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]	0.627 ± 0.414	17312979	0.995	0.800	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(5.787 \pm 164.602) \times 10^{-2}$	17312979	0.235	0.431	1.067×10^{-2}	-166	342
sulfurdioxide total vertical column precision [DU]	0.624 ± 1.171	17312979	0.222	0.360	0.303	3.465×10^{-2}	59.3
sulfurdioxide slant column density corrected [DU]	$(2.184 \pm 37.971) \times 10^{-2}$	17312979	0.235	0.347	9.429×10^{-3}	-22.0	63.5
sulfurdioxide slant column density cobra [DU]	$(2.161 \pm 36.619) \times 10^{-2}$	17312979	0.235	0.347	9.429×10^{-3}	-22.0	50.3
sulfurdioxide slant column density cobra precision [DU]	0.282 ± 0.136	17312979	0.188	0.136	0.238	8.046×10^{-2}	13.1
sulfurdioxide slant column density window1 [DU]	0.210 ± 0.683	17312979	0.225	0.716	0.223	-124	70.9
sulfurdioxide slant column density window1 precision [DU]	0.282 ± 0.136	17312979	0.188	0.136	0.238	8.046×10^{-2}	13.1
sulfurdioxide slant column density corrected win1 [DU]	$(9.370 \pm 66.927) \times 10^{-2}$	17312979	7.500×10^{-2}	0.692	7.347×10^{-2}	-124	70.7
background so2 slant column offset window1 [DU]	-0.116 ± 0.190	17312979	-0.220	0.206	-0.164	-0.973	3.71
sulfurdioxide slant column density window2 [DU]	3.67 ± 8.86	17312979	2.75	11.2	3.45	-980	1.012×10^{3}
sulfurdioxide slant column density window2 precision [DU]	7.89 ± 2.18	17312979	6.97	2.50	7.54	2.12	565
sulfurdioxide slant column density corrected win2 [DU]	1.52 ± 8.49	17312979	1.25	10.8	1.54	-981	1.012×10^{3}
background so2 slant column offset window2 [DU]	-2.15 ± 2.70	17312979	-0.250	3.07	-1.19	-14.7	4.11
sulfurdioxide slant column density window3 [DU]	-21.0 ± 23.7	17312979	-23.0	29.9	-21.2	-3.223×10^{3}	1.530×10^{3}
sulfurdioxide slant column density window3 precision [DU]	27.7 ± 12.6	17312979	22.5	9.27	24.5	9.78	996
sulfurdioxide slant column density corrected win3 [DU]	-8.84 ± 22.69	17312979	-9.52	28.6	-8.94	-3.213×10^{3}	1.536×10^{3}
background so2 slant column offset window3 [DU]	12.1 ± 7.3	17312979	7.28	11.2	11.8	-18.7	39.1
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.21	17312979	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(3.559 \pm 9.785) \times 10^{-2}$	17312979	1.800×10^{-2}	1.762×10^{-2}	1.645×10^{-2}	2.991×10^{-4}	2.44
fitted radiance shift [nm]	$(-4.452 \pm 25.260) \times 10^{-4}$	17312979	-5.000×10^{-4}	1.782×10^{-3}	-4.536×10^{-4}	-4.250×10^{-2}	4.033×10^{-2}
fitted radiance squeeze [1]	$(-4.159 \pm 18.309) \times 10^{-5}$	17312979	-3.000×10^{-5}	2.031×10^{-4}	-3.411×10^{-5}	-1.644×10^{-2}	1.864×10^{-2}
fitted root mean square [1]	$(1.250 \pm 0.568) \times 10^{-3}$	17312979	9.250×10^{-4}	5.434×10^{-4}	1.075×10^{-3}	3.102×10^{-4}	5.016×10^{-2}
sulfurdioxide total air mass factor polluted [1]	0.864 ± 0.500	17312979	0.780	0.602	0.780	5.000×10^{-2}	2.95
sulfurdioxide total air mass factor polluted precision [1]	0.132 ± 0.147	17312979	3.500×10^{-2}	0.143	7.579×10^{-2}	2.500×10^{-3}	1.83
sulfurdioxide clear air mass factor polluted [1]	0.746 ± 0.440	17312979	0.540	0.387	0.676	1.871×10^{-2}	3.00
number of spectral points in retrieval [1]	73.4 ± 0.5	17312979	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}	9.000×10^{-2}	0.200	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	−3.33	−0.964	−0.539	−0.349	−0.201	0.230	0.395	0.615	1.14	4.24
sulfurdioxide total vertical column precision [DU]	9.068×10^{-2}	0.119	0.143	0.167	0.200	0.560	0.815	1.21	2.09	5.85
sulfurdioxide slant column density corrected [DU]	−0.834	−0.472	−0.339	−0.252	−0.162	0.185	0.281	0.378	0.536	1.06
sulfurdioxide slant column density cobra [DU]	−0.834	−0.472	−0.339	−0.252	−0.162	0.185	0.281	0.378	0.536	1.06
sulfurdioxide slant column density cobra precision [DU]	0.132	0.158	0.171	0.181	0.195	0.331	0.389	0.446	0.540	0.791
sulfurdioxide slant column density window1 [DU]	−1.67	−0.835	−0.534	−0.340	−0.142	0.574	0.758	0.934	1.21	2.00
sulfurdioxide slant column density window1 precision [DU]	0.132	0.158	0.171	0.181	0.195	0.331	0.389	0.446	0.540	0.791
sulfurdioxide slant column density corrected win1 [DU]	−1.57	−0.867	−0.614	−0.446	−0.268	0.424	0.617	0.809	1.12	2.04
background so2 slant column offset window1 [DU]	−0.377	−0.319	−0.292	−0.272	−0.243	-3.726×10^{-2}	5.317×10^{-2}	0.136	0.239	0.466
sulfurdioxide slant column density window2 [DU]	−16.8	−10.3	−7.12	−4.73	−2.04	9.12	12.0	14.7	18.4	26.4
sulfurdioxide slant column density window2 precision [DU]	4.22	5.07	5.57	5.97	6.45	8.95	9.82	10.7	11.9	14.4
sulfurdioxide slant column density corrected win2 [DU]	−19.1	−12.3	−8.98	−6.56	−3.86	6.91	9.59	12.0	15.2	22.0
background so2 slant column offset window2 [DU]	−10.4	−8.10	−6.21	−4.78	−3.37	−0.294	-4.136×10^{-2}	0.157	0.515	1.97
sulfurdioxide slant column density window3 [DU]	−79.3	−59.4	−50.1	−43.4	−35.9	−6.01	1.76	8.77	18.2	36.8
sulfurdioxide slant column density window3 precision [DU]	14.3	16.2	17.6	19.0	20.7	30.0	34.5	40.0	51.2	81.5
sulfurdioxide slant column density corrected win3 [DU]	−65.1	−45.7	−36.7	−30.2	−23.1	5.49	12.8	19.4	28.4	46.5
background so2 slant column offset window3 [DU]	−1.53	1.28	2.76	4.31	6.42	17.6	20.0	21.9	24.1	28.3
sulfurdioxide slant column cobra flag [1]	0.0	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
integrated so2 profile apriori [DU]	2.181×10^{-3}	3.905×10^{-3}	5.780×10^{-3}	7.622×10^{-3}	9.885×10^{-3}	2.751×10^{-2}	3.648×10^{-2}	5.500×10^{-2}	0.114	0.399
fitted radiance shift [nm]	-8.008×10^{-3}	-4.170×10^{-3}	-2.819×10^{-3}	-2.043×10^{-3}	-1.380×10^{-3}	4.020×10^{-4}	1.101×10^{-3}	1.967×10^{-3}	3.450×10^{-3}	7.482×10^{-3}
fitted radiance squeeze [1]	-5.616×10^{-4}	-3.391×10^{-4}	-2.530×10^{-4}	-1.964×10^{-4}	-1.387×10^{-4}	6.450×10^{-5}	1.147×10^{-4}	1.617×10^{-4}	2.303×10^{-4}	4.071×10^{-4}
fitted root mean square [1]	5.720×10^{-4}	7.020×10^{-4}	7.734×10^{-4}	8.278×10^{-4}	8.941×10^{-4}	1.438×10^{-3}	1.685×10^{-3}	1.935×10^{-3}	2.353×10^{-3}	3.359×10^{-3}
sulfurdioxide total air mass factor polluted [1]	6.536×10^{-2}	0.193	0.297	0.394	0.510	1.11	1.34	1.56	1.86	2.42
sulfurdioxide total air mass factor polluted precision [1]	7.564×10^{-3}	1.543×10^{-2}	2.196×10^{-2}	2.751×10^{-2}	3.590×10^{-2}	0.179	0.244	0.310	0.415	0.696
sulfurdioxide clear air mass factor polluted [1]	0.139	0.248	0.329	0.406	0.491	0.878	0.987	1.11	1.52	2.67
number of spectral points in retrieval [1]	73.0	73.0	73.0	73.0	73.0	74.0	74.0	74.0	74.0	74.0

Table 3: Parameterlist and basic statistics for the analysis for observations in the northern hemisphere

Variable	mean $\pm\sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.672 ± 0.406	7400123	0.770	1.000	0.0	1.000	0.230	1.000
sulfurdioxide total vertical column [DU]	0.112 ± 2.415	7400123	0.610	1.689×10^{-2}	-166	342	-0.277	0.333
sulfurdioxide total vertical column precision [DU]	0.974 ± 1.659	7400123	0.700	0.438	4.780×10^{-2}	59.3	0.252	0.952
sulfurdioxide slant column density corrected [DU]	$(3.172 \pm 44.070) \times 10^{-2}$	7400123	0.392	1.254×10^{-2}	-11.3	62.3	-0.180	0.212
sulfurdioxide slant column density cobra [DU]	$(3.141 \pm 42.689) \times 10^{-2}$	7400123	0.392	1.254×10^{-2}	-11.3	32.3	-0.180	0.212
sulfurdioxide slant column density cobra precision [DU]	0.325 ± 0.165	7400123	0.187	0.271	8.046×10^{-2}	7.01	0.209	0.396
sulfurdioxide slant column density window1 [DU]	0.258 ± 0.786	7400123	0.791	0.273	-20.2	36.6	-0.128	0.664
sulfurdioxide slant column density window1 precision [DU]	0.325 ± 0.165	7400123	0.187	0.271	8.046×10^{-2}	7.01	0.209	0.396
sulfurdioxide slant column density corrected win1 [DU]	0.121 ± 0.782	7400123	0.781	8.908×10^{-2}	-20.2	36.3	-0.292	0.488
background so2 slant column offset window1 [DU]	-0.137 ± 0.211	7400123	0.195	-0.185	-0.659	3.71	-0.269	-7.366×10^{-2}
sulfurdioxide slant column density window2 [DU]	4.58 ± 9.59	7400123	12.2	4.22	-521	202	-1.73	10.5
sulfurdioxide slant column density window2 precision [DU]	8.42 ± 2.22	7400123	2.72	8.06	2.34	401	6.88	9.60
sulfurdioxide slant column density corrected win2 [DU]	1.50 ± 9.01	7400123	11.5	1.52	-527	203	-4.25	7.27
background so2 slant column offset window2 [DU]	-3.07 ± 3.39	7400123	5.28	-1.66	-14.7	4.10	-5.67	-0.390
sulfurdioxide slant column density window3 [DU]	-23.9 ± 24.6	7400123	31.4	-23.7	-198	183	-39.4	-8.05
sulfurdioxide slant column density window3 precision [DU]	29.0 ± 12.6	7400123	9.13	25.8	9.78	214	22.1	31.3
sulfurdioxide slant column density corrected win3 [DU]	-8.87 ± 23.79	7400123	30.1	-8.78	-175	195	-23.9	6.29
background so2 slant column offset window3 [DU]	15.0 ± 6.7	7400123	10.7	14.5	-14.1	39.1	9.45	20.1
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.25	7400123	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(5.769 \pm 14.392) \times 10^{-2}$	7400123	3.161×10^{-2}	1.975×10^{-2}	3.101×10^{-4}	2.44	1.091×10^{-2}	4.251×10^{-2}
fitted radiance shift [nm]	$(-3.019 \pm 25.358) \times 10^{-4}$	7400123	1.680×10^{-3}	-3.069×10^{-4}	-3.659×10^{-2}	3.616×10^{-2}	-1.163×10^{-3}	5.165×10^{-4}
fitted radiance squeeze [1]	$(-1.533 \pm 20.689) \times 10^{-5}$	7400123	2.180×10^{-4}	-8.137×10^{-6}	-1.191×10^{-2}	6.045×10^{-3}	-1.185×10^{-4}	9.954×10^{-5}
fitted root mean square [1]	$(1.418 \pm 0.694) \times 10^{-3}$	7400123	7.367×10^{-4}	1.182×10^{-3}	3.102×10^{-4}	2.807×10^{-2}	9.547×10^{-4}	1.691×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.690 ± 0.415	7400123	0.539	0.626	5.000×10^{-2}	2.77	0.383	0.922
sulfurdioxide total air mass factor polluted precision [1]	0.107 ± 0.158	7400123	9.476×10^{-2}	4.897×10^{-2}	2.500×10^{-3}	1.83	2.679×10^{-2}	0.122
sulfurdioxide clear air mass factor polluted [1]	0.585 ± 0.289	7400123	0.438	0.551	1.871×10^{-2}	2.41	0.355	0.793
number of spectral points in retrieval [1]	73.5 ± 0.5	7400123	1.000	73.0	53.0	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]	0.593 ± 0.416	9912856	0.830	0.490	0.0	1.000	0.170	1.000
sulfurdioxide total vertical column [DU]	$(1.746 \pm 61.061) \times 10^{-2}$	9912856	0.348	7.737×10^{-3}	-48.5	54.2	-0.165	0.183
sulfurdioxide total vertical column precision [DU]	0.362 ± 0.425	9912856	0.227	0.252	3.465×10^{-2}	21.5	0.176	0.403
sulfurdioxide slant column density corrected [DU]	$(1.447 \pm 32.665) \times 10^{-2}$	9912856	0.318	7.515×10^{-3}	-22.0	63.5	-0.150	0.168
sulfurdioxide slant column density cobra [DU]	$(1.429 \pm 31.310) \times 10^{-2}$	9912856	0.318	7.515×10^{-3}	-22.0	50.3	-0.150	0.168
sulfurdioxide slant column density cobra precision [DU]	0.251 ± 0.099	9912856	0.103	0.221	8.066×10^{-2}	13.1	0.186	0.290
sulfurdioxide slant column density window1 [DU]	0.175 ± 0.591	9912856	0.665	0.191	-124	70.9	-0.150	0.515
sulfurdioxide slant column density window1 precision [DU]	0.251 ± 0.099	9912856	0.103	0.221	8.066×10^{-2}	13.1	0.186	0.290
sulfurdioxide slant column density corrected win1 [DU]	$(7.336 \pm 57.018) \times 10^{-2}$	9912856	0.637	6.385×10^{-2}	-124	70.7	-0.253	0.384
background so2 slant column offset window1 [DU]	-0.101 ± 0.170	9912856	0.223	-0.151	-0.973	2.15	-0.228	-4.997×10^{-3}
sulfurdioxide slant column density window2 [DU]	3.00 ± 8.21	9912856	10.4	2.96	-980	1.012×10^{3}	-2.24	8.20
sulfurdioxide slant column density window2 precision [DU]	7.49 ± 2.07	9912856	2.23	7.20	2.12	565	6.20	8.43
sulfurdioxide slant column density corrected win2 [DU]	1.53 ± 8.07	9912856	10.3	1.55	-981	1.012×10^{3}	-3.59	6.67
background so2 slant column offset window2 [DU]	-1.47 ± 1.74	9912856	2.29	-0.967	-9.78	4.11	-2.53	-0.242
sulfurdioxide slant column density window3 [DU]	-18.8 ± 22.7	9912856	28.8	-19.4	-3.223×10^{3}	1.530×10^{3}	-33.4	-4.62
sulfurdioxide slant column density window3 precision [DU]	26.7 ± 12.5	9912856	9.03	23.5	10.5	996	19.7	28.8
sulfurdioxide slant column density corrected win3 [DU]	-8.81 ± 21.83	9912856	27.6	-9.05	-3.213×10^{3}	1.536×10^{3}	-22.6	4.92
background so2 slant column offset window3 [DU]	10.0 ± 7.0	9912856	11.5	9.33	-18.7	28.5	4.15	15.6
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.19	9912856	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(1.910 \pm 2.495) \times 10^{-2}$	9912856	1.362×10^{-2}	1.480×10^{-2}	2.991×10^{-4}	1.47	9.322×10^{-3}	2.294×10^{-2}
fitted radiance shift [nm]	$(-5.521 \pm 25.134) \times 10^{-4}$	9912856	1.816×10^{-3}	-5.731×10^{-4}	-4.250×10^{-2}	4.033×10^{-2}	-1.515×10^{-3}	3.011×10^{-4}
fitted radiance squeeze [1]	$(-6.119 \pm 16.029) \times 10^{-5}$	9912856	1.910×10^{-4}	-5.108×10^{-5}	-1.644×10^{-2}	1.864×10^{-2}	-1.510×10^{-4}	3.999×10^{-5}
fitted root mean square [1]	$(1.124 \pm 0.409) \times 10^{-3}$	9912856	4.336×10^{-4}	1.015×10^{-3}	3.137×10^{-4}	5.016×10^{-2}	8.594×10^{-4}	1.293×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.993 ± 0.519	9912856	0.634	0.883	5.000×10^{-2}	2.95	0.632	1.27
sulfurdioxide total air mass factor polluted precision [1]	0.151 ± 0.135	9912856	0.170	0.110	4.779×10^{-3}	1.32	4.500×10^{-2}	0.215
sulfurdioxide clear air mass factor polluted [1]	0.865 ± 0.492	9912856	0.355	0.742	0.161	3.00	0.579	0.934
number of spectral points in retrieval [1]	73.4 ± 0.5	9912856	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]	0.661 ± 0.406	12480013	0.770	1.000	0.0	1.000	0.230	1.000
sulfurdioxide total vertical column [DU]	$(3.491 \pm 125.515) \times 10^{-2}$	12480013	0.409	8.739×10^{-3}	-142	342	-0.193	0.215
sulfurdioxide total vertical column precision [DU]	0.511 ± 0.903	12480013	0.290	0.285	4.671×10^{-2}	49.0	0.202	0.492
sulfurdioxide slant column density corrected [DU]	$(1.510 \pm 32.387) \times 10^{-2}$	12480013	0.330	7.568×10^{-3}	-22.0	52.5	-0.156	0.174
sulfurdioxide slant column density cobra [DU]	$(1.506 \pm 32.153) \times 10^{-2}$	12480013	0.330	7.568×10^{-3}	-22.0	15.4	-0.156	0.174
sulfurdioxide slant column density cobra precision [DU]	0.267 ± 0.124	12480013	0.117	0.225	8.066×10^{-2}	13.1	0.190	0.307
sulfurdioxide slant column density window1 [DU]	0.208 ± 0.624	12480013	0.681	0.221	-20.2	23.2	-0.125	0.556
sulfurdioxide slant column density window1 precision [DU]	0.267 ± 0.124	12480013	0.117	0.225	8.066×10^{-2}	13.1	0.190	0.307
sulfurdioxide slant column density corrected win1 [DU]	$(7.856 \pm 61.096) \times 10^{-2}$	12480013	0.660	6.561×10^{-2}	-20.2	23.1	-0.262	0.399
background so2 slant column offset window1 [DU]	-0.130 ± 0.168	12480013	0.189	-0.167	-0.712	2.75	-0.244	-5.454×10^{-2}
sulfurdioxide slant column density window2 [DU]	3.20 ± 8.53	12480013	10.8	3.04	-980	547	-2.29	8.49
sulfurdioxide slant column density window2 precision [DU]	7.71 ± 2.06	12480013	2.39	7.39	2.13	382	6.34	8.73
sulfurdioxide slant column density corrected win2 [DU]	1.45 ± 8.28	12480013	10.6	1.48	-981	547	-3.82	6.75
background so2 slant column offset window2 [DU]	-1.75 ± 2.30	12480013	2.41	-1.02	-14.7	4.11	-2.67	-0.261
sulfurdioxide slant column density window3 [DU]	-18.1 ± 23.3	12480013	29.6	-18.4	-3.223×10^{3}	270	-32.9	-3.32
sulfurdioxide slant column density window3 precision [DU]	27.3 ± 12.0	12480013	8.82	24.3	10.5	996	20.7	29.6
sulfurdioxide slant column density corrected win3 [DU]	-6.85 ± 22.23	12480013	28.3	-7.22	-3.213×10^{3}	266	-21.1	7.19
background so2 slant column offset window3 [DU]	11.2 ± 6.8	12480013	10.1	10.9	-18.7	39.0	6.08	16.1
sulfurdioxide slant column cobra flag [1]	1.99 ± 0.17	12480013	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.577 \pm 6.999) \times 10^{-2}$	12480013	1.424×10^{-2}	1.615×10^{-2}	8.042×10^{-4}	2.41	1.045×10^{-2}	2.469×10^{-2}
fitted radiance shift [nm]	$(-4.288 \pm 24.067) \times 10^{-4}$	12480013	1.783×10^{-3}	-4.133×10^{-4}	-4.076×10^{-2}	3.954×10^{-2}	-1.354×10^{-3}	4.293×10^{-4}
fitted radiance squeeze [1]	$(-4.391 \pm 17.150) \times 10^{-5}$	12480013	1.932×10^{-4}	-3.525×10^{-5}	-1.191×10^{-2}	1.211×10^{-2}	-1.349×10^{-4}	5.831×10^{-5}
fitted root mean square [1]	$(1.183 \pm 0.513) \times 10^{-3}$	12480013	4.610×10^{-4}	1.027×10^{-3}	3.137×10^{-4}	3.911×10^{-2}	8.721×10^{-4}	1.333×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.848 ± 0.411	12480013	0.517	0.801	5.000×10^{-2}	2.63	0.558	1.07
sulfurdioxide total air mass factor polluted precision [1]	0.123 ± 0.120	12480013	0.131	7.545×10^{-2}	2.500×10^{-3}	1.36	3.950×10^{-2}	0.171
sulfurdioxide clear air mass factor polluted [1]	0.713 ± 0.270	12480013	0.337	0.695	2.252×10^{-2}	2.66	0.528	0.865
number of spectral points in retrieval [1]	73.5 ± 0.5	12480013	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]	0.551 ± 0.422	3937572	0.890	0.490	0.0	1.000	0.110	1.000
sulfurdioxide total vertical column [DU]	$(9.514 \pm 200.124) \times 10^{-2}$	3937572	0.474	1.443×10^{-2}	-102	145	-0.212	0.262
sulfurdioxide total vertical column precision [DU]	0.795 ± 1.397	3937572	0.582	0.360	3.465×10^{-2}	59.3	0.179	0.762
sulfurdioxide slant column density corrected [DU]	$(3.571 \pm 47.061) \times 10^{-2}$	3937572	0.388	1.409×10^{-2}	-10.3	62.3	-0.177	0.212
sulfurdioxide slant column density cobra [DU]	$(3.512 \pm 44.107) \times 10^{-2}$	3937572	0.388	1.409×10^{-2}	-10.3	50.3	-0.177	0.212
sulfurdioxide slant column density cobra precision [DU]	0.312 ± 0.145	3937572	0.151	0.275	8.046×10^{-2}	12.8	0.215	0.366
sulfurdioxide slant column density window1 [DU]	0.208 ± 0.788	3937572	0.811	0.223	-23.2	70.9	-0.194	0.617
sulfurdioxide slant column density window1 precision [DU]	0.312 ± 0.145	3937572	0.151	0.275	8.046×10^{-2}	12.8	0.215	0.366
sulfurdioxide slant column density corrected win1 [DU]	0.123 ± 0.769	3937572	0.774	9.206×10^{-2}	-23.4	70.7	-0.287	0.486
background so2 slant column offset window1 [DU]	$(-8.574 \pm 22.767) \times 10^{-2}$	3937572	0.259	-0.158	-0.973	2.64	-0.243	1.630×10^{-2}
sulfurdioxide slant column density window2 [DU]	4.61 ± 9.40	3937572	11.9	4.43	-818	1.012×10^{3}	-1.43	10.5
sulfurdioxide slant column density window2 precision [DU]	8.27 ± 2.42	3937572	2.61	7.90	2.12	565	6.76	9.37
sulfurdioxide slant column density corrected win2 [DU]	1.70 ± 8.91	3937572	11.2	1.73	-820	1.012×10^{3}	-3.90	7.32
background so2 slant column offset window2 [DU]	-2.91 ± 3.08	3937572	4.69	-1.93	-14.5	4.11	-5.06	-0.369
sulfurdioxide slant column density window3 [DU]	-28.3 ± 22.9	3937572	28.7	-28.1	-277	207	-42.5	-13.8
sulfurdioxide slant column density window3 precision [DU]	28.6 ± 14.1	3937572	10.4	25.1	10.7	227	20.4	30.8
sulfurdioxide slant column density corrected win3 [DU]	-14.3 ± 23.0	3937572	28.8	-13.7	-276	210	-28.4	0.384
background so2 slant column offset window3 [DU]	14.0 ± 7.9	3937572	13.3	15.0	-18.7	39.1	7.28	20.5
sulfurdioxide slant column cobra flag [1]	1.96 ± 0.28	3937572	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(5.588 \pm 12.720) \times 10^{-2}$	3937572	3.948×10^{-2}	1.761×10^{-2}	3.100×10^{-4}	2.36	7.403×10^{-3}	4.689×10^{-2}
fitted radiance shift [nm]	$(-5.043 \pm 28.248) \times 10^{-4}$	3937572	1.704×10^{-3}	-5.903×10^{-4}	-4.245×10^{-2}	4.033×10^{-2}	-1.435×10^{-3}	2.690×10^{-4}
fitted radiance squeeze [1]	$(-4.502 \pm 20.209) \times 10^{-5}$	3937572	2.292×10^{-4}	-3.796×10^{-5}	-1.107×10^{-2}	1.864×10^{-2}	-1.563×10^{-4}	7.290×10^{-5}
fitted root mean square [1]	$(1.385 \pm 0.616) \times 10^{-3}$	3937572	6.154×10^{-4}	1.230×10^{-3}	3.102×10^{-4}	3.658×10^{-2}	9.852×10^{-4}	1.601×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.956 ± 0.701	3937572	1.01	0.699	5.000×10^{-2}	2.95	0.411	1.42
sulfurdioxide total air mass factor polluted precision [1]	0.163 ± 0.203	3937572	0.192	8.837×10^{-2}	2.500×10^{-3}	1.83	2.741×10^{-2}	0.219
sulfurdioxide clear air mass factor polluted [1]	0.892 ± 0.746	3937572	0.705	0.616	1.871×10^{-2}	3.00	0.375	1.08
number of spectral points in retrieval [1]	73.4 ± 0.5	3937572	1.000	73.0	52.0	74.0	73.0	74.0

3 Granule outlines

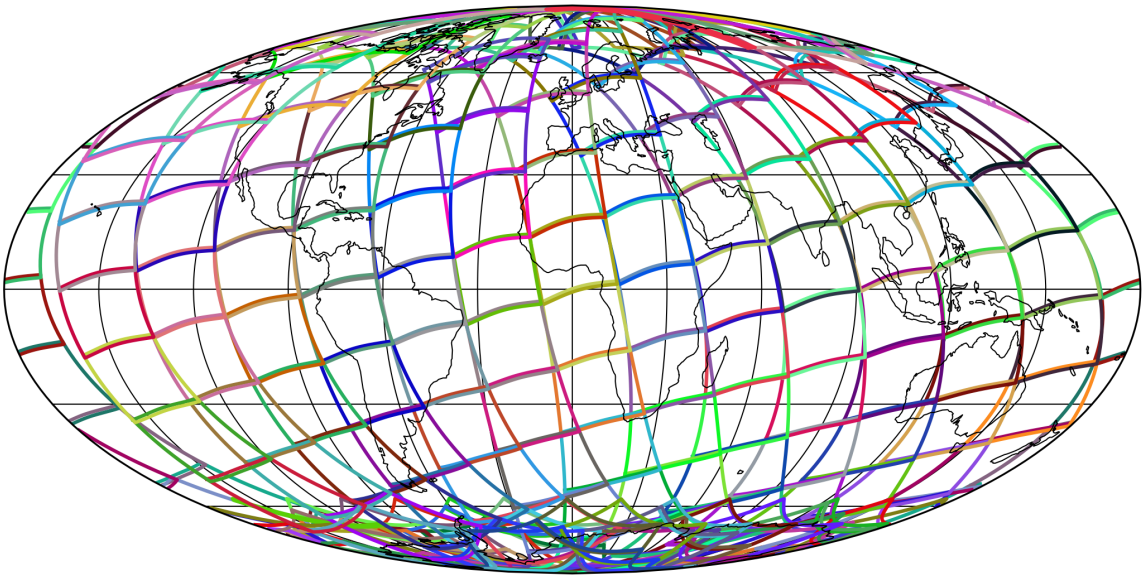


Figure 1: Outline of the granules.

4 Input data monitoring

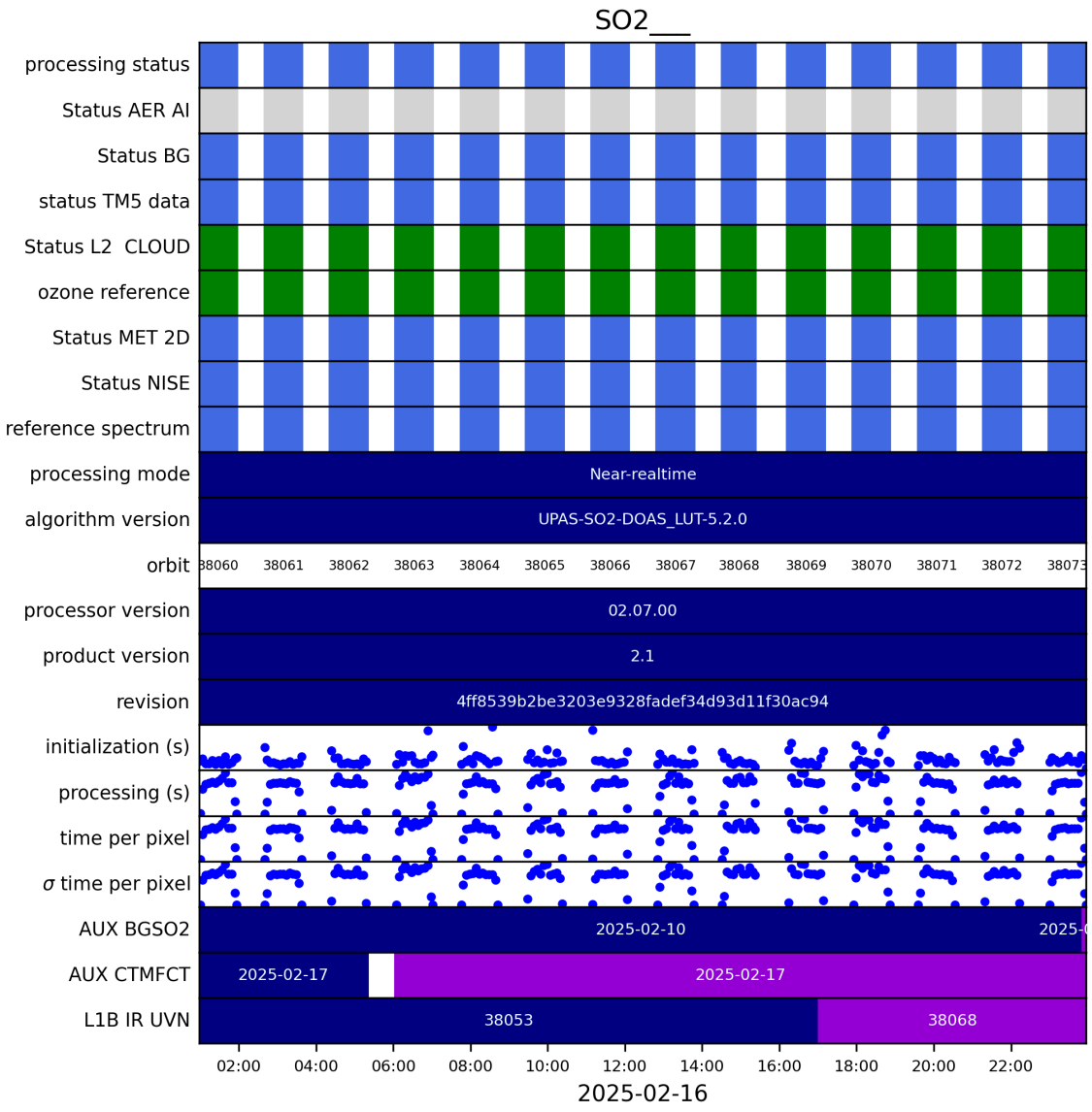


Figure 2: Input data per granule

5 Warnings and errors

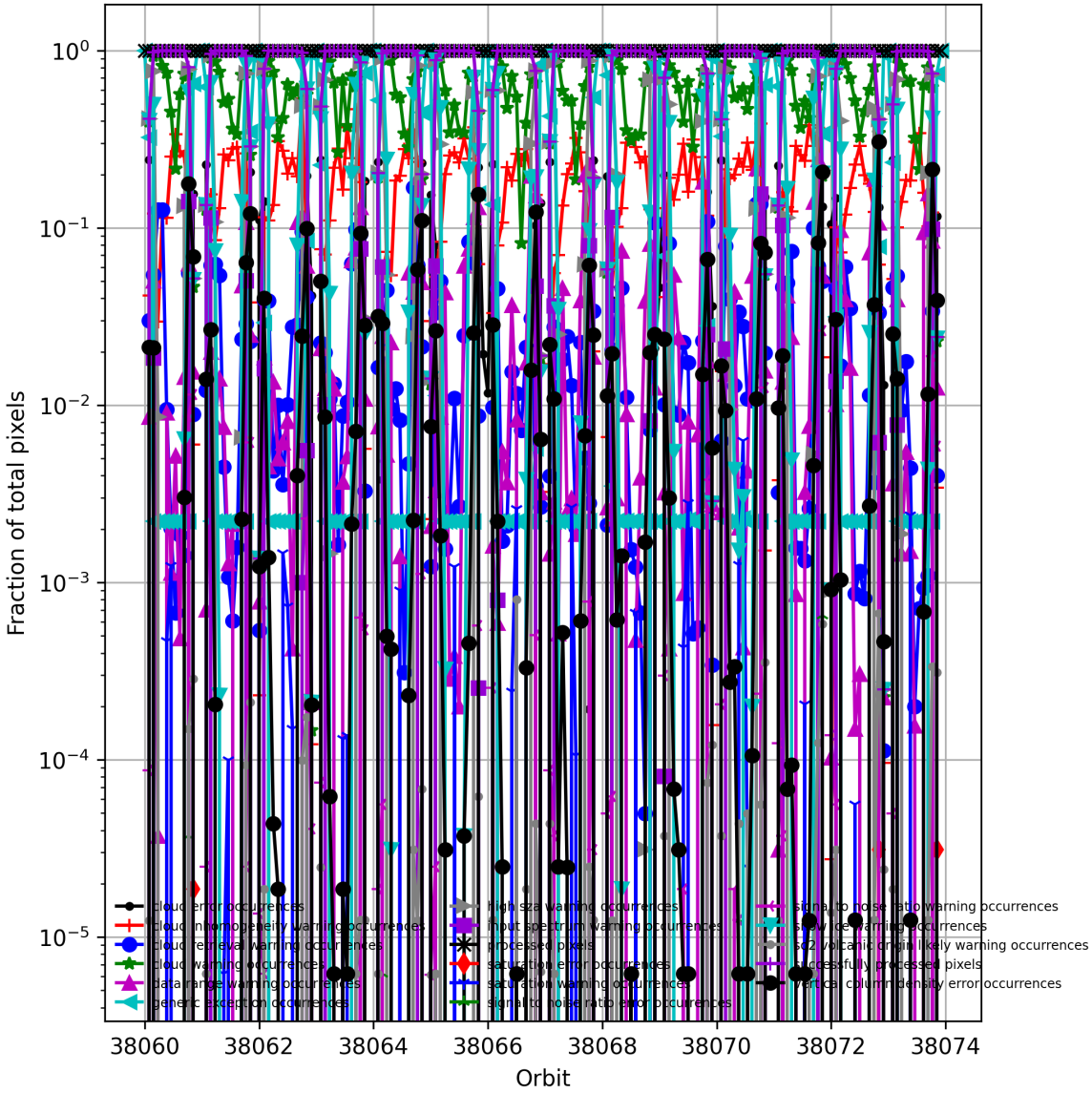


Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

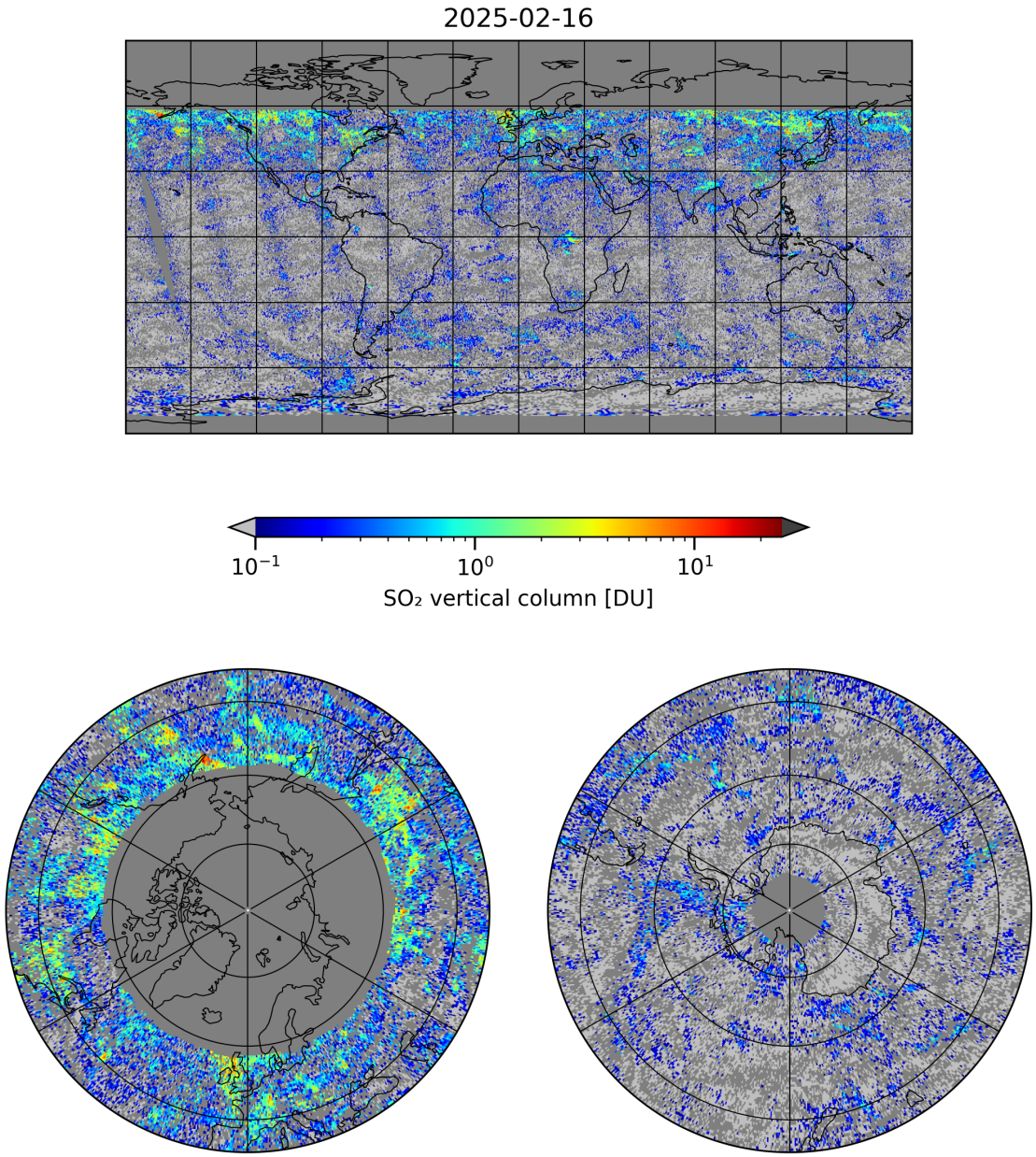


Figure 4: Map of "SO_2 vertical column" for 2025-02-16 to 2025-02-16

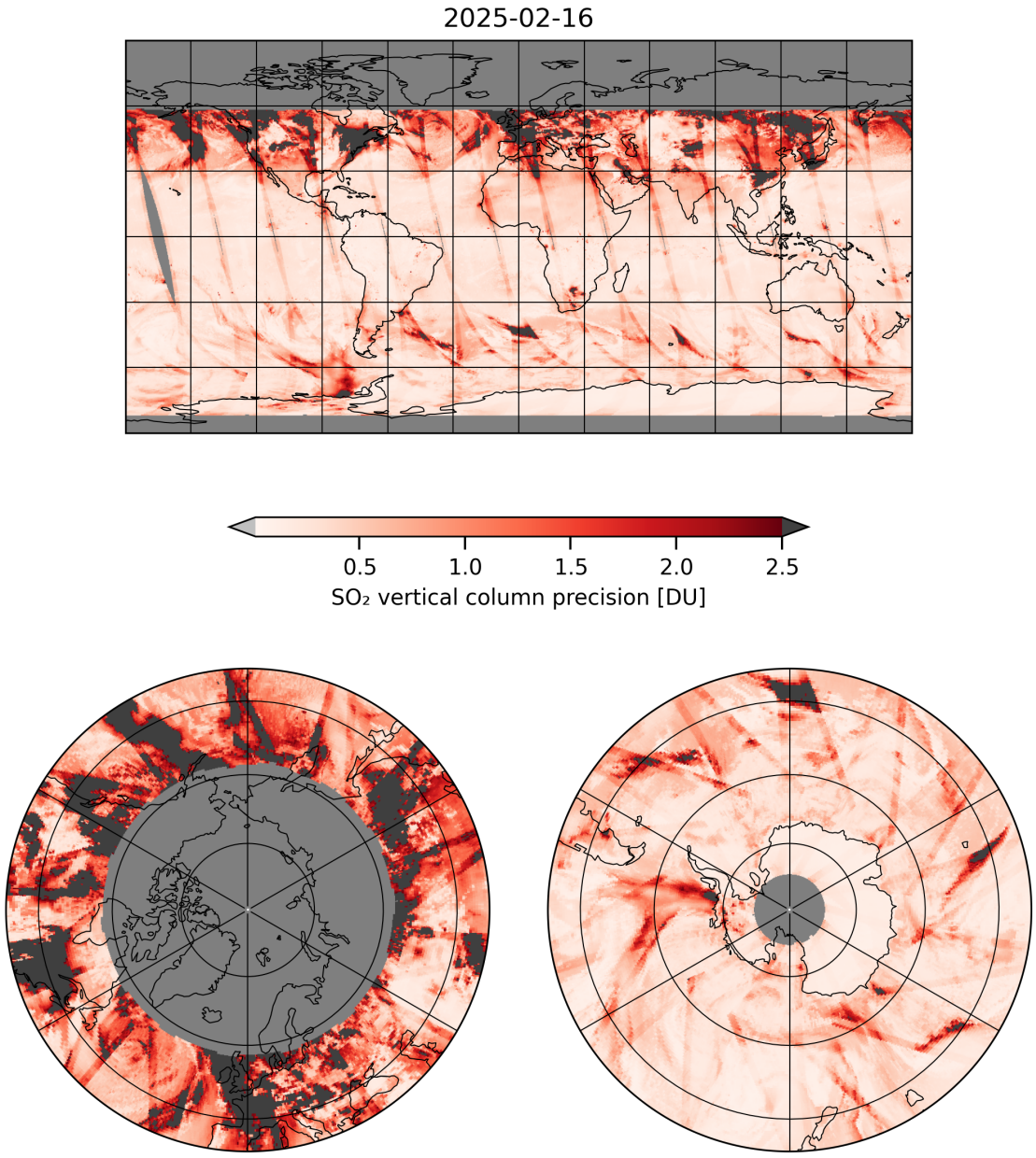


Figure 5: Map of "SO_2 vertical column precision" for 2025-02-16 to 2025-02-16

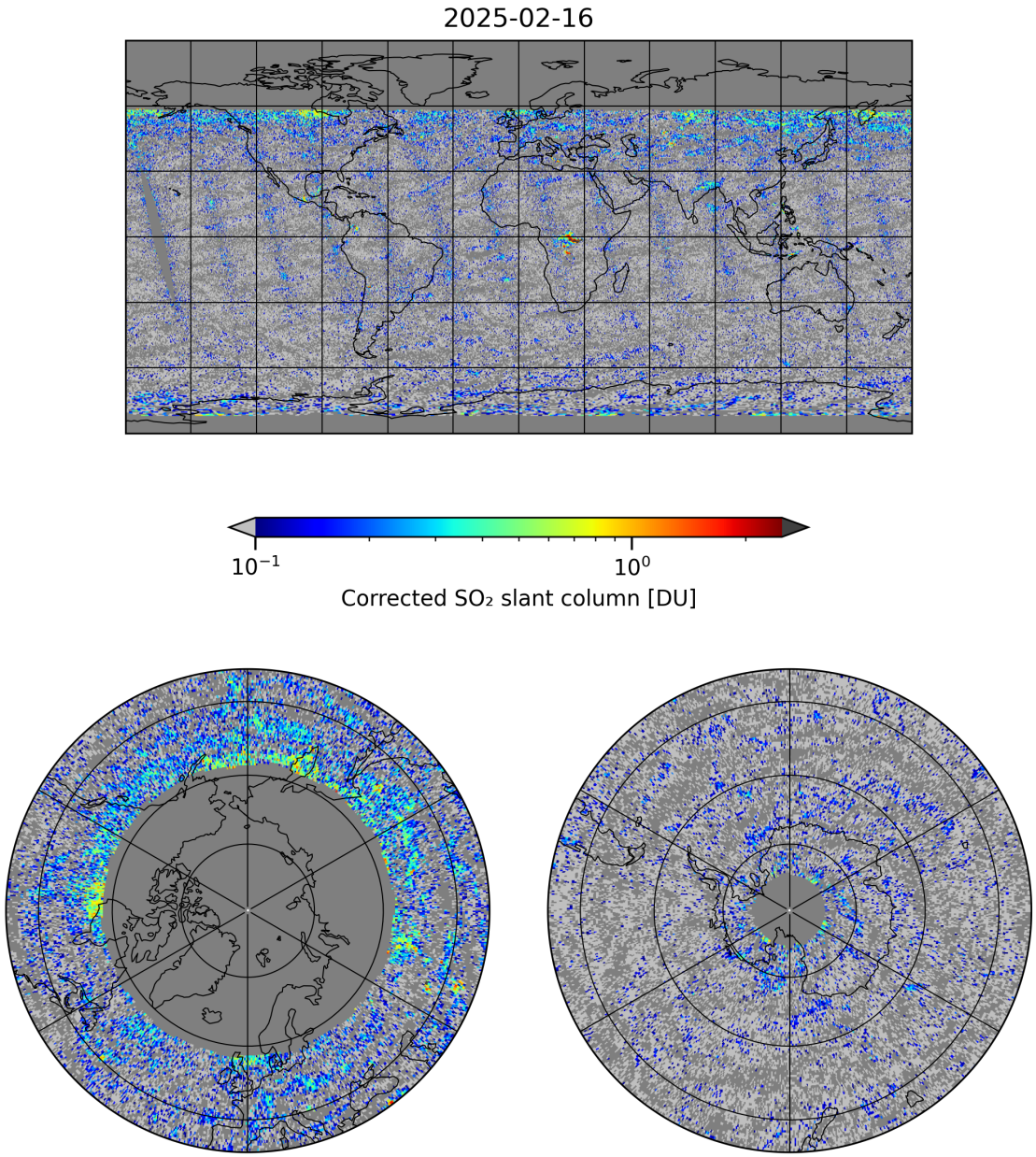


Figure 6: Map of “Corrected SO_2 slant column” for 2025-02-16 to 2025-02-16

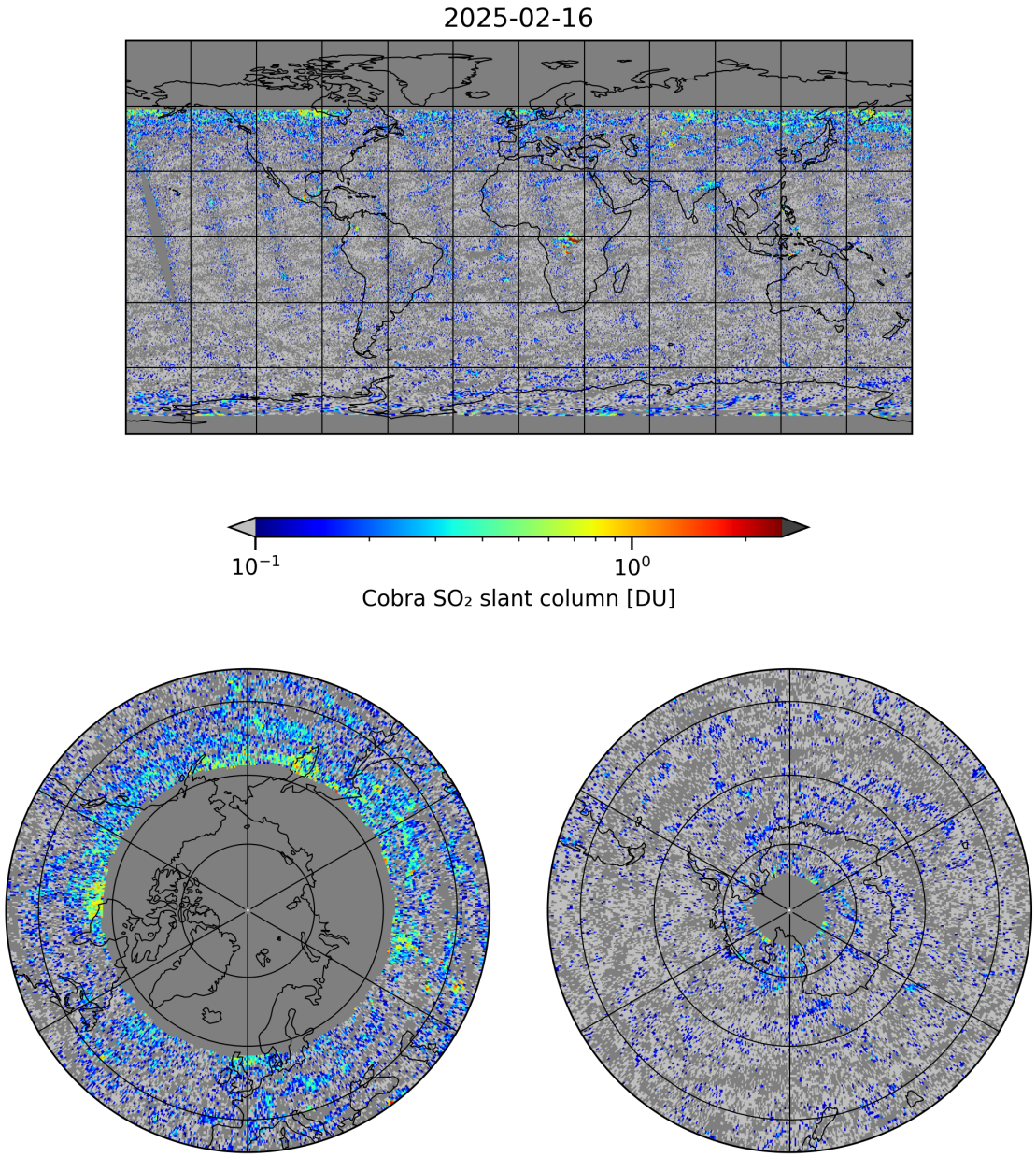


Figure 7: Map of "Cobra SO_2 slant column" for 2025-02-16 to 2025-02-16

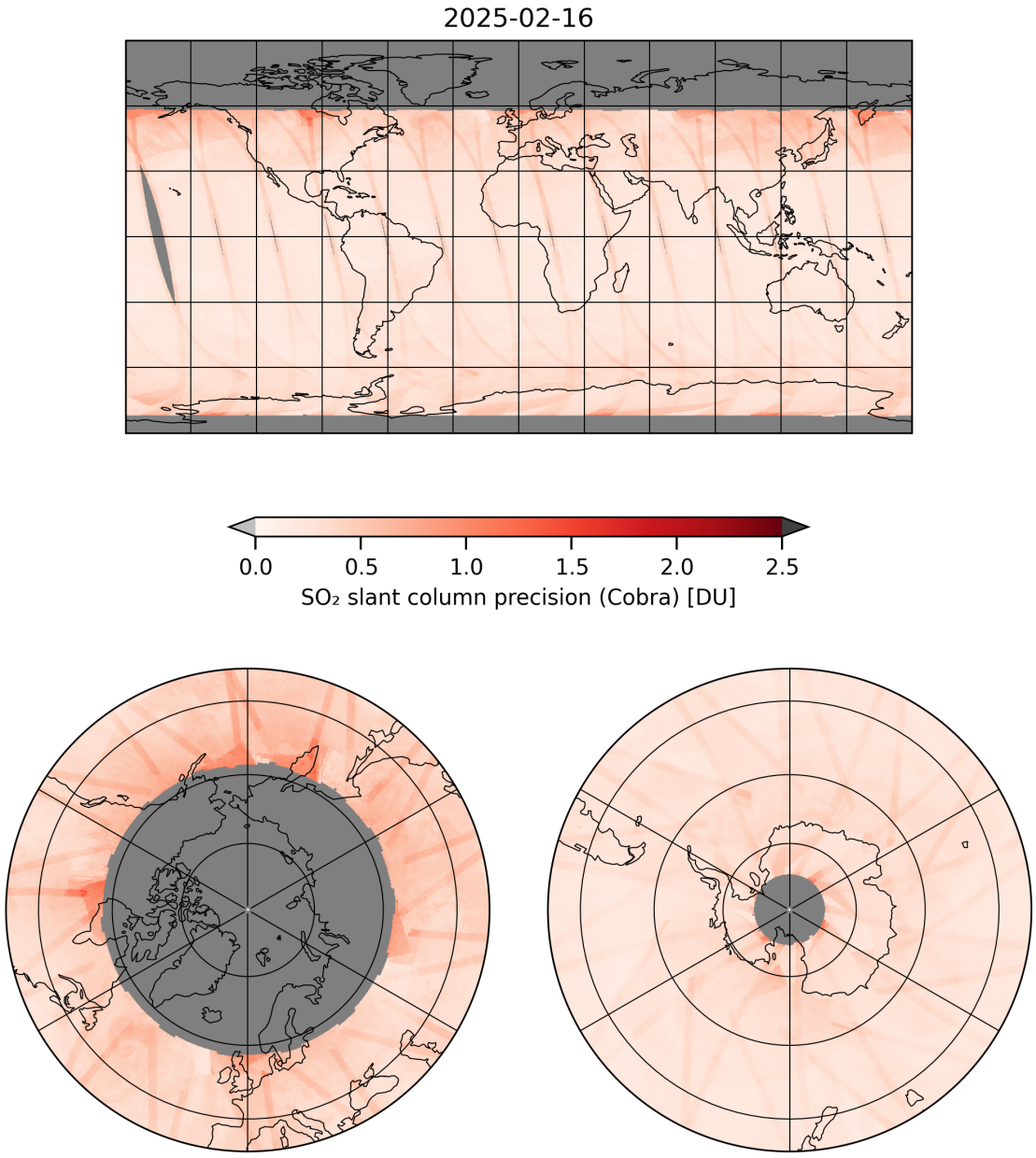


Figure 8: Map of "SO_2 slant column precision (Cobra)" for 2025-02-16 to 2025-02-16

