

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:

$$\bar{x} = \frac{1}{N} \sum_{i=1}^N x_i \quad (1)$$

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 $\sigma(x) = \sqrt{V(x)}$.

$$V(x) = \frac{1}{N-1} \sum_{i=1}^N (x_i - \bar{x})^2 \quad (2)$$

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 :

$$P(x \leq m) = P(x \geq m) = \int_{-\infty}^m f(x) dx = \frac{1}{2} \quad (3)$$

with $f(x)$ the probability density function.

The median is a special case of a percentile. Instead of 1/2 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} .

$$C_{kl} = C(x_{(k)}, x_{(l)}) = \frac{1}{N-1} \sum_{i=1}^N (x_{(k),i} - \bar{x}_{(k)})(x_{(l),i} - \bar{x}_{(l)}) \quad (4)$$

Rather than a dimensionally dependent covariance, it is often easier to interpret a correlation matrix R_{kl} , a matrix of Pearson's r coefficients:

$$R_{kl} = R(x_{(k)}, x_{(l)}) = \frac{C_{kl}}{\sqrt{C_{kk}C_{ll}}} = \frac{C_{kl}}{\sqrt{V(x_{(k)})V(x_{(l)})}} \quad (5)$$

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]	0.626 ± 0.413	17325476	0.995	0.800	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(4.919 \pm 172.511) \times 10^{-2}$	17325476	0.235	0.417	9.851×10^{-3}	-219	288
sulfurdioxide total vertical column precision [DU]	0.606 ± 1.233	17325476	0.197	0.327	0.300	2.872×10^{-2}	97.2
sulfurdioxide slant column density corrected [DU]	$(1.945 \pm 43.280) \times 10^{-2}$	17325476	0.235	0.345	9.007×10^{-3}	-30.6	335
sulfurdioxide slant column density cobra [DU]	$(1.907 \pm 35.705) \times 10^{-2}$	17325476	0.235	0.345	9.007×10^{-3}	-30.6	44.6
sulfurdioxide slant column density cobra precision [DU]	0.281 ± 0.139	17325476	0.188	0.129	0.237	6.900×10^{-2}	15.5
sulfurdioxide slant column density window1 [DU]	0.126 ± 0.677	17325476	0.175	0.715	0.138	-25.6	93.7
sulfurdioxide slant column density window1 precision [DU]	0.281 ± 0.139	17325476	0.188	0.129	0.237	6.900×10^{-2}	15.5
sulfurdioxide slant column density corrected win1 [DU]	$(2.805 \pm 66.180) \times 10^{-2}$	17325476	2.500×10^{-2}	0.690	1.174×10^{-2}	-25.6	93.7
background so2 slant column offset window1 [DU]	$(-9.827 \pm 17.513) \times 10^{-2}$	17325476	-0.220	0.201	-0.139	-1.25	2.92
sulfurdioxide slant column density window2 [DU]	0.350 ± 8.819	17325476	-0.250	11.1	0.135	-975	1.053×10^3
sulfurdioxide slant column density window2 precision [DU]	7.89 ± 2.20	17325476	6.97	2.49	7.55	2.24	720
sulfurdioxide slant column density corrected win2 [DU]	0.342 ± 8.504	17325476	0.250	10.8	0.373	-973	1.053×10^3
background so2 slant column offset window2 [DU]	$(-8.433 \pm 2698.500) \times 10^{-3}$	17325476	1.75	2.98	0.872	-20.1	9.79
sulfurdioxide slant column density window3 [DU]	-3.86 ± 23.65	17325476	-5.04	29.7	-4.01	-1.310×10^3	454
sulfurdioxide slant column density window3 precision [DU]	27.6 ± 12.9	17325476	21.5	9.27	24.2	10.0	418
sulfurdioxide slant column density corrected win3 [DU]	-5.32 ± 22.62	17325476	-5.04	28.4	-5.37	-1.316×10^3	454
background so2 slant column offset window3 [DU]	-1.46 ± 7.10	17325476	2.80	11.1	-1.41	-24.7	36.2
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.21	17325476	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(4.020 \pm 13.314) \times 10^{-2}$	17325476	1.539×10^{-2}	1.770×10^{-2}	1.702×10^{-2}	3.366×10^{-4}	4.96
fitted radiance shift [nm]	$(-3.459 \pm 25.221) \times 10^{-4}$	17325476	-5.000×10^{-4}	1.752×10^{-3}	-3.555×10^{-4}	-4.309×10^{-2}	4.293×10^{-2}
fitted radiance squeeze [1]	$(-3.199 \pm 18.508) \times 10^{-5}$	17325476	-1.000×10^{-5}	2.050×10^{-4}	-2.419×10^{-5}	-1.606×10^{-2}	1.419×10^{-2}
fitted root mean square [1]	$(1.243 \pm 0.572) \times 10^{-3}$	17325476	9.250×10^{-4}	5.264×10^{-4}	1.071×10^{-3}	3.158×10^{-4}	4.982×10^{-2}
sulfurdioxide total air mass factor polluted [1]	0.890 ± 0.520	17325476	0.700	0.598	0.791	5.000×10^{-2}	3.06
sulfurdioxide total air mass factor polluted precision [1]	0.139 ± 0.153	17325476	3.500×10^{-2}	0.149	8.000×10^{-2}	2.500×10^{-3}	1.95
sulfurdioxide clear air mass factor polluted [1]	0.766 ± 0.475	17325476	0.700	0.394	0.684	1.573×10^{-2}	3.11
number of spectral points in retrieval [1]	73.4 ± 0.5	17325476	73.0	1.000	73.0	52.0	74.0

Table 2: Percentile ranges

Variable	1 %	5 %	10 %	15.9 %	25 %	75 %	84.1 %	90 %	95 %	99 %
qa value [1]	0.0	0.0	4.000×10^{-2}	0.1000	0.200	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	-3.27	-0.916	-0.518	-0.338	-0.195	0.222	0.380	0.585	1.07	4.02
sulfurdioxide total vertical column precision [DU]	8.614×10^{-2}	0.113	0.136	0.162	0.196	0.523	0.758	1.14	2.04	5.68
sulfurdioxide slant column density corrected [DU]	-0.837	-0.469	-0.337	-0.251	-0.162	0.183	0.278	0.373	0.526	1.03
sulfurdioxide slant column density cobra [DU]	-0.837	-0.469	-0.337	-0.251	-0.162	0.183	0.278	0.373	0.526	1.03
sulfurdioxide slant column density cobra precision [DU]	0.133	0.158	0.171	0.181	0.195	0.324	0.382	0.441	0.541	0.797
sulfurdioxide slant column density window1 [DU]	-1.73	-0.907	-0.613	-0.422	-0.225	0.489	0.672	0.847	1.12	1.91
sulfurdioxide slant column density window1 precision [DU]	0.133	0.158	0.171	0.181	0.195	0.324	0.382	0.441	0.541	0.797
sulfurdioxide slant column density corrected win1 [DU]	-1.64	-0.927	-0.675	-0.507	-0.330	0.360	0.550	0.738	1.04	1.93
background so2 slant column offset window1 [DU]	-0.368	-0.297	-0.269	-0.246	-0.218	-1.645×10^{-2}	6.409×10^{-2}	0.138	0.236	0.429
sulfurdioxide slant column density window2 [DU]	-20.0	-13.6	-10.4	-8.01	-5.33	5.77	8.66	11.3	15.0	23.0
sulfurdioxide slant column density window2 precision [DU]	4.24	5.07	5.57	5.97	6.45	8.95	9.81	10.7	11.9	14.5
sulfurdioxide slant column density corrected win2 [DU]	-20.4	-13.5	-10.2	-7.73	-5.02	5.73	8.40	10.8	14.0	20.9
background so2 slant column offset window2 [DU]	-8.24	-5.88	-4.05	-2.59	-1.16	1.83	2.11	2.33	2.67	4.40
sulfurdioxide slant column density window3 [DU]	-62.4	-42.4	-33.0	-26.2	-18.7	11.0	18.8	25.8	35.2	53.8
sulfurdioxide slant column density window3 precision [DU]	14.3	16.4	17.9	19.1	20.6	29.9	34.4	40.0	51.7	83.4
sulfurdioxide slant column density corrected win3 [DU]	-61.8	-42.3	-33.1	-26.6	-19.5	8.93	16.2	22.8	31.8	49.8
background so2 slant column offset window3 [DU]	-15.0	-12.7	-11.1	-9.35	-7.02	4.06	6.26	7.97	9.87	13.0
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]	2.090×10^{-3}	4.027×10^{-3}	6.030×10^{-3}	7.915×10^{-3}	1.046×10^{-2}	2.816×10^{-2}	3.966×10^{-2}	6.014×10^{-2}	0.119	0.485
fitted radiance shift [nm]	-7.944×10^{-3}	-4.008×10^{-3}	-2.659×10^{-3}	-1.904×10^{-3}	-1.269×10^{-3}	4.829×10^{-4}	1.164×10^{-3}	2.022×10^{-3}	3.509×10^{-3}	7.622×10^{-3}
fitted radiance squeeze [1]	-5.593×10^{-4}	-3.314×10^{-4}	-2.449×10^{-4}	-1.880×10^{-4}	-1.298×10^{-4}	7.524×10^{-5}	1.258×10^{-4}	1.729×10^{-4}	2.425×10^{-4}	4.190×10^{-4}
fitted root mean square [1]	5.736×10^{-4}	7.012×10^{-4}	7.720×10^{-4}	8.259×10^{-4}	8.915×10^{-4}	1.418×10^{-3}	1.667×10^{-3}	1.920×10^{-3}	2.338×10^{-3}	3.402×10^{-3}
sulfurdioxide total air mass factor polluted [1]	6.442×10^{-2}	0.199	0.322	0.416	0.533	1.13	1.37	1.61	1.95	2.52
sulfurdioxide total air mass factor polluted precision [1]	7.678×10^{-3}	1.677×10^{-2}	2.352×10^{-2}	2.946×10^{-2}	3.751×10^{-2}	0.187	0.256	0.331	0.447	0.716
sulfurdioxide clear air mass factor polluted [1]	0.134	0.250	0.337	0.408	0.495	0.888	1.01	1.14	1.74	2.77
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]	0.668 ± 0.405	7182615	0.770	1.000	0.0	1.000	0.230	1.000
sulfurdioxide total vertical column [DU]	$(9.593 \pm 258.934) \times 10^{-2}$	7182615	0.592	1.575×10^{-2}	-219	288	-0.271	0.322
sulfurdioxide total vertical column precision [DU]	0.967 ± 1.790	7182615	0.635	0.408	4.070×10^{-2}	97.2	0.262	0.897
sulfurdioxide slant column density corrected [DU]	$(2.931 \pm 57.184) \times 10^{-2}$	7182615	0.391	1.196×10^{-2}	-14.0	335	-0.181	0.210
sulfurdioxide slant column density cobra [DU]	$(2.847 \pm 43.351) \times 10^{-2}$	7182615	0.391	1.196×10^{-2}	-14.0	44.6	-0.181	0.210
sulfurdioxide slant column density cobra precision [DU]	0.326 ± 0.172	7182615	0.181	0.271	8.422×10^{-2}	15.4	0.211	0.393
sulfurdioxide slant column density window1 [DU]	0.180 ± 0.798	7182615	0.790	0.193	-25.6	57.9	-0.206	0.584
sulfurdioxide slant column density window1 precision [DU]	0.326 ± 0.172	7182615	0.181	0.271	8.422×10^{-2}	15.4	0.211	0.393
sulfurdioxide slant column density corrected win1 [DU]	$(5.267 \pm 78.978) \times 10^{-2}$	7182615	0.779	2.631×10^{-2}	-25.6	57.8	-0.355	0.423
background so2 slant column offset window1 [DU]	-0.127 ± 0.183	7182615	0.181	-0.161	-1.16	2.92	-0.243	-6.113×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.19 ± 9.60	7182615	12.2	0.815	-494	390	-5.11	7.07
sulfurdioxide slant column density window2 precision [DU]	8.45 ± 2.28	7182615	2.75	8.11	2.28	427	6.90	9.65
sulfurdioxide slant column density corrected win2 [DU]	0.283 ± 9.094	7182615	11.6	0.303	-498	393	-5.49	6.07
background so2 slant column offset window2 [DU]	-0.908 ± 3.378	7182615	5.12	0.469	-20.1	9.79	-3.42	1.69
sulfurdioxide slant column density window3 [DU]	-6.93 ± 24.57	7182615	31.2	-6.62	-189	454	-22.4	8.87
sulfurdioxide slant column density window3 precision [DU]	29.2 ± 13.0	7182615	9.37	25.9	10.2	237	22.2	31.6
sulfurdioxide slant column density corrected win3 [DU]	-5.57 ± 23.88	7182615	30.2	-5.37	-181	454	-20.5	9.65
background so2 slant column offset window3 [DU]	1.36 ± 6.18	7182615	10.3	1.18	-21.6	36.2	-3.89	6.37
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.24	7182615	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(6.954 \pm 20.049) \times 10^{-2}$	7182615	3.751×10^{-2}	2.218×10^{-2}	3.821×10^{-4}	4.96	1.224×10^{-2}	4.975×10^{-2}
fitted radiance shift [nm]	$(-1.849 \pm 25.310) \times 10^{-4}$	7182615	1.654×10^{-3}	-1.881×10^{-4}	-4.309×10^{-2}	3.929×10^{-2}	-1.032×10^{-3}	6.210×10^{-4}
fitted radiance squeeze [1]	$(-9.872 \pm 2102.278) \times 10^{-7}$	7182615	2.168×10^{-4}	6.780×10^{-6}	-5.285×10^{-3}	9.968×10^{-3}	-1.027×10^{-4}	1.141×10^{-4}
fitted root mean square [1]	$(1.421 \pm 0.714) \times 10^{-3}$	7182615	7.401×10^{-4}	1.178×10^{-3}	3.514×10^{-4}	2.957×10^{-2}	9.552×10^{-4}	1.695×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.704 ± 0.411	7182615	0.489	0.666	5.000×10^{-2}	2.72	0.412	0.901
sulfurdioxide total air mass factor polluted precision [1]	0.107 ± 0.151	7182615	9.959×10^{-2}	4.910×10^{-2}	2.500×10^{-3}	1.95	2.902×10^{-2}	0.129
sulfurdioxide clear air mass factor polluted [1]	0.595 ± 0.285	7182615	0.424	0.590	1.573×10^{-2}	2.25	0.365	0.789
number of spectral points in retrieval [1]	73.4 ± 0.5	7182615	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]	0.597 ± 0.417	10142861	0.830	0.490	0.0	1.000	0.170	1.000
sulfurdioxide total vertical column [DU]	$(1.609 \pm 57.697) \times 10^{-2}$	10142861	0.339	7.251×10^{-3}	-36.8	63.2	-0.161	0.178
sulfurdioxide total vertical column precision [DU]	0.350 ± 0.411	10142861	0.229	0.246	2.872×10^{-2}	24.0	0.171	0.400
sulfurdioxide slant column density corrected [DU]	$(1.247 \pm 29.713) \times 10^{-2}$	10142861	0.318	7.283×10^{-3}	-30.6	92.7	-0.150	0.167
sulfurdioxide slant column density cobra [DU]	$(1.242 \pm 29.080) \times 10^{-2}$	10142861	0.318	7.283×10^{-3}	-30.6	22.4	-0.150	0.167
sulfurdioxide slant column density cobra precision [DU]	0.249 ± 0.097	10142861	9.703×10^{-2}	0.221	6.900×10^{-2}	15.5	0.187	0.284
sulfurdioxide slant column density window1 [DU]	$(8.862 \pm 57.428) \times 10^{-2}$	10142861	0.666	0.105	-25.4	93.7	-0.236	0.430
sulfurdioxide slant column density window1 precision [DU]	0.249 ± 0.097	10142861	9.703×10^{-2}	0.221	6.900×10^{-2}	15.5	0.187	0.284
sulfurdioxide slant column density corrected win1 [DU]	$(1.061 \pm 55.290) \times 10^{-2}$	10142861	0.637	3.122×10^{-3}	-25.4	93.7	-0.314	0.323
background so2 slant column offset window1 [DU]	$(-7.801 \pm 16.651) \times 10^{-2}$	10142861	0.220	-0.126	-1.25	1.51	-0.200	1.987×10^{-2}
sulfurdioxide slant column density window2 [DU]	-0.245 ± 8.166	10142861	10.4	-0.281	-975	1.053×10^3	-5.47	4.95
sulfurdioxide slant column density window2 precision [DU]	7.50 ± 2.05	10142861	2.20	7.21	2.24	720	6.22	8.42
sulfurdioxide slant column density corrected win2 [DU]	0.383 ± 8.060	10142861	10.2	0.417	-973	1.053×10^3	-4.72	5.52
background so2 slant column offset window2 [DU]	0.629 ± 1.838	10142861	2.35	1.11	-8.59	9.26	-0.443	1.90
sulfurdioxide slant column density window3 [DU]	-1.69 ± 22.72	10142861	28.7	-2.32	-1.310×10^3	249	-16.3	12.4
sulfurdioxide slant column density window3 precision [DU]	26.6 ± 12.7	10142861	8.55	23.0	10.0	418	19.8	28.3
sulfurdioxide slant column density corrected win3 [DU]	-5.15 ± 21.69	10142861	27.3	-5.37	-1.316×10^3	239	-18.8	8.45
background so2 slant column offset window3 [DU]	-3.46 ± 7.03	10142861	11.8	-3.65	-24.7	19.3	-9.55	2.23
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.18	10142861	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(1.943 \pm 2.783) \times 10^{-2}$	10142861	1.260×10^{-2}	1.520×10^{-2}	3.366×10^{-4}	1.19	9.667×10^{-3}	2.227×10^{-2}
fitted radiance shift [nm]	$(-4.598 \pm 25.095) \times 10^{-4}$	10142861	1.768×10^{-3}	-4.856×10^{-4}	-4.007×10^{-2}	4.293×10^{-2}	-1.401×10^{-3}	3.674×10^{-4}
fitted radiance squeeze [1]	$(-5.395 \pm 16.140) \times 10^{-5}$	10142861	1.943×10^{-4}	-4.373×10^{-5}	-1.606×10^{-2}	1.419×10^{-2}	-1.454×10^{-4}	4.884×10^{-5}
fitted root mean square [1]	$(1.117 \pm 0.399) \times 10^{-3}$	10142861	4.207×10^{-4}	1.012×10^{-3}	3.158×10^{-4}	4.982×10^{-2}	8.595×10^{-4}	1.280×10^{-3}
sulfurdioxide total air mass factor polluted [1]	1.02 ± 0.55	10142861	0.669	0.908	5.000×10^{-2}	3.06	0.629	1.30
sulfurdioxide total air mass factor polluted precision [1]	0.161 ± 0.151	10142861	0.176	0.112	4.664×10^{-3}	1.70	4.771×10^{-2}	0.223
sulfurdioxide clear air mass factor polluted [1]	0.888 ± 0.540	10142861	0.403	0.737	0.166	3.11	0.569	0.972
number of spectral points in retrieval [1]	73.4 ± 0.5	10142861	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]	0.667 ± 0.403	12438517	0.760	1.000	0.0	1.000	0.240	1.000
sulfurdioxide total vertical column [DU]	$(3.164 \pm 125.333) \times 10^{-2}$	12438517	0.404	8.855×10^{-3}	-186	288	-0.191	0.213
sulfurdioxide total vertical column precision [DU]	0.506 ± 0.916	12438517	0.274	0.288	4.794×10^{-2}	97.2	0.199	0.473
sulfurdioxide slant column density corrected [DU]	$(1.489 \pm 33.610) \times 10^{-2}$	12438517	0.329	7.788×10^{-3}	-14.0	335	-0.155	0.173
sulfurdioxide slant column density cobra [DU]	$(1.481 \pm 31.979) \times 10^{-2}$	12438517	0.329	7.788×10^{-3}	-14.0	14.1	-0.155	0.173
sulfurdioxide slant column density cobra precision [DU]	0.266 ± 0.126	12438517	0.110	0.225	8.368×10^{-2}	15.5	0.190	0.301
sulfurdioxide slant column density window1 [DU]	0.128 ± 0.624	12438517	0.679	0.139	-17.8	33.7	-0.205	0.474
sulfurdioxide slant column density window1 precision [DU]	0.266 ± 0.126	12438517	0.110	0.225	8.368×10^{-2}	15.5	0.190	0.301
sulfurdioxide slant column density corrected win1 [DU]	$(1.576 \pm 61.090) \times 10^{-2}$	12438517	0.659	4.882×10^{-3}	-17.8	33.6	-0.322	0.337
background so2 slant column offset window1 [DU]	-0.113 ± 0.153	12438517	0.184	-0.142	-1.09	2.54	-0.219	-3.495×10^{-2}
sulfurdioxide slant column density window2 [DU]	-0.105 ± 8.495	12438517	10.7	-0.263	-618	1.053×10^3	-5.58	5.16
sulfurdioxide slant column density window2 precision [DU]	7.72 ± 2.08	12438517	2.38	7.40	2.24	720	6.35	8.73
sulfurdioxide slant column density corrected win2 [DU]	0.302 ± 8.303	12438517	10.6	0.337	-617	1.053×10^3	-4.96	5.60
background so2 slant column offset window2 [DU]	0.407 ± 2.312	12438517	2.37	1.07	-20.1	9.79	-0.489	1.88
sulfurdioxide slant column density window3 [DU]	-0.991 ± 23.338	12438517	29.5	-1.30	-1.310×10^3	249	-15.8	13.7
sulfurdioxide slant column density window3 precision [DU]	27.1 ± 12.3	12438517	8.98	23.8	10.0	418	20.4	29.4
sulfurdioxide slant column density corrected win3 [DU]	-3.38 ± 22.23	12438517	28.2	-3.67	-1.316×10^3	239	-17.5	10.6
background so2 slant column offset window3 [DU]	-2.39 ± 6.61	12438517	9.98	-2.36	-24.7	35.8	-7.43	2.54
sulfurdioxide slant column cobra flag [1]	1.99 ± 0.13	12438517	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.460 \pm 5.180) \times 10^{-2}$	12438517	1.398×10^{-2}	1.658×10^{-2}	5.732×10^{-4}	4.58	1.094×10^{-2}	2.491×10^{-2}
fitted radiance shift [nm]	$(-3.177 \pm 23.997) \times 10^{-4}$	12438517	1.757×10^{-3}	-3.051×10^{-4}	-3.373×10^{-2}	3.929×10^{-2}	-1.230×10^{-3}	5.277×10^{-4}
fitted radiance squeeze [1]	$(-3.465 \pm 17.388) \times 10^{-5}$	12438517	1.940×10^{-4}	-2.525×10^{-5}	-1.428×10^{-2}	1.213×10^{-2}	-1.253×10^{-4}	6.874×10^{-5}
fitted root mean square [1]	$(1.176 \pm 0.522) \times 10^{-3}$	12438517	4.396×10^{-4}	1.022×10^{-3}	3.158×10^{-4}	4.390×10^{-2}	8.698×10^{-4}	1.309×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.855 ± 0.414	12438517	0.511	0.802	5.000×10^{-2}	2.58	0.570	1.08
sulfurdioxide total air mass factor polluted precision [1]	0.126 ± 0.123	12438517	0.133	7.757×10^{-2}	2.500×10^{-3}	1.35	4.035×10^{-2}	0.174
sulfurdioxide clear air mass factor polluted [1]	0.711 ± 0.271	12438517	0.335	0.692	3.037×10^{-2}	2.63	0.528	0.863
number of spectral points in retrieval [1]	73.4 ± 0.5	12438517	1.000	73.0	71.0	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]	0.531 ± 0.424	4043575	0.900	0.490	0.0	1.000	0.1000	1.000
sulfurdioxide total vertical column [DU]	$(7.615 \pm 232.302) \times 10^{-2}$	4043575	0.425	1.058×10^{-2}	-162	248	-0.194	0.231
sulfurdioxide total vertical column precision [DU]	0.751 ± 1.610	4043575	0.476	0.325	2.872×10^{-2}	64.9	0.166	0.642
sulfurdioxide slant column density corrected [DU]	$(2.731 \pm 62.378) \times 10^{-2}$	4043575	0.384	1.126×10^{-2}	-30.6	300	-0.178	0.206
sulfurdioxide slant column density cobra [DU]	$(2.608 \pm 41.705) \times 10^{-2}$	4043575	0.384	1.126×10^{-2}	-30.6	44.6	-0.178	0.206
sulfurdioxide slant column density cobra precision [DU]	0.308 ± 0.147	4043575	0.145	0.271	6.900×10^{-2}	15.2	0.216	0.360
sulfurdioxide slant column density window1 [DU]	0.112 ± 0.763	4043575	0.810	0.127	-25.6	93.7	-0.290	0.520
sulfurdioxide slant column density window1 precision [DU]	0.308 ± 0.147	4043575	0.145	0.271	6.900×10^{-2}	15.2	0.216	0.360
sulfurdioxide slant column density corrected win1 [DU]	$(5.039 \pm 73.841) \times 10^{-2}$	4043575	0.765	2.787×10^{-2}	-25.6	93.7	-0.350	0.416
background so2 slant column offset window1 [DU]	$(-6.148 \pm 21.406) \times 10^{-2}$	4043575	0.279	-0.131	-1.25	2.55	-0.217	6.173×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.23 ± 9.28	4043575	11.8	1.08	-831	712	-4.73	7.03
sulfurdioxide slant column density window2 precision [DU]	8.24 ± 2.35	4043575	2.59	7.88	2.33	379	6.74	9.33
sulfurdioxide slant column density corrected win2 [DU]	0.389 ± 8.870	4043575	11.2	0.439	-830	714	-5.17	6.00
background so2 slant column offset window2 [DU]	-0.840 ± 3.077	4043575	4.65	-3.370×10^{-2}	-20.1	9.79	-2.96	1.69
sulfurdioxide slant column density window3 [DU]	-11.1 ± 22.6	4043575	28.3	-10.8	-404	454	-25.1	3.20
sulfurdioxide slant column density window3 precision [DU]	28.7 ± 14.2	4043575	9.51	25.1	10.6	237	20.9	30.5
sulfurdioxide slant column density corrected win3 [DU]	-10.4 ± 22.7	4043575	28.3	-9.90	-409	454	-24.3	3.99
background so2 slant column offset window3 [DU]	0.645 ± 7.711	4043575	12.8	2.17	-24.7	36.2	-5.87	6.97
sulfurdioxide slant column cobra flag [1]	1.94 ± 0.32	4043575	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(7.346 \pm 21.866) \times 10^{-2}$	4043575	4.164×10^{-2}	1.825×10^{-2}	3.529×10^{-4}	4.96	7.982×10^{-3}	4.962×10^{-2}
fitted radiance shift [nm]	$(-4.334 \pm 28.070) \times 10^{-4}$	4043575	1.647×10^{-3}	-5.149×10^{-4}	-4.309×10^{-2}	4.293×10^{-2}	-1.341×10^{-3}	3.061×10^{-4}
fitted radiance squeeze [1]	$(-3.119 \pm 20.454) \times 10^{-5}$	4043575	2.367×10^{-4}	-2.596×10^{-5}	-1.606×10^{-2}	1.419×10^{-2}	-1.483×10^{-4}	8.835×10^{-5}
fitted root mean square [1]	$(1.371 \pm 0.593) \times 10^{-3}$	4043575	5.998×10^{-4}	1.228×10^{-3}	3.256×10^{-4}	4.982×10^{-2}	9.889×10^{-4}	1.589×10^{-3}
sulfurdioxide total air mass factor polluted [1]	1.04 ± 0.74	4043575	1.08	0.778	5.000×10^{-2}	3.06	0.475	1.55
sulfurdioxide total air mass factor polluted precision [1]	0.180 ± 0.213	4043575	0.216	0.104	2.500×10^{-3}	1.95	3.062×10^{-2}	0.246
sulfurdioxide clear air mass factor polluted [1]	0.981 ± 0.805	4043575	0.763	0.680	1.580×10^{-2}	3.11	0.415	1.18
number of spectral points in retrieval [1]	73.4 ± 0.5	4043575	1.000	73.0	52.0	74.0	73.0	74.0

3 Granule outlines

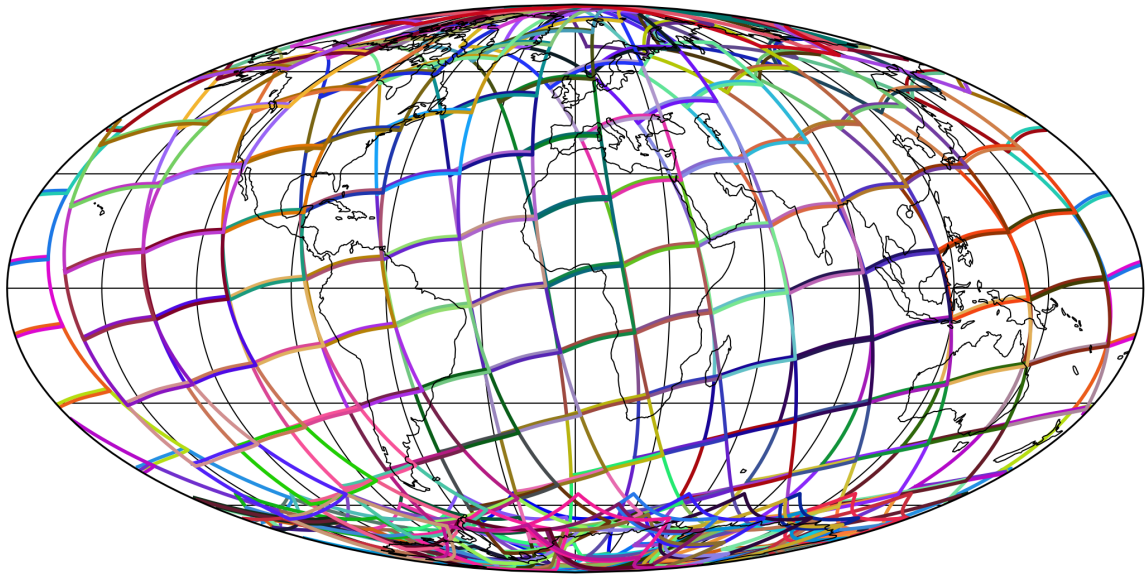


Figure 1: Outline of the granules.

4 Input data monitoring

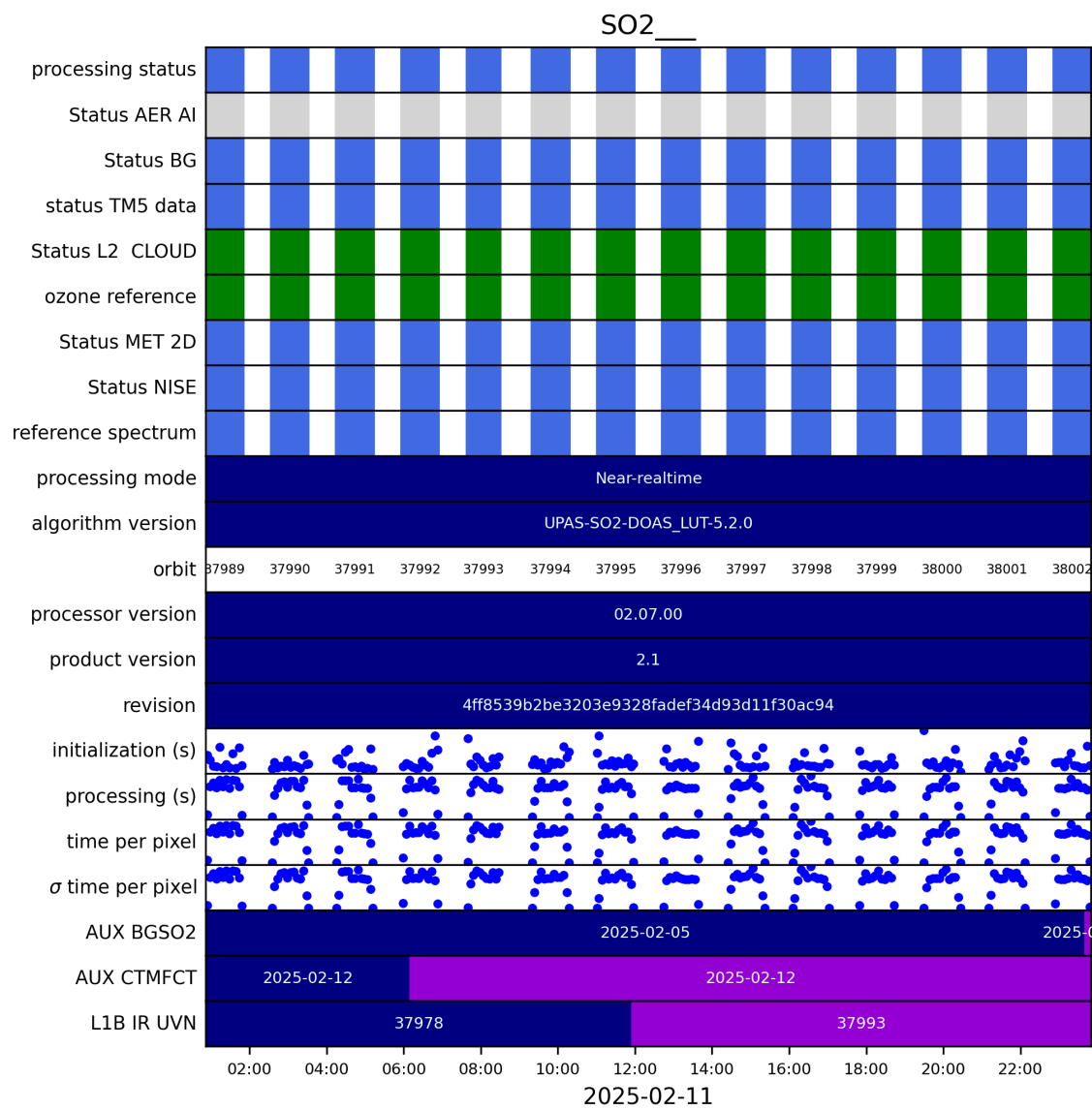


Figure 2: Input data per granule

5 Warnings and errors

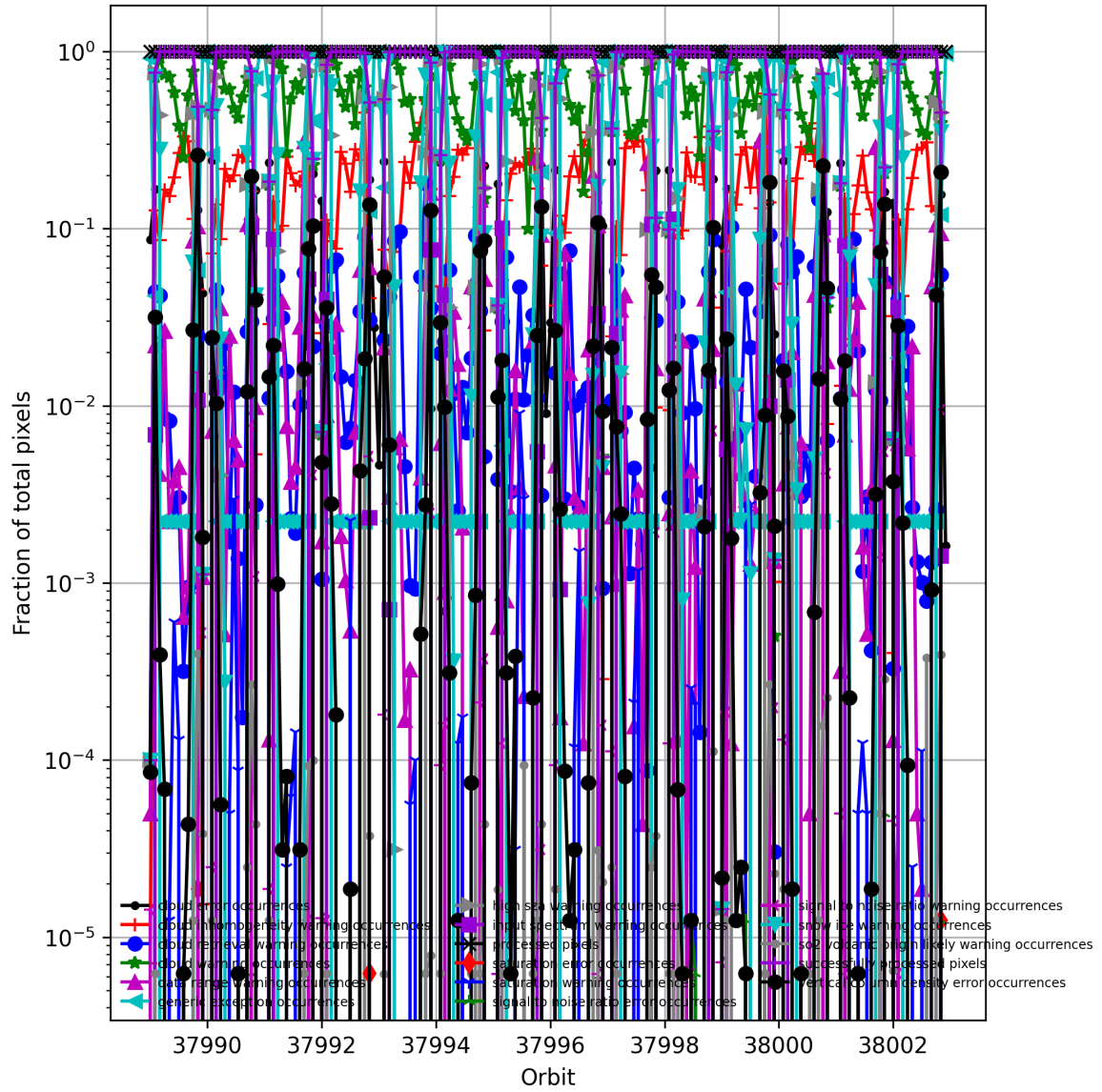


Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

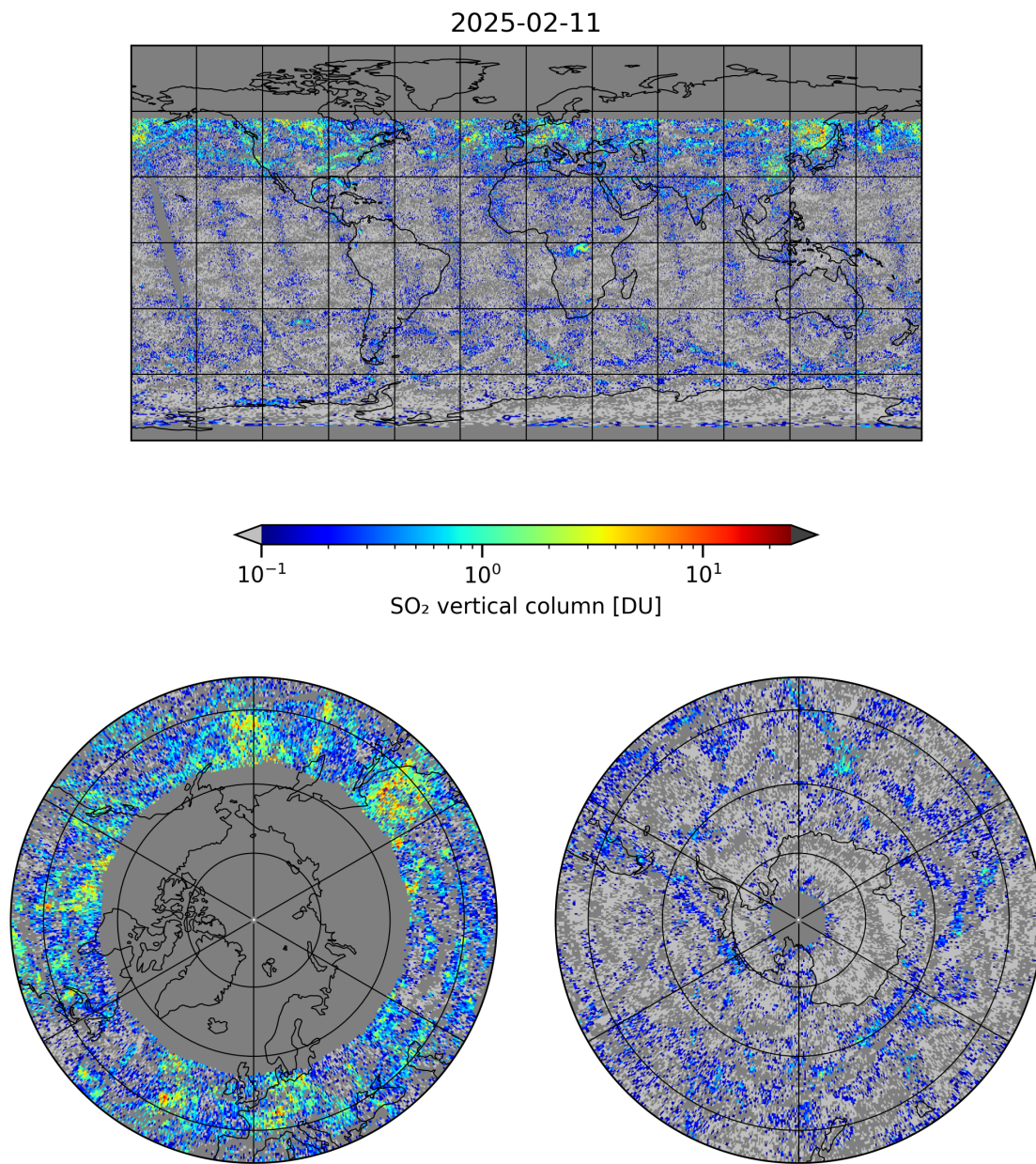


Figure 4: Map of “SO₂ vertical column” for 2025-02-11 to 2025-02-11

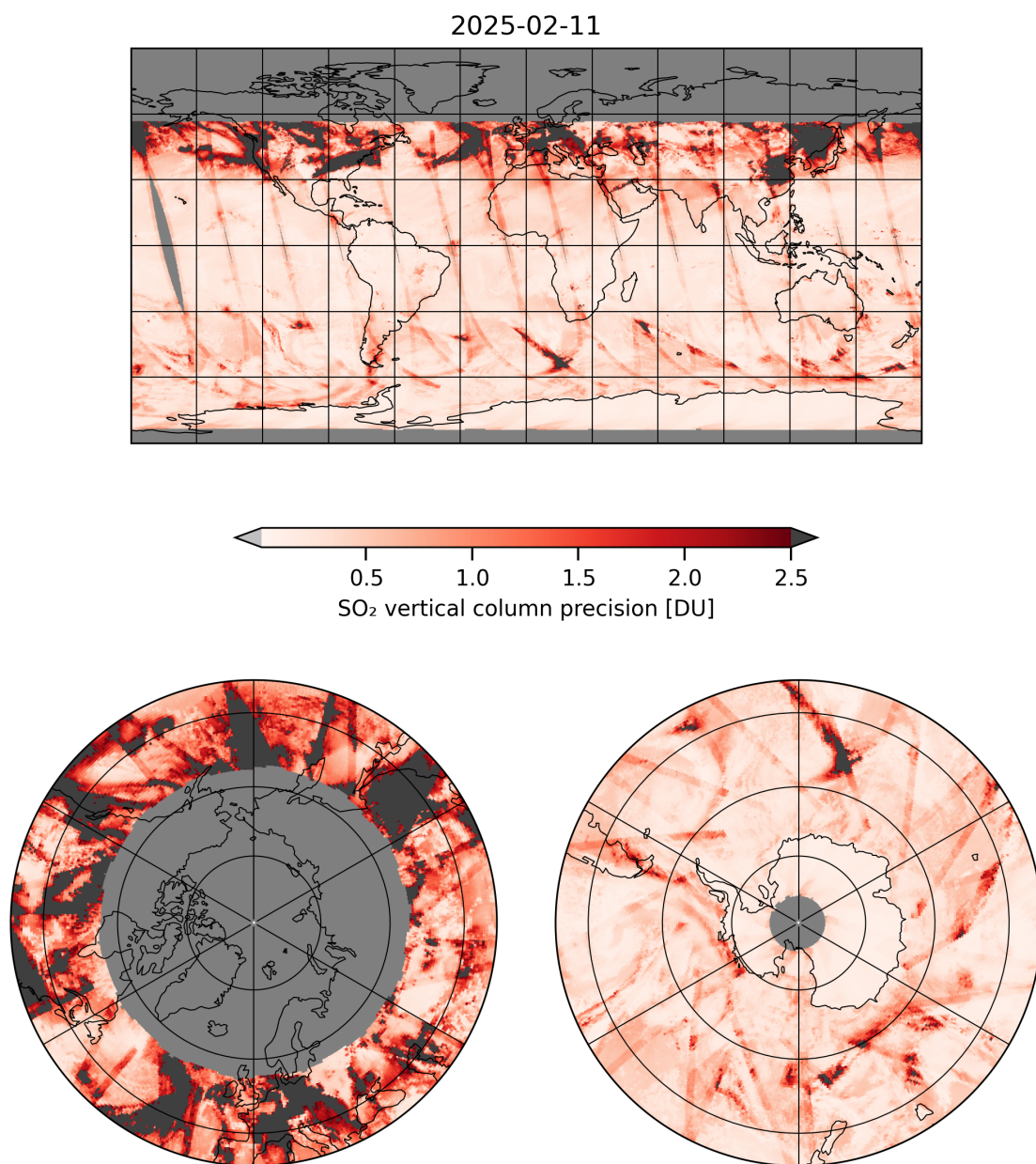


Figure 5: Map of “SO₂ vertical column precision” for 2025-02-11 to 2025-02-11

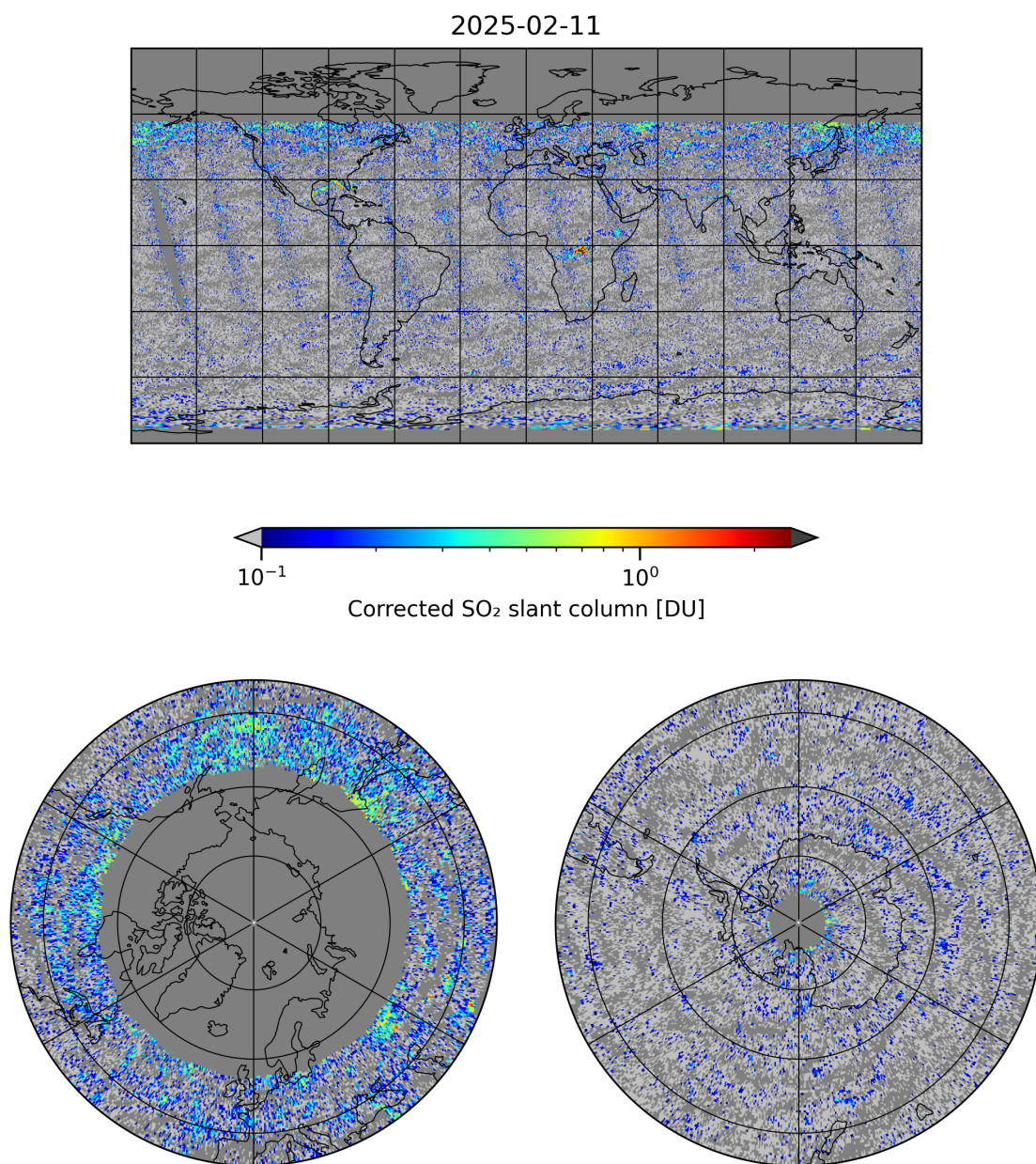


Figure 6: Map of “Corrected SO₂ slant column” for 2025-02-11 to 2025-02-11

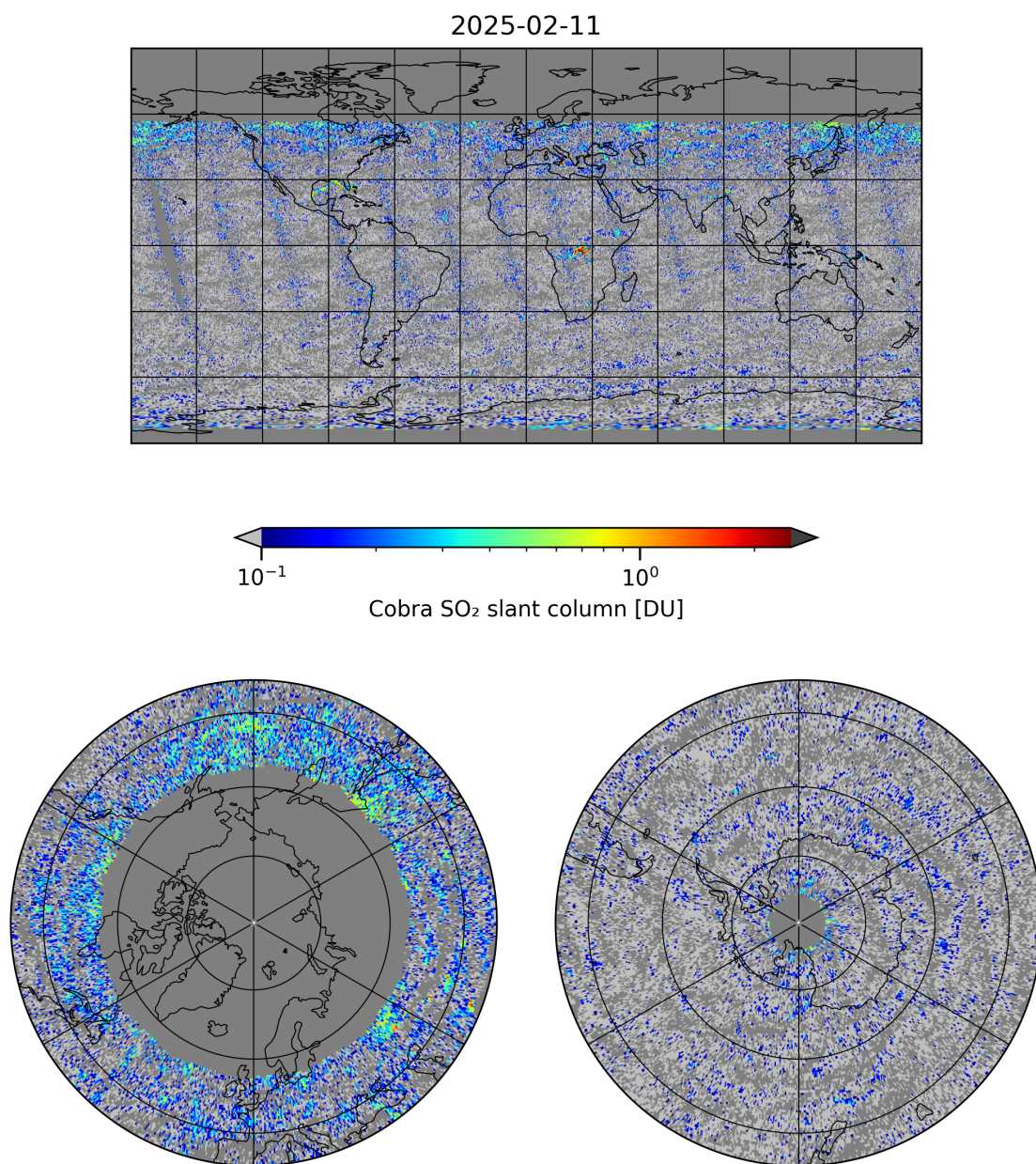


Figure 7: Map of “Cobra SO₂ slant column” for 2025-02-11 to 2025-02-11

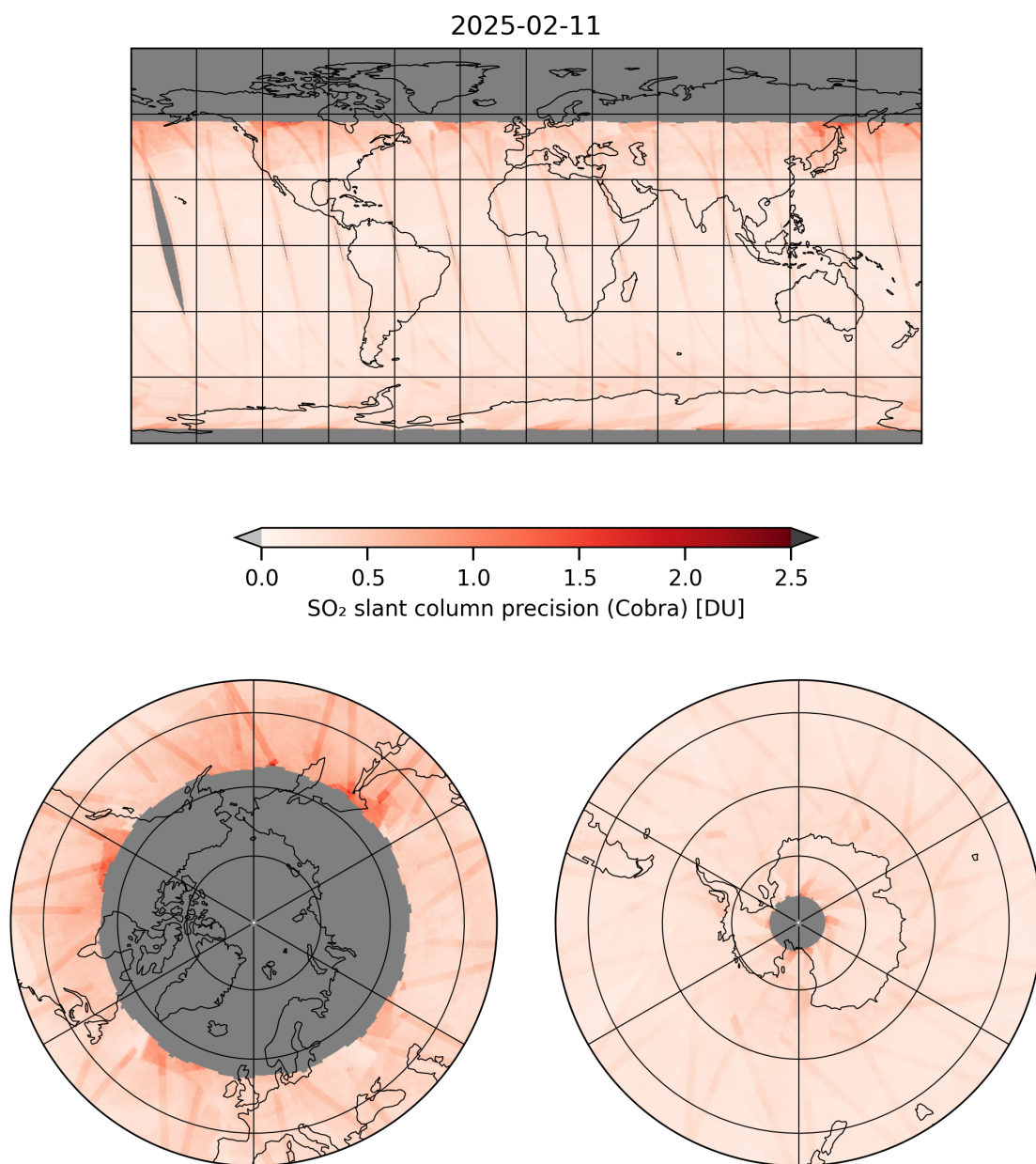


Figure 8: Map of “SO₂ slant column precision (Cobra)” for 2025-02-11 to 2025-02-11

