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]	0.624 ± 0.414	17309626	0.995	0.810	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(4.453 \pm 152.851) \times 10^{-2}$	17309626	0.235	0.412	8.829×10^{-3}	-107	597
sulfurdioxide total vertical column precision [DU]	0.590 ± 1.102	17309626	0.197	0.340	0.297	3.604×10^{-2}	231
sulfurdioxide slant column density corrected [DU]	$(1.656 \pm 34.668) \times 10^{-2}$	17309626	0.235	0.343	8.156×10^{-3}	-12.1	59.5
sulfurdioxide slant column density cobra [DU]	$(1.651 \pm 34.379) \times 10^{-2}$	17309626	0.235	0.343	8.156×10^{-3}	-12.1	36.0
sulfurdioxide slant column density cobra precision [DU]	0.279 ± 0.132	17309626	0.188	0.127	0.237	7.693×10^{-2}	26.2
sulfurdioxide slant column density window1 [DU]	0.114 ± 0.660	17309626	0.175	0.710	0.126	-84.9	82.4
sulfurdioxide slant column density window1 precision [DU]	0.279 ± 0.132	17309626	0.188	0.127	0.237	7.693×10^{-2}	26.2
sulfurdioxide slant column density corrected win1 [DU]	$(-1.312 \pm 64.595) \times 10^{-2}$	17309626	-2.500×10^{-2}	0.684	-3.016×10^{-2}	-84.9	82.1
background so2 slant column offset window1 [DU]	-0.127 ± 0.177	17309626	-0.180	0.201	-0.176	-1.43	3.99
sulfurdioxide slant column density window2 [DU]	-0.727 ± 8.731	17309626	-1.75	11.0	-0.926	-1.301×10^{3}	1.094×10^{3}
sulfurdioxide slant column density window2 precision [DU]	7.87 ± 2.16	17309626	6.97	2.46	7.53	2.19	454
sulfurdioxide slant column density corrected win2 [DU]	-3.06 ± 8.46	17309626	-2.75	10.7	-3.01	-1.304×10^{3}	1.094×10^{3}
background so2 slant column offset window2 [DU]	-2.33 ± 2.74	17309626	-0.250	2.99	-1.47	-20.7	8.00
sulfurdioxide slant column density window3 [DU]	4.25 ± 23.61	17309626	3.92	29.7	4.04	-3.039×10^{3}	460
sulfurdioxide slant column density window3 precision [DU]	28.6 ± 12.4	17309626	22.5	8.99	25.2	11.4	824
sulfurdioxide slant column density corrected win3 [DU]	16.5 ± 22.6	17309626	15.1	28.3	16.4	-3.035×10^{3}	478
background so2 slant column offset window3 [DU]	12.2 ± 7.1	17309626	8.40	10.8	12.3	-14.4	34.3
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.21	17309626	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(3.493 \pm 7.781) \times 10^{-2}$	17309626	1.664×10^{-2}	1.903×10^{-2}	1.787×10^{-2}	2.509×10^{-4}	2.59
fitted radiance shift [nm]	$(-3.555 \pm 24.843) \times 10^{-4}$	17309626	-5.000×10^{-4}	1.767×10^{-3}	-3.632×10^{-4}	-4.202×10^{-2}	4.388×10^{-2}
fitted radiance squeeze [1]	$(-3.093 \pm 17.940) \times 10^{-5}$	17309626	-1.000×10^{-5}	2.030×10^{-4}	-2.507×10^{-5}	-1.472×10^{-2}	1.559×10^{-2}
fitted root mean square [1]	$(1.231 \pm 0.544) \times 10^{-3}$	17309626	9.250×10^{-4}	5.081×10^{-4}	1.071×10^{-3}	3.359×10^{-4}	5.080×10^{-2}
sulfurdioxide total air mass factor polluted [1]	0.900 ± 0.538	17309626	0.580	0.635	0.800	5.000×10^{-2}	3.04
sulfurdioxide total air mass factor polluted precision [1]	0.137 ± 0.144	17309626	3.500×10^{-2}	0.154	8.106×10^{-2}	2.500×10^{-3}	1.69
sulfurdioxide clear air mass factor polluted [1]	0.777 ± 0.496	17309626	0.580	0.411	0.672	2.875×10^{-2}	3.08
number of spectral points in retrieval [1]	73.5 ± 0.5	17309626	73.0	1.000	73.0	70.0	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}	9.000×10^{-2}	0.190	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	−3.12	−0.925	−0.522	−0.338	−0.194	0.218	0.375	0.581	1.05	3.78
sulfurdioxide total vertical column precision [DU]	8.493×10^{-2}	0.111	0.134	0.157	0.191	0.532	0.780	1.13	1.95	5.42
sulfurdioxide slant column density corrected [DU]	−0.828	−0.468	−0.337	−0.251	−0.162	0.181	0.275	0.369	0.517	0.981
sulfurdioxide slant column density cobra [DU]	−0.828	−0.468	−0.337	−0.251	−0.162	0.181	0.275	0.369	0.517	0.981
sulfurdioxide slant column density cobra precision [DU]	0.129	0.157	0.171	0.181	0.195	0.322	0.385	0.442	0.522	0.777
sulfurdioxide slant column density window1 [DU]	−1.69	−0.910	−0.621	−0.431	−0.235	0.474	0.655	0.829	1.09	1.85
sulfurdioxide slant column density window1 precision [DU]	0.129	0.157	0.171	0.181	0.195	0.322	0.385	0.442	0.522	0.777
sulfurdioxide slant column density corrected win1 [DU]	−1.64	−0.956	−0.709	−0.543	−0.368	0.316	0.504	0.691	0.986	1.85
background so2 slant column offset window1 [DU]	−0.400	−0.327	−0.296	−0.274	−0.246	-4.520×10^{-2}	3.997×10^{-2}	0.115	0.212	0.412
sulfurdioxide slant column density window2 [DU]	−21.0	−14.5	−11.4	−9.01	−6.35	4.65	7.51	10.1	13.7	21.6
sulfurdioxide slant column density window2 precision [DU]	4.23	5.07	5.57	5.97	6.45	8.91	9.77	10.6	11.8	14.4
sulfurdioxide slant column density corrected win2 [DU]	−23.8	−16.9	−13.5	−11.1	−8.39	2.32	4.96	7.33	10.5	17.3
background so2 slant column offset window2 [DU]	−11.0	−8.39	−6.22	−4.78	−3.46	−0.473	−0.210	2.500×10^{-2}	0.361	2.02
sulfurdioxide slant column density window3 [DU]	−54.0	−34.0	−24.7	−18.0	−10.6	19.1	26.8	33.9	43.3	62.0
sulfurdioxide slant column density window3 precision [DU]	16.0	18.0	19.3	20.4	21.7	30.7	35.1	40.4	51.6	82.2
sulfurdioxide slant column density corrected win3 [DU]	−40.0	−20.3	−11.2	−4.72	2.37	30.7	38.0	44.5	53.4	71.3
background so2 slant column offset window3 [DU]	−2.79	1.08	2.69	4.34	6.93	17.7	19.9	21.5	23.4	26.5
sulfurdioxide slant column cobra flag [1]	0.0	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
integrated so2 profile apriori [DU]	1.800×10^{-3}	4.177×10^{-3}	6.639×10^{-3}	8.697×10^{-3}	1.111×10^{-2}	3.014×10^{-2}	4.229×10^{-2}	5.805×10^{-2}	0.103	0.394
fitted radiance shift [nm]	-7.830×10^{-3}	-3.989×10^{-3}	-2.654×10^{-3}	-1.912×10^{-3}	-1.288×10^{-3}	4.787×10^{-4}	1.143×10^{-3}	1.986×10^{-3}	3.455×10^{-3}	7.536×10^{-3}
fitted radiance squeeze [1]	-5.208×10^{-4}	-3.218×10^{-4}	-2.410×10^{-4}	-1.863×10^{-4}	-1.293×10^{-4}	7.368×10^{-5}	1.240×10^{-4}	1.712×10^{-4}	2.402×10^{-4}	4.154×10^{-4}
fitted root mean square [1]	5.735×10^{-4}	6.998×10^{-4}	7.728×10^{-4}	8.275×10^{-4}	8.934×10^{-4}	1.401×10^{-3}	1.656×10^{-3}	1.907×10^{-3}	2.276×10^{-3}	3.239×10^{-3}
sulfurdioxide total air mass factor polluted [1]	7.479×10^{-2}	0.200	0.314	0.410	0.521	1.16	1.40	1.65	2.01	2.57
sulfurdioxide total air mass factor polluted precision [1]	7.852×10^{-3}	1.656×10^{-2}	2.332×10^{-2}	2.882×10^{-2}	3.793×10^{-2}	0.192	0.259	0.326	0.424	0.650
sulfurdioxide clear air mass factor polluted [1]	0.138	0.255	0.344	0.414	0.495	0.905	1.02	1.16	1.92	2.80
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]	0.672 ± 0.405	7037383	0.770	1.000	0.0	1.000	0.230	1.000
sulfurdioxide total vertical column [DU]	$(9.054 \pm 228.459) \times 10^{-2}$	7037383	0.593	1.388×10^{-2}	-107	597	-0.273	0.319
sulfurdioxide total vertical column precision [DU]	0.932 ± 1.581	7037383	0.671	0.430	4.575×10^{-2}	231	0.248	0.919
sulfurdioxide slant column density corrected [DU]	$(2.543 \pm 42.279) \times 10^{-2}$	7037383	0.391	1.066×10^{-2}	-12.1	59.5	-0.182	0.209
sulfurdioxide slant column density cobra [DU]	$(2.531 \pm 41.733) \times 10^{-2}$	7037383	0.391	1.066×10^{-2}	-12.1	30.5	-0.182	0.209
sulfurdioxide slant column density cobra precision [DU]	0.325 ± 0.162	7037383	0.190	0.275	8.177×10^{-2}	11.8	0.212	0.401
sulfurdioxide slant column density window1 [DU]	0.168 ± 0.772	7037383	0.788	0.178	-14.0	47.4	-0.219	0.569
sulfurdioxide slant column density window1 precision [DU]	0.325 ± 0.162	7037383	0.190	0.275	8.177×10^{-2}	11.8	0.212	0.401
sulfurdioxide slant column density corrected win1 [DU]	$(1.165 \pm 76.894) \times 10^{-2}$	7037383	0.777	-1.845×10^{-2}	-12.1	47.3	-0.397	0.380
background so2 slant column offset window1 [DU]	-0.156 ± 0.183	7037383	0.176	-0.193	-0.551	3.99	-0.269	-9.292×10^{-2}
sulfurdioxide slant column density window2 [DU]	$(3.821 \pm 953.229) \times 10^{-2}$	7037383	12.1	-0.323	-68.6	365	-6.21	5.90
sulfurdioxide slant column density window2 precision [DU]	8.46 ± 2.23	7037383	2.75	8.13	2.25	226	6.92	9.67
sulfurdioxide slant column density corrected win2 [DU]	-3.18 ± 9.08	7037383	11.6	-3.13	-76.1	353	-8.94	2.62
background so2 slant column offset window2 [DU]	-3.22 ± 3.45	7037383	4.90	-1.85	-20.7	7.96	-5.50	-0.601
sulfurdioxide slant column density window3 [DU]	1.48 ± 24.62	7037383	31.3	1.78	-176	165	-14.0	17.3
sulfurdioxide slant column density window3 precision [DU]	30.1 ± 12.3	7037383	9.37	26.9	11.4	218	23.3	32.7
sulfurdioxide slant column density corrected win3 [DU]	16.4 ± 23.9	7037383	30.2	16.6	-169	181	1.42	31.6
background so2 slant column offset window3 [DU]	14.9 ± 6.1	7037383	9.92	14.4	-10.4	31.5	9.97	19.9
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.25	7037383	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(5.615 \pm 11.483) \times 10^{-2}$	7037383	3.714×10^{-2}	2.269×10^{-2}	2.509×10^{-4}	2.59	1.244×10^{-2}	4.957×10^{-2}
fitted radiance shift [nm]	$(-1.938 \pm 24.892) \times 10^{-4}$	7037383	1.672×10^{-3}	-1.912×10^{-4}	-4.202×10^{-2}	4.004×10^{-2}	-1.052×10^{-3}	6.194×10^{-4}
fitted radiance squeeze [1]	$(5.168 \pm 197.999) \times 10^{-6}$	7037383	2.139×10^{-4}	7.844×10^{-6}	-3.033×10^{-3}	1.404×10^{-2}	-9.908×10^{-5}	1.148×10^{-4}
fitted root mean square [1]	$(1.407 \pm 0.672) \times 10^{-3}$	7037383	7.486×10^{-4}	1.183×10^{-3}	3.473×10^{-4}	4.463×10^{-2}	9.573×10^{-4}	1.706×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.701 ± 0.401	7037383	0.540	0.647	5.000×10^{-2}	2.78	0.400	0.940
sulfurdioxide total air mass factor polluted precision [1]	0.109 ± 0.147	7037383	0.105	5.141×10^{-2}	2.500×10^{-3}	1.69	2.797×10^{-2}	0.133
sulfurdioxide clear air mass factor polluted [1]	0.595 ± 0.285	7037383	0.439	0.566	2.875×10^{-2}	2.25	0.367	0.806
number of spectral points in retrieval [1]	73.5 ± 0.5	7037383	1.000	73.0	71.0	74.0	73.0	74.0

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

Variable	mean $\pm\sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.591 ± 0.417	10272243	0.830	0.490	0.0	1.000	0.170	1.000
sulfurdioxide total vertical column [DU]	$(1.301 \pm 59.900) \times 10^{-2}$	10272243	0.335	6.668×10^{-3}	-39.6	98.5	-0.160	0.175
sulfurdioxide total vertical column precision [DU]	0.355 ± 0.444	10272243	0.232	0.244	3.604×10^{-2}	40.1	0.167	0.399
sulfurdioxide slant column density corrected [DU]	$(1.048 \pm 28.279) \times 10^{-2}$	10272243	0.316	6.730×10^{-3}	-11.9	46.9	-0.150	0.166
sulfurdioxide slant column density cobra [DU]	$(1.048 \pm 28.242) \times 10^{-2}$	10272243	0.316	6.730×10^{-3}	-11.9	36.0	-0.150	0.166
sulfurdioxide slant column density cobra precision [DU]	0.247 ± 0.096	10272243	9.262×10^{-2}	0.221	7.693×10^{-2}	26.2	0.188	0.280
sulfurdioxide slant column density window1 [DU]	$(7.662 \pm 56.799) \times 10^{-2}$	10272243	0.662	9.560×10^{-2}	-84.9	82.4	-0.245	0.417
sulfurdioxide slant column density window1 precision [DU]	0.247 ± 0.096	10272243	9.262×10^{-2}	0.221	7.693×10^{-2}	26.2	0.188	0.280
sulfurdioxide slant column density corrected win1 [DU]	$(-3.009 \pm 54.526) \times 10^{-2}$	10272243	0.631	-3.680×10^{-2}	-84.9	82.1	-0.351	0.280
background so2 slant column offset window1 [DU]	-0.107 ± 0.171	10272243	0.226	-0.162	-1.43	2.01	-0.230	-3.677×10^{-3}
sulfurdioxide slant column density window2 [DU]	-1.25 ± 8.10	10272243	10.3	-1.28	-1.301×10^{3}	1.094×10^{3}	-6.43	3.90
sulfurdioxide slant column density window2 precision [DU]	7.47 ± 2.02	10272243	2.15	7.19	2.19	454	6.21	8.36
sulfurdioxide slant column density corrected win2 [DU]	-2.98 ± 8.00	10272243	10.2	-2.93	-1.304×10^{3}	1.094×10^{3}	-8.04	2.13
background so2 slant column offset window2 [DU]	-1.73 ± 1.90	10272243	2.43	-1.23	-16.4	8.00	-2.83	-0.403
sulfurdioxide slant column density window3 [DU]	6.15 ± 22.69	10272243	28.6	5.45	-3.039×10^{3}	460	-8.45	20.2
sulfurdioxide slant column density window3 precision [DU]	27.5 ± 12.3	10272243	8.06	24.0	11.6	824	21.0	29.0
sulfurdioxide slant column density corrected win3 [DU]	16.5 ± 21.6	10272243	27.1	16.3	-3.035×10^{3}	478	2.95	30.1
background so2 slant column offset window3 [DU]	10.4 ± 7.1	10272243	11.9	10.2	-14.4	34.3	4.35	16.2
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.18	10272243	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.039 \pm 2.545) \times 10^{-2}$	10272243	1.389×10^{-2}	1.642×10^{-2}	8.877×10^{-4}	2.18	1.040×10^{-2}	2.429×10^{-2}
fitted radiance shift [nm]	$(-4.664 \pm 24.748) \times 10^{-4}$	10272243	1.779×10^{-3}	-4.930×10^{-4}	-4.040×10^{-2}	4.388×10^{-2}	-1.414×10^{-3}	3.651×10^{-4}
fitted radiance squeeze [1]	$(-5.566 \pm 16.084) \times 10^{-5}$	10272243	1.934×10^{-4}	-4.541×10^{-5}	-1.472×10^{-2}	1.559×10^{-2}	-1.467×10^{-4}	4.662×10^{-5}
fitted root mean square [1]	$(1.111 \pm 0.392) \times 10^{-3}$	10272243	3.988×10^{-4}	1.013×10^{-3}	3.359×10^{-4}	5.080×10^{-2}	8.626×10^{-4}	1.261×10^{-3}
sulfurdioxide total air mass factor polluted [1]	1.04 ± 0.58	10272243	0.720	0.909	5.000×10^{-2}	3.04	0.614	1.33
sulfurdioxide total air mass factor polluted precision [1]	0.156 ± 0.139	10272243	0.179	0.114	5.193×10^{-3}	1.36	4.705×10^{-2}	0.226
sulfurdioxide clear air mass factor polluted [1]	0.902 ± 0.565	10272243	0.406	0.740	0.155	3.08	0.563	0.969
number of spectral points in retrieval [1]	73.4 ± 0.5	10272243	1.000	73.0	70.0	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]	0.657 ± 0.408	12440547	0.780	1.000	0.0	1.000	0.220	1.000
sulfurdioxide total vertical column [DU]	$(2.948 \pm 134.455) \times 10^{-2}$	12440547	0.399	7.982×10^{-3}	-107	597	-0.190	0.209
sulfurdioxide total vertical column precision [DU]	0.521 ± 0.960	12440547	0.288	0.284	4.221×10^{-2}	231	0.194	0.481
sulfurdioxide slant column density corrected [DU]	$(1.303 \pm 31.821) \times 10^{-2}$	12440547	0.326	7.029×10^{-3}	-12.1	49.3	-0.155	0.171
sulfurdioxide slant column density cobra [DU]	$(1.299 \pm 31.575) \times 10^{-2}$	12440547	0.326	7.029×10^{-3}	-12.1	30.5	-0.155	0.171
sulfurdioxide slant column density cobra precision [DU]	0.262 ± 0.122	12440547	0.103	0.224	7.693×10^{-2}	11.8	0.190	0.294
sulfurdioxide slant column density window1 [DU]	0.118 ± 0.607	12440547	0.670	0.129	-84.9	47.4	-0.211	0.459
sulfurdioxide slant column density window1 precision [DU]	0.262 ± 0.122	12440547	0.103	0.224	7.693×10^{-2}	11.8	0.190	0.294
sulfurdioxide slant column density corrected win1 [DU]	$(-2.553 \pm 59.470) \times 10^{-2}$	12440547	0.650	-3.707×10^{-2}	-84.9	47.3	-0.359	0.291
background so2 slant column offset window1 [DU]	-0.144 ± 0.154	12440547	0.182	-0.180	-0.618	3.74	-0.248	-6.598×10^{-2}
sulfurdioxide slant column density window2 [DU]	-1.17 ± 8.38	12440547	10.6	-1.30	-1.301×10^{3}	777	-6.56	4.04
sulfurdioxide slant column density window2 precision [DU]	7.66 ± 2.02	12440547	2.31	7.35	2.19	454	6.32	8.63
sulfurdioxide slant column density corrected win2 [DU]	-3.06 ± 8.22	12440547	10.5	-3.01	-1.304×10^{3}	771	-8.26	2.19
background so2 slant column offset window2 [DU]	-1.90 ± 2.34	12440547	2.38	-1.24	-20.7	8.00	-2.79	-0.411
sulfurdioxide slant column density window3 [DU]	7.14 ± 23.11	12440547	29.3	6.70	-967	460	-7.61	21.7
sulfurdioxide slant column density window3 precision [DU]	27.8 ± 11.6	12440547	8.49	24.7	11.6	218	21.4	29.9
sulfurdioxide slant column density corrected win3 [DU]	18.3 ± 22.0	12440547	27.9	18.0	-958	478	4.30	32.2
background so2 slant column offset window3 [DU]	11.2 ± 6.6	12440547	9.82	11.3	-14.4	31.5	6.38	16.2
sulfurdioxide slant column cobra flag [1]	1.99 ± 0.17	12440547	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.523 \pm 3.344) \times 10^{-2}$	12440547	1.564×10^{-2}	1.742×10^{-2}	2.509×10^{-4}	0.955	1.160×10^{-2}	2.724×10^{-2}
fitted radiance shift [nm]	$(-3.136 \pm 23.649) \times 10^{-4}$	12440547	1.753×10^{-3}	-2.953×10^{-4}	-4.202×10^{-2}	4.388×10^{-2}	-1.221×10^{-3}	5.325×10^{-4}
fitted radiance squeeze [1]	$(-3.255 \pm 16.575) \times 10^{-5}$	12440547	1.901×10^{-4}	-2.552×10^{-5}	-1.472×10^{-2}	1.404×10^{-2}	-1.231×10^{-4}	6.700×10^{-5}
fitted root mean square [1]	$(1.156 \pm 0.488) \times 10^{-3}$	12440547	4.089×10^{-4}	1.019×10^{-3}	3.411×10^{-4}	4.463×10^{-2}	8.685×10^{-4}	1.277×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.859 ± 0.430	12440547	0.558	0.811	5.000×10^{-2}	2.59	0.546	1.10
sulfurdioxide total air mass factor polluted precision [1]	0.128 ± 0.123	12440547	0.141	7.875×10^{-2}	2.500×10^{-3}	1.45	4.065×10^{-2}	0.182
sulfurdioxide clear air mass factor polluted [1]	0.712 ± 0.275	12440547	0.364	0.679	3.699×10^{-2}	2.79	0.518	0.882
number of spectral points in retrieval [1]	73.5 ± 0.5	12440547	1.000	73.0	70.0	74.0	73.0	74.0

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

Variable	mean $\pm\sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.547 ± 0.420	4075596	0.890	0.490	0.0	1.000	0.110	1.000
sulfurdioxide total vertical column [DU]	$(6.796 \pm 168.056) \times 10^{-2}$	4075596	0.419	9.537×10^{-3}	-68.6	138	-0.192	0.226
sulfurdioxide total vertical column precision [DU]	0.681 ± 1.232	4075596	0.518	0.319	3.604×10^{-2}	37.3	0.163	0.681
sulfurdioxide slant column density corrected [DU]	$(2.273 \pm 39.195) \times 10^{-2}$	4075596	0.388	1.045×10^{-2}	-7.78	34.5	-0.181	0.207
sulfurdioxide slant column density cobra [DU]	$(2.267 \pm 38.929) \times 10^{-2}$	4075596	0.388	1.045×10^{-2}	-7.78	34.5	-0.181	0.207
sulfurdioxide slant column density cobra precision [DU]	0.313 ± 0.138	4075596	0.157	0.278	7.902×10^{-2}	26.2	0.218	0.375
sulfurdioxide slant column density window1 [DU]	$(9.137 \pm 76.005) \times 10^{-2}$	4075596	0.824	0.109	-24.3	42.0	-0.317	0.507
sulfurdioxide slant column density window1 precision [DU]	0.313 ± 0.138	4075596	0.157	0.278	7.902×10^{-2}	26.2	0.218	0.375
sulfurdioxide slant column density corrected win1 [DU]	$(1.168 \pm 73.716) \times 10^{-2}$	4075596	0.775	-1.266×10^{-2}	-24.3	42.0	-0.394	0.382
background so2 slant column offset window1 [DU]	$(-7.969 \pm 22.250) \times 10^{-2}$	4075596	0.302	-0.158	-1.21	3.99	-0.241	6.017×10^{-2}
sulfurdioxide slant column density window2 [DU]	0.222 ± 9.364	4075596	11.9	3.812×10^{-2}	-518	1.094×10^{3}	-5.81	6.05
sulfurdioxide slant column density window2 precision [DU]	8.36 ± 2.38	4075596	2.67	7.97	2.21	444	6.82	9.49
sulfurdioxide slant column density corrected win2 [DU]	-3.02 ± 8.97	4075596	11.3	-2.97	-518	1.094×10^{3}	-8.64	2.65
background so2 slant column offset window2 [DU]	-3.24 ± 3.11	4075596	4.55	-2.57	-20.7	6.50	-5.19	-0.636
sulfurdioxide slant column density window3 [DU]	-3.15 ± 23.15	4075596	28.8	-2.88	-3.039×10^{3}	265	-17.4	11.4
sulfurdioxide slant column density window3 precision [DU]	30.2 ± 14.1	4075596	9.62	26.4	11.4	824	22.6	32.2
sulfurdioxide slant column density corrected win3 [DU]	11.4 ± 23.3	4075596	28.8	12.0	-3.035×10^{3}	267	-2.64	26.1
background so2 slant column offset window3 [DU]	14.6 ± 7.6	4075596	12.5	16.0	-12.7	34.3	8.41	20.9
sulfurdioxide slant column cobra flag [1]	1.96 ± 0.28	4075596	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(5.503 \pm 12.486) \times 10^{-2}$	4075596	3.480×10^{-2}	1.932×10^{-2}	4.121×10^{-4}	2.59	8.135×10^{-3}	4.294×10^{-2}
fitted radiance shift [nm]	$(-4.988 \pm 27.686) \times 10^{-4}$	4075596	1.676×10^{-3}	-5.942×10^{-4}	-4.040×10^{-2}	3.572×10^{-2}	-1.423×10^{-3}	2.525×10^{-4}
fitted radiance squeeze [1]	$(-3.616 \pm 20.694) \times 10^{-5}$	4075596	2.428×10^{-4}	-3.132×10^{-5}	-1.394×10^{-2}	1.559×10^{-2}	-1.570×10^{-4}	8.582×10^{-5}
fitted root mean square [1]	$(1.398 \pm 0.596) \times 10^{-3}$	4075596	6.451×10^{-4}	1.247×10^{-3}	3.359×10^{-4}	5.080×10^{-2}	1.003×10^{-3}	1.649×10^{-3}
sulfurdioxide total air mass factor polluted [1]	1.07 ± 0.76	4075596	1.12	0.794	5.000×10^{-2}	3.04	0.475	1.59
sulfurdioxide total air mass factor polluted precision [1]	0.165 ± 0.188	4075596	0.199	0.102	2.500×10^{-3}	1.69	3.051×10^{-2}	0.230
sulfurdioxide clear air mass factor polluted [1]	1.02 ± 0.84	4075596	0.853	0.688	2.875×10^{-2}	3.08	0.424	1.28
number of spectral points in retrieval [1]	73.4 ± 0.5	4075596	1.000	73.0	70.0	74.0	73.0	74.0

3 Granule outlines

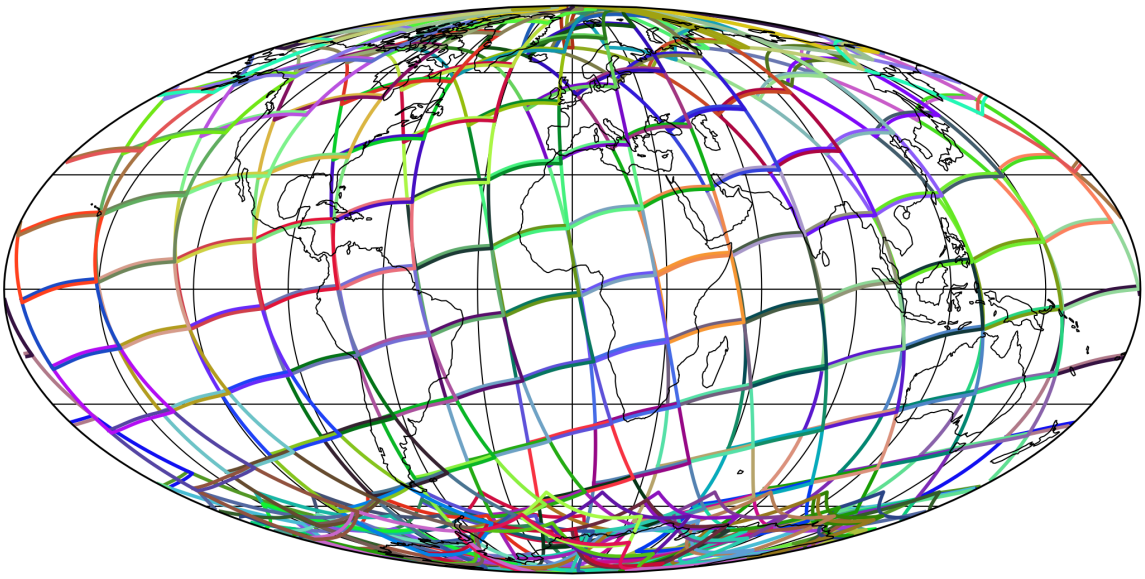

Figure 1: Outline of the granules.

4 Input data monitoring

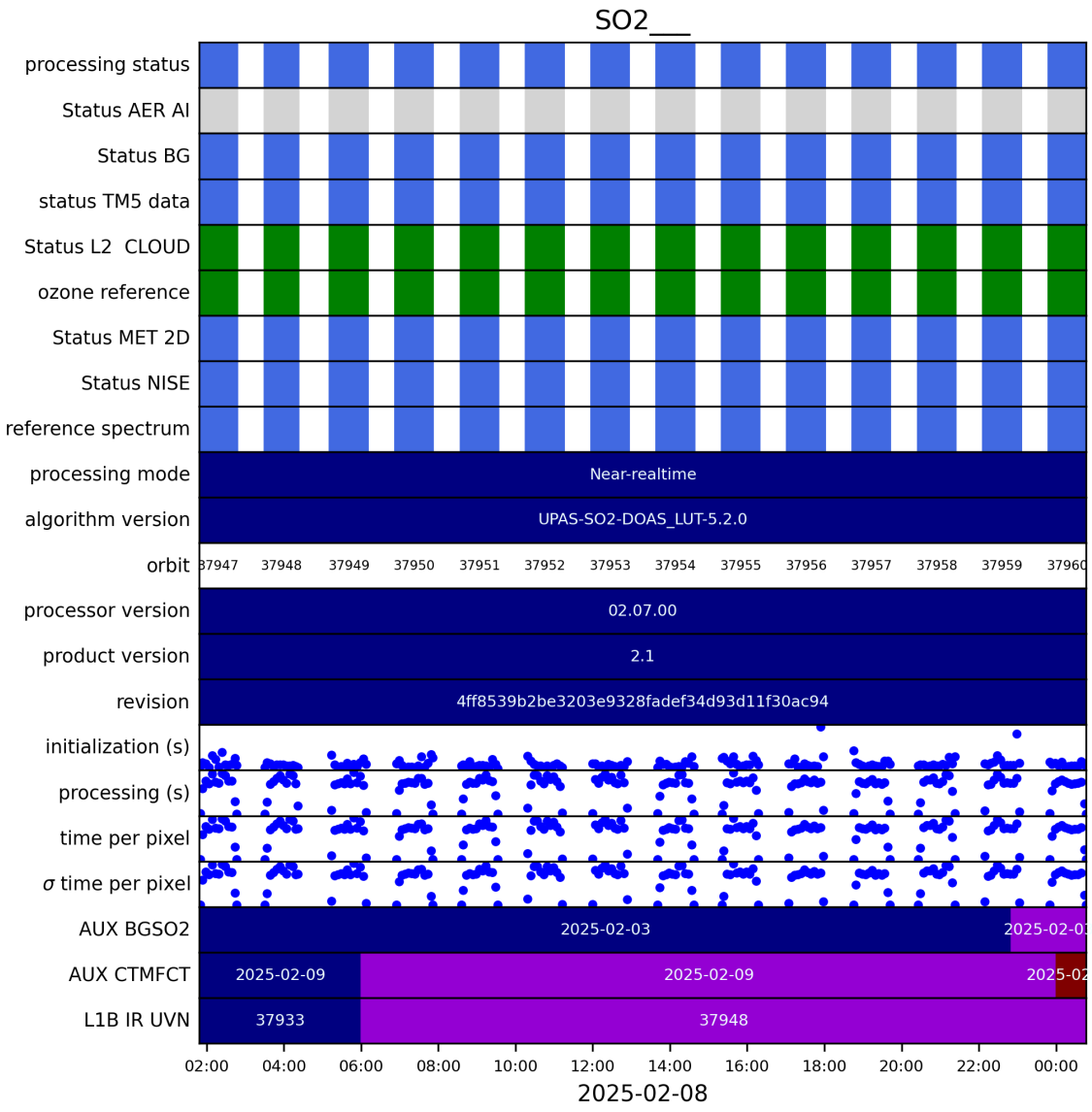

Figure 2: Input data per granule

5 Warnings and errors

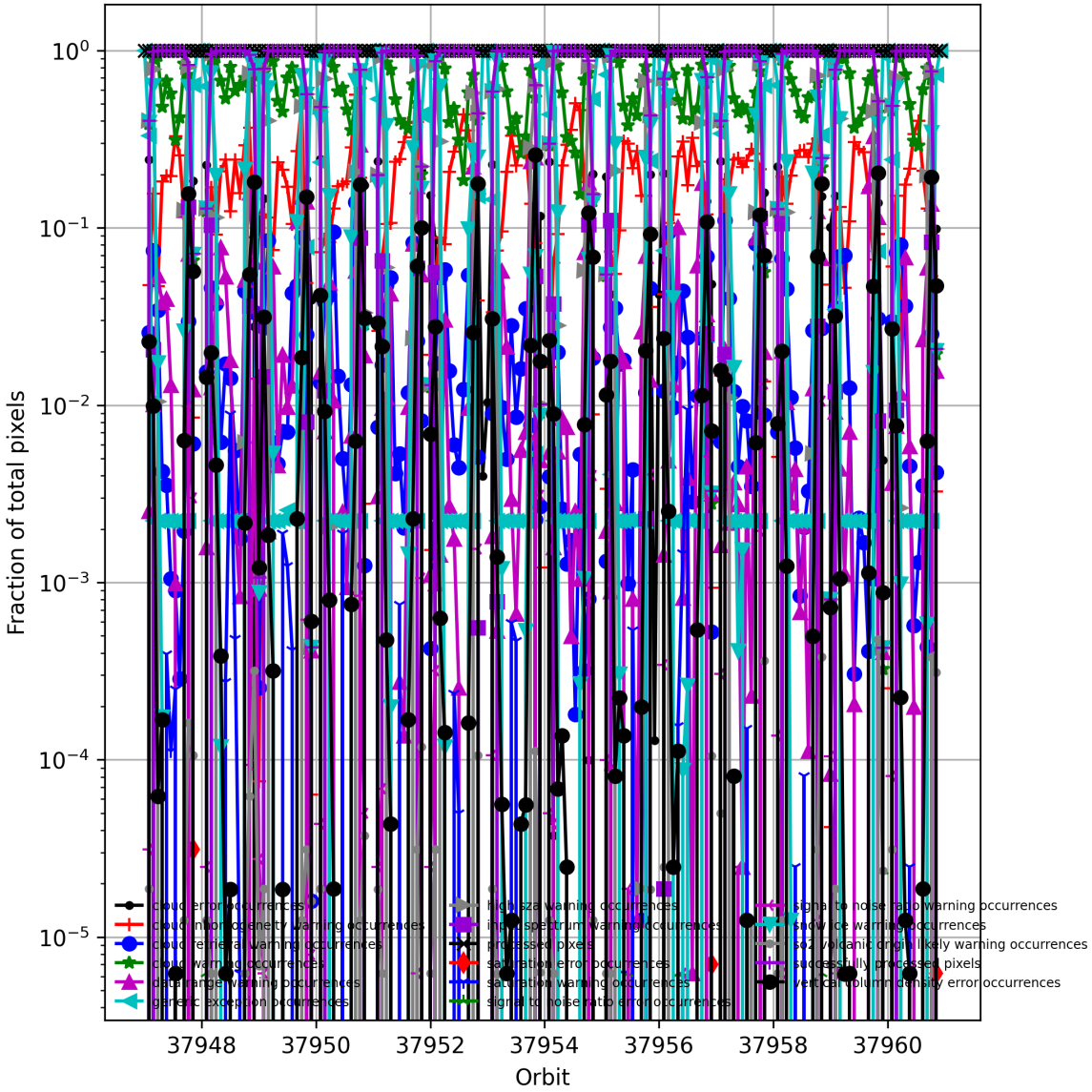

Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

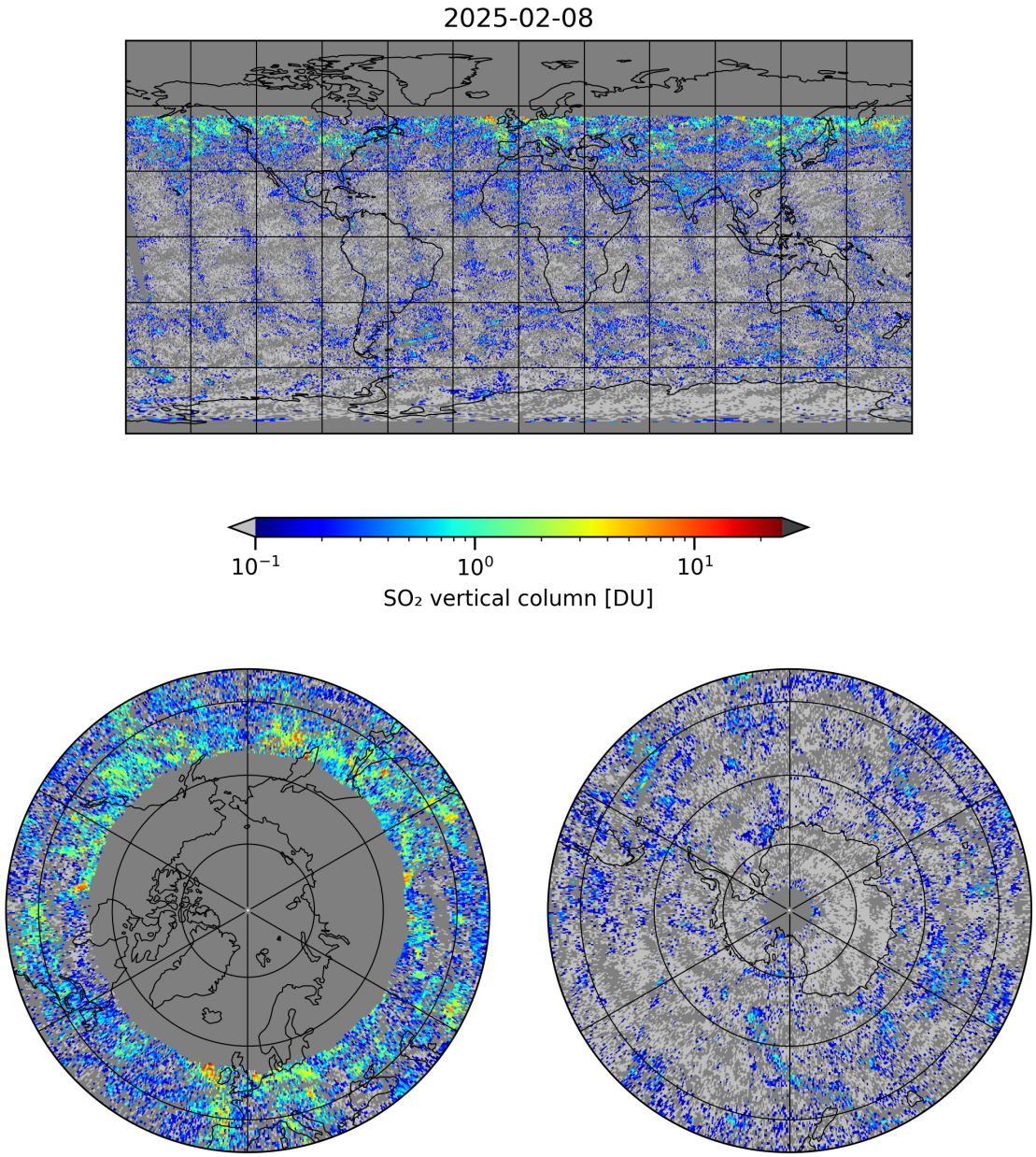

Figure 4: Map of "SO_2 vertical column" for 2025-02-08 to 2025-02-09

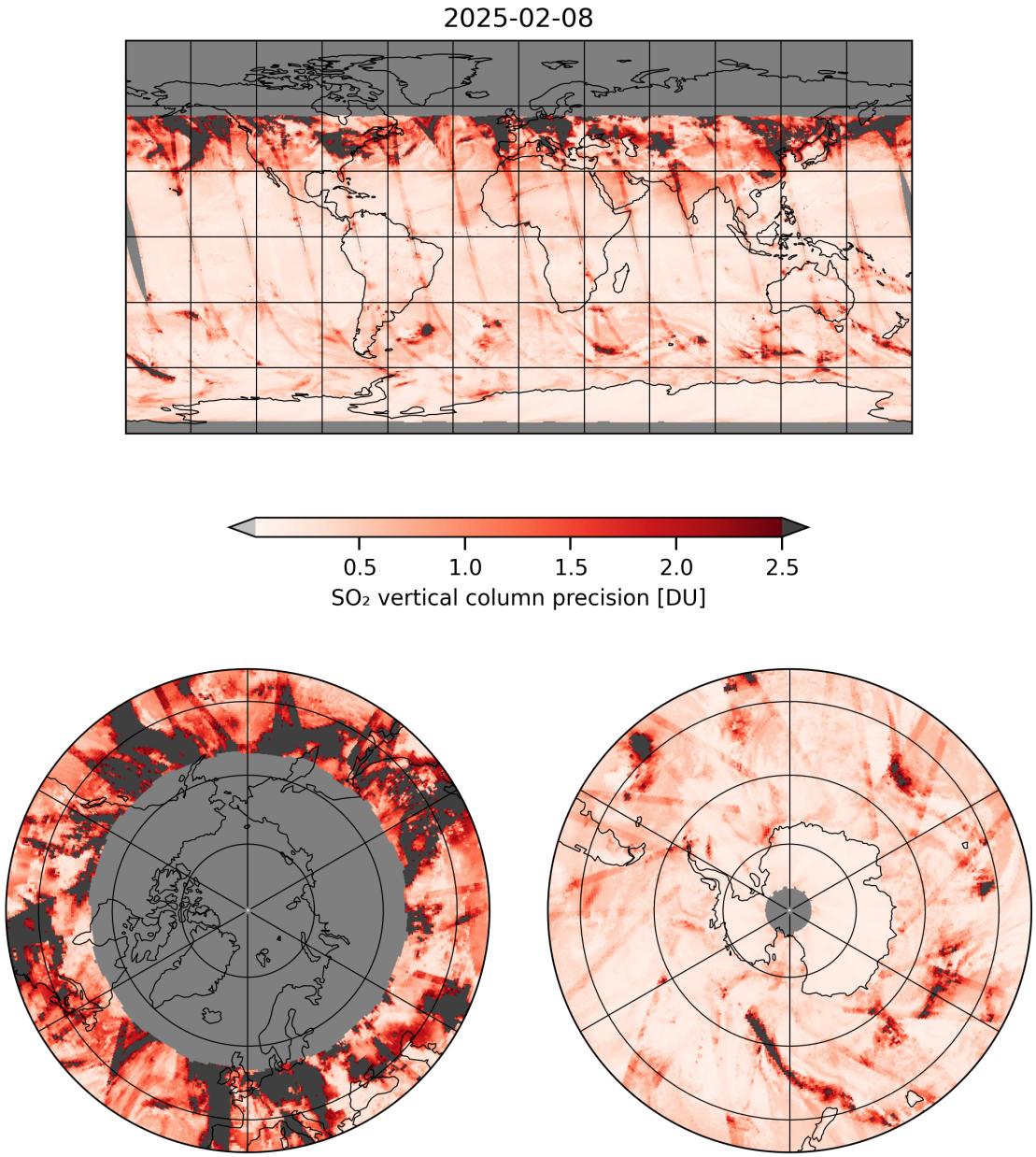

Figure 5: Map of "SO_2 vertical column precision" for 2025-02-08 to 2025-02-09

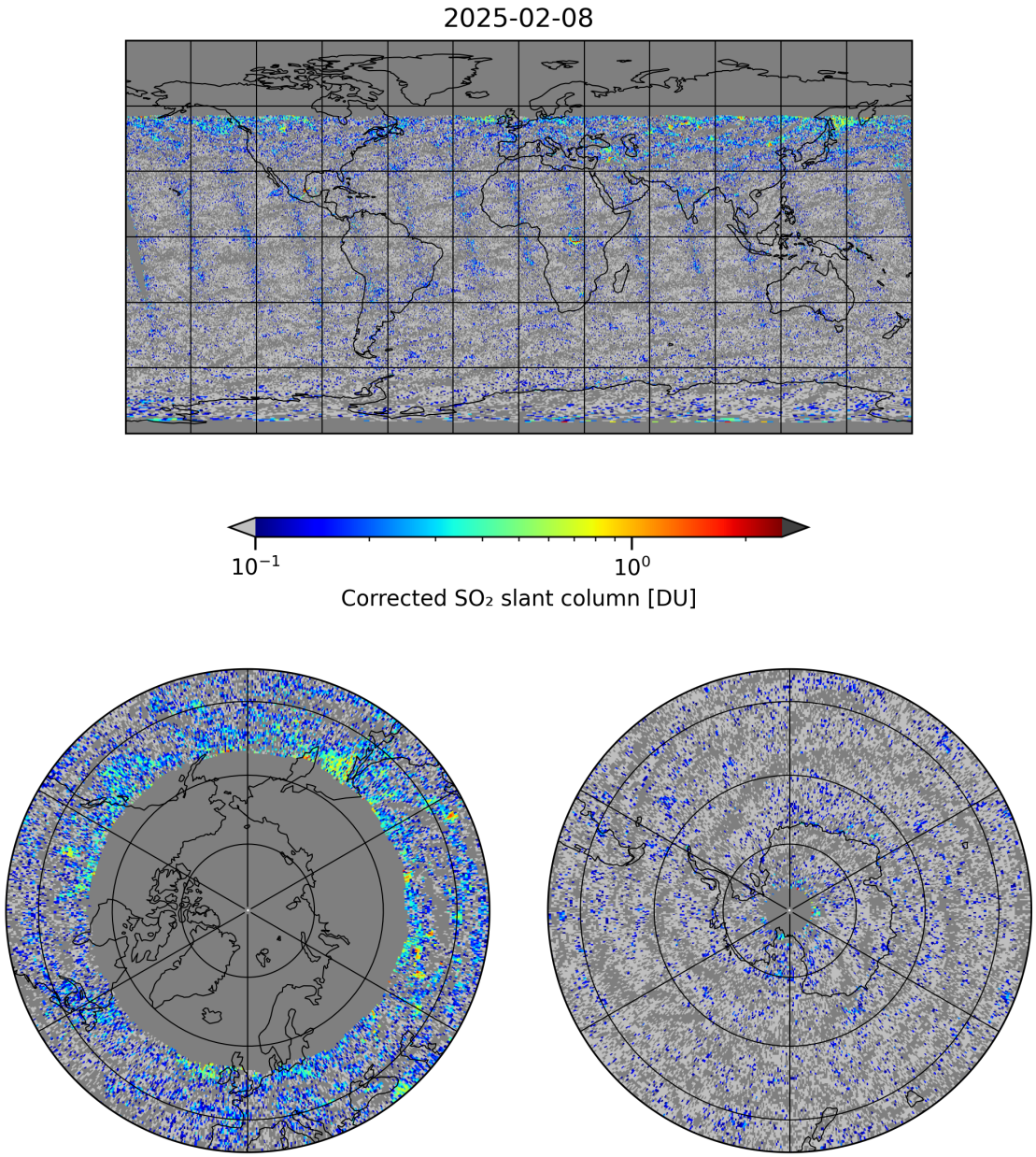

Figure 6: Map of "Corrected SO_2 slant column" for 2025-02-08 to 2025-02-09

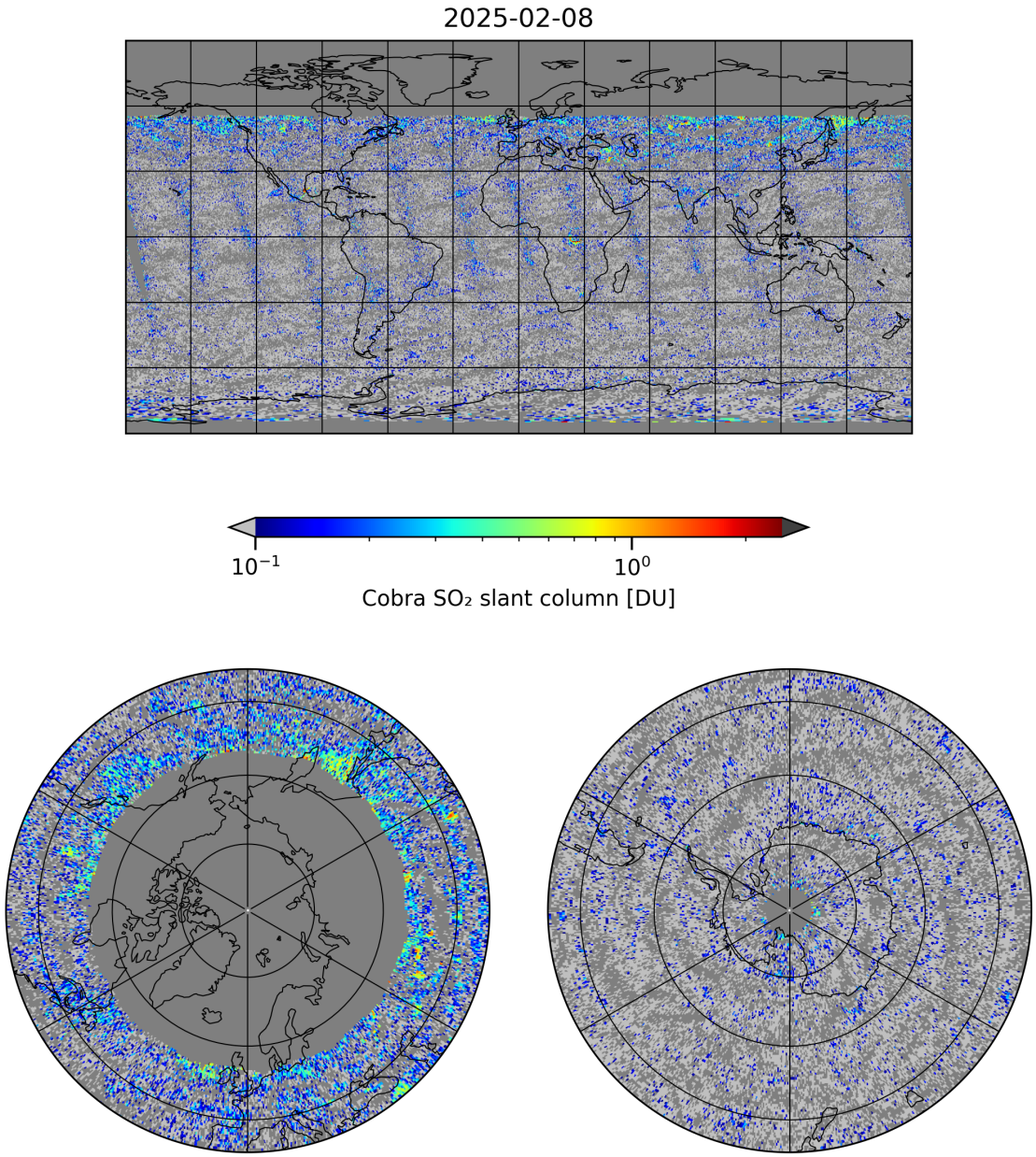

Figure 7: Map of "Cobra SO_2 slant column" for 2025-02-08 to 2025-02-09

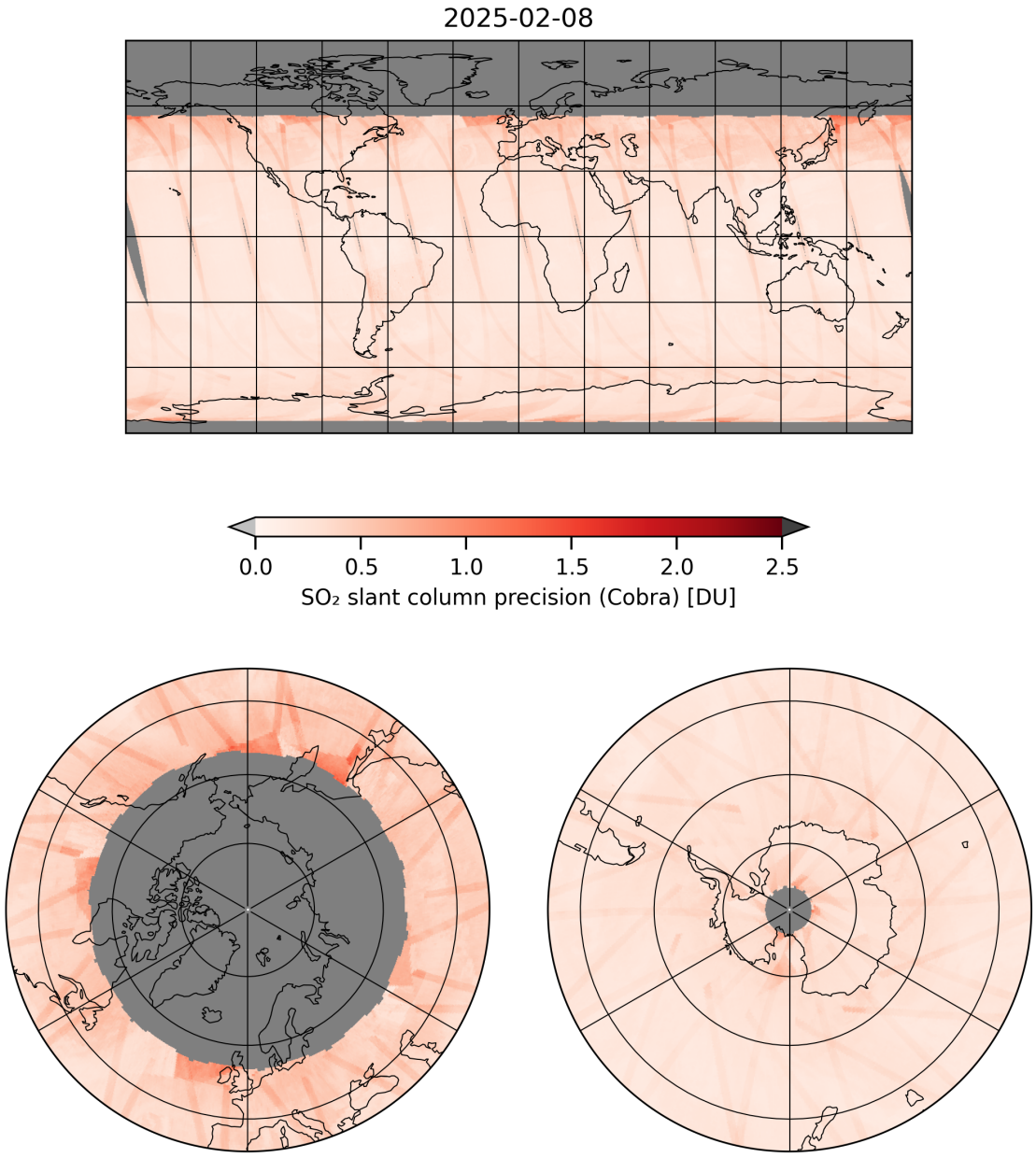

Figure 8: Map of "SO_2 slant column precision (Cobra)" for 2025-02-08 to 2025-02-09