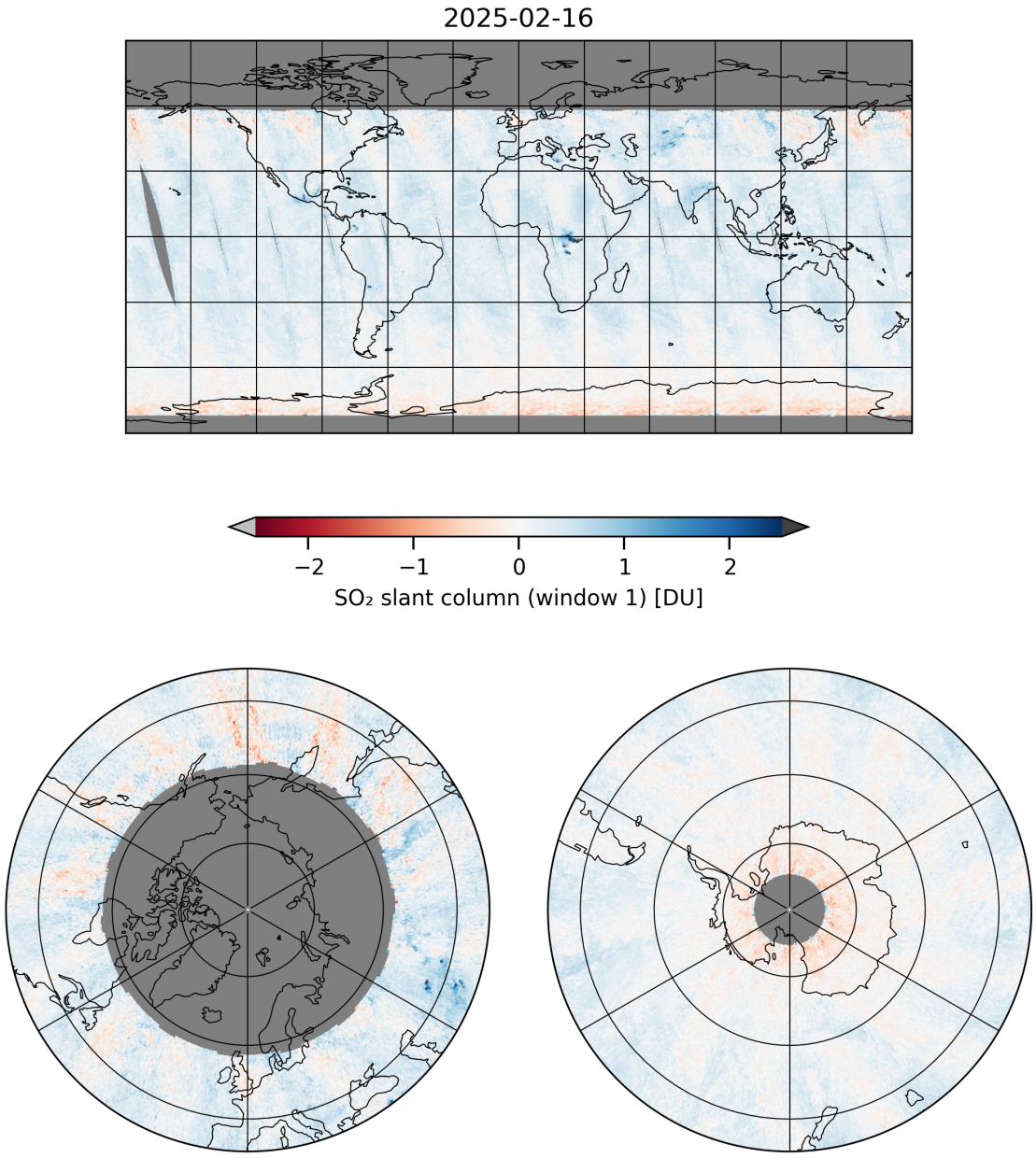


Figure 9: Map of "SO_2 slant column (window 1)" for 2025-02-16 to 2025-02-16

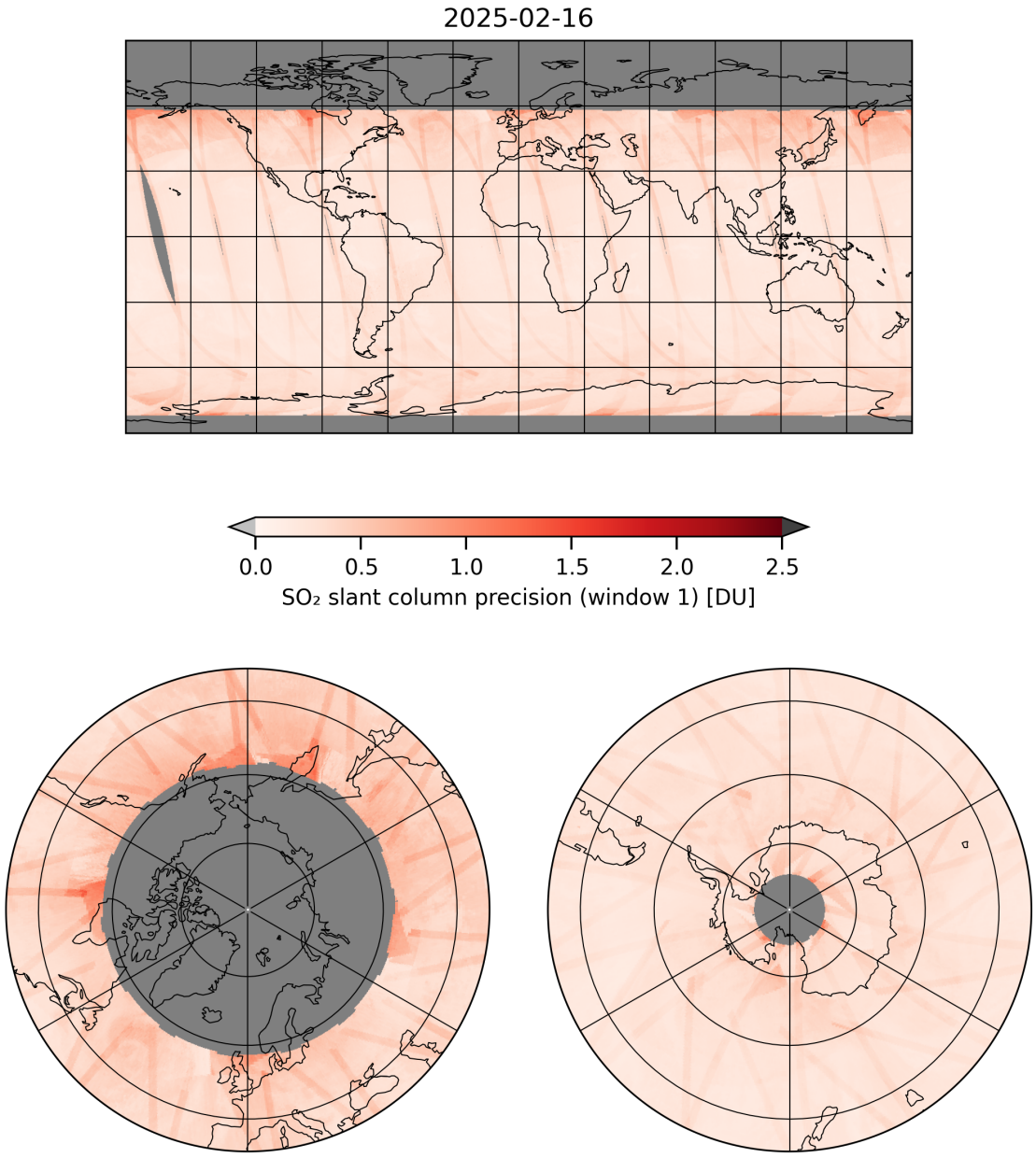


Figure 10: Map of "SO_2 slant column precision (window 1)" for 2025-02-16 to 2025-02-16

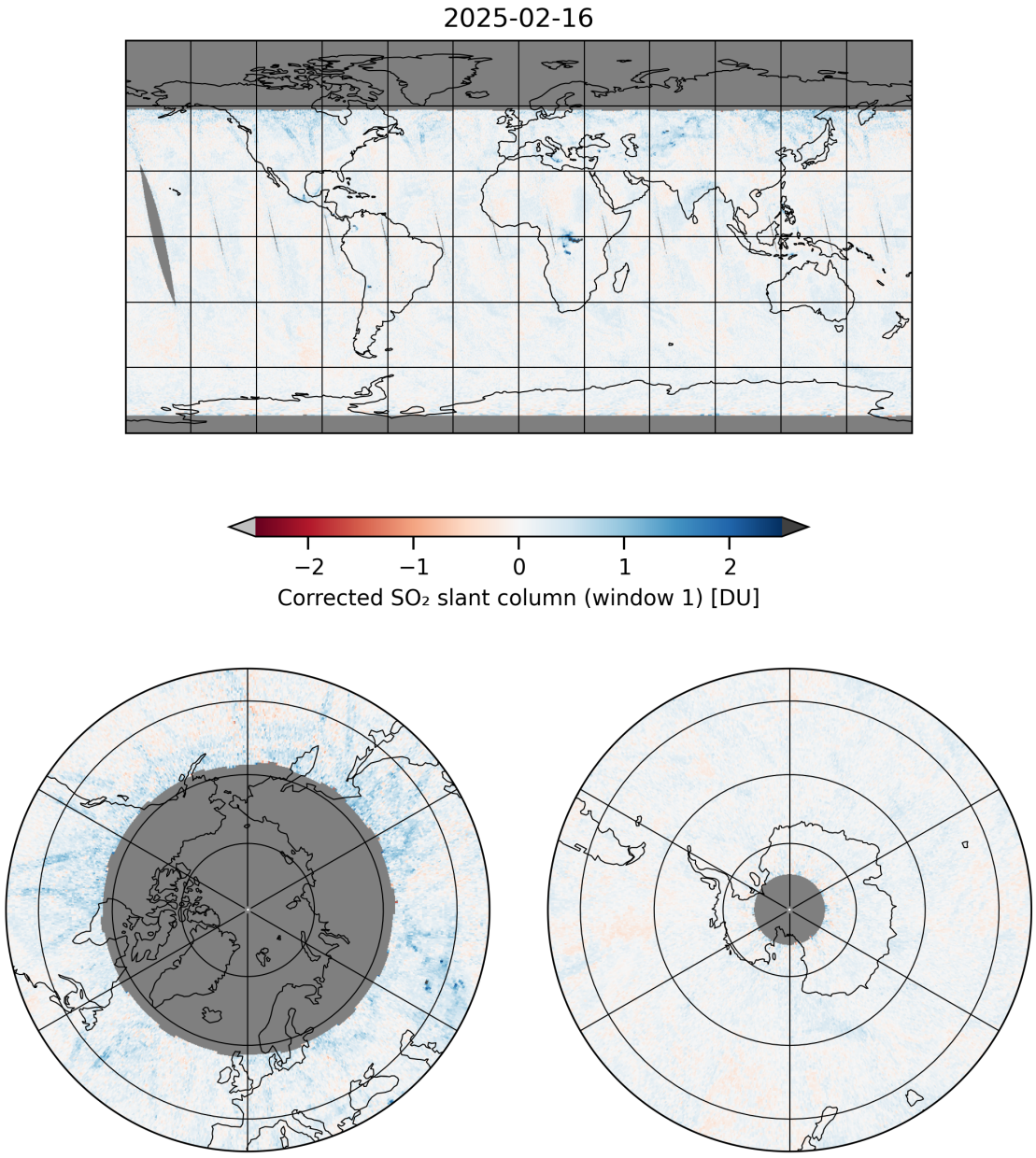


Figure 11: Map of “Corrected SO_2 slant column (window 1)” for 2025-02-16 to 2025-02-16

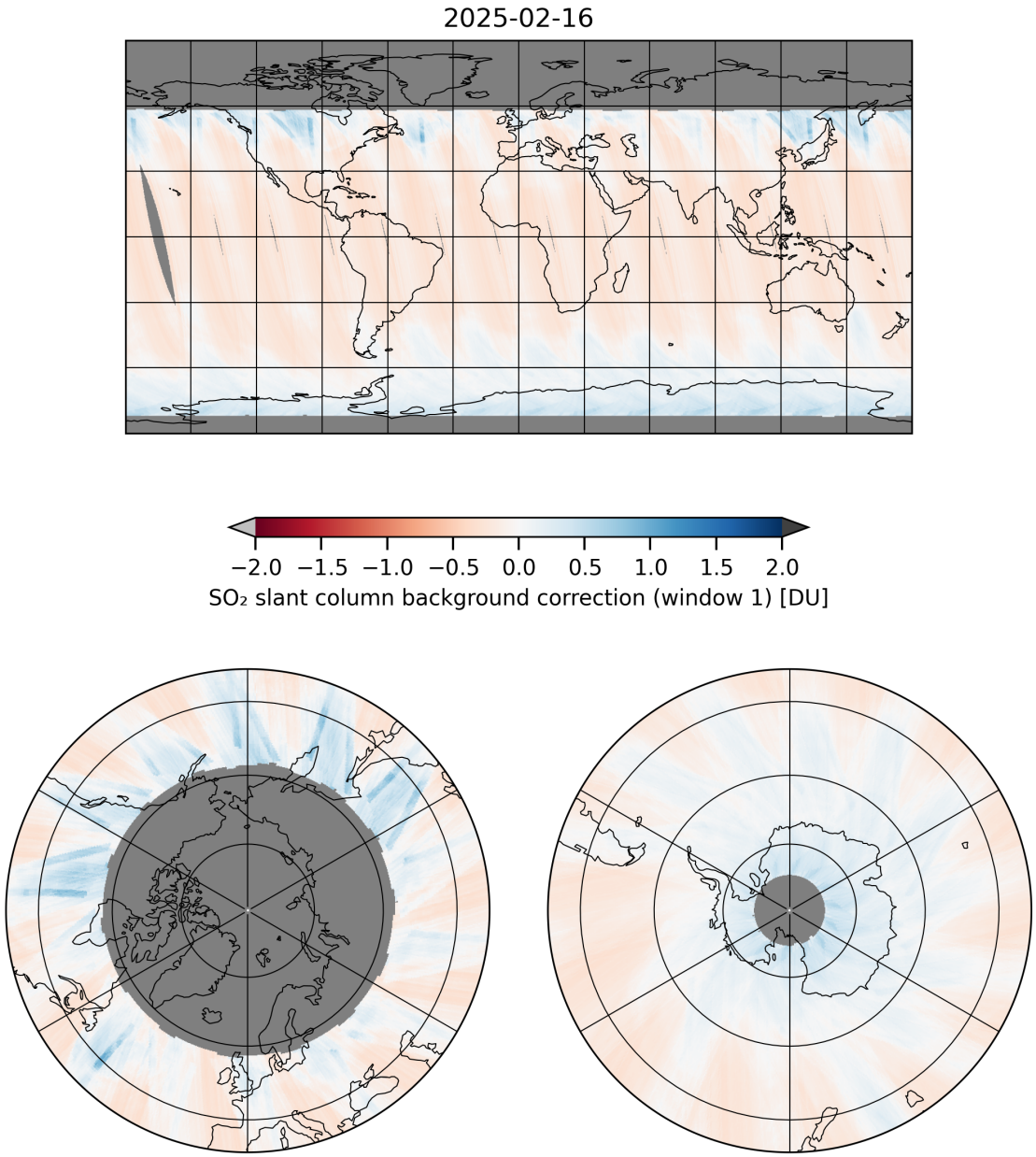


Figure 12: Map of "SO_2 slant column background correction (window 1)" for 2025-02-16 to 2025-02-16

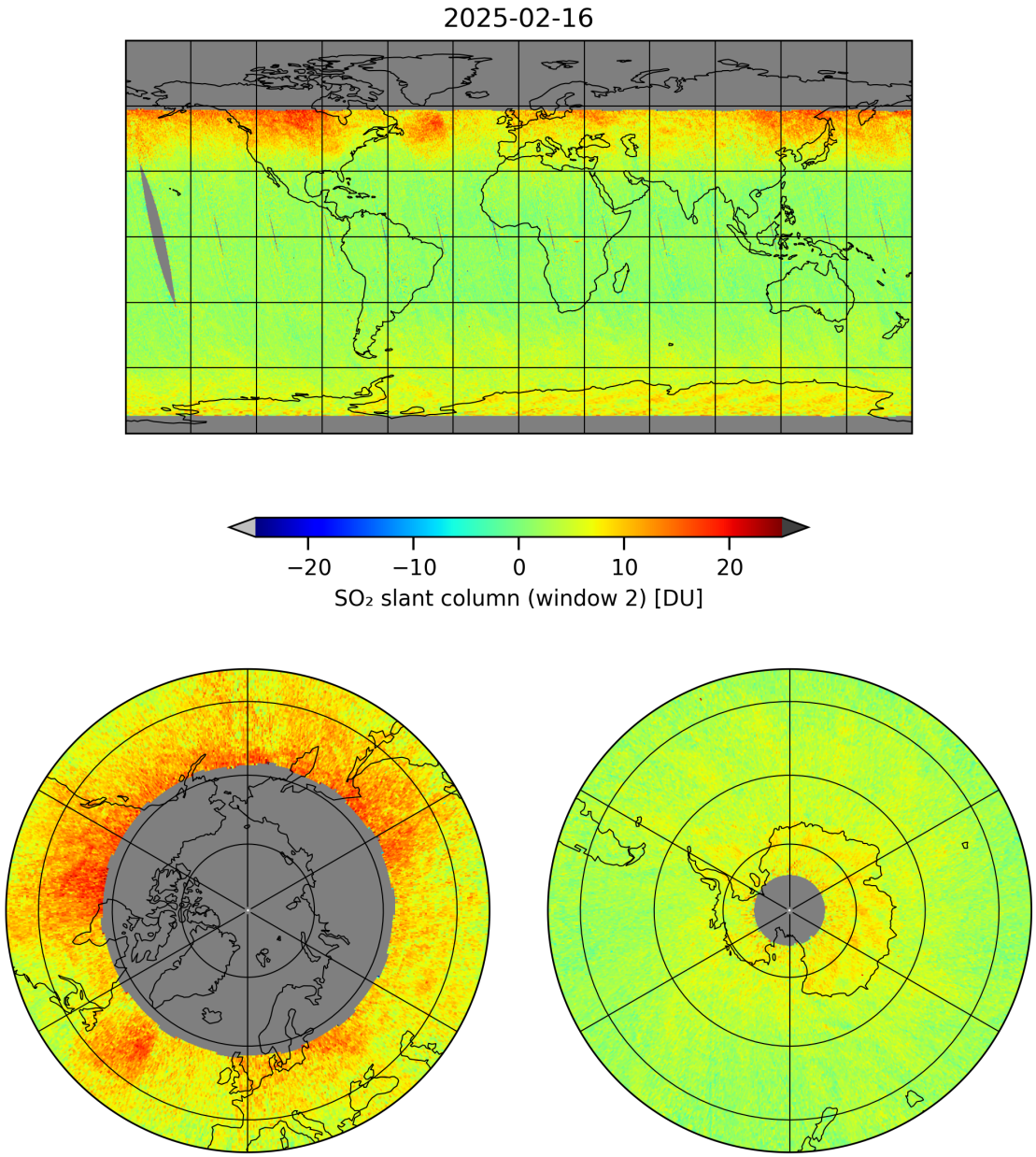


Figure 13: Map of "SO_2 slant column (window 2)" for 2025-02-16 to 2025-02-16

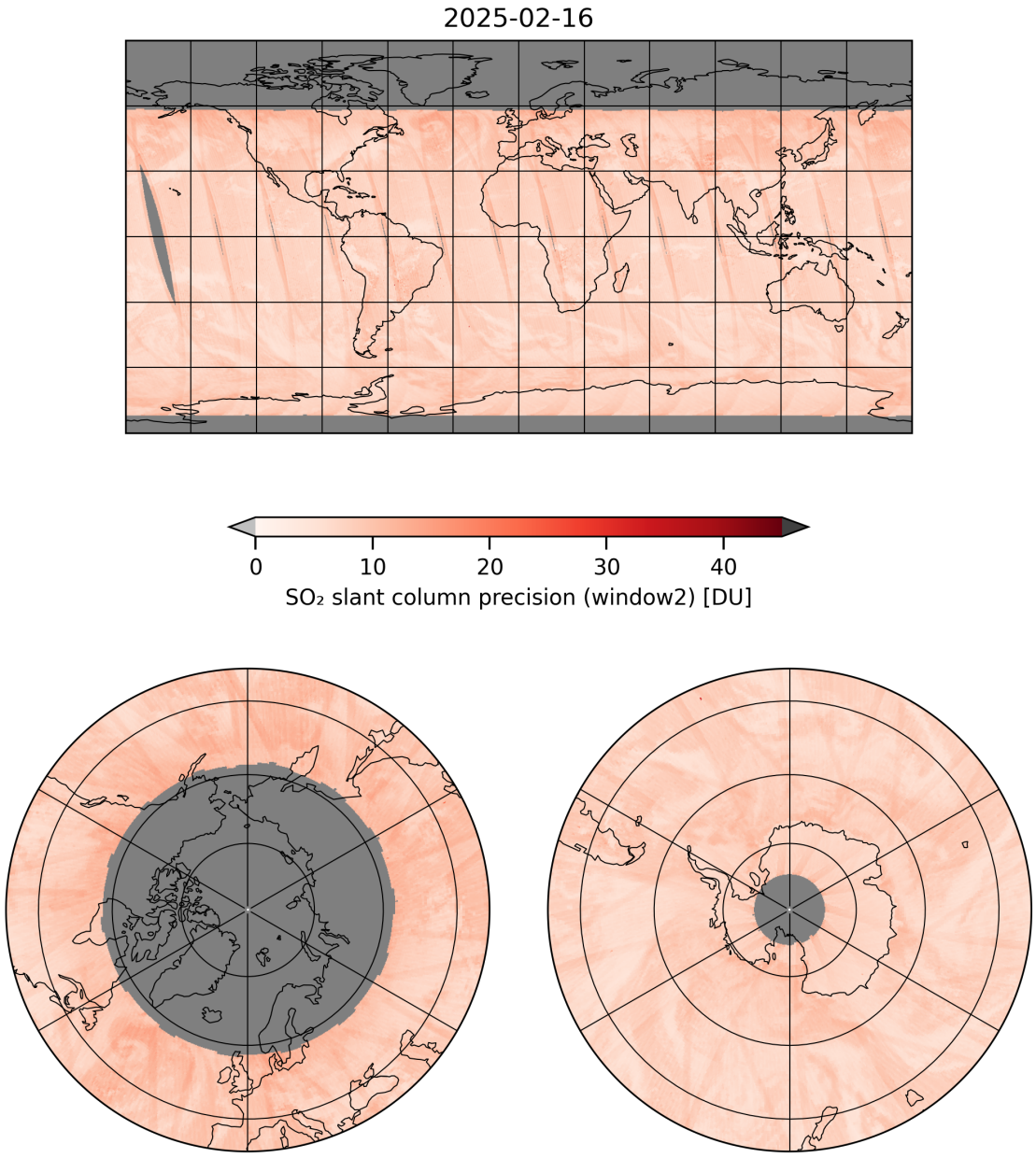


Figure 14: Map of "SO_2 slant column precision (window2)" for 2025-02-16 to 2025-02-16

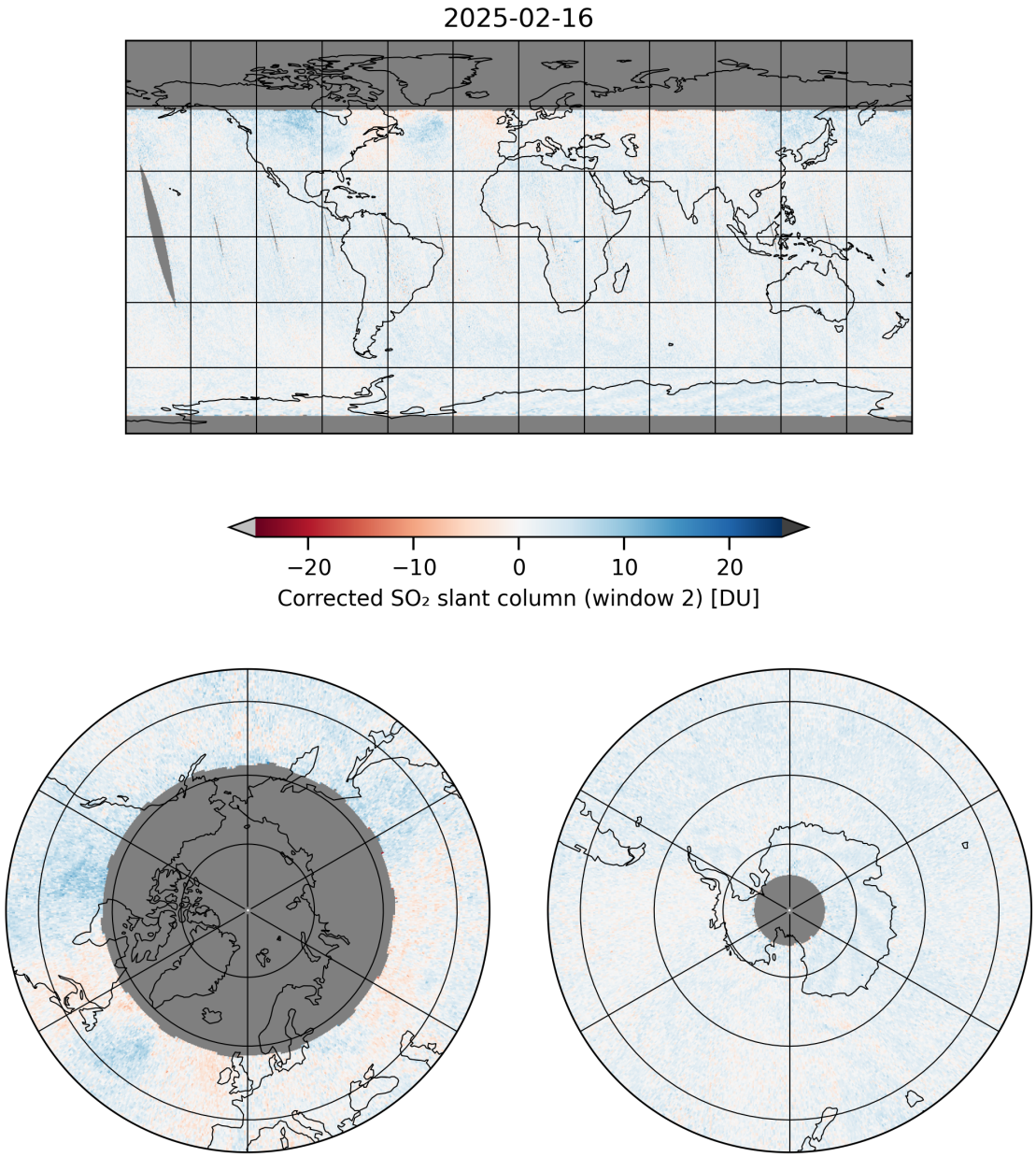


Figure 15: Map of “Corrected SO_2 slant column (window 2)” for 2025-02-16 to 2025-02-16

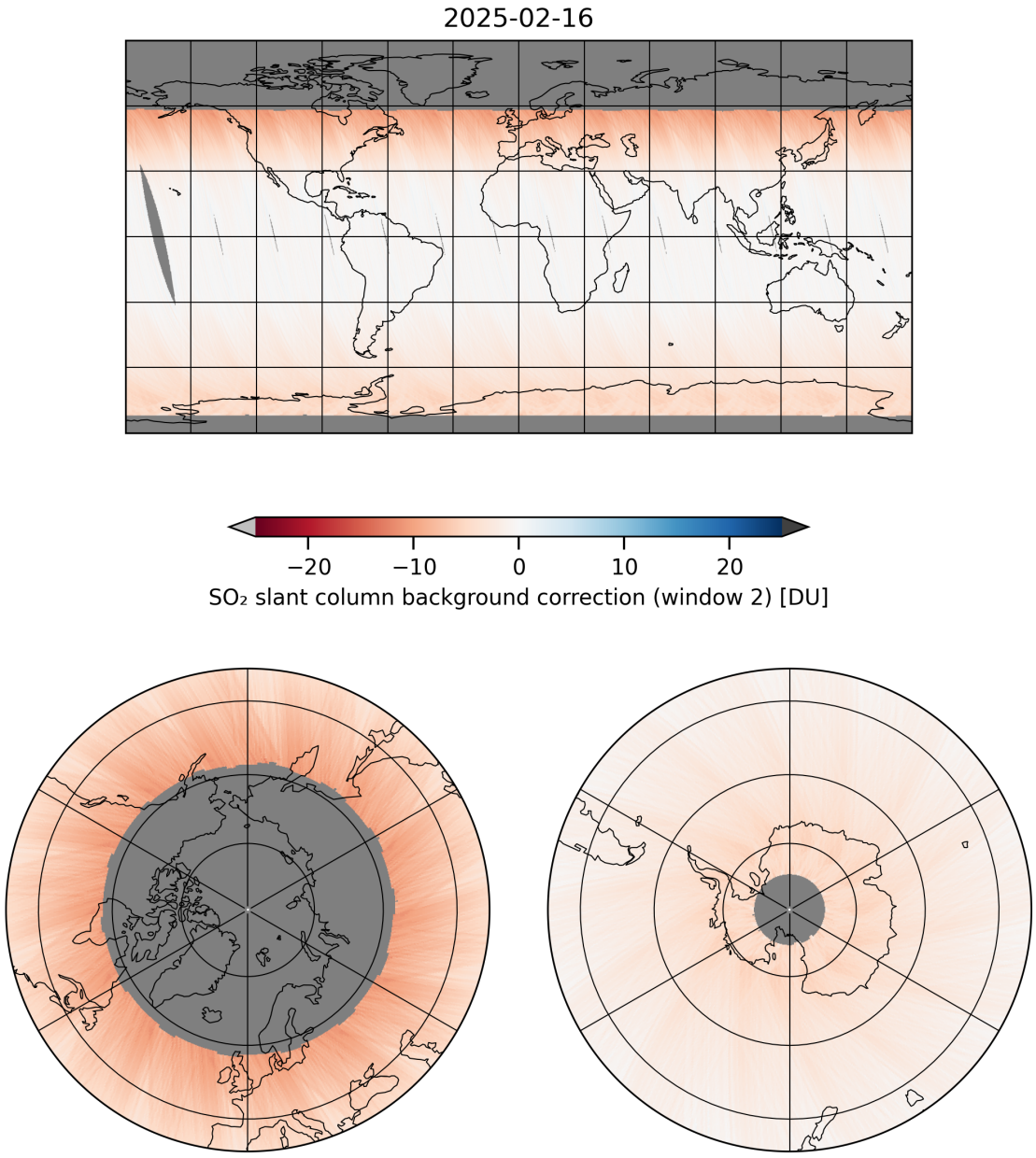


Figure 16: Map of "SO_2 slant column background correction (window 2)" for 2025-02-16 to 2025-02-16

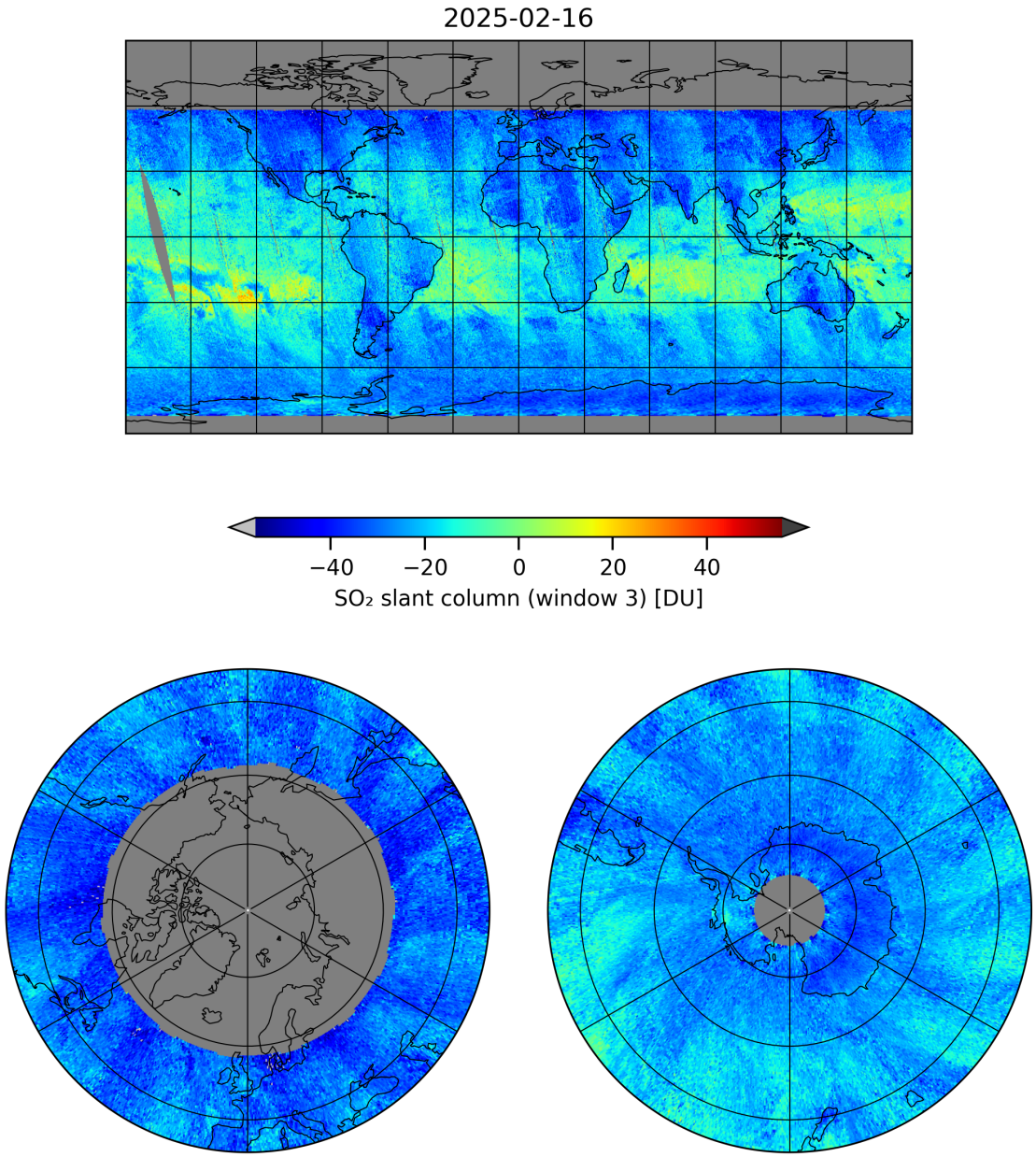


Figure 17: Map of "SO_2 slant column (window 3)" for 2025-02-16 to 2025-02-16

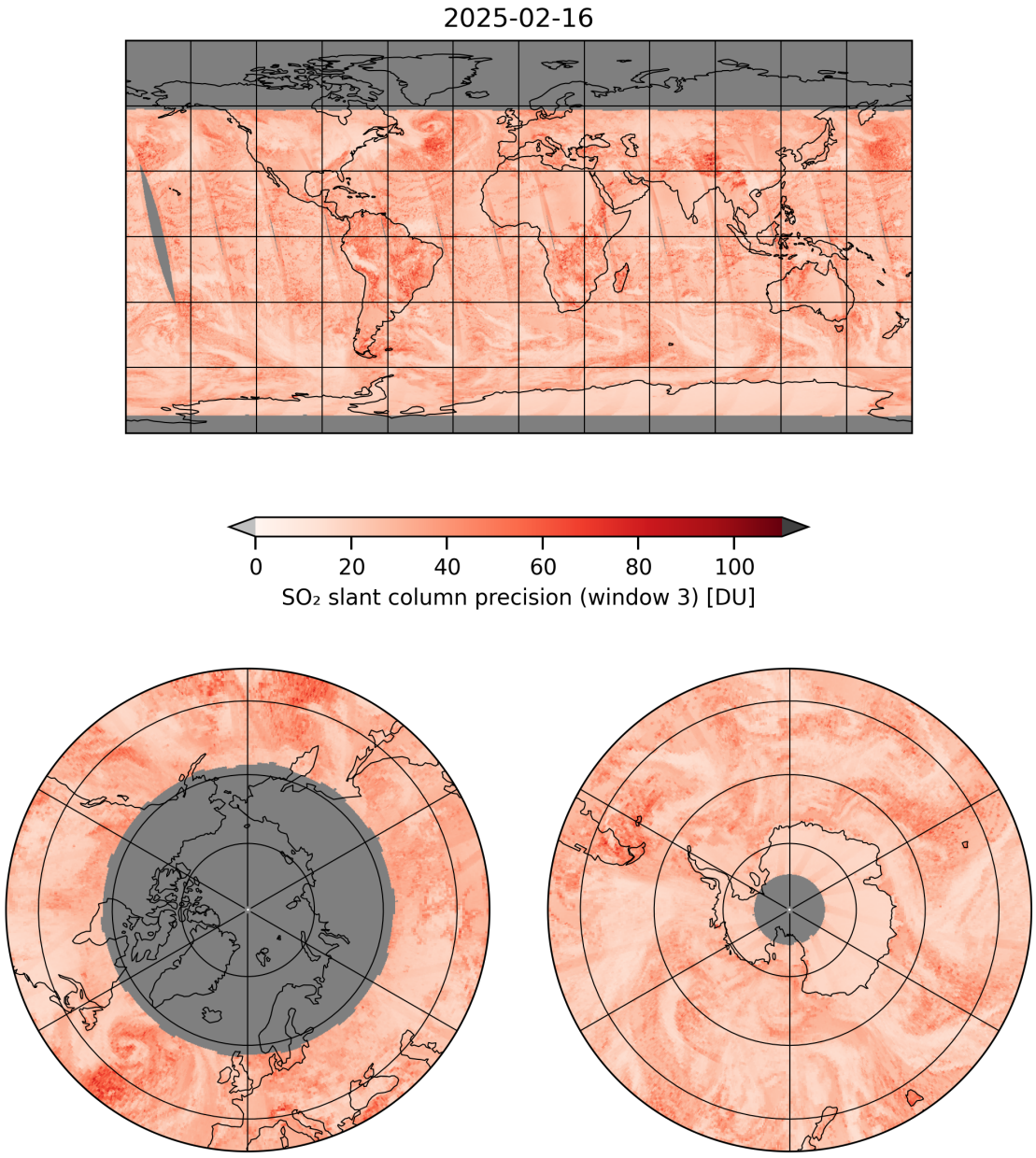


Figure 18: Map of "SO_2 slant column precision (window 3)" for 2025-02-16 to 2025-02-16

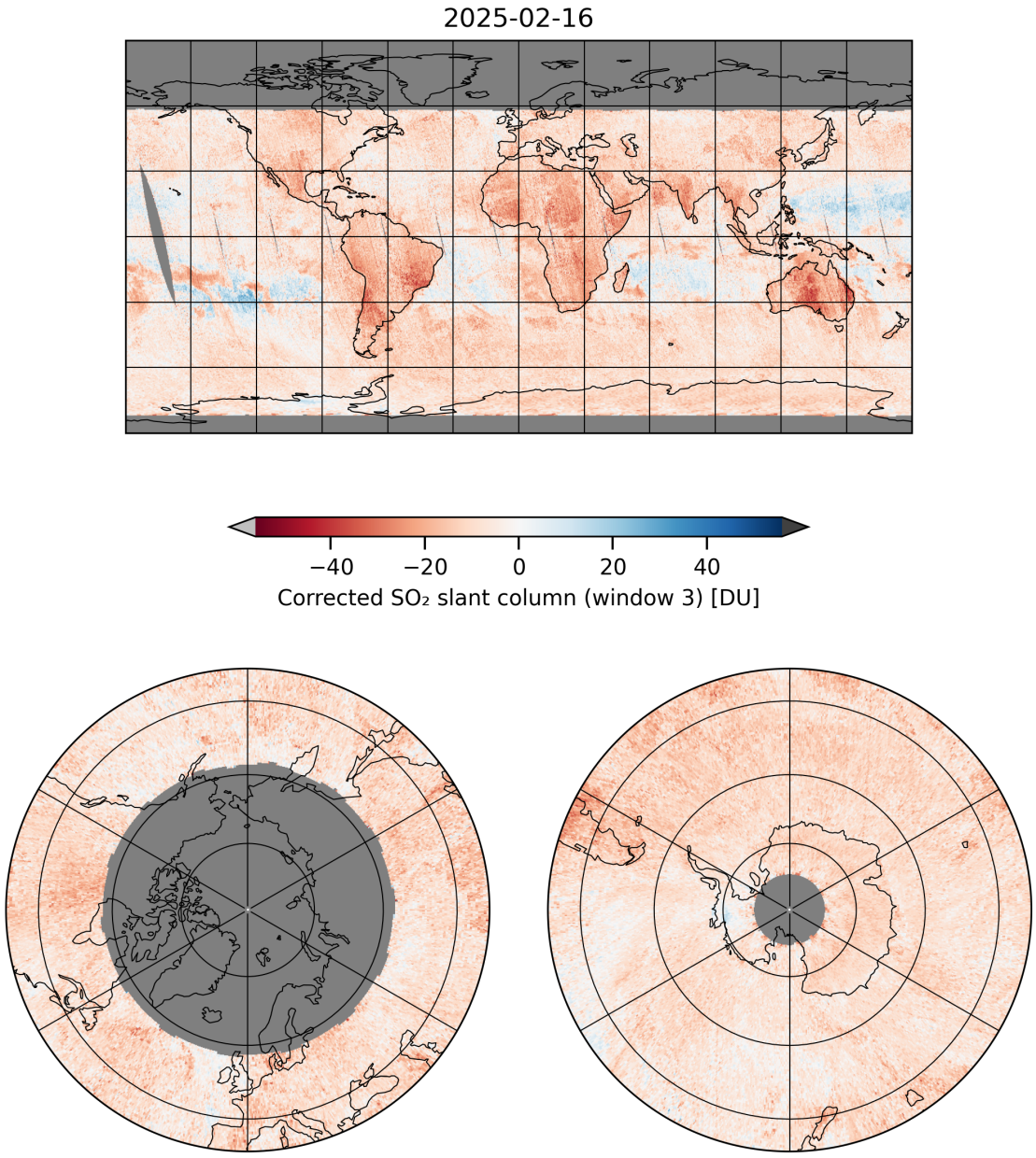


Figure 19: Map of "Corrected SO_2 slant column (window 3)" for 2025-02-16 to 2025-02-16

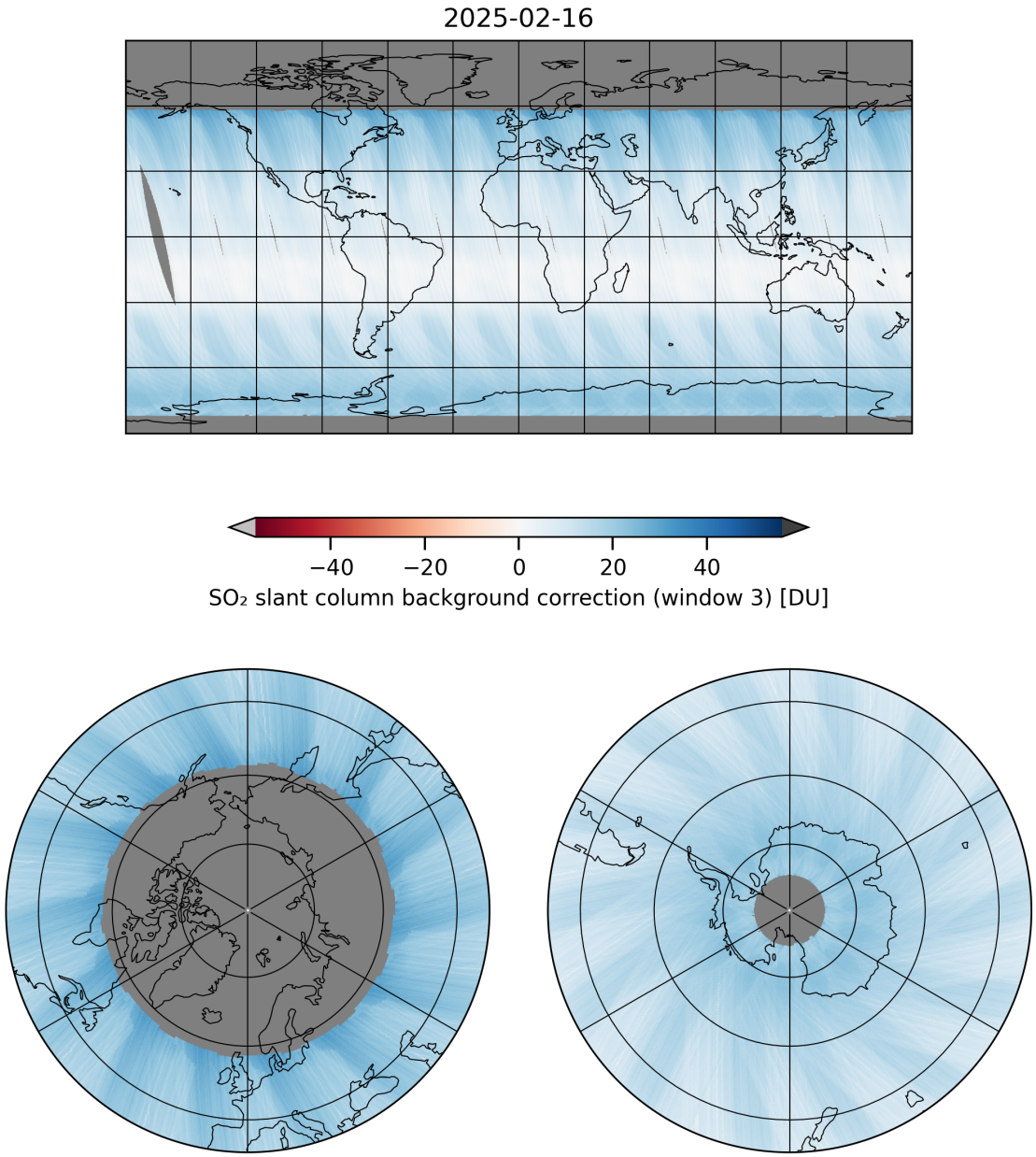


Figure 20: Map of "SO_2 slant column background correction (window 3)" for 2025-02-16 to 2025-02-16

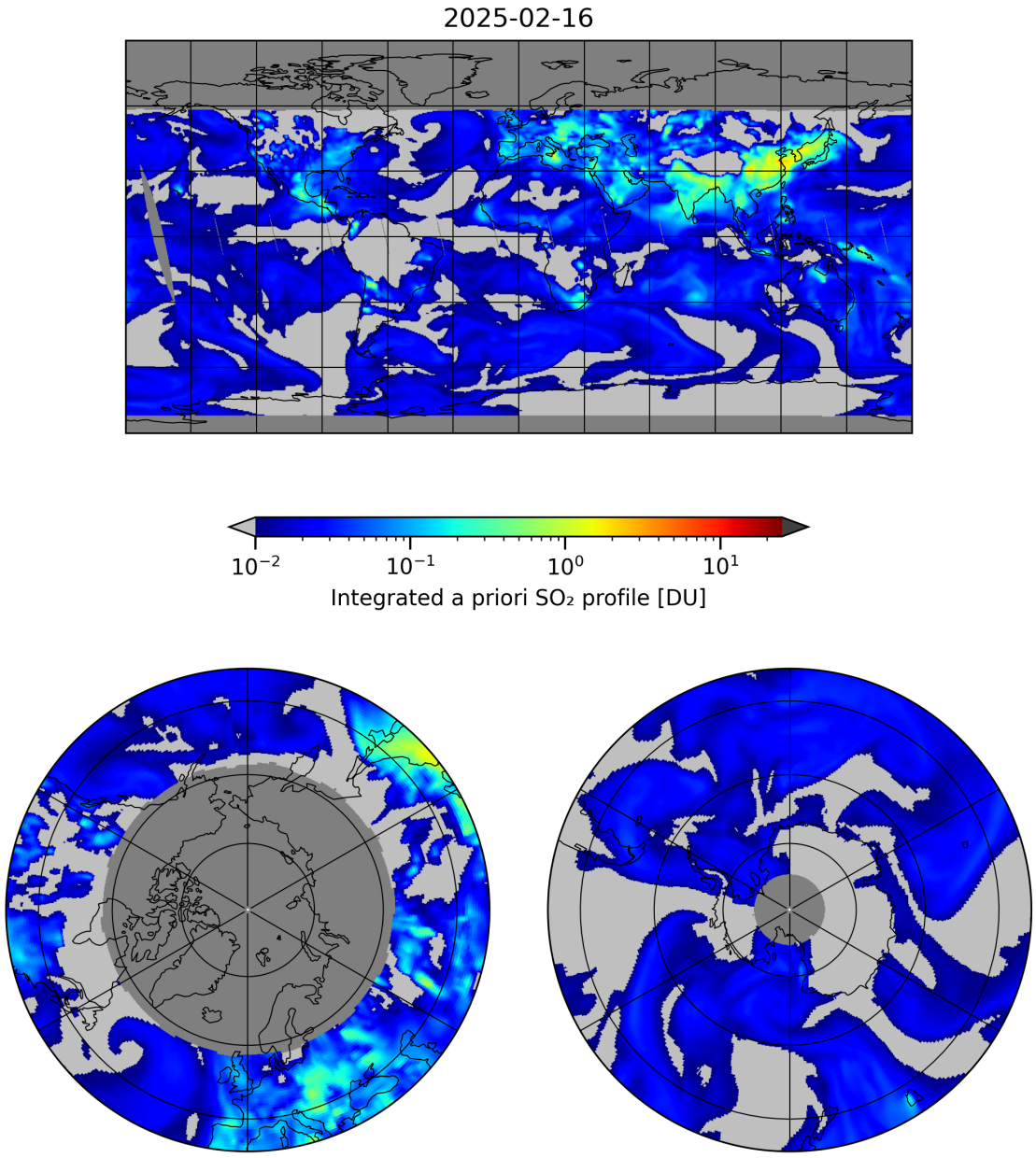


Figure 21: Map of “Integrated a priori SO_2 profile” for 2025-02-16 to 2025-02-16

