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]	0.635 ± 0.411	18570968	0.995	0.790	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(5.727 \pm 165.043) \times 10^{-2}$	18570968	0.235	0.436	1.034×10^{-2}	-333	696
sulfurdioxide total vertical column precision [DU]	0.633 ± 1.174	18570968	0.197	0.373	0.307	3.739×10^{-2}	163
sulfurdioxide slant column density corrected [DU]	$(2.056 \pm 38.077) \times 10^{-2}$	18570968	0.235	0.349	9.132×10^{-3}	-16.6	376
sulfurdioxide slant column density cobra [DU]	$(2.042 \pm 36.281) \times 10^{-2}$	18570968	0.235	0.349	9.132×10^{-3}	-16.6	45.5
sulfurdioxide slant column density cobra precision [DU]	0.286 ± 0.140	18570968	0.188	0.141	0.238	7.566×10^{-2}	19.2
sulfurdioxide slant column density window1 [DU]	0.212 ± 0.692	18570968	0.225	0.719	0.226	-309	98.6
sulfurdioxide slant column density window1 precision [DU]	0.286 ± 0.140	18570968	0.188	0.141	0.238	7.566×10^{-2}	19.2
sulfurdioxide slant column density corrected win1 [DU]	$(7.888 \pm 67.910) \times 10^{-2}$	18570968	2.500×10^{-2}	0.697	5.804×10^{-2}	-309	98.7
background so2 slant column offset window1 [DU]	-0.133 ± 0.190	18570968	-0.260	0.209	-0.181	-1.26	7.19
sulfurdioxide slant column density window2 [DU]	3.38 ± 8.97	18570968	2.75	11.3	3.12	-1.682×10^{3}	1.141×10^{3}
sulfurdioxide slant column density window2 precision [DU]	7.94 ± 2.22	18570968	6.97	2.53	7.58	2.18	639
sulfurdioxide slant column density corrected win2 [DU]	0.333 ± 8.556	18570968	0.250	10.8	0.333	-1.689×10^{3}	1.135×10^{3}
background so2 slant column offset window2 [DU]	-3.05 ± 2.70	18570968	-1.25	3.06	-2.11	-20.7	9.93
sulfurdioxide slant column density window3 [DU]	-18.4 ± 23.9	18570968	-19.6	30.3	-18.5	-730	833
sulfurdioxide slant column density window3 precision [DU]	27.5 ± 12.7	18570968	22.5	9.32	24.2	10.0	519
sulfurdioxide slant column density corrected win3 [DU]	-1.65 ± 22.95	18570968	-1.68	28.9	-1.75	-722	833
background so2 slant column offset window3 [DU]	16.7 ± 7.3	18570968	11.8	11.3	16.2	-10.1	43.6
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.22	18570968	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(3.366 \pm 8.820) \times 10^{-2}$	18570968	1.423×10^{-2}	1.661×10^{-2}	1.624×10^{-2}	2.595×10^{-4}	3.71
fitted radiance shift [nm]	$(-4.158 \pm 25.277) \times 10^{-4}$	18570968	-5.000×10^{-4}	1.789×10^{-3}	-4.057×10^{-4}	-5.493×10^{-2}	5.754×10^{-2}
fitted radiance squeeze [1]	$(-4.287 \pm 18.542) \times 10^{-5}$	18570968	-3.000×10^{-5}	2.048×10^{-4}	-3.341×10^{-5}	-2.003×10^{-2}	1.490×10^{-2}
fitted root mean square [1]	$(1.262 \pm 0.585) \times 10^{-3}$	18570968	9.250×10^{-4}	5.630×10^{-4}	1.077×10^{-3}	3.233×10^{-4}	0.129
sulfurdioxide total air mass factor polluted [1]	0.855 ± 0.490	18570968	0.700	0.583	0.772	5.000×10^{-2}	2.93
sulfurdioxide total air mass factor polluted precision [1]	0.126 ± 0.139	18570968	3.500×10^{-2}	0.137	7.134×10^{-2}	2.500×10^{-3}	1.69
sulfurdioxide clear air mass factor polluted [1]	0.741 ± 0.428	18570968	0.700	0.387	0.677	2.203×10^{-2}	3.09
number of spectral points in retrieval [1]	73.4 ± 0.5	18570968	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	5.000×10^{-2}	0.1000	0.210	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	−3.35	−0.991	−0.550	−0.355	−0.204	0.233	0.401	0.628	1.17	4.26
sulfurdioxide total vertical column precision [DU]	8.983×10^{-2}	0.120	0.144	0.168	0.202	0.575	0.849	1.24	2.13	5.79
sulfurdioxide slant column density corrected [DU]	−0.854	−0.479	−0.343	−0.254	−0.163	0.186	0.283	0.380	0.541	1.06
sulfurdioxide slant column density cobra [DU]	−0.854	−0.479	−0.343	−0.254	−0.163	0.186	0.283	0.380	0.541	1.06
sulfurdioxide slant column density cobra precision [DU]	0.133	0.159	0.172	0.182	0.195	0.335	0.396	0.459	0.554	0.810
sulfurdioxide slant column density window1 [DU]	−1.70	−0.844	−0.536	−0.340	−0.140	0.579	0.764	0.941	1.22	2.02
sulfurdioxide slant column density window1 precision [DU]	0.133	0.159	0.172	0.182	0.195	0.335	0.396	0.459	0.554	0.810
sulfurdioxide slant column density corrected win1 [DU]	−1.62	−0.890	−0.634	−0.464	−0.285	0.412	0.606	0.801	1.12	2.06
background so2 slant column offset window1 [DU]	−0.384	−0.335	−0.310	−0.290	−0.262	-5.343×10^{-2}	3.605×10^{-2}	0.120	0.224	0.466
sulfurdioxide slant column density window2 [DU]	−17.1	−10.7	−7.48	−5.09	−2.40	8.86	11.8	14.5	18.3	26.5
sulfurdioxide slant column density window2 precision [DU]	4.24	5.10	5.61	6.01	6.49	9.01	9.90	10.8	12.0	14.6
sulfurdioxide slant column density corrected win2 [DU]	−20.3	−13.5	−10.2	−7.78	−5.08	5.74	8.44	10.9	14.1	21.0
background so2 slant column offset window2 [DU]	−11.3	−8.97	−7.12	−5.68	−4.24	−1.18	−0.936	−0.739	−0.400	0.971
sulfurdioxide slant column density window3 [DU]	−77.5	−57.4	−47.9	−41.0	−33.4	−3.20	4.62	11.7	21.1	39.6
sulfurdioxide slant column density window3 precision [DU]	13.9	16.0	17.5	18.8	20.5	29.8	34.3	39.9	51.1	82.2
sulfurdioxide slant column density corrected win3 [DU]	−58.6	−39.1	−29.9	−23.3	−16.1	12.9	20.3	27.0	36.0	54.2
background so2 slant column offset window3 [DU]	3.06	5.91	7.48	8.99	10.9	22.2	24.7	26.7	29.0	33.0
sulfurdioxide slant column cobra flag [1]	0.0	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
integrated so2 profile apriori [DU]	2.127×10^{-3}	4.098×10^{-3}	6.088×10^{-3}	7.999×10^{-3}	1.034×10^{-2}	2.695×10^{-2}	3.620×10^{-2}	5.305×10^{-2}	0.108	0.367
fitted radiance shift [nm]	-7.996×10^{-3}	-4.133×10^{-3}	-2.797×10^{-3}	-2.027×10^{-3}	-1.355×10^{-3}	4.340×10^{-4}	1.115×10^{-3}	1.966×10^{-3}	3.434×10^{-3}	7.529×10^{-3}
fitted radiance squeeze [1]	-5.795×10^{-4}	-3.482×10^{-4}	-2.576×10^{-4}	-1.987×10^{-4}	-1.394×10^{-4}	6.537×10^{-5}	1.152×10^{-4}	1.615×10^{-4}	2.289×10^{-4}	4.016×10^{-4}
fitted root mean square [1]	5.755×10^{-4}	7.065×10^{-4}	7.766×10^{-4}	8.300×10^{-4}	8.951×10^{-4}	1.458×10^{-3}	1.717×10^{-3}	1.978×10^{-3}	2.401×10^{-3}	3.391×10^{-3}
sulfurdioxide total air mass factor polluted [1]	7.220×10^{-2}	0.190	0.295	0.394	0.513	1.10	1.32	1.54	1.83	2.36
sulfurdioxide total air mass factor polluted precision [1]	7.705×10^{-3}	1.499×10^{-2}	2.151×10^{-2}	2.756×10^{-2}	3.565×10^{-2}	0.173	0.234	0.297	0.395	0.635
sulfurdioxide clear air mass factor polluted [1]	0.132	0.250	0.333	0.405	0.491	0.878	0.985	1.11	1.46	2.64
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]	0.688 ± 0.401	8002186	0.760	1.000	0.0	1.000	0.240	1.000
sulfurdioxide total vertical column [DU]	0.112 ± 2.398	8002186	0.620	1.679×10^{-2}	-132	494	-0.281	0.339
sulfurdioxide total vertical column precision [DU]	0.987 ± 1.652	8002186	0.741	0.455	4.518×10^{-2}	67.9	0.253	0.995
sulfurdioxide slant column density corrected [DU]	$(3.077 \pm 44.284) \times 10^{-2}$	8002186	0.396	1.256×10^{-2}	-9.44	103	-0.182	0.214
sulfurdioxide slant column density cobra [DU]	$(3.055 \pm 43.155) \times 10^{-2}$	8002186	0.396	1.256×10^{-2}	-9.44	45.5	-0.182	0.214
sulfurdioxide slant column density cobra precision [DU]	0.330 ± 0.167	8002186	0.194	0.275	8.794×10^{-2}	18.0	0.210	0.404
sulfurdioxide slant column density window1 [DU]	0.255 ± 0.804	8002186	0.802	0.271	-38.4	51.3	-0.134	0.667
sulfurdioxide slant column density window1 precision [DU]	0.330 ± 0.167	8002186	0.194	0.275	8.794×10^{-2}	18.0	0.210	0.404
sulfurdioxide slant column density corrected win1 [DU]	0.105 ± 0.799	8002186	0.792	7.114×10^{-2}	-38.4	51.1	-0.315	0.477
background so2 slant column offset window1 [DU]	-0.151 ± 0.212	8002186	0.200	-0.202	-0.673	7.19	-0.287	-8.682×10^{-2}
sulfurdioxide slant column density window2 [DU]	4.34 ± 9.71	8002186	12.4	3.96	-1.682×10^{3}	274	-2.06	10.3
sulfurdioxide slant column density window2 precision [DU]	8.49 ± 2.25	8002186	2.75	8.11	2.42	639	6.93	9.68
sulfurdioxide slant column density corrected win2 [DU]	0.368 ± 9.081	8002186	11.6	0.353	-1.689×10^{3}	272	-5.45	6.15
background so2 slant column offset window2 [DU]	-3.98 ± 3.38	8002186	5.29	-2.62	-20.7	9.93	-6.57	-1.28
sulfurdioxide slant column density window3 [DU]	-21.1 ± 25.0	8002186	32.0	-20.9	-201	146	-37.0	-4.94
sulfurdioxide slant column density window3 precision [DU]	28.8 ± 12.8	8002186	9.15	25.6	10.2	226	21.9	31.1
sulfurdioxide slant column density corrected win3 [DU]	-1.55 ± 24.20	8002186	30.7	-1.45	-170	162	-16.8	13.9
background so2 slant column offset window3 [DU]	19.5 ± 6.8	8002186	11.0	19.0	-5.50	43.6	13.8	24.8
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.24	8002186	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(5.341 \pm 12.851) \times 10^{-2}$	8002186	3.222×10^{-2}	1.925×10^{-2}	2.595×10^{-4}	3.71	1.084×10^{-2}	4.306×10^{-2}
fitted radiance shift [nm]	$(-2.752 \pm 25.072) \times 10^{-4}$	8002186	1.625×10^{-3}	-2.583×10^{-4}	-5.185×10^{-2}	3.772×10^{-2}	-1.109×10^{-3}	5.162×10^{-4}
fitted radiance squeeze [1]	$(-2.334 \pm 21.087) \times 10^{-5}$	8002186	2.215×10^{-4}	-1.317×10^{-5}	-2.003×10^{-2}	8.732×10^{-3}	-1.264×10^{-4}	9.503×10^{-5}
fitted root mean square [1]	$(1.440 \pm 0.711) \times 10^{-3}$	8002186	7.699×10^{-4}	1.194×10^{-3}	3.447×10^{-4}	5.734×10^{-2}	9.592×10^{-4}	1.729×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.684 ± 0.411	8002186	0.526	0.631	5.000×10^{-2}	2.78	0.379	0.905
sulfurdioxide total air mass factor polluted precision [1]	$(9.717 \pm 14.408) \times 10^{-2}$	8002186	8.505×10^{-2}	4.617×10^{-2}	2.500×10^{-3}	1.69	2.641×10^{-2}	0.111
sulfurdioxide clear air mass factor polluted [1]	0.592 ± 0.293	8002186	0.439	0.557	2.203×10^{-2}	2.31	0.363	0.801
number of spectral points in retrieval [1]	73.5 ± 0.5	8002186	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]	0.594 ± 0.415	10568782	0.820	0.490	0.0	1.000	0.180	1.000
sulfurdioxide total vertical column [DU]	$(1.613 \pm 65.322) \times 10^{-2}$	10568782	0.352	7.249×10^{-3}	-333	696	-0.167	0.185
sulfurdioxide total vertical column precision [DU]	0.365 ± 0.437	10568782	0.228	0.256	3.739×10^{-2}	163	0.178	0.405
sulfurdioxide slant column density corrected [DU]	$(1.284 \pm 32.580) \times 10^{-2}$	10568782	0.319	7.003×10^{-3}	-16.6	376	-0.151	0.168
sulfurdioxide slant column density cobra [DU]	$(1.275 \pm 30.026) \times 10^{-2}$	10568782	0.319	7.003×10^{-3}	-16.6	34.9	-0.151	0.168
sulfurdioxide slant column density cobra precision [DU]	0.252 ± 0.103	10568782	0.106	0.220	7.566×10^{-2}	19.2	0.186	0.292
sulfurdioxide slant column density window1 [DU]	0.180 ± 0.591	10568782	0.664	0.198	-309	98.6	-0.143	0.521
sulfurdioxide slant column density window1 precision [DU]	0.252 ± 0.103	10568782	0.106	0.220	7.566×10^{-2}	19.2	0.186	0.292
sulfurdioxide slant column density corrected win1 [DU]	$(5.934 \pm 57.144) \times 10^{-2}$	10568782	0.638	4.995×10^{-2}	-309	98.7	-0.267	0.371
background so2 slant column offset window1 [DU]	-0.120 ± 0.170	10568782	0.220	-0.168	-1.26	2.91	-0.246	-2.589×10^{-2}
sulfurdioxide slant column density window2 [DU]	2.65 ± 8.29	10568782	10.5	2.59	-1.191×10^{3}	1.141×10^{3}	-2.62	7.86
sulfurdioxide slant column density window2 precision [DU]	7.53 ± 2.12	10568782	2.25	7.23	2.18	561	6.22	8.47
sulfurdioxide slant column density corrected win2 [DU]	0.307 ± 8.136	10568782	10.3	0.320	-1.194×10^{3}	1.135×10^{3}	-4.82	5.45
background so2 slant column offset window2 [DU]	-2.34 ± 1.74	10568782	2.23	-1.89	-9.82	9.56	-3.36	-1.13
sulfurdioxide slant column density window3 [DU]	-16.3 ± 22.8	10568782	28.9	-16.8	-730	833	-30.9	-2.01
sulfurdioxide slant column density window3 precision [DU]	26.5 ± 12.6	10568782	9.13	23.2	10.0	519	19.5	28.7
sulfurdioxide slant column density corrected win3 [DU]	-1.72 ± 21.96	10568782	27.7	-1.95	-722	833	-15.6	12.1
background so2 slant column offset window3 [DU]	14.6 ± 6.9	10568782	11.2	13.8	-10.1	38.8	8.86	20.1
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.20	10568782	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(1.872 \pm 2.541) \times 10^{-2}$	10568782	1.204×10^{-2}	1.511×10^{-2}	5.505×10^{-4}	1.46	1.003×10^{-2}	2.207×10^{-2}
fitted radiance shift [nm]	$(-5.223 \pm 25.380) \times 10^{-4}$	10568782	1.870×10^{-3}	-5.333×10^{-4}	-5.493×10^{-2}	5.754×10^{-2}	-1.514×10^{-3}	3.554×10^{-4}
fitted radiance squeeze [1]	$(-5.766 \pm 16.198) \times 10^{-5}$	10568782	1.923×10^{-4}	-4.673×10^{-5}	-1.502×10^{-2}	1.490×10^{-2}	-1.476×10^{-4}	4.469×10^{-5}
fitted root mean square [1]	$(1.127 \pm 0.420) \times 10^{-3}$	10568782	4.386×10^{-4}	1.012×10^{-3}	3.233×10^{-4}	0.129	8.582×10^{-4}	1.297×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.984 ± 0.505	10568782	0.621	0.877	5.000×10^{-2}	2.93	0.634	1.26
sulfurdioxide total air mass factor polluted precision [1]	0.148 ± 0.130	10568782	0.167	0.110	4.165×10^{-3}	1.46	4.489×10^{-2}	0.212
sulfurdioxide clear air mass factor polluted [1]	0.855 ± 0.477	10568782	0.352	0.735	0.123	3.09	0.578	0.930
number of spectral points in retrieval [1]	73.4 ± 0.5	10568782	1.000	73.0	52.0	74.0	73.0	74.0

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

Variable	mean $\pm\sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.666 ± 0.403	13721968	0.760	1.000	0.0	1.000	0.240	1.000
sulfurdioxide total vertical column [DU]	$(3.377 \pm 122.397) \times 10^{-2}$	13721968	0.414	8.684×10^{-3}	-333	309	-0.196	0.218
sulfurdioxide total vertical column precision [DU]	0.520 ± 0.871	13721968	0.305	0.291	4.617×10^{-2}	163	0.202	0.507
sulfurdioxide slant column density corrected [DU]	$(1.539 \pm 32.894) \times 10^{-2}$	13721968	0.333	7.545×10^{-3}	-16.6	45.9	-0.157	0.175
sulfurdioxide slant column density cobra [DU]	$(1.535 \pm 32.669) \times 10^{-2}$	13721968	0.333	7.545×10^{-3}	-16.6	32.0	-0.157	0.175
sulfurdioxide slant column density cobra precision [DU]	0.270 ± 0.127	13721968	0.121	0.226	7.566×10^{-2}	19.2	0.191	0.312
sulfurdioxide slant column density window1 [DU]	0.211 ± 0.636	13721968	0.685	0.224	-52.5	48.5	-0.124	0.561
sulfurdioxide slant column density window1 precision [DU]	0.270 ± 0.127	13721968	0.121	0.226	7.566×10^{-2}	19.2	0.191	0.312
sulfurdioxide slant column density corrected win1 [DU]	$(6.391 \pm 62.371) \times 10^{-2}$	13721968	0.666	4.932×10^{-2}	-52.5	48.5	-0.280	0.386
background so2 slant column offset window1 [DU]	-0.147 ± 0.168	13721968	0.193	-0.185	-1.26	5.61	-0.263	-6.956×10^{-2}
sulfurdioxide slant column density window2 [DU]	2.90 ± 8.64	13721968	10.9	2.71	-1.682×10^{3}	1.141×10^{3}	-2.66	8.21
sulfurdioxide slant column density window2 precision [DU]	7.77 ± 2.12	13721968	2.42	7.42	2.18	639	6.37	8.79
sulfurdioxide slant column density corrected win2 [DU]	0.217 ± 8.366	13721968	10.6	0.228	-1.689×10^{3}	1.135×10^{3}	-5.08	5.53
background so2 slant column offset window2 [DU]	-2.68 ± 2.35	13721968	2.42	-1.96	-20.7	9.93	-3.57	-1.16
sulfurdioxide slant column density window3 [DU]	-15.5 ± 23.5	13721968	29.9	-15.8	-231	833	-30.5	-0.610
sulfurdioxide slant column density window3 precision [DU]	27.1 ± 12.1	13721968	8.98	23.9	10.1	296	20.5	29.4
sulfurdioxide slant column density corrected win3 [DU]	0.419 ± 22.443	13721968	28.6	4.288×10^{-2}	-223	833	-14.0	14.6
background so2 slant column offset window3 [DU]	15.9 ± 6.9	13721968	10.3	15.4	-10.1	43.6	10.6	20.9
sulfurdioxide slant column cobra flag [1]	1.99 ± 0.17	13721968	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.321 \pm 3.956) \times 10^{-2}$	13721968	1.310×10^{-2}	1.591×10^{-2}	2.595×10^{-4}	2.64	1.097×10^{-2}	2.407×10^{-2}
fitted radiance shift [nm]	$(-3.923 \pm 24.130) \times 10^{-4}$	13721968	1.793×10^{-3}	-3.681×10^{-4}	-5.185×10^{-2}	5.754×10^{-2}	-1.322×10^{-3}	4.706×10^{-4}
fitted radiance squeeze [1]	$(-4.300 \pm 17.486) \times 10^{-5}$	13721968	1.950×10^{-4}	-3.295×10^{-5}	-2.003×10^{-2}	1.270×10^{-2}	-1.339×10^{-4}	6.109×10^{-5}
fitted root mean square [1]	$(1.197 \pm 0.533) \times 10^{-3}$	13721968	4.727×10^{-4}	1.029×10^{-3}	3.242×10^{-4}	5.896×10^{-2}	8.749×10^{-4}	1.348×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.844 ± 0.414	13721968	0.513	0.792	5.000×10^{-2}	2.60	0.555	1.07
sulfurdioxide total air mass factor polluted precision [1]	0.120 ± 0.115	13721968	0.129	7.232×10^{-2}	2.500×10^{-3}	1.43	3.880×10^{-2}	0.168
sulfurdioxide clear air mass factor polluted [1]	0.710 ± 0.274	13721968	0.338	0.689	4.279×10^{-2}	2.65	0.525	0.862
number of spectral points in retrieval [1]	73.5 ± 0.5	13721968	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]	0.566 ± 0.421	3924046	0.880	0.490	0.0	1.000	0.120	1.000
sulfurdioxide total vertical column [DU]	0.105 ± 2.275	3924046	0.483	1.373×10^{-2}	-126	696	-0.217	0.266
sulfurdioxide total vertical column precision [DU]	0.857 ± 1.608	3924046	0.621	0.350	3.739×10^{-2}	42.3	0.185	0.806
sulfurdioxide slant column density corrected [DU]	$(3.212 \pm 48.651) \times 10^{-2}$	3924046	0.395	1.338×10^{-2}	-8.93	376	-0.181	0.214
sulfurdioxide slant column density cobra [DU]	$(3.172 \pm 43.377) \times 10^{-2}$	3924046	0.395	1.338×10^{-2}	-8.93	34.9	-0.181	0.214
sulfurdioxide slant column density cobra precision [DU]	0.322 ± 0.157	3924046	0.161	0.282	7.883×10^{-2}	17.1	0.214	0.375
sulfurdioxide slant column density window1 [DU]	0.209 ± 0.810	3924046	0.819	0.229	-309	98.6	-0.193	0.626
sulfurdioxide slant column density window1 precision [DU]	0.322 ± 0.157	3924046	0.161	0.282	7.883×10^{-2}	17.1	0.214	0.375
sulfurdioxide slant column density corrected win1 [DU]	0.112 ± 0.791	3924046	0.781	8.237×10^{-2}	-309	98.7	-0.300	0.481
background so2 slant column offset window1 [DU]	$(-9.704 \pm 23.383) \times 10^{-2}$	3924046	0.270	-0.172	-1.11	7.19	-0.261	9.546×10^{-3}
sulfurdioxide slant column density window2 [DU]	4.47 ± 9.57	3924046	12.2	4.24	-1.060×10^{3}	781	-1.72	10.4
sulfurdioxide slant column density window2 precision [DU]	8.37 ± 2.41	3924046	2.63	8.00	2.29	561	6.86	9.48
sulfurdioxide slant column density corrected win2 [DU]	0.695 ± 8.997	3924046	11.3	0.699	-1.061×10^{3}	775	-4.97	6.36
background so2 slant column offset window2 [DU]	-3.78 ± 3.06	3924046	4.68	-2.82	-20.7	7.57	-5.92	-1.25
sulfurdioxide slant column density window3 [DU]	-26.3 ± 23.2	3924046	29.2	-25.9	-730	237	-40.7	-11.5
sulfurdioxide slant column density window3 precision [DU]	28.7 ± 14.4	3924046	10.2	25.2	10.0	519	20.6	30.8
sulfurdioxide slant column density corrected win3 [DU]	-7.90 ± 23.36	3924046	29.2	-7.33	-722	246	-22.2	7.03
background so2 slant column offset window3 [DU]	18.4 ± 7.9	3924046	13.5	19.1	-10.1	41.8	11.5	24.9
sulfurdioxide slant column cobra flag [1]	1.95 ± 0.30	3924046	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(6.031 \pm 15.080) \times 10^{-2}$	3924046	4.192×10^{-2}	1.843×10^{-2}	4.176×10^{-4}	3.70	7.681×10^{-3}	4.960×10^{-2}
fitted radiance shift [nm]	$(-4.986 \pm 28.623) \times 10^{-4}$	3924046	1.718×10^{-3}	-5.406×10^{-4}	-5.493×10^{-2}	4.075×10^{-2}	-1.439×10^{-3}	2.791×10^{-4}
fitted radiance squeeze [1]	$(-5.498 \pm 20.463) \times 10^{-5}$	3924046	2.328×10^{-4}	-4.401×10^{-5}	-1.434×10^{-2}	1.490×10^{-2}	-1.657×10^{-4}	6.709×10^{-5}
fitted root mean square [1]	$(1.409 \pm 0.647) \times 10^{-3}$	3924046	6.397×10^{-4}	1.252×10^{-3}	3.233×10^{-4}	0.129	9.910×10^{-4}	1.631×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.939 ± 0.682	3924046	0.954	0.719	5.000×10^{-2}	2.93	0.409	1.36
sulfurdioxide total air mass factor polluted precision [1]	0.151 ± 0.194	3924046	0.172	7.088×10^{-2}	2.500×10^{-3}	1.69	2.738×10^{-2}	0.199
sulfurdioxide clear air mass factor polluted [1]	0.889 ± 0.732	3924046	0.688	0.652	2.203×10^{-2}	3.09	0.378	1.07
number of spectral points in retrieval [1]	73.4 ± 0.5	3924046	1.000	73.0	52.0	74.0	73.0	74.0

3 Granule outlines

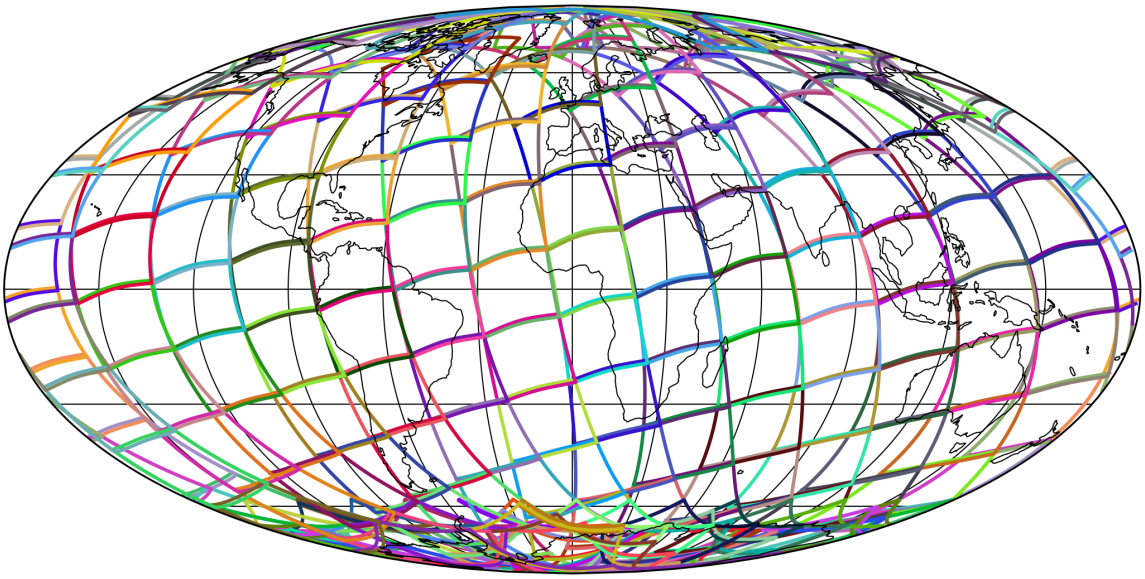

Figure 1: Outline of the granules.

4 Input data monitoring

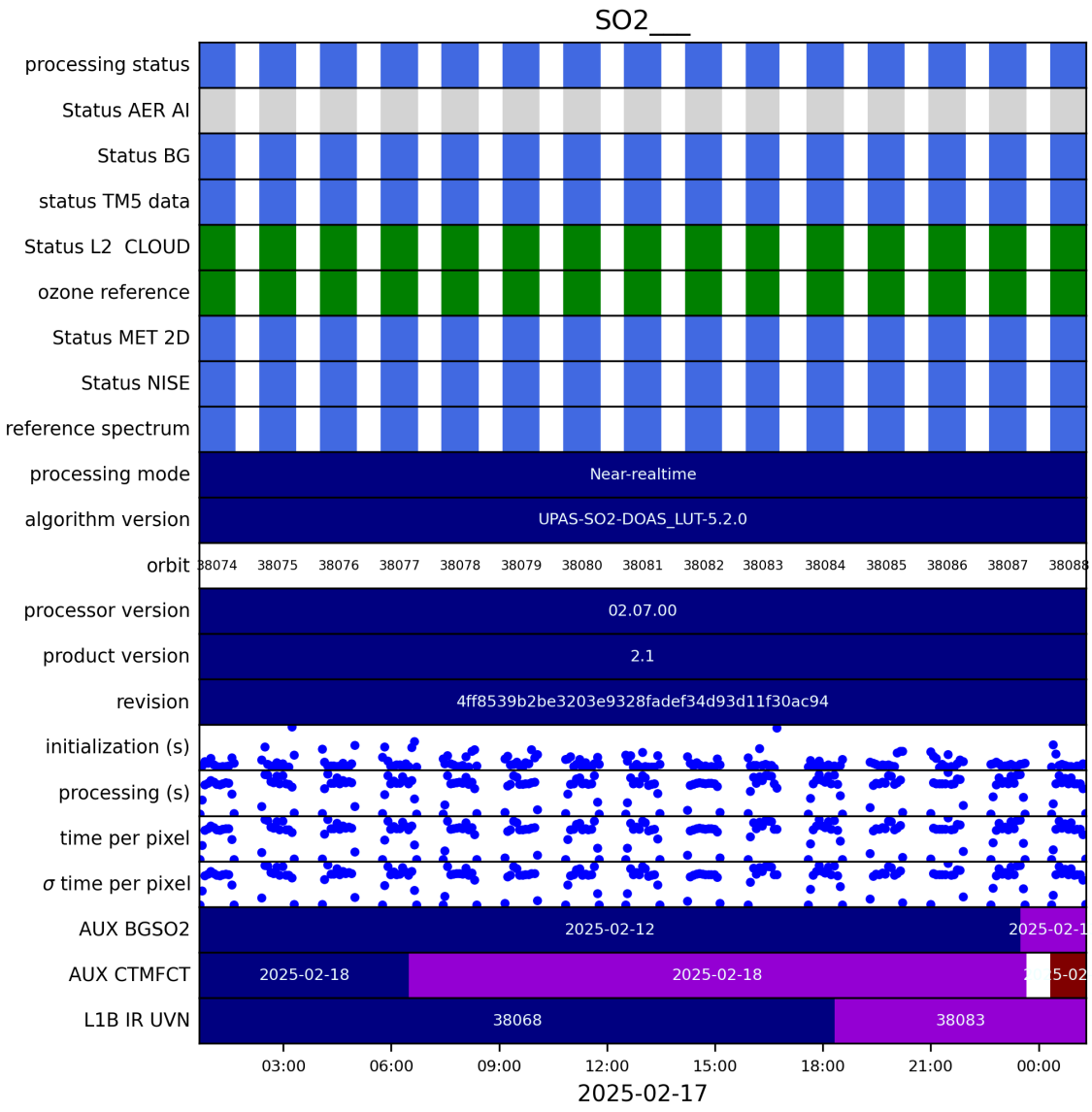

Figure 2: Input data per granule

5 Warnings and errors

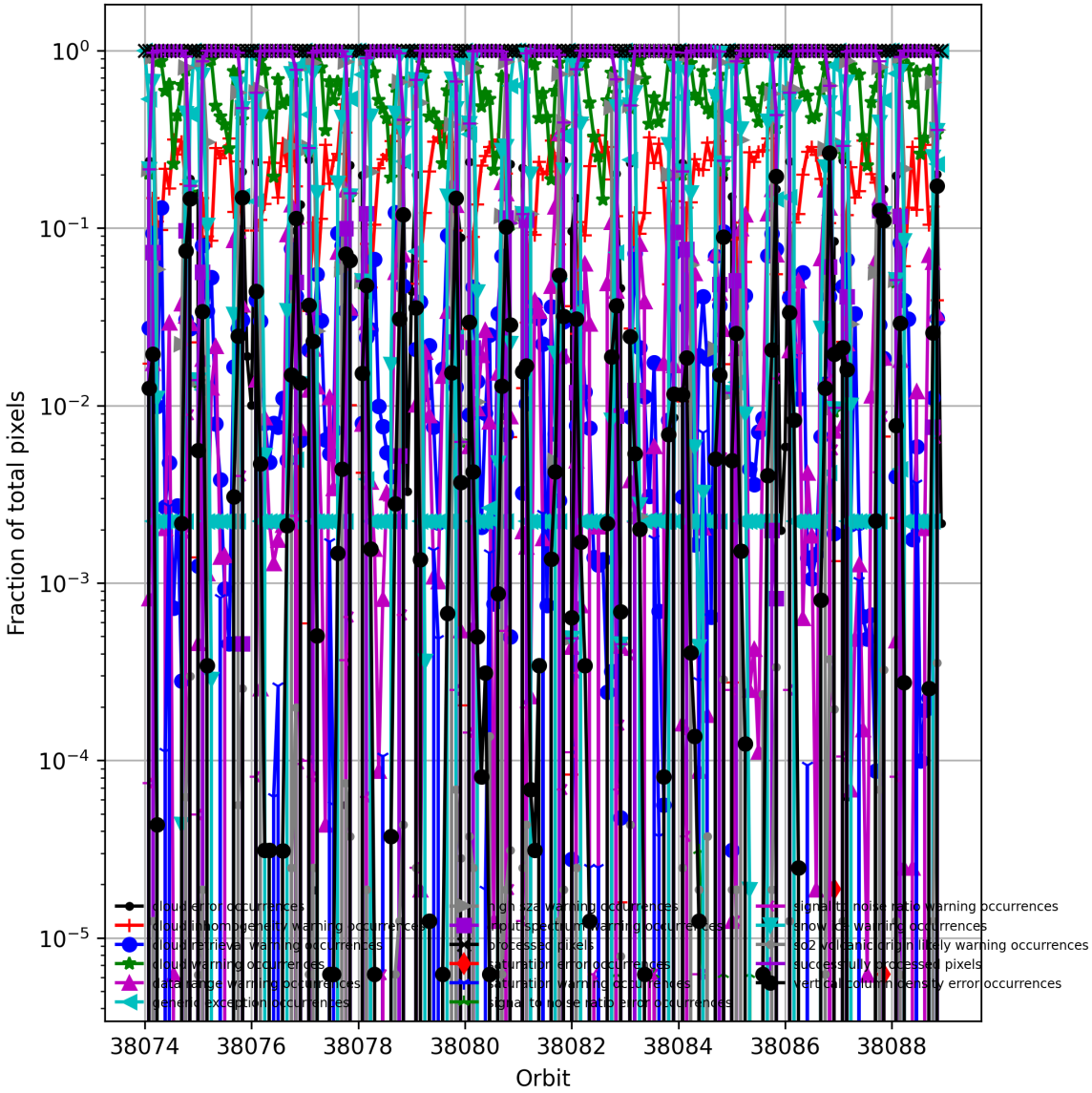

Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

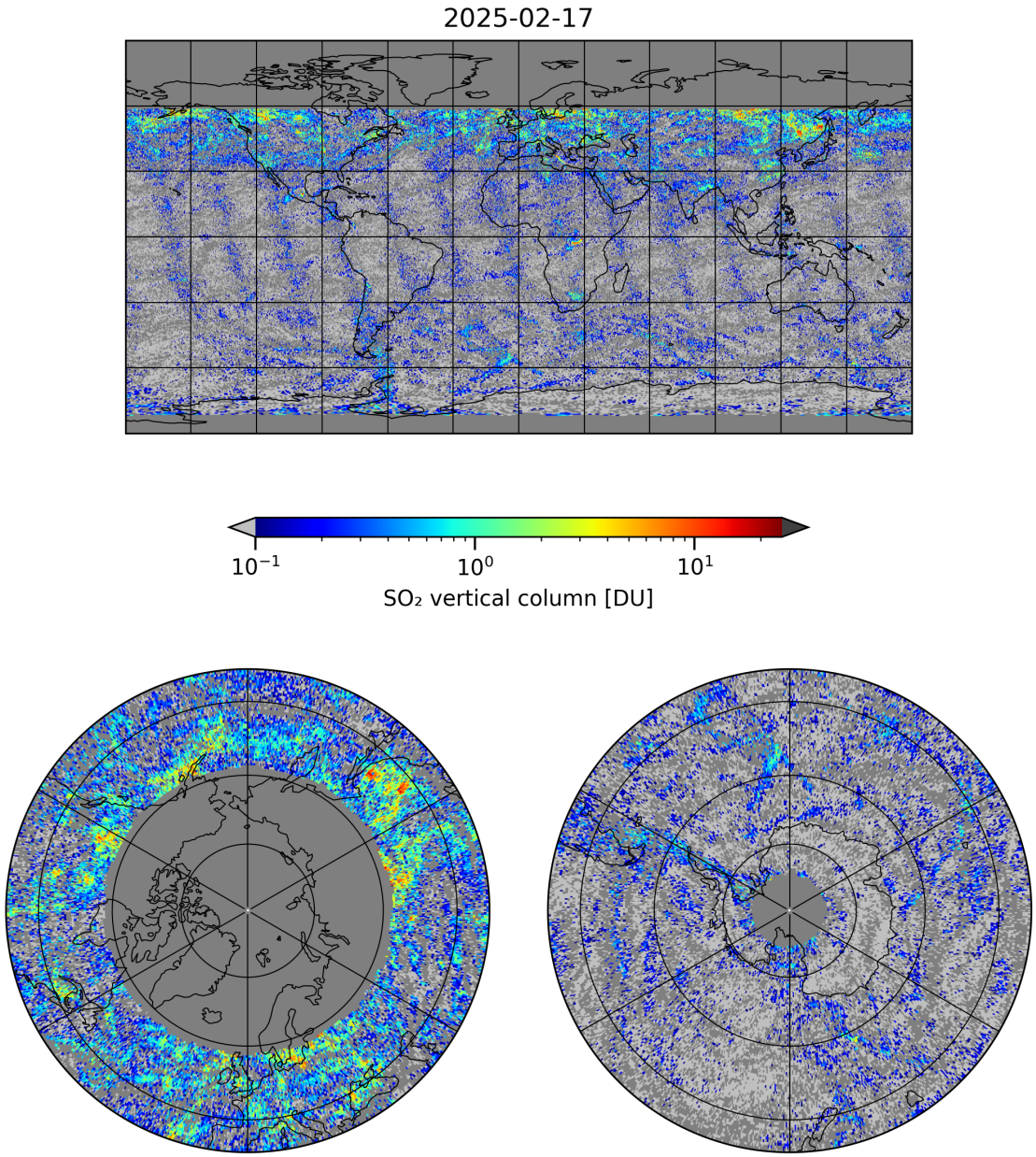

Figure 4: Map of "SO_2 vertical column" for 2025-02-17 to 2025-02-18

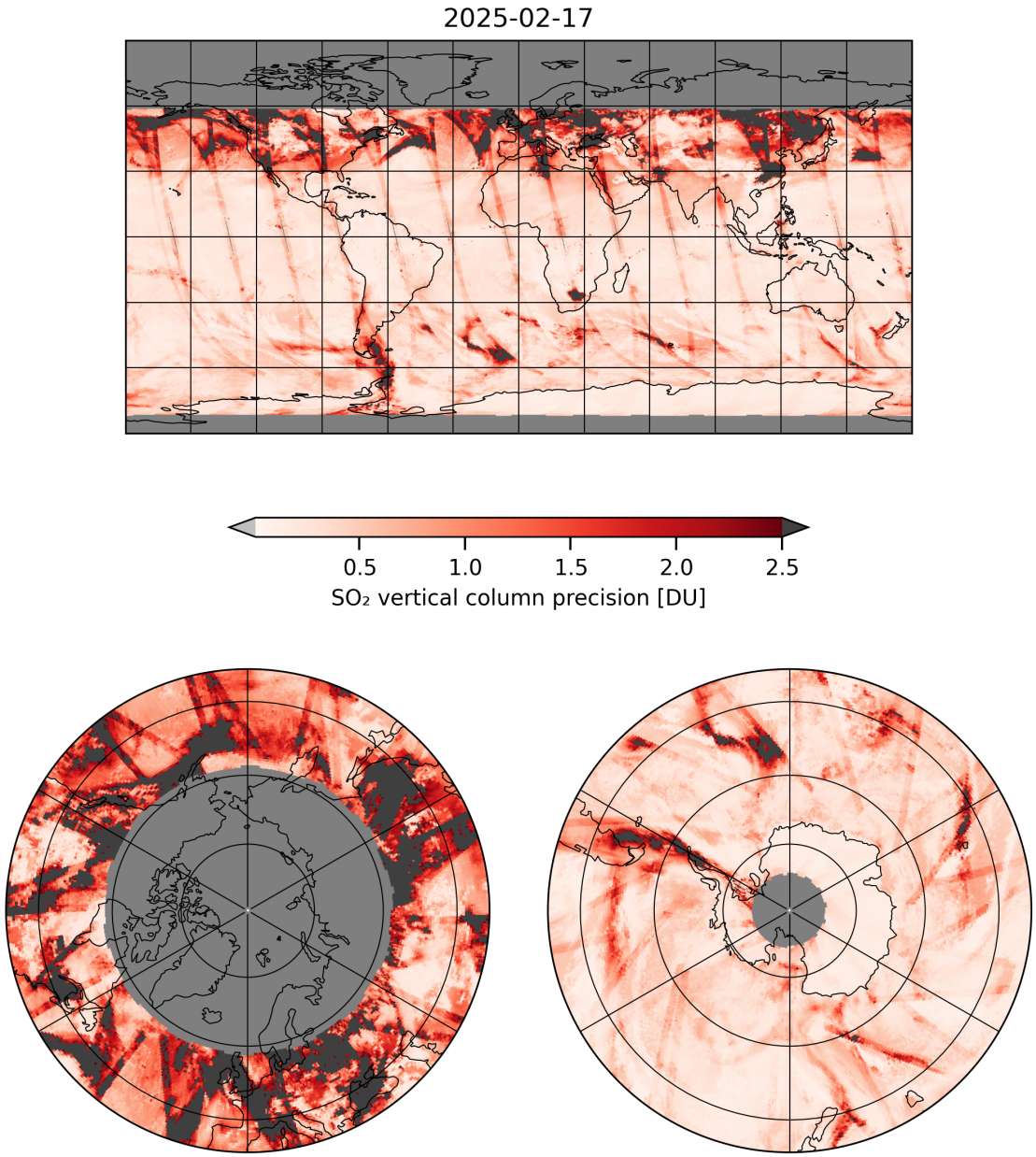

Figure 5: Map of "SO_2 vertical column precision" for 2025-02-17 to 2025-02-18

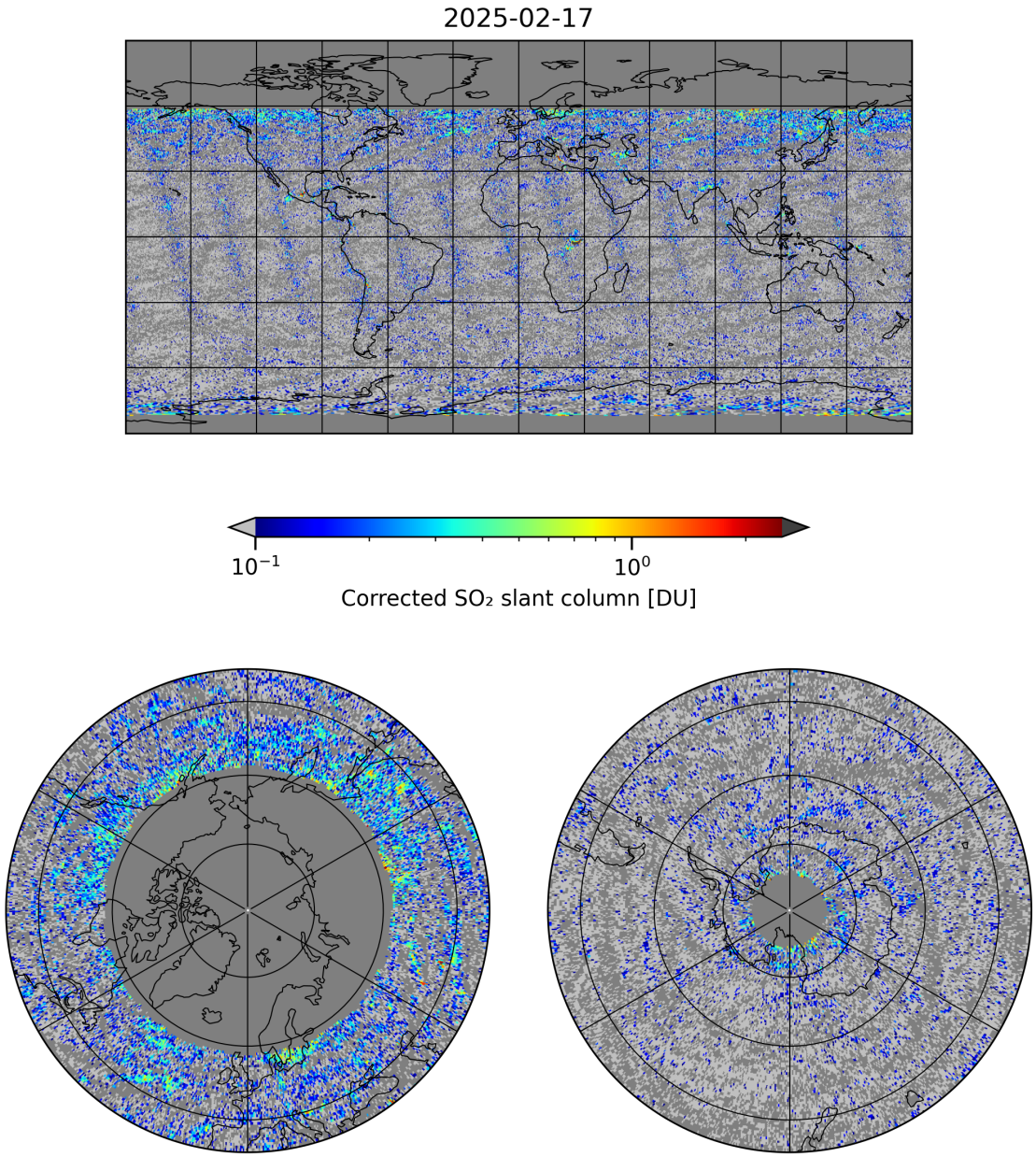

Figure 6: Map of "Corrected SO_2 slant column" for 2025-02-17 to 2025-02-18

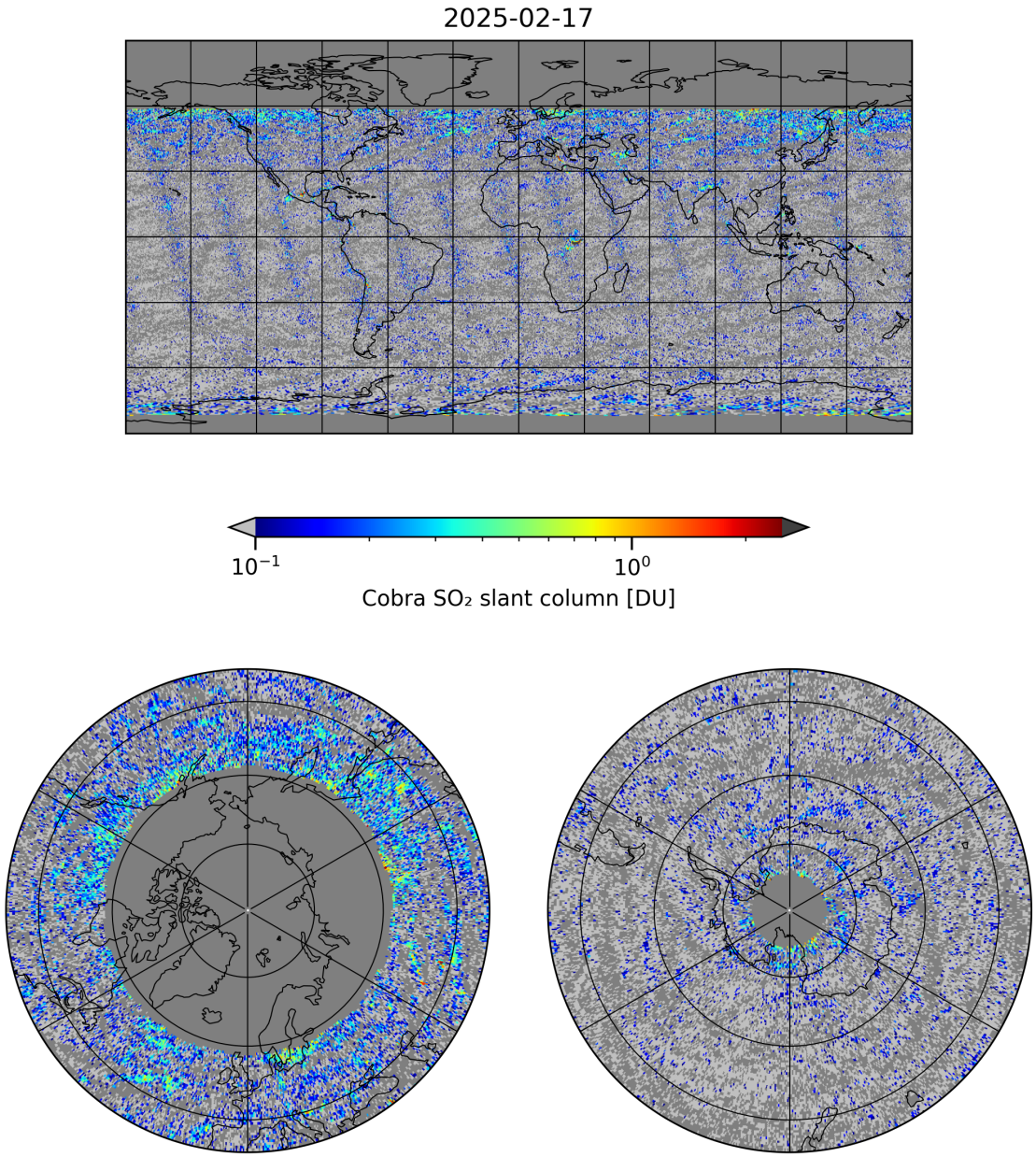

Figure 7: Map of "Cobra SO_2 slant column" for 2025-02-17 to 2025-02-18

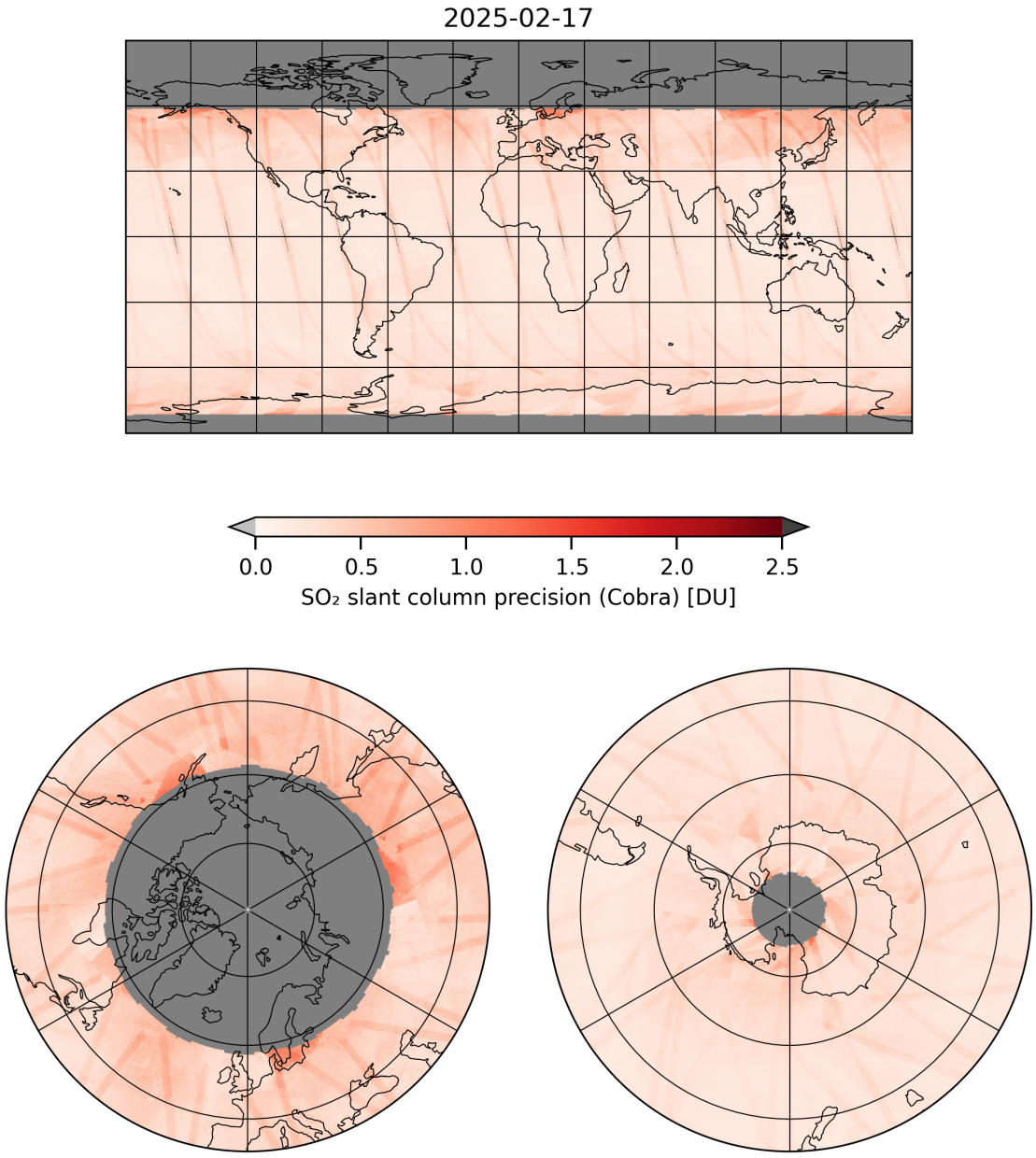

Figure 8: Map of "SO_2 slant column precision (Cobra)" for 2025-02-17 to 2025-02-18