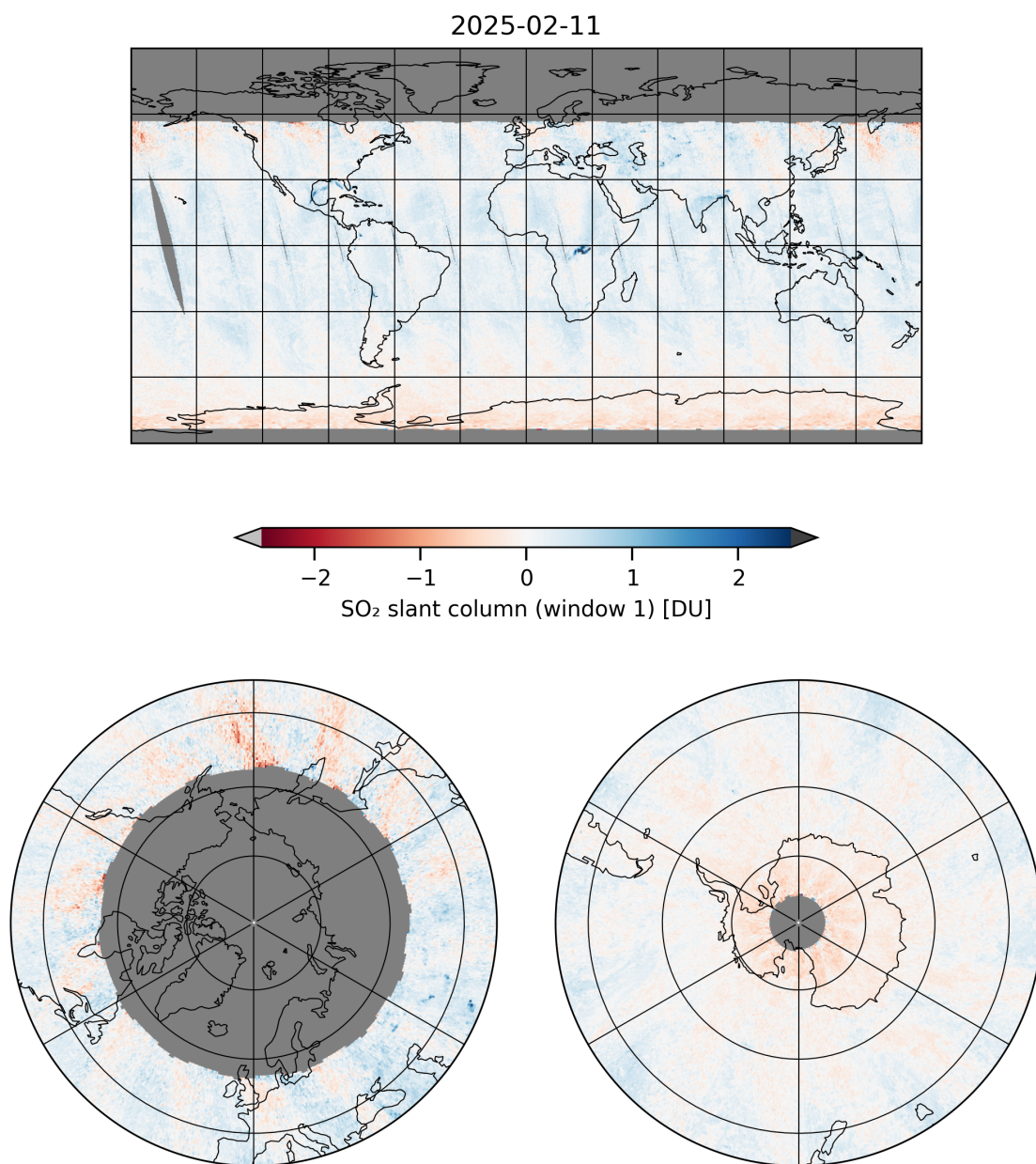


Figure 9: Map of “SO₂ slant column (window 1)” for 2025-02-11 to 2025-02-11

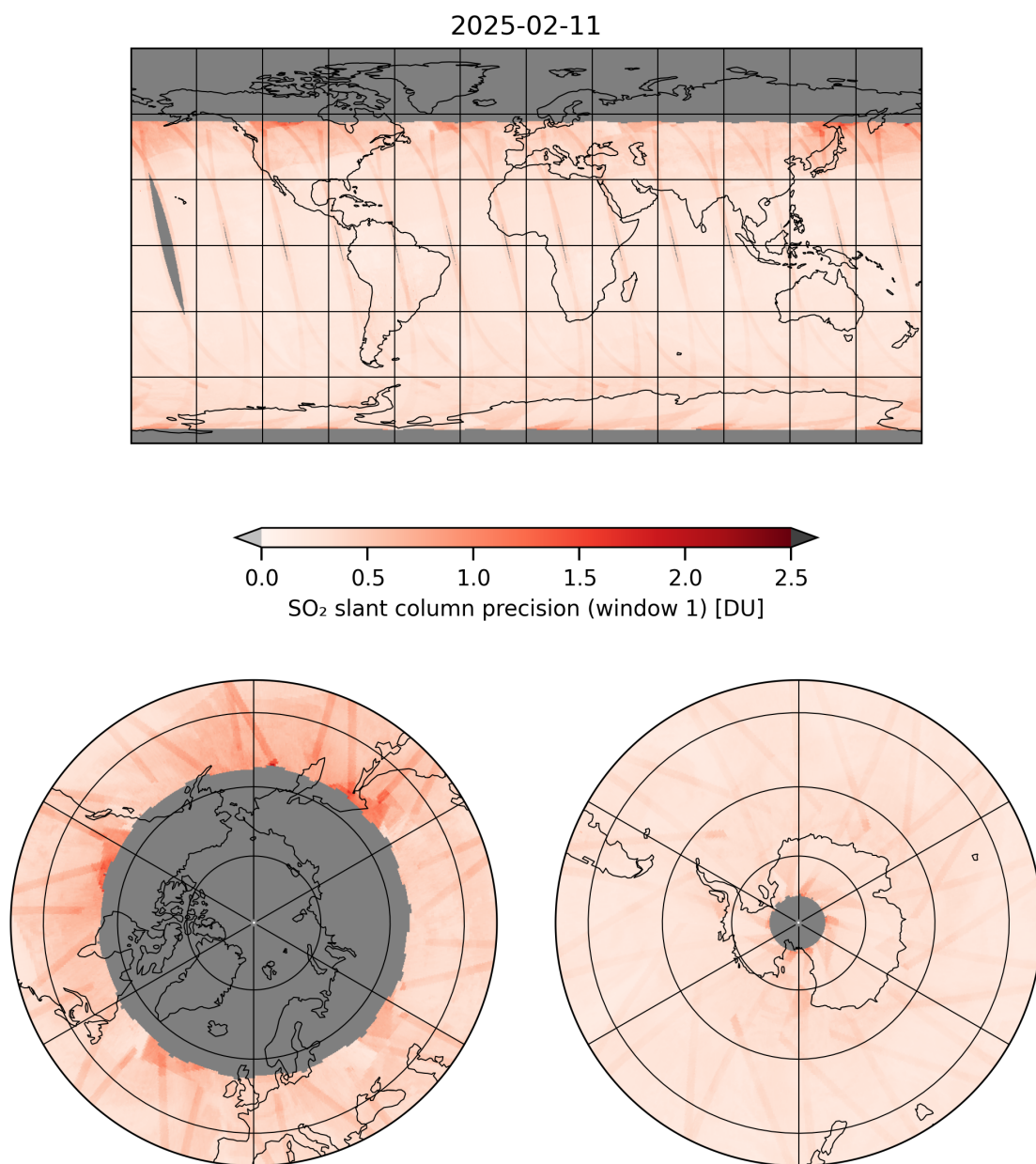


Figure 10: Map of “SO₂ slant column precision (window 1)” for 2025-02-11 to 2025-02-11

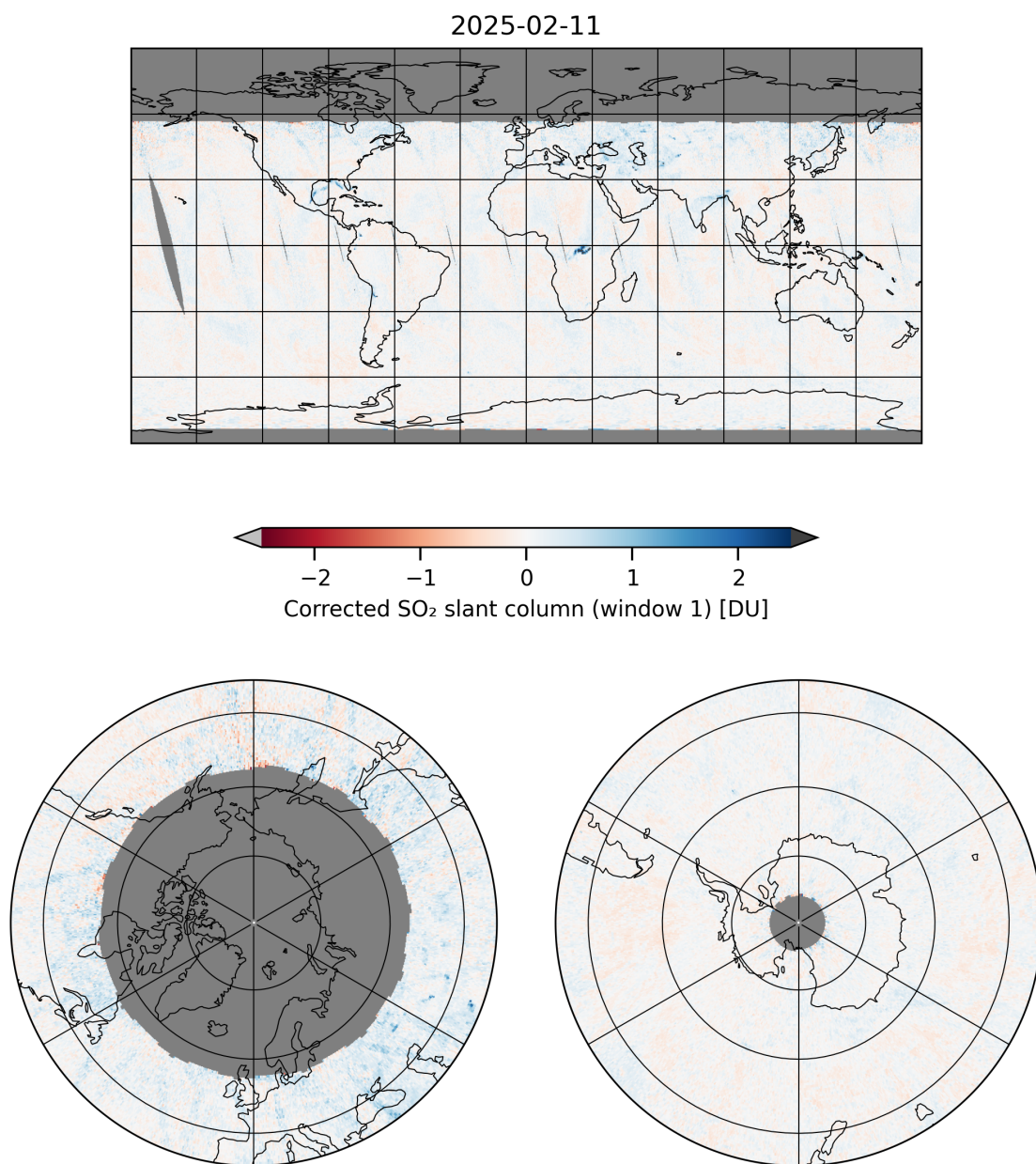


Figure 11: Map of “Corrected SO₂ slant column (window 1)” for 2025-02-11 to 2025-02-11

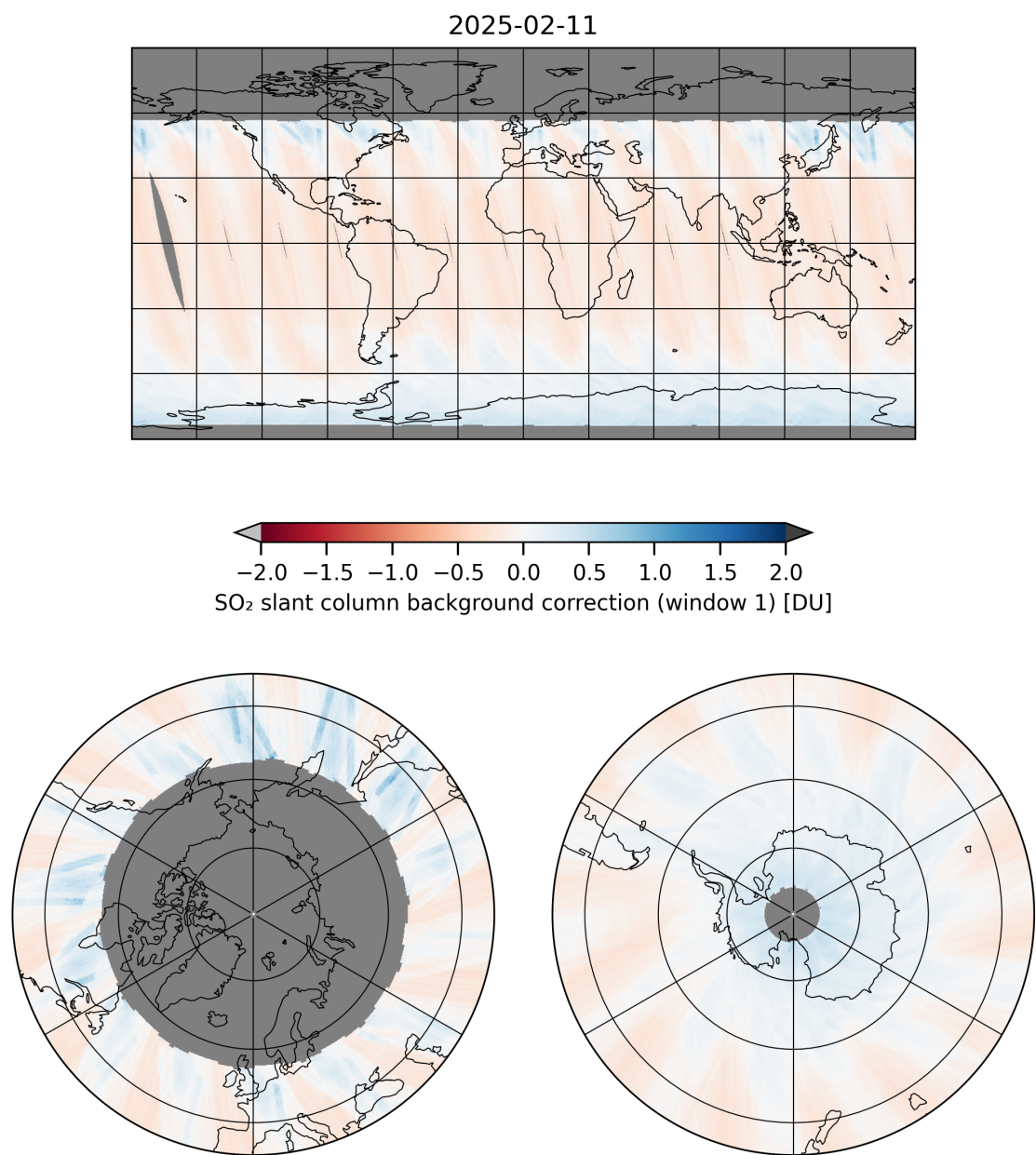


Figure 12: Map of “SO₂ slant column background correction (window 1)” for 2025-02-11 to 2025-02-11

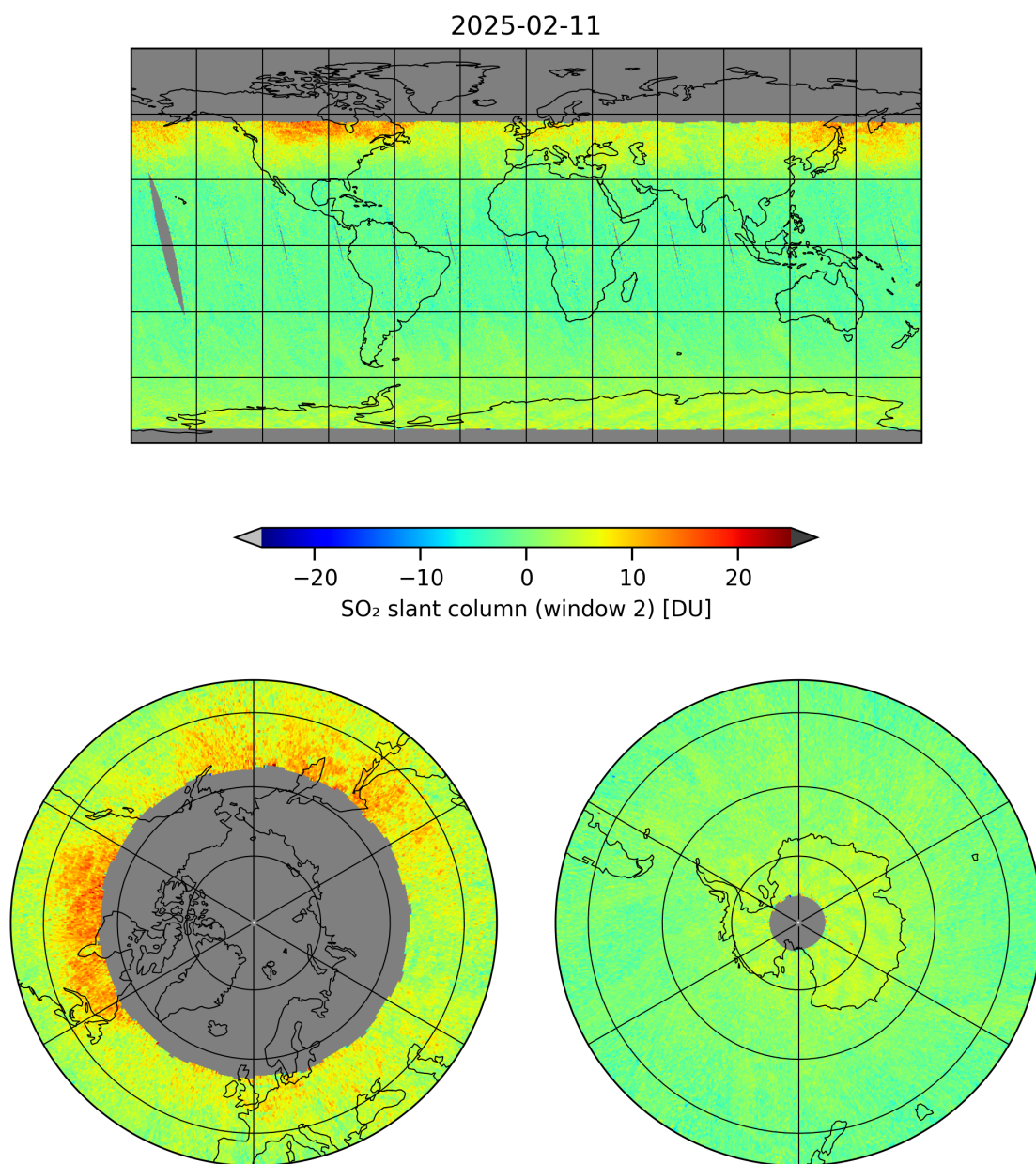


Figure 13: Map of “SO₂ slant column (window 2)” for 2025-02-11 to 2025-02-11

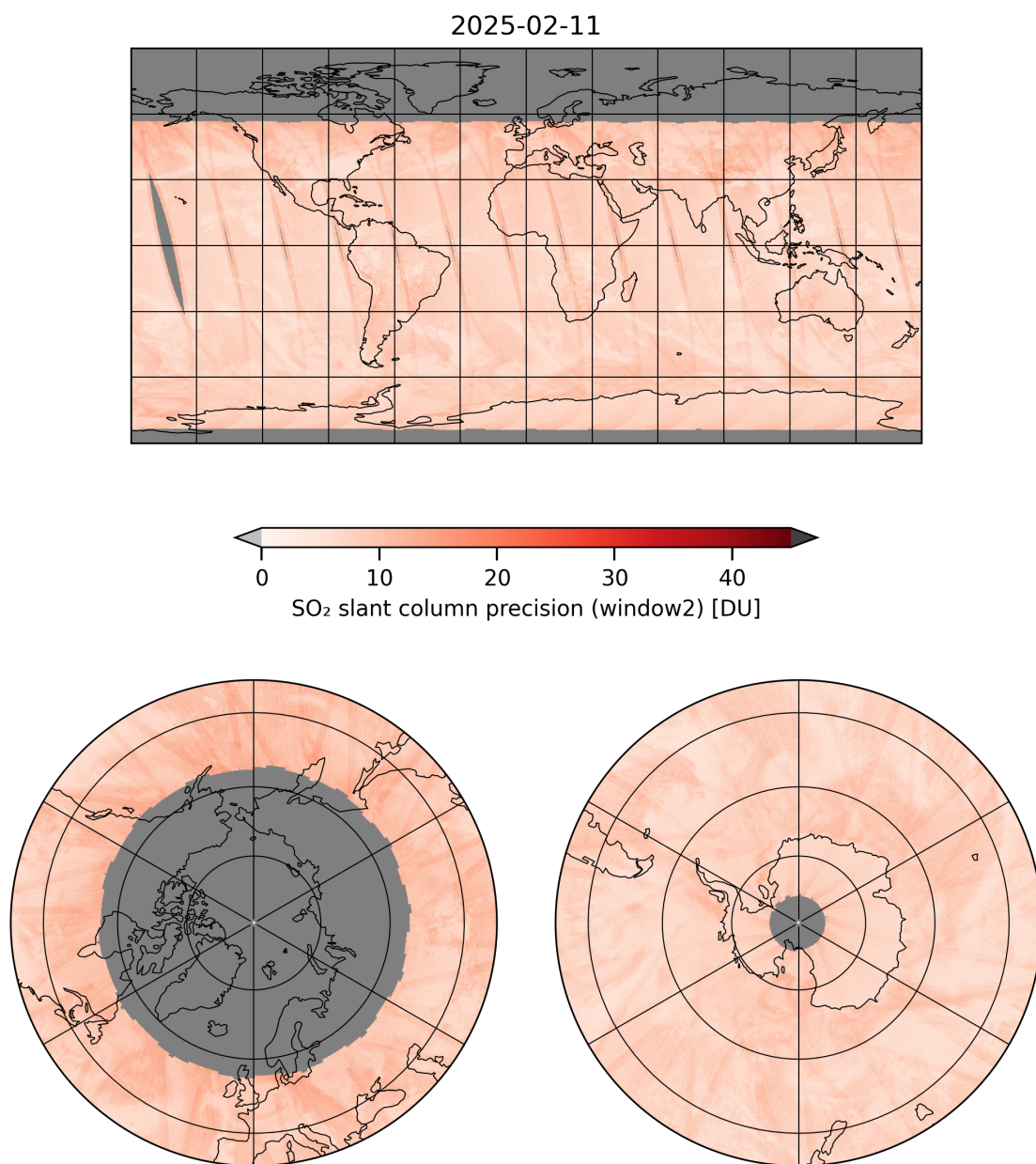


Figure 14: Map of “SO₂ slant column precision (window2)” for 2025-02-11 to 2025-02-11

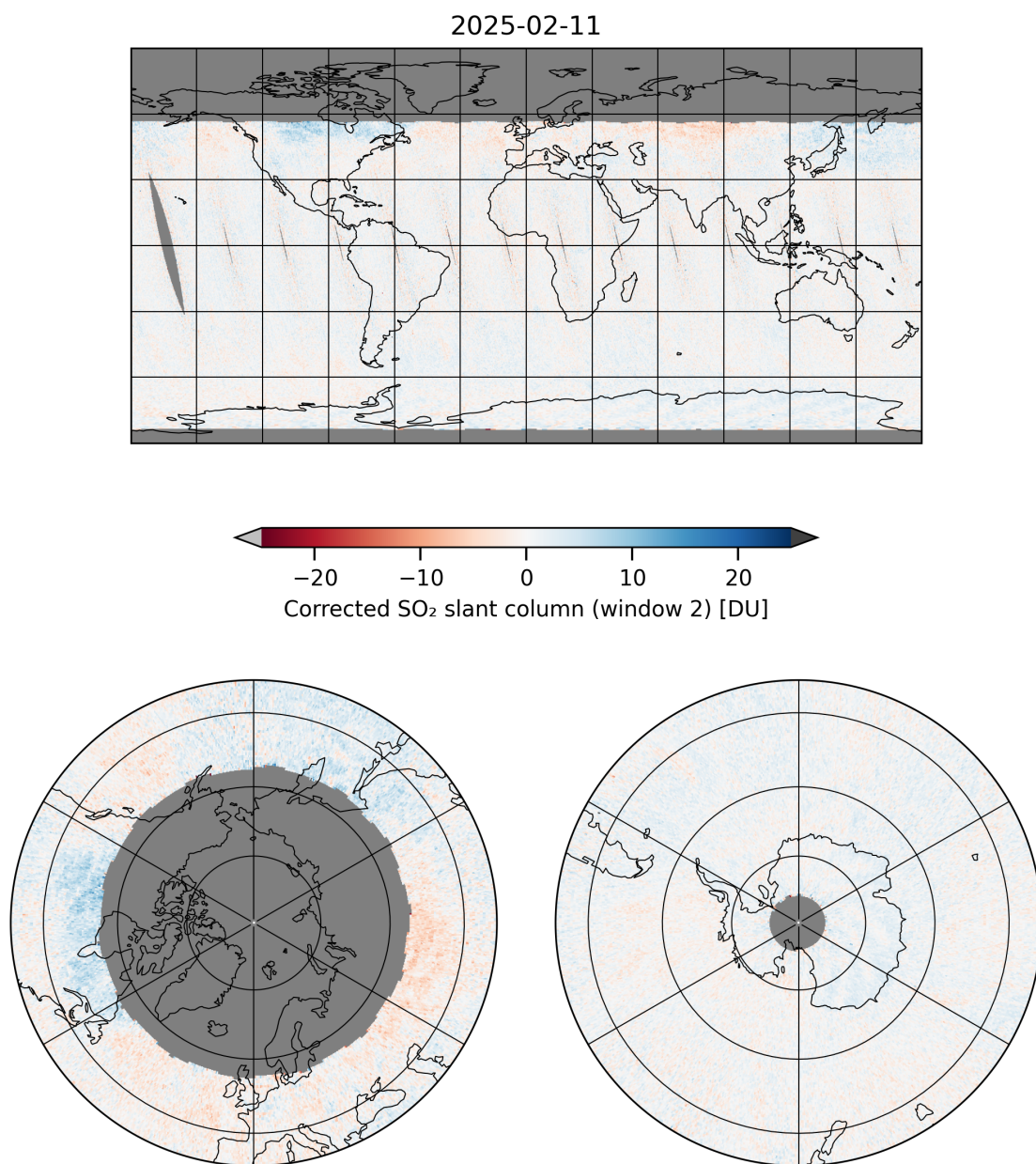


Figure 15: Map of “Corrected SO₂ slant column (window 2)” for 2025-02-11 to 2025-02-11

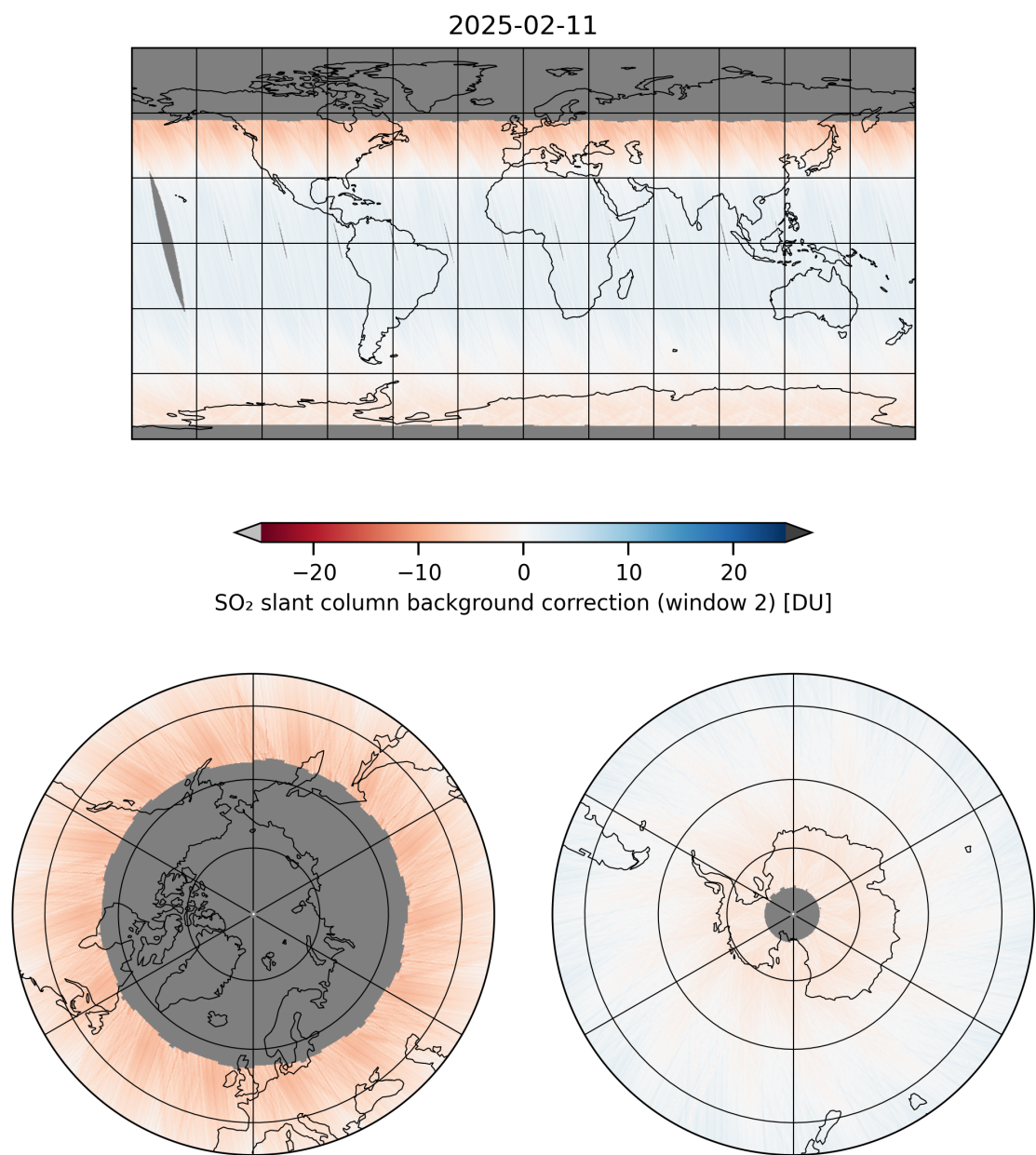


Figure 16: Map of “SO₂ slant column background correction (window 2)” for 2025-02-11 to 2025-02-11

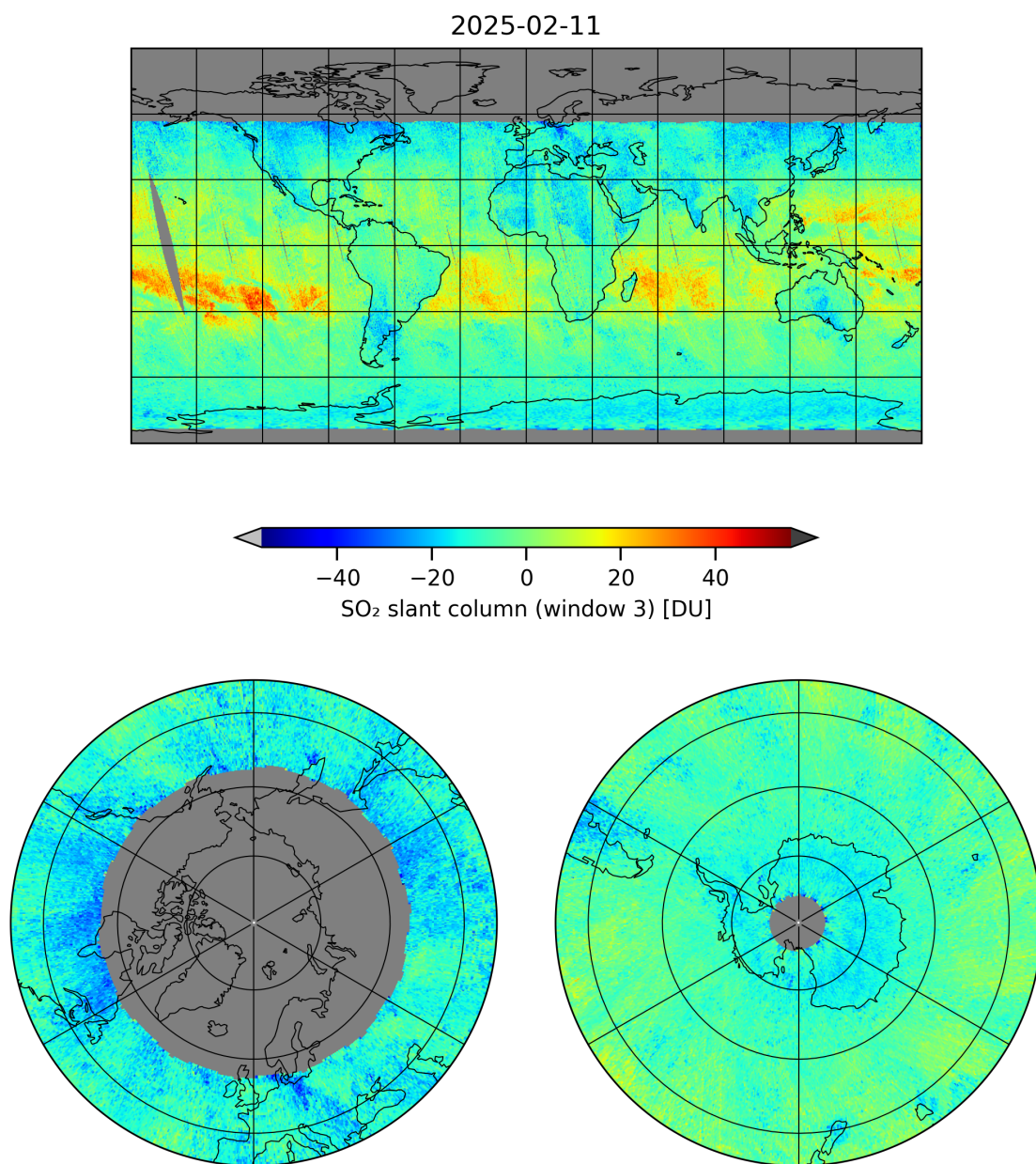


Figure 17: Map of “SO₂ slant column (window 3)” for 2025-02-11 to 2025-02-11

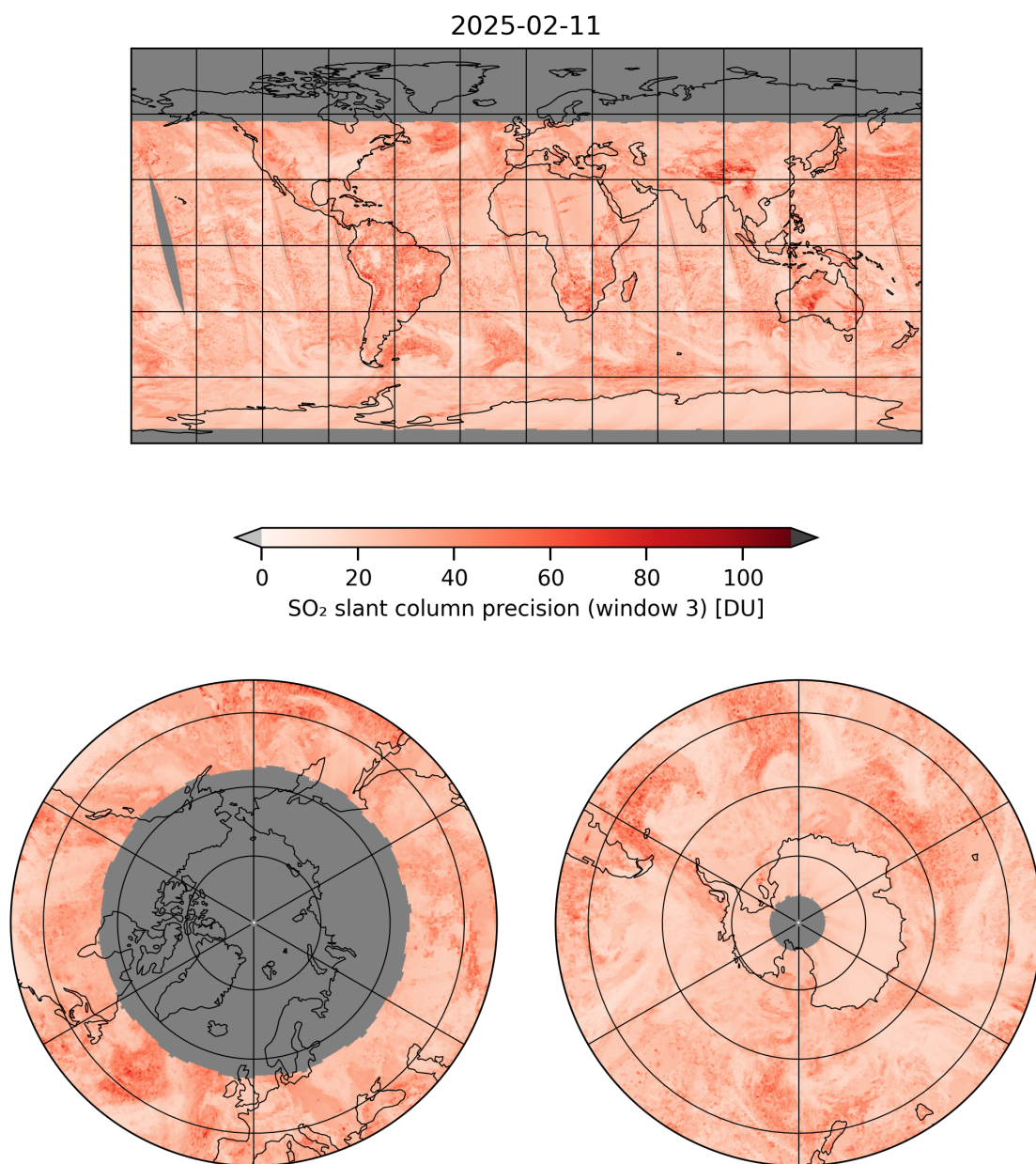


Figure 18: Map of “SO₂ slant column precision (window 3)” for 2025-02-11 to 2025-02-11

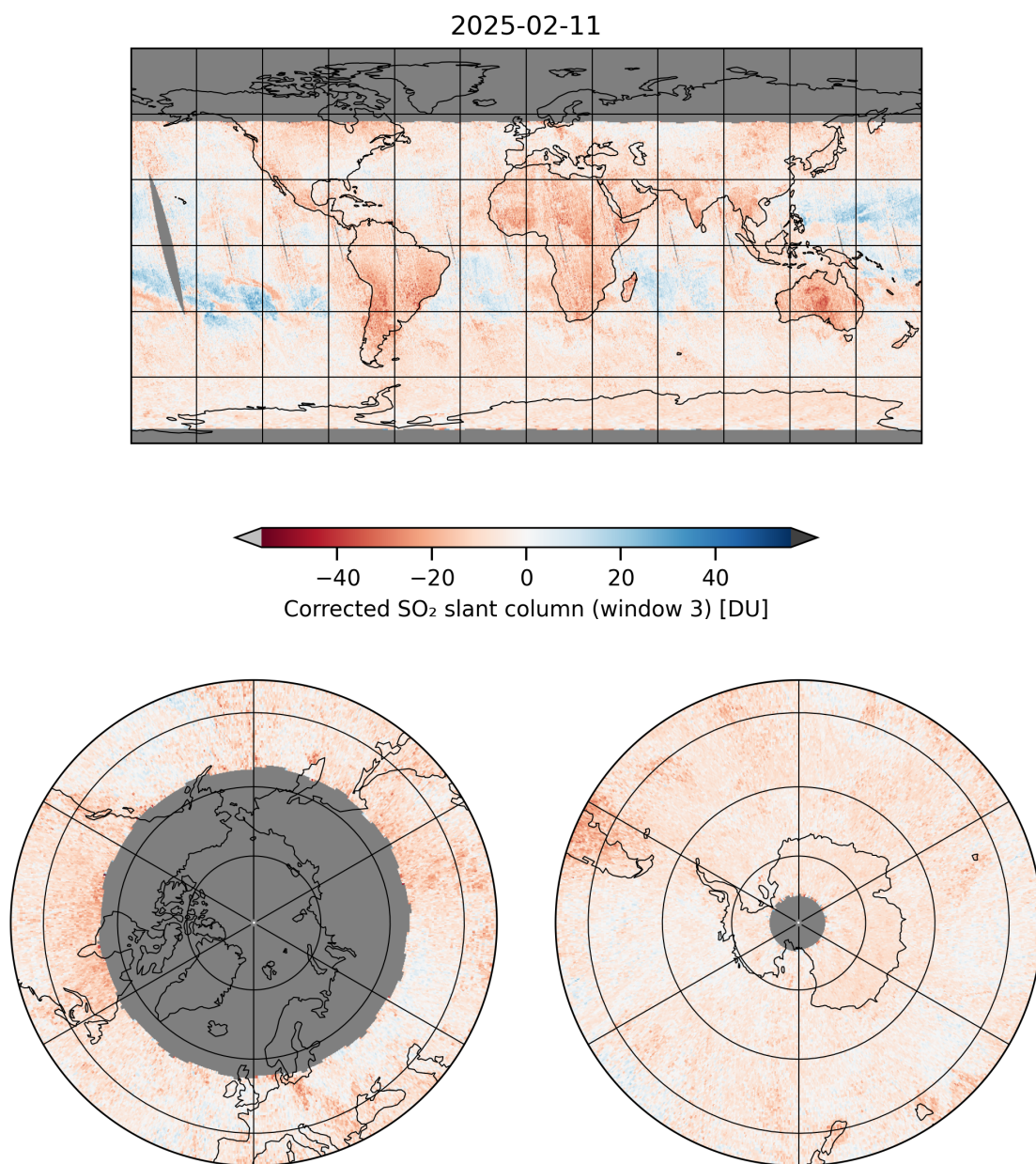


Figure 19: Map of “Corrected SO₂ slant column (window 3)” for 2025-02-11 to 2025-02-11

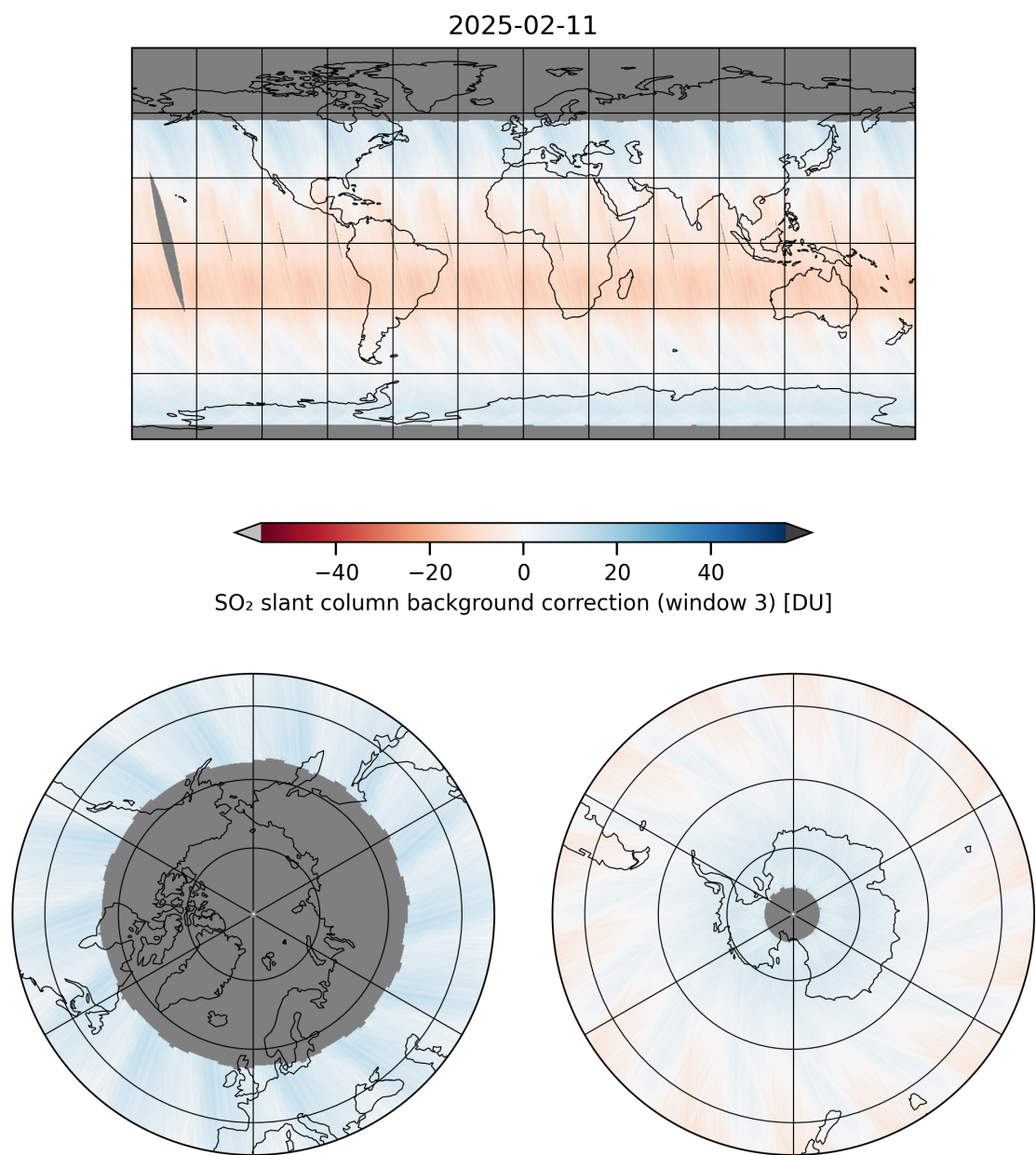


Figure 20: Map of “SO₂ slant column background correction (window 3)” for 2025-02-11 to 2025-02-11