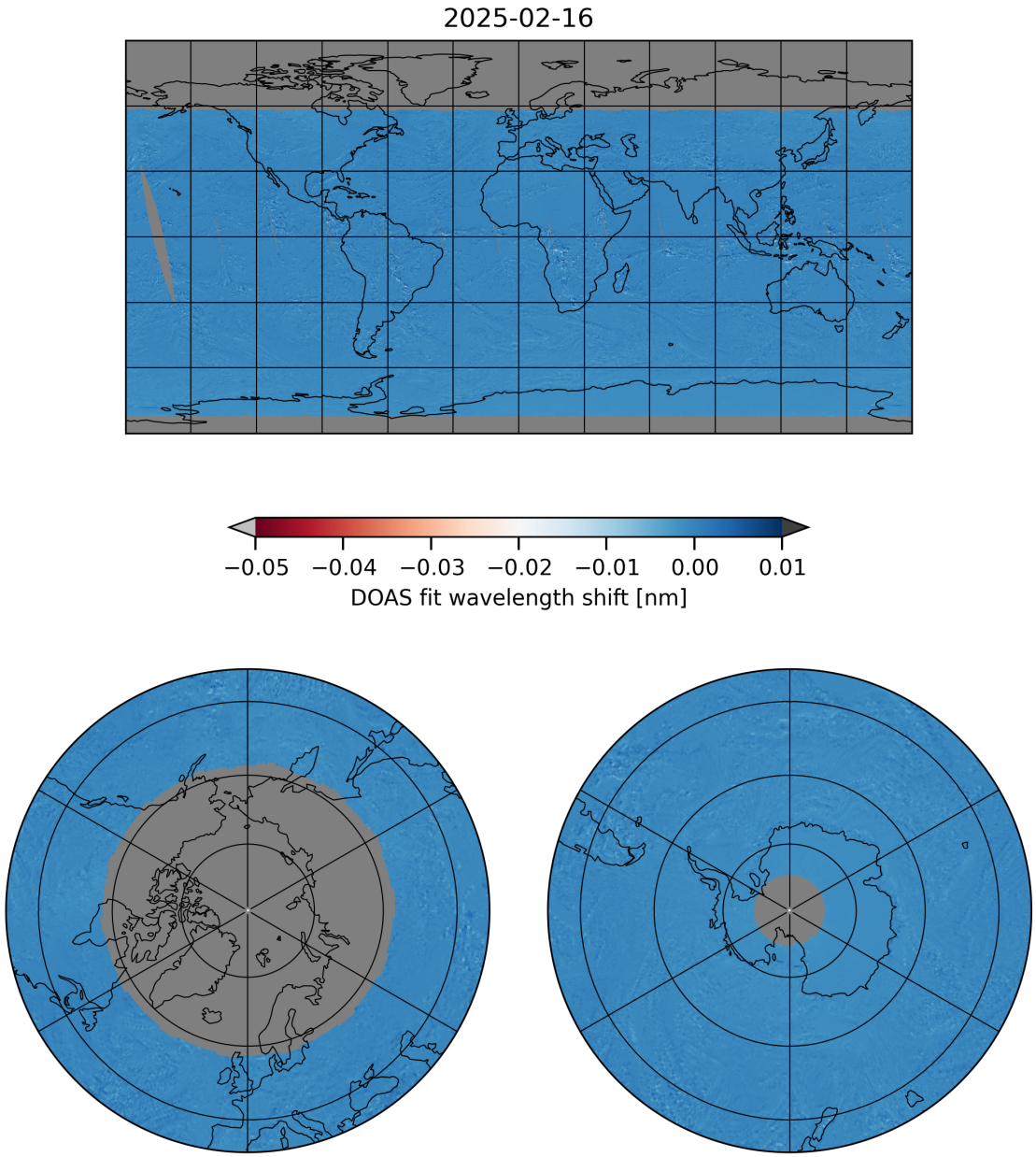


Figure 22: Map of “DOAS fit wavelength shift” for 2025-02-16 to 2025-02-16

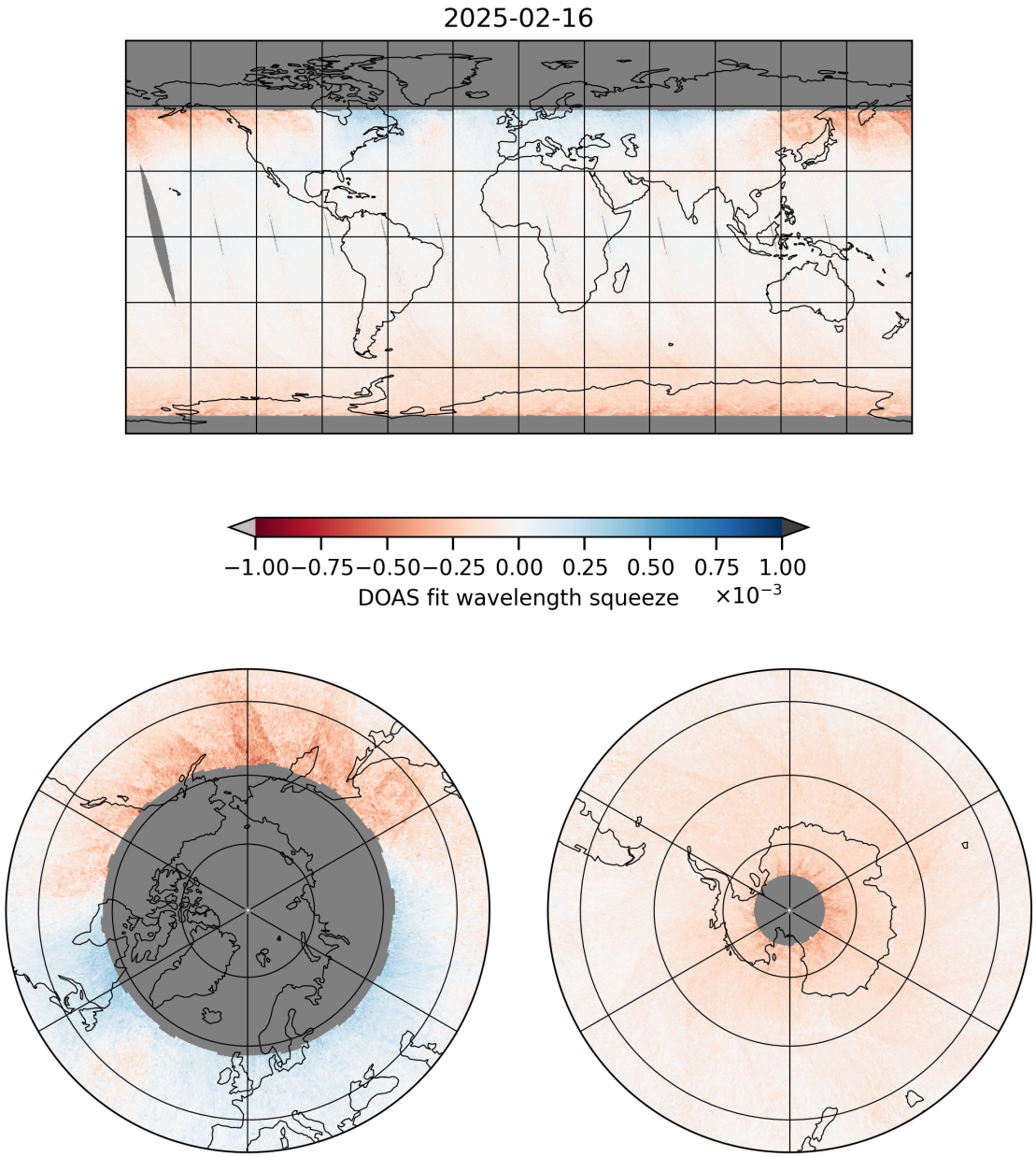


Figure 23: Map of “DOAS fit wavelength squeeze” for 2025-02-16 to 2025-02-16

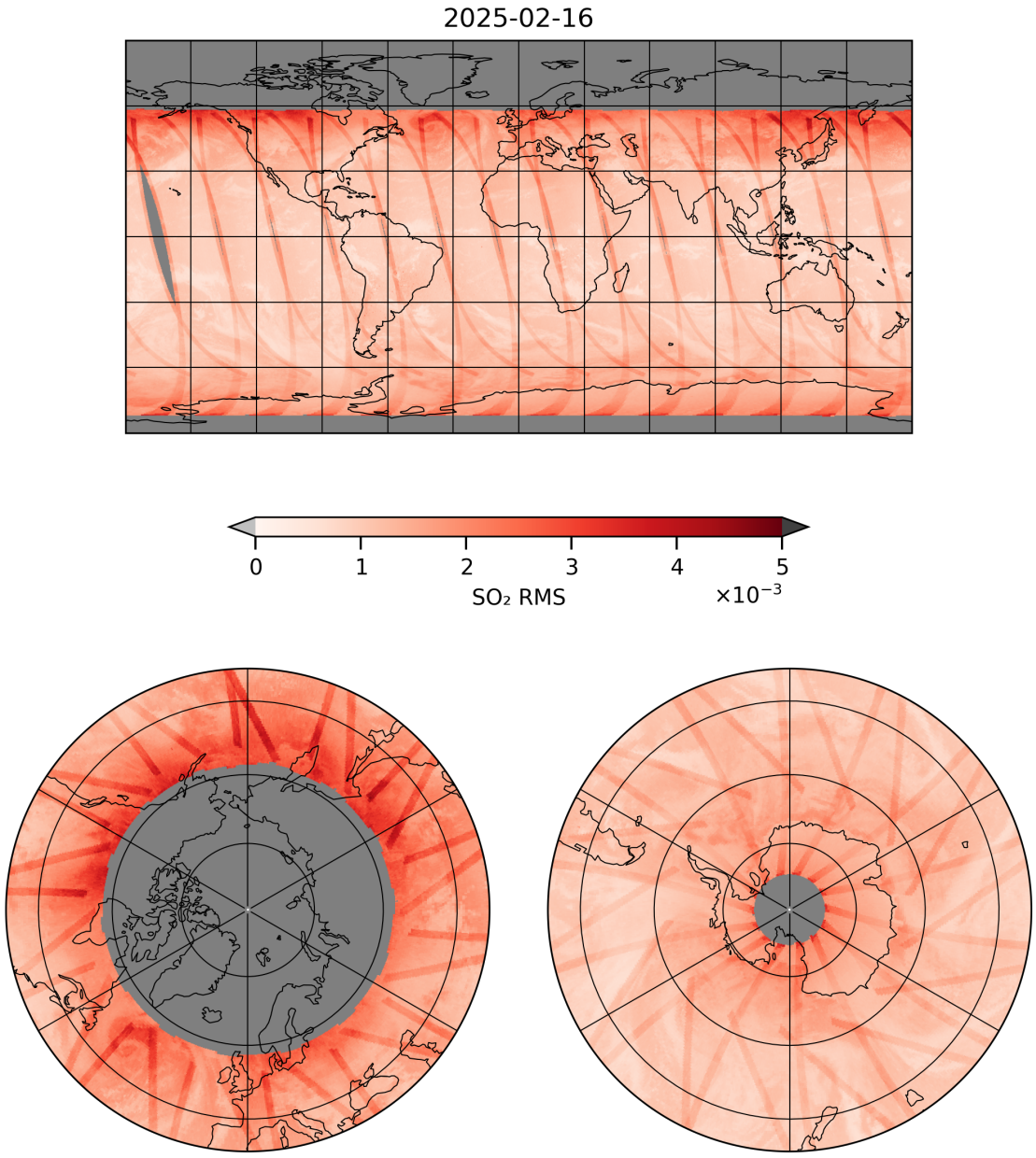


Figure 24: Map of "SO_2 RMS" for 2025-02-16 to 2025-02-16

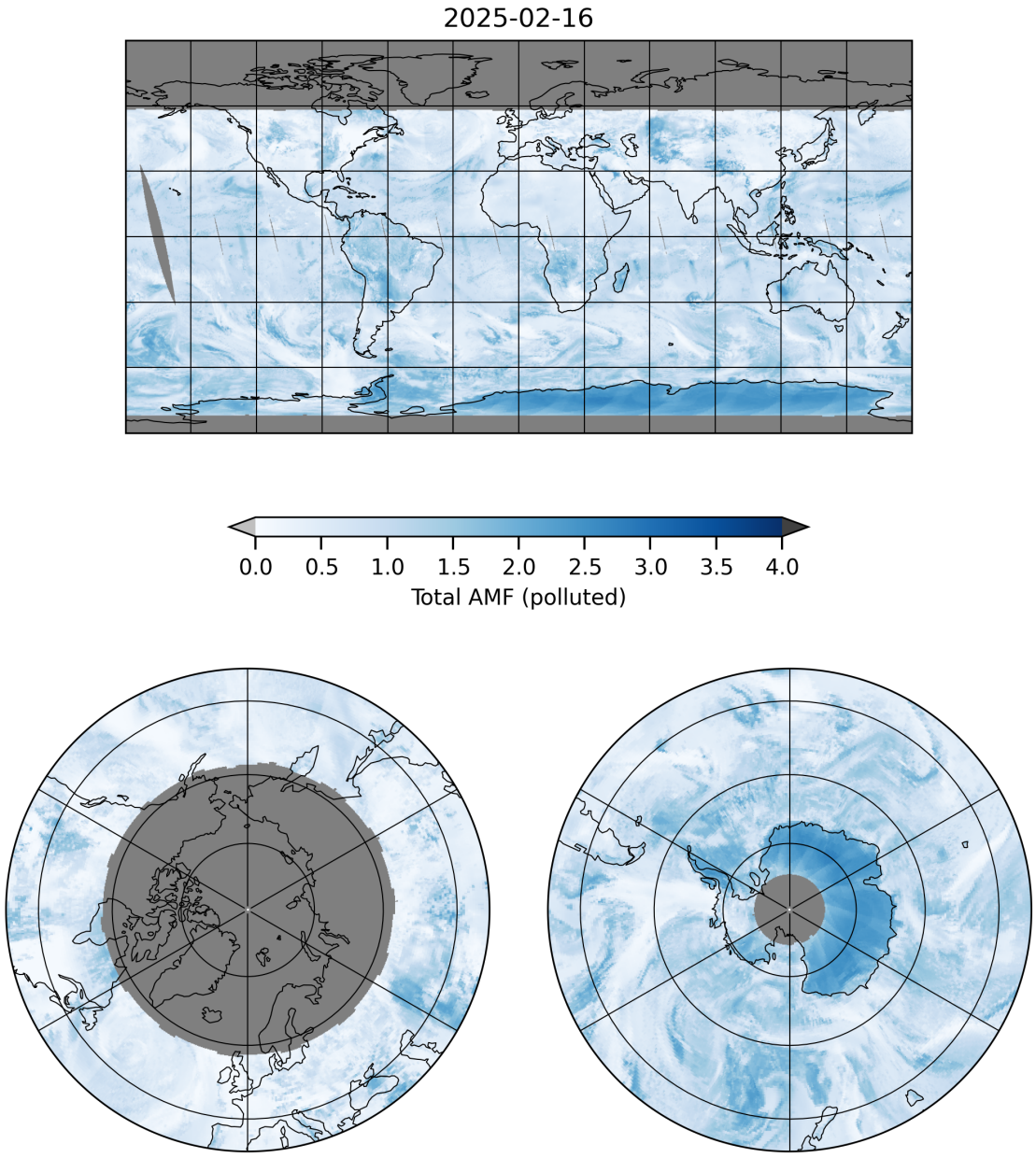


Figure 25: Map of “Total AMF (polluted)” for 2025-02-16 to 2025-02-16

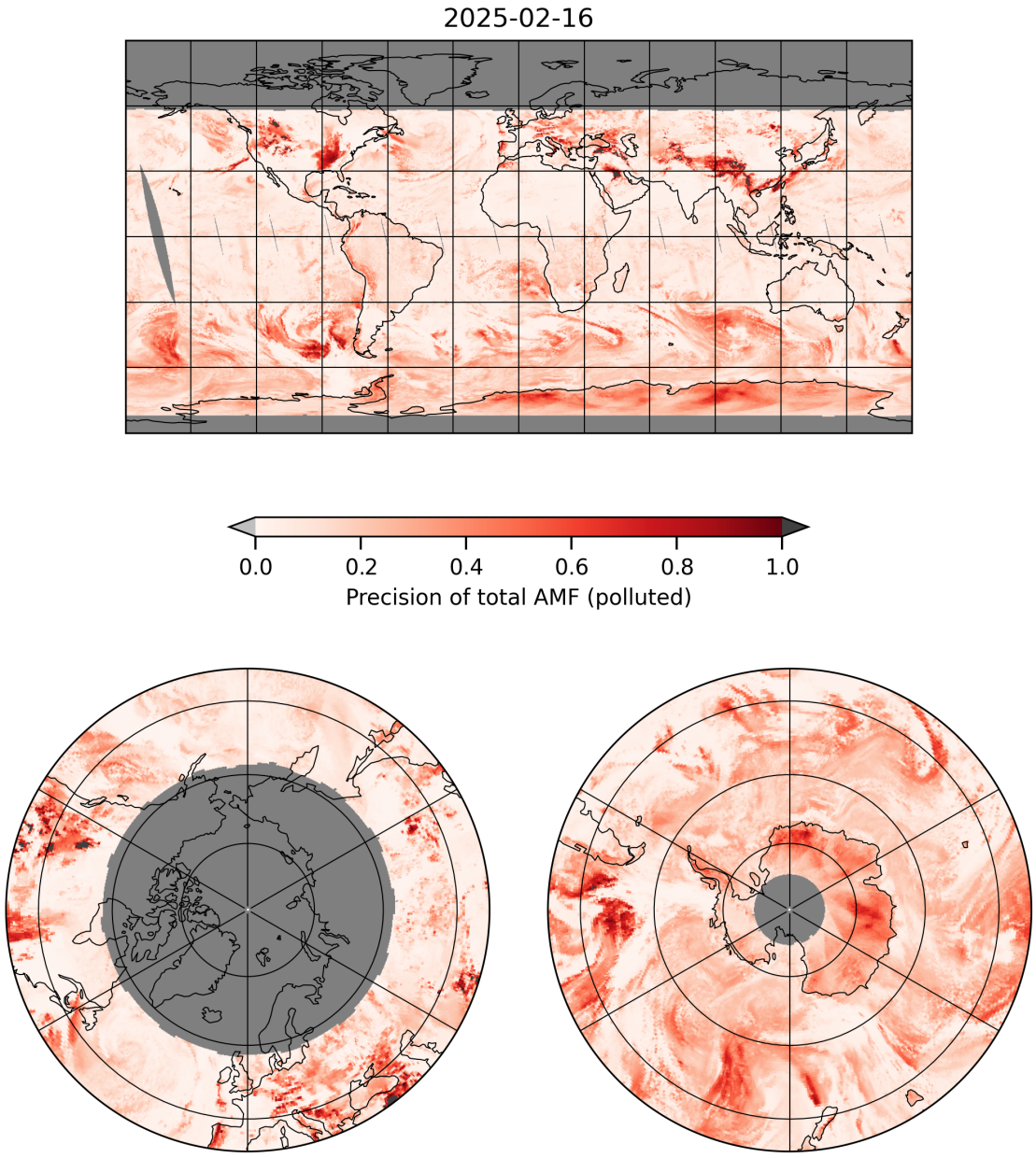


Figure 26: Map of “Precision of total AMF (polluted)” for 2025-02-16 to 2025-02-16

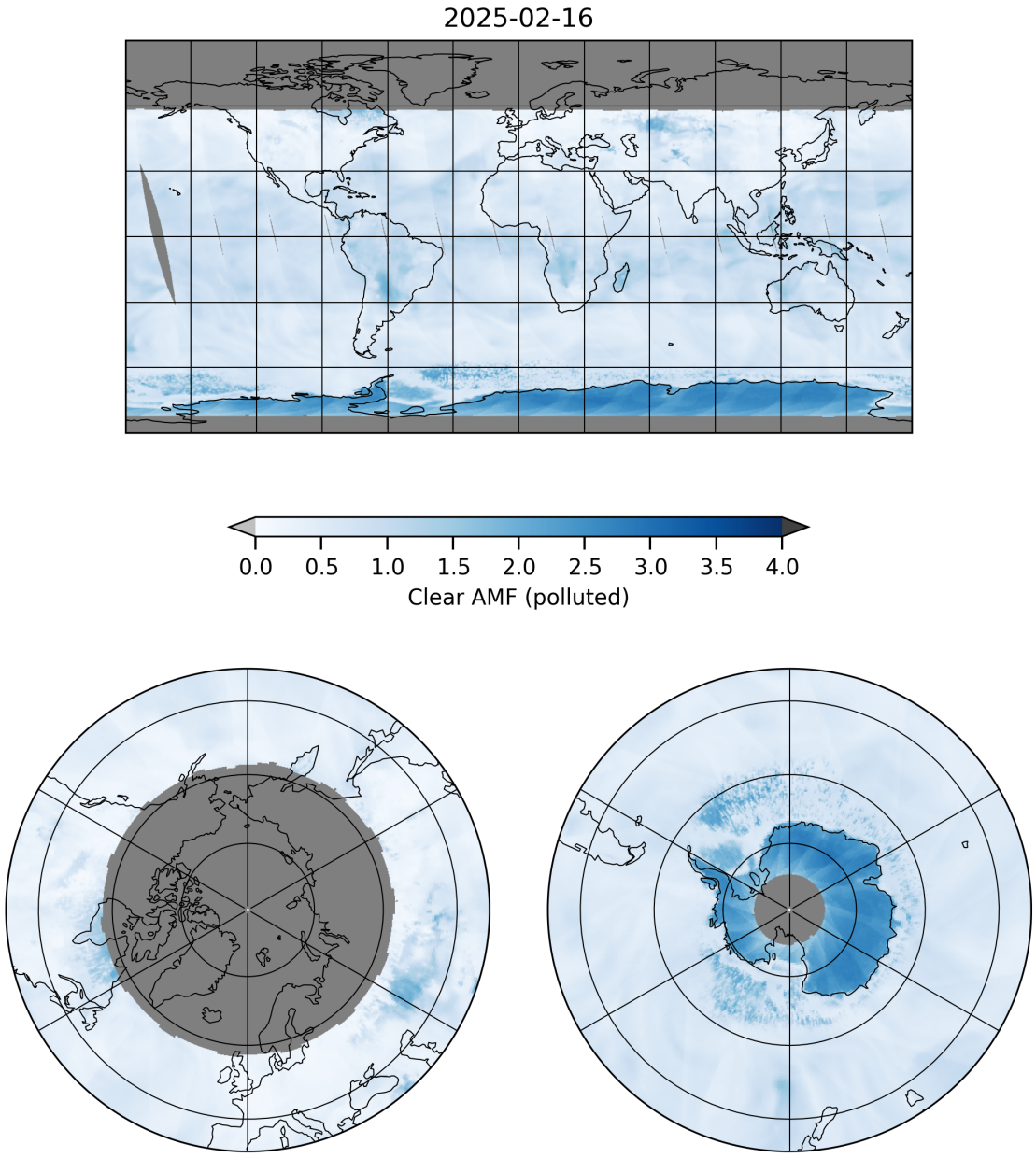


Figure 27: Map of “Clear AMF (polluted)” for 2025-02-16 to 2025-02-16

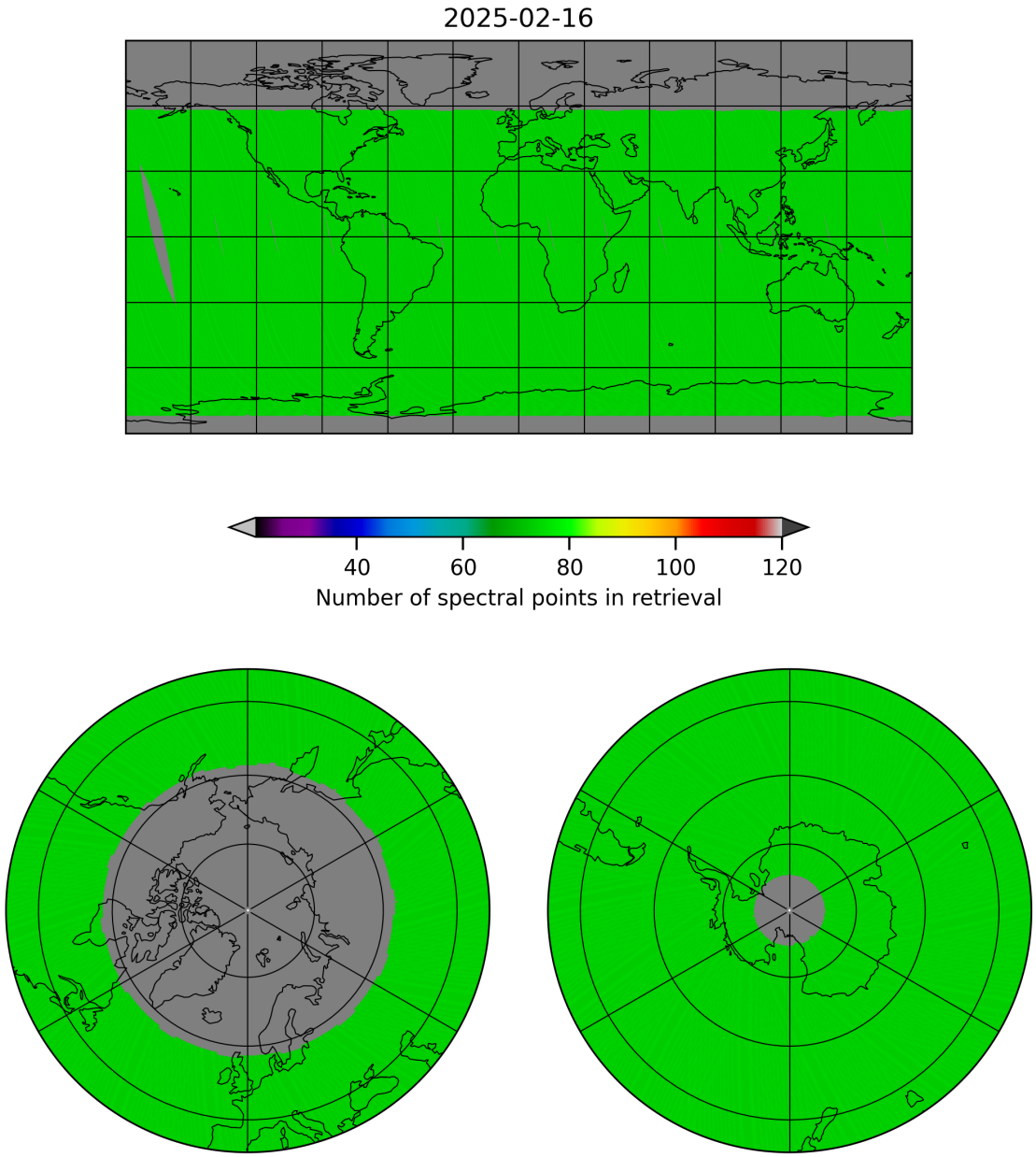


Figure 28: Map of “Number of spectral points in retrieval” for 2025-02-16 to 2025-02-16

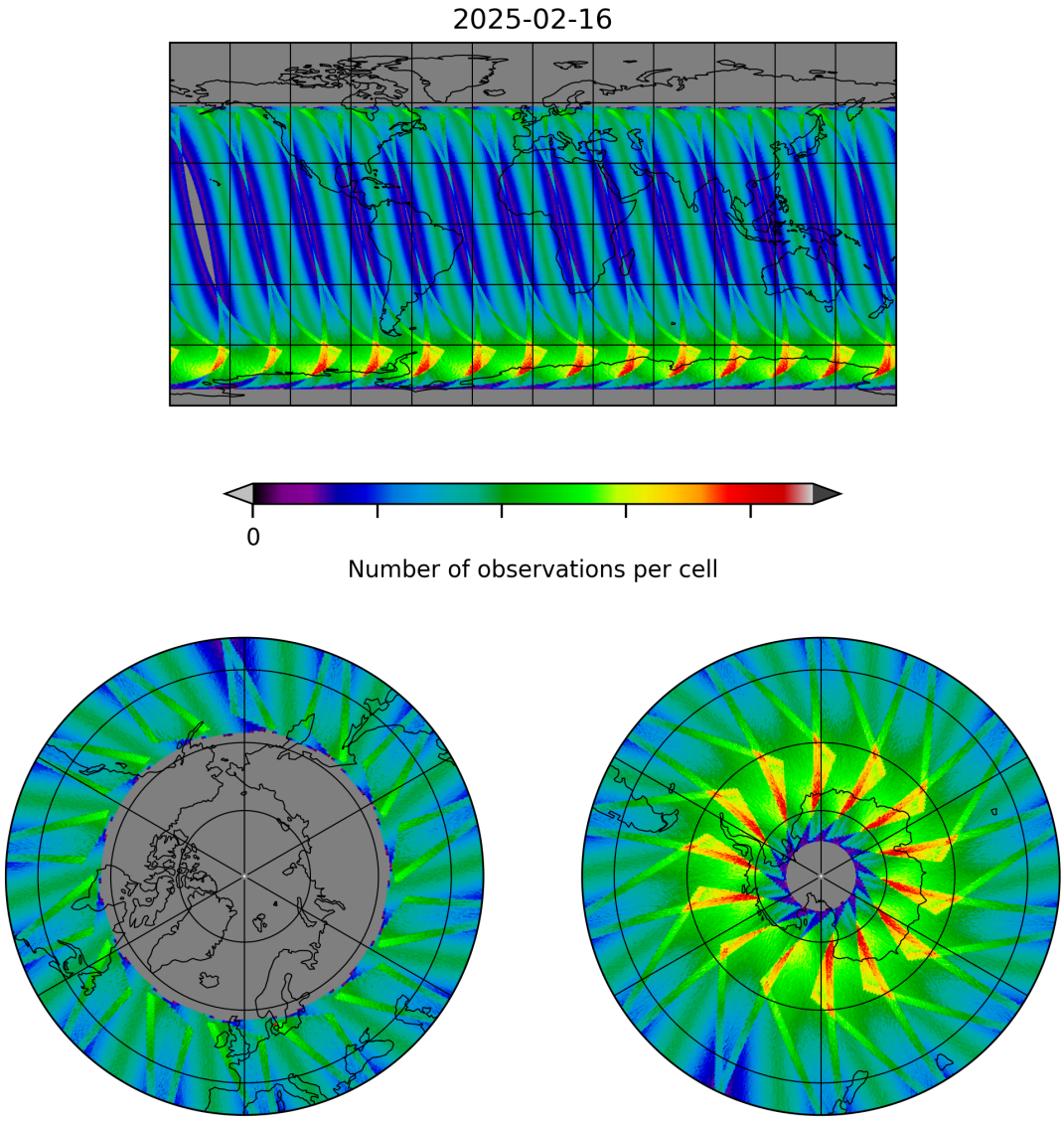


Figure 29: Map of the number of observations for 2025-02-16 to 2025-02-16

7 Zonal average

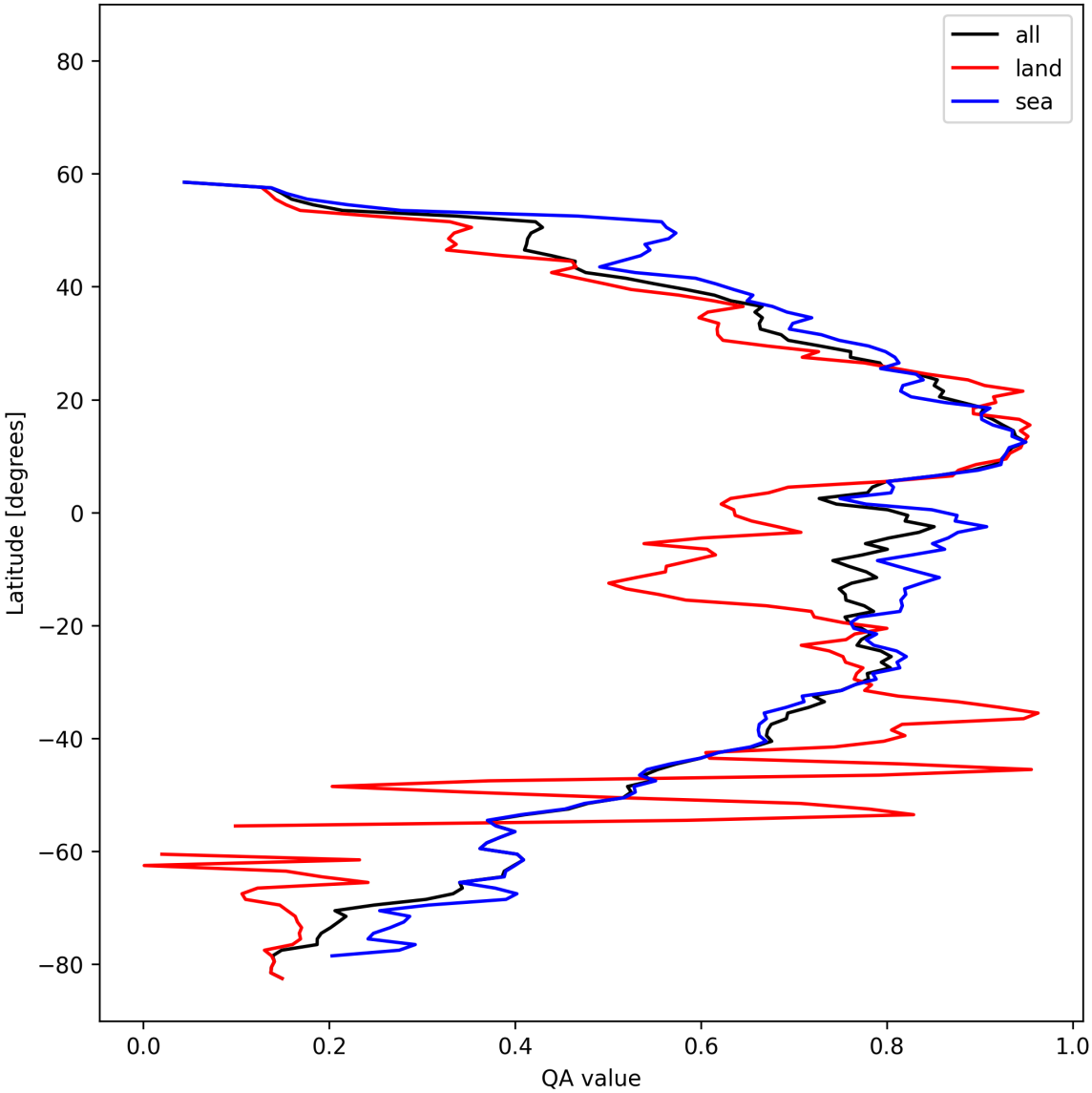


Figure 30: Zonal average of “QA value” for 2025-02-16 to 2025-02-16.

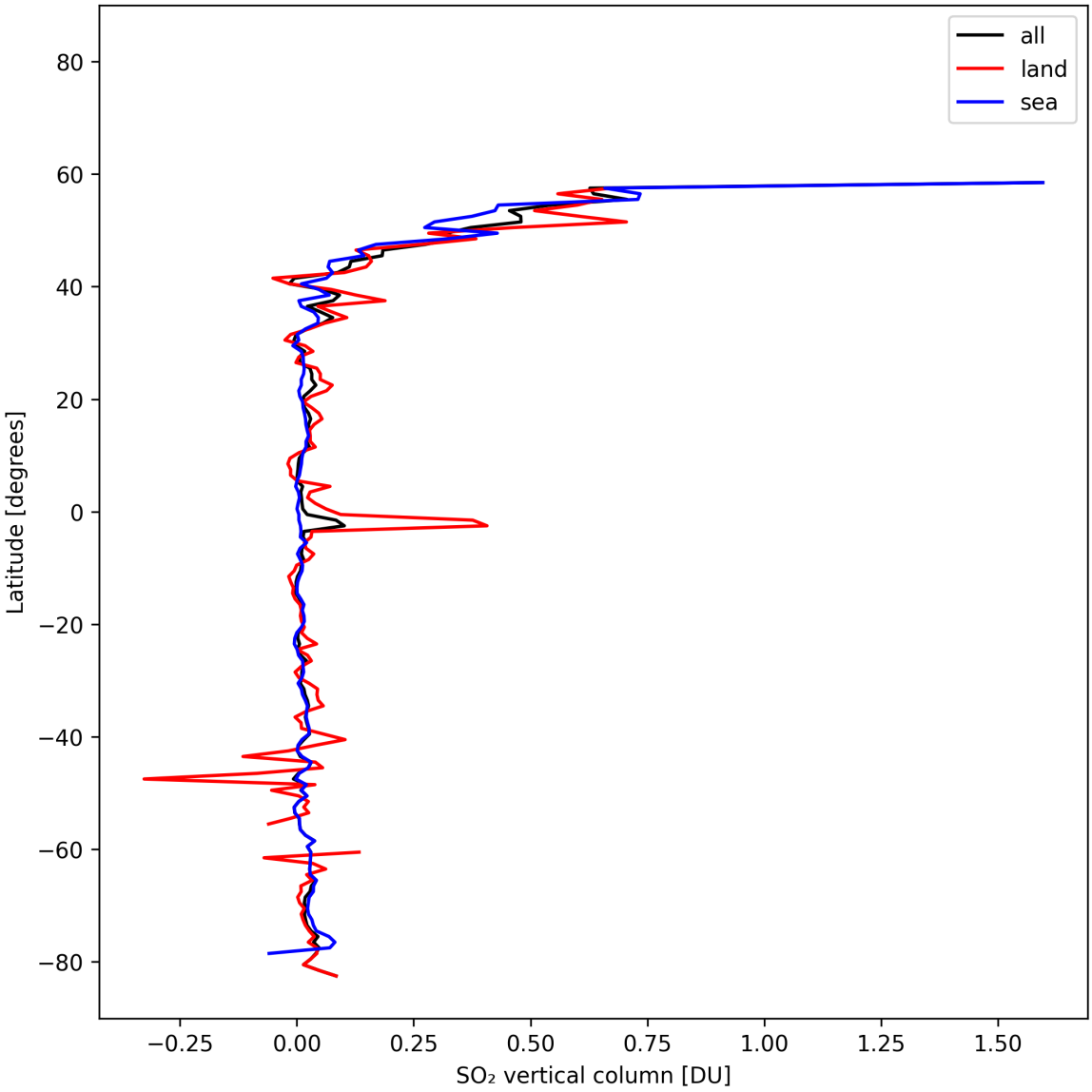


Figure 31: Zonal average of "SO_2 vertical column" for 2025-02-16 to 2025-02-16.

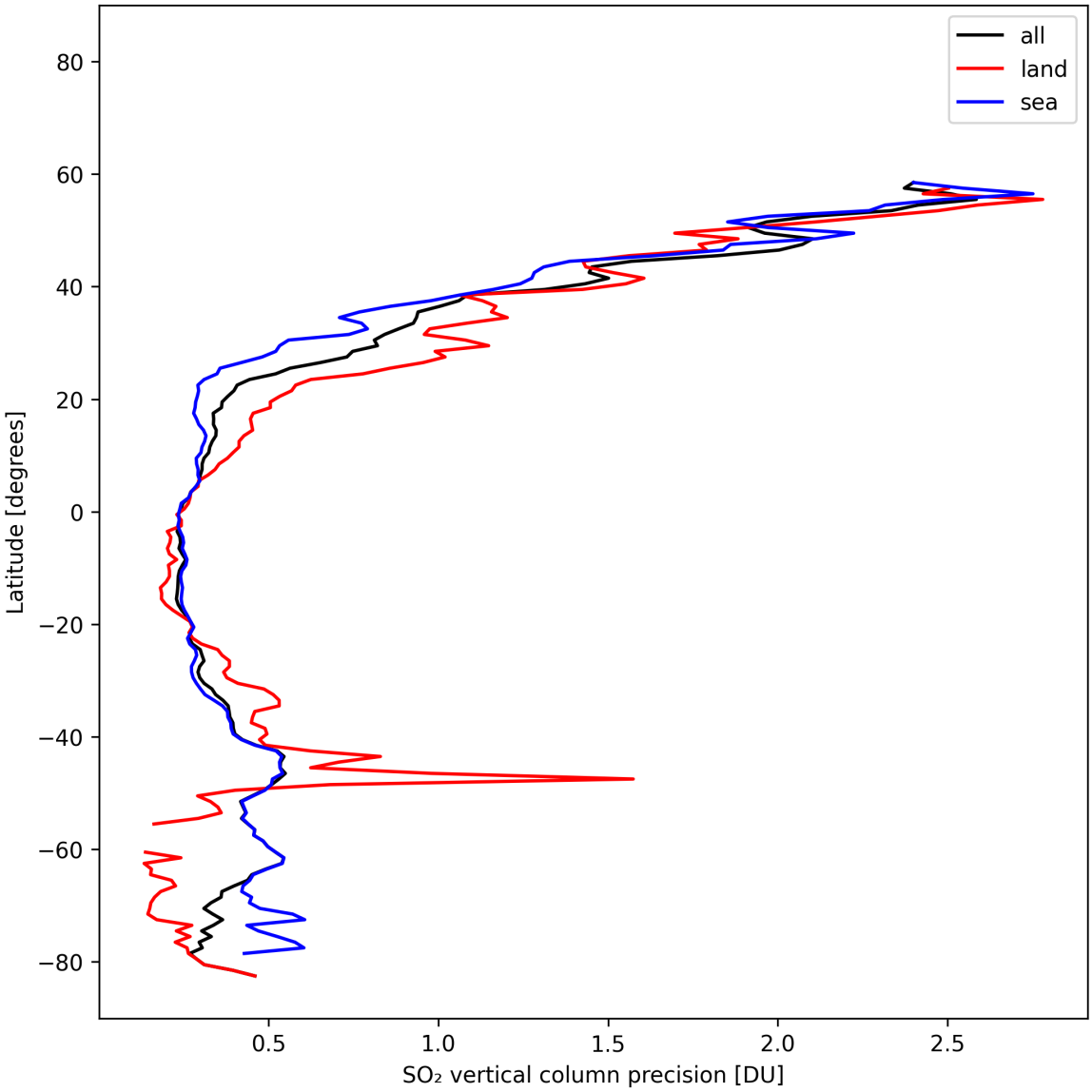


Figure 32: Zonal average of "SO_2 vertical column precision" for 2025-02-16 to 2025-02-16.

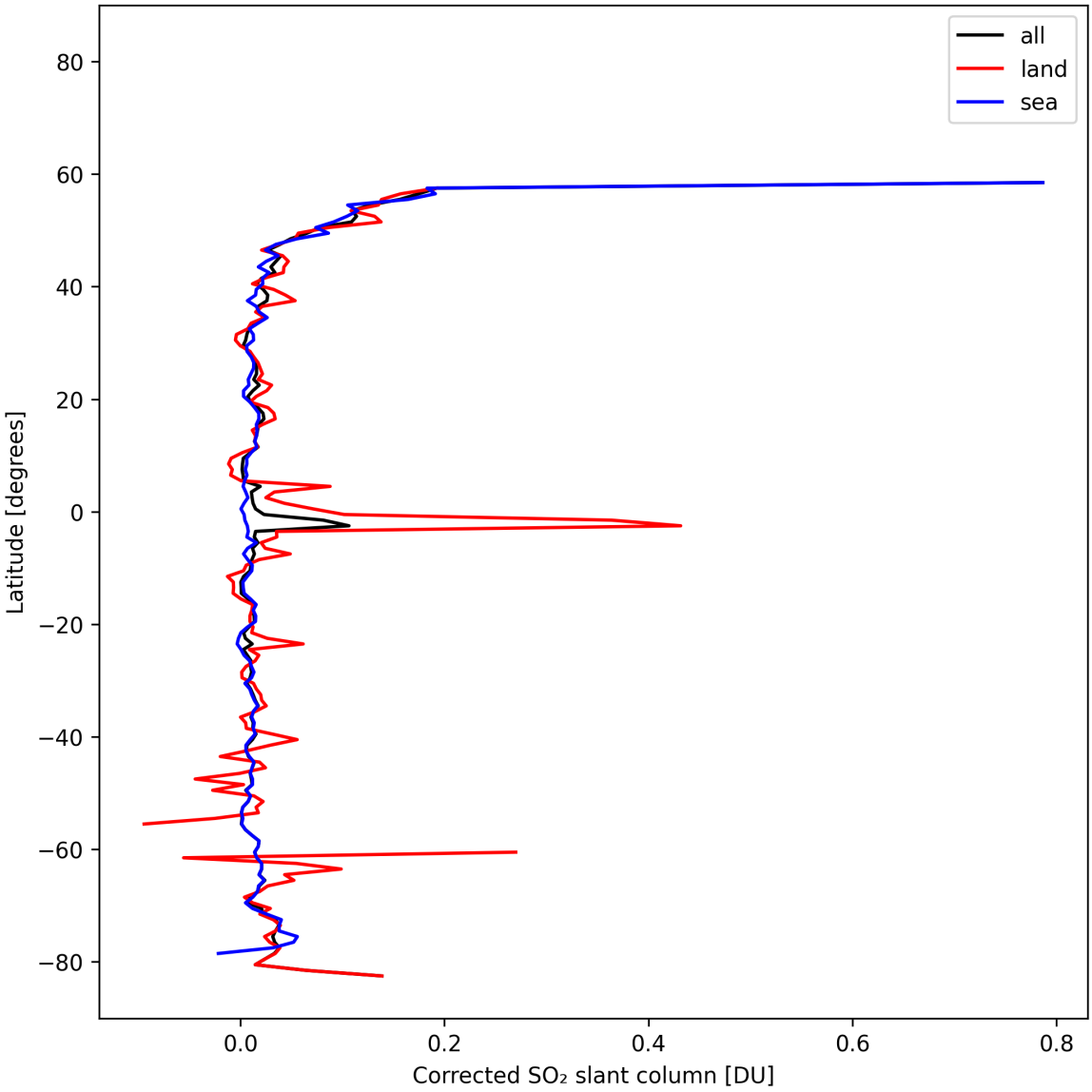


Figure 33: Zonal average of “Corrected SO_2 slant column” for 2025-02-16 to 2025-02-16.

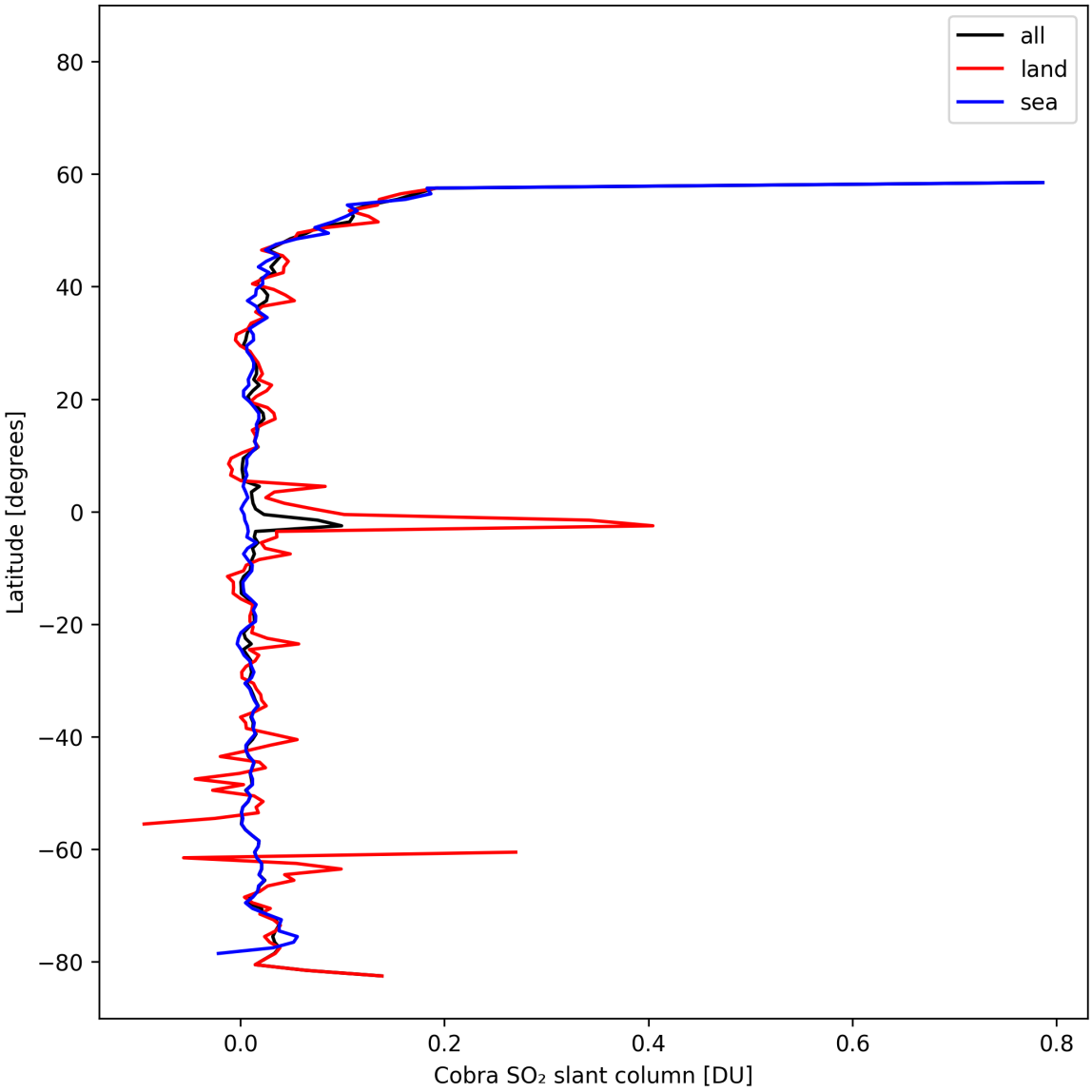


Figure 34: Zonal average of “Cobra SO_2 slant column” for 2025-02-16 to 2025-02-16.

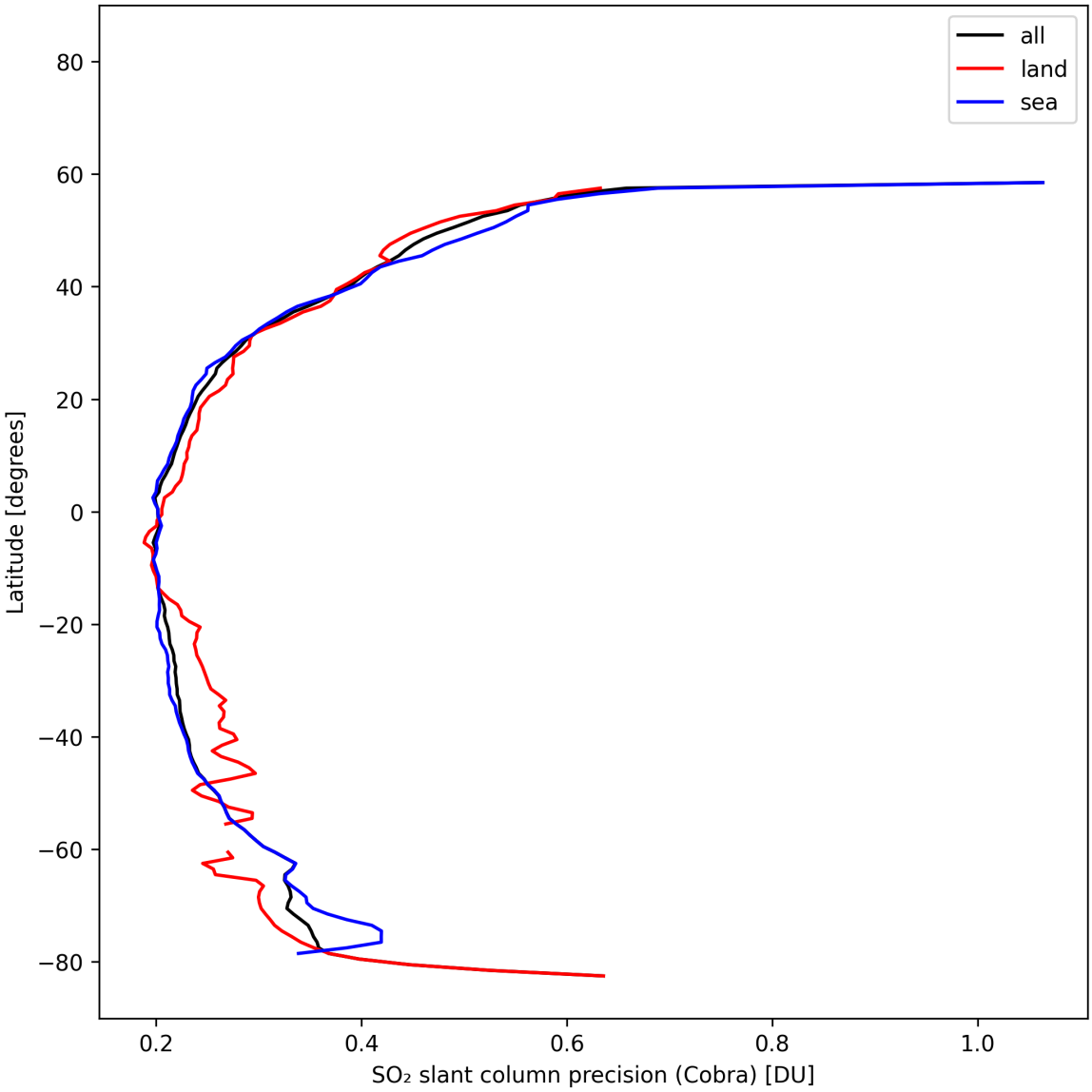


Figure 35: Zonal average of "SO_2 slant column precision (Cobra)" for 2025-02-16 to 2025-02-16.

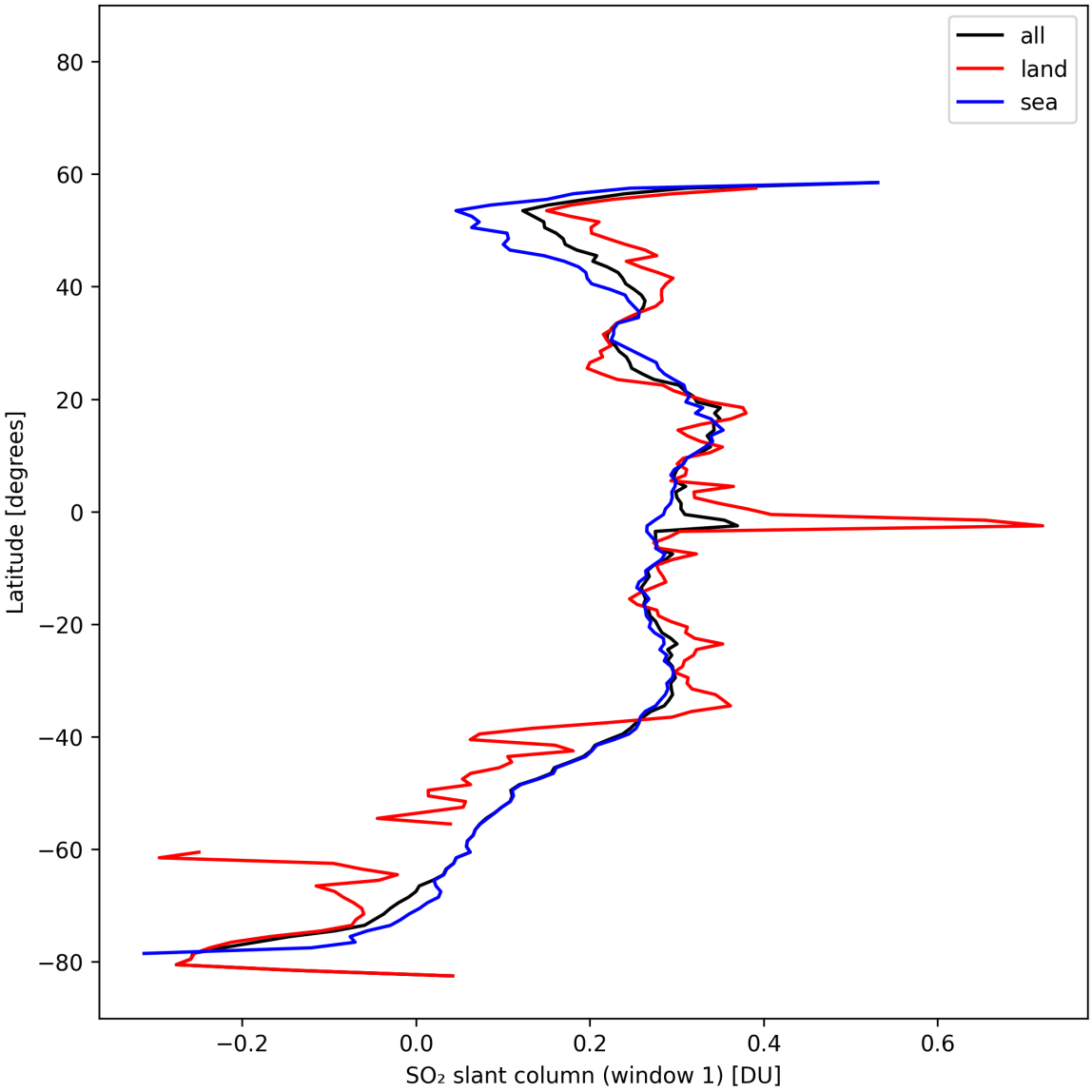


Figure 36: Zonal average of "SO_2 slant column (window 1)" for 2025-02-16 to 2025-02-16.

