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]	0.641 ± 0.412	17321837	0.995	0.790	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(5.355 \pm 181.904) \times 10^{-2}$	17321837	0.235	0.463	1.112×10^{-2}	-188	263
sulfurdioxide total vertical column precision [DU]	0.704 ± 1.317	17321837	0.197	0.427	0.326	3.661×10^{-2}	98.8
sulfurdioxide slant column density corrected [DU]	$(1.948 \pm 37.968) \times 10^{-2}$	17321837	0.227	0.353	9.427×10^{-3}	-26.8	388
sulfurdioxide slant column density cobra [DU]	$(1.938 \pm 35.673) \times 10^{-2}$	17321837	0.227	0.353	9.427×10^{-3}	-26.8	42.2
sulfurdioxide slant column density cobra precision [DU]	0.289 ± 0.138	17321837	0.188	0.147	0.243	7.382×10^{-2}	26.9
sulfurdioxide slant column density window1 [DU]	0.178 ± 0.691	17321837	0.225	0.730	0.191	-36.2	64.5
sulfurdioxide slant column density window1 precision [DU]	0.289 ± 0.138	17321837	0.188	0.147	0.243	7.382×10^{-2}	26.9
sulfurdioxide slant column density corrected win1 [DU]	$(3.001 \pm 67.778) \times 10^{-2}$	17321837	-2.500×10^{-2}	0.707	9.794×10^{-3}	-36.2	64.5
background so2 slant column offset window1 [DU]	-0.148 ± 0.189	17321837	-0.300	0.222	-0.181	-1.43	3.43
sulfurdioxide slant column density window2 [DU]	1.49 ± 8.99	17321837	0.750	11.3	1.23	-1.808×10^{3}	1.270×10^{3}
sulfurdioxide slant column density window2 precision [DU]	7.99 ± 2.20	17321837	6.97	2.53	7.65	2.01	619
sulfurdioxide slant column density corrected win2 [DU]	0.437 ± 8.596	17321837	0.250	10.9	0.456	-1.811×10^{3}	1.271×10^{3}
background so2 slant column offset window2 [DU]	-1.05 ± 2.84	17321837	0.750	3.37	1.124×10^{-4}	-23.3	5.49
sulfurdioxide slant column density window3 [DU]	-4.00 ± 24.04	17321837	-3.92	30.3	-4.10	-359	1.181×10^{3}
sulfurdioxide slant column density window3 precision [DU]	27.6 ± 12.8	17321837	21.5	9.41	24.2	9.43	1.076×10^{3}
sulfurdioxide slant column density corrected win3 [DU]	0.906 ± 23.051	17321837	0.560	29.0	0.888	-357	1.181×10^{3}
background so2 slant column offset window3 [DU]	4.90 ± 7.27	17321837	0.560	11.6	4.32	-23.6	62.9
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.21	17321837	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(3.844 \pm 10.253) \times 10^{-2}$	17321837	1.800×10^{-2}	2.119×10^{-2}	1.766×10^{-2}	4.092×10^{-4}	2.71
fitted radiance shift [nm]	$(-3.643 \pm 25.238) \times 10^{-4}$	17321837	-5.000×10^{-4}	1.821×10^{-3}	-3.479×10^{-4}	-4.161×10^{-2}	5.552×10^{-2}
fitted radiance squeeze [1]	$(-3.530 \pm 18.117) \times 10^{-5}$	17321837	-1.000×10^{-5}	2.017×10^{-4}	-2.751×10^{-5}	-1.538×10^{-2}	2.484×10^{-2}
fitted root mean square [1]	$(1.270 \pm 0.584) \times 10^{-3}$	17321837	9.250×10^{-4}	5.831×10^{-4}	1.089×10^{-3}	3.291×10^{-4}	8.038×10^{-2}
sulfurdioxide total air mass factor polluted [1]	0.818 ± 0.478	17321837	0.740	0.586	0.752	5.000×10^{-2}	2.91
sulfurdioxide total air mass factor polluted precision [1]	0.117 ± 0.126	17321837	3.500×10^{-2}	0.129	6.644×10^{-2}	2.500×10^{-3}	2.14
sulfurdioxide clear air mass factor polluted [1]	0.713 ± 0.386	17321837	0.500	0.413	0.668	2.643×10^{-2}	2.94
number of spectral points in retrieval [1]	73.4 ± 0.5	17321837	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	0.210	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	−3.91	−1.13	−0.604	−0.381	−0.216	0.247	0.431	0.687	1.31	4.74
sulfurdioxide total vertical column precision [DU]	9.037×10^{-2}	0.125	0.152	0.177	0.210	0.636	0.966	1.43	2.46	6.59
sulfurdioxide slant column density corrected [DU]	−0.861	−0.486	−0.348	−0.258	−0.165	0.188	0.286	0.386	0.547	1.05
sulfurdioxide slant column density cobra [DU]	−0.861	−0.486	−0.348	−0.258	−0.165	0.188	0.286	0.386	0.547	1.05
sulfurdioxide slant column density cobra precision [DU]	0.131	0.158	0.172	0.183	0.197	0.344	0.401	0.460	0.553	0.794
sulfurdioxide slant column density window1 [DU]	−1.74	−0.893	−0.583	−0.383	−0.181	0.550	0.738	0.921	1.20	2.00
sulfurdioxide slant column density window1 precision [DU]	0.131	0.158	0.172	0.183	0.197	0.344	0.401	0.460	0.553	0.794
sulfurdioxide slant column density corrected win1 [DU]	−1.68	−0.954	−0.693	−0.520	−0.338	0.369	0.567	0.765	1.08	2.01
background so2 slant column offset window1 [DU]	−0.484	−0.348	−0.322	−0.305	−0.280	-5.813×10^{-2}	2.058×10^{-2}	9.794×10^{-2}	0.195	0.426
sulfurdioxide slant column density window2 [DU]	−19.1	−12.6	−9.41	−7.01	−4.31	7.00	9.98	12.7	16.5	24.5
sulfurdioxide slant column density window2 precision [DU]	4.23	5.11	5.64	6.05	6.54	9.07	9.94	10.8	12.0	14.5
sulfurdioxide slant column density corrected win2 [DU]	−20.4	−13.5	−10.2	−7.71	−4.98	5.88	8.58	11.0	14.3	21.2
background so2 slant column offset window2 [DU]	−9.42	−7.16	−5.51	−4.05	−2.42	0.946	1.21	1.42	1.72	3.08
sulfurdioxide slant column density window3 [DU]	−63.5	−43.3	−33.7	−26.7	−19.1	11.2	19.1	26.1	35.6	54.4
sulfurdioxide slant column density window3 precision [DU]	13.7	16.1	17.8	19.1	20.6	30.0	34.5	40.2	51.7	82.7
sulfurdioxide slant column density corrected win3 [DU]	−56.6	−36.9	−27.5	−20.8	−13.5	15.5	22.9	29.6	38.6	56.8
background so2 slant column offset window3 [DU]	−9.37	−5.72	−4.21	−2.75	−0.823	10.7	13.1	14.8	16.8	19.8
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]	1.430×10^{-3}	3.917×10^{-3}	5.968×10^{-3}	7.877×10^{-3}	1.015×10^{-2}	3.134×10^{-2}	4.512×10^{-2}	6.407×10^{-2}	0.119	0.412
fitted radiance shift [nm]	-7.935×10^{-3}	-4.120×10^{-3}	-2.777×10^{-3}	-1.999×10^{-3}	-1.313×10^{-3}	5.082×10^{-4}	1.183×10^{-3}	2.032×10^{-3}	3.499×10^{-3}	7.511×10^{-3}
fitted radiance squeeze [1]	-5.502×10^{-4}	-3.305×10^{-4}	-2.450×10^{-4}	-1.888×10^{-4}	-1.314×10^{-4}	7.034×10^{-5}	1.199×10^{-4}	1.662×10^{-4}	2.334×10^{-4}	4.037×10^{-4}
fitted root mean square [1]	5.694×10^{-4}	7.000×10^{-4}	7.744×10^{-4}	8.308×10^{-4}	8.992×10^{-4}	1.482×10^{-3}	1.729×10^{-3}	1.974×10^{-3}	2.386×10^{-3}	3.410×10^{-3}
sulfurdioxide total air mass factor polluted [1]	5.086×10^{-2}	0.162	0.263	0.355	0.474	1.06	1.27	1.49	1.77	2.24
sulfurdioxide total air mass factor polluted precision [1]	7.088×10^{-3}	1.405×10^{-2}	1.996×10^{-2}	2.573×10^{-2}	3.448×10^{-2}	0.163	0.220	0.273	0.359	0.576
sulfurdioxide clear air mass factor polluted [1]	0.127	0.236	0.315	0.382	0.468	0.880	0.981	1.08	1.25	2.48
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]	0.674 ± 0.406	7853528	0.770	1.000	0.0	1.000	0.230	1.000
sulfurdioxide total vertical column [DU]	$(9.764 \pm 258.775) \times 10^{-2}$	7853528	0.655	1.675×10^{-2}	-188	263	-0.298	0.357
sulfurdioxide total vertical column precision [DU]	1.08 ± 1.80	7853528	0.864	0.482	4.210×10^{-2}	98.8	0.256	1.12
sulfurdioxide slant column density corrected [DU]	$(2.812 \pm 42.347) \times 10^{-2}$	7853528	0.391	1.193×10^{-2}	-9.41	59.5	-0.180	0.210
sulfurdioxide slant column density cobra [DU]	$(2.798 \pm 41.635) \times 10^{-2}$	7853528	0.391	1.193×10^{-2}	-9.41	42.2	-0.180	0.210
sulfurdioxide slant column density cobra precision [DU]	0.326 ± 0.164	7853528	0.193	0.277	8.239×10^{-2}	26.9	0.207	0.400
sulfurdioxide slant column density window1 [DU]	0.217 ± 0.797	7853528	0.801	0.230	-15.6	41.9	-0.174	0.627
sulfurdioxide slant column density window1 precision [DU]	0.326 ± 0.164	7853528	0.193	0.277	8.239×10^{-2}	26.9	0.207	0.400
sulfurdioxide slant column density corrected win1 [DU]	$(6.228 \pm 78.892) \times 10^{-2}$	7853528	0.785	3.171×10^{-2}	-16.0	42.2	-0.351	0.434
background so2 slant column offset window1 [DU]	-0.154 ± 0.204	7853528	0.213	-0.196	-1.43	3.43	-0.286	-7.333×10^{-2}
sulfurdioxide slant column density window2 [DU]	2.33 ± 9.58	7853528	12.2	1.94	-60.9	1.270×10^{3}	-3.96	8.19
sulfurdioxide slant column density window2 precision [DU]	8.37 ± 2.27	7853528	2.78	8.02	2.23	619	6.82	9.59
sulfurdioxide slant column density corrected win2 [DU]	0.279 ± 9.004	7853528	11.4	0.298	-67.8	1.271×10^{3}	-5.42	5.99
background so2 slant column offset window2 [DU]	-2.05 ± 3.47	7853528	5.70	-0.749	-23.3	5.18	-4.86	0.838
sulfurdioxide slant column density window3 [DU]	-7.03 ± 24.50	7853528	31.1	-6.79	-193	173	-22.4	8.70
sulfurdioxide slant column density window3 precision [DU]	28.3 ± 12.5	7853528	9.45	25.1	9.82	223	21.4	30.8
sulfurdioxide slant column density corrected win3 [DU]	0.556 ± 23.732	7853528	29.9	0.748	-188	182	-14.3	15.7
background so2 slant column offset window3 [DU]	7.59 ± 6.80	7853528	11.7	7.54	-20.4	62.9	1.63	13.3
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.23	7853528	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(5.948 \pm 14.666) \times 10^{-2}$	7853528	3.720×10^{-2}	2.156×10^{-2}	4.092×10^{-4}	2.71	1.189×10^{-2}	4.909×10^{-2}
fitted radiance shift [nm]	$(-2.291 \pm 24.214) \times 10^{-4}$	7853528	1.662×10^{-3}	-2.126×10^{-4}	-3.962×10^{-2}	3.362×10^{-2}	-1.078×10^{-3}	5.835×10^{-4}
fitted radiance squeeze [1]	$(-2.244 \pm 20.372) \times 10^{-5}$	7853528	2.162×10^{-4}	-1.349×10^{-5}	-1.385×10^{-2}	2.484×10^{-2}	-1.242×10^{-4}	9.203×10^{-5}
fitted root mean square [1]	$(1.423 \pm 0.706) \times 10^{-3}$	7853528	7.730×10^{-4}	1.193×10^{-3}	3.490×10^{-4}	8.038×10^{-2}	9.436×10^{-4}	1.717×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.654 ± 0.414	7853528	0.555	0.589	5.000×10^{-2}	2.72	0.340	0.895
sulfurdioxide total air mass factor polluted precision [1]	$(9.055 \pm 12.776) \times 10^{-2}$	7853528	8.218×10^{-2}	4.577×10^{-2}	2.500×10^{-3}	2.14	2.402×10^{-2}	0.106
sulfurdioxide clear air mass factor polluted [1]	0.585 ± 0.294	7853528	0.458	0.540	2.643×10^{-2}	2.34	0.347	0.805
number of spectral points in retrieval [1]	73.5 ± 0.5	7853528	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]	0.614 ± 0.415	9468309	0.810	1.000	0.0	1.000	0.190	1.000
sulfurdioxide total vertical column [DU]	$(1.698 \pm 70.440) \times 10^{-2}$	9468309	0.369	8.120×10^{-3}	-74.3	263	-0.175	0.194
sulfurdioxide total vertical column precision [DU]	0.391 ± 0.512	9468309	0.240	0.266	3.661×10^{-2}	33.4	0.187	0.427
sulfurdioxide slant column density corrected [DU]	$(1.231 \pm 33.892) \times 10^{-2}$	9468309	0.326	7.662×10^{-3}	-26.8	388	-0.154	0.172
sulfurdioxide slant column density cobra [DU]	$(1.224 \pm 29.819) \times 10^{-2}$	9468309	0.326	7.662×10^{-3}	-26.8	32.8	-0.154	0.172
sulfurdioxide slant column density cobra precision [DU]	0.258 ± 0.104	9468309	0.109	0.227	7.382×10^{-2}	24.1	0.191	0.300
sulfurdioxide slant column density window1 [DU]	0.145 ± 0.588	9468309	0.678	0.162	-36.2	64.5	-0.185	0.493
sulfurdioxide slant column density window1 precision [DU]	0.258 ± 0.104	9468309	0.109	0.227	7.382×10^{-2}	24.1	0.191	0.300
sulfurdioxide slant column density corrected win1 [DU]	$(3.245 \pm 567.966) \times 10^{-3}$	9468309	0.651	-5.573×10^{-3}	-36.2	64.5	-0.329	0.322
background so2 slant column offset window1 [DU]	-0.142 ± 0.176	9468309	0.229	-0.172	-1.03	2.25	-0.274	-4.460×10^{-2}
sulfurdioxide slant column density window2 [DU]	0.800 ± 8.405	9468309	10.7	0.717	-1.808×10^{3}	1.085×10^{3}	-4.57	6.09
sulfurdioxide slant column density window2 precision [DU]	7.67 ± 2.08	9468309	2.28	7.38	2.01	497	6.36	8.63
sulfurdioxide slant column density corrected win2 [DU]	0.568 ± 8.240	9468309	10.4	0.577	-1.811×10^{3}	1.086×10^{3}	-4.64	5.79
background so2 slant column offset window2 [DU]	-0.232 ± 1.802	9468309	2.23	0.311	-9.81	5.49	-1.22	1.01
sulfurdioxide slant column density window3 [DU]	-1.48 ± 23.35	9468309	29.6	-1.99	-359	1.181×10^{3}	-16.4	13.1
sulfurdioxide slant column density window3 precision [DU]	27.1 ± 13.1	9468309	9.10	23.5	9.43	1.076×10^{3}	20.0	29.1
sulfurdioxide slant column density corrected win3 [DU]	1.20 ± 22.47	9468309	28.4	0.998	-357	1.181×10^{3}	-13.0	15.4
background so2 slant column offset window3 [DU]	2.67 ± 6.88	9468309	11.3	1.67	-23.6	23.8	-2.97	8.29
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.20	9468309	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.099 \pm 2.678) \times 10^{-2}$	9468309	1.599×10^{-2}	1.526×10^{-2}	8.228×10^{-4}	1.98	9.359×10^{-3}	2.534×10^{-2}
fitted radiance shift [nm]	$(-4.764 \pm 26.003) \times 10^{-4}$	9468309	1.921×10^{-3}	-4.771×10^{-4}	-4.161×10^{-2}	5.552×10^{-2}	-1.490×10^{-3}	4.312×10^{-4}
fitted radiance squeeze [1]	$(-4.597 \pm 15.928) \times 10^{-5}$	9468309	1.901×10^{-4}	-3.781×10^{-5}	-1.538×10^{-2}	1.634×10^{-2}	-1.364×10^{-4}	5.373×10^{-5}
fitted root mean square [1]	$(1.142 \pm 0.417) \times 10^{-3}$	9468309	4.478×10^{-4}	1.031×10^{-3}	3.291×10^{-4}	4.472×10^{-2}	8.715×10^{-4}	1.319×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.954 ± 0.484	9468309	0.591	0.864	5.000×10^{-2}	2.91	0.616	1.21
sulfurdioxide total air mass factor polluted precision [1]	0.139 ± 0.120	9468309	0.157	0.102	5.166×10^{-3}	1.30	4.470×10^{-2}	0.201
sulfurdioxide clear air mass factor polluted [1]	0.819 ± 0.420	9468309	0.365	0.731	0.143	2.94	0.564	0.929
number of spectral points in retrieval [1]	73.4 ± 0.5	9468309	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]	0.675 ± 0.404	12546044	0.760	1.000	0.0	1.000	0.240	1.000
sulfurdioxide total vertical column [DU]	$(3.596 \pm 133.387) \times 10^{-2}$	12546044	0.427	9.408×10^{-3}	-132	233	-0.201	0.225
sulfurdioxide total vertical column precision [DU]	0.557 ± 0.950	12546044	0.322	0.298	4.575×10^{-2}	98.8	0.206	0.528
sulfurdioxide slant column density corrected [DU]	$(1.569 \pm 33.118) \times 10^{-2}$	12546044	0.337	8.037×10^{-3}	-20.3	42.2	-0.159	0.178
sulfurdioxide slant column density cobra [DU]	$(1.565 \pm 32.934) \times 10^{-2}$	12546044	0.337	8.037×10^{-3}	-20.3	42.2	-0.159	0.178
sulfurdioxide slant column density cobra precision [DU]	0.273 ± 0.127	12546044	0.127	0.230	7.382×10^{-2}	26.9	0.193	0.319
sulfurdioxide slant column density window1 [DU]	0.173 ± 0.647	12546044	0.699	0.186	-36.2	64.5	-0.170	0.530
sulfurdioxide slant column density window1 precision [DU]	0.273 ± 0.127	12546044	0.127	0.230	7.382×10^{-2}	26.9	0.193	0.319
sulfurdioxide slant column density corrected win1 [DU]	$(1.640 \pm 63.284) \times 10^{-2}$	12546044	0.677	2.107×10^{-3}	-36.2	64.5	-0.333	0.344
background so2 slant column offset window1 [DU]	-0.156 ± 0.175	12546044	0.214	-0.184	-1.43	3.35	-0.281	-6.744×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.08 ± 8.69	12546044	11.0	0.869	-1.808×10^{3}	1.270×10^{3}	-4.53	6.42
sulfurdioxide slant column density window2 precision [DU]	7.81 ± 2.09	12546044	2.39	7.49	2.01	619	6.44	8.82
sulfurdioxide slant column density corrected win2 [DU]	0.449 ± 8.391	12546044	10.6	0.456	-1.811×10^{3}	1.271×10^{3}	-4.87	5.78
background so2 slant column offset window2 [DU]	-0.627 ± 2.424	12546044	2.58	0.182	-23.3	5.49	-1.60	0.981
sulfurdioxide slant column density window3 [DU]	-1.24 ± 23.73	12546044	30.1	-1.50	-293	306	-16.3	13.8
sulfurdioxide slant column density window3 precision [DU]	27.0 ± 12.2	12546044	8.91	23.8	9.43	255	20.4	29.3
sulfurdioxide slant column density corrected win3 [DU]	2.87 ± 22.56	12546044	28.7	2.62	-296	303	-11.5	17.2
background so2 slant column offset window3 [DU]	4.11 ± 6.81	12546044	10.5	3.51	-23.6	62.9	-1.11	9.35
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.17	12546044	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.589 \pm 5.374) \times 10^{-2}$	12546044	1.633×10^{-2}	1.669×10^{-2}	4.998×10^{-4}	2.68	1.048×10^{-2}	2.682×10^{-2}
fitted radiance shift [nm]	$(-3.393 \pm 23.909) \times 10^{-4}$	12546044	1.802×10^{-3}	-3.032×10^{-4}	-4.161×10^{-2}	5.552×10^{-2}	-1.269×10^{-3}	5.323×10^{-4}
fitted radiance squeeze [1]	$(-3.807 \pm 17.101) \times 10^{-5}$	12546044	1.932×10^{-4}	-2.884×10^{-5}	-1.538×10^{-2}	2.484×10^{-2}	-1.287×10^{-4}	6.453×10^{-5}
fitted root mean square [1]	$(1.207 \pm 0.538) \times 10^{-3}$	12546044	4.903×10^{-4}	1.041×10^{-3}	3.434×10^{-4}	8.038×10^{-2}	8.810×10^{-4}	1.371×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.832 ± 0.422	12546044	0.521	0.789	5.000×10^{-2}	2.60	0.534	1.05
sulfurdioxide total air mass factor polluted precision [1]	0.114 ± 0.108	12546044	0.122	6.933×10^{-2}	2.650×10^{-3}	1.77	3.884×10^{-2}	0.161
sulfurdioxide clear air mass factor polluted [1]	0.714 ± 0.279	12546044	0.369	0.697	2.940×10^{-2}	2.63	0.515	0.884
number of spectral points in retrieval [1]	73.5 ± 0.5	12546044	1.000	73.0	53.0	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]	0.577 ± 0.421	3773760	0.860	0.490	0.0	1.000	0.140	1.000
sulfurdioxide total vertical column [DU]	$(8.400 \pm 243.094) \times 10^{-2}$	3773760	0.563	1.453×10^{-2}	-188	263	-0.255	0.308
sulfurdioxide total vertical column precision [DU]	0.989 ± 1.773	3773760	0.740	0.415	3.661×10^{-2}	55.1	0.220	0.960
sulfurdioxide slant column density corrected [DU]	$(2.621 \pm 43.523) \times 10^{-2}$	3773760	0.390	1.241×10^{-2}	-26.8	309	-0.180	0.211
sulfurdioxide slant column density cobra [DU]	$(2.603 \pm 39.992) \times 10^{-2}$	3773760	0.390	1.241×10^{-2}	-26.8	19.9	-0.180	0.211
sulfurdioxide slant column density cobra precision [DU]	0.318 ± 0.151	3773760	0.170	0.282	8.130×10^{-2}	24.1	0.212	0.382
sulfurdioxide slant column density window1 [DU]	0.192 ± 0.760	3773760	0.801	0.205	-18.9	33.8	-0.204	0.597
sulfurdioxide slant column density window1 precision [DU]	0.318 ± 0.151	3773760	0.170	0.282	8.130×10^{-2}	24.1	0.212	0.382
sulfurdioxide slant column density corrected win1 [DU]	$(5.654 \pm 74.391) \times 10^{-2}$	3773760	0.770	2.789×10^{-2}	-18.9	34.0	-0.348	0.422
background so2 slant column offset window1 [DU]	-0.135 ± 0.213	3773760	0.233	-0.182	-1.43	2.96	-0.280	-4.666×10^{-2}
sulfurdioxide slant column density window2 [DU]	2.21 ± 9.49	3773760	12.0	1.97	-1.354×10^{3}	611	-3.92	8.12
sulfurdioxide slant column density window2 precision [DU]	8.38 ± 2.40	3773760	2.76	8.05	2.18	357	6.83	9.59
sulfurdioxide slant column density corrected win2 [DU]	0.422 ± 9.053	3773760	11.4	0.475	-1.352×10^{3}	613	-5.22	6.13
background so2 slant column offset window2 [DU]	-1.79 ± 3.25	3773760	5.16	-0.601	-23.2	5.49	-4.26	0.894
sulfurdioxide slant column density window3 [DU]	-11.3 ± 23.4	3773760	29.2	-10.8	-359	1.181×10^{3}	-25.6	3.58
sulfurdioxide slant column density window3 precision [DU]	29.2 ± 14.5	3773760	10.4	25.5	9.87	1.076×10^{3}	21.2	31.5
sulfurdioxide slant column density corrected win3 [DU]	-4.88 ± 23.61	3773760	29.4	-4.33	-357	1.181×10^{3}	-19.3	10.1
background so2 slant column offset window3 [DU]	6.37 ± 7.94	3773760	13.7	6.77	-23.6	61.3	-0.365	13.3
sulfurdioxide slant column cobra flag [1]	1.96 ± 0.29	3773760	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(6.583 \pm 15.404) \times 10^{-2}$	3773760	4.420×10^{-2}	2.256×10^{-2}	4.092×10^{-4}	2.71	8.646×10^{-3}	5.285×10^{-2}
fitted radiance shift [nm]	$(-4.432 \pm 28.781) \times 10^{-4}$	3773760	1.790×10^{-3}	-4.885×10^{-4}	-3.858×10^{-2}	4.406×10^{-2}	-1.409×10^{-3}	3.805×10^{-4}
fitted radiance squeeze [1]	$(-2.721 \pm 19.859) \times 10^{-5}$	3773760	2.222×10^{-4}	-2.367×10^{-5}	-1.391×10^{-2}	1.090×10^{-2}	-1.367×10^{-4}	8.543×10^{-5}
fitted root mean square [1]	$(1.384 \pm 0.621) \times 10^{-3}$	3773760	6.655×10^{-4}	1.235×10^{-3}	3.291×10^{-4}	3.572×10^{-2}	9.725×10^{-4}	1.638×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.817 ± 0.621	3773760	0.783	0.630	5.000×10^{-2}	2.91	0.358	1.14
sulfurdioxide total air mass factor polluted precision [1]	0.127 ± 0.165	3773760	0.151	5.469×10^{-2}	2.500×10^{-3}	2.14	2.362×10^{-2}	0.175
sulfurdioxide clear air mass factor polluted [1]	0.755 ± 0.618	3773760	0.535	0.578	2.643×10^{-2}	2.94	0.356	0.891
number of spectral points in retrieval [1]	73.4 ± 0.5	3773760	1.000	73.0	52.0	74.0	73.0	74.0

3 Granule outlines

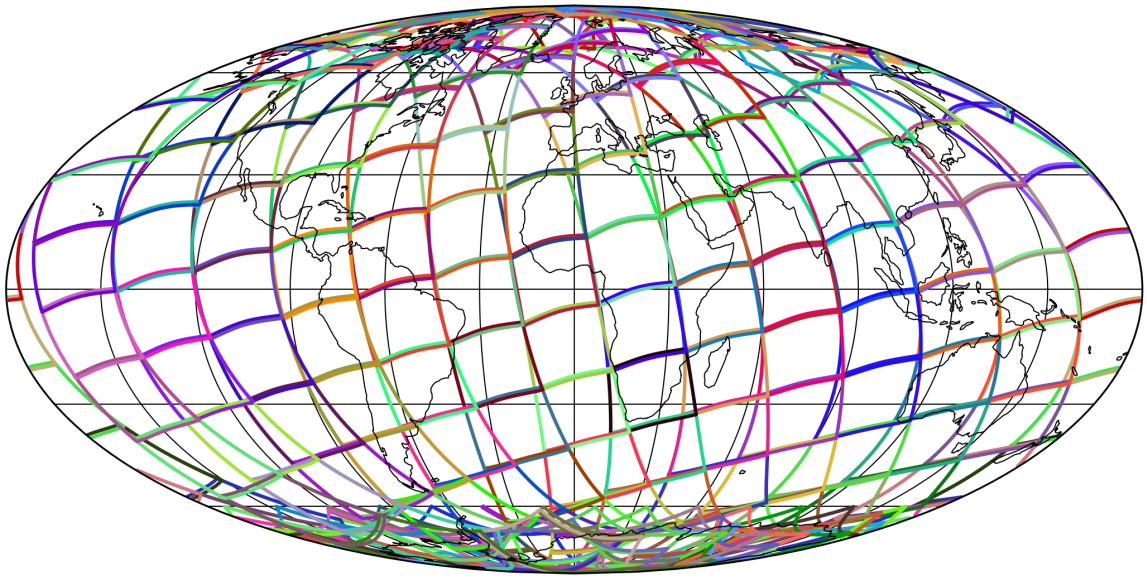

Figure 1: Outline of the granules.

4 Input data monitoring

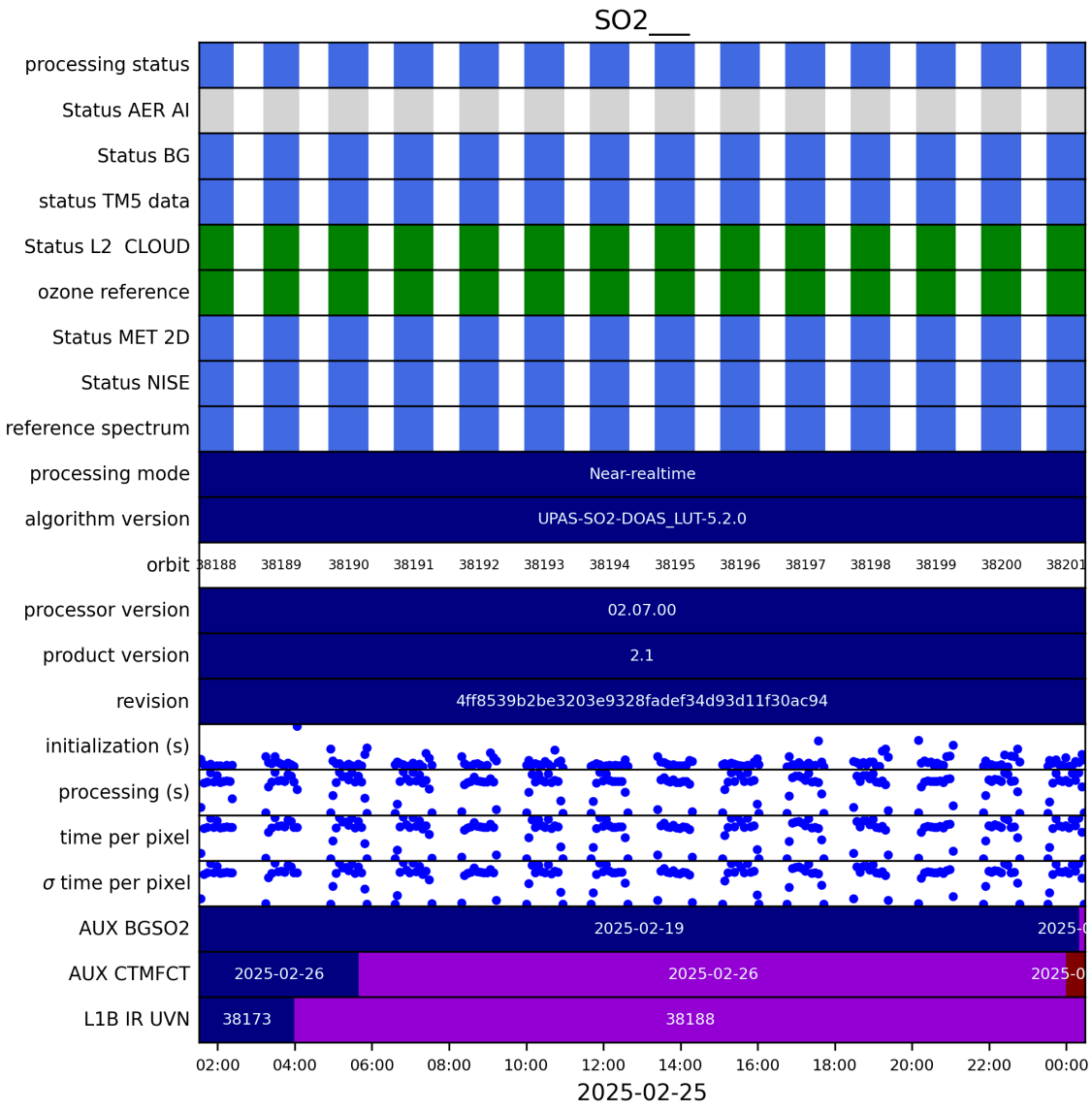

Figure 2: Input data per granule

5 Warnings and errors

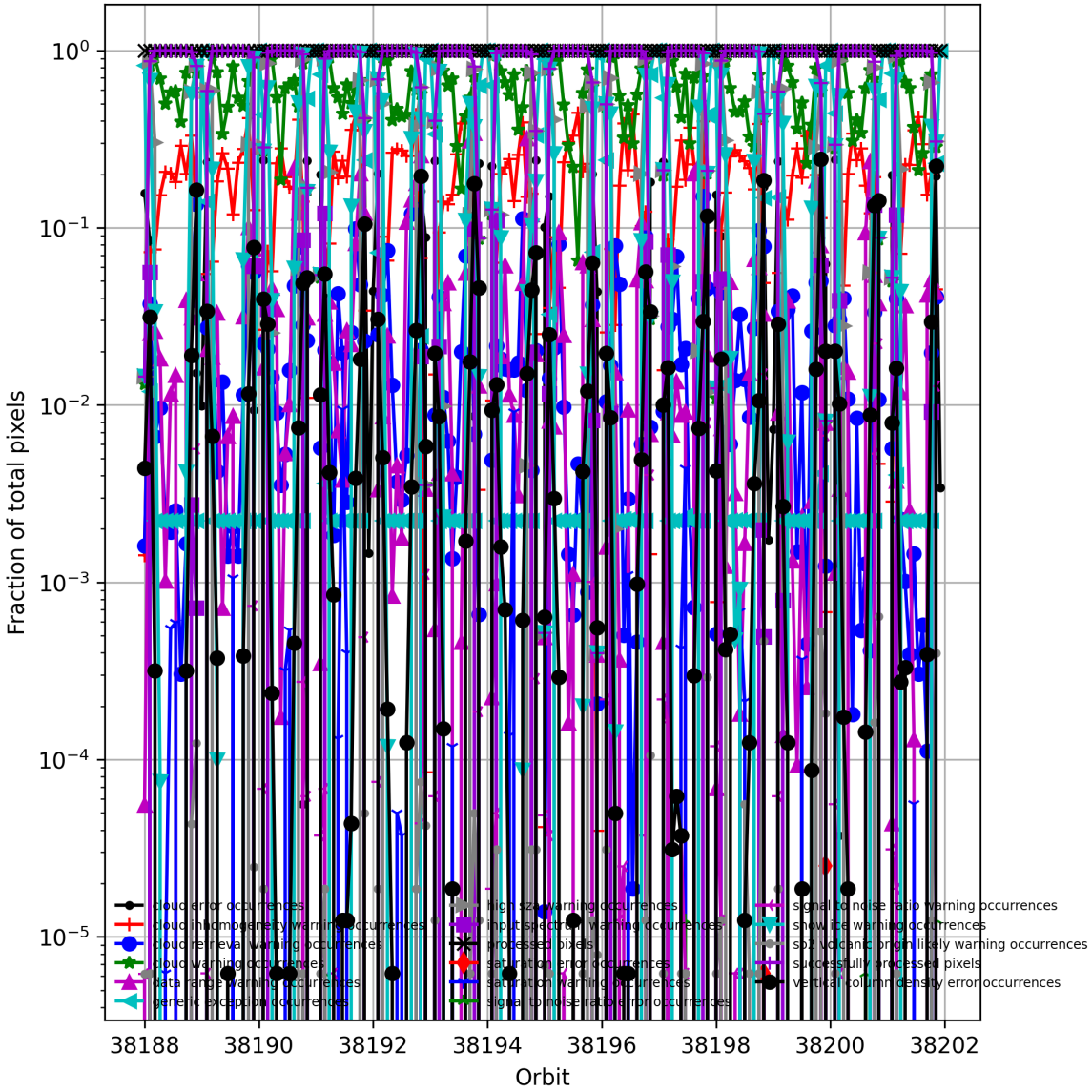

Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

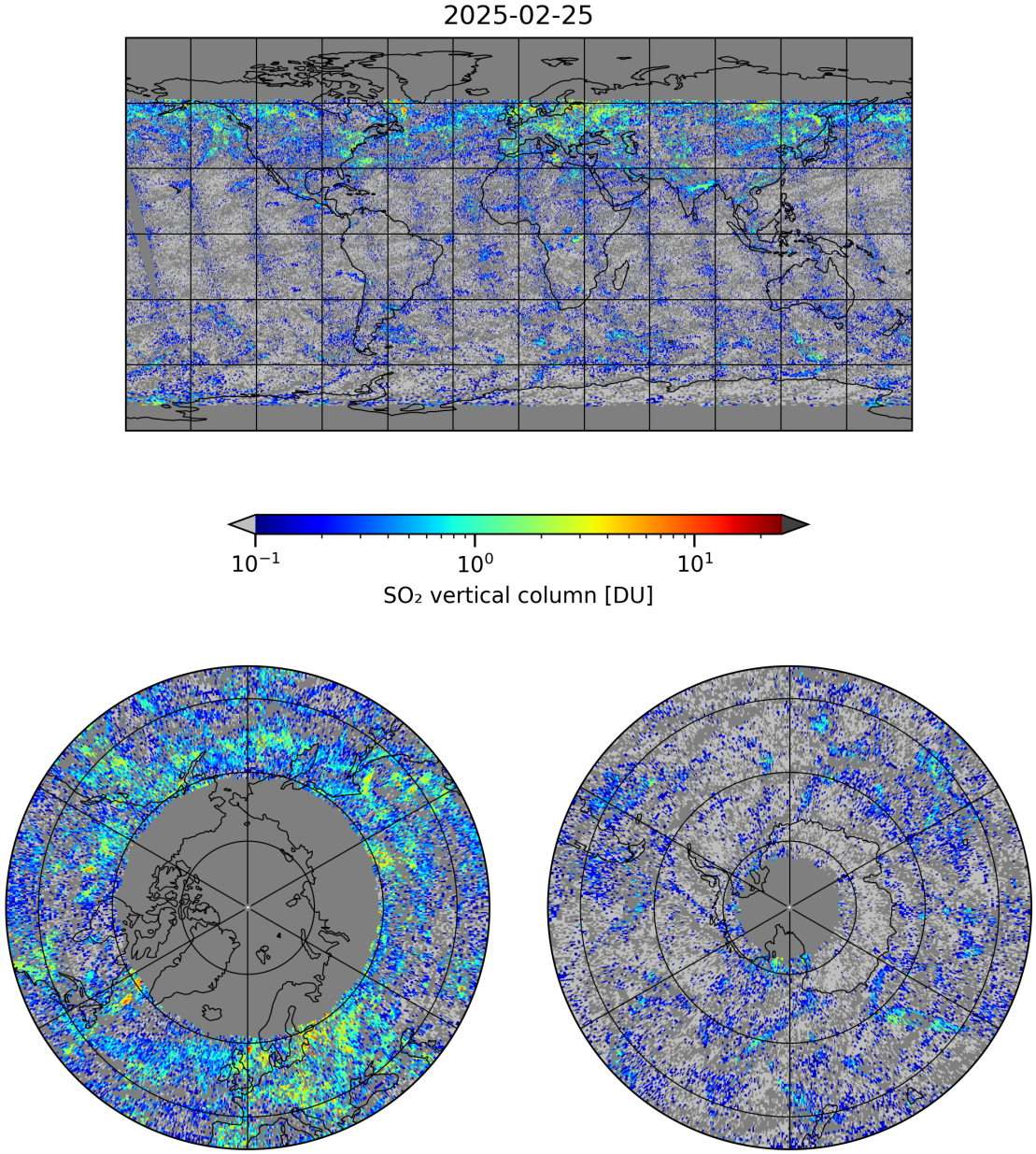

Figure 4: Map of "SO_2 vertical column" for 2025-02-25 to 2025-02-26

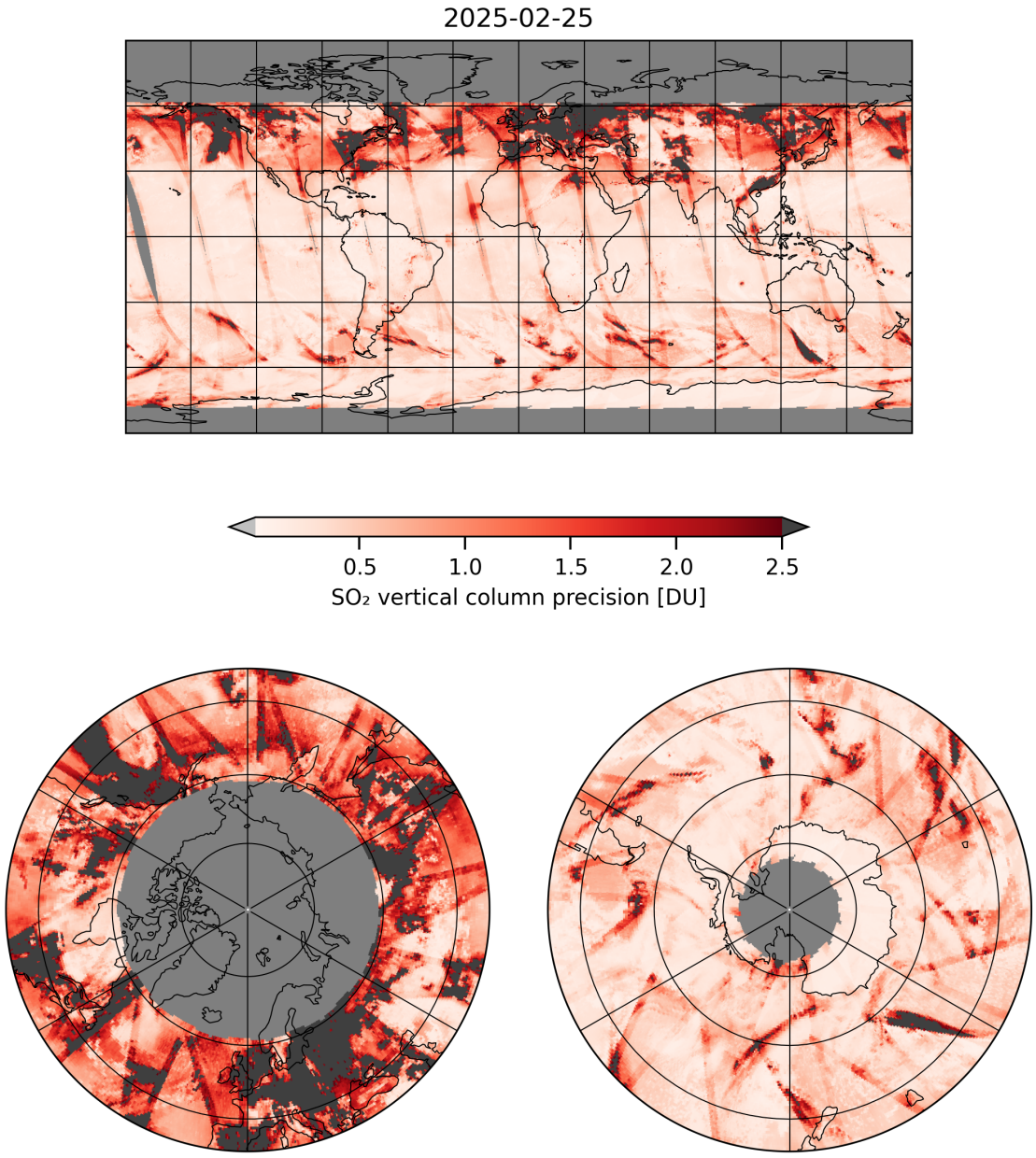

Figure 5: Map of "SO_2 vertical column precision" for 2025-02-25 to 2025-02-26

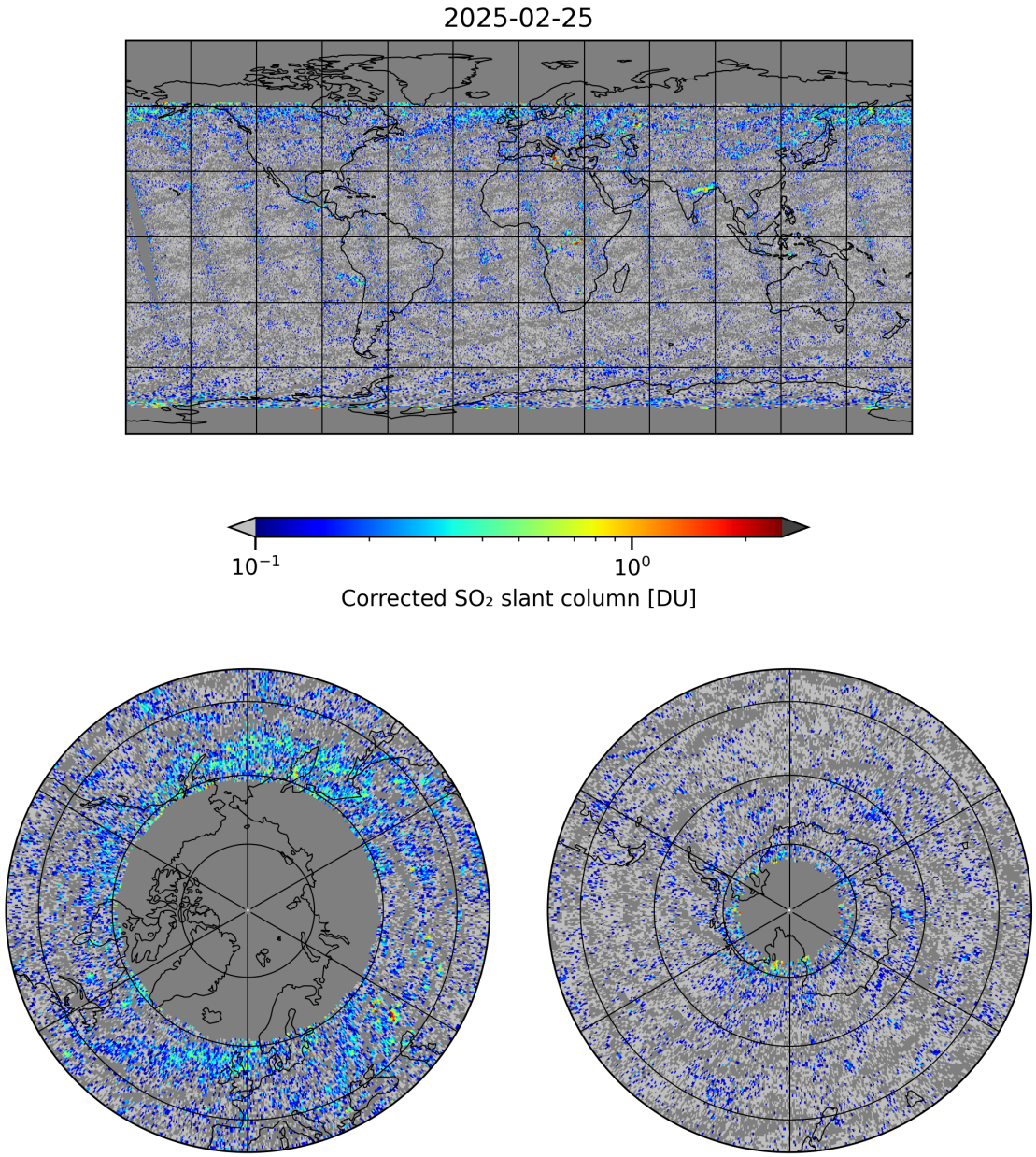

Figure 6: Map of “Corrected SO_2 slant column” for 2025-02-25 to 2025-02-26

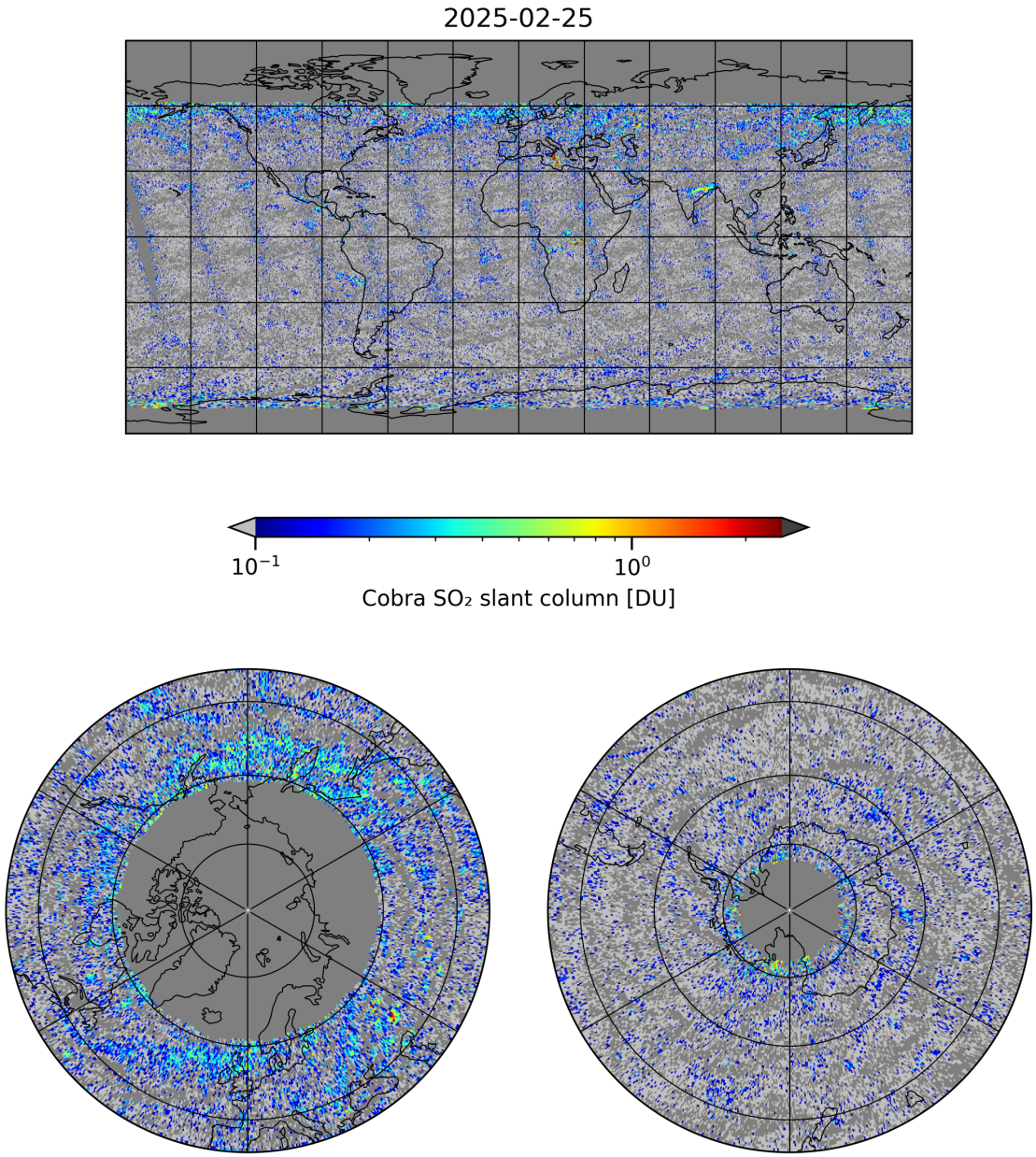

Figure 7: Map of "Cobra SO_2 slant column" for 2025-02-25 to 2025-02-26

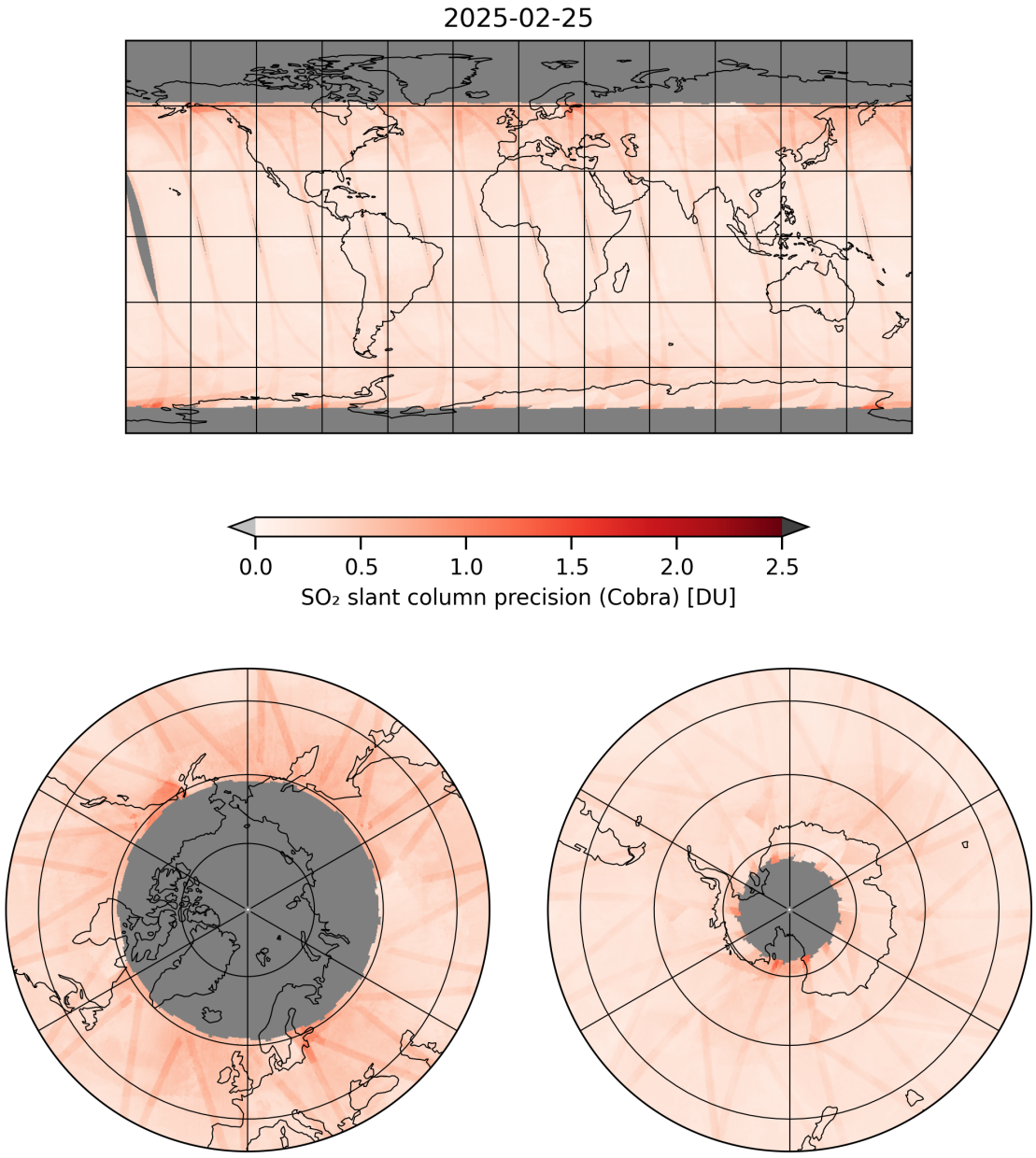

Figure 8: Map of "SO_2 slant column precision (Cobra)" for 2025-02-25 to 2025-02-26

