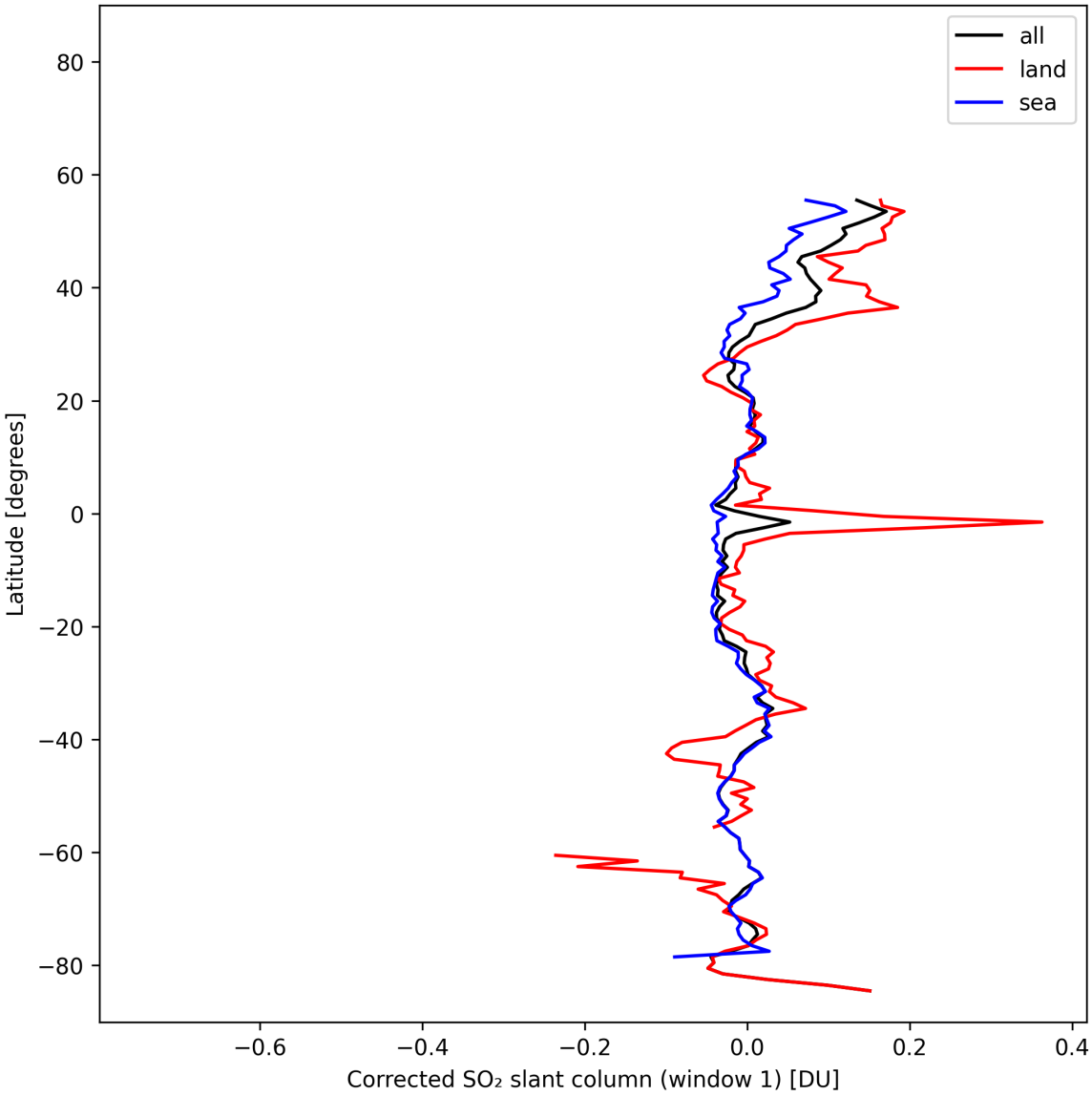

Figure 38: Zonal average of "Corrected SO_2 slant column (window 1)" for 2025-02-10 to 2025-02-11.

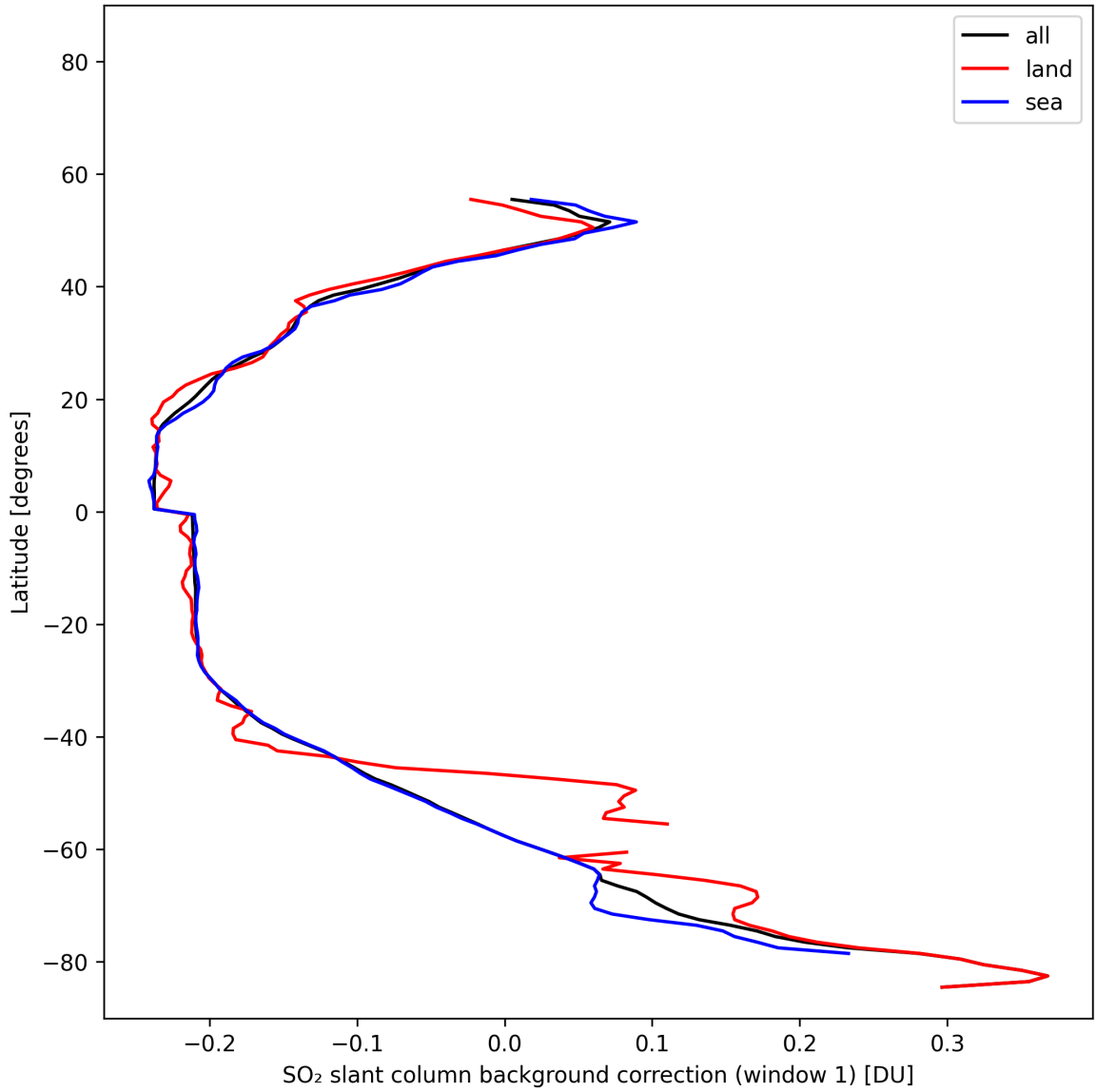

Figure 39: Zonal average of "SO_2 slant column background correction (window 1)" for 2025-02-10 to 2025-02-11.

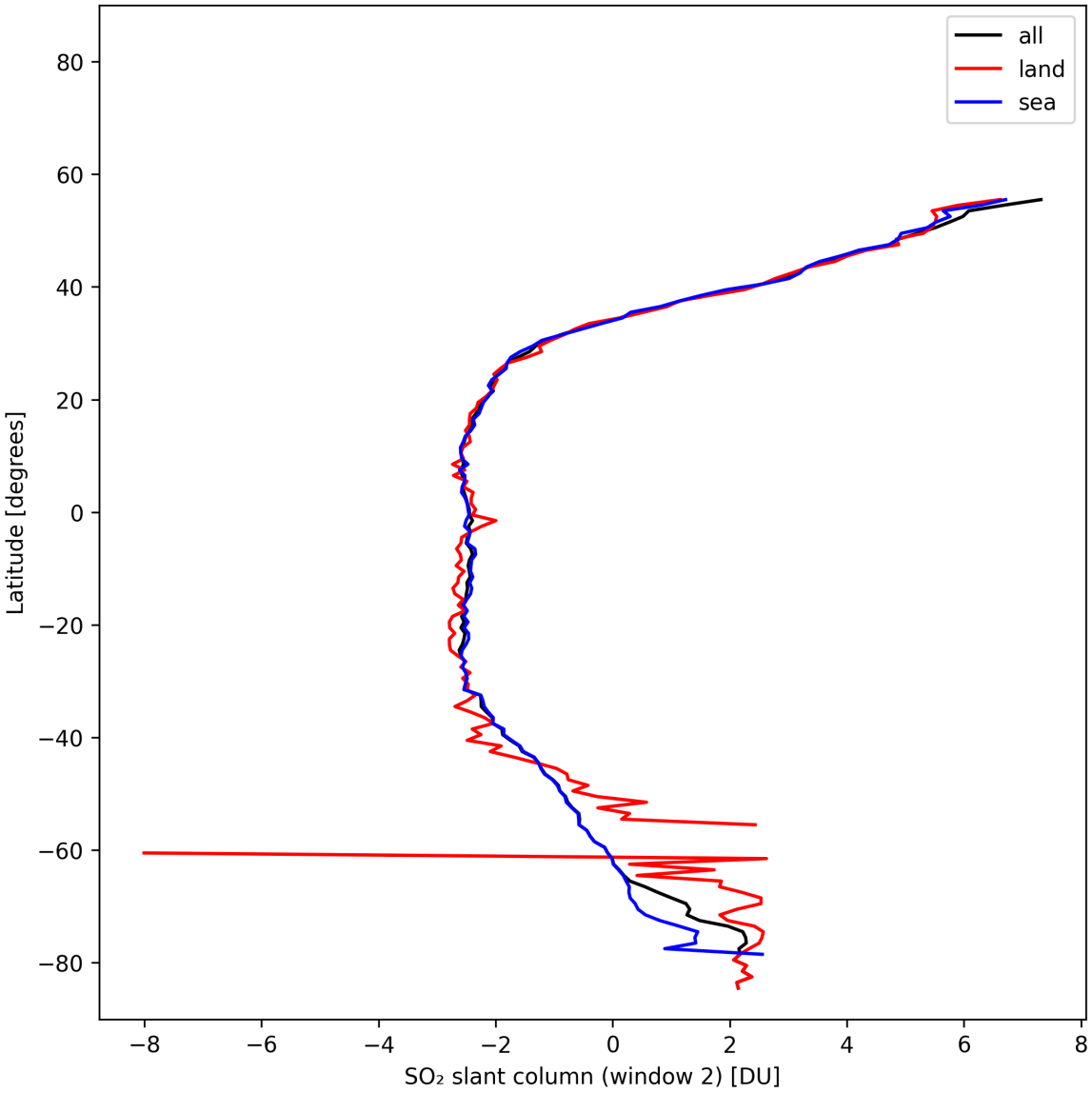

Figure 40: Zonal average of "SO_2 slant column (window 2)" for 2025-02-10 to 2025-02-11.

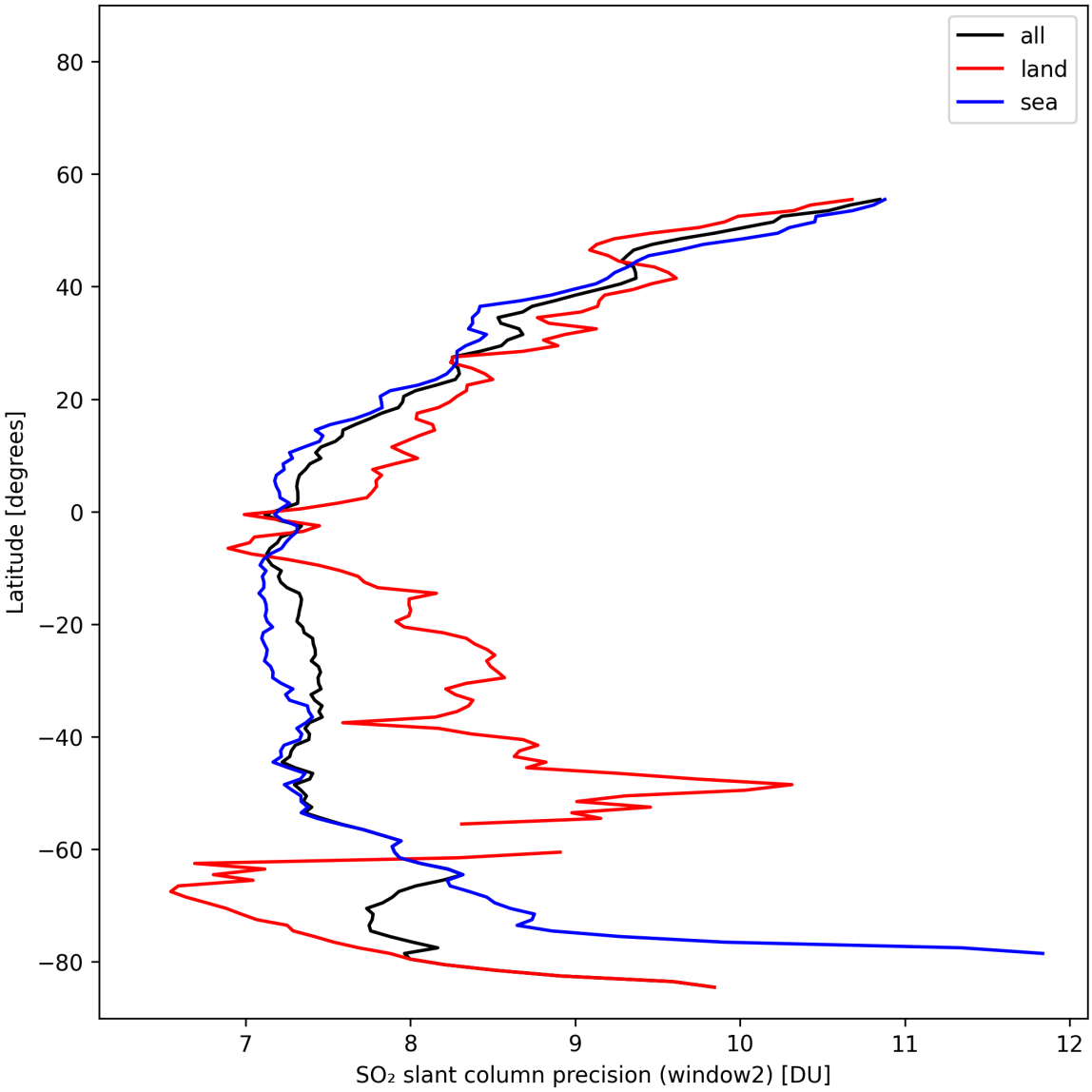

Figure 41: Zonal average of "SO_2 slant column precision (window2)" for 2025-02-10 to 2025-02-11.

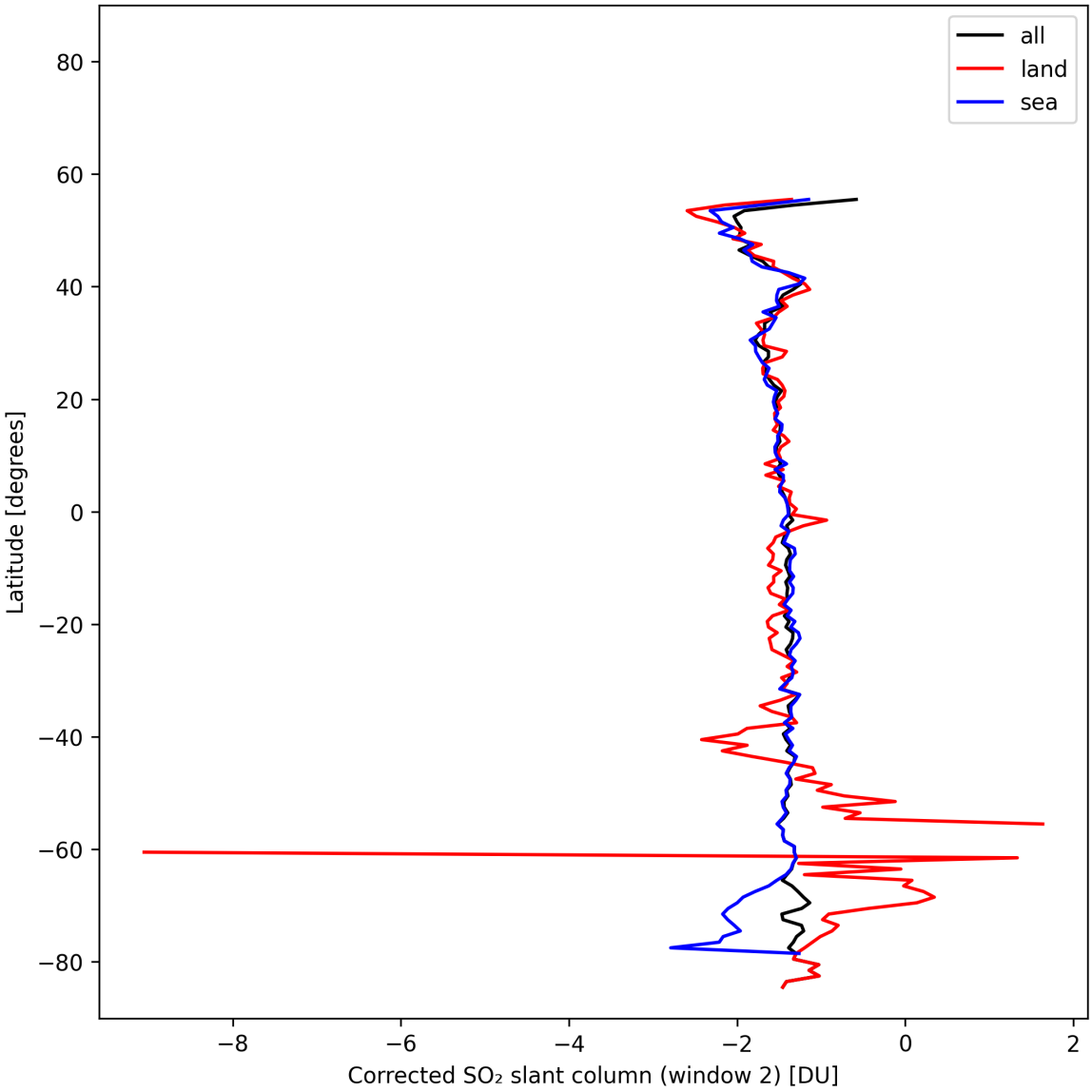

Figure 42: Zonal average of "Corrected SO_2 slant column (window 2)" for 2025-02-10 to 2025-02-11.

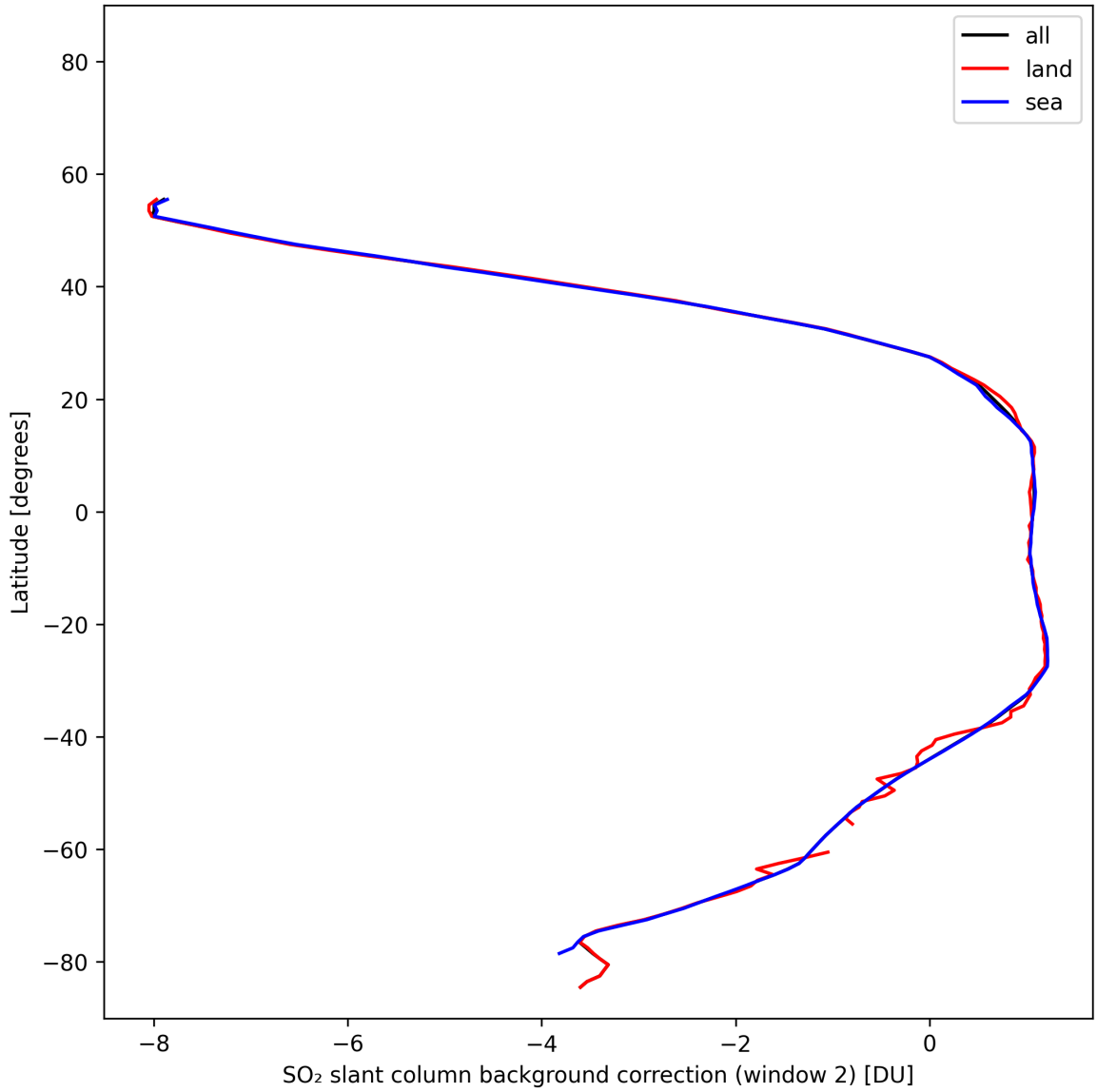

Figure 43: Zonal average of "SO_2 slant column background correction (window 2)" for 2025-02-10 to 2025-02-11.

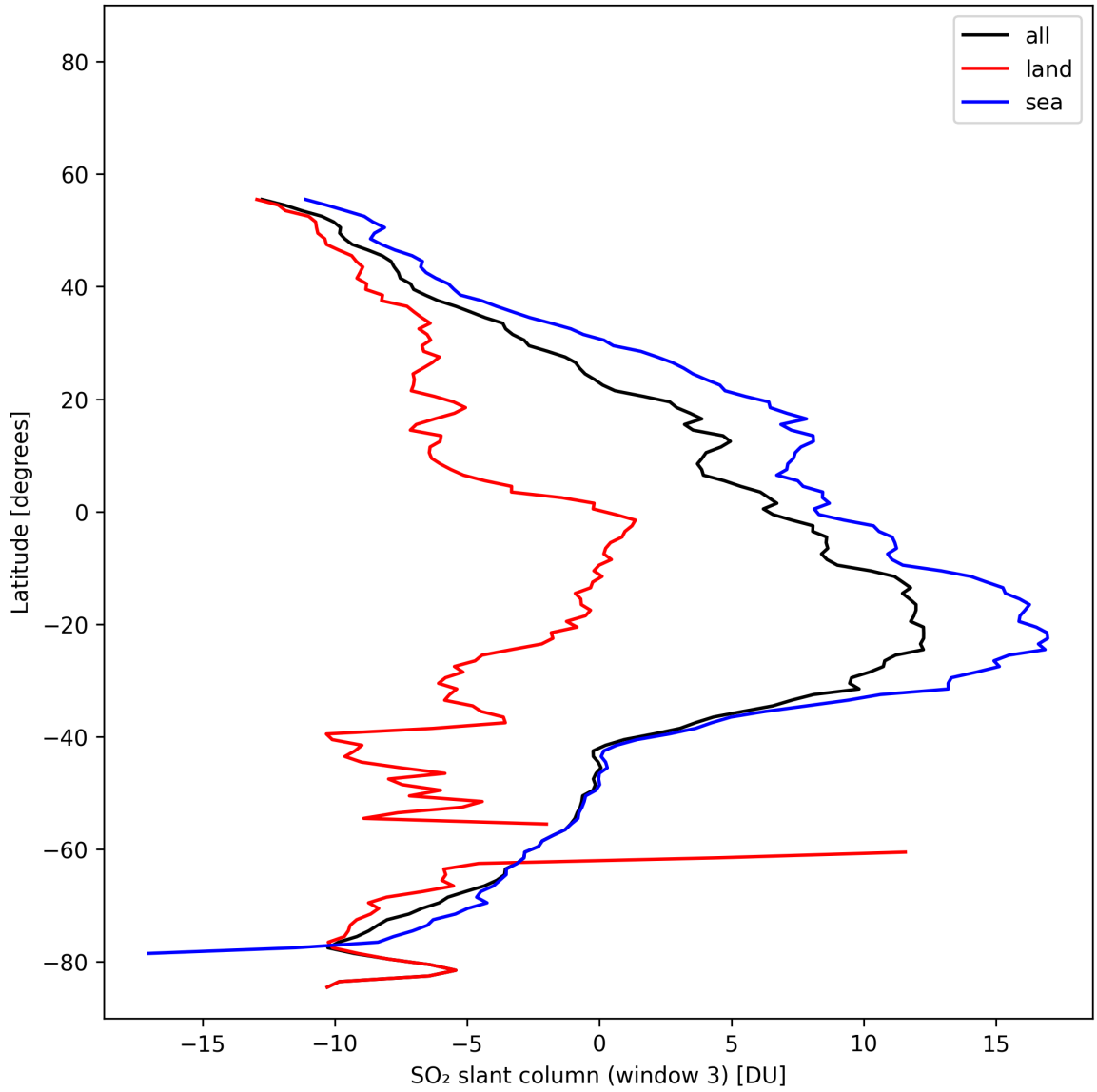

Figure 44: Zonal average of "SO_2 slant column (window 3)" for 2025-02-10 to 2025-02-11.

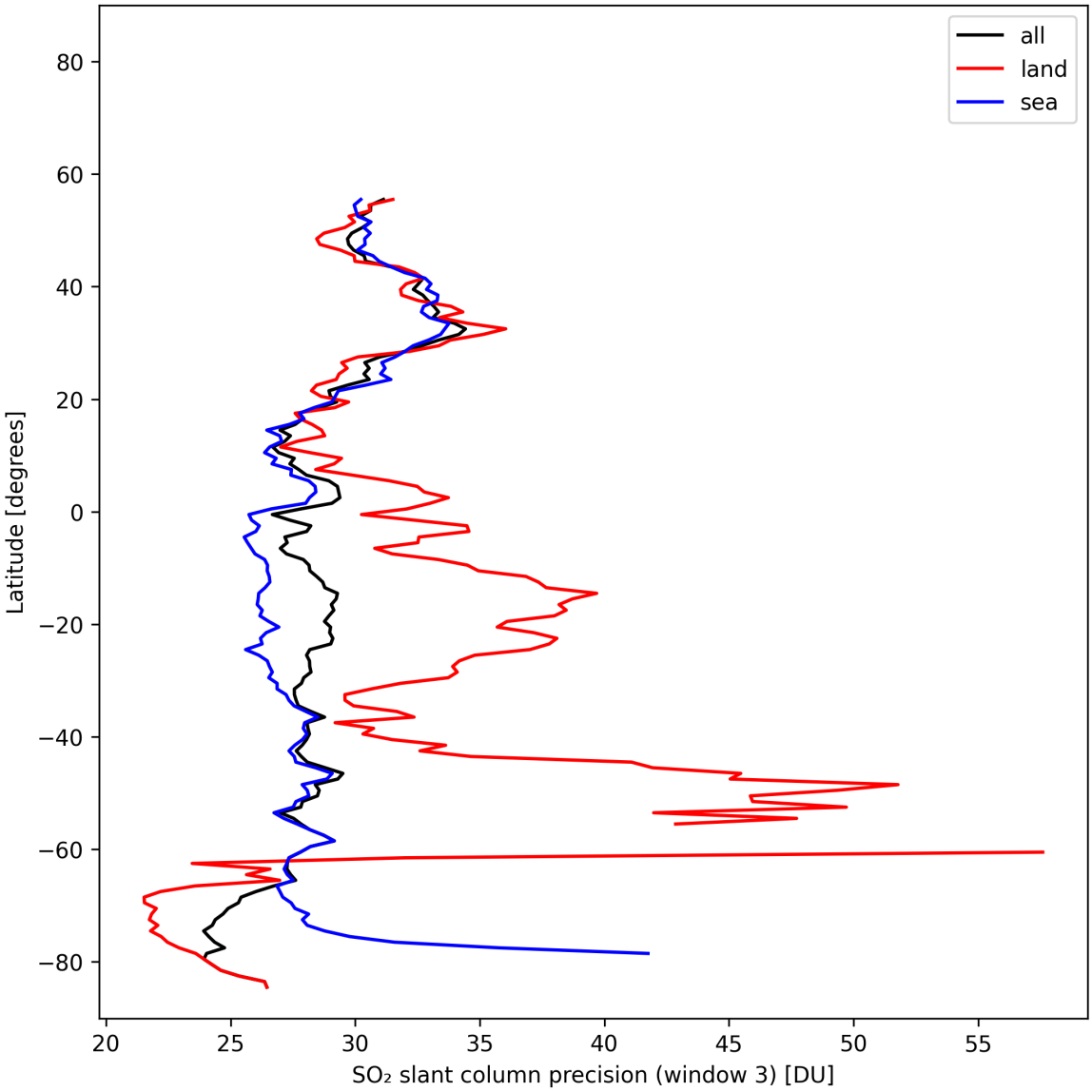

Figure 45: Zonal average of "SO_2 slant column precision (window 3)" for 2025-02-10 to 2025-02-11.

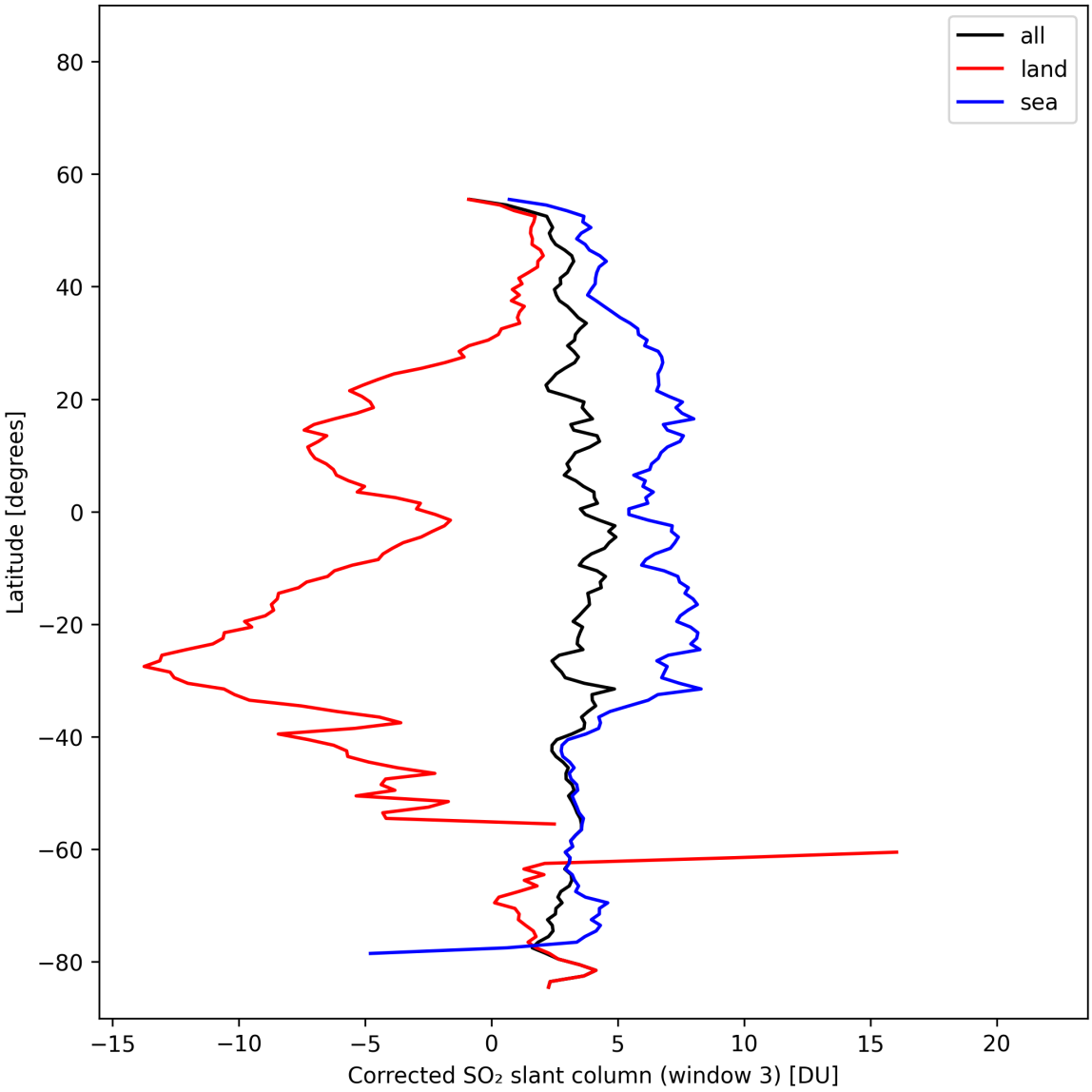

Figure 46: Zonal average of "Corrected SO_2 slant column (window 3)" for 2025-02-10 to 2025-02-11.