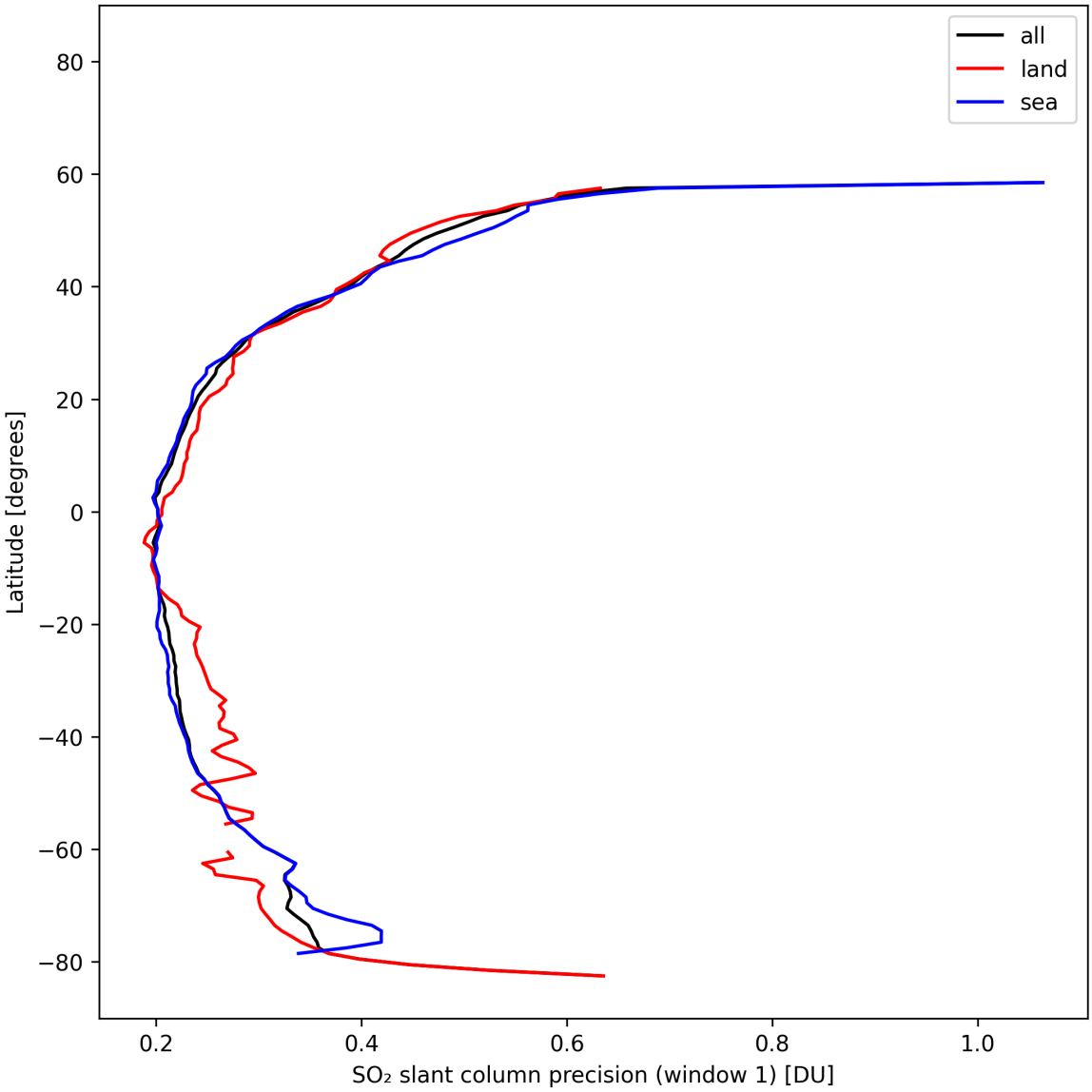


Figure 37: Zonal average of "SO_2 slant column precision (window 1)" for 2025-02-16 to 2025-02-16.

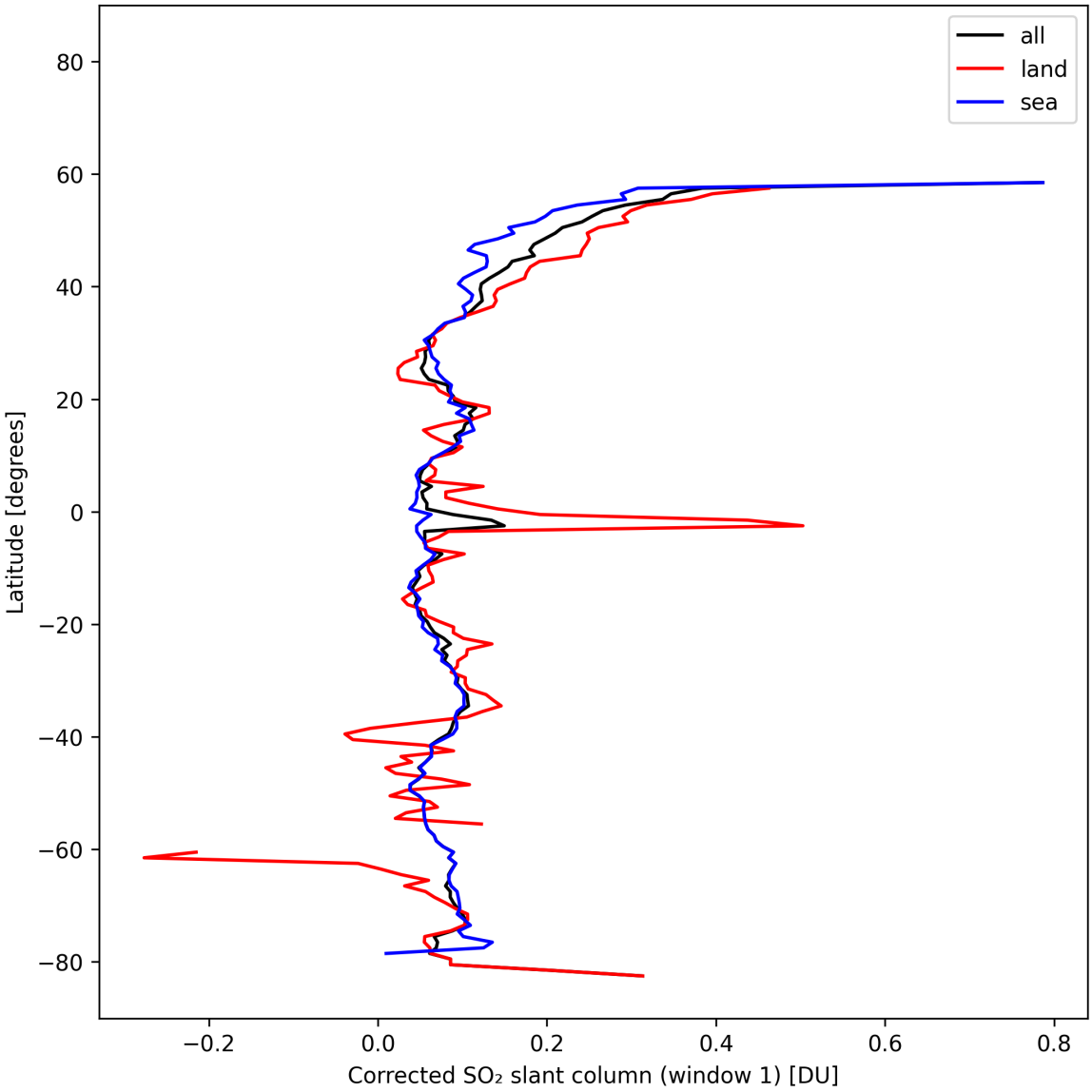


Figure 38: Zonal average of "Corrected SO_2 slant column (window 1)" for 2025-02-16 to 2025-02-16.

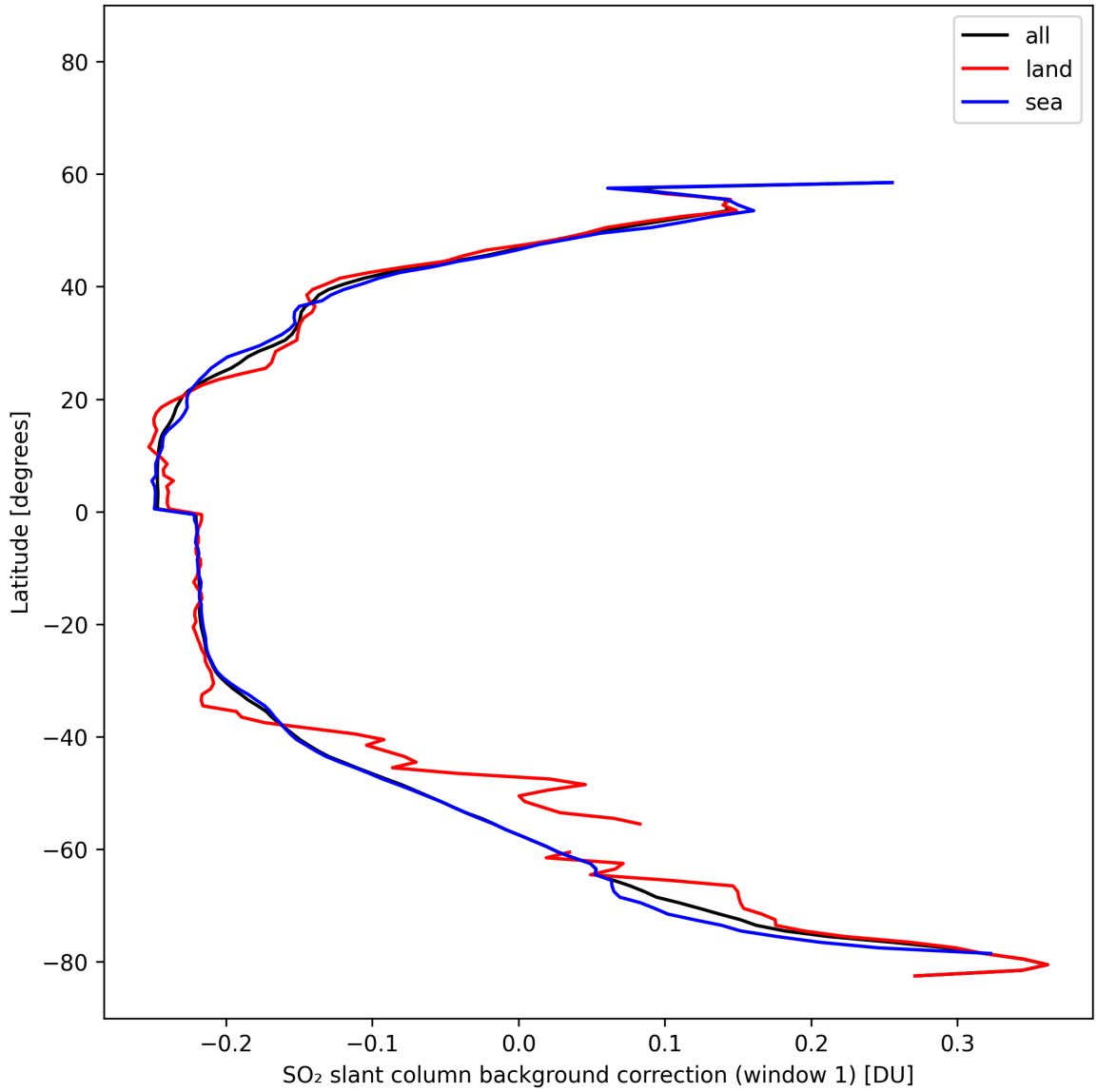


Figure 39: Zonal average of "SO_2 slant column background correction (window 1)" for 2025-02-16 to 2025-02-16.

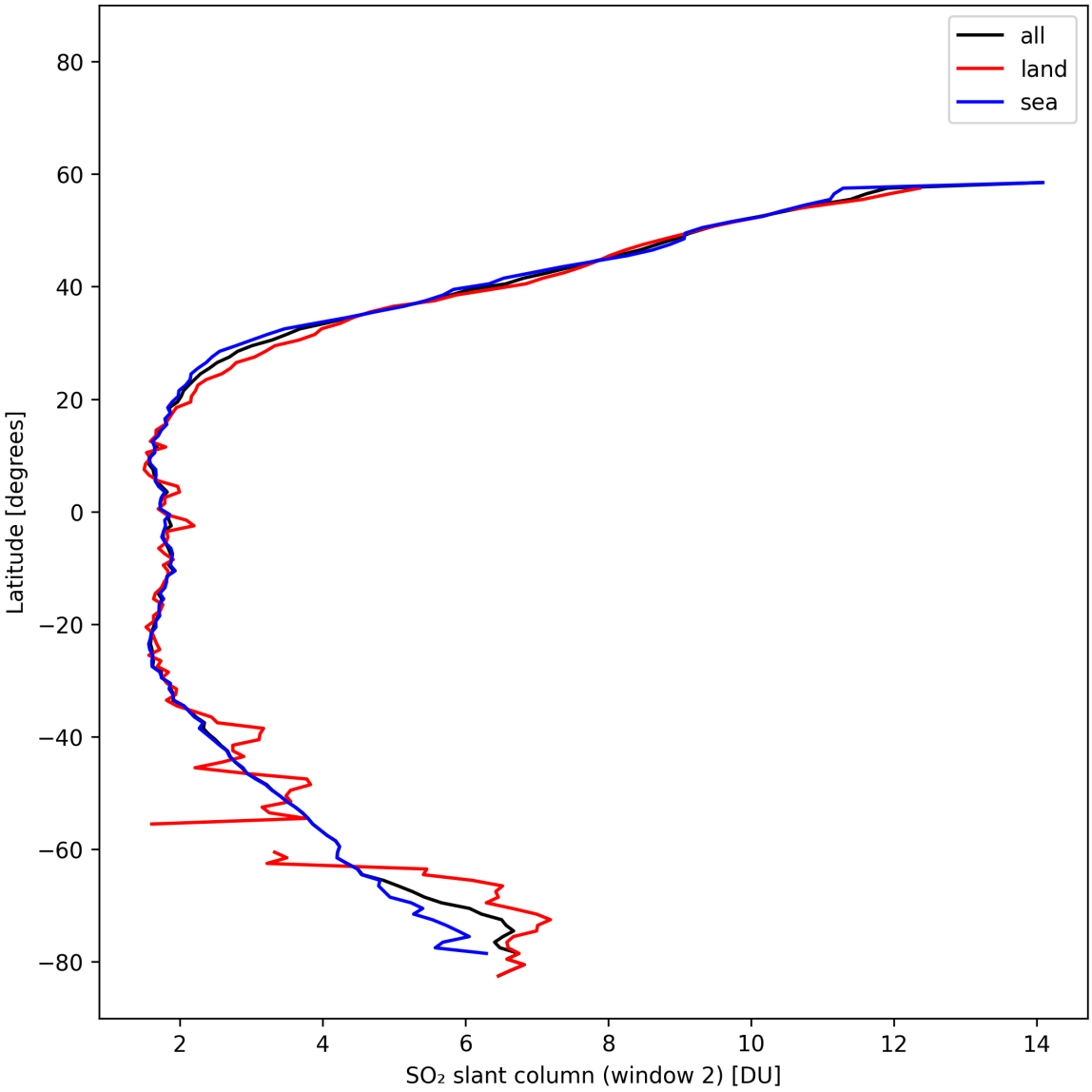


Figure 40: Zonal average of "SO_2 slant column (window 2)" for 2025-02-16 to 2025-02-16.

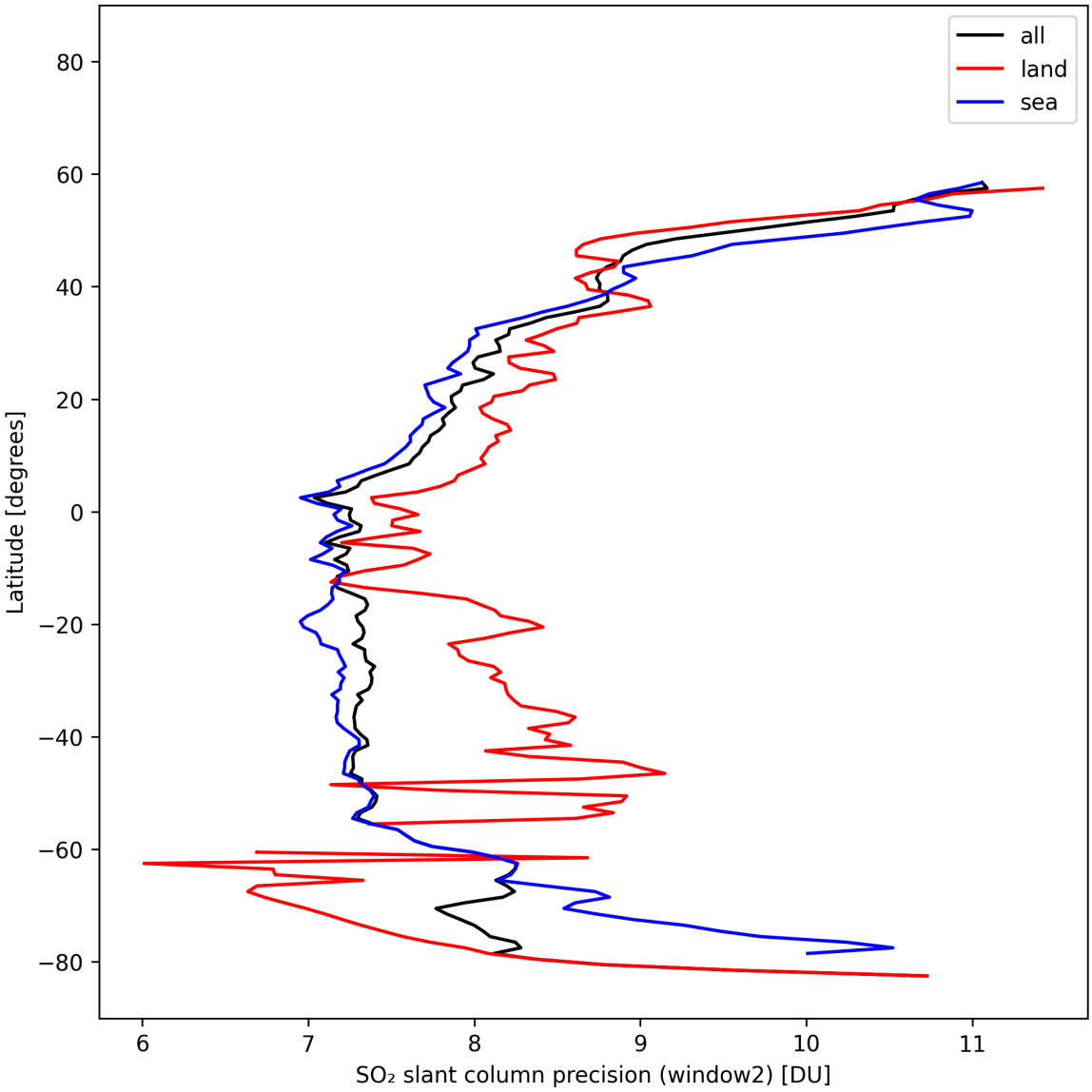


Figure 41: Zonal average of "SO_2 slant column precision (window2)" for 2025-02-16 to 2025-02-16.

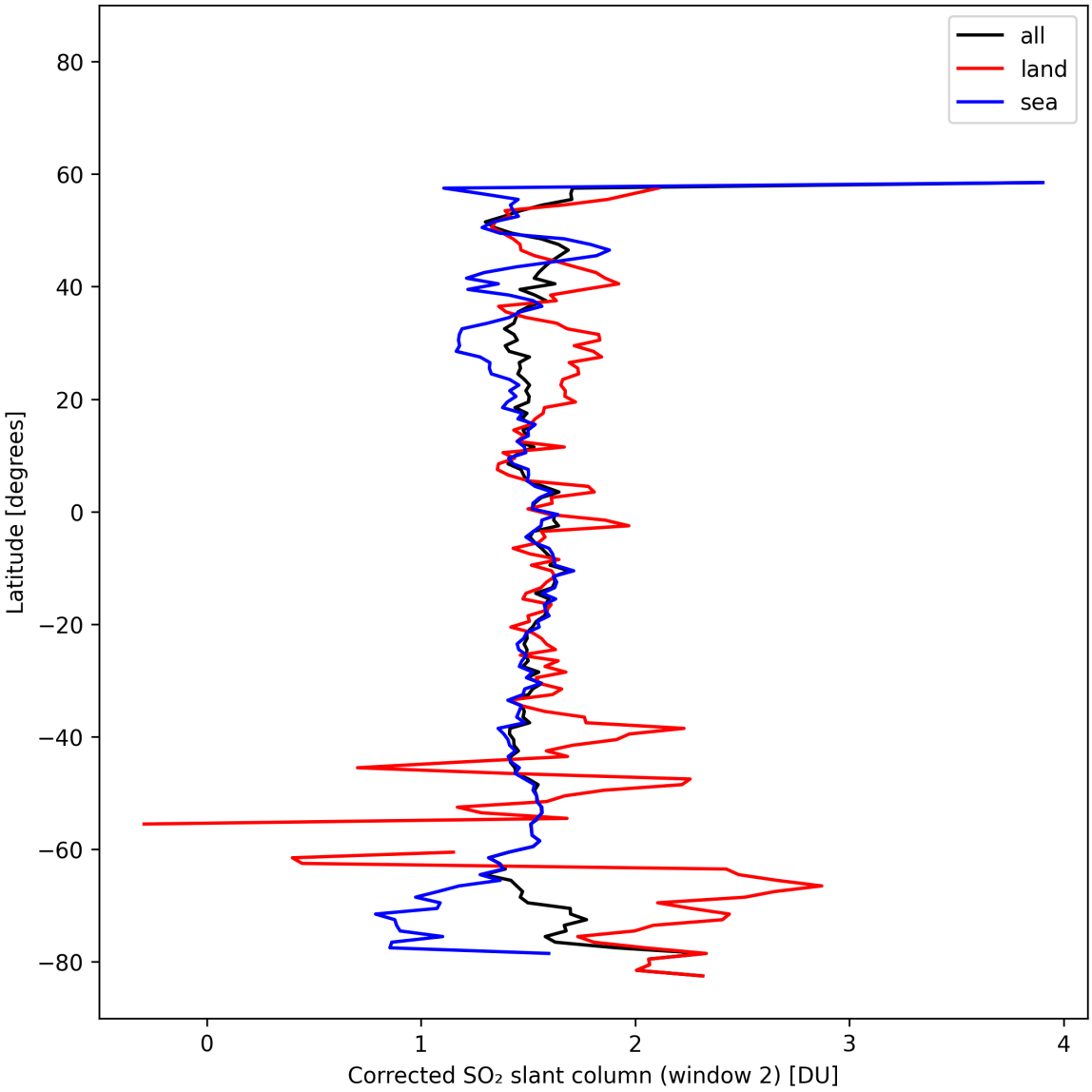


Figure 42: Zonal average of "Corrected SO_2 slant column (window 2)" for 2025-02-16 to 2025-02-16.

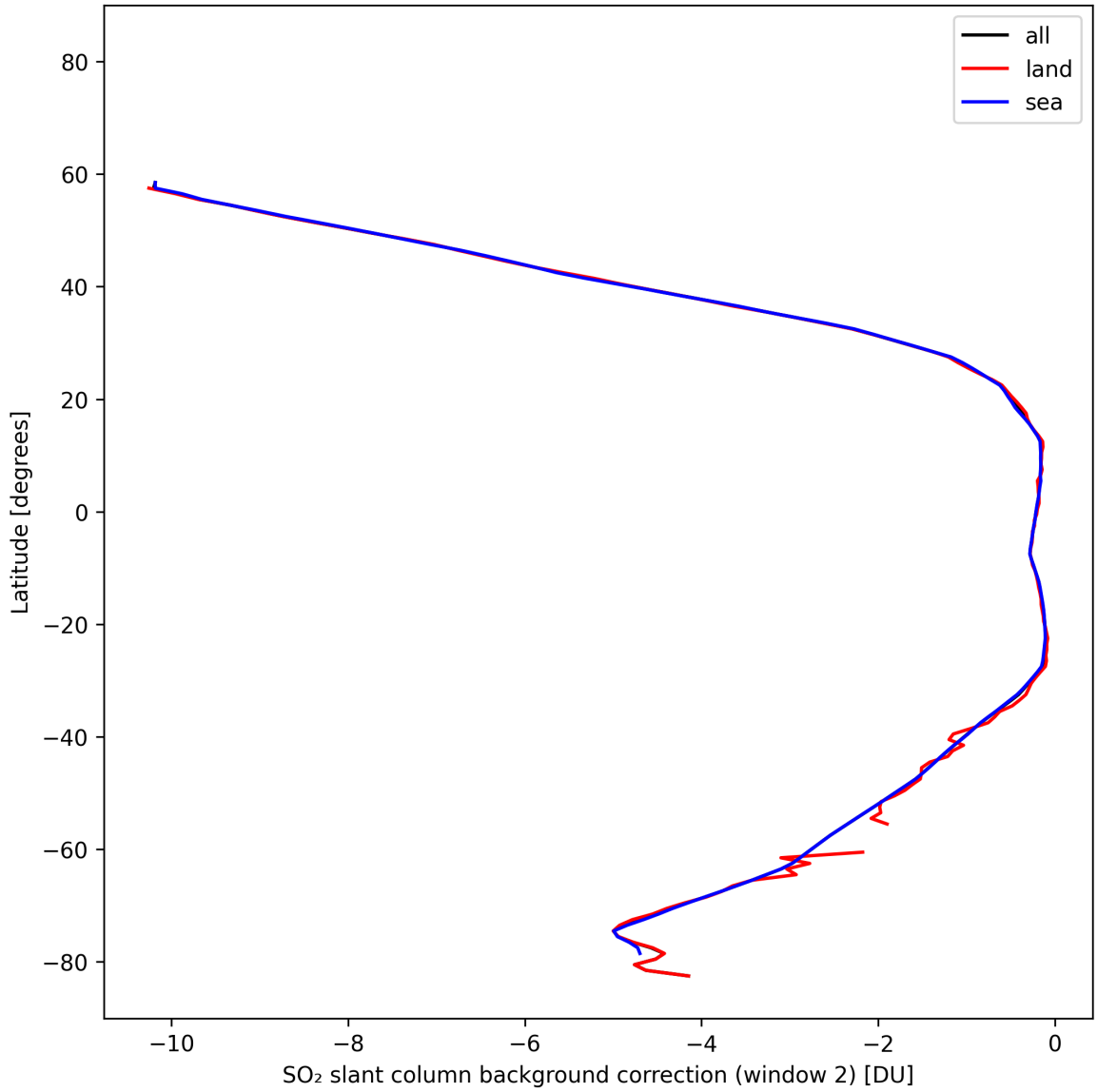


Figure 43: Zonal average of "SO_2 slant column background correction (window 2)" for 2025-02-16 to 2025-02-16.

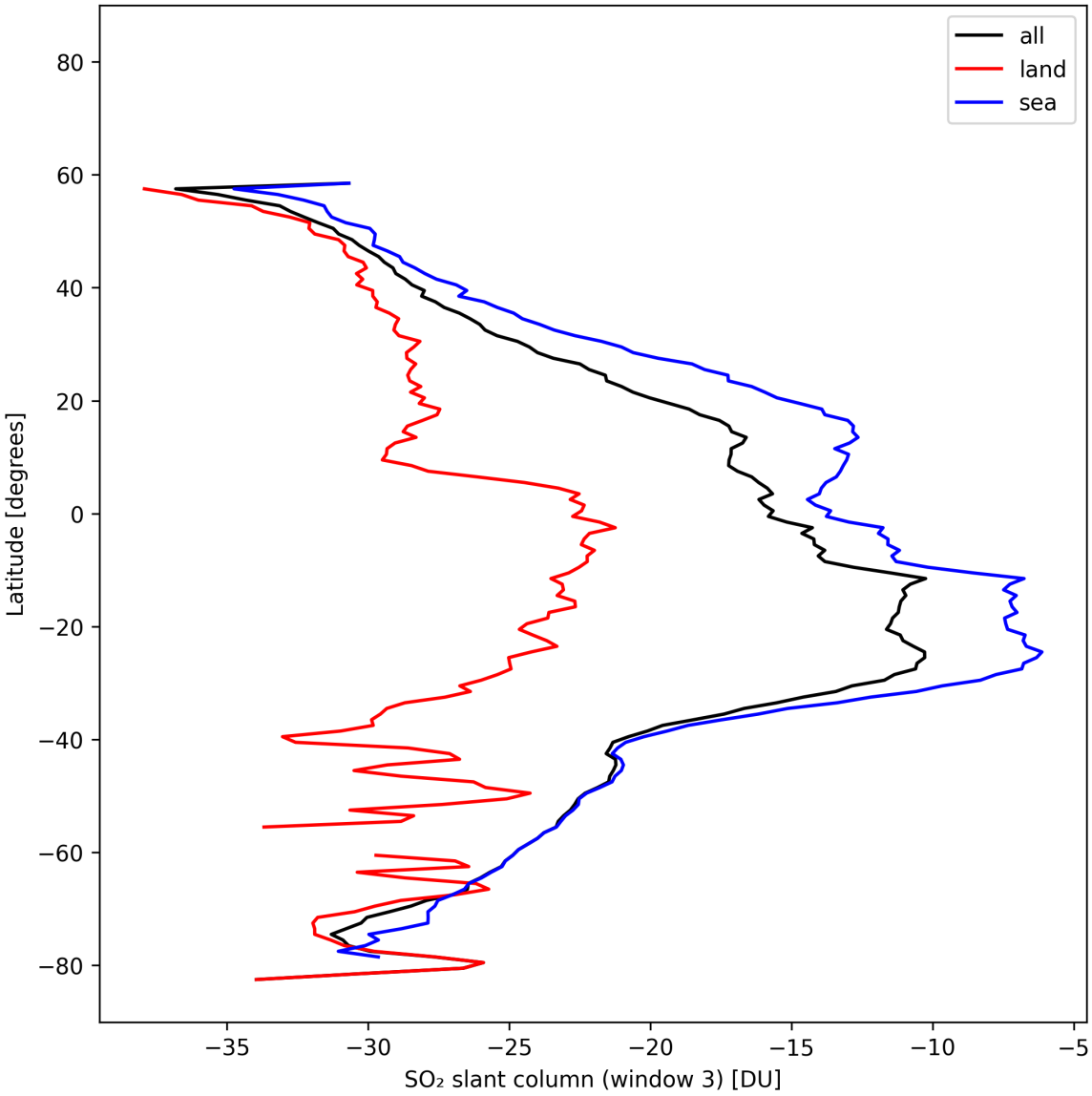


Figure 44: Zonal average of "SO_2 slant column (window 3)" for 2025-02-16 to 2025-02-16.

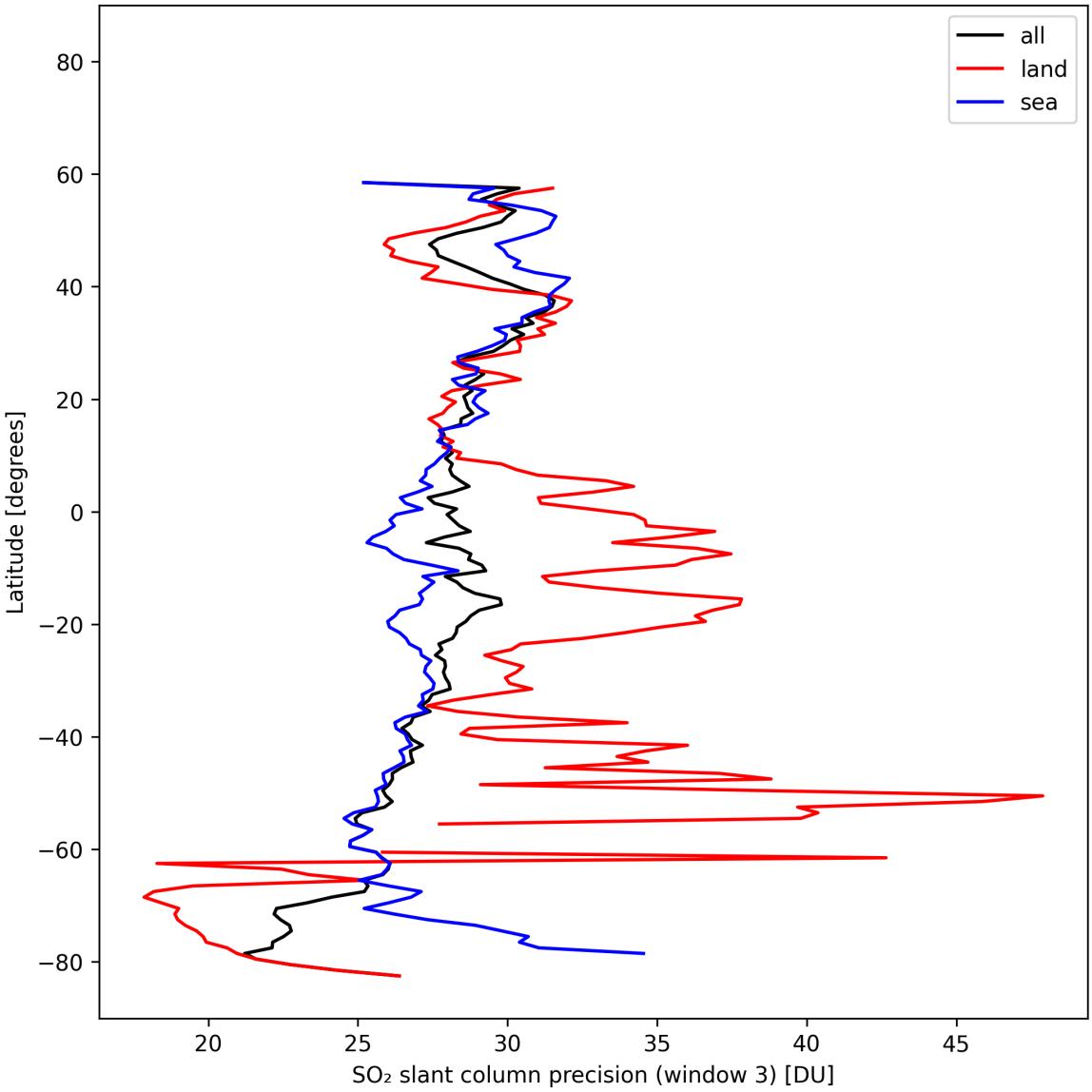


Figure 45: Zonal average of "SO_2 slant column precision (window 3)" for 2025-02-16 to 2025-02-16.

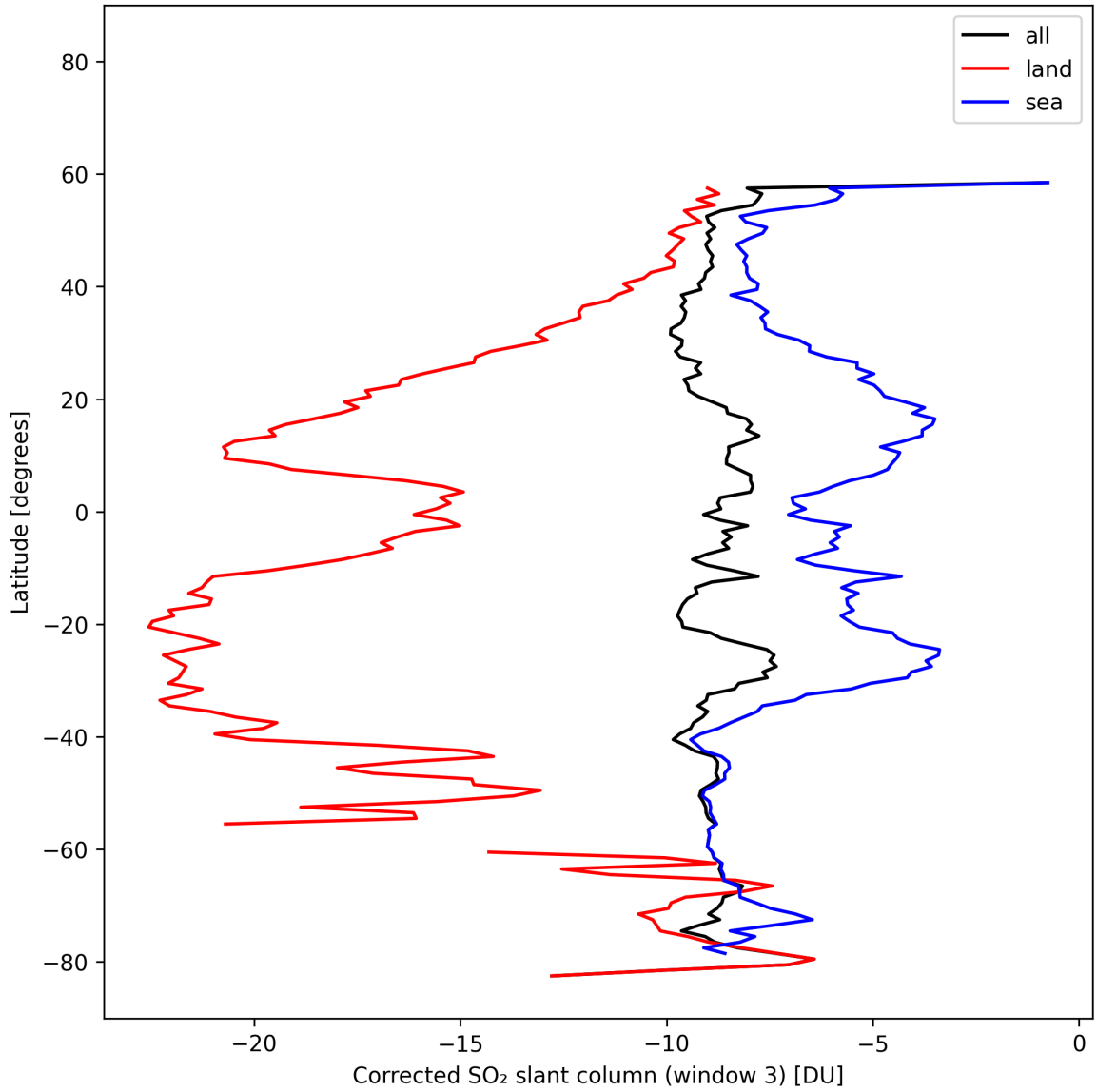


Figure 46: Zonal average of “Corrected SO_2 slant column (window 3)” for 2025-02-16 to 2025-02-16.

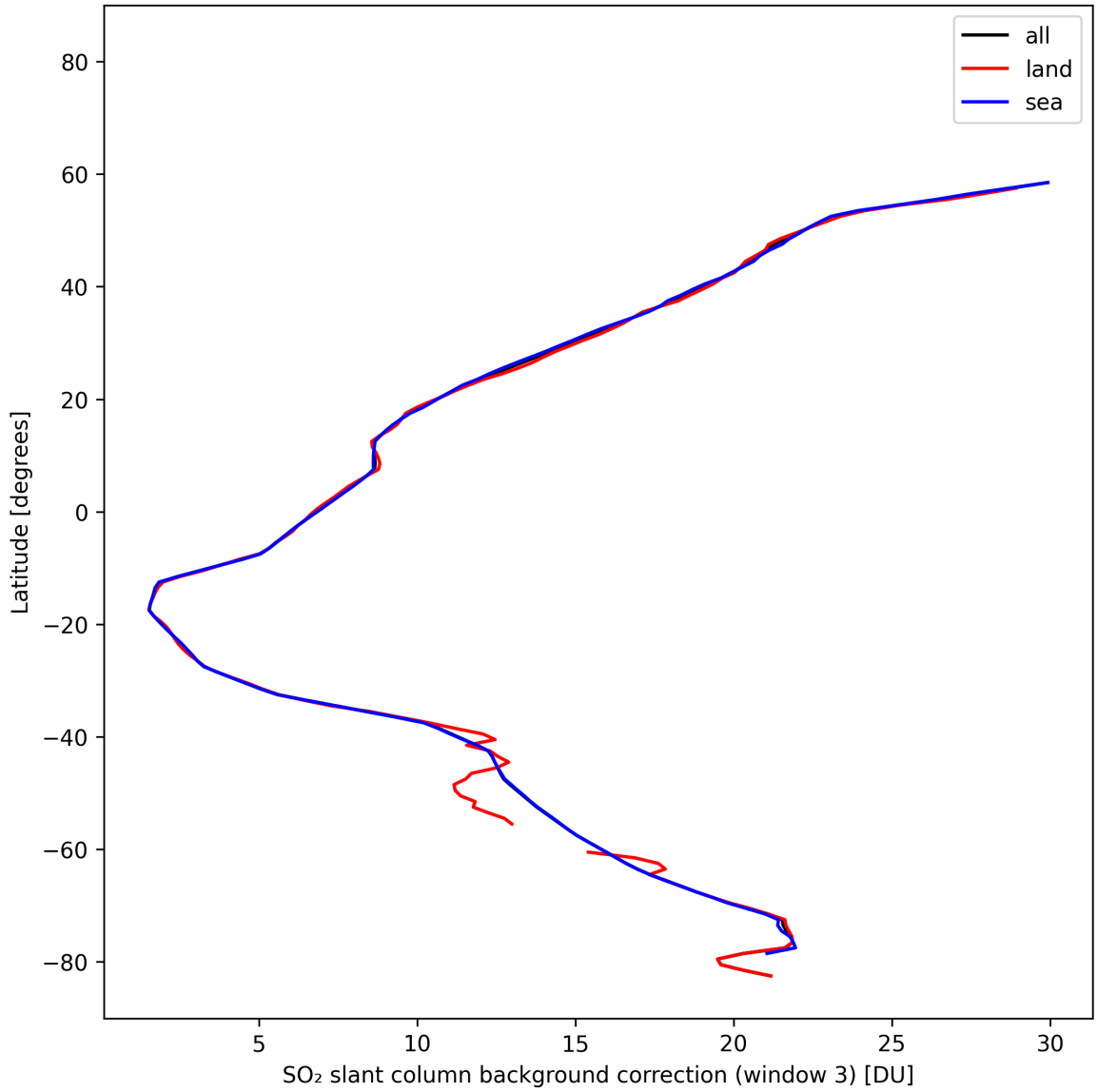


Figure 47: Zonal average of "SO_2 slant column background correction (window 3)" for 2025-02-16 to 2025-02-16.

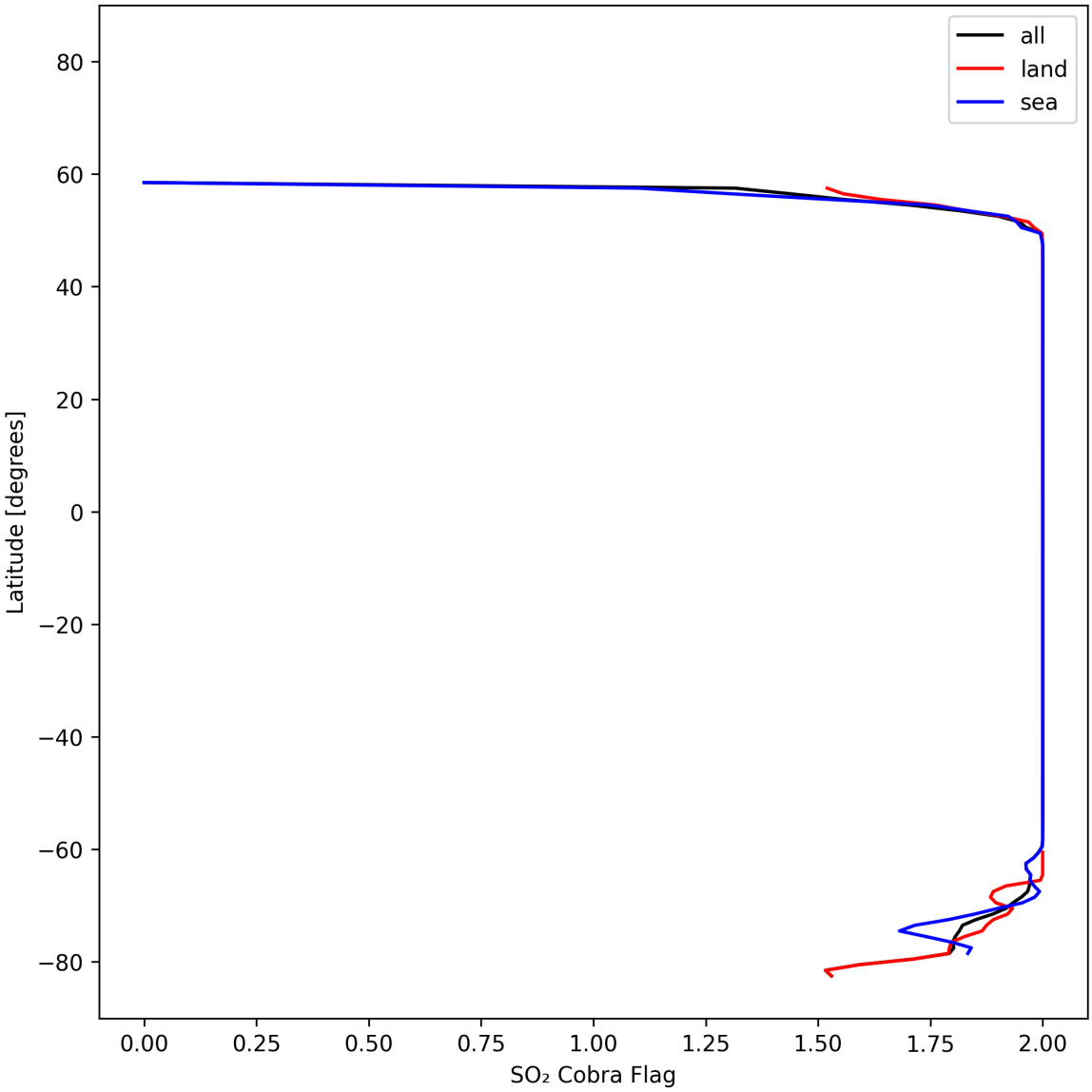


Figure 48: Zonal average of "SO_2 Cobra Flag" for 2025-02-16 to 2025-02-16.

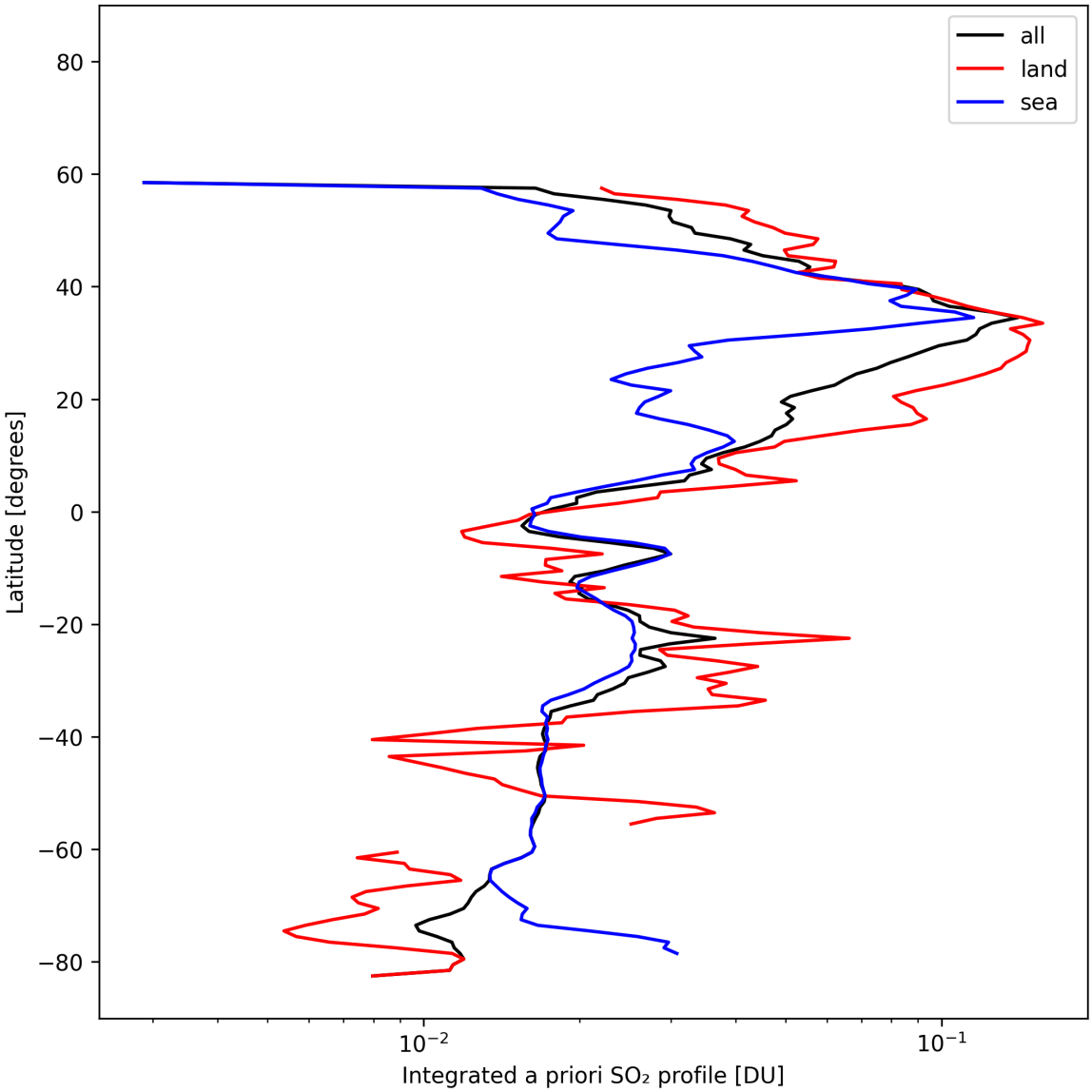


Figure 49: Zonal average of “Integrated a priori SO_2 profile” for 2025-02-16 to 2025-02-16.

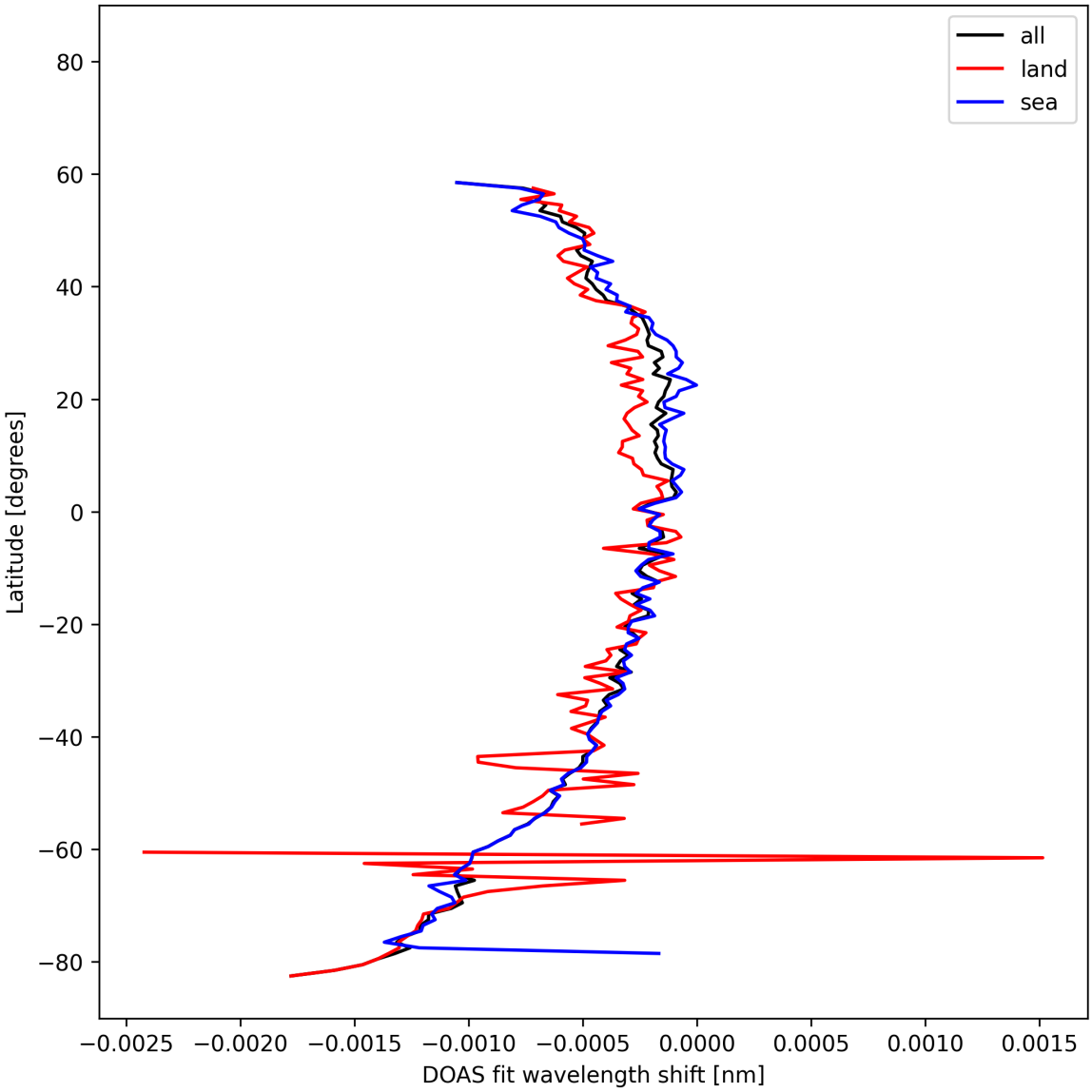


Figure 50: Zonal average of “DOAS fit wavelength shift” for 2025-02-16 to 2025-02-16.

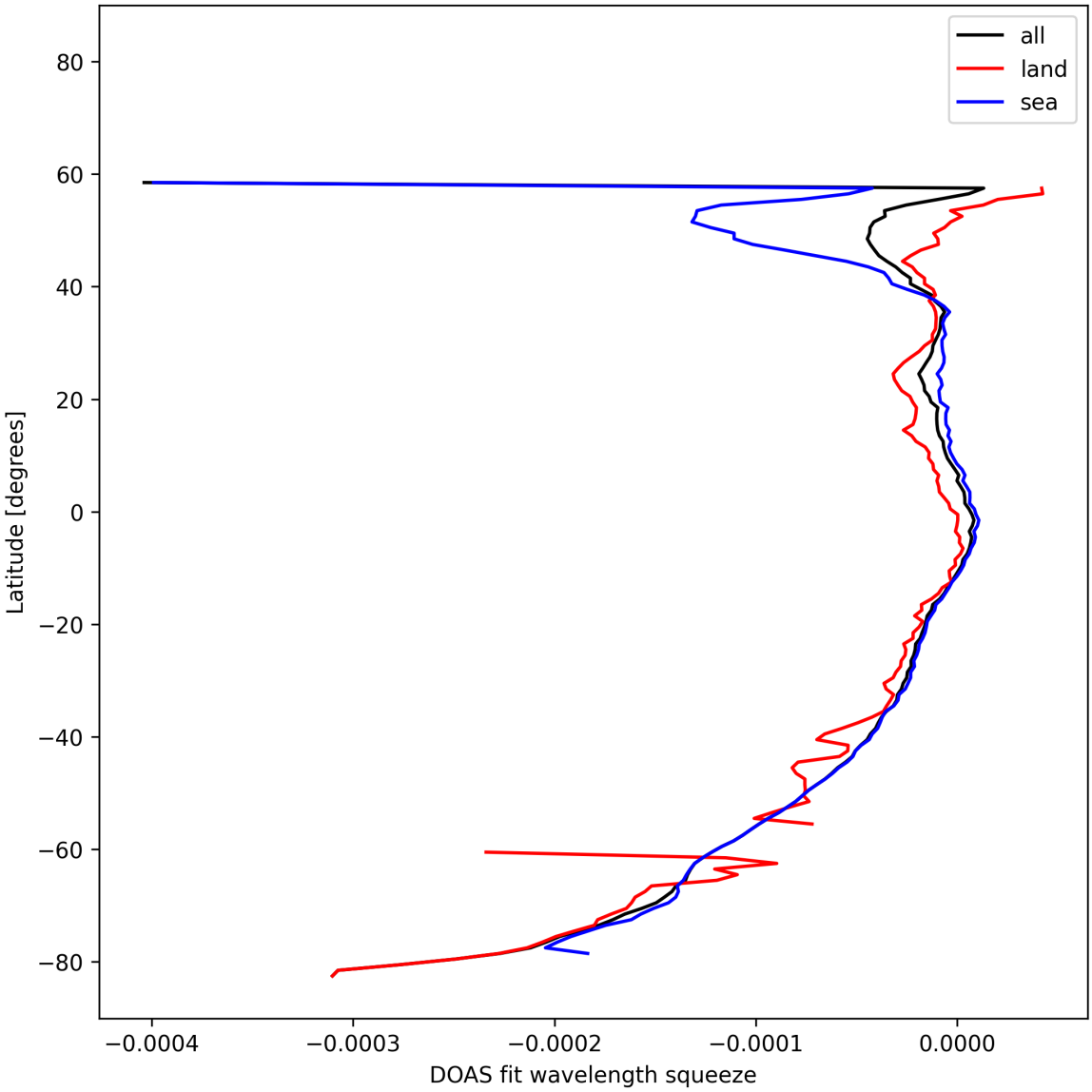


Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-02-16 to 2025-02-16.