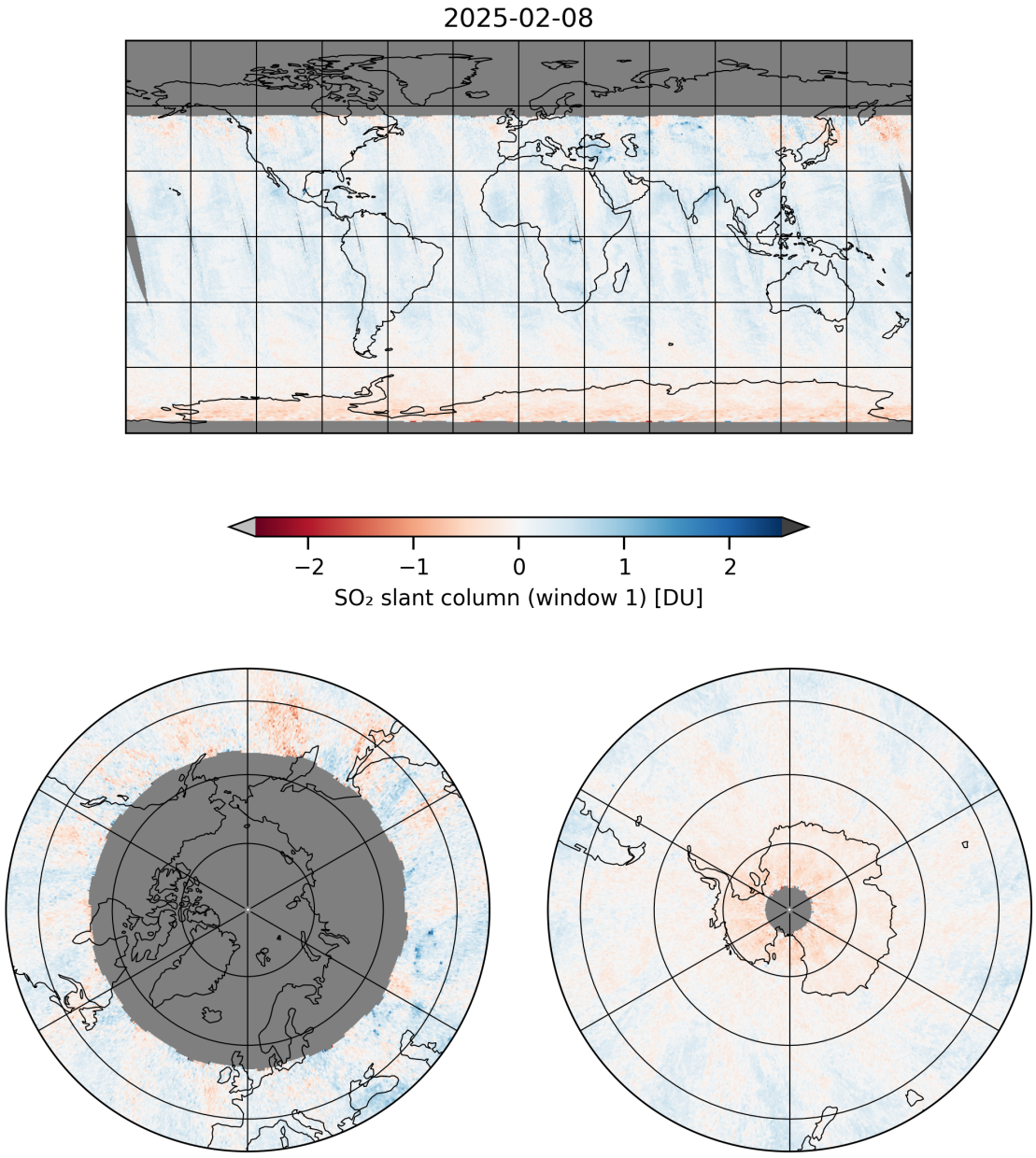

Figure 9: Map of "SO_2 slant column (window 1)" for 2025-02-08 to 2025-02-09

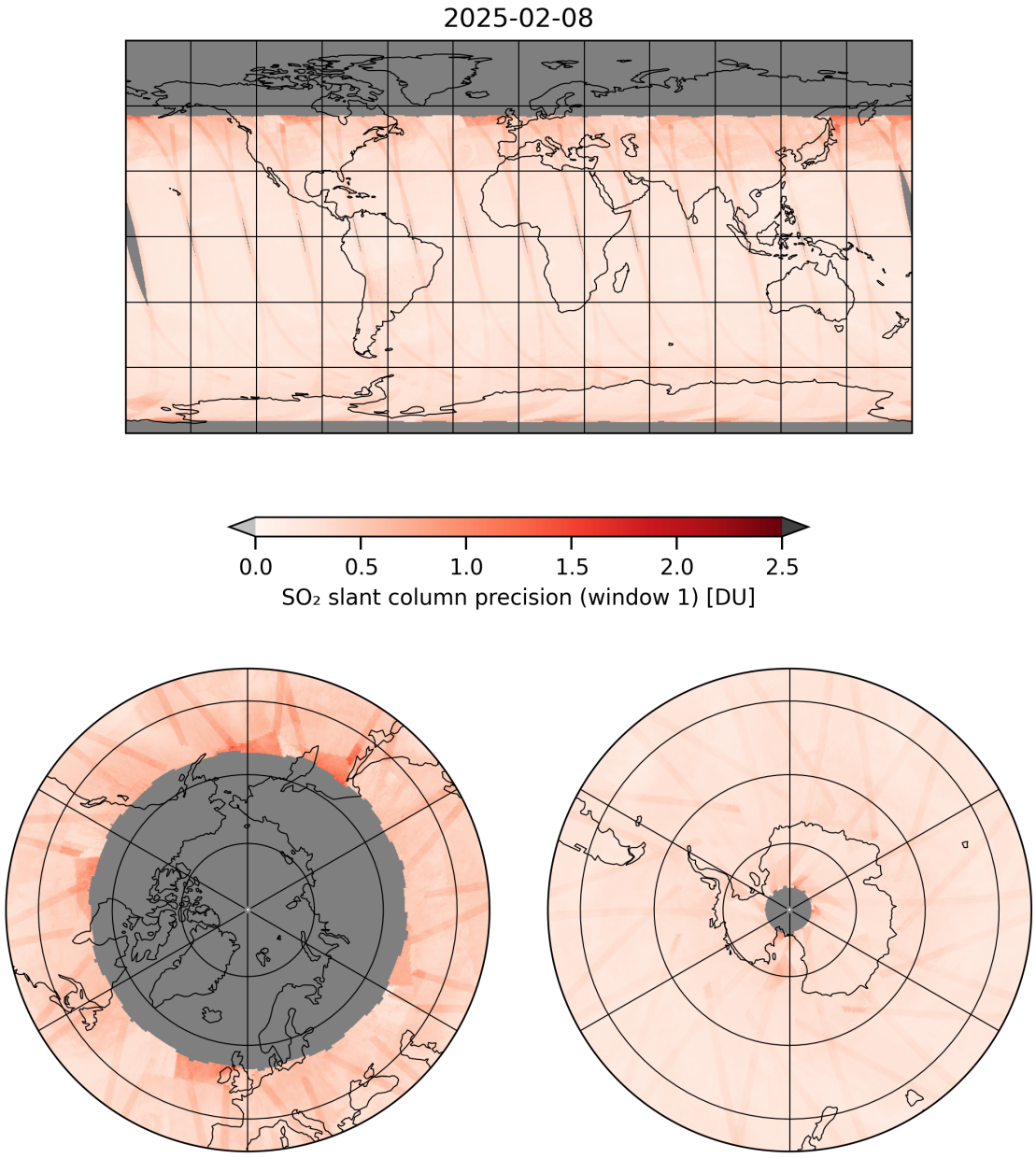

Figure 10: Map of "SO_2 slant column precision (window 1)" for 2025-02-08 to 2025-02-09

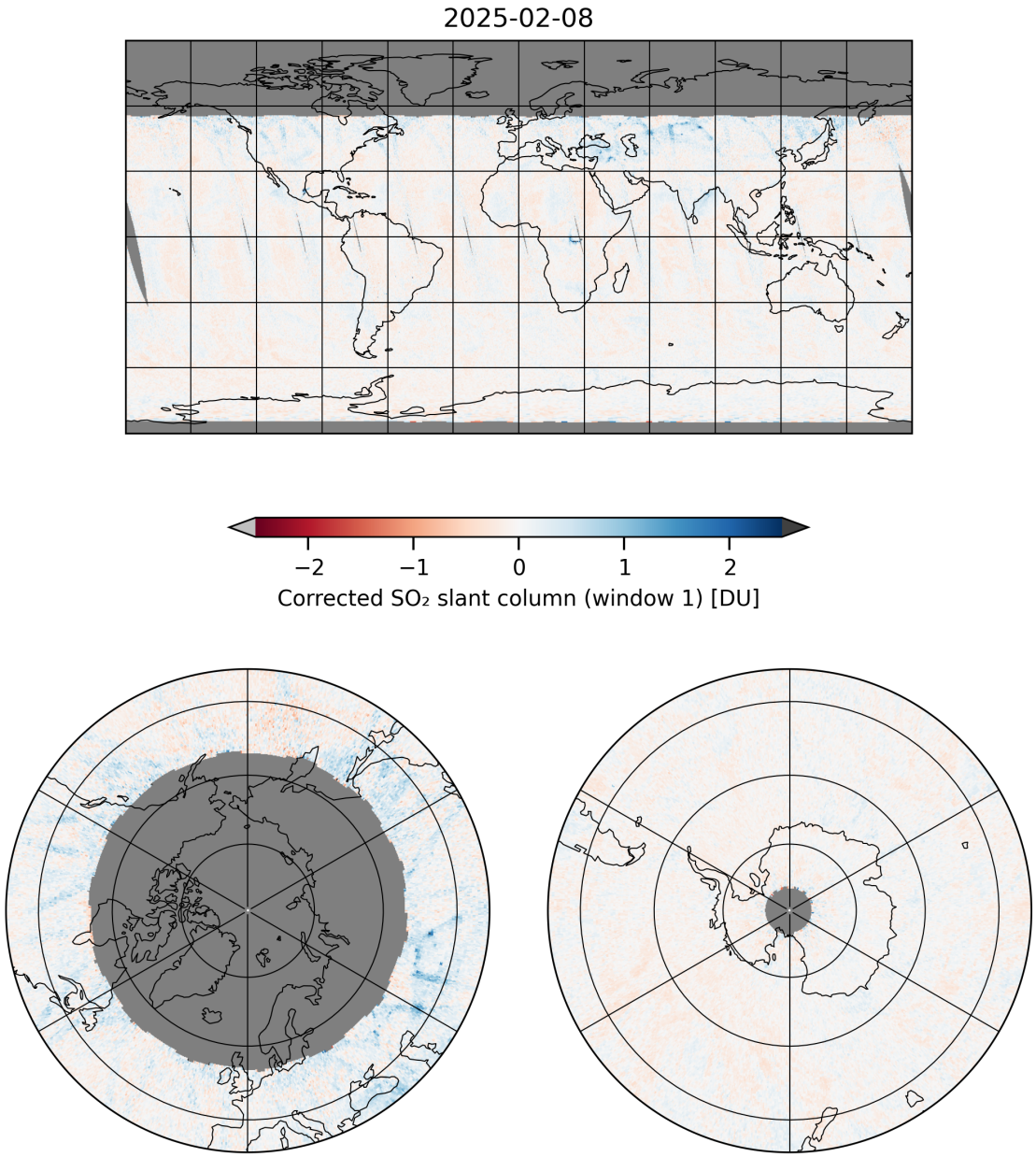

Figure 11: Map of “Corrected SO_2 slant column (window 1)” for 2025-02-08 to 2025-02-09

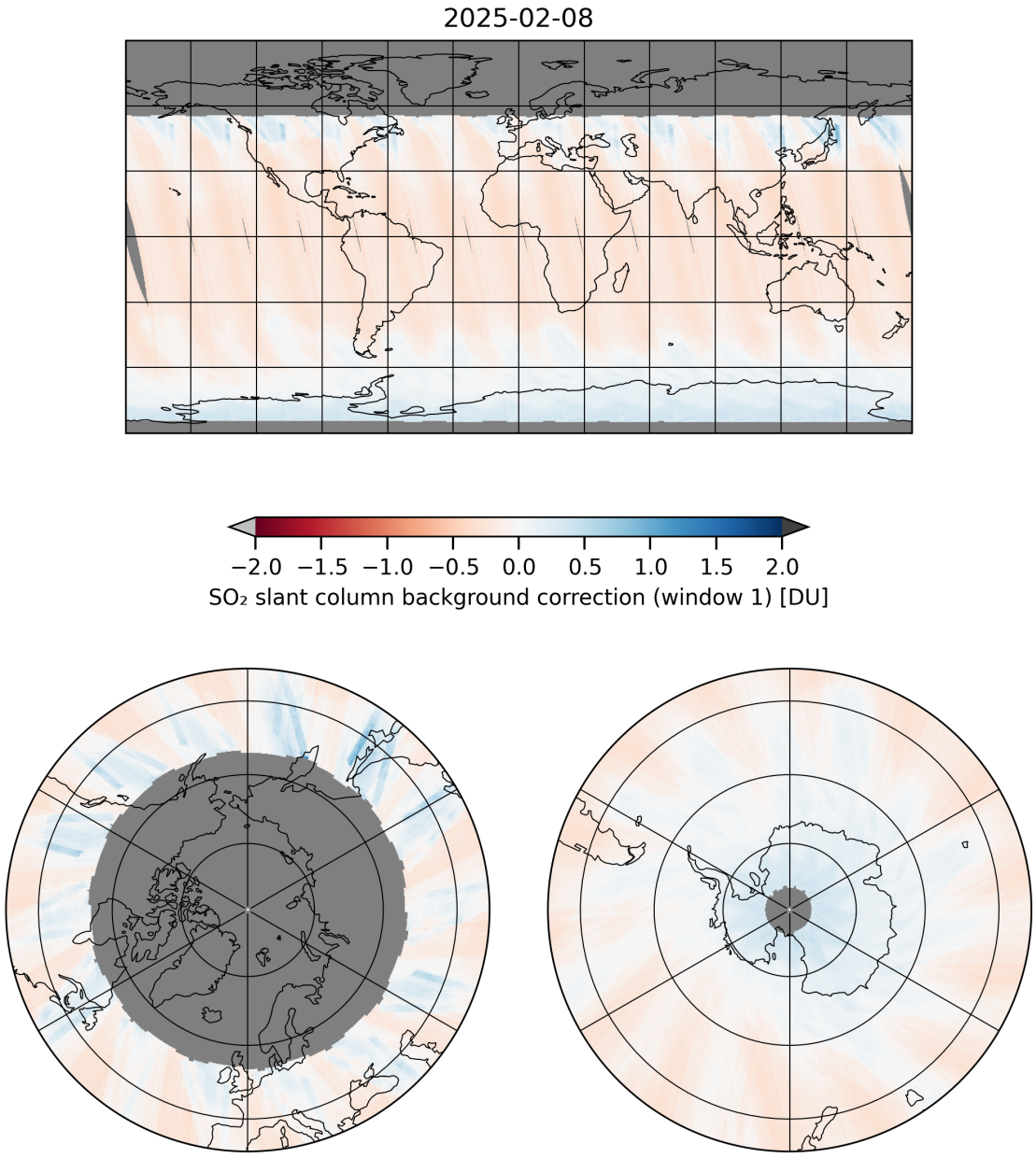

Figure 12: Map of "SO_2 slant column background correction (window 1)" for 2025-02-08 to 2025-02-09

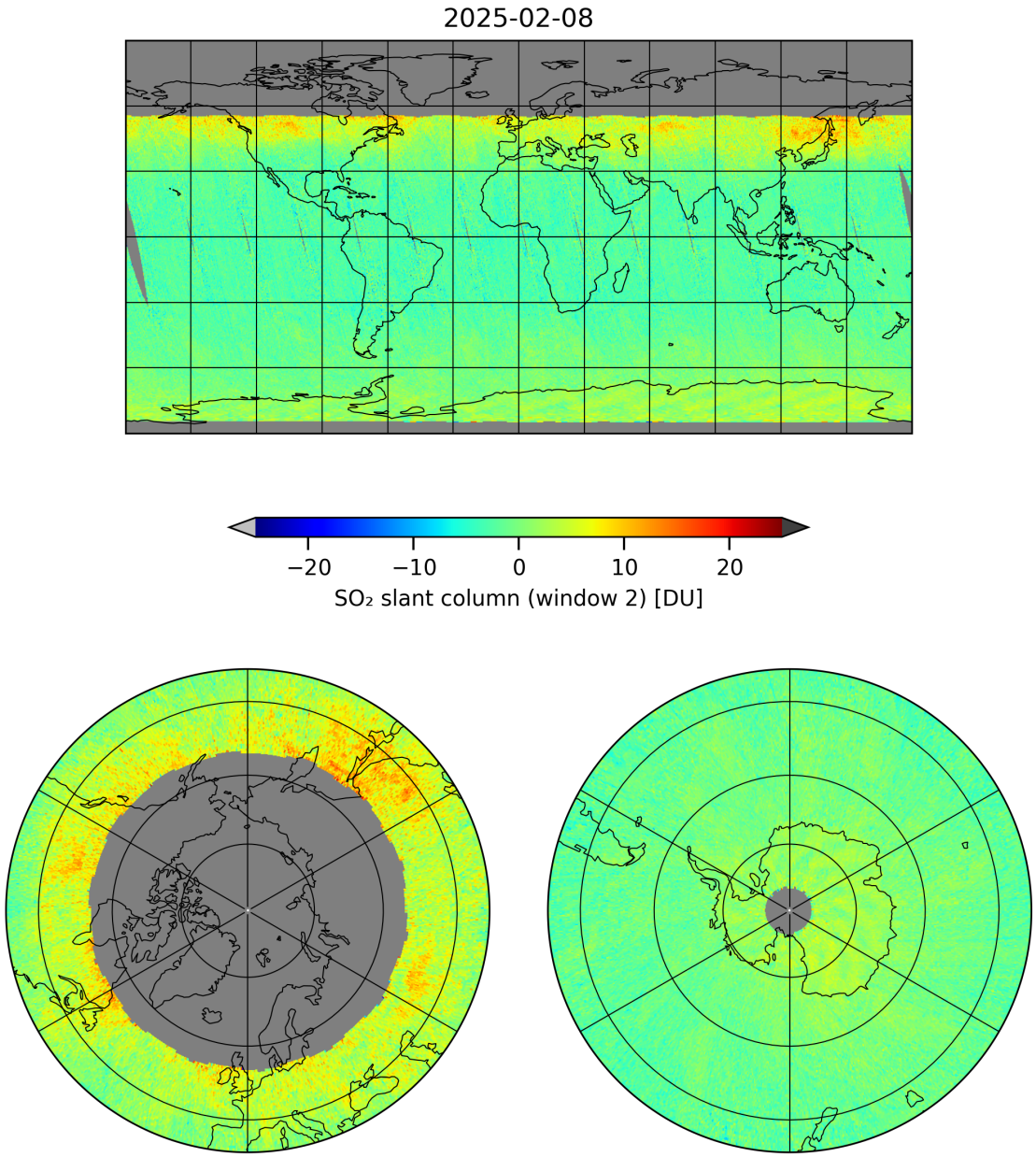

Figure 13: Map of "SO_2 slant column (window 2)" for 2025-02-08 to 2025-02-09

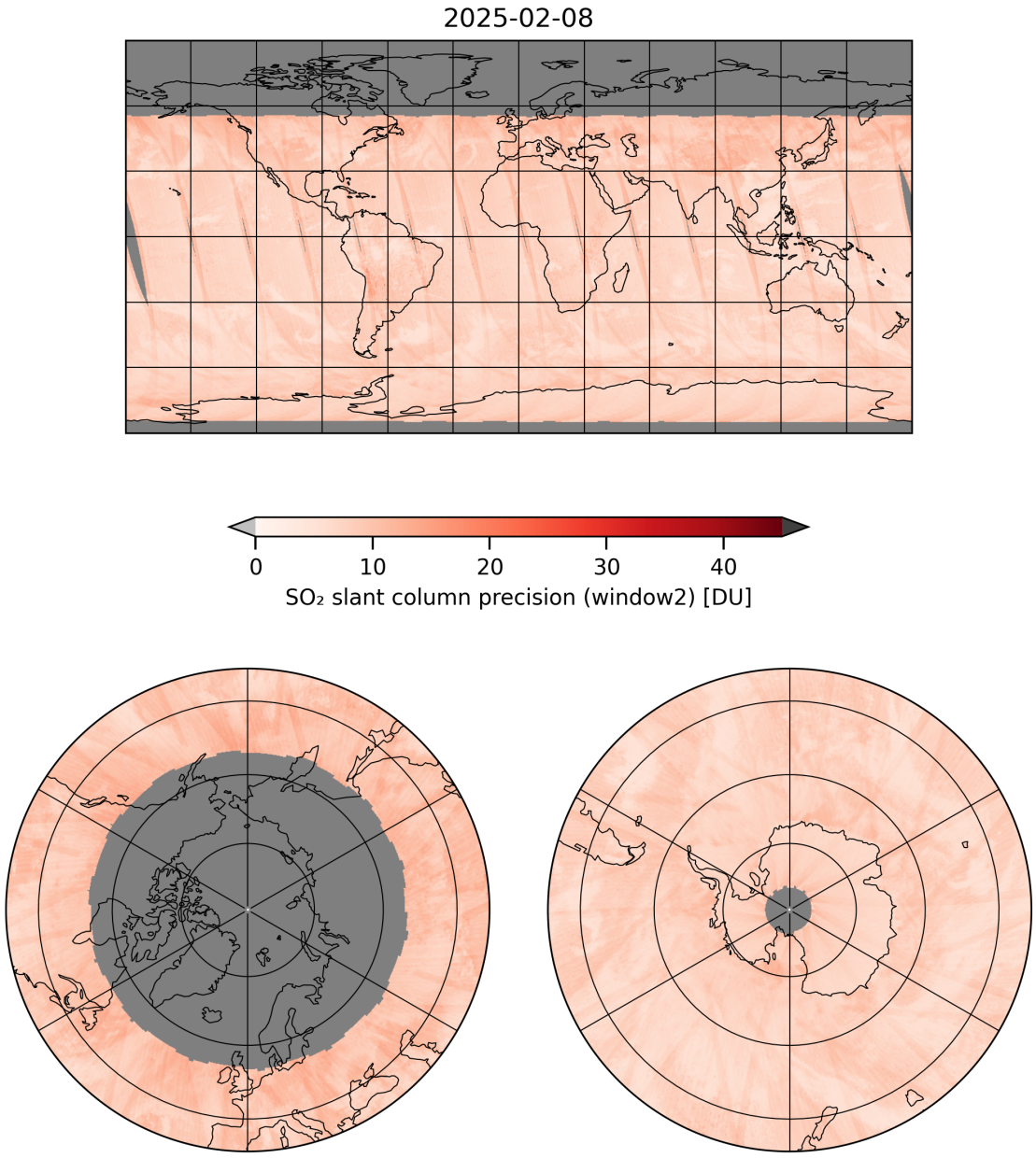

Figure 14: Map of "SO_2 slant column precision (window2)" for 2025-02-08 to 2025-02-09

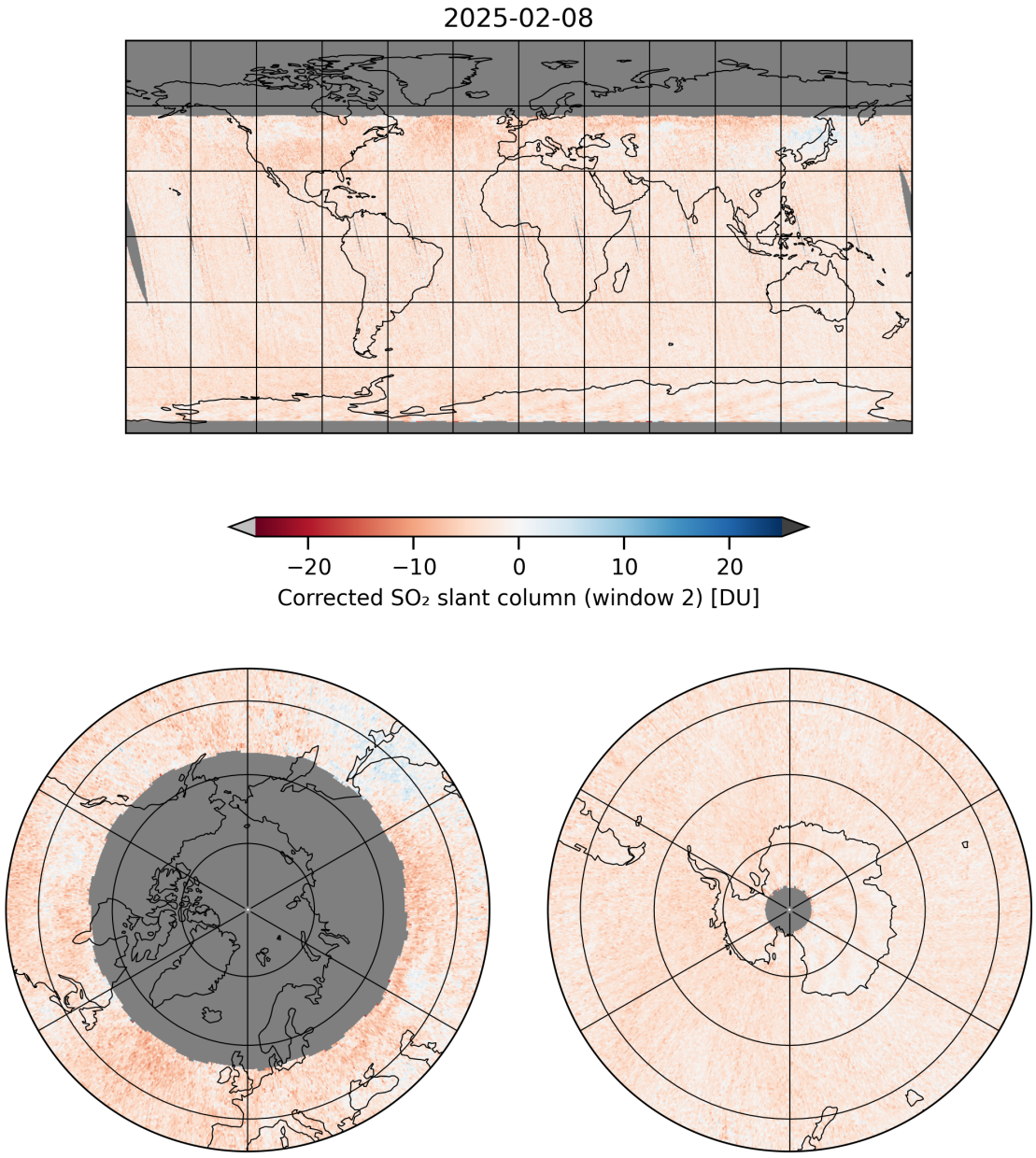

Figure 15: Map of "Corrected SO_2 slant column (window 2)" for 2025-02-08 to 2025-02-09

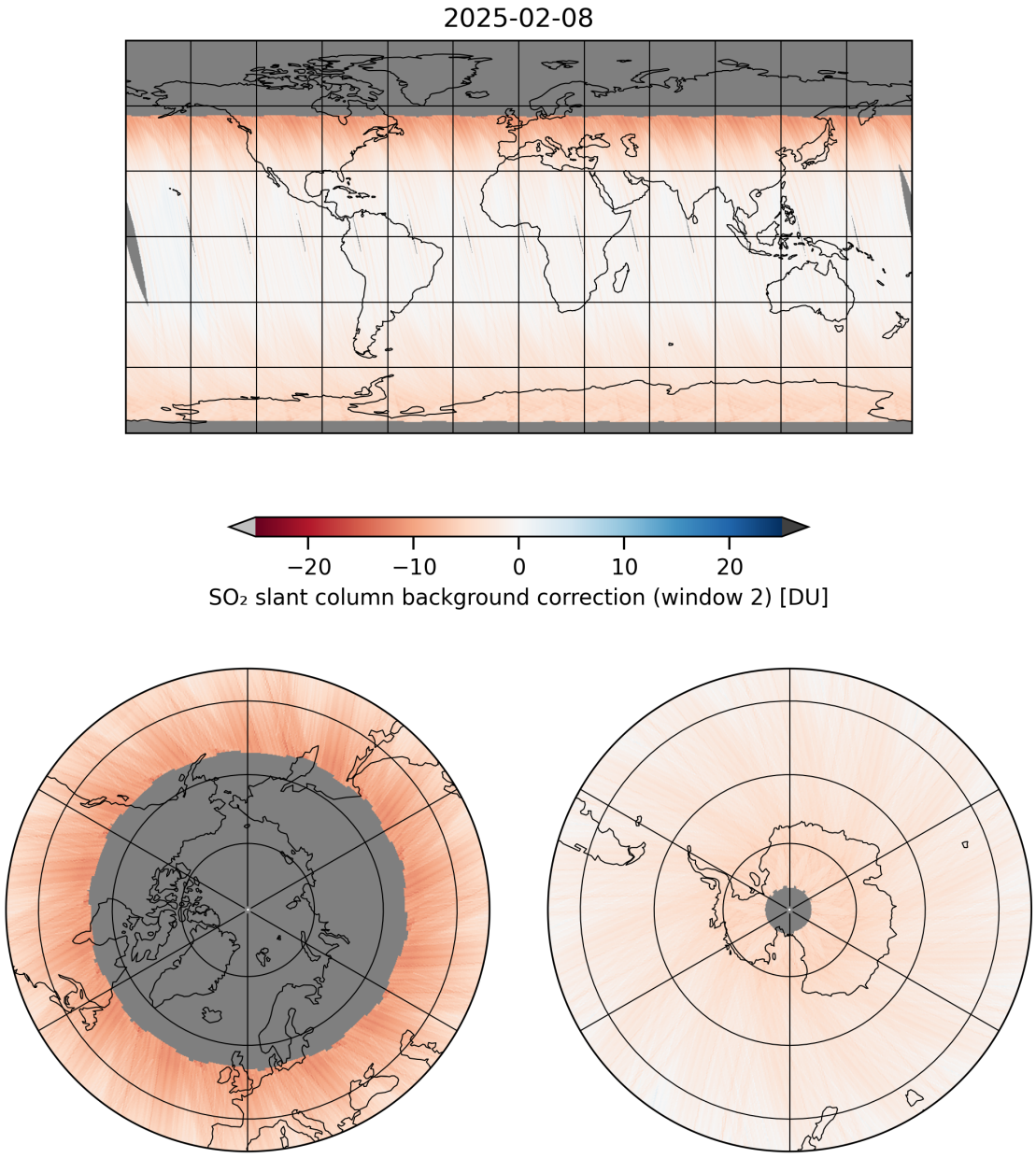

Figure 16: Map of "SO_2 slant column background correction (window 2)" for 2025-02-08 to 2025-02-09

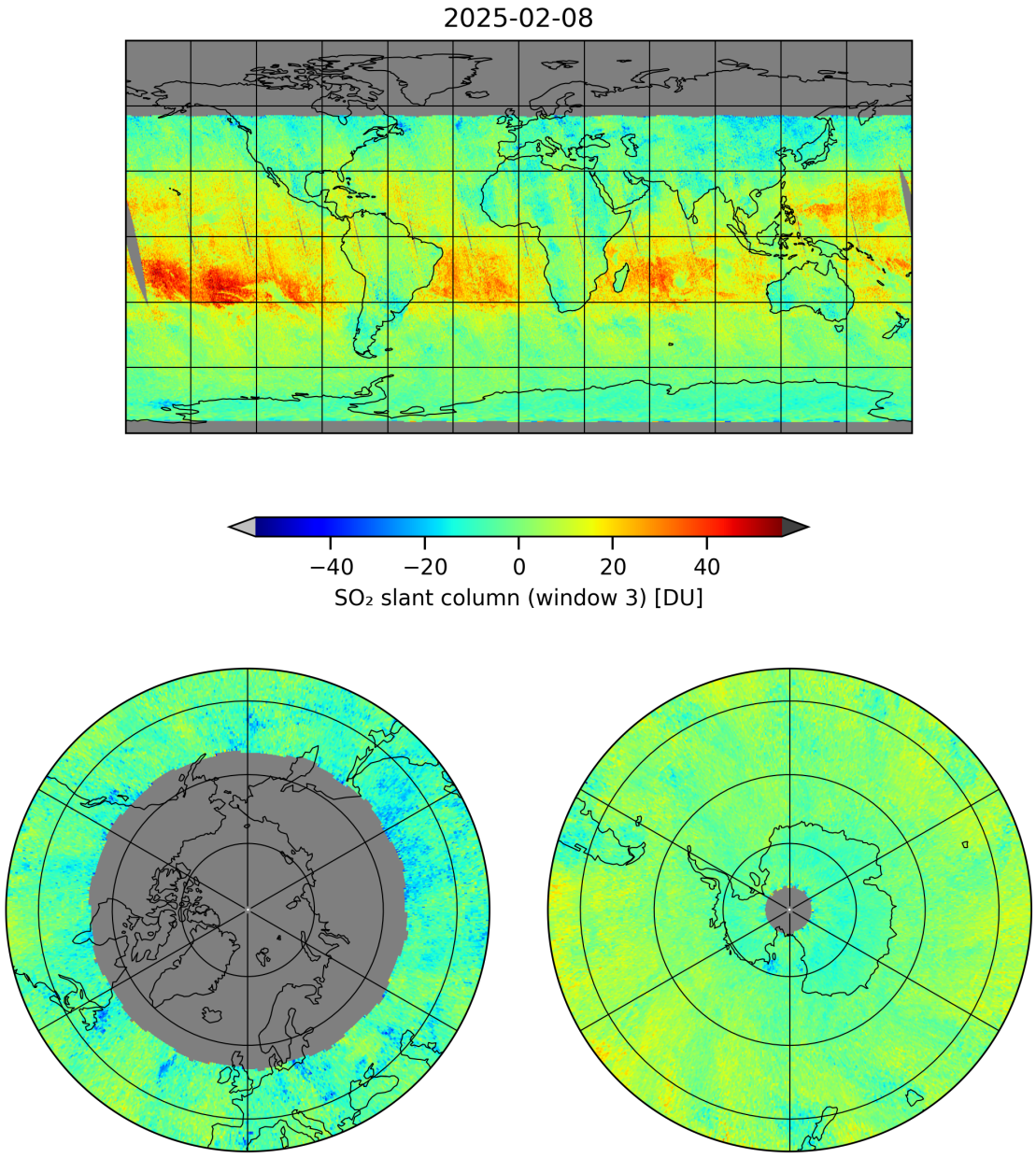

Figure 17: Map of "SO_2 slant column (window 3)" for 2025-02-08 to 2025-02-09

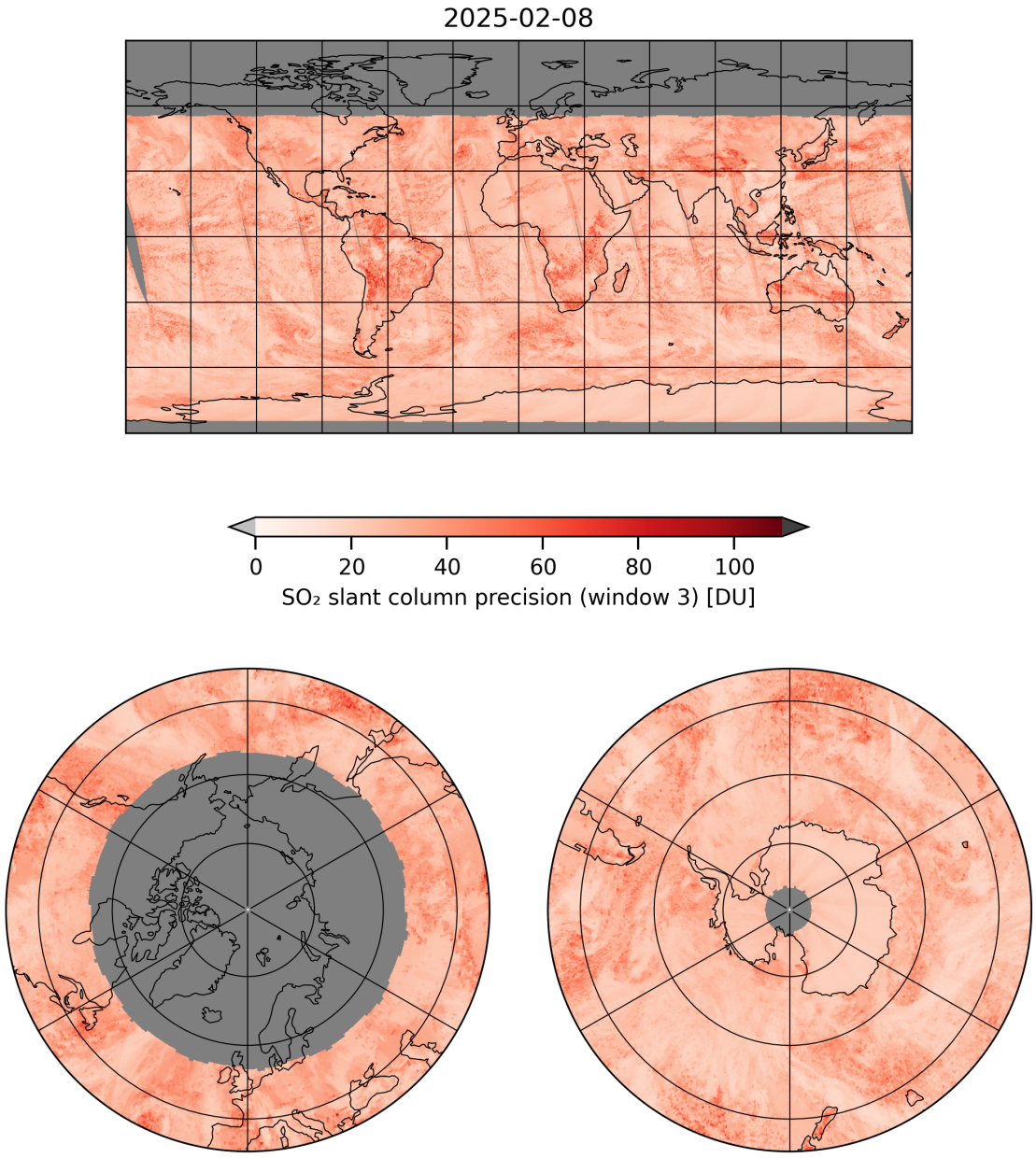

Figure 18: Map of "SO_2 slant column precision (window 3)" for 2025-02-08 to 2025-02-09

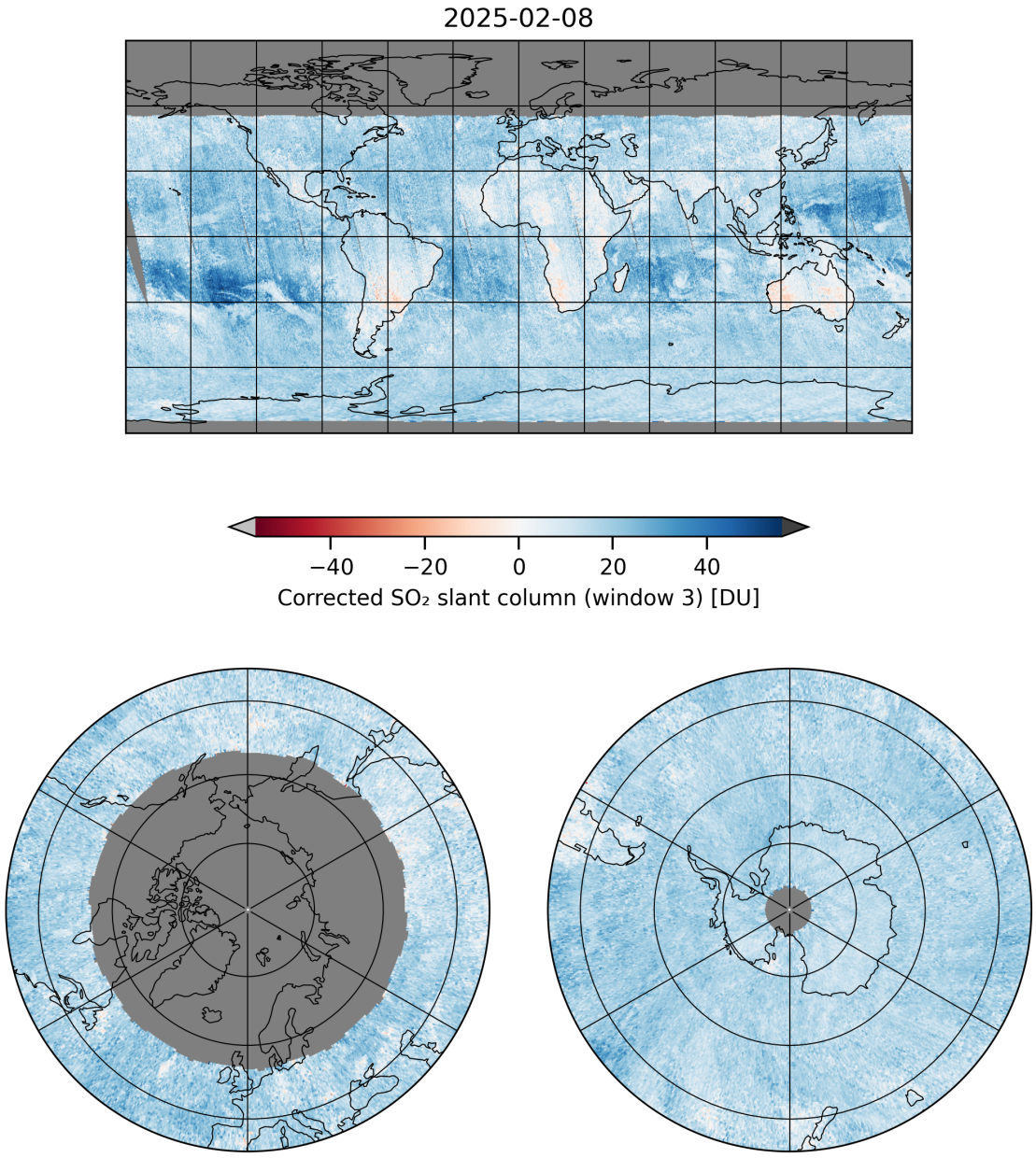

Figure 19: Map of "Corrected SO_2 slant column (window 3)" for 2025-02-08 to 2025-02-09

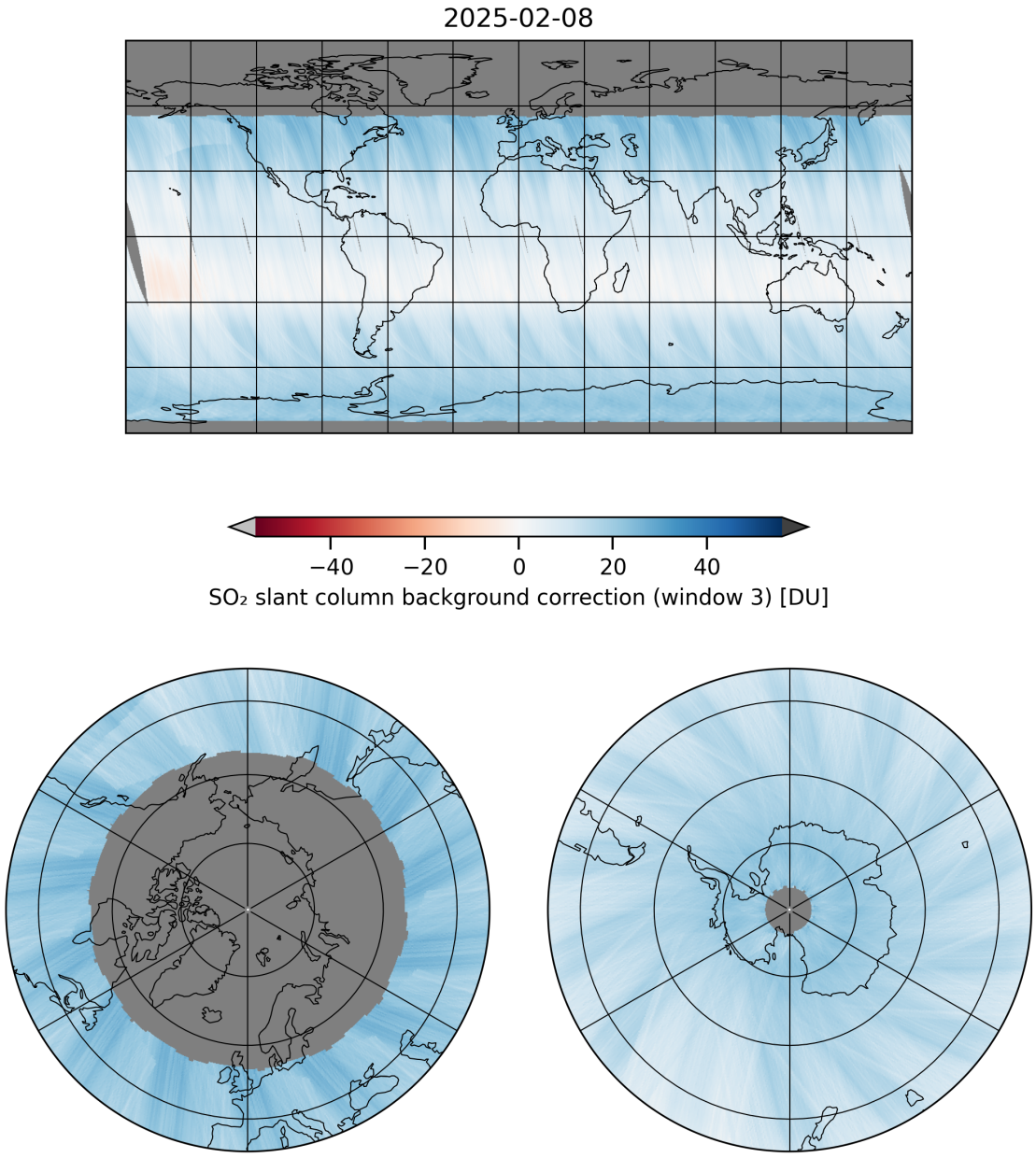

Figure 20: Map of "SO_2 slant column background correction (window 3)" for 2025-02-08 to 2025-02-09

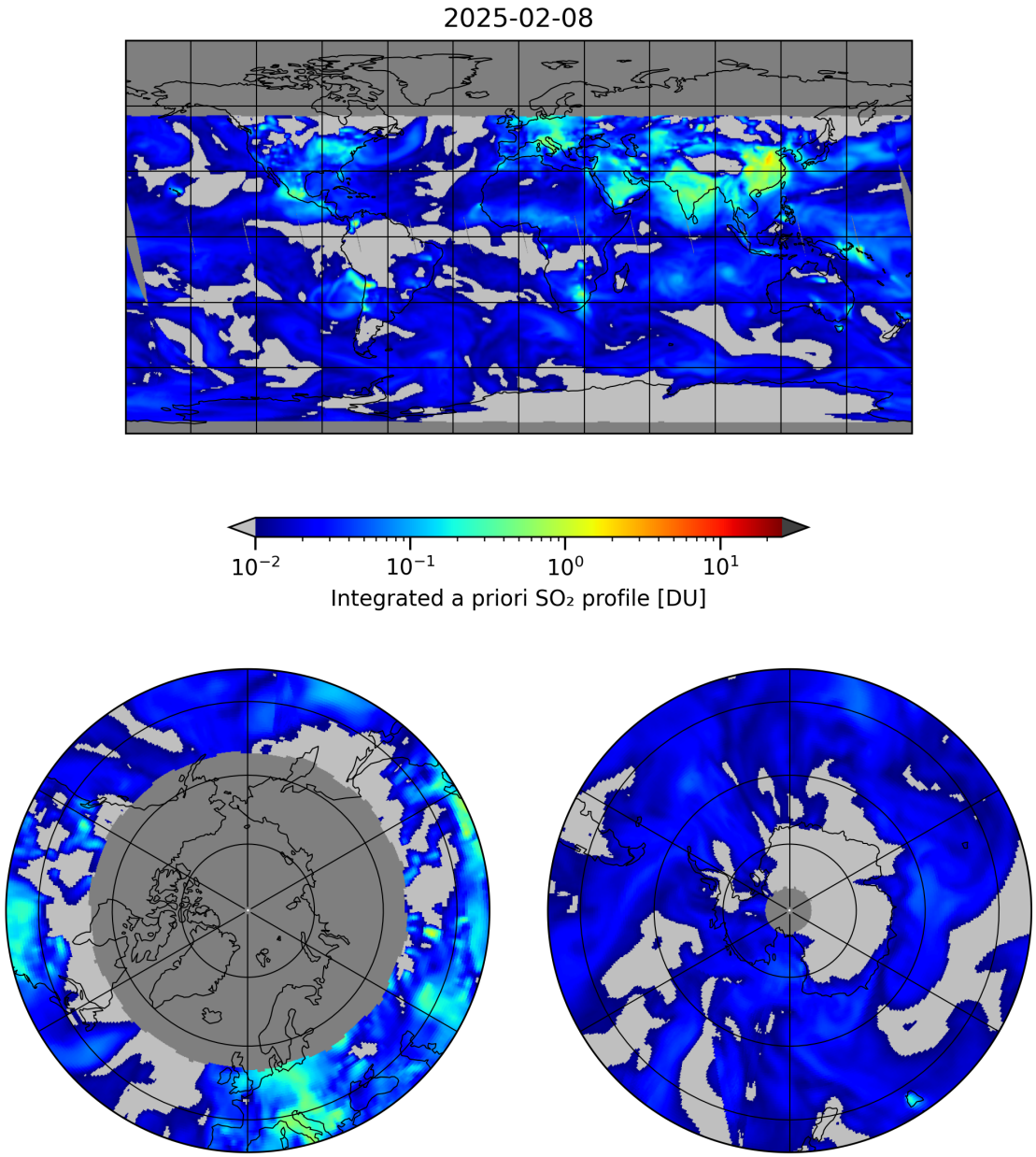

Figure 21: Map of “Integrated a priori SO_2 profile” for 2025-02-08 to 2025-02-09