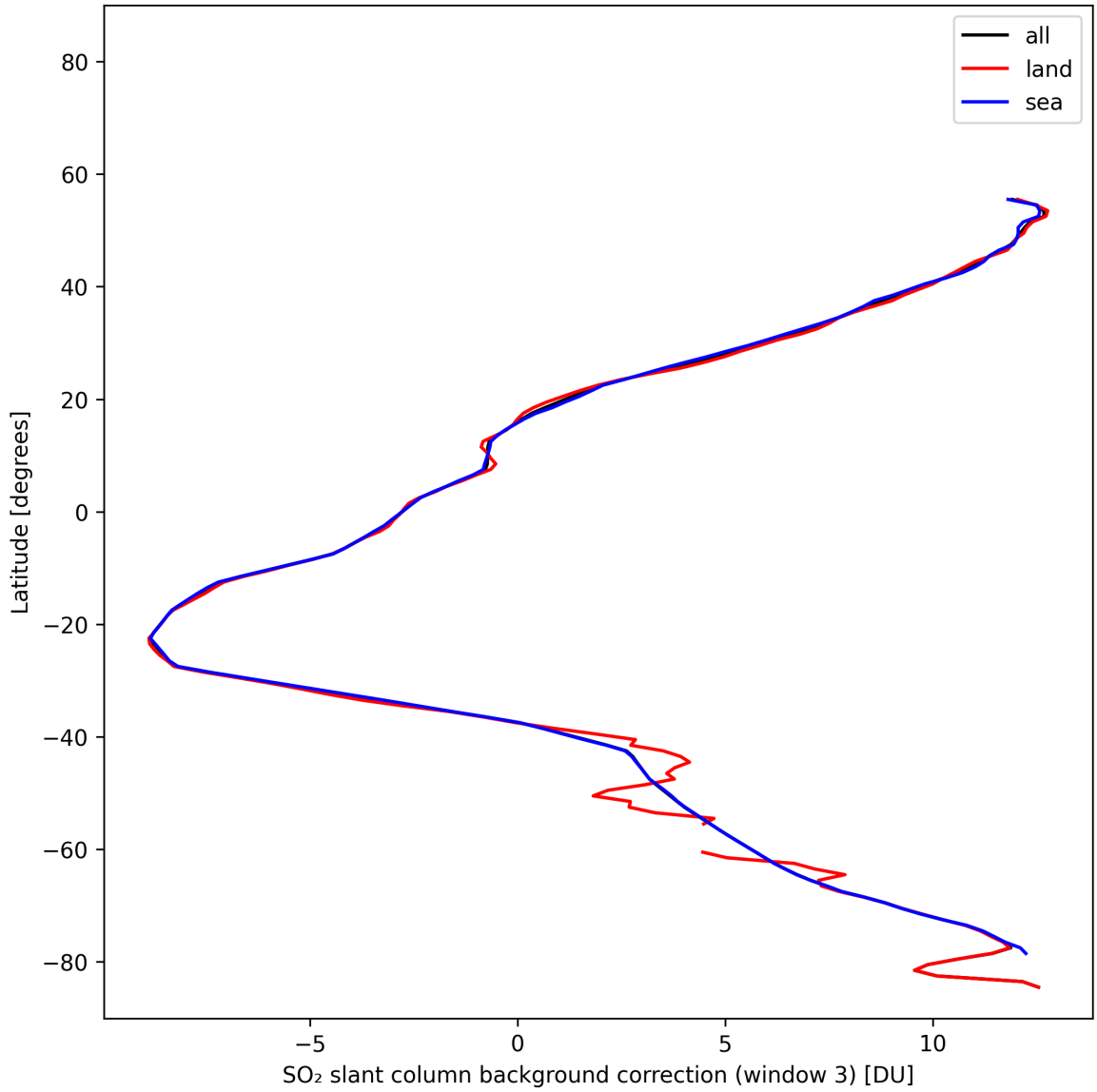

Figure 47: Zonal average of "SO_2 slant column background correction (window 3)" for 2025-02-10 to 2025-02-11.

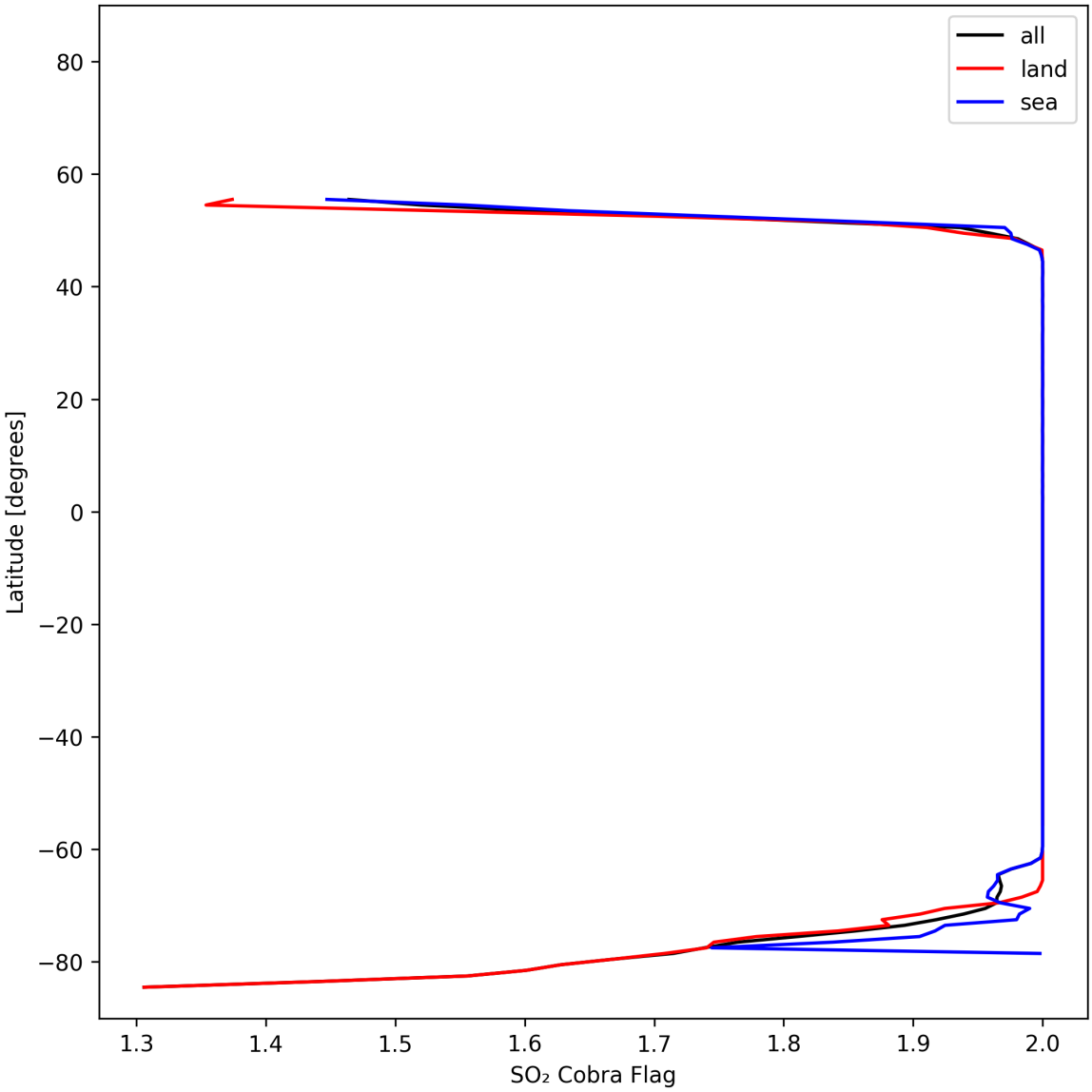

Figure 48: Zonal average of "SO_2 Cobra Flag" for 2025-02-10 to 2025-02-11.

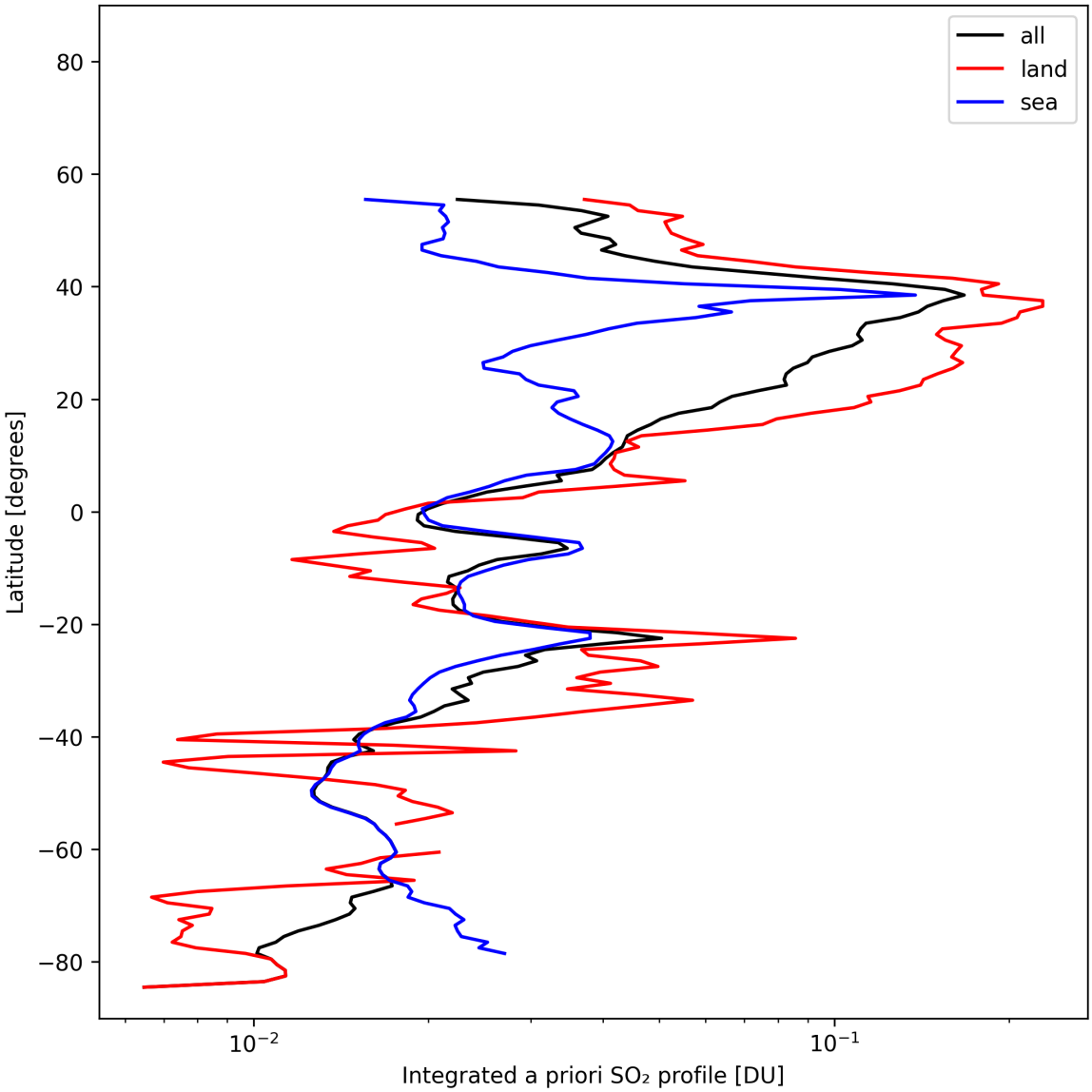

Figure 49: Zonal average of “Integrated a priori SO_2 profile” for 2025-02-10 to 2025-02-11.

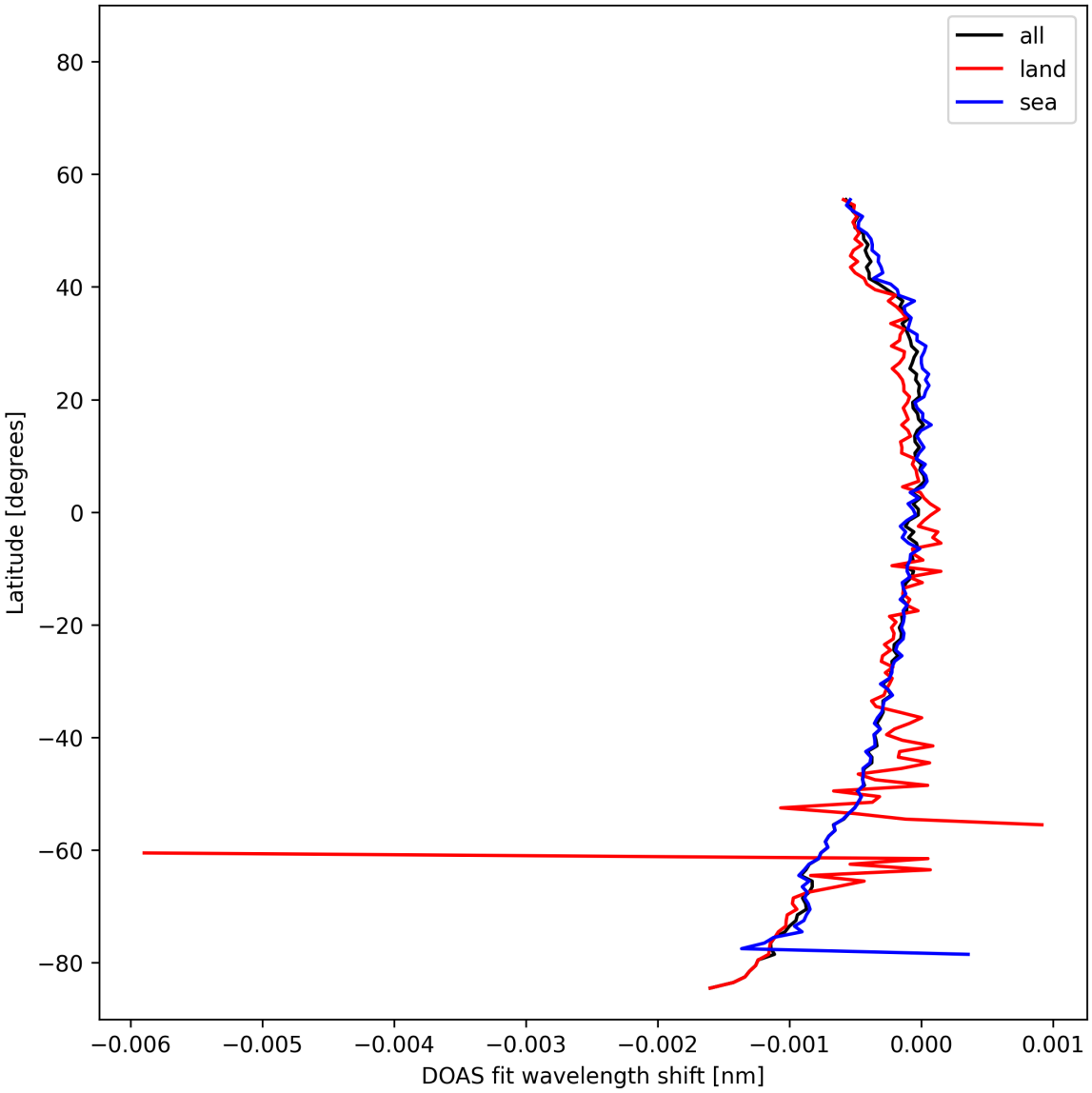

Figure 50: Zonal average of “DOAS fit wavelength shift” for 2025-02-10 to 2025-02-11.

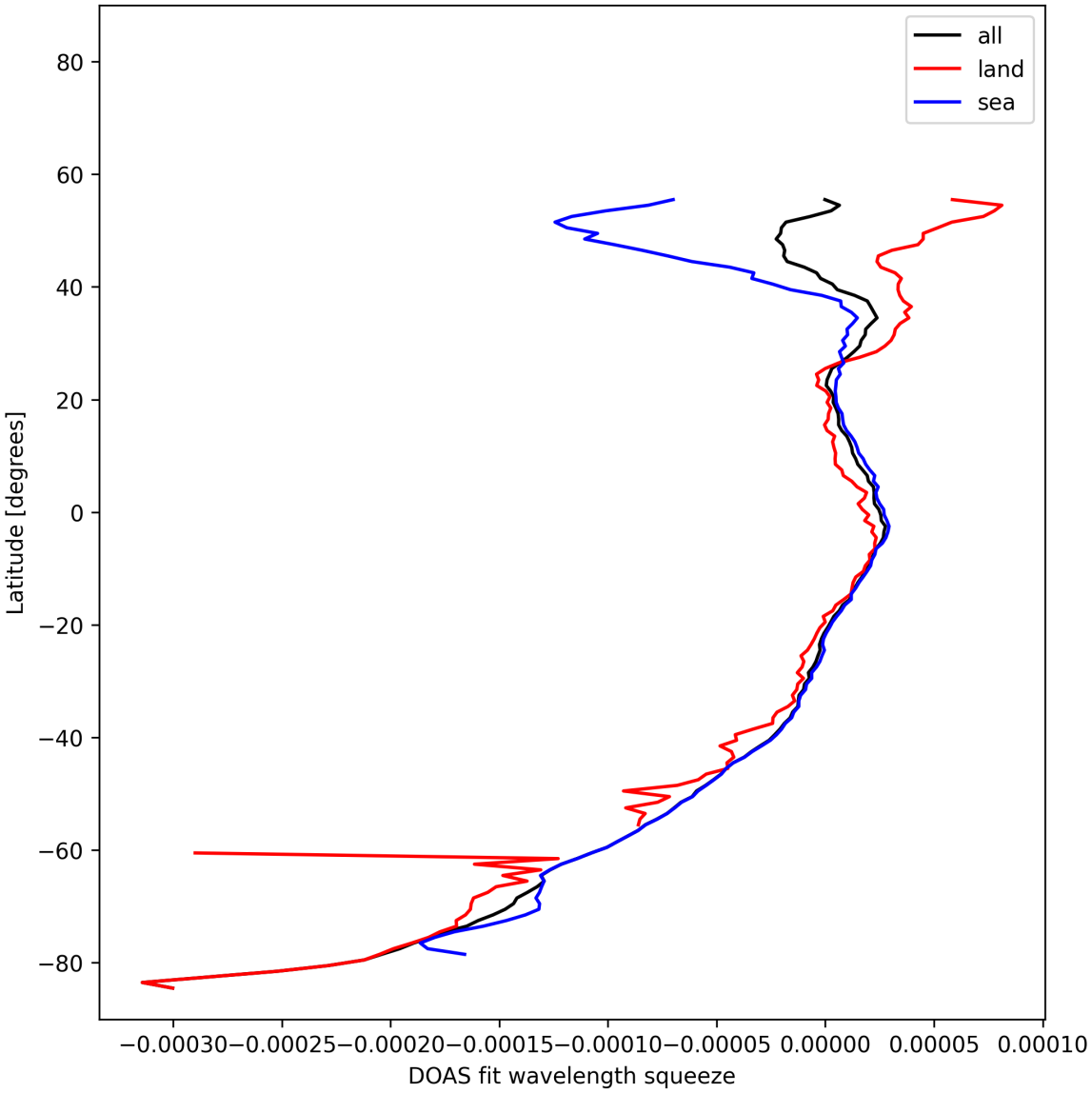

Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-02-10 to 2025-02-11.

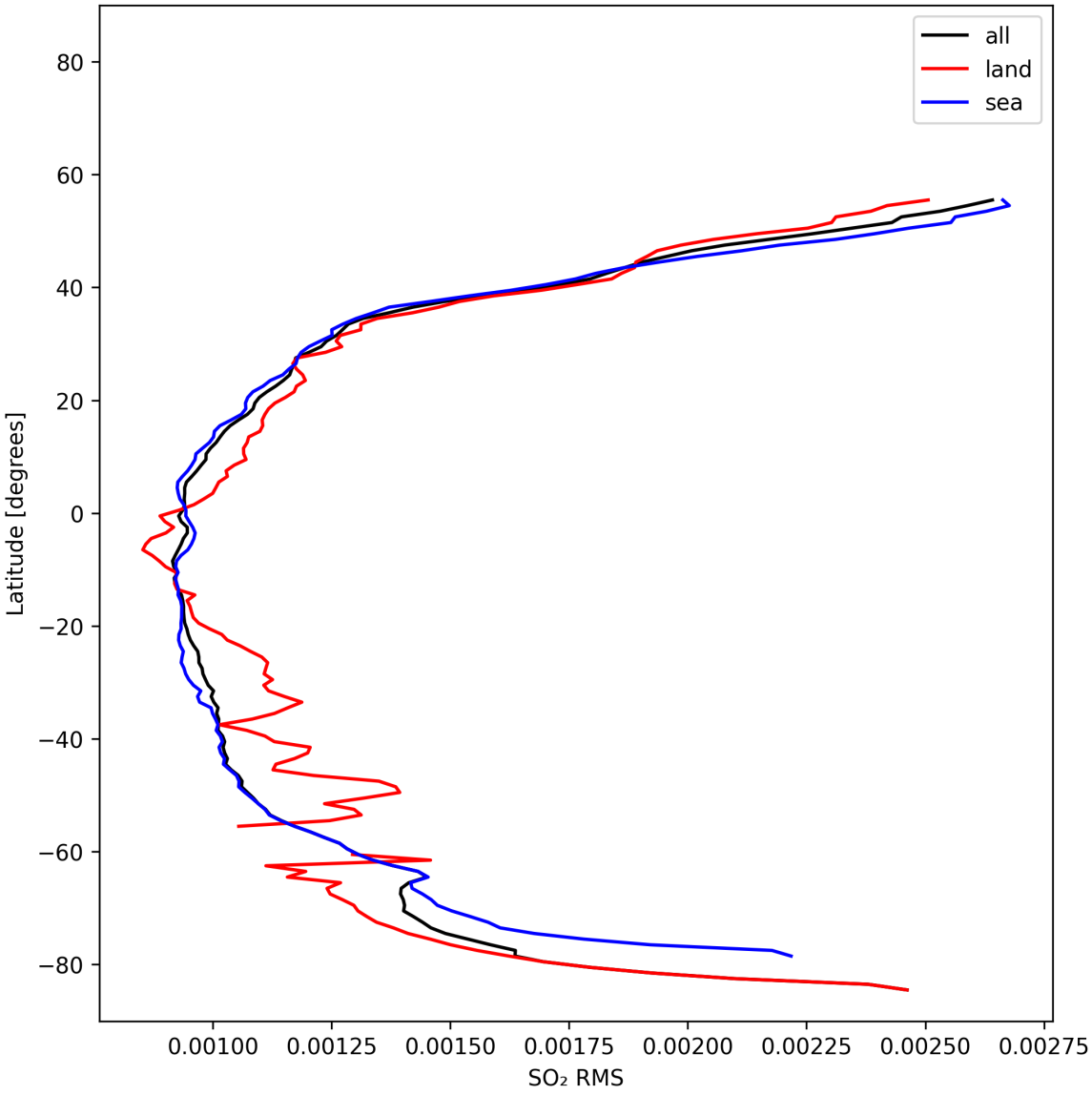

Figure 52: Zonal average of "SO_2 RMS" for 2025-02-10 to 2025-02-11.

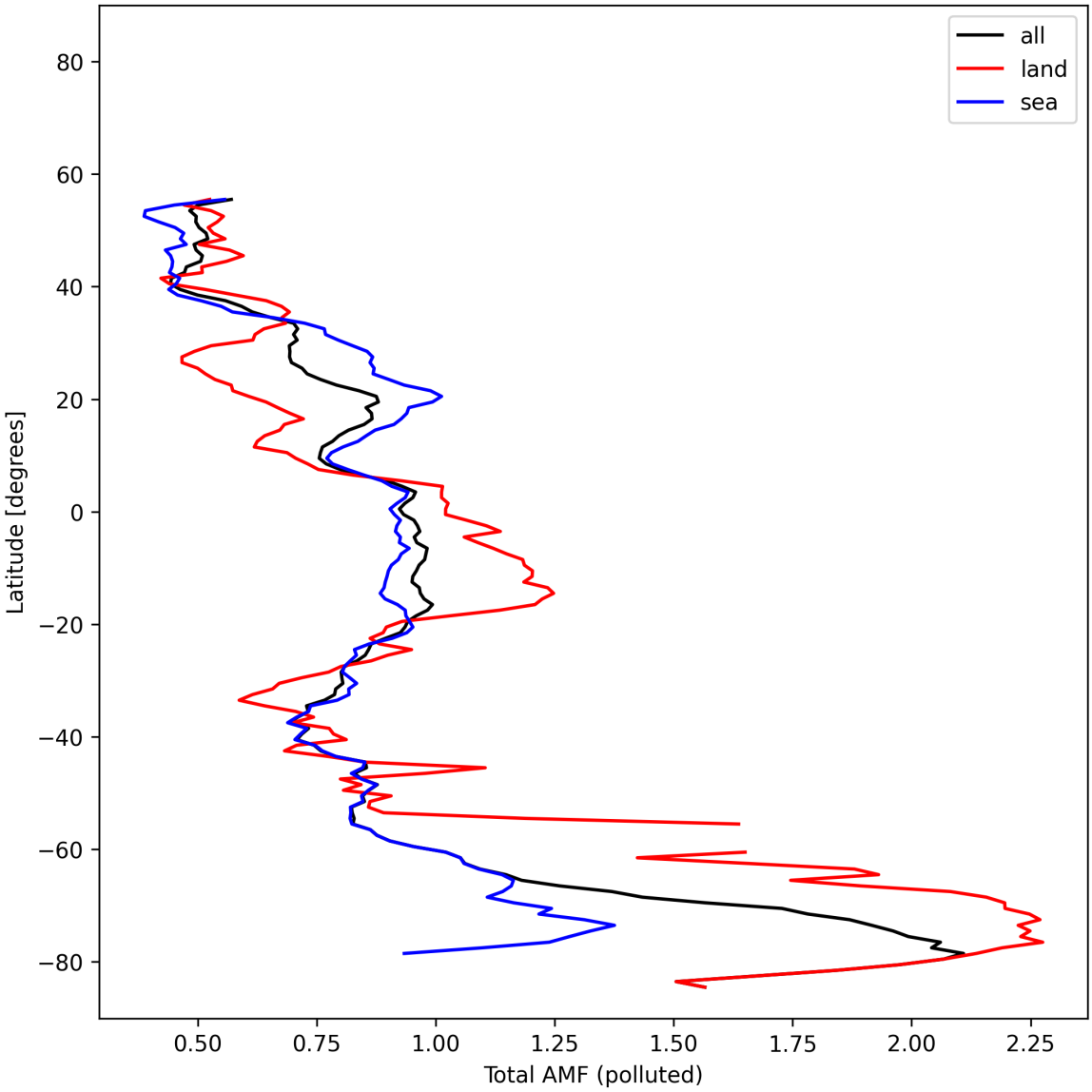

Figure 53: Zonal average of “Total AMF (polluted)” for 2025-02-10 to 2025-02-11.

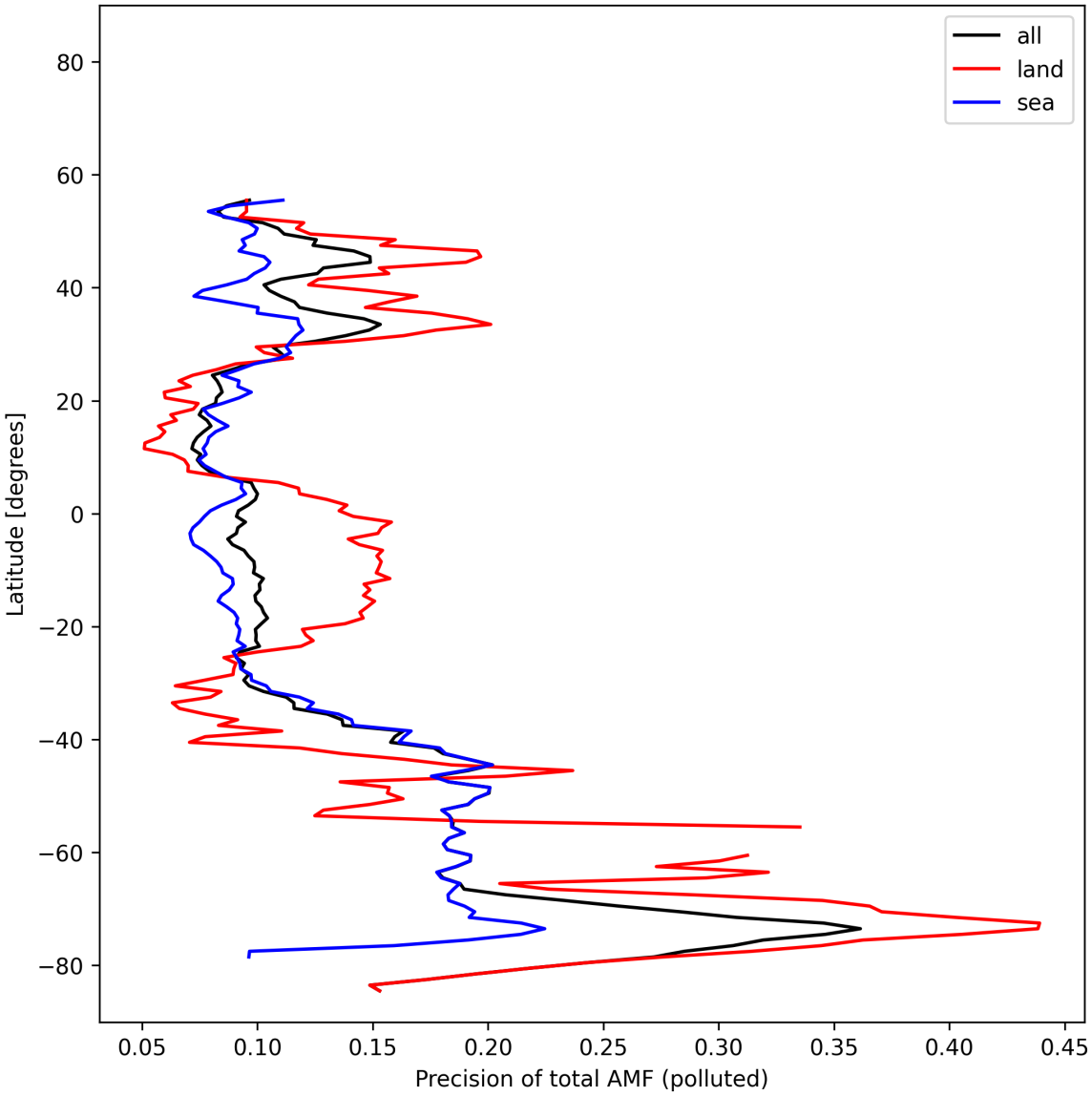

Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-02-10 to 2025-02-11.

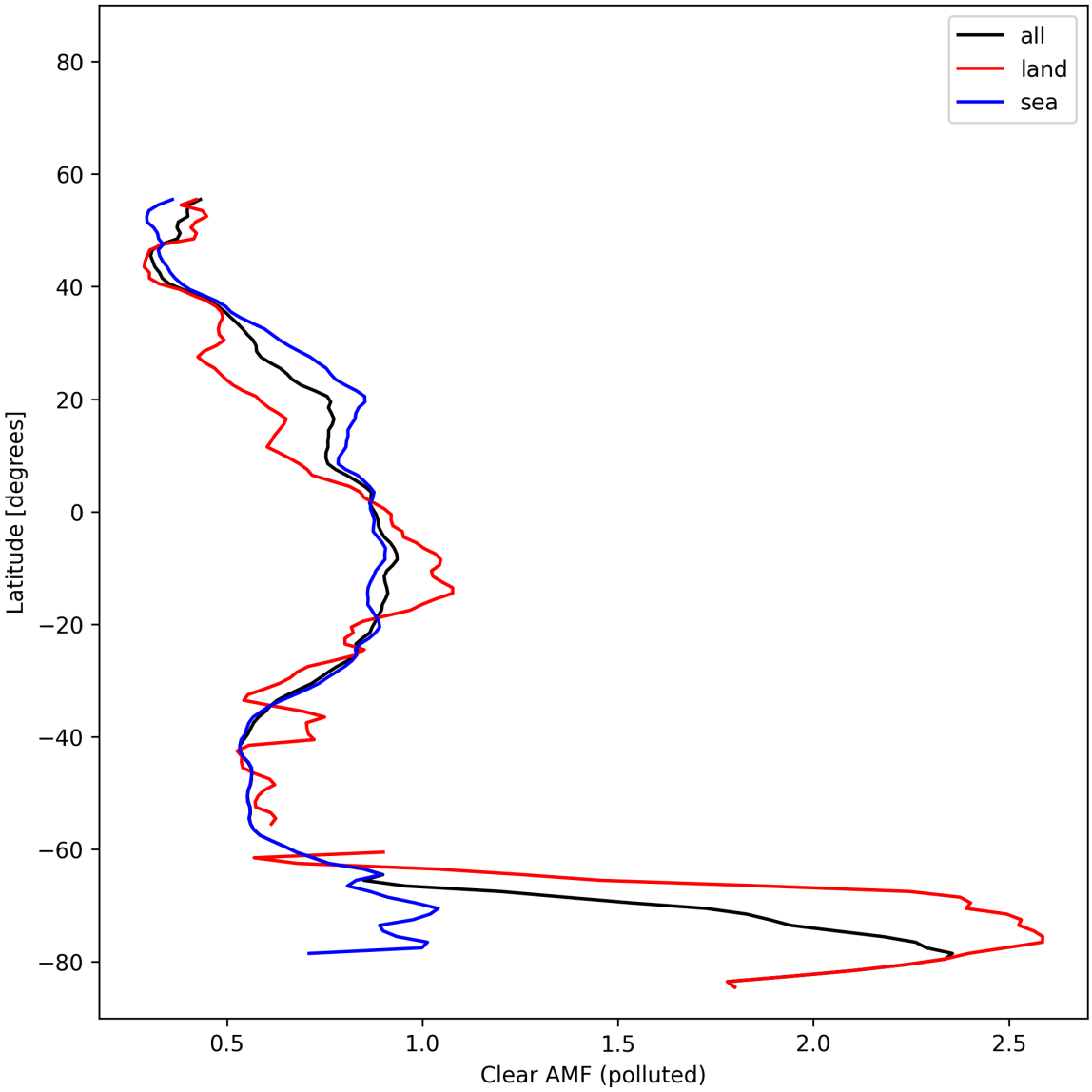

Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-02-10 to 2025-02-11.