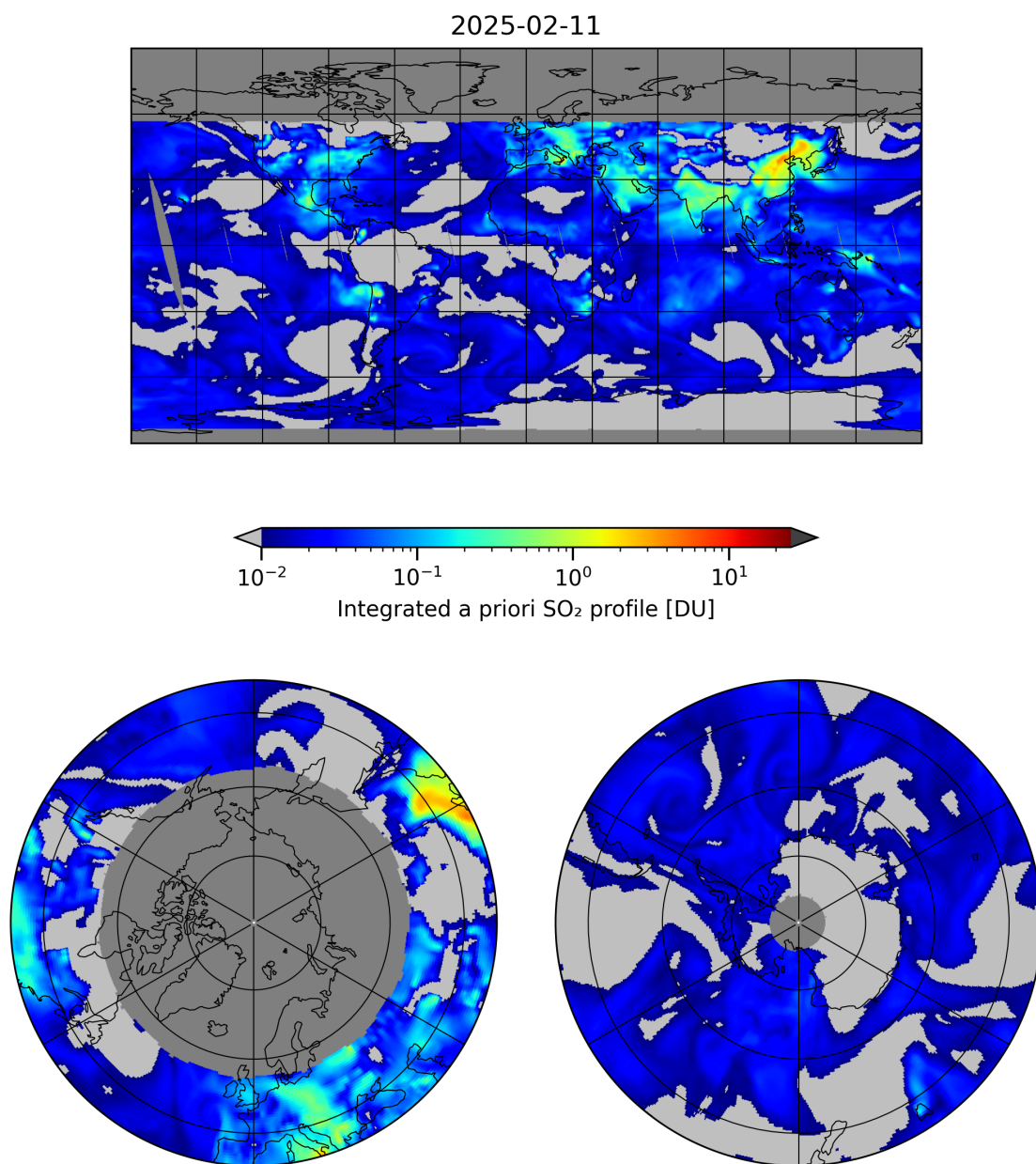


Figure 21: Map of “Integrated a priori SO₂ profile” for 2025-02-11 to 2025-02-11

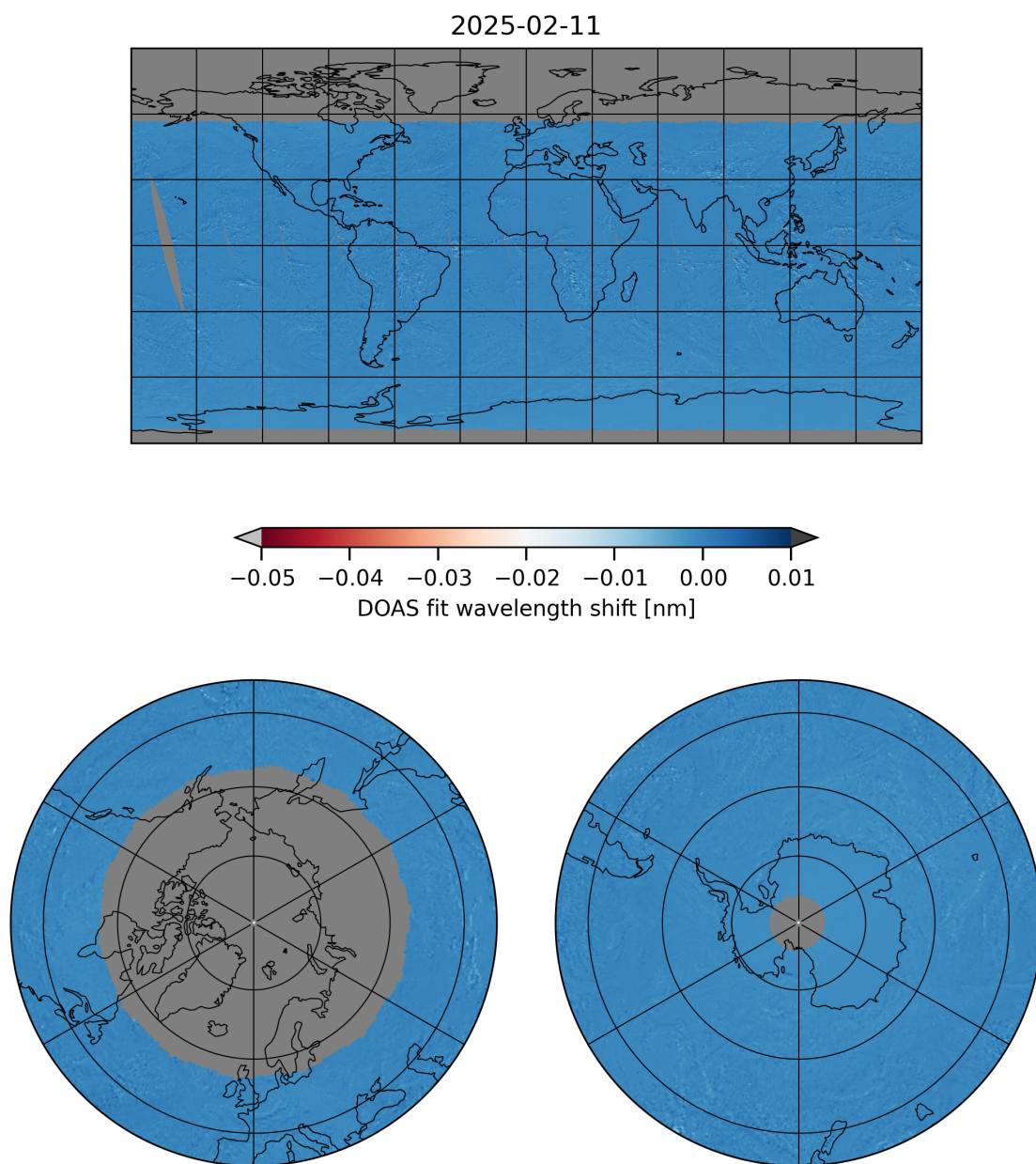


Figure 22: Map of “DOAS fit wavelength shift” for 2025-02-11 to 2025-02-11

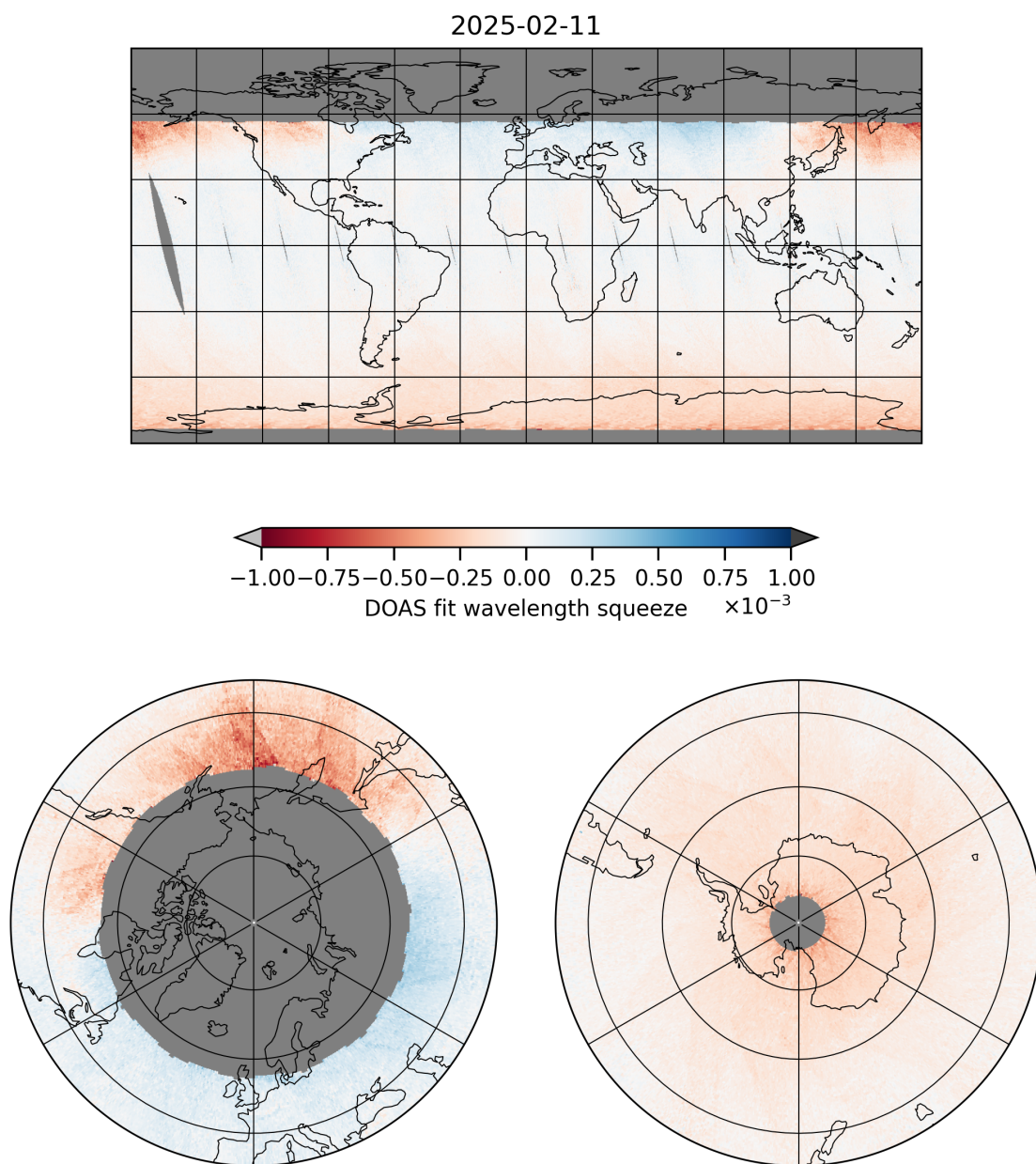


Figure 23: Map of “DOAS fit wavelength squeeze” for 2025-02-11 to 2025-02-11

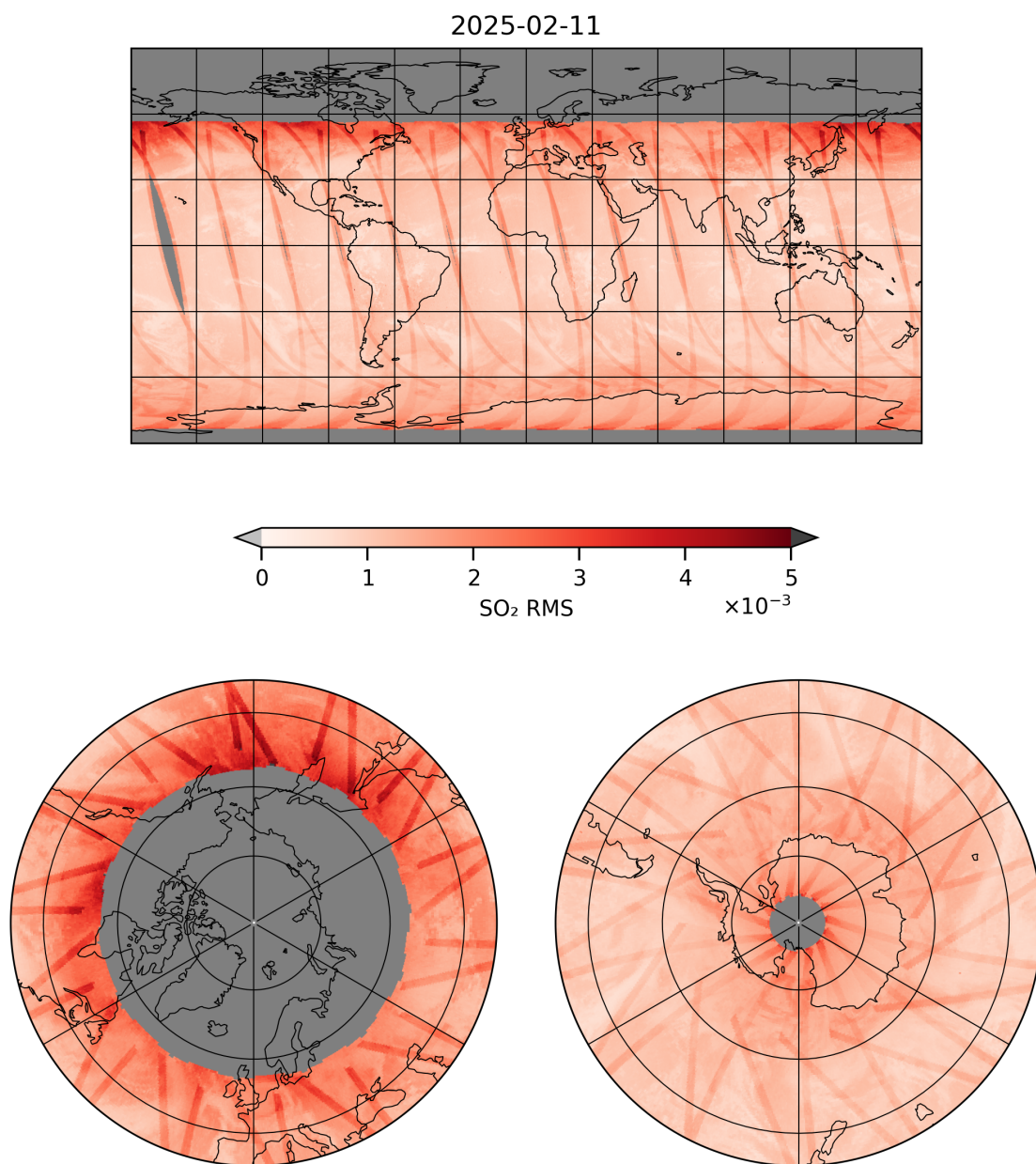


Figure 24: Map of “SO₂ RMS” for 2025-02-11 to 2025-02-11

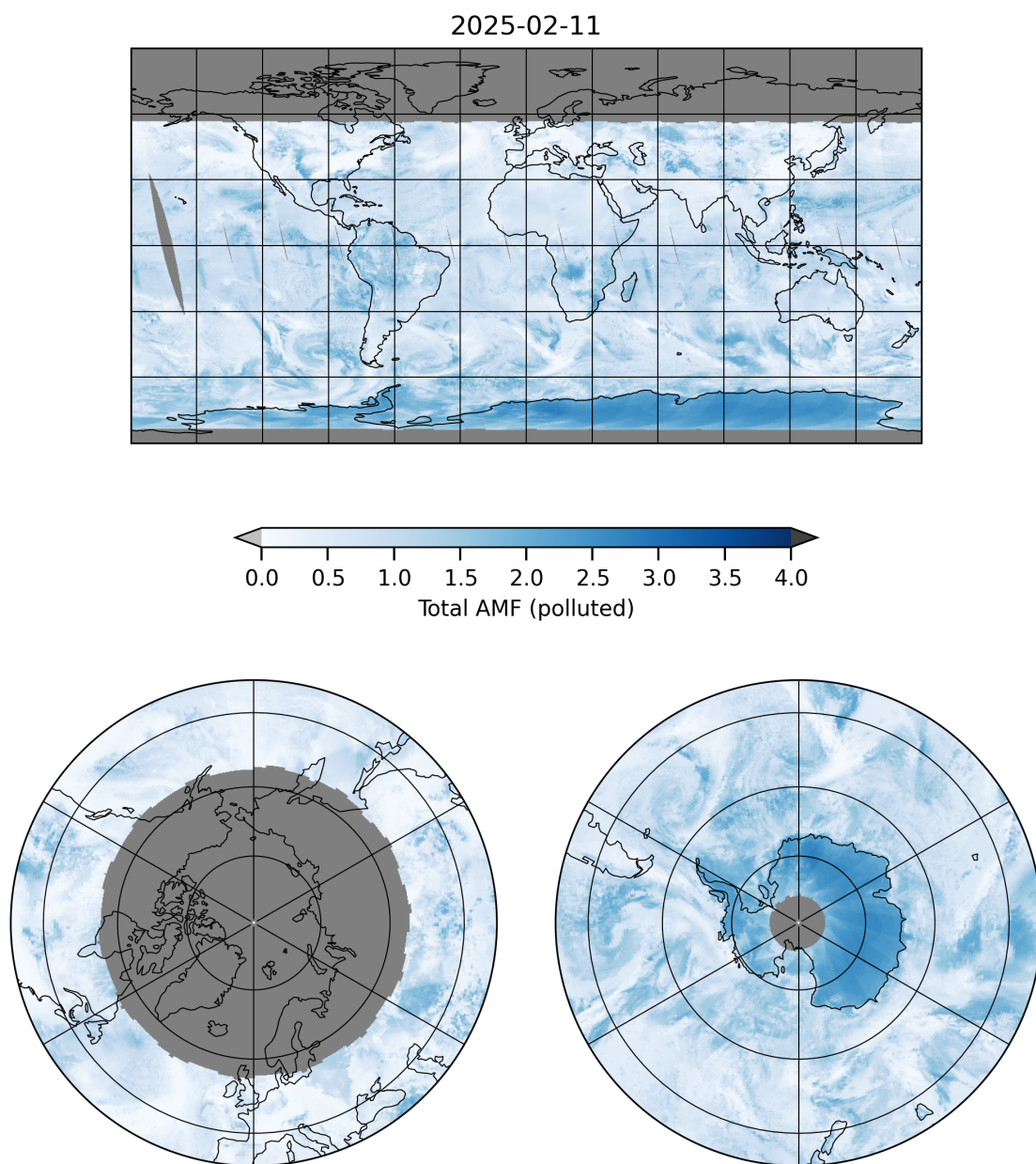


Figure 25: Map of “Total AMF (polluted)” for 2025-02-11 to 2025-02-11

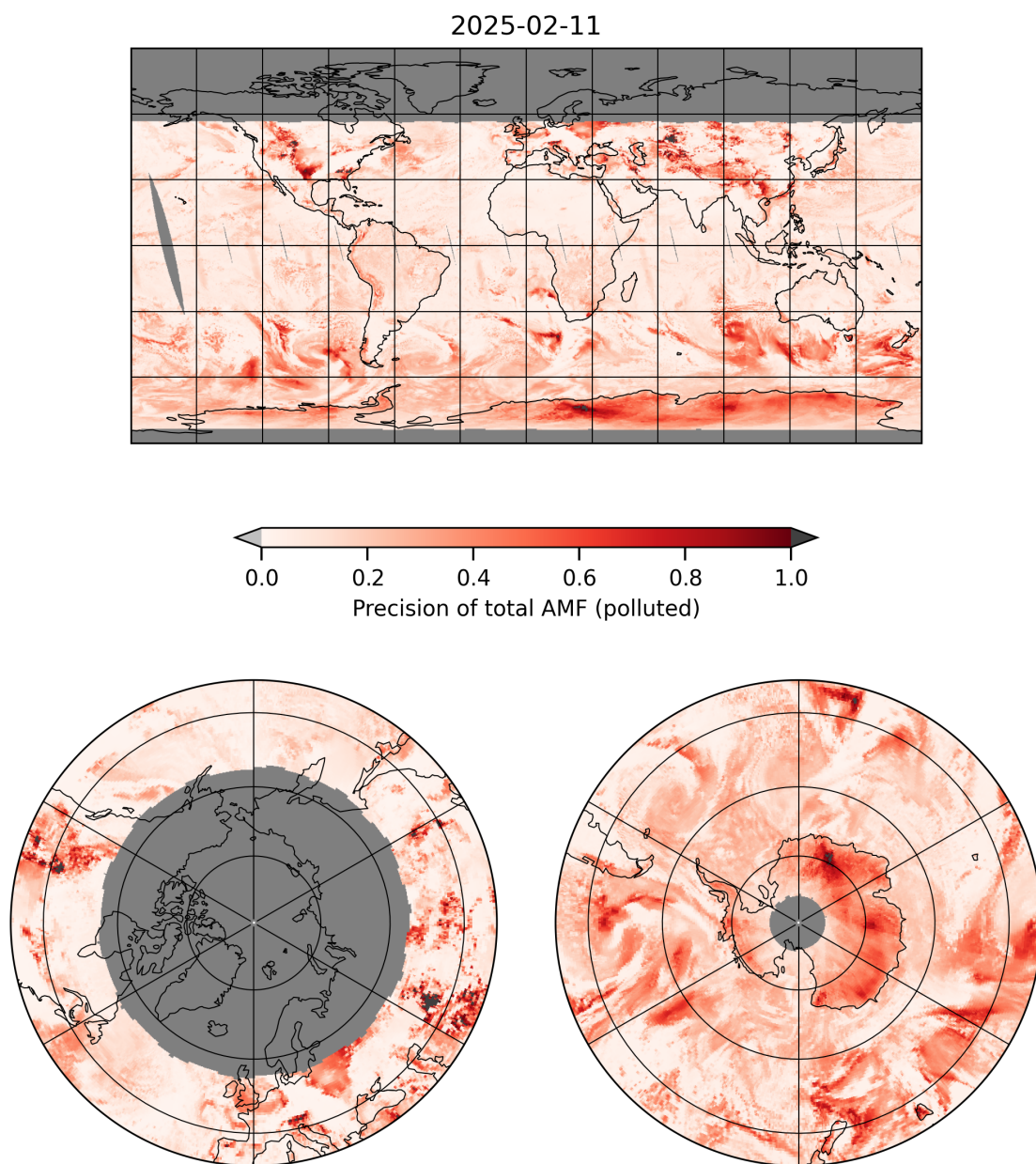


Figure 26: Map of “Precision of total AMF (polluted)” for 2025-02-11 to 2025-02-11

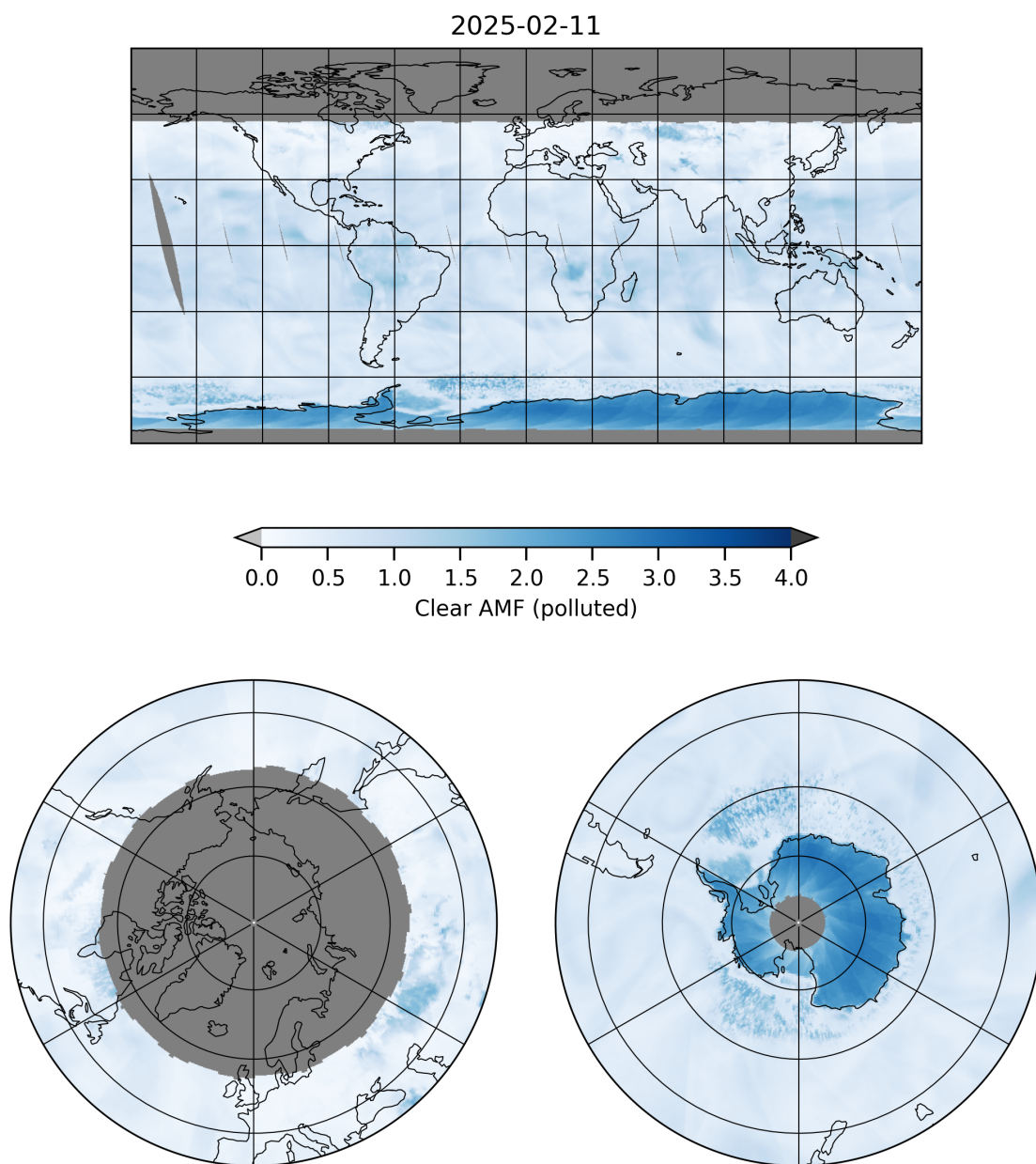


Figure 27: Map of “Clear AMF (polluted)” for 2025-02-11 to 2025-02-11

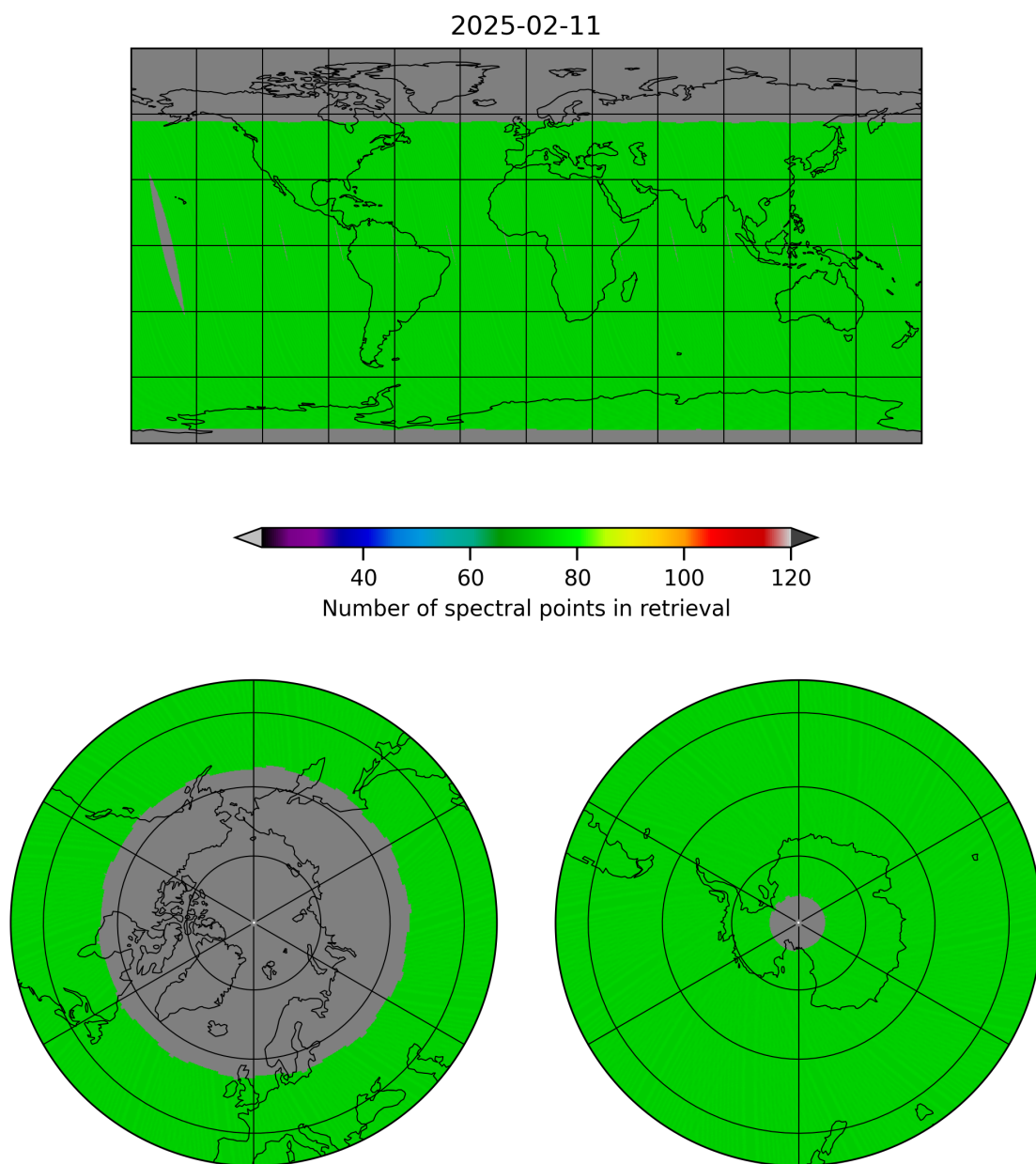


Figure 28: Map of “Number of spectral points in retrieval” for 2025-02-11 to 2025-02-11

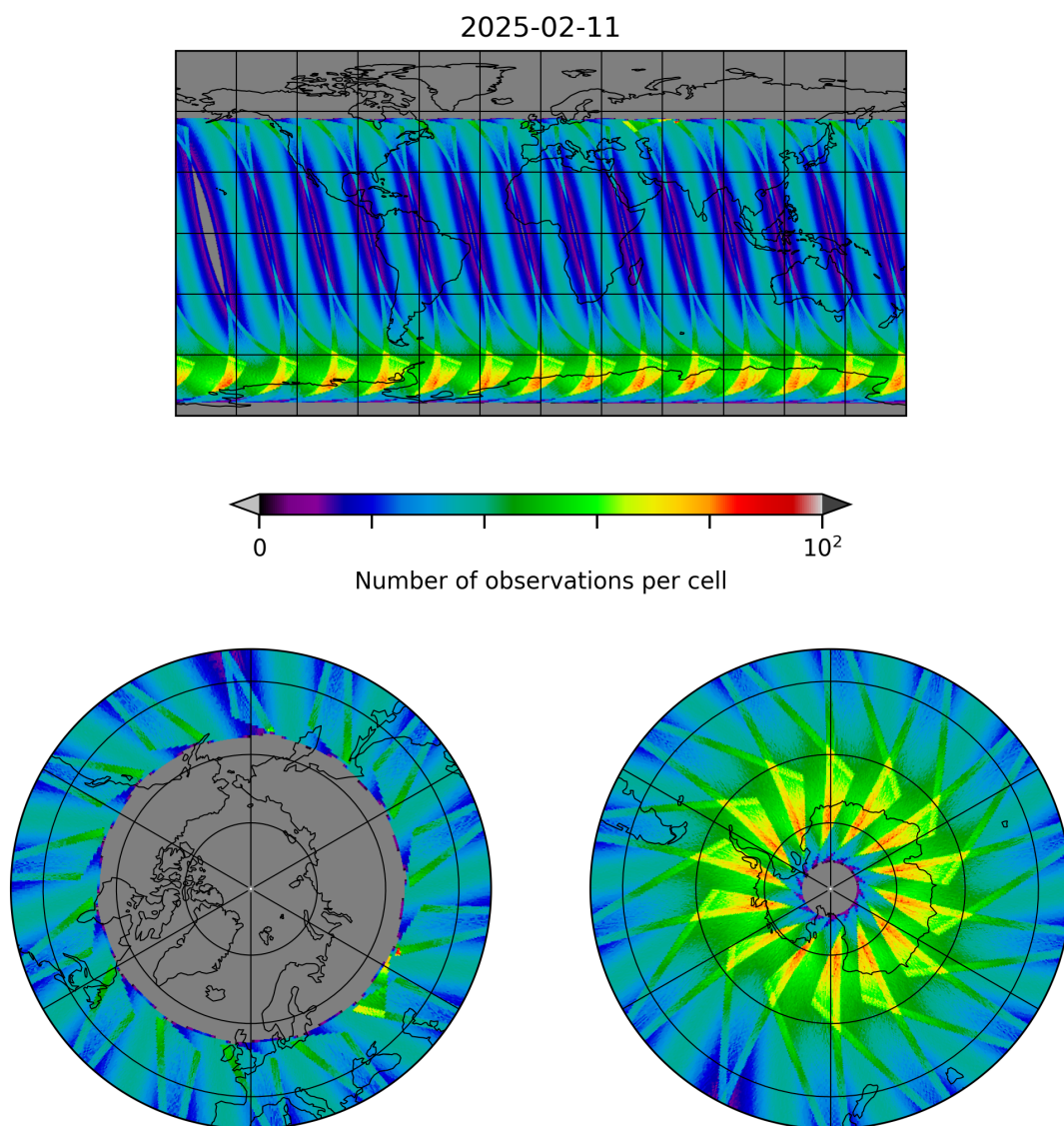


Figure 29: Map of the number of observations for 2025-02-11 to 2025-02-11

7 Zonal average

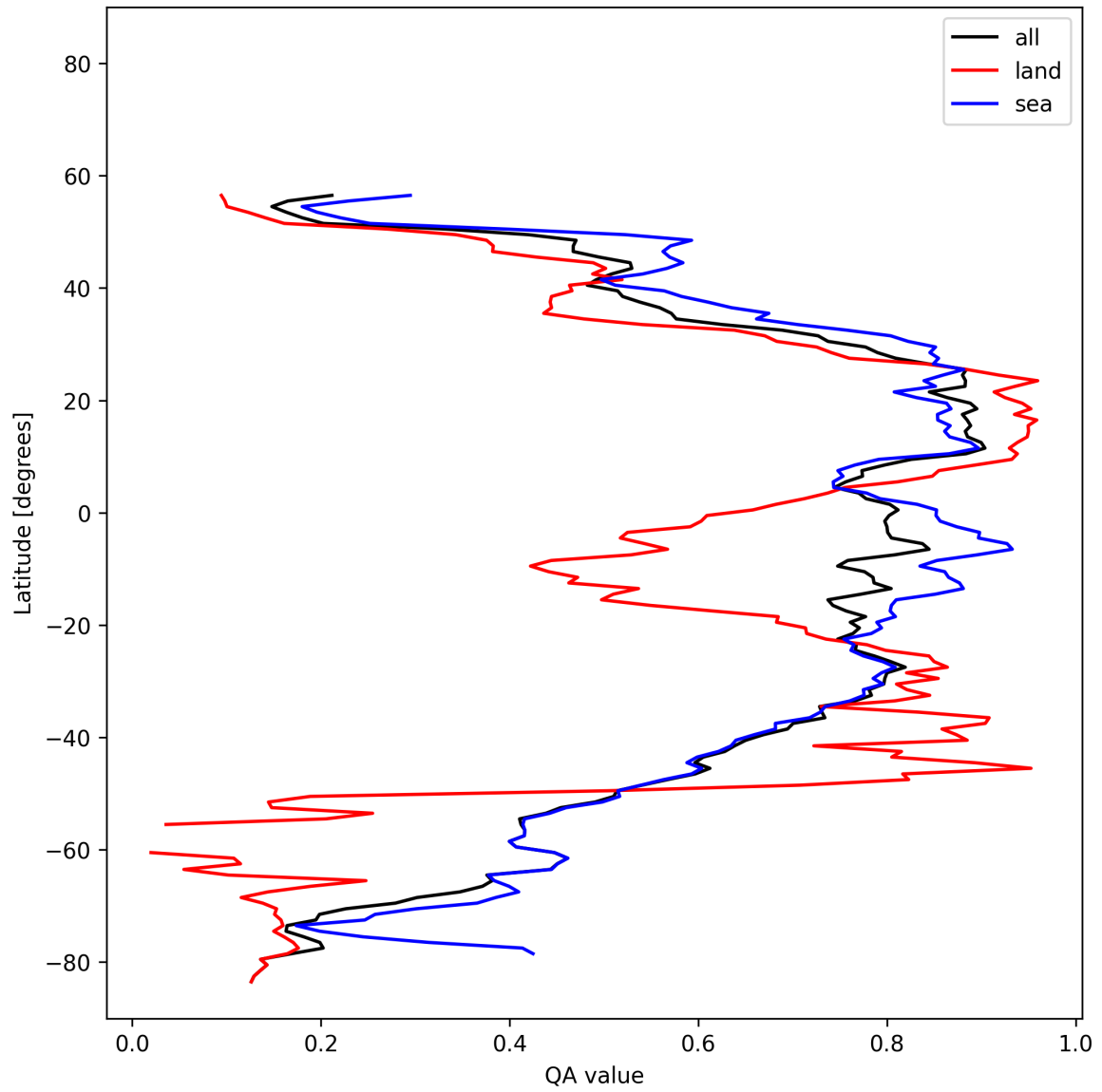


Figure 30: Zonal average of "QA value" for 2025-02-11 to 2025-02-11.

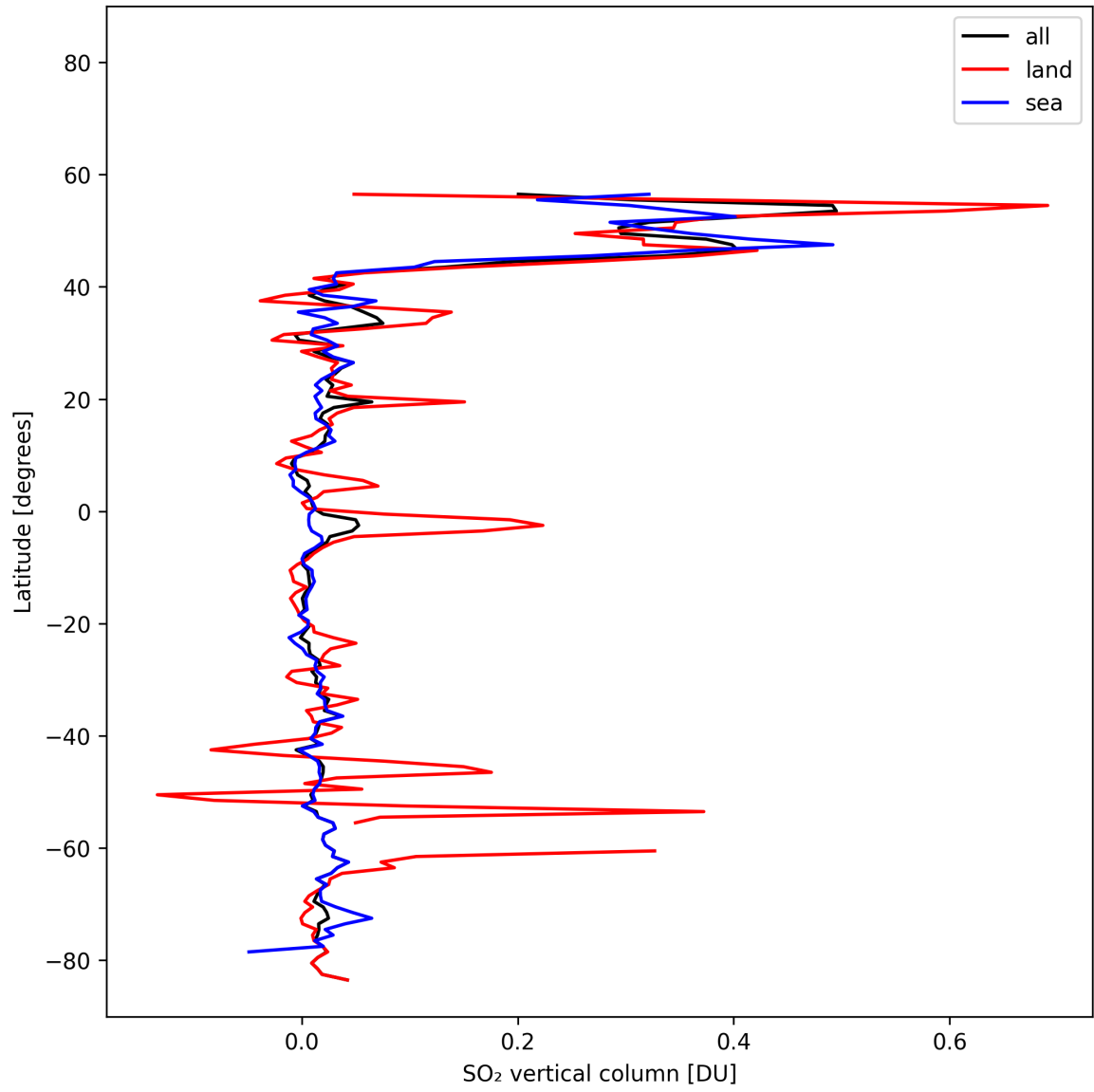


Figure 31: Zonal average of “SO₂ vertical column” for 2025-02-11 to 2025-02-11.

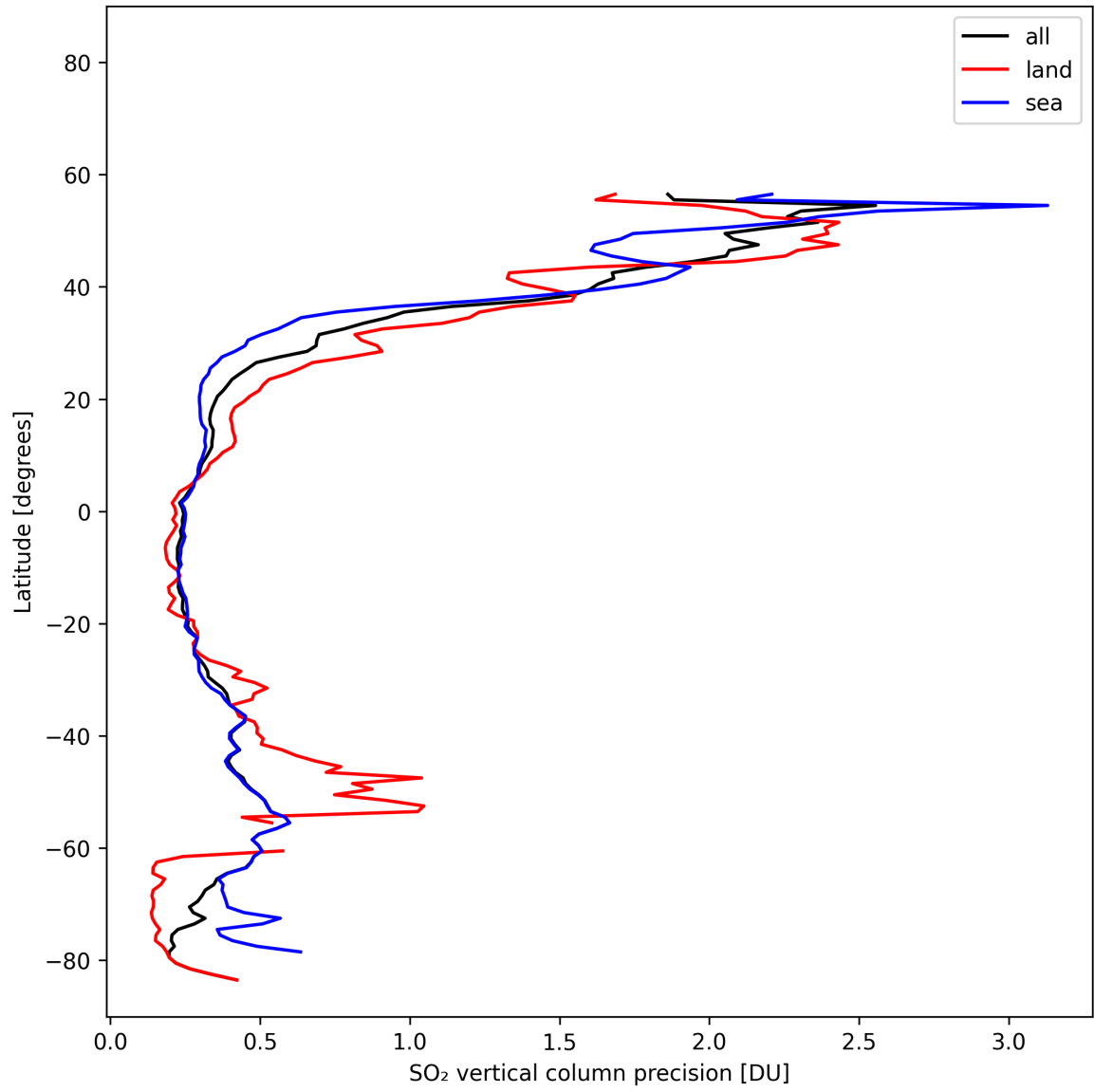


Figure 32: Zonal average of “SO₂ vertical column precision” for 2025-02-11 to 2025-02-11.

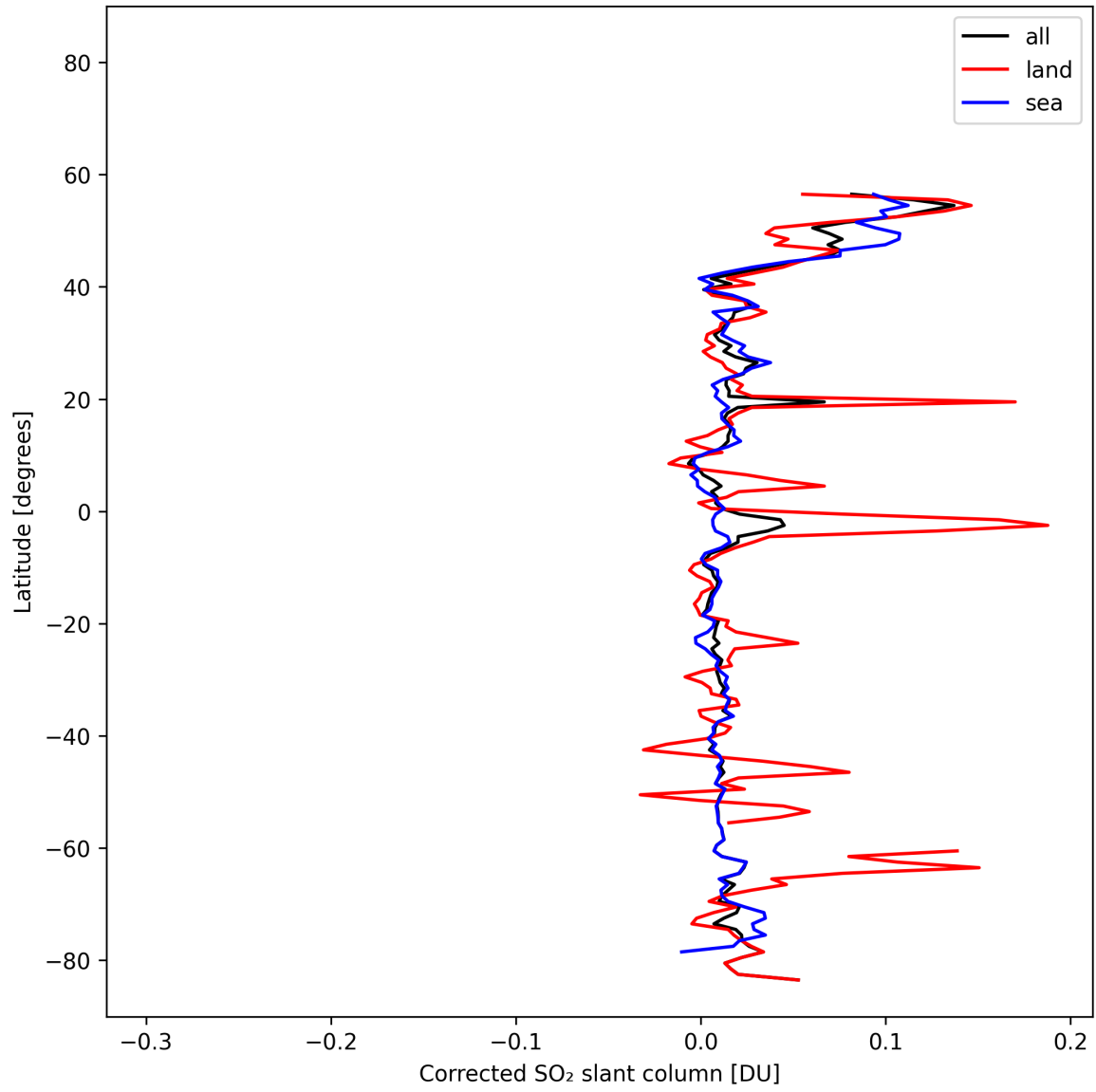


Figure 33: Zonal average of “Corrected SO₂ slant column” for 2025-02-11 to 2025-02-11.

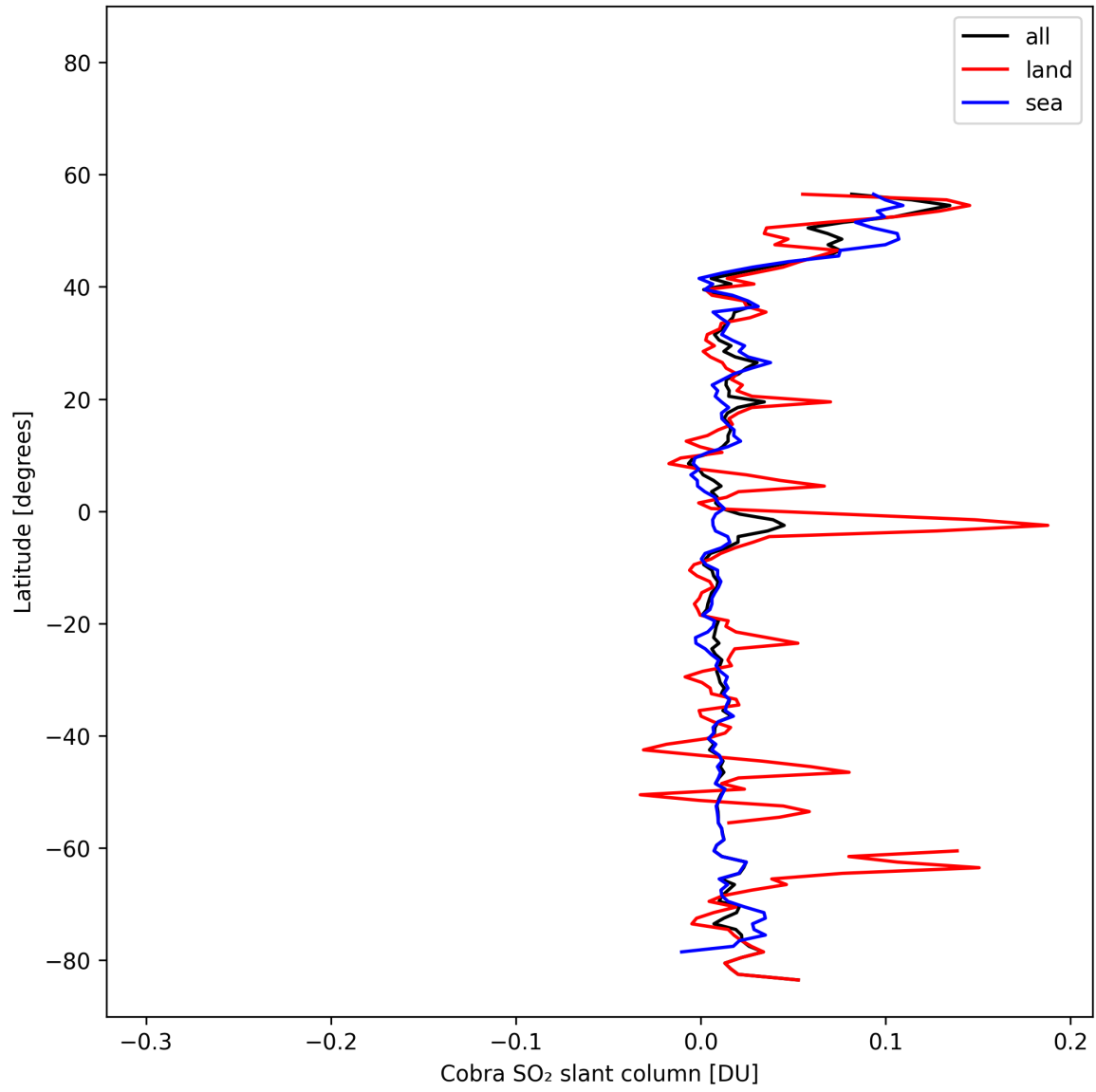


Figure 34: Zonal average of “Cobra SO₂ slant column” for 2025-02-11 to 2025-02-11.

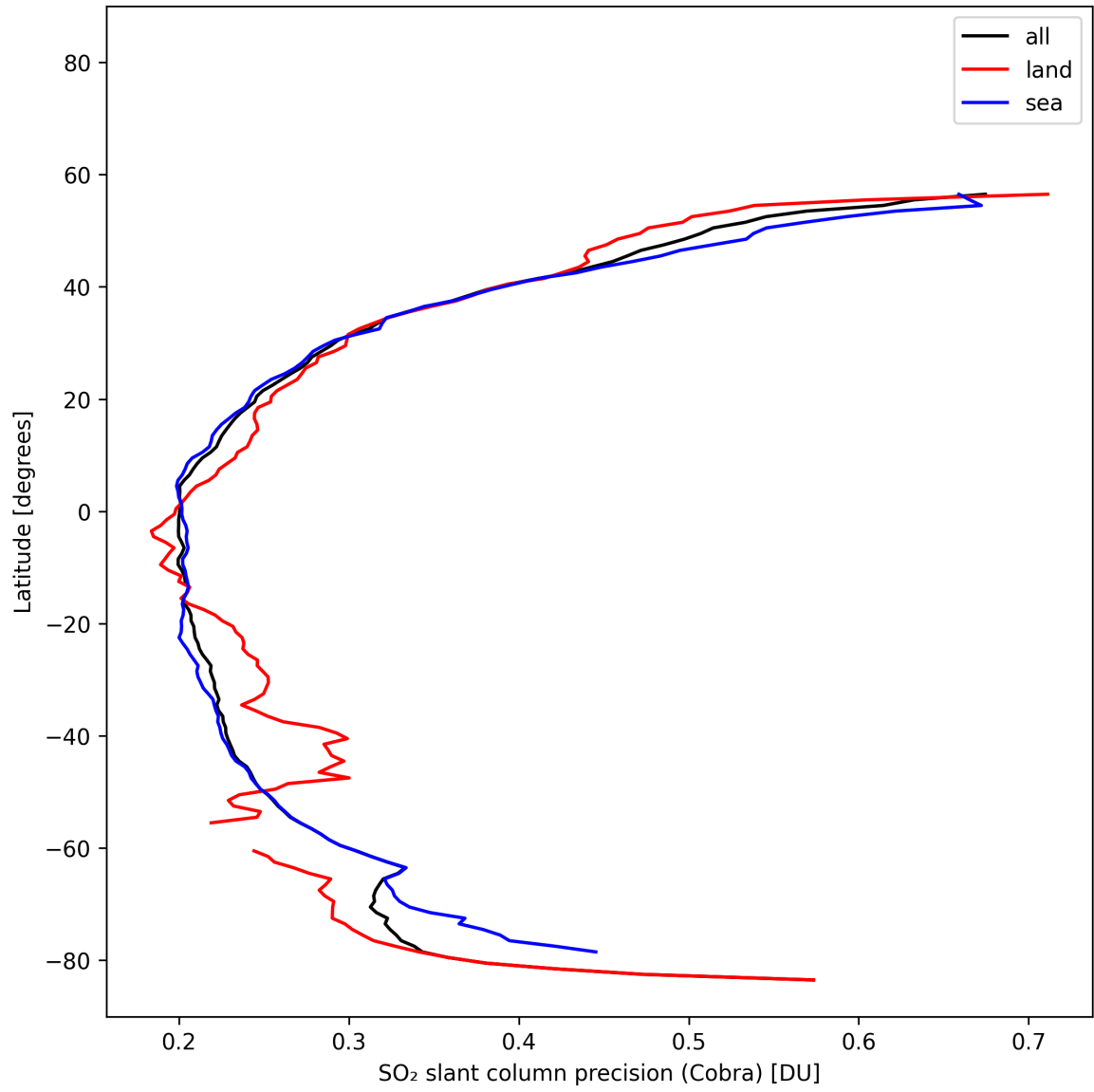


Figure 35: Zonal average of "SO₂ slant column precision (Cobra)" for 2025-02-11 to 2025-02-11.

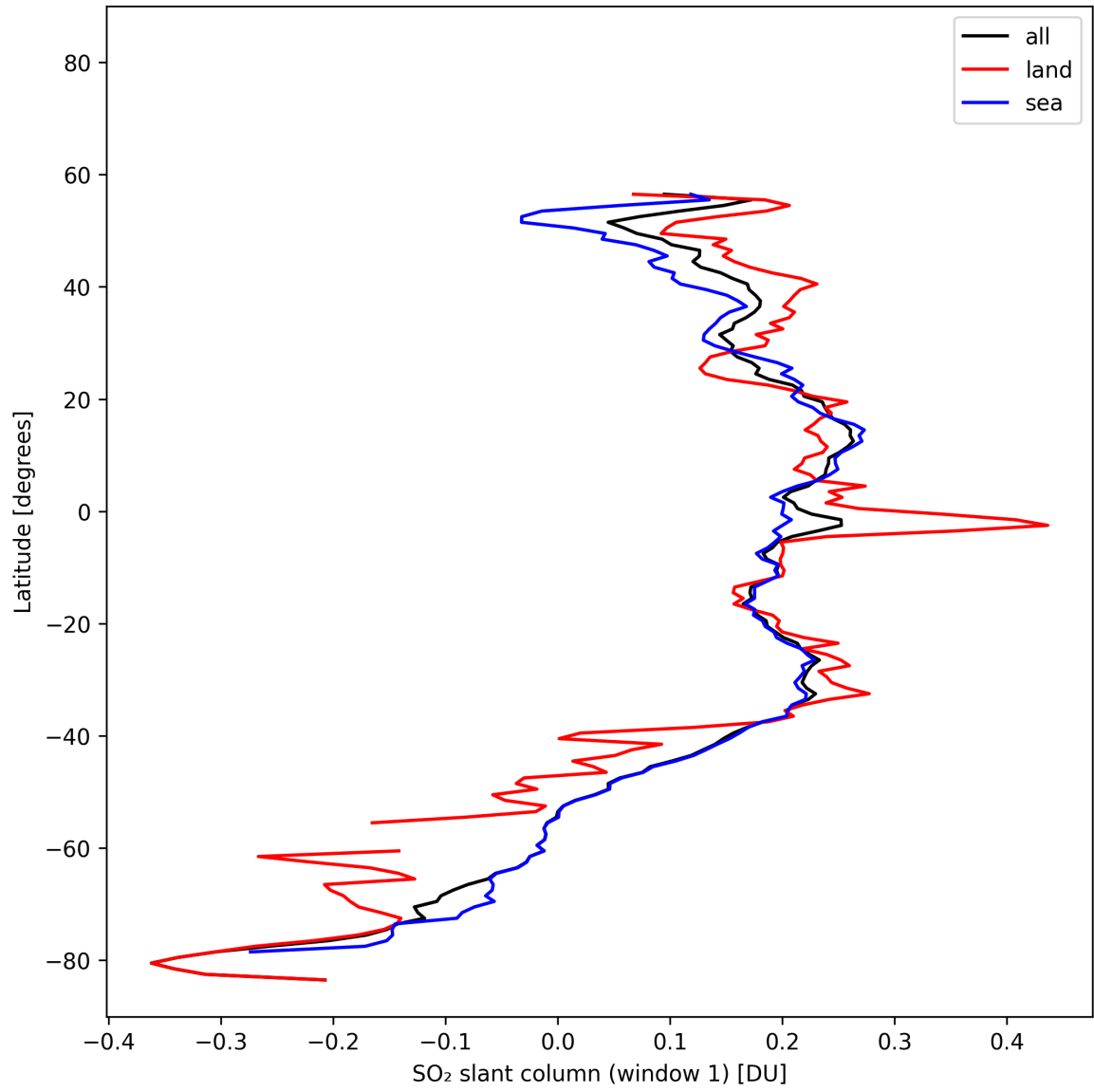


Figure 36: Zonal average of “SO₂ slant column (window 1)” for 2025-02-11 to 2025-02-11.

