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	17338523	0.995	0.800	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(6.314 \pm 183.816) \times 10^{-2}$	17338523	0.249	0.438	1.043×10^{-2}	-145	465
sulfurdioxide total vertical column precision [DU]	0.660 ± 1.286	17338523	0.222	0.372	0.308	4.228×10^{-2}	47.6
sulfurdioxide slant column density corrected [DU]	$(2.056 \pm 38.148) \times 10^{-2}$	17338523	0.242	0.350	9.227×10^{-3}	-69.8	361
sulfurdioxide slant column density cobra [DU]	$(2.042 \pm 36.541) \times 10^{-2}$	17338523	0.242	0.350	9.227×10^{-3}	-69.8	75.0
sulfurdioxide slant column density cobra precision [DU]	0.287 ± 0.142	17338523	0.188	0.144	0.239	7.937×10^{-2}	24.2
sulfurdioxide slant column density window1 [DU]	0.203 ± 0.691	17338523	0.225	0.726	0.215	-88.9	130
sulfurdioxide slant column density window1 precision [DU]	0.287 ± 0.142	17338523	0.188	0.144	0.239	7.937×10^{-2}	24.2
sulfurdioxide slant column density corrected win1 [DU]	$(3.961 \pm 67.848) \times 10^{-2}$	17338523	-2.500×10^{-2}	0.702	1.658×10^{-2}	-88.9	130
background so2 slant column offset window1 [DU]	-0.163 ± 0.189	17338523	-0.300	0.210	-0.210	-1.17	2.82
sulfurdioxide slant column density window2 [DU]	1.99 ± 8.86	17338523	1.25	11.2	1.75	-1.156×10^{3}	739
sulfurdioxide slant column density window2 precision [DU]	7.91 ± 2.17	17338523	6.97	2.49	7.57	2.26	472
sulfurdioxide slant column density corrected win2 [DU]	-1.66 ± 8.51	17338523	-1.75	10.8	-1.65	-1.158×10^{3}	737
background so2 slant column offset window2 [DU]	-3.65 ± 2.80	17338523	-1.75	3.14	-2.70	-19.0	10.1
sulfurdioxide slant column density window3 [DU]	-11.0 ± 24.0	17338523	-10.6	30.2	-11.3	-3.333×10^{3}	930
sulfurdioxide slant column density window3 precision [DU]	27.2 ± 12.8	17338523	21.5	9.39	23.9	9.56	1.237×10^{3}
sulfurdioxide slant column density corrected win3 [DU]	9.11 ± 22.92	17338523	8.40	28.9	8.97	-3.319×10^{3}	949
background so2 slant column offset window3 [DU]	20.1 ± 7.2	17338523	15.1	11.5	19.5	-4.20	43.6
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.22	17338523	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(3.622 \pm 11.365) \times 10^{-2}$	17338523	1.539×10^{-2}	1.744×10^{-2}	1.687×10^{-2}	3.873×10^{-4}	3.94
fitted radiance shift [nm]	$(-3.472 \pm 25.250) \times 10^{-4}$	17338523	-5.000×10^{-4}	1.817×10^{-3}	-3.448×10^{-4}	-6.159×10^{-2}	6.466×10^{-2}
fitted radiance squeeze [1]	$(-3.280 \pm 18.333) \times 10^{-5}$	17338523	-1.000×10^{-5}	2.033×10^{-4}	-2.562×10^{-5}	-1.290×10^{-2}	2.029×10^{-2}
fitted root mean square [1]	$(1.261 \pm 0.581) \times 10^{-3}$	17338523	9.250×10^{-4}	5.730×10^{-4}	1.078×10^{-3}	3.152×10^{-4}	8.460×10^{-2}
sulfurdioxide total air mass factor polluted [1]	0.858 ± 0.498	17338523	0.700	0.594	0.774	5.000×10^{-2}	2.99
sulfurdioxide total air mass factor polluted precision [1]	0.128 ± 0.144	17338523	3.500×10^{-2}	0.137	7.212×10^{-2}	2.500×10^{-3}	1.88
sulfurdioxide clear air mass factor polluted [1]	0.735 ± 0.422	17338523	0.660	0.381	0.667	2.617×10^{-2}	2.94
number of spectral points in retrieval [1]	73.4 ± 0.5	17338523	73.0	1.000	73.0	52.0	74.0

Table 2: Percentile ranges

Variable	1 %	5 %	10 %	15.9 %	25 %	75 %	84.1 %	90 %	95 %	99 %
qa value [1]	0.0	0.0	5.000×10^{-2}	0.1000	0.200	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	−3.61	−1.01	−0.553	−0.357	−0.204	0.234	0.403	0.631	1.19	4.63
sulfurdioxide total vertical column precision [DU]	8.785×10^{-2}	0.119	0.145	0.169	0.204	0.575	0.850	1.28	2.27	6.48
sulfurdioxide slant column density corrected [DU]	−0.858	−0.480	−0.344	−0.255	−0.164	0.186	0.284	0.382	0.542	1.07
sulfurdioxide slant column density cobra [DU]	−0.858	−0.480	−0.344	−0.255	−0.164	0.186	0.284	0.382	0.542	1.07
sulfurdioxide slant column density cobra precision [DU]	0.134	0.158	0.172	0.182	0.196	0.340	0.396	0.455	0.550	0.823
sulfurdioxide slant column density window1 [DU]	−1.70	−0.861	−0.553	−0.355	−0.154	0.572	0.759	0.940	1.22	2.03
sulfurdioxide slant column density window1 precision [DU]	0.134	0.158	0.172	0.182	0.196	0.340	0.396	0.455	0.550	0.823
sulfurdioxide slant column density corrected win1 [DU]	−1.64	−0.935	−0.678	−0.508	−0.328	0.373	0.571	0.769	1.09	2.04
background so2 slant column offset window1 [DU]	−0.404	−0.362	−0.341	−0.322	−0.294	-8.445×10^{-2}	3.182×10^{-3}	8.998×10^{-2}	0.198	0.443
sulfurdioxide slant column density window2 [DU]	−18.4	−12.0	−8.78	−6.41	−3.73	7.44	10.4	13.0	16.8	24.8
sulfurdioxide slant column density window2 precision [DU]	4.26	5.09	5.59	5.99	6.48	8.96	9.83	10.7	11.9	14.5
sulfurdioxide slant column density corrected win2 [DU]	−22.3	−15.5	−12.2	−9.75	−7.05	3.73	6.42	8.83	12.1	19.0
background so2 slant column offset window2 [DU]	−11.9	−9.73	−7.93	−6.41	−4.89	−1.75	−1.50	−1.29	−0.944	0.289
sulfurdioxide slant column density window3 [DU]	−69.7	−49.9	−40.5	−33.7	−26.2	4.02	11.9	19.1	28.8	47.7
sulfurdioxide slant column density window3 precision [DU]	13.4	15.7	17.3	18.6	20.2	29.6	34.2	39.9	51.2	81.8
sulfurdioxide slant column density corrected win3 [DU]	−47.6	−28.2	−19.1	−12.5	−5.31	23.5	31.0	37.7	46.8	65.2
background so2 slant column offset window3 [DU]	7.11	9.56	11.0	12.4	14.3	25.8	28.2	30.2	32.4	36.0
sulfurdioxide slant column cobra flag [1]	0.0	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
integrated so2 profile apriori [DU]	2.166×10^{-3}	4.019×10^{-3}	5.877×10^{-3}	7.965×10^{-3}	1.053×10^{-2}	2.797×10^{-2}	3.725×10^{-2}	5.427×10^{-2}	0.106	0.405
fitted radiance shift [nm]	-7.914×10^{-3}	-4.077×10^{-3}	-2.735×10^{-3}	-1.968×10^{-3}	-1.300×10^{-3}	5.168×10^{-4}	1.209×10^{-3}	2.068×10^{-3}	3.538×10^{-3}	7.558×10^{-3}
fitted radiance squeeze [1]	-5.479×10^{-4}	-3.310×10^{-4}	-2.448×10^{-4}	-1.881×10^{-4}	-1.303×10^{-4}	7.301×10^{-5}	1.232×10^{-4}	1.701×10^{-4}	2.397×10^{-4}	4.236×10^{-4}
fitted root mean square [1]	5.800×10^{-4}	7.034×10^{-4}	7.736×10^{-4}	8.276×10^{-4}	8.937×10^{-4}	1.467×10^{-3}	1.715×10^{-3}	1.963×10^{-3}	2.378×10^{-3}	3.396×10^{-3}
sulfurdioxide total air mass factor polluted [1]	5.899×10^{-2}	0.177	0.287	0.393	0.512	1.11	1.33	1.55	1.86	2.37
sulfurdioxide total air mass factor polluted precision [1]	6.872×10^{-3}	1.455×10^{-2}	2.202×10^{-2}	2.781×10^{-2}	3.580×10^{-2}	0.173	0.233	0.297	0.405	0.666
sulfurdioxide clear air mass factor polluted [1]	0.119	0.237	0.327	0.406	0.491	0.872	0.987	1.11	1.39	2.59
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]	0.663 ± 0.405	7571080	0.770	1.000	0.0	1.000	0.230	1.000
sulfurdioxide total vertical column [DU]	0.123 ± 2.674	7571080	0.586	1.527×10^{-2}	-145	465	-0.267	0.320
sulfurdioxide total vertical column precision [DU]	1.01 ± 1.81	7571080	0.713	0.411	4.356×10^{-2}	47.6	0.242	0.955
sulfurdioxide slant column density corrected [DU]	$(3.060 \pm 44.808) \times 10^{-2}$	7571080	0.395	1.201×10^{-2}	-69.8	50.5	-0.182	0.213
sulfurdioxide slant column density cobra [DU]	$(3.033 \pm 43.695) \times 10^{-2}$	7571080	0.395	1.201×10^{-2}	-69.8	29.2	-0.182	0.213
sulfurdioxide slant column density cobra precision [DU]	0.330 ± 0.171	7571080	0.191	0.276	9.161×10^{-2}	18.0	0.210	0.401
sulfurdioxide slant column density window1 [DU]	0.240 ± 0.800	7571080	0.804	0.254	-69.8	35.4	-0.152	0.651
sulfurdioxide slant column density window1 precision [DU]	0.330 ± 0.171	7571080	0.191	0.276	9.161×10^{-2}	18.0	0.210	0.401
sulfurdioxide slant column density corrected win1 [DU]	$(6.477 \pm 79.520) \times 10^{-2}$	7571080	0.791	2.886×10^{-2}	-69.8	35.2	-0.355	0.435
background so2 slant column offset window1 [DU]	-0.175 ± 0.212	7571080	0.209	-0.227	-0.651	2.82	-0.315	-0.106
sulfurdioxide slant column density window2 [DU]	2.90 ± 9.51	7571080	12.1	2.54	-789	97.9	-3.36	8.77
sulfurdioxide slant column density window2 precision [DU]	8.38 ± 2.23	7571080	2.70	8.02	2.44	355	6.85	9.55
sulfurdioxide slant column density corrected win2 [DU]	-1.72 ± 8.97	7571080	11.4	-1.71	-801	96.8	-7.44	4.00
background so2 slant column offset window2 [DU]	-4.62 ± 3.47	7571080	5.55	-3.25	-19.0	10.1	-7.41	-1.85
sulfurdioxide slant column density window3 [DU]	-13.7 ± 24.6	7571080	31.3	-13.7	-182	173	-29.3	2.00
sulfurdioxide slant column density window3 precision [DU]	28.4 ± 13.0	7571080	9.44	25.0	9.64	225	21.4	30.8
sulfurdioxide slant column density corrected win3 [DU]	9.18 ± 23.67	7571080	30.0	9.26	-160	202	-5.74	24.3
background so2 slant column offset window3 [DU]	22.9 ± 6.9	7571080	11.6	22.6	-8.221×10^{-6}	43.6	16.9	28.5
sulfurdioxide slant column cobra flag [1]	1.96 ± 0.26	7571080	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(5.863 \pm 16.772) \times 10^{-2}$	7571080	3.221×10^{-2}	2.051×10^{-2}	3.873×10^{-4}	3.94	1.101×10^{-2}	4.321×10^{-2}
fitted radiance shift [nm]	$(-2.058 \pm 25.486) \times 10^{-4}$	7571080	1.711×10^{-3}	-1.944×10^{-4}	-4.606×10^{-2}	6.466×10^{-2}	-1.081×10^{-3}	6.295×10^{-4}
fitted radiance squeeze [1]	$(-1.427 \pm 20.758) \times 10^{-5}$	7571080	2.206×10^{-4}	-7.781×10^{-6}	-1.244×10^{-2}	1.433×10^{-2}	-1.200×10^{-4}	1.006×10^{-4}
fitted root mean square [1]	$(1.428 \pm 0.704) \times 10^{-3}$	7571080	7.664×10^{-4}	1.192×10^{-3}	3.329×10^{-4}	7.549×10^{-2}	9.519×10^{-4}	1.718×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.720 ± 0.436	7571080	0.554	0.671	5.000×10^{-2}	2.85	0.399	0.953
sulfurdioxide total air mass factor polluted precision [1]	0.107 ± 0.157	7571080	9.705×10^{-2}	5.025×10^{-2}	2.500×10^{-3}	1.88	2.809×10^{-2}	0.125
sulfurdioxide clear air mass factor polluted [1]	0.600 ± 0.302	7571080	0.445	0.577	2.617×10^{-2}	2.43	0.364	0.809
number of spectral points in retrieval [1]	73.4 ± 0.5	7571080	1.000	73.0	52.0	74.0	73.0	74.0

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

Variable	mean $\pm\sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.605 ± 0.415	9767443	0.820	1.000	0.0	1.000	0.180	1.000
sulfurdioxide total vertical column [DU]	$(1.694 \pm 67.273) \times 10^{-2}$	9767443	0.363	7.830×10^{-3}	-82.6	447	-0.172	0.191
sulfurdioxide total vertical column precision [DU]	0.386 ± 0.481	9767443	0.242	0.265	4.228×10^{-2}	27.1	0.182	0.424
sulfurdioxide slant column density corrected [DU]	$(1.278 \pm 32.024) \times 10^{-2}$	9767443	0.321	7.461×10^{-3}	-19.4	361	-0.152	0.169
sulfurdioxide slant column density cobra [DU]	$(1.274 \pm 29.814) \times 10^{-2}$	9767443	0.321	7.461×10^{-3}	-19.4	75.0	-0.152	0.169
sulfurdioxide slant column density cobra precision [DU]	0.253 ± 0.102	9767443	0.106	0.222	7.937×10^{-2}	24.2	0.188	0.294
sulfurdioxide slant column density window1 [DU]	0.174 ± 0.592	9767443	0.673	0.190	-88.9	130	-0.155	0.518
sulfurdioxide slant column density window1 precision [DU]	0.253 ± 0.102	9767443	0.106	0.222	7.937×10^{-2}	24.2	0.188	0.294
sulfurdioxide slant column density corrected win1 [DU]	$(2.011 \pm 57.109) \times 10^{-2}$	9767443	0.644	8.684×10^{-3}	-88.9	130	-0.311	0.333
background so2 slant column offset window1 [DU]	-0.154 ± 0.170	9767443	0.214	-0.198	-1.17	2.18	-0.279	-6.565×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.29 ± 8.25	9767443	10.5	1.23	-1.156×10^{3}	739	-3.98	6.50
sulfurdioxide slant column density window2 precision [DU]	7.55 ± 2.06	9767443	2.25	7.25	2.26	472	6.24	8.49
sulfurdioxide slant column density corrected win2 [DU]	-1.62 ± 8.14	9767443	10.3	-1.61	-1.158×10^{3}	737	-6.77	3.54
background so2 slant column offset window2 [DU]	-2.91 ± 1.81	9767443	2.22	-2.46	-11.3	9.87	-3.91	-1.69
sulfurdioxide slant column density window3 [DU]	-8.96 ± 23.31	9767443	29.4	-9.59	-3.333×10^{3}	930	-23.9	5.49
sulfurdioxide slant column density window3 precision [DU]	26.3 ± 12.5	9767443	9.06	22.9	9.56	1.237×10^{3}	19.4	28.4
sulfurdioxide slant column density corrected win3 [DU]	9.04 ± 22.33	9767443	28.0	8.76	-3.319×10^{3}	949	-5.01	23.0
background so2 slant column offset window3 [DU]	18.0 ± 6.8	9767443	11.3	17.0	-4.20	41.5	12.3	23.5
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.19	9767443	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(1.885 \pm 2.080) \times 10^{-2}$	9767443	1.212×10^{-2}	1.563×10^{-2}	9.230×10^{-4}	0.982	1.022×10^{-2}	2.234×10^{-2}
fitted radiance shift [nm]	$(-4.568 \pm 25.010) \times 10^{-4}$	9767443	1.852×10^{-3}	-4.724×10^{-4}	-6.159×10^{-2}	3.770×10^{-2}	-1.440×10^{-3}	4.113×10^{-4}
fitted radiance squeeze [1]	$(-4.717 \pm 16.059) \times 10^{-5}$	9767443	1.906×10^{-4}	-3.761×10^{-5}	-1.290×10^{-2}	2.029×10^{-2}	-1.369×10^{-4}	5.365×10^{-5}
fitted root mean square [1]	$(1.131 \pm 0.420) \times 10^{-3}$	9767443	4.469×10^{-4}	1.015×10^{-3}	3.152×10^{-4}	8.460×10^{-2}	8.605×10^{-4}	1.307×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.965 ± 0.516	9767443	0.637	0.853	5.000×10^{-2}	2.99	0.601	1.24
sulfurdioxide total air mass factor polluted precision [1]	0.143 ± 0.130	9767443	0.161	0.103	4.779×10^{-3}	1.63	4.260×10^{-2}	0.203
sulfurdioxide clear air mass factor polluted [1]	0.839 ± 0.470	9767443	0.357	0.712	0.152	2.94	0.567	0.924
number of spectral points in retrieval [1]	73.4 ± 0.5	9767443	1.000	73.0	53.0	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]	0.665 ± 0.404	12537069	0.770	1.000	0.0	1.000	0.230	1.000
sulfurdioxide total vertical column [DU]	$(3.656 \pm 133.552) \times 10^{-2}$	12537069	0.413	9.271×10^{-3}	-145	465	-0.195	0.219
sulfurdioxide total vertical column precision [DU]	0.531 ± 0.976	12537069	0.293	0.290	5.053×10^{-2}	47.6	0.203	0.497
sulfurdioxide slant column density corrected [DU]	$(1.608 \pm 35.002) \times 10^{-2}$	12537069	0.333	8.088×10^{-3}	-69.8	361	-0.157	0.176
sulfurdioxide slant column density cobra [DU]	$(1.598 \pm 33.107) \times 10^{-2}$	12537069	0.333	8.088×10^{-3}	-69.8	33.7	-0.157	0.176
sulfurdioxide slant column density cobra precision [DU]	0.270 ± 0.130	12537069	0.120	0.226	8.387×10^{-2}	23.7	0.192	0.312
sulfurdioxide slant column density window1 [DU]	0.202 ± 0.635	12537069	0.690	0.213	-88.9	54.8	-0.137	0.553
sulfurdioxide slant column density window1 precision [DU]	0.270 ± 0.130	12537069	0.120	0.226	8.387×10^{-2}	23.7	0.192	0.312
sulfurdioxide slant column density corrected win1 [DU]	$(2.486 \pm 62.227) \times 10^{-2}$	12537069	0.668	8.589×10^{-3}	-88.9	54.5	-0.321	0.347
background so2 slant column offset window1 [DU]	-0.177 ± 0.169	12537069	0.195	-0.213	-0.838	2.03	-0.295	-0.101
sulfurdioxide slant column density window2 [DU]	1.48 ± 8.53	12537069	10.8	1.31	-1.156×10^{3}	739	-4.02	6.77
sulfurdioxide slant column density window2 precision [DU]	7.73 ± 2.05	12537069	2.36	7.41	2.33	430	6.37	8.73
sulfurdioxide slant column density corrected win2 [DU]	-1.74 ± 8.31	12537069	10.6	-1.72	-1.158×10^{3}	737	-7.02	3.56
background so2 slant column offset window2 [DU]	-3.22 ± 2.40	12537069	2.42	-2.52	-19.0	10.1	-4.13	-1.71
sulfurdioxide slant column density window3 [DU]	-8.04 ± 23.60	12537069	30.0	-8.48	-1.416×10^{3}	930	-23.1	6.84
sulfurdioxide slant column density window3 precision [DU]	26.8 ± 12.3	12537069	9.01	23.5	9.56	555	20.1	29.1
sulfurdioxide slant column density corrected win3 [DU]	11.2 ± 22.4	12537069	28.6	10.8	-1.397×10^{3}	949	-3.21	25.4
background so2 slant column offset window3 [DU]	19.2 ± 6.7	12537069	10.3	18.7	-4.20	43.6	13.9	24.3
sulfurdioxide slant column cobra flag [1]	1.99 ± 0.16	12537069	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.336 \pm 3.695) \times 10^{-2}$	12537069	1.356×10^{-2}	1.656×10^{-2}	5.935×10^{-4}	2.10	1.124×10^{-2}	2.480×10^{-2}
fitted radiance shift [nm]	$(-3.191 \pm 24.275) \times 10^{-4}$	12537069	1.815×10^{-3}	-2.971×10^{-4}	-6.159×10^{-2}	3.308×10^{-2}	-1.262×10^{-3}	5.528×10^{-4}
fitted radiance squeeze [1]	$(-3.325 \pm 17.015) \times 10^{-5}$	12537069	1.926×10^{-4}	-2.544×10^{-5}	-1.290×10^{-2}	1.744×10^{-2}	-1.246×10^{-4}	6.806×10^{-5}
fitted root mean square [1]	$(1.187 \pm 0.519) \times 10^{-3}$	12537069	4.684×10^{-4}	1.028×10^{-3}	3.349×10^{-4}	8.460×10^{-2}	8.736×10^{-4}	1.342×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.850 ± 0.422	12537069	0.525	0.799	5.000×10^{-2}	2.71	0.559	1.08
sulfurdioxide total air mass factor polluted precision [1]	0.120 ± 0.116	12537069	0.126	7.387×10^{-2}	2.500×10^{-3}	1.45	3.937×10^{-2}	0.166
sulfurdioxide clear air mass factor polluted [1]	0.716 ± 0.278	12537069	0.331	0.685	3.088×10^{-2}	2.72	0.533	0.864
number of spectral points in retrieval [1]	73.4 ± 0.5	12537069	1.000	73.0	52.0	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]	0.562 ± 0.420	3866044	0.880	0.490	0.0	1.000	0.120	1.000
sulfurdioxide total vertical column [DU]	0.109 ± 2.486	3866044	0.495	1.225×10^{-2}	-104	410	-0.226	0.270
sulfurdioxide total vertical column precision [DU]	0.888 ± 1.642	3866044	0.631	0.359	4.228×10^{-2}	39.3	0.192	0.823
sulfurdioxide slant column density corrected [DU]	$(2.937 \pm 43.673) \times 10^{-2}$	3866044	0.394	1.174×10^{-2}	-19.4	75.0	-0.182	0.212
sulfurdioxide slant column density cobra [DU]	$(2.911 \pm 42.683) \times 10^{-2}$	3866044	0.394	1.174×10^{-2}	-19.4	75.0	-0.182	0.212
sulfurdioxide slant column density cobra precision [DU]	0.321 ± 0.154	3866044	0.172	0.282	7.937×10^{-2}	24.2	0.214	0.387
sulfurdioxide slant column density window1 [DU]	0.197 ± 0.804	3866044	0.823	0.215	-34.0	130	-0.209	0.614
sulfurdioxide slant column density window1 precision [DU]	0.321 ± 0.154	3866044	0.172	0.282	7.937×10^{-2}	24.2	0.214	0.387
sulfurdioxide slant column density corrected win1 [DU]	$(6.902 \pm 78.702) \times 10^{-2}$	3866044	0.788	3.548×10^{-2}	-34.0	130	-0.349	0.439
background so2 slant column offset window1 [DU]	-0.128 ± 0.233	3866044	0.268	-0.202	-1.17	2.50	-0.292	-2.401×10^{-2}
sulfurdioxide slant column density window2 [DU]	3.10 ± 9.46	3866044	12.0	2.86	-913	553	-3.01	8.98
sulfurdioxide slant column density window2 precision [DU]	8.31 ± 2.39	3866044	2.67	7.94	2.26	472	6.78	9.45
sulfurdioxide slant column density corrected win2 [DU]	-1.33 ± 8.95	3866044	11.3	-1.34	-916	552	-6.97	4.29
background so2 slant column offset window2 [DU]	-4.43 ± 3.18	3866044	4.88	-3.42	-18.7	10.1	-6.72	-1.84
sulfurdioxide slant column density window3 [DU]	-18.9 ± 23.1	3866044	28.9	-18.6	-353	292	-33.2	-4.26
sulfurdioxide slant column density window3 precision [DU]	28.2 ± 14.0	3866044	10.1	24.8	9.83	230	20.3	30.5
sulfurdioxide slant column density corrected win3 [DU]	3.06 ± 23.22	3866044	29.0	3.61	-344	302	-11.1	17.8
background so2 slant column offset window3 [DU]	21.9 ± 7.9	3866044	13.6	22.5	-6.346×10^{-6}	43.6	15.0	28.6
sulfurdioxide slant column cobra flag [1]	1.95 ± 0.30	3866044	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(6.637 \pm 20.041) \times 10^{-2}$	3866044	3.985×10^{-2}	1.827×10^{-2}	3.873×10^{-4}	3.94	7.590×10^{-3}	4.744×10^{-2}
fitted radiance shift [nm]	$(-4.497 \pm 27.917) \times 10^{-4}$	3866044	1.727×10^{-3}	-5.095×10^{-4}	-4.353×10^{-2}	6.466×10^{-2}	-1.387×10^{-3}	3.399×10^{-4}
fitted radiance squeeze [1]	$(-4.727 \pm 20.329) \times 10^{-5}$	3866044	2.302×10^{-4}	-3.618×10^{-5}	-1.178×10^{-2}	2.029×10^{-2}	-1.568×10^{-4}	7.345×10^{-5}
fitted root mean square [1]	$(1.421 \pm 0.661) \times 10^{-3}$	3866044	6.924×10^{-4}	1.251×10^{-3}	3.152×10^{-4}	7.549×10^{-2}	9.825×10^{-4}	1.675×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.920 ± 0.677	3866044	0.887	0.696	5.000×10^{-2}	2.98	0.417	1.30
sulfurdioxide total air mass factor polluted precision [1]	0.152 ± 0.197	3866044	0.178	6.739×10^{-2}	2.500×10^{-3}	1.88	2.679×10^{-2}	0.204
sulfurdioxide clear air mass factor polluted [1]	0.838 ± 0.702	3866044	0.601	0.611	2.617×10^{-2}	2.94	0.376	0.977
number of spectral points in retrieval [1]	73.4 ± 0.5	3866044	1.000	73.0	71.0	74.0	73.0	74.0

3 Granule outlines

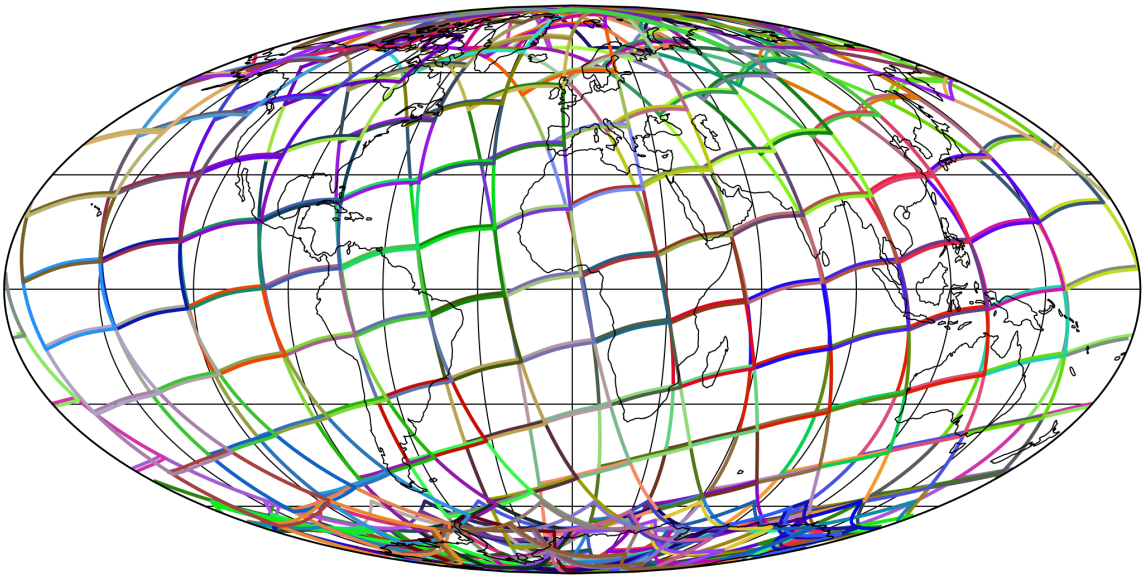

Figure 1: Outline of the granules.

4 Input data monitoring

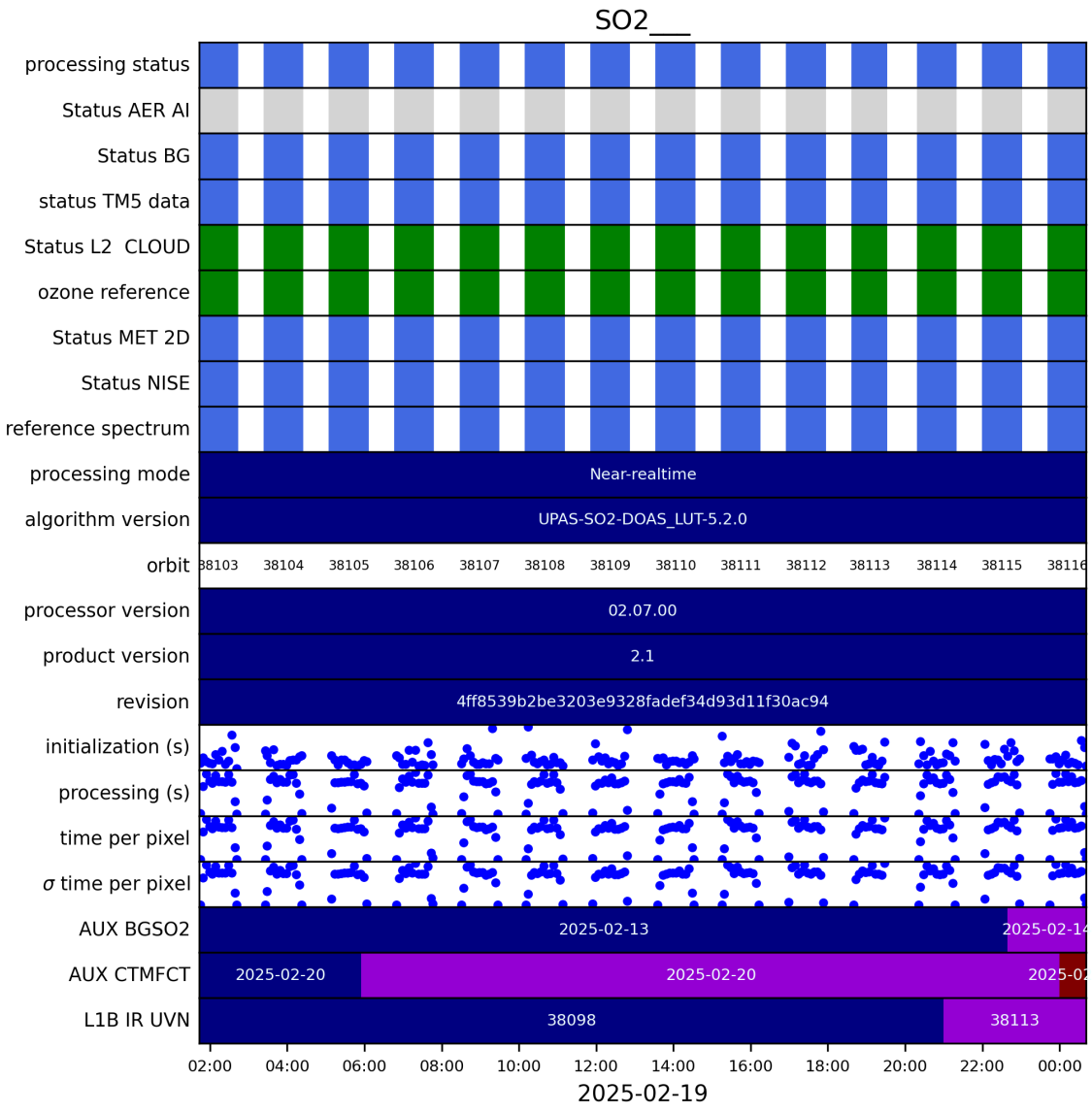

Figure 2: Input data per granule

5 Warnings and errors

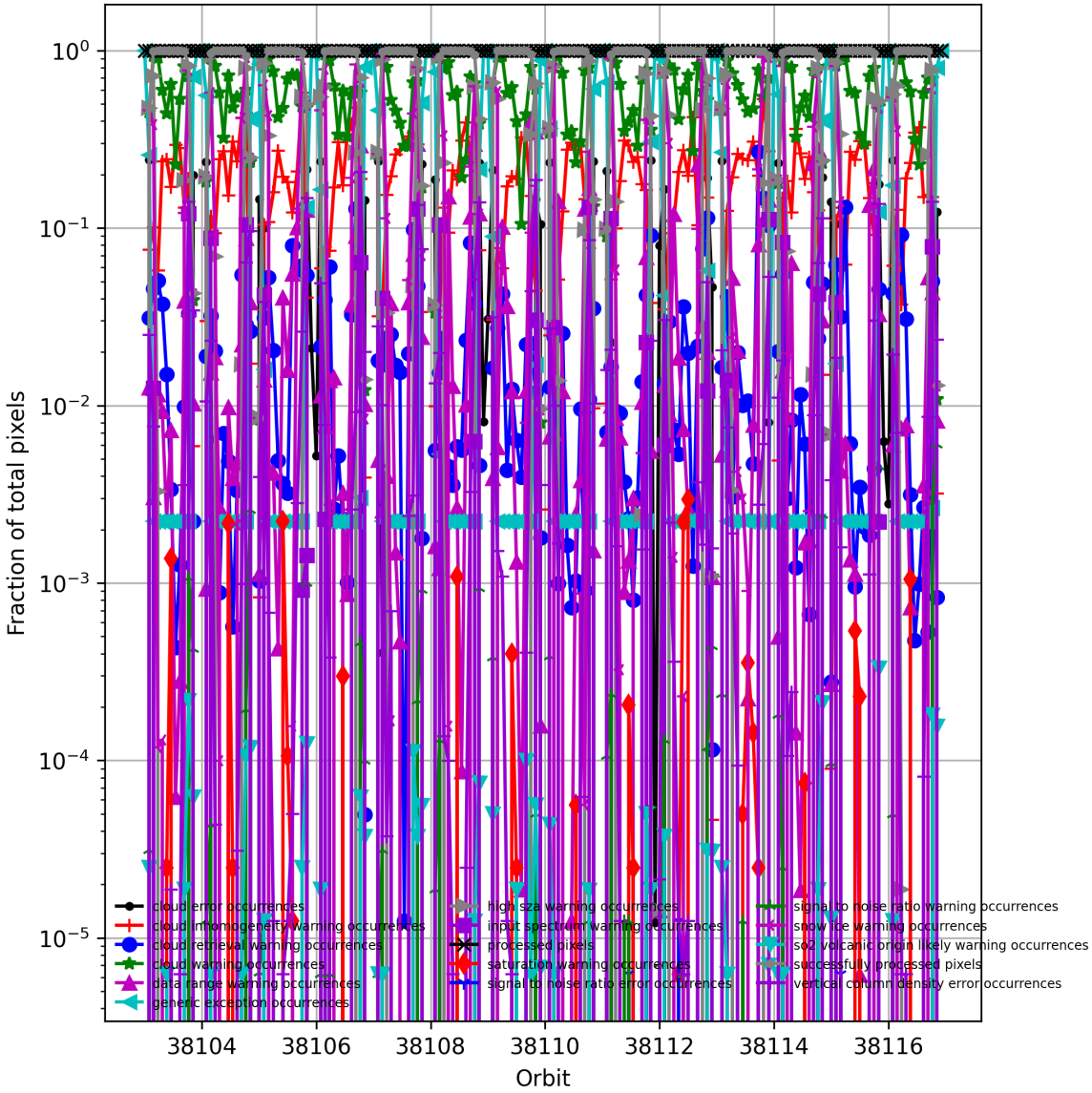

Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

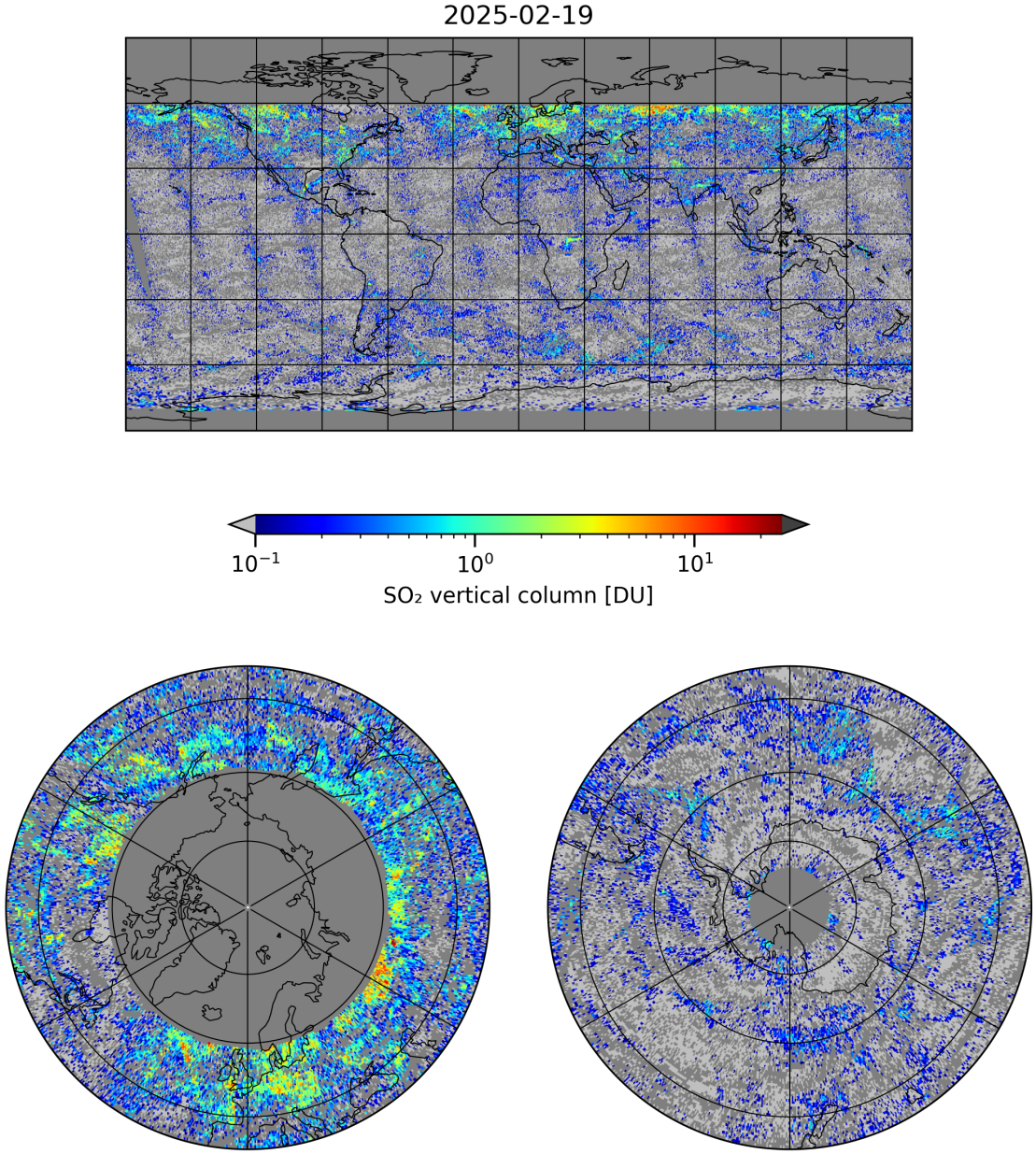

Figure 4: Map of "SO_2 vertical column" for 2025-02-19 to 2025-02-20

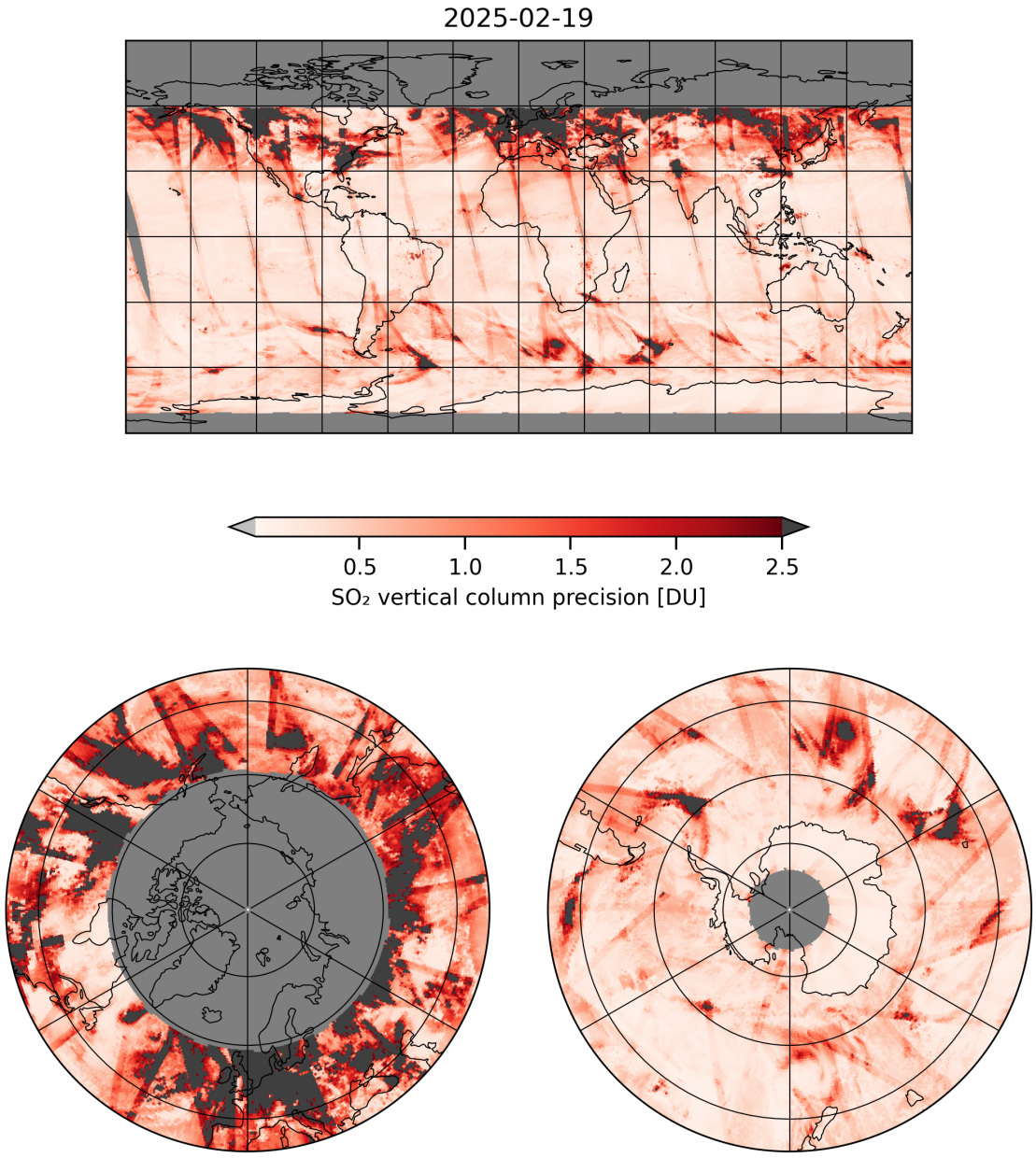

Figure 5: Map of "SO_2 vertical column precision" for 2025-02-19 to 2025-02-20

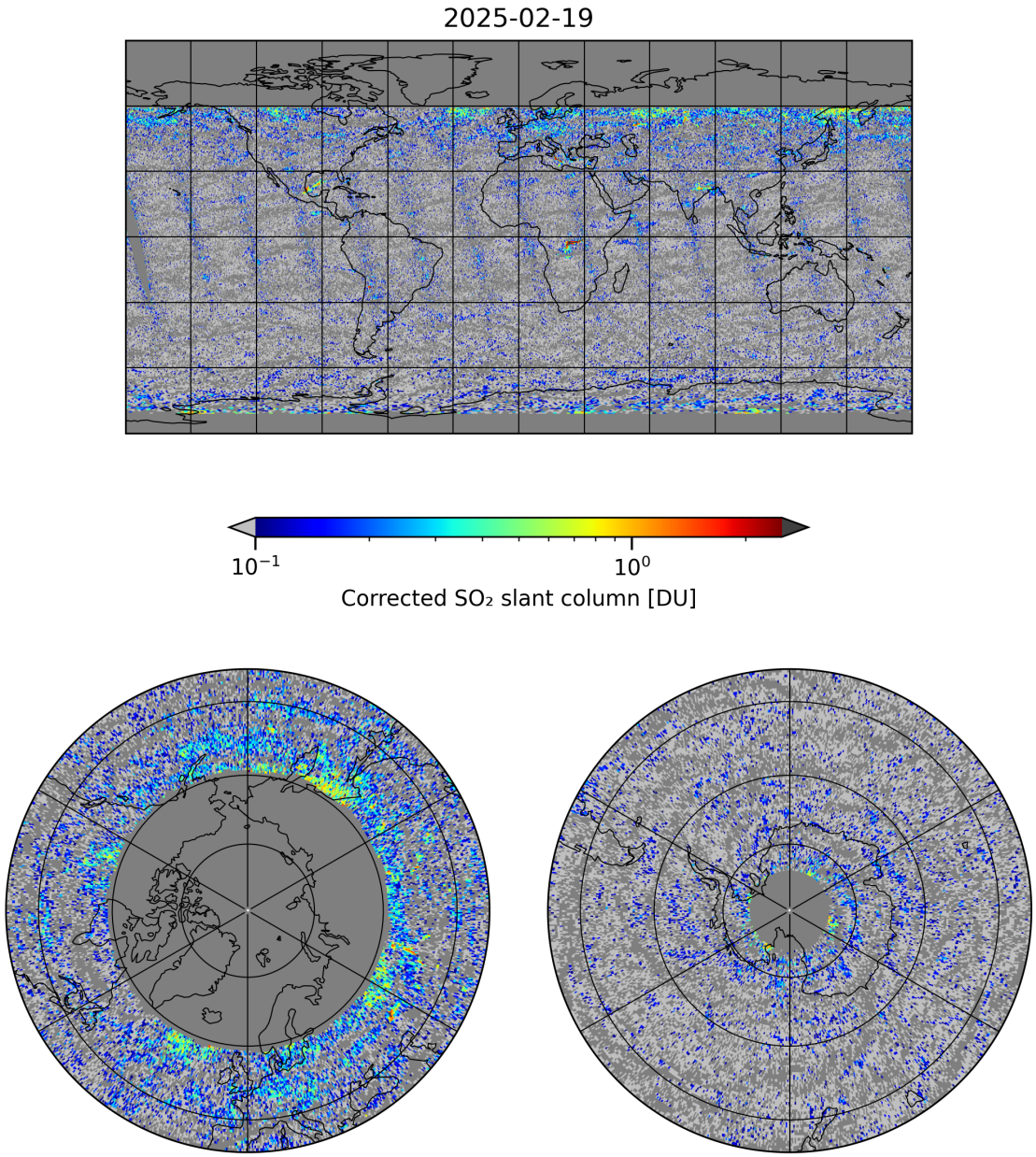

Figure 6: Map of "Corrected SO_2 slant column" for 2025-02-19 to 2025-02-20

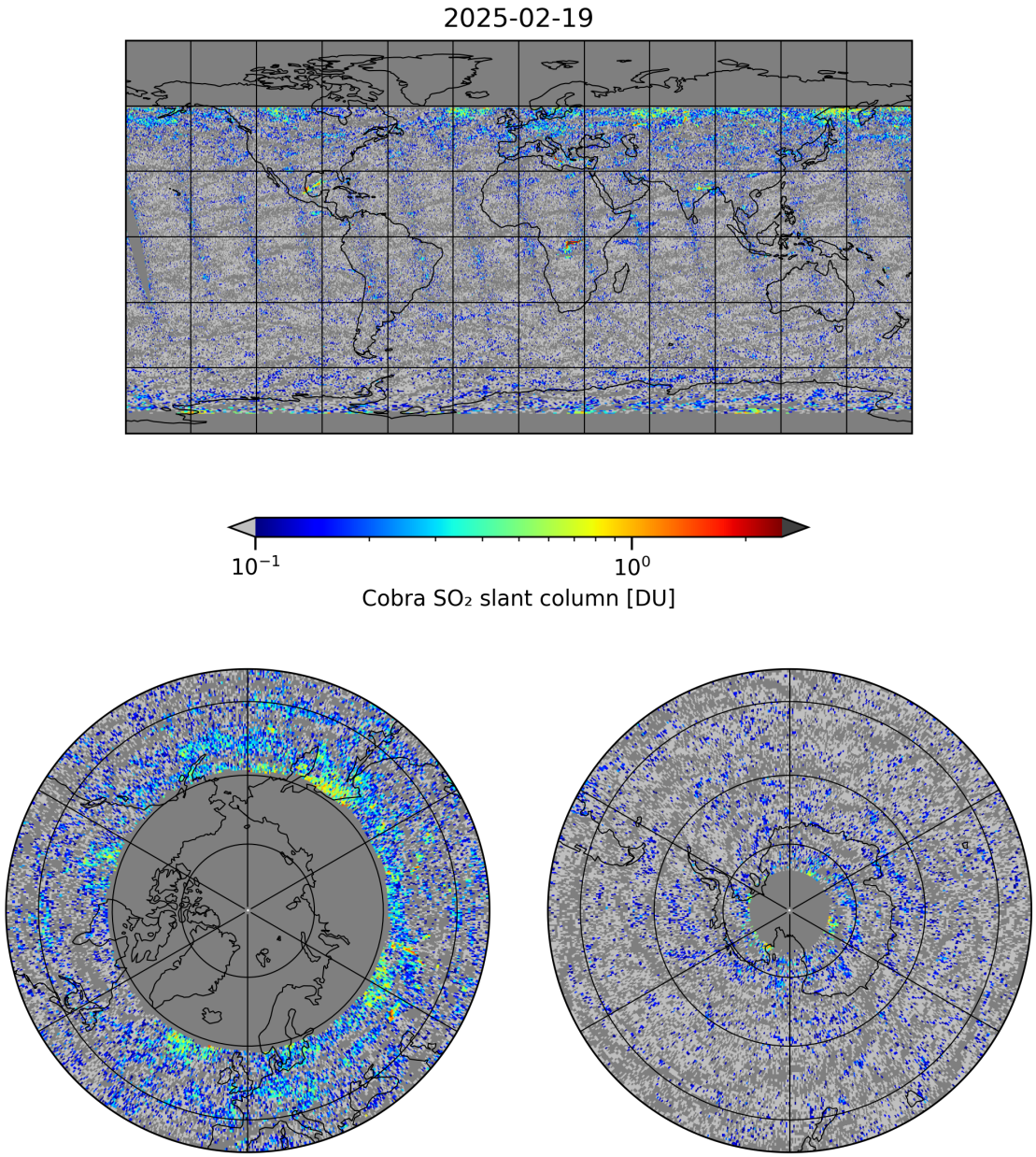

Figure 7: Map of "Cobra SO_2 slant column" for 2025-02-19 to 2025-02-20

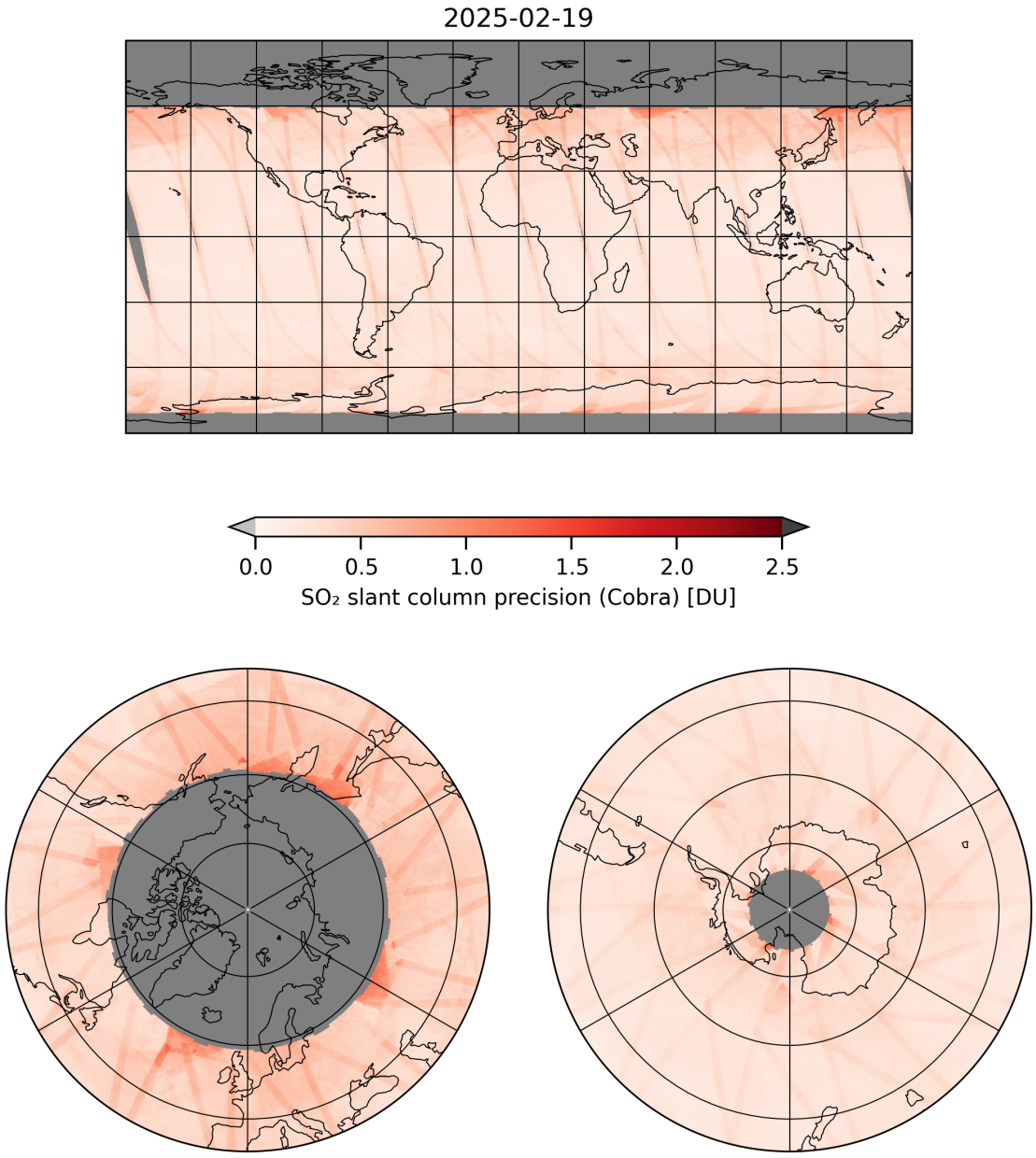

Figure 8: Map of "SO_2 slant column precision (Cobra)" for 2025-02-19 to 2025-02-20