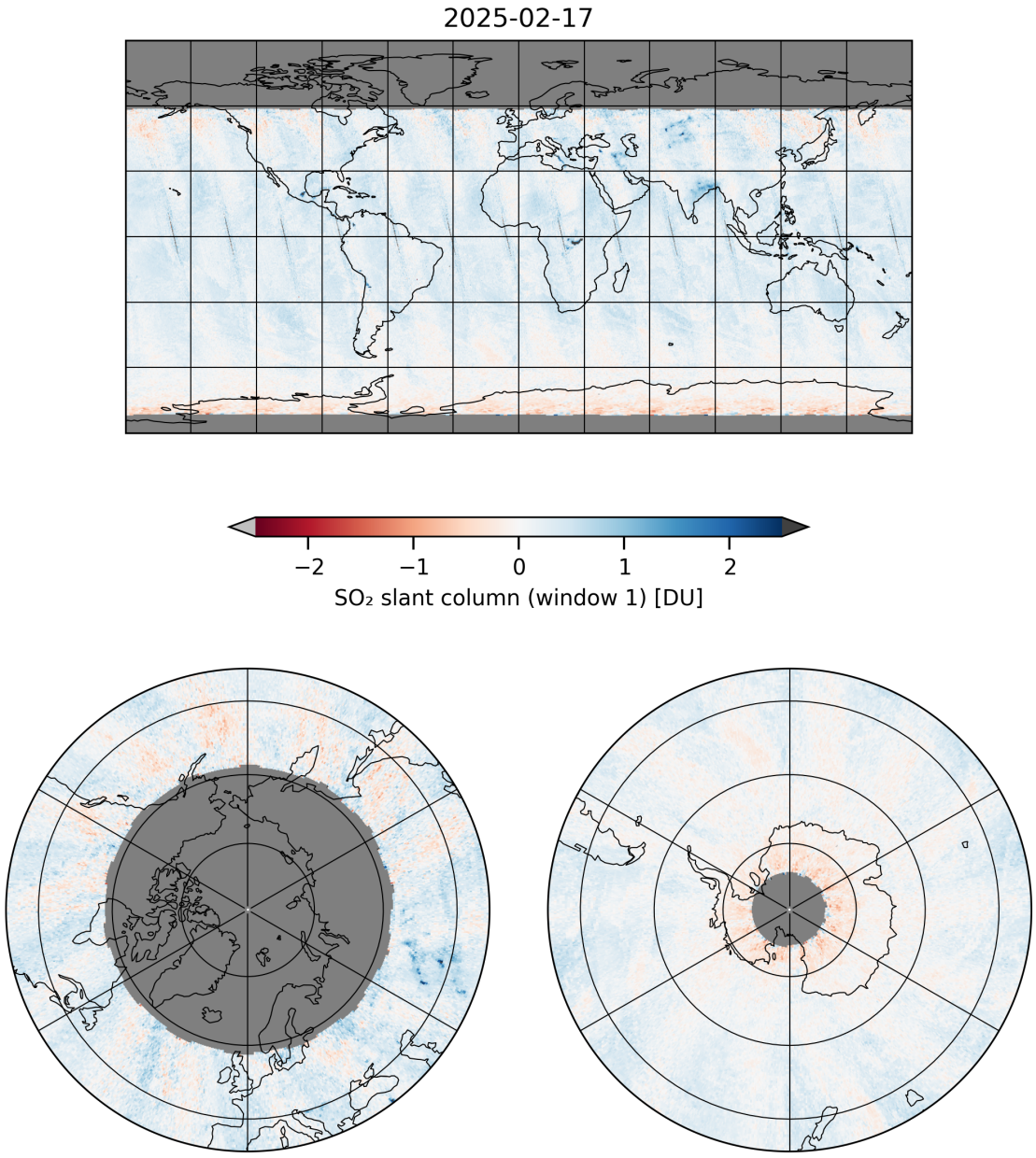

Figure 9: Map of "SO_2 slant column (window 1)" for 2025-02-17 to 2025-02-18

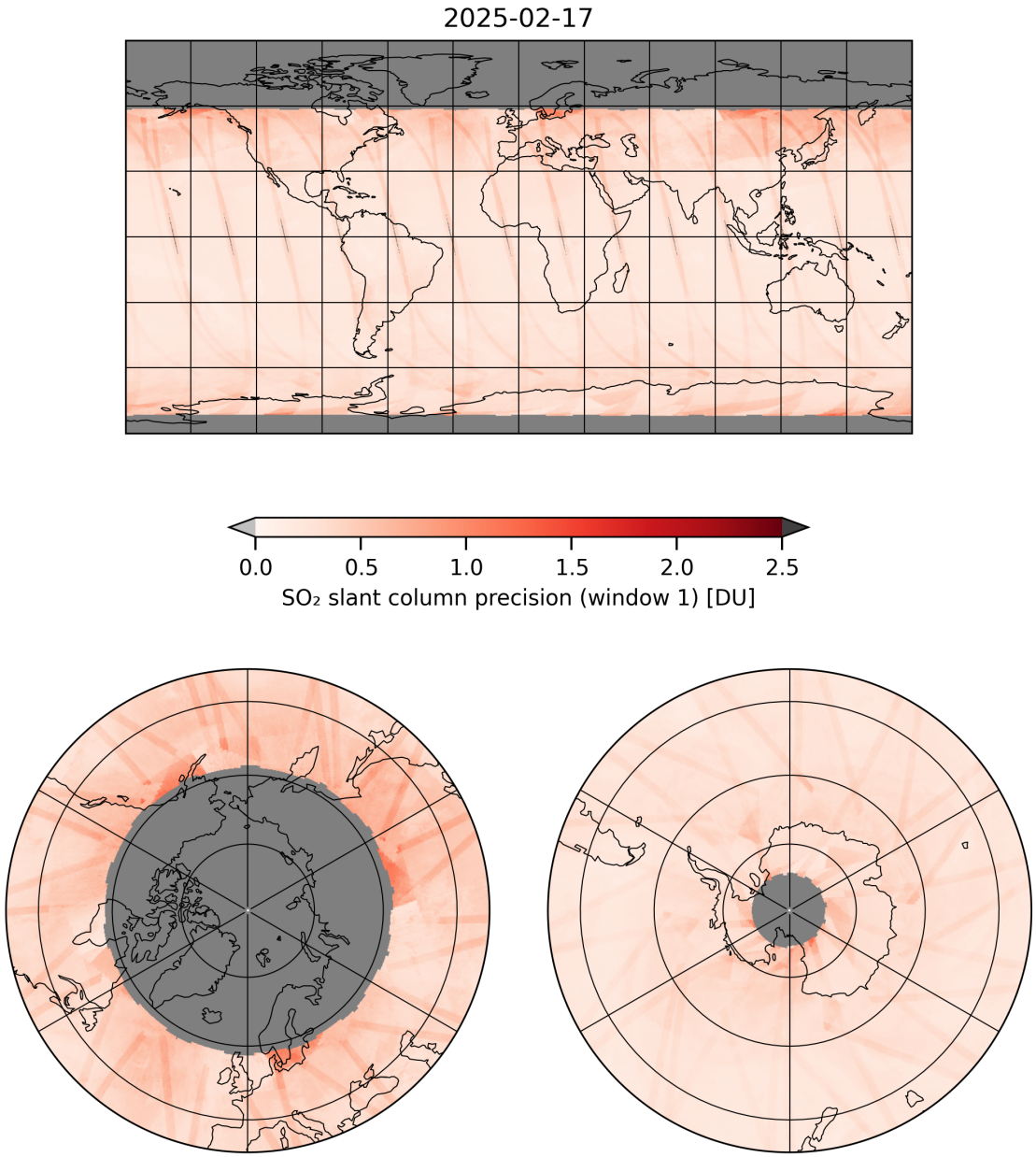

Figure 10: Map of "SO_2 slant column precision (window 1)" for 2025-02-17 to 2025-02-18

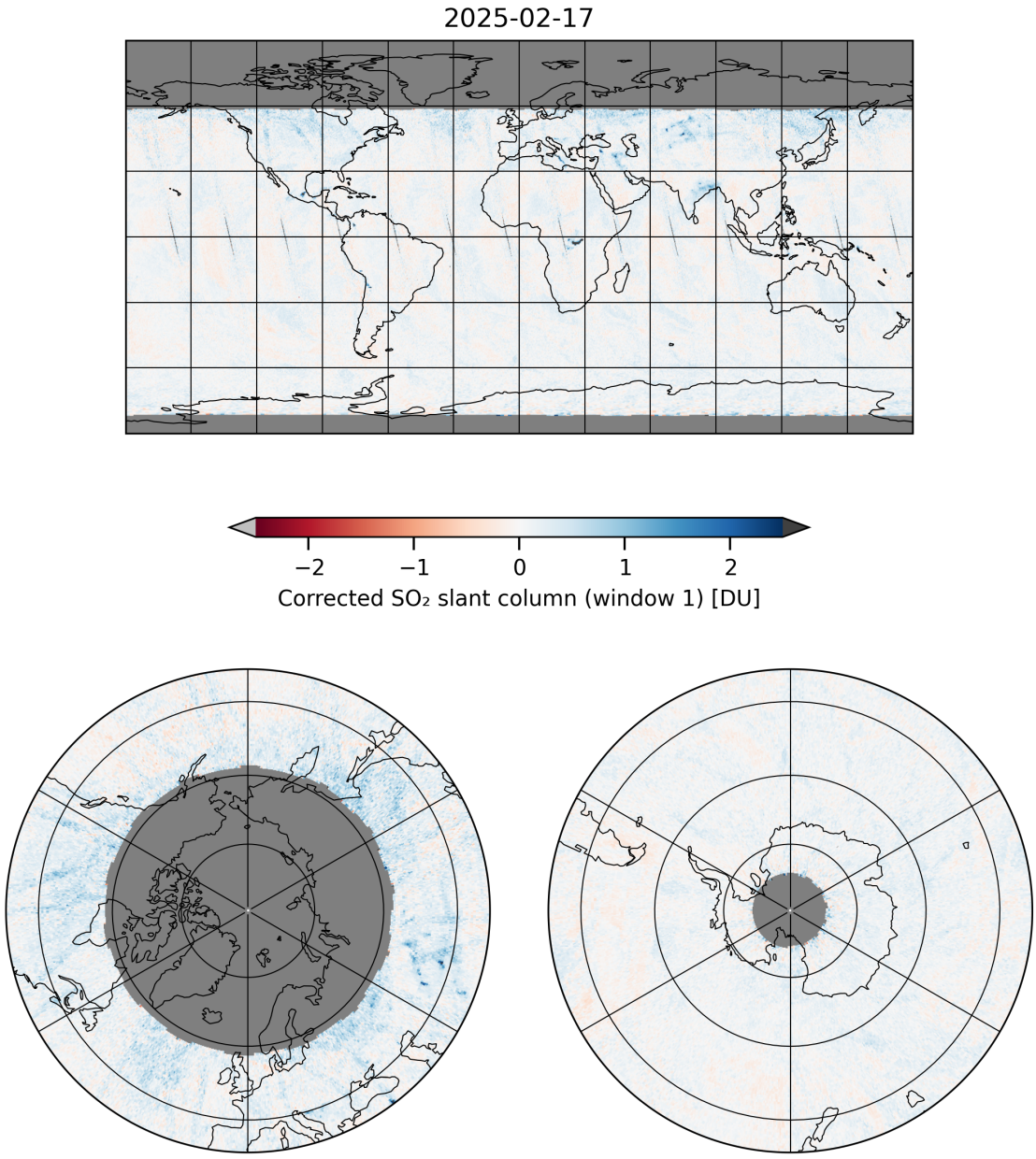

Figure 11: Map of “Corrected SO_2 slant column (window 1)” for 2025-02-17 to 2025-02-18

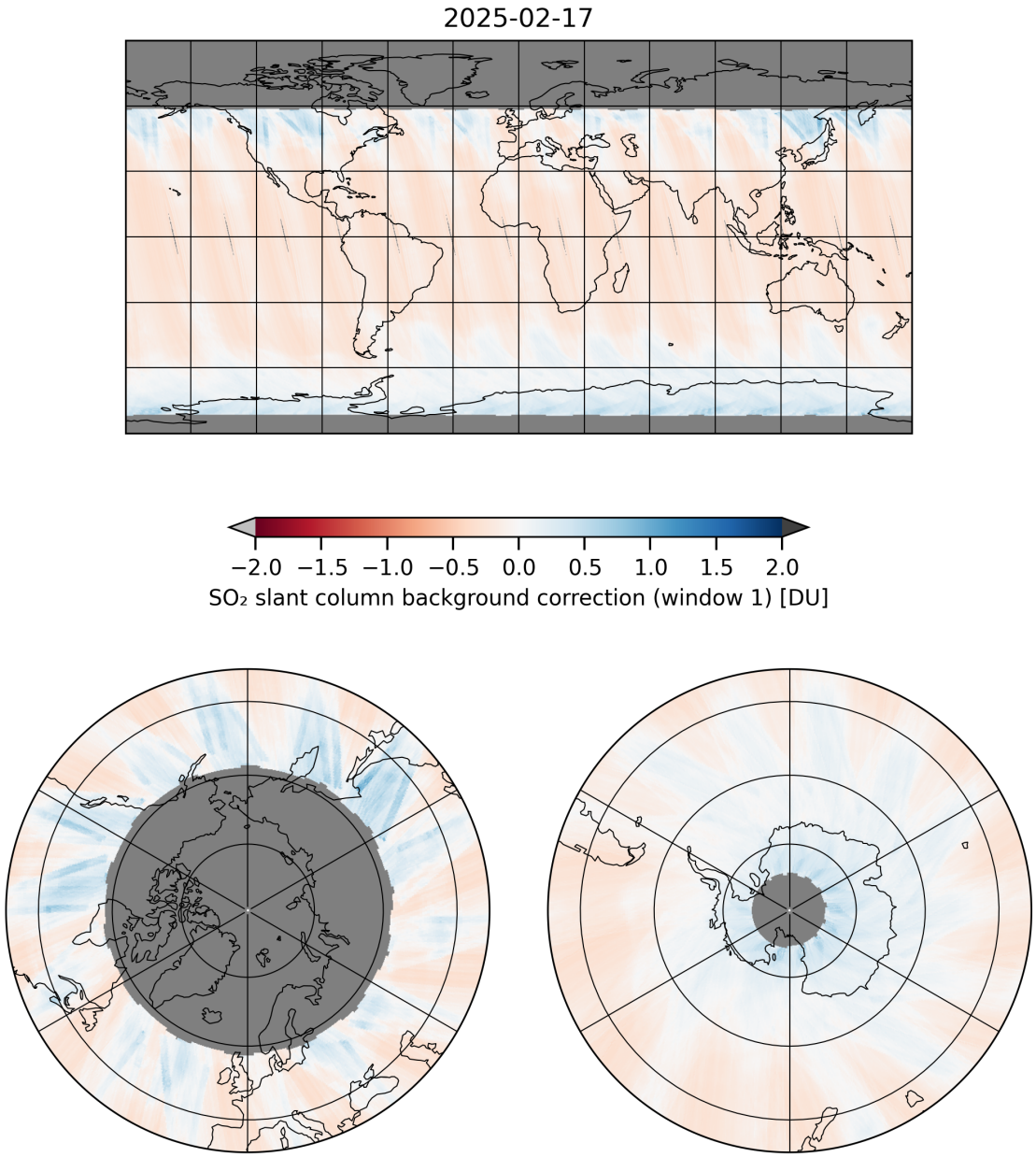

Figure 12: Map of "SO_2 slant column background correction (window 1)" for 2025-02-17 to 2025-02-18

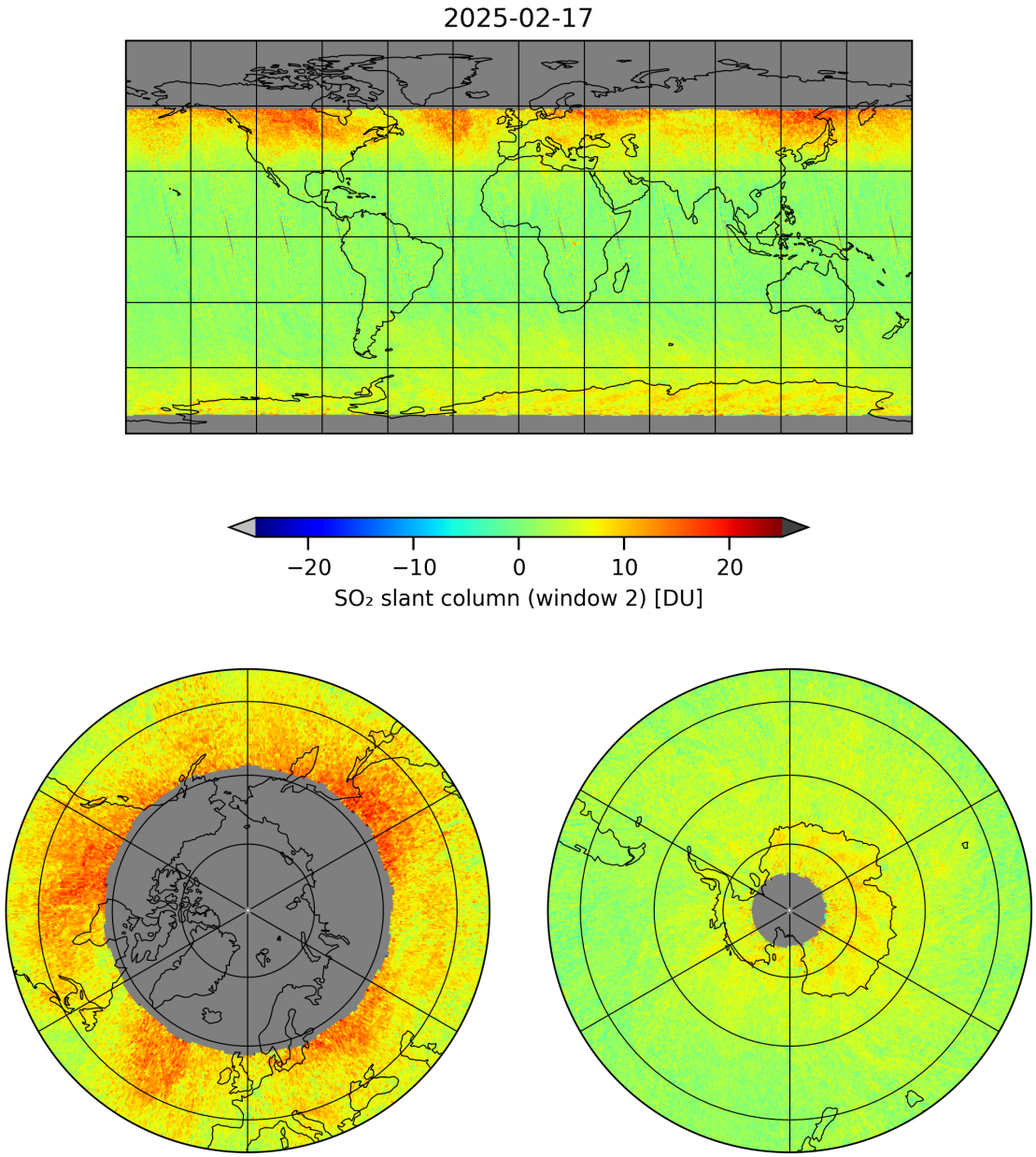

Figure 13: Map of "SO_2 slant column (window 2)" for 2025-02-17 to 2025-02-18

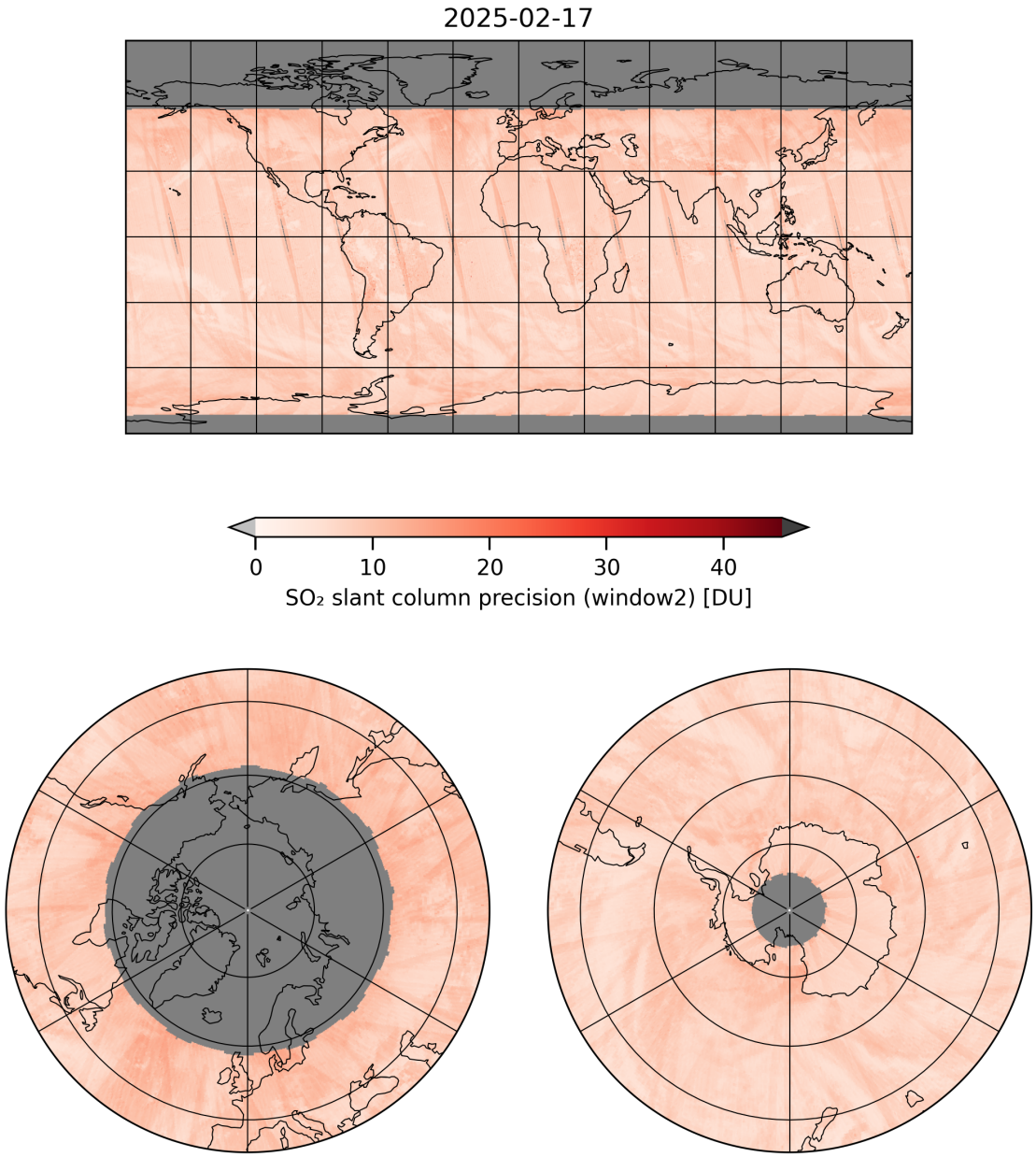

Figure 14: Map of "SO_2 slant column precision (window2)" for 2025-02-17 to 2025-02-18

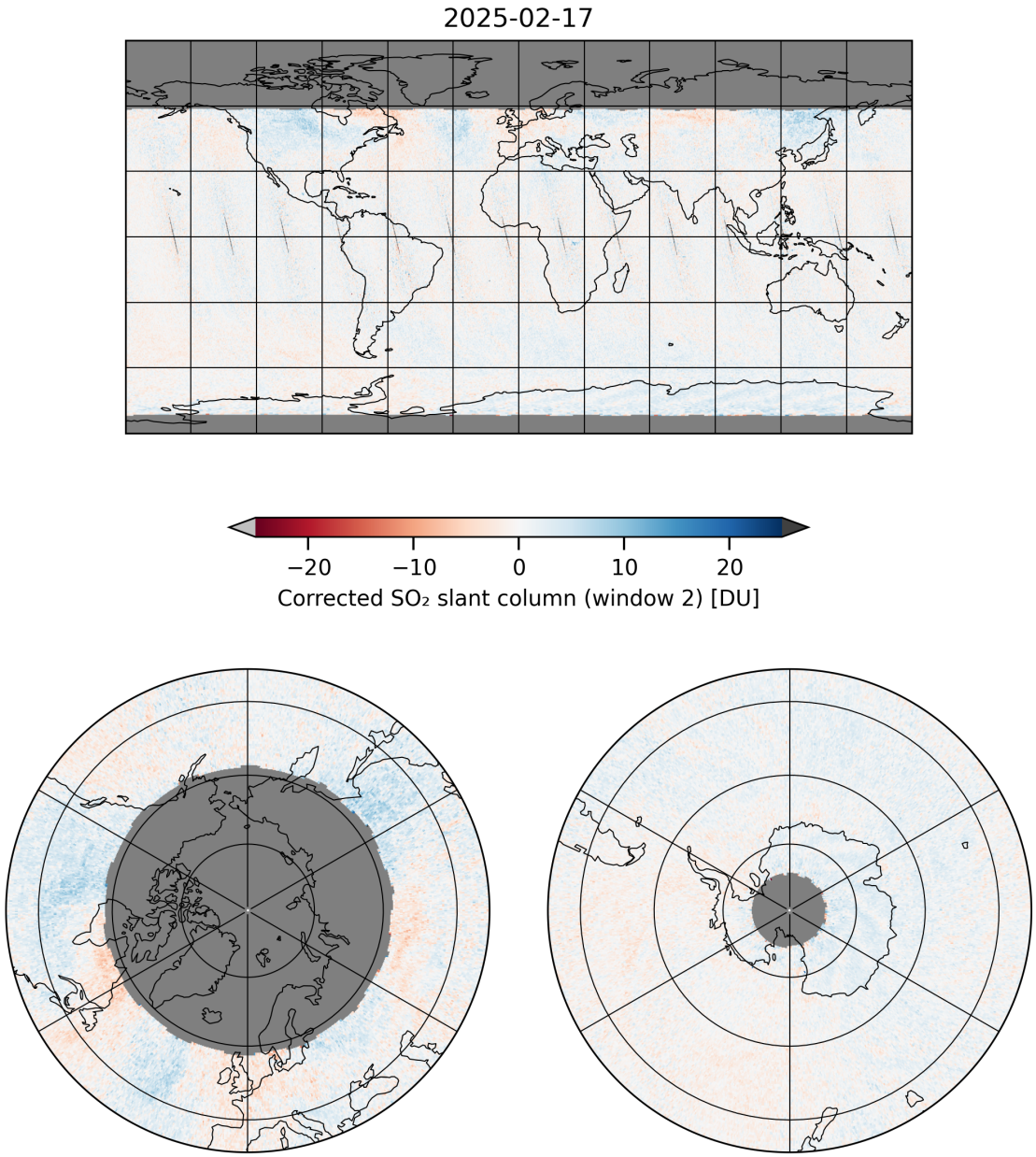

Figure 15: Map of "Corrected SO_2 slant column (window 2)" for 2025-02-17 to 2025-02-18

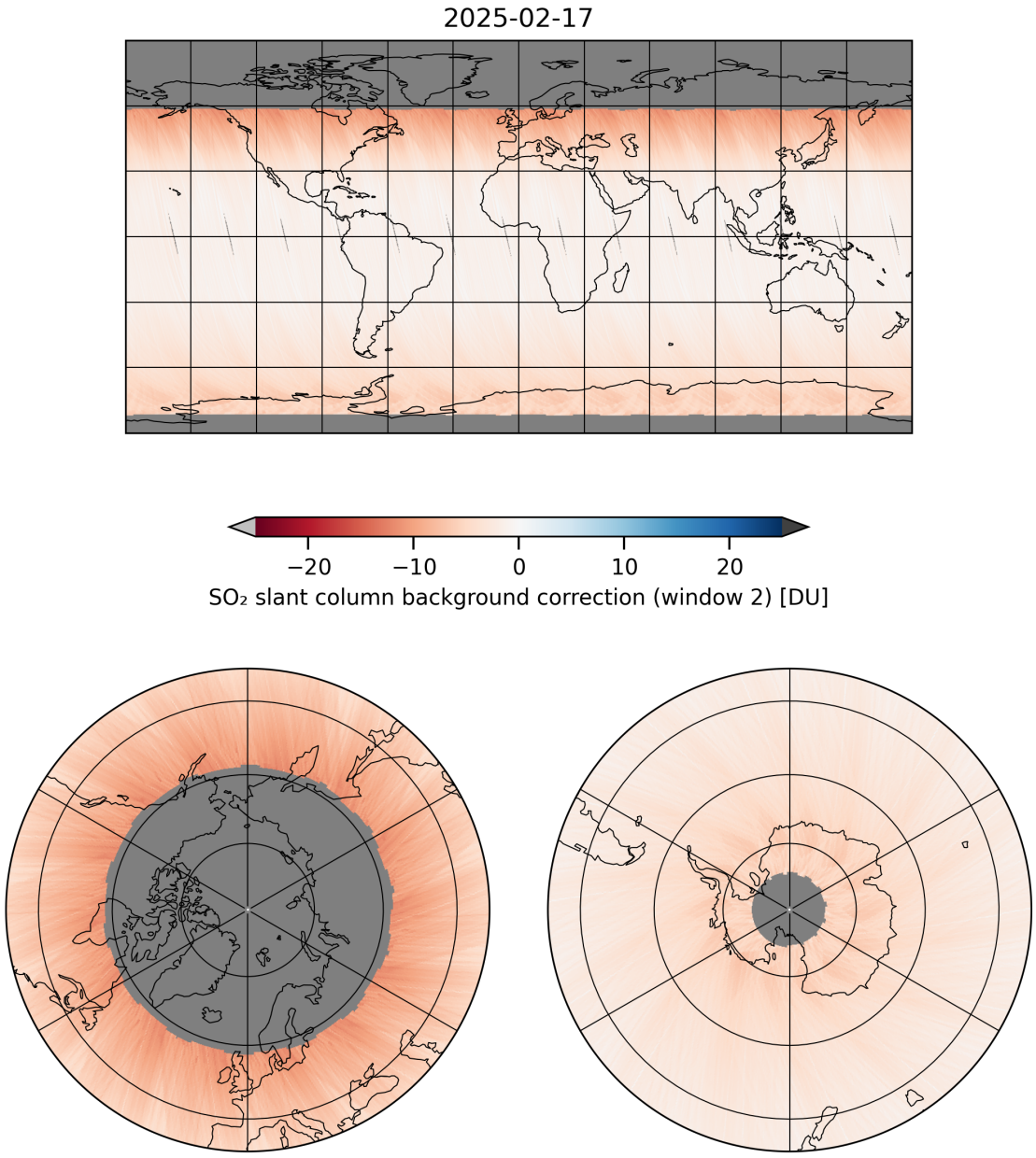

Figure 16: Map of "SO_2 slant column background correction (window 2)" for 2025-02-17 to 2025-02-18

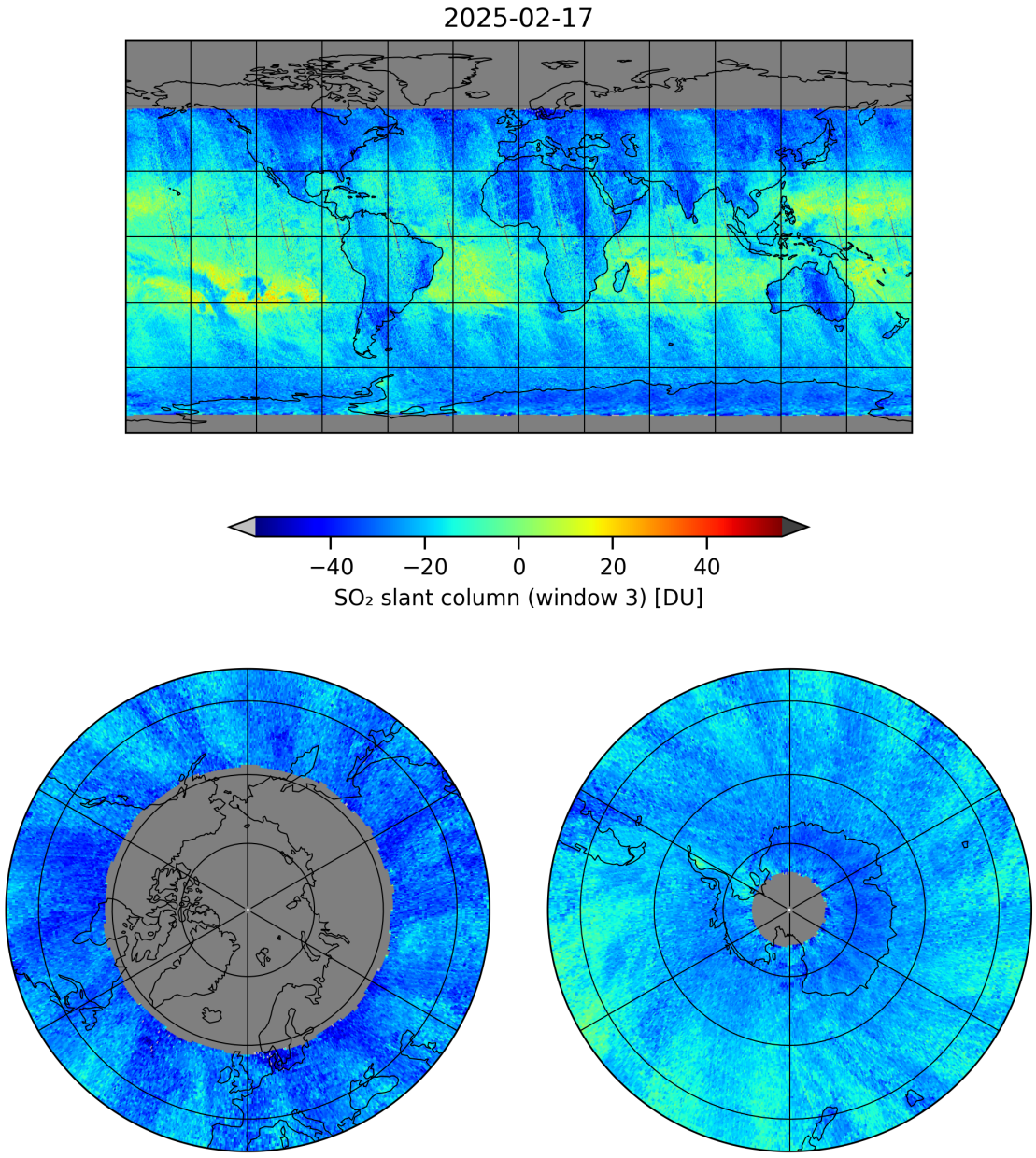

Figure 17: Map of "SO_2 slant column (window 3)" for 2025-02-17 to 2025-02-18

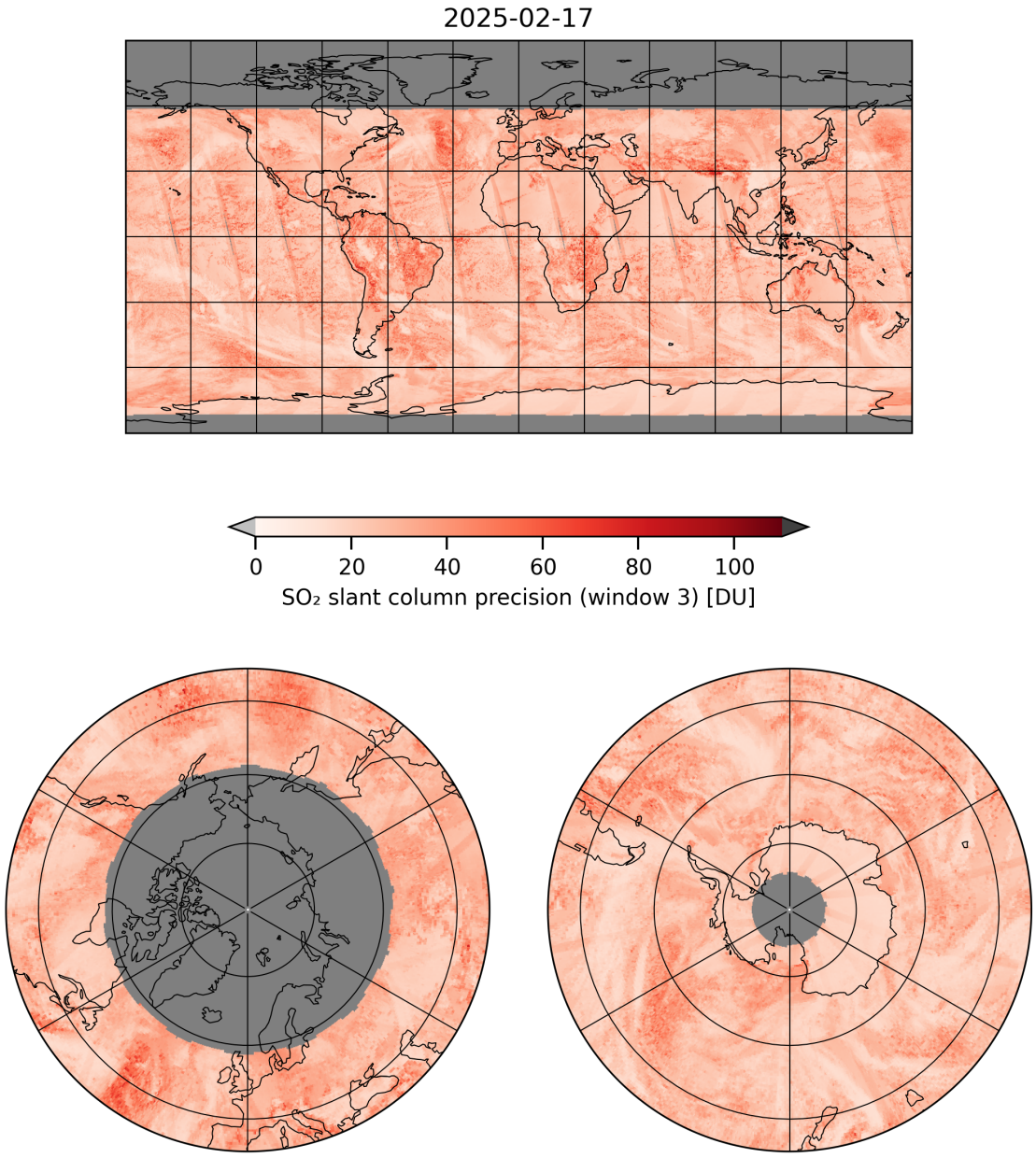

Figure 18: Map of "SO_2 slant column precision (window 3)" for 2025-02-17 to 2025-02-18

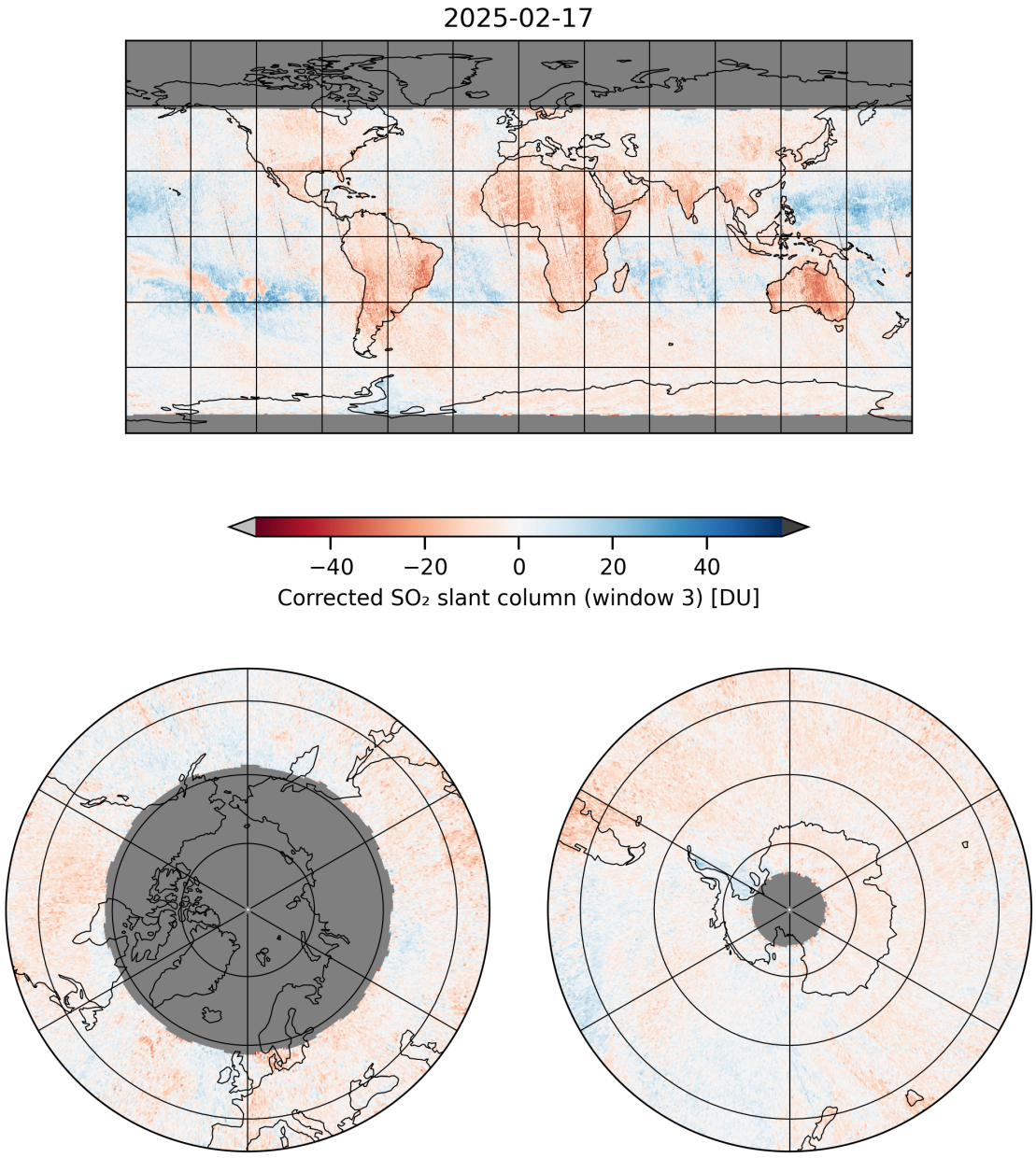

Figure 19: Map of "Corrected SO_2 slant column (window 3)" for 2025-02-17 to 2025-02-18

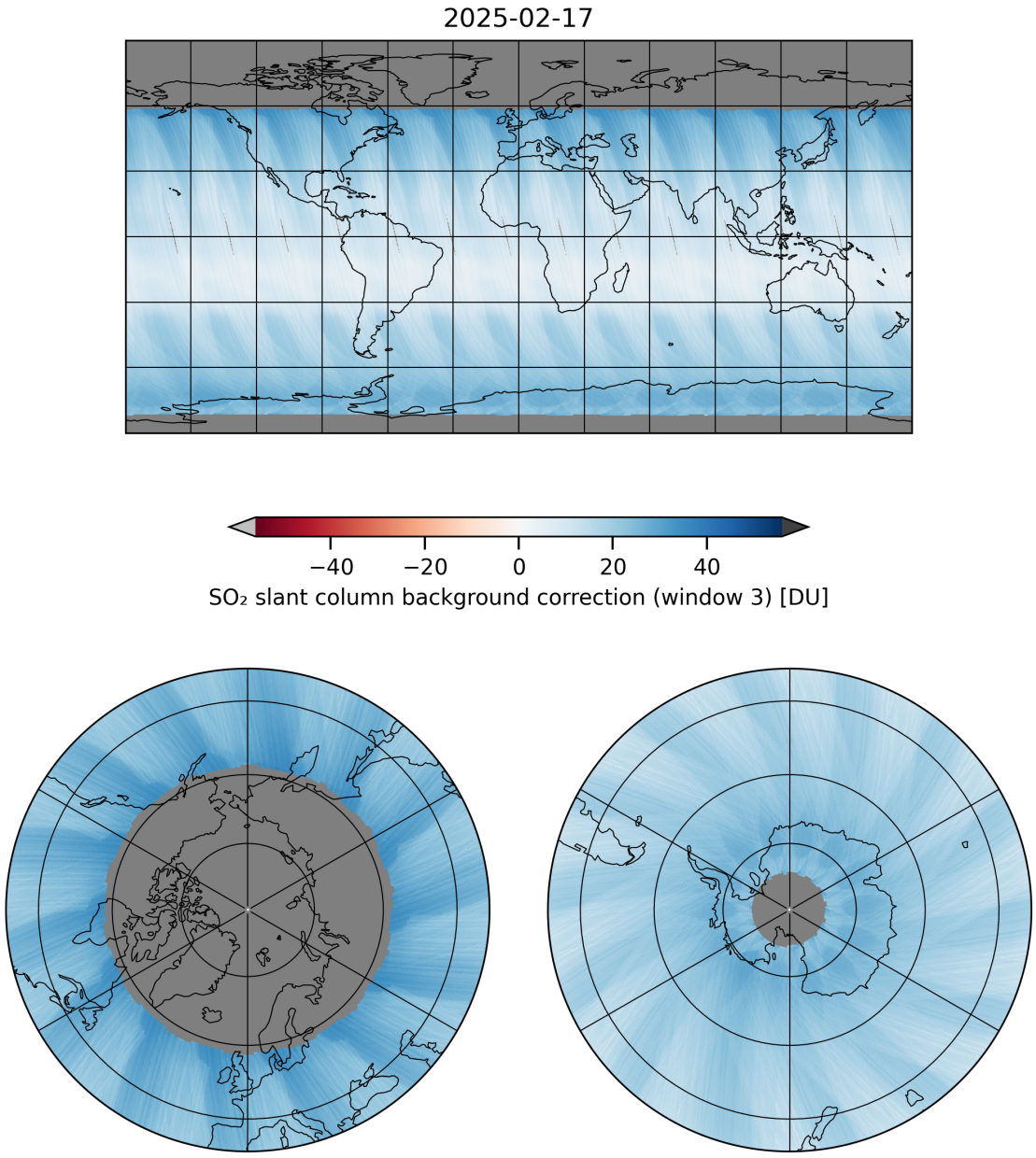

Figure 20: Map of "SO_2 slant column background correction (window 3)" for 2025-02-17 to 2025-02-18

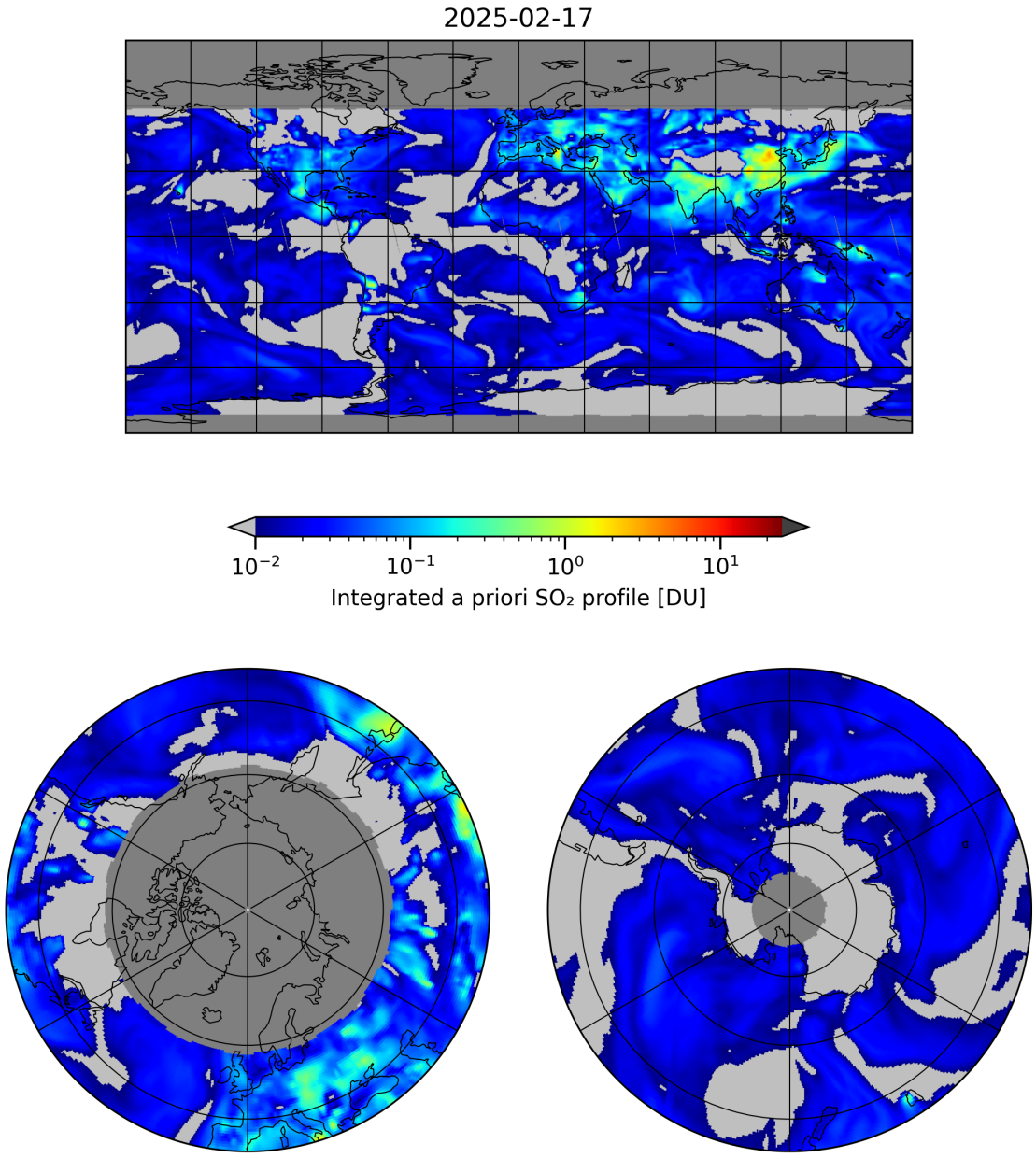

Figure 21: Map of “Integrated a priori SO_2 profile” for 2025-02-17 to 2025-02-18

