

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]	0.614 ± 0.418	17328926	0.995	0.820	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(5.920 \pm 181.994) \times 10^{-2}$	17328926	0.235	0.425	1.002×10^{-2}	-151	799
sulfurdioxide total vertical column precision [DU]	0.666 ± 1.320	17328926	0.197	0.372	0.300	3.333×10^{-2}	65.5
sulfurdioxide slant column density corrected [DU]	$(1.972 \pm 39.612) \times 10^{-2}$	17328926	0.235	0.342	8.954×10^{-3}	-17.9	519
sulfurdioxide slant column density cobra [DU]	$(1.945 \pm 35.385) \times 10^{-2}$	17328926	0.235	0.342	8.954×10^{-3}	-17.9	79.5
sulfurdioxide slant column density cobra precision [DU]	0.278 ± 0.137	17328926	0.188	0.127	0.235	7.425×10^{-2}	19.4
sulfurdioxide slant column density window1 [DU]	0.160 ± 0.670	17328926	0.225	0.707	0.173	-67.8	100
sulfurdioxide slant column density window1 precision [DU]	0.278 ± 0.137	17328926	0.188	0.127	0.235	7.425×10^{-2}	19.4
sulfurdioxide slant column density corrected win1 [DU]	$(7.137 \pm 65.468) \times 10^{-2}$	17328926	2.500×10^{-2}	0.683	5.543×10^{-2}	-67.8	100
background so2 slant column offset window1 [DU]	$(-8.846 \pm 18.105) \times 10^{-2}$	17328926	-0.180	0.203	-0.130	-1.47	4.28
sulfurdioxide slant column density window2 [DU]	2.87 ± 8.74	17328926	2.25	11.0	2.65	-948	733
sulfurdioxide slant column density window2 precision [DU]	7.82 ± 2.16	17328926	6.97	2.48	7.48	2.12	516
sulfurdioxide slant column density corrected win2 [DU]	3.30 ± 8.41	17328926	2.75	10.7	3.31	-946	734
background so2 slant column offset window2 [DU]	0.426 ± 2.680	17328926	2.25	2.92	1.32	-20.4	7.64
sulfurdioxide slant column density window3 [DU]	-15.3 ± 23.5	17328926	-15.1	29.5	-15.5	-859	282
sulfurdioxide slant column density window3 precision [DU]	26.9 ± 12.6	17328926	22.5	9.36	23.8	9.29	1.637×10^3
sulfurdioxide slant column density corrected win3 [DU]	-16.5 ± 22.5	17328926	-17.4	28.3	-16.5	-867	274
background so2 slant column offset window3 [DU]	-1.12 ± 7.39	17328926	-6.16	11.4	-1.30	-29.8	32.7
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.22	17328926	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(3.393 \pm 8.192) \times 10^{-2}$	17328926	1.423×10^{-2}	1.749×10^{-2}	1.613×10^{-2}	6.258×10^{-4}	2.54
fitted radiance shift [nm]	$(-3.564 \pm 24.903) \times 10^{-4}$	17328926	-5.000×10^{-4}	1.779×10^{-3}	-3.675×10^{-4}	-4.397×10^{-2}	4.555×10^{-2}
fitted radiance squeeze [1]	$(-4.052 \pm 18.410) \times 10^{-5}$	17328926	-3.000×10^{-5}	2.030×10^{-4}	-3.294×10^{-5}	-1.294×10^{-2}	1.527×10^{-2}
fitted root mean square [1]	$(1.234 \pm 0.571) \times 10^{-3}$	17328926	9.250×10^{-4}	5.237×10^{-4}	1.065×10^{-3}	3.088×10^{-4}	5.390×10^{-2}
sulfurdioxide total air mass factor polluted [1]	0.872 ± 0.527	17328926	0.580	0.628	0.785	5.000×10^{-2}	3.04
sulfurdioxide total air mass factor polluted precision [1]	0.136 ± 0.156	17328926	3.500×10^{-2}	0.143	7.547×10^{-2}	2.500×10^{-3}	1.92
sulfurdioxide clear air mass factor polluted [1]	0.761 ± 0.470	17328926	0.580	0.413	0.667	1.497×10^{-2}	3.05
number of spectral points in retrieval [1]	73.4 ± 0.5	17328926	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	3.000×10^{-2}	8.000×10^{-2}	0.180	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	-3.81	-1.03	-0.549	-0.349	-0.198	0.227	0.394	0.626	1.21	4.73
sulfurdioxide total vertical column precision [DU]	8.755×10^{-2}	0.115	0.137	0.161	0.193	0.564	0.866	1.33	2.41	6.54
sulfurdioxide slant column density corrected [DU]	-0.826	-0.464	-0.334	-0.249	-0.160	0.182	0.276	0.370	0.522	1.02
sulfurdioxide slant column density cobra [DU]	-0.826	-0.464	-0.334	-0.249	-0.160	0.182	0.276	0.370	0.522	1.02
sulfurdioxide slant column density cobra precision [DU]	0.134	0.158	0.170	0.180	0.194	0.321	0.377	0.438	0.533	0.789
sulfurdioxide slant column density window1 [DU]	-1.68	-0.864	-0.572	-0.382	-0.187	0.520	0.700	0.874	1.14	1.91
sulfurdioxide slant column density window1 precision [DU]	0.134	0.158	0.170	0.180	0.194	0.321	0.377	0.438	0.533	0.789
sulfurdioxide slant column density corrected win1 [DU]	-1.58	-0.874	-0.624	-0.458	-0.283	0.401	0.588	0.773	1.07	1.96
background so2 slant column offset window1 [DU]	-0.350	-0.290	-0.262	-0.240	-0.210	-7.412×10^{-3}	7.656×10^{-2}	0.155	0.252	0.460
sulfurdioxide slant column density window2 [DU]	-17.3	-10.9	-7.77	-5.42	-2.77	8.24	11.1	13.7	17.4	25.4
sulfurdioxide slant column density window2 precision [DU]	4.19	5.00	5.50	5.91	6.39	8.87	9.73	10.6	11.8	14.4
sulfurdioxide slant column density corrected win2 [DU]	-17.2	-10.4	-7.12	-4.72	-2.03	8.64	11.3	13.7	16.9	23.7
background so2 slant column offset window2 [DU]	-7.74	-5.42	-3.61	-2.14	-0.705	2.21	2.48	2.75	3.20	4.70
sulfurdioxide slant column density window3 [DU]	-73.3	-53.4	-44.2	-37.5	-30.1	-0.589	7.11	14.1	23.5	42.0
sulfurdioxide slant column density window3 precision [DU]	13.2	15.3	16.8	18.2	19.9	29.3	33.8	39.3	50.4	80.5
sulfurdioxide slant column density corrected win3 [DU]	-72.5	-53.1	-44.1	-37.6	-30.5	-2.29	4.94	11.5	20.4	38.5
background so2 slant column offset window3 [DU]	-15.0	-12.4	-10.9	-9.23	-6.90	4.49	6.88	8.74	10.9	14.9
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]	2.414×10^{-3}	4.316×10^{-3}	6.062×10^{-3}	7.865×10^{-3}	1.026×10^{-2}	2.775×10^{-2}	3.790×10^{-2}	5.539×10^{-2}	0.105	0.373
fitted radiance shift [nm]	-7.820×10^{-3}	-4.025×10^{-3}	-2.688×10^{-3}	-1.930×10^{-3}	-1.288×10^{-3}	4.915×10^{-4}	1.176×10^{-3}	2.020×10^{-3}	3.475×10^{-3}	7.468×10^{-3}
fitted radiance squeeze [1]	-5.651×10^{-4}	-3.363×10^{-4}	-2.510×10^{-4}	-1.948×10^{-4}	-1.373×10^{-4}	6.576×10^{-5}	1.161×10^{-4}	1.632×10^{-4}	2.321×10^{-4}	4.064×10^{-4}
fitted root mean square [1]	5.704×10^{-4}	6.951×10^{-4}	7.660×10^{-4}	8.204×10^{-4}	8.866×10^{-4}	1.410×10^{-3}	1.647×10^{-3}	1.887×10^{-3}	2.302×10^{-3}	3.449×10^{-3}
sulfurdioxide total air mass factor polluted [1]	5.076×10^{-2}	0.157	0.265	0.376	0.506	1.13	1.37	1.60	1.92	2.49
sulfurdioxide total air mass factor polluted precision [1]	7.307×10^{-3}	1.397×10^{-2}	2.180×10^{-2}	2.820×10^{-2}	3.669×10^{-2}	0.180	0.248	0.324	0.446	0.727
sulfurdioxide clear air mass factor polluted [1]	0.137	0.238	0.320	0.399	0.490	0.903	1.03	1.16	1.66	2.73
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]	0.656 ± 0.412	7278429	0.780	1.000	0.0	1.000	0.220	1.000
sulfurdioxide total vertical column [DU]	0.118 ± 2.671	7278429	0.615	1.643×10^{-2}	-151	468	-0.279	0.335
sulfurdioxide total vertical column precision [DU]	1.06 ± 1.87	7278429	0.763	0.436	4.380×10^{-2}	65.5	0.250	1.01
sulfurdioxide slant column density corrected [DU]	$(3.073 \pm 45.101) \times 10^{-2}$	7278429	0.387	1.218×10^{-2}	-11.1	57.0	-0.178	0.209
sulfurdioxide slant column density cobra [DU]	$(3.026 \pm 42.990) \times 10^{-2}$	7278429	0.387	1.218×10^{-2}	-11.1	17.5	-0.178	0.209
sulfurdioxide slant column density cobra precision [DU]	0.321 ± 0.168	7278429	0.172	0.267	8.646×10^{-2}	8.58	0.210	0.382
sulfurdioxide slant column density window1 [DU]	0.210 ± 0.784	7278429	0.781	0.223	-13.5	34.4	-0.171	0.610
sulfurdioxide slant column density window1 precision [DU]	0.321 ± 0.168	7278429	0.172	0.267	8.646×10^{-2}	8.58	0.210	0.382
sulfurdioxide slant column density corrected win1 [DU]	$(9.462 \pm 77.613) \times 10^{-2}$	7278429	0.769	6.677×10^{-2}	-12.5	34.5	-0.309	0.459
background so2 slant column offset window1 [DU]	-0.116 ± 0.194	7278429	0.187	-0.156	-1.47	4.28	-0.237	-5.008×10^{-2}
sulfurdioxide slant column density window2 [DU]	3.71 ± 9.49	7278429	12.0	3.34	-254	320	-2.52	9.52
sulfurdioxide slant column density window2 precision [DU]	8.34 ± 2.22	7278429	2.70	7.99	2.29	169	6.81	9.52
sulfurdioxide slant column density corrected win2 [DU]	3.24 ± 8.98	7278429	11.4	3.23	-254	320	-2.49	8.95
background so2 slant column offset window2 [DU]	-0.472 ± 3.367	7278429	5.14	0.915	-20.4	7.64	-3.04	2.10
sulfurdioxide slant column density window3 [DU]	-18.2 ± 24.4	7278429	30.9	-17.9	-212	170	-33.4	-2.55
sulfurdioxide slant column density window3 precision [DU]	28.0 ± 12.0	7278429	9.17	25.1	9.36	225	21.4	30.5
sulfurdioxide slant column density corrected win3 [DU]	-16.3 ± 23.7	7278429	29.9	-16.1	-217	172	-31.1	-1.20
background so2 slant column offset window3 [DU]	1.87 ± 6.72	7278429	10.9	1.51	-24.8	32.7	-3.76	7.15
sulfurdioxide slant column cobra flag [1]	1.96 ± 0.25	7278429	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(5.536 \pm 12.069) \times 10^{-2}$	7278429	3.411×10^{-2}	2.002×10^{-2}	6.258×10^{-4}	2.54	1.145×10^{-2}	4.556×10^{-2}
fitted radiance shift [nm]	$(-1.990 \pm 24.101) \times 10^{-4}$	7278429	1.656×10^{-3}	-1.988×10^{-4}	-3.806×10^{-2}	3.122×10^{-2}	-1.042×10^{-3}	6.145×10^{-4}
fitted radiance squeeze [1]	$(-1.104 \pm 20.876) \times 10^{-5}$	7278429	2.154×10^{-4}	-3.663×10^{-6}	-9.156×10^{-3}	1.106×10^{-2}	-1.120×10^{-4}	1.034×10^{-4}
fitted root mean square [1]	$(1.402 \pm 0.709) \times 10^{-3}$	7278429	6.964×10^{-4}	1.167×10^{-3}	3.545×10^{-4}	2.699×10^{-2}	9.484×10^{-4}	1.645×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.683 ± 0.427	7278429	0.559	0.635	5.000×10^{-2}	2.79	0.355	0.914
sulfurdioxide total air mass factor polluted precision [1]	0.109 ± 0.164	7278429	9.312×10^{-2}	4.788×10^{-2}	2.500×10^{-3}	1.92	2.700×10^{-2}	0.120
sulfurdioxide clear air mass factor polluted [1]	0.587 ± 0.294	7278429	0.465	0.555	1.497×10^{-2}	2.30	0.343	0.808
number of spectral points in retrieval [1]	73.5 ± 0.5	7278429	1.000	73.0	53.0	74.0	73.0	74.0

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

Variable	mean $\pm \sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.584 ± 0.419	10050497	0.840	0.490	0.0	1.000	0.160	1.000
sulfurdioxide total vertical column [DU]	$(1.693 \pm 73.386) \times 10^{-2}$	10050497	0.341	7.125×10^{-3}	-66.9	799	-0.162	0.180
sulfurdioxide total vertical column precision [DU]	0.377 ± 0.516	10050497	0.234	0.246	3.333×10^{-2}	26.7	0.168	0.402
sulfurdioxide slant column density corrected [DU]	$(1.174 \pm 35.083) \times 10^{-2}$	10050497	0.315	7.048×10^{-3}	-17.9	519	-0.149	0.166
sulfurdioxide slant column density cobra [DU]	$(1.163 \pm 28.618) \times 10^{-2}$	10050497	0.315	7.048×10^{-3}	-17.9	79.5	-0.149	0.166
sulfurdioxide slant column density cobra precision [DU]	0.248 ± 0.098	10050497	9.731×10^{-2}	0.218	7.425×10^{-2}	19.4	0.186	0.283
sulfurdioxide slant column density window1 [DU]	0.123 ± 0.571	10050497	0.660	0.142	-67.8	100	-0.197	0.462
sulfurdioxide slant column density window1 precision [DU]	0.248 ± 0.098	10050497	9.731×10^{-2}	0.218	7.425×10^{-2}	19.4	0.186	0.283
sulfurdioxide slant column density corrected win1 [DU]	$(5.453 \pm 54.962) \times 10^{-2}$	10050497	0.631	4.855×10^{-2}	-67.8	100	-0.266	0.365
background so2 slant column offset window1 [DU]	$(-6.875 \pm 16.807) \times 10^{-2}$	10050497	0.222	-0.115	-0.957	1.75	-0.192	2.994×10^{-2}
sulfurdioxide slant column density window2 [DU]	2.27 ± 8.09	10050497	10.3	2.22	-948	733	-2.93	7.41
sulfurdioxide slant column density window2 precision [DU]	7.44 ± 2.03	10050497	2.22	7.15	2.12	516	6.15	8.37
sulfurdioxide slant column density corrected win2 [DU]	3.34 ± 7.98	10050497	10.2	3.36	-946	734	-1.73	8.43
background so2 slant column offset window2 [DU]	1.08 ± 1.78	10050497	2.24	1.53	-11.2	7.35	3.084×10^{-2}	2.27
sulfurdioxide slant column density window3 [DU]	-13.3 ± 22.5	10050497	28.5	-13.9	-859	282	-27.8	0.723
sulfurdioxide slant column density window3 precision [DU]	26.1 ± 12.9	10050497	9.10	22.8	9.29	1.637×10^3	19.0	28.1
sulfurdioxide slant column density corrected win3 [DU]	-16.6 ± 21.6	10050497	27.1	-16.8	-867	274	-30.2	-3.06
background so2 slant column offset window3 [DU]	-3.29 ± 7.10	10050497	11.8	-3.68	-29.8	19.9	-9.39	2.44
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.20	10050497	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(1.841 \pm 2.122) \times 10^{-2}$	10050497	1.189×10^{-2}	1.465×10^{-2}	6.432×10^{-4}	1.49	9.661×10^{-3}	2.155×10^{-2}
fitted radiance shift [nm]	$(-4.704 \pm 25.407) \times 10^{-4}$	10050497	1.816×10^{-3}	-5.038×10^{-4}	-4.397×10^{-2}	4.555×10^{-2}	-1.434×10^{-3}	3.825×10^{-4}
fitted radiance squeeze [1]	$(-6.187 \pm 16.059) \times 10^{-5}$	10050497	1.924×10^{-4}	-5.186×10^{-5}	-1.294×10^{-2}	1.527×10^{-2}	-1.525×10^{-4}	3.993×10^{-5}
fitted root mean square [1]	$(1.113 \pm 0.403) \times 10^{-3}$	10050497	4.242×10^{-4}	1.007×10^{-3}	3.088×10^{-4}	5.390×10^{-2}	8.534×10^{-4}	1.278×10^{-3}
sulfurdioxide total air mass factor polluted [1]	1.01 ± 0.55	10050497	0.688	0.901	5.000×10^{-2}	3.04	0.612	1.30
sulfurdioxide total air mass factor polluted precision [1]	0.156 ± 0.146	10050497	0.168	0.110	4.870×10^{-3}	1.51	4.691×10^{-2}	0.215
sulfurdioxide clear air mass factor polluted [1]	0.887 ± 0.530	10050497	0.418	0.729	0.141	3.05	0.570	0.988
number of spectral points in retrieval [1]	73.4 ± 0.5	10050497	1.000	73.0	52.0	74.0	73.0	74.0

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

Variable	mean $\pm \sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.657 ± 0.409	12484238	0.780	1.000	0.0	1.000	0.220	1.000
sulfurdioxide total vertical column [DU]	$(3.906 \pm 138.650) \times 10^{-2}$	12484238	0.409	8.947×10^{-3}	-142	158	-0.193	0.216
sulfurdioxide total vertical column precision [DU]	0.558 ± 1.015	12484238	0.302	0.287	4.665×10^{-2}	65.5	0.196	0.497
sulfurdioxide slant column density corrected [DU]	$(1.609 \pm 34.323) \times 10^{-2}$	12484238	0.328	7.737×10^{-3}	-11.1	79.5	-0.155	0.173
sulfurdioxide slant column density cobra [DU]	$(1.589 \pm 33.092) \times 10^{-2}$	12484238	0.328	7.737×10^{-3}	-11.1	79.5	-0.155	0.173
sulfurdioxide slant column density cobra precision [DU]	0.265 ± 0.127	12484238	0.110	0.224	8.018×10^{-2}	17.8	0.190	0.299
sulfurdioxide slant column density window1 [DU]	0.162 ± 0.629	12484238	0.676	0.173	-48.4	79.8	-0.170	0.506
sulfurdioxide slant column density window1 precision [DU]	0.265 ± 0.127	12484238	0.110	0.224	8.018×10^{-2}	17.8	0.190	0.299
sulfurdioxide slant column density corrected win1 [DU]	$(6.294 \pm 61.613) \times 10^{-2}$	12484238	0.656	4.996×10^{-2}	-48.4	81.6	-0.275	0.381
background so2 slant column offset window1 [DU]	$(-9.892 \pm 16.513) \times 10^{-2}$	12484238	0.190	-0.132	-1.41	4.28	-0.211	-2.050×10^{-2}
sulfurdioxide slant column density window2 [DU]	2.50 ± 8.47	12484238	10.7	2.32	-948	733	-2.98	7.73
sulfurdioxide slant column density window2 precision [DU]	7.65 ± 2.04	12484238	2.36	7.33	2.12	408	6.29	8.65
sulfurdioxide slant column density corrected win2 [DU]	3.30 ± 8.22	12484238	10.5	3.31	-946	734	-1.94	8.55
background so2 slant column offset window2 [DU]	0.807 ± 2.327	12484238	2.31	1.48	-20.4	7.64	-6.041×10^{-2}	2.25
sulfurdioxide slant column density window3 [DU]	-12.7 ± 23.2	12484238	29.4	-13.0	-859	231	-27.4	1.99
sulfurdioxide slant column density window3 precision [DU]	26.5 ± 11.9	12484238	8.83	23.6	9.29	1.637×10^3	20.0	28.8
sulfurdioxide slant column density corrected win3 [DU]	-14.6 ± 22.1	12484238	28.0	-14.9	-867	226	-28.7	-0.675
background so2 slant column offset window3 [DU]	-1.92 ± 6.95	12484238	10.2	-2.11	-29.8	32.7	-7.18	2.99
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.17	12484238	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.355 \pm 3.758) \times 10^{-2}$	12484238	1.375×10^{-2}	1.581×10^{-2}	6.912×10^{-4}	2.37	1.082×10^{-2}	2.457×10^{-2}
fitted radiance shift [nm]	$(-3.390 \pm 23.554) \times 10^{-4}$	12484238	1.752×10^{-3}	-3.251×10^{-4}	-4.043×10^{-2}	3.156×10^{-2}	-1.245×10^{-3}	5.068×10^{-4}
fitted radiance squeeze [1]	$(-4.417 \pm 17.244) \times 10^{-5}$	12484238	1.923×10^{-4}	-3.486×10^{-5}	-1.227×10^{-2}	1.527×10^{-2}	-1.339×10^{-4}	5.840×10^{-5}
fitted root mean square [1]	$(1.175 \pm 0.532) \times 10^{-3}$	12484238	4.354×10^{-4}	1.018×10^{-3}	3.229×10^{-4}	5.390×10^{-2}	8.677×10^{-4}	1.303×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.844 ± 0.430	12484238	0.537	0.800	5.000×10^{-2}	2.61	0.547	1.08
sulfurdioxide total air mass factor polluted precision [1]	0.122 ± 0.121	12484238	0.127	7.281×10^{-2}	2.500×10^{-3}	1.56	3.950×10^{-2}	0.167
sulfurdioxide clear air mass factor polluted [1]	0.714 ± 0.282	12484238	0.351	0.675	3.197×10^{-2}	2.72	0.526	0.877
number of spectral points in retrieval [1]	73.5 ± 0.5	12484238	1.000	73.0	70.0	74.0	73.0	74.0