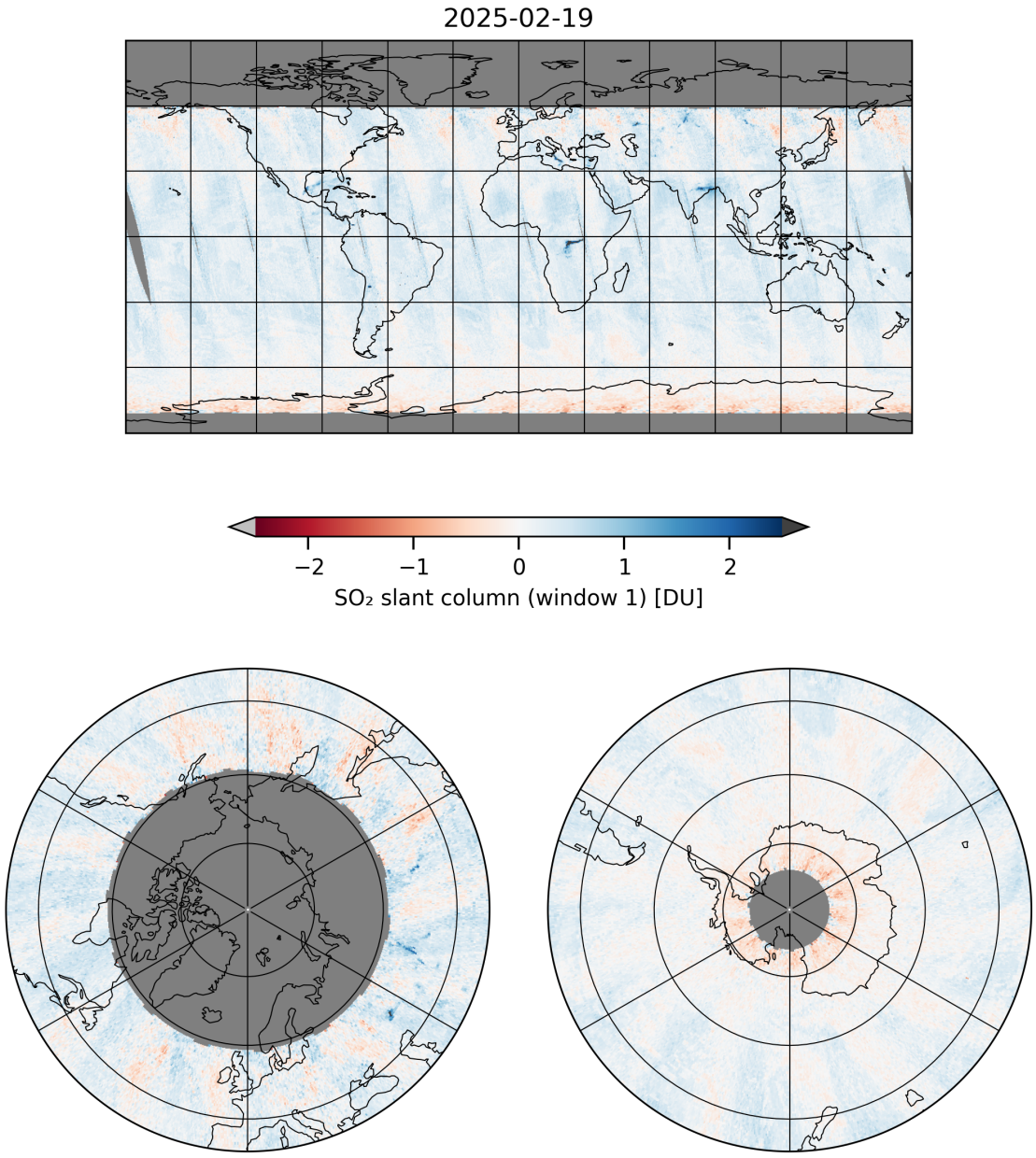

Figure 9: Map of "SO_2 slant column (window 1)" for 2025-02-19 to 2025-02-20

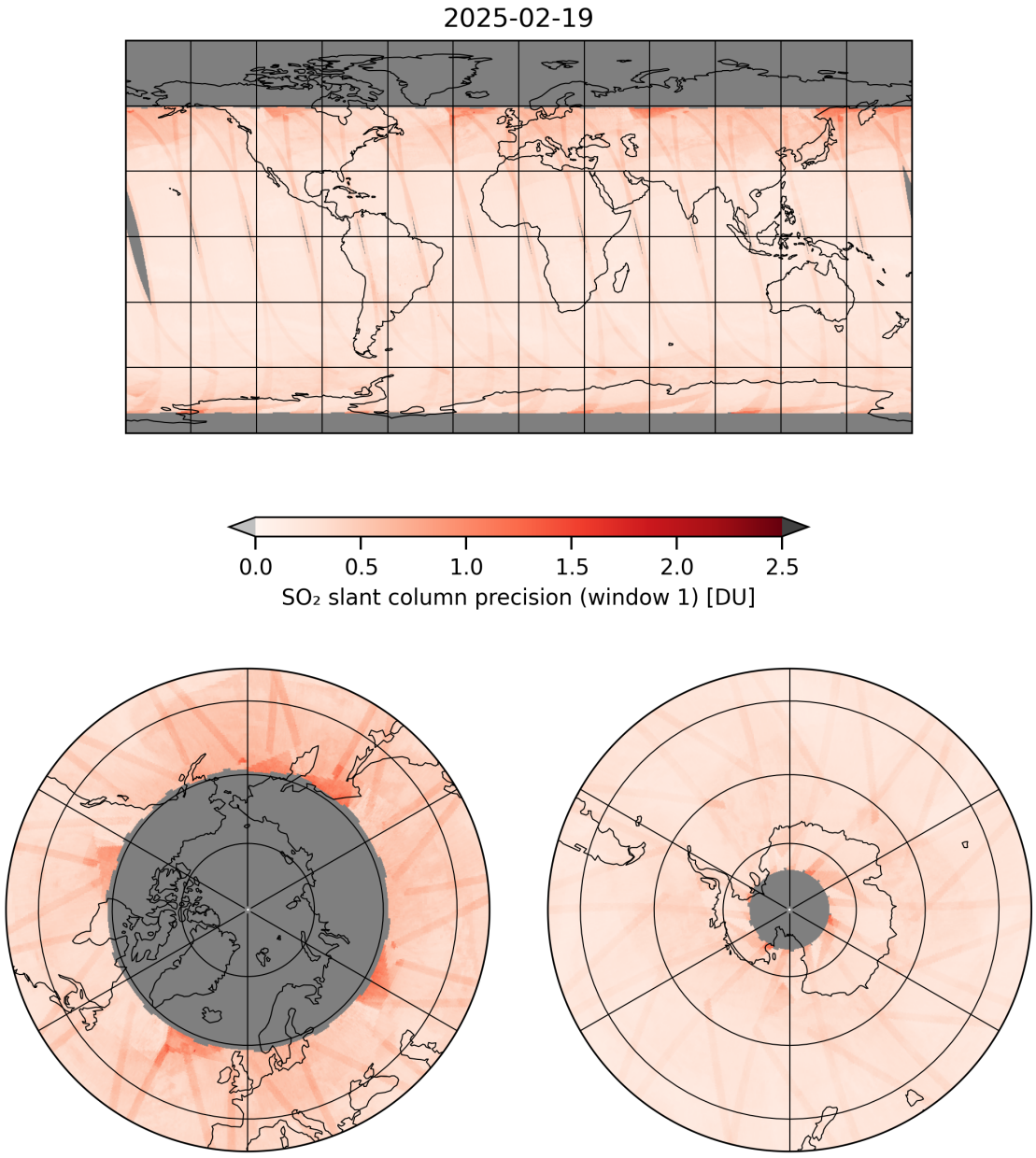

Figure 10: Map of "SO_2 slant column precision (window 1)" for 2025-02-19 to 2025-02-20

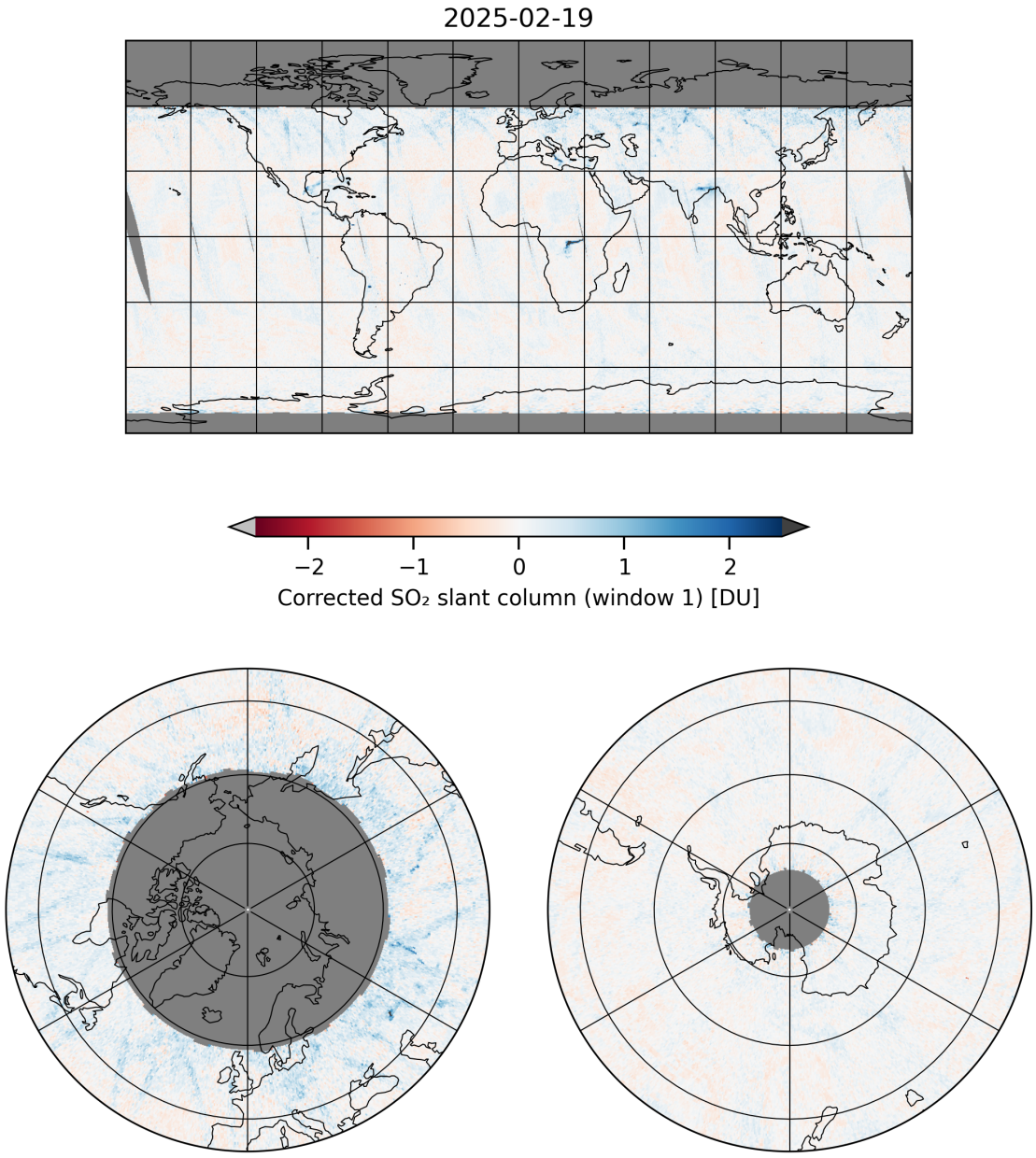

Figure 11: Map of “Corrected SO_2 slant column (window 1)” for 2025-02-19 to 2025-02-20

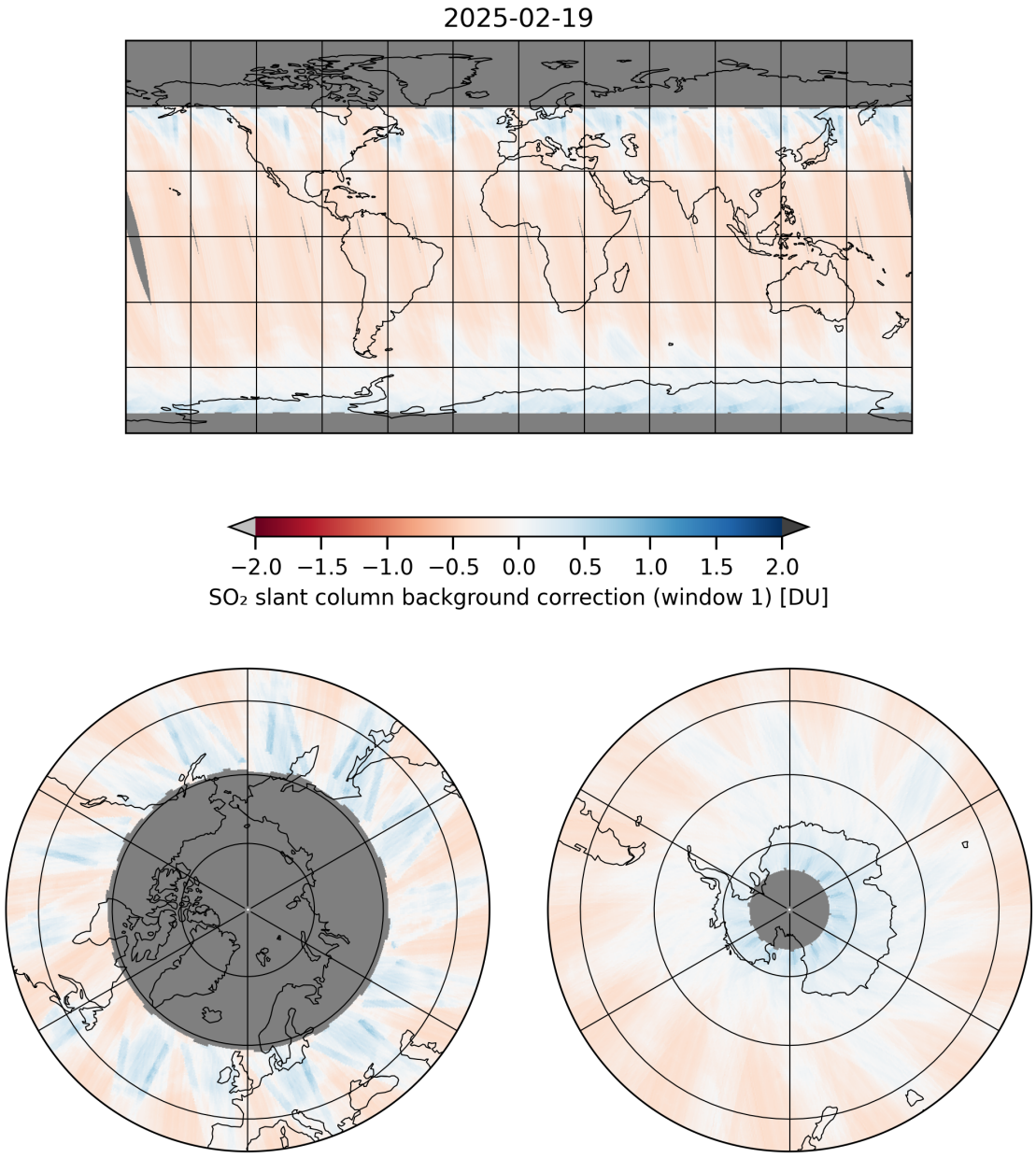

Figure 12: Map of "SO_2 slant column background correction (window 1)" for 2025-02-19 to 2025-02-20

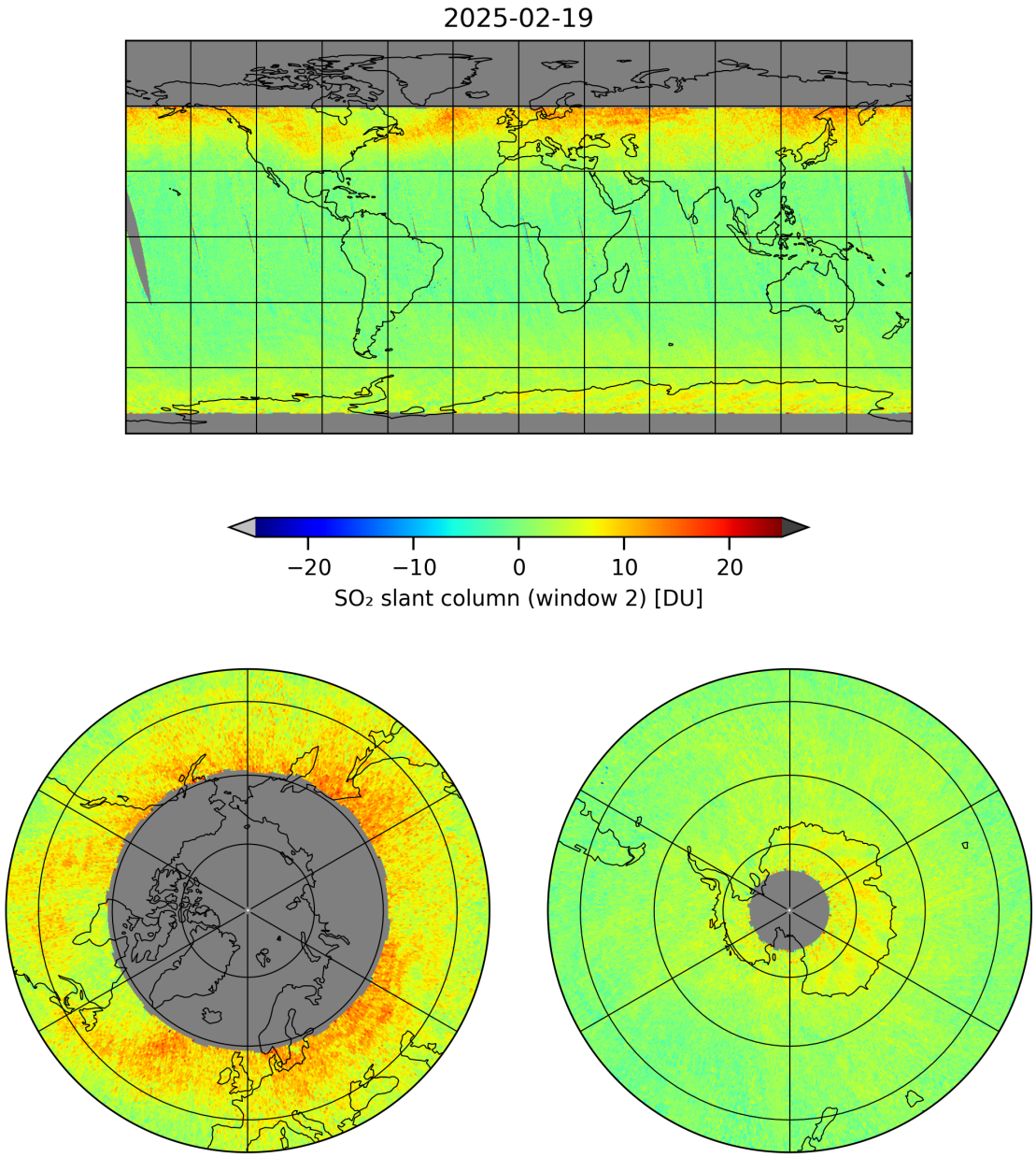

Figure 13: Map of "SO_2 slant column (window 2)" for 2025-02-19 to 2025-02-20

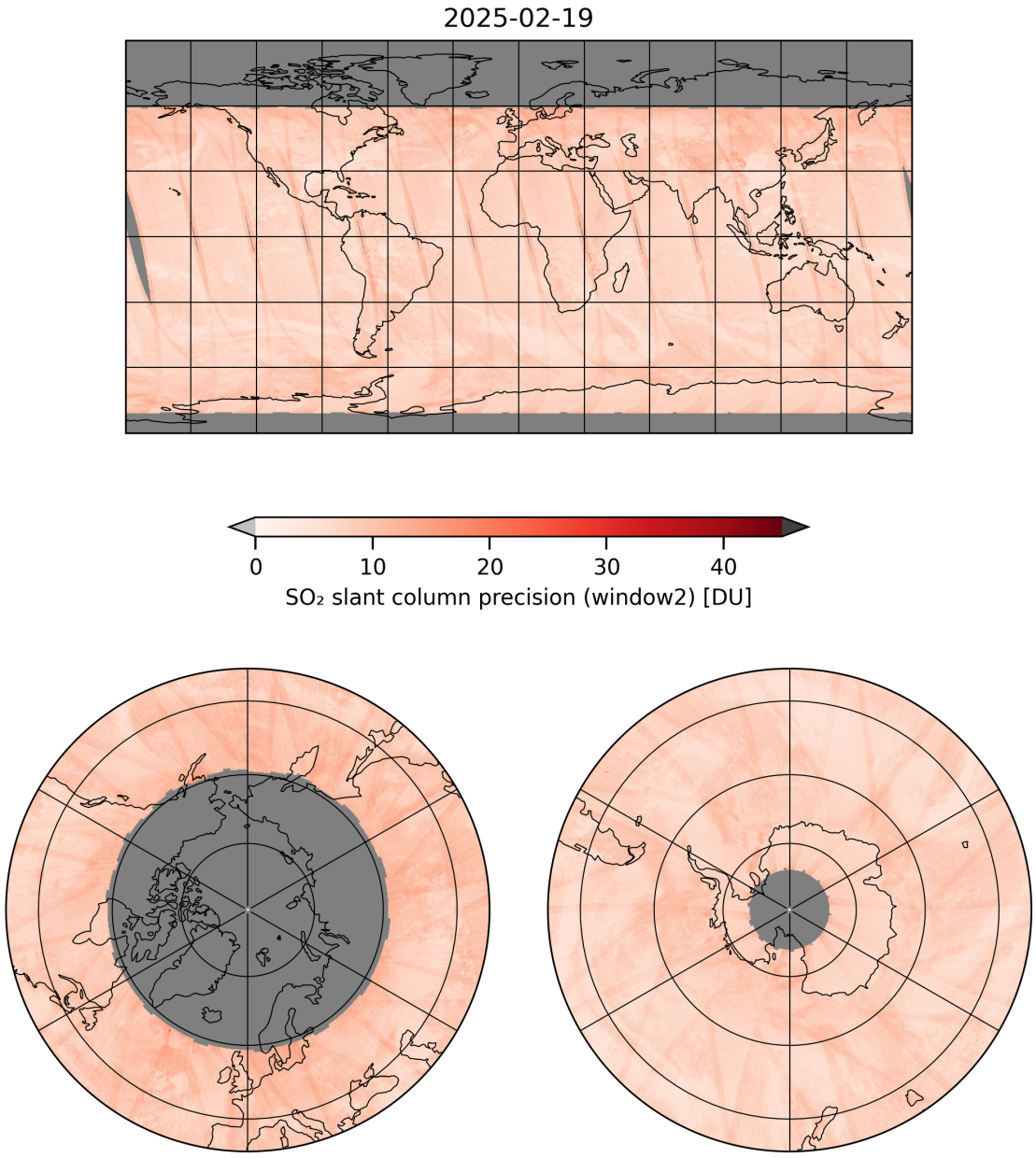

Figure 14: Map of "SO_2 slant column precision (window2)" for 2025-02-19 to 2025-02-20

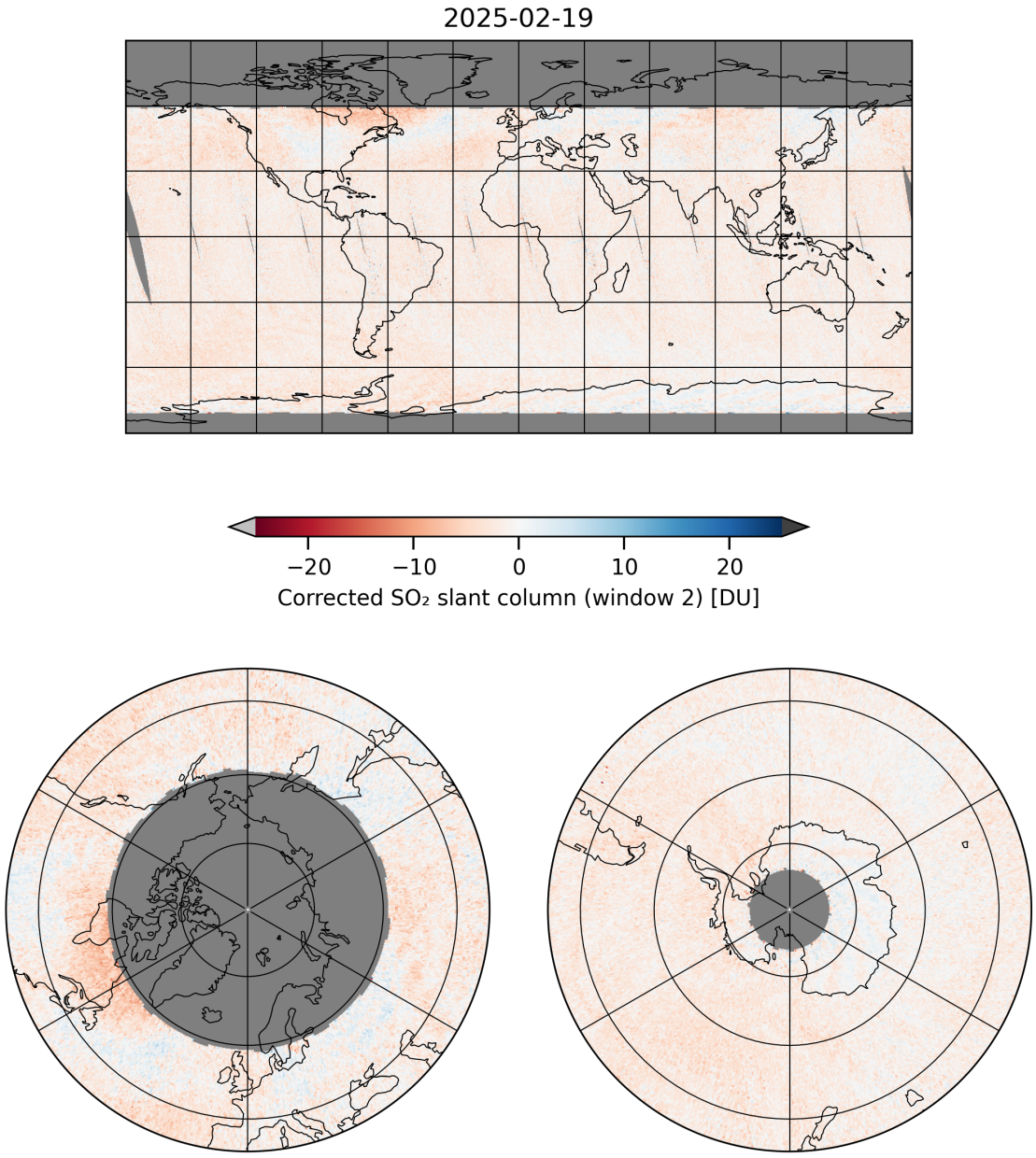

Figure 15: Map of "Corrected SO_2 slant column (window 2)" for 2025-02-19 to 2025-02-20

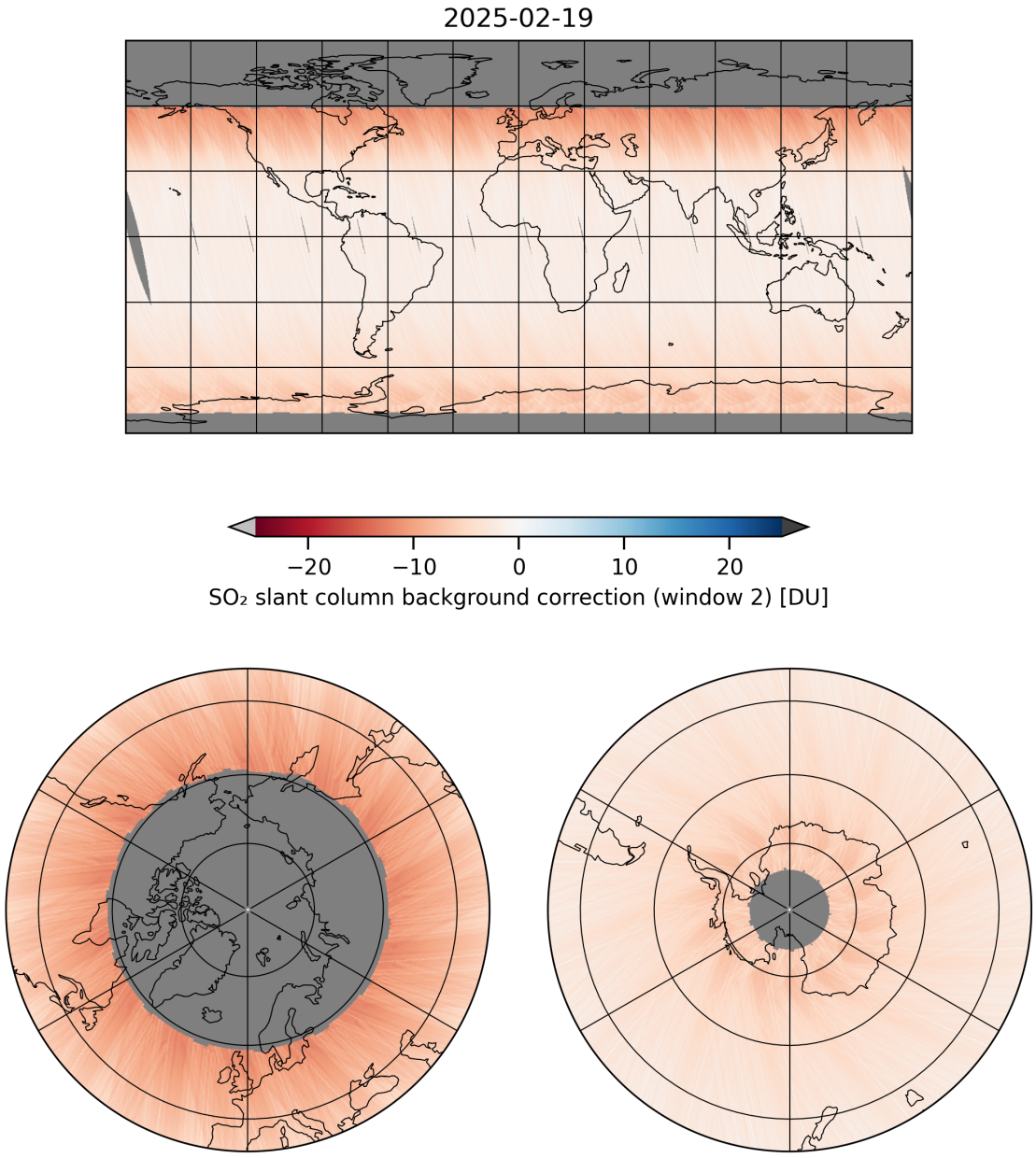

Figure 16: Map of "SO_2 slant column background correction (window 2)" for 2025-02-19 to 2025-02-20

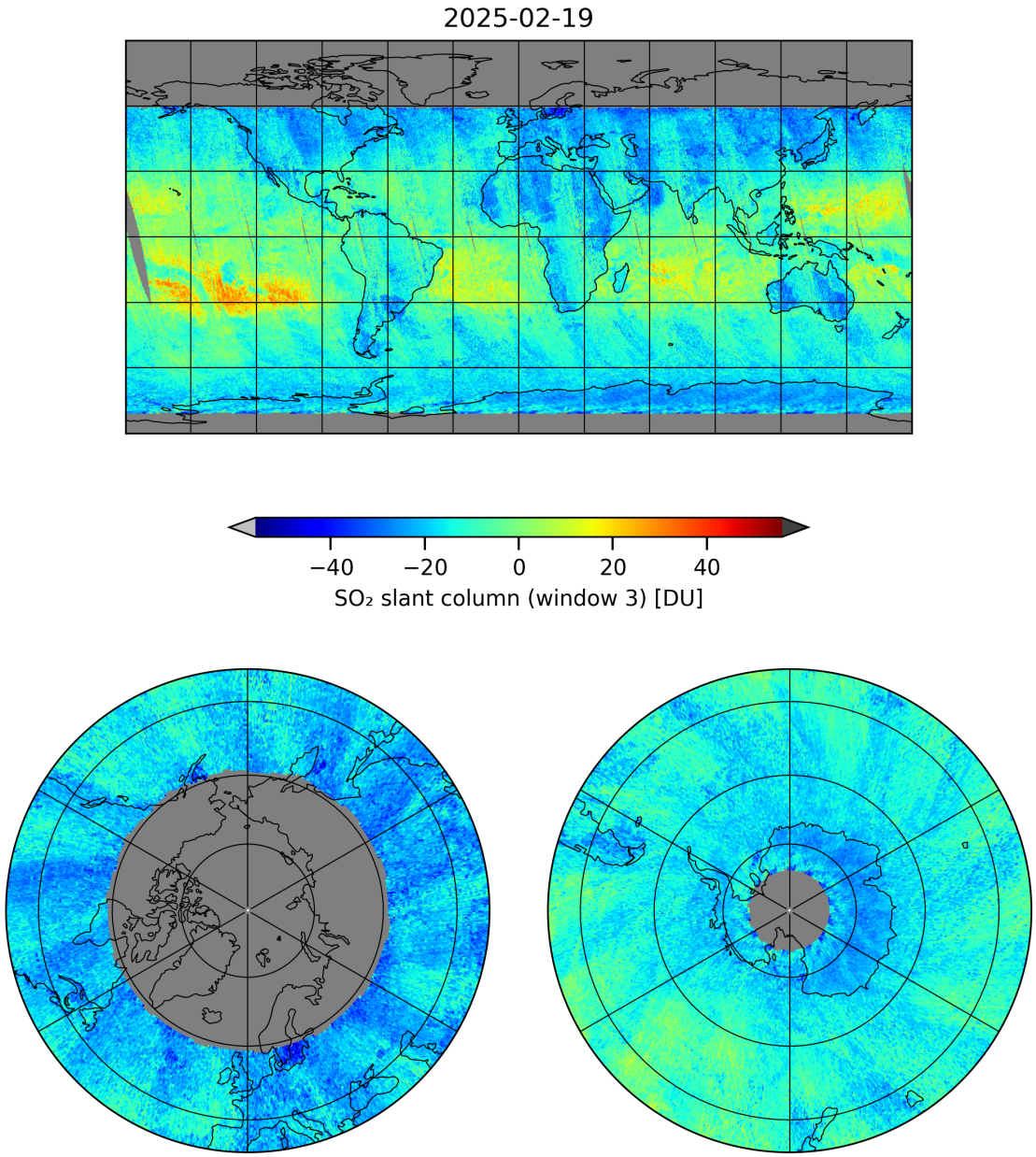

Figure 17: Map of "SO_2 slant column (window 3)" for 2025-02-19 to 2025-02-20

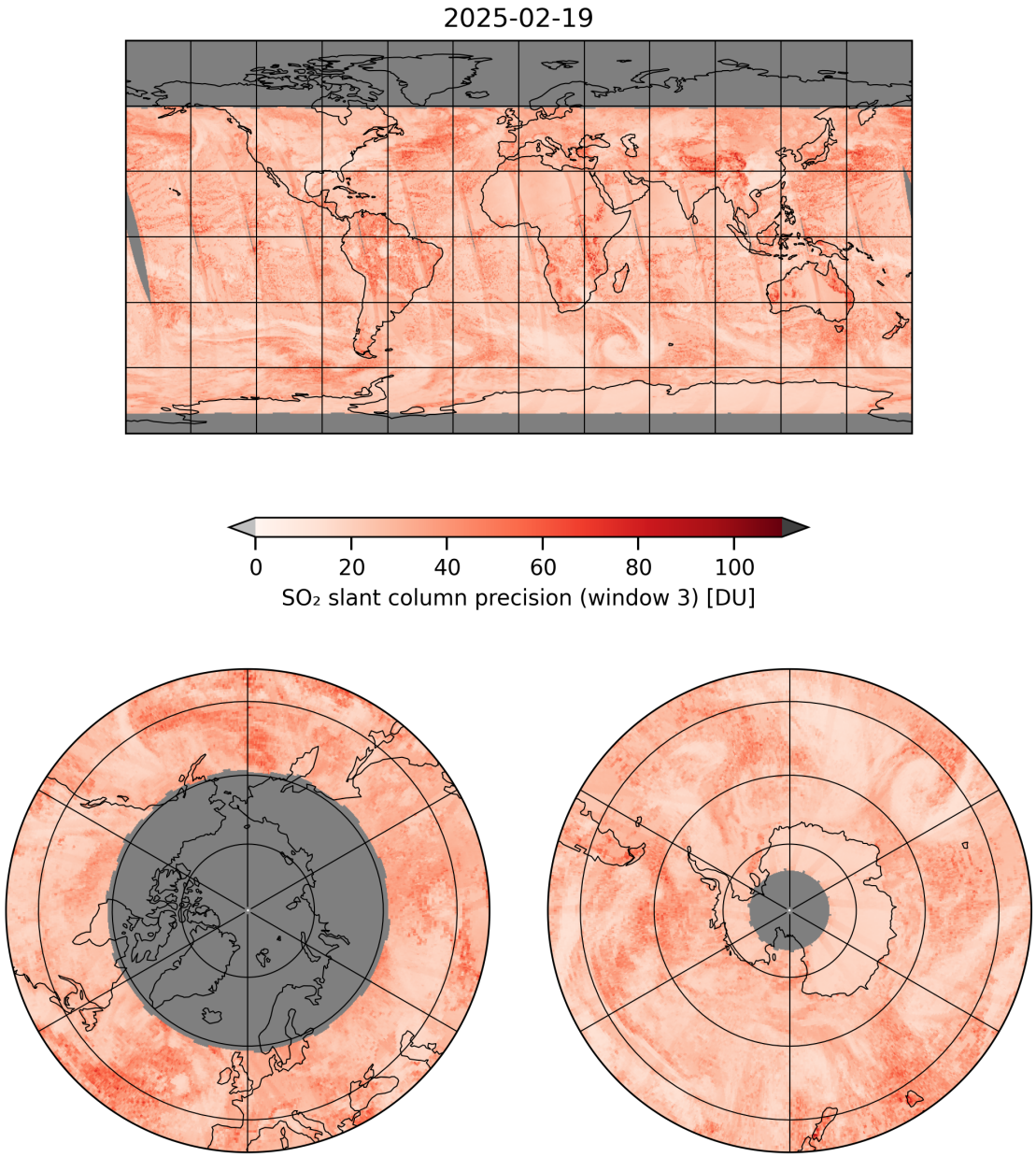

Figure 18: Map of "SO_2 slant column precision (window 3)" for 2025-02-19 to 2025-02-20

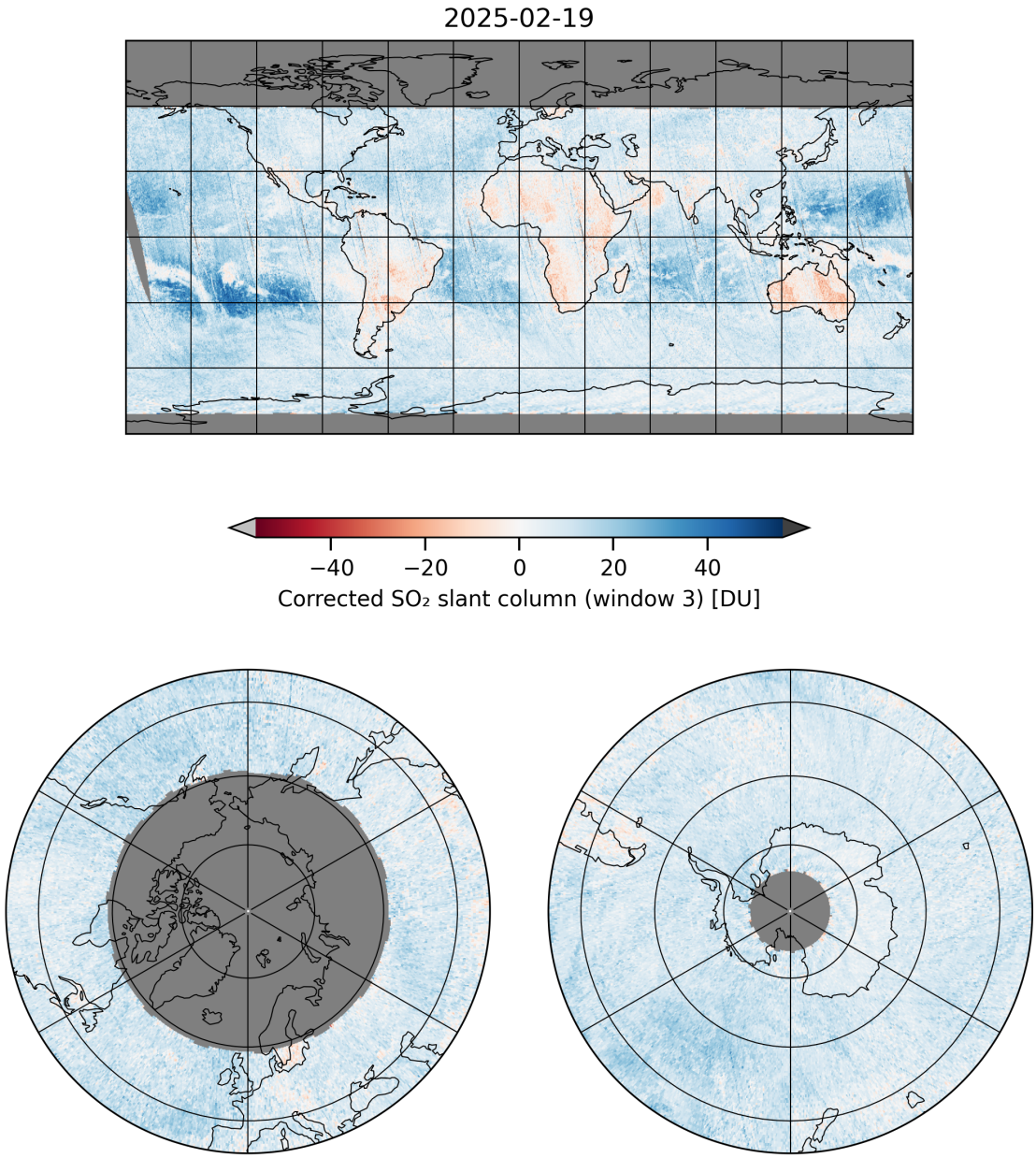

Figure 19: Map of "Corrected SO_2 slant column (window 3)" for 2025-02-19 to 2025-02-20

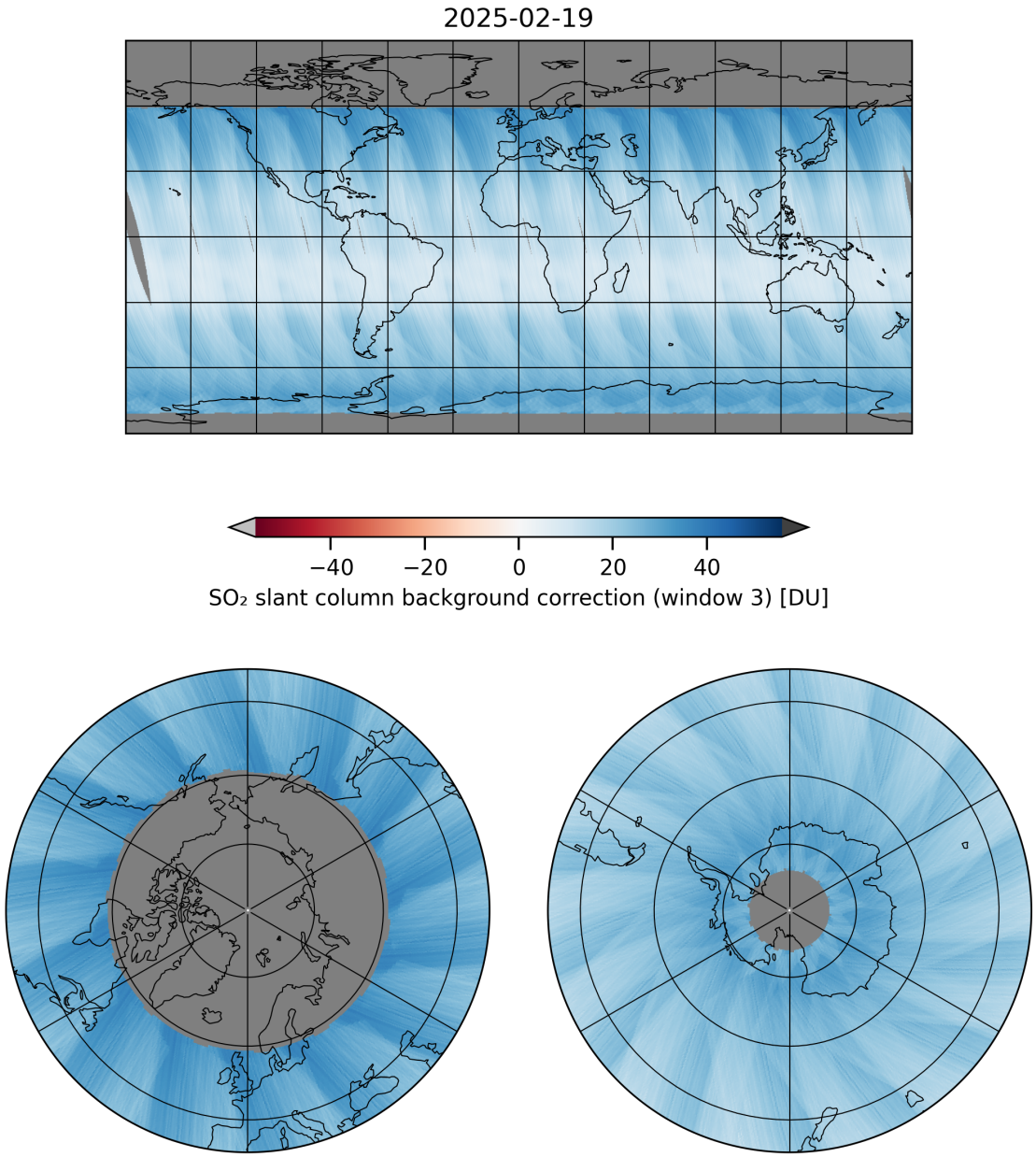

Figure 20: Map of "SO_2 slant column background correction (window 3)" for 2025-02-19 to 2025-02-20

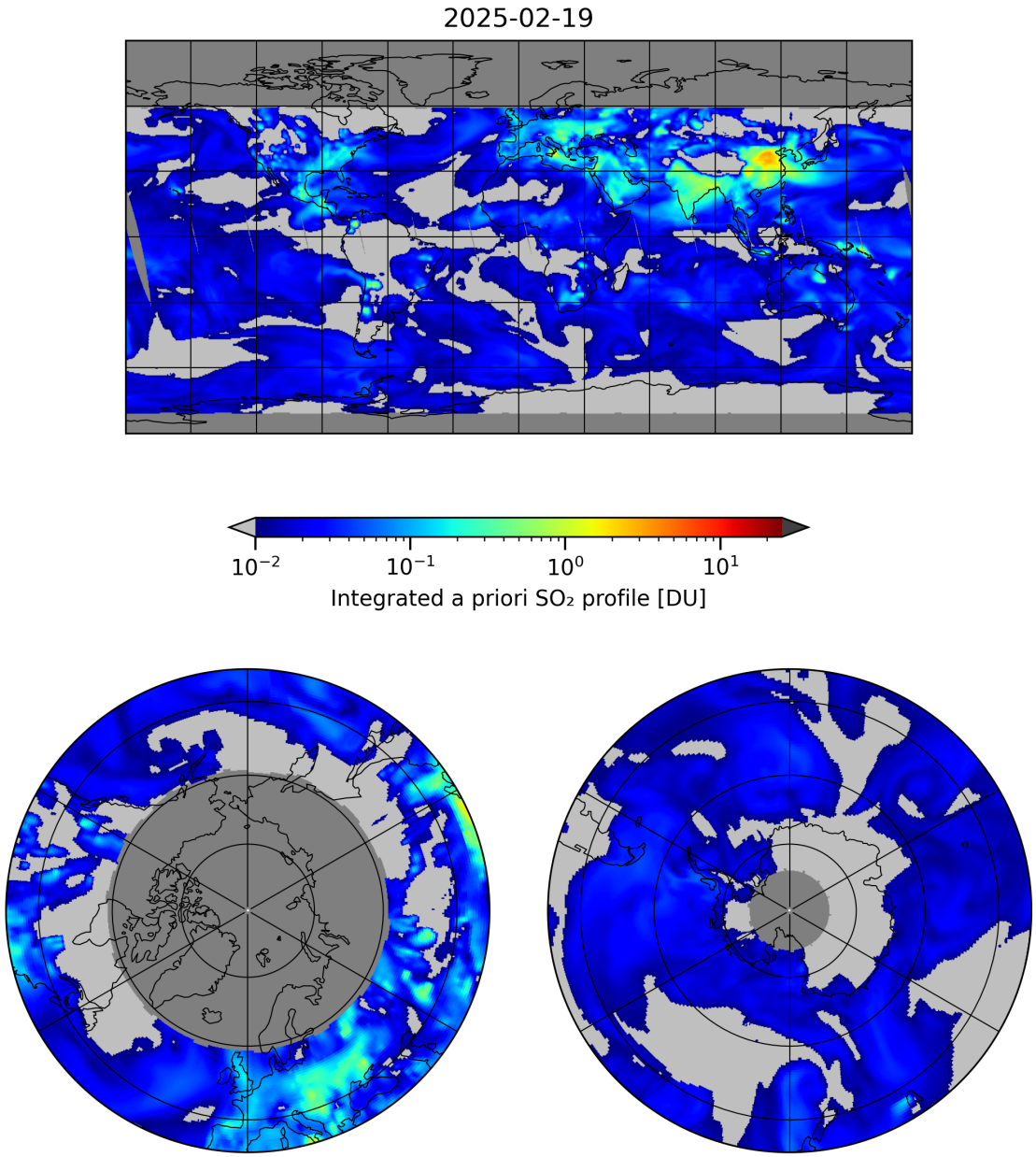

Figure 21: Map of “Integrated a priori SO_2 profile” for 2025-02-19 to 2025-02-20