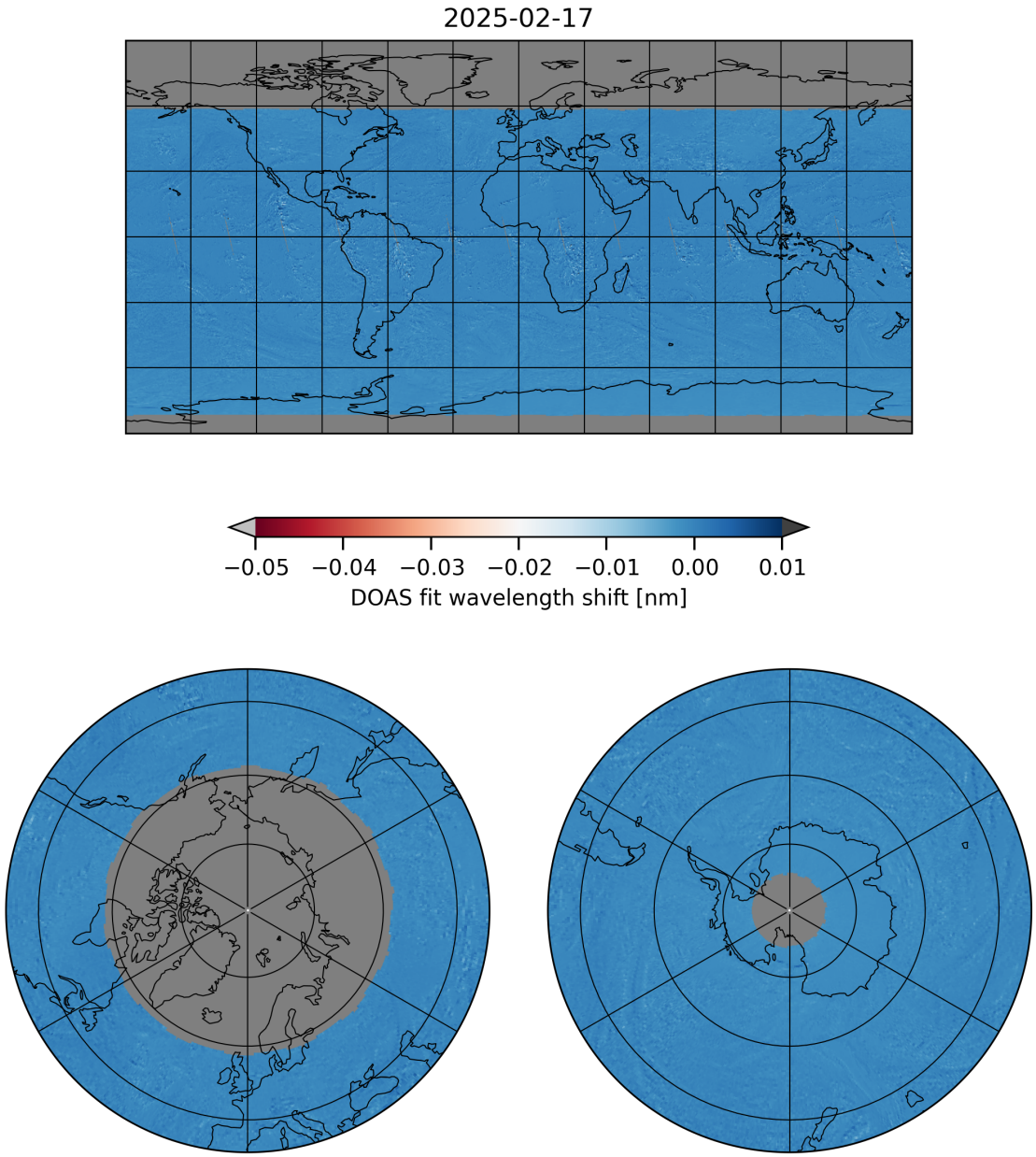

Figure 22: Map of “DOAS fit wavelength shift” for 2025-02-17 to 2025-02-18

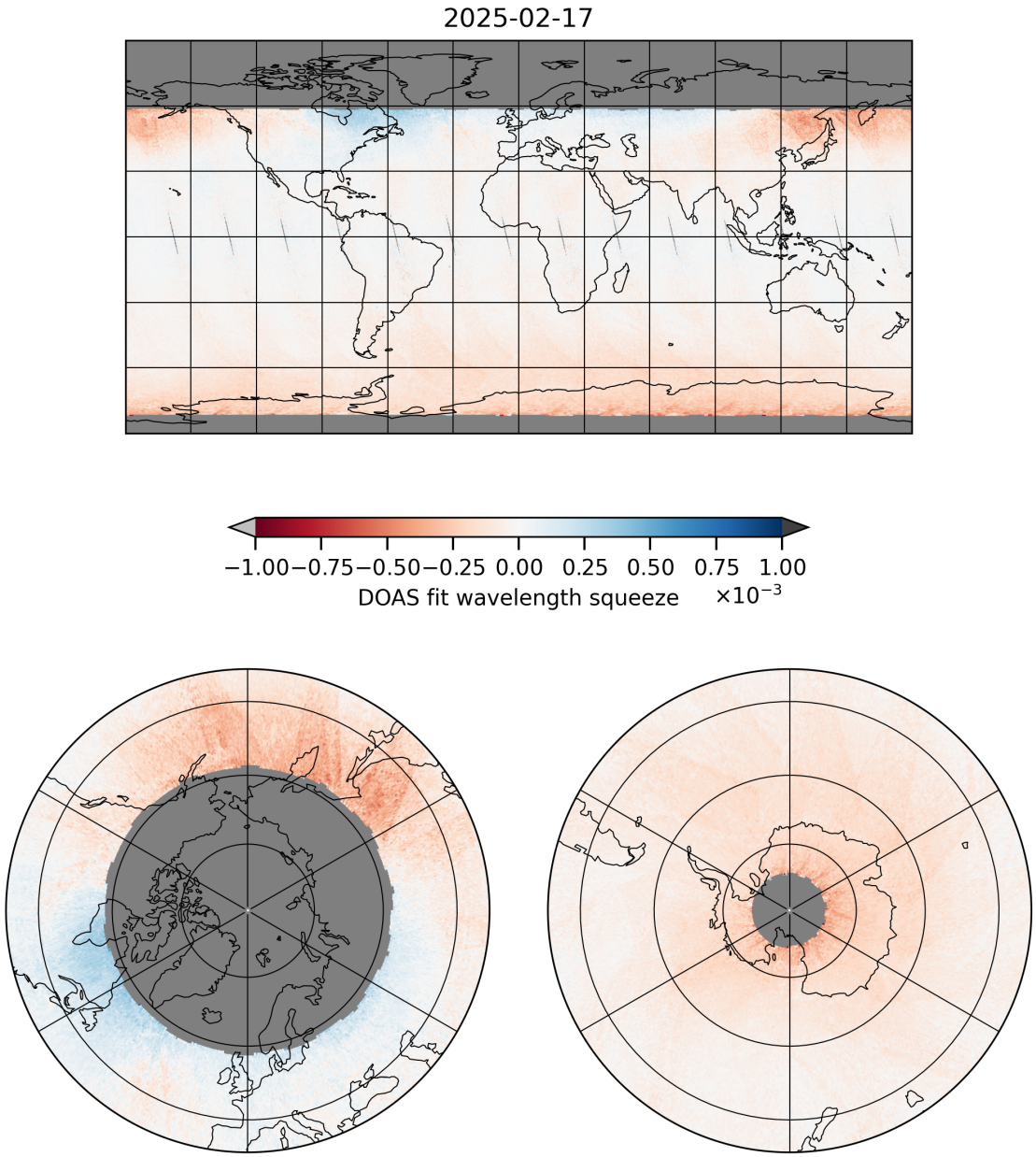

Figure 23: Map of “DOAS fit wavelength squeeze” for 2025-02-17 to 2025-02-18

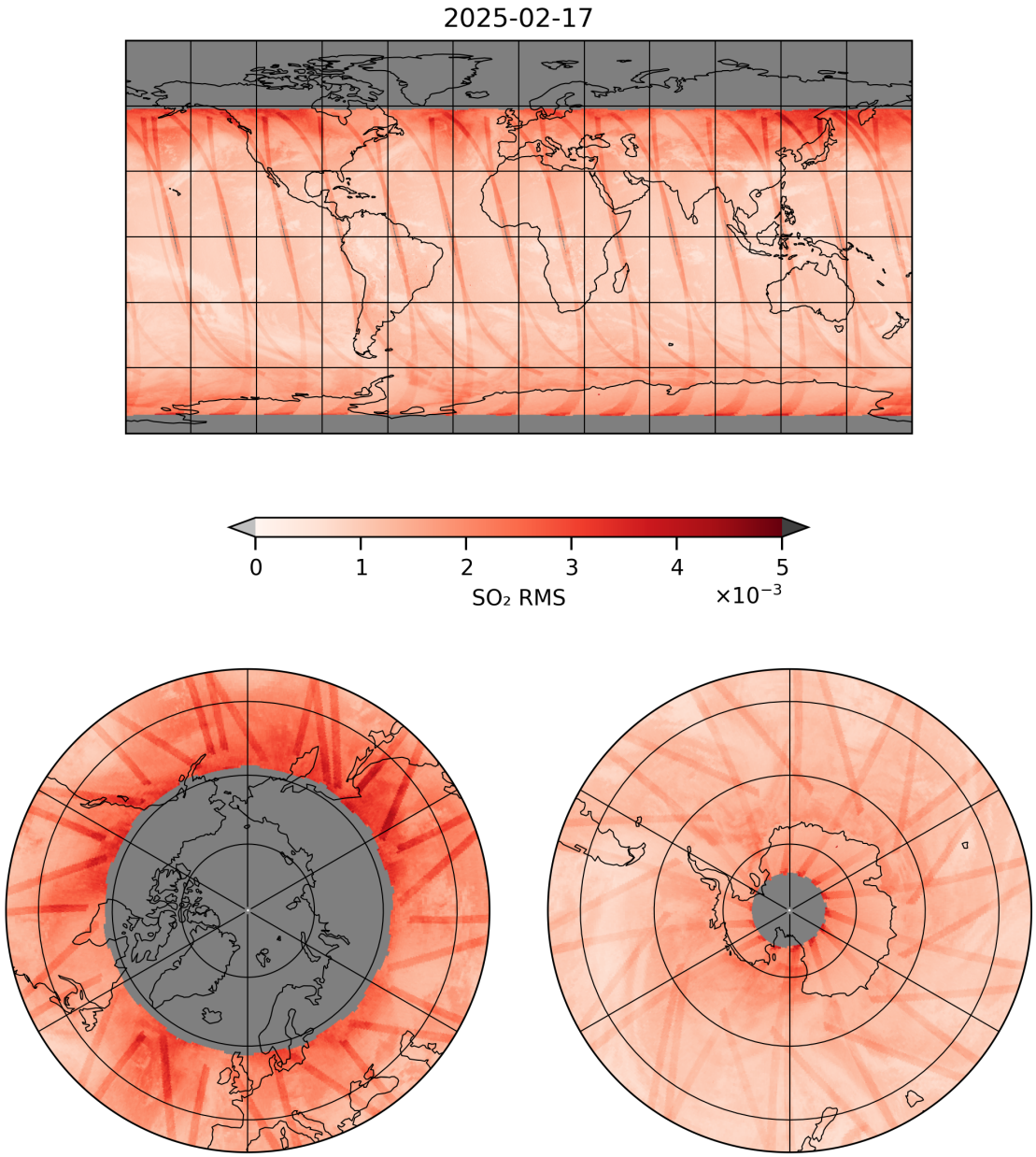

Figure 24: Map of "SO_2 RMS" for 2025-02-17 to 2025-02-18

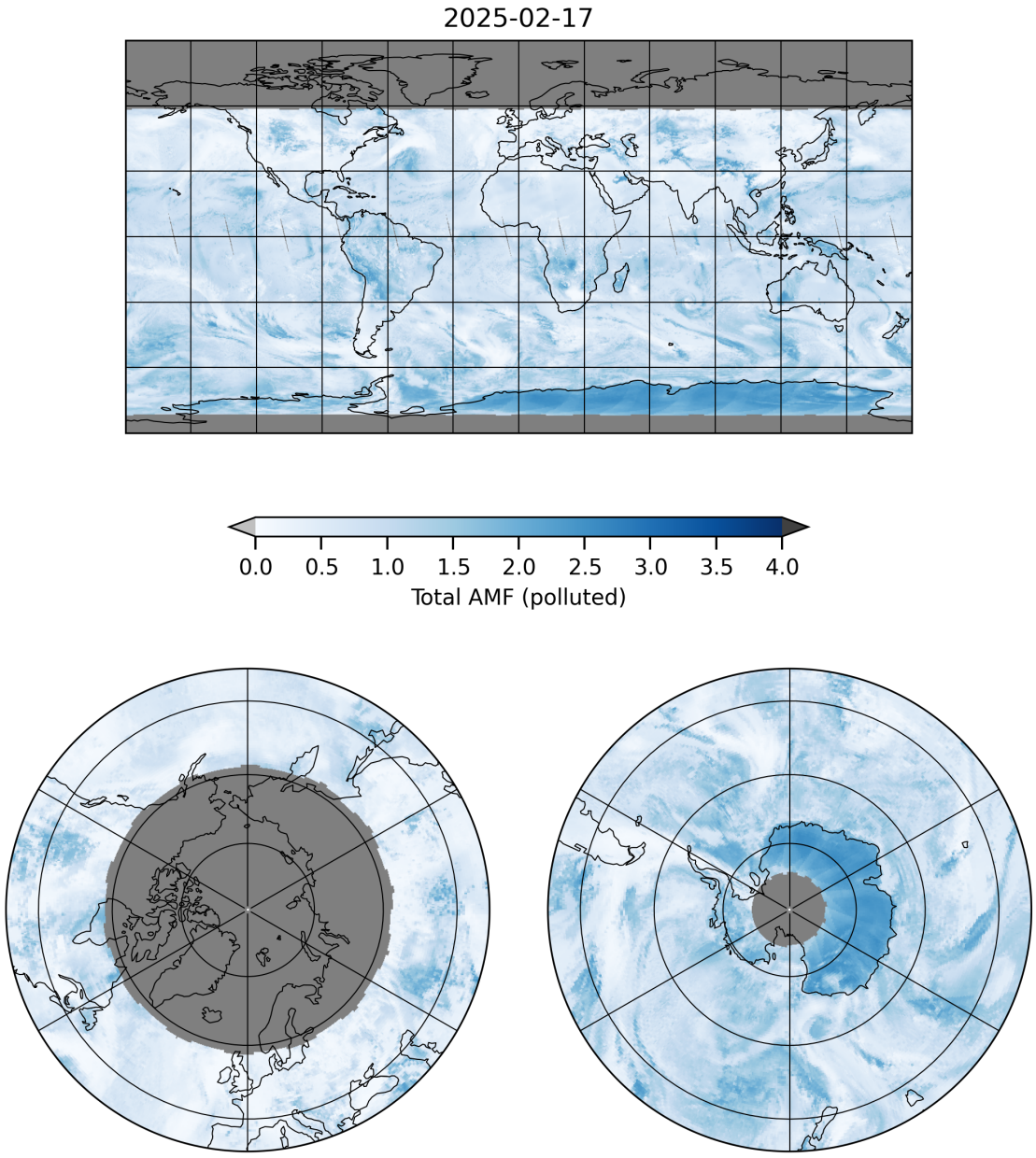

Figure 25: Map of “Total AMF (polluted)” for 2025-02-17 to 2025-02-18

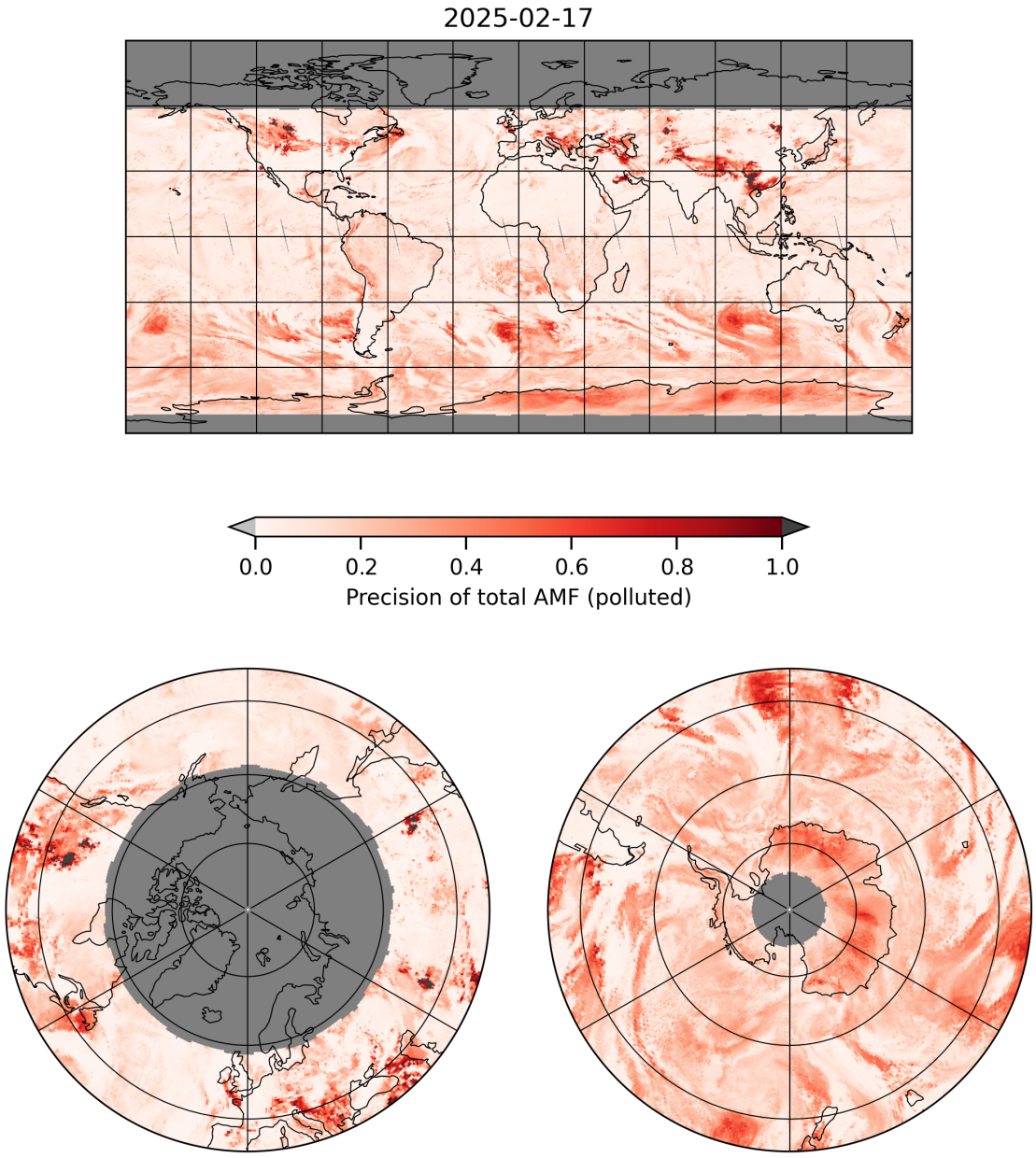

Figure 26: Map of “Precision of total AMF (polluted)” for 2025-02-17 to 2025-02-18

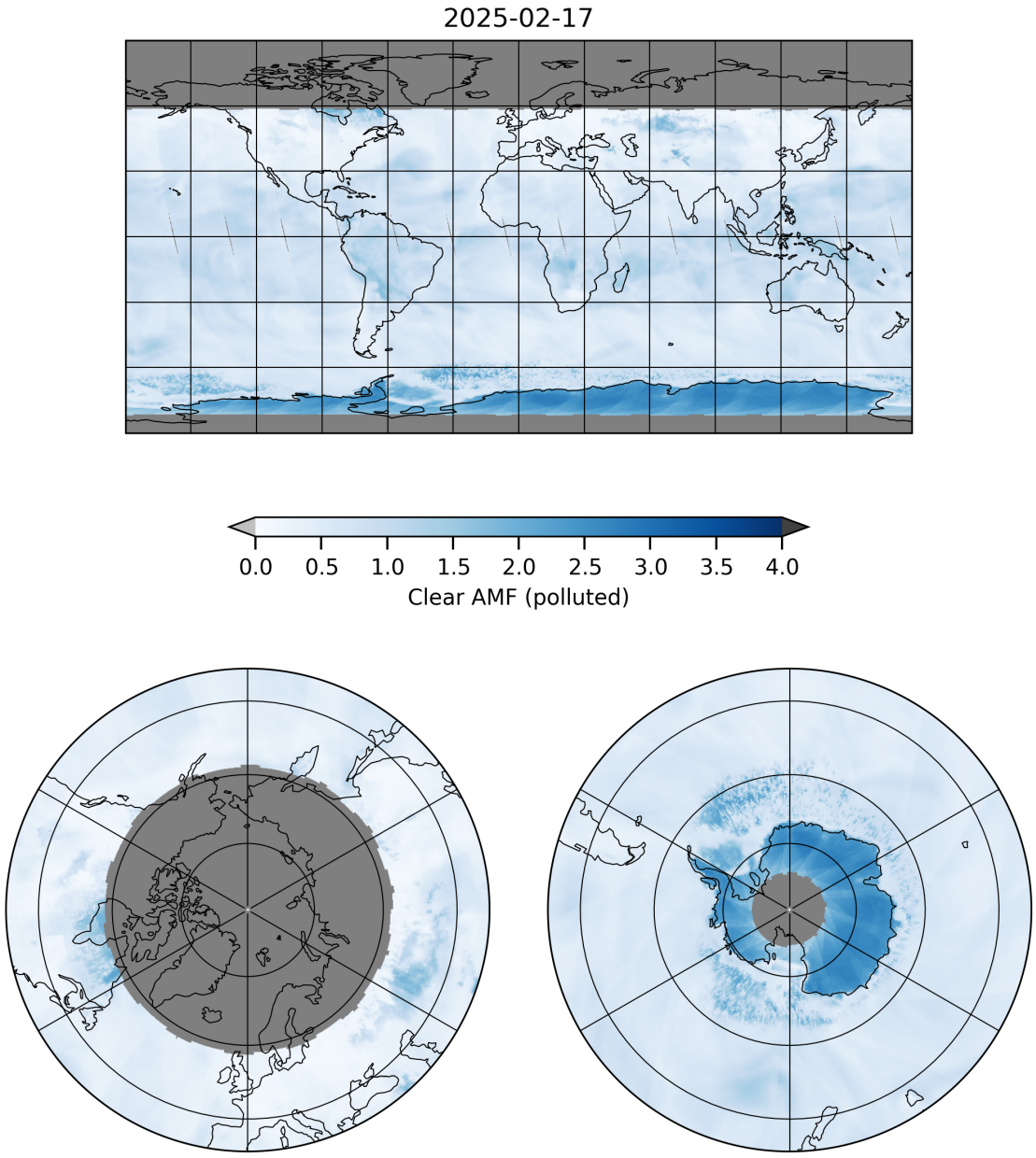

Figure 27: Map of “Clear AMF (polluted)” for 2025-02-17 to 2025-02-18

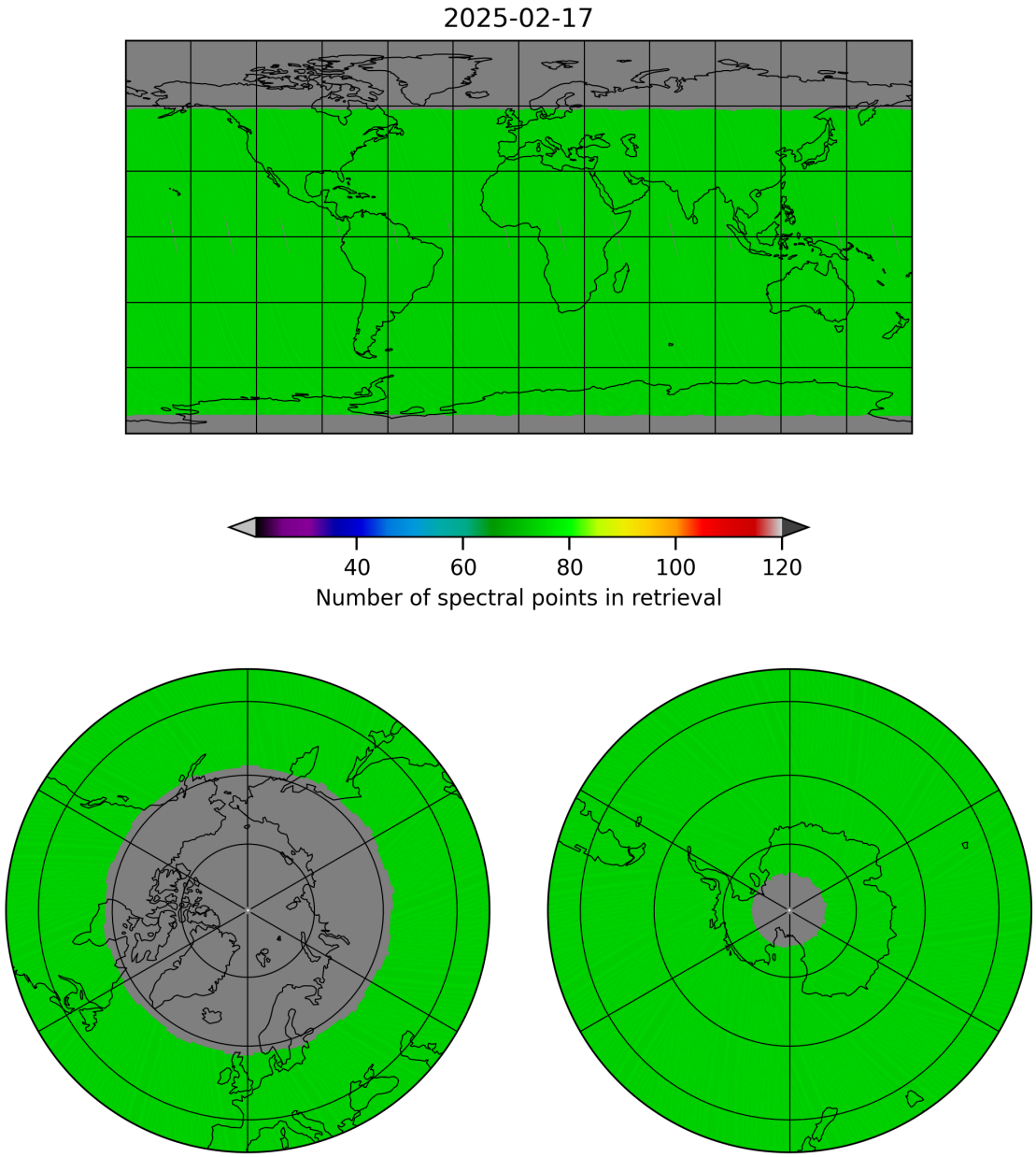

Figure 28: Map of “Number of spectral points in retrieval” for 2025-02-17 to 2025-02-18

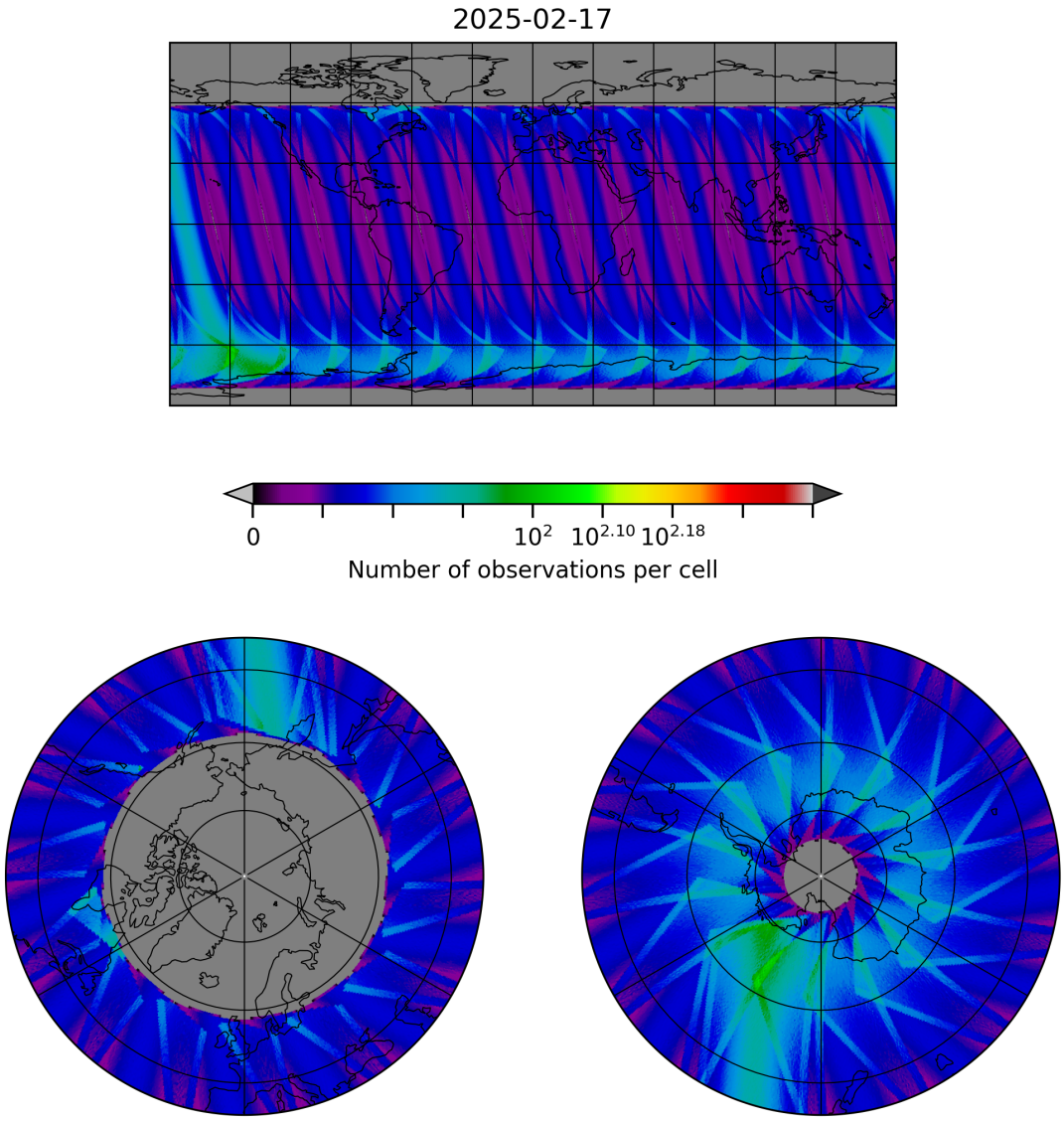

Figure 29: Map of the number of observations for 2025-02-17 to 2025-02-18

7 Zonal average

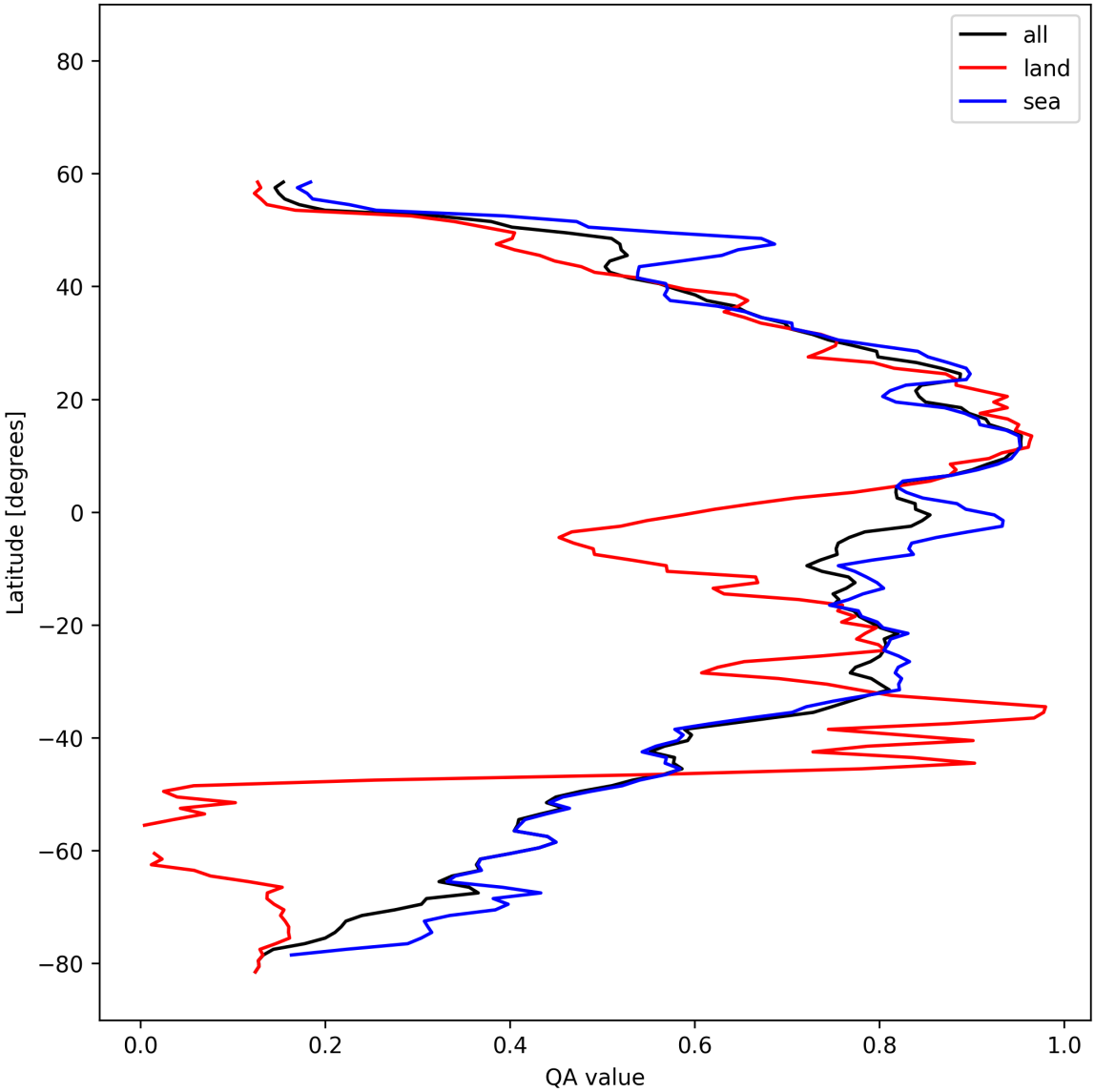

Figure 30: Zonal average of “QA value” for 2025-02-17 to 2025-02-18.

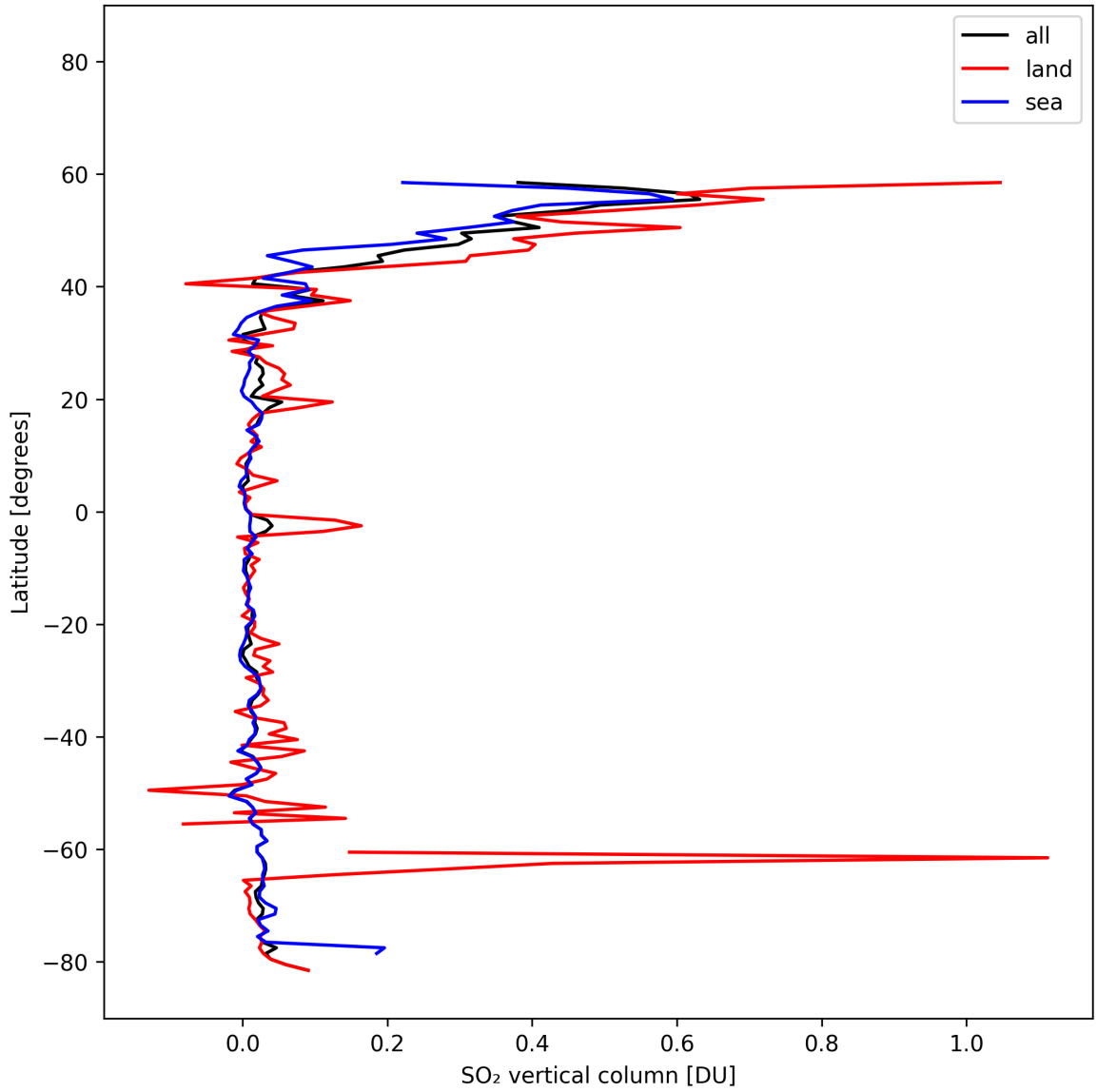

Figure 31: Zonal average of "SO_2 vertical column" for 2025-02-17 to 2025-02-18.

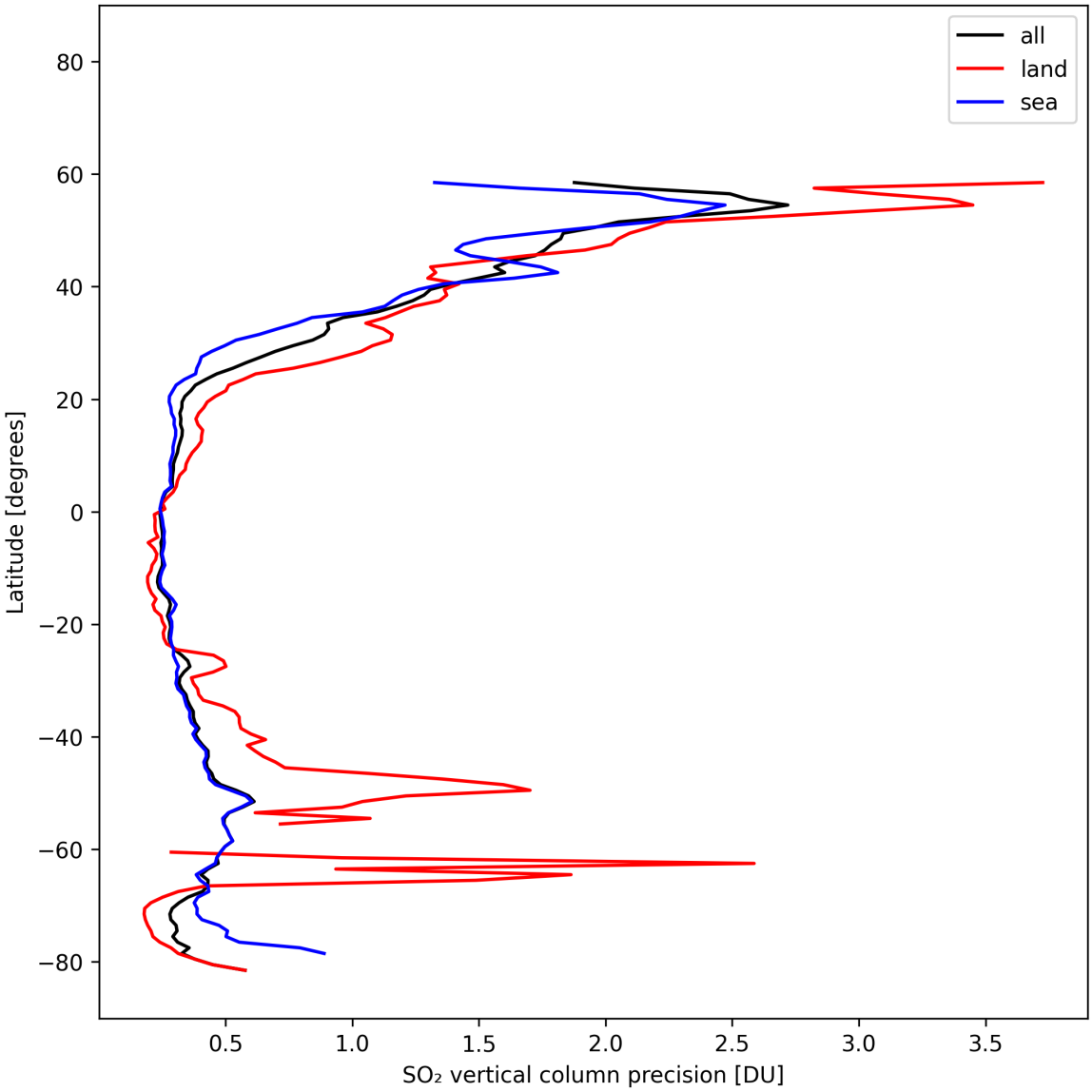

Figure 32: Zonal average of "SO_2 vertical column precision" for 2025-02-17 to 2025-02-18.

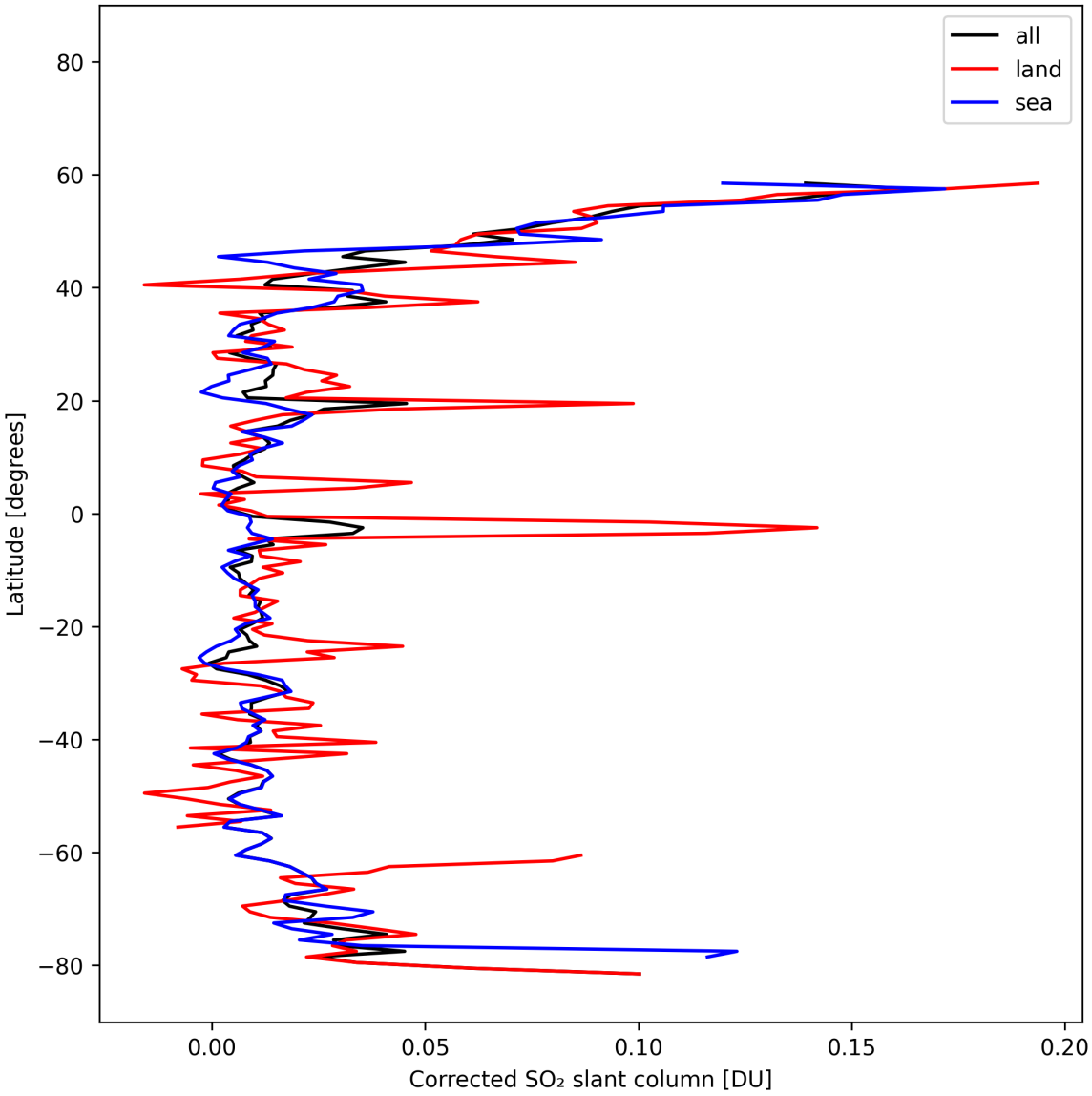

Figure 33: Zonal average of "Corrected SO_2 slant column" for 2025-02-17 to 2025-02-18.

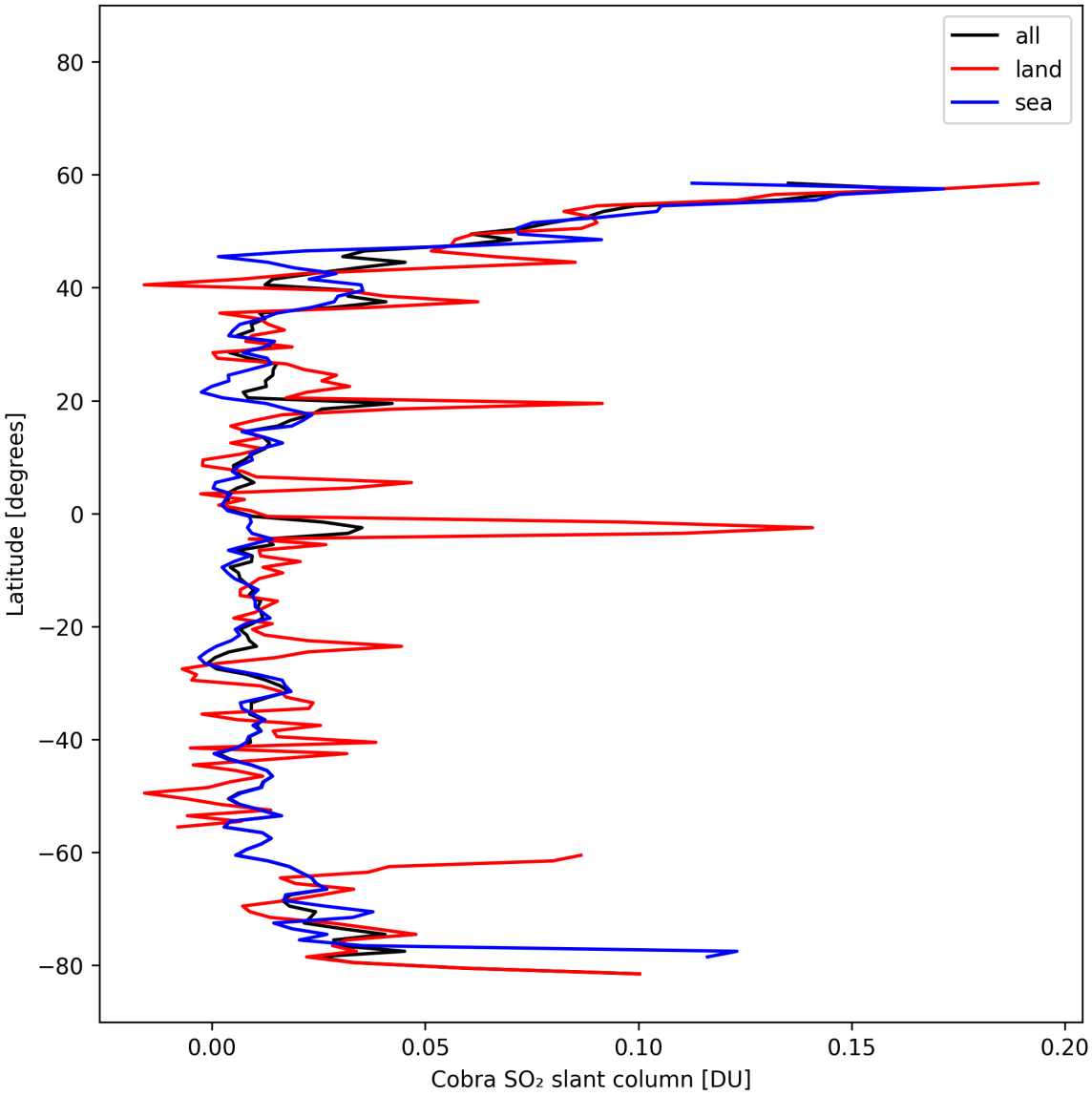

Figure 34: Zonal average of "Cobra SO_2 slant column" for 2025-02-17 to 2025-02-18.

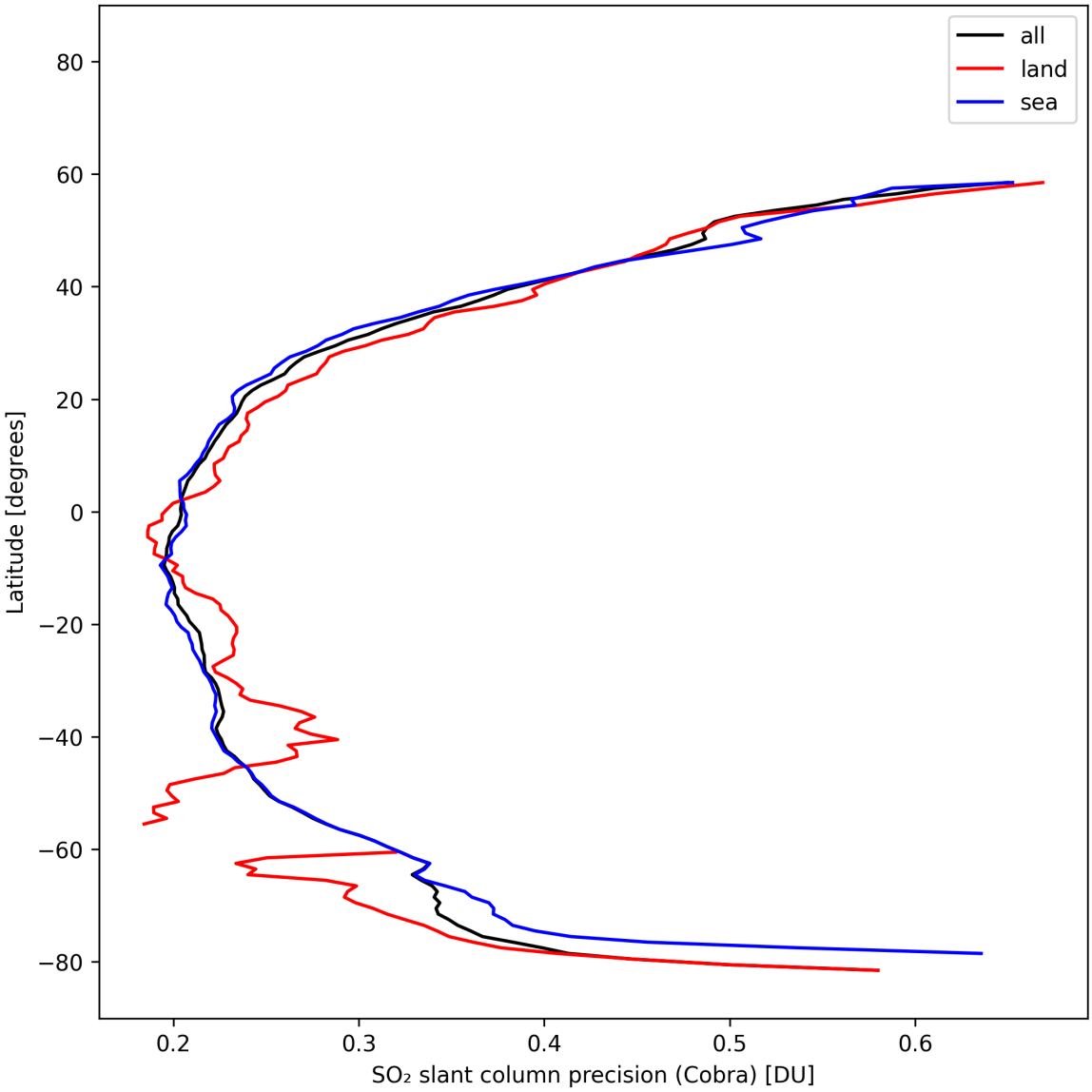

Figure 35: Zonal average of "SO_2 slant column precision (Cobra)" for 2025-02-17 to 2025-02-18.

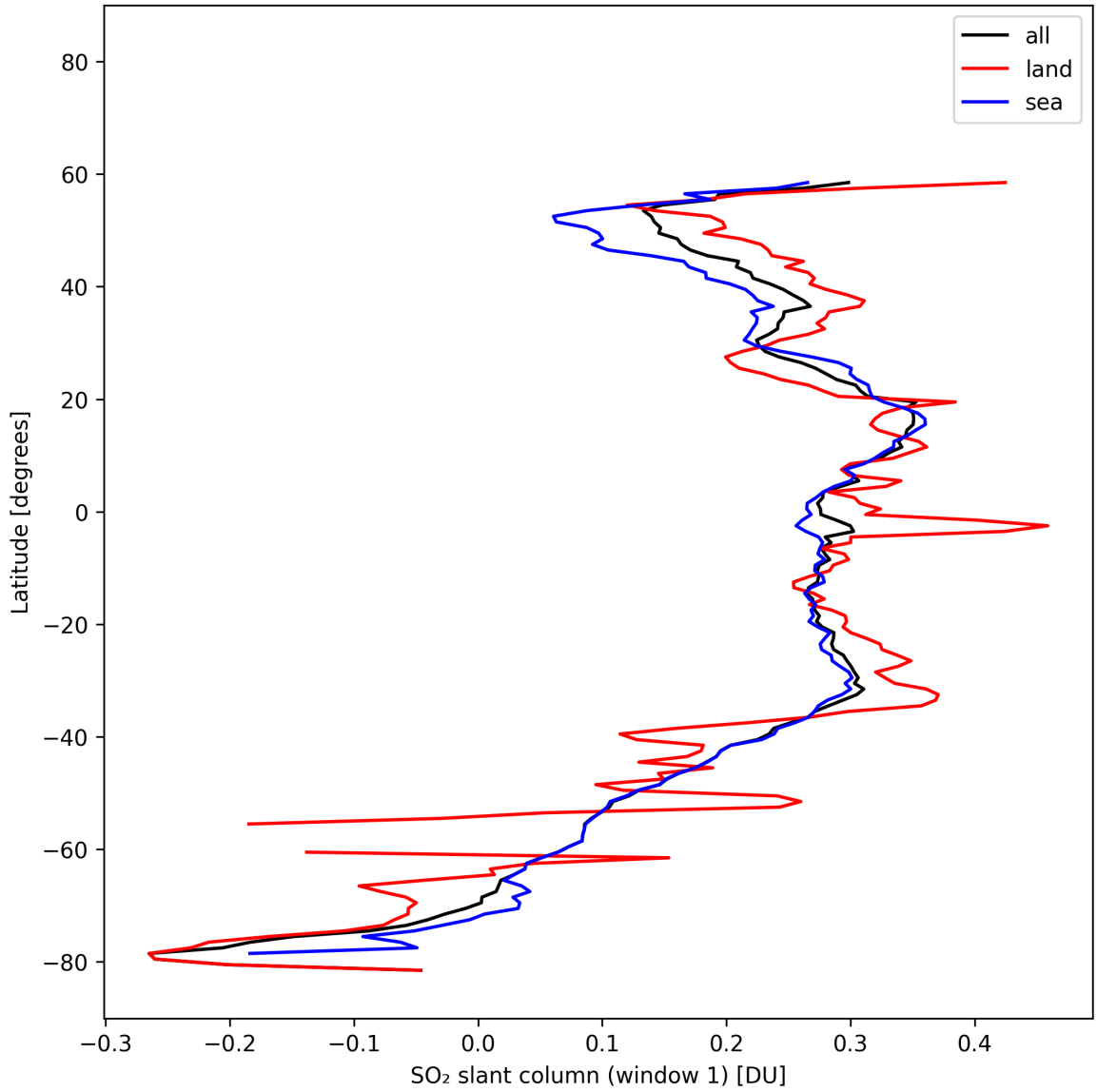

Figure 36: Zonal average of "SO_2 slant column (window 1)" for 2025-02-17 to 2025-02-18.