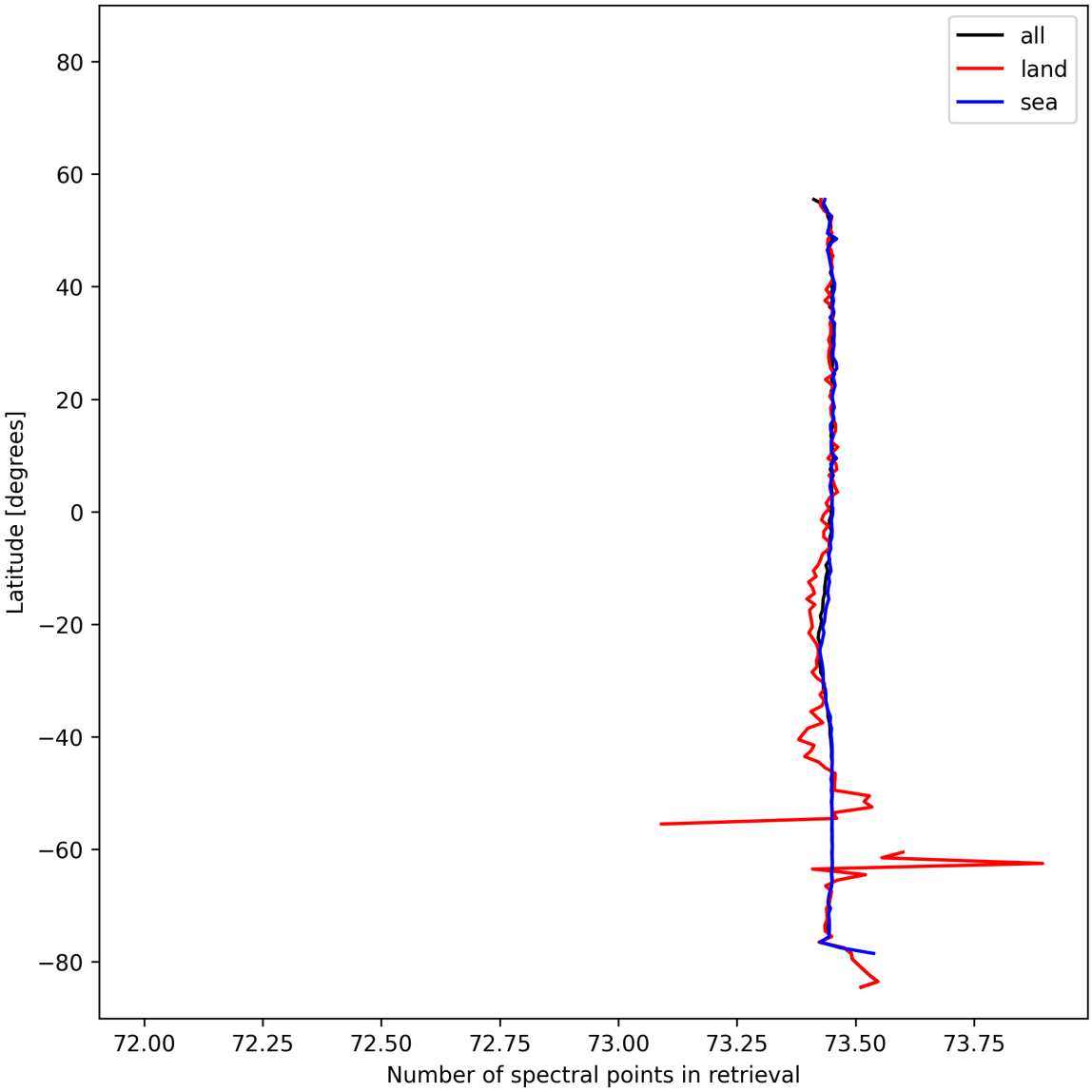

Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-02-10 to 2025-02-11.

8 Histograms

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

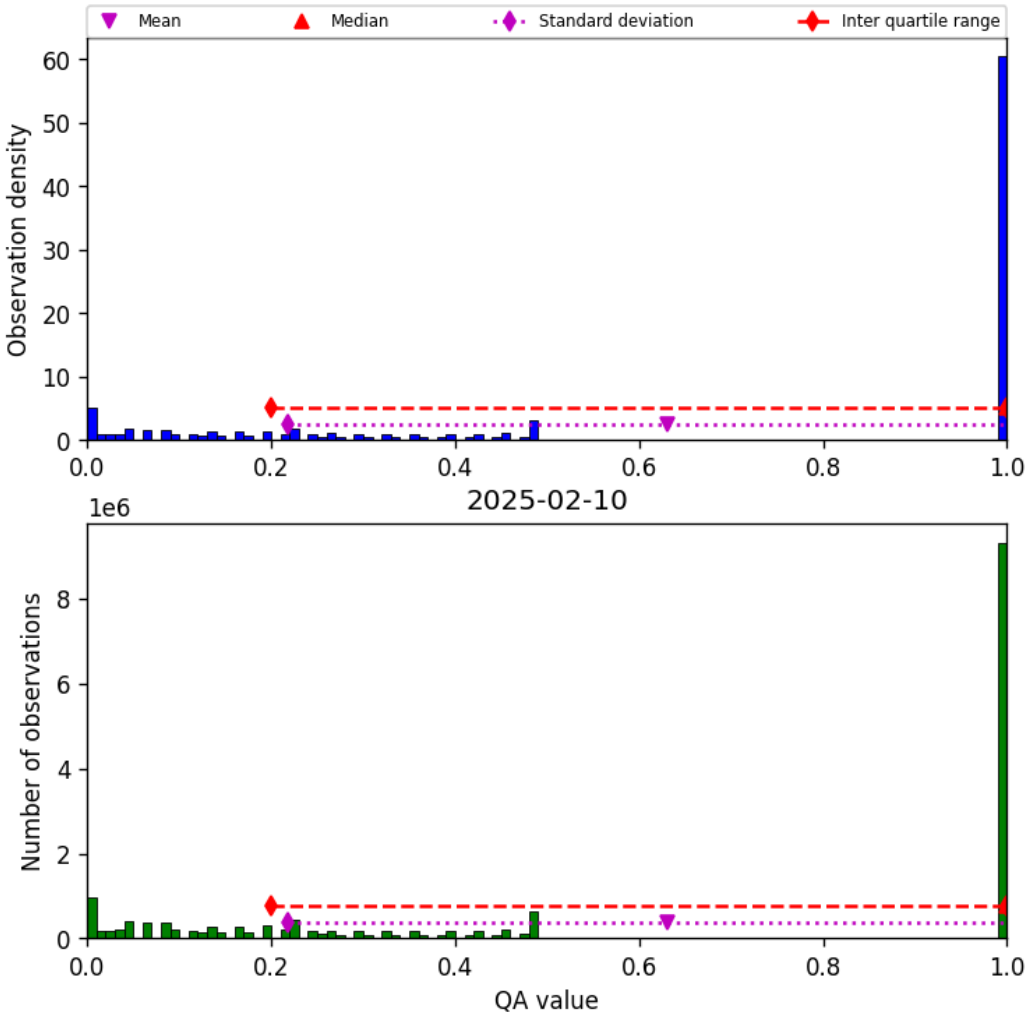

Figure 57: Histogram of “QA value” for 2025-02-10 to 2025-02-11

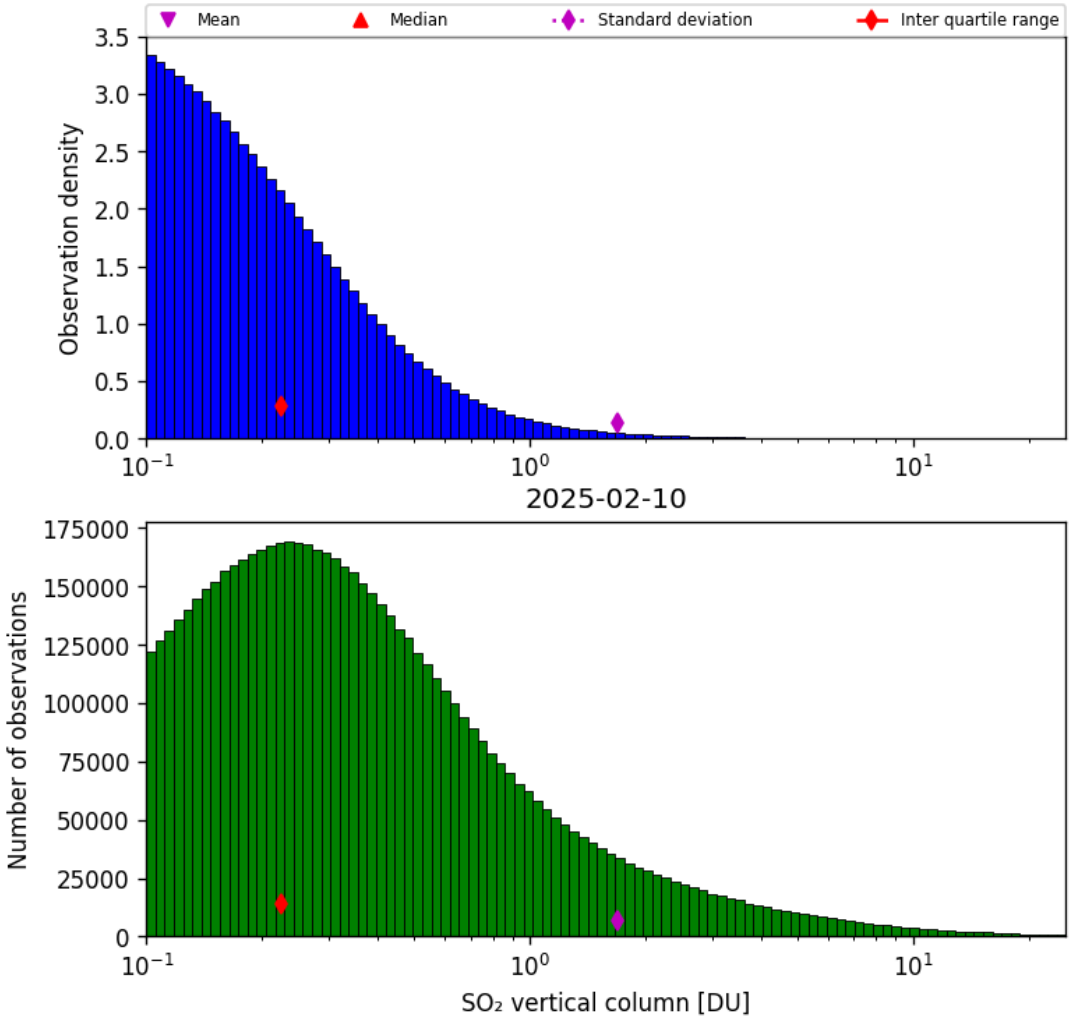

Figure 58: Histogram of "SO_2 vertical column" for 2025-02-10 to 2025-02-11

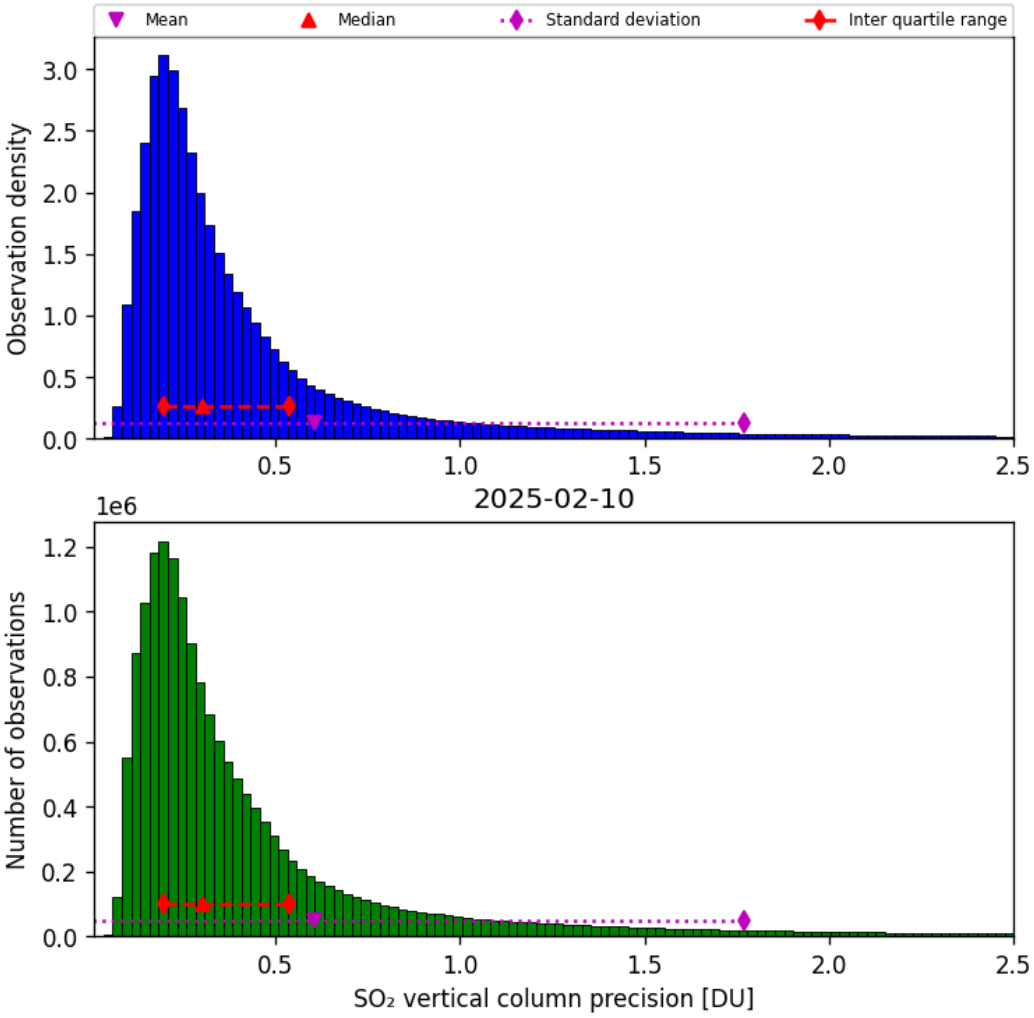

Figure 59: Histogram of "SO_2 vertical column precision" for 2025-02-10 to 2025-02-11

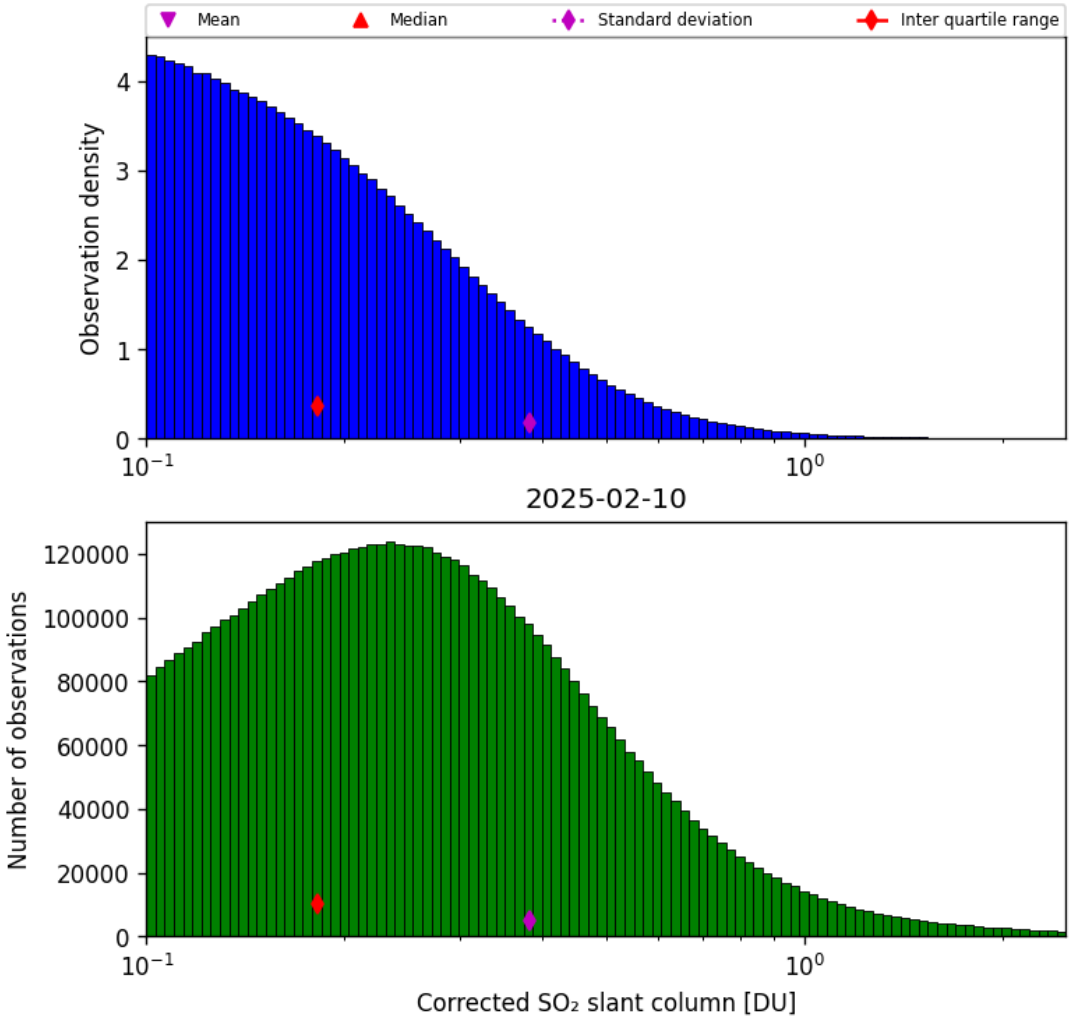

Figure 60: Histogram of "Corrected SO_2 slant column" for 2025-02-10 to 2025-02-11

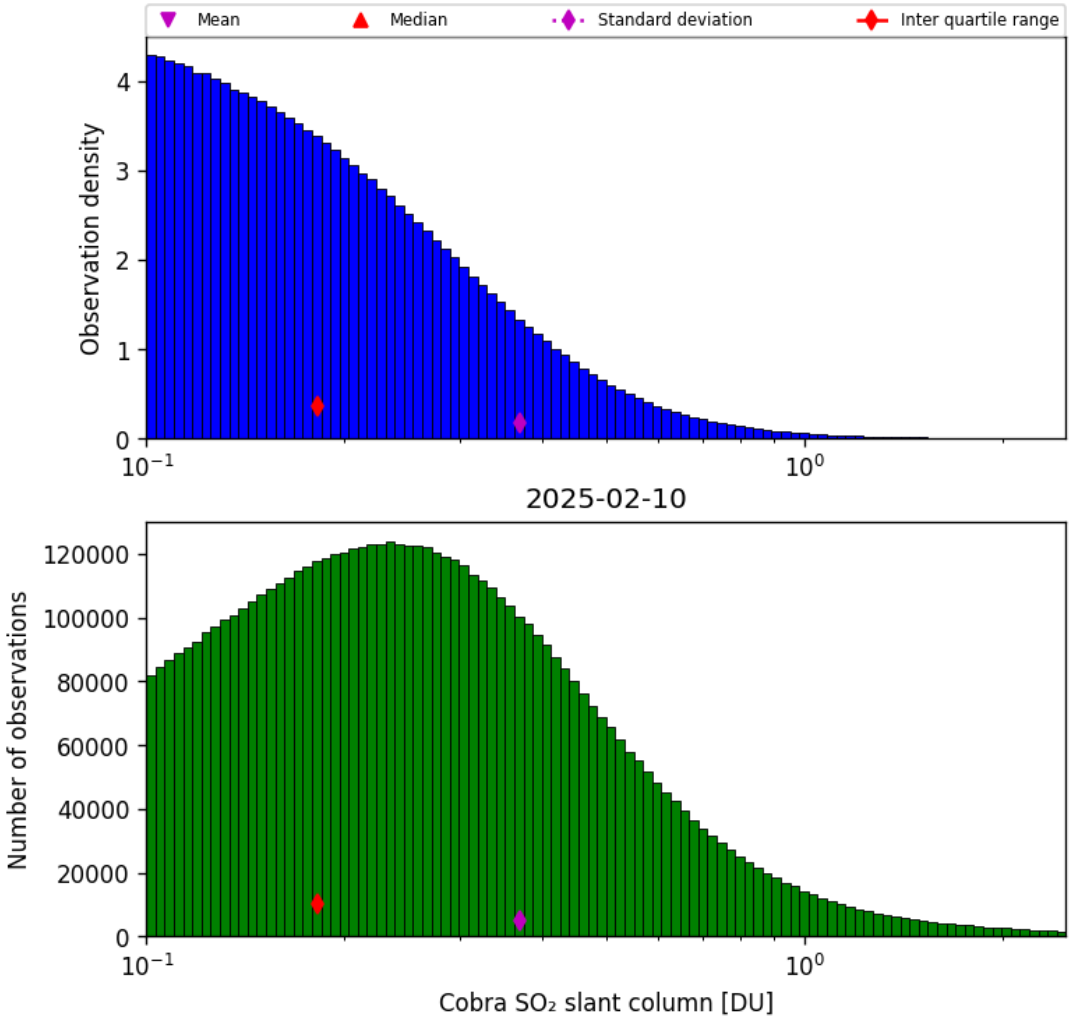

Figure 61: Histogram of "Cobra SO_2 slant column" for 2025-02-10 to 2025-02-11

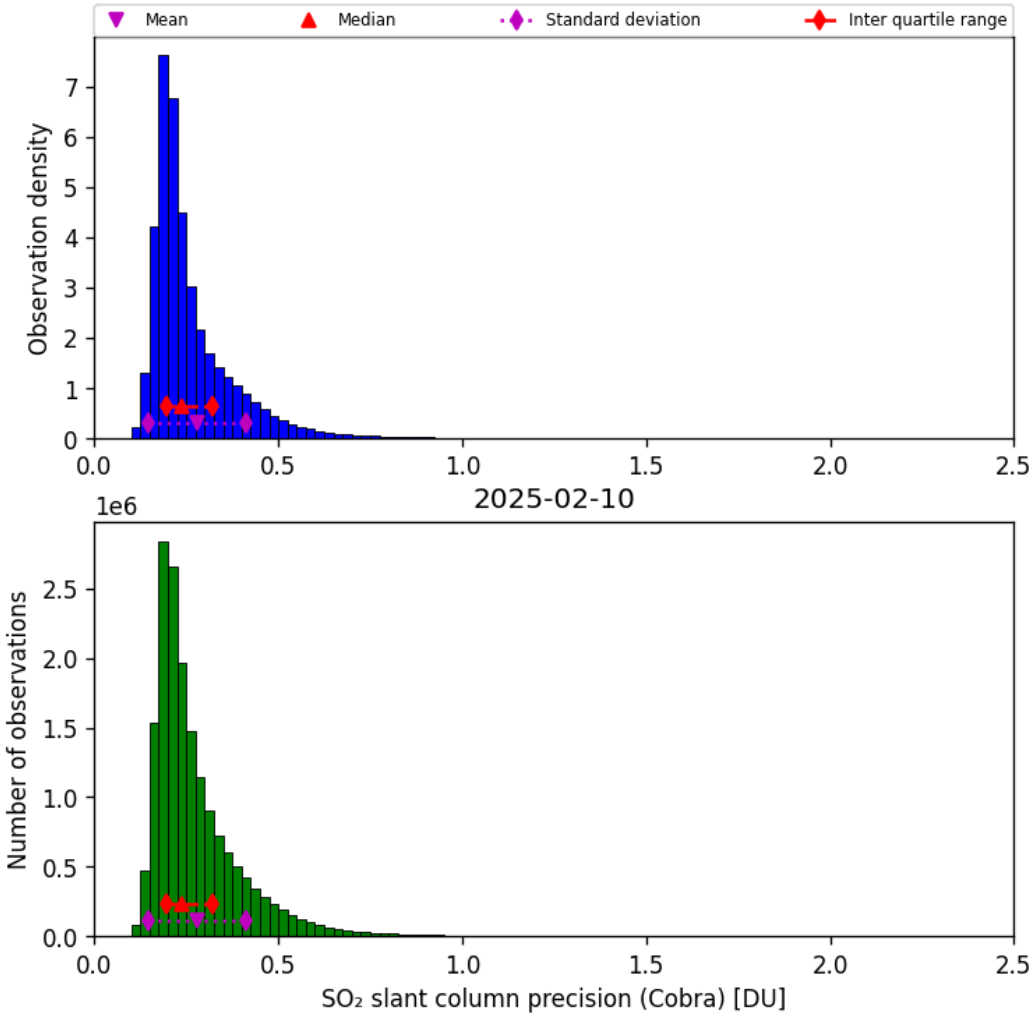

Figure 62: Histogram of "SO_2 slant column precision (Cobra)" for 2025-02-10 to 2025-02-11

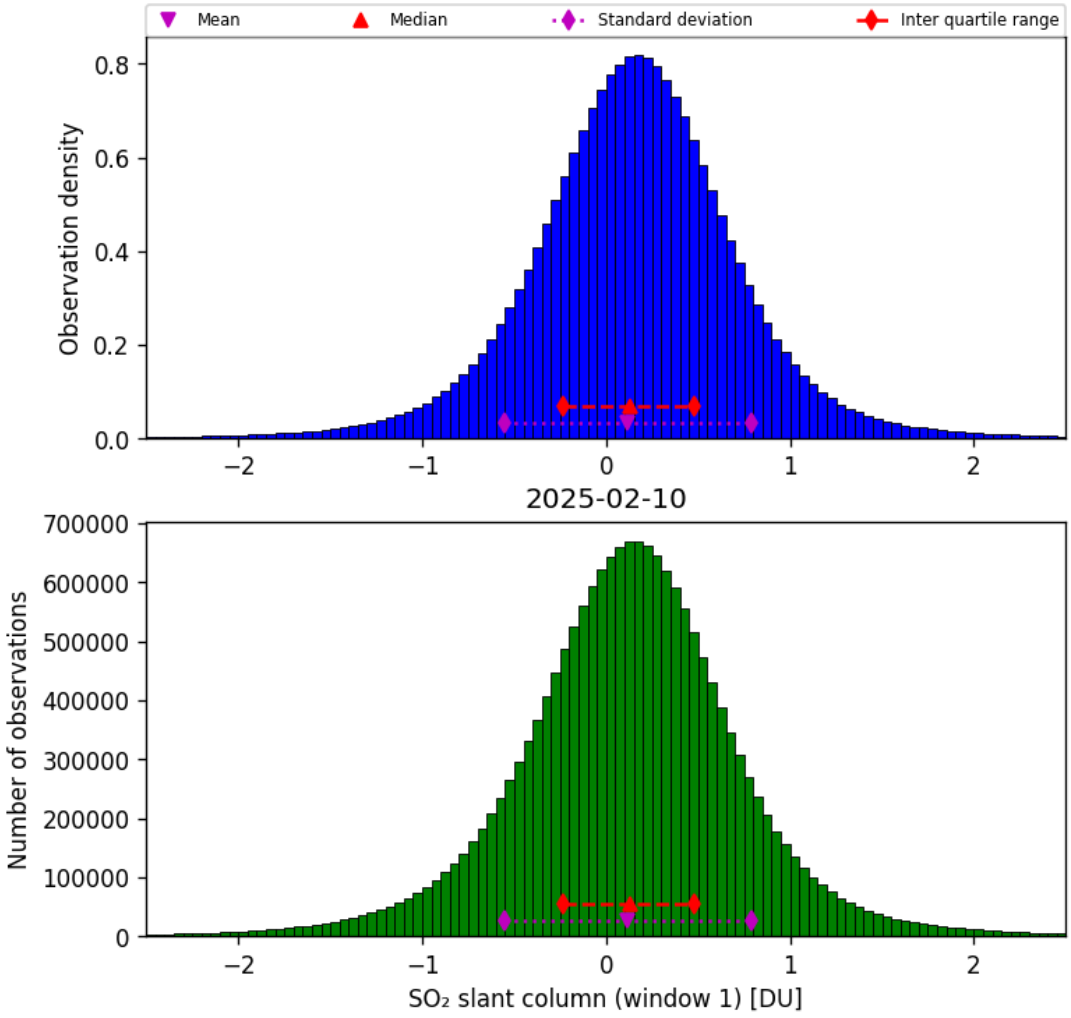

Figure 63: Histogram of "SO_2 slant column (window 1)" for 2025-02-10 to 2025-02-11

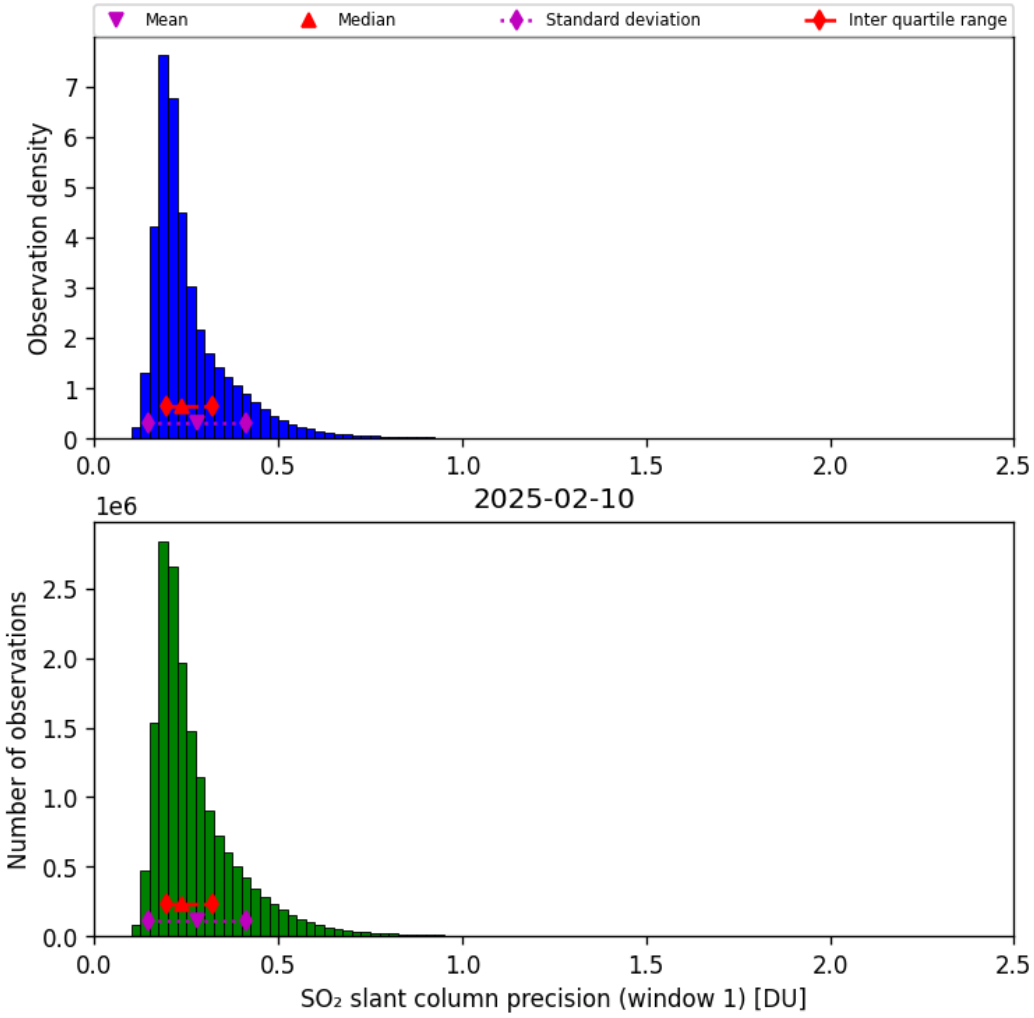

Figure 64: Histogram of "SO_2 slant column precision (window 1)" for 2025-02-10 to 2025-02-11