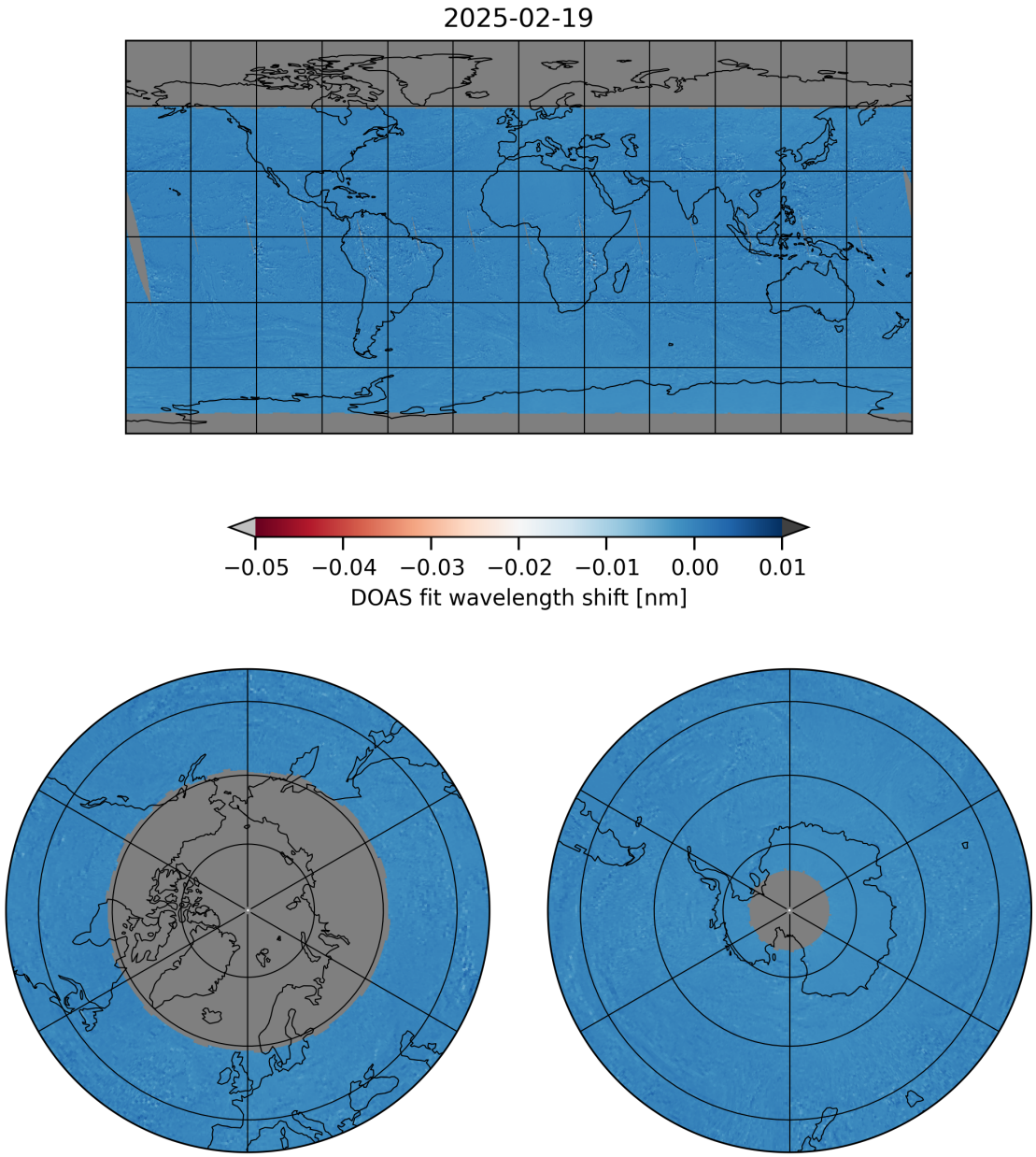

Figure 22: Map of “DOAS fit wavelength shift” for 2025-02-19 to 2025-02-20

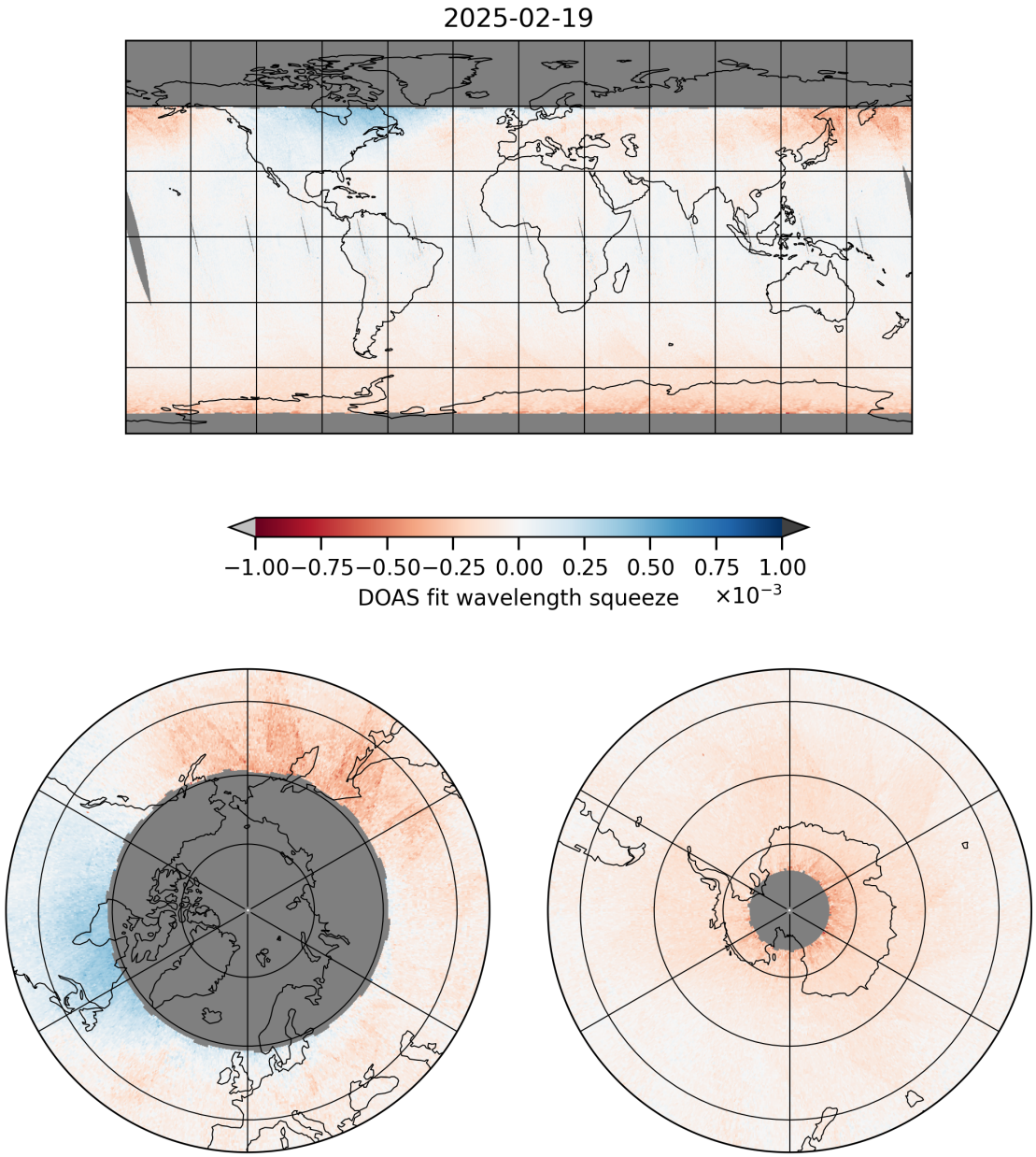

Figure 23: Map of “DOAS fit wavelength squeeze” for 2025-02-19 to 2025-02-20

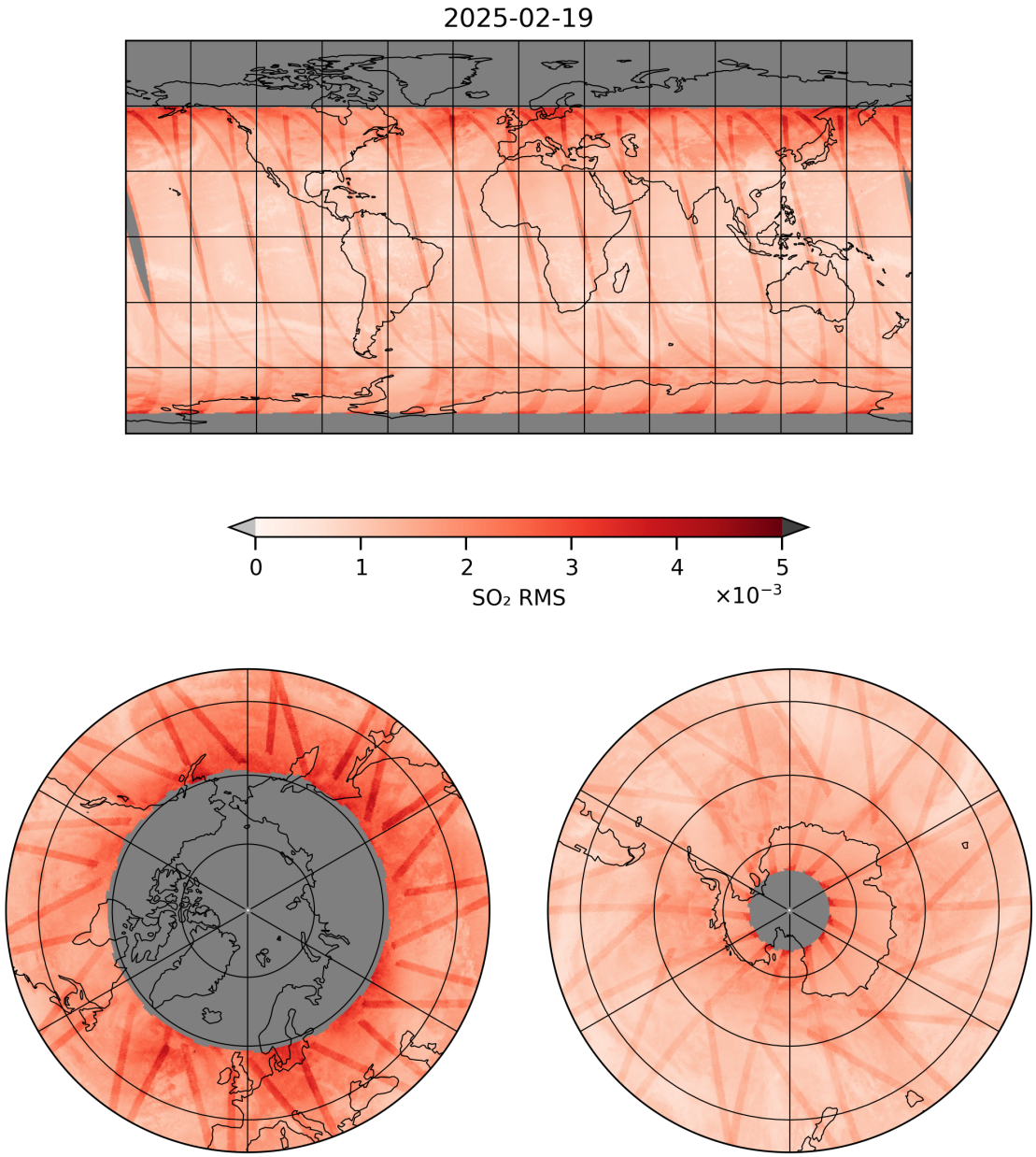

Figure 24: Map of "SO_2 RMS" for 2025-02-19 to 2025-02-20

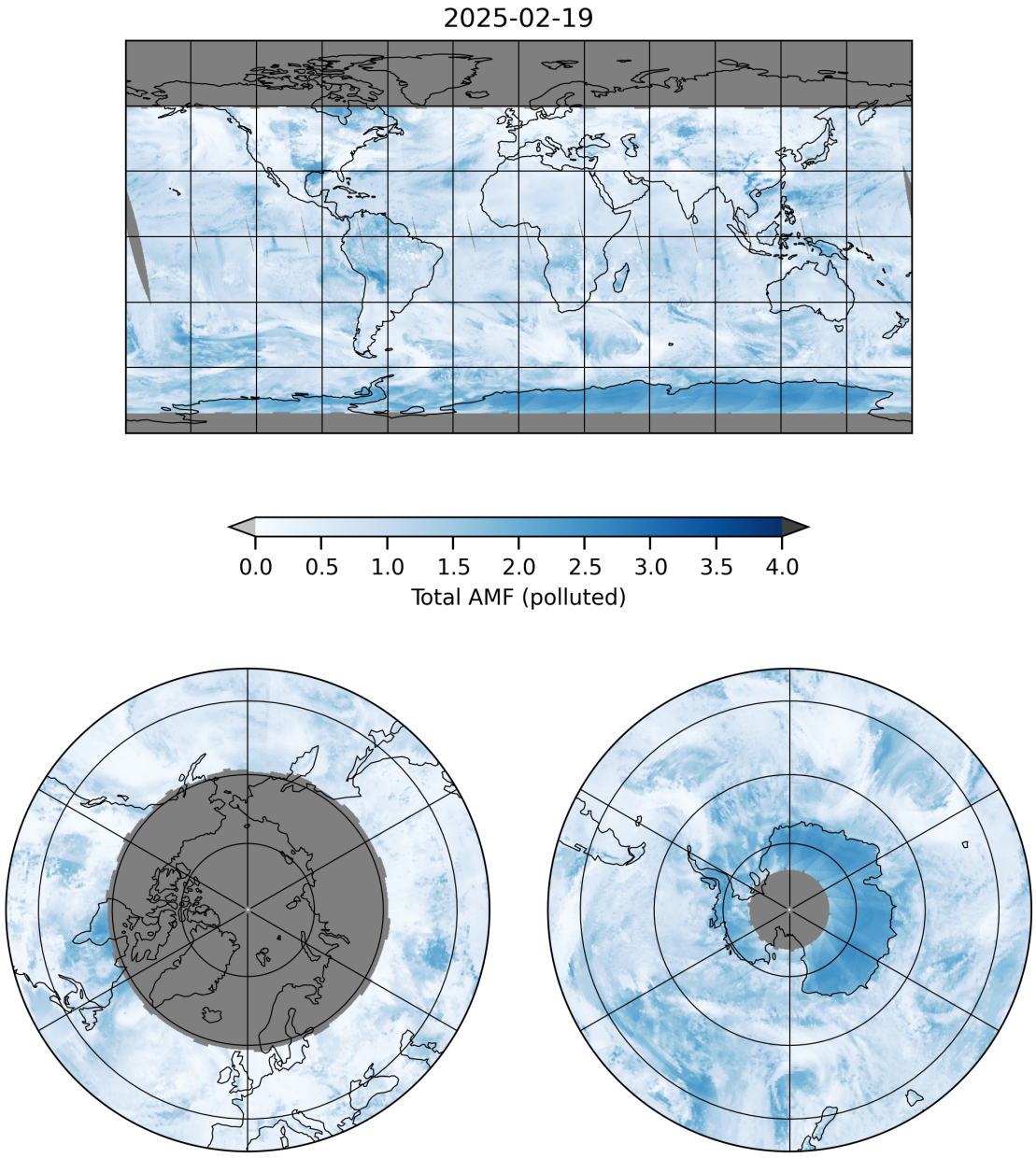

Figure 25: Map of “Total AMF (polluted)” for 2025-02-19 to 2025-02-20

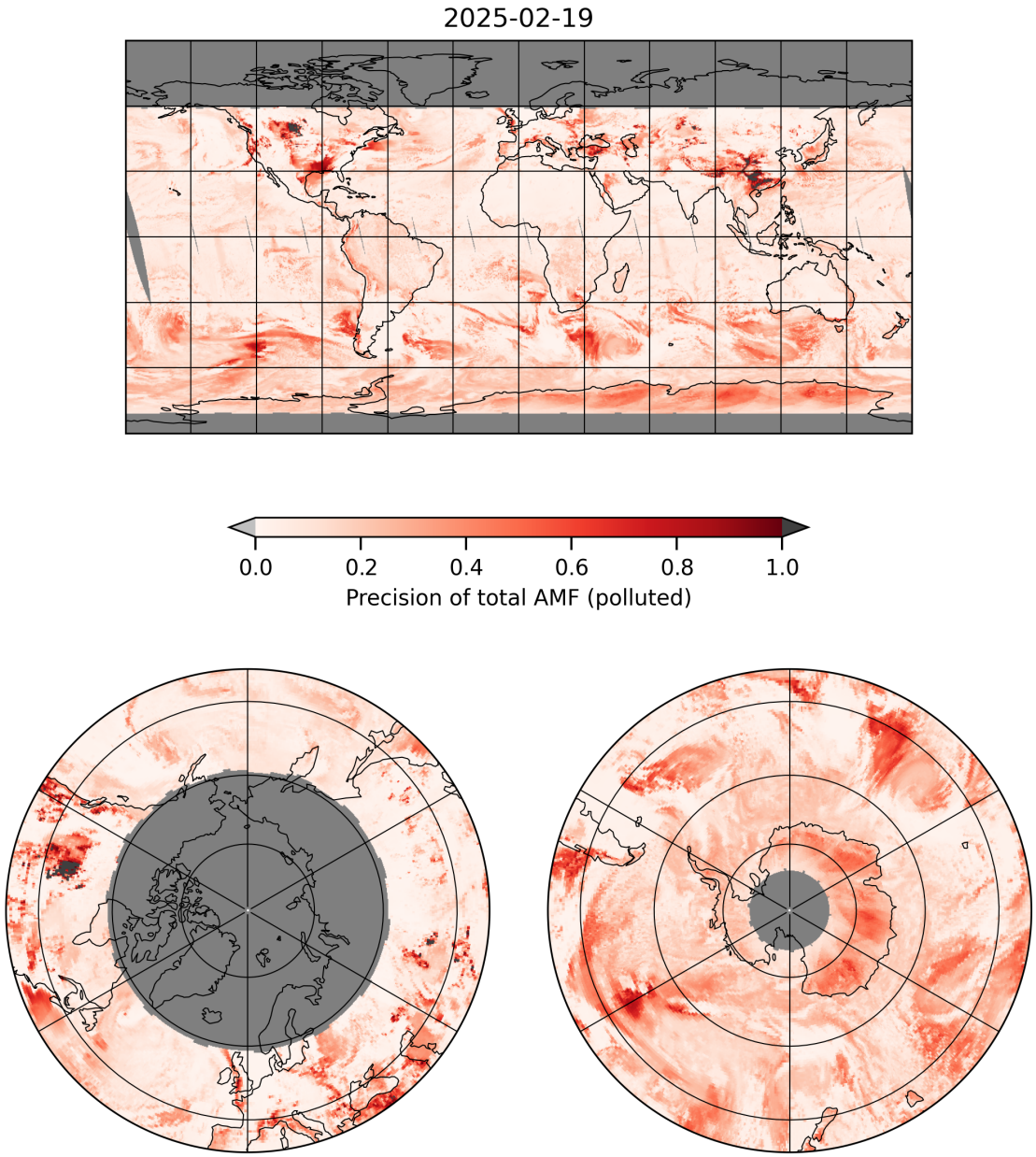

Figure 26: Map of “Precision of total AMF (polluted)” for 2025-02-19 to 2025-02-20

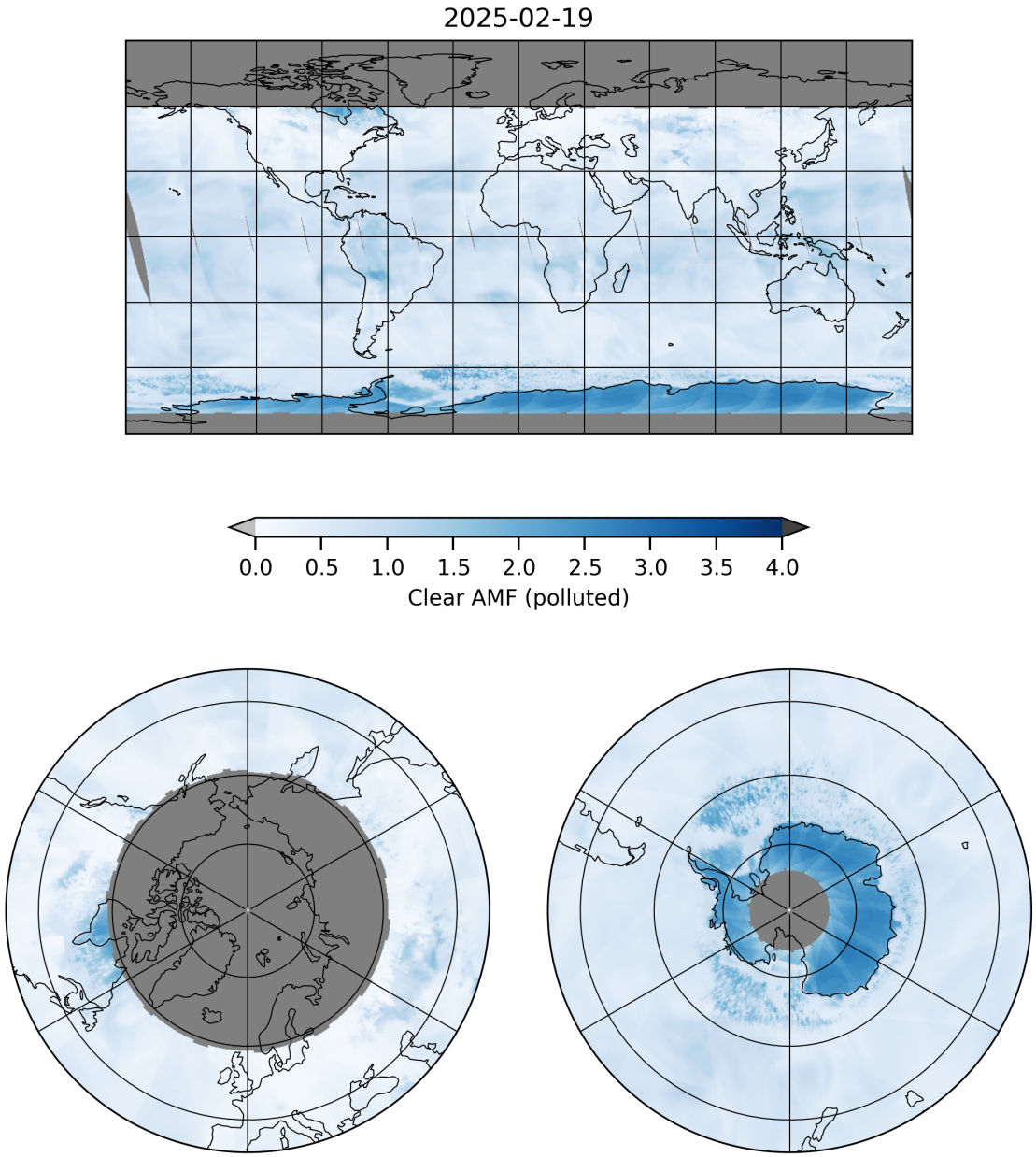

Figure 27: Map of “Clear AMF (polluted)” for 2025-02-19 to 2025-02-20

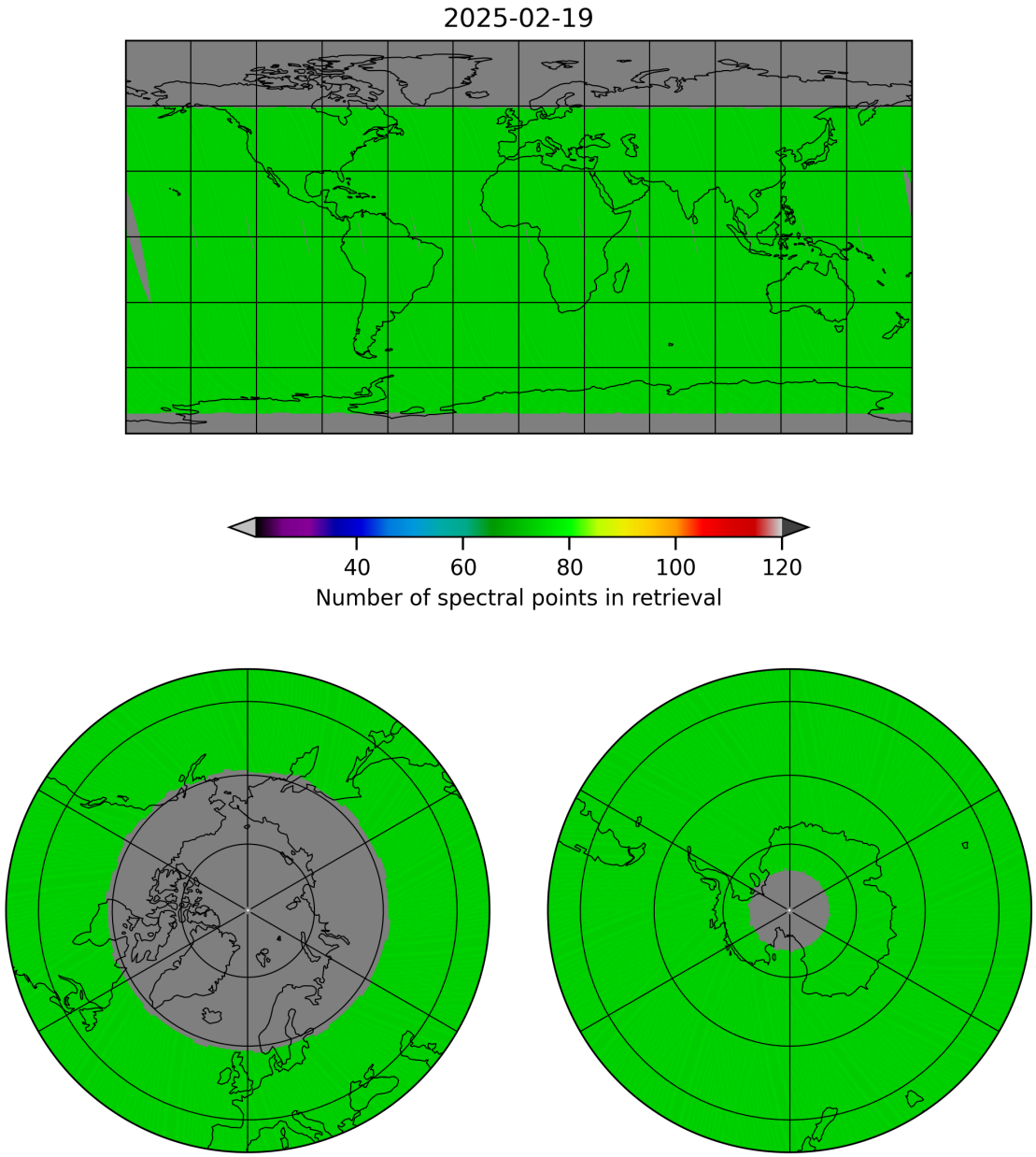

Figure 28: Map of “Number of spectral points in retrieval” for 2025-02-19 to 2025-02-20

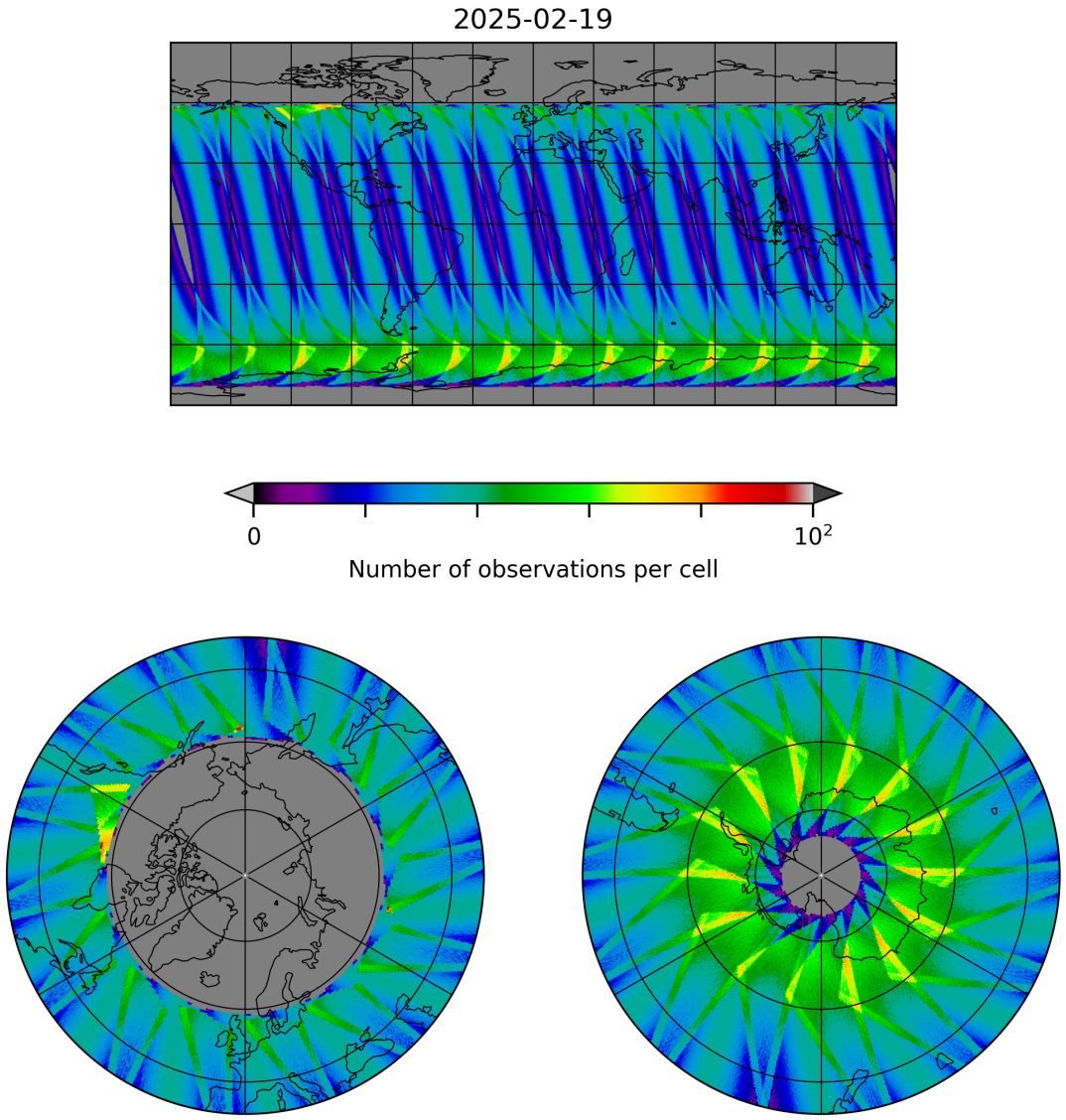

Figure 29: Map of the number of observations for 2025-02-19 to 2025-02-20

7 Zonal average

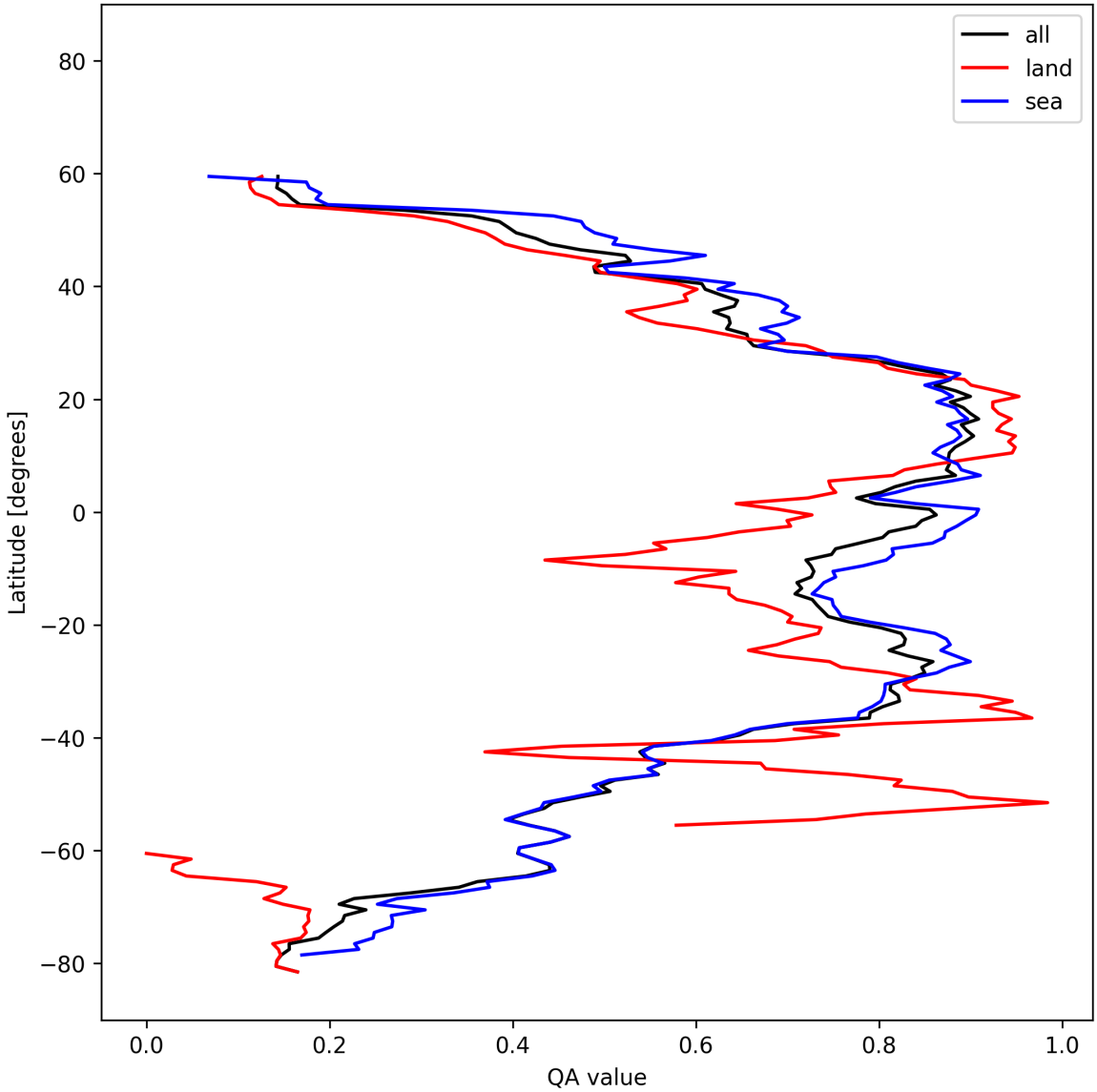

Figure 30: Zonal average of “QA value” for 2025-02-19 to 2025-02-20.

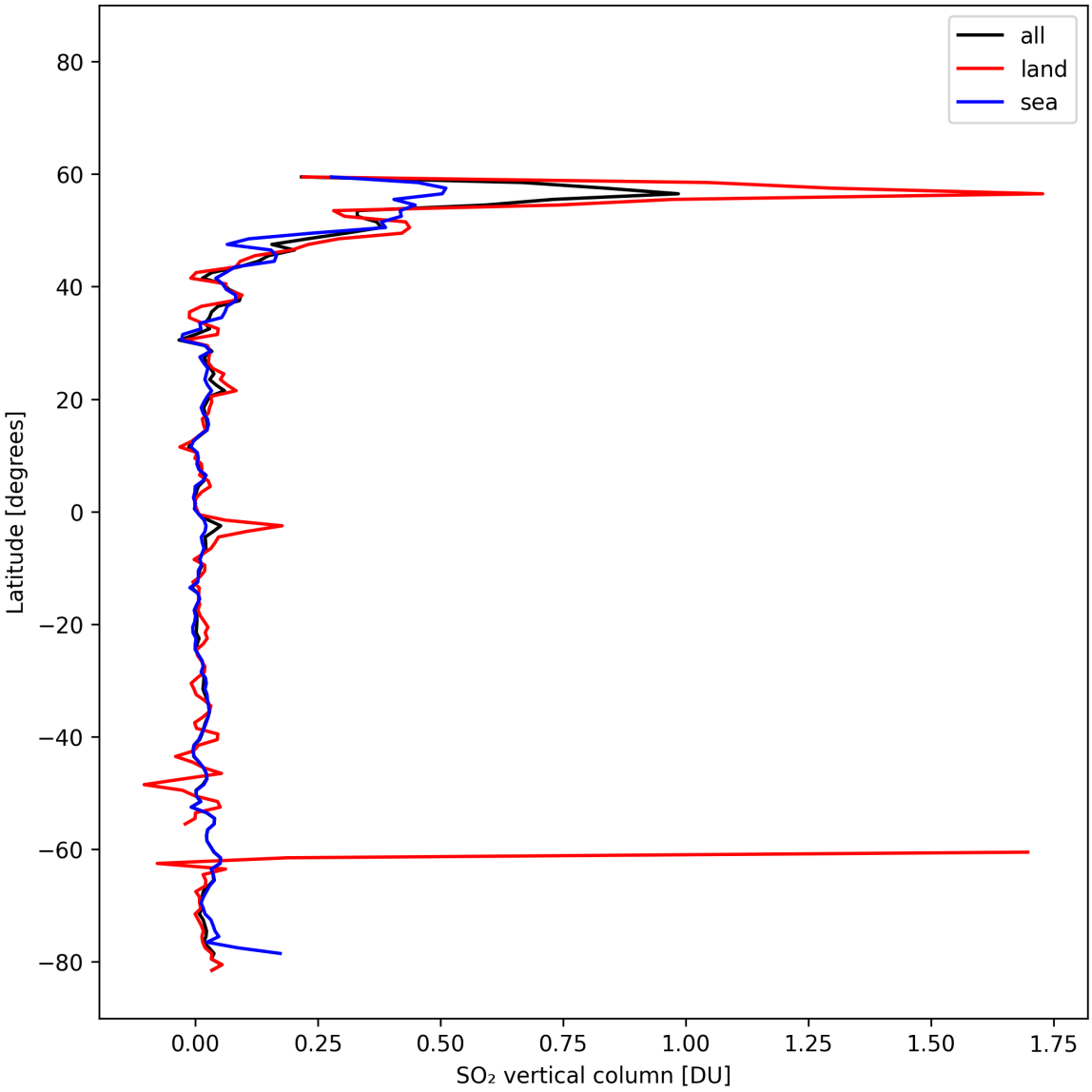

Figure 31: Zonal average of "SO_2 vertical column" for 2025-02-19 to 2025-02-20.

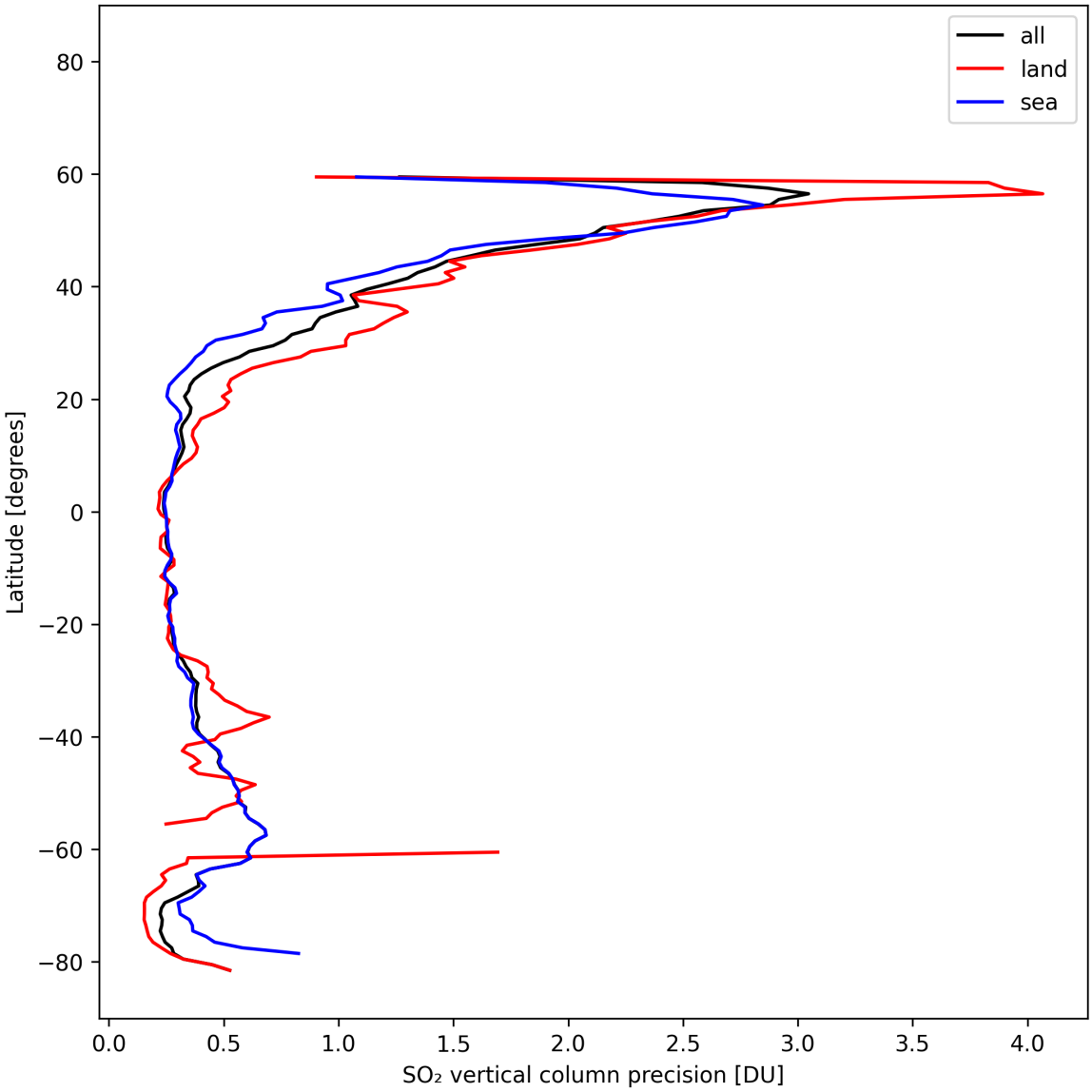

Figure 32: Zonal average of "SO_2 vertical column precision" for 2025-02-19 to 2025-02-20.

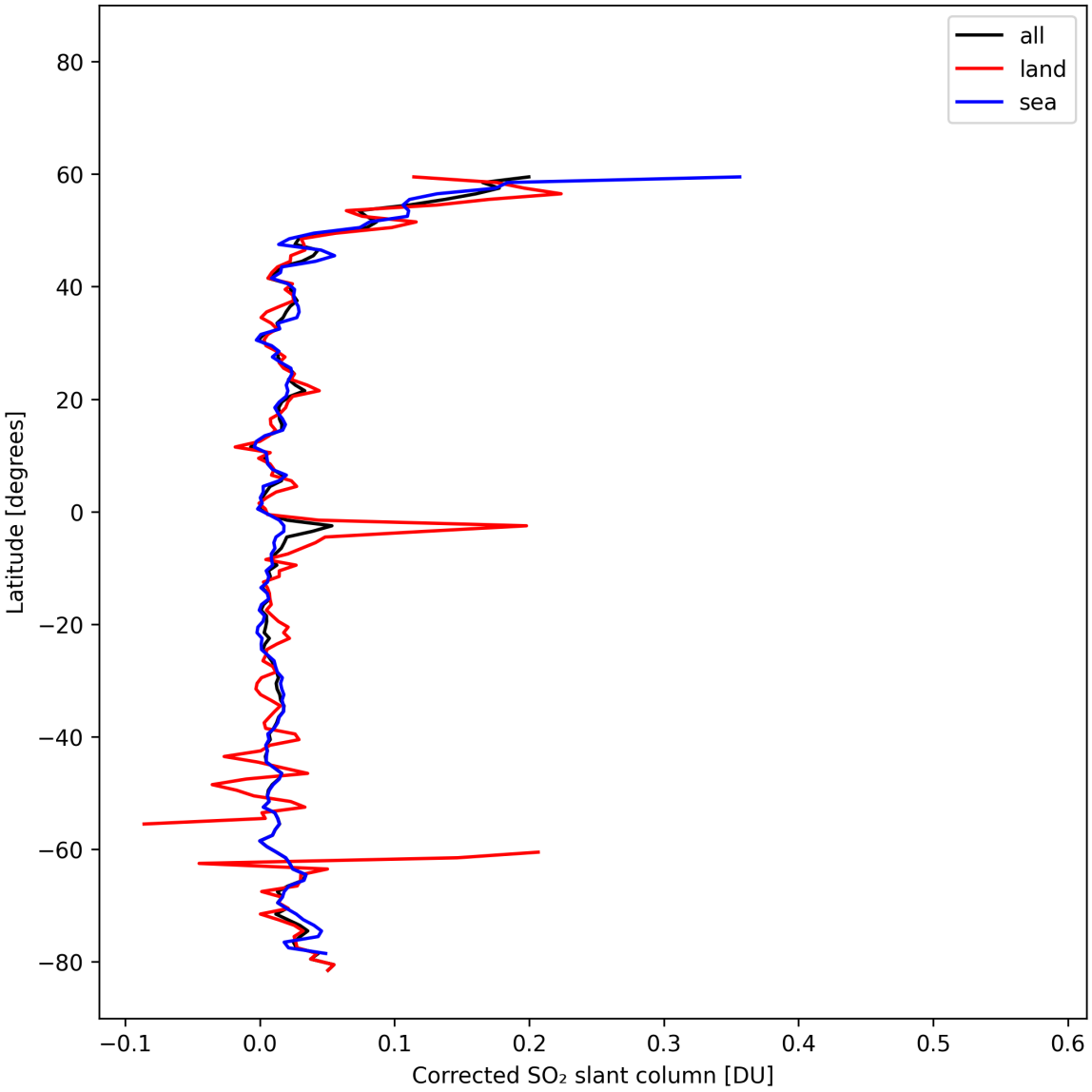

Figure 33: Zonal average of “Corrected SO_2 slant column” for 2025-02-19 to 2025-02-20.

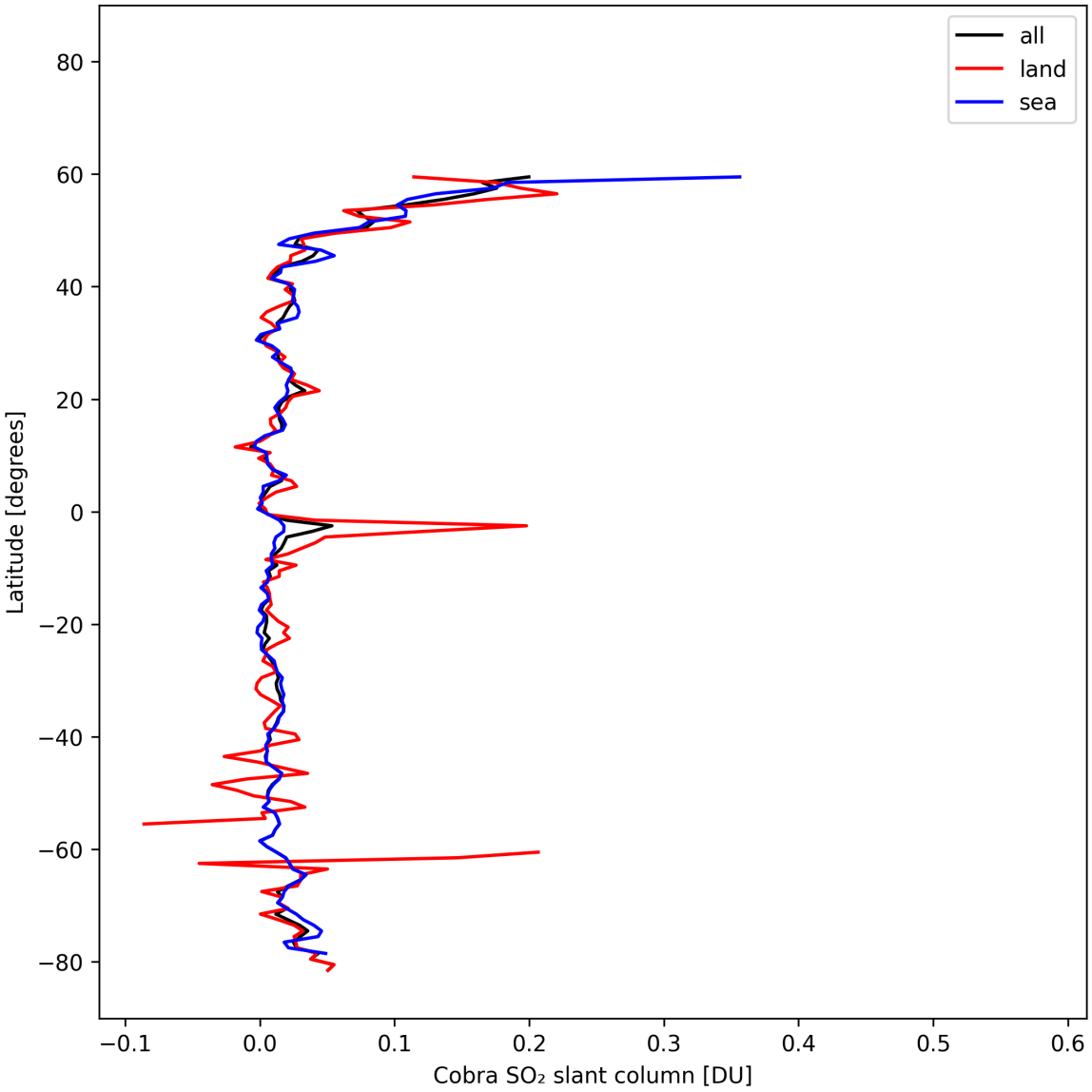

Figure 34: Zonal average of "Cobra SO_2 slant column" for 2025-02-19 to 2025-02-20.

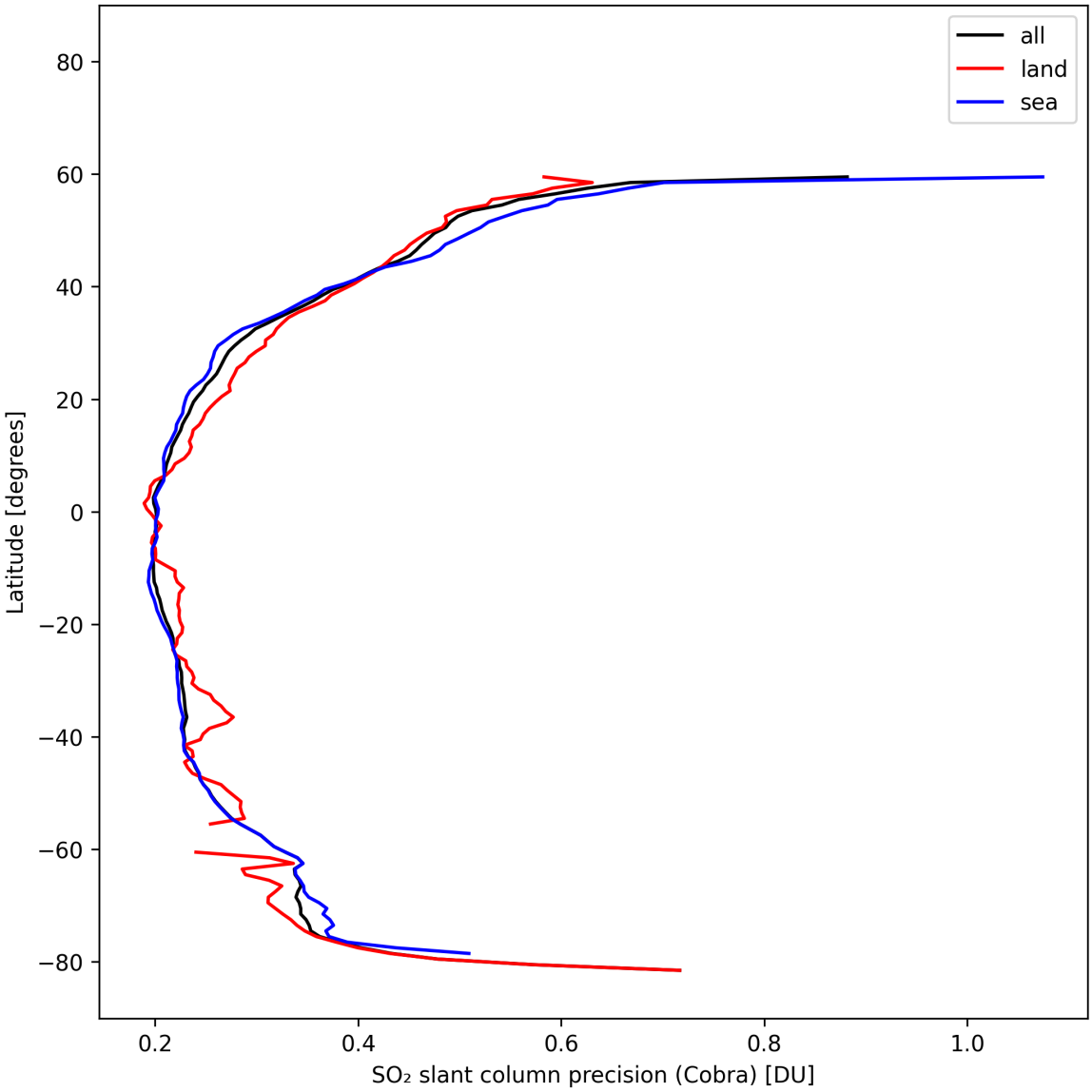

Figure 35: Zonal average of "SO_2 slant column precision (Cobra)" for 2025-02-19 to 2025-02-20.

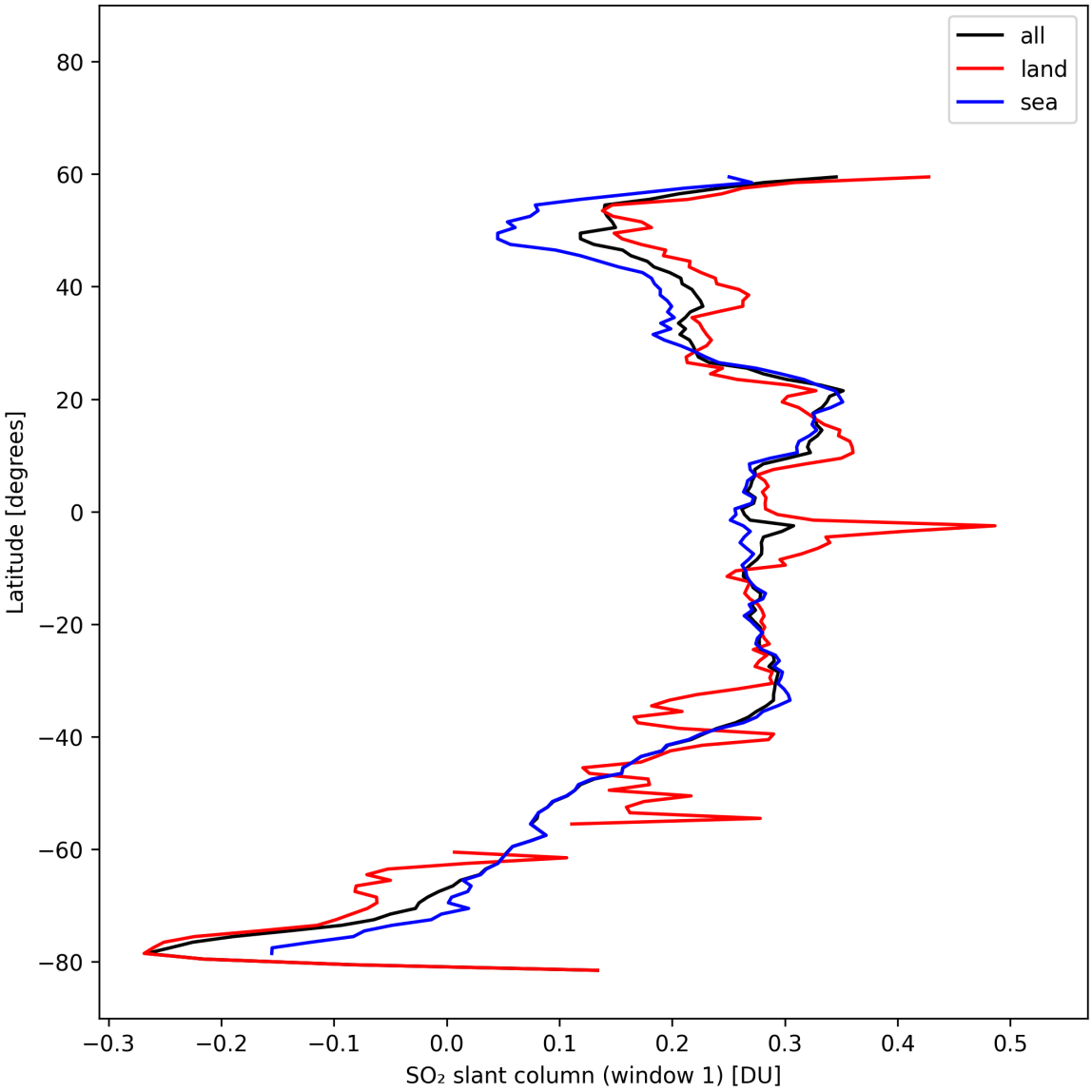

Figure 36: Zonal average of "SO_2 slant column (window 1)" for 2025-02-19 to 2025-02-20.