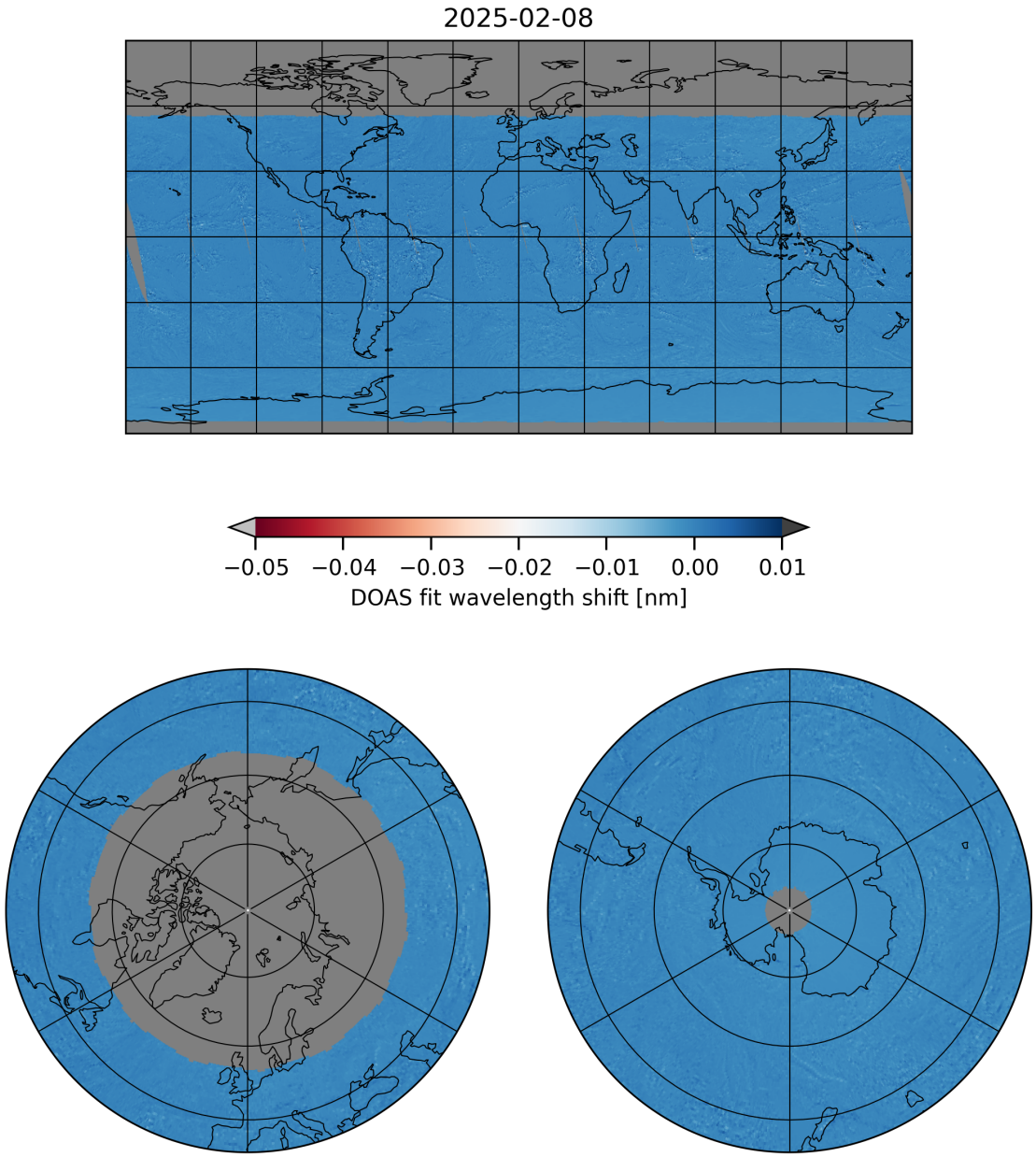

Figure 22: Map of “DOAS fit wavelength shift” for 2025-02-08 to 2025-02-09

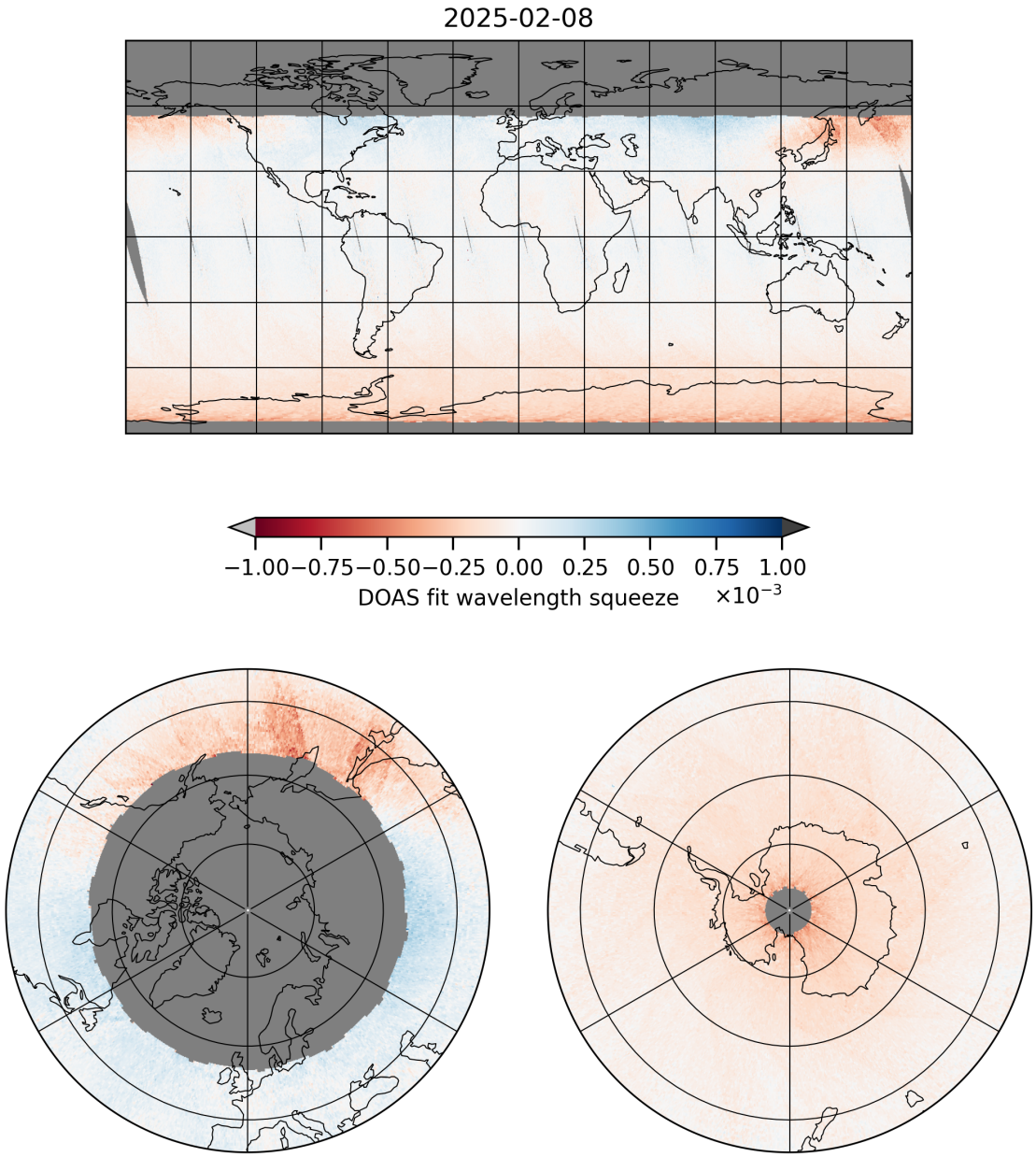

Figure 23: Map of “DOAS fit wavelength squeeze” for 2025-02-08 to 2025-02-09

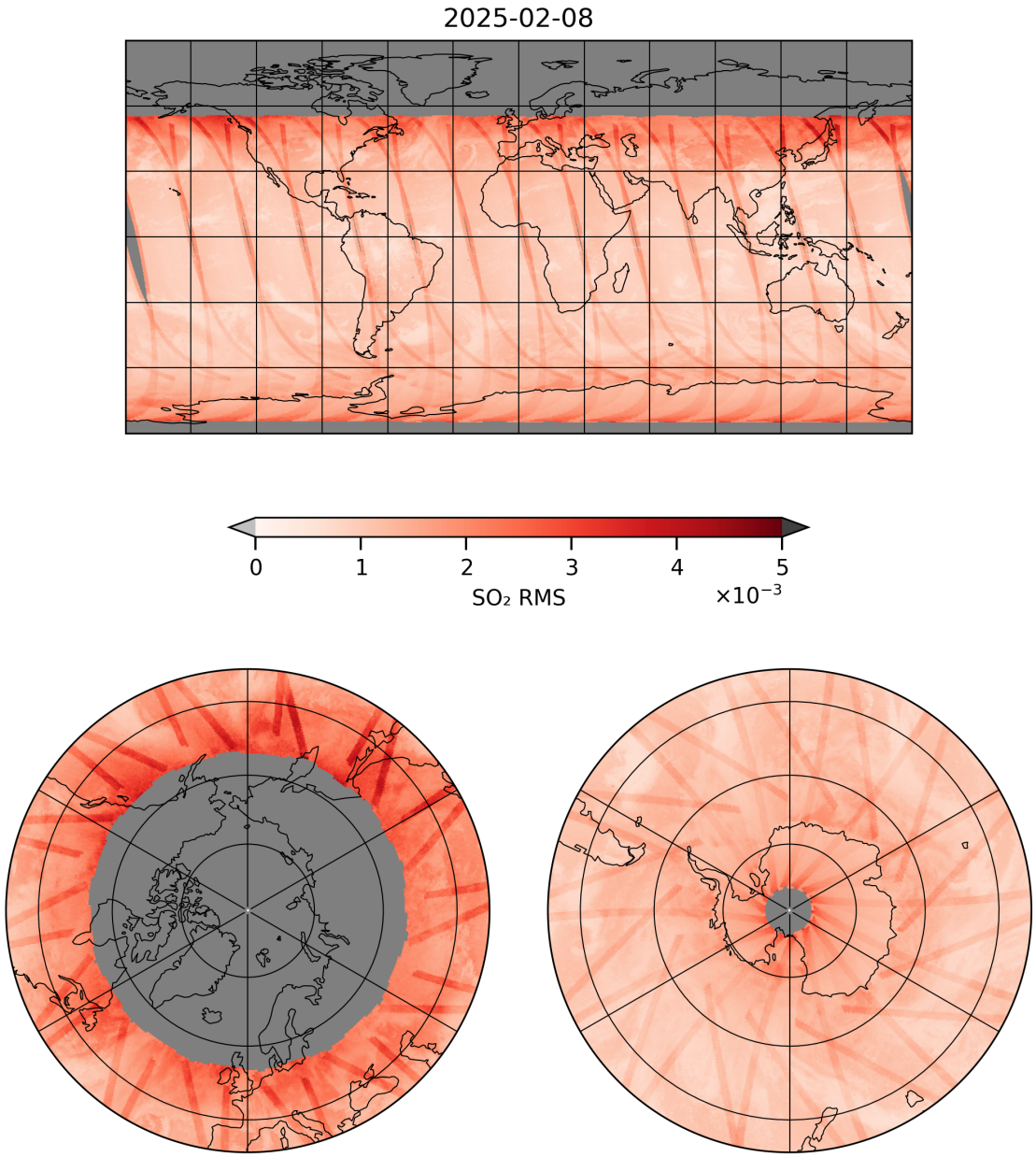

Figure 24: Map of "SO_2 RMS" for 2025-02-08 to 2025-02-09

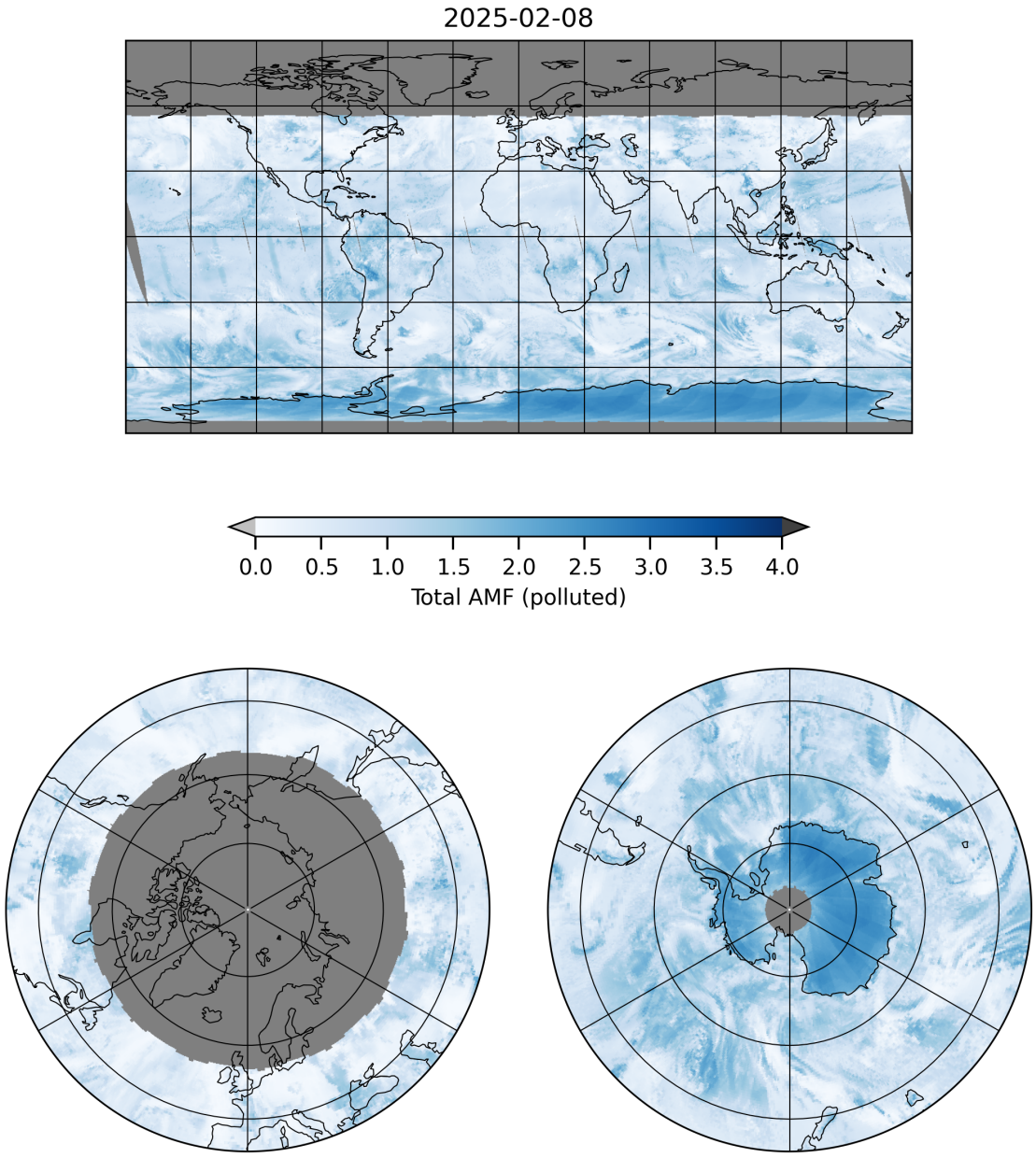

Figure 25: Map of “Total AMF (polluted)” for 2025-02-08 to 2025-02-09

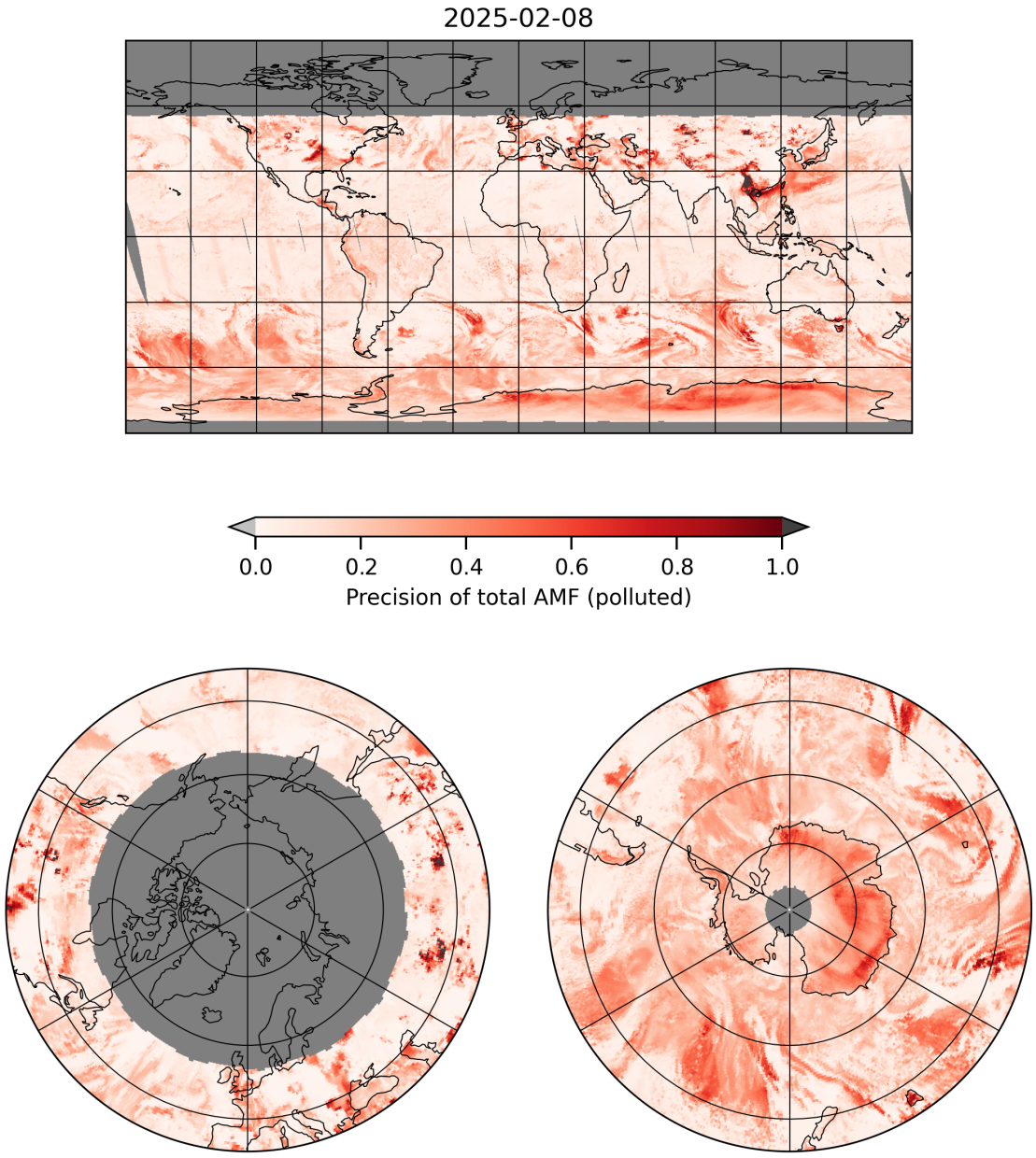

Figure 26: Map of “Precision of total AMF (polluted)” for 2025-02-08 to 2025-02-09

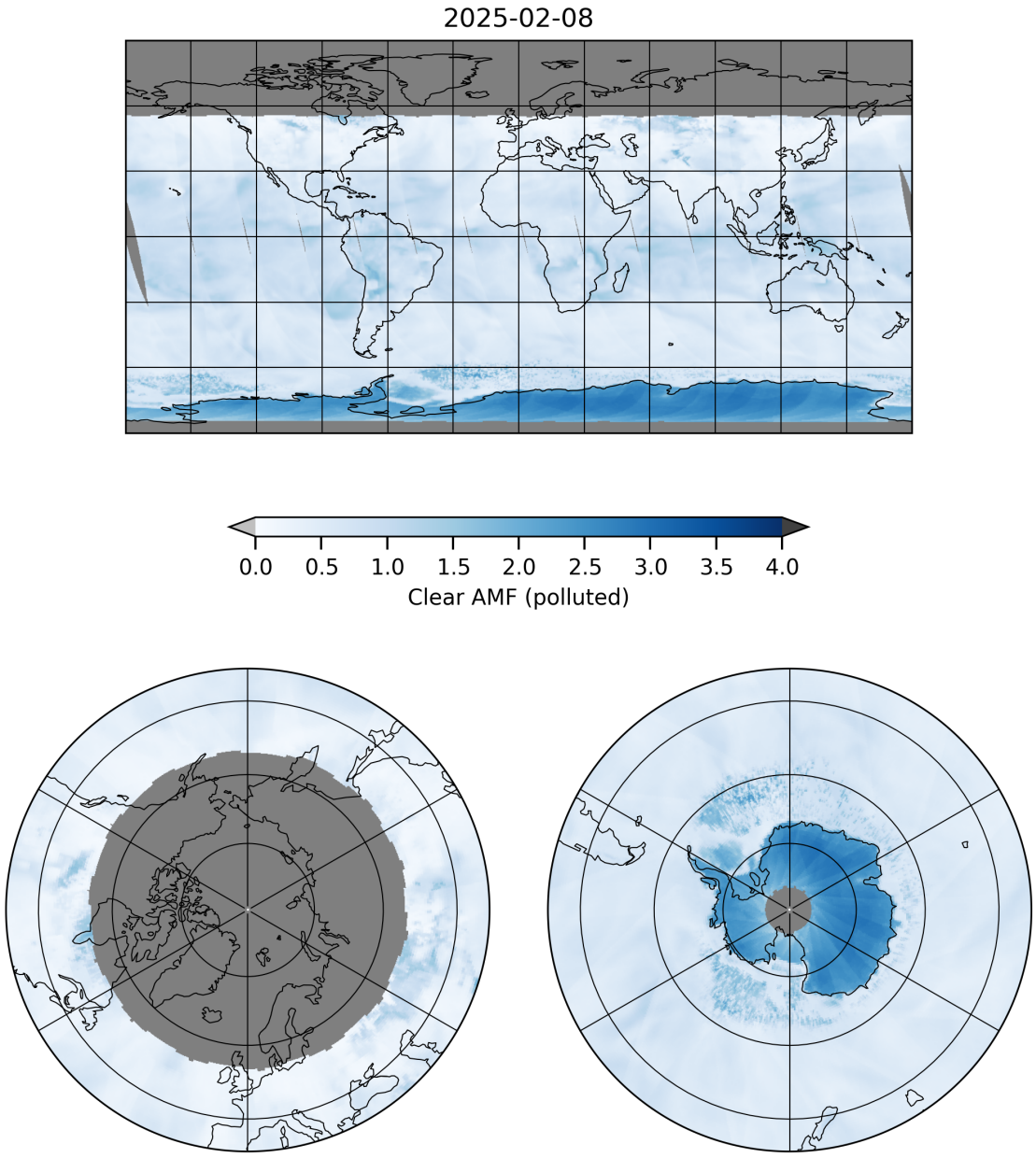

Figure 27: Map of “Clear AMF (polluted)” for 2025-02-08 to 2025-02-09

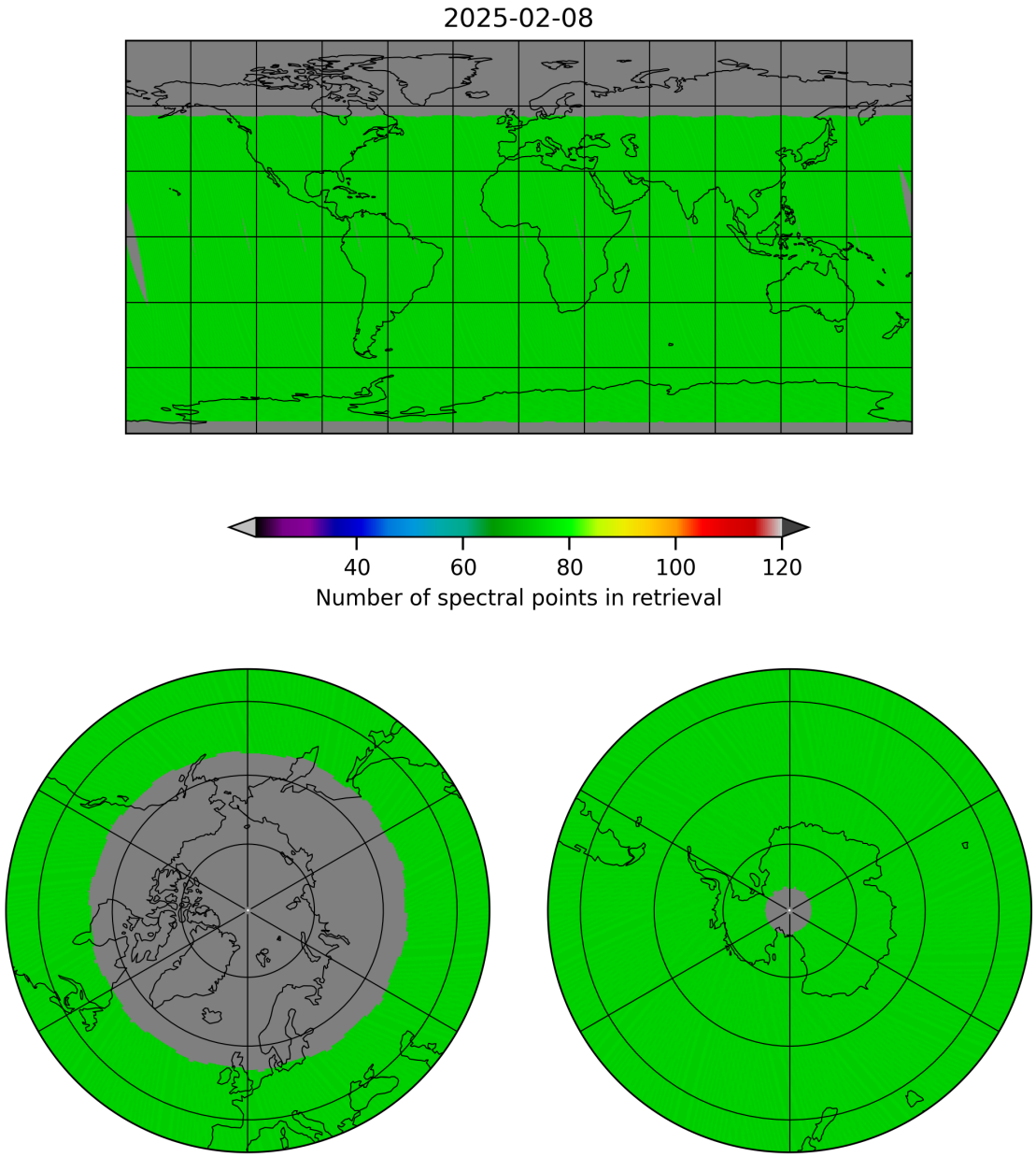

Figure 28: Map of “Number of spectral points in retrieval” for 2025-02-08 to 2025-02-09

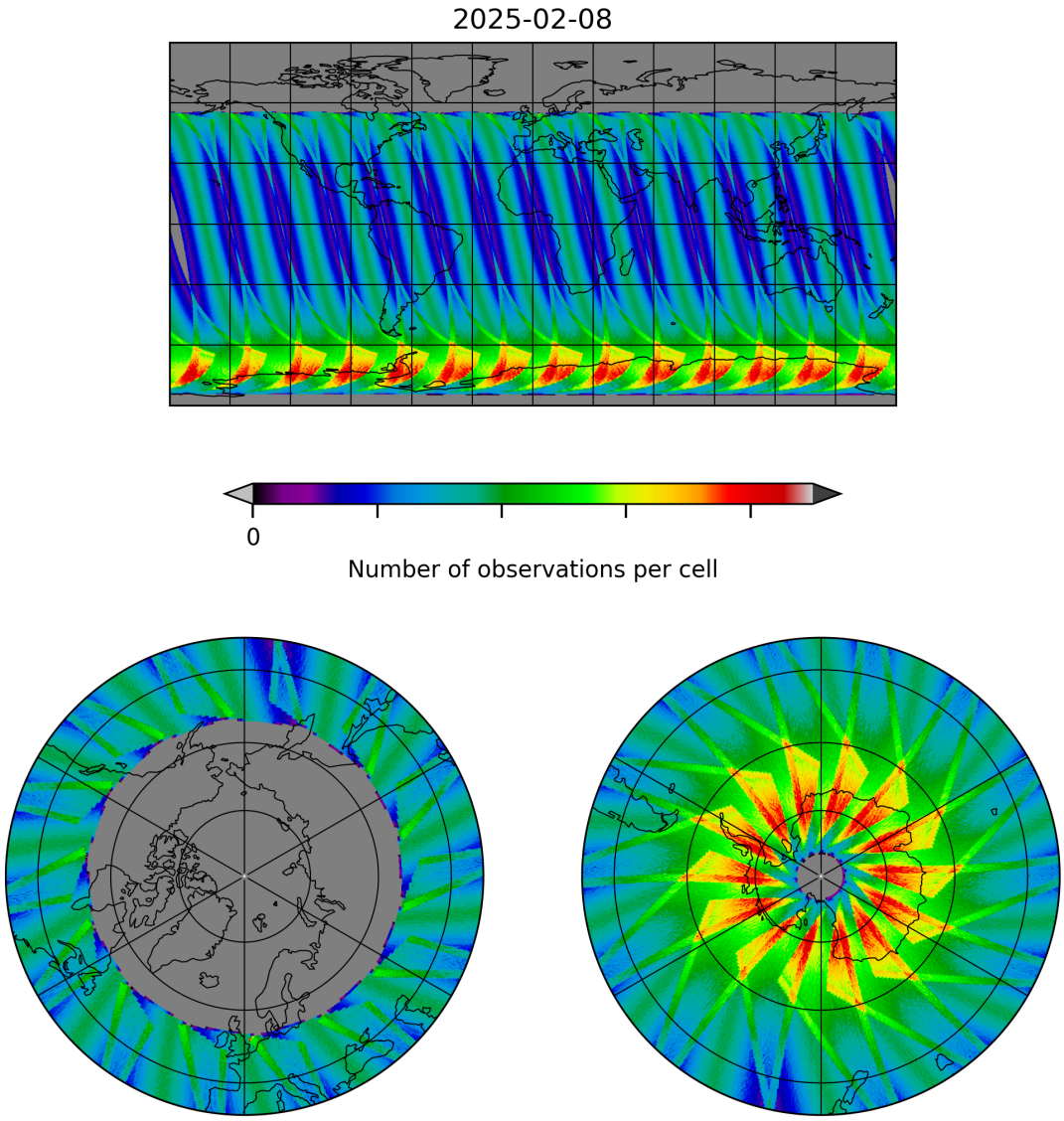

Figure 29: Map of the number of observations for 2025-02-08 to 2025-02-09

7 Zonal average

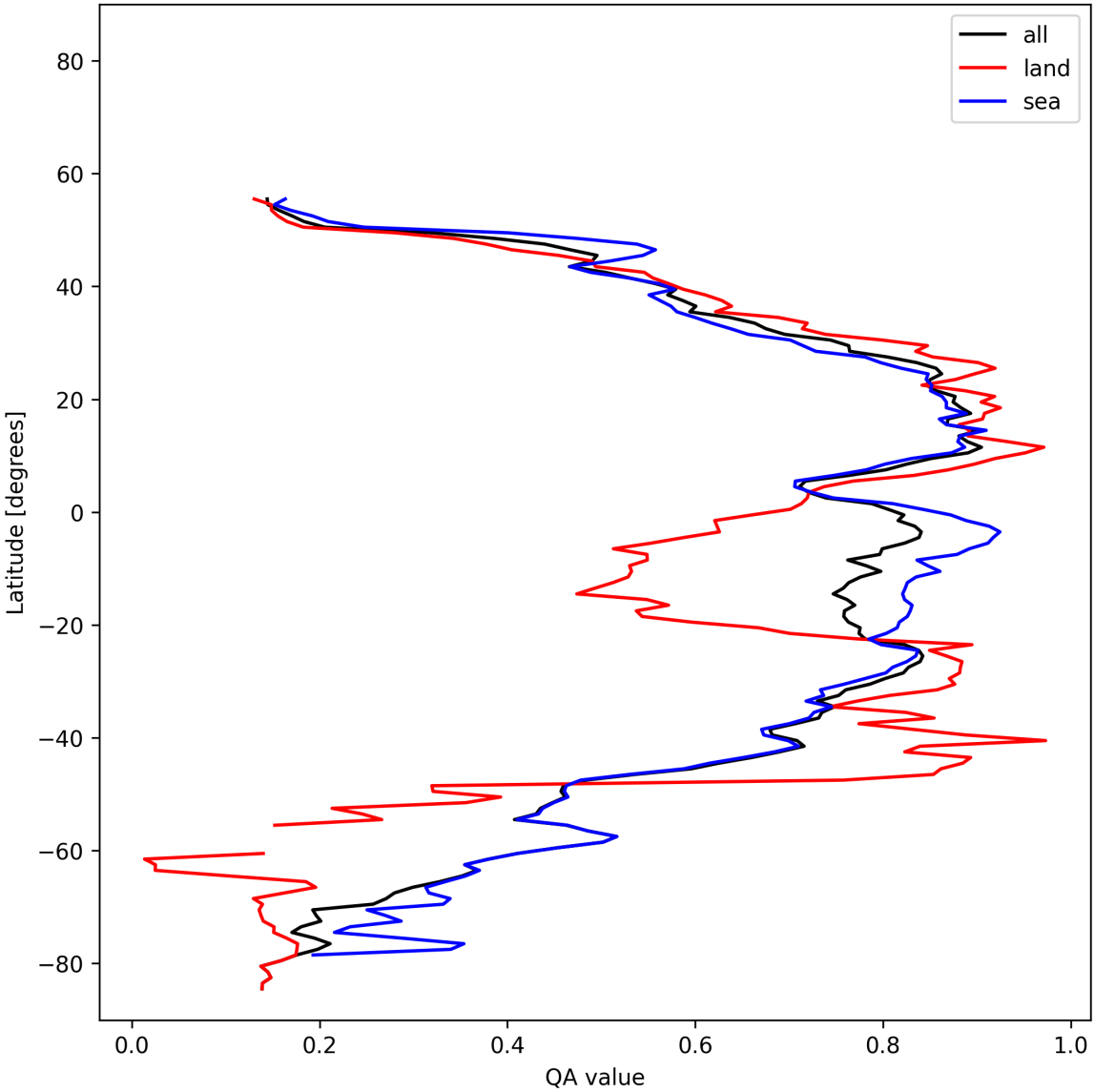

Figure 30: Zonal average of “QA value” for 2025-02-08 to 2025-02-09.

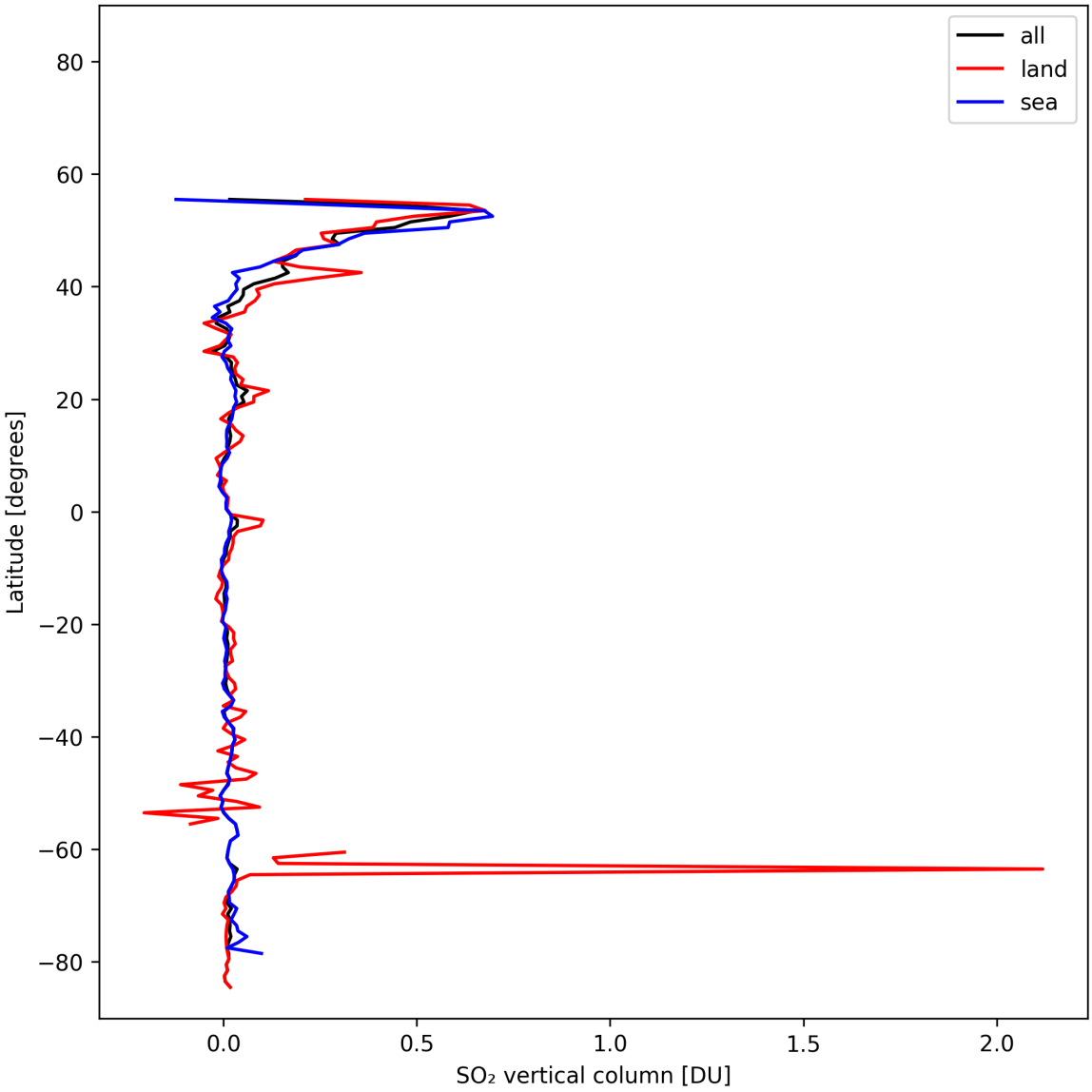

Figure 31: Zonal average of "SO_2 vertical column" for 2025-02-08 to 2025-02-09.

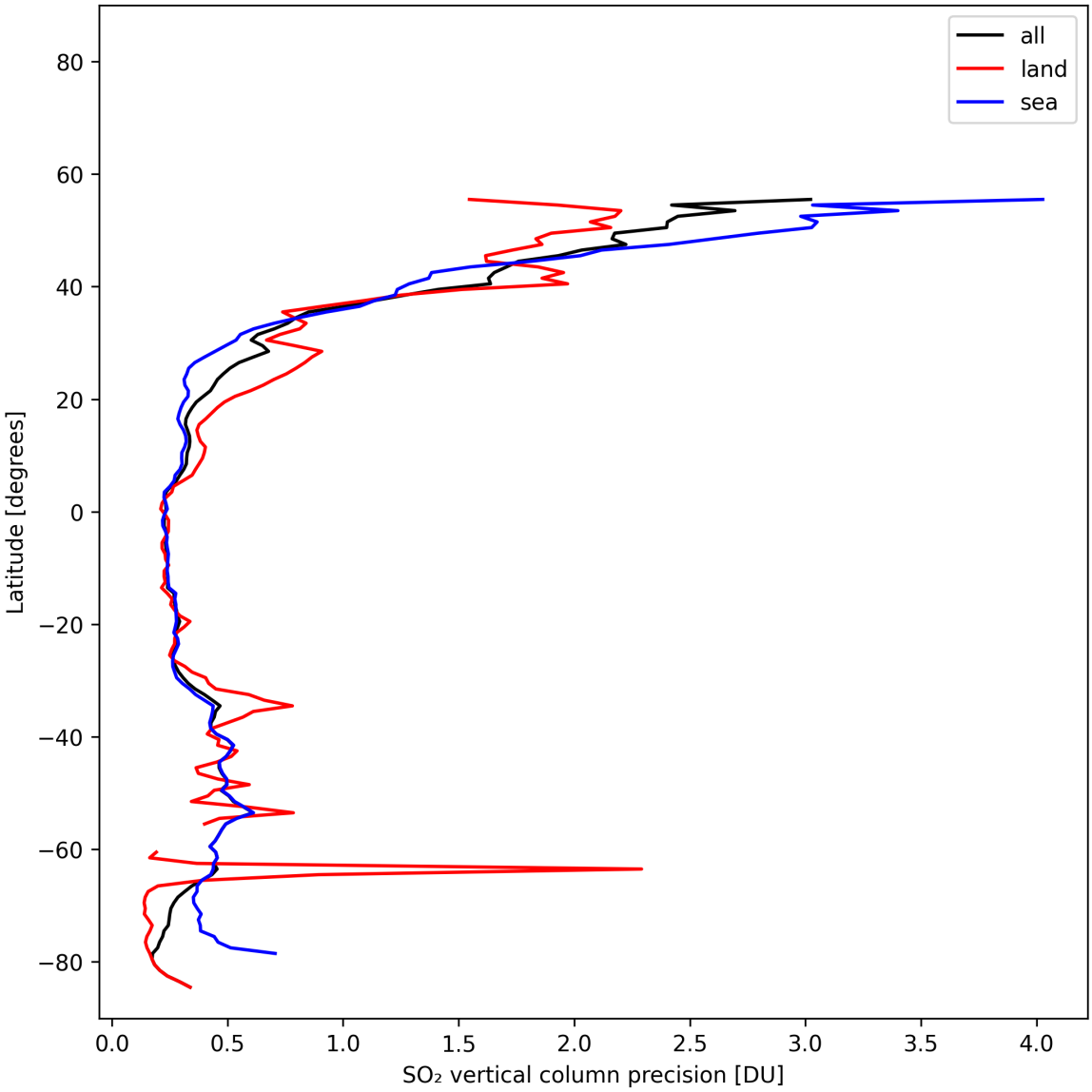

Figure 32: Zonal average of "SO_2 vertical column precision" for 2025-02-08 to 2025-02-09.

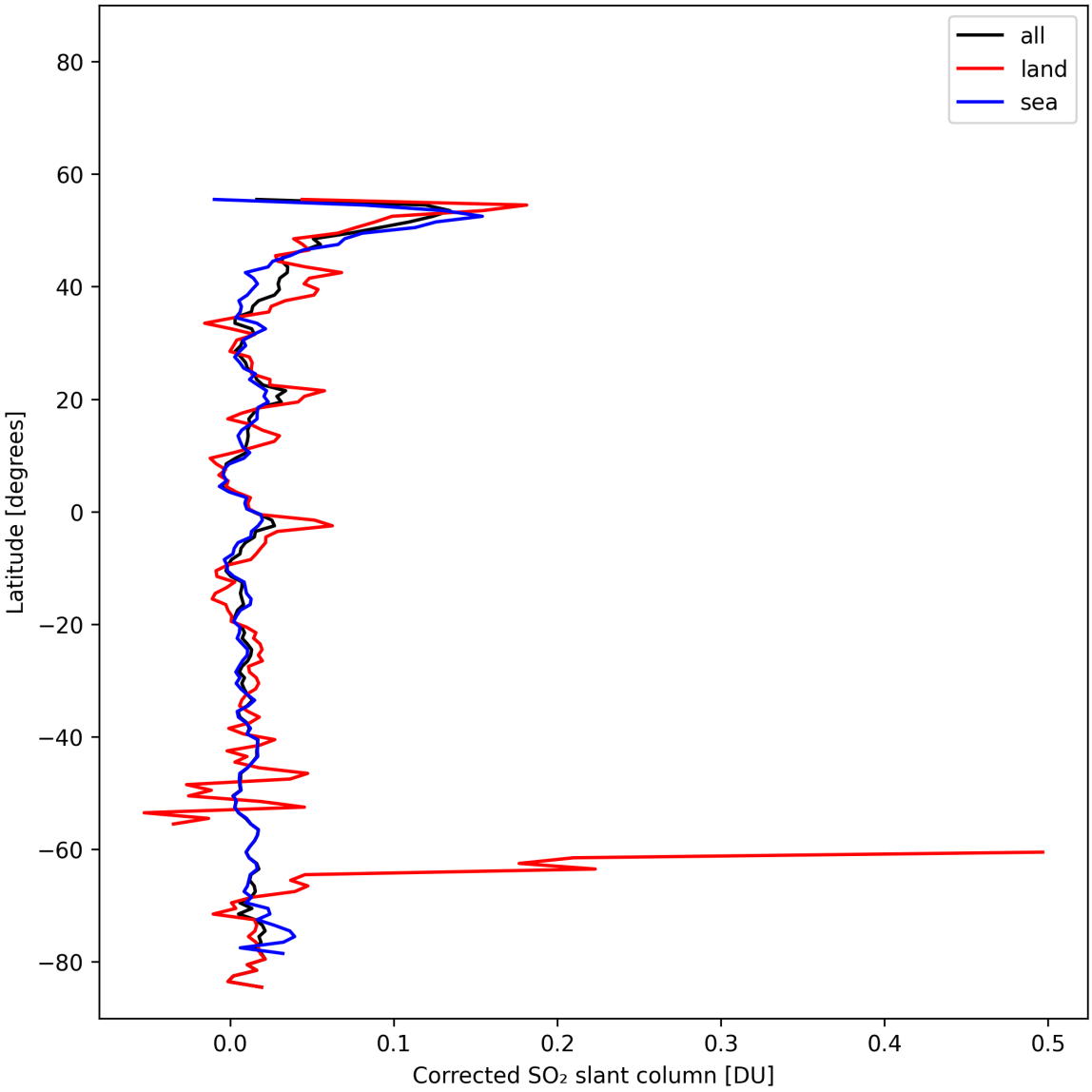

Figure 33: Zonal average of “Corrected SO_2 slant column” for 2025-02-08 to 2025-02-09.

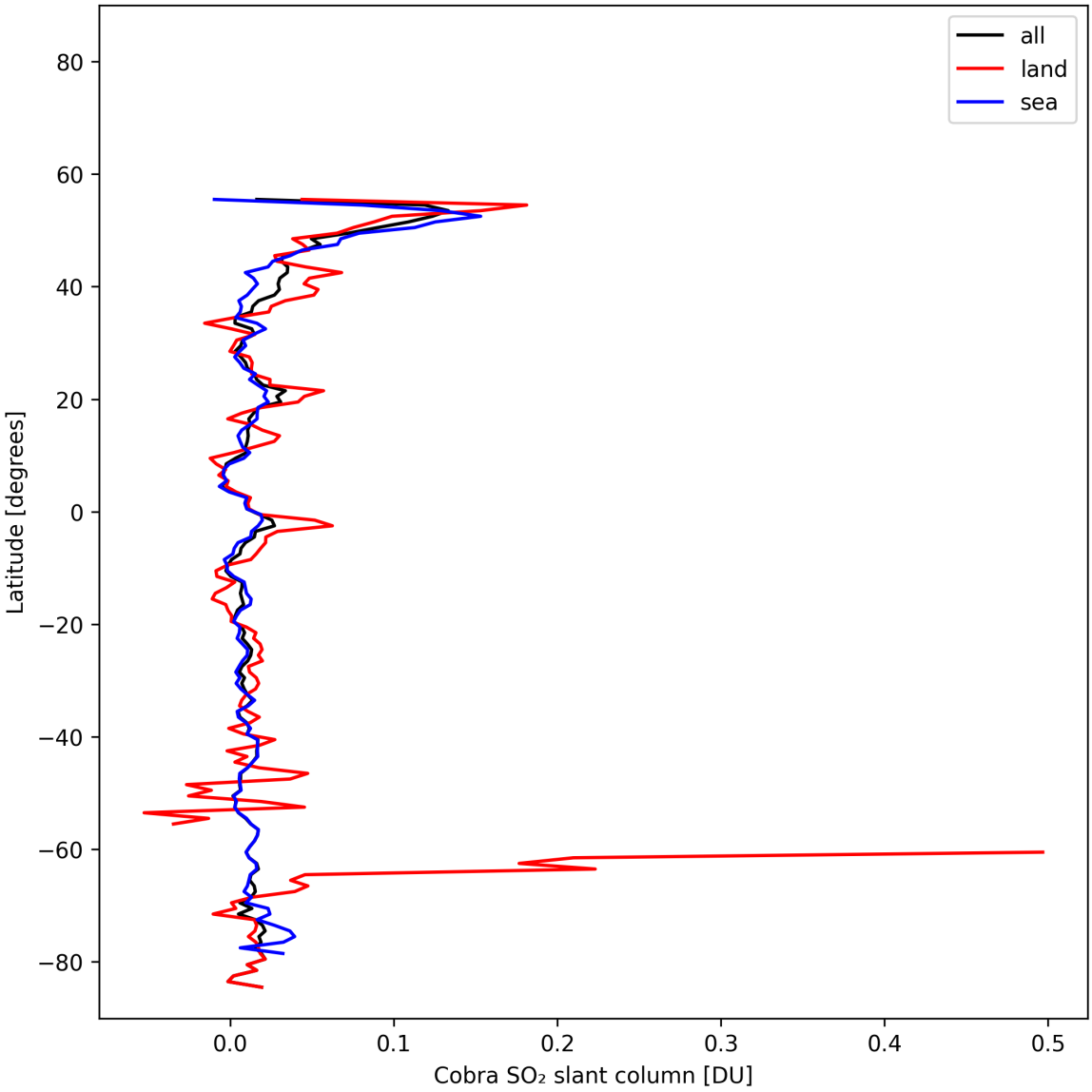

Figure 34: Zonal average of "Cobra SO_2 slant column" for 2025-02-08 to 2025-02-09.

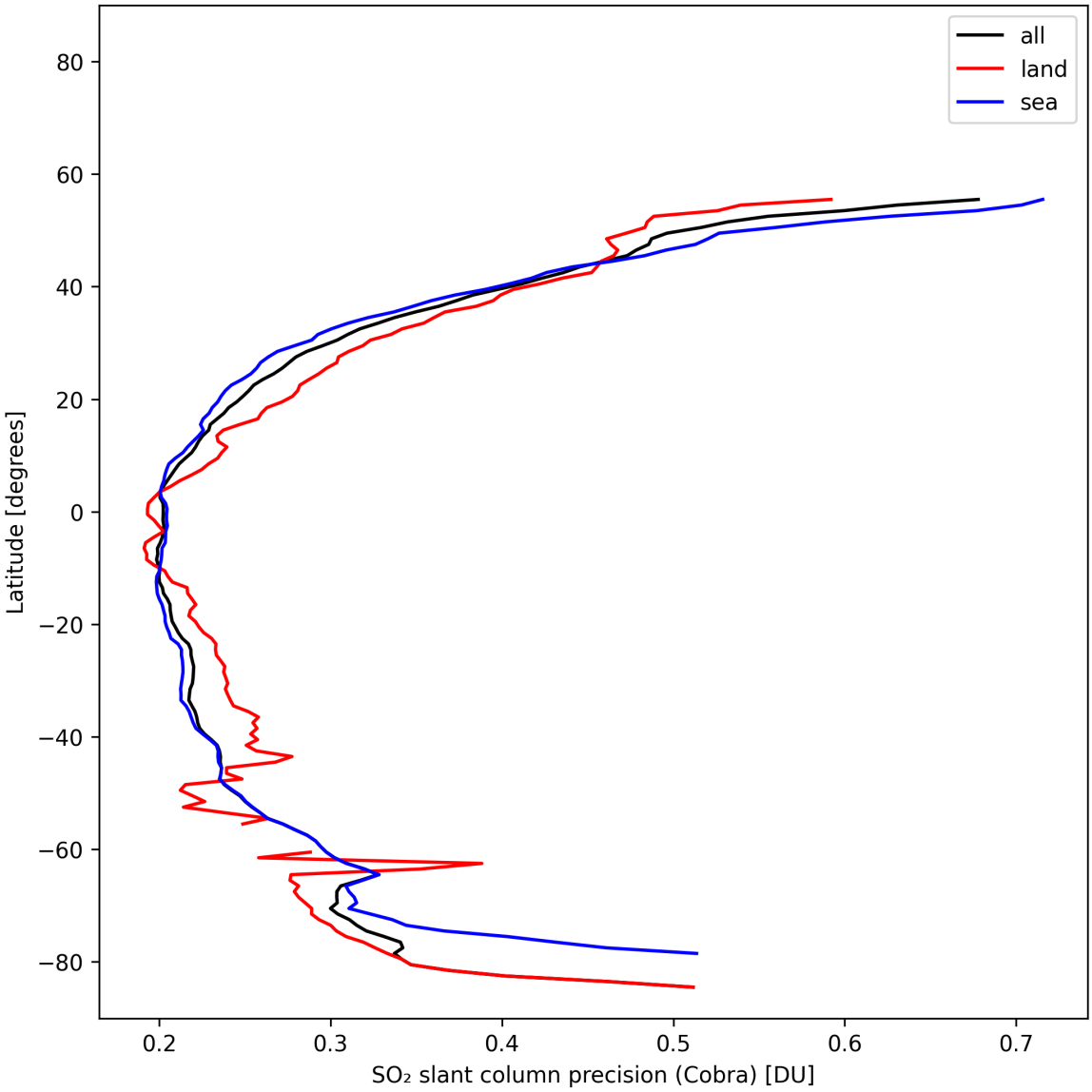

Figure 35: Zonal average of "SO_2 slant column precision (Cobra)" for 2025-02-08 to 2025-02-09.

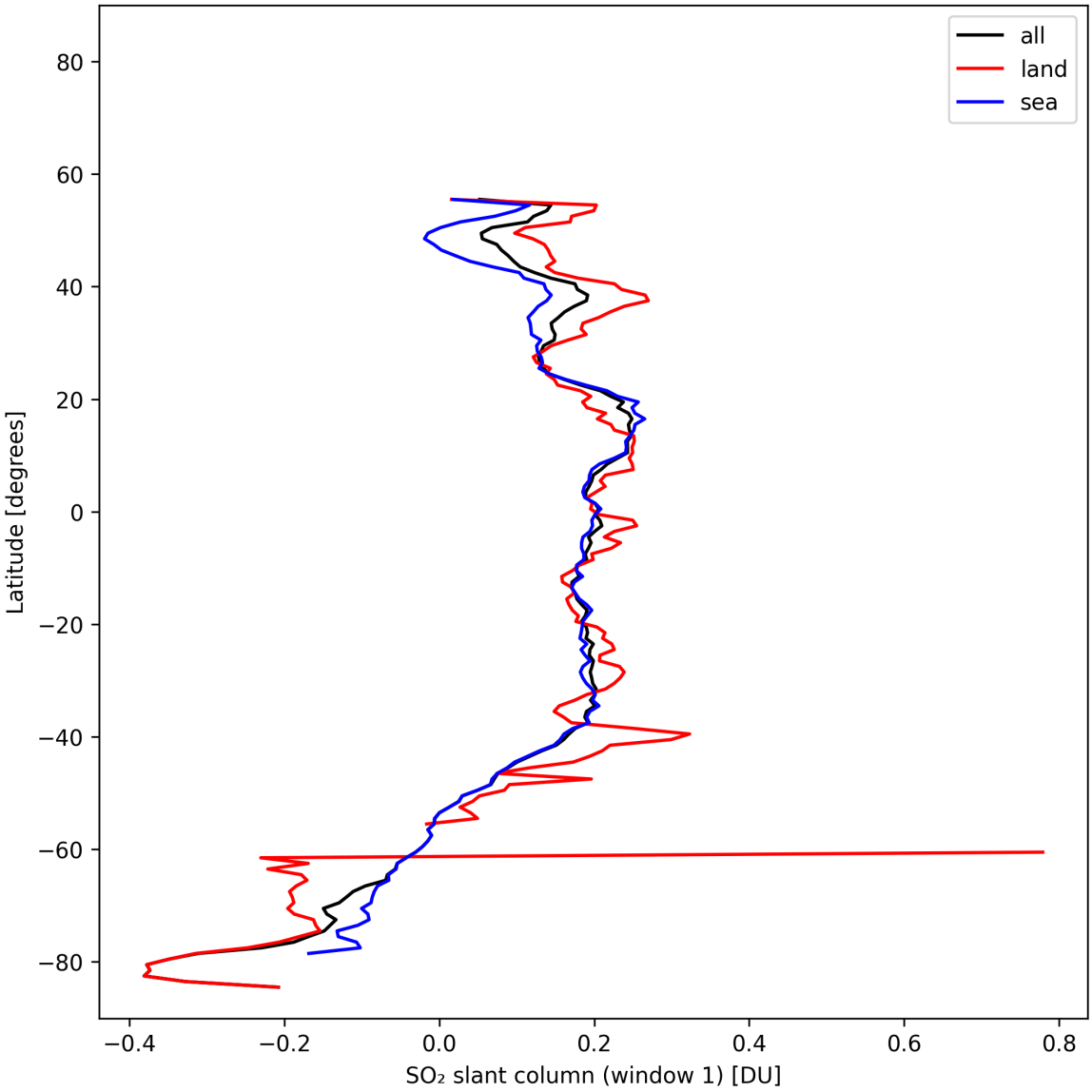

Figure 36: Zonal average of "SO_2 slant column (window 1)" for 2025-02-08 to 2025-02-09.

