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]	0.630 ± 0.412	17318282	0.995	0.800	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(5.842 \pm 178.805) \times 10^{-2}$	17318282	0.235	0.434	1.032×10^{-2}	-146	508
sulfurdioxide total vertical column precision [DU]	0.650 ± 1.285	17318282	0.197	0.371	0.306	4.072×10^{-2}	124
sulfurdioxide slant column density corrected [DU]	$(2.007 \pm 36.766) \times 10^{-2}$	17318282	0.227	0.349	9.189×10^{-3}	-11.1	84.5
sulfurdioxide slant column density cobra [DU]	$(1.991 \pm 35.930) \times 10^{-2}$	17318282	0.227	0.349	9.189×10^{-3}	-11.1	39.4
sulfurdioxide slant column density cobra precision [DU]	0.285 ± 0.140	17318282	0.188	0.140	0.238	7.367×10^{-2}	18.0
sulfurdioxide slant column density window1 [DU]	0.212 ± 0.683	17318282	0.225	0.721	0.224	-44.3	76.6
sulfurdioxide slant column density window1 precision [DU]	0.285 ± 0.140	17318282	0.188	0.140	0.238	7.367×10^{-2}	18.0
sulfurdioxide slant column density corrected win1 [DU]	$(6.428 \pm 67.203) \times 10^{-2}$	17318282	2.500×10^{-2}	0.700	4.041×10^{-2}	-44.3	76.5
background so2 slant column offset window1 [DU]	-0.148 ± 0.194	17318282	-0.260	0.210	-0.197	-1.46	7.82
sulfurdioxide slant column density window2 [DU]	2.75 ± 8.84	17318282	2.25	11.2	2.51	-987	670
sulfurdioxide slant column density window2 precision [DU]	7.91 ± 2.14	17318282	6.97	2.47	7.58	2.13	594
sulfurdioxide slant column density corrected win2 [DU]	-0.771 ± 8.458	17318282	-0.750	10.8	-0.763	-989	668
background so2 slant column offset window2 [DU]	-3.52 ± 2.73	17318282	-1.75	3.05	-2.60	-18.4	10.1
sulfurdioxide slant column density window3 [DU]	-14.8 ± 23.9	17318282	-15.1	30.3	-15.0	-1.913×10^3	868
sulfurdioxide slant column density window3 precision [DU]	27.2 ± 12.7	17318282	22.5	9.22	23.9	9.63	1.224×10^3
sulfurdioxide slant column density corrected win3 [DU]	4.59 ± 22.86	17318282	2.80	28.8	4.46	-1.900×10^3	881
background so2 slant column offset window3 [DU]	19.4 ± 7.2	17318282	14.0	11.4	18.8	-3.67	43.6
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.21	17318282	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(3.599 \pm 10.786) \times 10^{-2}$	17318282	1.800×10^{-2}	1.730×10^{-2}	1.694×10^{-2}	3.893×10^{-4}	4.47
fitted radiance shift [nm]	$(-3.945 \pm 25.145) \times 10^{-4}$	17318282	-5.000×10^{-4}	1.797×10^{-3}	-3.896×10^{-4}	-4.468×10^{-2}	5.963×10^{-2}
fitted radiance squeeze [1]	$(-3.651 \pm 18.202) \times 10^{-5}$	17318282	-3.000×10^{-5}	2.033×10^{-4}	-2.907×10^{-5}	-1.890×10^{-2}	1.469×10^{-2}
fitted root mean square [1]	$(1.257 \pm 0.573) \times 10^{-3}$	17318282	9.250×10^{-4}	5.587×10^{-4}	1.077×10^{-3}	3.158×10^{-4}	7.141×10^{-2}
sulfurdioxide total air mass factor polluted [1]	0.861 ± 0.496	17318282	0.700	0.608	0.777	5.000×10^{-2}	2.93
sulfurdioxide total air mass factor polluted precision [1]	0.131 ± 0.147	17318282	3.500×10^{-2}	0.144	7.433×10^{-2}	2.500×10^{-3}	2.07
sulfurdioxide clear air mass factor polluted [1]	0.735 ± 0.429	17318282	0.580	0.385	0.662	2.579×10^{-2}	2.96
number of spectral points in retrieval [1]	73.4 ± 0.5	17318282	73.0	1.000	73.0	51.0	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	0.200	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	−3.48	−0.997	−0.550	−0.354	−0.203	0.231	0.399	0.625	1.16	4.38
sulfurdioxide total vertical column precision [DU]	8.812×10^{-2}	0.119	0.143	0.167	0.200	0.571	0.842	1.25	2.20	6.22
sulfurdioxide slant column density corrected [DU]	−0.847	−0.478	−0.343	−0.255	−0.164	0.186	0.282	0.380	0.538	1.05
sulfurdioxide slant column density cobra [DU]	−0.847	−0.478	−0.343	−0.255	−0.164	0.186	0.282	0.380	0.538	1.05
sulfurdioxide slant column density cobra precision [DU]	0.138	0.161	0.173	0.183	0.195	0.336	0.394	0.454	0.544	0.810
sulfurdioxide slant column density window1 [DU]	−1.68	−0.842	−0.537	−0.342	−0.142	0.579	0.765	0.945	1.22	2.03
sulfurdioxide slant column density window1 precision [DU]	0.138	0.161	0.173	0.183	0.195	0.336	0.394	0.454	0.544	0.810
sulfurdioxide slant column density corrected win1 [DU]	−1.60	−0.902	−0.649	−0.481	−0.303	0.396	0.593	0.790	1.11	2.06
background so2 slant column offset window1 [DU]	−0.389	−0.350	−0.326	−0.307	−0.279	-6.947×10^{-2}	2.075×10^{-2}	0.109	0.217	0.467
sulfurdioxide slant column density window2 [DU]	−17.6	−11.2	−8.04	−5.67	−2.98	8.21	11.1	13.8	17.5	25.4
sulfurdioxide slant column density window2 precision [DU]	4.27	5.11	5.61	6.01	6.49	8.96	9.80	10.6	11.8	14.4
sulfurdioxide slant column density corrected win2 [DU]	−21.3	−14.5	−11.3	−8.85	−6.15	4.62	7.30	9.70	12.9	19.7
background so2 slant column offset window2 [DU]	−11.8	−9.45	−7.64	−6.18	−4.72	−1.67	−1.42	−1.21	−0.859	0.313
sulfurdioxide slant column density window3 [DU]	−73.3	−53.6	−44.3	−37.5	−30.0	0.282	8.15	15.3	24.8	43.6
sulfurdioxide slant column density window3 precision [DU]	13.5	15.7	17.3	18.6	20.2	29.4	34.1	39.8	51.1	81.5
sulfurdioxide slant column density corrected win3 [DU]	−52.0	−32.6	−23.5	−17.0	−9.79	19.0	26.4	33.1	42.2	60.4
background so2 slant column offset window3 [DU]	6.26	8.80	10.3	11.7	13.5	25.0	27.4	29.4	31.6	35.5
sulfurdioxide slant column cobra flag [1]	0.0	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
integrated so2 profile apriori [DU]	2.316×10^{-3}	4.091×10^{-3}	6.082×10^{-3}	8.104×10^{-3}	1.060×10^{-2}	2.791×10^{-2}	3.839×10^{-2}	5.834×10^{-2}	0.107	0.399
fitted radiance shift [nm]	-7.923×10^{-3}	-4.117×10^{-3}	-2.782×10^{-3}	-2.010×10^{-3}	-1.336×10^{-3}	4.612×10^{-4}	1.148×10^{-3}	2.000×10^{-3}	3.462×10^{-3}	7.506×10^{-3}
fitted radiance squeeze [1]	-5.487×10^{-4}	-3.339×10^{-4}	-2.482×10^{-4}	-1.914×10^{-4}	-1.336×10^{-4}	6.961×10^{-5}	1.195×10^{-4}	1.659×10^{-4}	2.337×10^{-4}	4.106×10^{-4}
fitted root mean square [1]	5.845×10^{-4}	7.081×10^{-4}	7.769×10^{-4}	8.302×10^{-4}	8.956×10^{-4}	1.454×10^{-3}	1.704×10^{-3}	1.955×10^{-3}	2.358×10^{-3}	3.376×10^{-3}
sulfurdioxide total air mass factor polluted [1]	6.937×10^{-2}	0.180	0.294	0.393	0.511	1.12	1.34	1.55	1.83	2.38
sulfurdioxide total air mass factor polluted precision [1]	6.831×10^{-3}	1.512×10^{-2}	2.180×10^{-2}	2.781×10^{-2}	3.588×10^{-2}	0.180	0.244	0.313	0.413	0.657
sulfurdioxide clear air mass factor polluted [1]	0.121	0.243	0.330	0.404	0.485	0.870	0.991	1.12	1.44	2.62
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]	0.669 ± 0.407	7503245	0.770	1.000	0.0	1.000	0.230	1.000
sulfurdioxide total vertical column [DU]	0.114 ± 2.615	7503245	0.603	1.565×10^{-2}	-146	508	-0.274	0.329
sulfurdioxide total vertical column precision [DU]	1.01 ± 1.81	7503245	0.726	0.437	4.154×10^{-2}	50.9	0.249	0.975
sulfurdioxide slant column density corrected [DU]	$(3.043 \pm 44.426) \times 10^{-2}$	7503245	0.393	1.204×10^{-2}	-11.1	84.5	-0.181	0.212
sulfurdioxide slant column density cobra [DU]	$(3.011 \pm 43.094) \times 10^{-2}$	7503245	0.393	1.204×10^{-2}	-11.1	39.4	-0.181	0.212
sulfurdioxide slant column density cobra precision [DU]	0.328 ± 0.170	7503245	0.189	0.276	8.443×10^{-2}	14.9	0.210	0.399
sulfurdioxide slant column density window1 [DU]	0.255 ± 0.794	7503245	0.801	0.268	-11.9	39.2	-0.136	0.665
sulfurdioxide slant column density window1 precision [DU]	0.328 ± 0.170	7503245	0.189	0.276	8.443×10^{-2}	14.9	0.210	0.399
sulfurdioxide slant column density corrected win1 [DU]	$(9.271 \pm 79.080) \times 10^{-2}$	7503245	0.789	5.614×10^{-2}	-11.1	42.2	-0.327	0.461
background so2 slant column offset window1 [DU]	-0.162 ± 0.219	7503245	0.203	-0.217	-1.46	7.82	-0.301	-9.869×10^{-2}
sulfurdioxide slant column density window2 [DU]	3.67 ± 9.54	7503245	12.2	3.32	-91.4	278	-2.63	9.59
sulfurdioxide slant column density window2 precision [DU]	8.39 ± 2.18	7503245	2.66	8.05	2.34	130	6.89	9.55
sulfurdioxide slant column density corrected win2 [DU]	-0.786 ± 8.944	7503245	11.4	-0.780	-102	276	-6.51	4.94
background so2 slant column offset window2 [DU]	-4.46 ± 3.40	7503245	5.33	-3.12	-18.4	10.1	-7.10	-1.77
sulfurdioxide slant column density window3 [DU]	-17.7 ± 24.6	7503245	31.5	-17.7	-206	137	-33.4	-1.89
sulfurdioxide slant column density window3 precision [DU]	28.3 ± 12.6	7503245	9.16	25.0	9.63	223	21.5	30.6
sulfurdioxide slant column density corrected win3 [DU]	4.48 ± 23.77	7503245	30.1	4.53	-173	156	-10.5	19.6
background so2 slant column offset window3 [DU]	22.2 ± 6.8	7503245	11.2	21.7	-5.230×10^{-6}	43.6	16.4	27.6
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.23	7503245	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(5.861 \pm 15.903) \times 10^{-2}$	7503245	3.607×10^{-2}	2.146×10^{-2}	3.893×10^{-4}	4.47	1.102×10^{-2}	4.709×10^{-2}
fitted radiance shift [nm]	$(-2.499 \pm 25.218) \times 10^{-4}$	7503245	1.673×10^{-3}	-2.398×10^{-4}	-3.642×10^{-2}	3.500×10^{-2}	-1.109×10^{-3}	5.640×10^{-4}
fitted radiance squeeze [1]	$(-1.600 \pm 20.472) \times 10^{-5}$	7503245	2.184×10^{-4}	-9.305×10^{-6}	-3.119×10^{-3}	1.132×10^{-2}	-1.203×10^{-4}	9.809×10^{-5}
fitted root mean square [1]	$(1.424 \pm 0.697) \times 10^{-3}$	7503245	7.530×10^{-4}	1.187×10^{-3}	3.276×10^{-4}	2.947×10^{-2}	9.557×10^{-4}	1.709×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.701 ± 0.427	7503245	0.550	0.646	5.000×10^{-2}	2.83	0.383	0.933
sulfurdioxide total air mass factor polluted precision [1]	0.106 ± 0.158	7503245	9.462×10^{-2}	4.845×10^{-2}	2.500×10^{-3}	2.07	2.678×10^{-2}	0.121
sulfurdioxide clear air mass factor polluted [1]	0.591 ± 0.298	7503245	0.436	0.558	2.579×10^{-2}	2.33	0.359	0.795
number of spectral points in retrieval [1]	73.5 ± 0.5	7503245	1.000	73.0	71.0	74.0	73.0	74.0

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

Variable	mean $\pm\sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.601 ± 0.414	9815037	0.820	1.000	0.0	1.000	0.180	1.000
sulfurdioxide total vertical column [DU]	$(1.613 \pm 63.961) \times 10^{-2}$	9815037	0.354	7.659×10^{-3}	-41.9	235	-0.168	0.186
sulfurdioxide total vertical column precision [DU]	0.372 ± 0.465	9815037	0.237	0.257	4.072×10^{-2}	124	0.177	0.415
sulfurdioxide slant column density corrected [DU]	$(1.214 \pm 29.576) \times 10^{-2}$	9815037	0.321	7.412×10^{-3}	-8.07	50.2	-0.152	0.169
sulfurdioxide slant column density cobra [DU]	$(1.210 \pm 29.271) \times 10^{-2}$	9815037	0.321	7.412×10^{-3}	-8.07	24.6	-0.152	0.169
sulfurdioxide slant column density cobra precision [DU]	0.253 ± 0.100	9815037	0.106	0.221	7.367×10^{-2}	18.0	0.188	0.294
sulfurdioxide slant column density window1 [DU]	0.180 ± 0.583	9815037	0.667	0.195	-44.3	76.6	-0.146	0.521
sulfurdioxide slant column density window1 precision [DU]	0.253 ± 0.100	9815037	0.106	0.221	7.367×10^{-2}	18.0	0.188	0.294
sulfurdioxide slant column density corrected win1 [DU]	$(4.255 \pm 56.366) \times 10^{-2}$	9815037	0.643	3.050×10^{-2}	-44.3	76.5	-0.288	0.355
background so2 slant column offset window1 [DU]	-0.137 ± 0.170	9815037	0.219	-0.182	-1.22	3.65	-0.264	-4.550×10^{-2}
sulfurdioxide slant column density window2 [DU]	2.05 ± 8.20	9815037	10.5	1.99	-987	670	-3.22	7.25
sulfurdioxide slant column density window2 precision [DU]	7.54 ± 2.04	9815037	2.23	7.25	2.13	594	6.25	8.48
sulfurdioxide slant column density corrected win2 [DU]	-0.759 ± 8.067	9815037	10.3	-0.751	-989	668	-5.90	4.39
background so2 slant column offset window2 [DU]	-2.81 ± 1.77	9815037	2.18	-2.37	-10.9	9.87	-3.80	-1.62
sulfurdioxide slant column density window3 [DU]	-12.6 ± 23.1	9815037	29.2	-13.2	-1.913×10^3	868	-27.4	1.80
sulfurdioxide slant column density window3 precision [DU]	26.3 ± 12.7	9815037	9.01	22.9	9.63	1.224×10^3	19.3	28.3
sulfurdioxide slant column density corrected win3 [DU]	4.67 ± 22.14	9815037	27.8	4.41	-1.900×10^3	881	-9.28	18.5
background so2 slant column offset window3 [DU]	17.3 ± 6.8	9815037	11.3	16.3	-3.67	41.5	11.6	22.8
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.19	9815037	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(1.870 \pm 2.243) \times 10^{-2}$	9815037	1.159×10^{-2}	1.552×10^{-2}	5.160×10^{-4}	1.73	1.034×10^{-2}	2.193×10^{-2}
fitted radiance shift [nm]	$(-5.051 \pm 25.032) \times 10^{-4}$	9815037	1.845×10^{-3}	-5.167×10^{-4}	-4.468×10^{-2}	5.963×10^{-2}	-1.479×10^{-3}	3.658×10^{-4}
fitted radiance squeeze [1]	$(-5.219 \pm 16.079) \times 10^{-5}$	9815037	1.917×10^{-4}	-4.231×10^{-5}	-1.890×10^{-2}	1.469×10^{-2}	-1.423×10^{-4}	4.943×10^{-5}
fitted root mean square [1]	$(1.129 \pm 0.414) \times 10^{-3}$	9815037	4.416×10^{-4}	1.015×10^{-3}	3.158×10^{-4}	7.141×10^{-2}	8.610×10^{-4}	1.303×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.984 ± 0.509	9815037	0.637	0.877	5.000×10^{-2}	2.93	0.628	1.26
sulfurdioxide total air mass factor polluted precision [1]	0.151 ± 0.134	9815037	0.171	0.111	5.042×10^{-3}	1.59	4.438×10^{-2}	0.215
sulfurdioxide clear air mass factor polluted [1]	0.845 ± 0.479	9815037	0.363	0.714	0.142	2.96	0.565	0.928
number of spectral points in retrieval [1]	73.4 ± 0.5	9815037	1.000	73.0	51.0	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 ± 0.404	12512844	0.760	1.000	0.0	1.000	0.240	1.000
sulfurdioxide total vertical column [DU]	$(3.391 \pm 130.678) \times 10^{-2}$	12512844	0.411	8.951×10^{-3}	-146	162	-0.194	0.217
sulfurdioxide total vertical column precision [DU]	0.532 ± 0.984	12512844	0.299	0.289	4.944×10^{-2}	46.3	0.201	0.500
sulfurdioxide slant column density corrected [DU]	$(1.496 \pm 32.188) \times 10^{-2}$	12512844	0.333	7.813×10^{-3}	-8.65	50.0	-0.157	0.176
sulfurdioxide slant column density cobra [DU]	$(1.490 \pm 31.815) \times 10^{-2}$	12512844	0.333	7.813×10^{-3}	-8.65	24.6	-0.157	0.176
sulfurdioxide slant column density cobra precision [DU]	0.268 ± 0.120	12512844	0.120	0.226	7.367×10^{-2}	16.9	0.192	0.311
sulfurdioxide slant column density window1 [DU]	0.211 ± 0.629	12512844	0.687	0.221	-44.3	76.6	-0.127	0.560
sulfurdioxide slant column density window1 precision [DU]	0.268 ± 0.120	12512844	0.120	0.226	7.367×10^{-2}	16.9	0.192	0.311
sulfurdioxide slant column density corrected win1 [DU]	$(4.893 \pm 61.684) \times 10^{-2}$	12512844	0.668	3.193×10^{-2}	-44.3	76.5	-0.298	0.370
background so2 slant column offset window1 [DU]	-0.162 ± 0.170	12512844	0.194	-0.200	-1.46	7.82	-0.280	-8.527×10^{-2}
sulfurdioxide slant column density window2 [DU]	2.24 ± 8.51	12512844	10.8	2.07	-987	578	-3.28	7.54
sulfurdioxide slant column density window2 precision [DU]	7.73 ± 2.01	12512844	2.35	7.42	2.13	334	6.39	8.73
sulfurdioxide slant column density corrected win2 [DU]	-0.884 ± 8.266	12512844	10.6	-0.867	-989	575	-6.16	4.41
background so2 slant column offset window2 [DU]	-3.12 ± 2.35	12512844	2.37	-2.44	-18.4	10.1	-4.01	-1.64
sulfurdioxide slant column density window3 [DU]	-11.7 ± 23.5	12512844	30.0	-12.1	-1.913×10^3	779	-26.8	3.14
sulfurdioxide slant column density window3 precision [DU]	26.8 ± 12.1	12512844	8.80	23.5	9.63	1.224×10^3	20.2	29.0
sulfurdioxide slant column density corrected win3 [DU]	6.82 ± 22.35	12512844	28.5	6.44	-1.900×10^3	787	-7.54	20.9
background so2 slant column offset window3 [DU]	18.6 ± 6.8	12512844	10.3	18.0	-3.67	43.6	13.2	23.5
sulfurdioxide slant column cobra flag [1]	1.99 ± 0.14	12512844	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.402 \pm 4.490) \times 10^{-2}$	12512844	1.362×10^{-2}	1.663×10^{-2}	5.160×10^{-4}	2.22	1.130×10^{-2}	2.492×10^{-2}
fitted radiance shift [nm]	$(-3.740 \pm 24.047) \times 10^{-4}$	12512844	1.790×10^{-3}	-3.549×10^{-4}	-4.468×10^{-2}	4.396×10^{-2}	-1.300×10^{-3}	4.892×10^{-4}
fitted radiance squeeze [1]	$(-3.615 \pm 16.975) \times 10^{-5}$	12512844	1.935×10^{-4}	-2.856×10^{-5}	-1.240×10^{-2}	1.297×10^{-2}	-1.280×10^{-4}	6.552×10^{-5}
fitted root mean square [1]	$(1.185 \pm 0.508) \times 10^{-3}$	12512844	4.596×10^{-4}	1.030×10^{-3}	3.323×10^{-4}	7.141×10^{-2}	8.766×10^{-4}	1.336×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.851 ± 0.415	12512844	0.528	0.798	5.000×10^{-2}	2.67	0.562	1.09
sulfurdioxide total air mass factor polluted precision [1]	0.124 ± 0.121	12512844	0.135	7.564×10^{-2}	2.500×10^{-3}	1.75	3.900×10^{-2}	0.174
sulfurdioxide clear air mass factor polluted [1]	0.707 ± 0.279	12512844	0.331	0.675	3.722×10^{-2}	2.61	0.522	0.854
number of spectral points in retrieval [1]	73.4 ± 0.5	12512844	1.000	73.0	53.0	74.0	73.0	74.0

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

Variable	mean $\pm\sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.558 ± 0.421	3890880	0.880	0.490	0.0	1.000	0.120	1.000
sulfurdioxide total vertical column [DU]	0.102 ± 2.472	3890880	0.483	1.264×10^{-2}	-133	508	-0.219	0.264
sulfurdioxide total vertical column precision [DU]	0.866 ± 1.679	3890880	0.627	0.356	4.072×10^{-2}	116	0.184	0.810
sulfurdioxide slant column density corrected [DU]	$(3.002 \pm 45.508) \times 10^{-2}$	3890880	0.393	1.240×10^{-2}	-11.1	84.5	-0.181	0.212
sulfurdioxide slant column density cobra [DU]	$(2.961 \pm 43.713) \times 10^{-2}$	3890880	0.393	1.240×10^{-2}	-11.1	20.7	-0.181	0.212
sulfurdioxide slant column density cobra precision [DU]	0.323 ± 0.169	3890880	0.168	0.281	8.448×10^{-2}	18.0	0.212	0.381
sulfurdioxide slant column density window1 [DU]	0.207 ± 0.787	3890880	0.814	0.227	-38.9	43.1	-0.192	0.621
sulfurdioxide slant column density window1 precision [DU]	0.323 ± 0.169	3890880	0.168	0.281	8.448×10^{-2}	18.0	0.212	0.381
sulfurdioxide slant column density corrected win1 [DU]	$(9.387 \pm 77.159) \times 10^{-2}$	3890880	0.779	6.082×10^{-2}	-38.9	43.2	-0.319	0.459
background so2 slant column offset window1 [DU]	-0.113 ± 0.238	3890880	0.271	-0.190	-1.22	5.17	-0.279	-7.411×10^{-3}
sulfurdioxide slant column density window2 [DU]	3.82 ± 9.40	3890880	12.0	3.58	-561	670	-2.28	9.68
sulfurdioxide slant column density window2 precision [DU]	8.29 ± 2.36	3890880	2.63	7.94	2.40	594	6.79	9.41
sulfurdioxide slant column density corrected win2 [DU]	-0.431 ± 8.856	3890880	11.2	-0.427	-562	668	-6.03	5.17
background so2 slant column offset window2 [DU]	-4.25 ± 3.09	3890880	4.71	-3.25	-17.2	9.93	-6.45	-1.74
sulfurdioxide slant column density window3 [DU]	-22.8 ± 23.0	3890880	28.9	-22.5	-1.262×10^{3}	595	-37.1	-8.20
sulfurdioxide slant column density window3 precision [DU]	28.2 ± 14.1	3890880	10.1	24.8	9.63	802	20.2	30.3
sulfurdioxide slant column density corrected win3 [DU]	-1.74 ± 23.13	3890880	28.8	-1.19	-1.251×10^{3}	611	-15.9	13.0
background so2 slant column offset window3 [DU]	21.0 ± 7.8	3890880	13.5	21.7	-3.67	43.6	14.1	27.6
sulfurdioxide slant column cobra flag [1]	1.94 ± 0.32	3890880	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(6.338 \pm 18.157) \times 10^{-2}$	3890880	4.109×10^{-2}	1.848×10^{-2}	3.893×10^{-4}	4.45	7.560×10^{-3}	4.865×10^{-2}
fitted radiance shift [nm]	$(-4.640 \pm 27.954) \times 10^{-4}$	3890880	1.737×10^{-3}	-5.078×10^{-4}	-4.190×10^{-2}	4.982×10^{-2}	-1.406×10^{-3}	3.310×10^{-4}
fitted radiance squeeze [1]	$(-5.097 \pm 20.195) \times 10^{-5}$	3890880	2.284×10^{-4}	-3.973×10^{-5}	-1.890×10^{-2}	1.469×10^{-2}	-1.594×10^{-4}	6.902×10^{-5}
fitted root mean square [1]	$(1.408 \pm 0.655) \times 10^{-3}$	3890880	6.708×10^{-4}	1.240×10^{-3}	3.267×10^{-4}	6.079×10^{-2}	9.772×10^{-4}	1.648×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.935 ± 0.682	3890880	0.936	0.712	5.000×10^{-2}	2.93	0.412	1.35
sulfurdioxide total air mass factor polluted precision [1]	0.153 ± 0.200	3890880	0.177	7.091×10^{-2}	2.500×10^{-3}	2.07	2.716×10^{-2}	0.204
sulfurdioxide clear air mass factor polluted [1]	0.863 ± 0.714	3890880	0.660	0.627	2.740×10^{-2}	2.96	0.381	1.04
number of spectral points in retrieval [1]	73.4 ± 0.5	3890880	1.000	73.0	51.0	74.0	73.0	74.0

3 Granule outlines

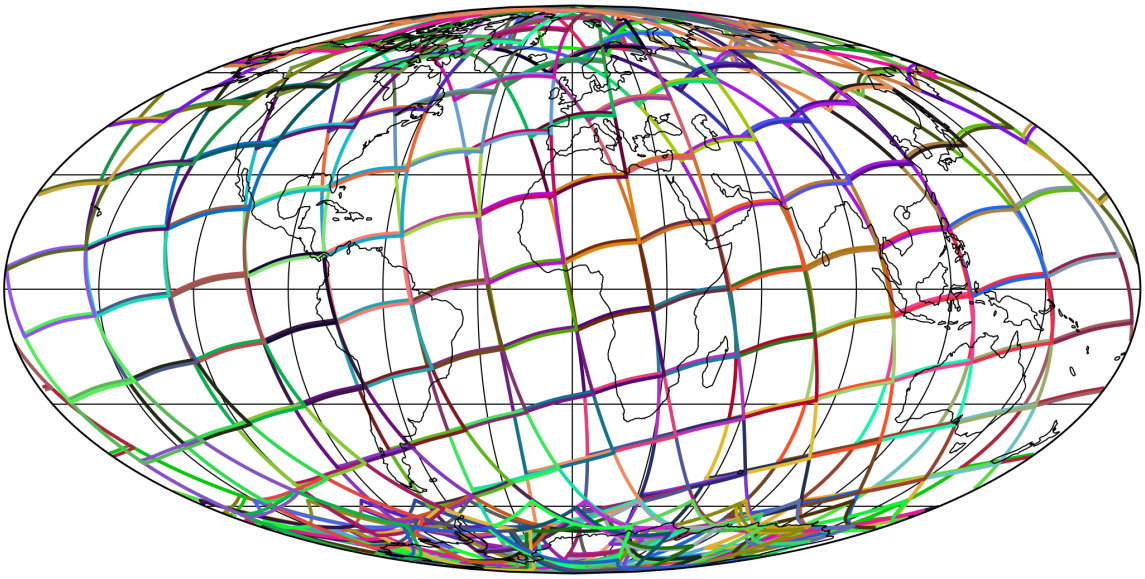


Figure 1: Outline of the granules.

4 Input data monitoring

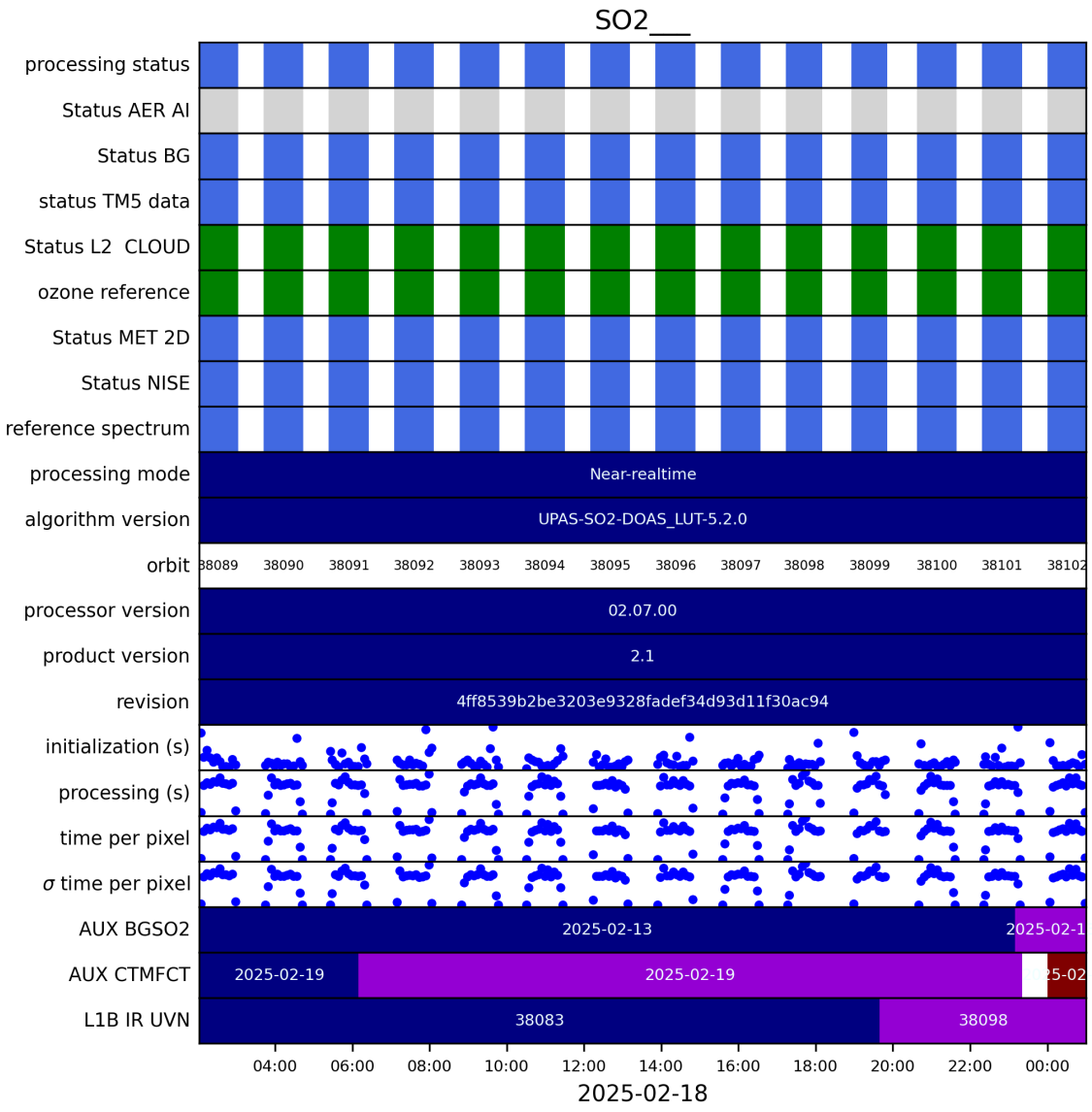


Figure 2: Input data per granule

5 Warnings and errors

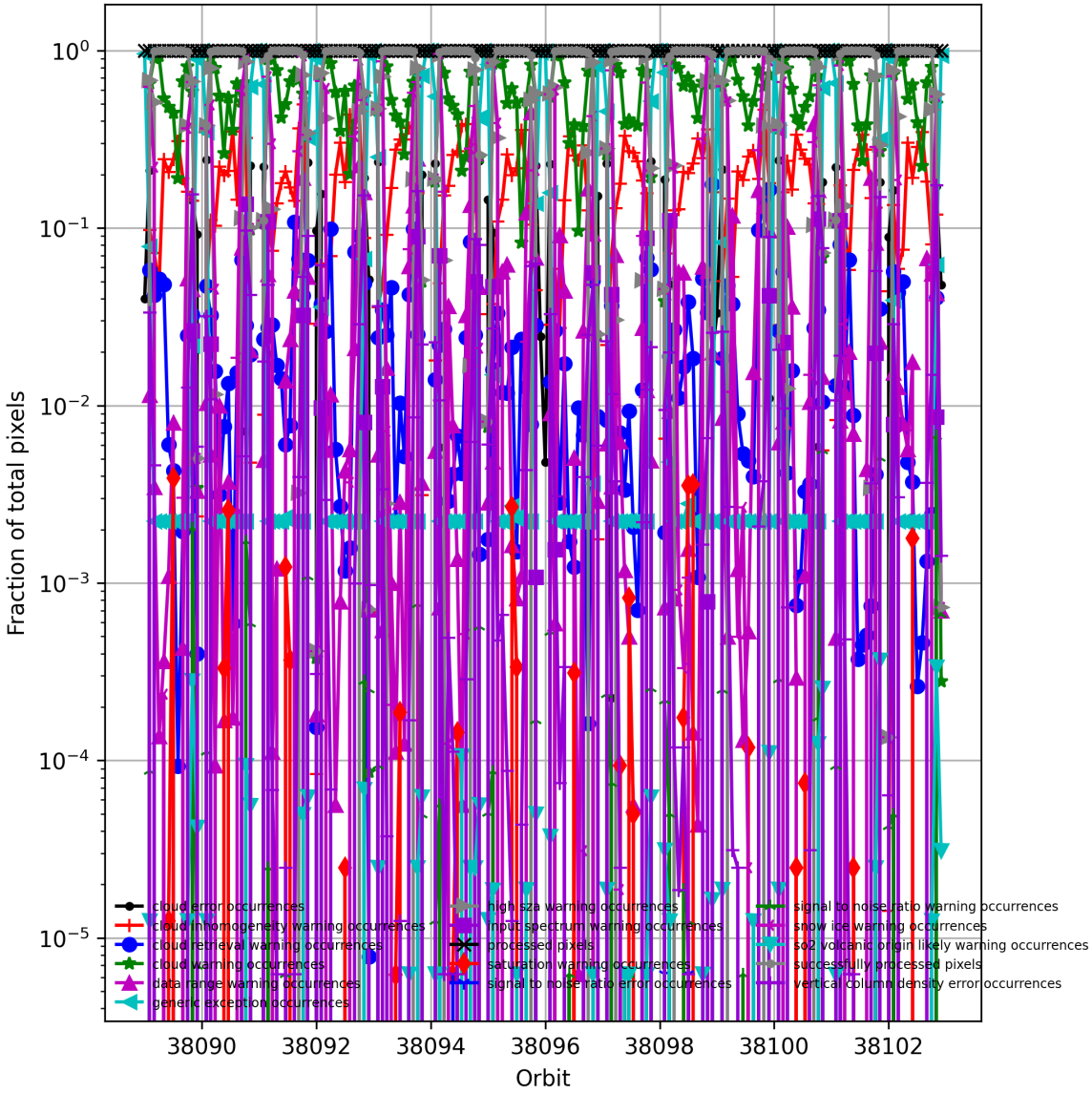


Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

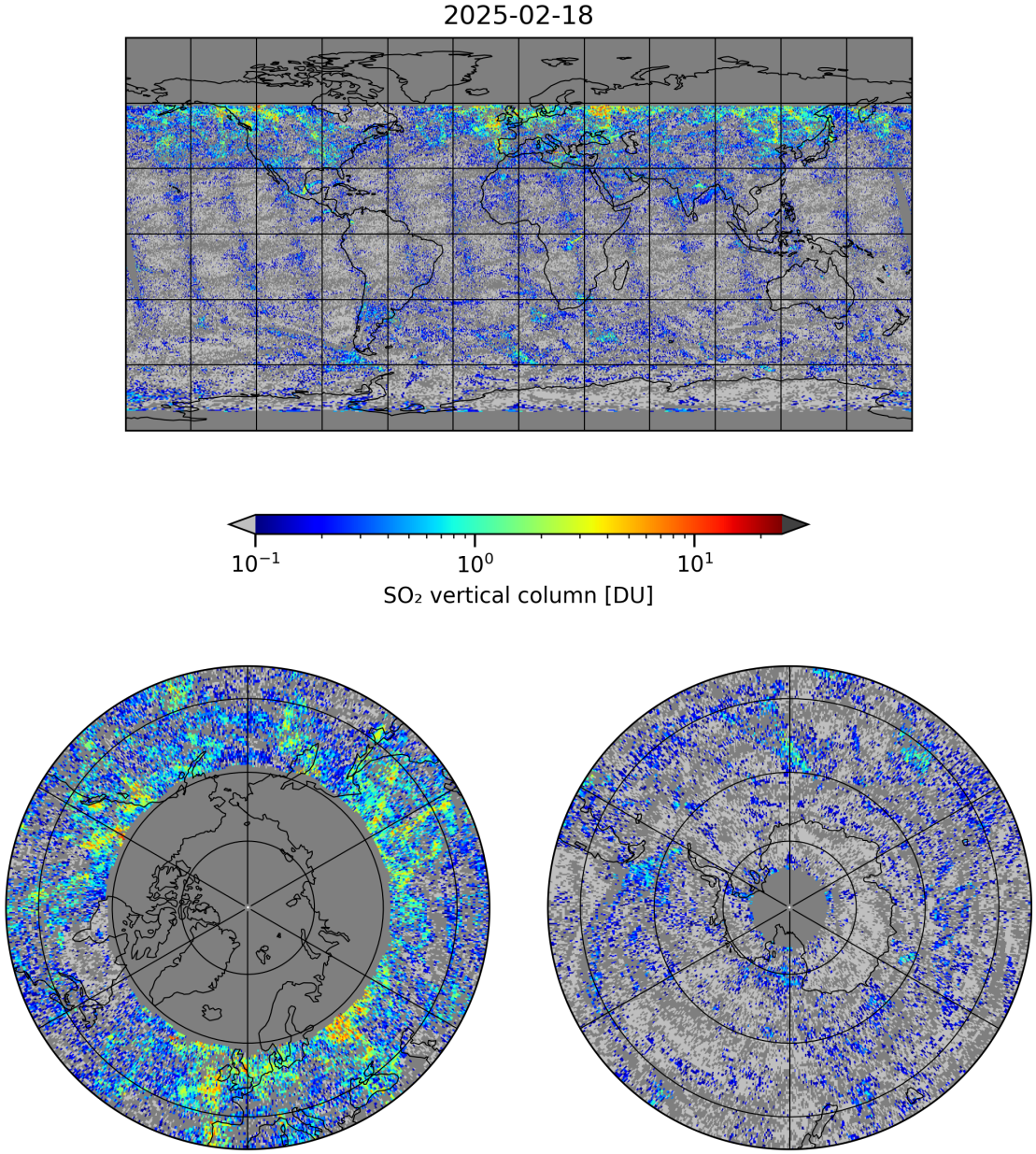


Figure 4: Map of "SO_2 vertical column" for 2025-02-18 to 2025-02-19

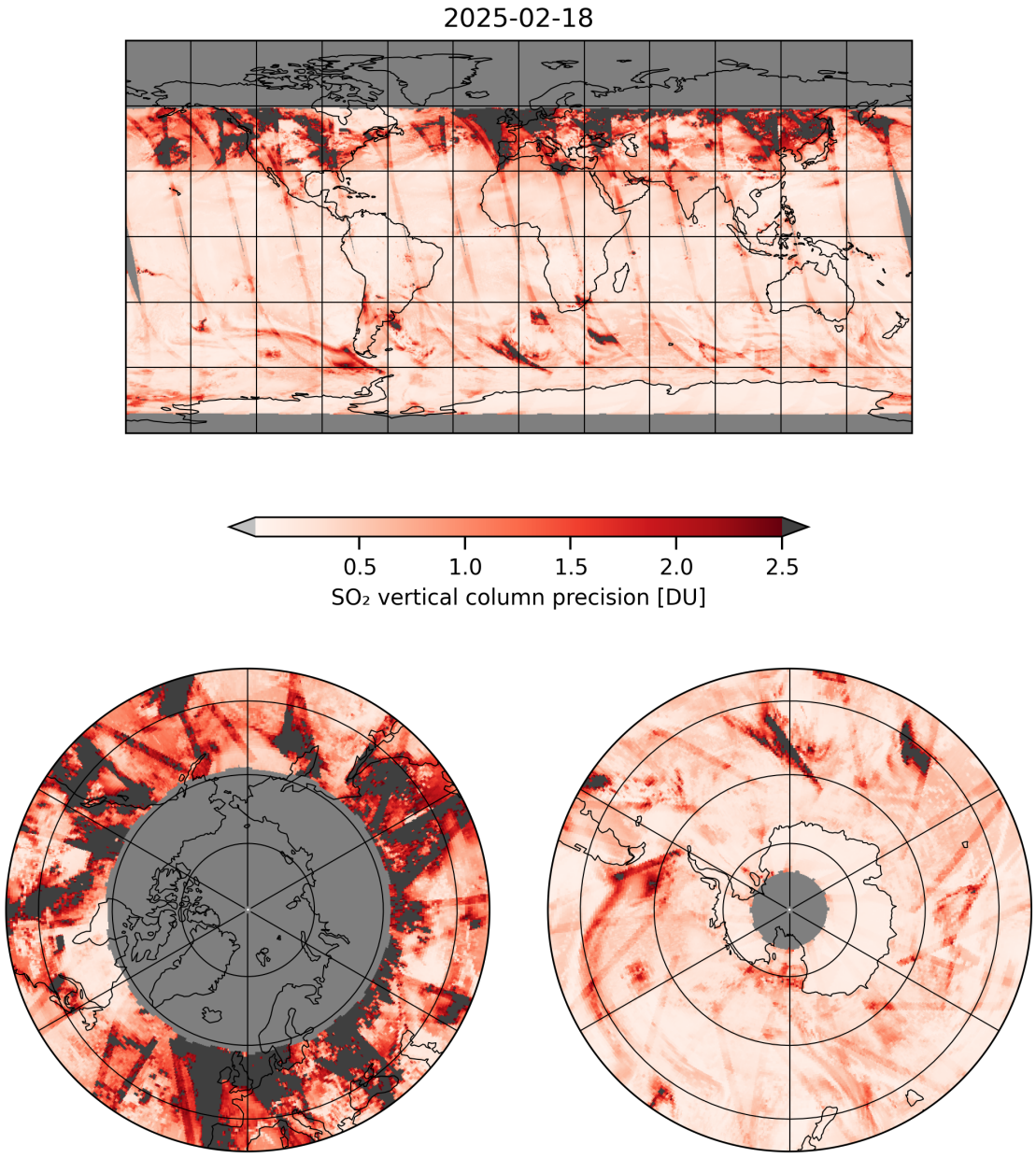


Figure 5: Map of "SO_2 vertical column precision" for 2025-02-18 to 2025-02-19

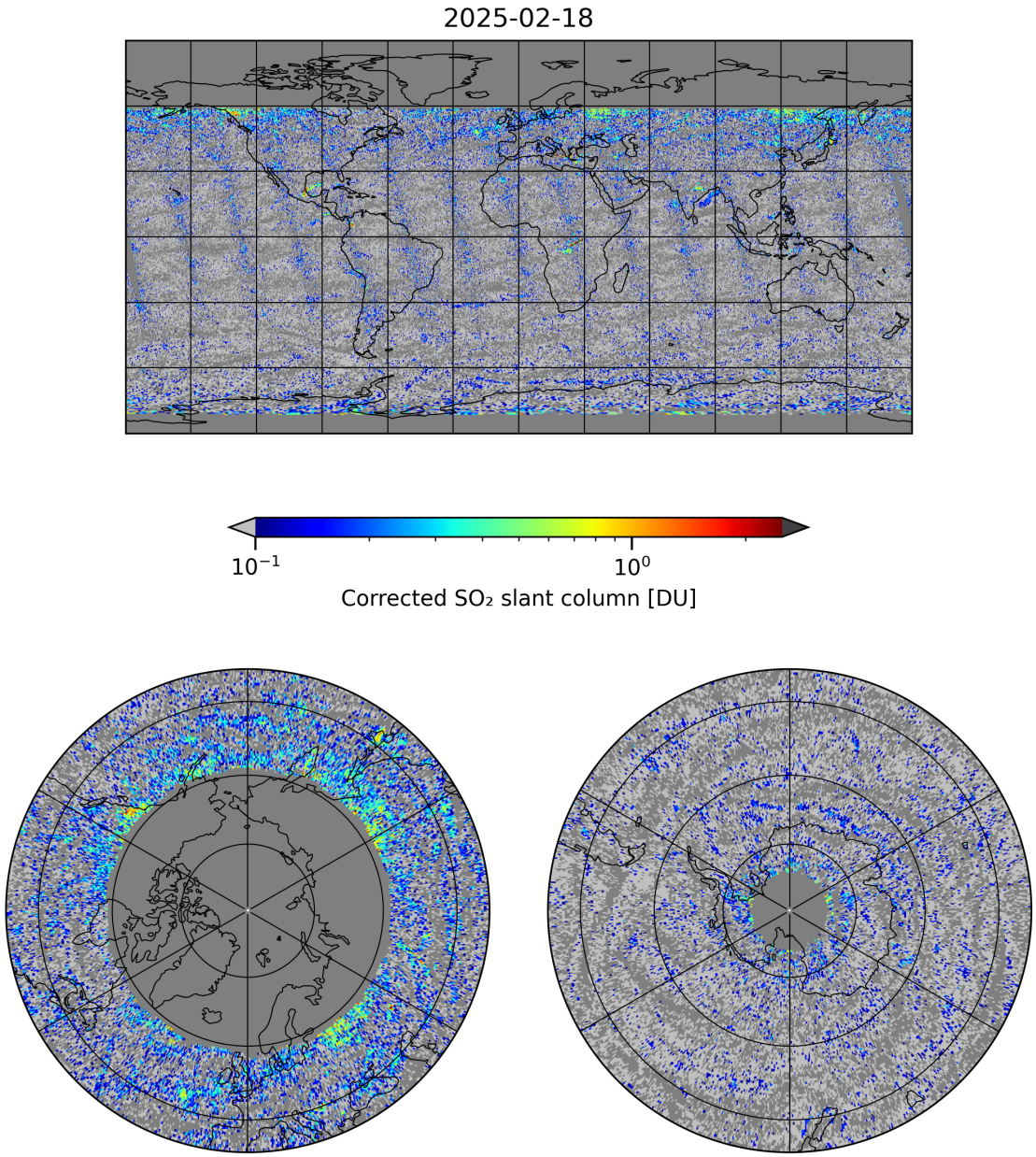


Figure 6: Map of “Corrected SO_2 slant column” for 2025-02-18 to 2025-02-19

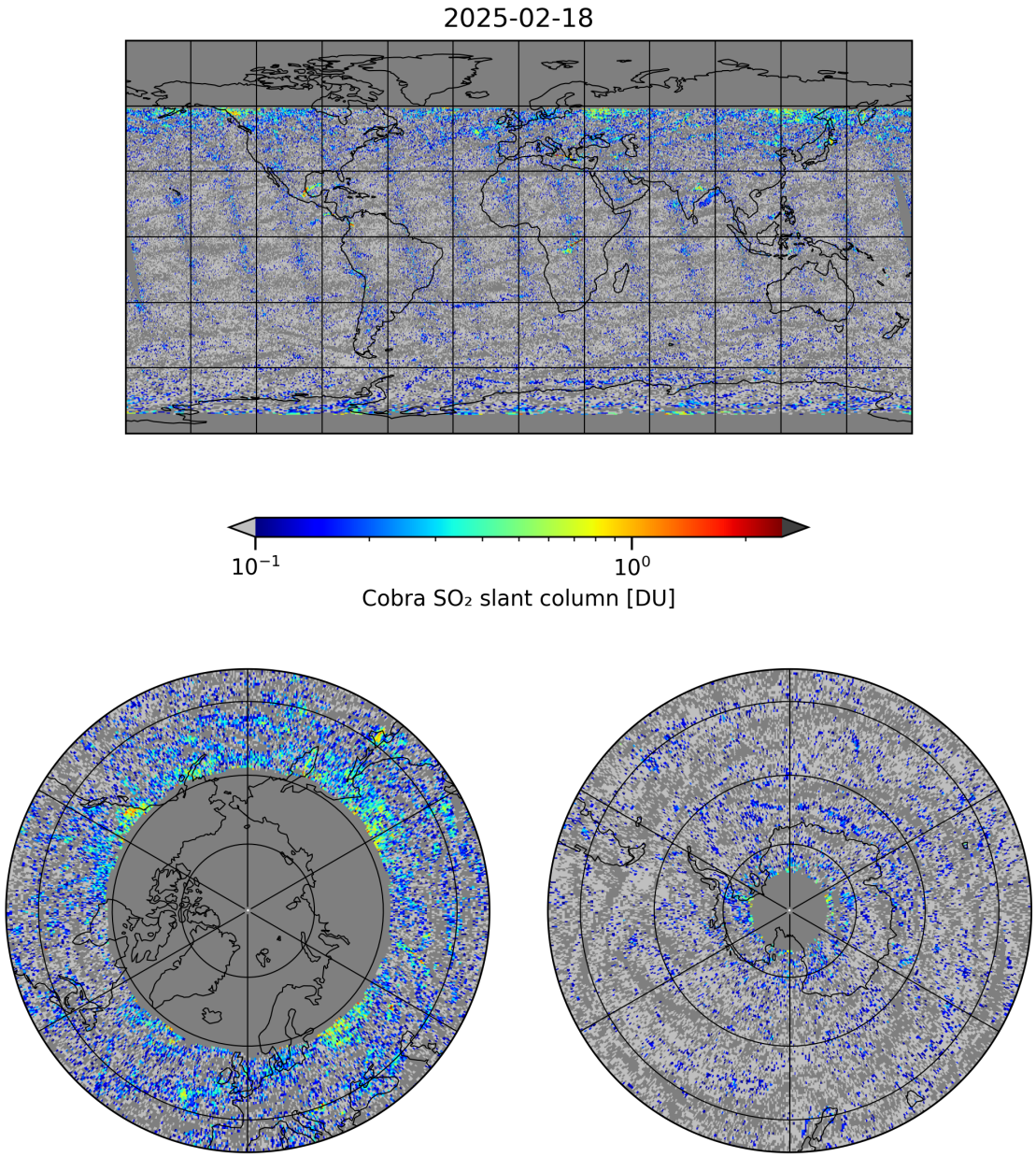


Figure 7: Map of "Cobra SO_2 slant column" for 2025-02-18 to 2025-02-19

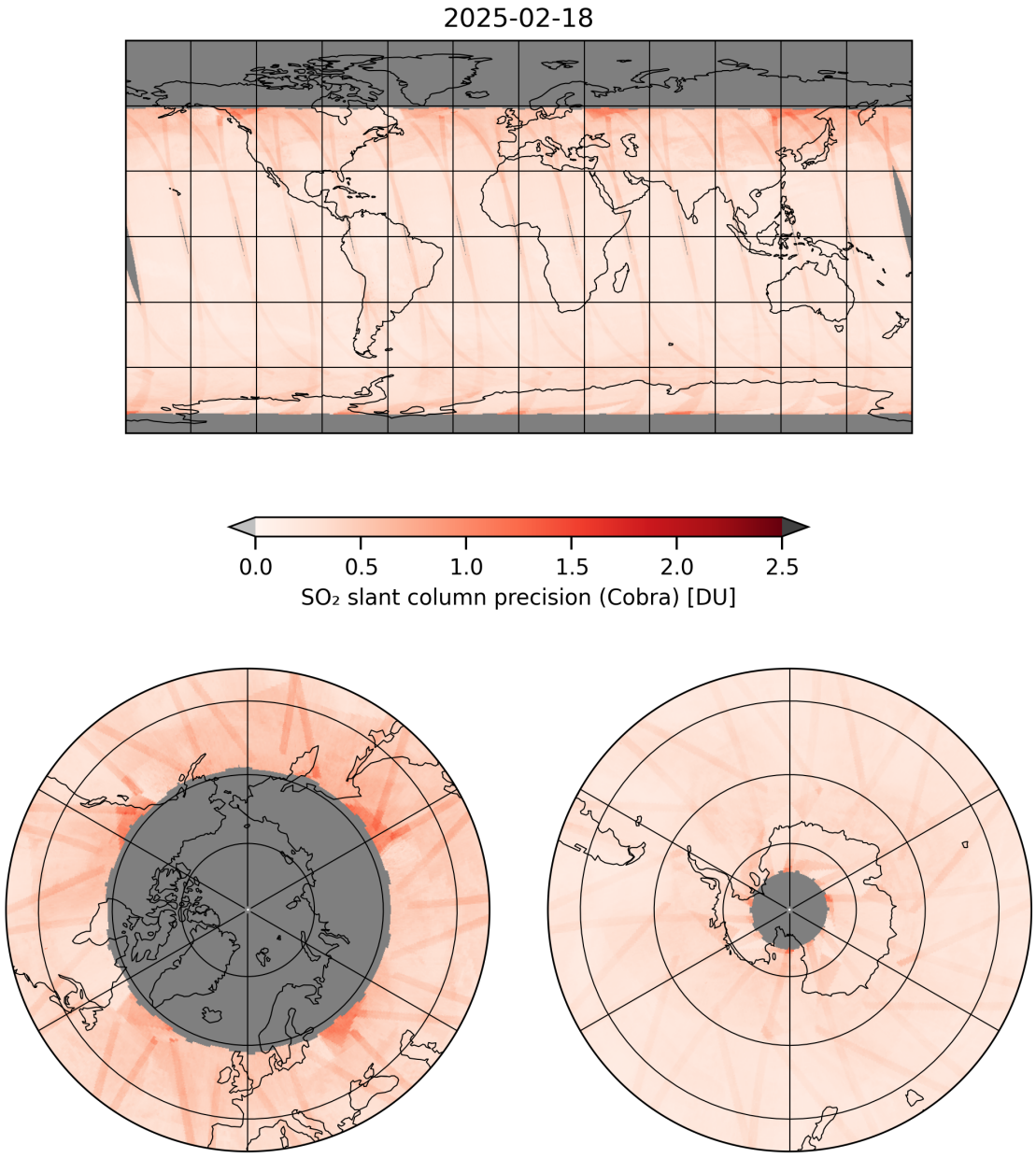


Figure 8: Map of "SO_2 slant column precision (Cobra)" for 2025-02-18 to 2025-02-19