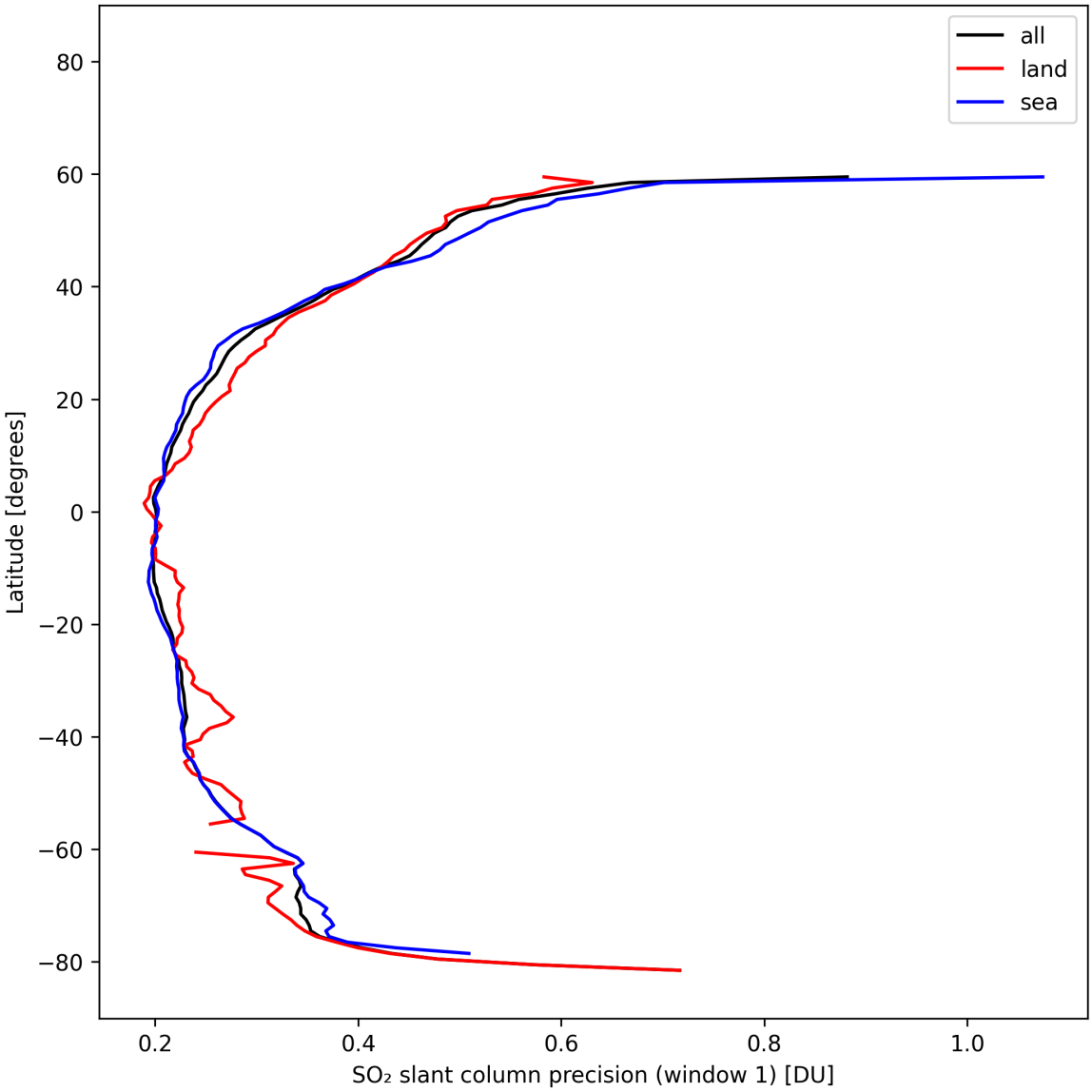

Figure 37: Zonal average of "SO_2 slant column precision (window 1)" for 2025-02-19 to 2025-02-20.

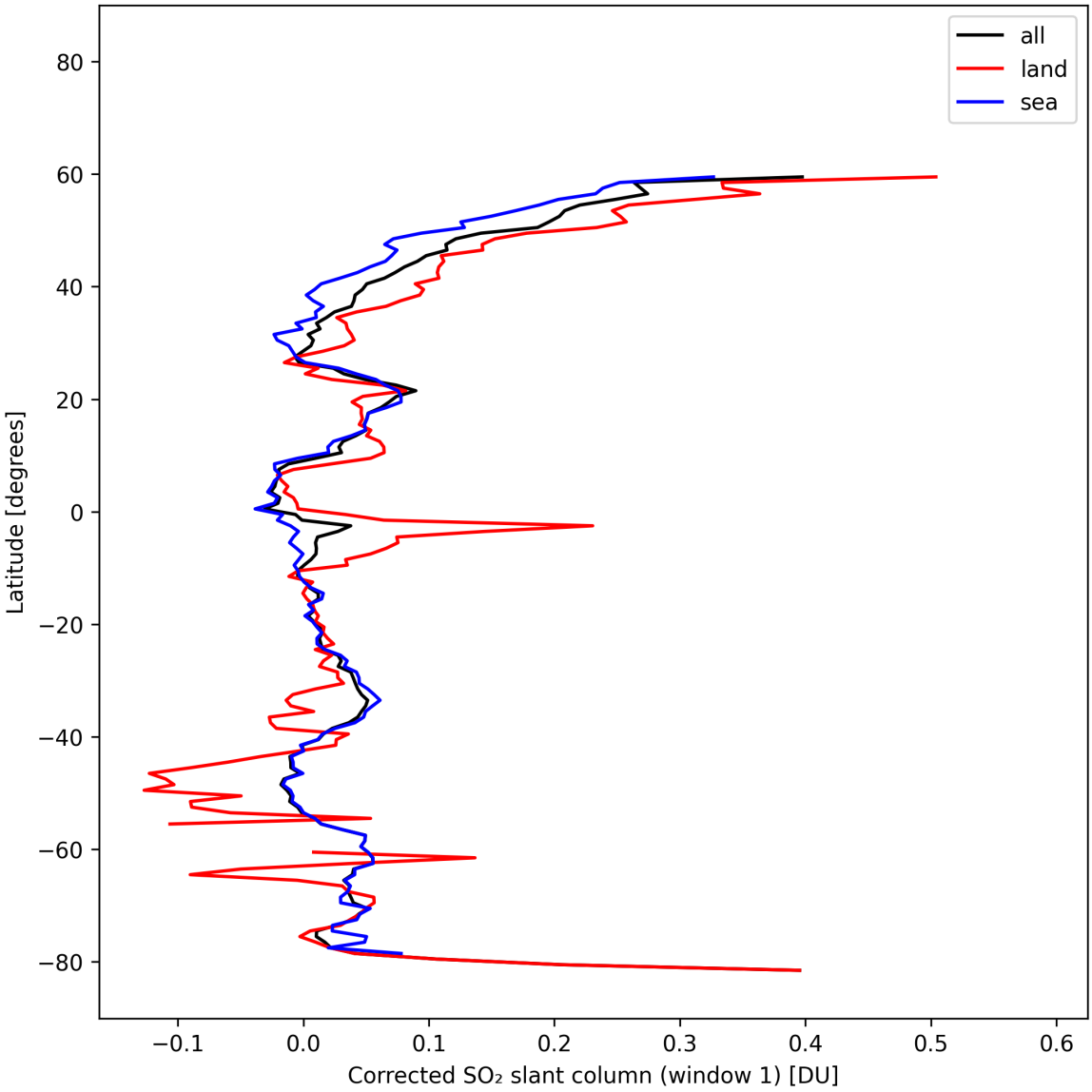

Figure 38: Zonal average of "Corrected SO_2 slant column (window 1)" for 2025-02-19 to 2025-02-20.

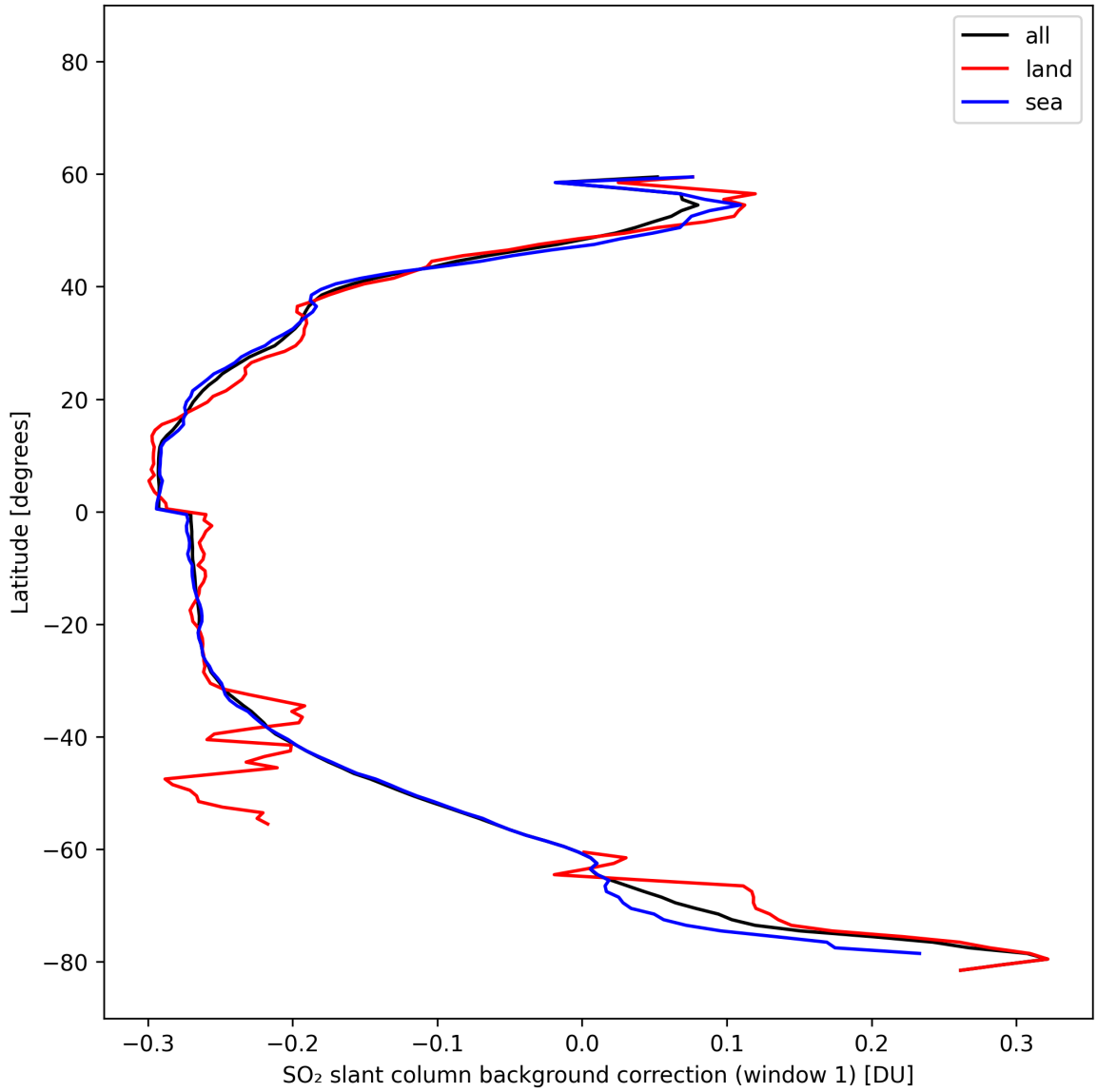

Figure 39: Zonal average of "SO_2 slant column background correction (window 1)" for 2025-02-19 to 2025-02-20.

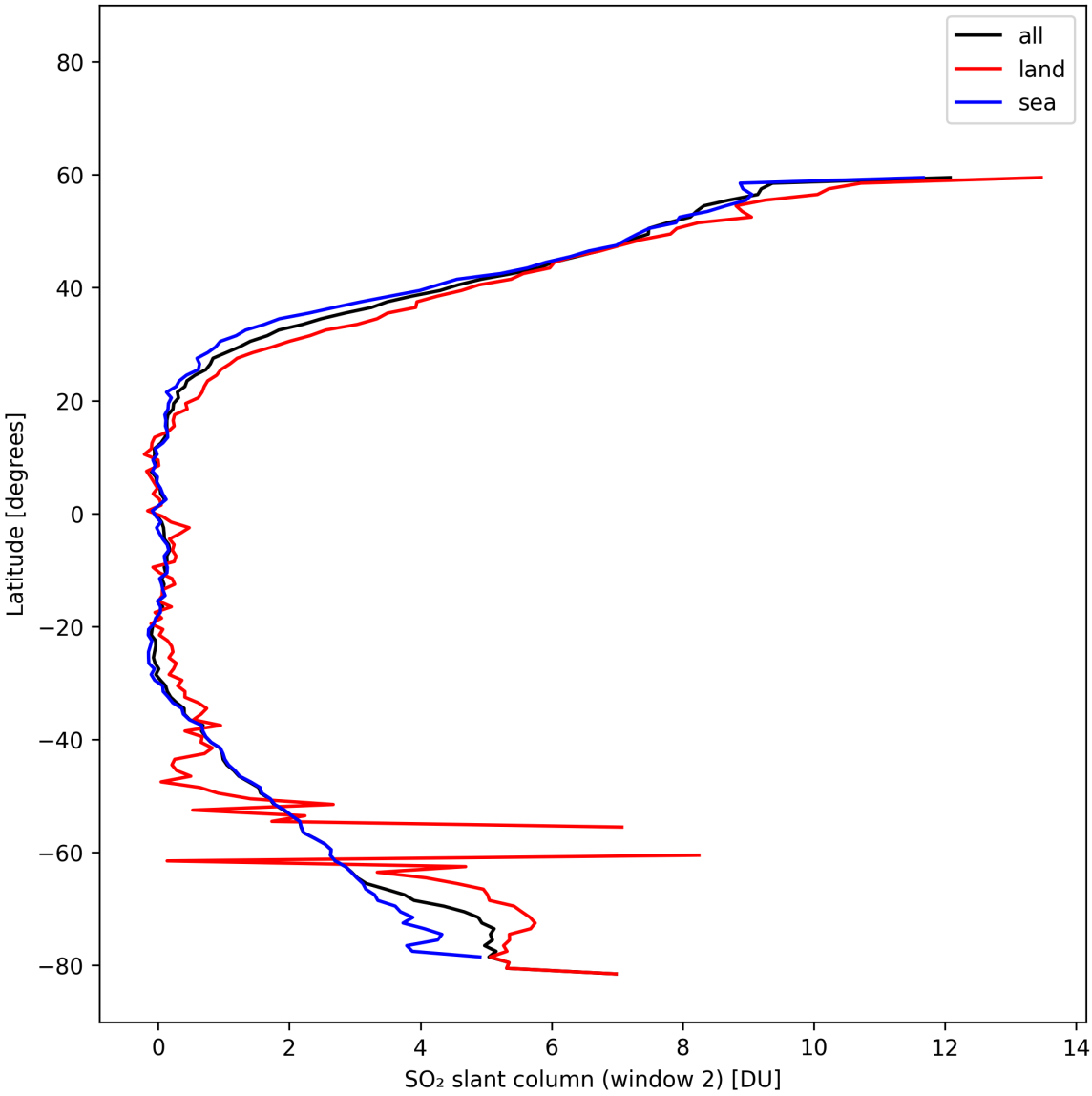

Figure 40: Zonal average of "SO_2 slant column (window 2)" for 2025-02-19 to 2025-02-20.

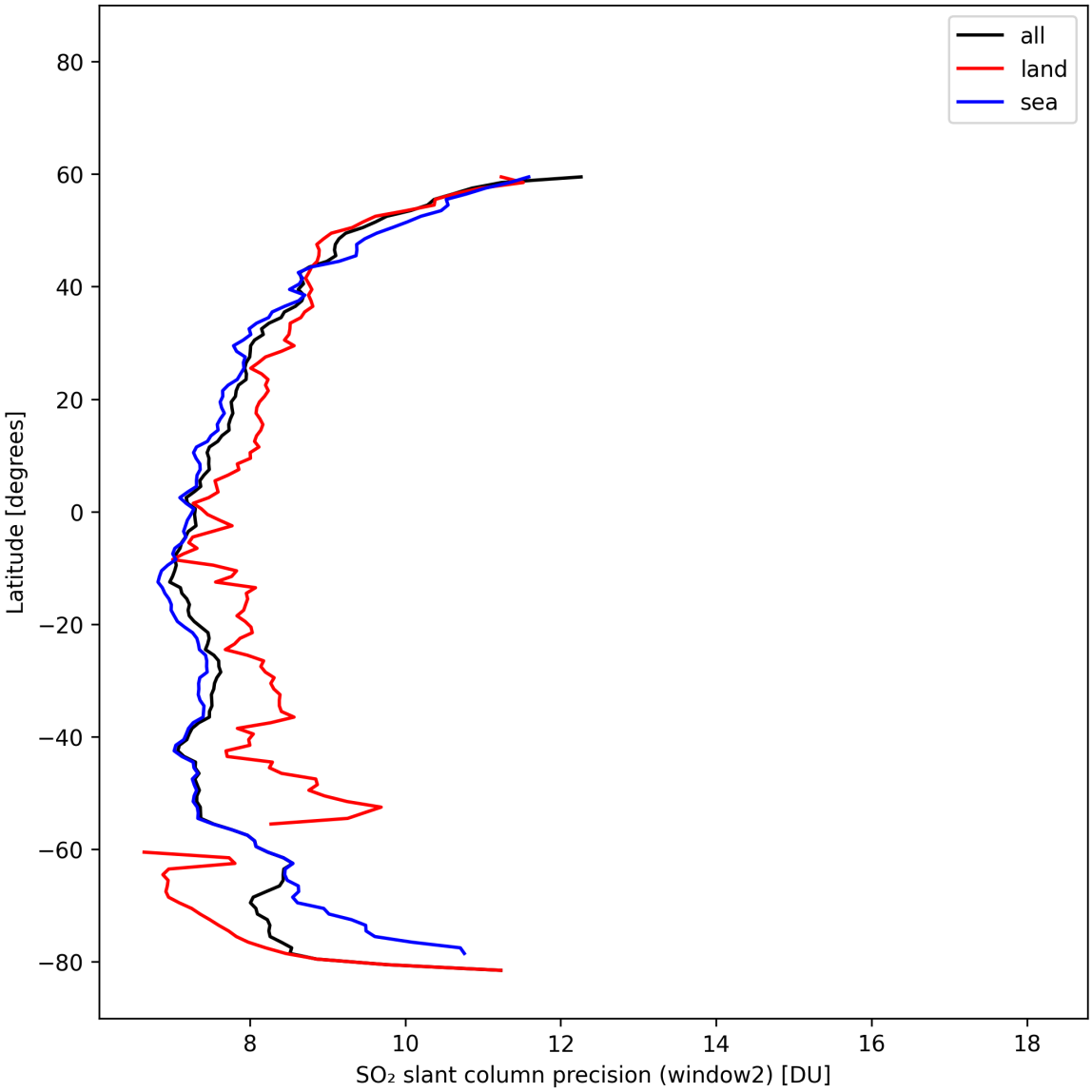

Figure 41: Zonal average of "SO_2 slant column precision (window2)" for 2025-02-19 to 2025-02-20.

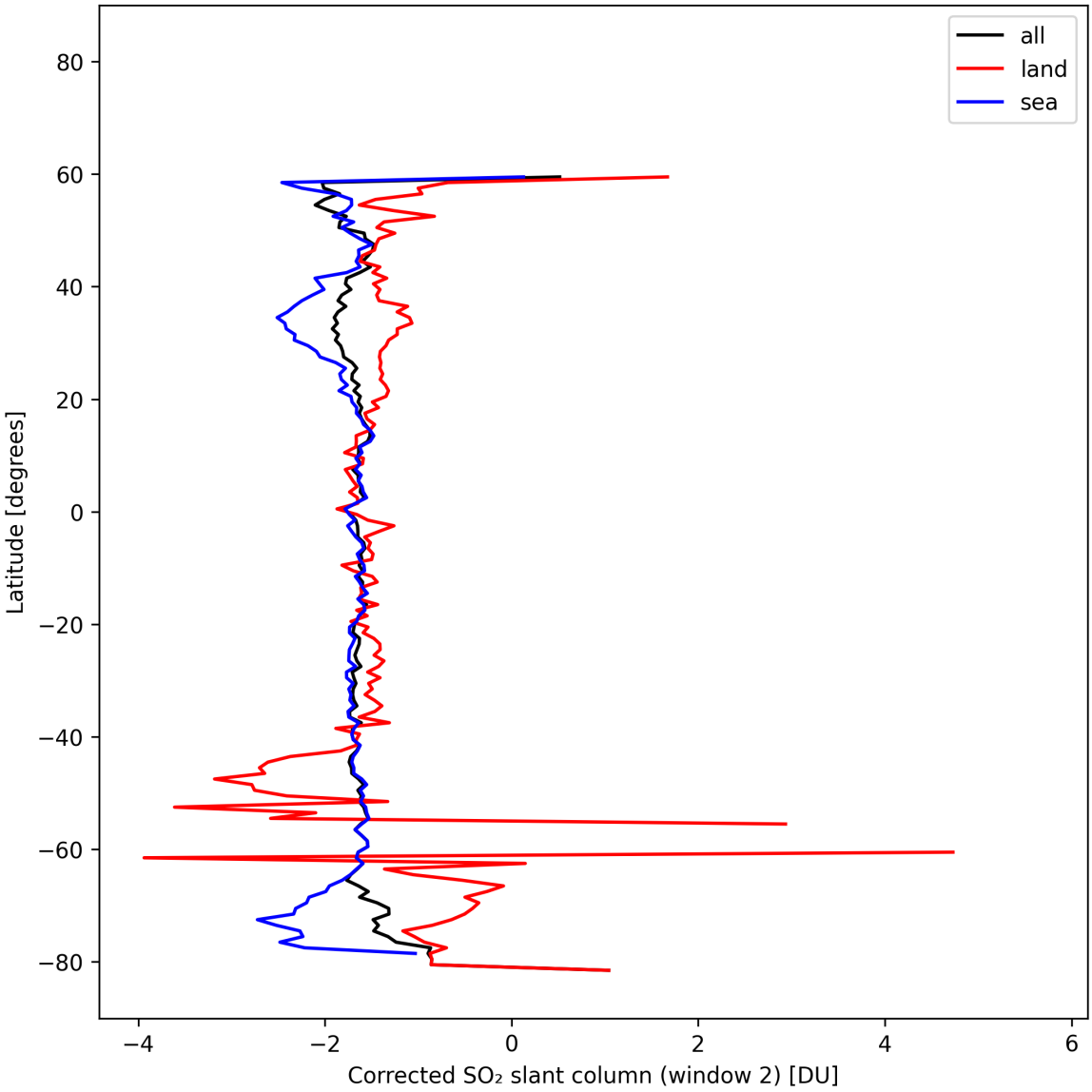

Figure 42: Zonal average of "Corrected SO_2 slant column (window 2)" for 2025-02-19 to 2025-02-20.

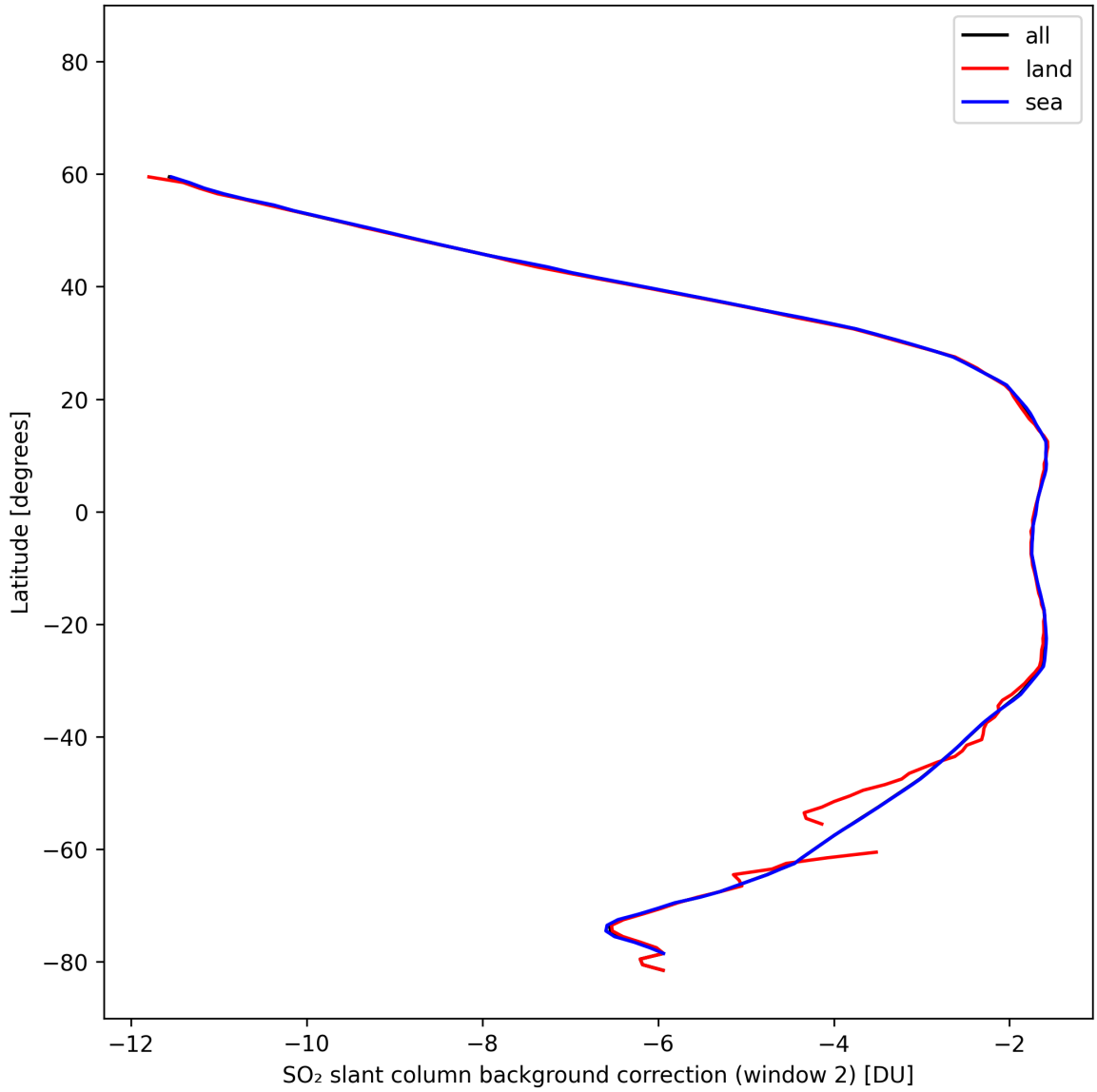

Figure 43: Zonal average of "SO_2 slant column background correction (window 2)" for 2025-02-19 to 2025-02-20.

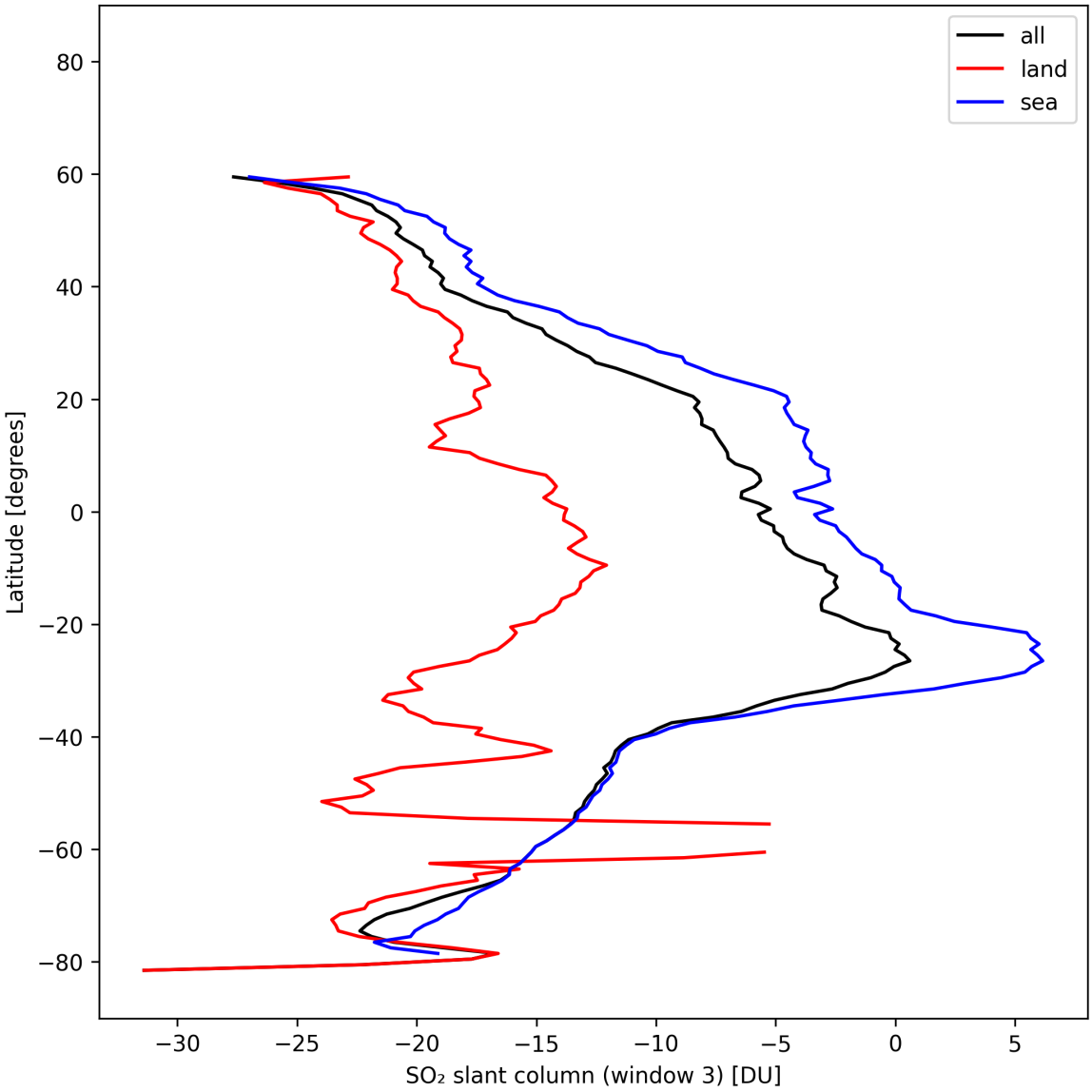

Figure 44: Zonal average of "SO_2 slant column (window 3)" for 2025-02-19 to 2025-02-20.

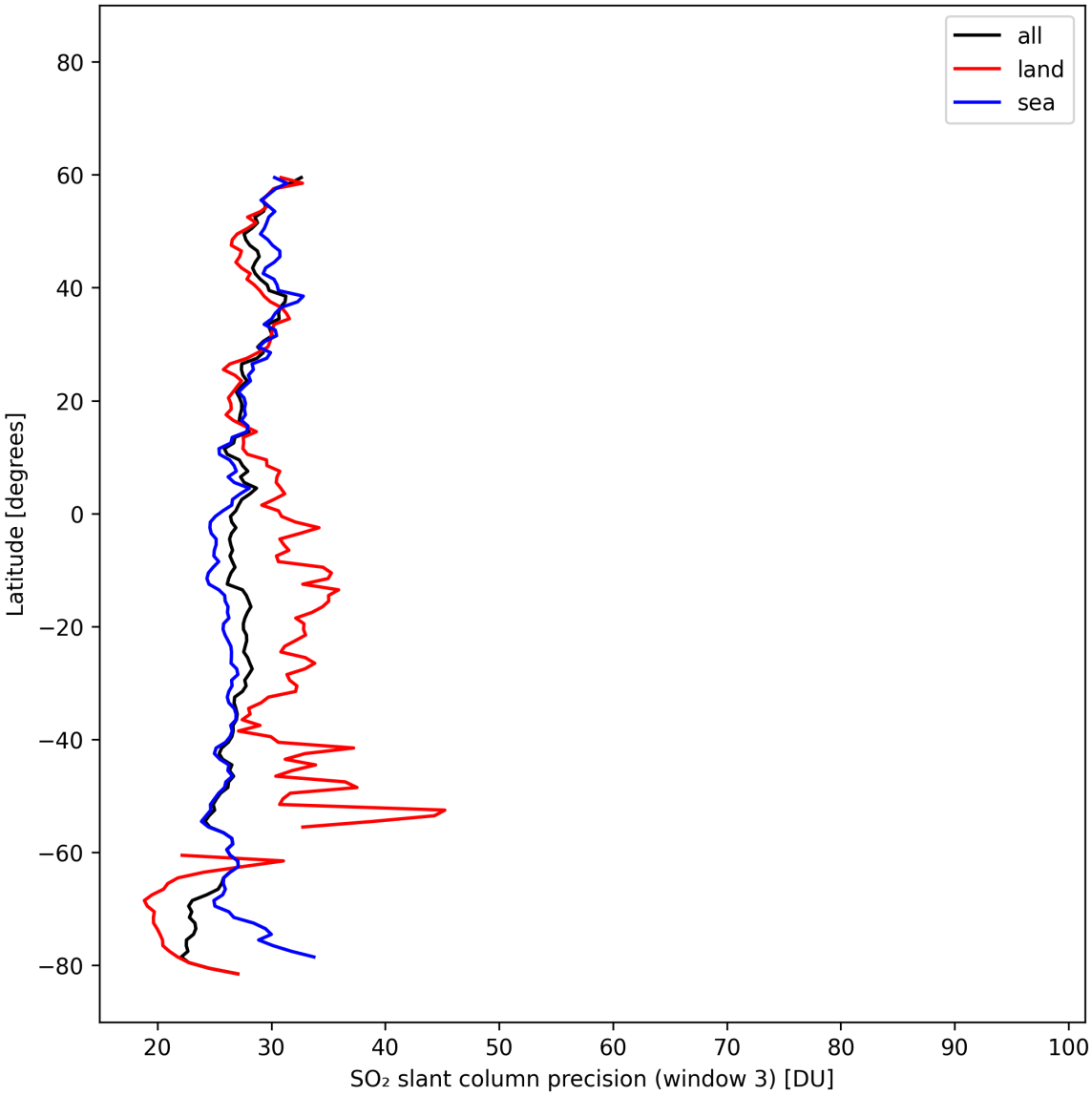

Figure 45: Zonal average of "SO_2 slant column precision (window 3)" for 2025-02-19 to 2025-02-20.

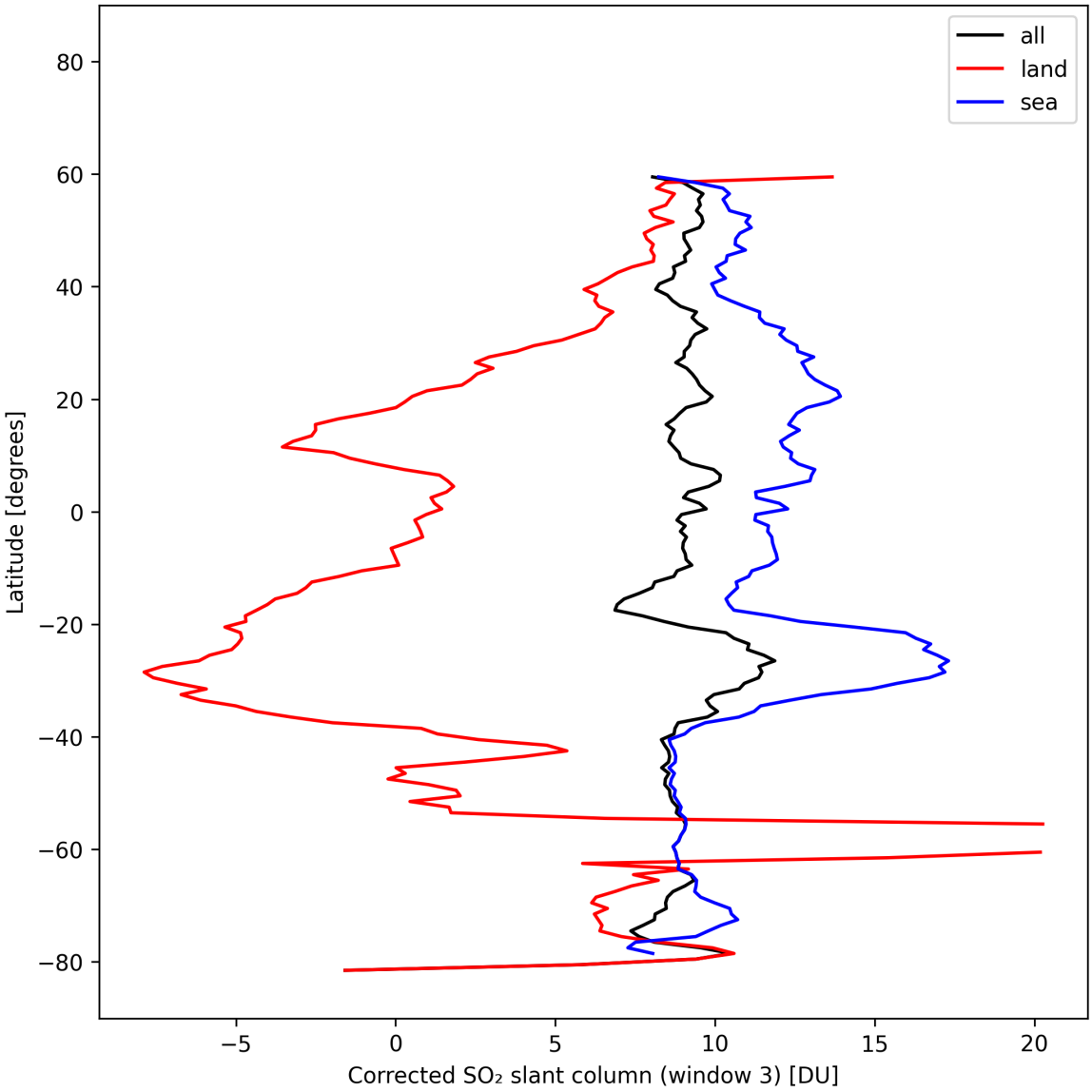

Figure 46: Zonal average of "Corrected SO_2 slant column (window 3)" for 2025-02-19 to 2025-02-20.

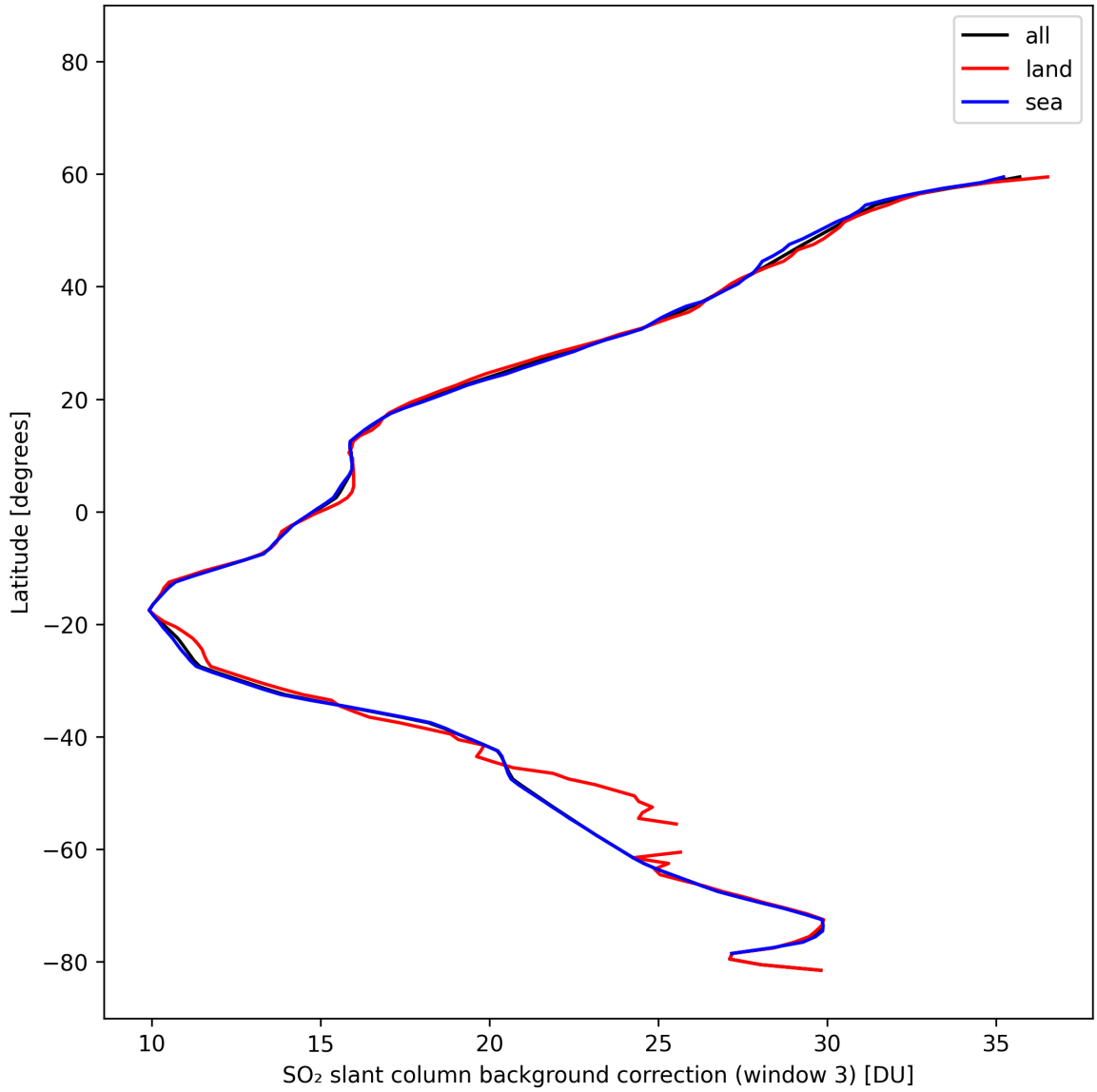

Figure 47: Zonal average of "SO_2 slant column background correction (window 3)" for 2025-02-19 to 2025-02-20.

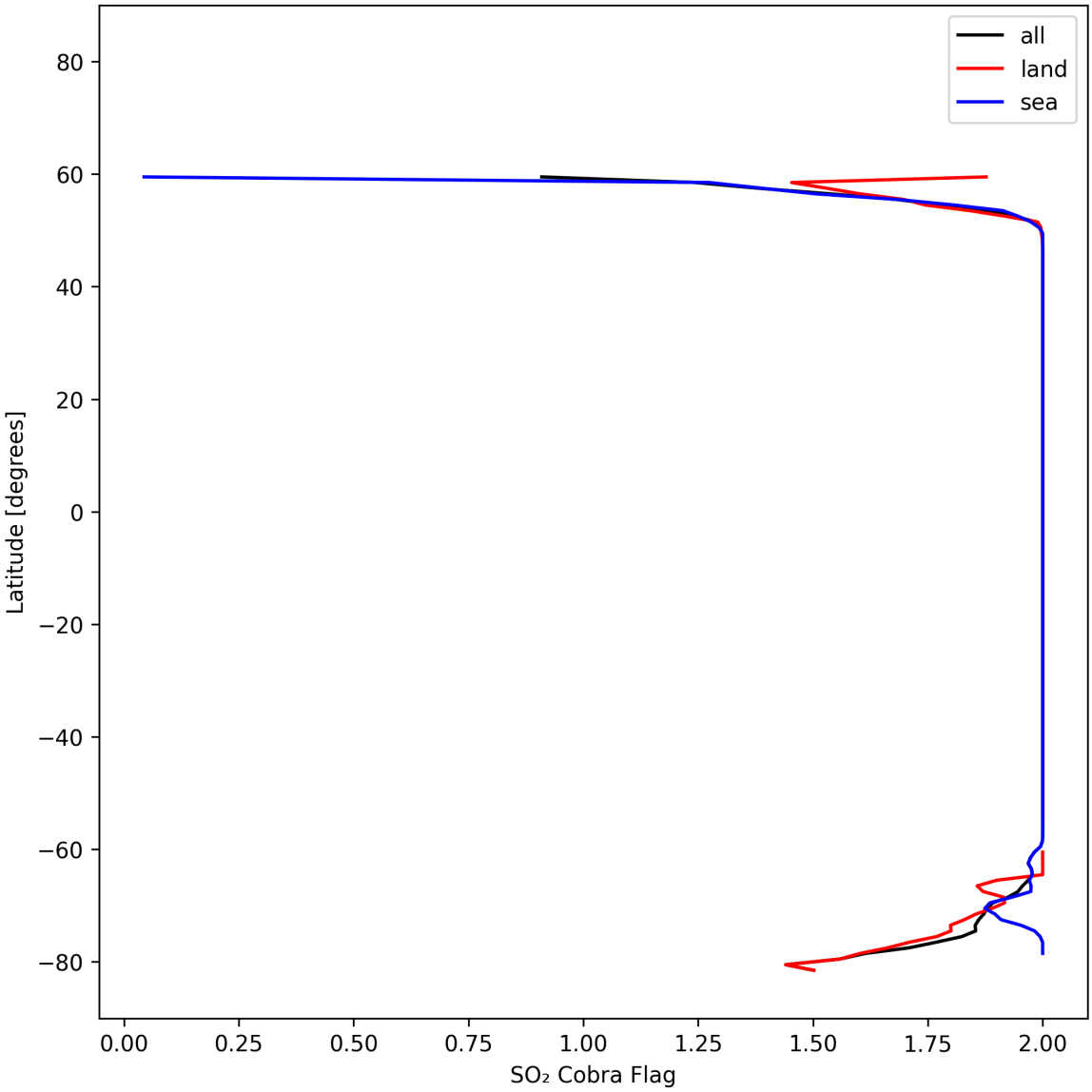

Figure 48: Zonal average of "SO_2 Cobra Flag" for 2025-02-19 to 2025-02-20.

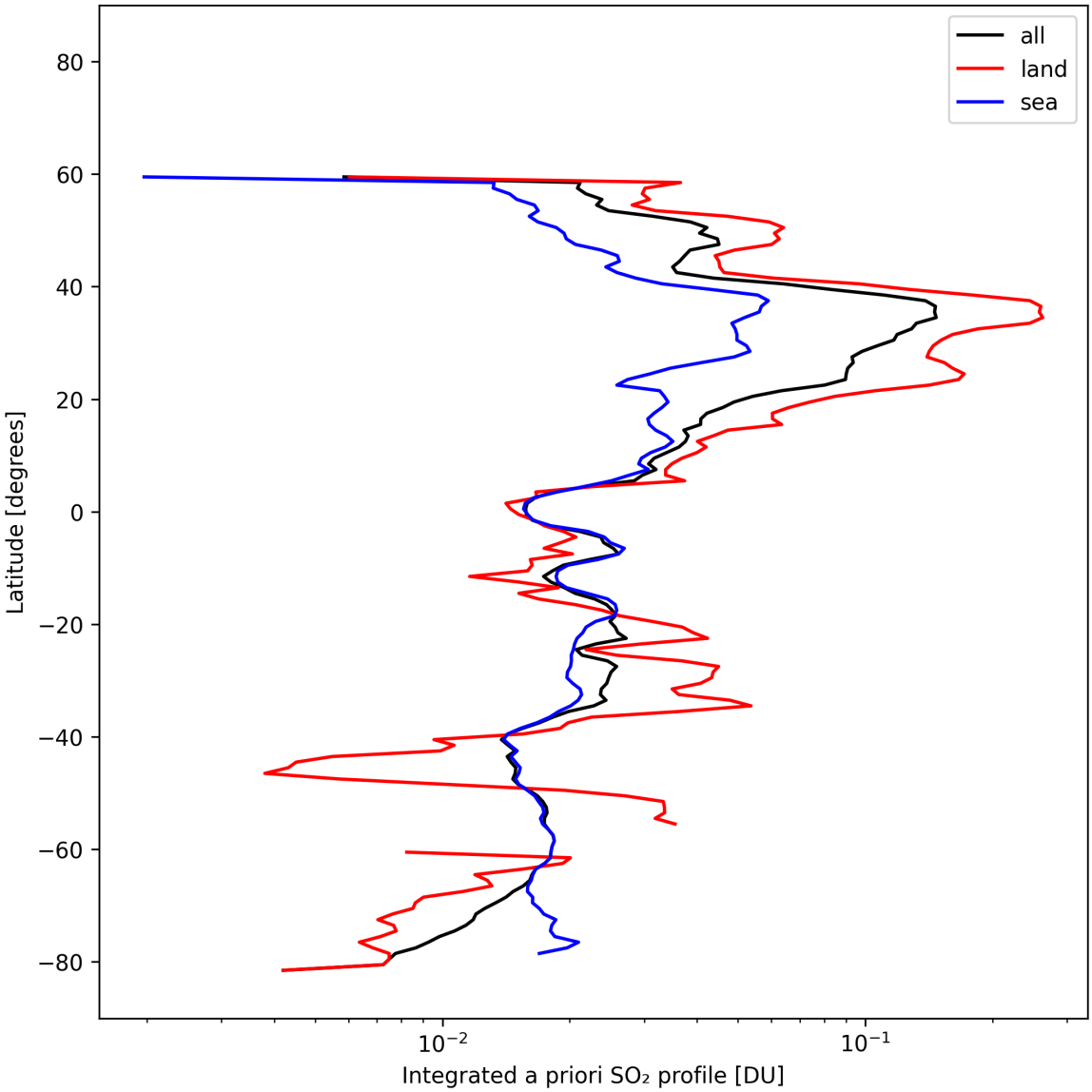

Figure 49: Zonal average of “Integrated a priori SO_2 profile” for 2025-02-19 to 2025-02-20.

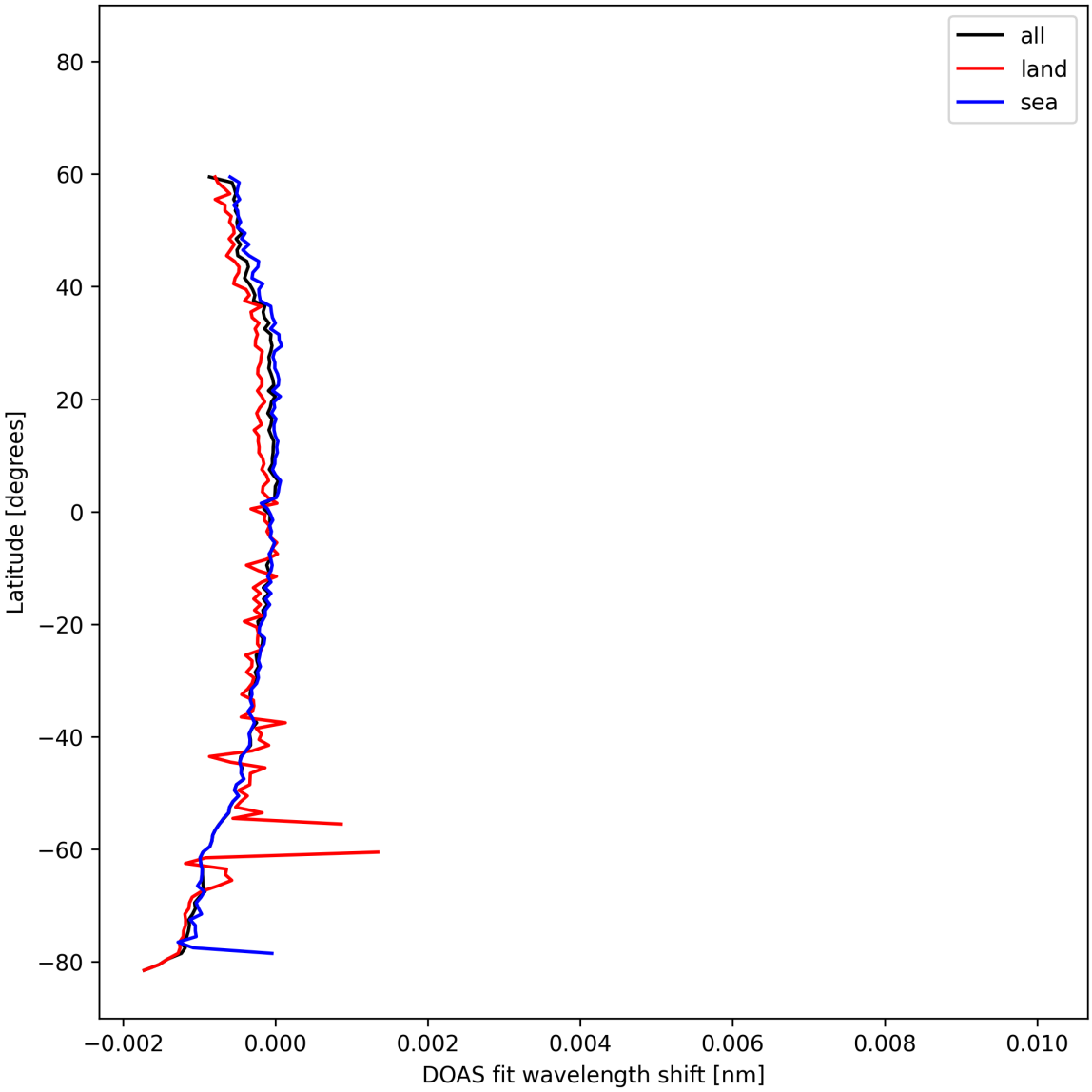

Figure 50: Zonal average of “DOAS fit wavelength shift” for 2025-02-19 to 2025-02-20.

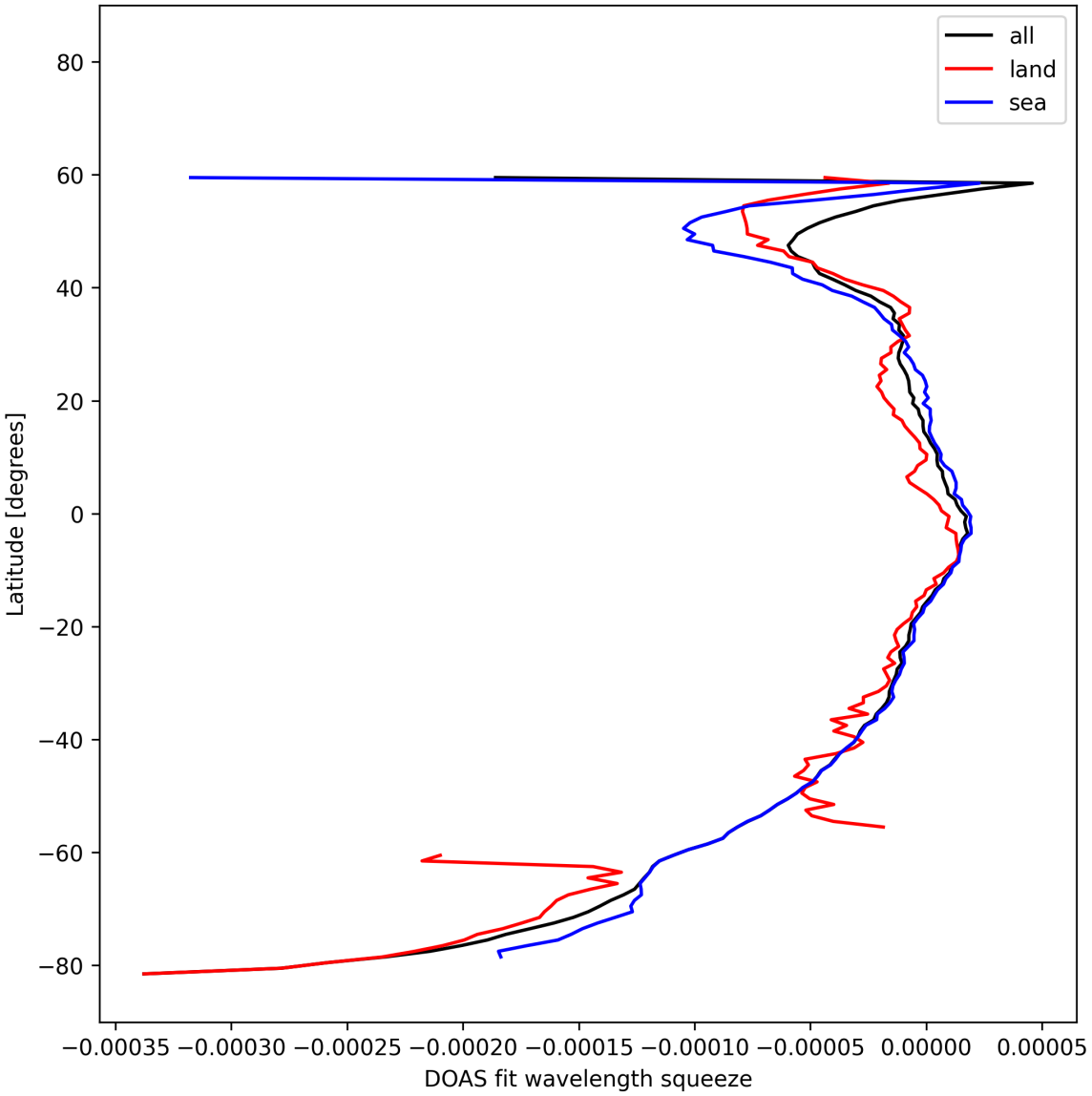

Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-02-19 to 2025-02-20.