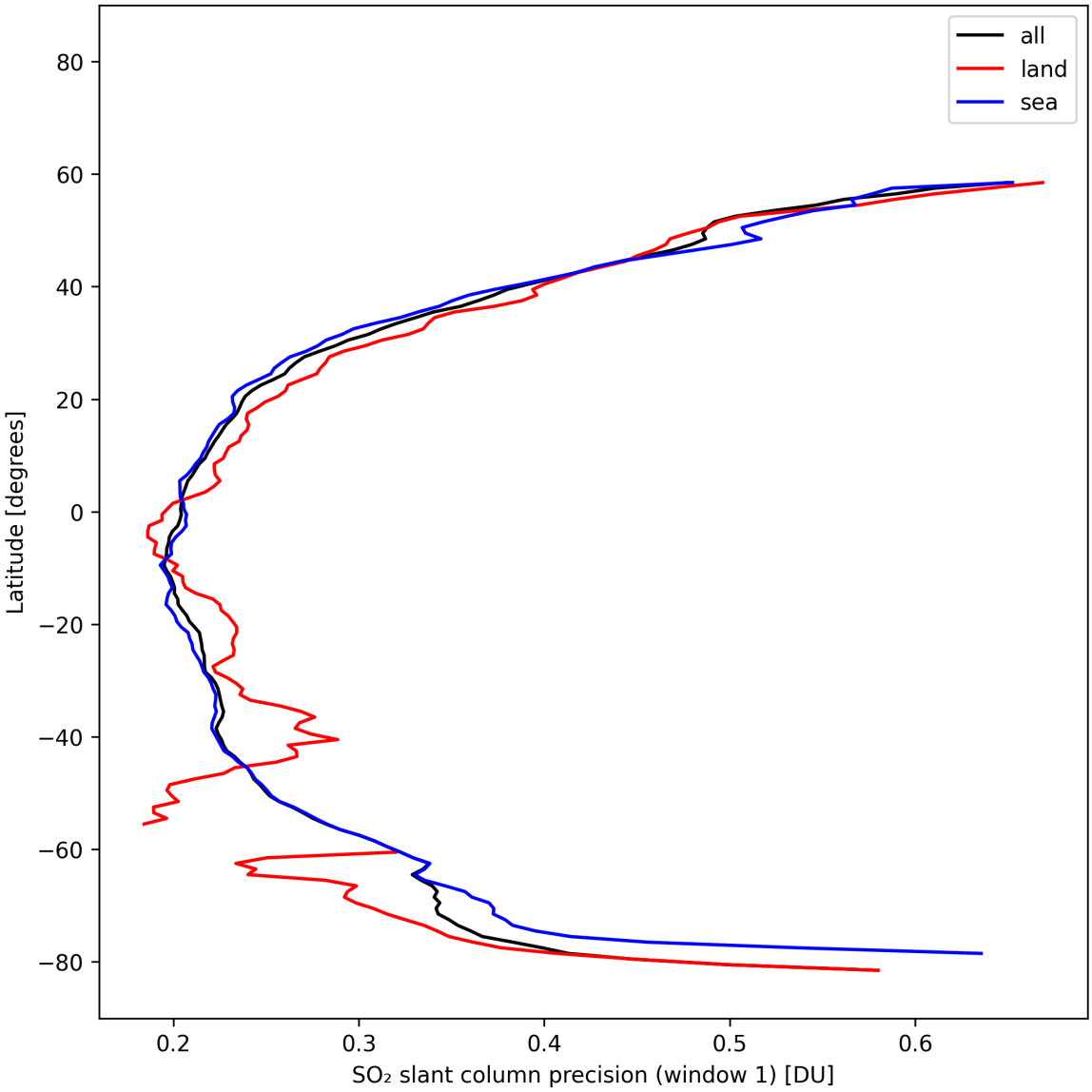

Figure 37: Zonal average of "SO_2 slant column precision (window 1)" for 2025-02-17 to 2025-02-18.

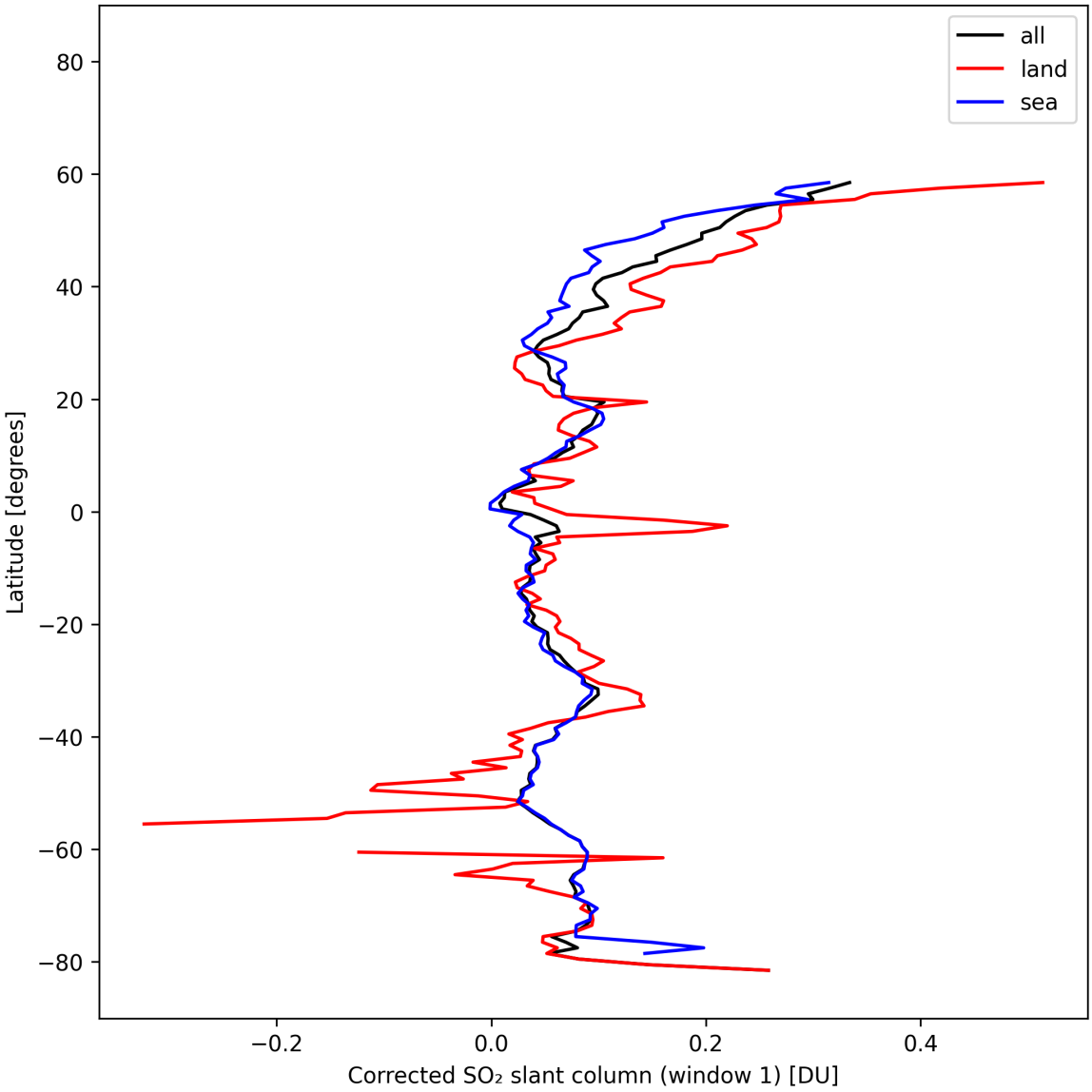

Figure 38: Zonal average of "Corrected SO_2 slant column (window 1)" for 2025-02-17 to 2025-02-18.

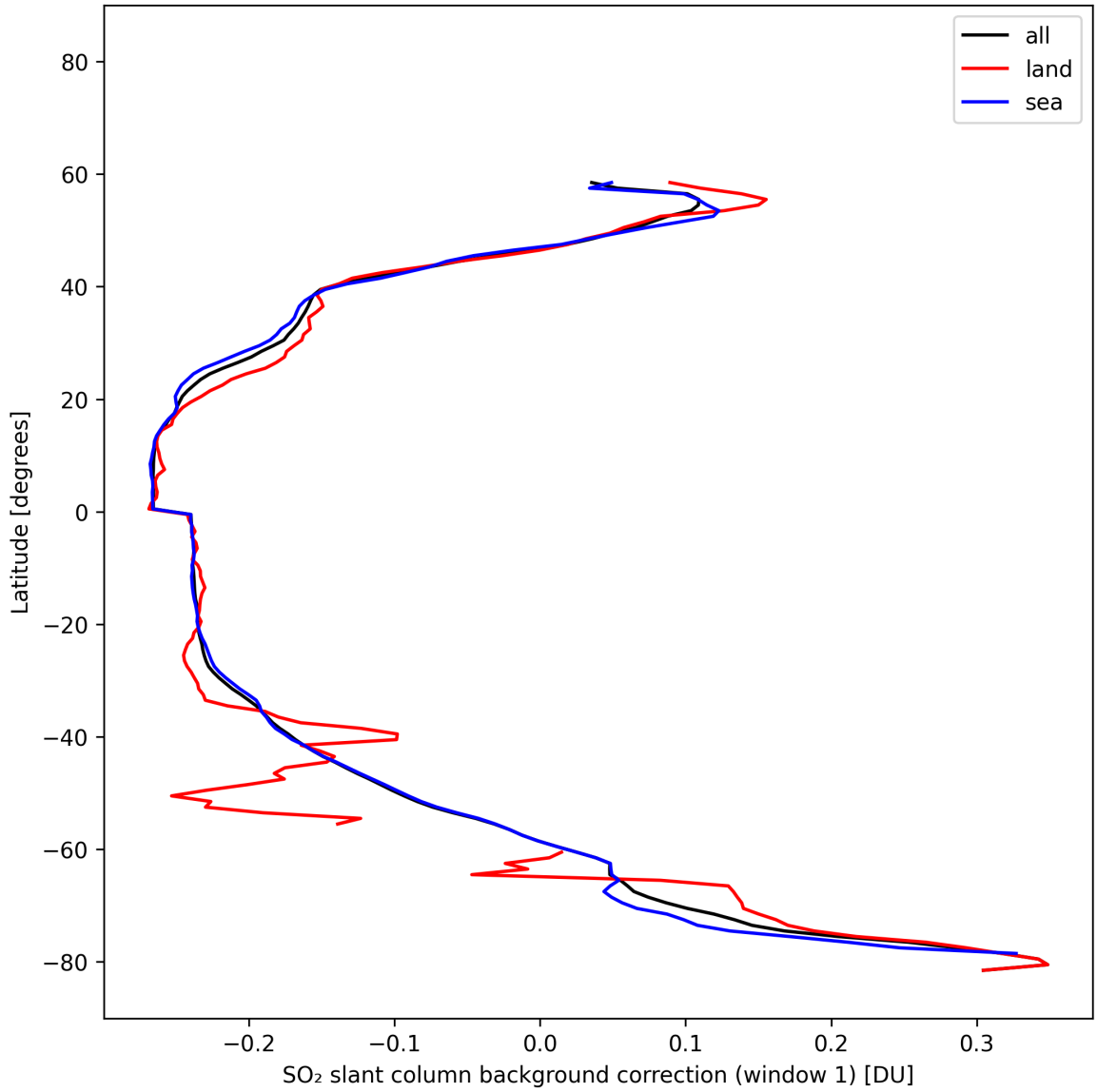

Figure 39: Zonal average of "SO_2 slant column background correction (window 1)" for 2025-02-17 to 2025-02-18.

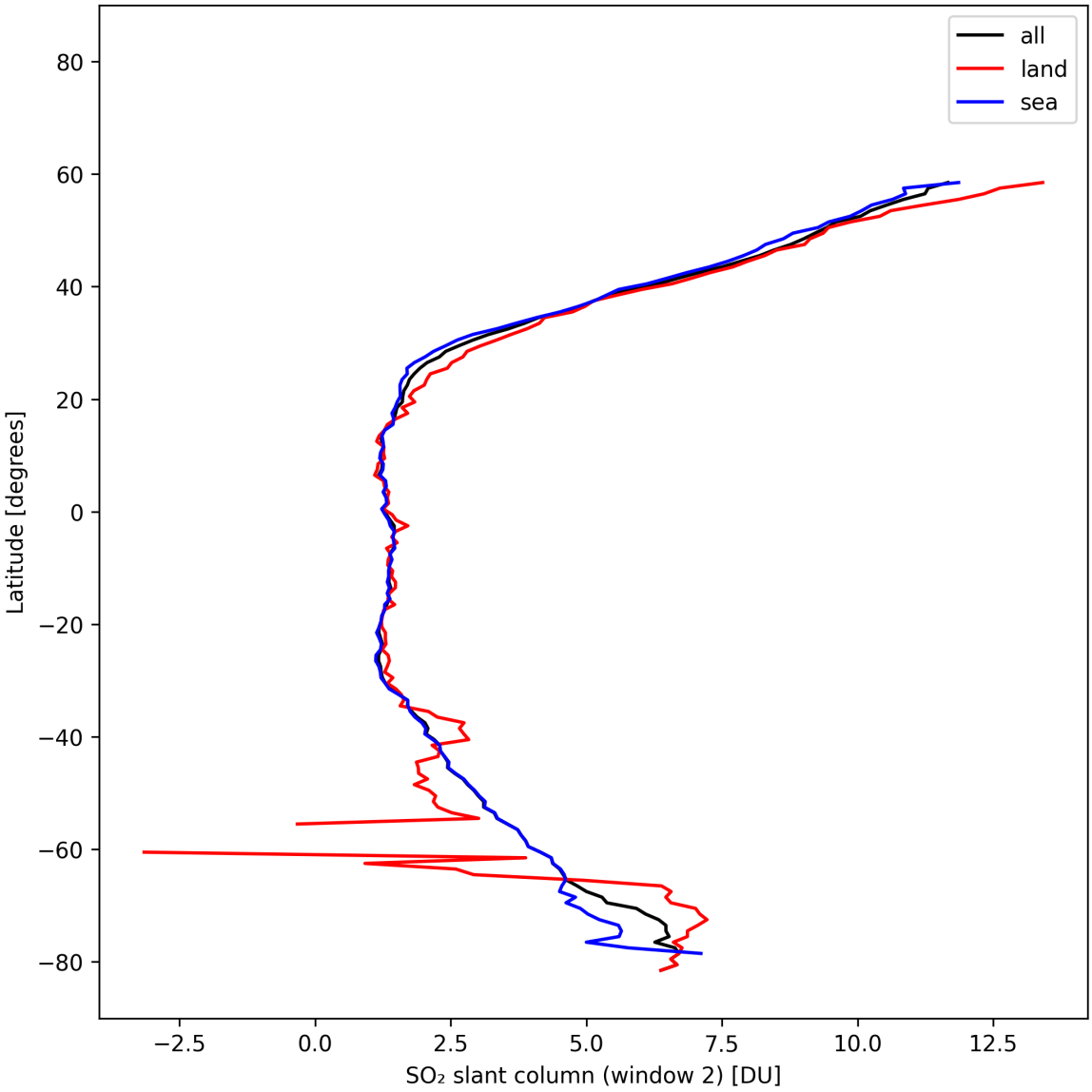

Figure 40: Zonal average of "SO_2 slant column (window 2)" for 2025-02-17 to 2025-02-18.

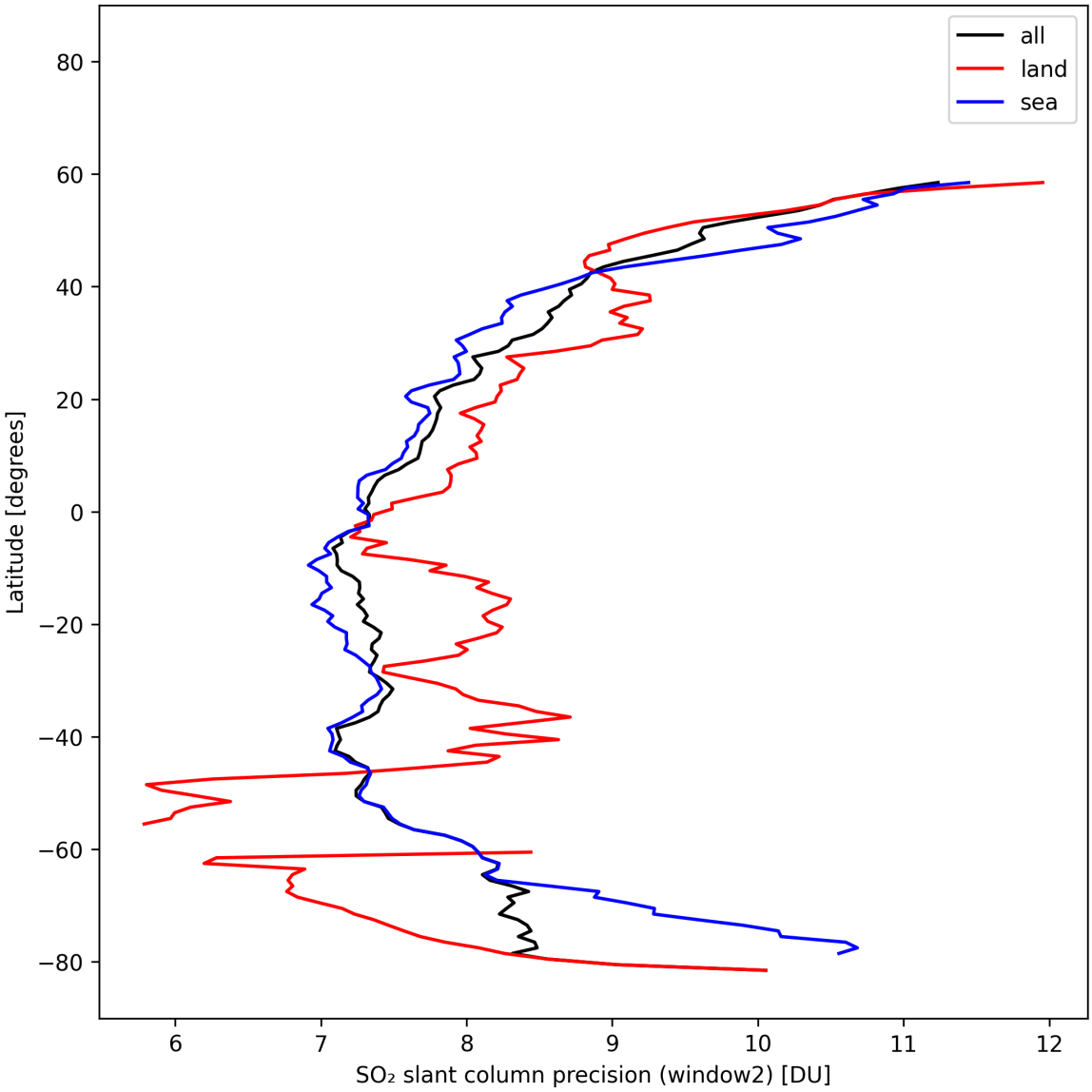

Figure 41: Zonal average of "SO_2 slant column precision (window2)" for 2025-02-17 to 2025-02-18.

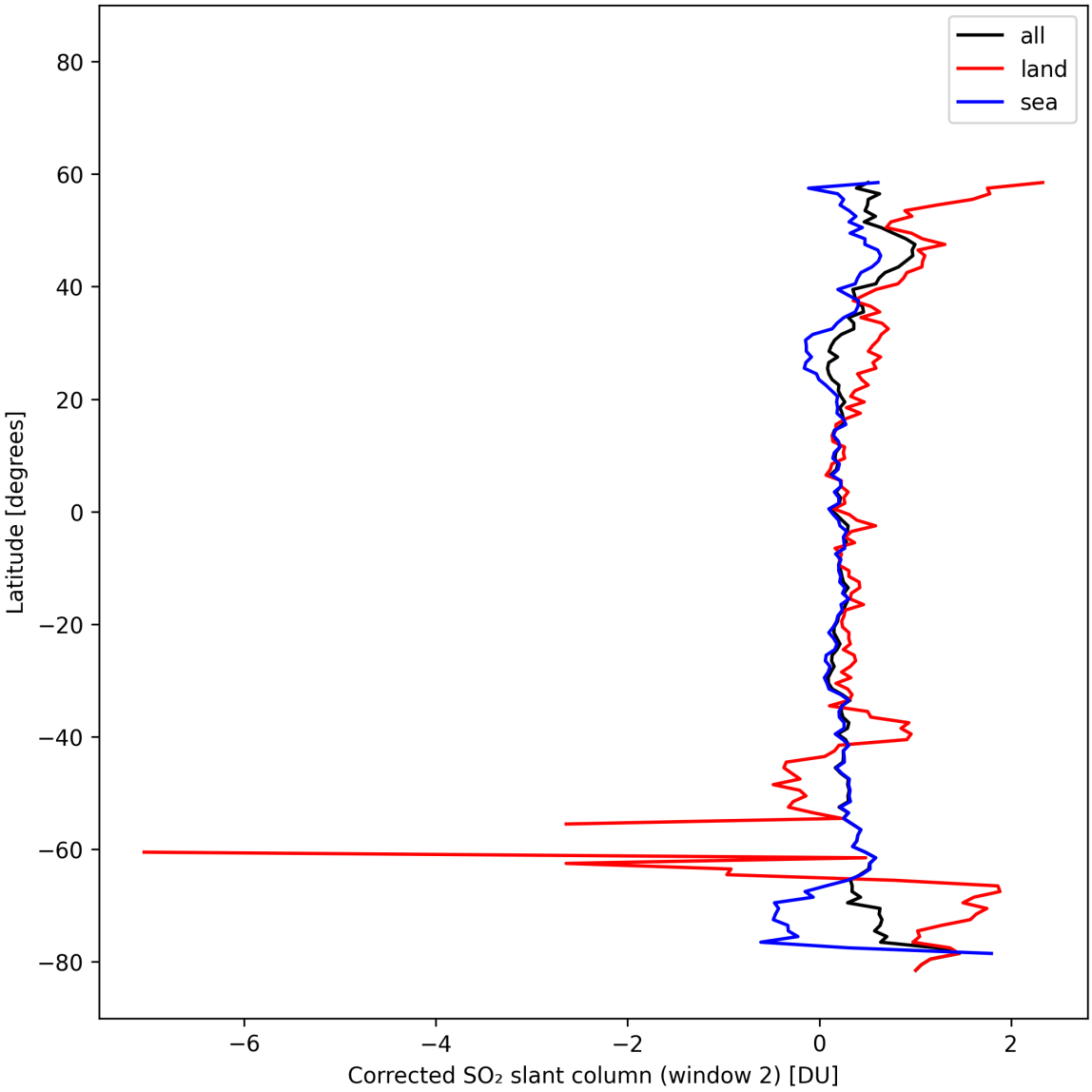

Figure 42: Zonal average of "Corrected SO_2 slant column (window 2)" for 2025-02-17 to 2025-02-18.

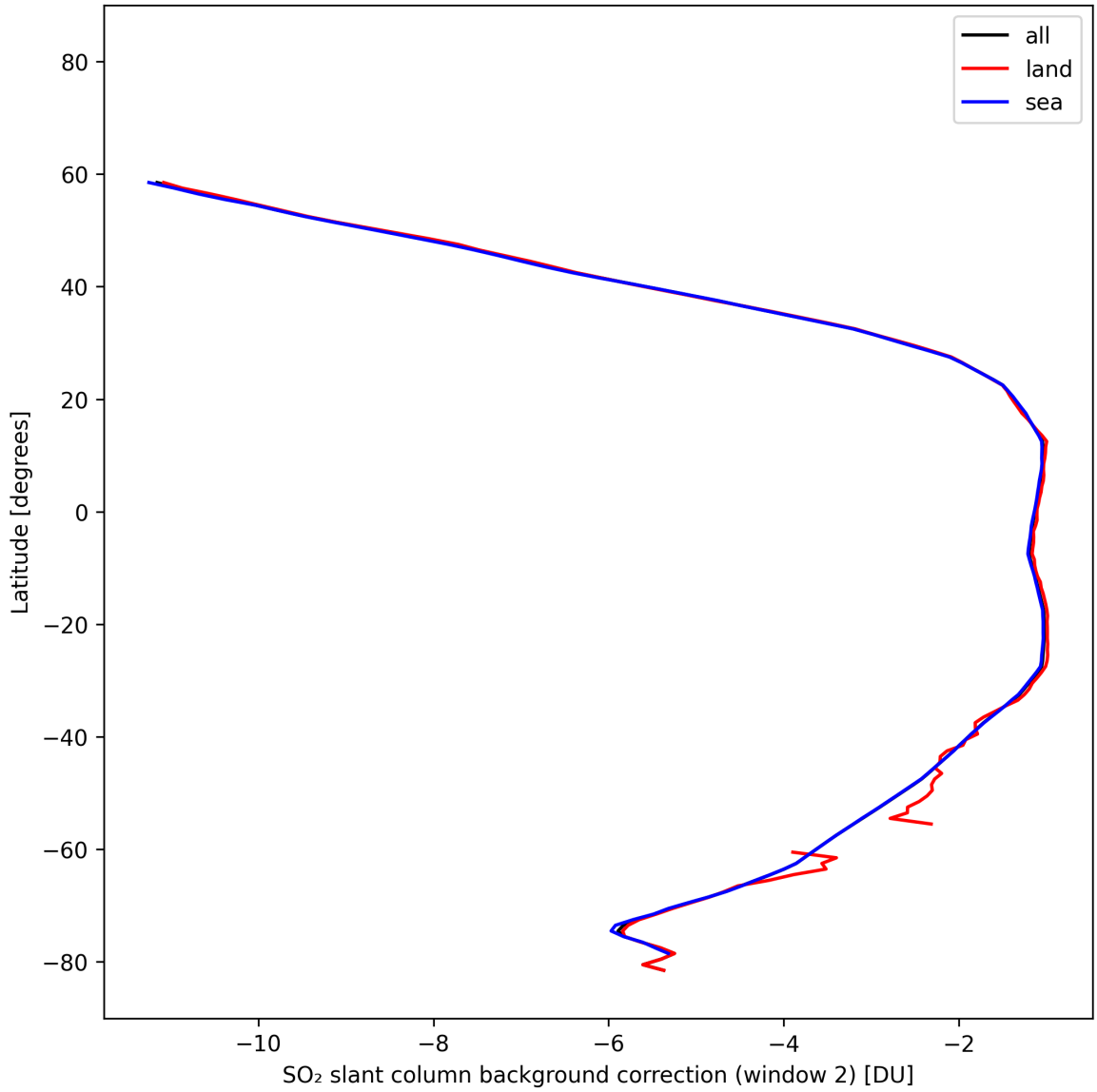

Figure 43: Zonal average of "SO_2 slant column background correction (window 2)" for 2025-02-17 to 2025-02-18.

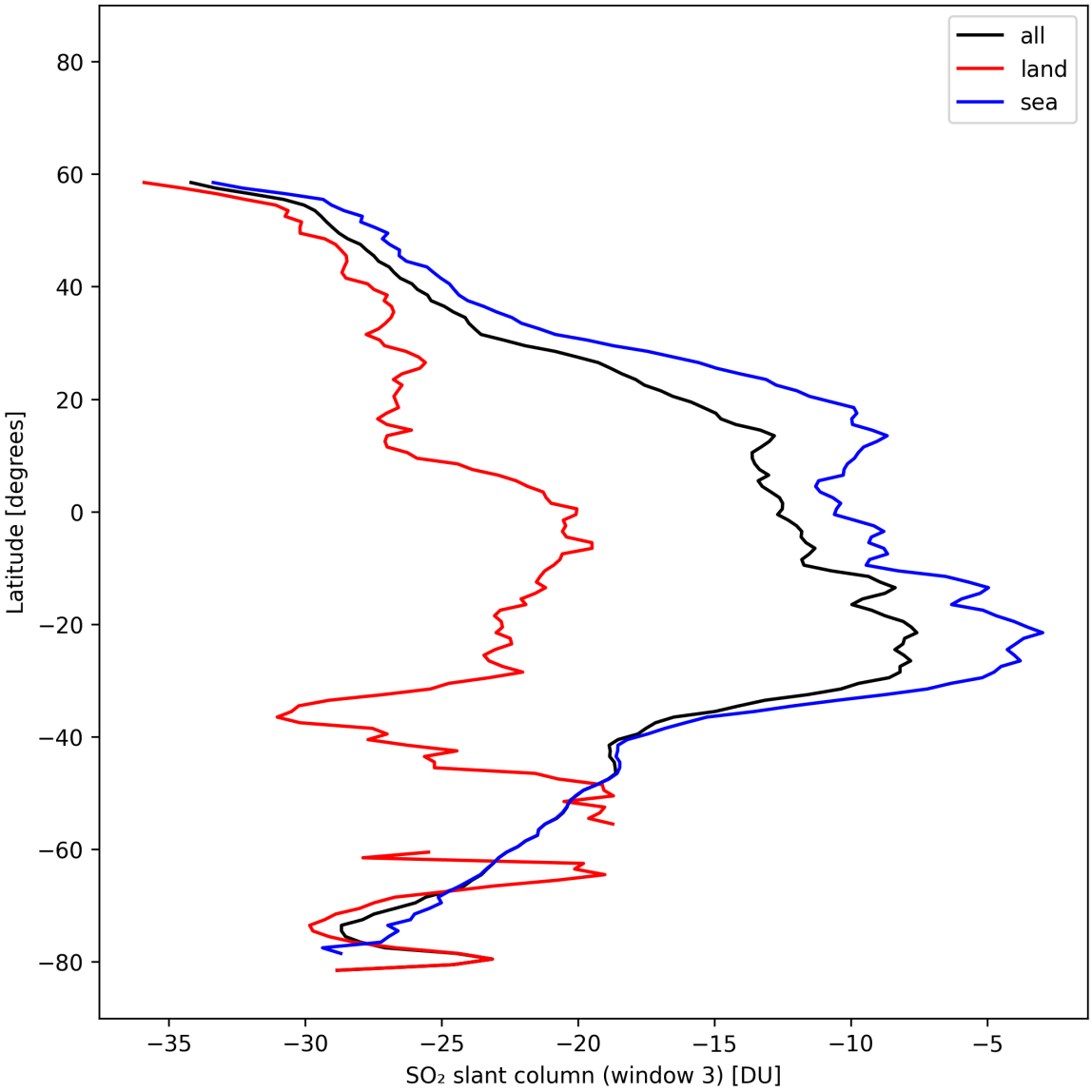

Figure 44: Zonal average of "SO_2 slant column (window 3)" for 2025-02-17 to 2025-02-18.

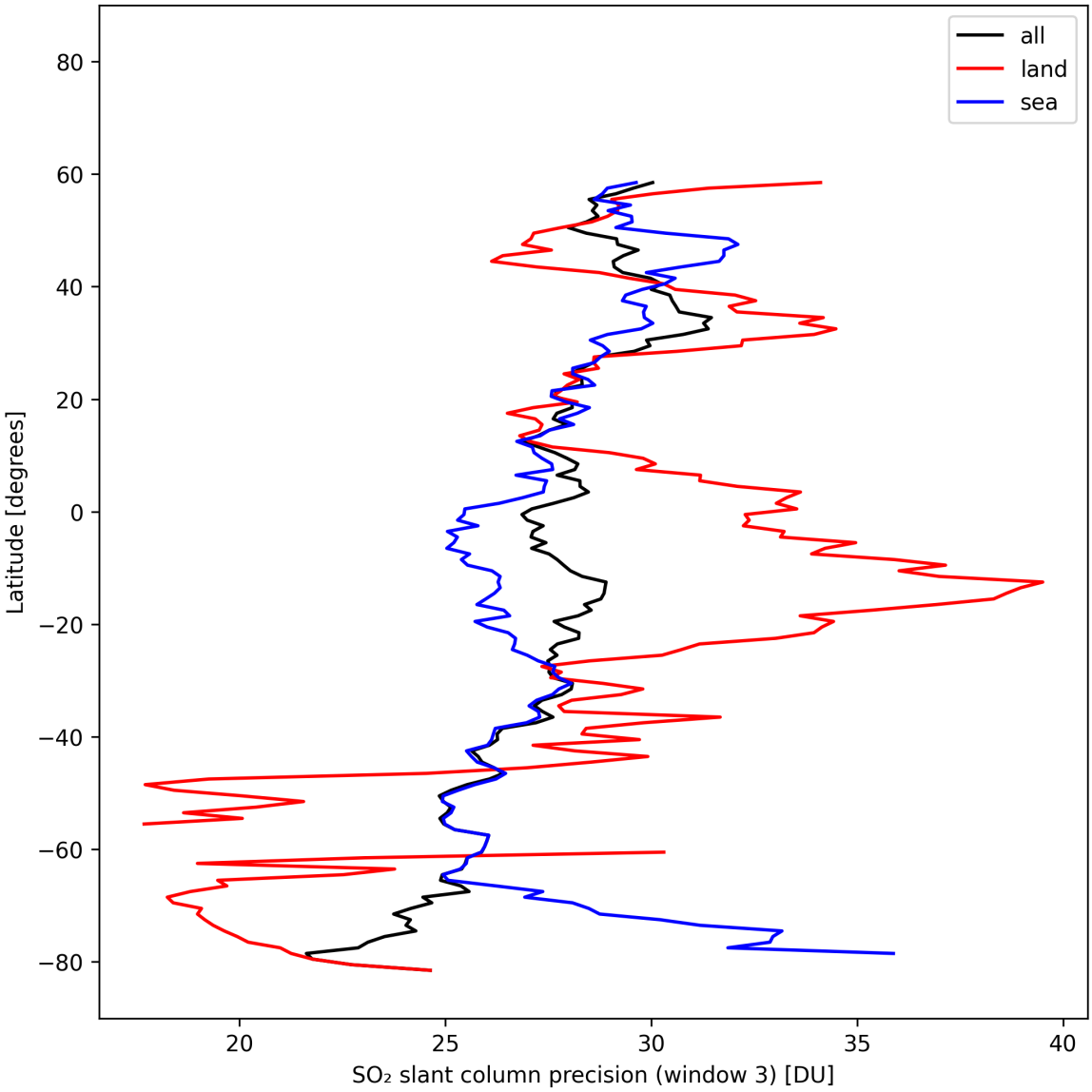

Figure 45: Zonal average of "SO_2 slant column precision (window 3)" for 2025-02-17 to 2025-02-18.

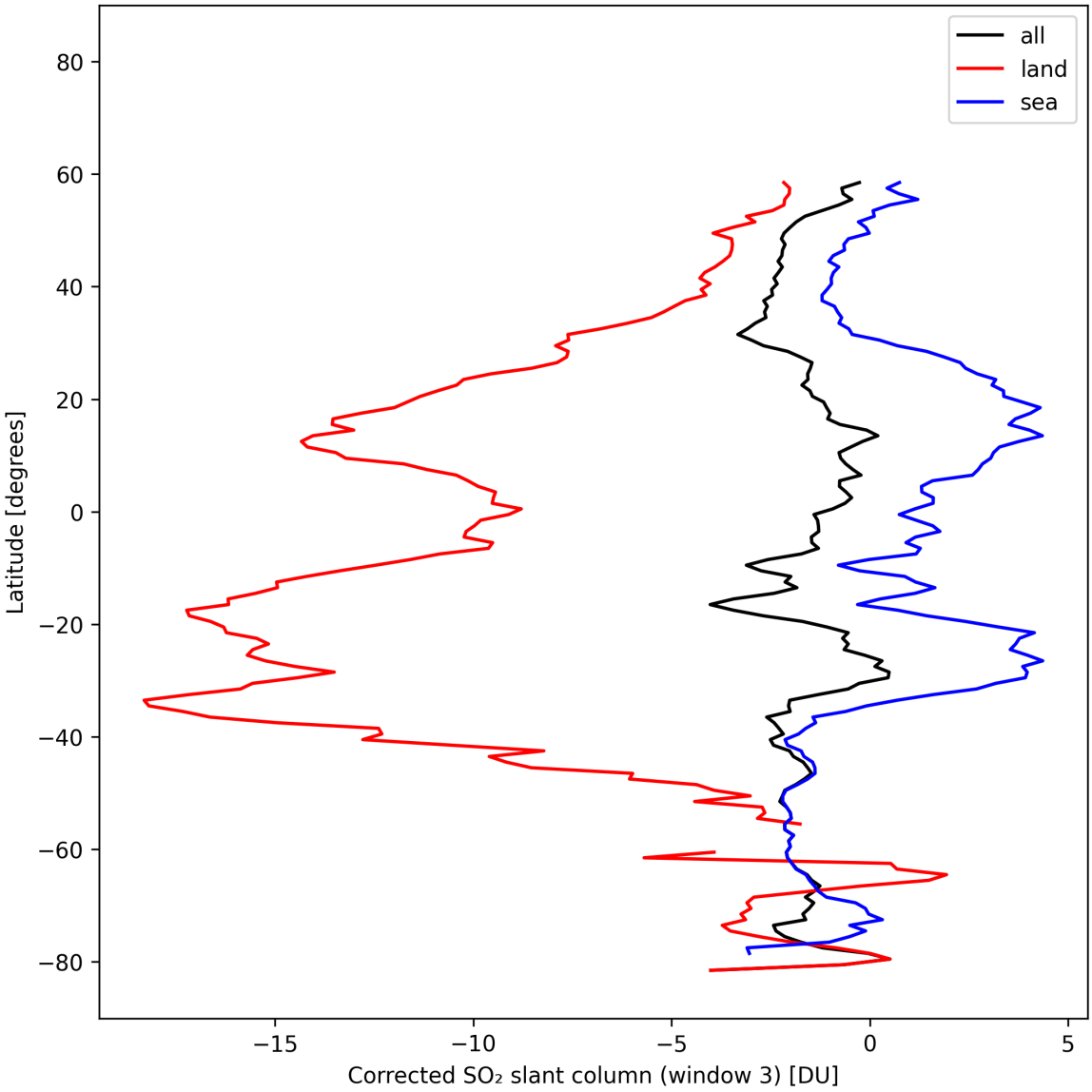

Figure 46: Zonal average of "Corrected SO_2 slant column (window 3)" for 2025-02-17 to 2025-02-18.

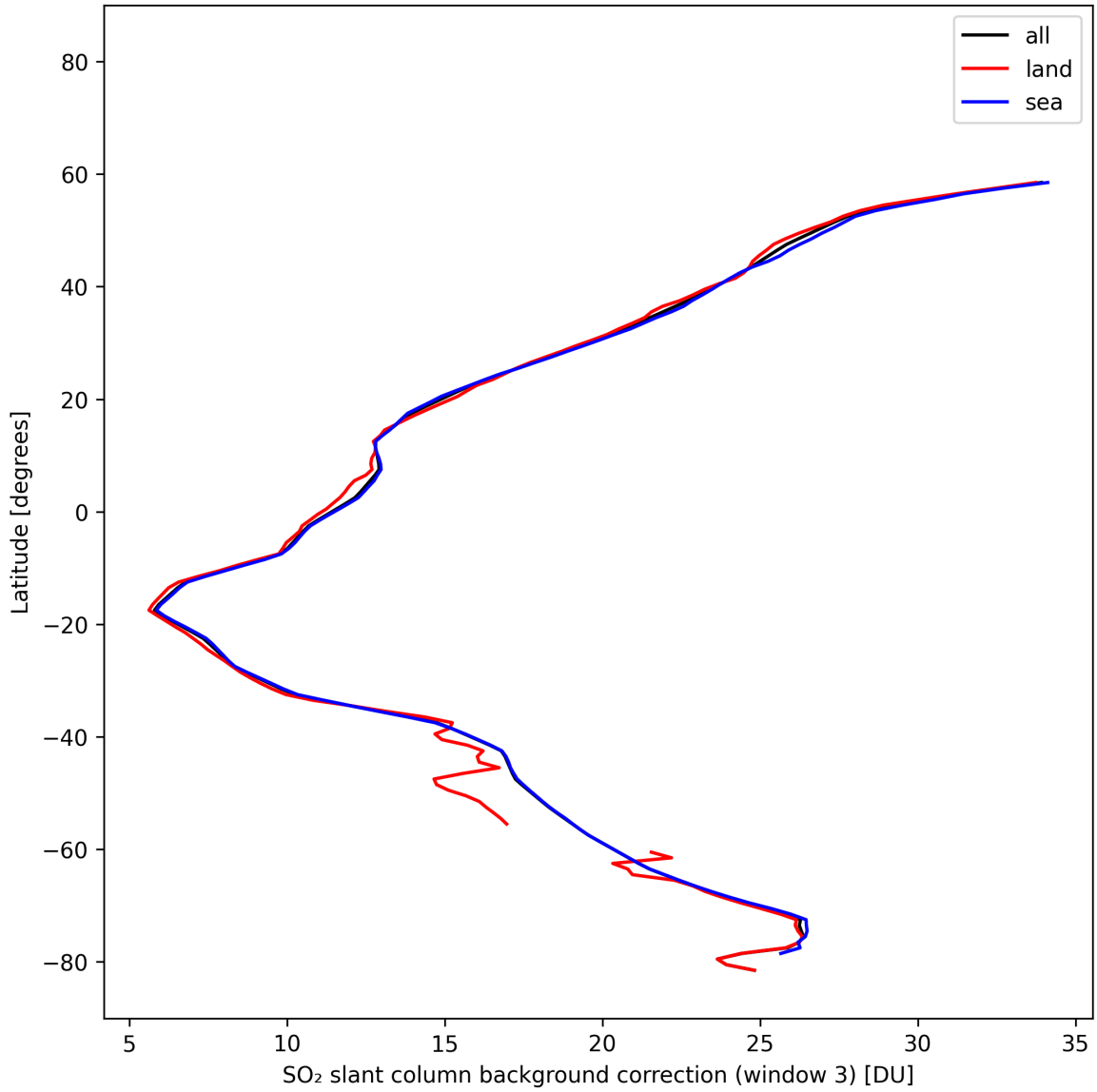

Figure 47: Zonal average of "SO_2 slant column background correction (window 3)" for 2025-02-17 to 2025-02-18.

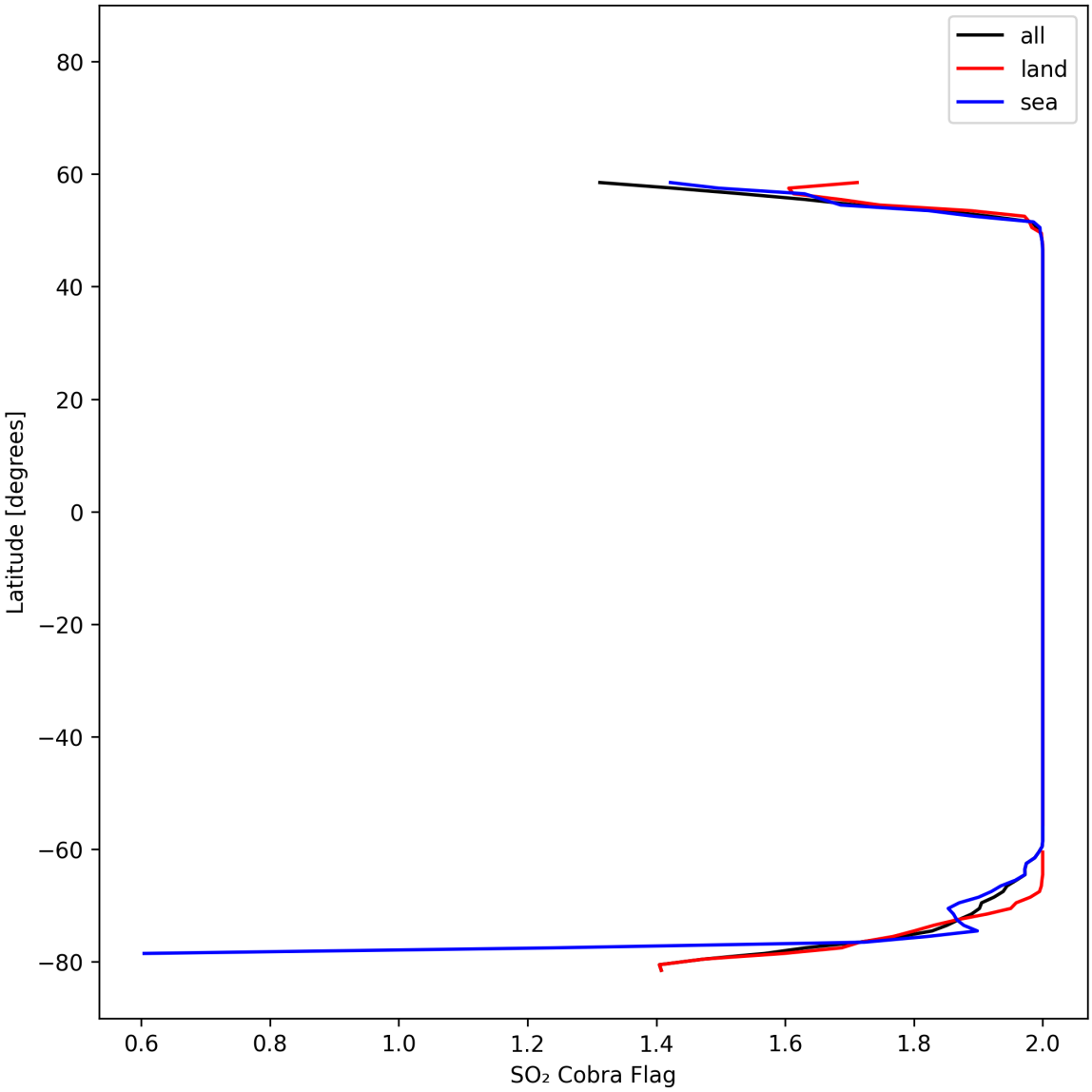

Figure 48: Zonal average of "SO_2 Cobra Flag" for 2025-02-17 to 2025-02-18.

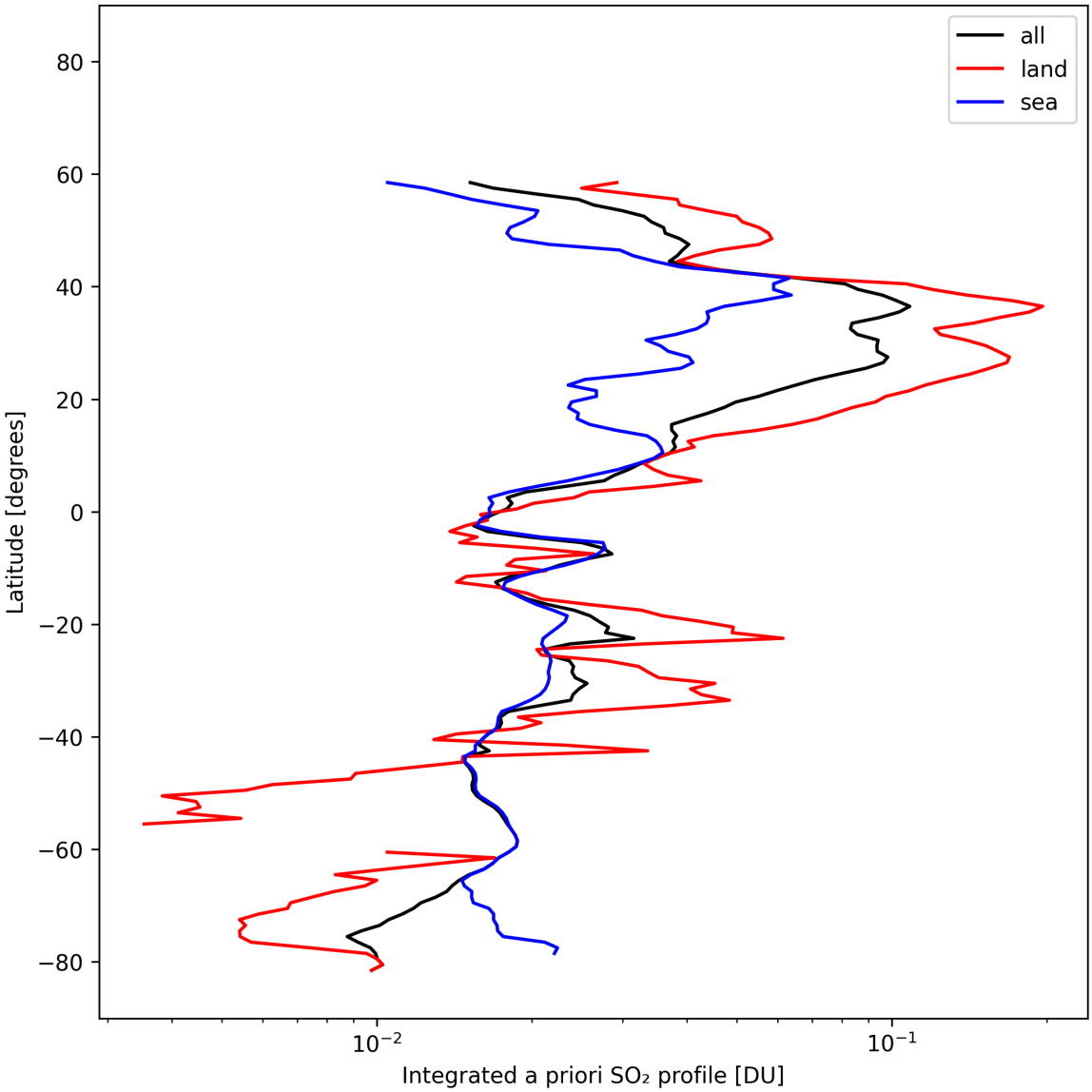

Figure 49: Zonal average of “Integrated a priori SO_2 profile” for 2025-02-17 to 2025-02-18.

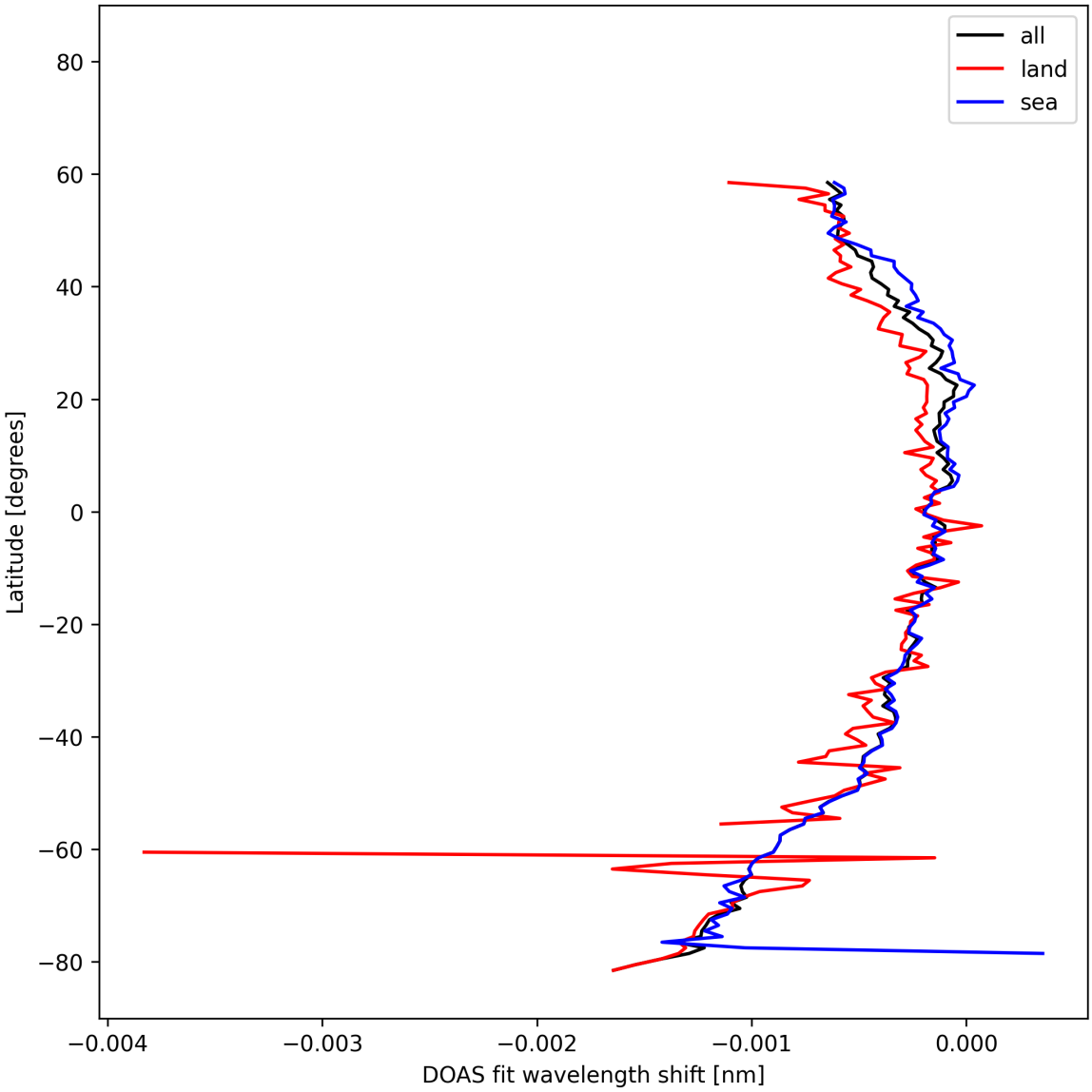

Figure 50: Zonal average of “DOAS fit wavelength shift” for 2025-02-17 to 2025-02-18.

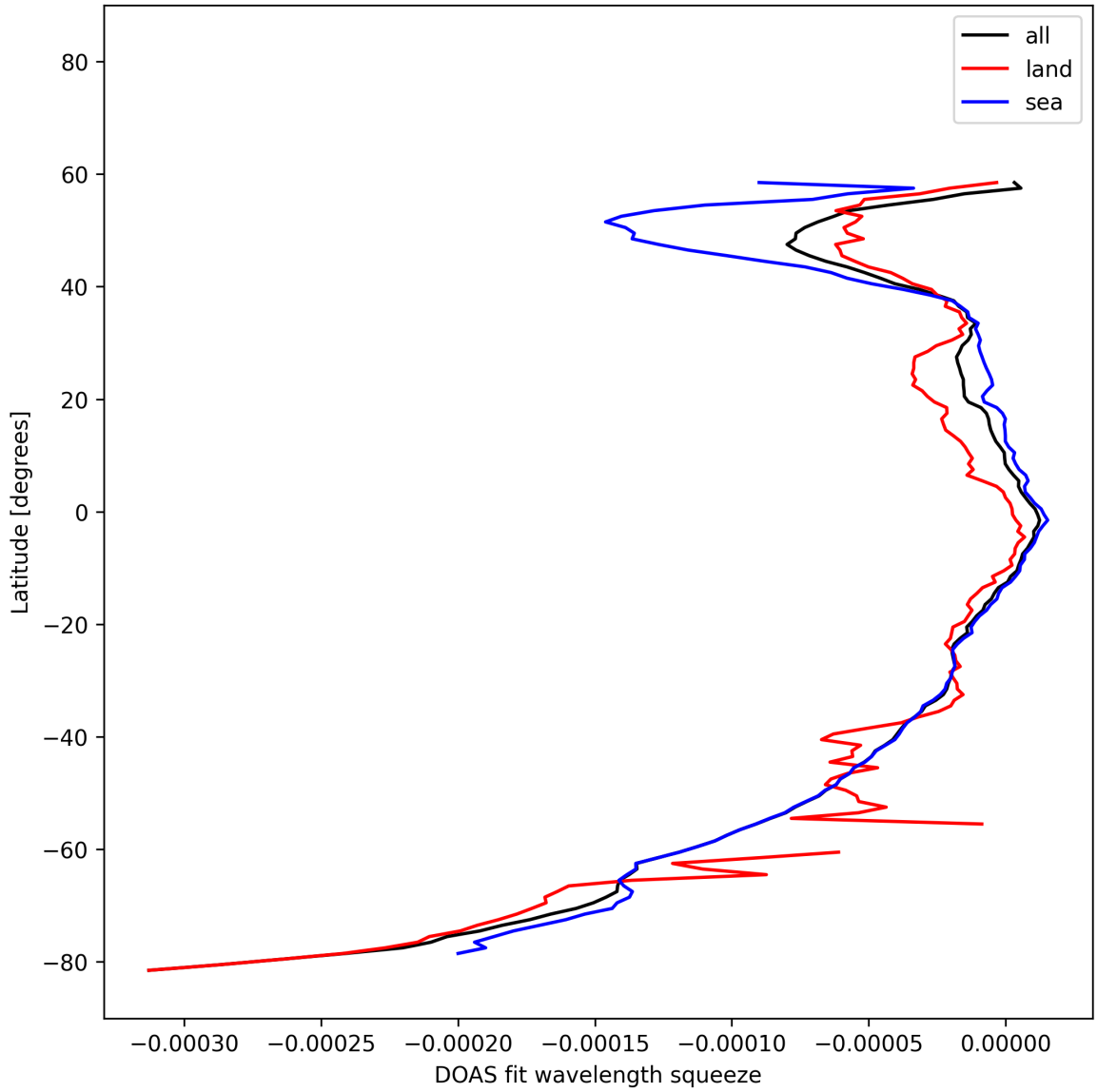

Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-02-17 to 2025-02-18.