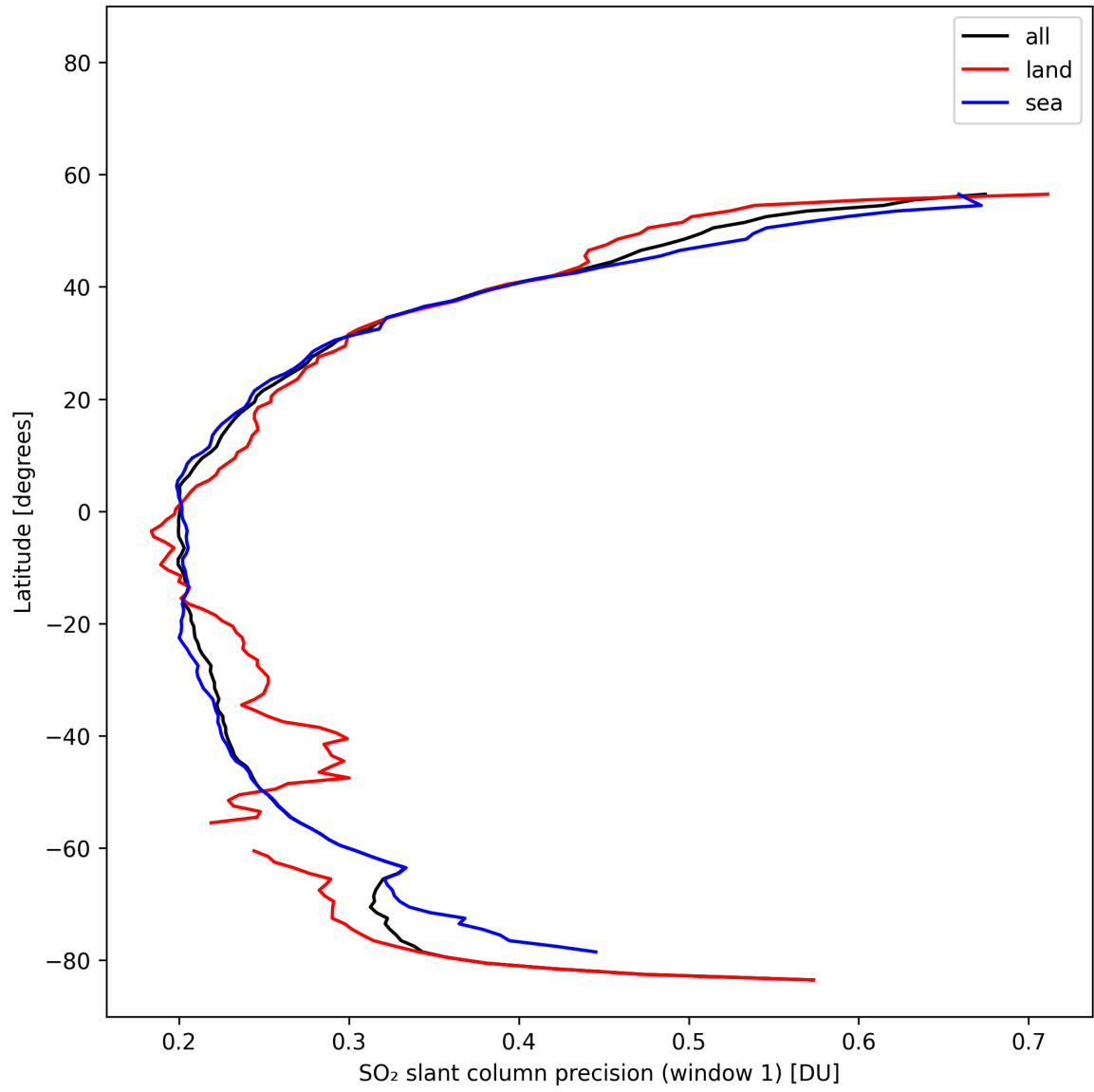


Figure 37: Zonal average of “SO₂ slant column precision (window 1)” for 2025-02-11 to 2025-02-11.

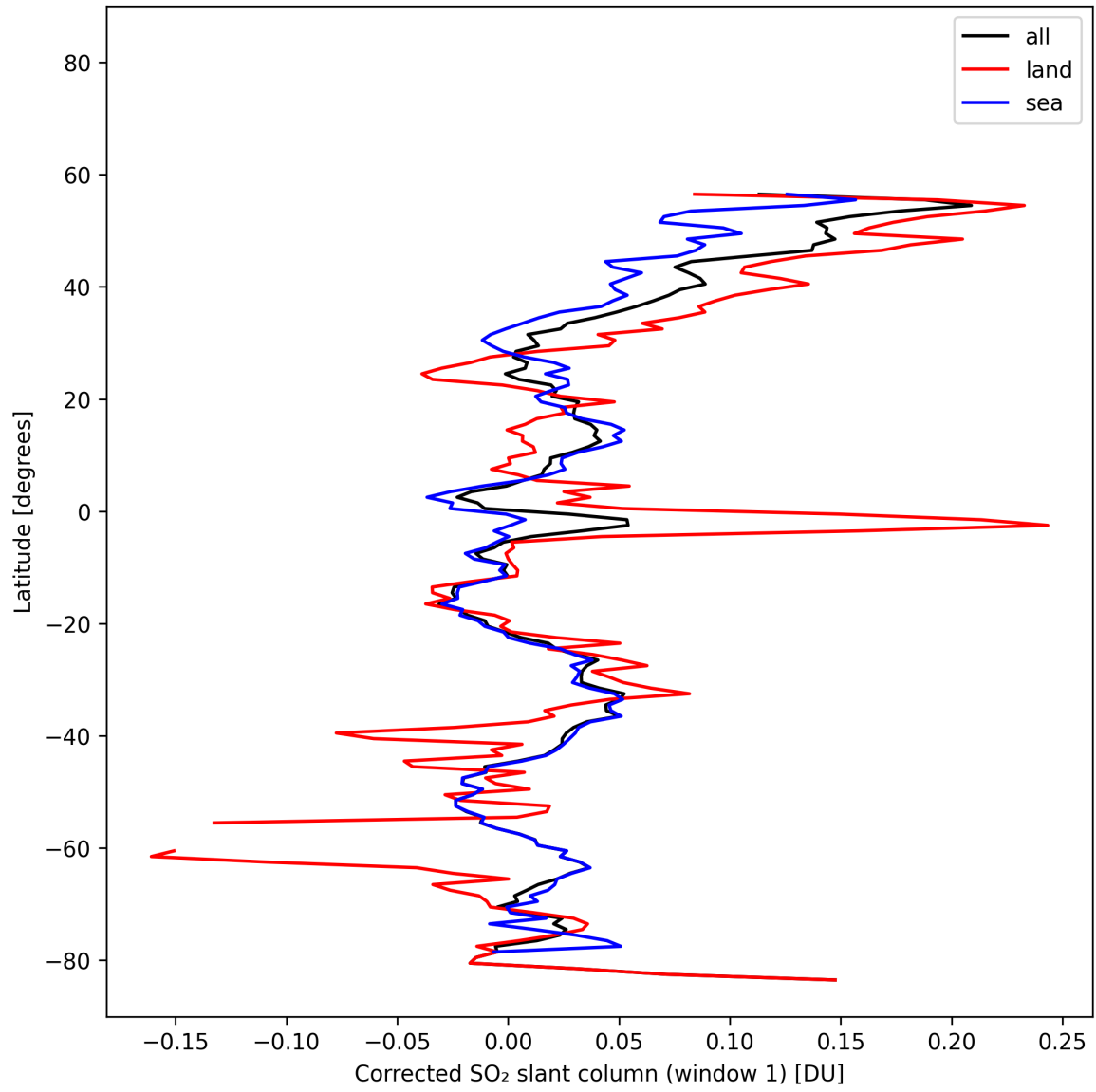


Figure 38: Zonal average of “Corrected SO₂ slant column (window 1)” for 2025-02-11 to 2025-02-11.

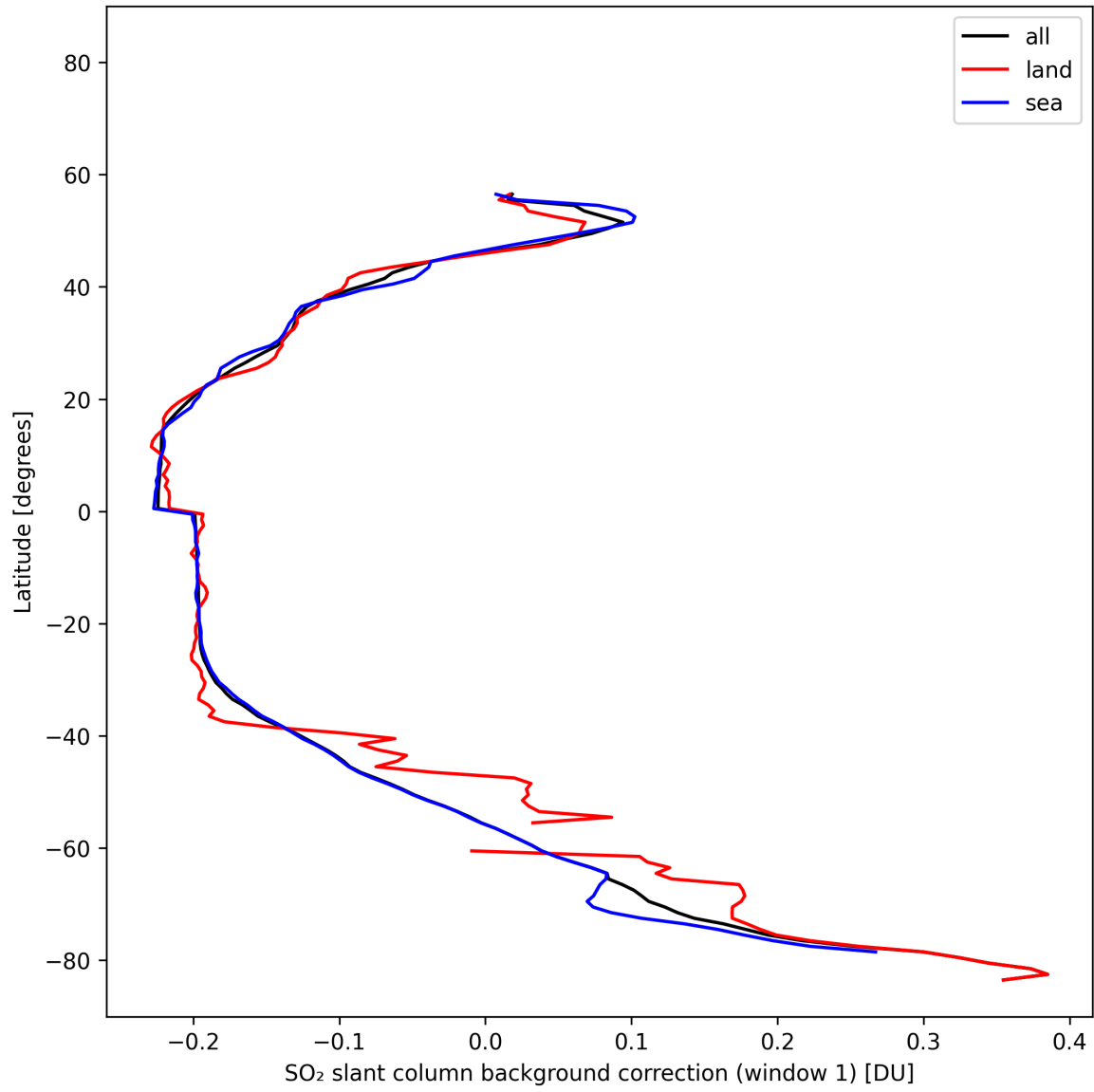


Figure 39: Zonal average of “SO₂ slant column background correction (window 1)” for 2025-02-11 to 2025-02-11.

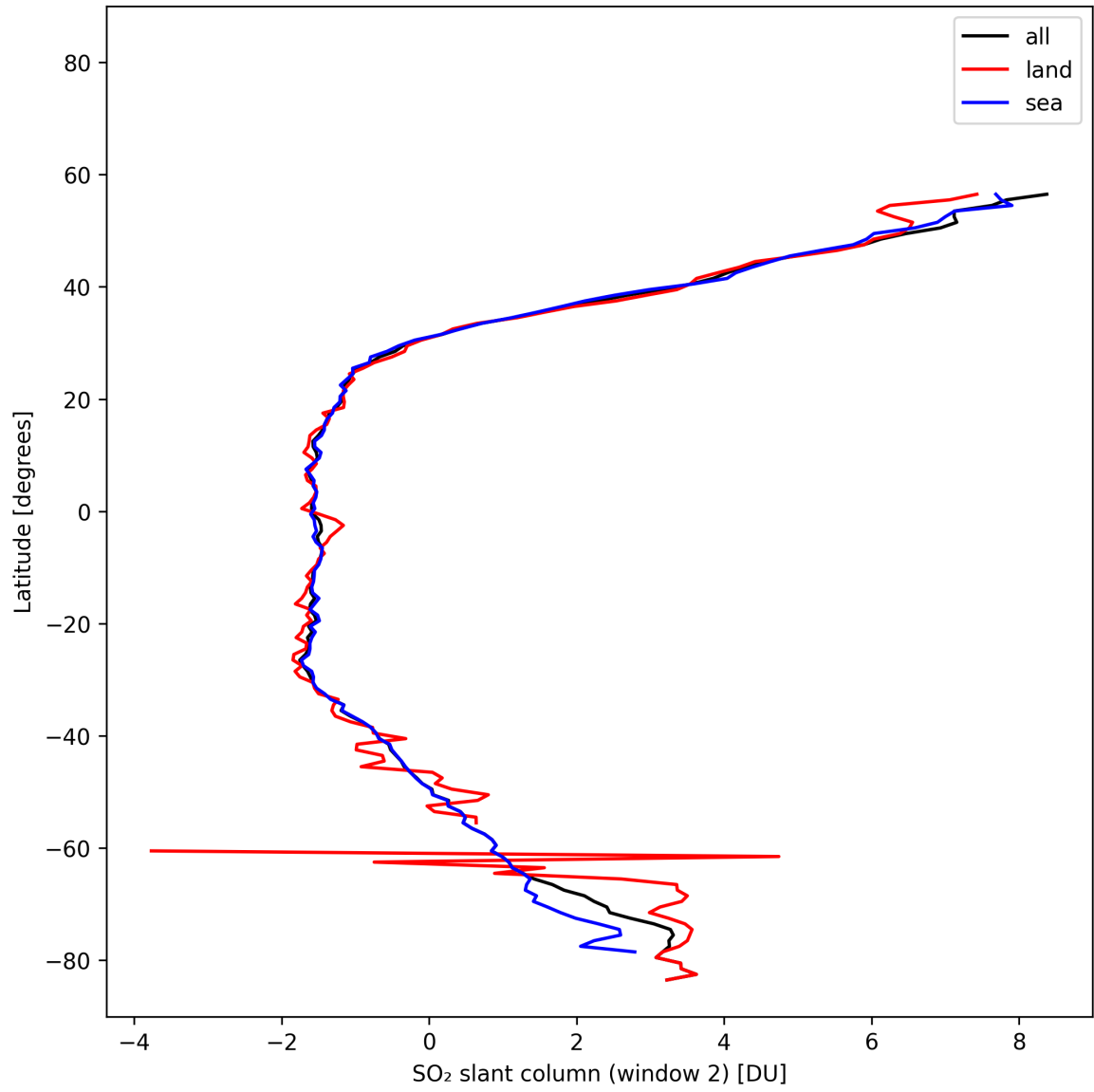


Figure 40: Zonal average of “SO₂ slant column (window 2)” for 2025-02-11 to 2025-02-11.

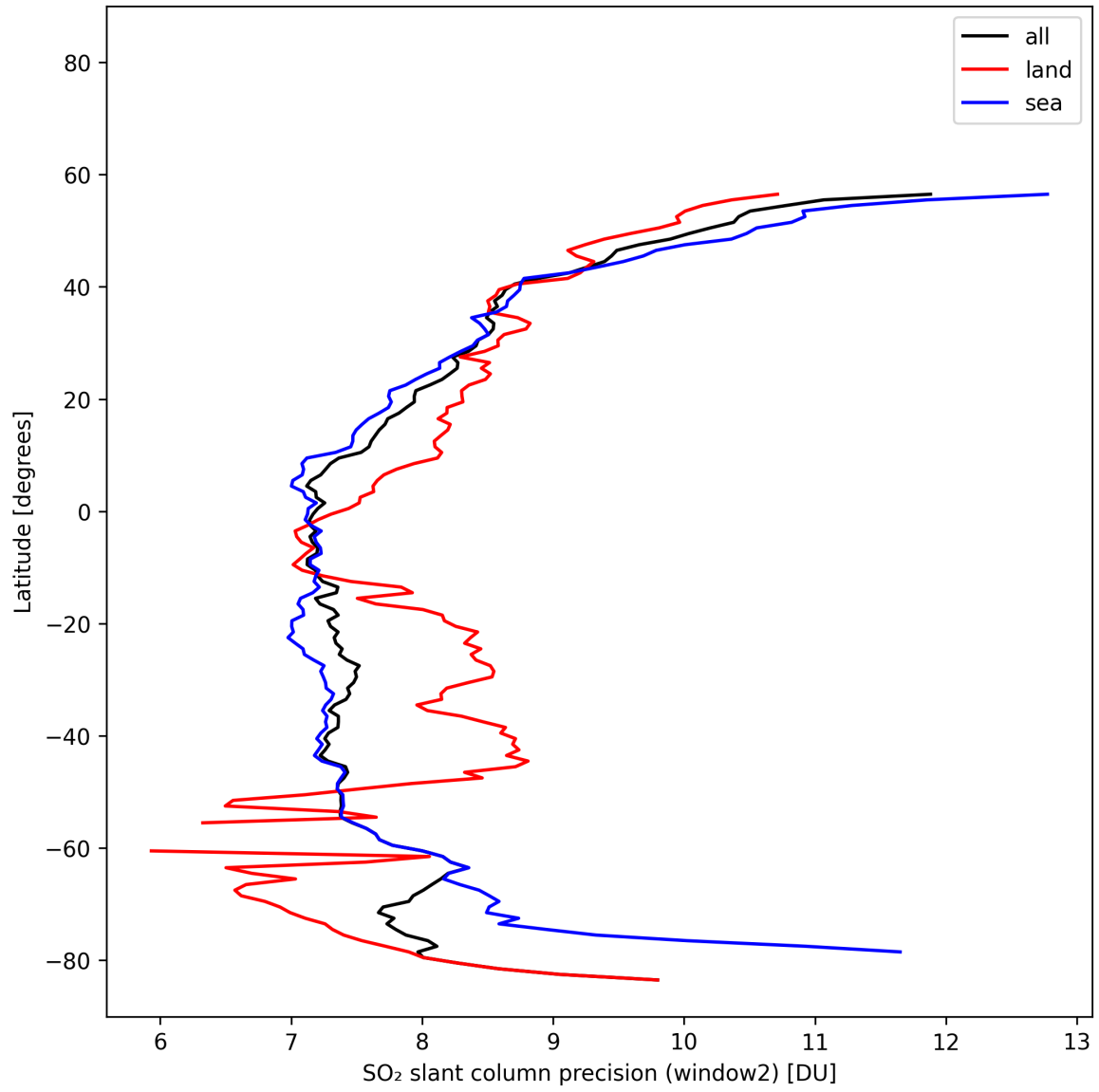


Figure 41: Zonal average of “SO₂ slant column precision (window2)” for 2025-02-11 to 2025-02-11.

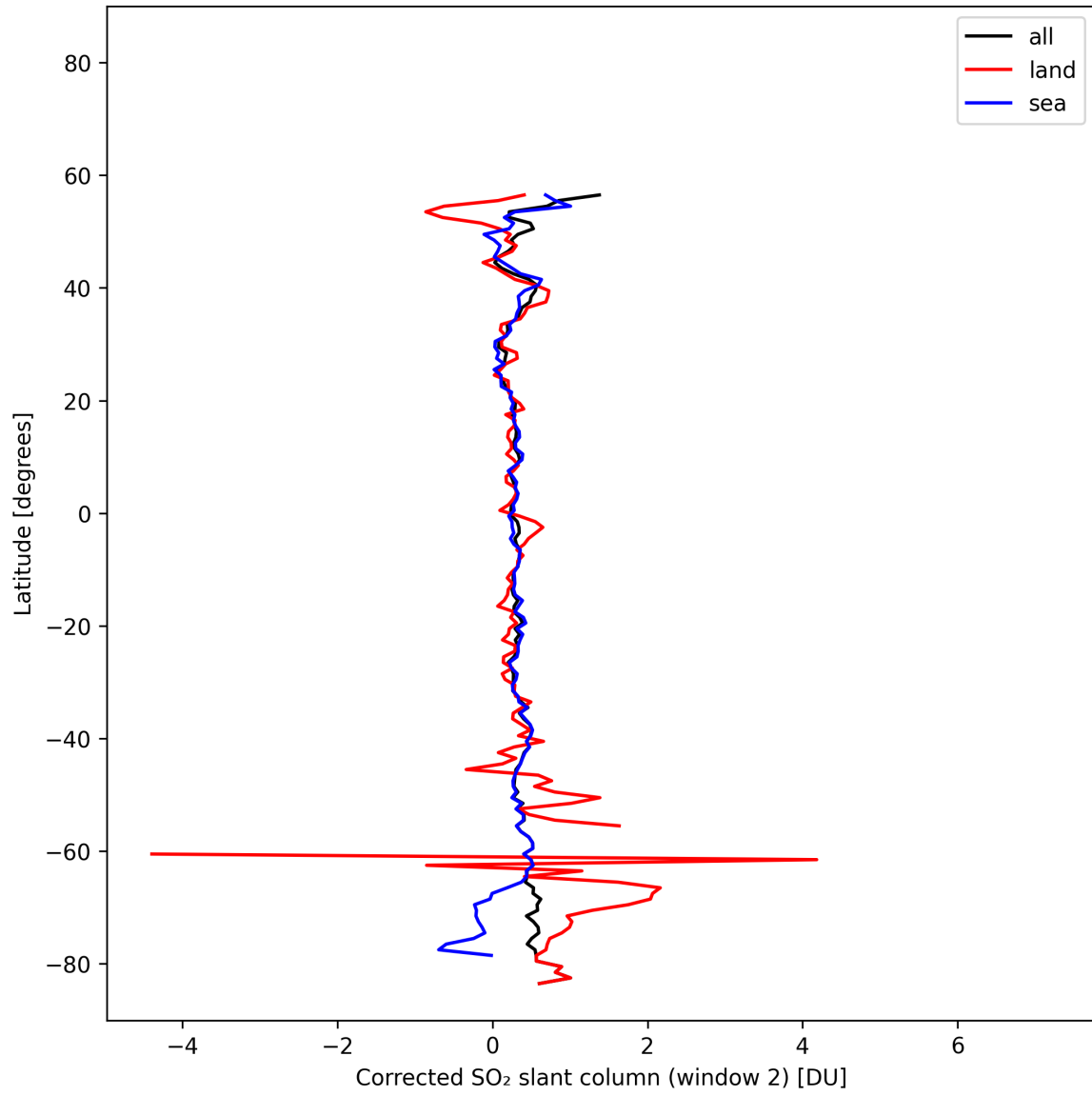


Figure 42: Zonal average of “Corrected SO₂ slant column (window 2)” for 2025-02-11 to 2025-02-11.

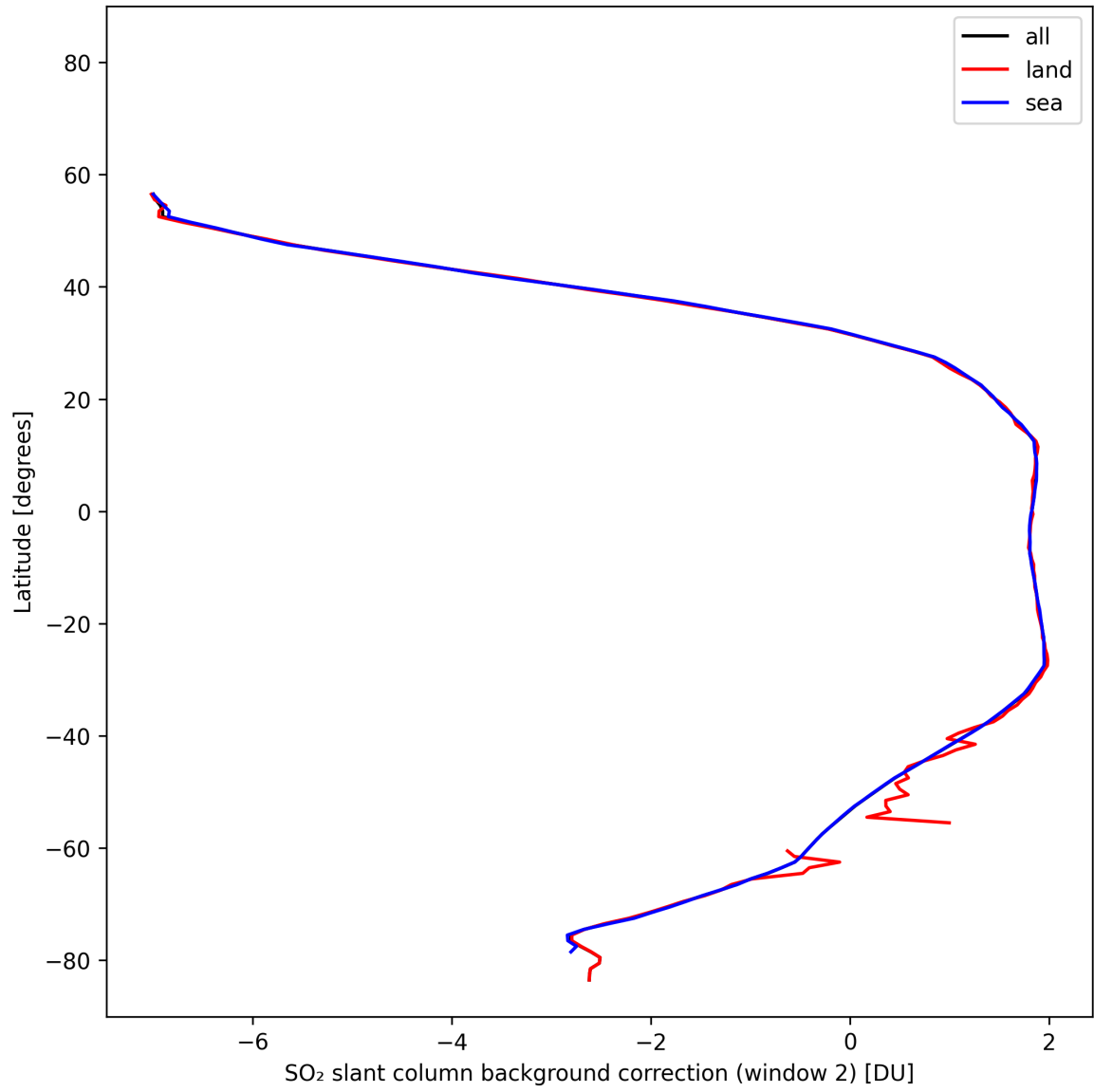


Figure 43: Zonal average of “SO₂ slant column background correction (window 2)” for 2025-02-11 to 2025-02-11.

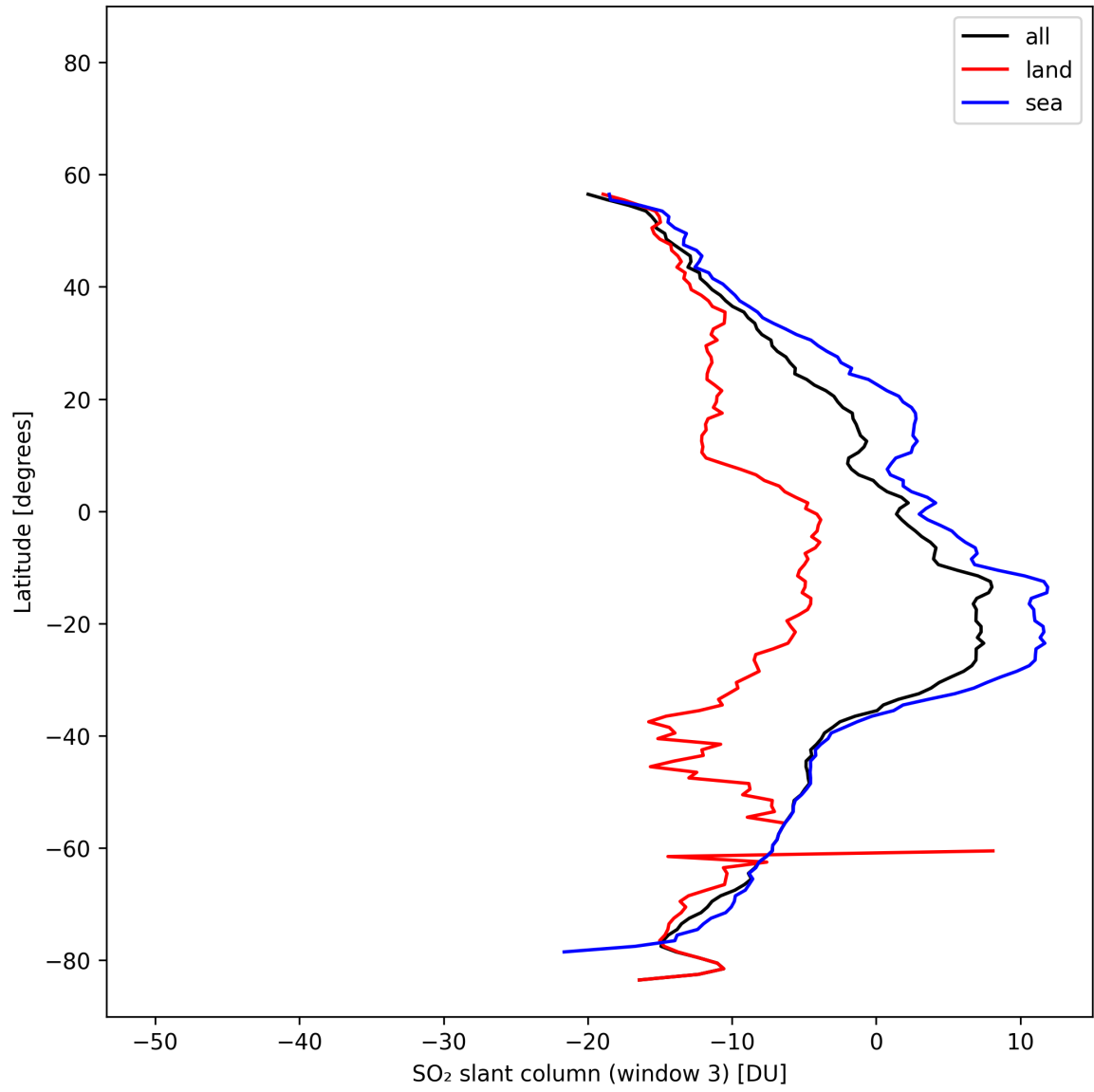


Figure 44: Zonal average of “SO₂ slant column (window 3)” for 2025-02-11 to 2025-02-11.

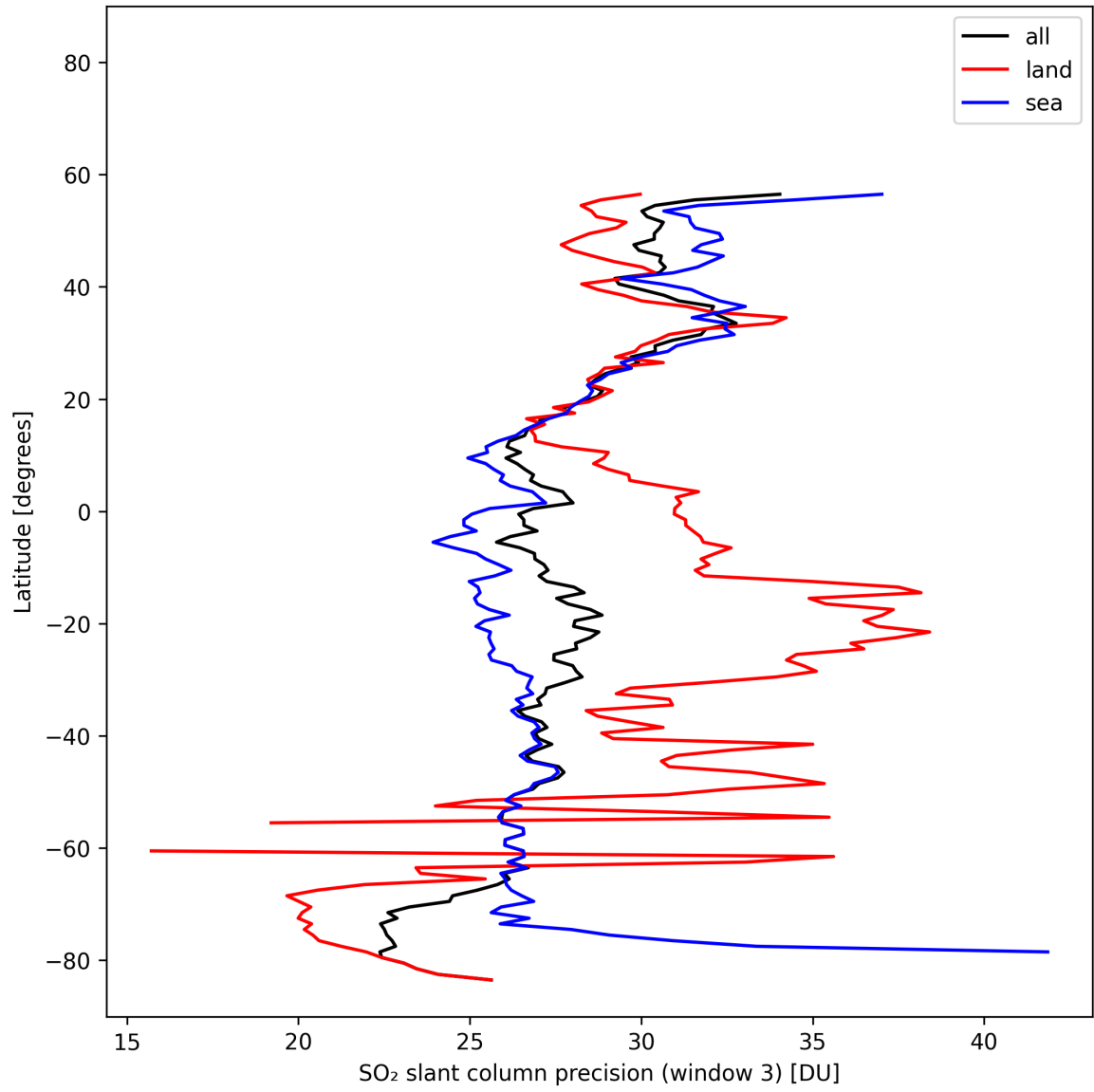


Figure 45: Zonal average of “SO₂ slant column precision (window 3)” for 2025-02-11 to 2025-02-11.

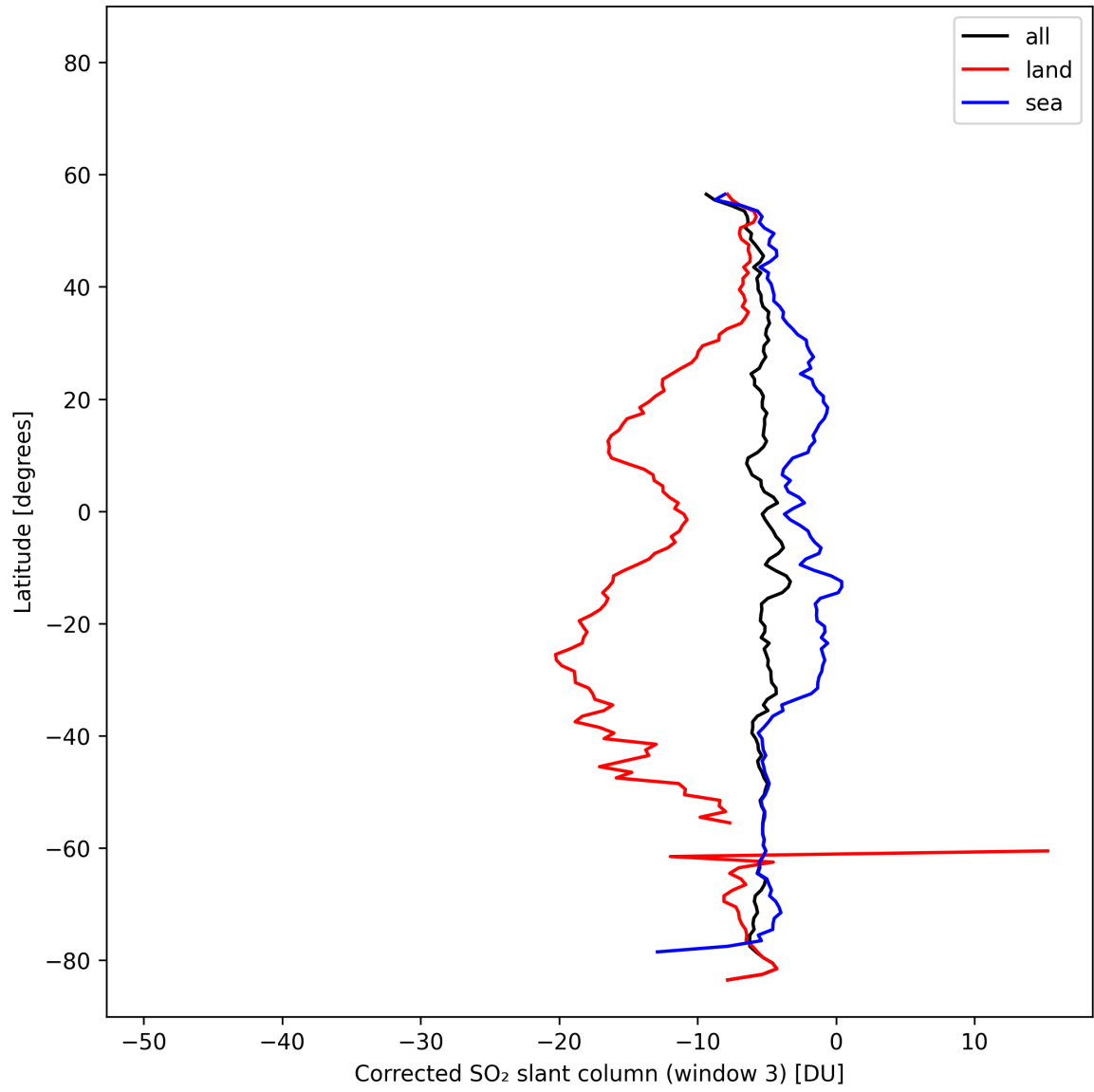


Figure 46: Zonal average of “Corrected SO₂ slant column (window 3)” for 2025-02-11 to 2025-02-11.

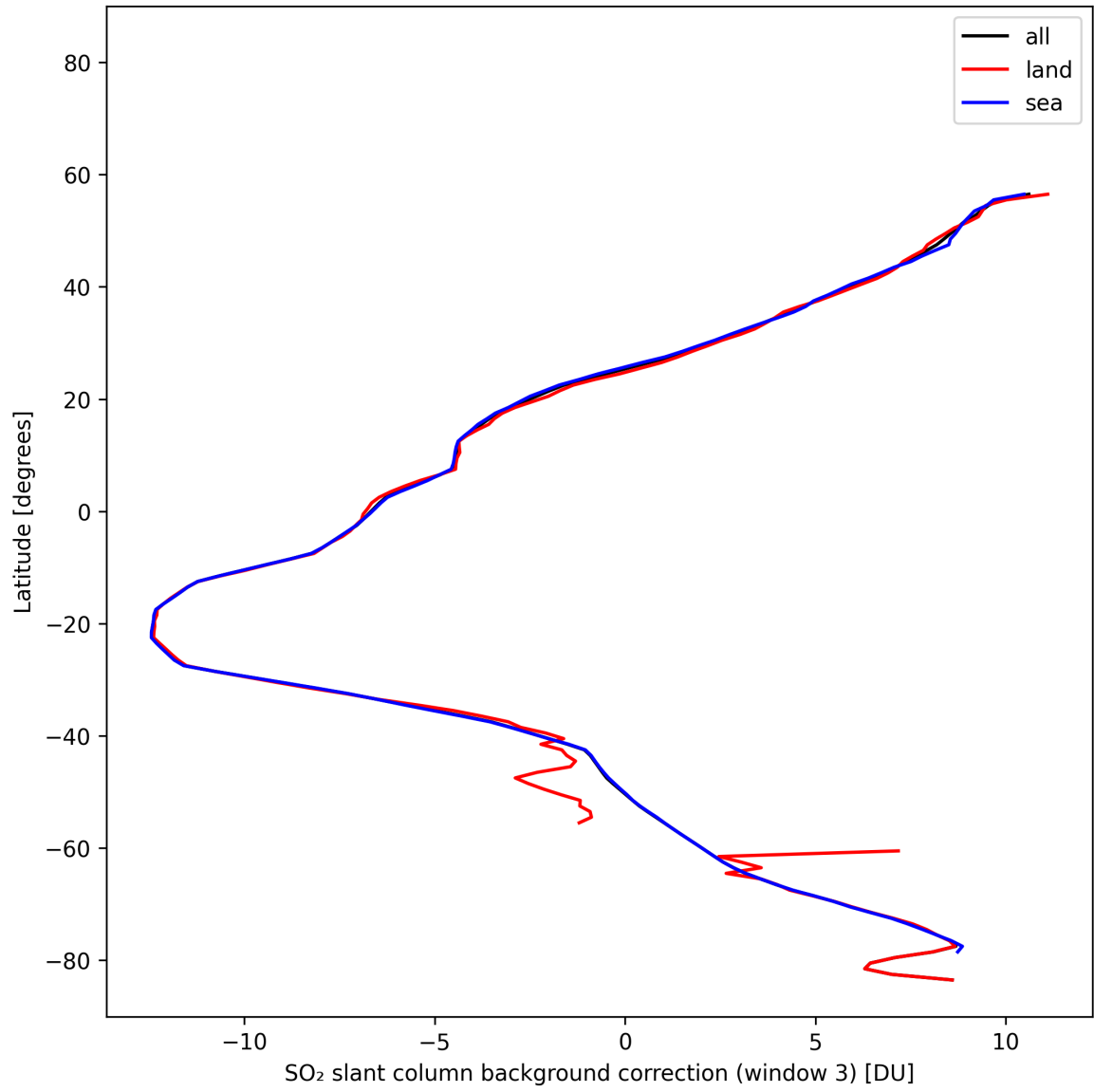


Figure 47: Zonal average of “SO₂ slant column background correction (window 3)” for 2025-02-11 to 2025-02-11.

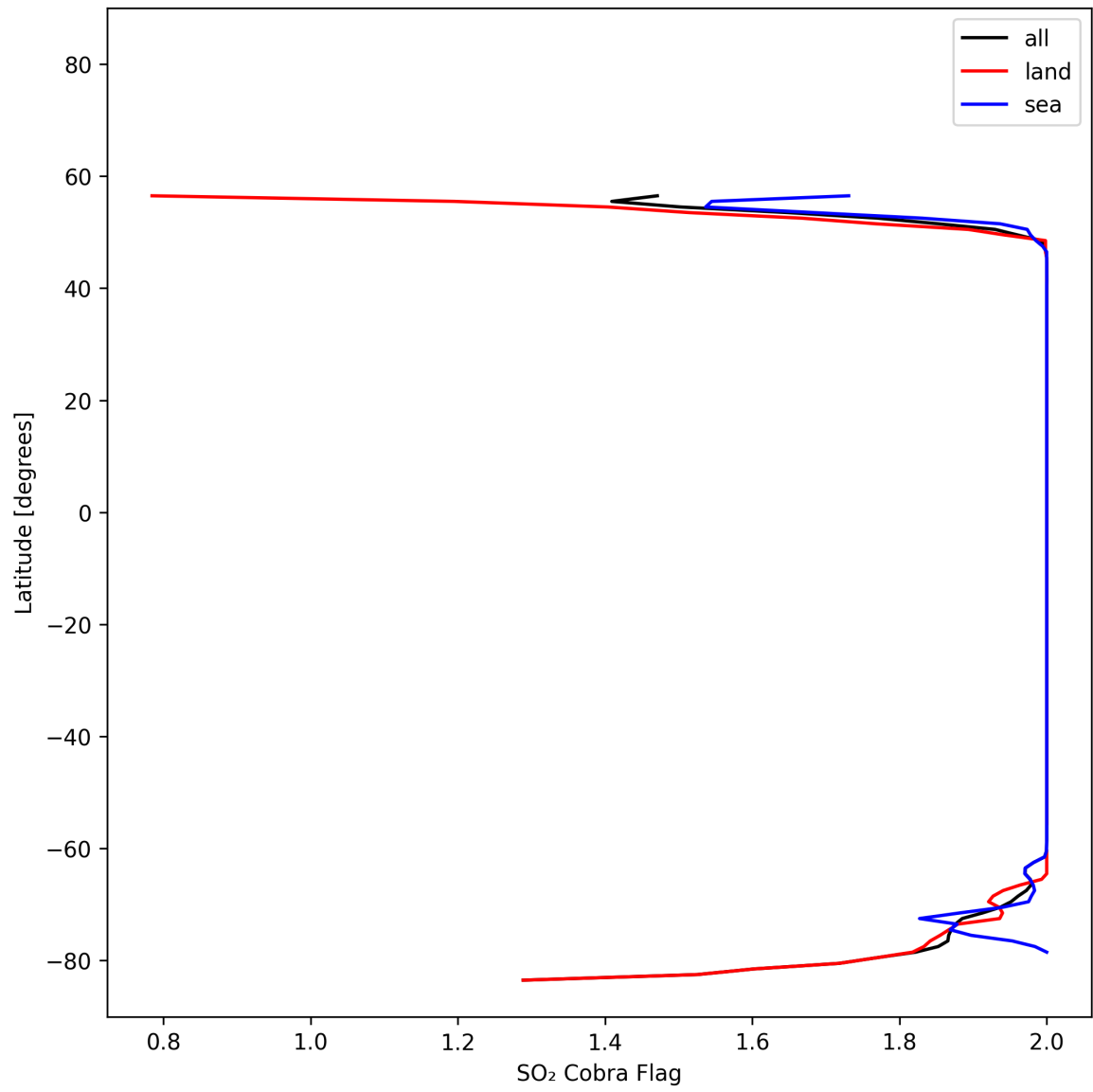


Figure 48: Zonal average of “SO₂ Cobra Flag” for 2025-02-11 to 2025-02-11.

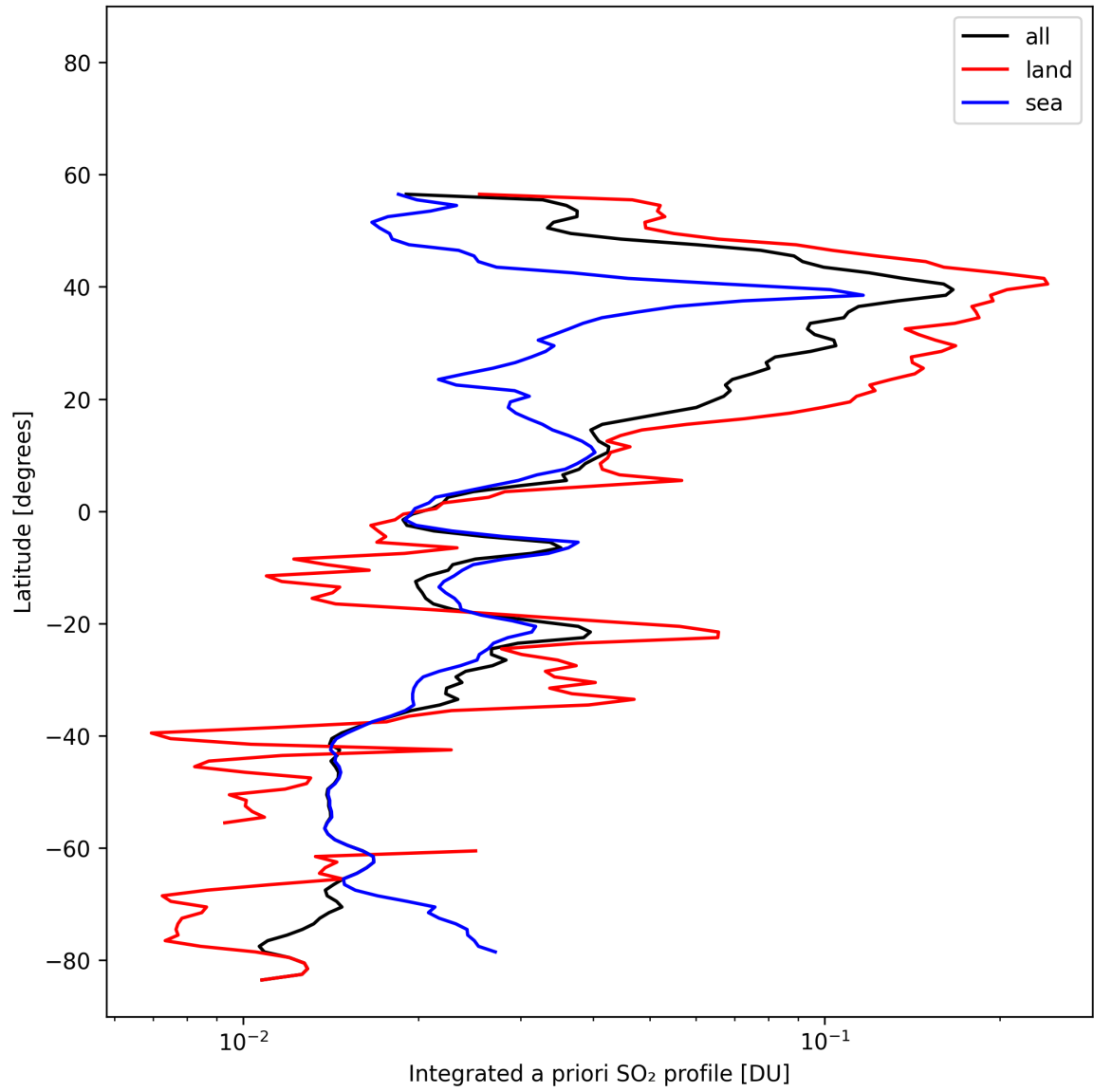


Figure 49: Zonal average of “Integrated a priori SO₂ profile” for 2025-02-11 to 2025-02-11.

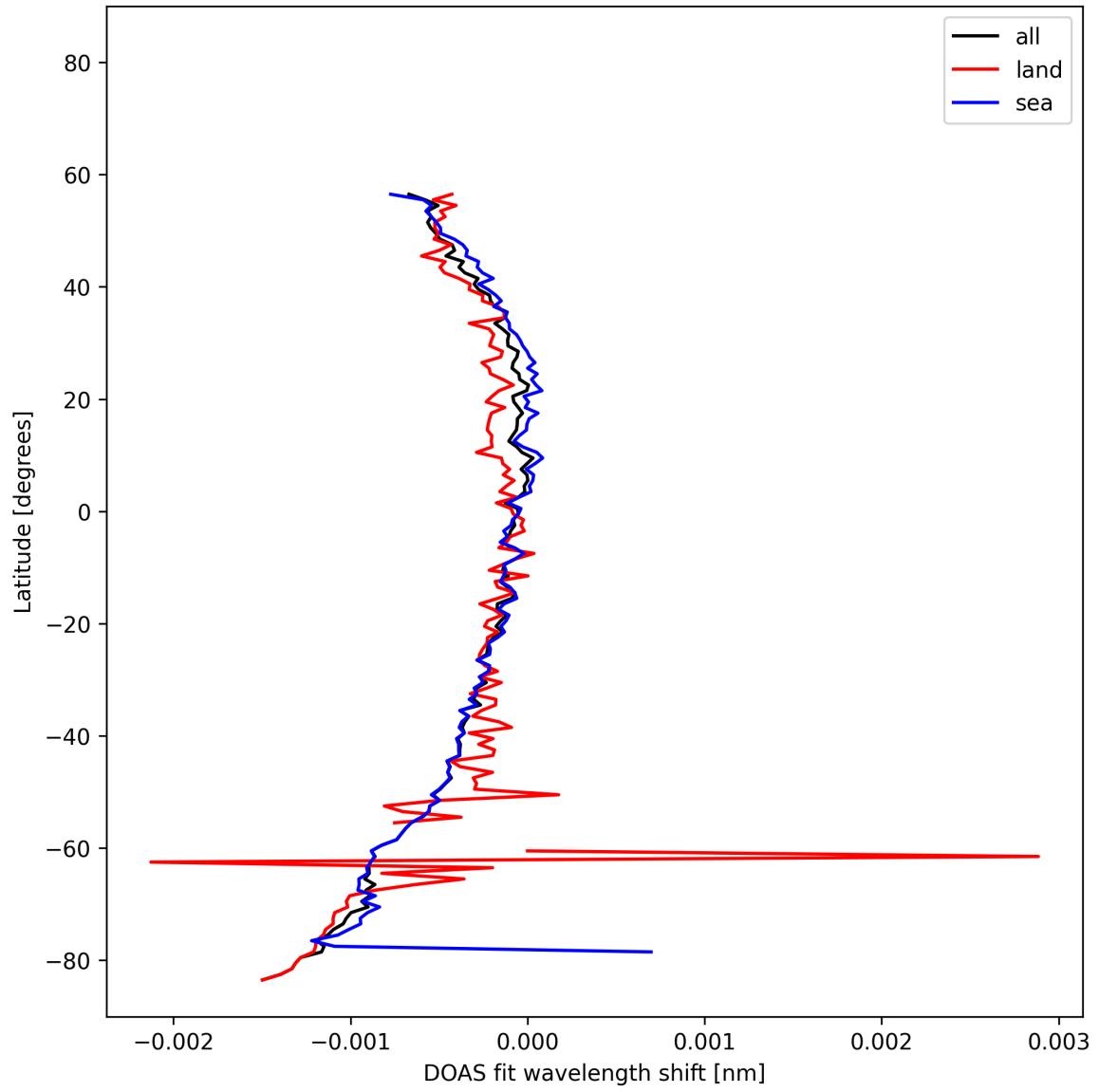


Figure 50: Zonal average of “DOAS fit wavelength shift” for 2025-02-11 to 2025-02-11.