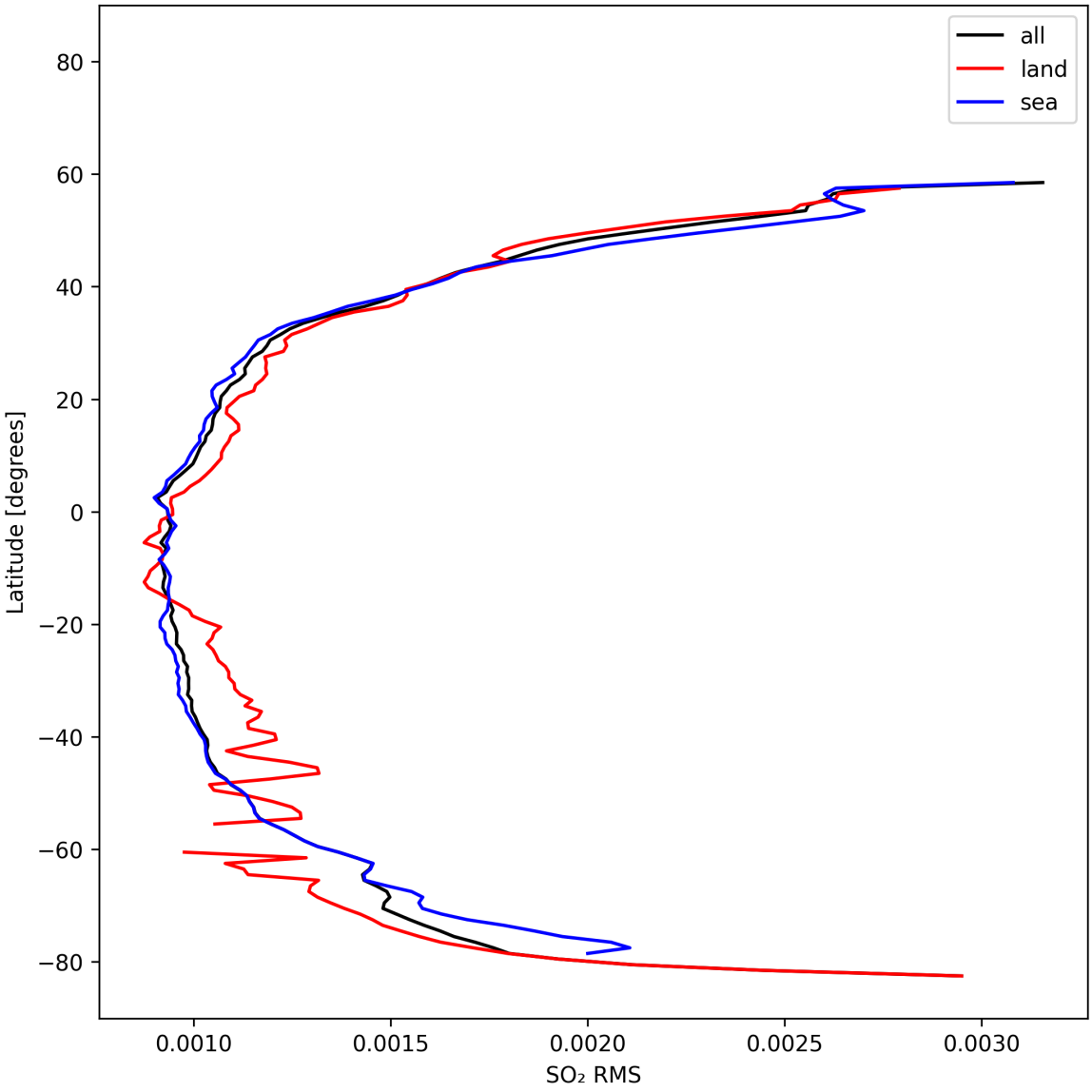


Figure 52: Zonal average of "SO_2 RMS" for 2025-02-16 to 2025-02-16.

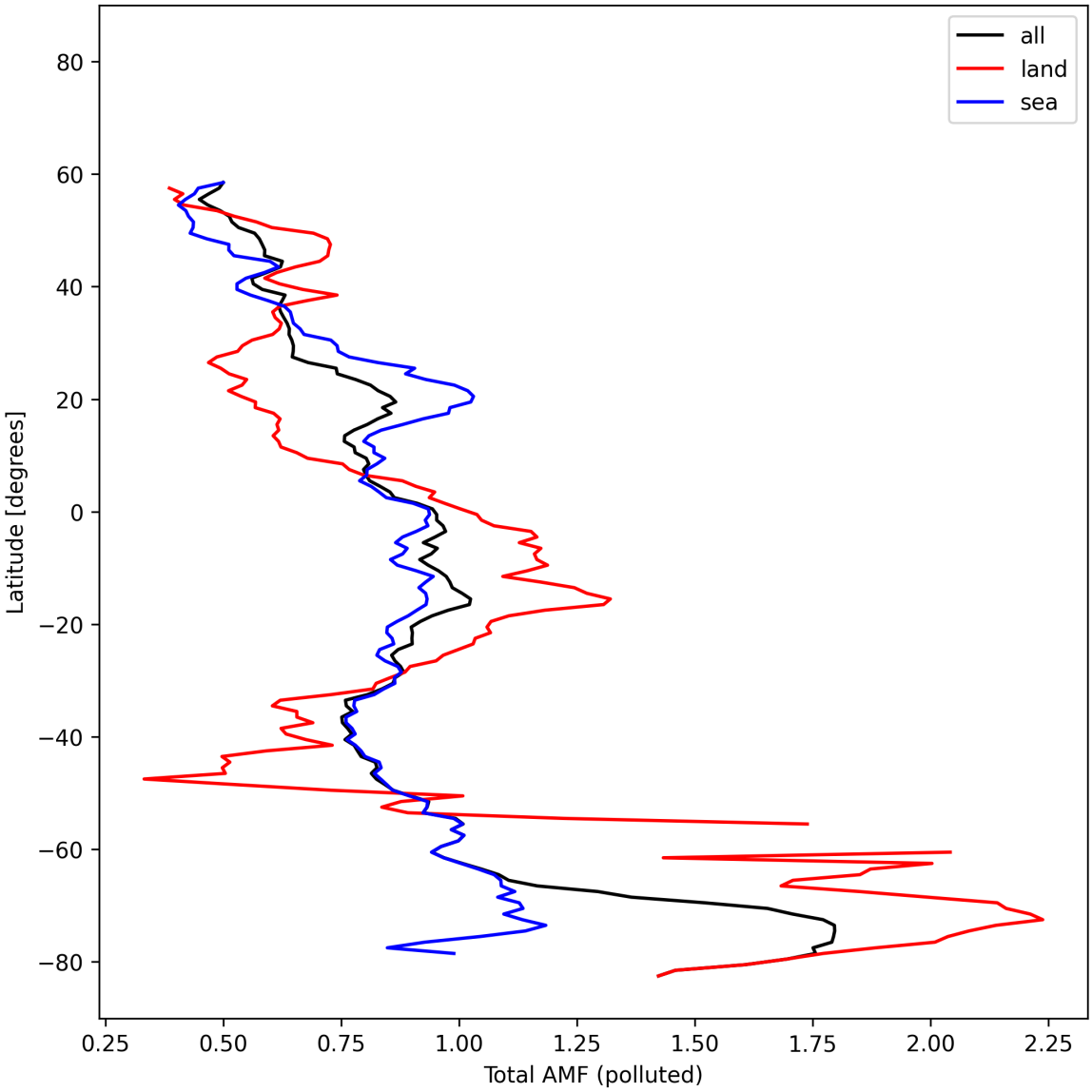


Figure 53: Zonal average of “Total AMF (polluted)” for 2025-02-16 to 2025-02-16.

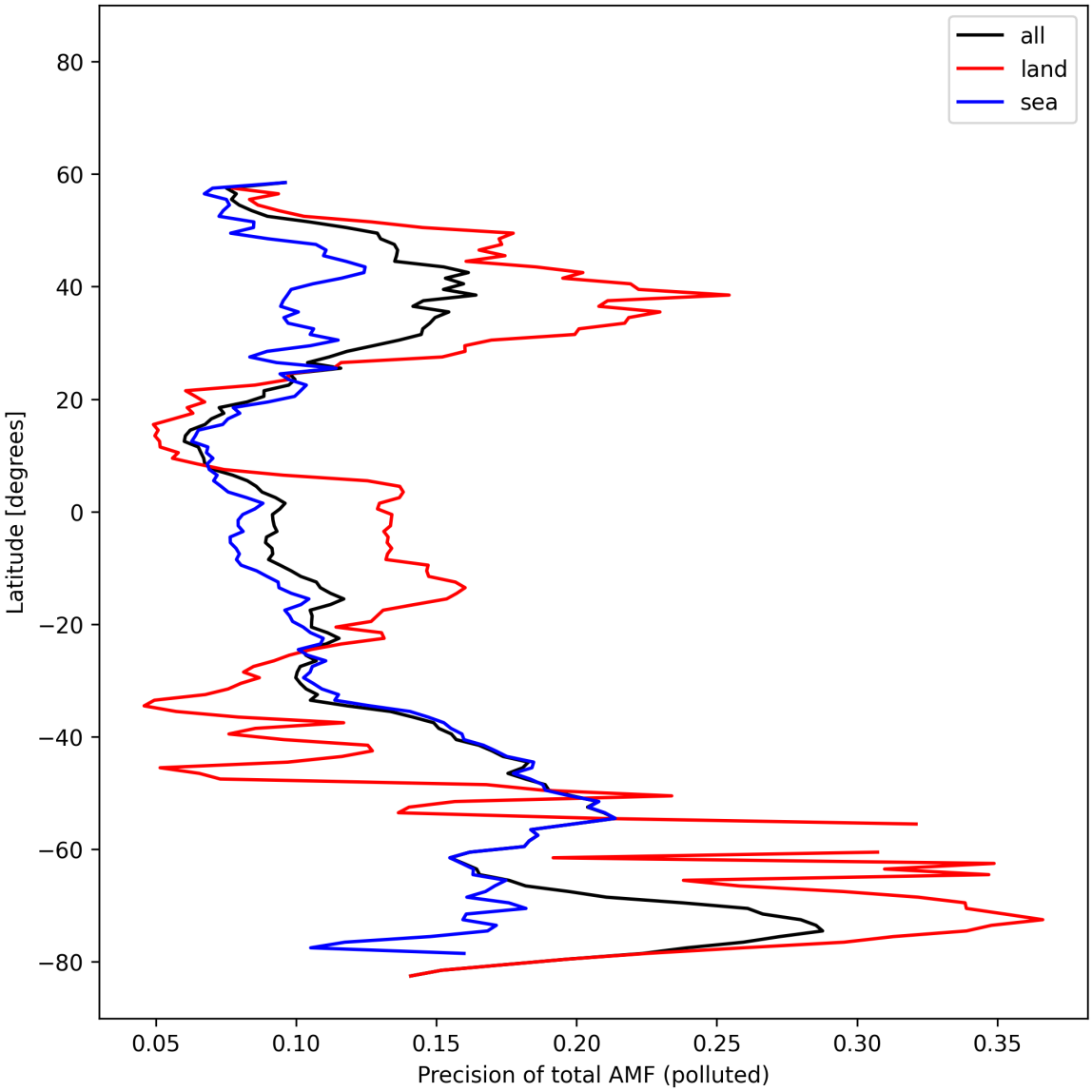


Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-02-16 to 2025-02-16.

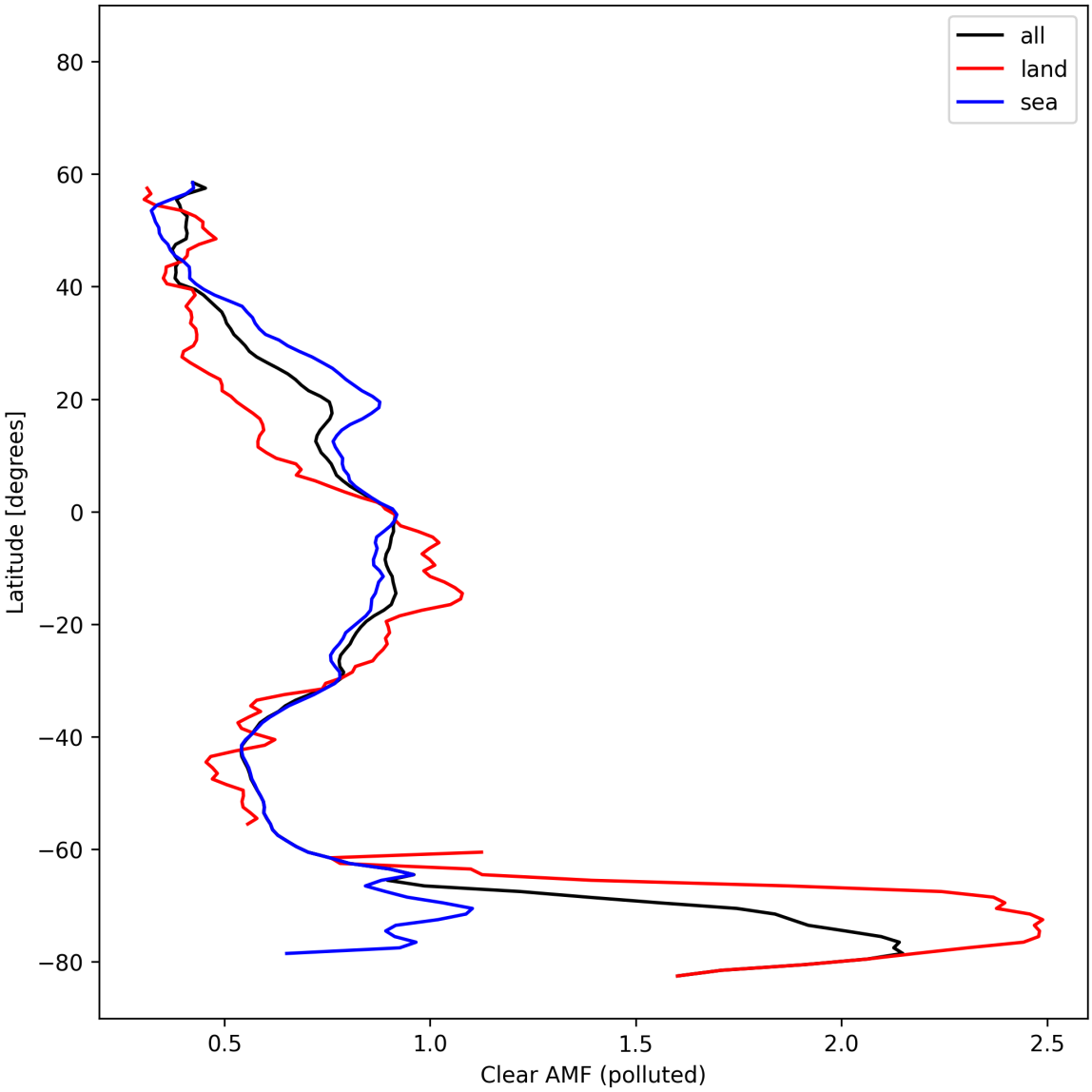


Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-02-16 to 2025-02-16.

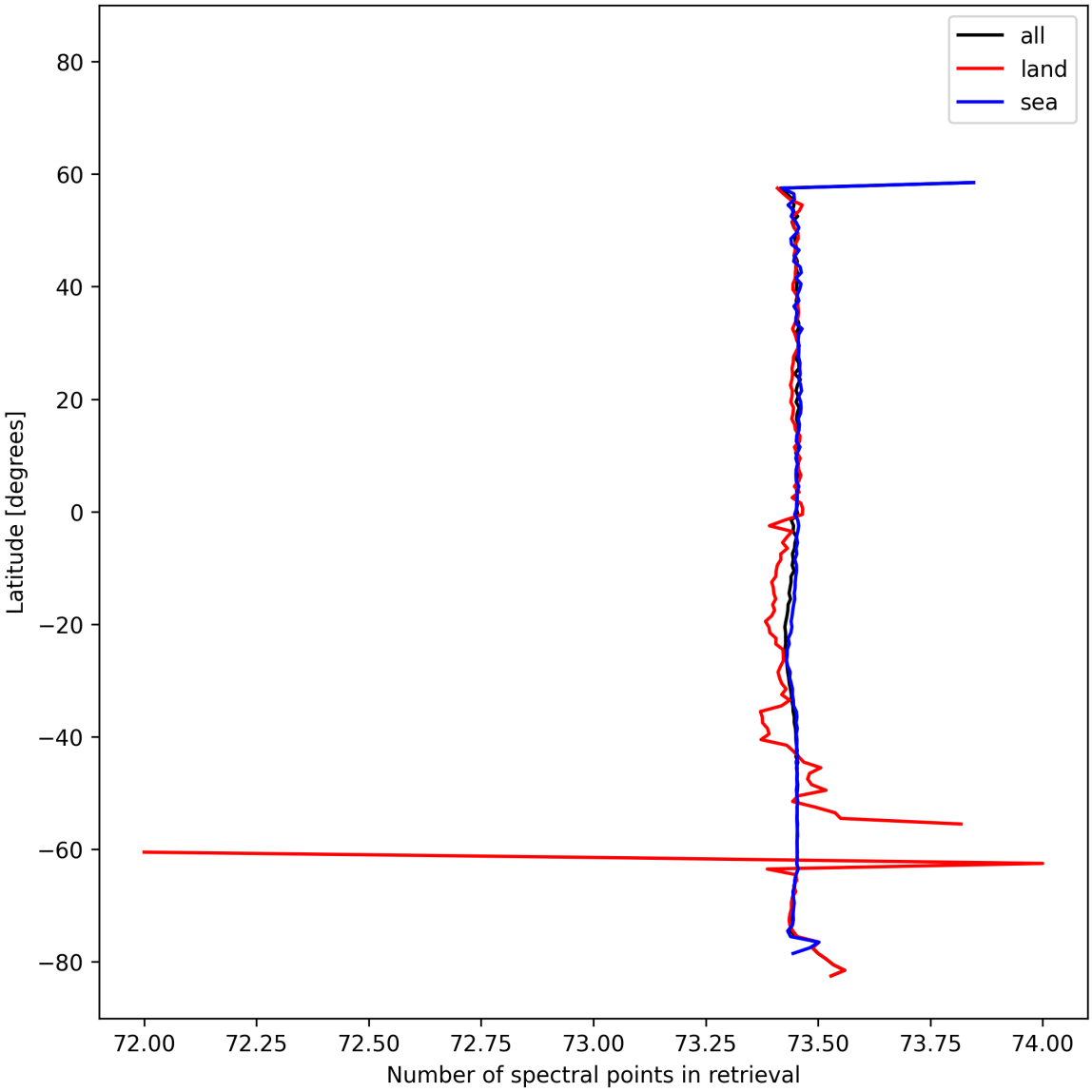


Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-02-16 to 2025-02-16.

8 Histograms

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

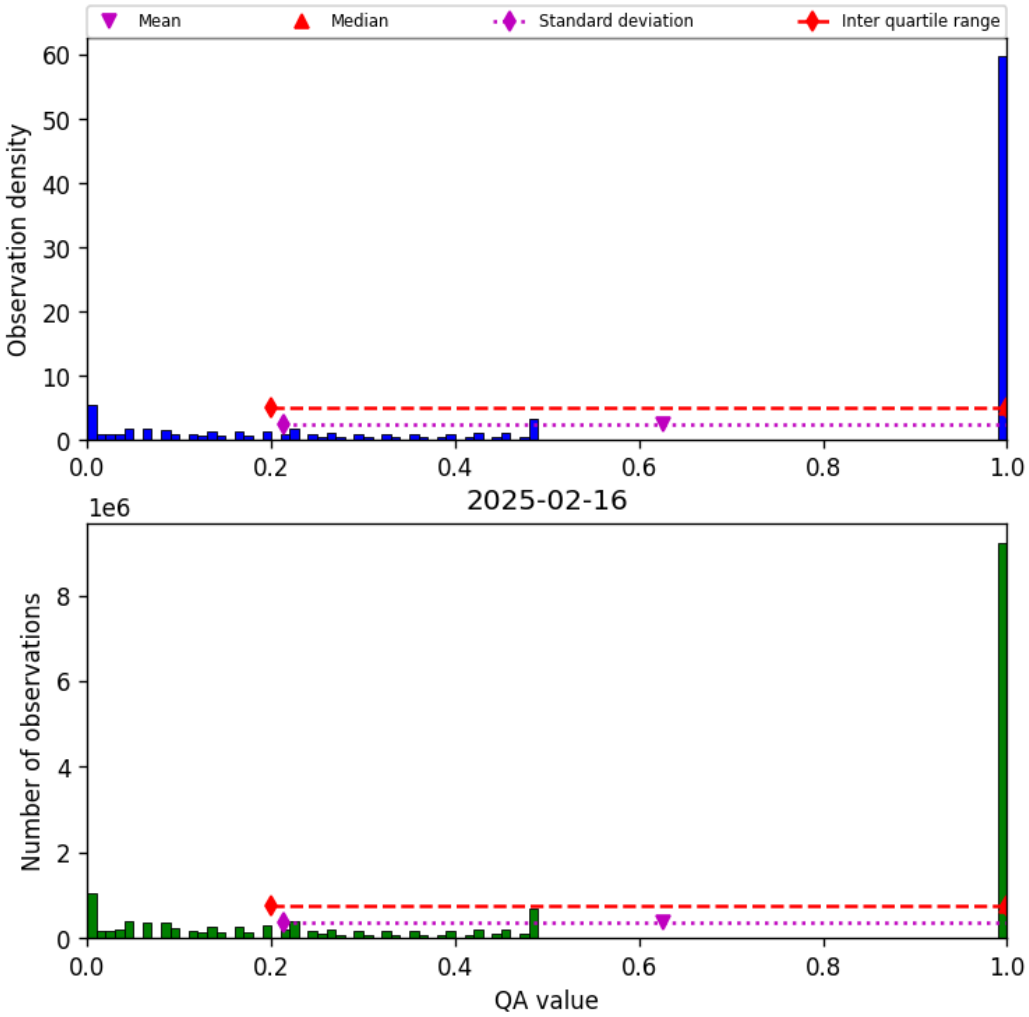


Figure 57: Histogram of “QA value” for 2025-02-16 to 2025-02-16

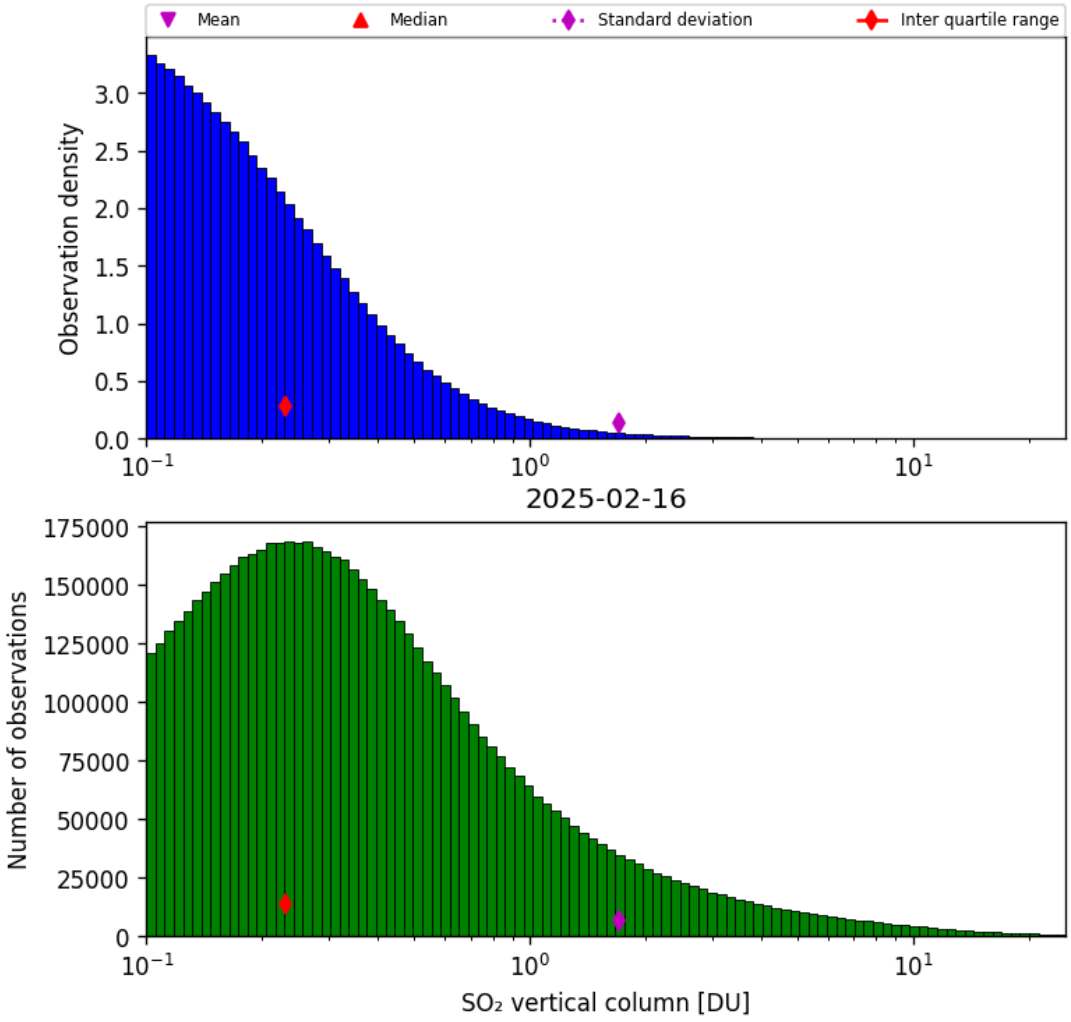


Figure 58: Histogram of "SO_2 vertical column" for 2025-02-16 to 2025-02-16

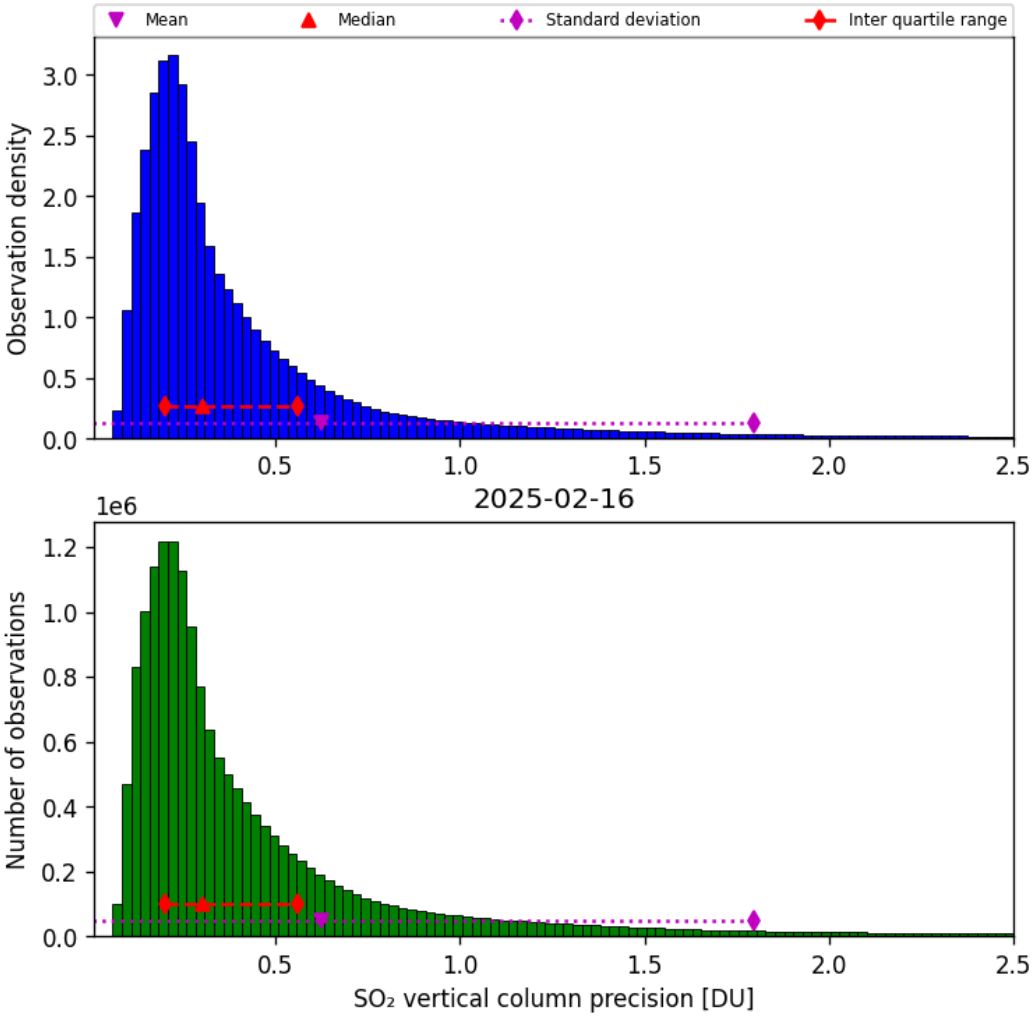


Figure 59: Histogram of "SO_2 vertical column precision" for 2025-02-16 to 2025-02-16

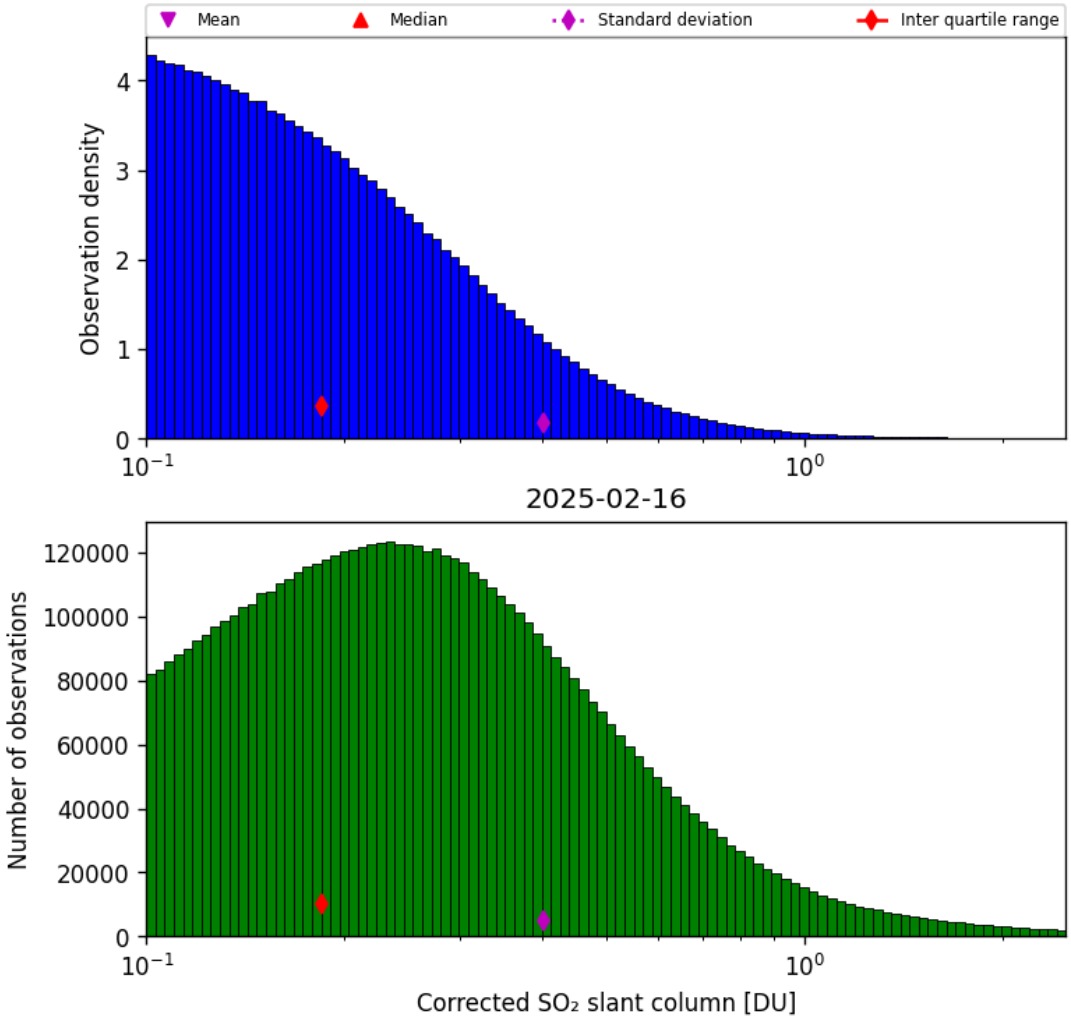


Figure 60: Histogram of "Corrected SO_2 slant column" for 2025-02-16 to 2025-02-16

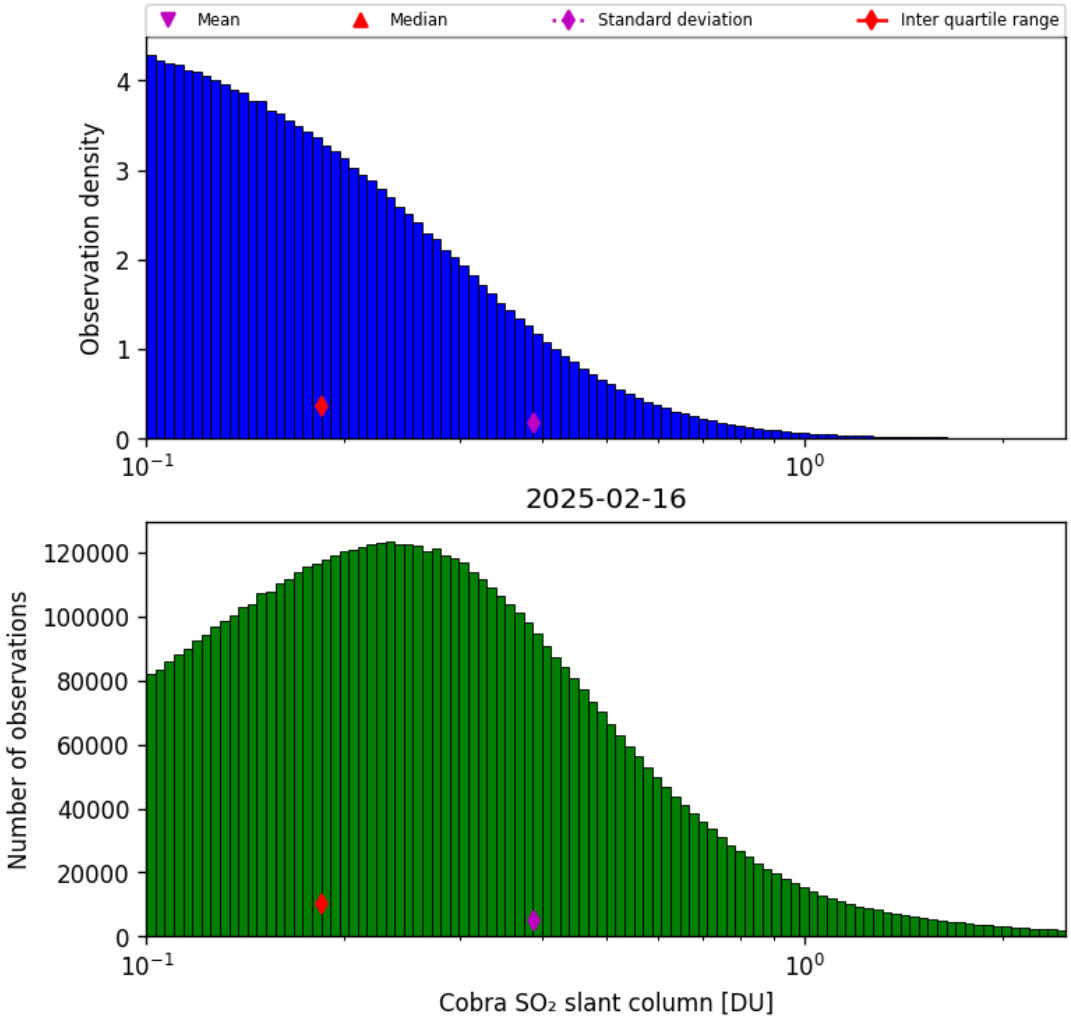


Figure 61: Histogram of “Cobra SO_2 slant column” for 2025-02-16 to 2025-02-16

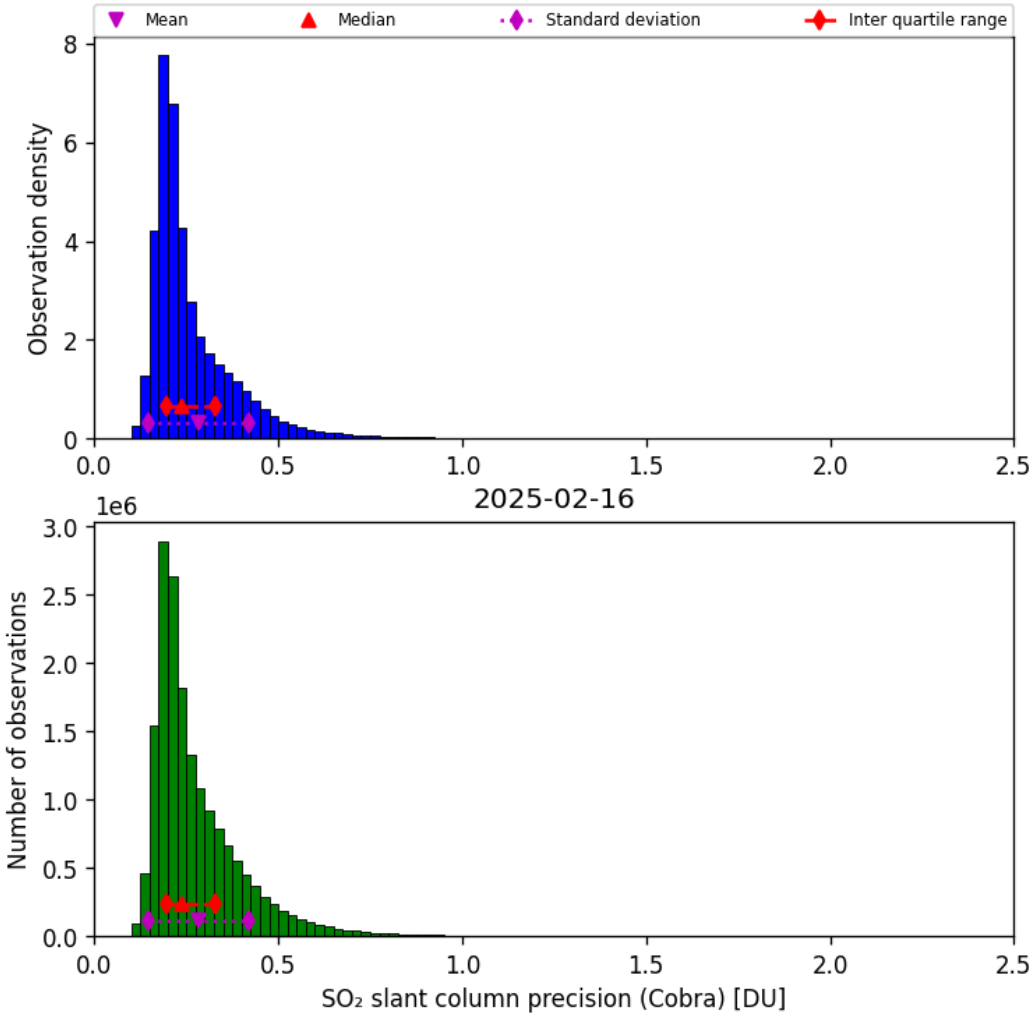


Figure 62: Histogram of "SO_2 slant column precision (Cobra)" for 2025-02-16 to 2025-02-16

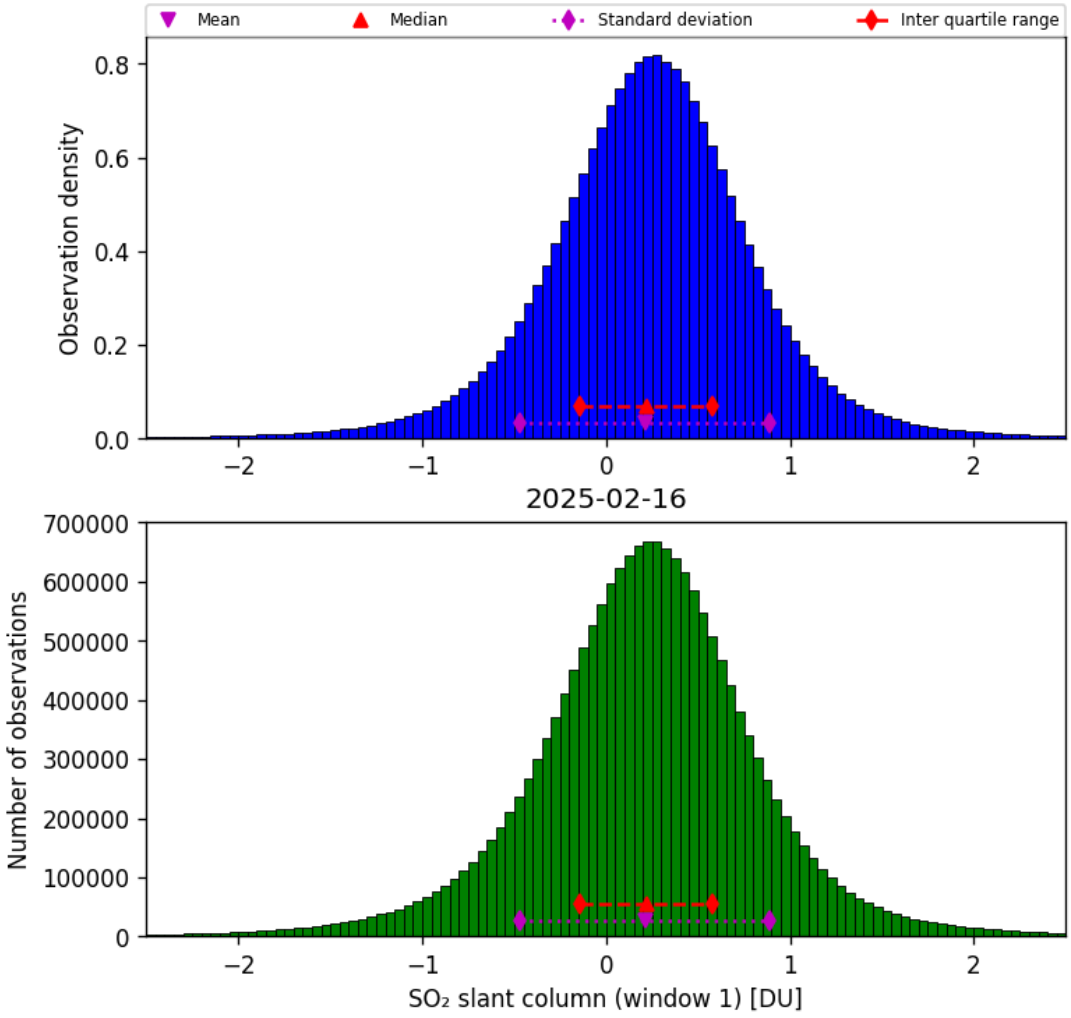


Figure 63: Histogram of "SO_2 slant column (window 1)" for 2025-02-16 to 2025-02-16

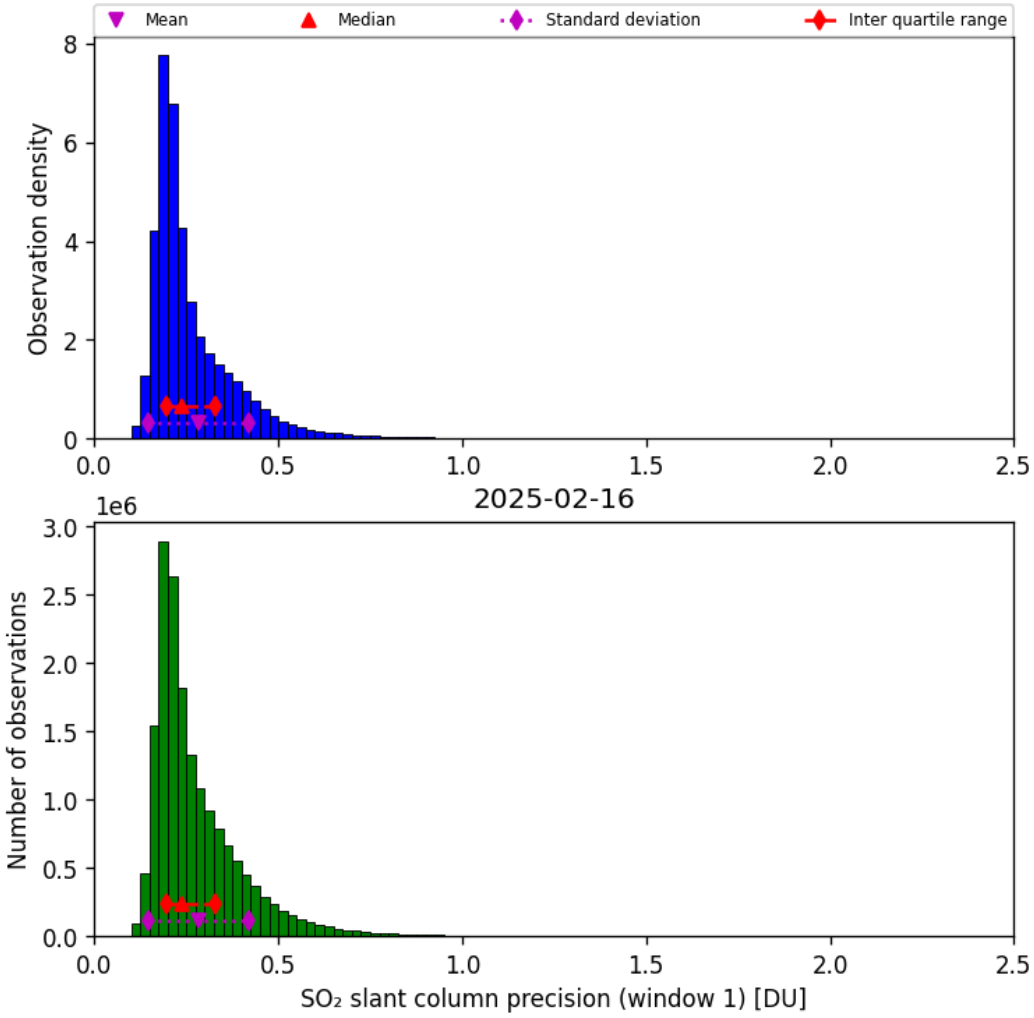


Figure 64: Histogram of "SO_2 slant column precision (window 1)" for 2025-02-16 to 2025-02-16

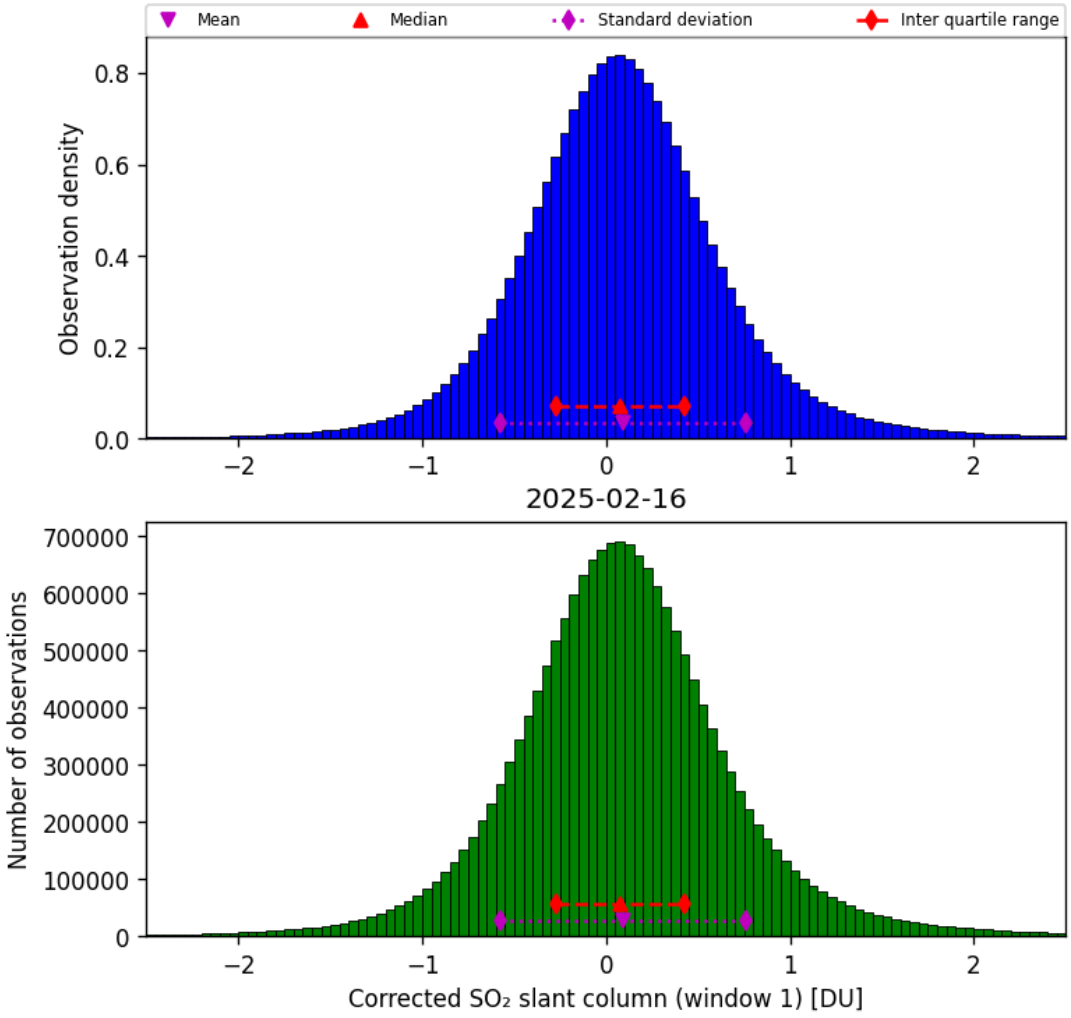


Figure 65: Histogram of "Corrected SO_2 slant column (window 1)" for 2025-02-16 to 2025-02-16

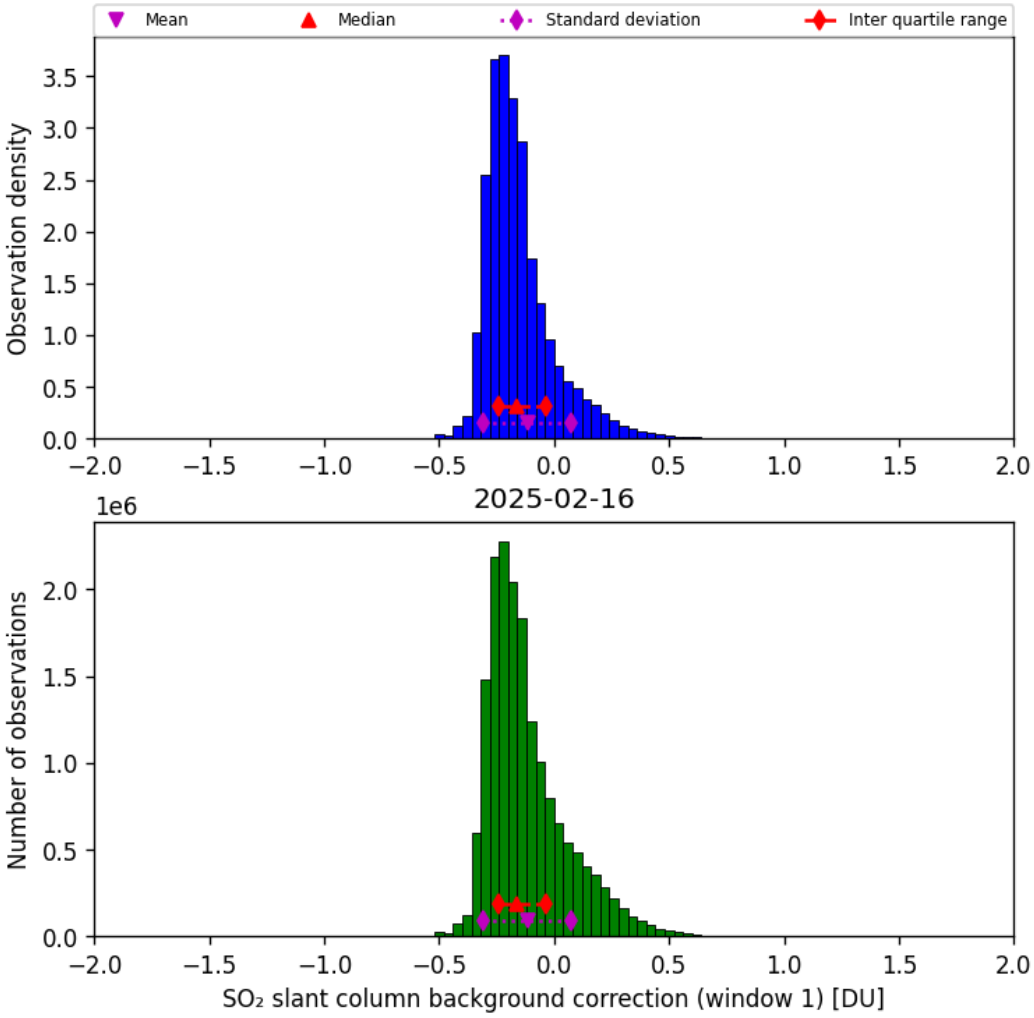


Figure 66: Histogram of "SO_2 slant column background correction (window 1)" for 2025-02-16 to 2025-02-16