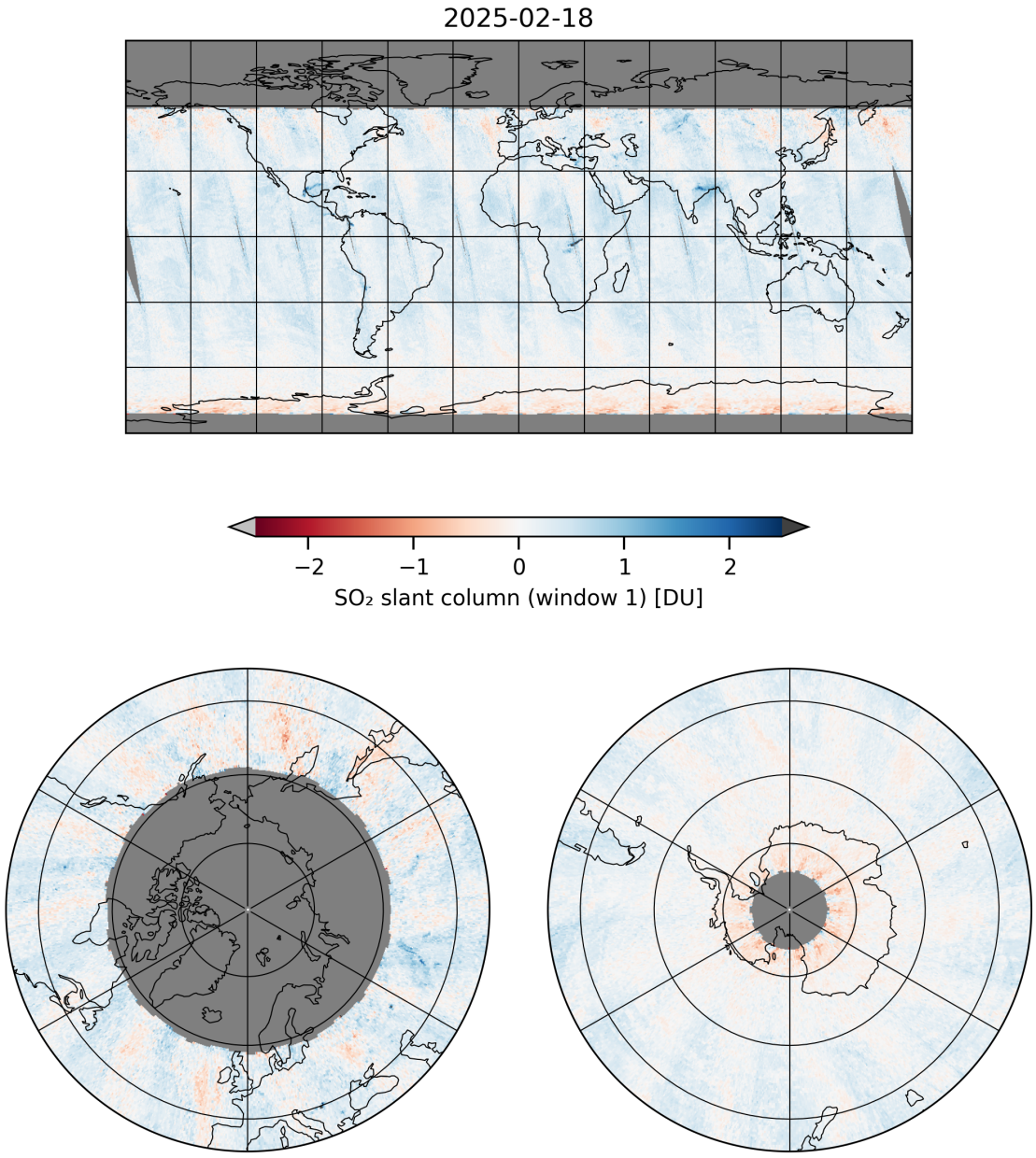


Figure 9: Map of "SO_2 slant column (window 1)" for 2025-02-18 to 2025-02-19

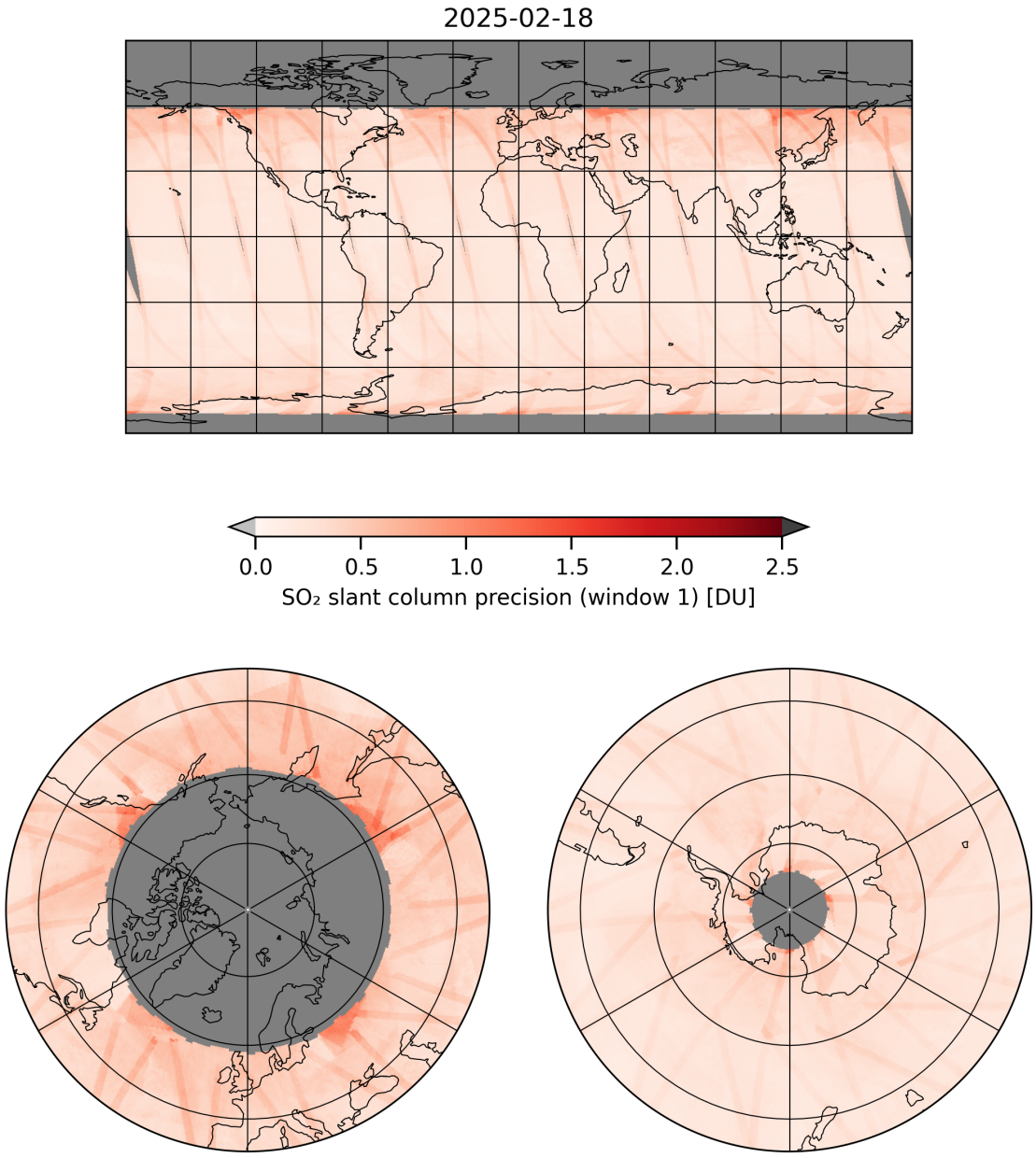


Figure 10: Map of "SO_2 slant column precision (window 1)" for 2025-02-18 to 2025-02-19

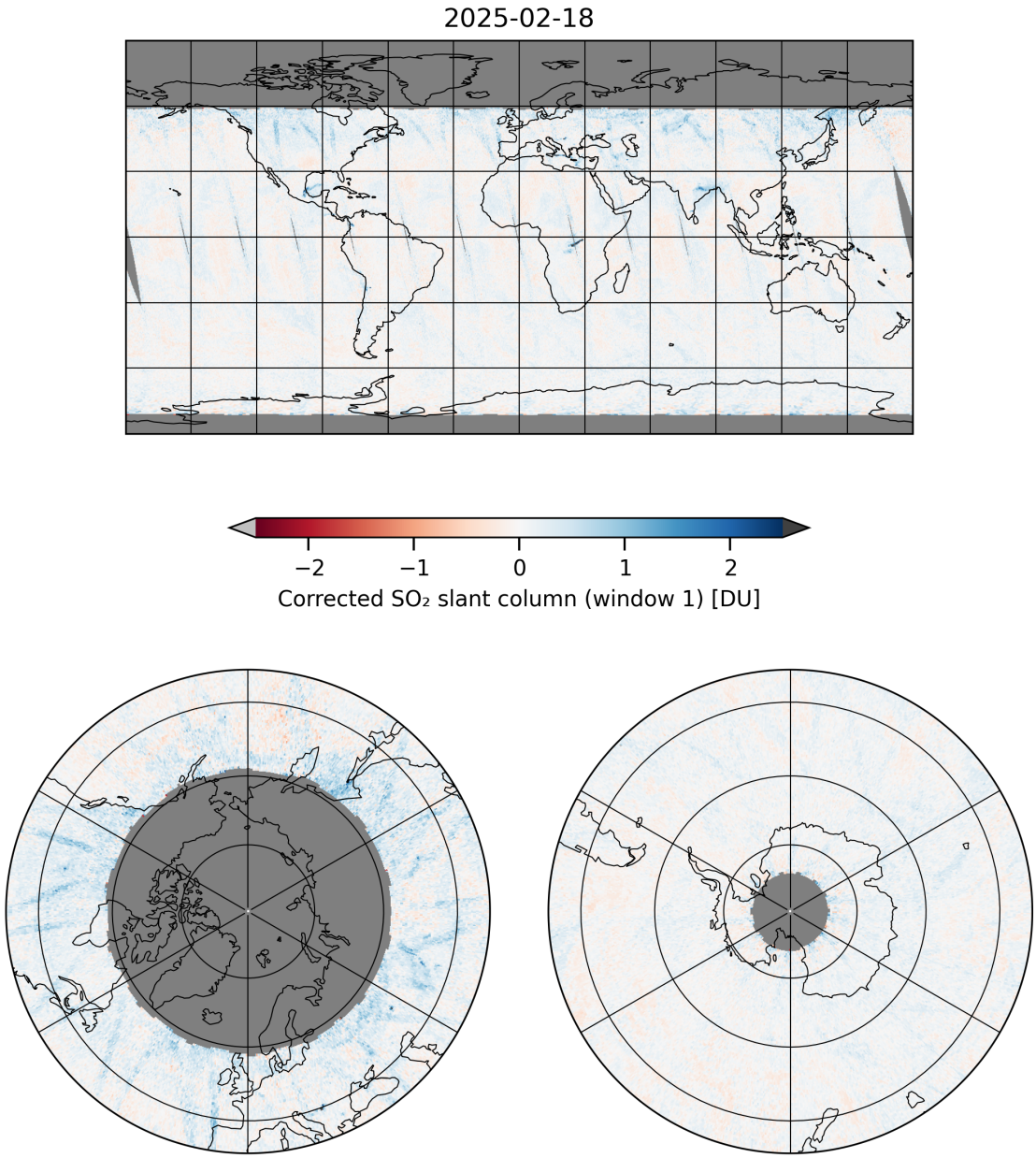


Figure 11: Map of “Corrected SO_2 slant column (window 1)” for 2025-02-18 to 2025-02-19

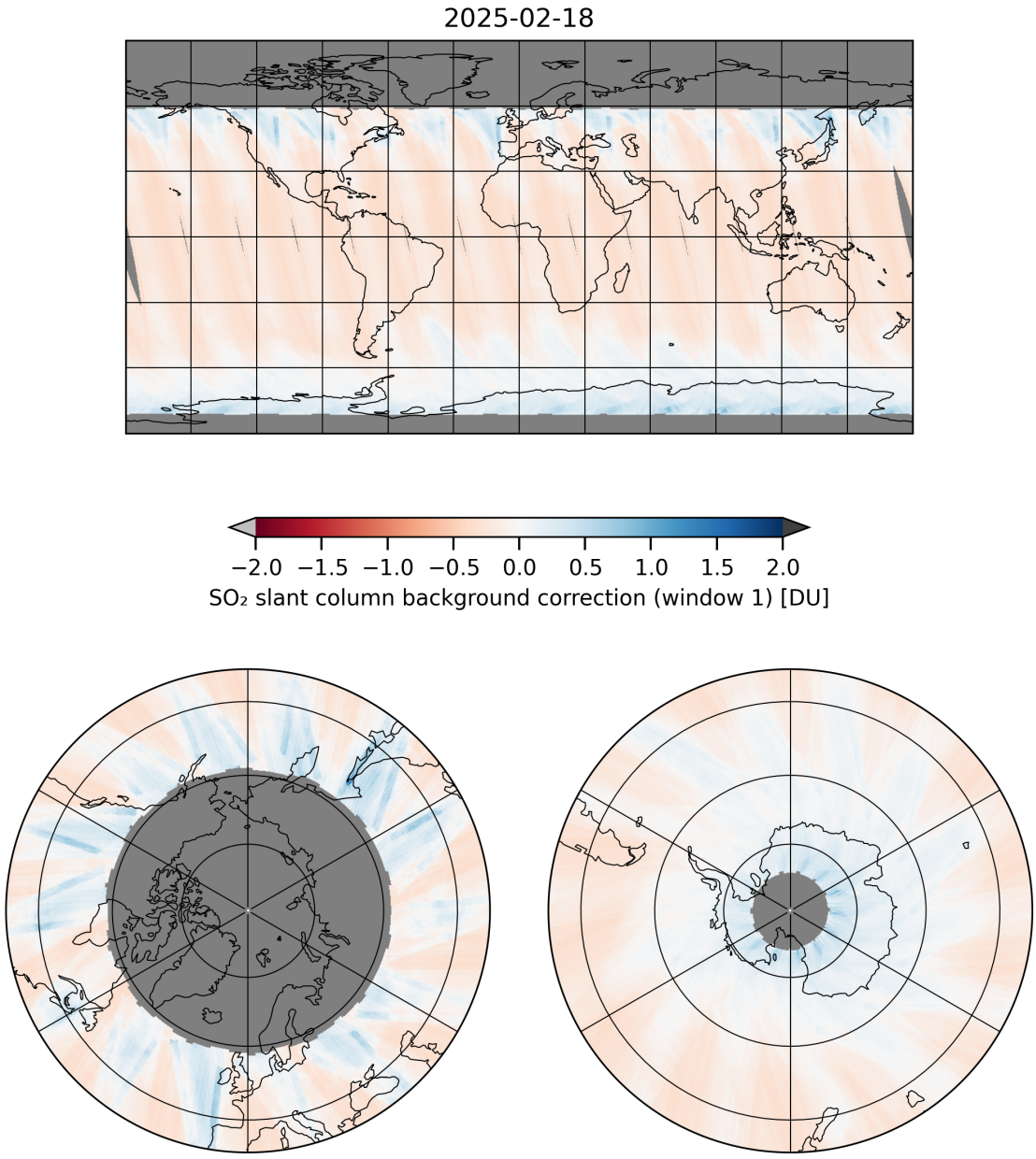


Figure 12: Map of "SO_2 slant column background correction (window 1)" for 2025-02-18 to 2025-02-19

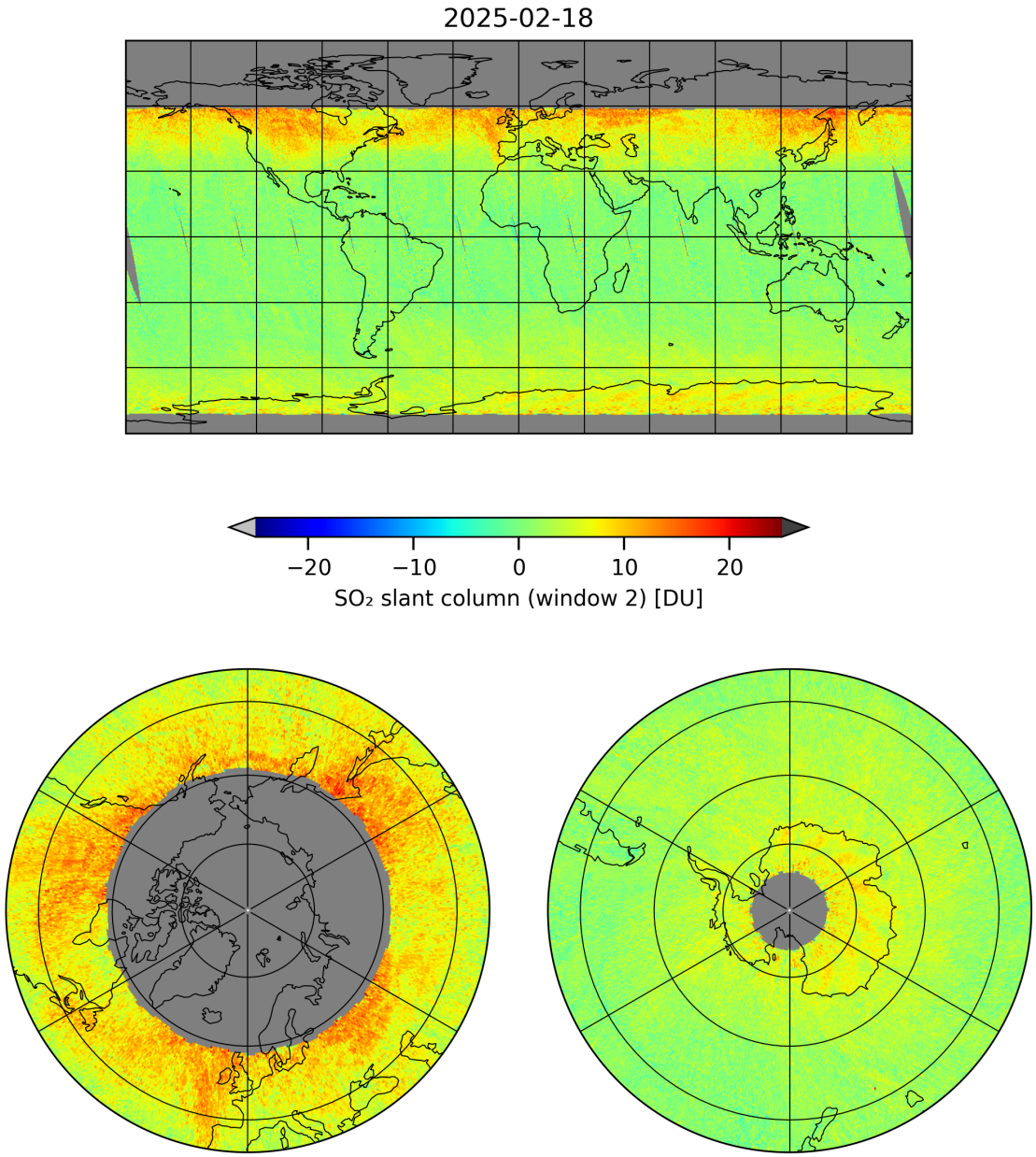


Figure 13: Map of "SO_2 slant column (window 2)" for 2025-02-18 to 2025-02-19

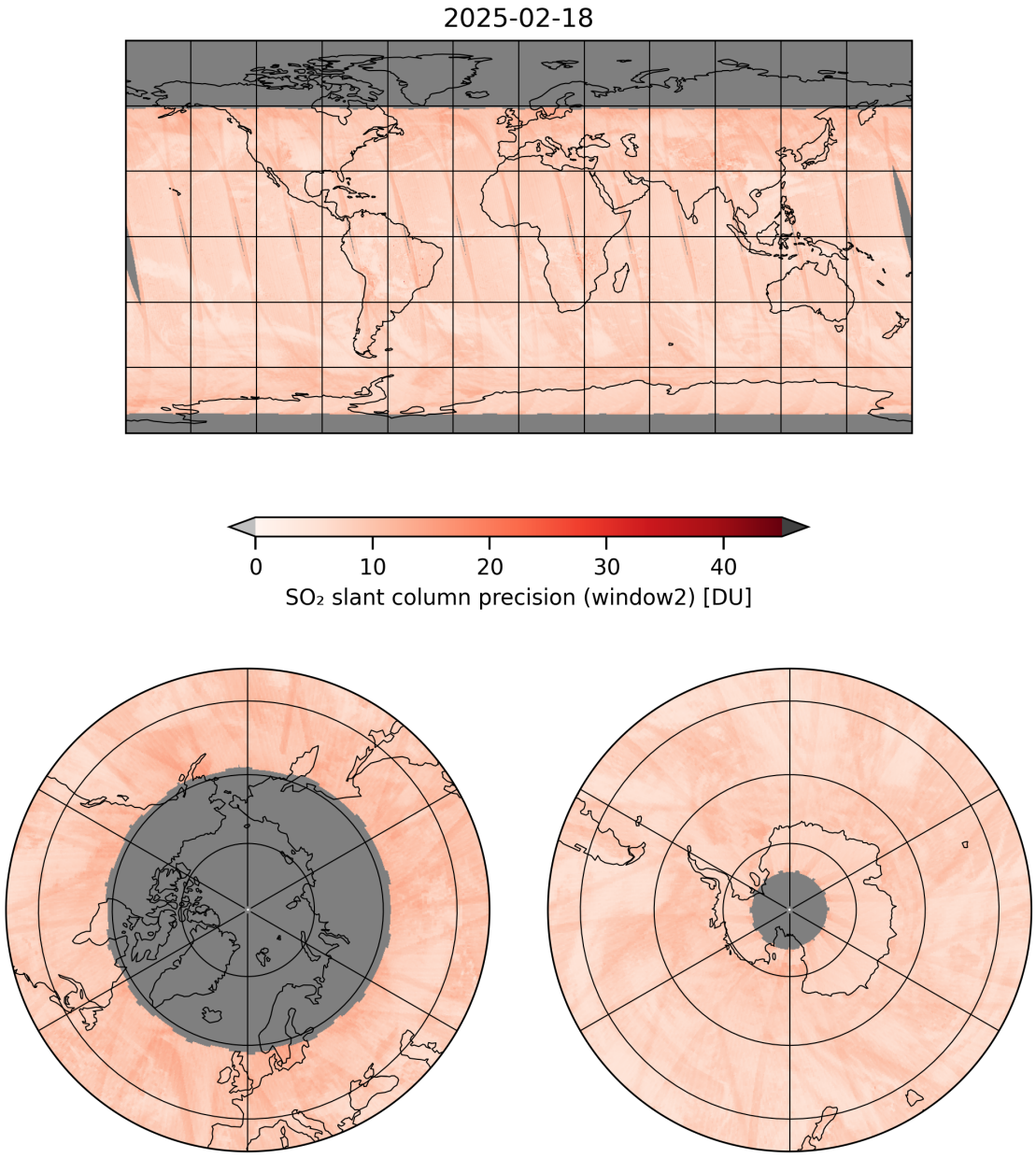


Figure 14: Map of "SO_2 slant column precision (window2)" for 2025-02-18 to 2025-02-19

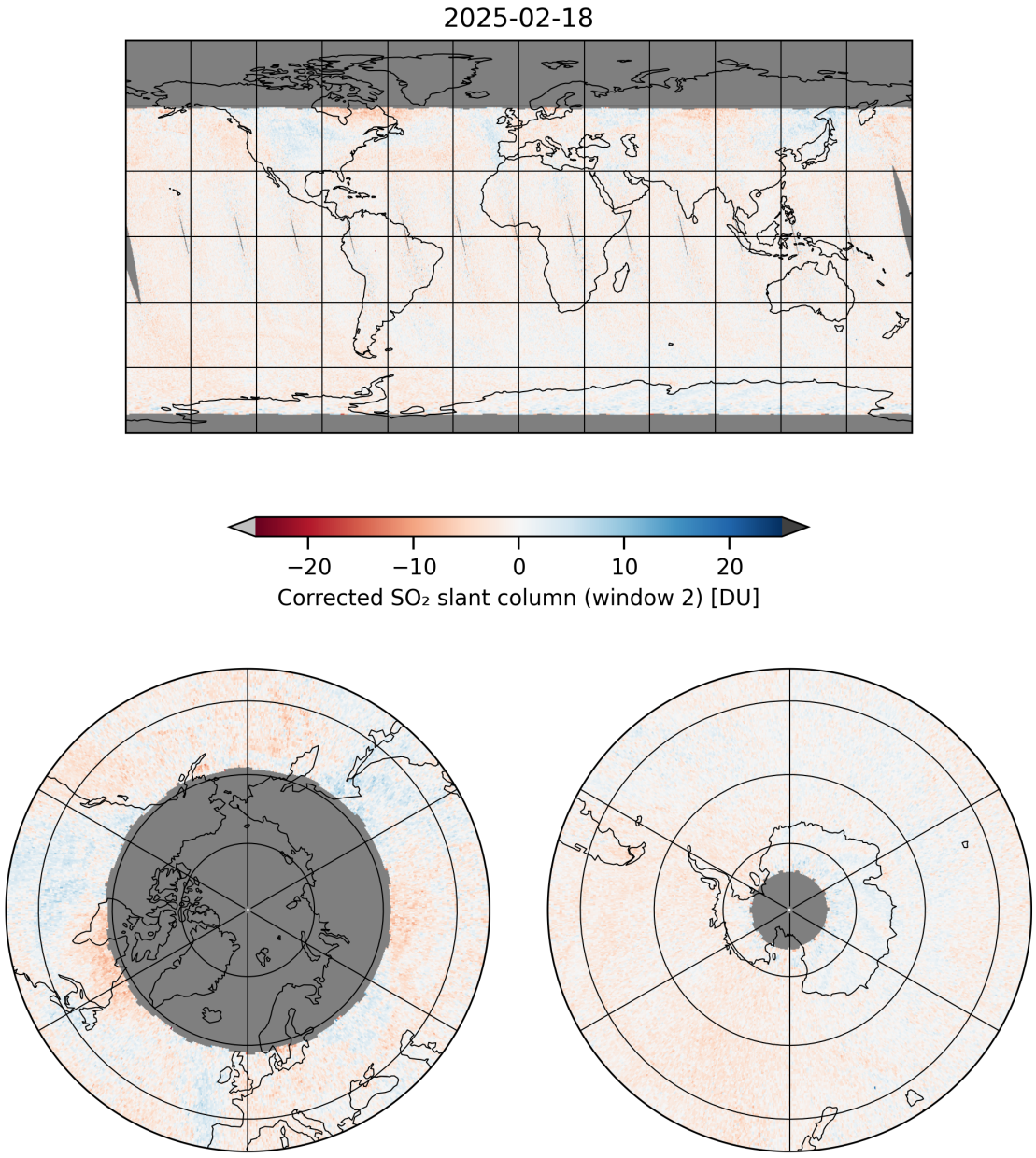


Figure 15: Map of “Corrected SO_2 slant column (window 2)” for 2025-02-18 to 2025-02-19

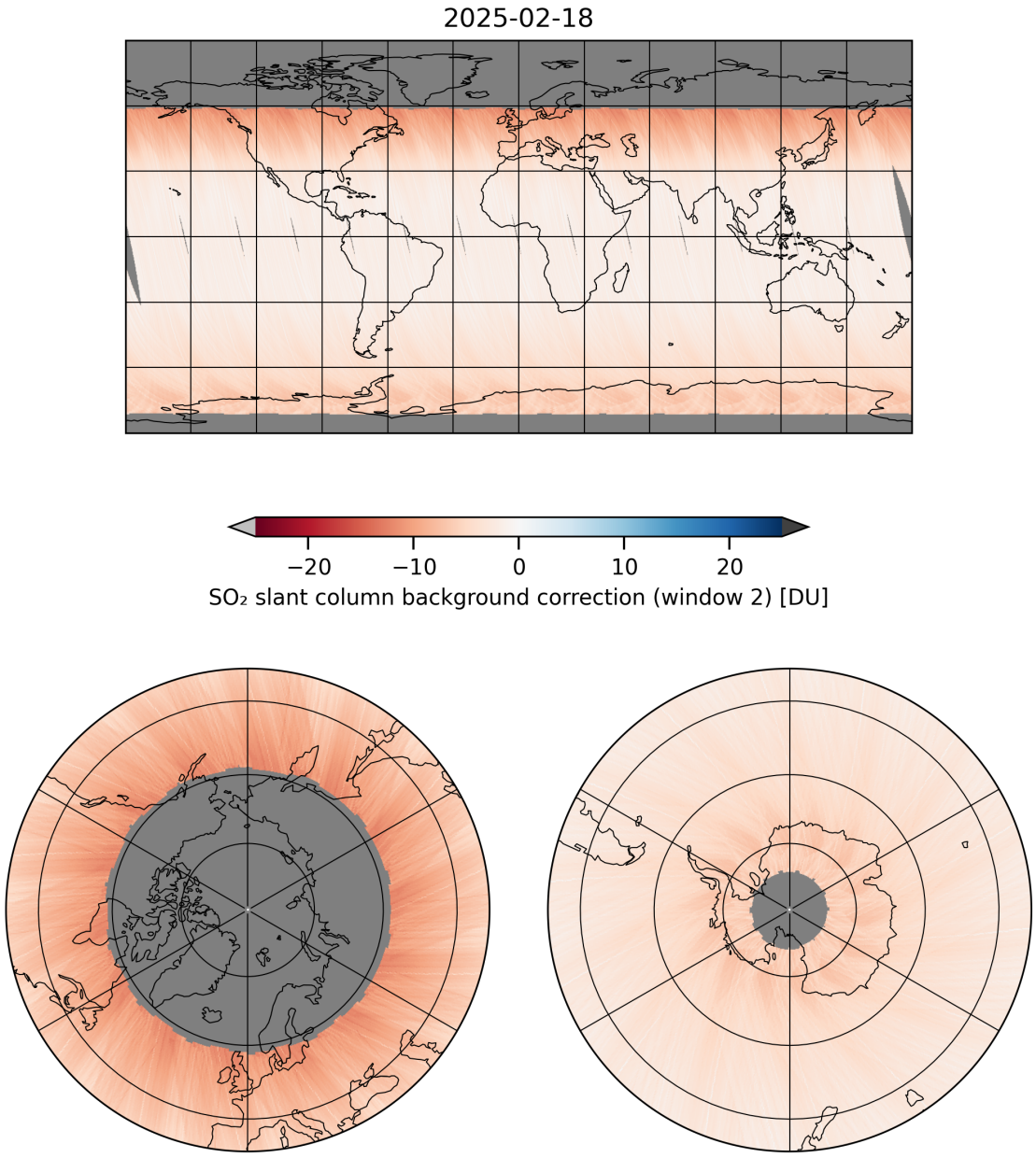


Figure 16: Map of "SO_2 slant column background correction (window 2)" for 2025-02-18 to 2025-02-19

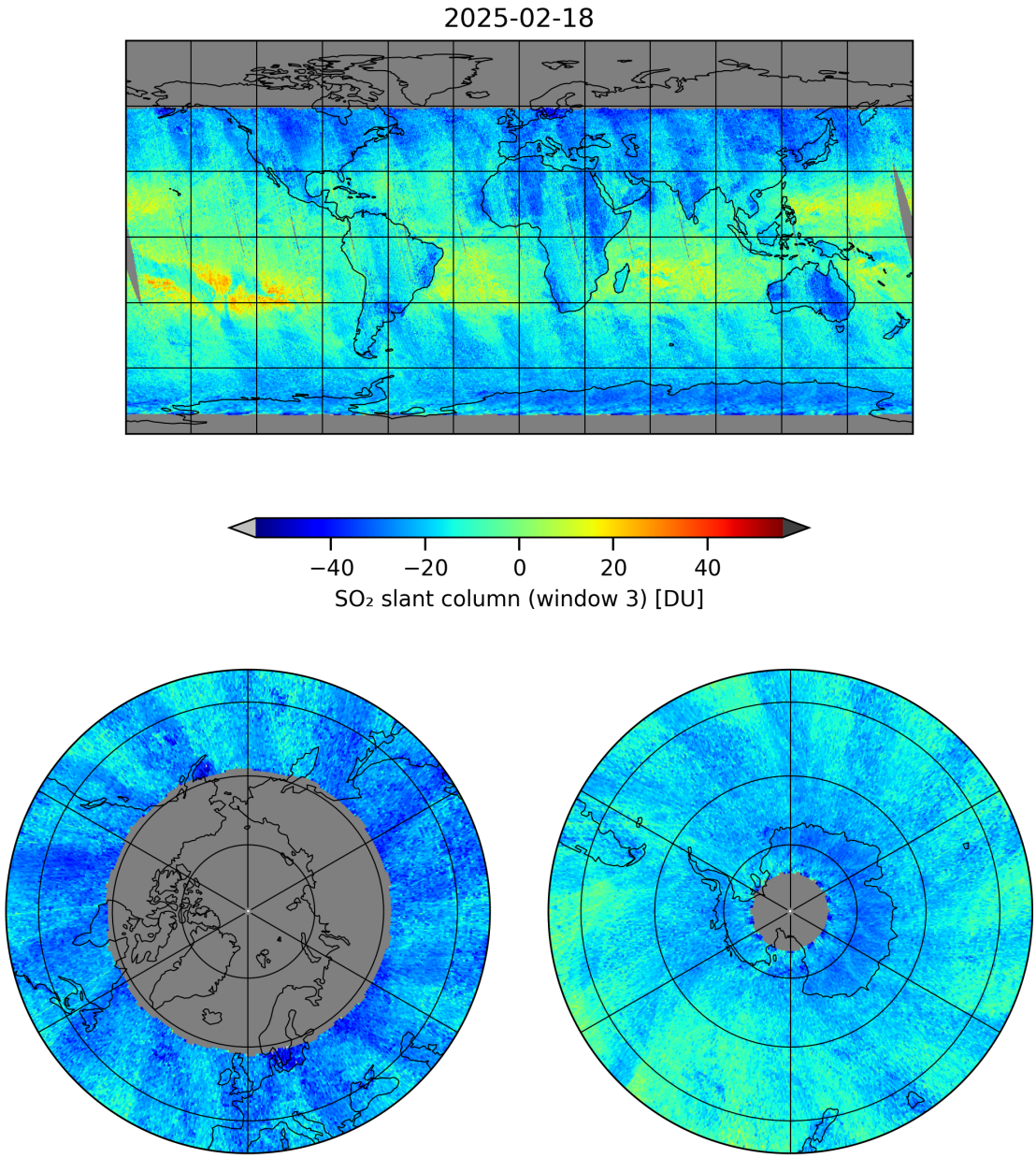


Figure 17: Map of "SO_2 slant column (window 3)" for 2025-02-18 to 2025-02-19

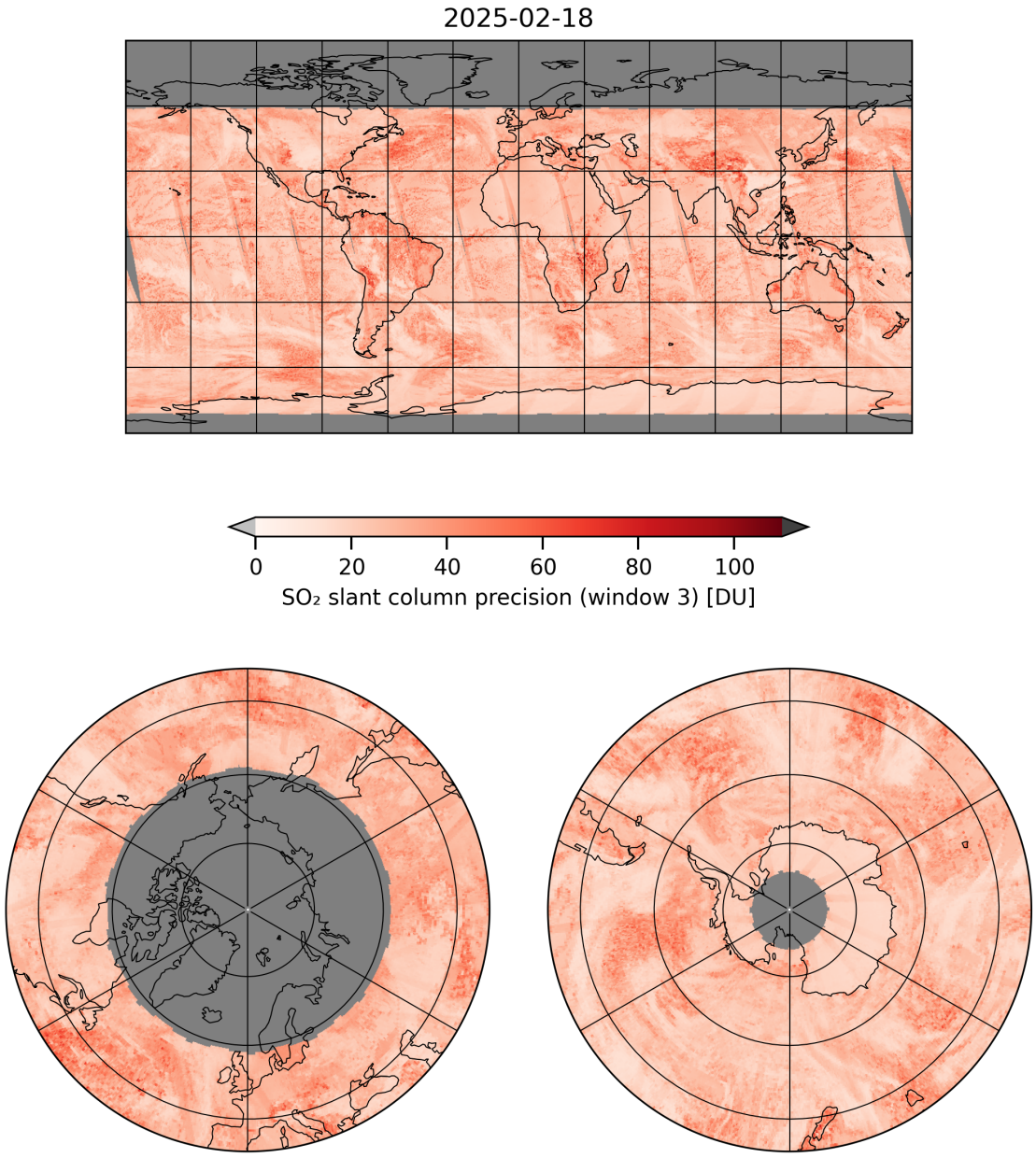


Figure 18: Map of "SO_2 slant column precision (window 3)" for 2025-02-18 to 2025-02-19

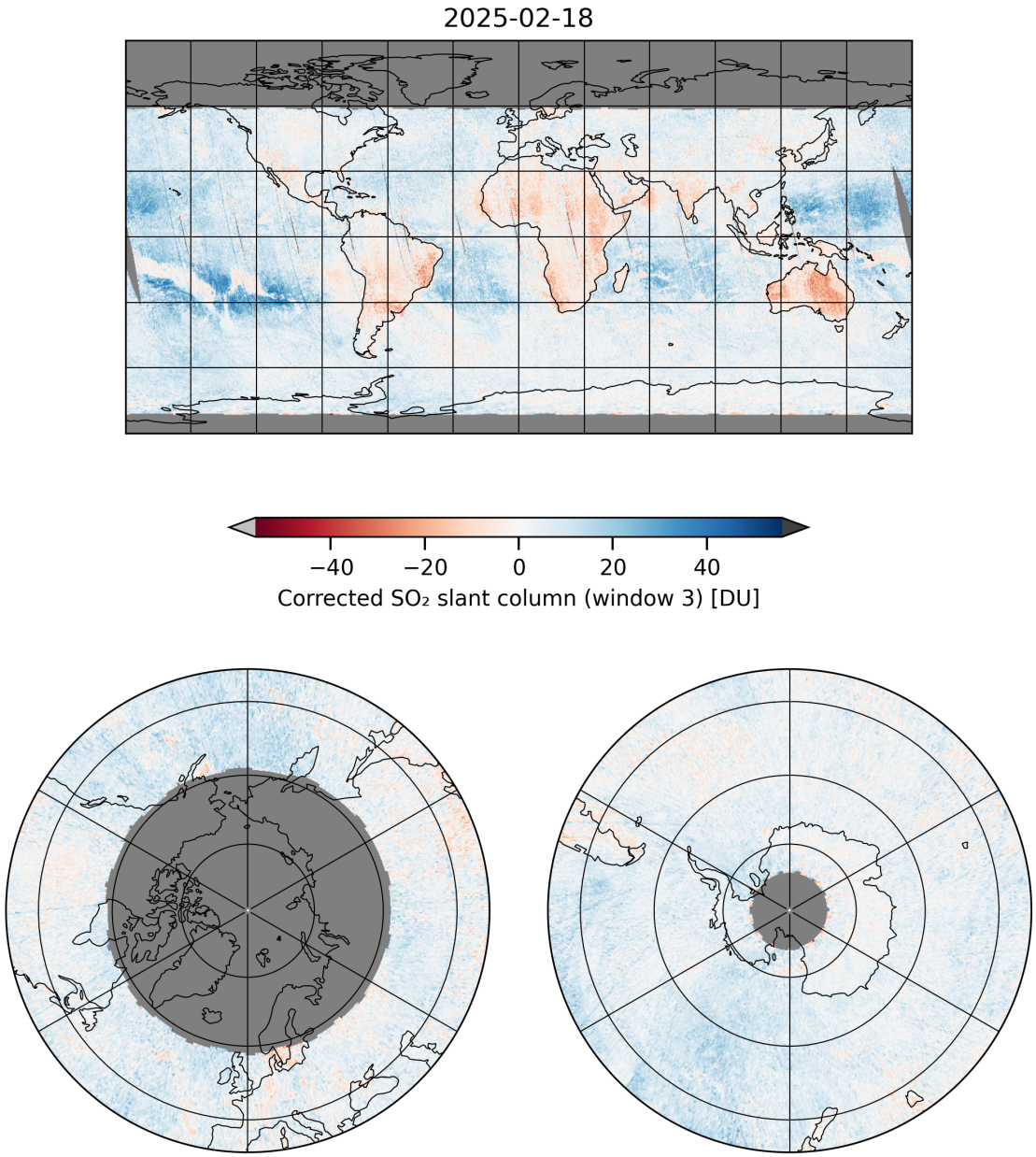


Figure 19: Map of "Corrected SO_2 slant column (window 3)" for 2025-02-18 to 2025-02-19

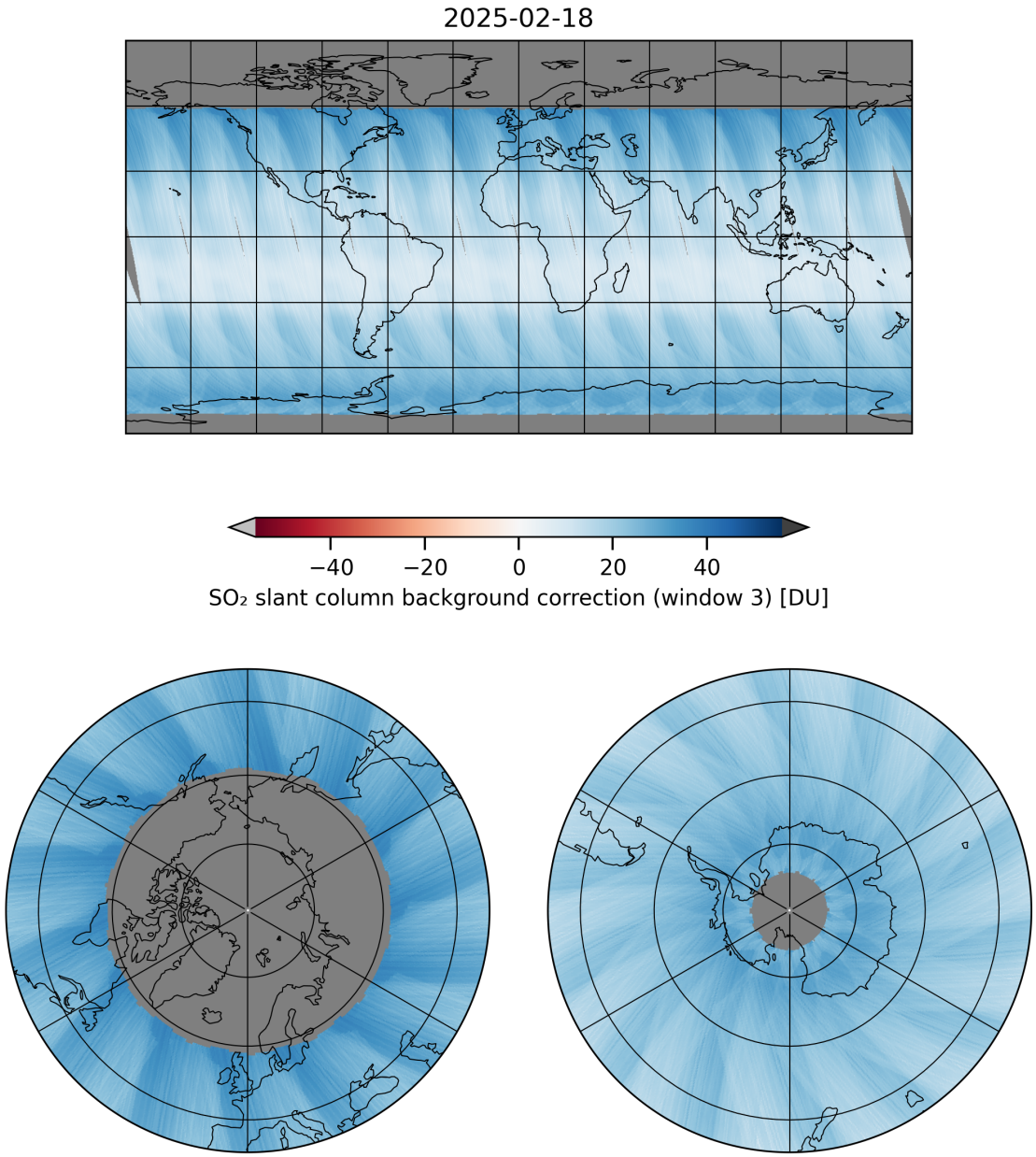


Figure 20: Map of "SO_2 slant column background correction (window 3)" for 2025-02-18 to 2025-02-19

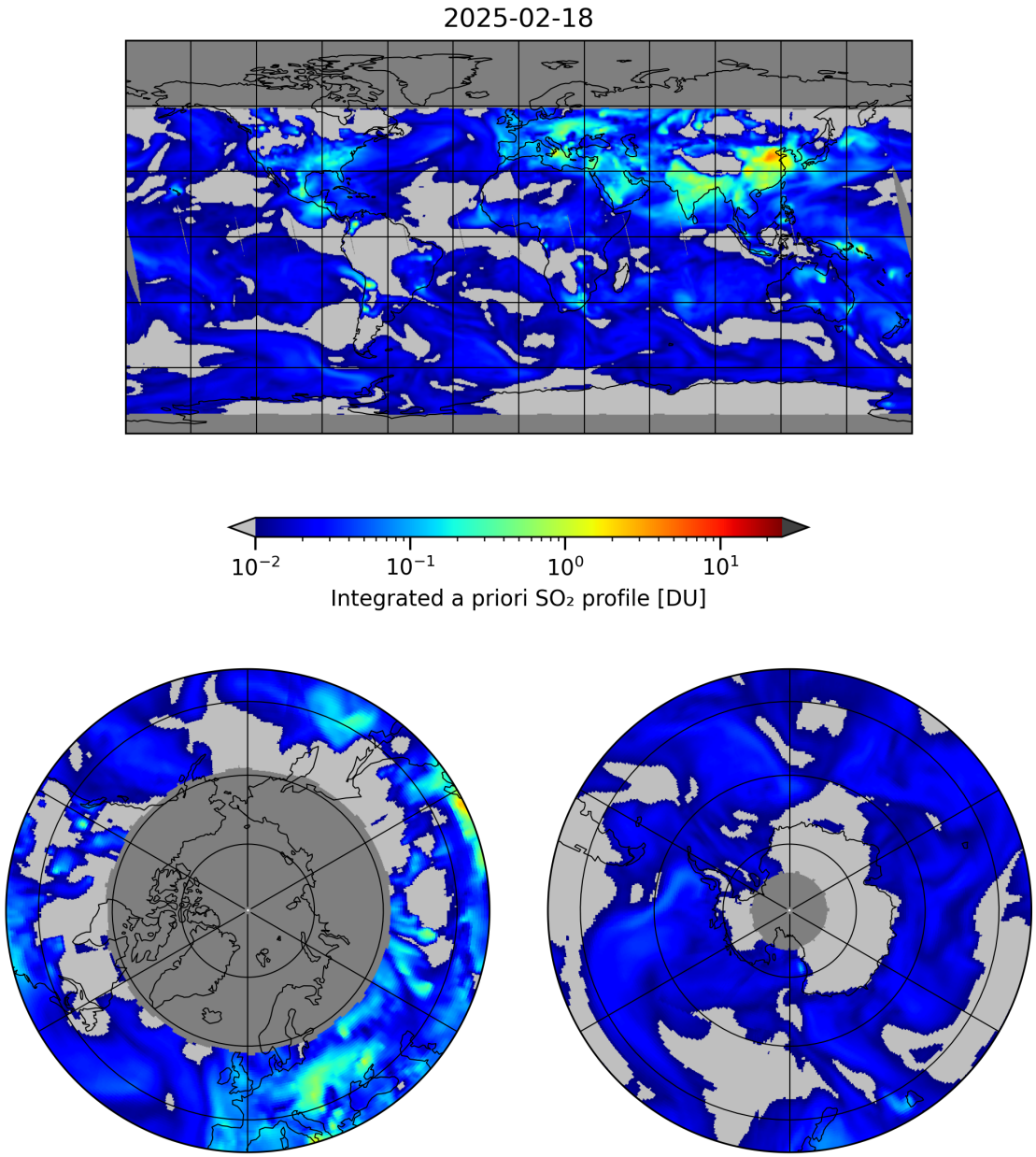


Figure 21: Map of “Integrated a priori SO_2 profile” for 2025-02-18 to 2025-02-19