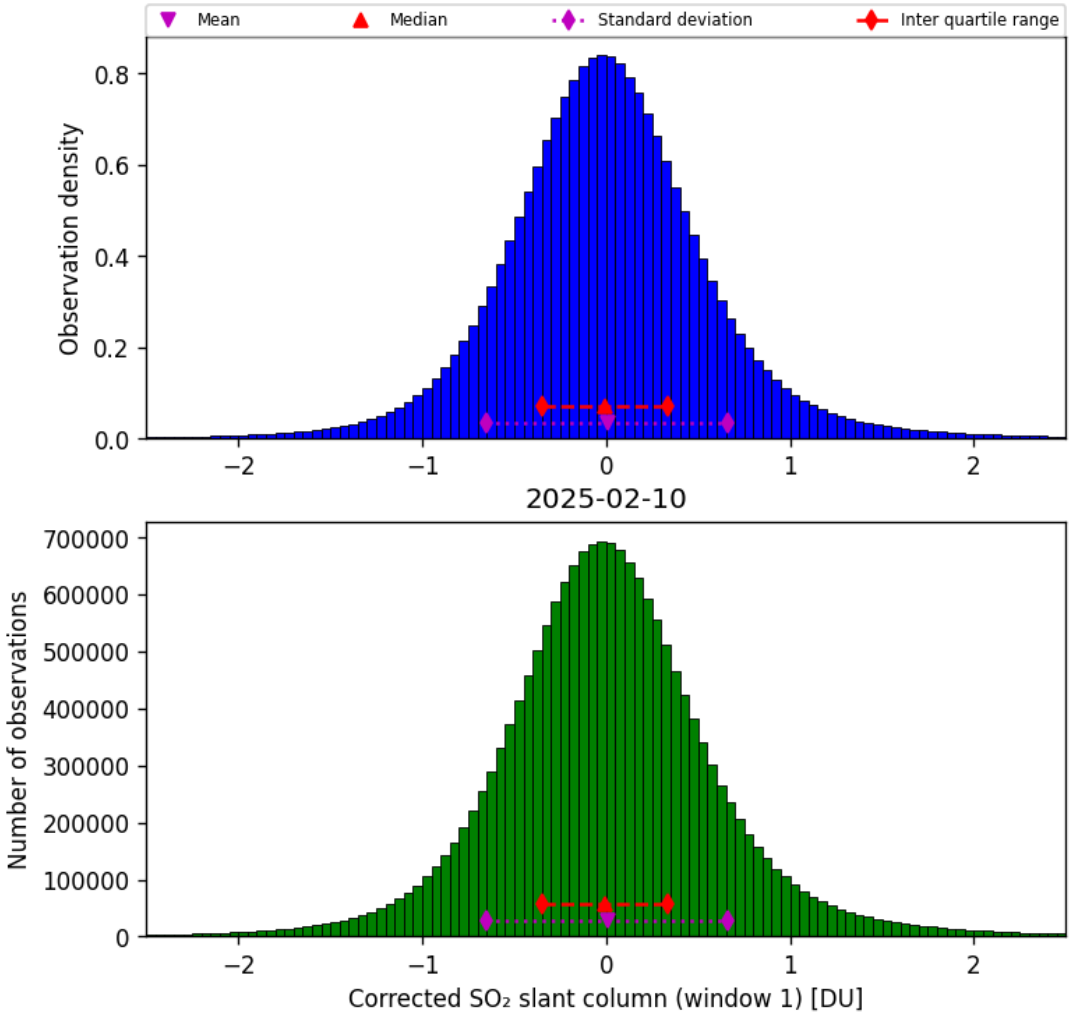

Figure 65: Histogram of "Corrected SO_2 slant column (window 1)" for 2025-02-10 to 2025-02-11

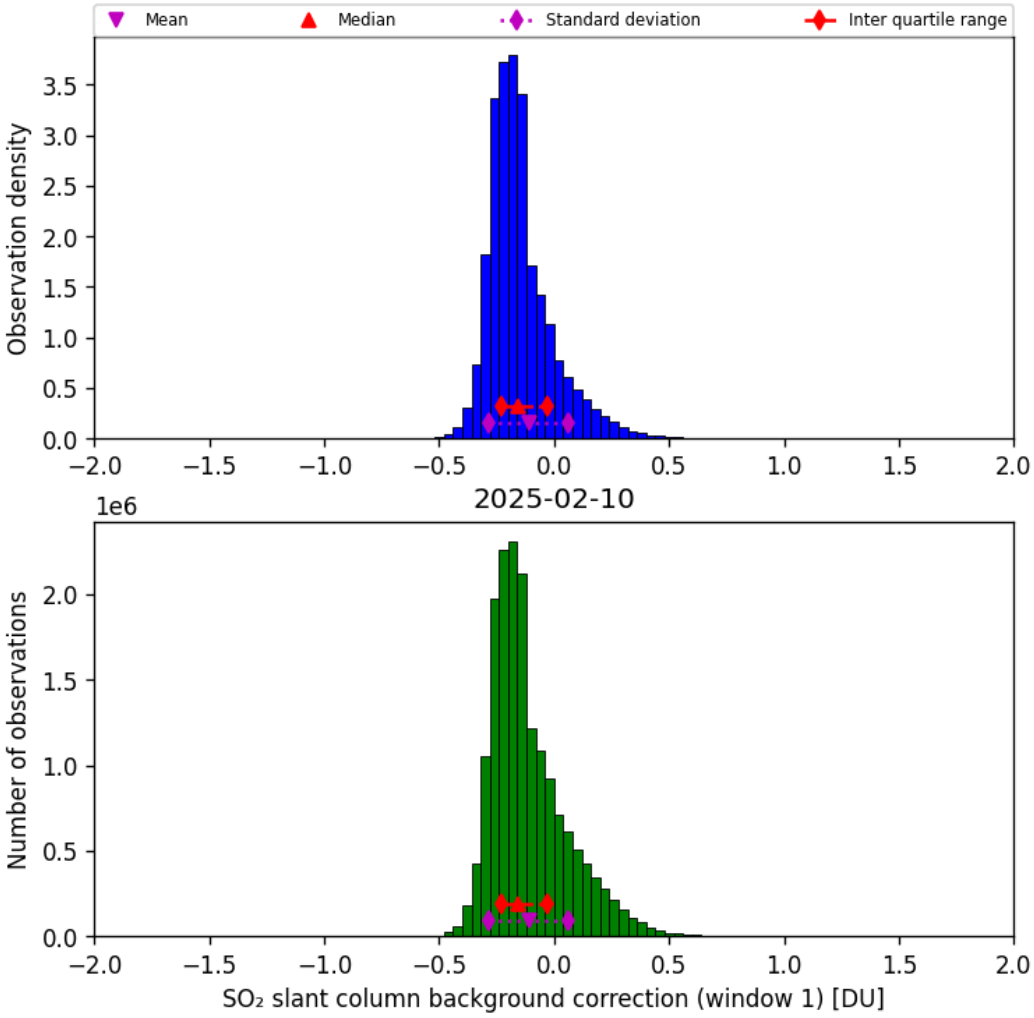

Figure 66: Histogram of "SO_2 slant column background correction (window 1)" for 2025-02-10 to 2025-02-11

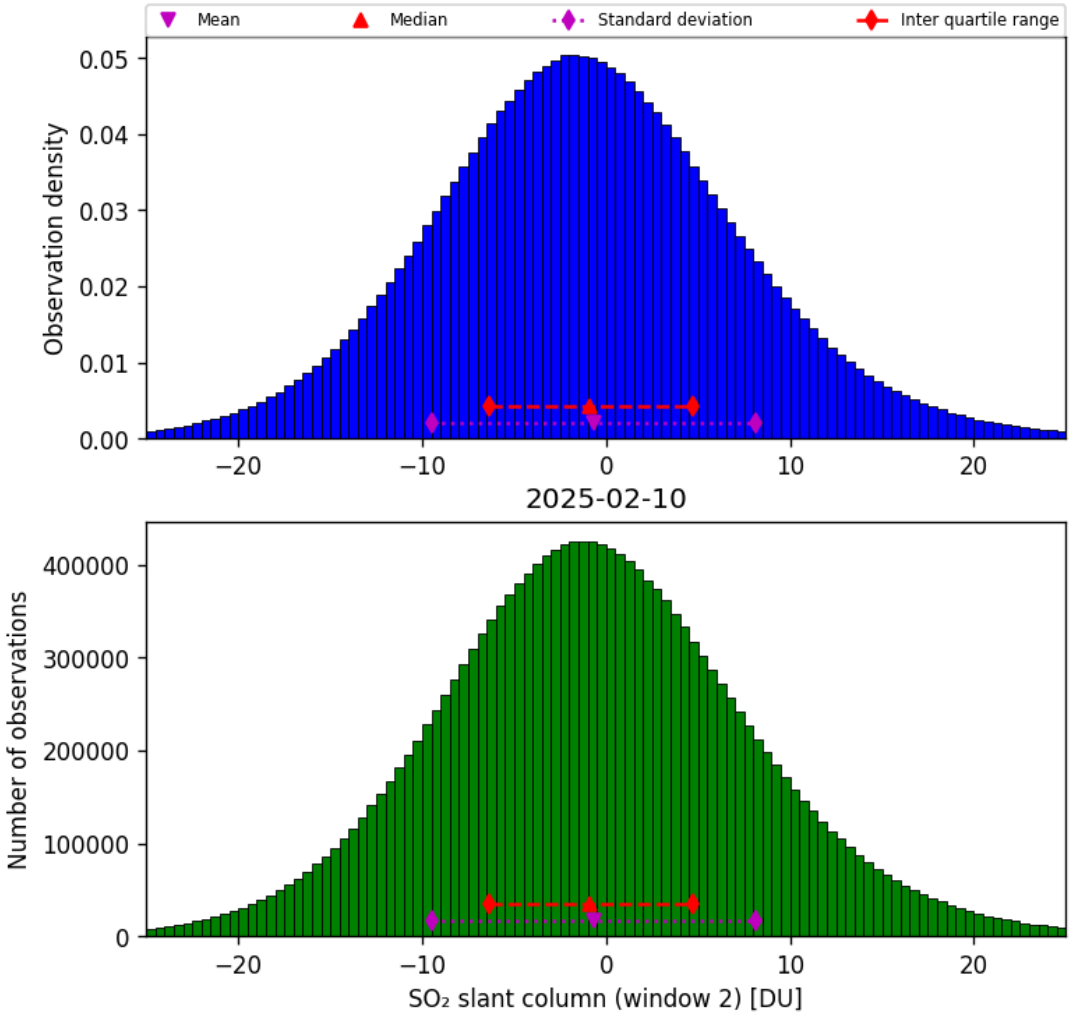

Figure 67: Histogram of "SO_2 slant column (window 2)" for 2025-02-10 to 2025-02-11

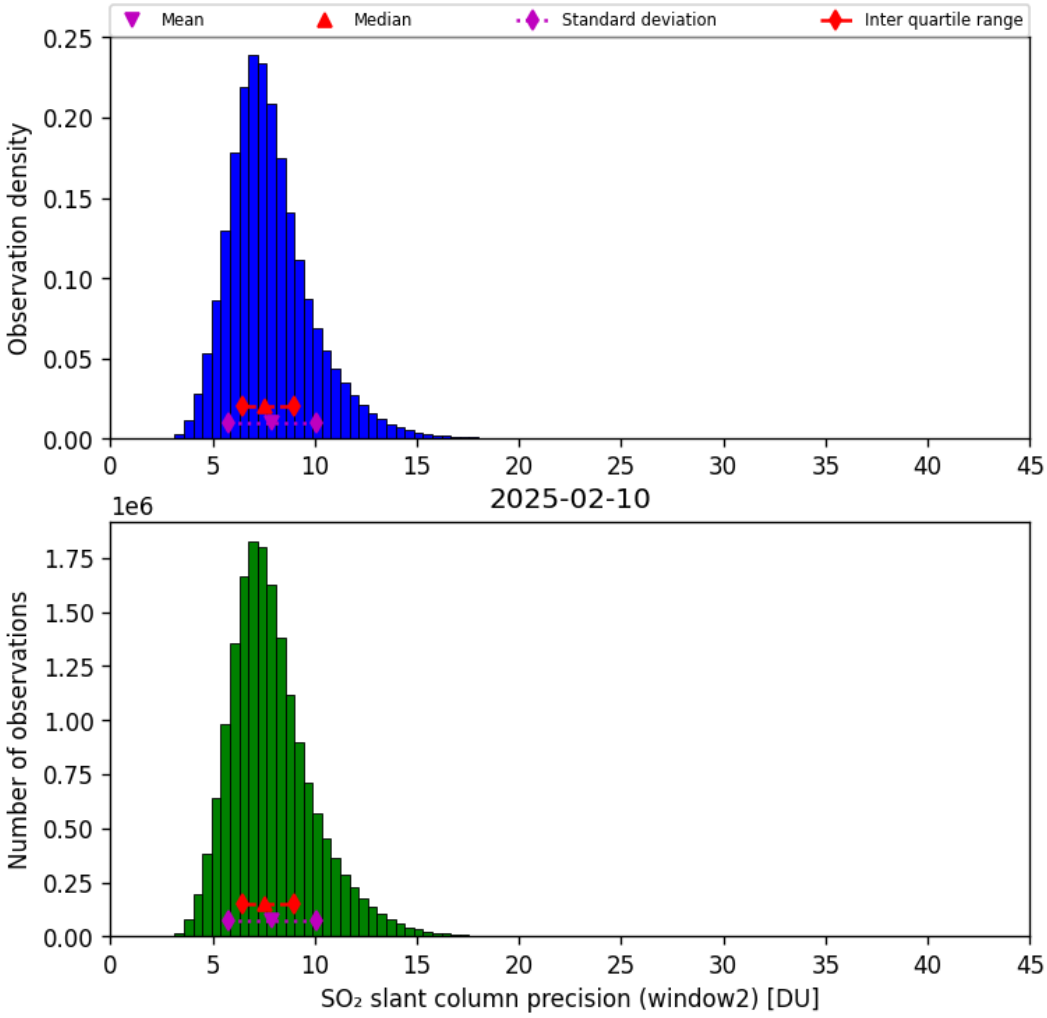

Figure 68: Histogram of "SO_2 slant column precision (window2)" for 2025-02-10 to 2025-02-11

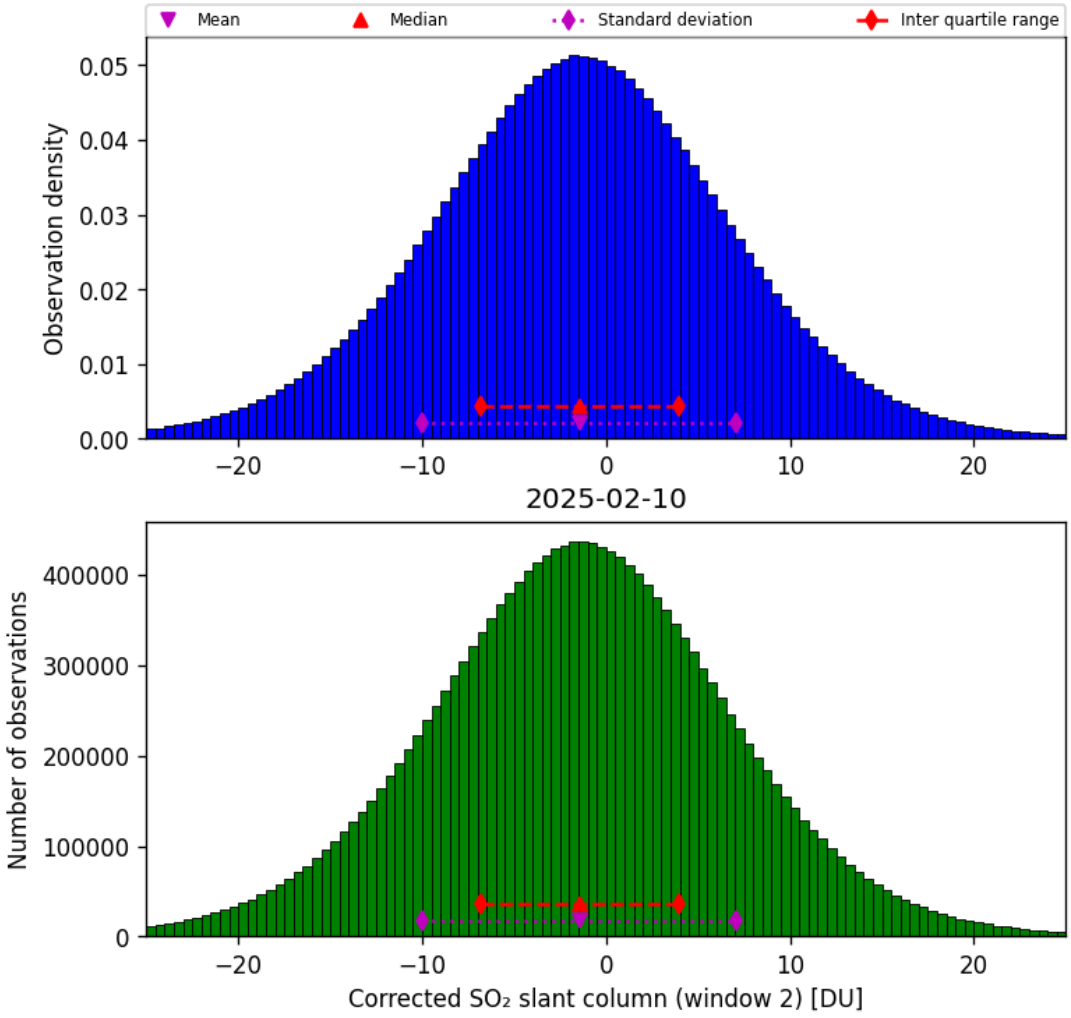

Figure 69: Histogram of "Corrected SO_2 slant column (window 2)" for 2025-02-10 to 2025-02-11

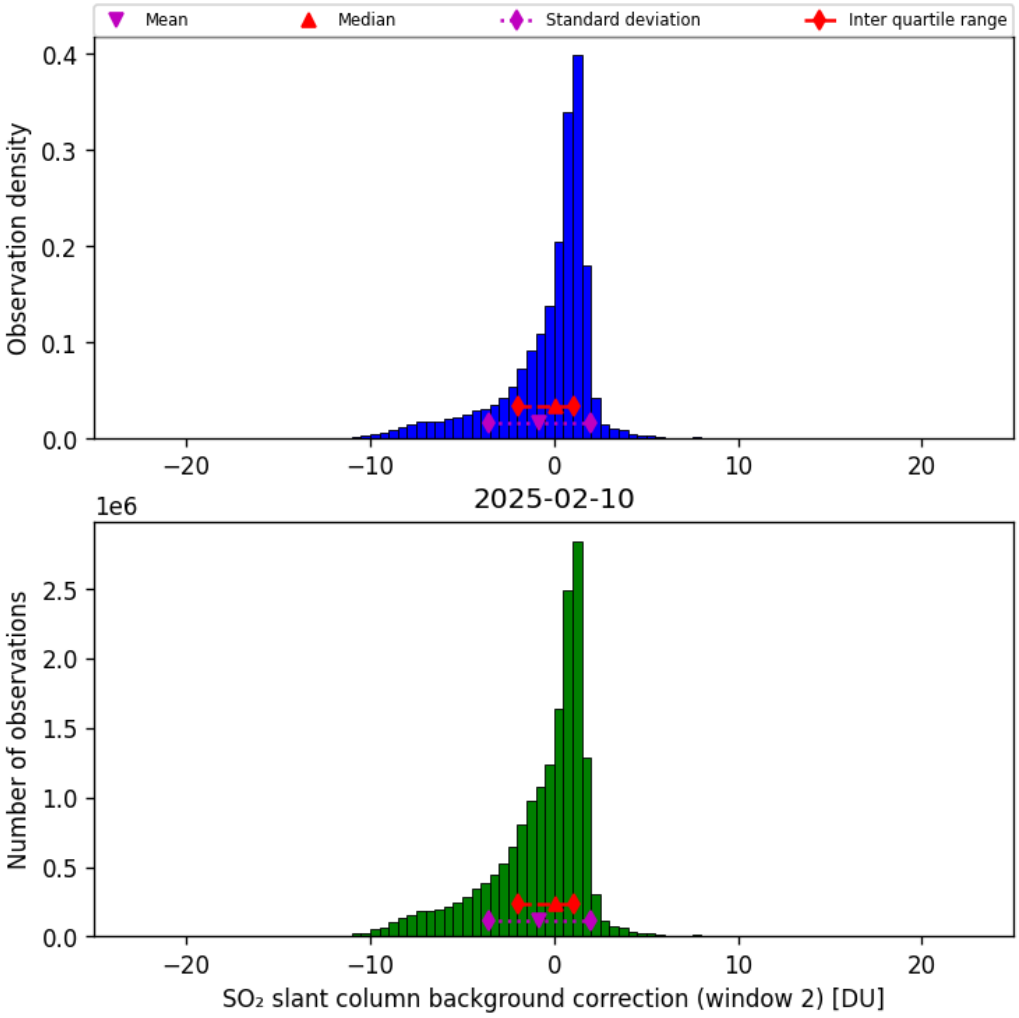

Figure 70: Histogram of "SO_2 slant column background correction (window 2)" for 2025-02-10 to 2025-02-11

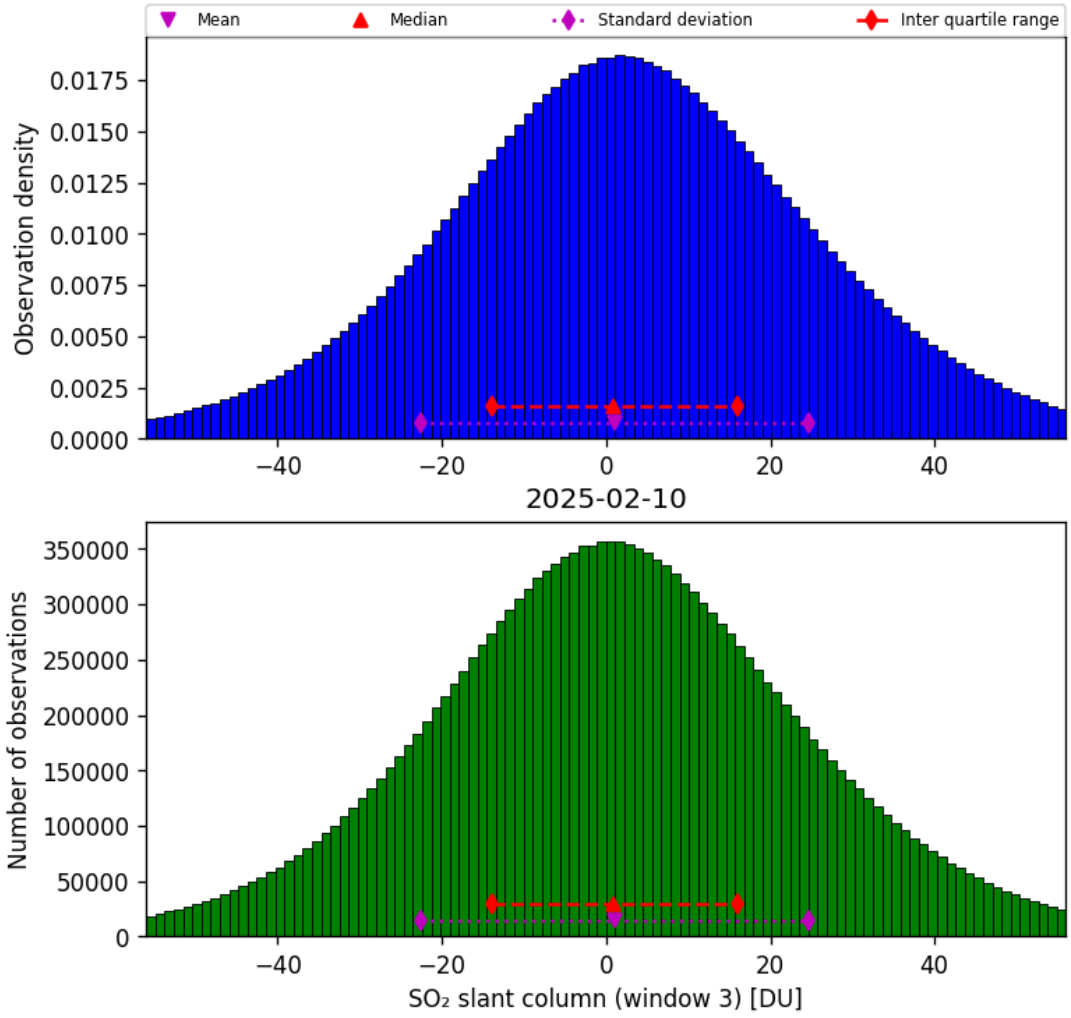

Figure 71: Histogram of "SO_2 slant column (window 3)" for 2025-02-10 to 2025-02-11

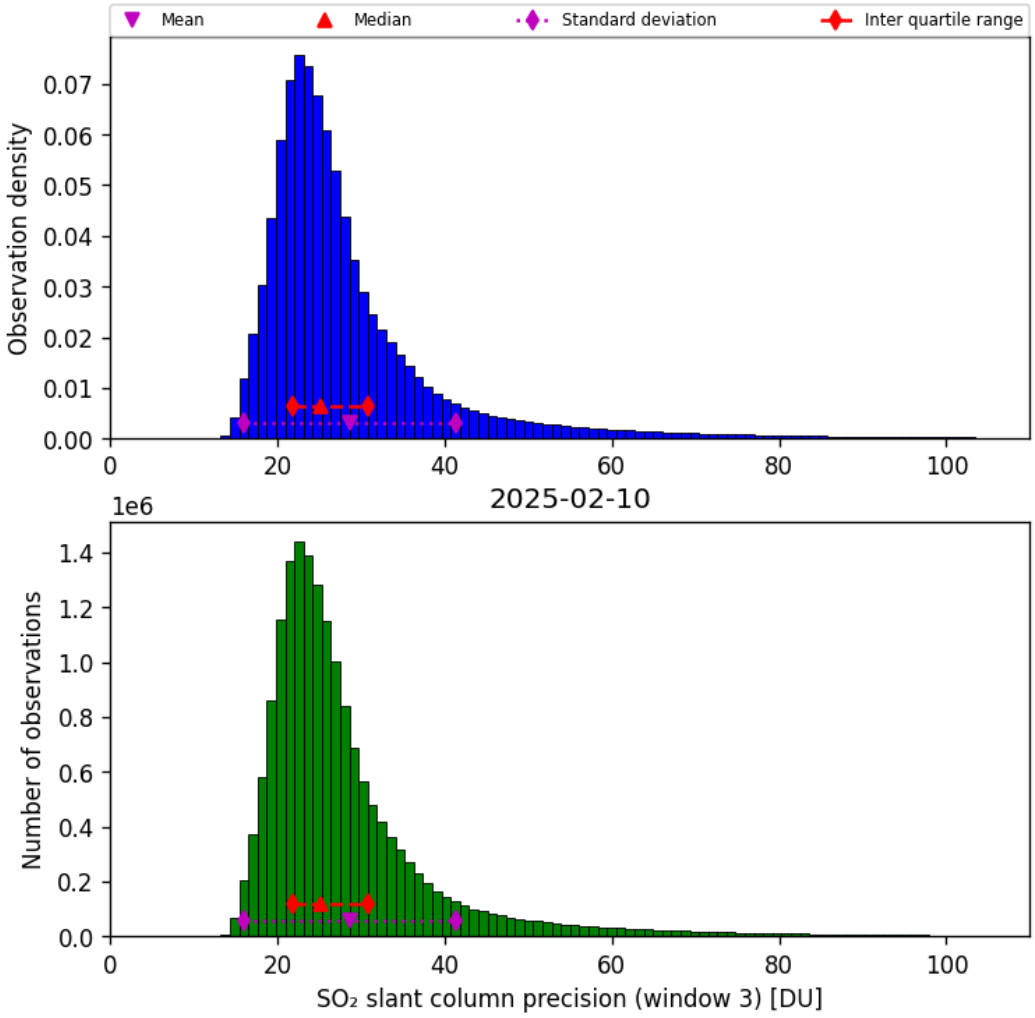

Figure 72: Histogram of "SO_2 slant column precision (window 3)" for 2025-02-10 to 2025-02-11

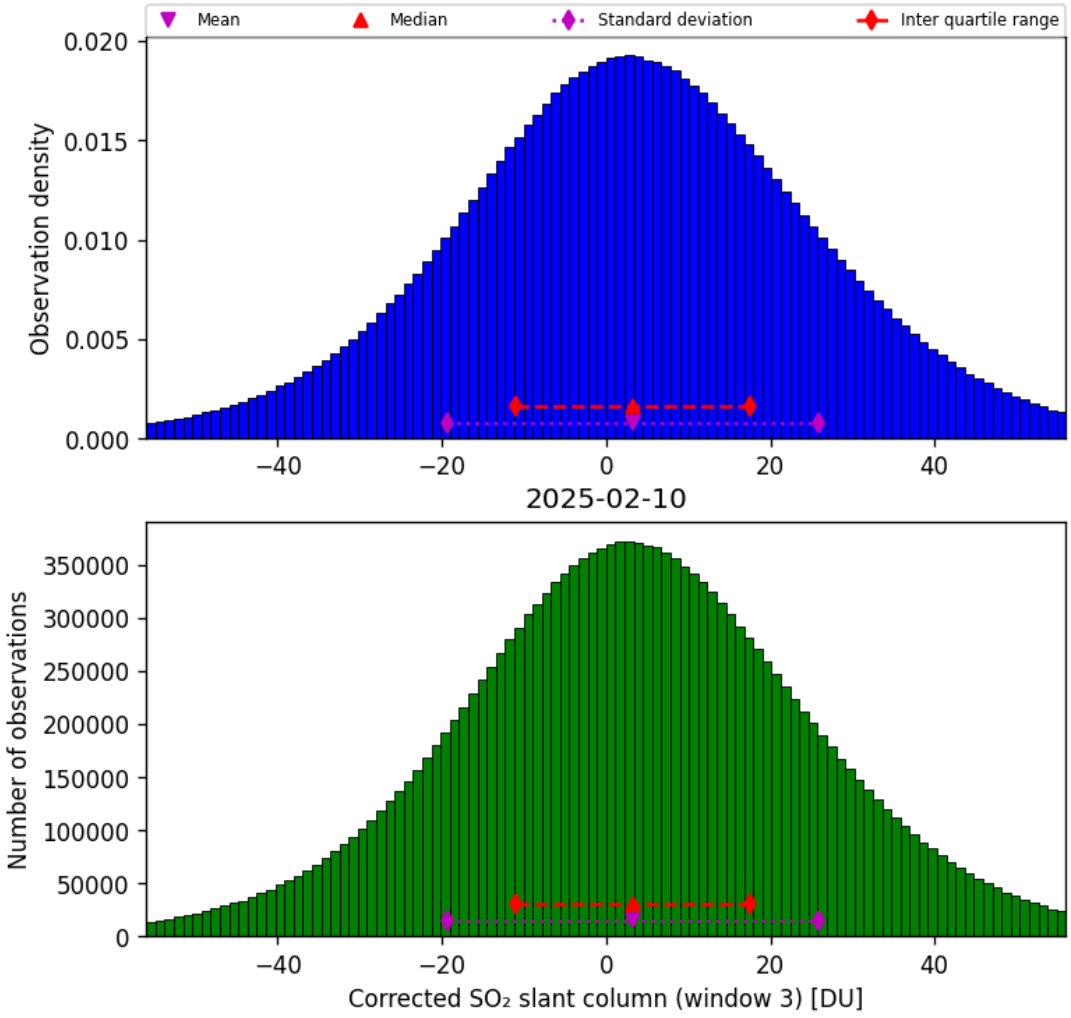

Figure 73: Histogram of "Corrected SO_2 slant column (window 3)" for 2025-02-10 to 2025-02-11

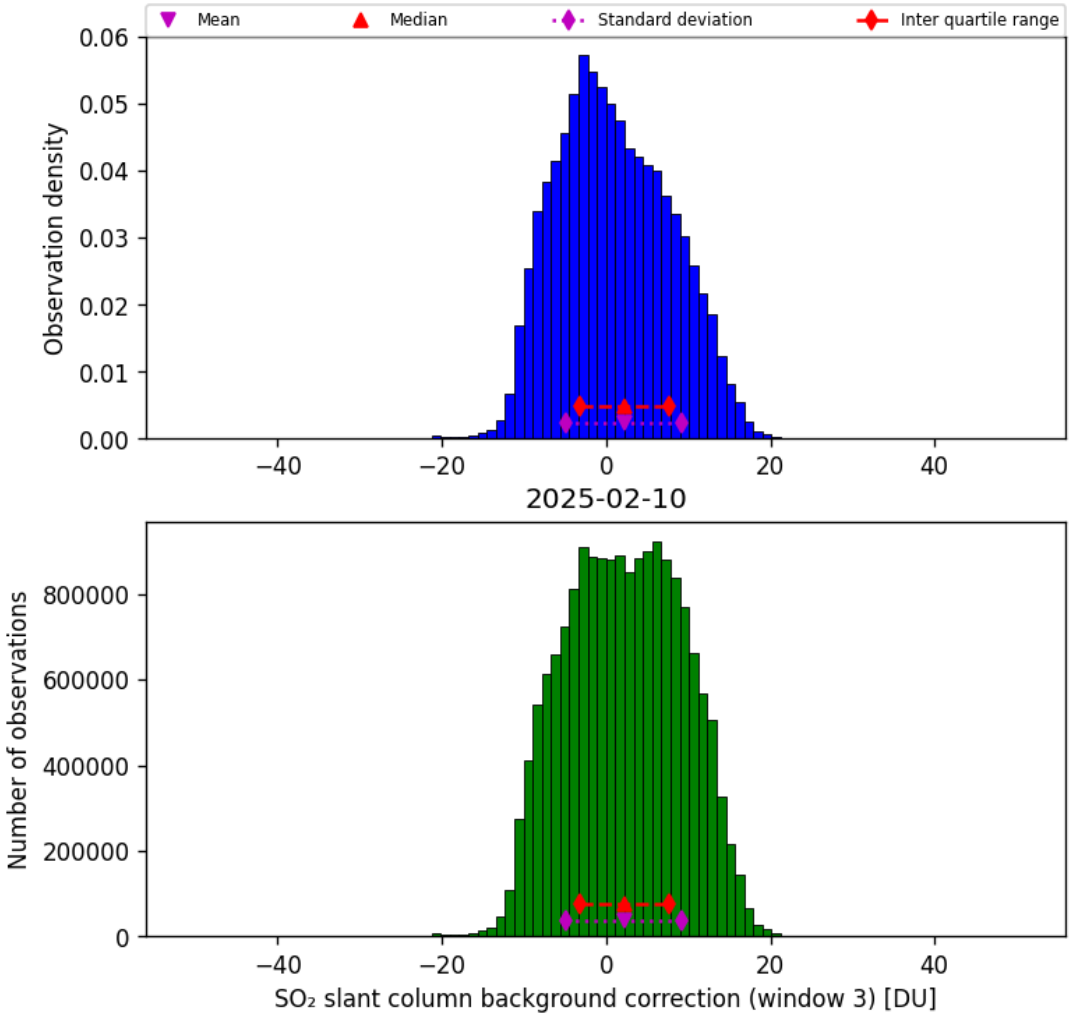

Figure 74: Histogram of "SO_2 slant column background correction (window 3)" for 2025-02-10 to 2025-02-11