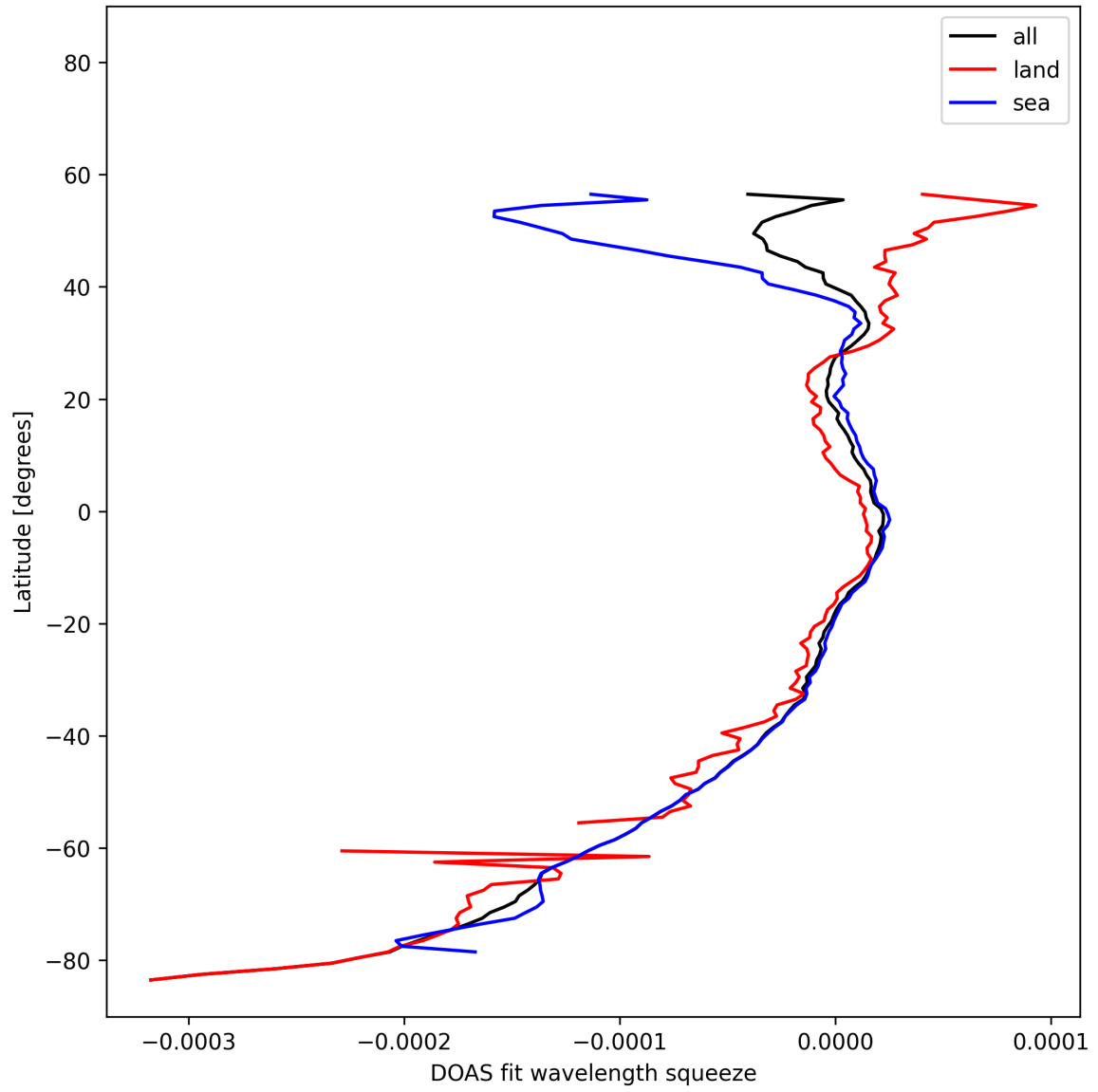


Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-02-11 to 2025-02-11.

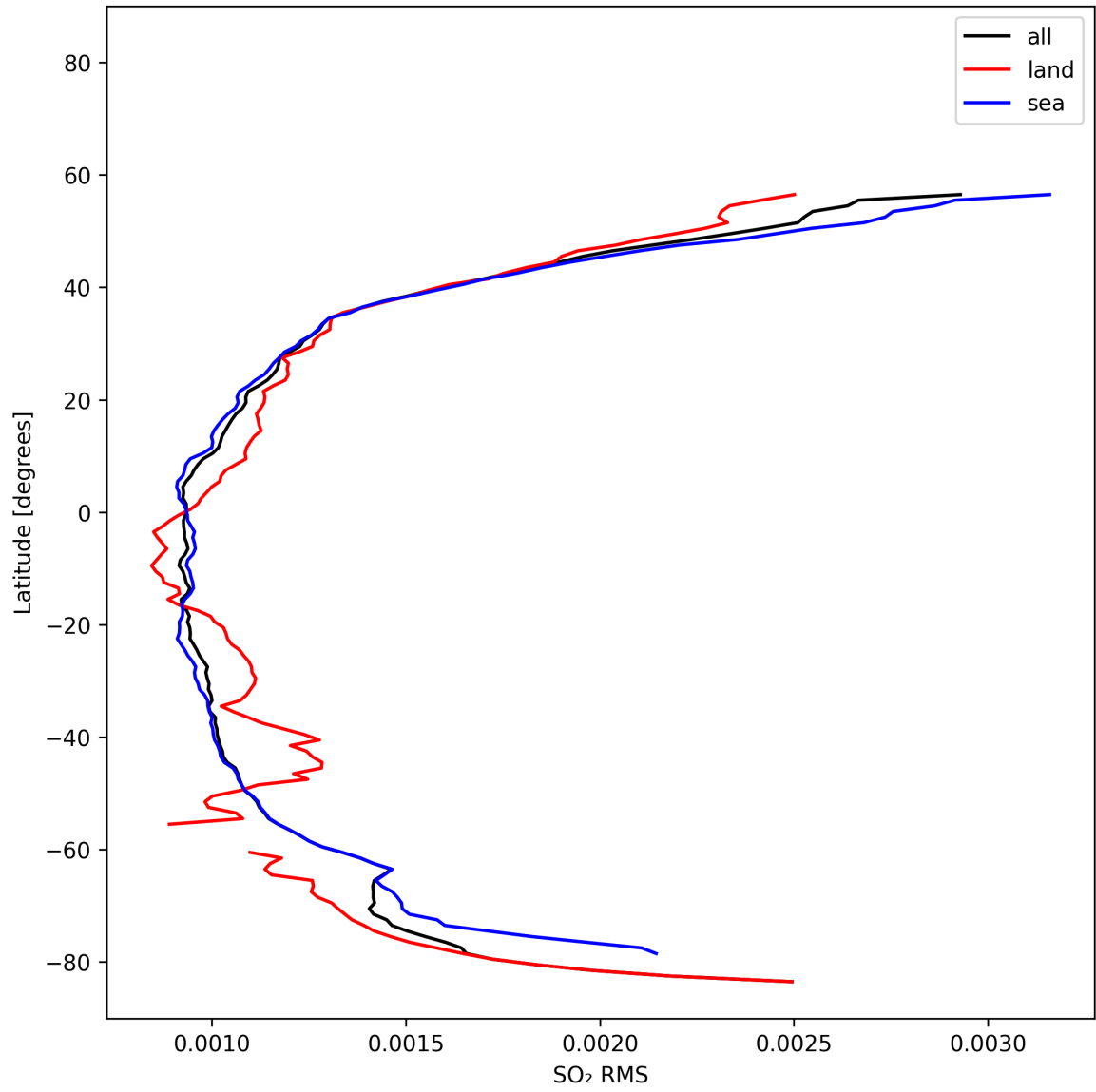


Figure 52: Zonal average of “SO₂ RMS” for 2025-02-11 to 2025-02-11.

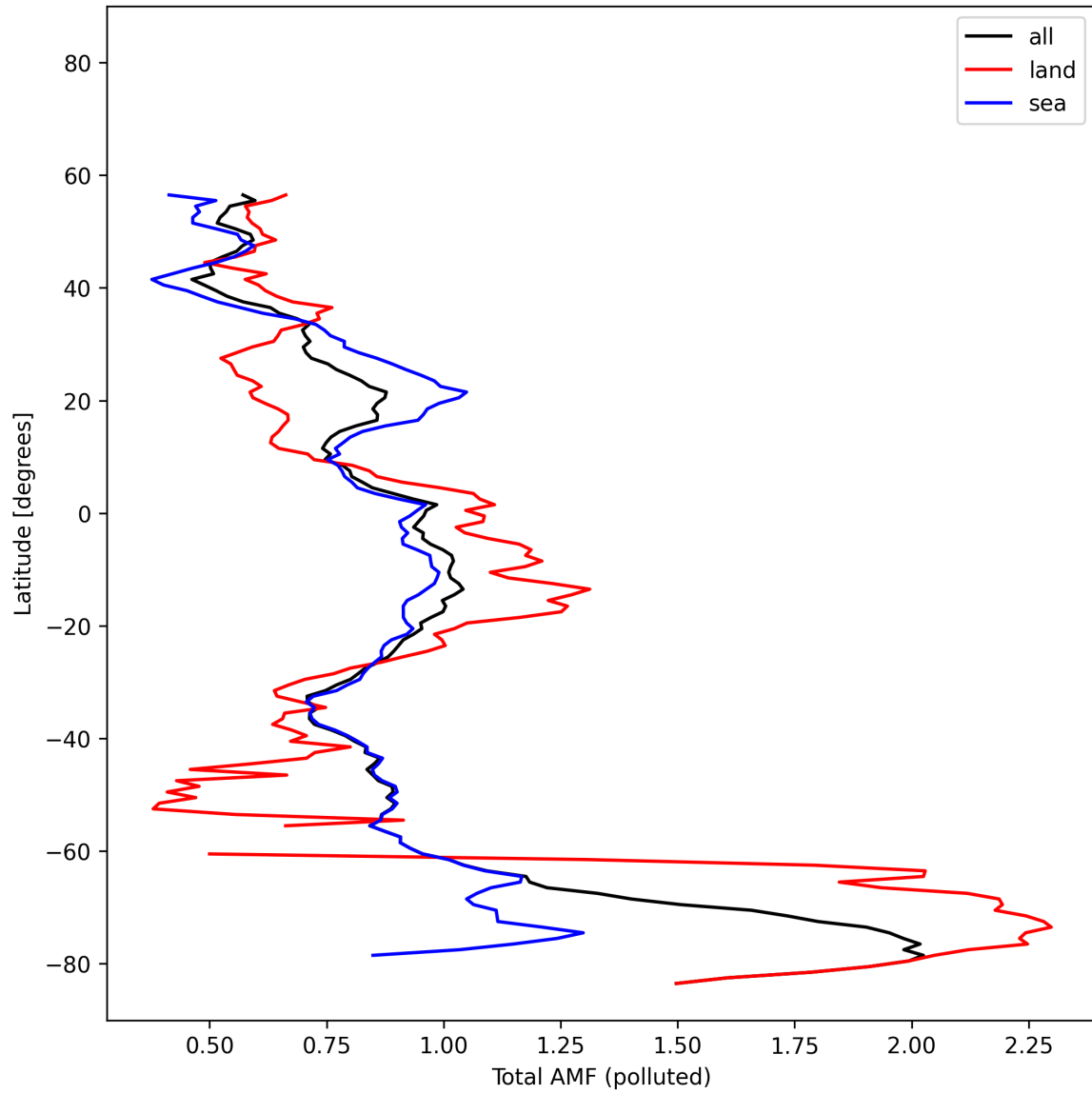


Figure 53: Zonal average of “Total AMF (polluted)” for 2025-02-11 to 2025-02-11.

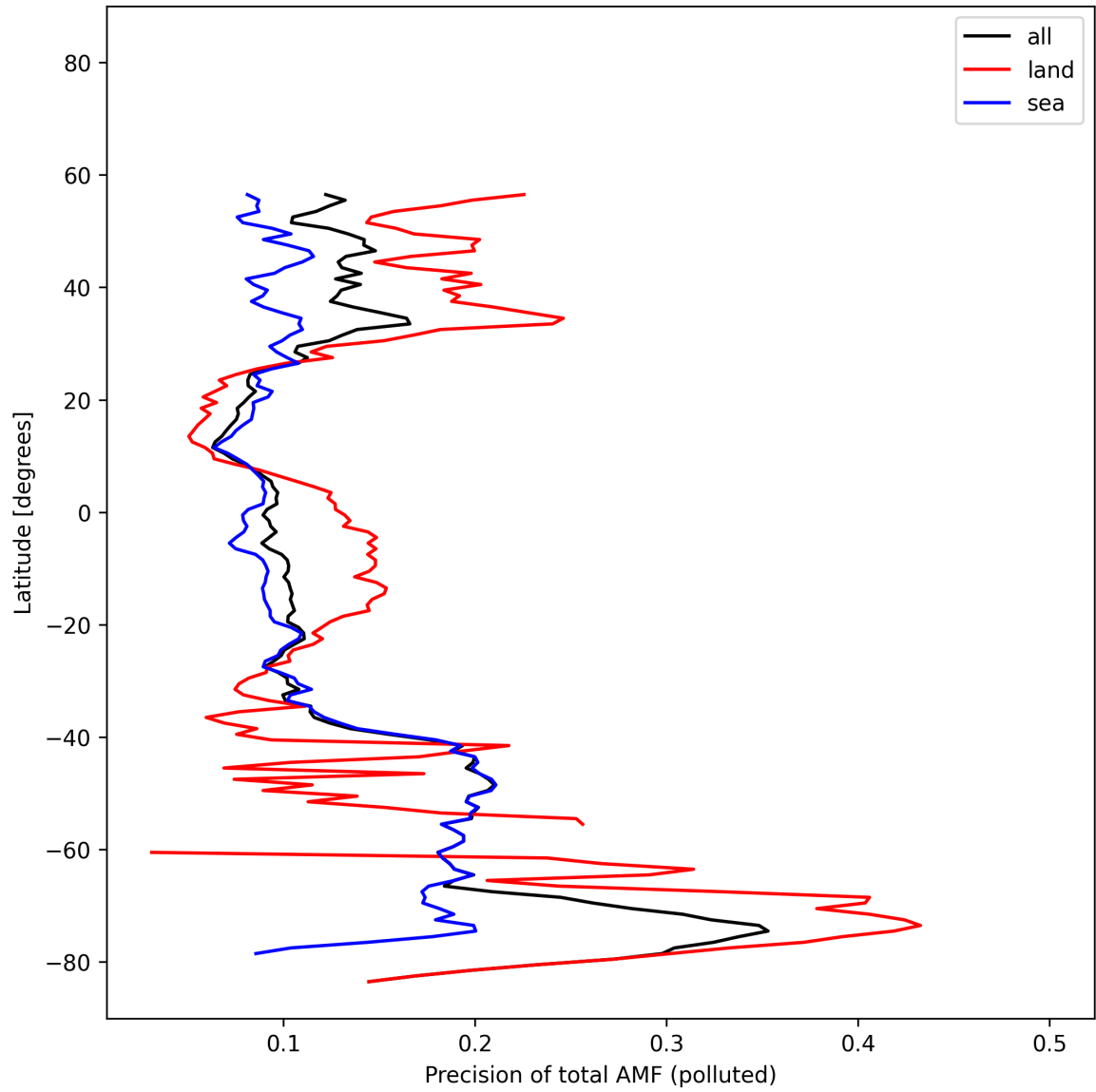


Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-02-11 to 2025-02-11.

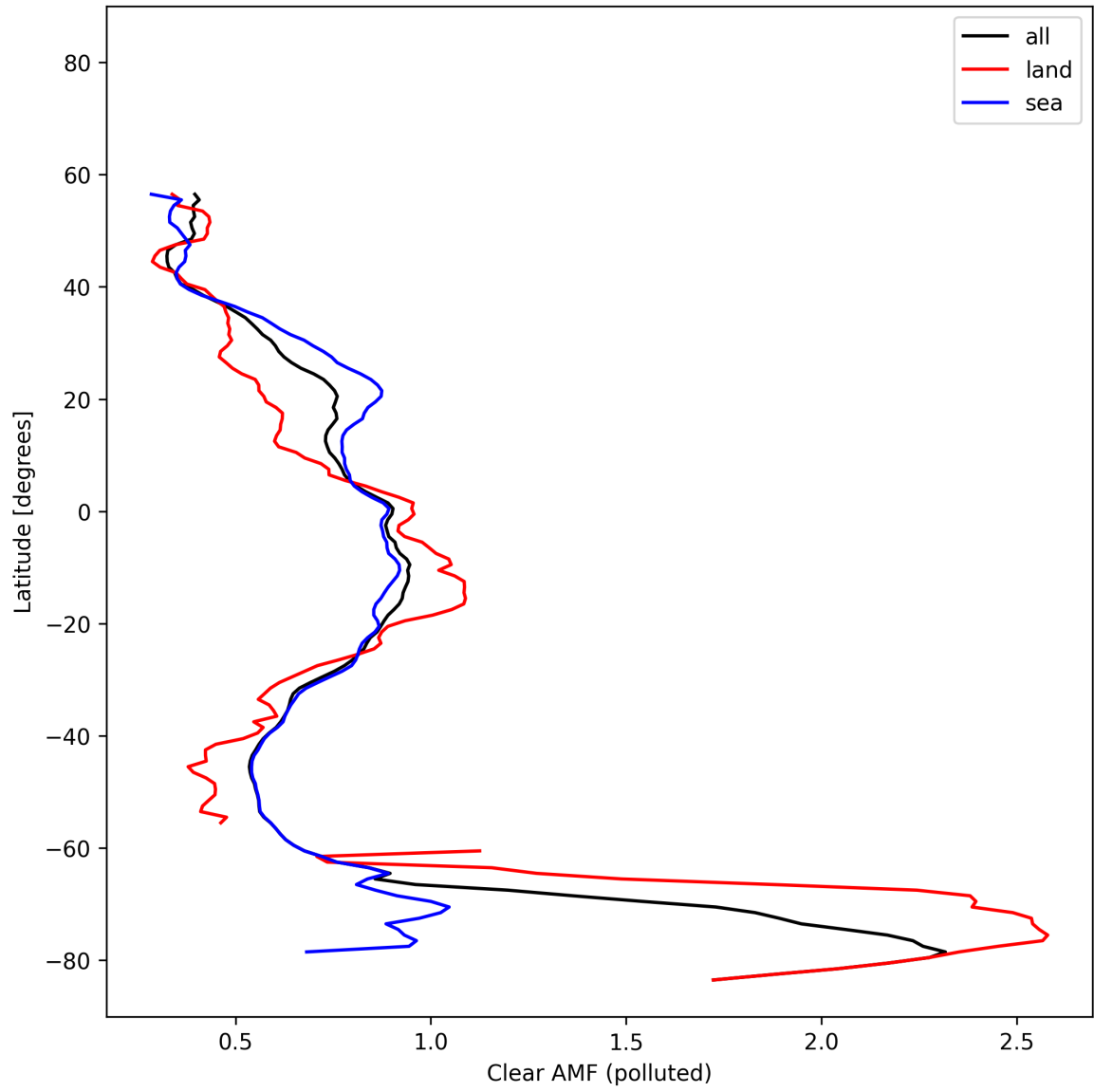


Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-02-11 to 2025-02-11.

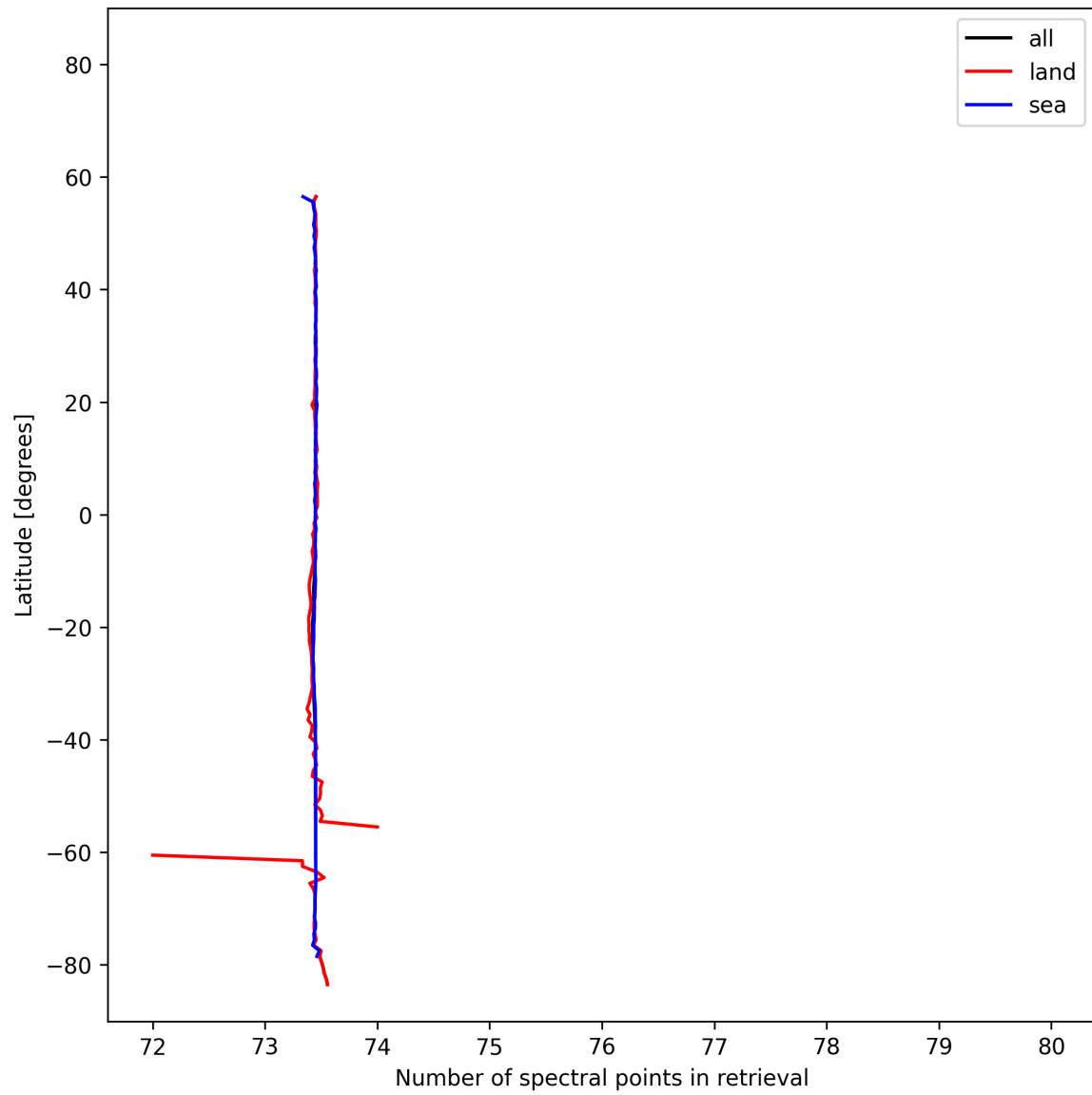


Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-02-11 to 2025-02-11.

8 Histograms

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

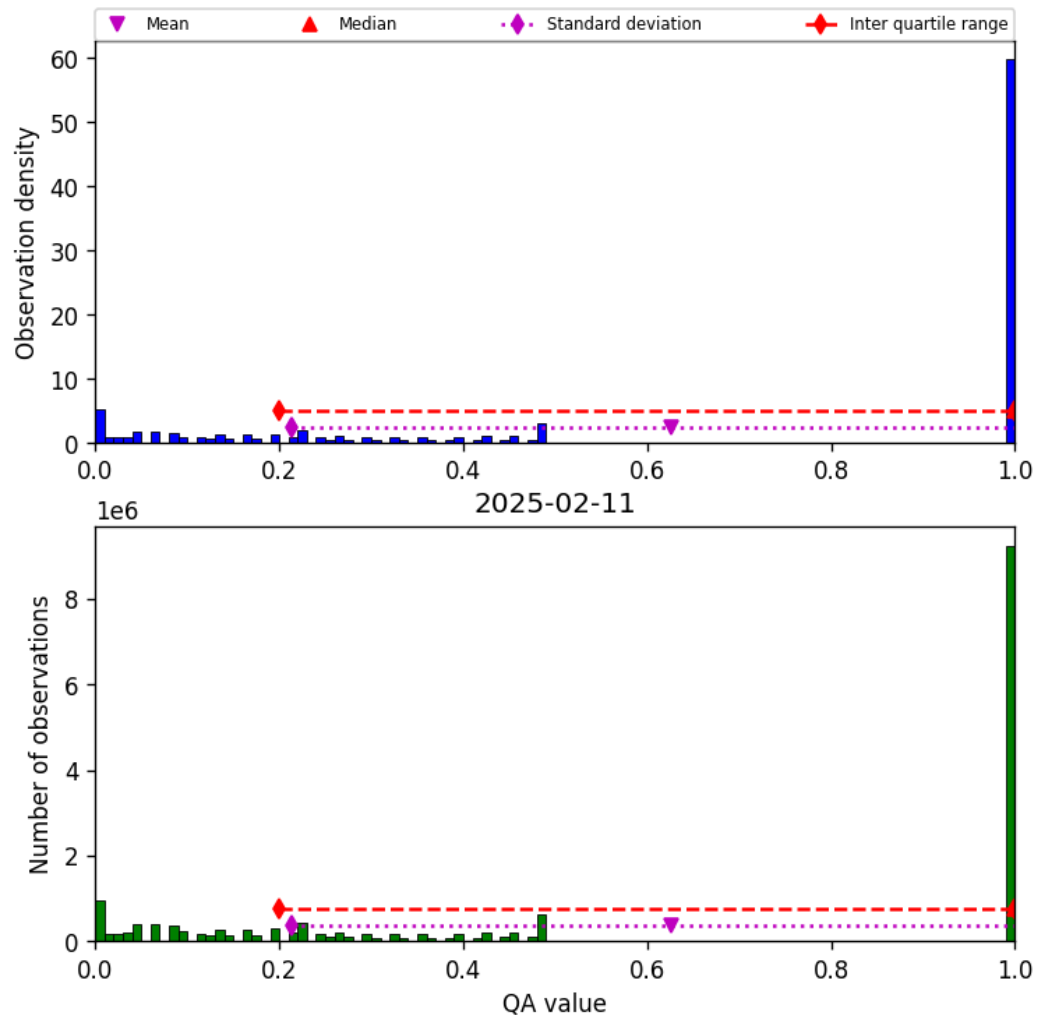


Figure 57: Histogram of “QA value” for 2025-02-11 to 2025-02-11

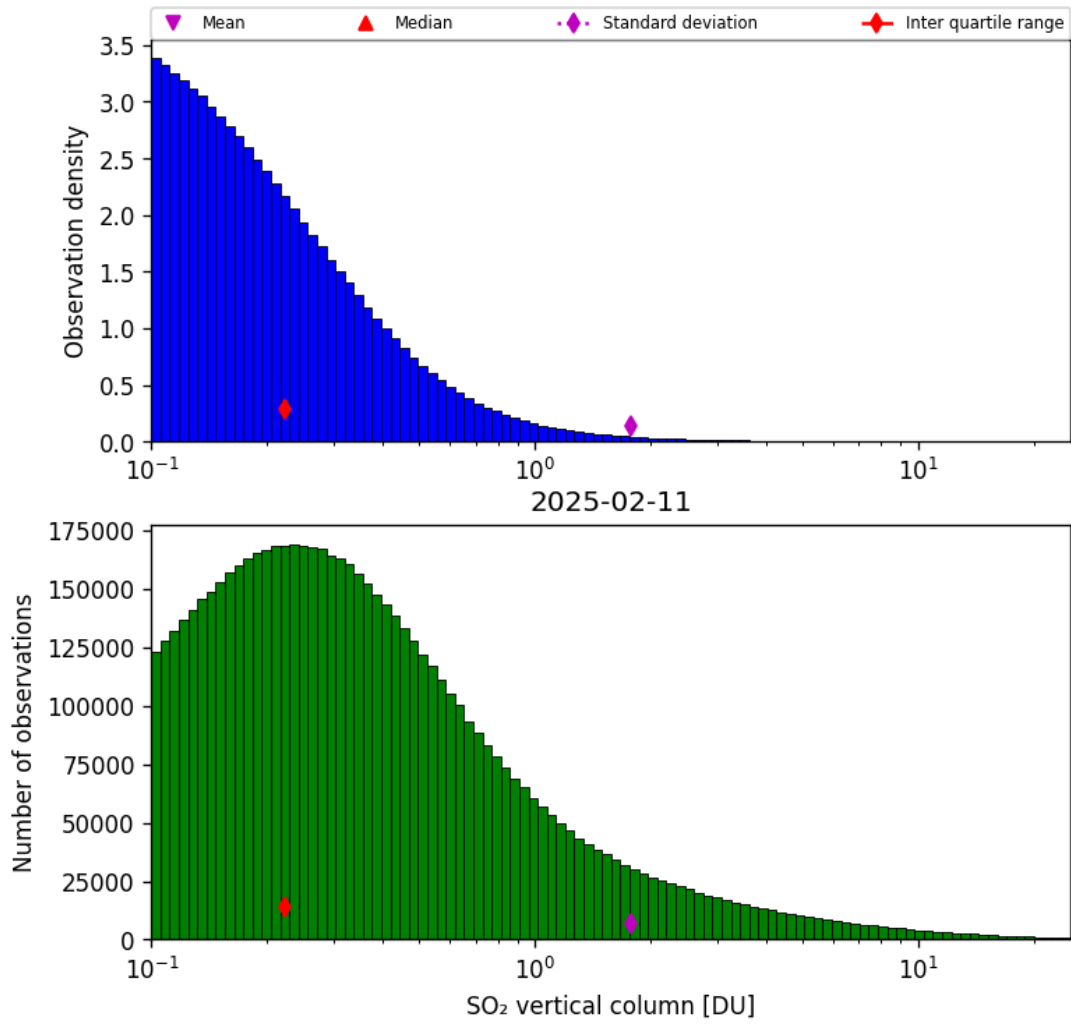


Figure 58: Histogram of “SO₂ vertical column” for 2025-02-11 to 2025-02-11

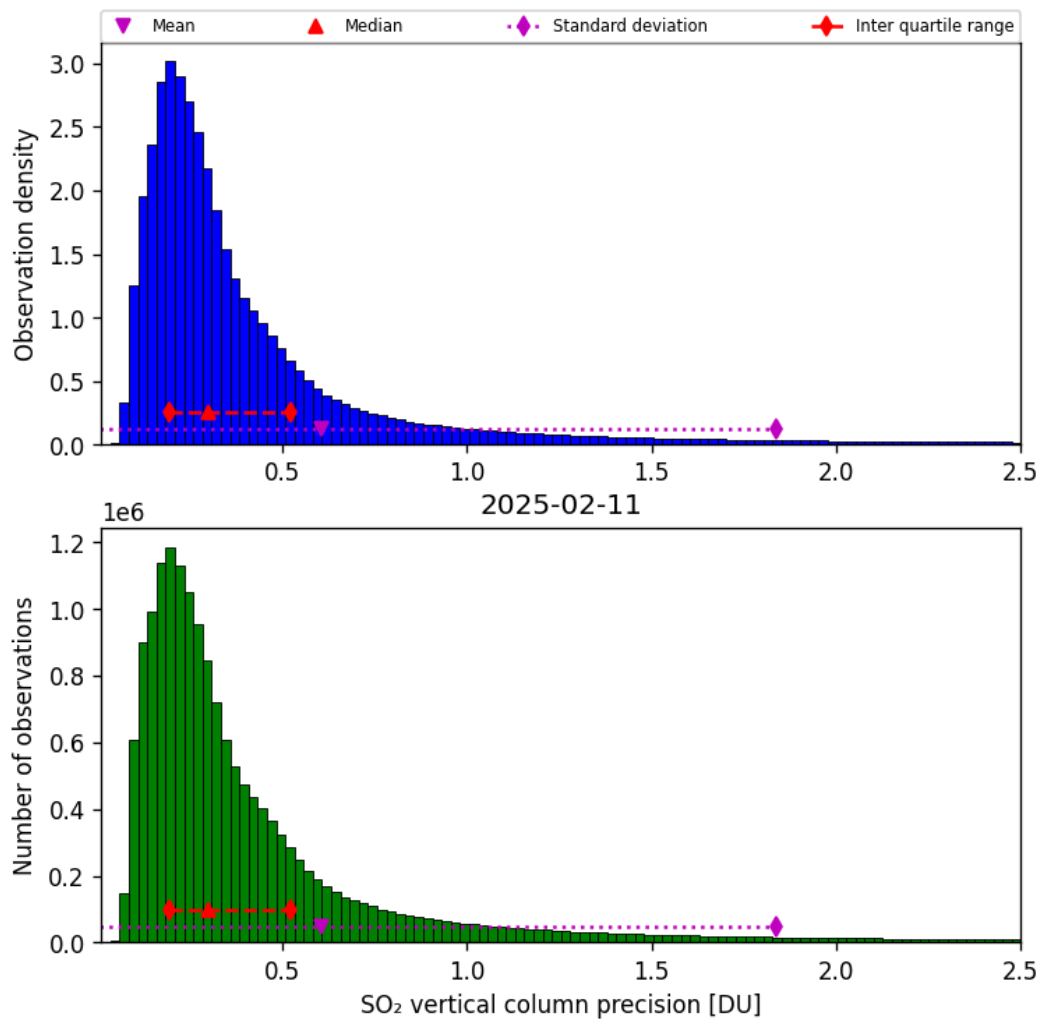


Figure 59: Histogram of "SO₂ vertical column precision" for 2025-02-11 to 2025-02-11

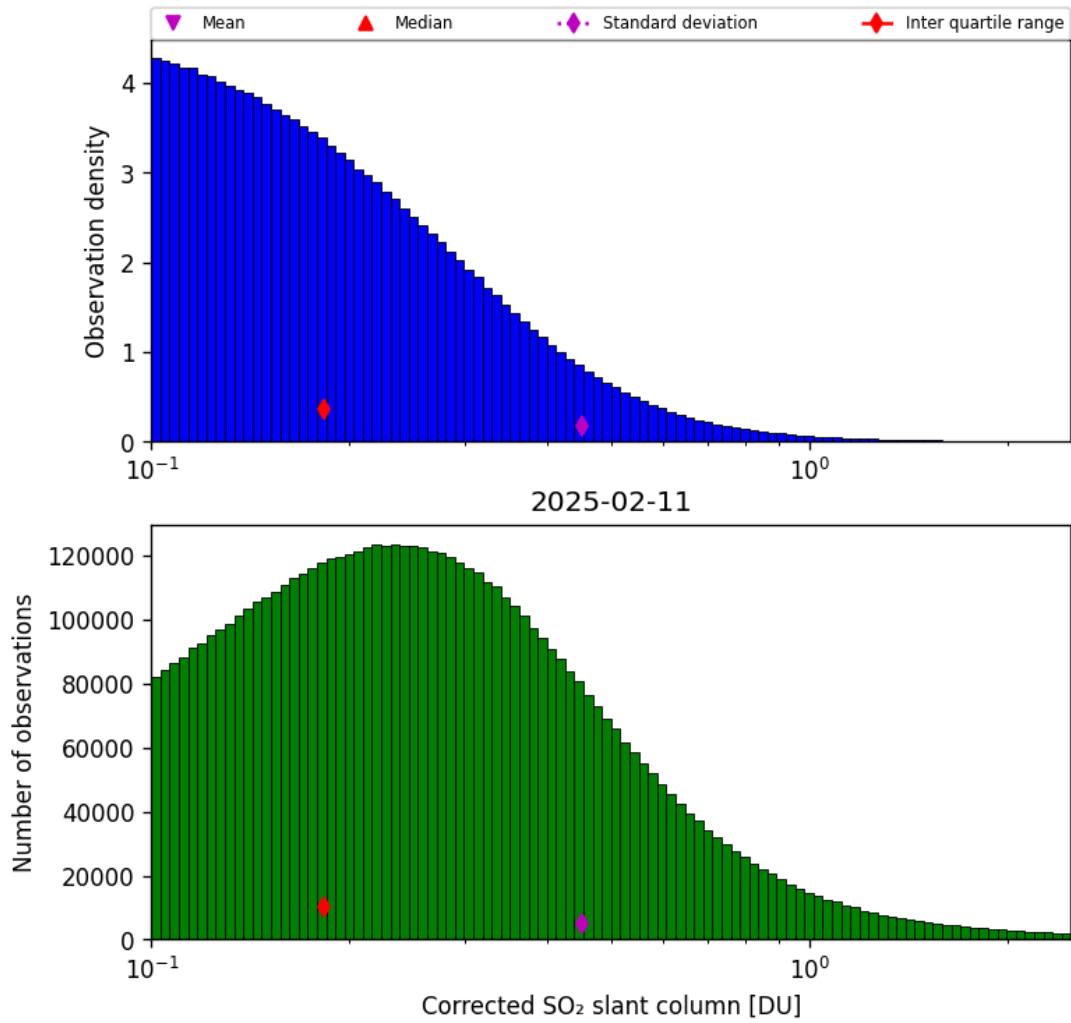


Figure 60: Histogram of “Corrected SO₂ slant column” for 2025-02-11 to 2025-02-11

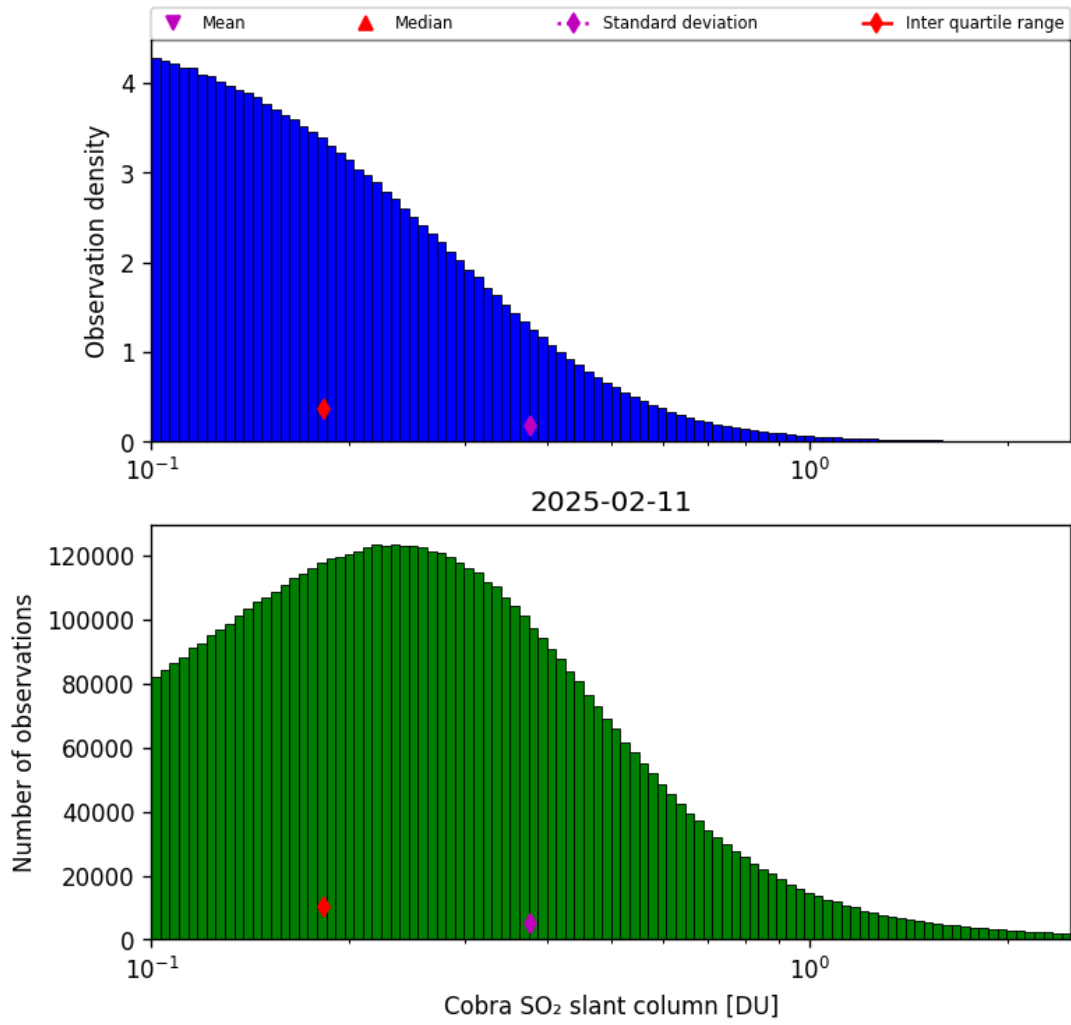


Figure 61: Histogram of “Cobra SO₂ slant column” for 2025-02-11 to 2025-02-11

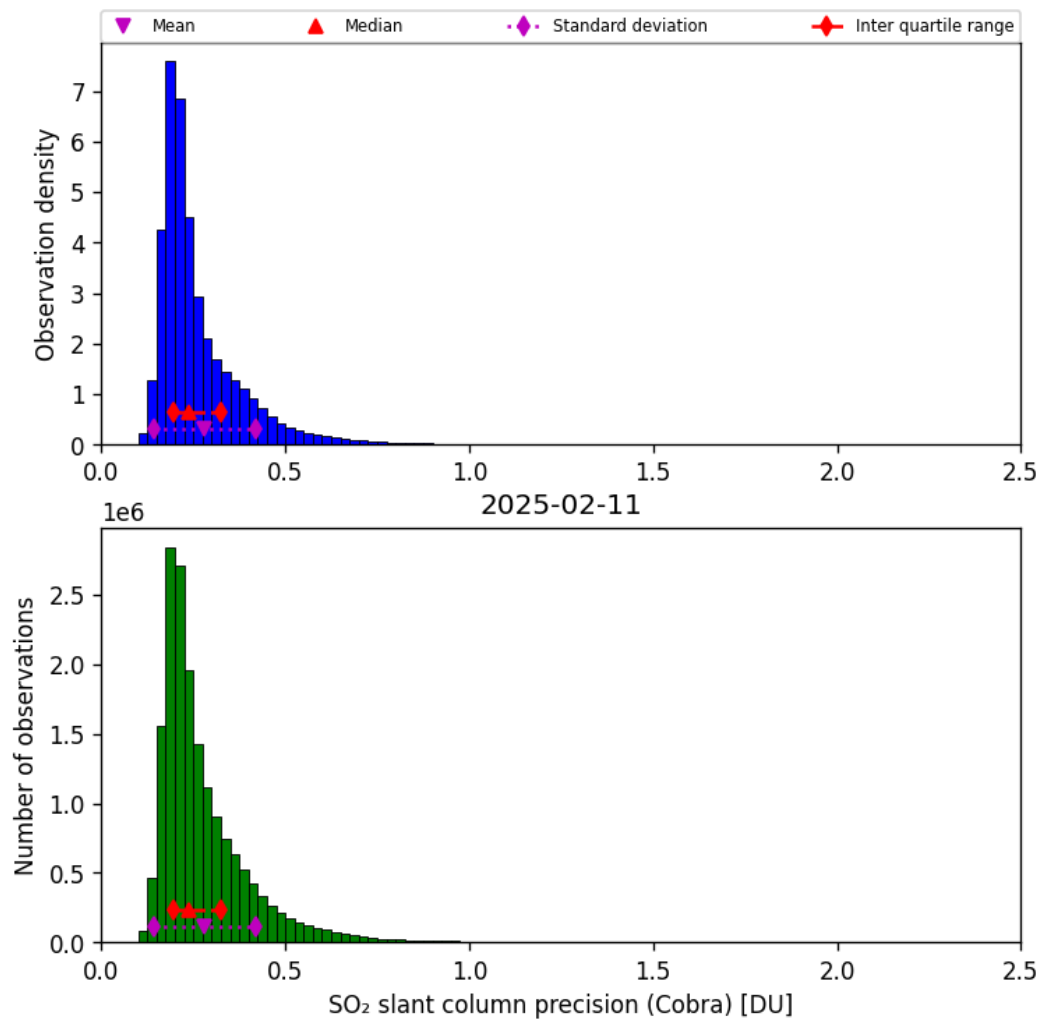


Figure 62: Histogram of “SO₂ slant column precision (Cobra)” for 2025-02-11 to 2025-02-11

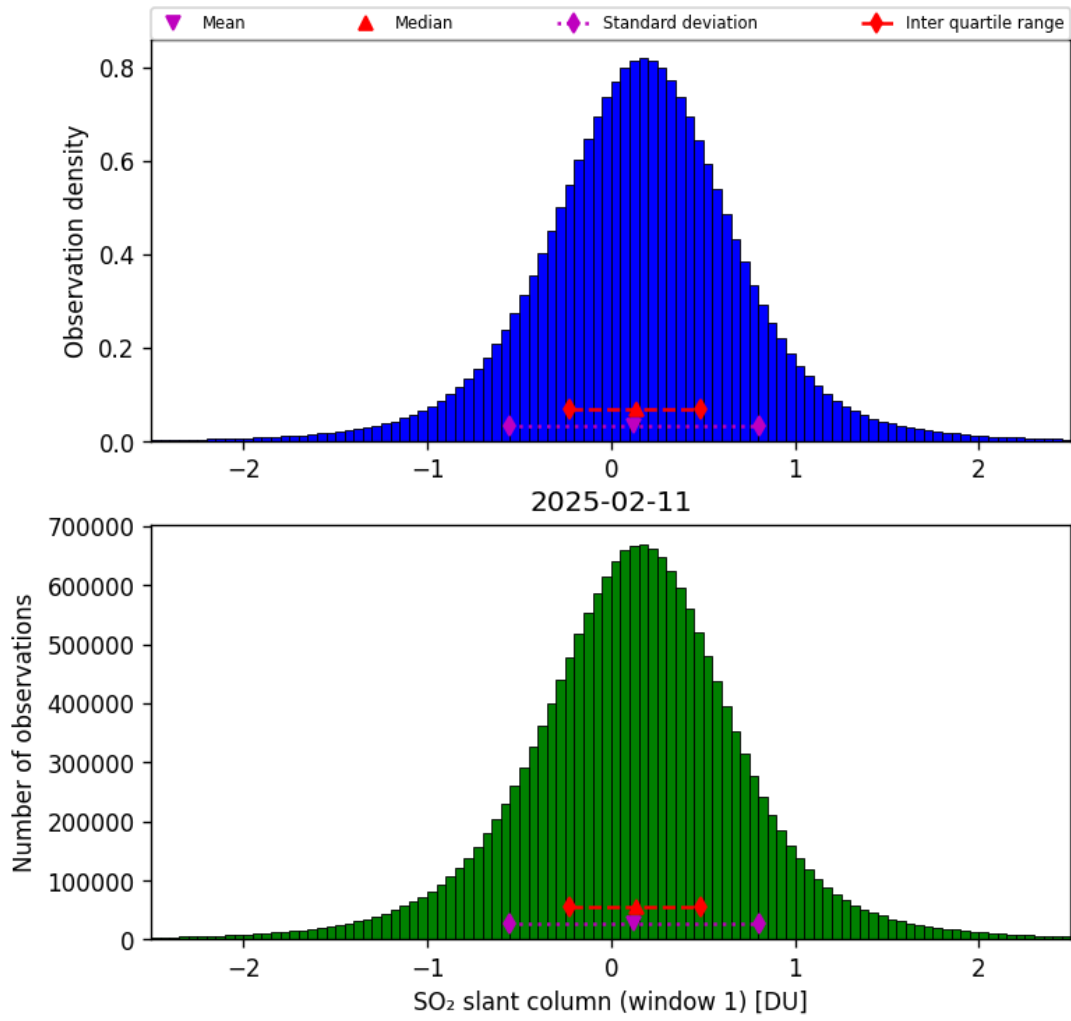


Figure 63: Histogram of “SO₂ slant column (window 1)” for 2025-02-11 to 2025-02-11

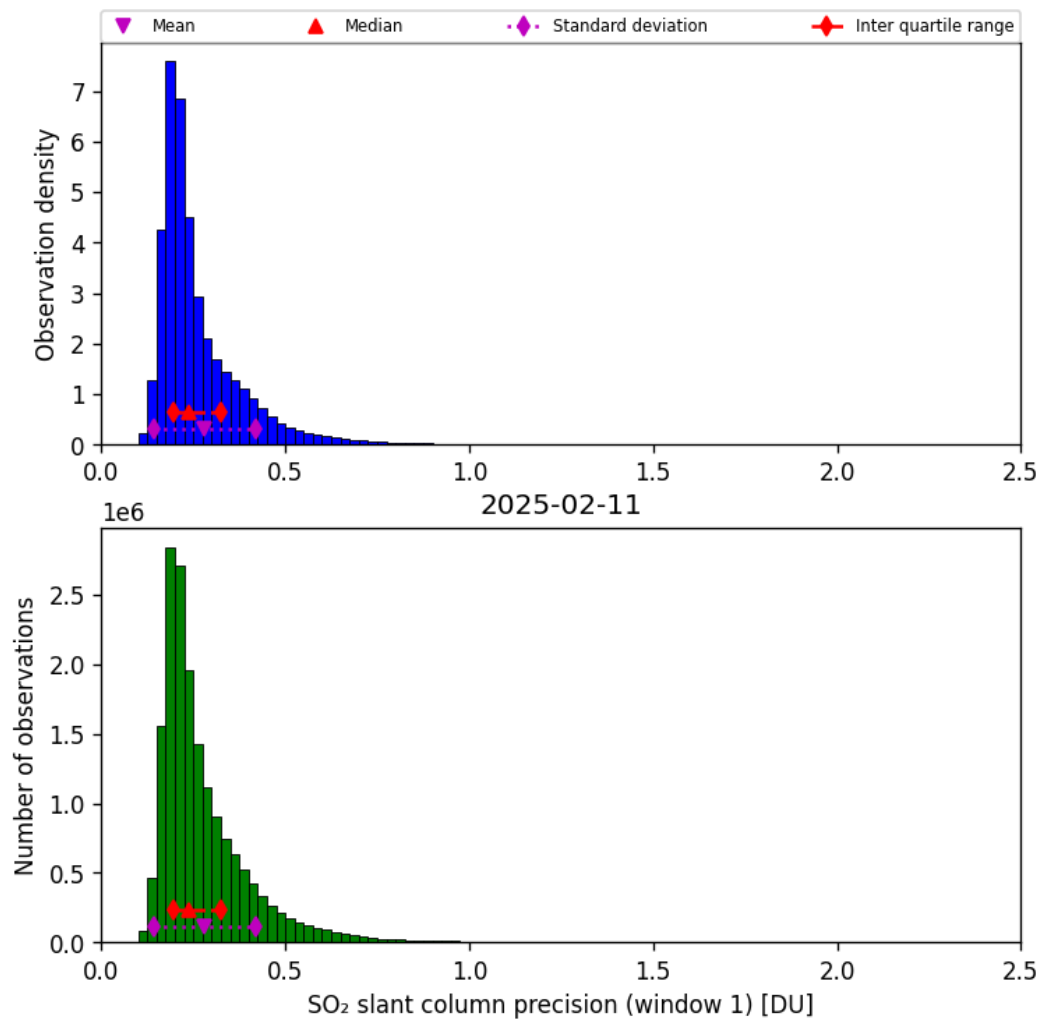


Figure 64: Histogram of “SO₂ slant column precision (window 1)” for 2025-02-11 to 2025-02-11

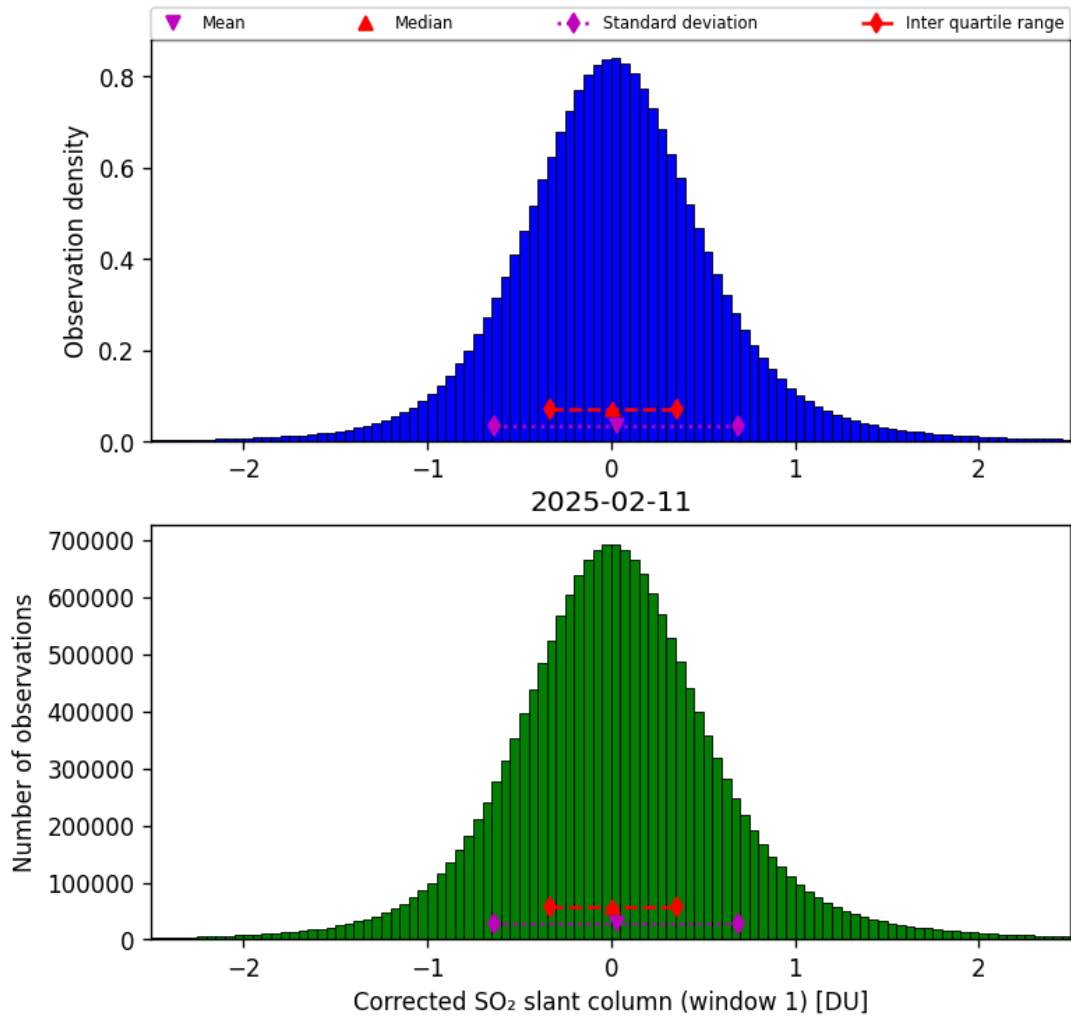


Figure 65: Histogram of “Corrected SO₂ slant column (window 1)” for 2025-02-11 to 2025-02-11

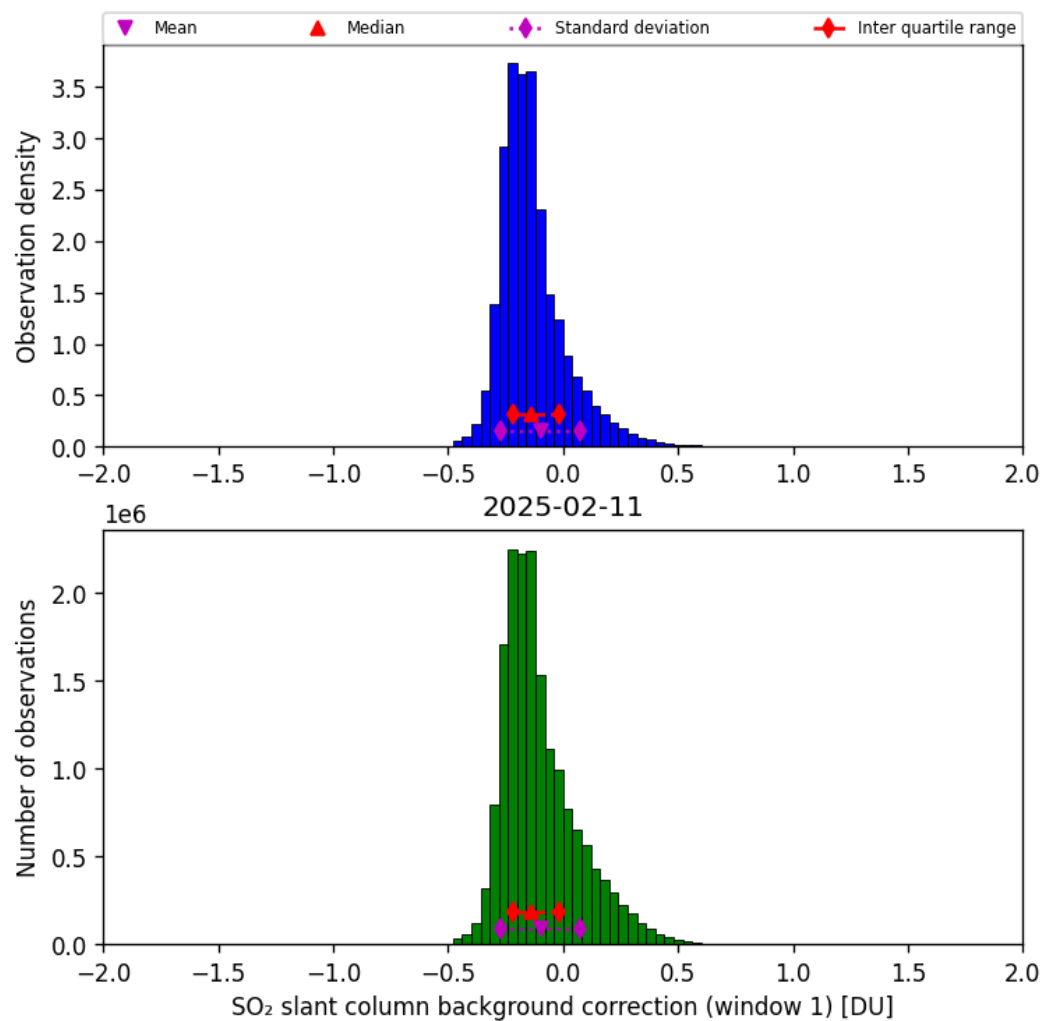


Figure 66: Histogram of “SO₂ slant column background correction (window 1)” for 2025-02-11 to 2025-02-11