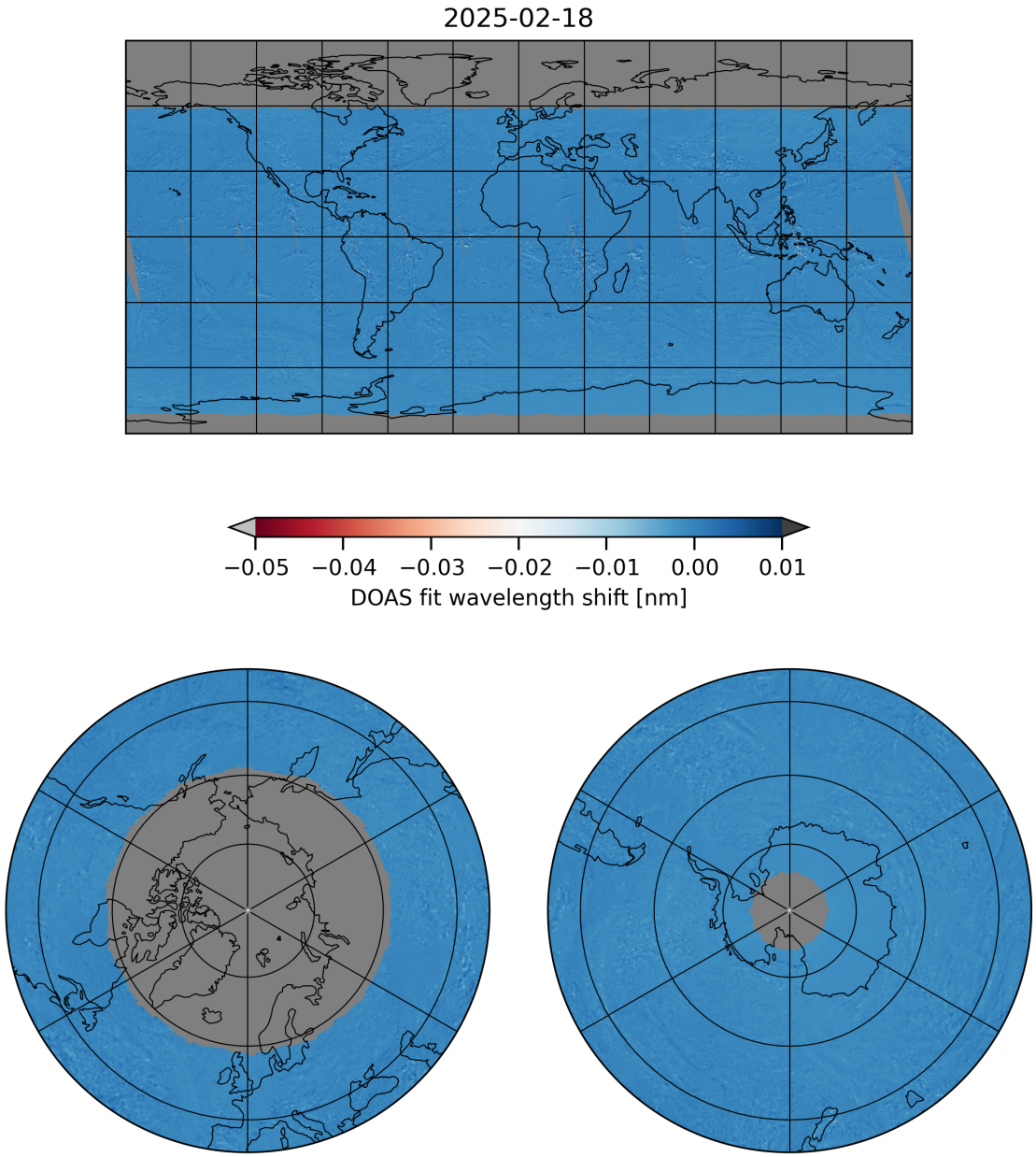


Figure 22: Map of “DOAS fit wavelength shift” for 2025-02-18 to 2025-02-19

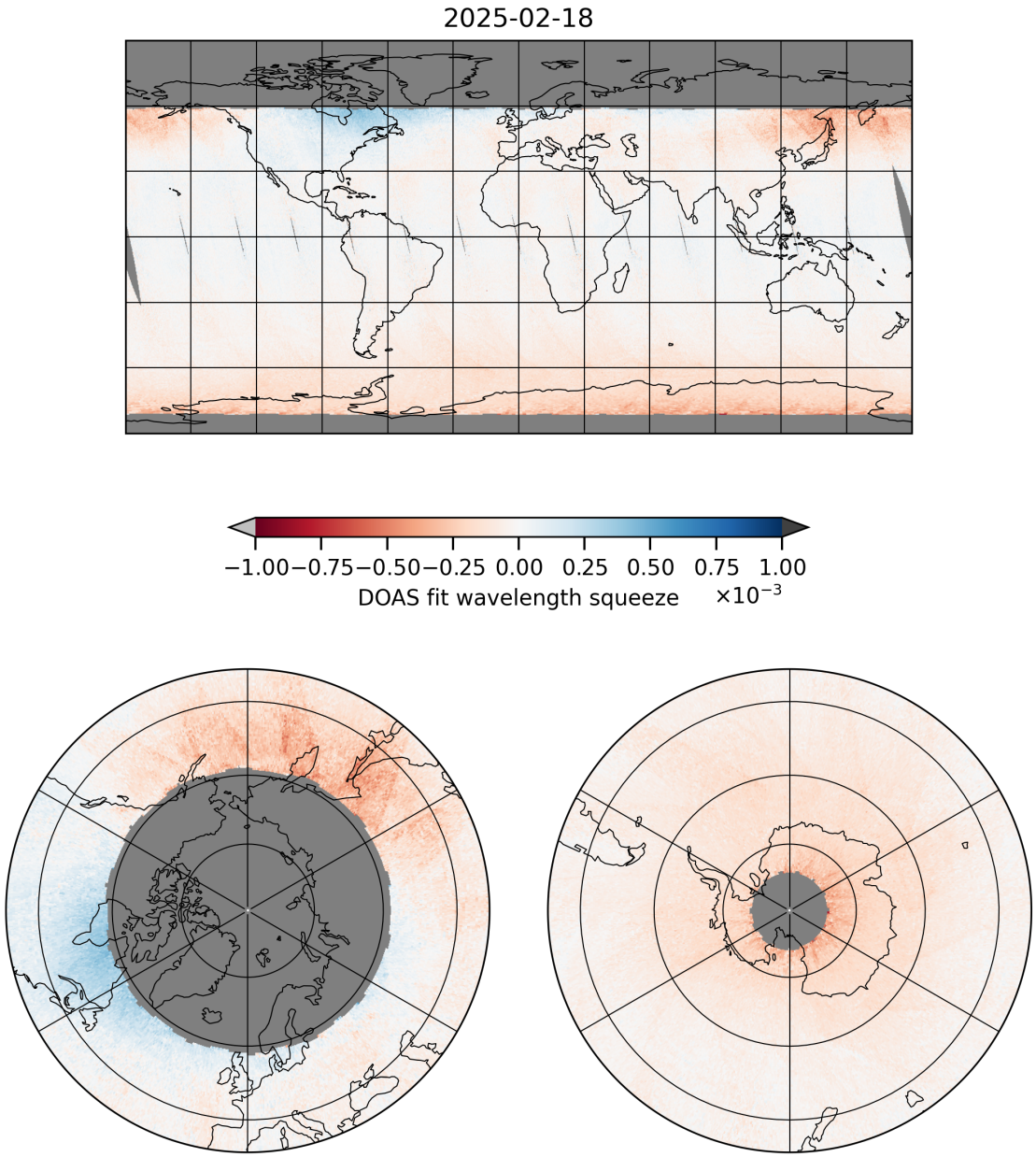


Figure 23: Map of “DOAS fit wavelength squeeze” for 2025-02-18 to 2025-02-19

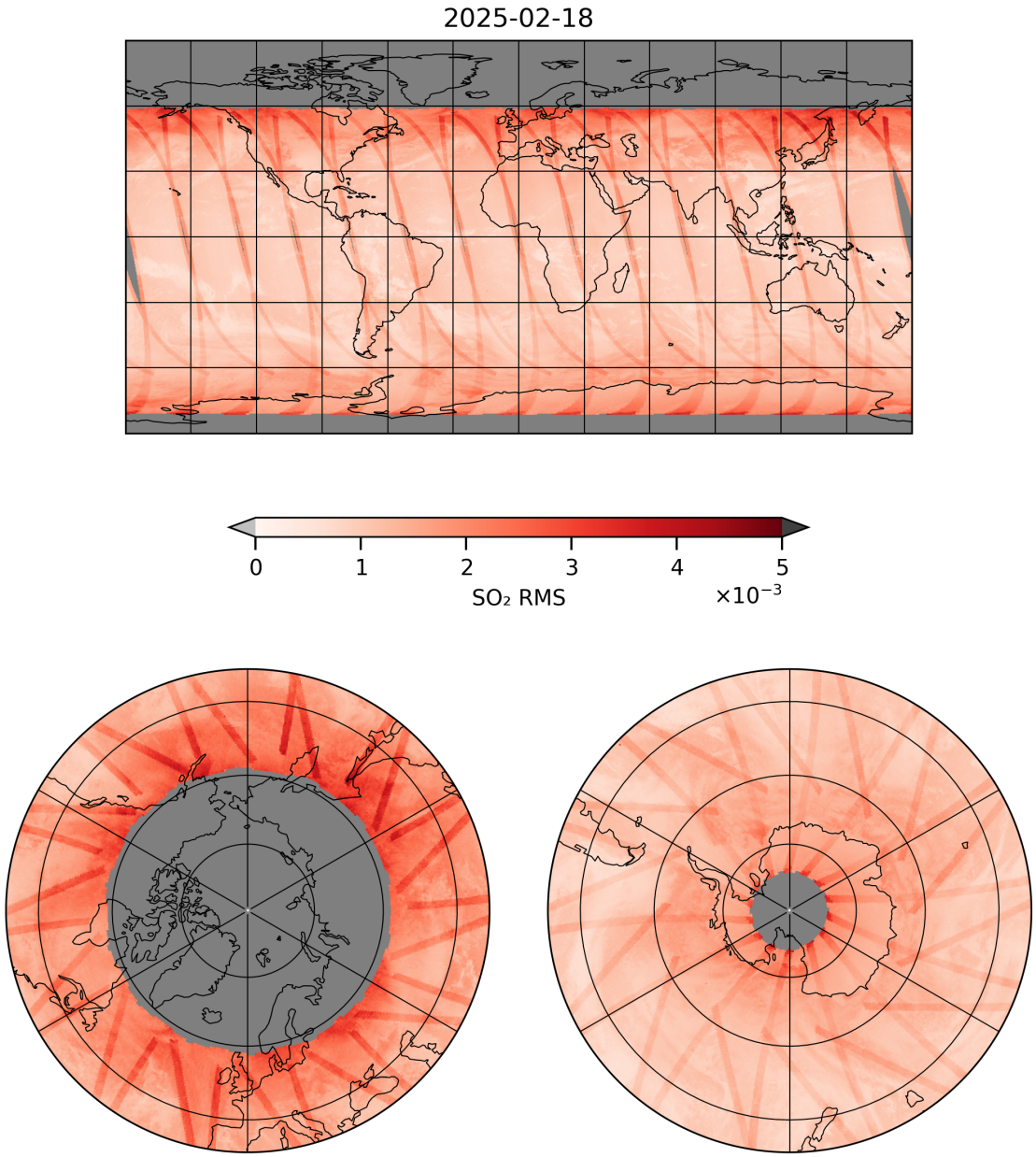


Figure 24: Map of "SO_2 RMS" for 2025-02-18 to 2025-02-19

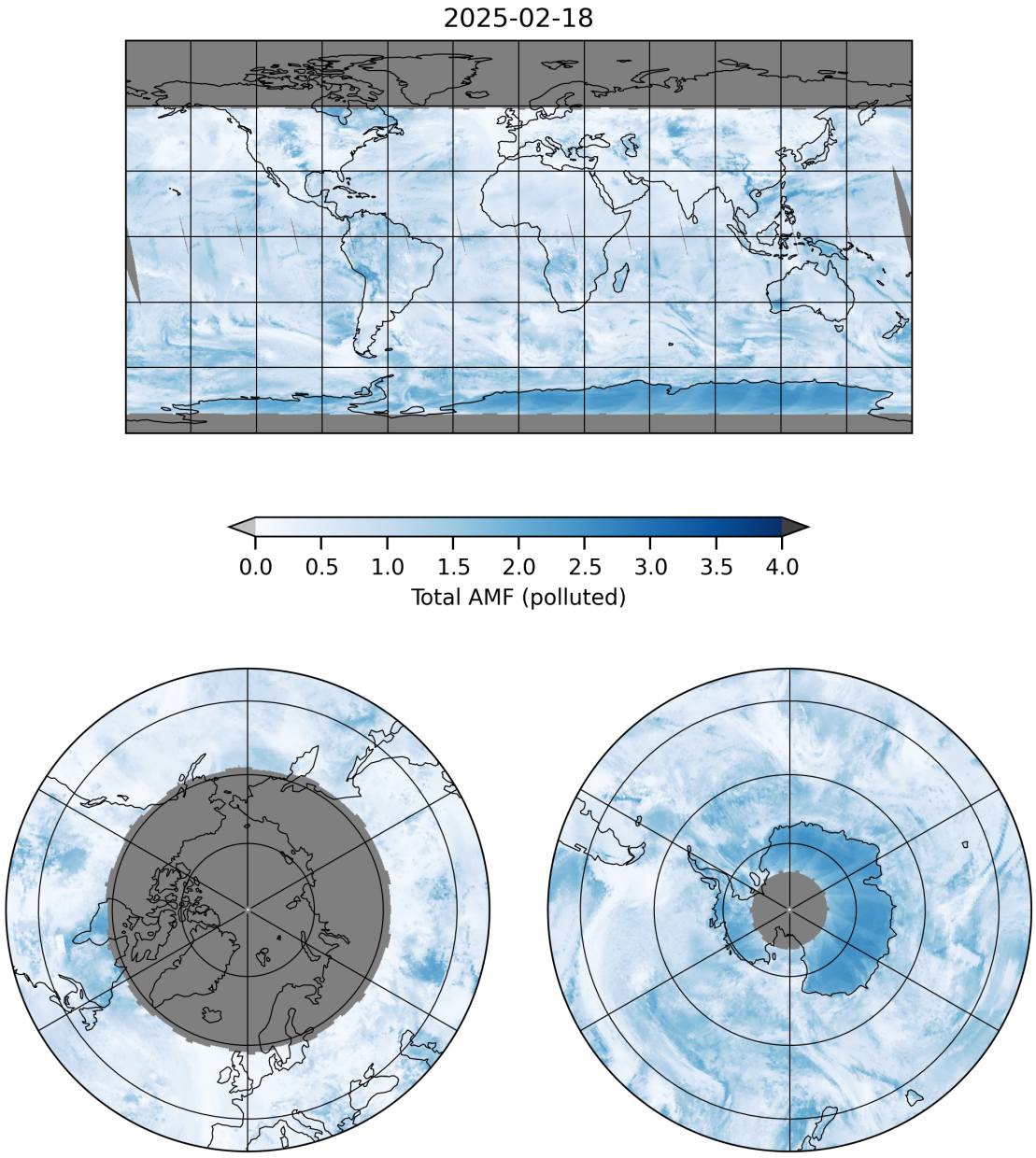


Figure 25: Map of “Total AMF (polluted)” for 2025-02-18 to 2025-02-19

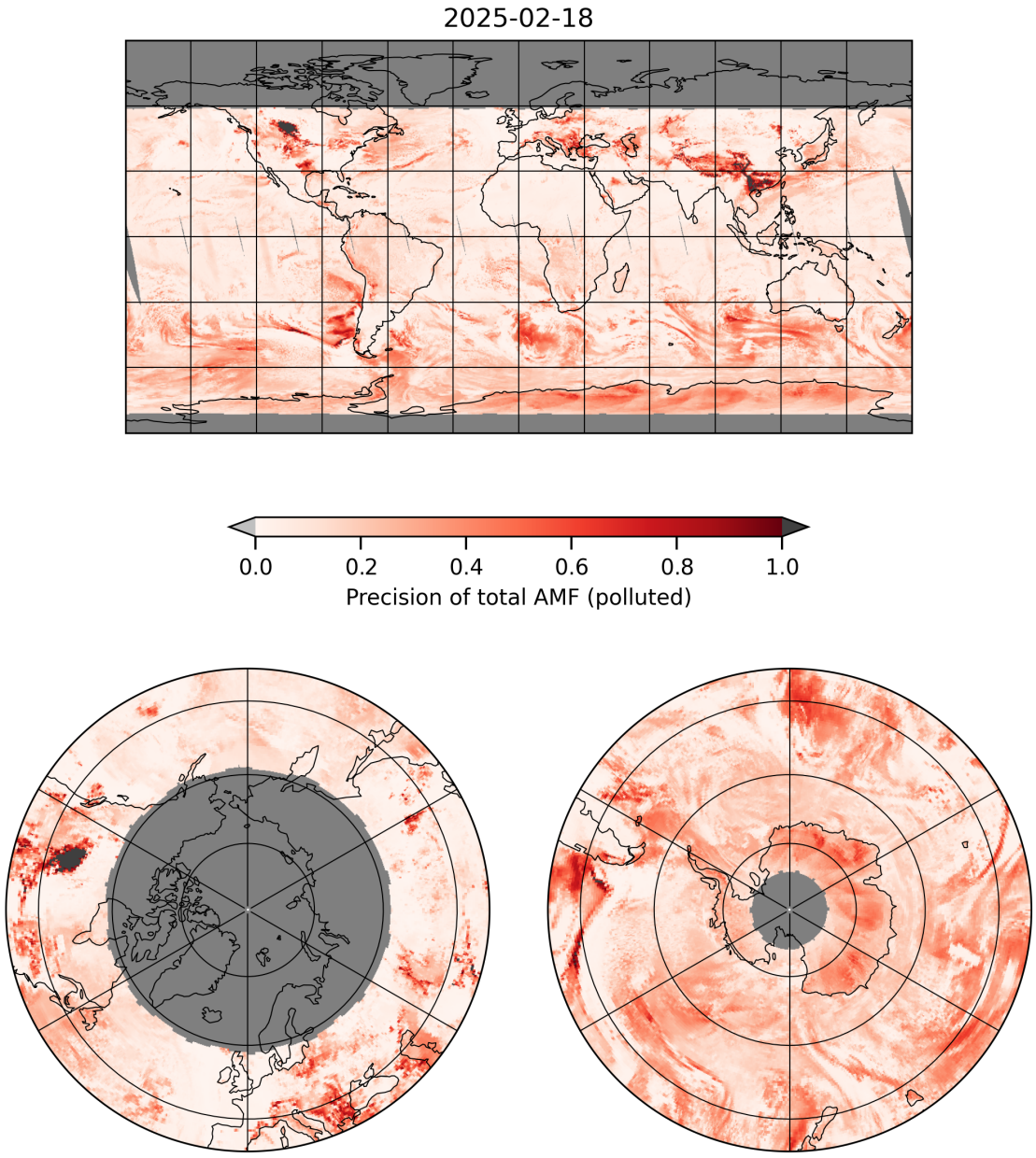


Figure 26: Map of “Precision of total AMF (polluted)” for 2025-02-18 to 2025-02-19

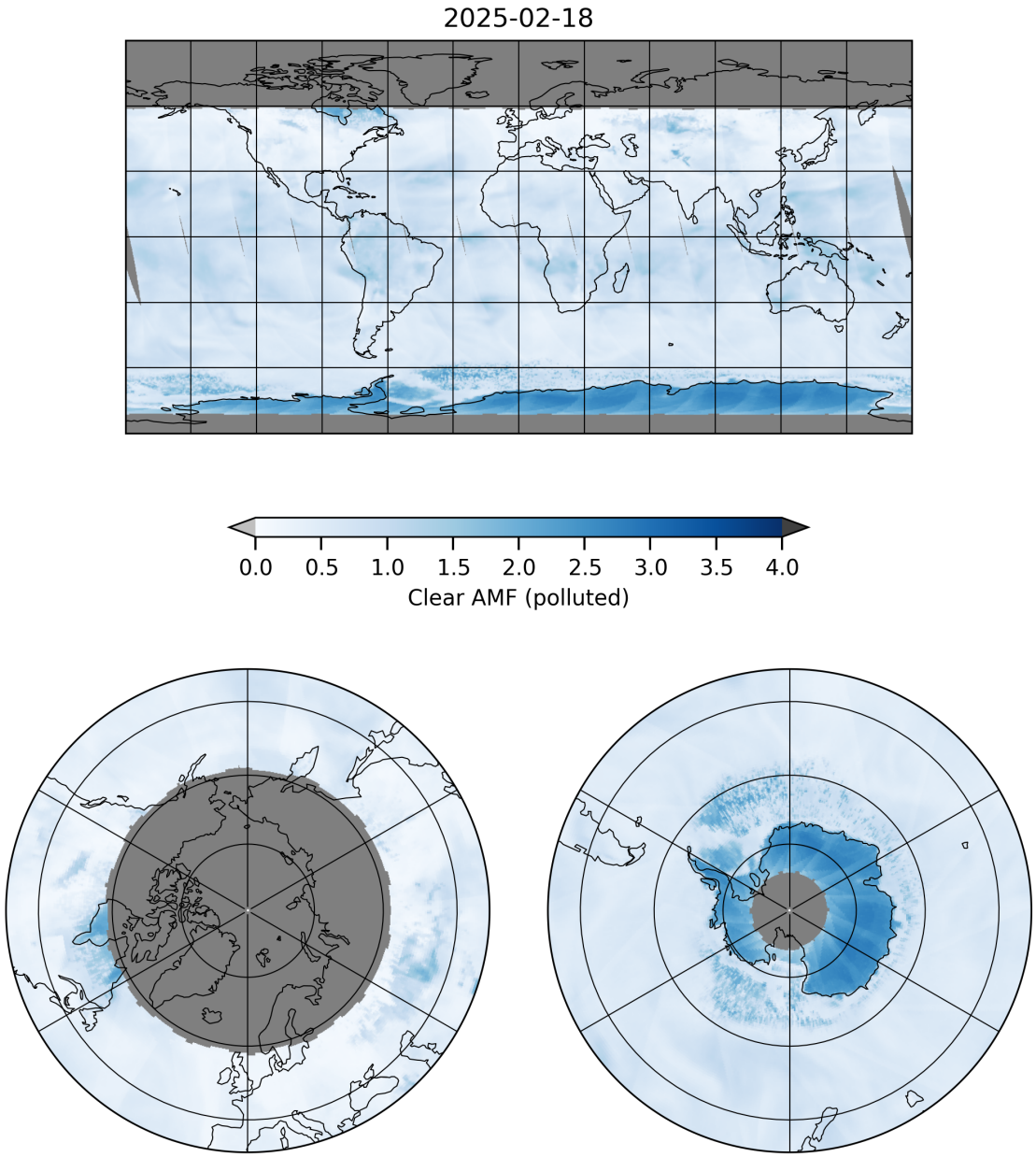


Figure 27: Map of “Clear AMF (polluted)” for 2025-02-18 to 2025-02-19

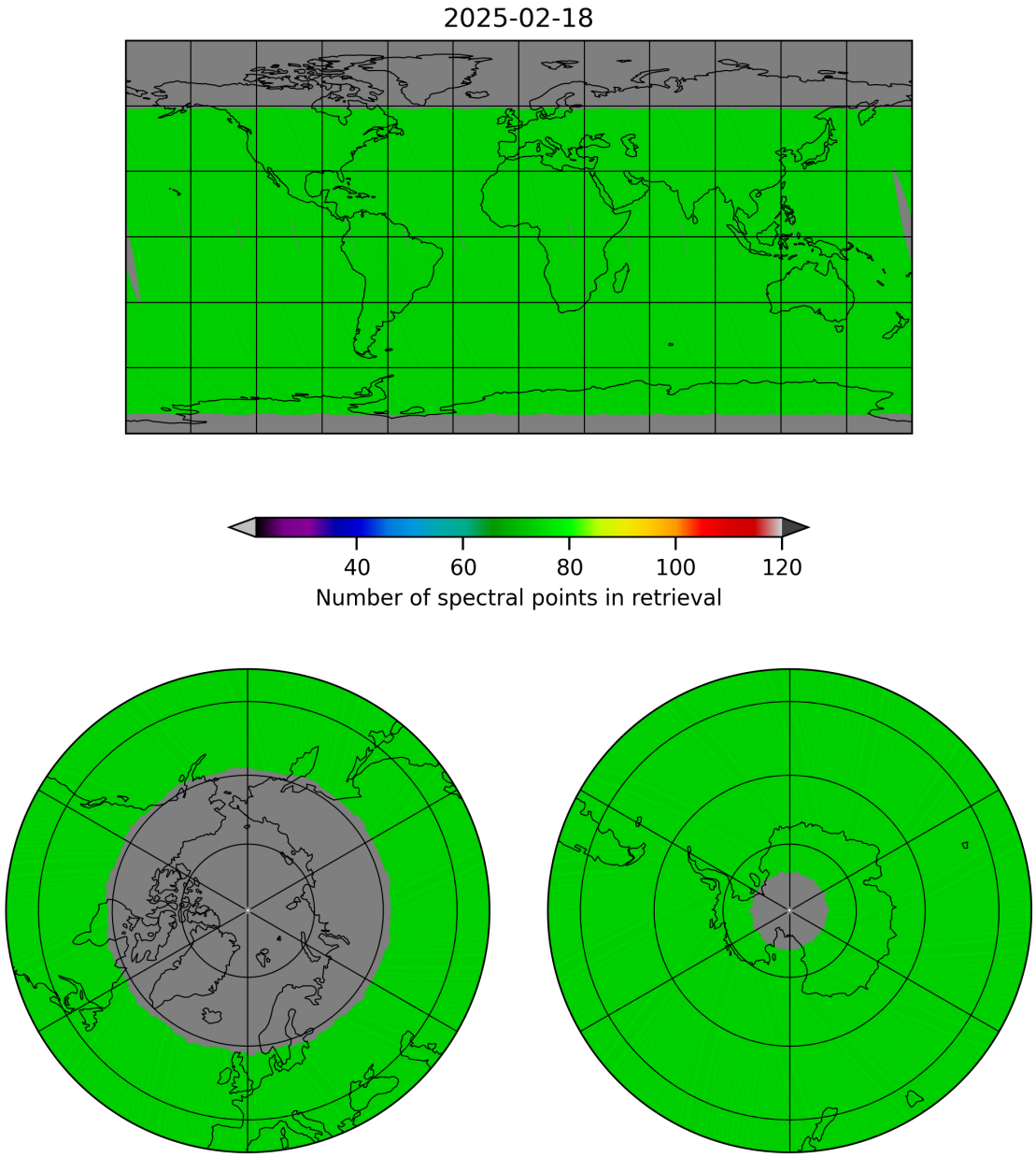


Figure 28: Map of “Number of spectral points in retrieval” for 2025-02-18 to 2025-02-19

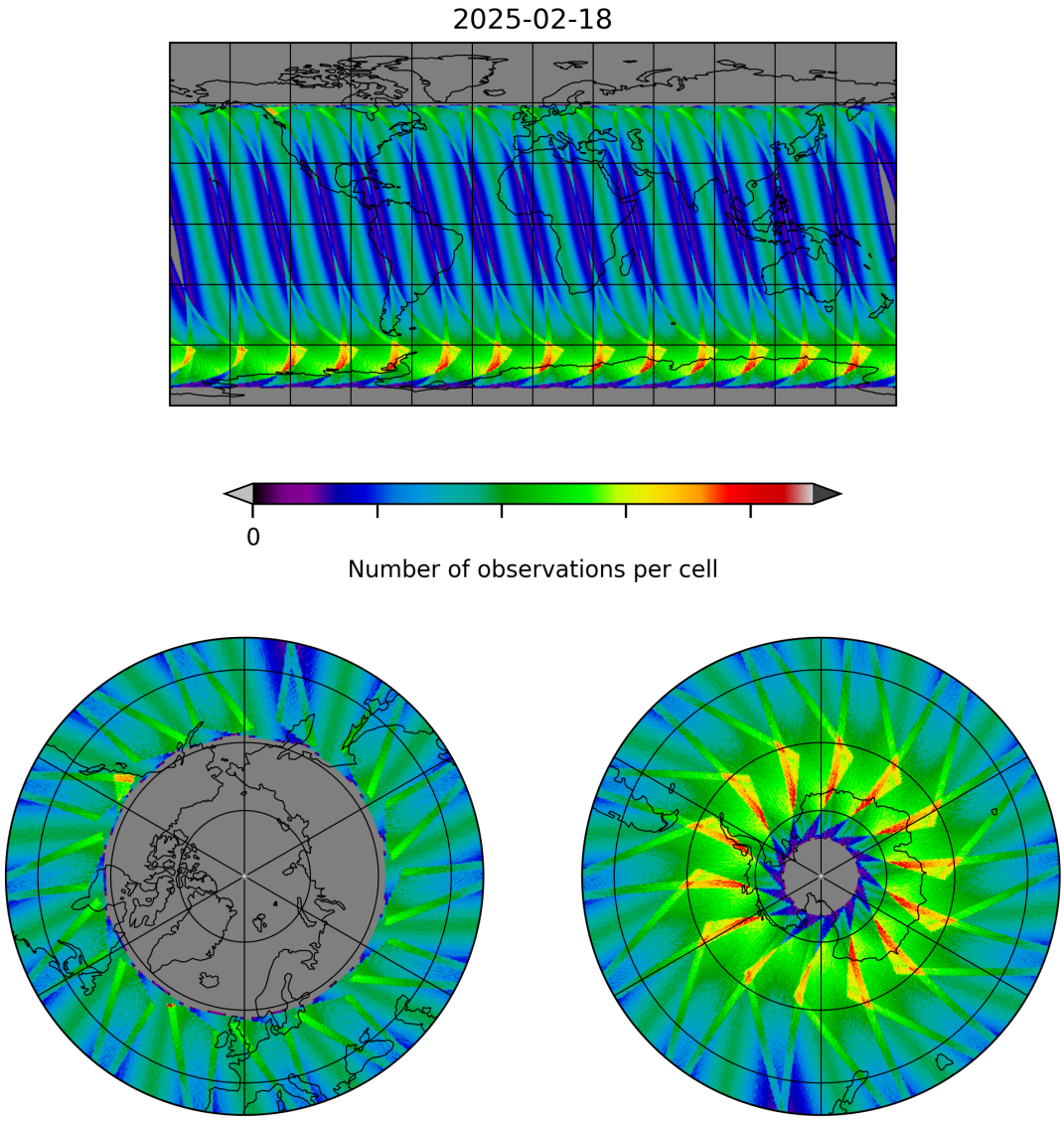


Figure 29: Map of the number of observations for 2025-02-18 to 2025-02-19

7 Zonal average

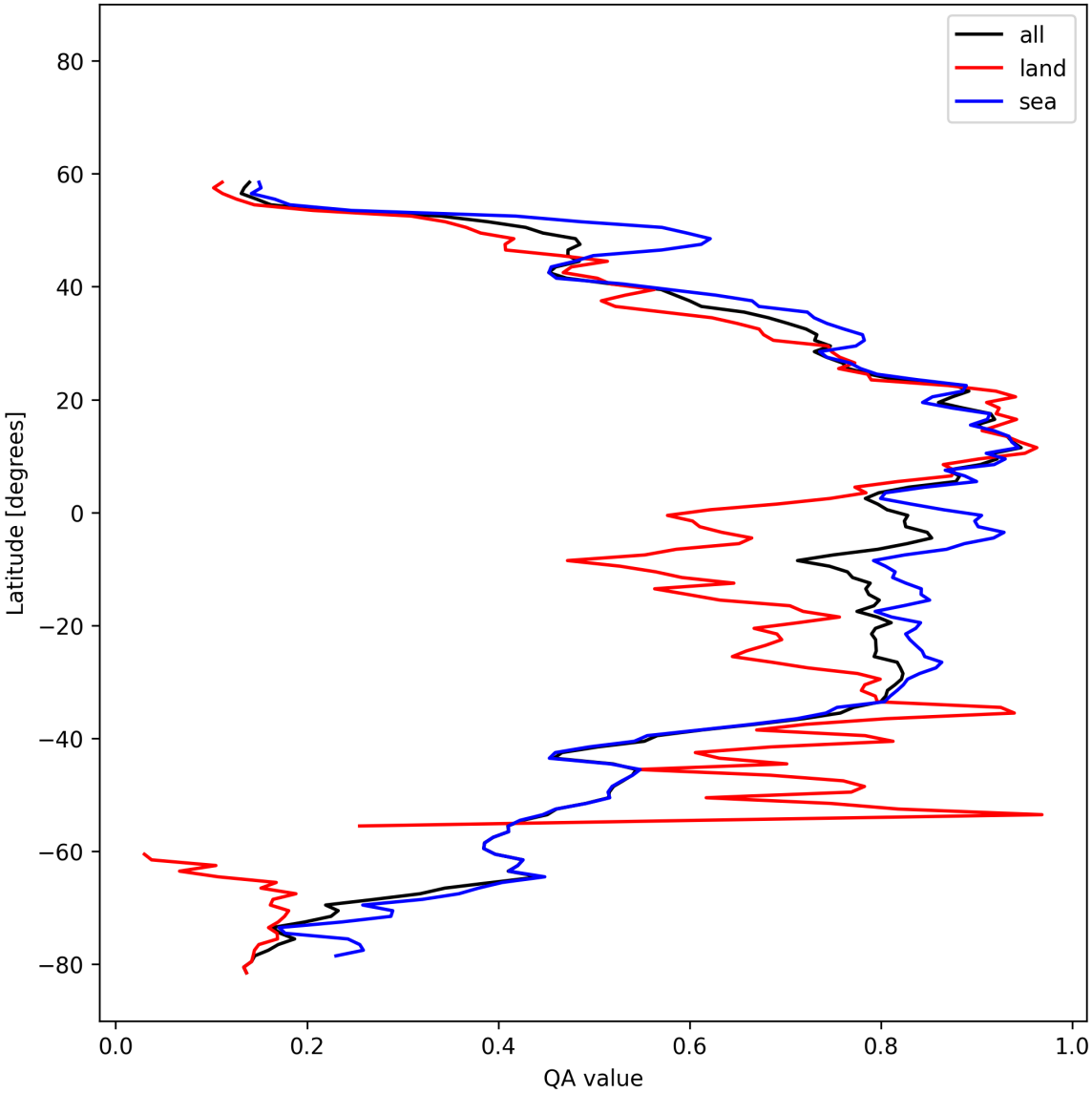


Figure 30: Zonal average of “QA value” for 2025-02-18 to 2025-02-19.

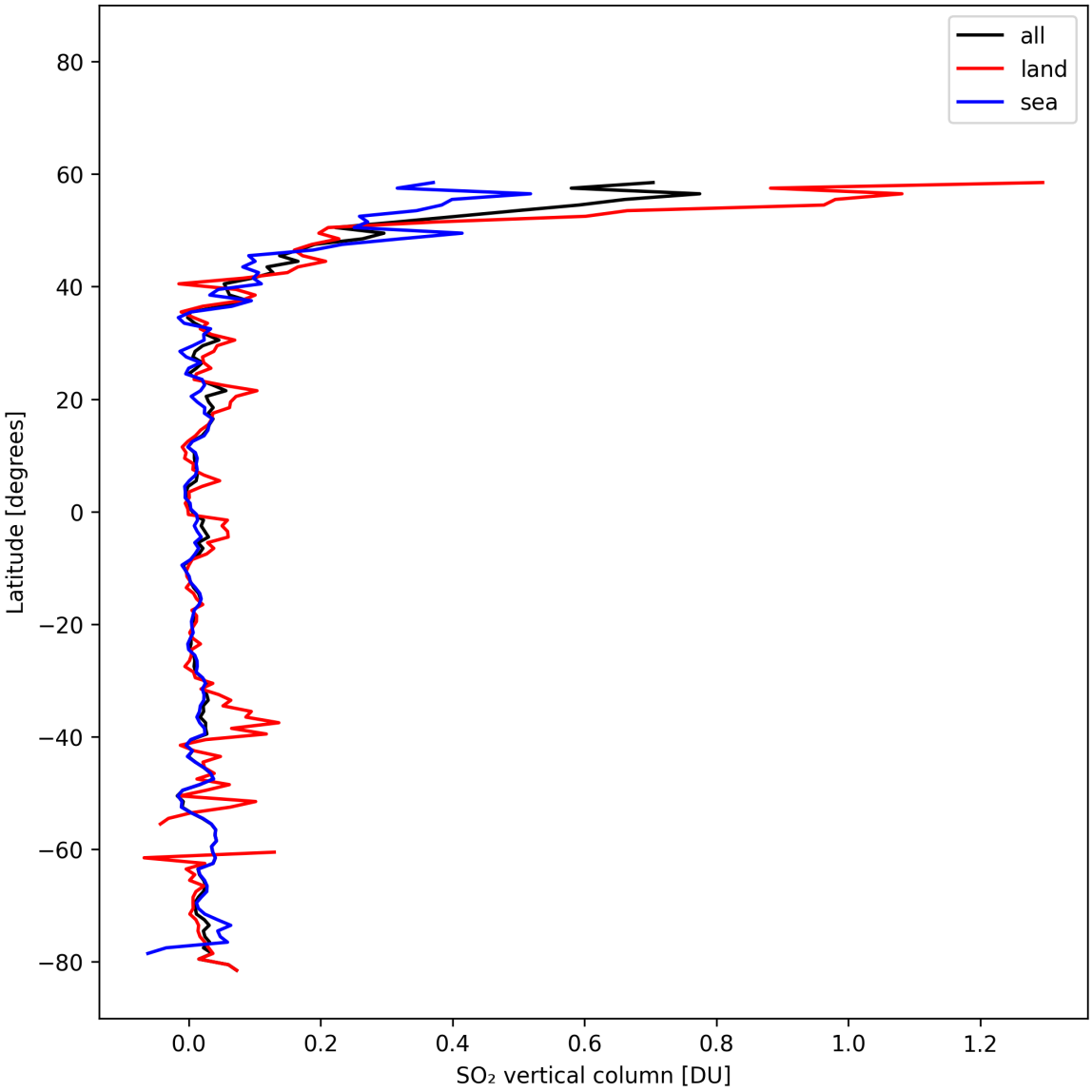


Figure 31: Zonal average of "SO_2 vertical column" for 2025-02-18 to 2025-02-19.

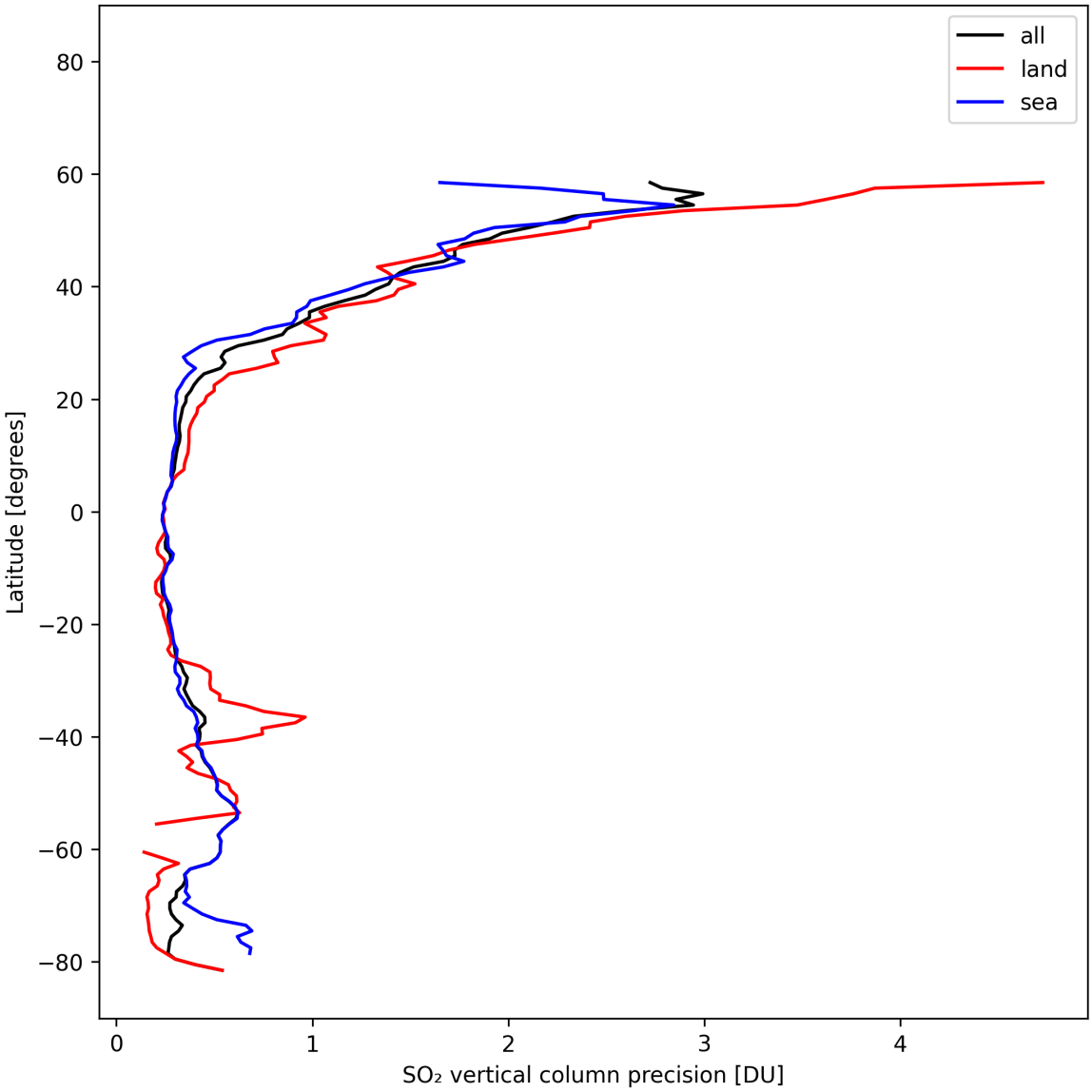


Figure 32: Zonal average of "SO_2 vertical column precision" for 2025-02-18 to 2025-02-19.

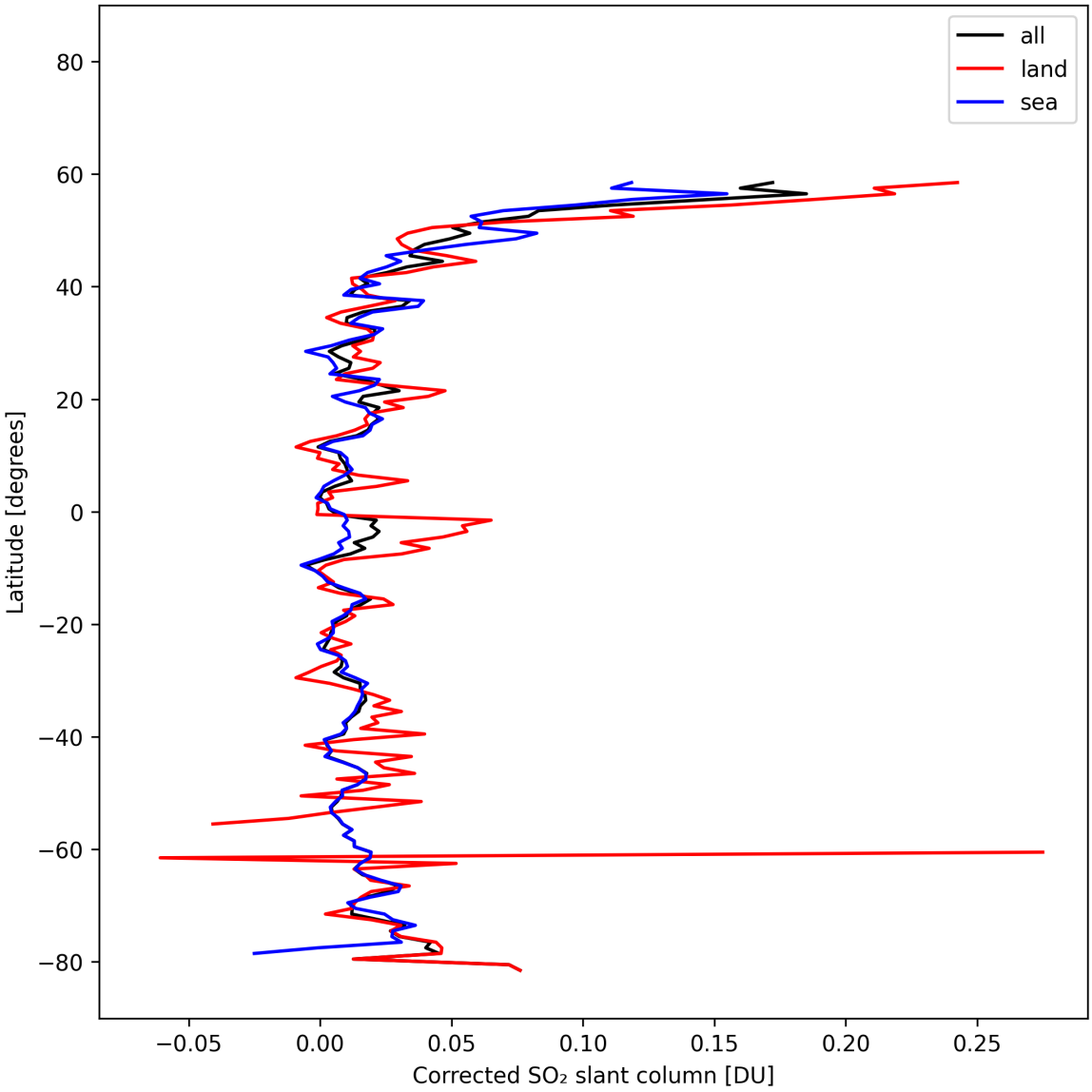


Figure 33: Zonal average of "Corrected SO_2 slant column" for 2025-02-18 to 2025-02-19.

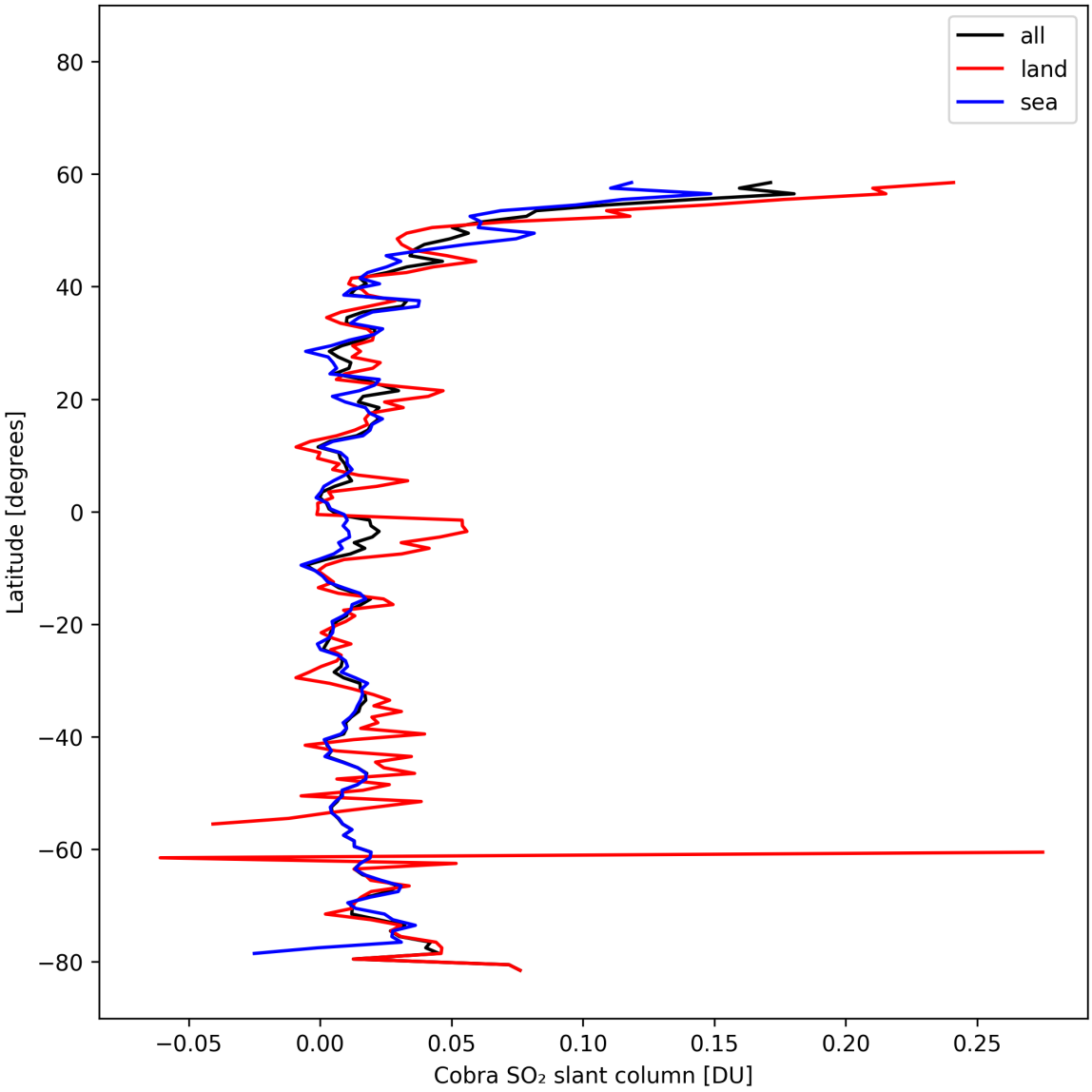


Figure 34: Zonal average of "Cobra SO_2 slant column" for 2025-02-18 to 2025-02-19.

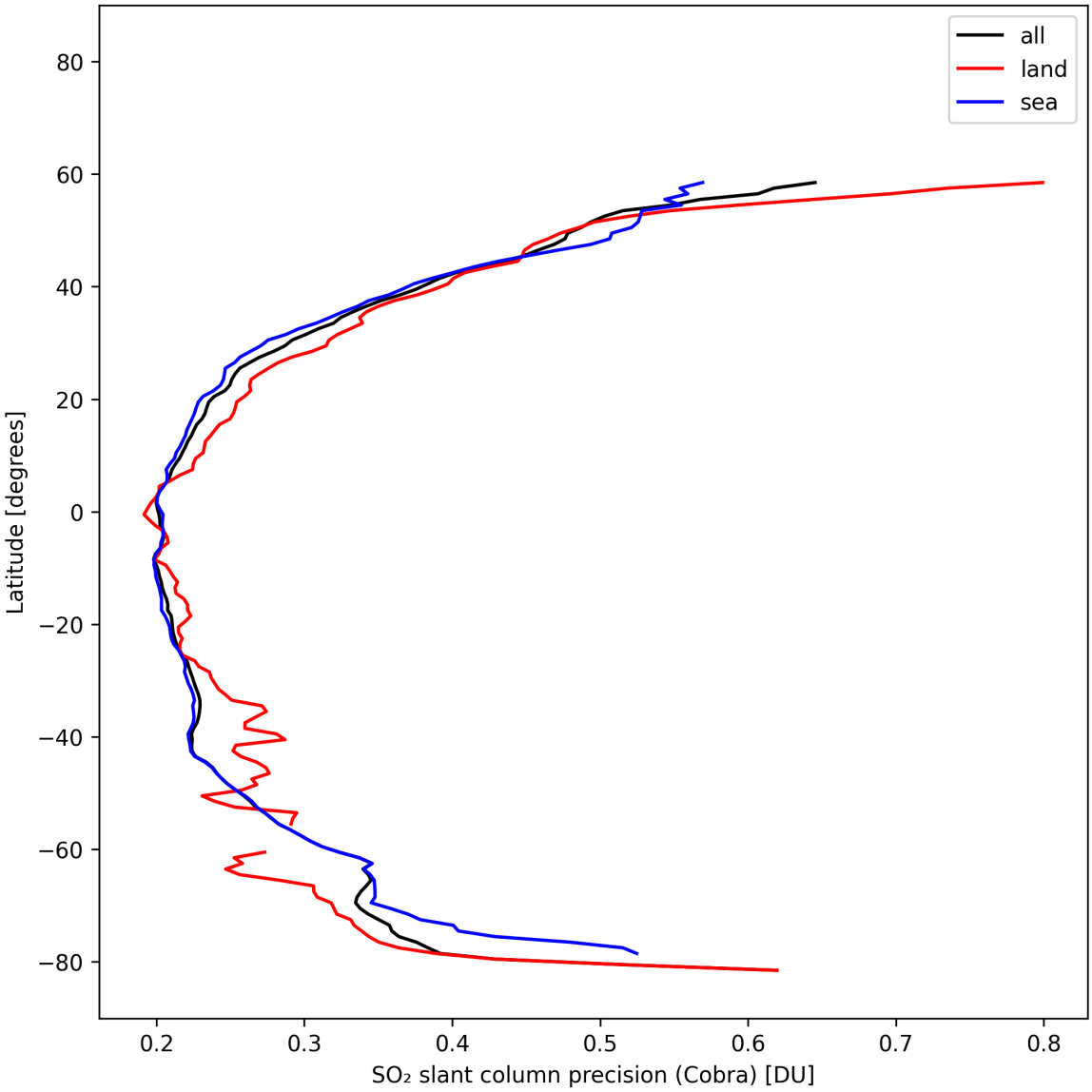


Figure 35: Zonal average of "SO_2 slant column precision (Cobra)" for 2025-02-18 to 2025-02-19.

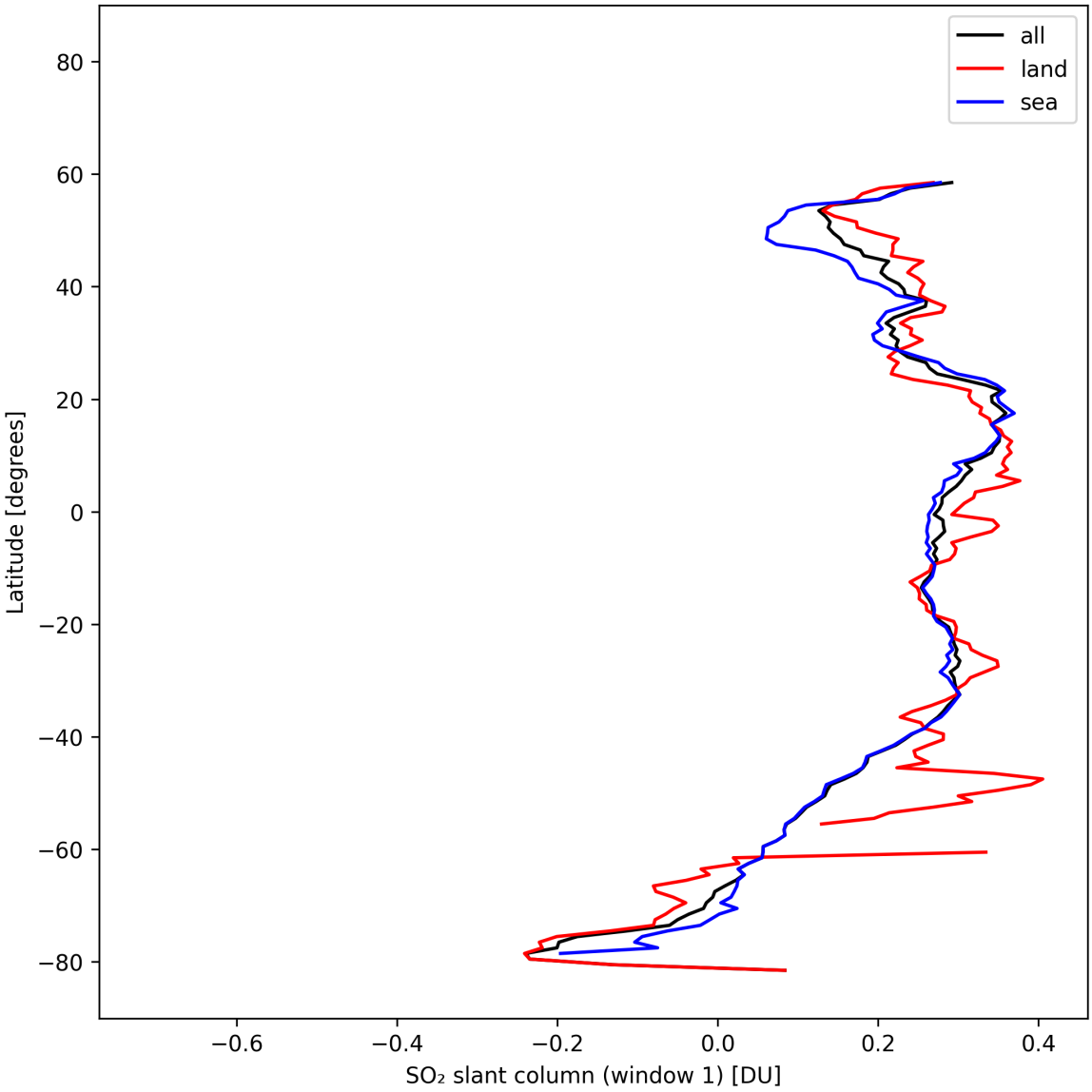


Figure 36: Zonal average of "SO_2 slant column (window 1)" for 2025-02-18 to 2025-02-19.