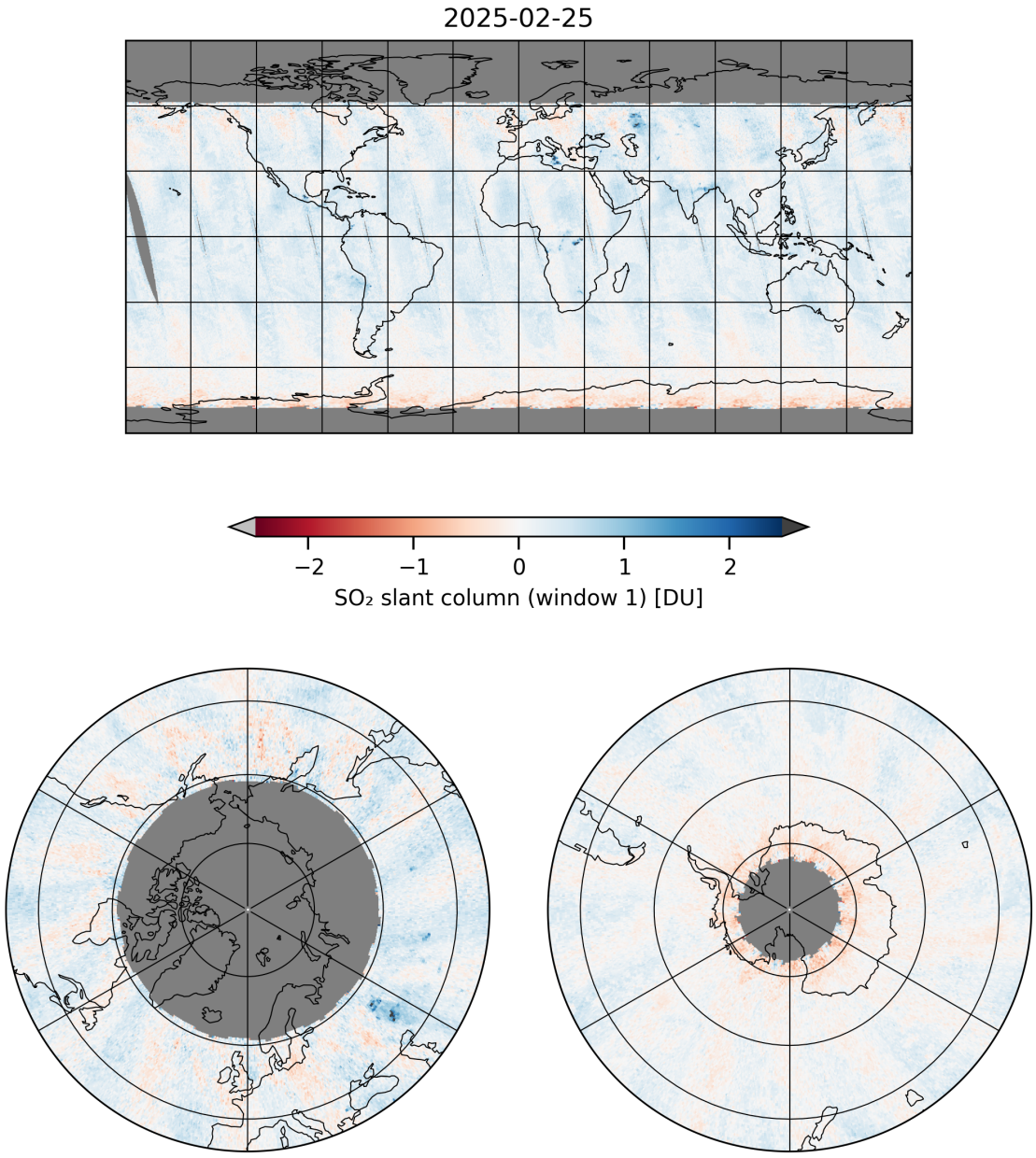

Figure 9: Map of "SO_2 slant column (window 1)" for 2025-02-25 to 2025-02-26

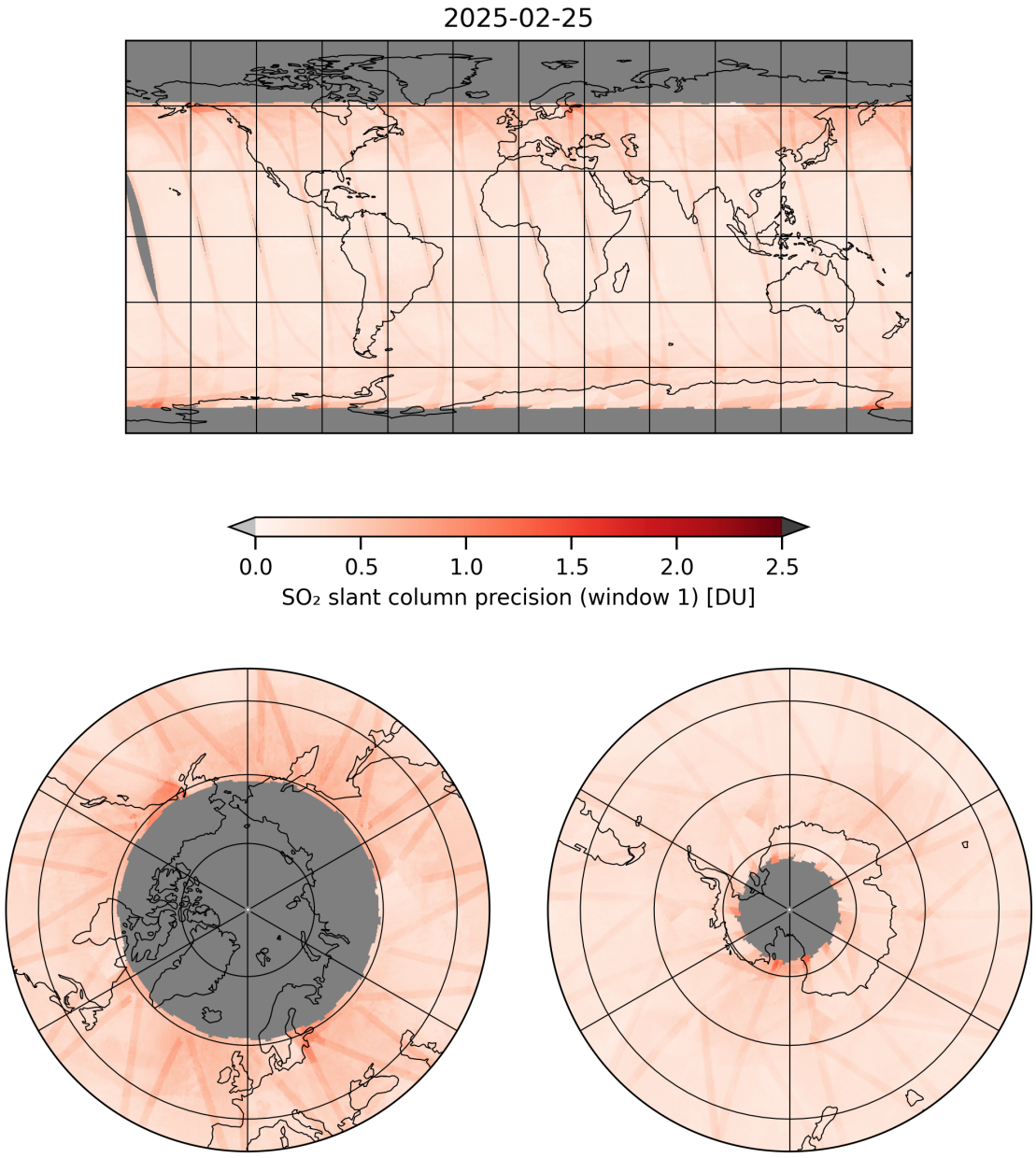

Figure 10: Map of "SO_2 slant column precision (window 1)" for 2025-02-25 to 2025-02-26

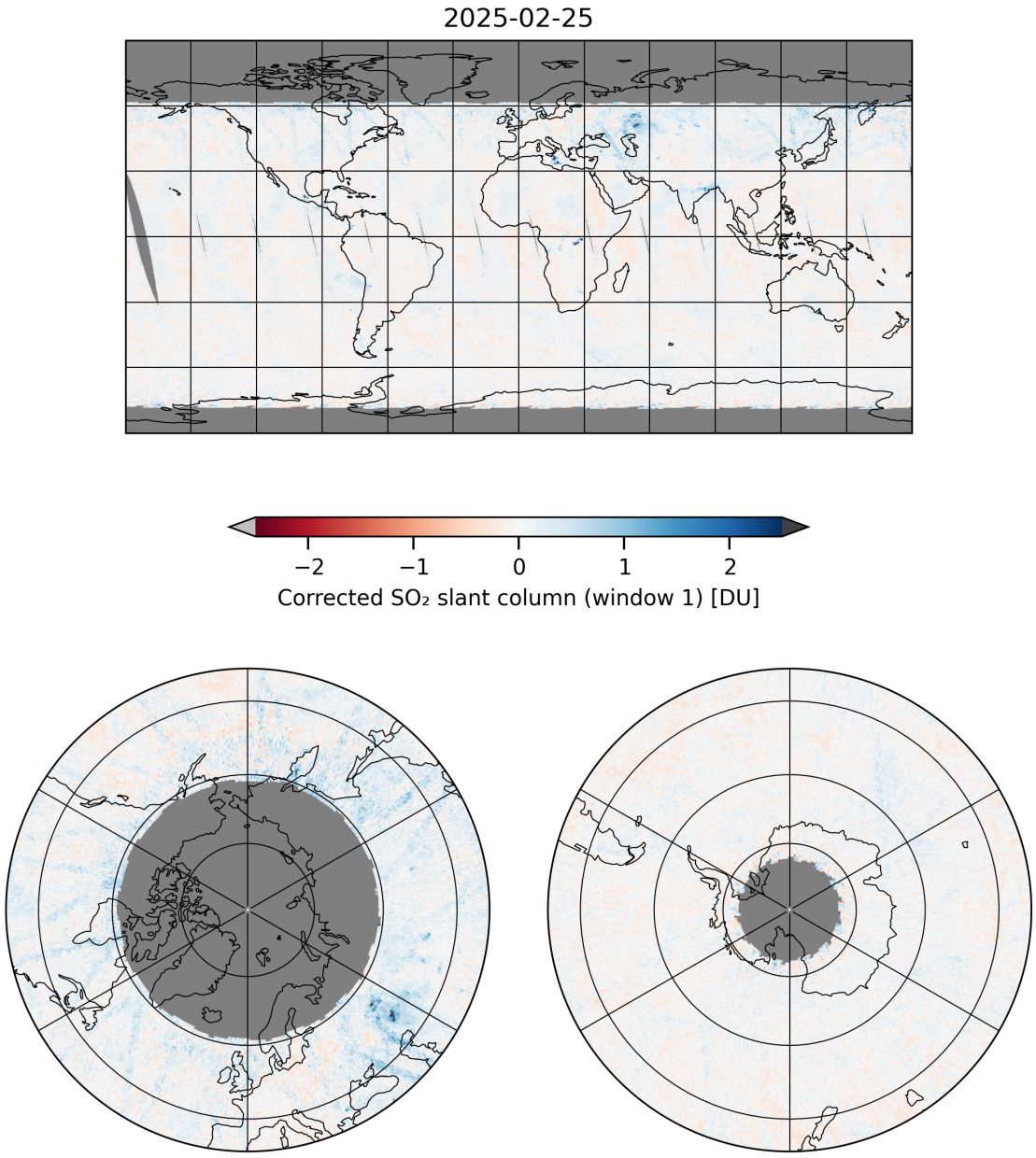

Figure 11: Map of "Corrected SO_2 slant column (window 1)" for 2025-02-25 to 2025-02-26

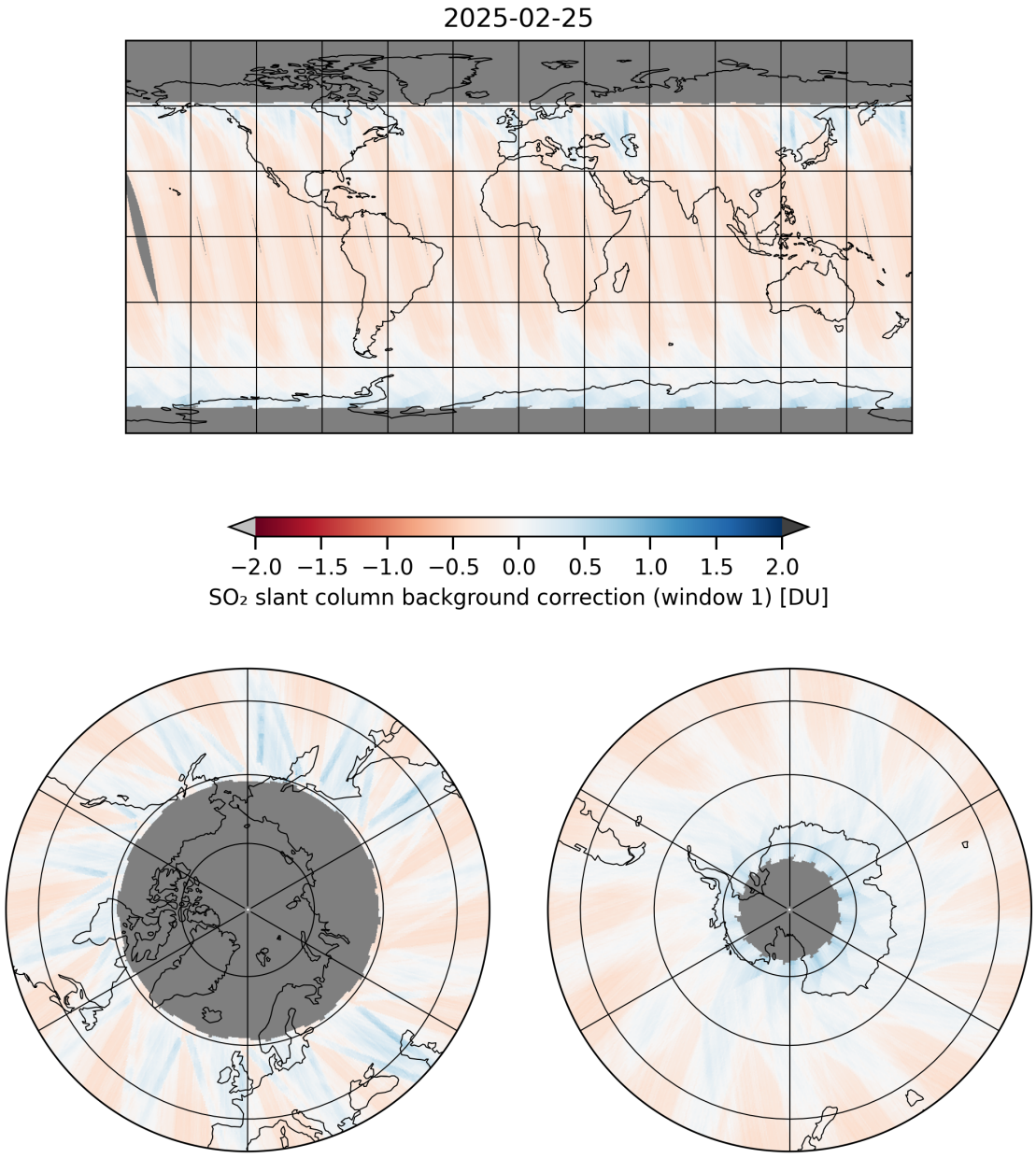

Figure 12: Map of "SO_2 slant column background correction (window 1)" for 2025-02-25 to 2025-02-26

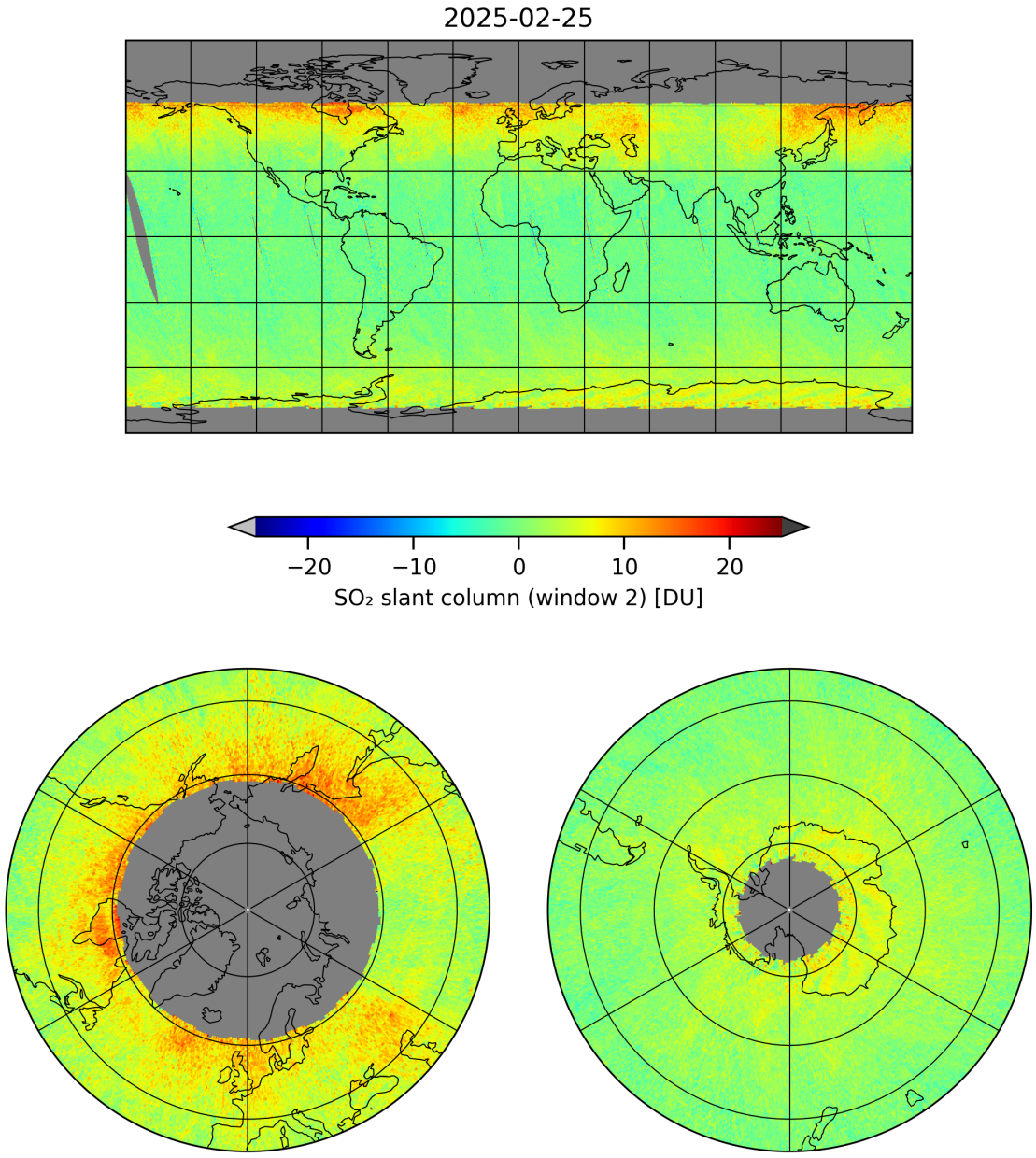

Figure 13: Map of "SO_2 slant column (window 2)" for 2025-02-25 to 2025-02-26

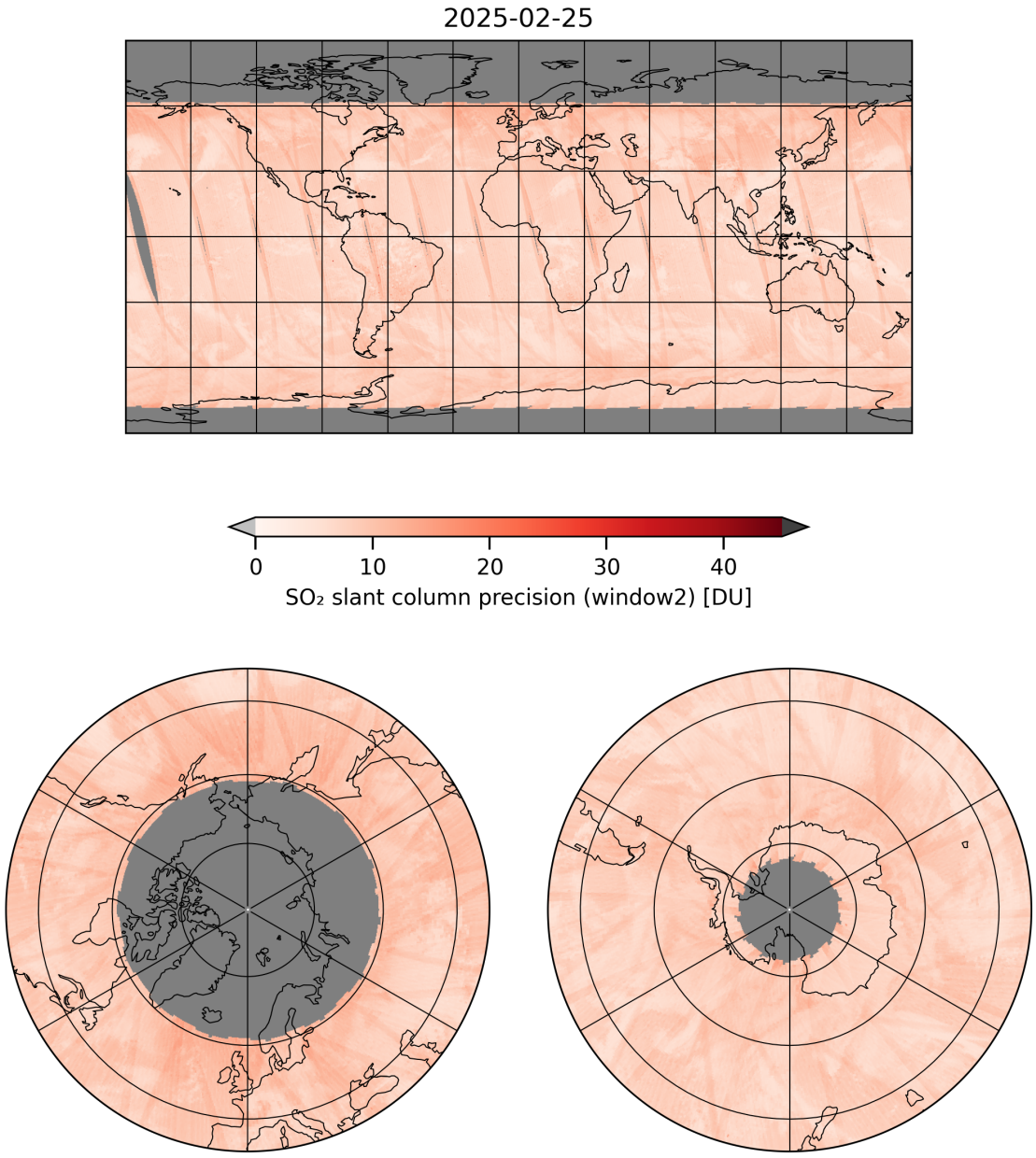

Figure 14: Map of "SO_2 slant column precision (window2)" for 2025-02-25 to 2025-02-26

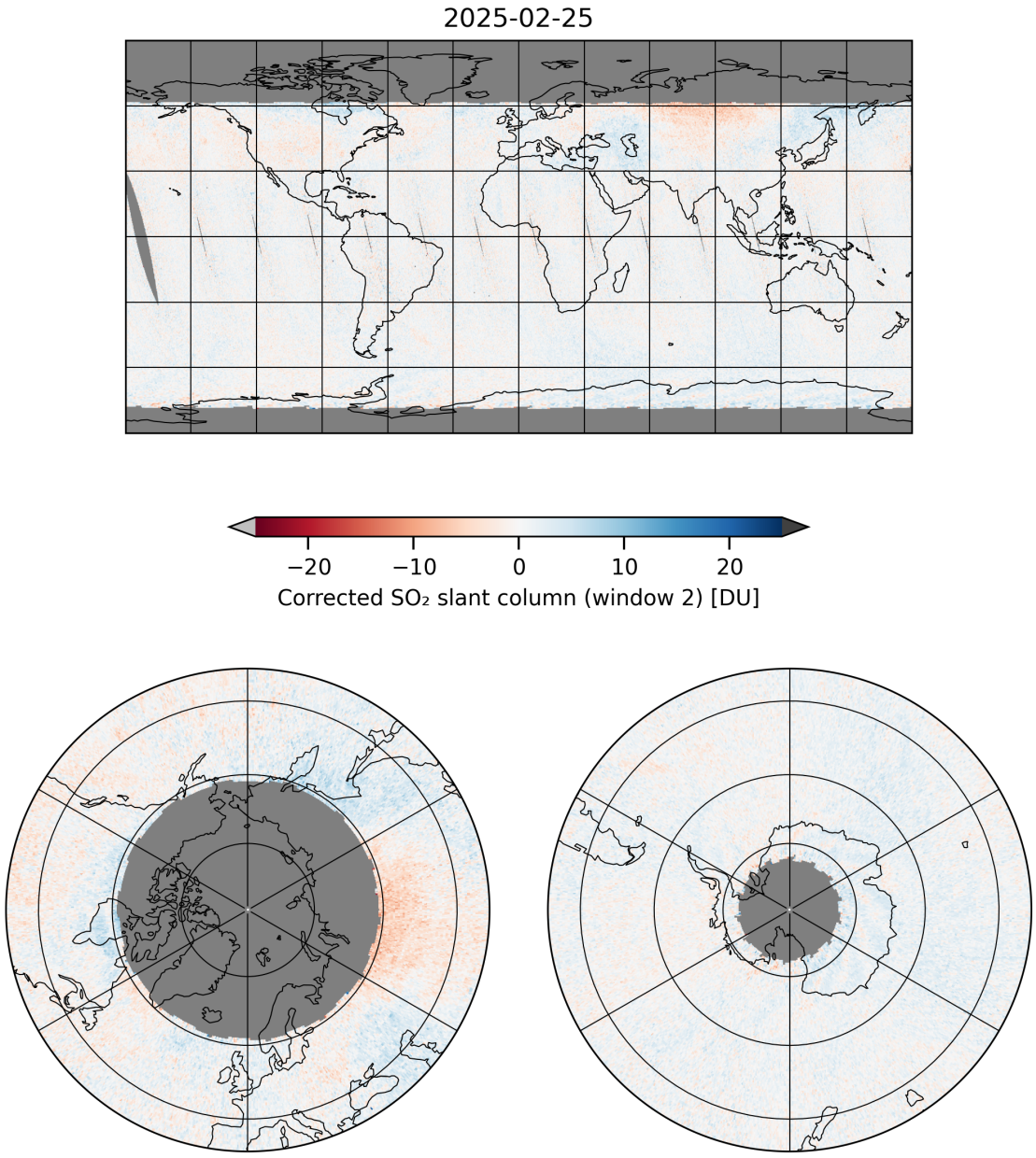

Figure 15: Map of "Corrected SO_2 slant column (window 2)" for 2025-02-25 to 2025-02-26

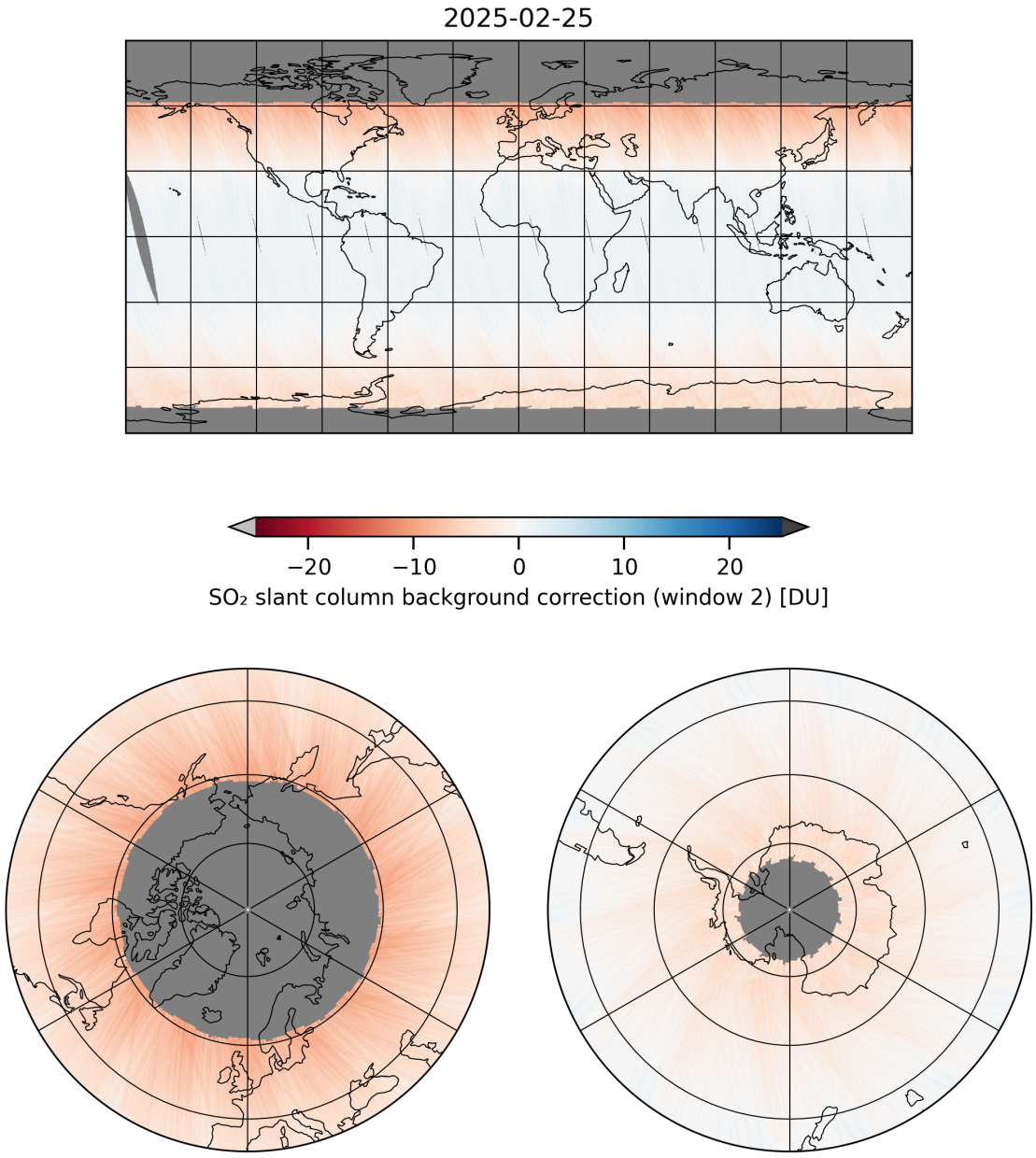

Figure 16: Map of "SO_2 slant column background correction (window 2)" for 2025-02-25 to 2025-02-26

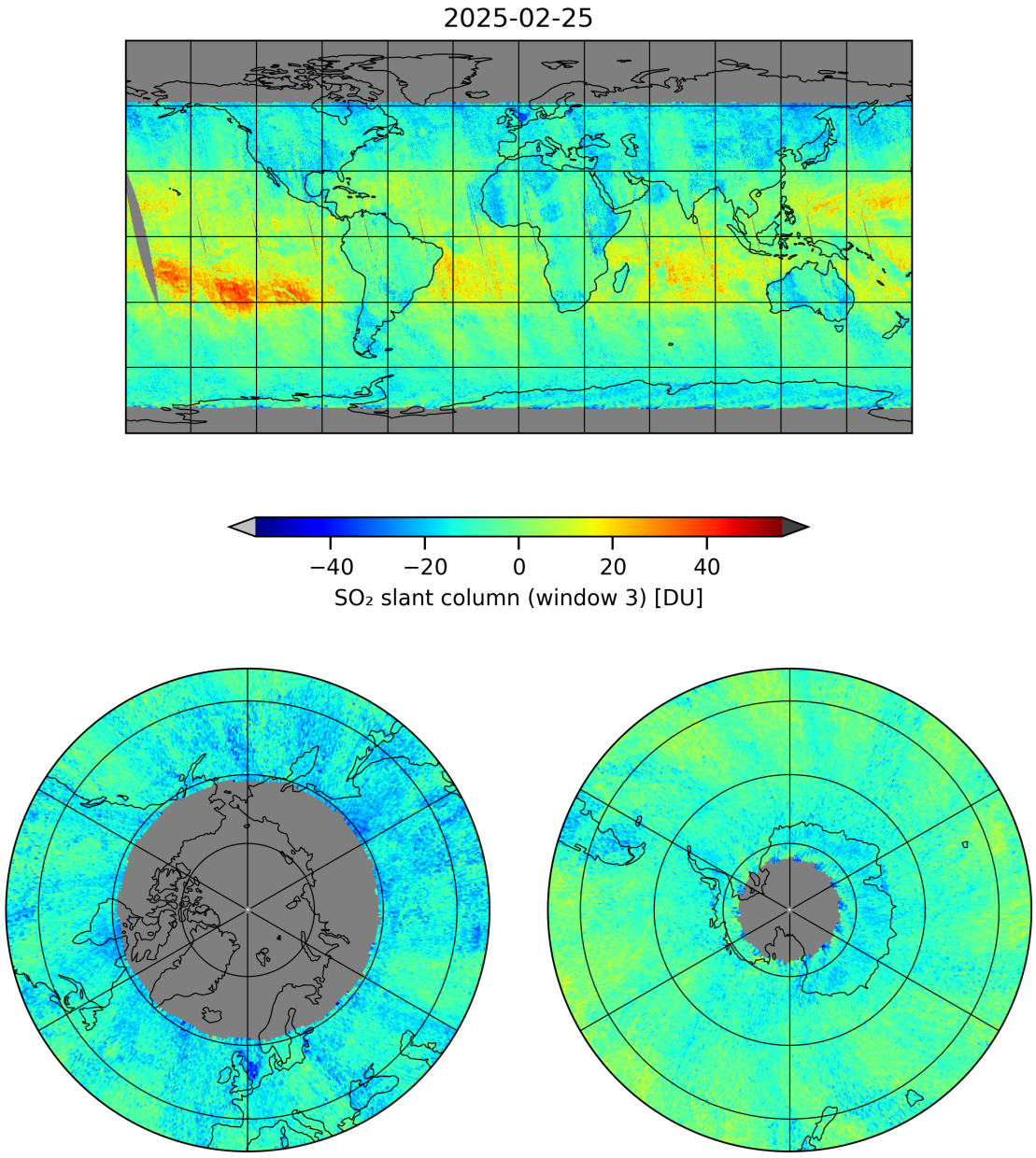

Figure 17: Map of "SO_2 slant column (window 3)" for 2025-02-25 to 2025-02-26

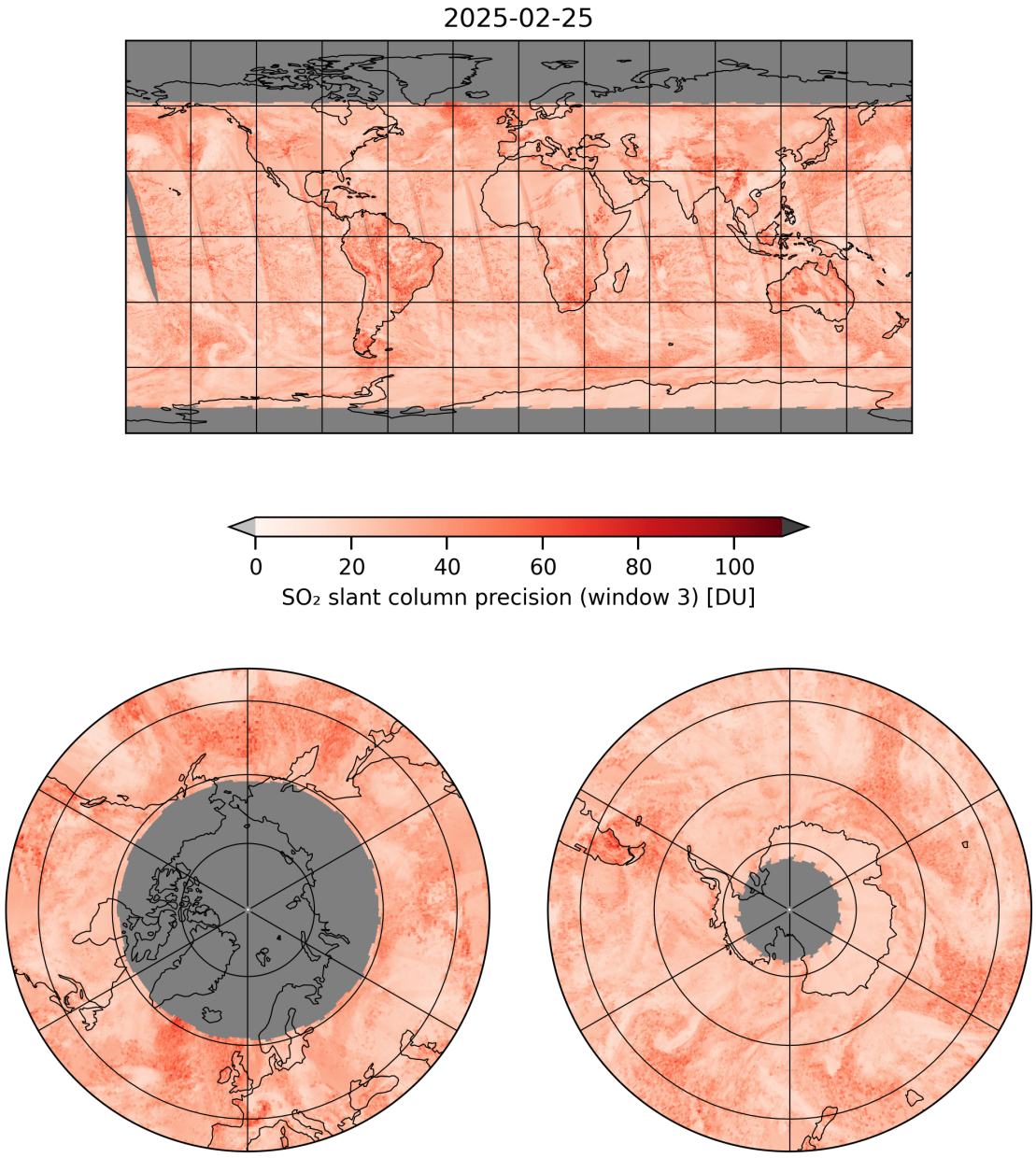

Figure 18: Map of "SO_2 slant column precision (window 3)" for 2025-02-25 to 2025-02-26

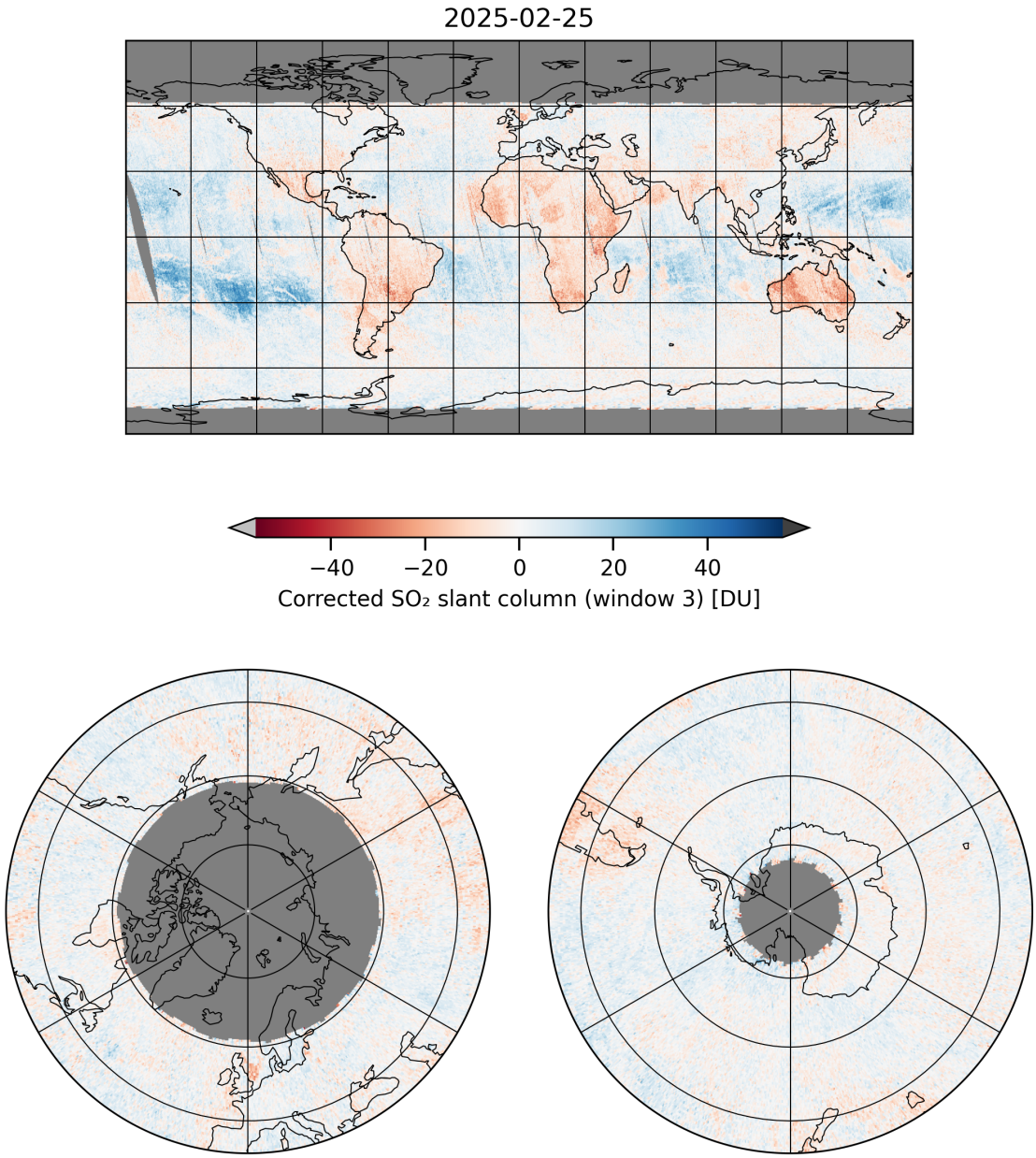

Figure 19: Map of "Corrected SO_2 slant column (window 3)" for 2025-02-25 to 2025-02-26

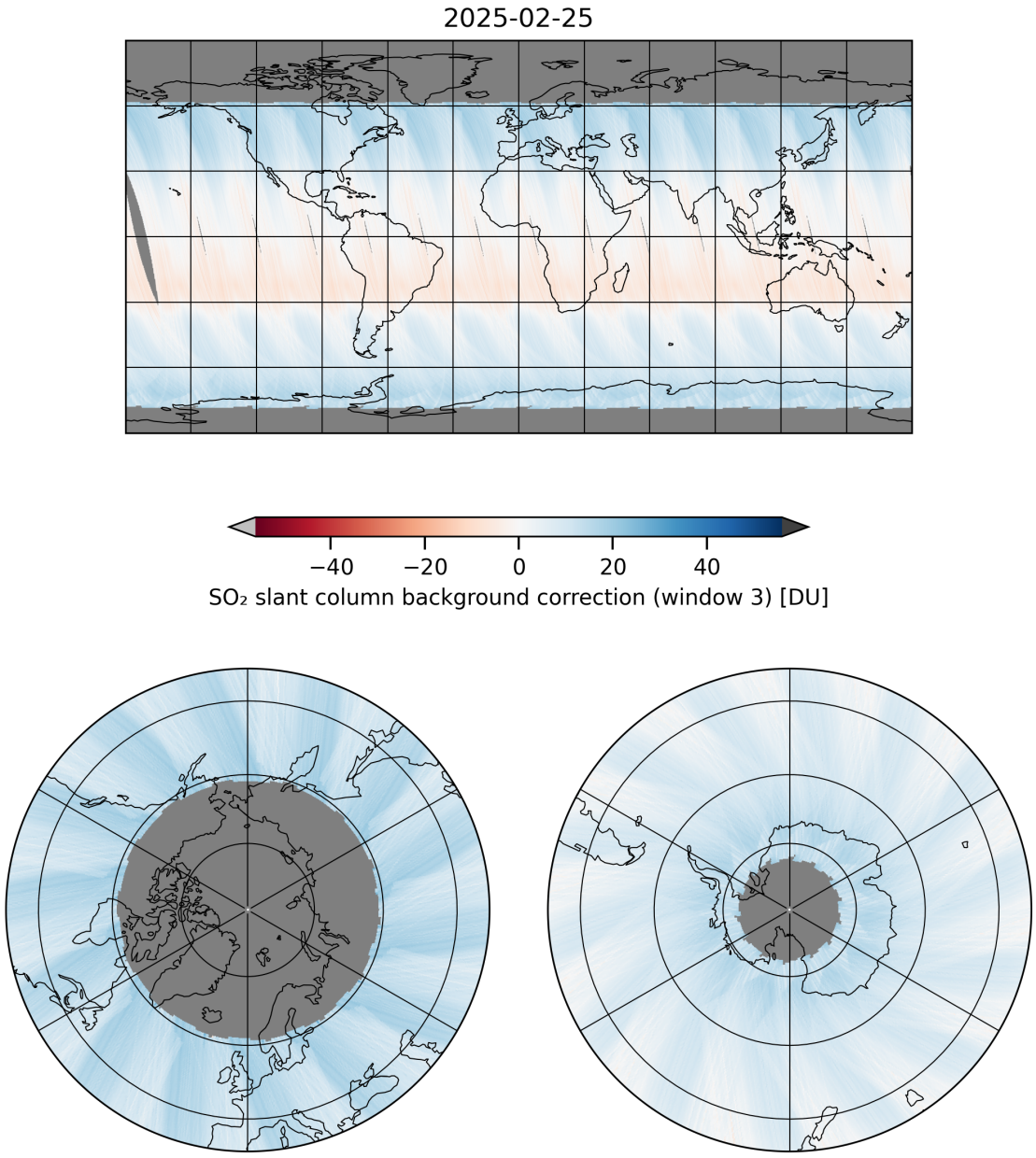

Figure 20: Map of "SO_2 slant column background correction (window 3)" for 2025-02-25 to 2025-02-26

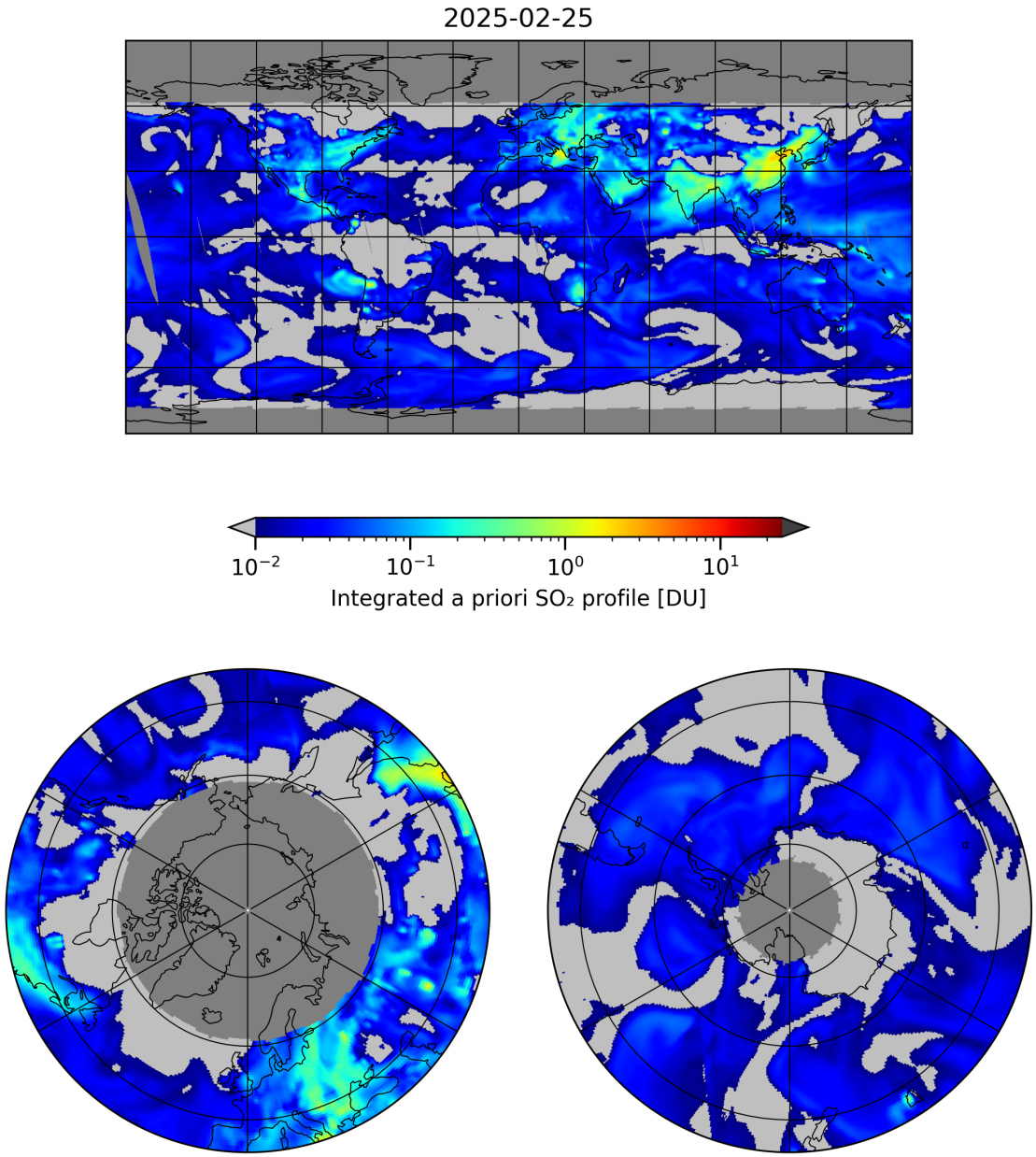

Figure 21: Map of “Integrated a priori SO_2 profile” for 2025-02-25 to 2025-02-26