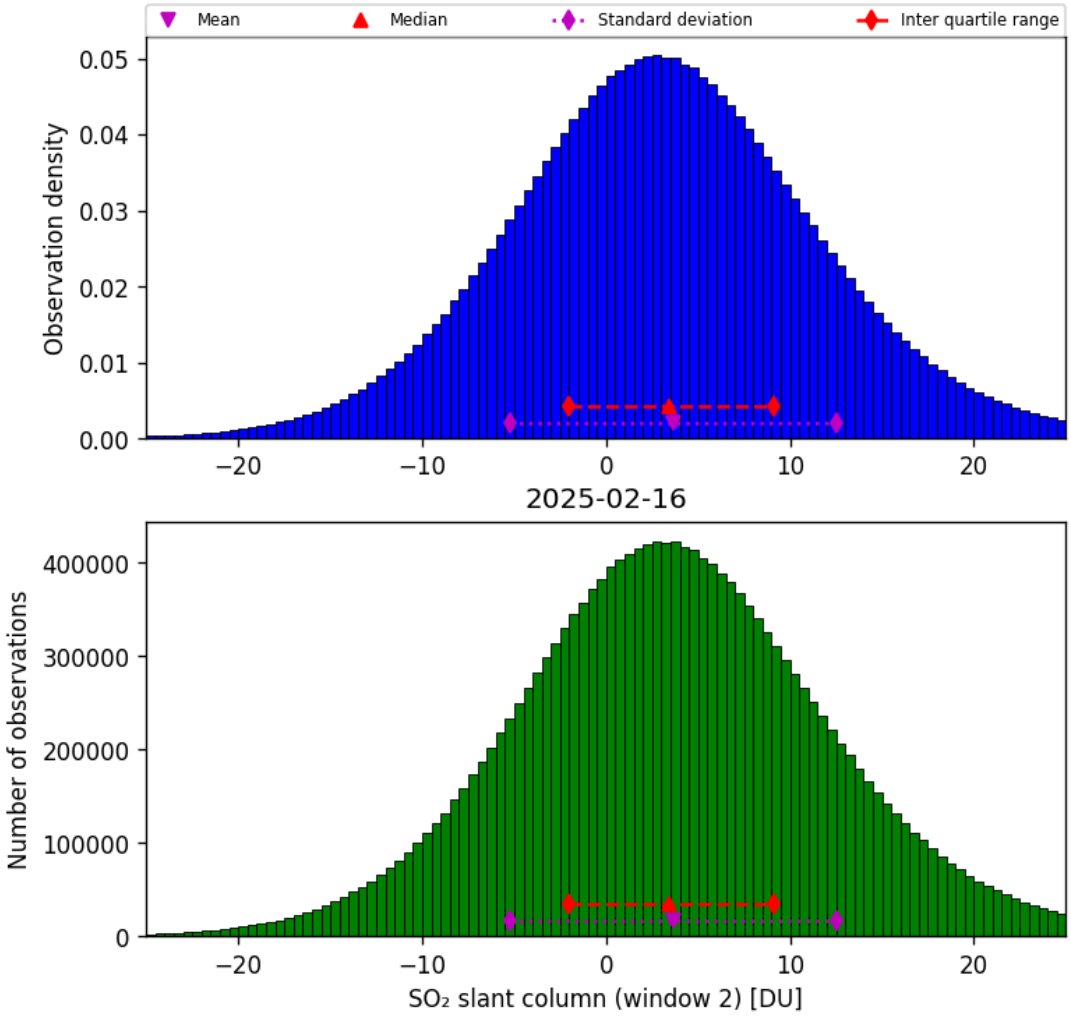


Figure 67: Histogram of "SO_2 slant column (window 2)" for 2025-02-16 to 2025-02-16

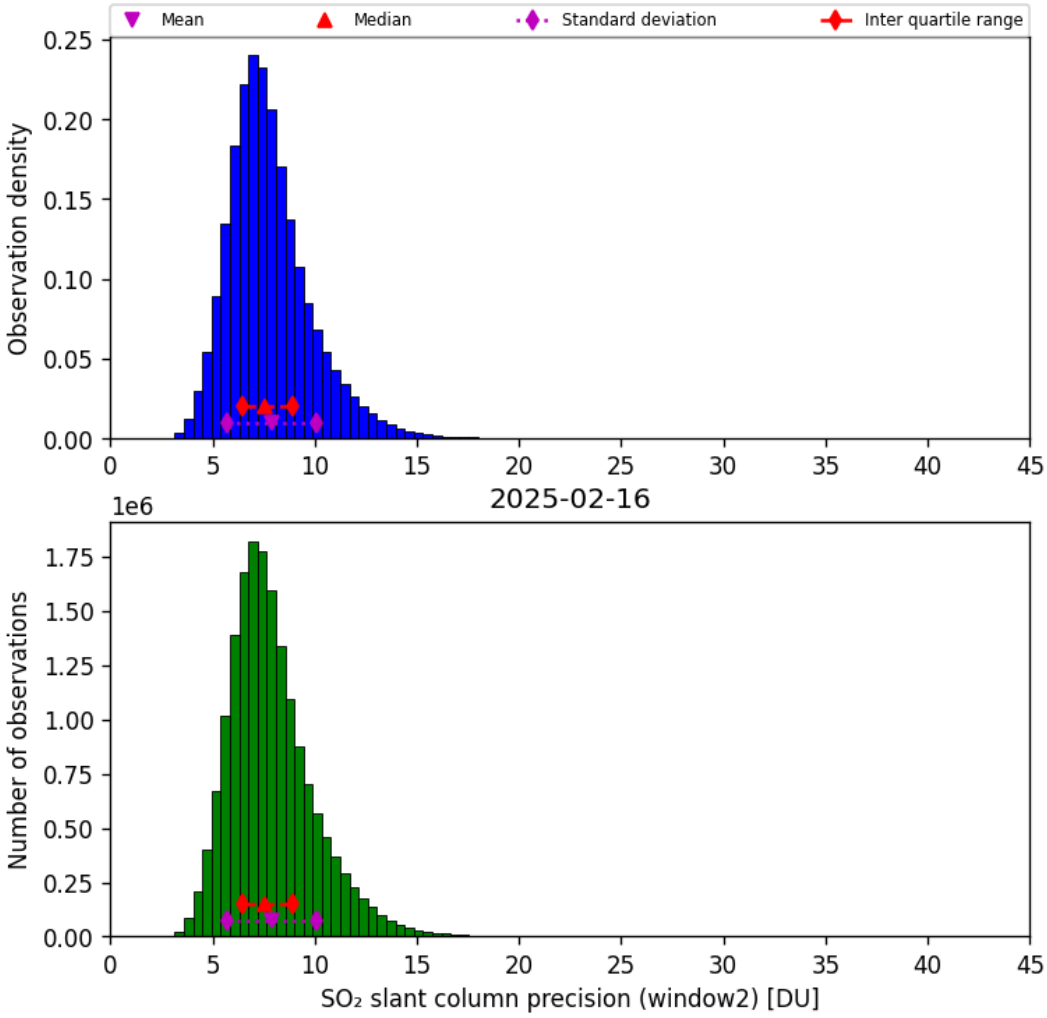


Figure 68: Histogram of "SO_2 slant column precision (window2)" for 2025-02-16 to 2025-02-16

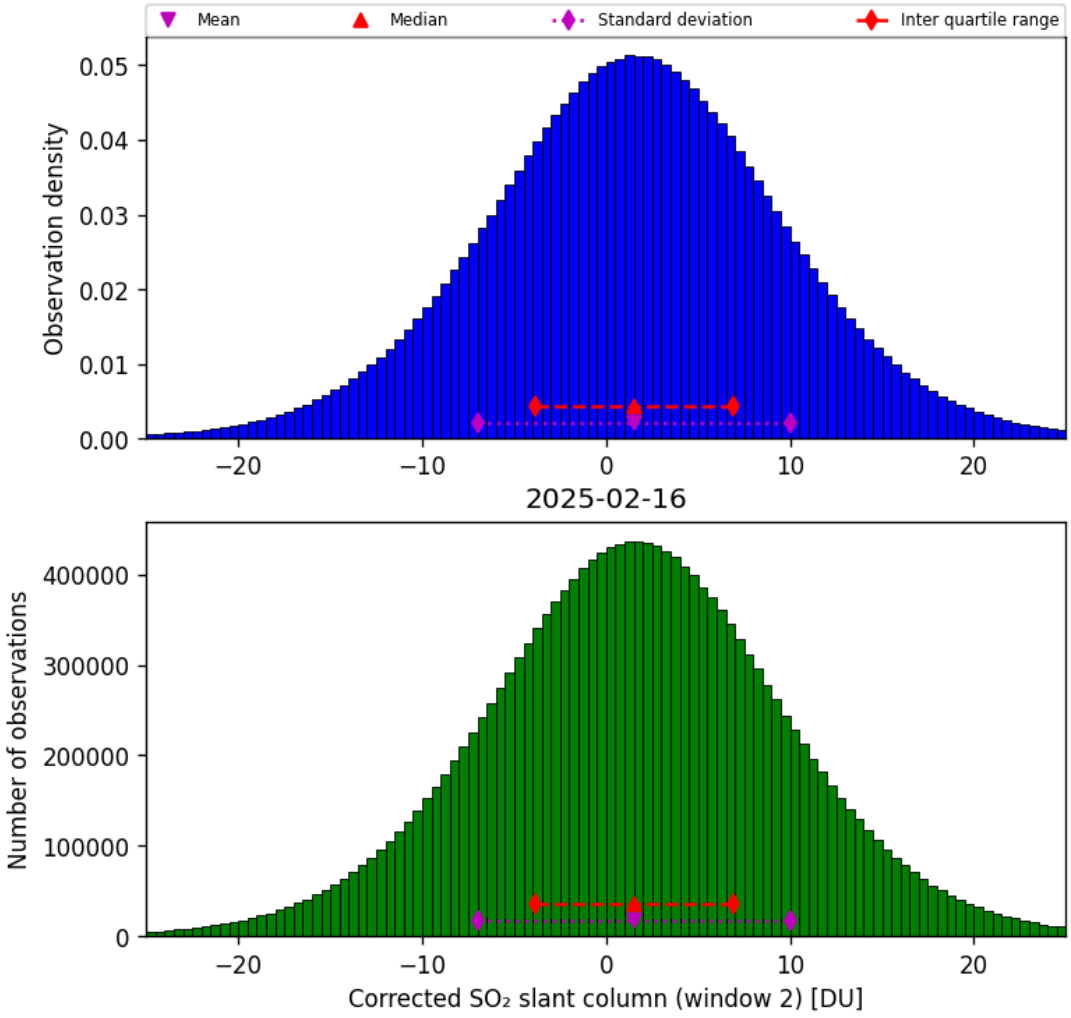


Figure 69: Histogram of "Corrected SO_2 slant column (window 2)" for 2025-02-16 to 2025-02-16

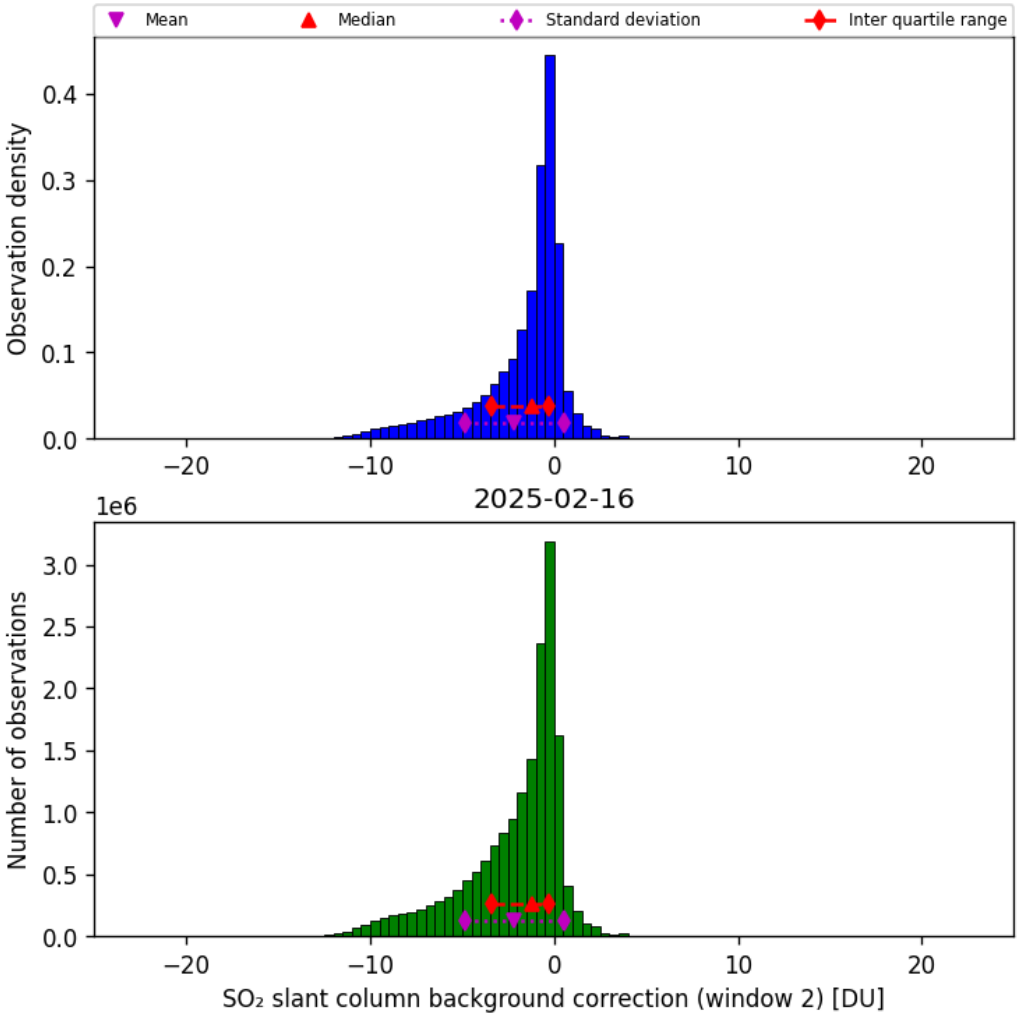


Figure 70: Histogram of "SO_2 slant column background correction (window 2)" for 2025-02-16 to 2025-02-16

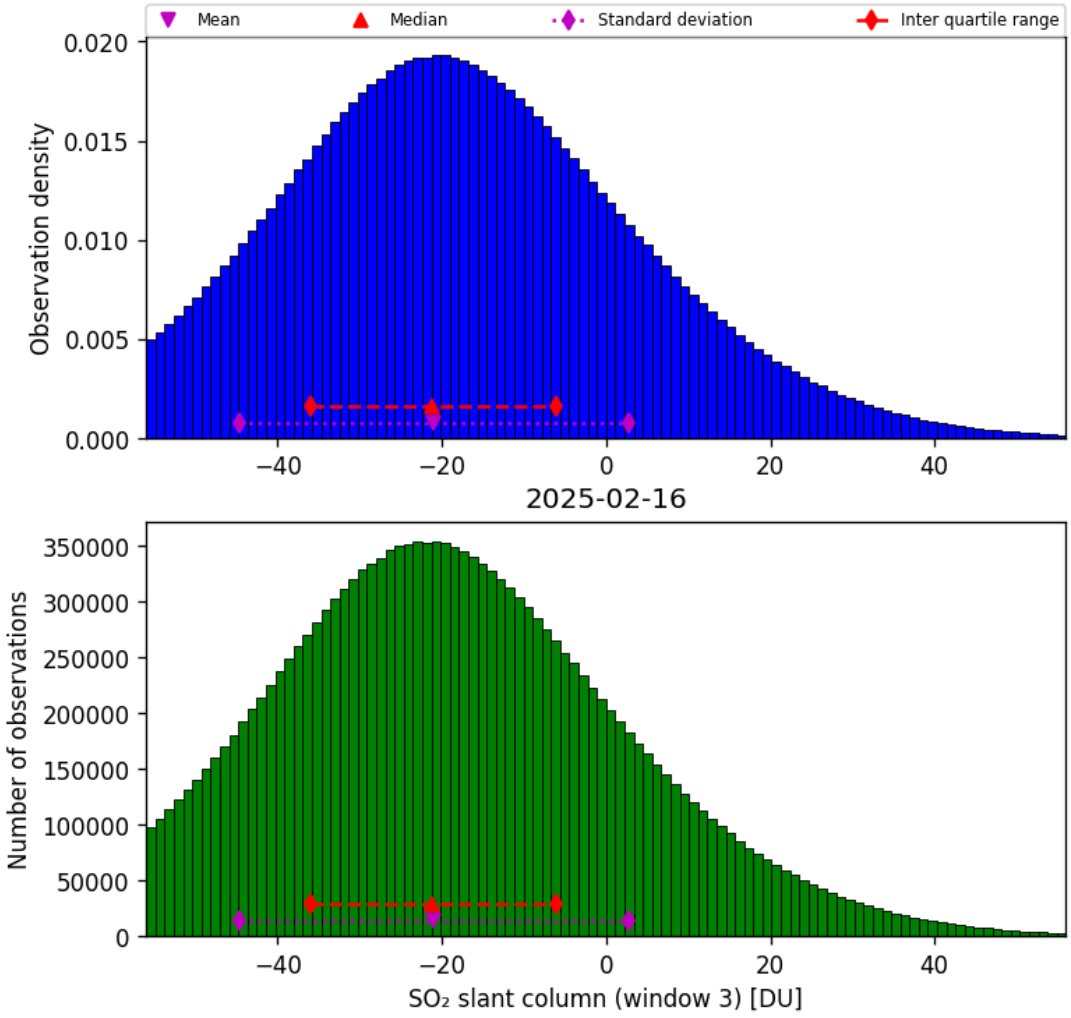


Figure 71: Histogram of "SO_2 slant column (window 3)" for 2025-02-16 to 2025-02-16

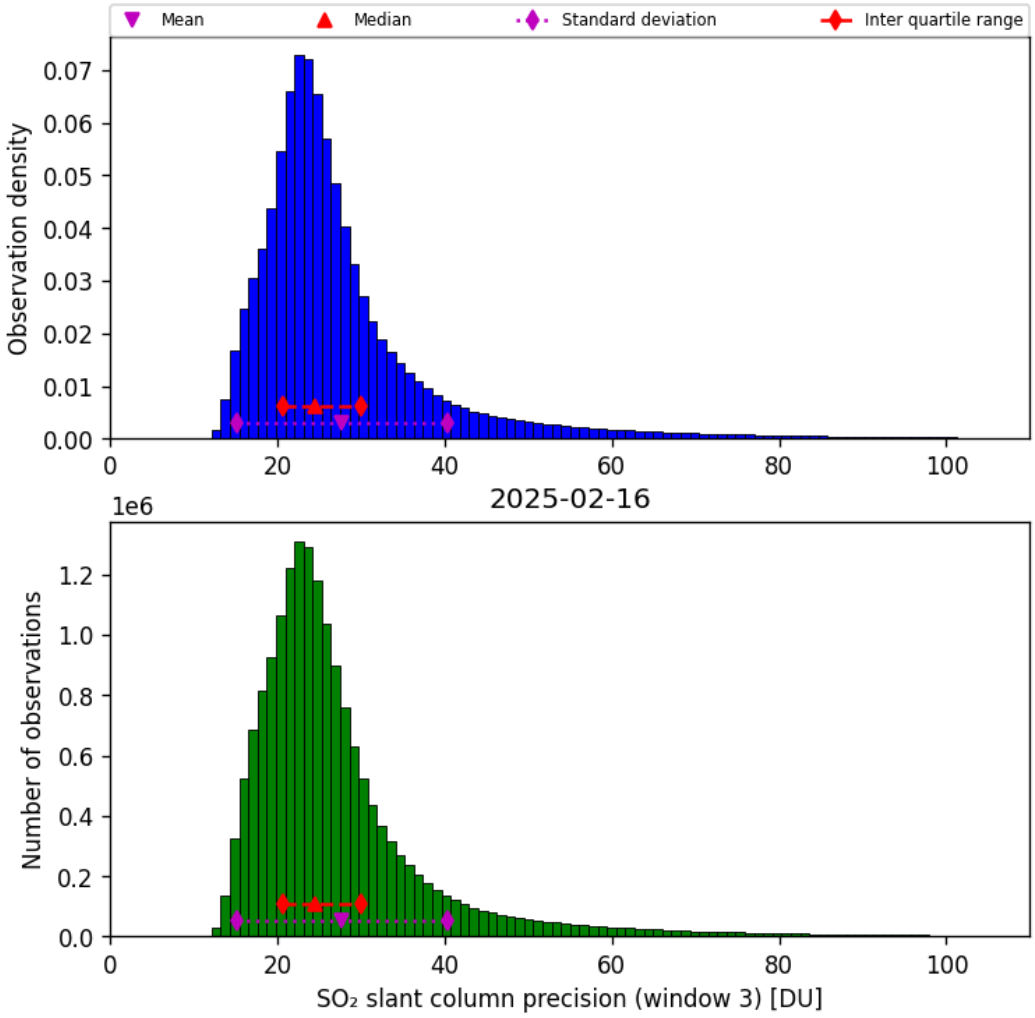


Figure 72: Histogram of "SO_2 slant column precision (window 3)" for 2025-02-16 to 2025-02-16

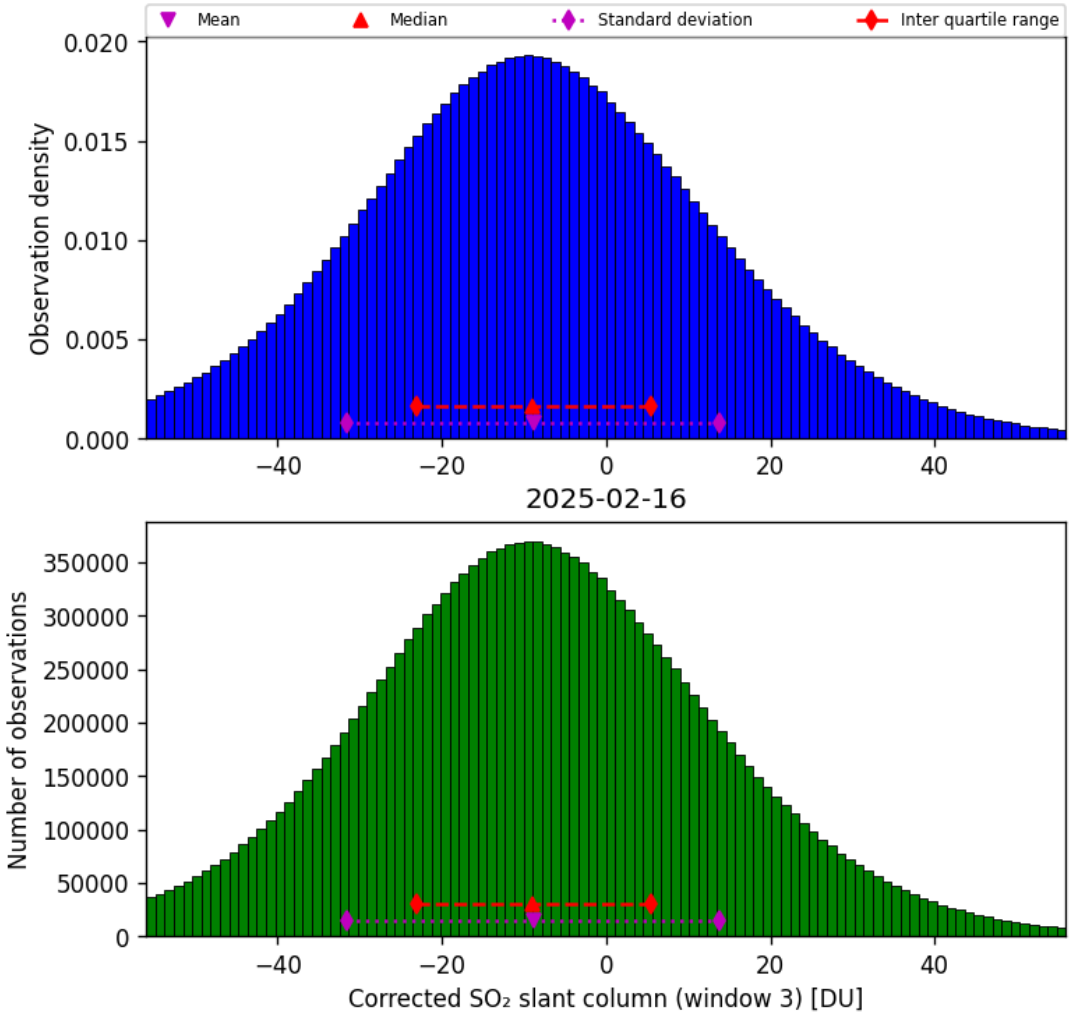


Figure 73: Histogram of "Corrected SO_2 slant column (window 3)" for 2025-02-16 to 2025-02-16

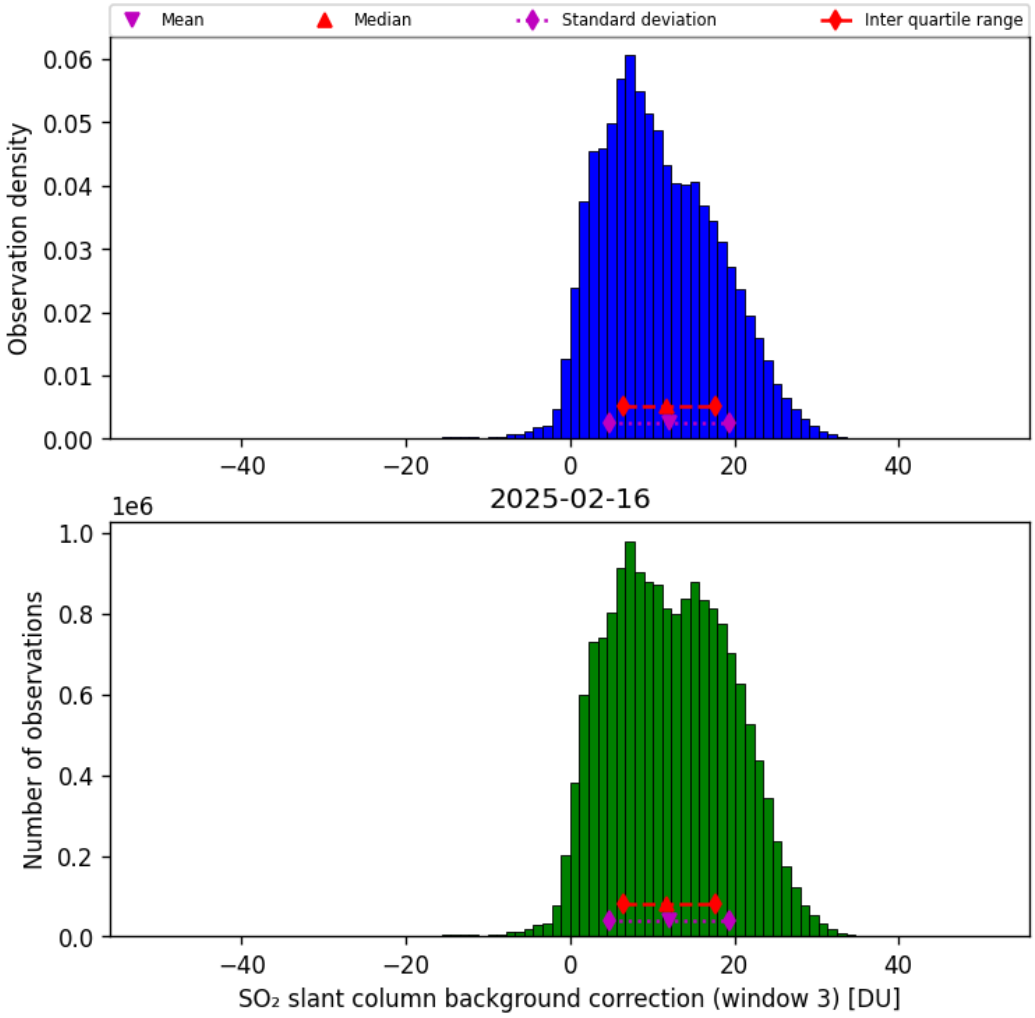


Figure 74: Histogram of "SO_2 slant column background correction (window 3)" for 2025-02-16 to 2025-02-16

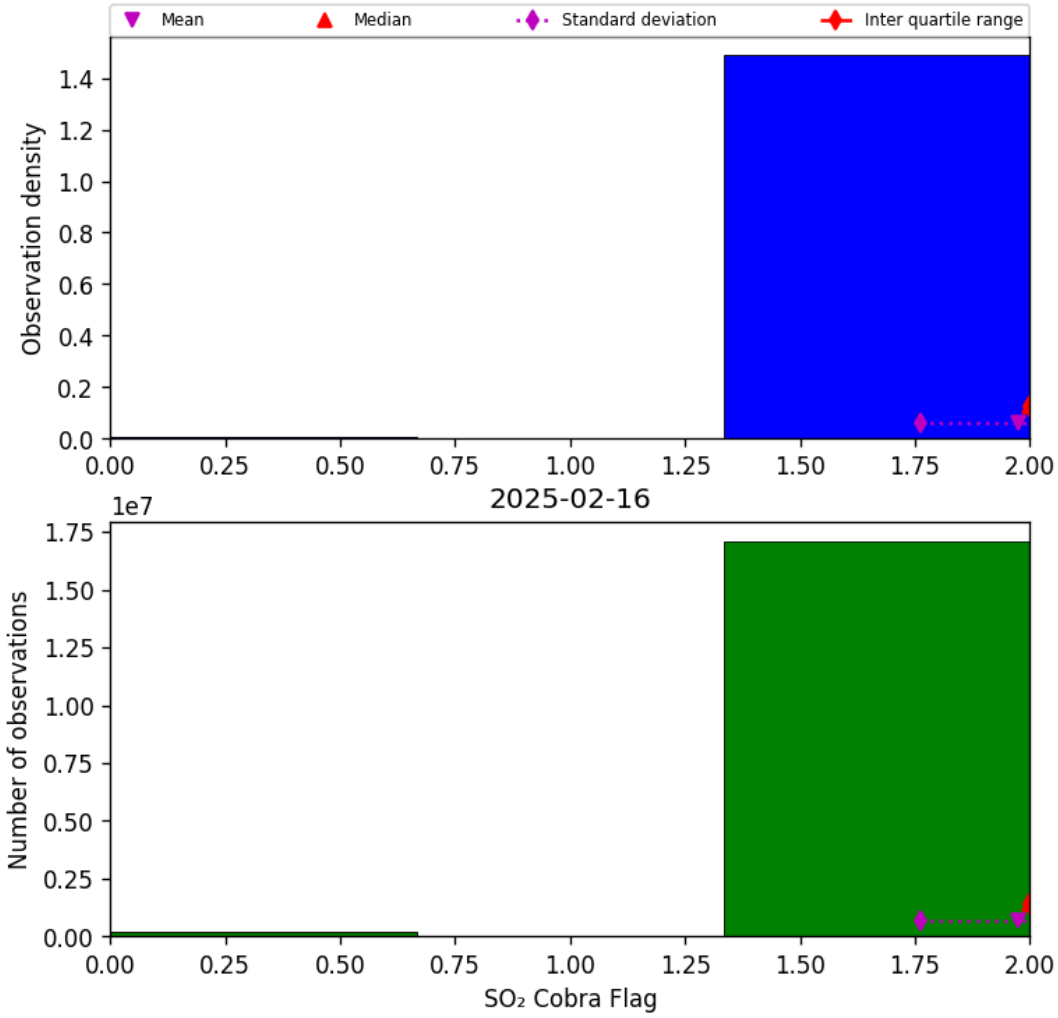


Figure 75: Histogram of "SO_2 Cobra Flag" for 2025-02-16 to 2025-02-16

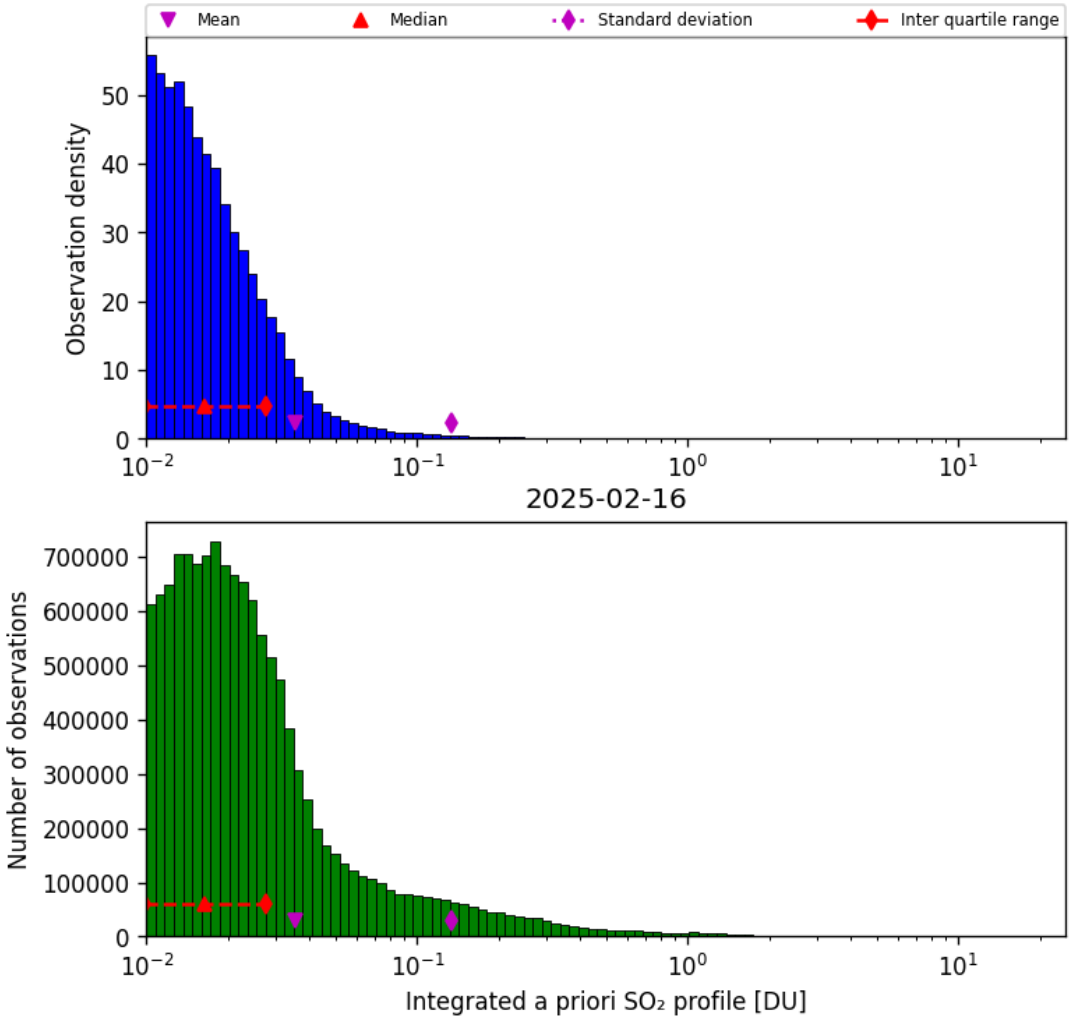


Figure 76: Histogram of “Integrated a priori SO_2 profile” for 2025-02-16 to 2025-02-16

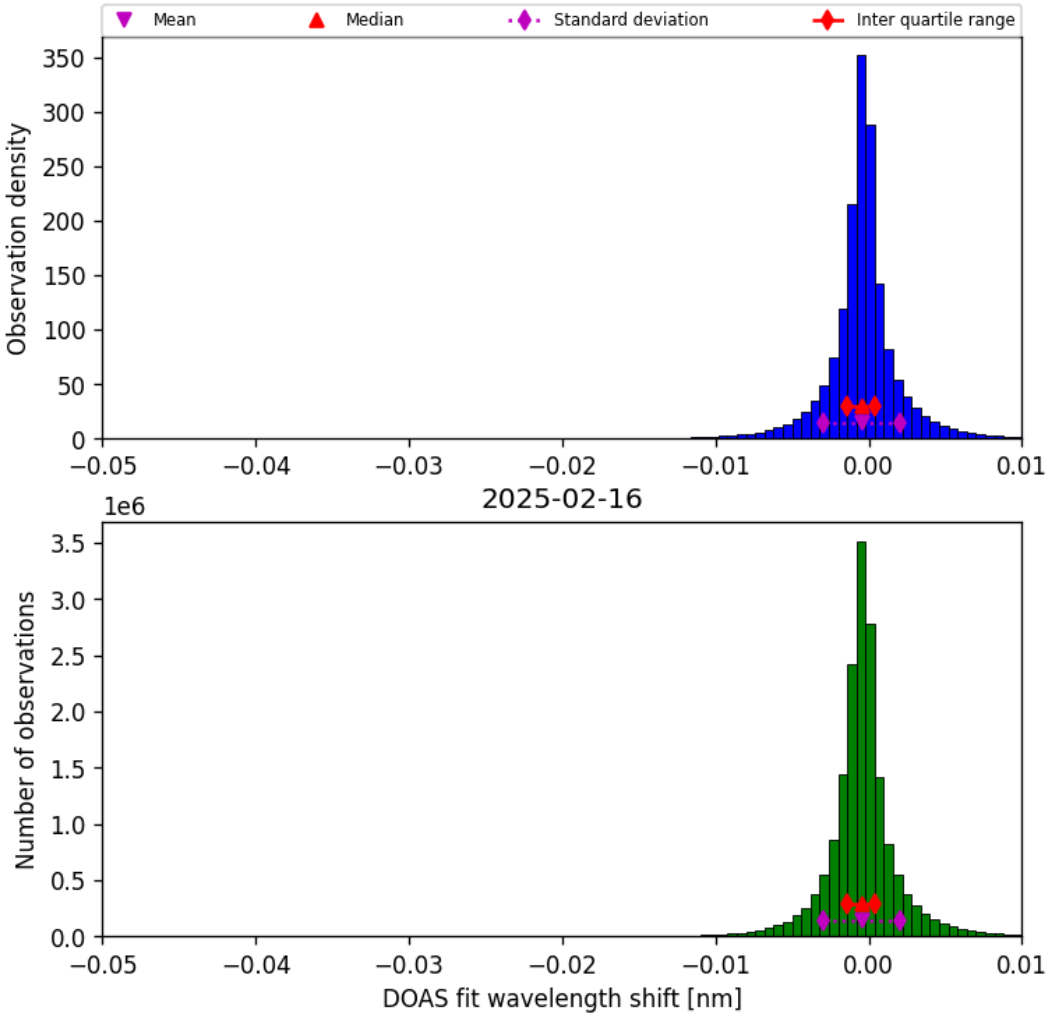


Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-02-16 to 2025-02-16

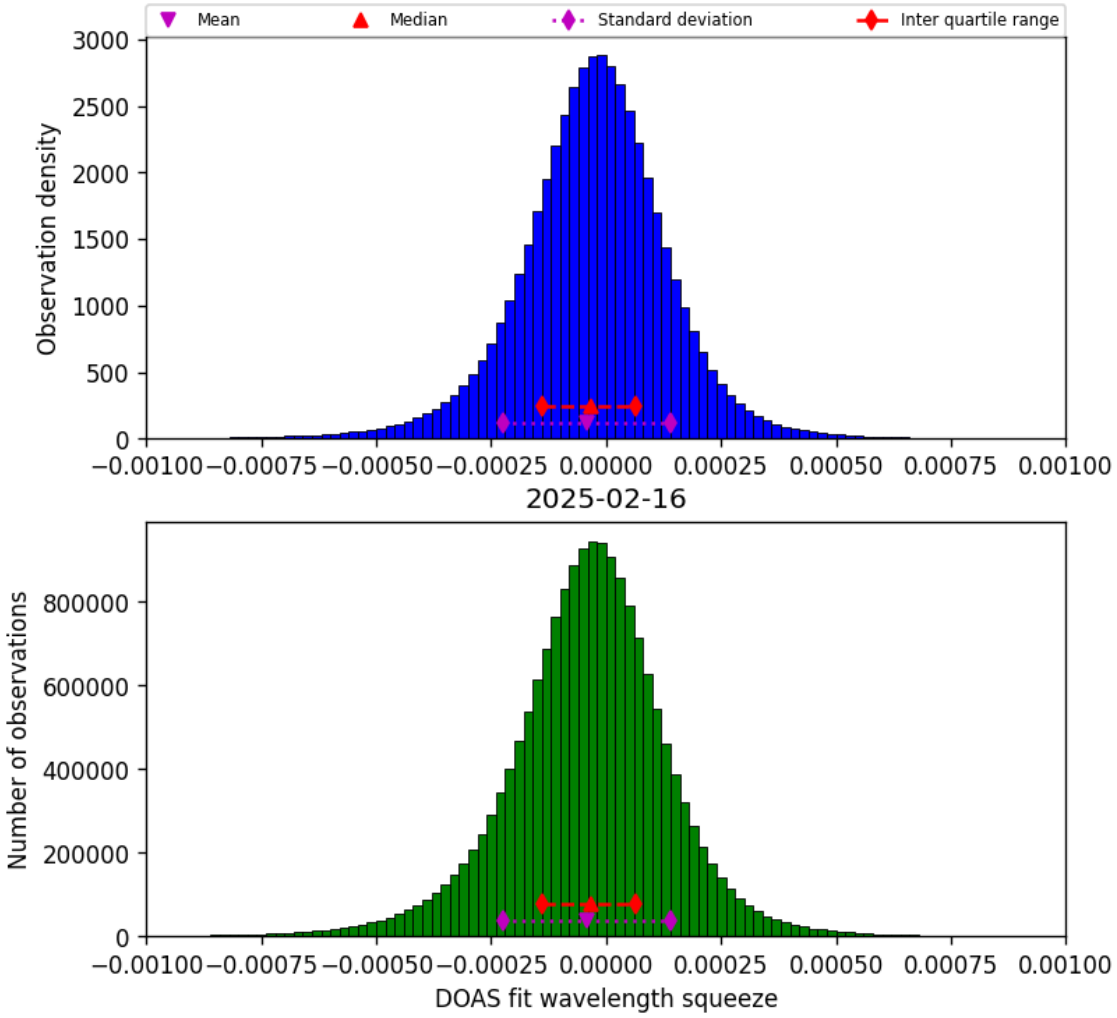


Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-02-16 to 2025-02-16

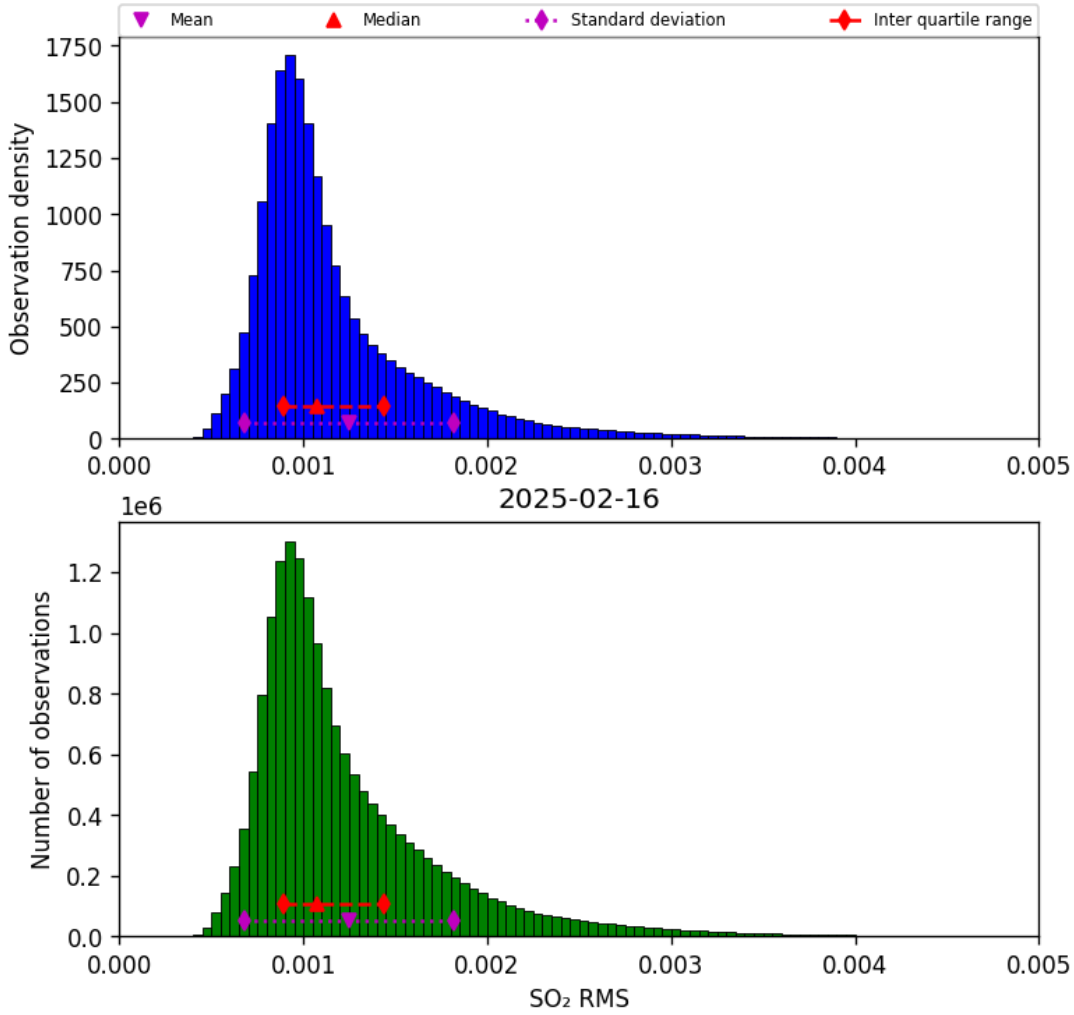


Figure 79: Histogram of "SO_2 RMS" for 2025-02-16 to 2025-02-16

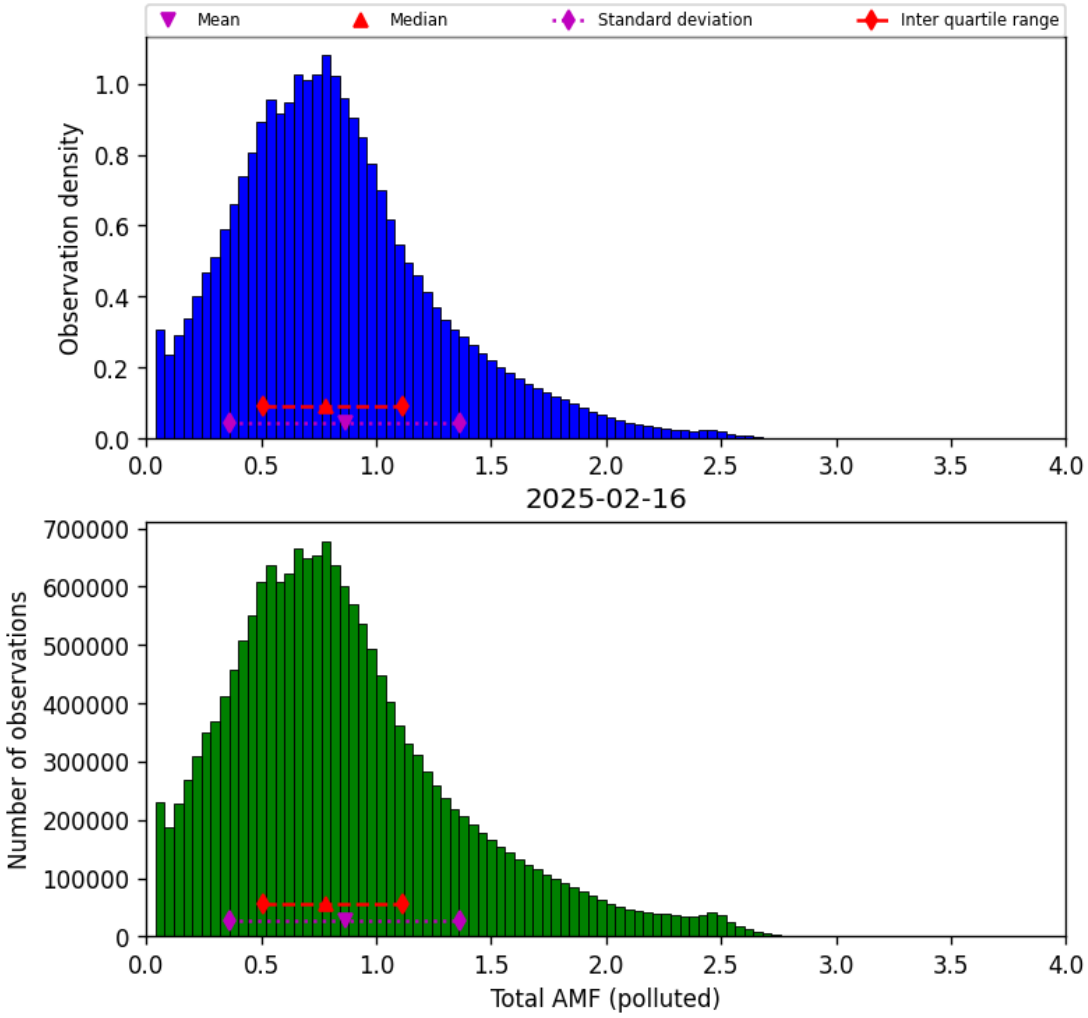


Figure 80: Histogram of “Total AMF (polluted)” for 2025-02-16 to 2025-02-16

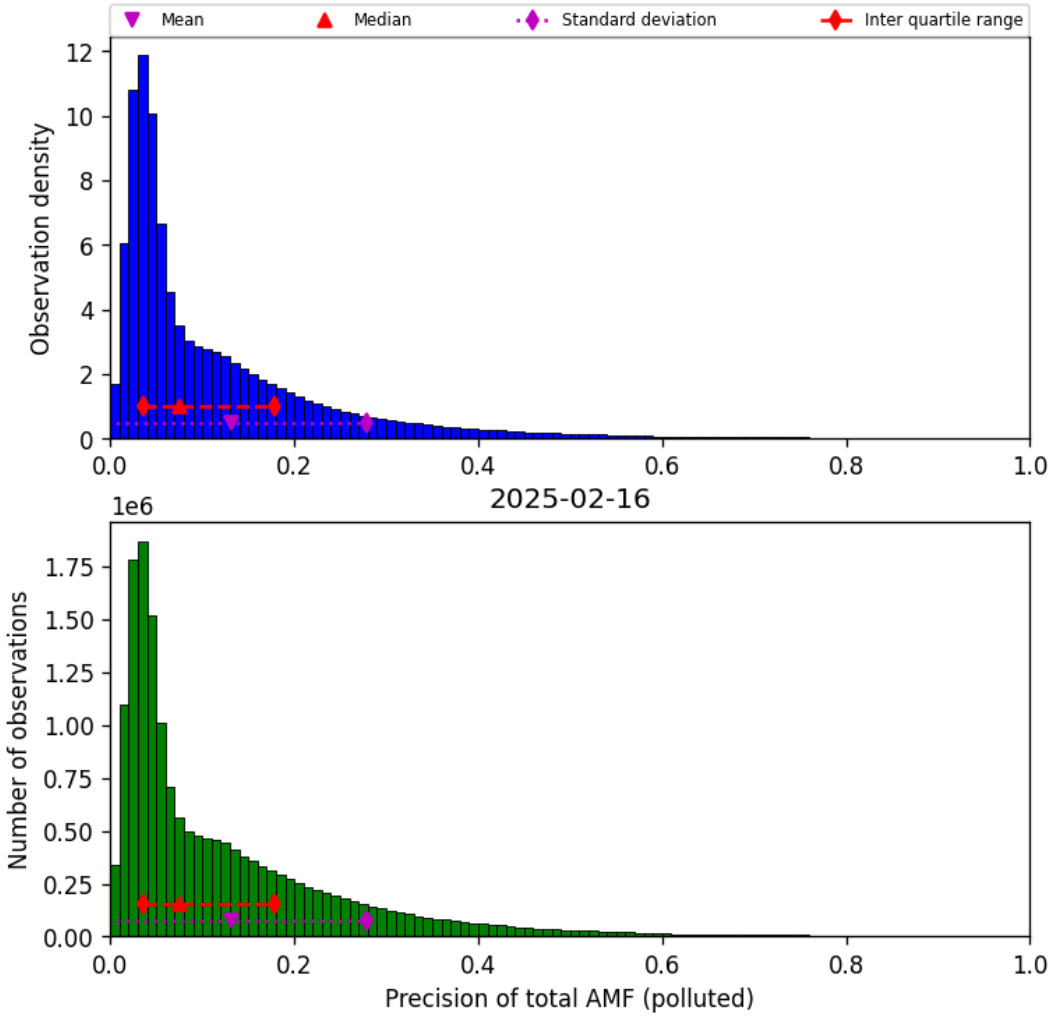


Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-02-16 to 2025-02-16

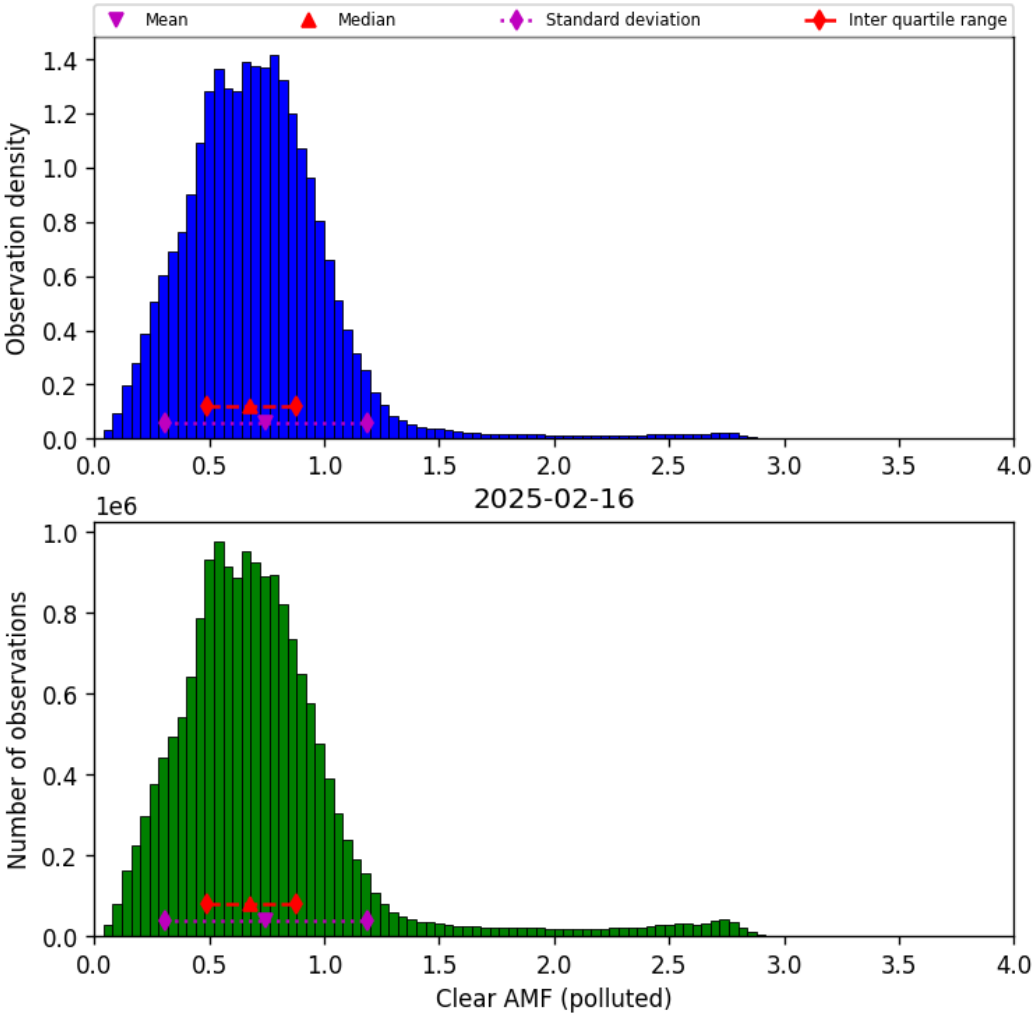


Figure 82: Histogram of “Clear AMF (polluted)” for 2025-02-16 to 2025-02-16

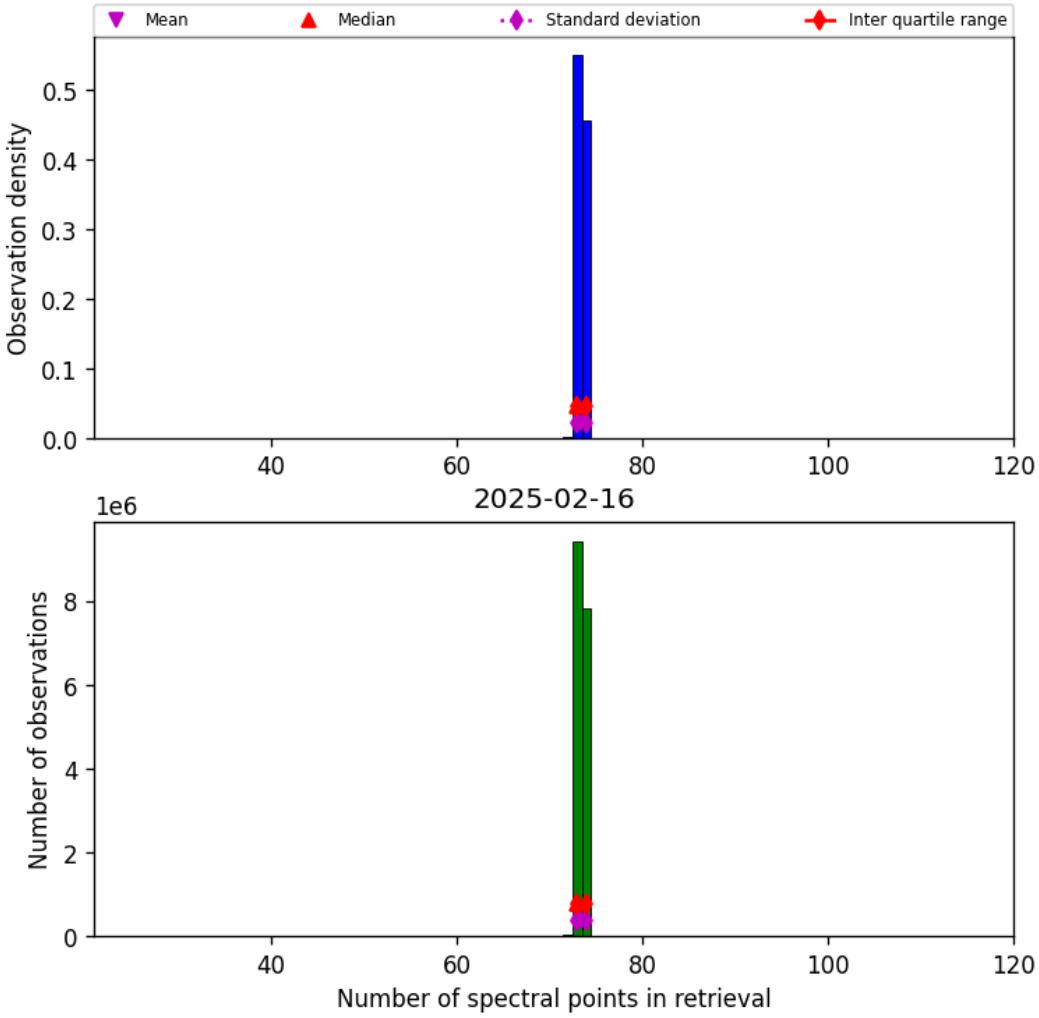


Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-02-16 to 2025-02-16

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.