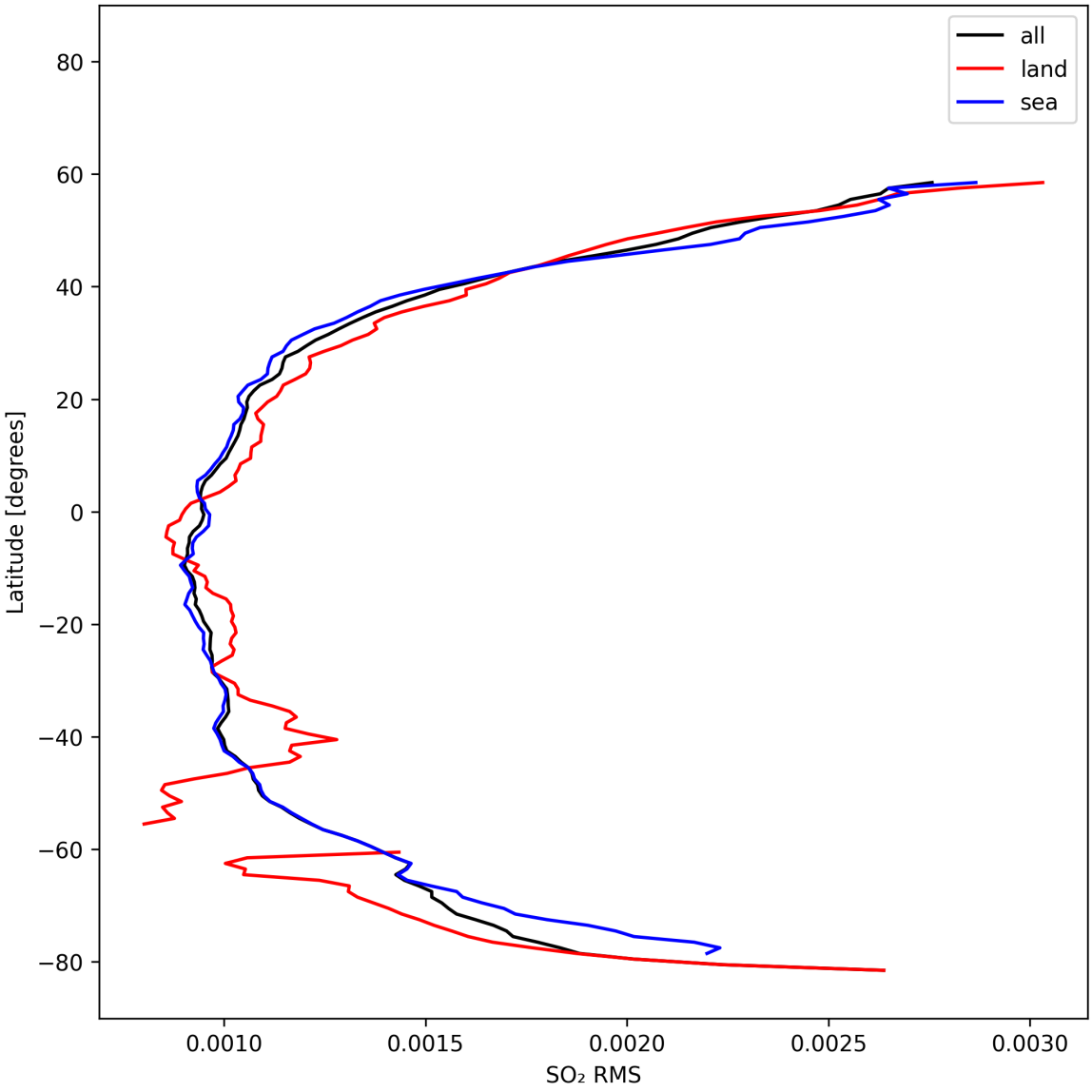

Figure 52: Zonal average of "SO_2 RMS" for 2025-02-17 to 2025-02-18.

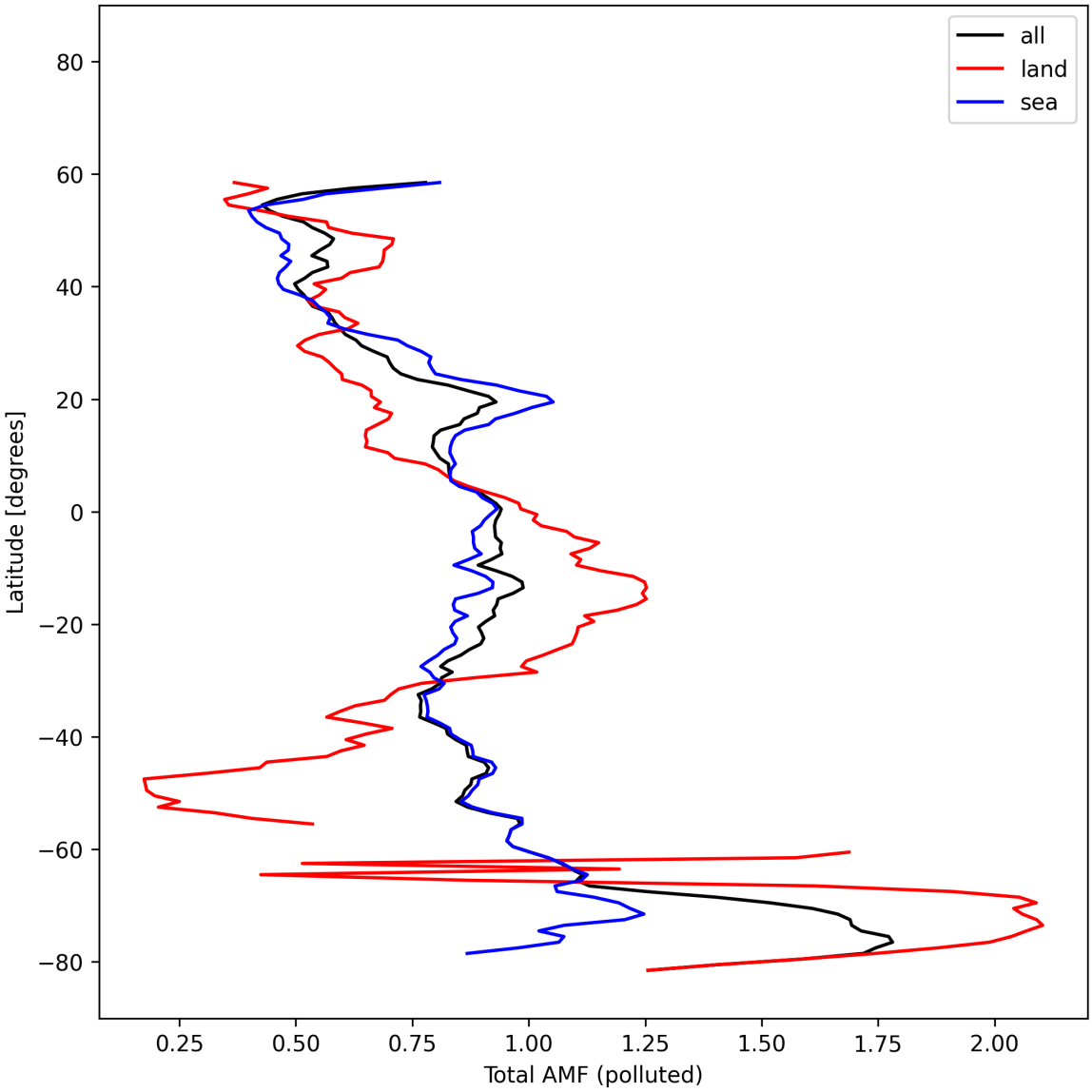

Figure 53: Zonal average of “Total AMF (polluted)” for 2025-02-17 to 2025-02-18.

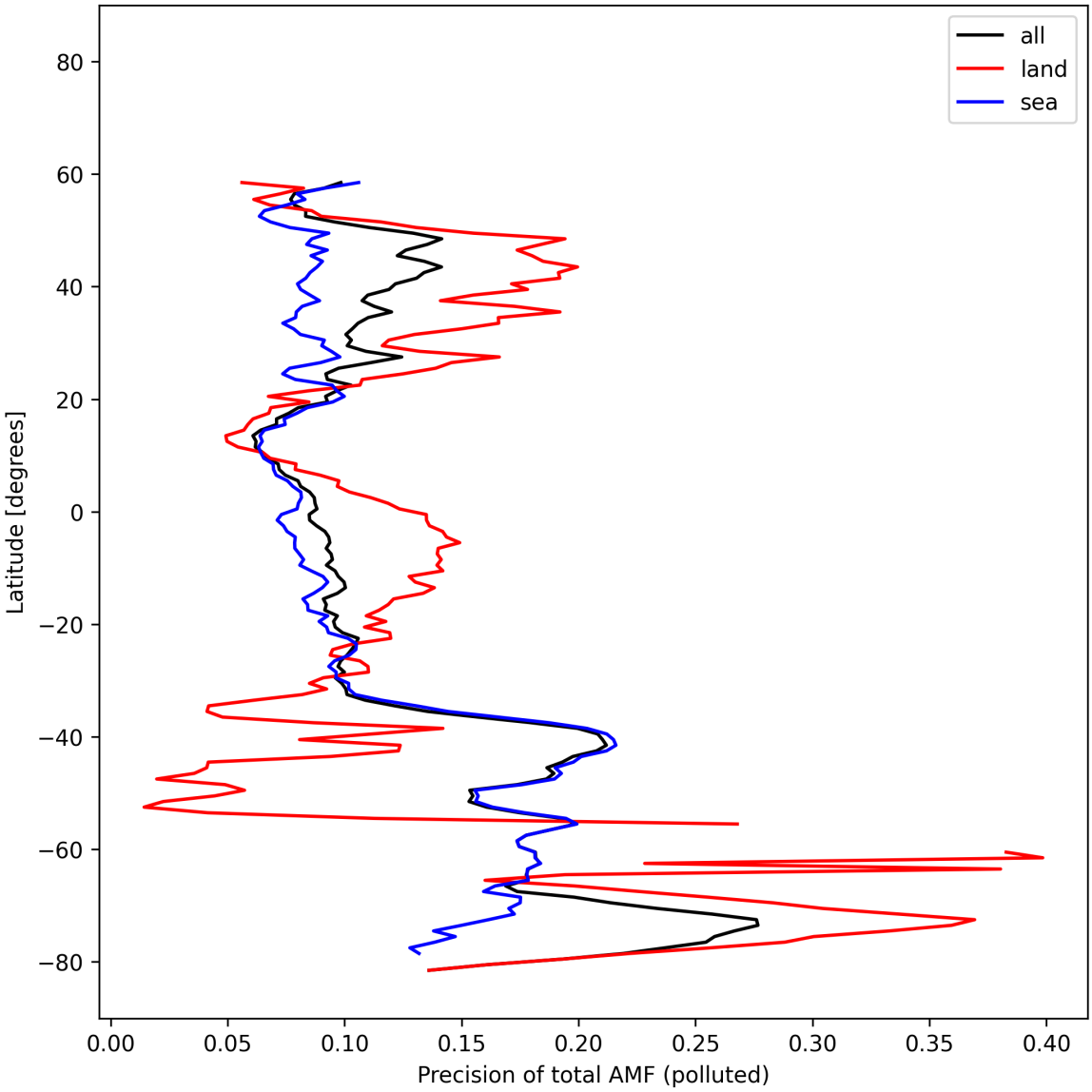

Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-02-17 to 2025-02-18.

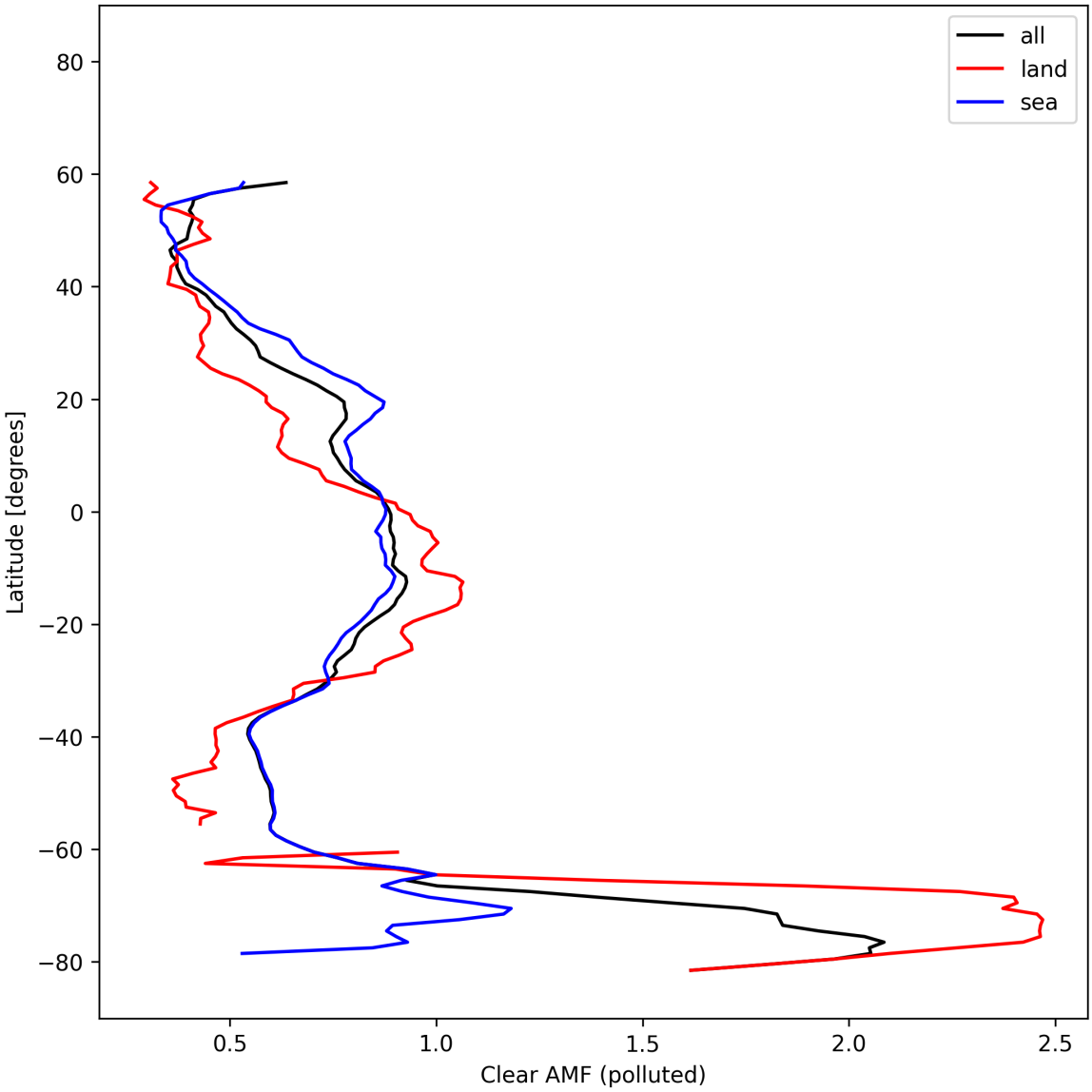

Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-02-17 to 2025-02-18.

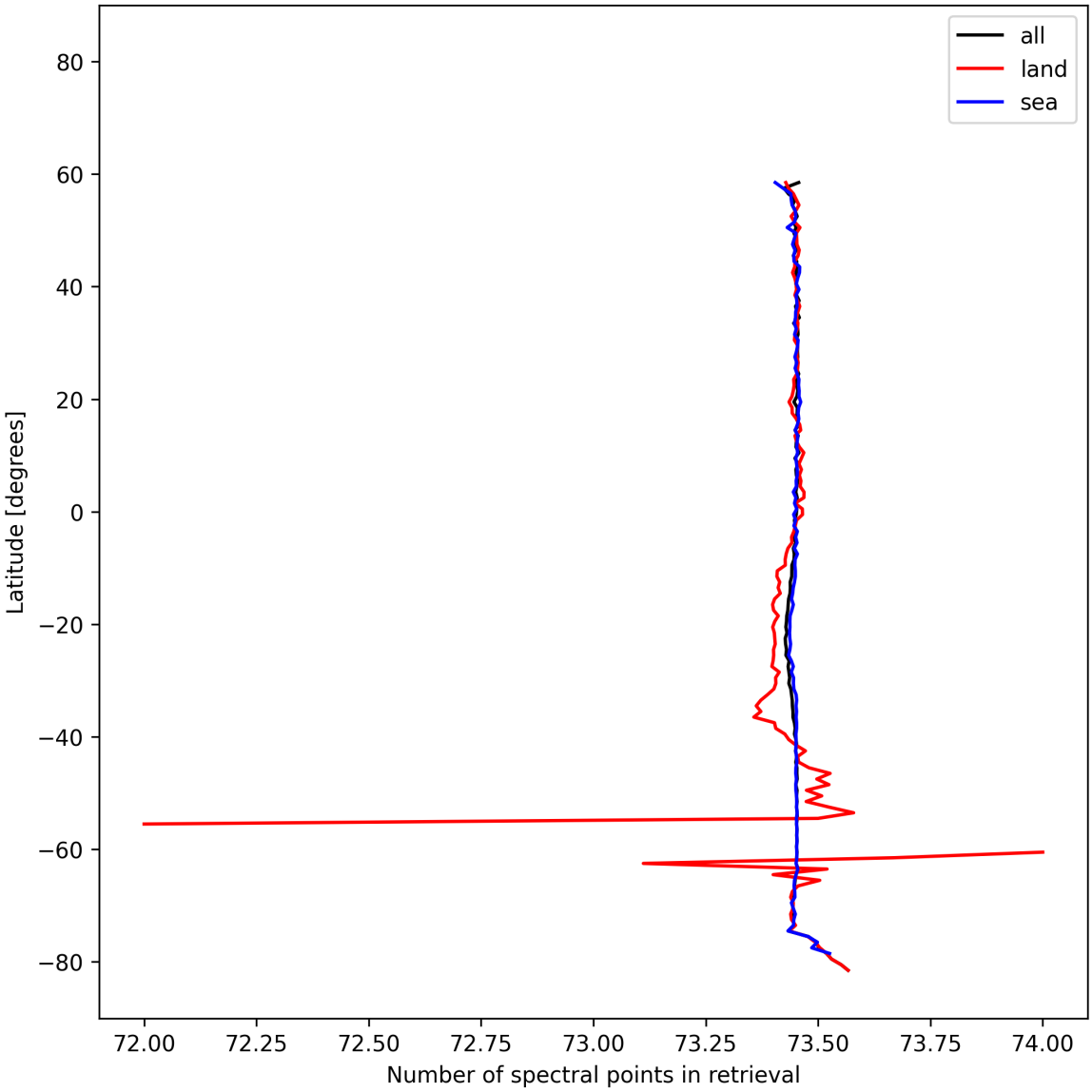

Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-02-17 to 2025-02-18.

8 Histograms

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

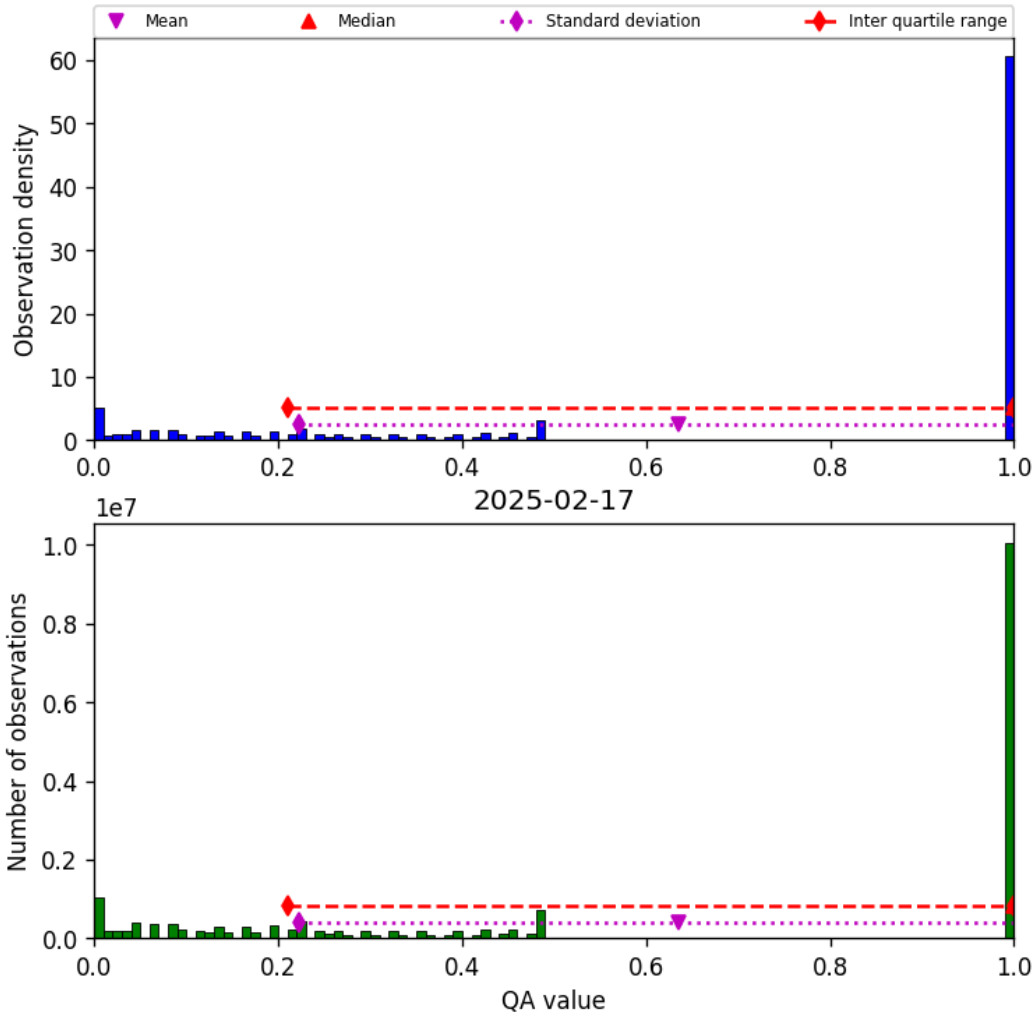

Figure 57: Histogram of “QA value” for 2025-02-17 to 2025-02-18

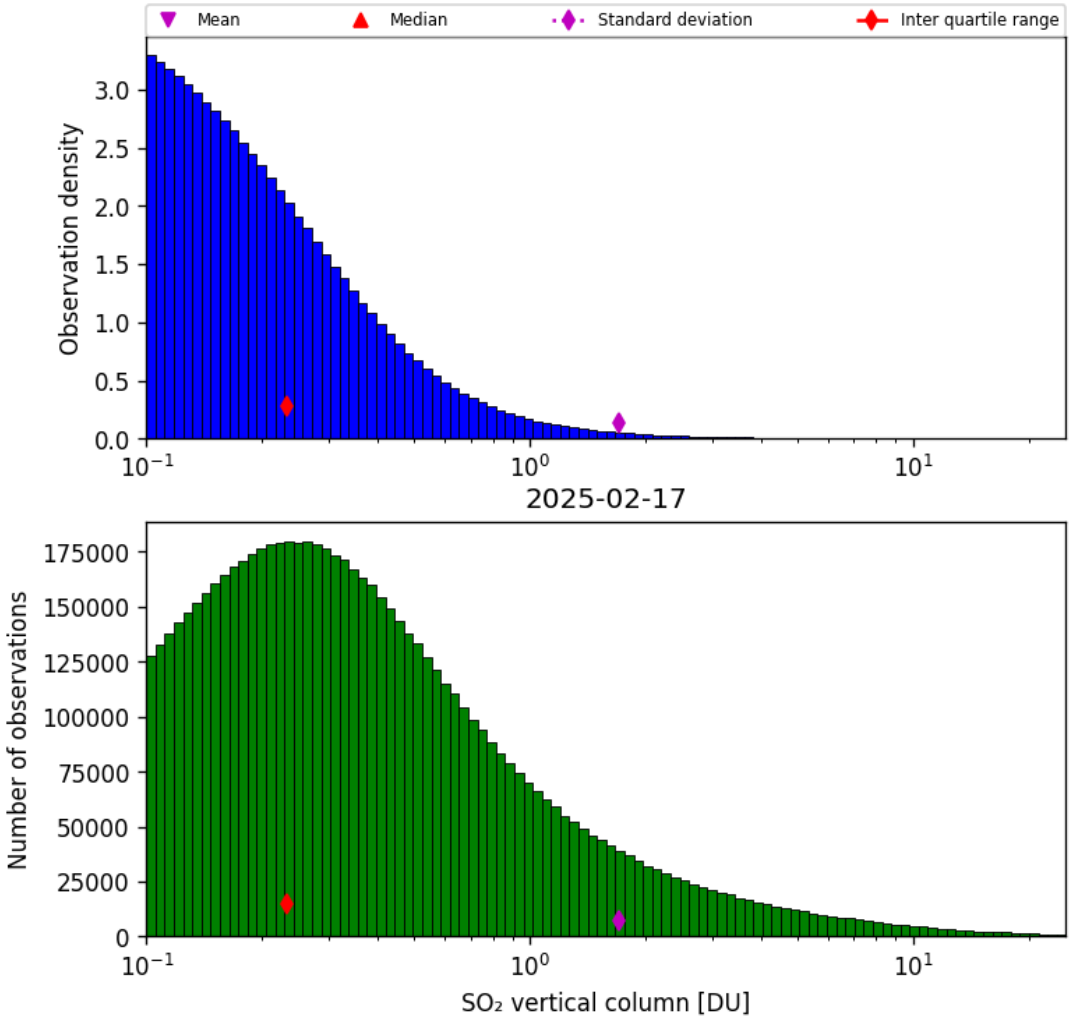

Figure 58: Histogram of "SO_2 vertical column" for 2025-02-17 to 2025-02-18

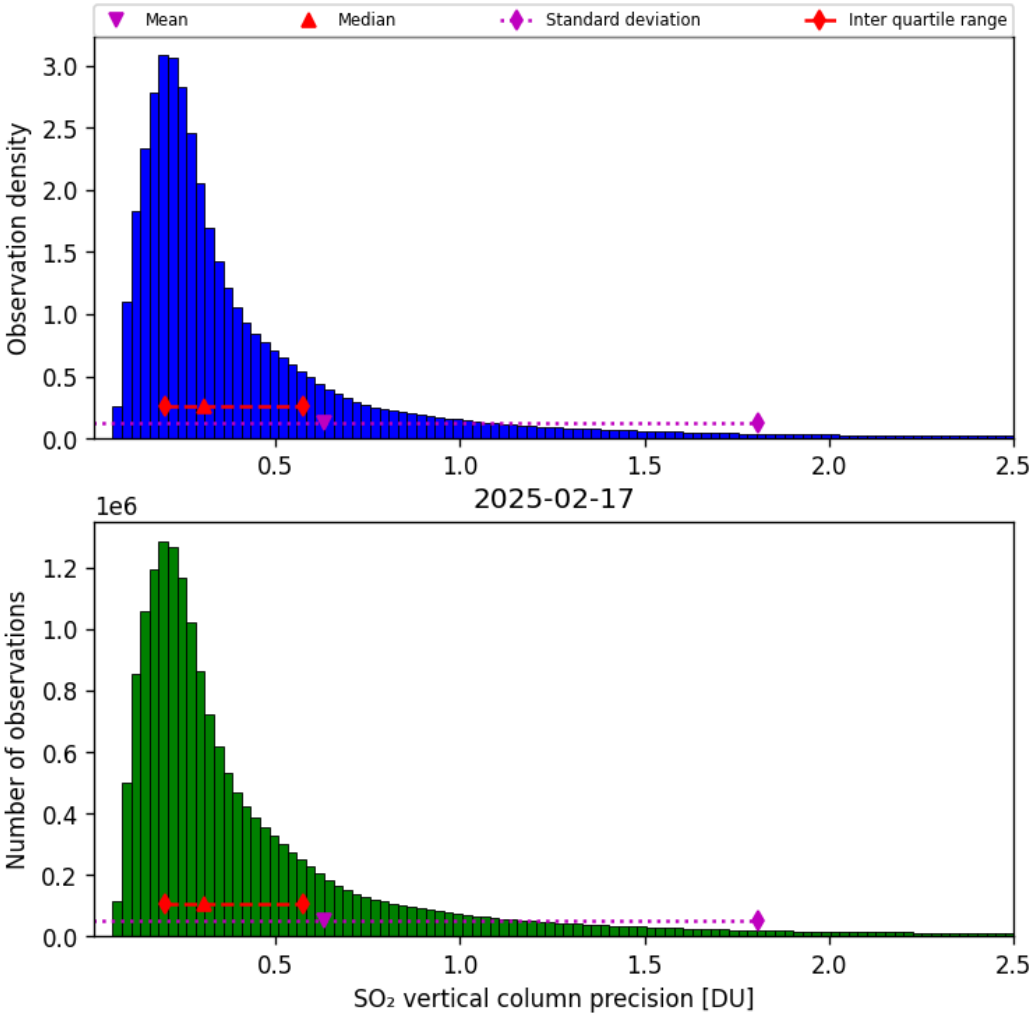

Figure 59: Histogram of "SO_2 vertical column precision" for 2025-02-17 to 2025-02-18

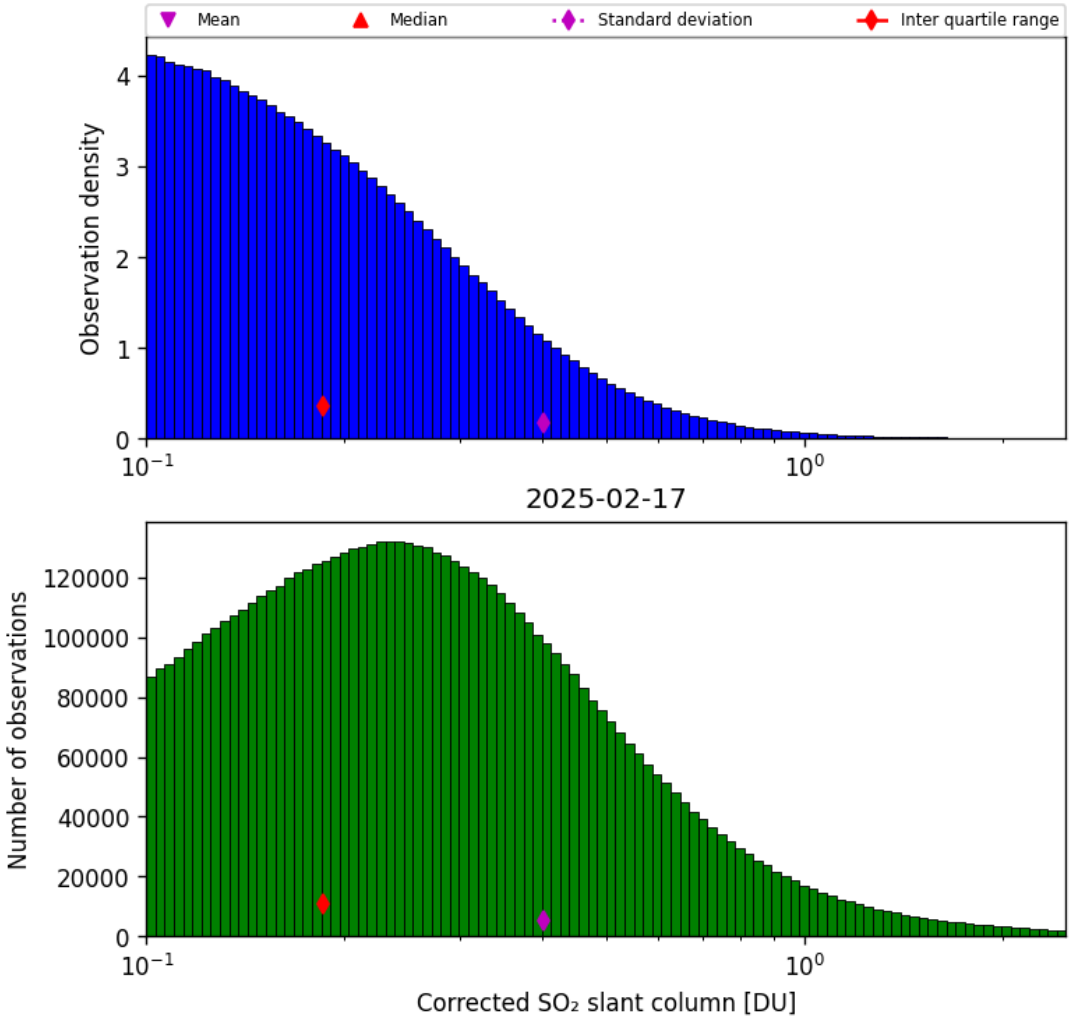

Figure 60: Histogram of "Corrected SO_2 slant column" for 2025-02-17 to 2025-02-18

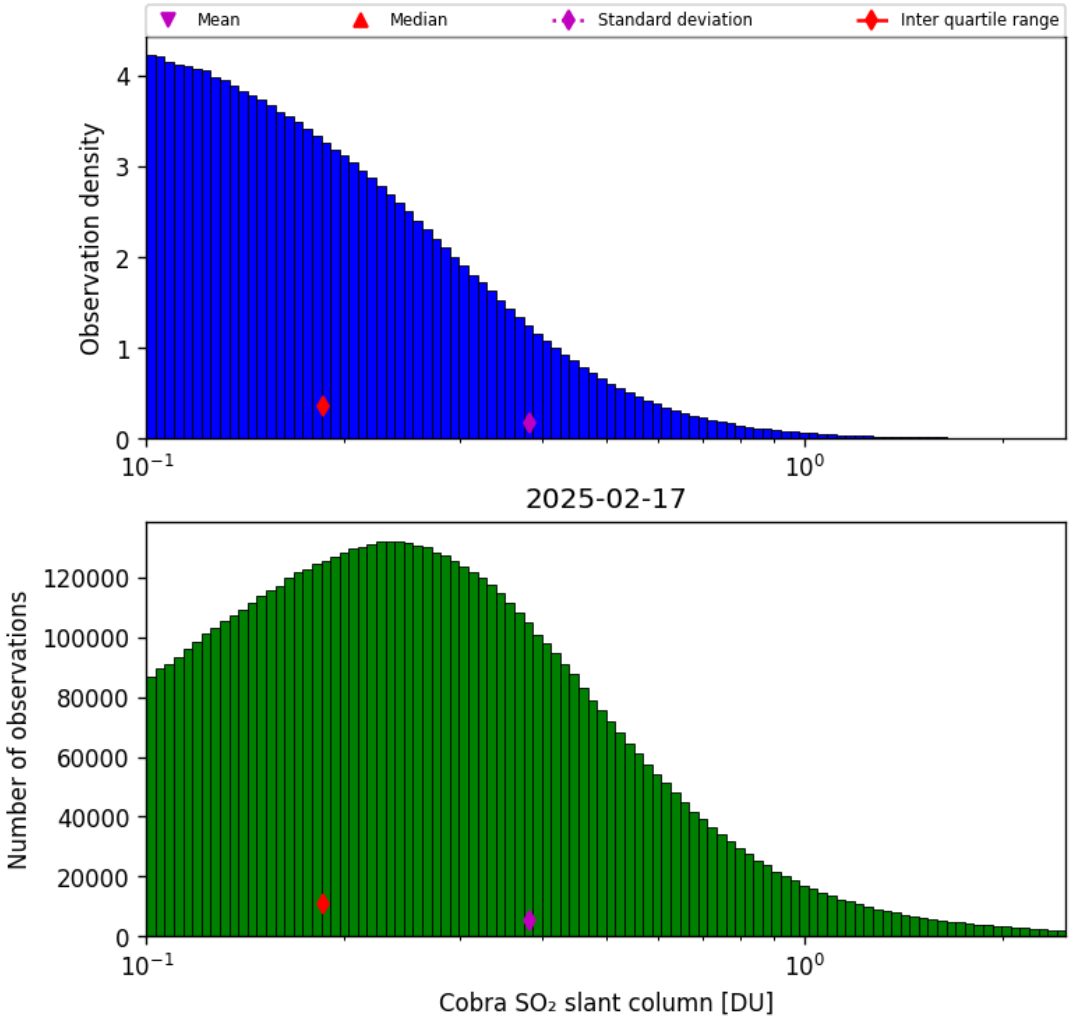

Figure 61: Histogram of "Cobra SO_2 slant column" for 2025-02-17 to 2025-02-18

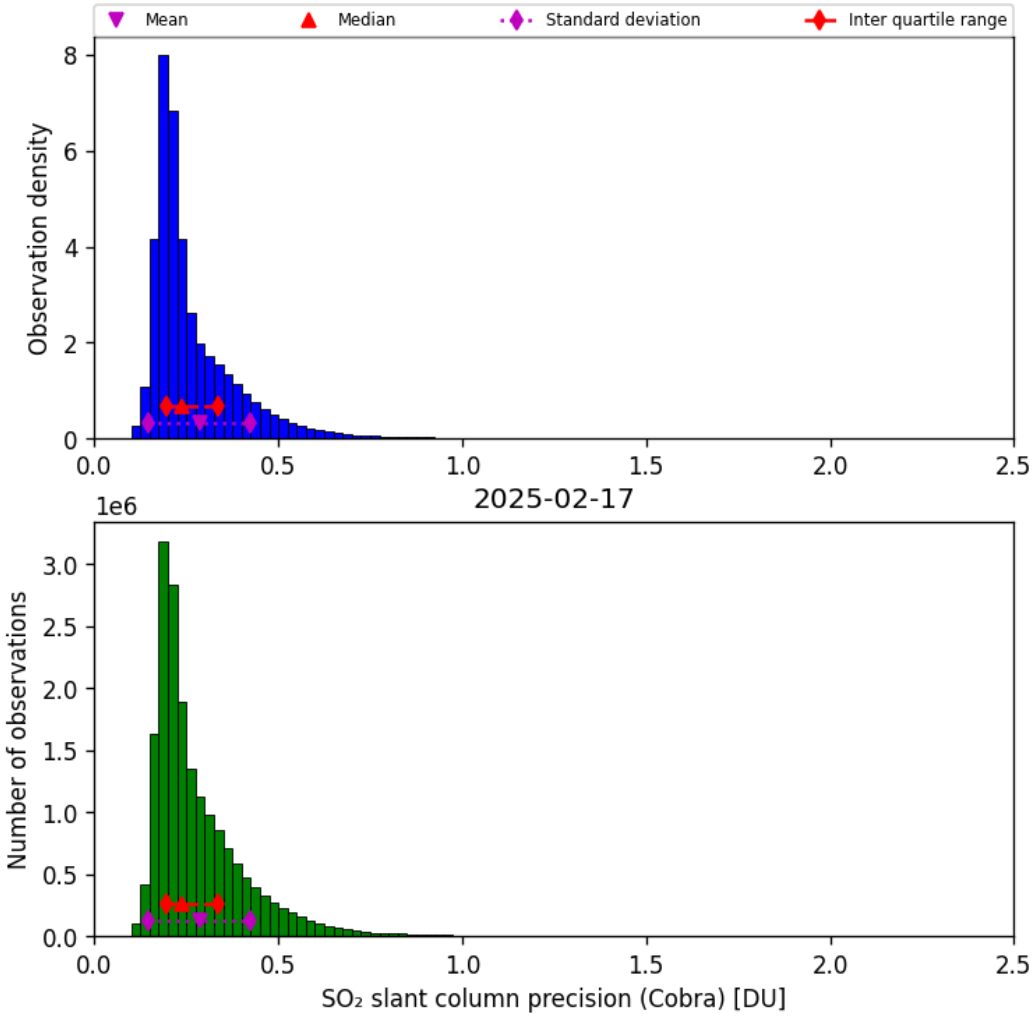

Figure 62: Histogram of "SO_2 slant column precision (Cobra)" for 2025-02-17 to 2025-02-18

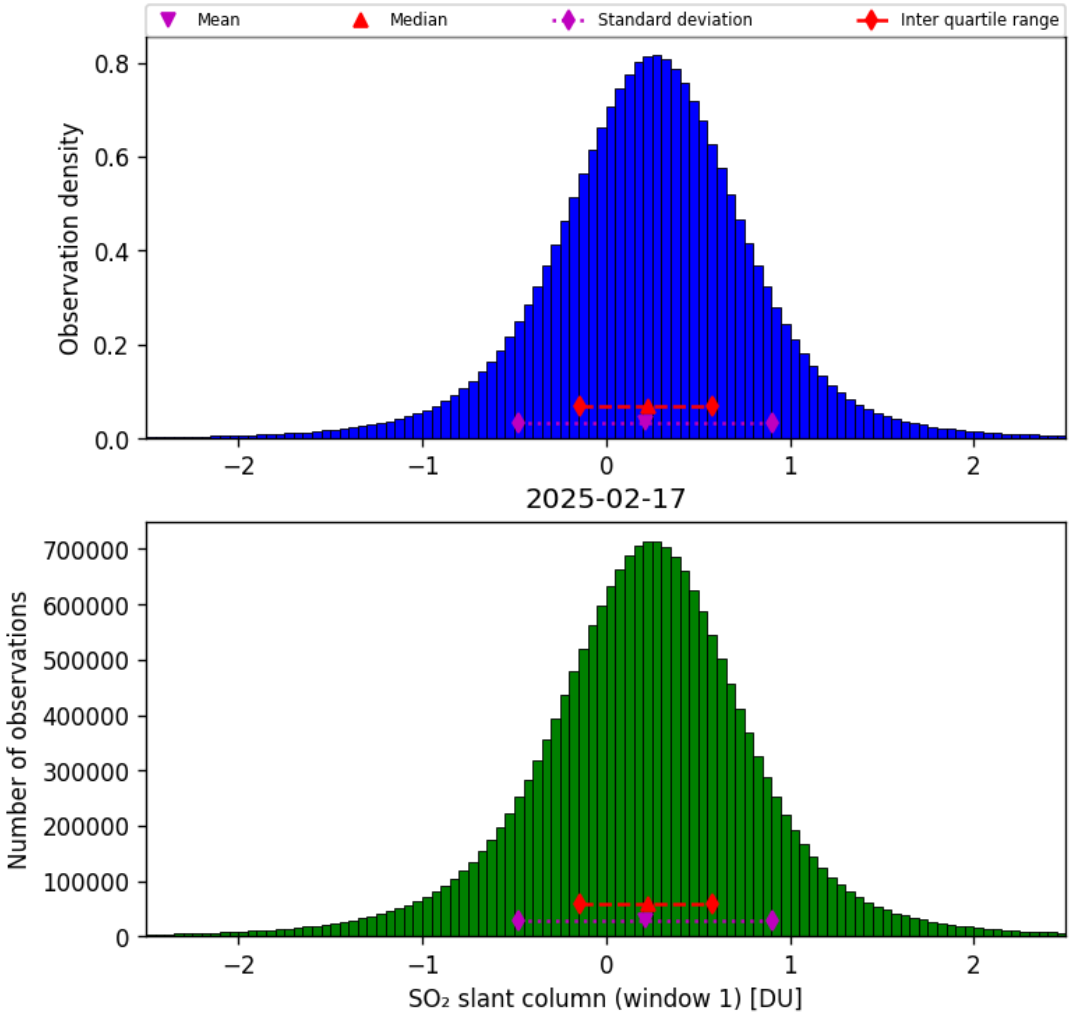

Figure 63: Histogram of "SO_2 slant column (window 1)" for 2025-02-17 to 2025-02-18

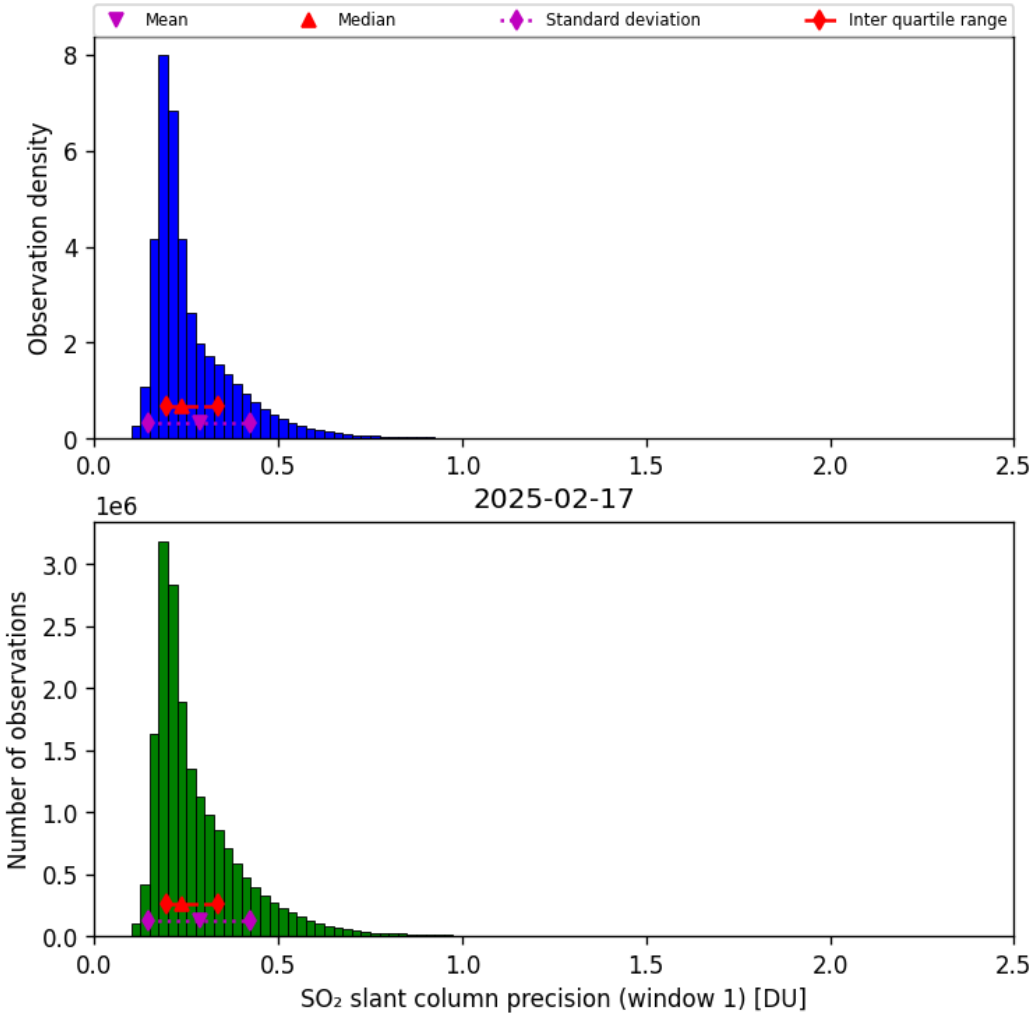

Figure 64: Histogram of "SO_2 slant column precision (window 1)" for 2025-02-17 to 2025-02-18

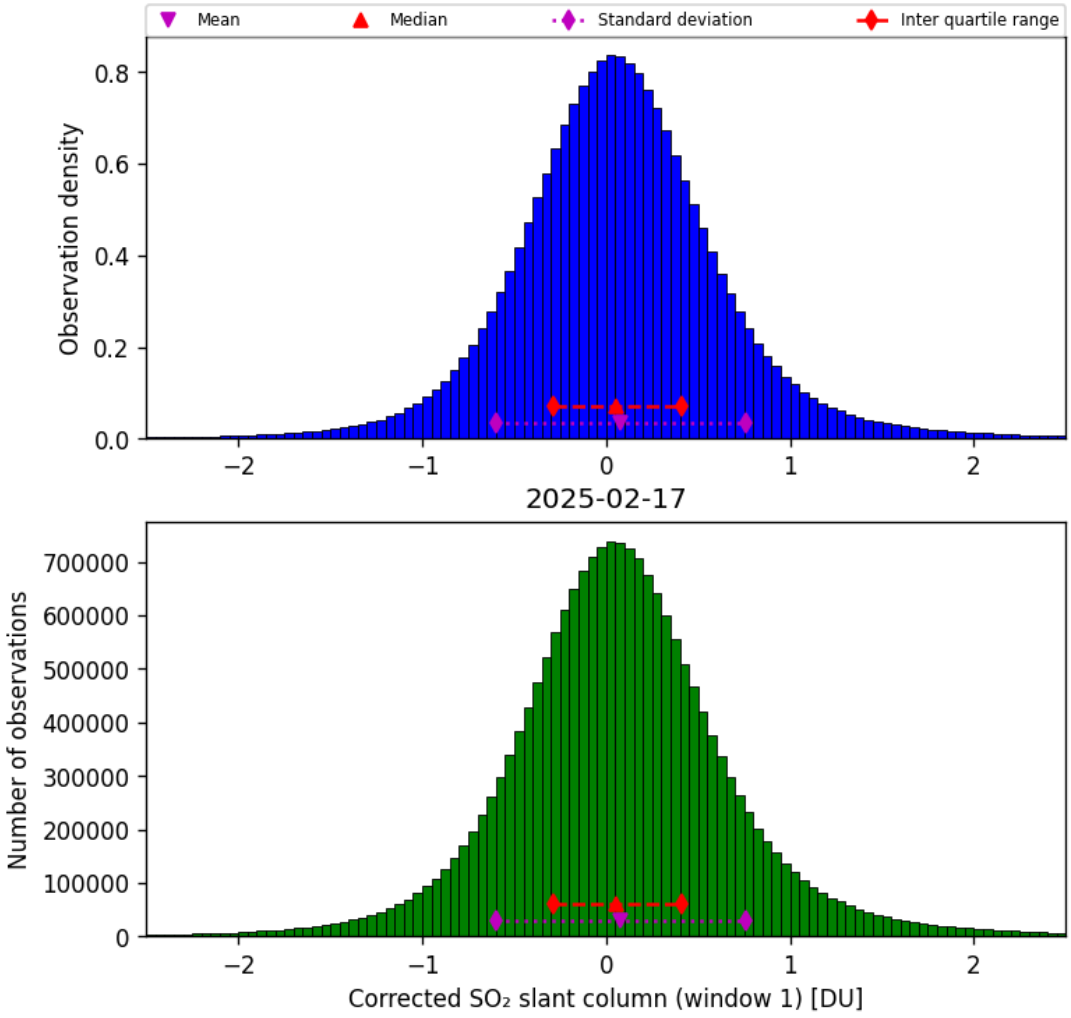

Figure 65: Histogram of "Corrected SO_2 slant column (window 1)" for 2025-02-17 to 2025-02-18

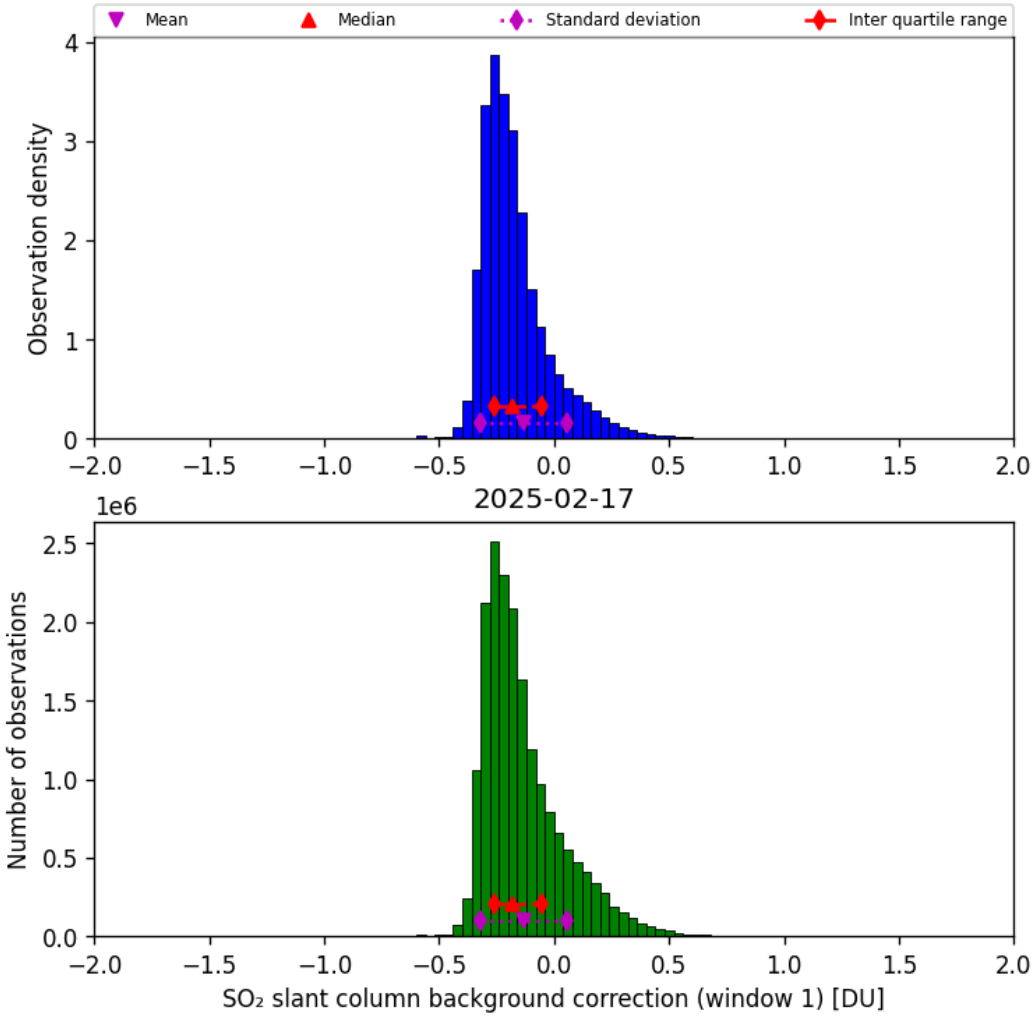

Figure 66: Histogram of "SO_2 slant column background correction (window 1)" for 2025-02-17 to 2025-02-18