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

Variable	mean $\pm \sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.515 $\pm$ 0.421	3985962	0.900	0.460	0.0	1.000	0.1000	1.000
sulfurdioxide total vertical column [DU]	(8.596 $\pm$ 234.782) $\times 10^{-2}$	3985962	0.436	1.103 $\times 10^{-2}$	-137	799	-0.198	0.238
sulfurdioxide total vertical column precision [DU]	0.837 $\pm$ 1.702	3985962	0.588	0.326	3.333 $\times 10^{-2}$	47.4	0.164	0.753
sulfurdioxide slant column density corrected [DU]	(2.528 $\pm$ 50.543) $\times 10^{-2}$	3985962	0.377	1.133 $\times 10^{-2}$	-17.9	519	-0.174	0.203
sulfurdioxide slant column density cobra [DU]	(2.488 $\pm$ 38.447) $\times 10^{-2}$	3985962	0.377	1.133 $\times 10^{-2}$	-17.9	25.7	-0.174	0.203
sulfurdioxide slant column density cobra precision [DU]	0.305 $\pm$ 0.143	3985962	0.143	0.269	7.425 $\times 10^{-2}$	19.4	0.210	0.353
sulfurdioxide slant column density window1 [DU]	0.148 $\pm$ 0.739	3985962	0.790	0.167	-67.8	100	-0.242	0.549
sulfurdioxide slant column density window1 precision [DU]	0.305 $\pm$ 0.143	3985962	0.143	0.269	7.425 $\times 10^{-2}$	19.4	0.210	0.353
sulfurdioxide slant column density corrected win1 [DU]	(8.762 $\pm$ 71.506) $\times 10^{-2}$	3985962	0.747	6.915 $\times 10^{-2}$	-67.8	100	-0.301	0.446
background so2 slant column offset window1 [DU]	(-6.014 $\pm$ 21.396) $\times 10^{-2}$	3985962	0.258	-0.124	-1.47	3.83	-0.211	4.728 $\times 10^{-2}$
sulfurdioxide slant column density window2 [DU]	3.60 $\pm$ 9.14	3985962	11.6	3.42	-411	677	-2.29	9.32
sulfurdioxide slant column density window2 precision [DU]	8.16 $\pm$ 2.36	3985962	2.63	7.81	2.23	516	6.65	9.28
sulfurdioxide slant column density corrected win2 [DU]	3.31 $\pm$ 8.77	3985962	11.1	3.34	-409	679	-2.21	8.86
background so2 slant column offset window2 [DU]	-0.296 $\pm$ 3.025	3985962	4.55	0.596	-20.4	7.64	-2.42	2.13
sulfurdioxide slant column density window3 [DU]	-22.1 $\pm$ 22.5	3985962	28.0	-21.8	-277	282	-36.0	-7.94
sulfurdioxide slant column density window3 precision [DU]	27.8 $\pm$ 14.3	3985962	10.7	24.3	9.36	336	19.5	30.2
sulfurdioxide slant column density corrected win3 [DU]	-21.6 $\pm$ 22.7	3985962	28.2	-21.1	-288	274	-35.4	-7.18
background so2 slant column offset window3 [DU]	0.546 $\pm$ 7.962	3985962	13.5	1.88	-29.8	29.3	-6.24	7.21
sulfurdioxide slant column cobra flag [1]	1.96 $\pm$ 0.28	3985962	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	(5.501 $\pm$ 12.637) $\times 10^{-2}$	3985962	3.433 $\times 10^{-2}$	1.704 $\times 10^{-2}$	6.339 $\times 10^{-4}$	2.52	7.654 $\times 10^{-3}$	4.198 $\times 10^{-2}$
fitted radiance shift [nm]	(-4.263 $\pm$ 28.270) $\times 10^{-4}$	3985962	1.774 $\times 10^{-3}$	-5.327 $\times 10^{-4}$	-4.193 $\times 10^{-2}$	3.986 $\times 10^{-2}$	-1.381 $\times 10^{-3}$	3.925 $\times 10^{-4}$
fitted radiance squeeze [1]	(-3.728 $\pm$ 20.525) $\times 10^{-5}$	3985962	2.340 $\times 10^{-4}$	-3.233 $\times 10^{-5}$	-1.294 $\times 10^{-2}$	1.455 $\times 10^{-2}$	-1.528 $\times 10^{-4}$	8.115 $\times 10^{-5}$
fitted root mean square [1]	(1.352 $\pm$ 0.592) $\times 10^{-3}$	3985962	6.034 $\times 10^{-4}$	1.222 $\times 10^{-3}$	3.249 $\times 10^{-4}$	5.063 $\times 10^{-2}$	9.712 $\times 10^{-4}$	1.575 $\times 10^{-3}$
sulfurdioxide total air mass factor polluted [1]	1.00 $\pm$ 0.74	3985962	1.08	0.760	5.000 $\times 10^{-2}$	3.04	0.419	1.49
sulfurdioxide total air mass factor polluted precision [1]	0.180 $\pm$ 0.222	3985962	0.205	0.101	2.500 $\times 10^{-3}$	1.92	2.933 $\times 10^{-2}$	0.234
sulfurdioxide clear air mass factor polluted [1]	0.954 $\pm$ 0.793	3985962	0.824	0.665	1.798 $\times 10^{-2}$	3.05	0.374	1.20
number of spectral points in retrieval [1]	73.4 $\pm$ 0.5	3985962	1.000	73.0	52.0	74.0	73.0	74.0

3 Granule outlines

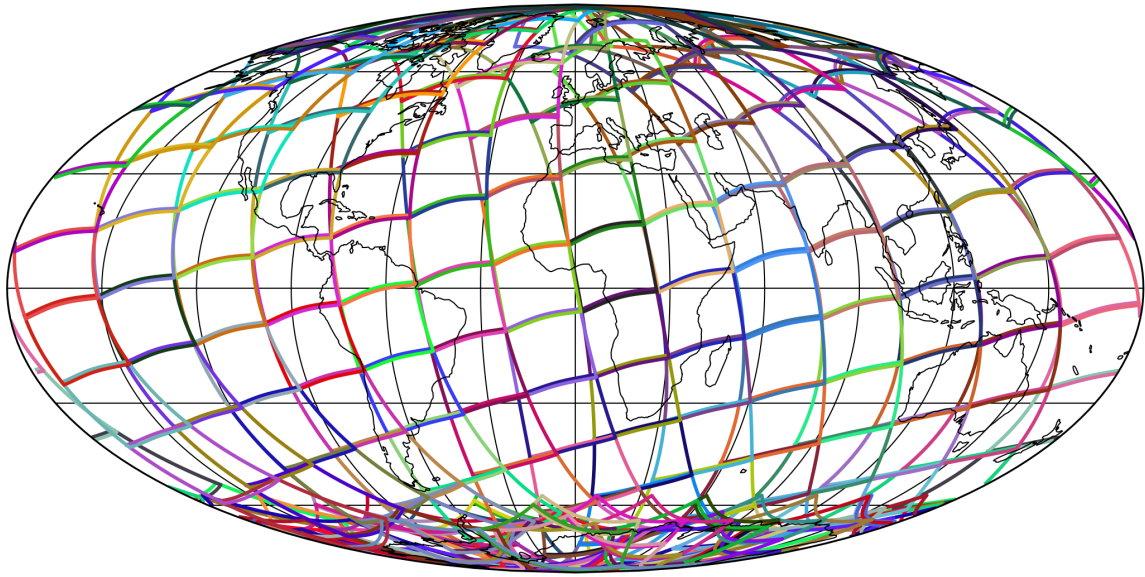


Figure 1: Outline of the granules.