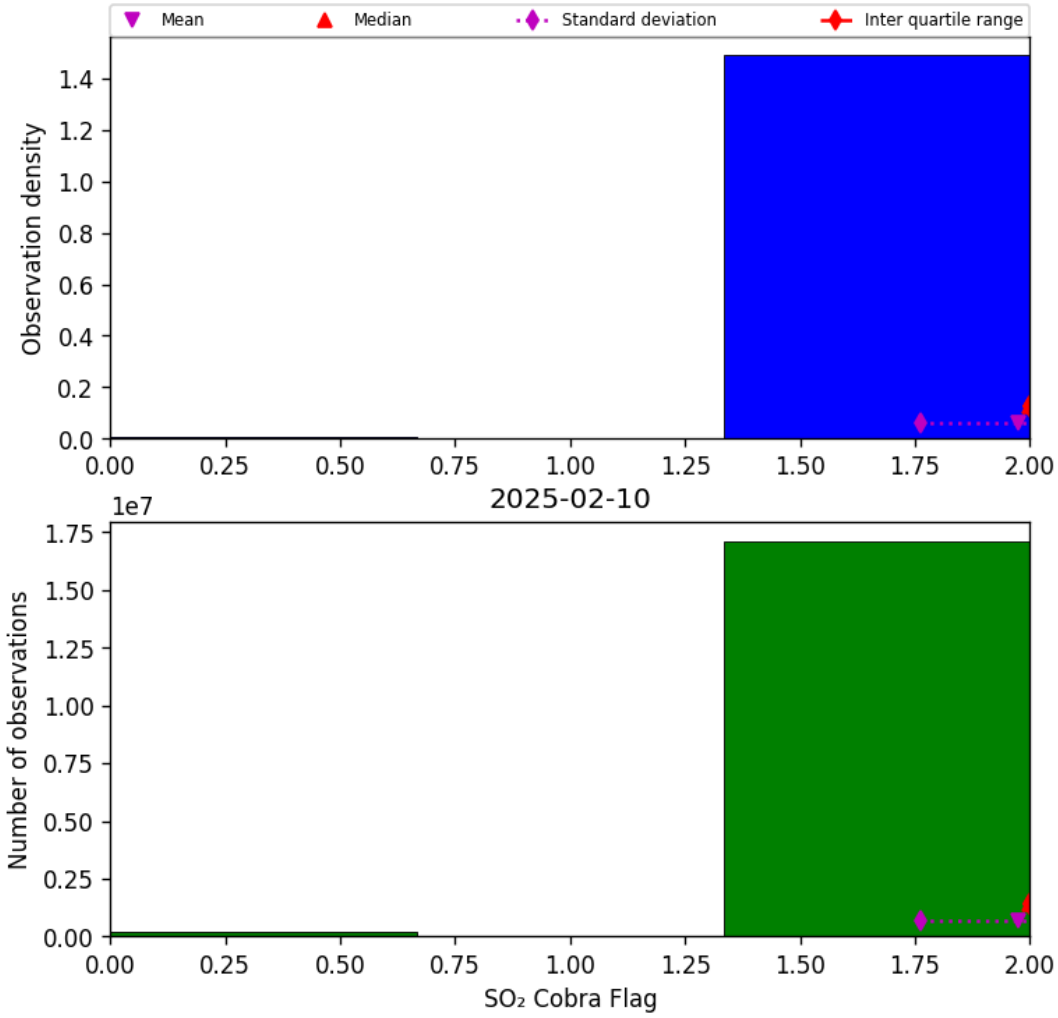

Figure 75: Histogram of "SO_2 Cobra Flag" for 2025-02-10 to 2025-02-11

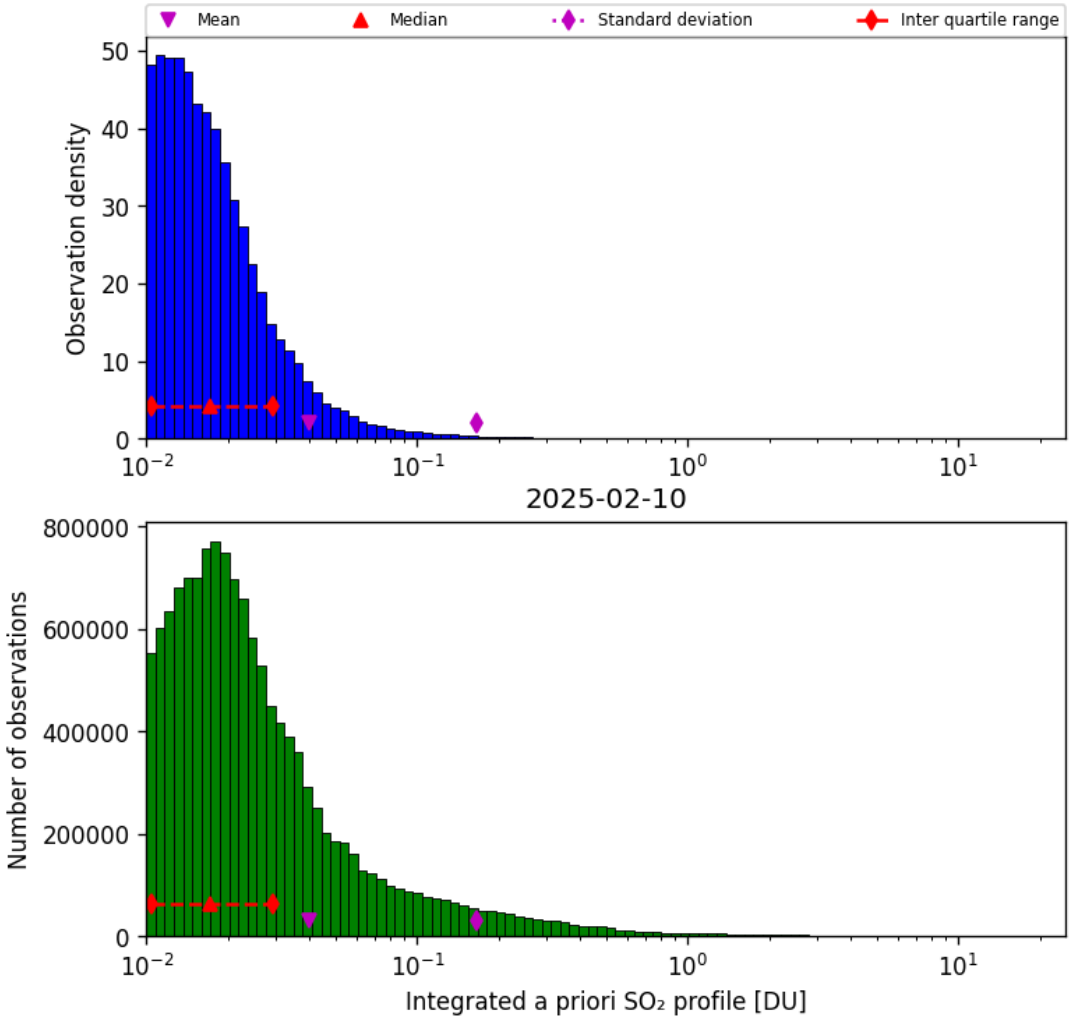

Figure 76: Histogram of "Integrated a priori SO_2 profile" for 2025-02-10 to 2025-02-11

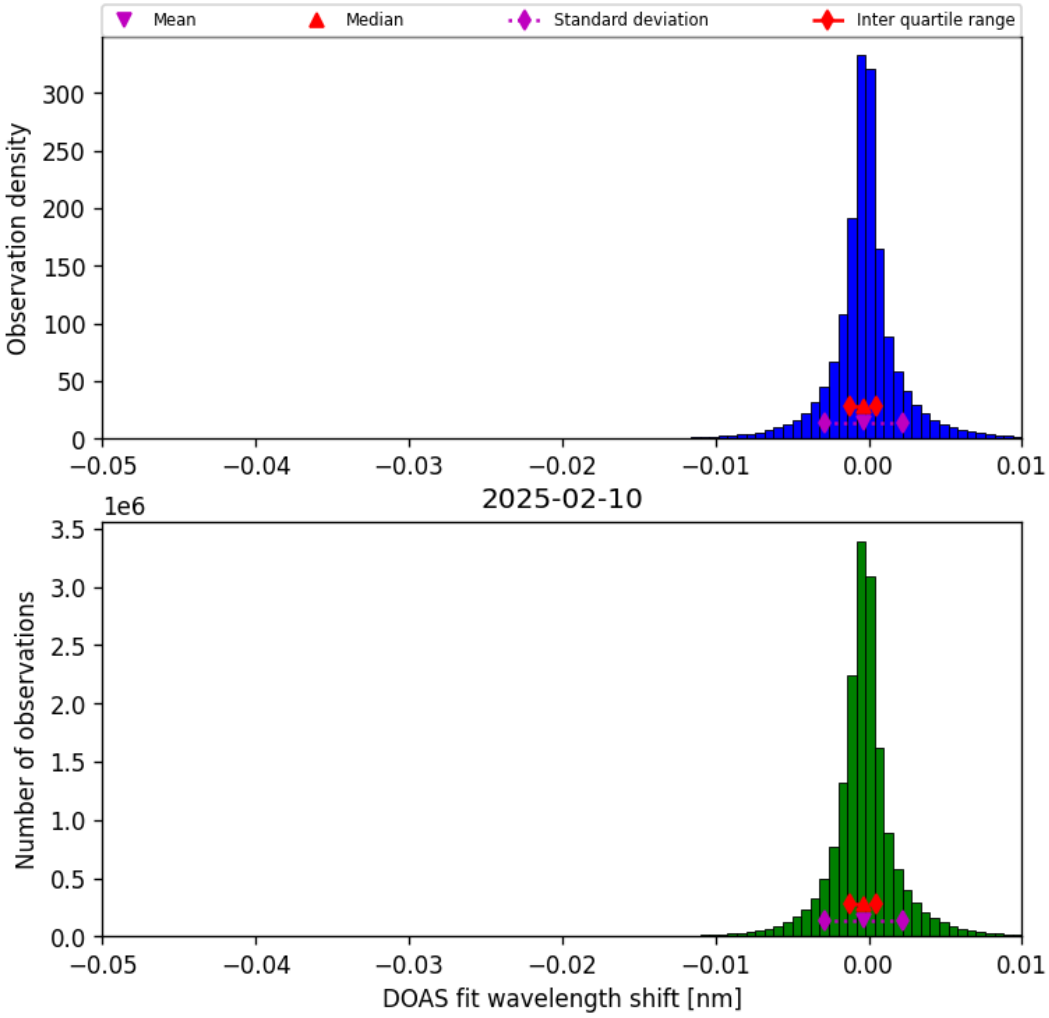

Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-02-10 to 2025-02-11

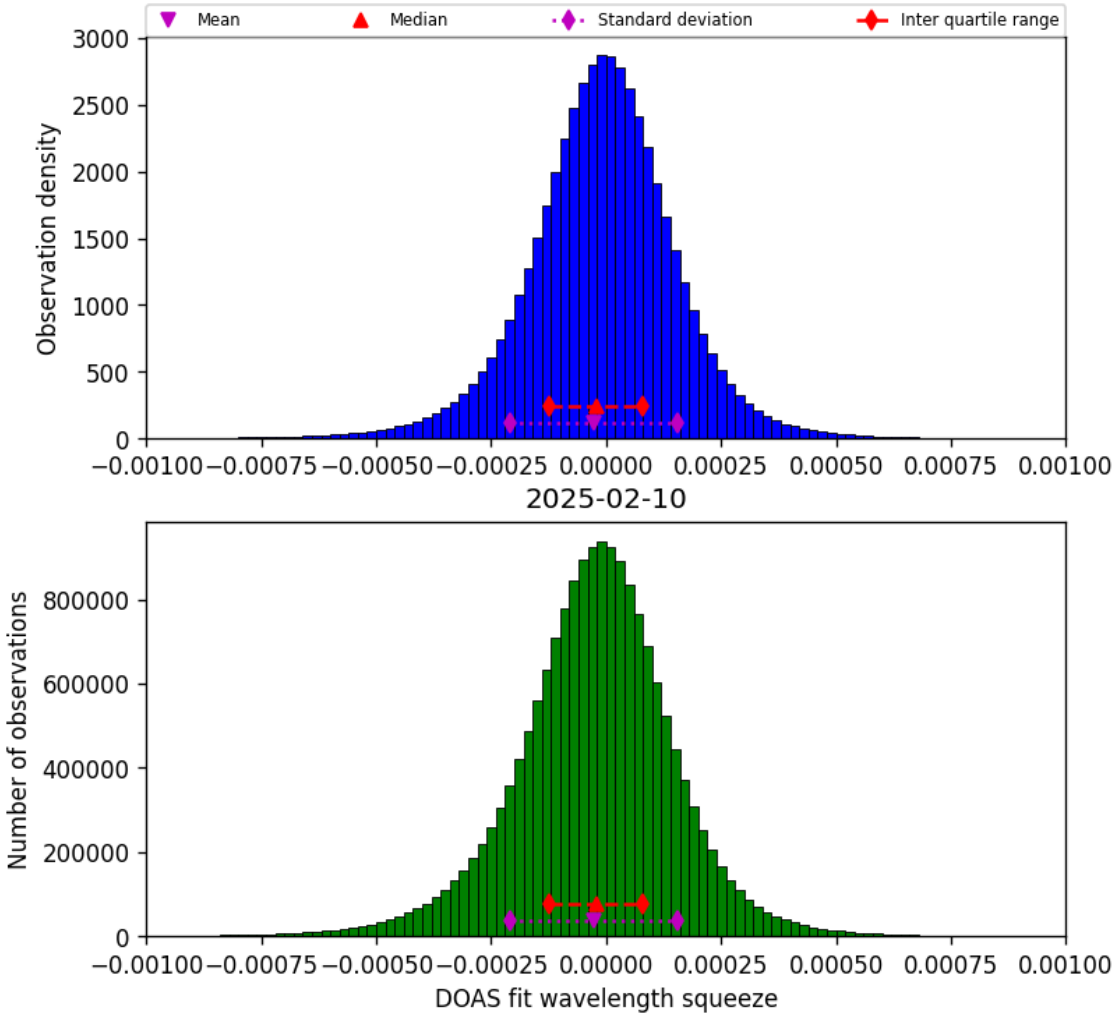

Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-02-10 to 2025-02-11

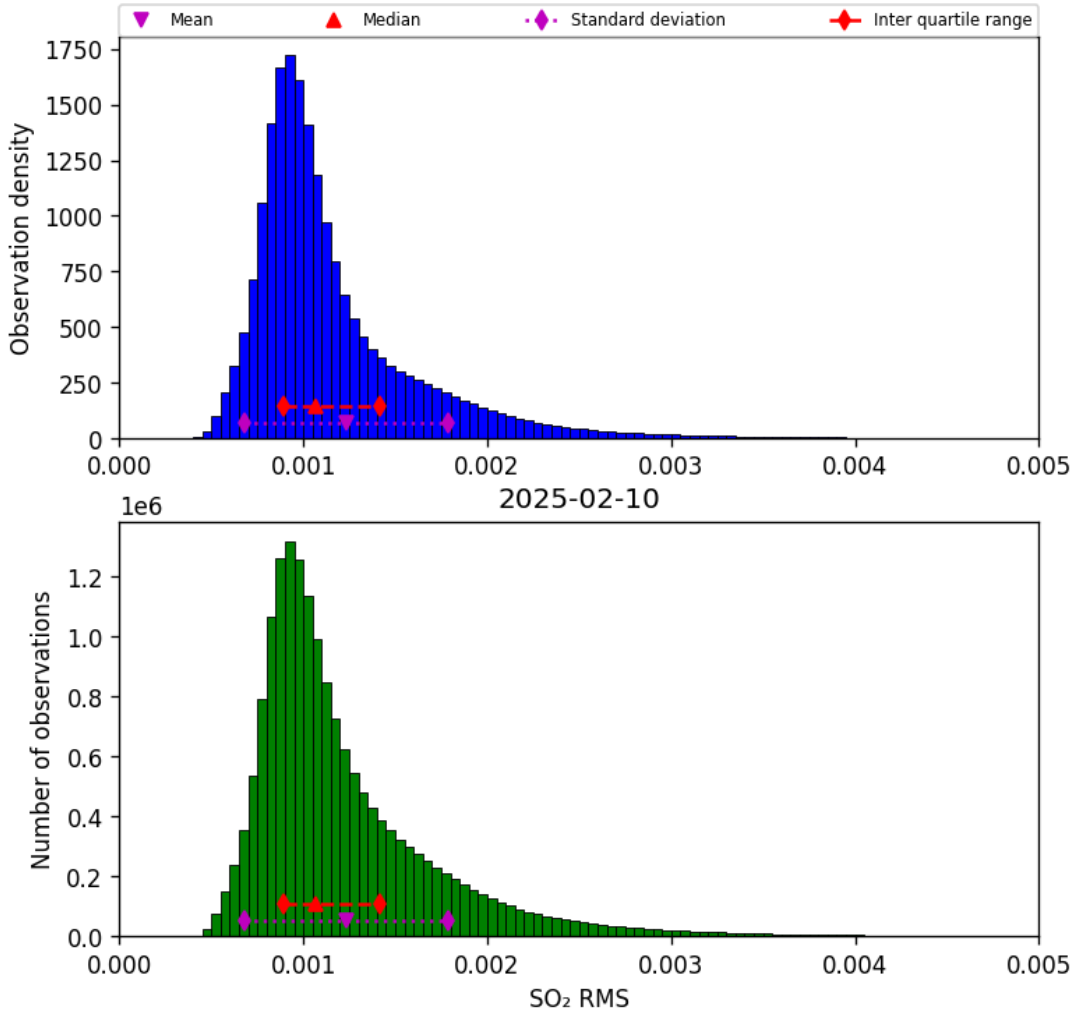

Figure 79: Histogram of "SO_2 RMS" for 2025-02-10 to 2025-02-11

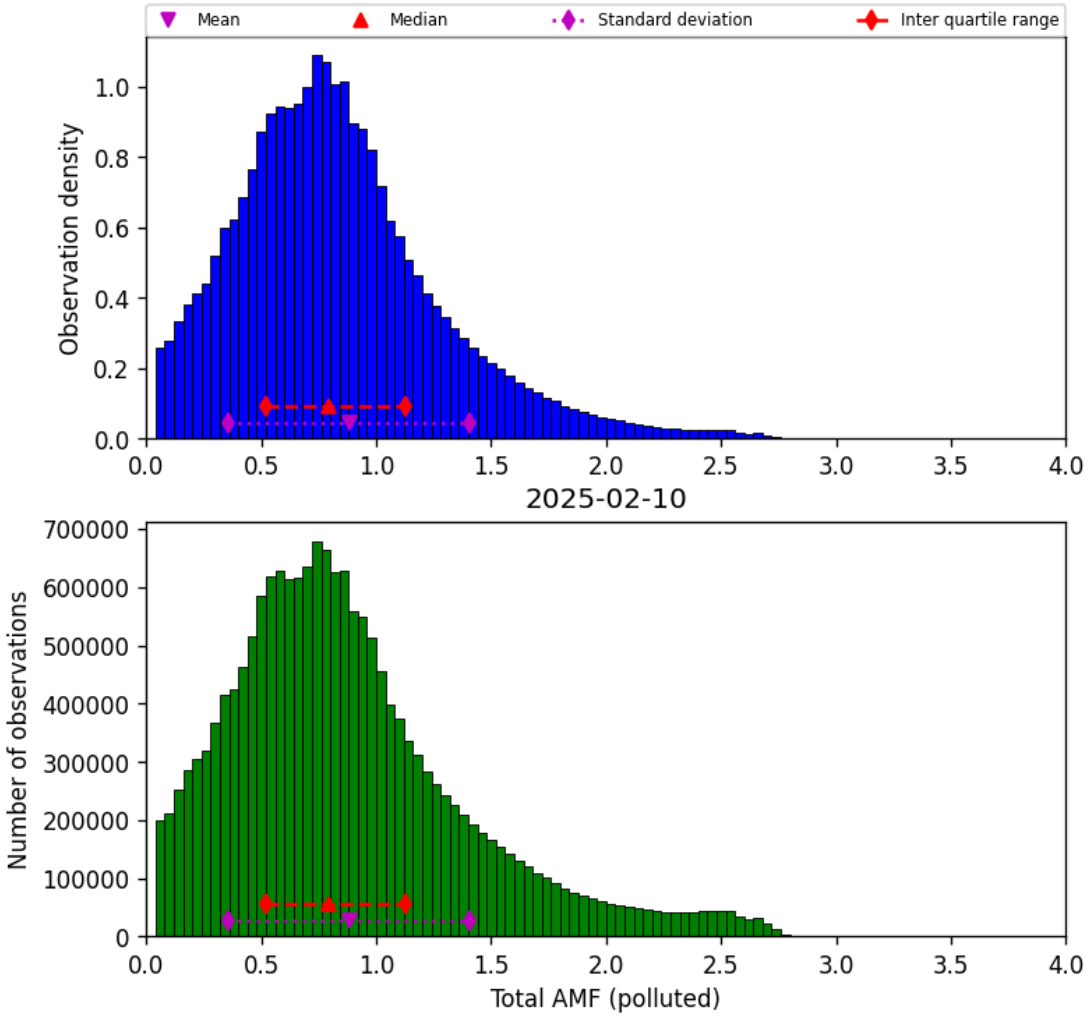

Figure 80: Histogram of “Total AMF (polluted)” for 2025-02-10 to 2025-02-11

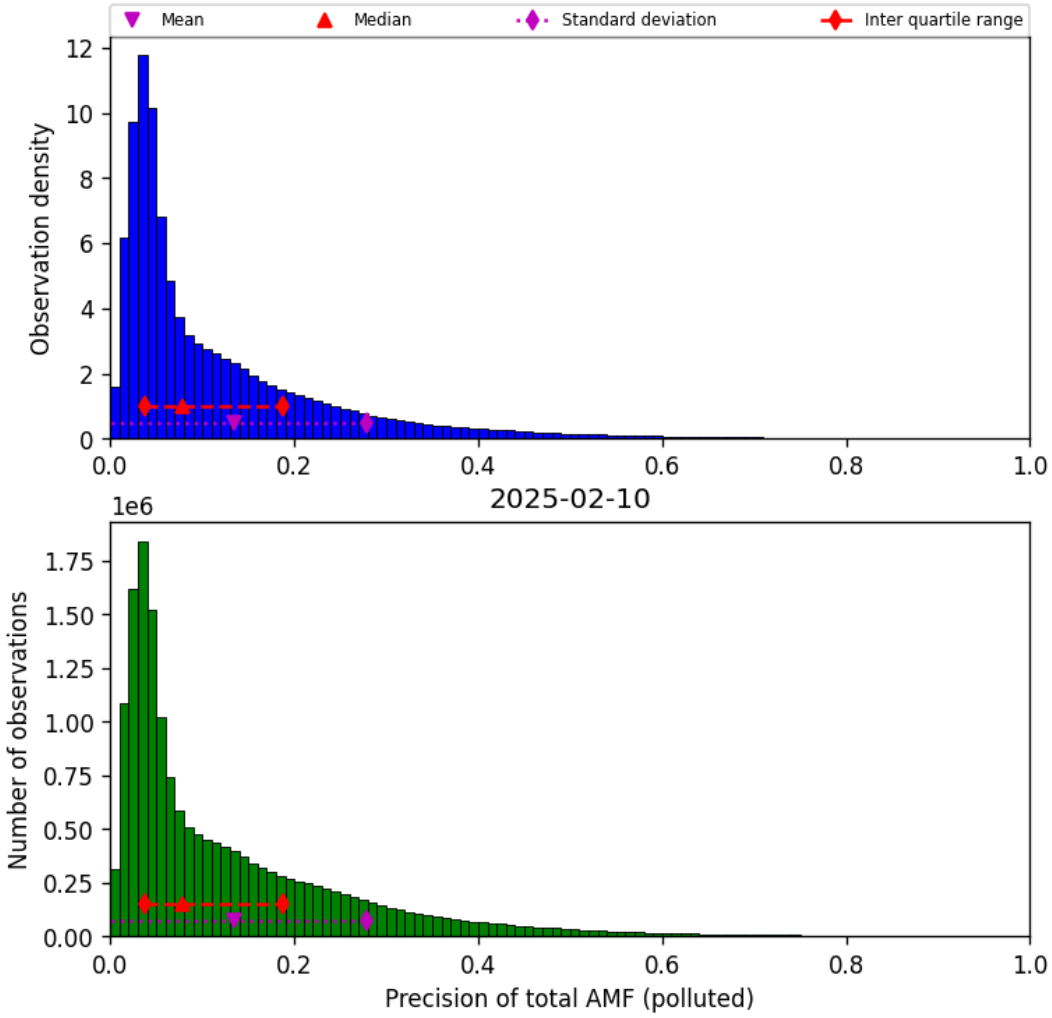

Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-02-10 to 2025-02-11

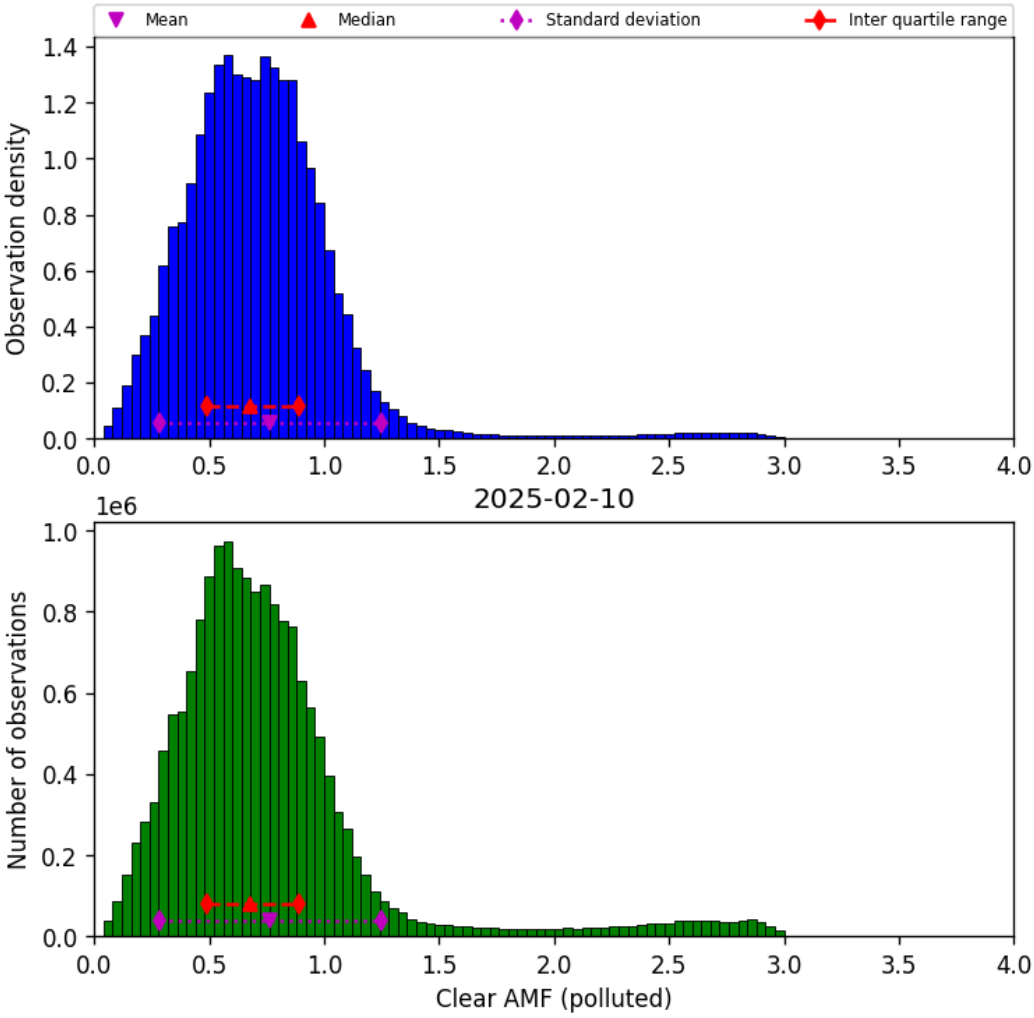

Figure 82: Histogram of “Clear AMF (polluted)” for 2025-02-10 to 2025-02-11

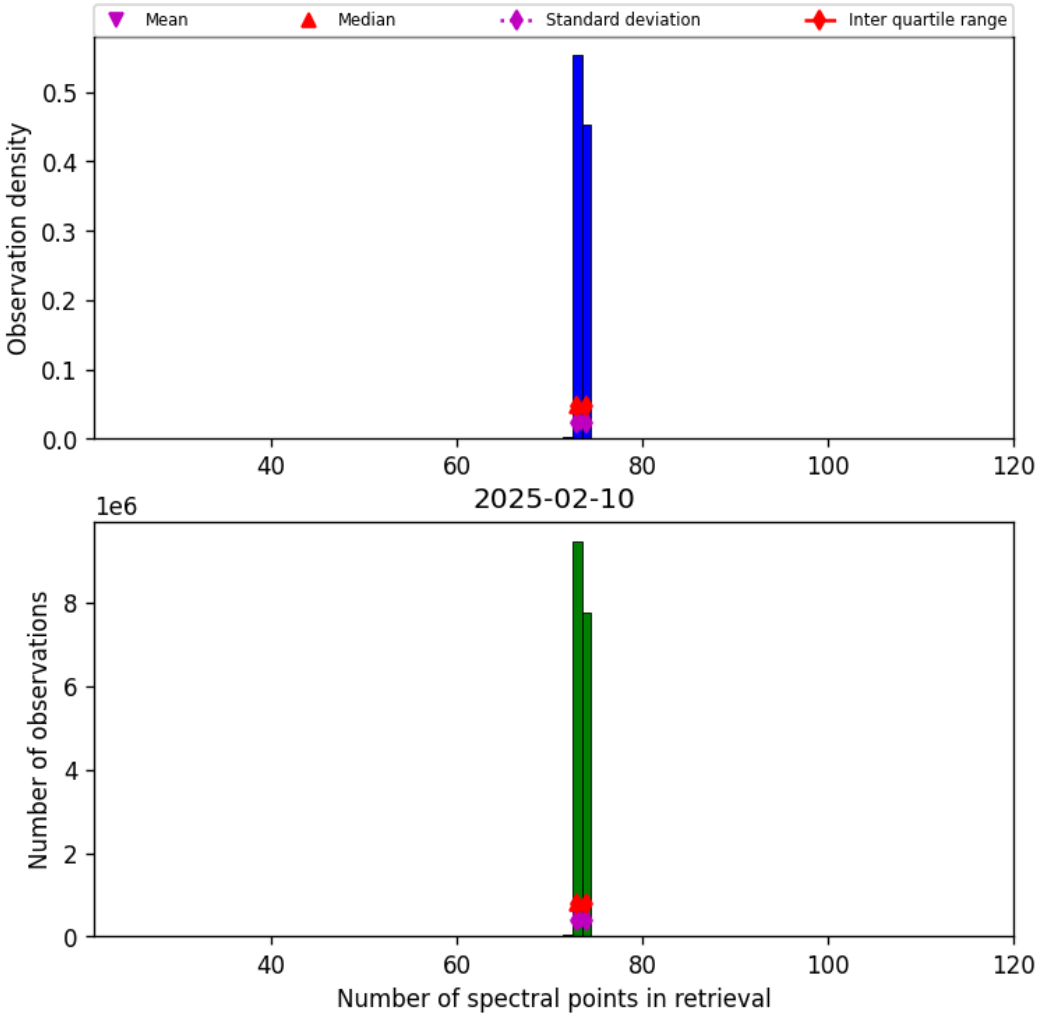

Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-02-10 to 2025-02-11

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.