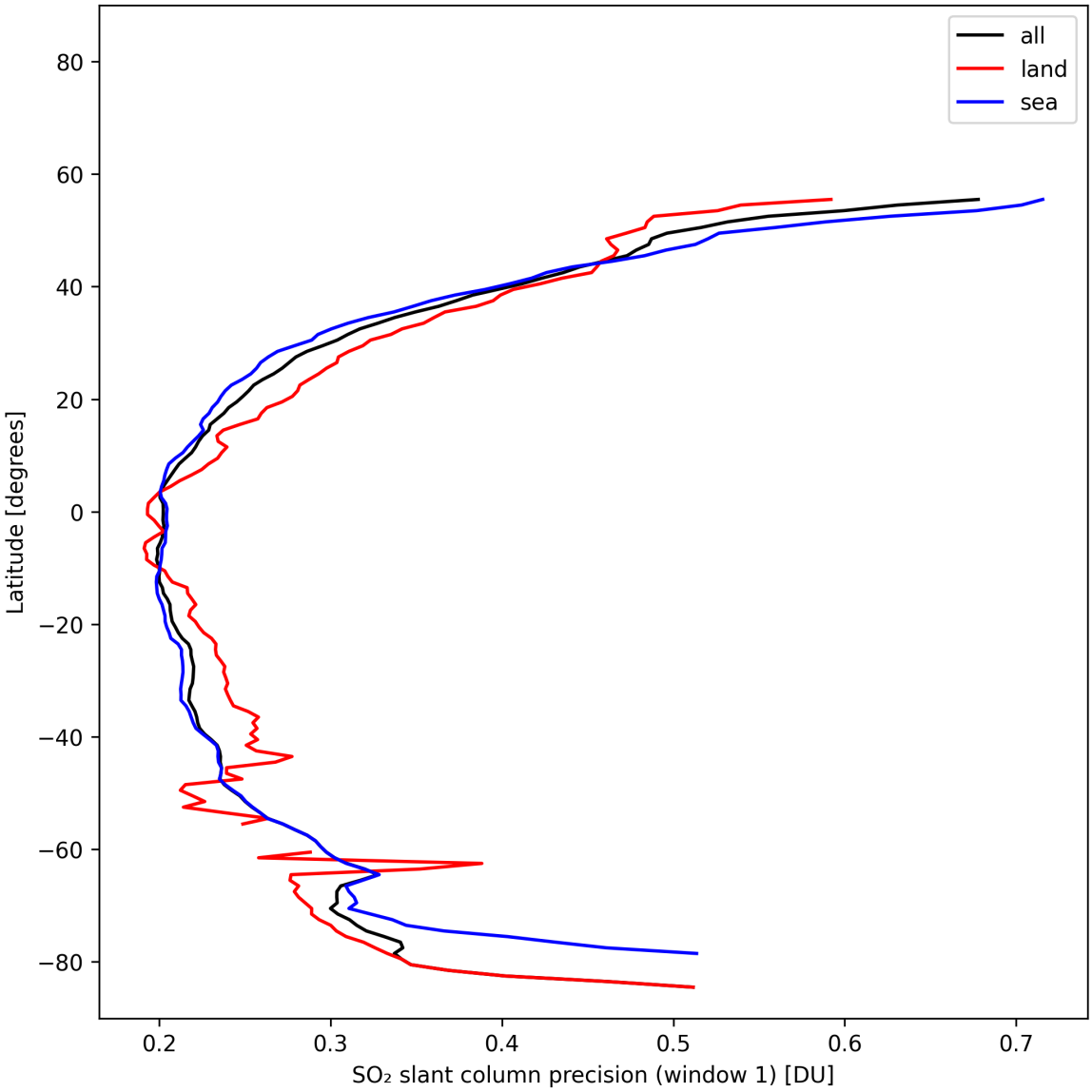

Figure 37: Zonal average of "SO_2 slant column precision (window 1)" for 2025-02-08 to 2025-02-09.

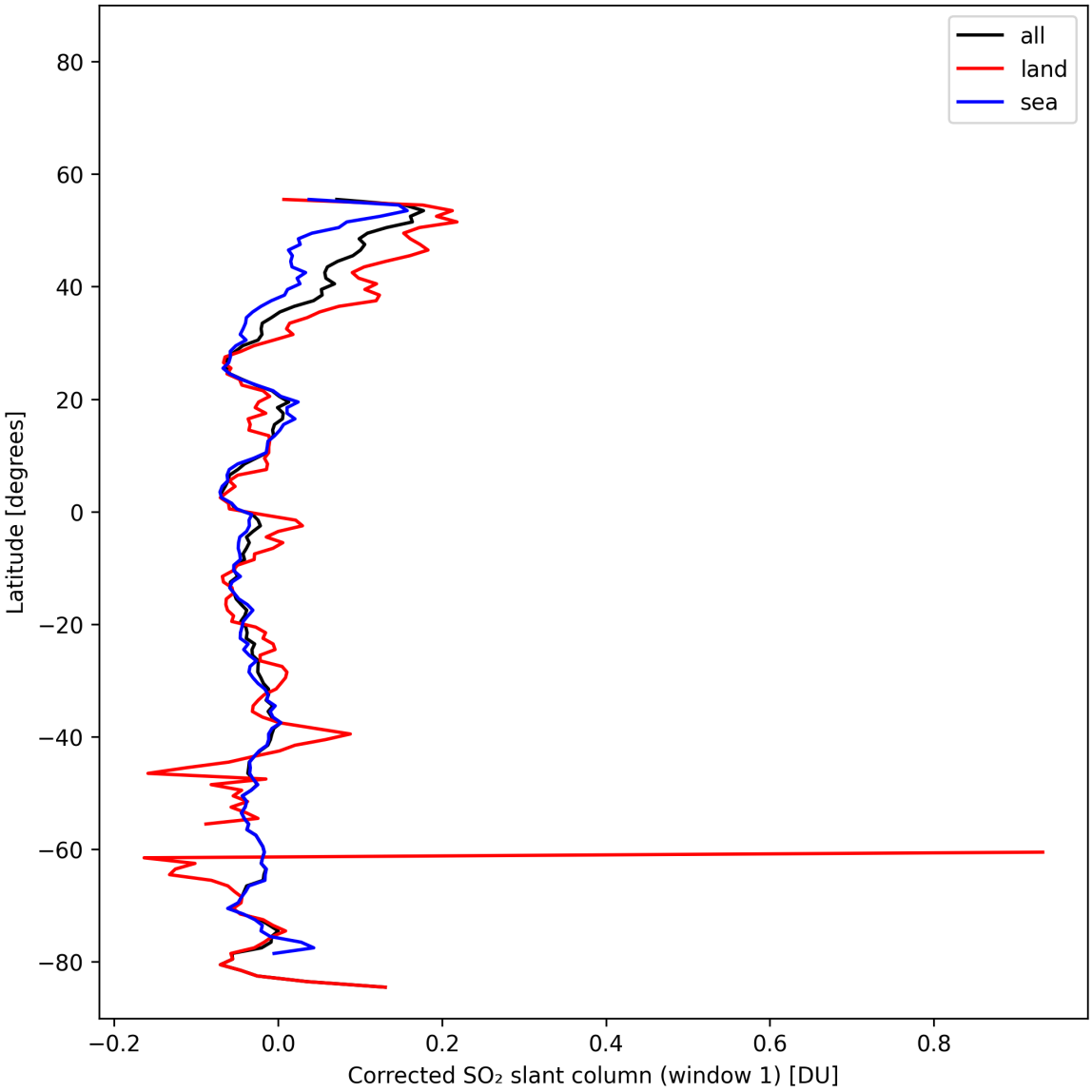

Figure 38: Zonal average of "Corrected SO_2 slant column (window 1)" for 2025-02-08 to 2025-02-09.

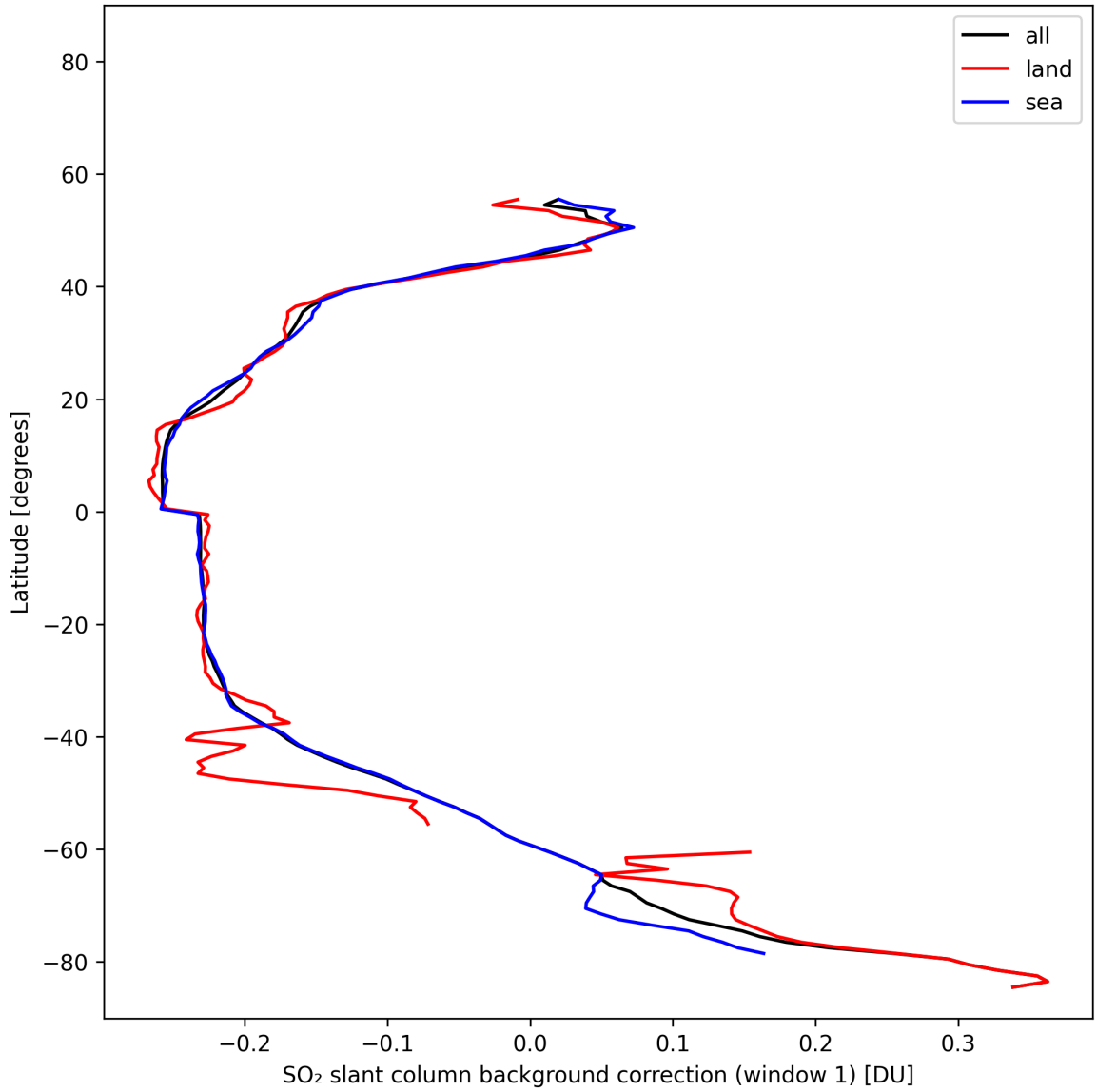

Figure 39: Zonal average of "SO_2 slant column background correction (window 1)" for 2025-02-08 to 2025-02-09.

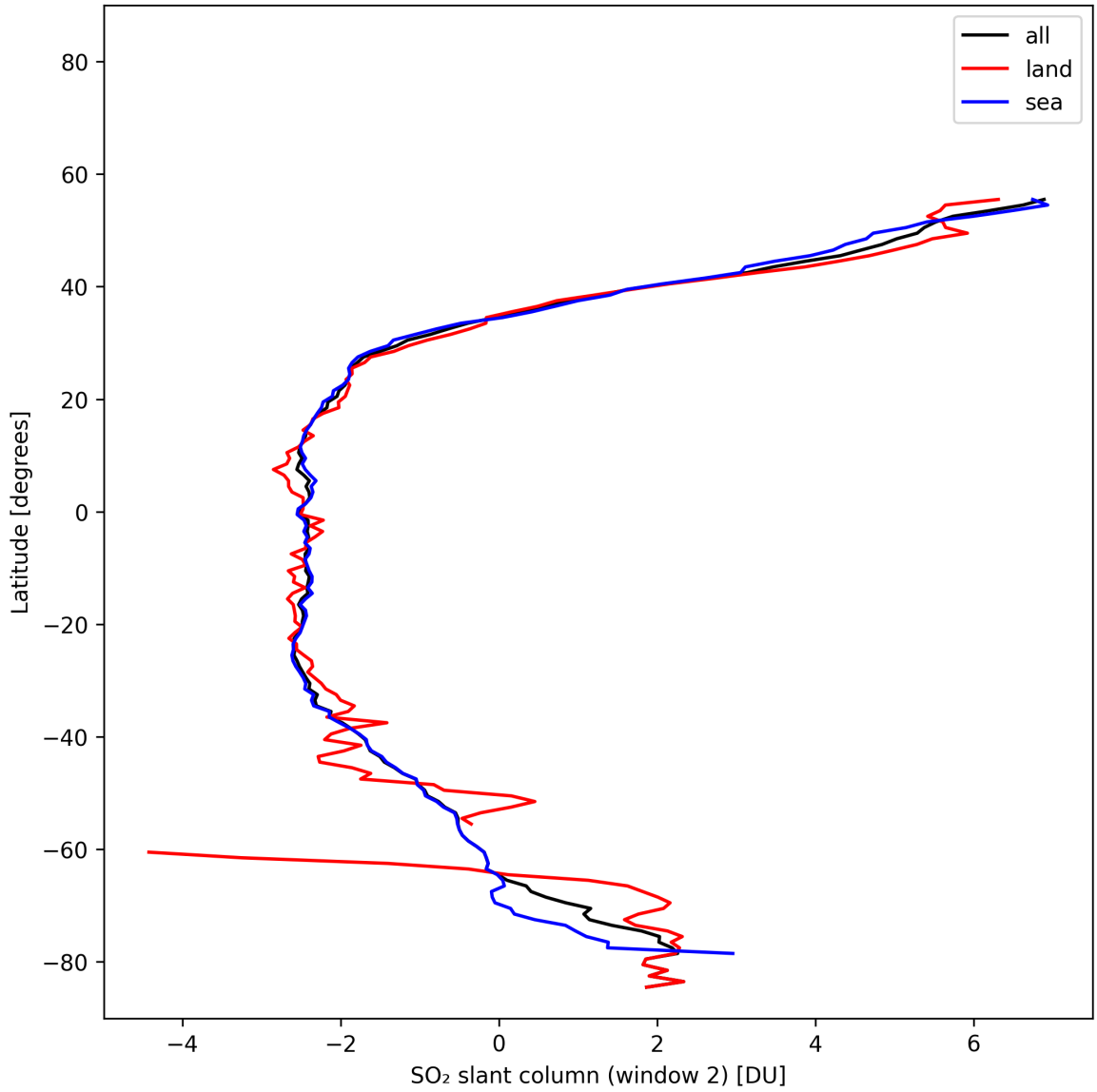

Figure 40: Zonal average of "SO_2 slant column (window 2)" for 2025-02-08 to 2025-02-09.

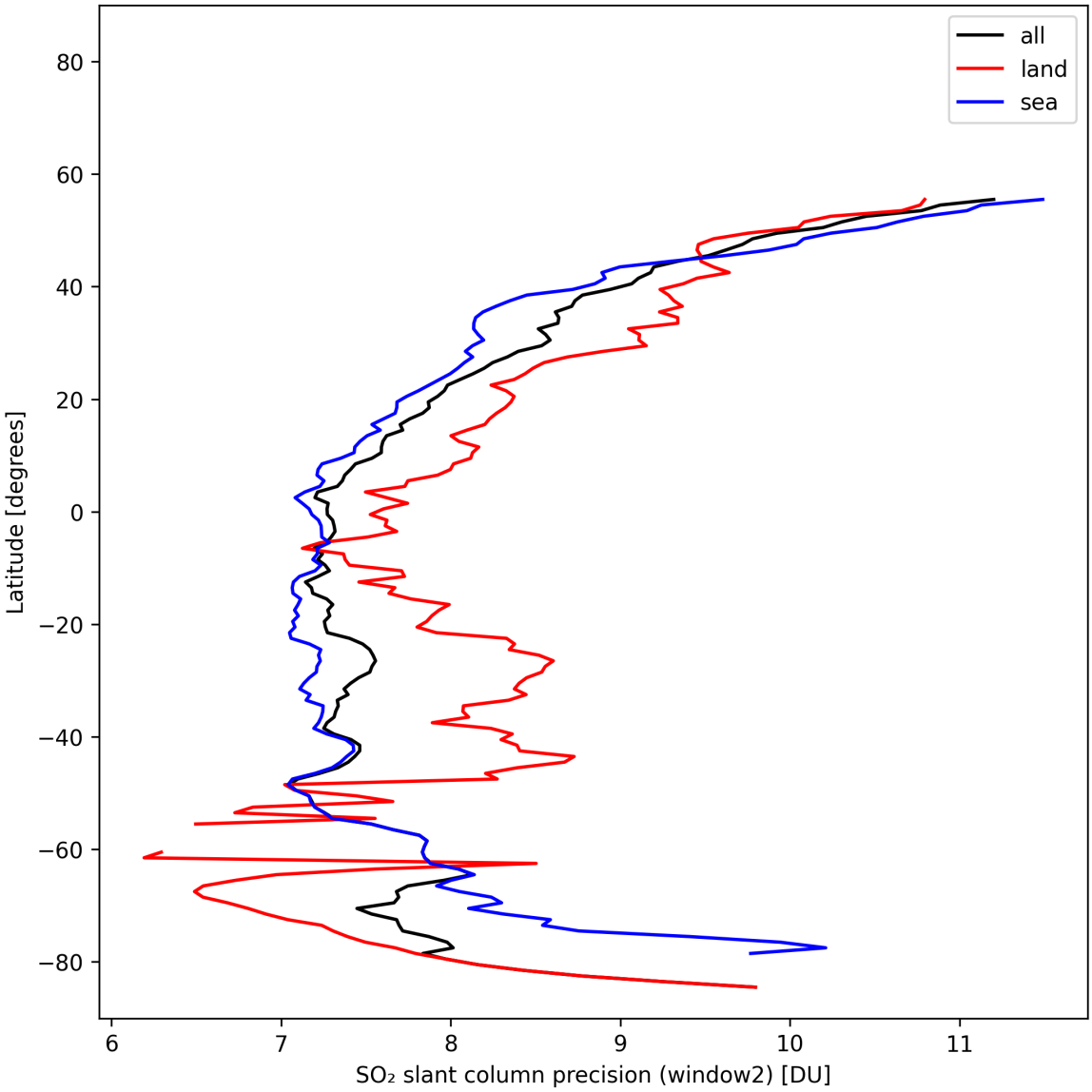

Figure 41: Zonal average of "SO_2 slant column precision (window2)" for 2025-02-08 to 2025-02-09.

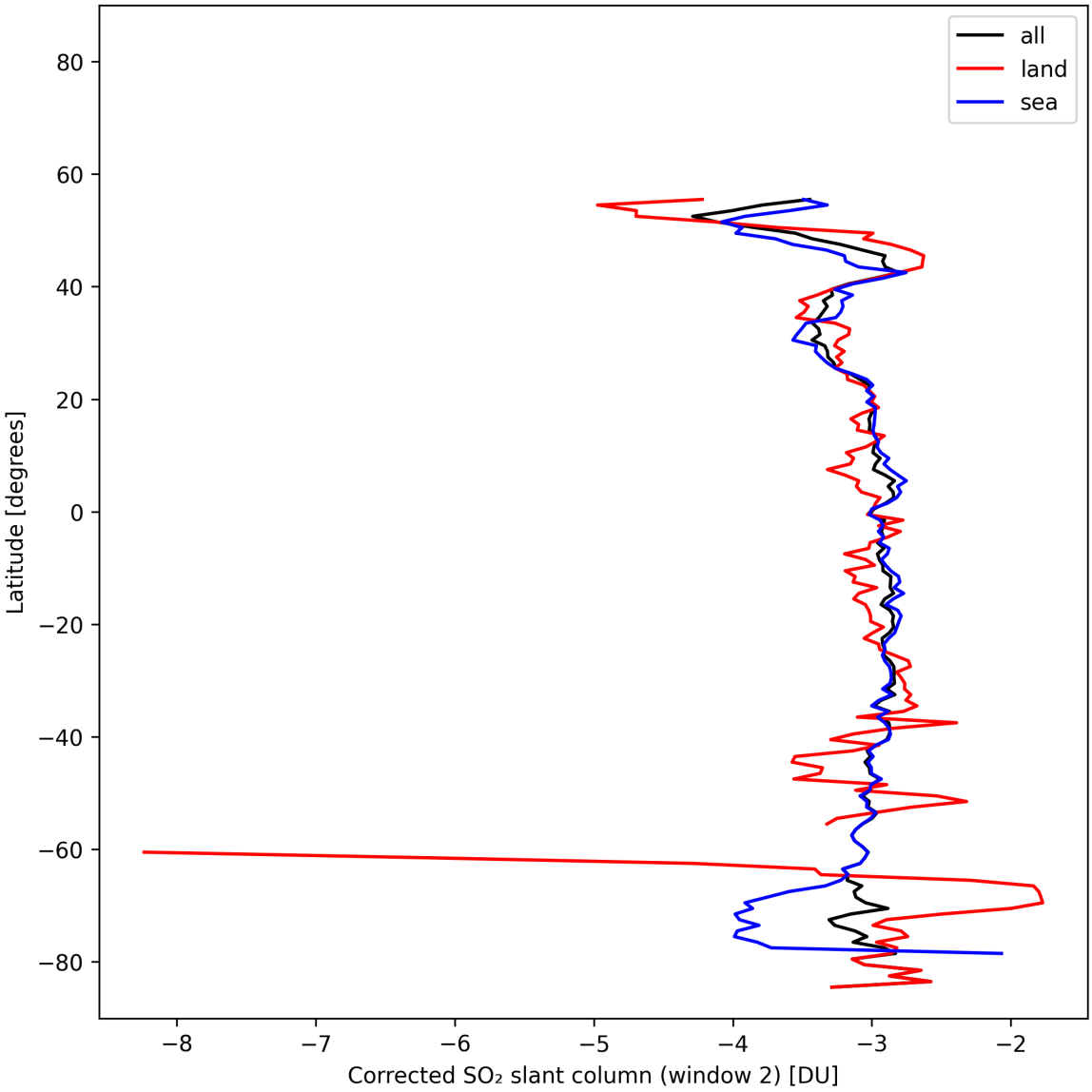

Figure 42: Zonal average of “Corrected SO_2 slant column (window 2)” for 2025-02-08 to 2025-02-09.

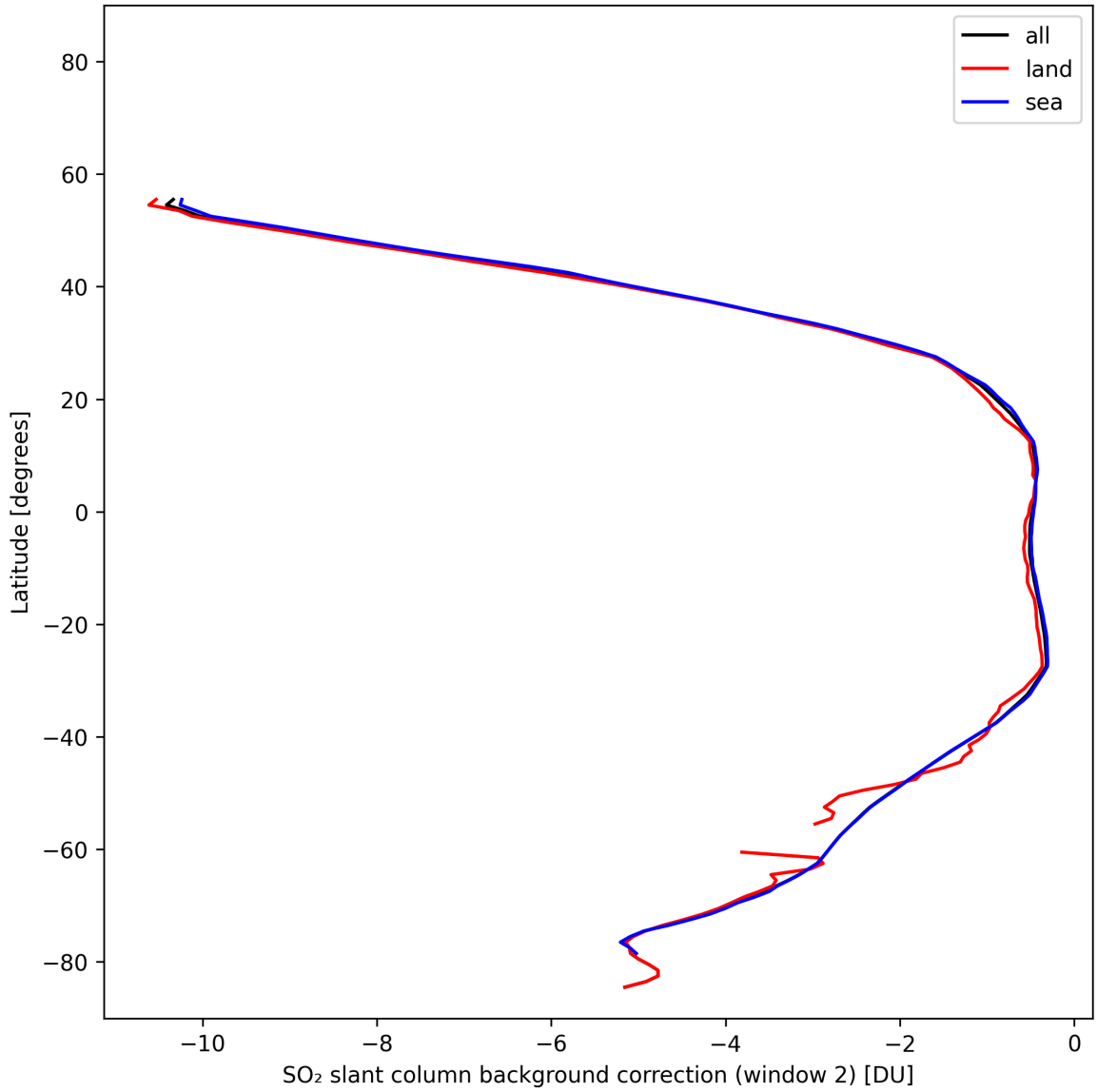

Figure 43: Zonal average of "SO_2 slant column background correction (window 2)" for 2025-02-08 to 2025-02-09.

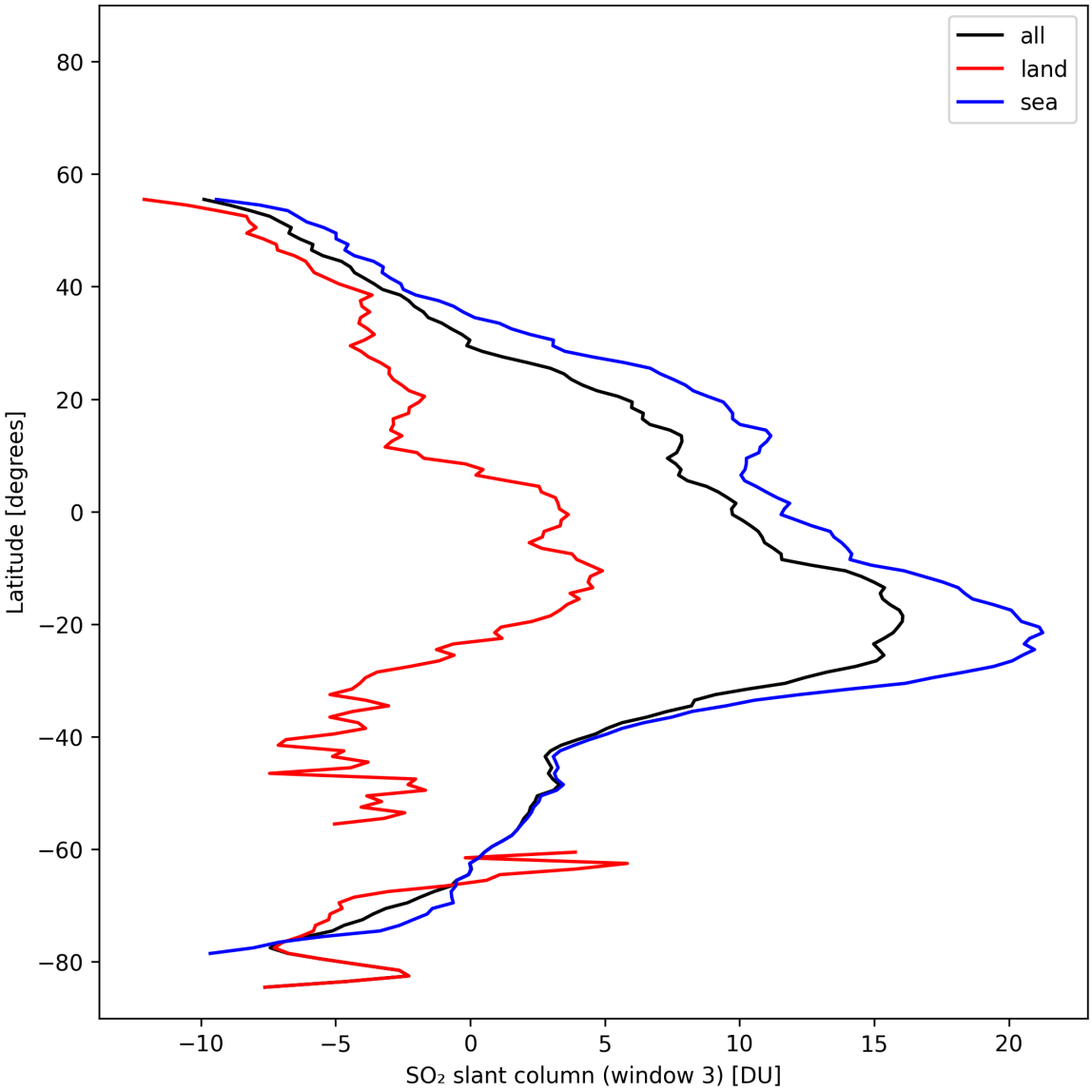

Figure 44: Zonal average of "SO_2 slant column (window 3)" for 2025-02-08 to 2025-02-09.

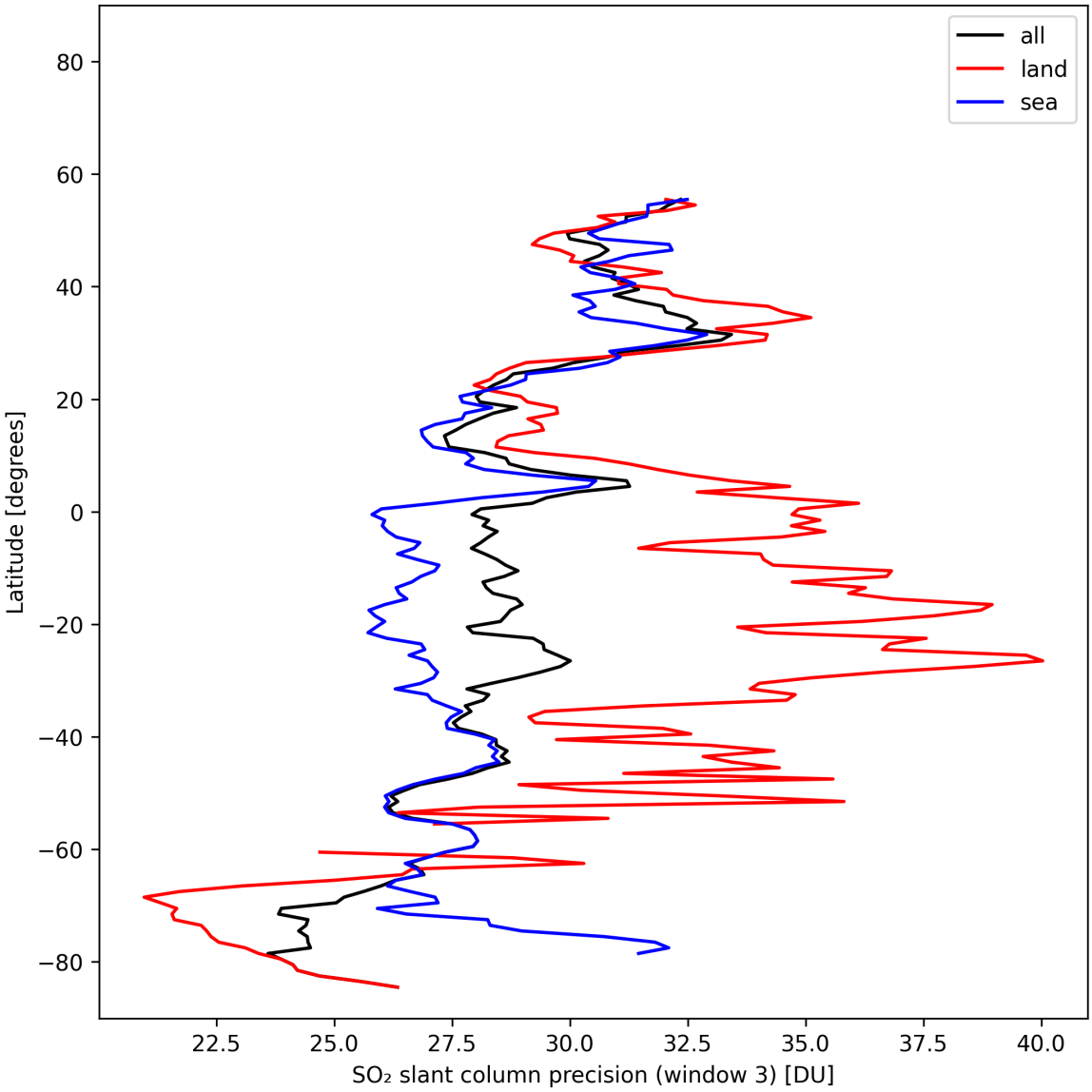

Figure 45: Zonal average of "SO_2 slant column precision (window 3)" for 2025-02-08 to 2025-02-09.

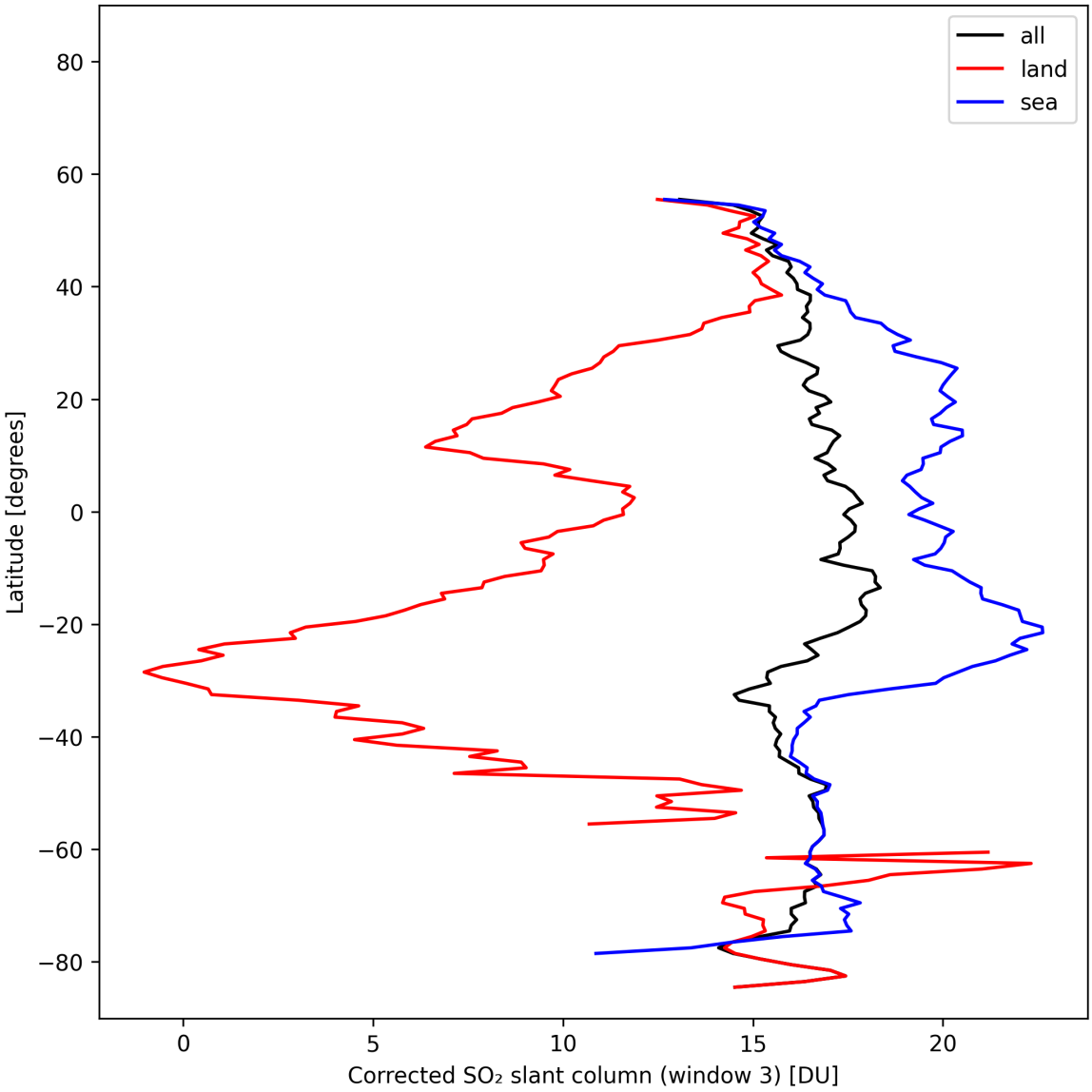

Figure 46: Zonal average of "Corrected SO_2 slant column (window 3)" for 2025-02-08 to 2025-02-09.

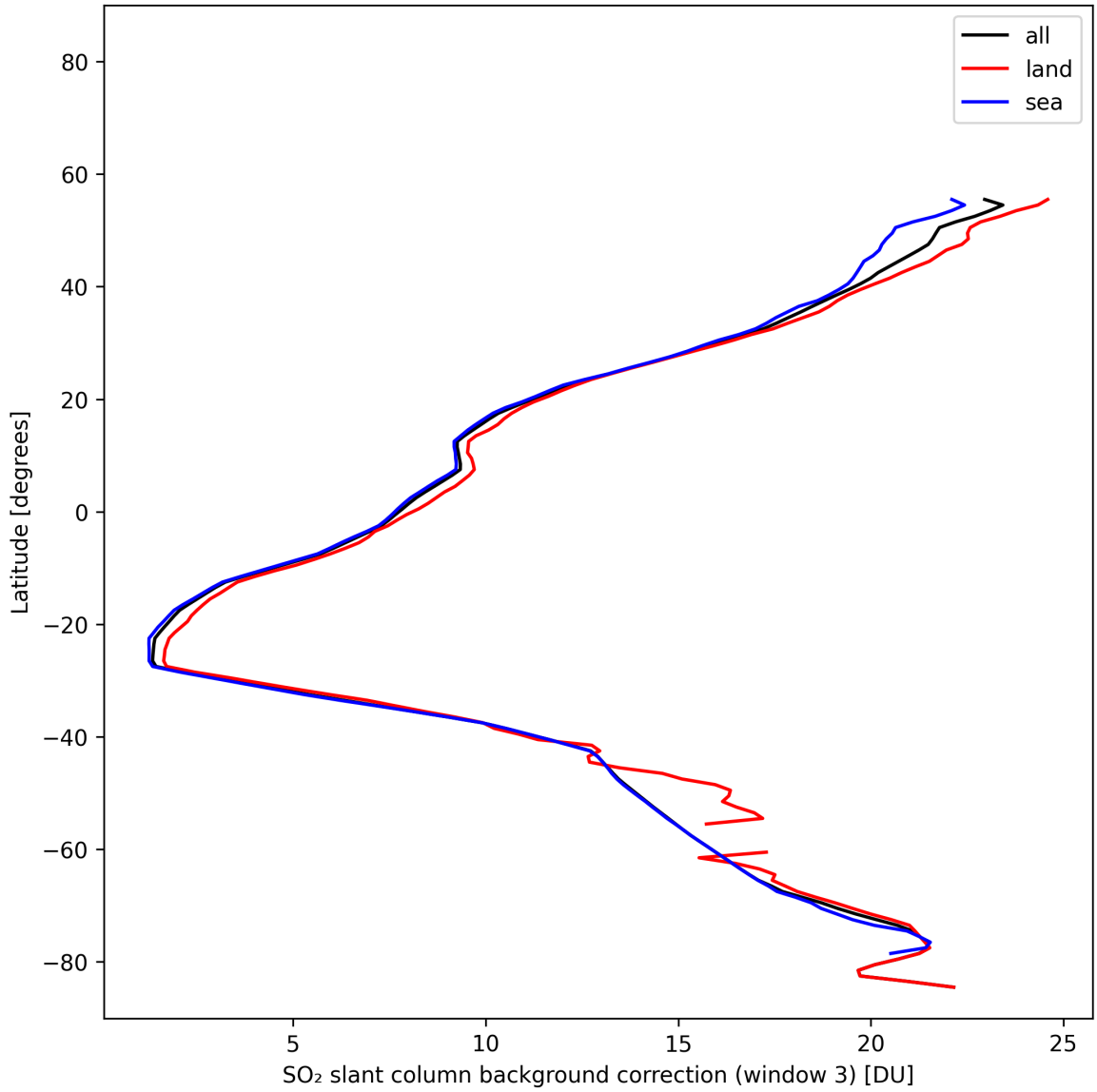

Figure 47: Zonal average of "SO_2 slant column background correction (window 3)" for 2025-02-08 to 2025-02-09.

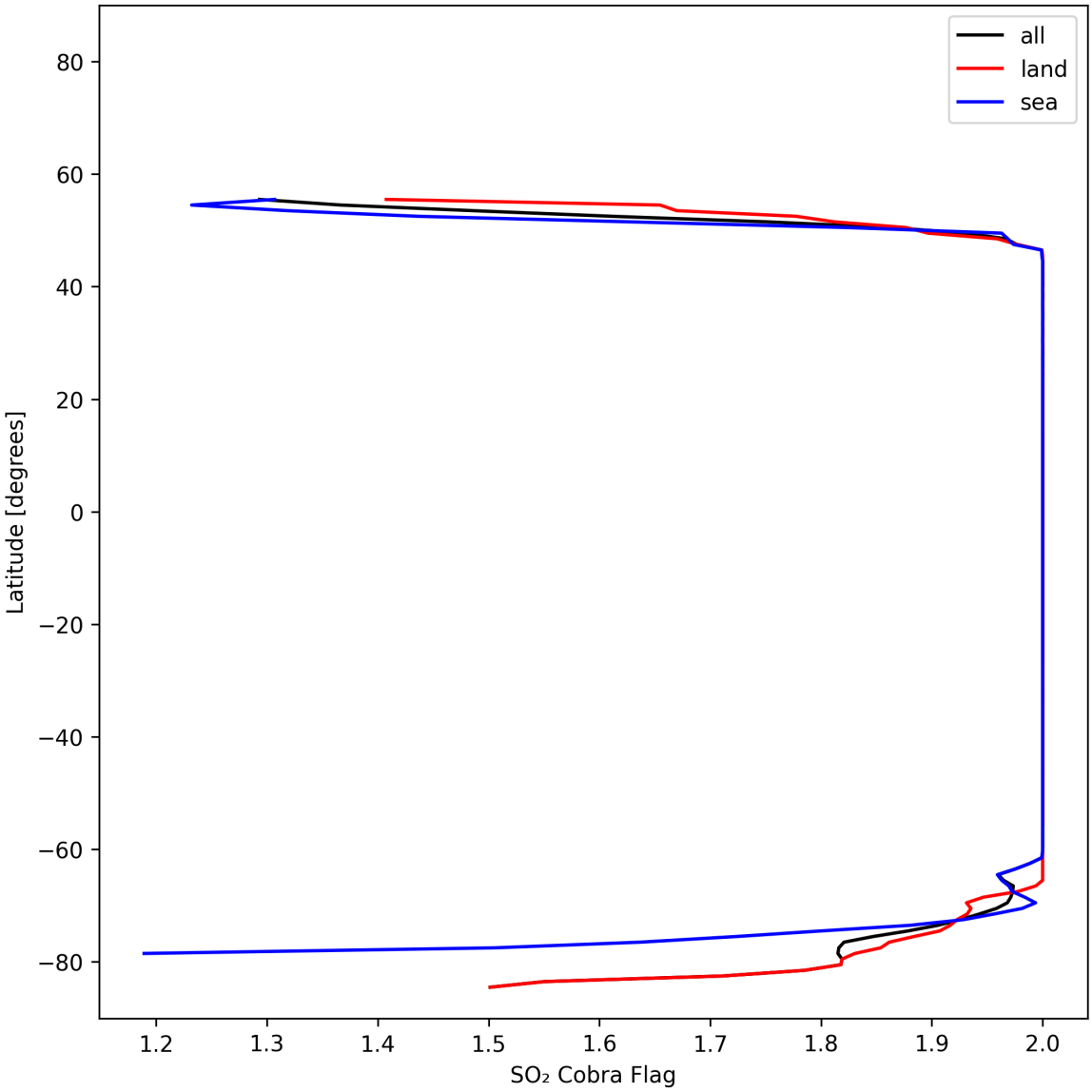

Figure 48: Zonal average of "SO_2 Cobra Flag" for 2025-02-08 to 2025-02-09.

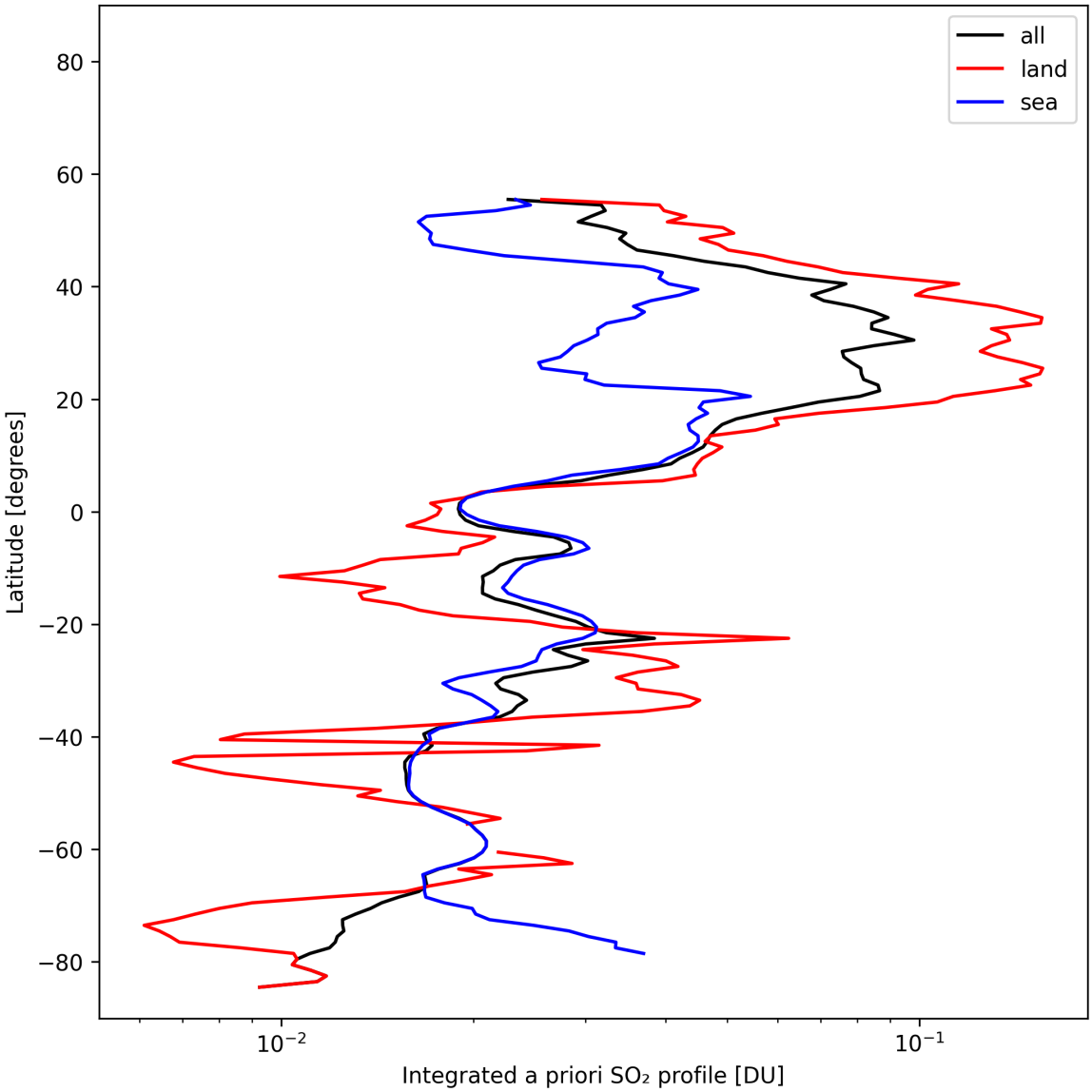

Figure 49: Zonal average of "Integrated a priori SO_2 profile" for 2025-02-08 to 2025-02-09.

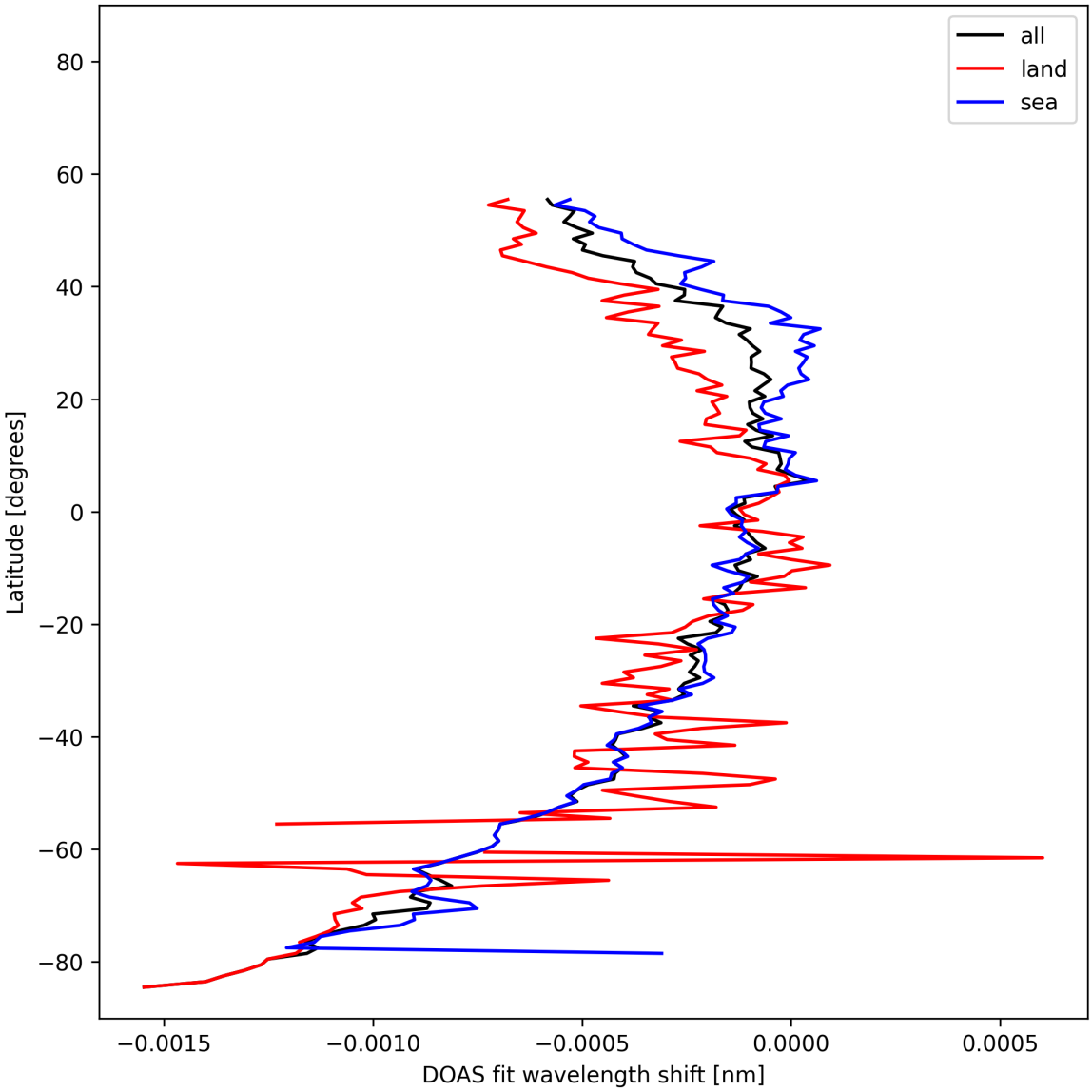

Figure 50: Zonal average of “DOAS fit wavelength shift” for 2025-02-08 to 2025-02-09.

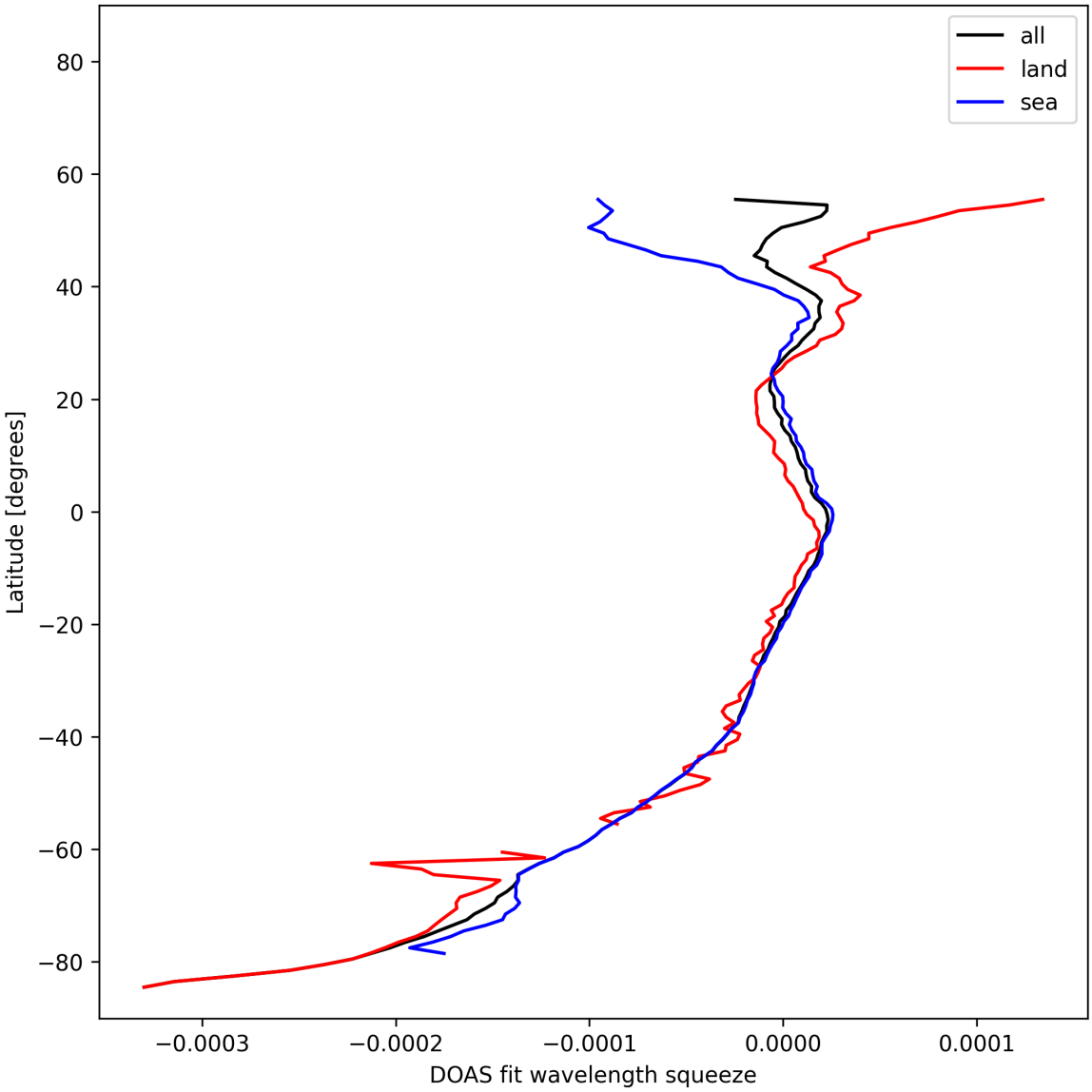

Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-02-08 to 2025-02-09.