4 Input data monitoring

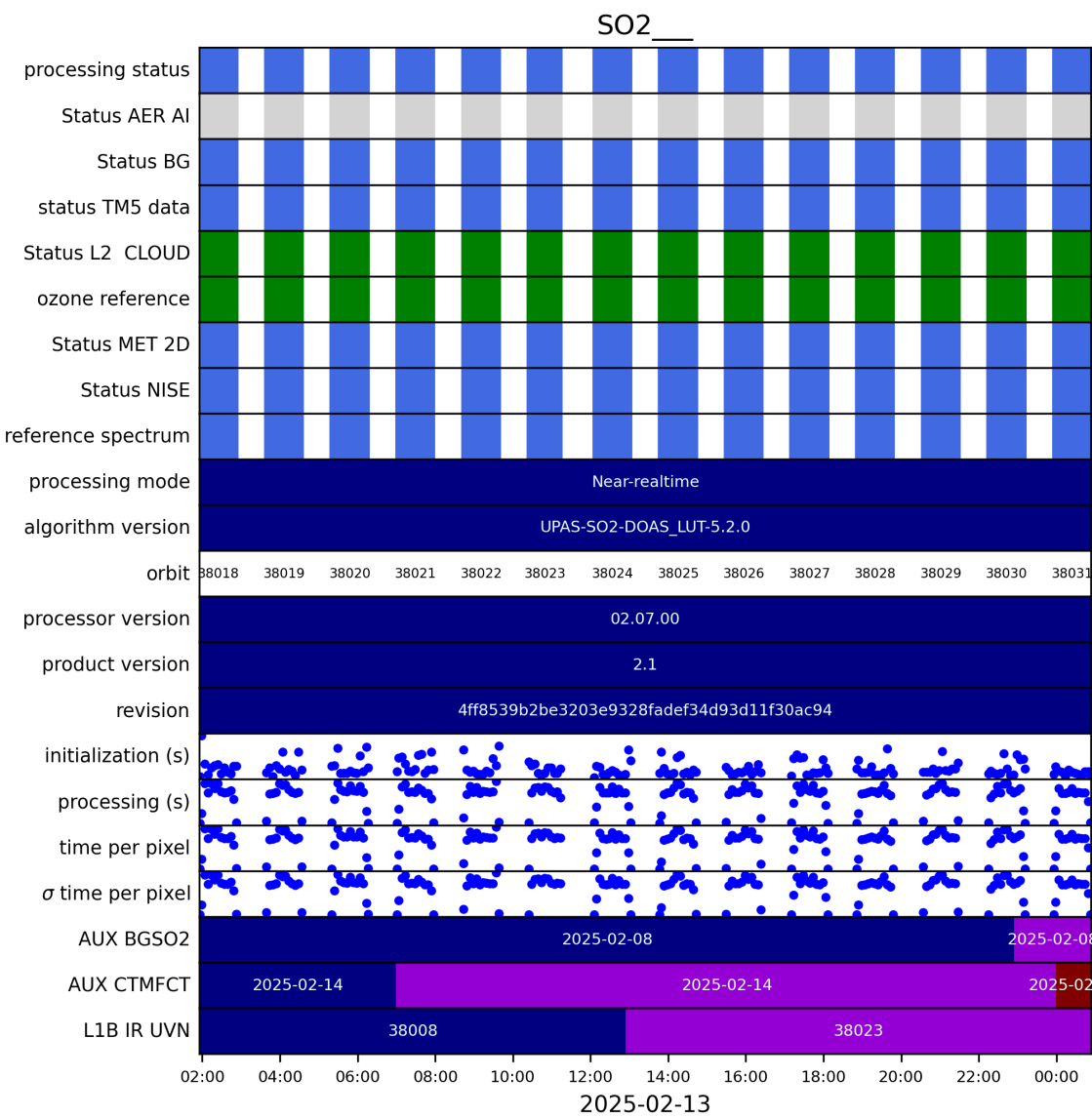


Figure 2: Input data per granule

5 Warnings and errors

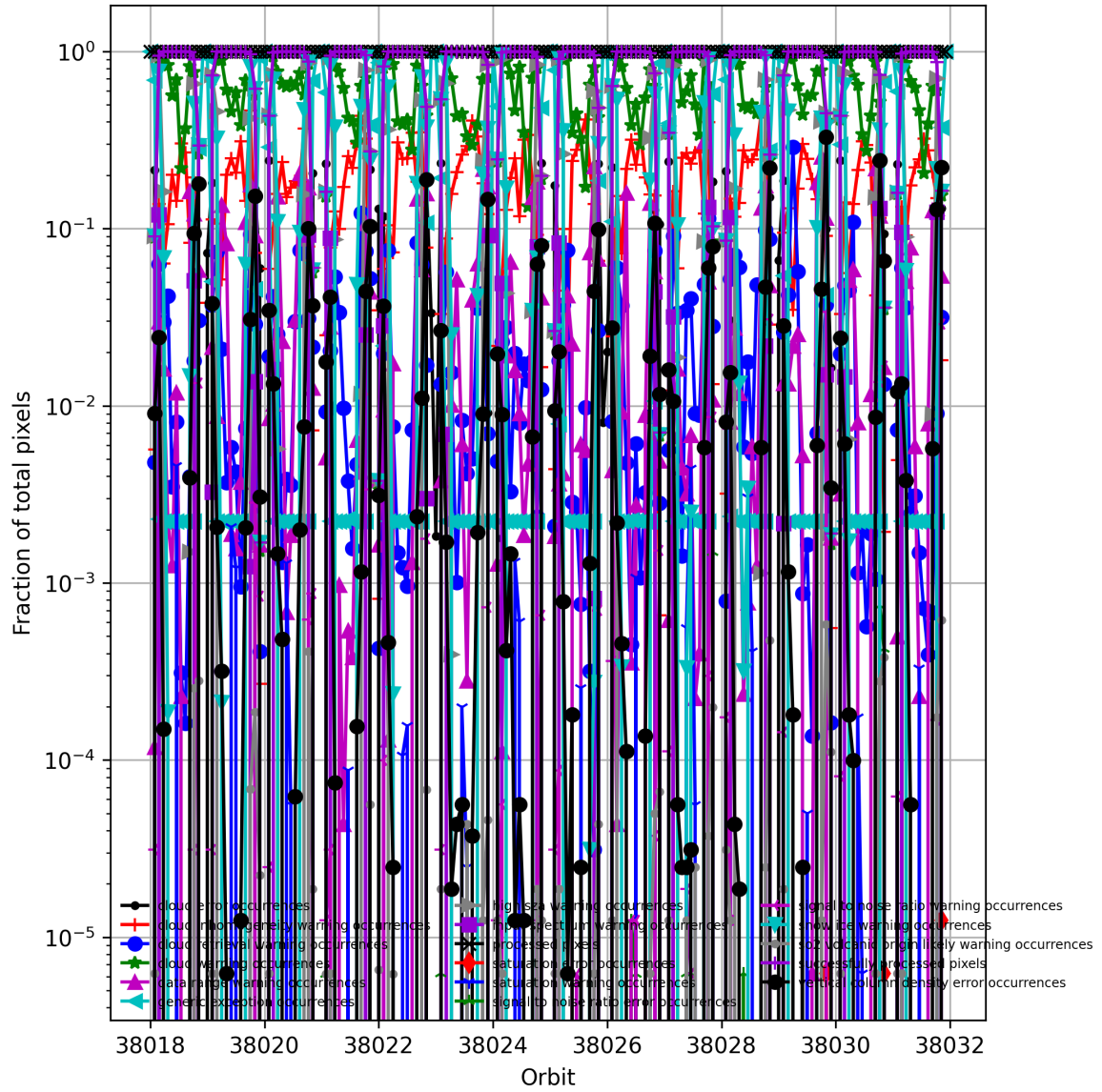


Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

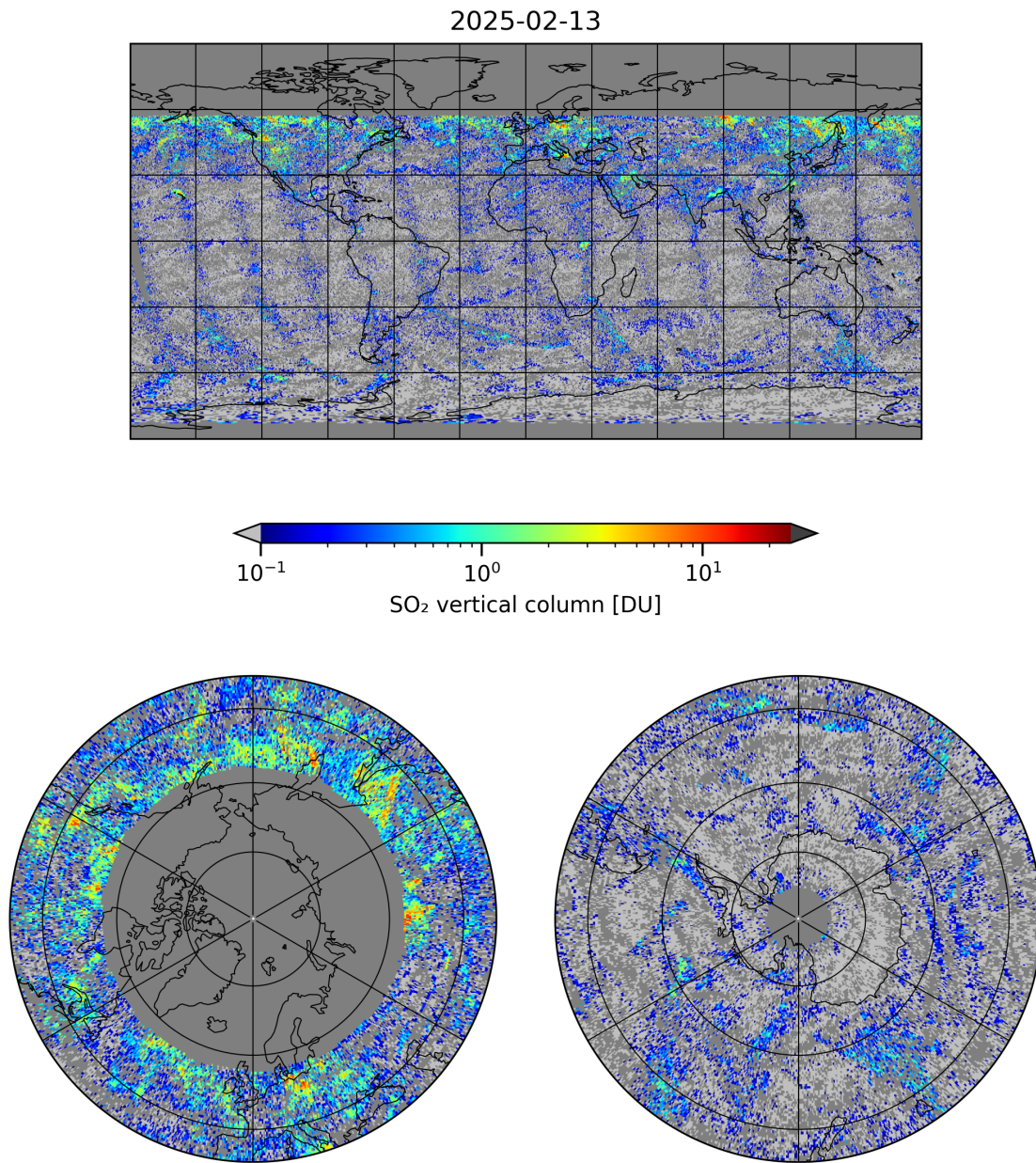


Figure 4: Map of “SO₂ vertical column” for 2025-02-13 to 2025-02-14

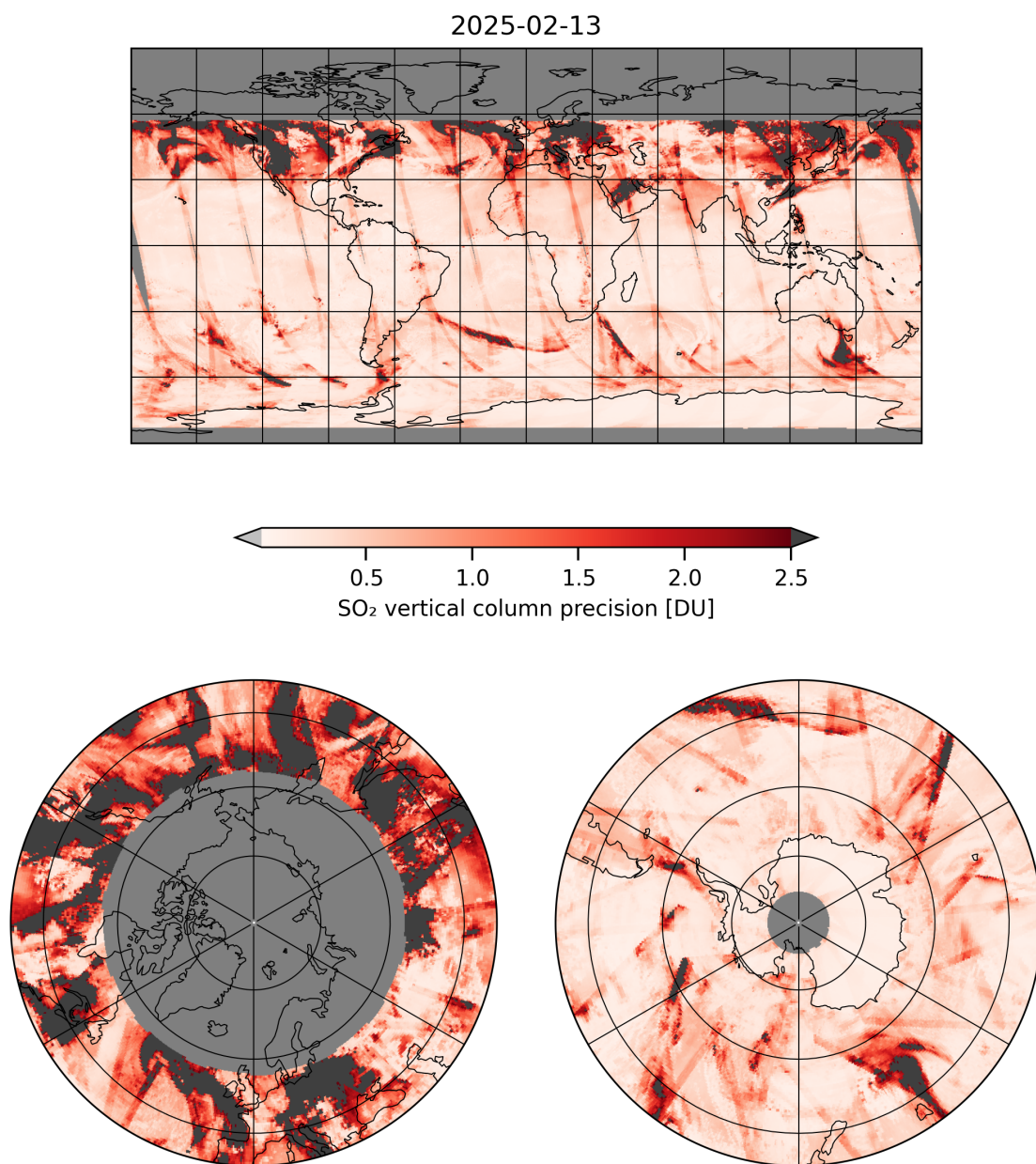


Figure 5: Map of “SO₂ vertical column precision” for 2025-02-13 to 2025-02-14

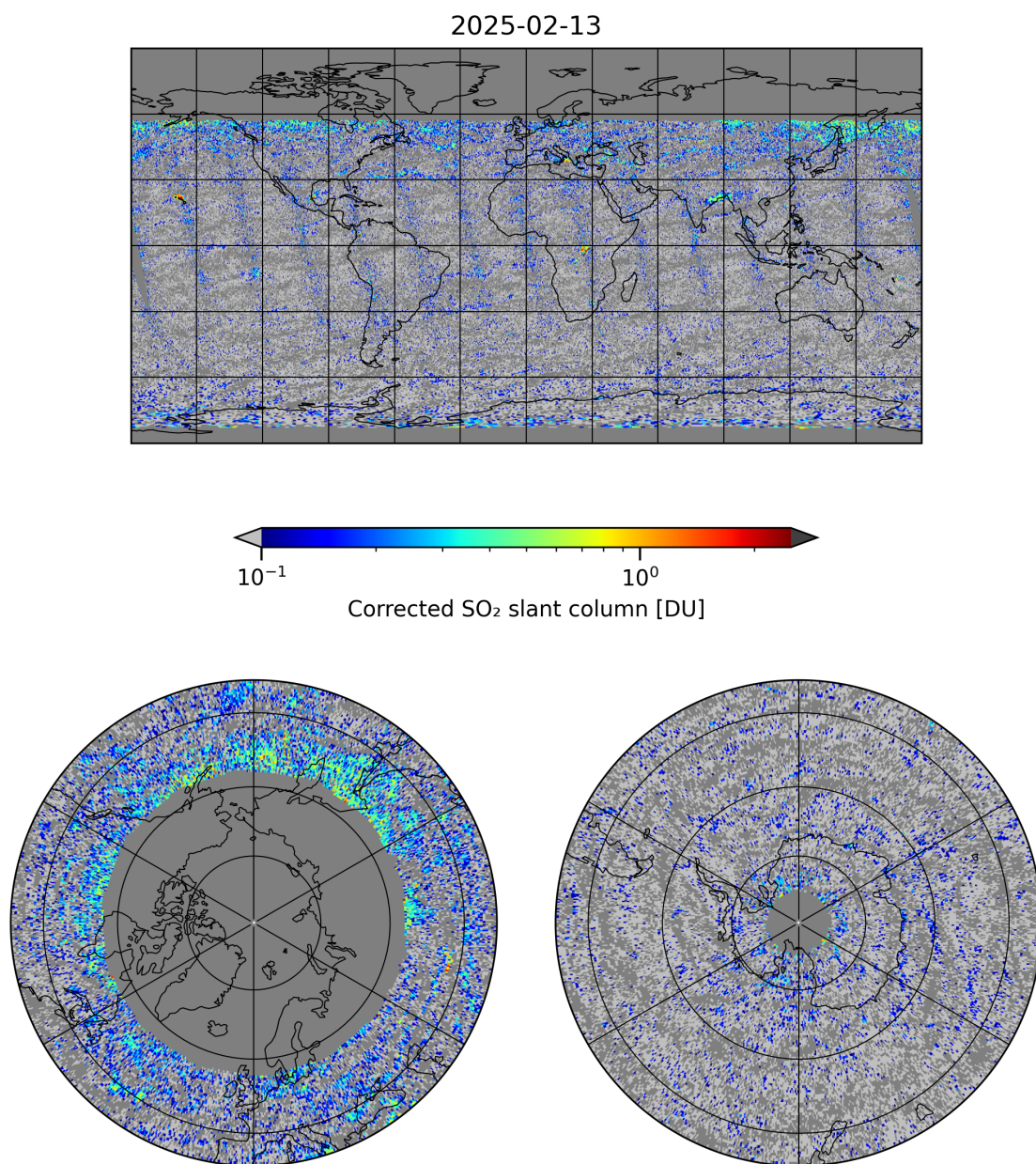


Figure 6: Map of “Corrected SO₂ slant column” for 2025-02-13 to 2025-02-14

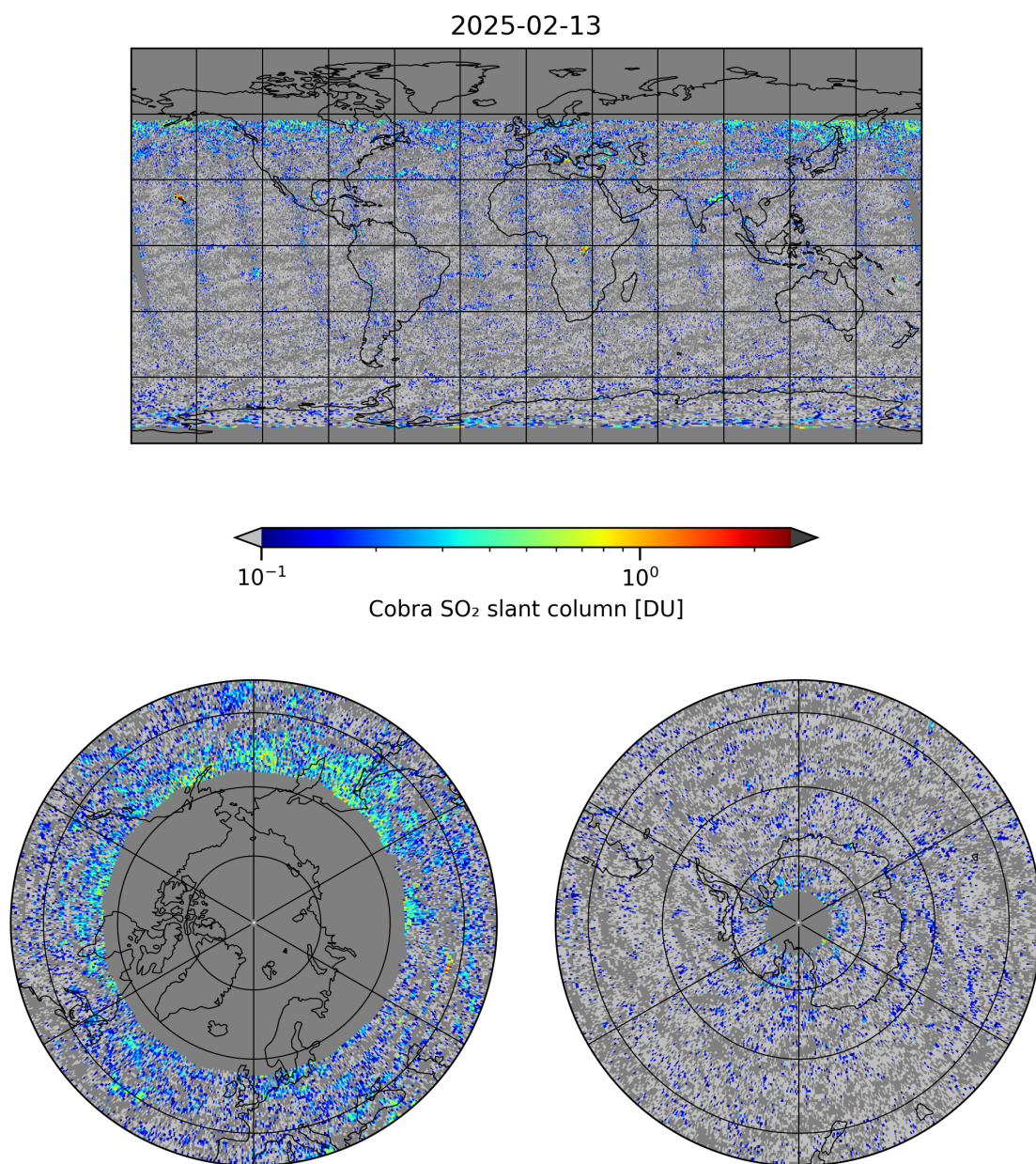


Figure 7: Map of “Cobra SO₂ slant column” for 2025-02-13 to 2025-02-14

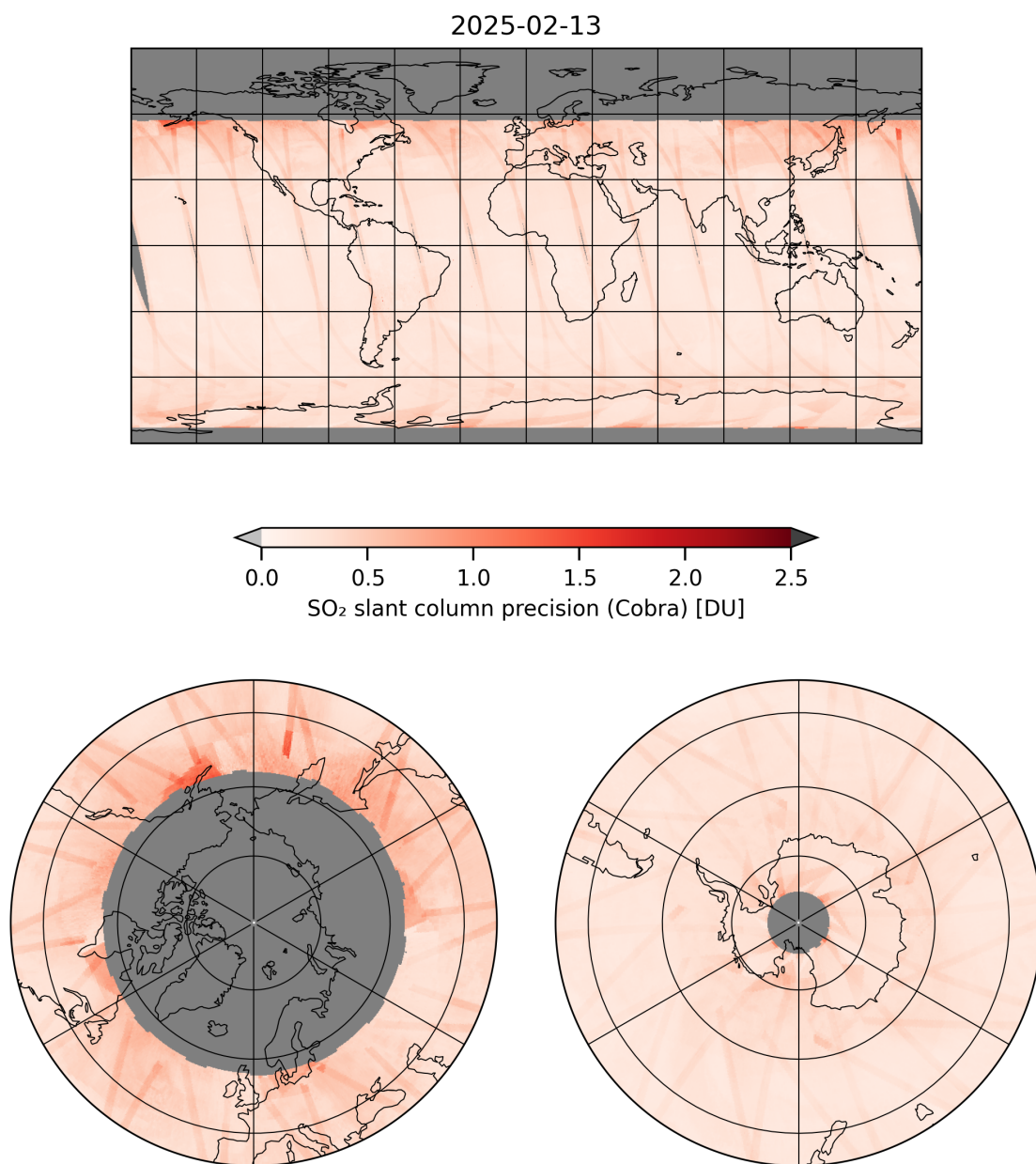


Figure 8: Map of “SO₂ slant column precision (Cobra)” for 2025-02-13 to 2025-02-14

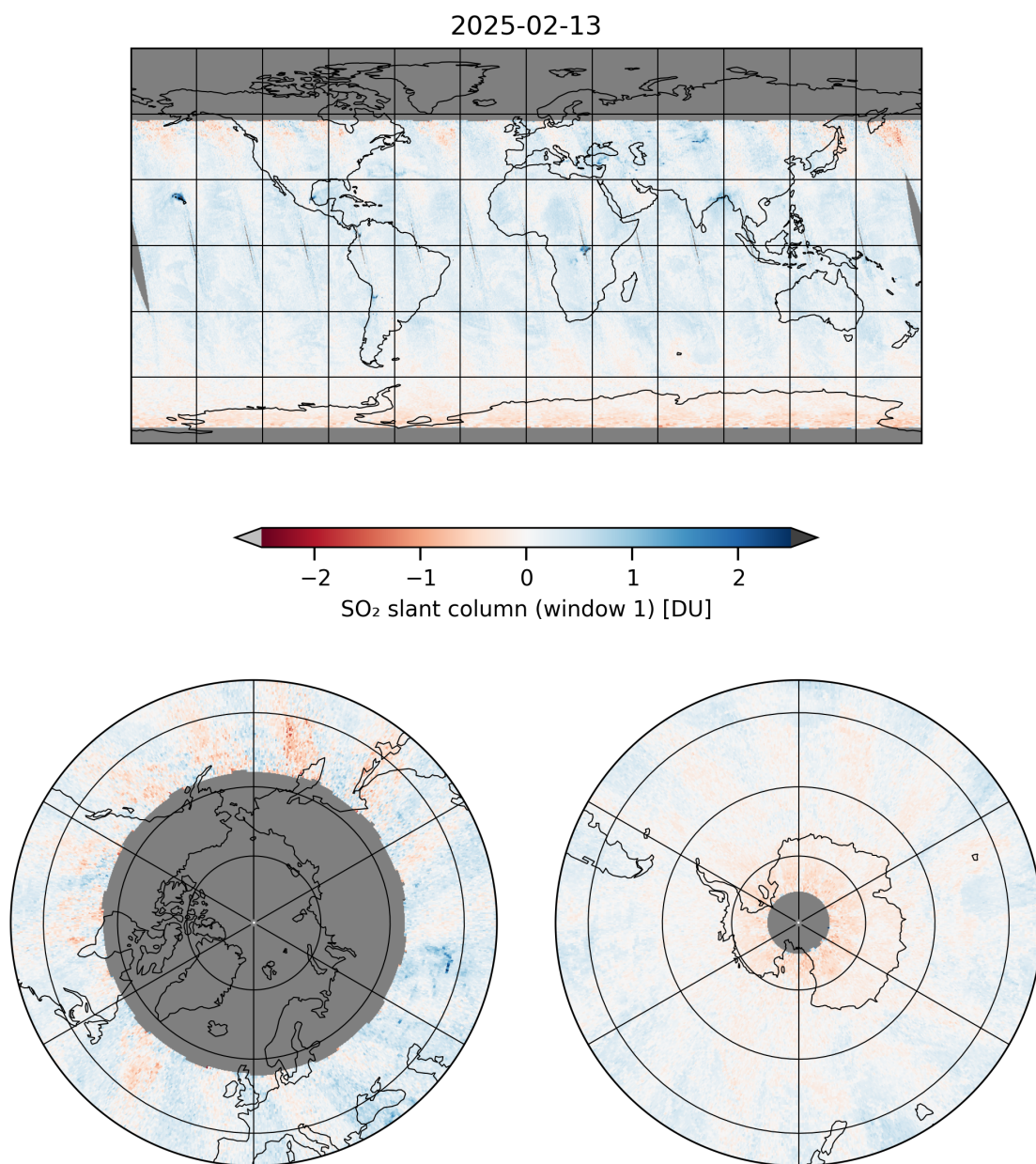


Figure 9: Map of “SO₂ slant column (window 1)” for 2025-02-13 to 2025-02-14

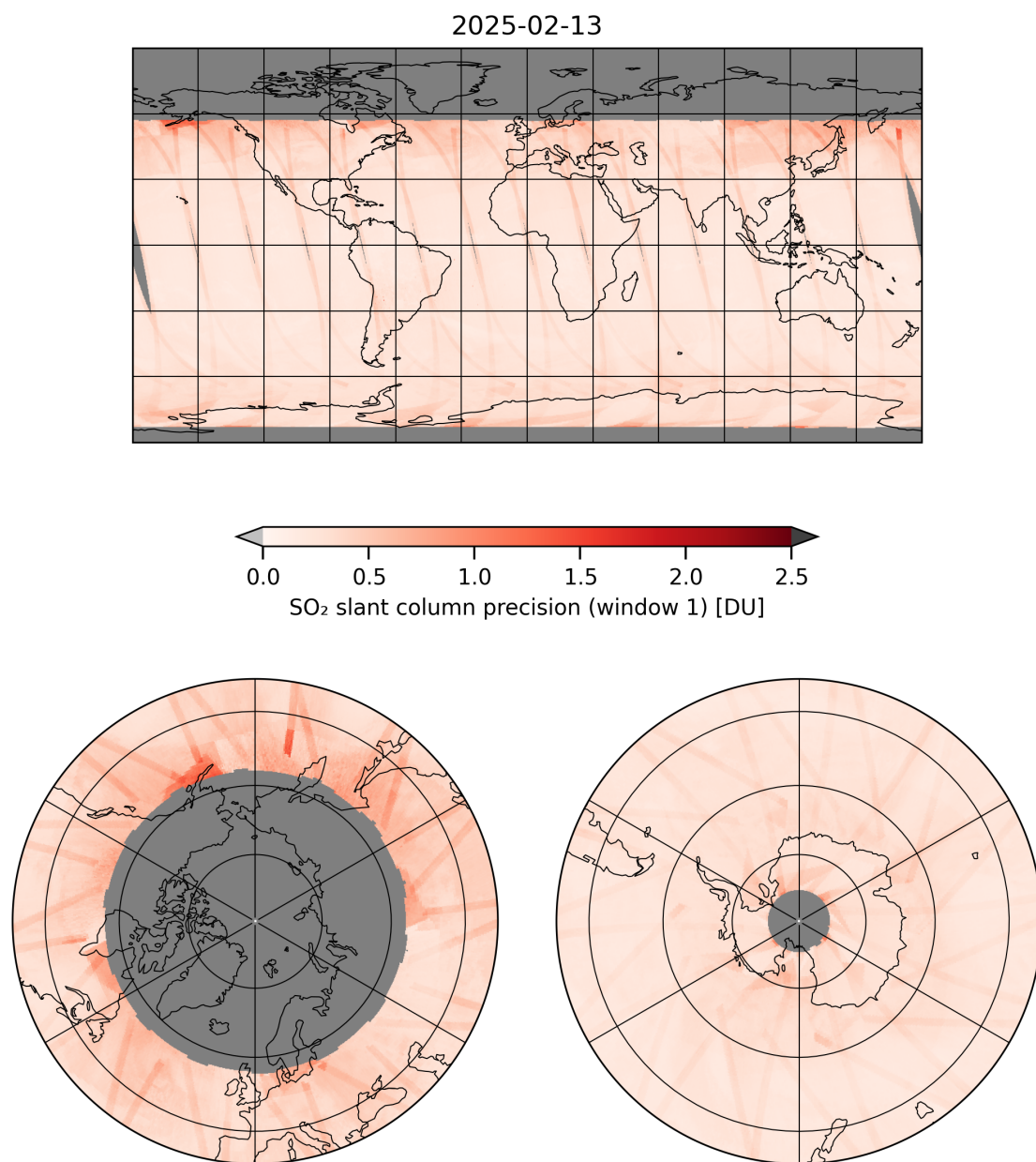


Figure 10: Map of “SO₂ slant column precision (window 1)” for 2025-02-13 to 2025-02-14

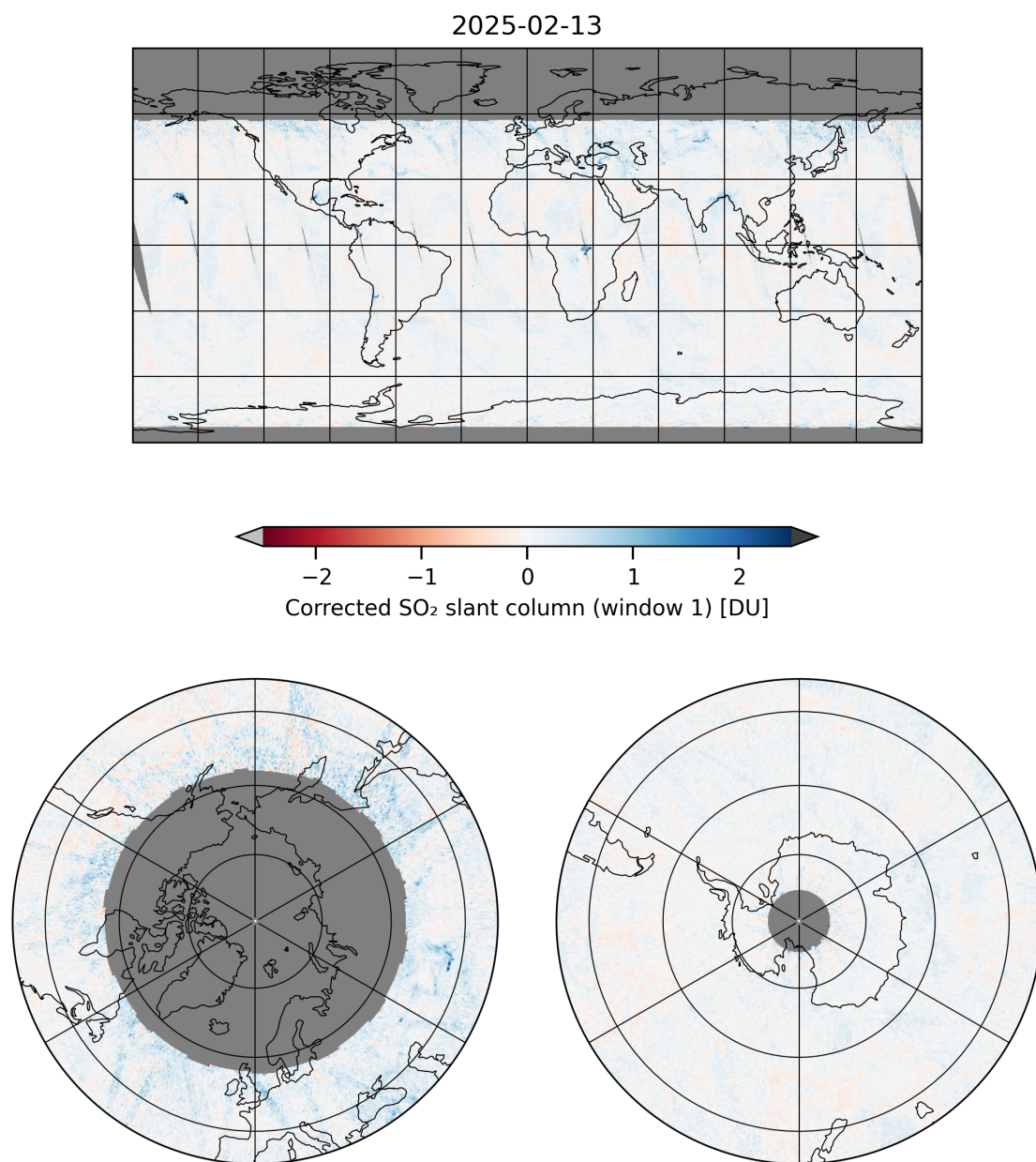


Figure 11: Map of “Corrected SO₂ slant column (window 1)” for 2025-02-13 to 2025-02-14