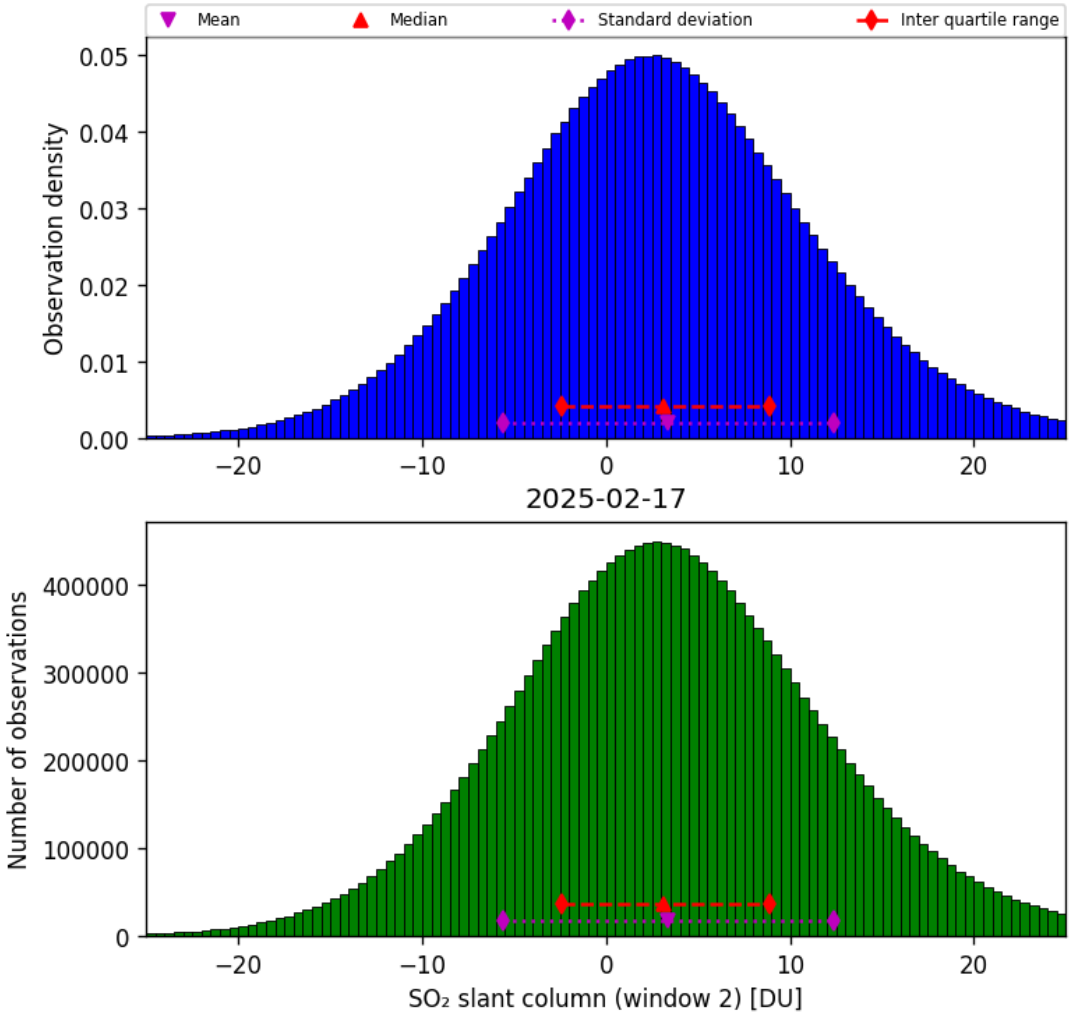

Figure 67: Histogram of "SO_2 slant column (window 2)" for 2025-02-17 to 2025-02-18

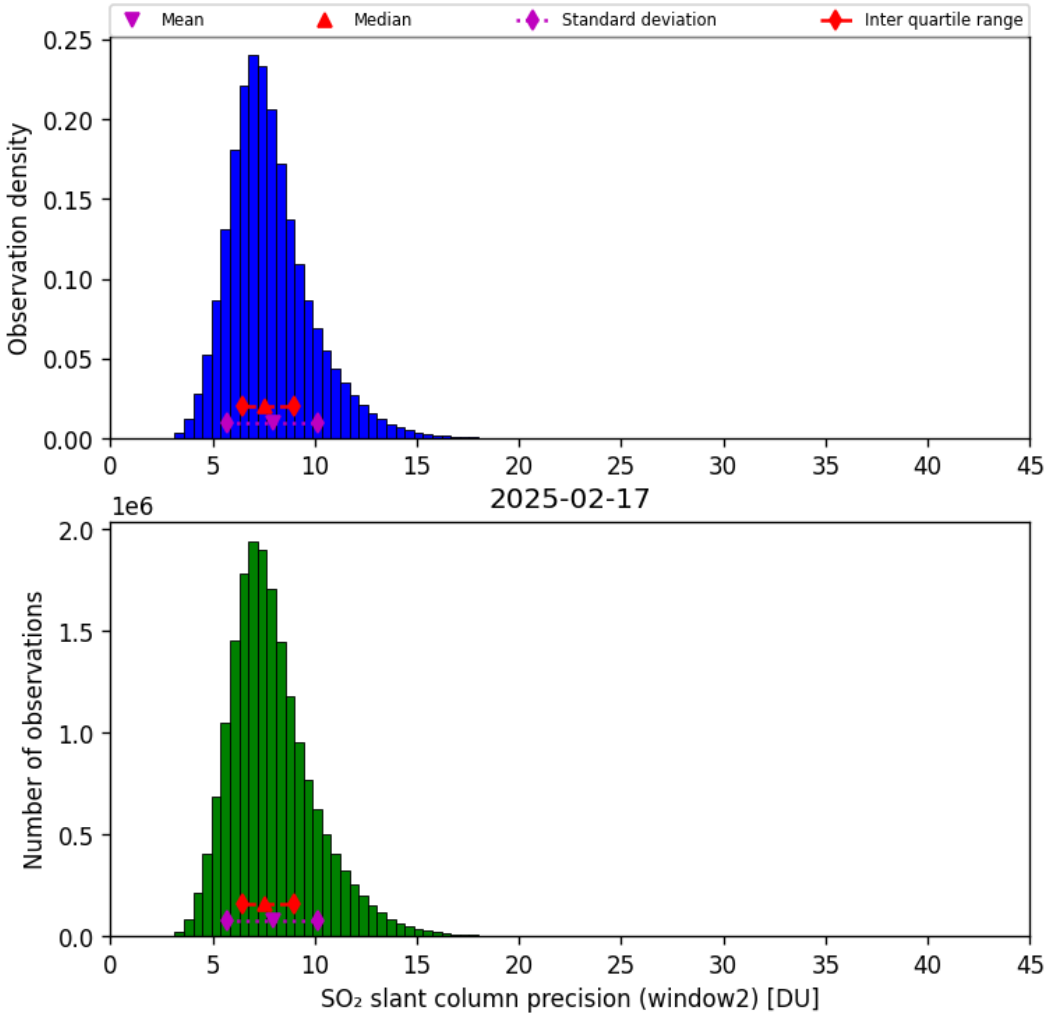

Figure 68: Histogram of "SO_2 slant column precision (window2)" for 2025-02-17 to 2025-02-18

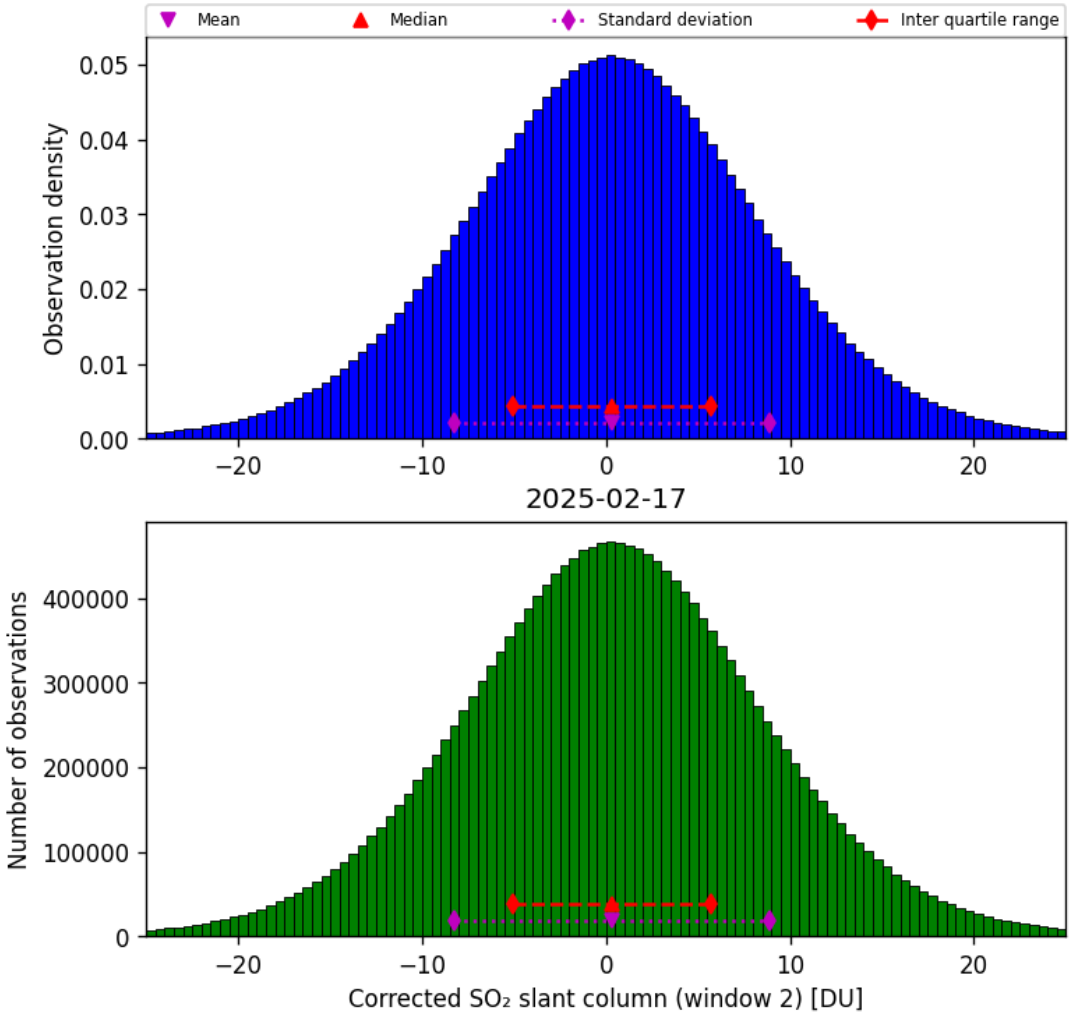

Figure 69: Histogram of "Corrected SO_2 slant column (window 2)" for 2025-02-17 to 2025-02-18

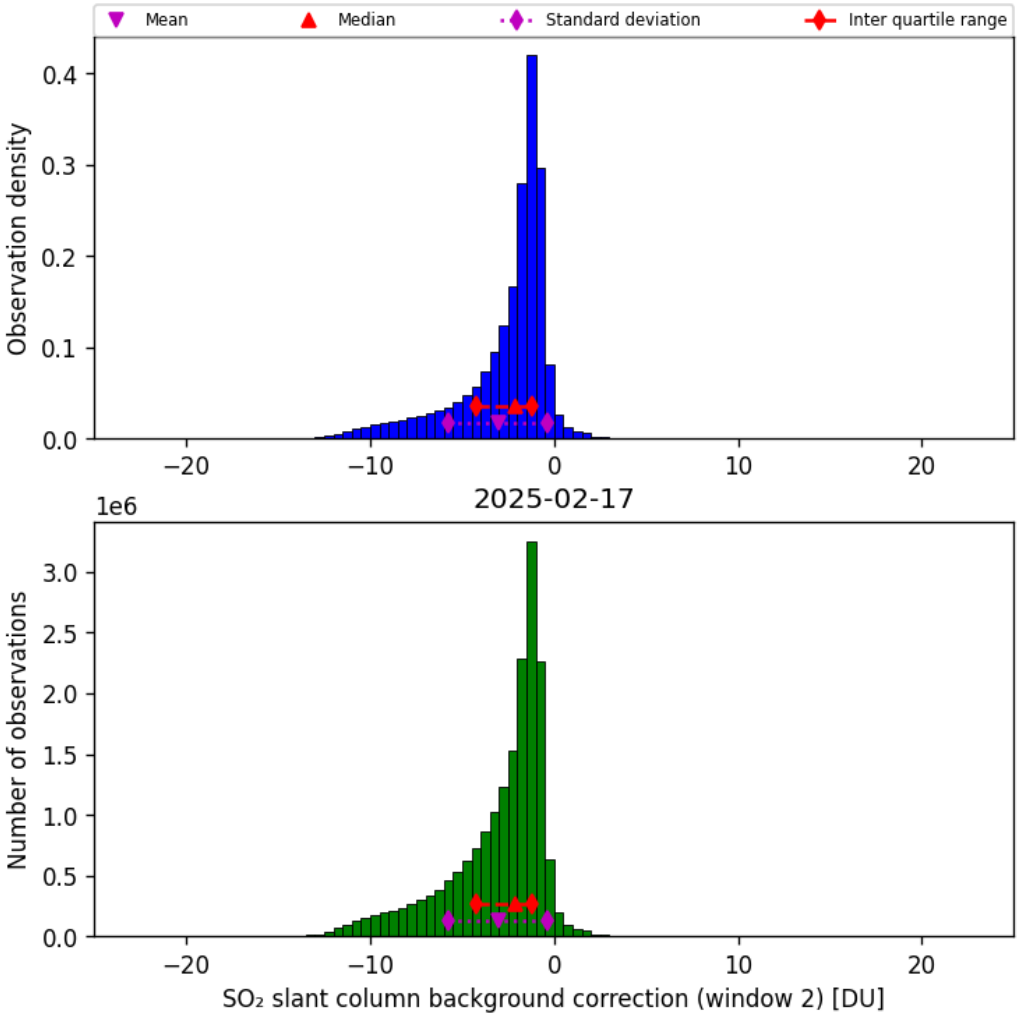

Figure 70: Histogram of "SO_2 slant column background correction (window 2)" for 2025-02-17 to 2025-02-18

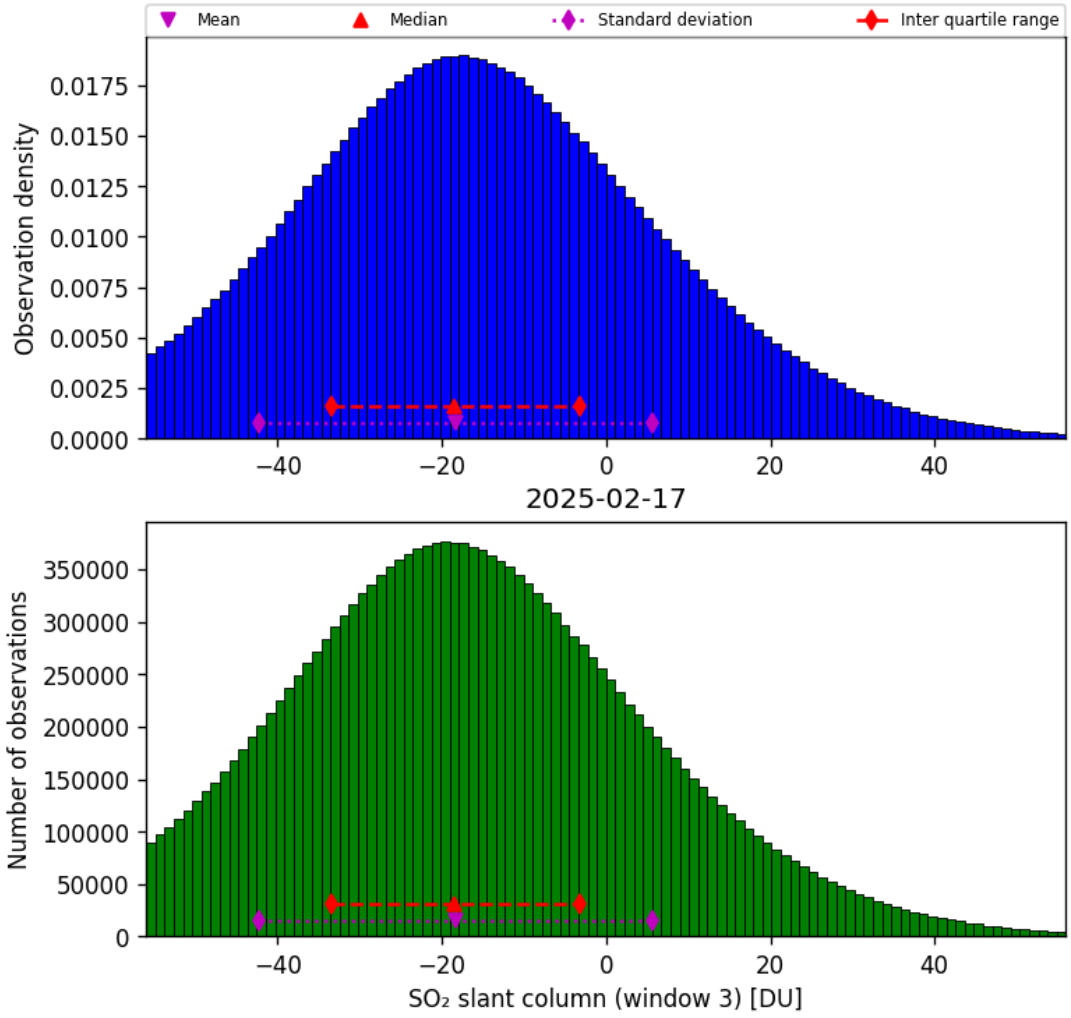

Figure 71: Histogram of "SO_2 slant column (window 3)" for 2025-02-17 to 2025-02-18

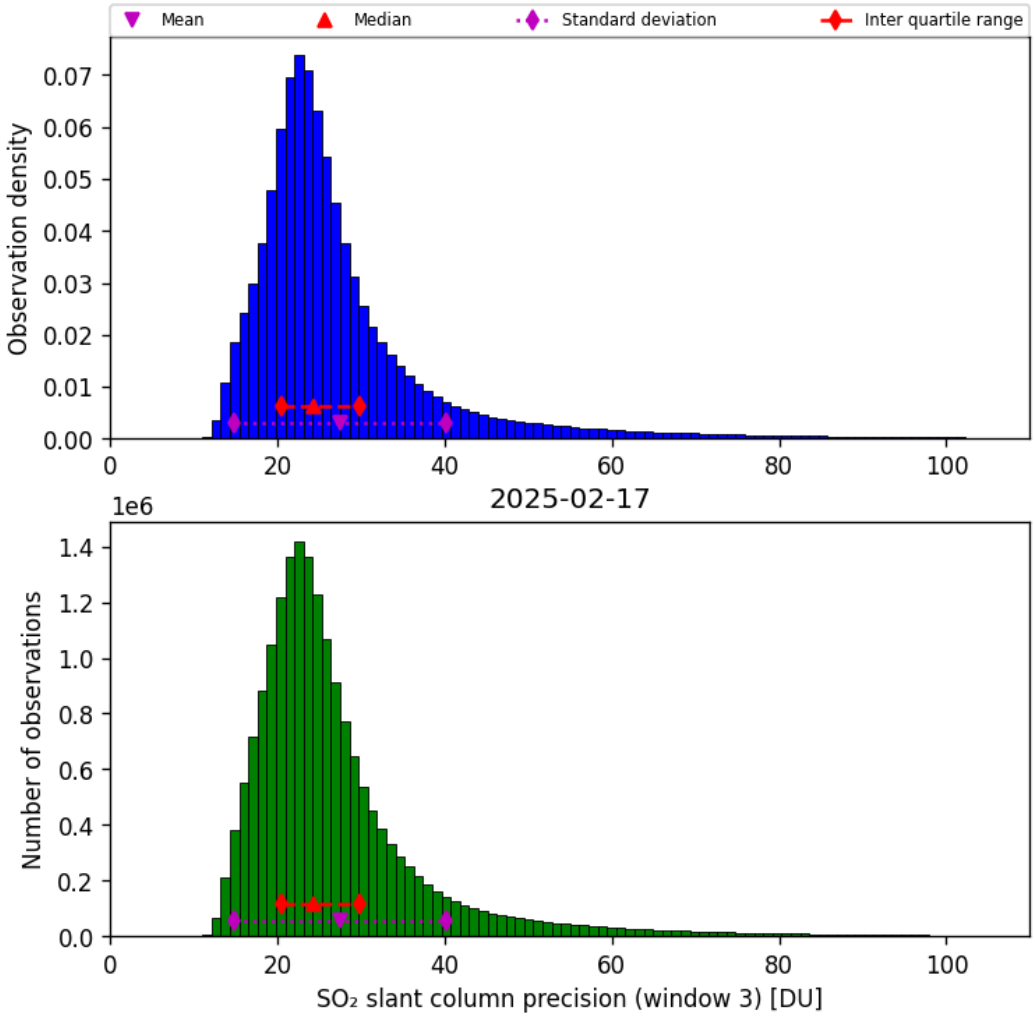

Figure 72: Histogram of "SO_2 slant column precision (window 3)" for 2025-02-17 to 2025-02-18

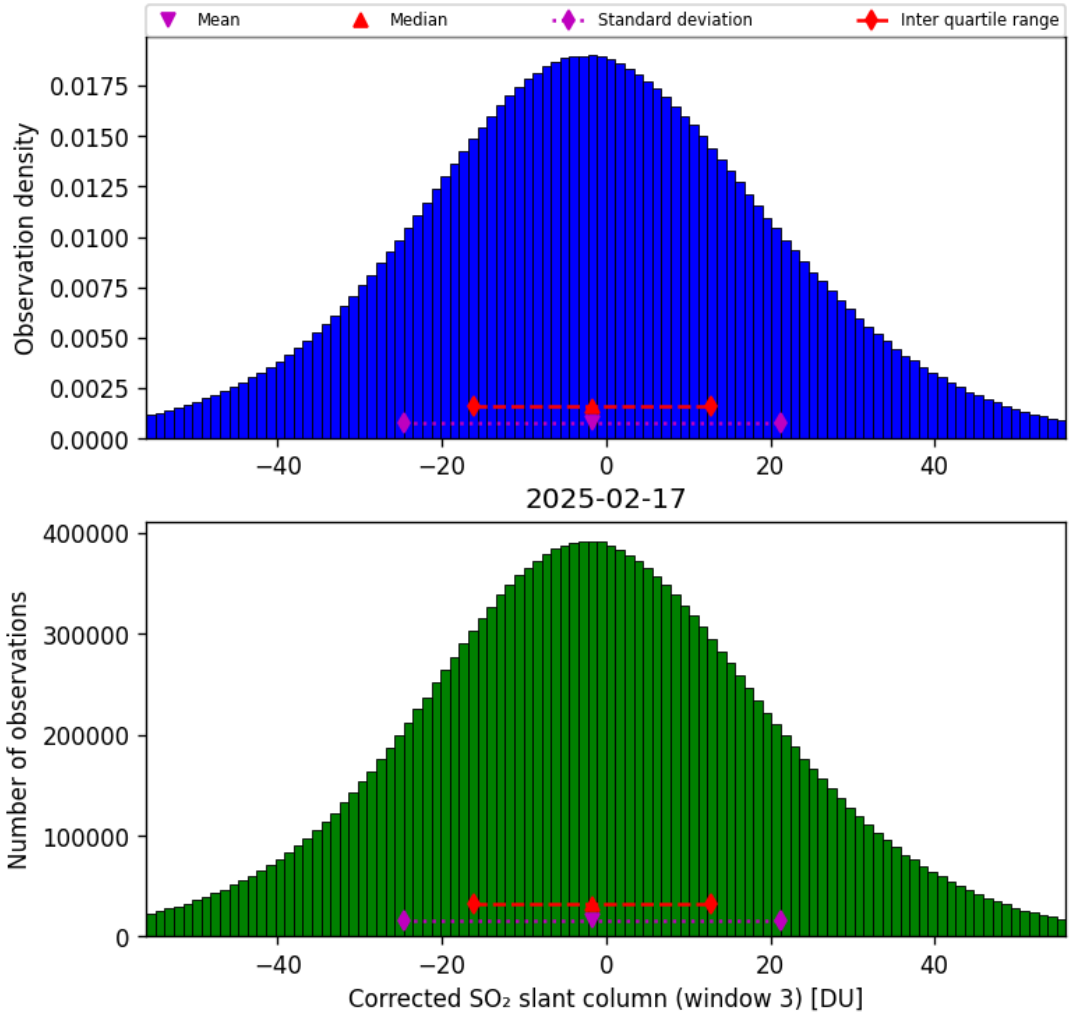

Figure 73: Histogram of "Corrected SO_2 slant column (window 3)" for 2025-02-17 to 2025-02-18

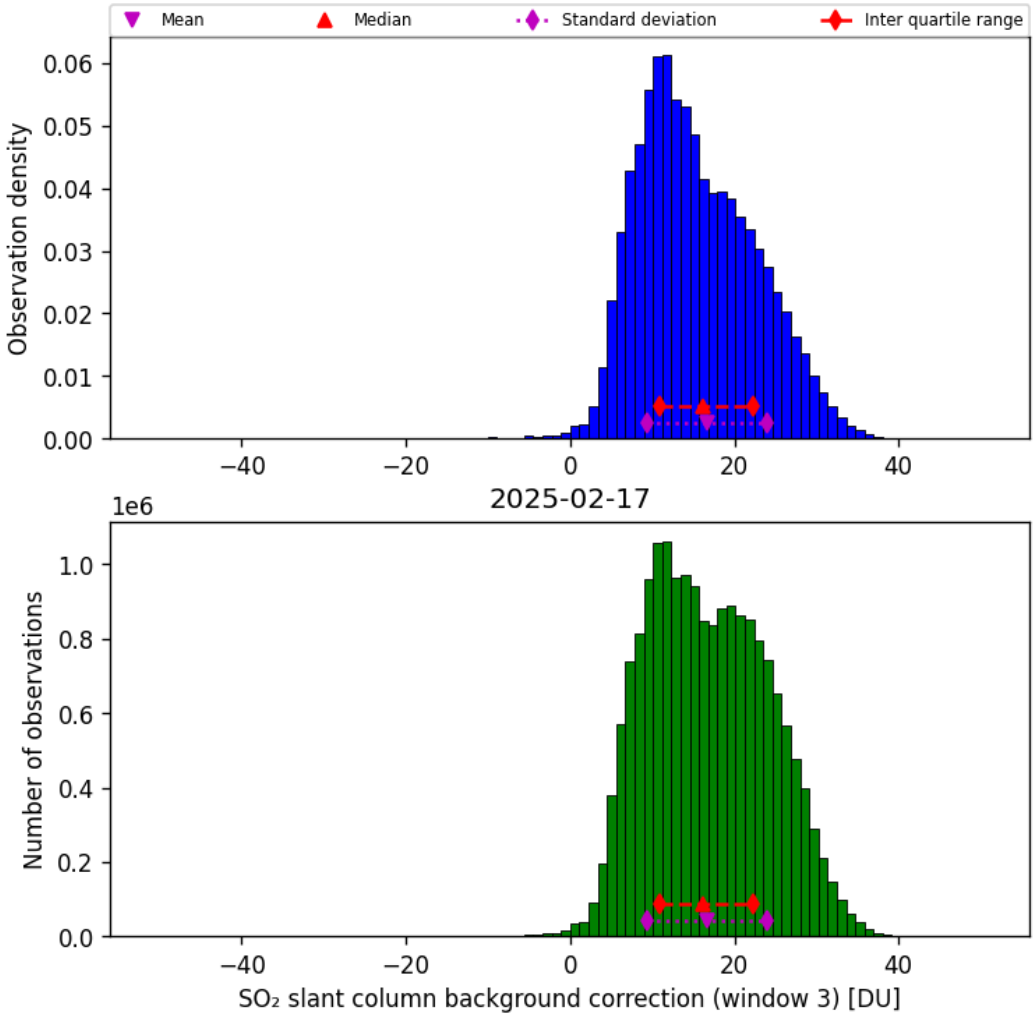

Figure 74: Histogram of "SO_2 slant column background correction (window 3)" for 2025-02-17 to 2025-02-18

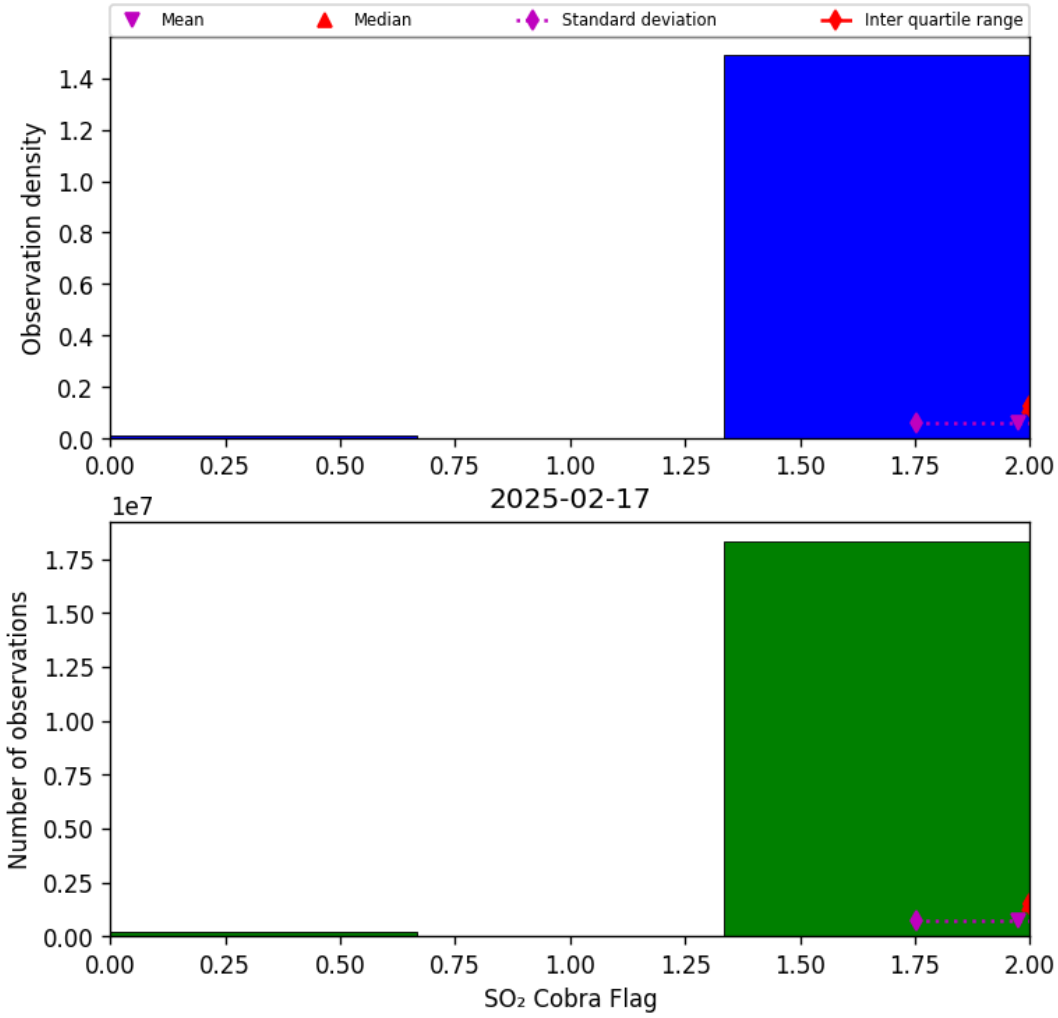

Figure 75: Histogram of "SO_2 Cobra Flag" for 2025-02-17 to 2025-02-18

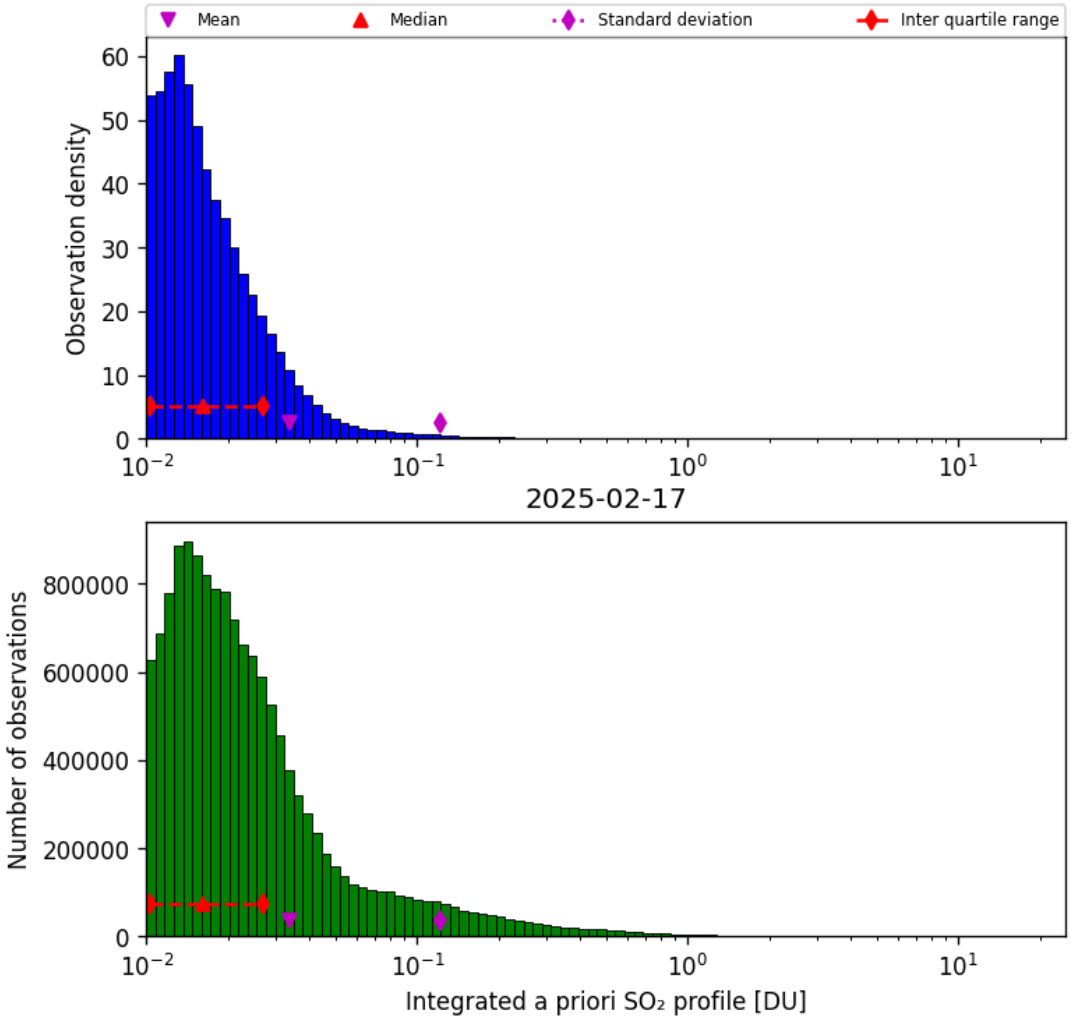

Figure 76: Histogram of "Integrated a priori SO_2 profile" for 2025-02-17 to 2025-02-18

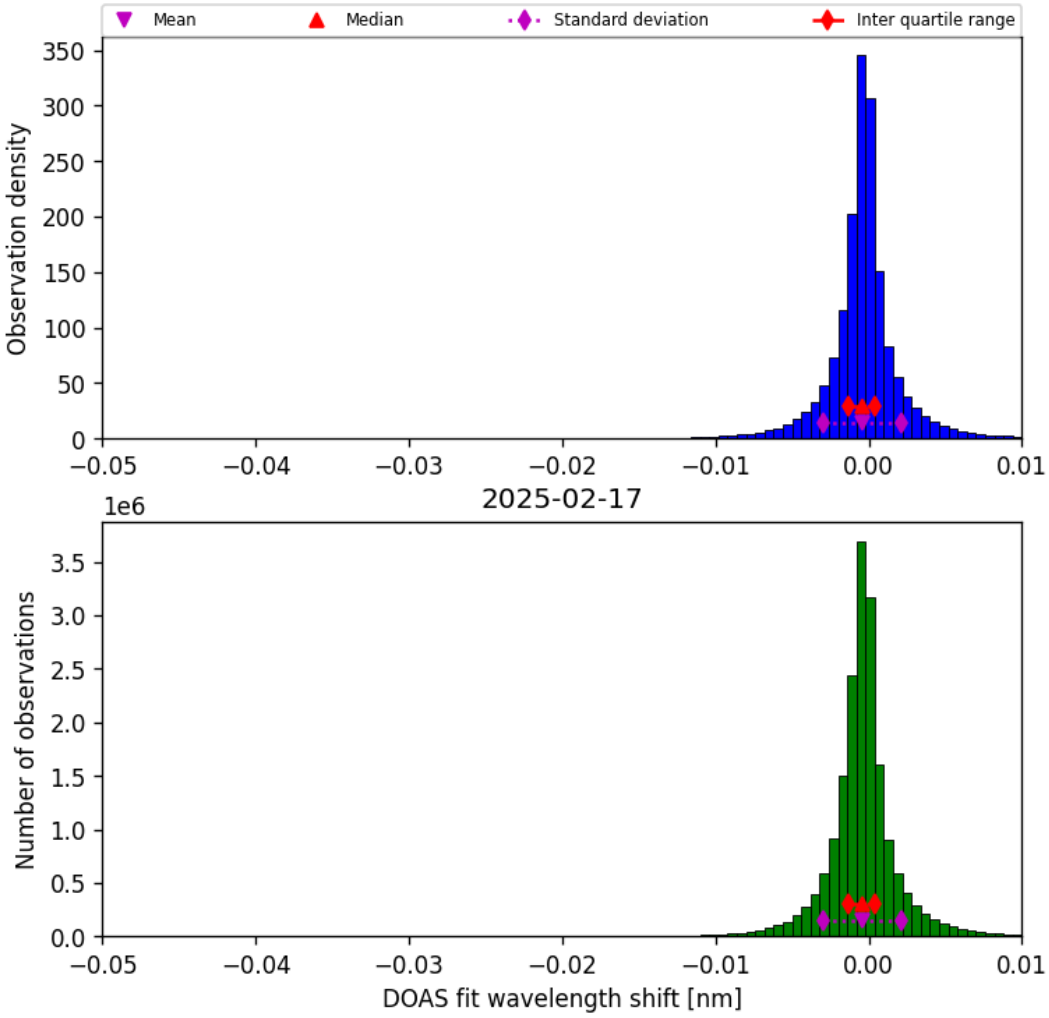

Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-02-17 to 2025-02-18

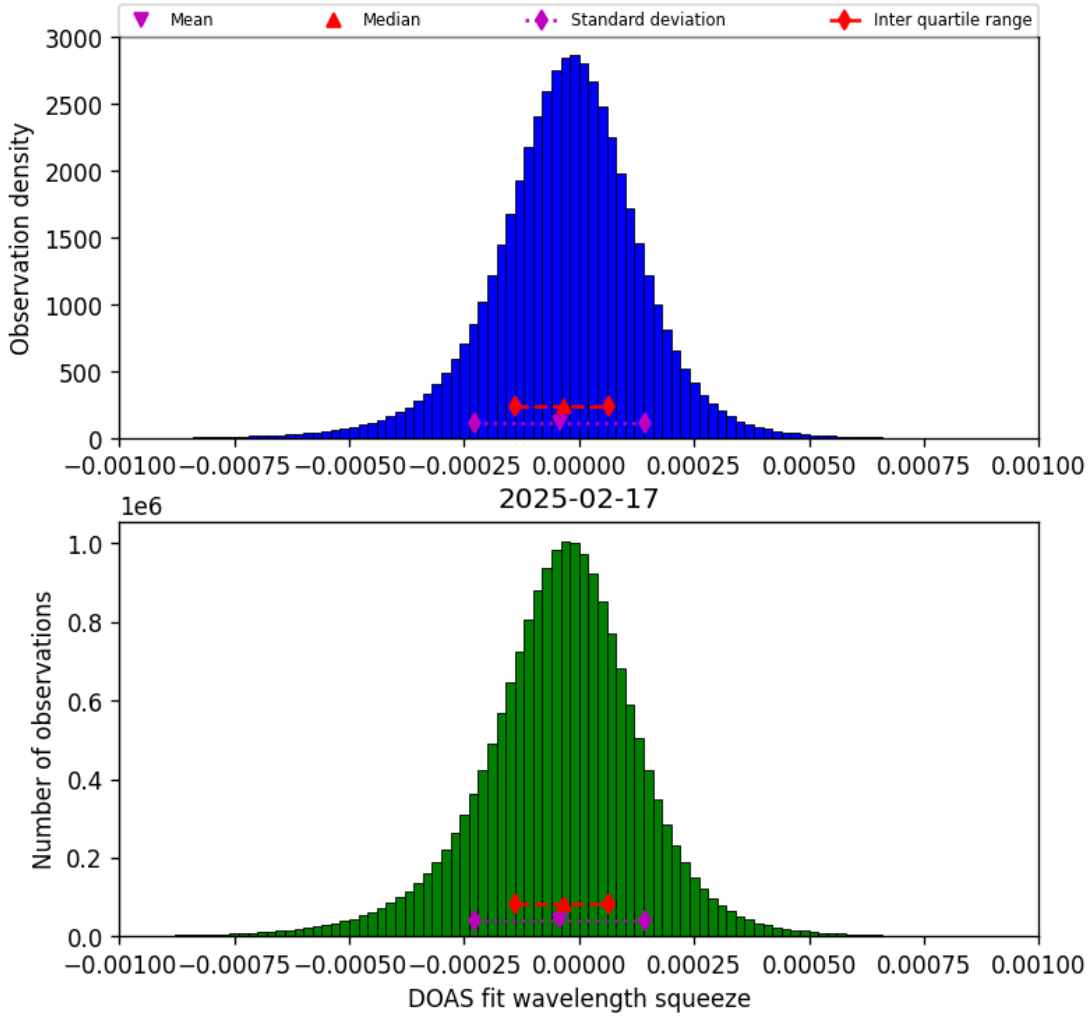

Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-02-17 to 2025-02-18

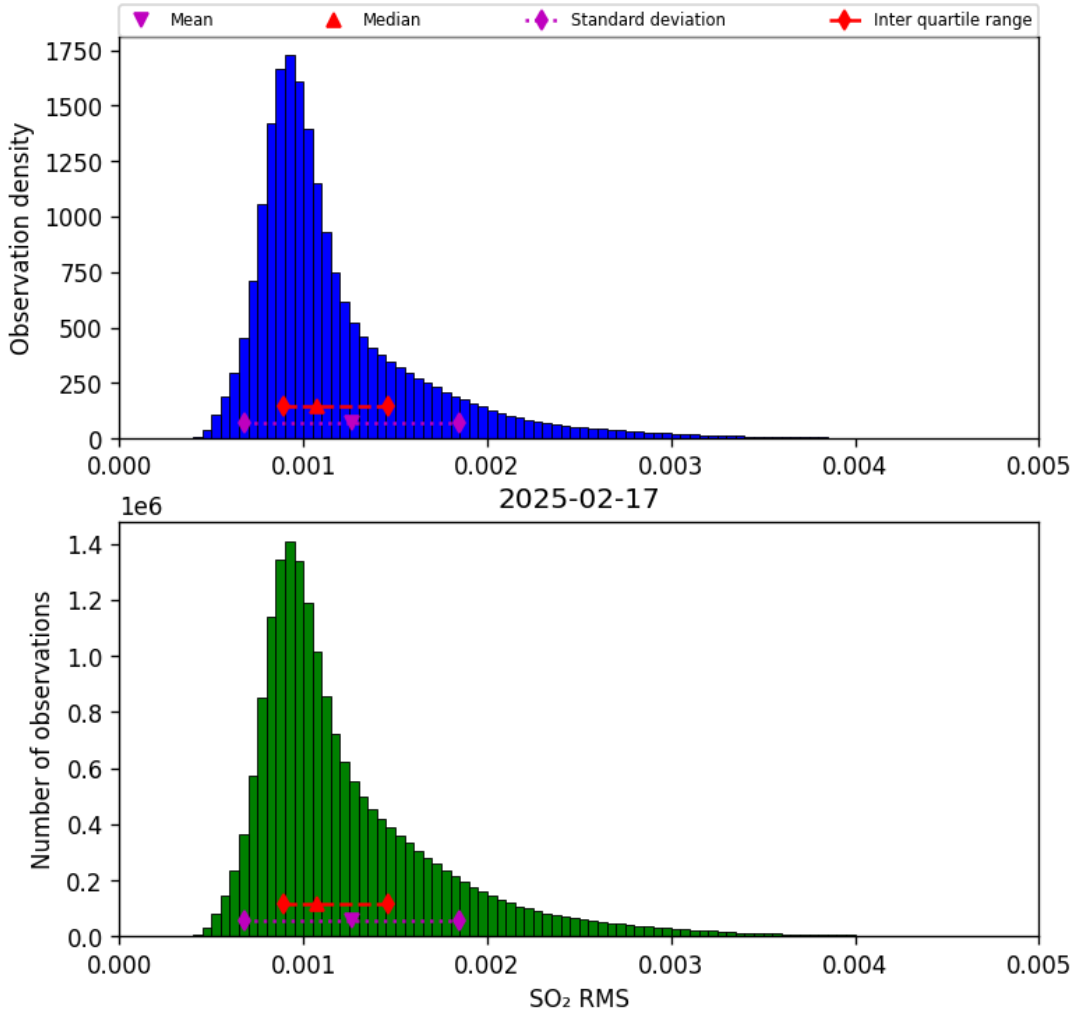

Figure 79: Histogram of "SO_2 RMS" for 2025-02-17 to 2025-02-18

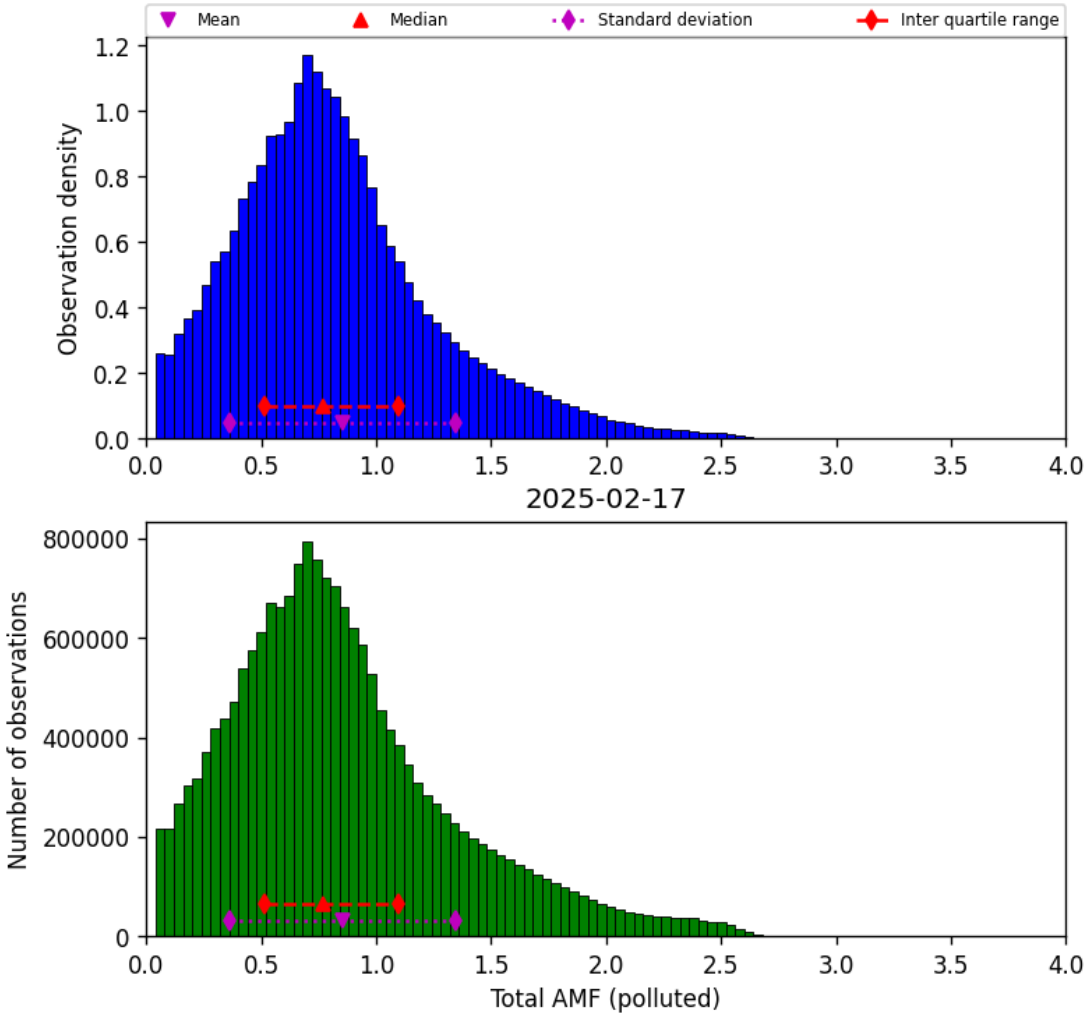

Figure 80: Histogram of “Total AMF (polluted)” for 2025-02-17 to 2025-02-18

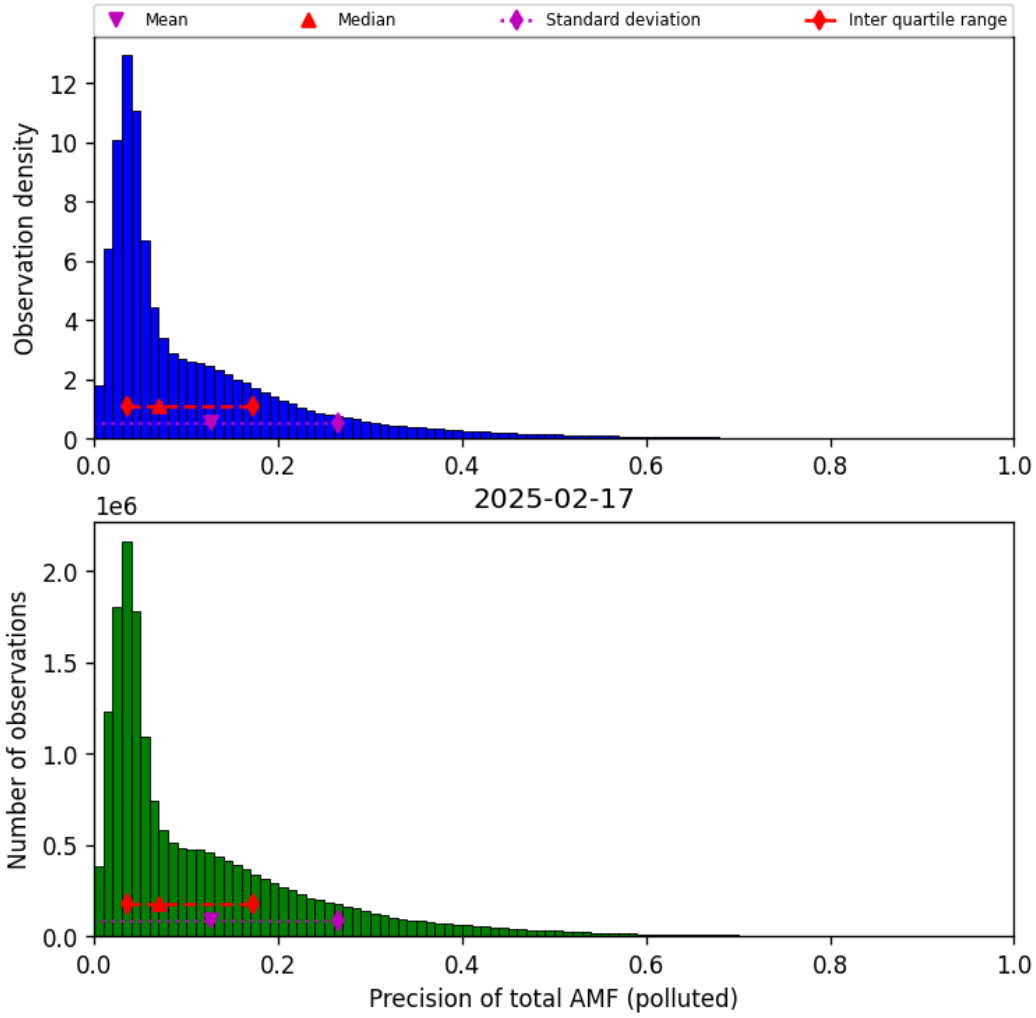

Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-02-17 to 2025-02-18

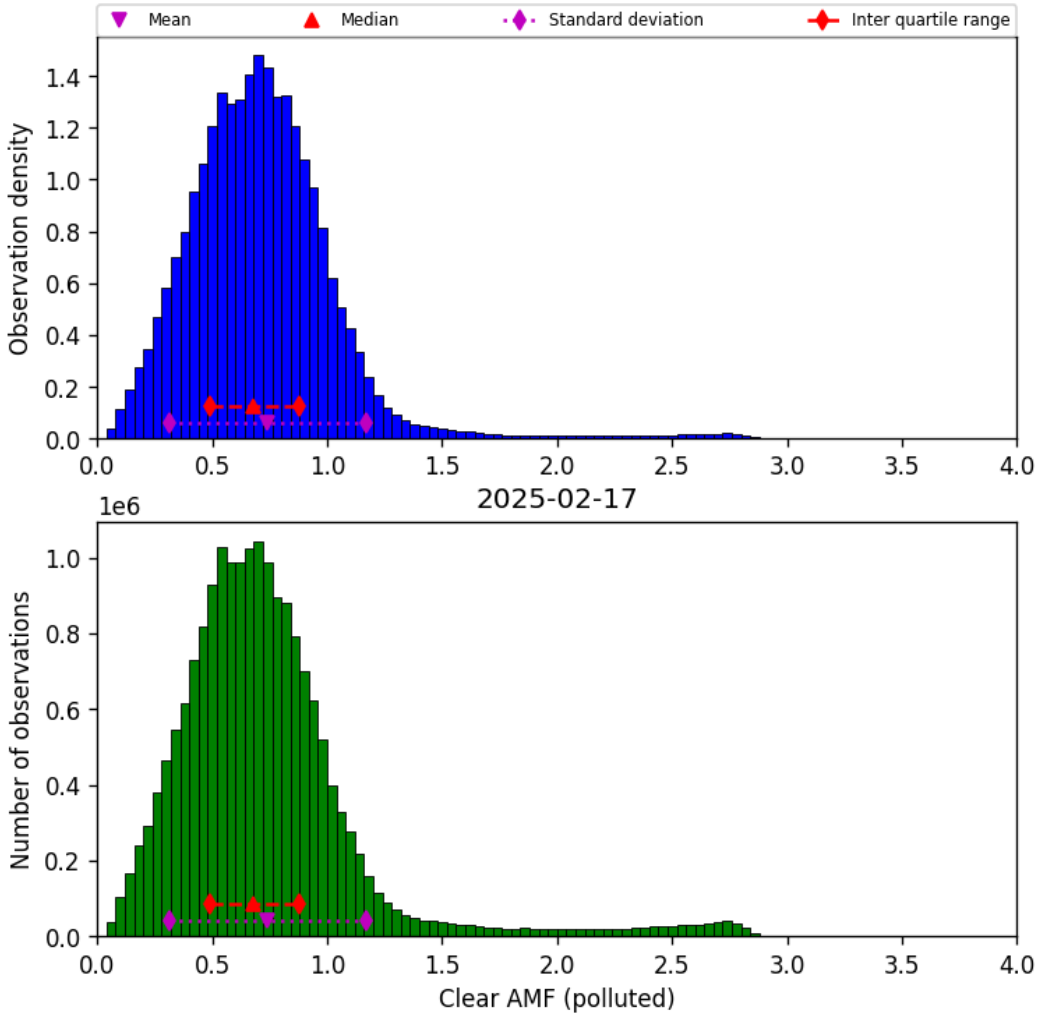

Figure 82: Histogram of “Clear AMF (polluted)” for 2025-02-17 to 2025-02-18

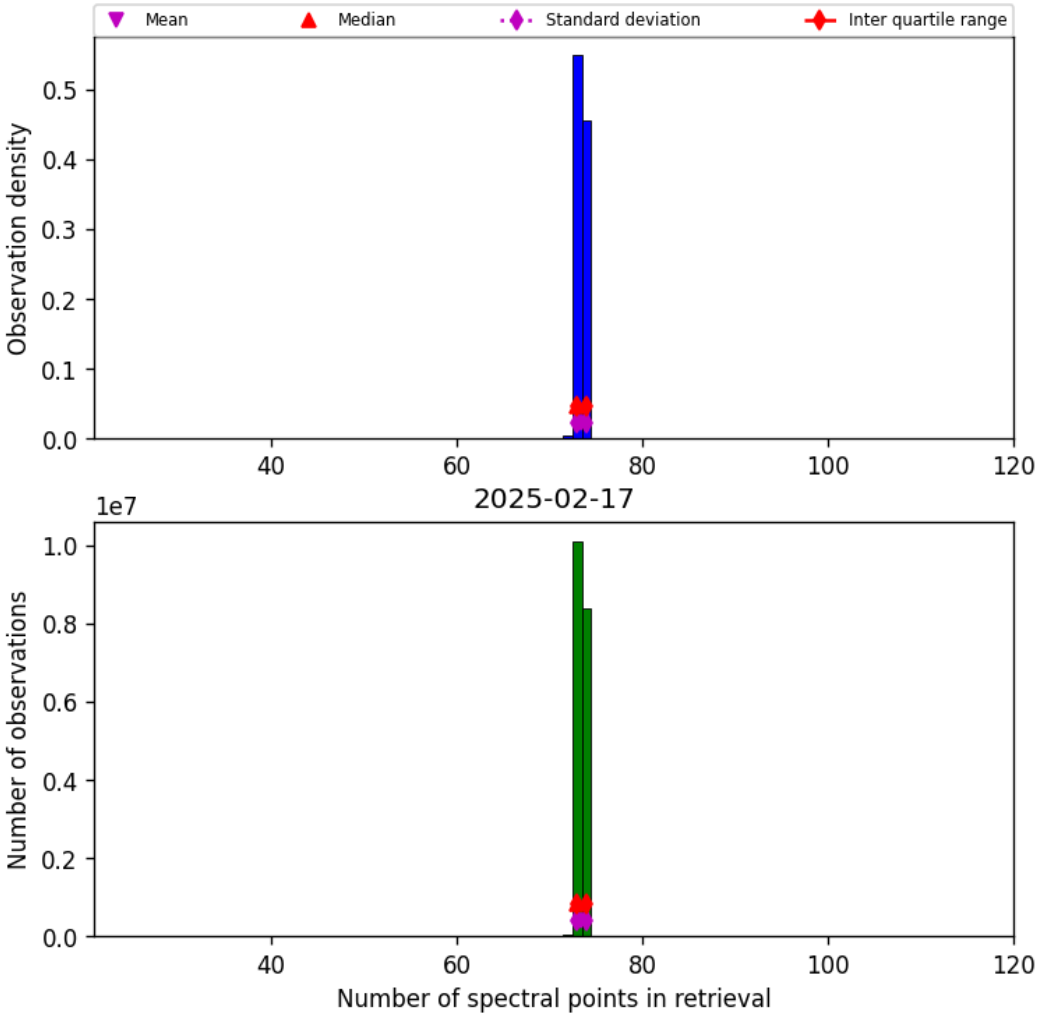

Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-02-17 to 2025-02-18

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.