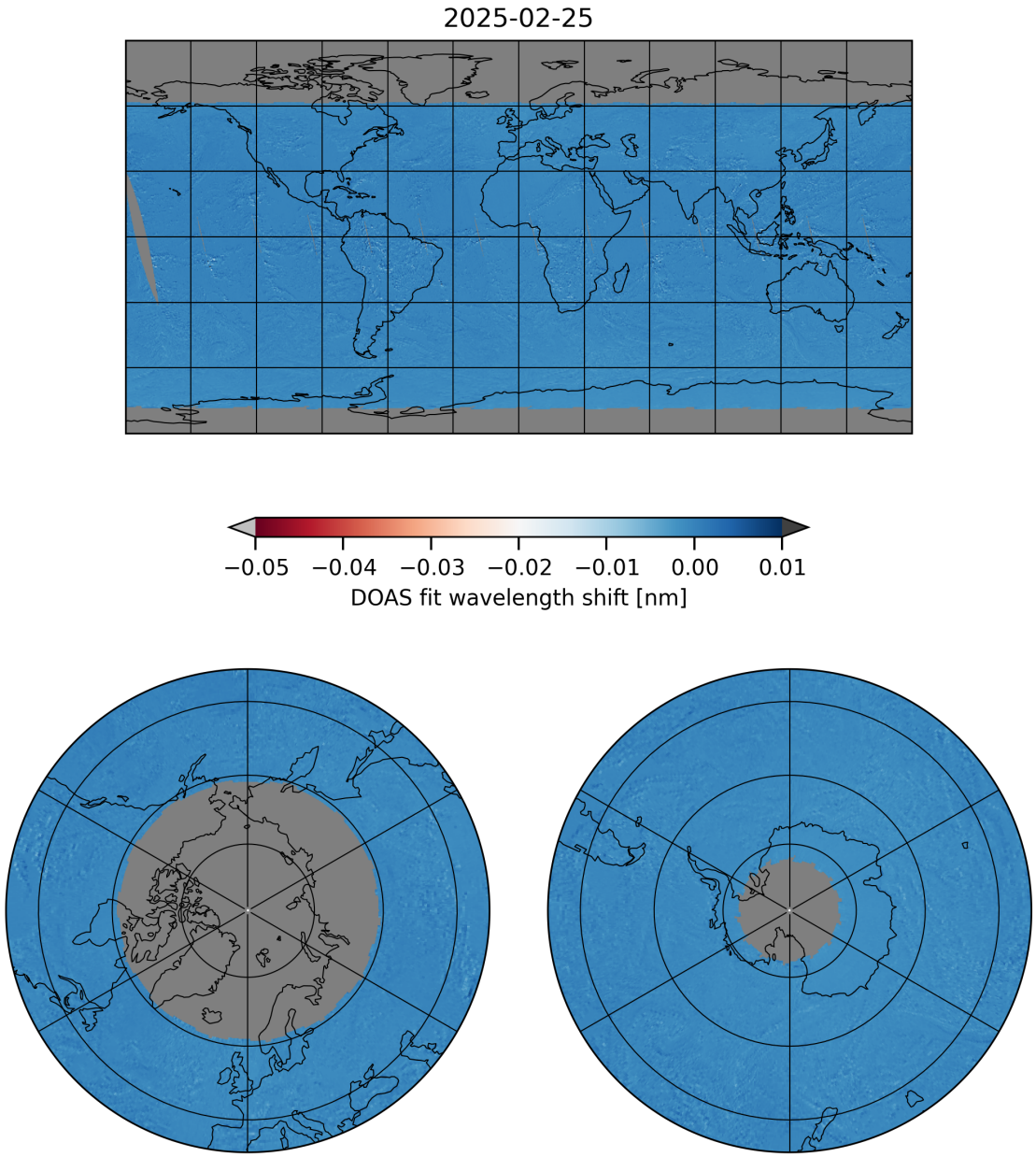

Figure 22: Map of “DOAS fit wavelength shift” for 2025-02-25 to 2025-02-26

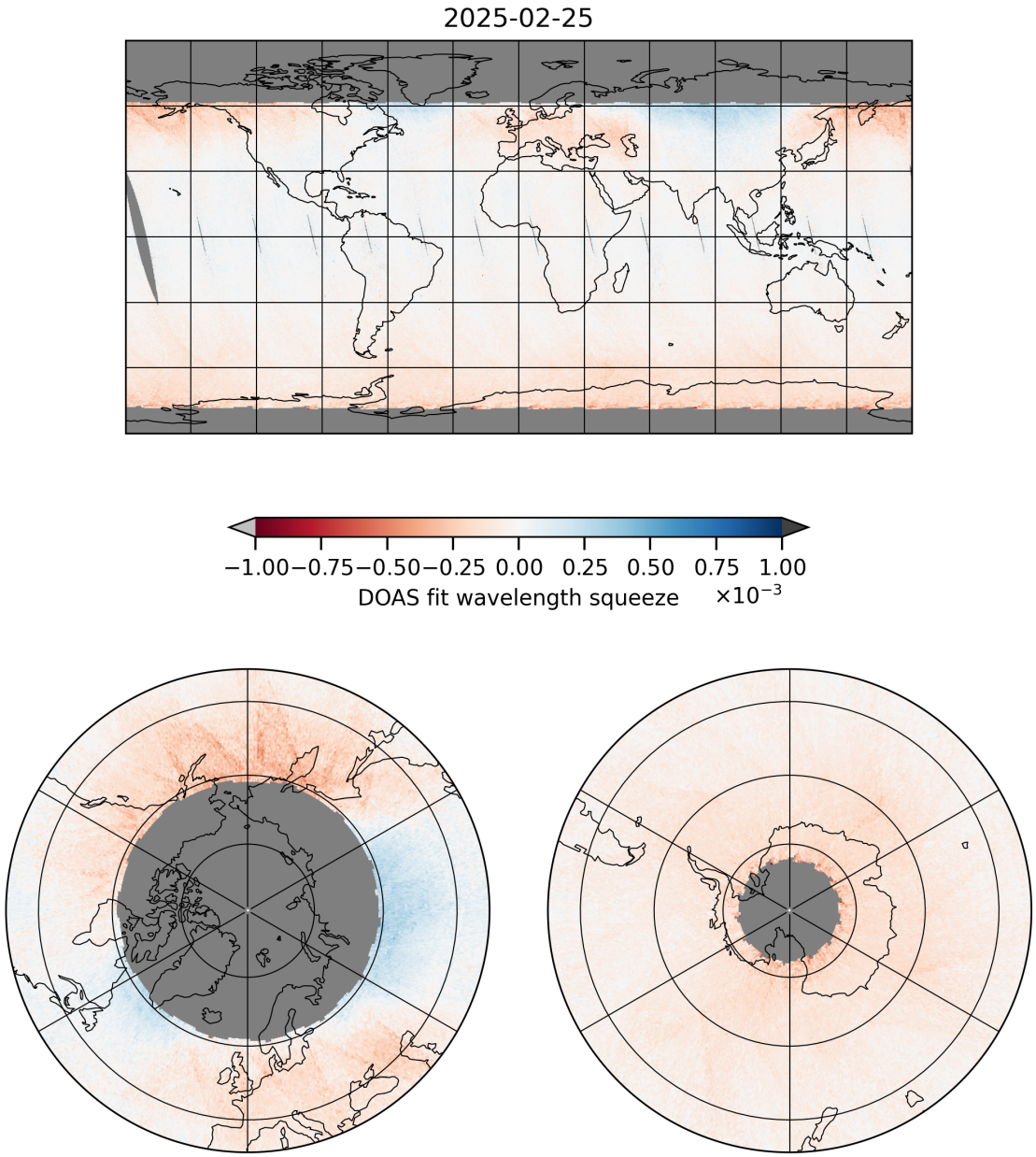

Figure 23: Map of “DOAS fit wavelength squeeze” for 2025-02-25 to 2025-02-26

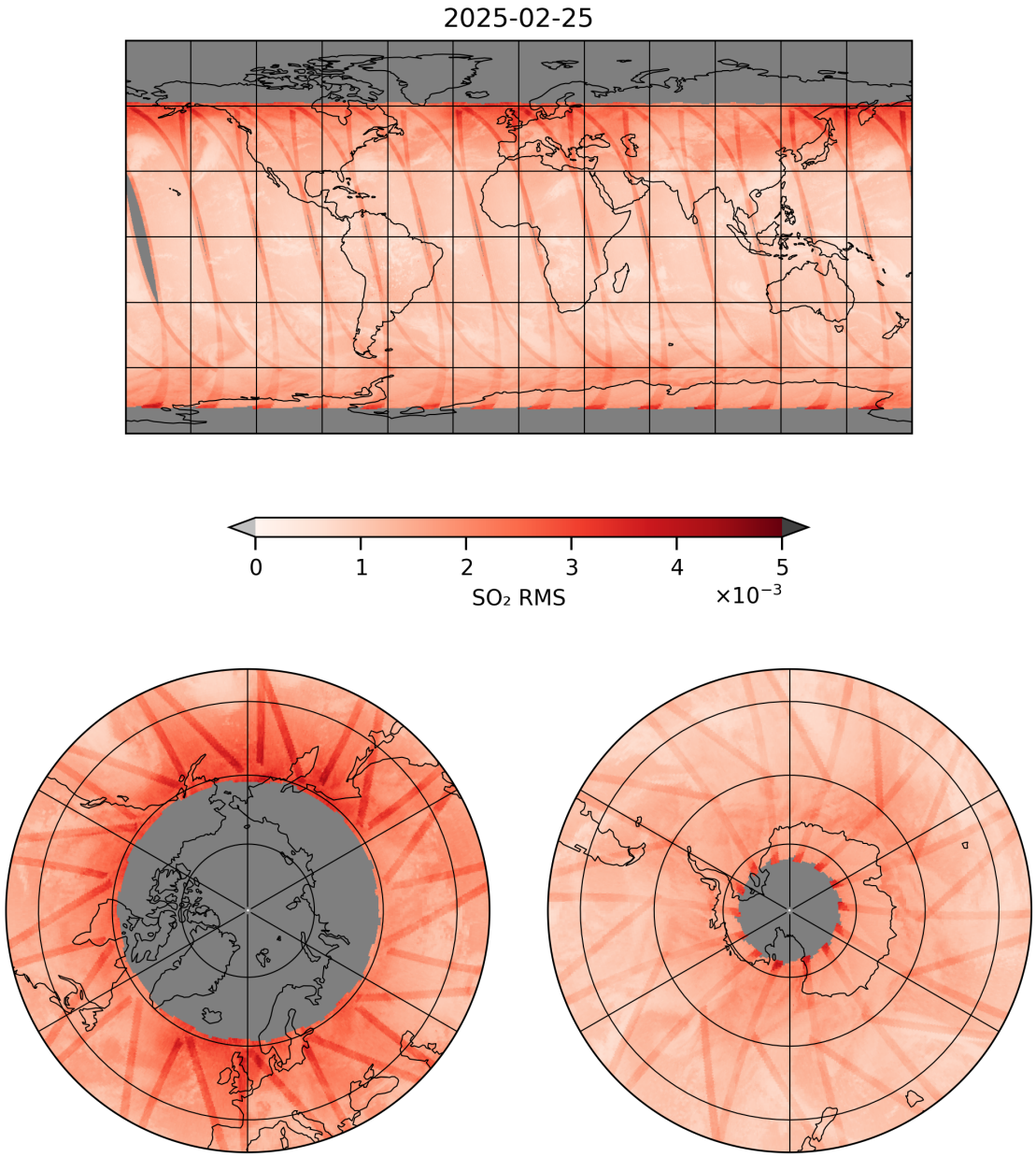

Figure 24: Map of "SO_2 RMS" for 2025-02-25 to 2025-02-26

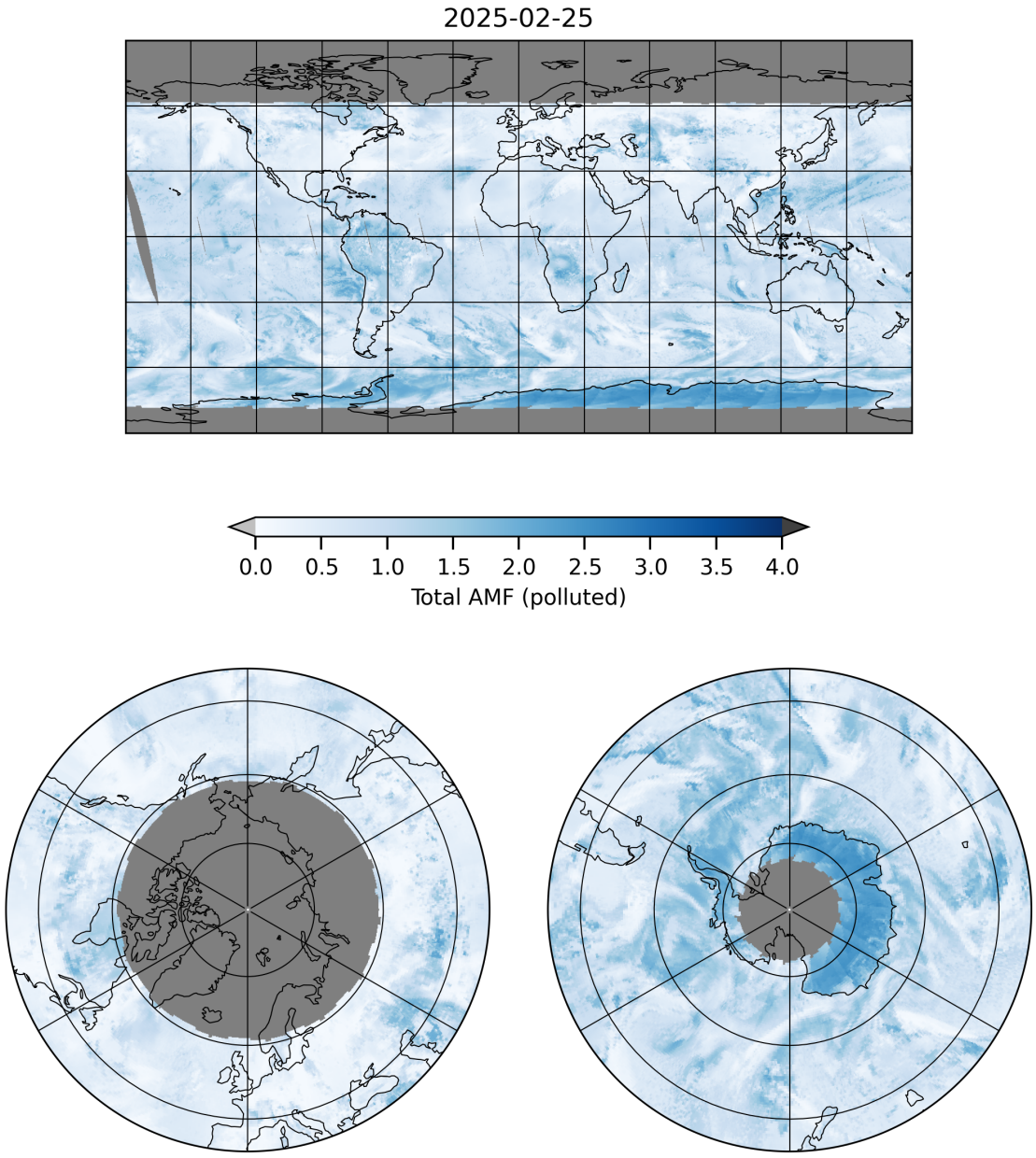

Figure 25: Map of “Total AMF (polluted)” for 2025-02-25 to 2025-02-26

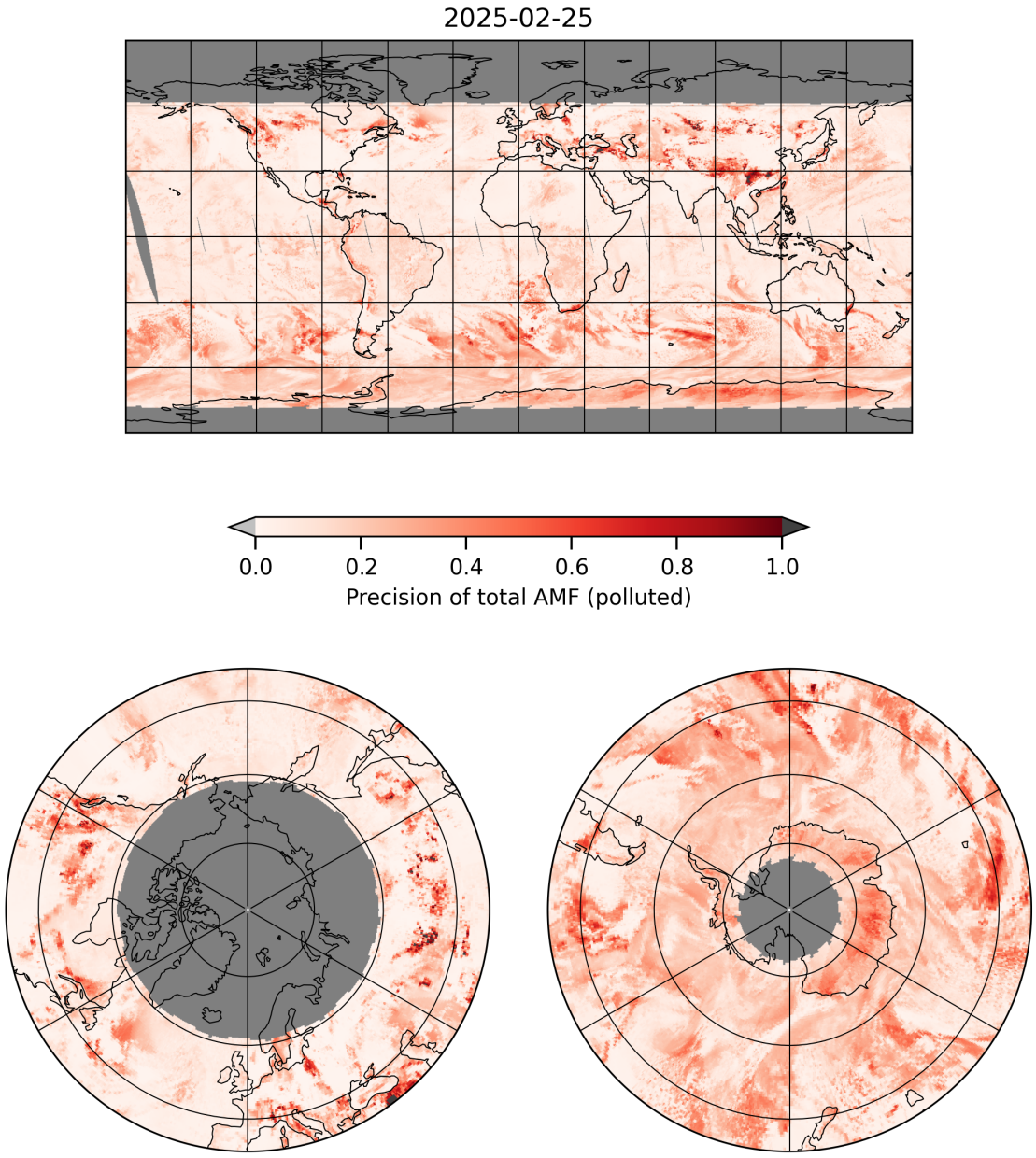

Figure 26: Map of “Precision of total AMF (polluted)” for 2025-02-25 to 2025-02-26

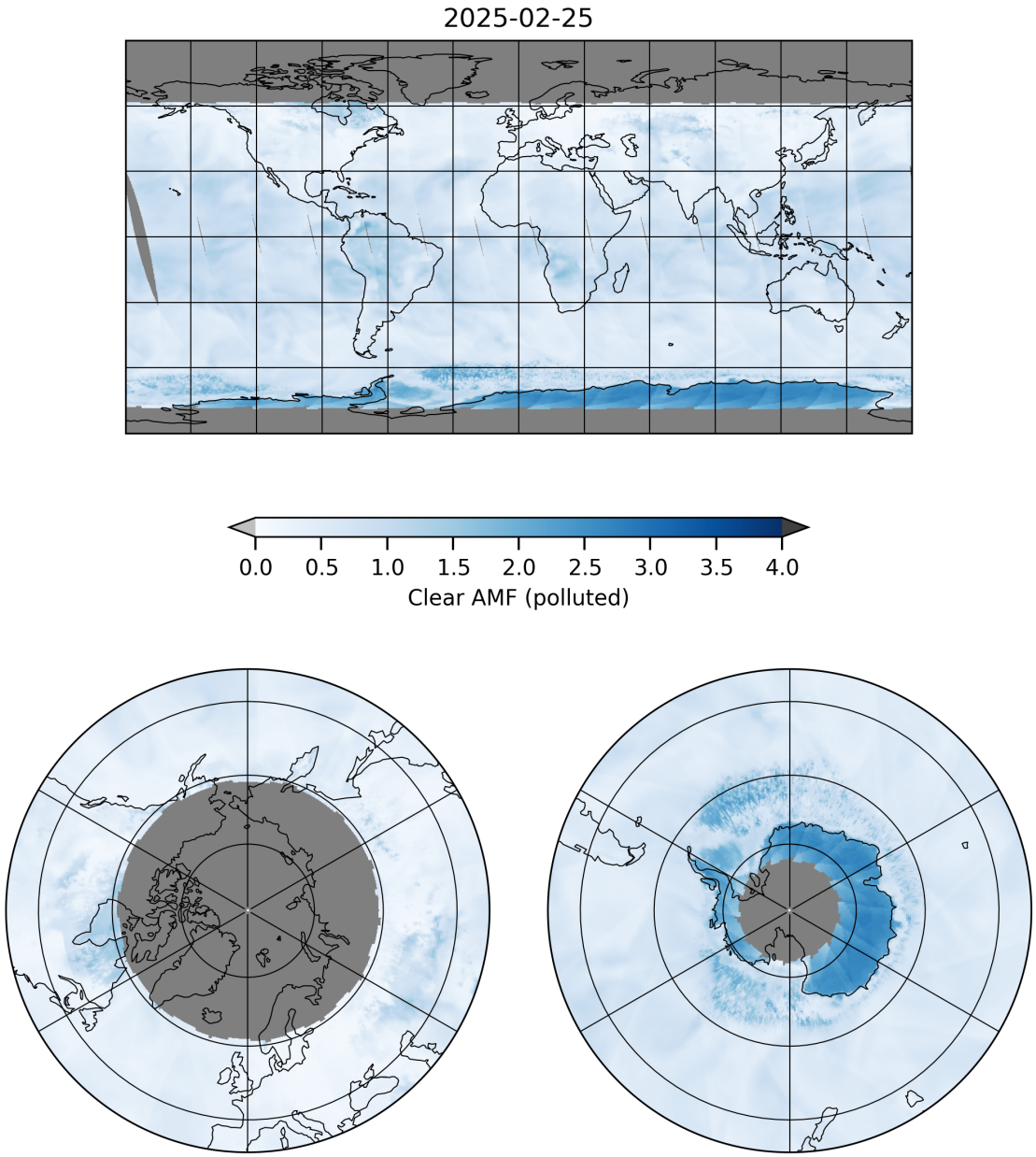

Figure 27: Map of “Clear AMF (polluted)” for 2025-02-25 to 2025-02-26

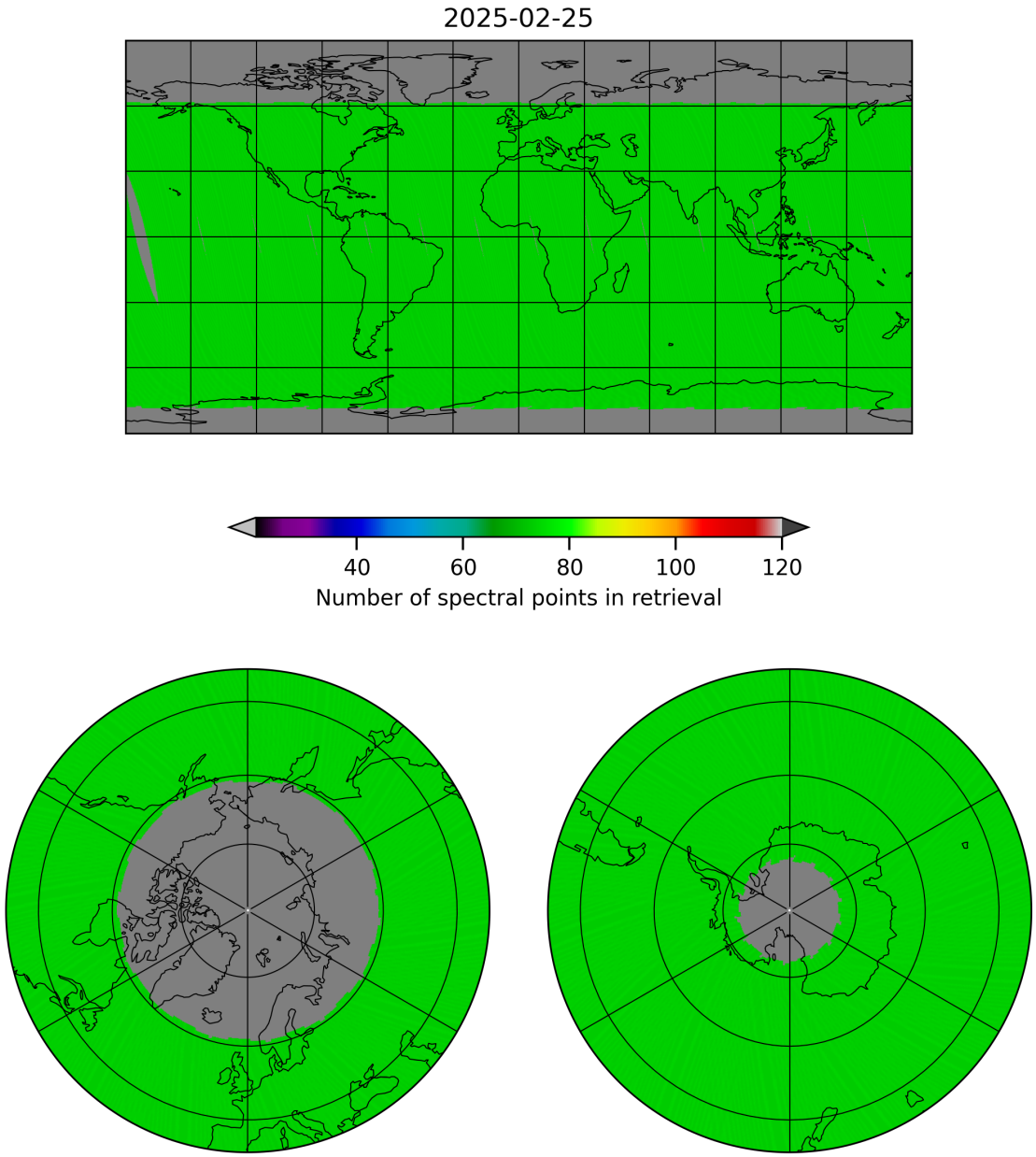

Figure 28: Map of “Number of spectral points in retrieval” for 2025-02-25 to 2025-02-26

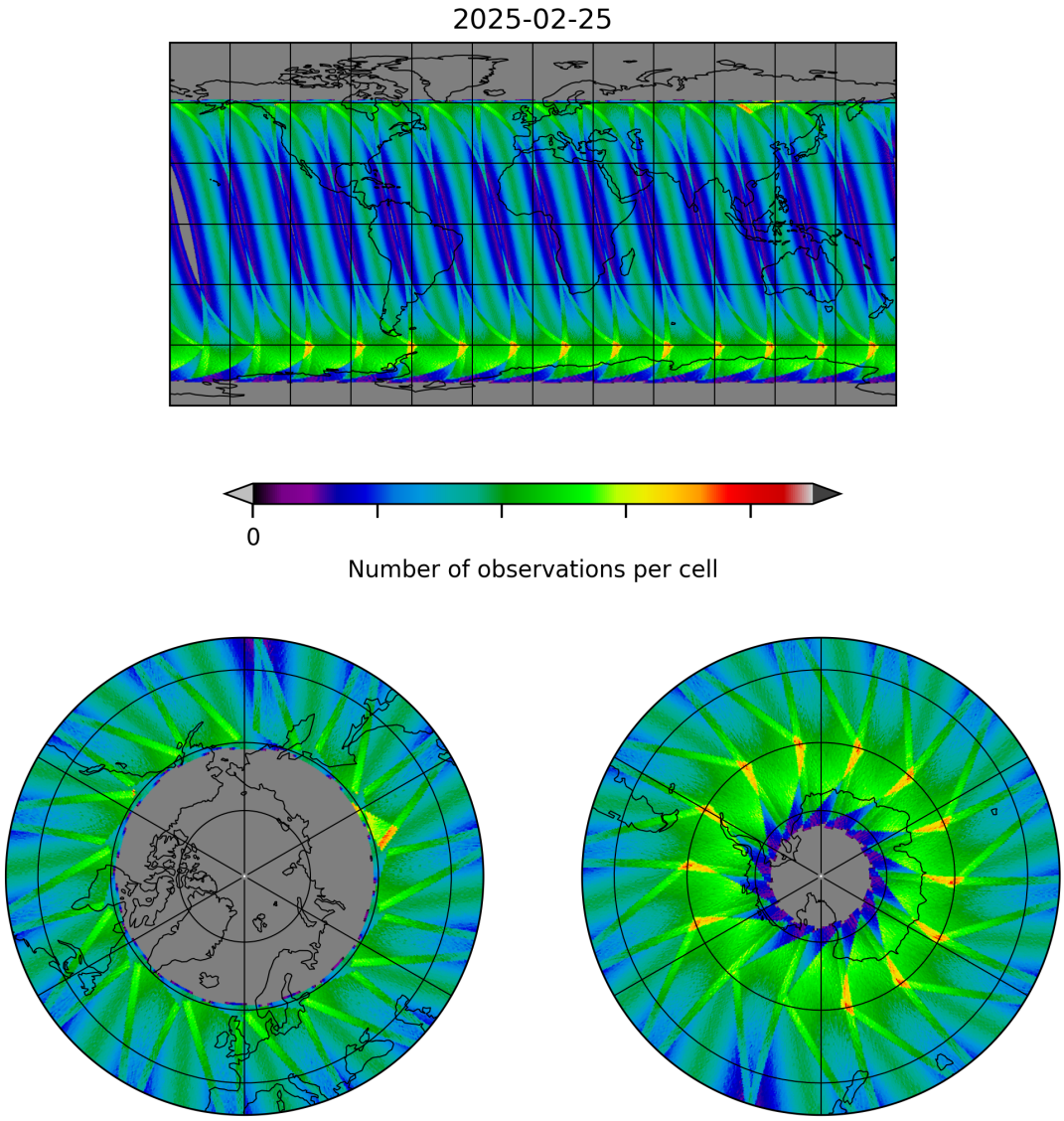

Figure 29: Map of the number of observations for 2025-02-25 to 2025-02-26

7 Zonal average

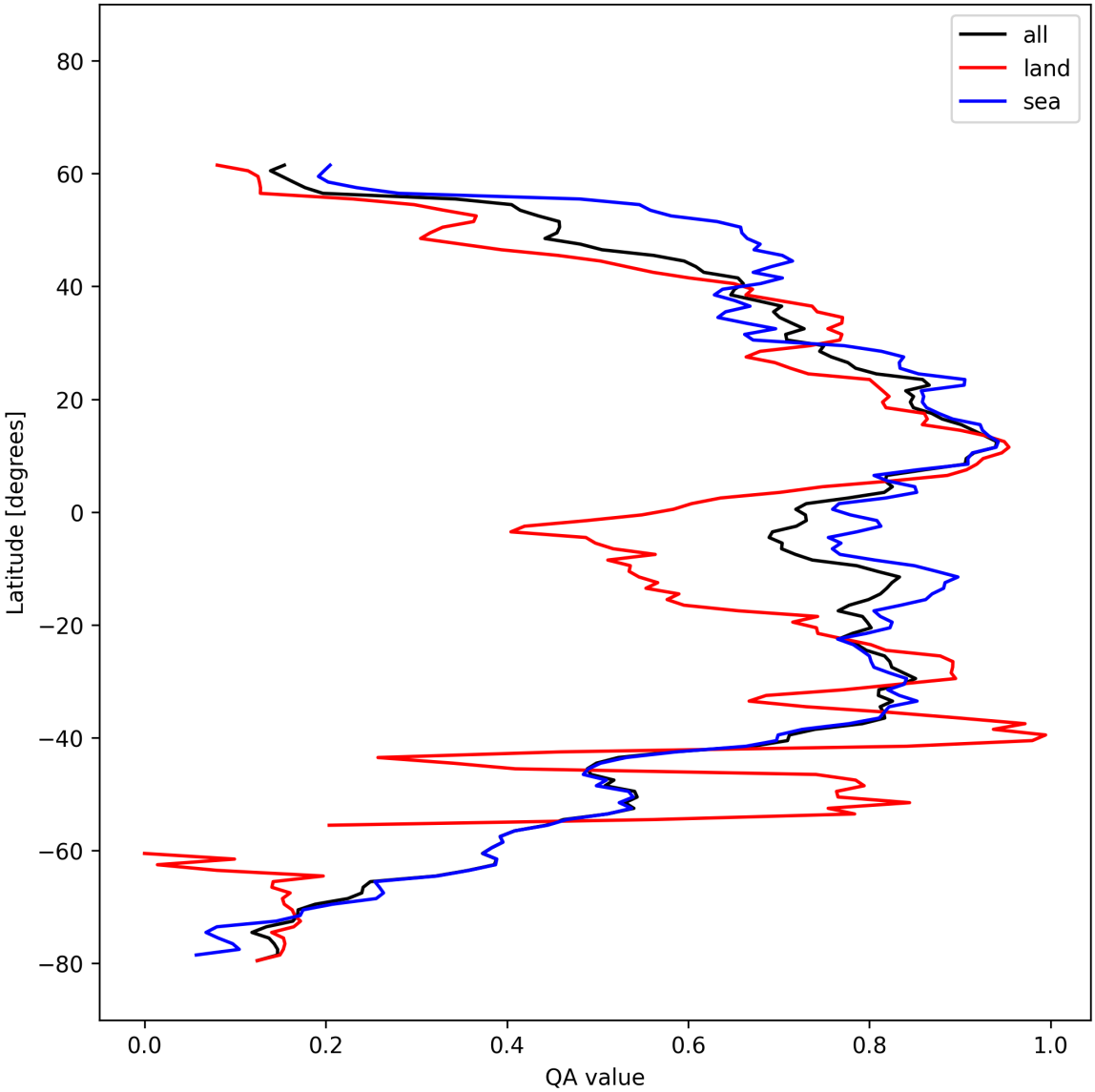

Figure 30: Zonal average of “QA value” for 2025-02-25 to 2025-02-26.

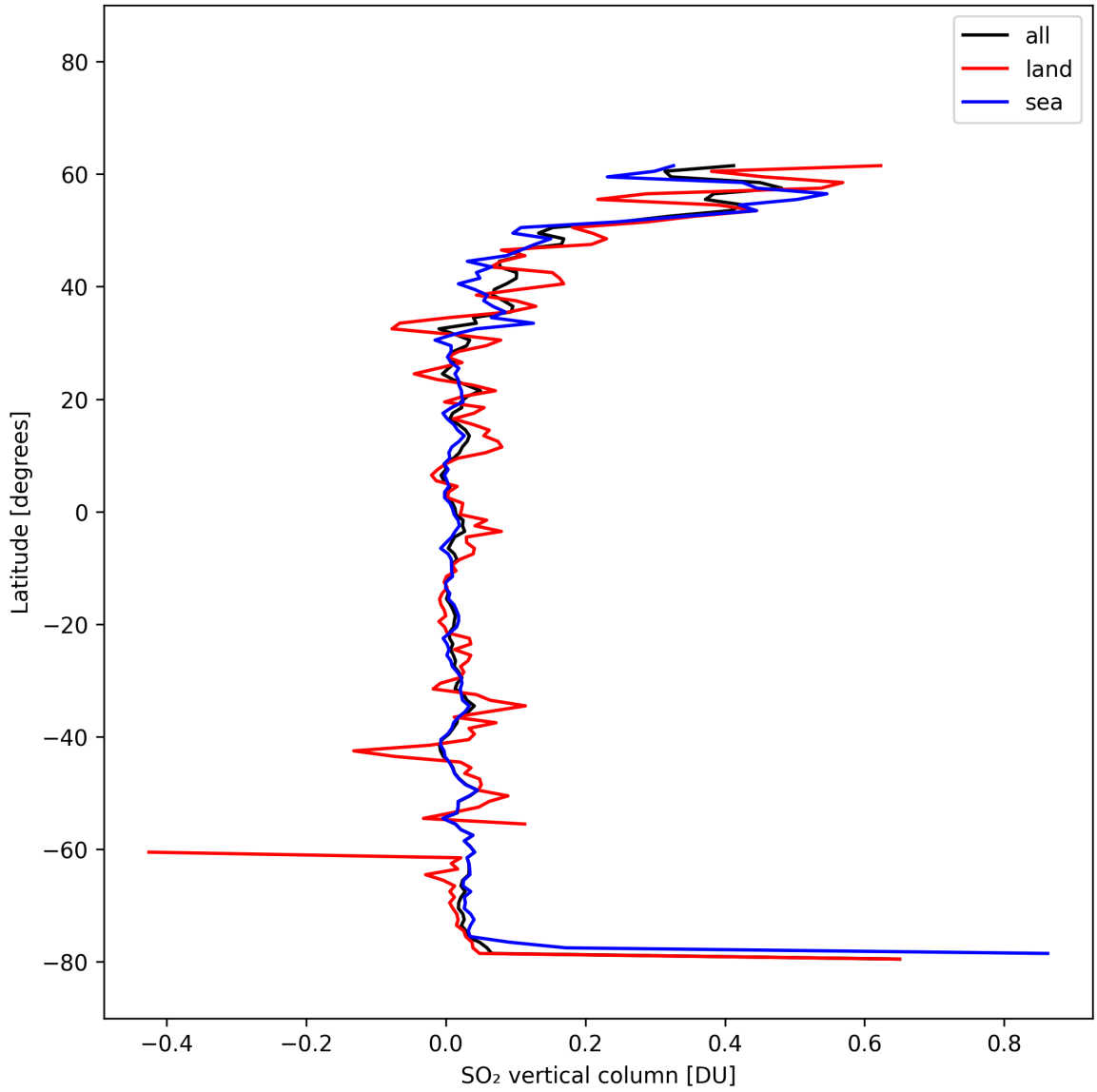

Figure 31: Zonal average of "SO_2 vertical column" for 2025-02-25 to 2025-02-26.

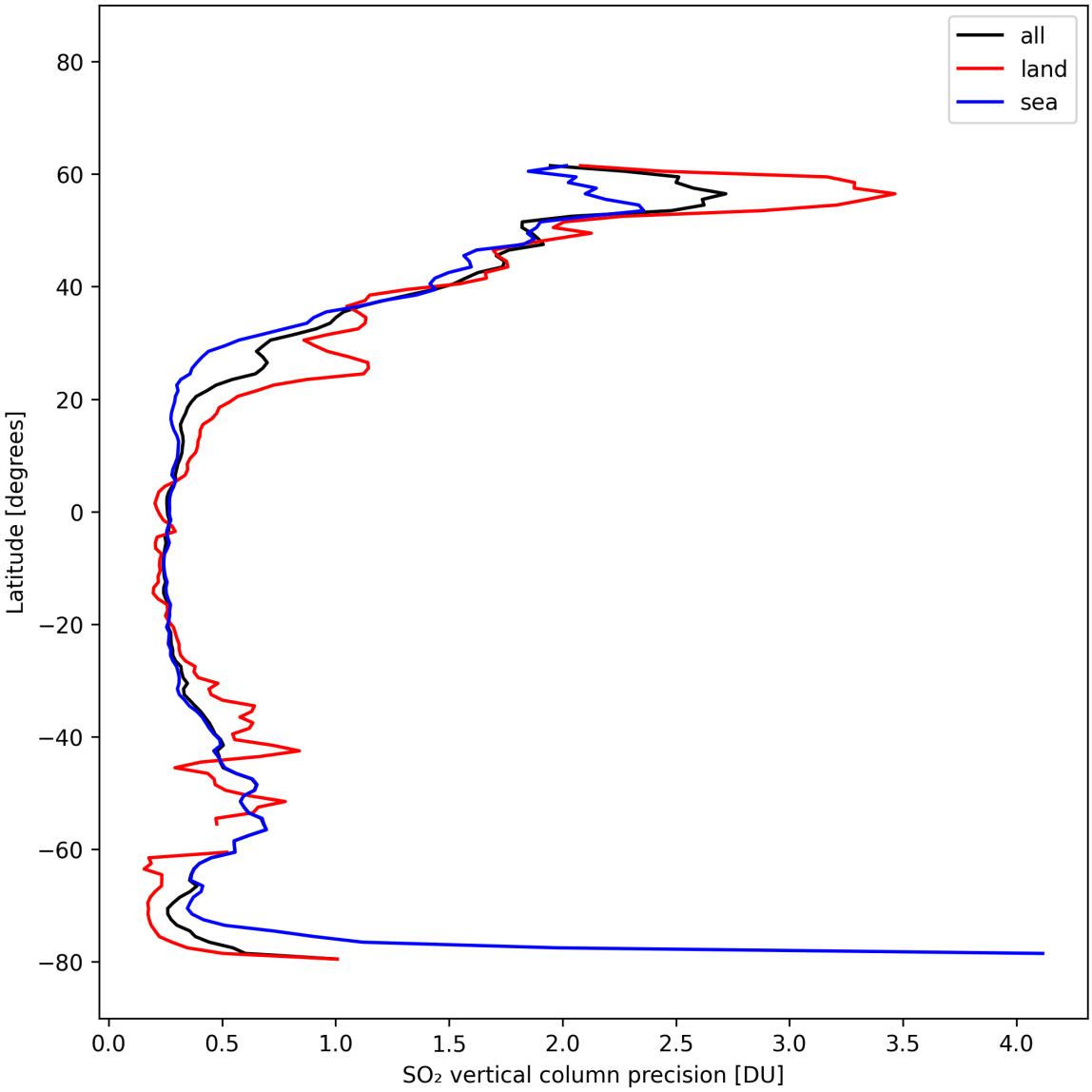

Figure 32: Zonal average of "SO_2 vertical column precision" for 2025-02-25 to 2025-02-26.

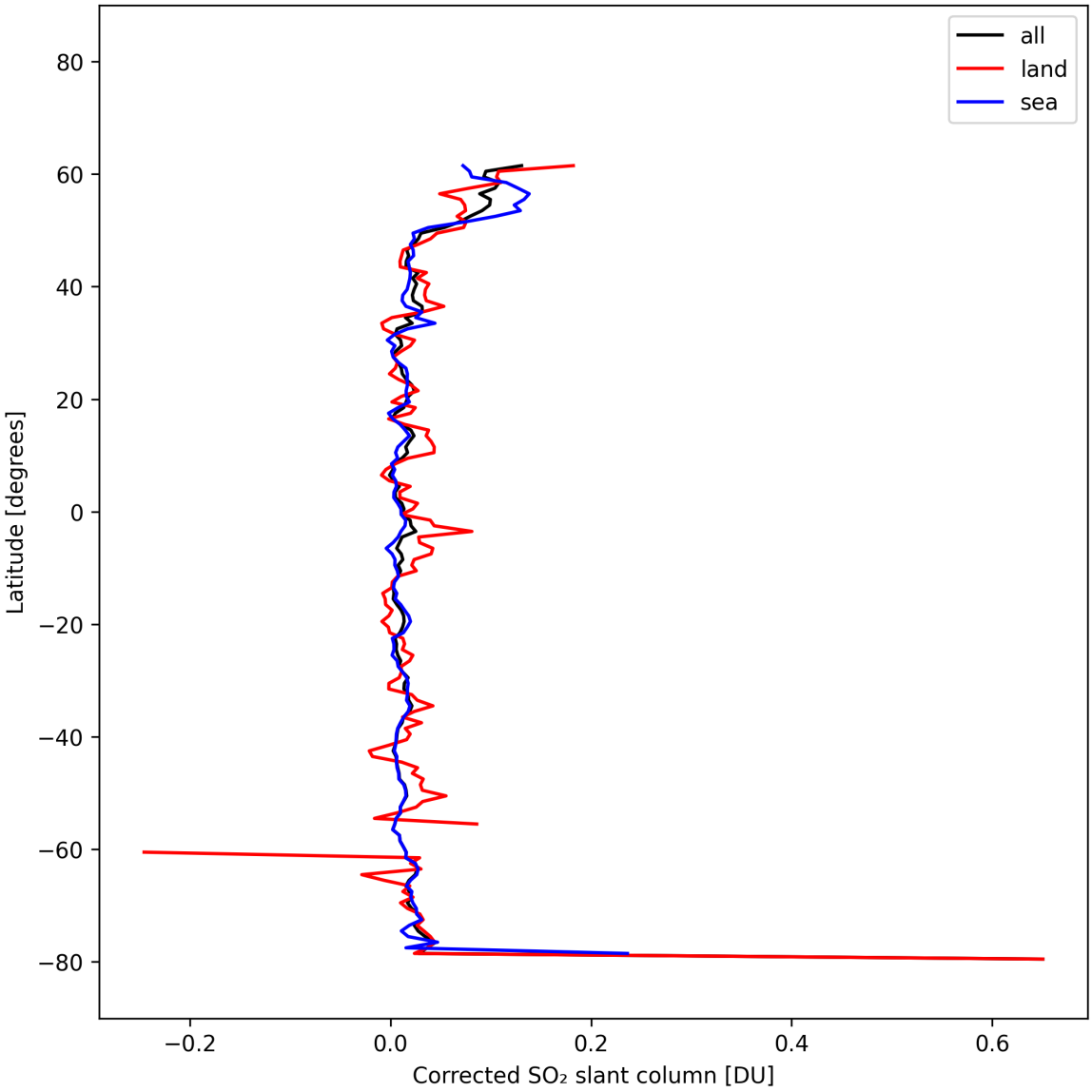

Figure 33: Zonal average of "Corrected SO_2 slant column" for 2025-02-25 to 2025-02-26.

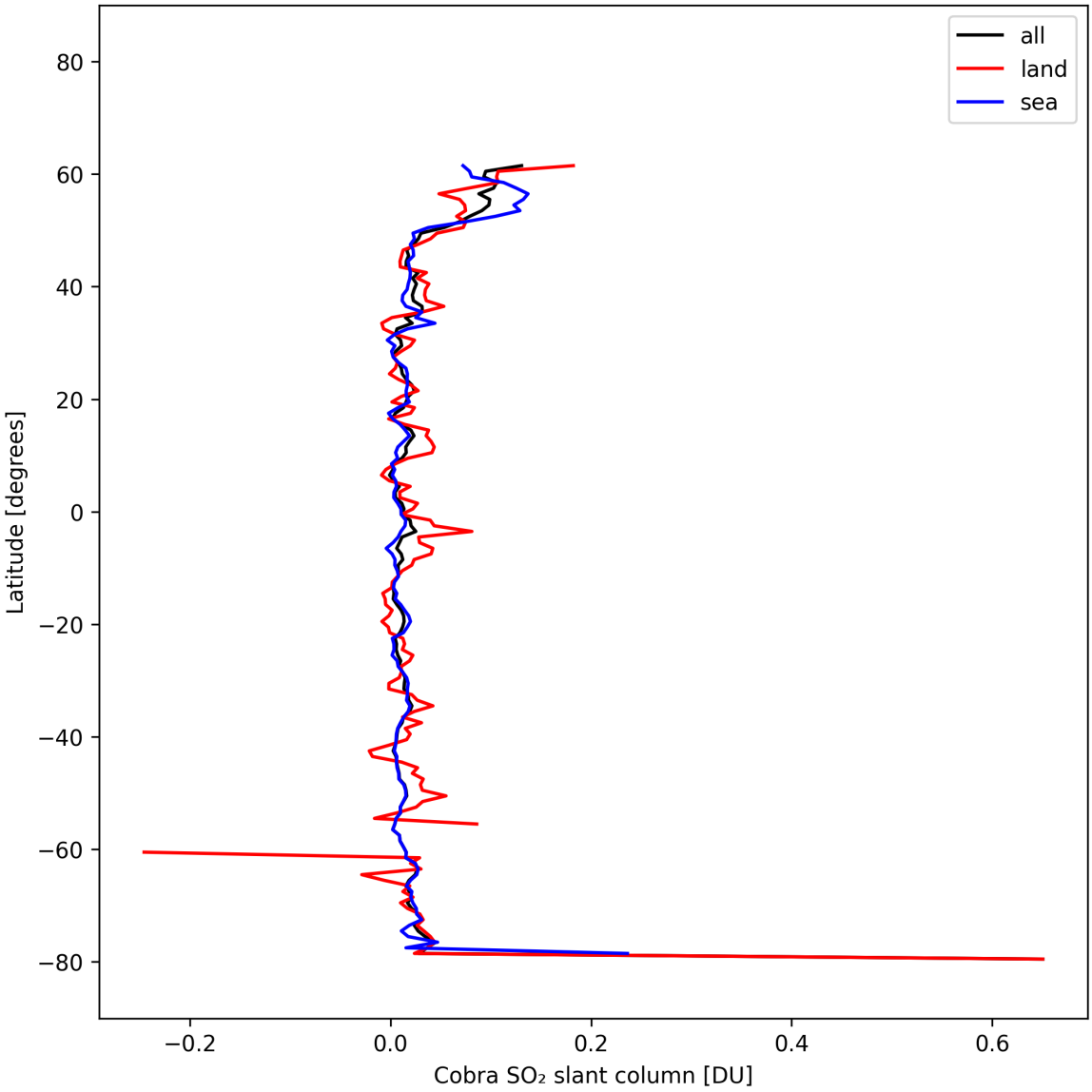

Figure 34: Zonal average of "Cobra SO_2 slant column" for 2025-02-25 to 2025-02-26.

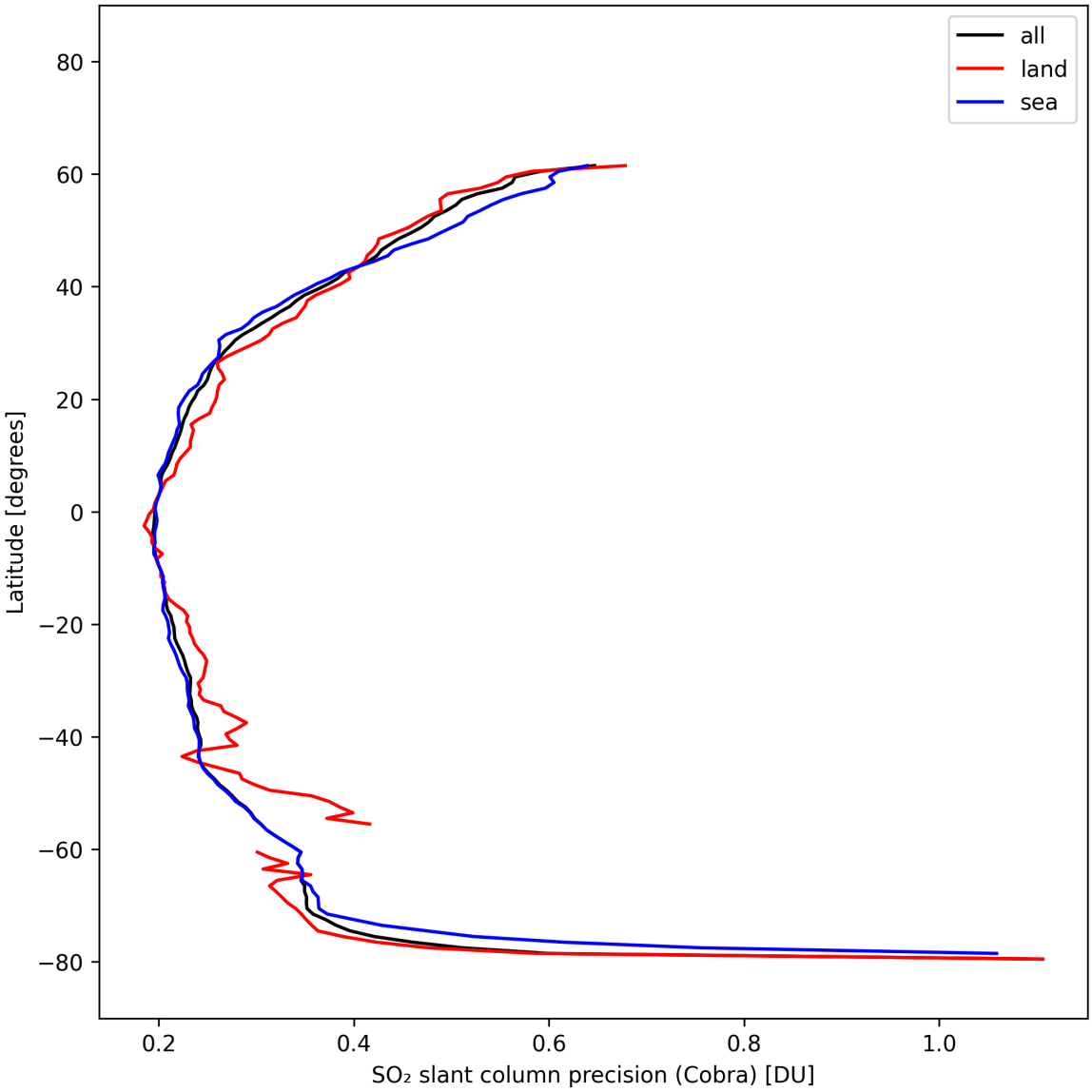

Figure 35: Zonal average of "SO_2 slant column precision (Cobra)" for 2025-02-25 to 2025-02-26.

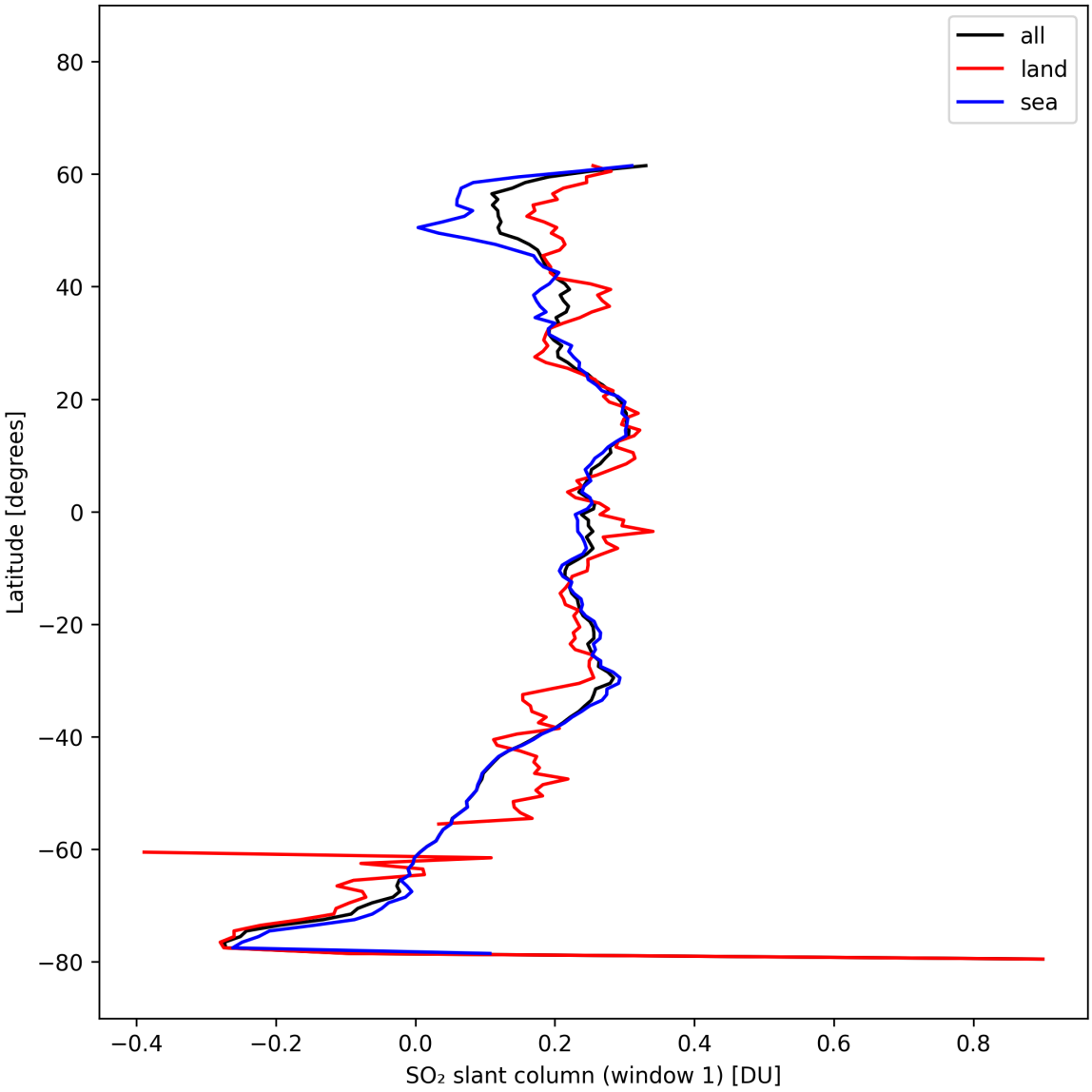

Figure 36: Zonal average of "SO_2 slant column (window 1)" for 2025-02-25 to 2025-02-26.