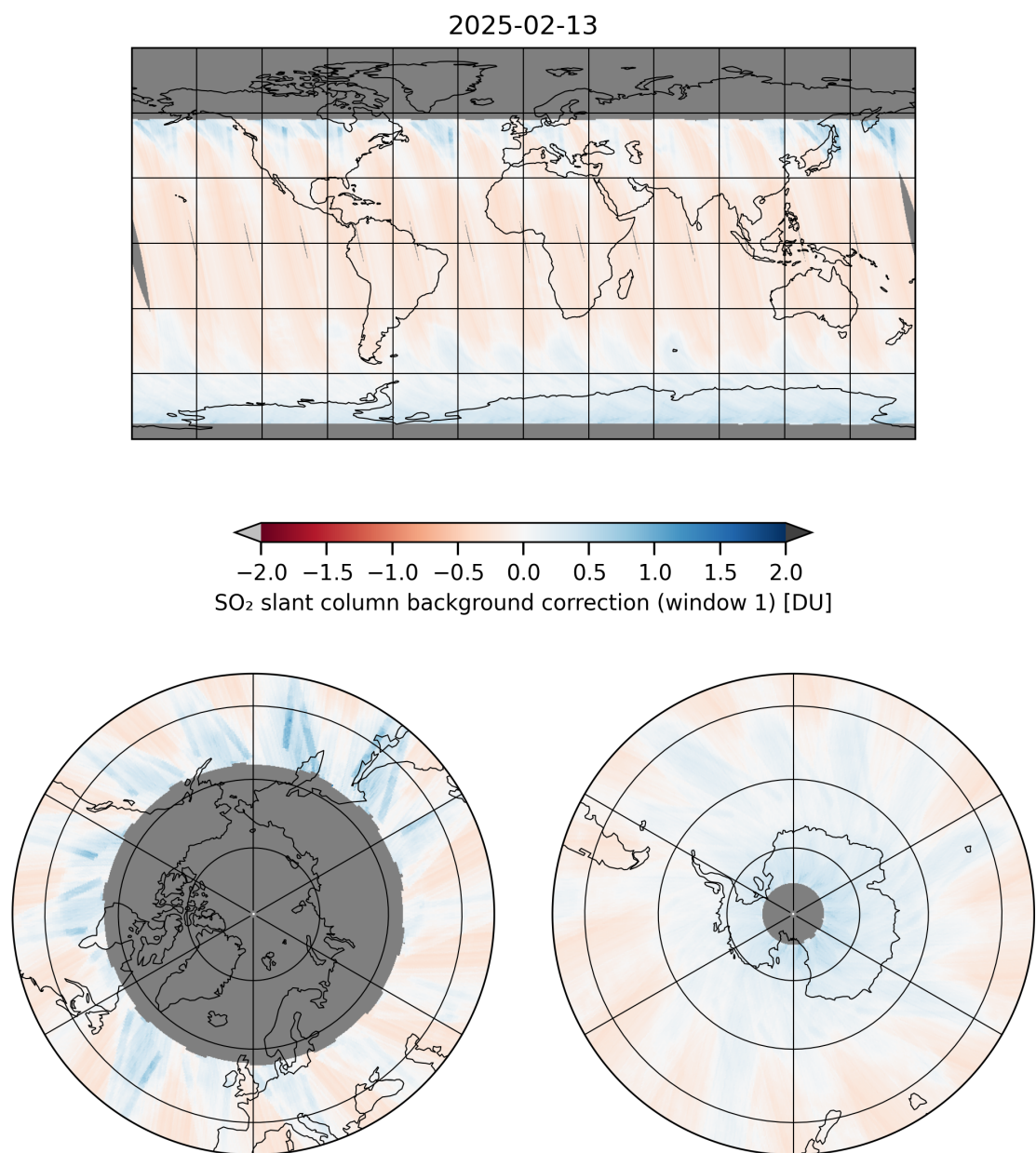


Figure 12: Map of “SO₂ slant column background correction (window 1)” for 2025-02-13 to 2025-02-14

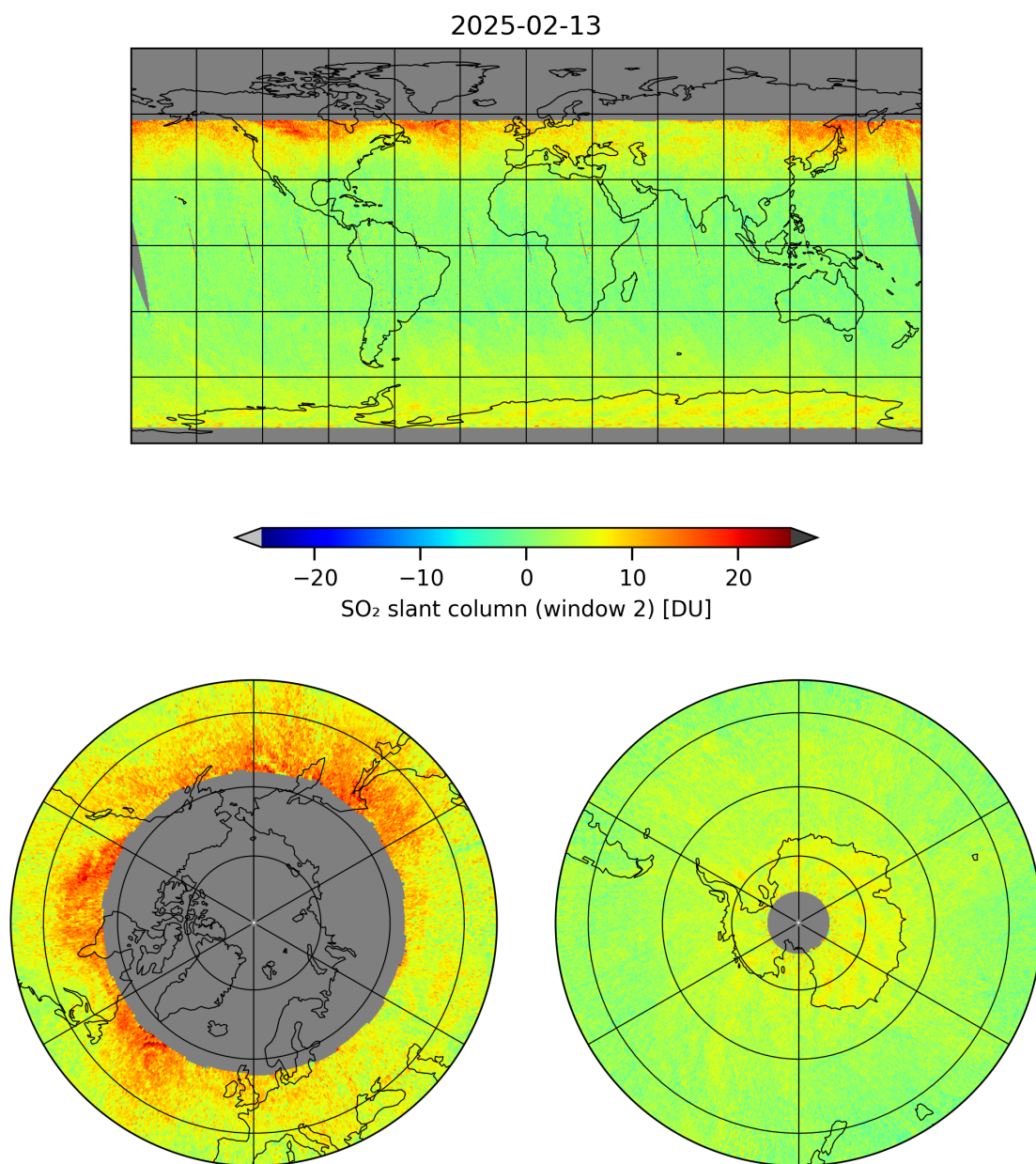


Figure 13: Map of “SO₂ slant column (window 2)” for 2025-02-13 to 2025-02-14

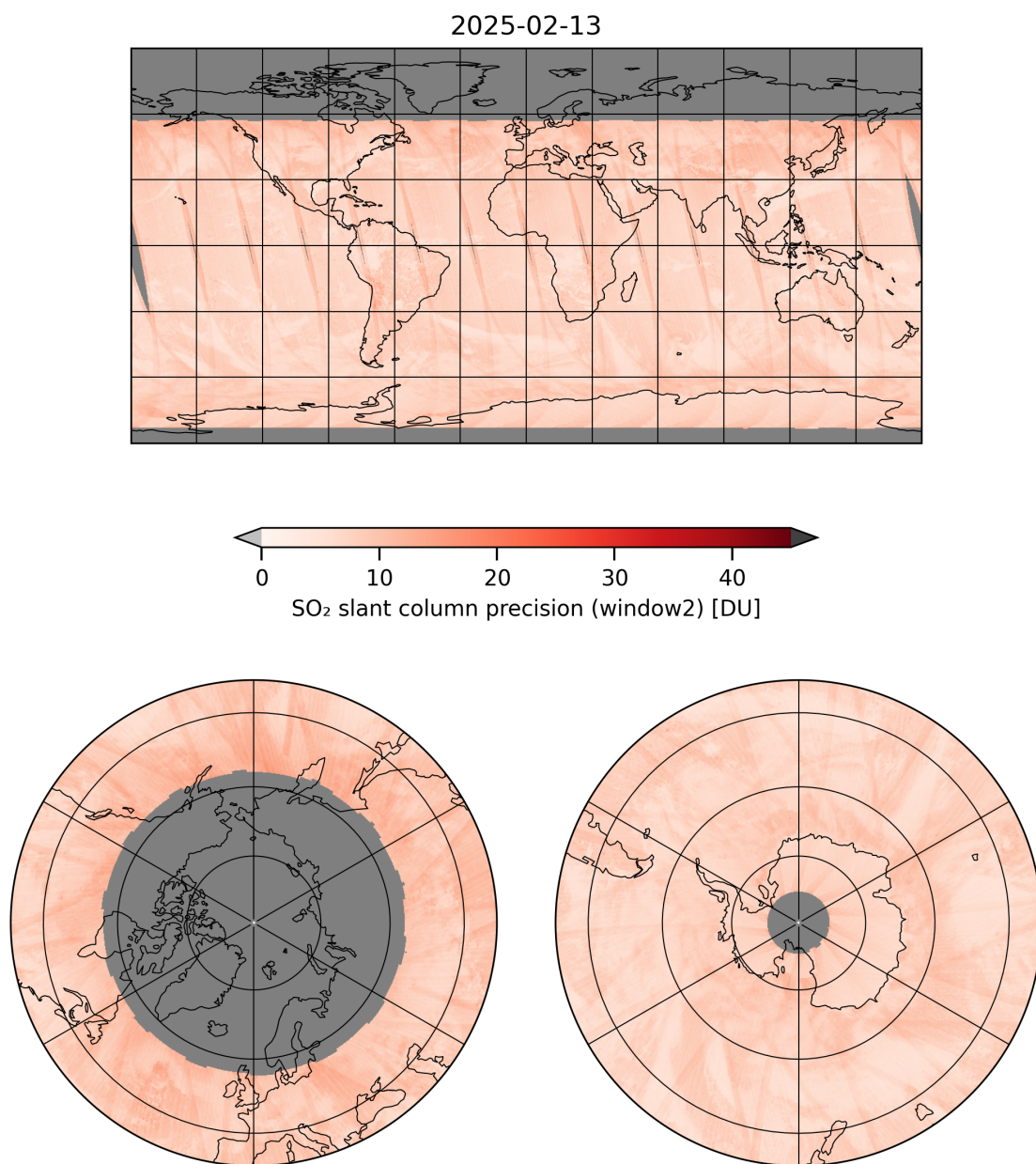


Figure 14: Map of “SO₂ slant column precision (window2)” for 2025-02-13 to 2025-02-14

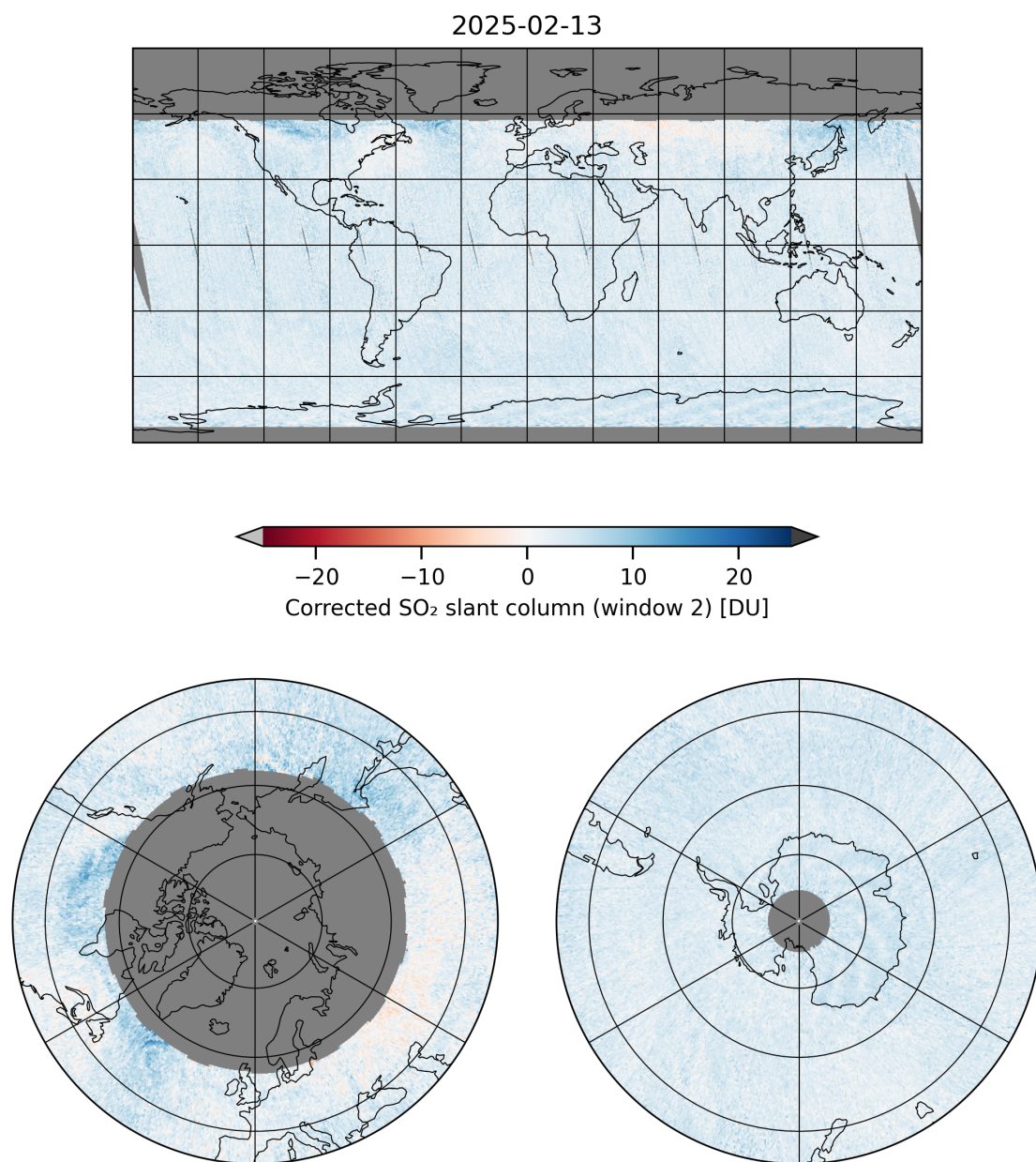


Figure 15: Map of “Corrected SO₂ slant column (window 2)” for 2025-02-13 to 2025-02-14

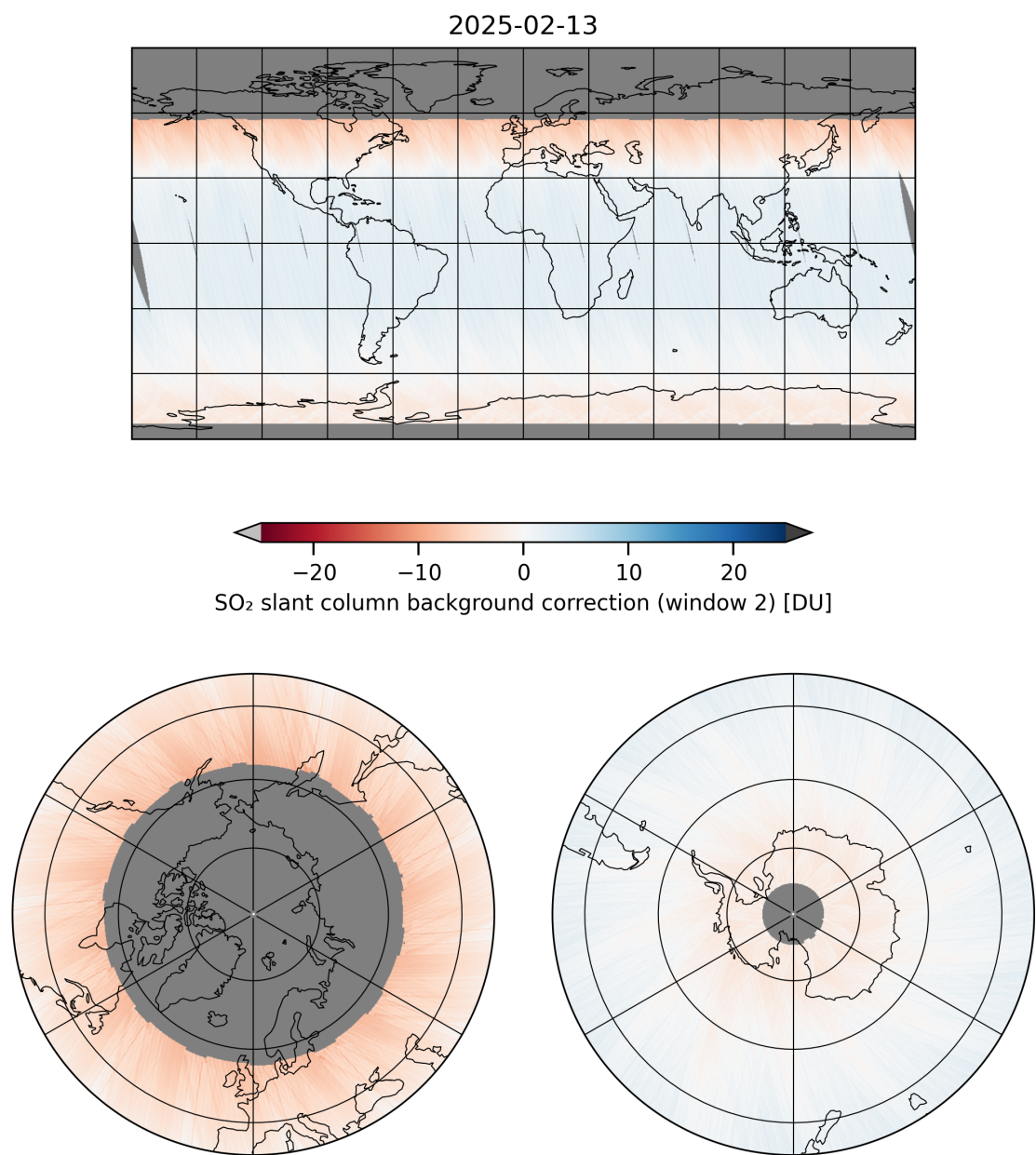


Figure 16: Map of “SO₂ slant column background correction (window 2)” for 2025-02-13 to 2025-02-14