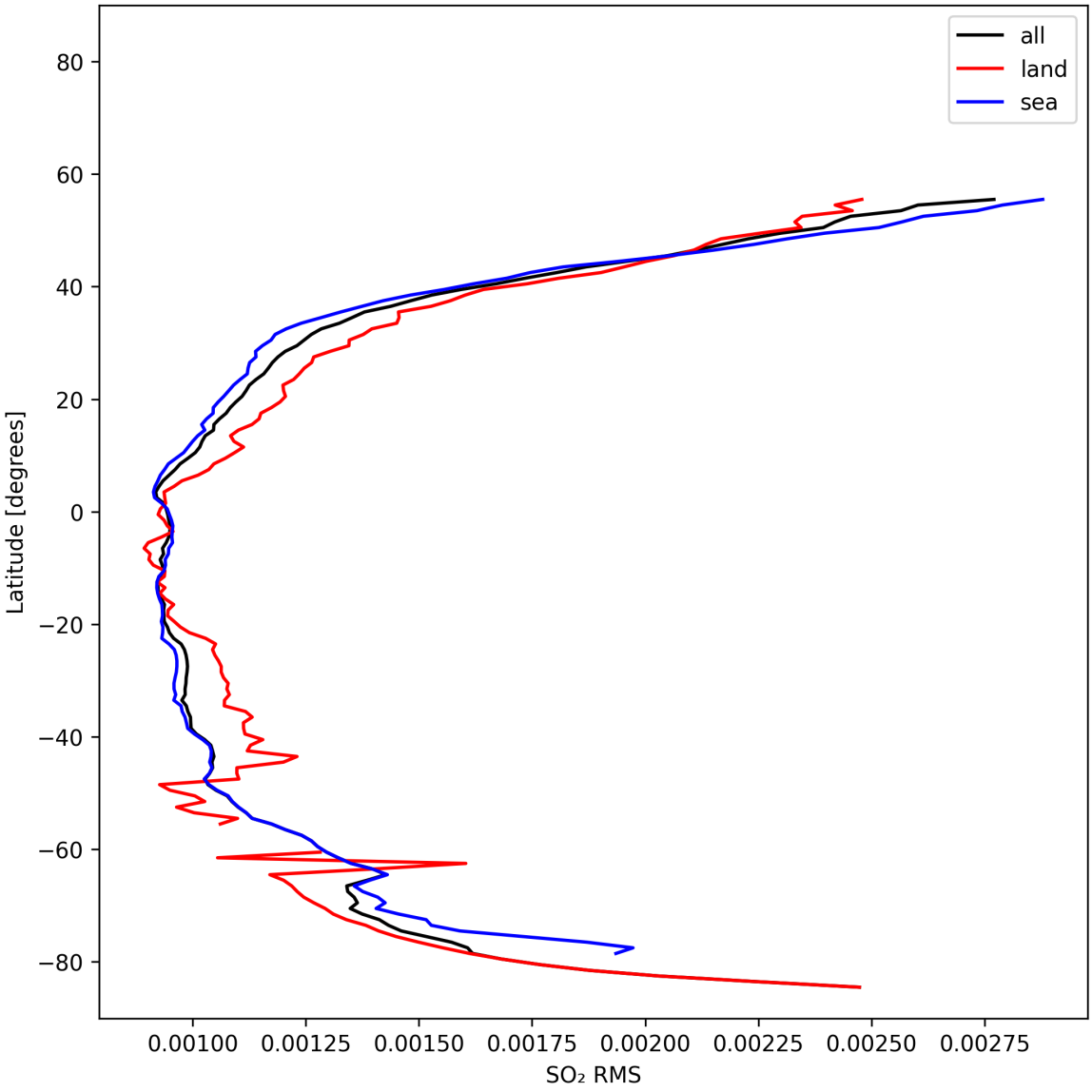

Figure 52: Zonal average of "SO_2 RMS" for 2025-02-08 to 2025-02-09.

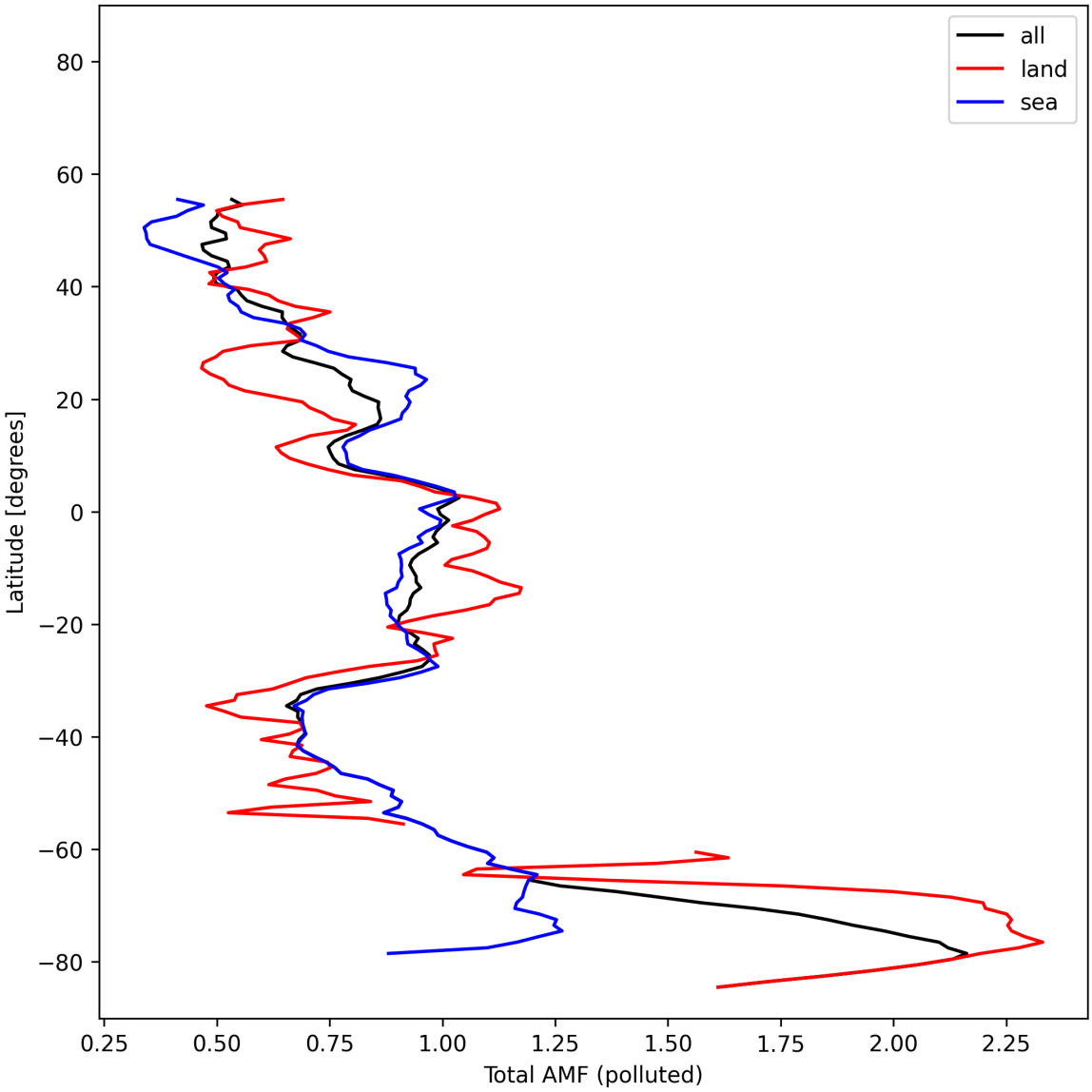

Figure 53: Zonal average of “Total AMF (polluted)” for 2025-02-08 to 2025-02-09.

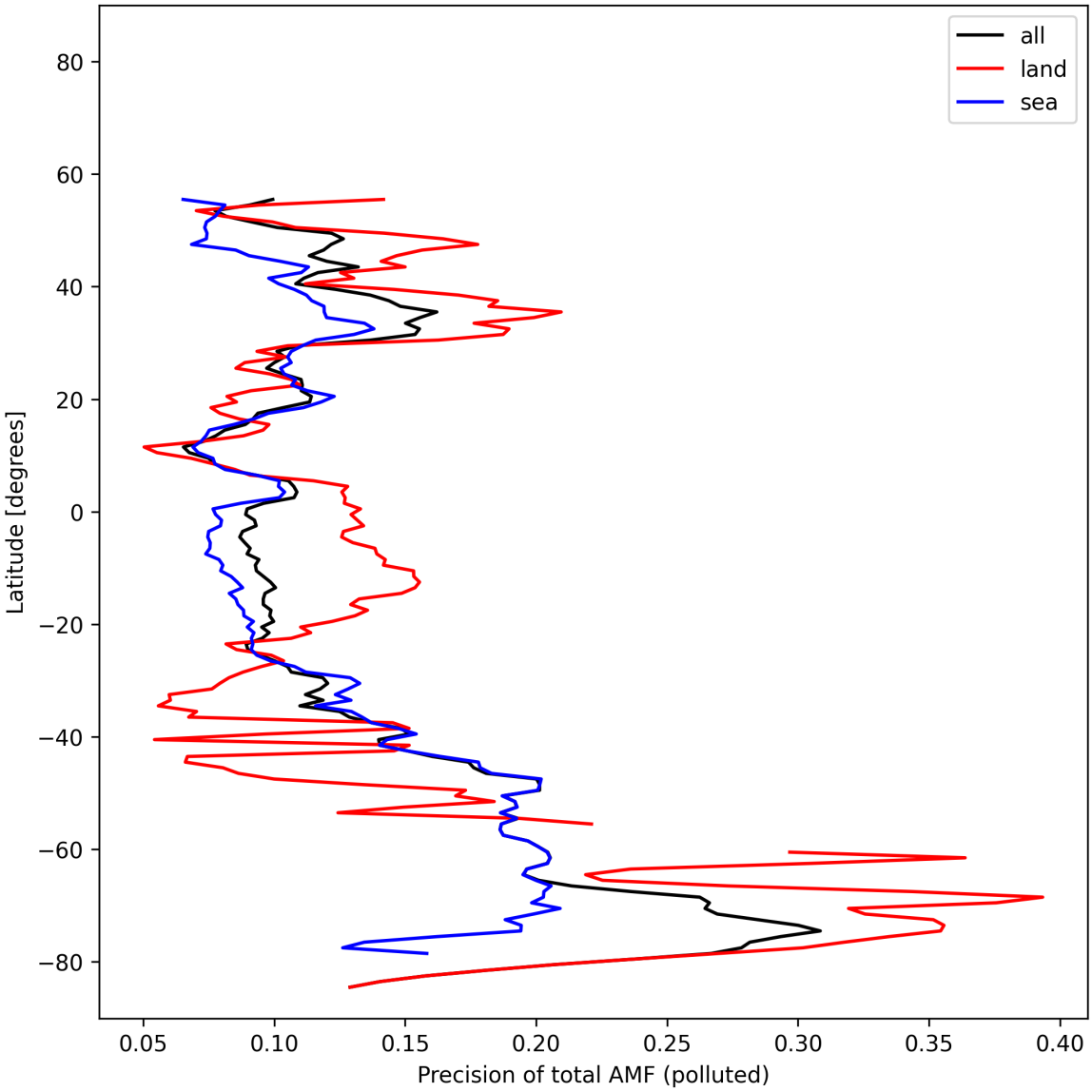

Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-02-08 to 2025-02-09.

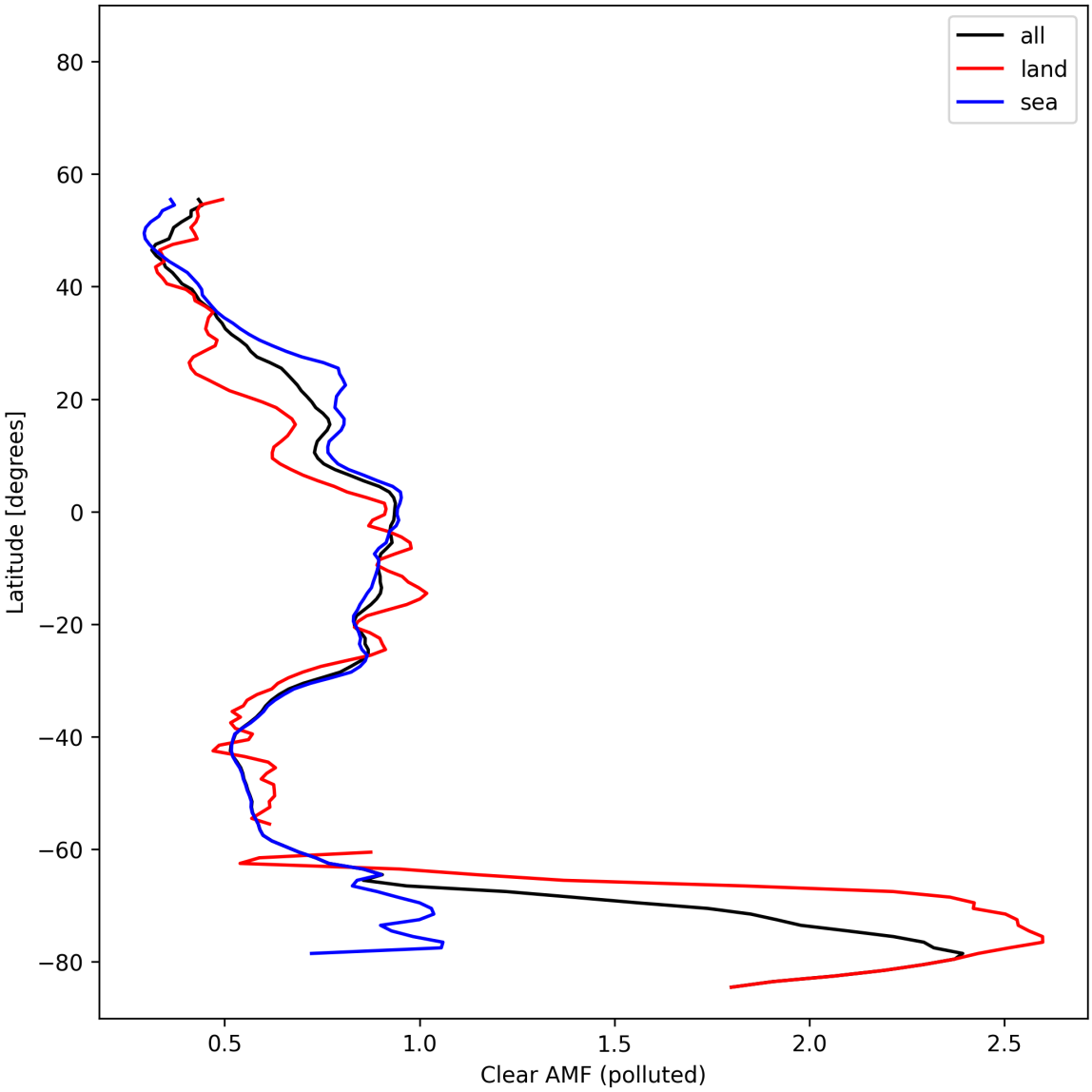

Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-02-08 to 2025-02-09.

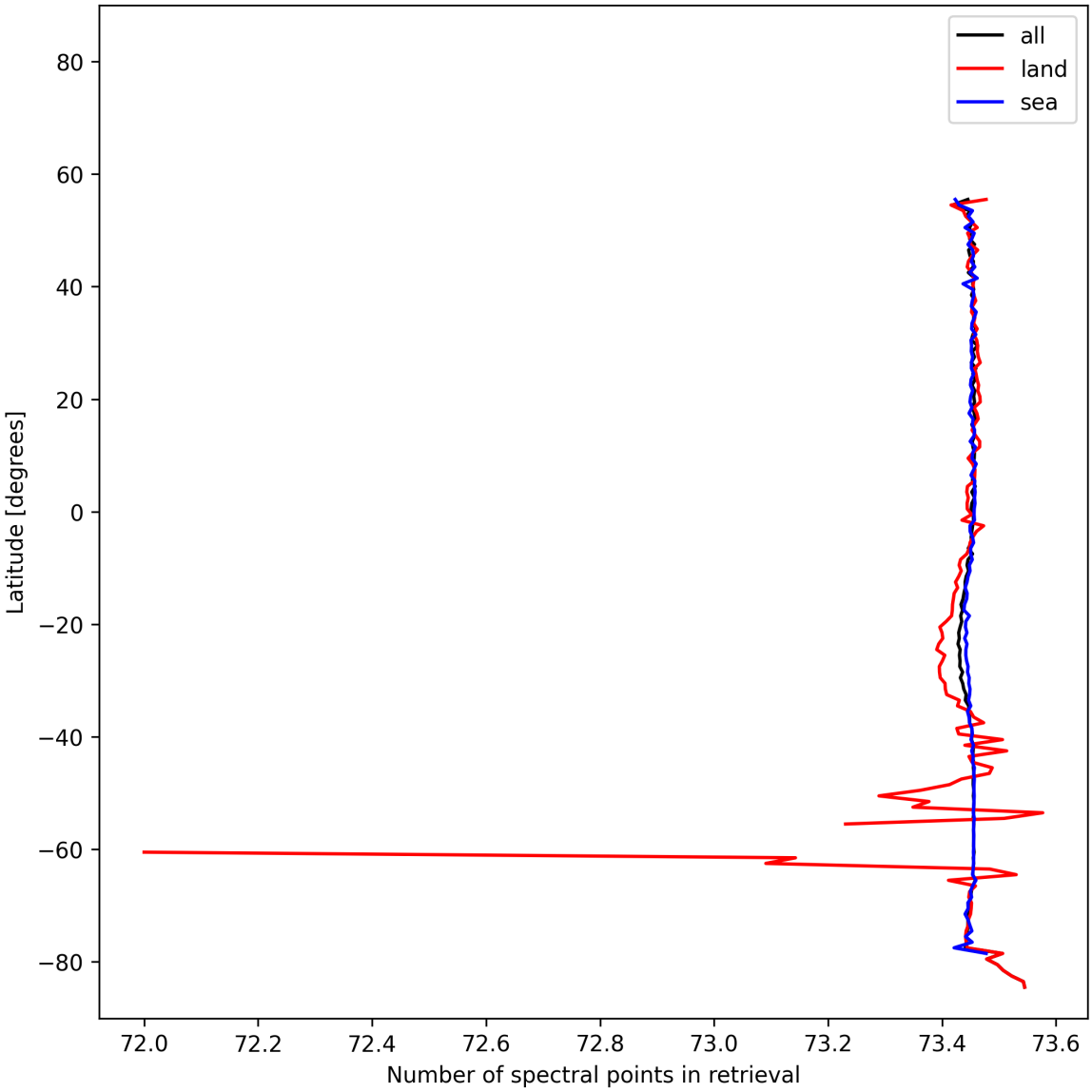

Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-02-08 to 2025-02-09.

8 Histograms

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

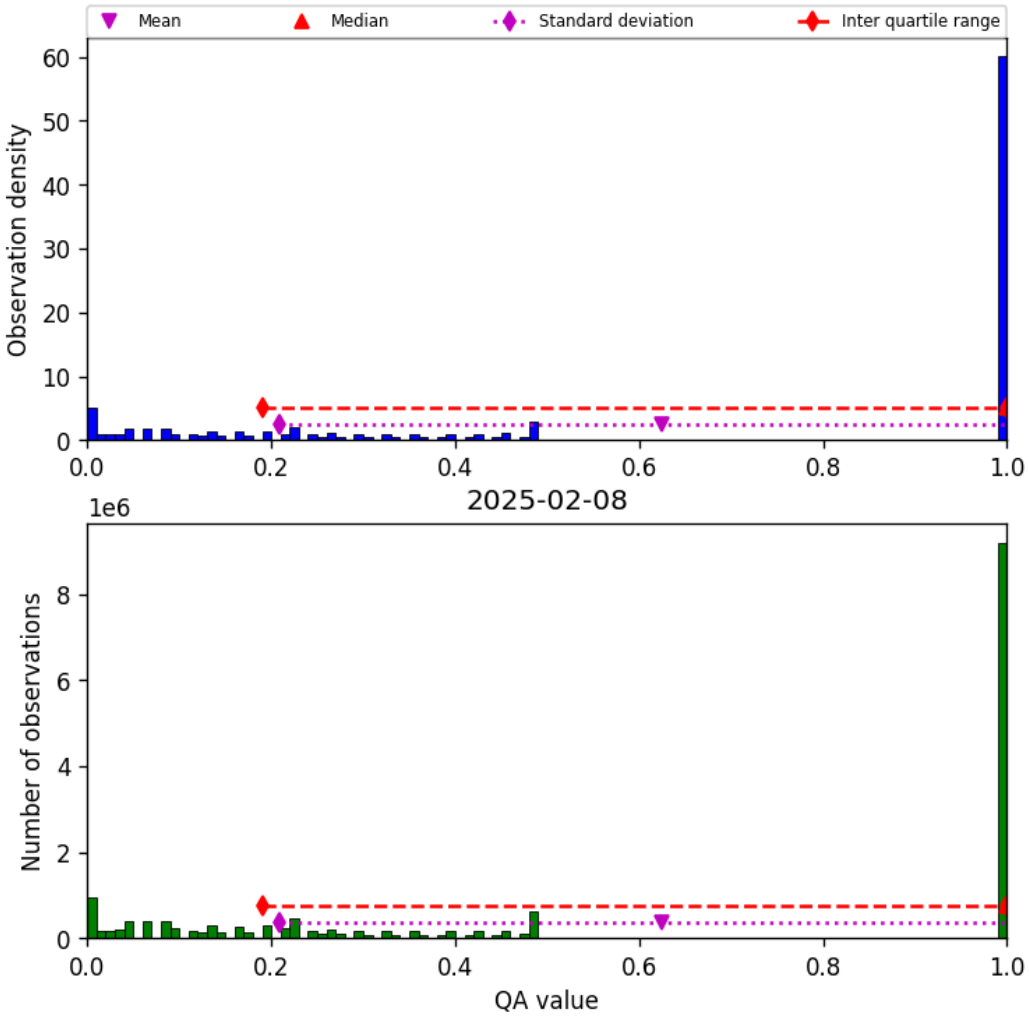

Figure 57: Histogram of “QA value” for 2025-02-08 to 2025-02-09

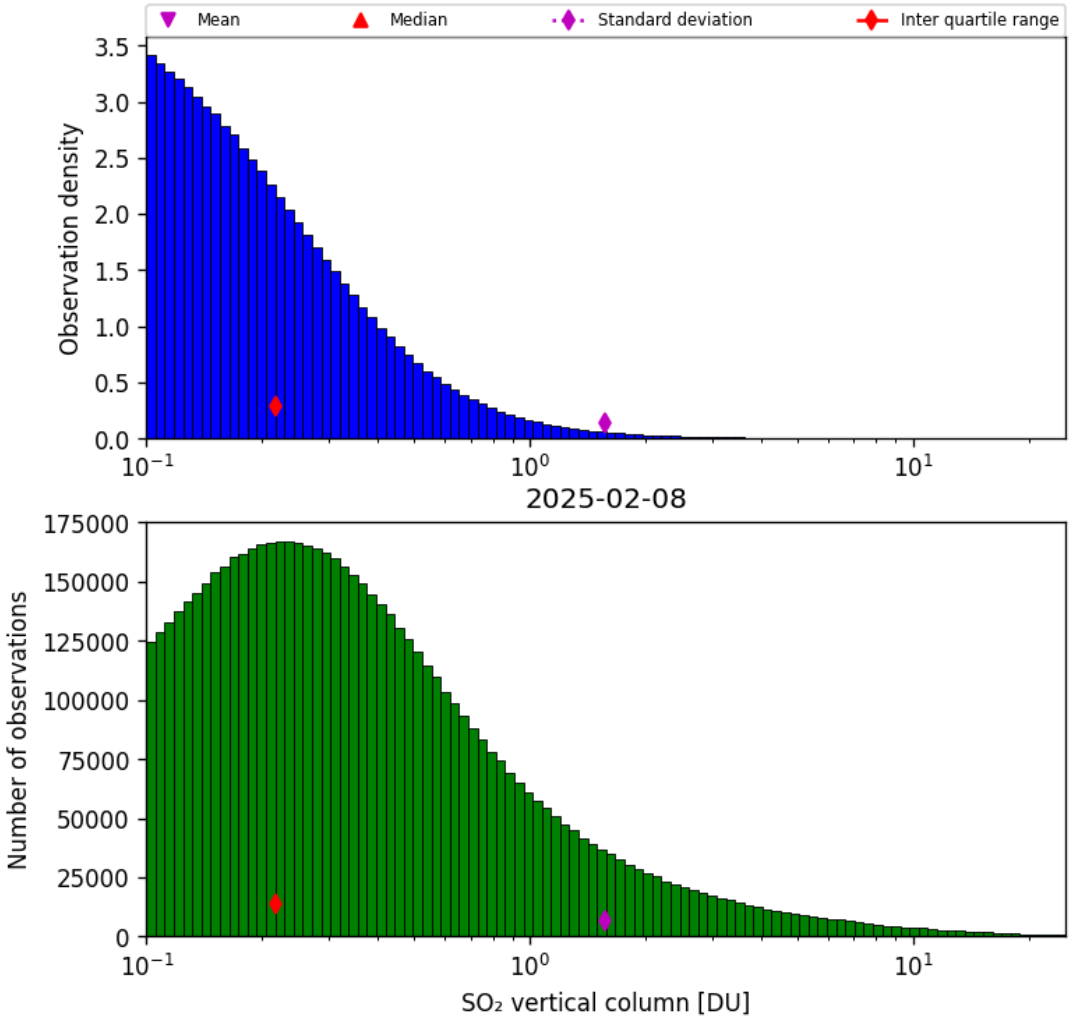

Figure 58: Histogram of "SO_2 vertical column" for 2025-02-08 to 2025-02-09

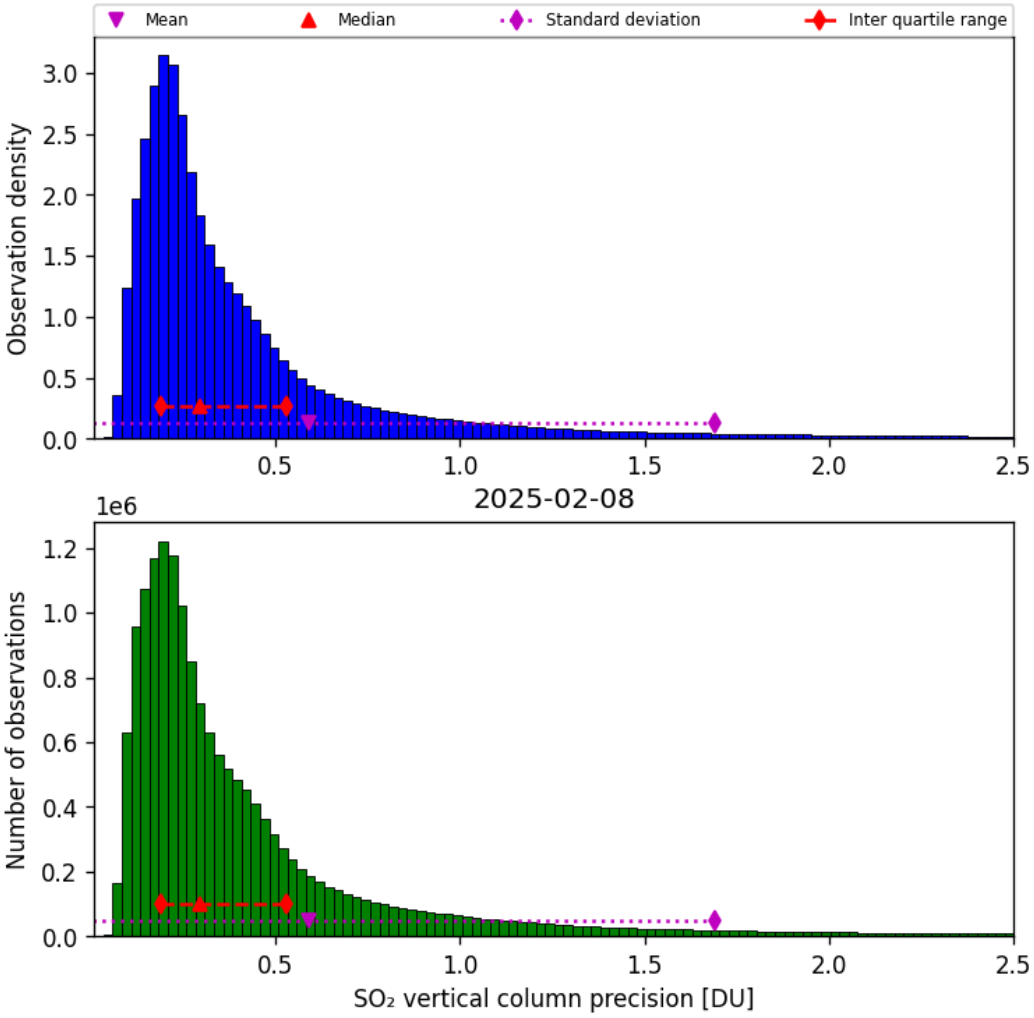

Figure 59: Histogram of "SO_2 vertical column precision" for 2025-02-08 to 2025-02-09

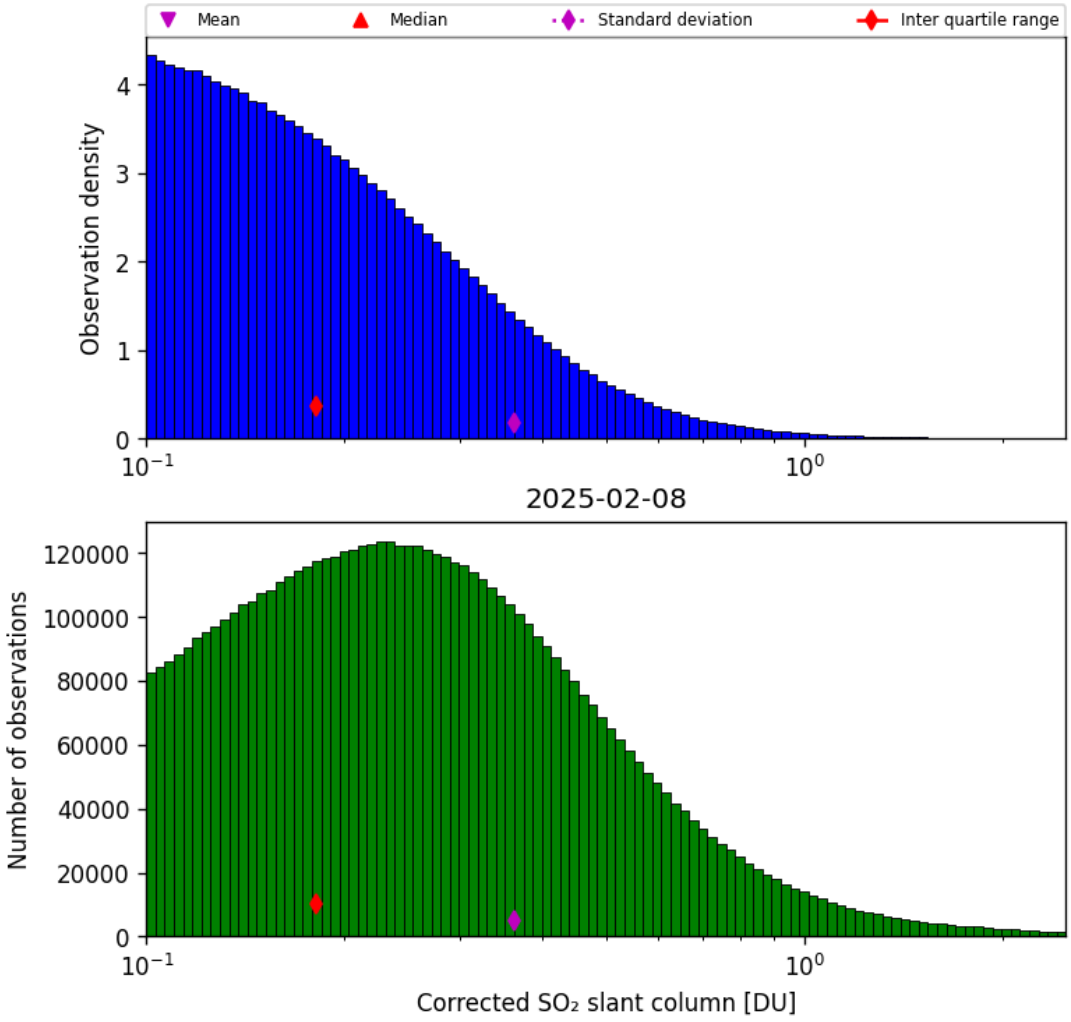

Figure 60: Histogram of "Corrected SO_2 slant column" for 2025-02-08 to 2025-02-09

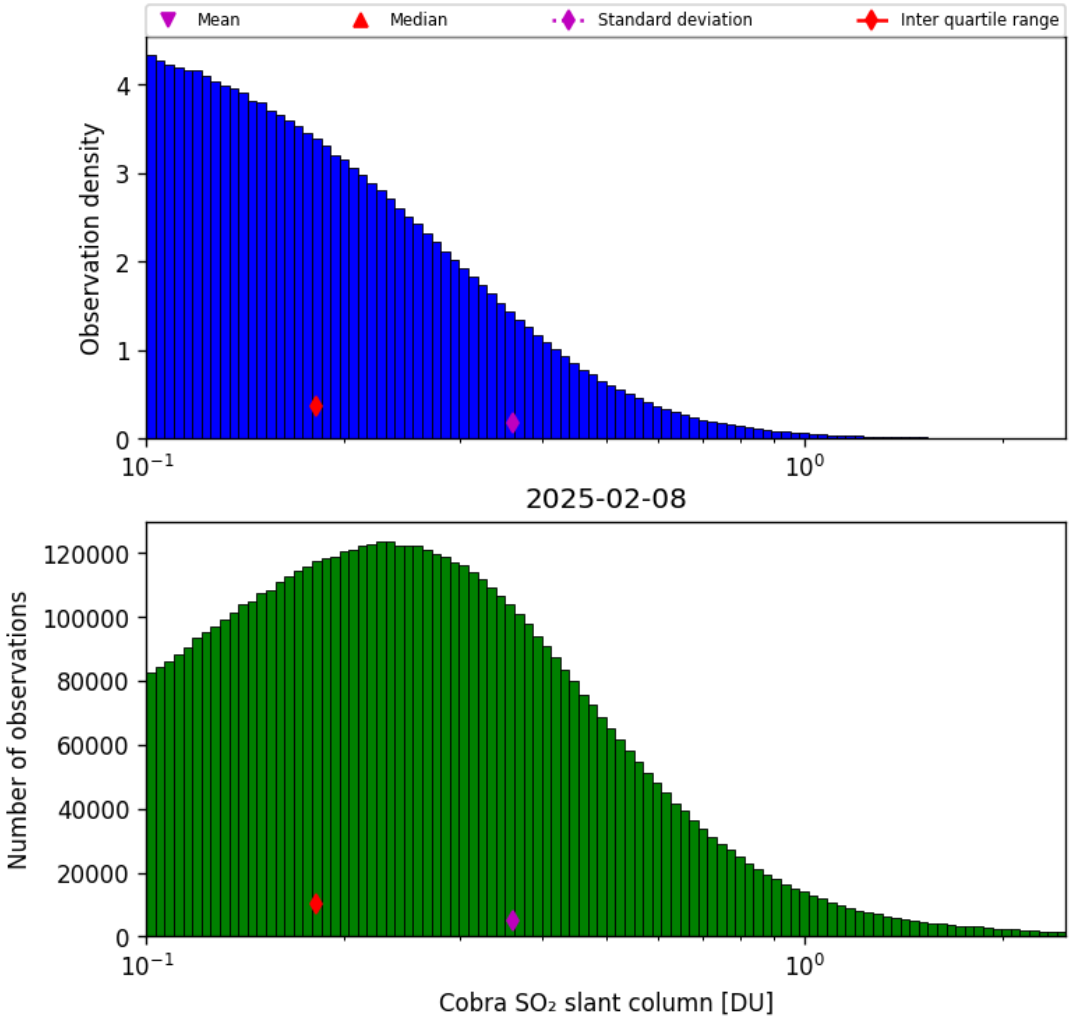

Figure 61: Histogram of "Cobra SO_2 slant column" for 2025-02-08 to 2025-02-09

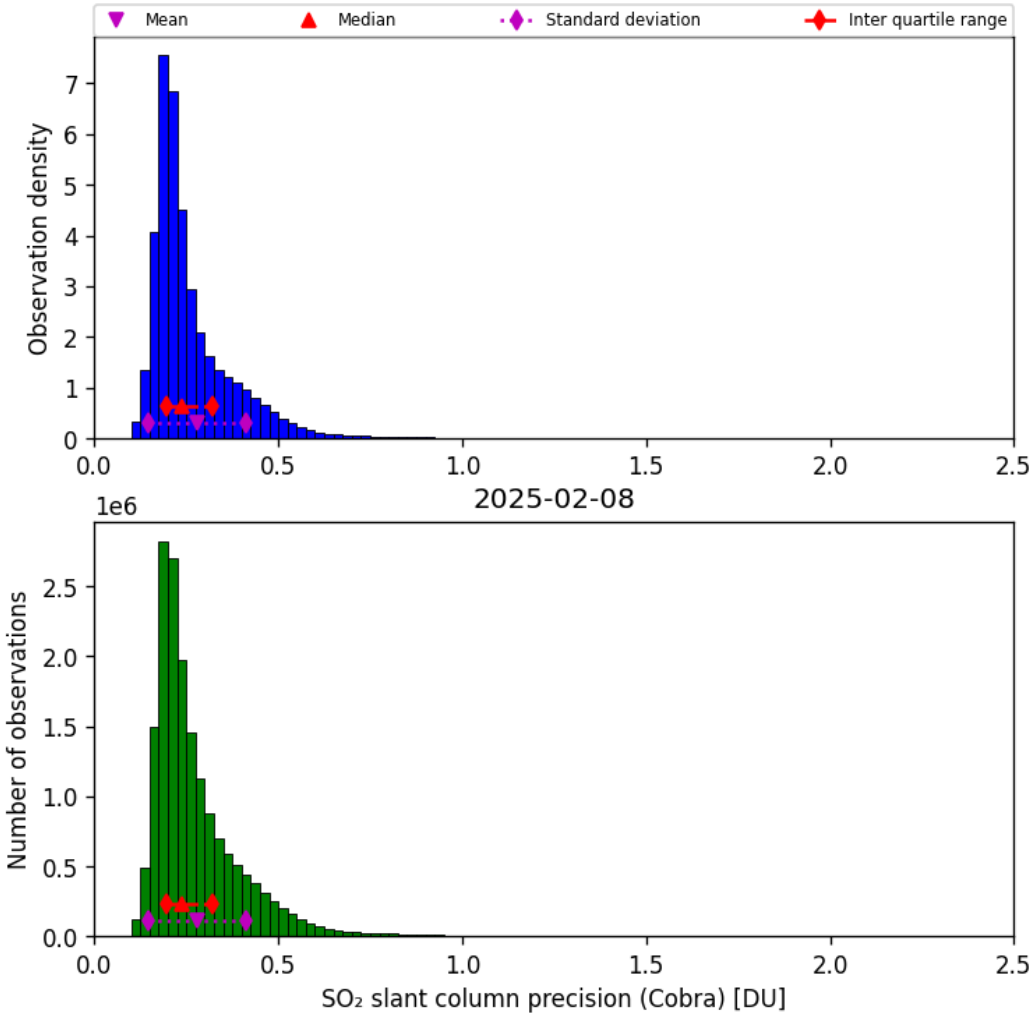

Figure 62: Histogram of "SO_2 slant column precision (Cobra)" for 2025-02-08 to 2025-02-09

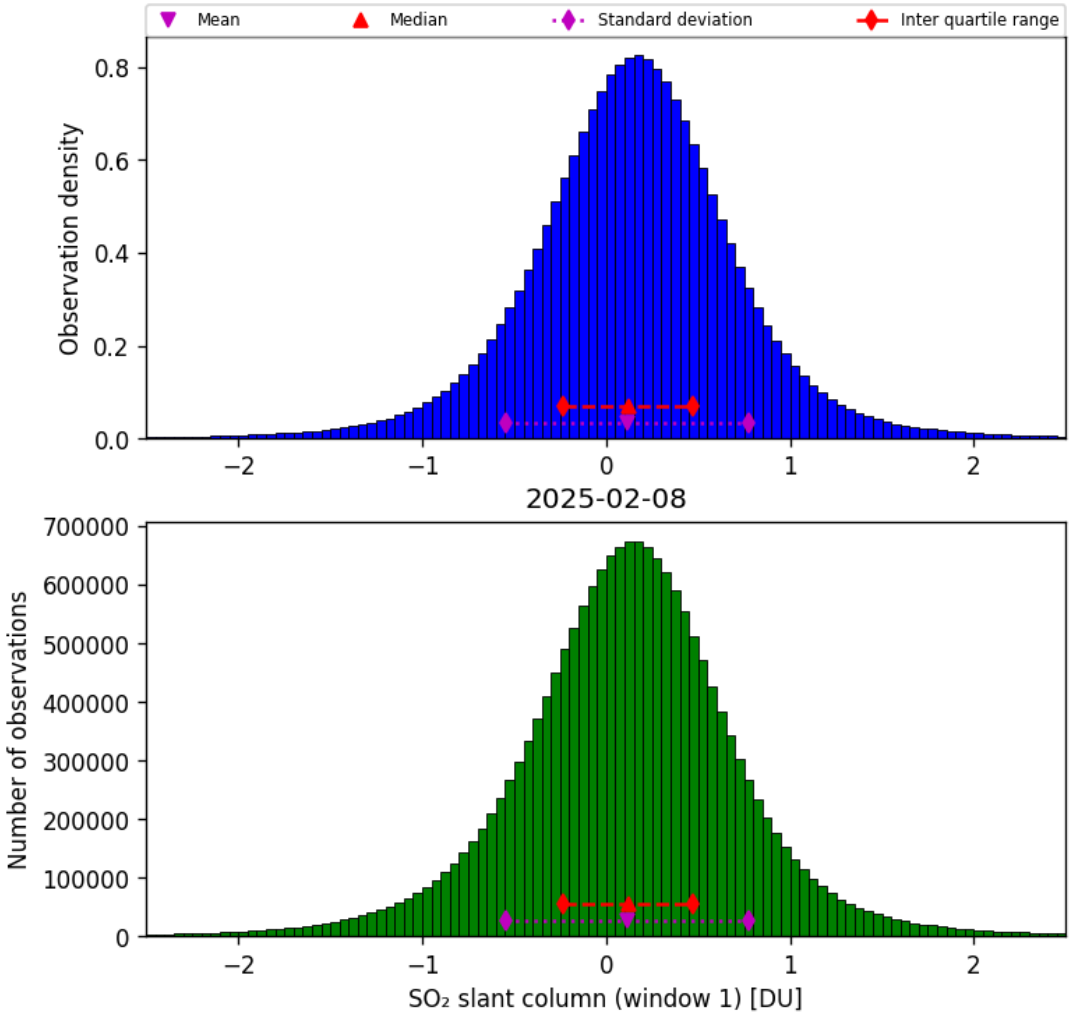

Figure 63: Histogram of "SO_2 slant column (window 1)" for 2025-02-08 to 2025-02-09

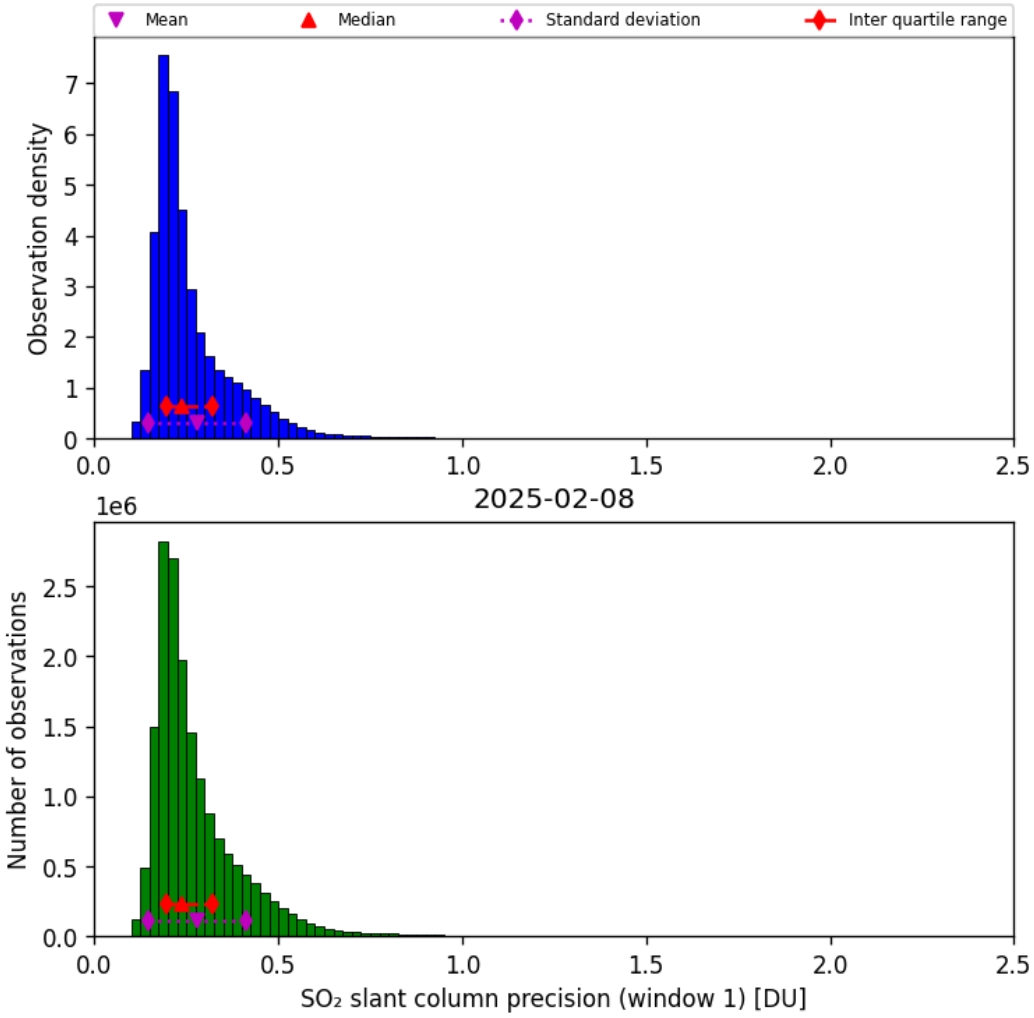

Figure 64: Histogram of "SO_2 slant column precision (window 1)" for 2025-02-08 to 2025-02-09

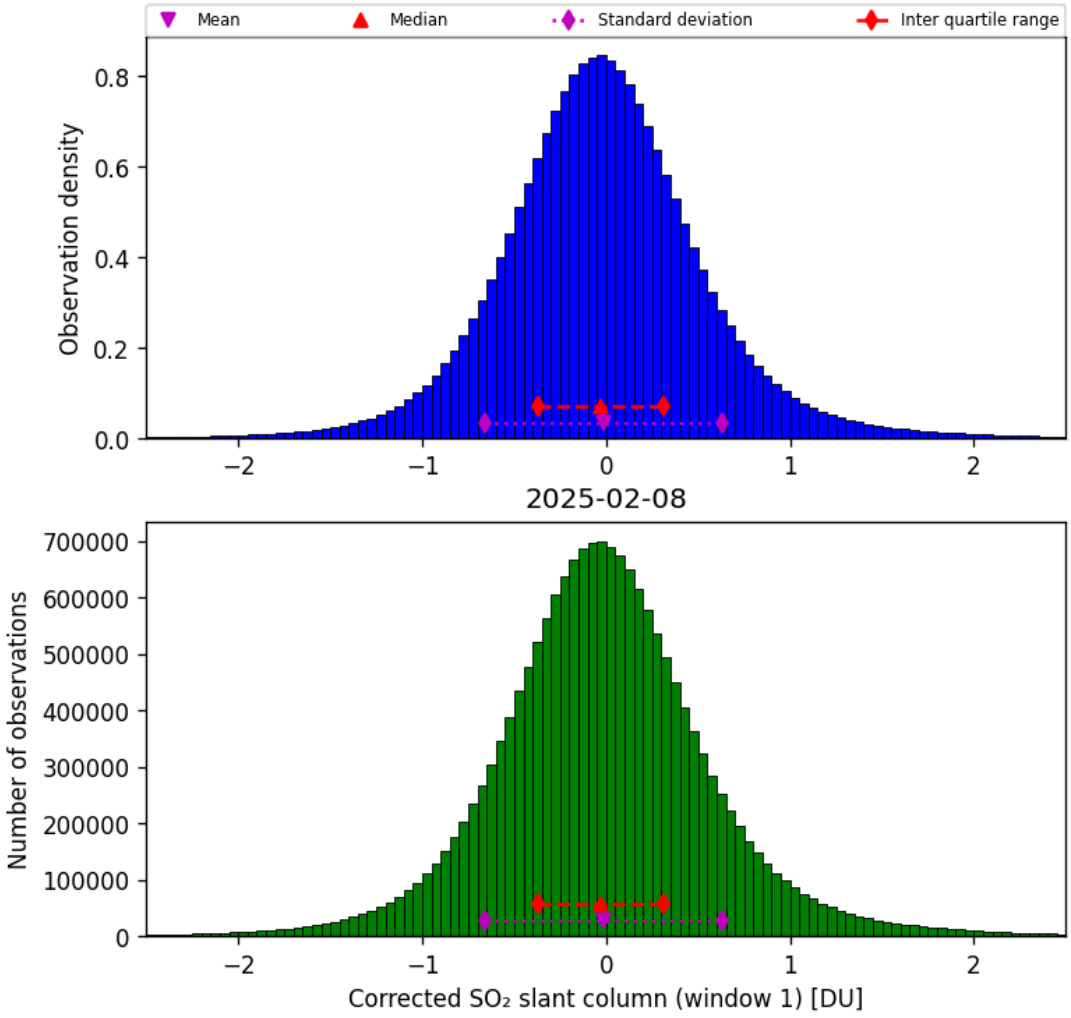

Figure 65: Histogram of "Corrected SO_2 slant column (window 1)" for 2025-02-08 to 2025-02-09

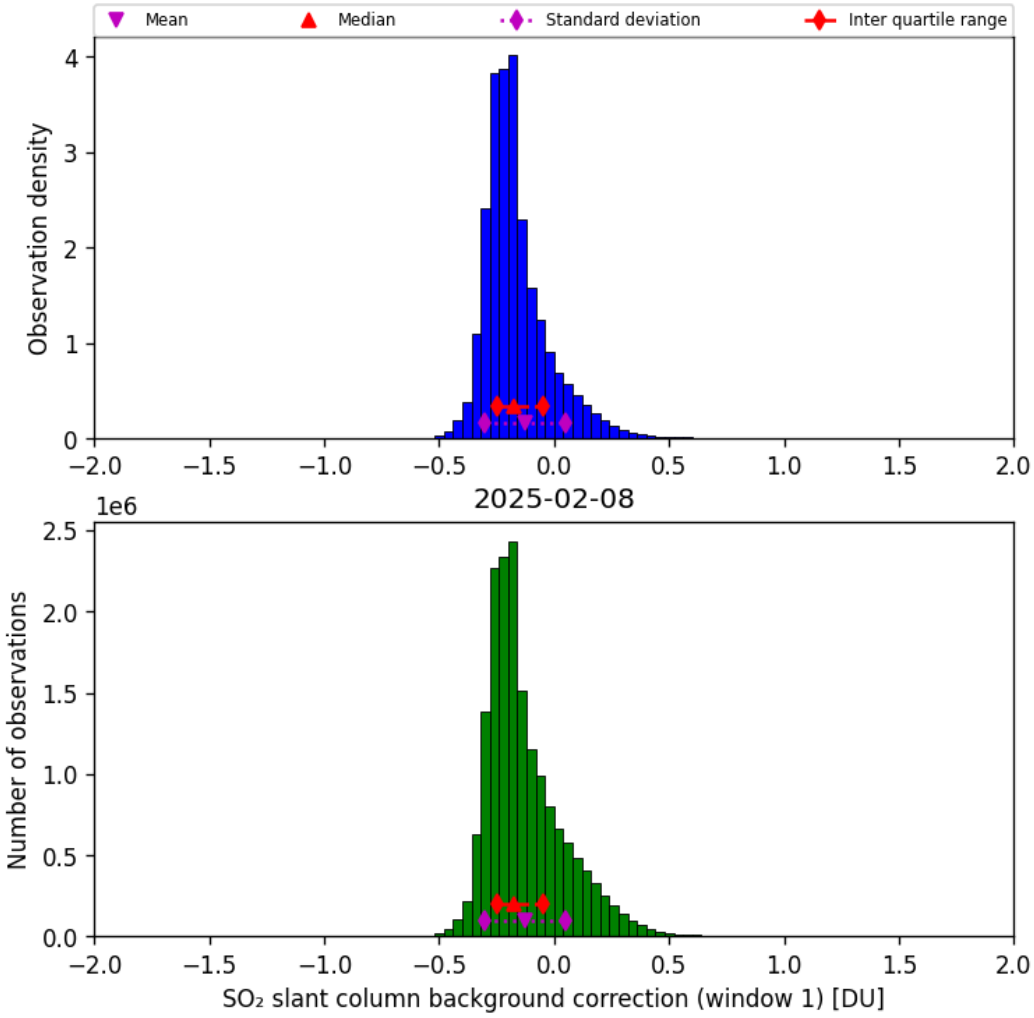

Figure 66: Histogram of "SO_2 slant column background correction (window 1)" for 2025-02-08 to 2025-02-09