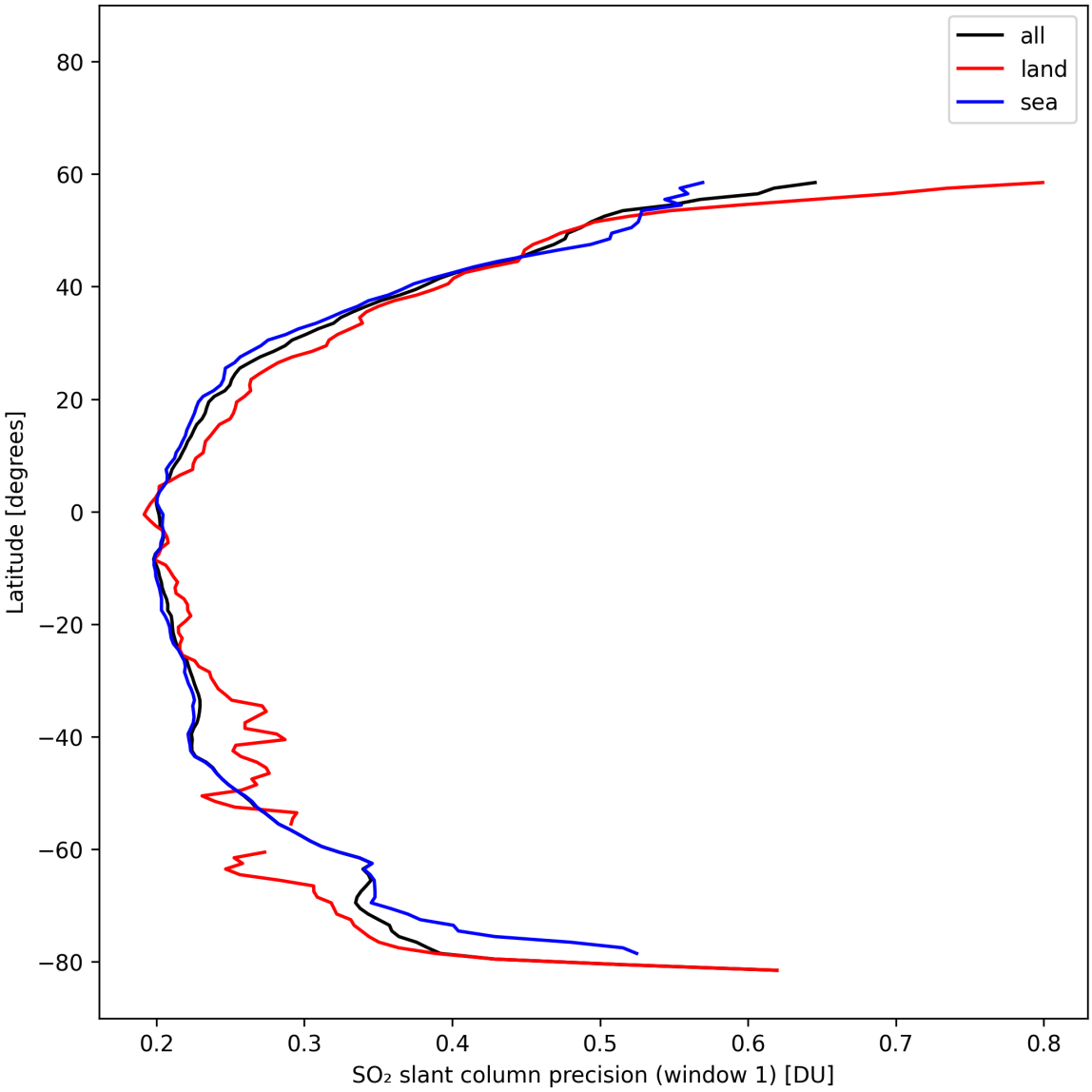


Figure 37: Zonal average of "SO_2 slant column precision (window 1)" for 2025-02-18 to 2025-02-19.

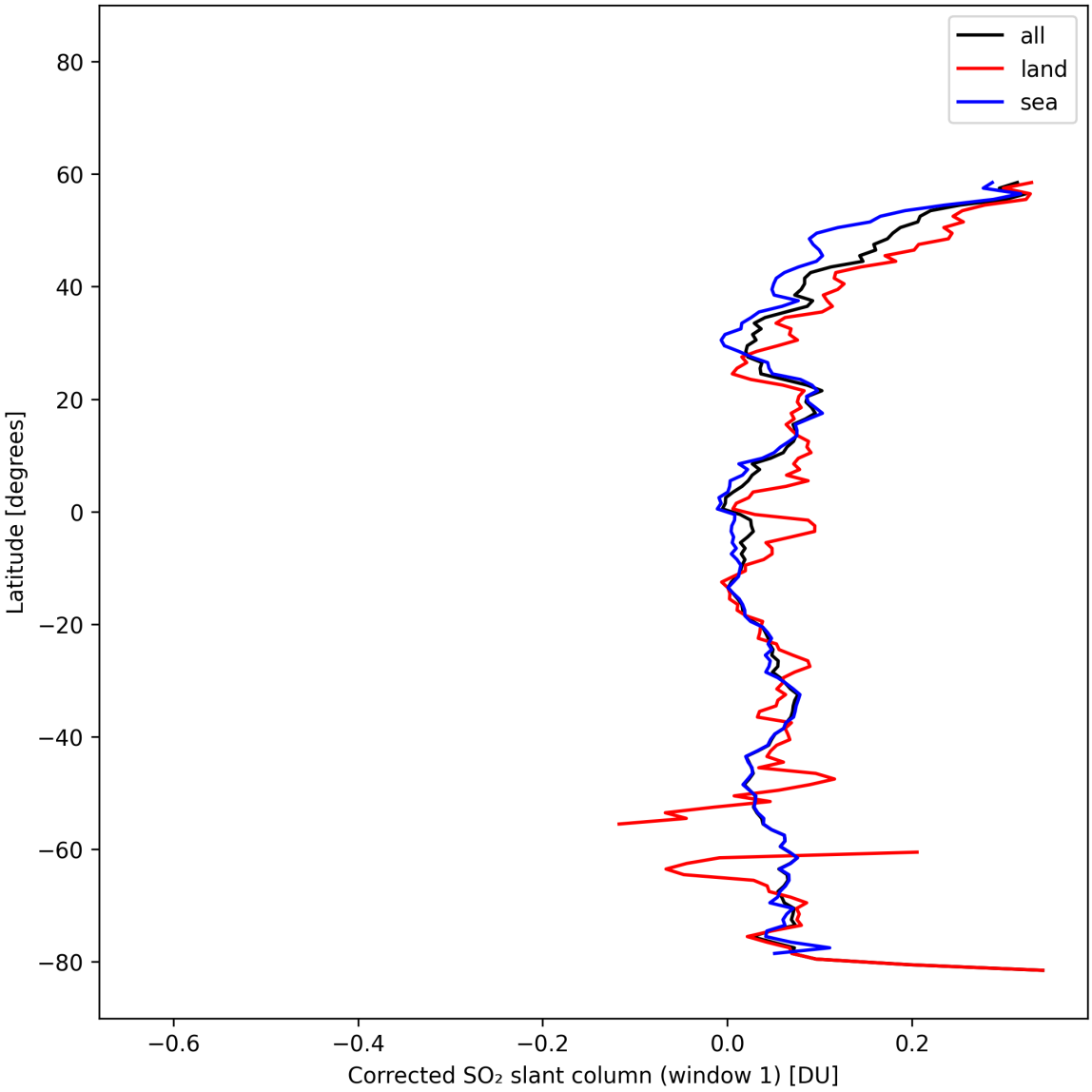


Figure 38: Zonal average of "Corrected SO_2 slant column (window 1)" for 2025-02-18 to 2025-02-19.

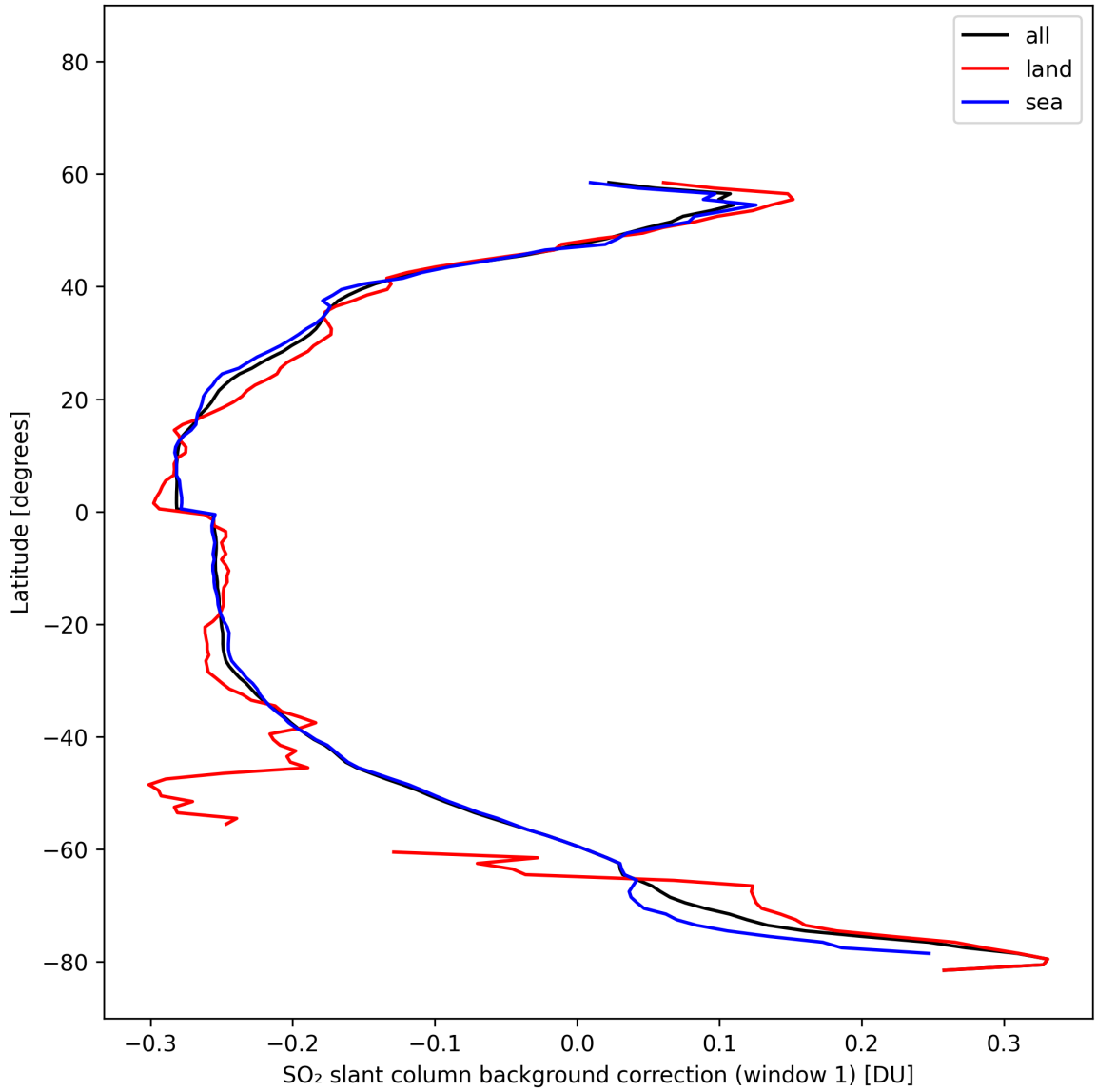


Figure 39: Zonal average of "SO_2 slant column background correction (window 1)" for 2025-02-18 to 2025-02-19.

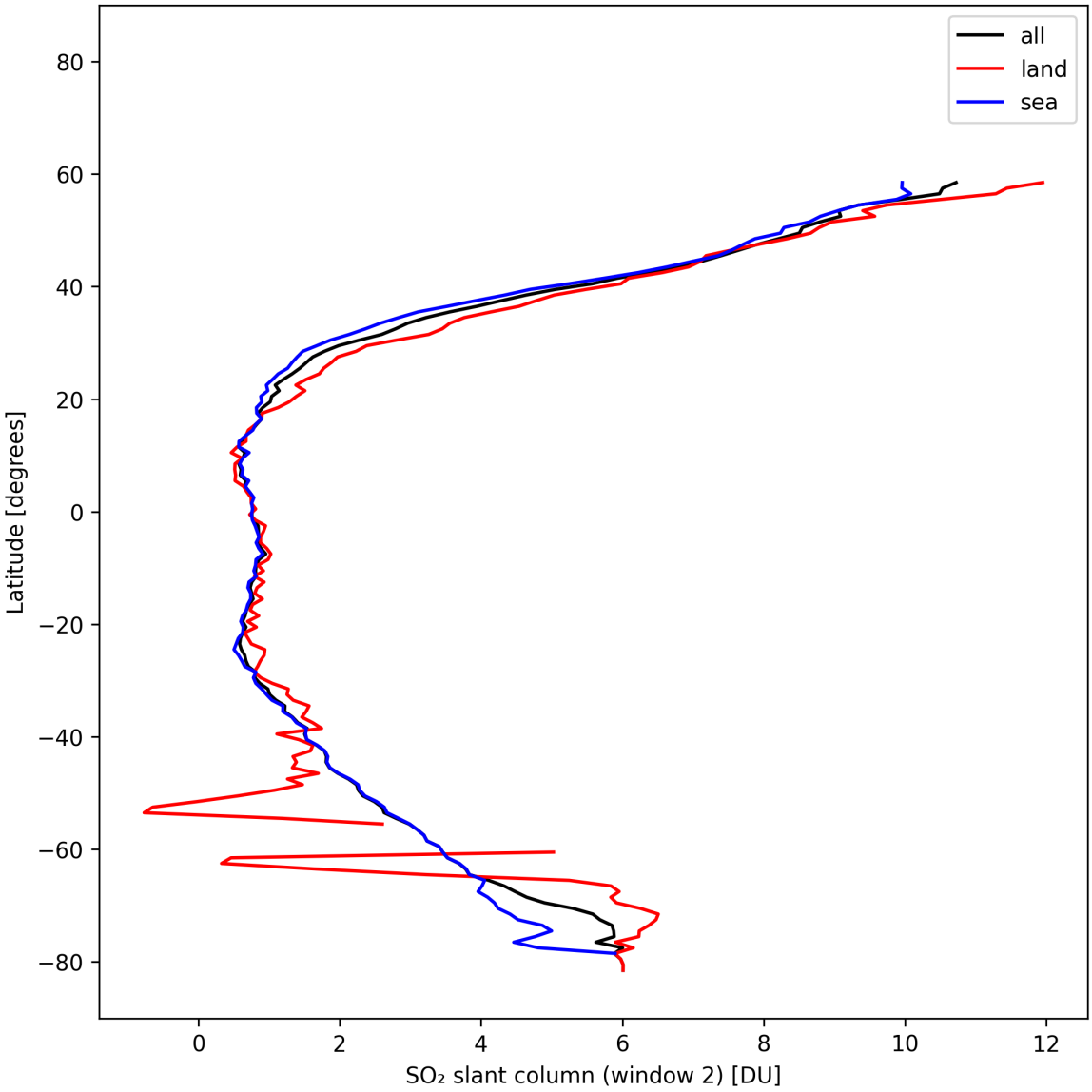


Figure 40: Zonal average of "SO_2 slant column (window 2)" for 2025-02-18 to 2025-02-19.

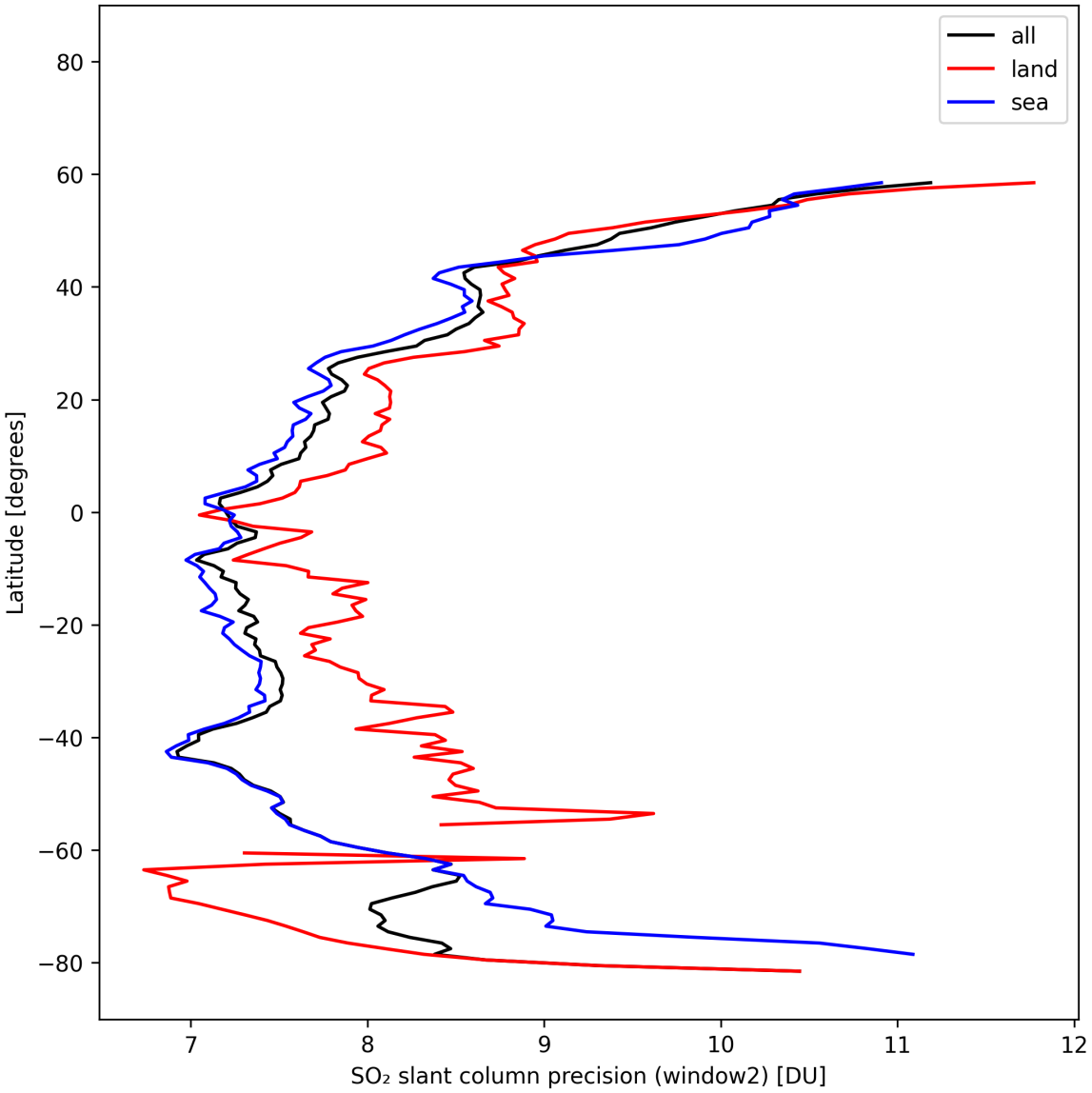


Figure 41: Zonal average of "SO_2 slant column precision (window2)" for 2025-02-18 to 2025-02-19.

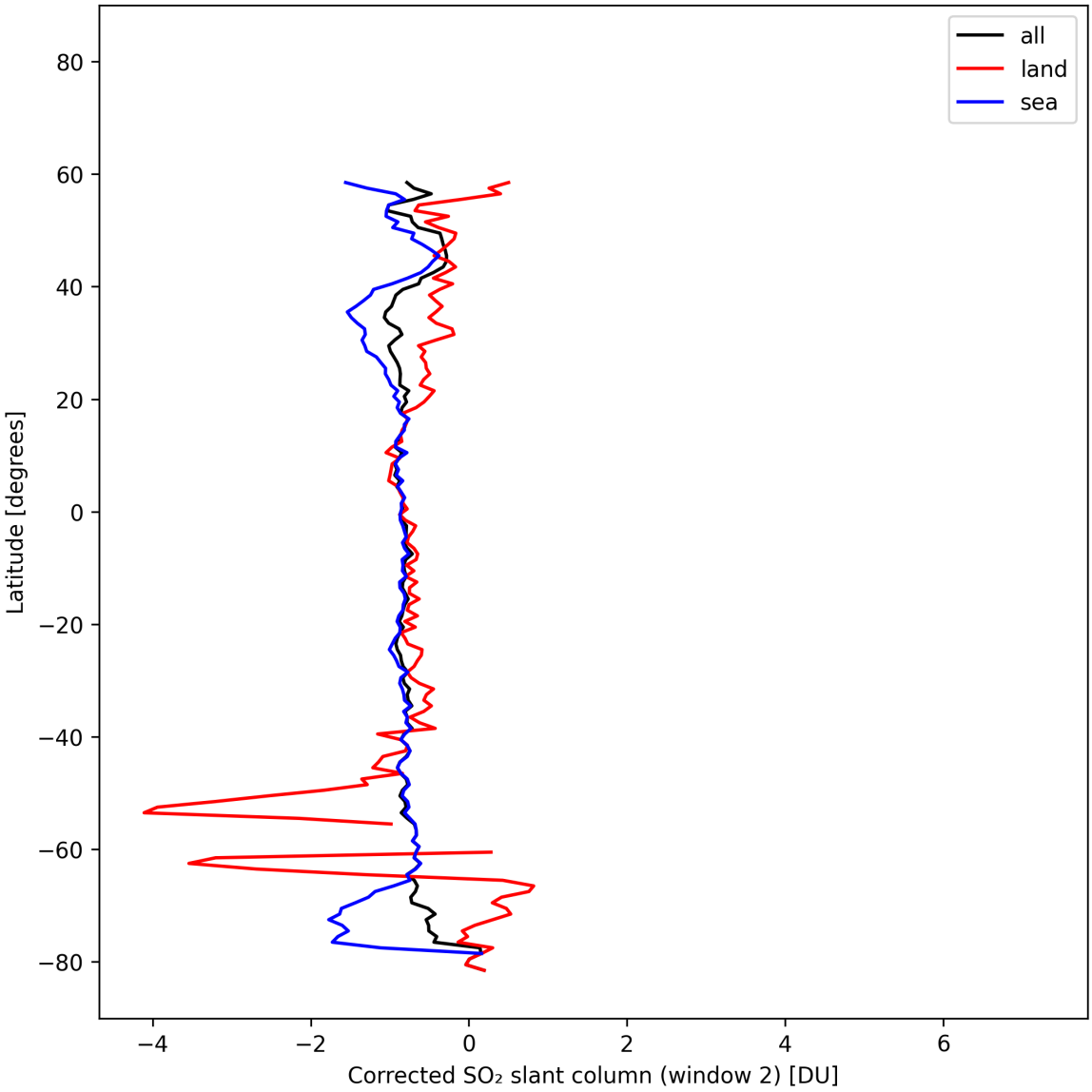


Figure 42: Zonal average of "Corrected SO_2 slant column (window 2)" for 2025-02-18 to 2025-02-19.

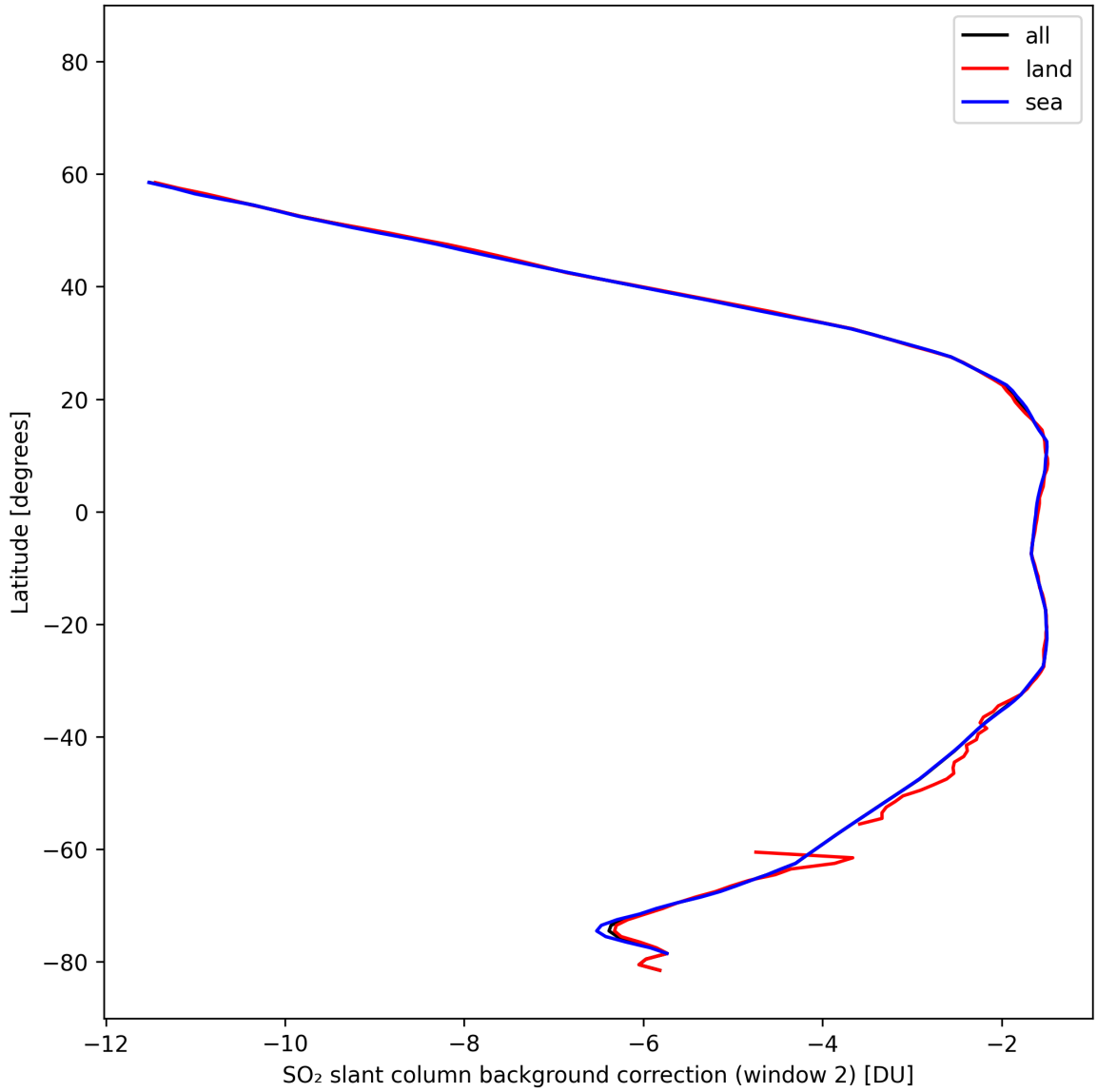


Figure 43: Zonal average of "SO_2 slant column background correction (window 2)" for 2025-02-18 to 2025-02-19.

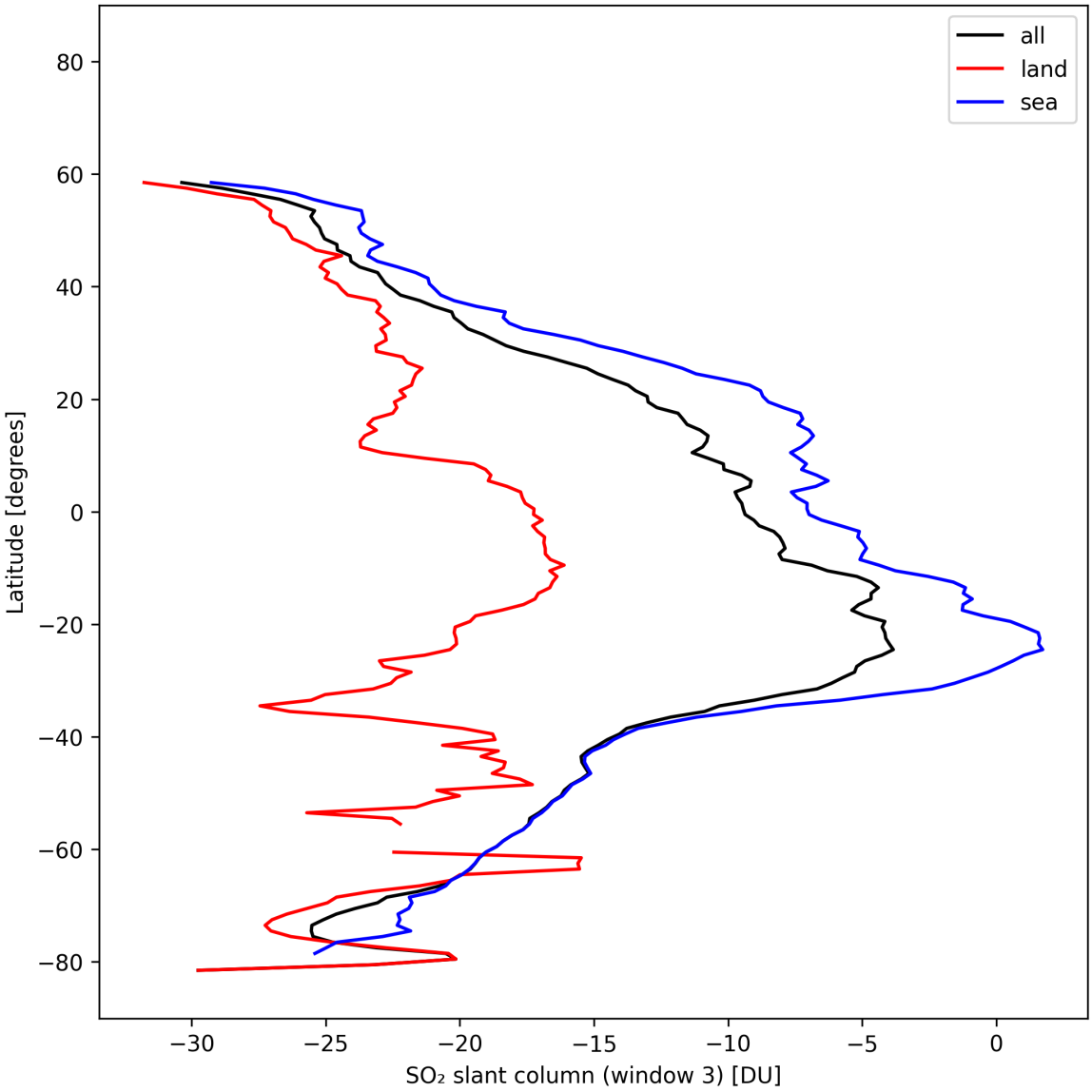


Figure 44: Zonal average of "SO_2 slant column (window 3)" for 2025-02-18 to 2025-02-19.

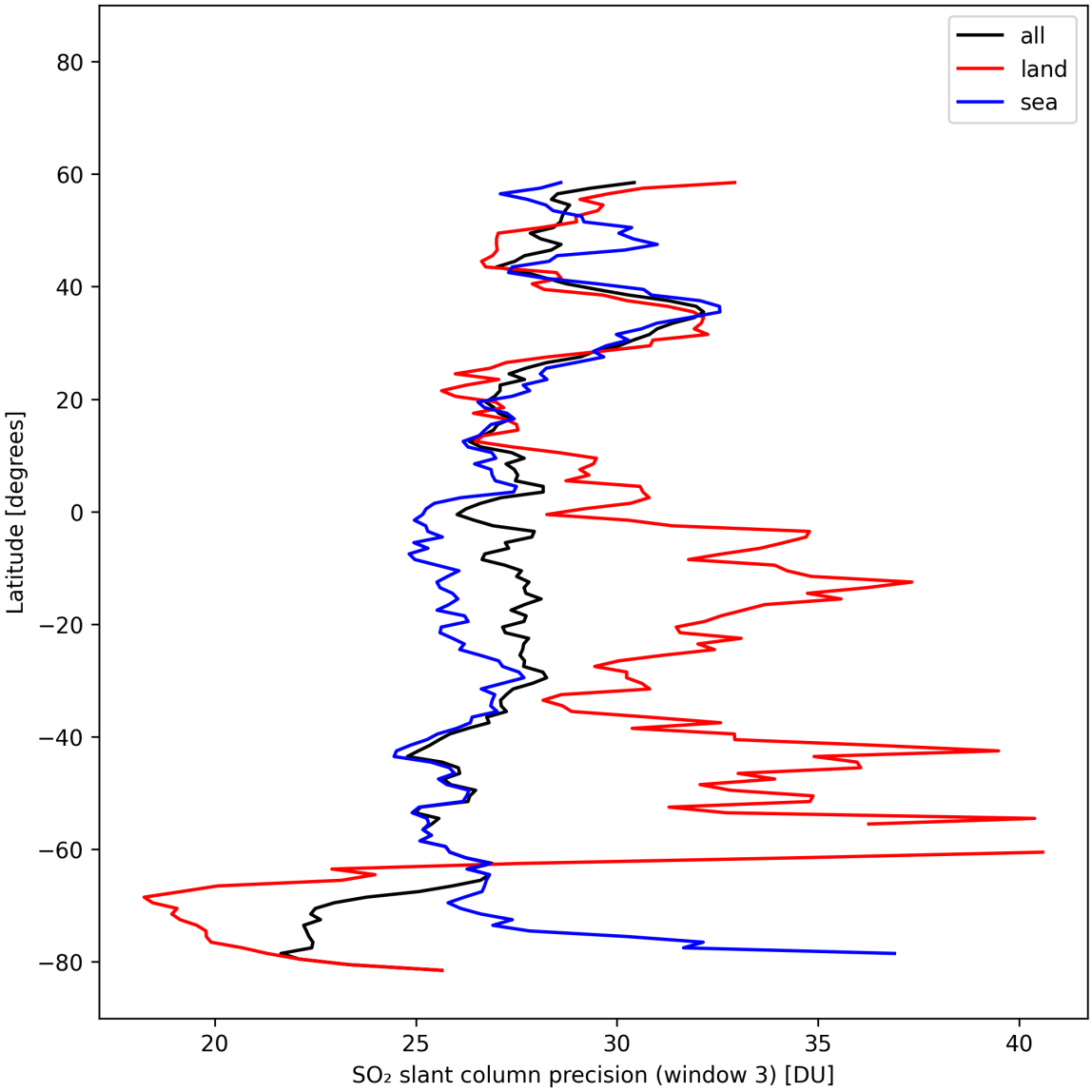


Figure 45: Zonal average of "SO_2 slant column precision (window 3)" for 2025-02-18 to 2025-02-19.

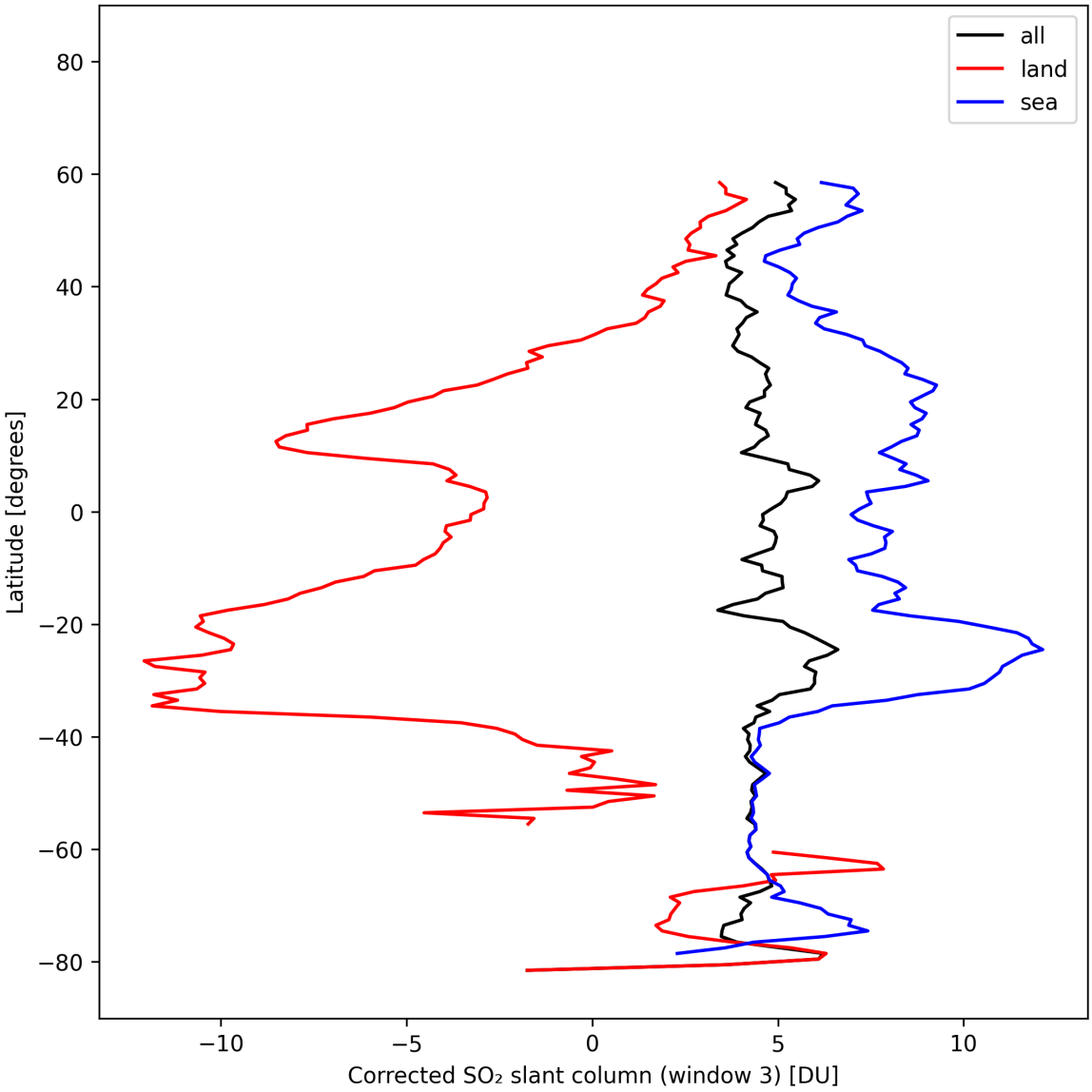


Figure 46: Zonal average of "Corrected SO_2 slant column (window 3)" for 2025-02-18 to 2025-02-19.

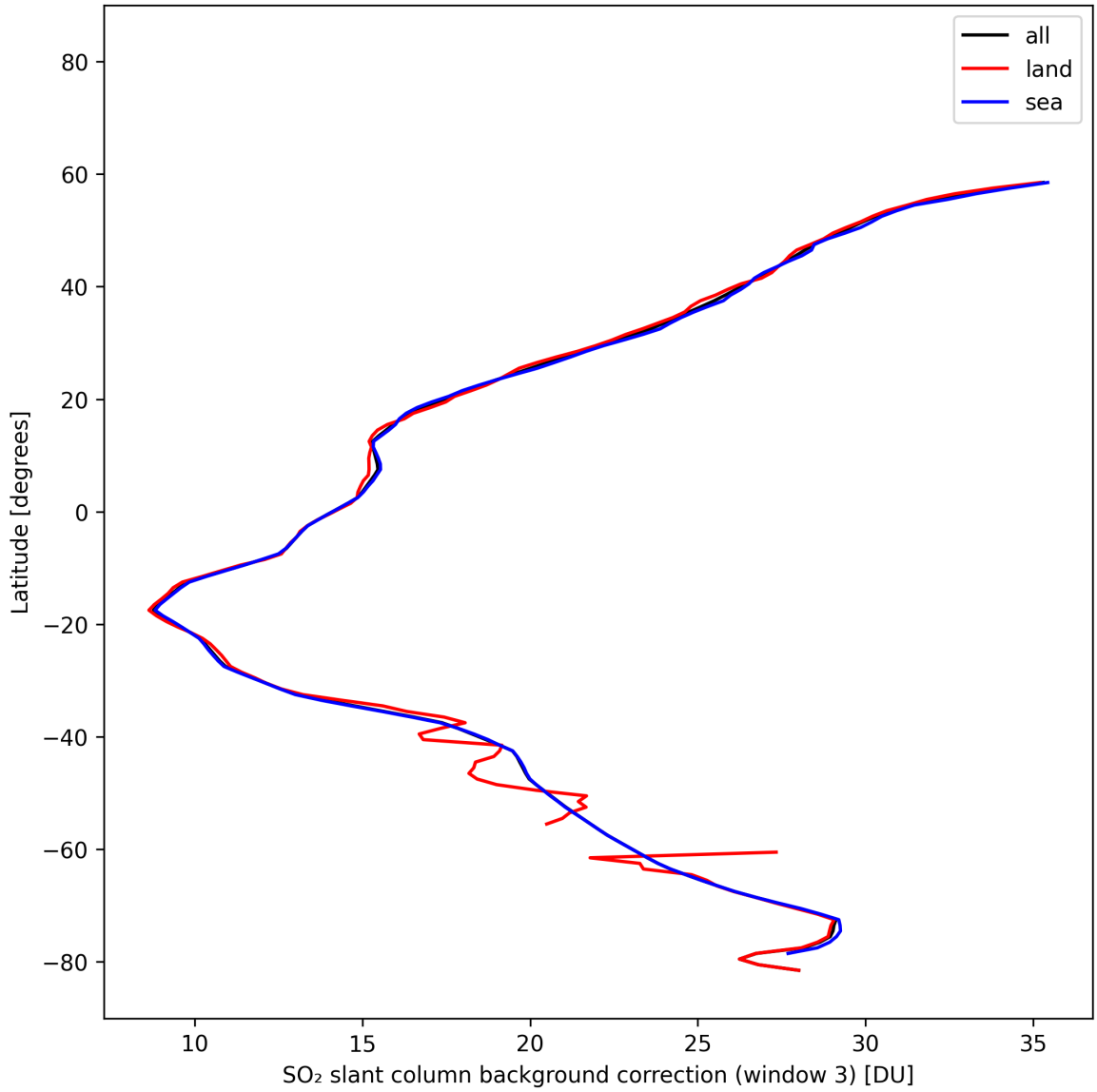


Figure 47: Zonal average of "SO_2 slant column background correction (window 3)" for 2025-02-18 to 2025-02-19.

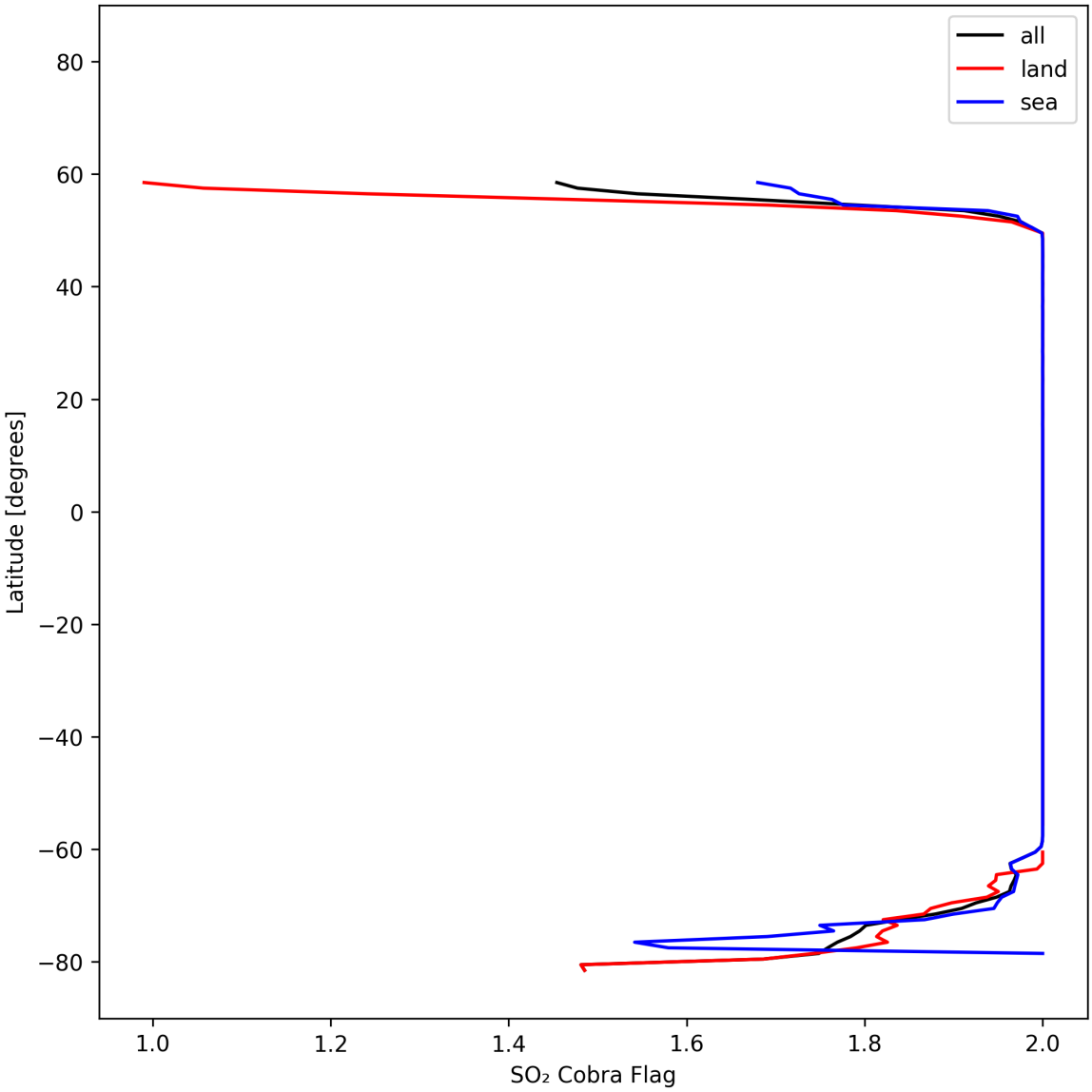


Figure 48: Zonal average of "SO_2 Cobra Flag" for 2025-02-18 to 2025-02-19.

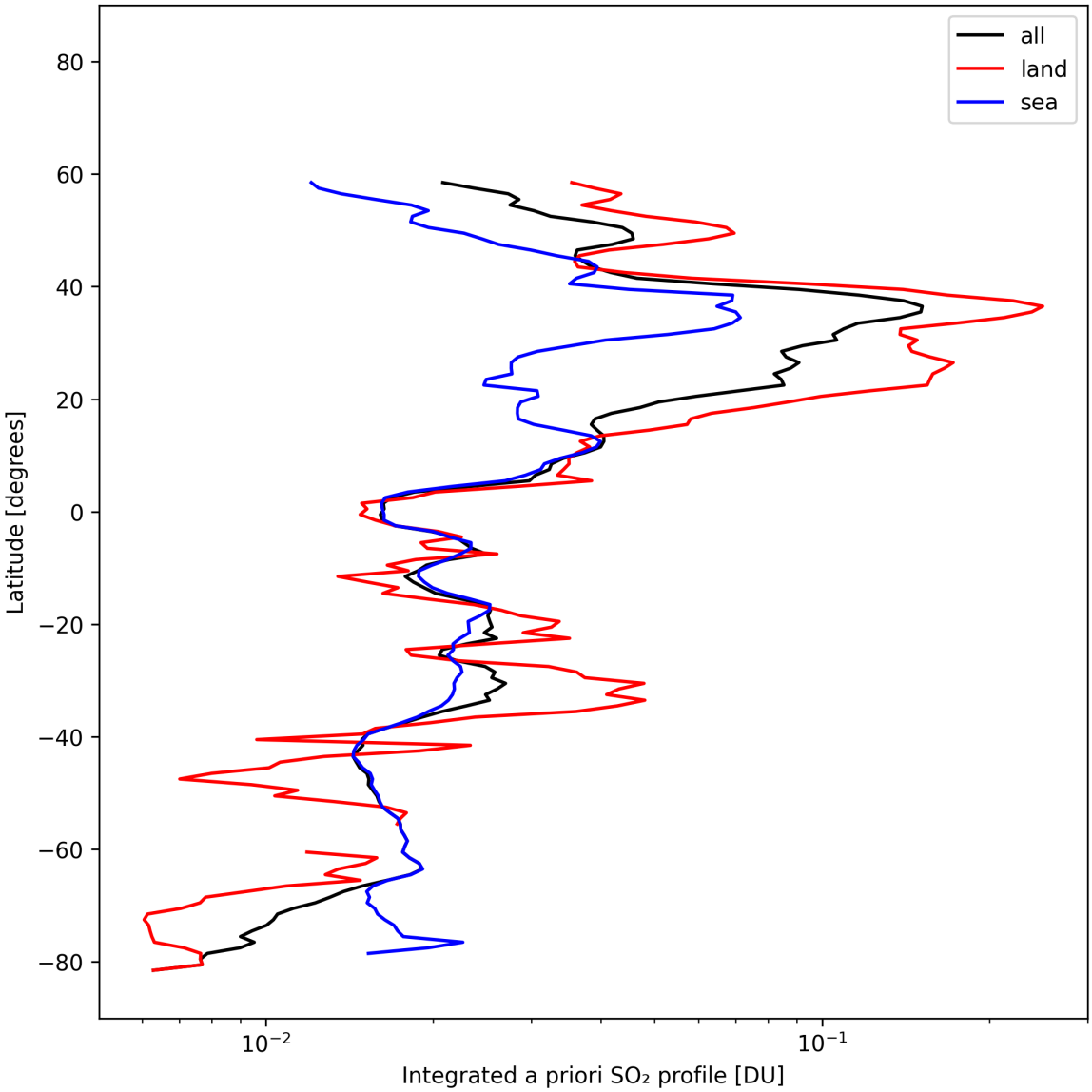


Figure 49: Zonal average of “Integrated a priori SO_2 profile” for 2025-02-18 to 2025-02-19.

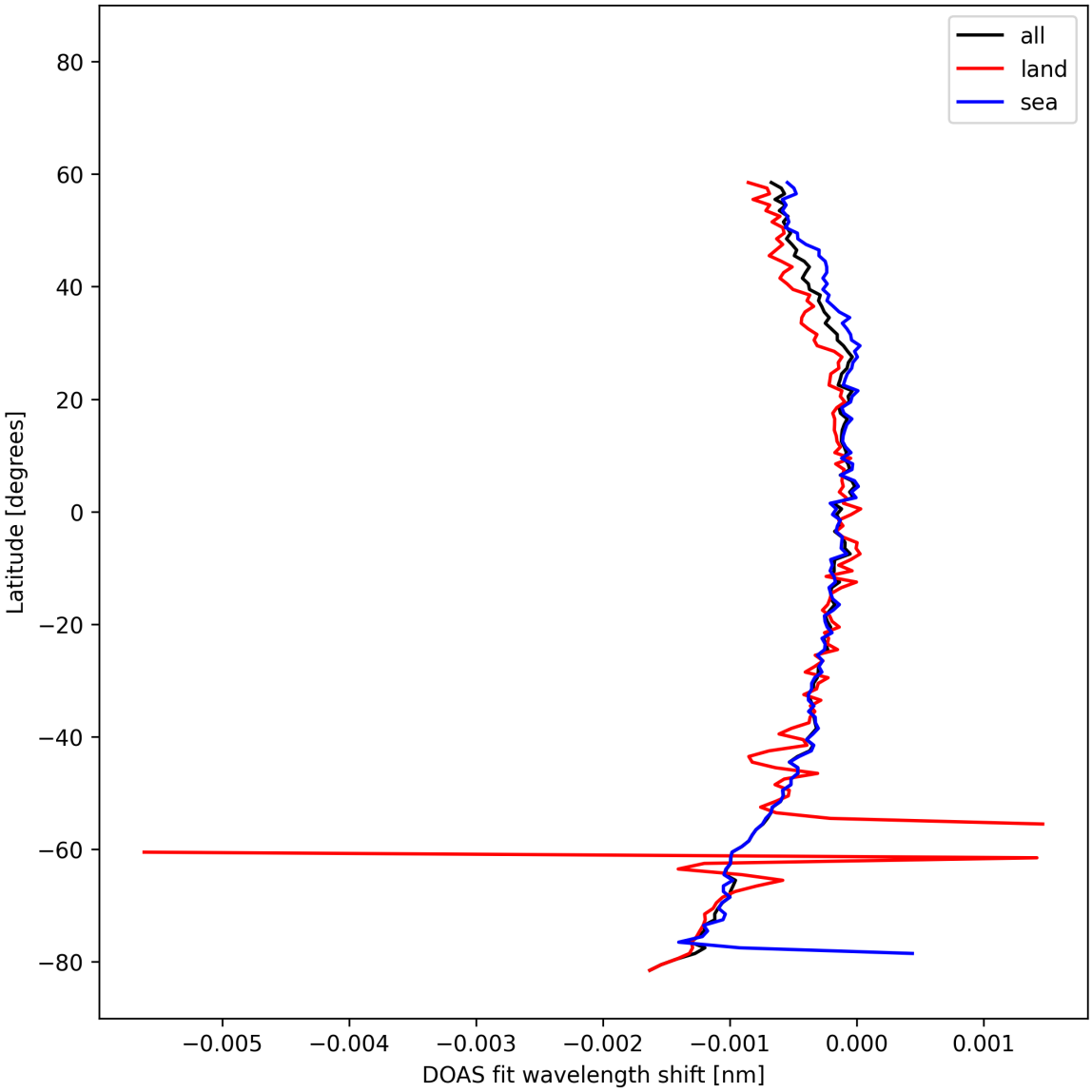


Figure 50: Zonal average of “DOAS fit wavelength shift” for 2025-02-18 to 2025-02-19.

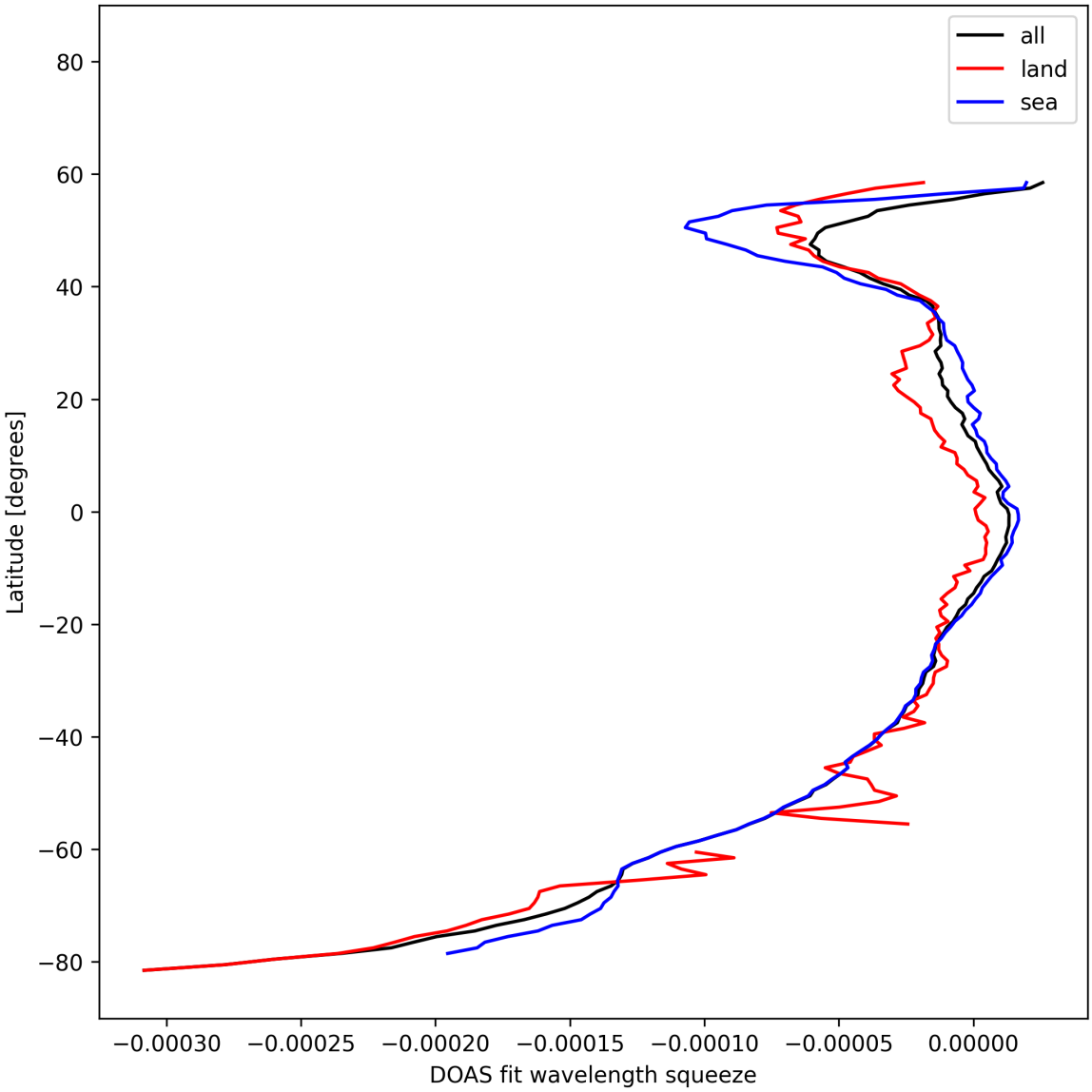


Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-02-18 to 2025-02-19.