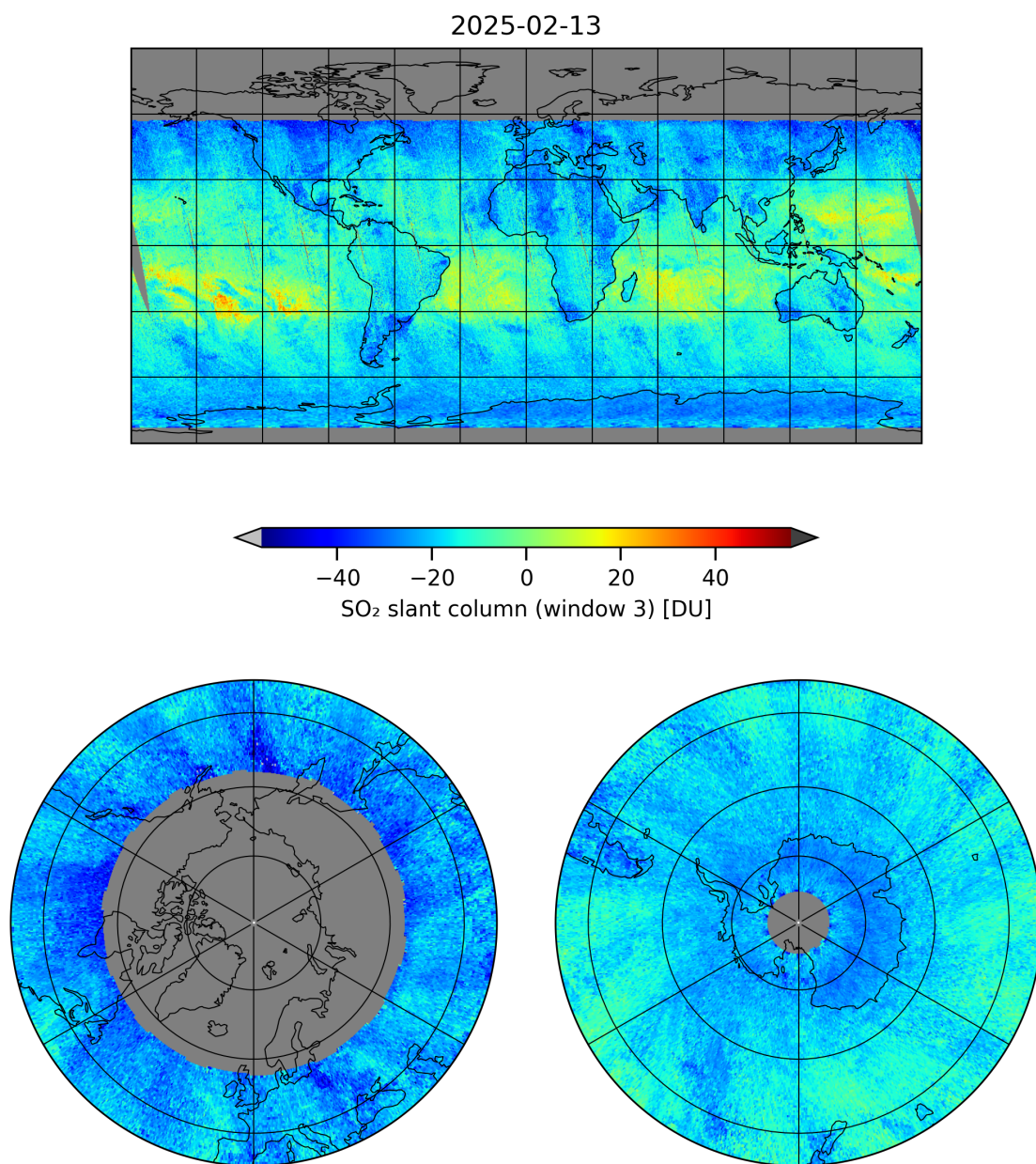


Figure 17: Map of “SO₂ slant column (window 3)” for 2025-02-13 to 2025-02-14

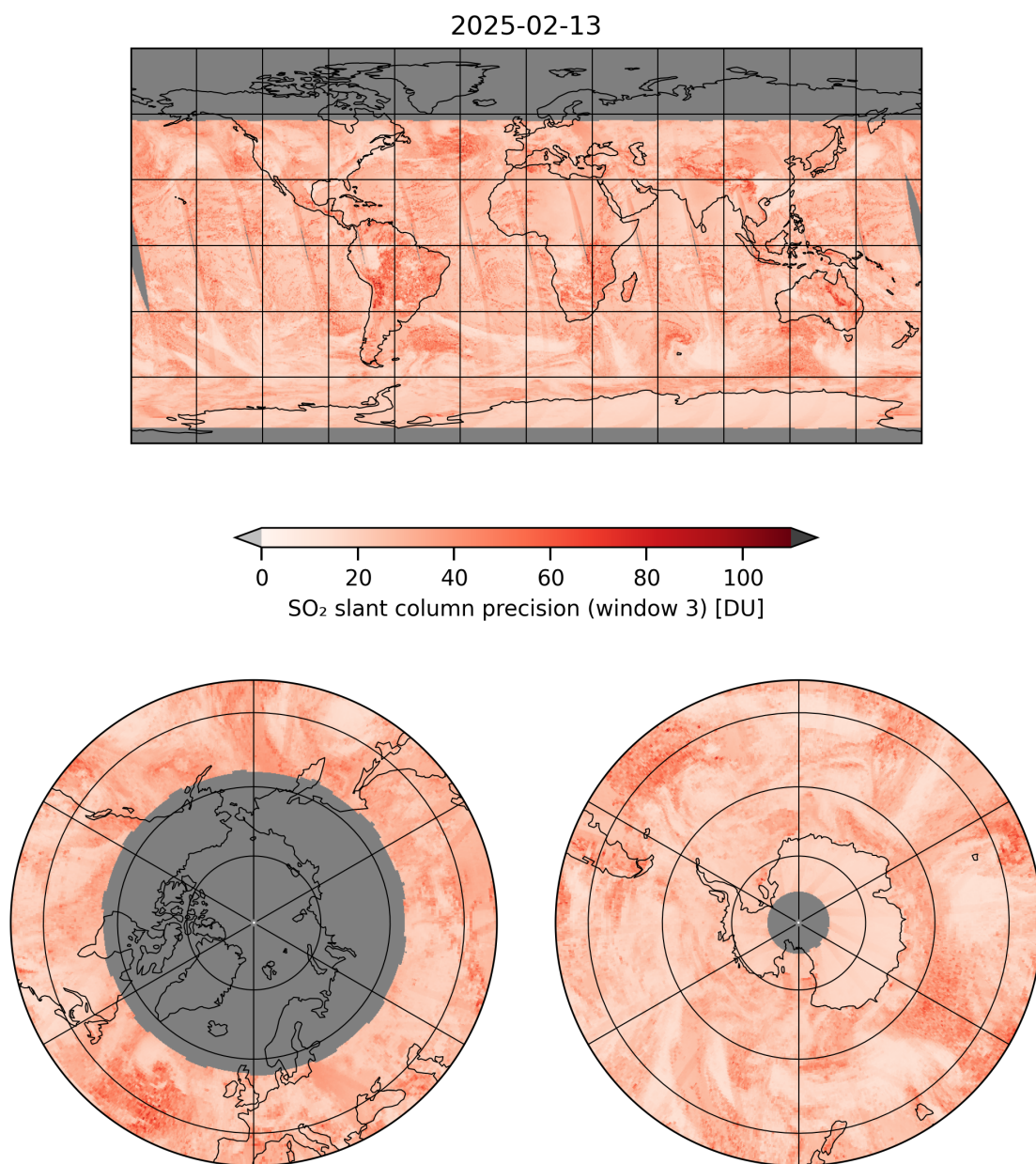


Figure 18: Map of “SO₂ slant column precision (window 3)” for 2025-02-13 to 2025-02-14

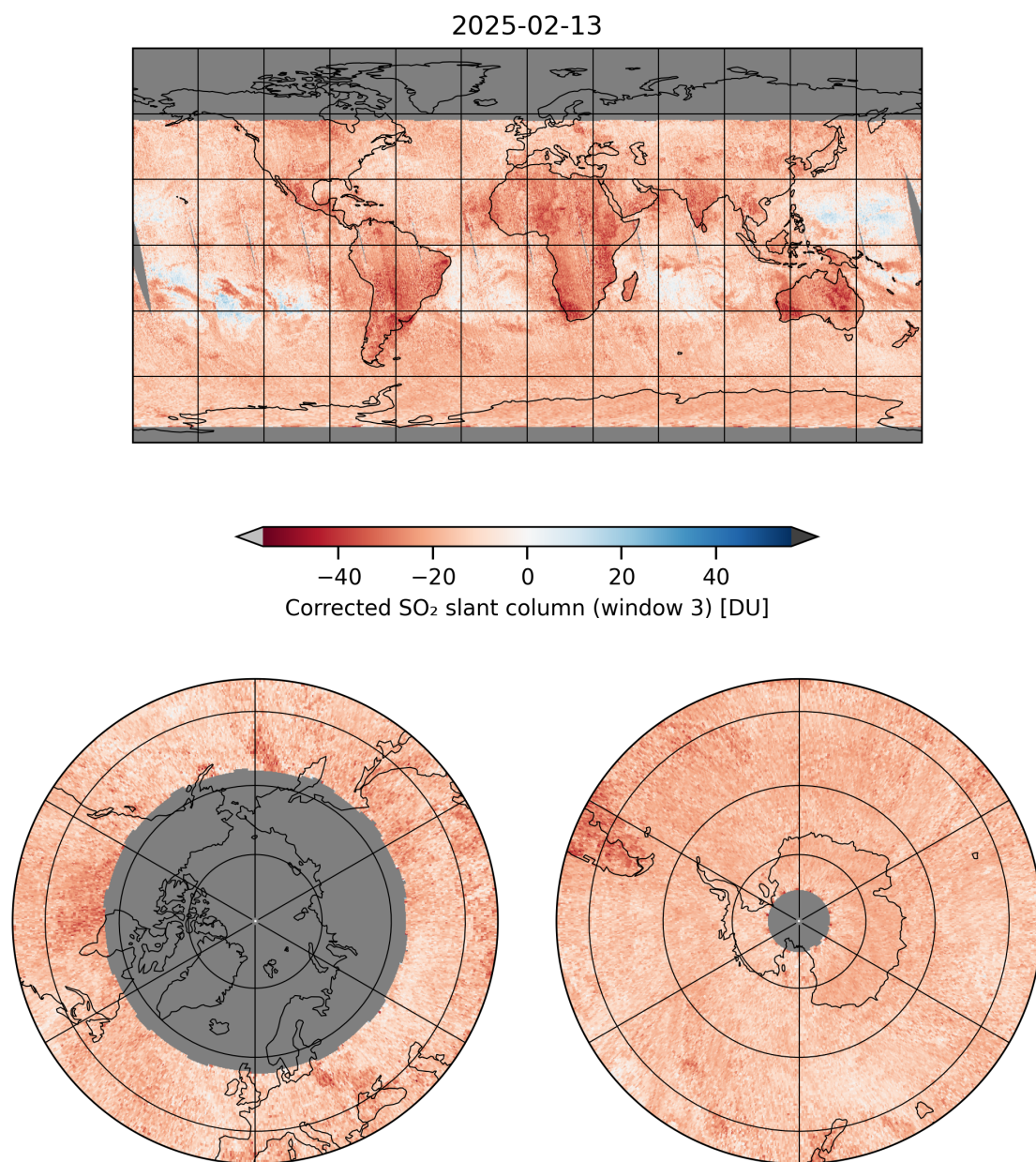


Figure 19: Map of “Corrected SO₂ slant column (window 3)” for 2025-02-13 to 2025-02-14

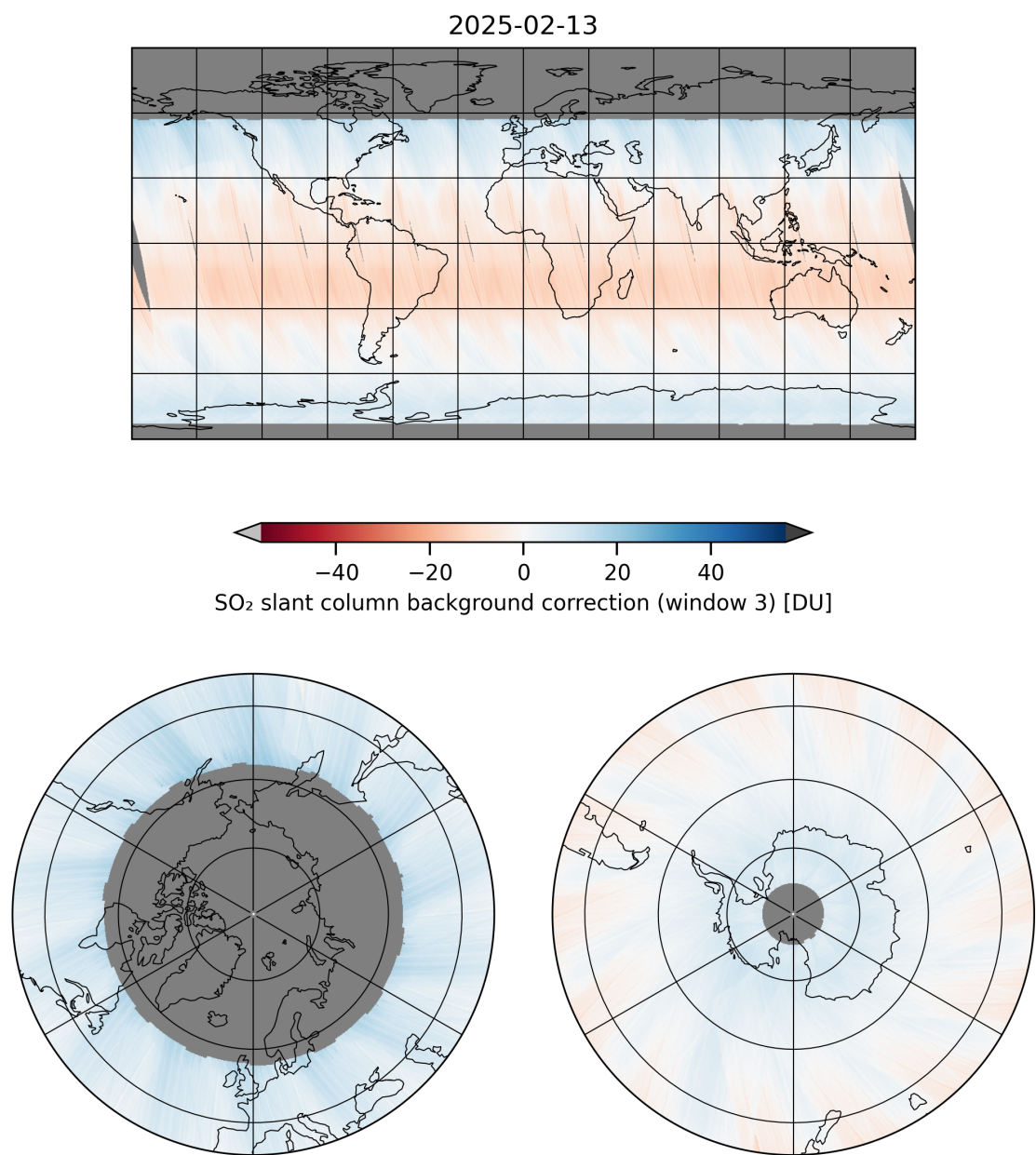


Figure 20: Map of “SO₂ slant column background correction (window 3)” for 2025-02-13 to 2025-02-14