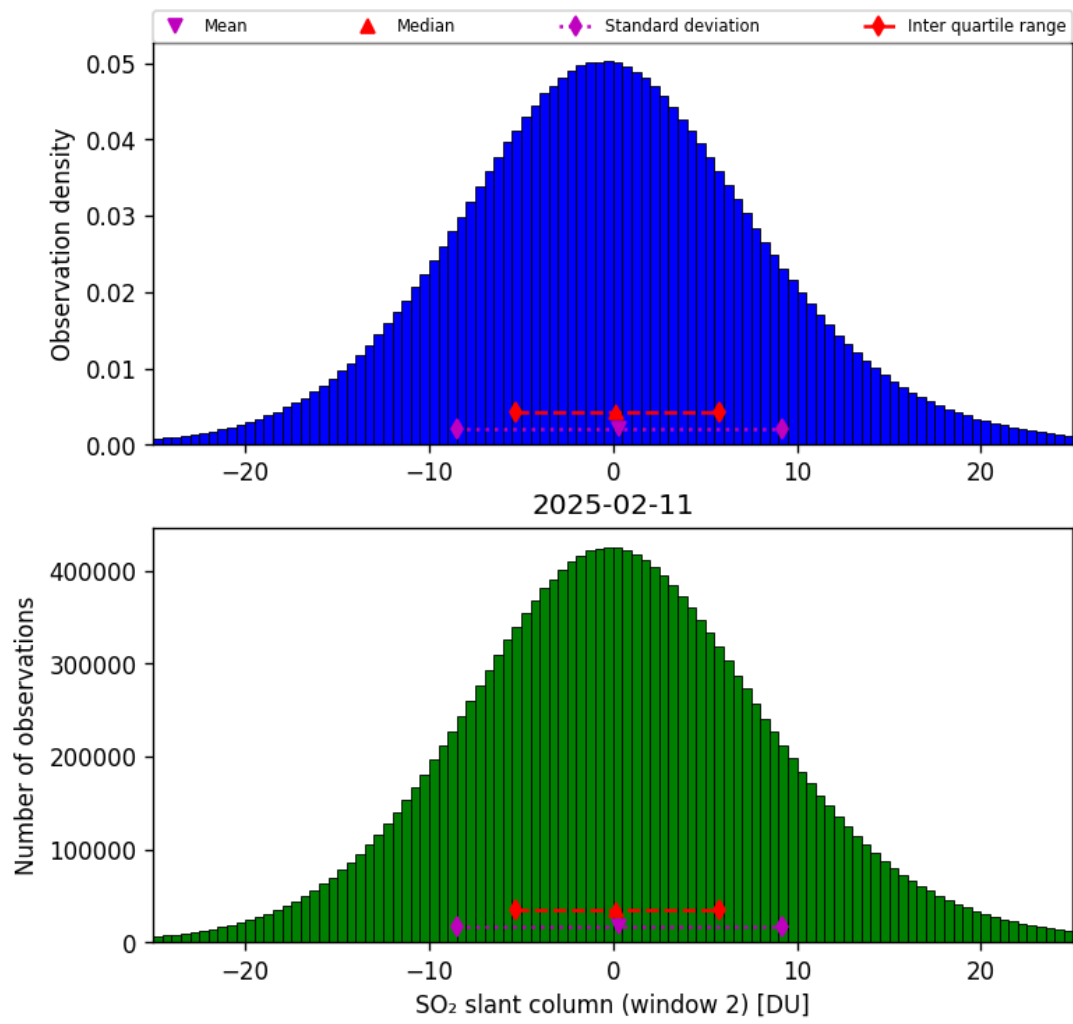


Figure 67: Histogram of “SO₂ slant column (window 2)” for 2025-02-11 to 2025-02-11

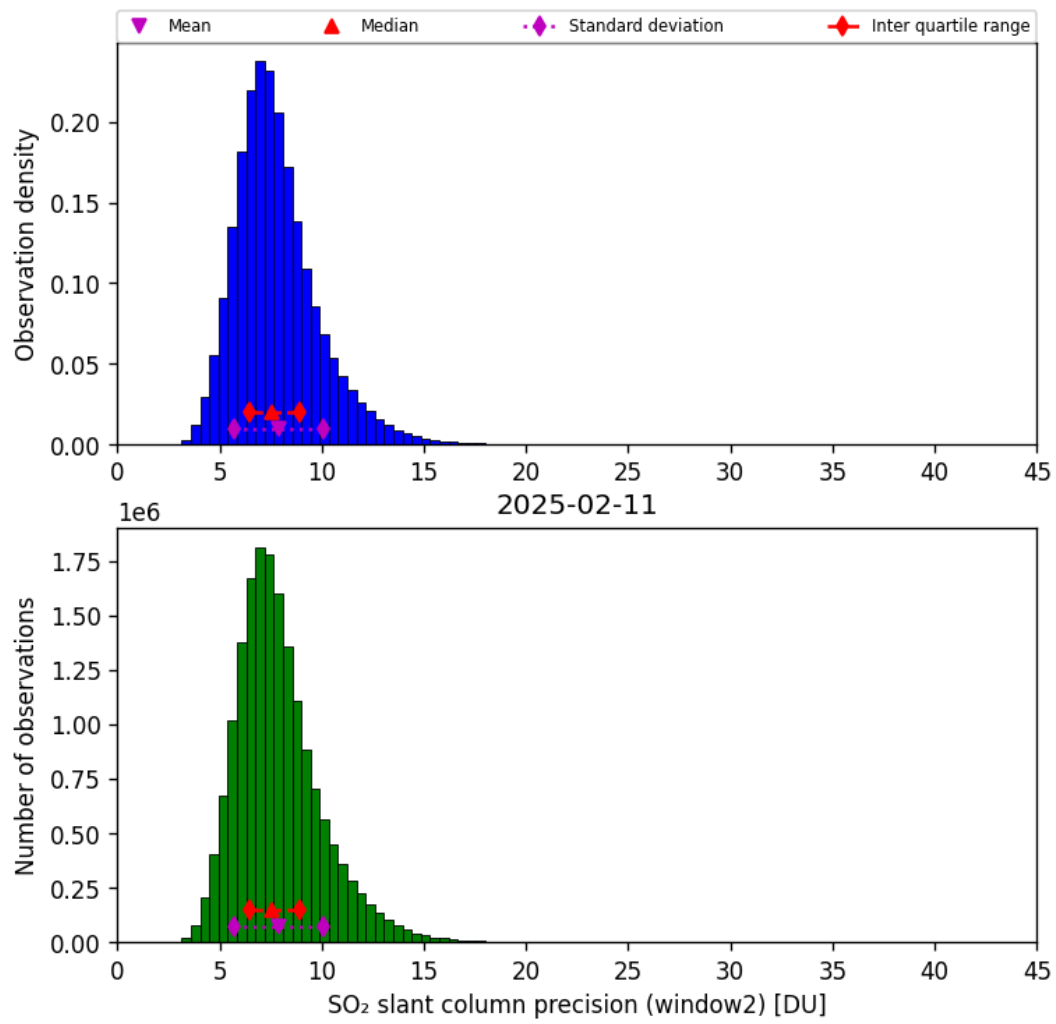


Figure 68: Histogram of “SO₂ slant column precision (window2)” for 2025-02-11 to 2025-02-11

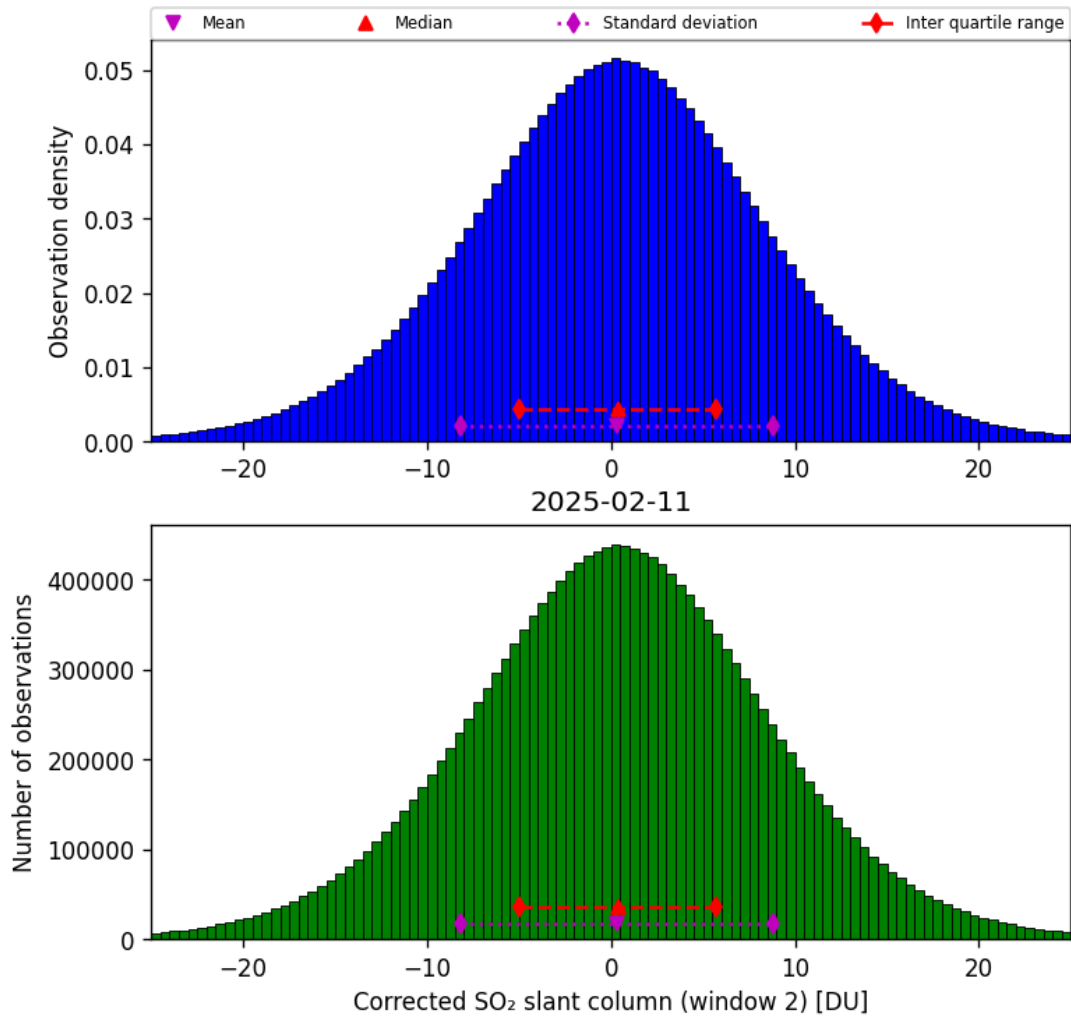


Figure 69: Histogram of “Corrected SO₂ slant column (window 2)” for 2025-02-11 to 2025-02-11

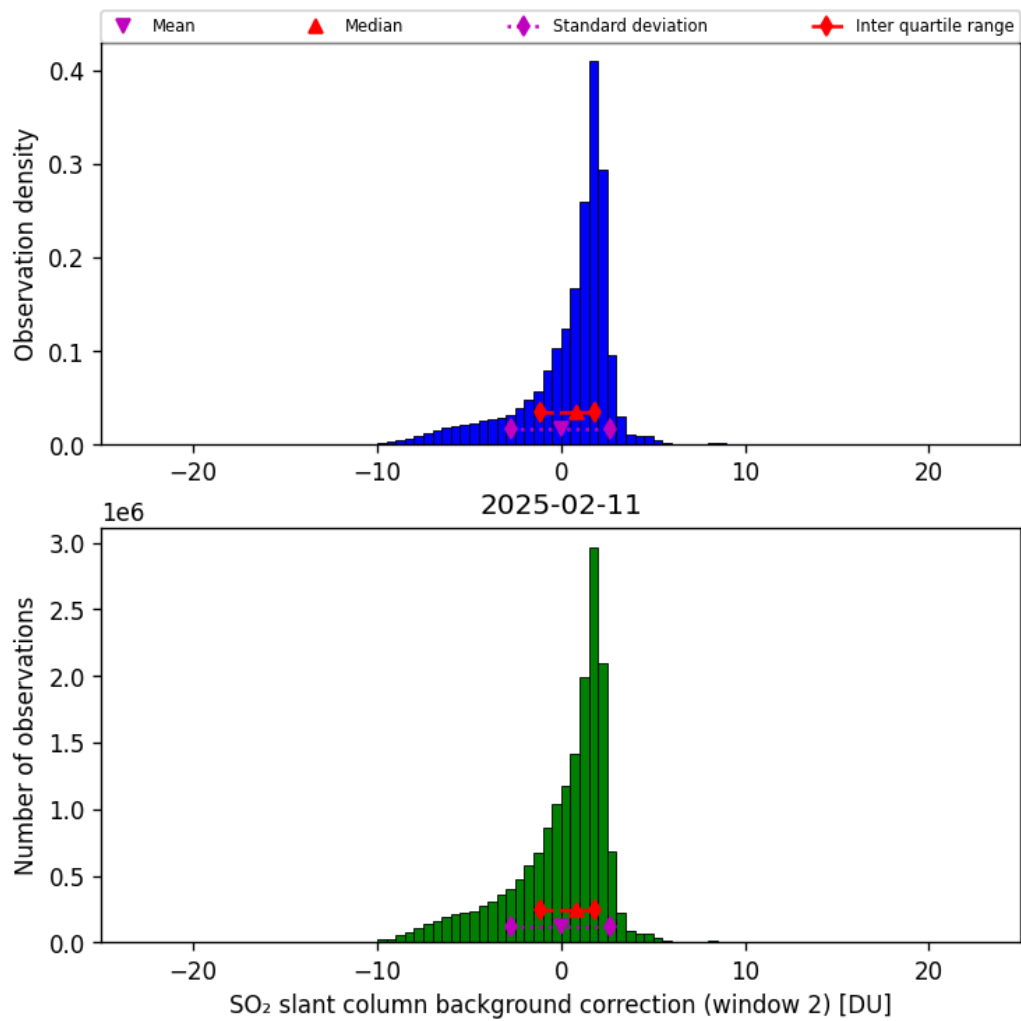


Figure 70: Histogram of “SO₂ slant column background correction (window 2)” for 2025-02-11 to 2025-02-11

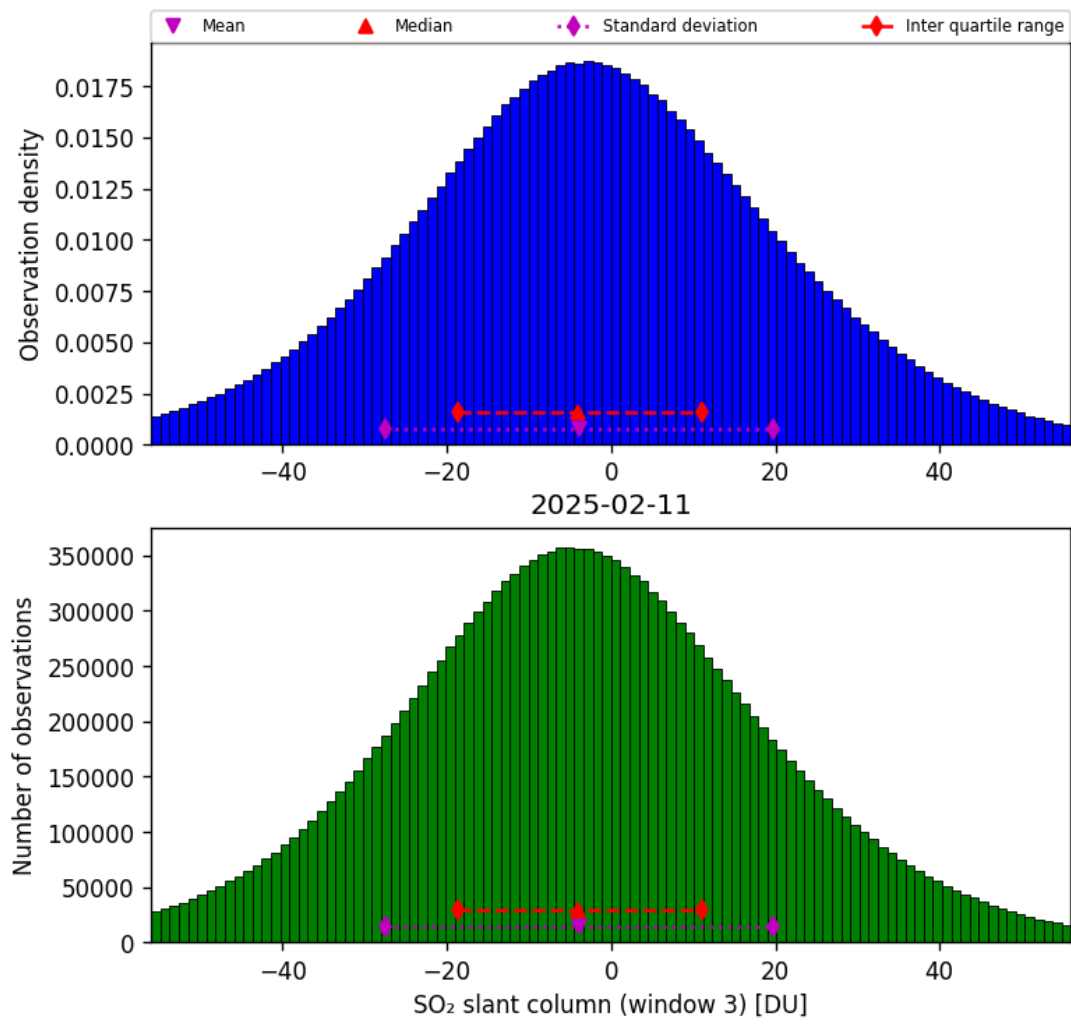


Figure 71: Histogram of “SO₂ slant column (window 3)” for 2025-02-11 to 2025-02-11

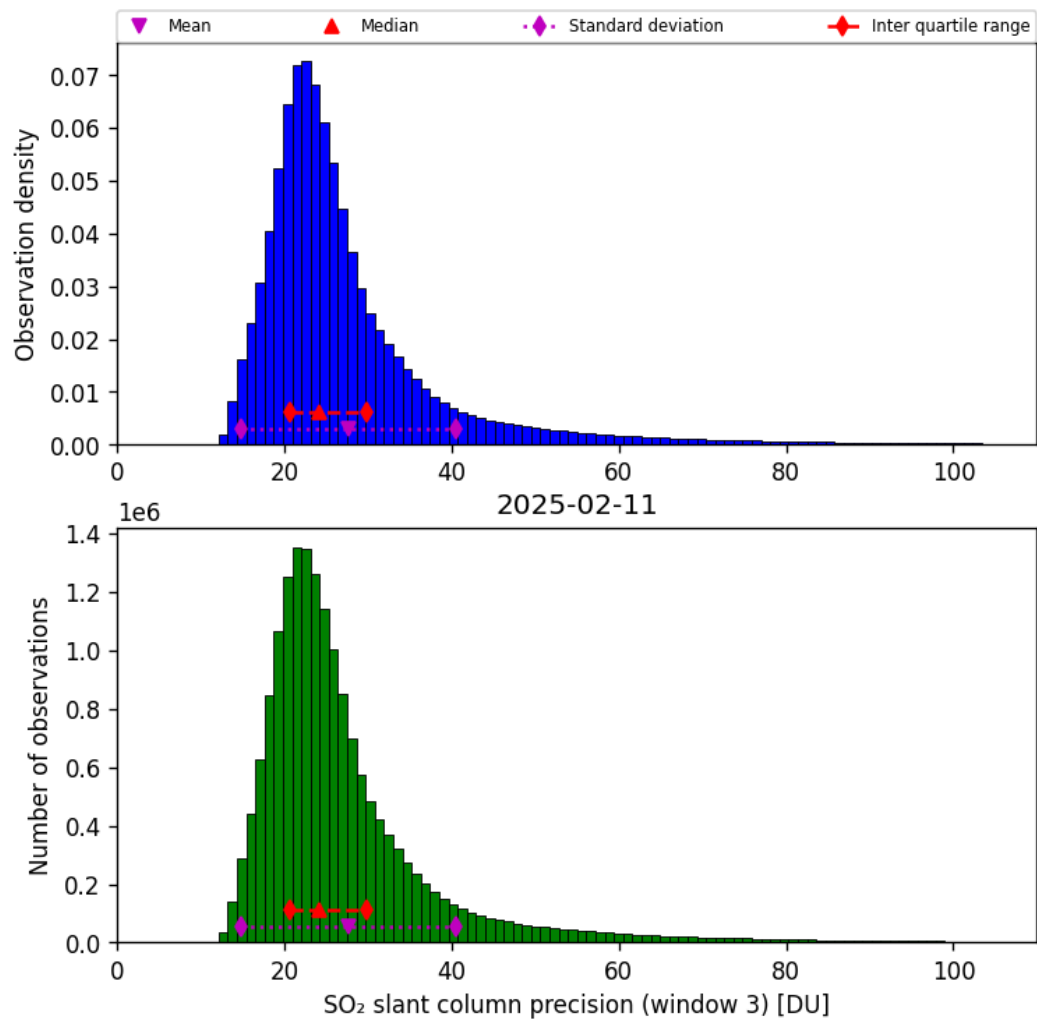


Figure 72: Histogram of “SO₂ slant column precision (window 3)” for 2025-02-11 to 2025-02-11

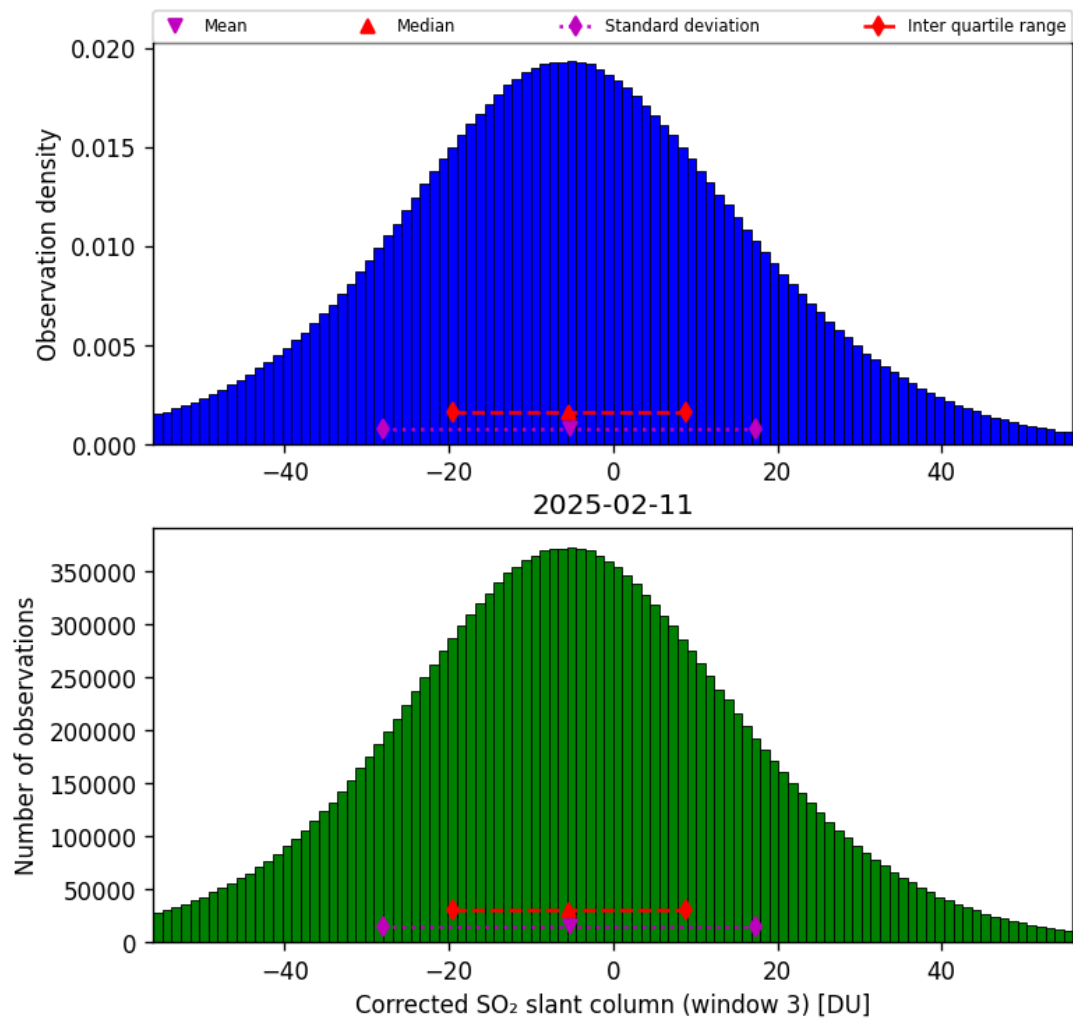


Figure 73: Histogram of “Corrected SO₂ slant column (window 3)” for 2025-02-11 to 2025-02-11

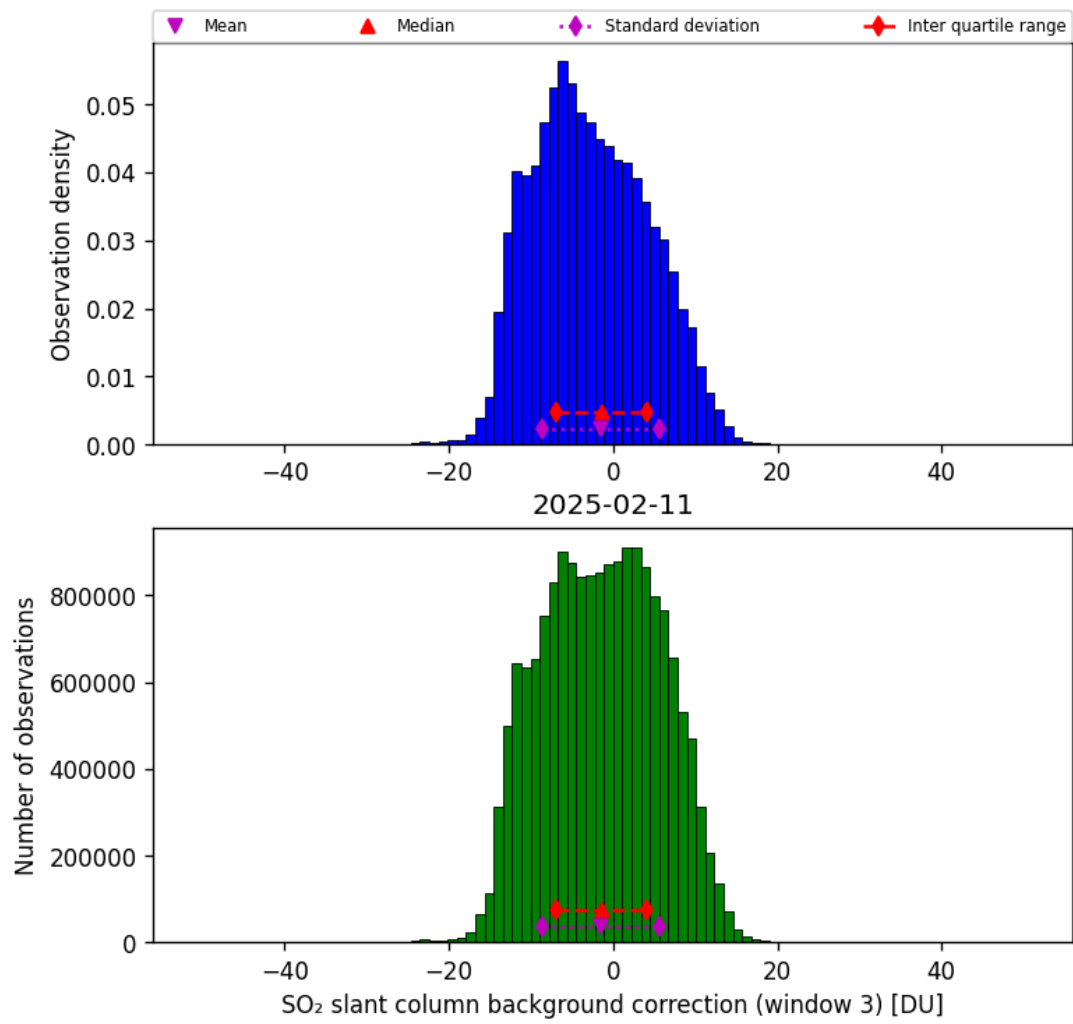


Figure 74: Histogram of “SO₂ slant column background correction (window 3)” for 2025-02-11 to 2025-02-11

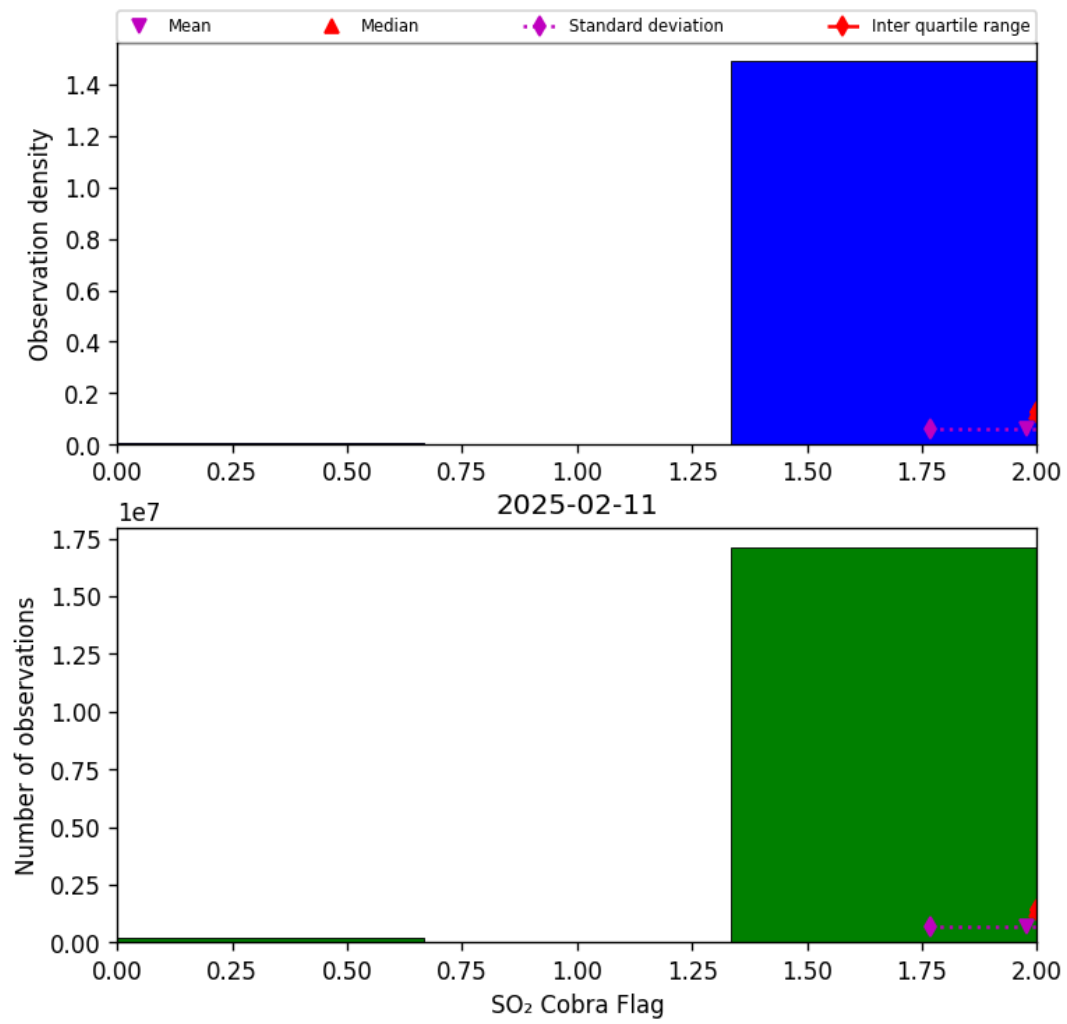


Figure 75: Histogram of "SO₂ Cobra Flag" for 2025-02-11 to 2025-02-11

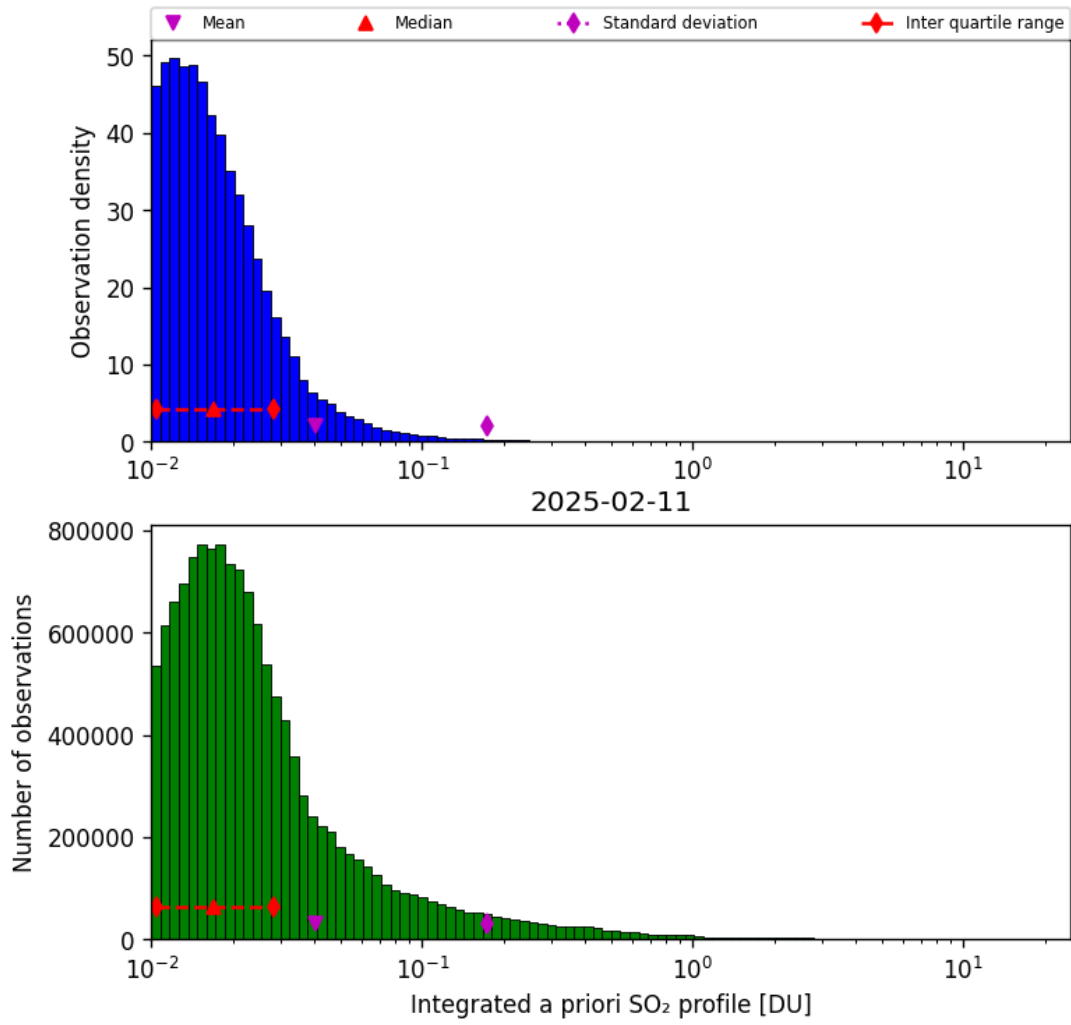


Figure 76: Histogram of “Integrated a priori SO₂ profile” for 2025-02-11 to 2025-02-11

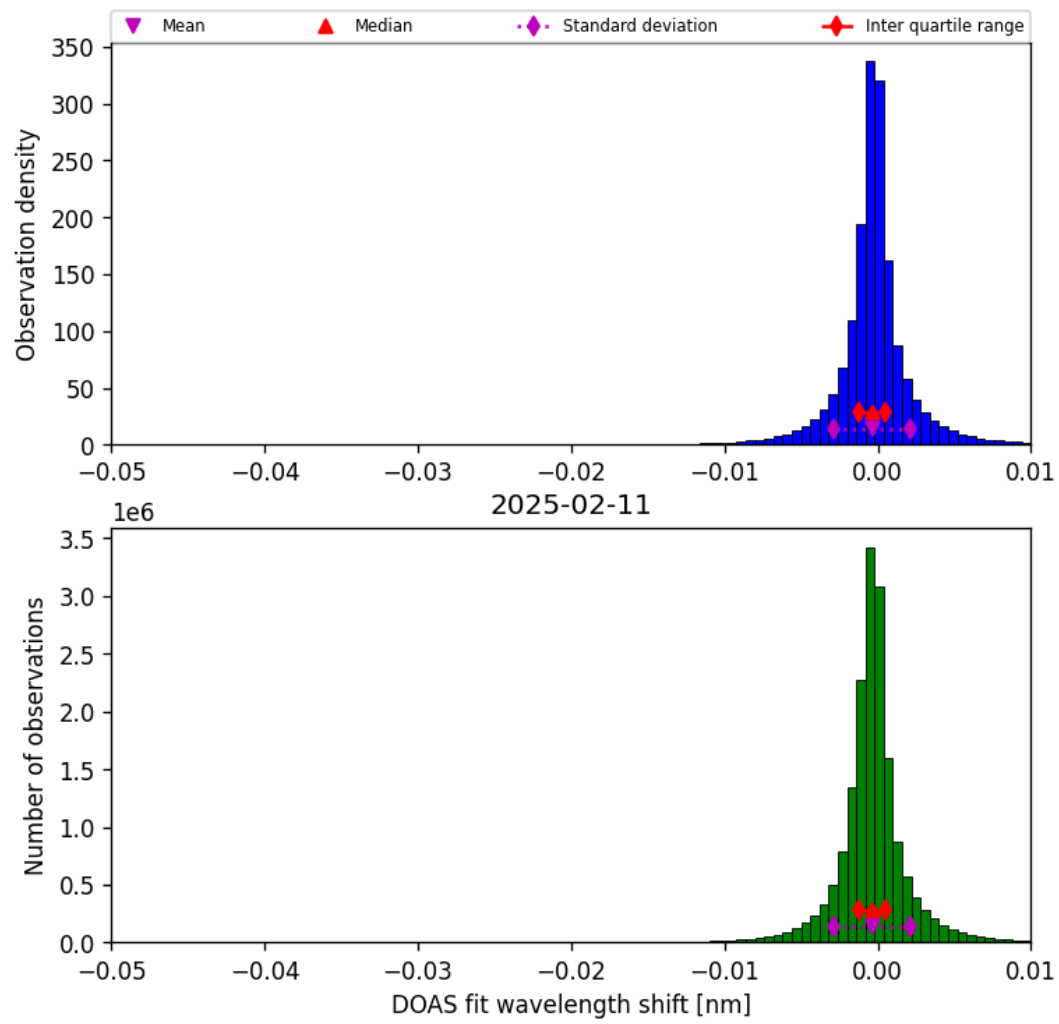


Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-02-11 to 2025-02-11

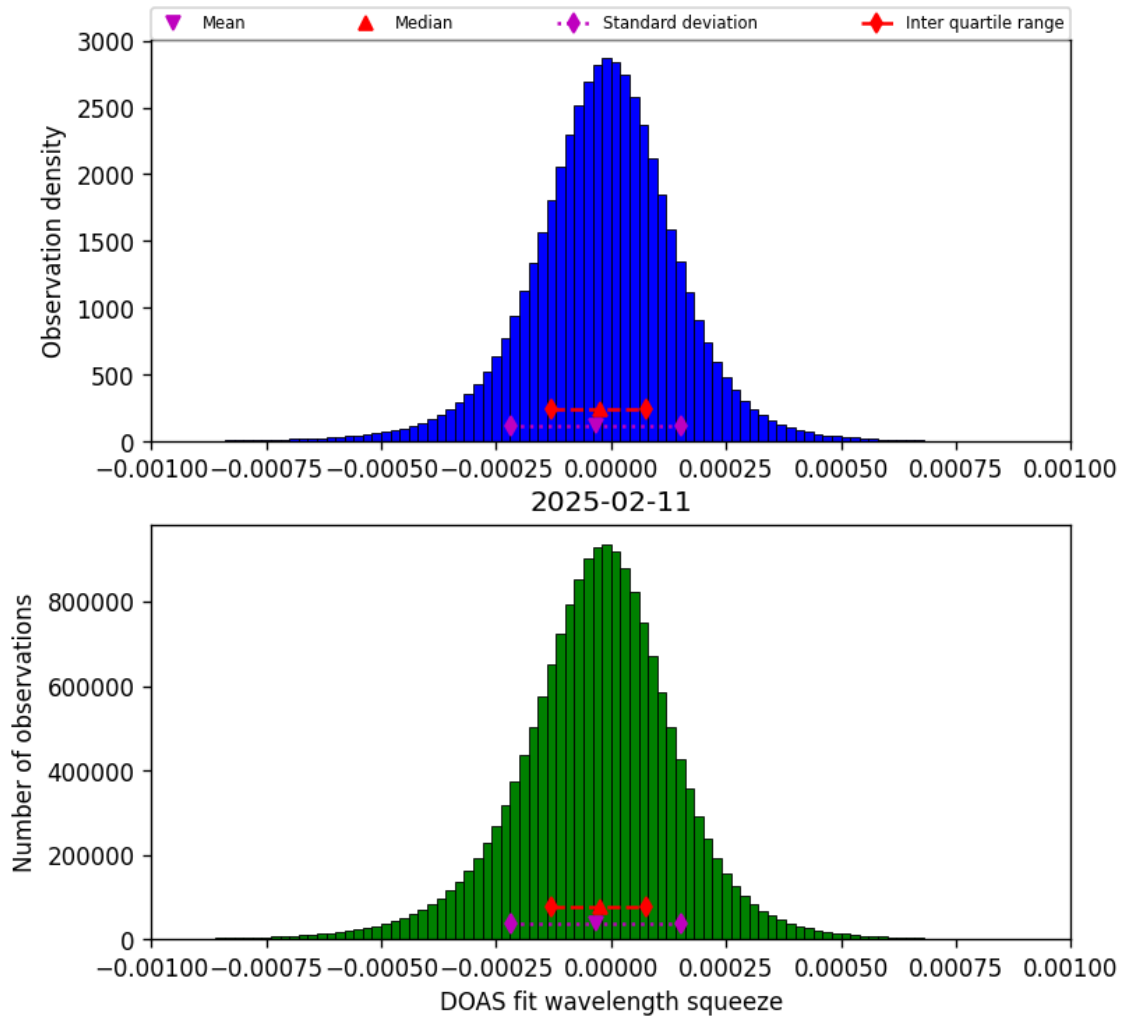


Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-02-11 to 2025-02-11

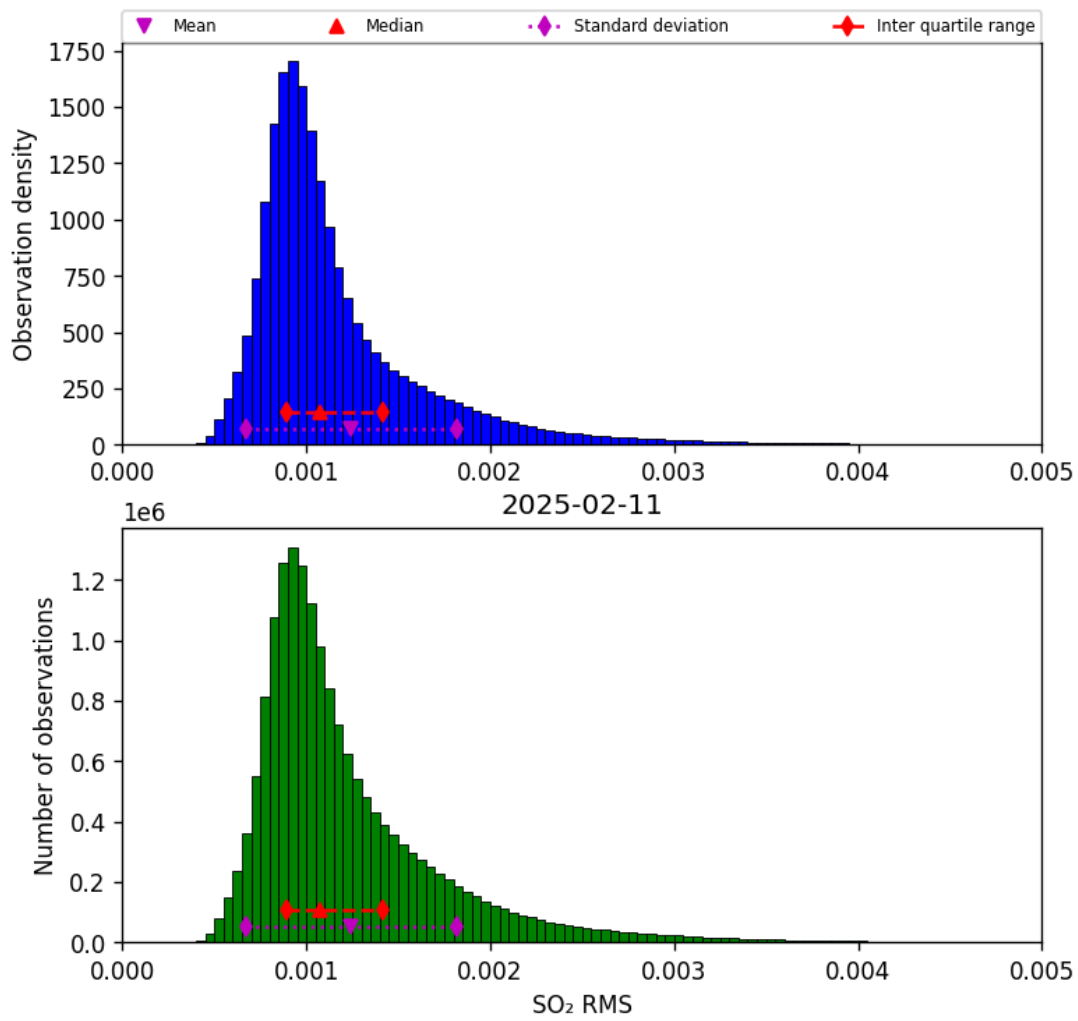


Figure 79: Histogram of “SO₂ RMS” for 2025-02-11 to 2025-02-11

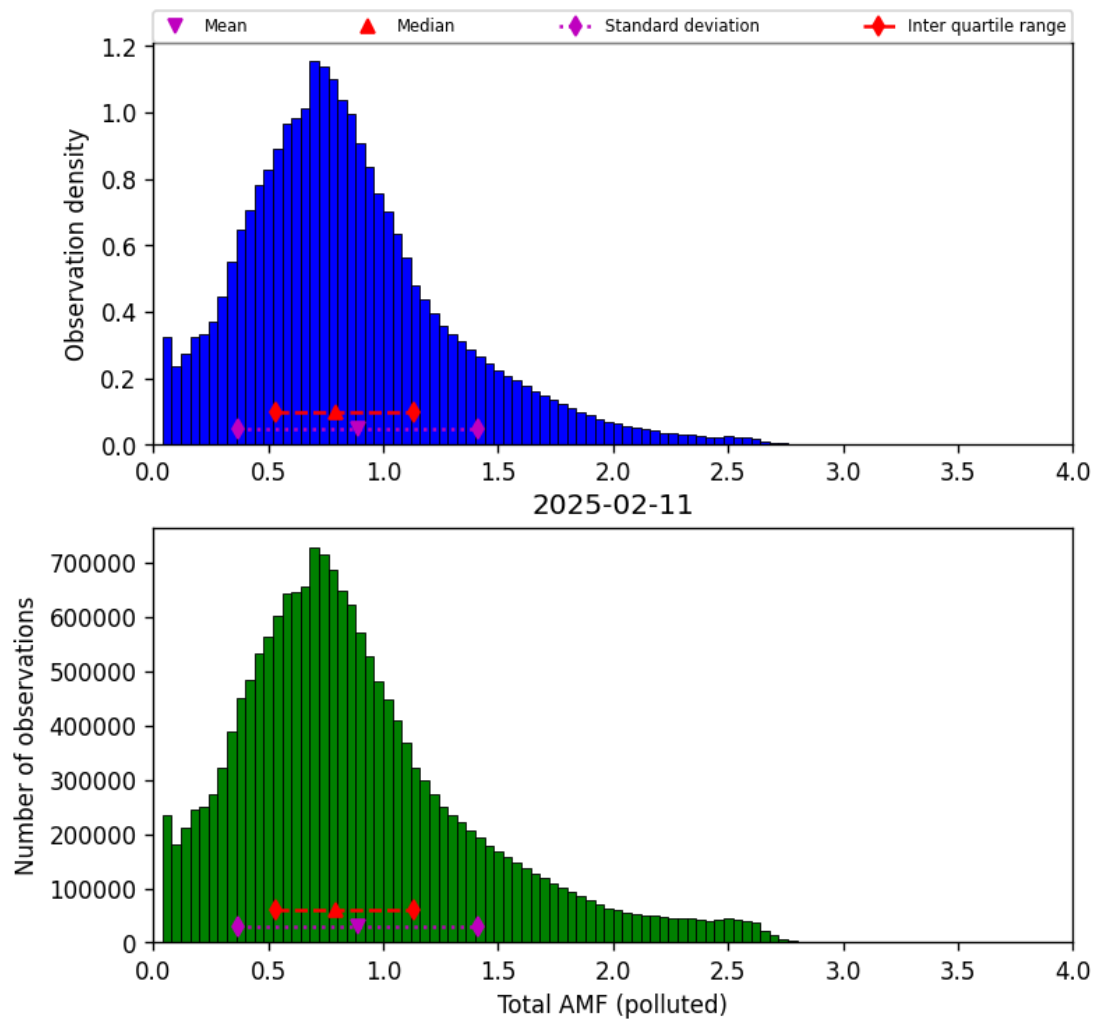


Figure 80: Histogram of “Total AMF (polluted)” for 2025-02-11 to 2025-02-11

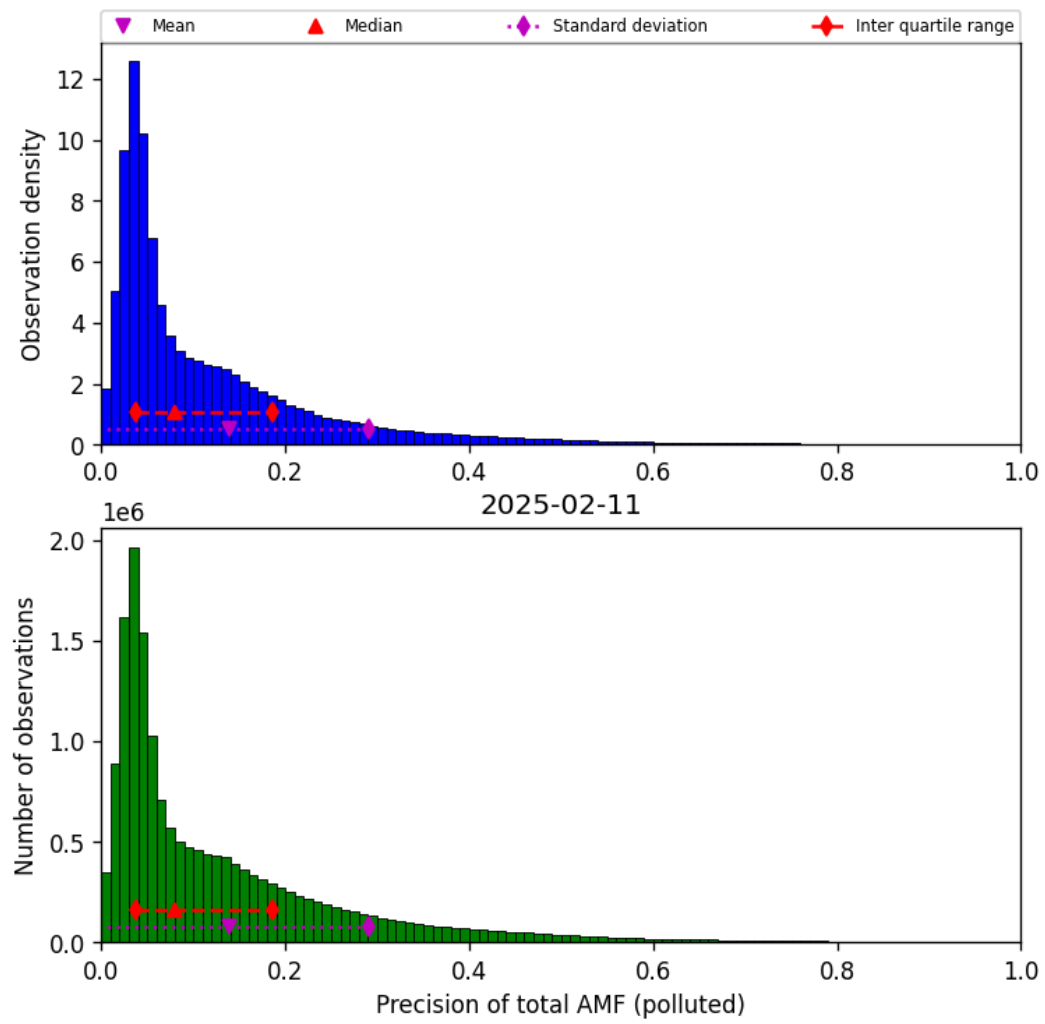


Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-02-11 to 2025-02-11

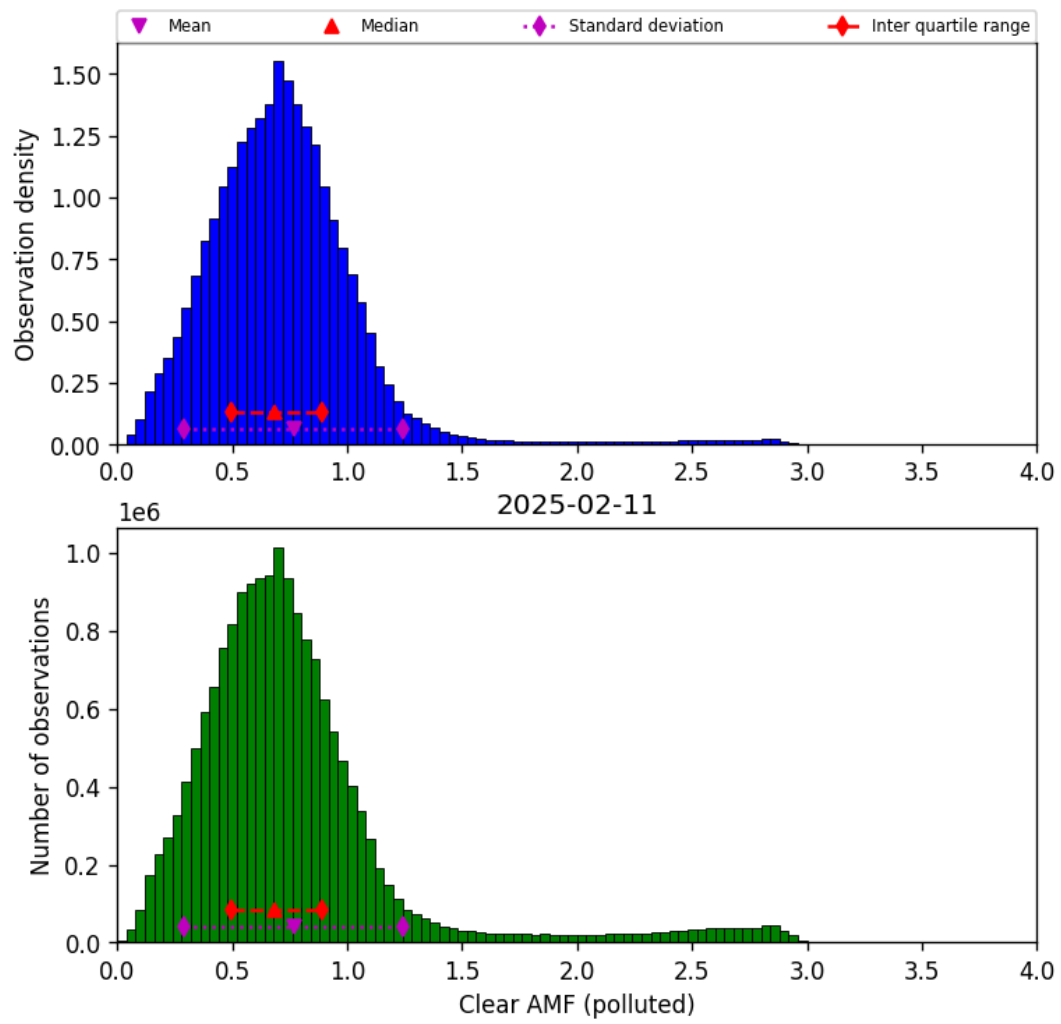


Figure 82: Histogram of “Clear AMF (polluted)” for 2025-02-11 to 2025-02-11

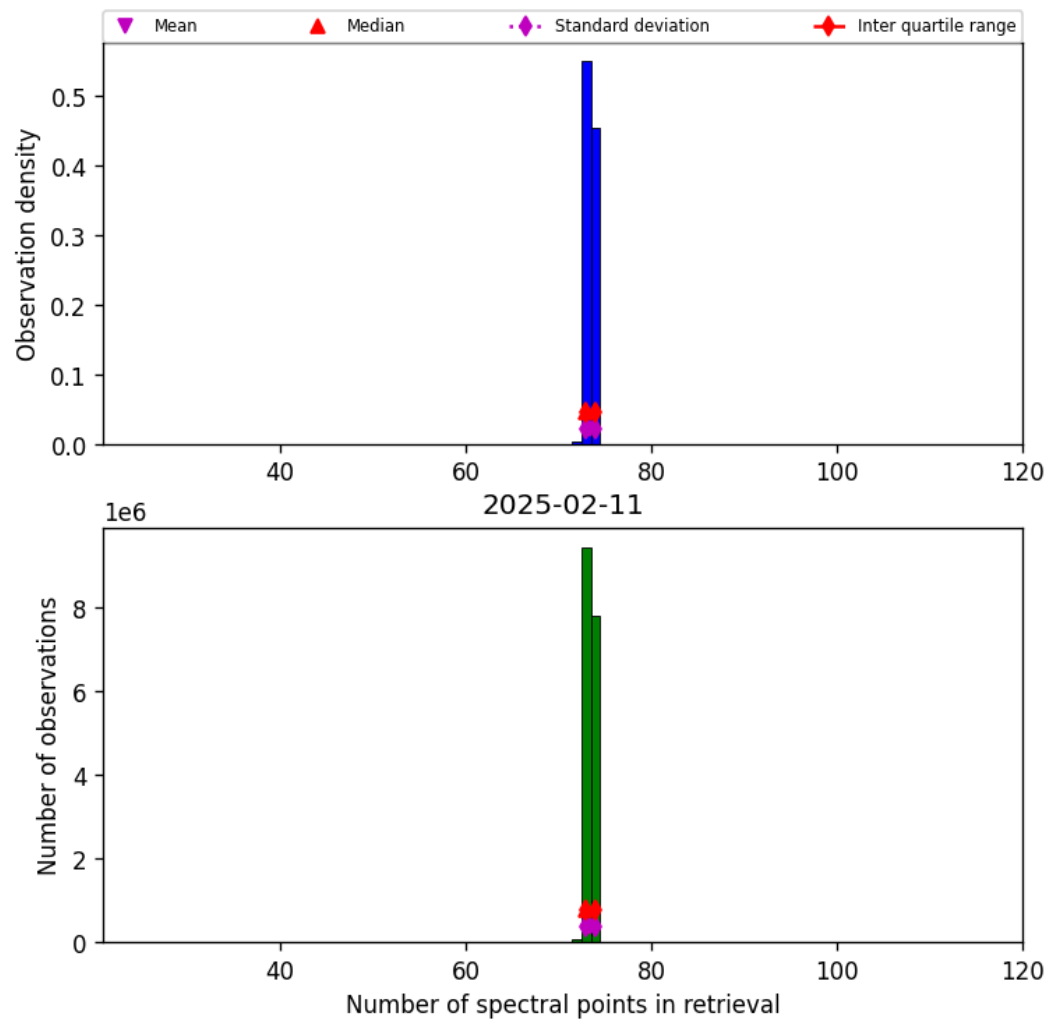


Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-02-11 to 2025-02-11

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.