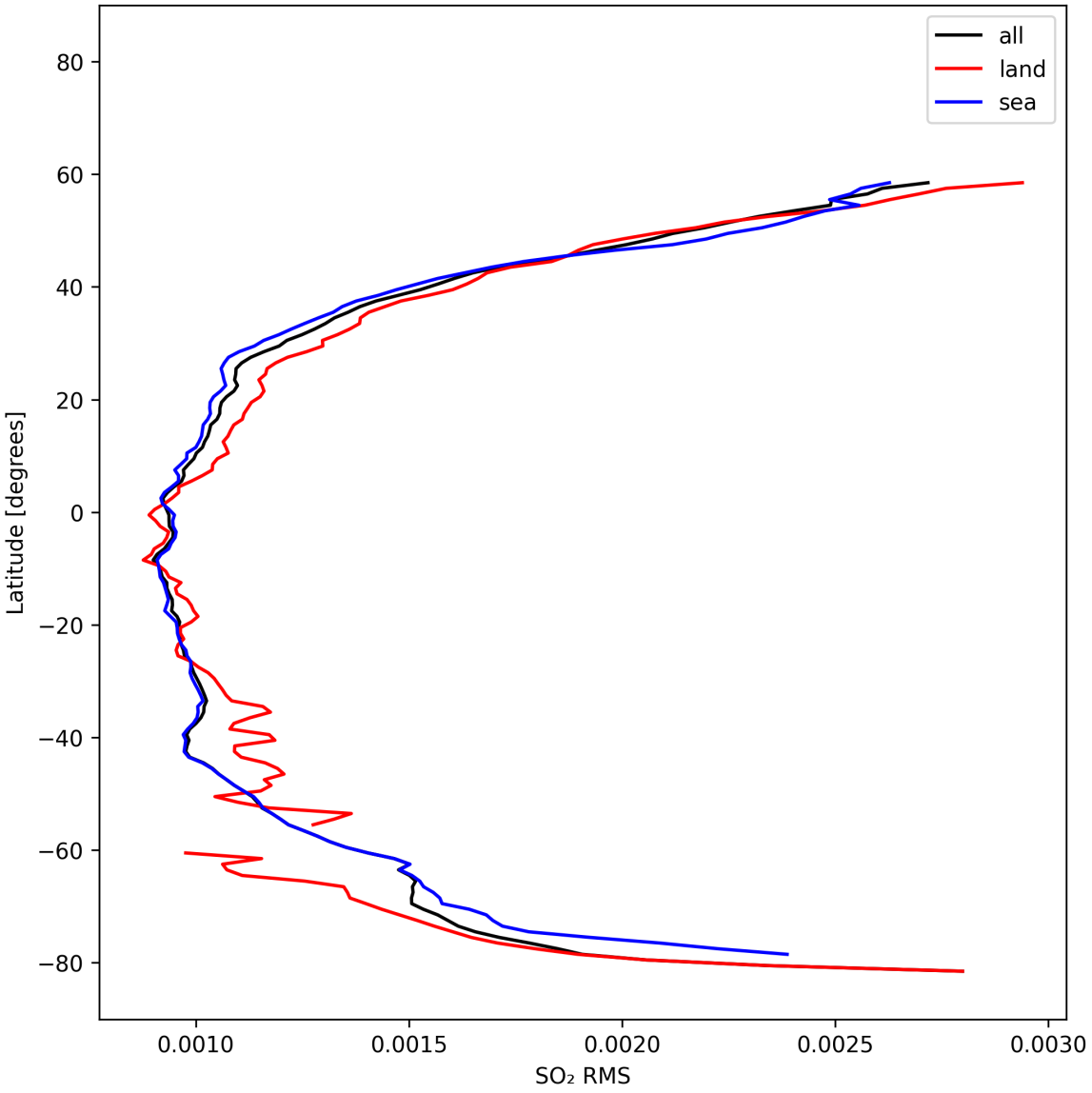


Figure 52: Zonal average of "SO_2 RMS" for 2025-02-18 to 2025-02-19.

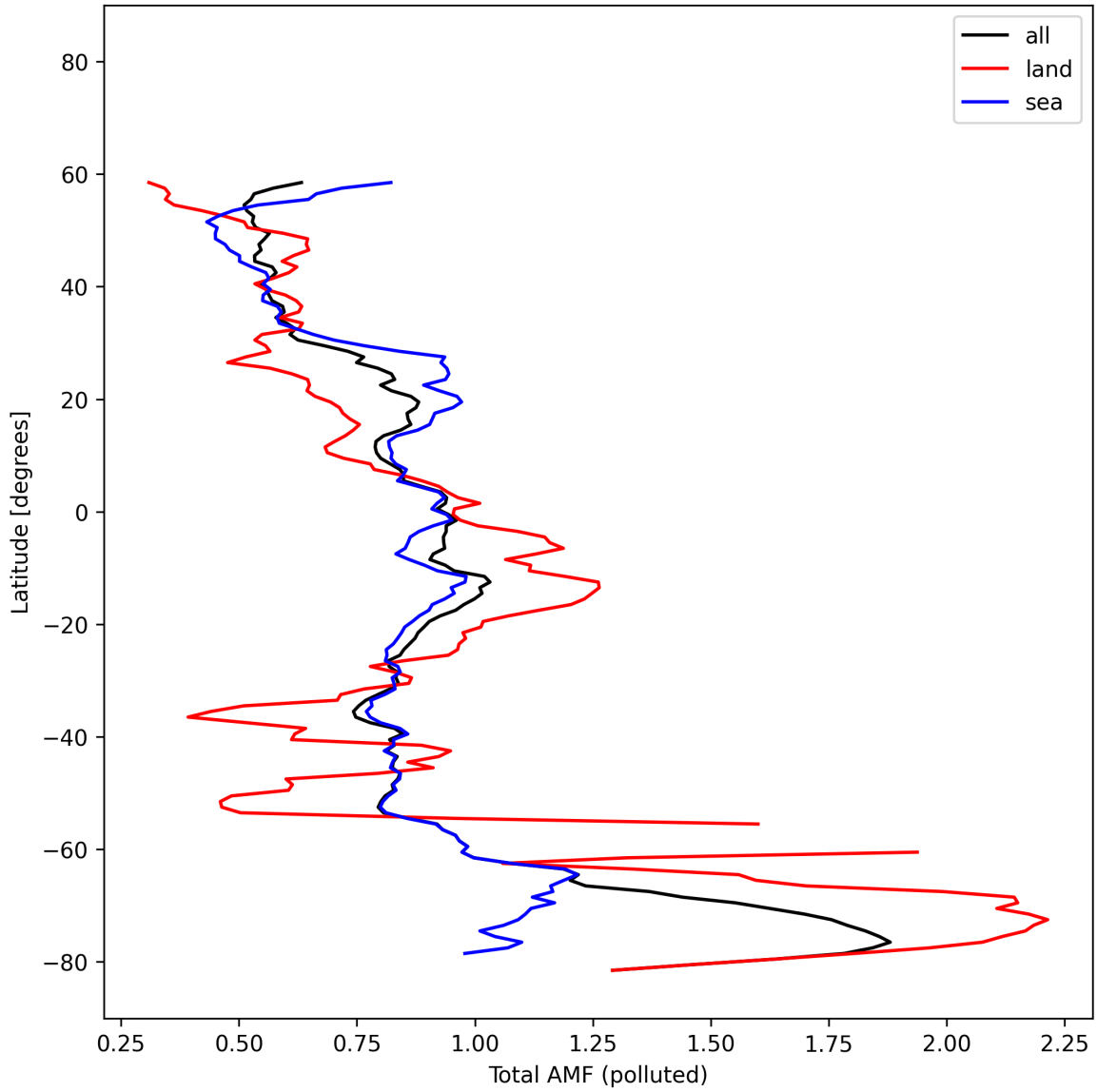


Figure 53: Zonal average of “Total AMF (polluted)” for 2025-02-18 to 2025-02-19.

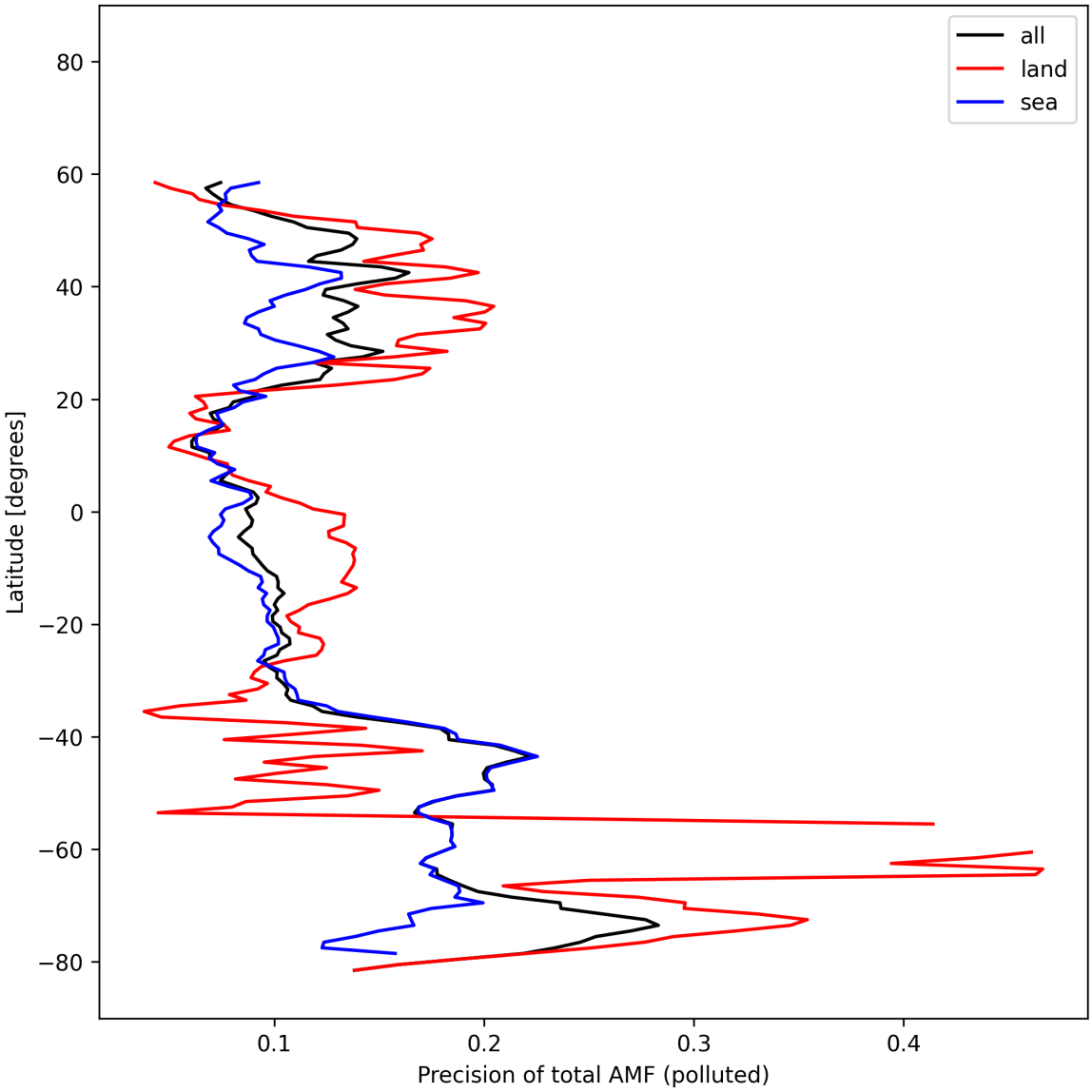


Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-02-18 to 2025-02-19.

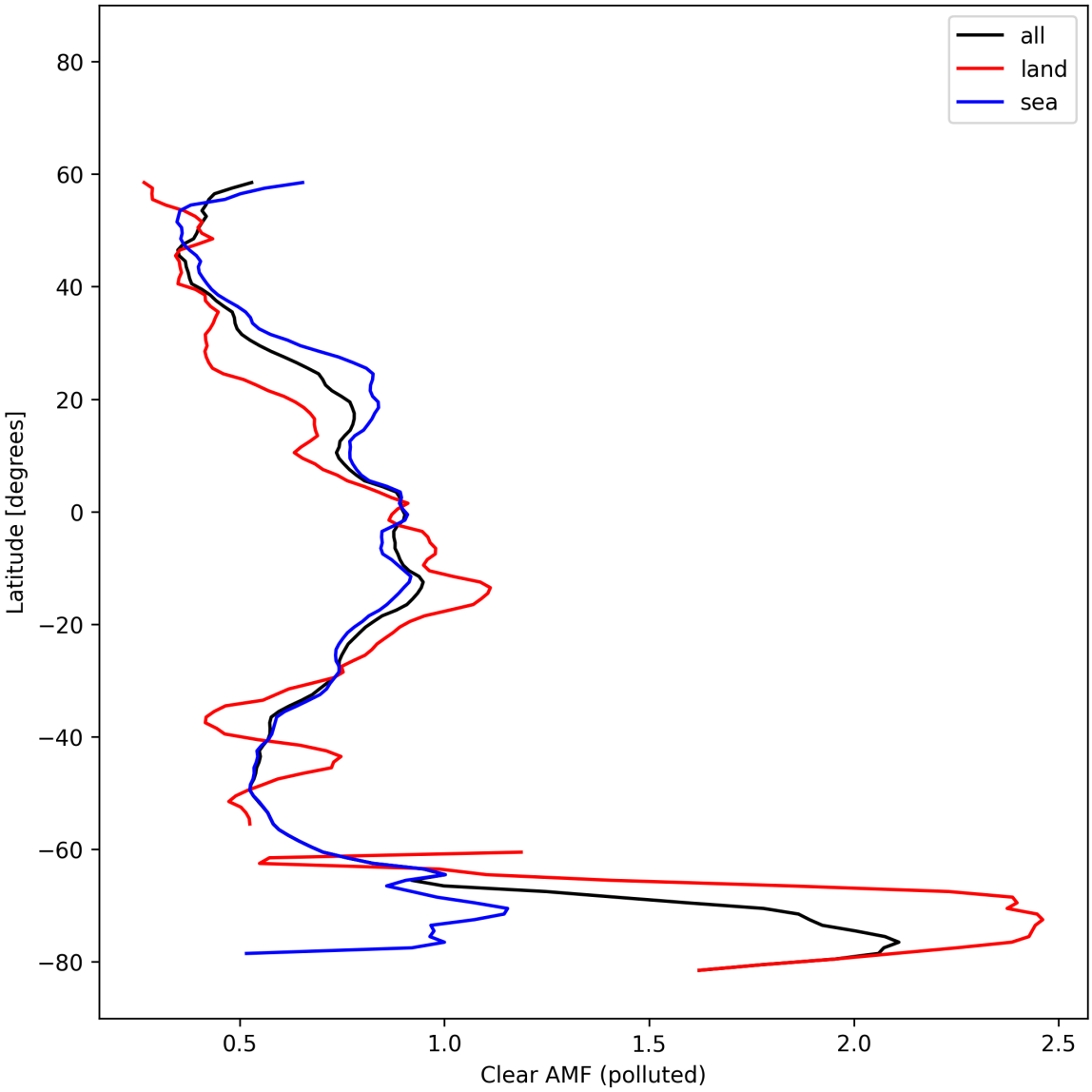


Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-02-18 to 2025-02-19.

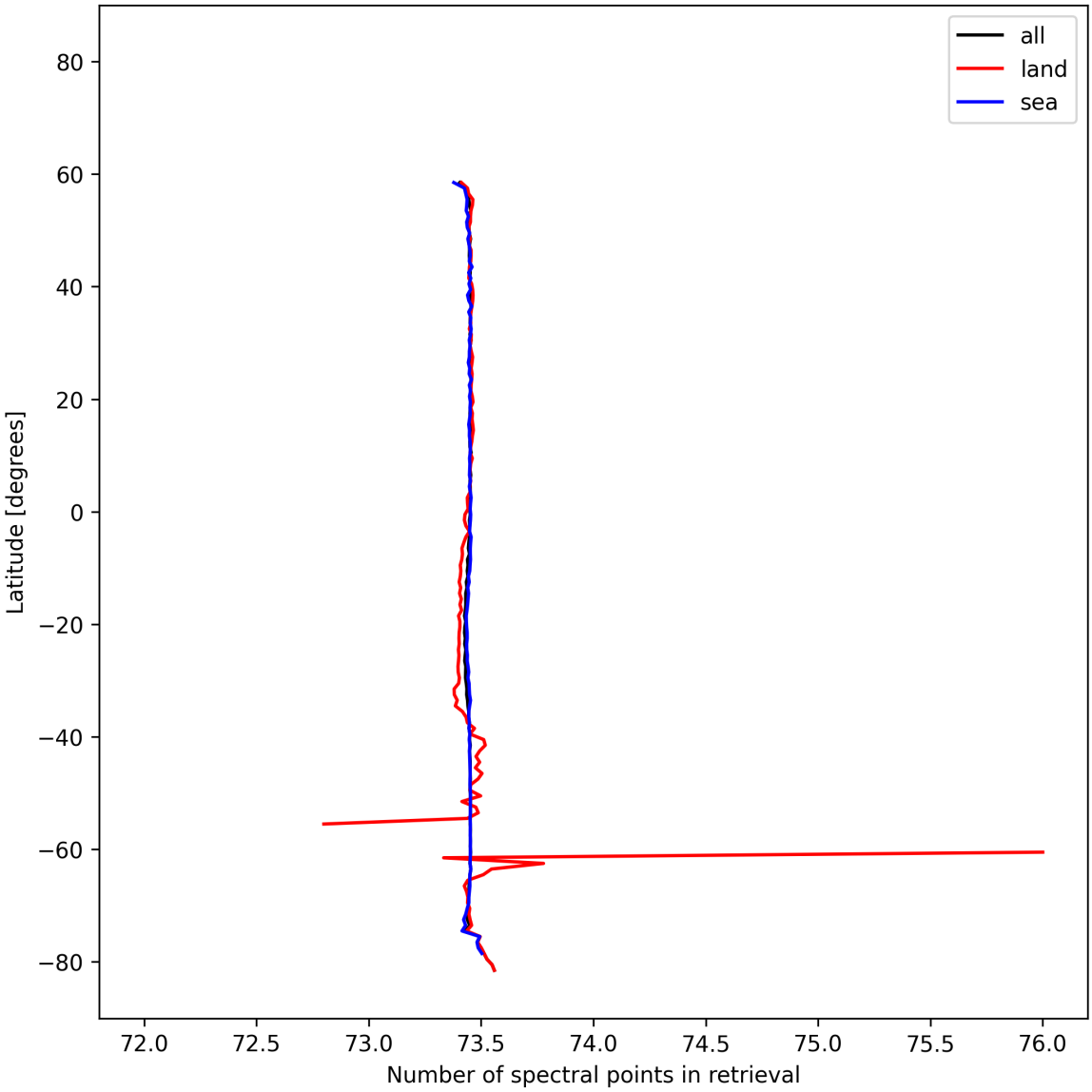


Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-02-18 to 2025-02-19.

8 Histograms

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

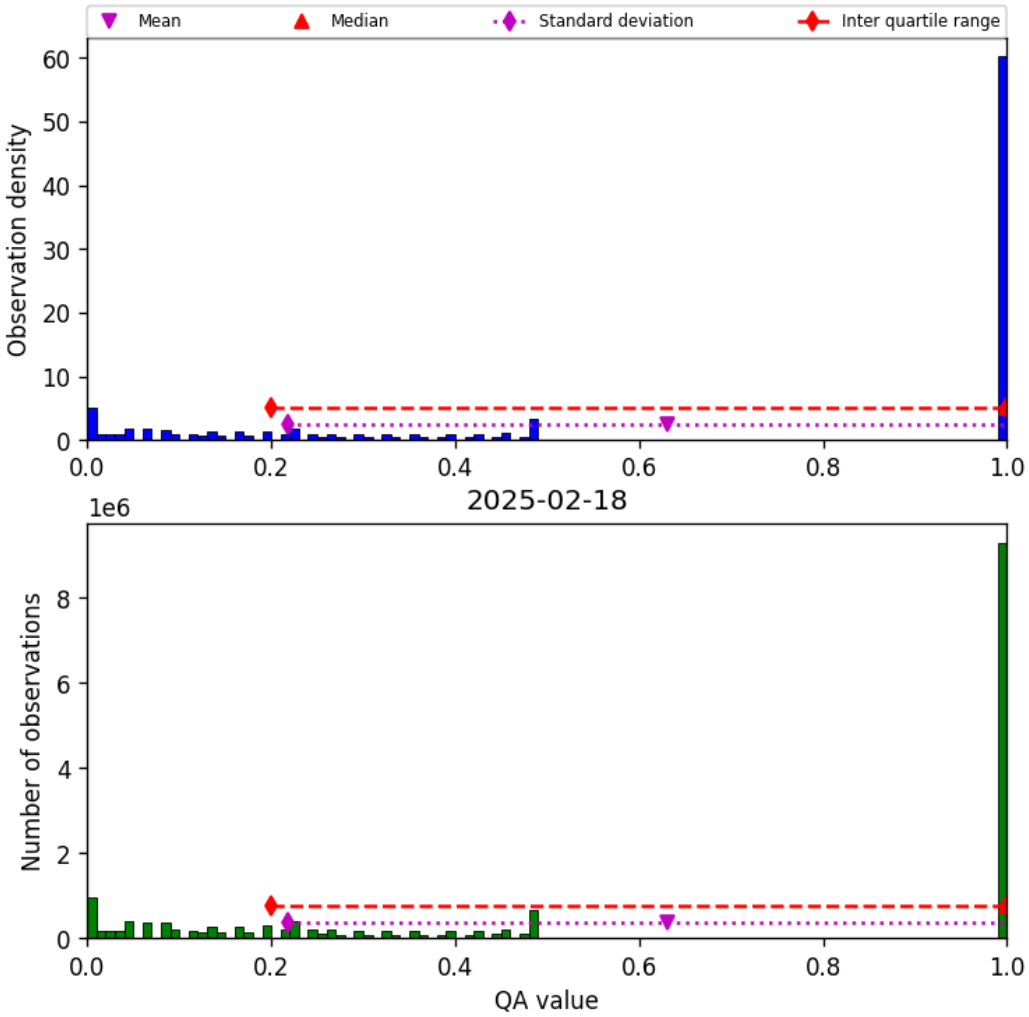


Figure 57: Histogram of “QA value” for 2025-02-18 to 2025-02-19

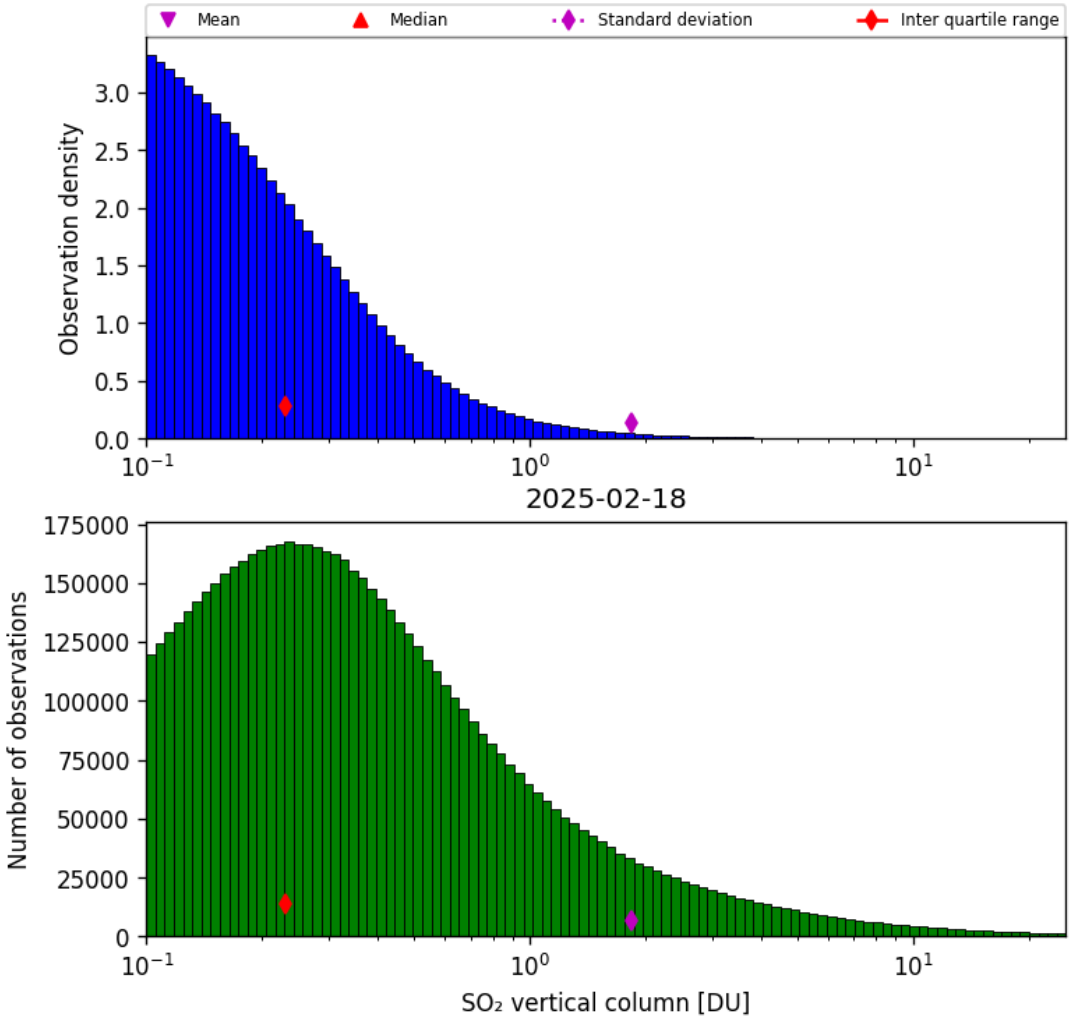


Figure 58: Histogram of "SO_2 vertical column" for 2025-02-18 to 2025-02-19

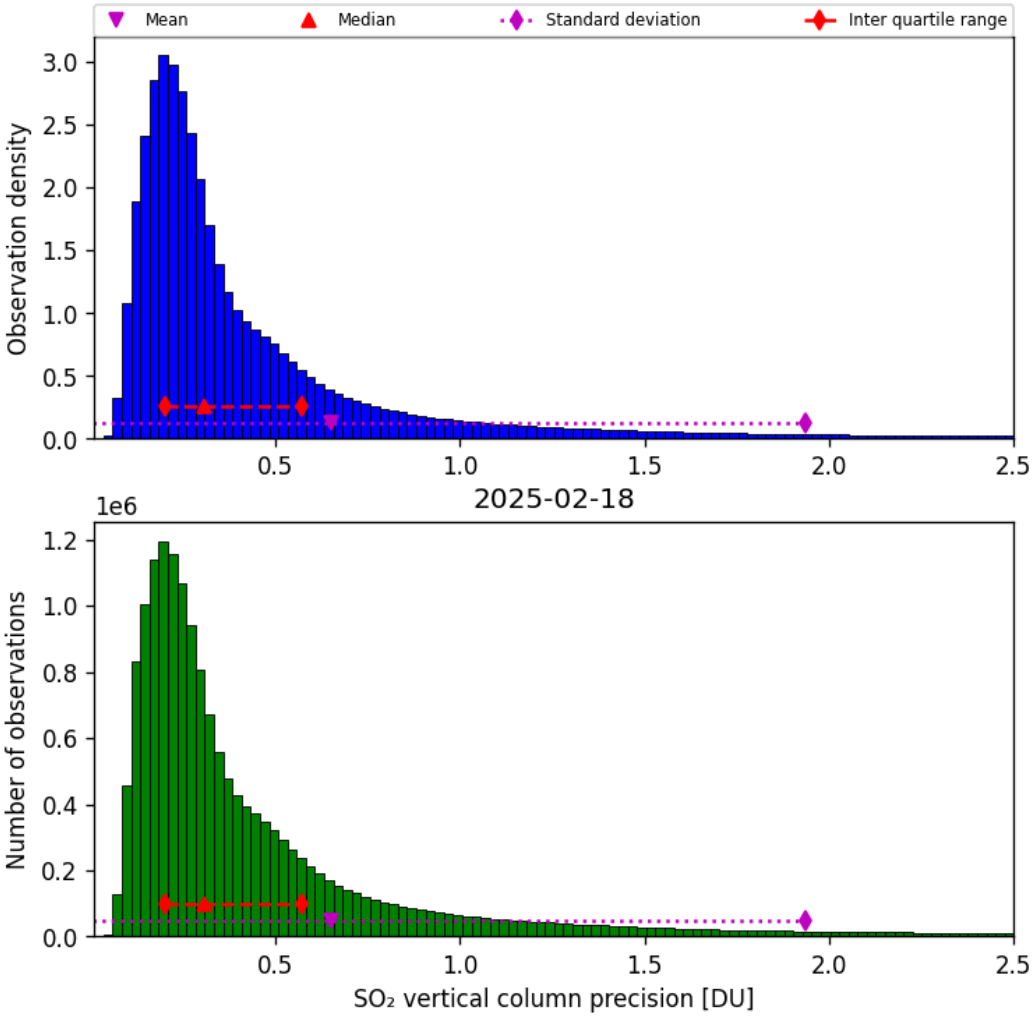


Figure 59: Histogram of "SO_2 vertical column precision" for 2025-02-18 to 2025-02-19

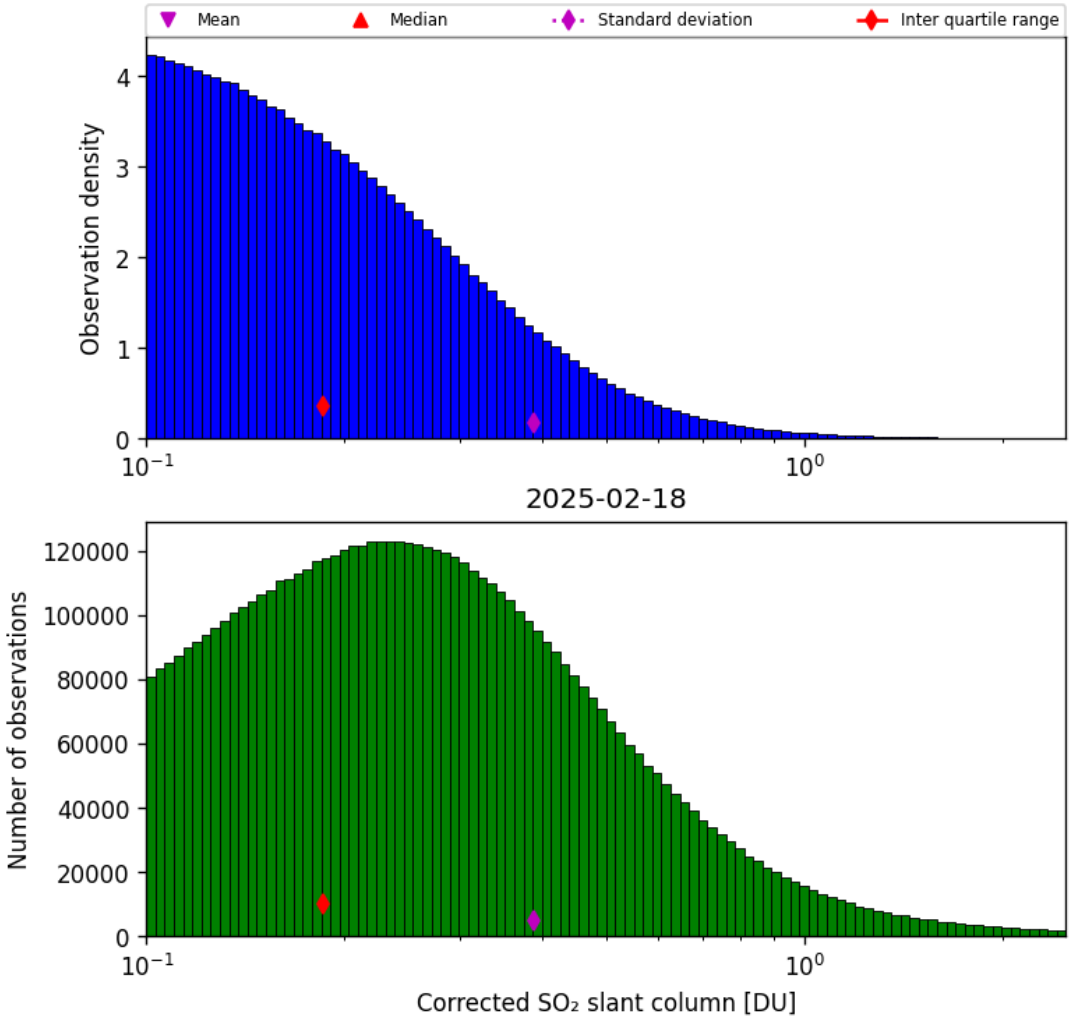


Figure 60: Histogram of "Corrected SO_2 slant column" for 2025-02-18 to 2025-02-19

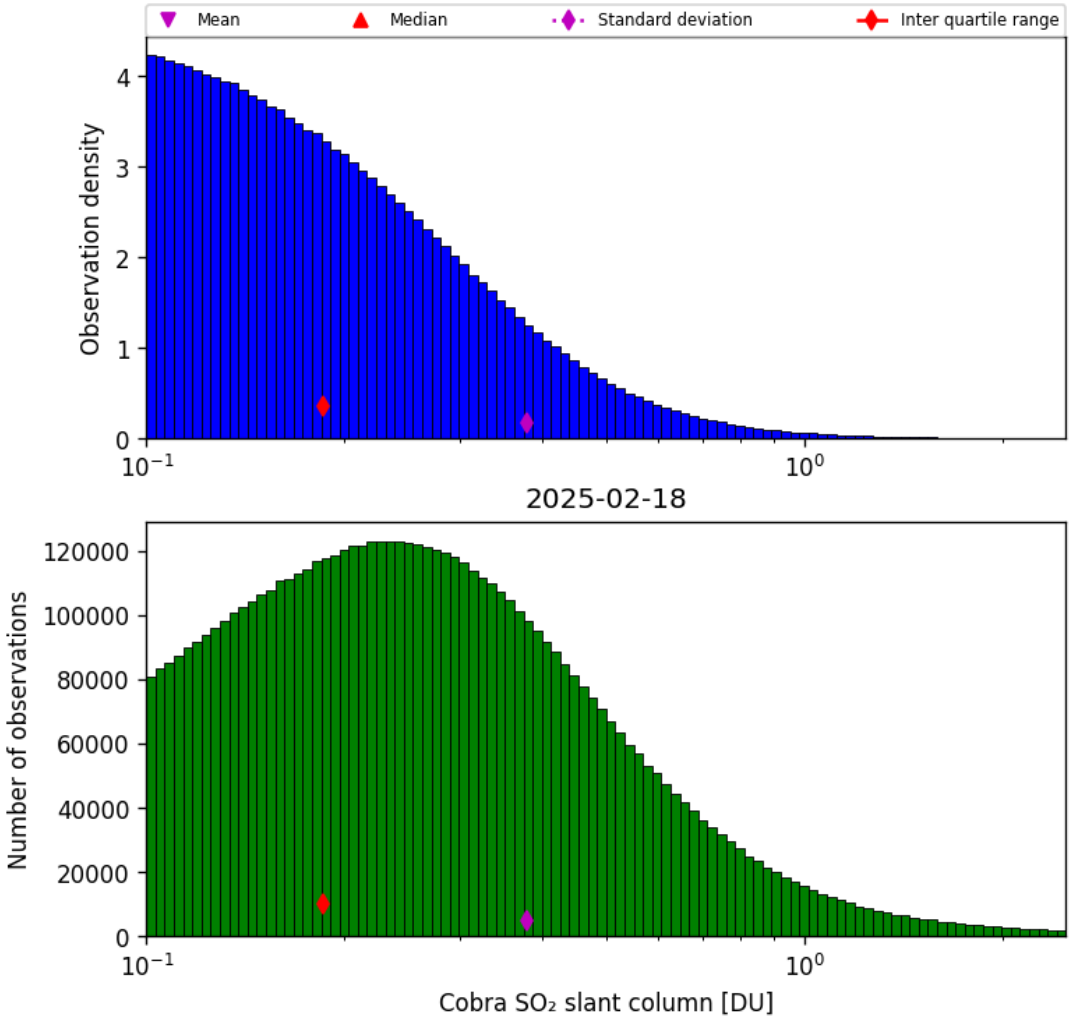


Figure 61: Histogram of "Cobra SO_2 slant column" for 2025-02-18 to 2025-02-19

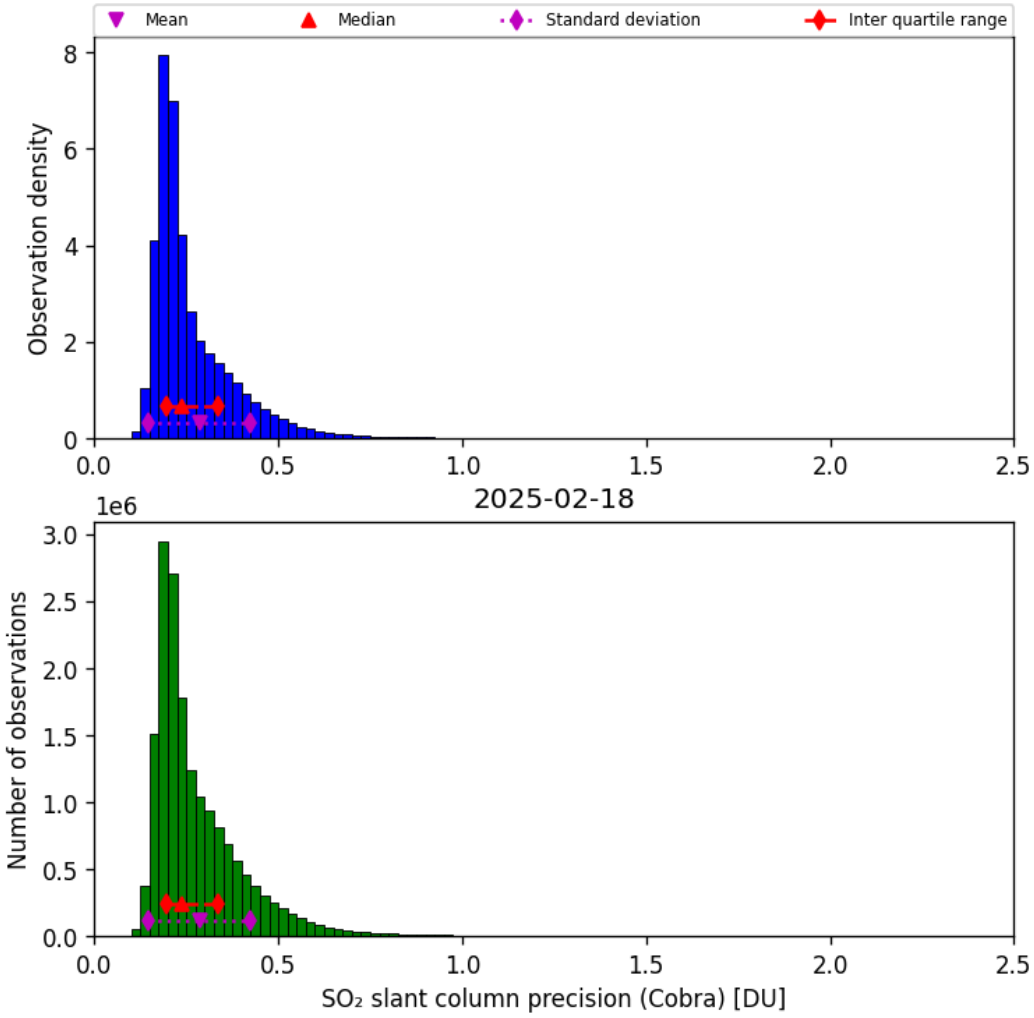


Figure 62: Histogram of "SO_2 slant column precision (Cobra)" for 2025-02-18 to 2025-02-19

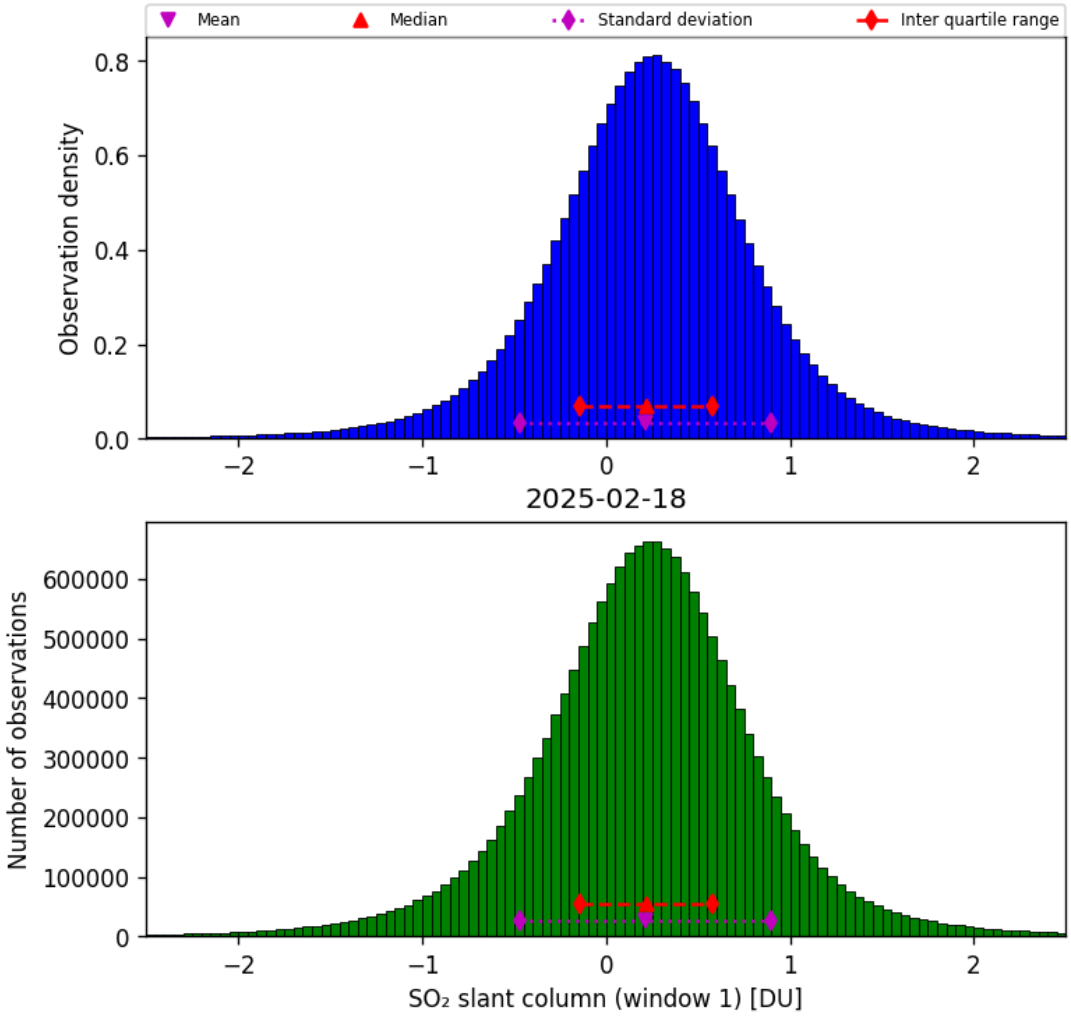


Figure 63: Histogram of "SO_2 slant column (window 1)" for 2025-02-18 to 2025-02-19

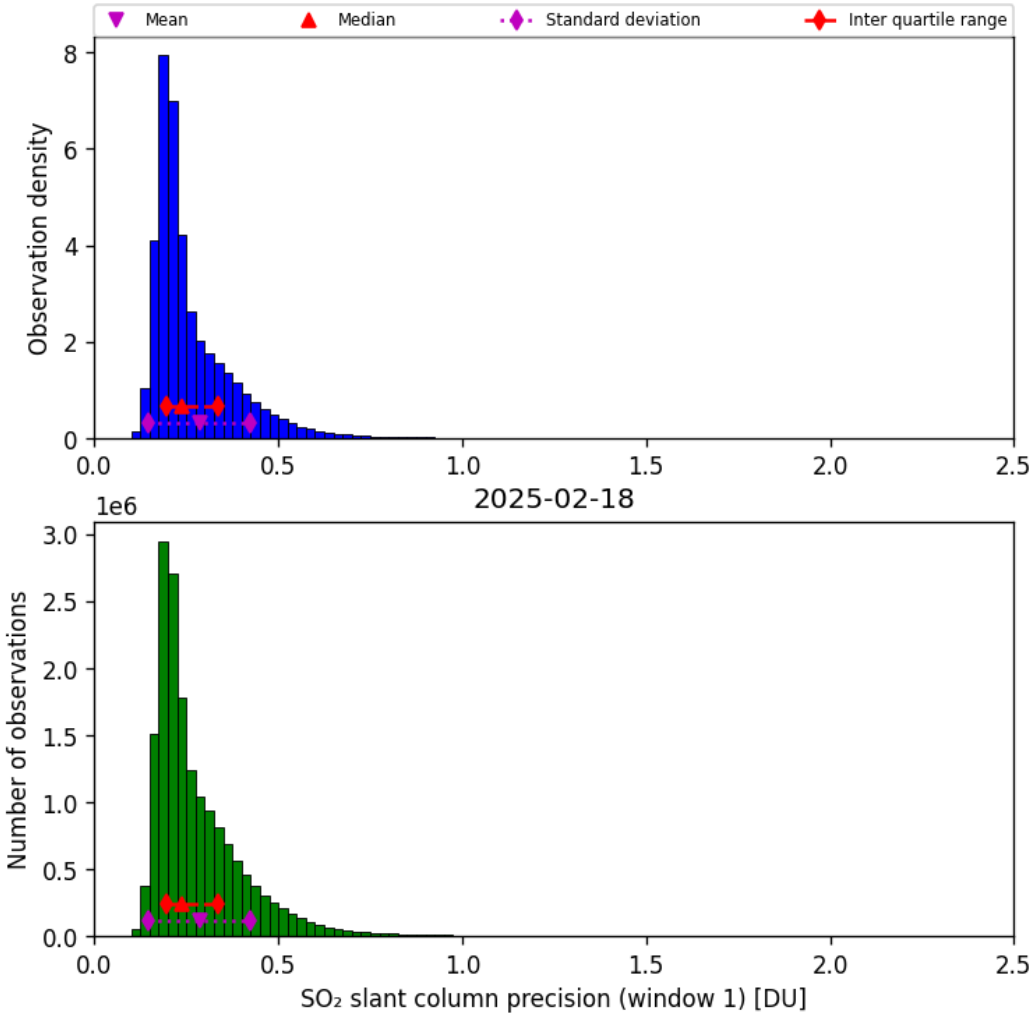


Figure 64: Histogram of "SO_2 slant column precision (window 1)" for 2025-02-18 to 2025-02-19

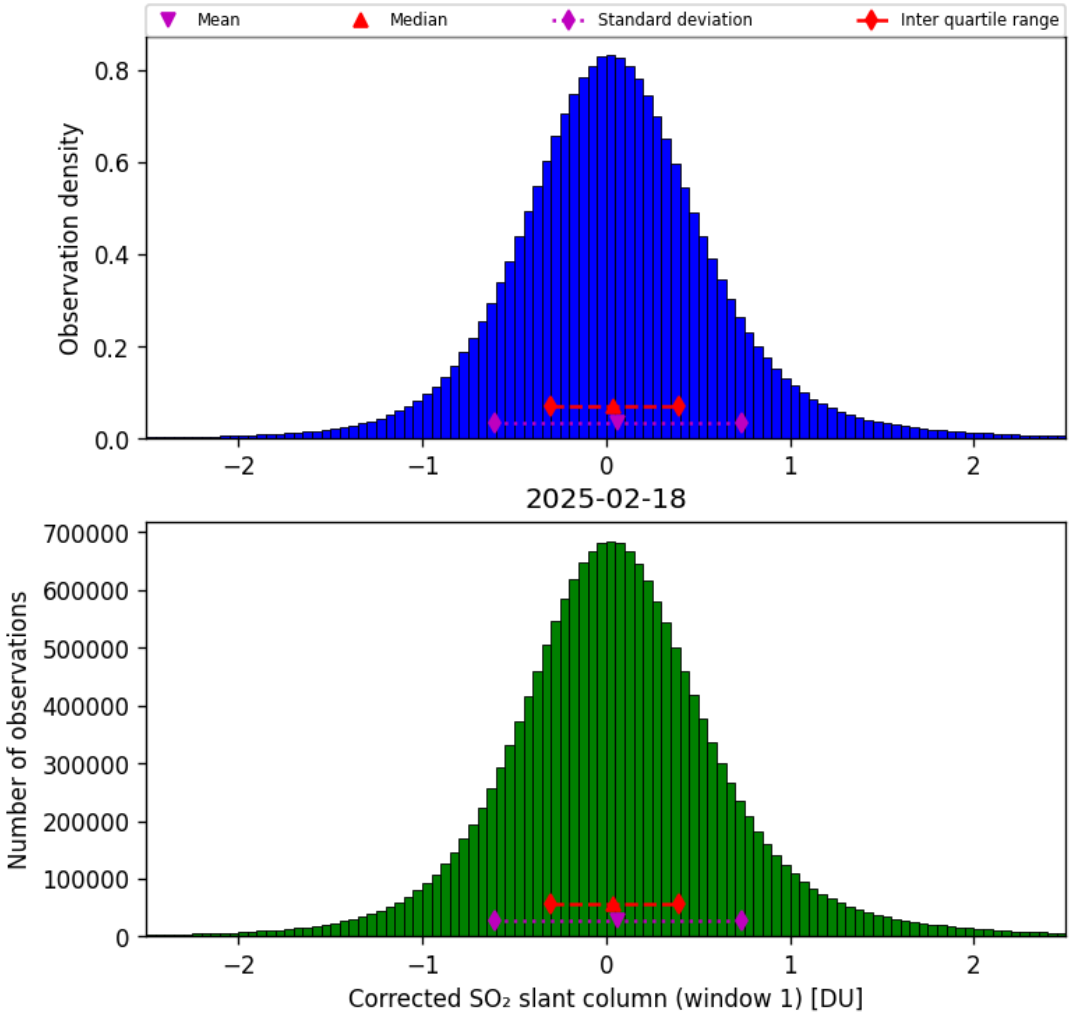


Figure 65: Histogram of "Corrected SO_2 slant column (window 1)" for 2025-02-18 to 2025-02-19

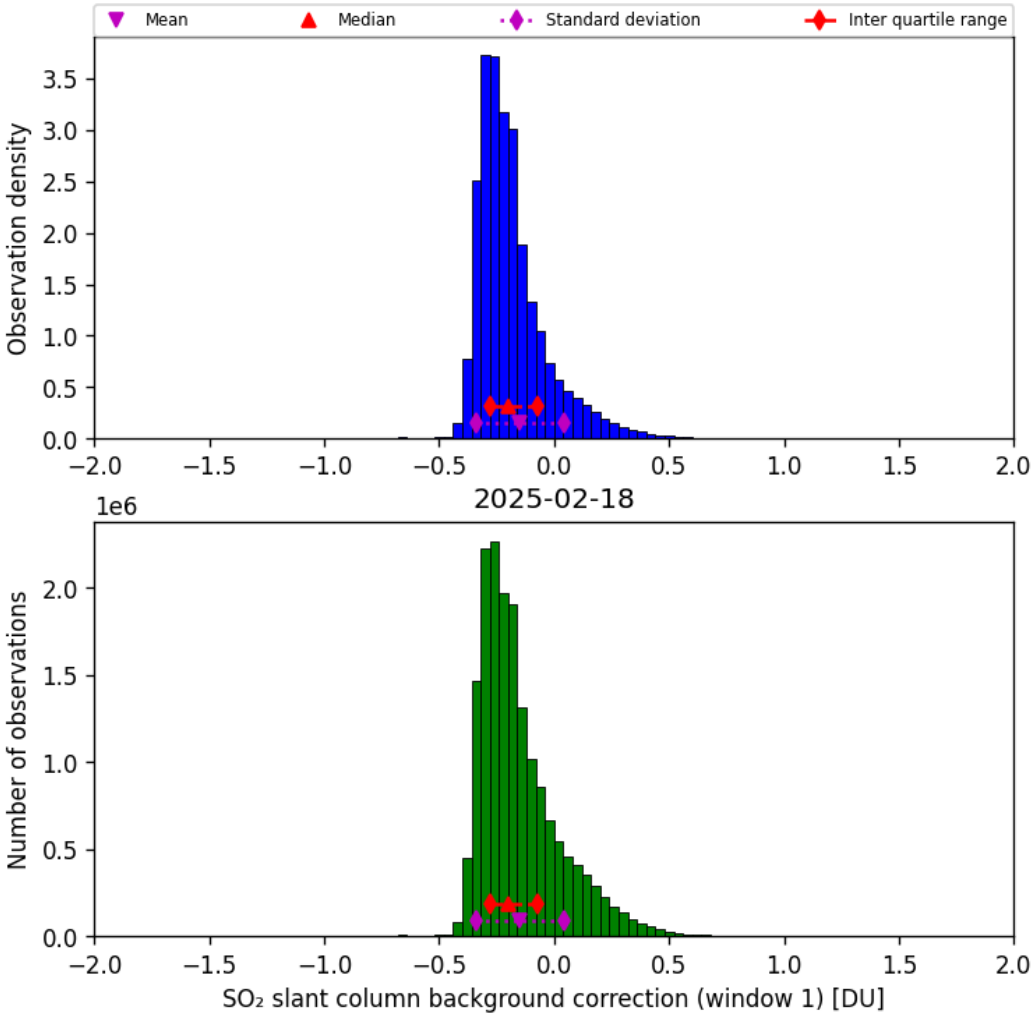


Figure 66: Histogram of "SO_2 slant column background correction (window 1)" for 2025-02-18 to 2025-02-19