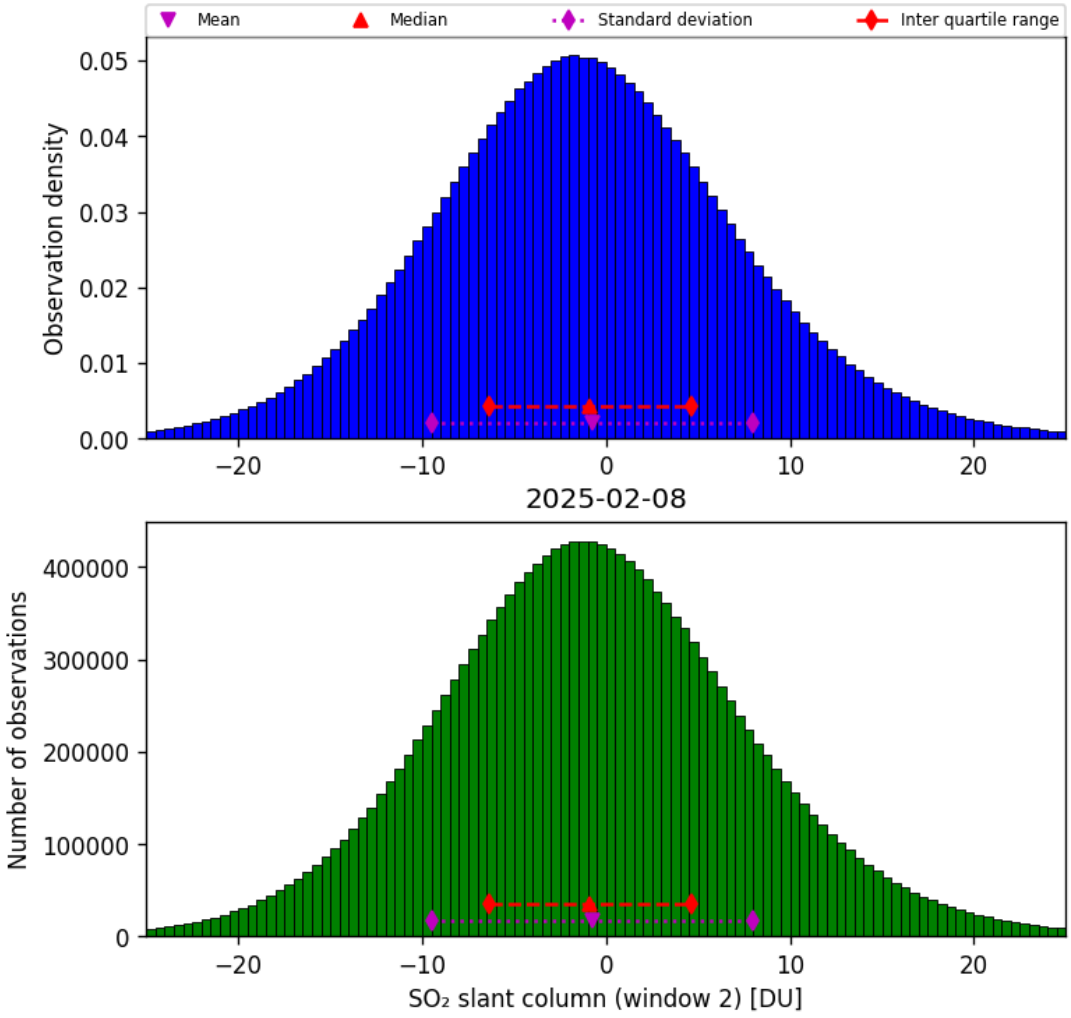

Figure 67: Histogram of "SO_2 slant column (window 2)" for 2025-02-08 to 2025-02-09

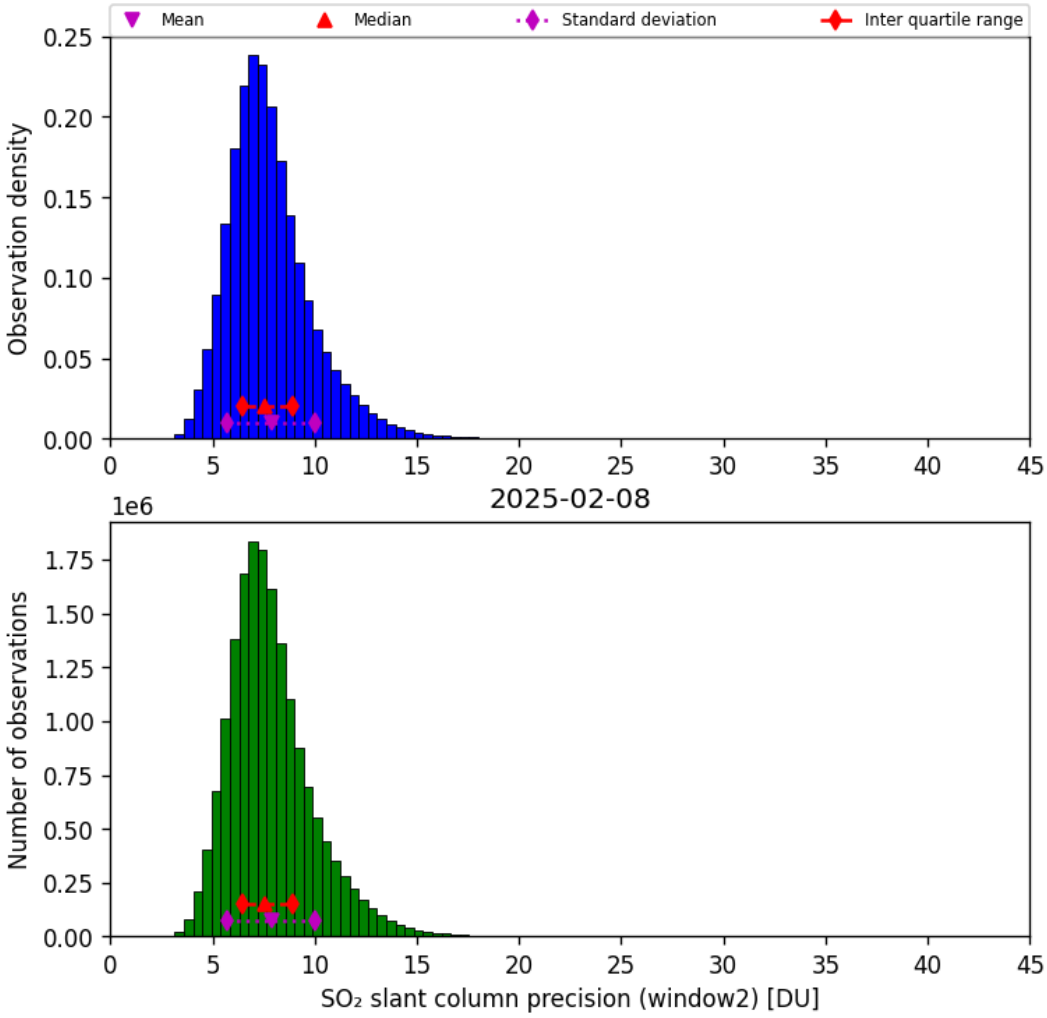

Figure 68: Histogram of "SO_2 slant column precision (window2)" for 2025-02-08 to 2025-02-09

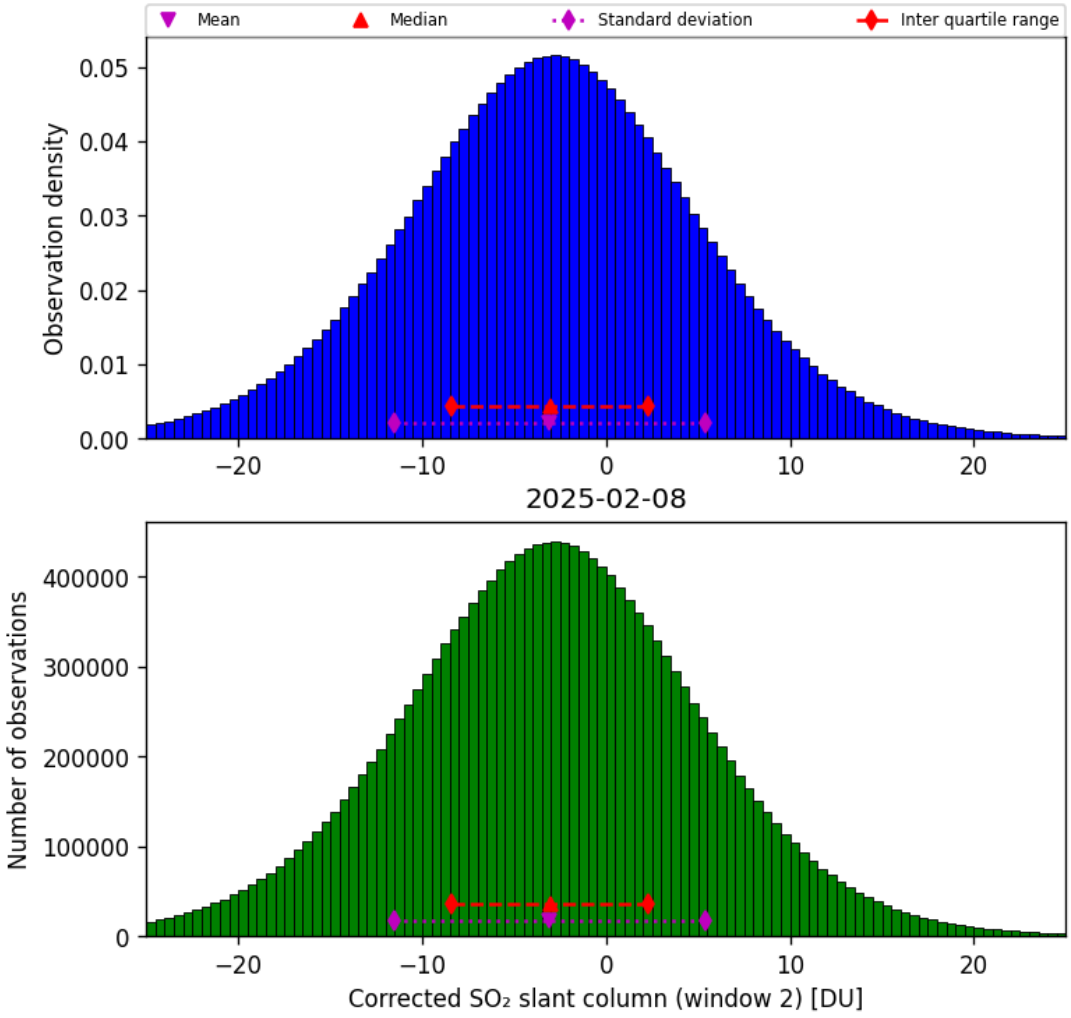

Figure 69: Histogram of "Corrected SO_2 slant column (window 2)" for 2025-02-08 to 2025-02-09

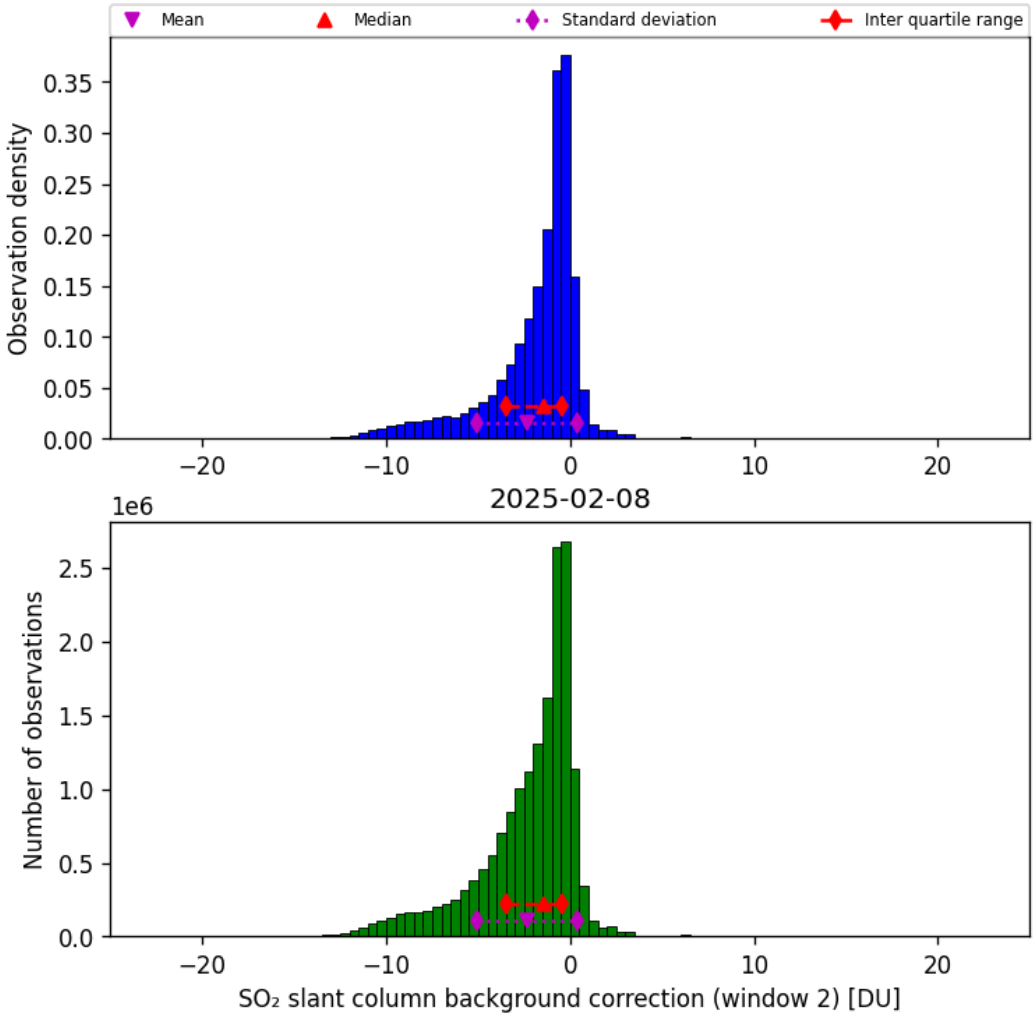

Figure 70: Histogram of "SO_2 slant column background correction (window 2)" for 2025-02-08 to 2025-02-09

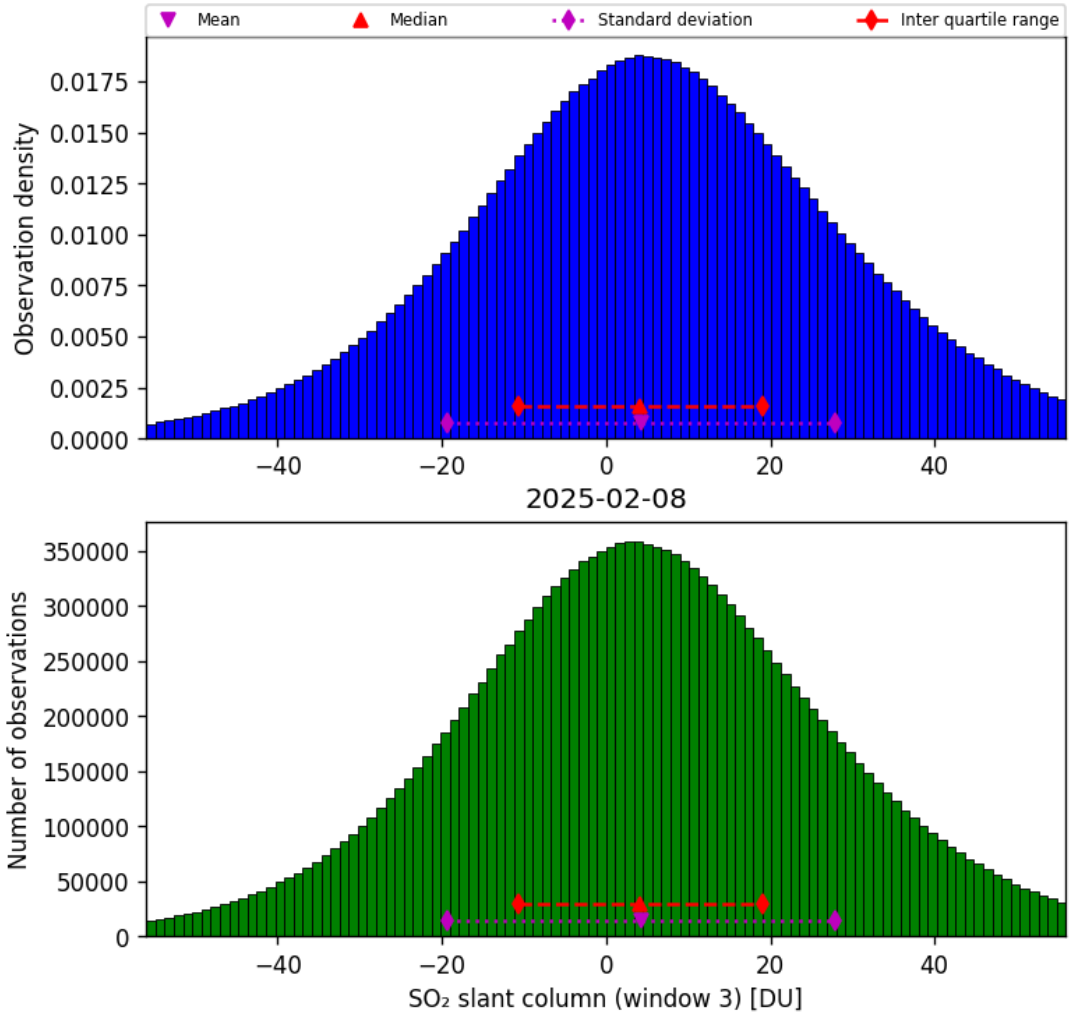

Figure 71: Histogram of "SO_2 slant column (window 3)" for 2025-02-08 to 2025-02-09

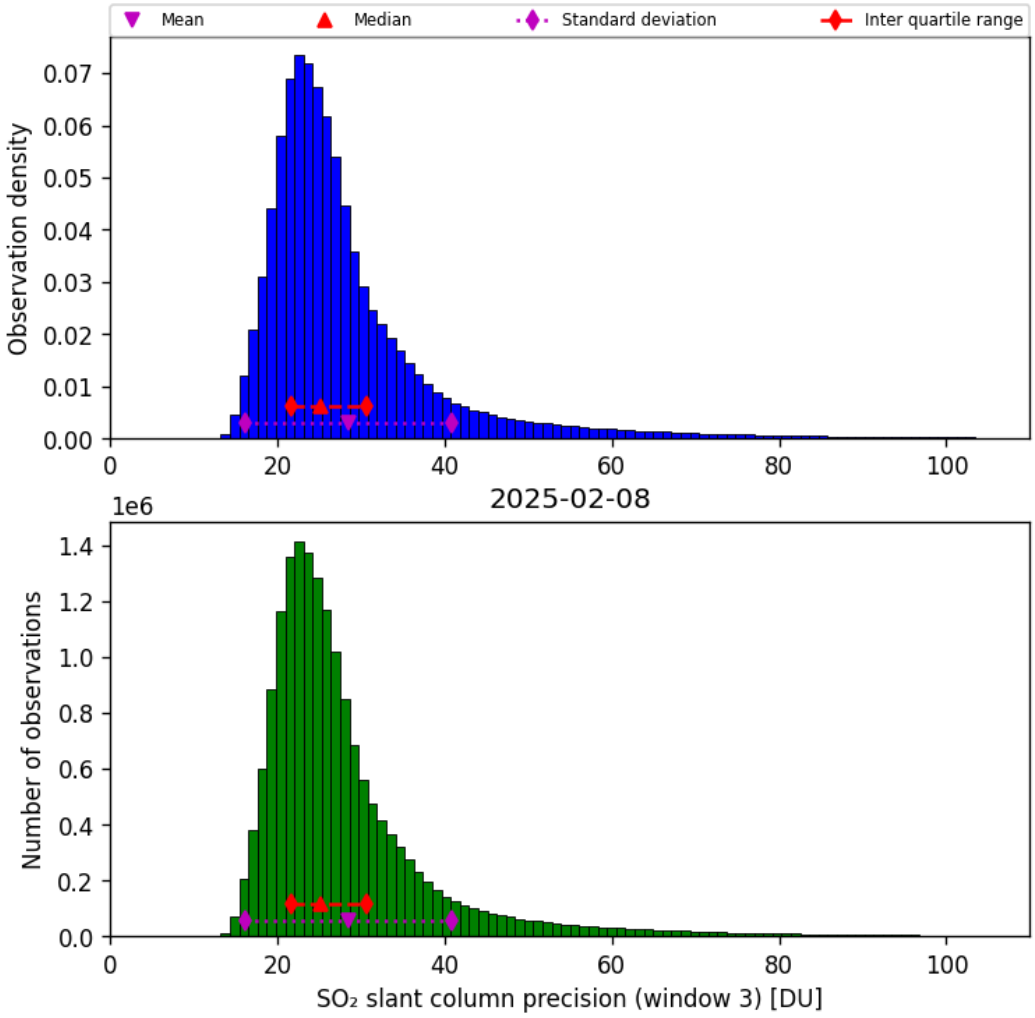

Figure 72: Histogram of "SO_2 slant column precision (window 3)" for 2025-02-08 to 2025-02-09

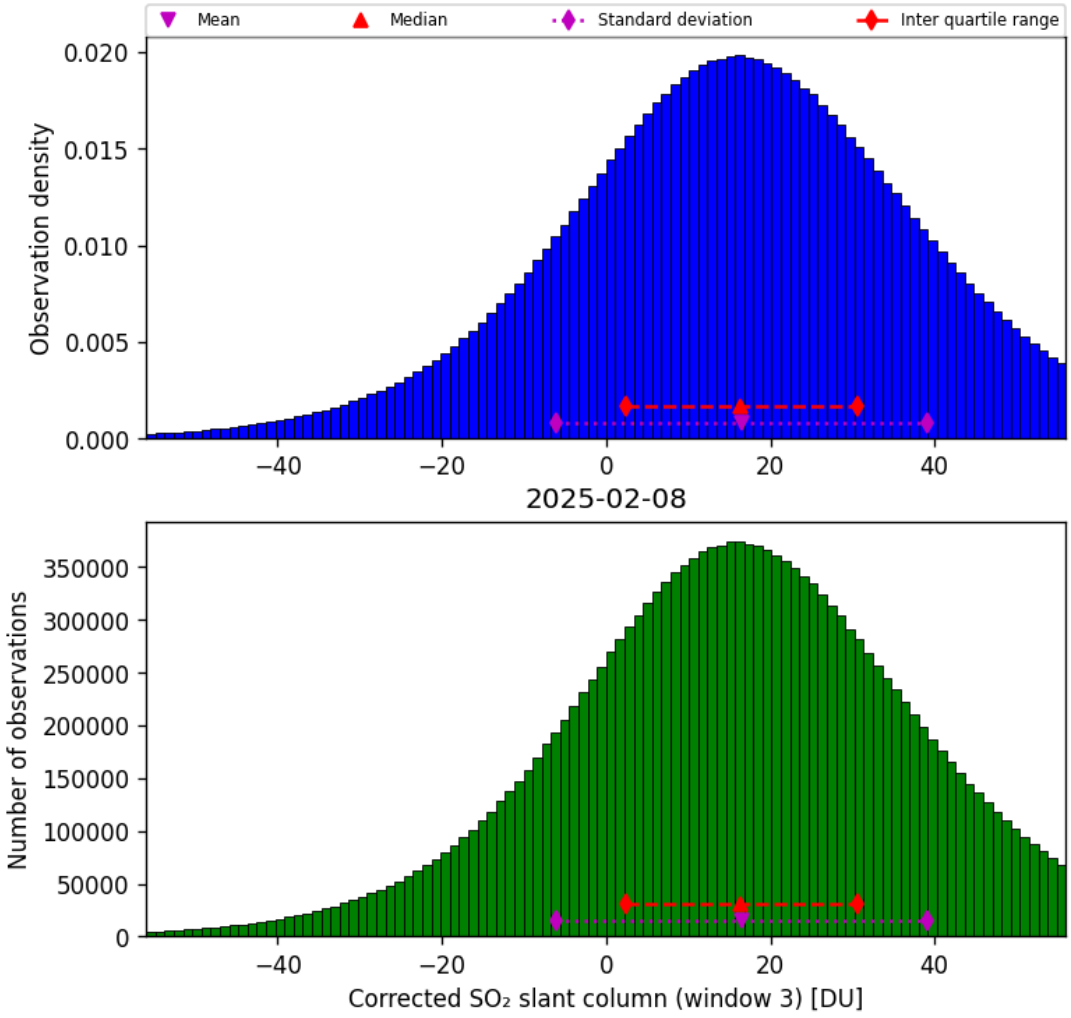

Figure 73: Histogram of "Corrected SO_2 slant column (window 3)" for 2025-02-08 to 2025-02-09

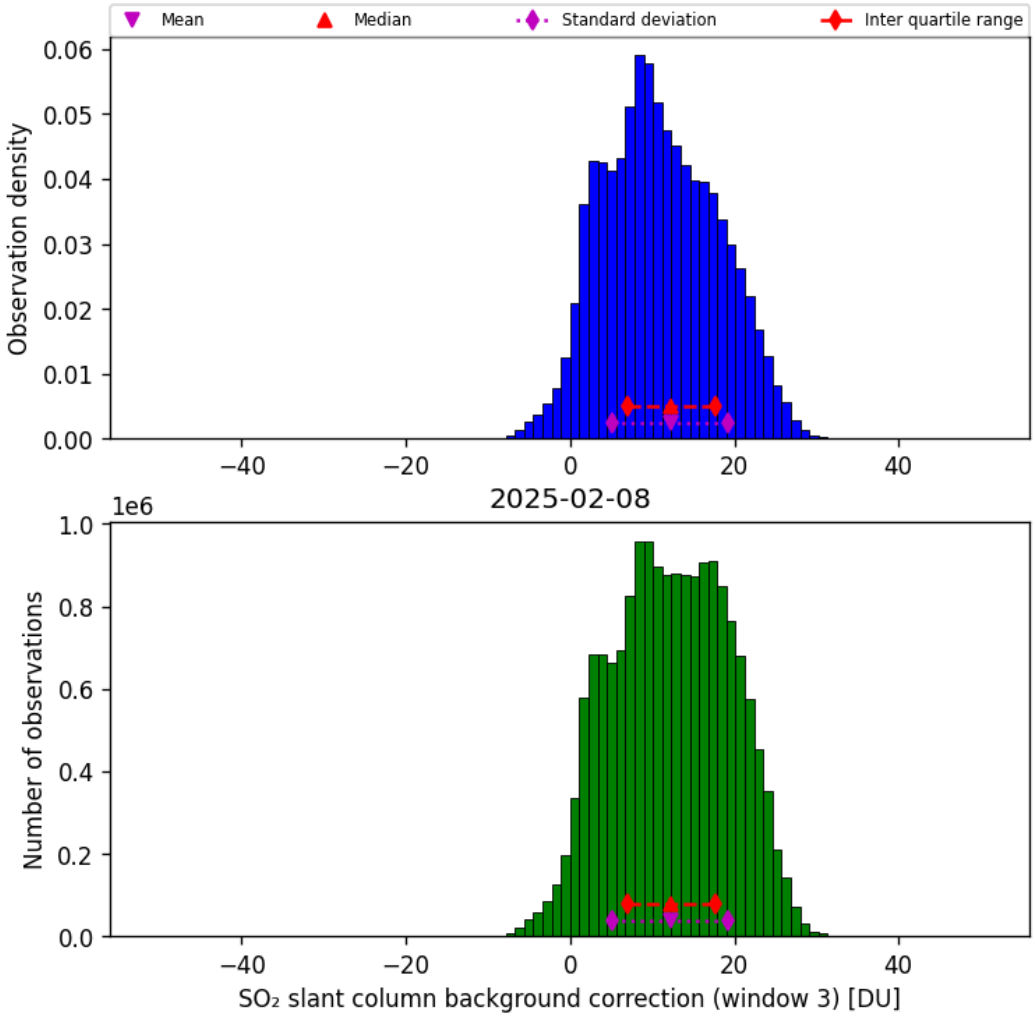

Figure 74: Histogram of "SO_2 slant column background correction (window 3)" for 2025-02-08 to 2025-02-09

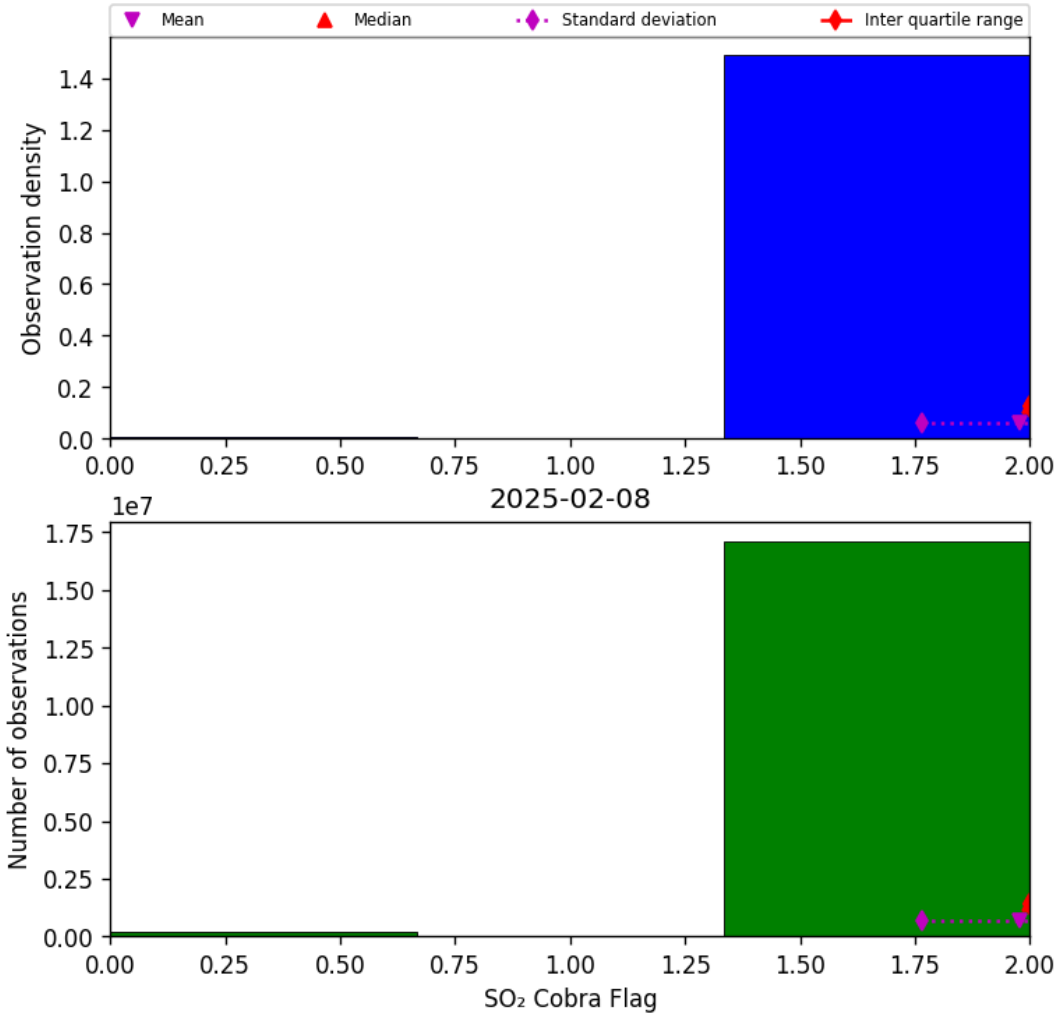

Figure 75: Histogram of "SO_2 Cobra Flag" for 2025-02-08 to 2025-02-09

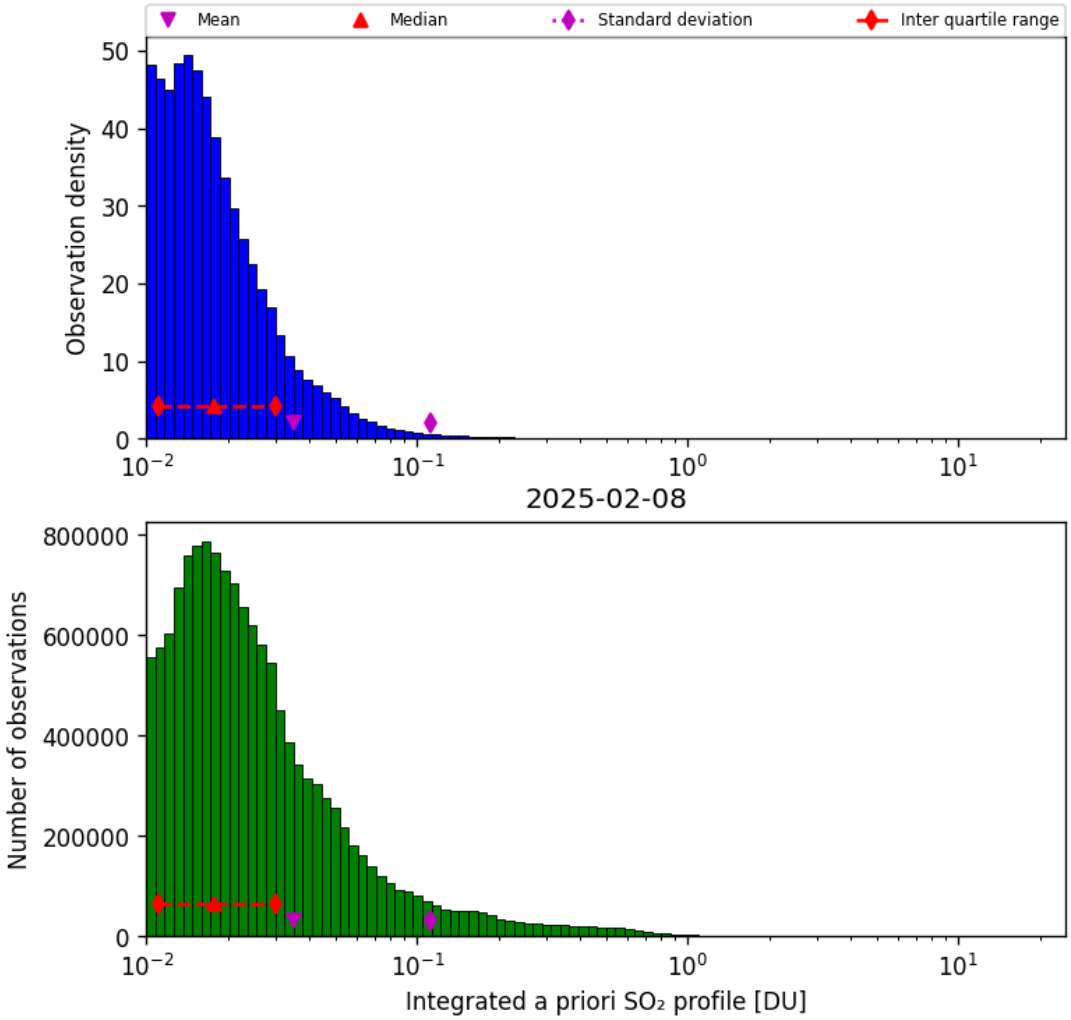

Figure 76: Histogram of "Integrated a priori SO_2 profile" for 2025-02-08 to 2025-02-09

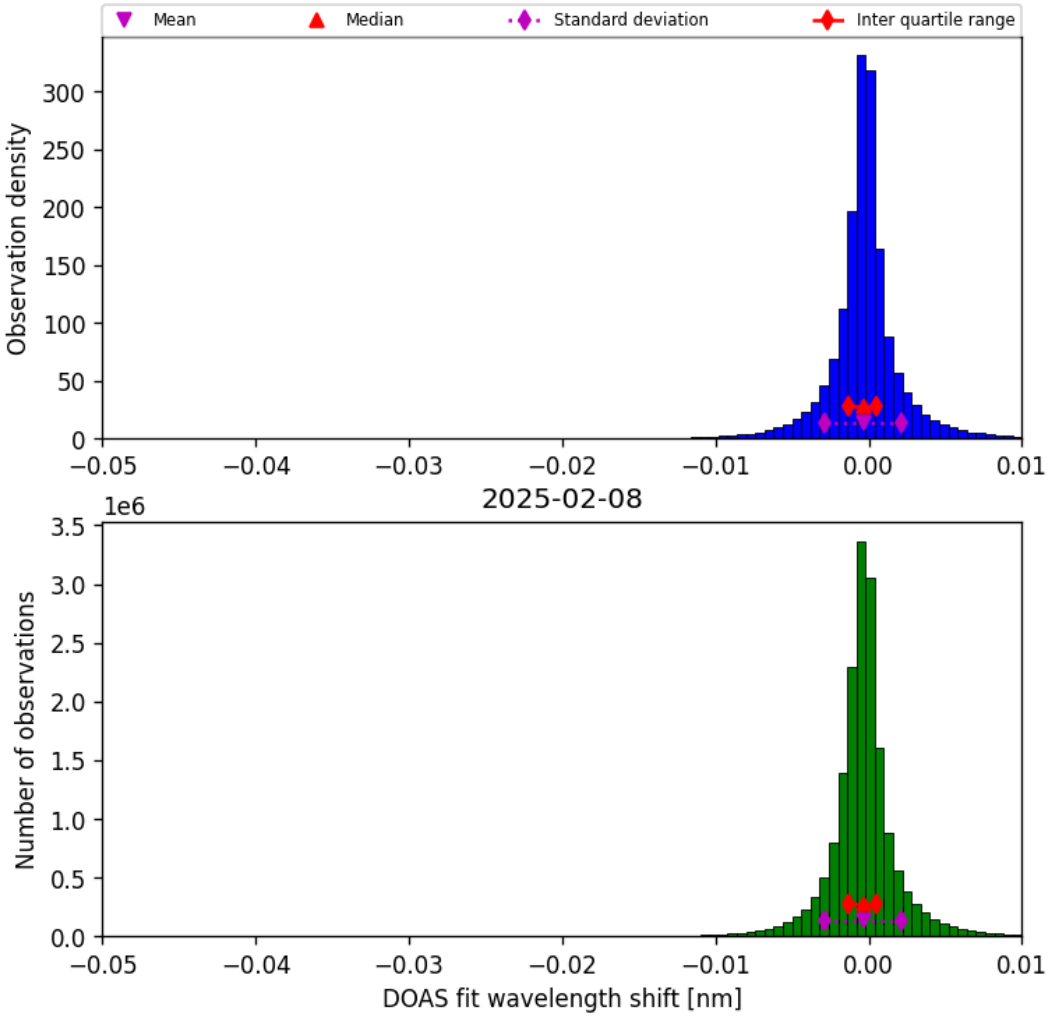

Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-02-08 to 2025-02-09

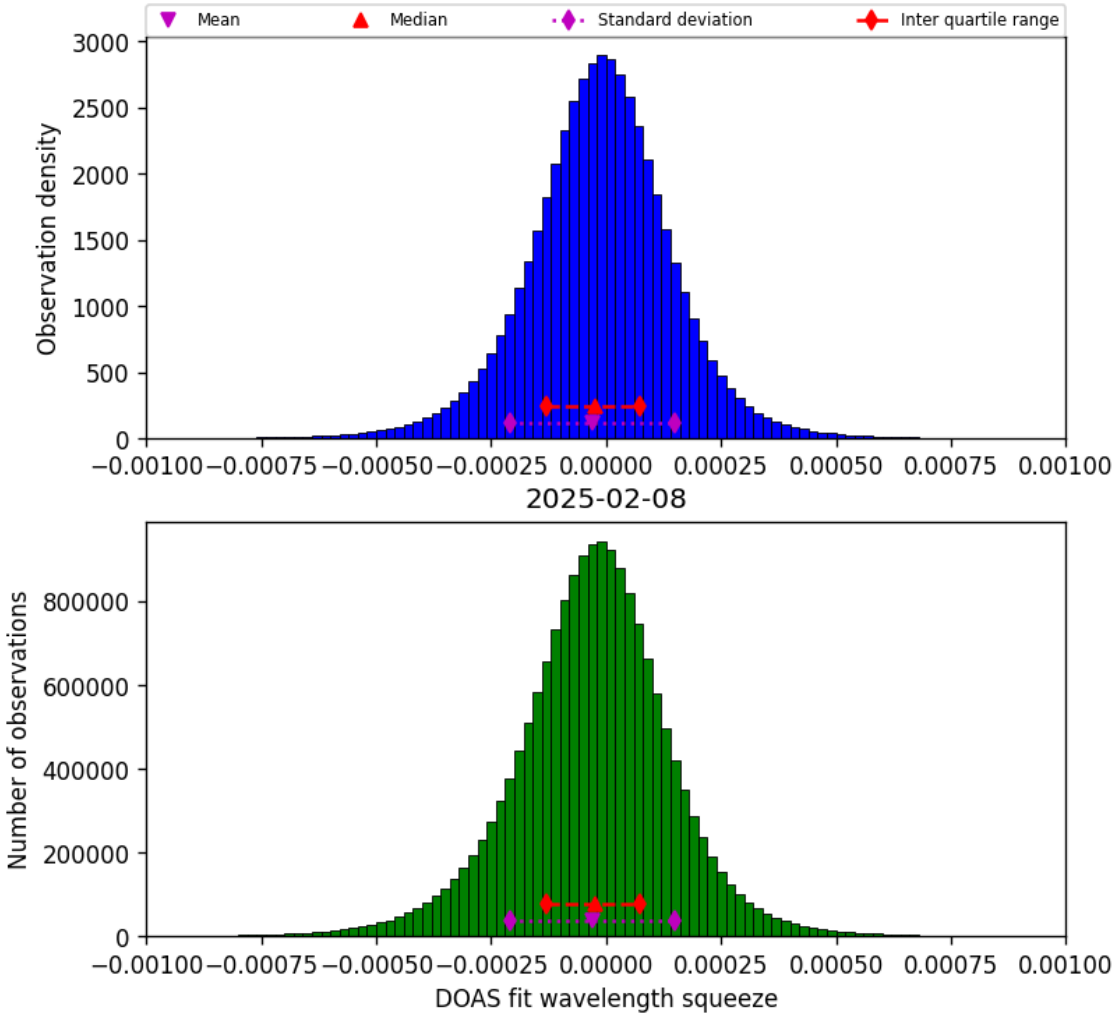

Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-02-08 to 2025-02-09

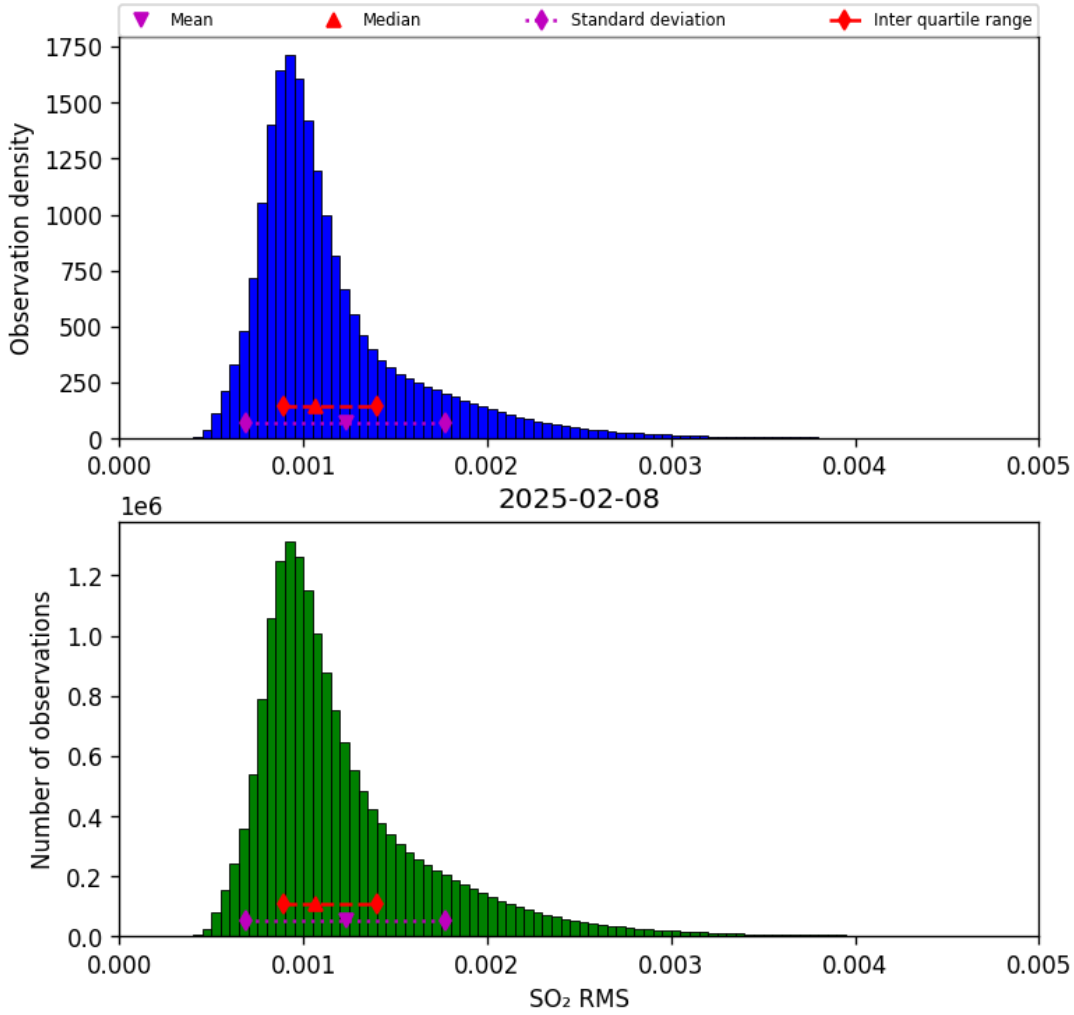

Figure 79: Histogram of "SO_2 RMS" for 2025-02-08 to 2025-02-09

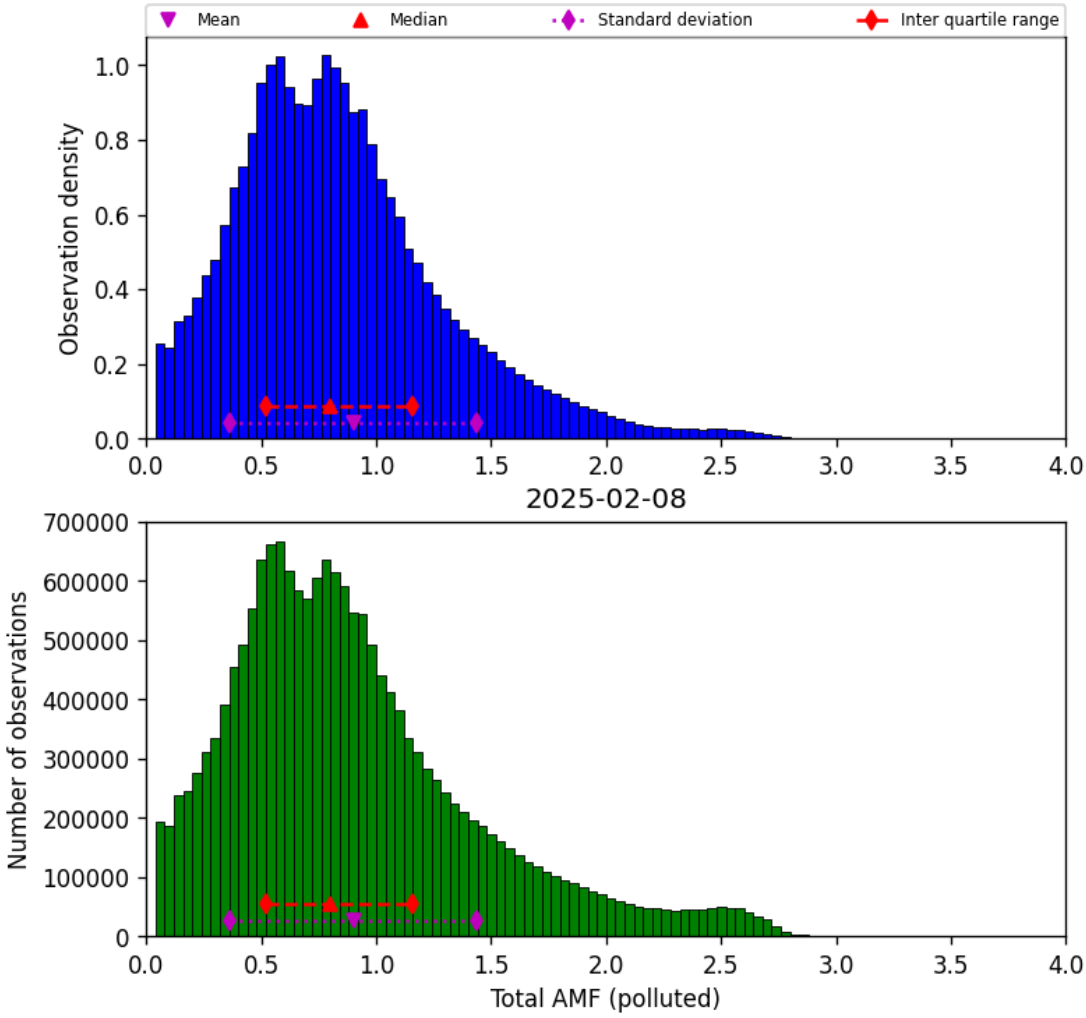

Figure 80: Histogram of “Total AMF (polluted)” for 2025-02-08 to 2025-02-09

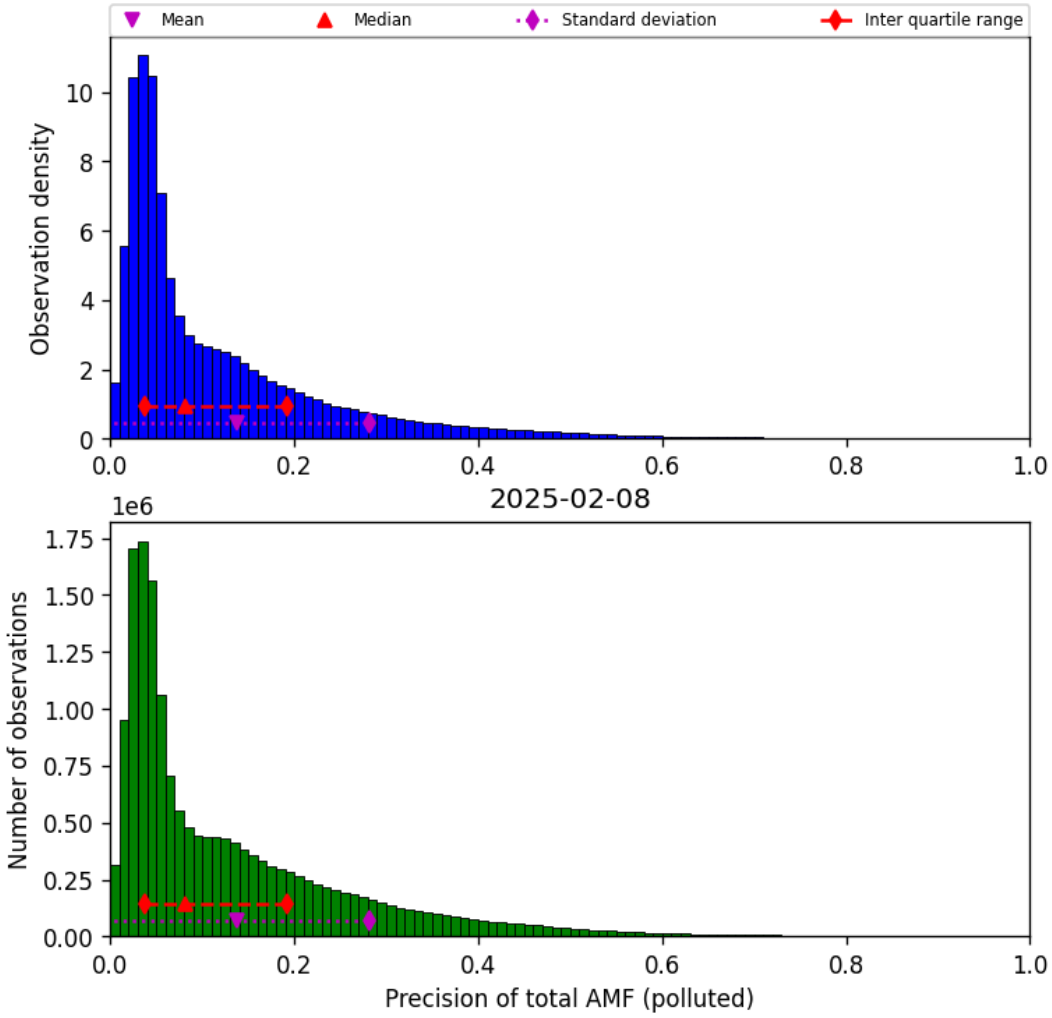

Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-02-08 to 2025-02-09

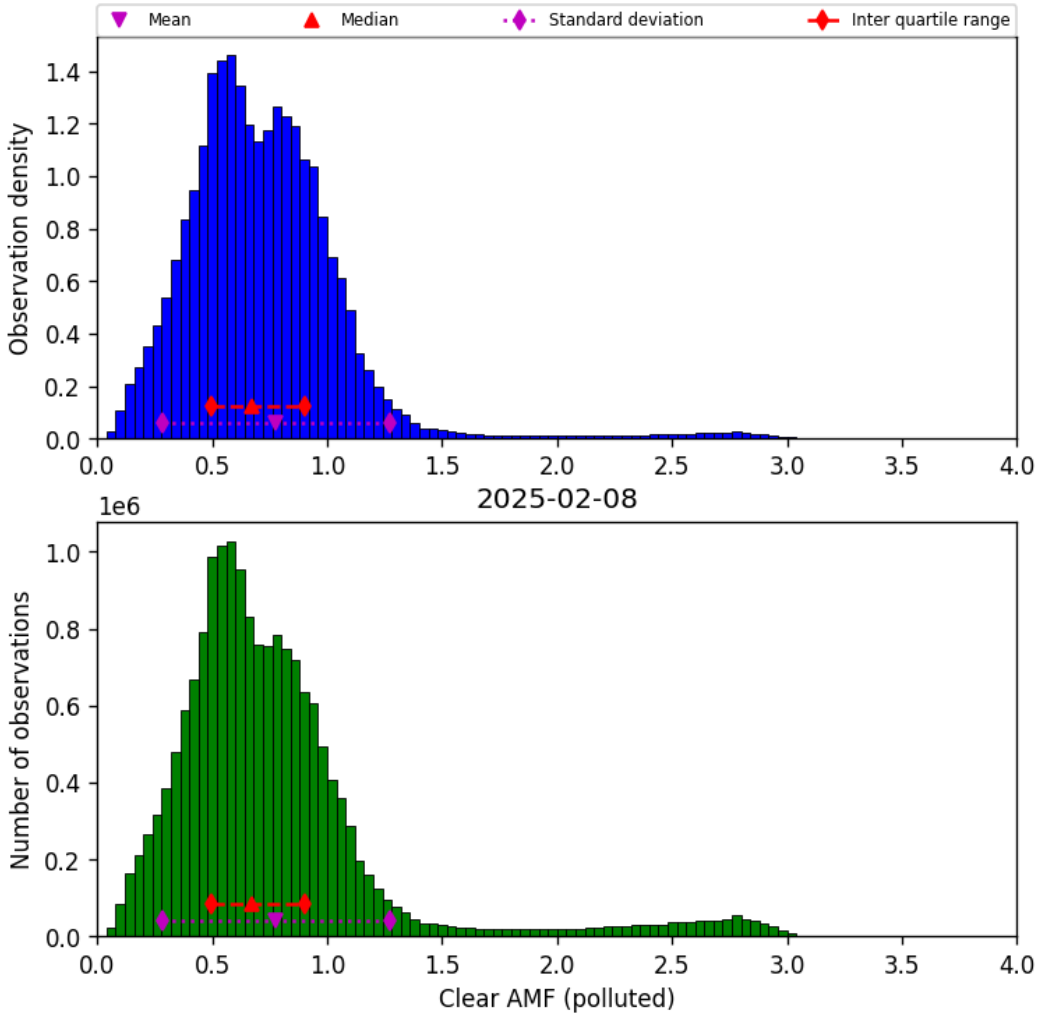

Figure 82: Histogram of “Clear AMF (polluted)” for 2025-02-08 to 2025-02-09

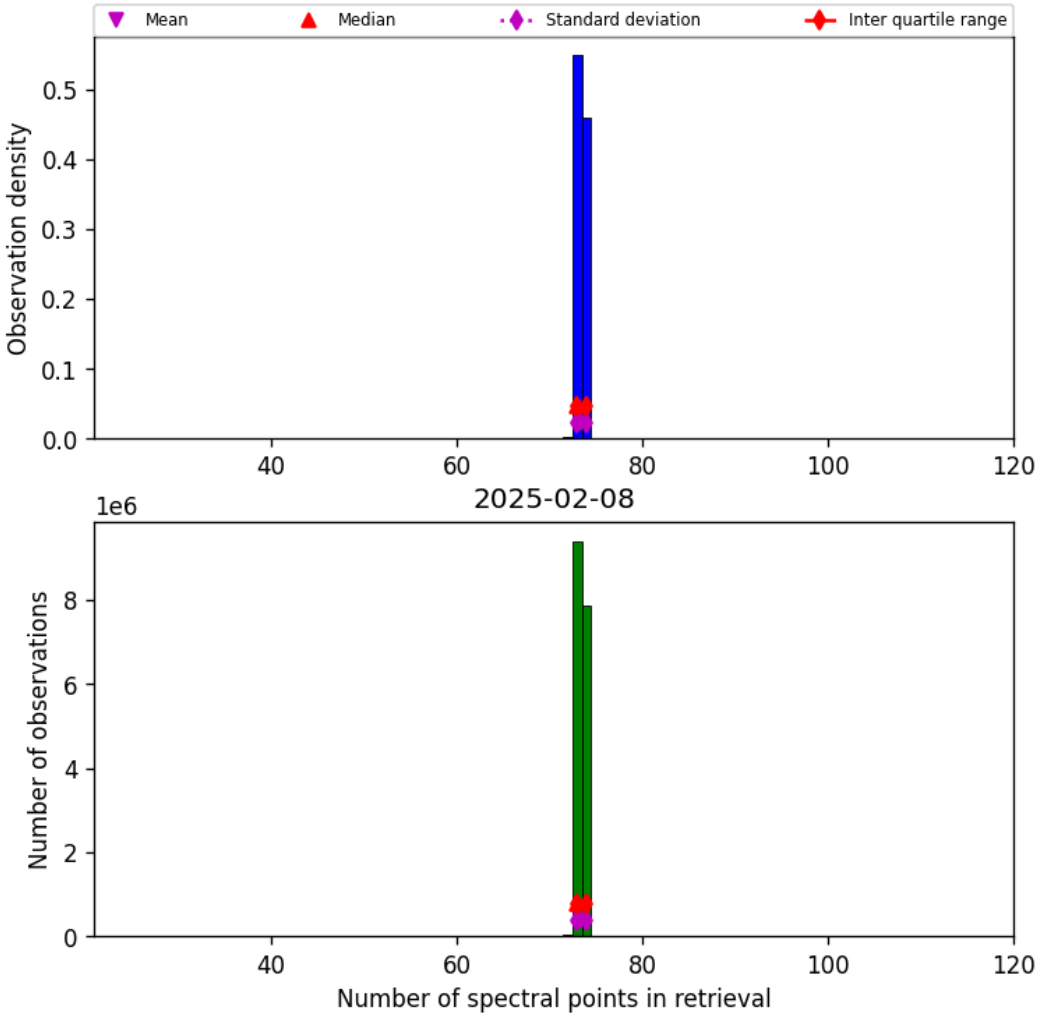

Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-02-08 to 2025-02-09

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.