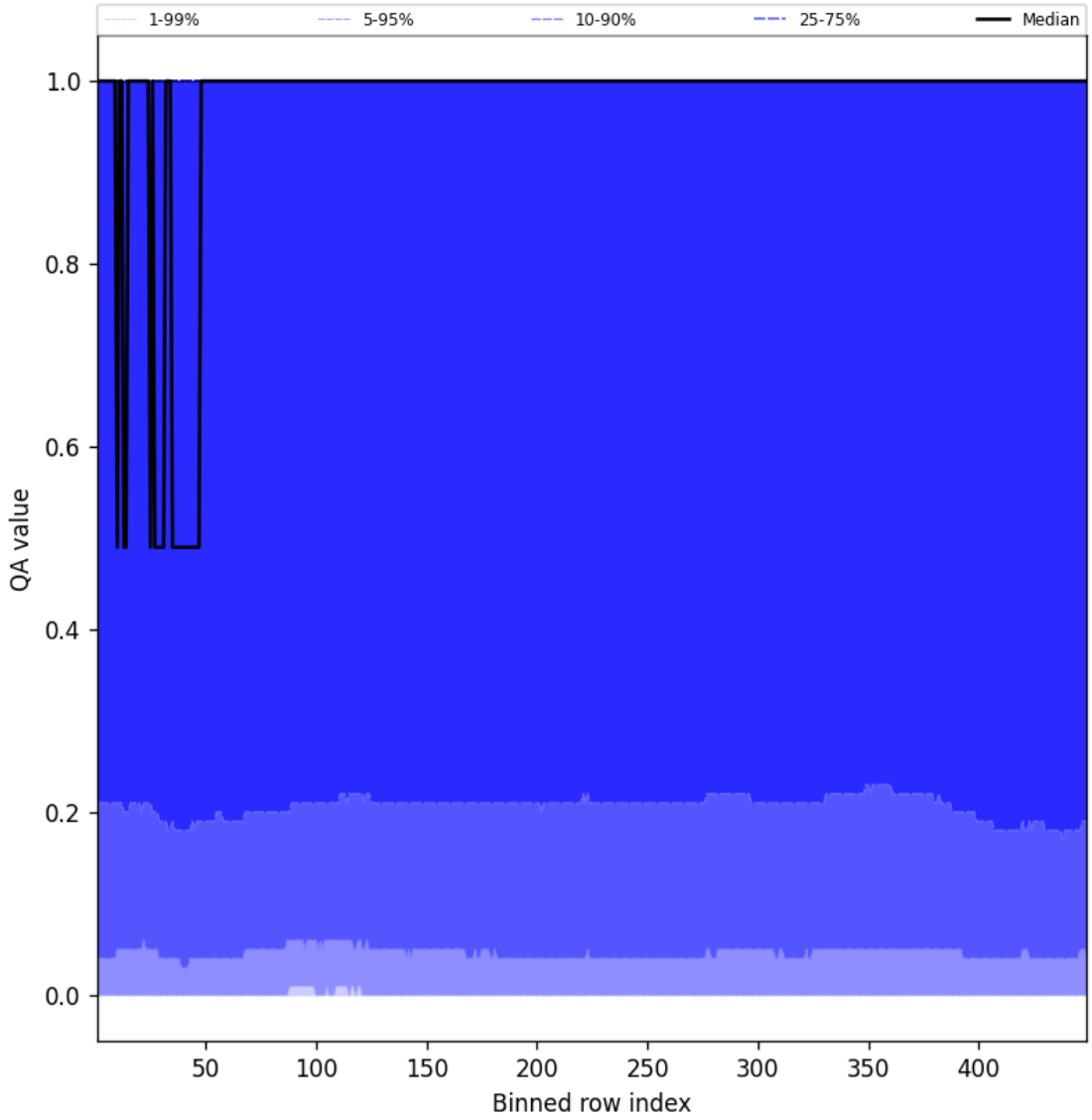

Figure 84: Along track statistics of “QA value” for 2025-02-17 to 2025-02-18

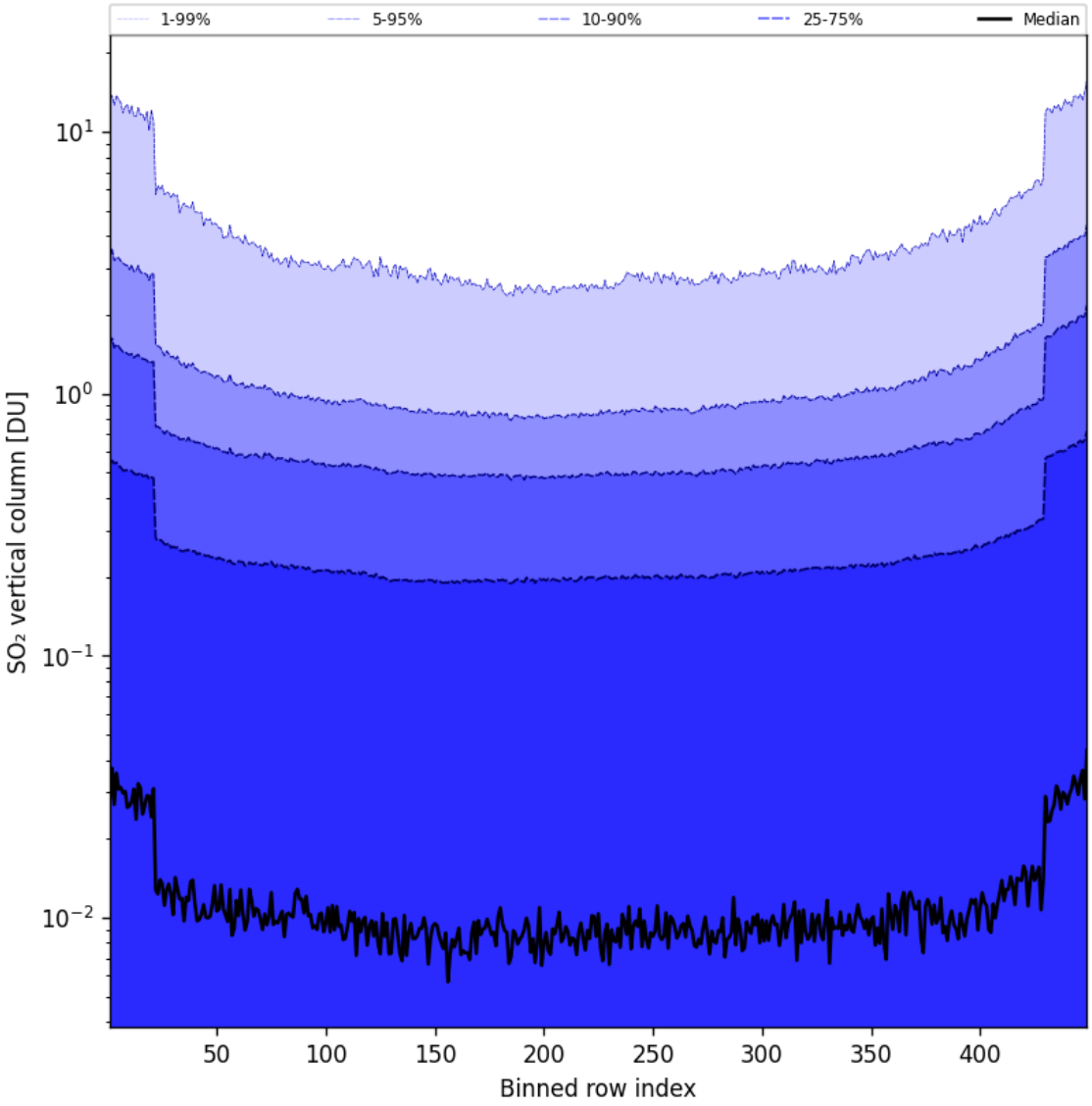

Figure 85: Along track statistics of "SO_2 vertical column" for 2025-02-17 to 2025-02-18

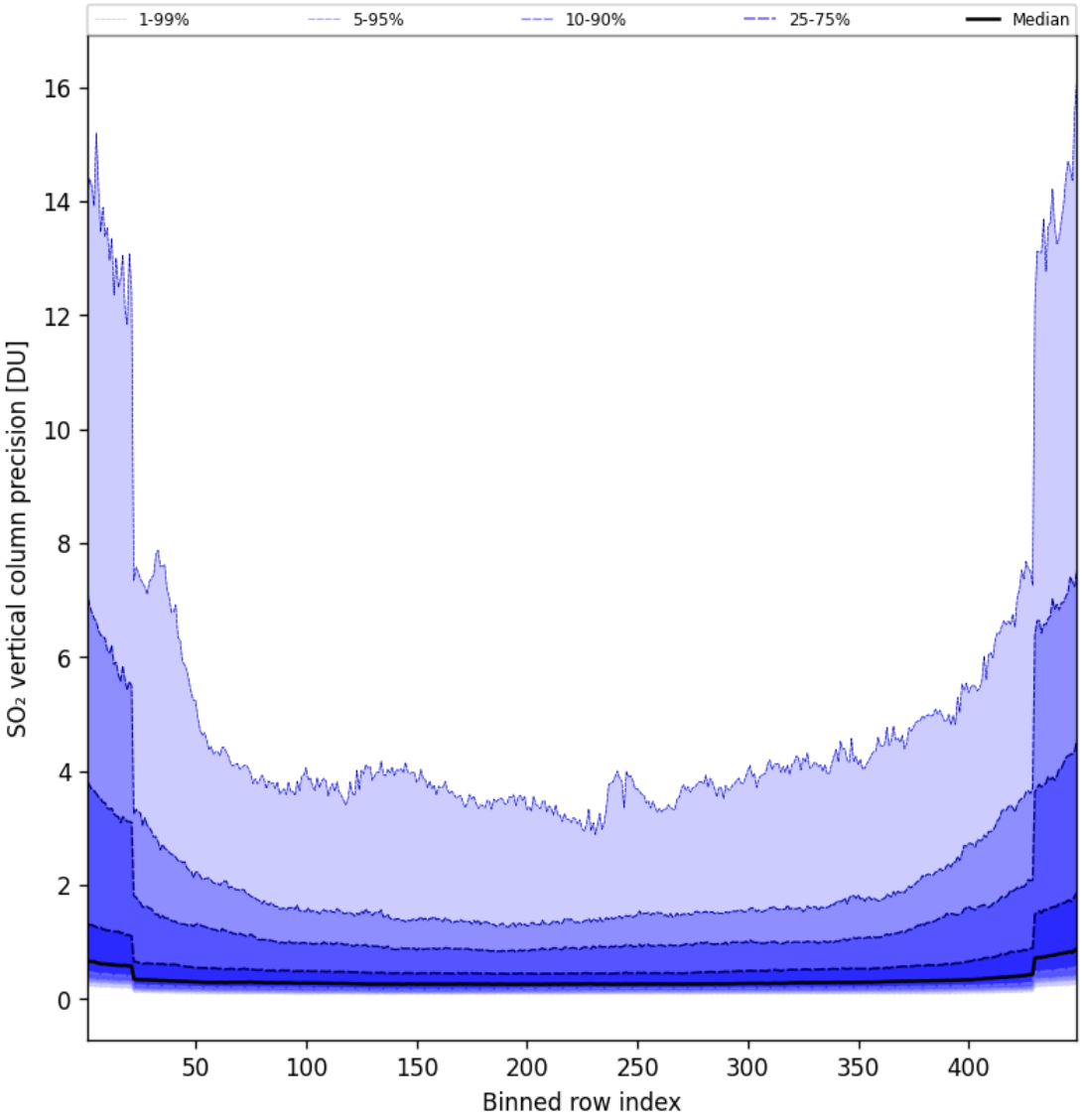

Figure 86: Along track statistics of "SO_2 vertical column precision" for 2025-02-17 to 2025-02-18

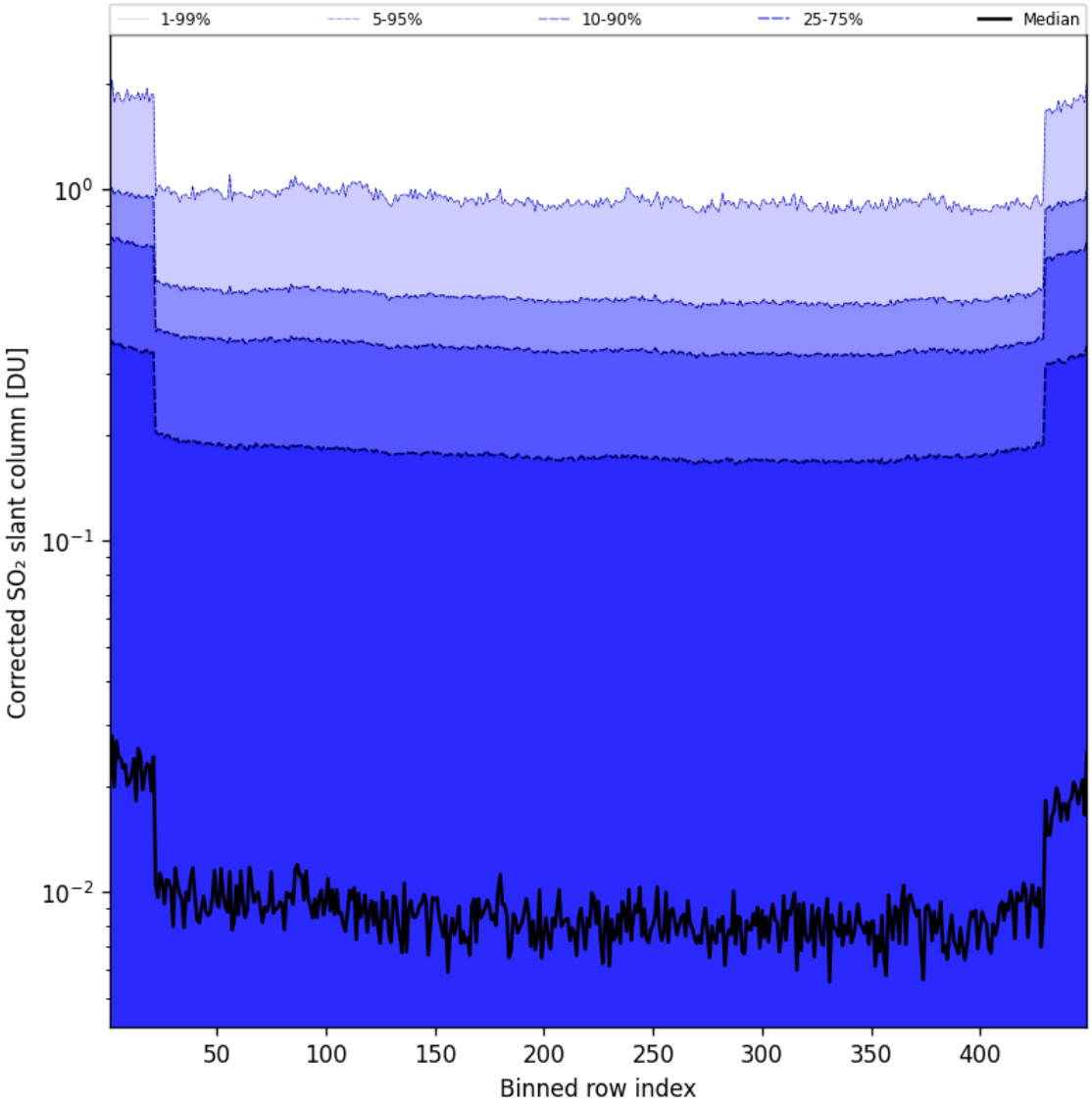

Figure 87: Along track statistics of "Corrected SO_2 slant column" for 2025-02-17 to 2025-02-18

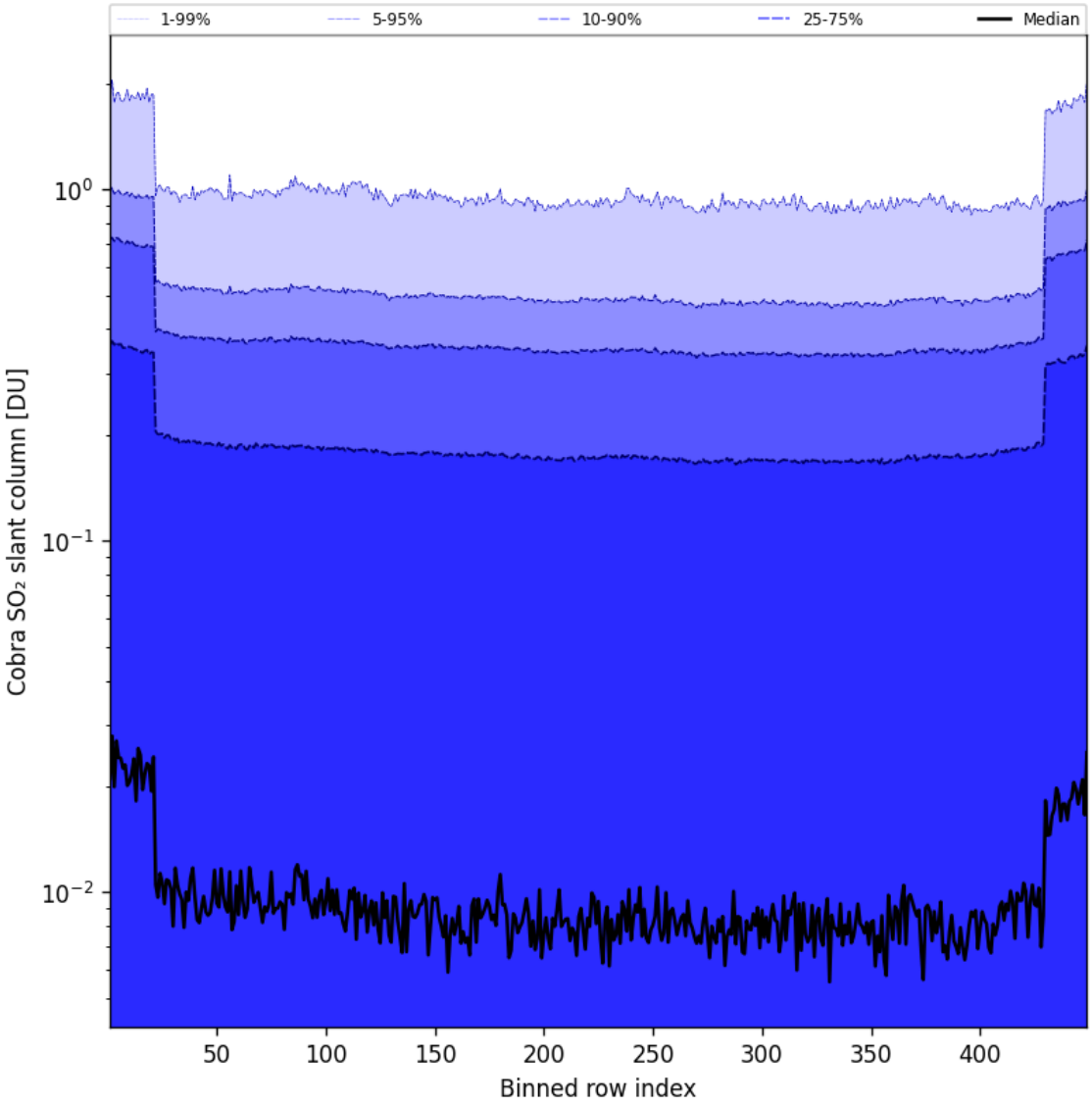

Figure 88: Along track statistics of “Cobra SO_2 slant column” for 2025-02-17 to 2025-02-18

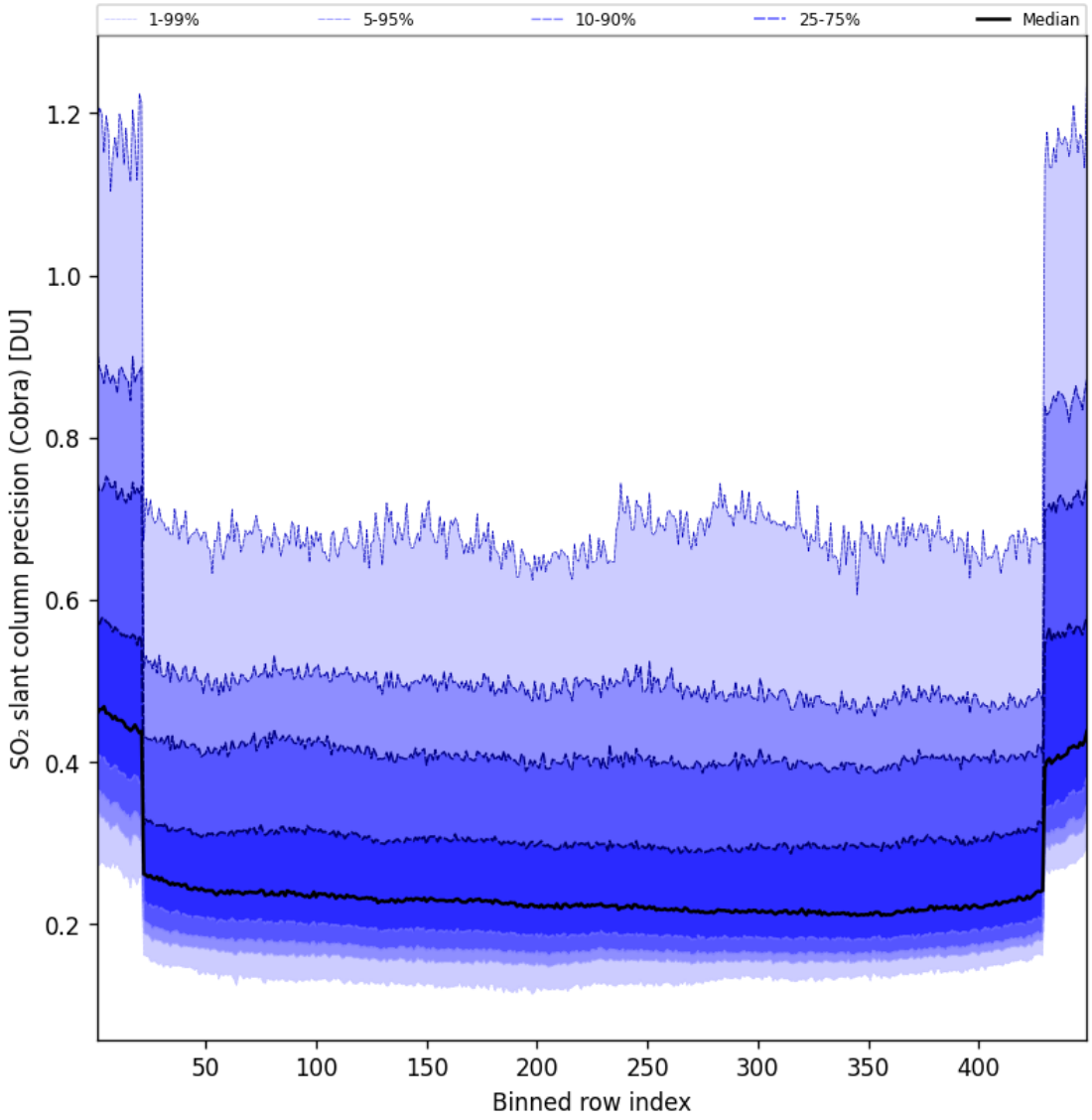

Figure 89: Along track statistics of "SO_2 slant column precision (Cobra)" for 2025-02-17 to 2025-02-18

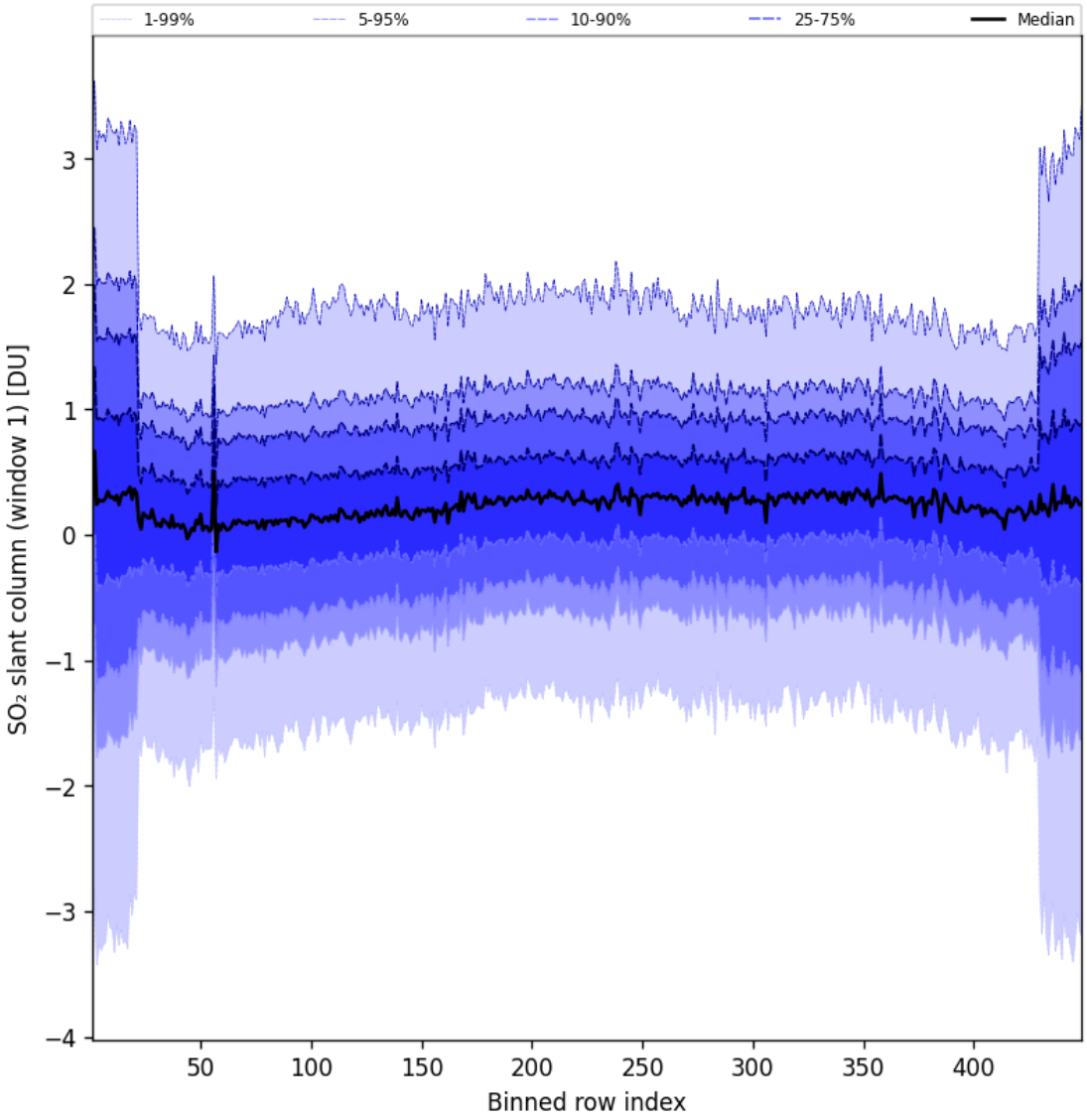

Figure 90: Along track statistics of "SO_2 slant column (window 1)" for 2025-02-17 to 2025-02-18

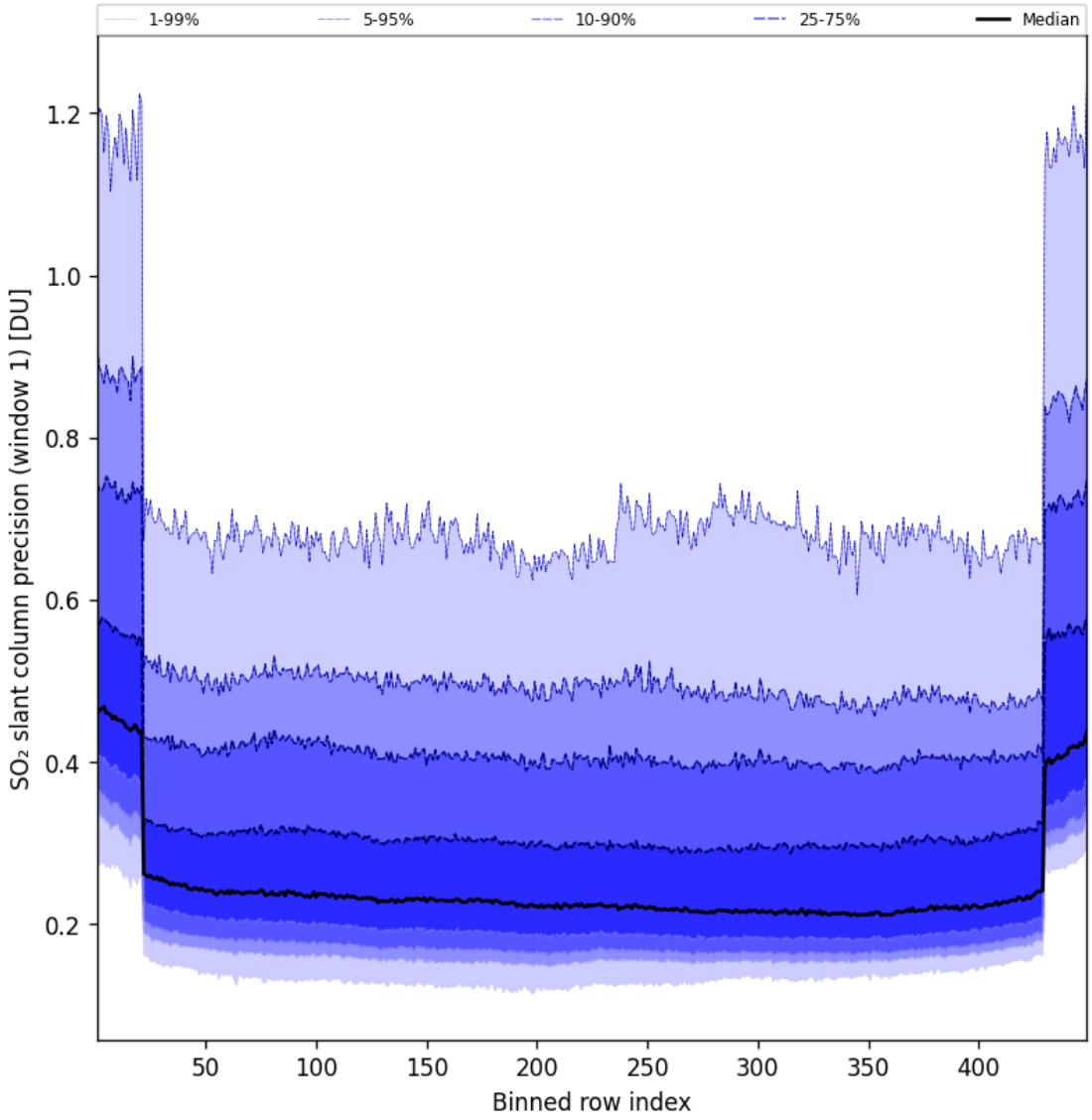

Figure 91: Along track statistics of "SO_2 slant column precision (window 1)" for 2025-02-17 to 2025-02-18

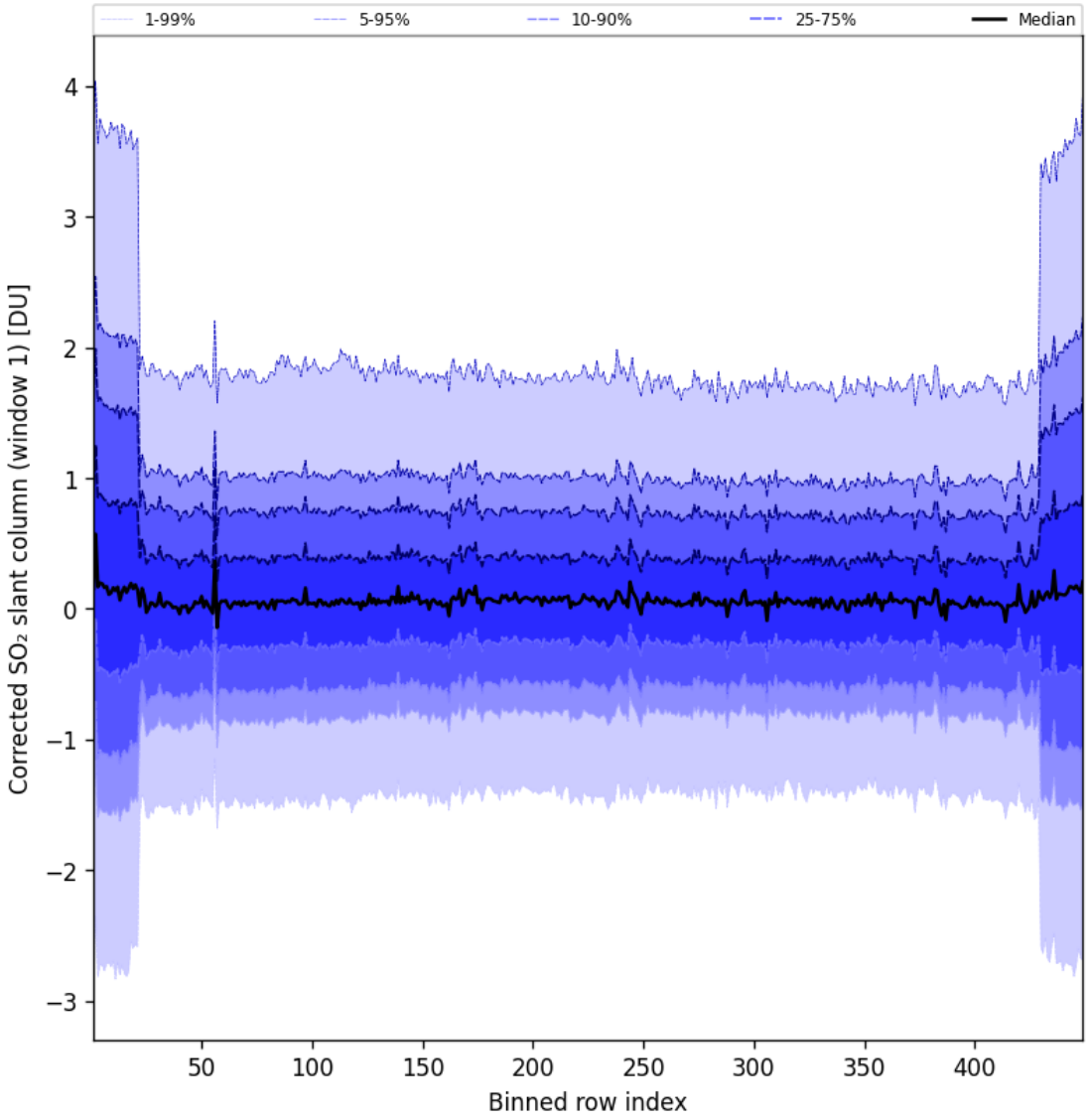

Figure 92: Along track statistics of “Corrected SO_2 slant column (window 1)” for 2025-02-17 to 2025-02-18

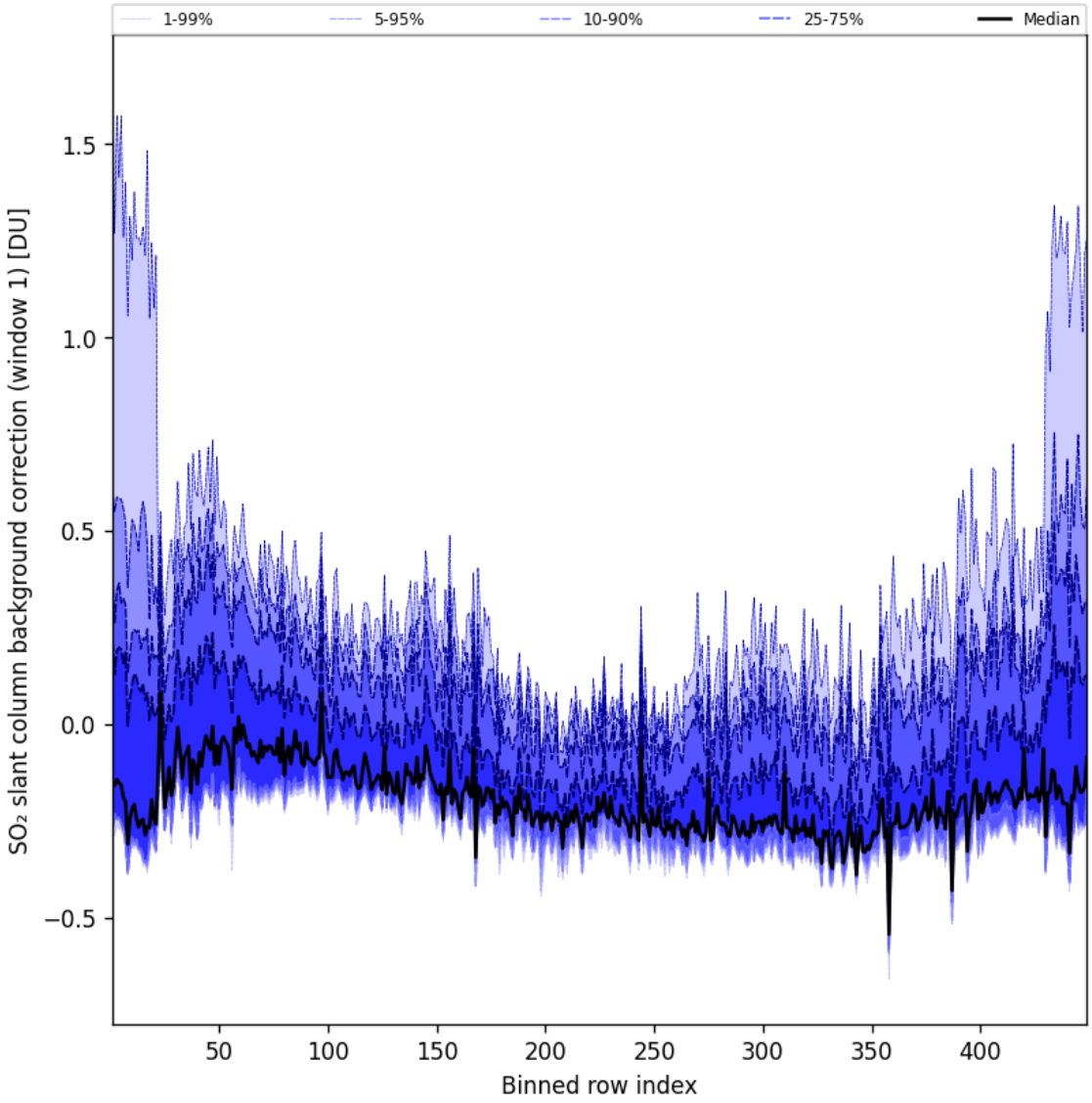

Figure 93: Along track statistics of "SO_2 slant column background correction (window 1)" for 2025-02-17 to 2025-02-18

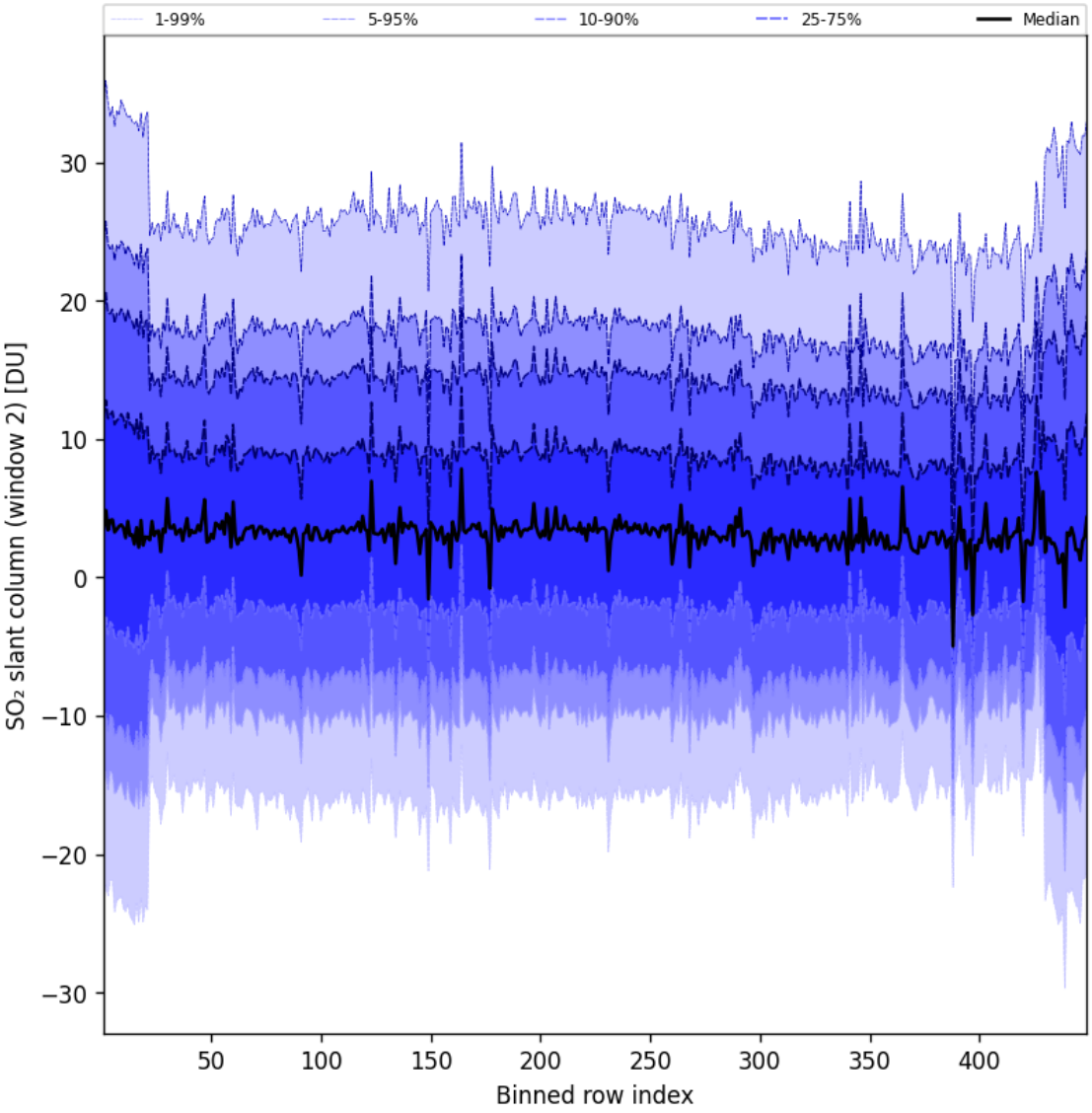

Figure 94: Along track statistics of "SO_2 slant column (window 2)" for 2025-02-17 to 2025-02-18

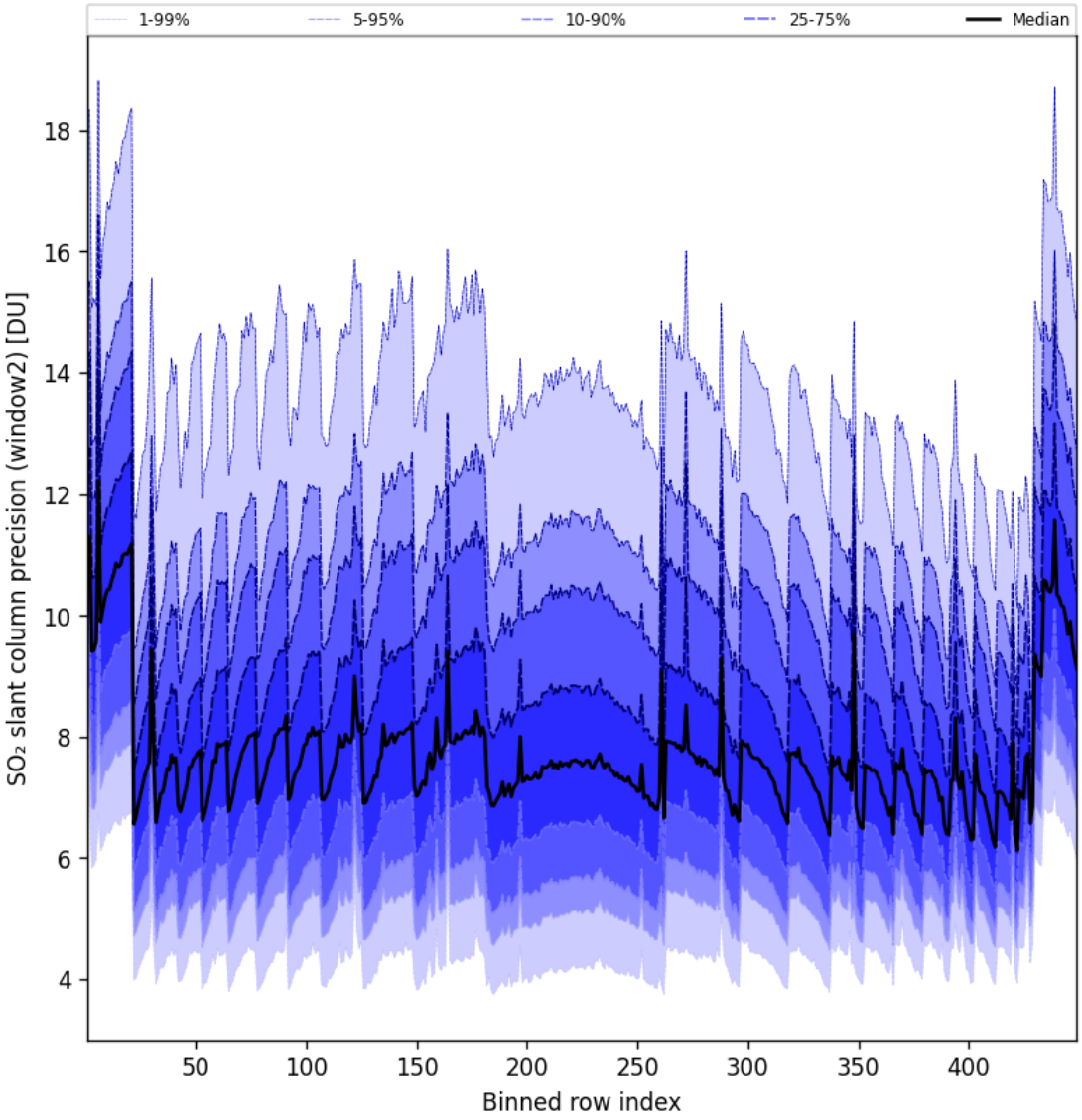

Figure 95: Along track statistics of "SO_2 slant column precision (window2)" for 2025-02-17 to 2025-02-18

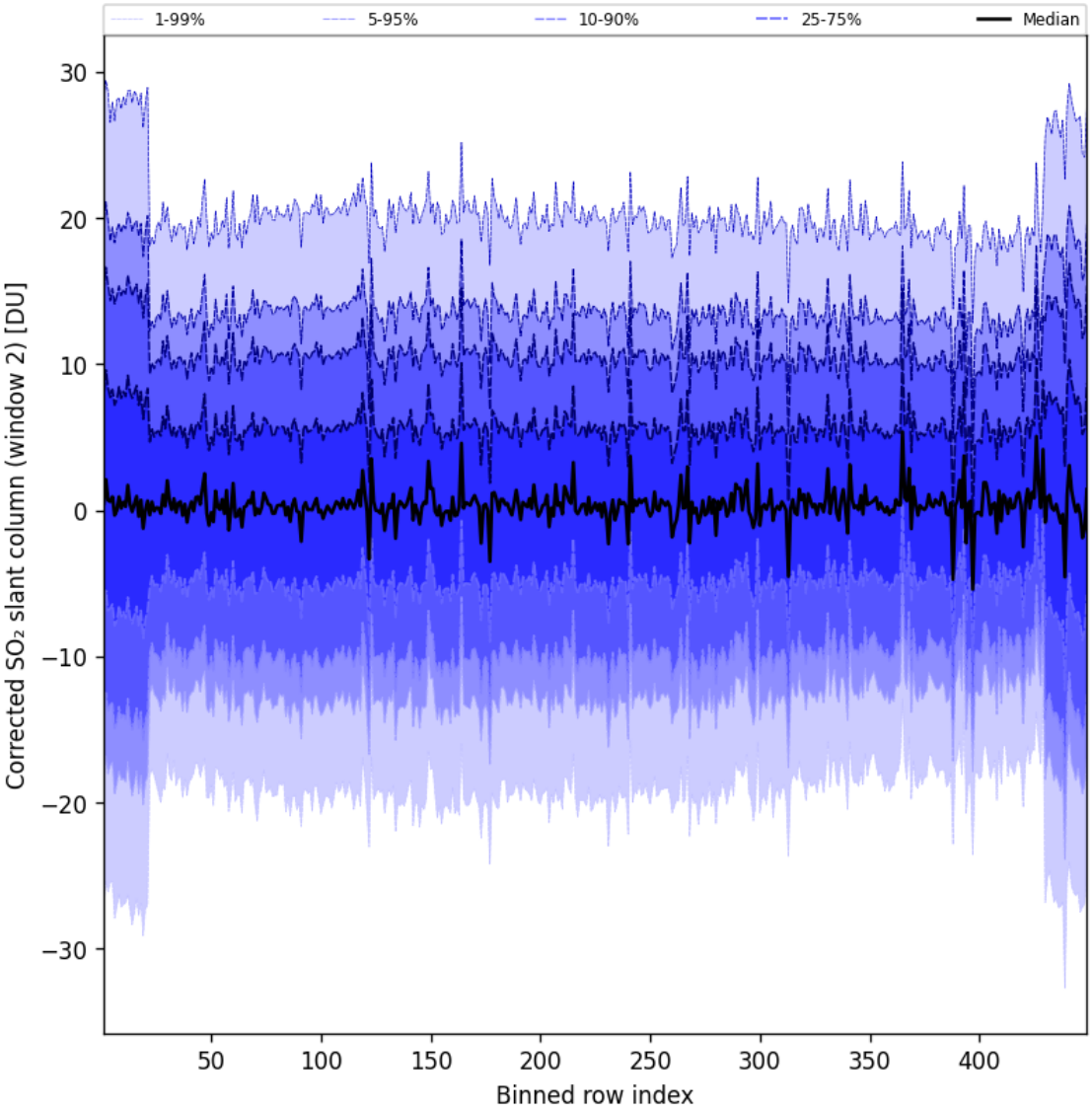

Figure 96: Along track statistics of “Corrected SO_2 slant column (window 2)” for 2025-02-17 to 2025-02-18