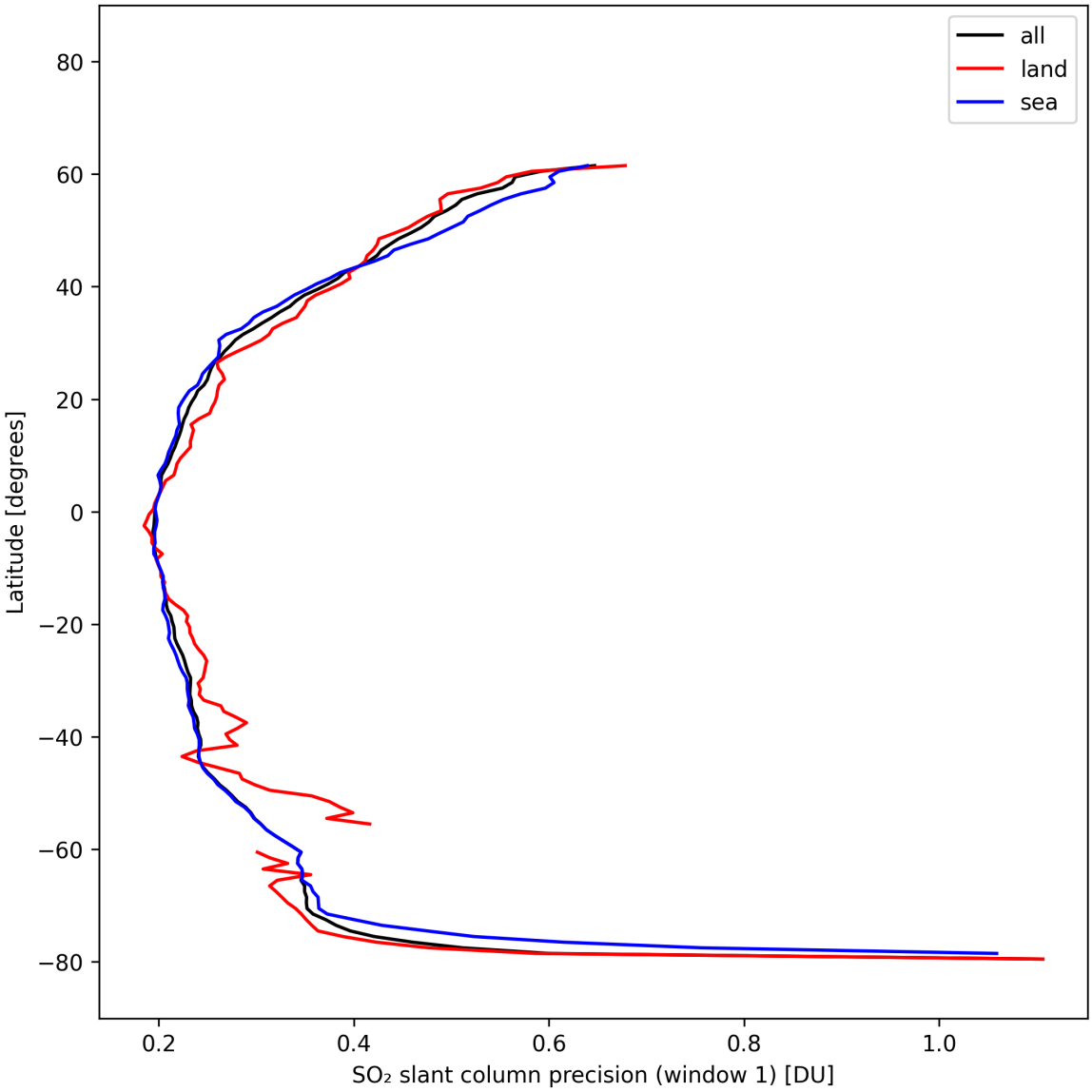

Figure 37: Zonal average of "SO_2 slant column precision (window 1)" for 2025-02-25 to 2025-02-26.

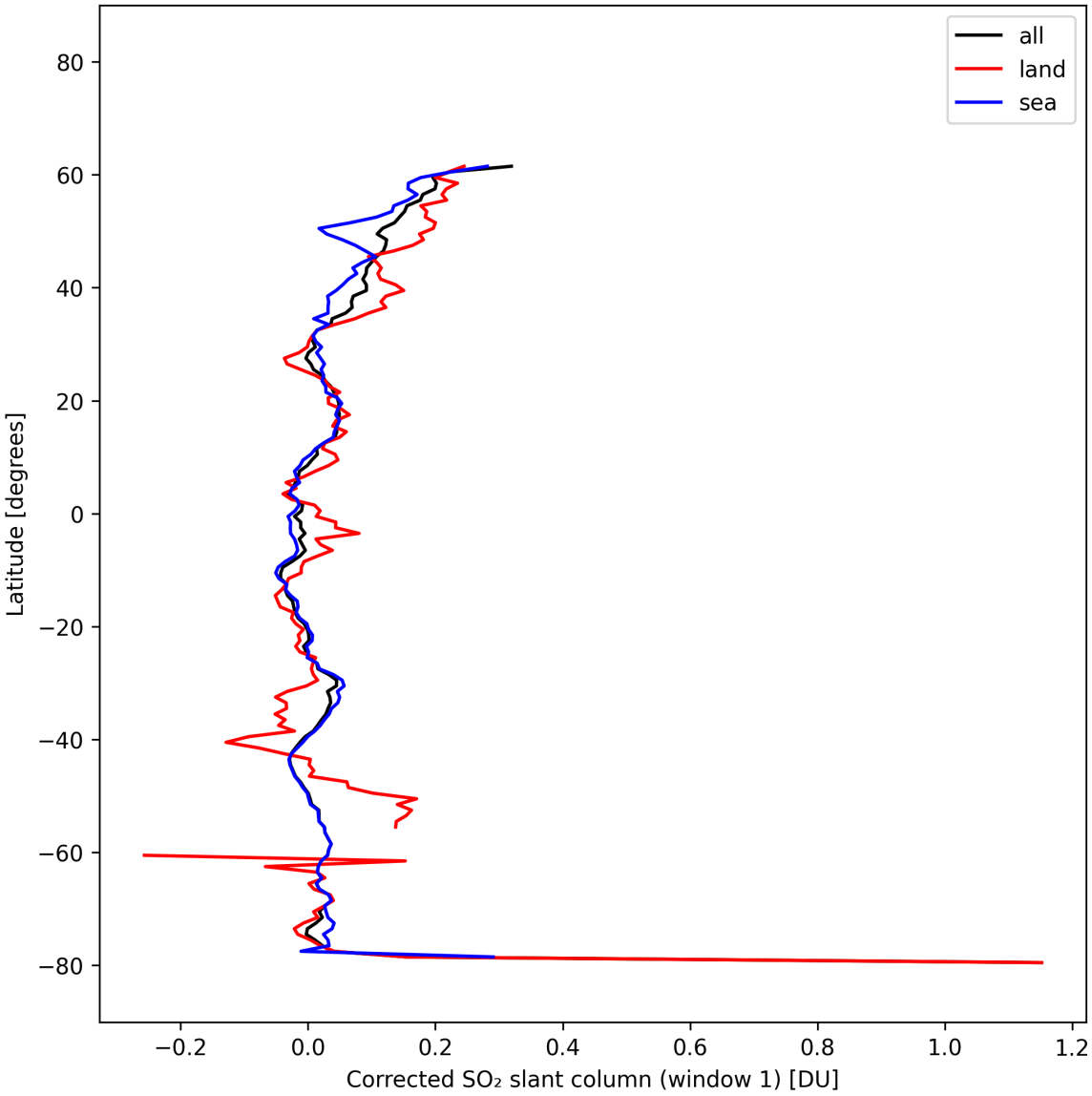

Figure 38: Zonal average of "Corrected SO_2 slant column (window 1)" for 2025-02-25 to 2025-02-26.

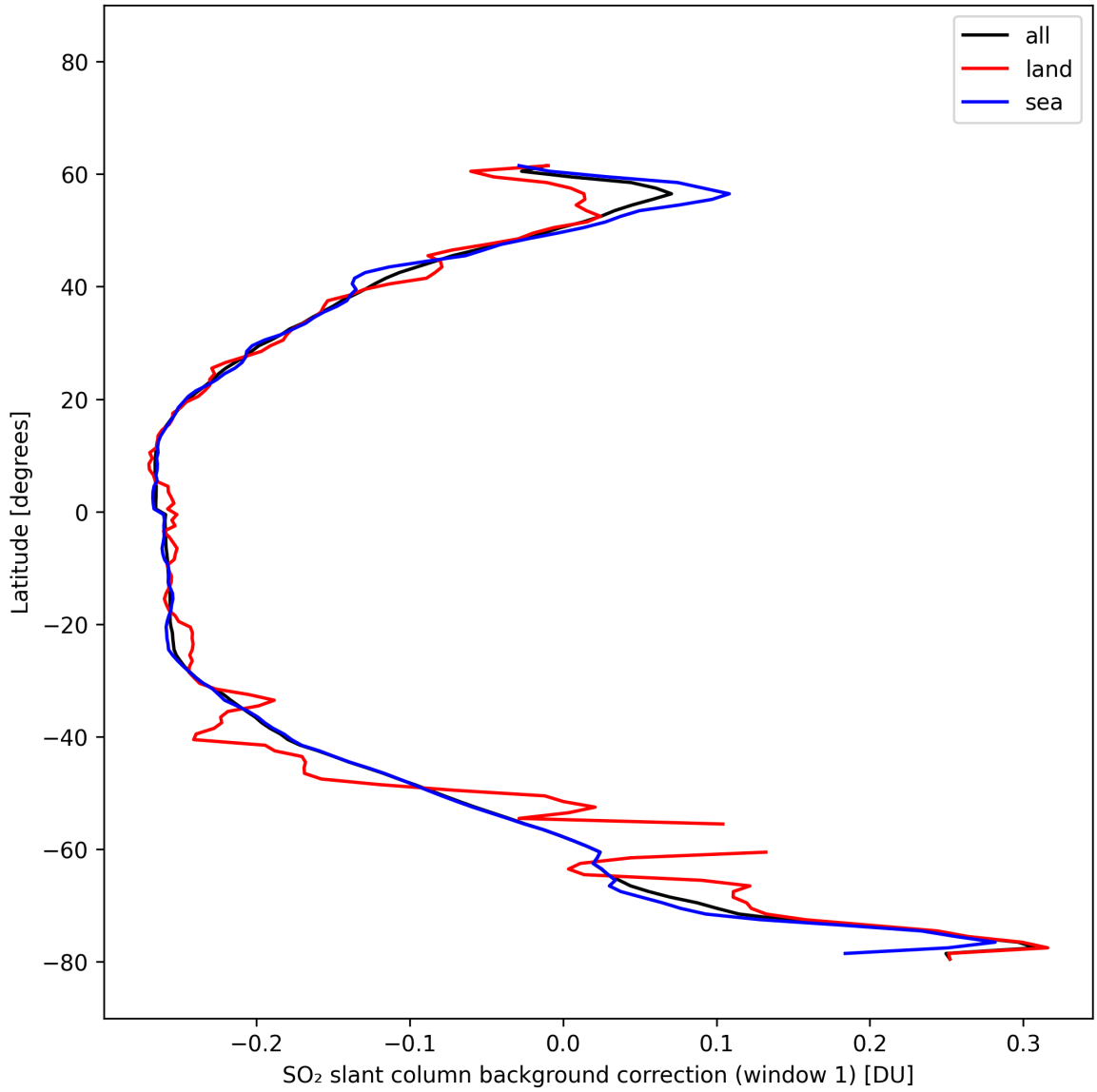

Figure 39: Zonal average of "SO_2 slant column background correction (window 1)" for 2025-02-25 to 2025-02-26.

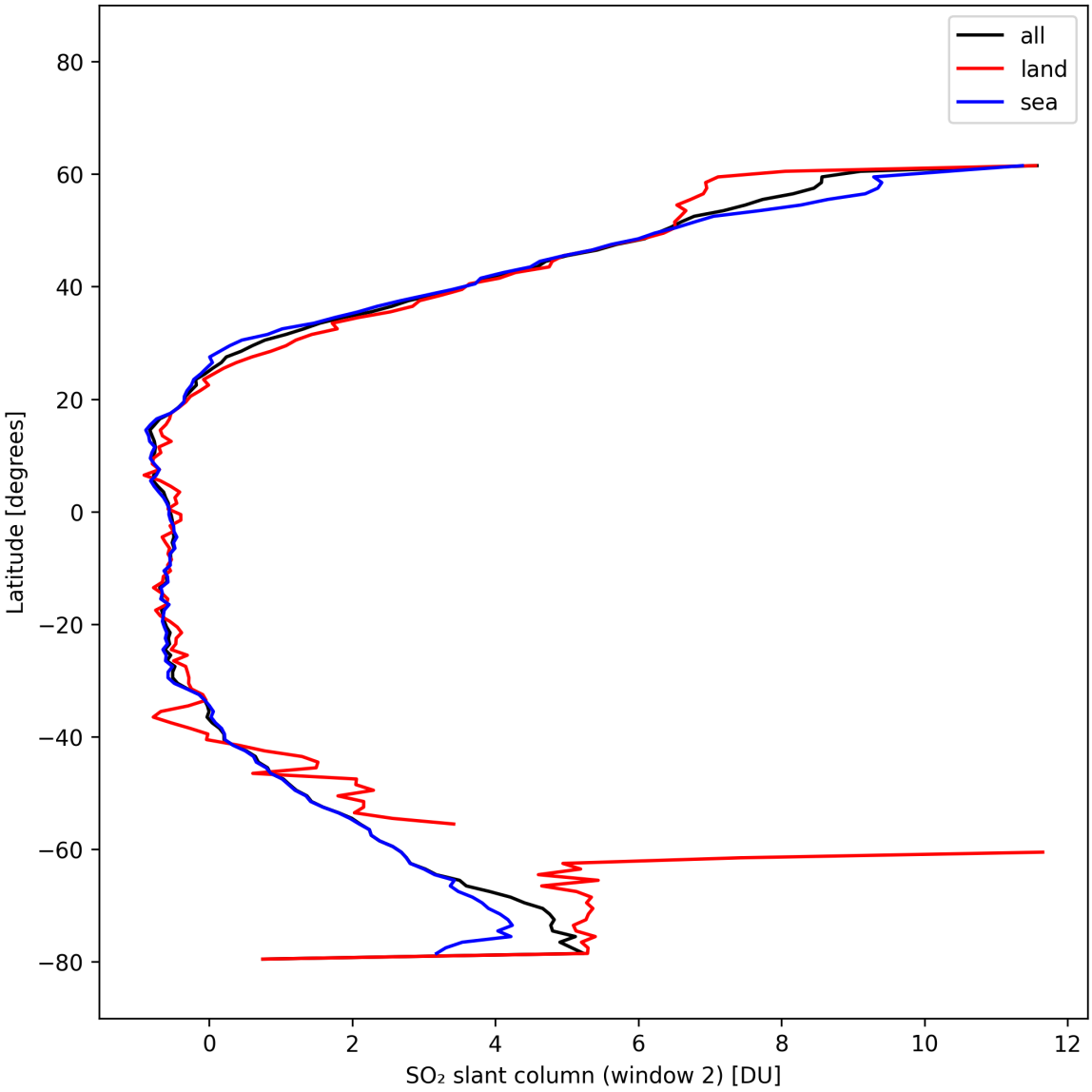

Figure 40: Zonal average of "SO_2 slant column (window 2)" for 2025-02-25 to 2025-02-26.

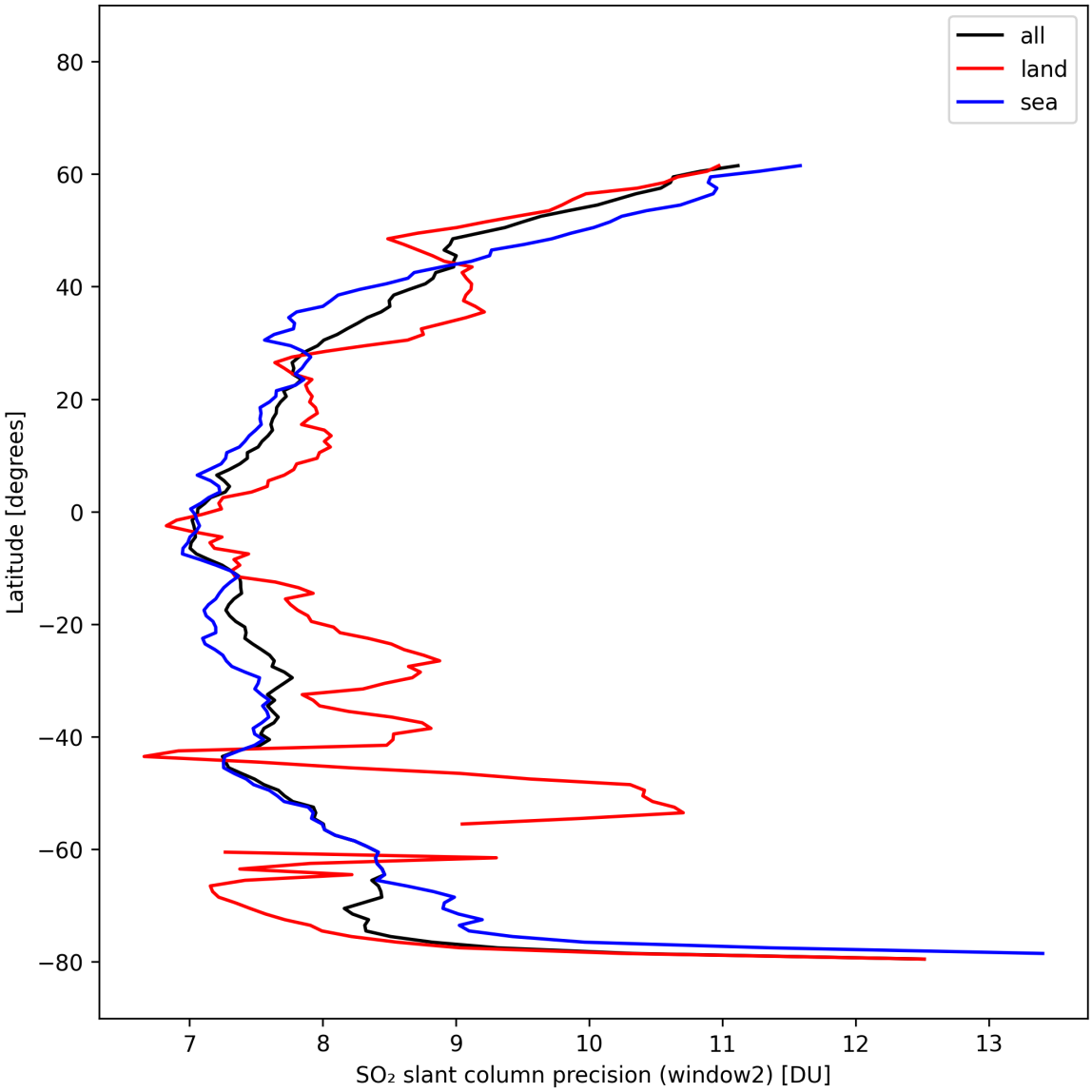

Figure 41: Zonal average of "SO_2 slant column precision (window2)" for 2025-02-25 to 2025-02-26.

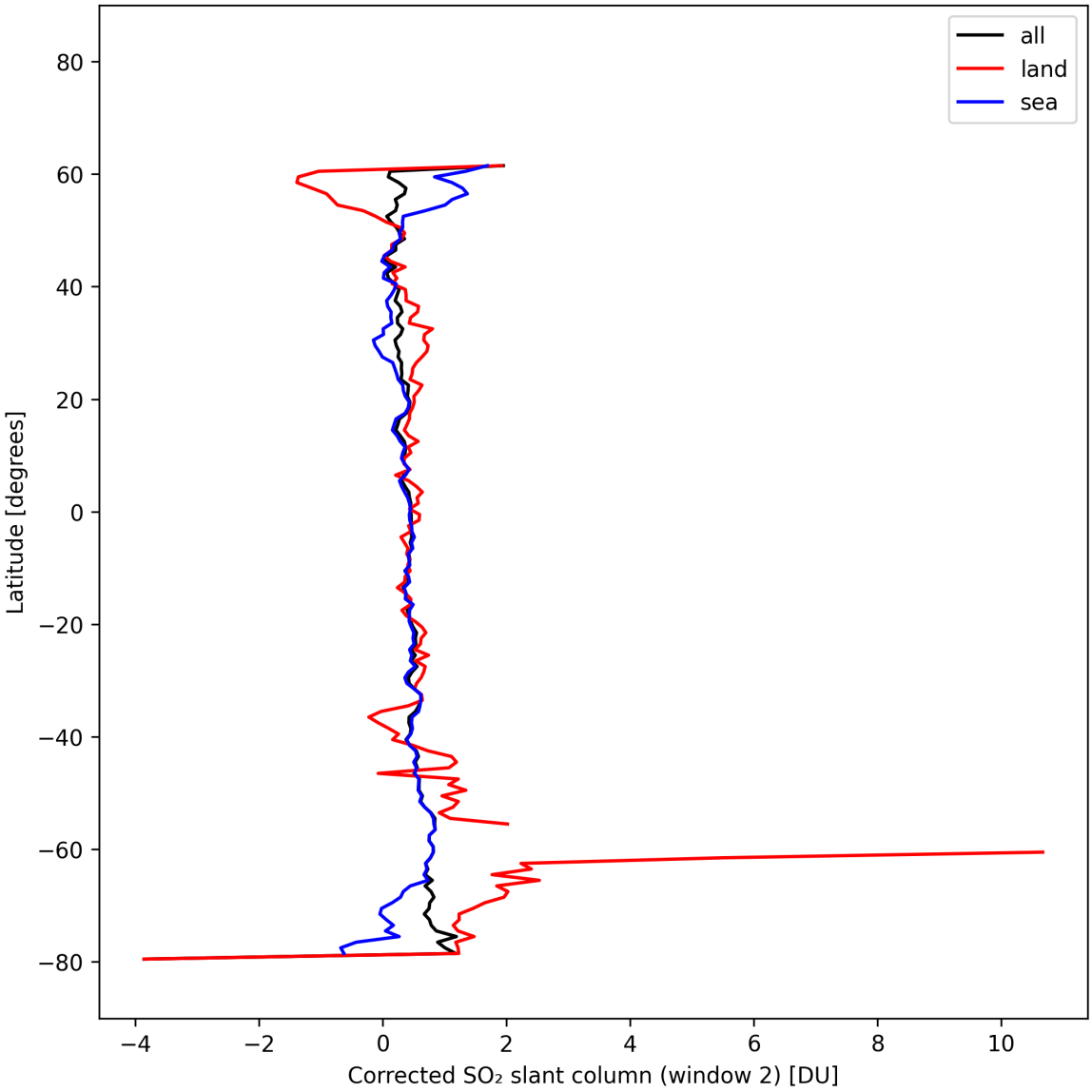

Figure 42: Zonal average of "Corrected SO_2 slant column (window 2)" for 2025-02-25 to 2025-02-26.

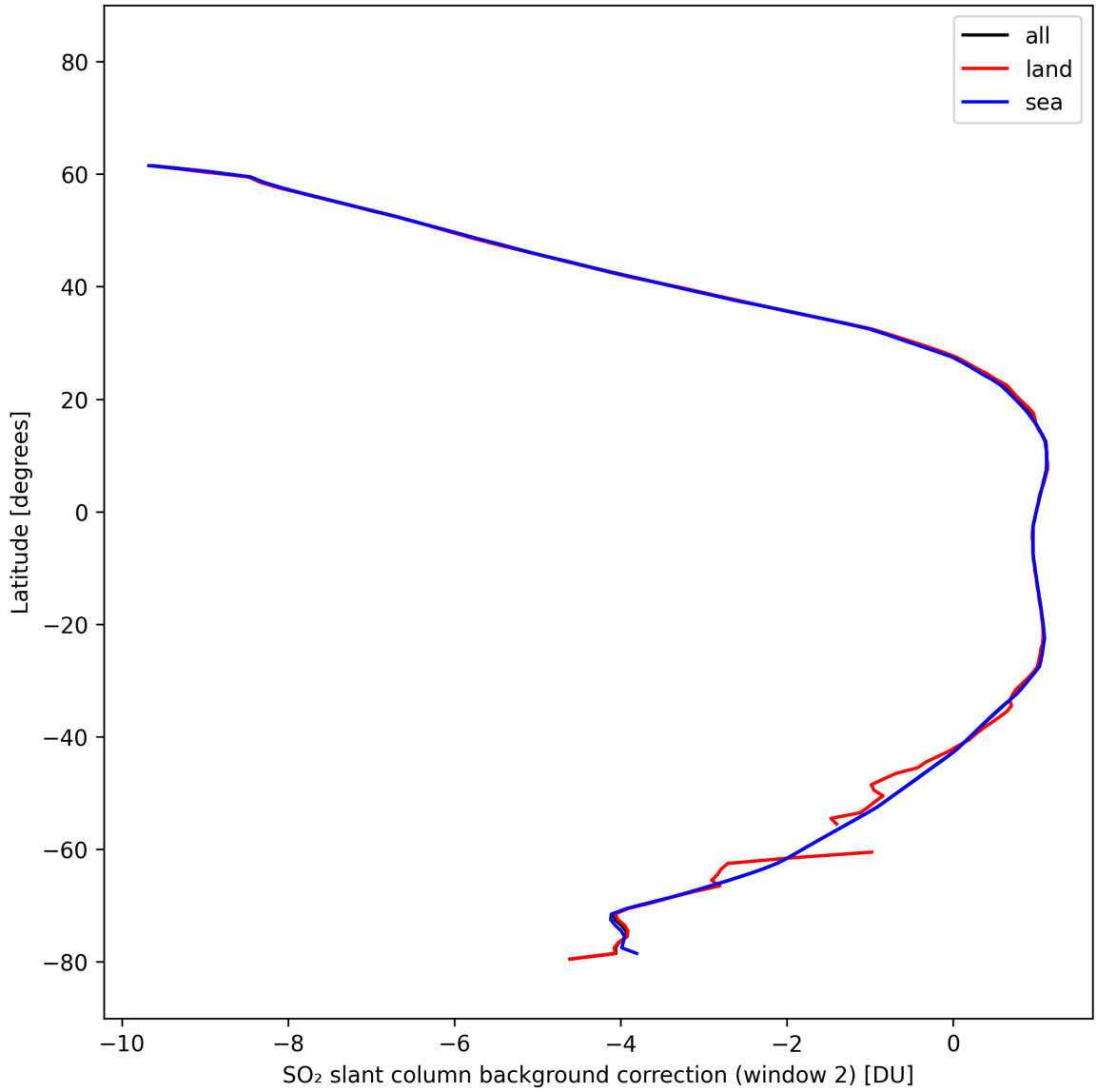

Figure 43: Zonal average of "SO_2 slant column background correction (window 2)" for 2025-02-25 to 2025-02-26.

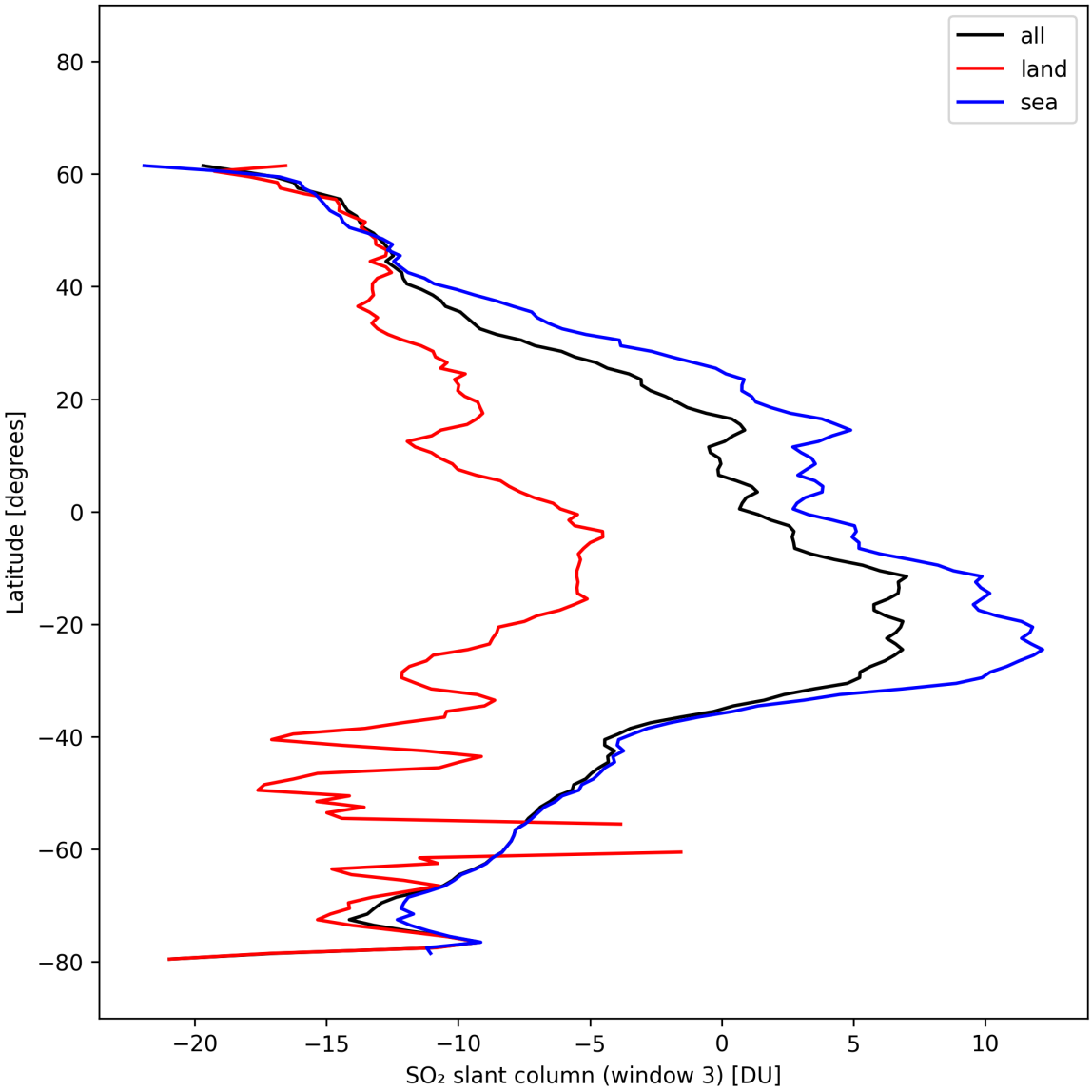

Figure 44: Zonal average of "SO_2 slant column (window 3)" for 2025-02-25 to 2025-02-26.

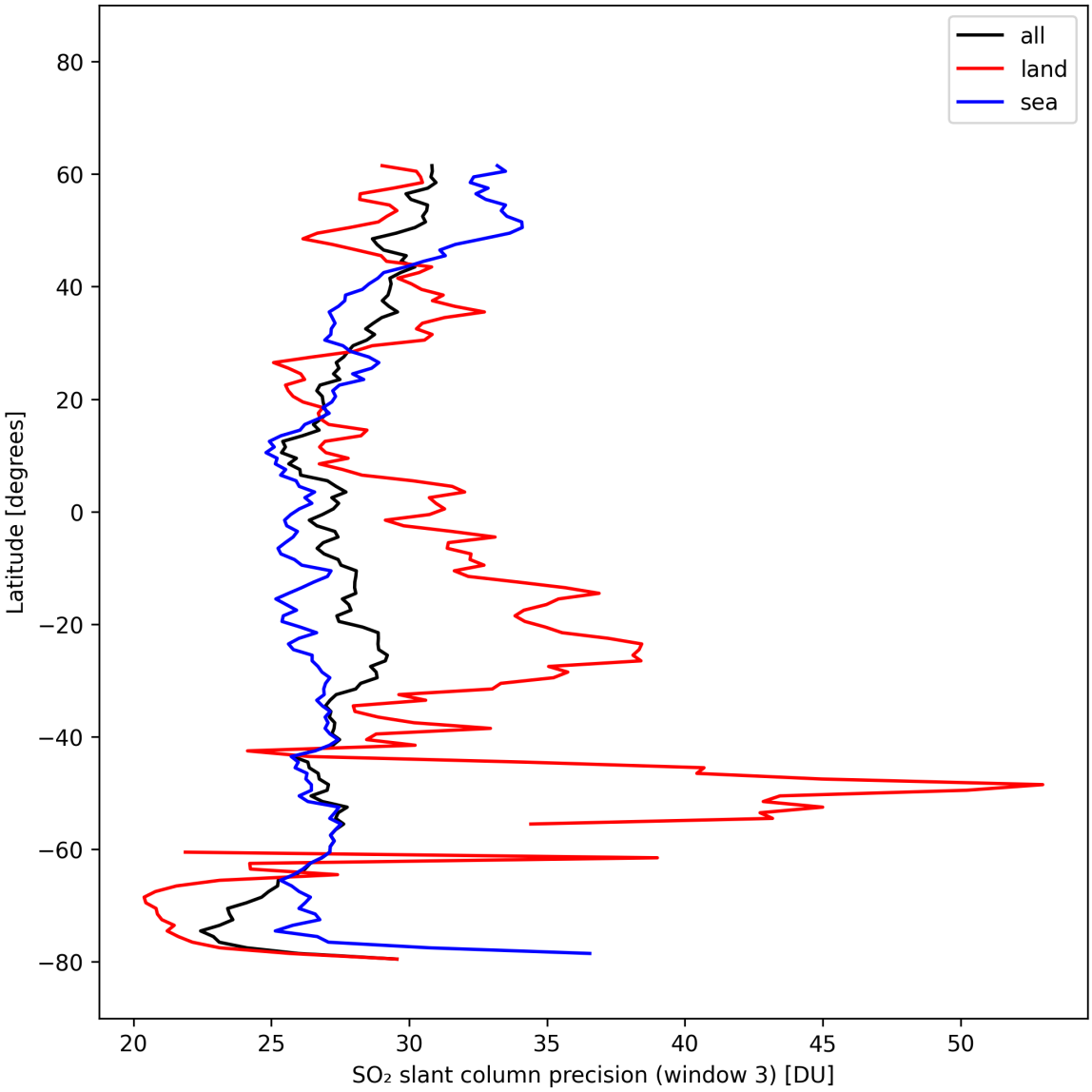

Figure 45: Zonal average of "SO_2 slant column precision (window 3)" for 2025-02-25 to 2025-02-26.

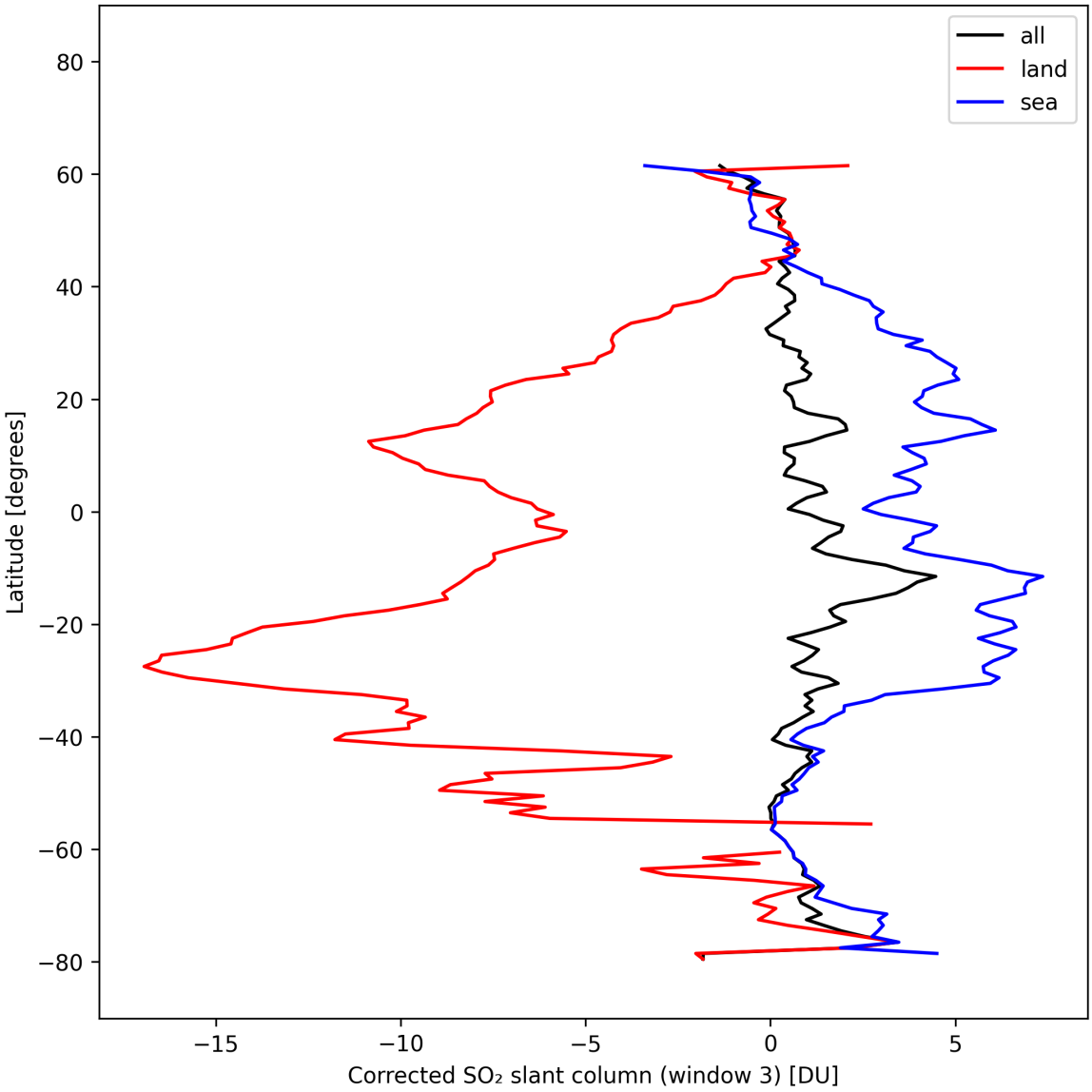

Figure 46: Zonal average of "Corrected SO_2 slant column (window 3)" for 2025-02-25 to 2025-02-26.

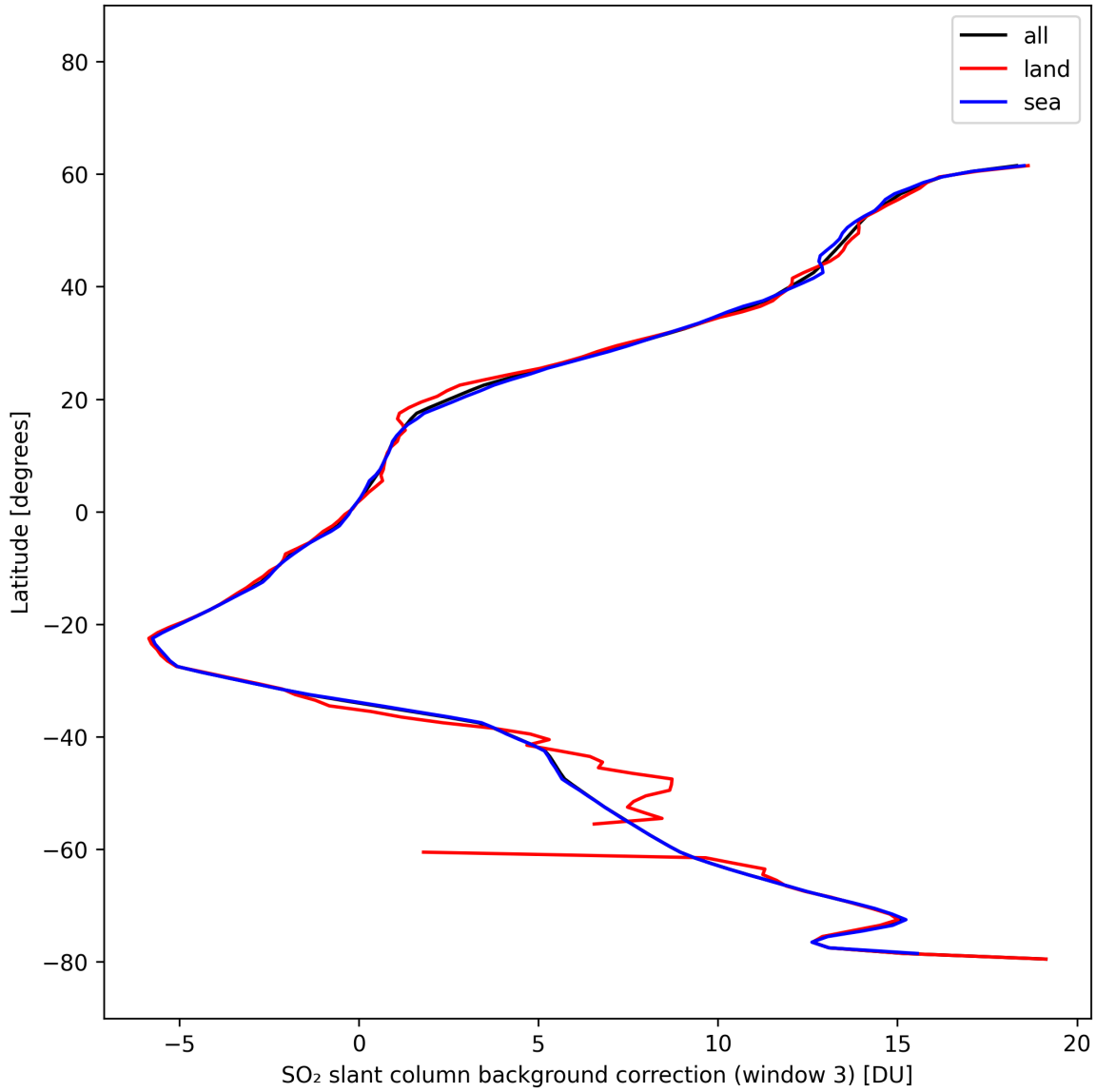

Figure 47: Zonal average of "SO_2 slant column background correction (window 3)" for 2025-02-25 to 2025-02-26.

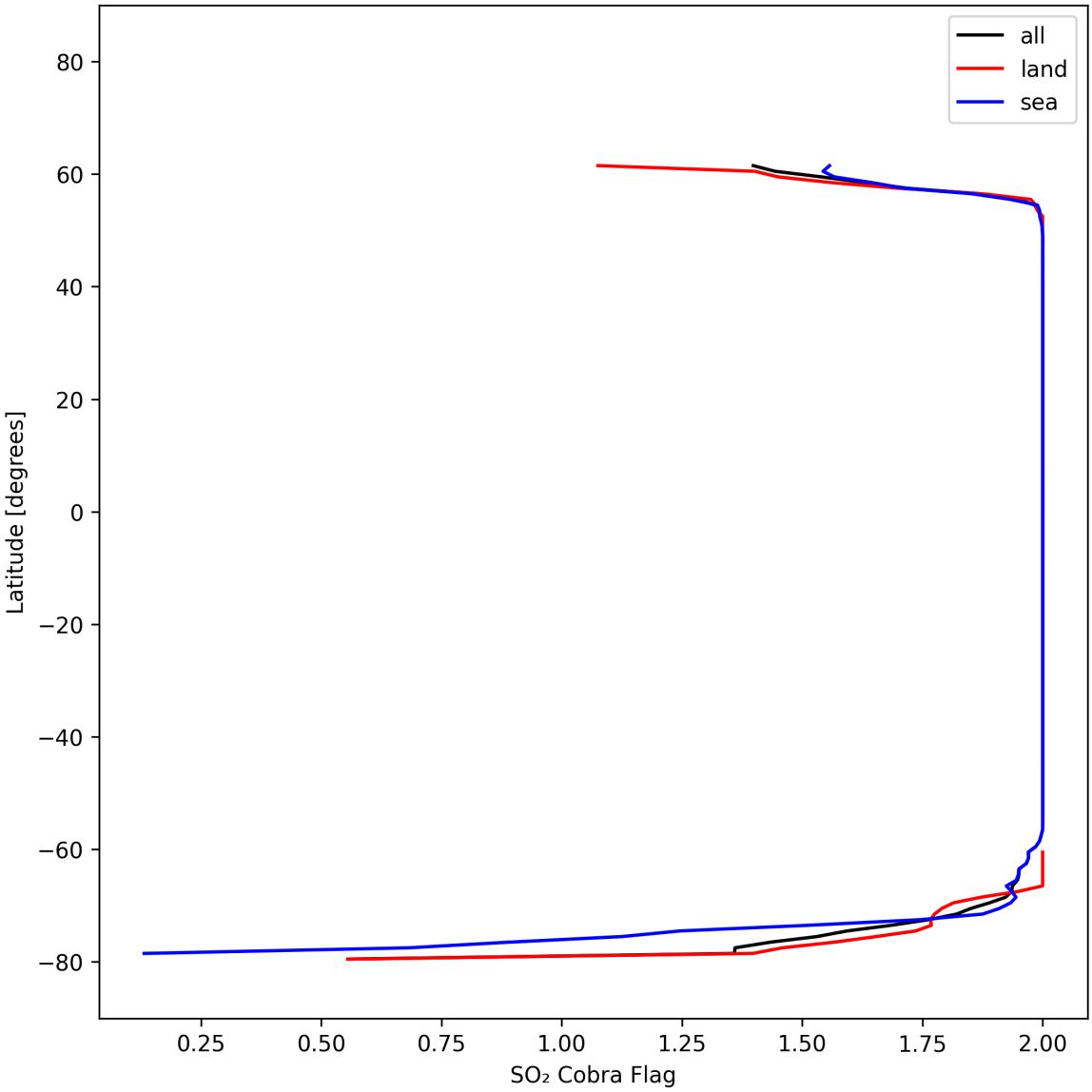

Figure 48: Zonal average of "SO_2 Cobra Flag" for 2025-02-25 to 2025-02-26.

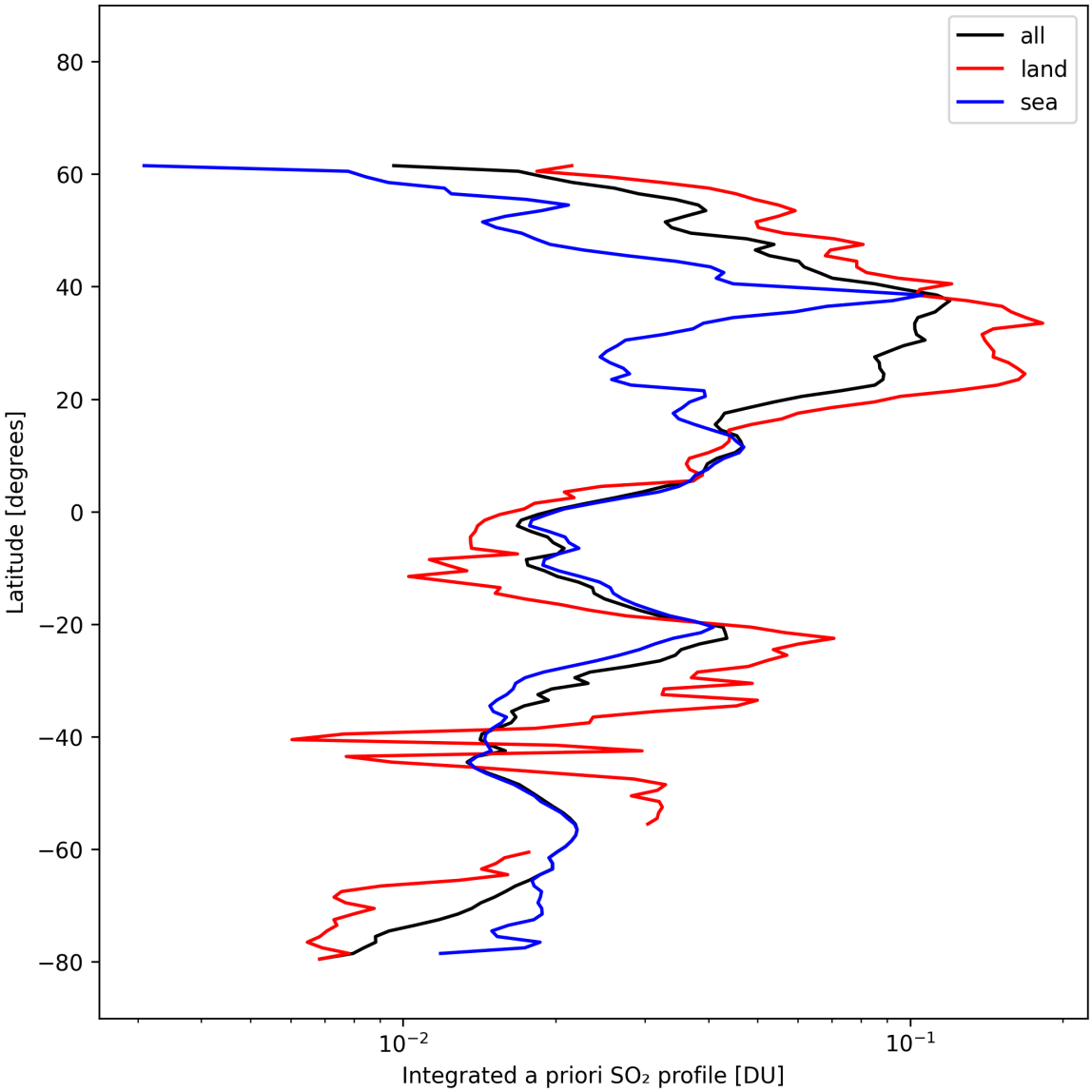

Figure 49: Zonal average of “Integrated a priori SO_2 profile” for 2025-02-25 to 2025-02-26.

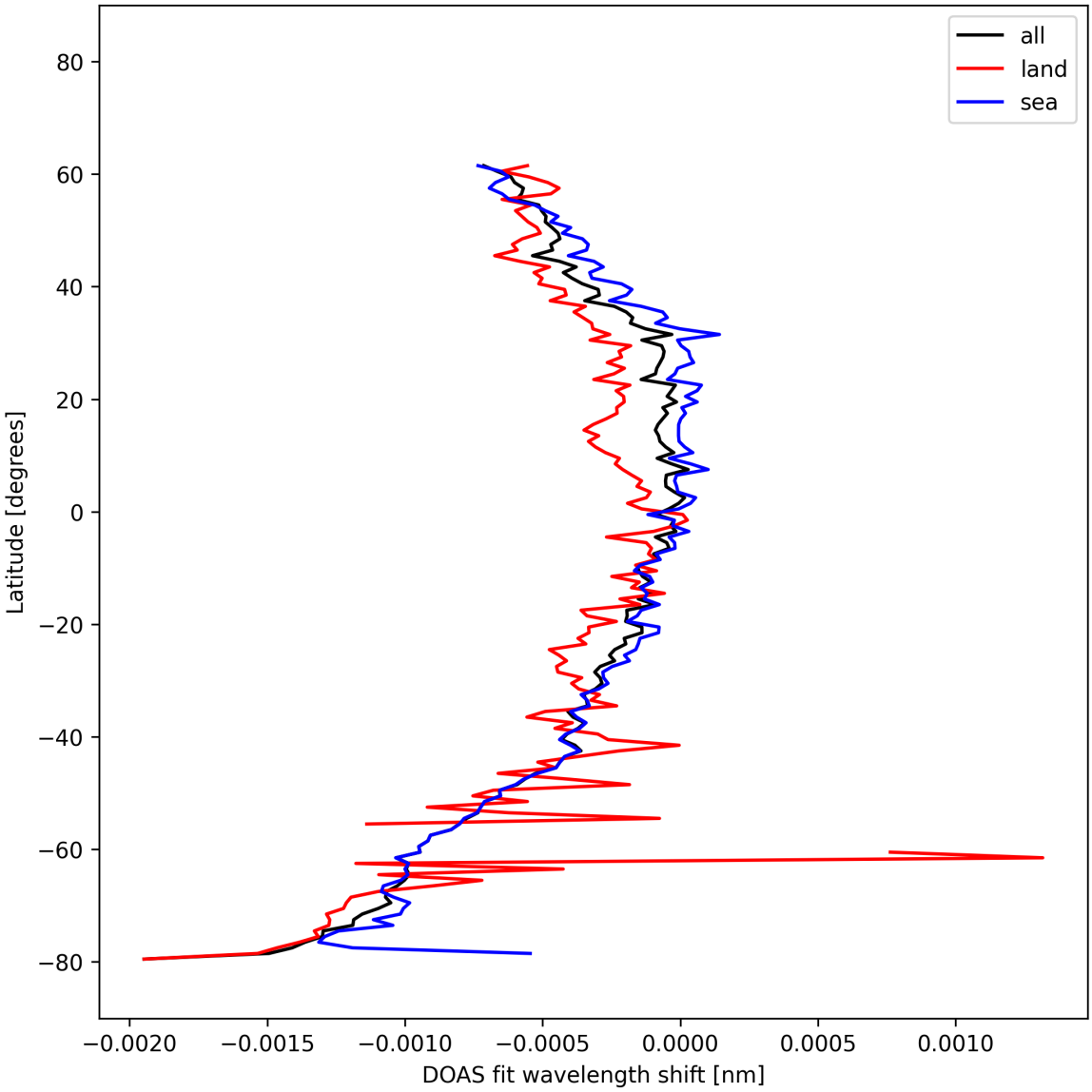

Figure 50: Zonal average of “DOAS fit wavelength shift” for 2025-02-25 to 2025-02-26.

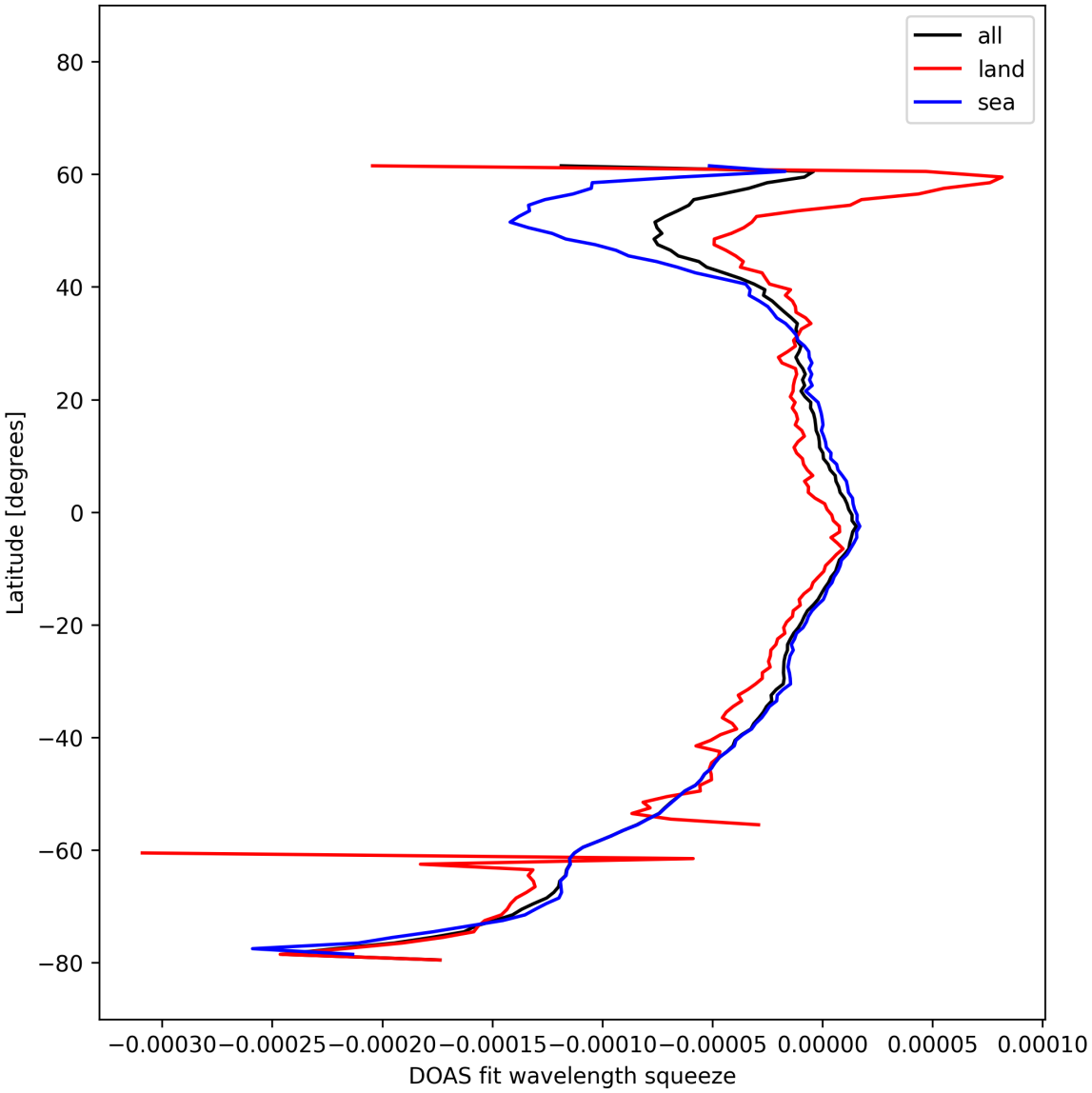

Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-02-25 to 2025-02-26.