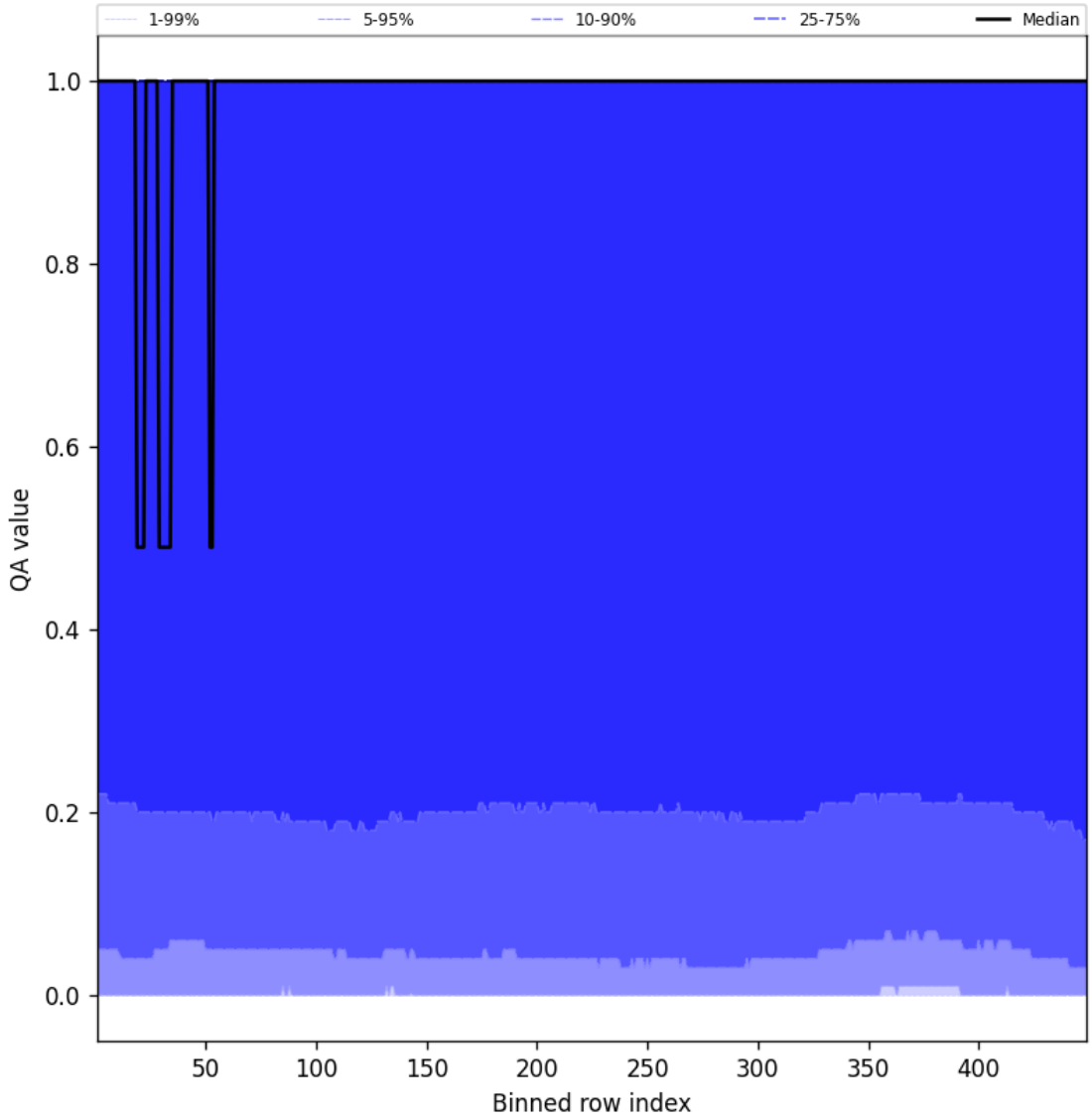

Figure 84: Along track statistics of “QA value” for 2025-02-10 to 2025-02-11

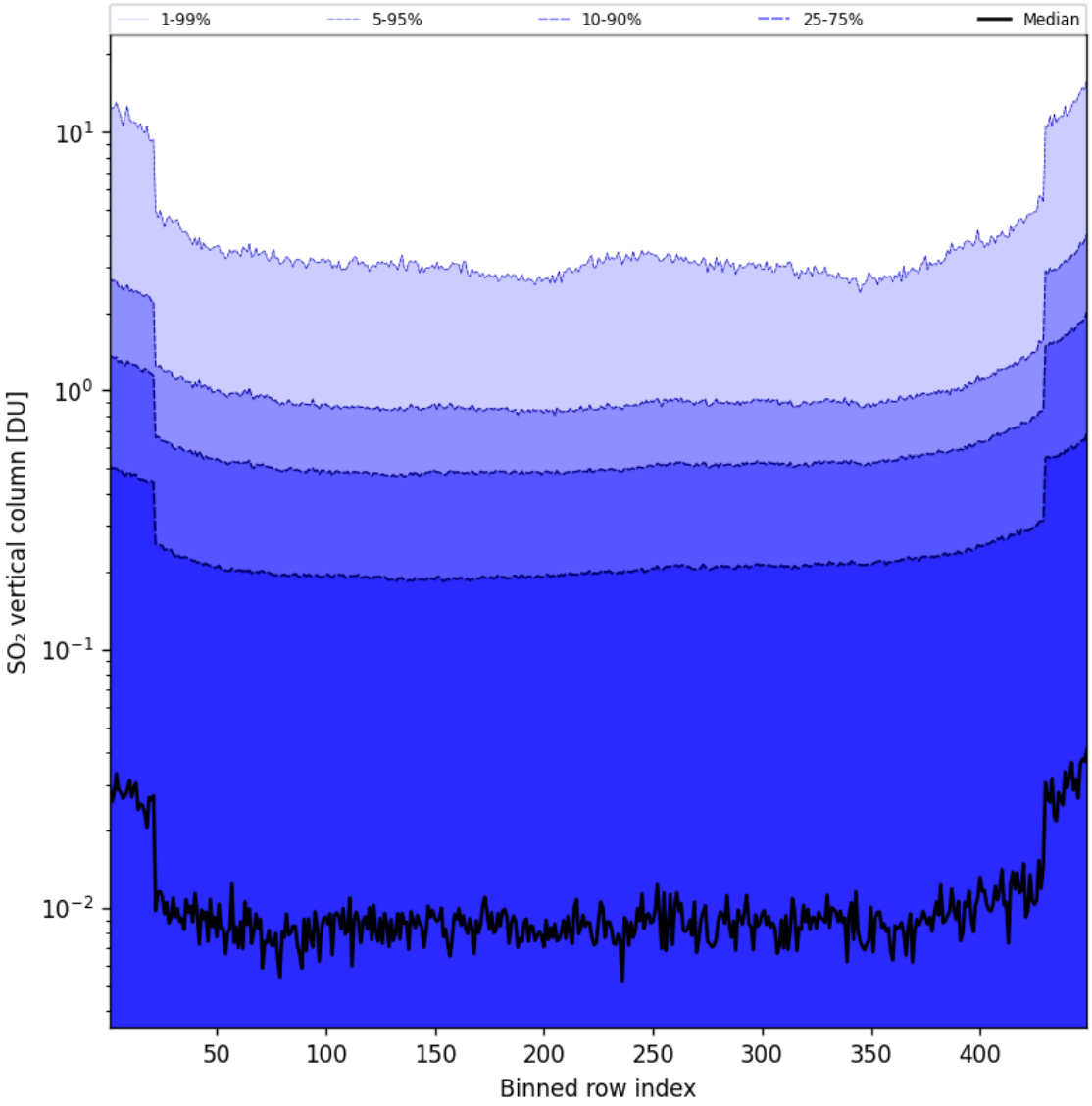

Figure 85: Along track statistics of "SO_2 vertical column" for 2025-02-10 to 2025-02-11

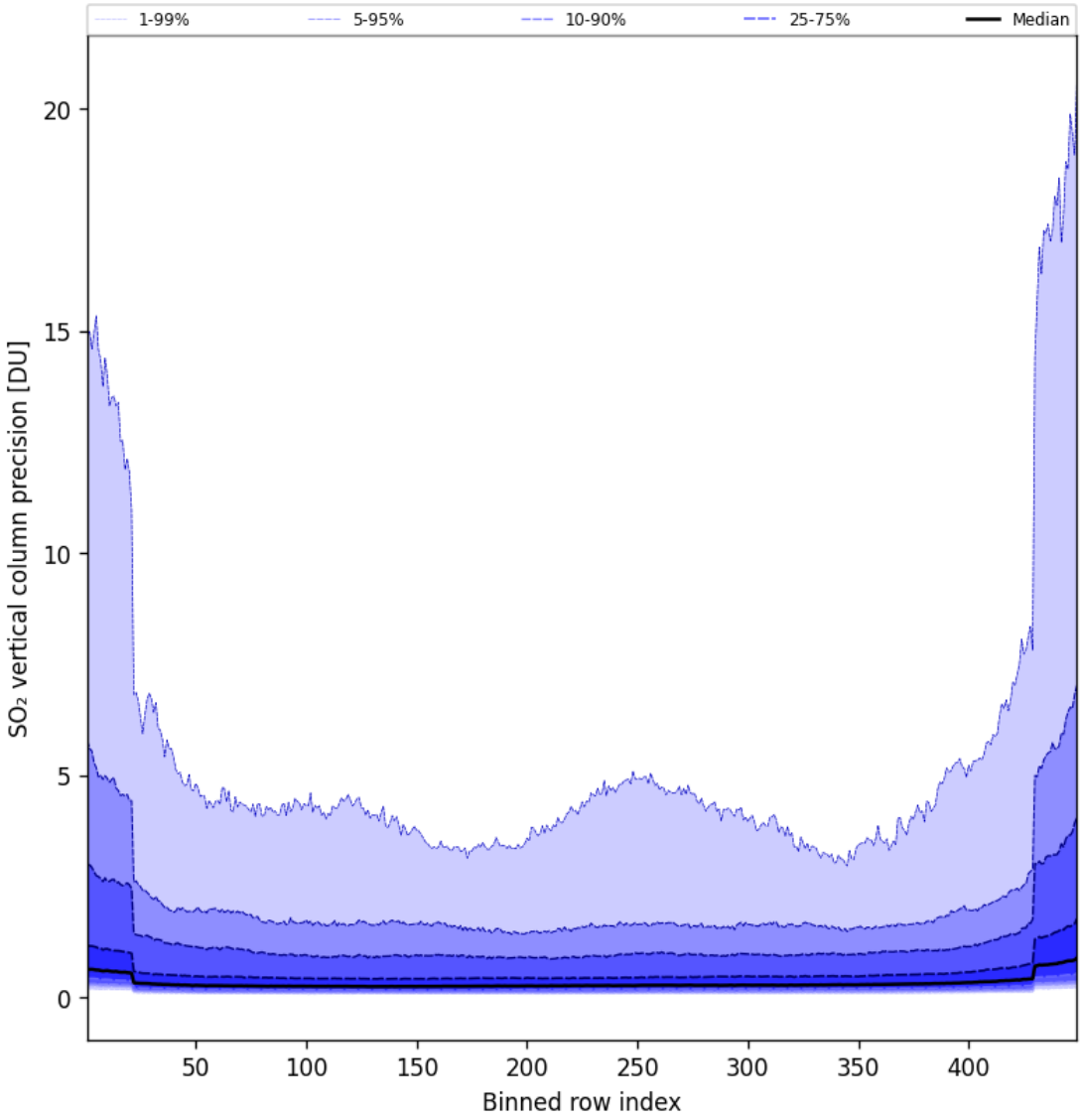

Figure 86: Along track statistics of "SO_2 vertical column precision" for 2025-02-10 to 2025-02-11

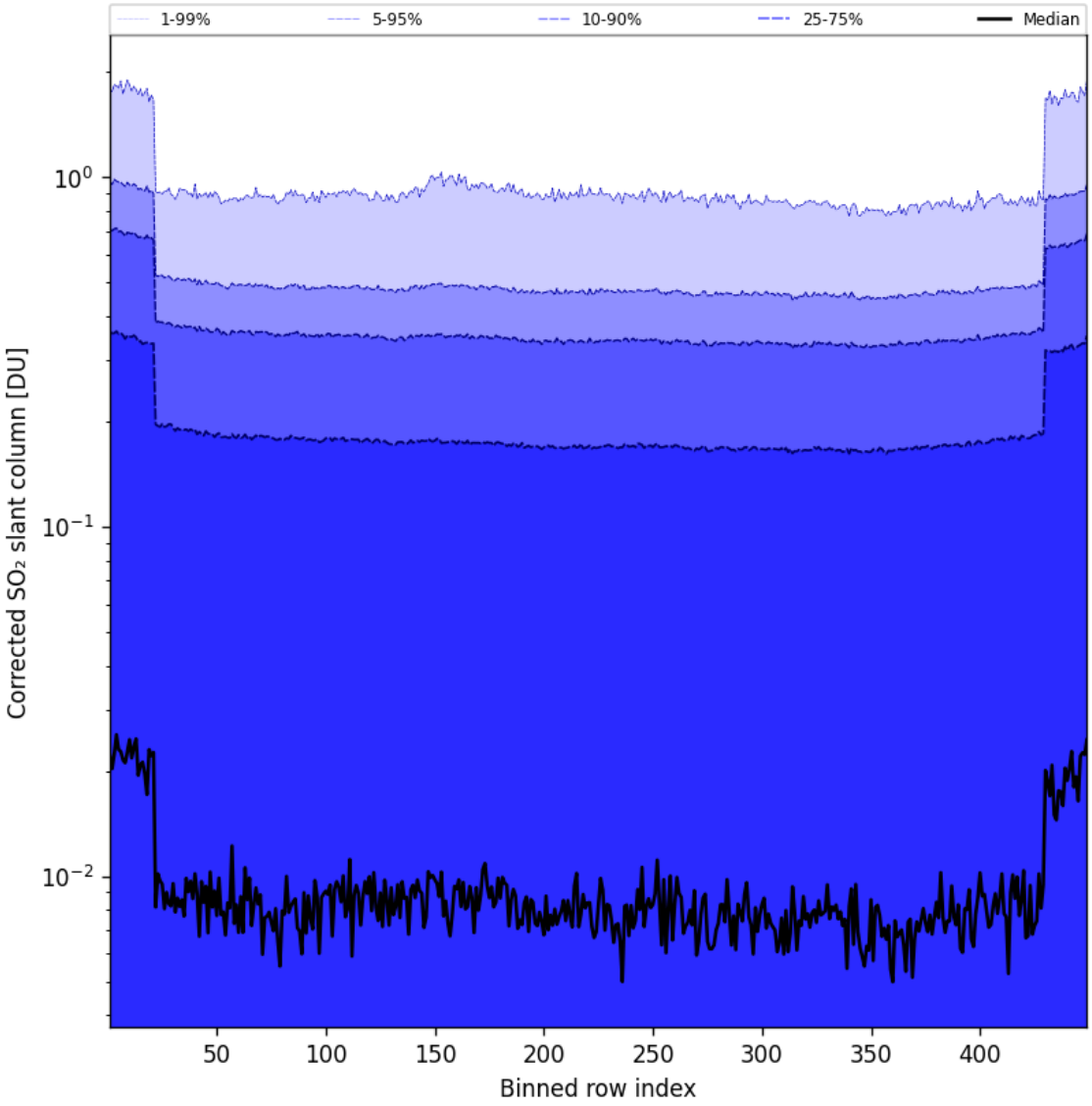

Figure 87: Along track statistics of "Corrected SO_2 slant column" for 2025-02-10 to 2025-02-11

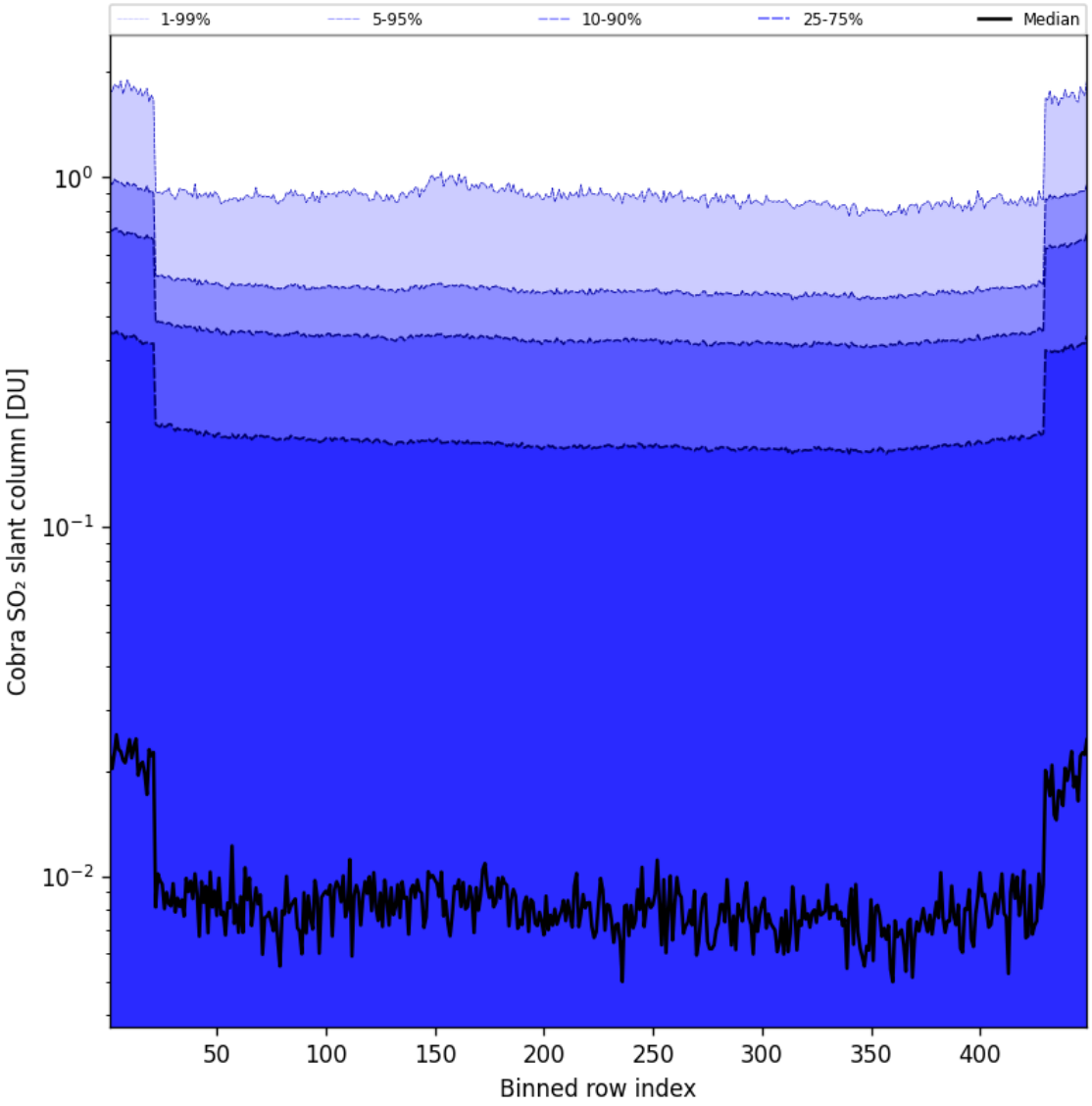

Figure 88: Along track statistics of "Cobra SO_2 slant column" for 2025-02-10 to 2025-02-11

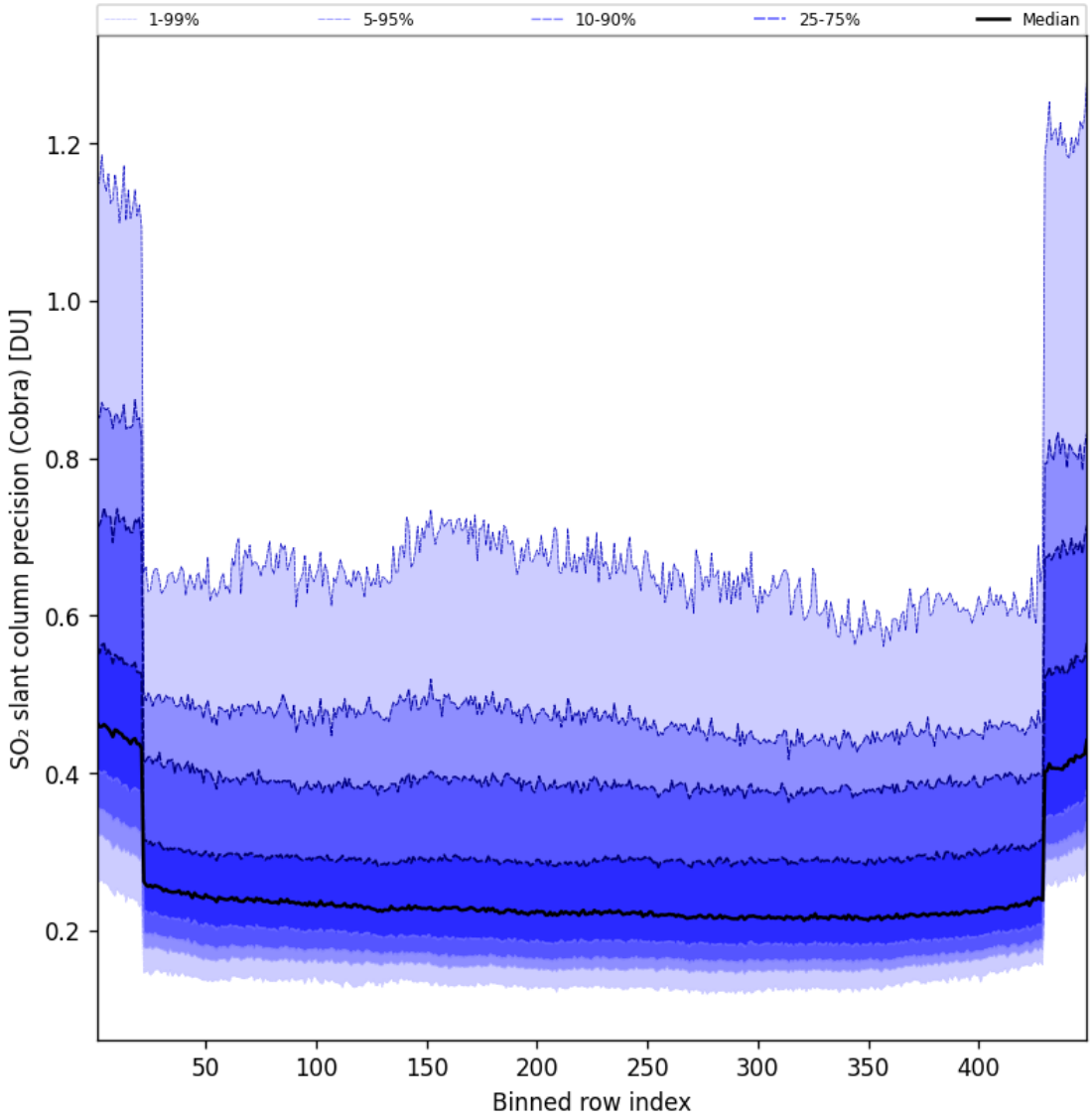

Figure 89: Along track statistics of "SO_2 slant column precision (Cobra)" for 2025-02-10 to 2025-02-11

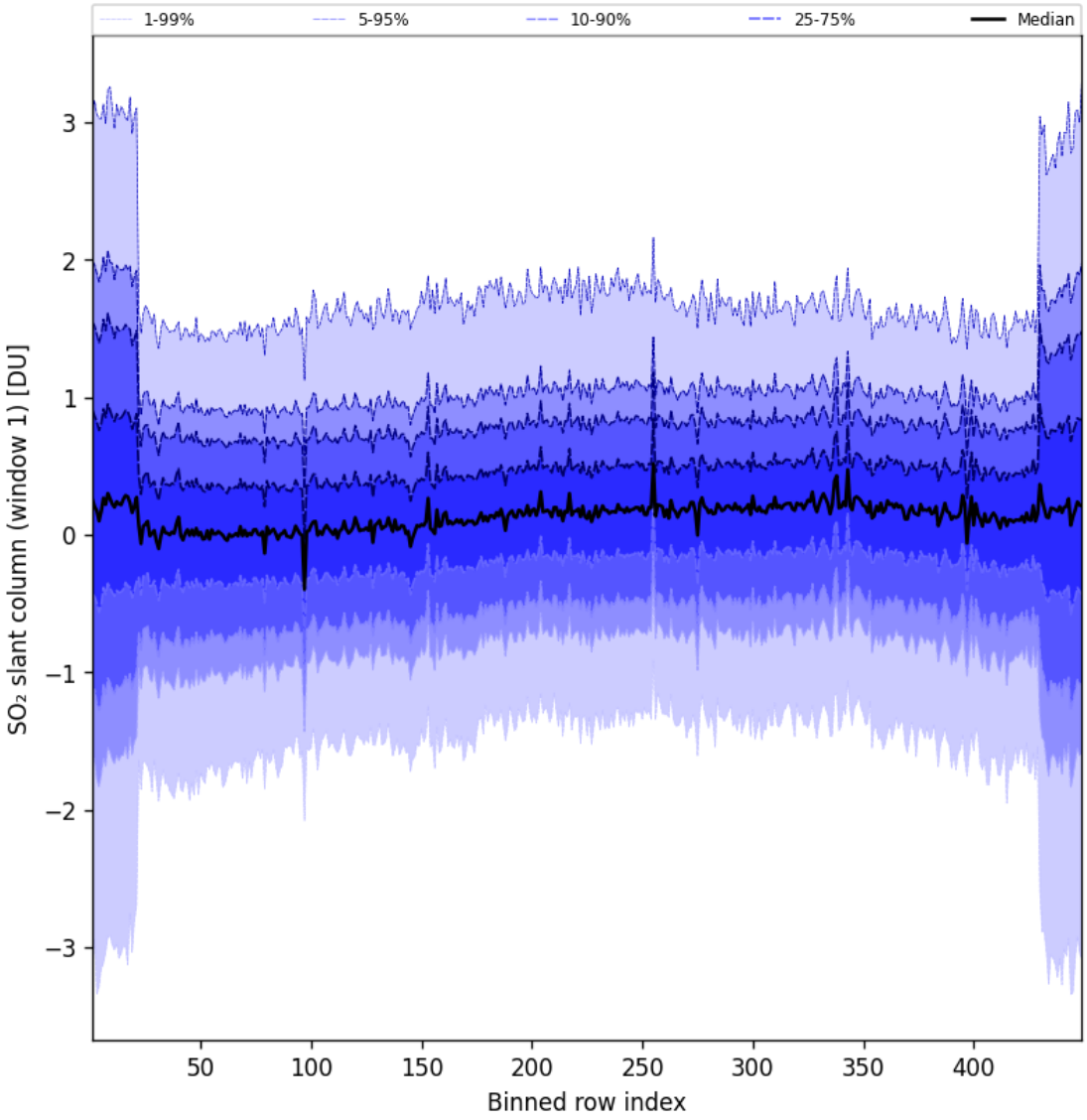

Figure 90: Along track statistics of "SO_2 slant column (window 1)" for 2025-02-10 to 2025-02-11

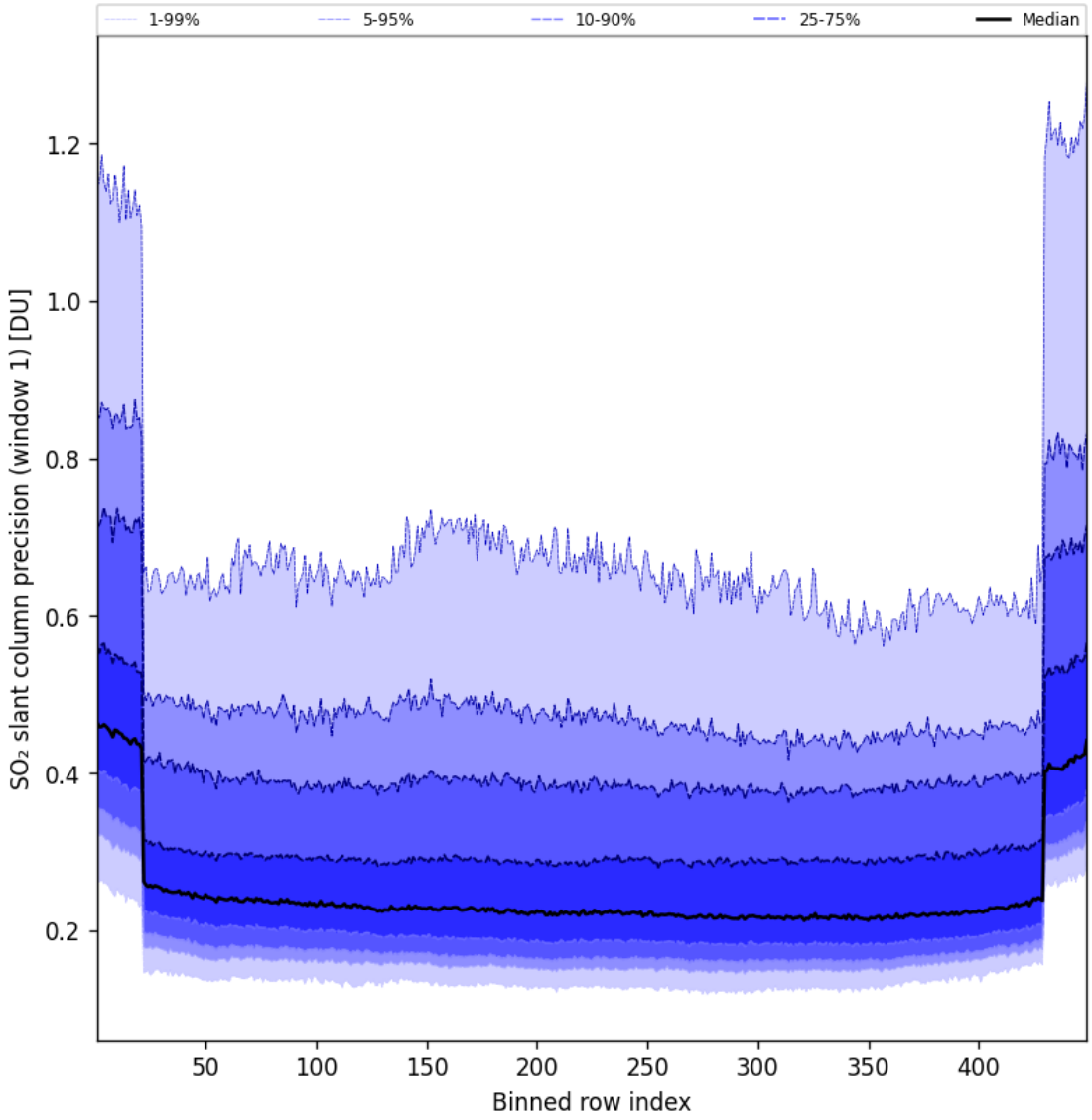

Figure 91: Along track statistics of "SO_2 slant column precision (window 1)" for 2025-02-10 to 2025-02-11

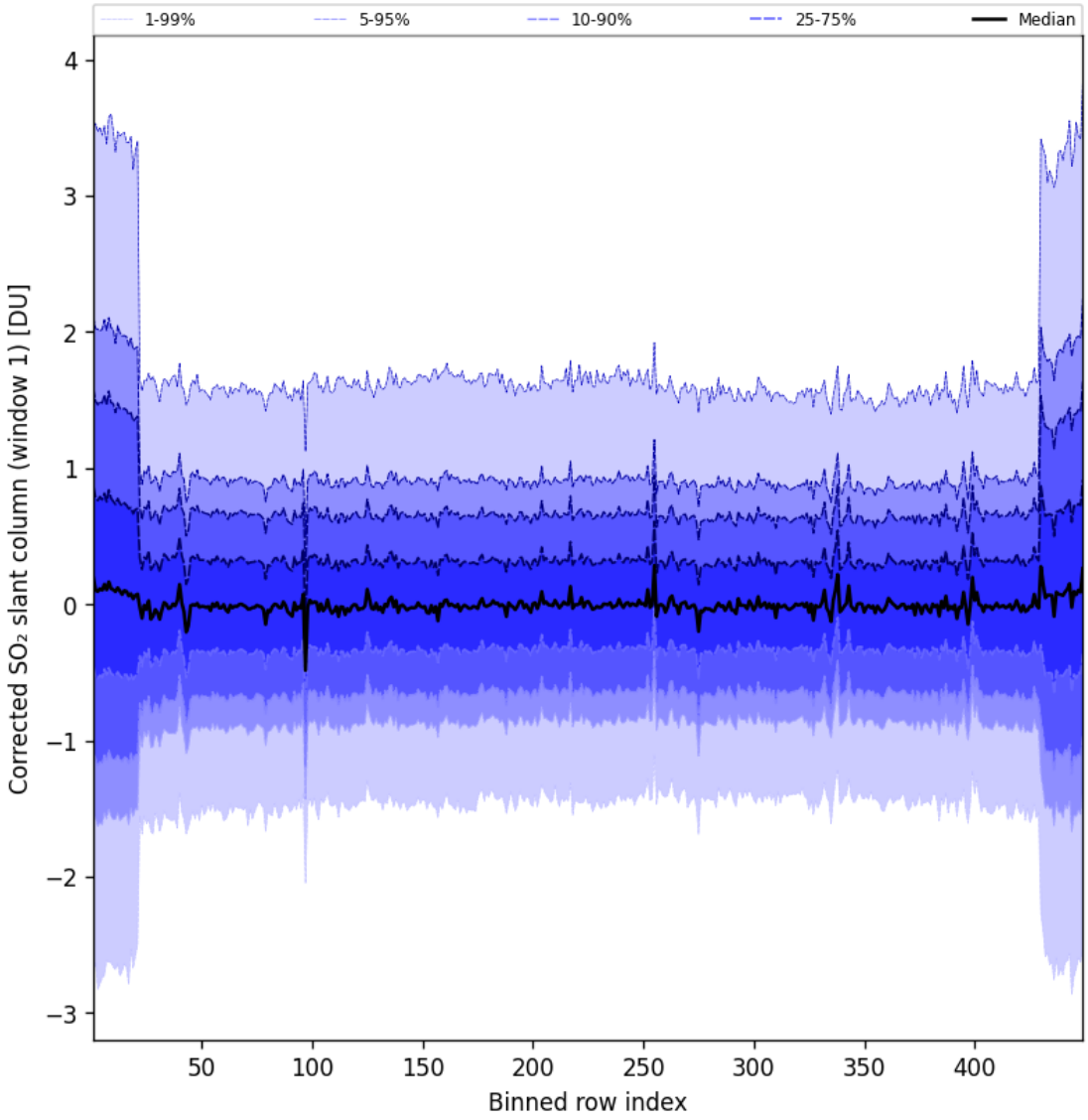

Figure 92: Along track statistics of “Corrected SO_2 slant column (window 1)” for 2025-02-10 to 2025-02-11