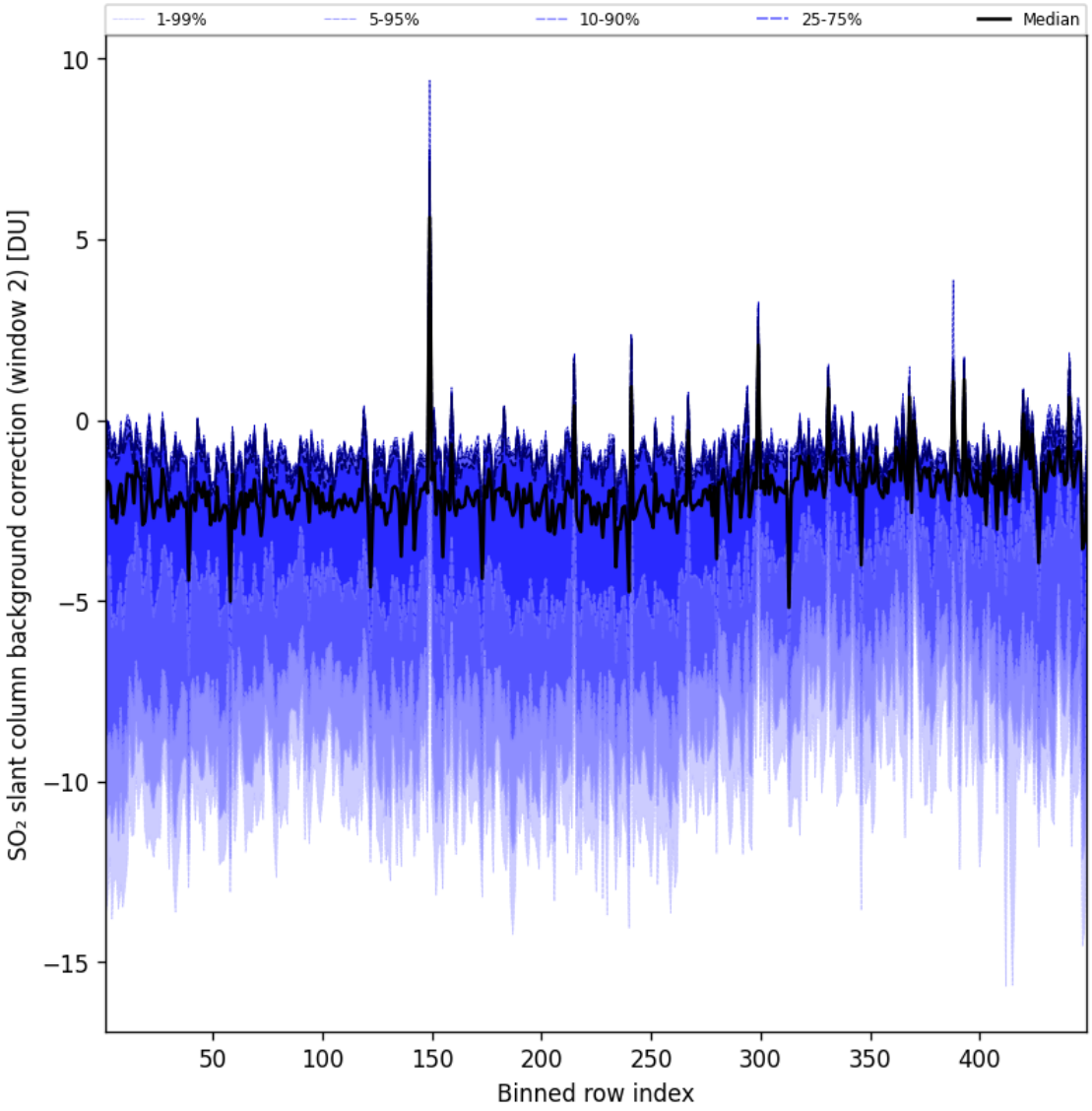

Figure 97: Along track statistics of "SO_2 slant column background correction (window 2)" for 2025-02-17 to 2025-02-18

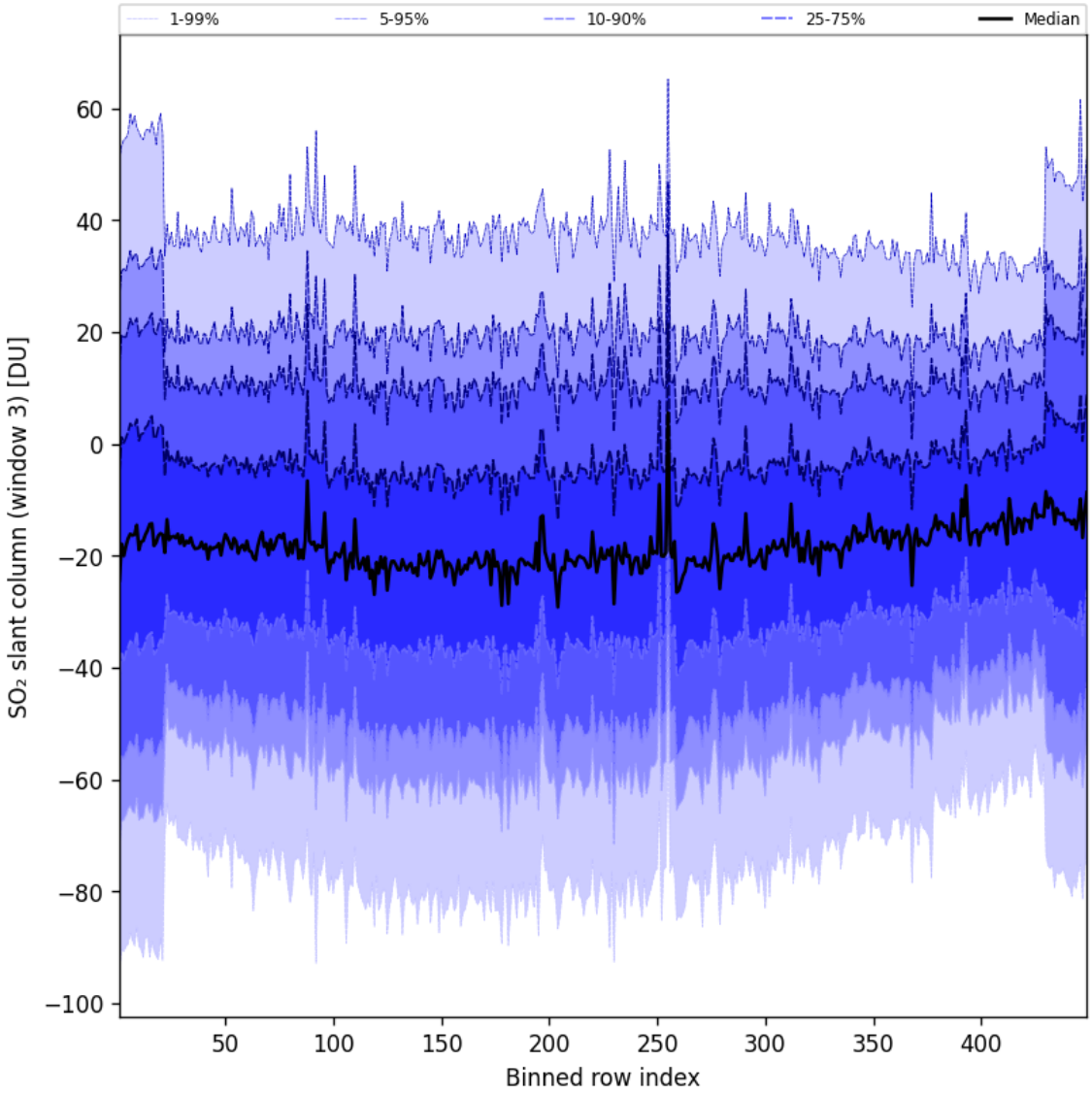

Figure 98: Along track statistics of "SO_2 slant column (window 3)" for 2025-02-17 to 2025-02-18

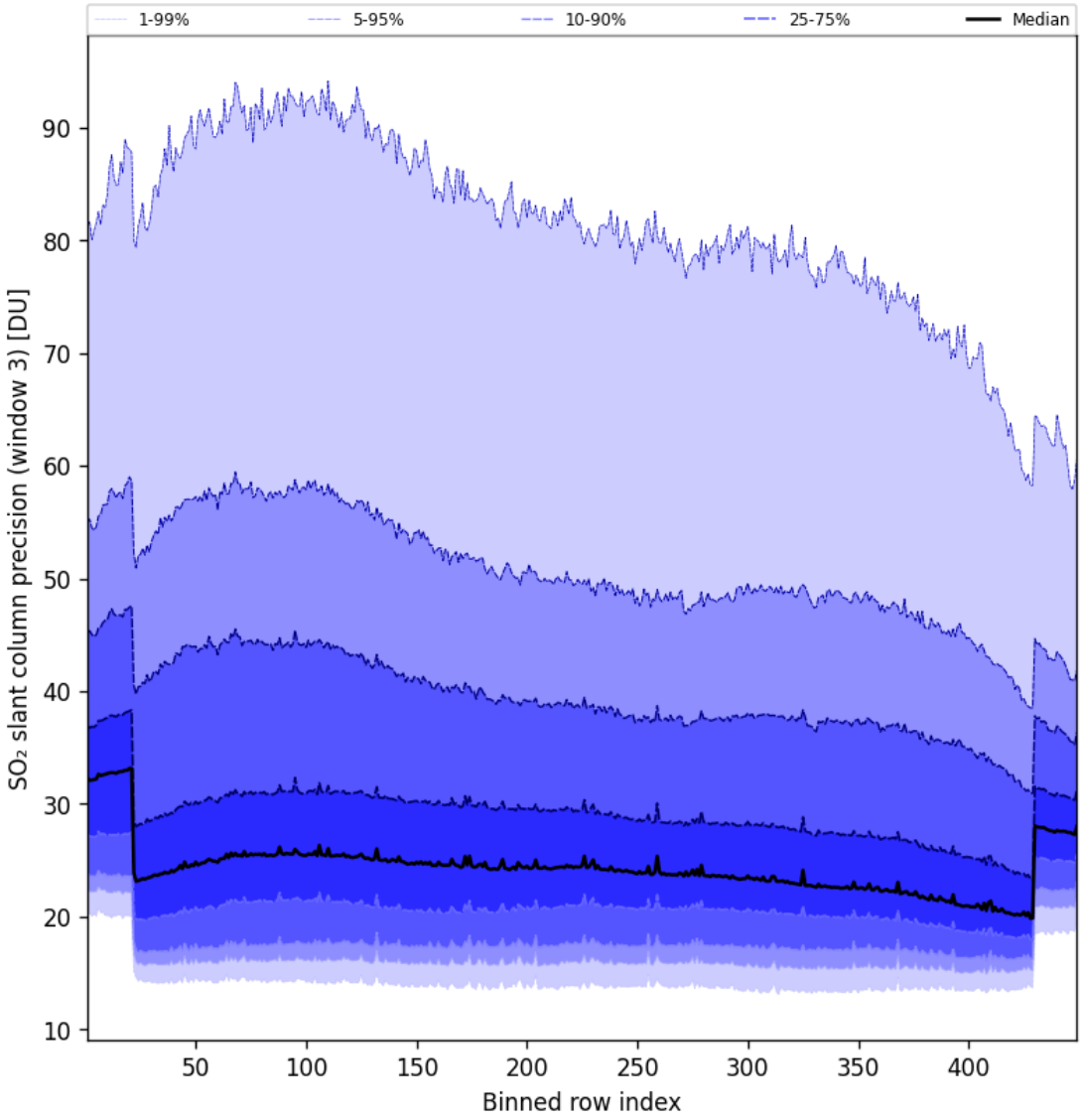

Figure 99: Along track statistics of "SO_2 slant column precision (window 3)" for 2025-02-17 to 2025-02-18

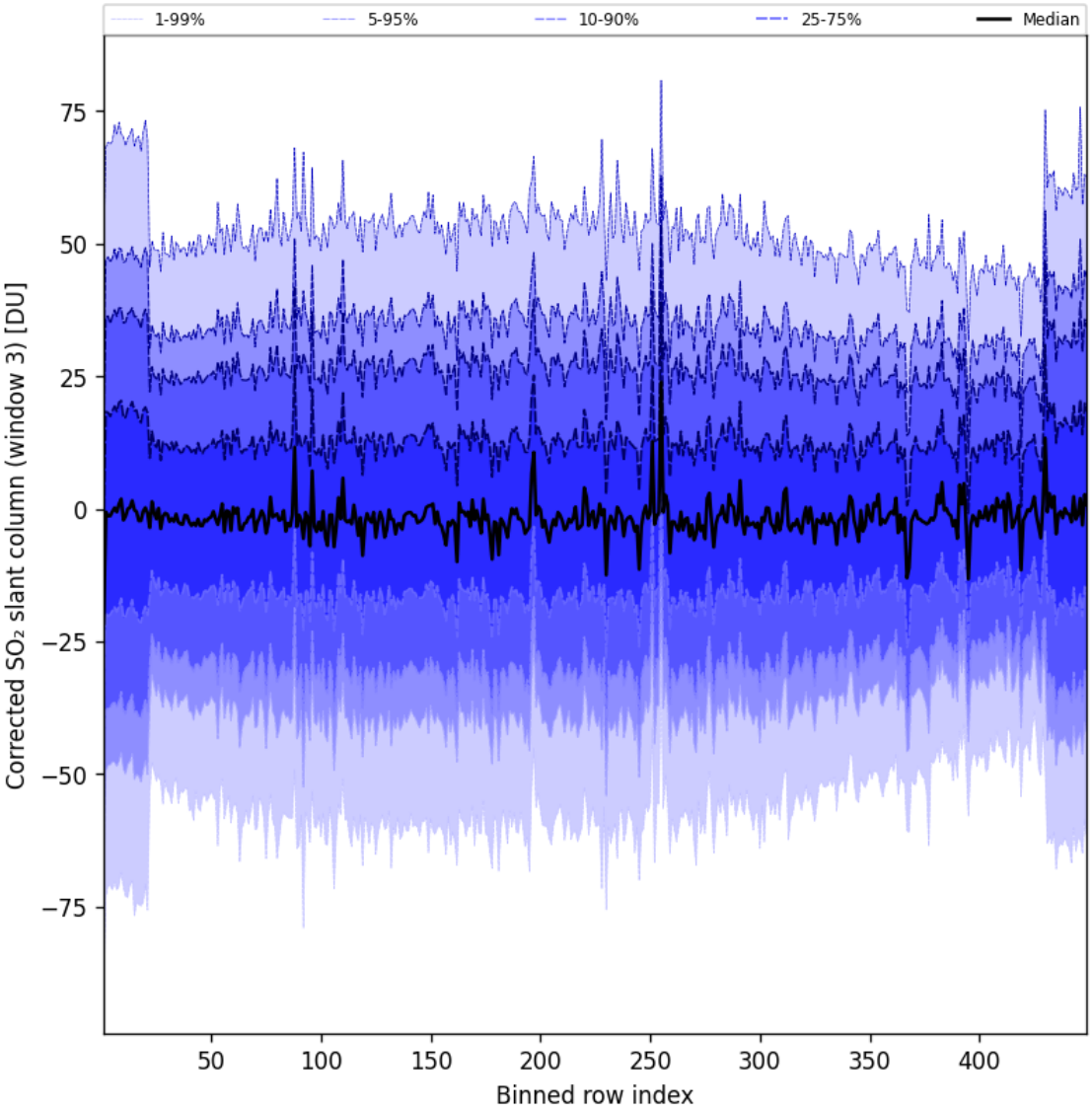

Figure 100: Along track statistics of “Corrected SO_2 slant column (window 3)” for 2025-02-17 to 2025-02-18

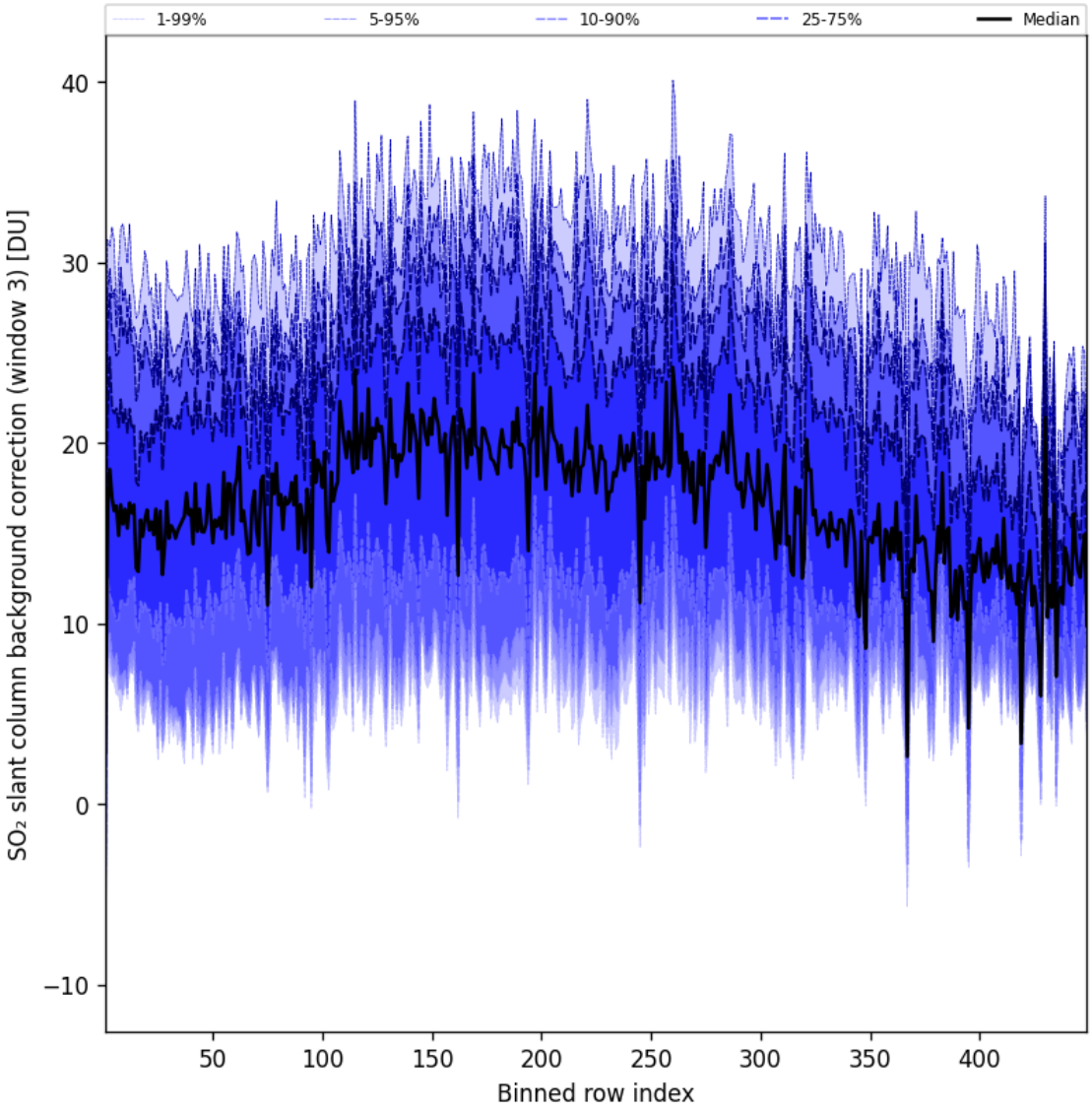

Figure 101: Along track statistics of "SO_2 slant column background correction (window 3)" for 2025-02-17 to 2025-02-18

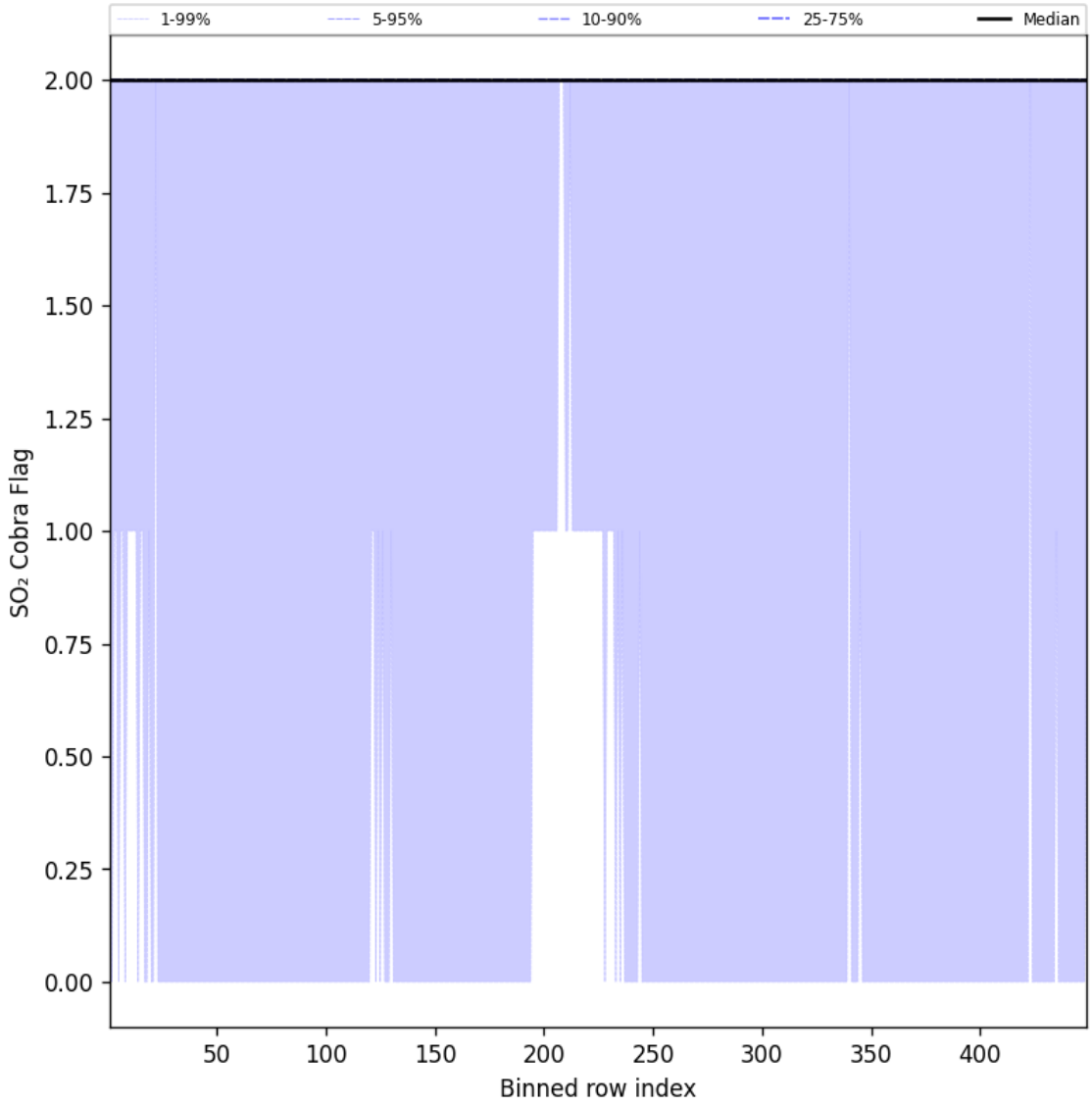

Figure 102: Along track statistics of "SO_2 Cobra Flag" for 2025-02-17 to 2025-02-18

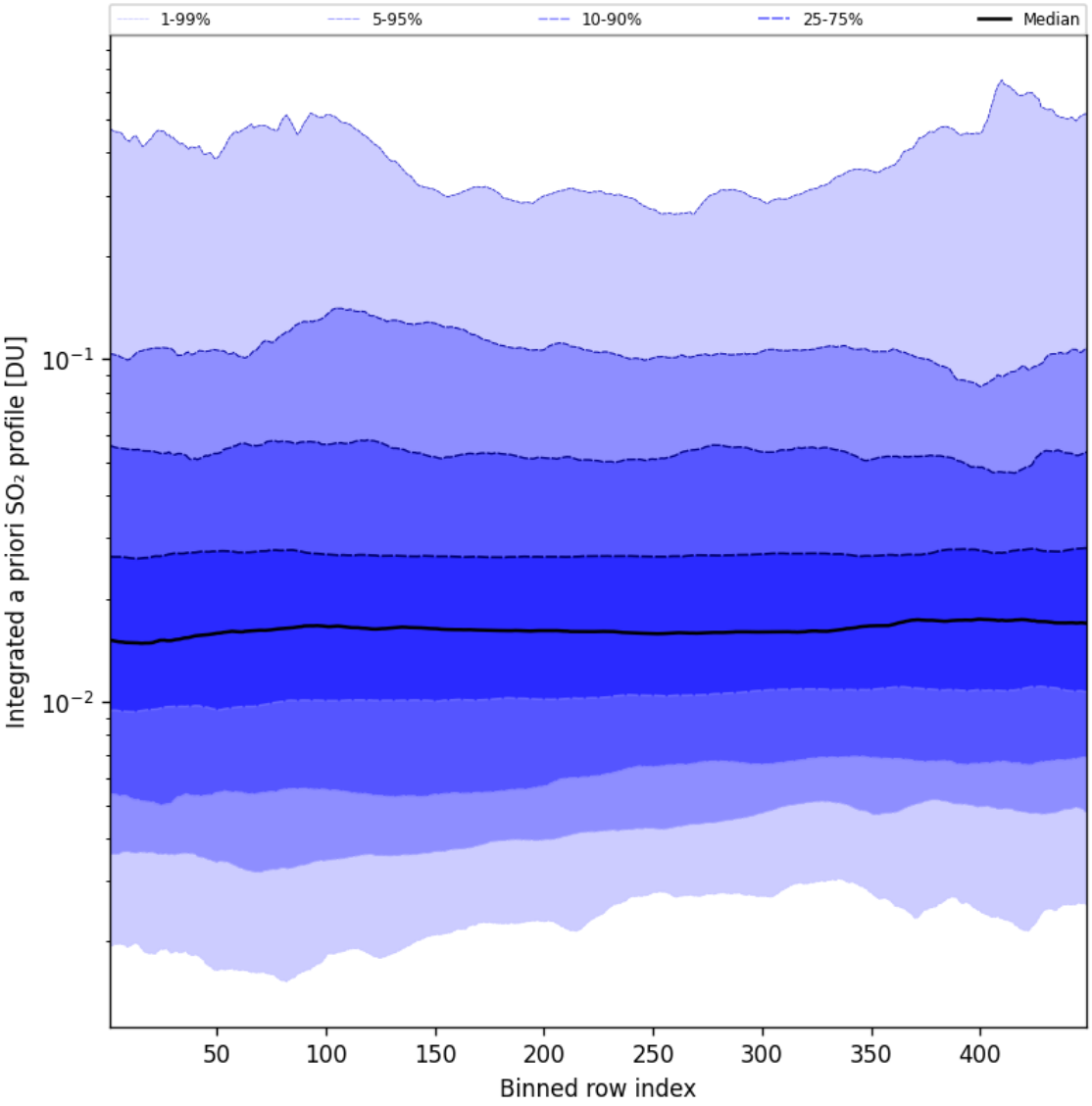

Figure 103: Along track statistics of “Integrated a priori SO_2 profile” for 2025-02-17 to 2025-02-18

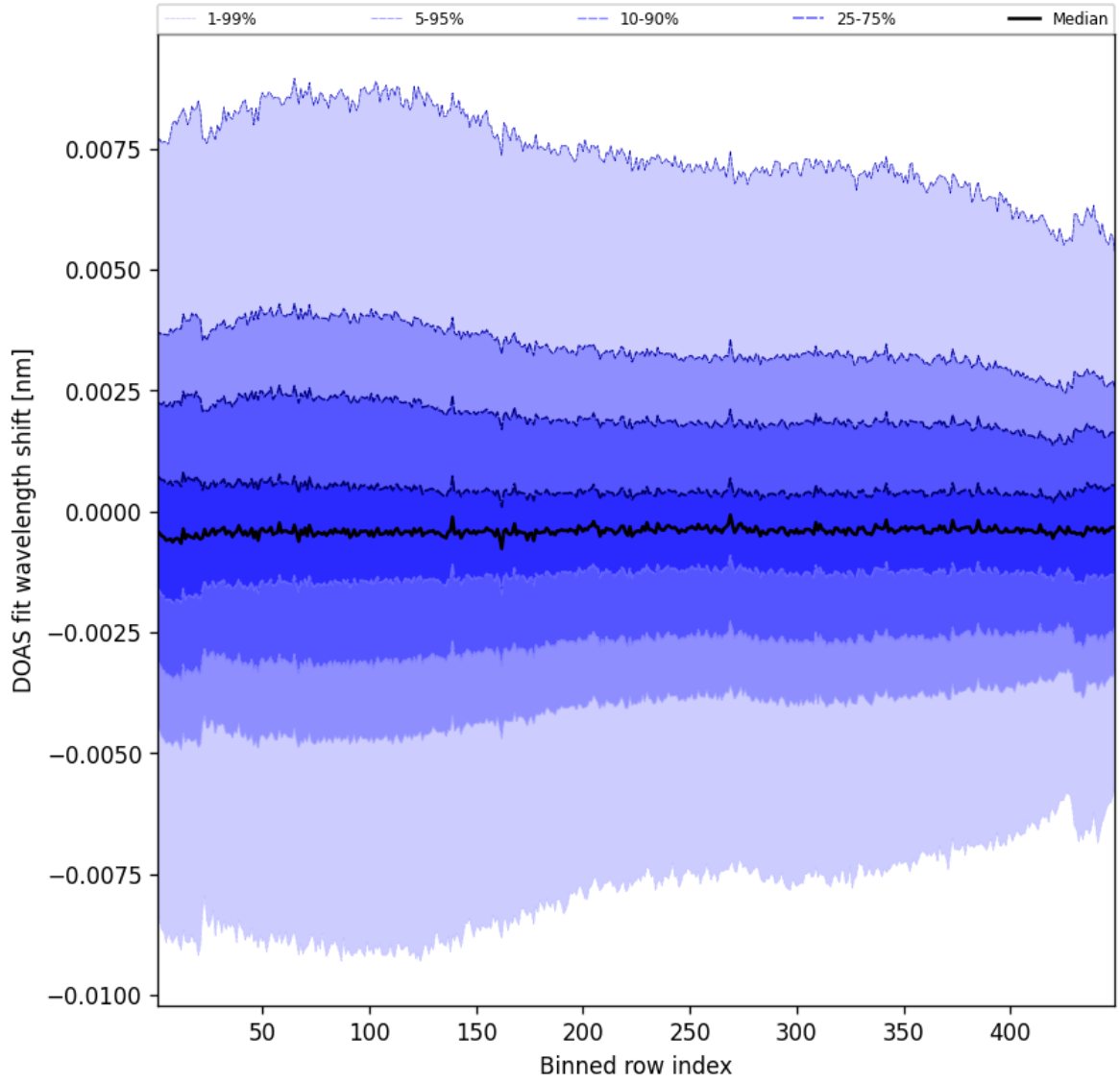

Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2025-02-17 to 2025-02-18

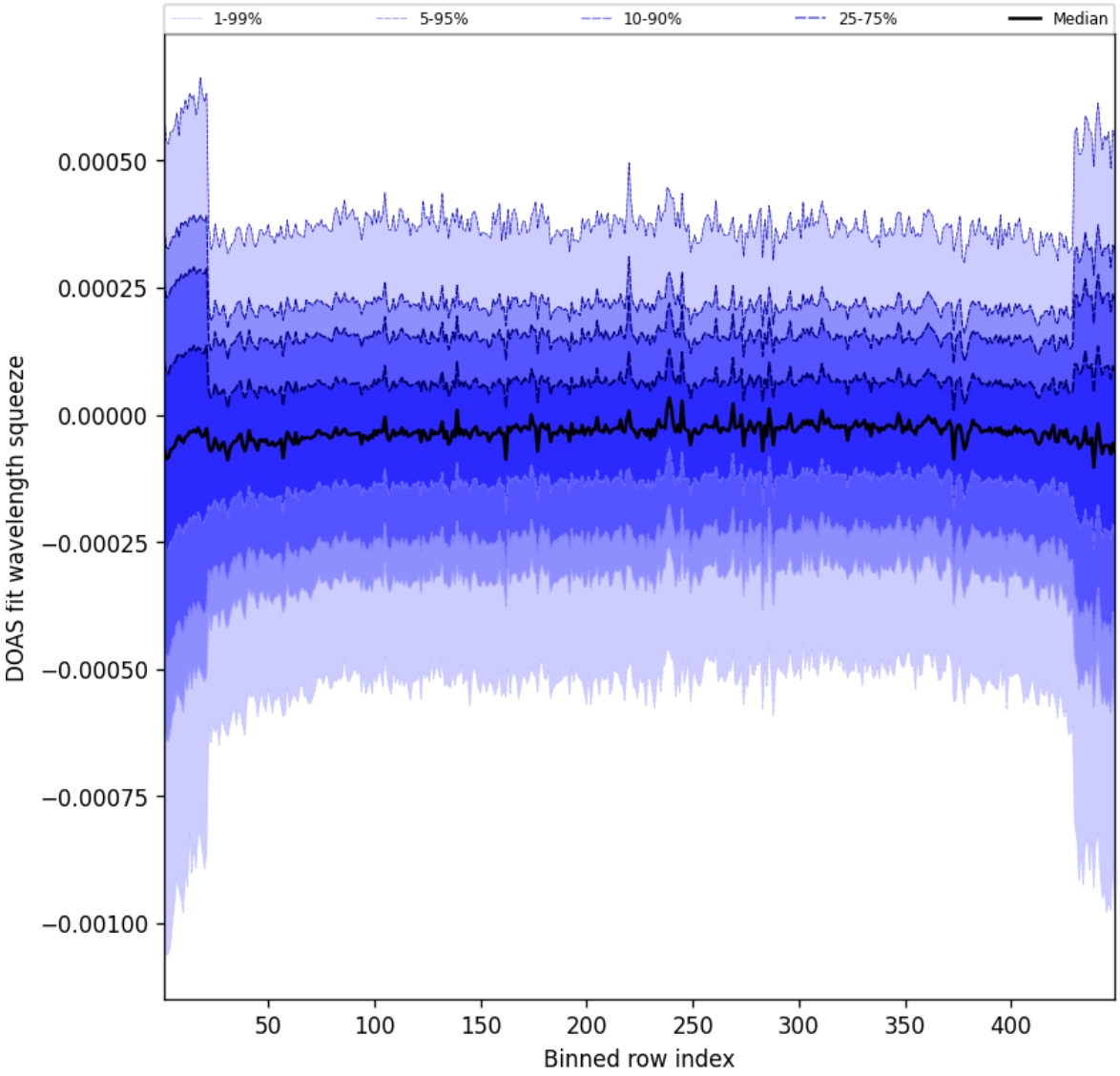

Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2025-02-17 to 2025-02-18

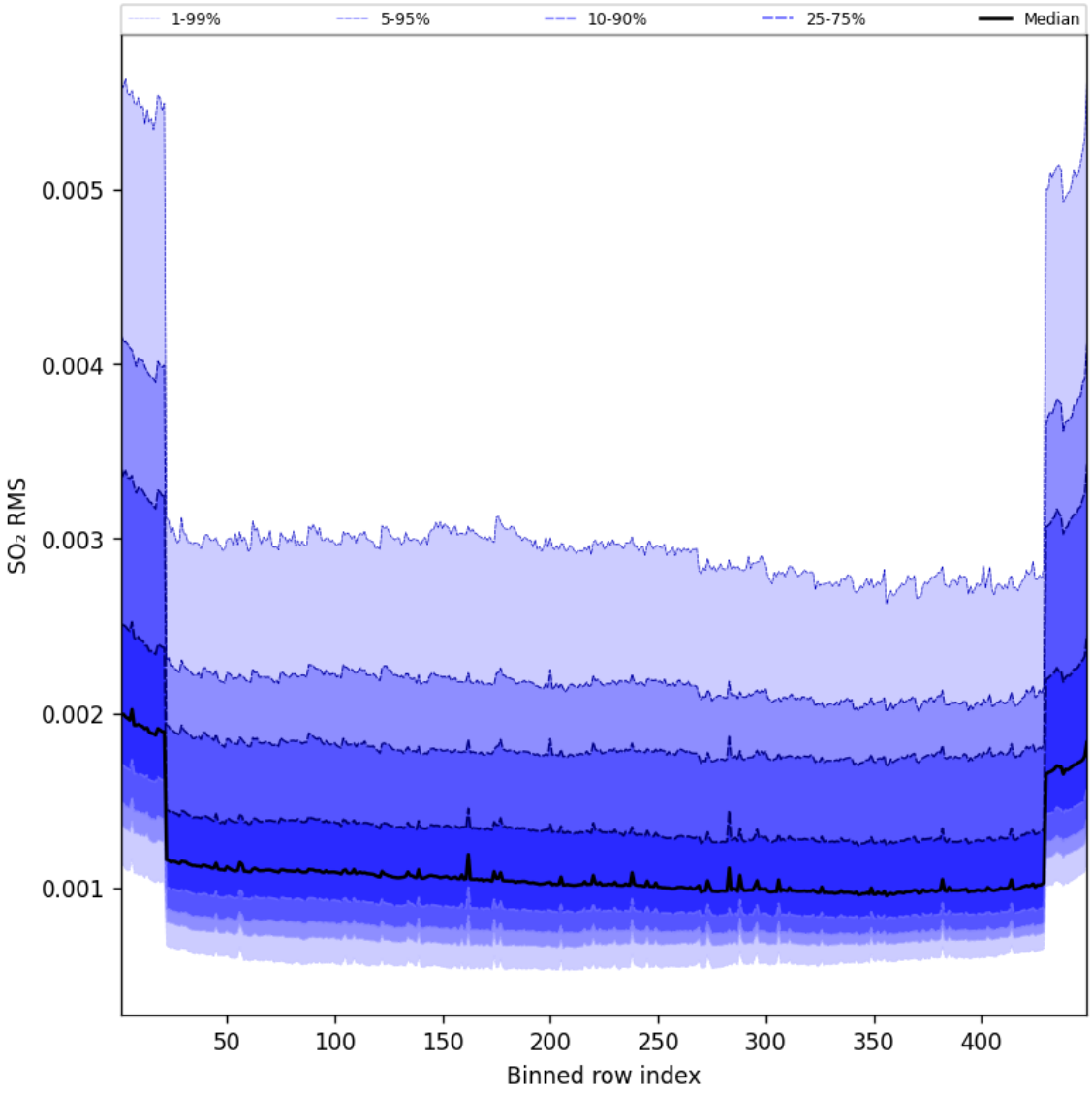

Figure 106: Along track statistics of "SO_2 RMS" for 2025-02-17 to 2025-02-18

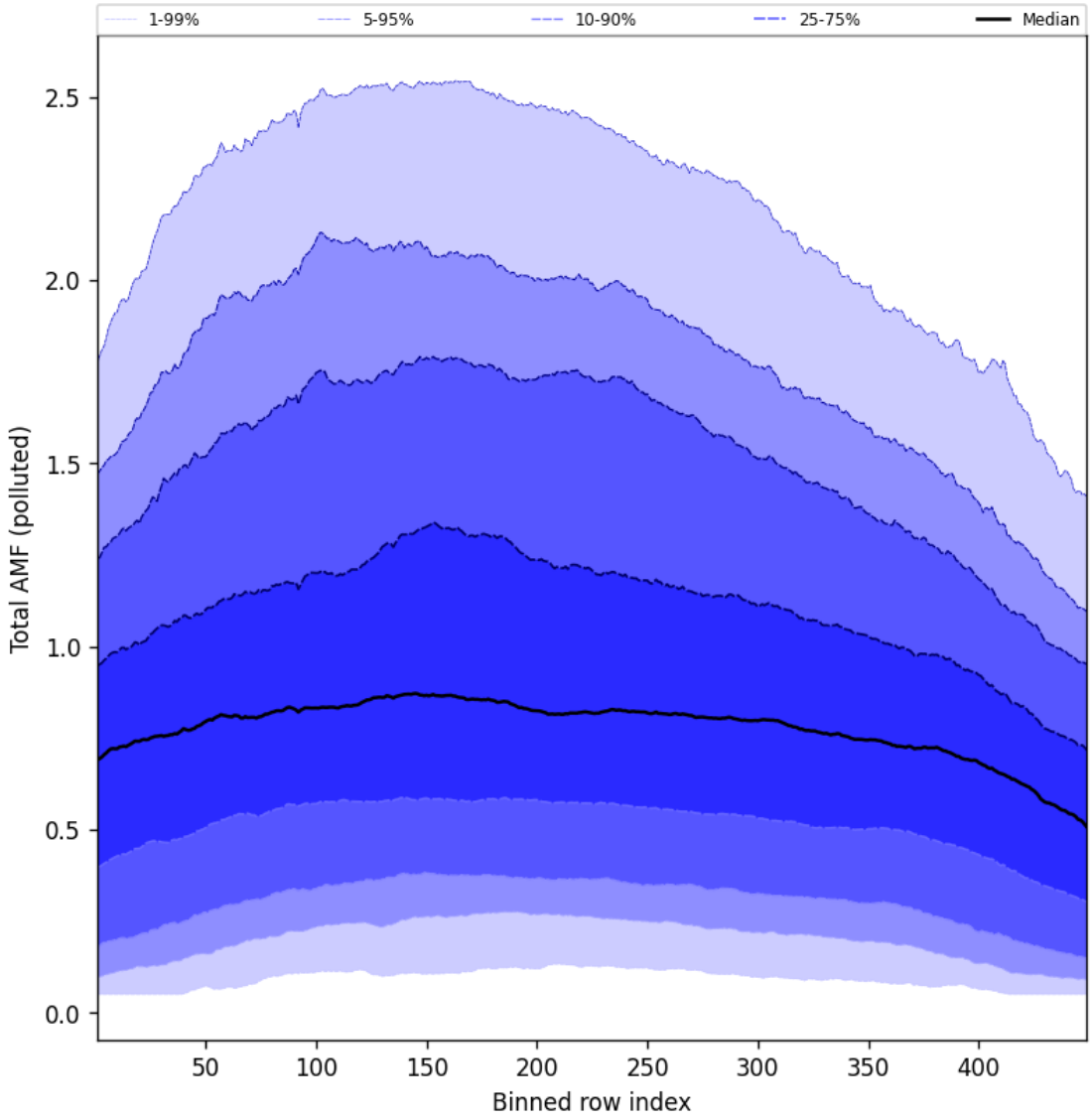

Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-02-17 to 2025-02-18

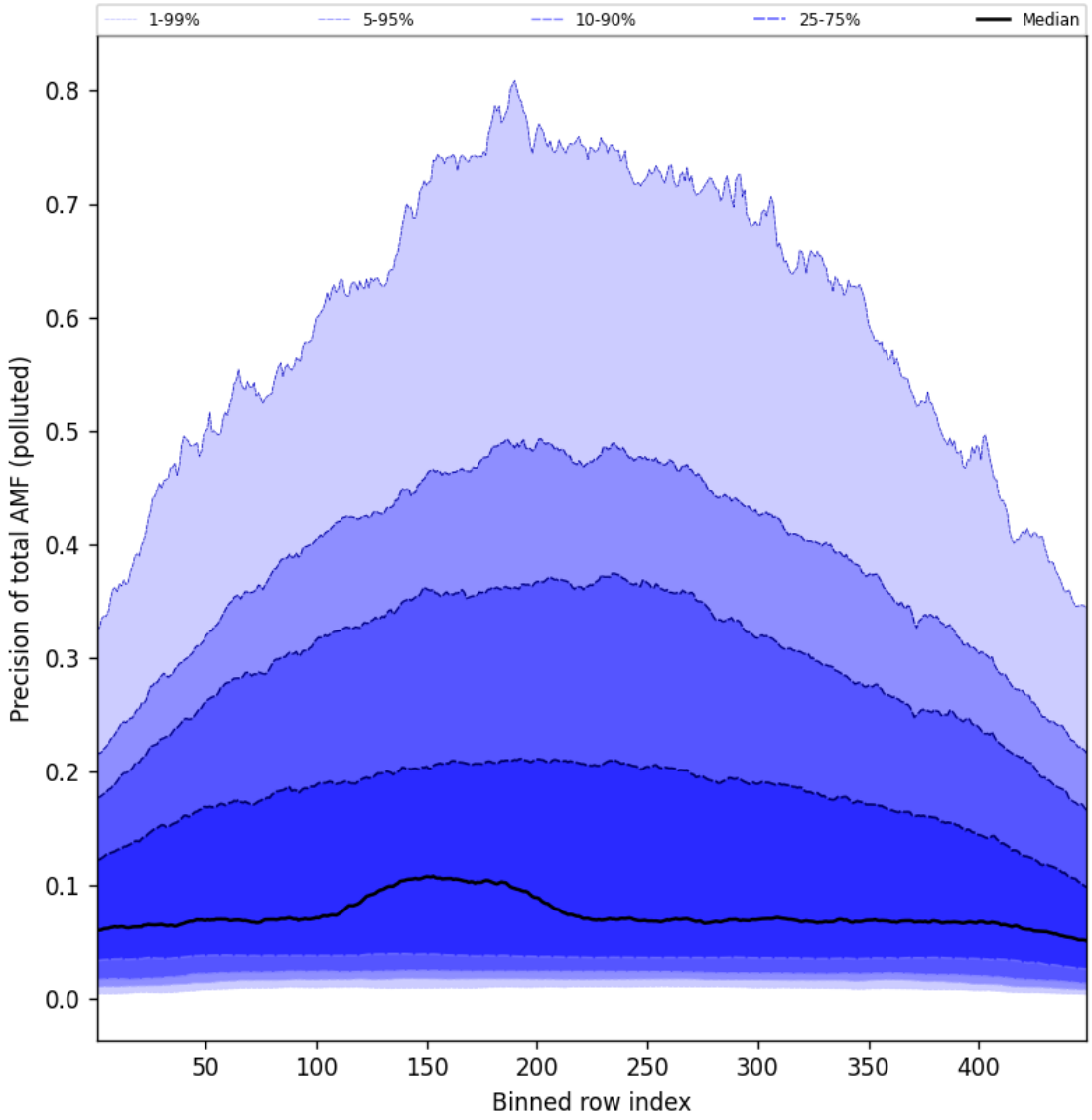

Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-02-17 to 2025-02-18

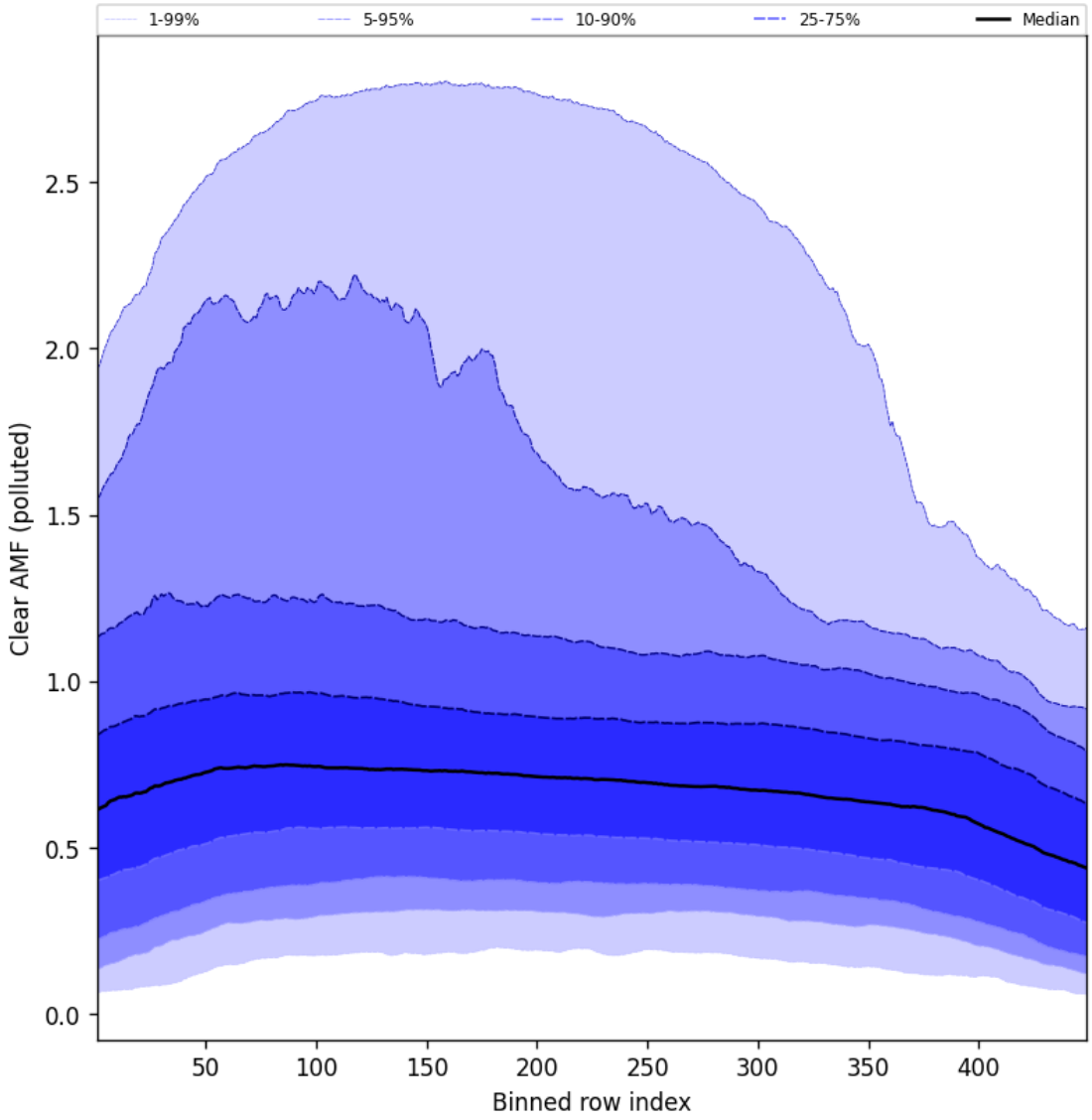

Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-02-17 to 2025-02-18

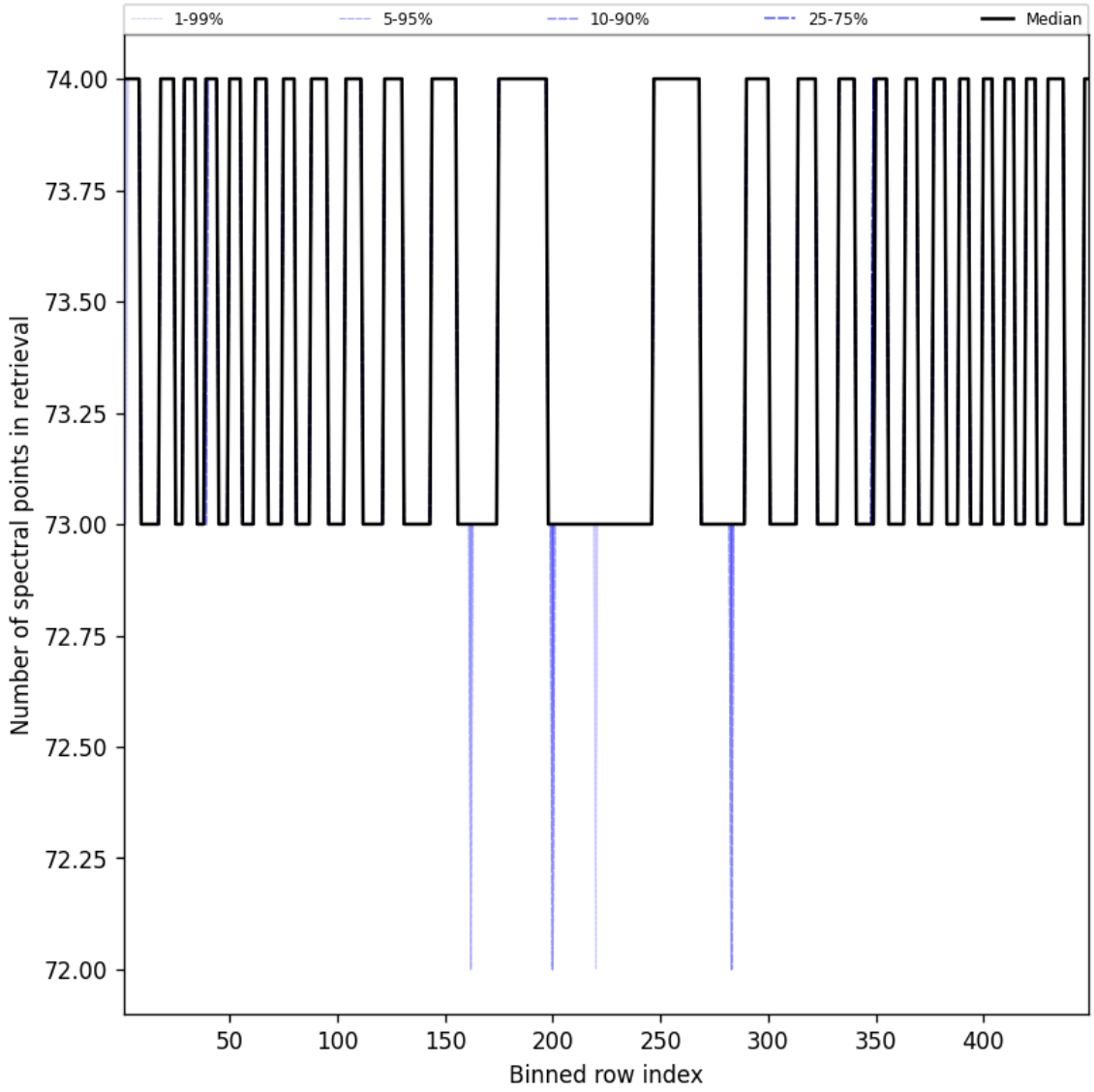

Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-02-17 to 2025-02-18

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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