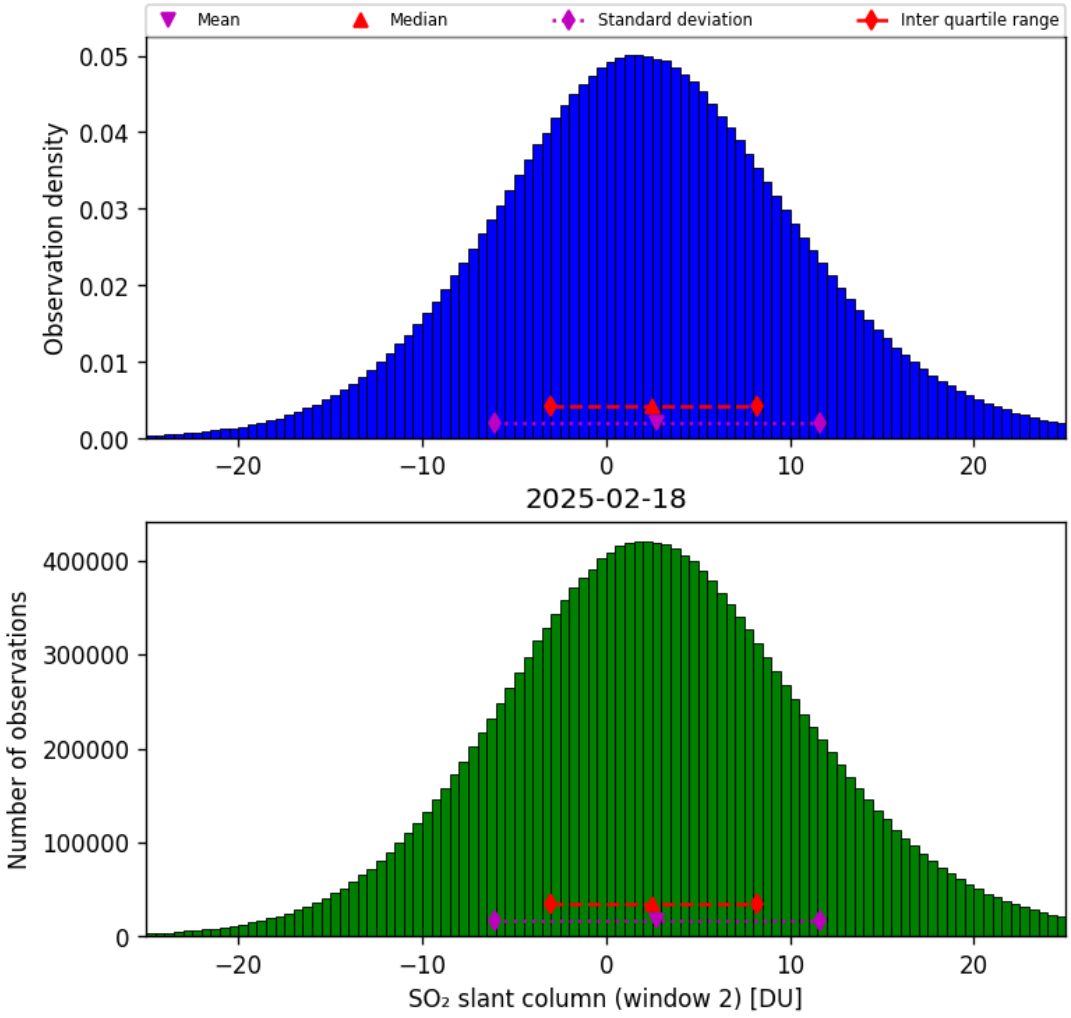


Figure 67: Histogram of "SO_2 slant column (window 2)" for 2025-02-18 to 2025-02-19

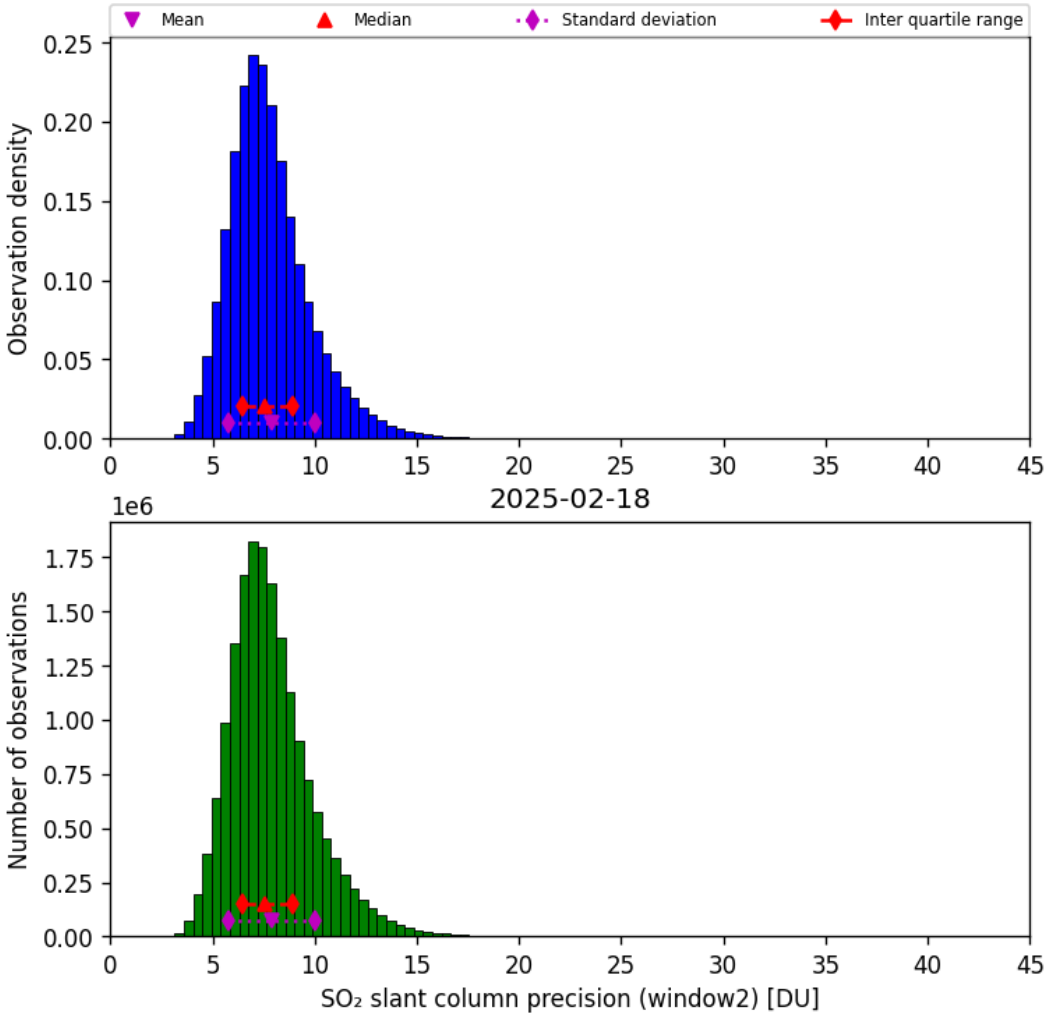


Figure 68: Histogram of "SO_2 slant column precision (window2)" for 2025-02-18 to 2025-02-19

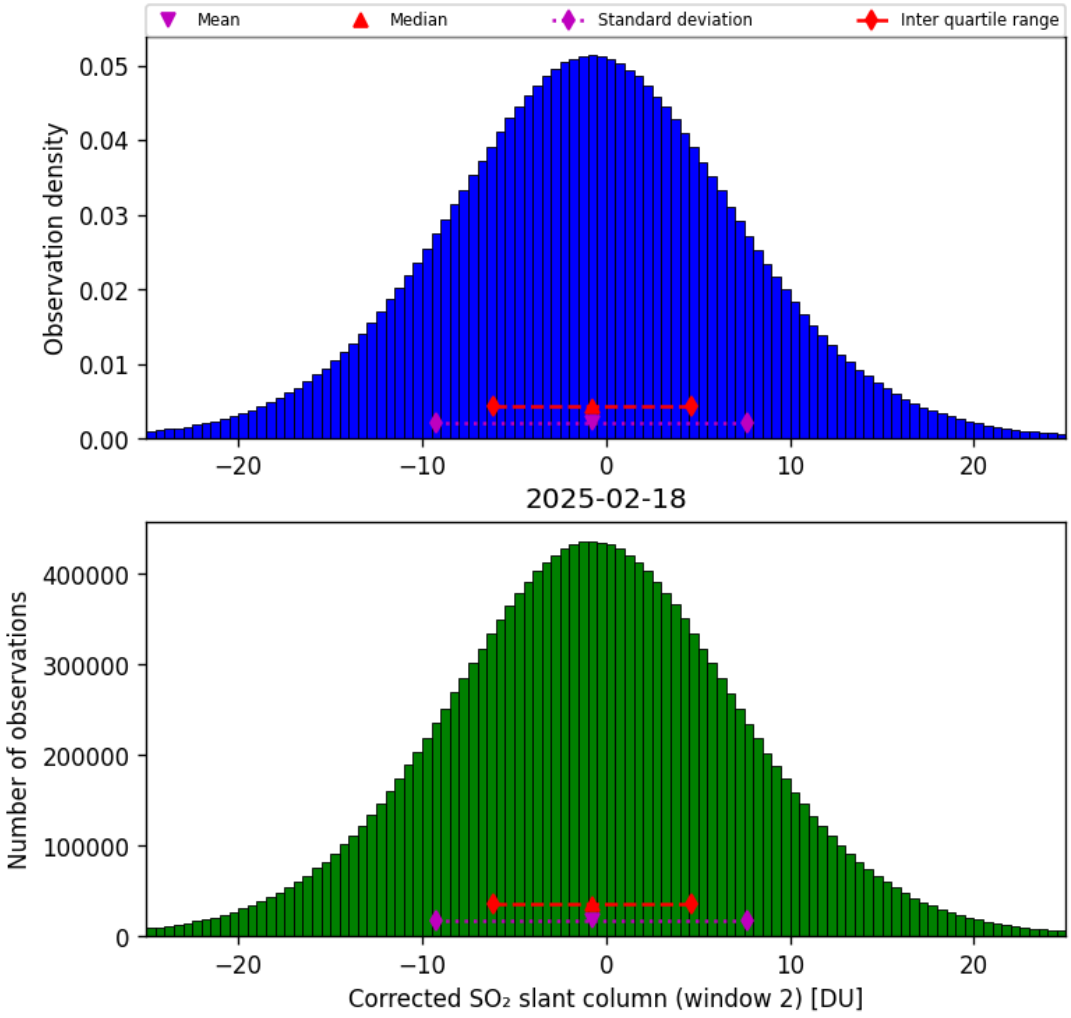


Figure 69: Histogram of "Corrected SO_2 slant column (window 2)" for 2025-02-18 to 2025-02-19

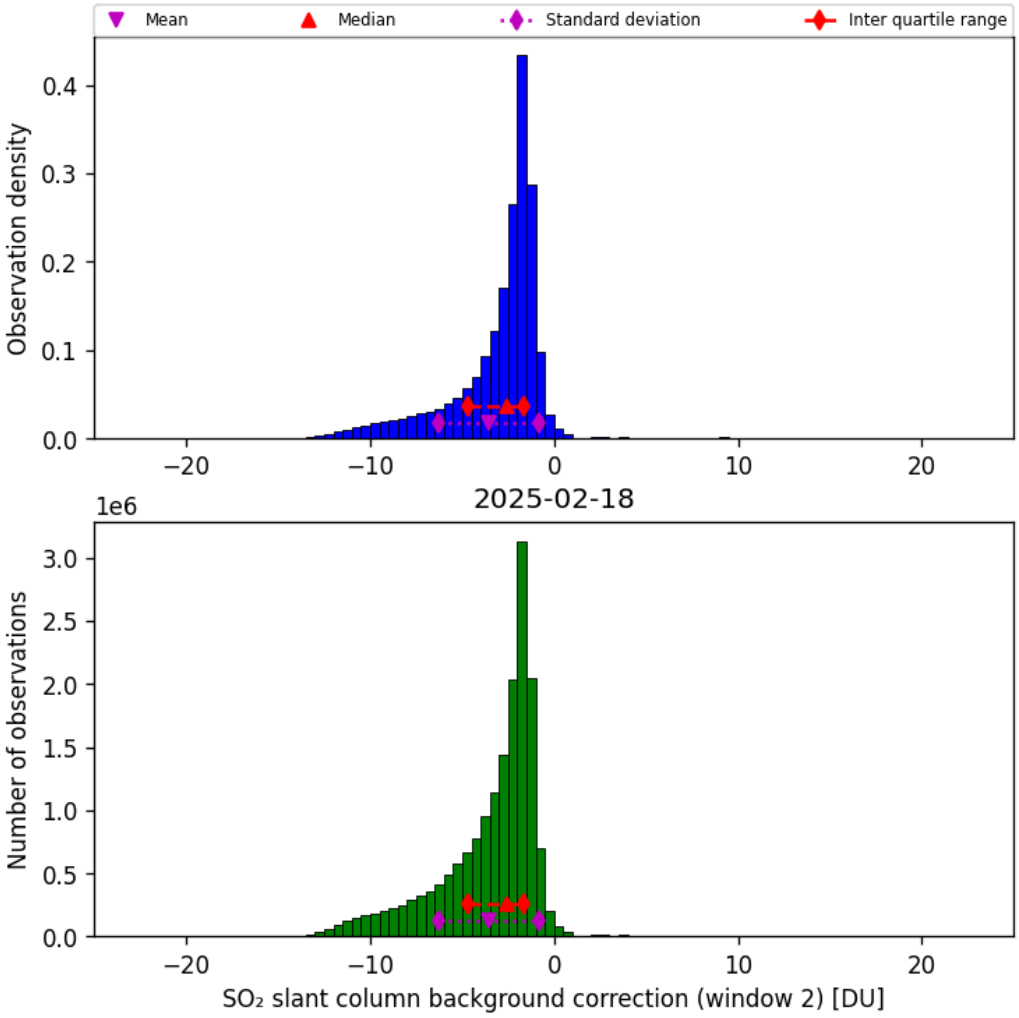


Figure 70: Histogram of "SO_2 slant column background correction (window 2)" for 2025-02-18 to 2025-02-19

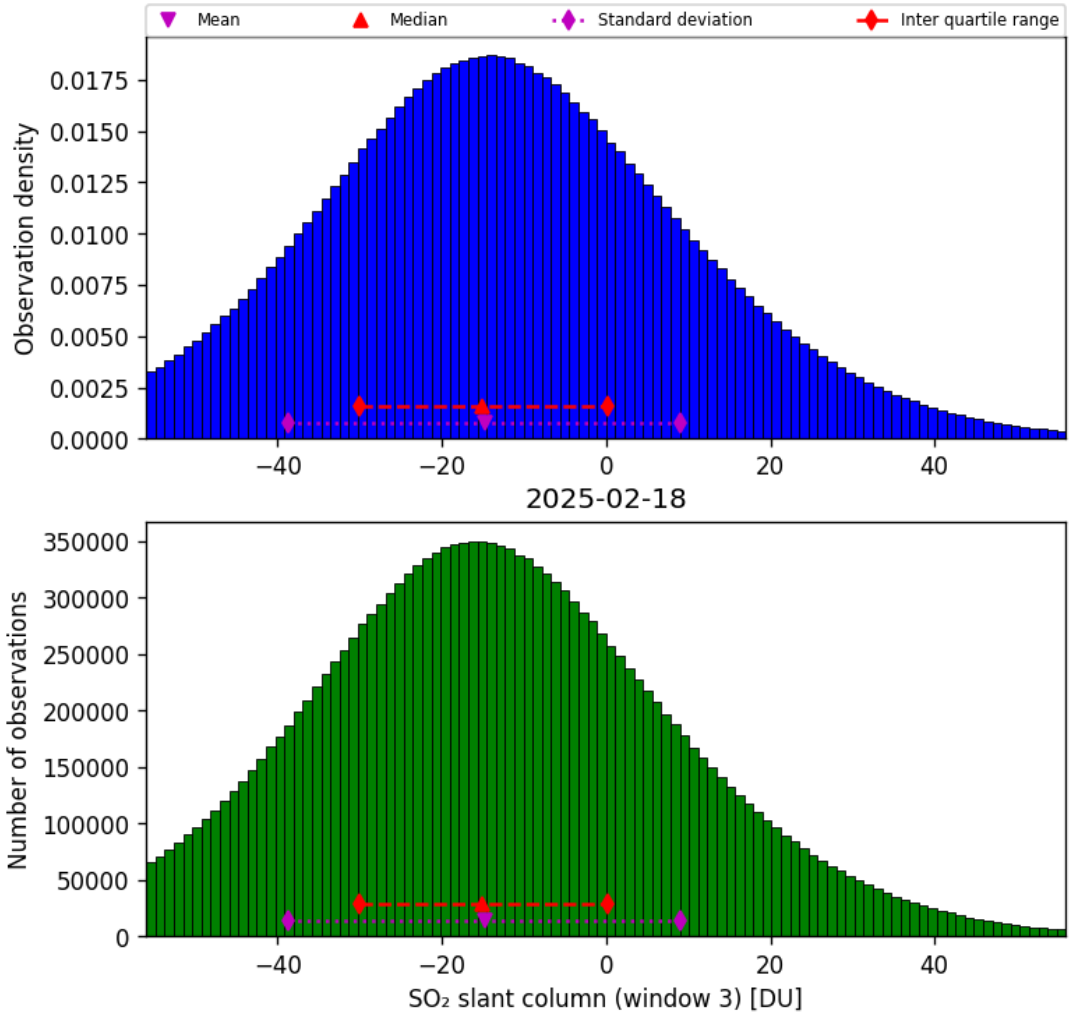


Figure 71: Histogram of "SO_2 slant column (window 3)" for 2025-02-18 to 2025-02-19

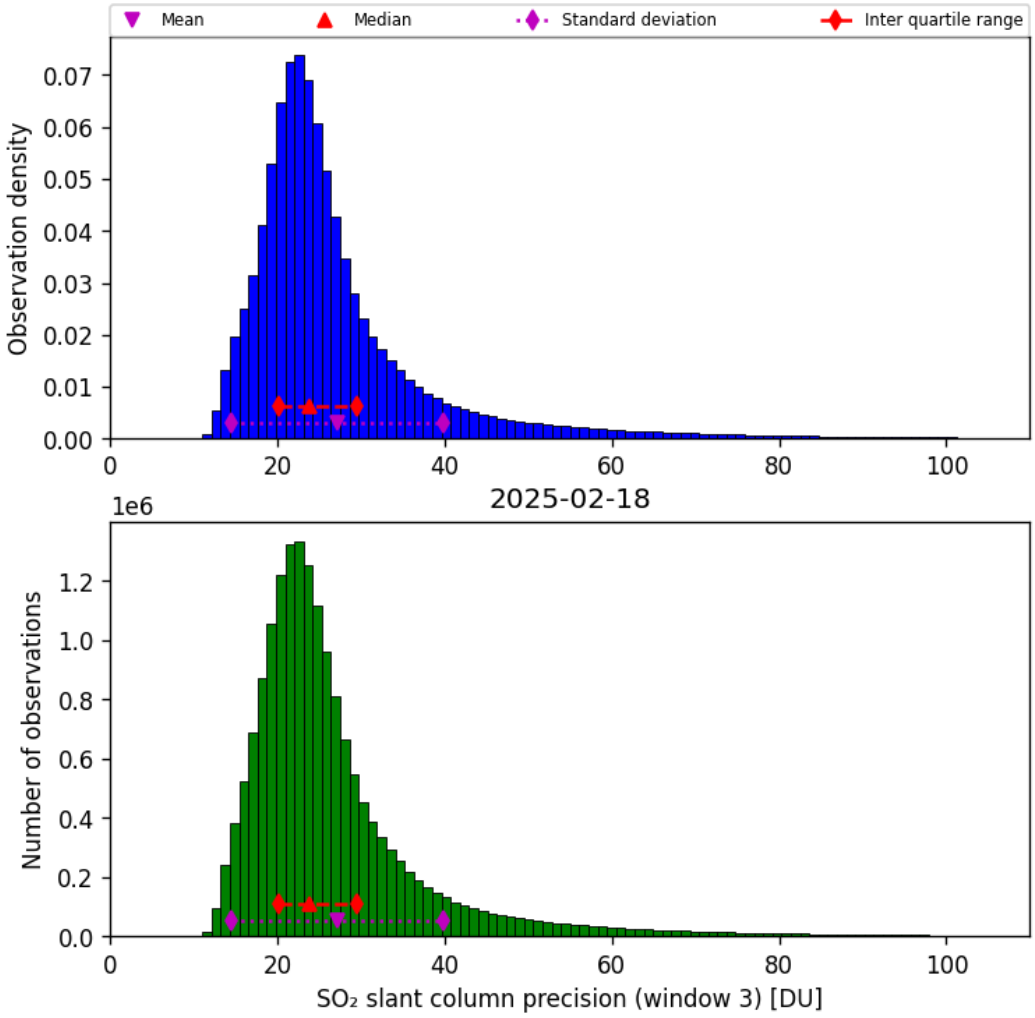


Figure 72: Histogram of "SO_2 slant column precision (window 3)" for 2025-02-18 to 2025-02-19

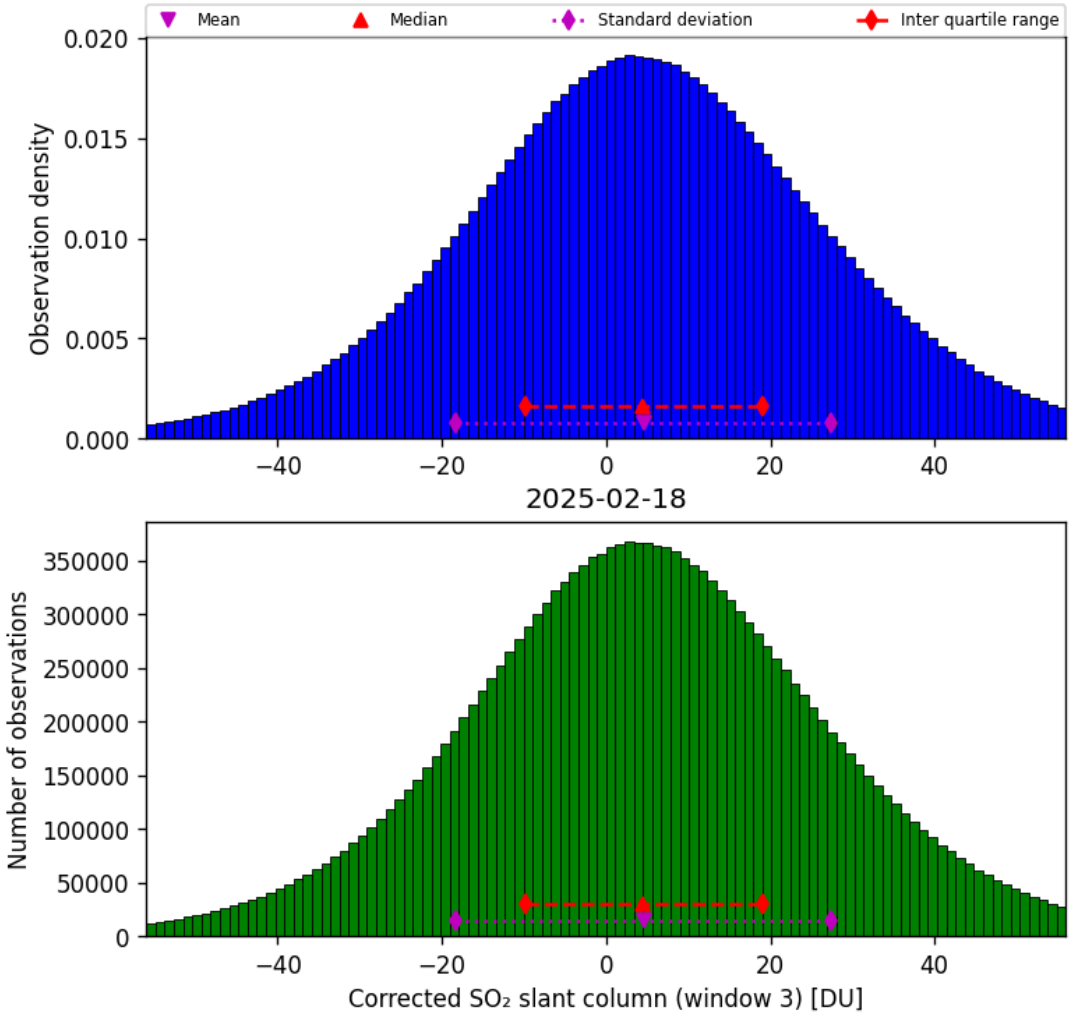


Figure 73: Histogram of "Corrected SO_2 slant column (window 3)" for 2025-02-18 to 2025-02-19

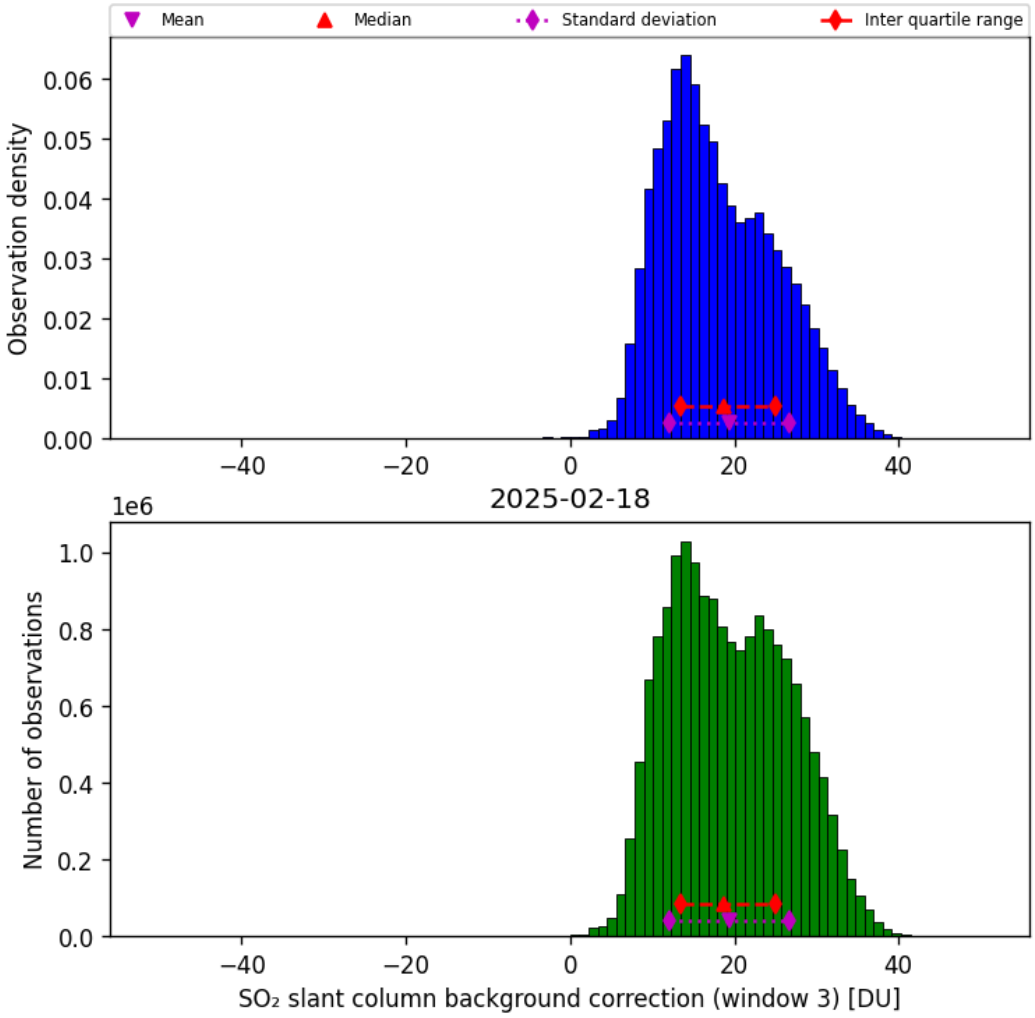


Figure 74: Histogram of "SO_2 slant column background correction (window 3)" for 2025-02-18 to 2025-02-19

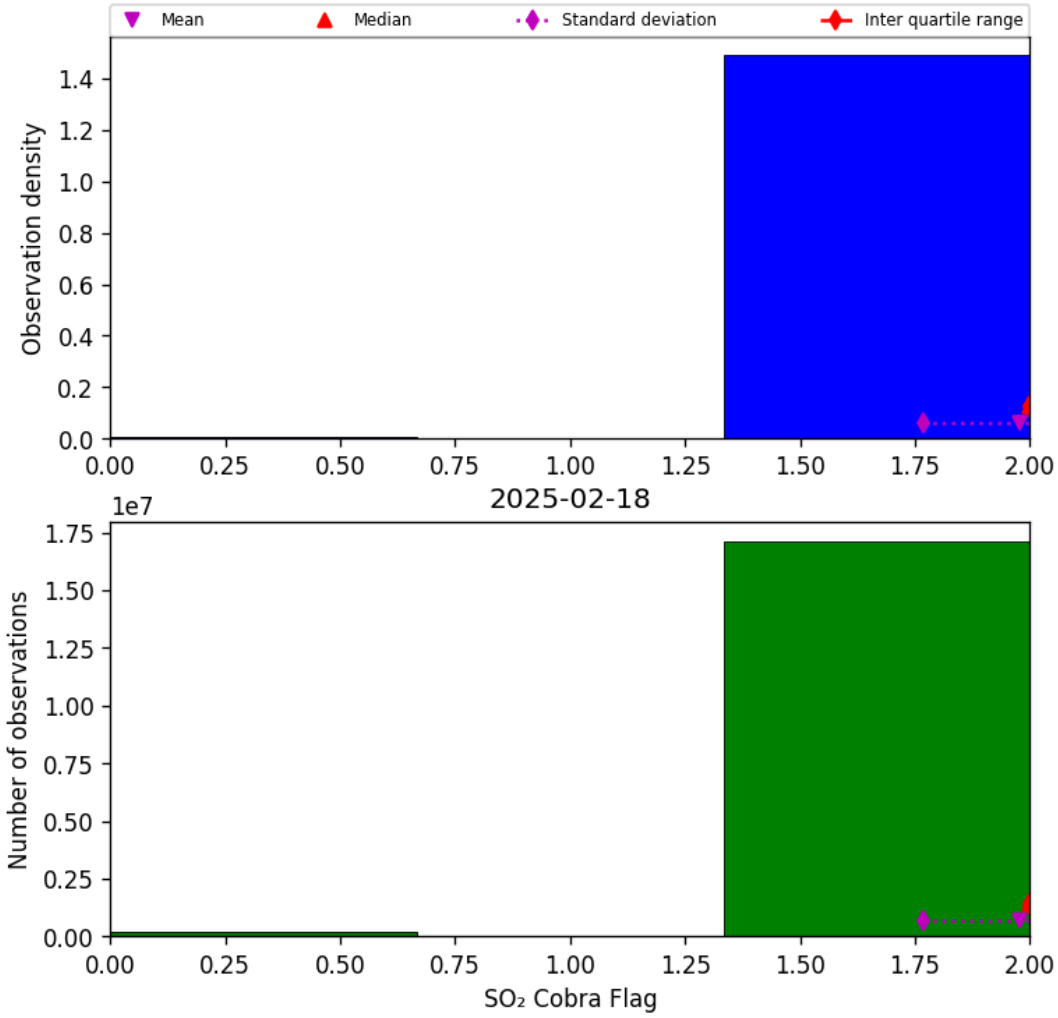


Figure 75: Histogram of "SO_2 Cobra Flag" for 2025-02-18 to 2025-02-19

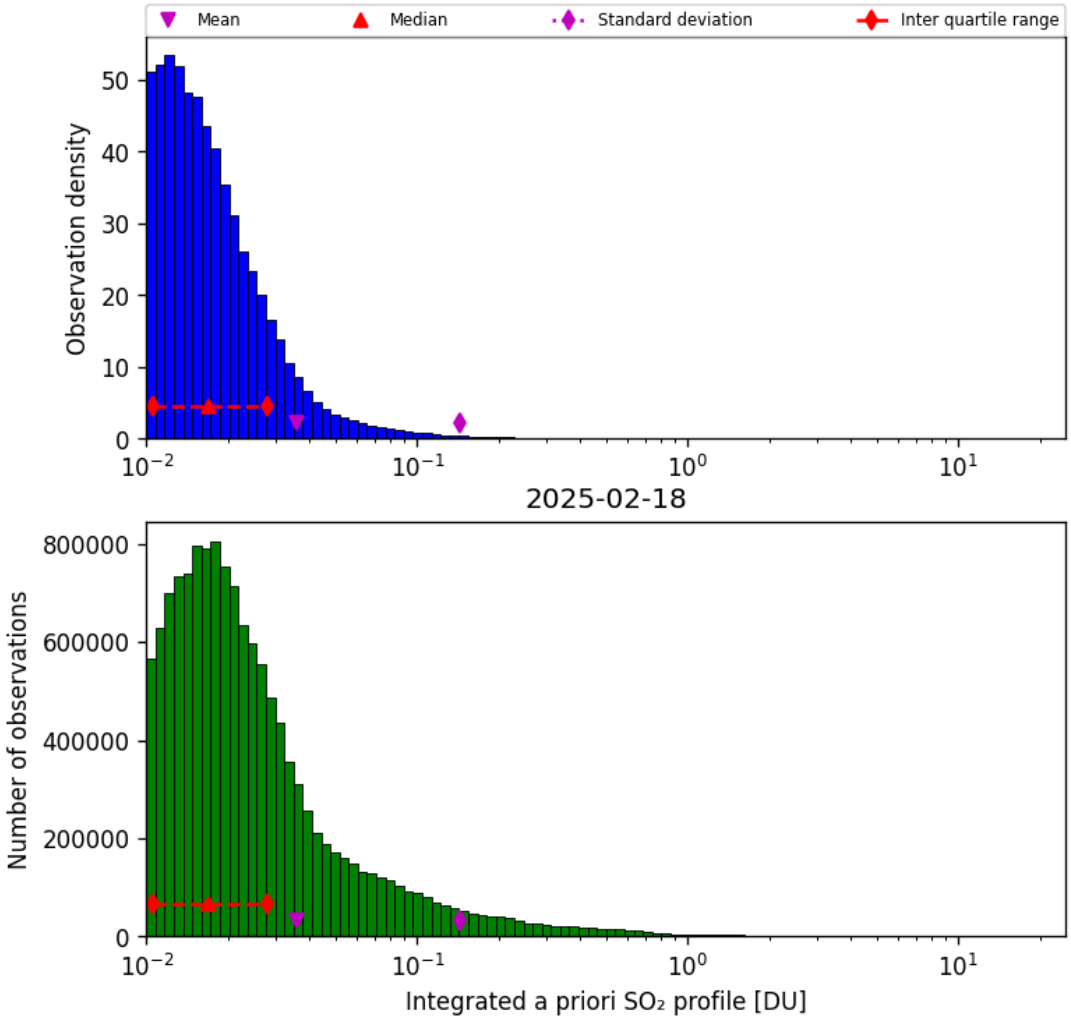


Figure 76: Histogram of “Integrated a priori SO_2 profile” for 2025-02-18 to 2025-02-19

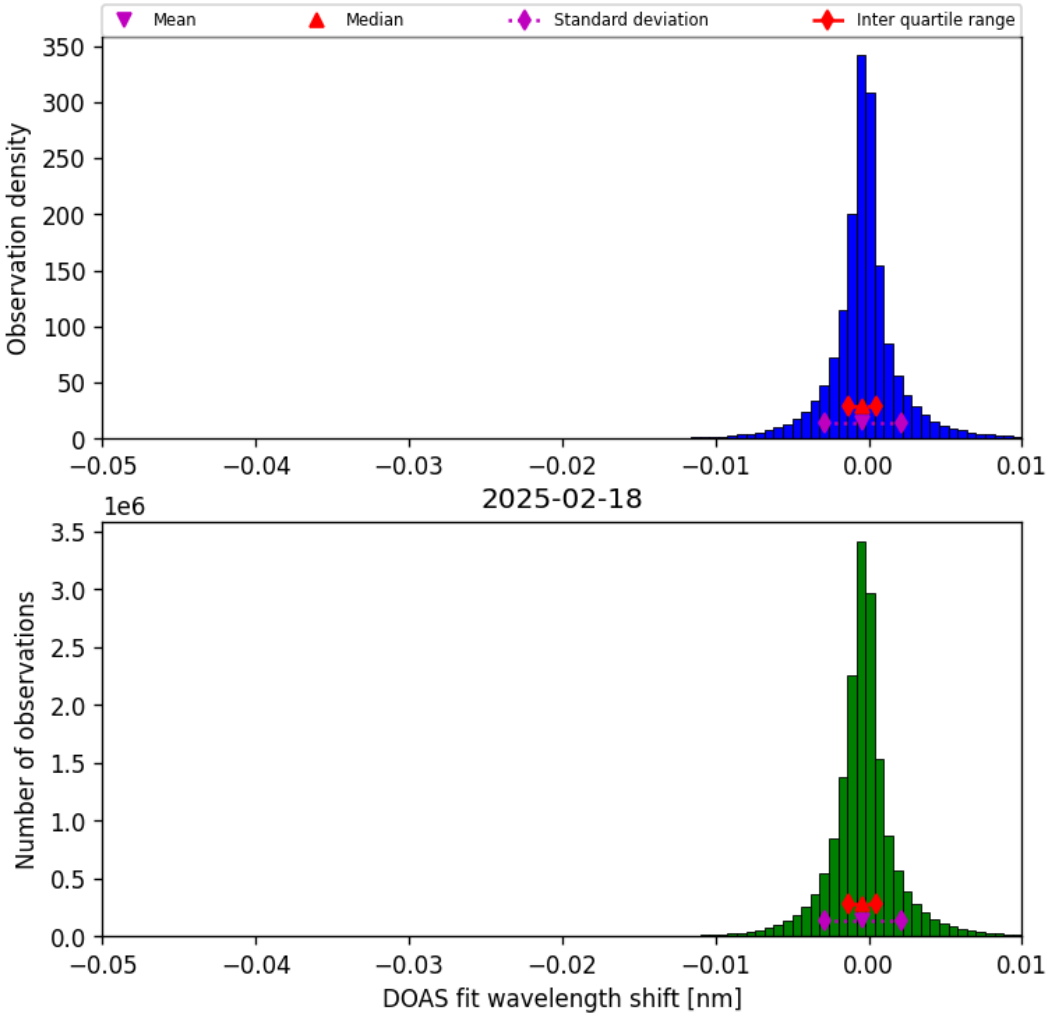


Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-02-18 to 2025-02-19

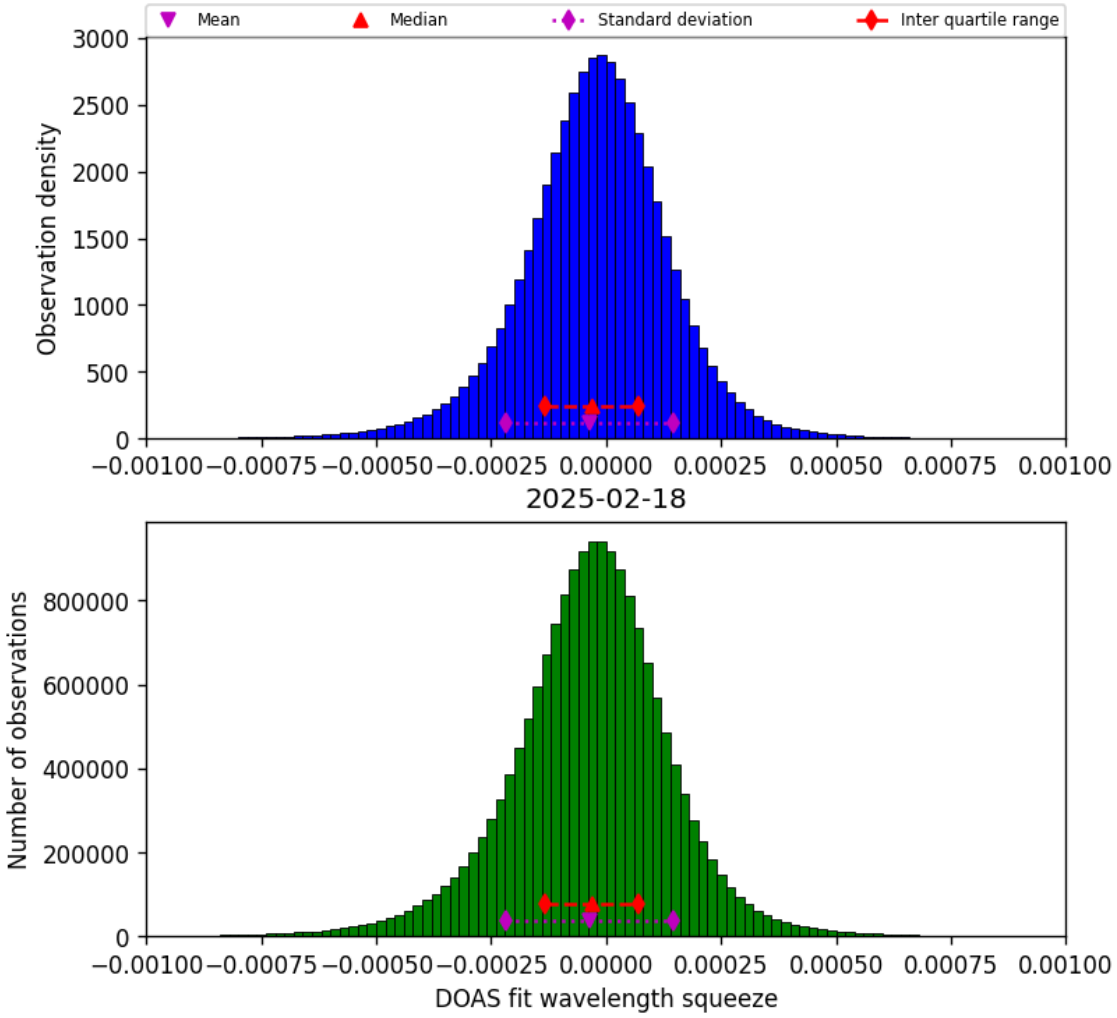


Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-02-18 to 2025-02-19

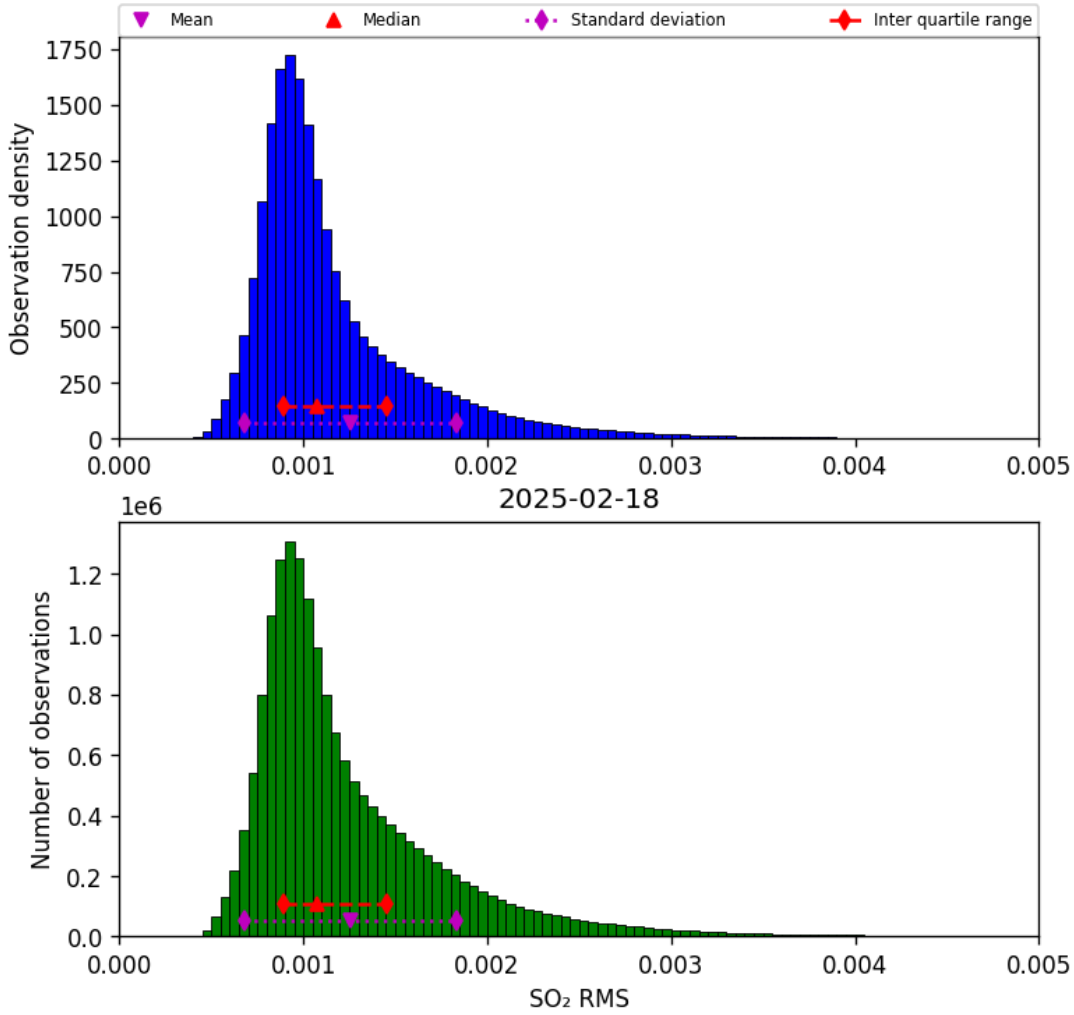


Figure 79: Histogram of "SO_2 RMS" for 2025-02-18 to 2025-02-19

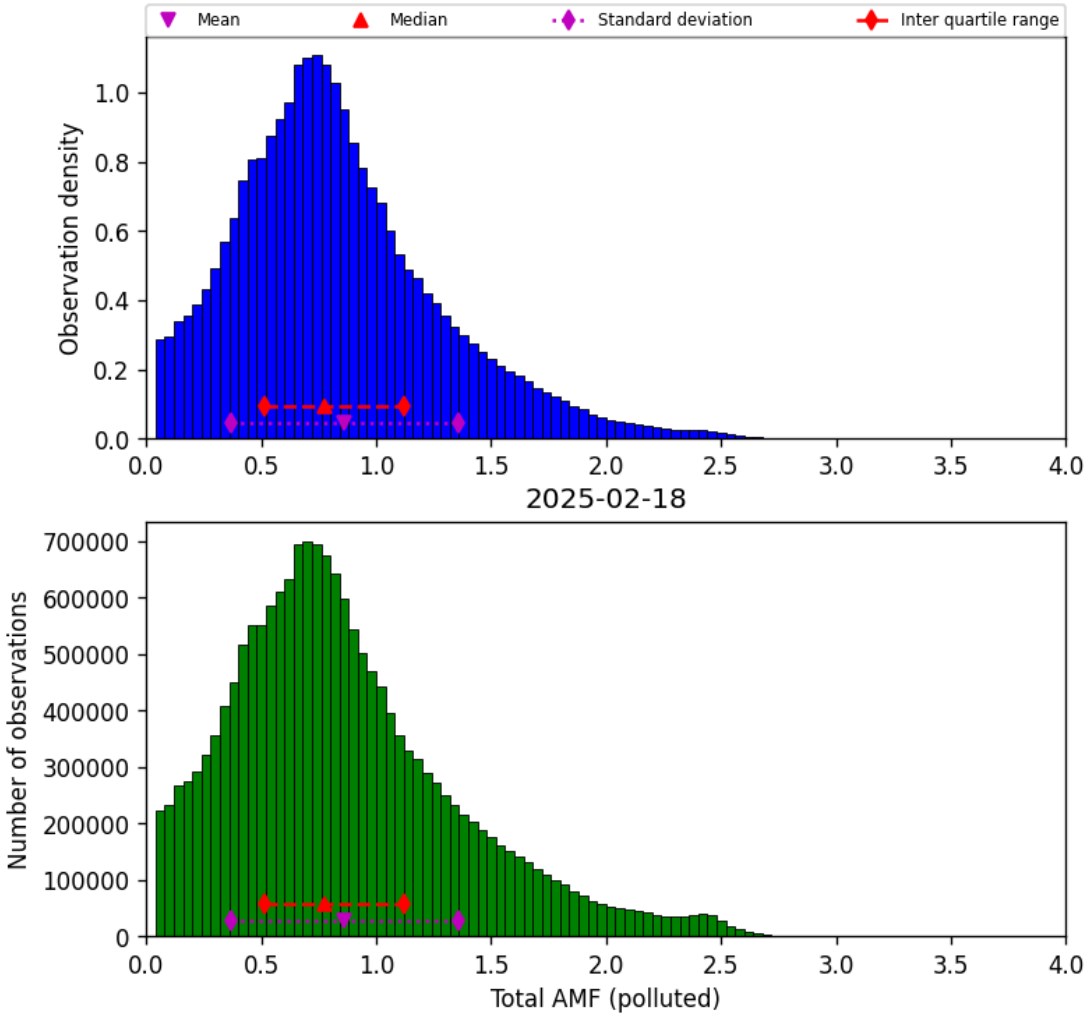


Figure 80: Histogram of “Total AMF (polluted)” for 2025-02-18 to 2025-02-19

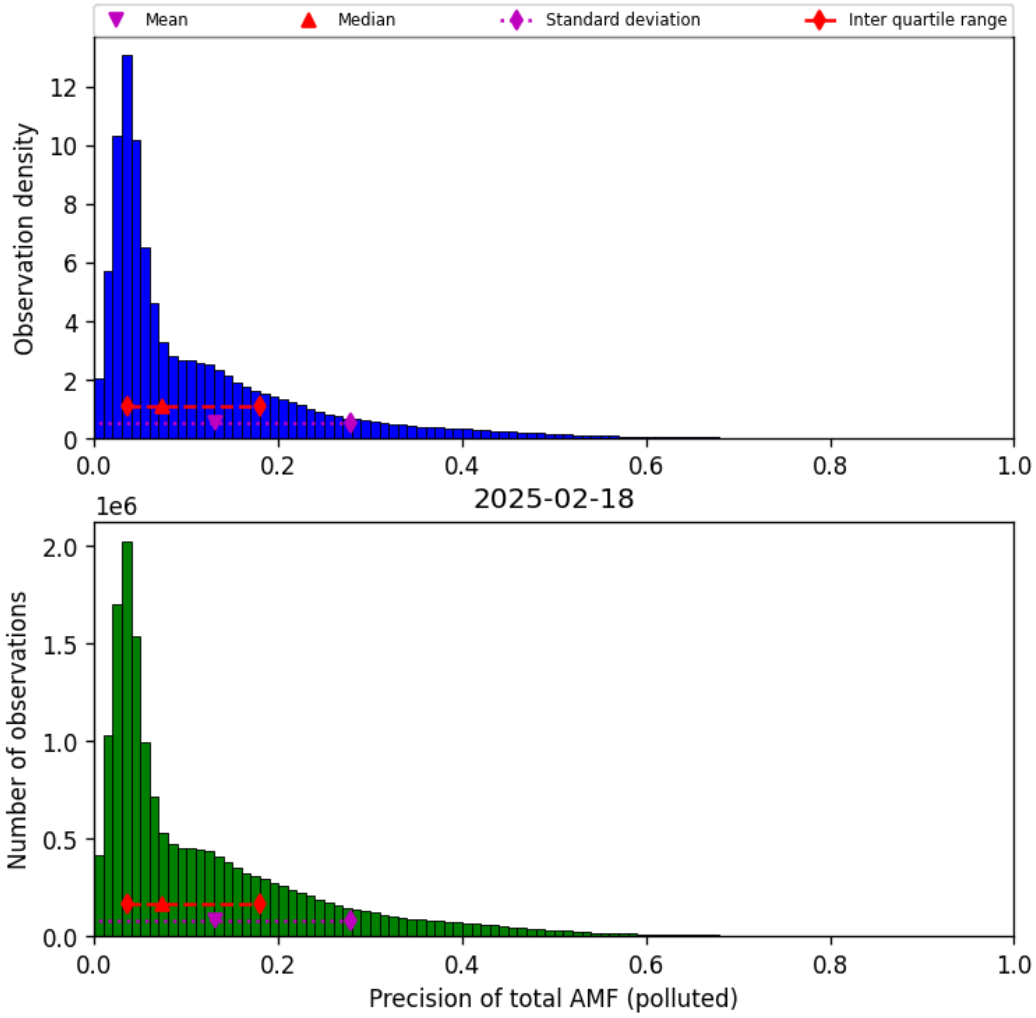


Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-02-18 to 2025-02-19

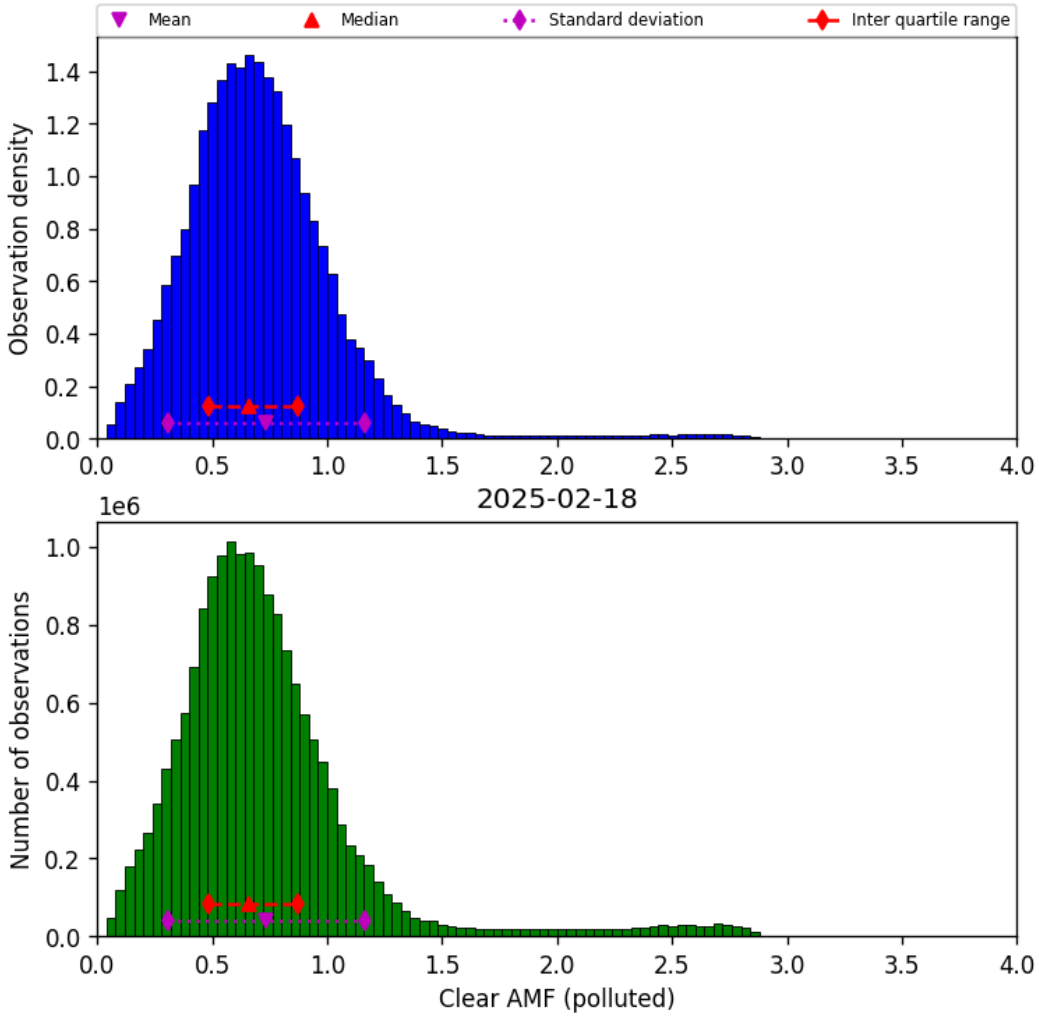


Figure 82: Histogram of “Clear AMF (polluted)” for 2025-02-18 to 2025-02-19

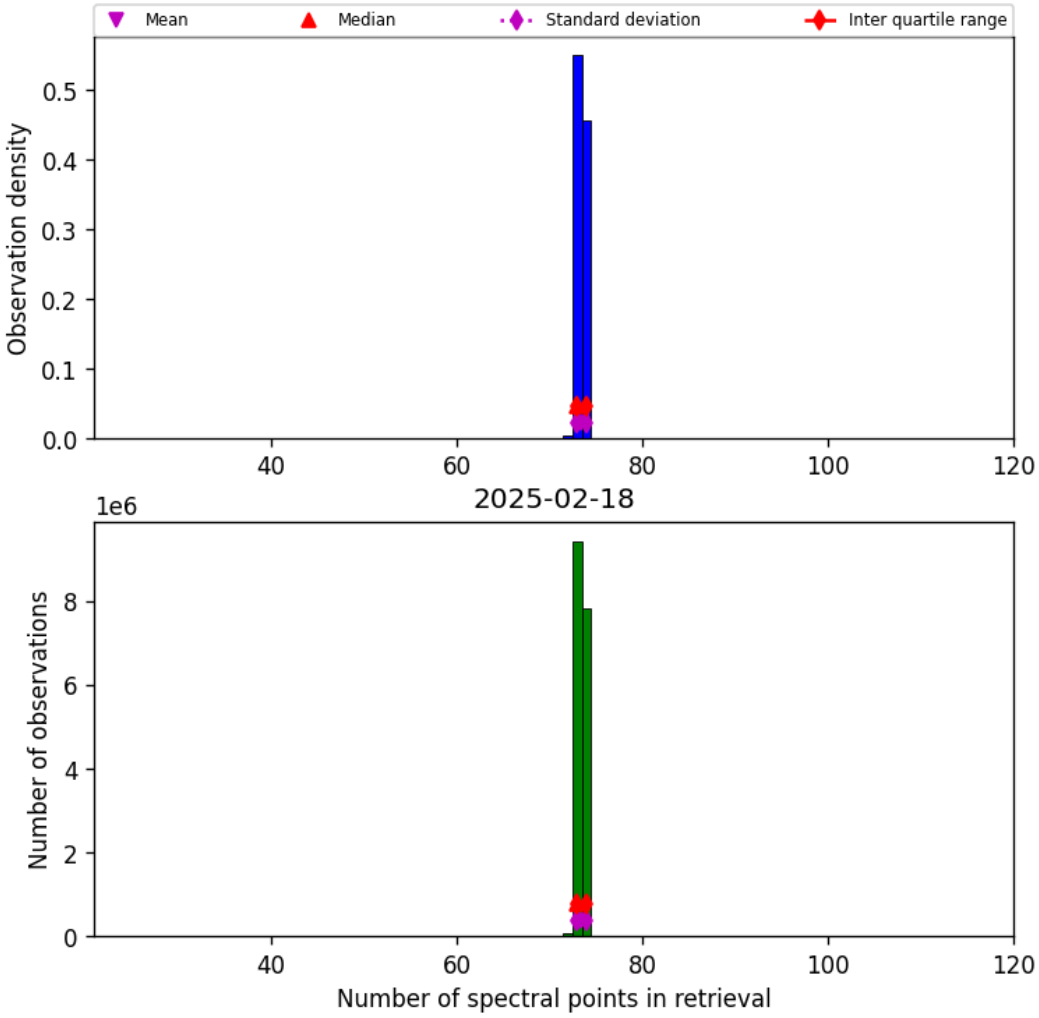


Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-02-18 to 2025-02-19

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.