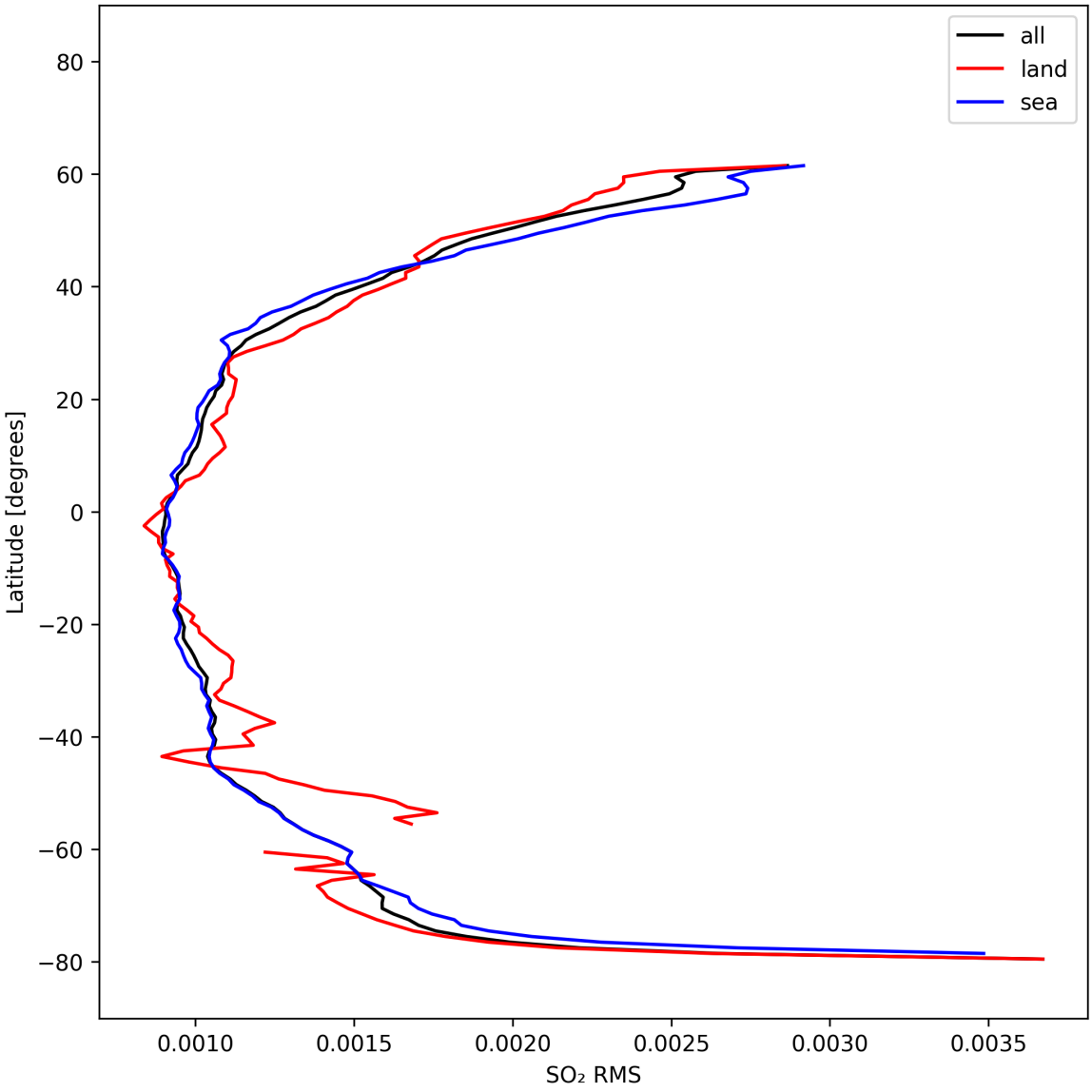

Figure 52: Zonal average of "SO_2 RMS" for 2025-02-25 to 2025-02-26.

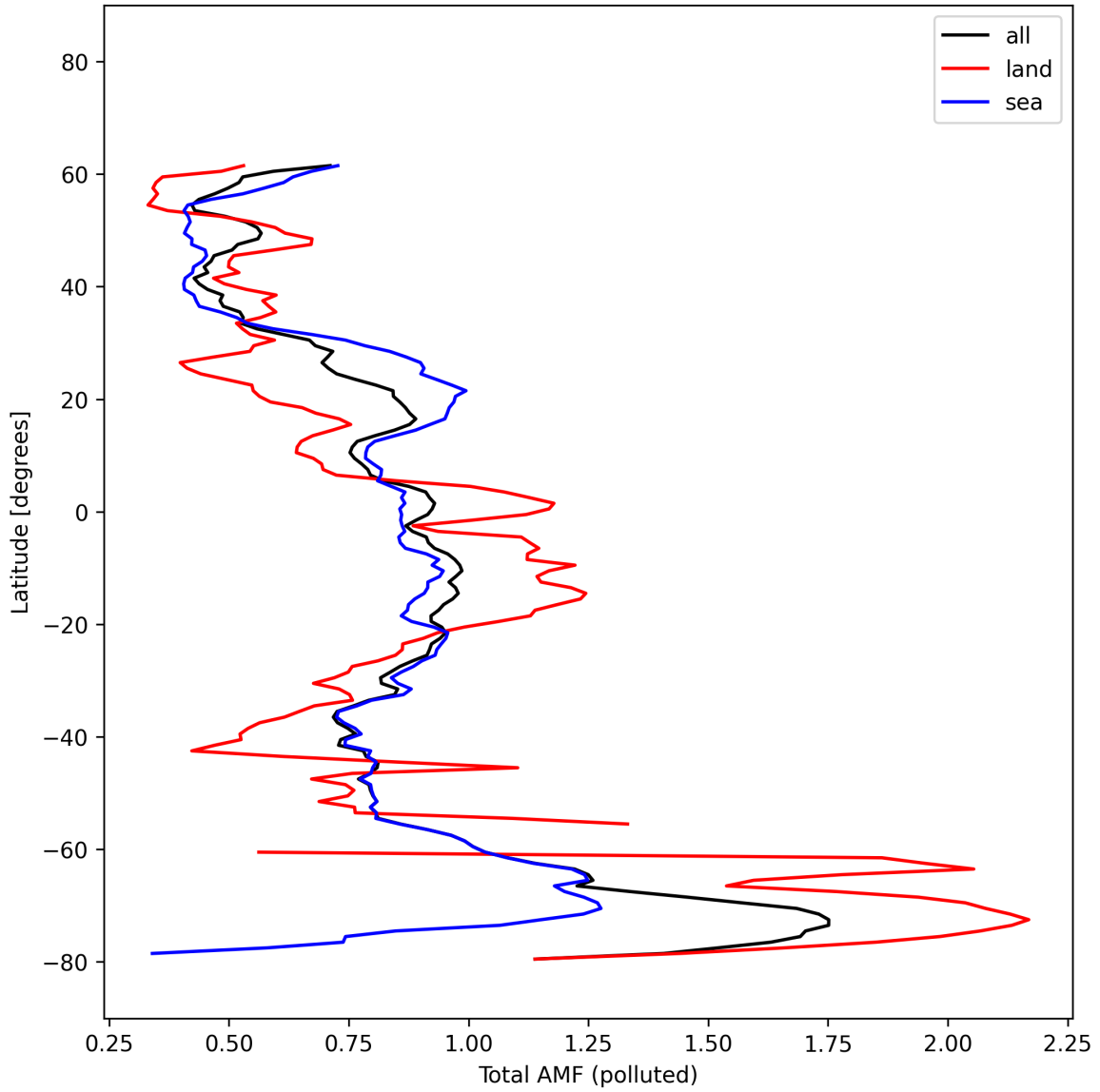

Figure 53: Zonal average of “Total AMF (polluted)” for 2025-02-25 to 2025-02-26.

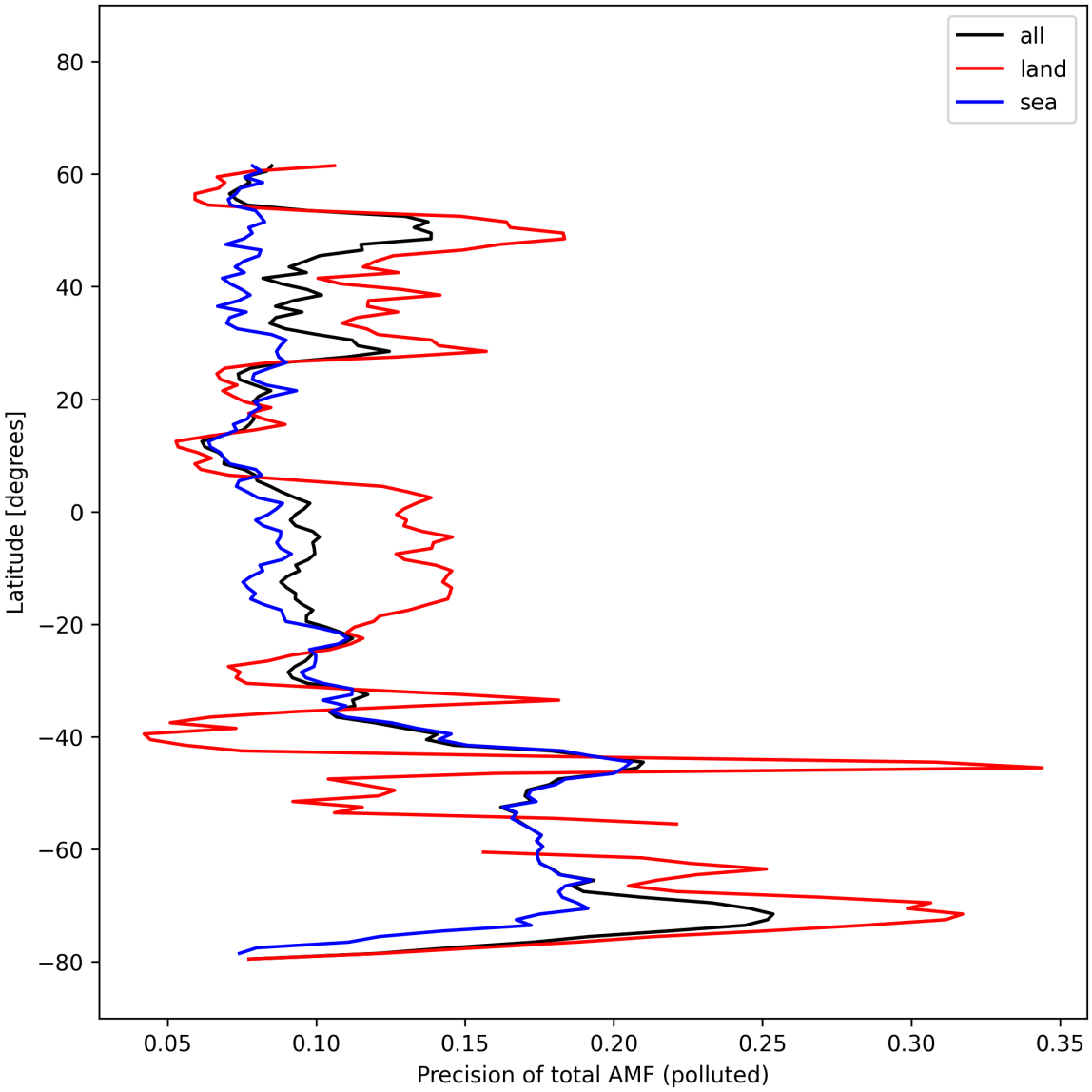

Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-02-25 to 2025-02-26.

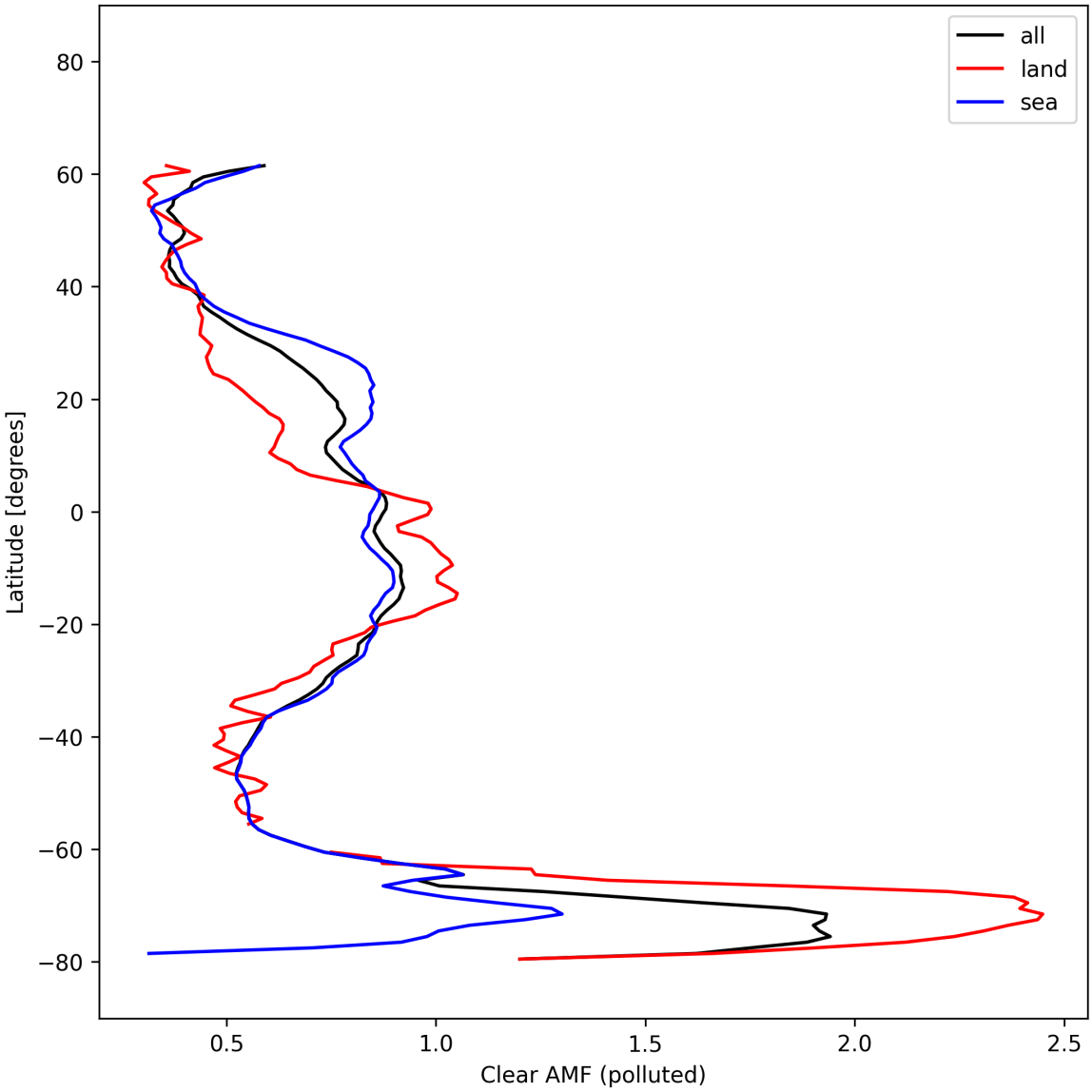

Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-02-25 to 2025-02-26.

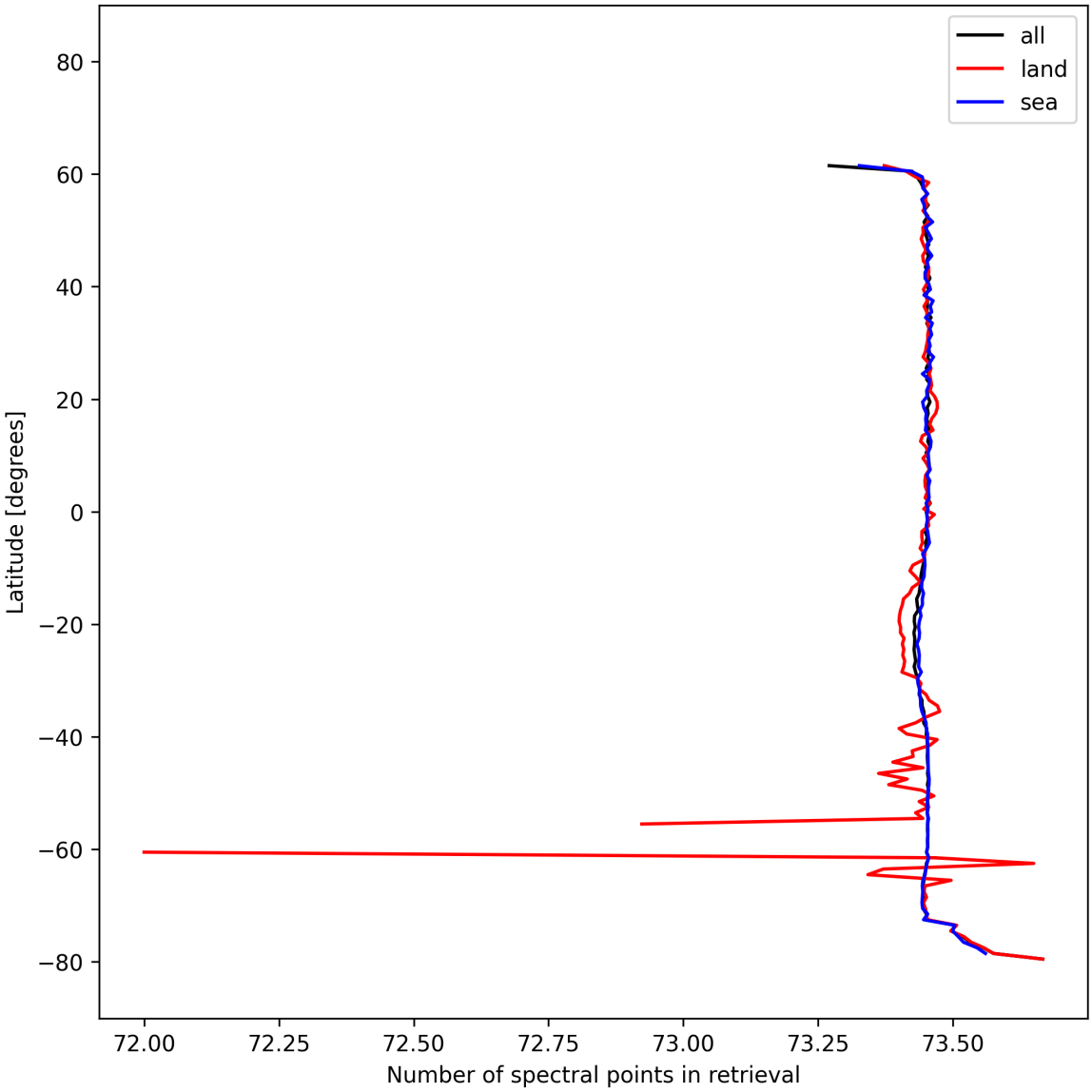

Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-02-25 to 2025-02-26.

8 Histograms

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

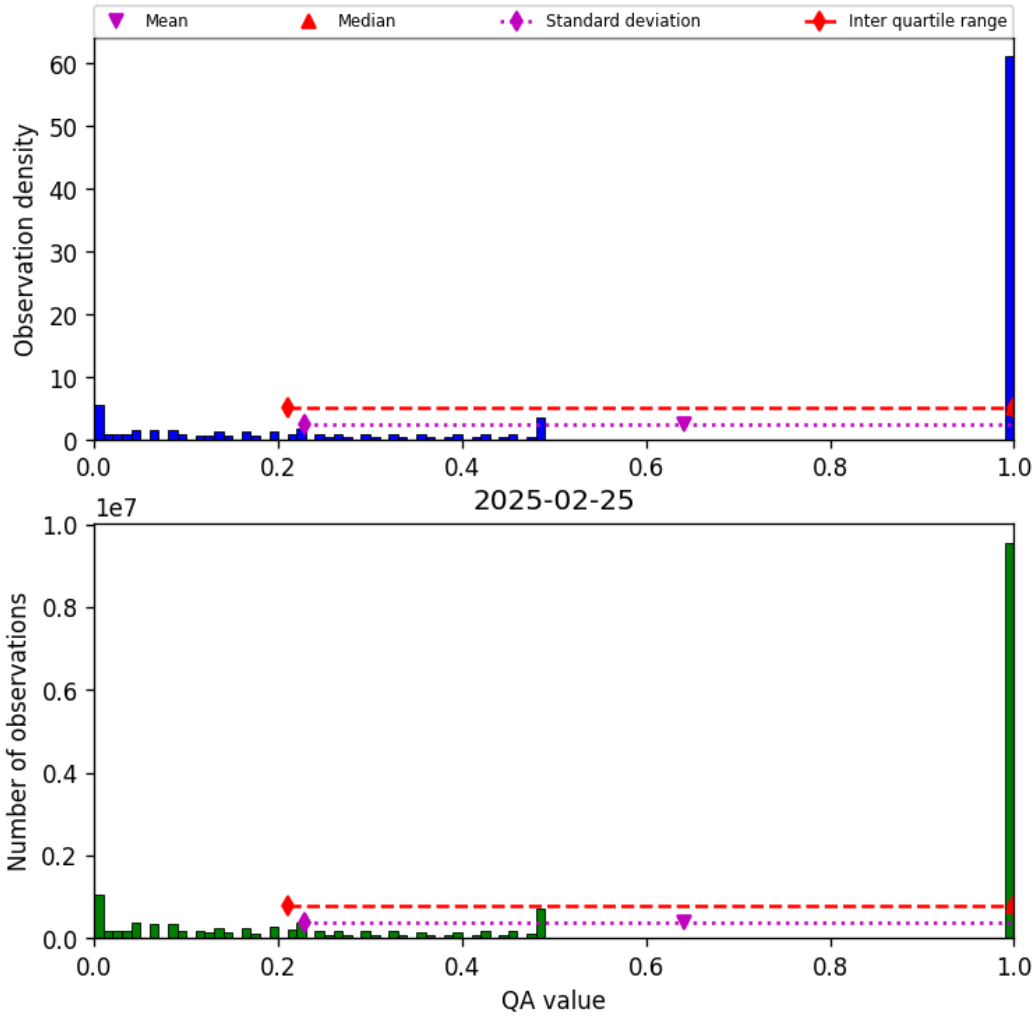

Figure 57: Histogram of “QA value” for 2025-02-25 to 2025-02-26

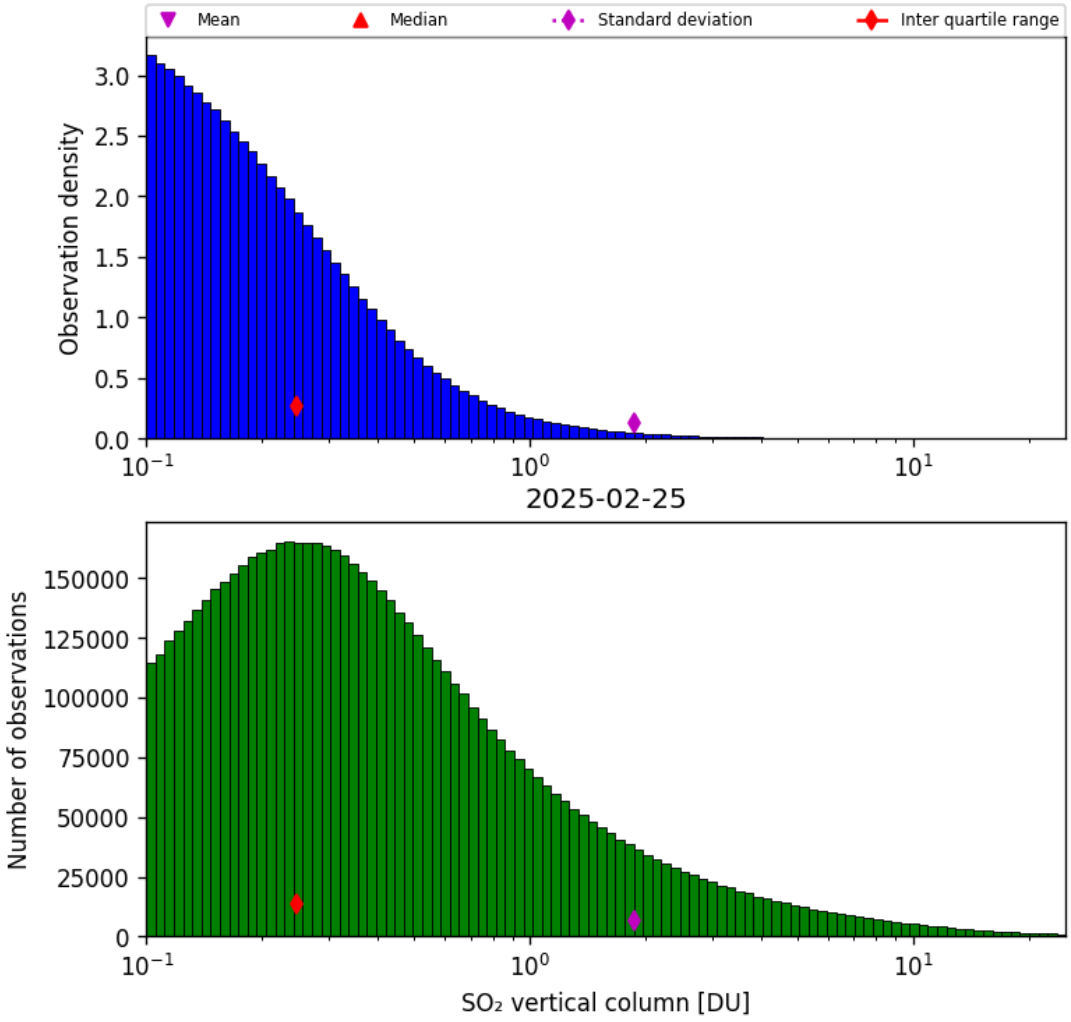

Figure 58: Histogram of "SO_2 vertical column" for 2025-02-25 to 2025-02-26

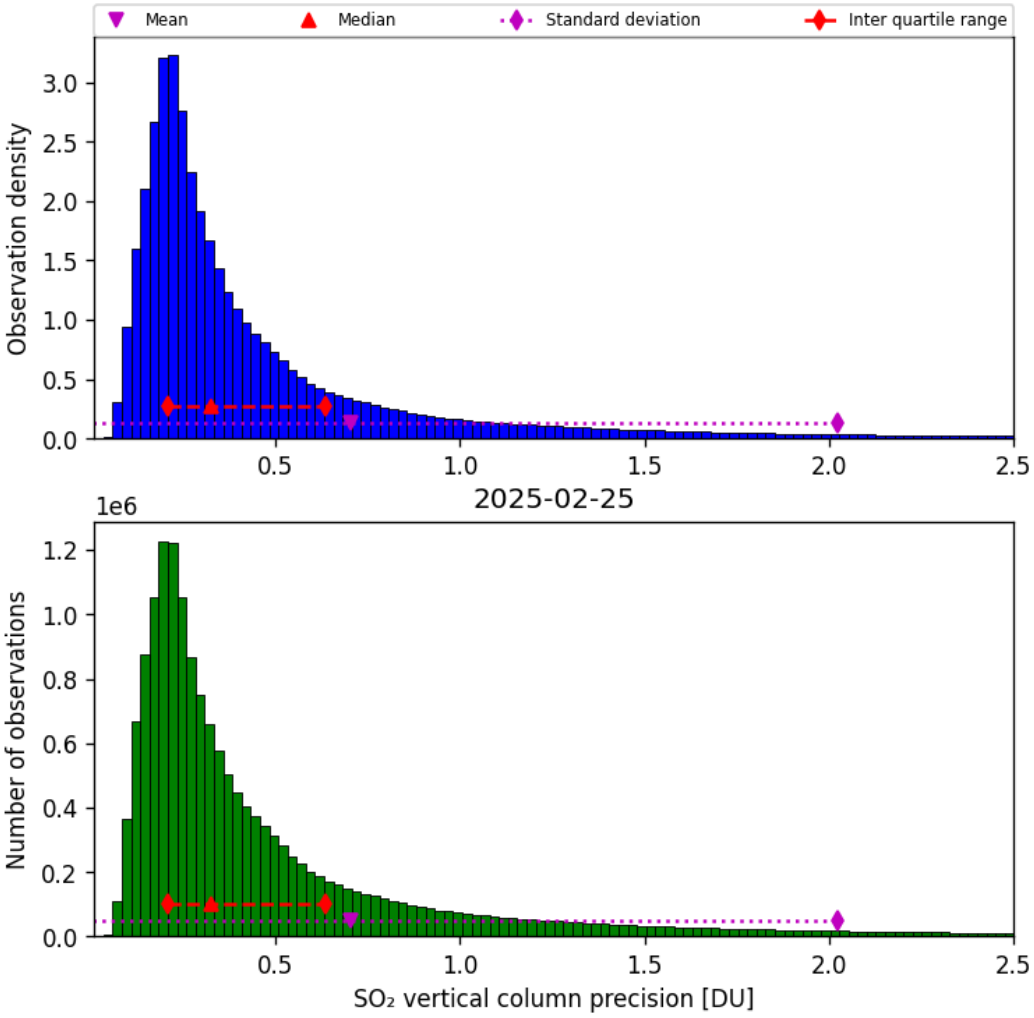

Figure 59: Histogram of "SO_2 vertical column precision" for 2025-02-25 to 2025-02-26

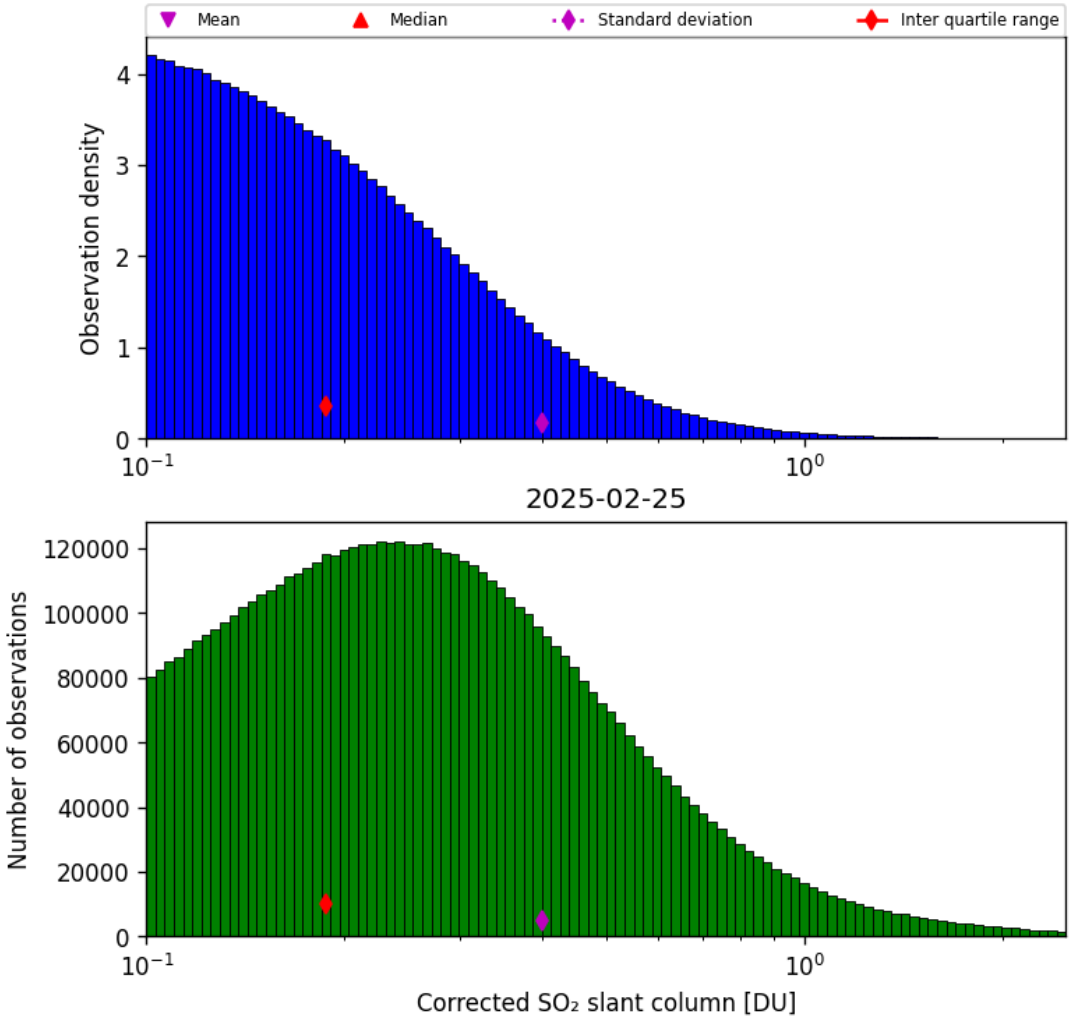

Figure 60: Histogram of "Corrected SO_2 slant column" for 2025-02-25 to 2025-02-26

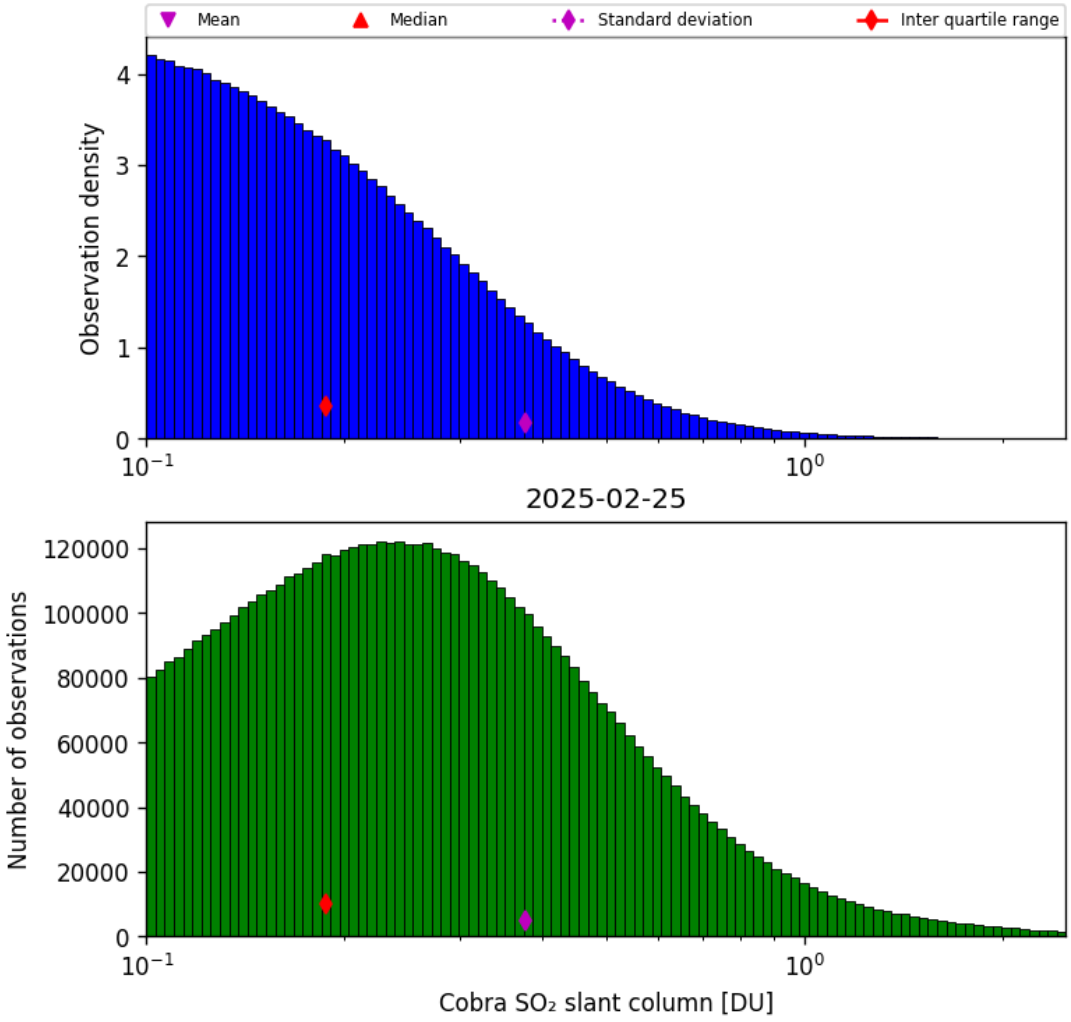

Figure 61: Histogram of "Cobra SO_2 slant column" for 2025-02-25 to 2025-02-26

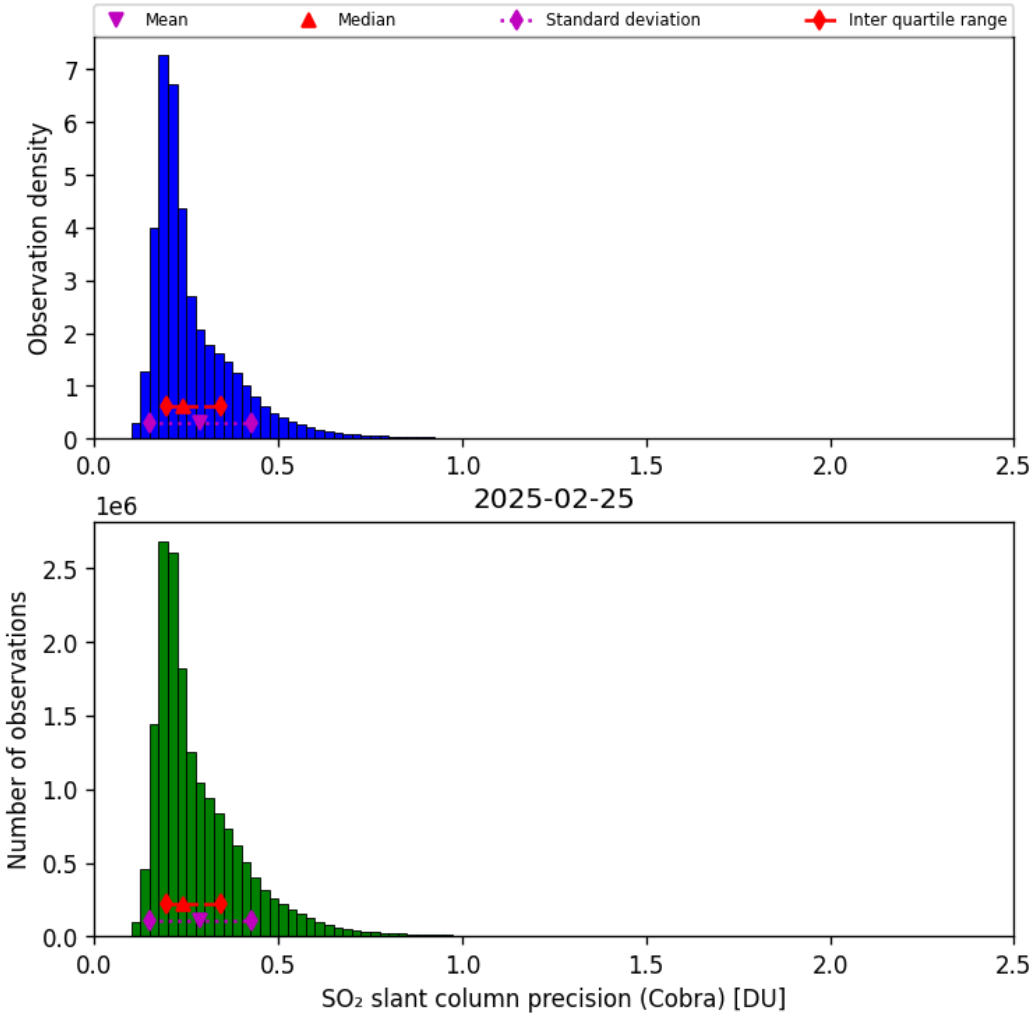

Figure 62: Histogram of "SO_2 slant column precision (Cobra)" for 2025-02-25 to 2025-02-26

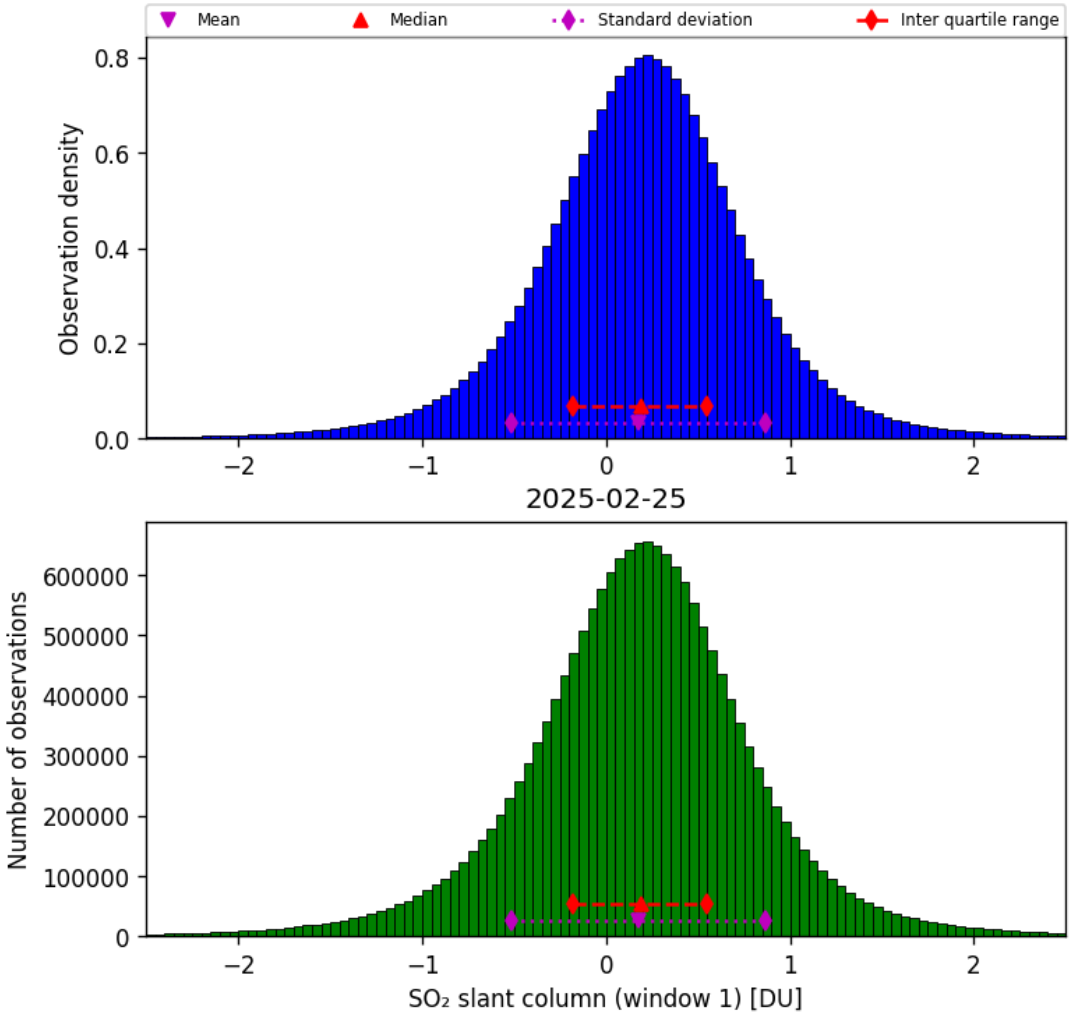

Figure 63: Histogram of "SO_2 slant column (window 1)" for 2025-02-25 to 2025-02-26

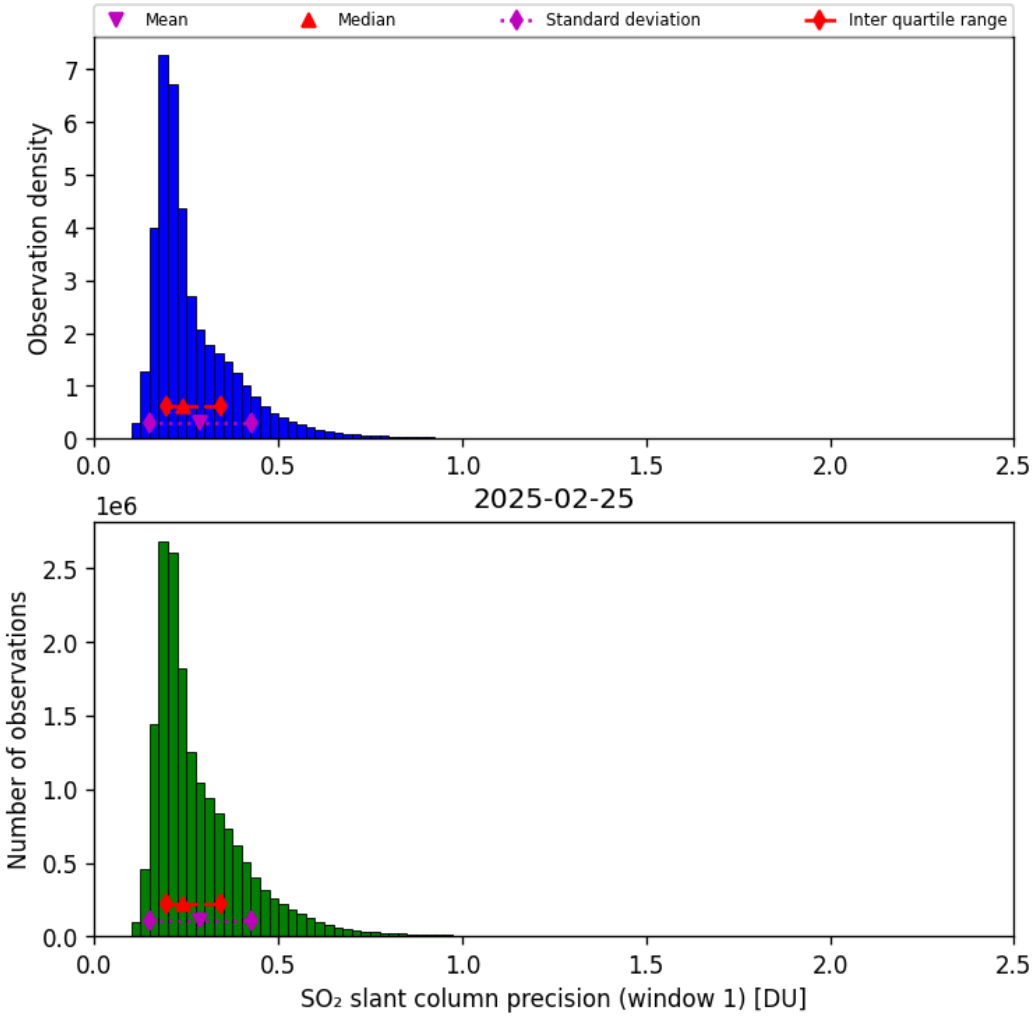

Figure 64: Histogram of "SO_2 slant column precision (window 1)" for 2025-02-25 to 2025-02-26

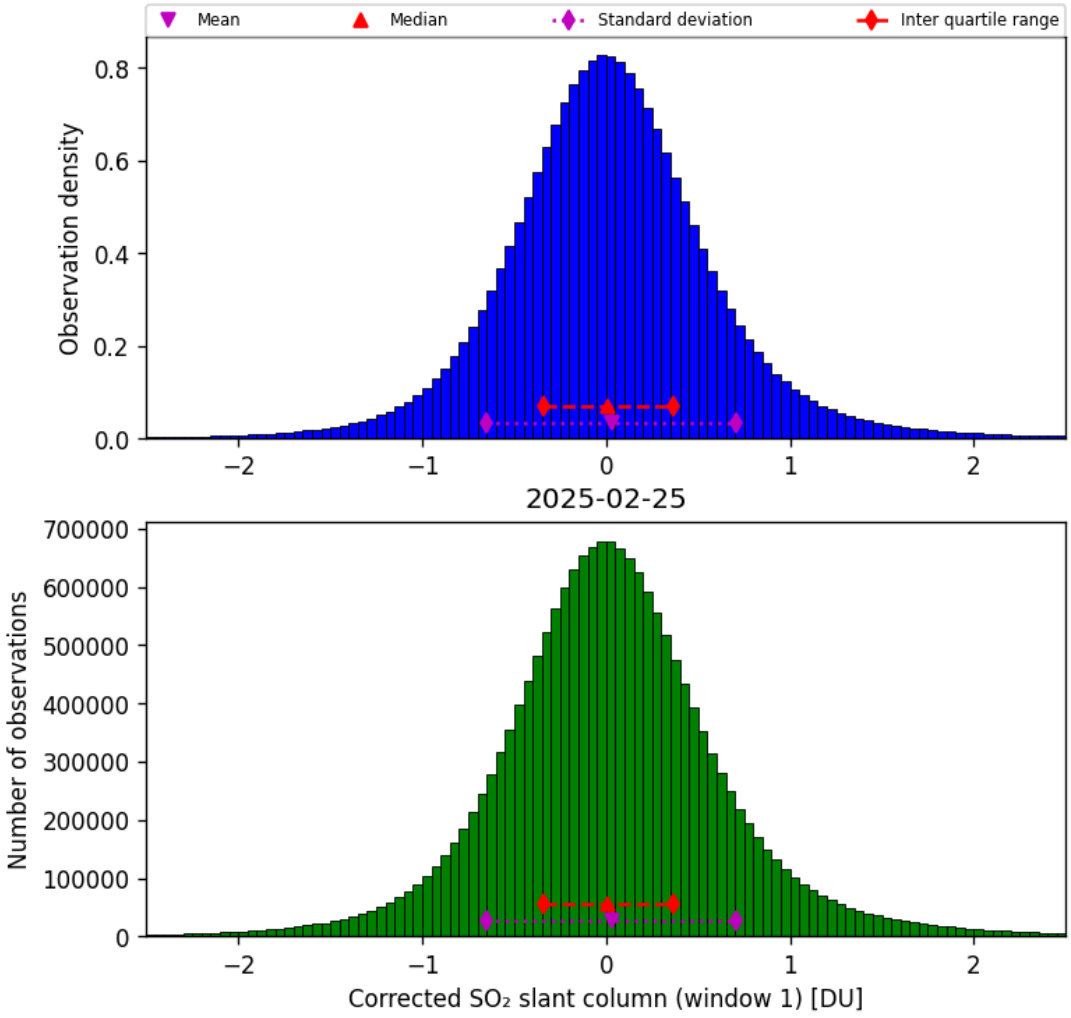

Figure 65: Histogram of "Corrected SO_2 slant column (window 1)" for 2025-02-25 to 2025-02-26

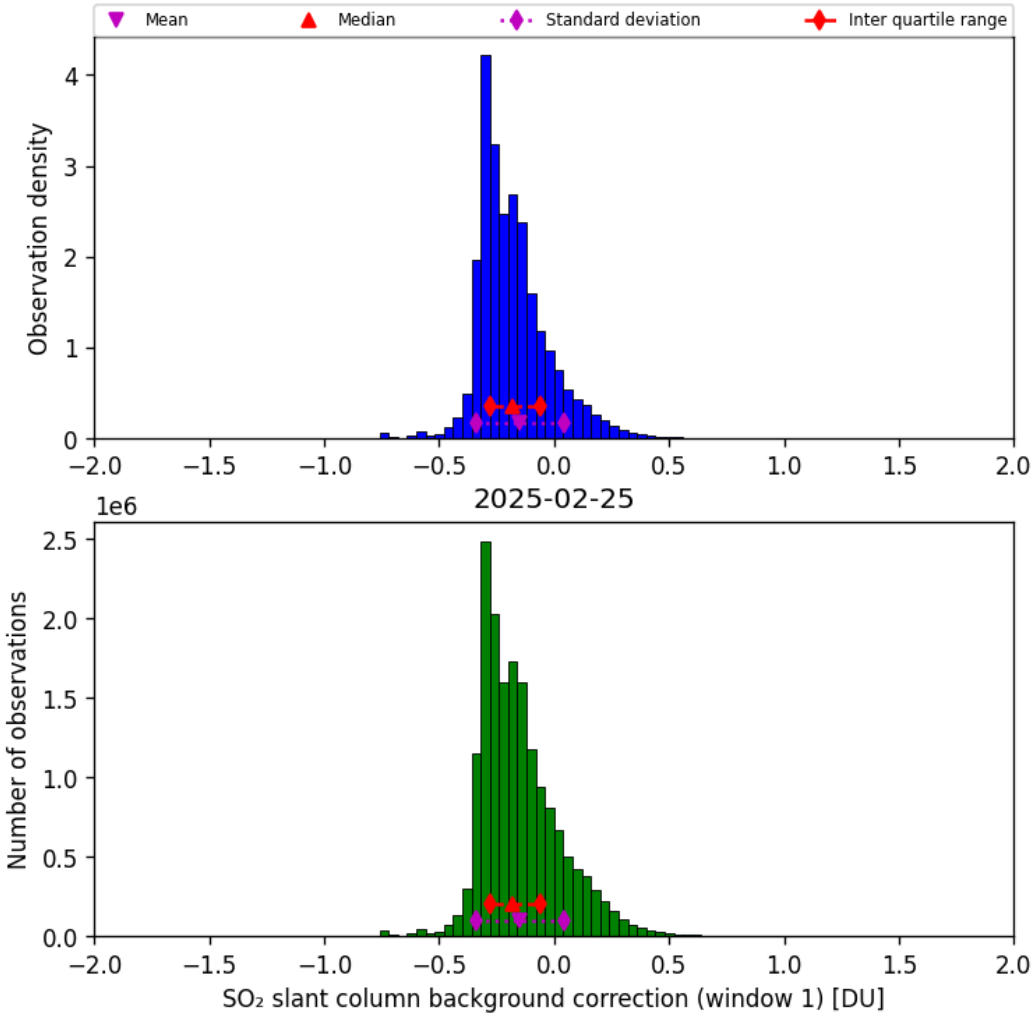

Figure 66: Histogram of "SO_2 slant column background correction (window 1)" for 2025-02-25 to 2025-02-26