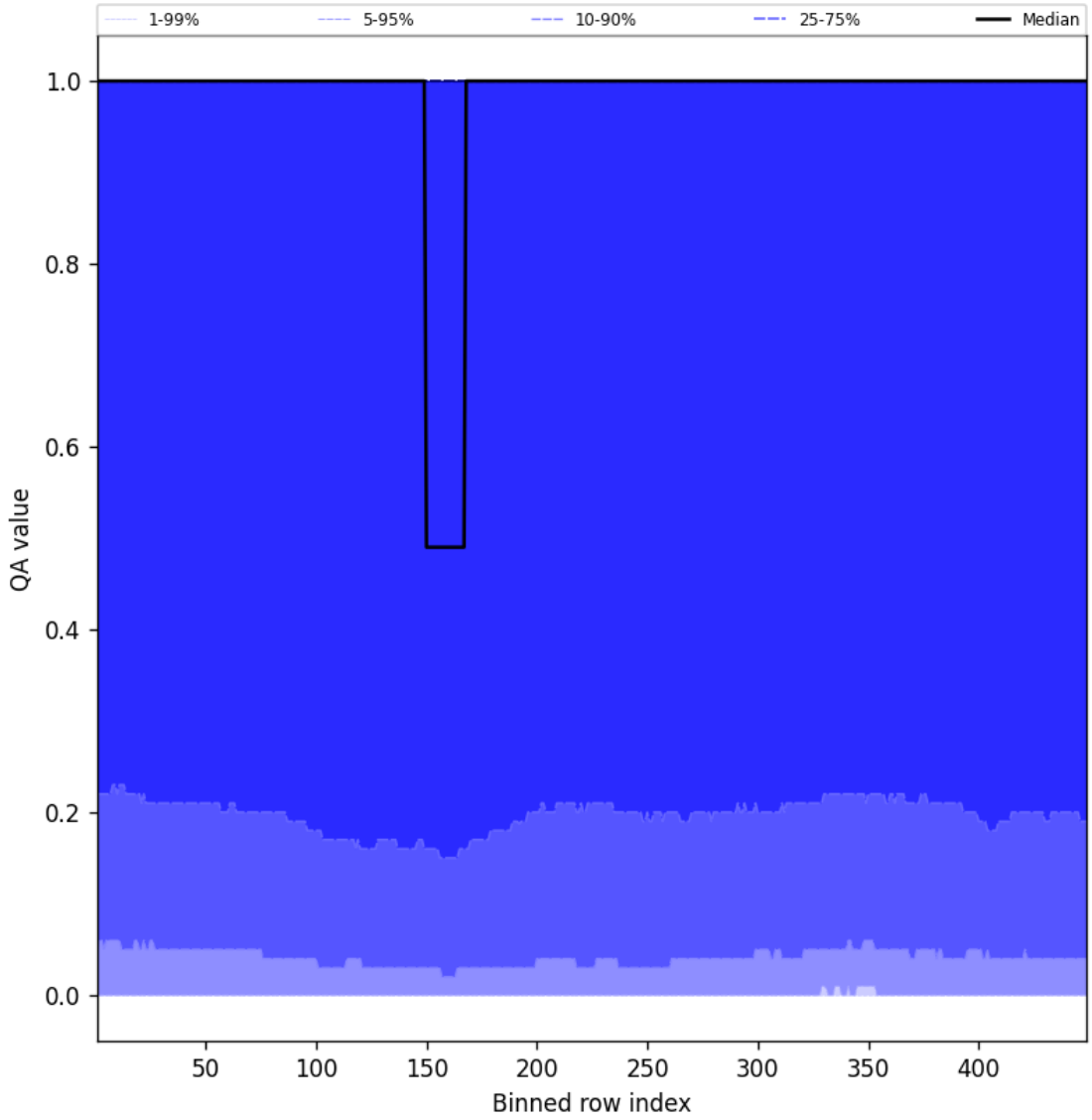


Figure 84: Along track statistics of “QA value” for 2025-02-16 to 2025-02-16

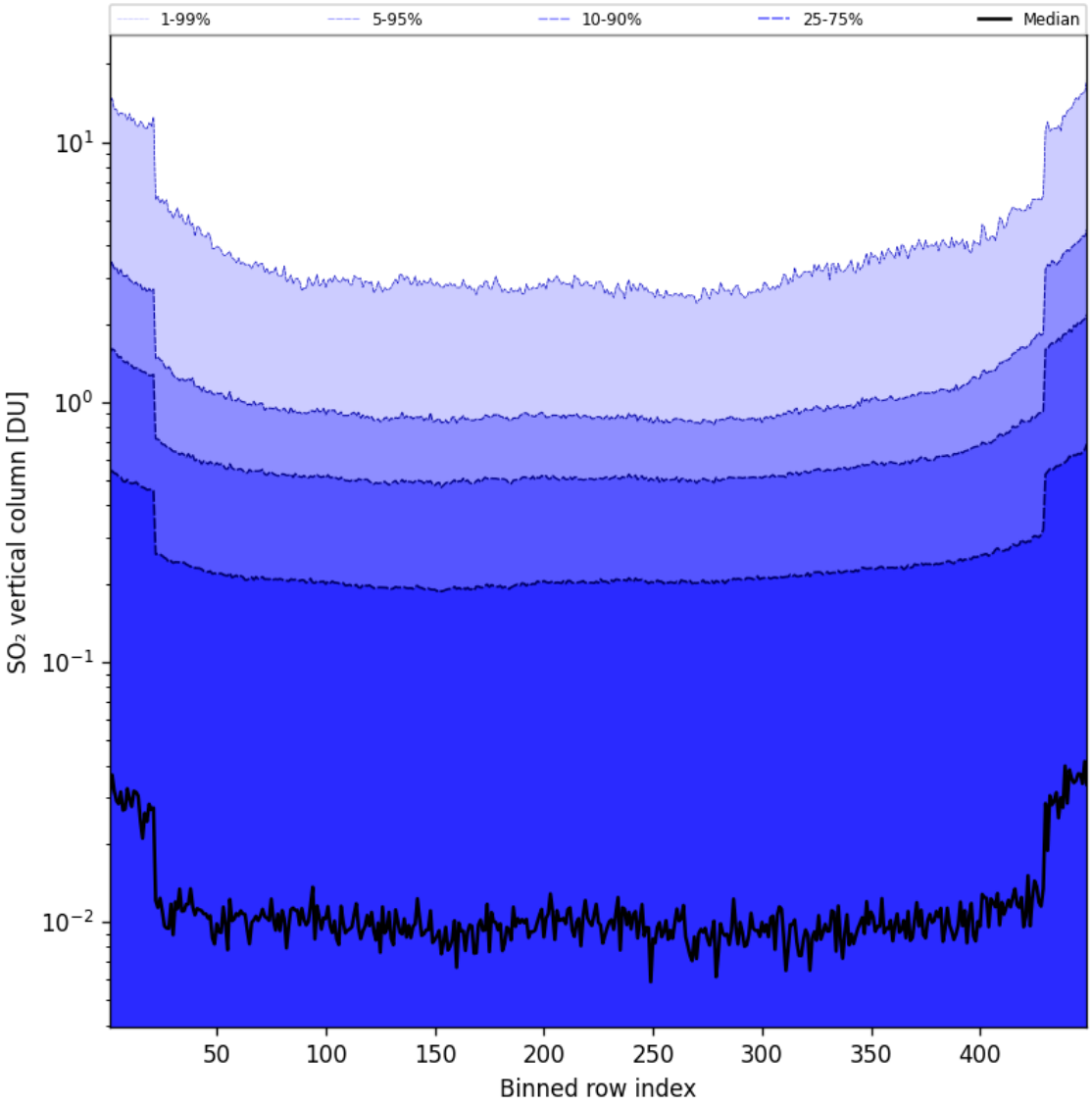


Figure 85: Along track statistics of "SO_2 vertical column" for 2025-02-16 to 2025-02-16

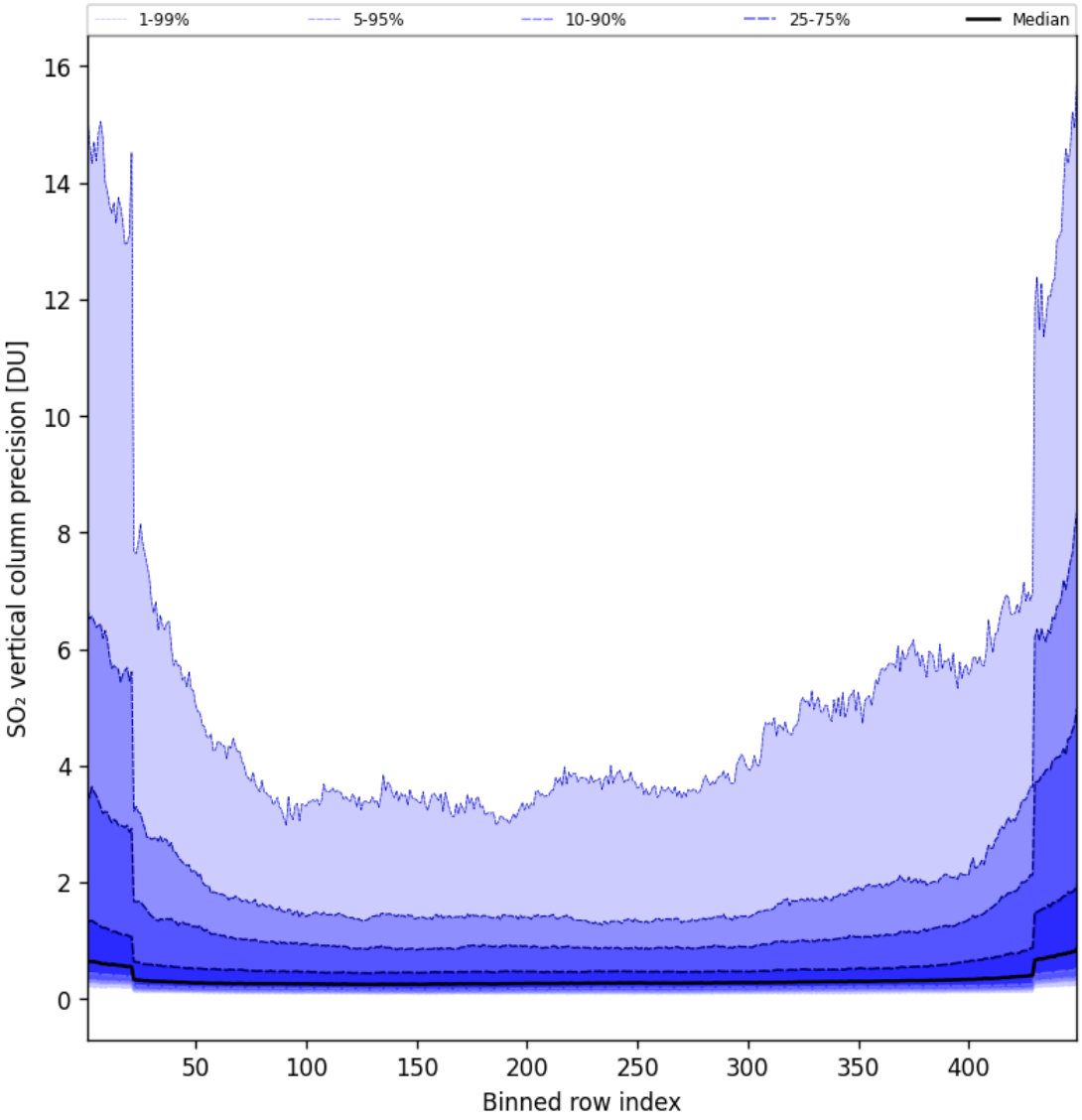


Figure 86: Along track statistics of "SO_2 vertical column precision" for 2025-02-16 to 2025-02-16

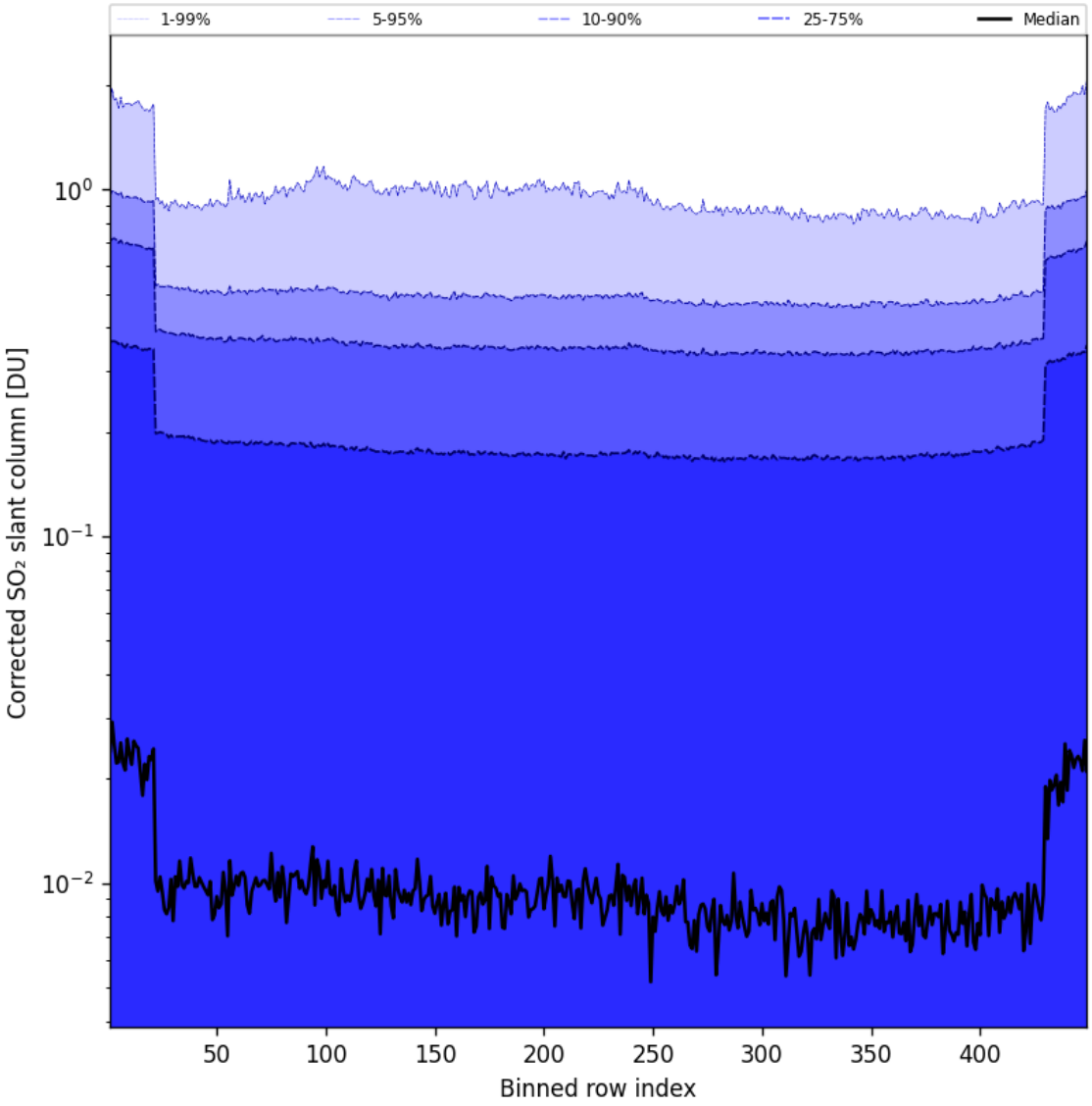


Figure 87: Along track statistics of “Corrected SO_2 slant column” for 2025-02-16 to 2025-02-16

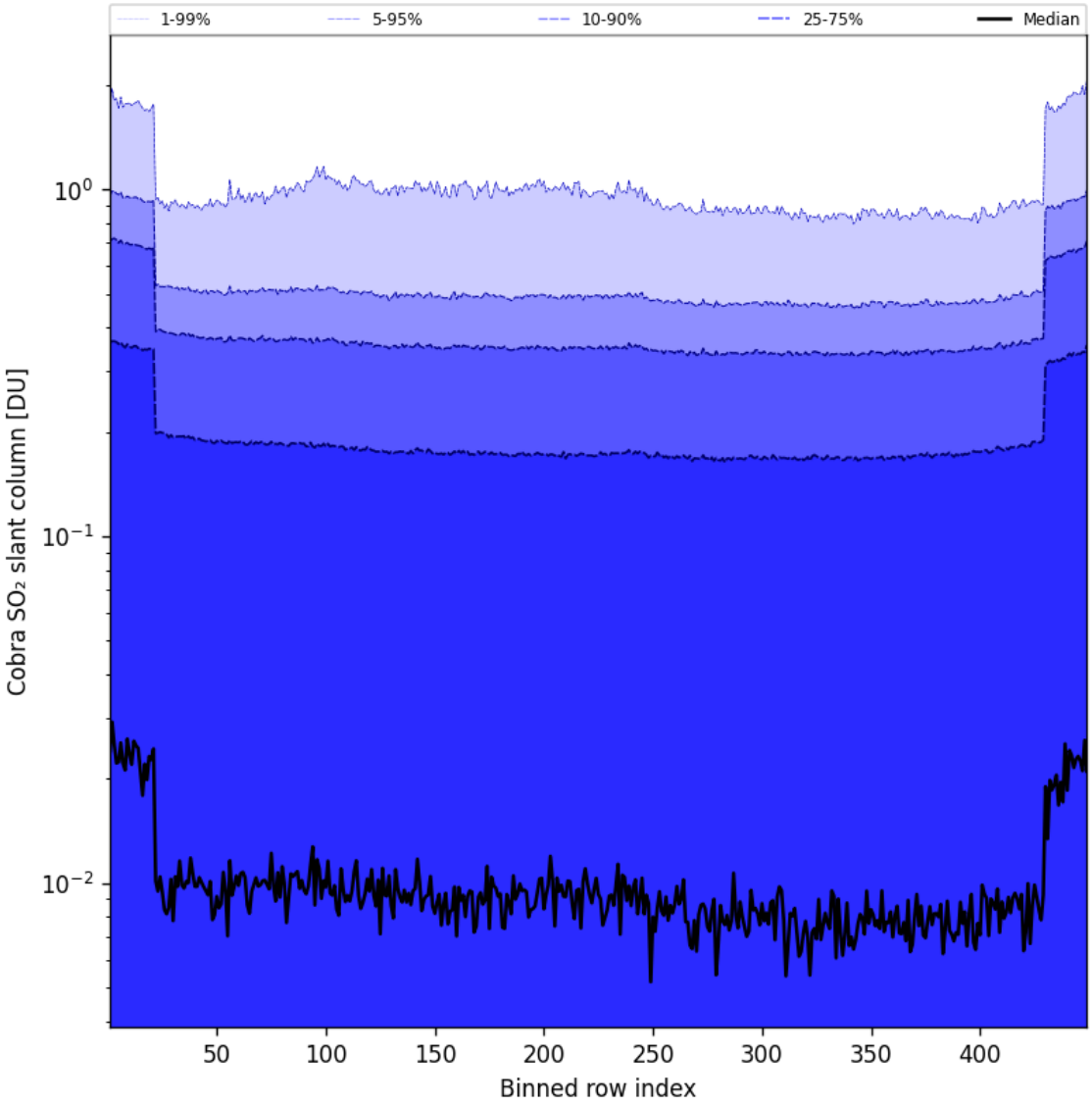


Figure 88: Along track statistics of “Cobra SO_2 slant column” for 2025-02-16 to 2025-02-16

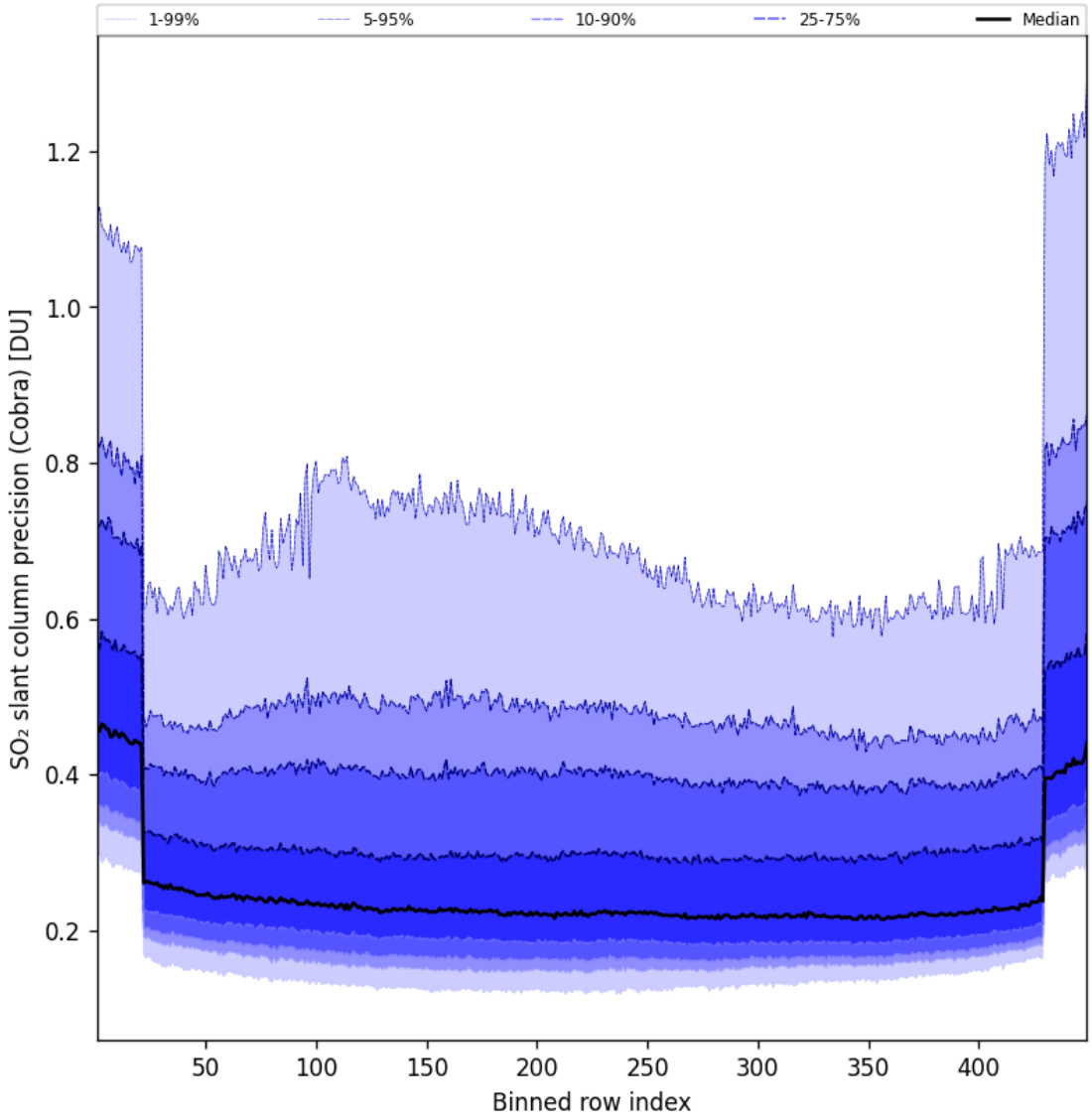


Figure 89: Along track statistics of "SO_2 slant column precision (Cobra)" for 2025-02-16 to 2025-02-16

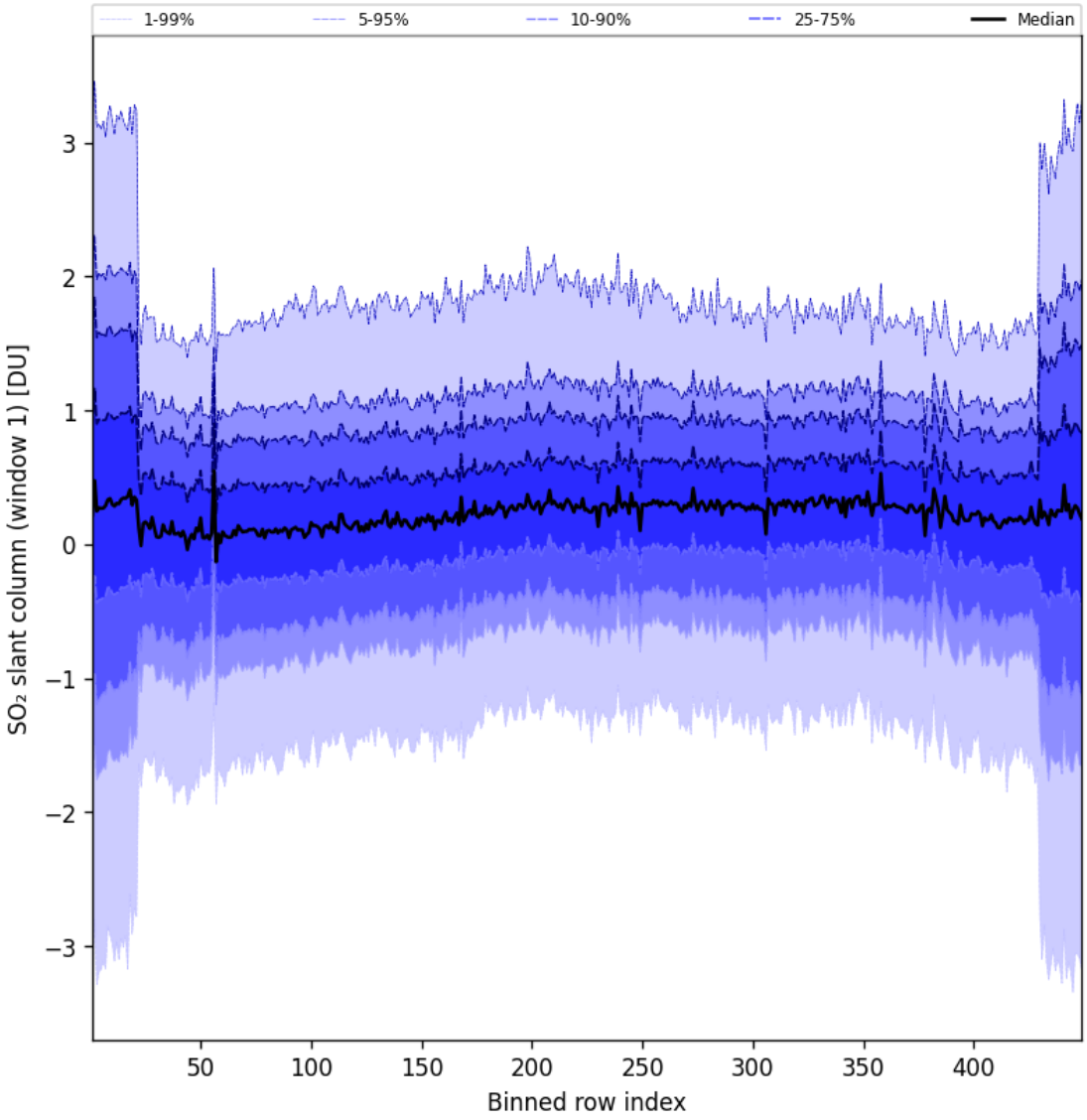


Figure 90: Along track statistics of "SO_2 slant column (window 1)" for 2025-02-16 to 2025-02-16

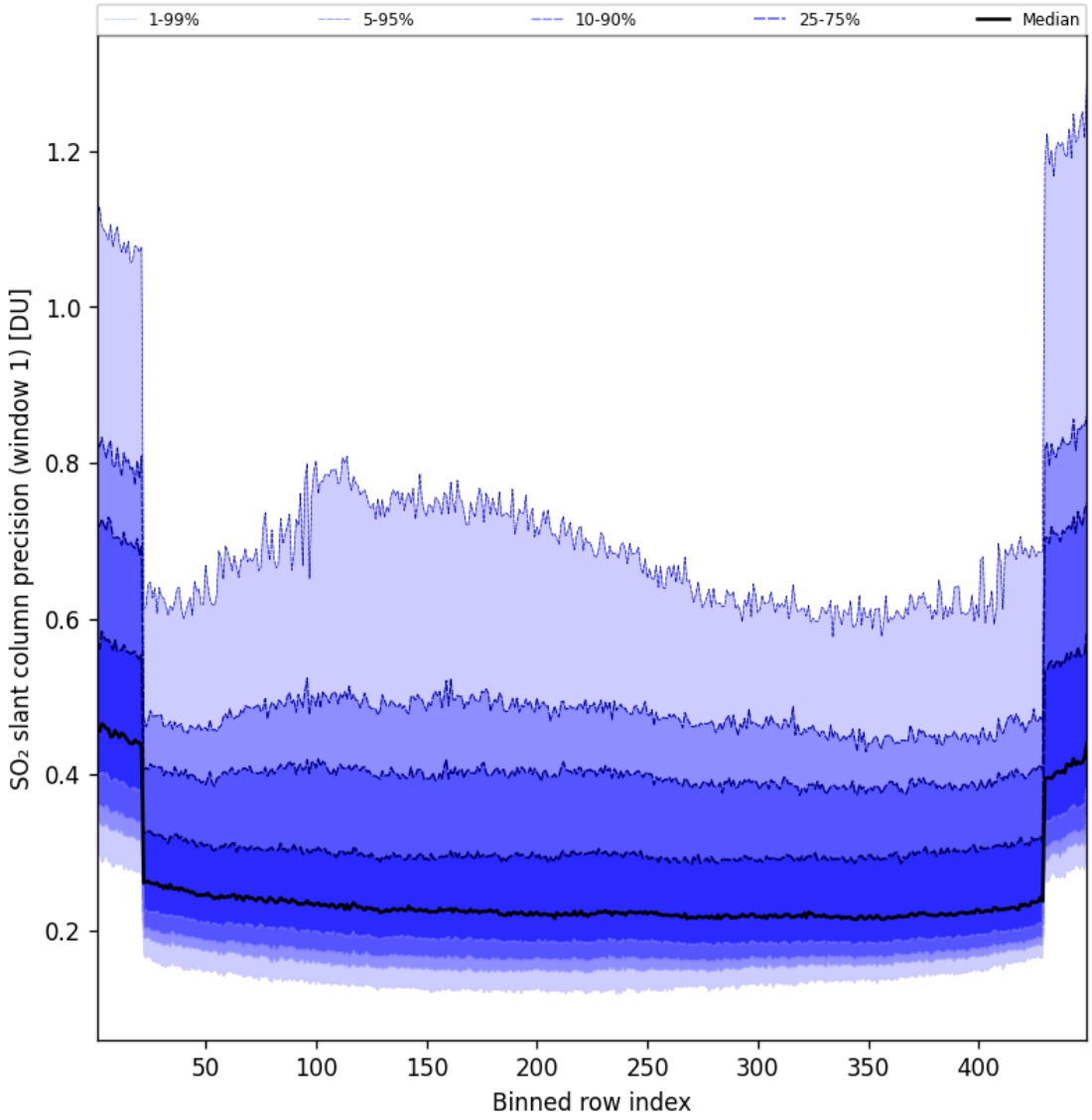


Figure 91: Along track statistics of "SO_2 slant column precision (window 1)" for 2025-02-16 to 2025-02-16

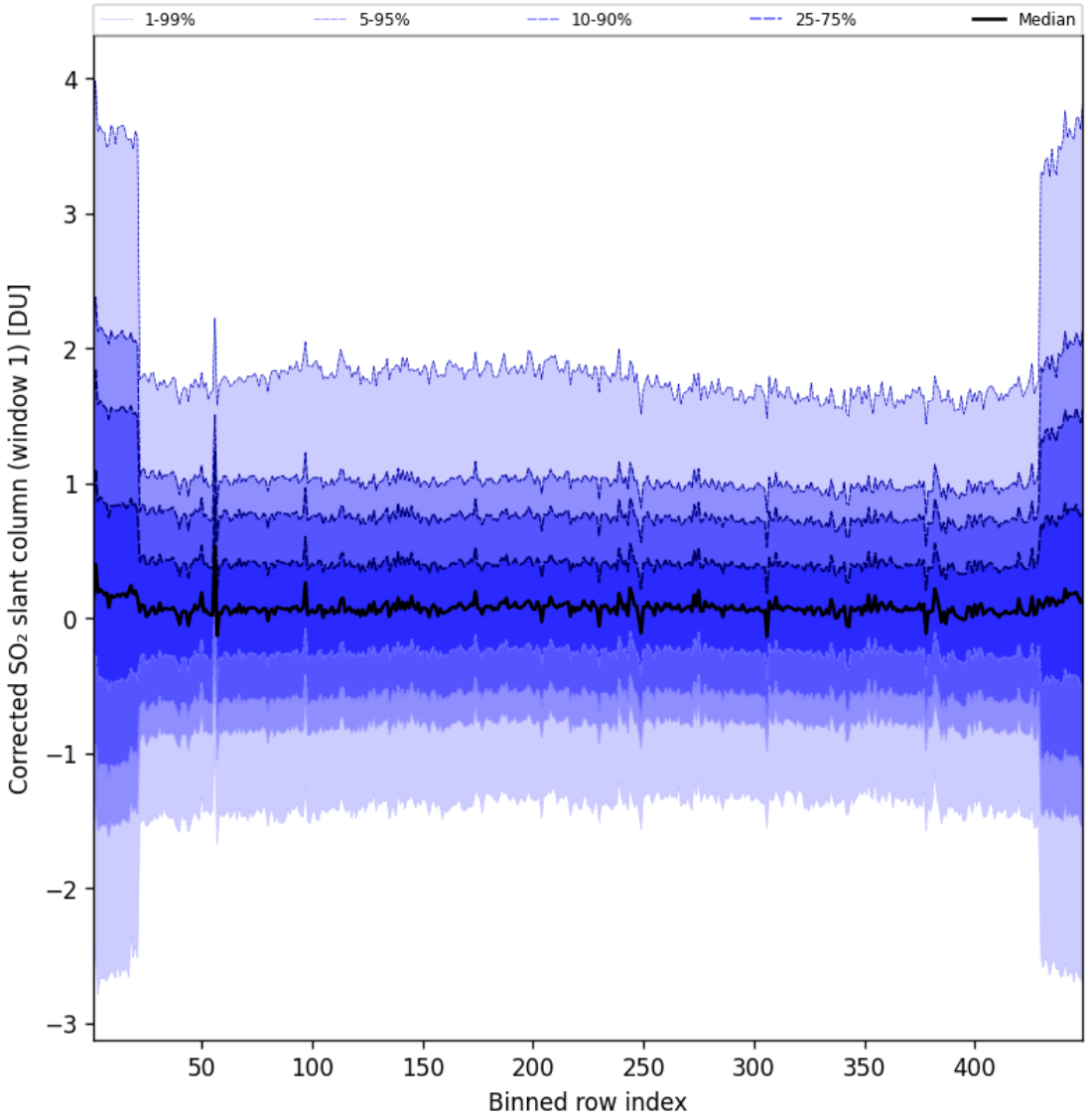


Figure 92: Along track statistics of “Corrected SO_2 slant column (window 1)” for 2025-02-16 to 2025-02-16

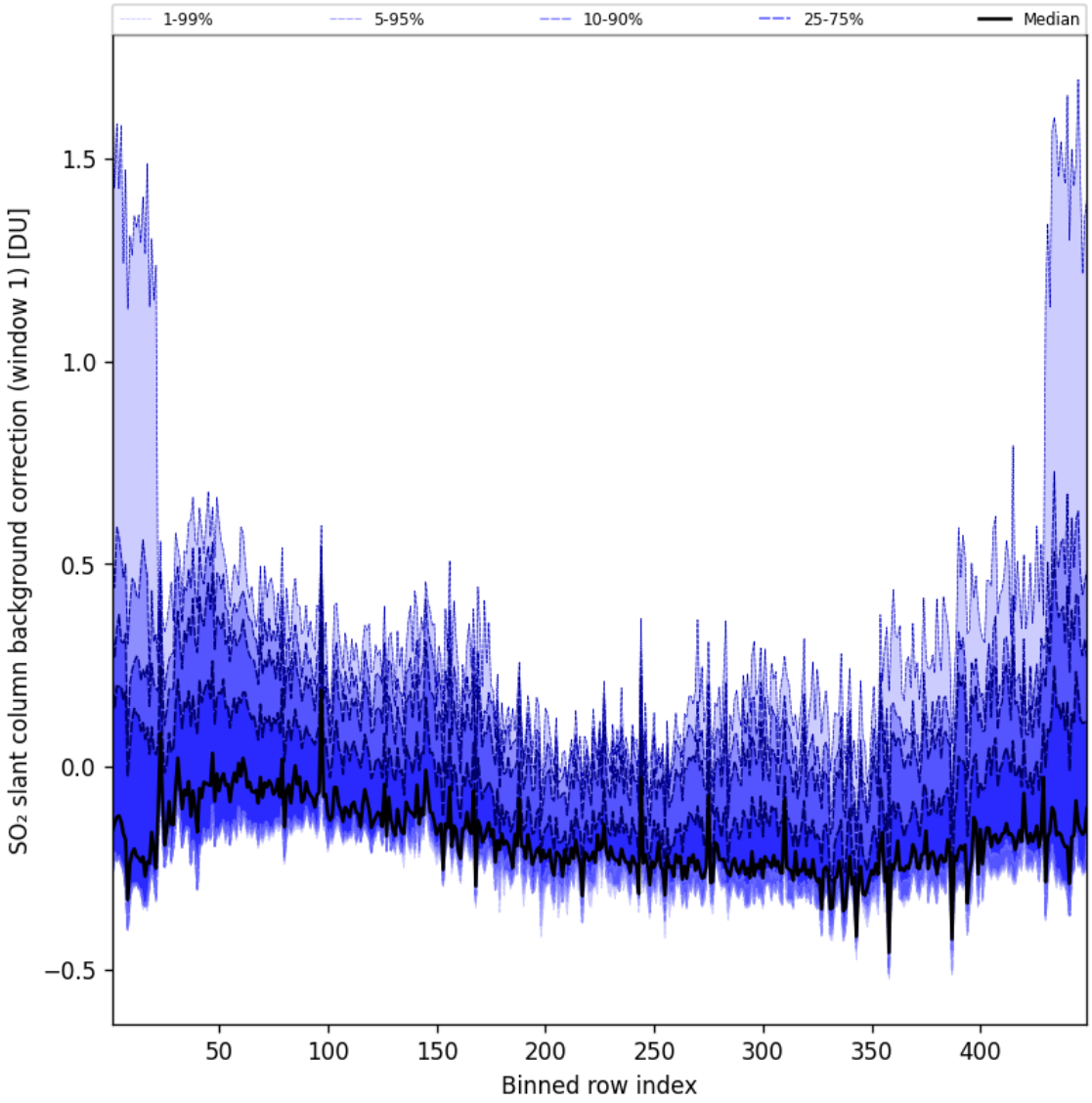


Figure 93: Along track statistics of "SO_2 slant column background correction (window 1)" for 2025-02-16 to 2025-02-16

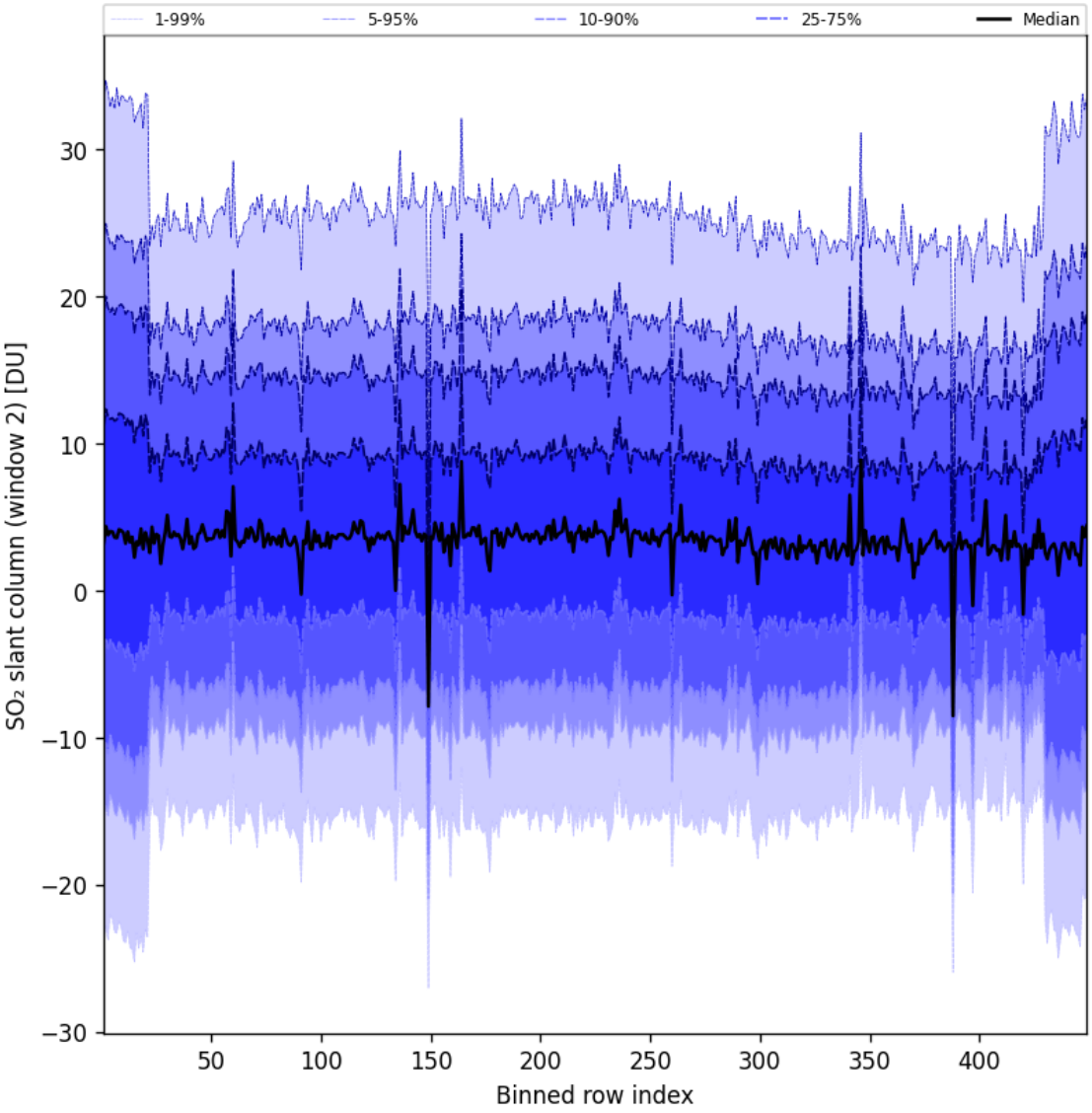


Figure 94: Along track statistics of "SO_2 slant column (window 2)" for 2025-02-16 to 2025-02-16

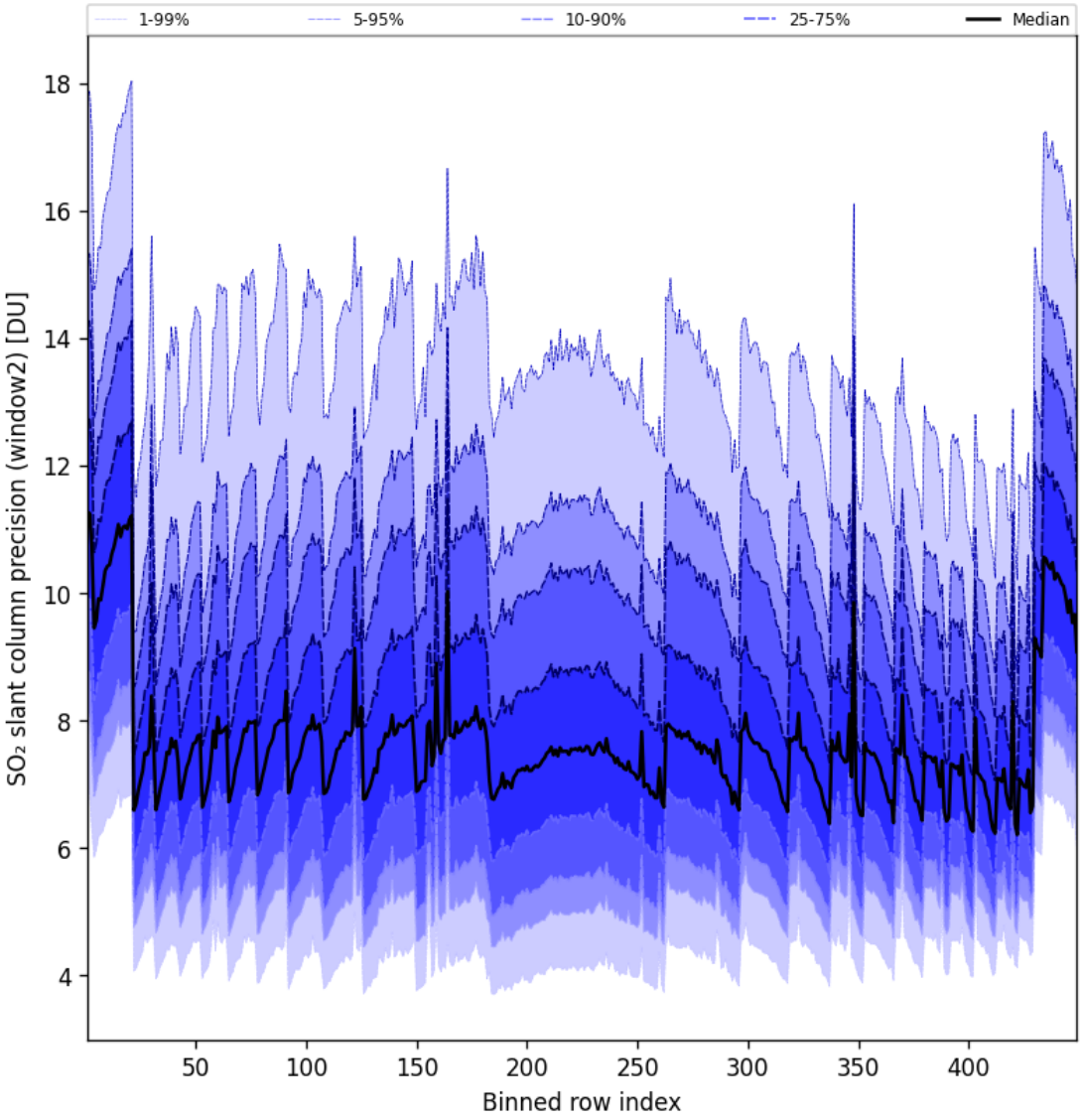


Figure 95: Along track statistics of "SO_2 slant column precision (window2)" for 2025-02-16 to 2025-02-16

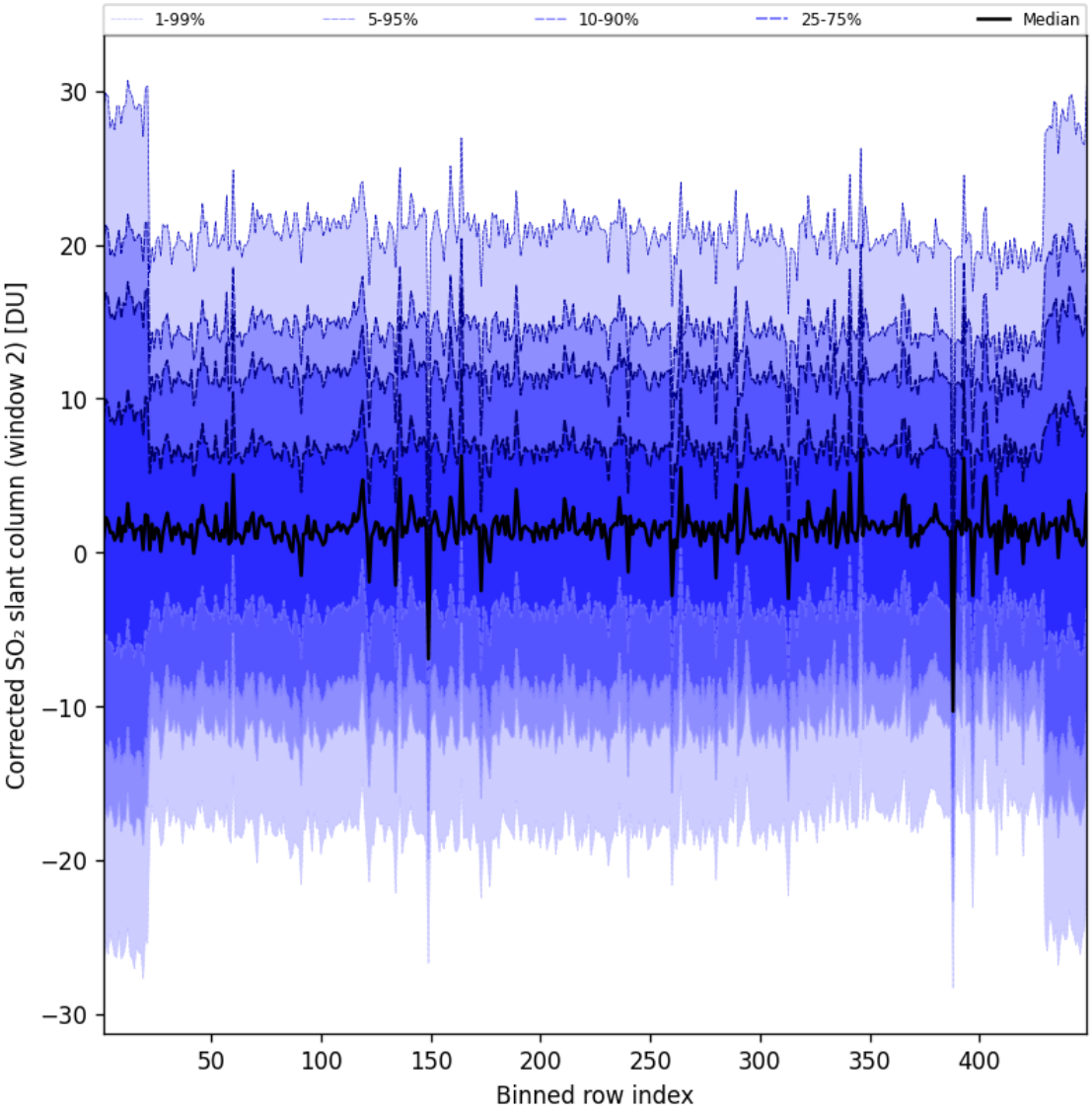


Figure 96: Along track statistics of “Corrected SO_2 slant column (window 2)” for 2025-02-16 to 2025-02-16