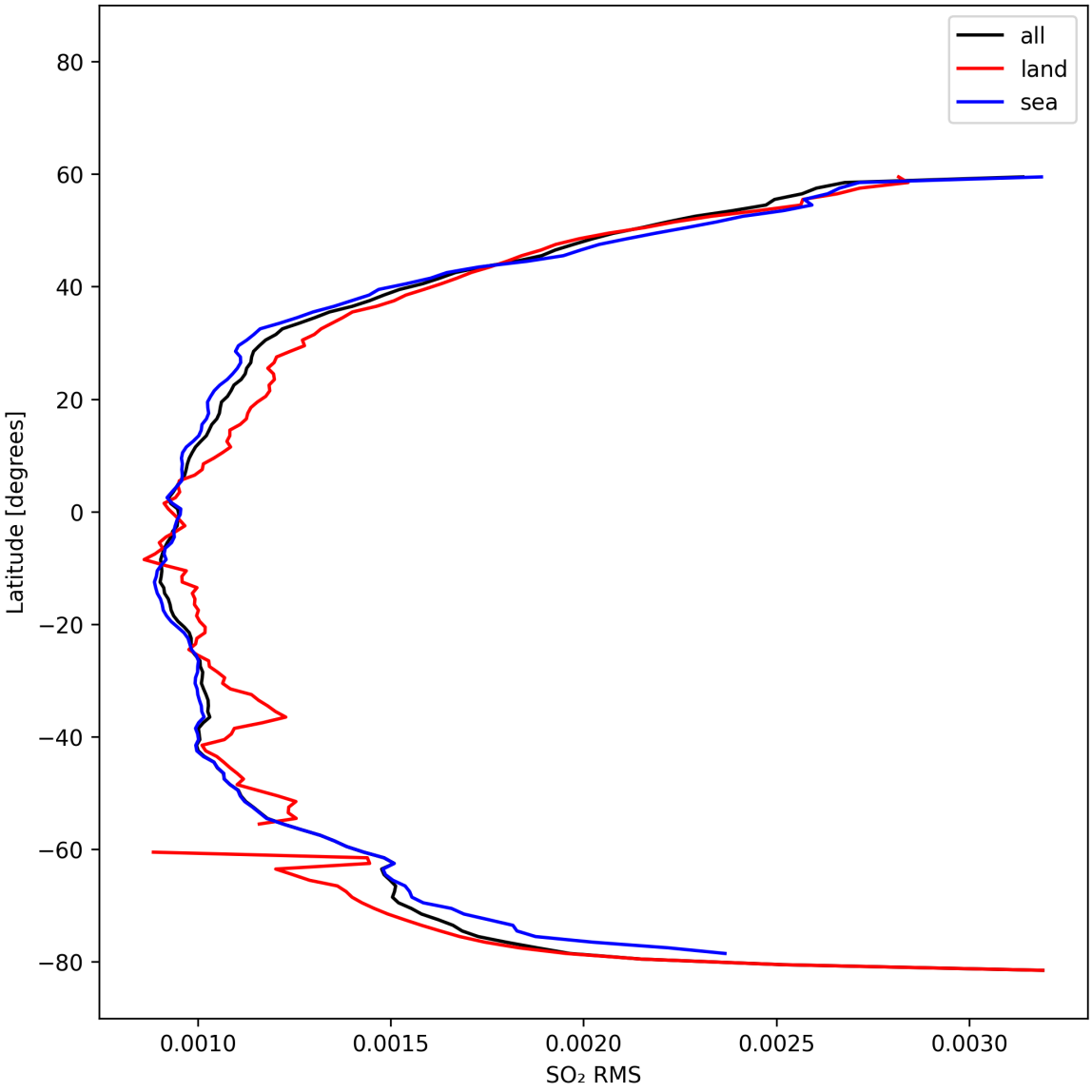

Figure 52: Zonal average of "SO_2 RMS" for 2025-02-19 to 2025-02-20.

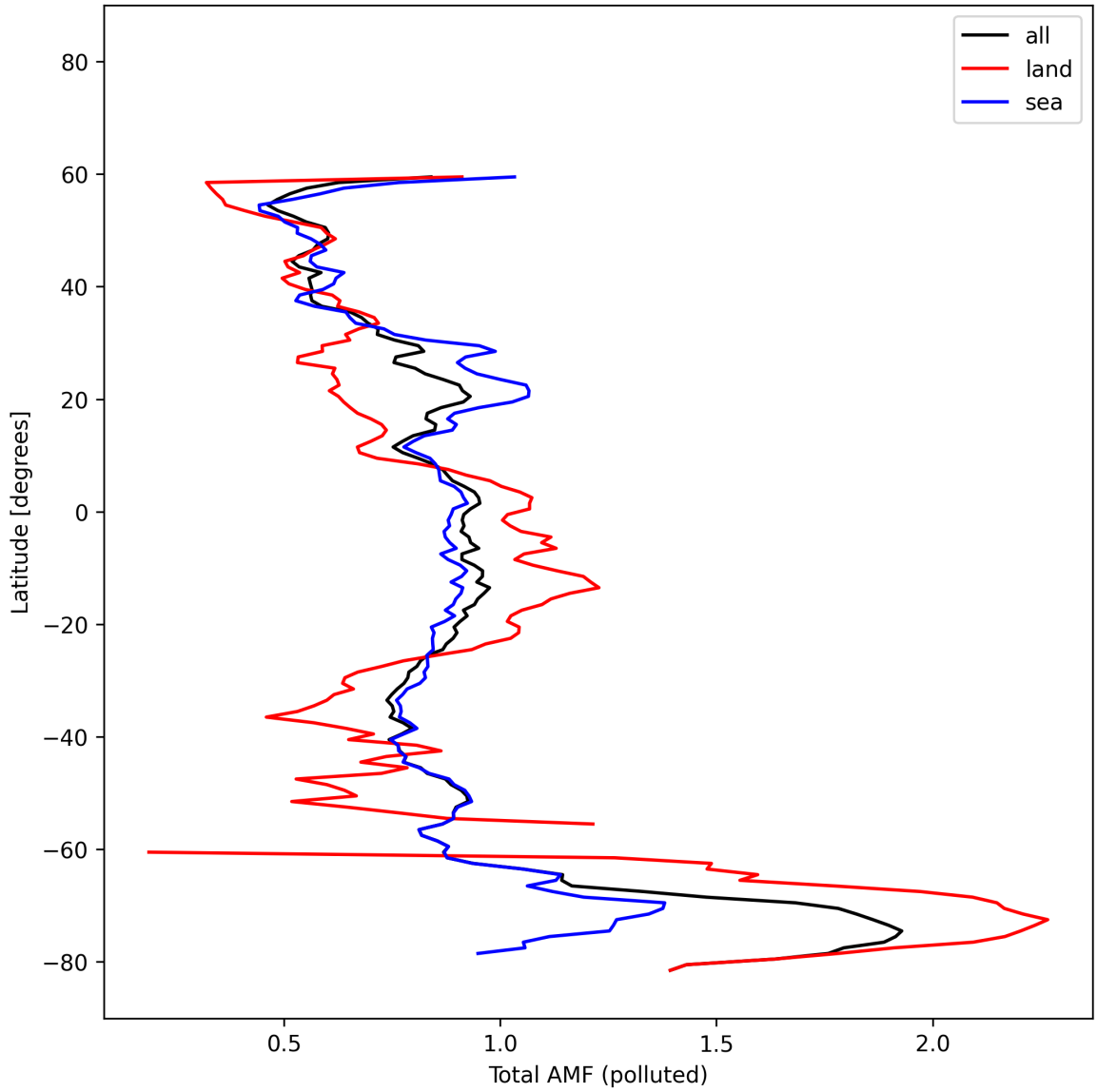

Figure 53: Zonal average of “Total AMF (polluted)” for 2025-02-19 to 2025-02-20.

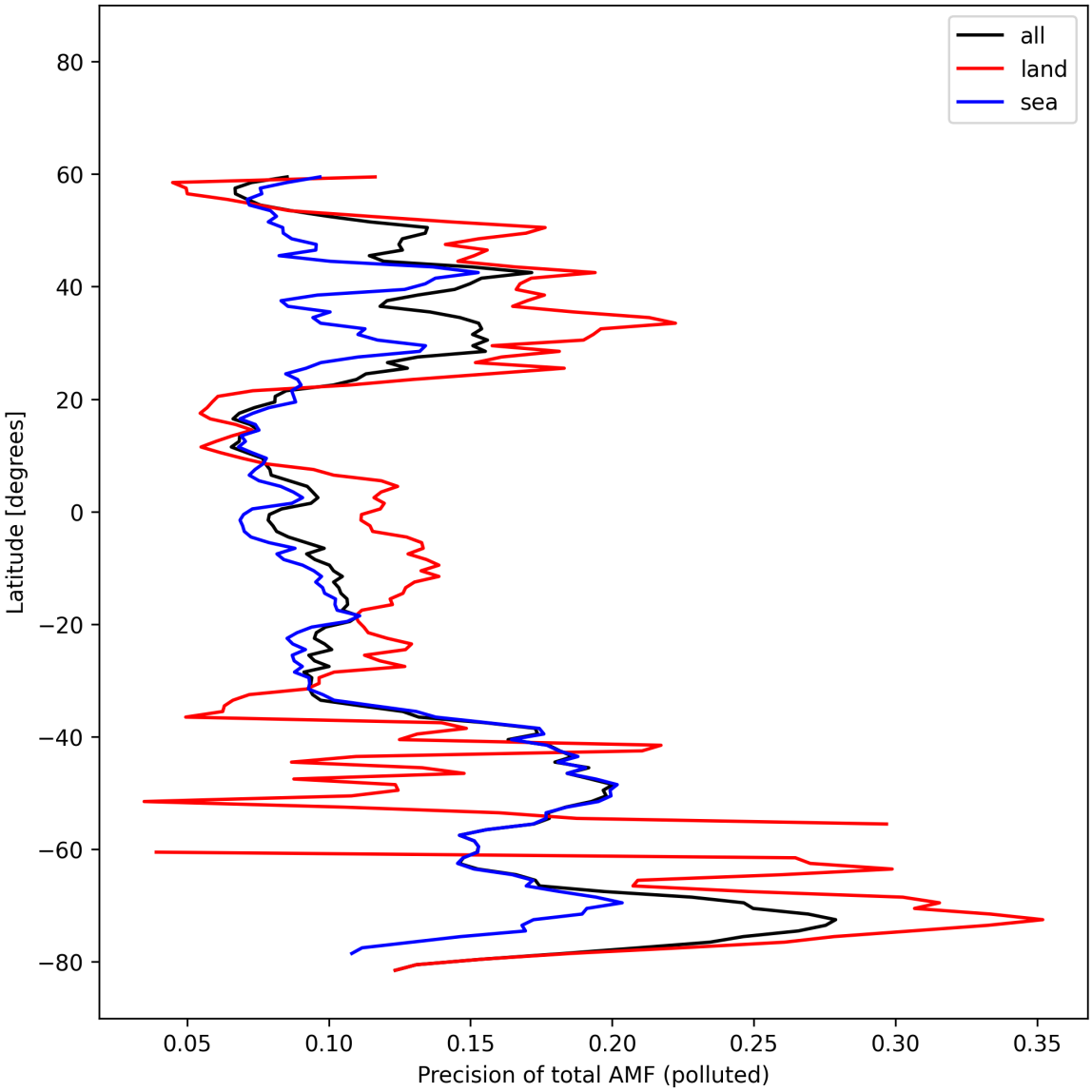

Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-02-19 to 2025-02-20.

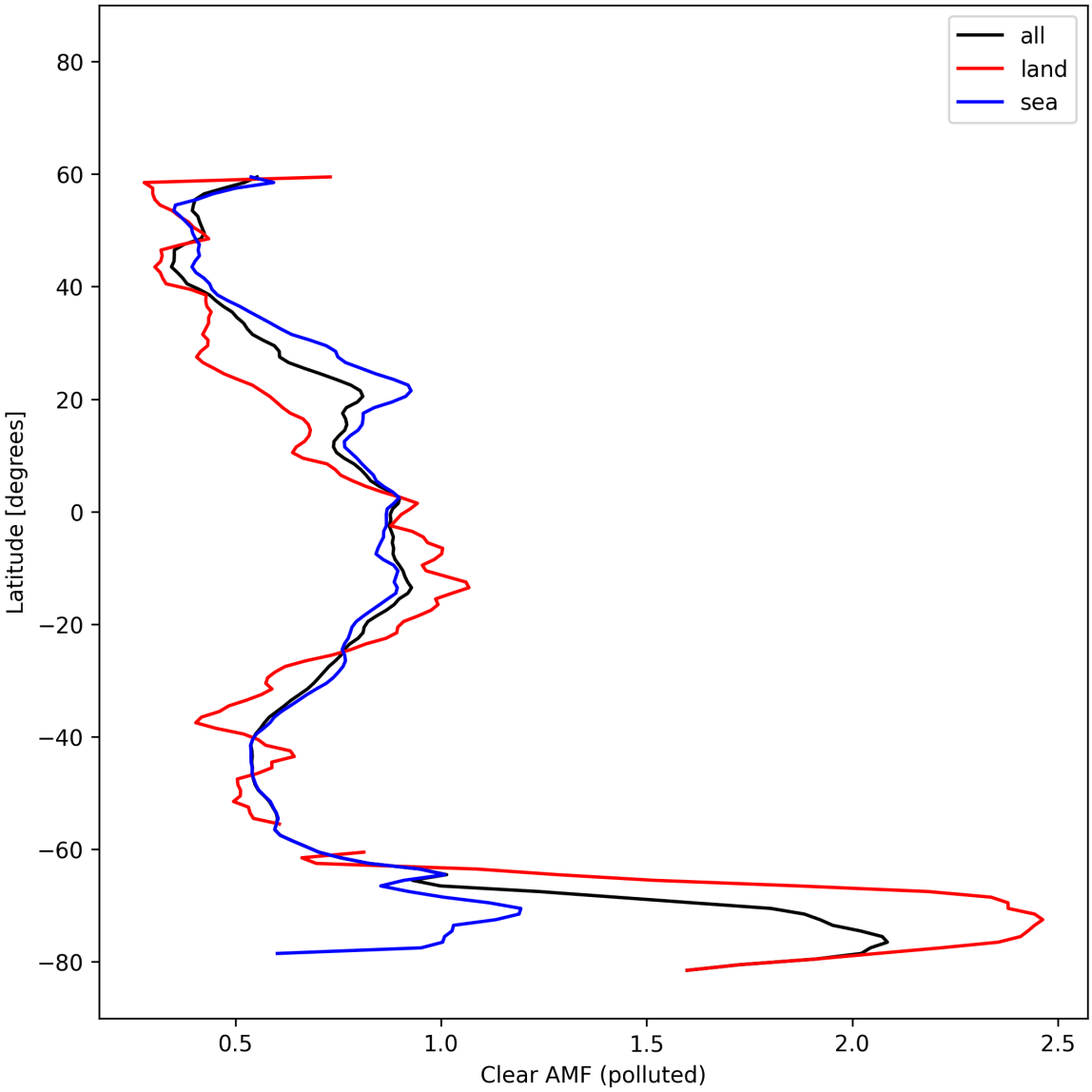

Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-02-19 to 2025-02-20.

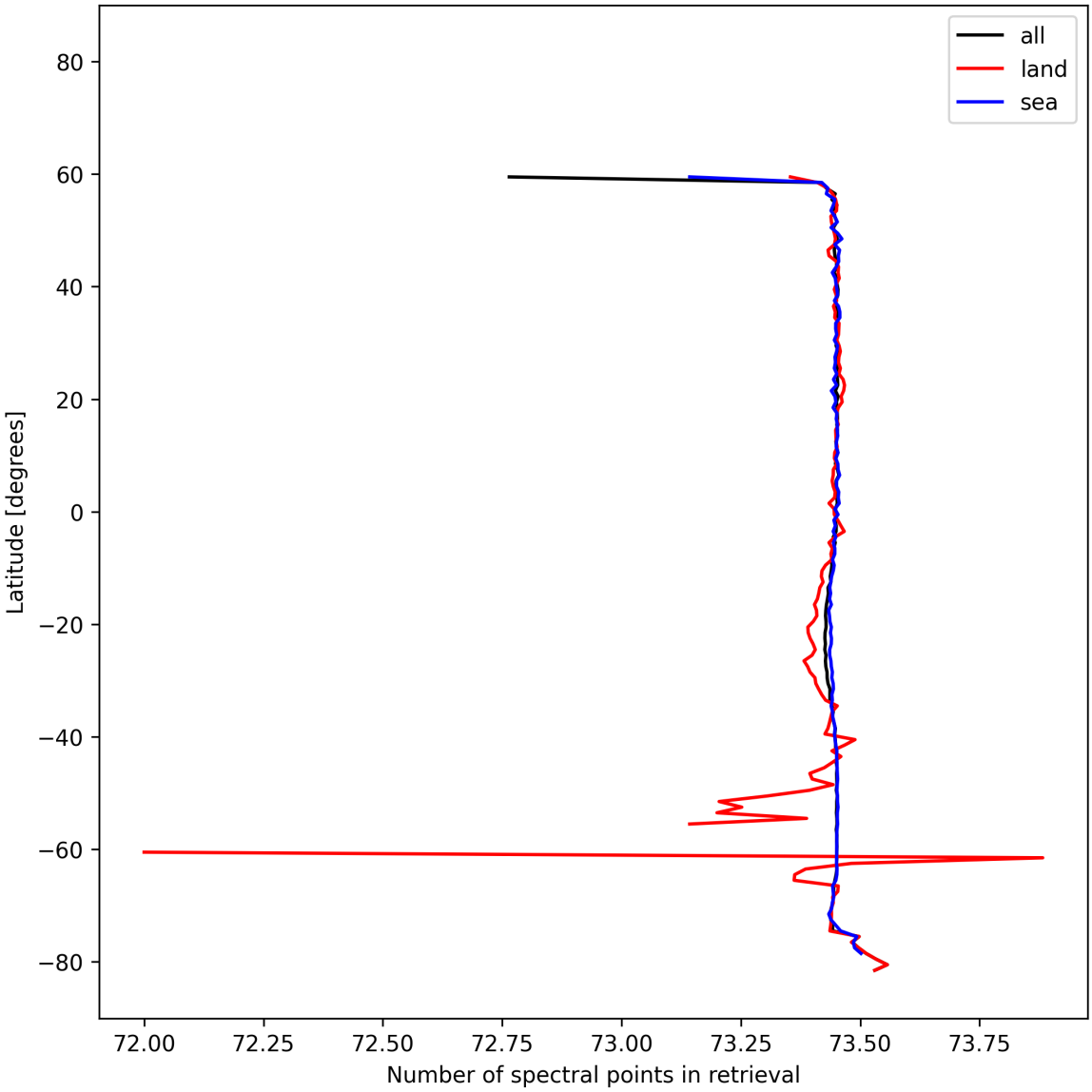

Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-02-19 to 2025-02-20.

8 Histograms

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

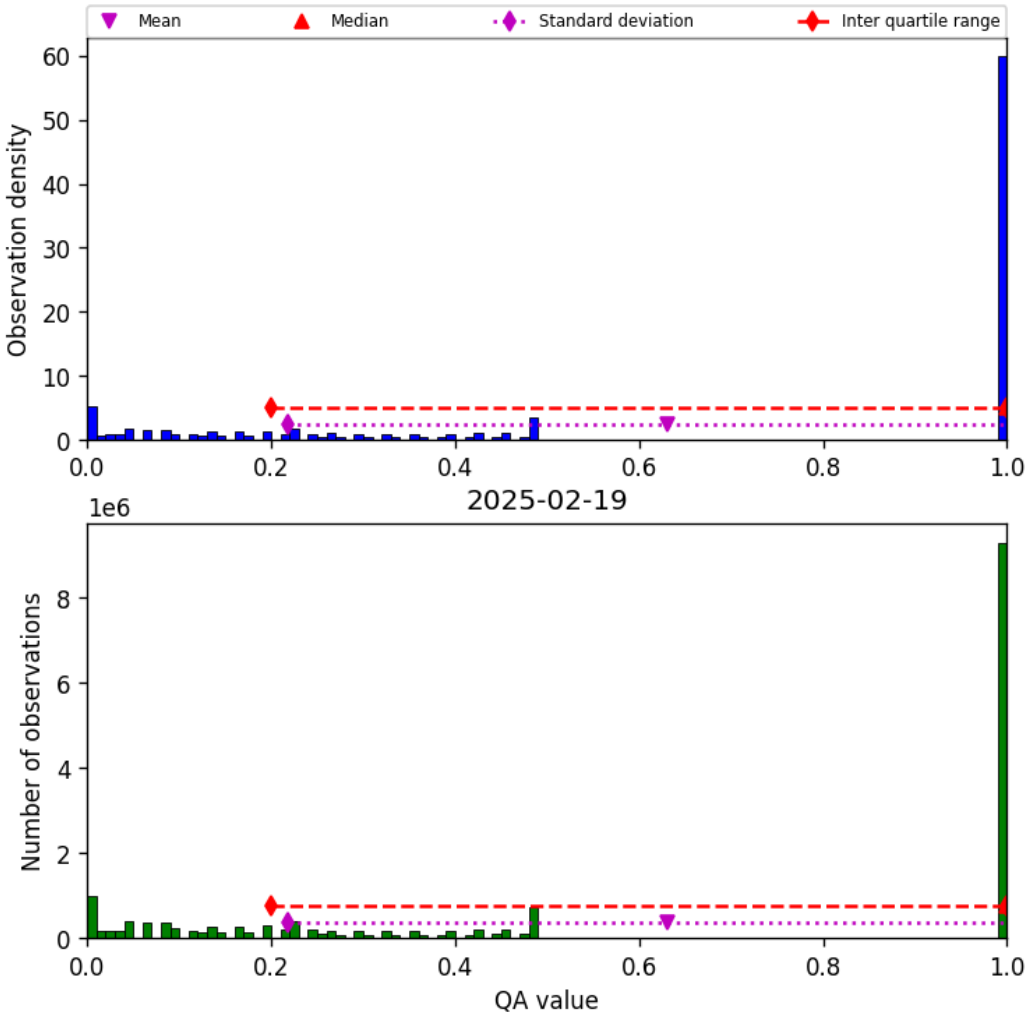

Figure 57: Histogram of “QA value” for 2025-02-19 to 2025-02-20

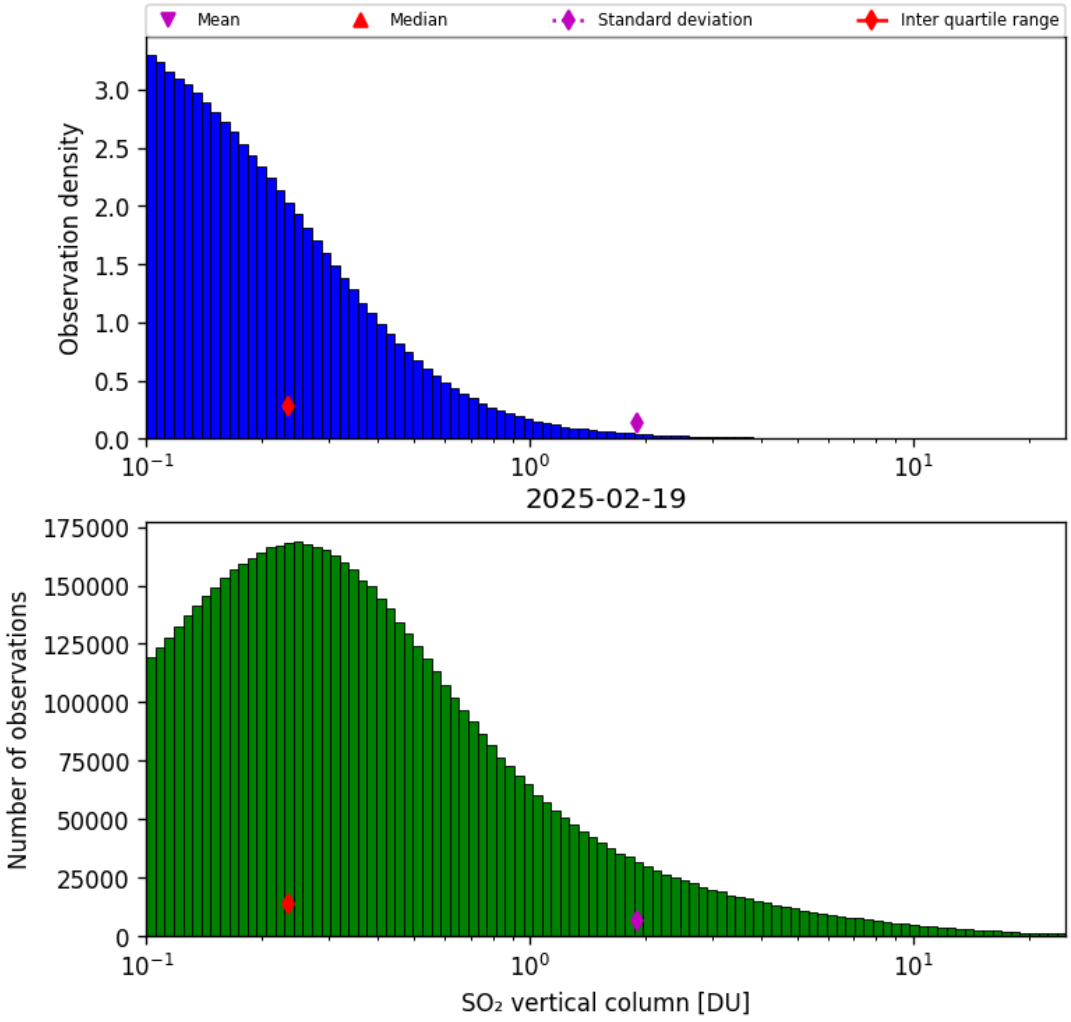

Figure 58: Histogram of "SO_2 vertical column" for 2025-02-19 to 2025-02-20

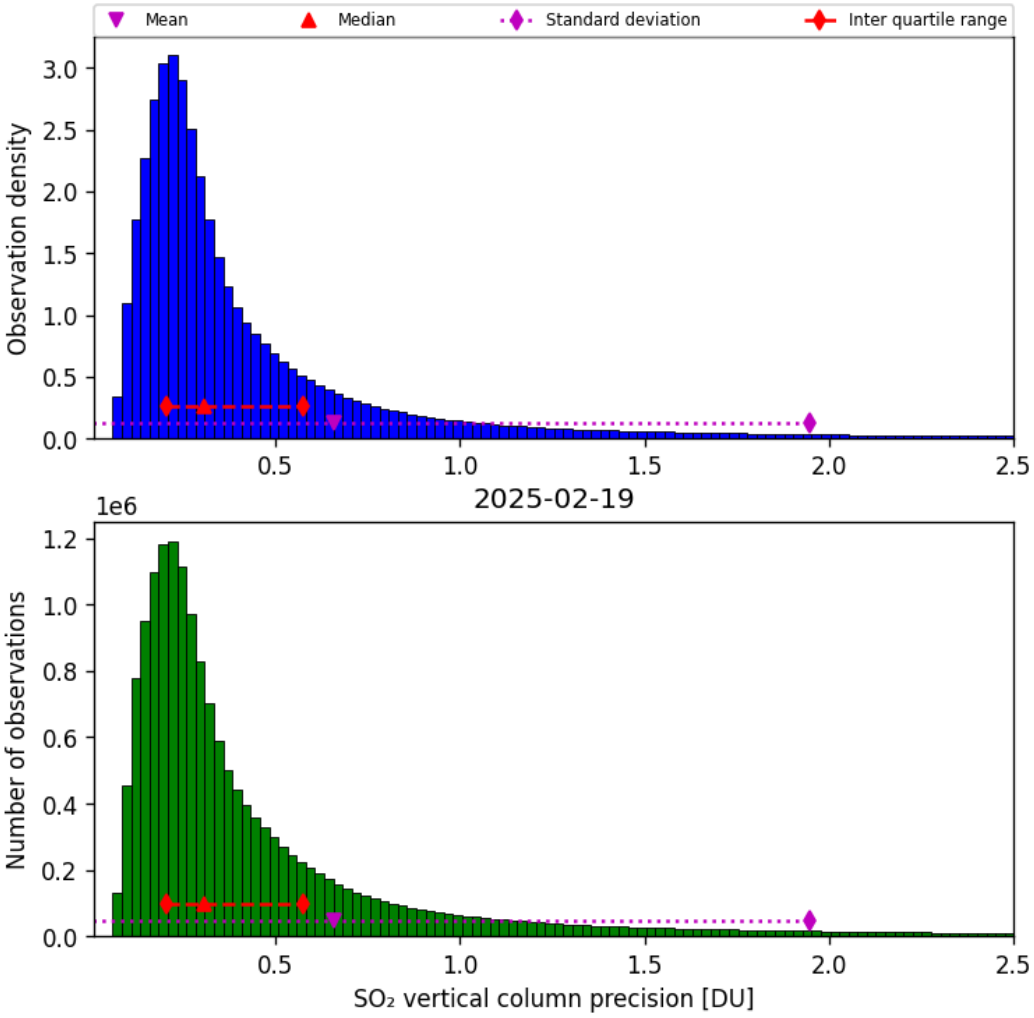

Figure 59: Histogram of "SO_2 vertical column precision" for 2025-02-19 to 2025-02-20

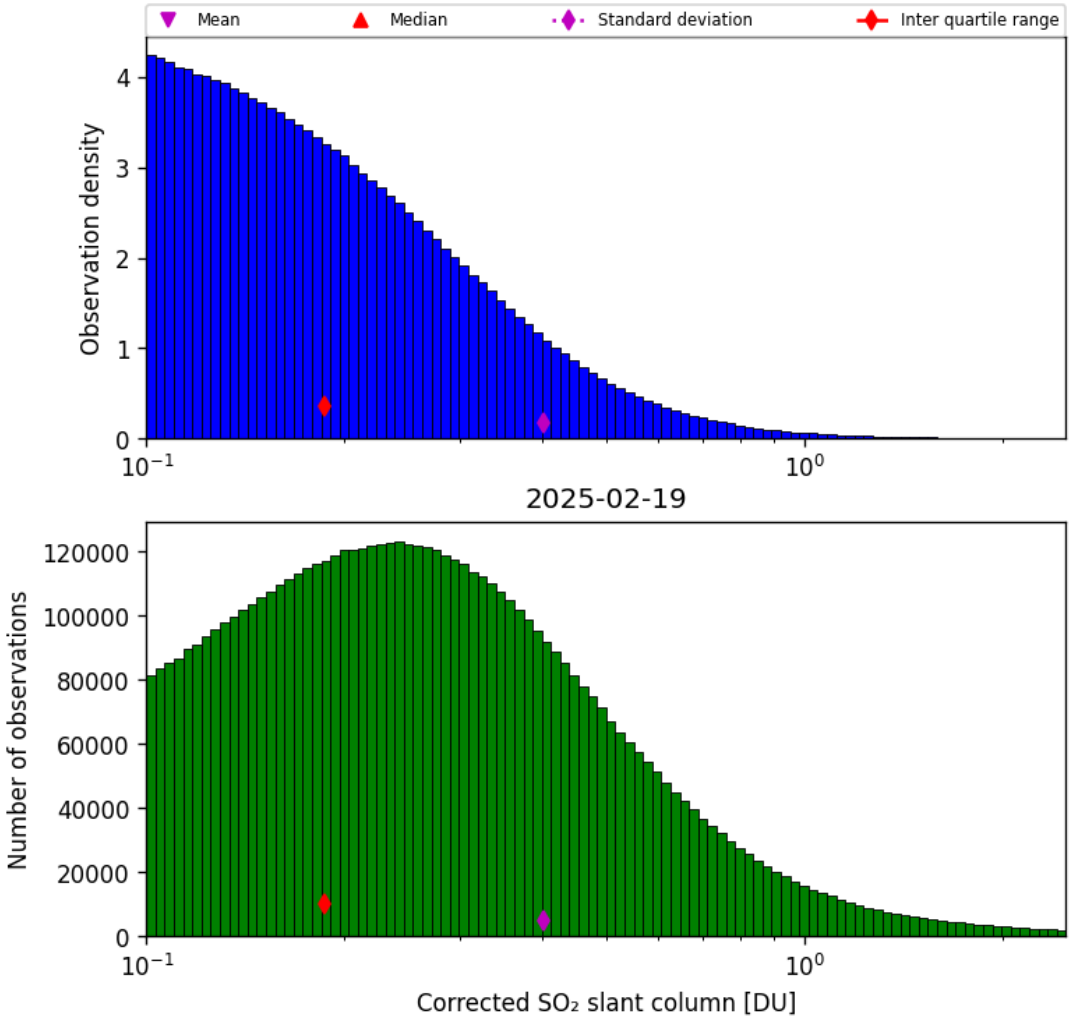

Figure 60: Histogram of "Corrected SO_2 slant column" for 2025-02-19 to 2025-02-20

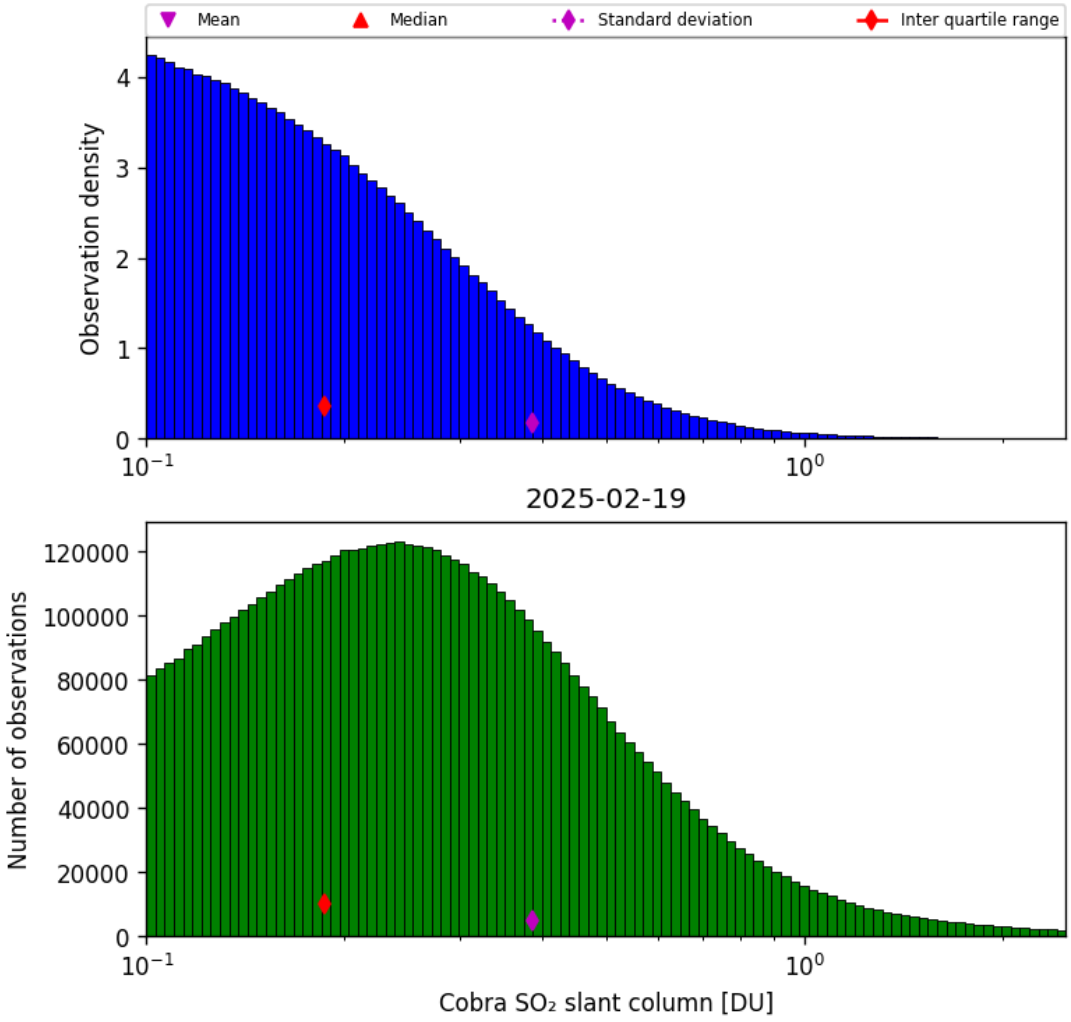

Figure 61: Histogram of "Cobra SO_2 slant column" for 2025-02-19 to 2025-02-20

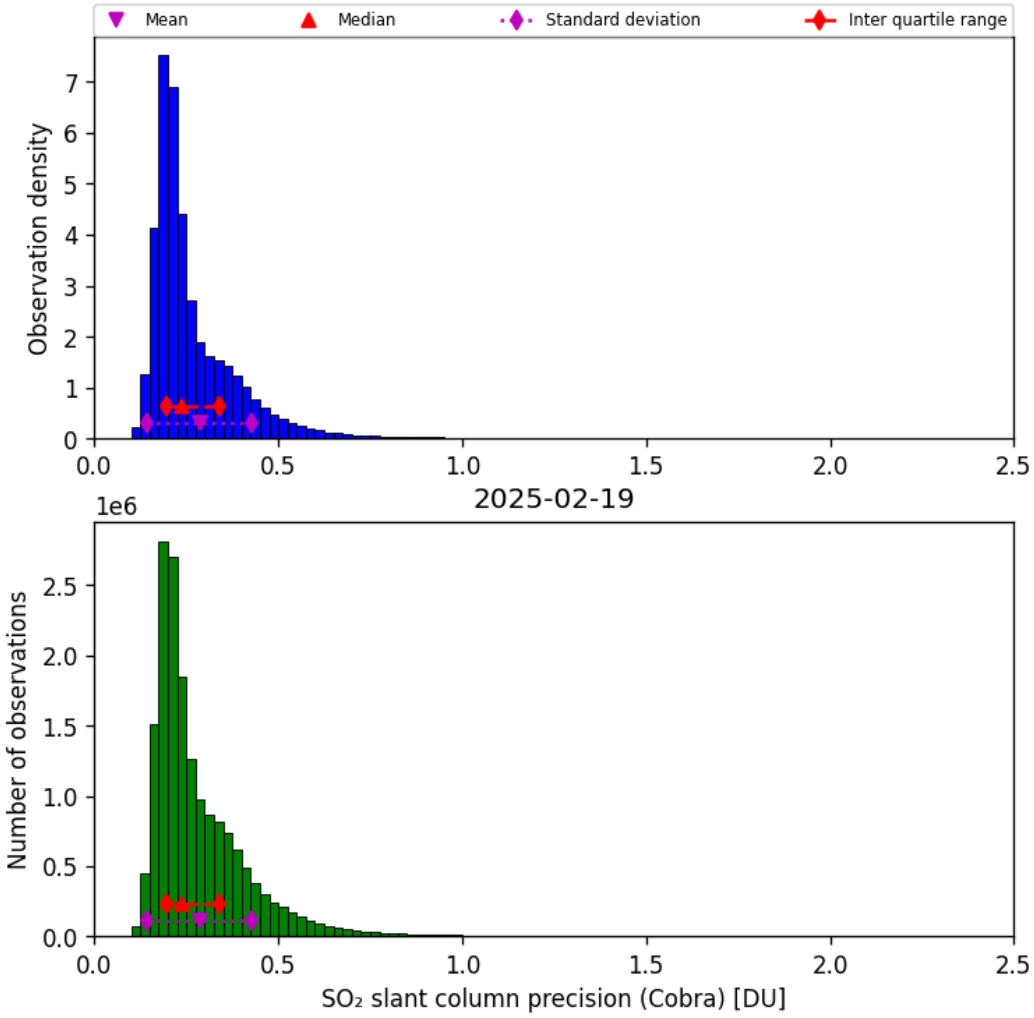

Figure 62: Histogram of "SO_2 slant column precision (Cobra)" for 2025-02-19 to 2025-02-20

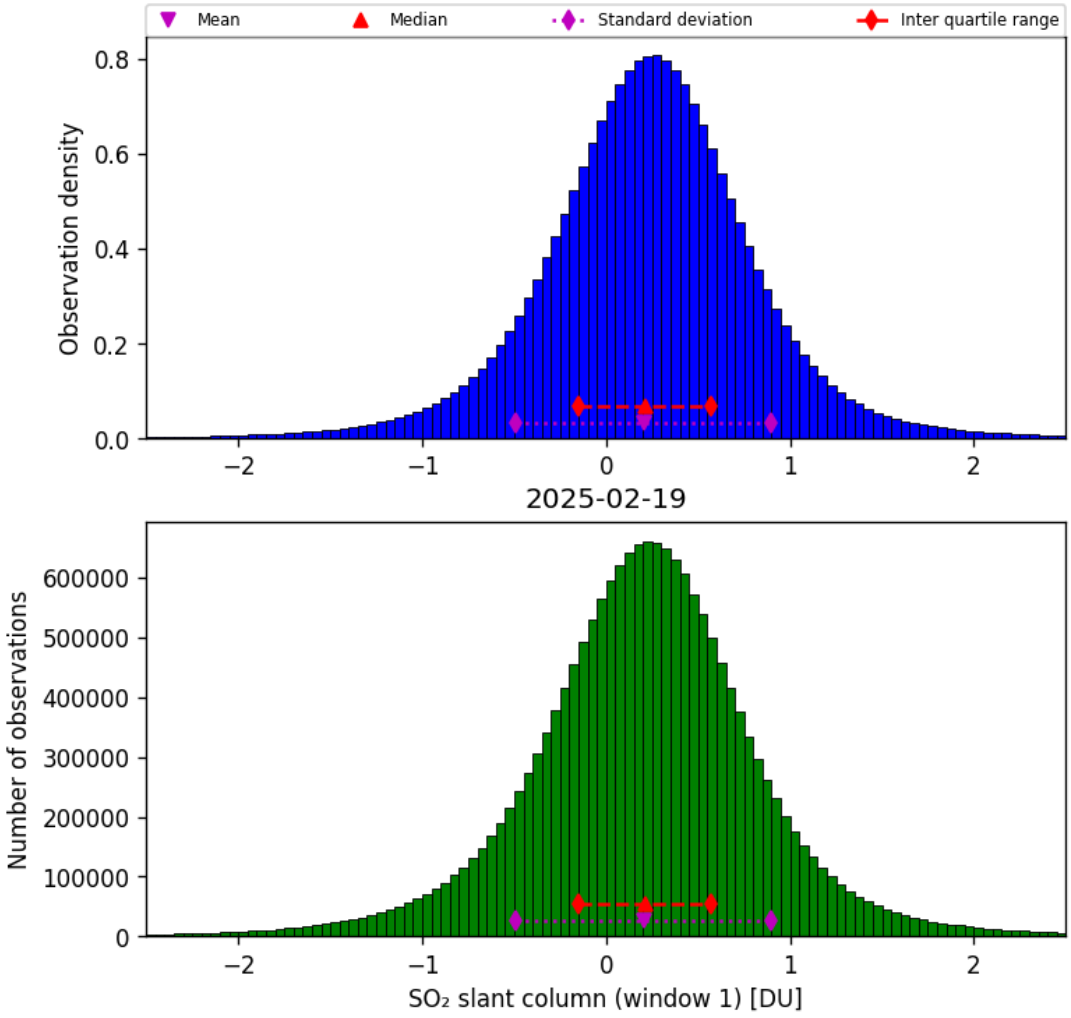

Figure 63: Histogram of "SO_2 slant column (window 1)" for 2025-02-19 to 2025-02-20

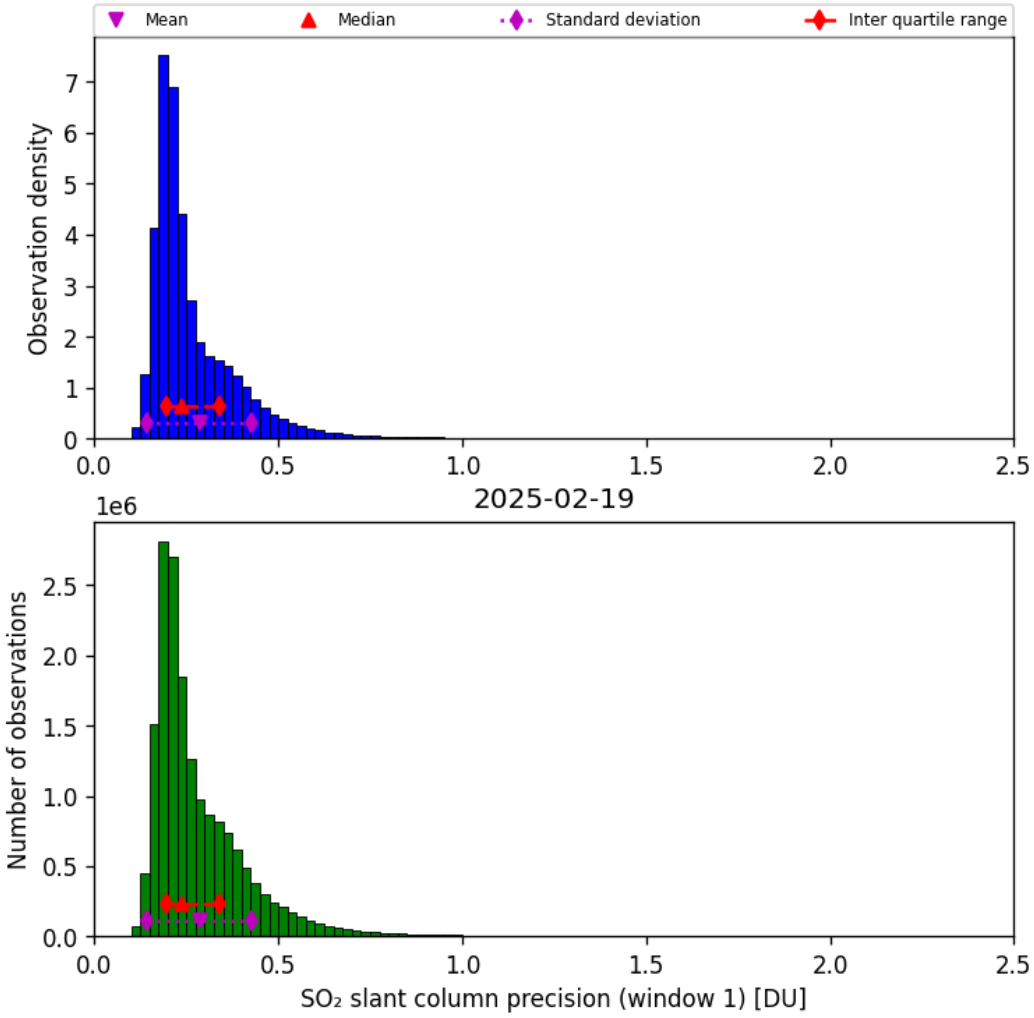

Figure 64: Histogram of "SO_2 slant column precision (window 1)" for 2025-02-19 to 2025-02-20

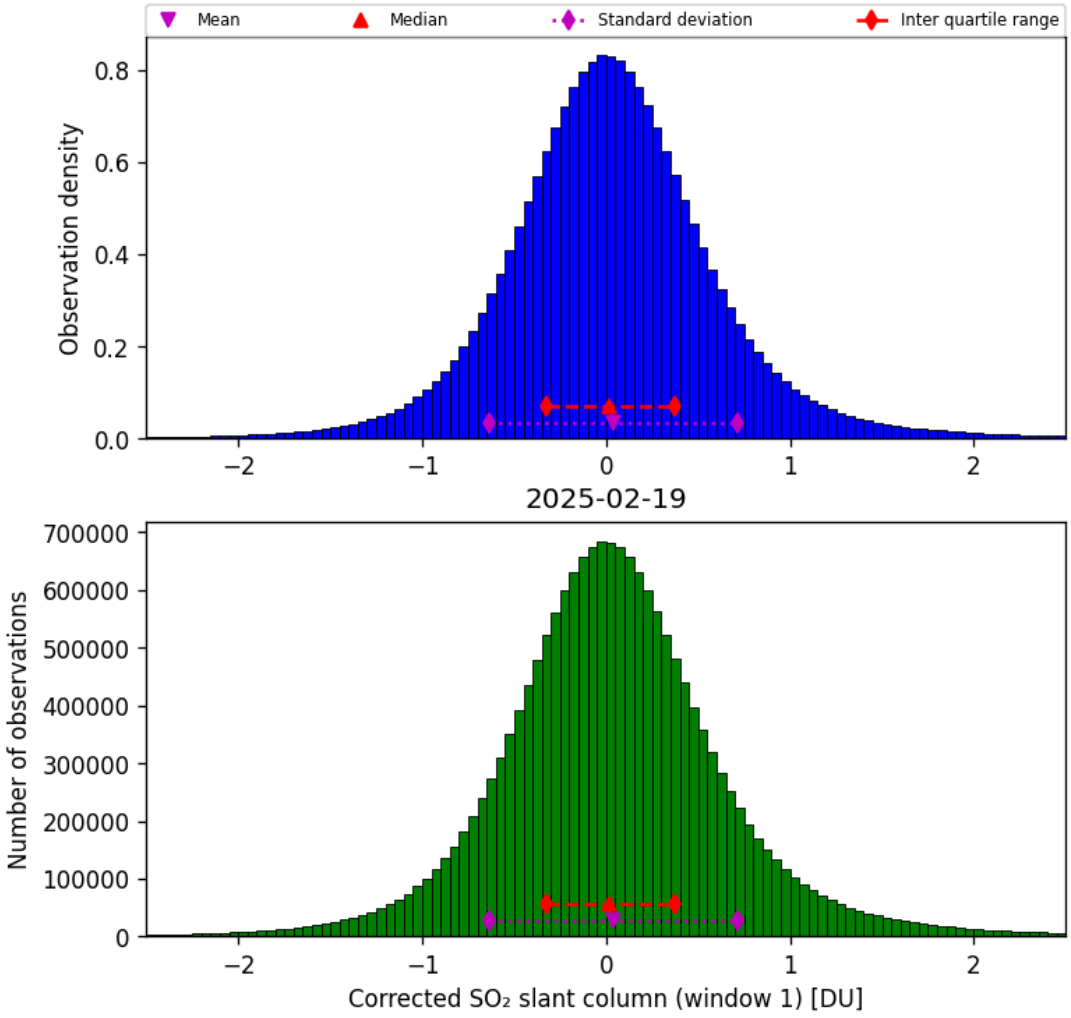

Figure 65: Histogram of "Corrected SO_2 slant column (window 1)" for 2025-02-19 to 2025-02-20

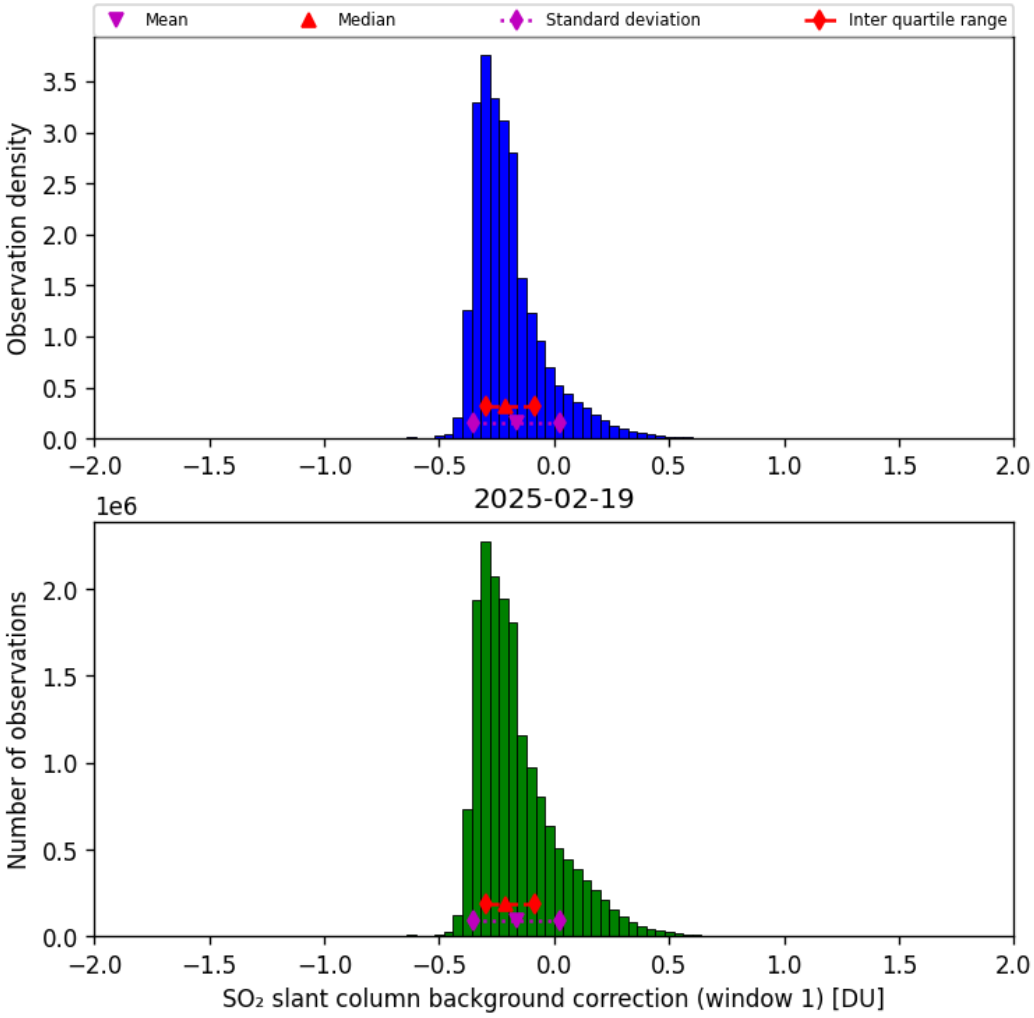

Figure 66: Histogram of "SO_2 slant column background correction (window 1)" for 2025-02-19 to 2025-02-20