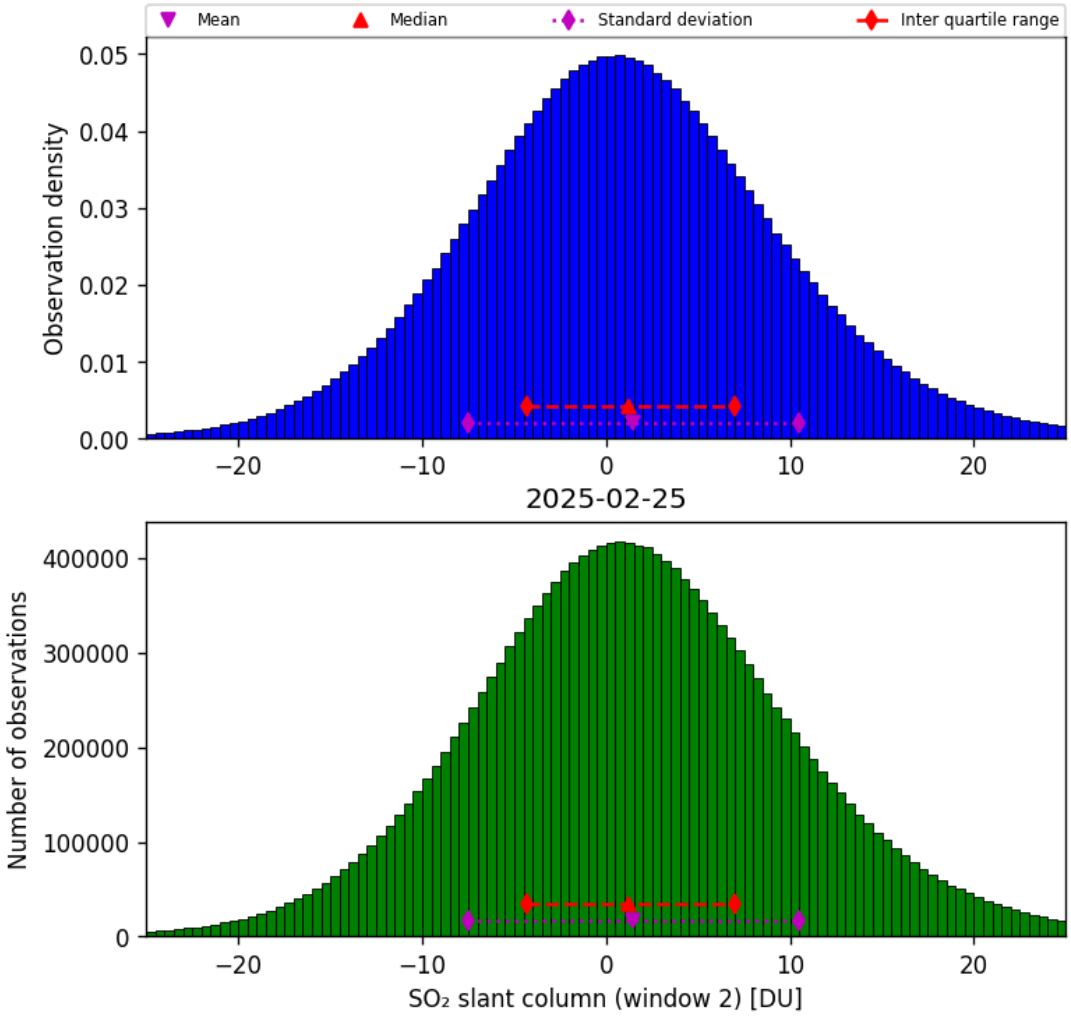

Figure 67: Histogram of "SO_2 slant column (window 2)" for 2025-02-25 to 2025-02-26

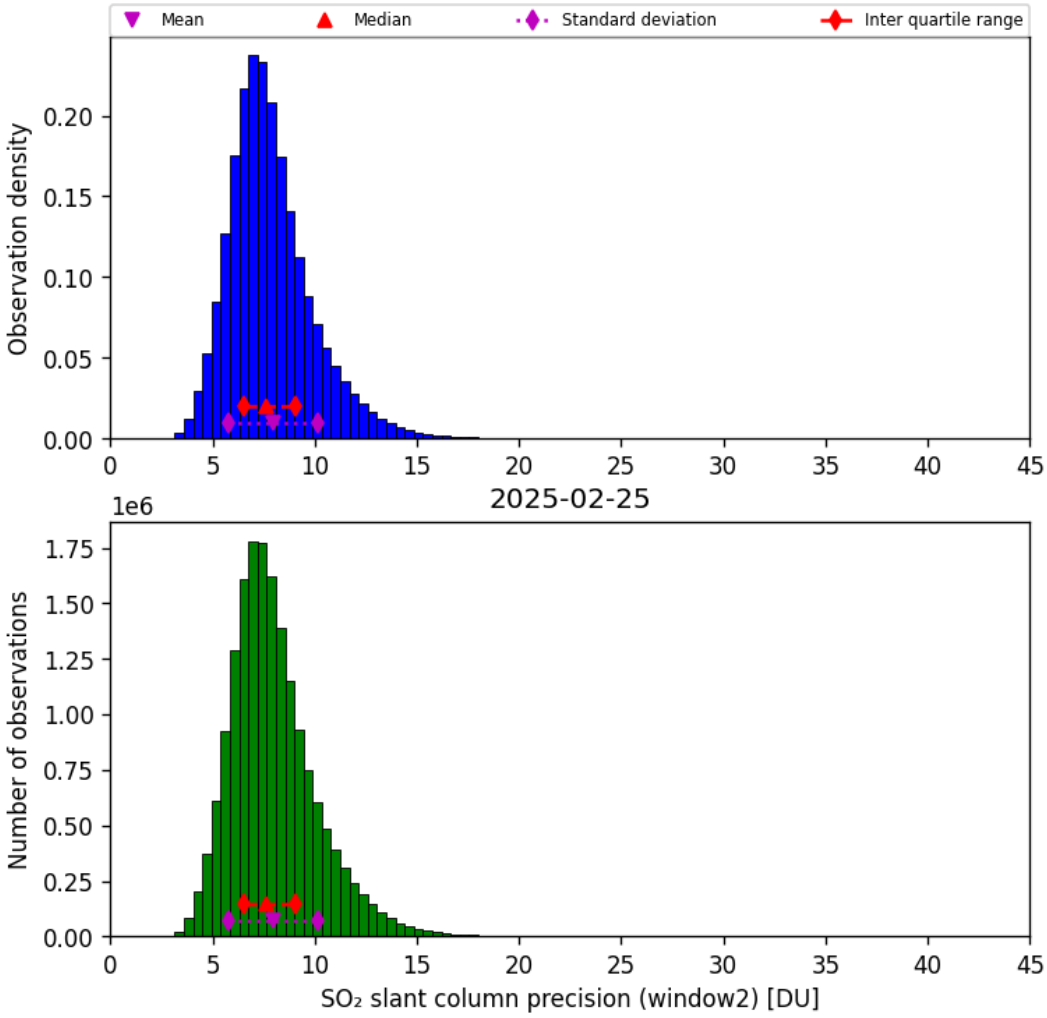

Figure 68: Histogram of "SO_2 slant column precision (window2)" for 2025-02-25 to 2025-02-26

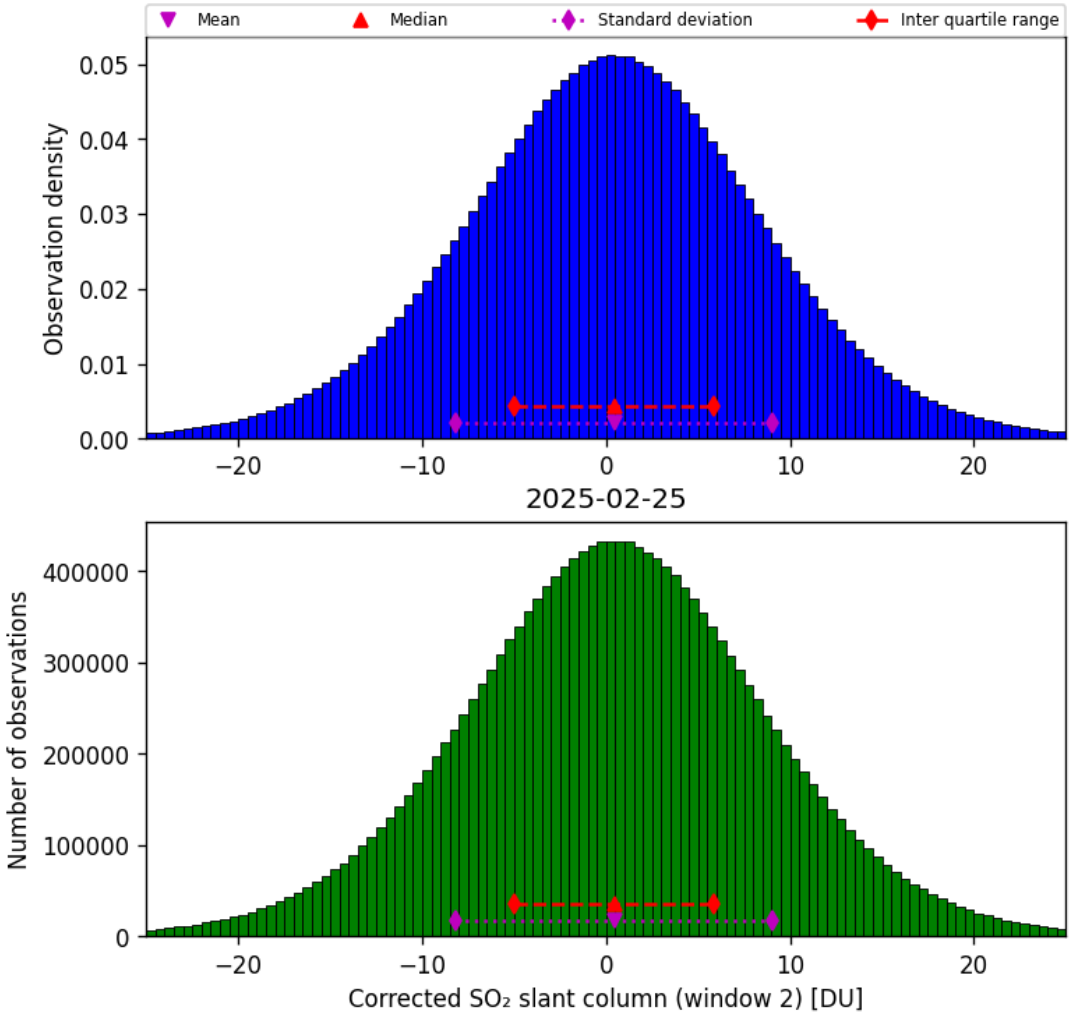

Figure 69: Histogram of "Corrected SO_2 slant column (window 2)" for 2025-02-25 to 2025-02-26

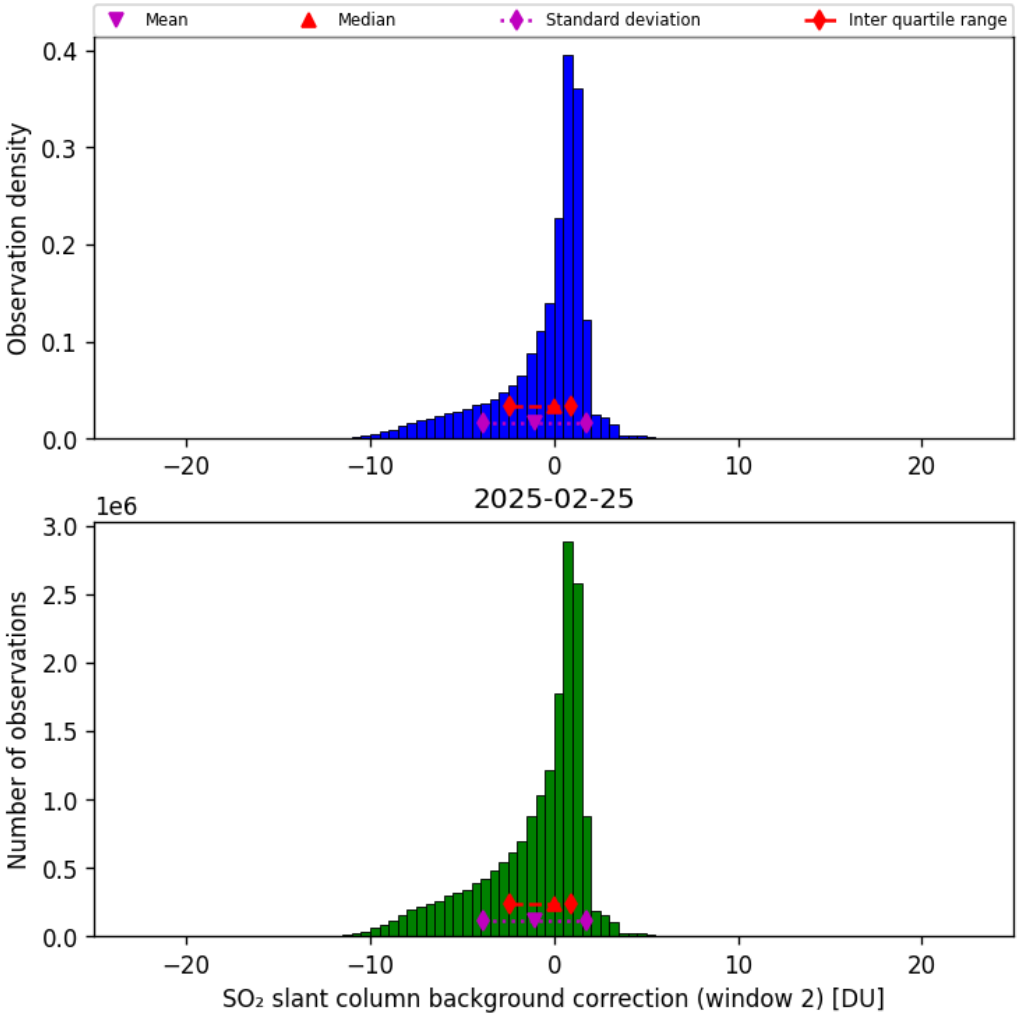

Figure 70: Histogram of "SO_2 slant column background correction (window 2)" for 2025-02-25 to 2025-02-26

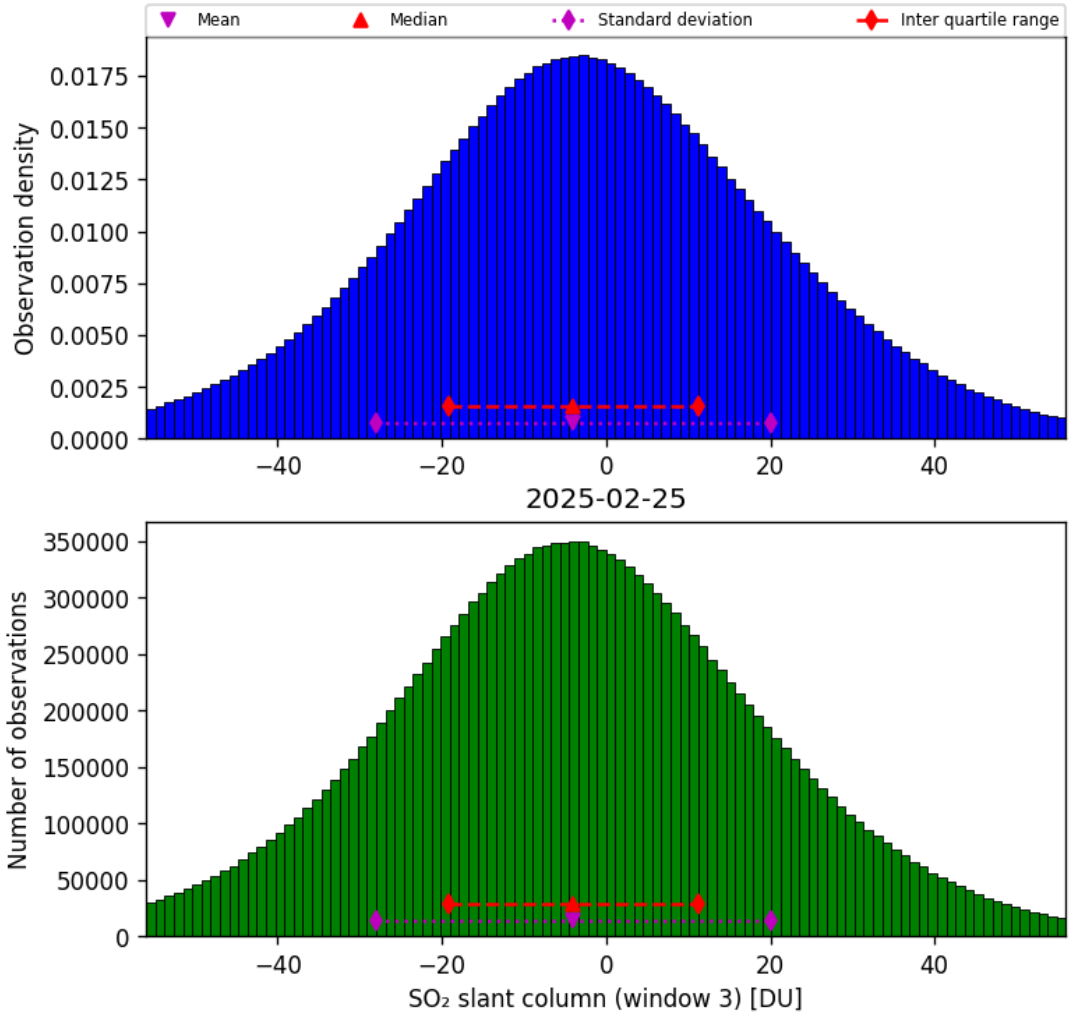

Figure 71: Histogram of "SO_2 slant column (window 3)" for 2025-02-25 to 2025-02-26

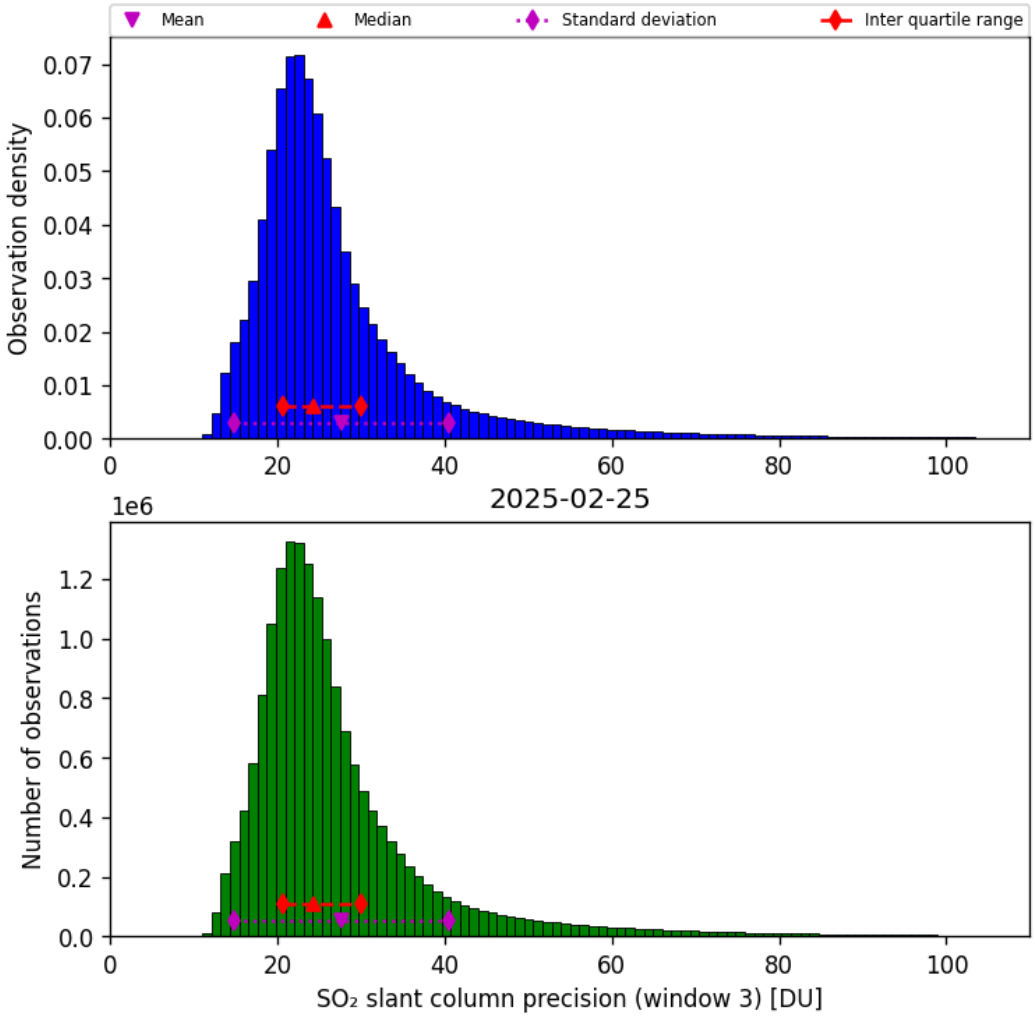

Figure 72: Histogram of "SO_2 slant column precision (window 3)" for 2025-02-25 to 2025-02-26

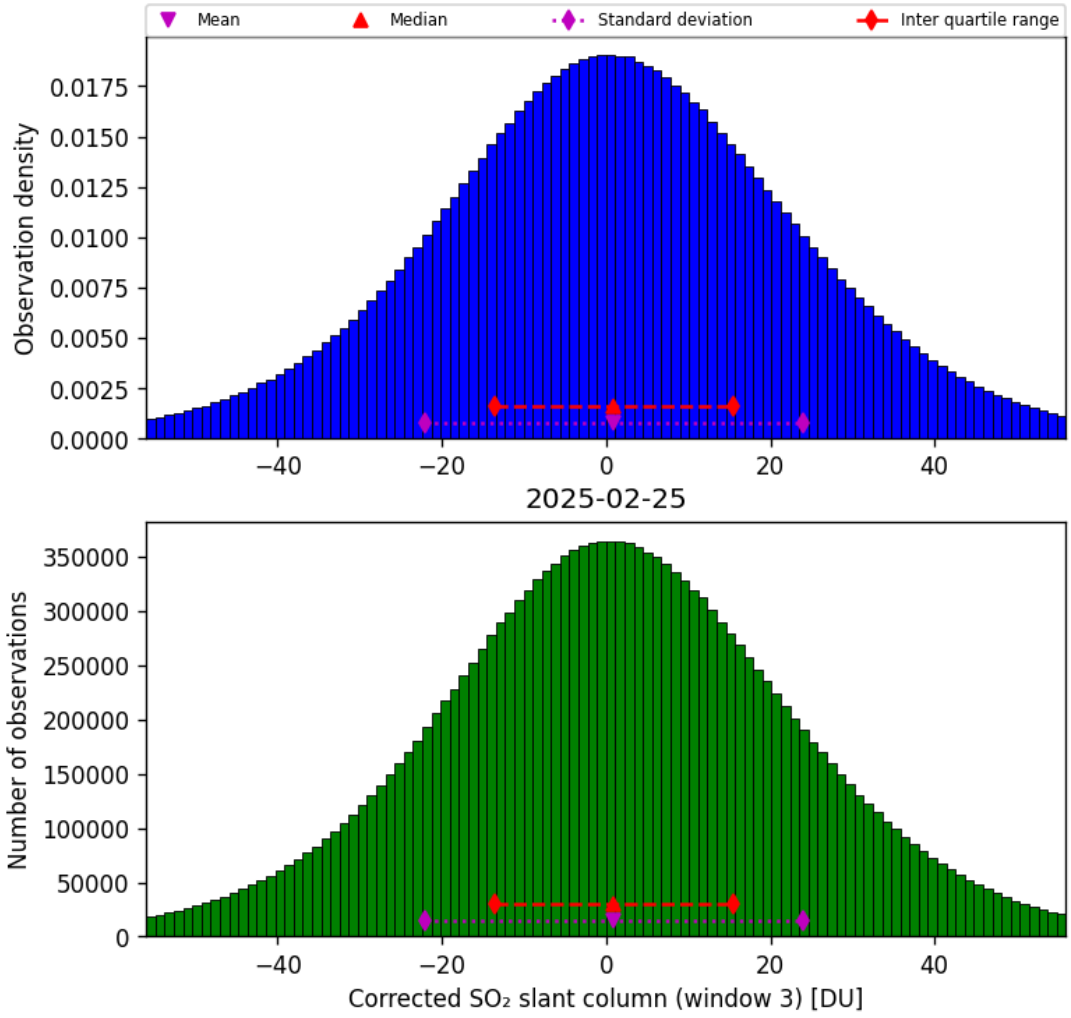

Figure 73: Histogram of "Corrected SO_2 slant column (window 3)" for 2025-02-25 to 2025-02-26

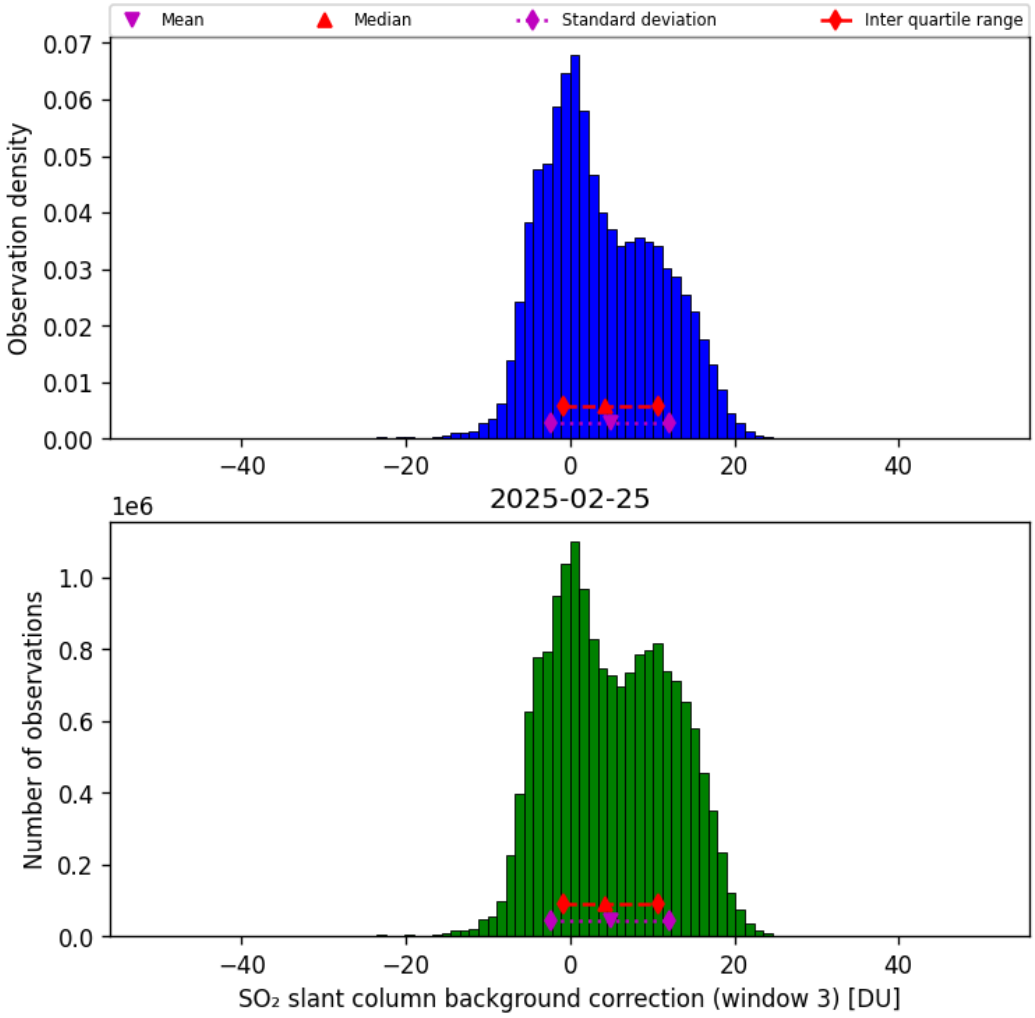

Figure 74: Histogram of "SO_2 slant column background correction (window 3)" for 2025-02-25 to 2025-02-26

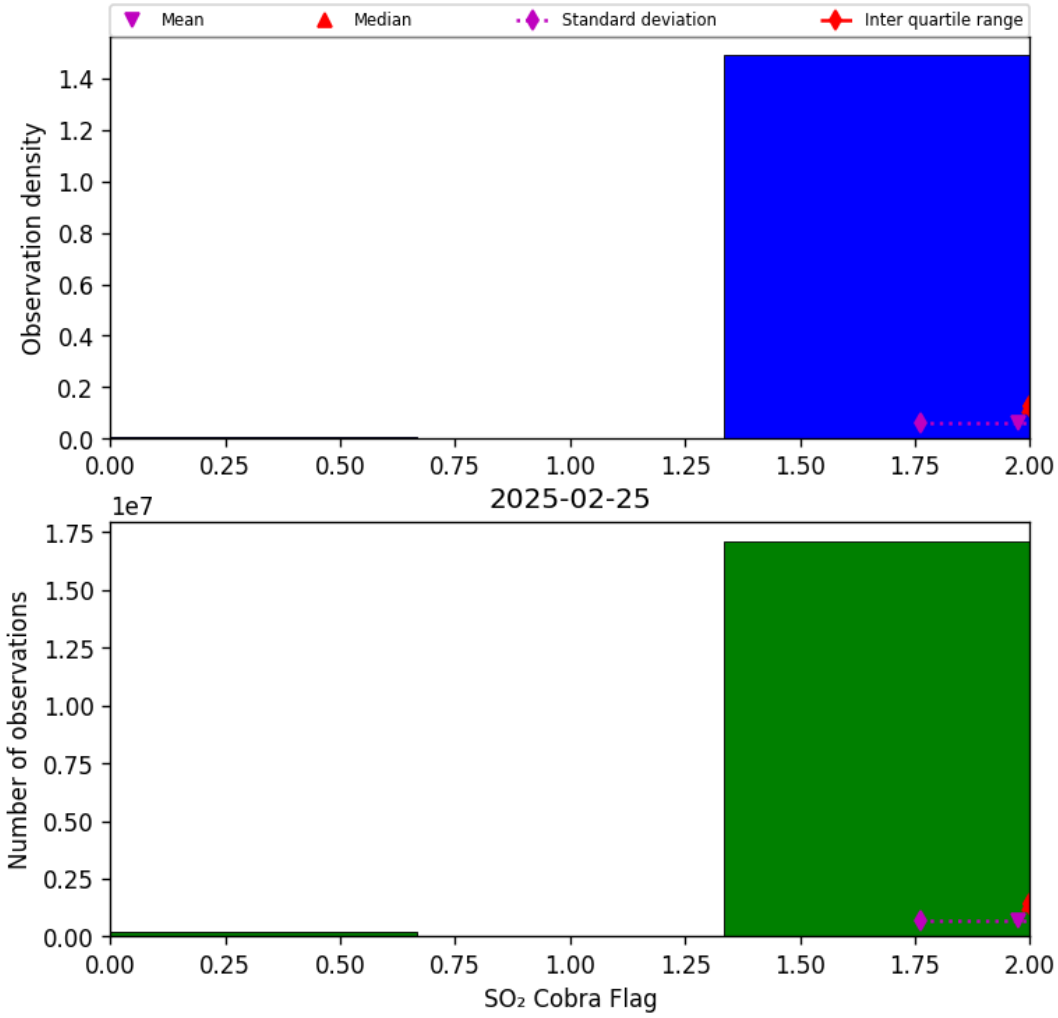

Figure 75: Histogram of "SO_2 Cobra Flag" for 2025-02-25 to 2025-02-26

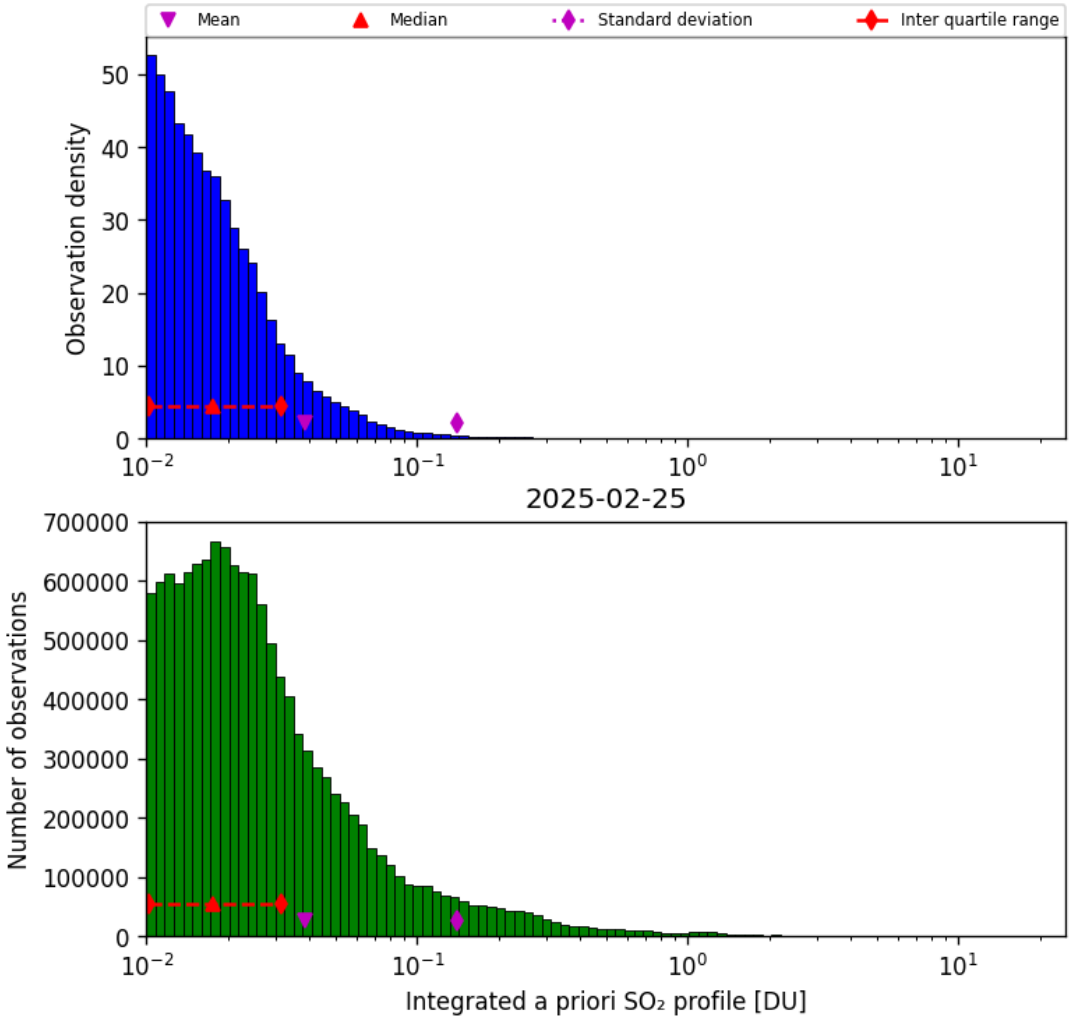

Figure 76: Histogram of "Integrated a priori SO_2 profile" for 2025-02-25 to 2025-02-26

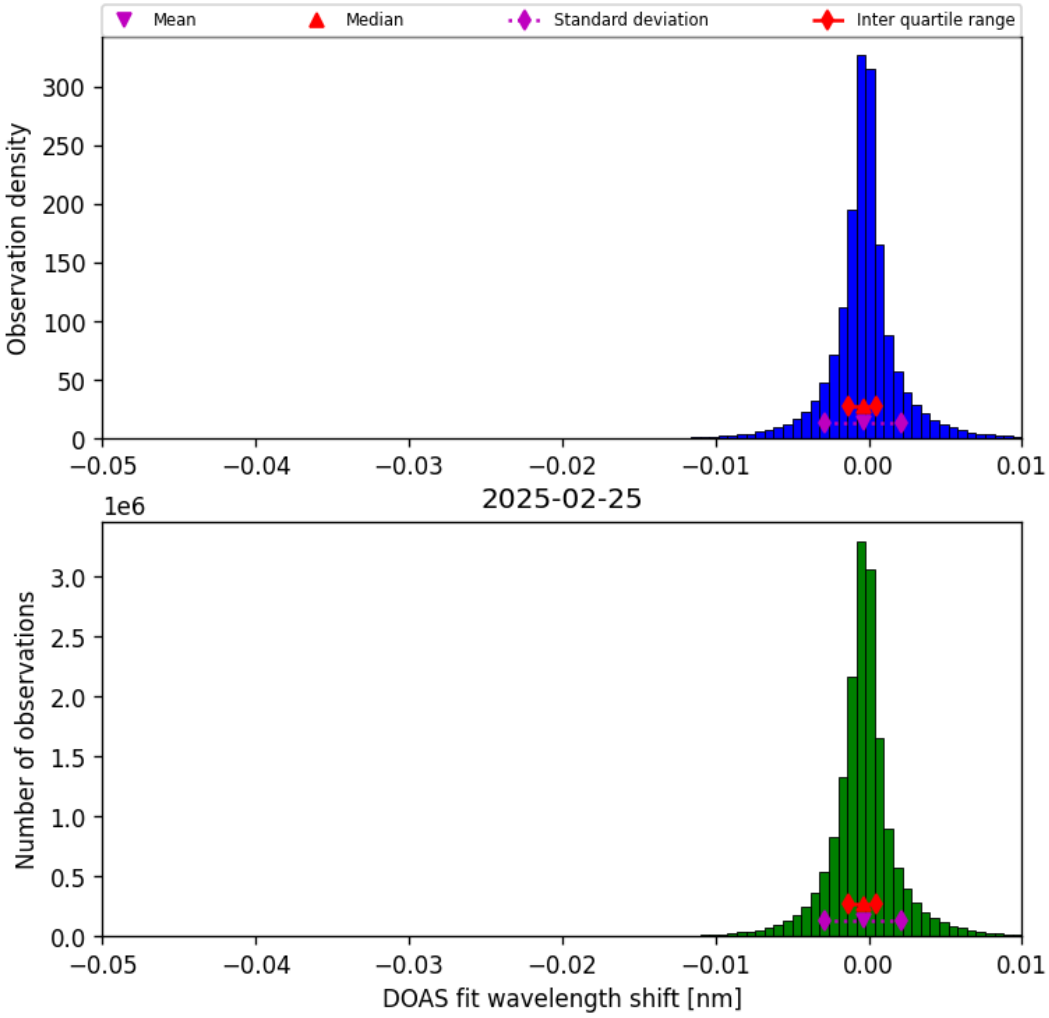

Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-02-25 to 2025-02-26

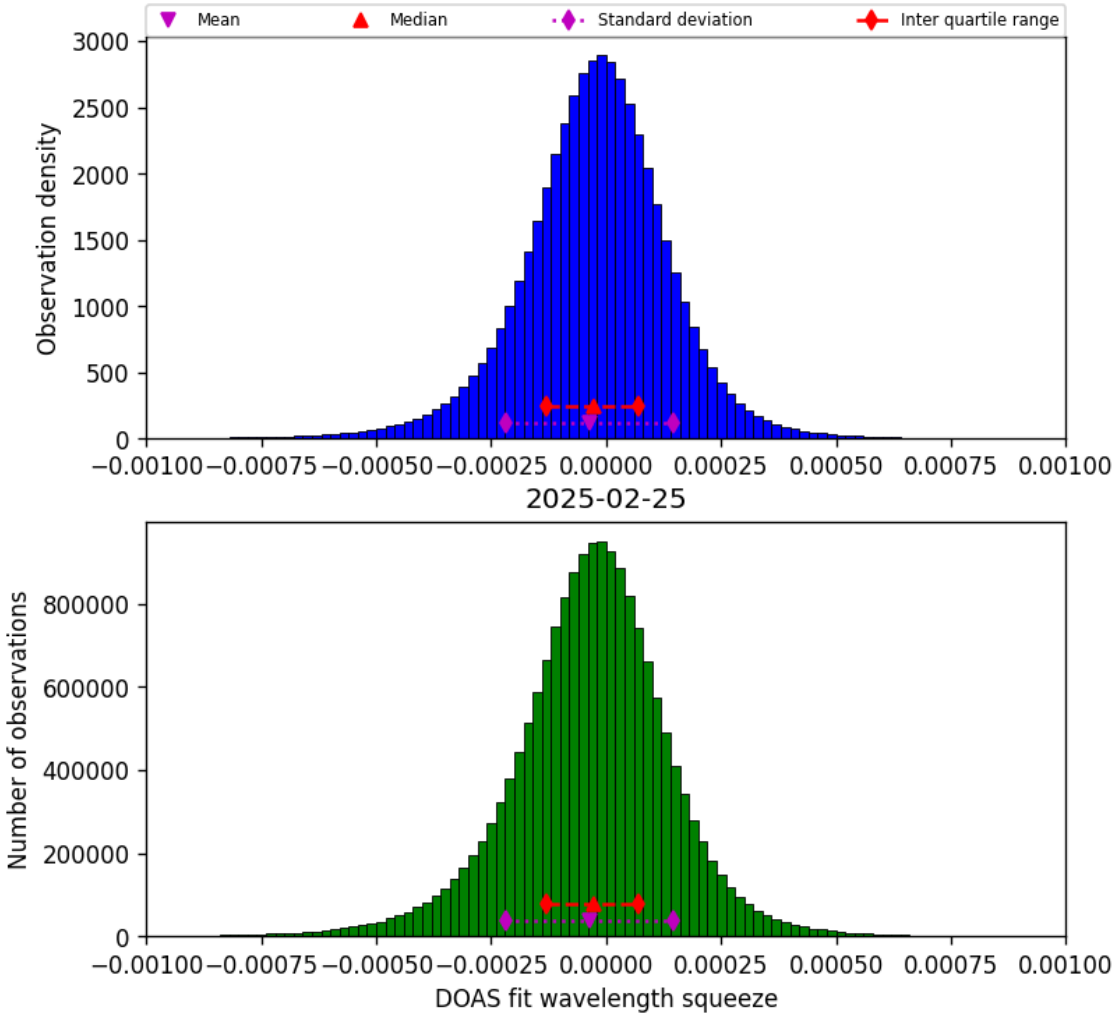

Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-02-25 to 2025-02-26

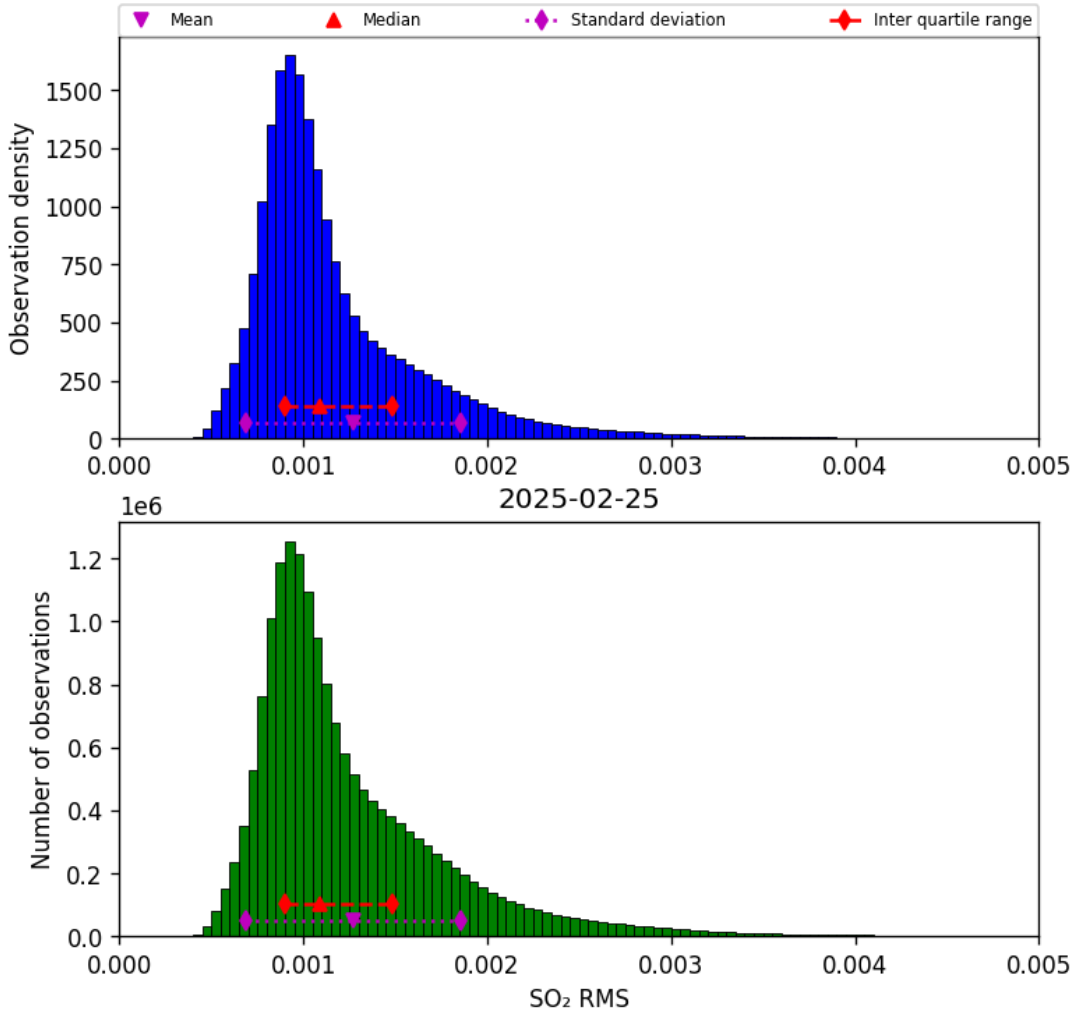

Figure 79: Histogram of "SO_2 RMS" for 2025-02-25 to 2025-02-26

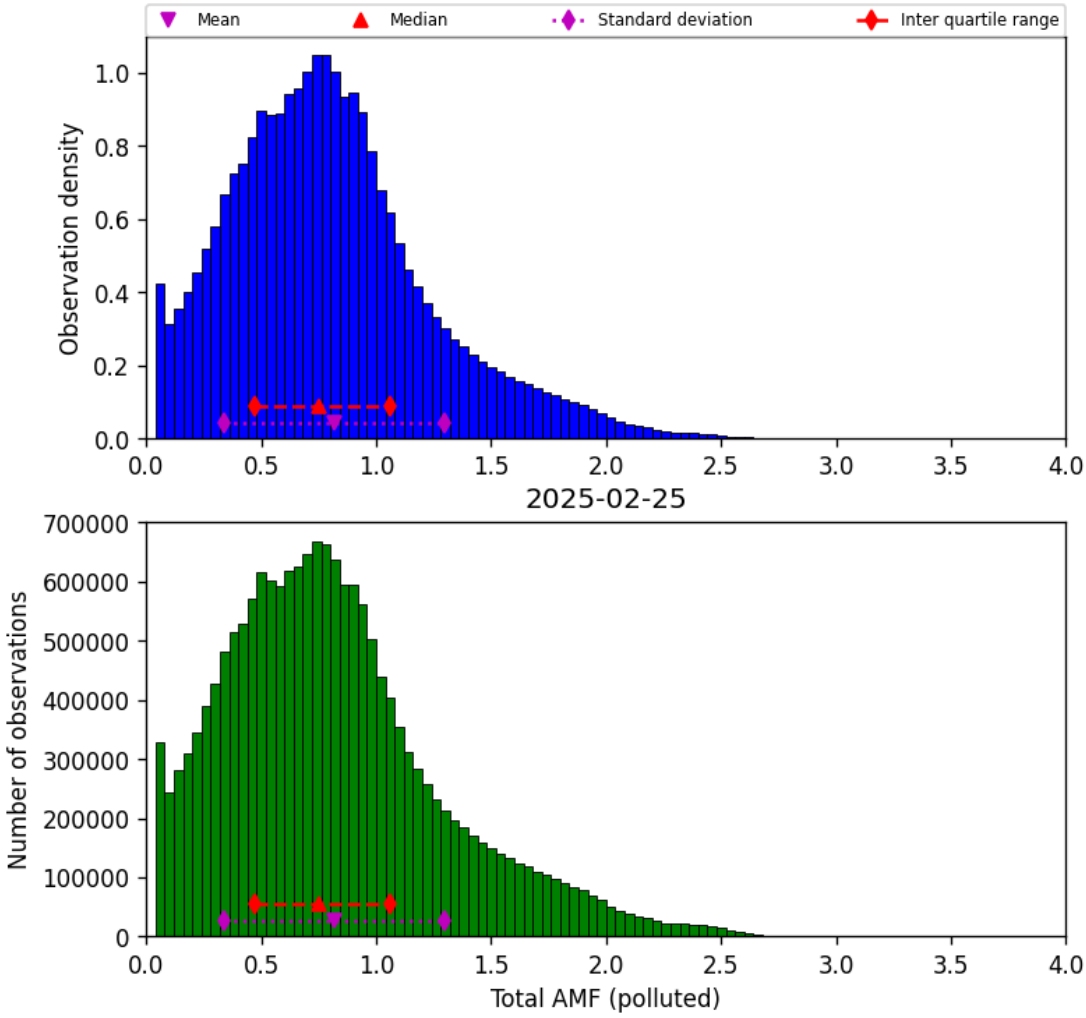

Figure 80: Histogram of “Total AMF (polluted)” for 2025-02-25 to 2025-02-26

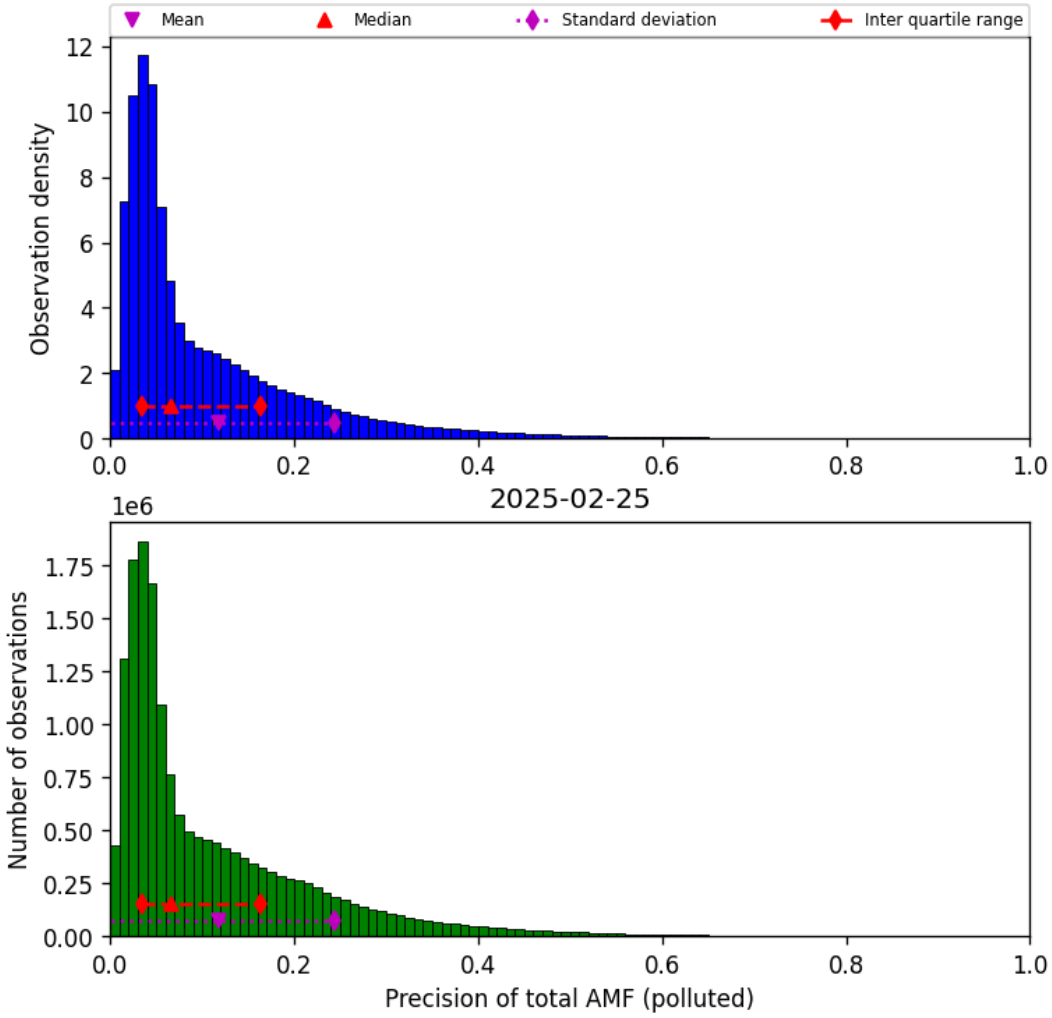

Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-02-25 to 2025-02-26

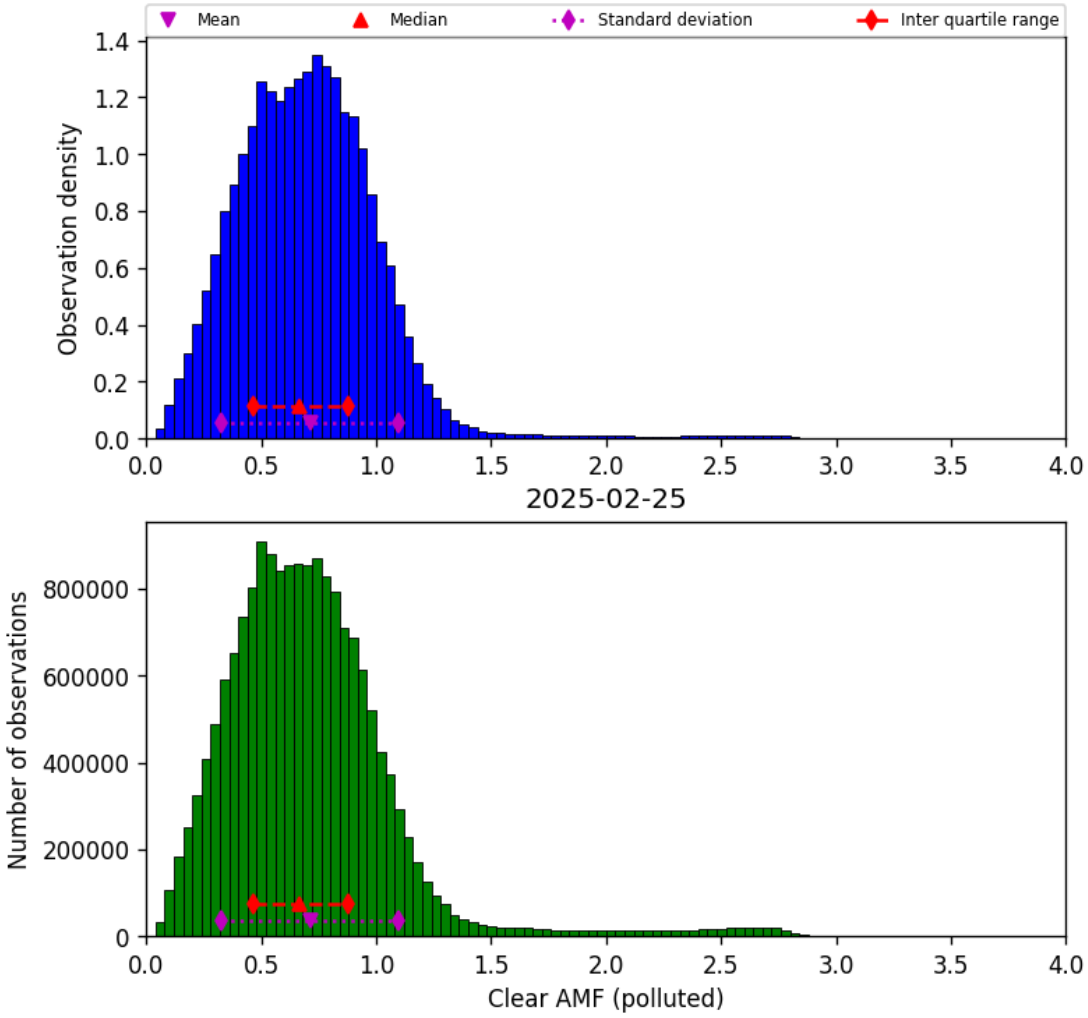

Figure 82: Histogram of “Clear AMF (polluted)” for 2025-02-25 to 2025-02-26

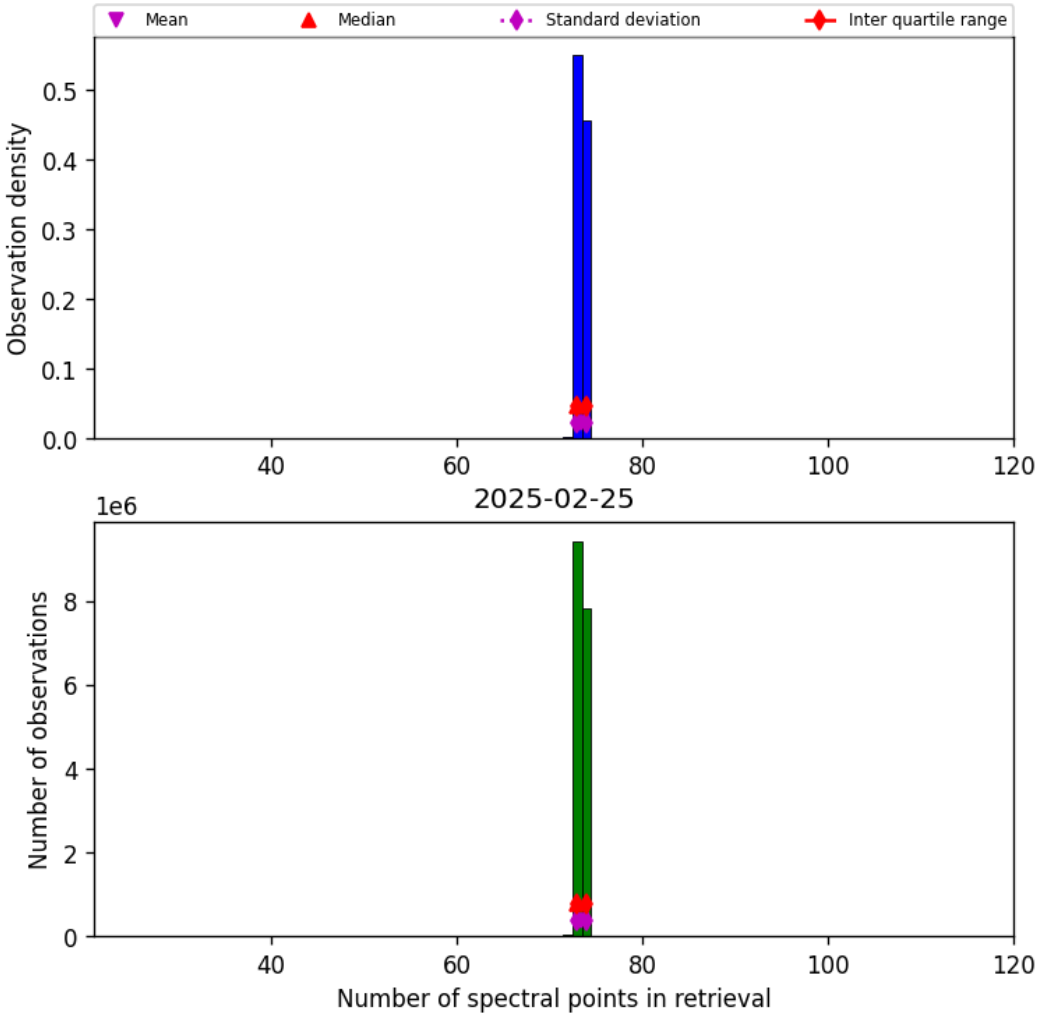

Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-02-25 to 2025-02-26

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.