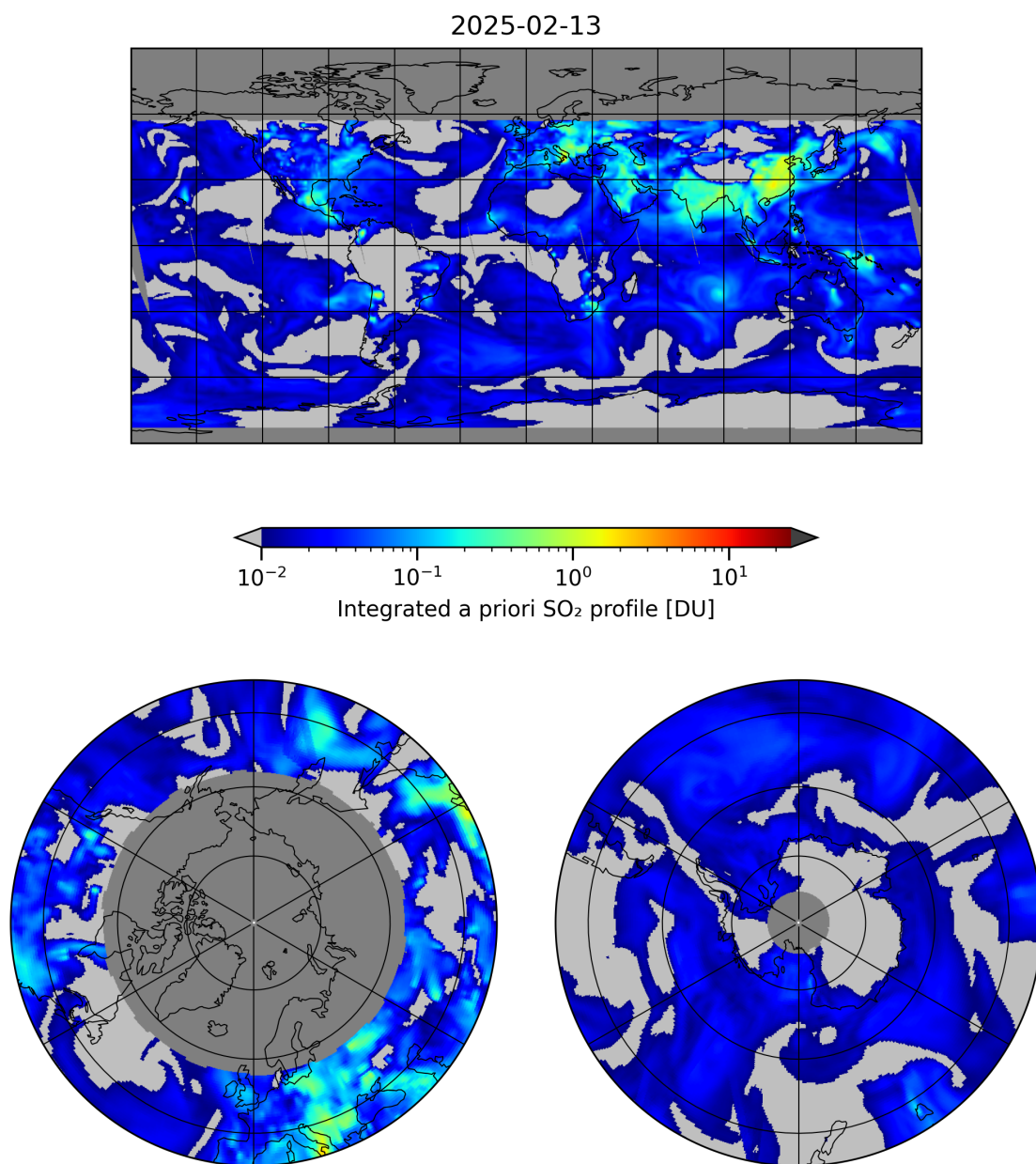


Figure 21: Map of “Integrated a priori SO₂ profile” for 2025-02-13 to 2025-02-14

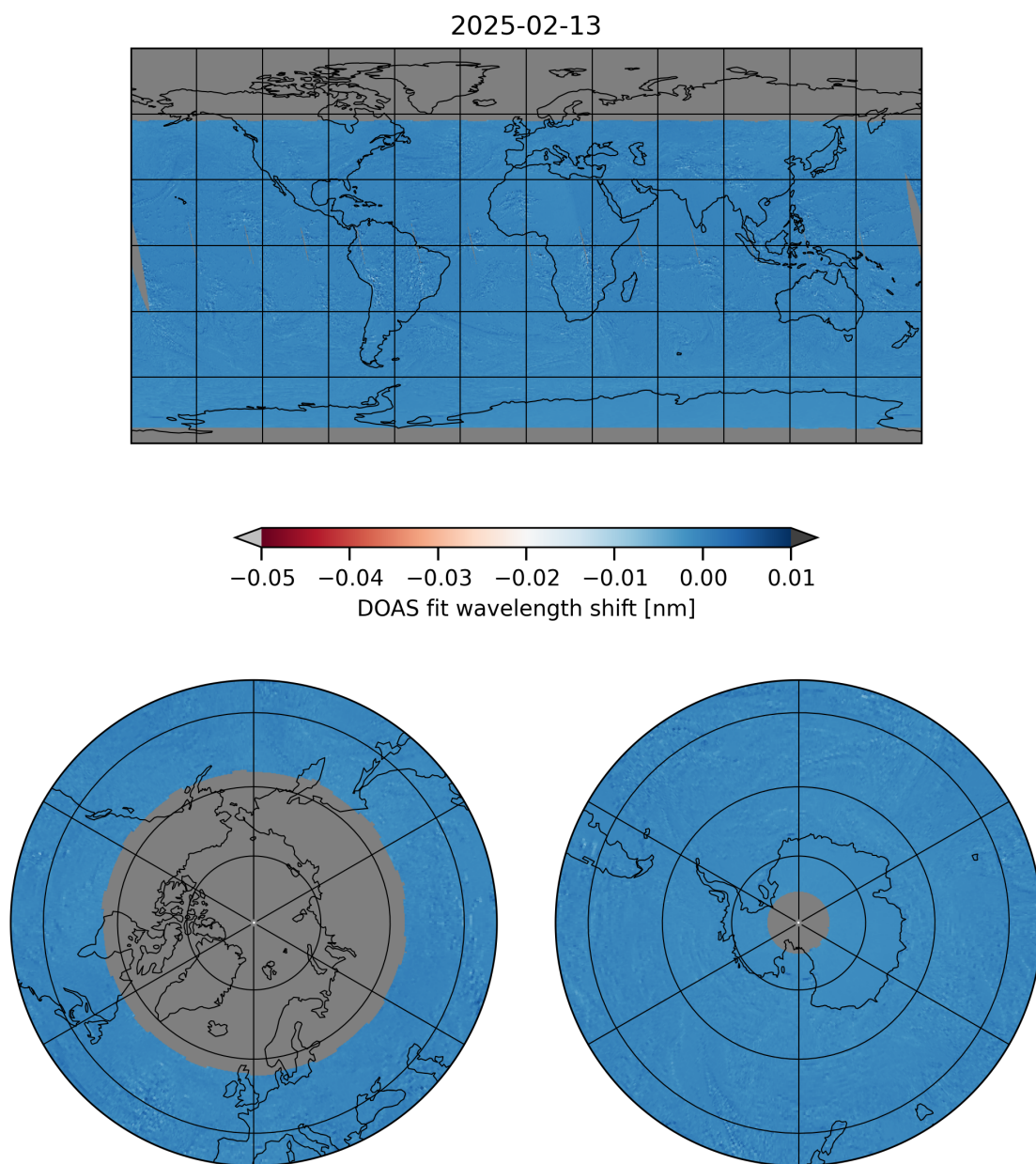


Figure 22: Map of “DOAS fit wavelength shift” for 2025-02-13 to 2025-02-14

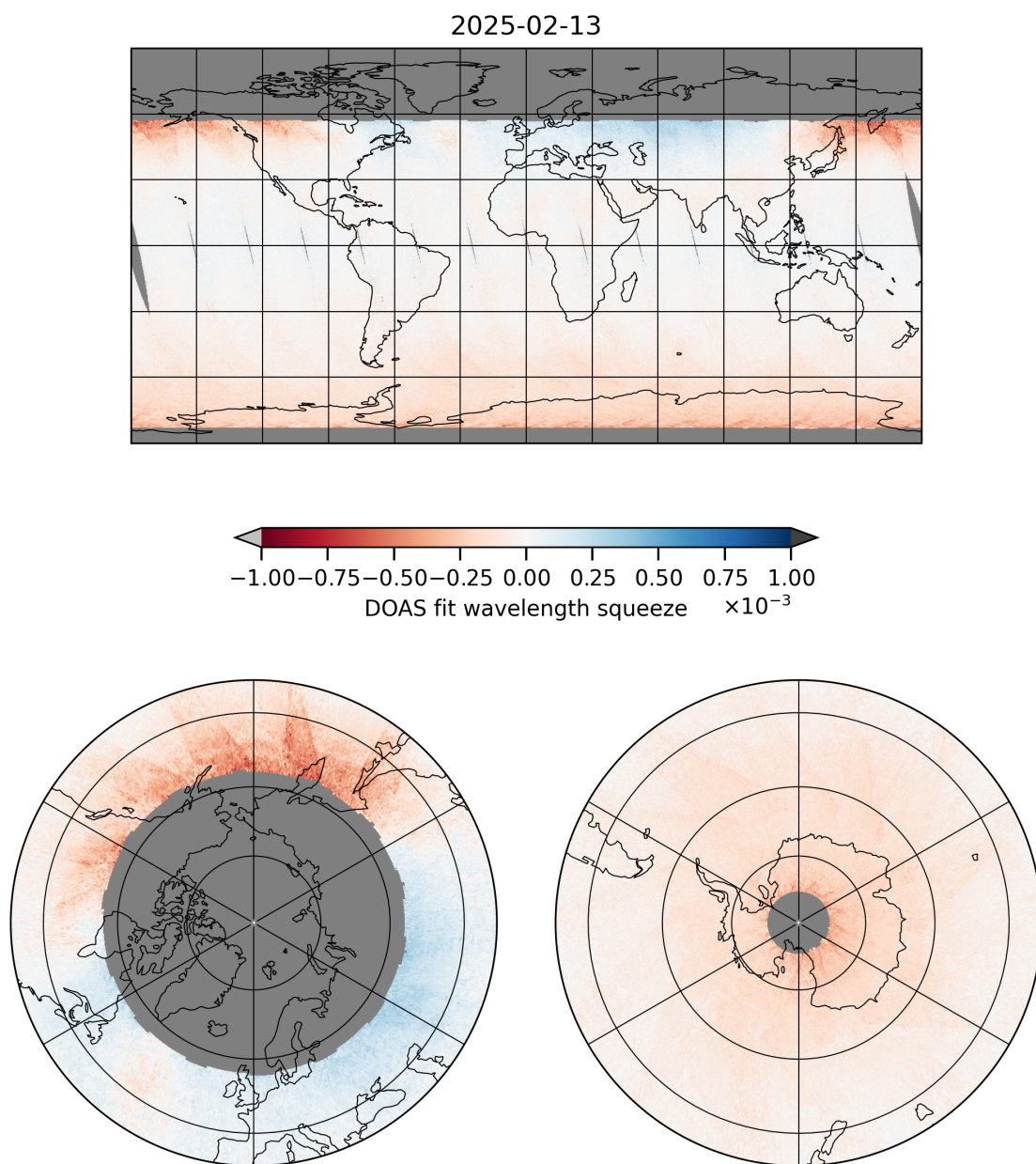


Figure 23: Map of “DOAS fit wavelength squeeze” for 2025-02-13 to 2025-02-14

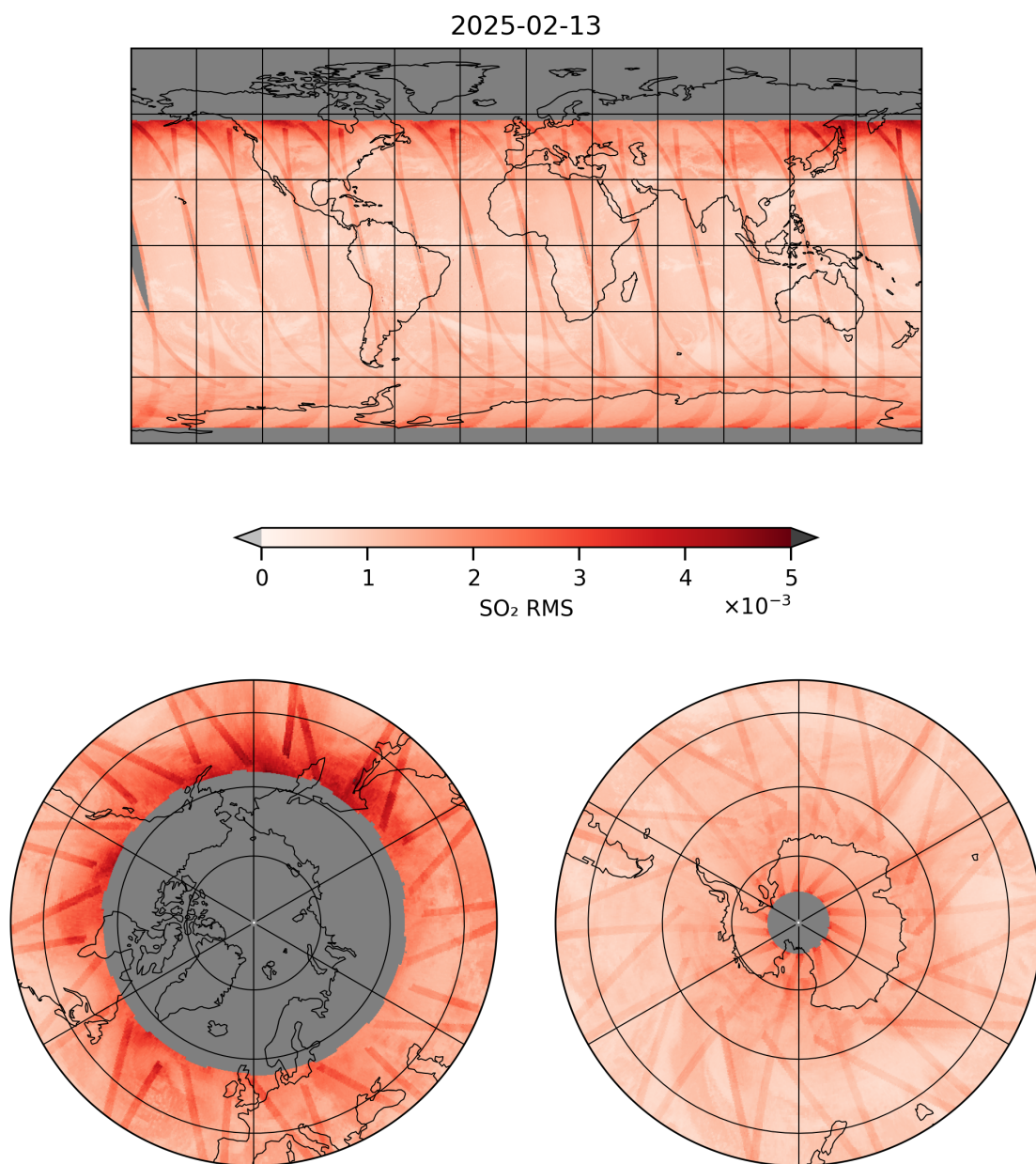


Figure 24: Map of “SO₂ RMS” for 2025-02-13 to 2025-02-14

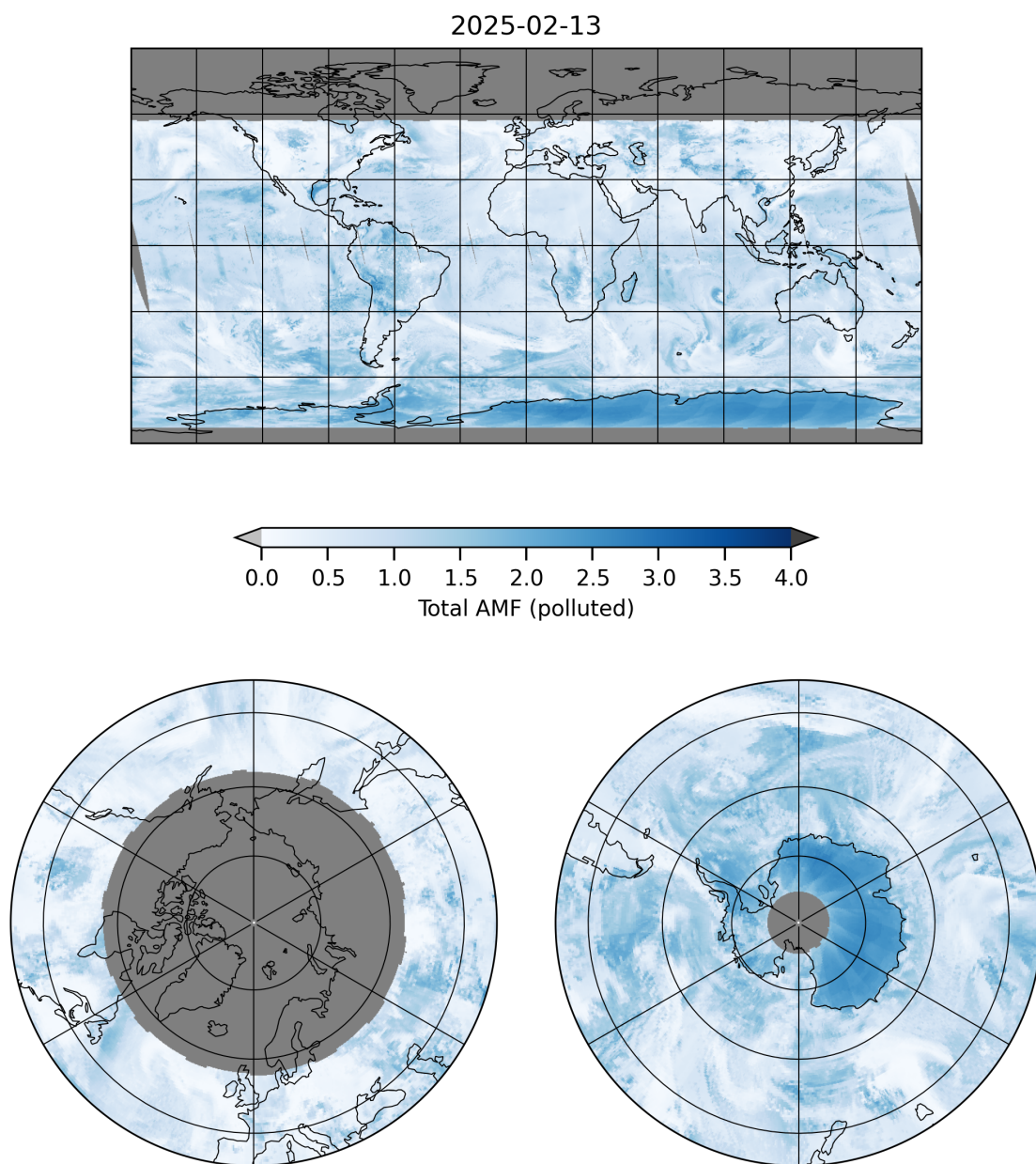


Figure 25: Map of “Total AMF (polluted)” for 2025-02-13 to 2025-02-14

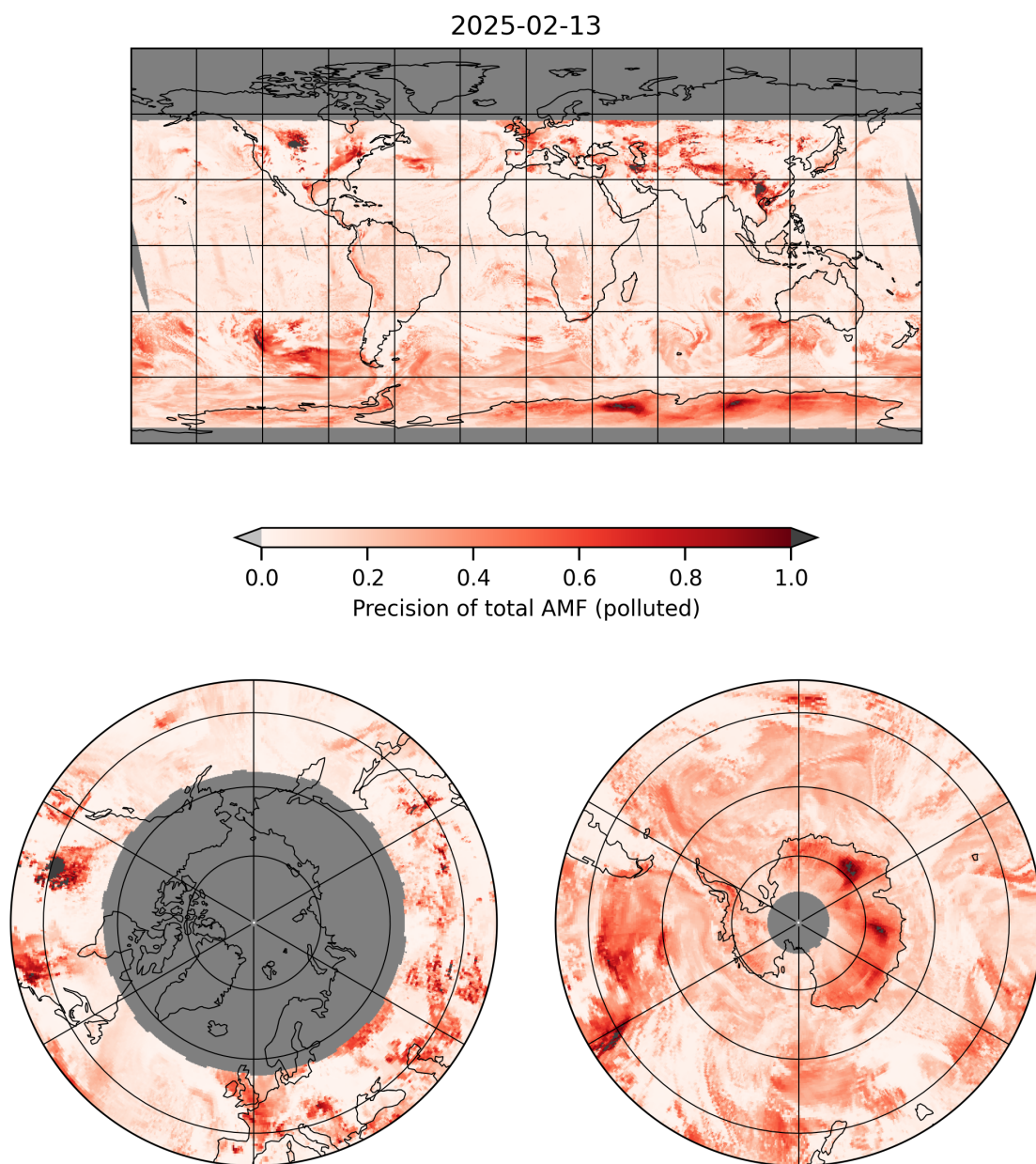


Figure 26: Map of “Precision of total AMF (polluted)” for 2025-02-13 to 2025-02-14

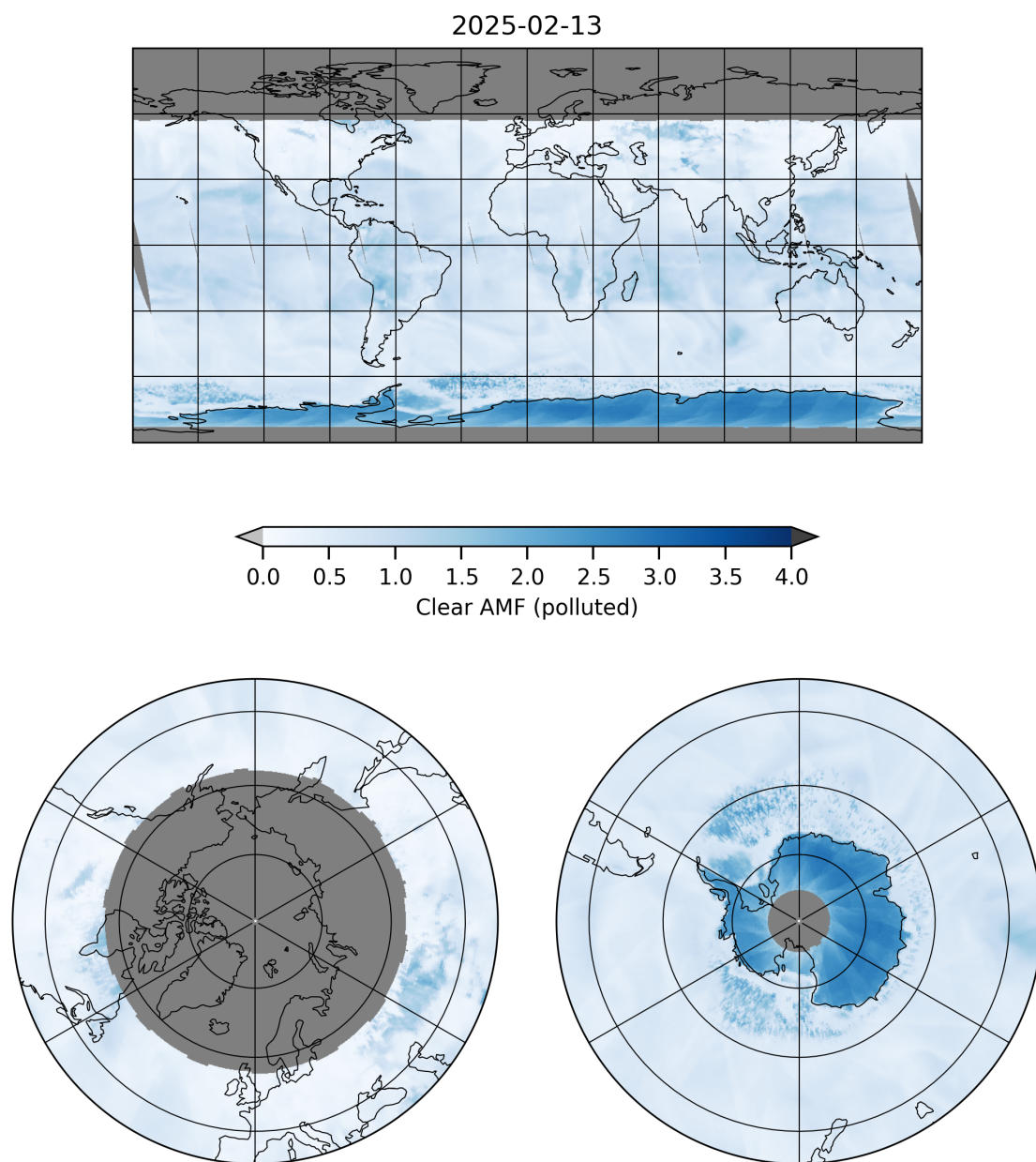


Figure 27: Map of “Clear AMF (polluted)” for 2025-02-13 to 2025-02-14

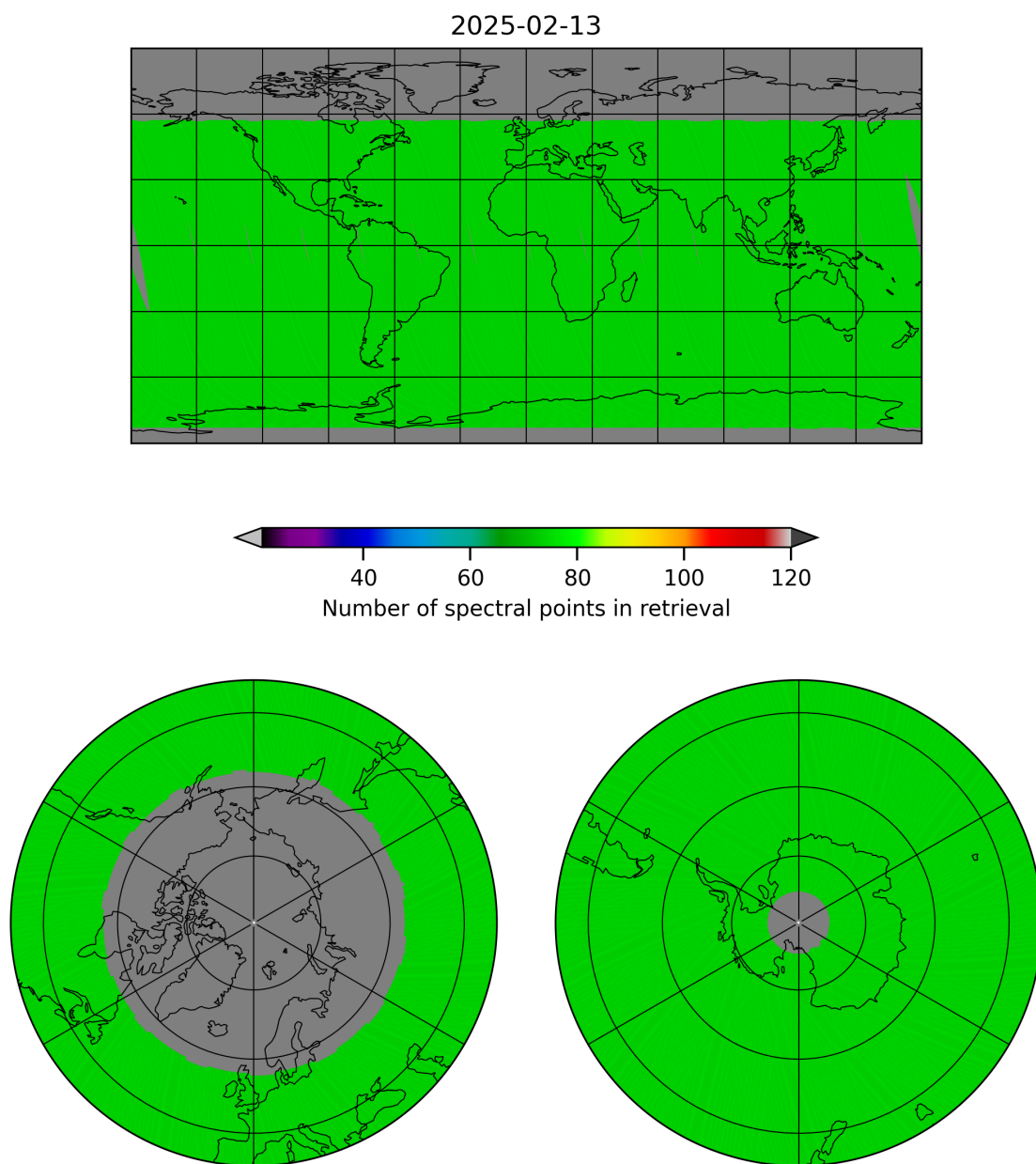


Figure 28: Map of “Number of spectral points in retrieval” for 2025-02-13 to 2025-02-14