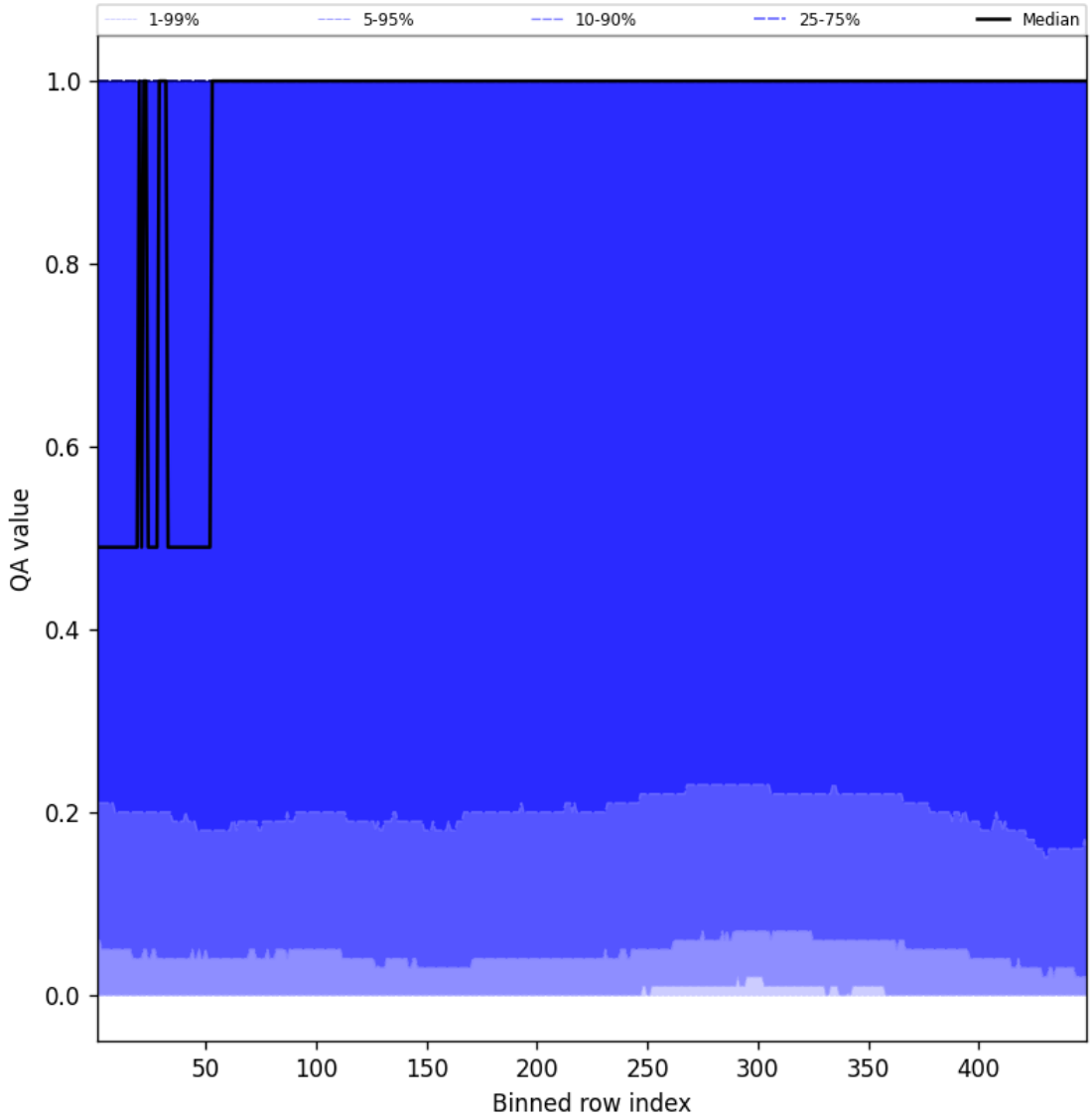


Figure 84: Along track statistics of “QA value” for 2025-02-18 to 2025-02-19

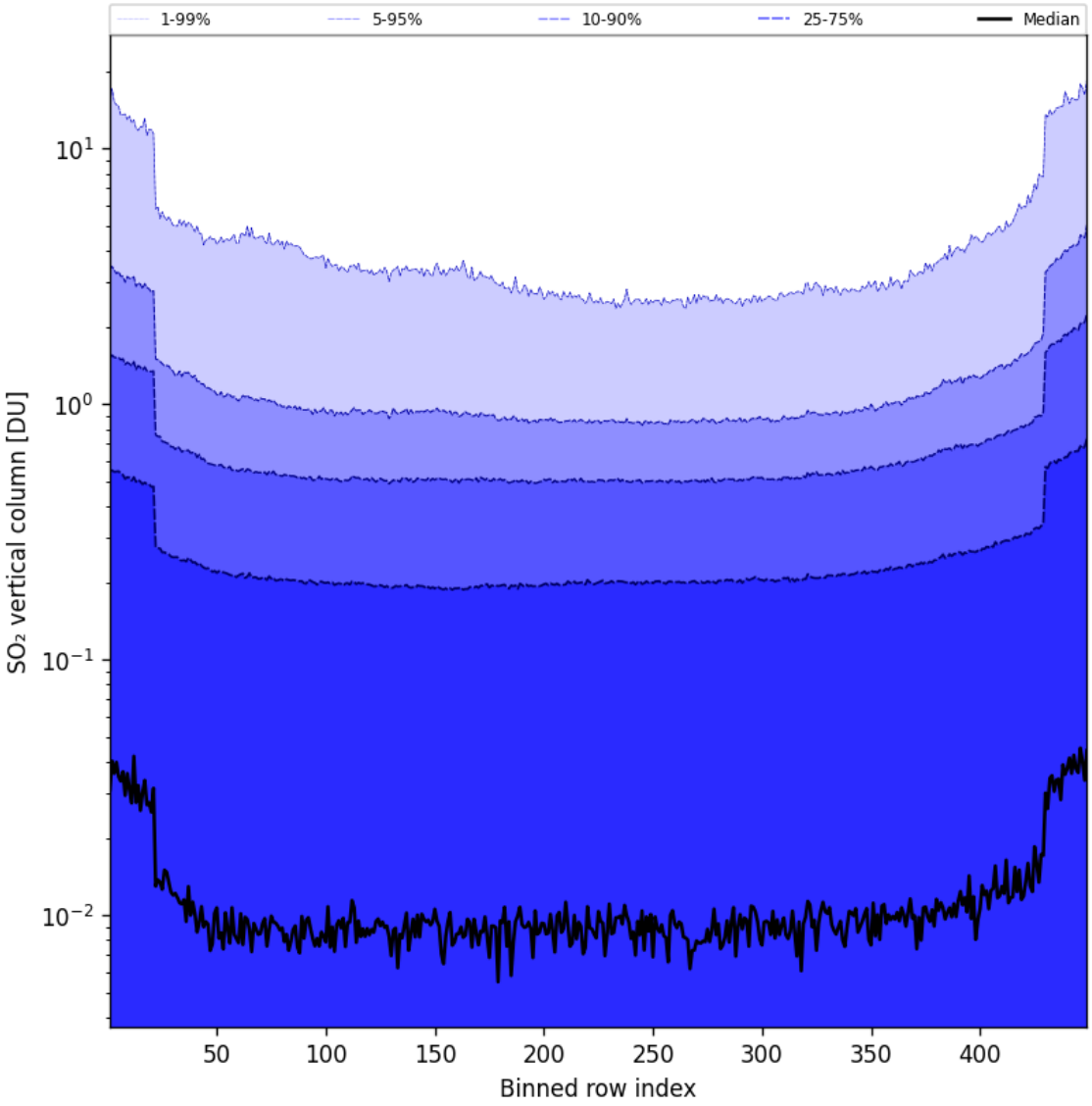


Figure 85: Along track statistics of "SO_2 vertical column" for 2025-02-18 to 2025-02-19

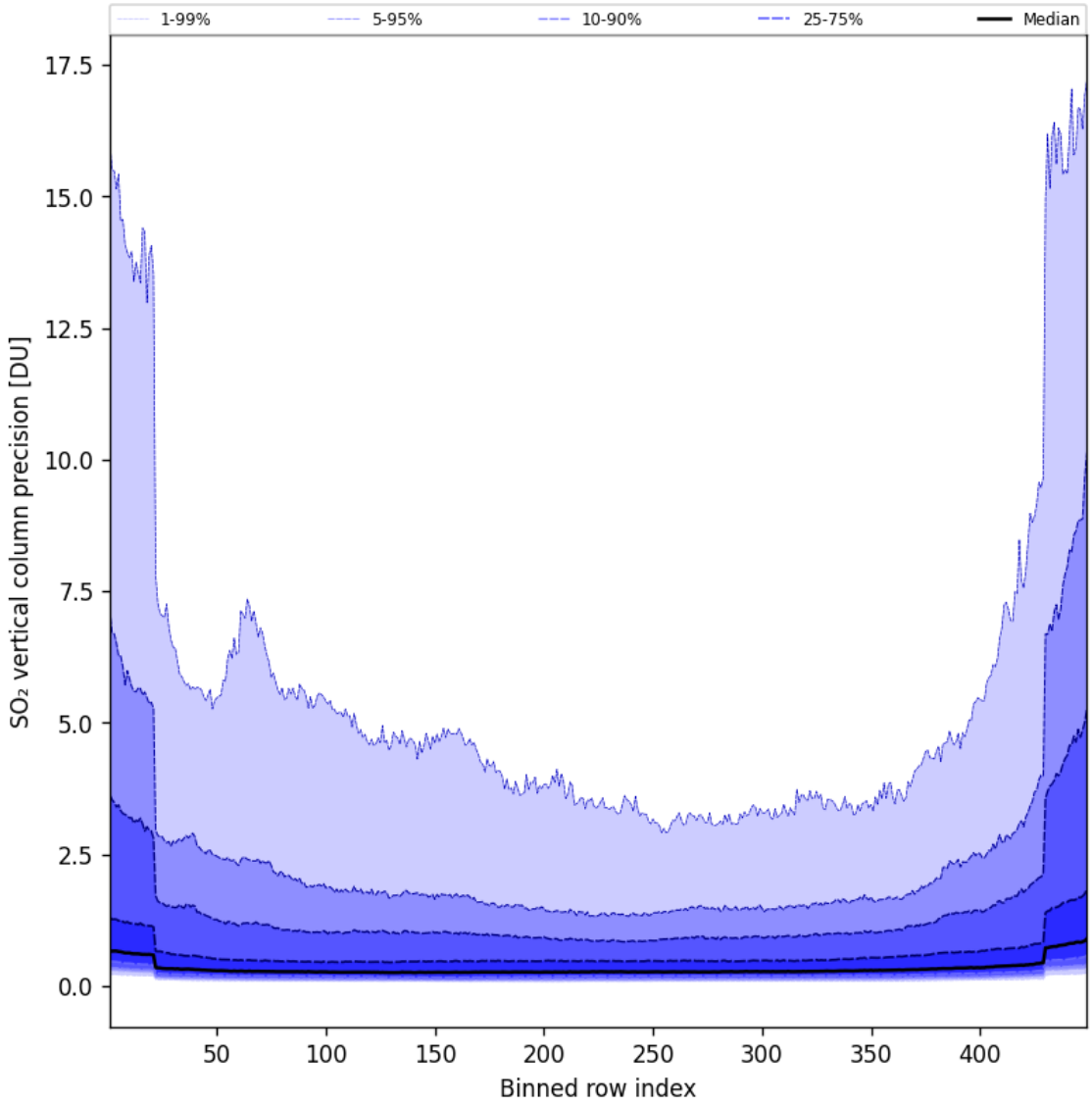


Figure 86: Along track statistics of "SO_2 vertical column precision" for 2025-02-18 to 2025-02-19

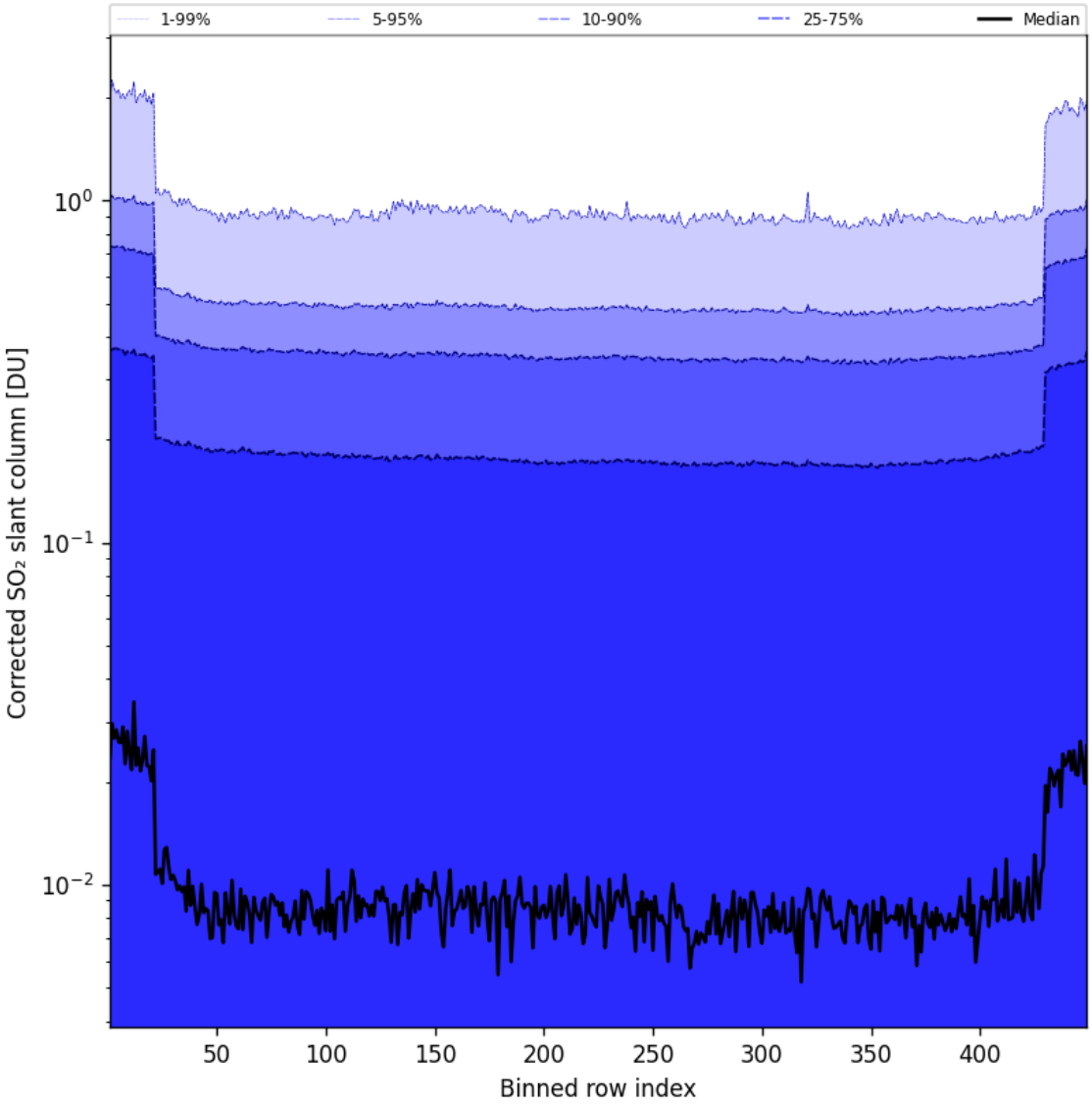


Figure 87: Along track statistics of "Corrected SO_2 slant column" for 2025-02-18 to 2025-02-19

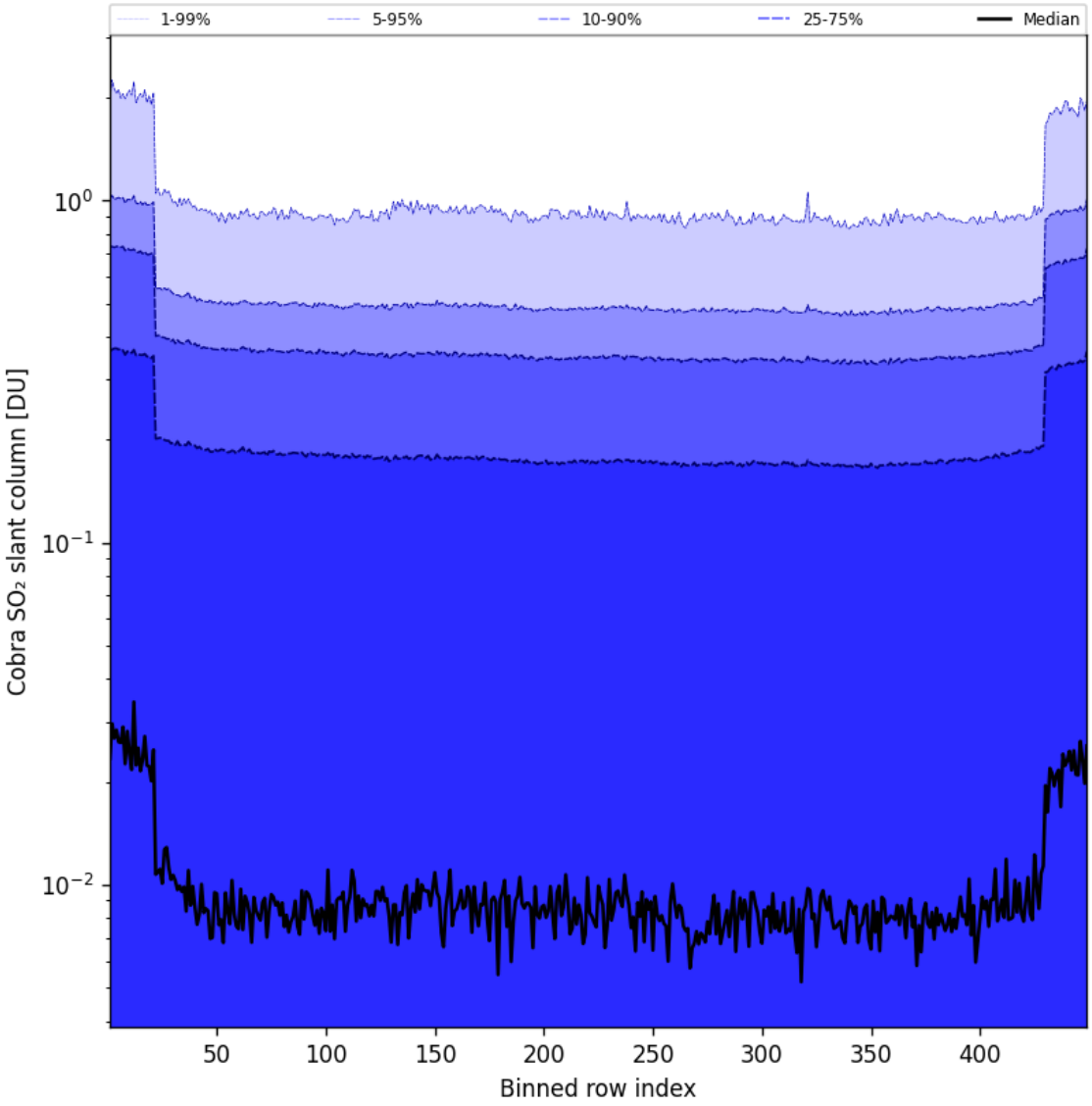


Figure 88: Along track statistics of “Cobra SO_2 slant column” for 2025-02-18 to 2025-02-19

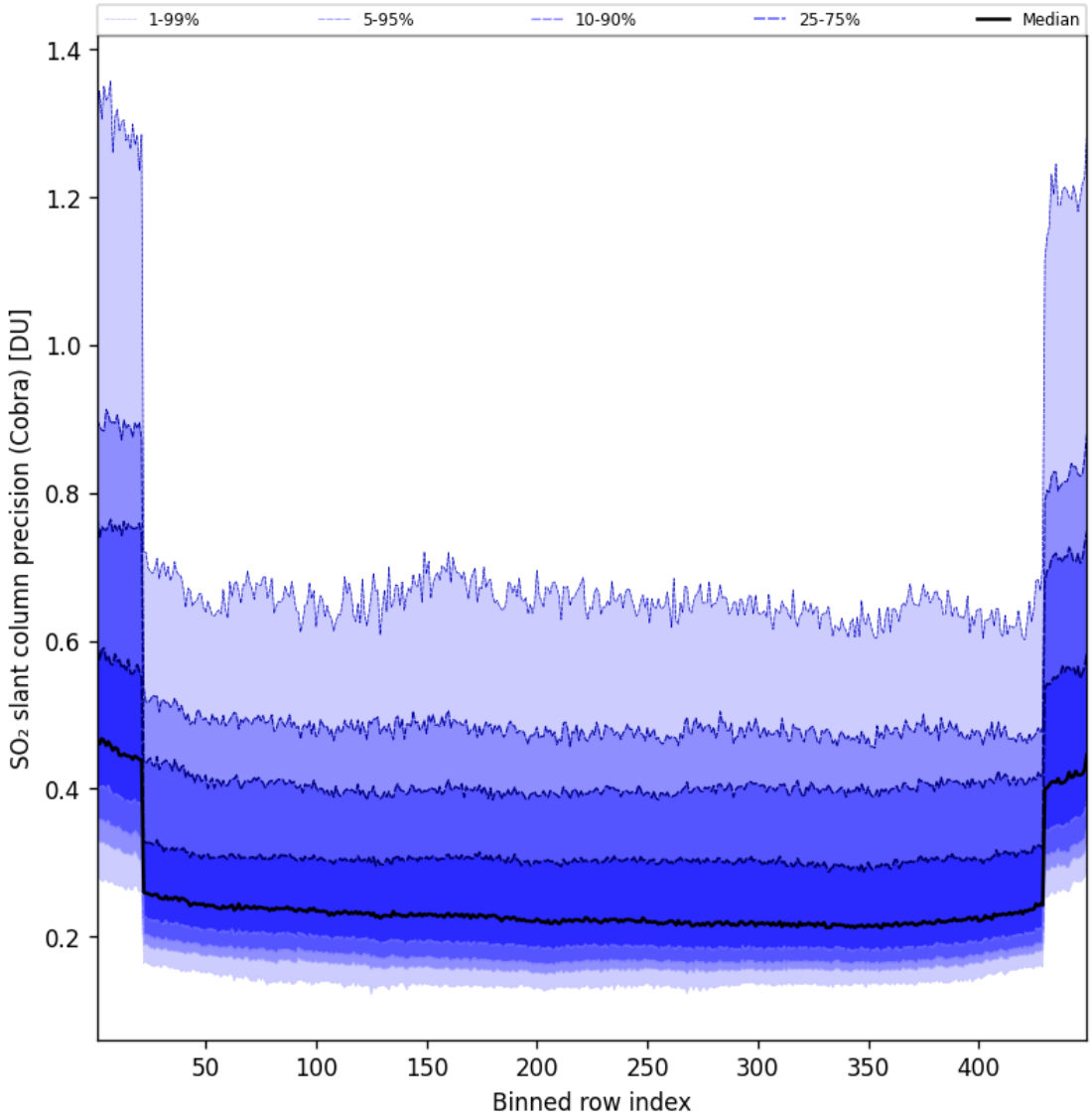


Figure 89: Along track statistics of "SO_2 slant column precision (Cobra)" for 2025-02-18 to 2025-02-19

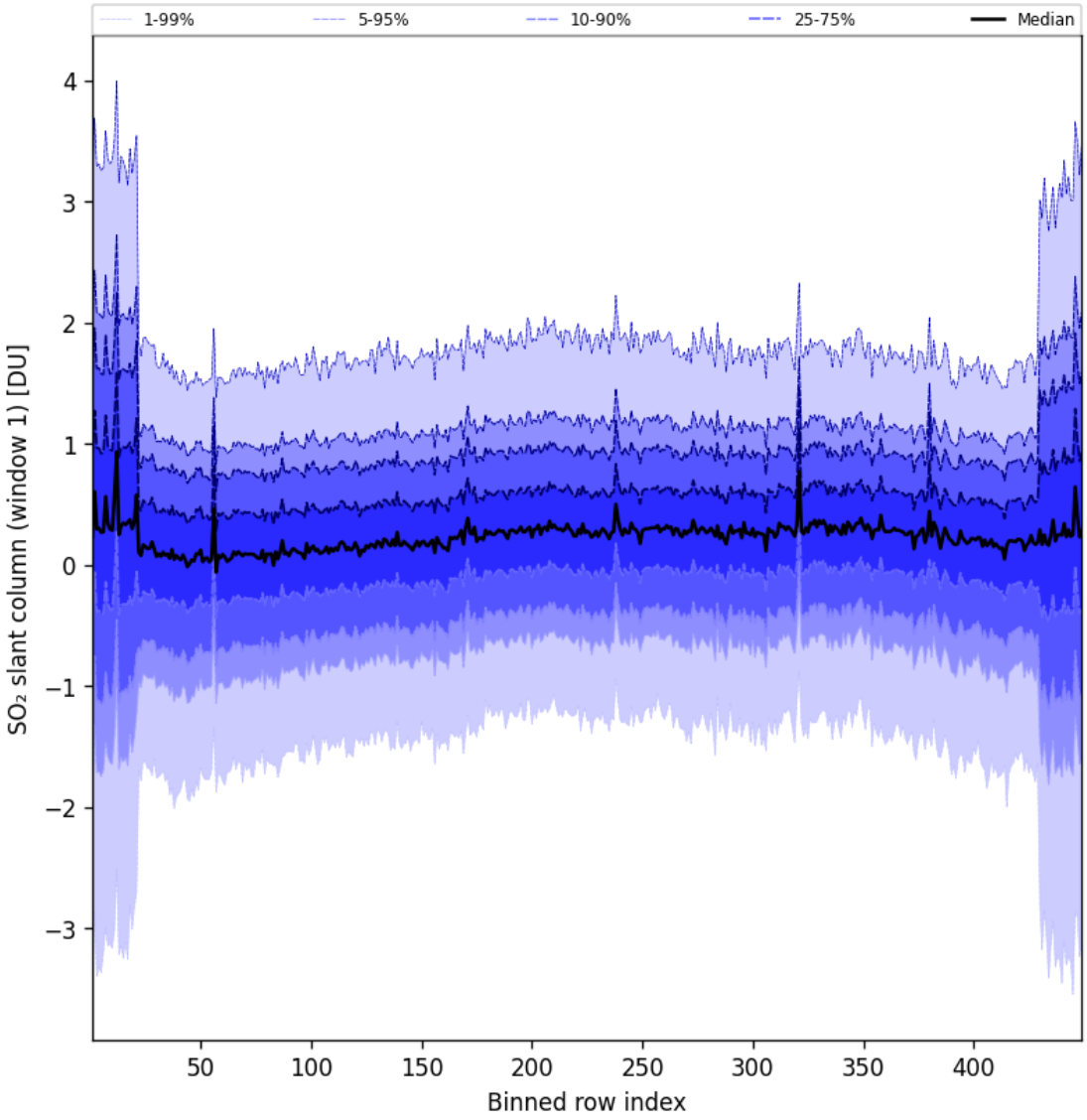


Figure 90: Along track statistics of "SO_2 slant column (window 1)" for 2025-02-18 to 2025-02-19

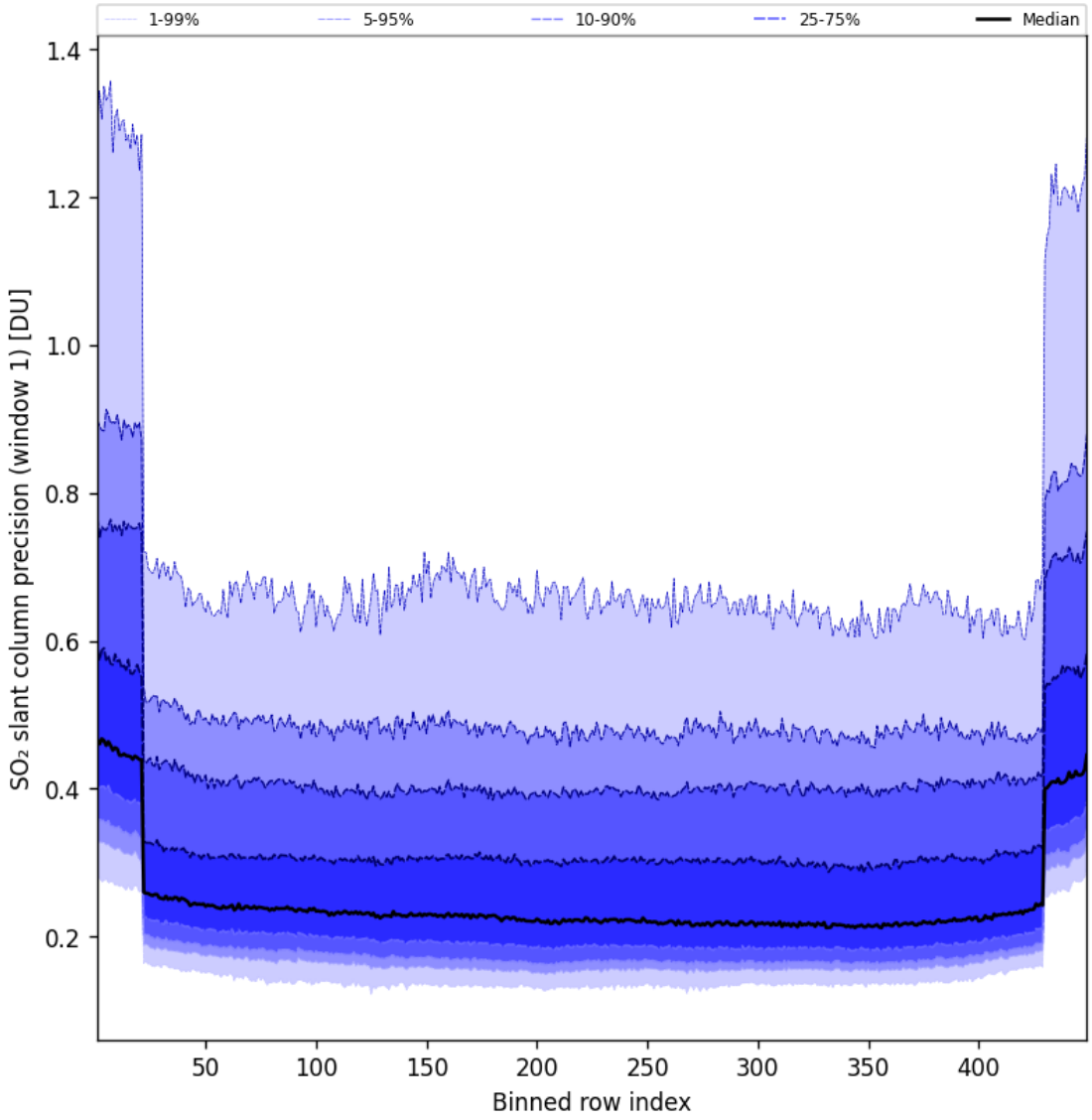


Figure 91: Along track statistics of "SO_2 slant column precision (window 1)" for 2025-02-18 to 2025-02-19

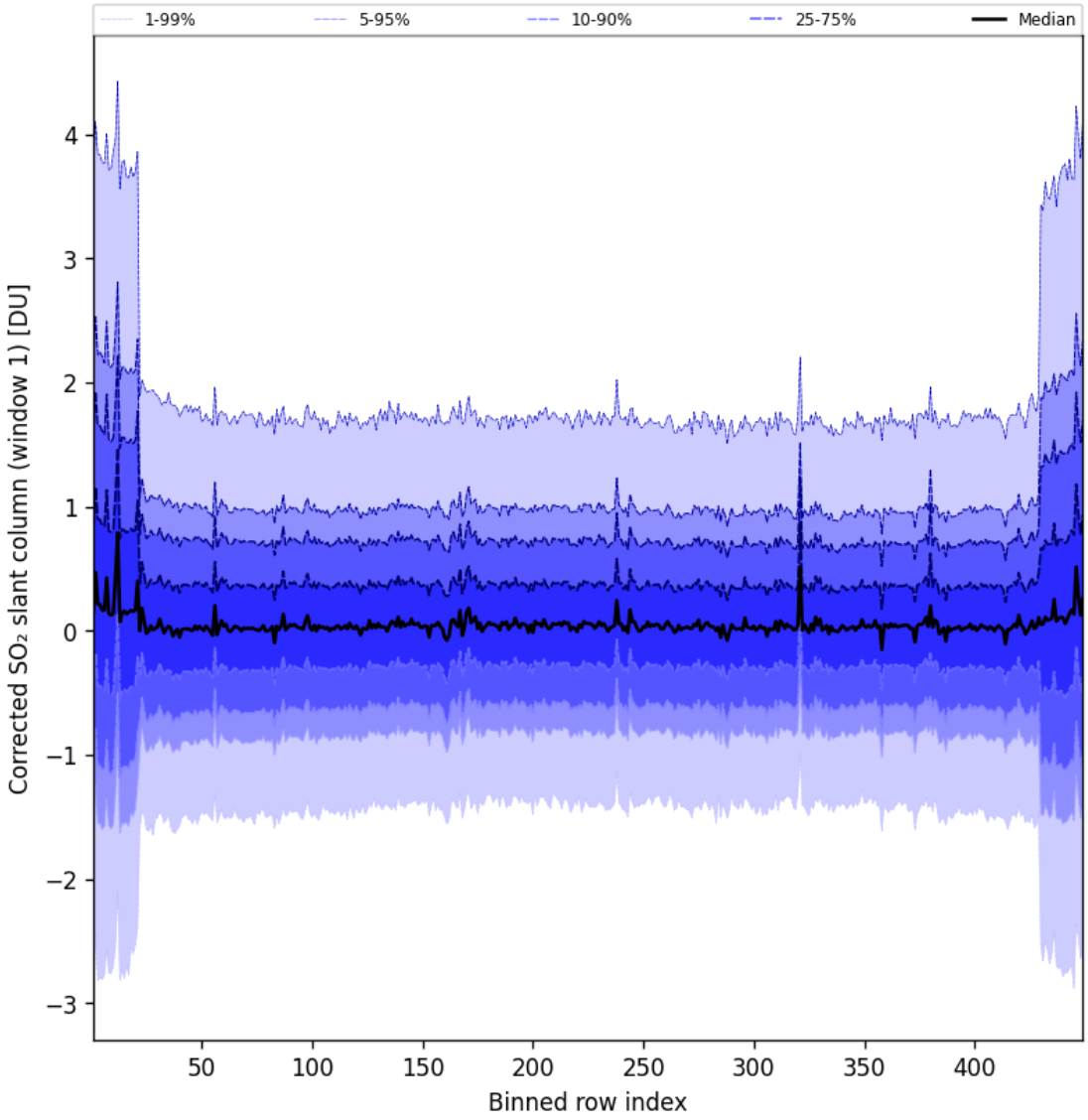


Figure 92: Along track statistics of “Corrected SO_2 slant column (window 1)” for 2025-02-18 to 2025-02-19

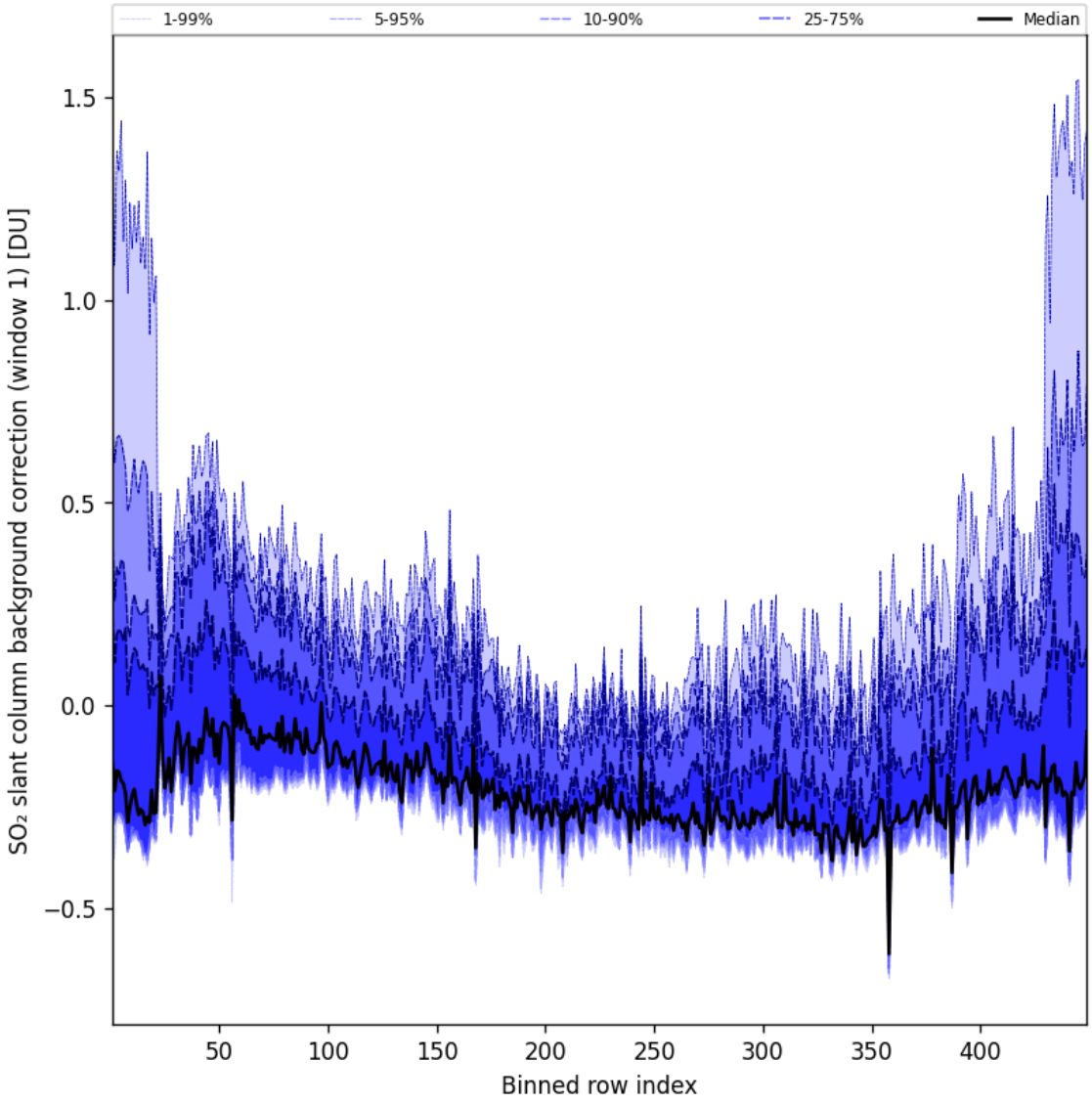


Figure 93: Along track statistics of "SO_2 slant column background correction (window 1)" for 2025-02-18 to 2025-02-19

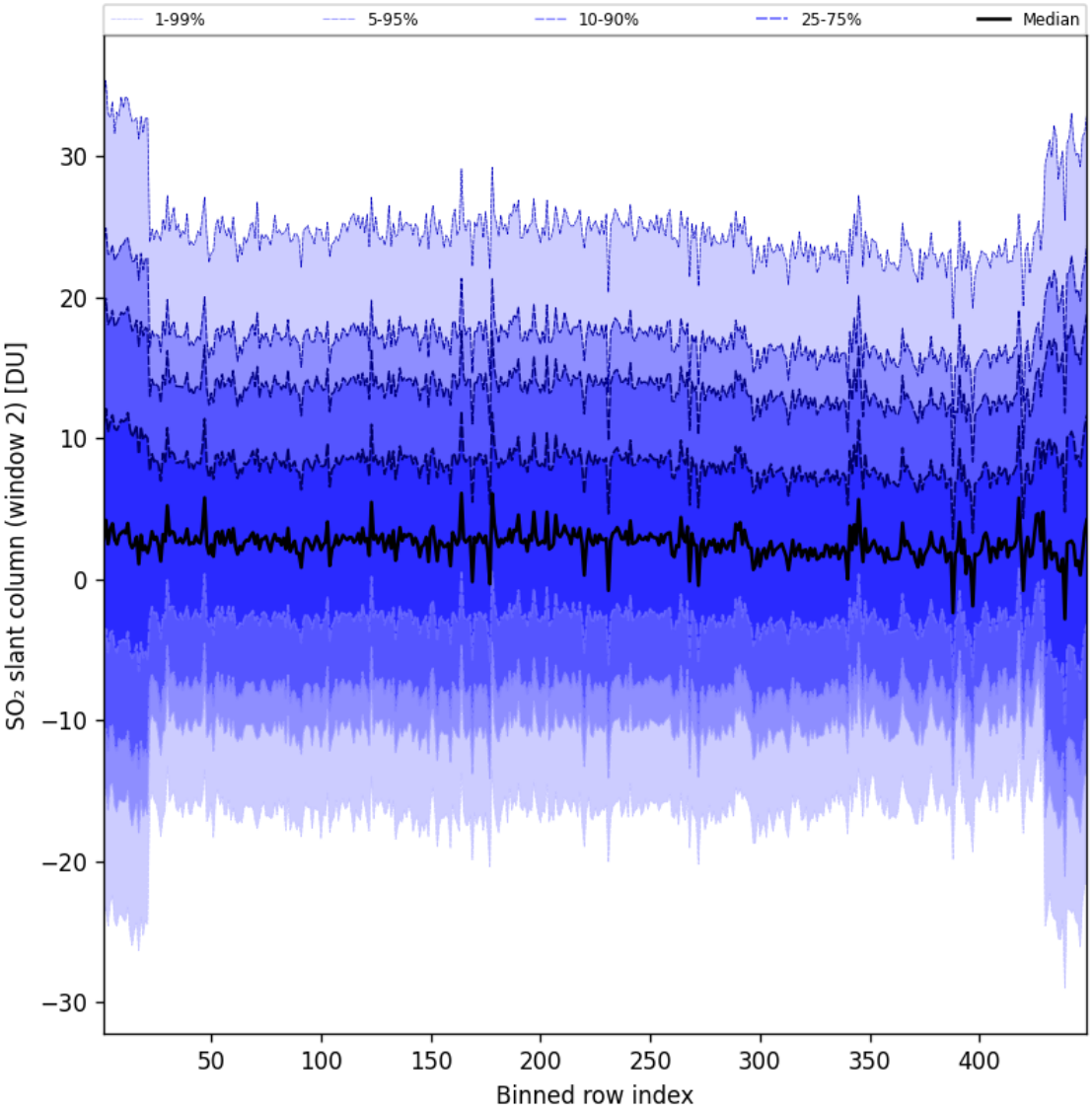


Figure 94: Along track statistics of "SO_2 slant column (window 2)" for 2025-02-18 to 2025-02-19

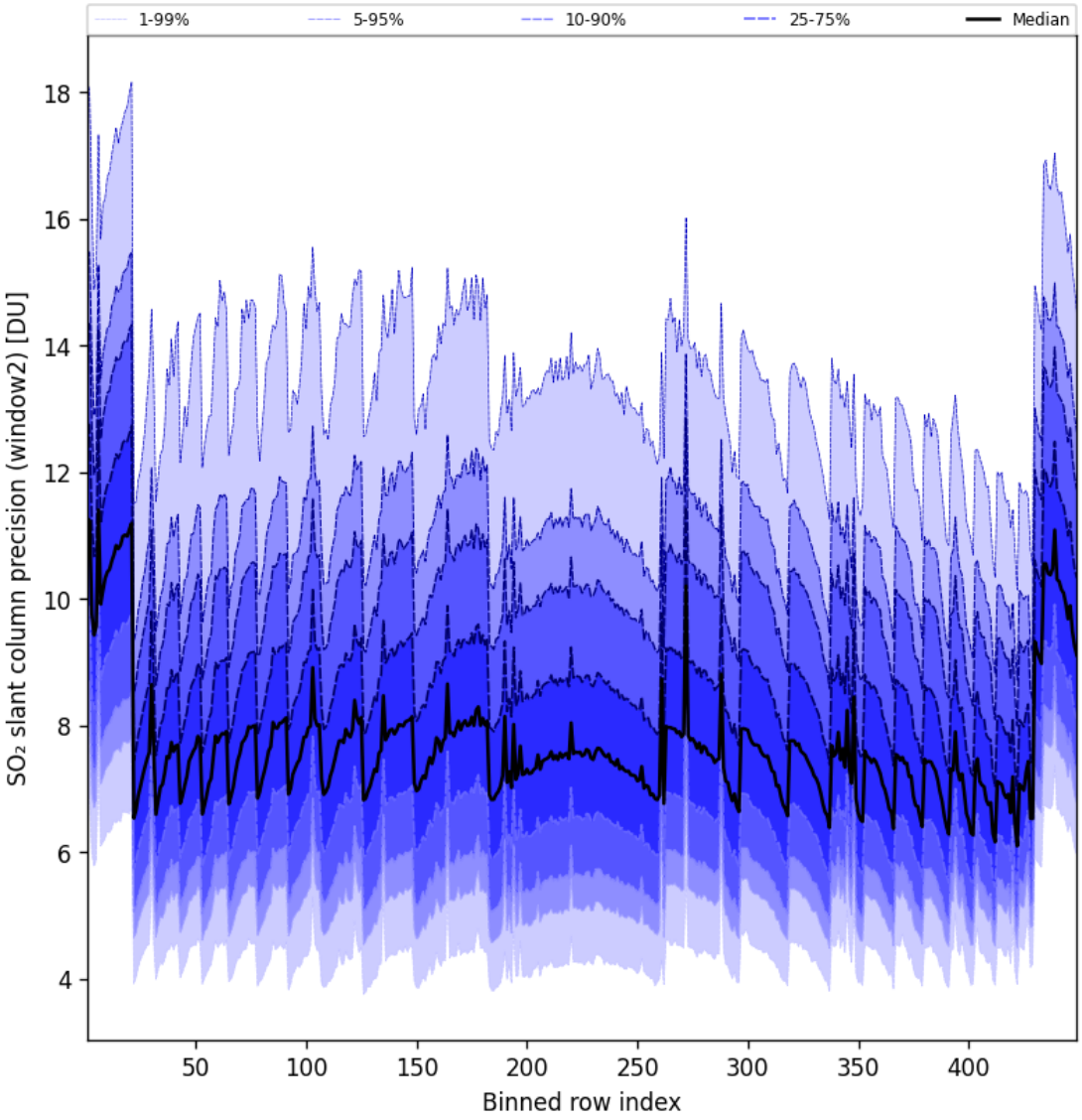


Figure 95: Along track statistics of "SO_2 slant column precision (window2)" for 2025-02-18 to 2025-02-19

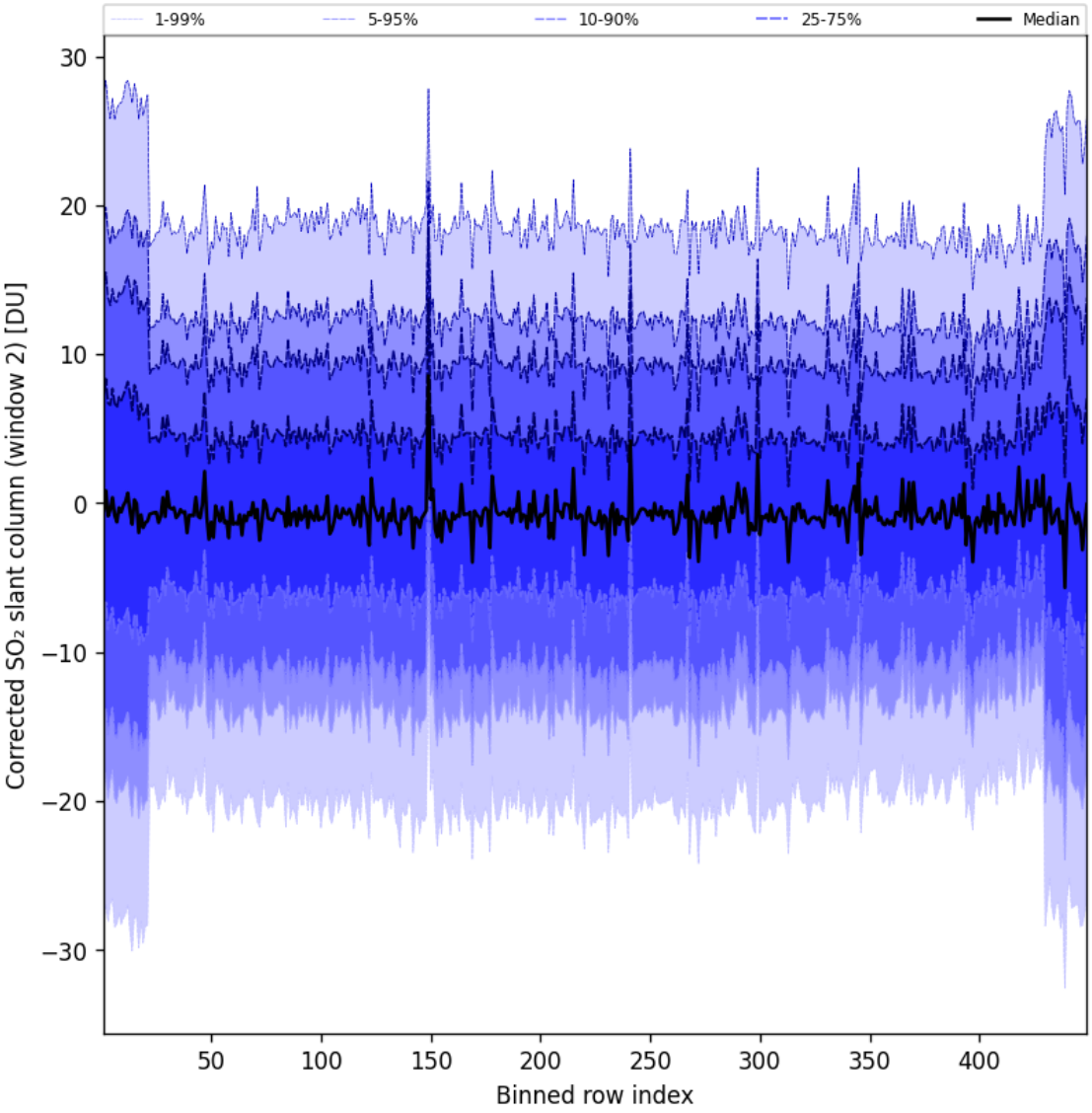


Figure 96: Along track statistics of "Corrected SO_2 slant column (window 2)" for 2025-02-18 to 2025-02-19