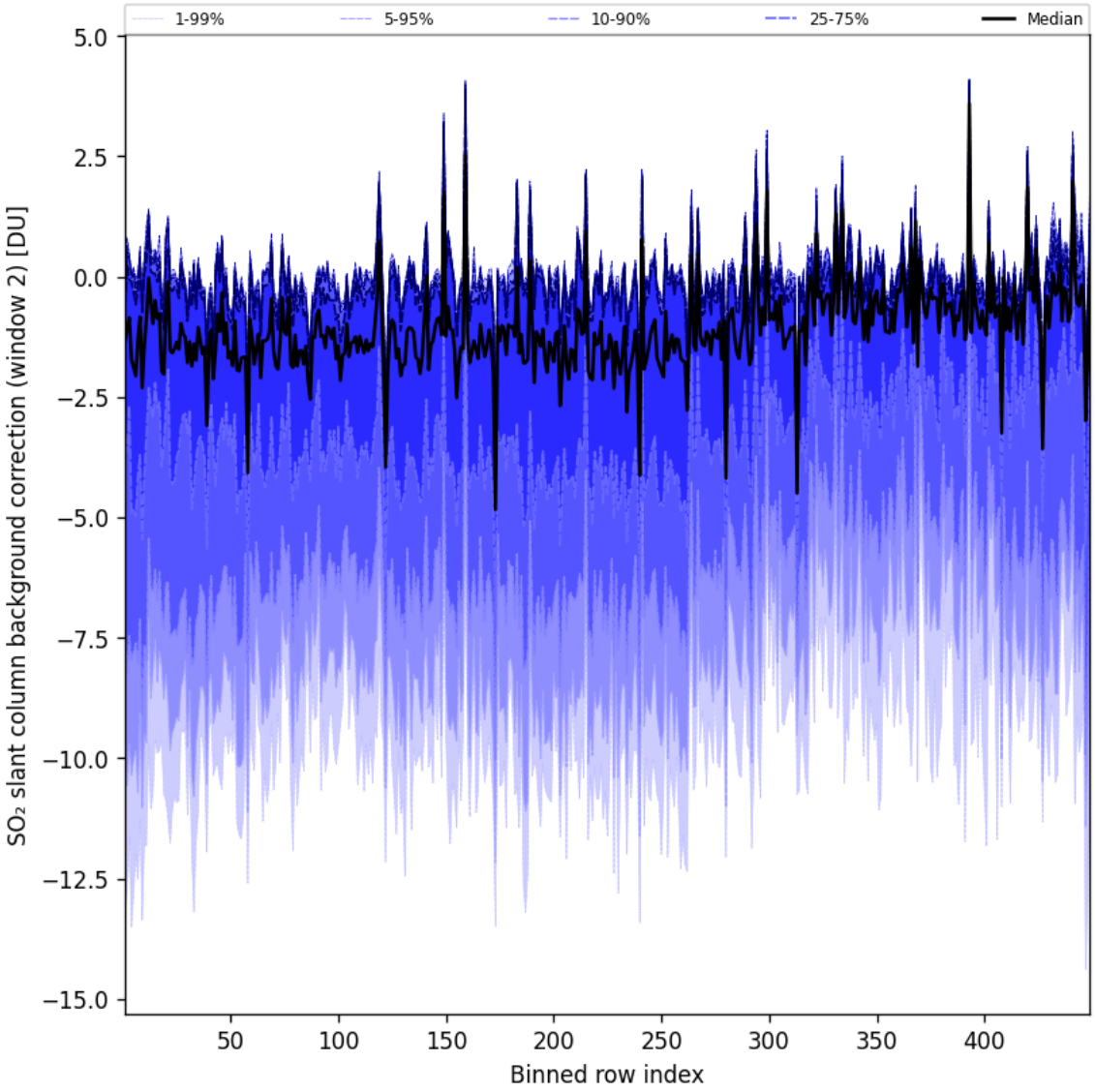


Figure 97: Along track statistics of "SO_2 slant column background correction (window 2)" for 2025-02-16 to 2025-02-16

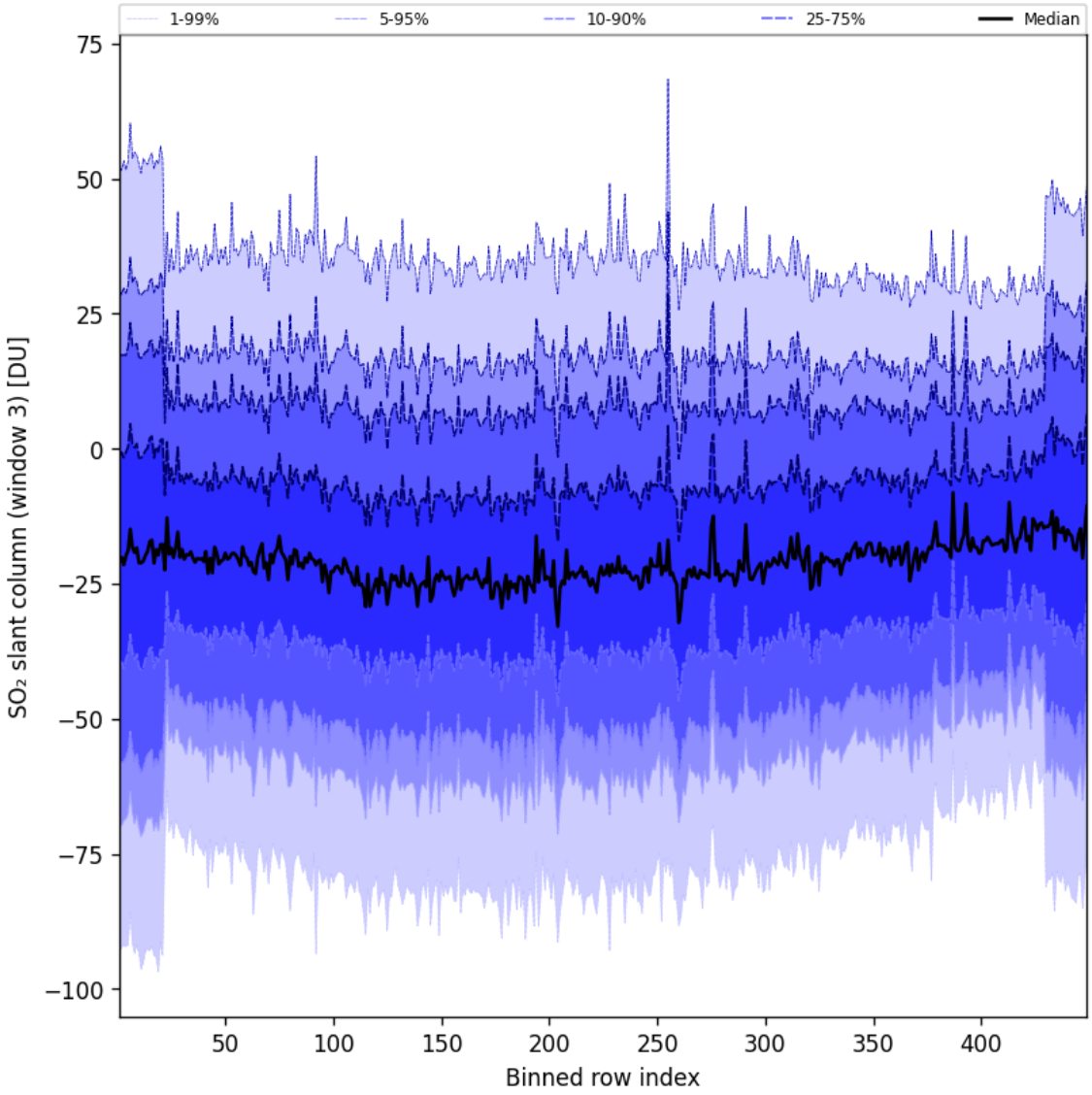


Figure 98: Along track statistics of "SO_2 slant column (window 3)" for 2025-02-16 to 2025-02-16

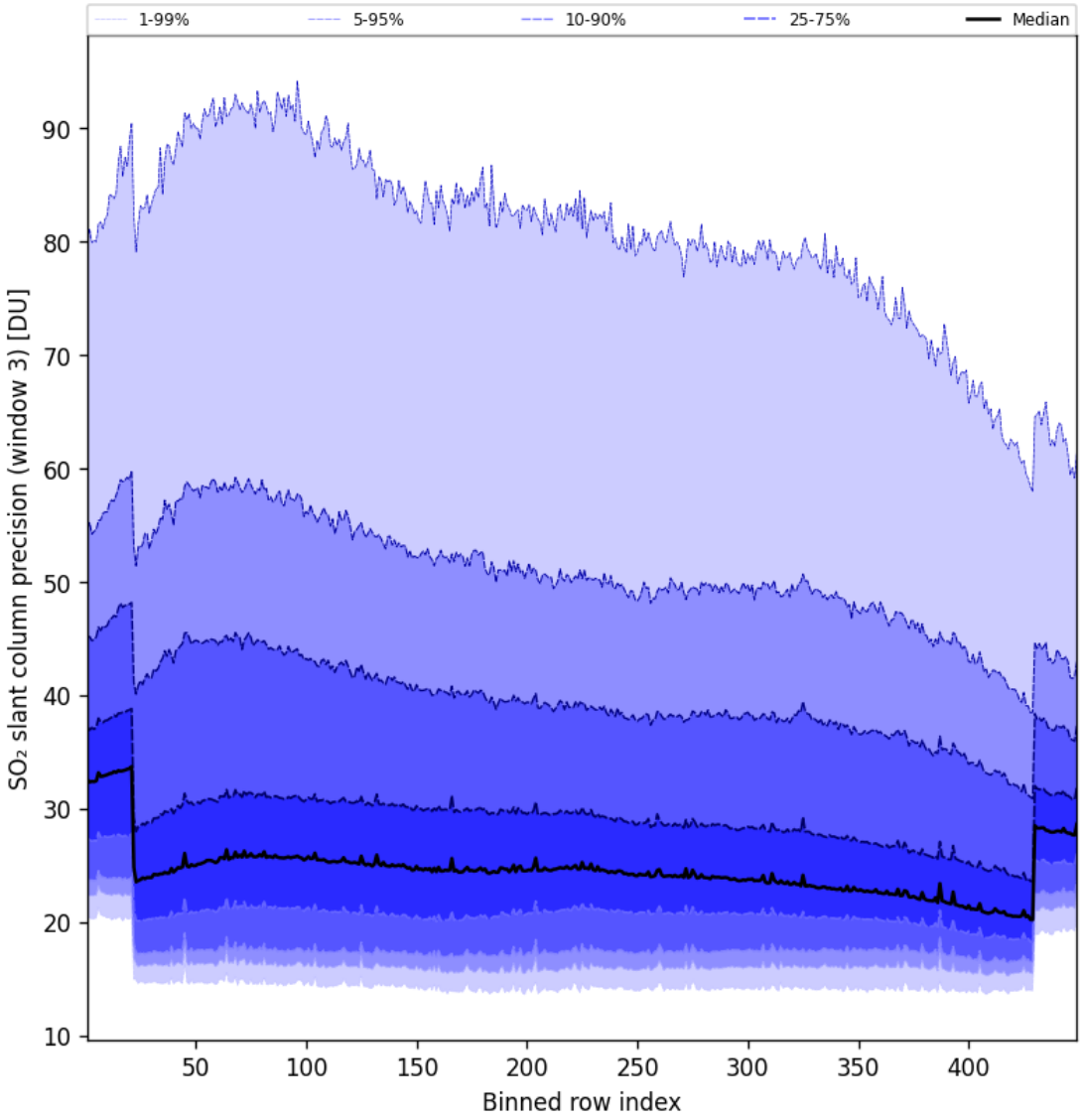


Figure 99: Along track statistics of "SO_2 slant column precision (window 3)" for 2025-02-16 to 2025-02-16

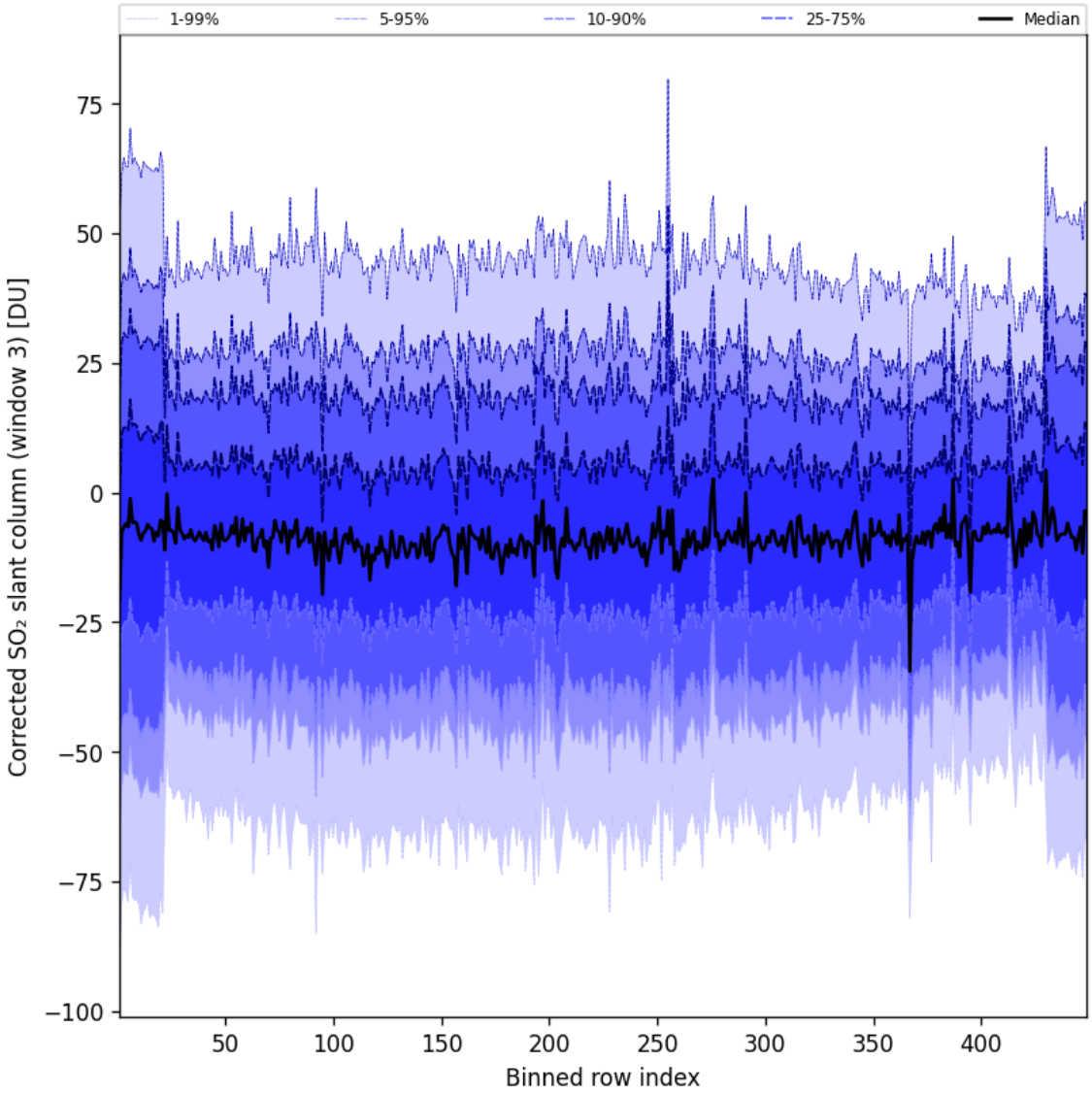


Figure 100: Along track statistics of “Corrected SO_2 slant column (window 3)” for 2025-02-16 to 2025-02-16

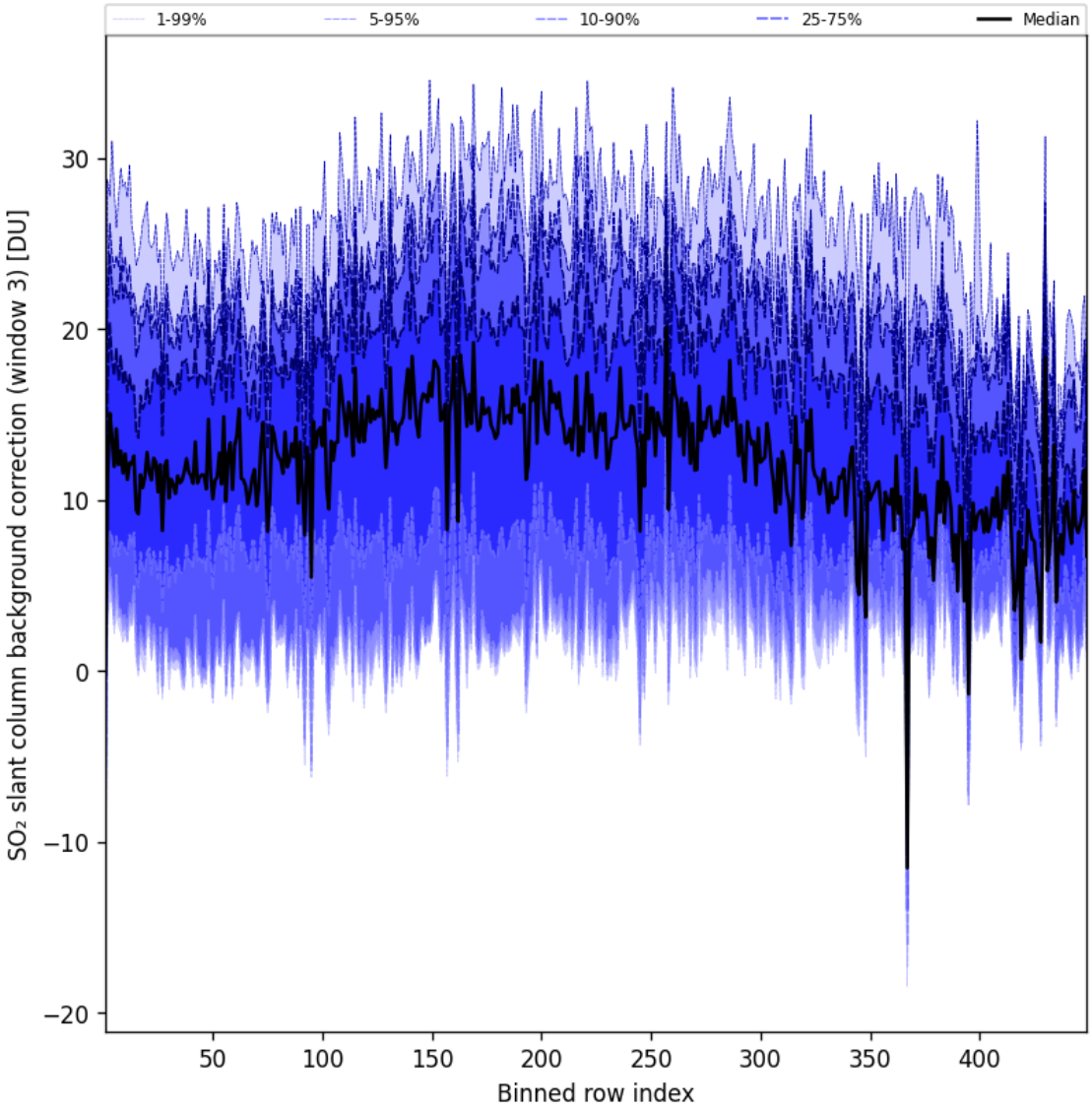


Figure 101: Along track statistics of "SO_2 slant column background correction (window 3)" for 2025-02-16 to 2025-02-16

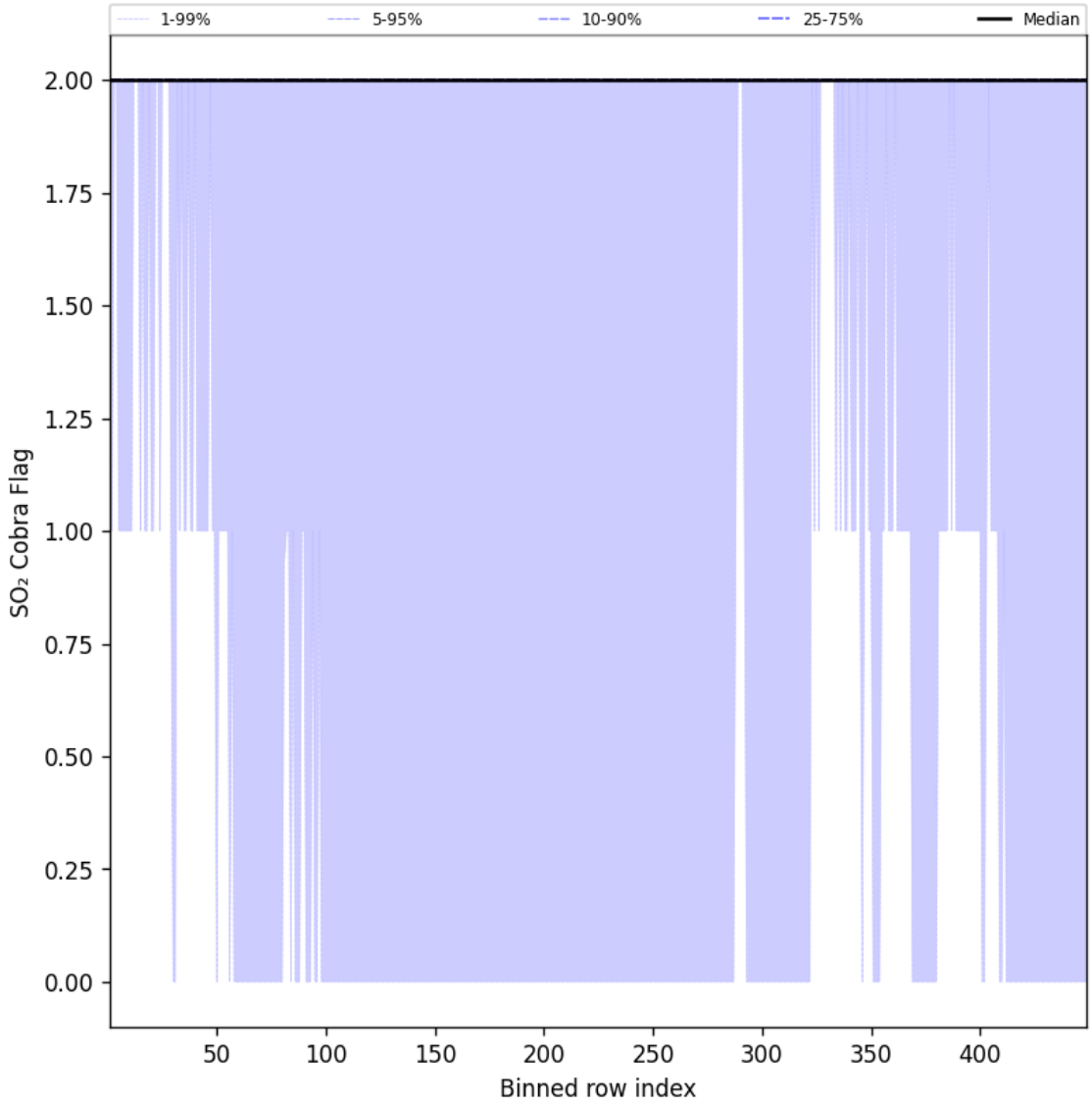


Figure 102: Along track statistics of "SO_2 Cobra Flag" for 2025-02-16 to 2025-02-16

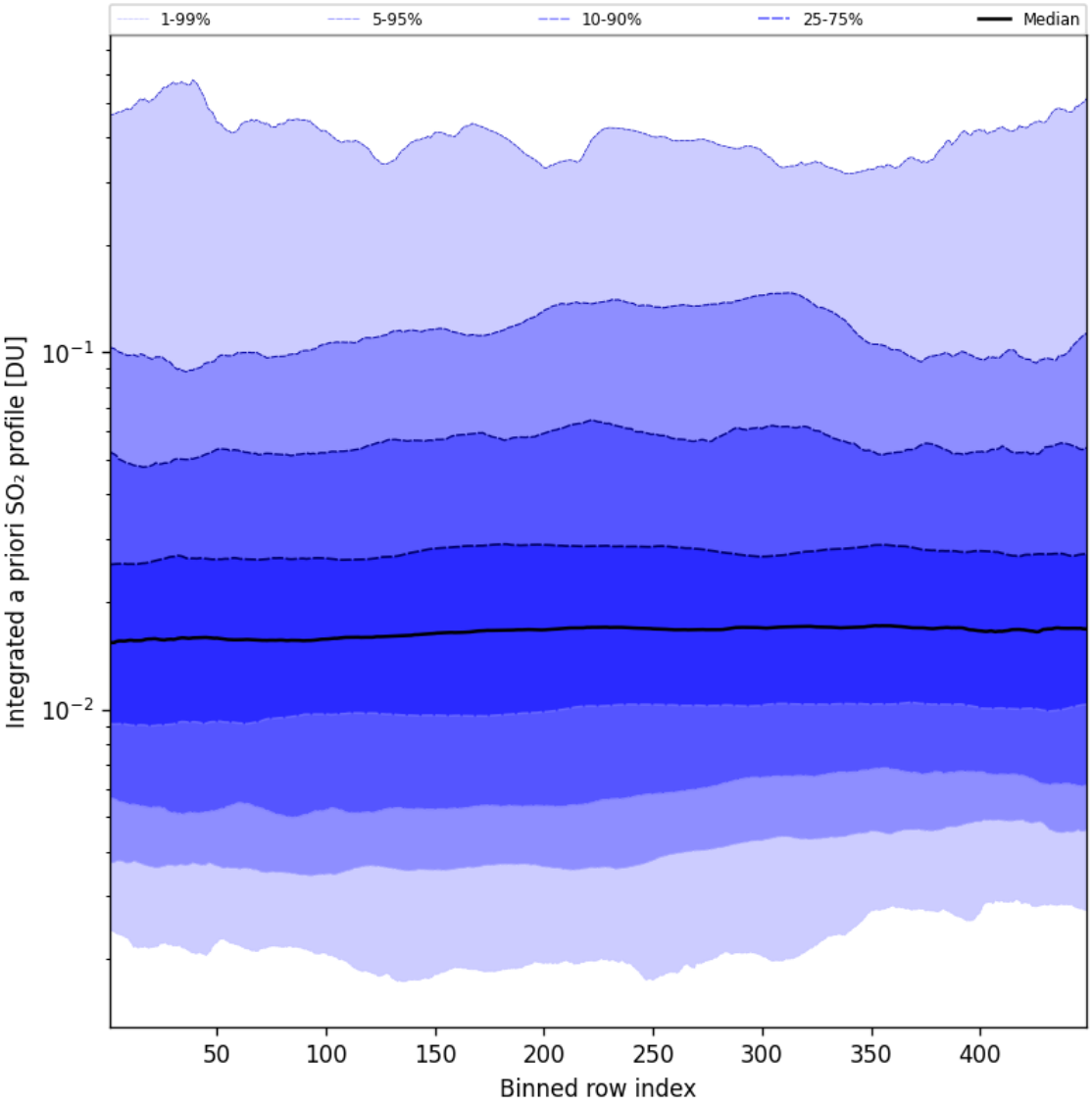


Figure 103: Along track statistics of “Integrated a priori SO_2 profile” for 2025-02-16 to 2025-02-16

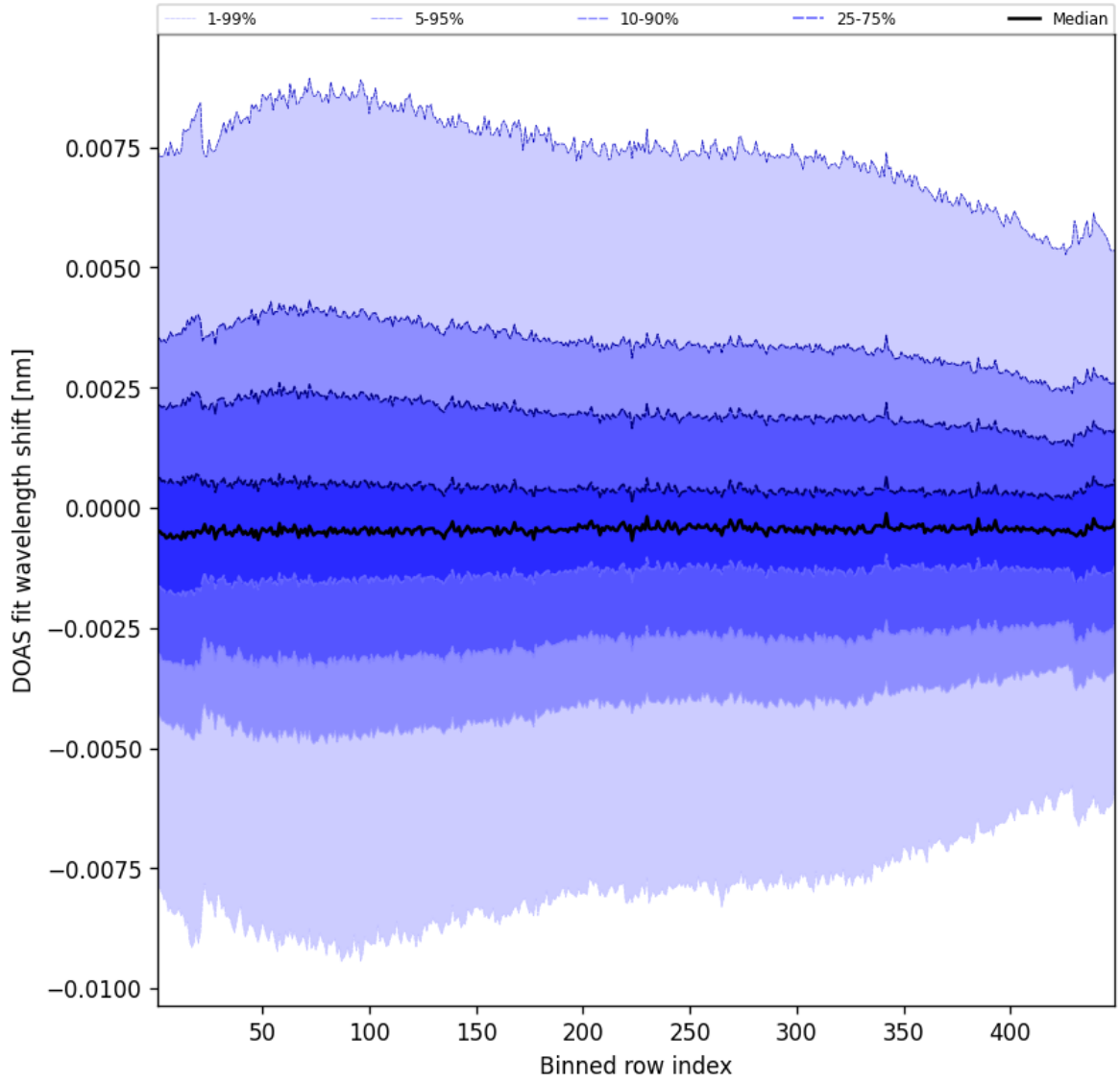
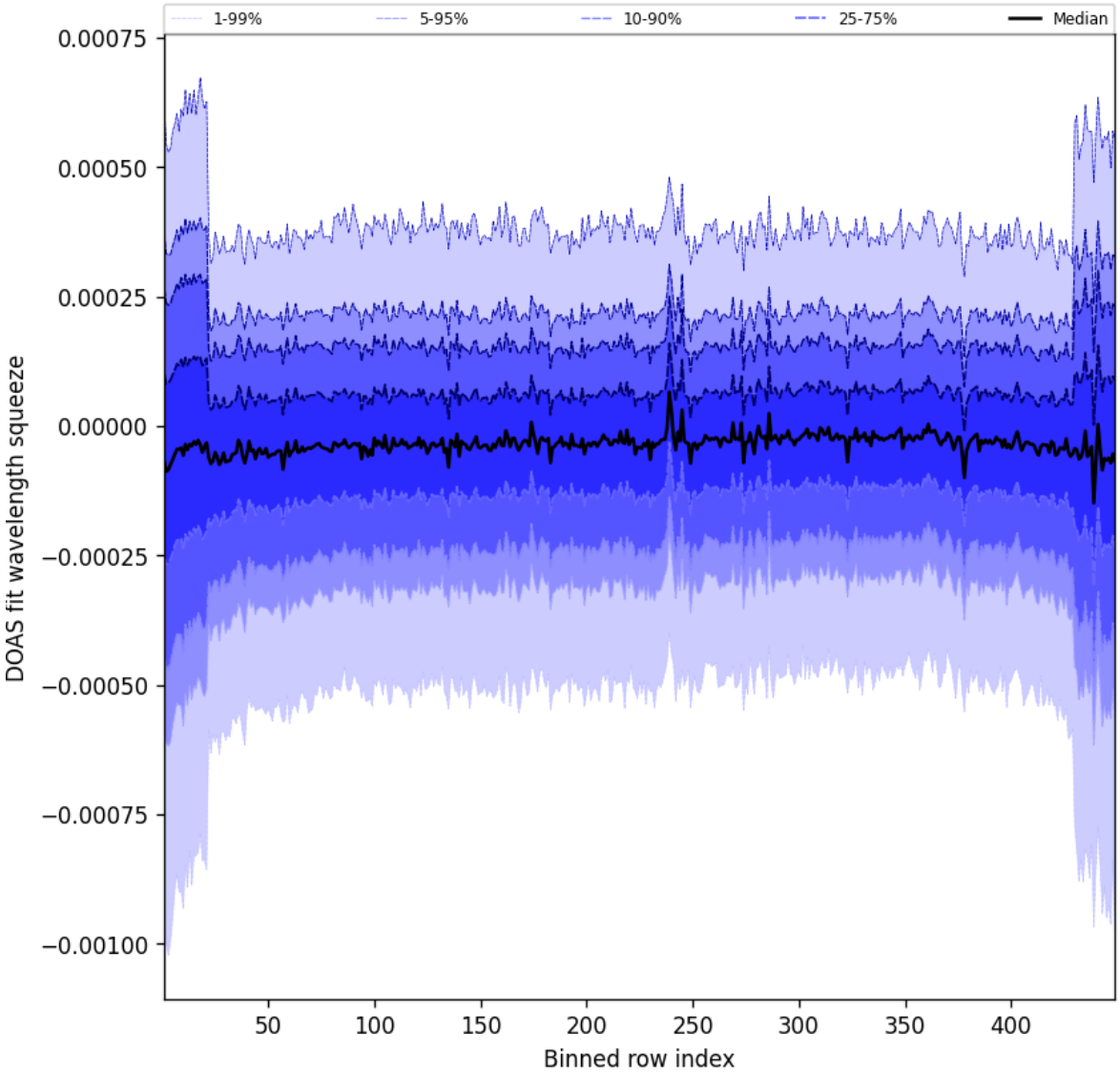


Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2025-02-16 to 2025-02-16



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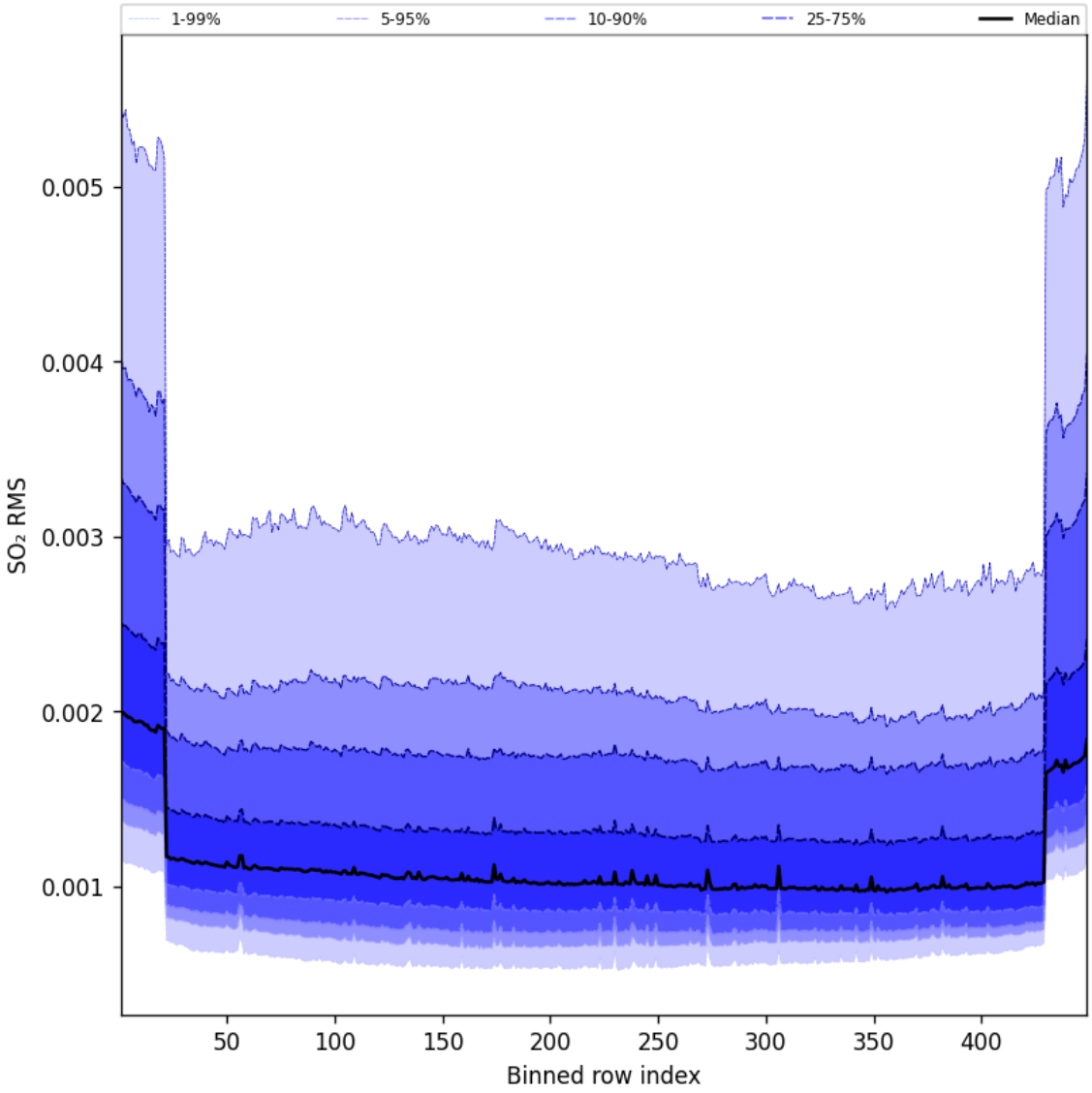

Figure 106: Along track statistics of "SO_2 RMS" for 2025-02-16 to 2025-02-16

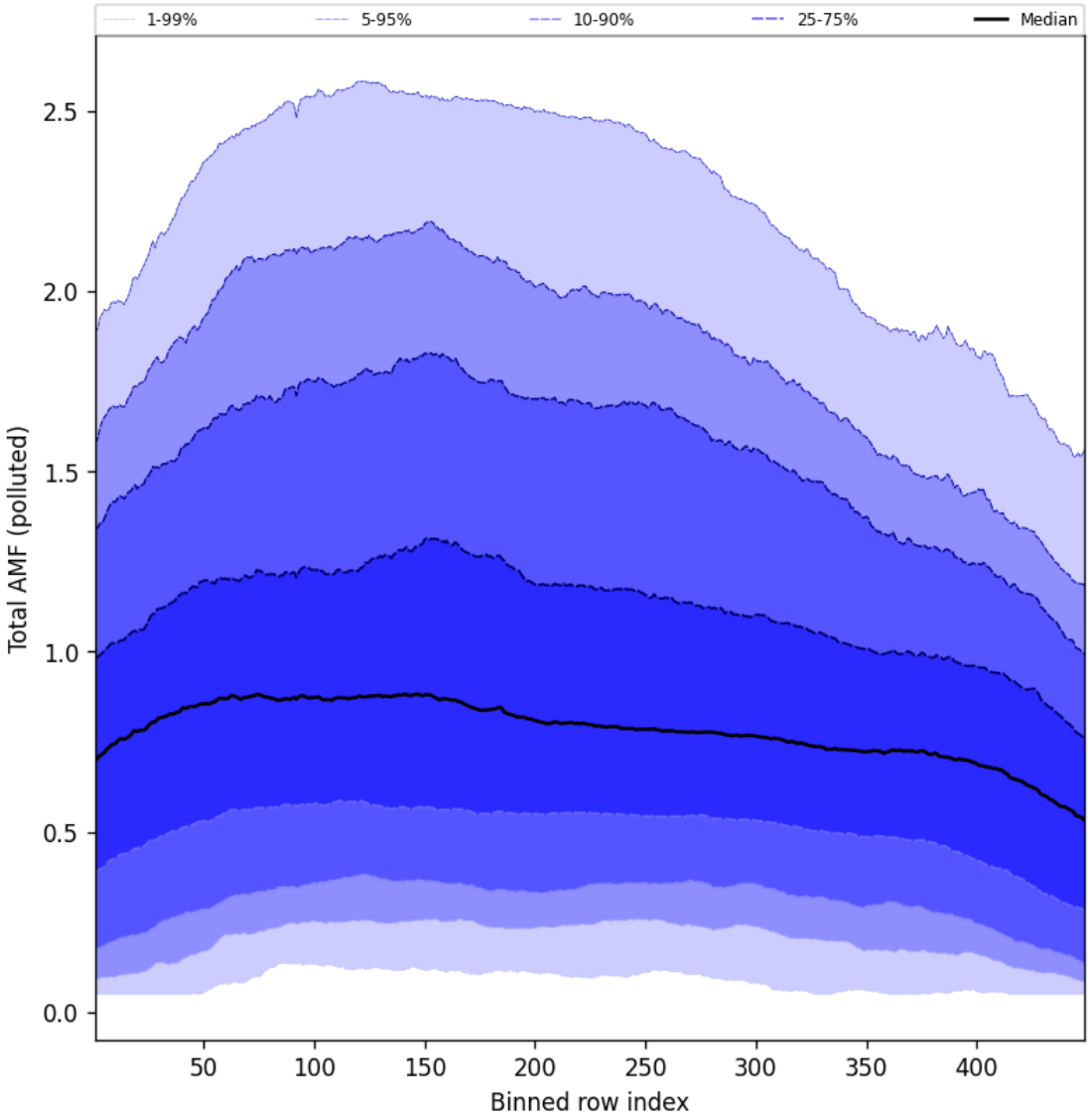

Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-02-16 to 2025-02-16

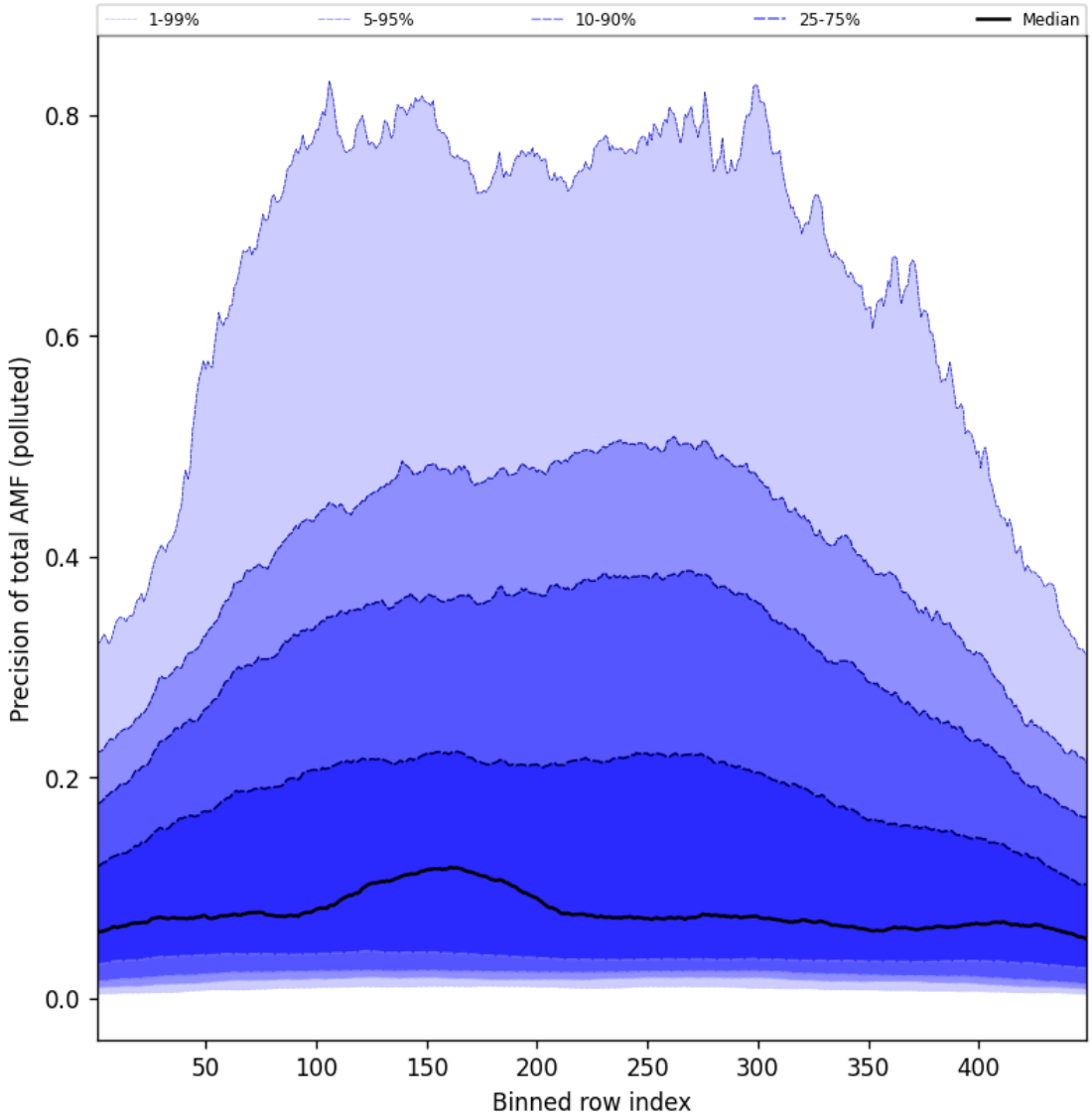

Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-02-16 to 2025-02-16

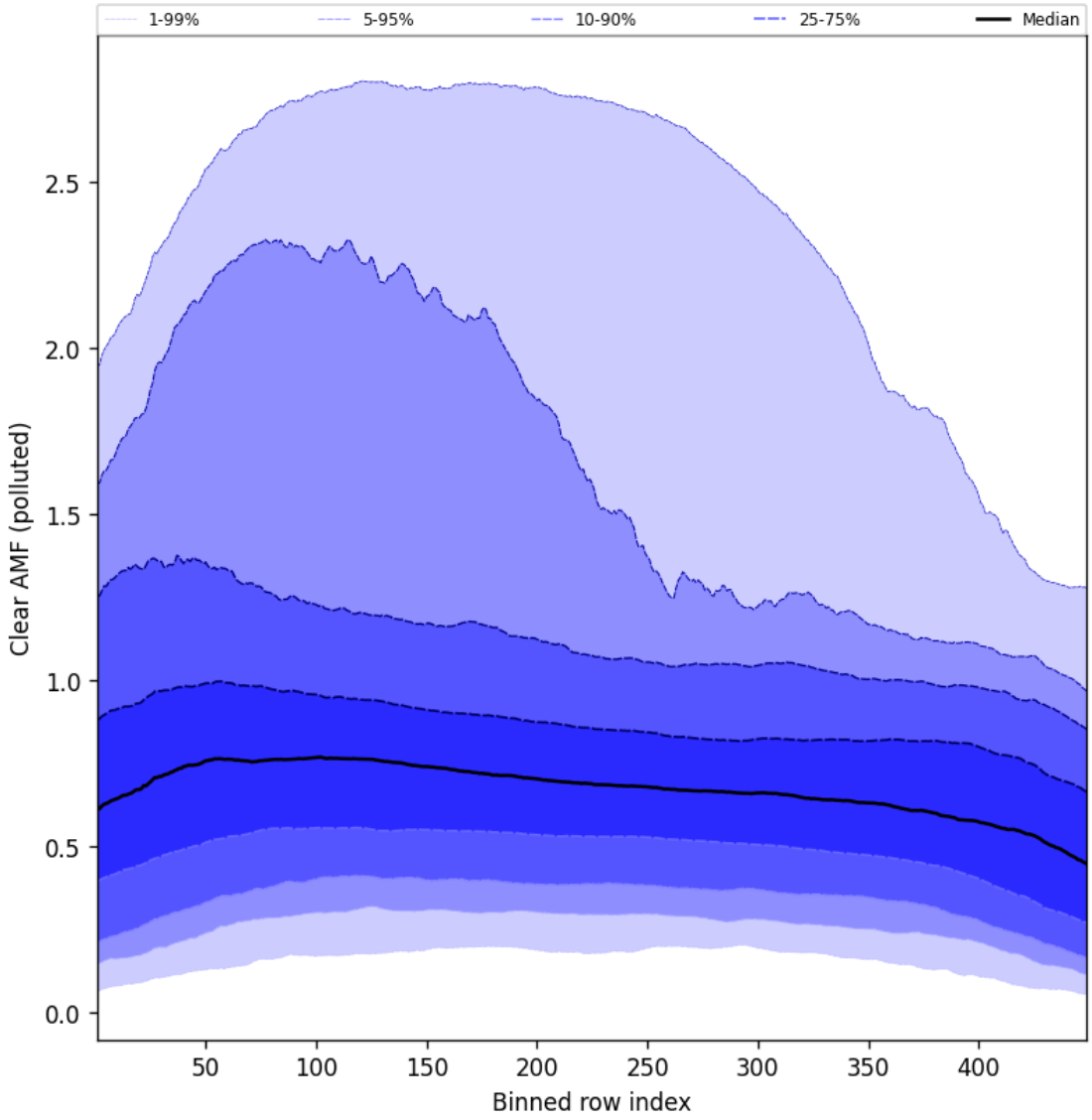

Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-02-16 to 2025-02-16

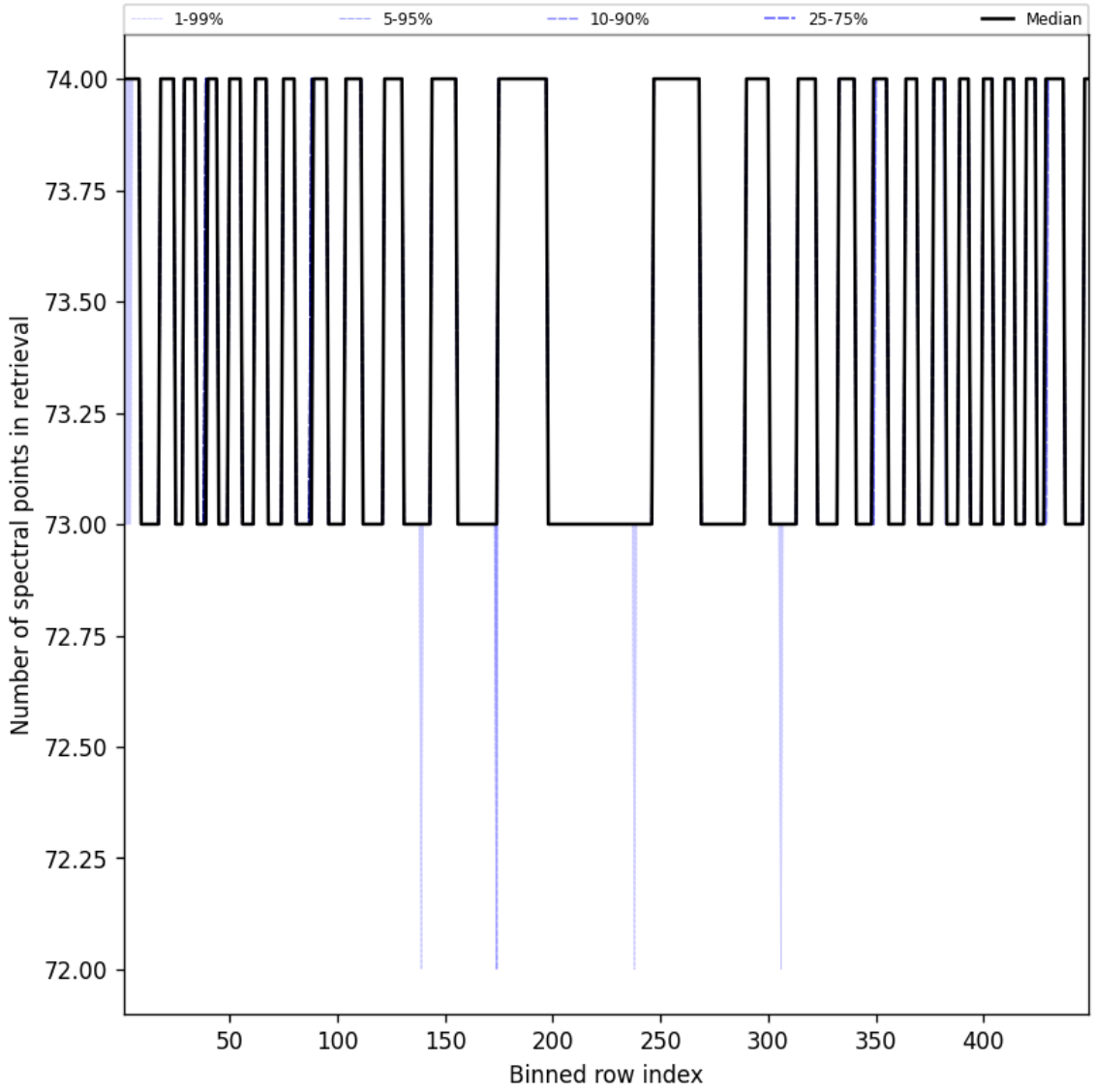

Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-02-16 to 2025-02-16

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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