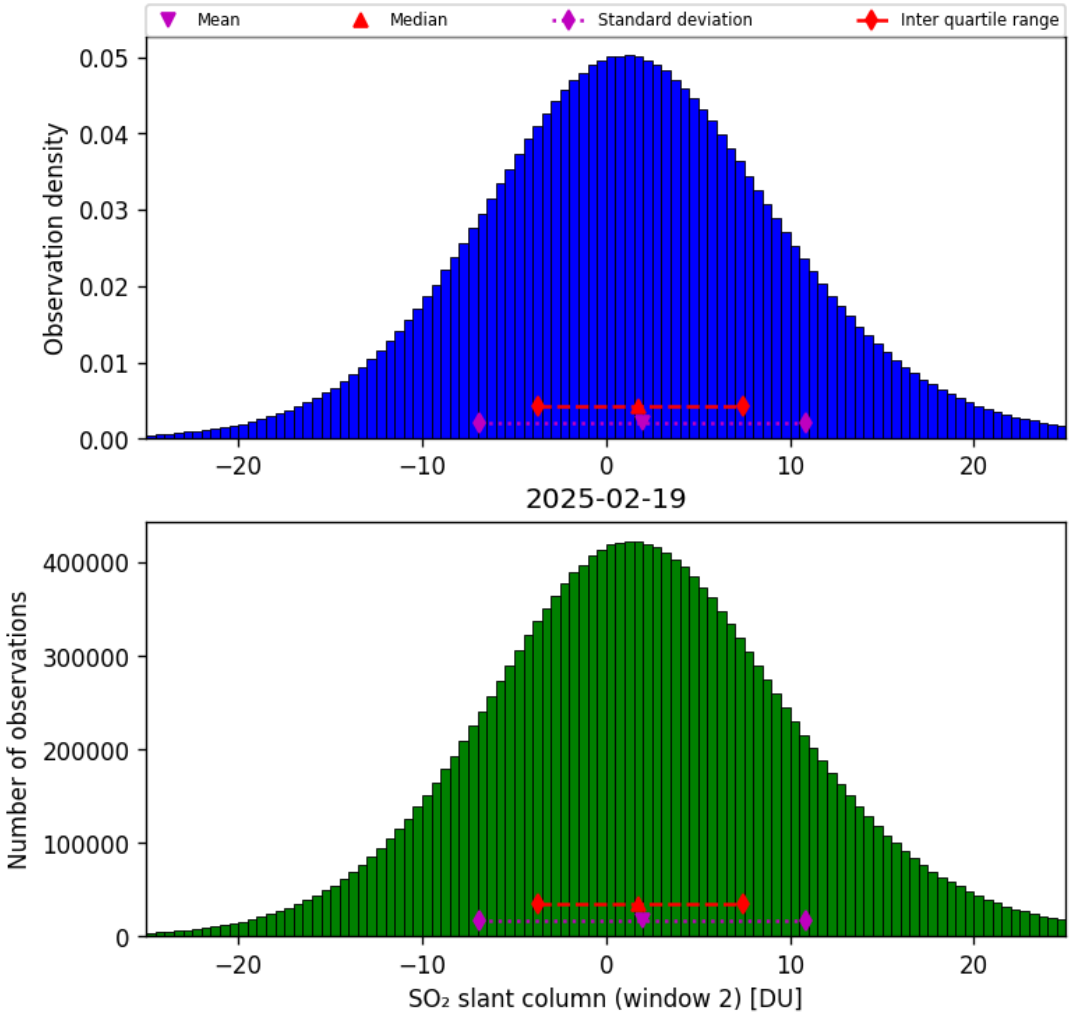

Figure 67: Histogram of "SO_2 slant column (window 2)" for 2025-02-19 to 2025-02-20

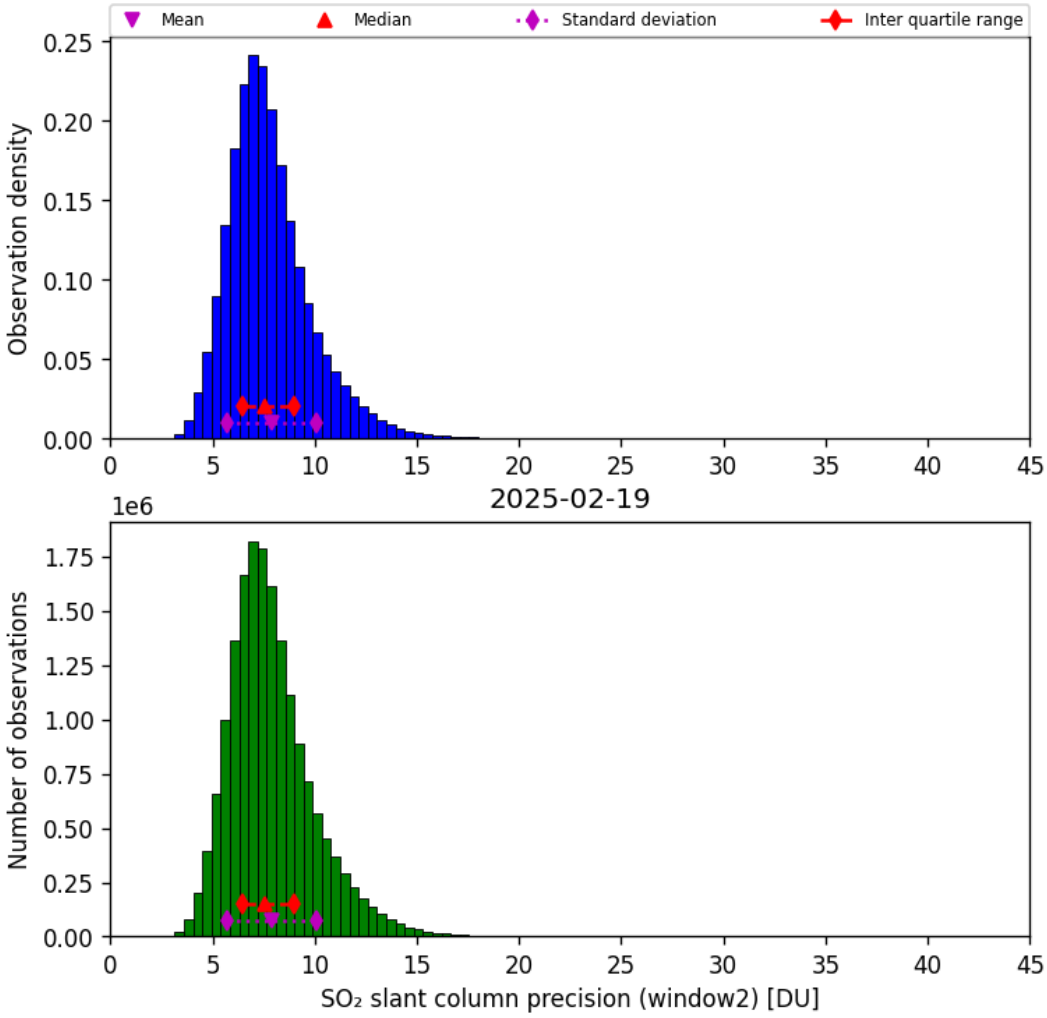

Figure 68: Histogram of "SO_2 slant column precision (window2)" for 2025-02-19 to 2025-02-20

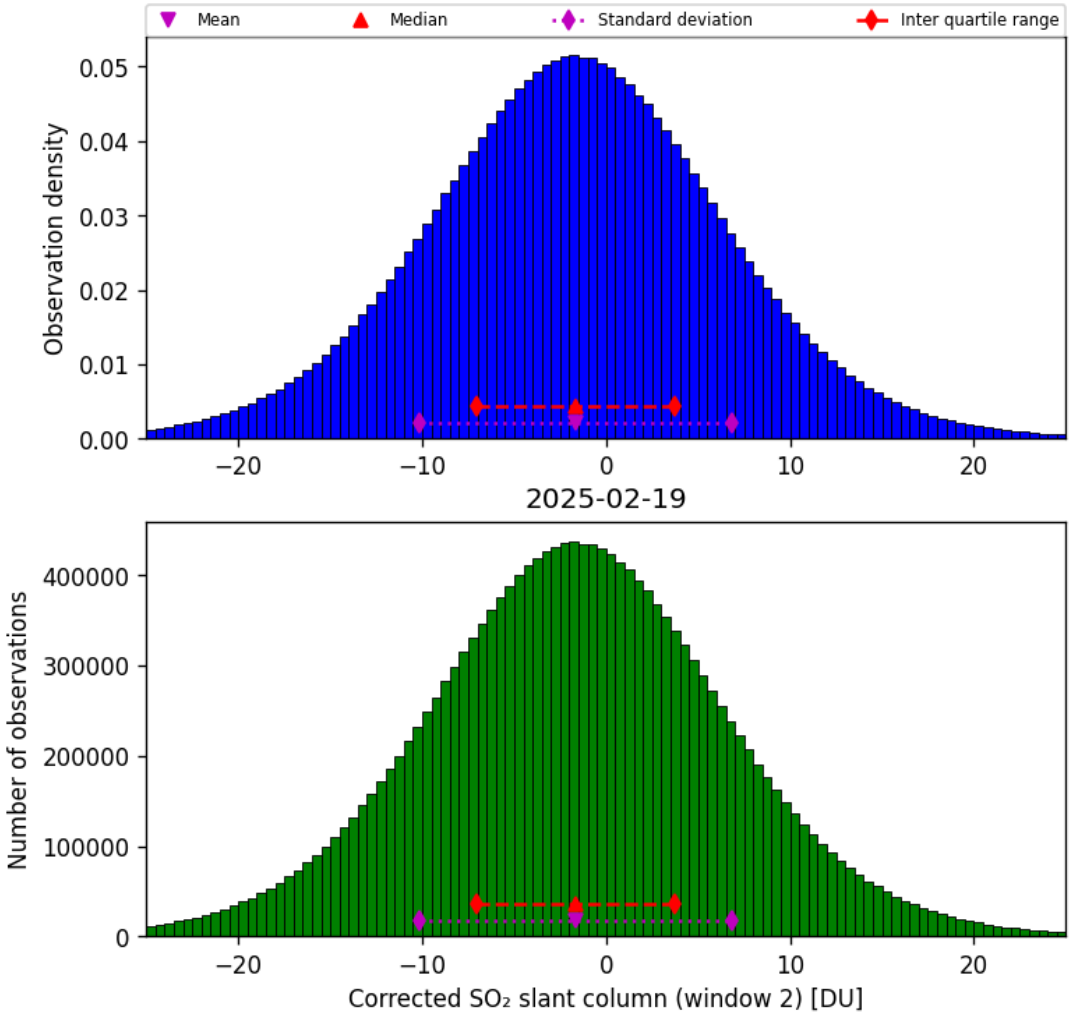

Figure 69: Histogram of "Corrected SO_2 slant column (window 2)" for 2025-02-19 to 2025-02-20

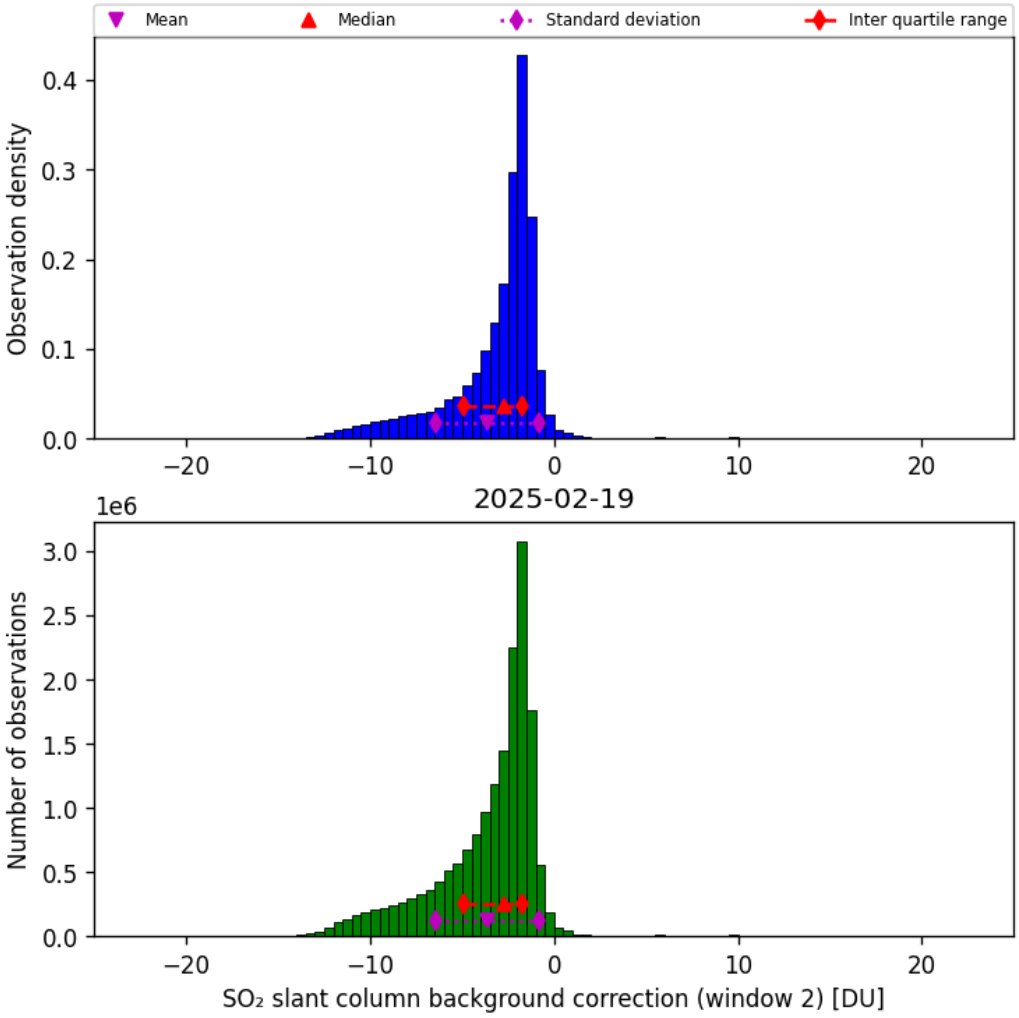

Figure 70: Histogram of "SO_2 slant column background correction (window 2)" for 2025-02-19 to 2025-02-20

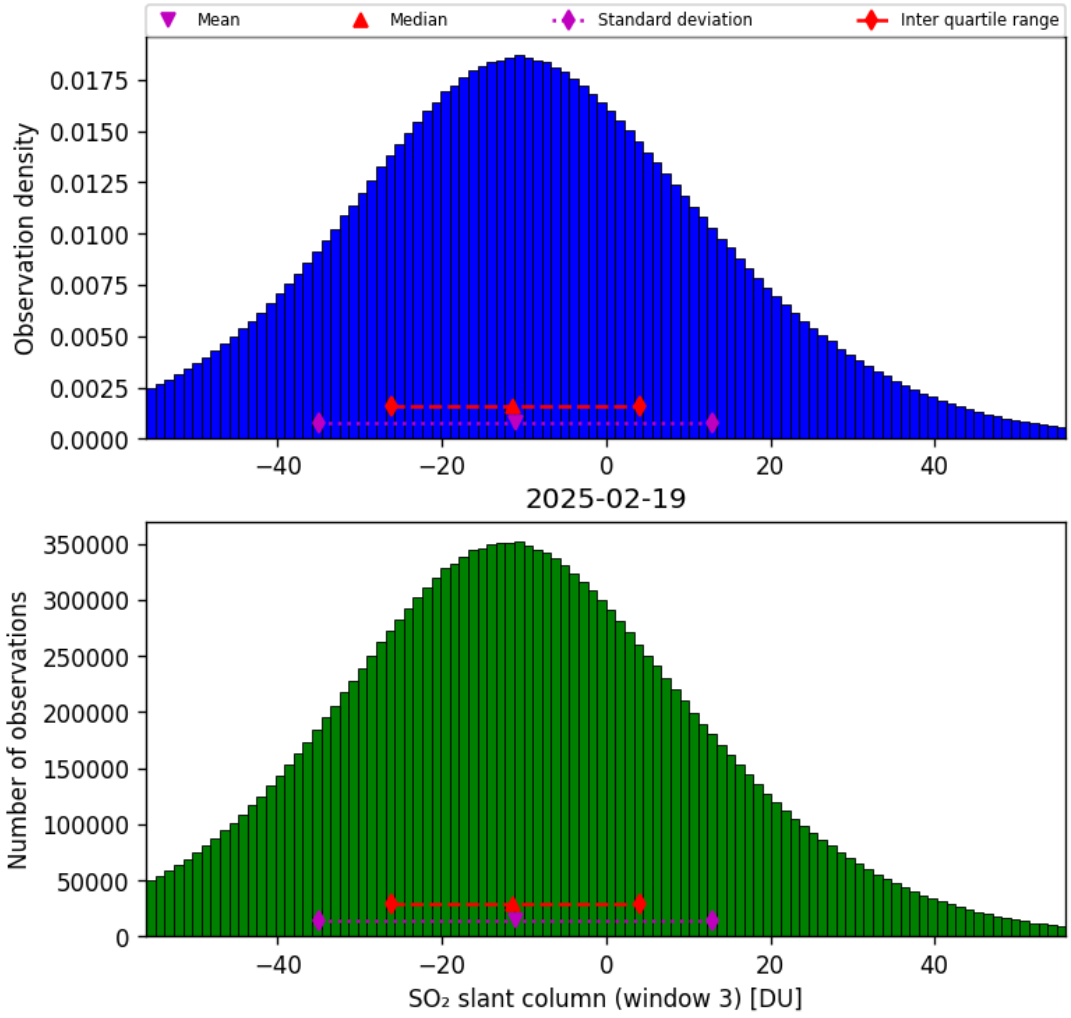

Figure 71: Histogram of "SO_2 slant column (window 3)" for 2025-02-19 to 2025-02-20

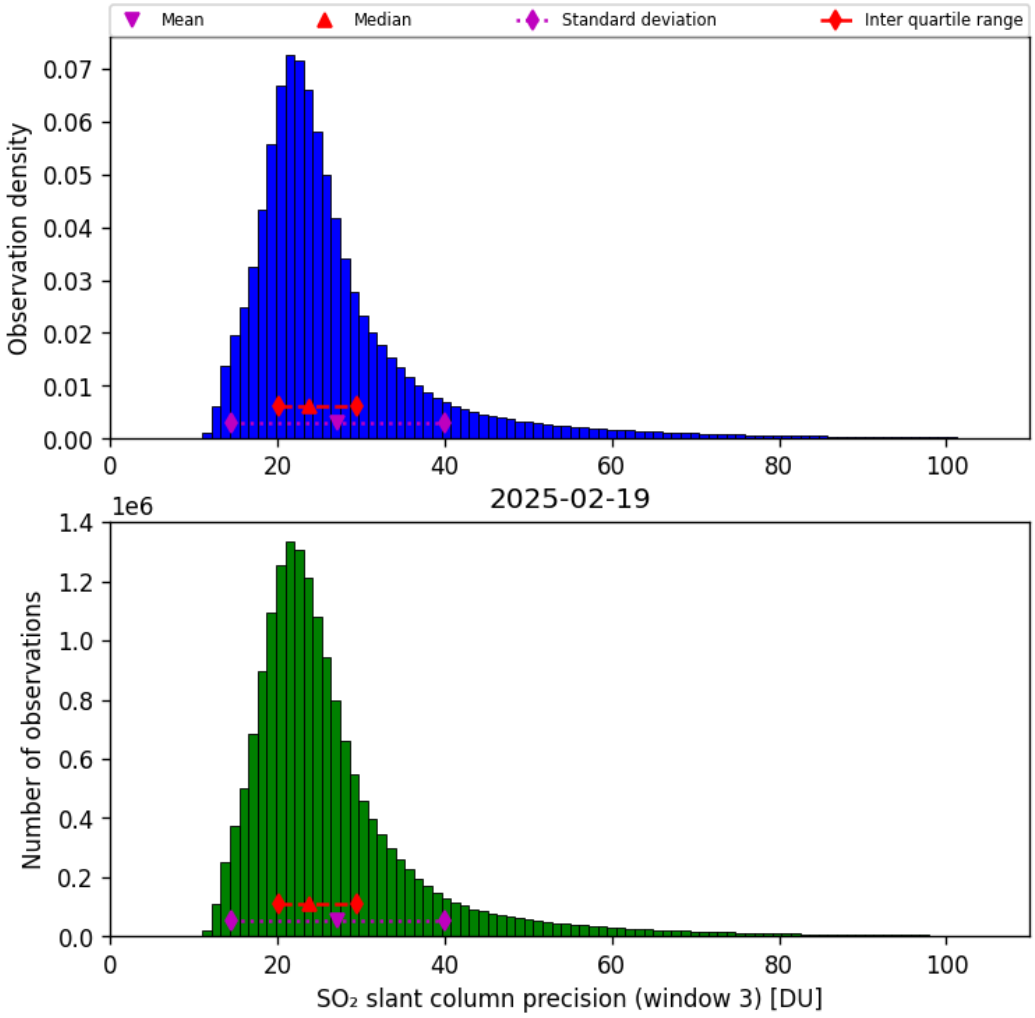

Figure 72: Histogram of "SO_2 slant column precision (window 3)" for 2025-02-19 to 2025-02-20

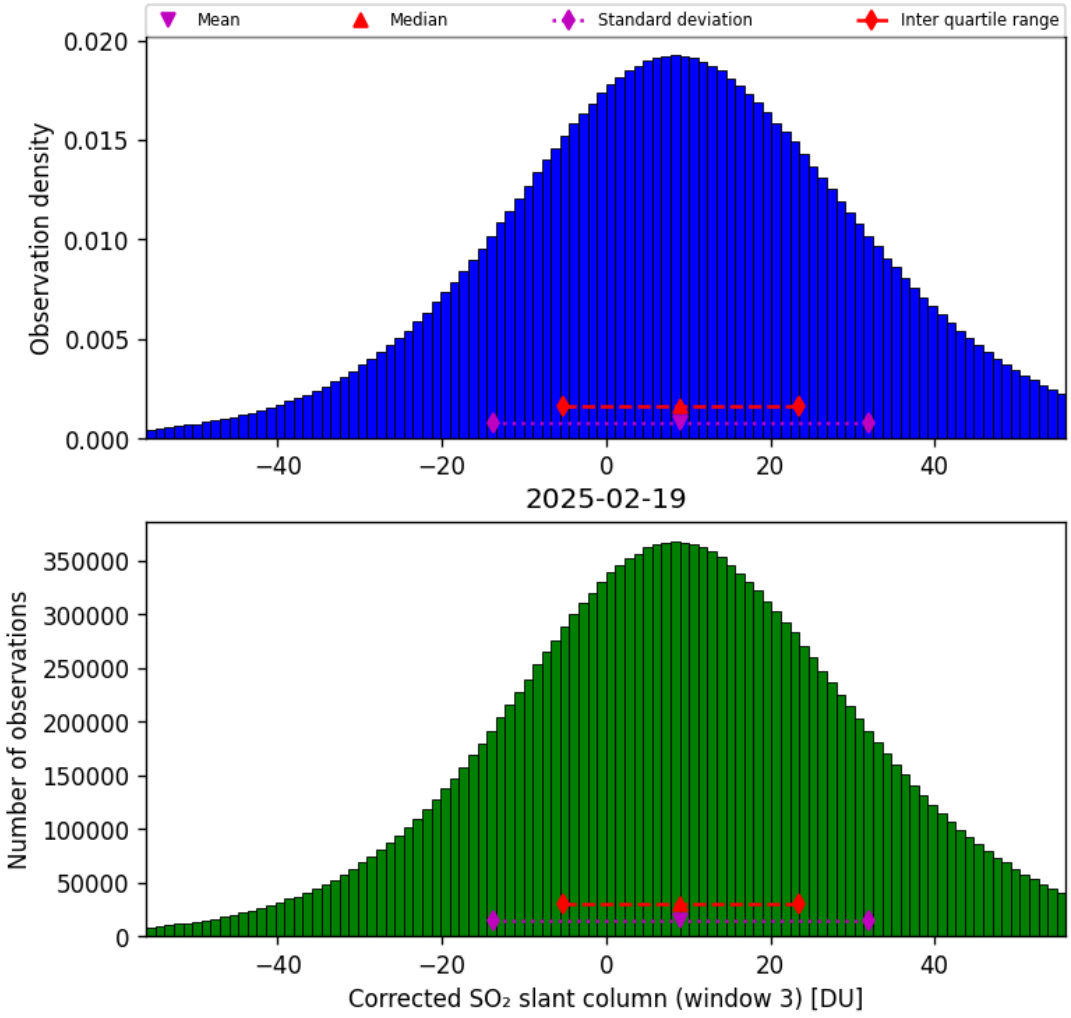

Figure 73: Histogram of "Corrected SO_2 slant column (window 3)" for 2025-02-19 to 2025-02-20

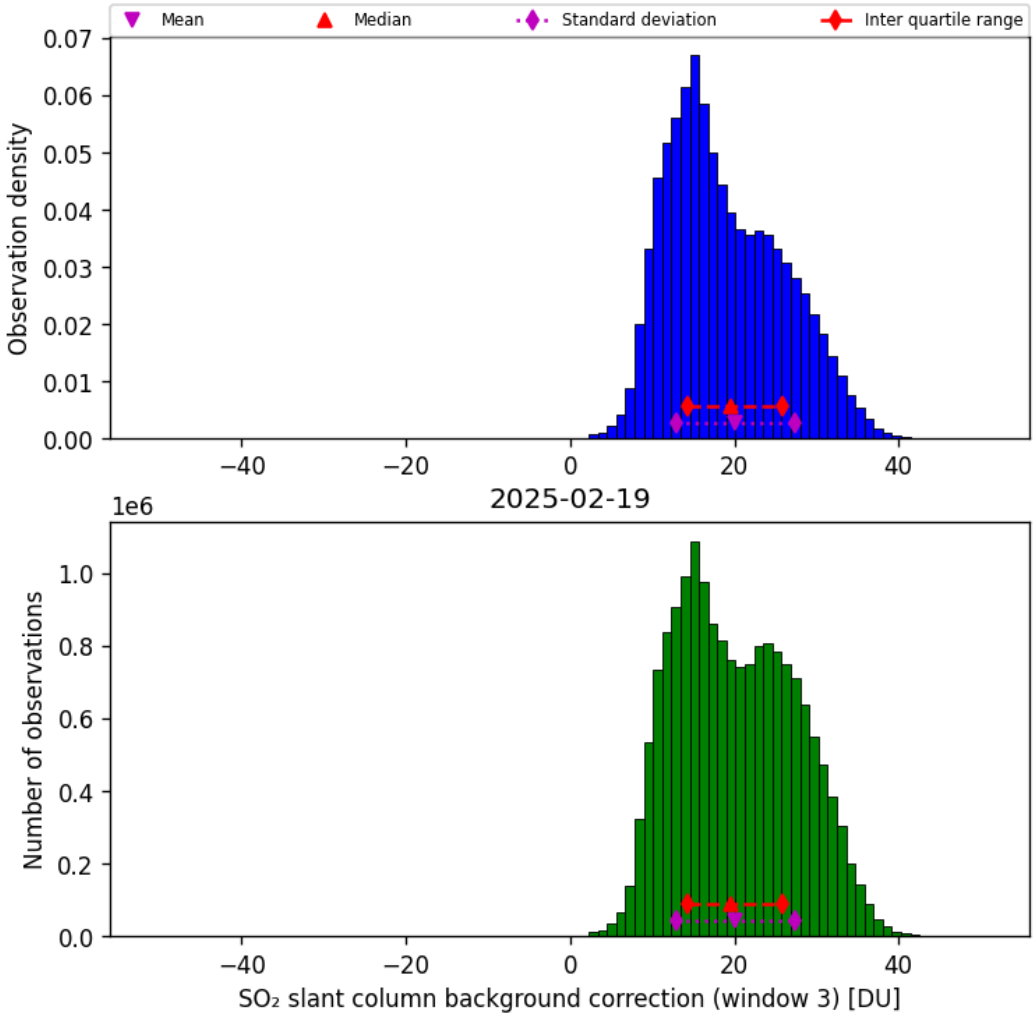

Figure 74: Histogram of "SO_2 slant column background correction (window 3)" for 2025-02-19 to 2025-02-20

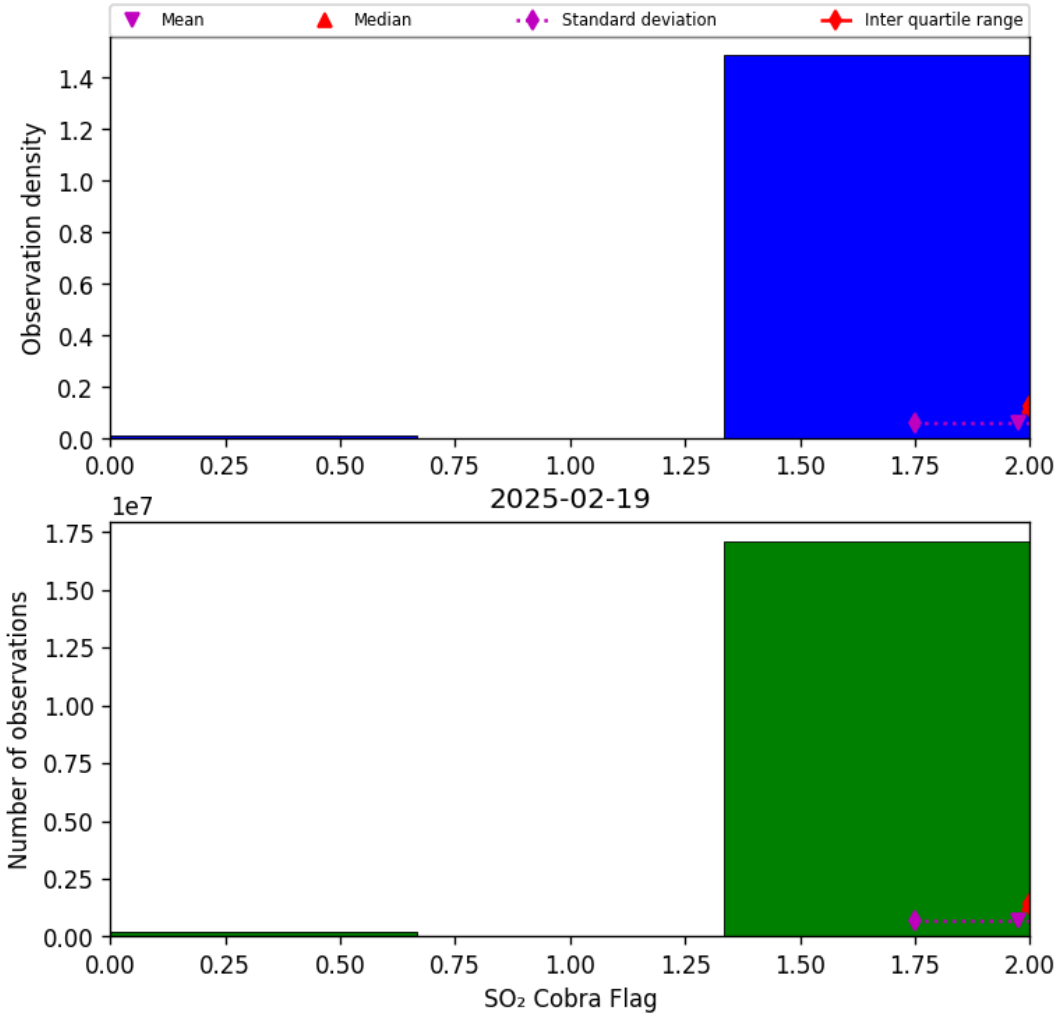

Figure 75: Histogram of "SO_2 Cobra Flag" for 2025-02-19 to 2025-02-20

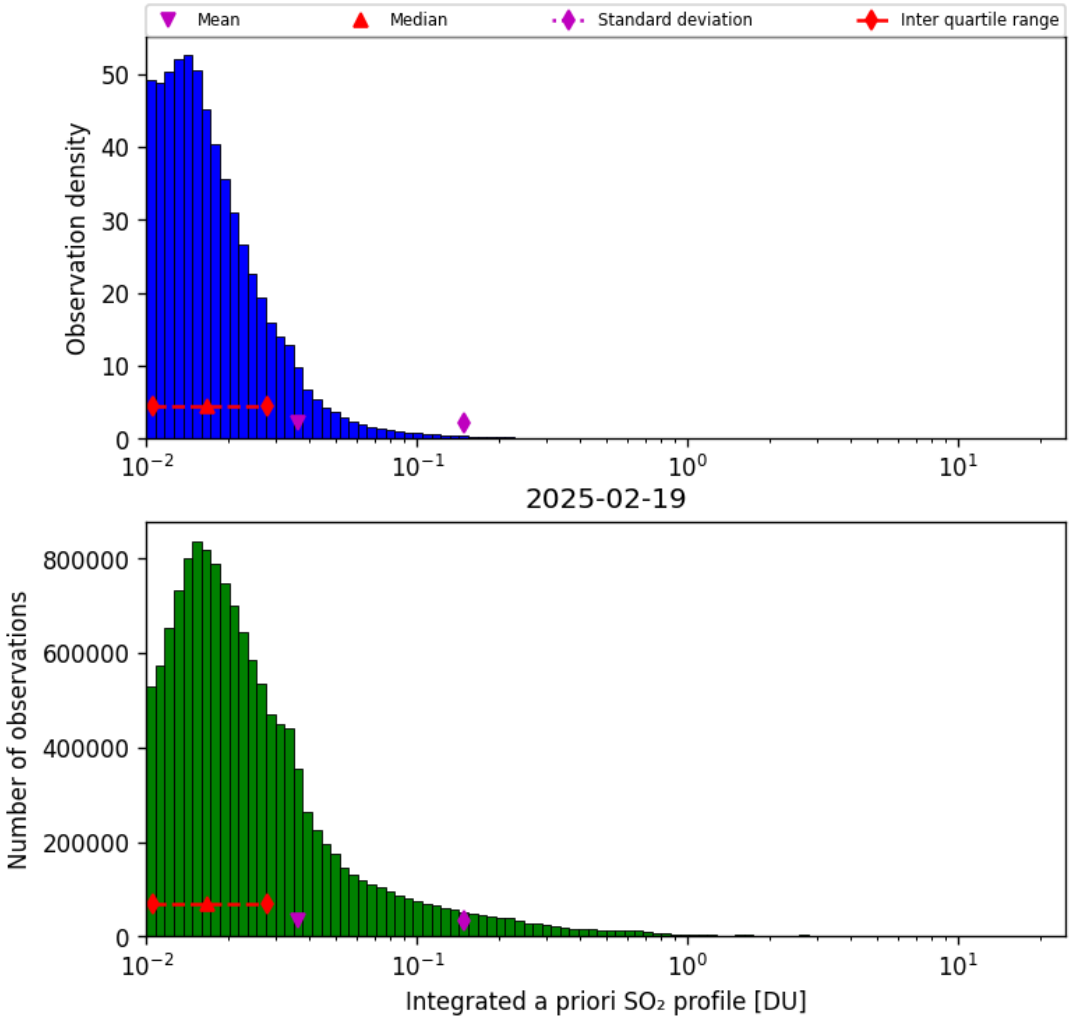

Figure 76: Histogram of "Integrated a priori SO_2 profile" for 2025-02-19 to 2025-02-20

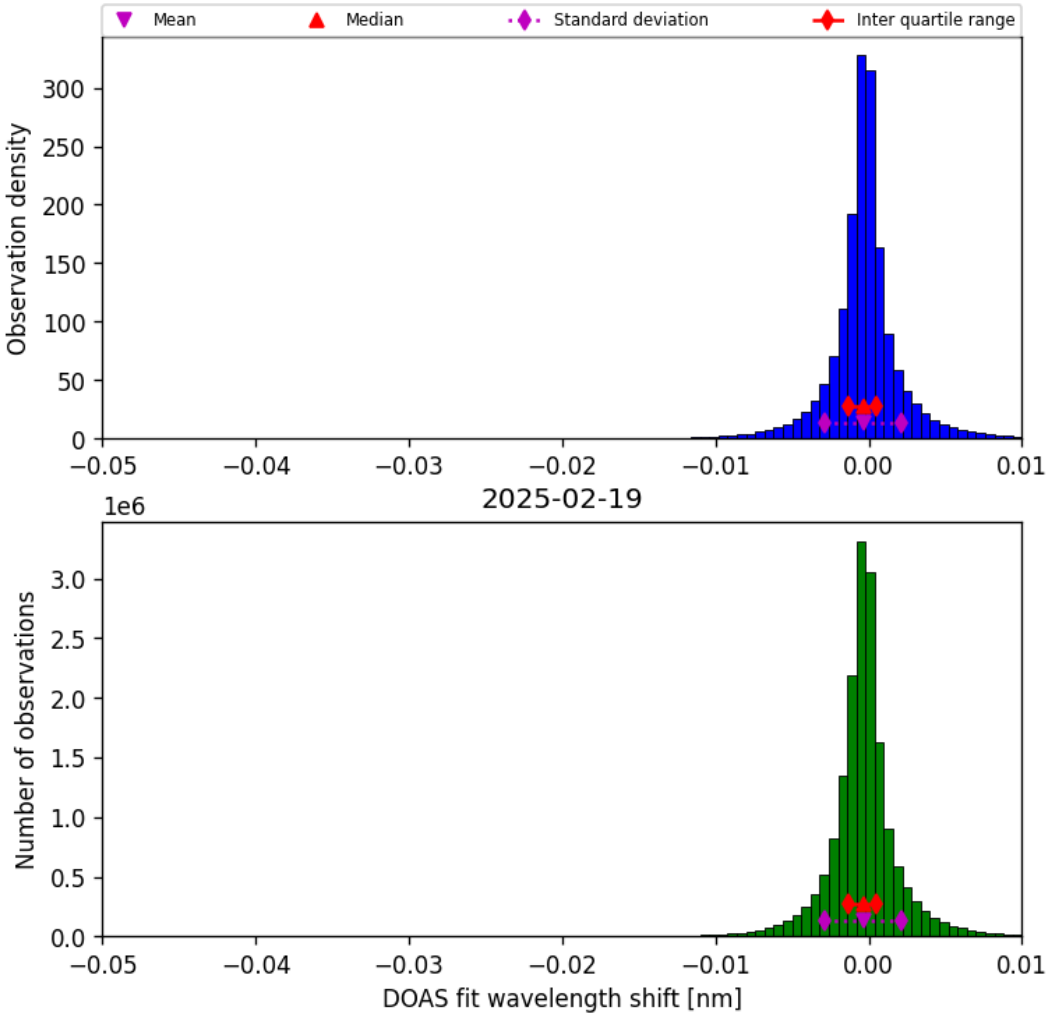

Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-02-19 to 2025-02-20

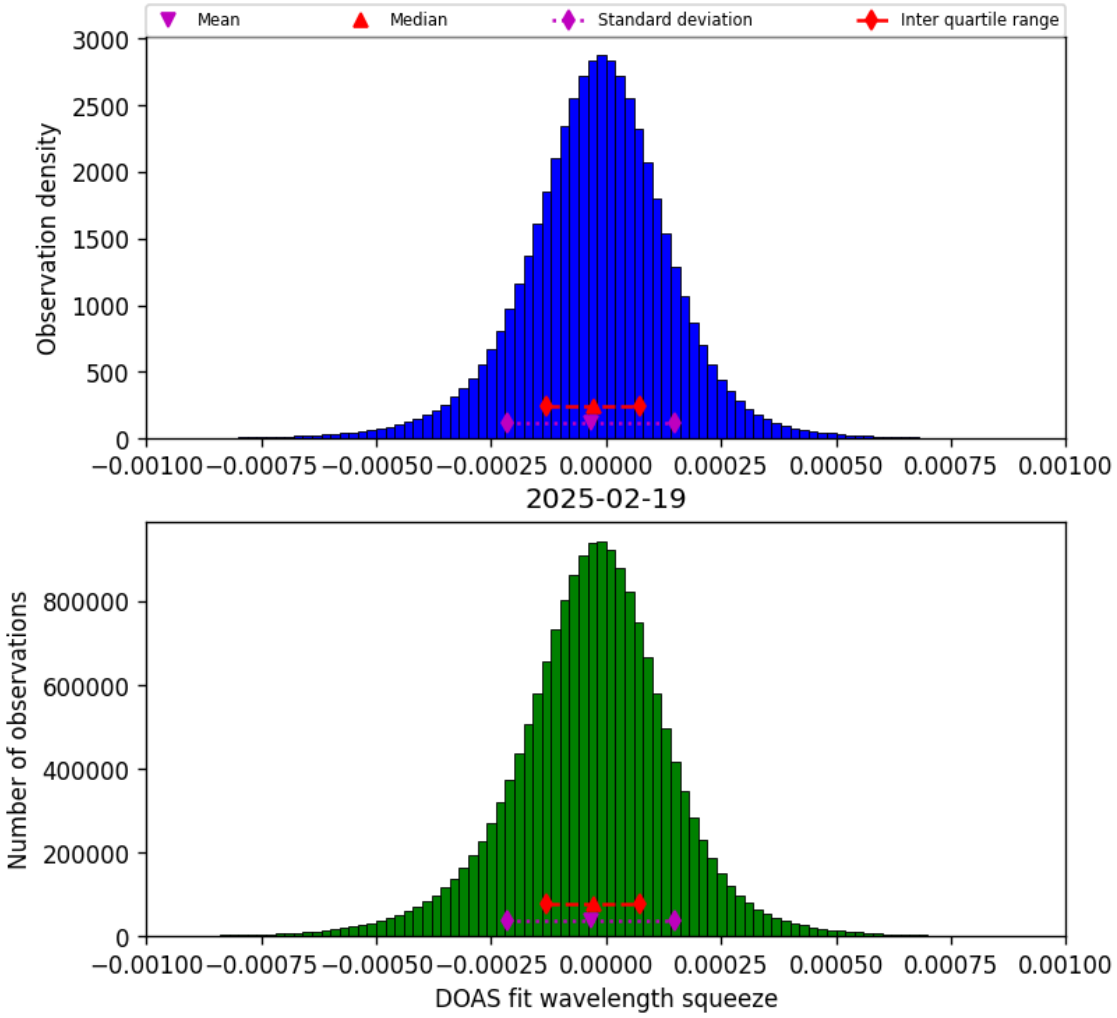

Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-02-19 to 2025-02-20

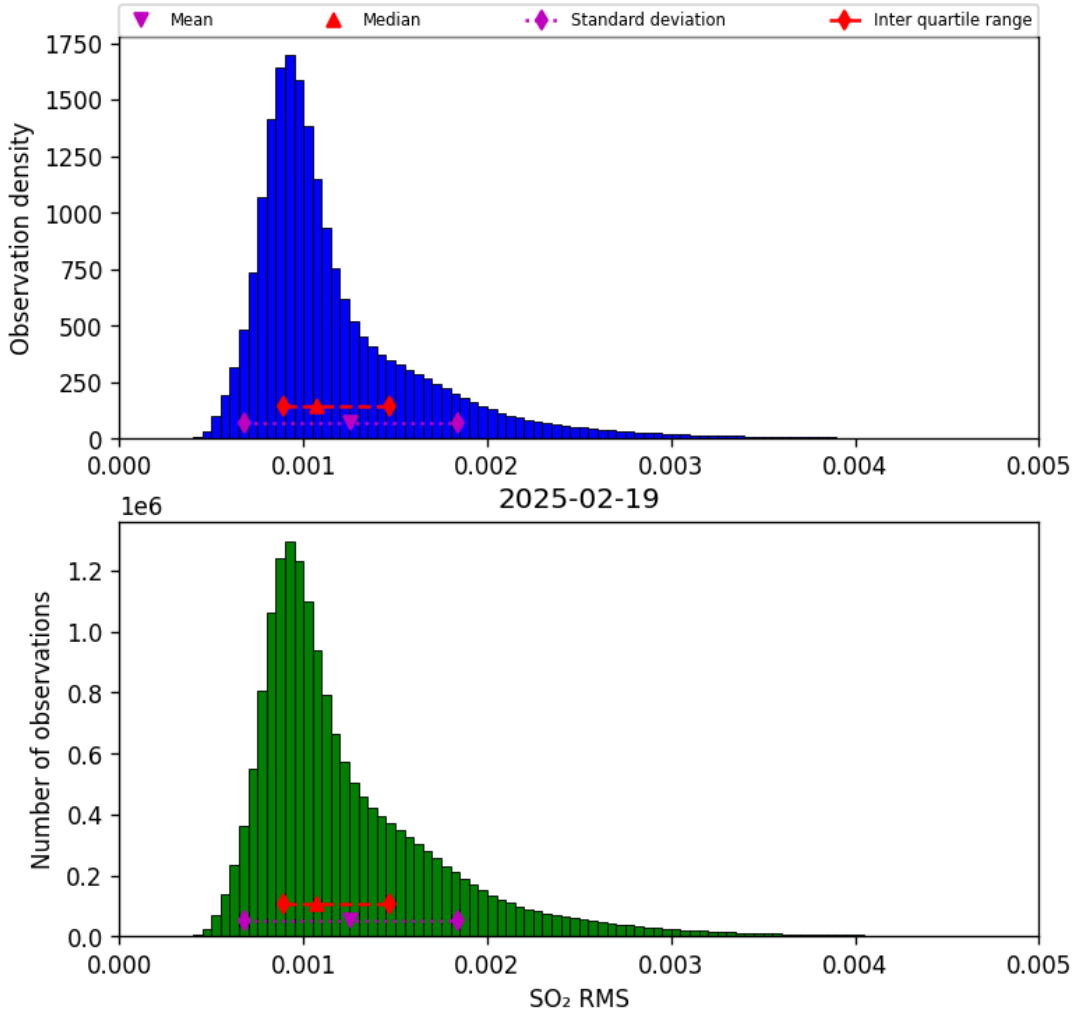

Figure 79: Histogram of "SO_2 RMS" for 2025-02-19 to 2025-02-20

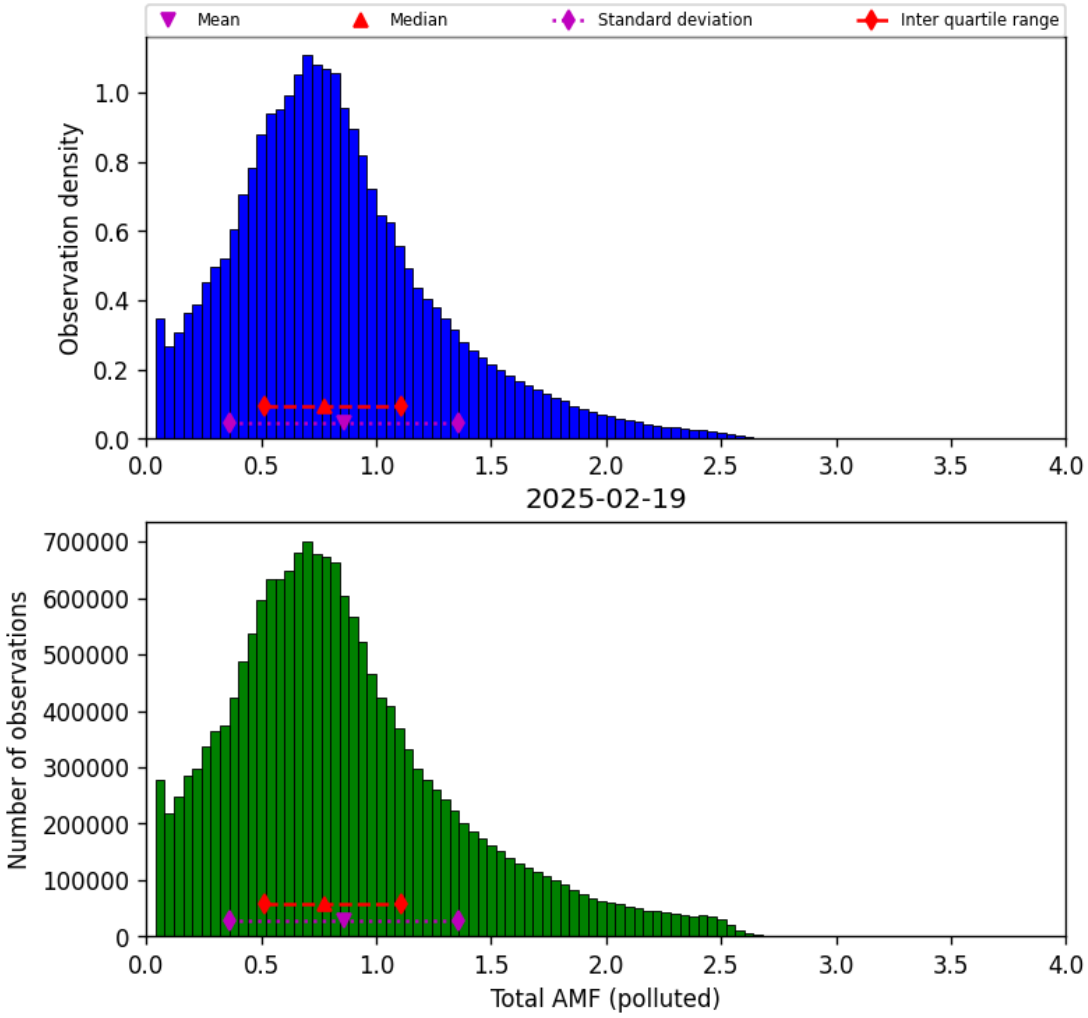

Figure 80: Histogram of “Total AMF (polluted)” for 2025-02-19 to 2025-02-20

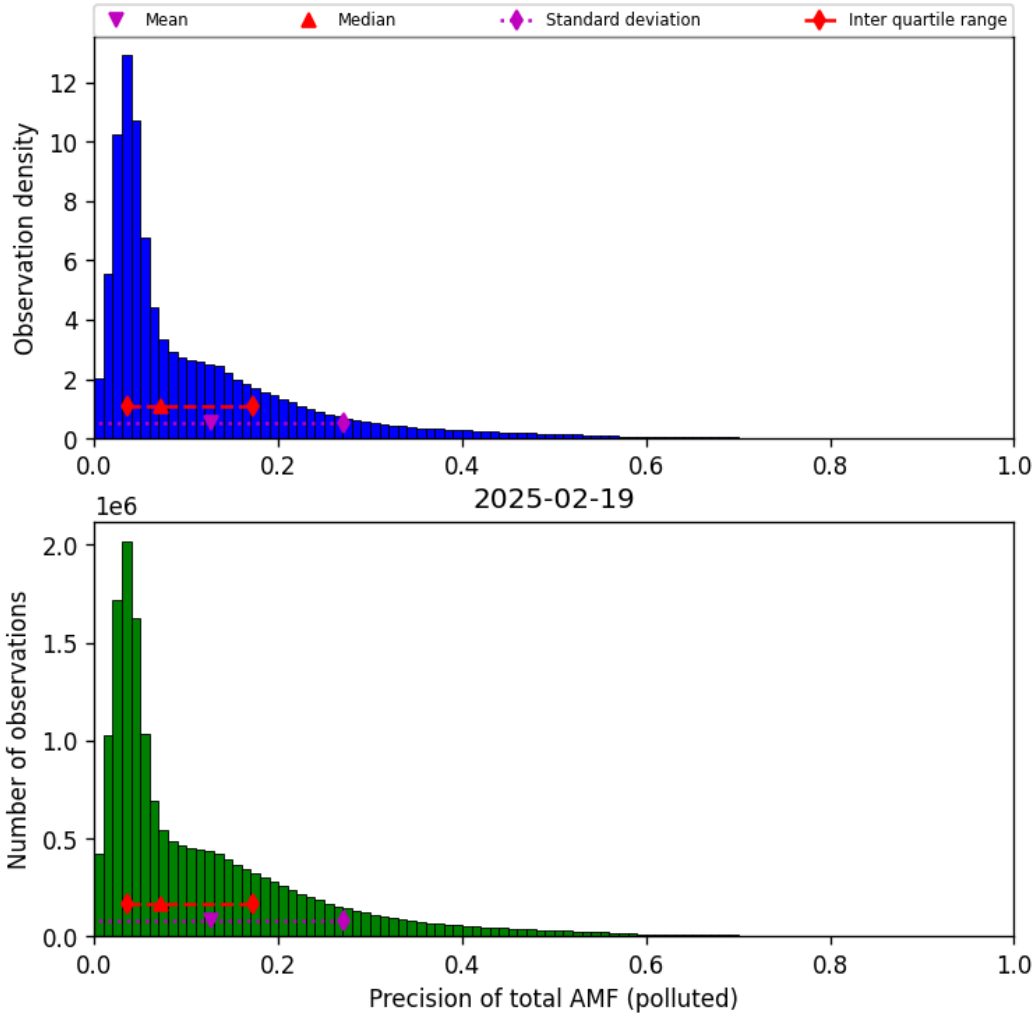

Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-02-19 to 2025-02-20

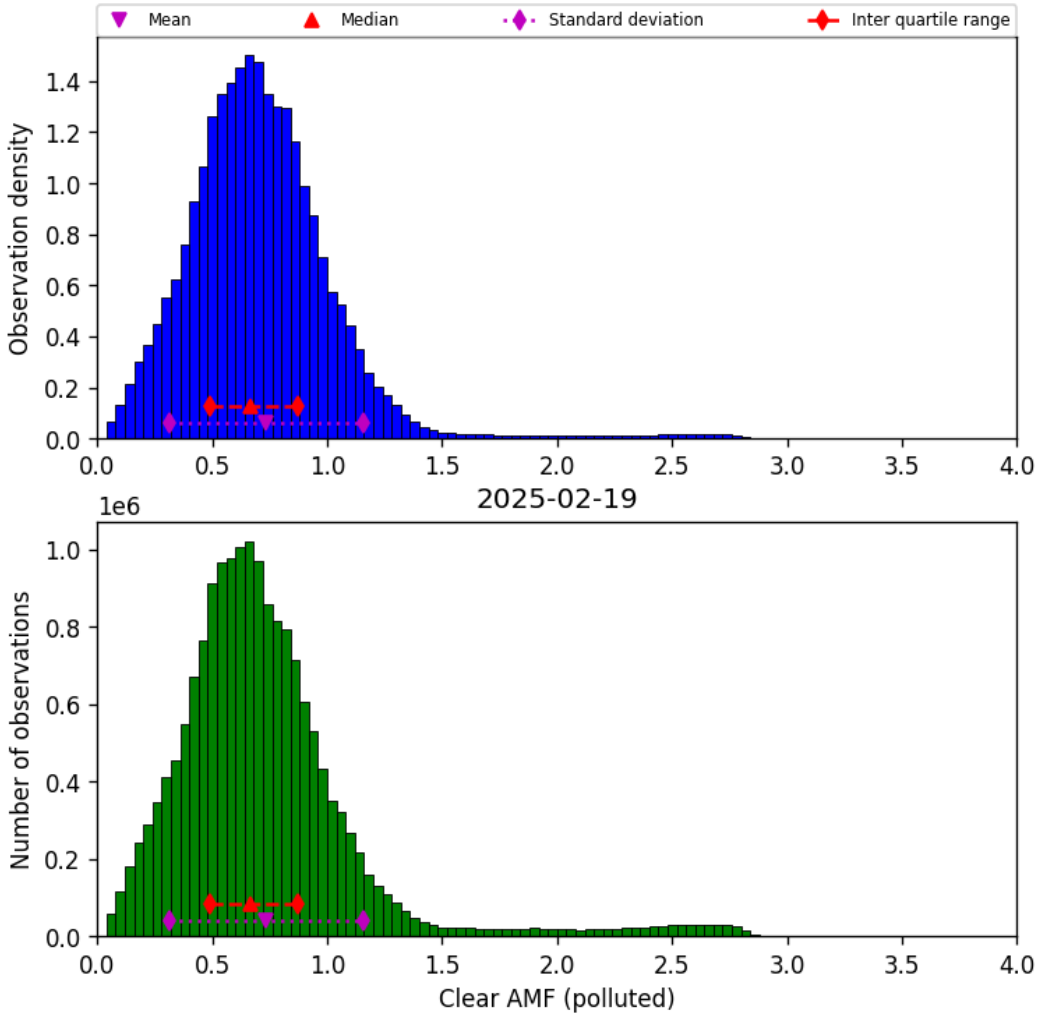

Figure 82: Histogram of “Clear AMF (polluted)” for 2025-02-19 to 2025-02-20

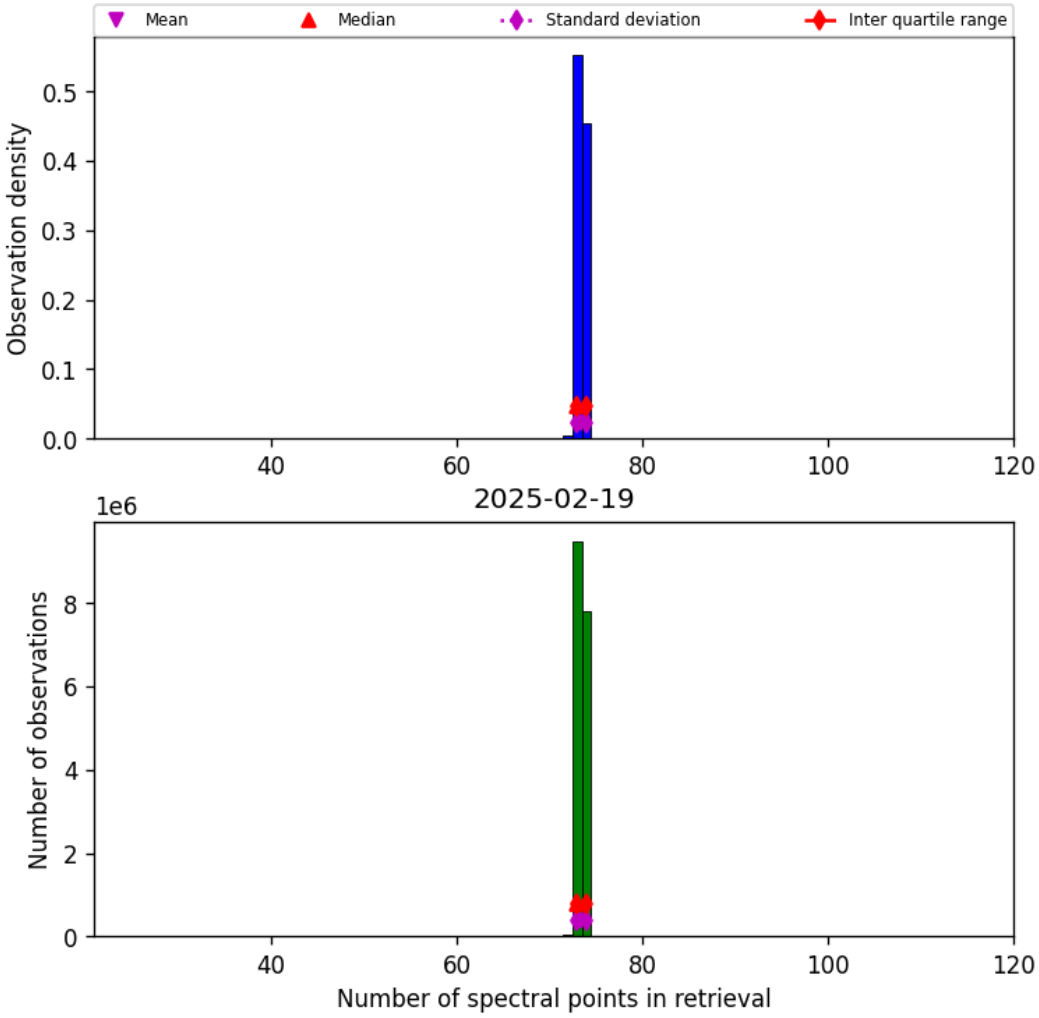

Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-02-19 to 2025-02-20

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.