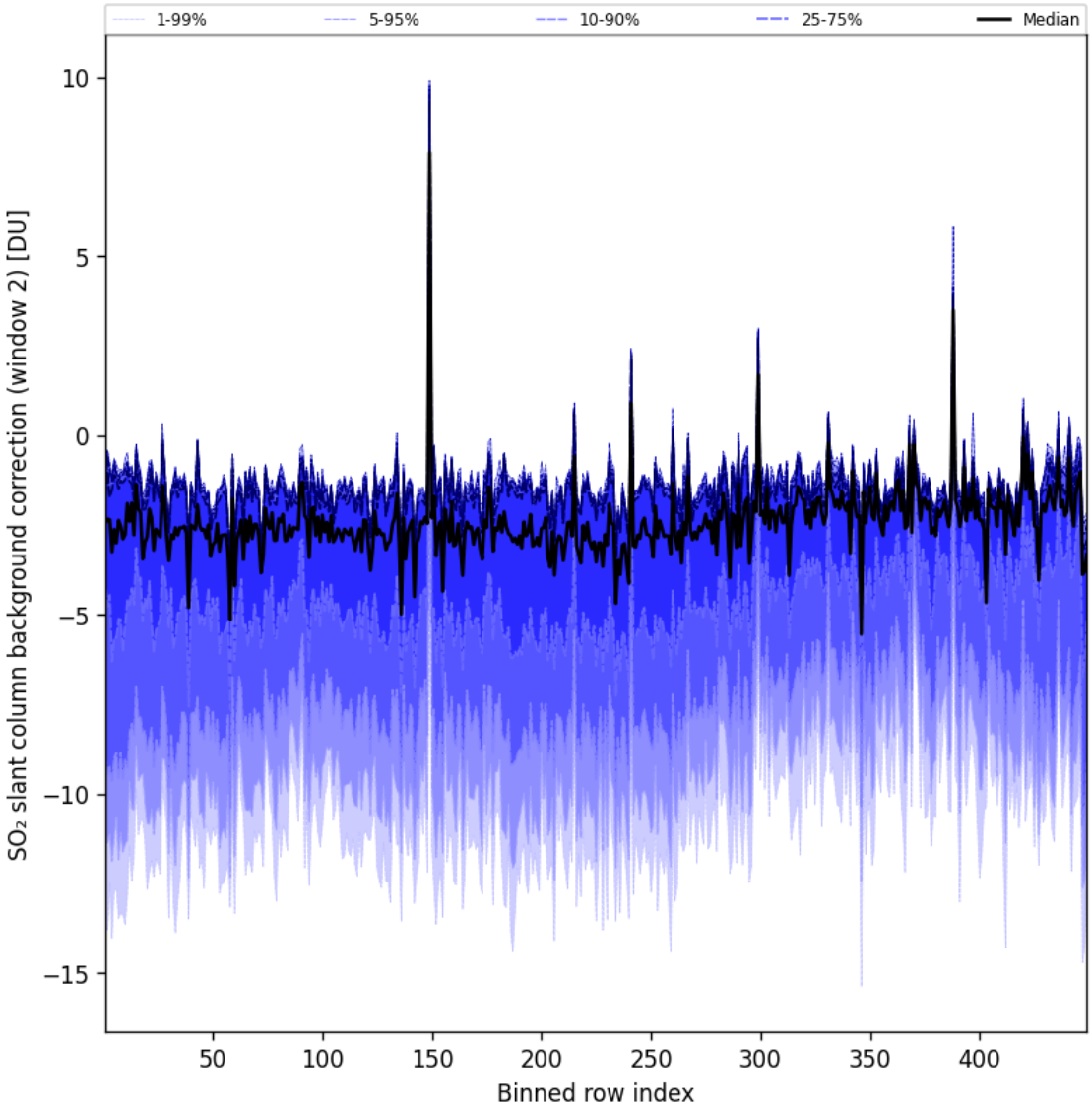


Figure 97: Along track statistics of "SO_2 slant column background correction (window 2)" for 2025-02-18 to 2025-02-19

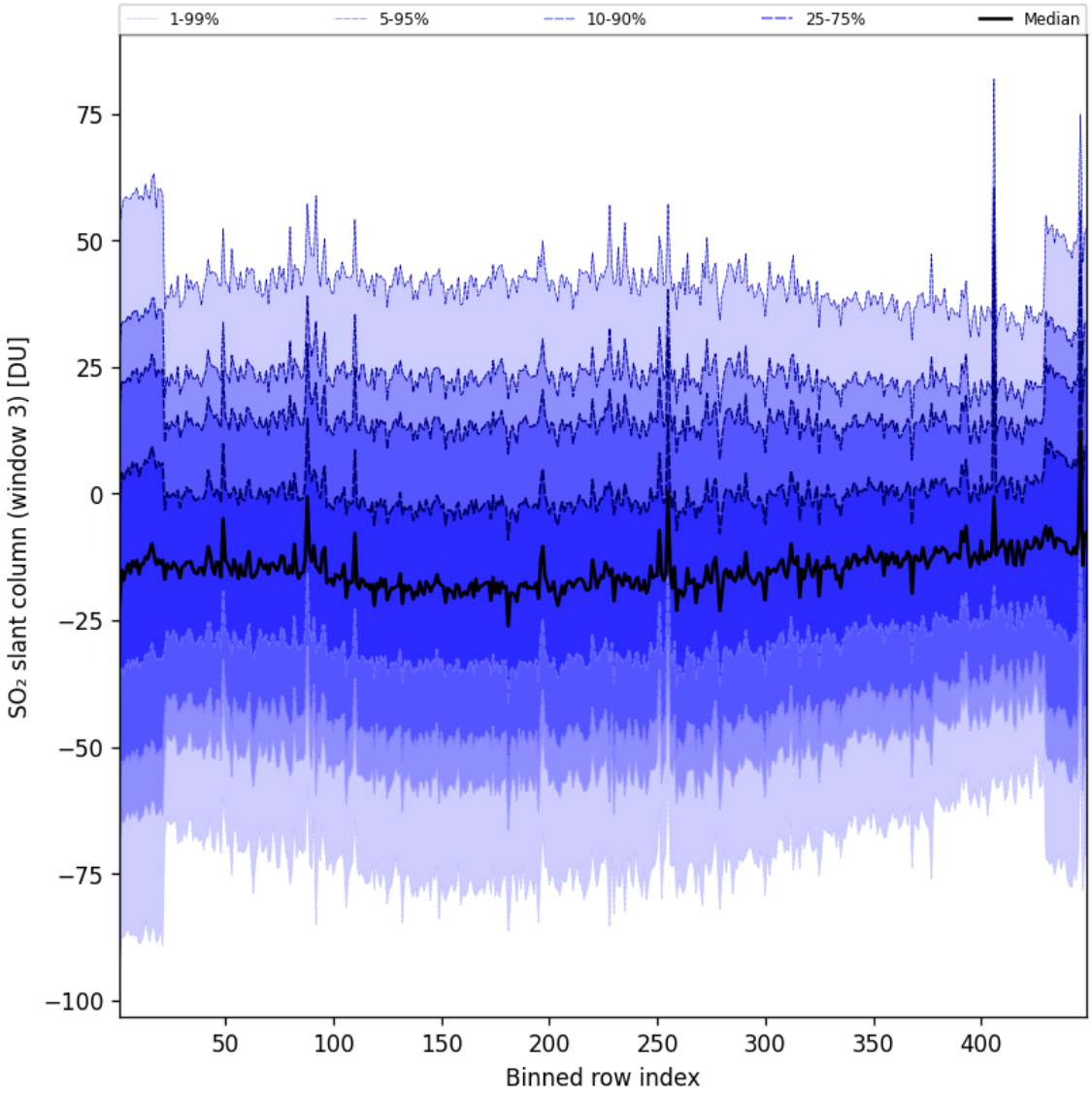


Figure 98: Along track statistics of "SO_2 slant column (window 3)" for 2025-02-18 to 2025-02-19

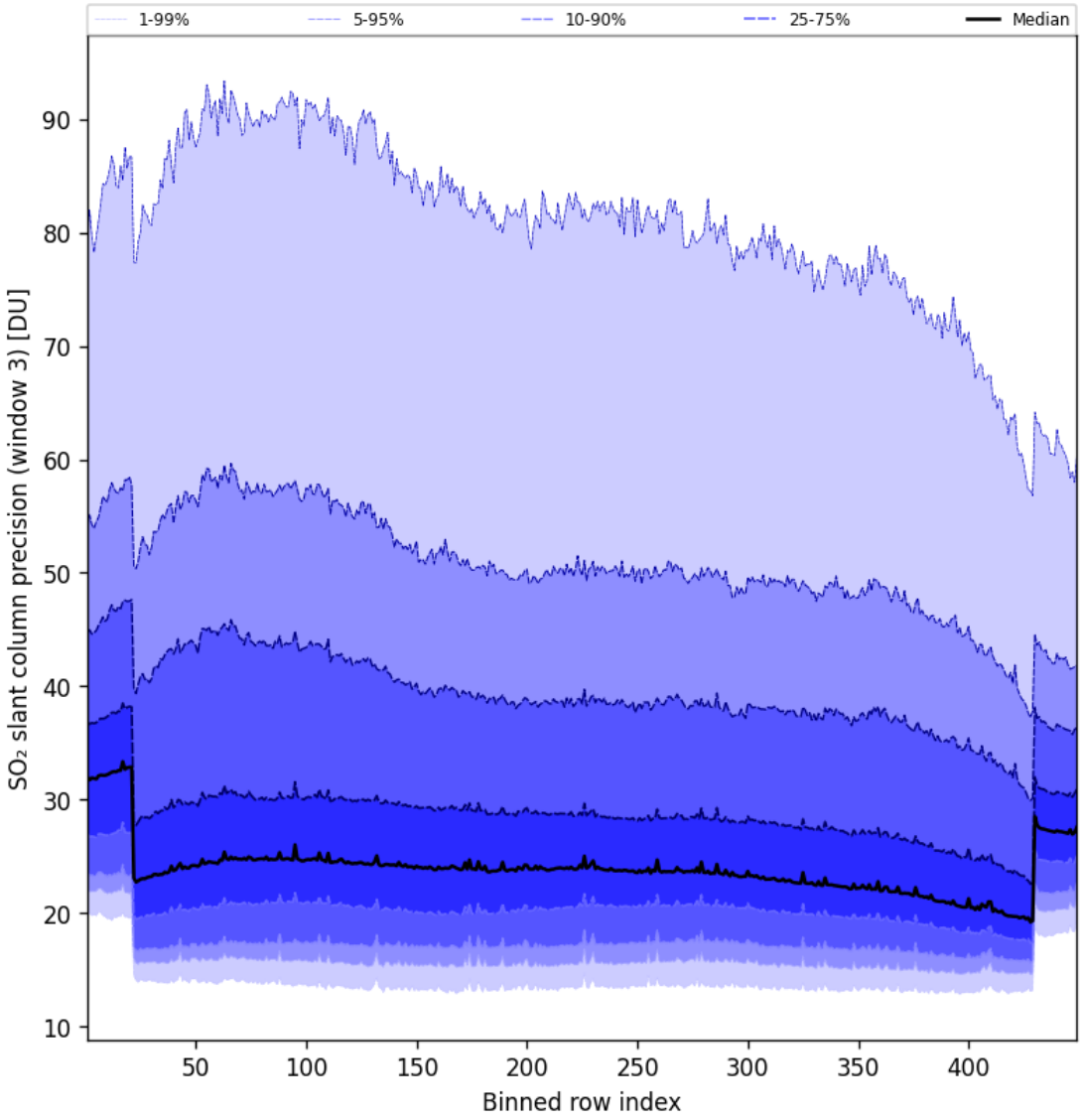


Figure 99: Along track statistics of "SO_2 slant column precision (window 3)" for 2025-02-18 to 2025-02-19

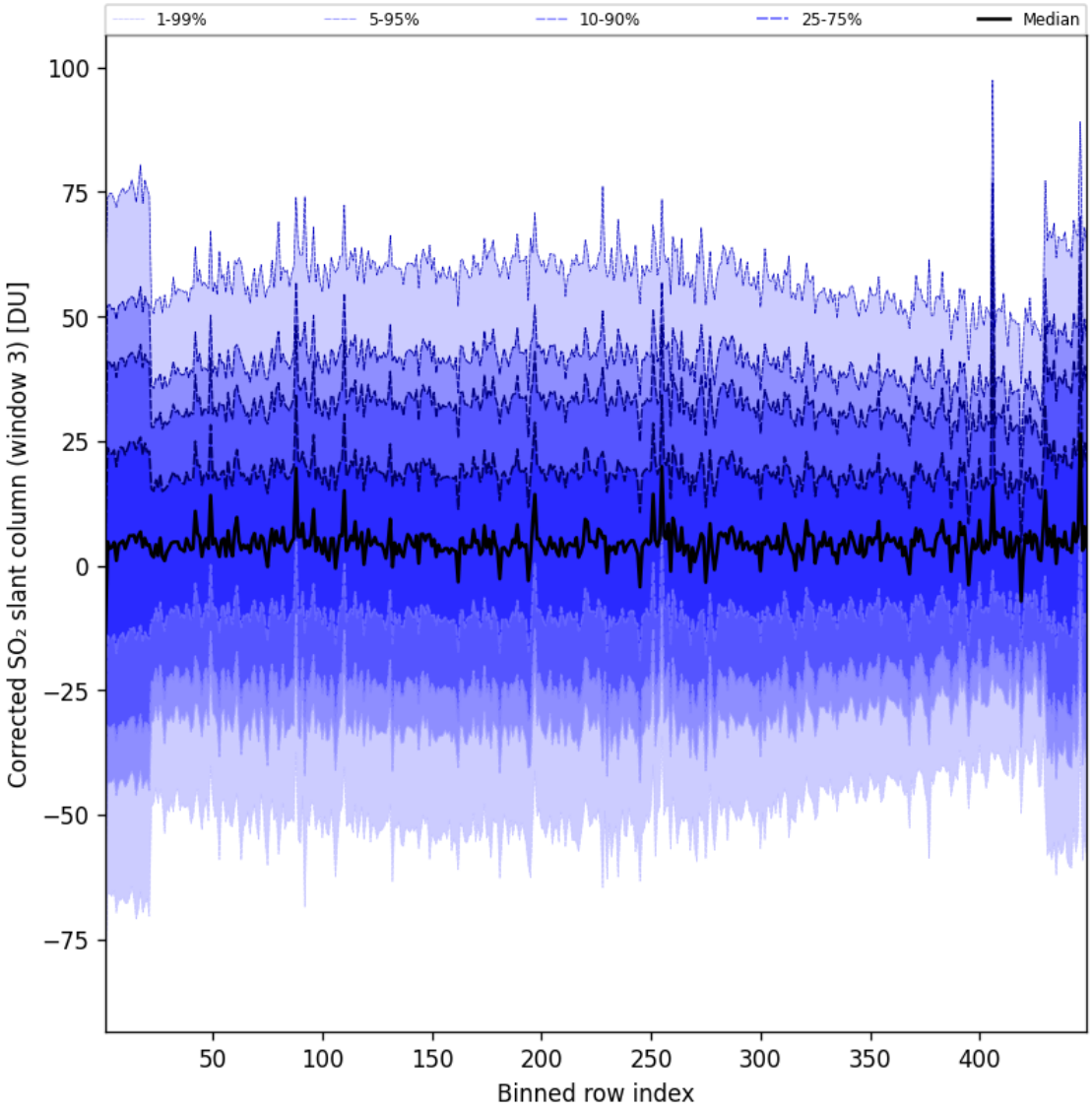


Figure 100: Along track statistics of “Corrected SO_2 slant column (window 3)” for 2025-02-18 to 2025-02-19

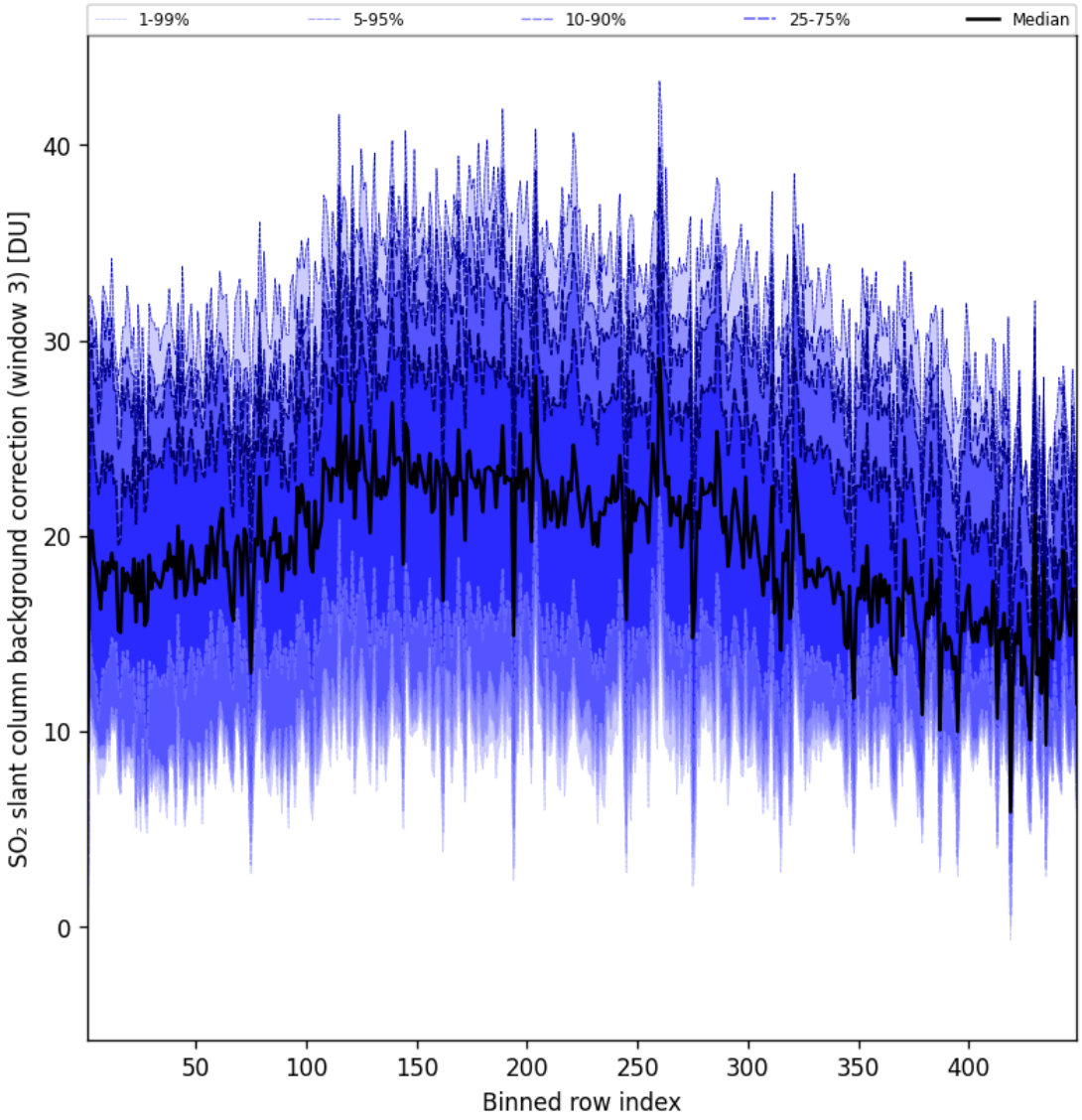
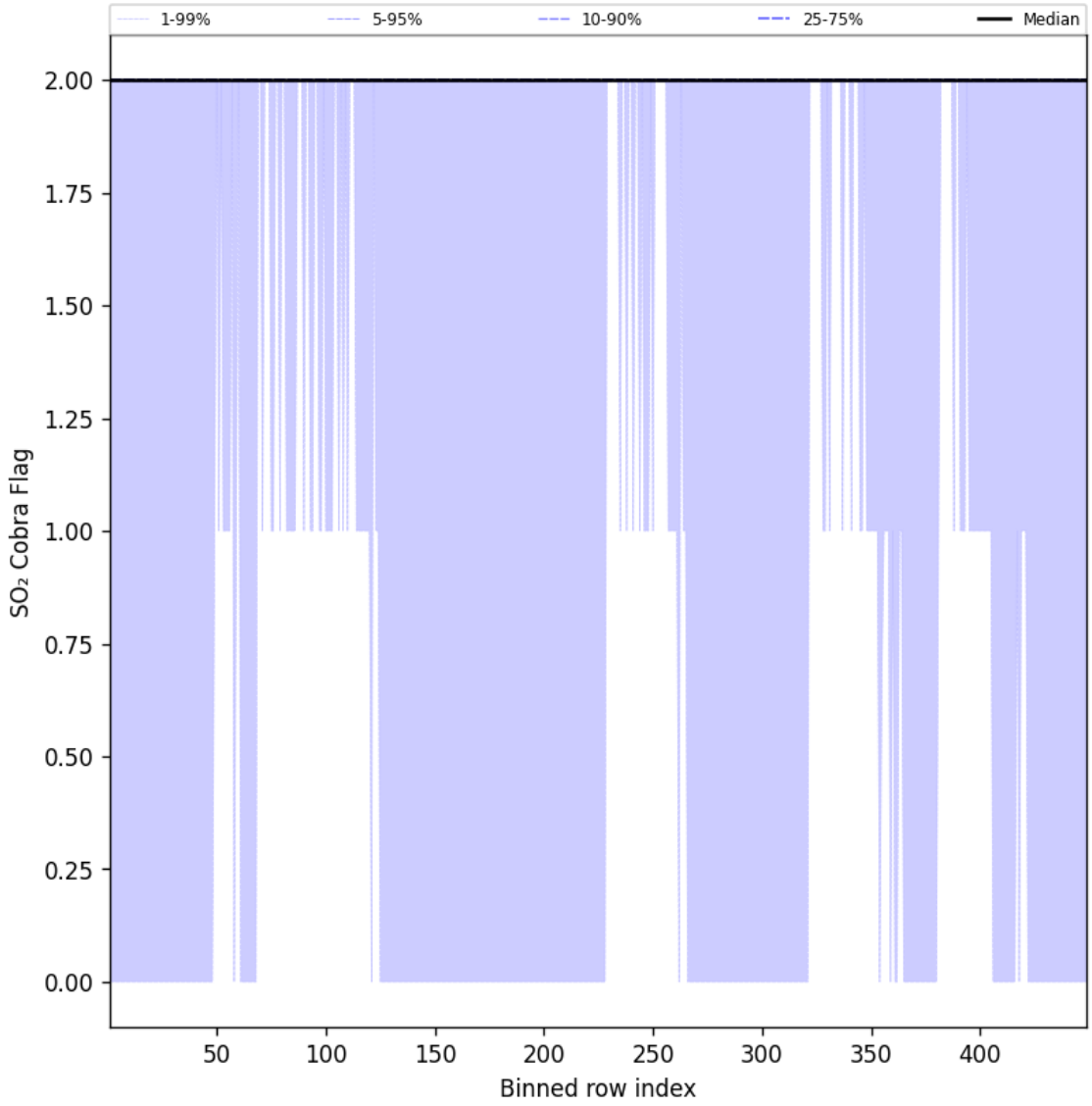


Figure 101: Along track statistics of "SO_2 slant column background correction (window 3)" for 2025-02-18 to 2025-02-19



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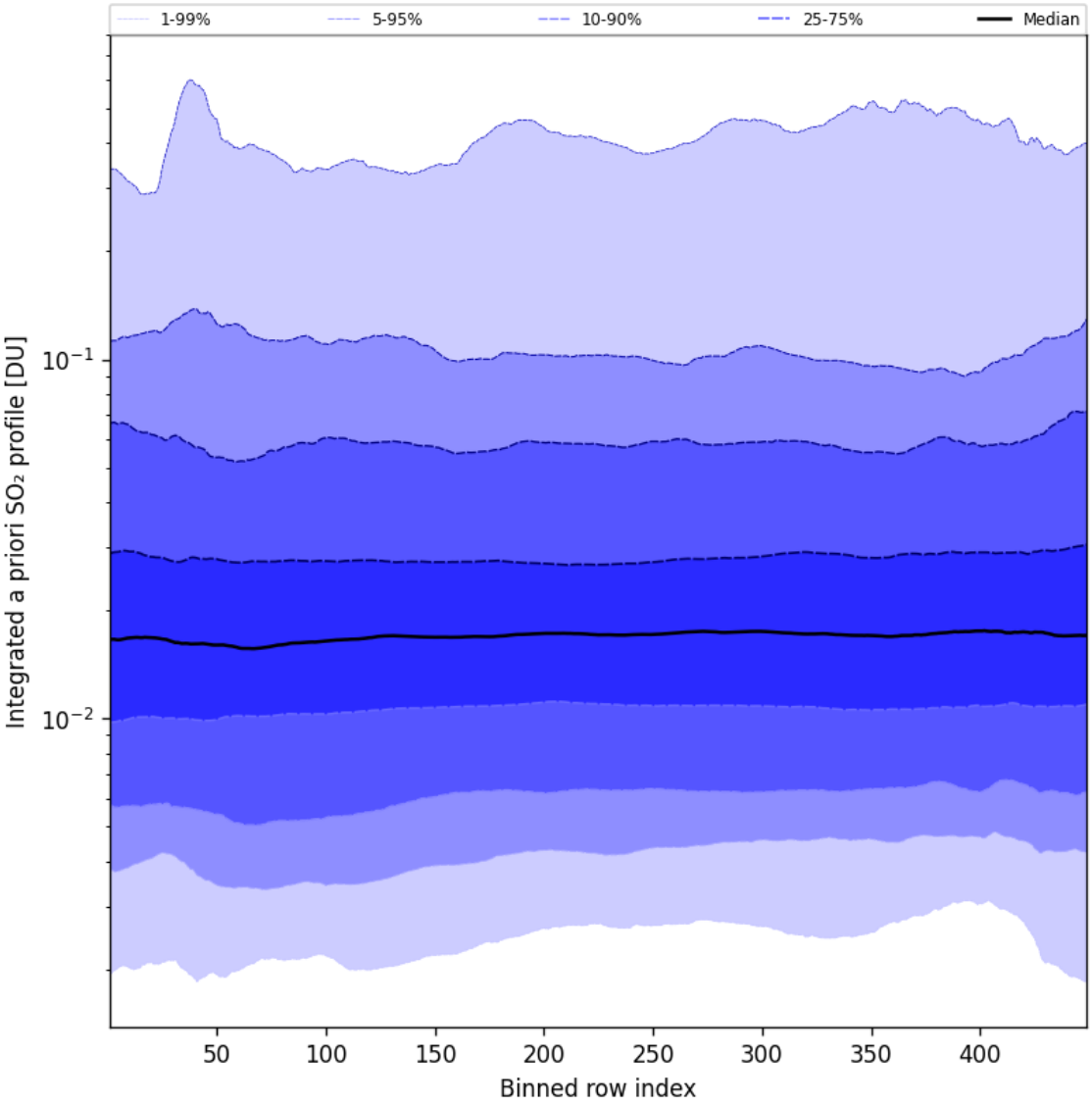
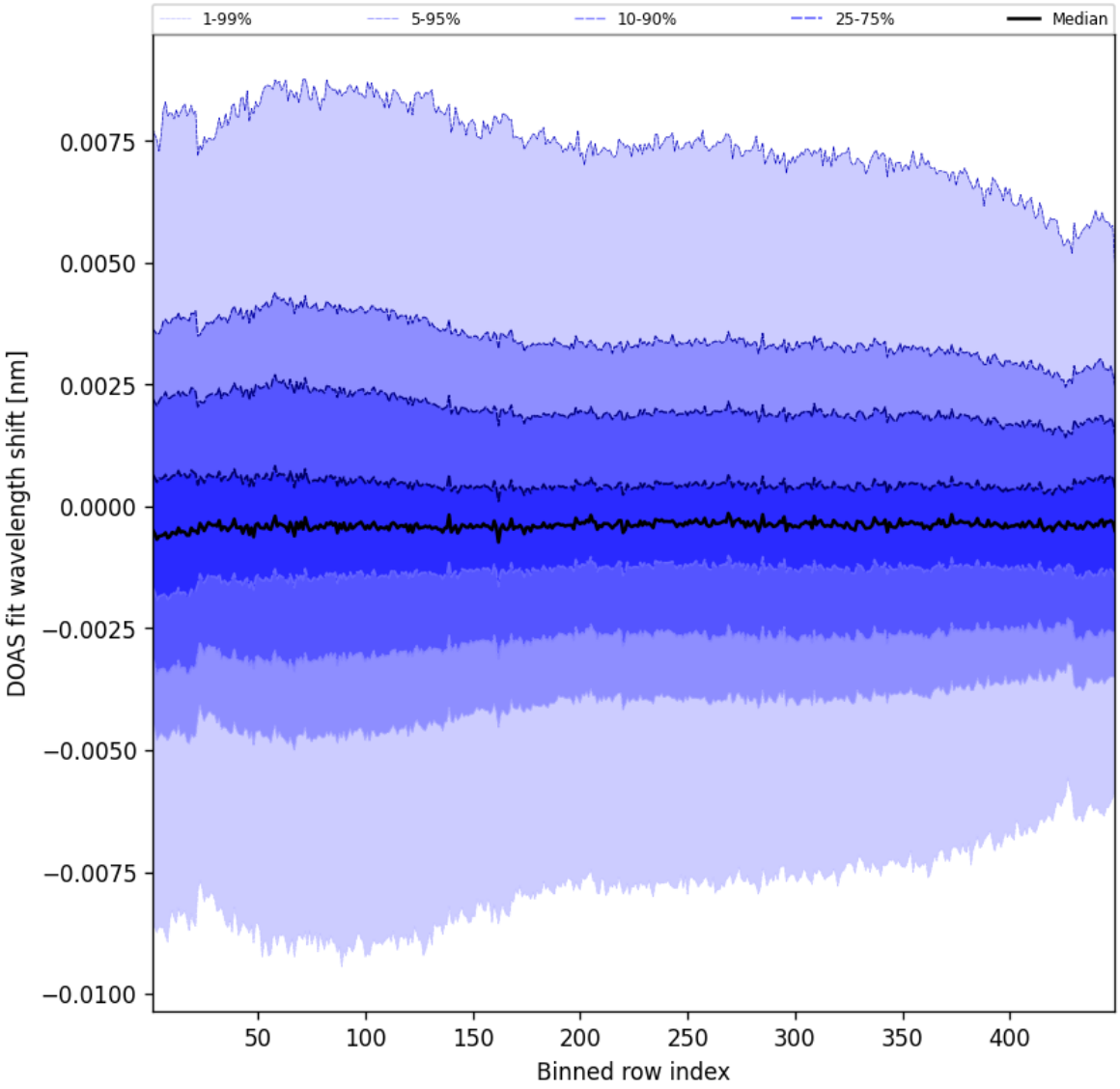


Figure 103: Along track statistics of “Integrated a priori SO_2 profile” for 2025-02-18 to 2025-02-19



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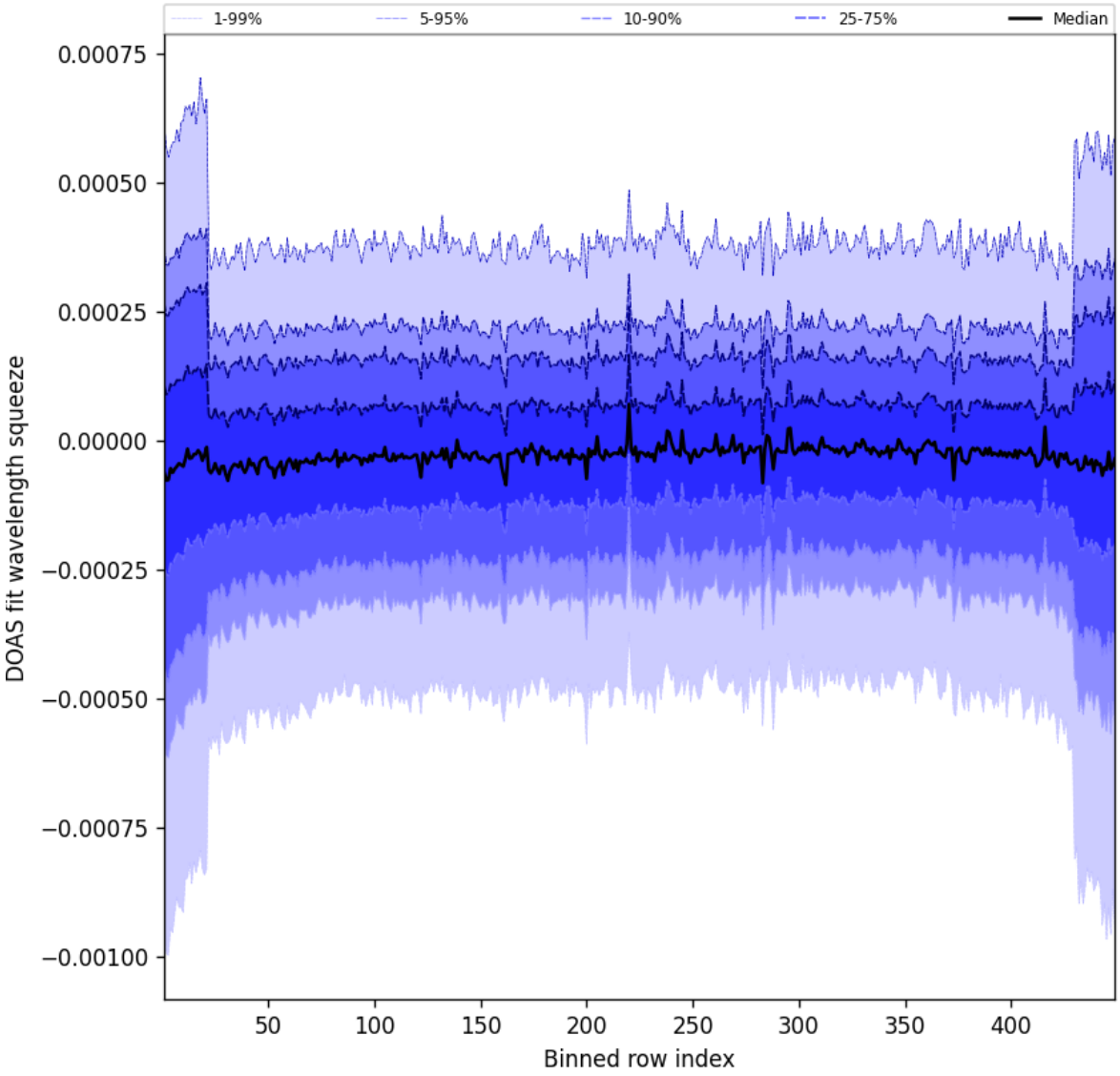

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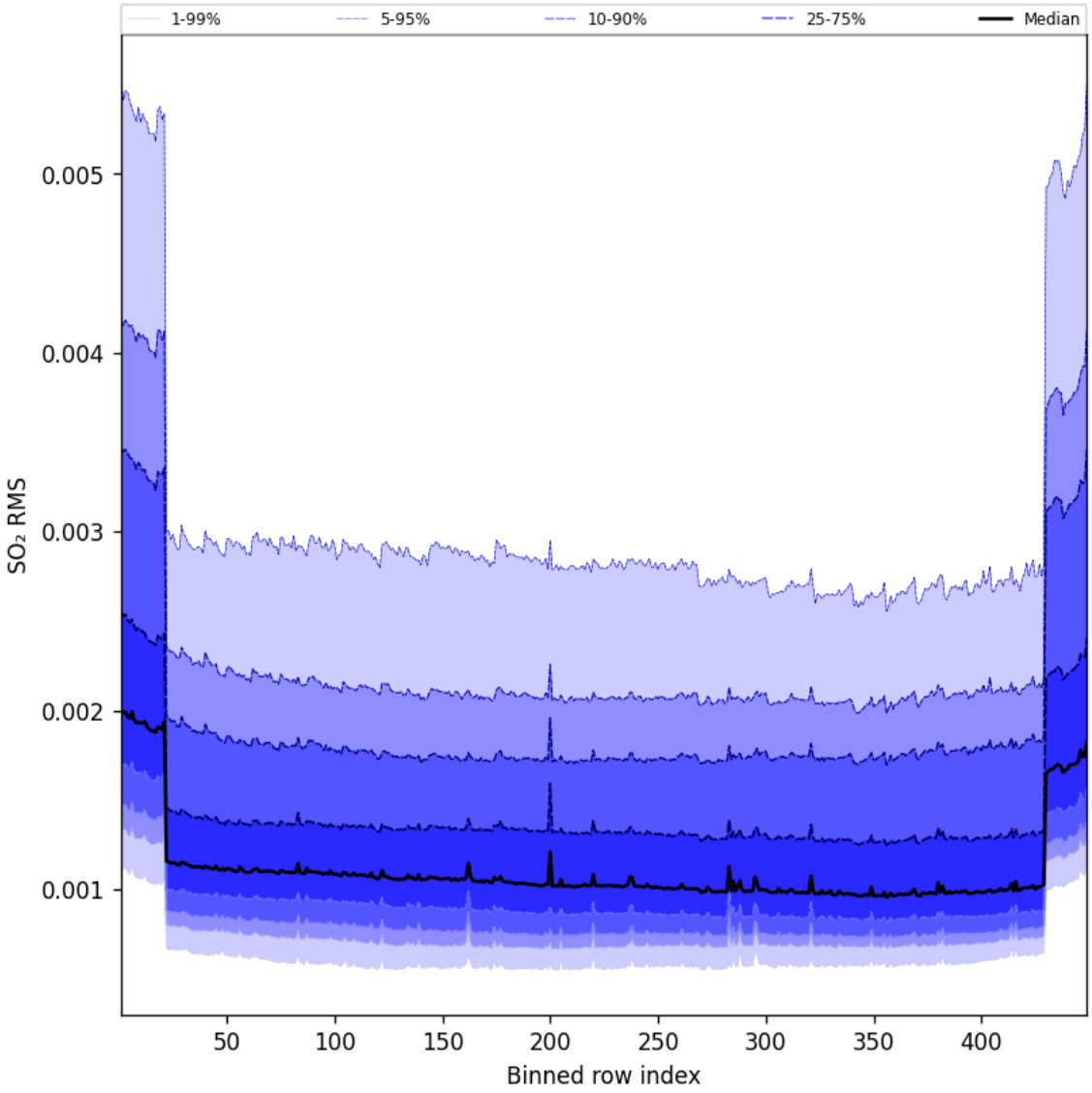


Figure 106: Along track statistics of "SO_2 RMS" for 2025-02-18 to 2025-02-19

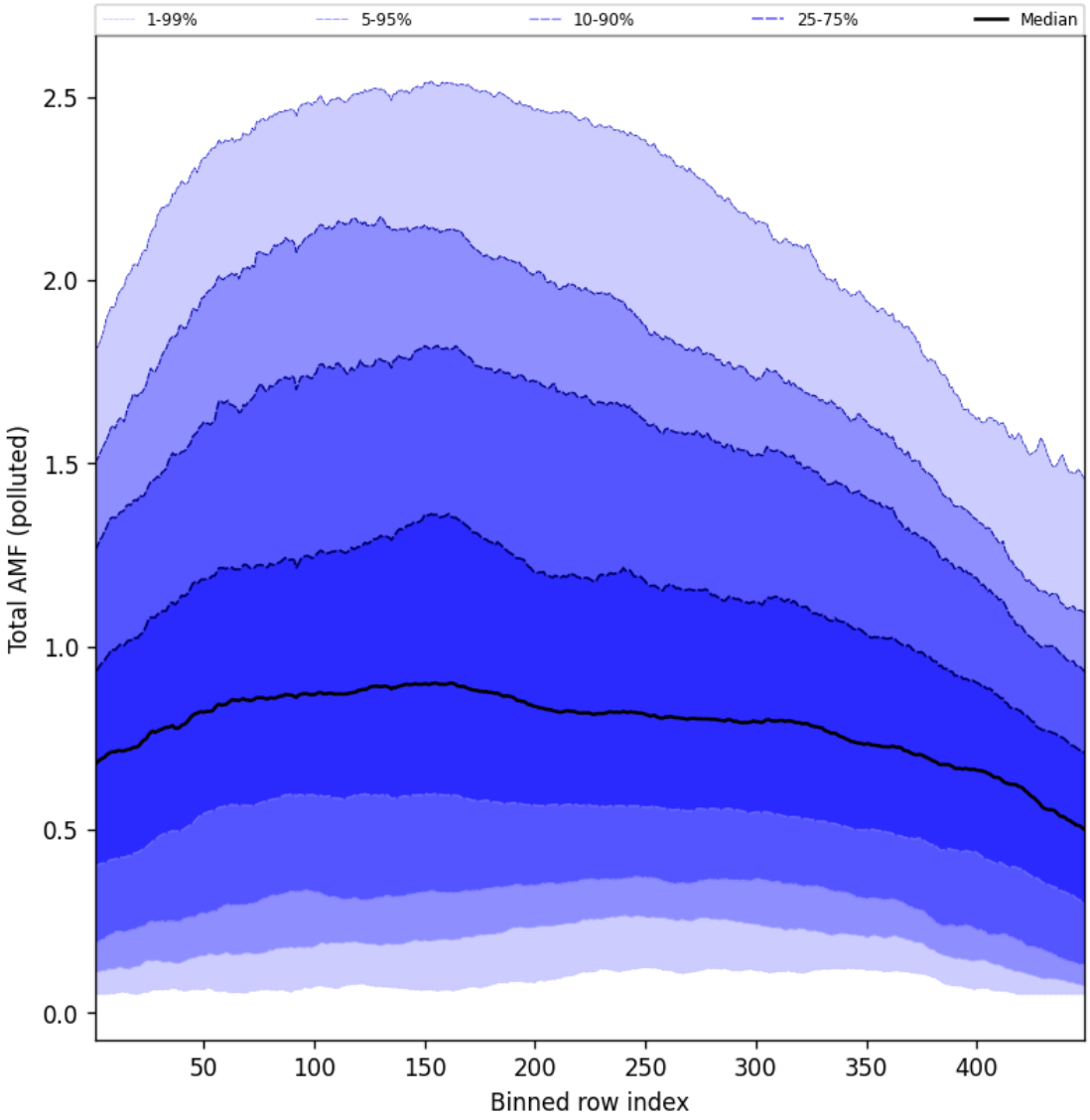
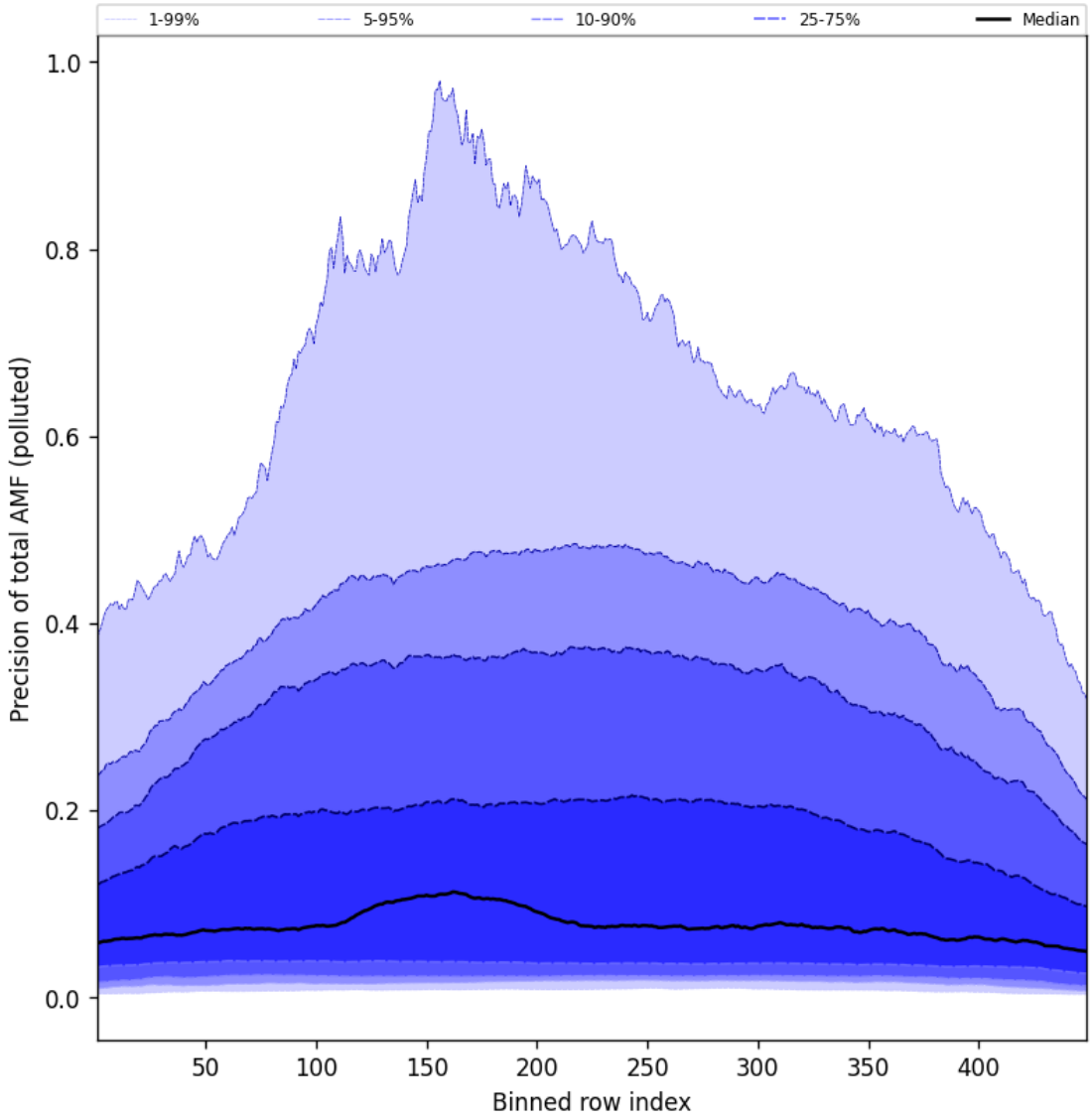


Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-02-18 to 2025-02-19



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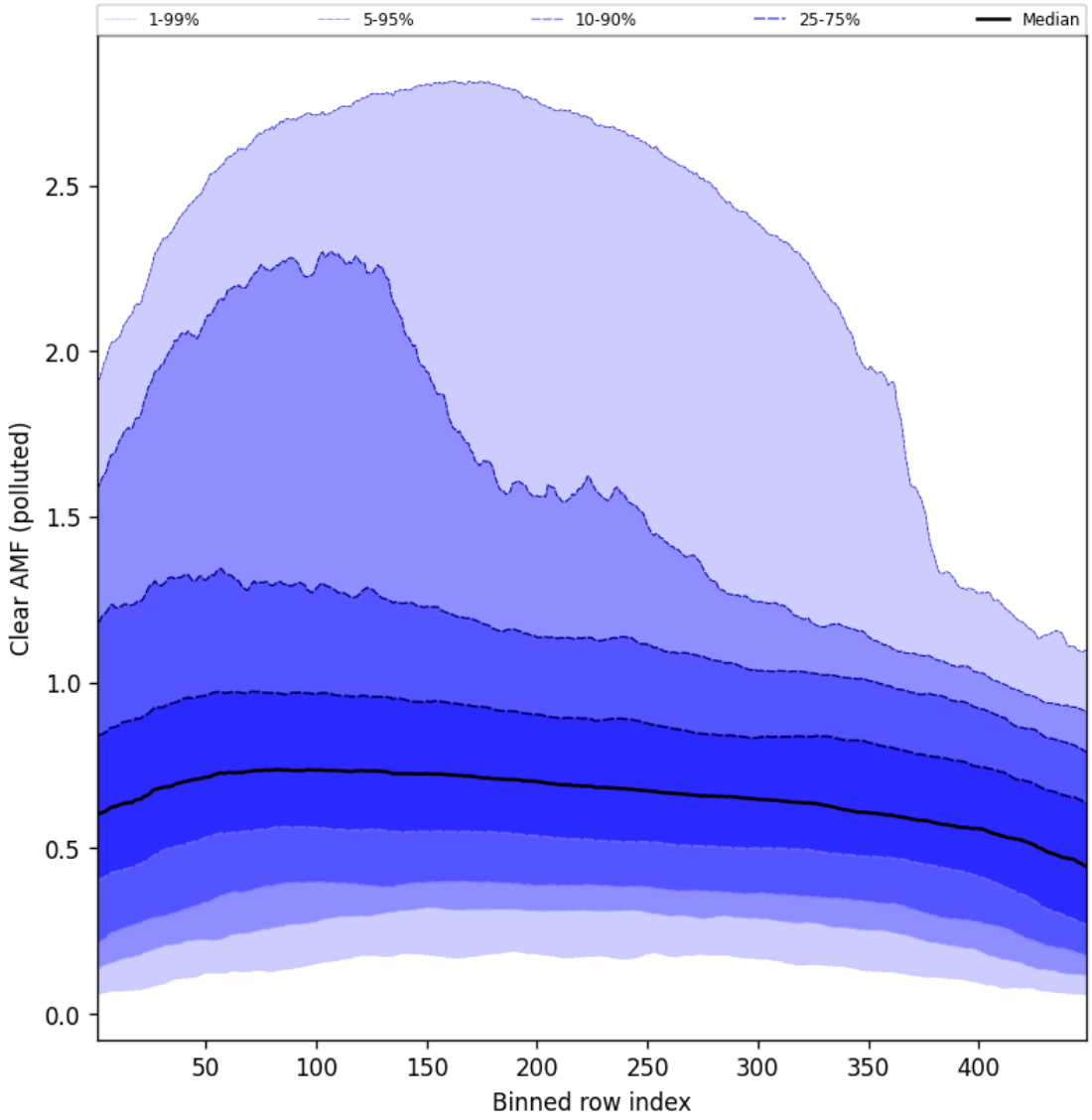

Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-02-18 to 2025-02-19

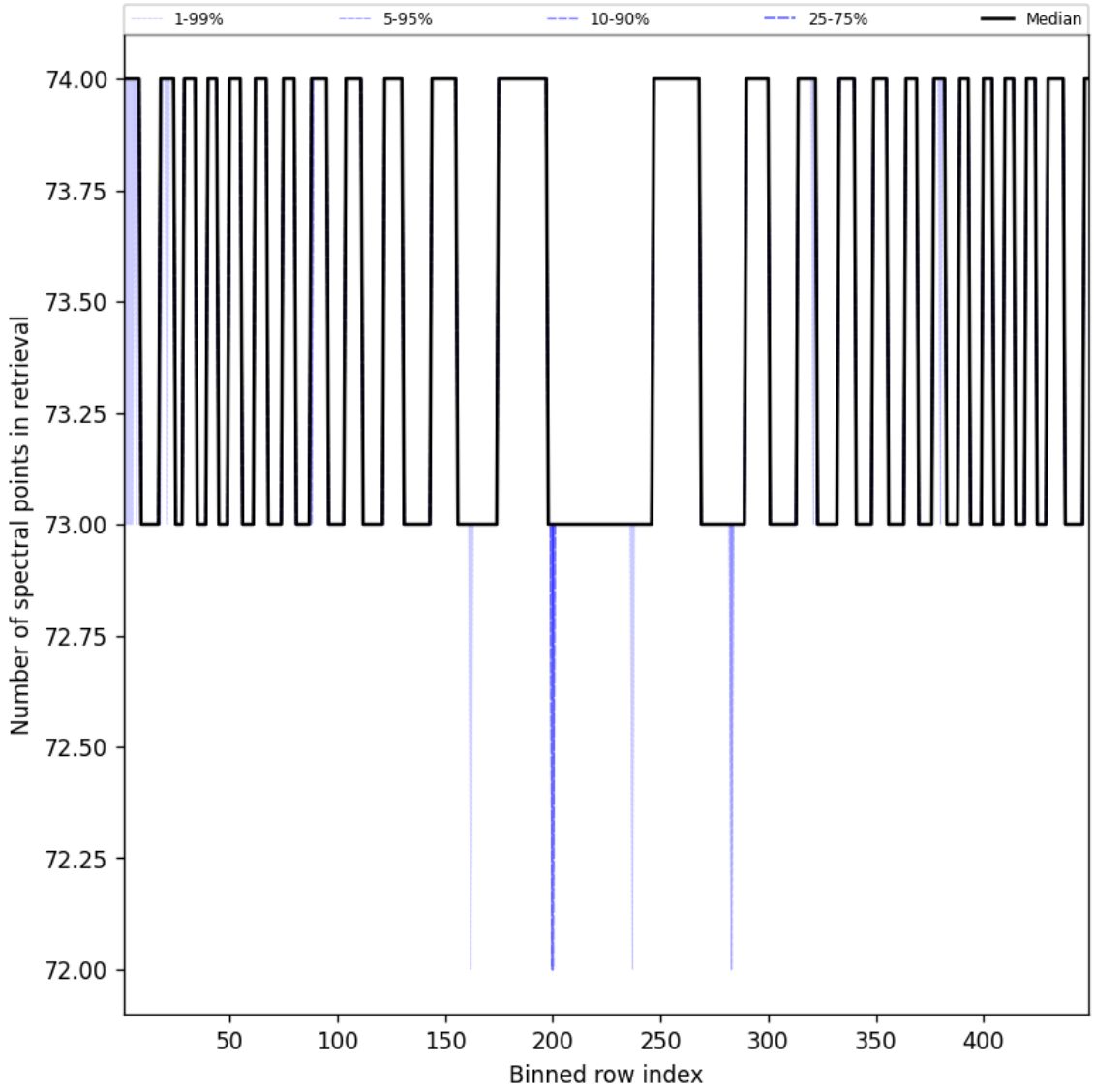

Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-02-18 to 2025-02-19

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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