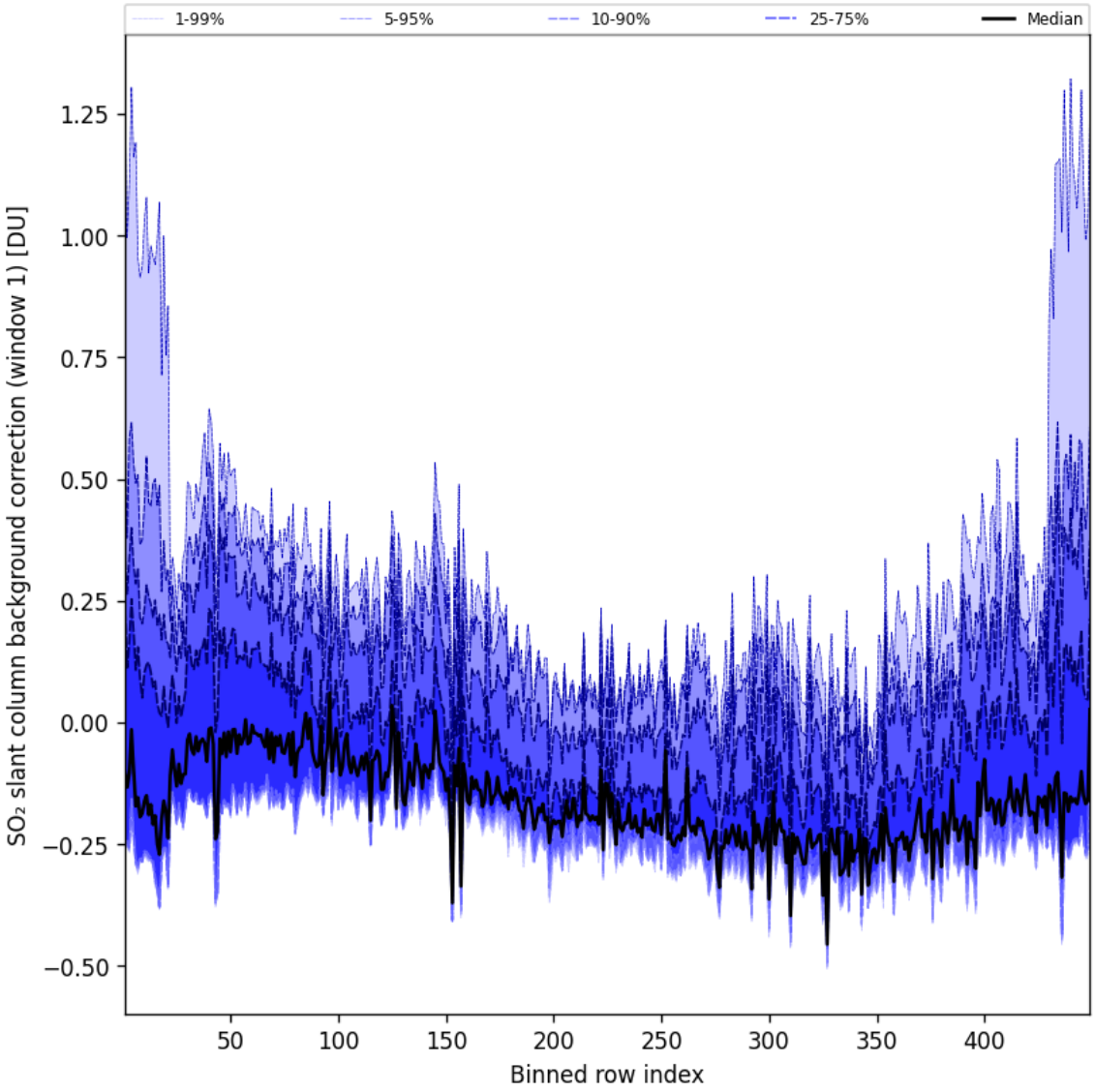

Figure 93: Along track statistics of "SO_2 slant column background correction (window 1)" for 2025-02-10 to 2025-02-11

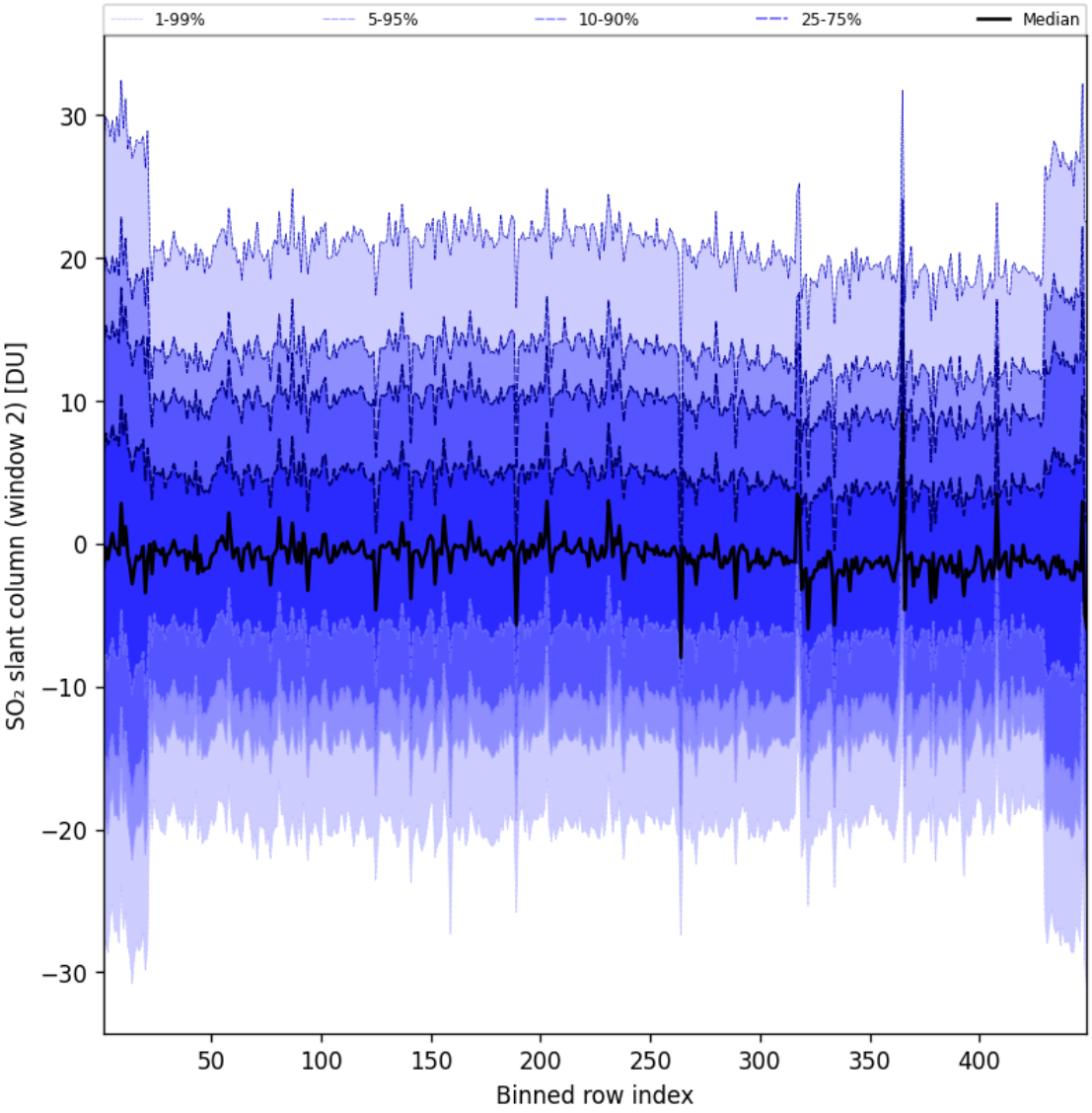

Figure 94: Along track statistics of "SO_2 slant column (window 2)" for 2025-02-10 to 2025-02-11

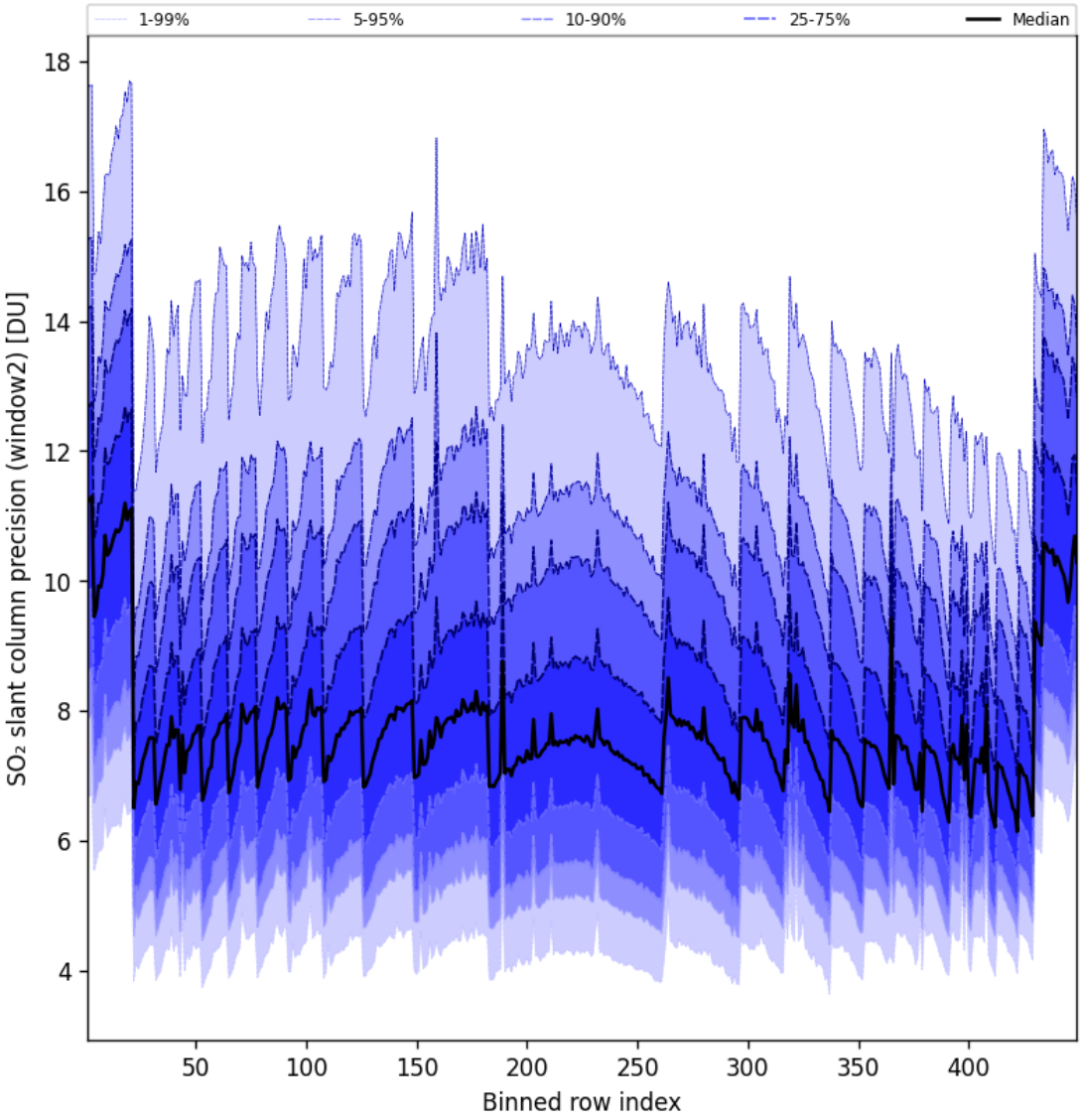

Figure 95: Along track statistics of "SO_2 slant column precision (window2)" for 2025-02-10 to 2025-02-11

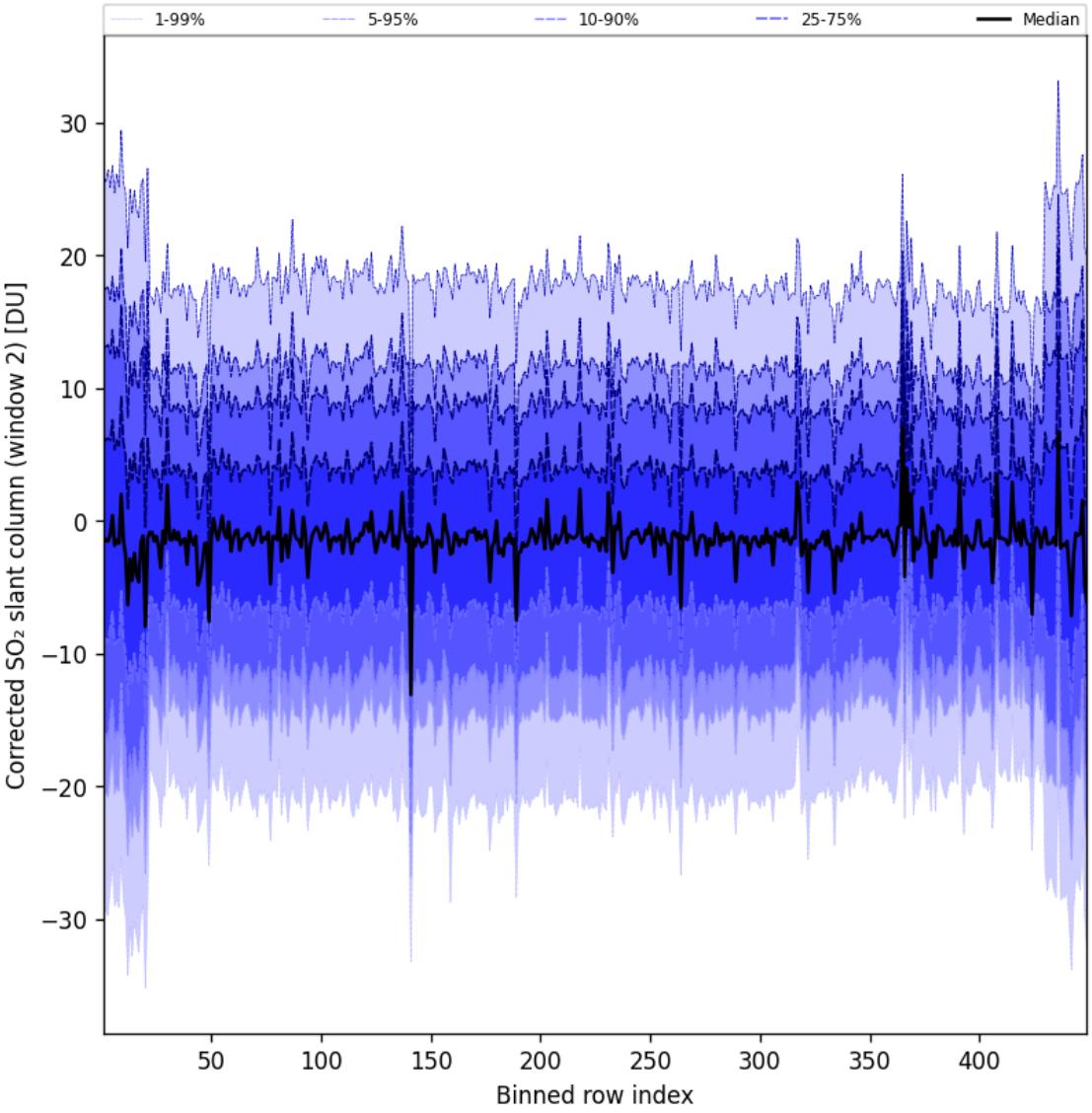

Figure 96: Along track statistics of "Corrected SO_2 slant column (window 2)" for 2025-02-10 to 2025-02-11

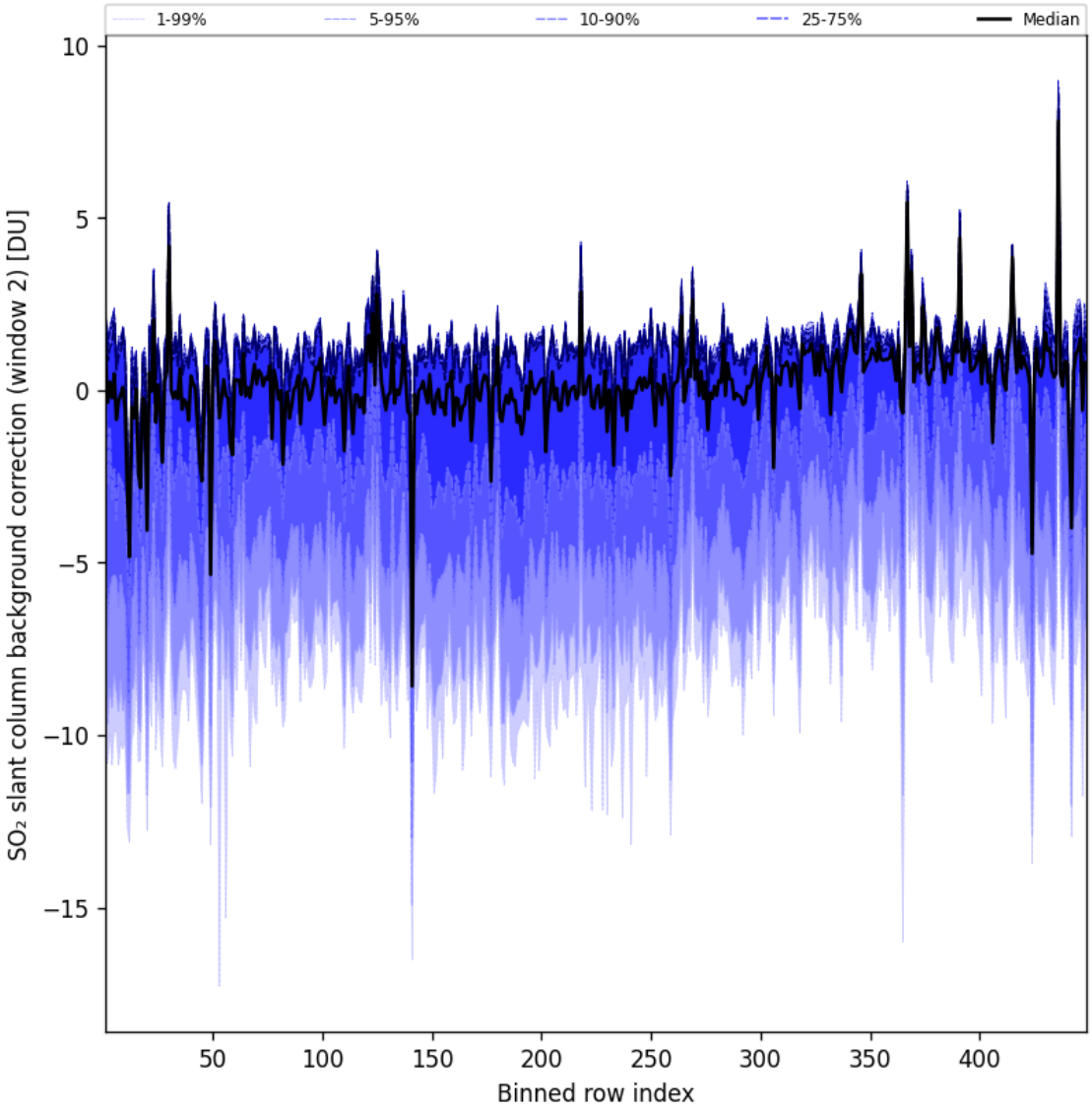

Figure 97: Along track statistics of "SO_2 slant column background correction (window 2)" for 2025-02-10 to 2025-02-11

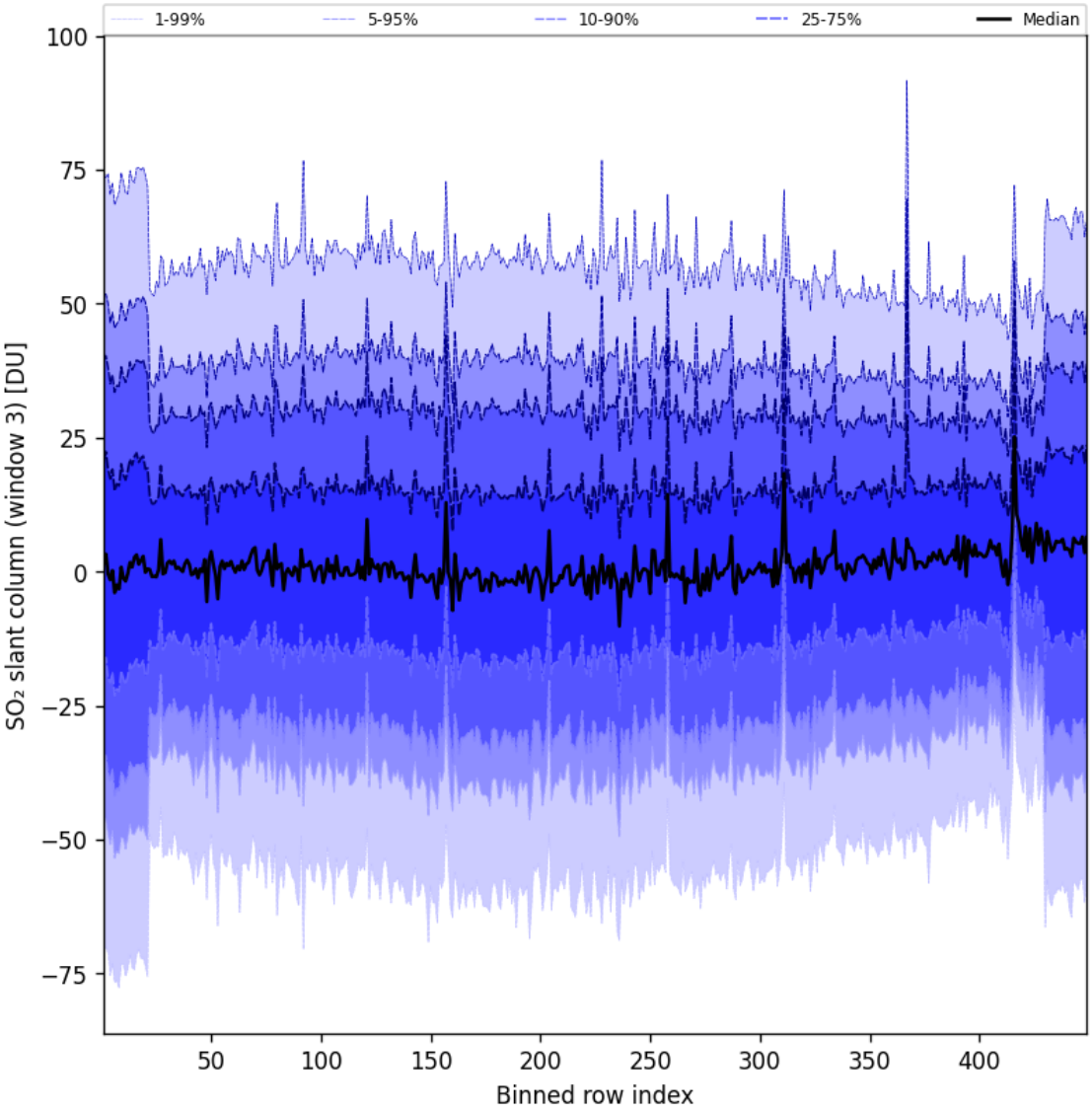

Figure 98: Along track statistics of "SO_2 slant column (window 3)" for 2025-02-10 to 2025-02-11

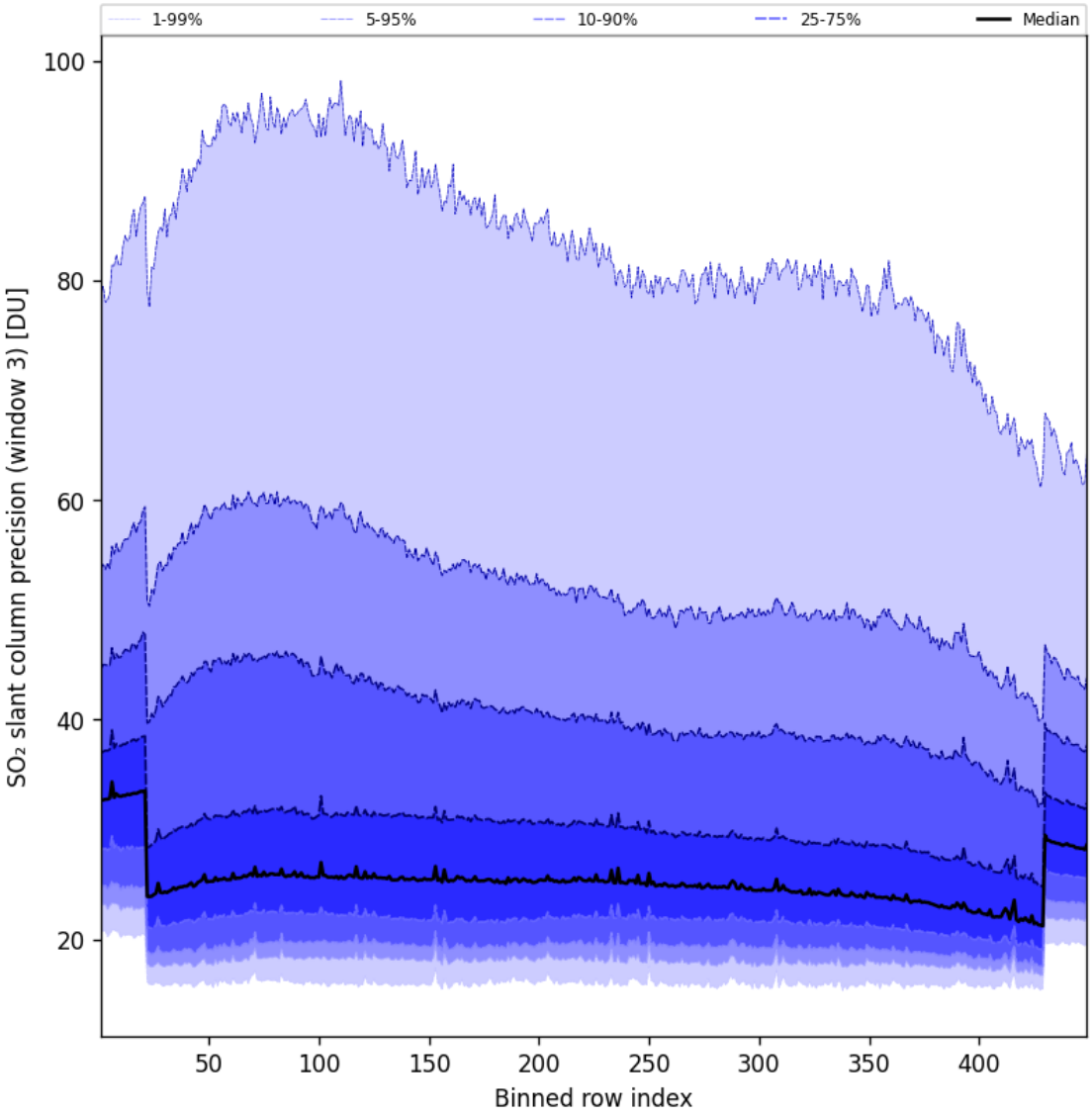

Figure 99: Along track statistics of "SO_2 slant column precision (window 3)" for 2025-02-10 to 2025-02-11

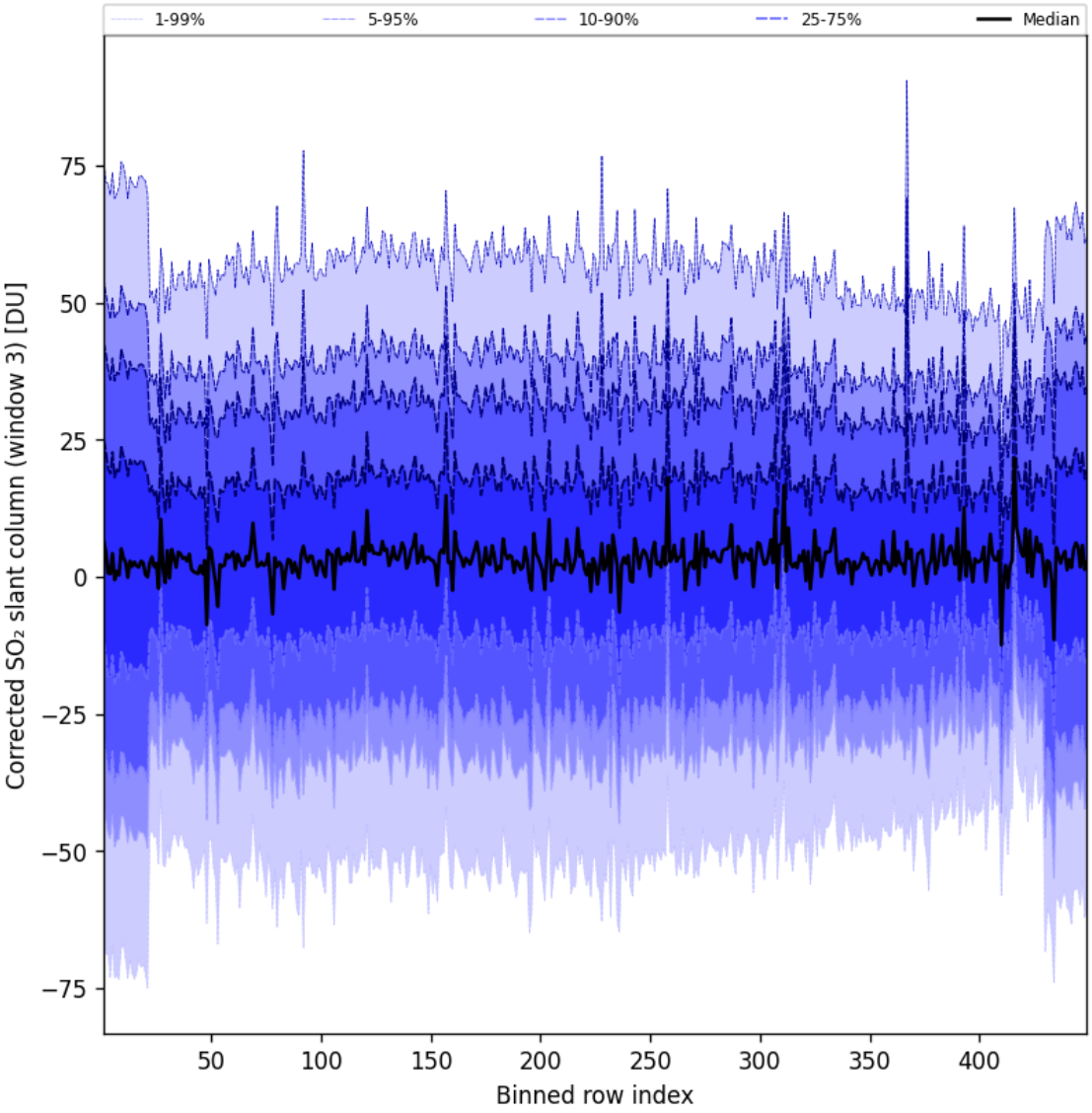

Figure 100: Along track statistics of “Corrected SO_2 slant column (window 3)” for 2025-02-10 to 2025-02-11

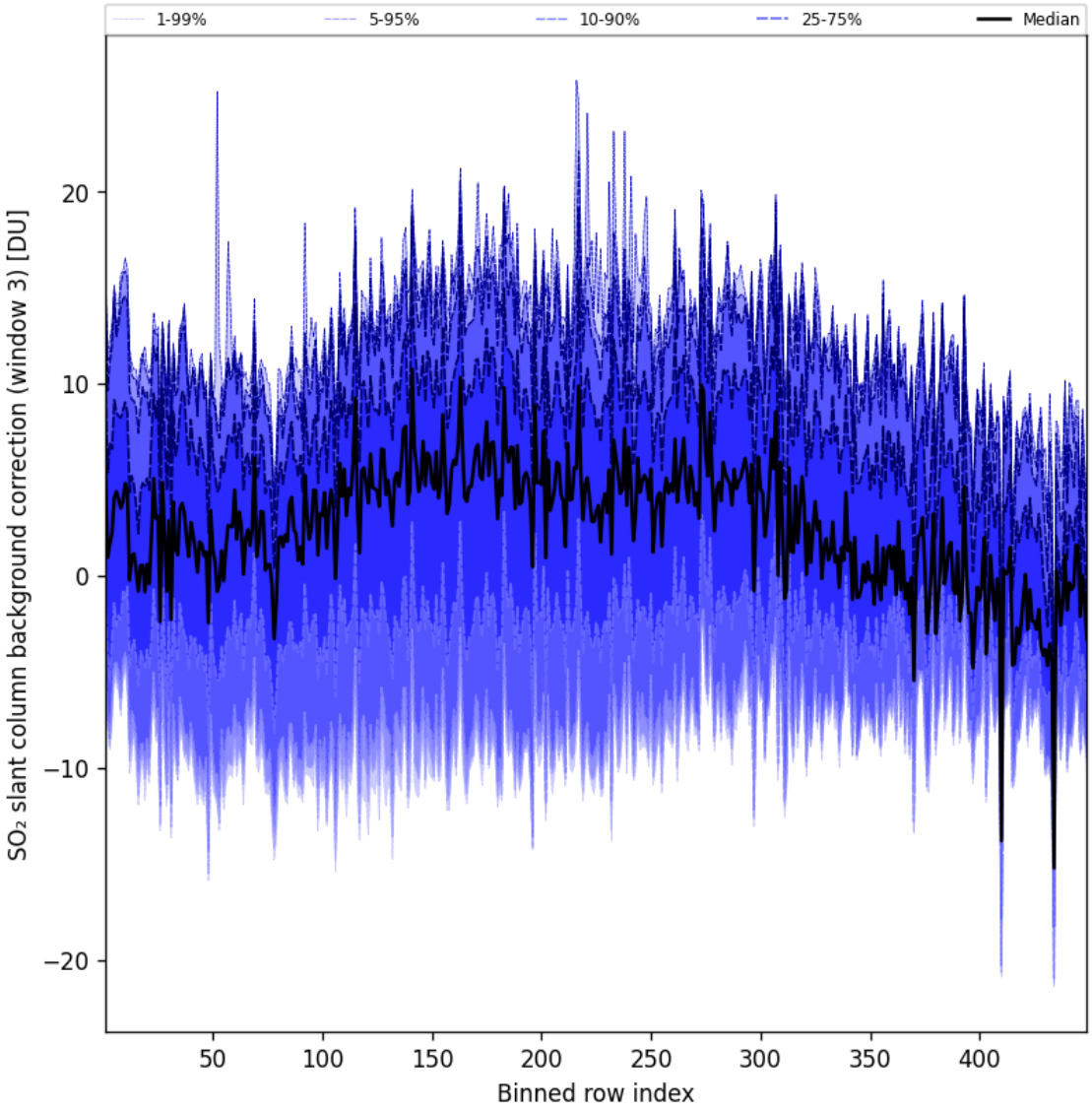

Figure 101: Along track statistics of "SO_2 slant column background correction (window 3)" for 2025-02-10 to 2025-02-11