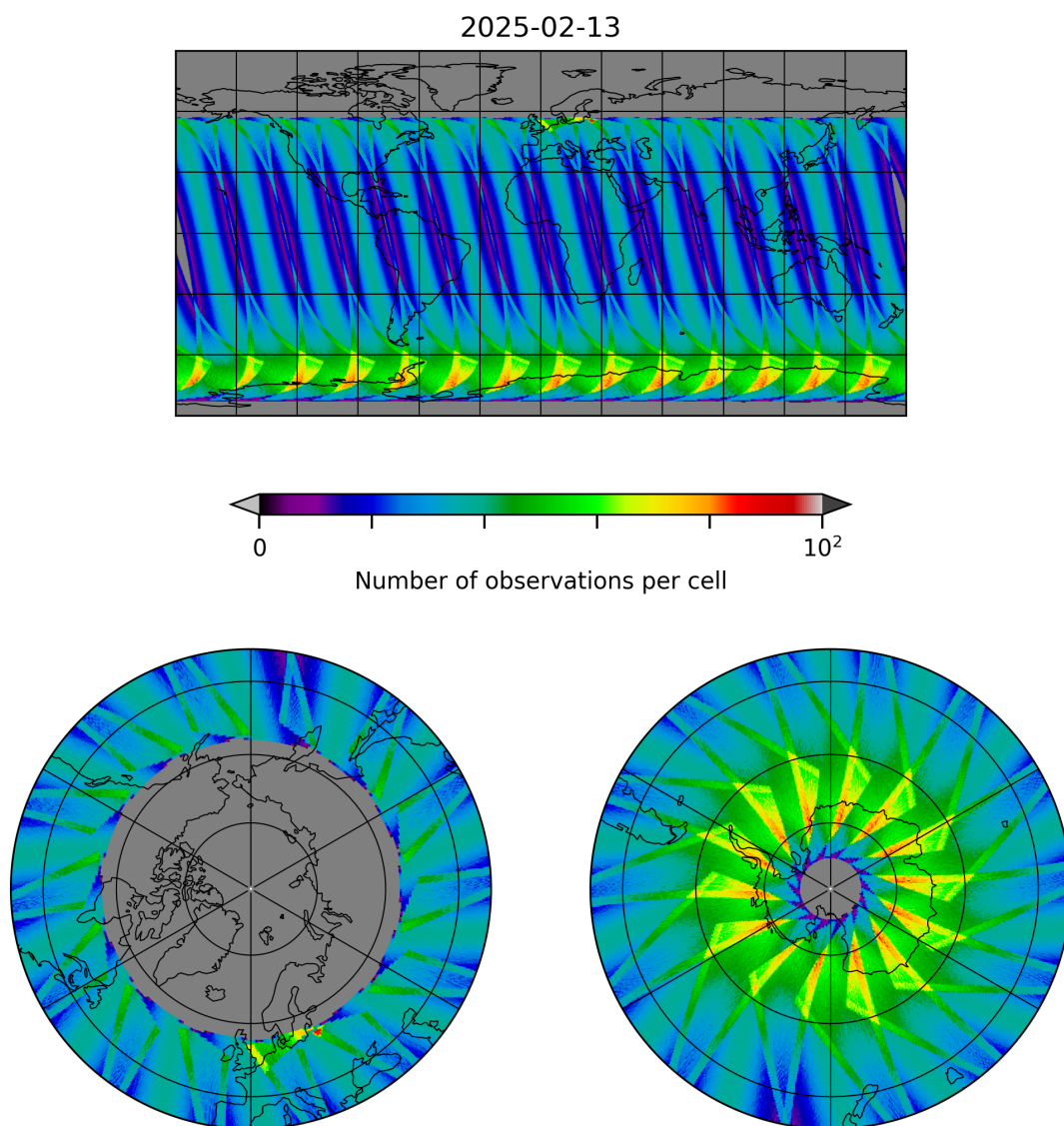


Figure 29: Map of the number of observations for 2025-02-13 to 2025-02-14

7 Zonal average

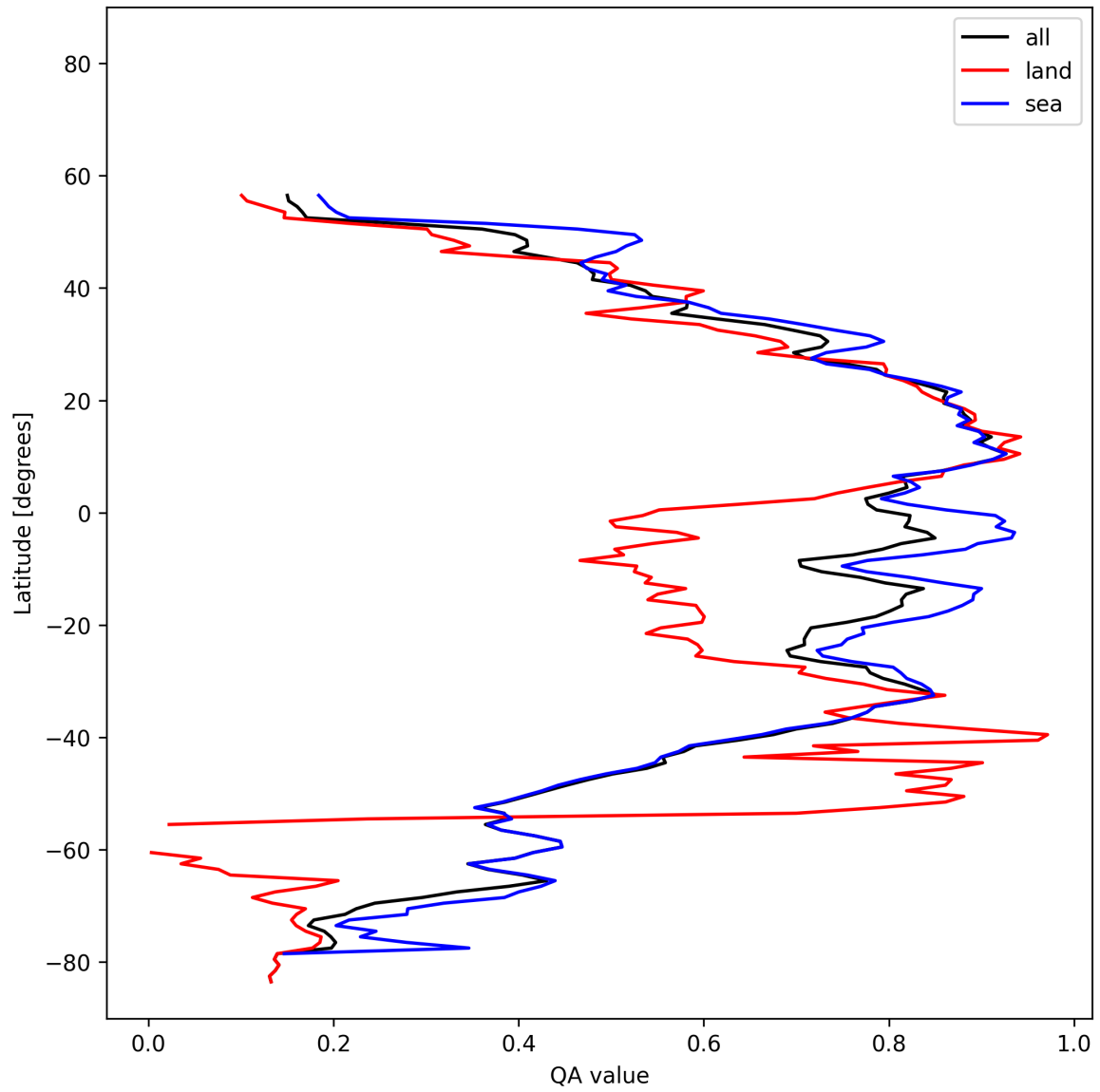


Figure 30: Zonal average of “QA value” for 2025-02-13 to 2025-02-14.

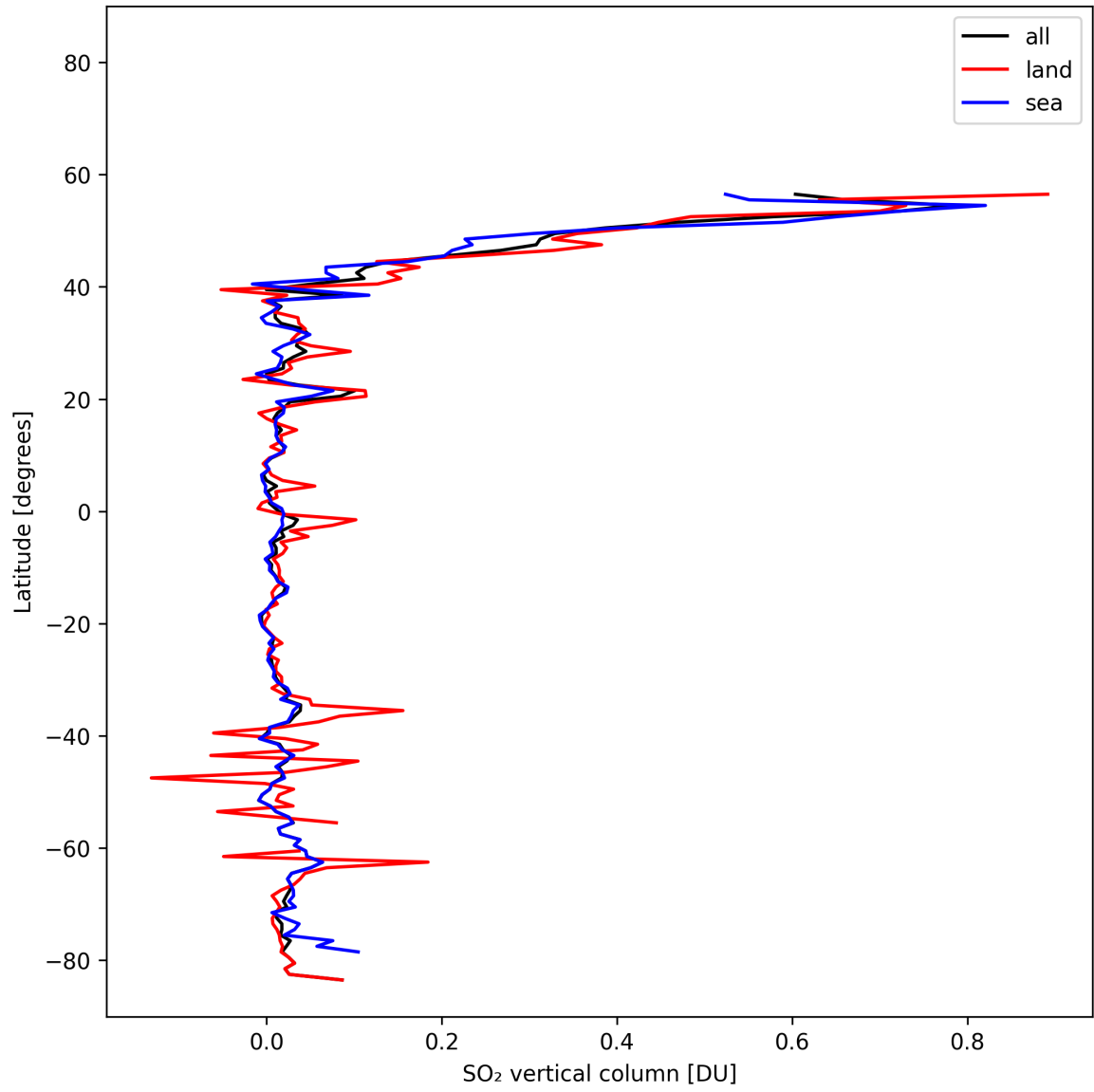


Figure 31: Zonal average of “SO₂ vertical column” for 2025-02-13 to 2025-02-14.

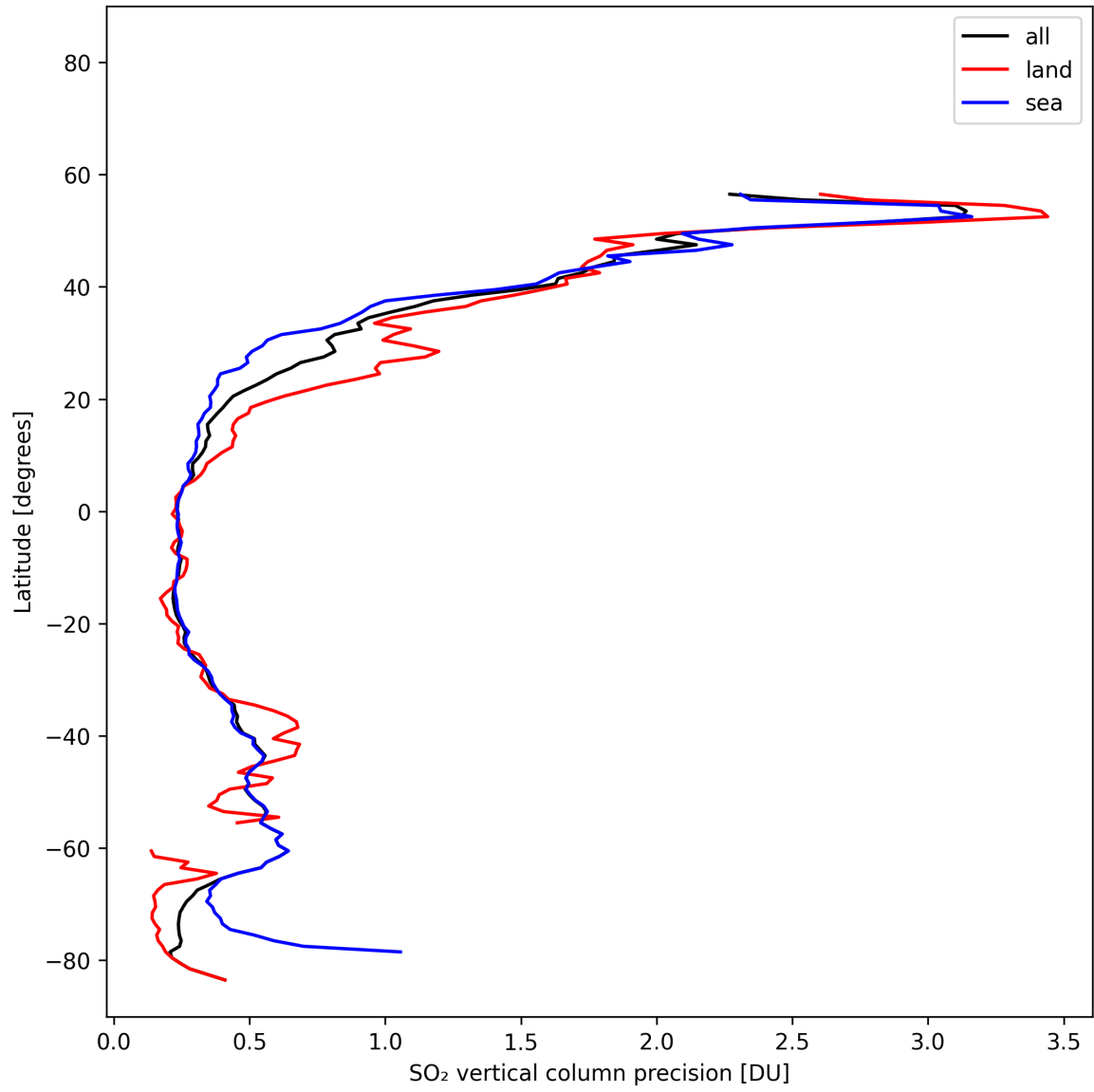


Figure 32: Zonal average of “SO₂ vertical column precision” for 2025-02-13 to 2025-02-14.

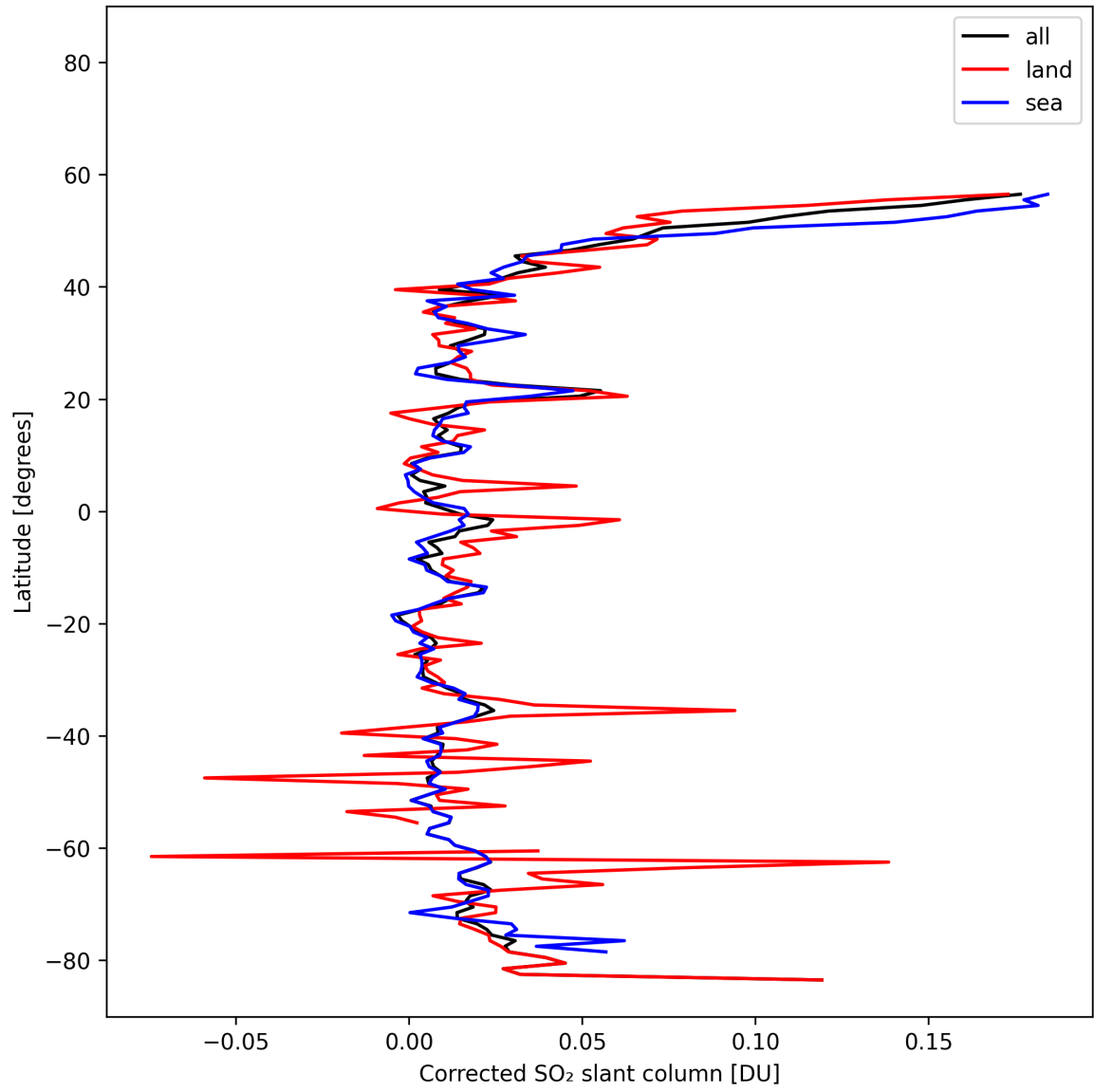


Figure 33: Zonal average of “Corrected SO₂ slant column” for 2025-02-13 to 2025-02-14.