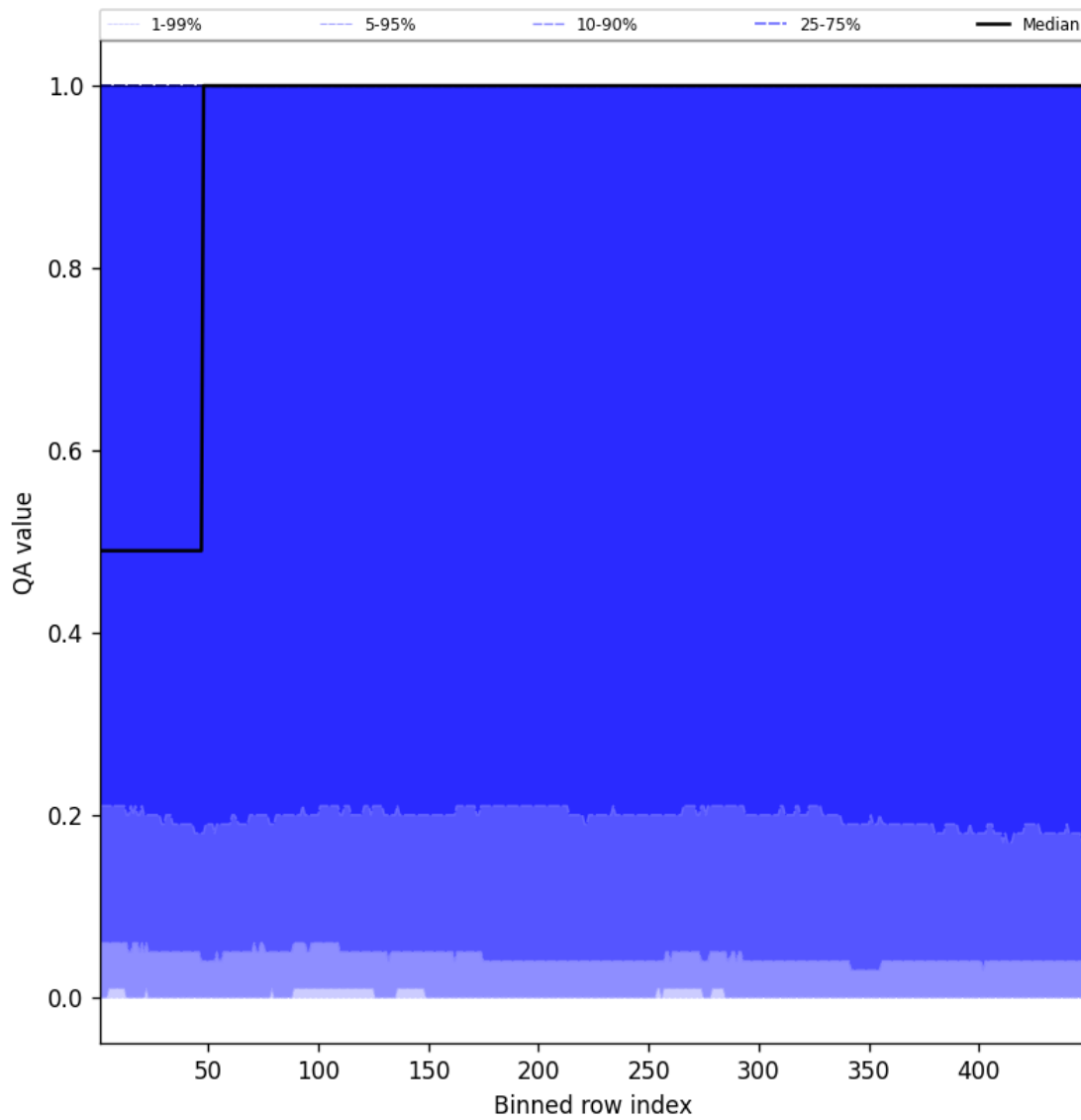


Figure 84: Along track statistics of “QA value” for 2025-02-11 to 2025-02-11

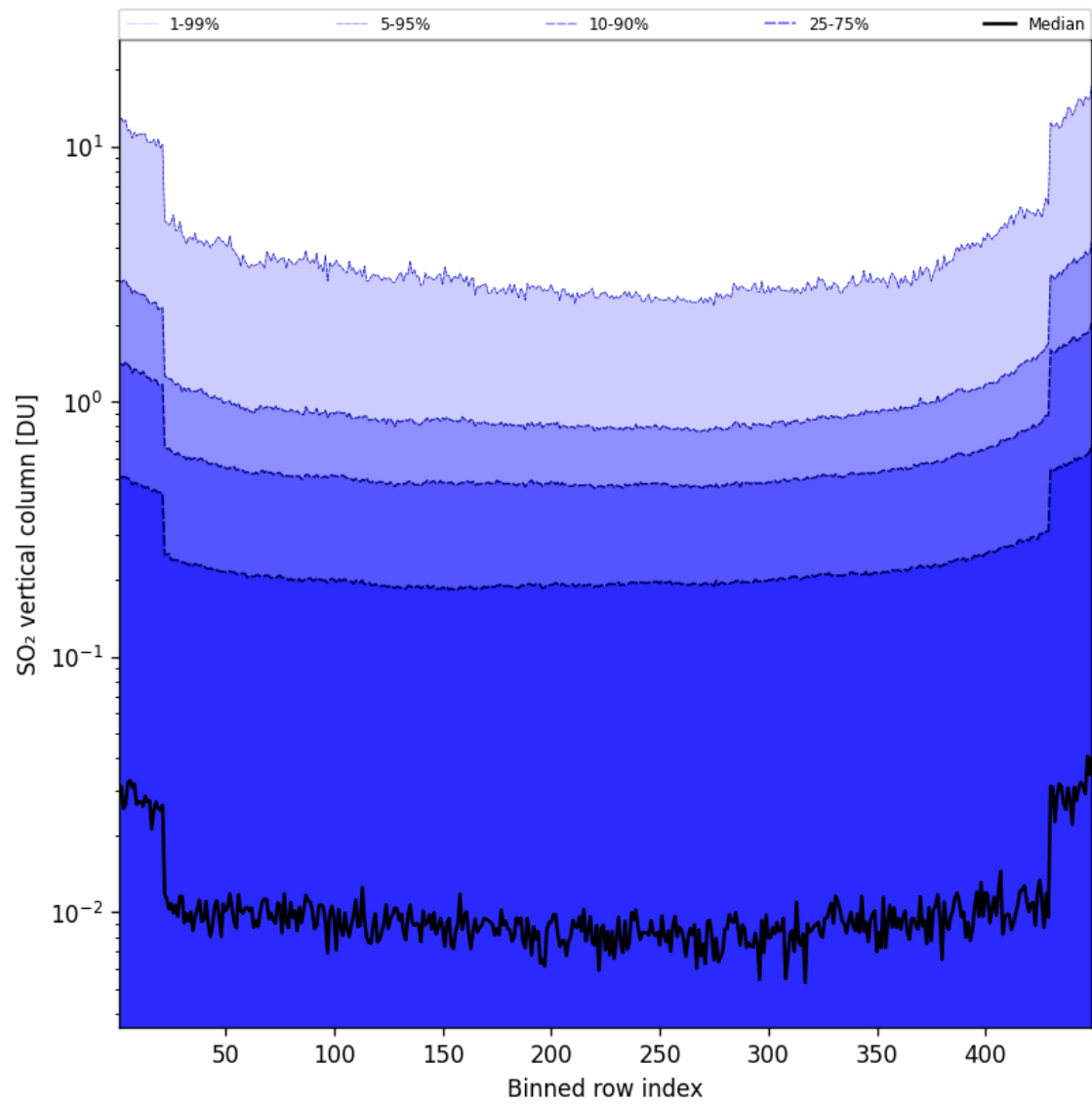


Figure 85: Along track statistics of “SO₂ vertical column” for 2025-02-11 to 2025-02-11

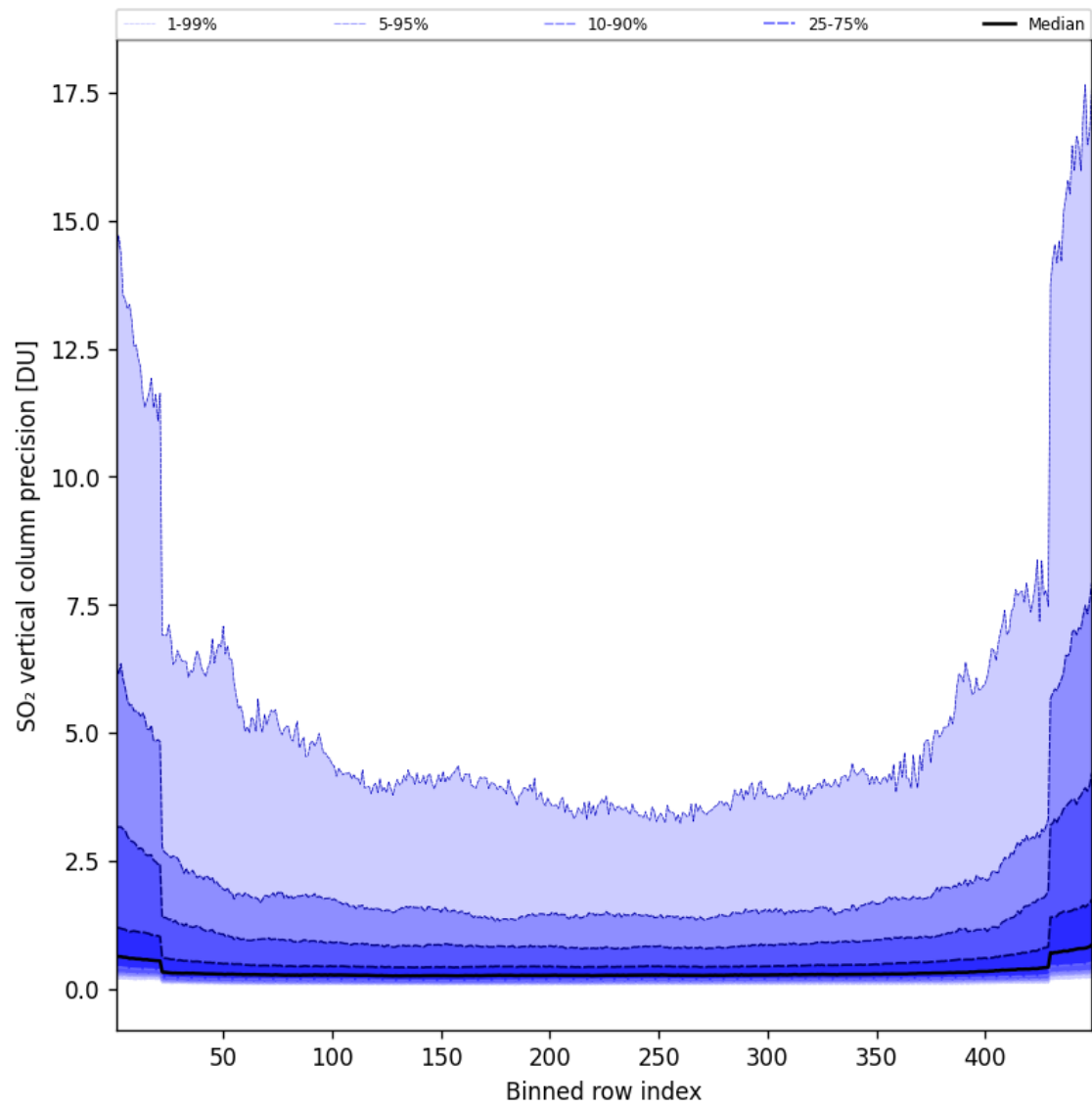


Figure 86: Along track statistics of "SO₂ vertical column precision" for 2025-02-11 to 2025-02-11

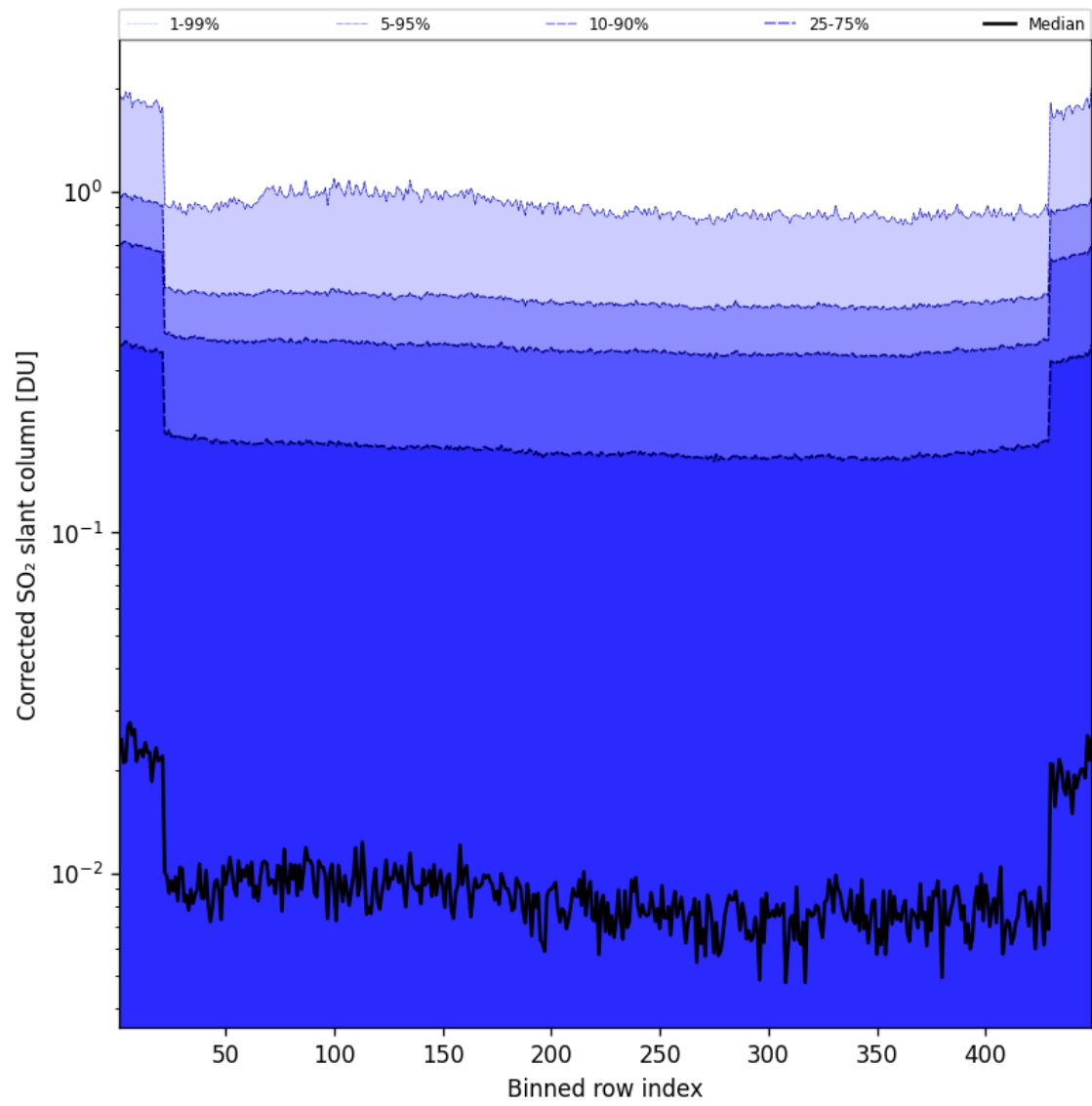


Figure 87: Along track statistics of "Corrected SO₂ slant column" for 2025-02-11 to 2025-02-11

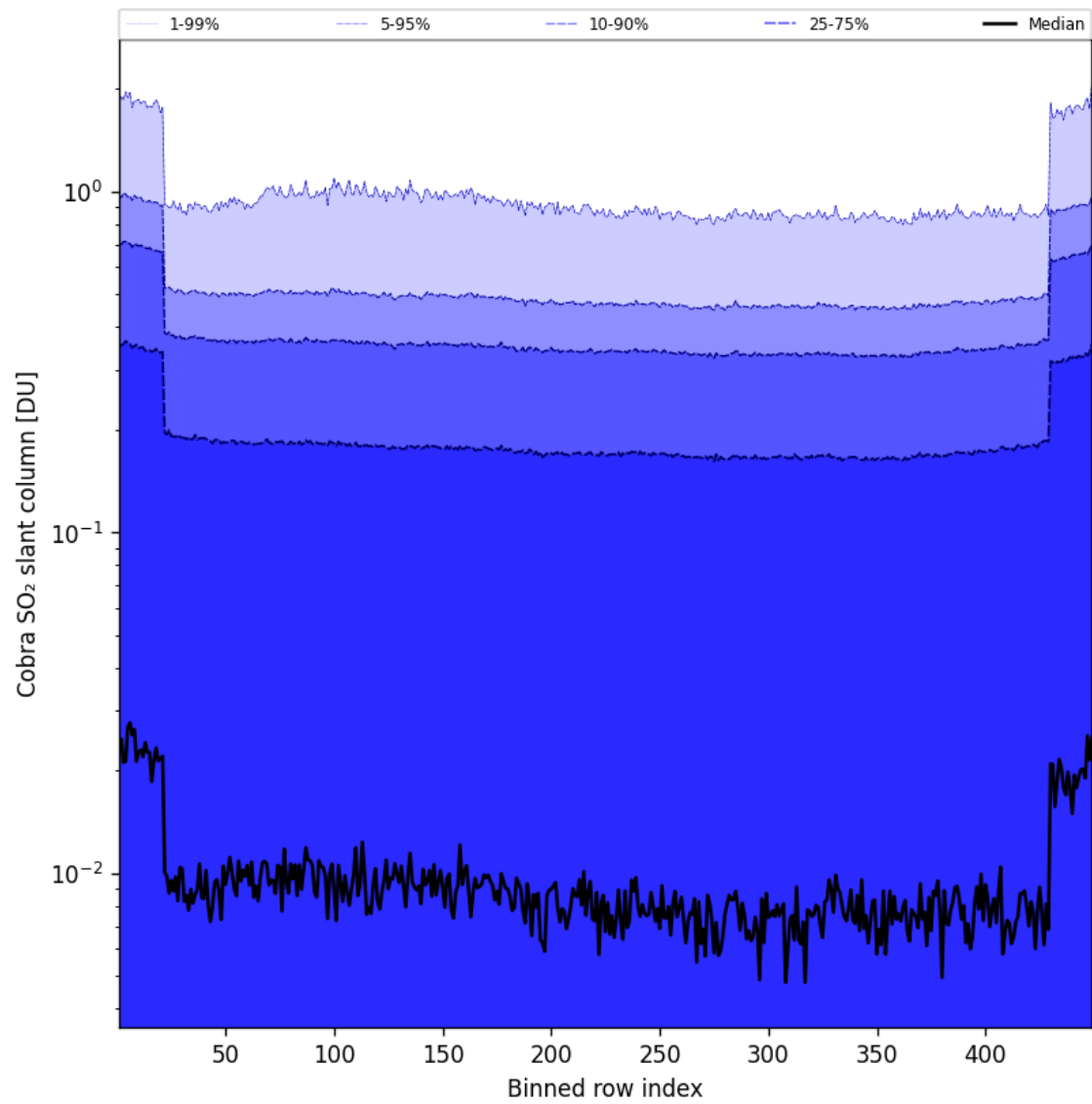


Figure 88: Along track statistics of “Cobra SO₂ slant column” for 2025-02-11 to 2025-02-11

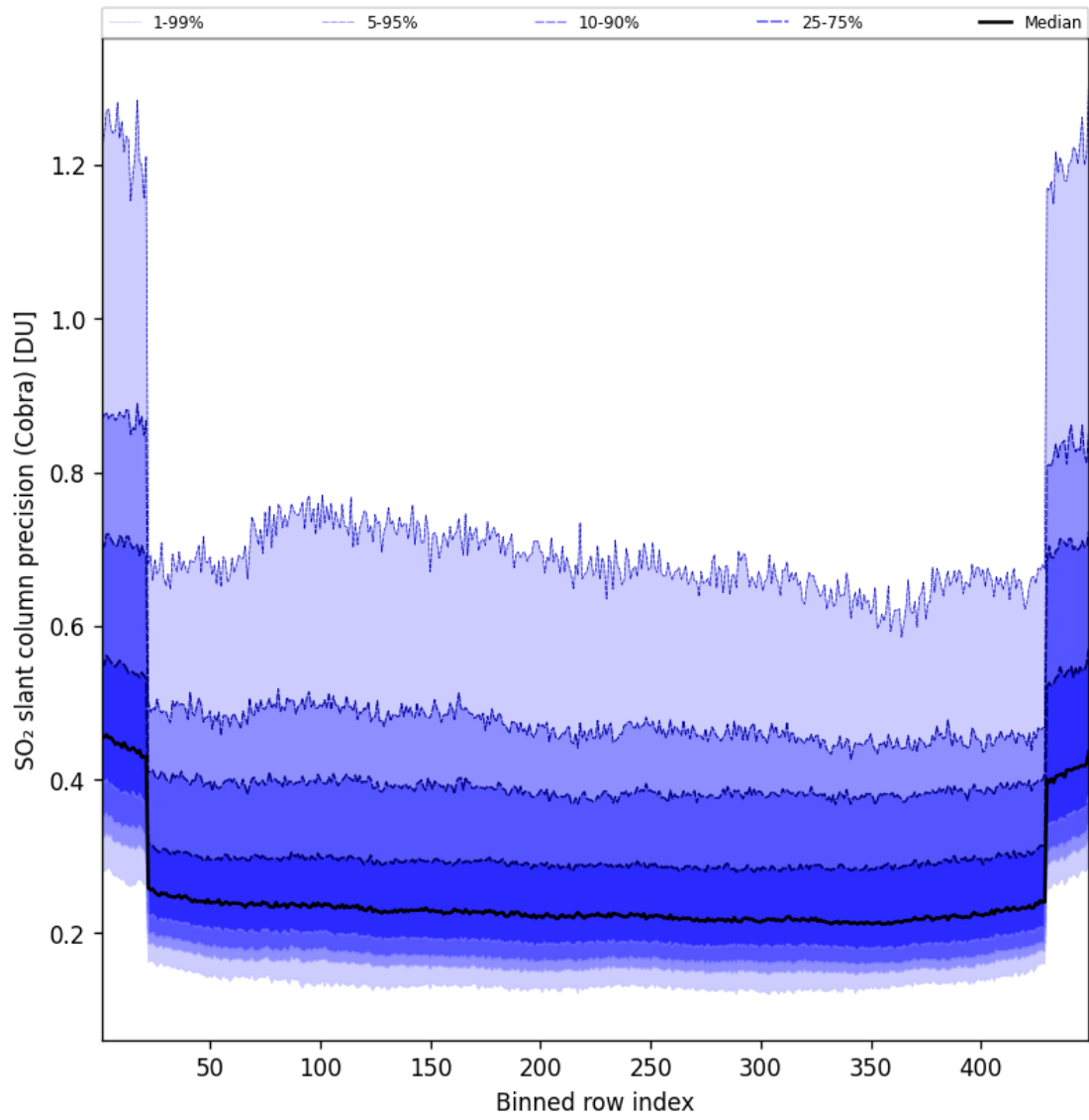


Figure 89: Along track statistics of “SO₂ slant column precision (Cobra)” for 2025-02-11 to 2025-02-11

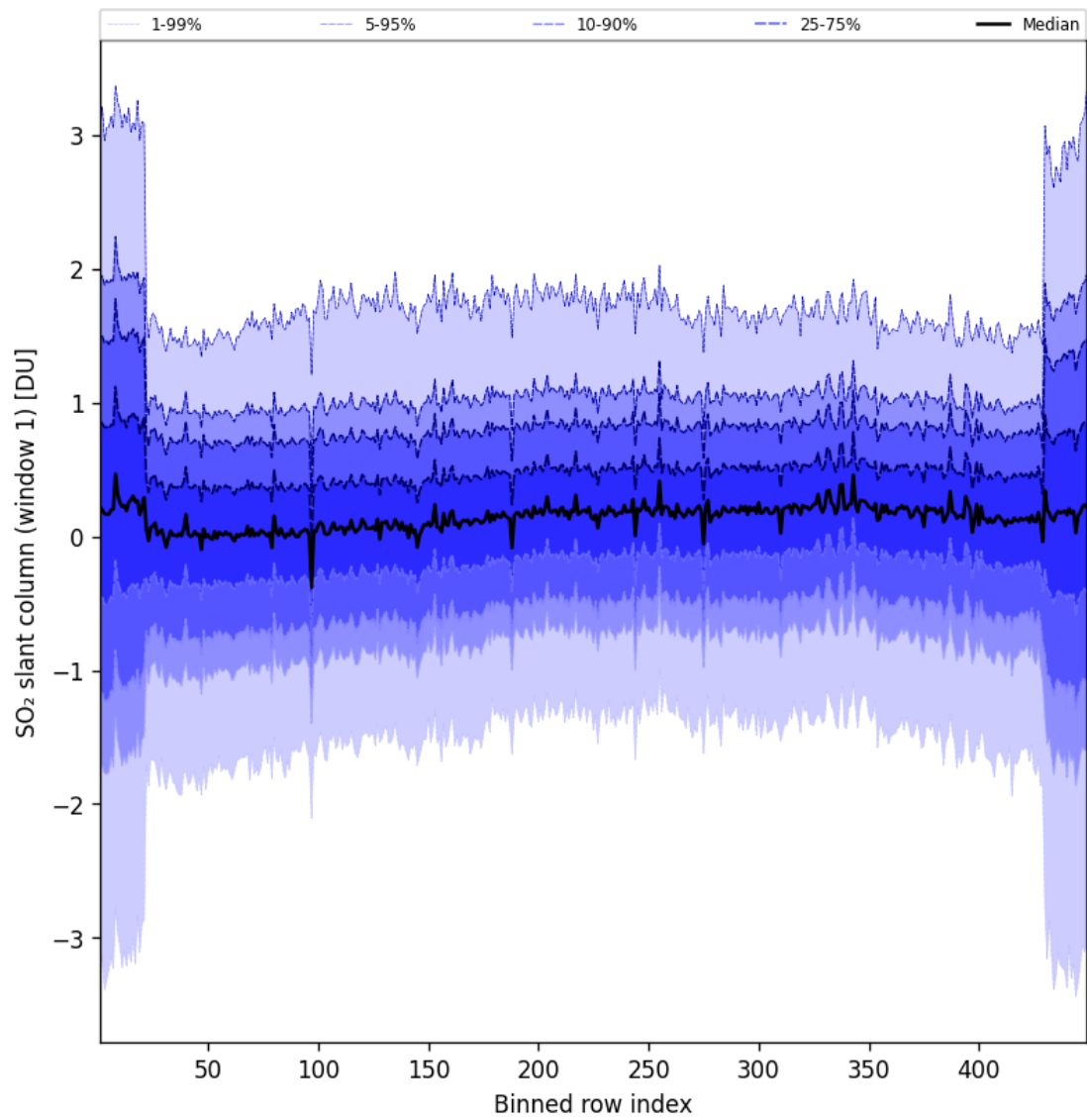


Figure 90: Along track statistics of “SO₂ slant column (window 1)” for 2025-02-11 to 2025-02-11

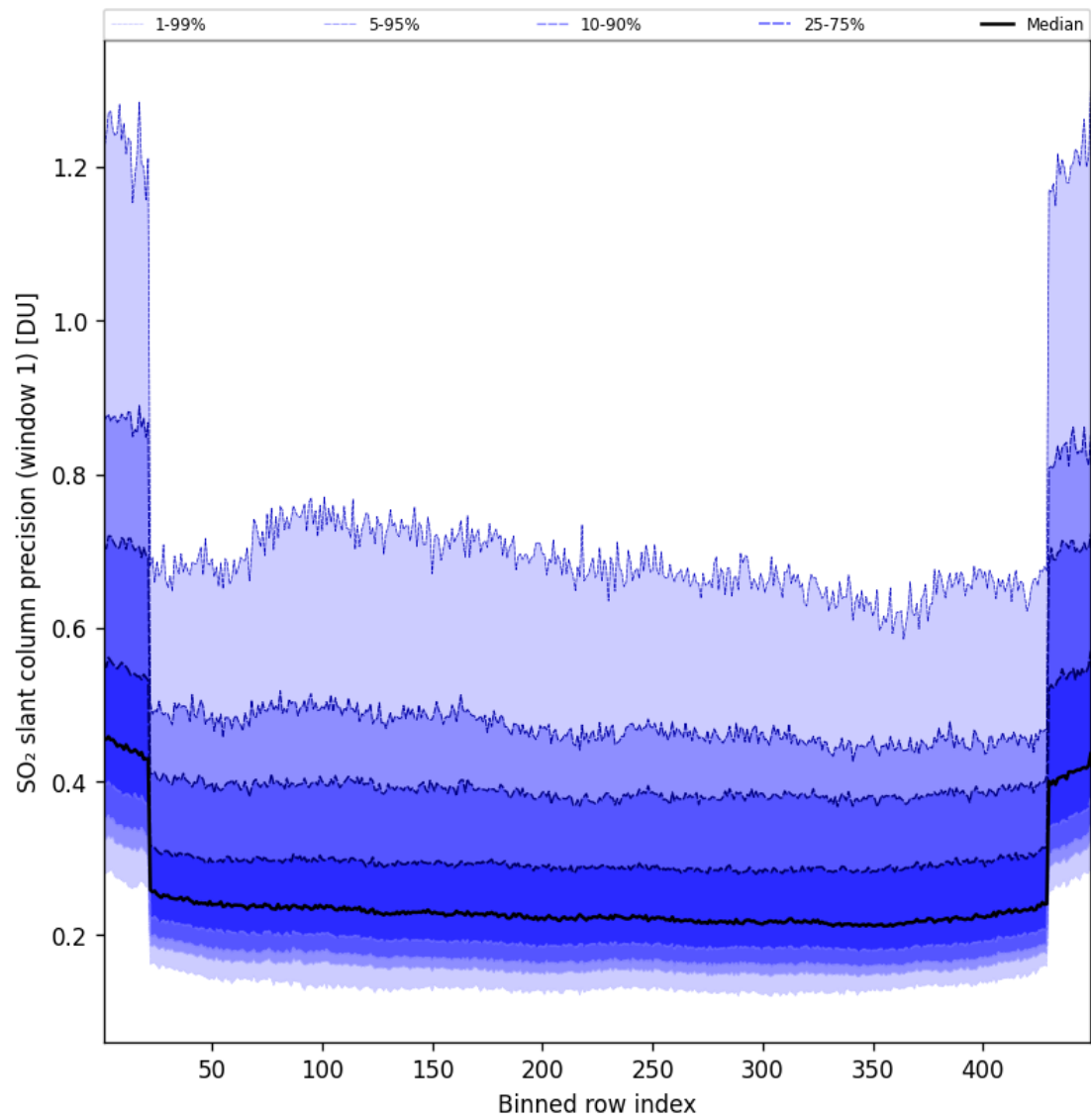


Figure 91: Along track statistics of “SO₂ slant column precision (window 1)” for 2025-02-11 to 2025-02-11

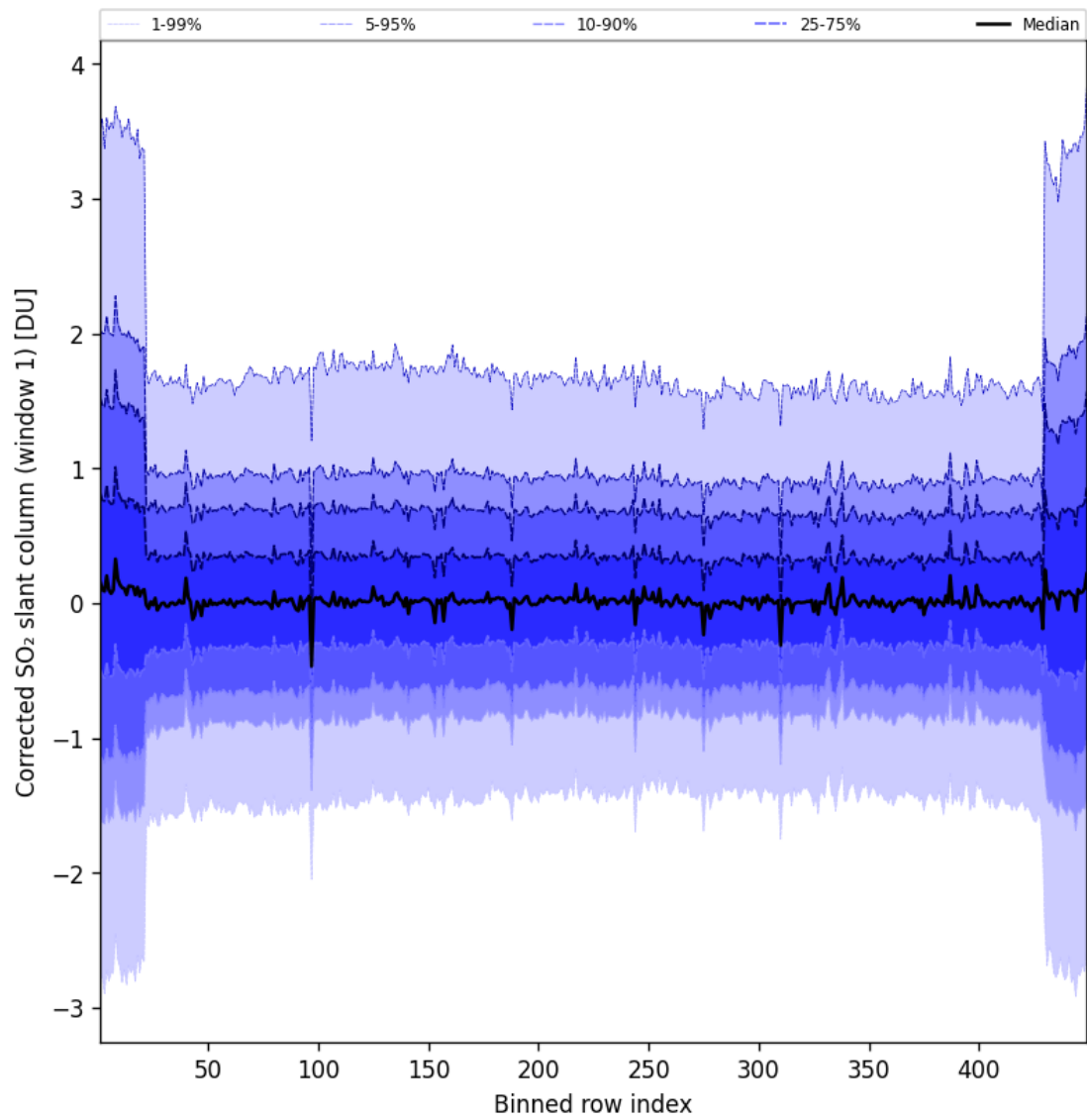


Figure 92: Along track statistics of “Corrected SO₂ slant column (window 1)” for 2025-02-11 to 2025-02-11

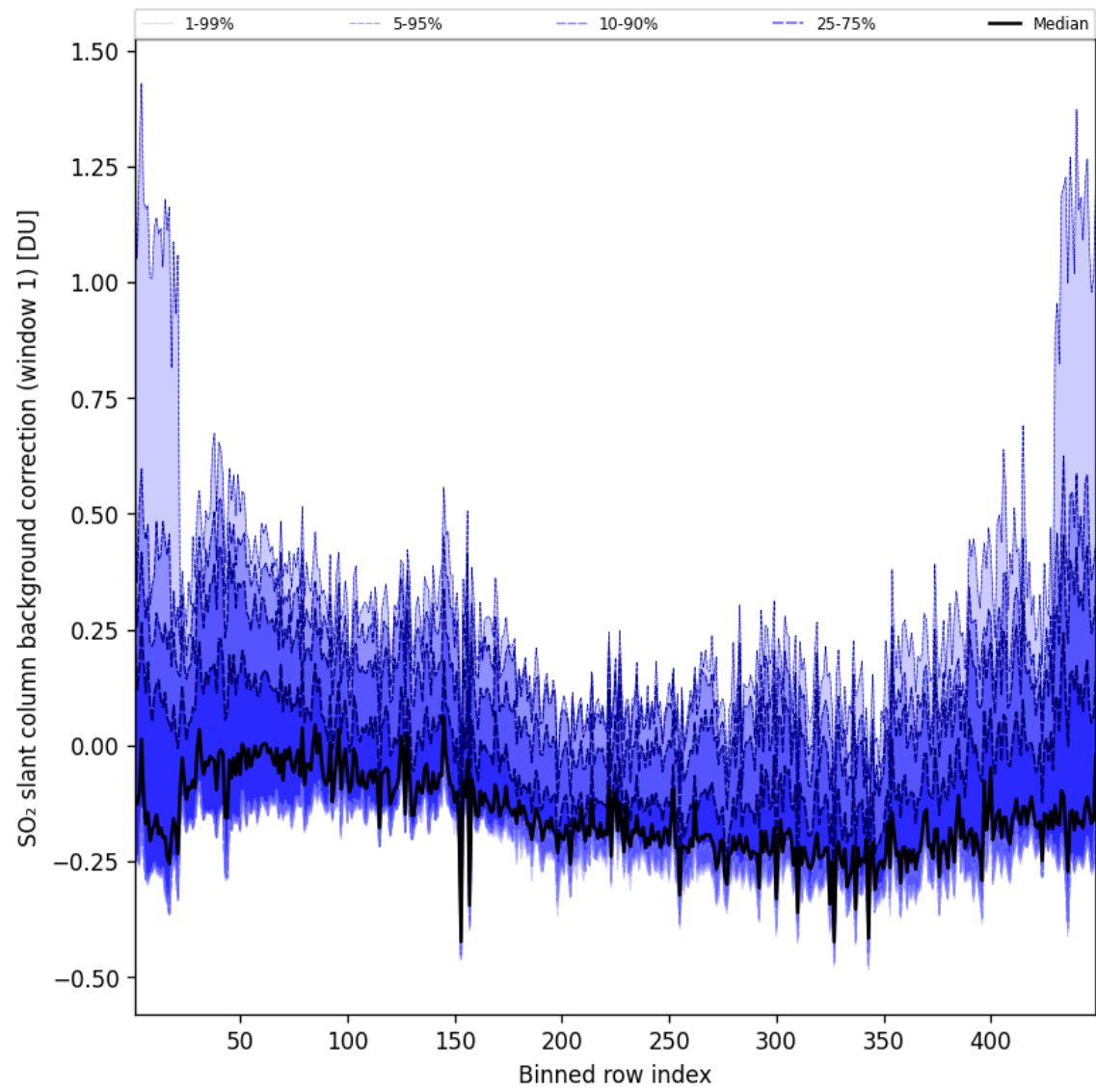


Figure 93: Along track statistics of “SO₂ slant column background correction (window 1)” for 2025-02-11 to 2025-02-11

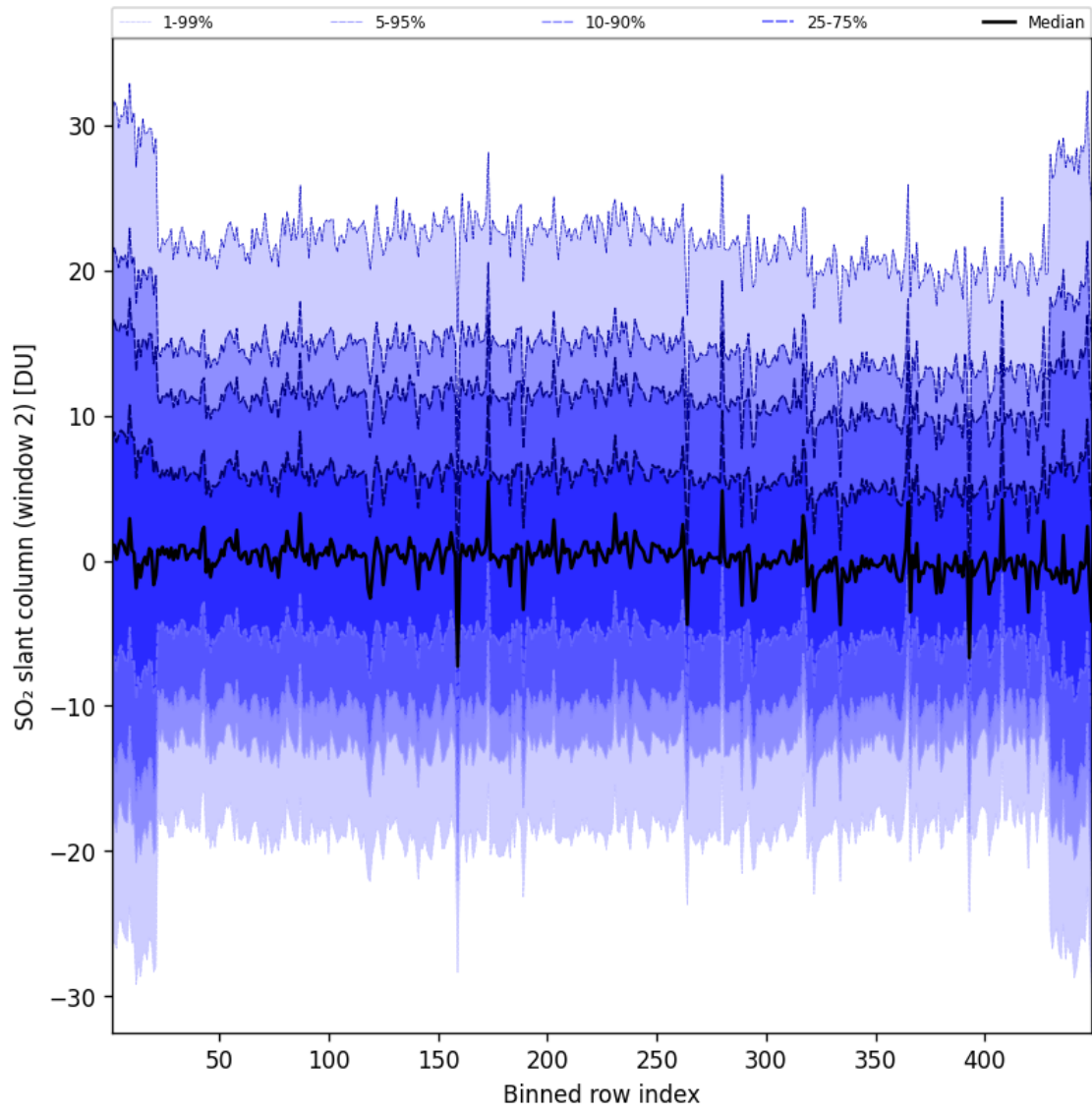


Figure 94: Along track statistics of “SO₂ slant column (window 2)” for 2025-02-11 to 2025-02-11

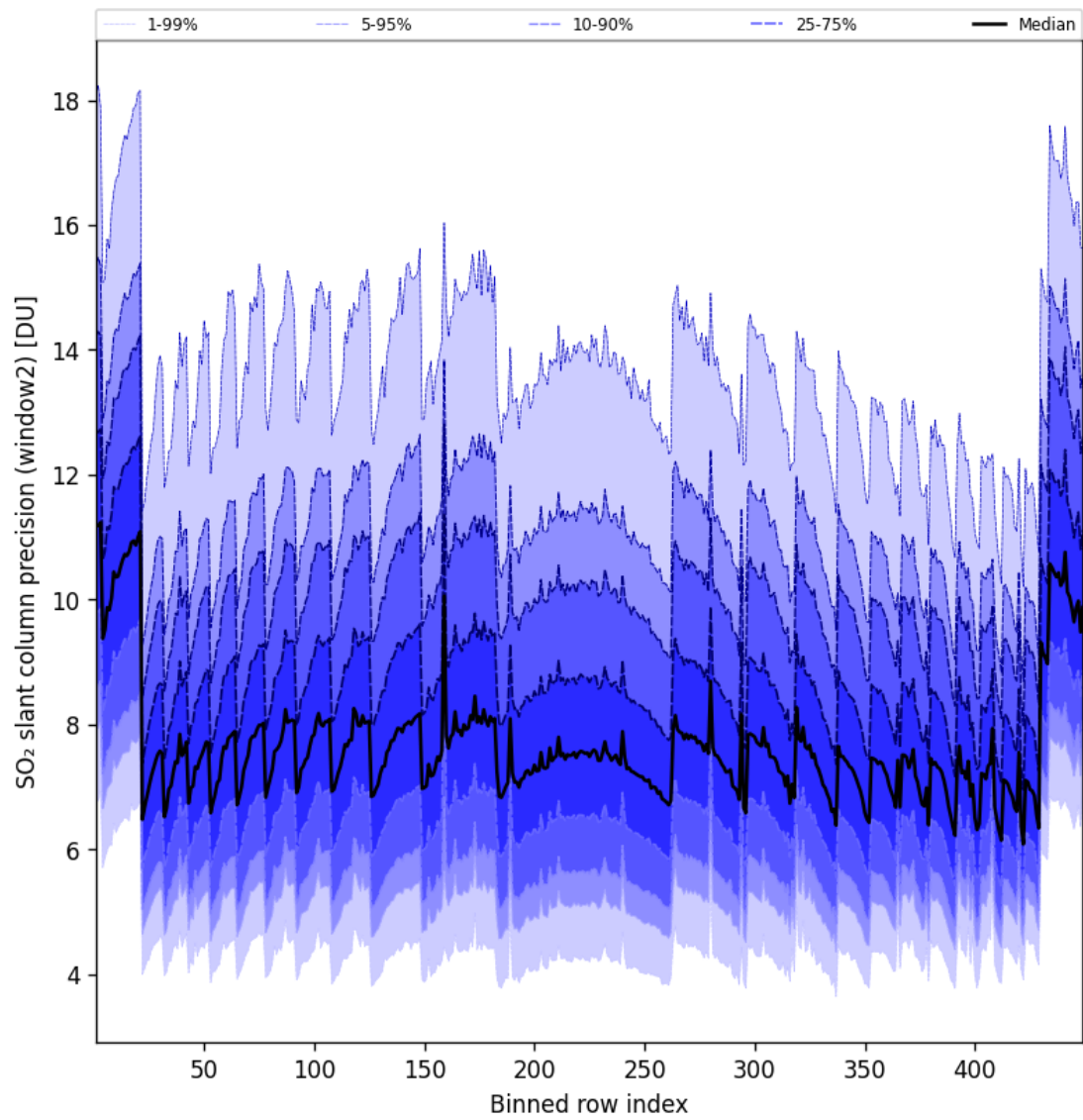


Figure 95: Along track statistics of “SO₂ slant column precision (window2)” for 2025-02-11 to 2025-02-11

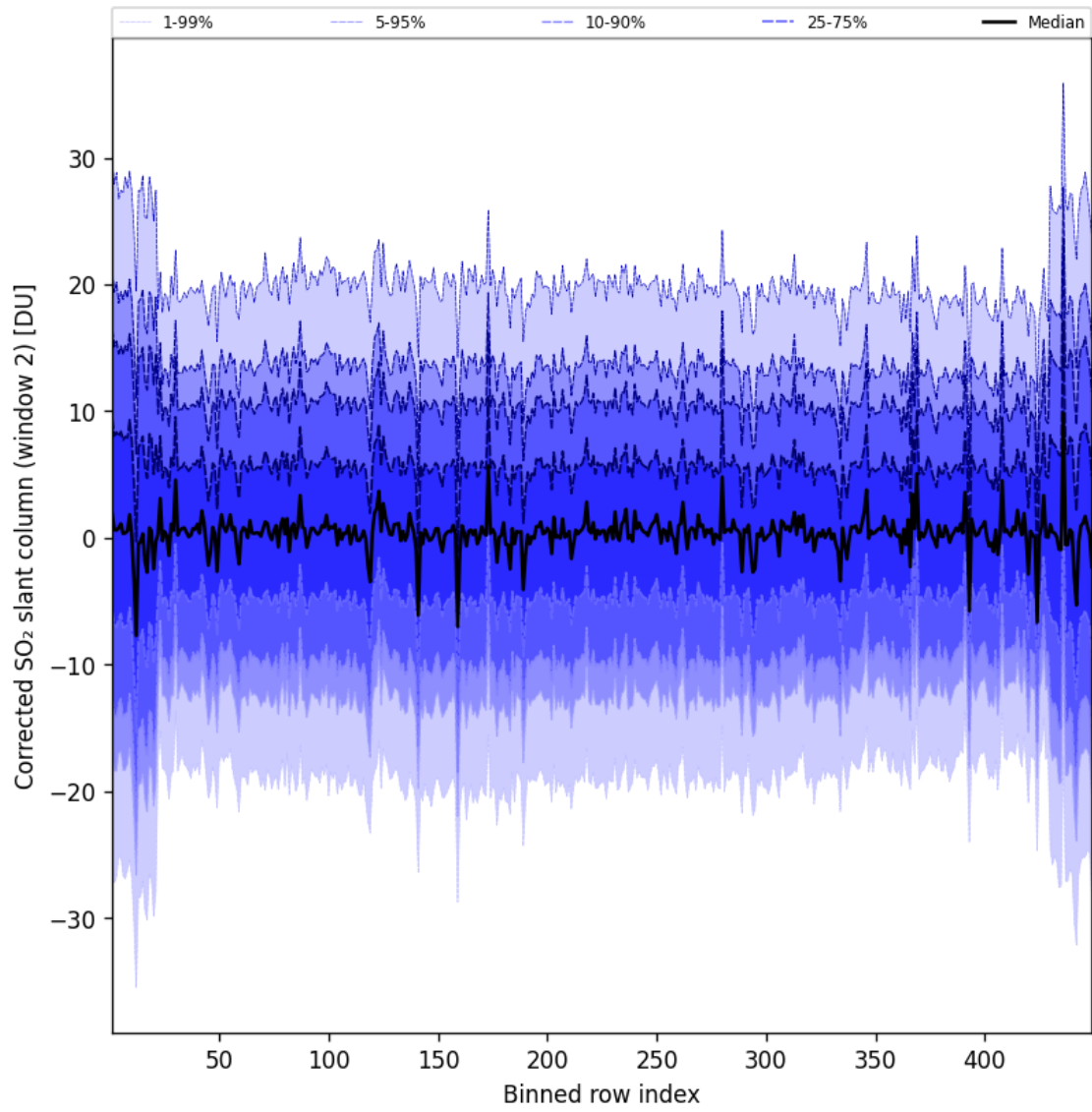


Figure 96: Along track statistics of “Corrected SO₂ slant column (window 2)” for 2025-02-11 to 2025-02-11