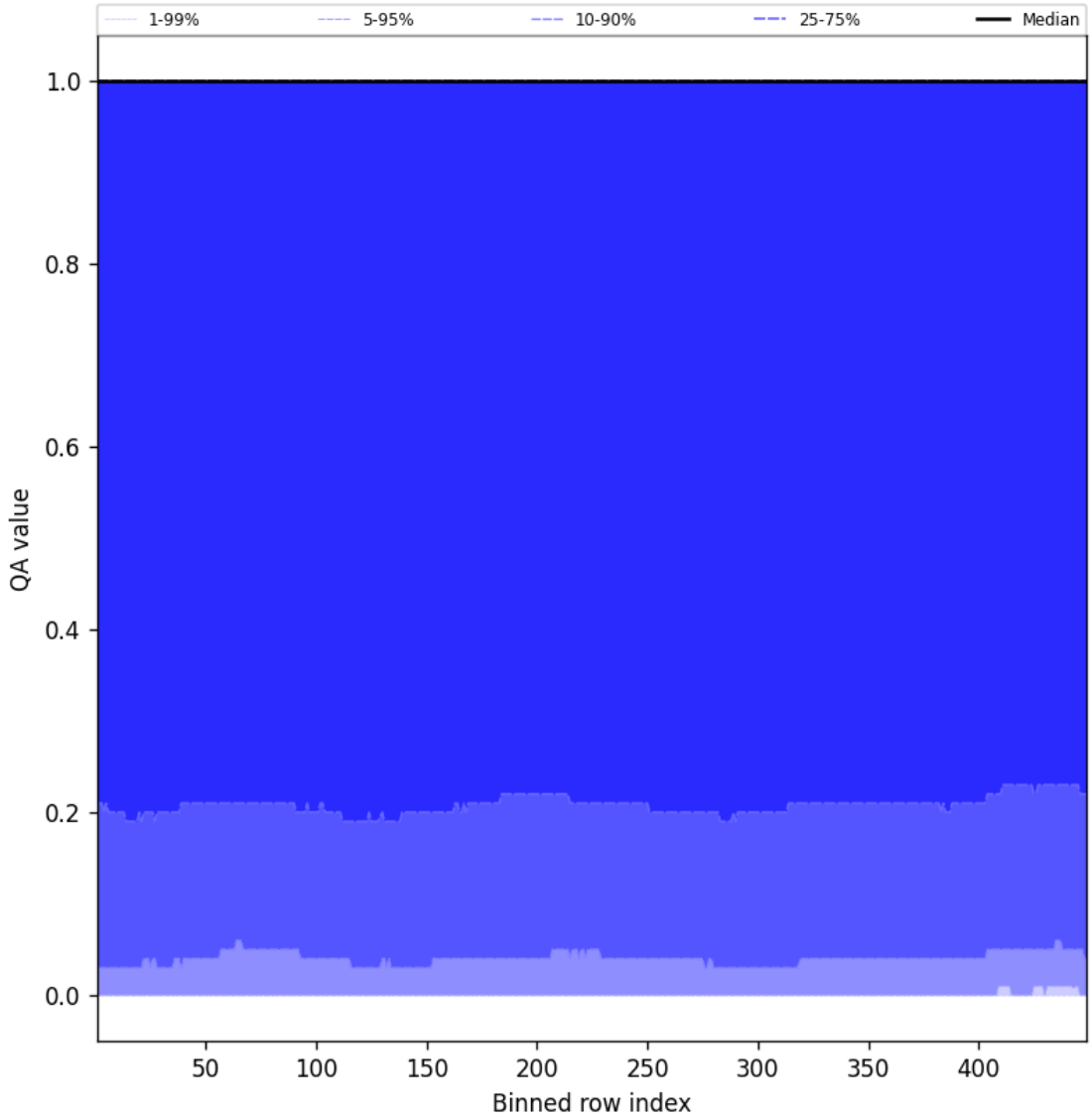

Figure 84: Along track statistics of “QA value” for 2025-02-25 to 2025-02-26

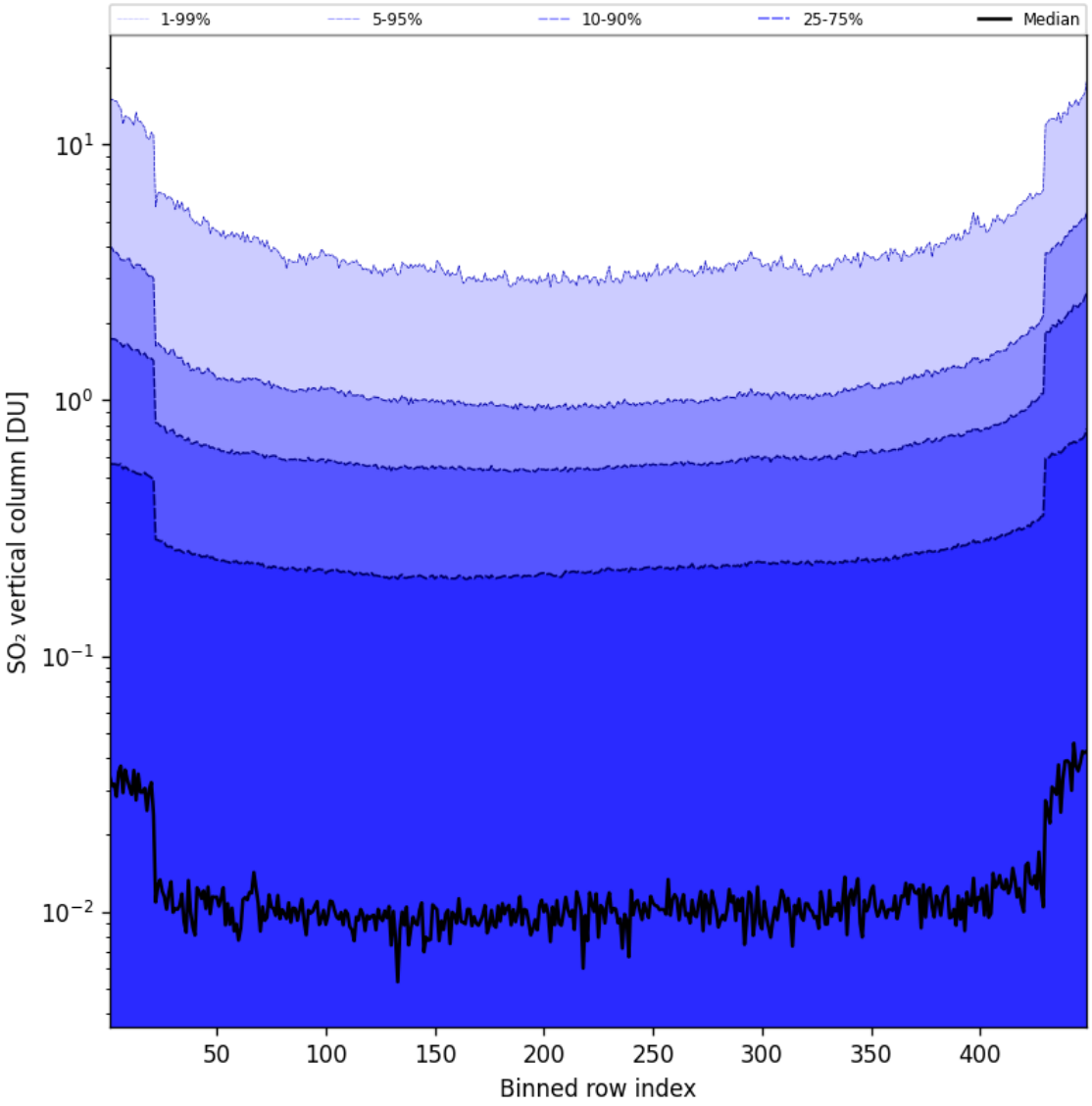

Figure 85: Along track statistics of "SO_2 vertical column" for 2025-02-25 to 2025-02-26

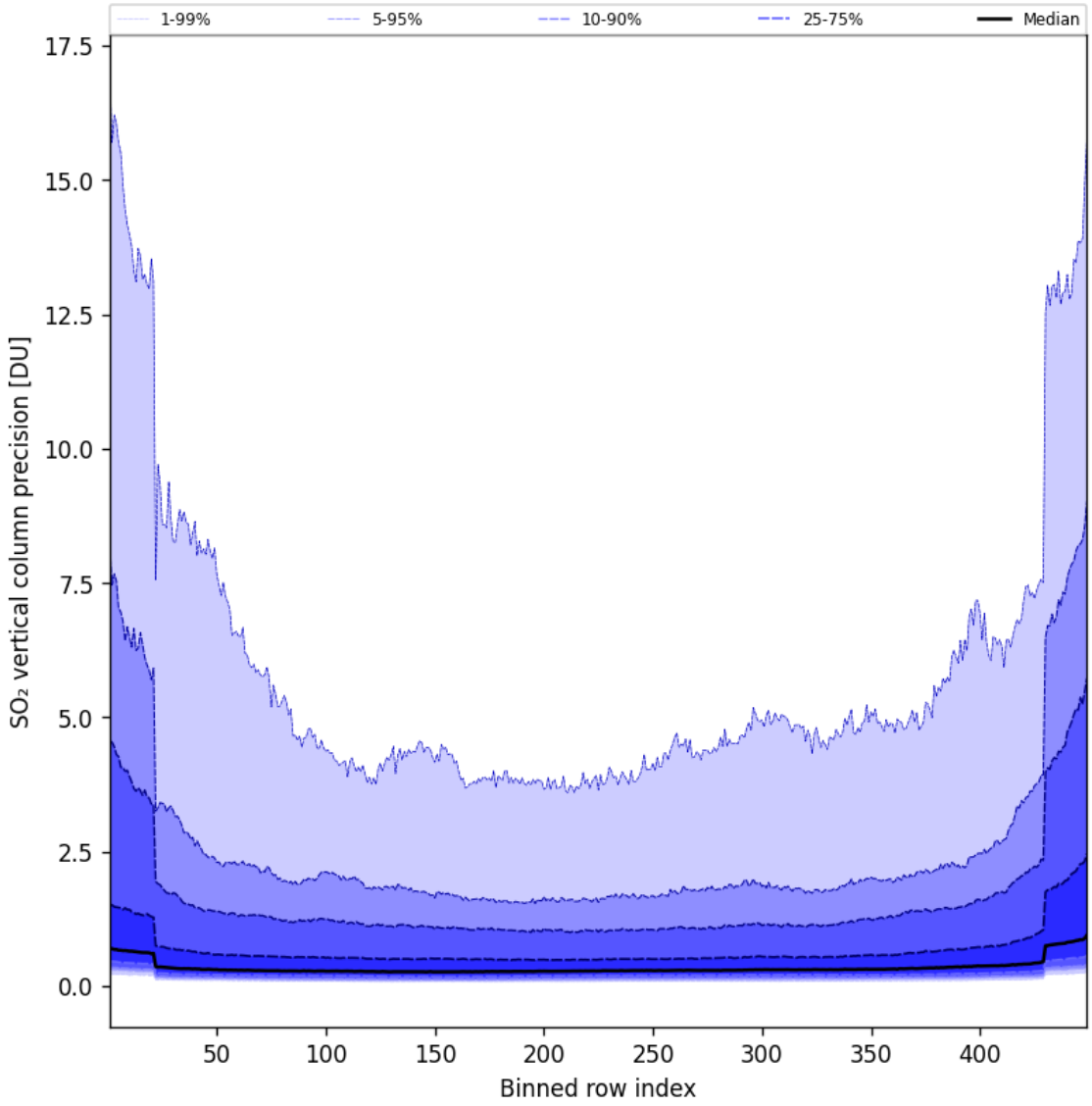

Figure 86: Along track statistics of "SO_2 vertical column precision" for 2025-02-25 to 2025-02-26

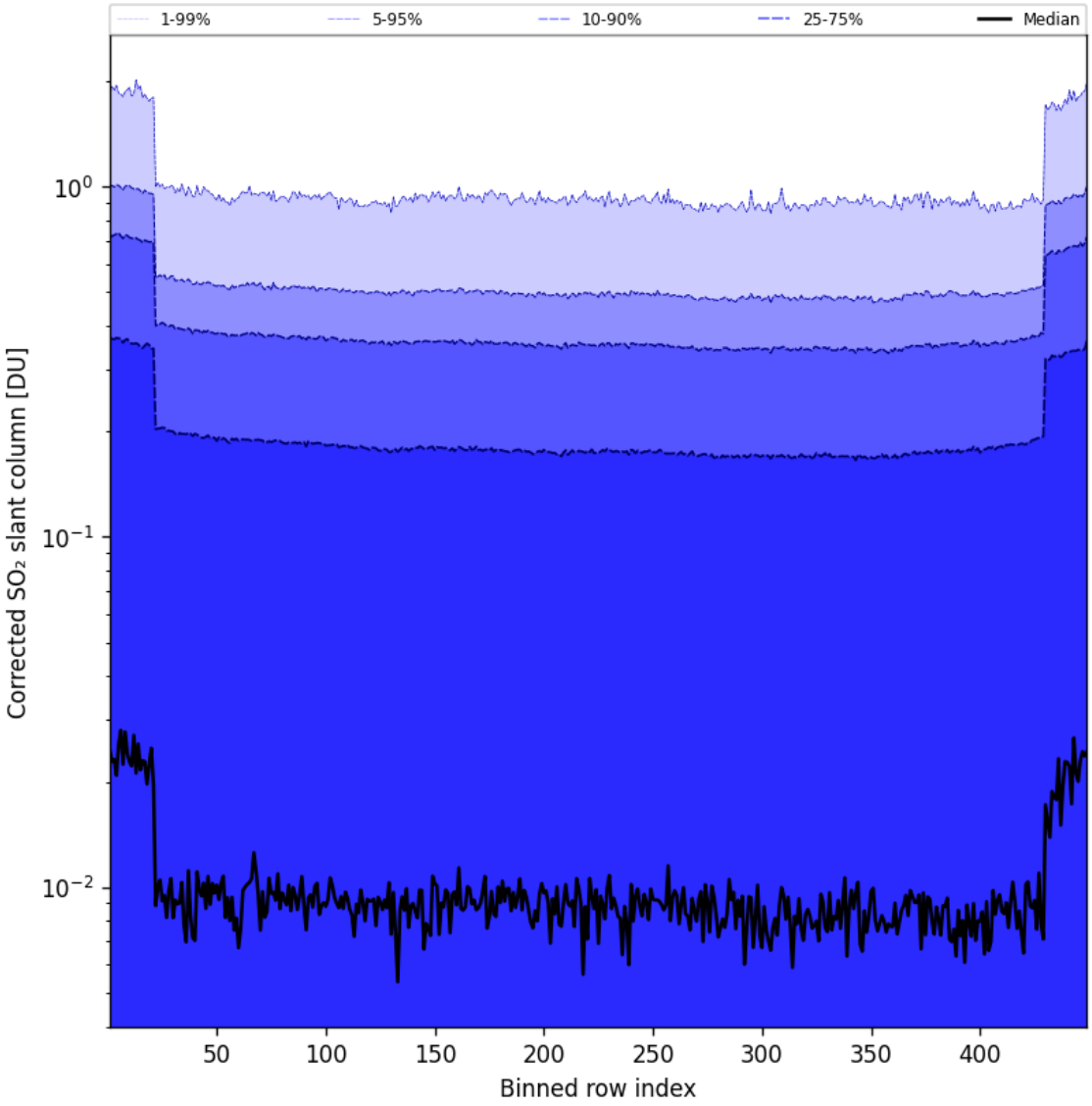

Figure 87: Along track statistics of "Corrected SO_2 slant column" for 2025-02-25 to 2025-02-26

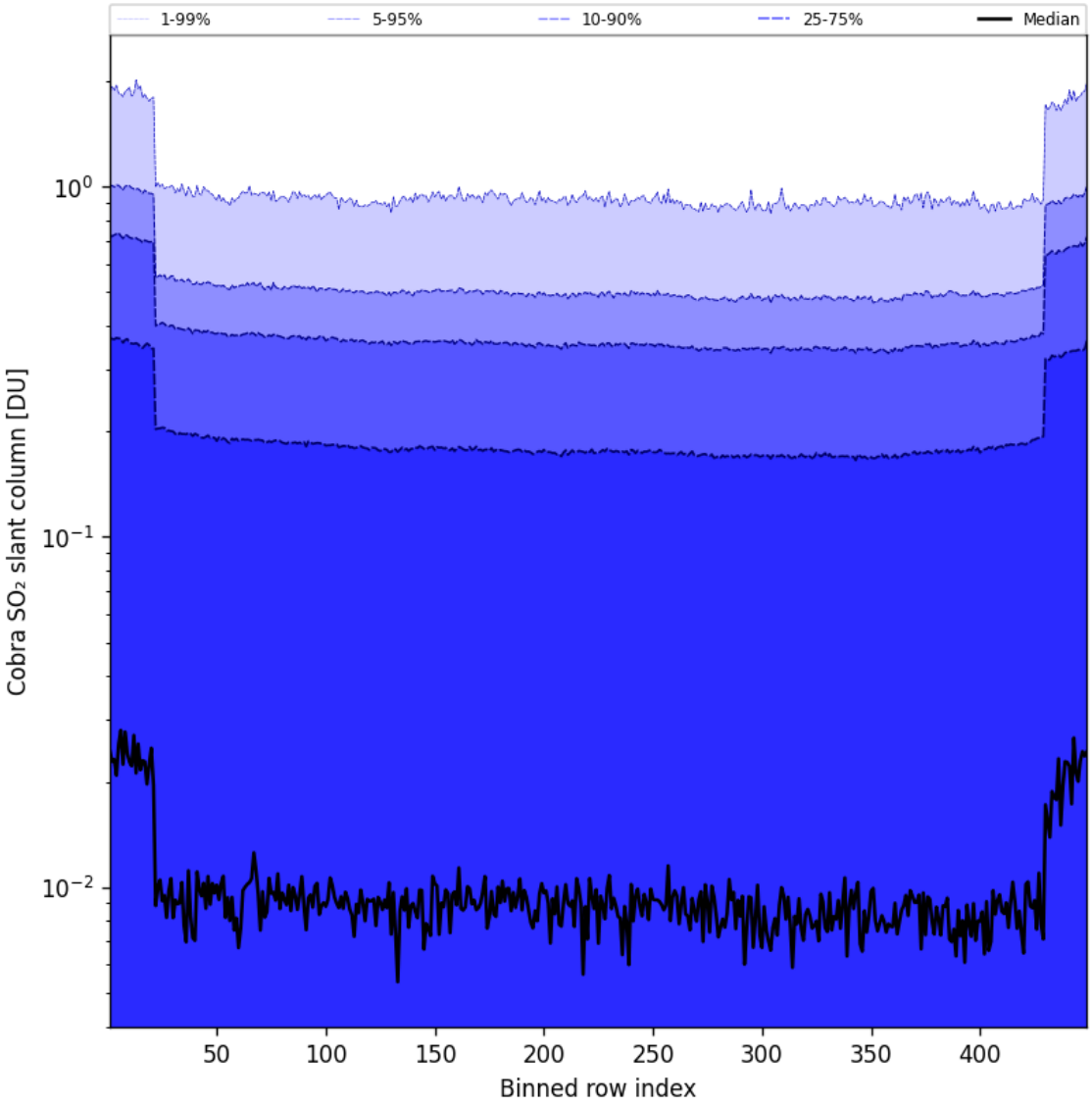

Figure 88: Along track statistics of "Cobra SO_2 slant column" for 2025-02-25 to 2025-02-26

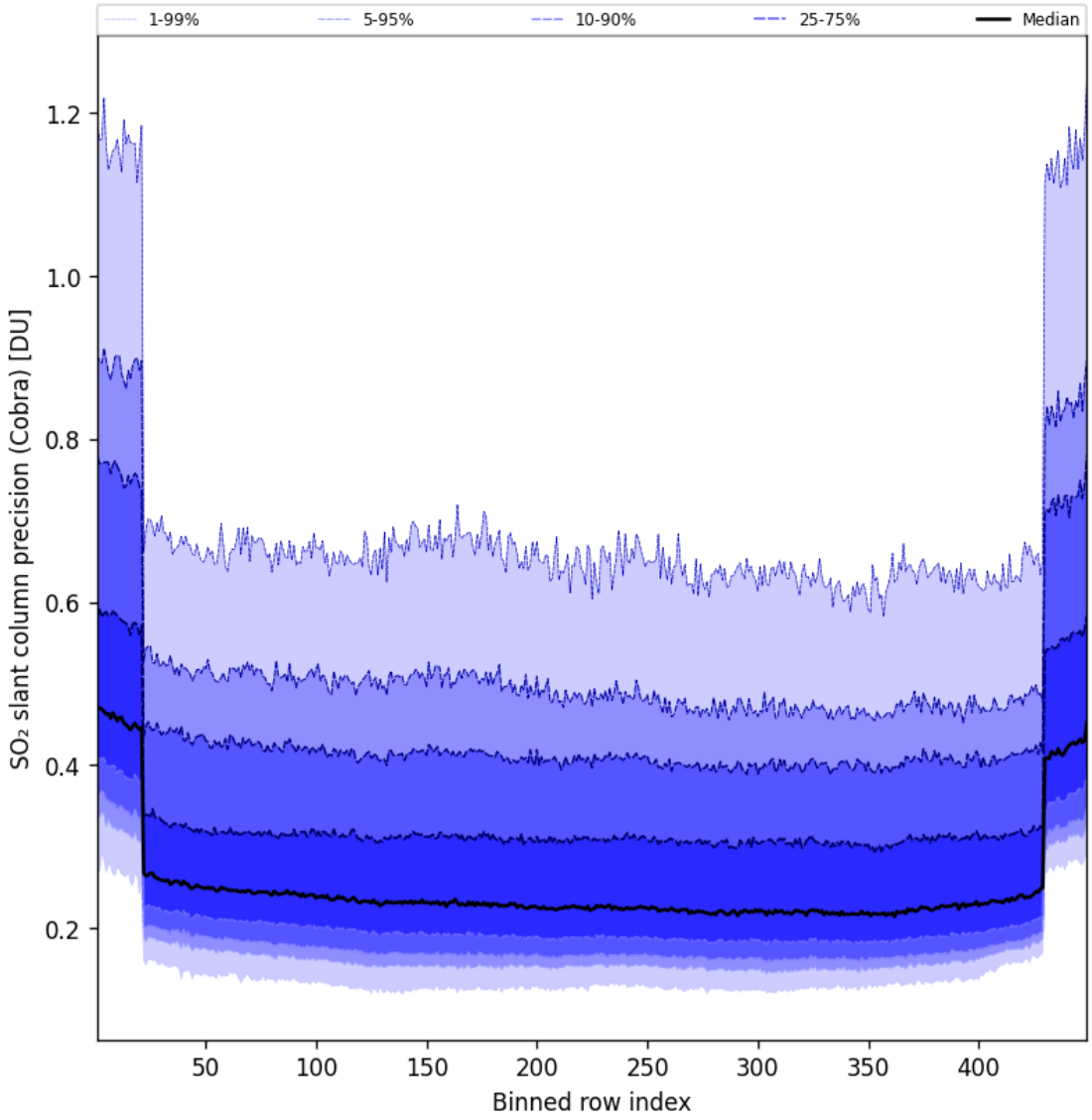

Figure 89: Along track statistics of "SO_2 slant column precision (Cobra)" for 2025-02-25 to 2025-02-26

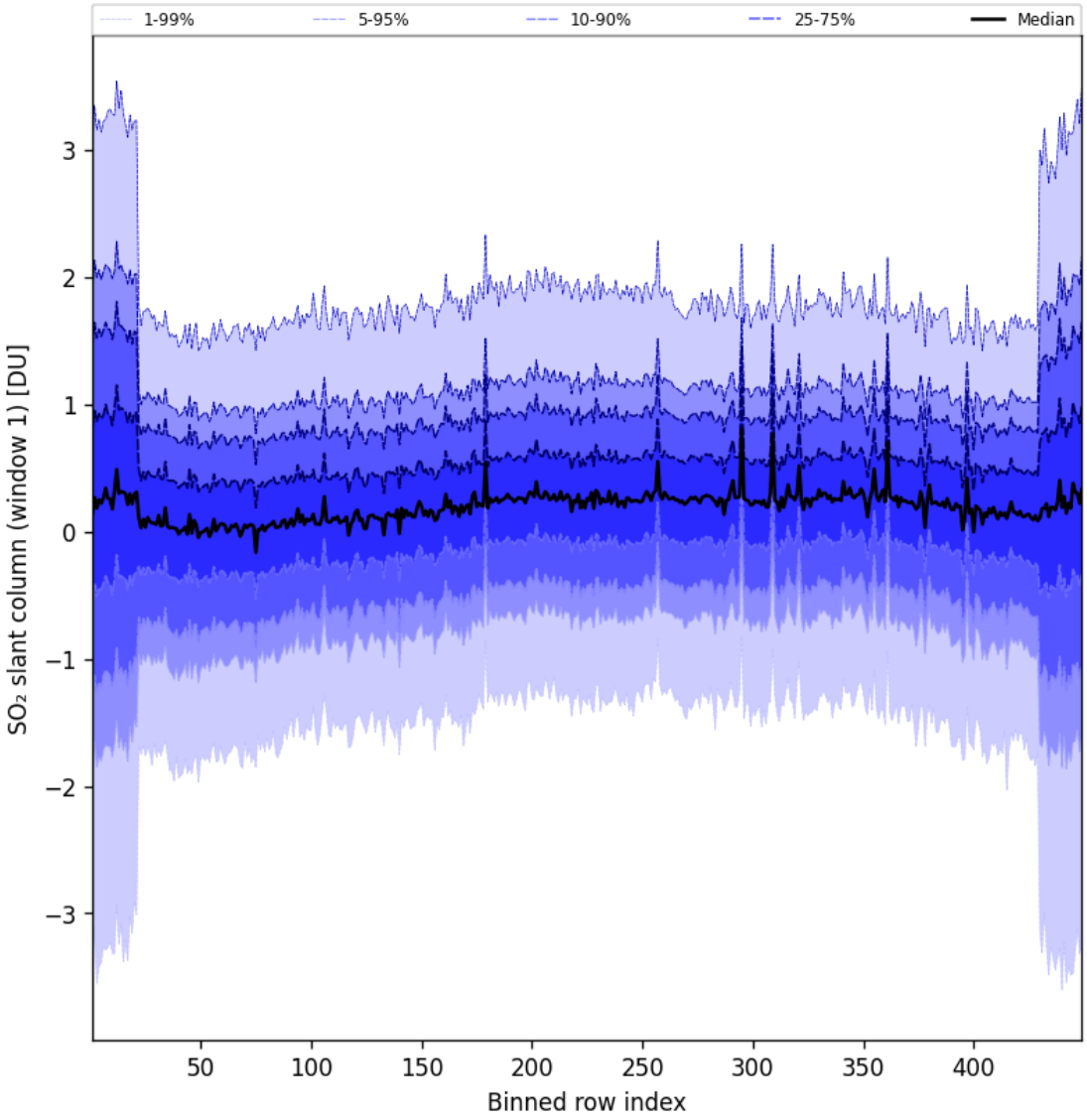

Figure 90: Along track statistics of "SO_2 slant column (window 1)" for 2025-02-25 to 2025-02-26

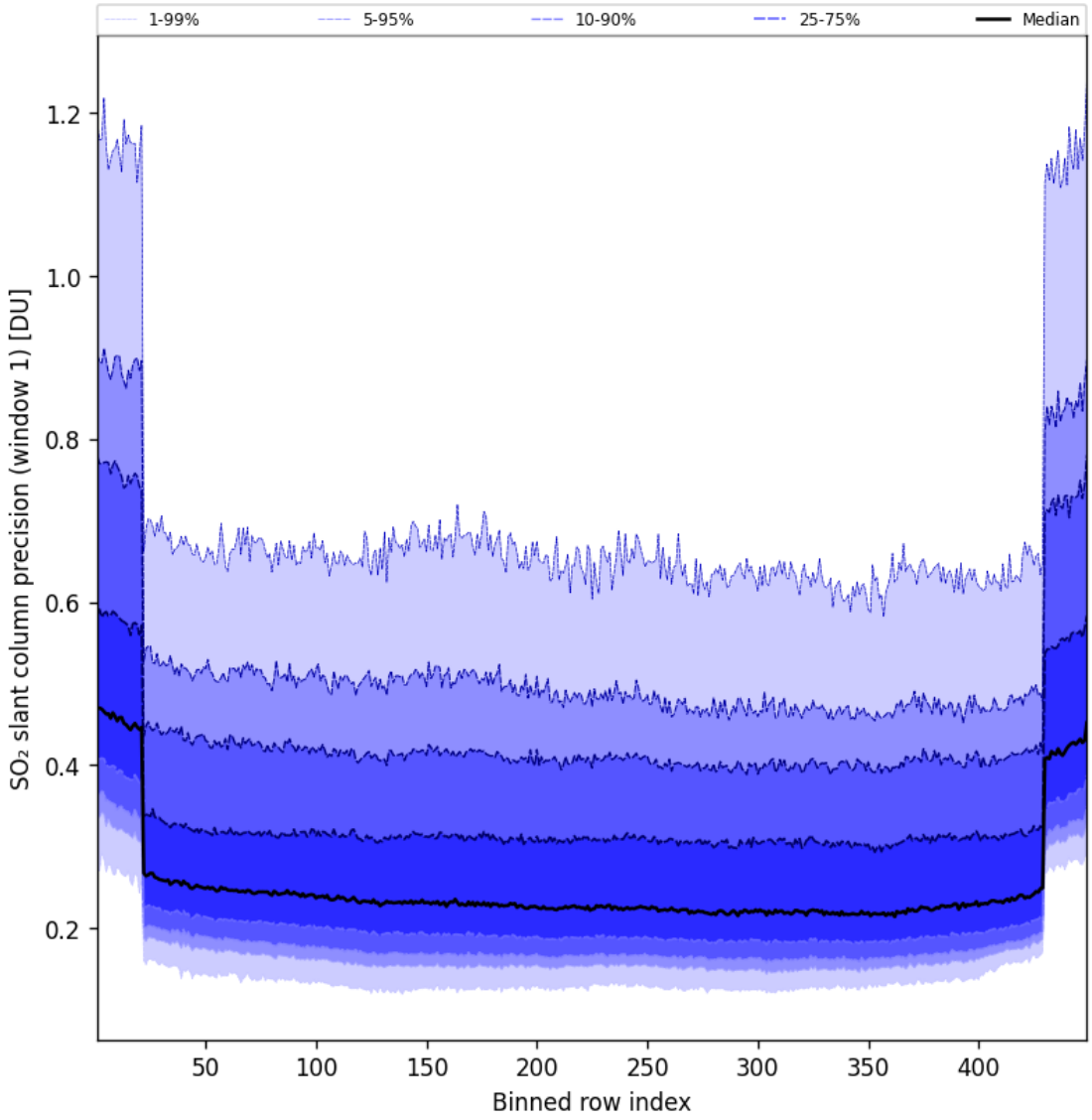

Figure 91: Along track statistics of "SO_2 slant column precision (window 1)" for 2025-02-25 to 2025-02-26

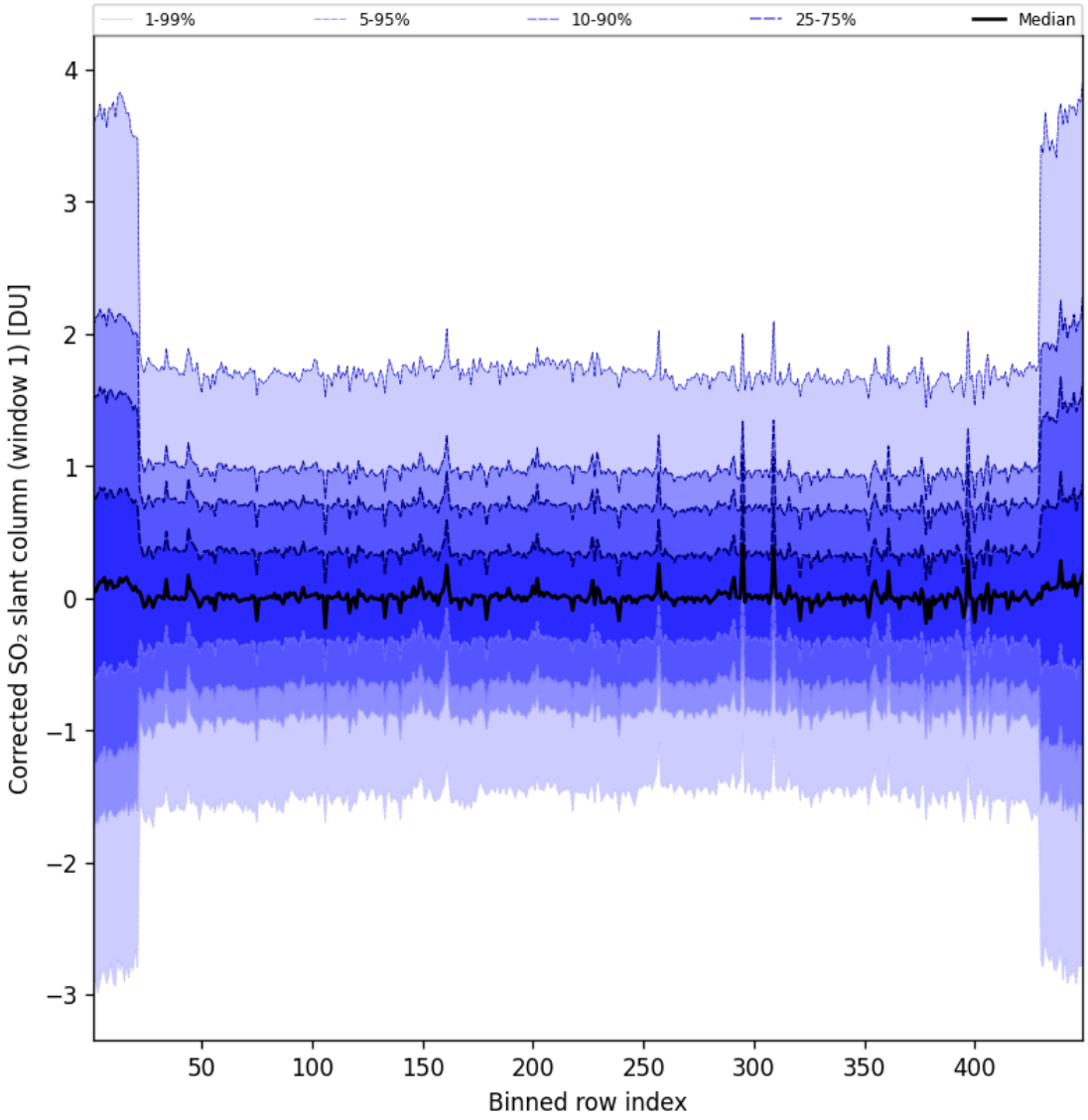

Figure 92: Along track statistics of “Corrected SO_2 slant column (window 1)” for 2025-02-25 to 2025-02-26

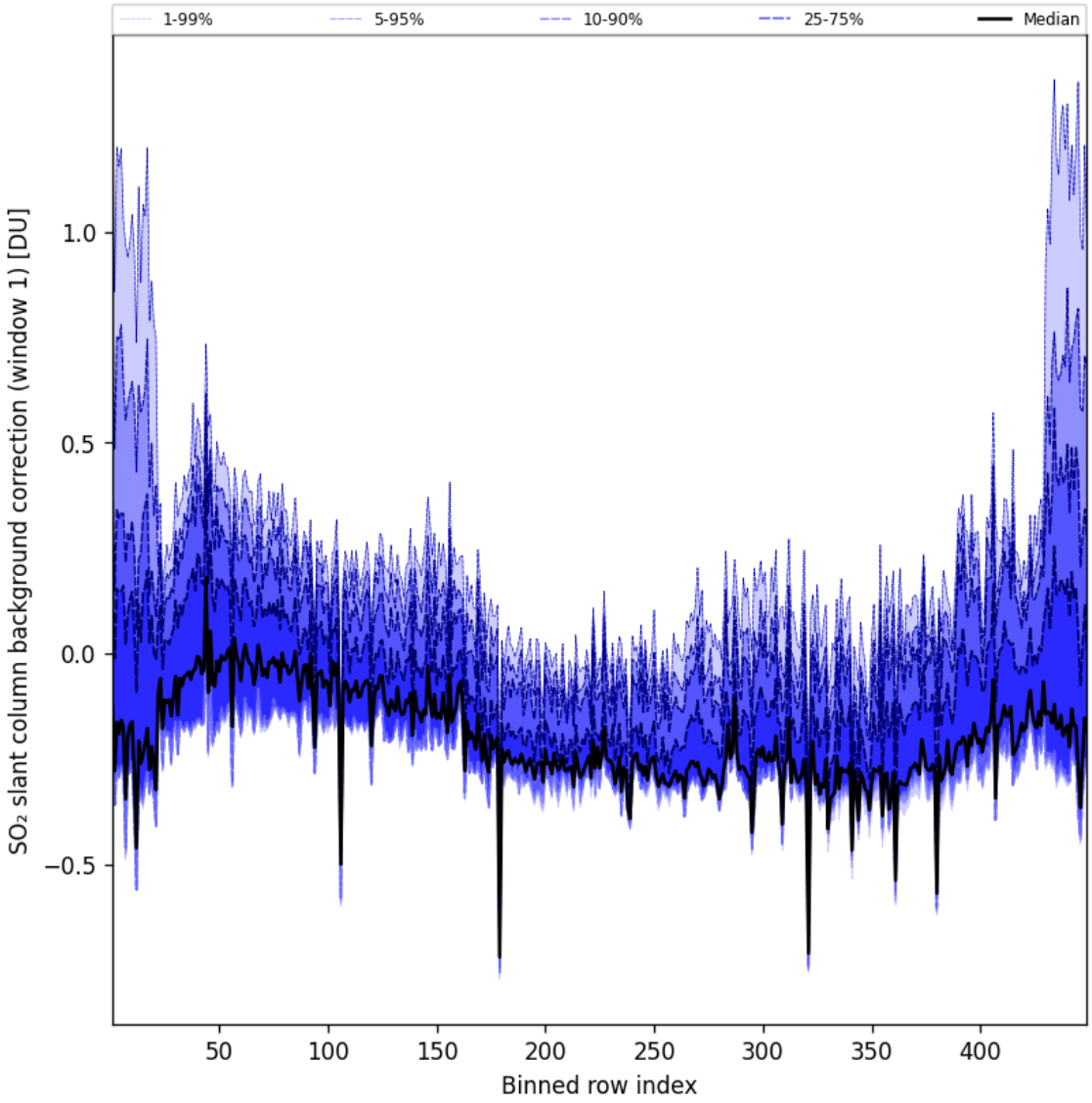

Figure 93: Along track statistics of "SO_2 slant column background correction (window 1)" for 2025-02-25 to 2025-02-26

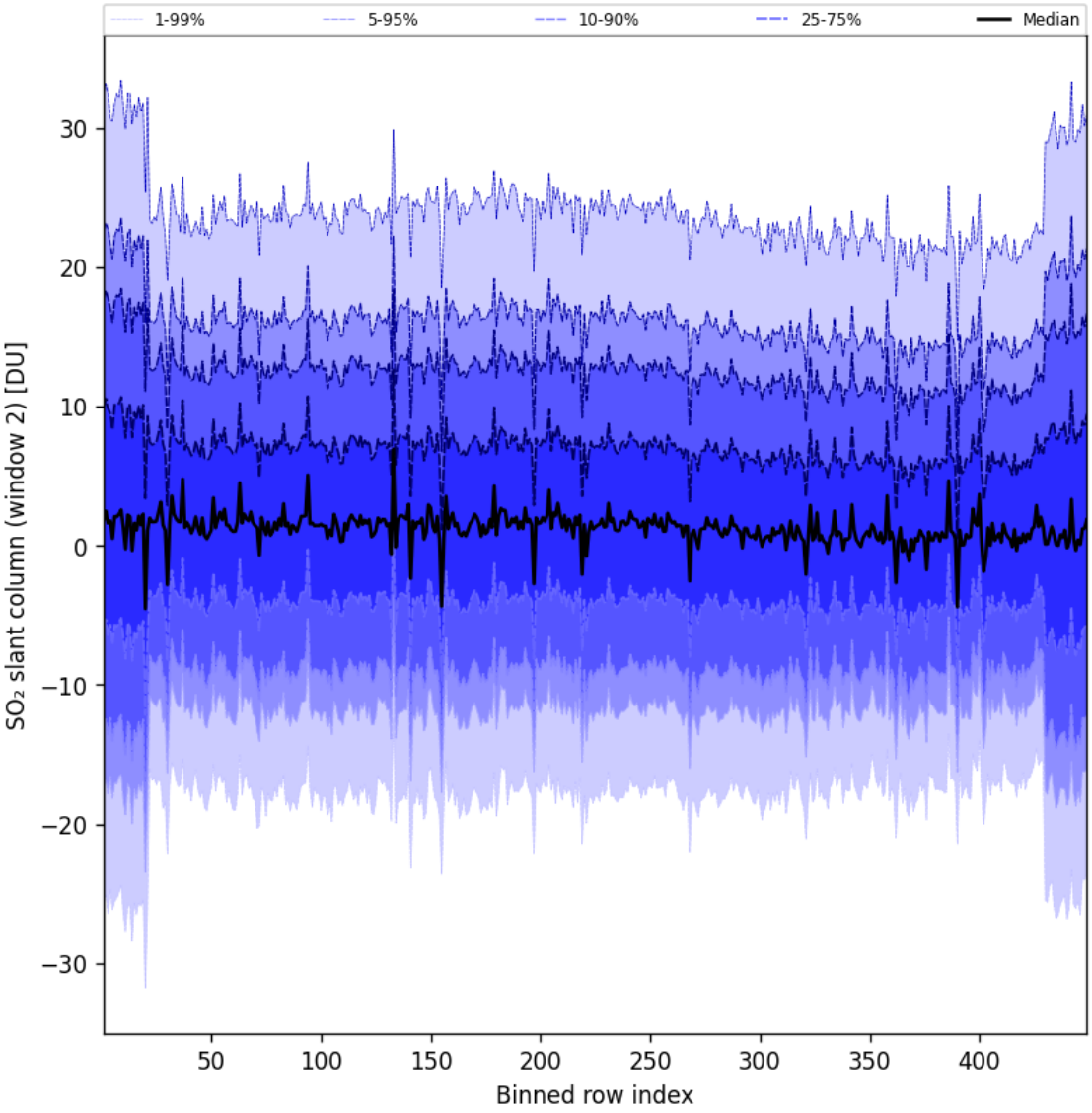

Figure 94: Along track statistics of "SO_2 slant column (window 2)" for 2025-02-25 to 2025-02-26

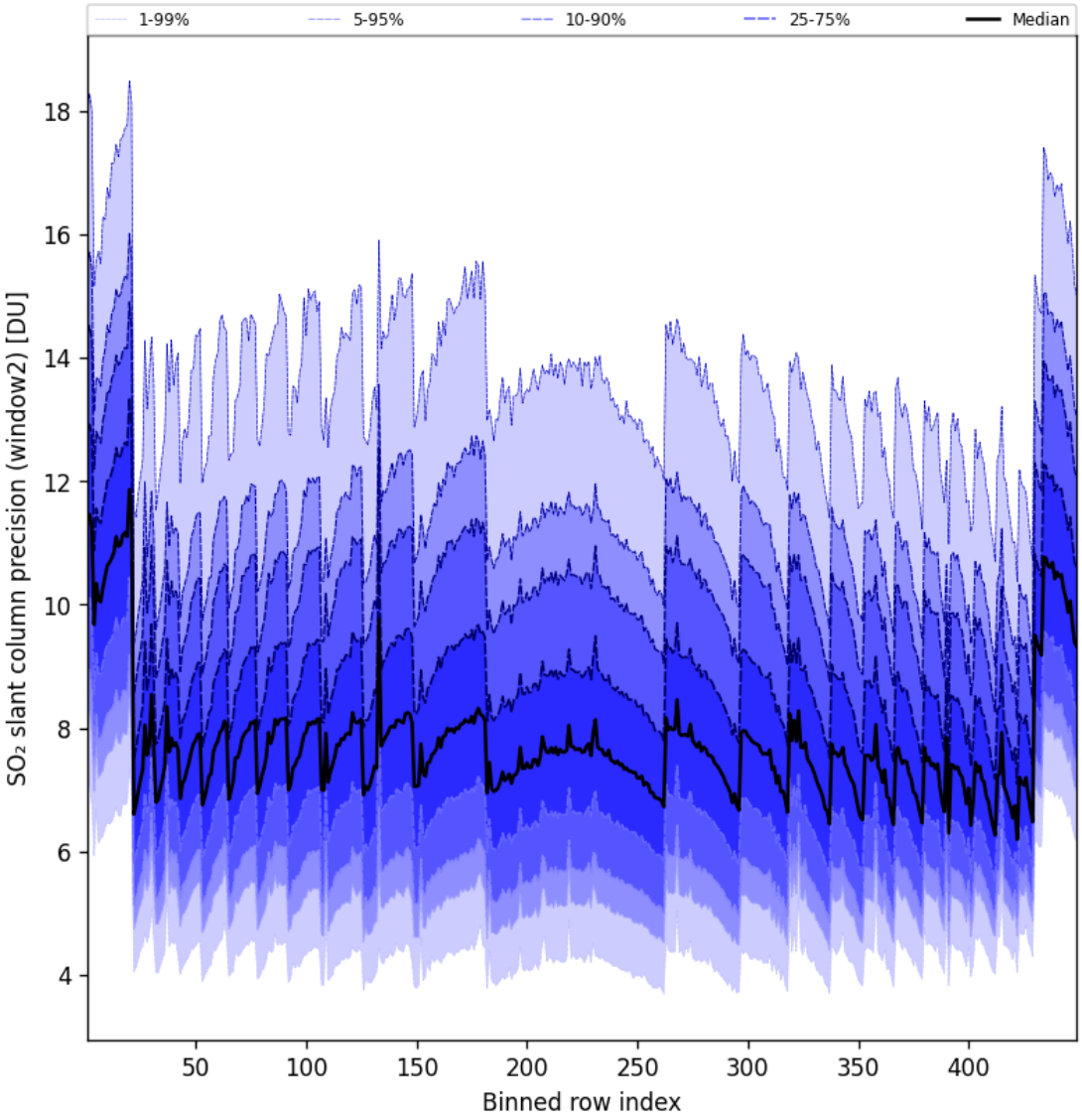

Figure 95: Along track statistics of "SO_2 slant column precision (window2)" for 2025-02-25 to 2025-02-26

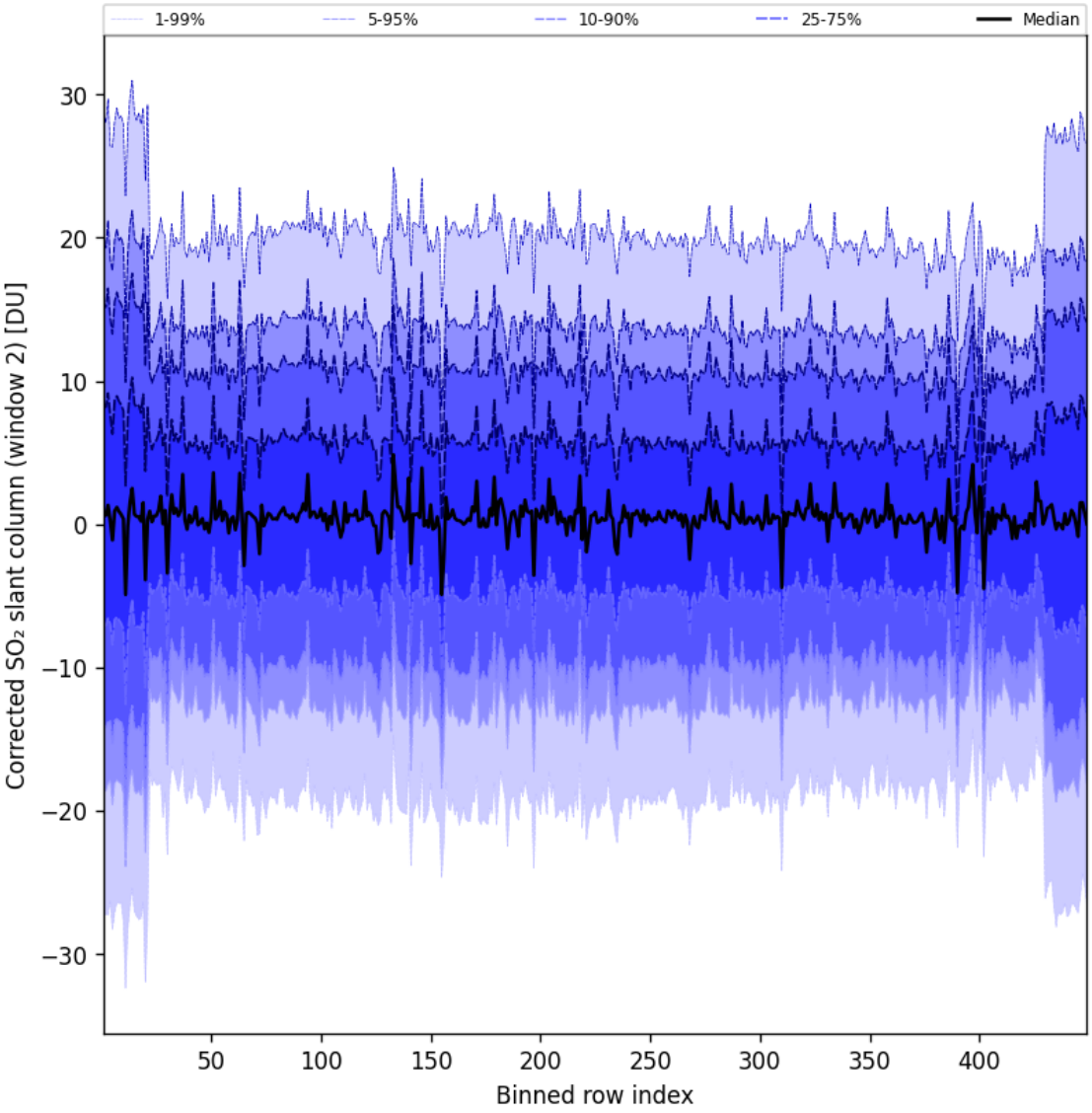

Figure 96: Along track statistics of "Corrected SO_2 slant column (window 2)" for 2025-02-25 to 2025-02-26