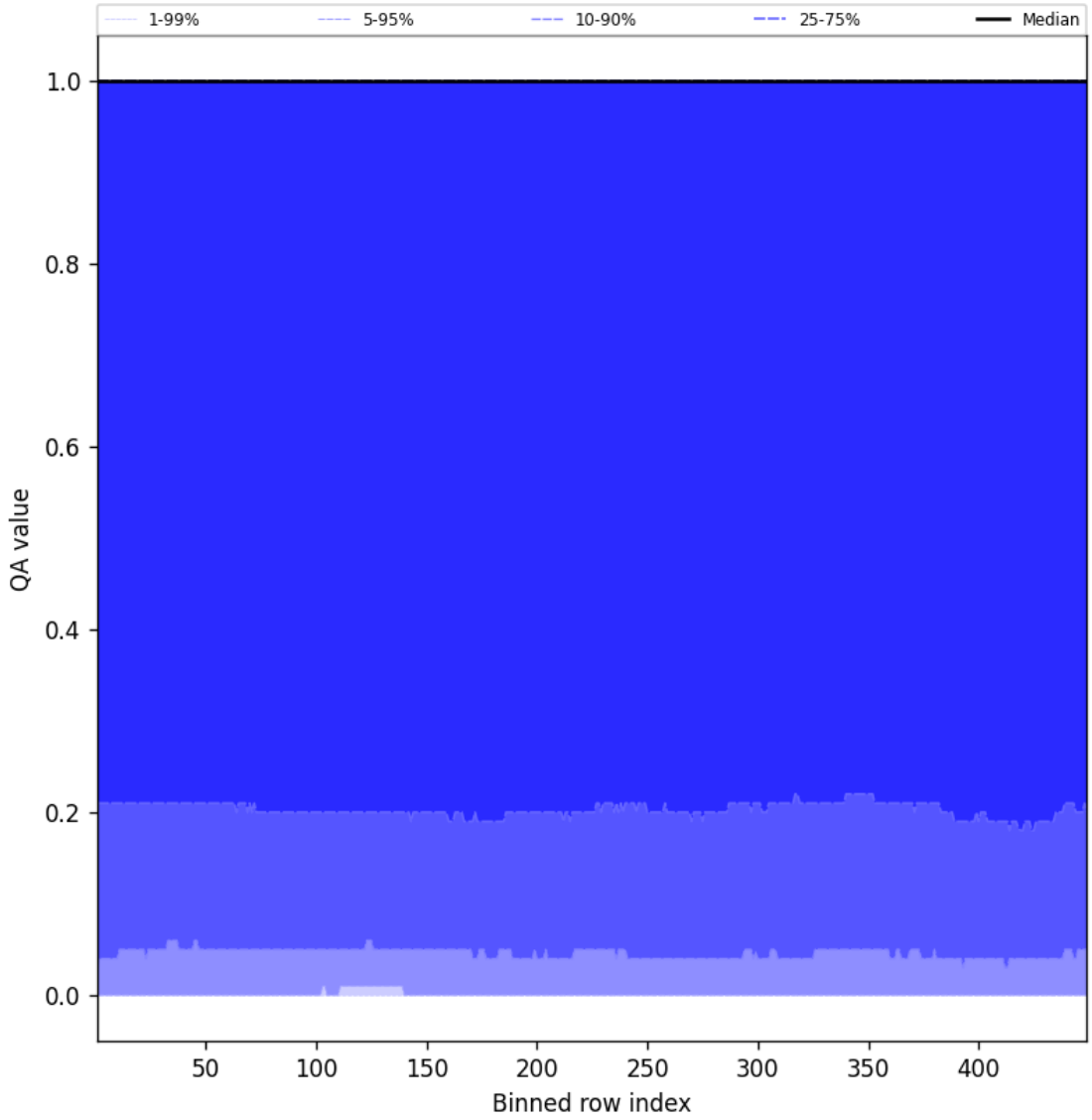

Figure 84: Along track statistics of “QA value” for 2025-02-19 to 2025-02-20

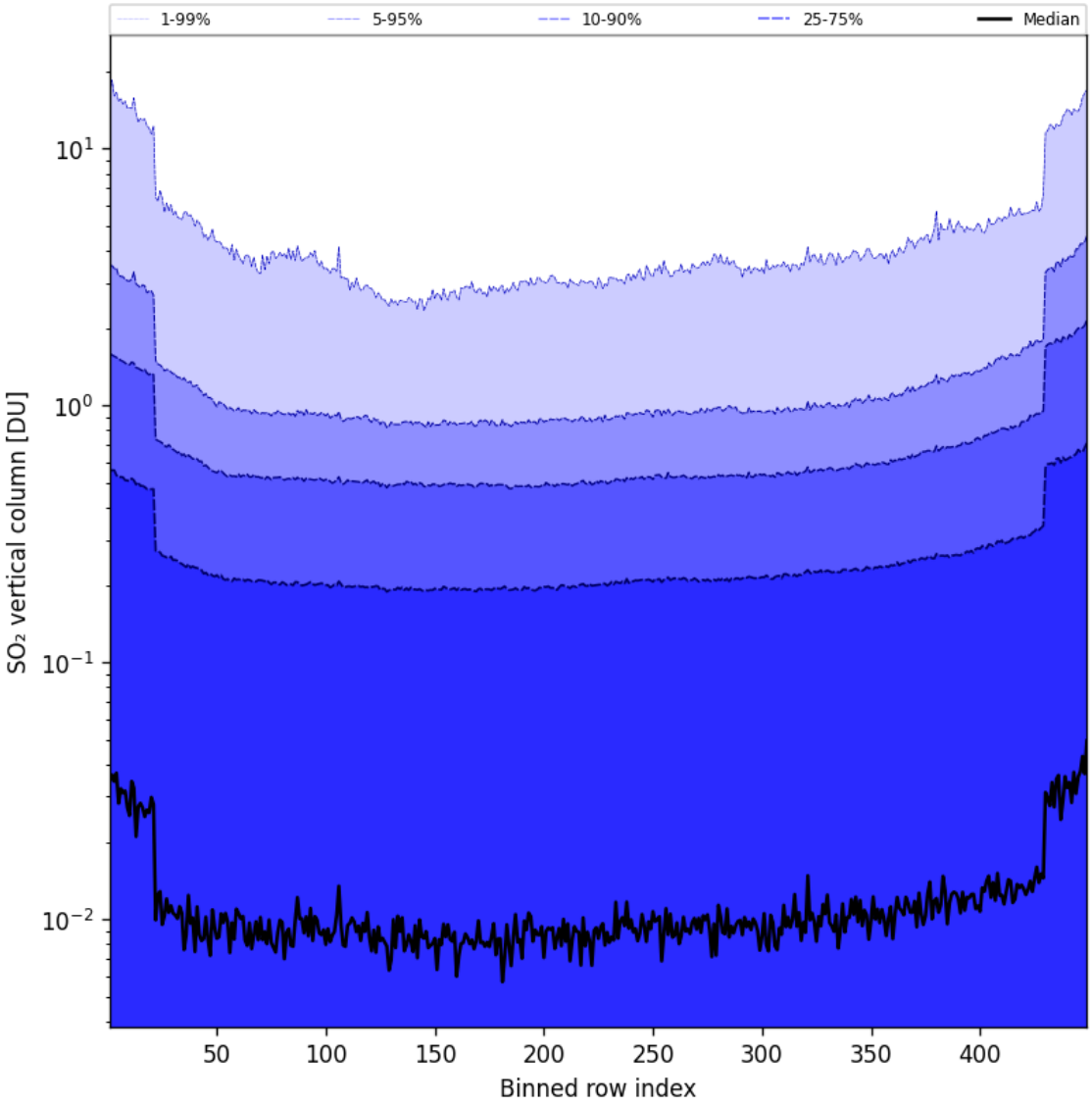

Figure 85: Along track statistics of "SO_2 vertical column" for 2025-02-19 to 2025-02-20

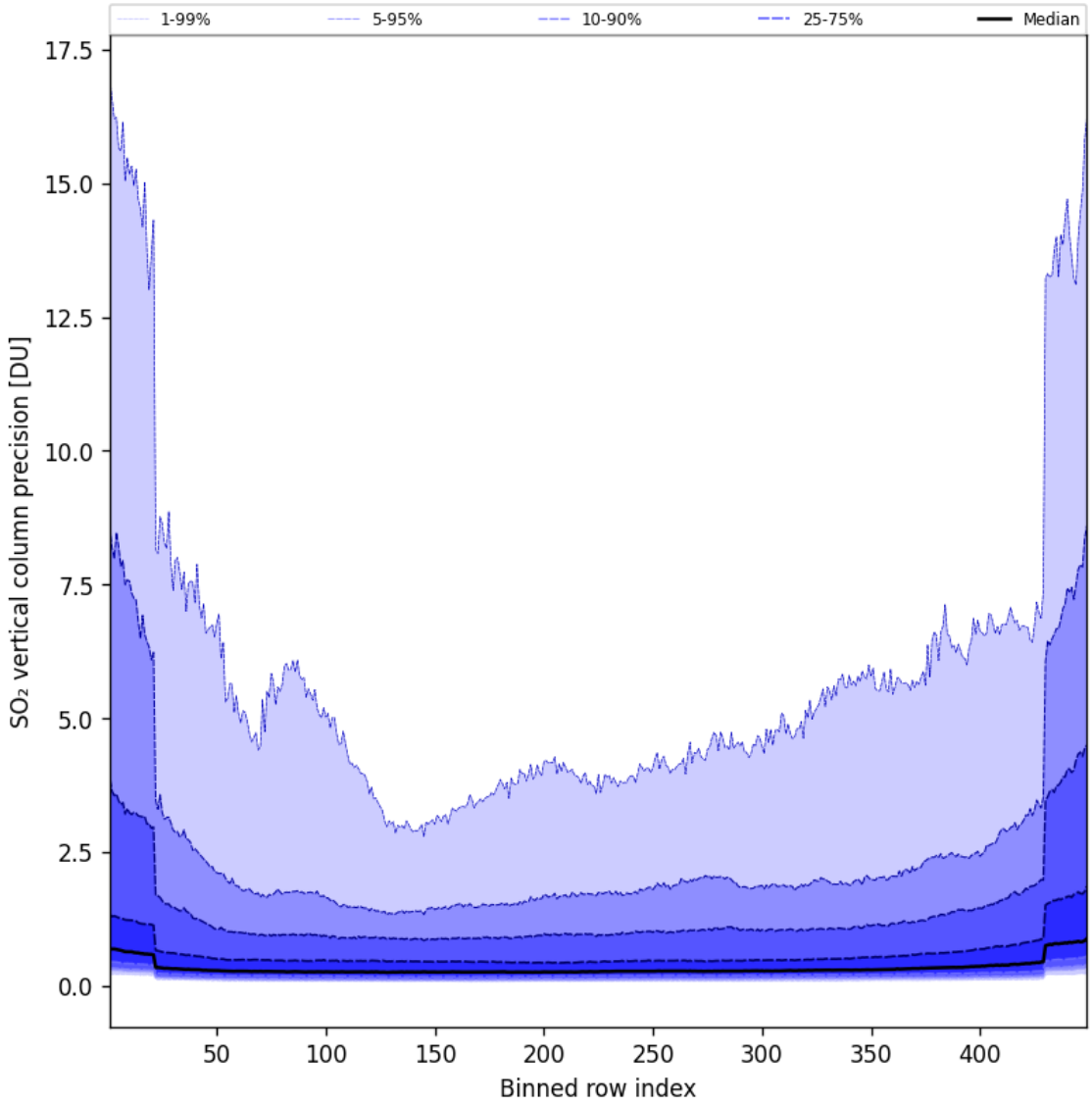

Figure 86: Along track statistics of "SO_2 vertical column precision" for 2025-02-19 to 2025-02-20

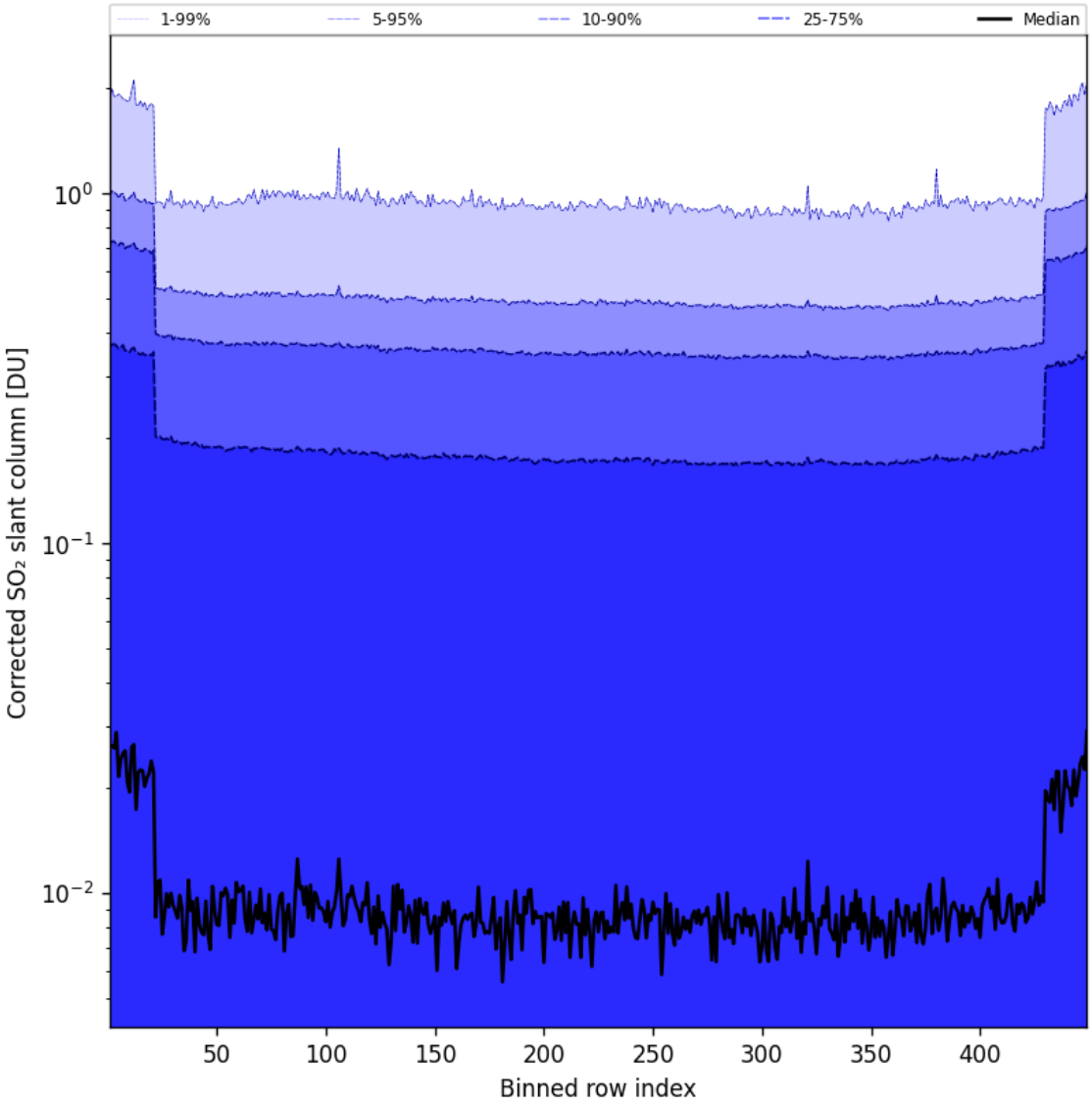

Figure 87: Along track statistics of "Corrected SO_2 slant column" for 2025-02-19 to 2025-02-20

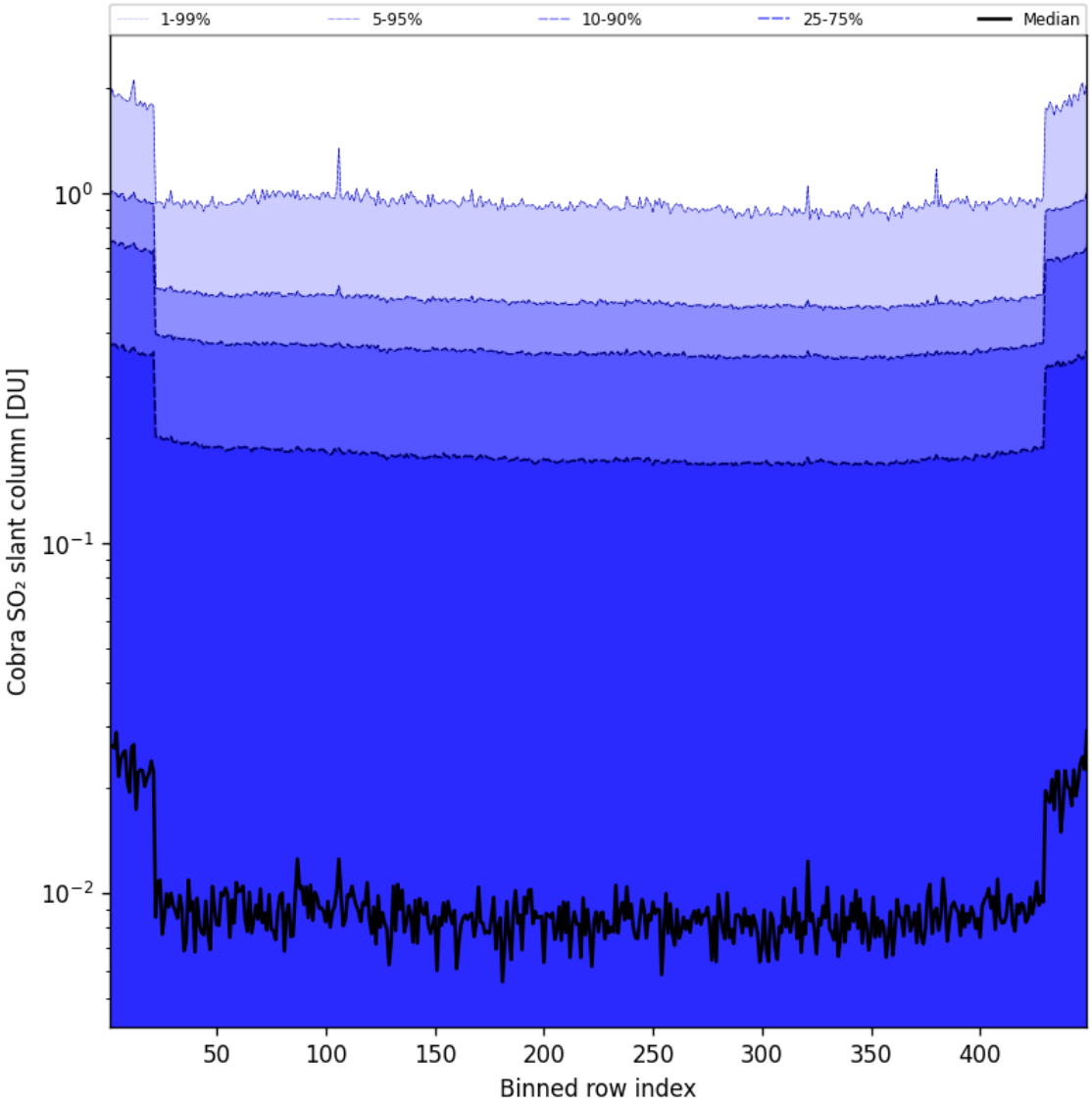

Figure 88: Along track statistics of “Cobra SO_2 slant column” for 2025-02-19 to 2025-02-20

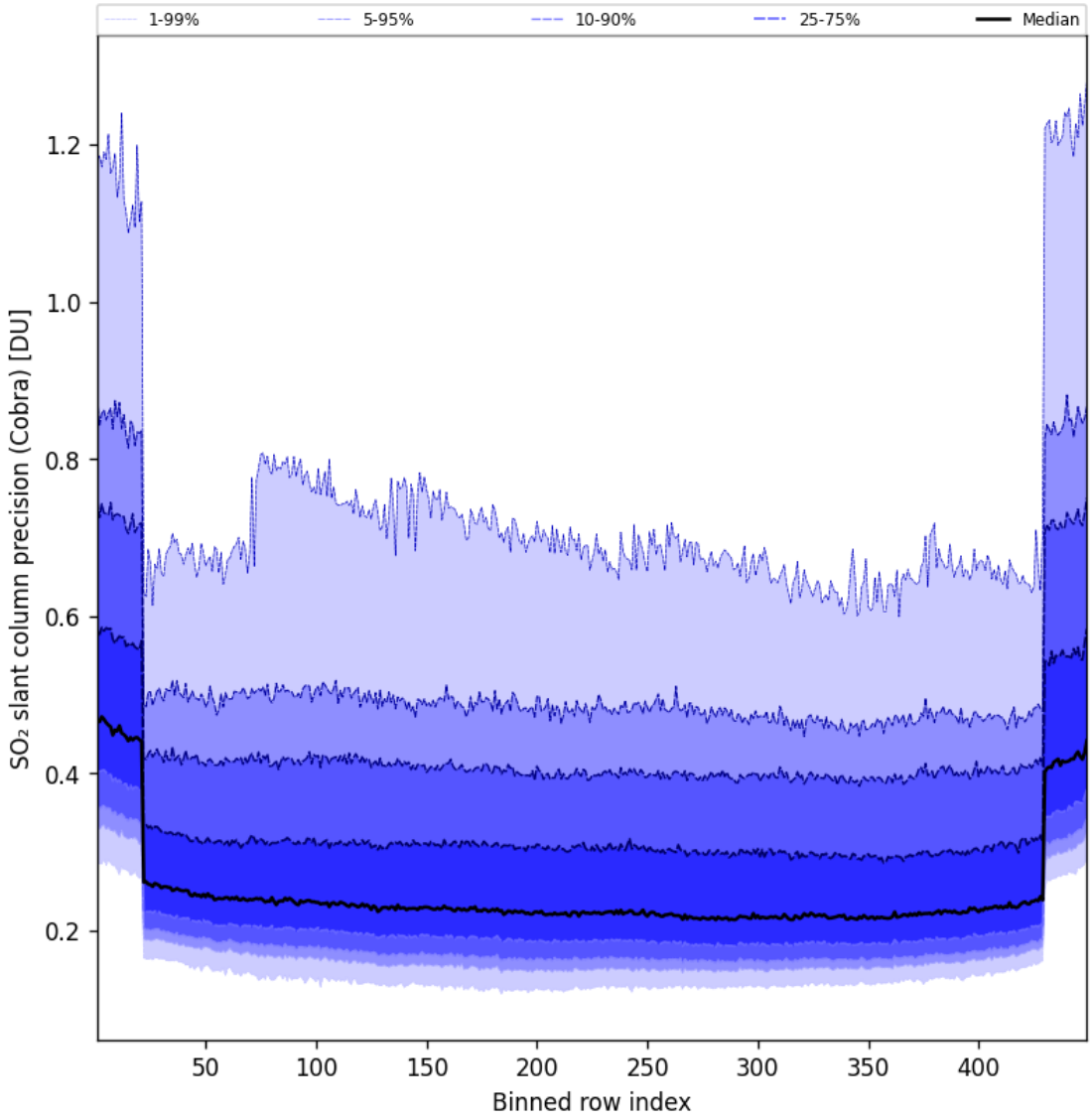

Figure 89: Along track statistics of "SO_2 slant column precision (Cobra)" for 2025-02-19 to 2025-02-20

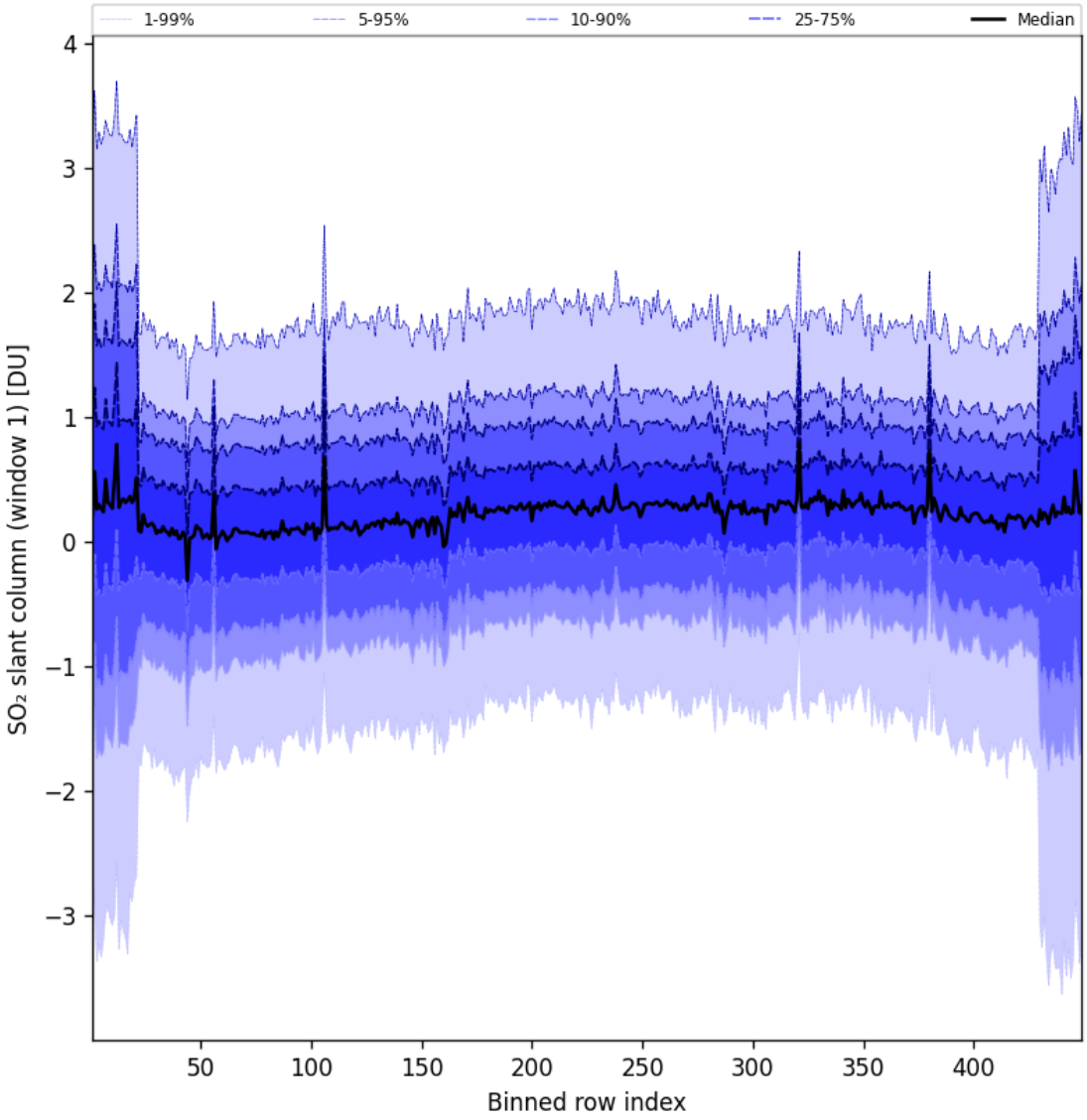

Figure 90: Along track statistics of "SO_2 slant column (window 1)" for 2025-02-19 to 2025-02-20

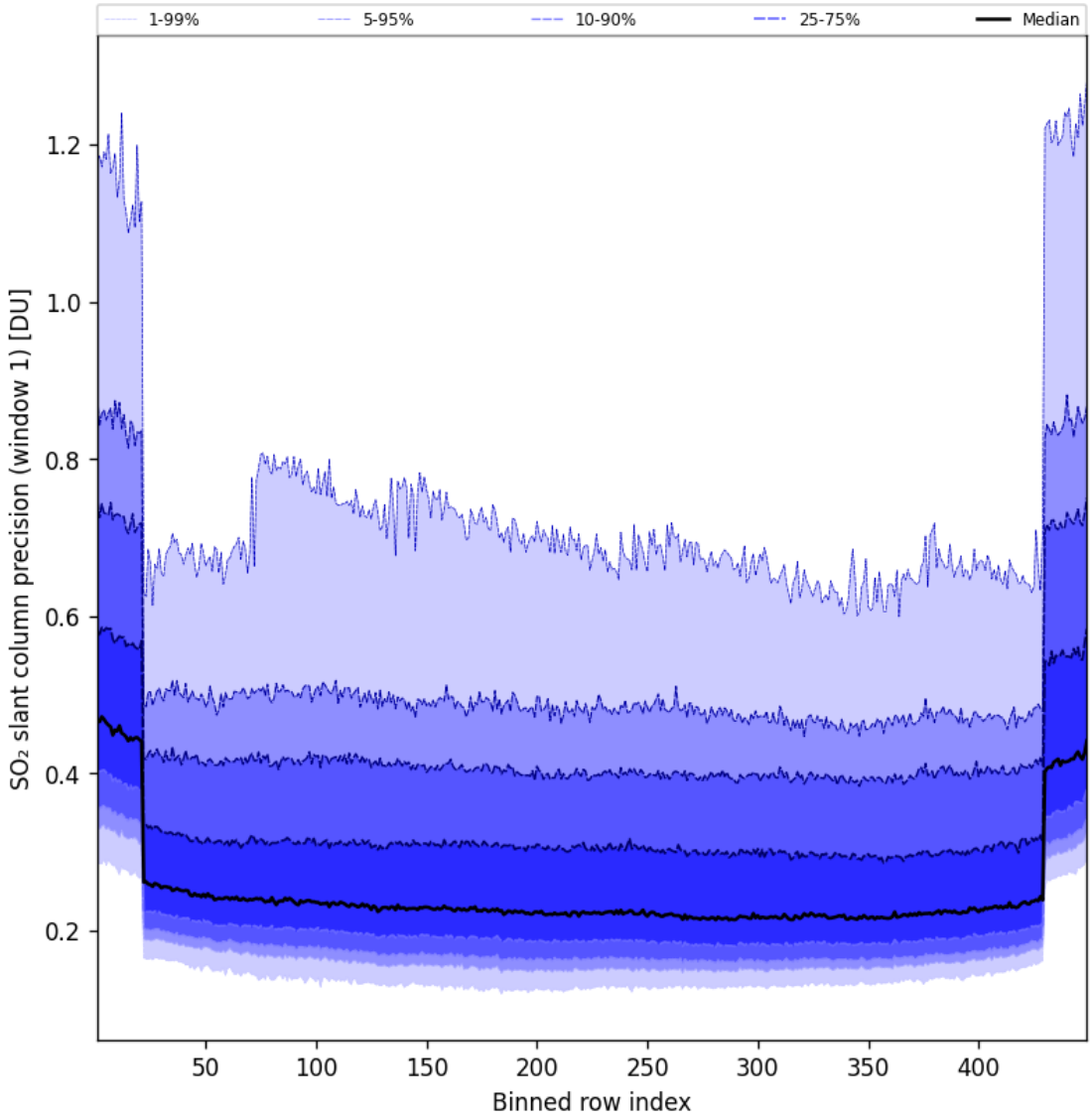

Figure 91: Along track statistics of "SO_2 slant column precision (window 1)" for 2025-02-19 to 2025-02-20

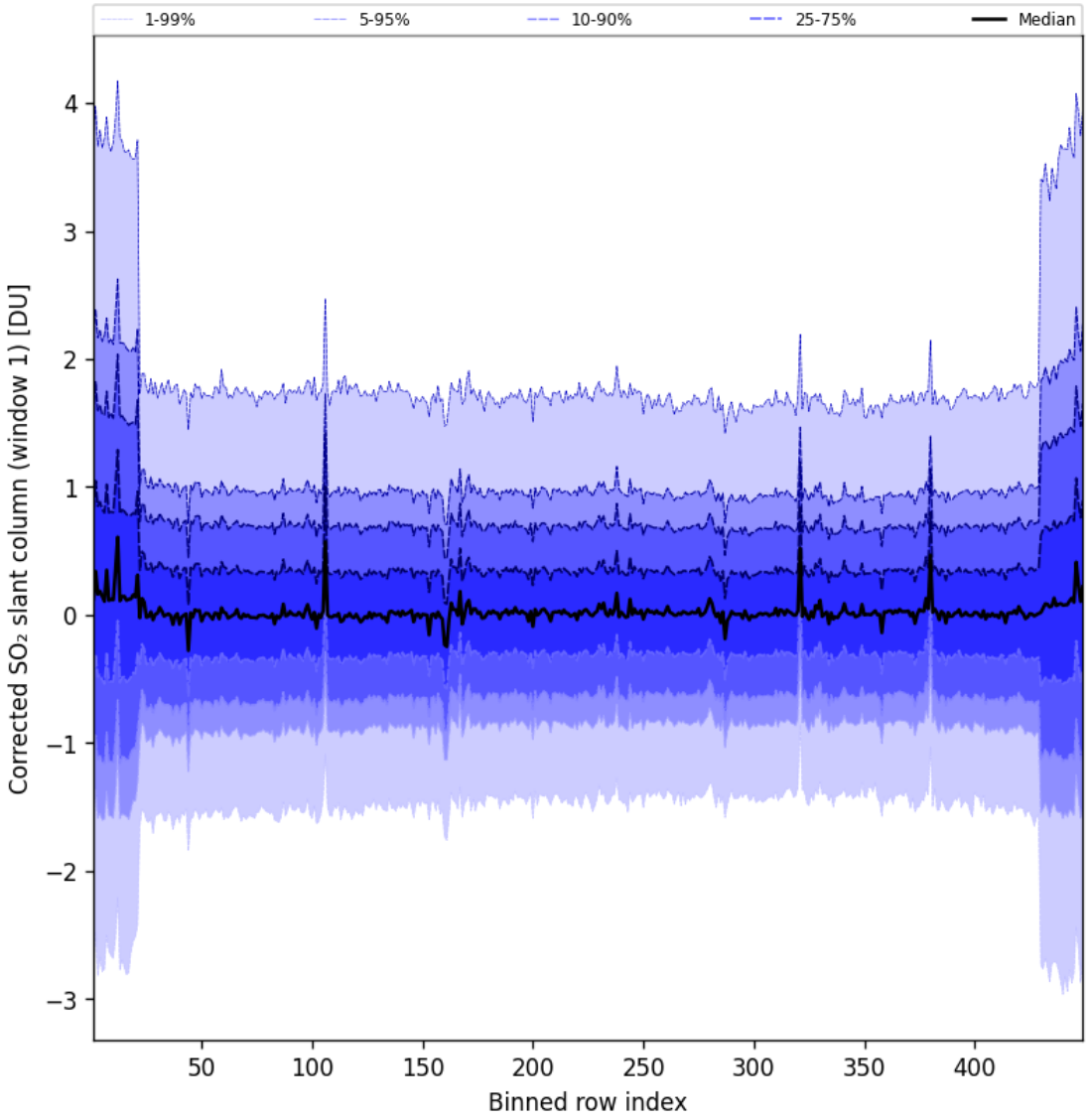

Figure 92: Along track statistics of "Corrected SO_2 slant column (window 1)" for 2025-02-19 to 2025-02-20

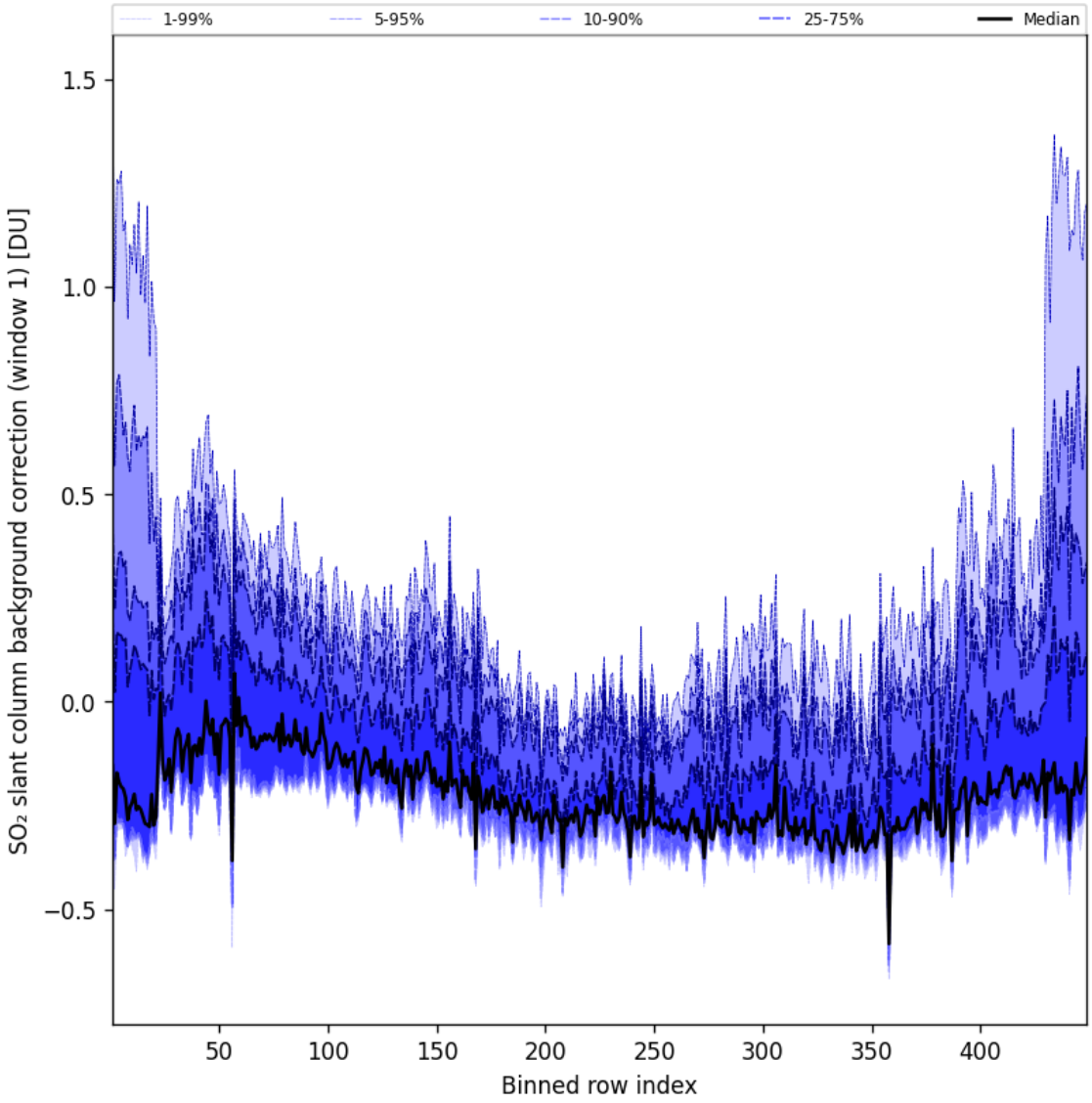

Figure 93: Along track statistics of "SO_2 slant column background correction (window 1)" for 2025-02-19 to 2025-02-20

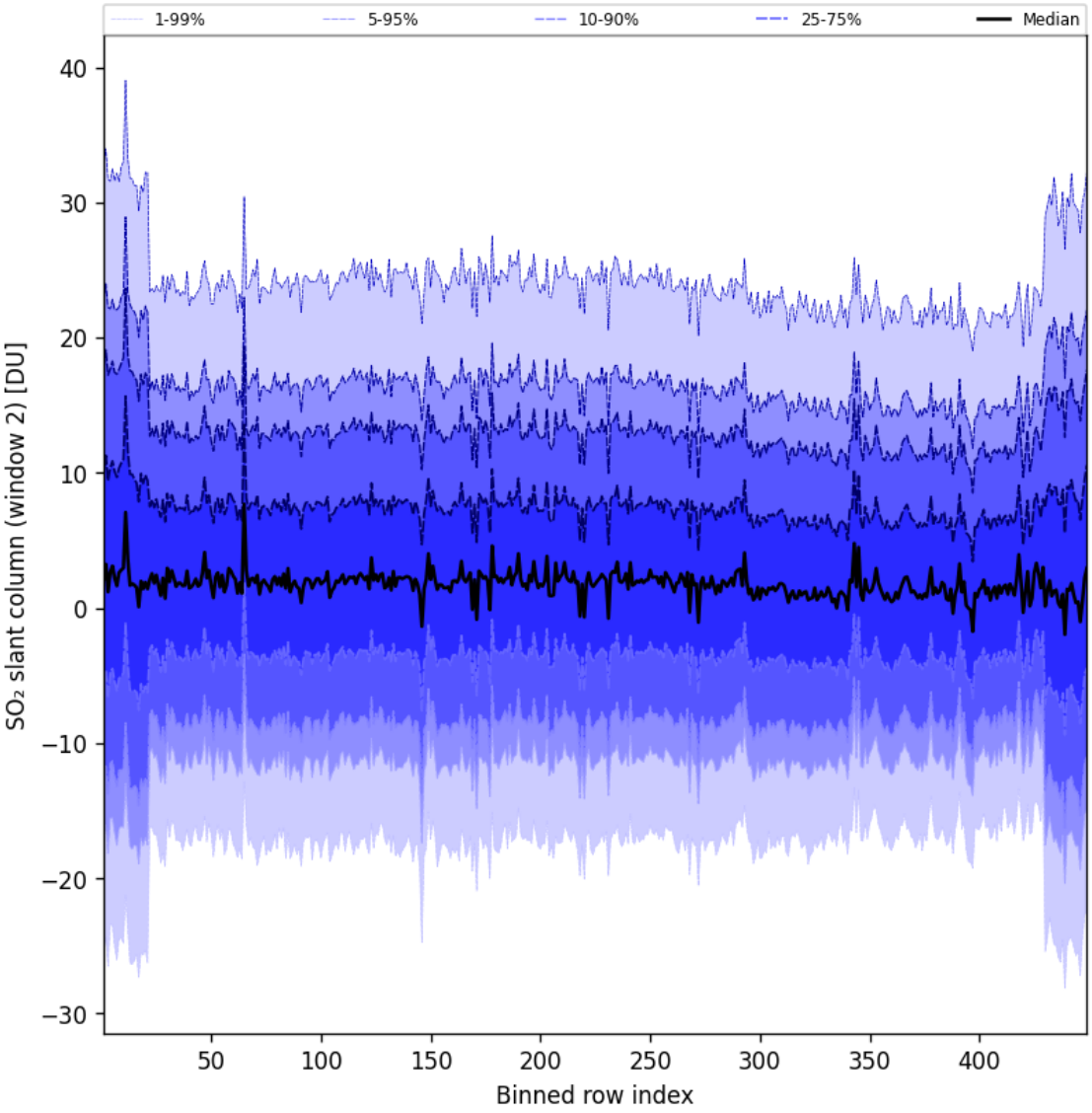

Figure 94: Along track statistics of "SO_2 slant column (window 2)" for 2025-02-19 to 2025-02-20

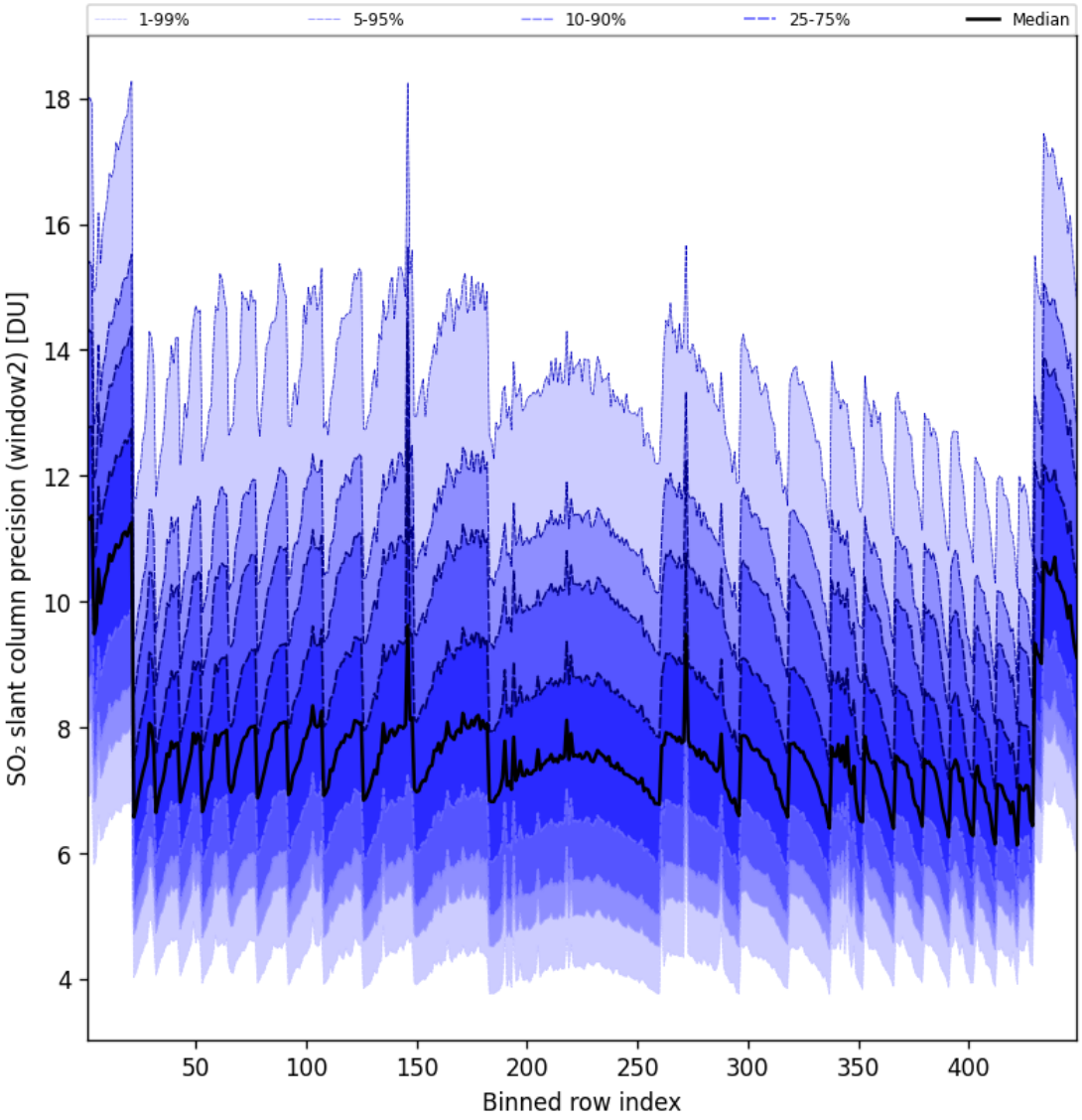

Figure 95: Along track statistics of "SO_2 slant column precision (window2)" for 2025-02-19 to 2025-02-20

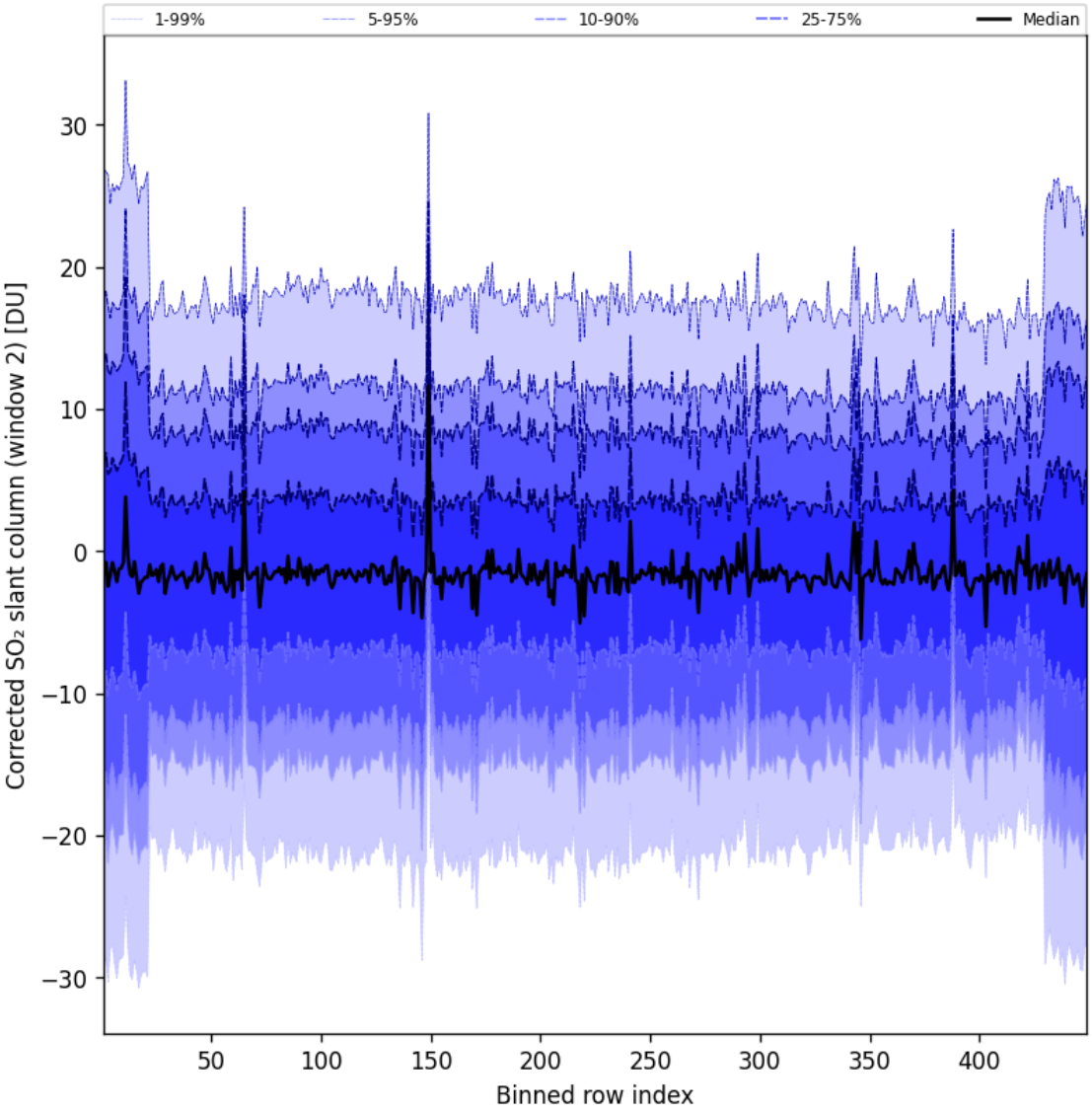

Figure 96: Along track statistics of "Corrected SO_2 slant column (window 2)" for 2025-02-19 to 2025-02-20