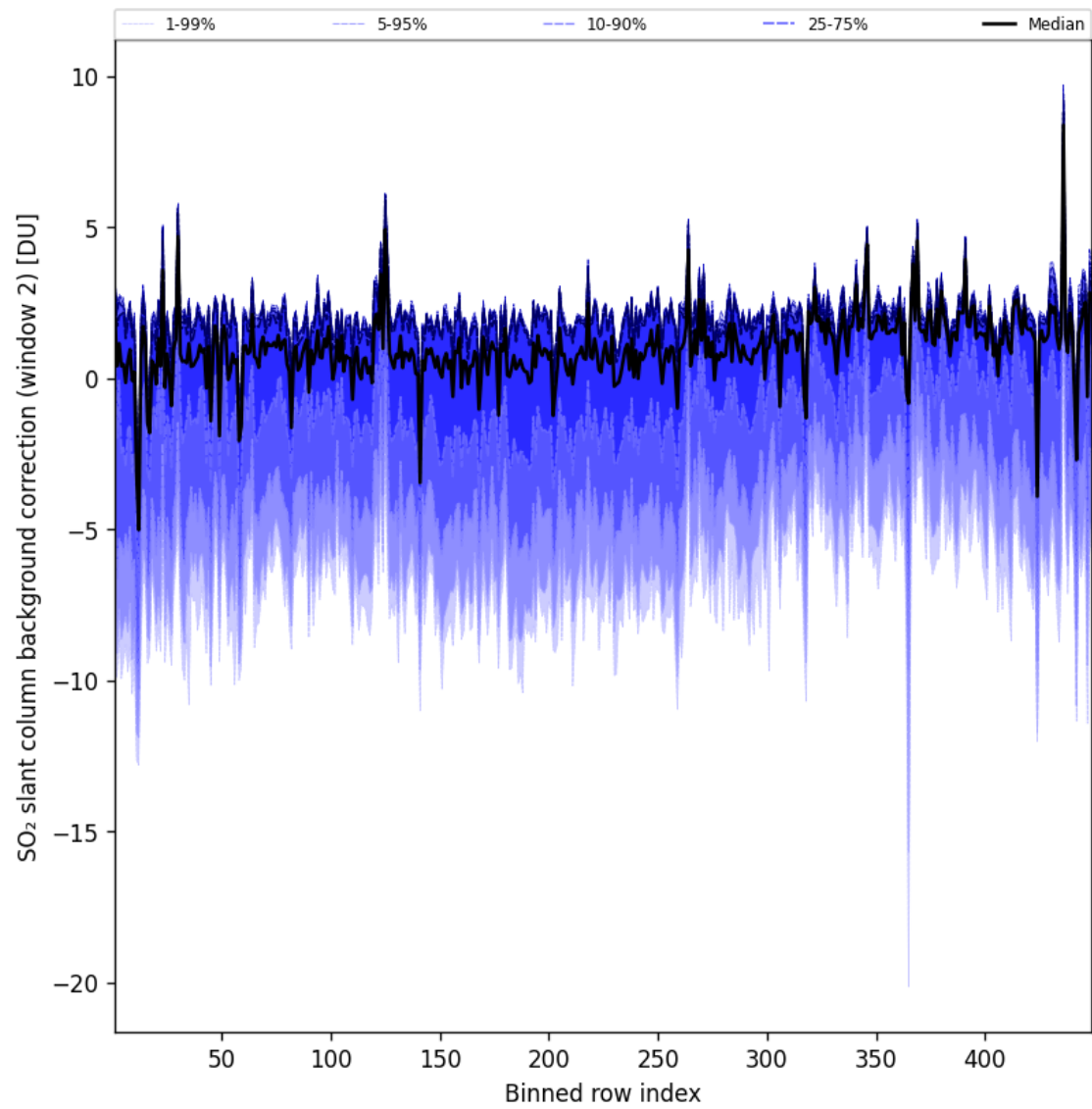


Figure 97: Along track statistics of “SO₂ slant column background correction (window 2)” for 2025-02-11 to 2025-02-11

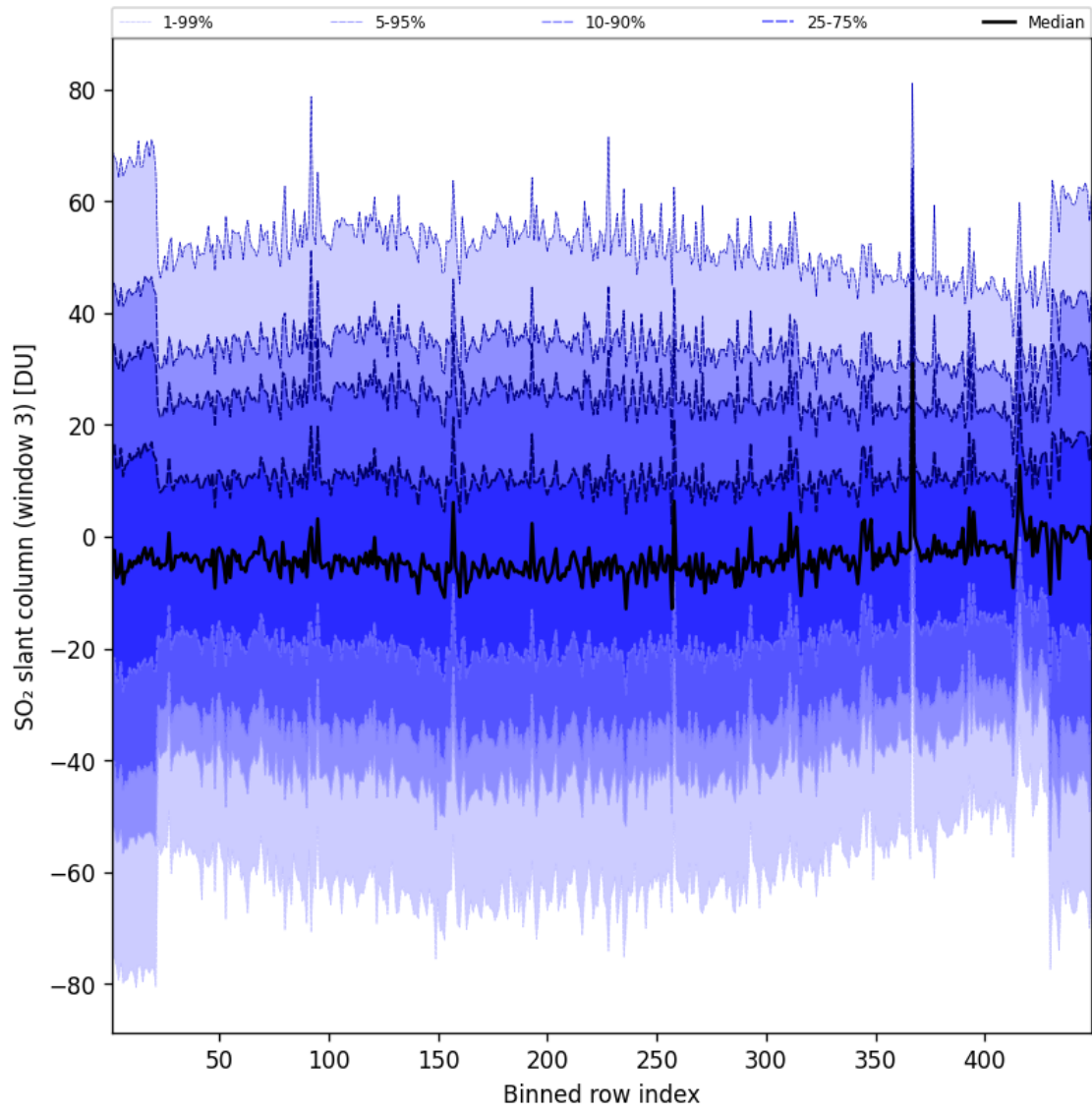


Figure 98: Along track statistics of “SO₂ slant column (window 3)” for 2025-02-11 to 2025-02-11

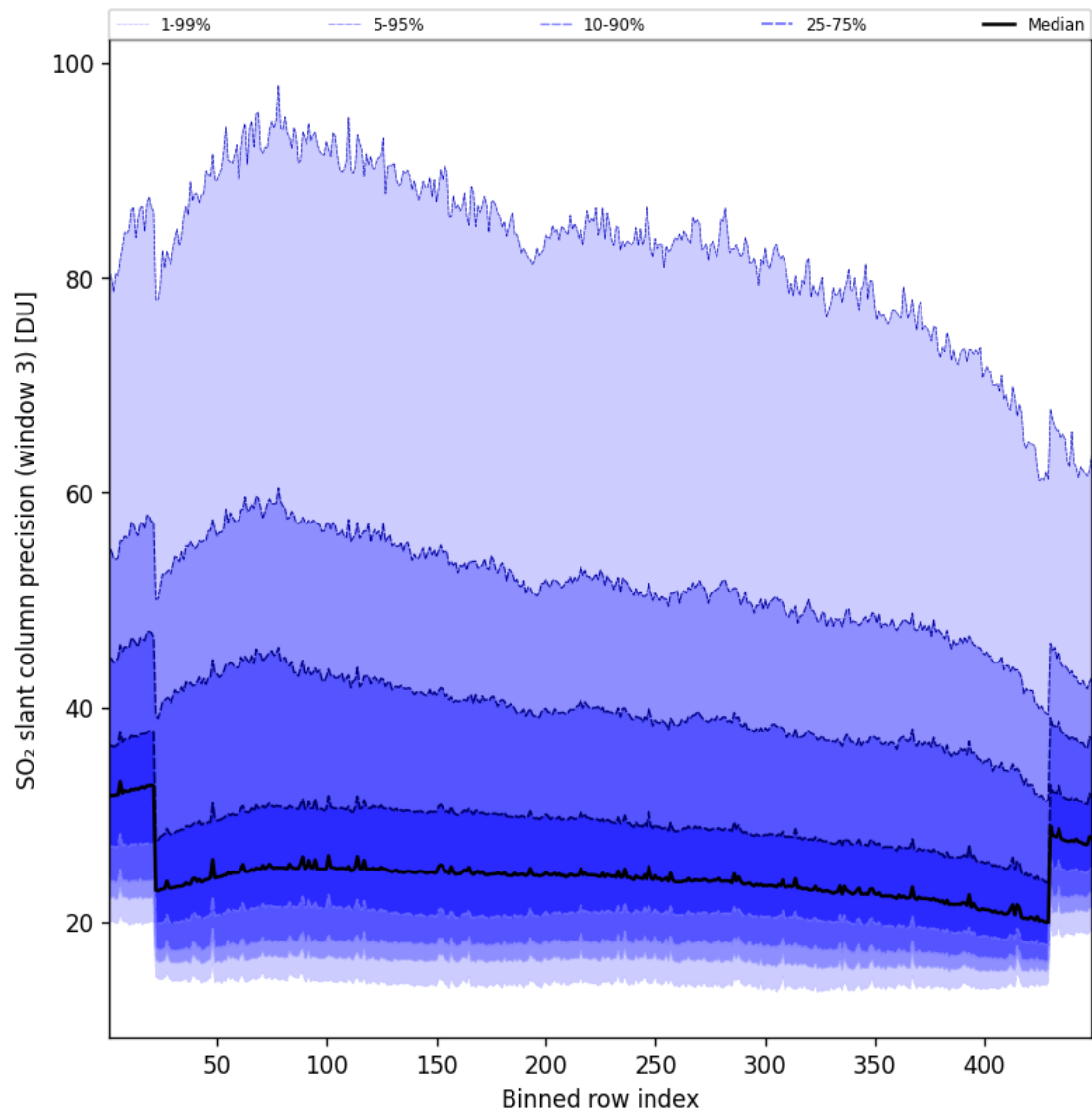


Figure 99: Along track statistics of “SO₂ slant column precision (window 3)” for 2025-02-11 to 2025-02-11

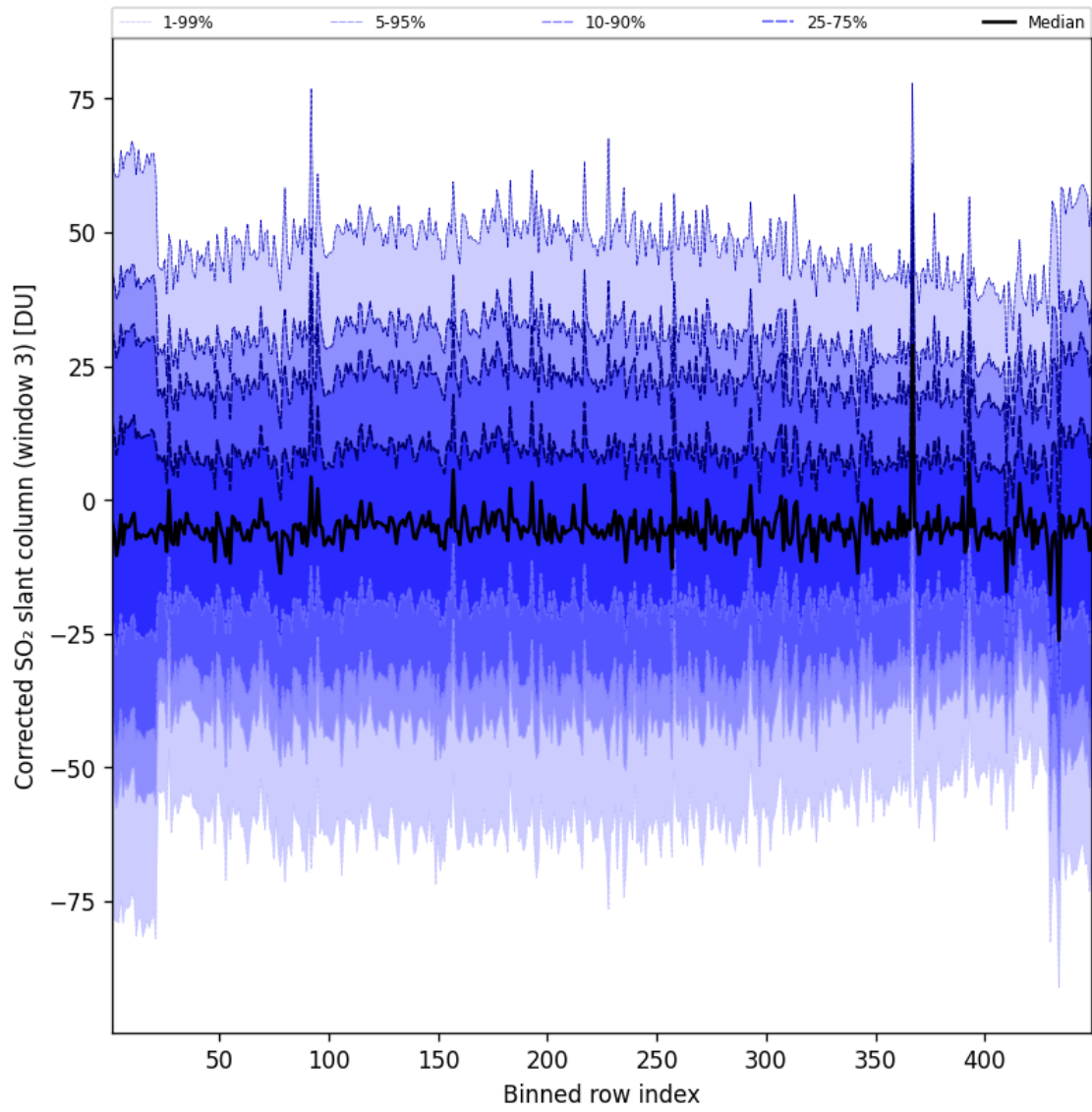


Figure 100: Along track statistics of “Corrected SO₂ slant column (window 3)” for 2025-02-11 to 2025-02-11

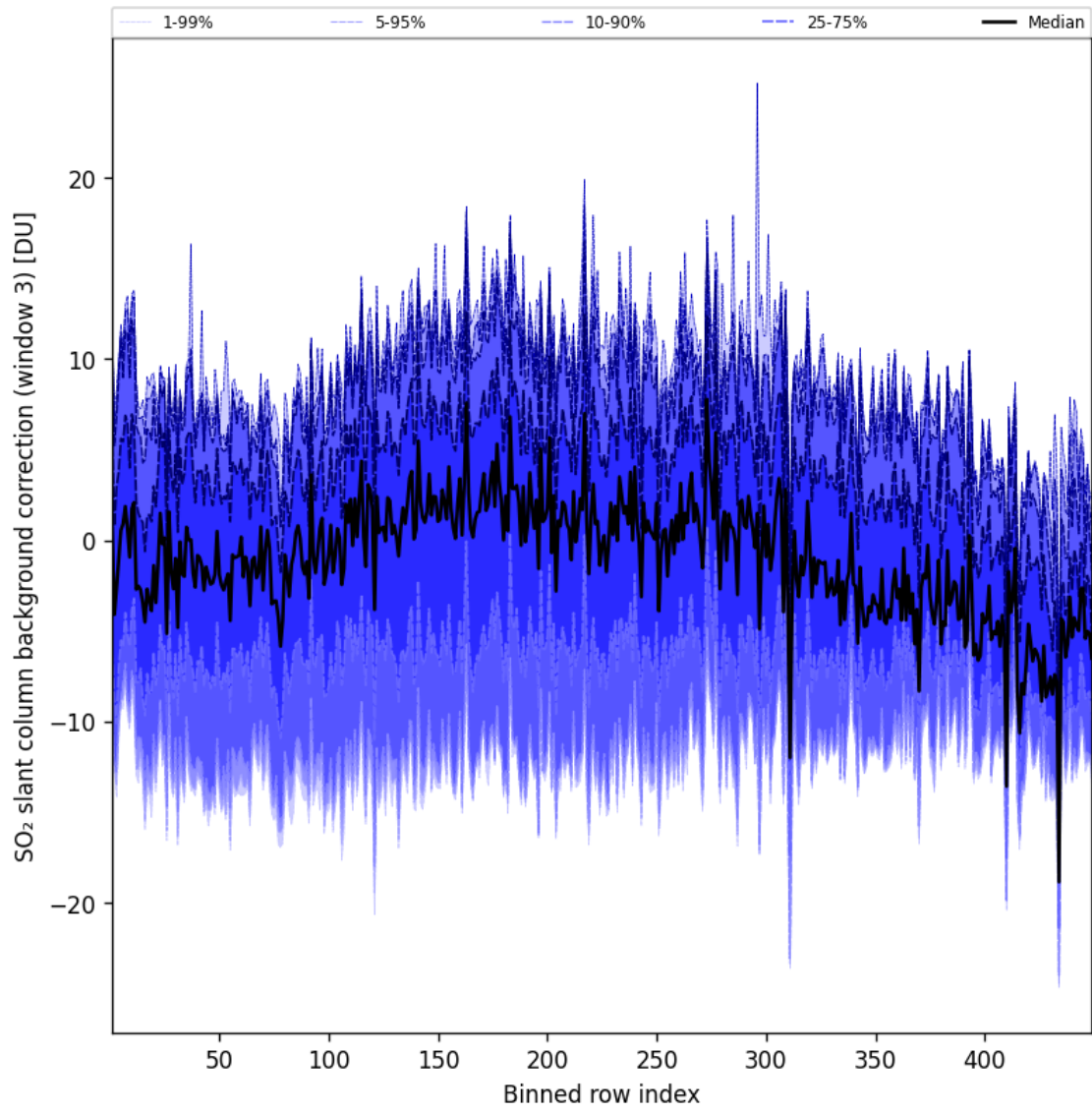


Figure 101: Along track statistics of “SO₂ slant column background correction (window 3)” for 2025-02-11 to 2025-02-11

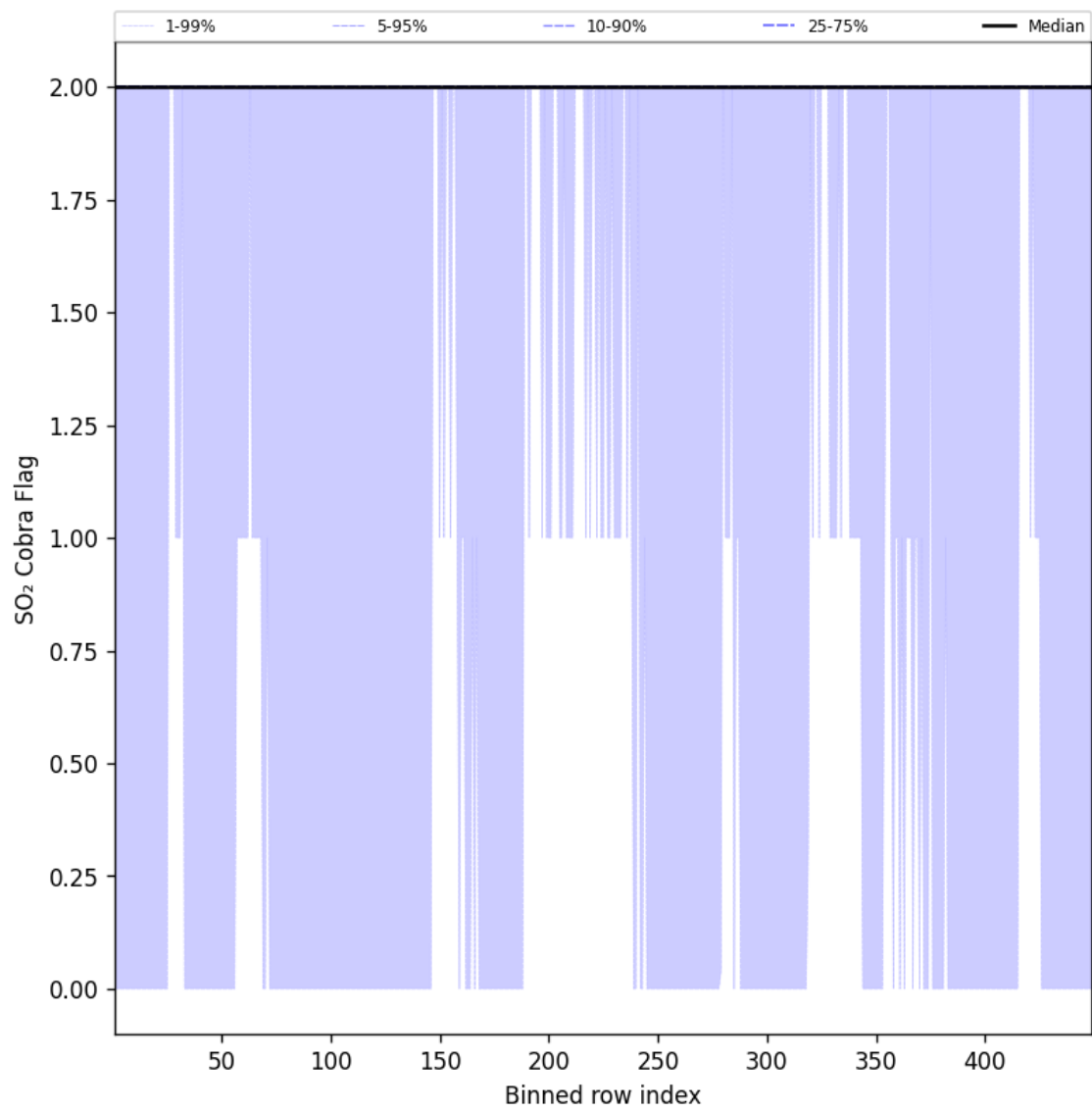


Figure 102: Along track statistics of “SO₂ Cobra Flag” for 2025-02-11 to 2025-02-11

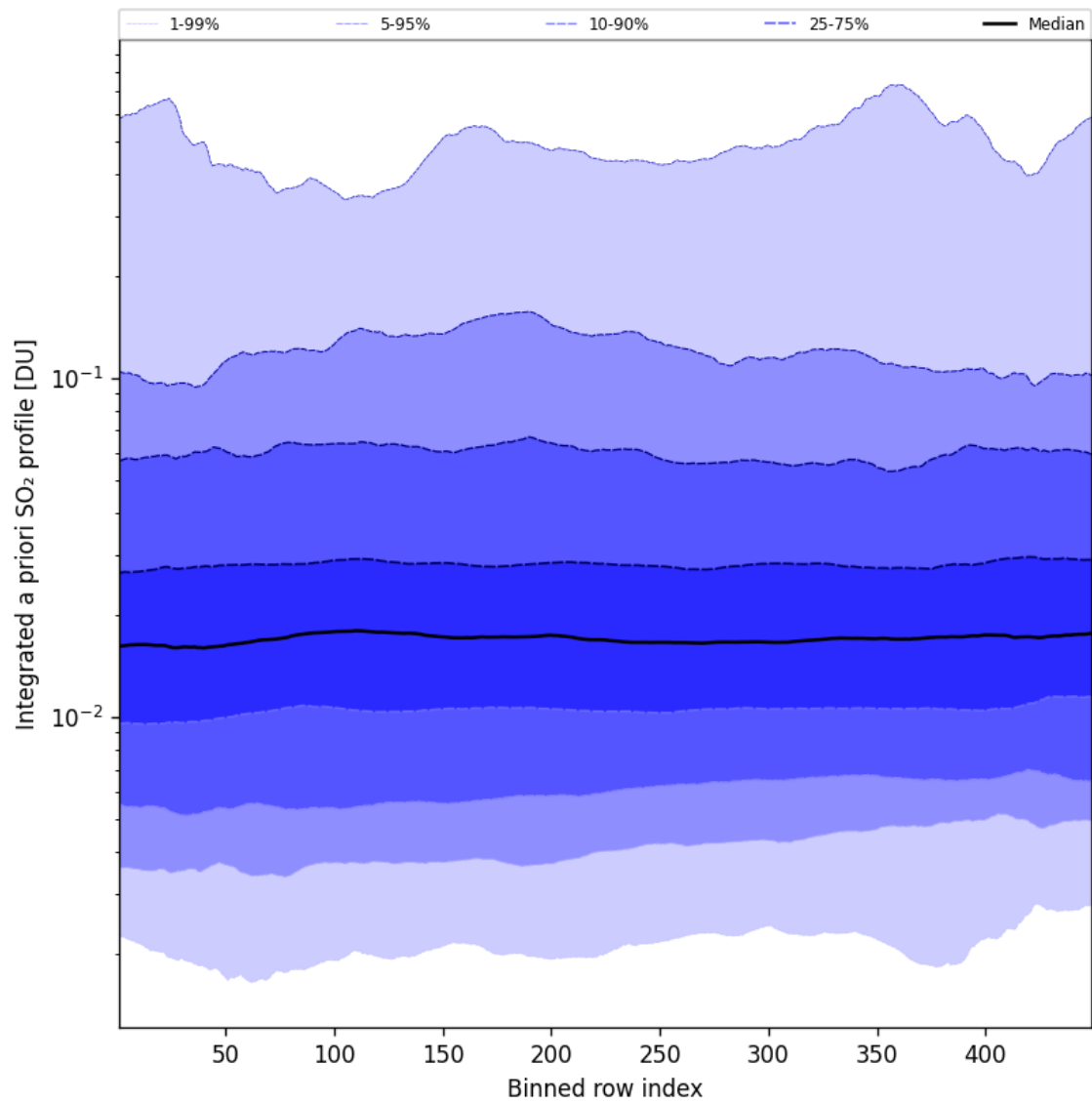


Figure 103: Along track statistics of “Integrated a priori SO₂ profile” for 2025-02-11 to 2025-02-11

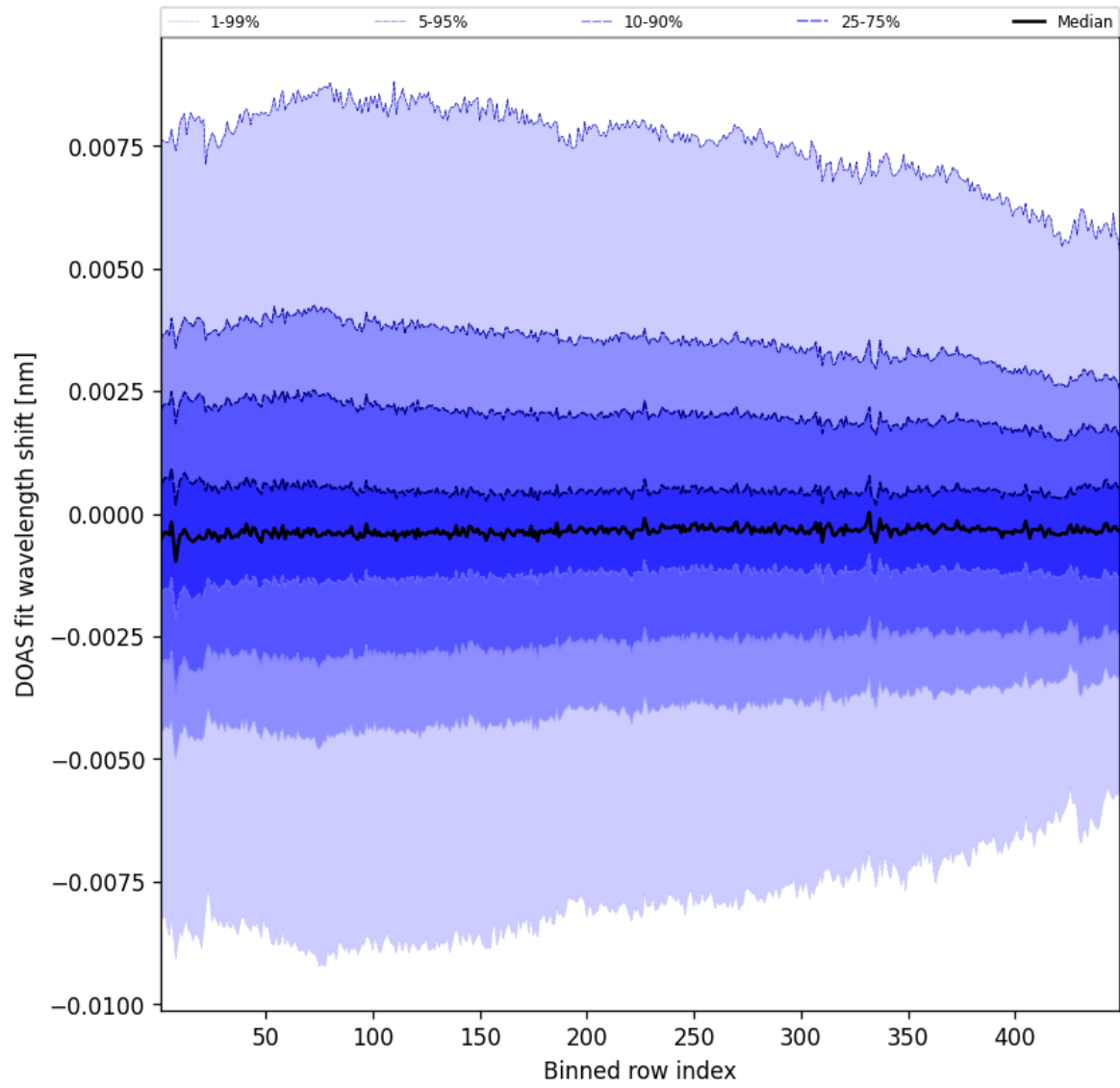


Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2025-02-11 to 2025-02-11

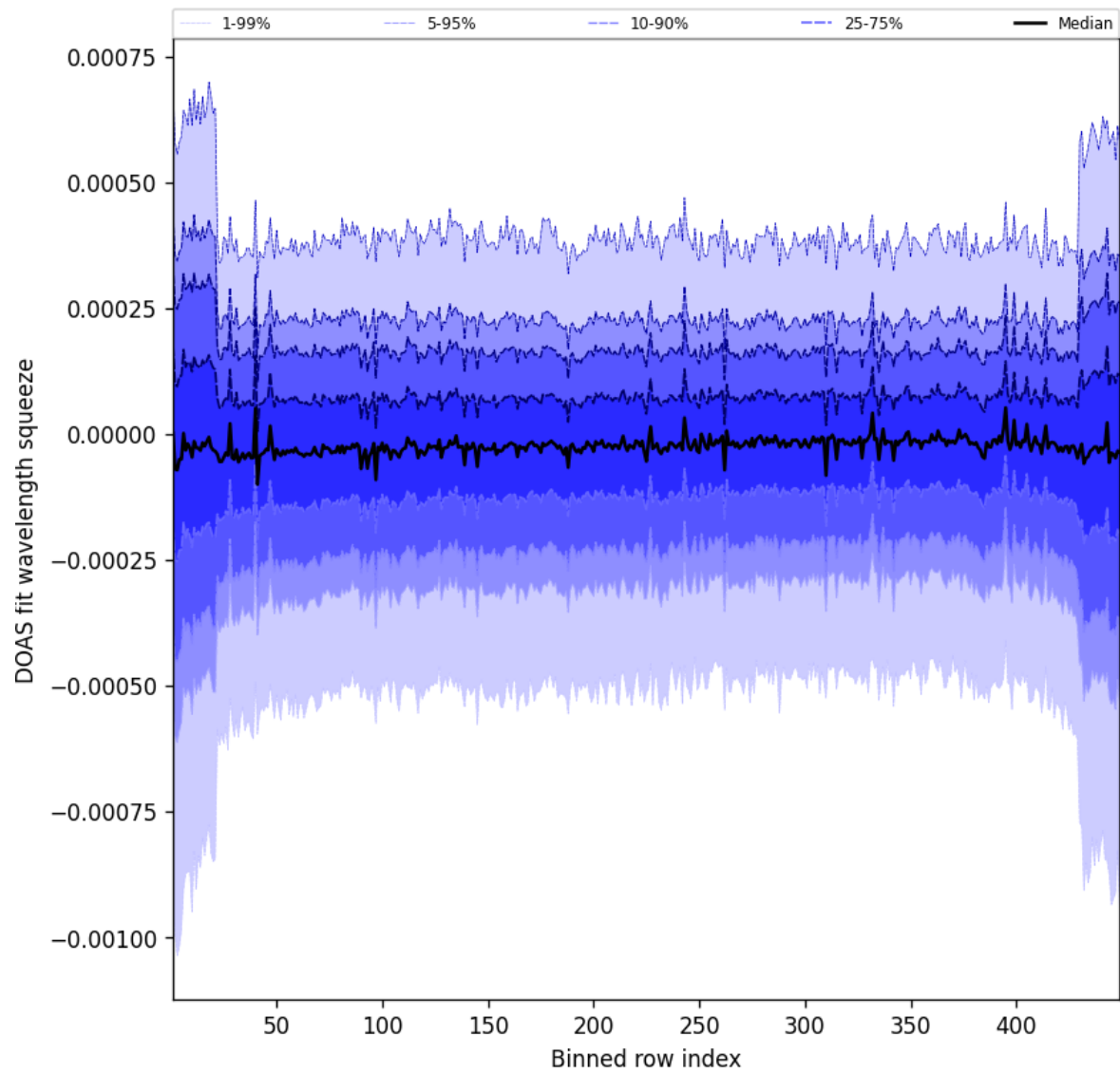


Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2025-02-11 to 2025-02-11

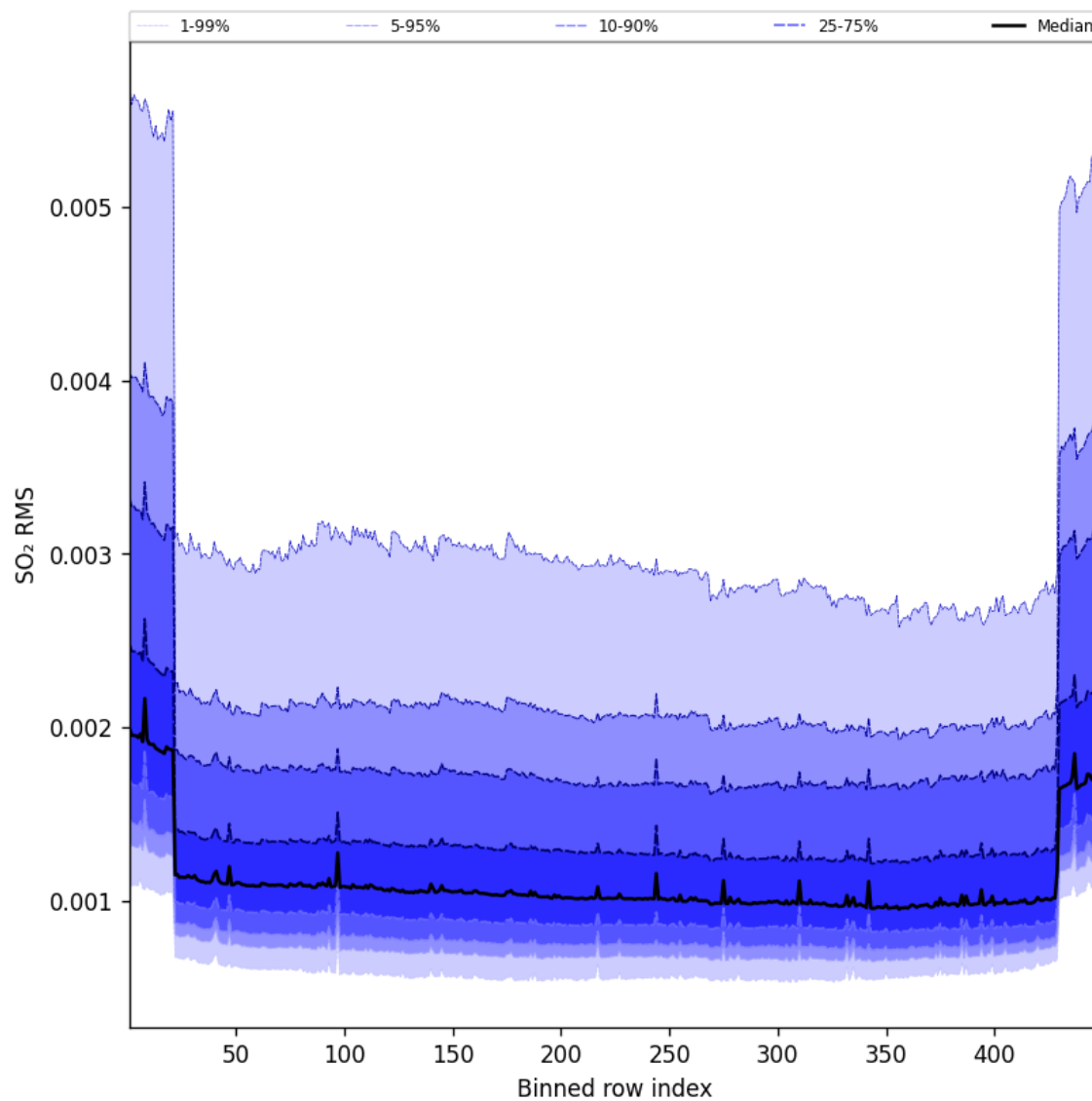


Figure 106: Along track statistics of “SO₂ RMS” for 2025-02-11 to 2025-02-11

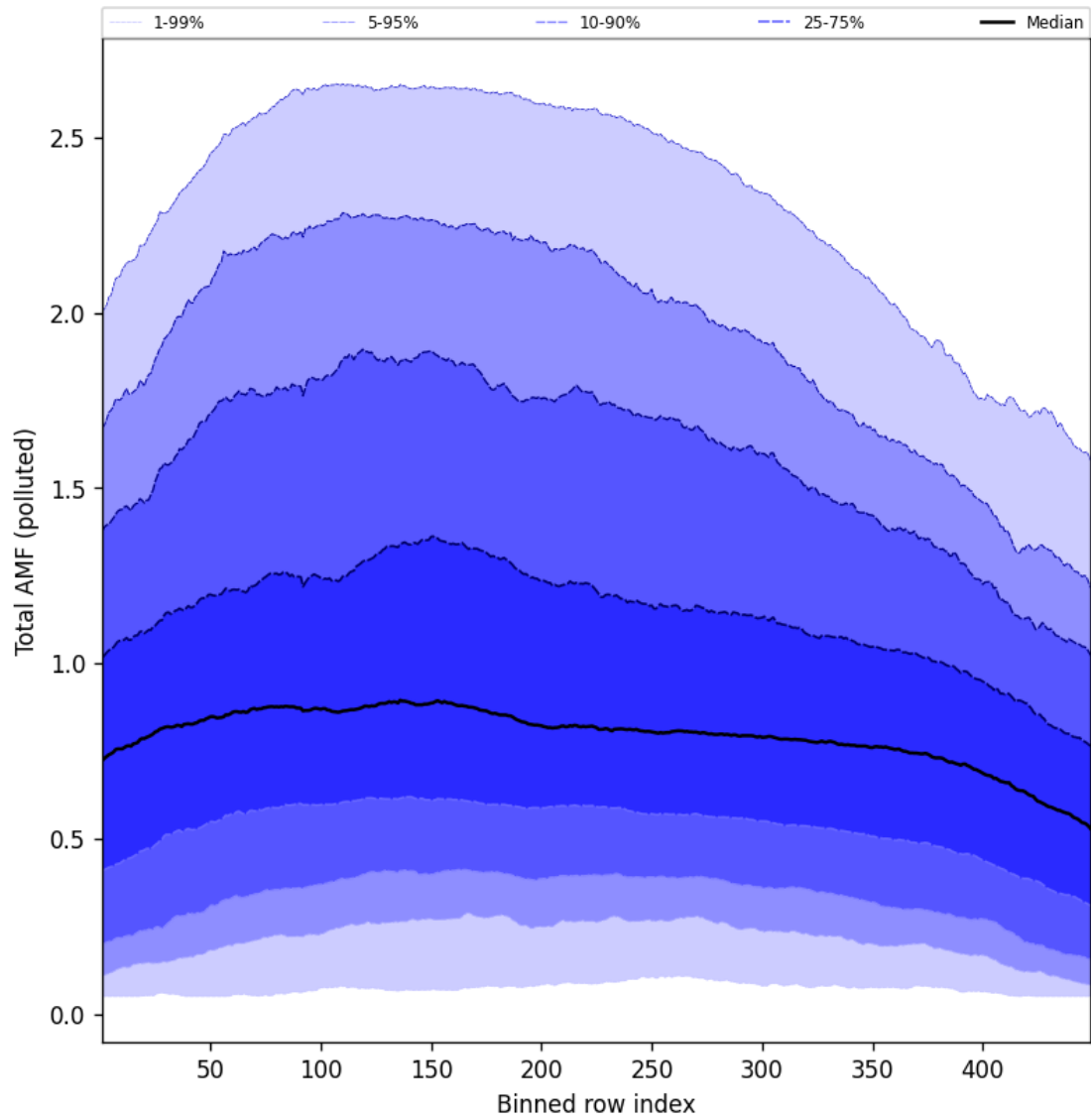


Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-02-11 to 2025-02-11

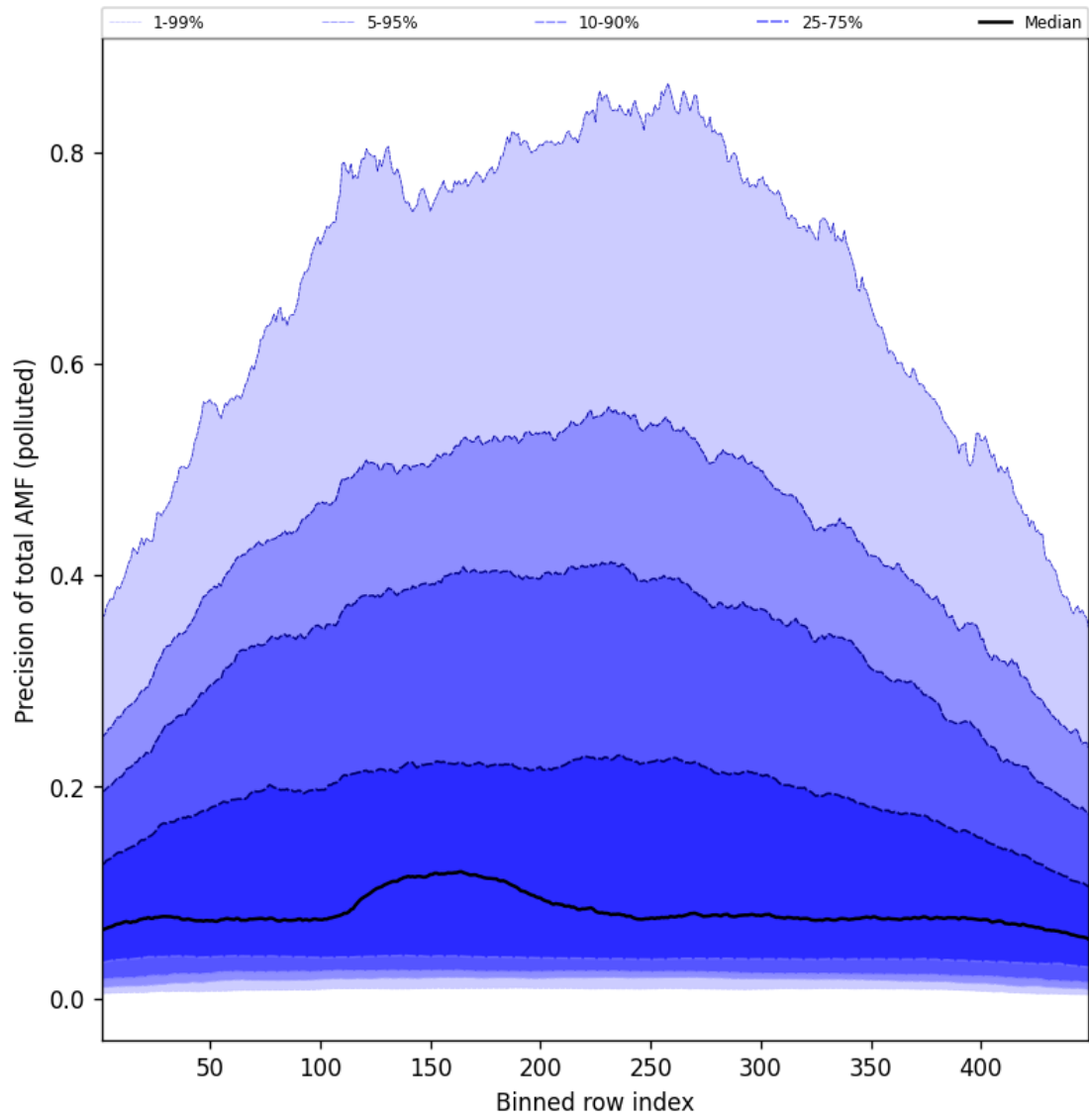


Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-02-11 to 2025-02-11

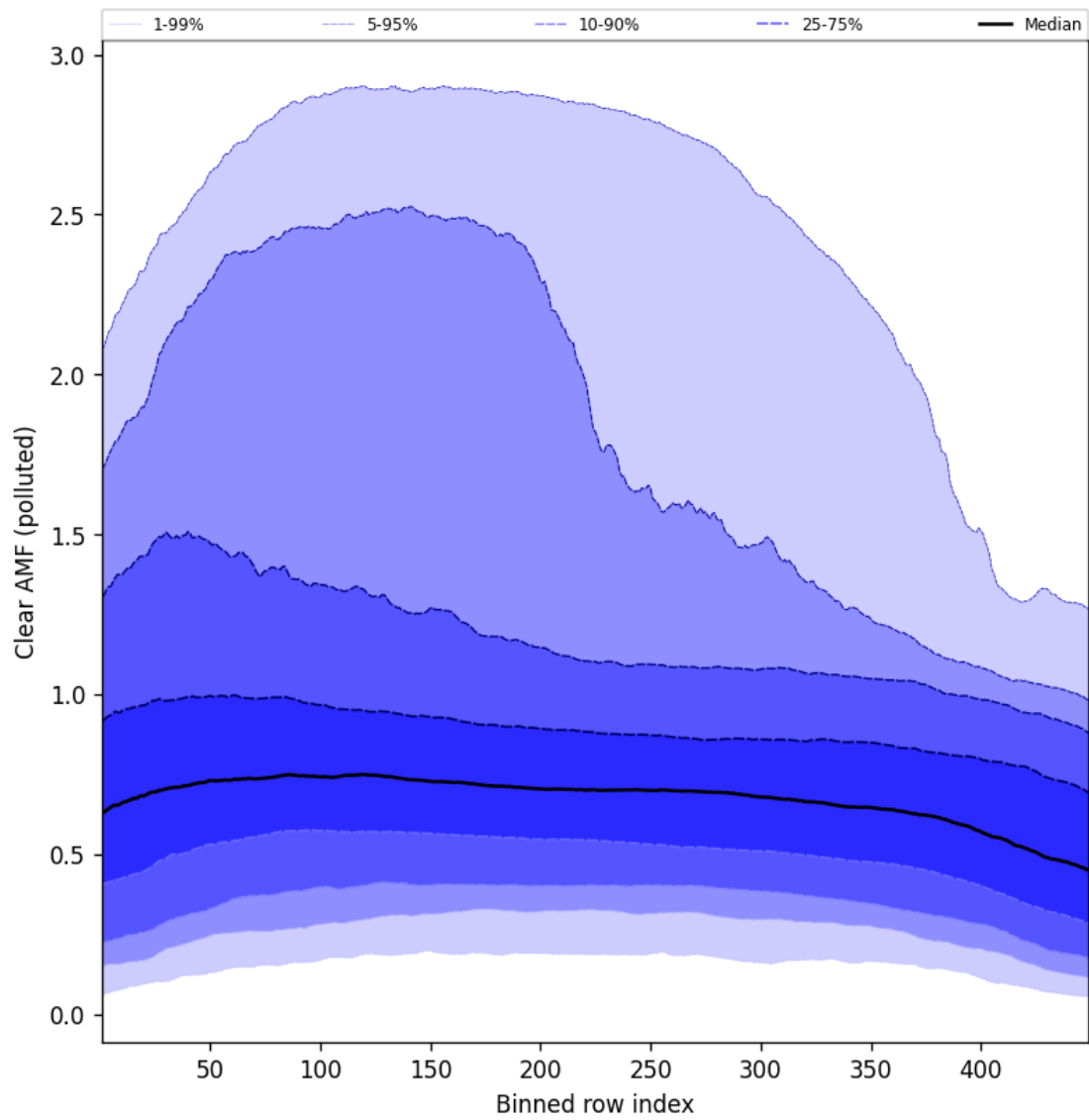


Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-02-11 to 2025-02-11

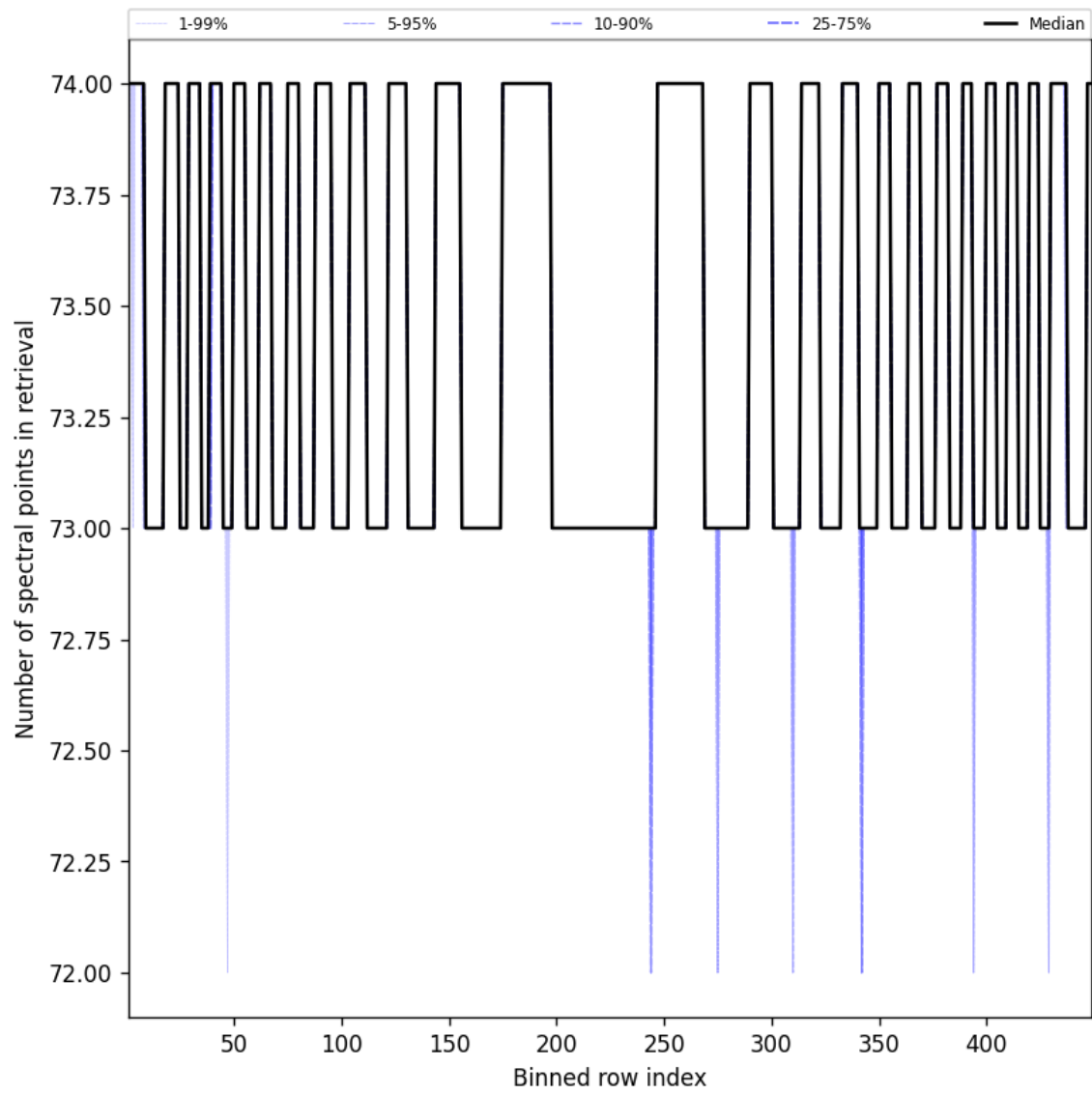


Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-02-11 to 2025-02-11

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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