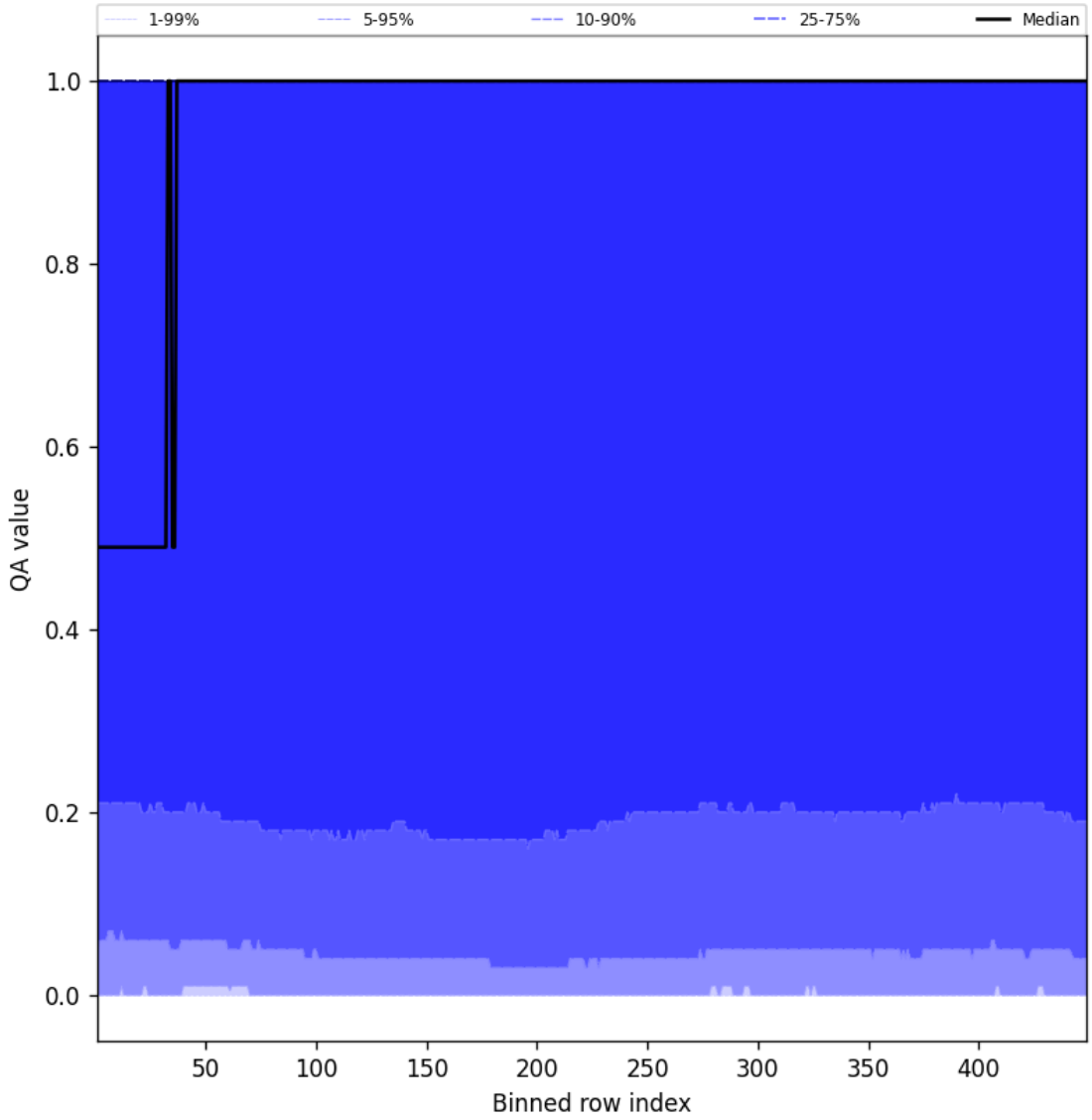

Figure 84: Along track statistics of “QA value” for 2025-02-08 to 2025-02-09

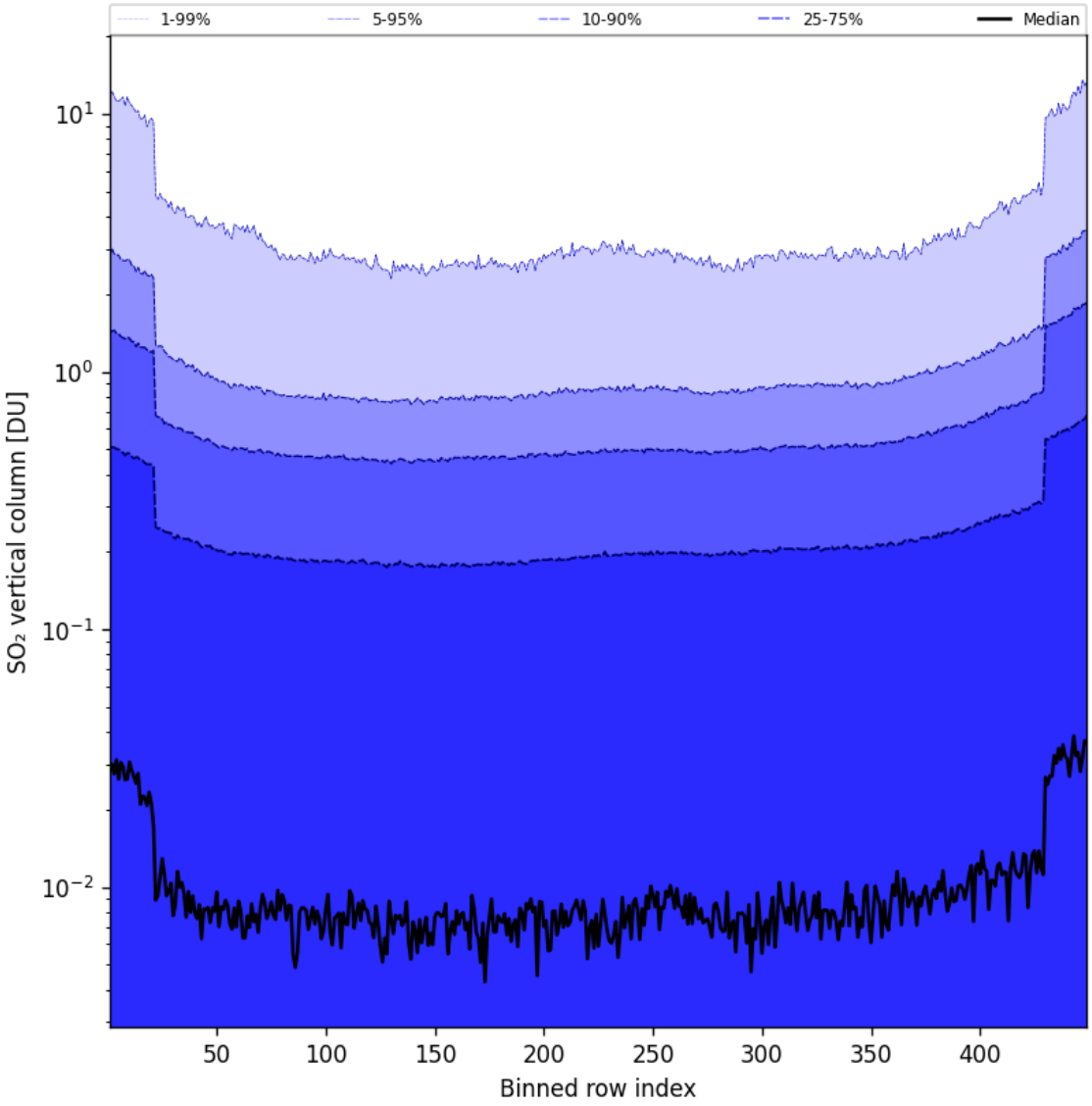

Figure 85: Along track statistics of "SO_2 vertical column" for 2025-02-08 to 2025-02-09

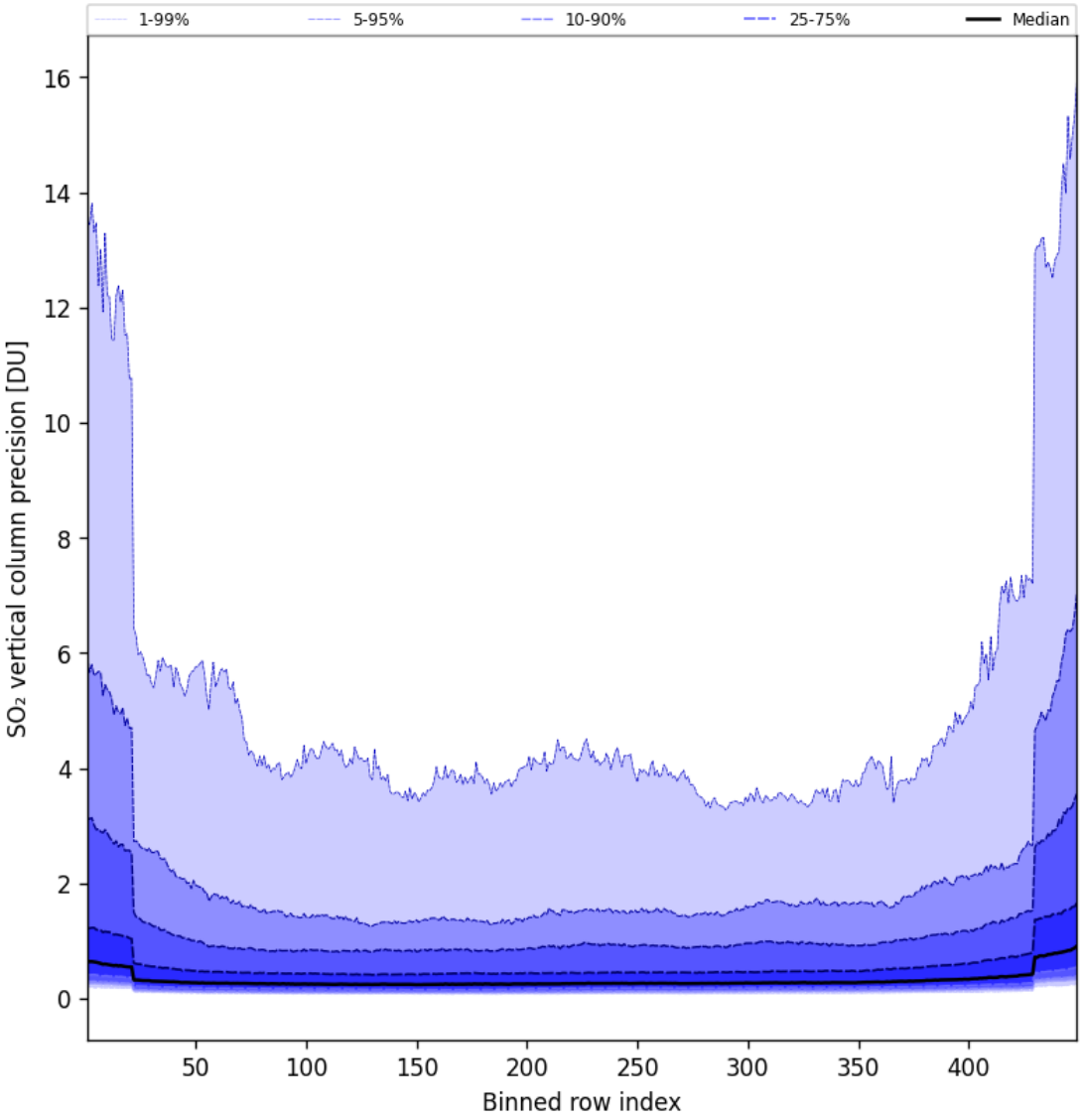

Figure 86: Along track statistics of "SO_2 vertical column precision" for 2025-02-08 to 2025-02-09

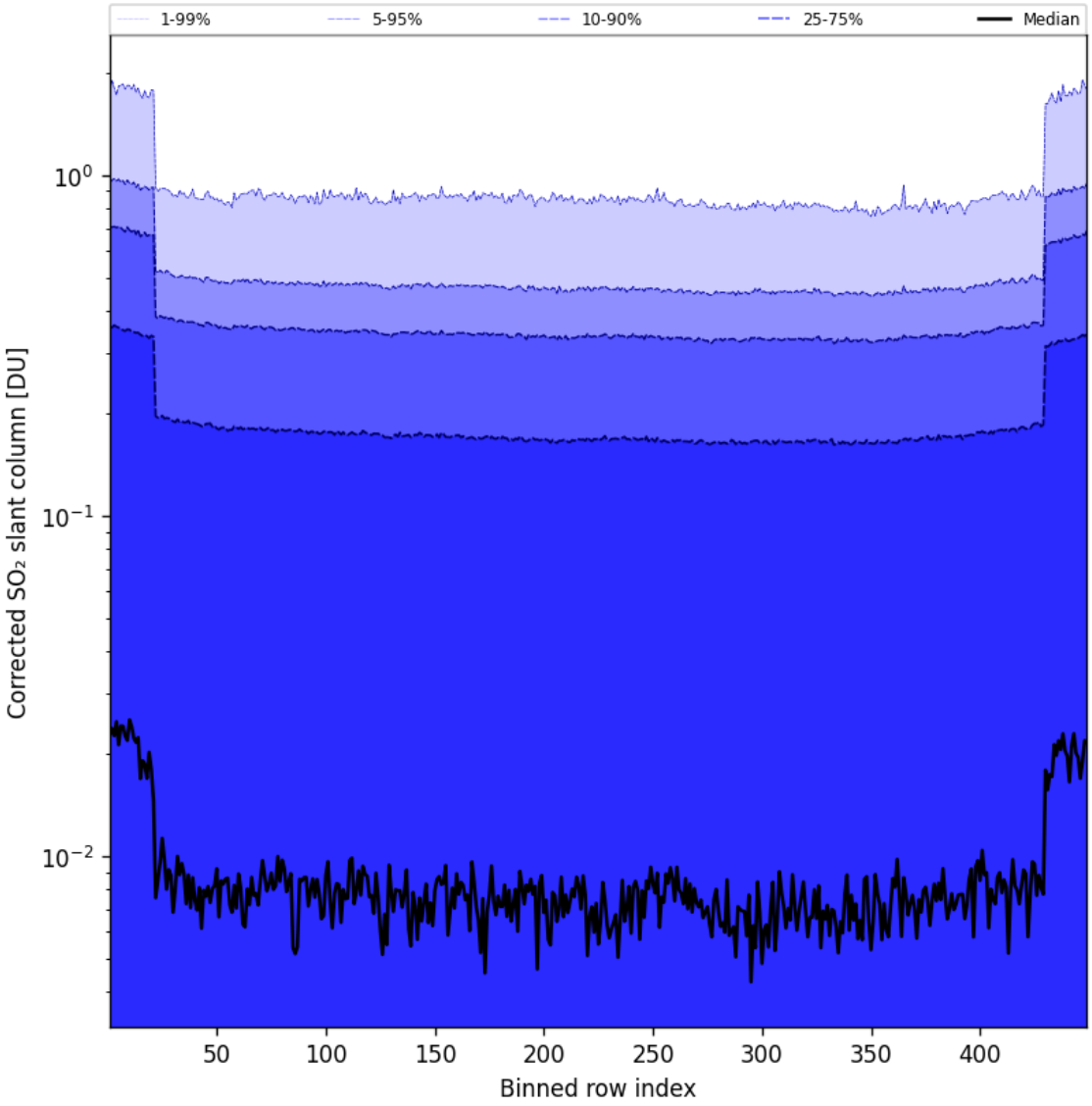

Figure 87: Along track statistics of "Corrected SO_2 slant column" for 2025-02-08 to 2025-02-09

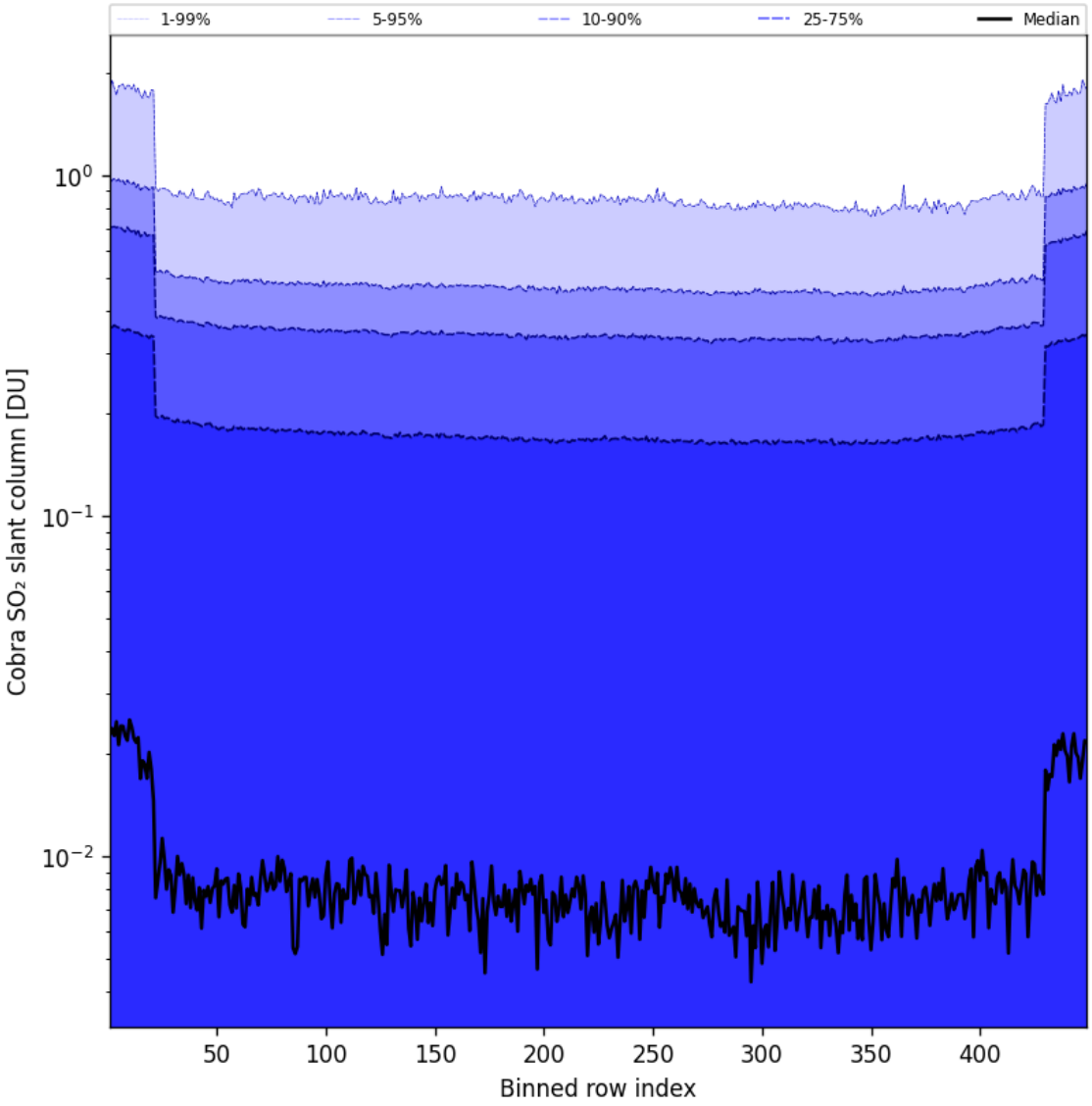

Figure 88: Along track statistics of "Cobra SO_2 slant column" for 2025-02-08 to 2025-02-09

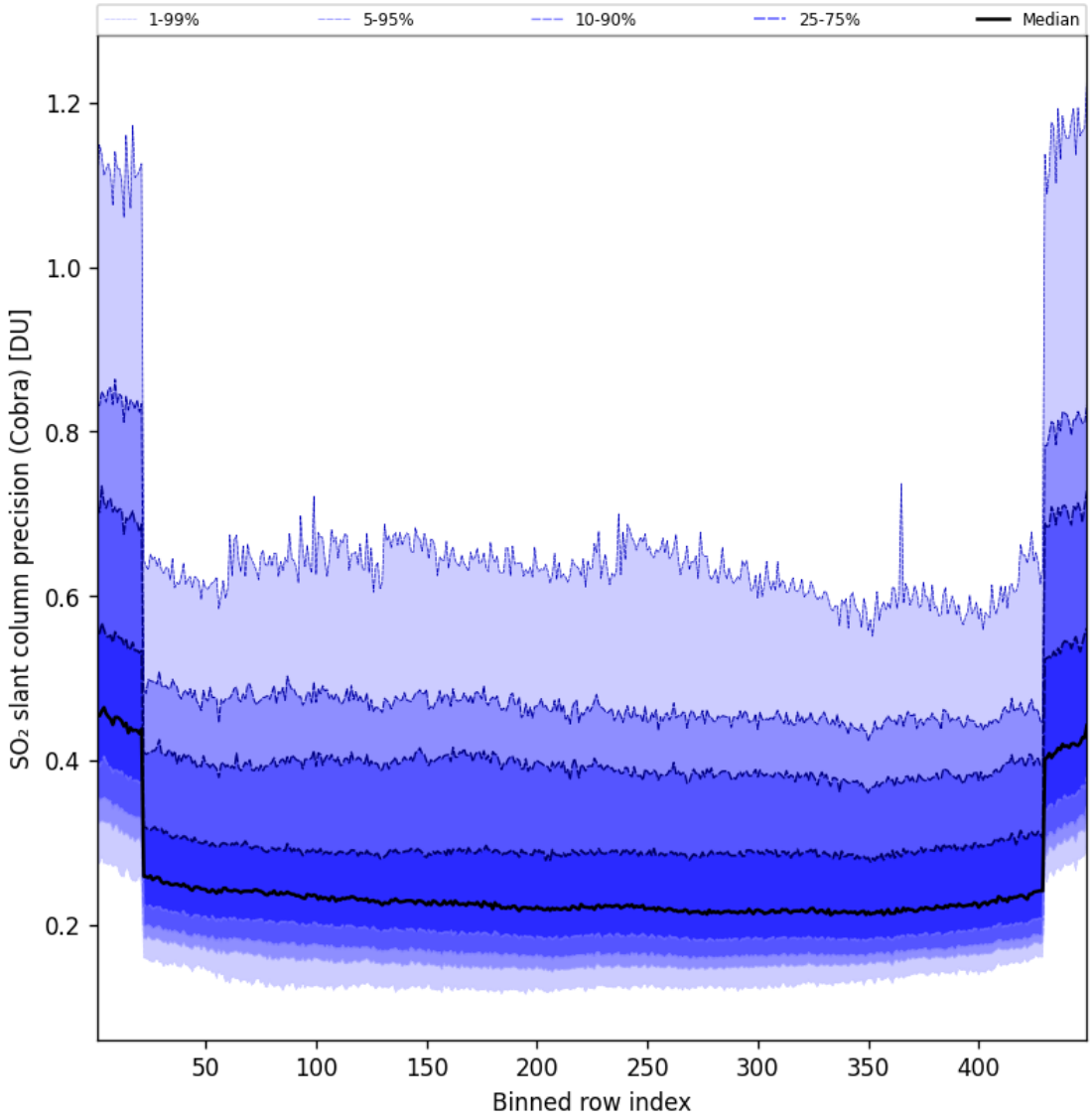

Figure 89: Along track statistics of "SO_2 slant column precision (Cobra)" for 2025-02-08 to 2025-02-09

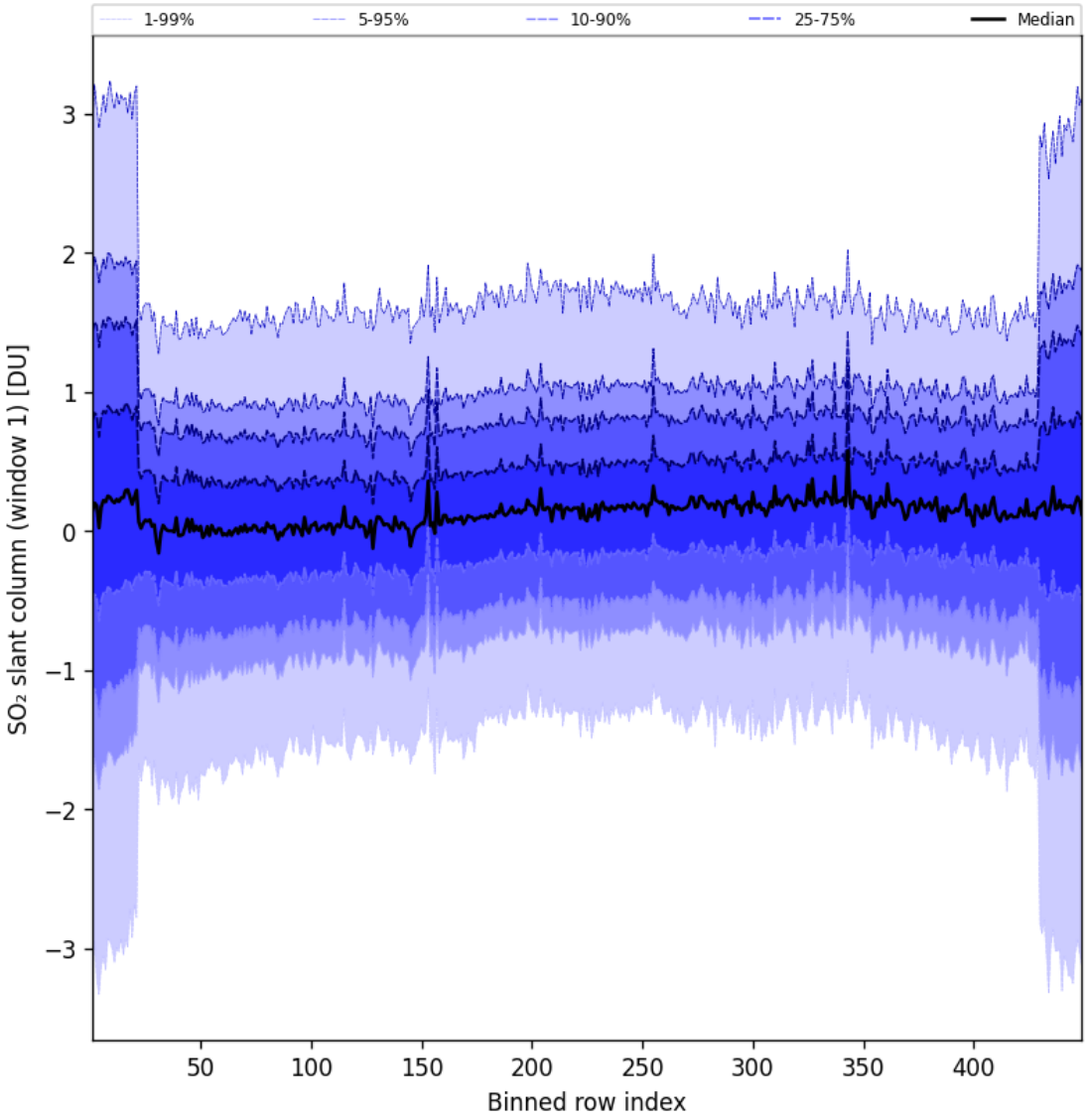

Figure 90: Along track statistics of "SO_2 slant column (window 1)" for 2025-02-08 to 2025-02-09

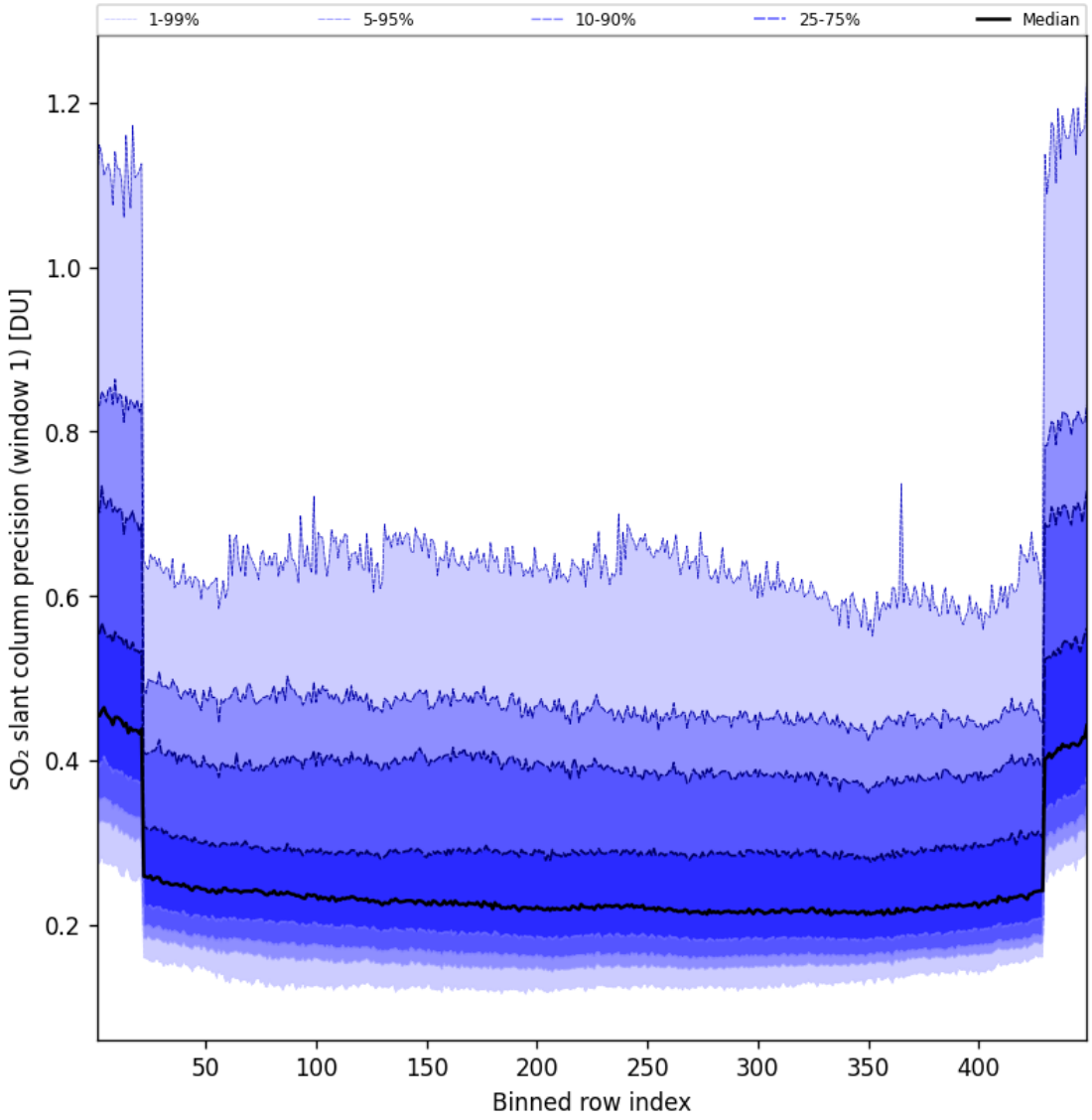

Figure 91: Along track statistics of "SO_2 slant column precision (window 1)" for 2025-02-08 to 2025-02-09

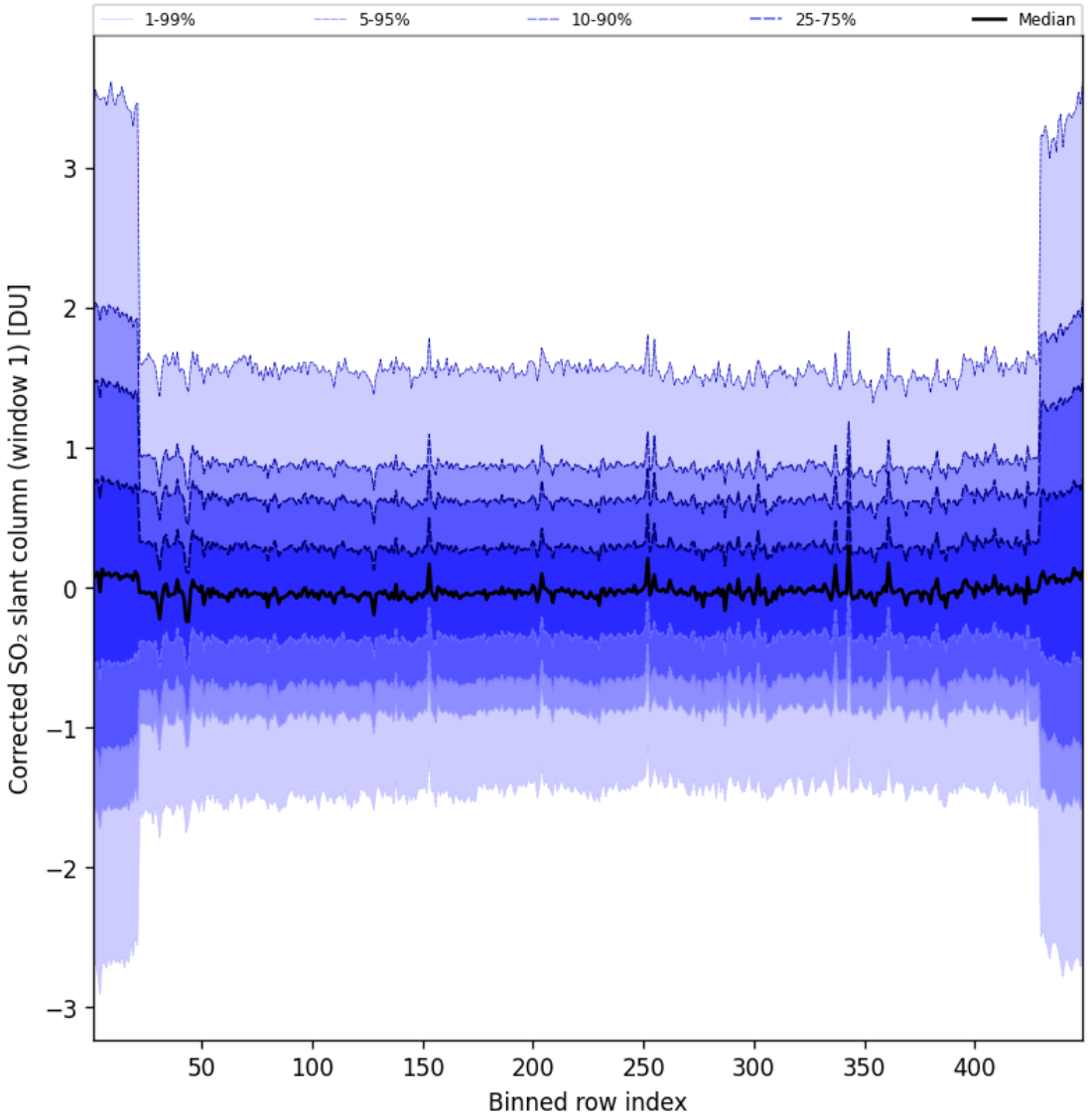

Figure 92: Along track statistics of “Corrected SO_2 slant column (window 1)” for 2025-02-08 to 2025-02-09

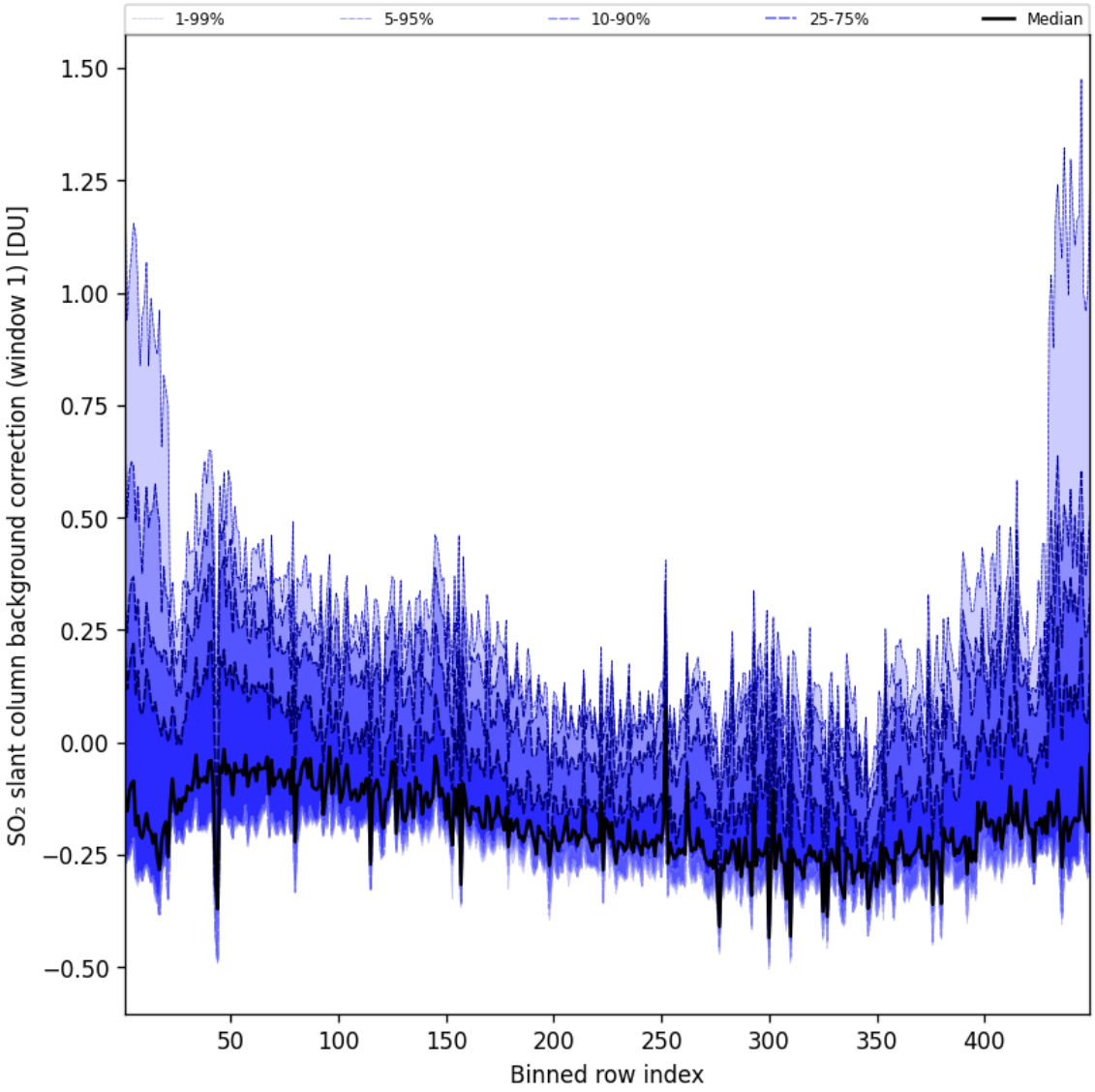

Figure 93: Along track statistics of "SO_2 slant column background correction (window 1)" for 2025-02-08 to 2025-02-09

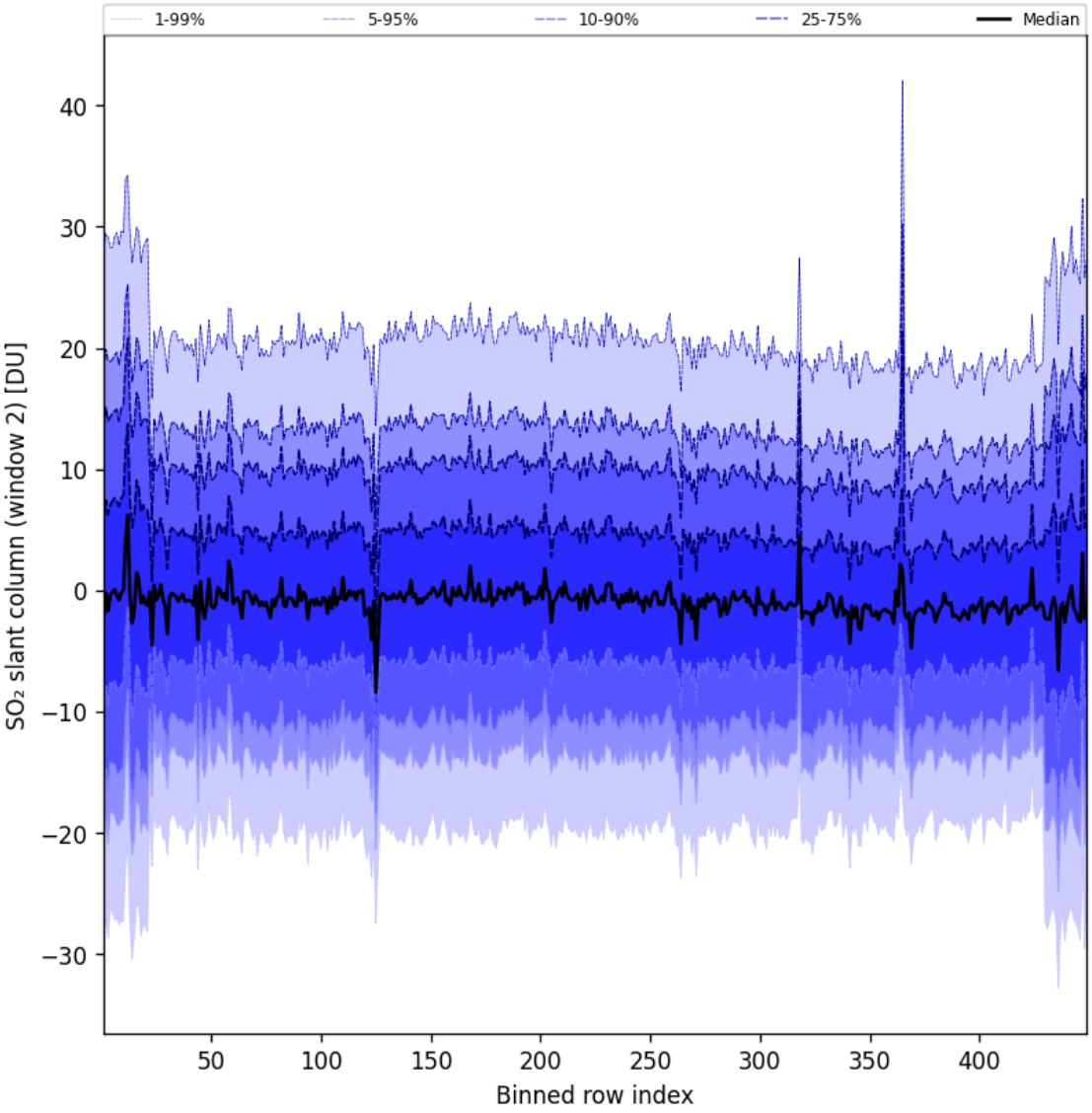

Figure 94: Along track statistics of "SO_2 slant column (window 2)" for 2025-02-08 to 2025-02-09

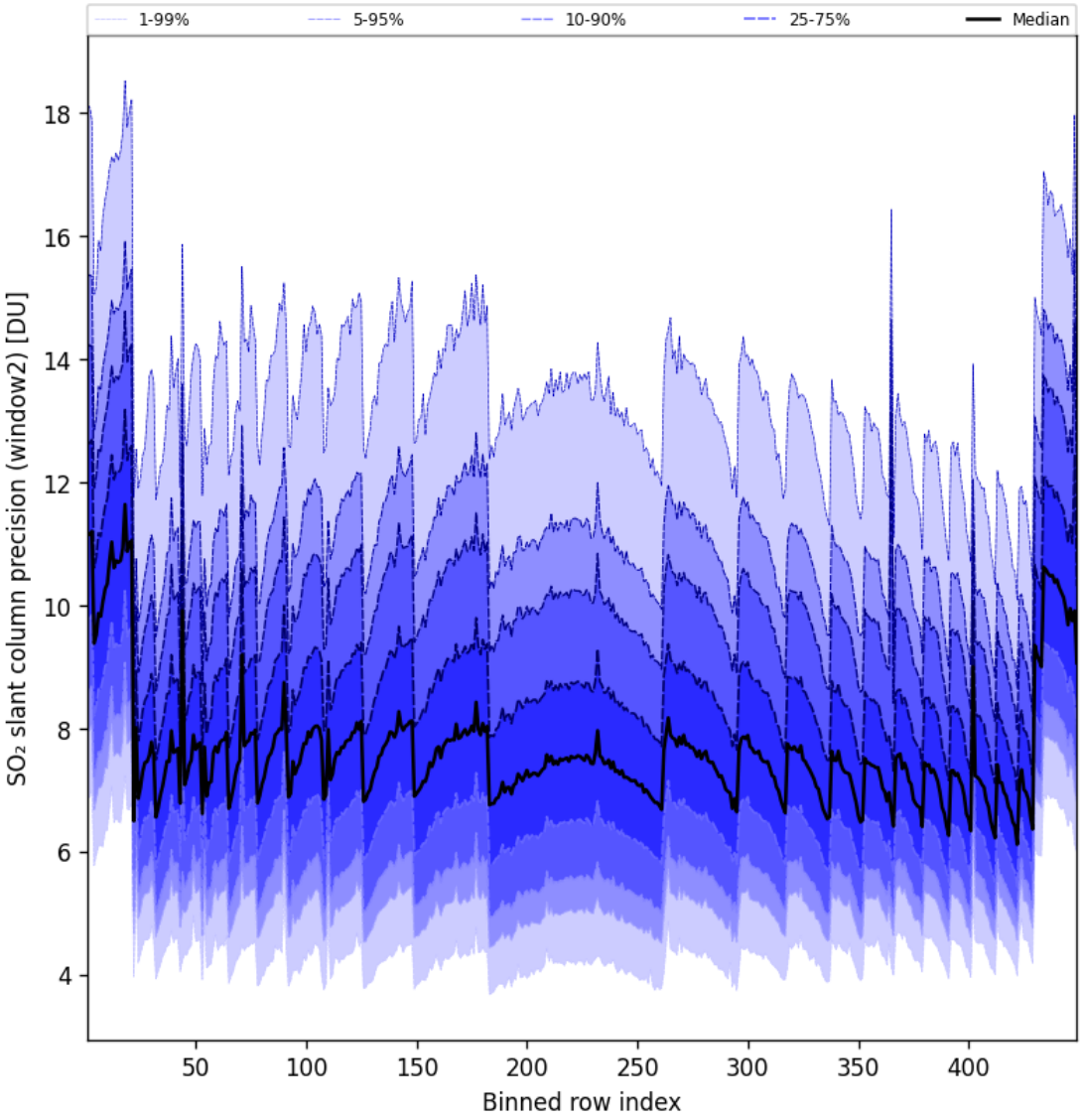

Figure 95: Along track statistics of "SO_2 slant column precision (window2)" for 2025-02-08 to 2025-02-09

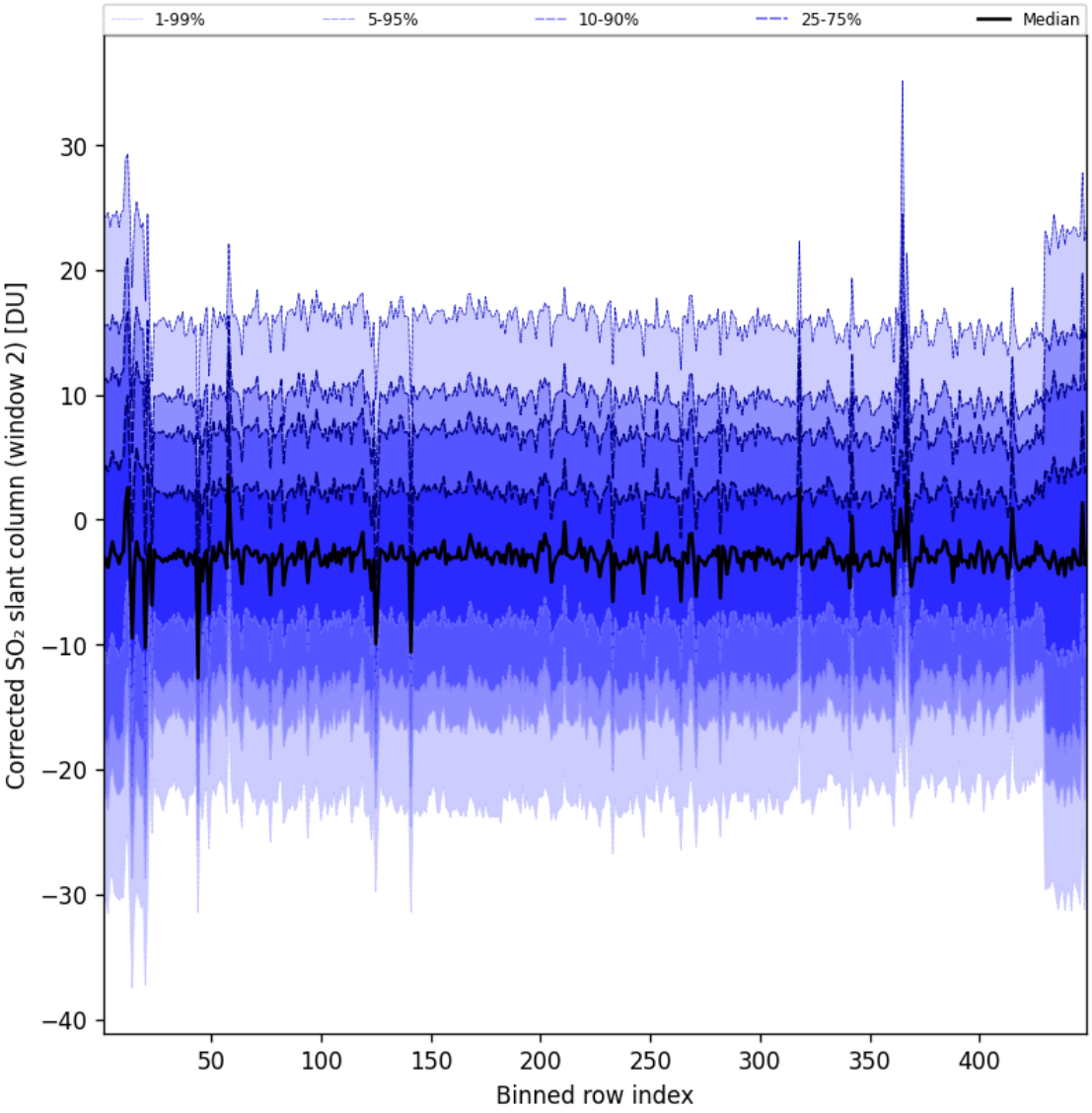

Figure 96: Along track statistics of "Corrected SO_2 slant column (window 2)" for 2025-02-08 to 2025-02-09