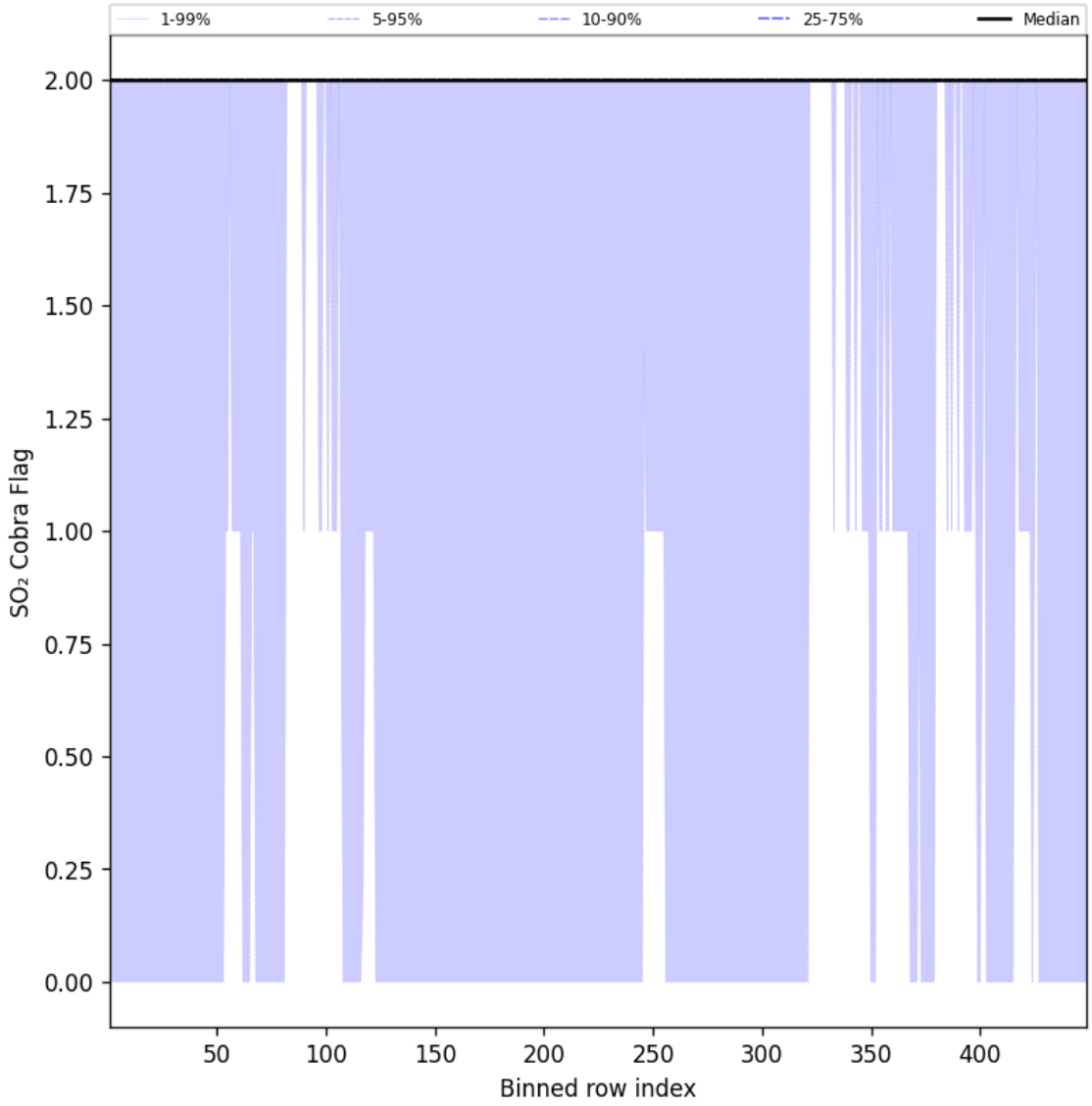

Figure 102: Along track statistics of "SO_2 Cobra Flag" for 2025-02-10 to 2025-02-11

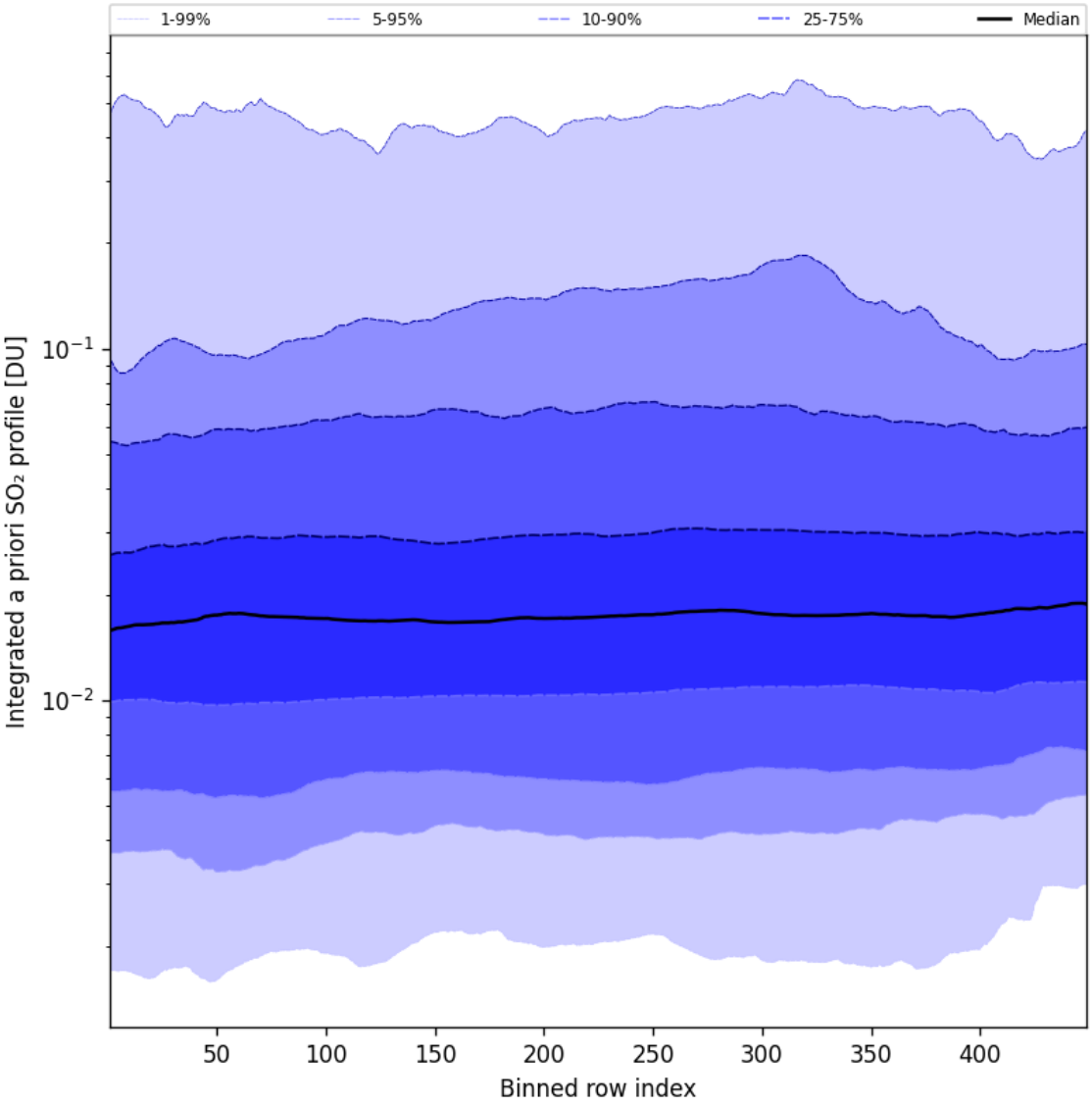

Figure 103: Along track statistics of “Integrated a priori SO_2 profile” for 2025-02-10 to 2025-02-11

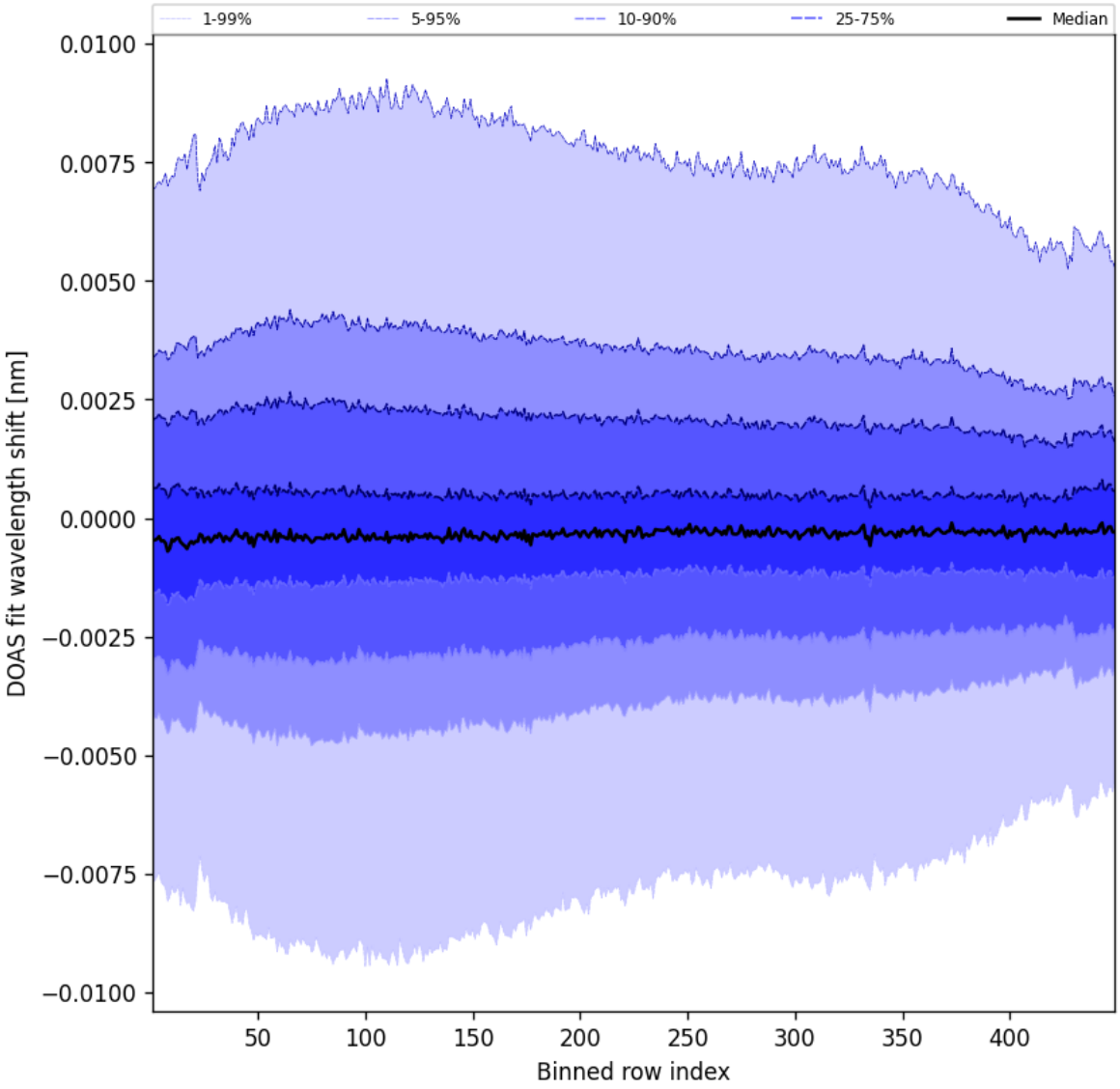

Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2025-02-10 to 2025-02-11

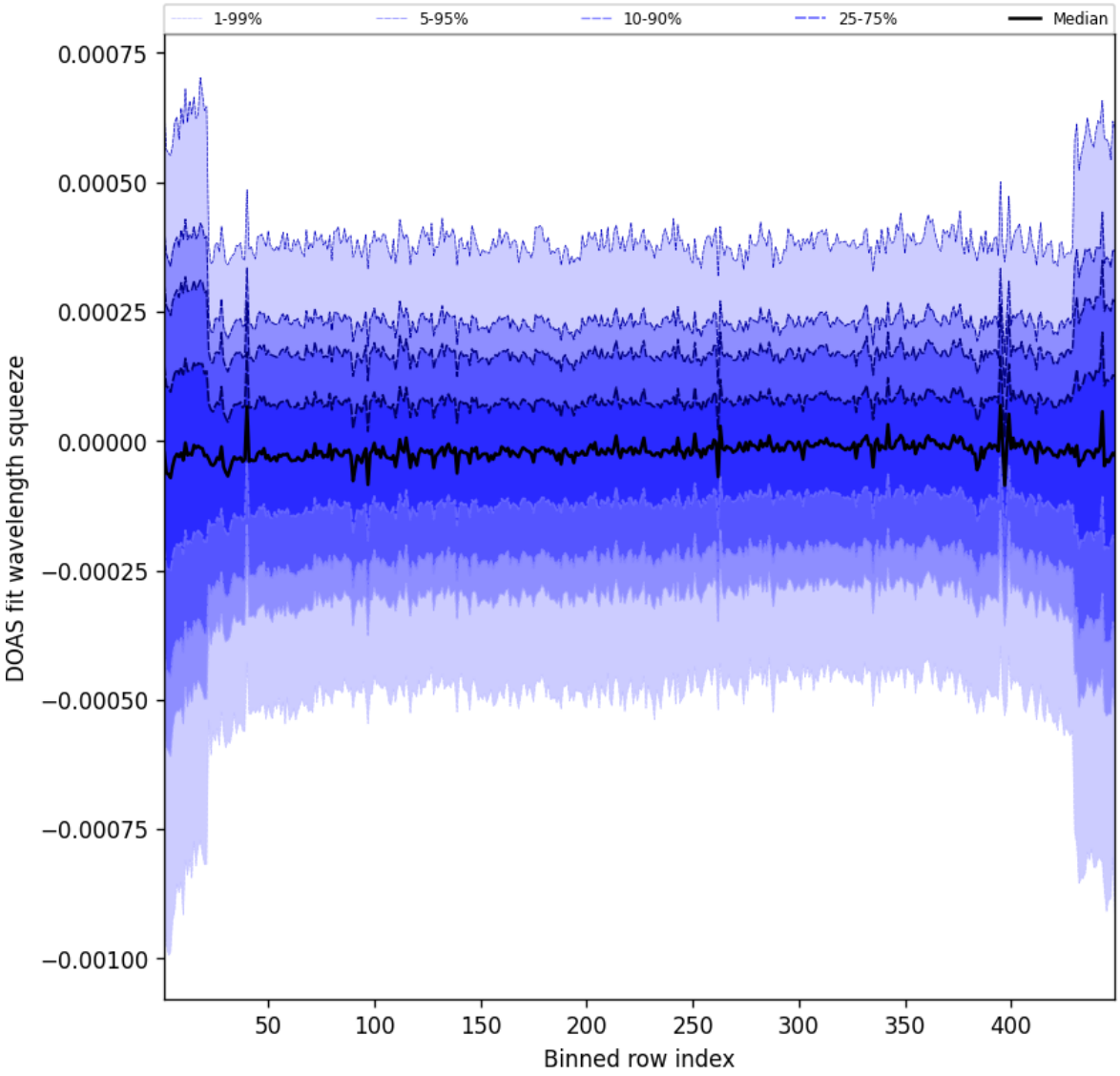

Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2025-02-10 to 2025-02-11

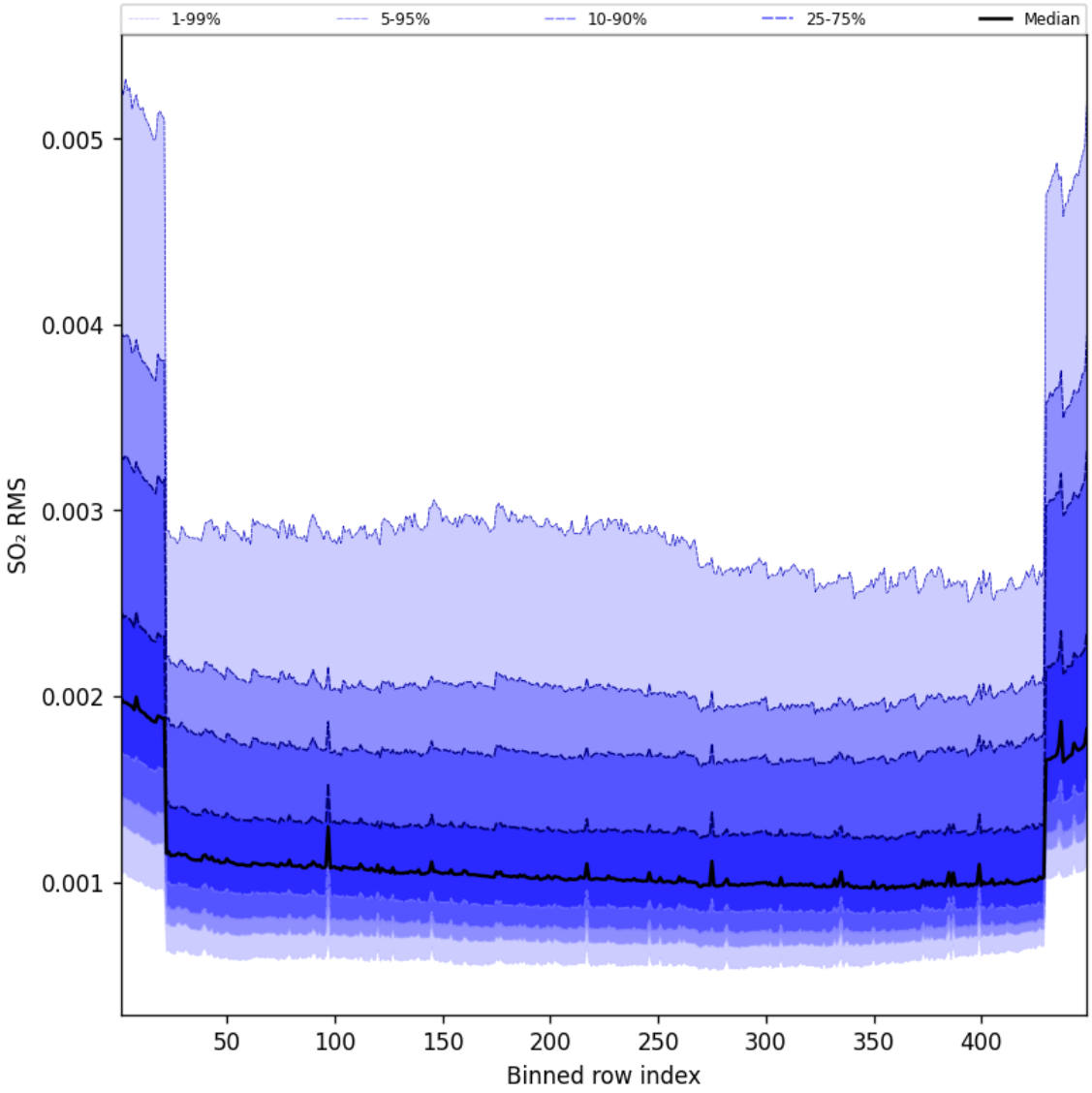

Figure 106: Along track statistics of "SO_2 RMS" for 2025-02-10 to 2025-02-11

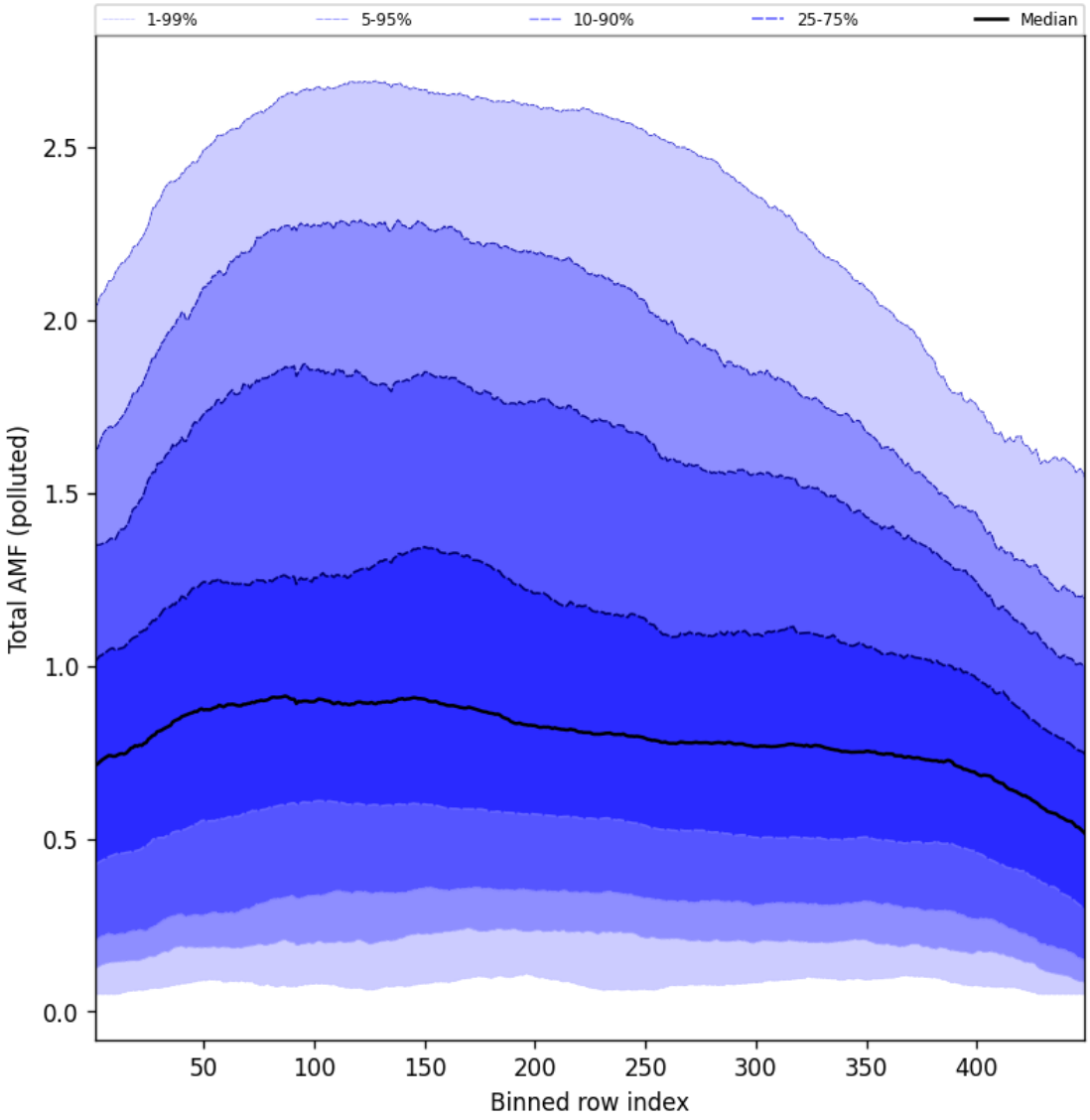

Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-02-10 to 2025-02-11

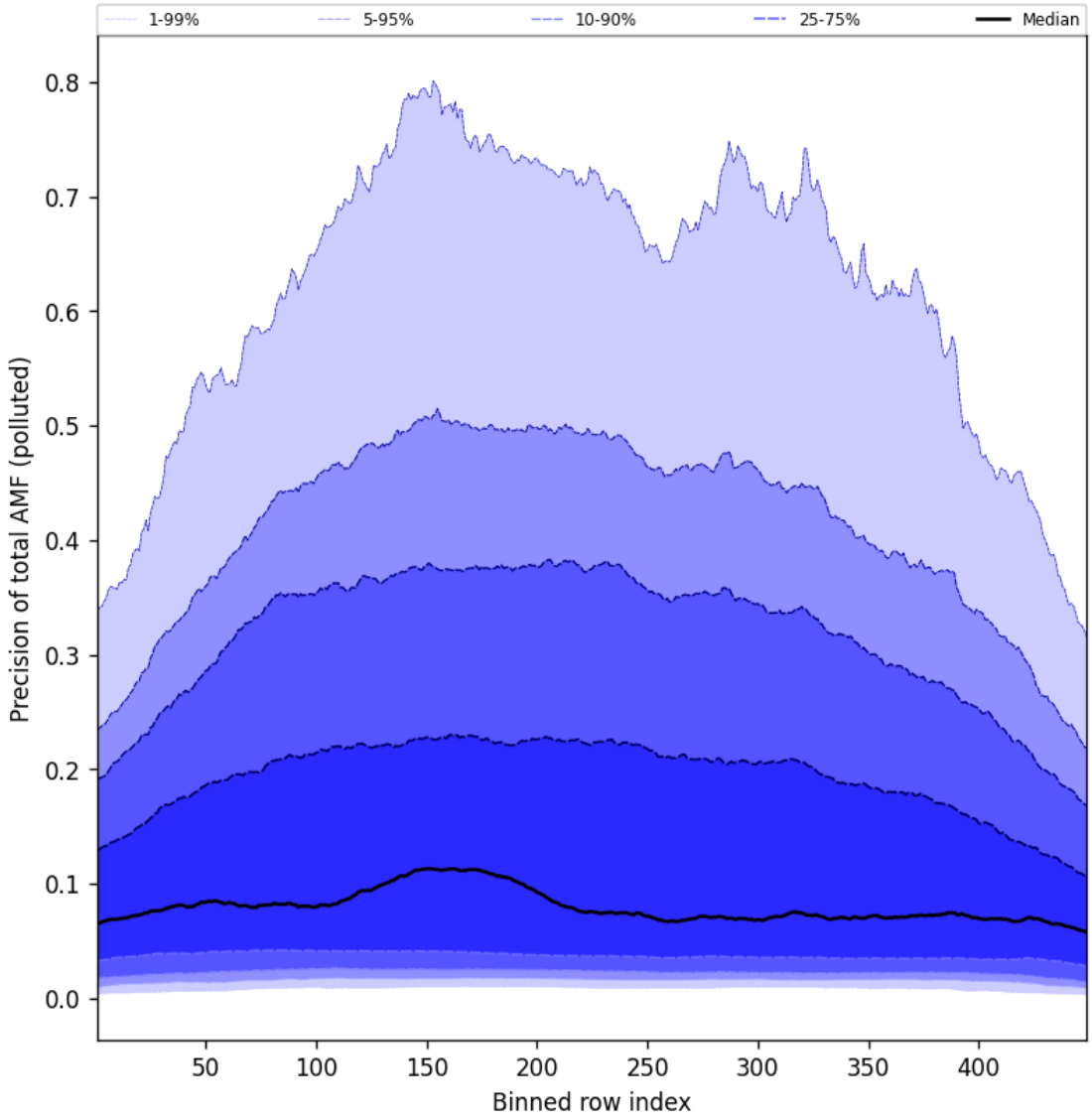

Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-02-10 to 2025-02-11

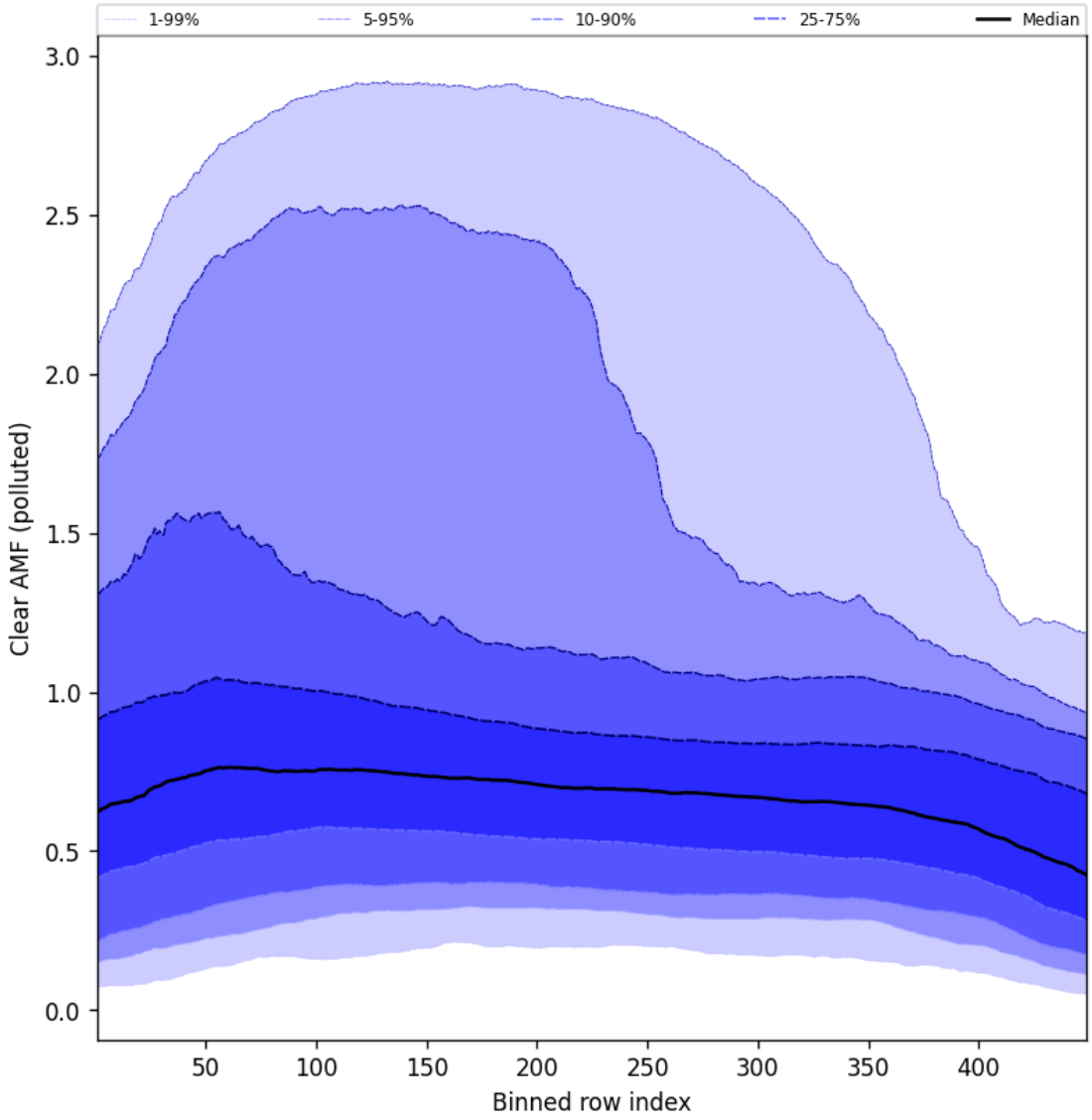

Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-02-10 to 2025-02-11

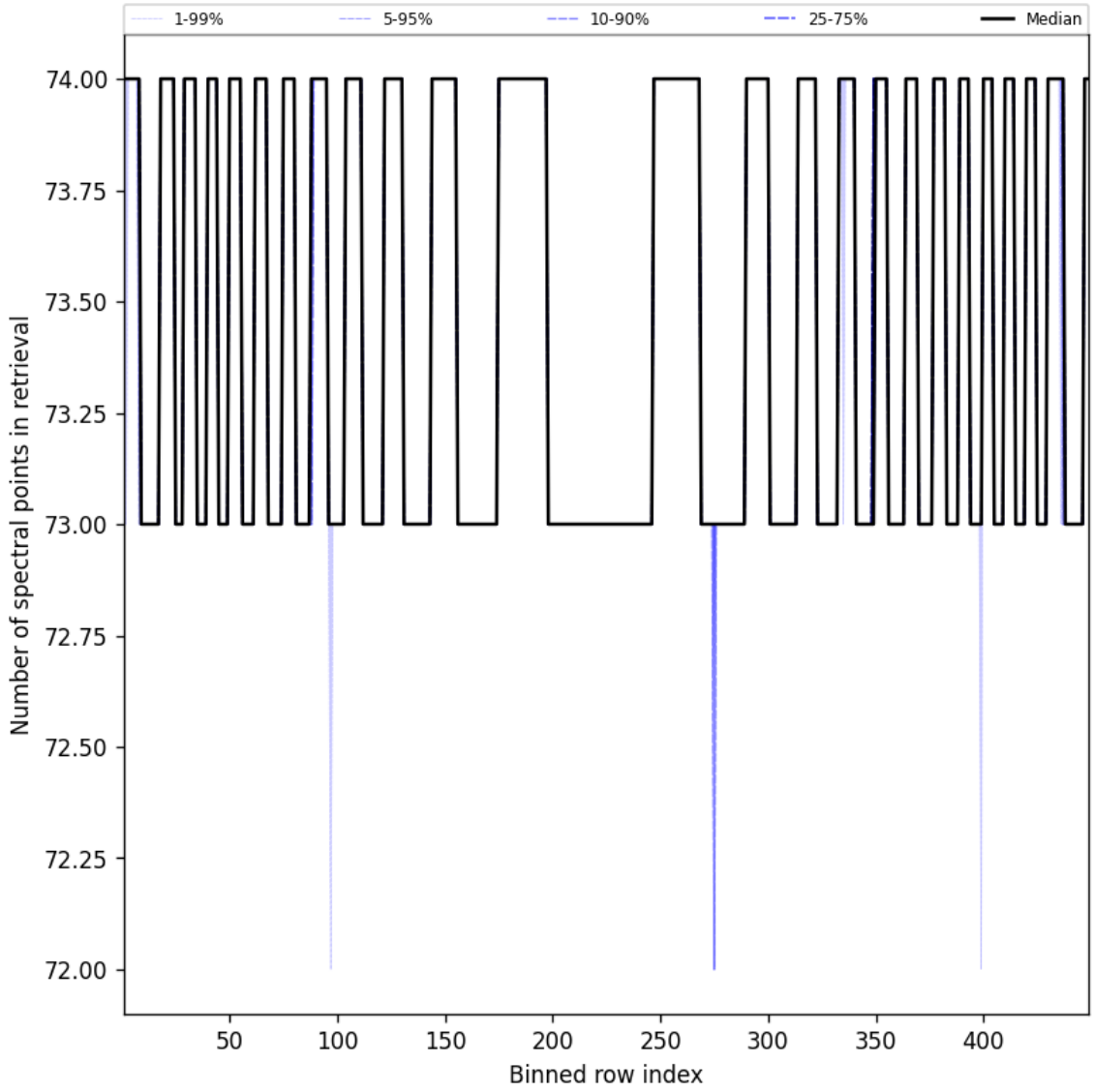

Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-02-10 to 2025-02-11

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

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