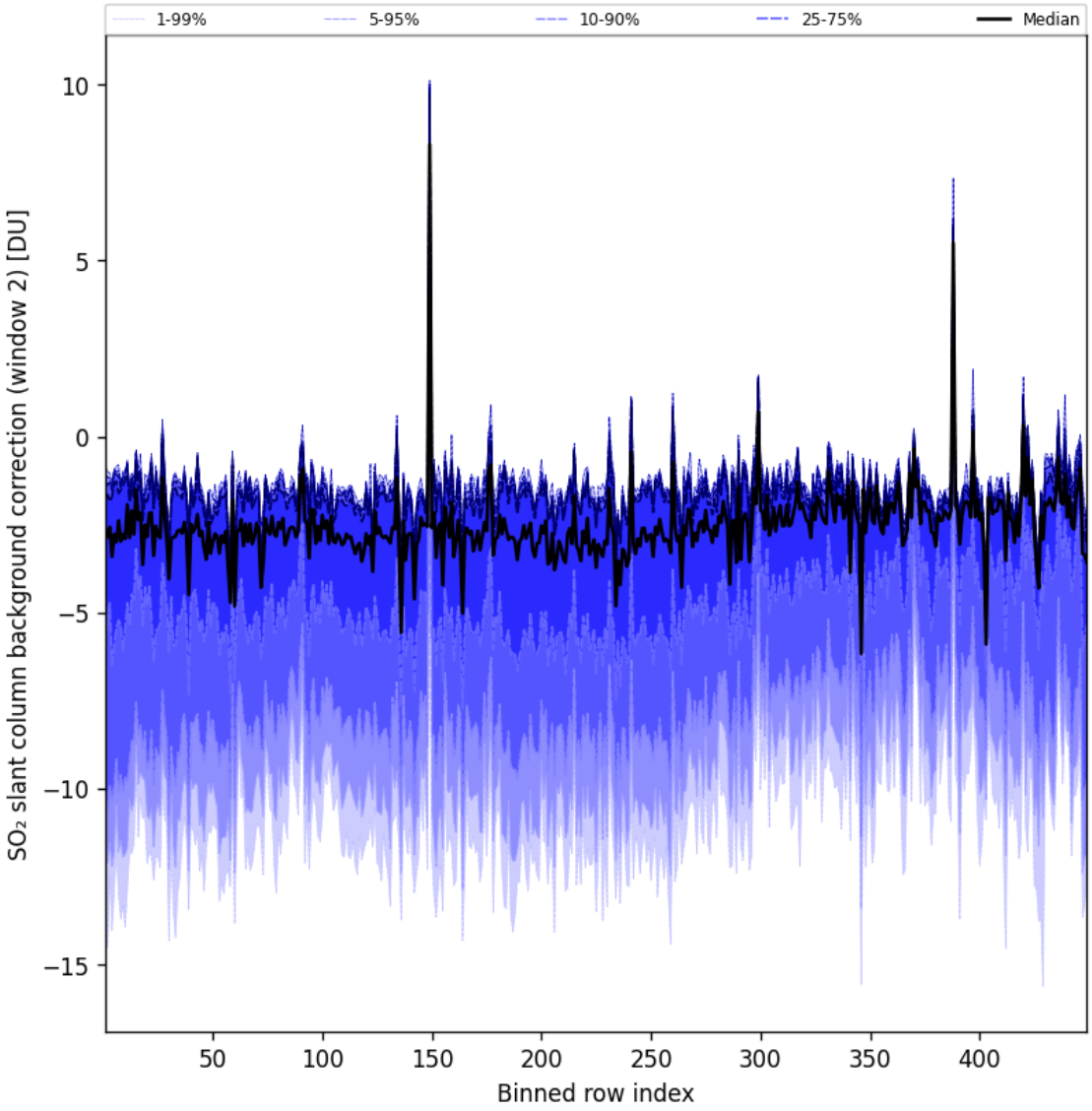

Figure 97: Along track statistics of "SO_2 slant column background correction (window 2)" for 2025-02-19 to 2025-02-20

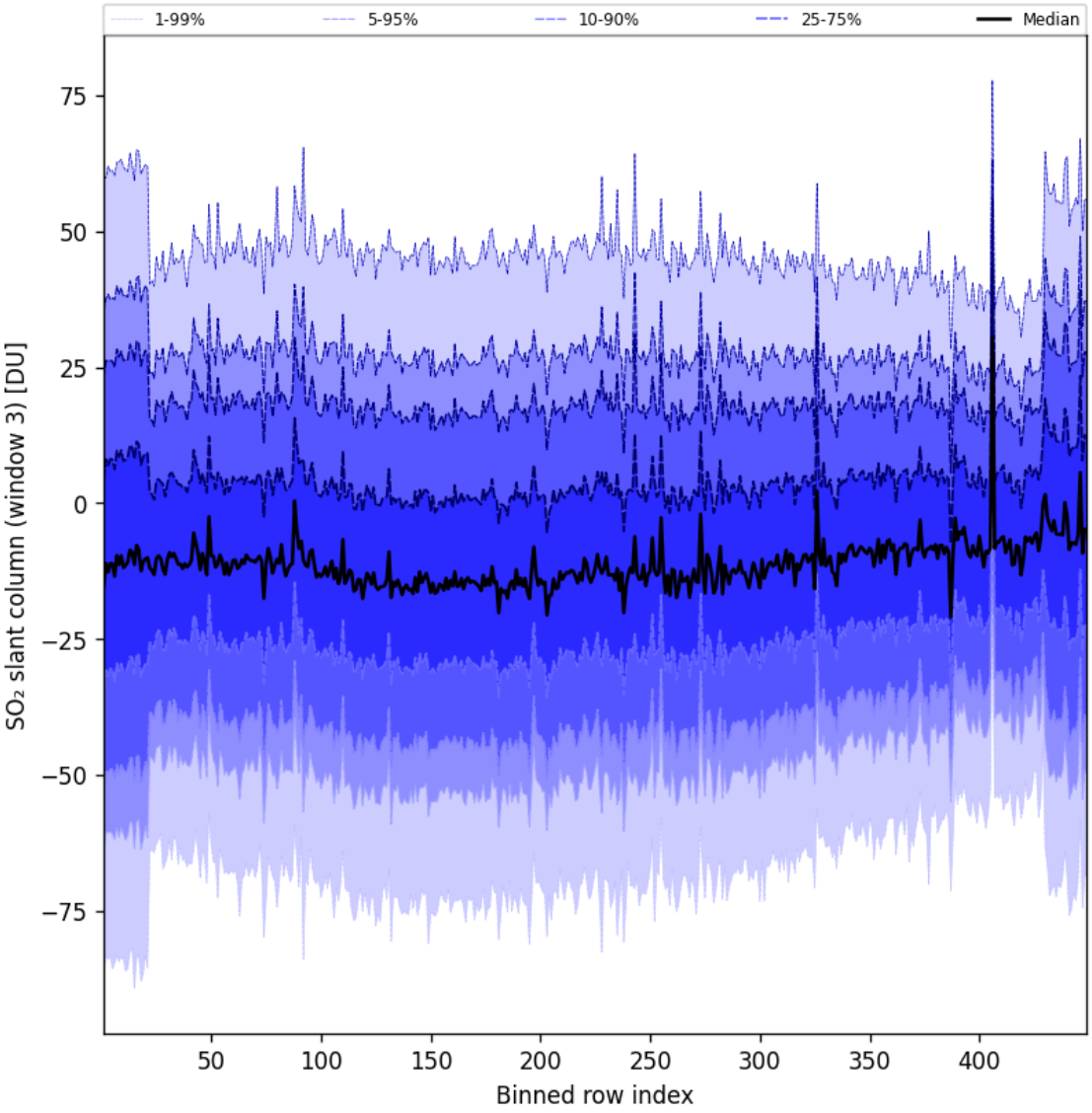

Figure 98: Along track statistics of "SO_2 slant column (window 3)" for 2025-02-19 to 2025-02-20

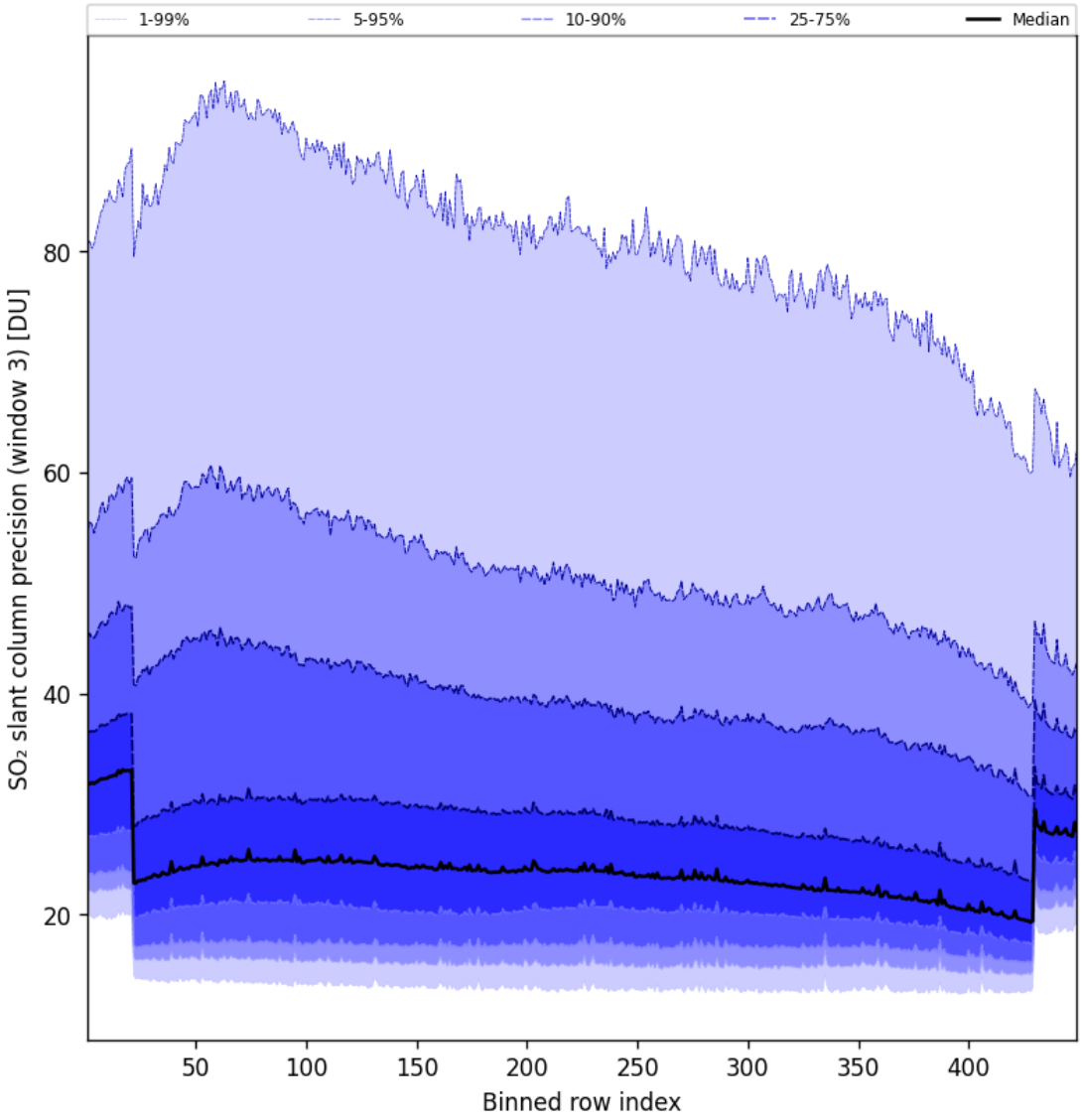

Figure 99: Along track statistics of "SO_2 slant column precision (window 3)" for 2025-02-19 to 2025-02-20

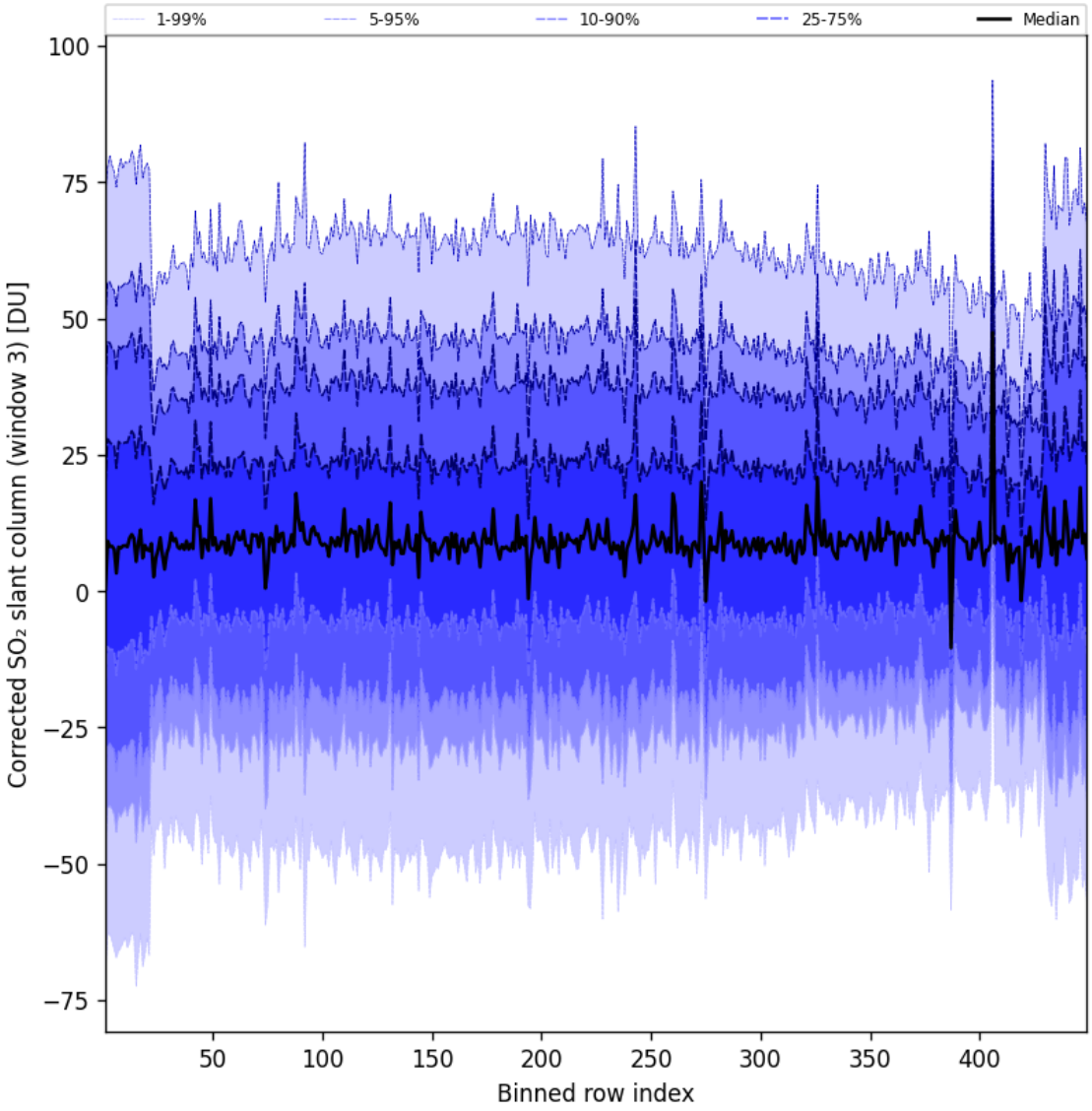

Figure 100: Along track statistics of “Corrected SO_2 slant column (window 3)” for 2025-02-19 to 2025-02-20

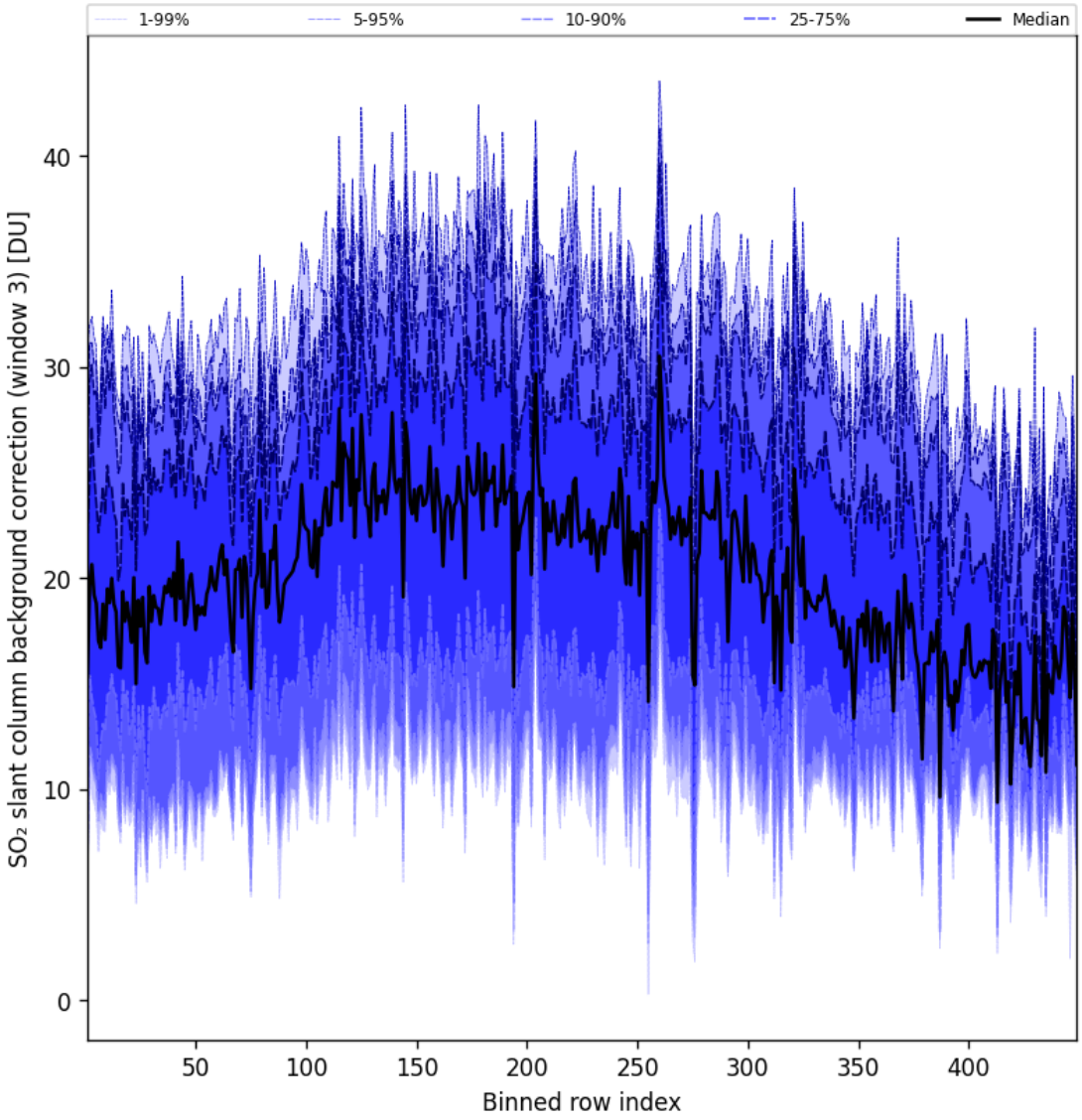

Figure 101: Along track statistics of "SO_2 slant column background correction (window 3)" for 2025-02-19 to 2025-02-20

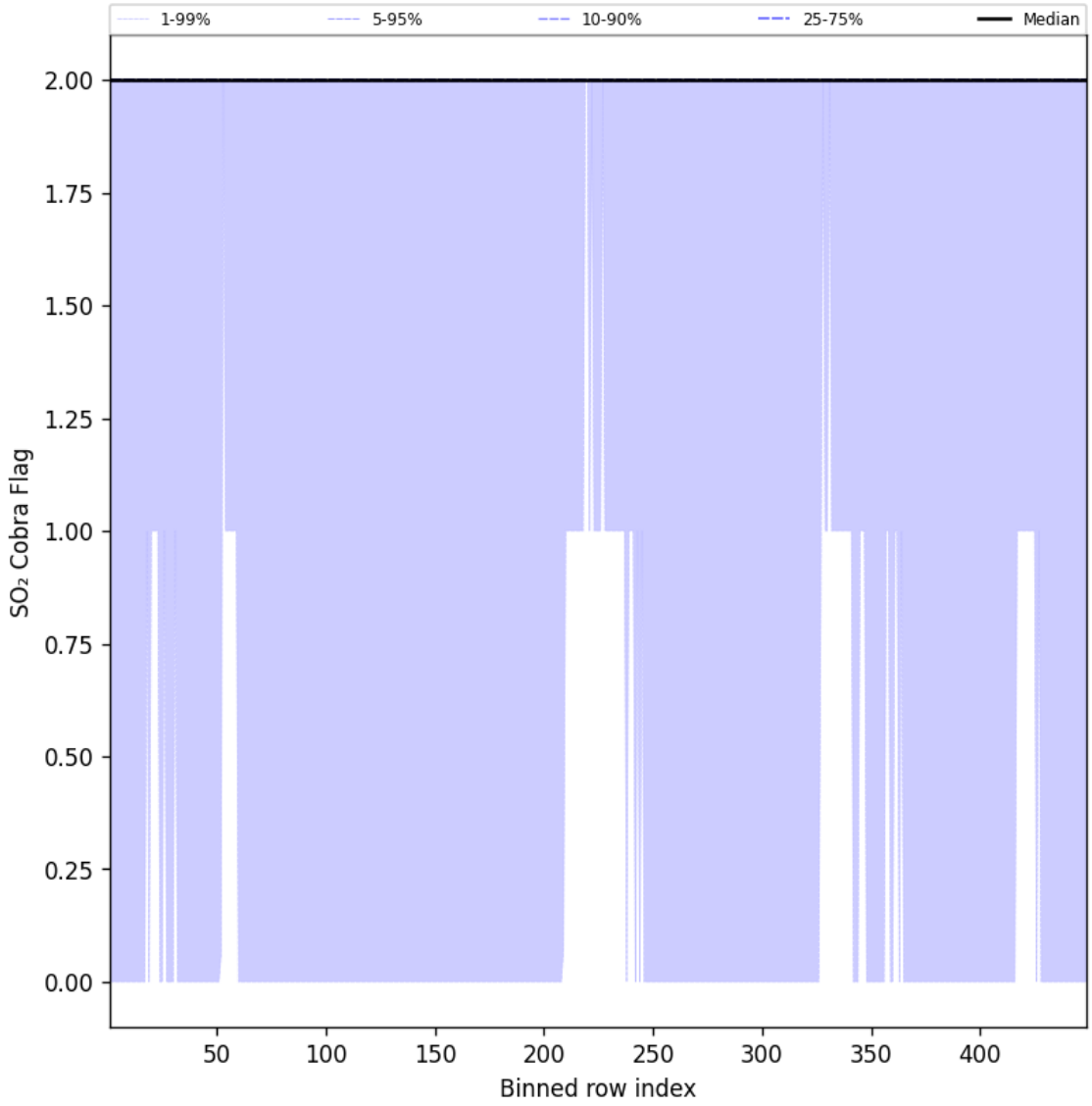

Figure 102: Along track statistics of "SO_2 Cobra Flag" for 2025-02-19 to 2025-02-20

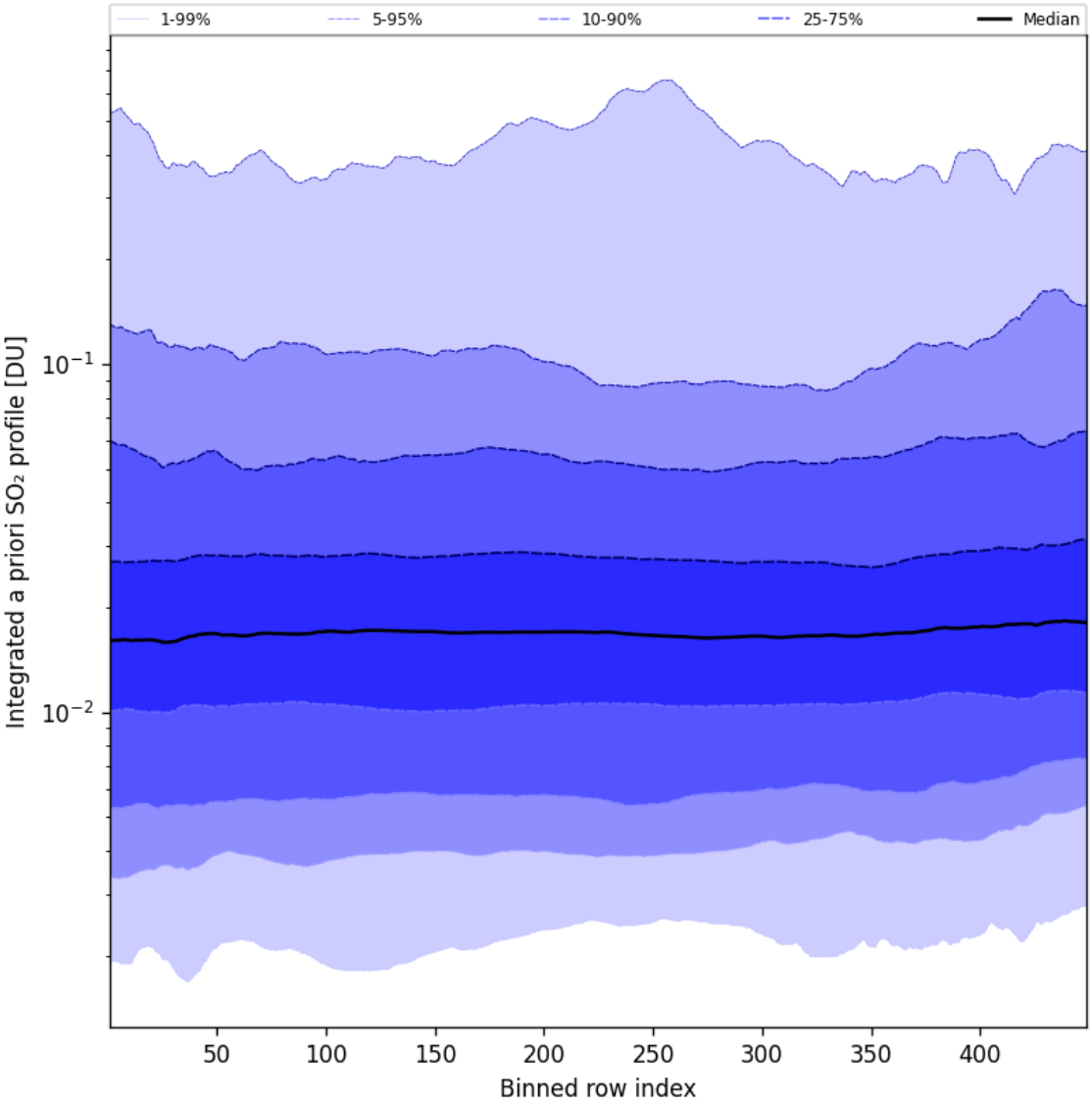

Figure 103: Along track statistics of “Integrated a priori SO_2 profile” for 2025-02-19 to 2025-02-20

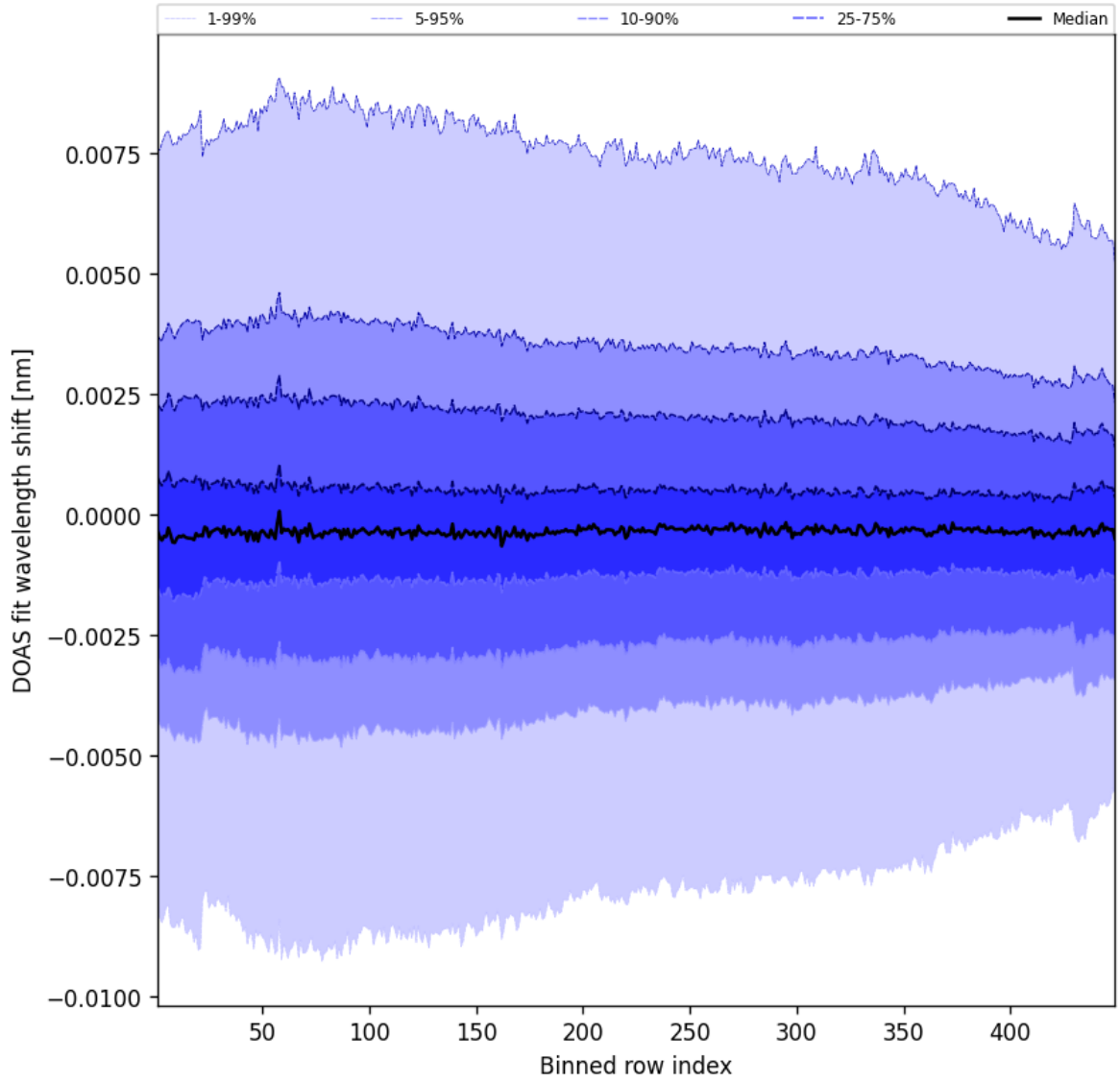

Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2025-02-19 to 2025-02-20

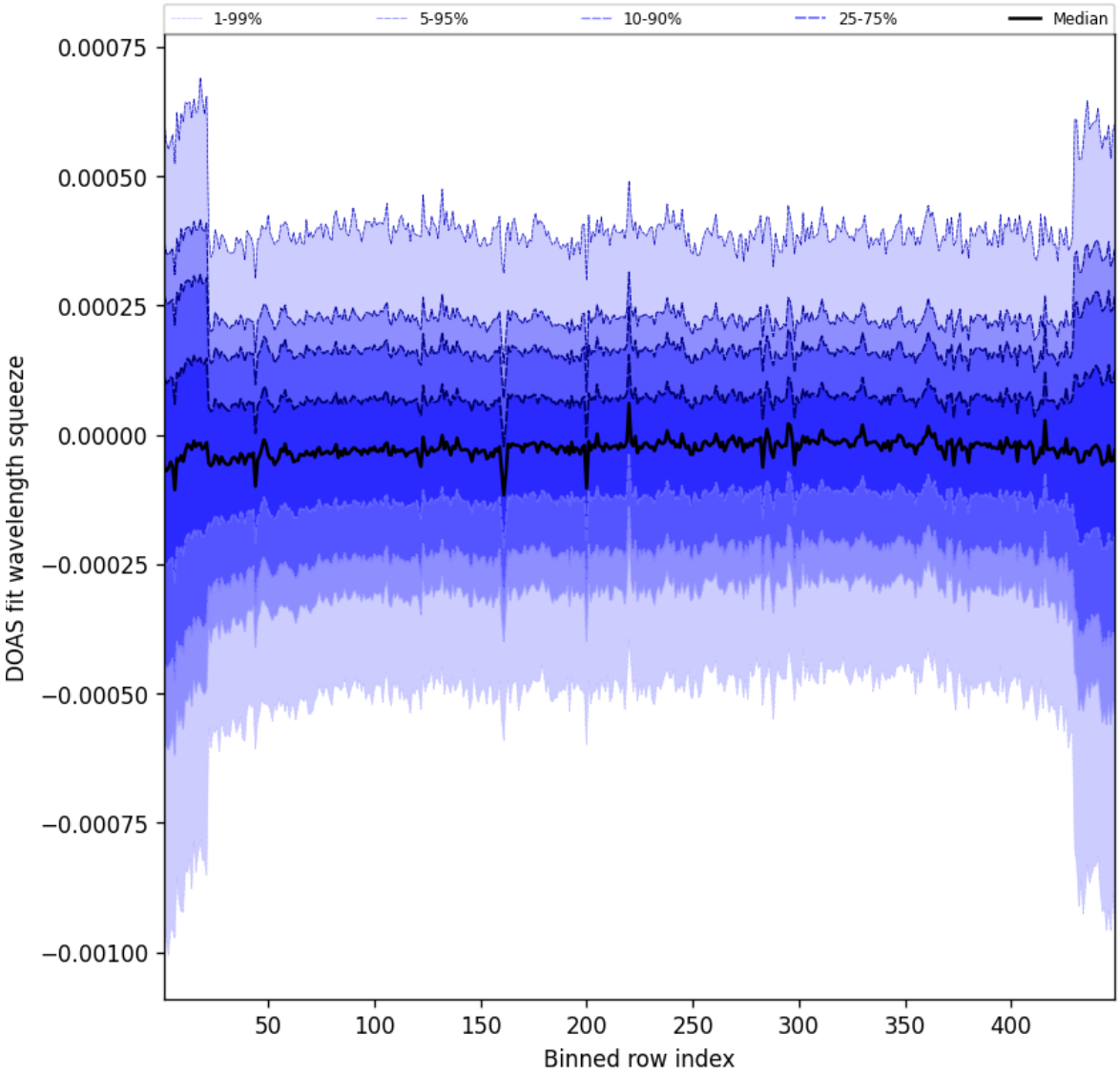

Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2025-02-19 to 2025-02-20

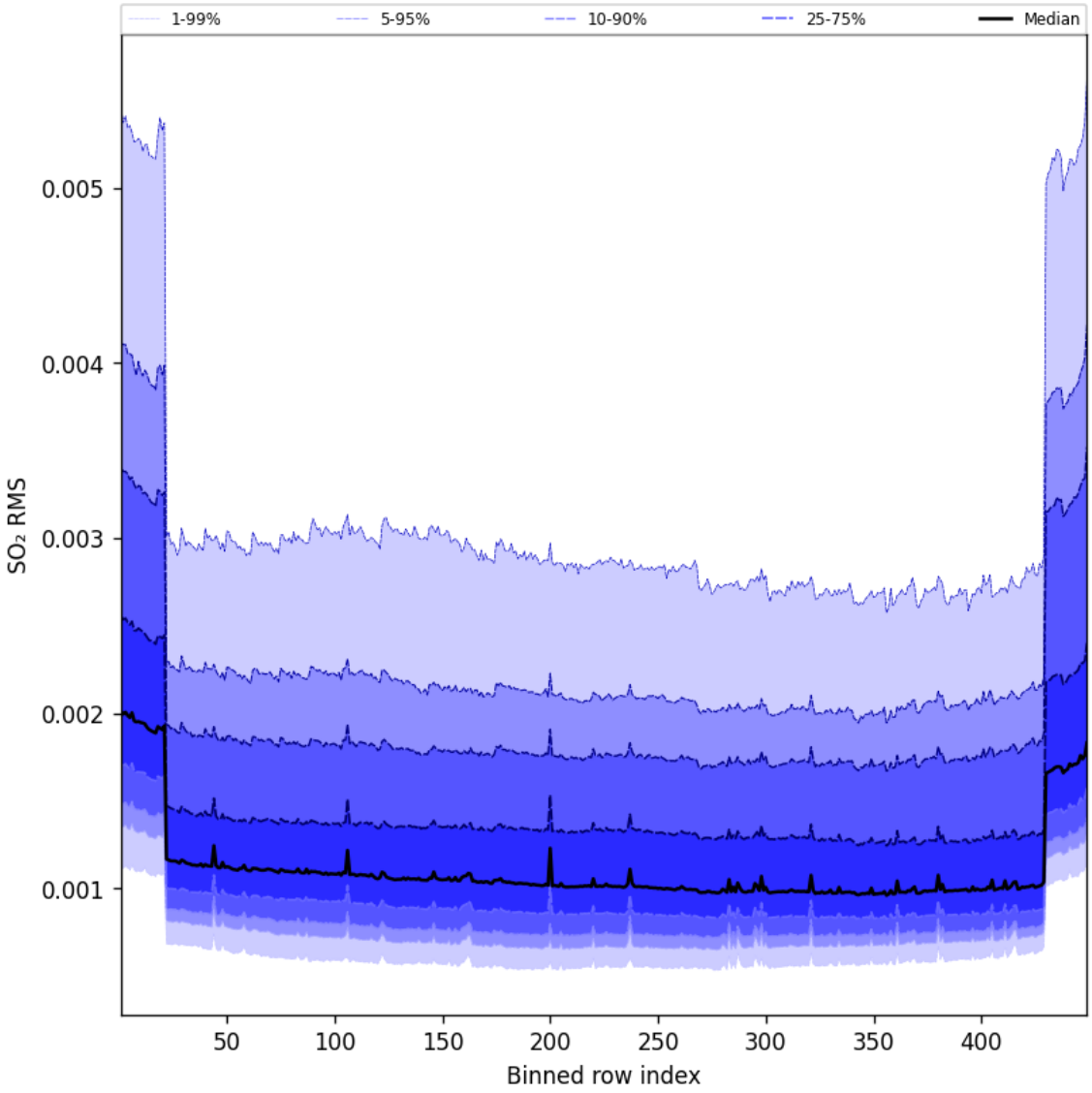

Figure 106: Along track statistics of "SO_2 RMS" for 2025-02-19 to 2025-02-20

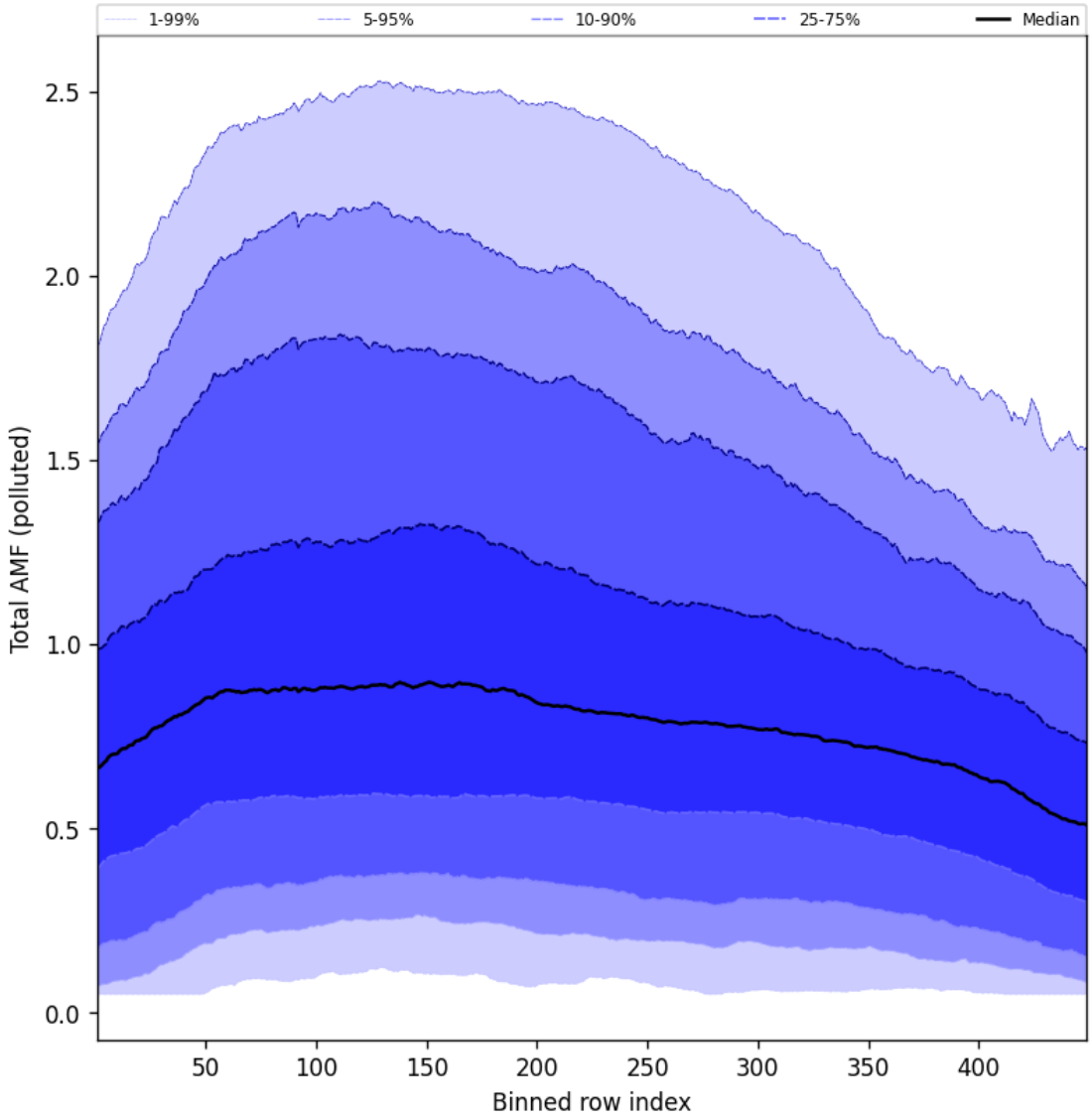

Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-02-19 to 2025-02-20

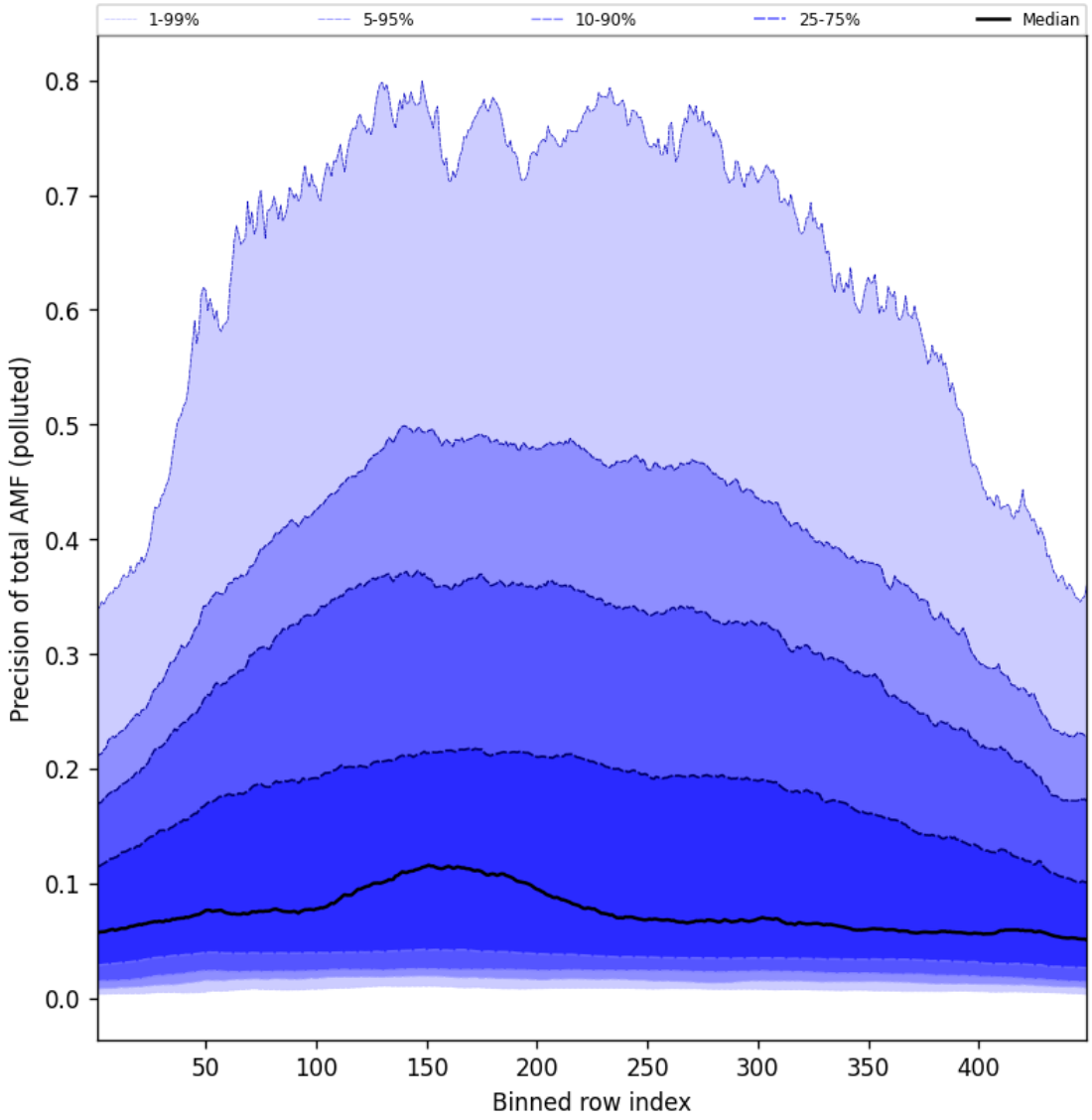

Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-02-19 to 2025-02-20

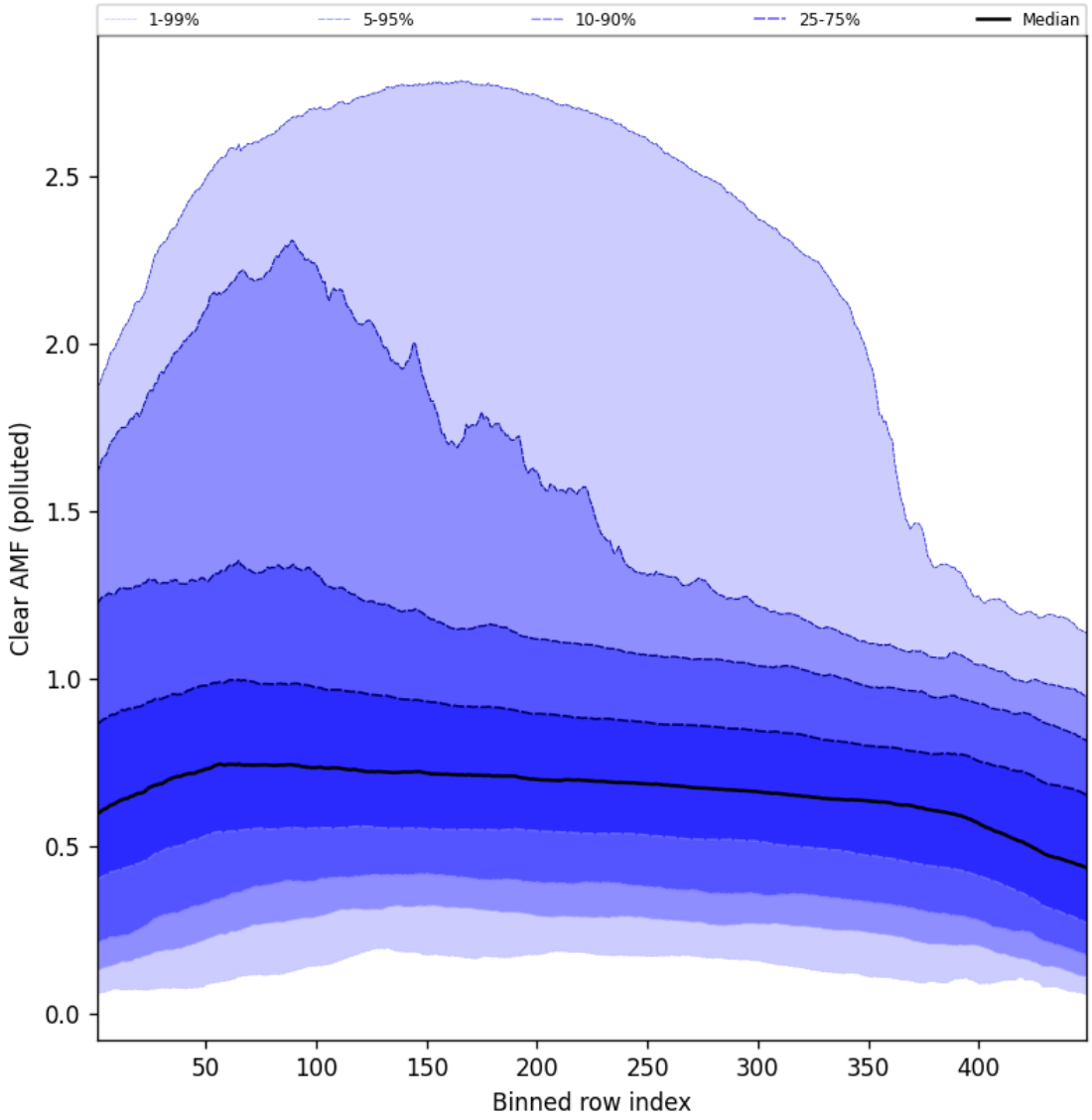

Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-02-19 to 2025-02-20

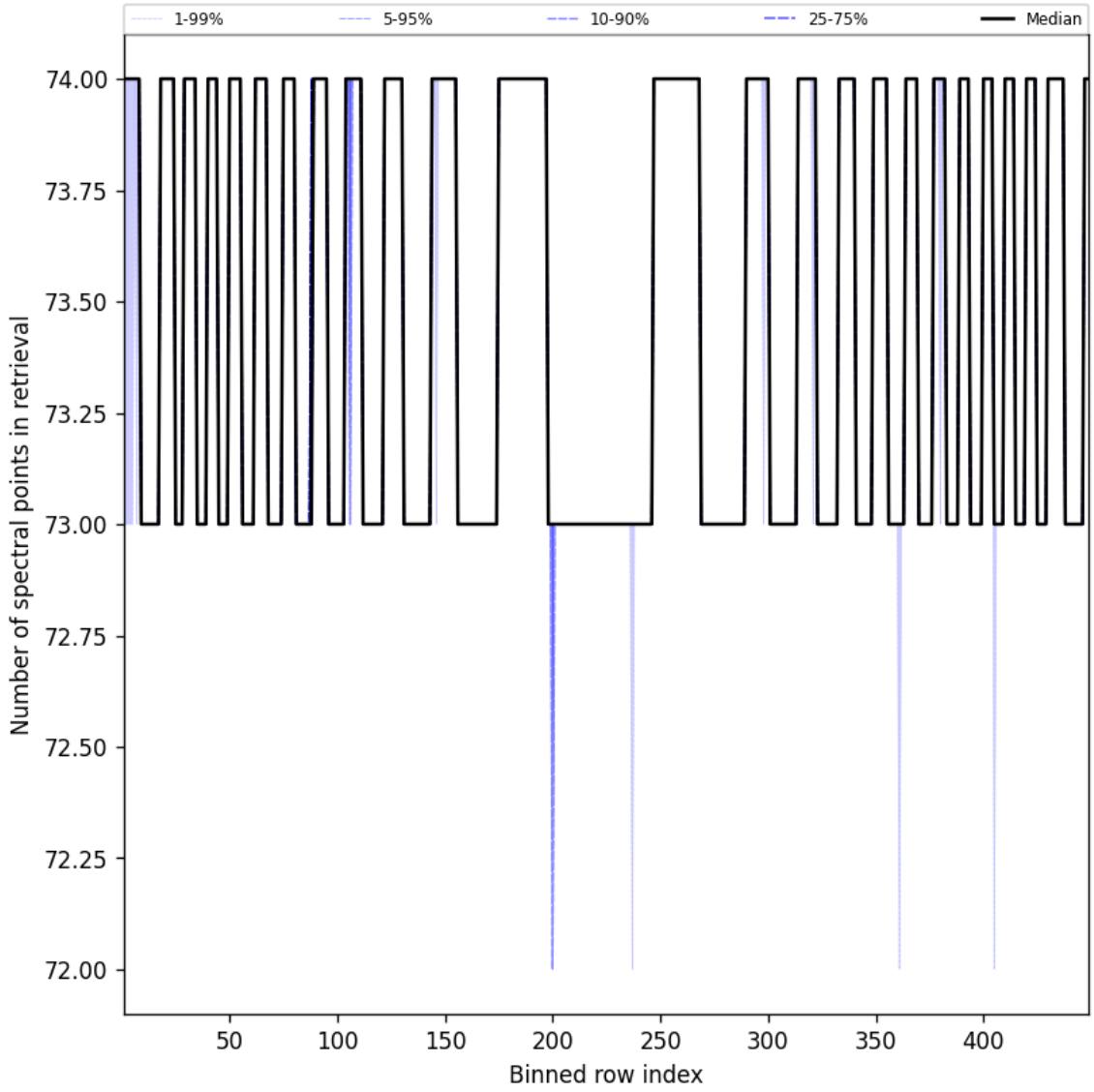

Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-02-19 to 2025-02-20

10 Coincidence density

To investigate the relation between parameters scatter density plots are produced. These include some 'hidden' parameters, latitude and the solar- and viewing geometries, in addition to all configured parameters. All combinations of pairs of parameters are included *once*, in one direction alone.

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11 Copyright information of 'PyCAMA'

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