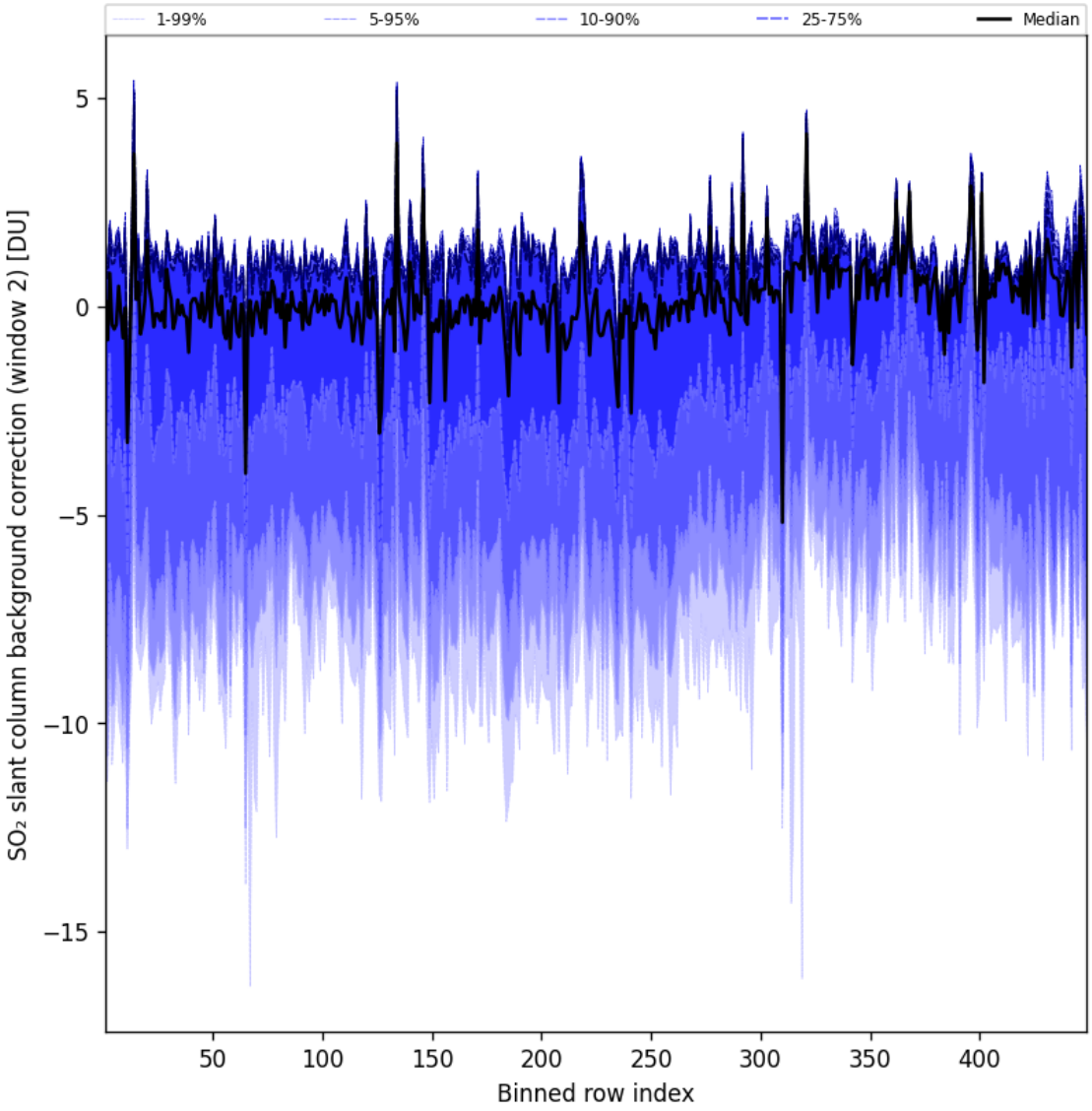

Figure 97: Along track statistics of "SO_2 slant column background correction (window 2)" for 2025-02-25 to 2025-02-26

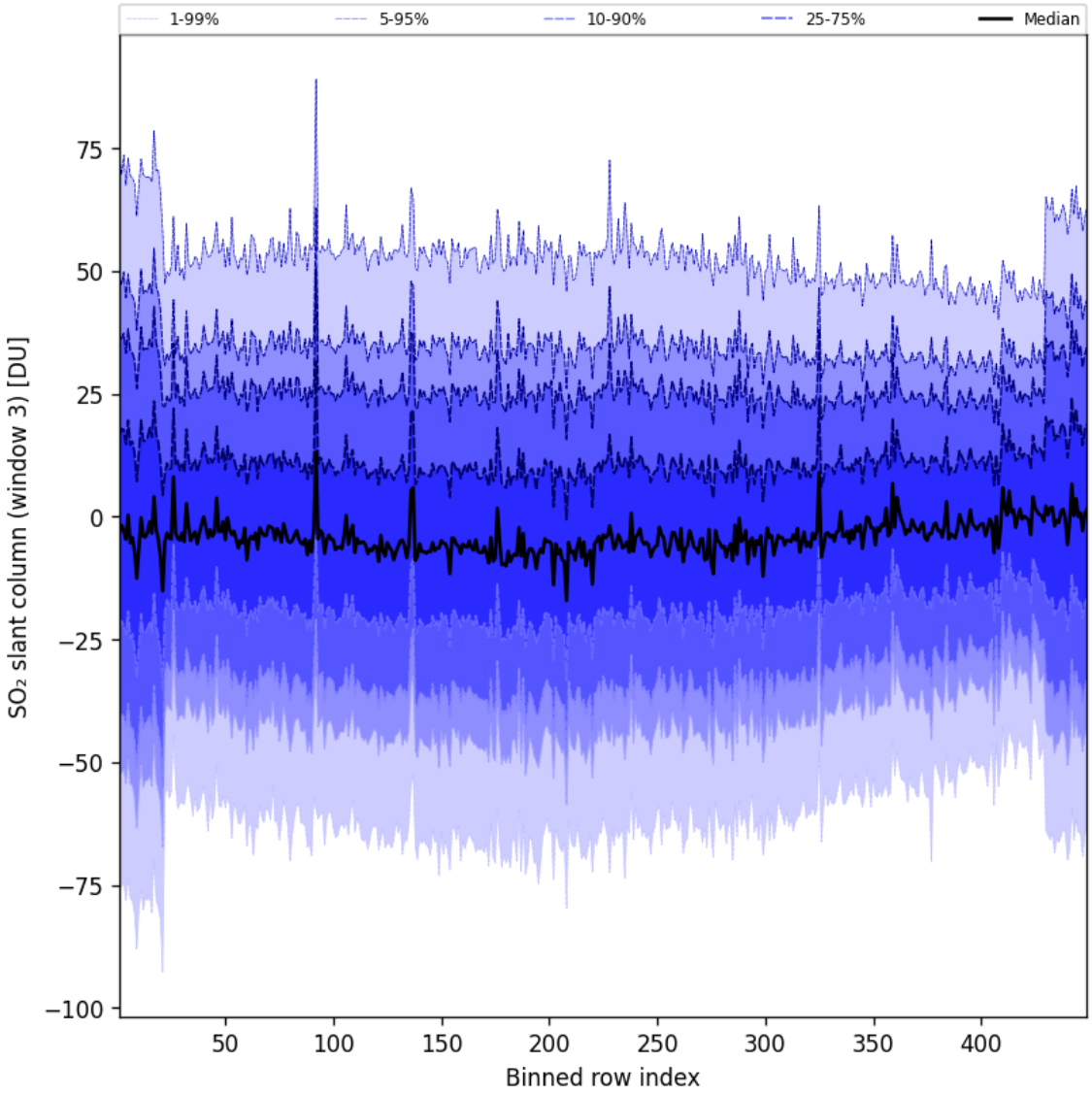

Figure 98: Along track statistics of "SO_2 slant column (window 3)" for 2025-02-25 to 2025-02-26

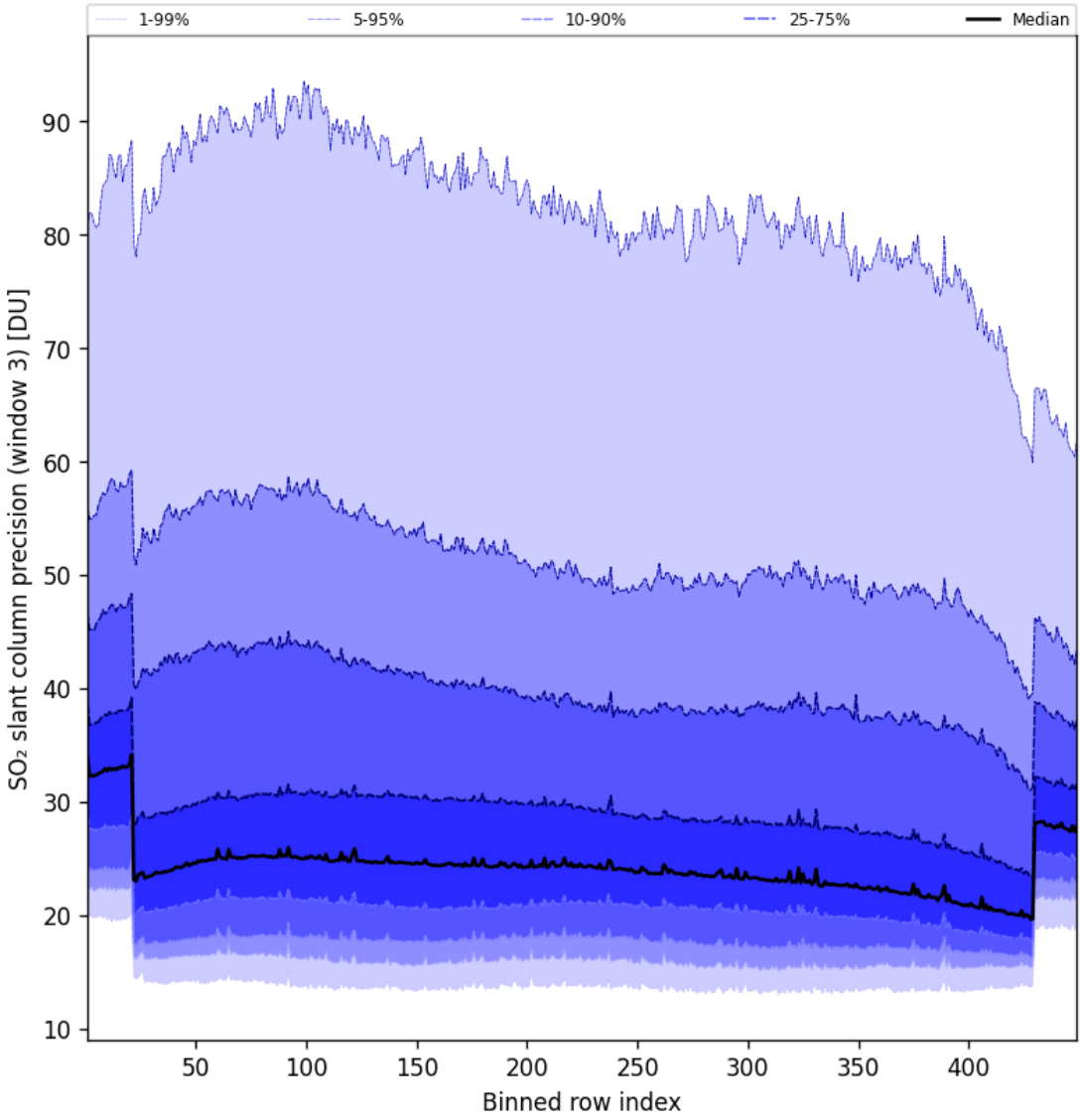

Figure 99: Along track statistics of "SO_2 slant column precision (window 3)" for 2025-02-25 to 2025-02-26

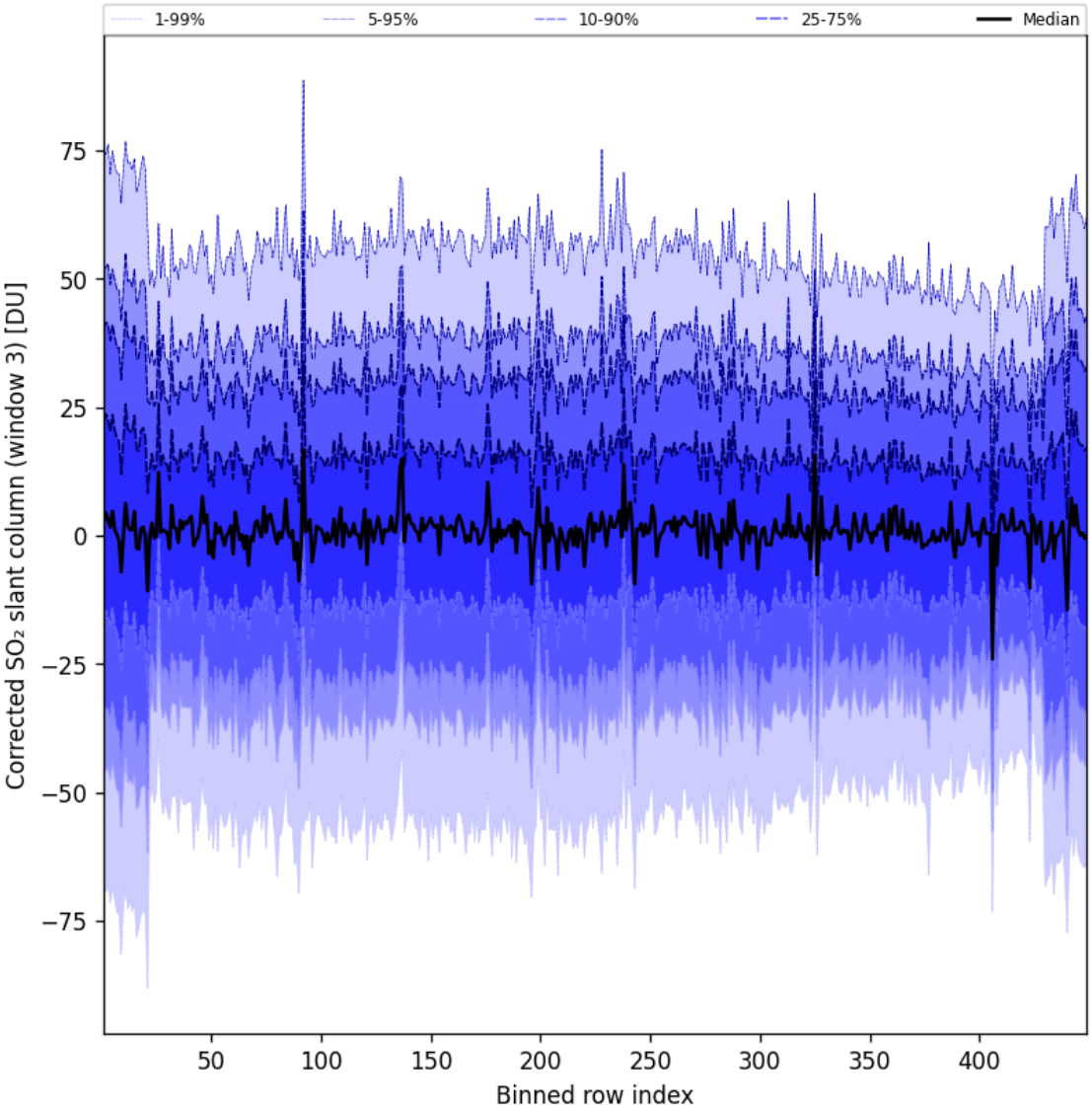

Figure 100: Along track statistics of “Corrected SO_2 slant column (window 3)” for 2025-02-25 to 2025-02-26

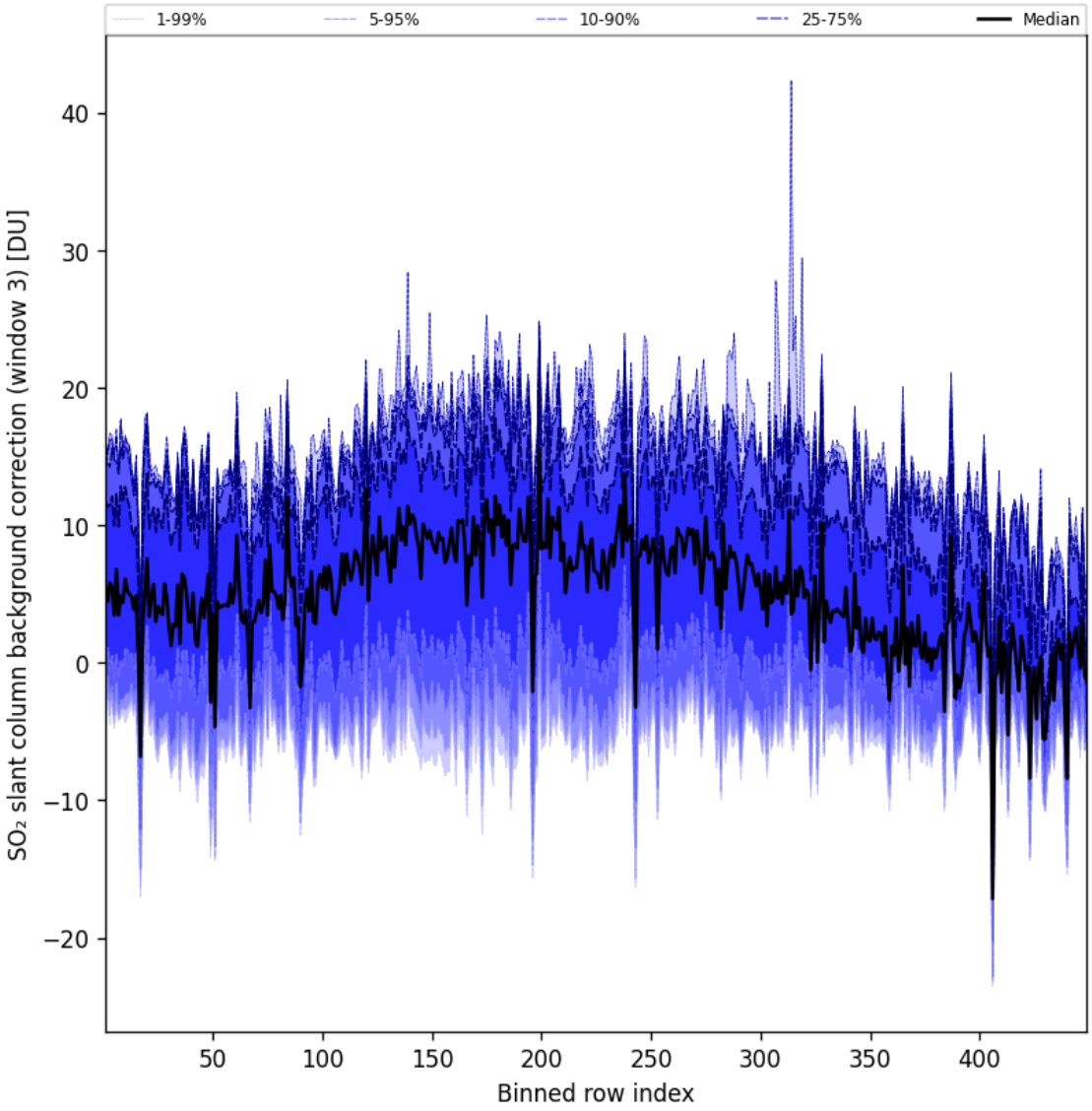

Figure 101: Along track statistics of "SO_2 slant column background correction (window 3)" for 2025-02-25 to 2025-02-26

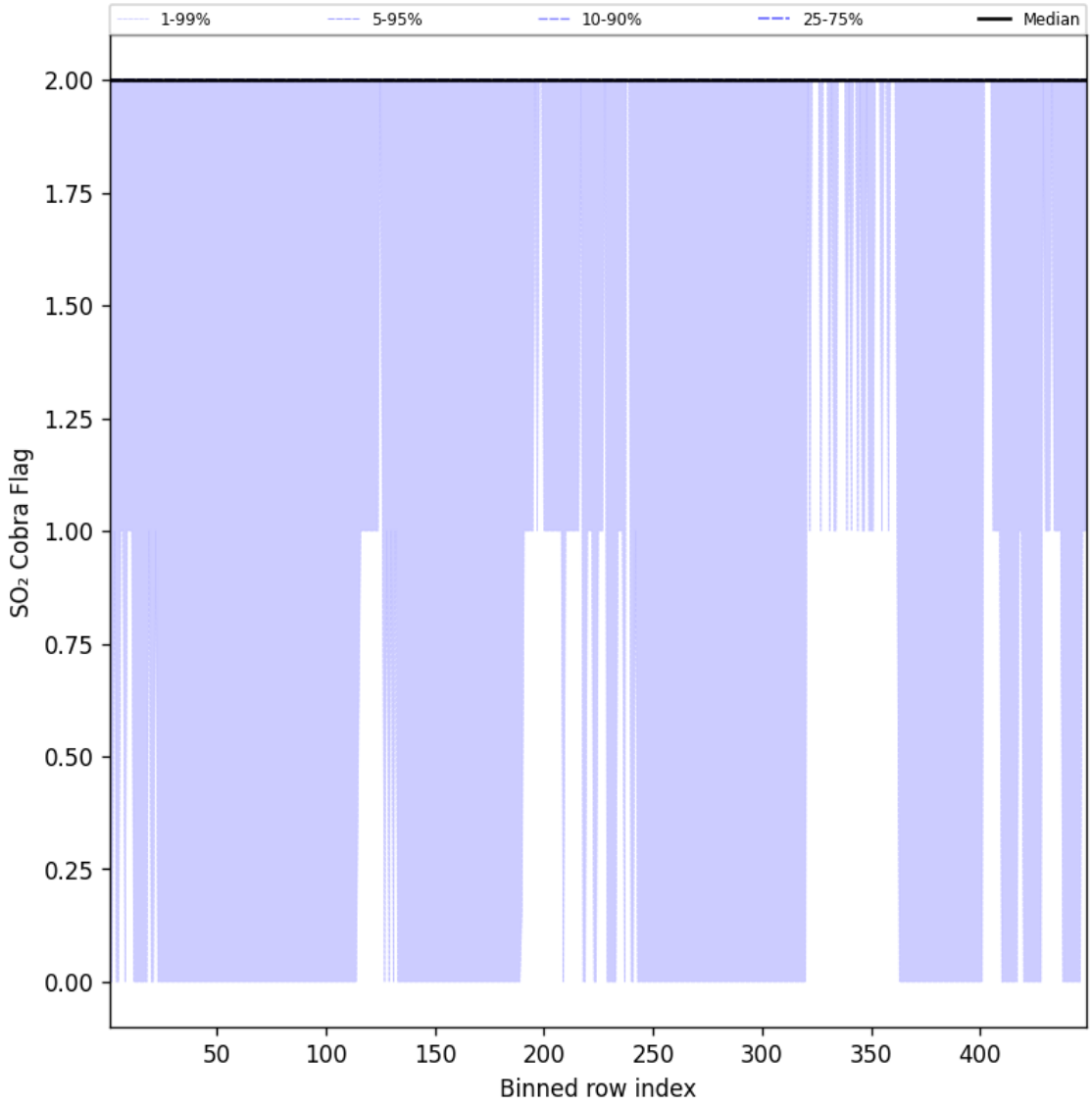

Figure 102: Along track statistics of "SO_2 Cobra Flag" for 2025-02-25 to 2025-02-26

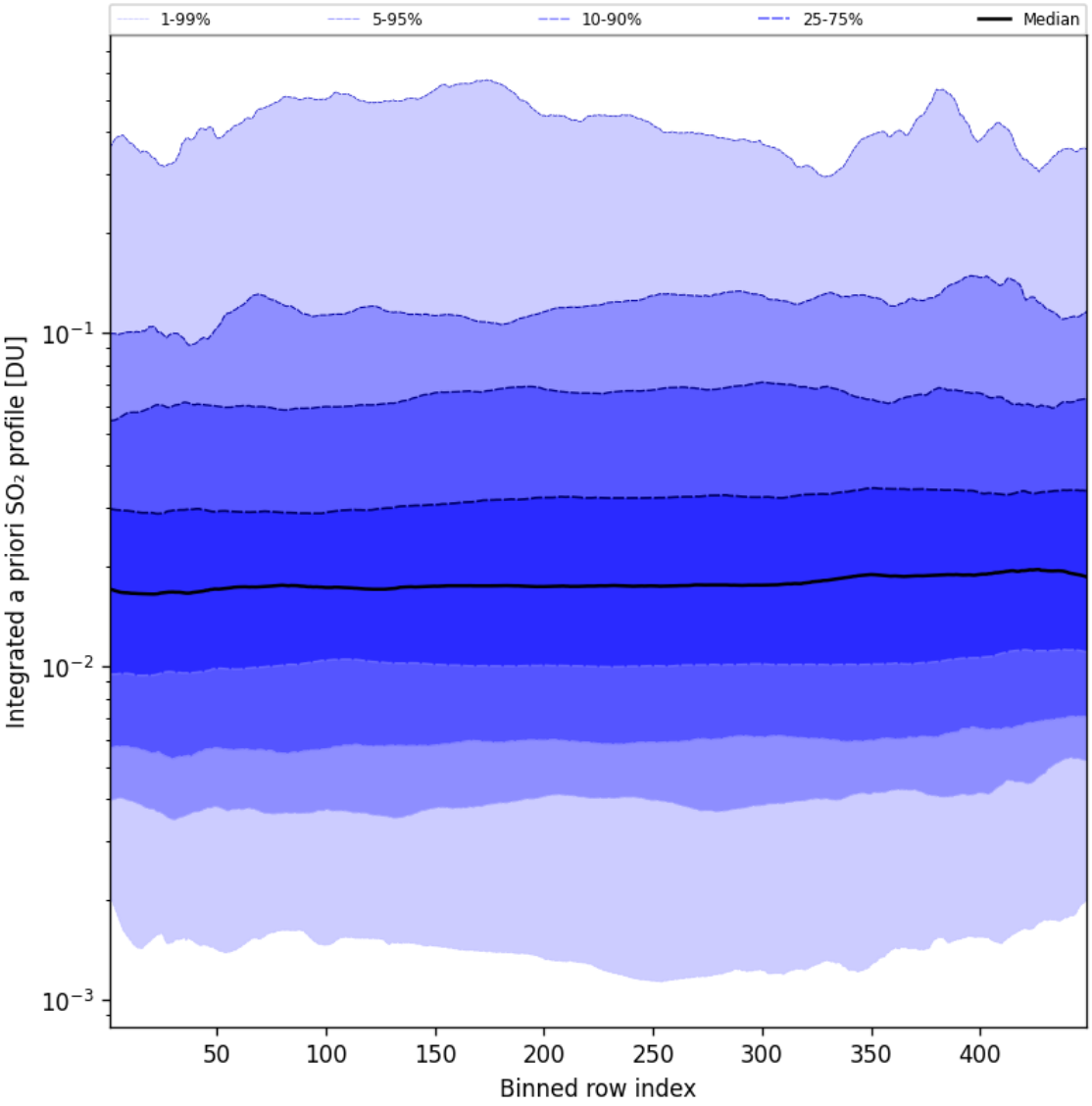

Figure 103: Along track statistics of “Integrated a priori SO_2 profile” for 2025-02-25 to 2025-02-26

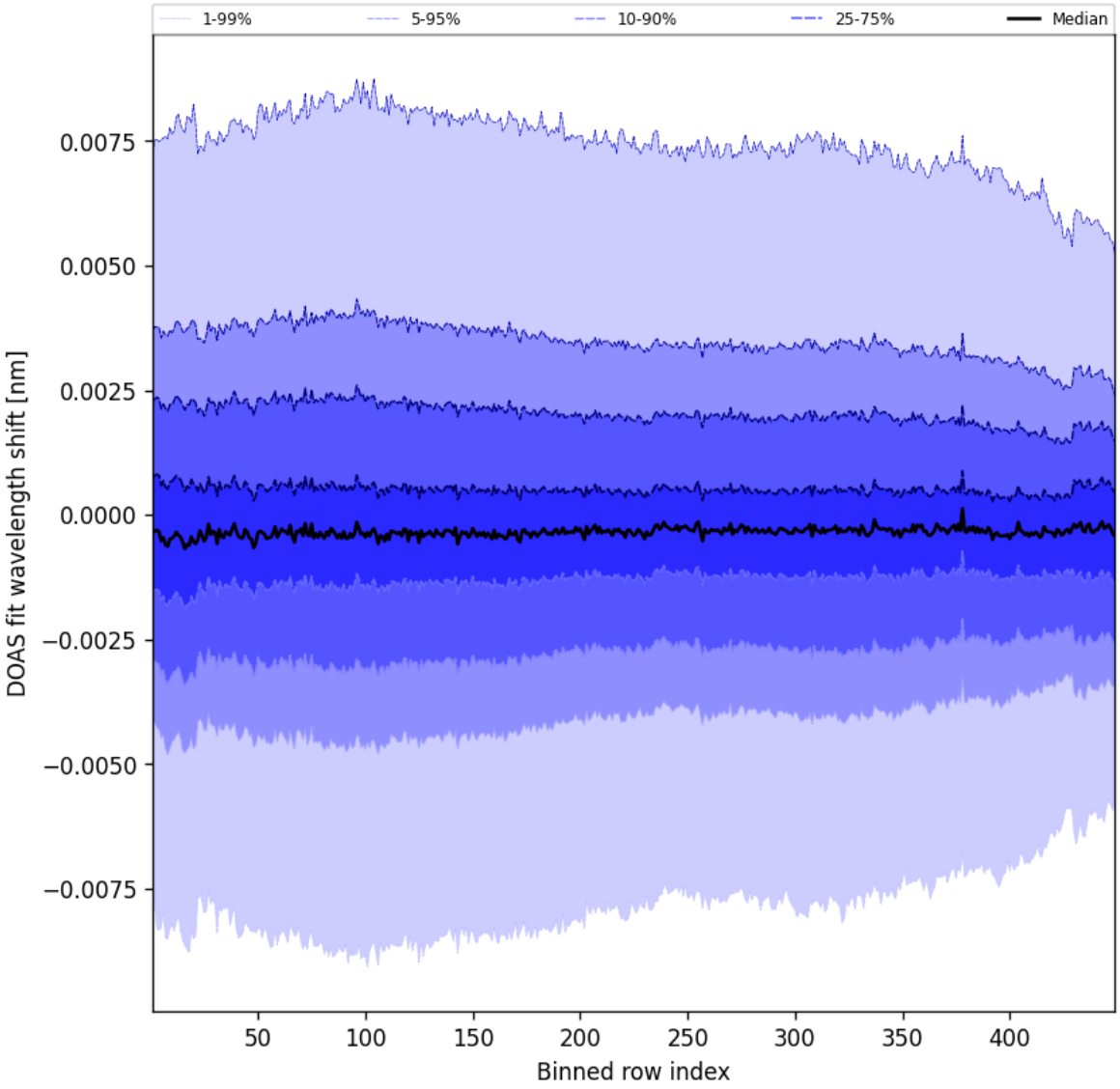

Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2025-02-25 to 2025-02-26

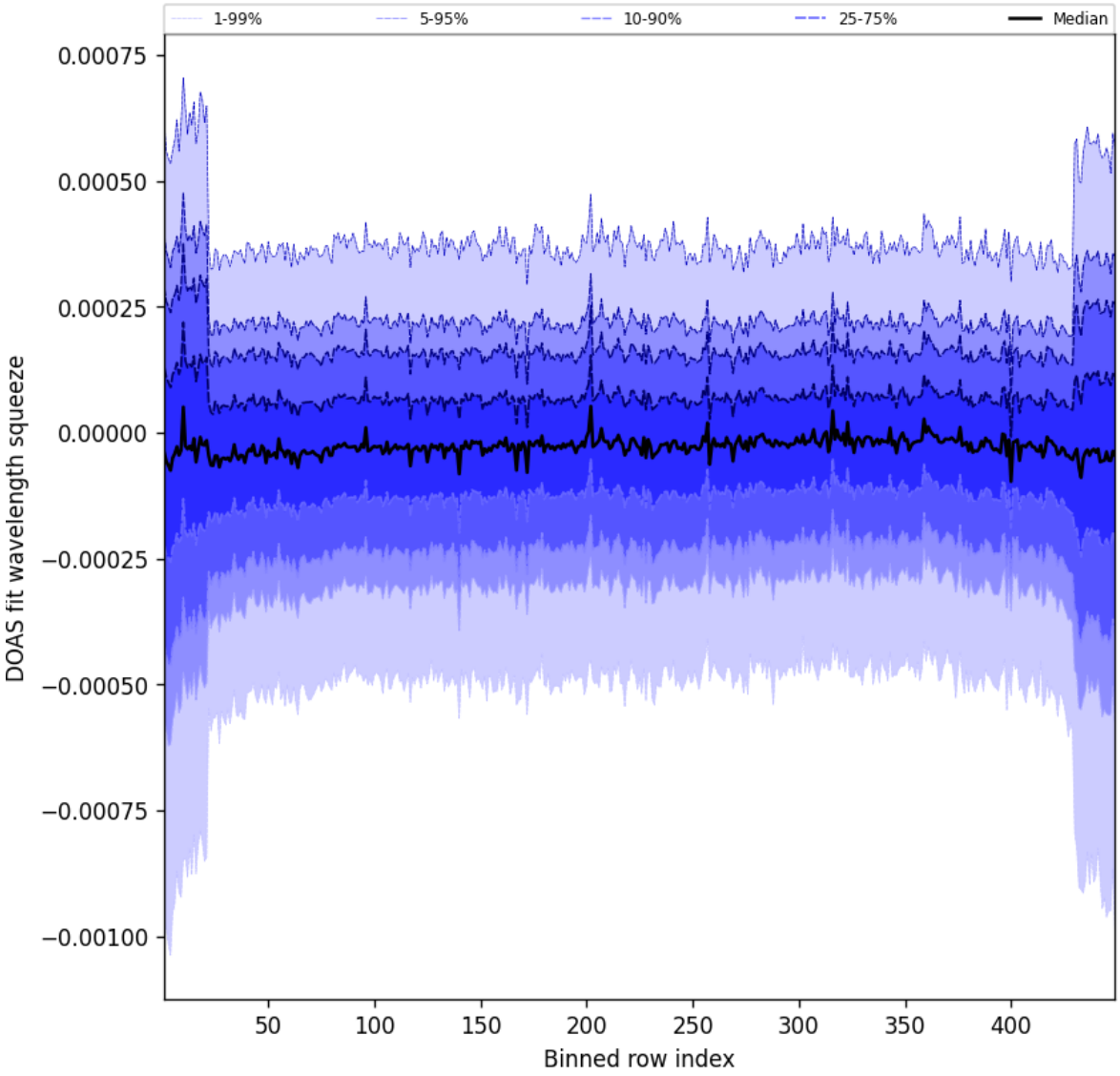

Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2025-02-25 to 2025-02-26

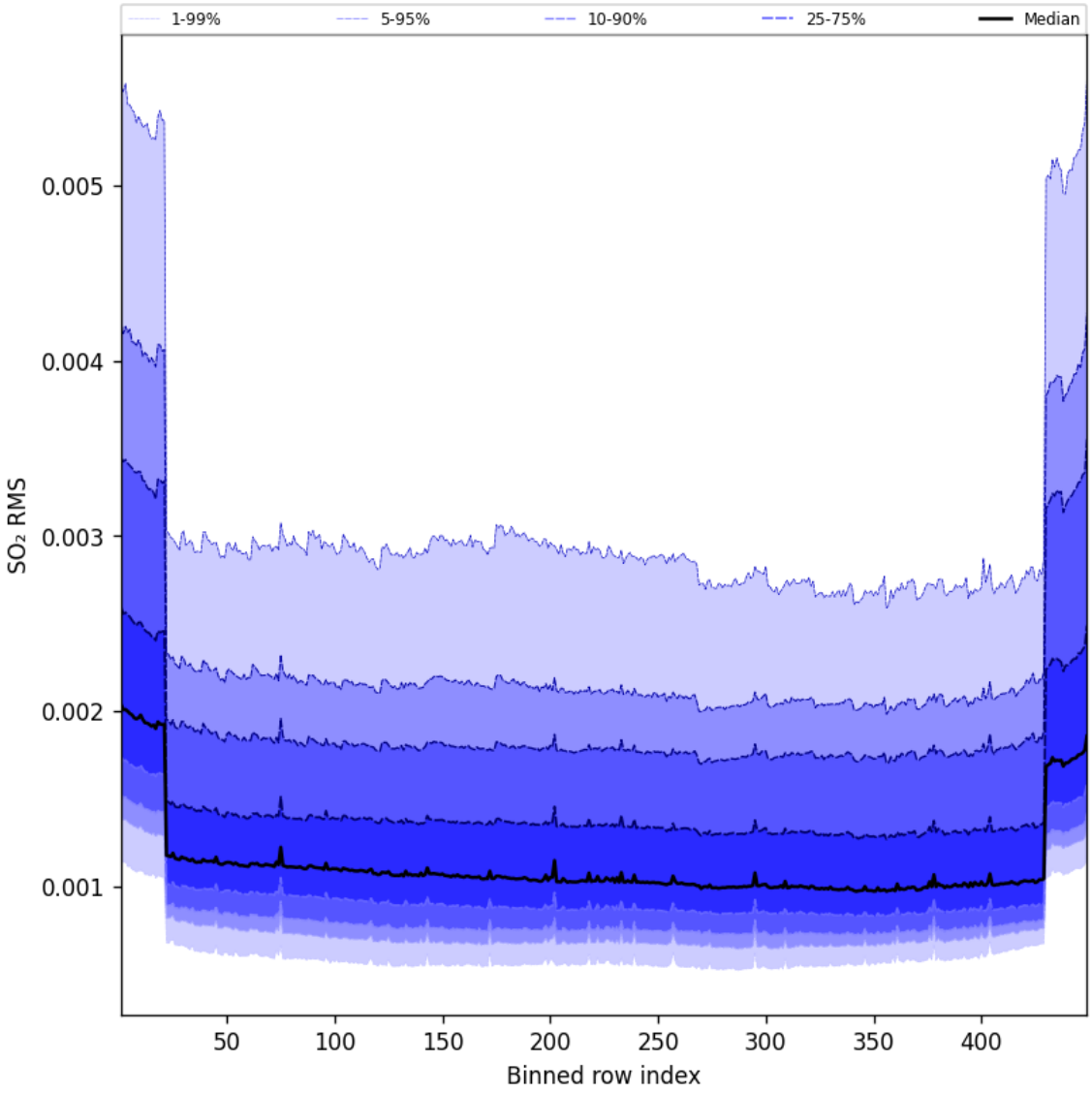

Figure 106: Along track statistics of "SO_2 RMS" for 2025-02-25 to 2025-02-26

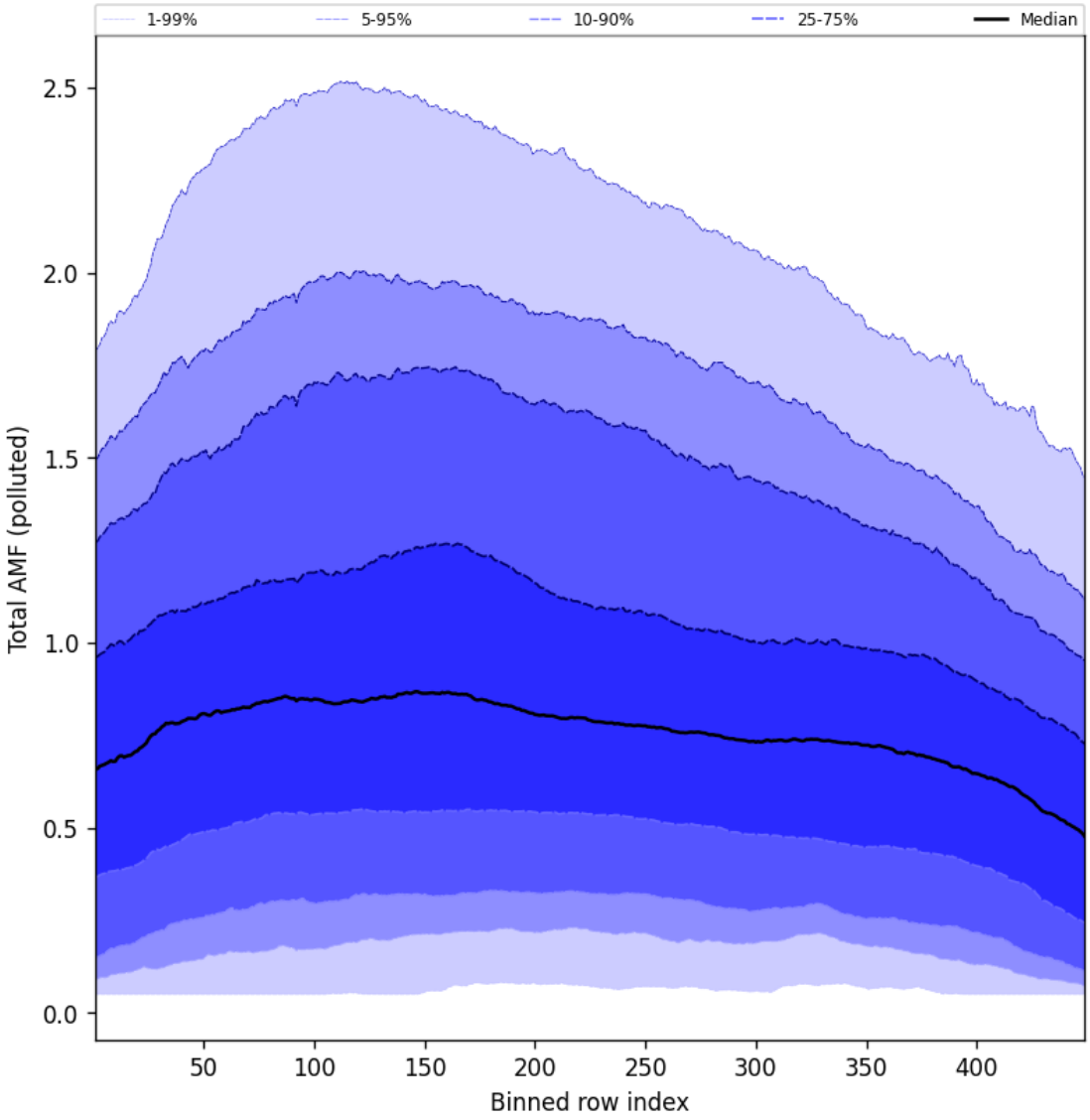

Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-02-25 to 2025-02-26

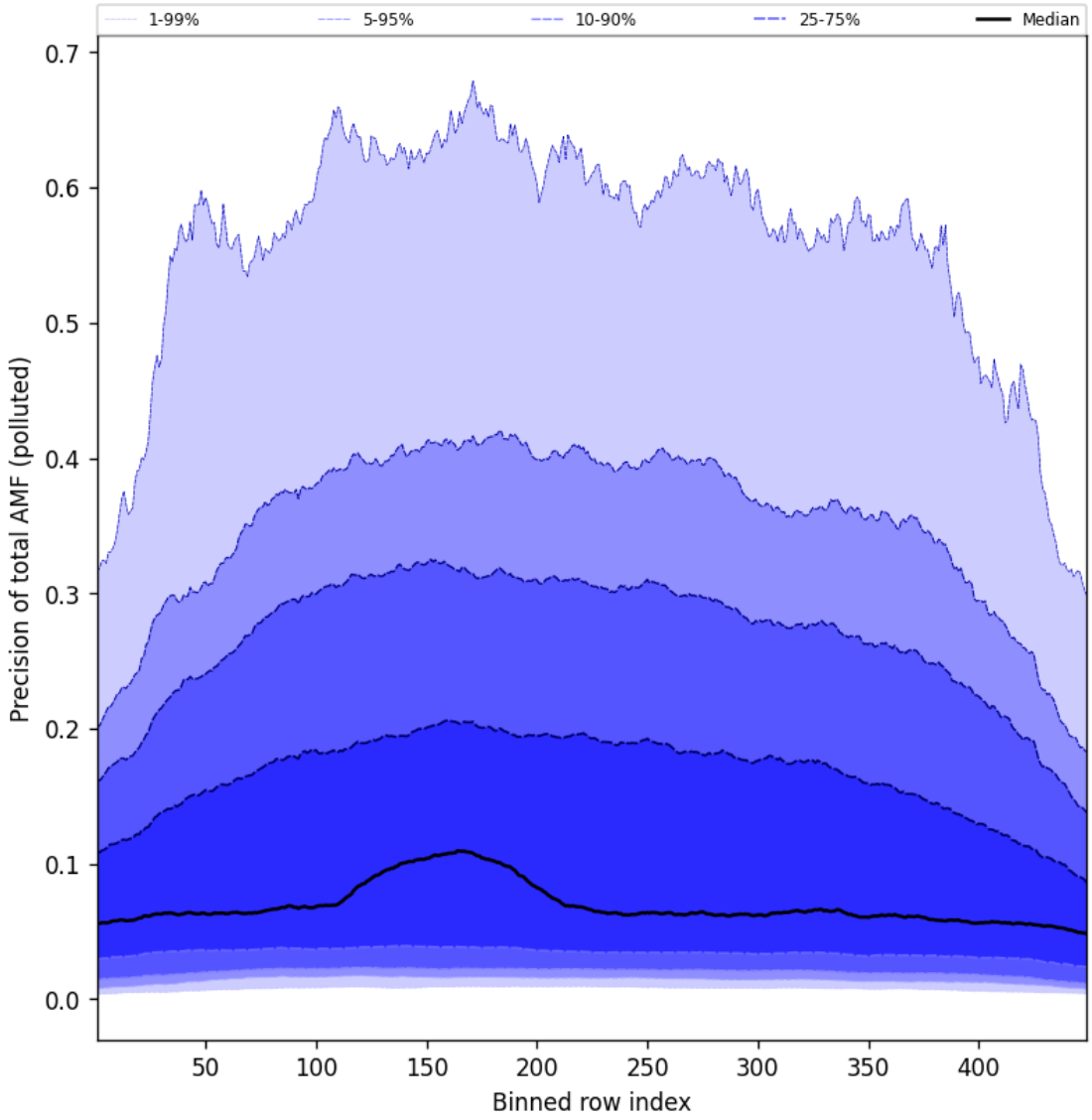

Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-02-25 to 2025-02-26

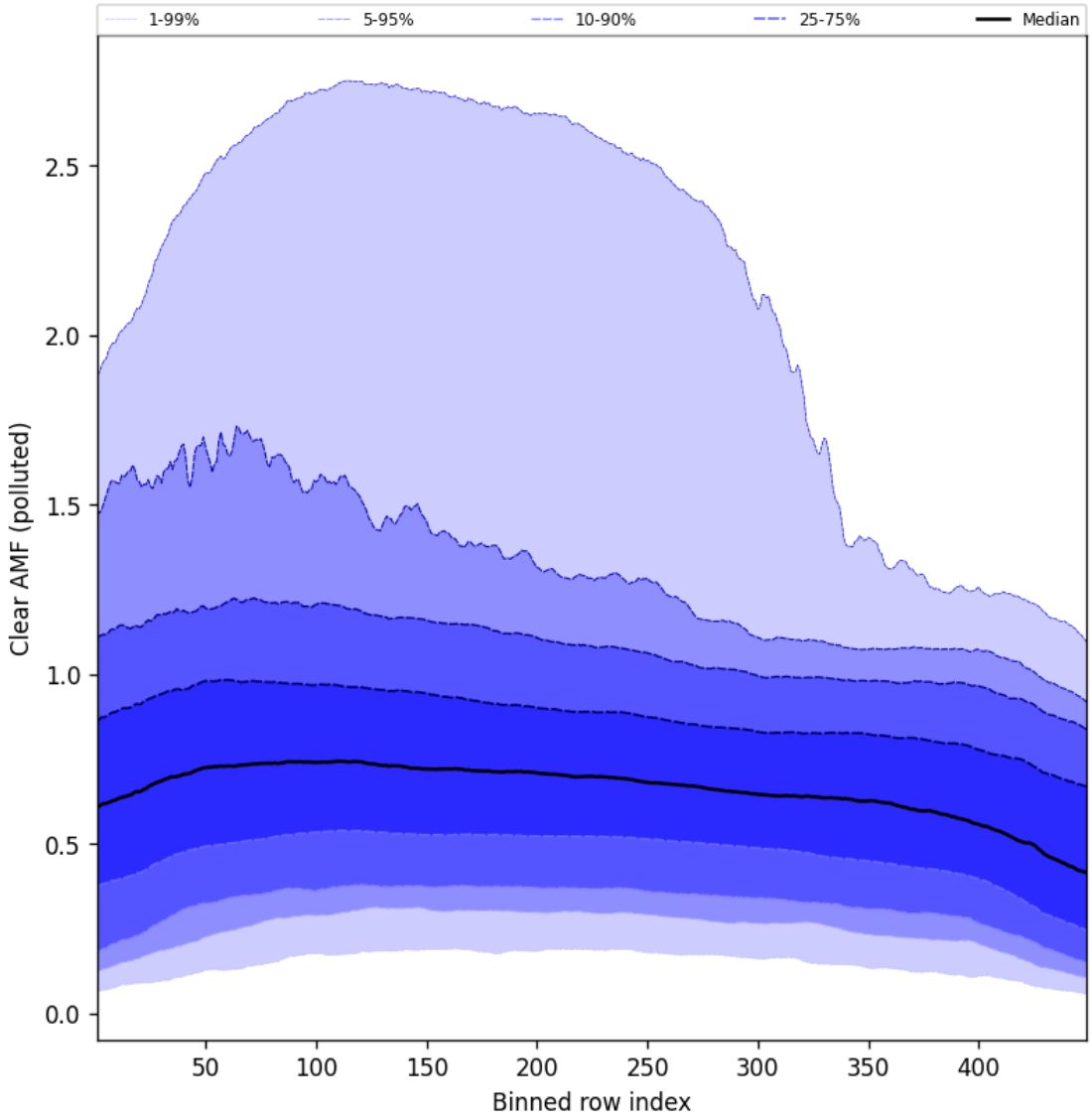

Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-02-25 to 2025-02-26

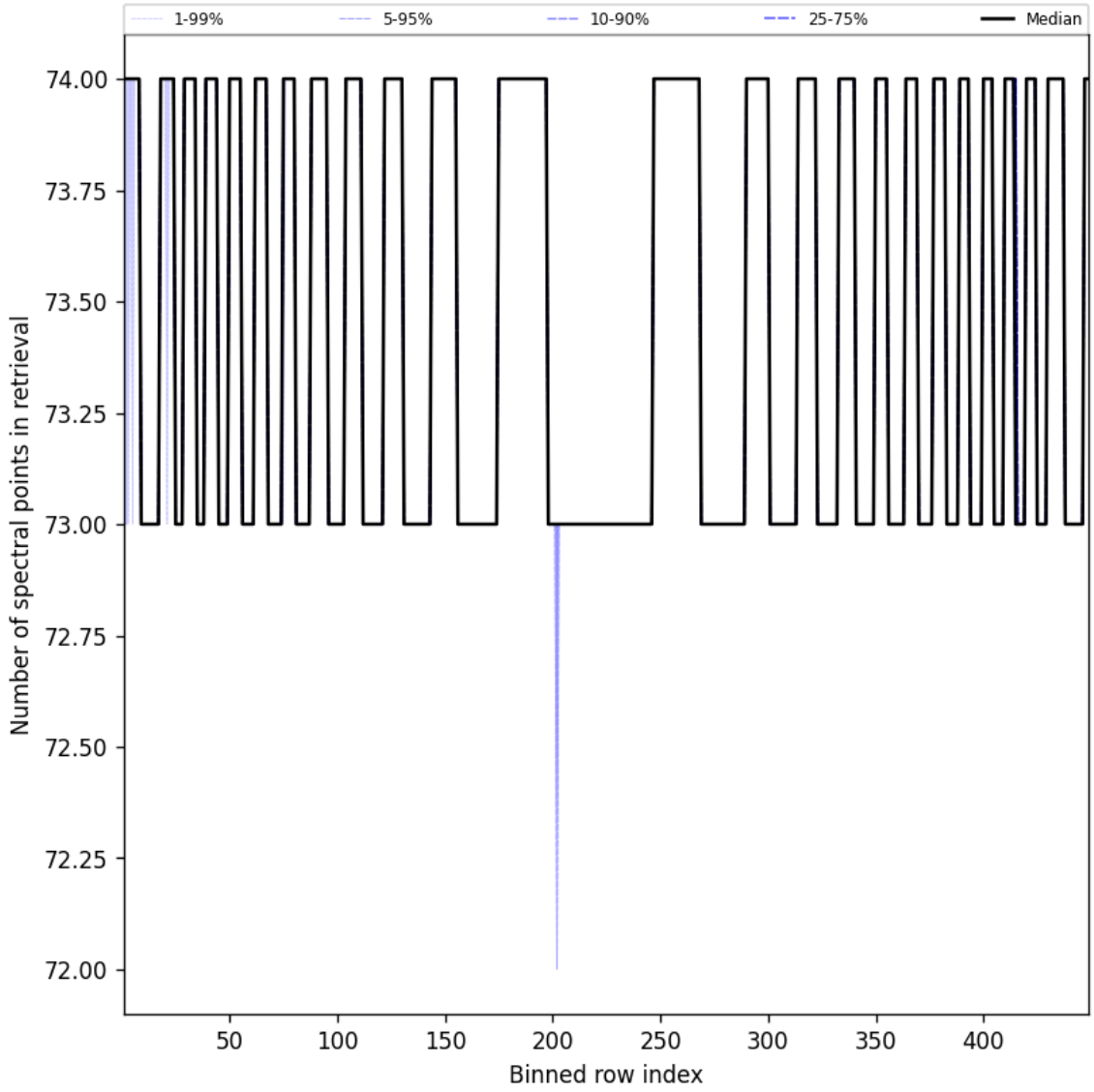

Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-02-25 to 2025-02-26

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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