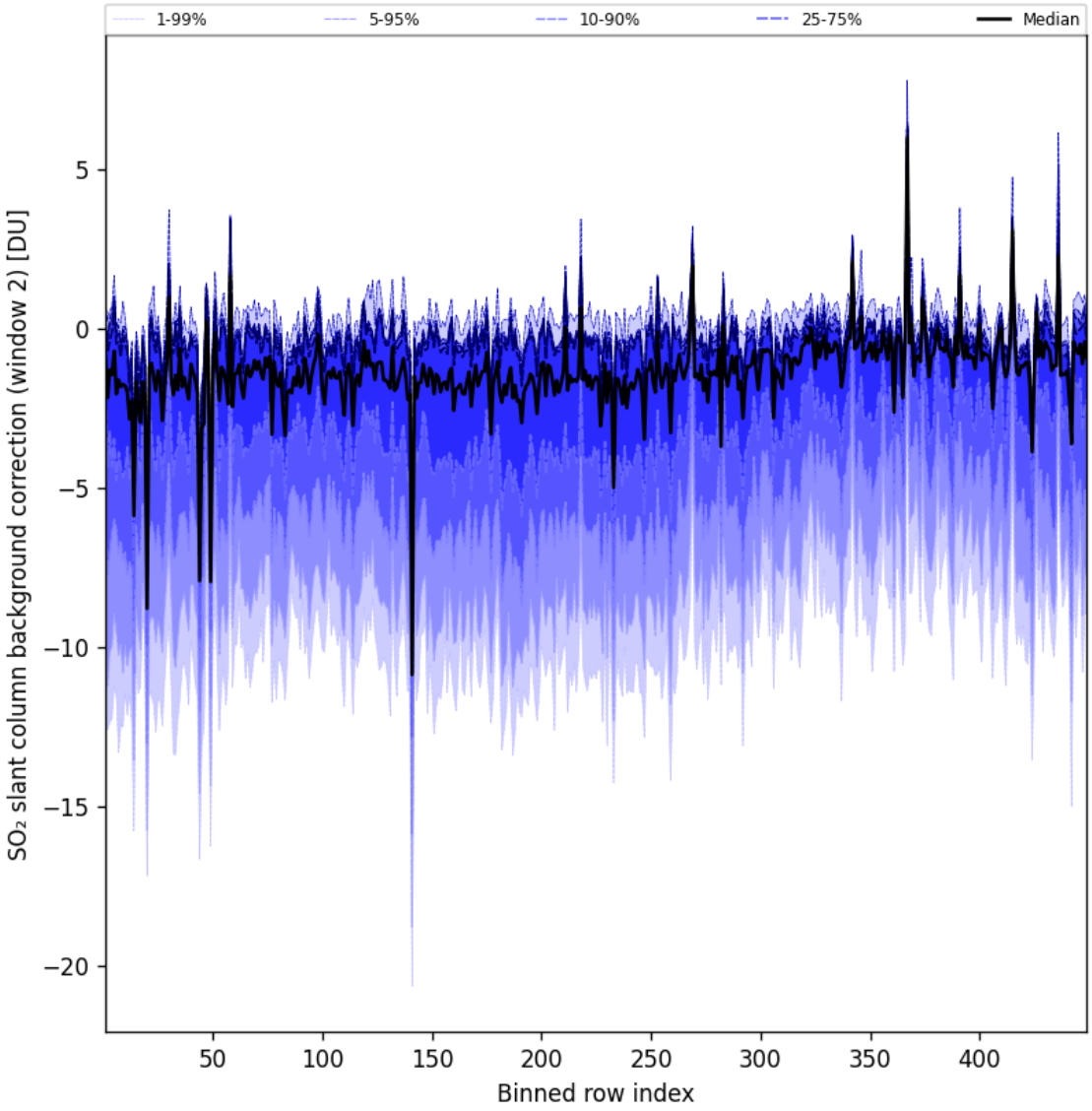

Figure 97: Along track statistics of "SO_2 slant column background correction (window 2)" for 2025-02-08 to 2025-02-09

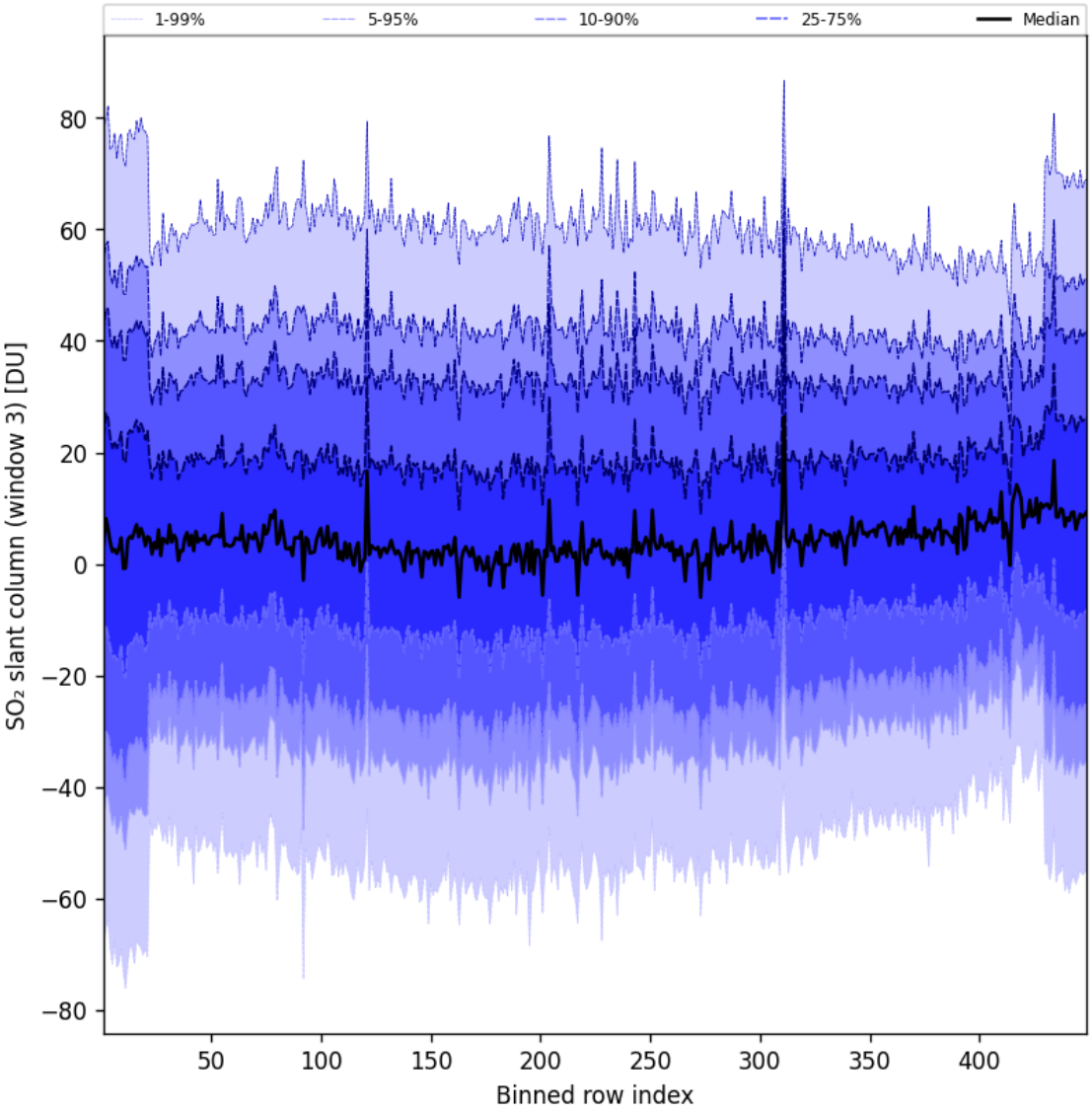

Figure 98: Along track statistics of "SO_2 slant column (window 3)" for 2025-02-08 to 2025-02-09

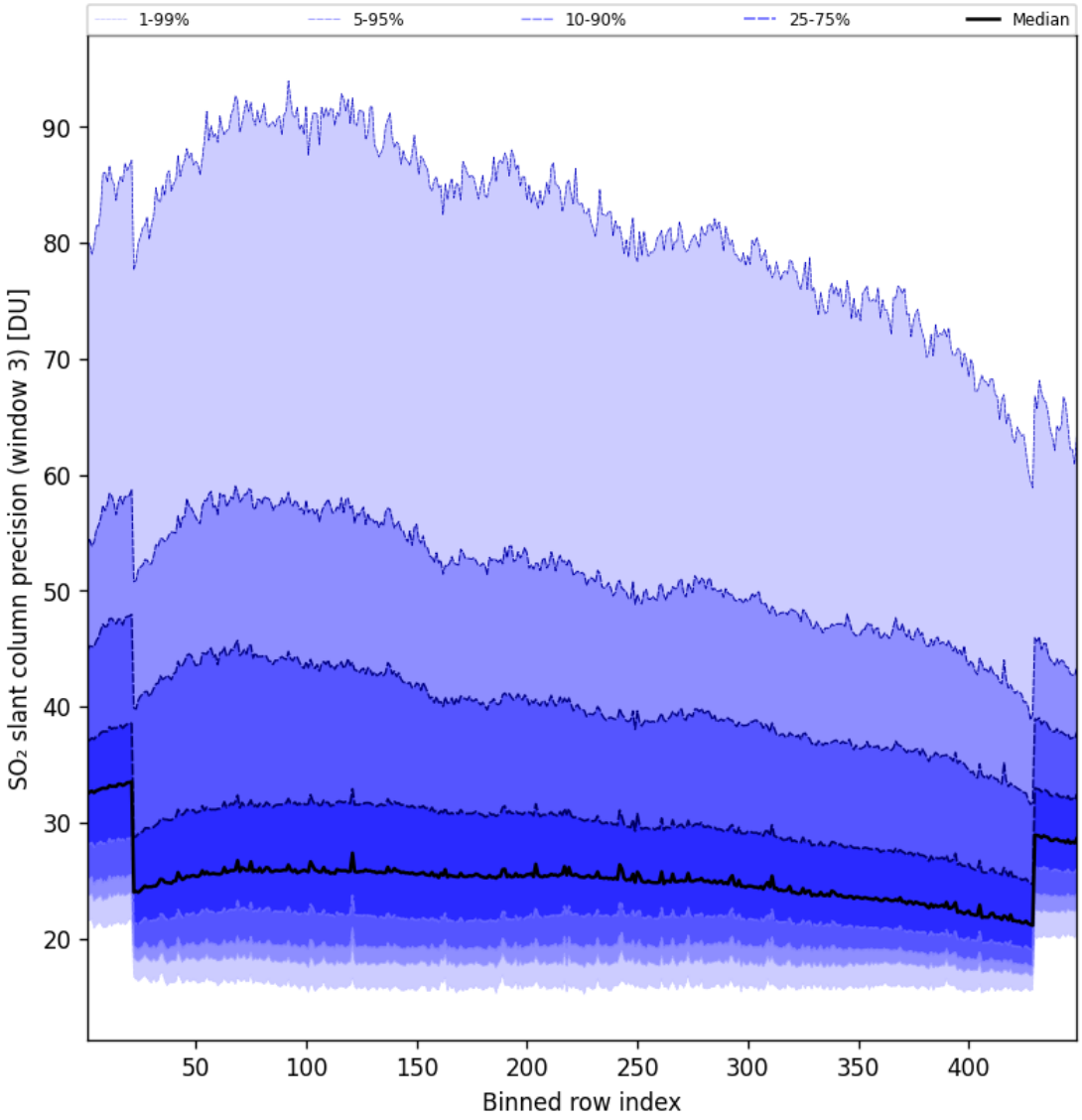

Figure 99: Along track statistics of "SO_2 slant column precision (window 3)" for 2025-02-08 to 2025-02-09

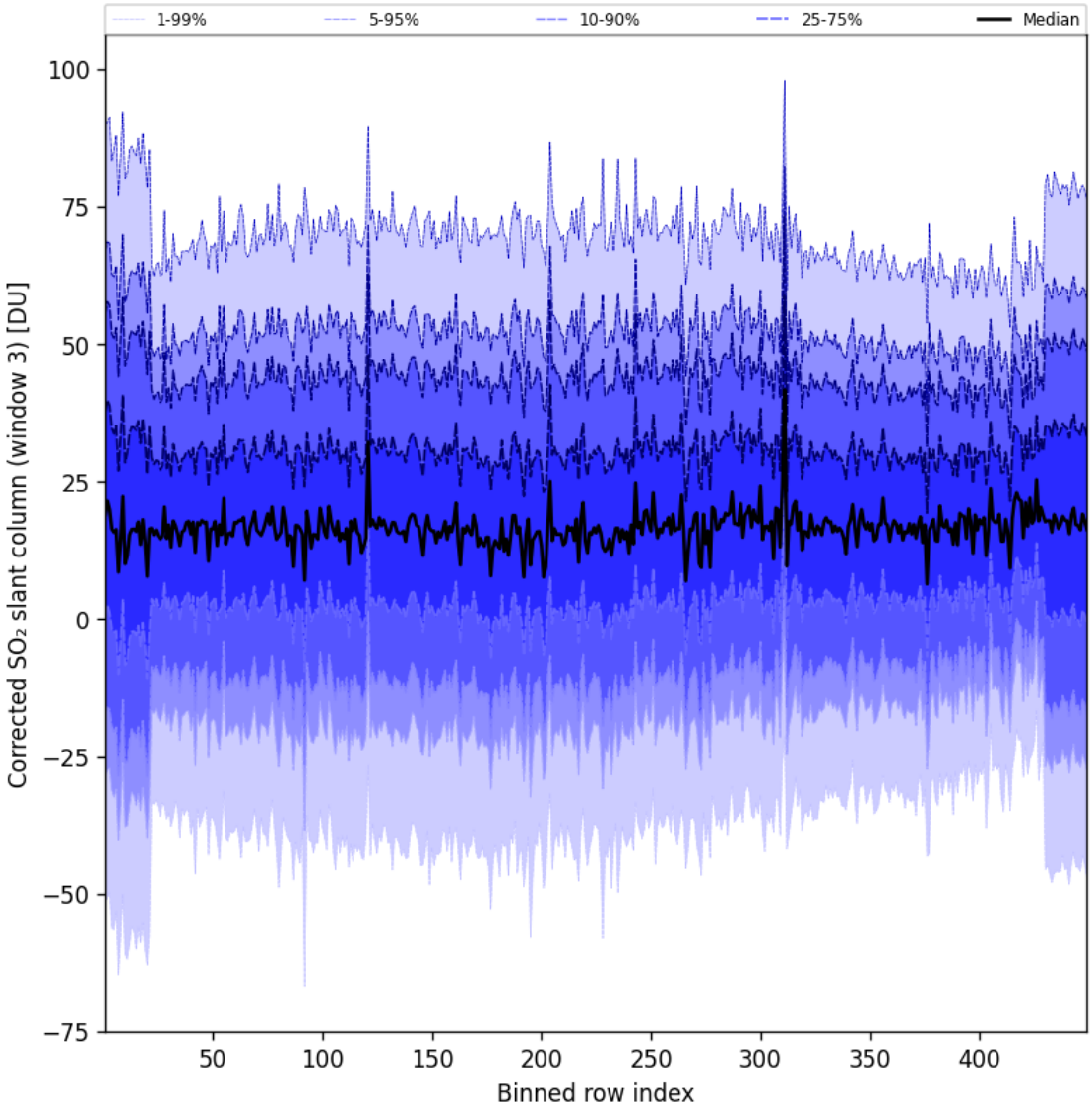

Figure 100: Along track statistics of “Corrected SO_2 slant column (window 3)” for 2025-02-08 to 2025-02-09

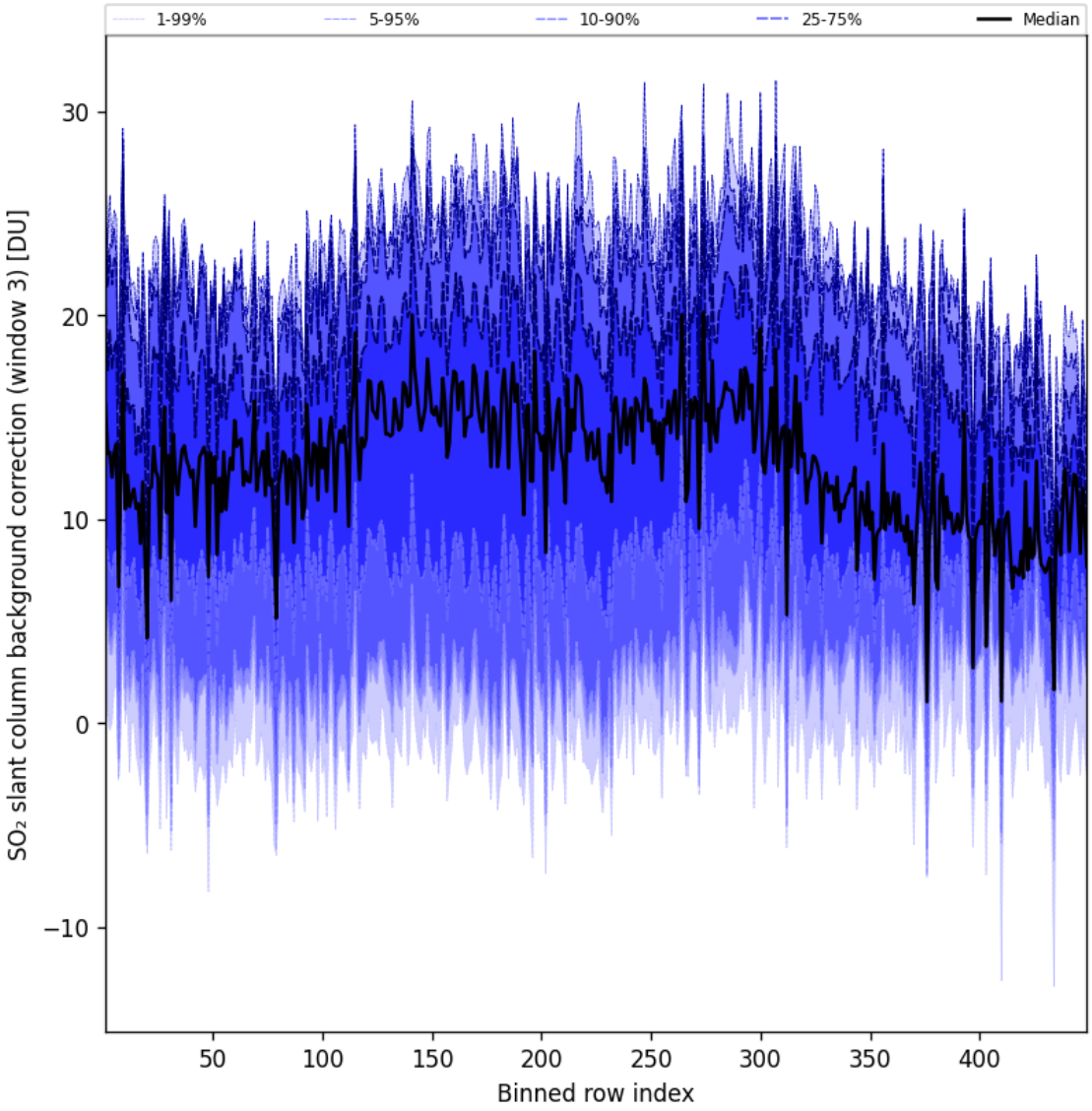

Figure 101: Along track statistics of "SO_2 slant column background correction (window 3)" for 2025-02-08 to 2025-02-09

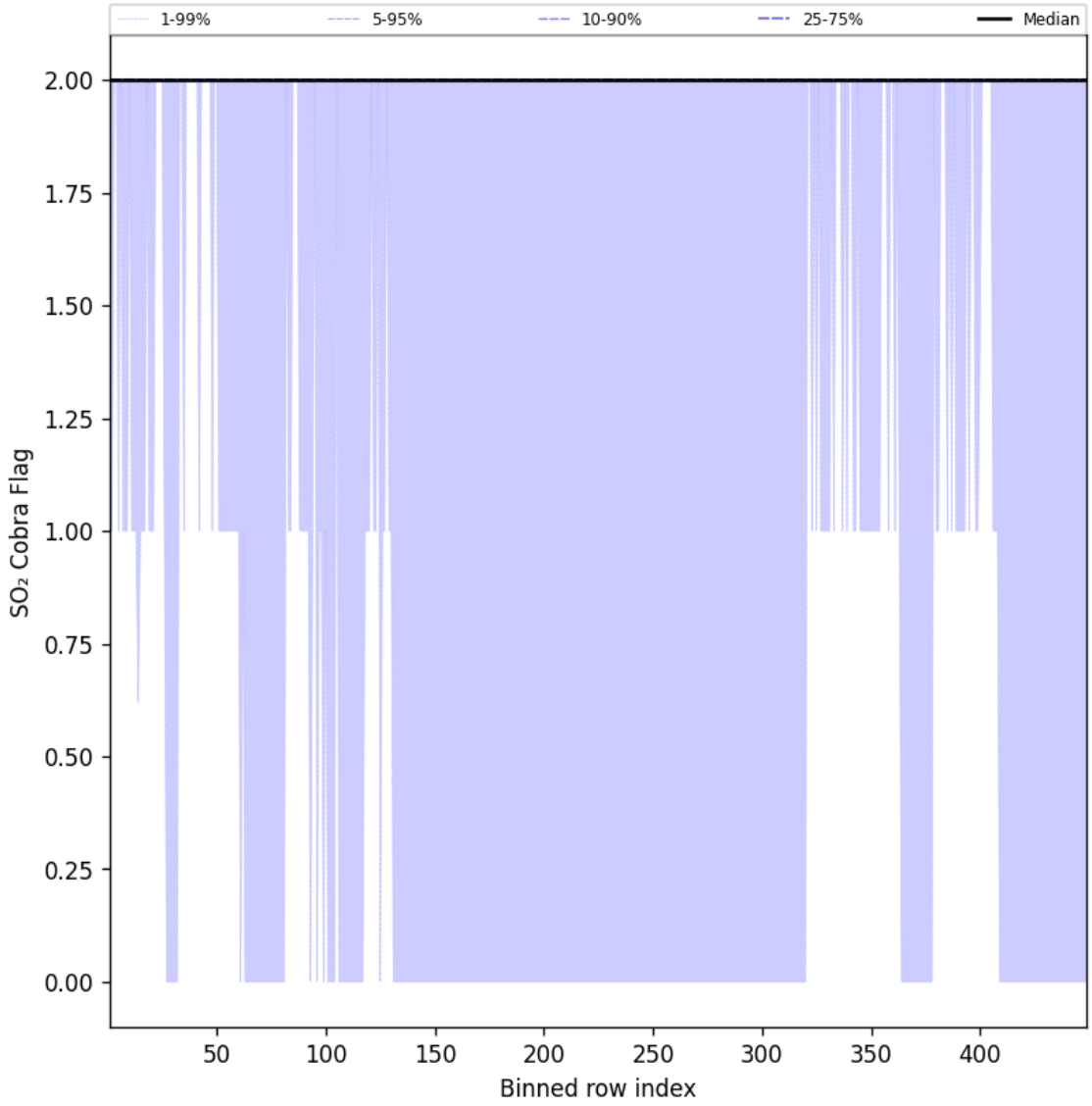

Figure 102: Along track statistics of "SO_2 Cobra Flag" for 2025-02-08 to 2025-02-09

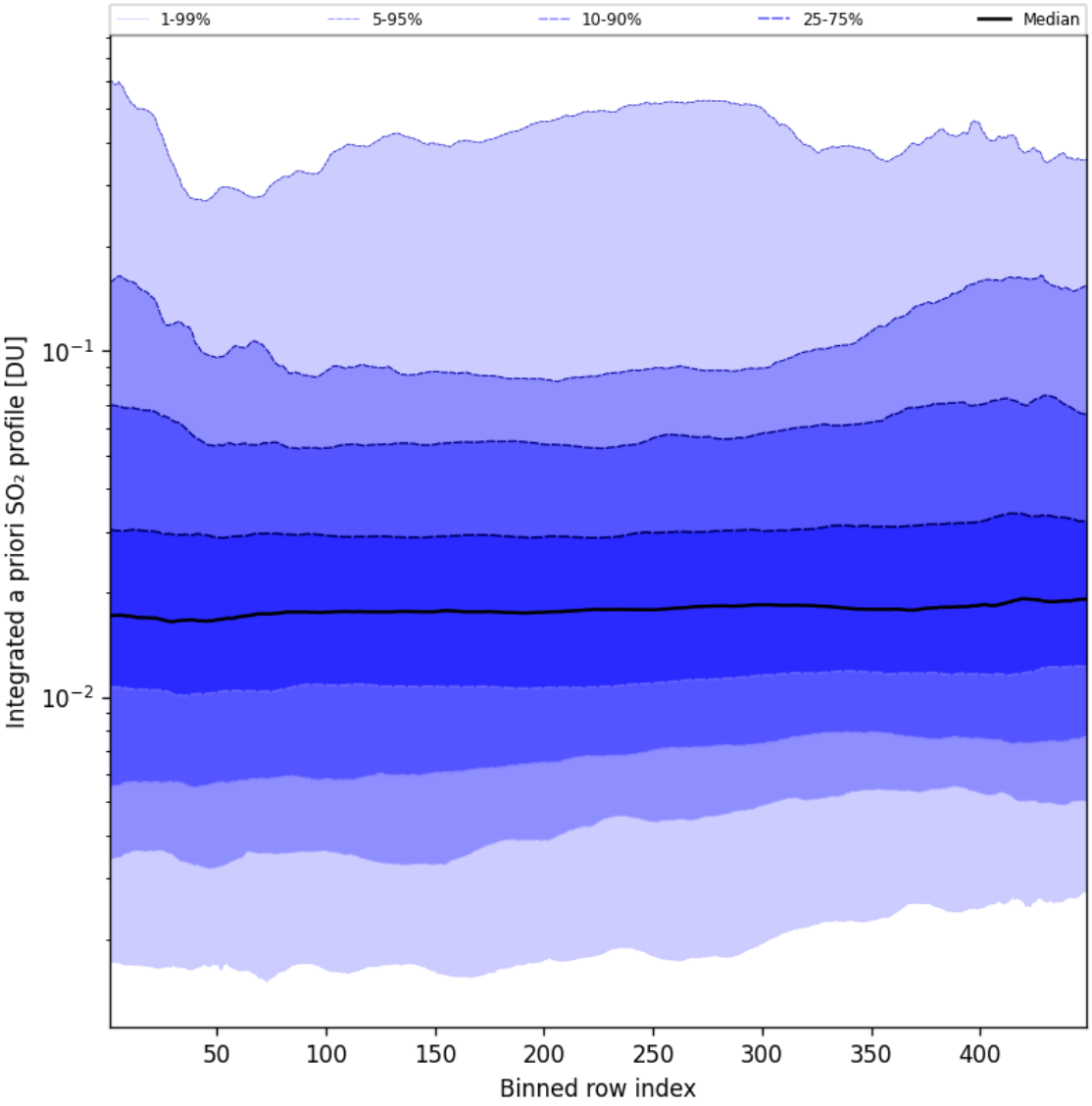

Figure 103: Along track statistics of “Integrated a priori SO_2 profile” for 2025-02-08 to 2025-02-09

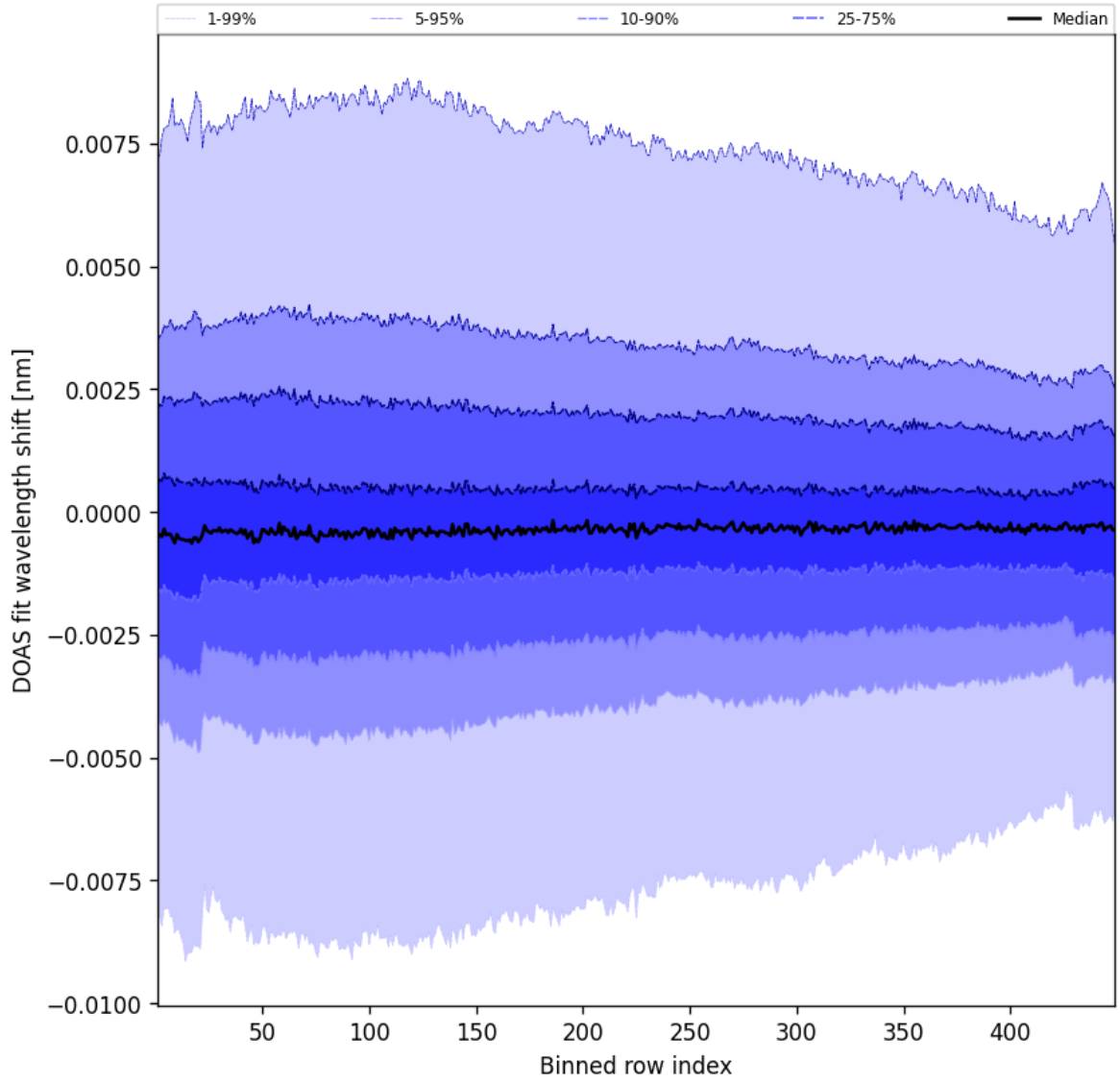

Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2025-02-08 to 2025-02-09

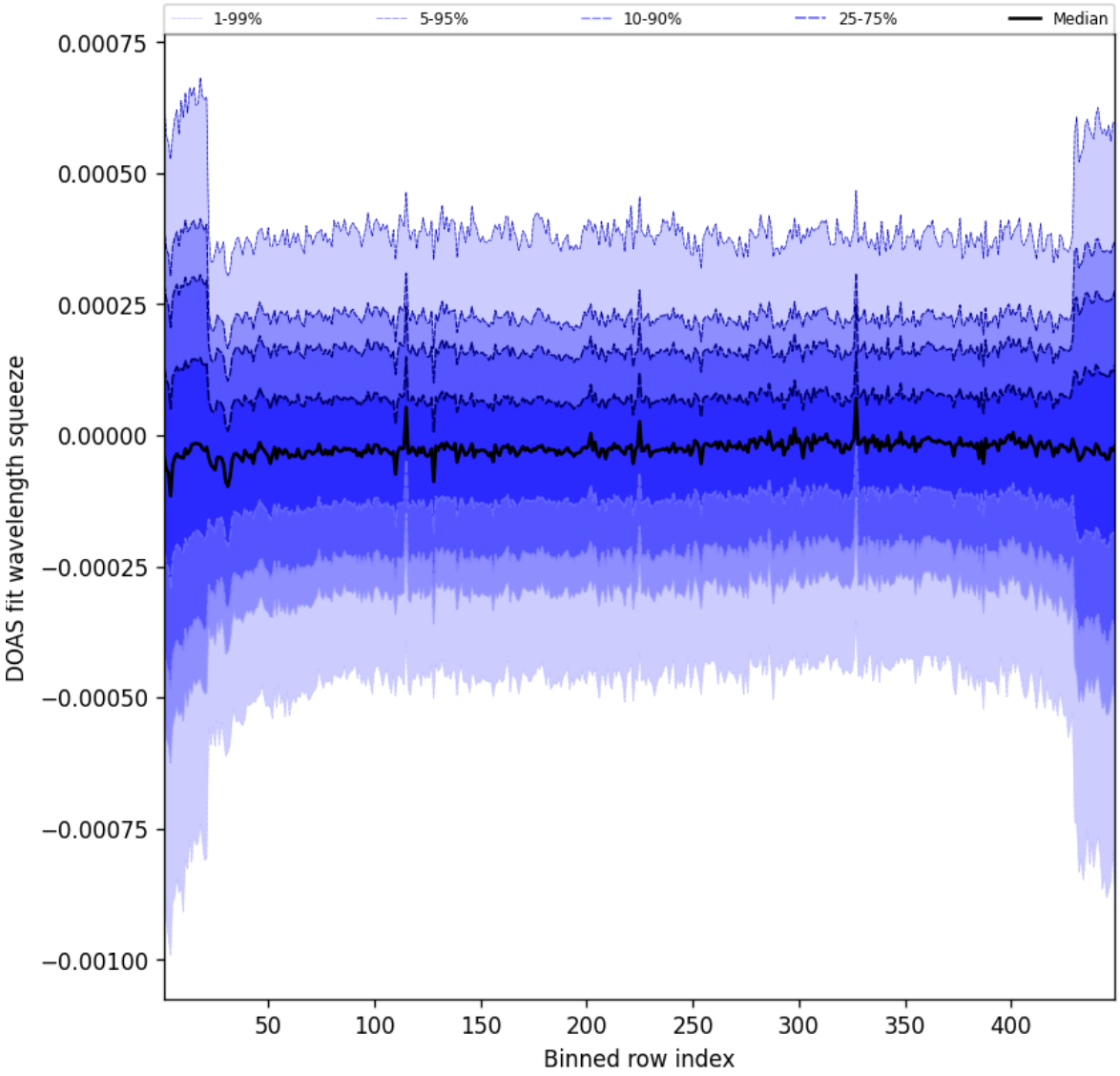

Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2025-02-08 to 2025-02-09

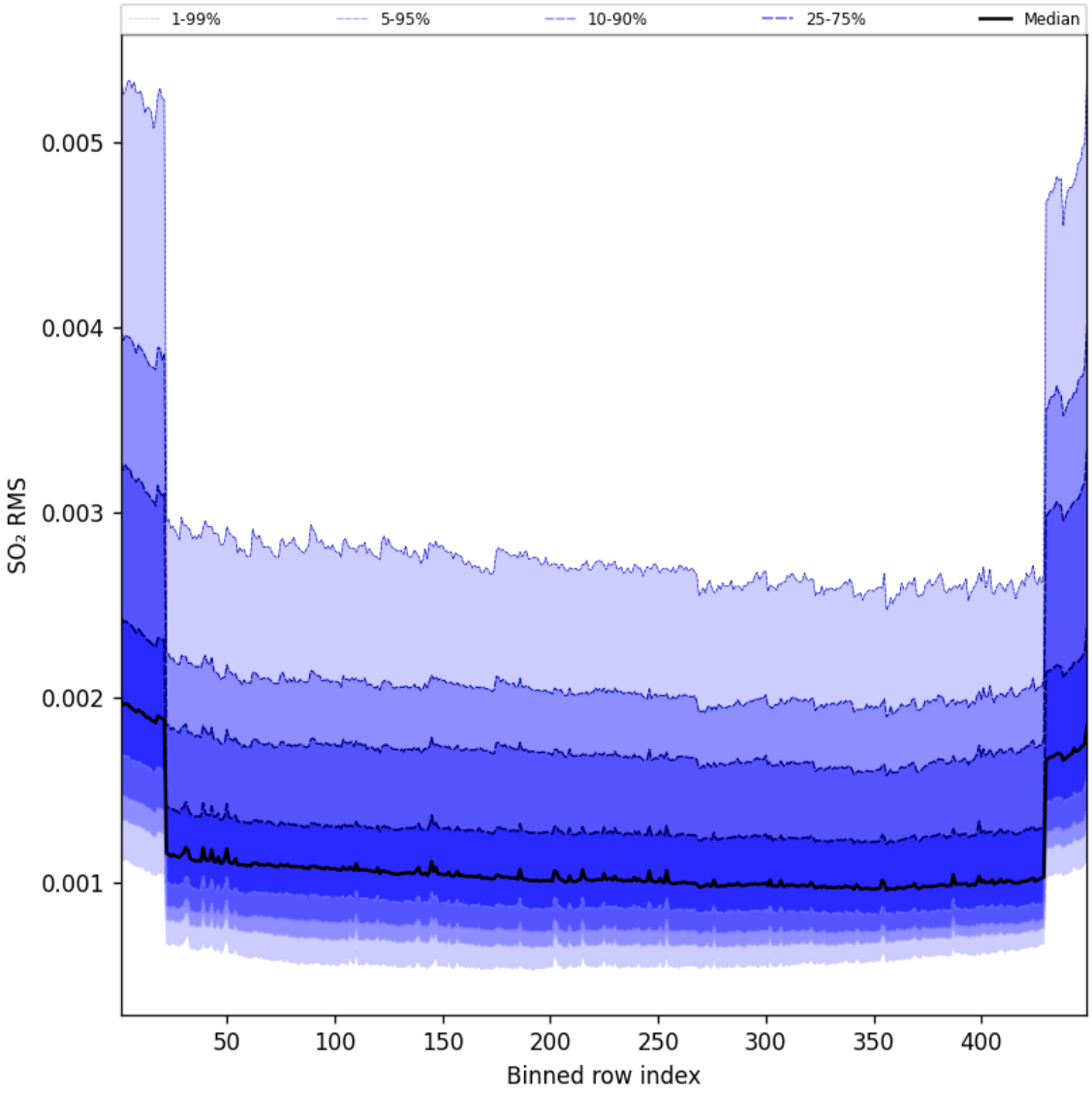

Figure 106: Along track statistics of "SO_2 RMS" for 2025-02-08 to 2025-02-09

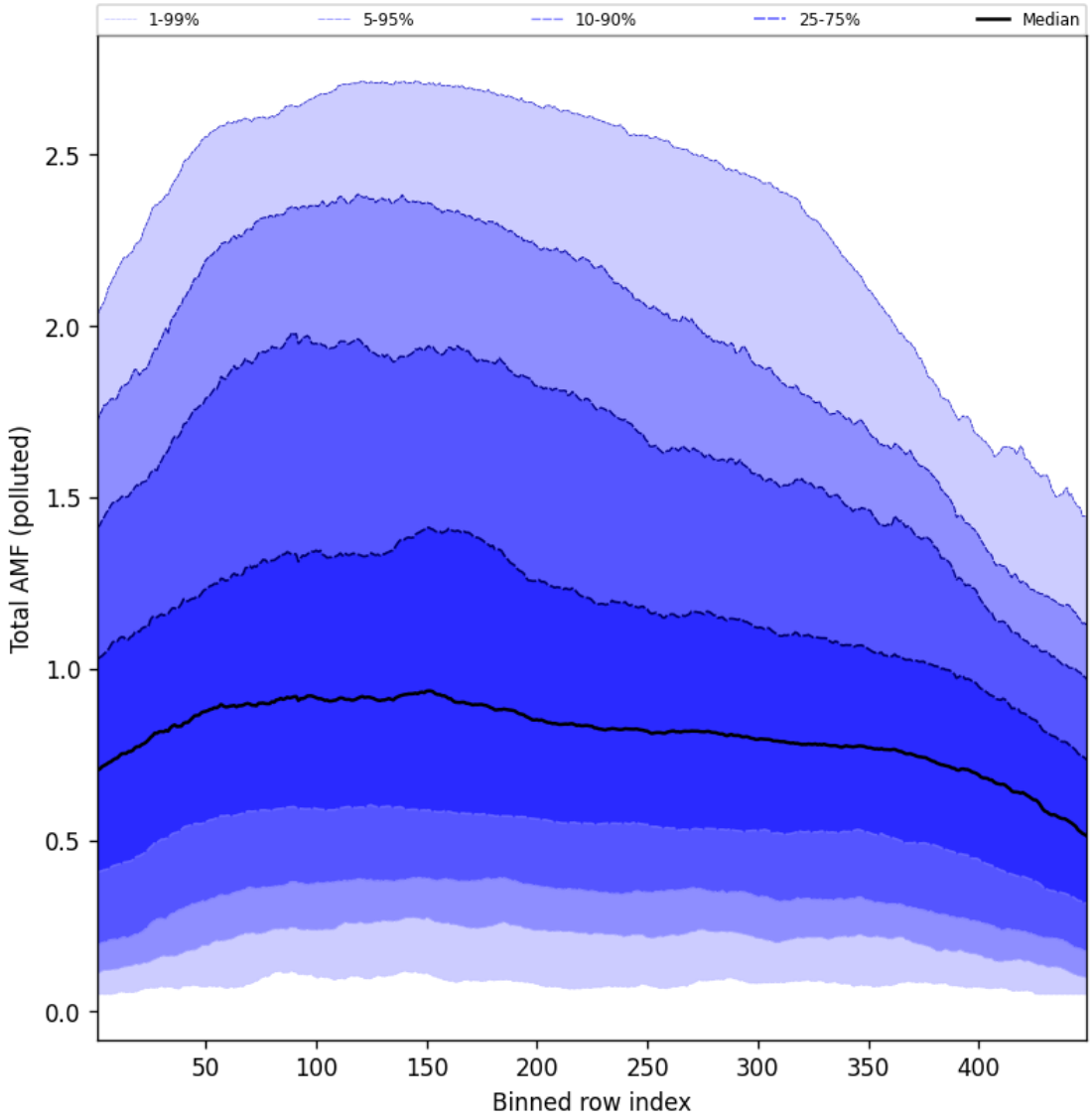

Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-02-08 to 2025-02-09

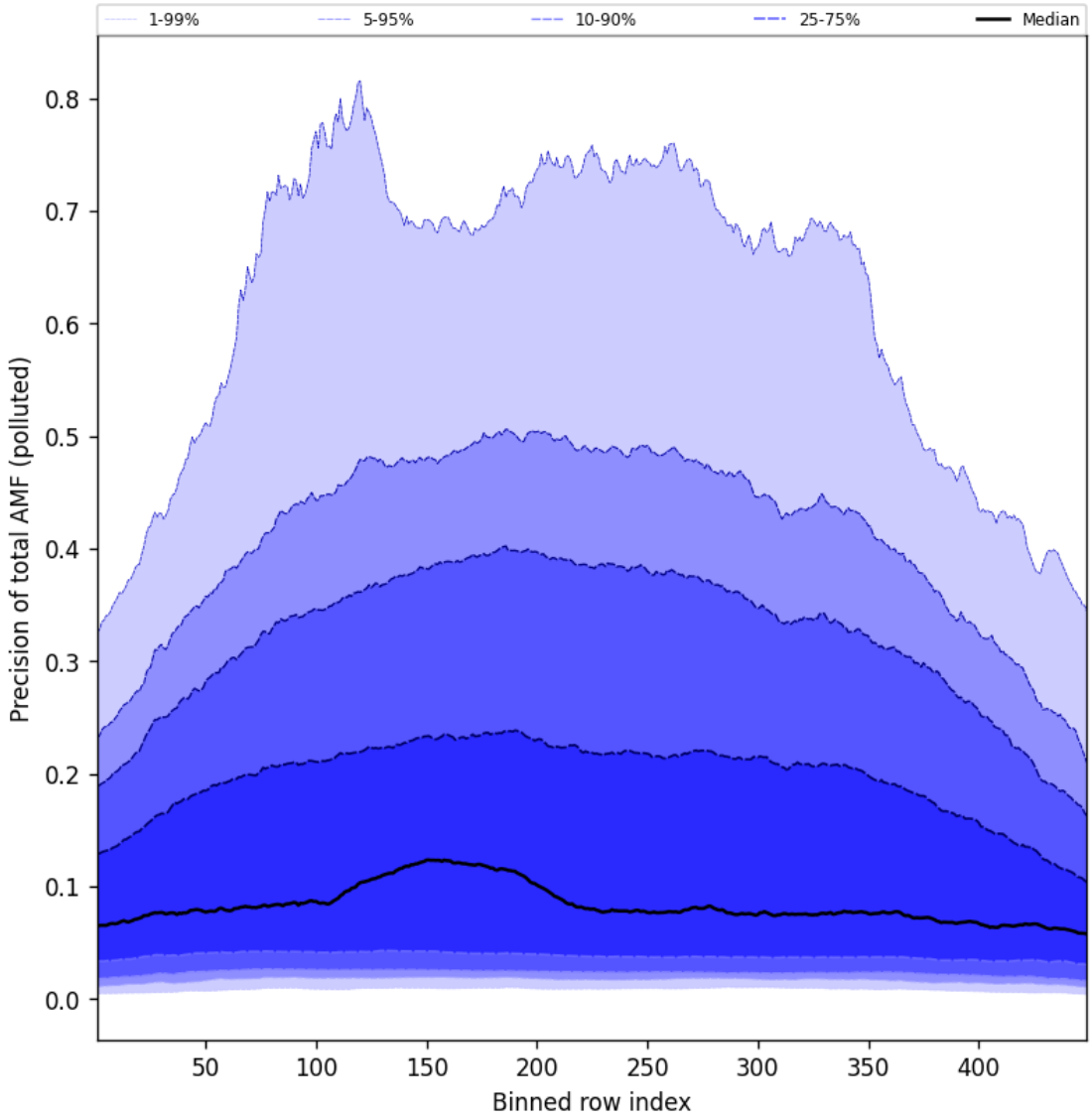

Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-02-08 to 2025-02-09

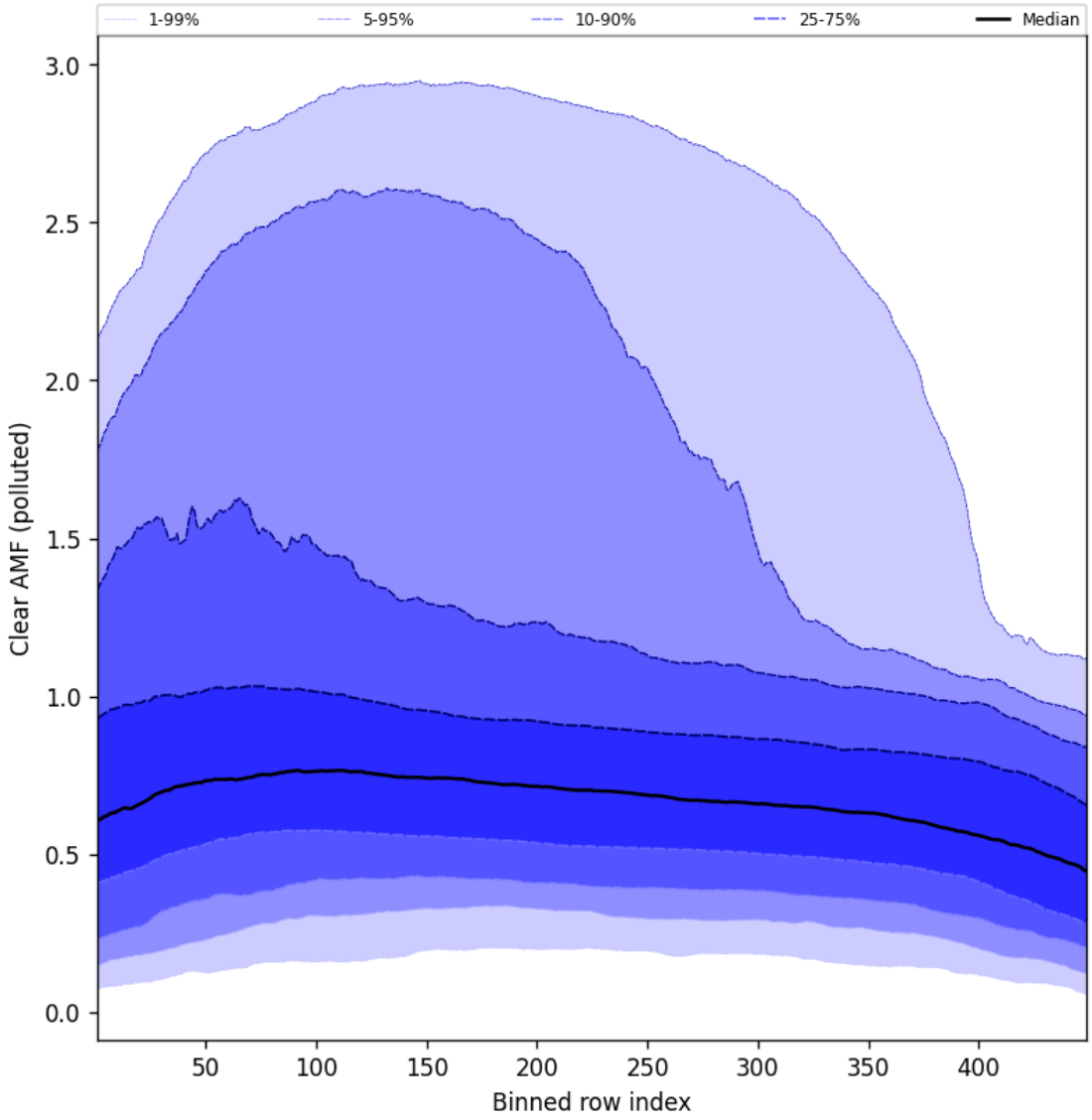

Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-02-08 to 2025-02-09

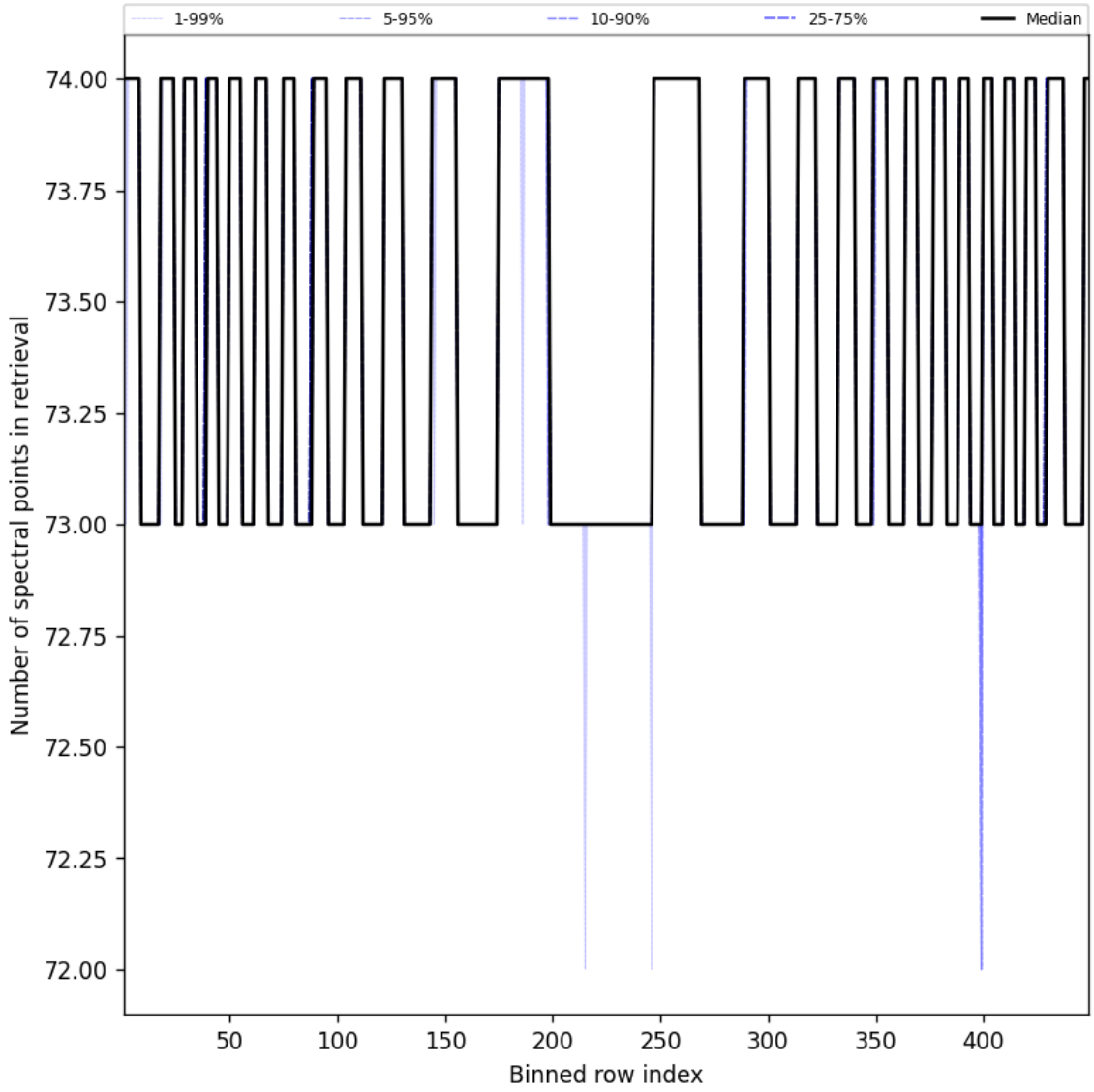

Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-02-08 to 2025-02-09

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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11 Copyright information of 'PyCAMA'

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