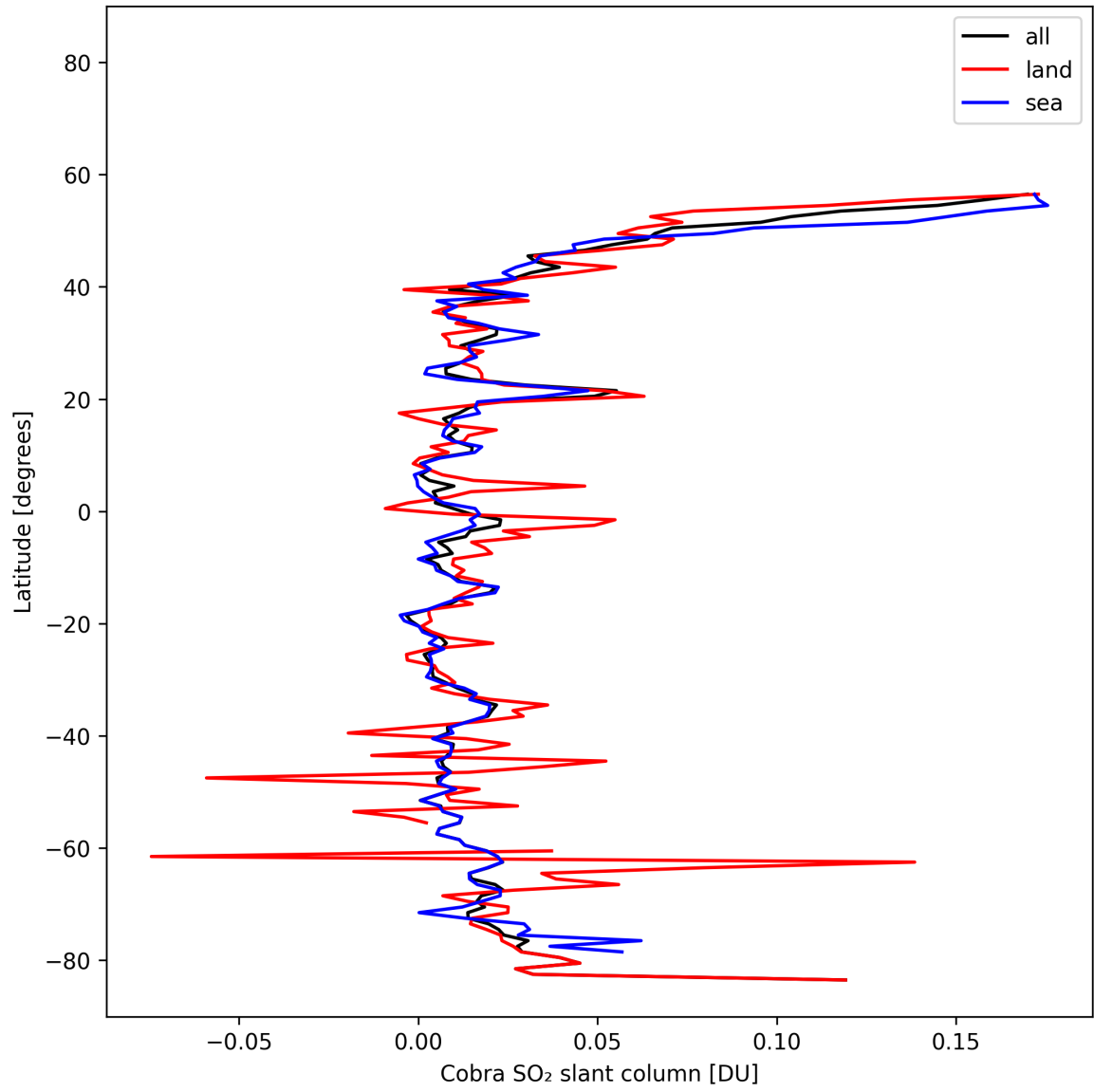


Figure 34: Zonal average of “Cobra SO₂ slant column” for 2025-02-13 to 2025-02-14.

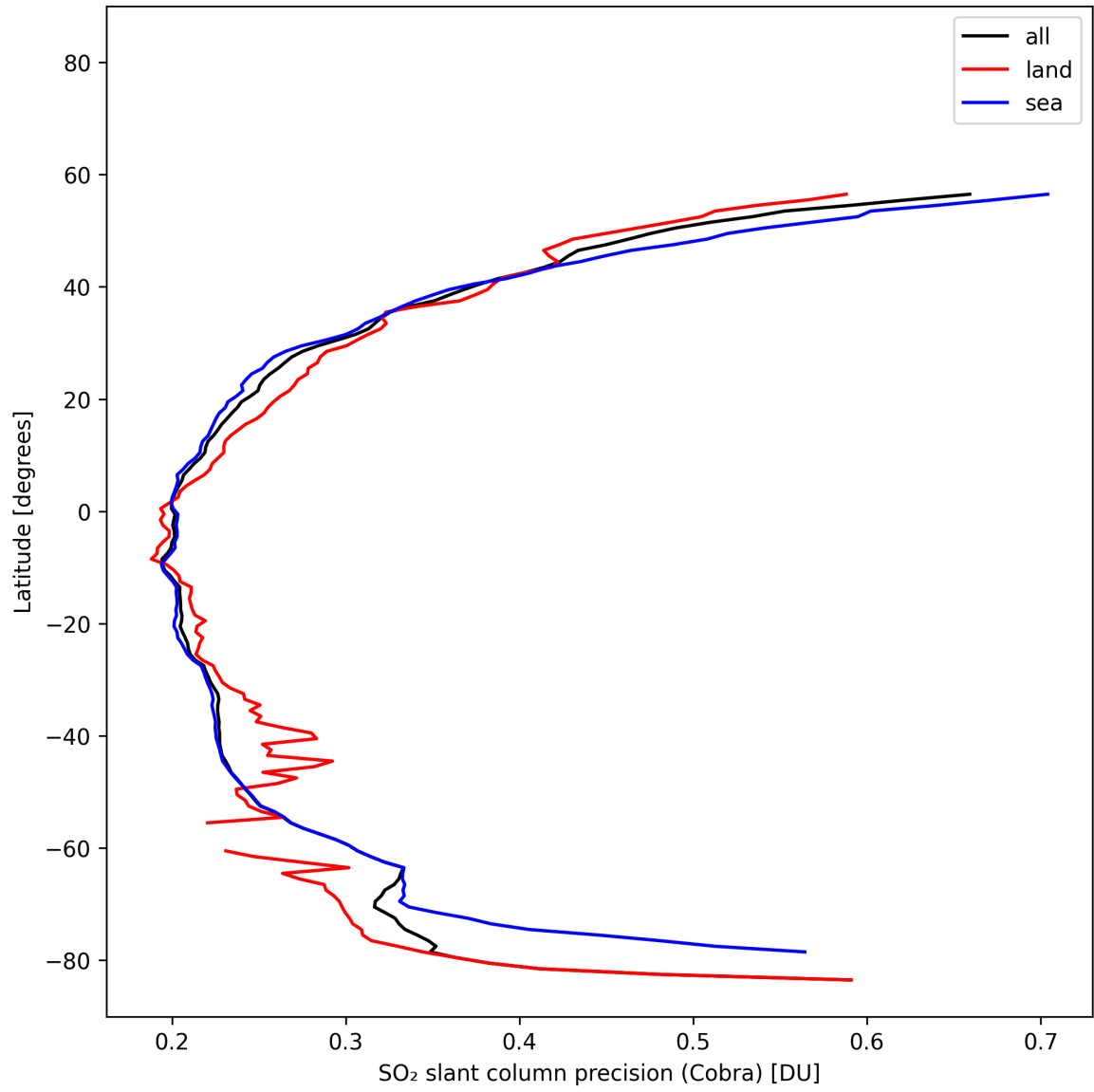


Figure 35: Zonal average of “SO₂ slant column precision (Cobra)” for 2025-02-13 to 2025-02-14.

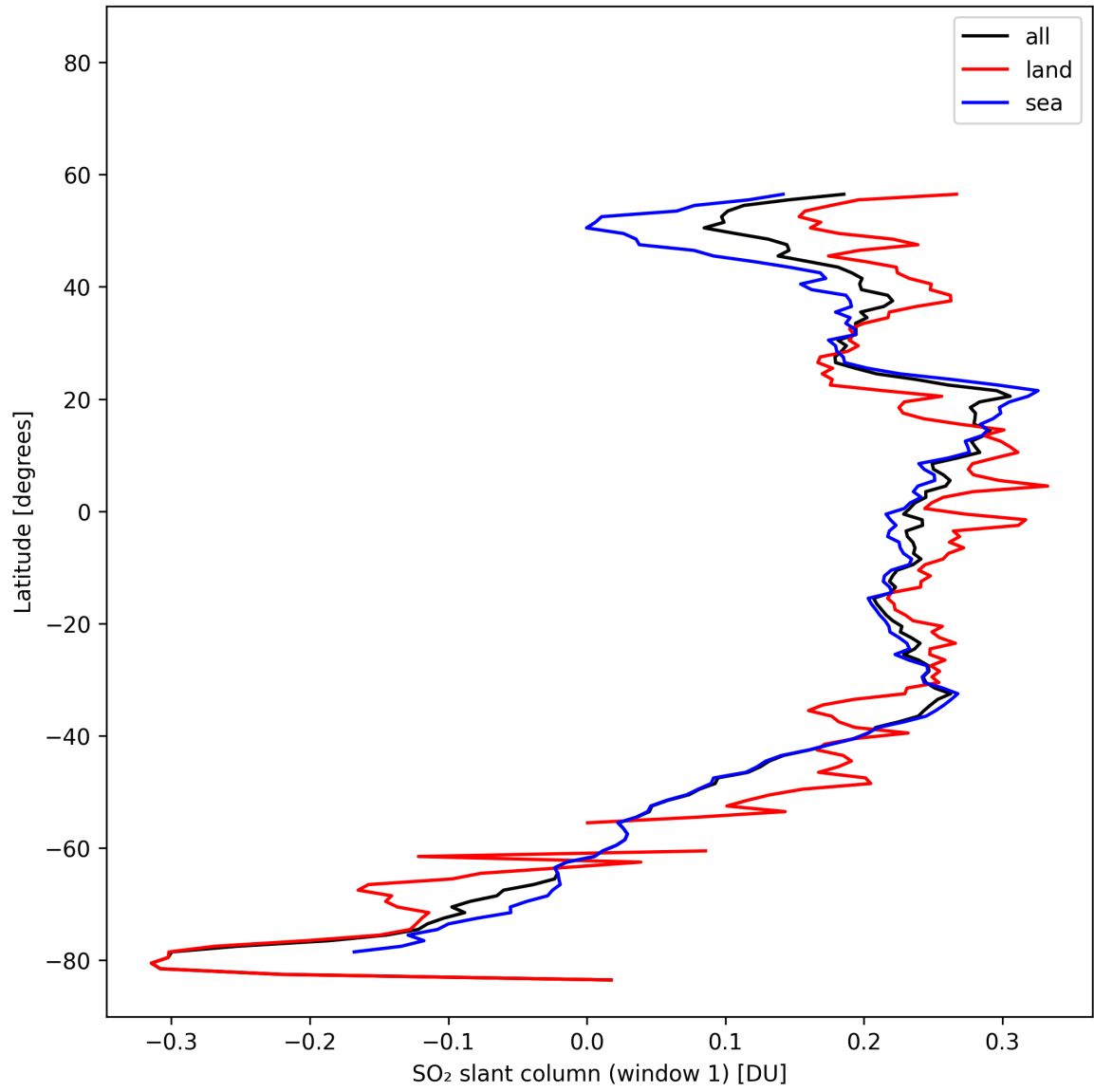


Figure 36: Zonal average of “SO₂ slant column (window 1)” for 2025-02-13 to 2025-02-14.

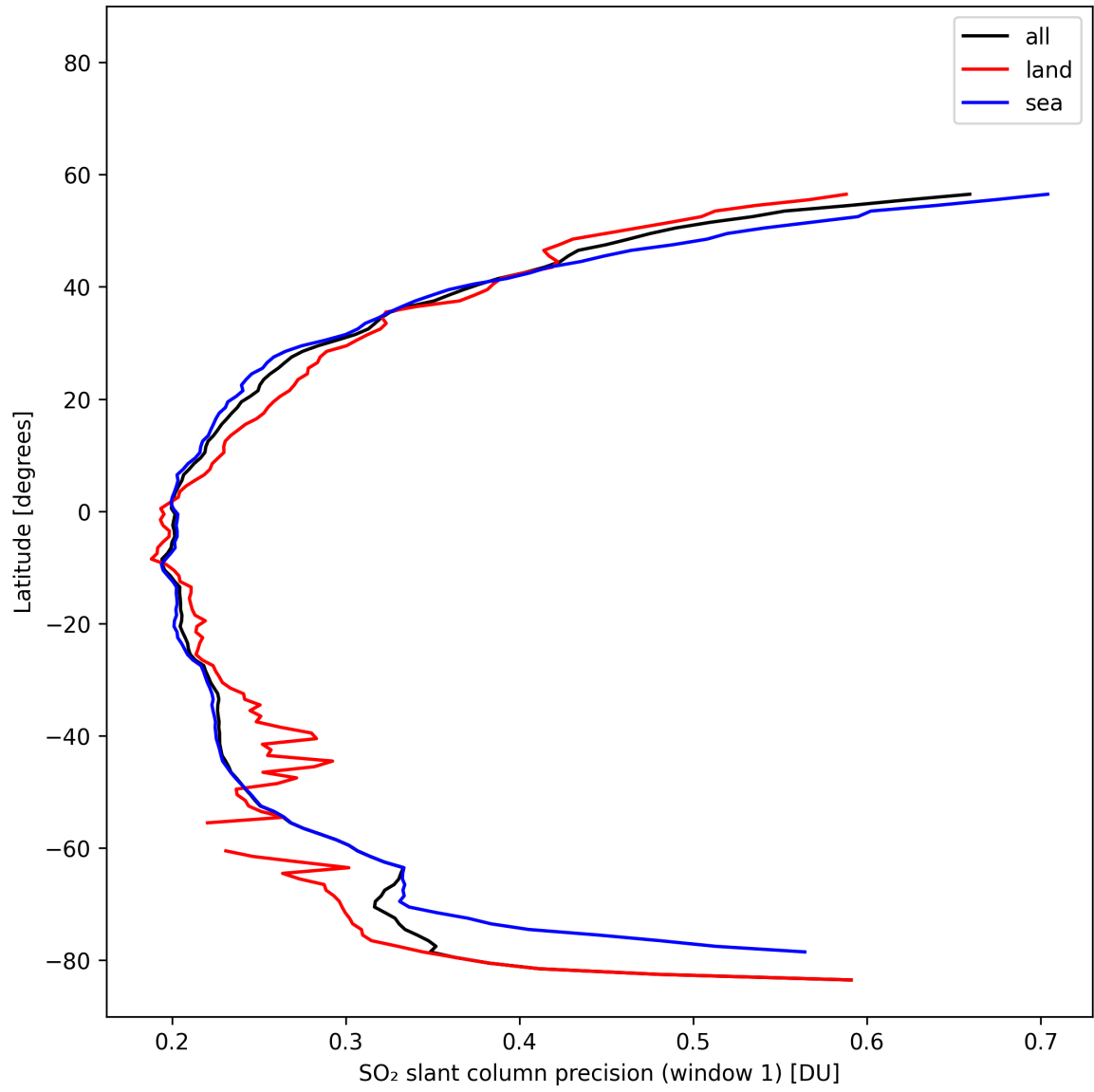


Figure 37: Zonal average of “SO₂ slant column precision (window 1)” for 2025-02-13 to 2025-02-14.

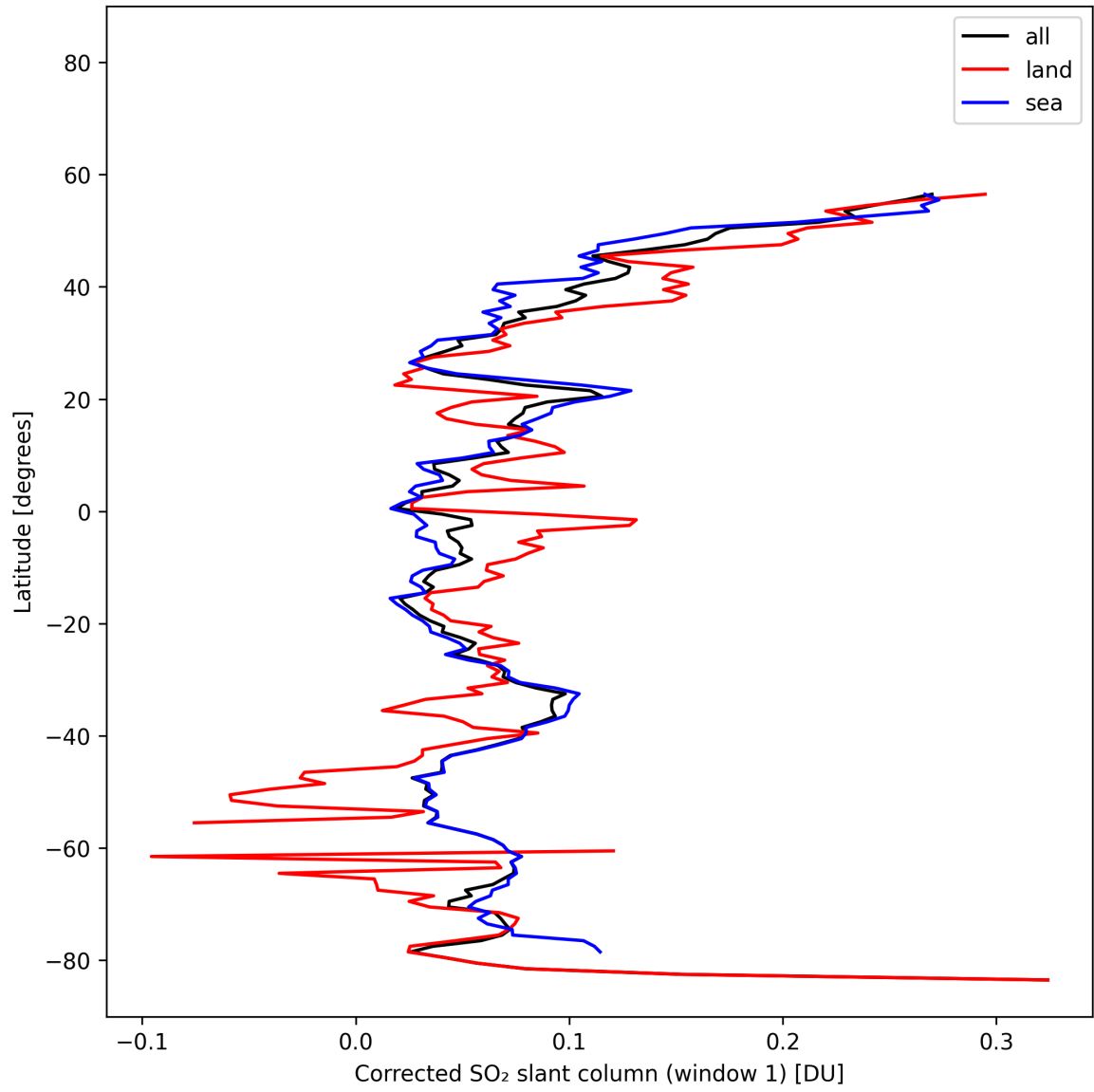


Figure 38: Zonal average of “Corrected SO₂ slant column (window 1)” for 2025-02-13 to 2025-02-14.

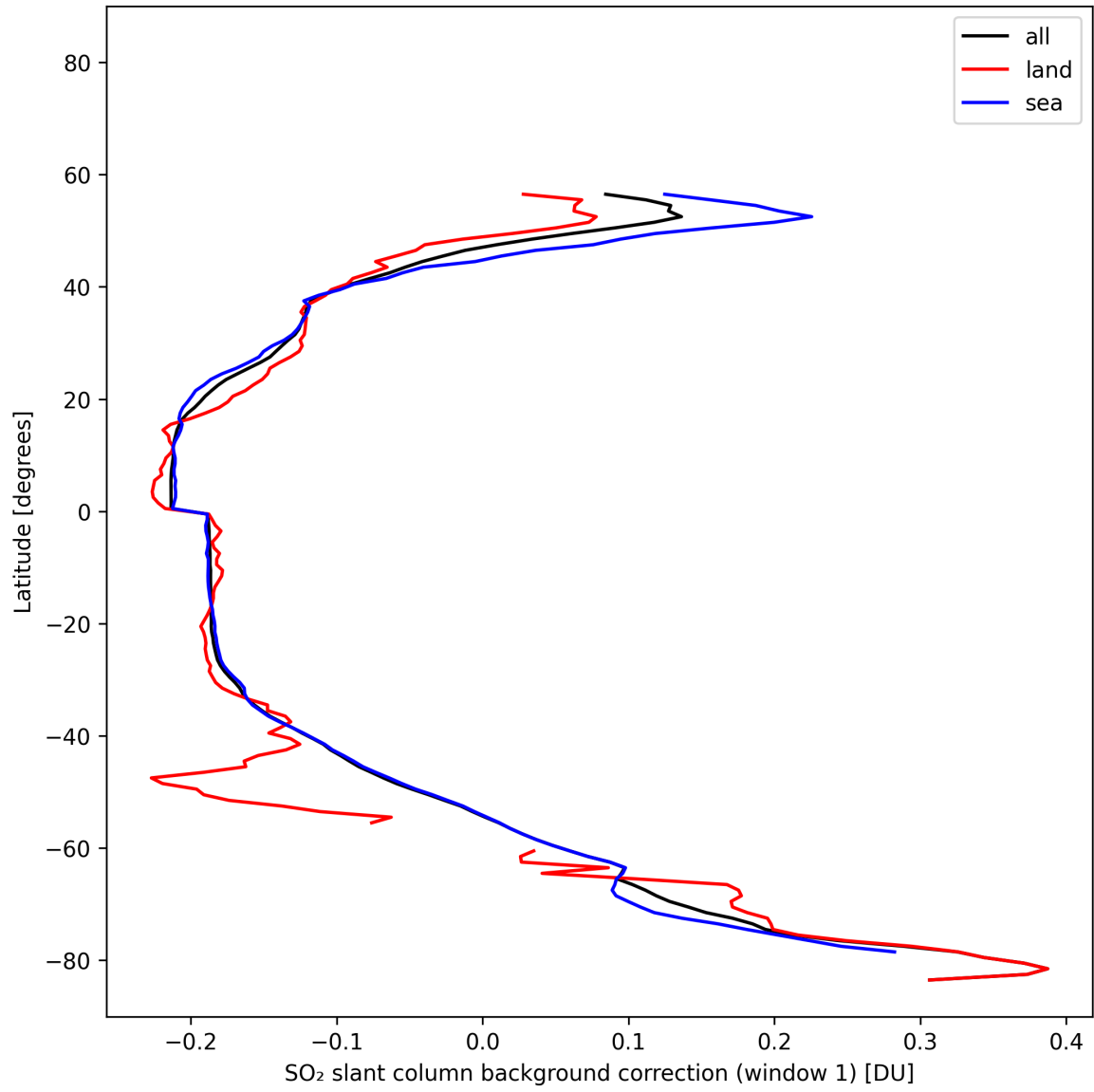


Figure 39: Zonal average of “SO₂ slant column background correction (window 1)” for 2025-02-13 to 2025-02-14.

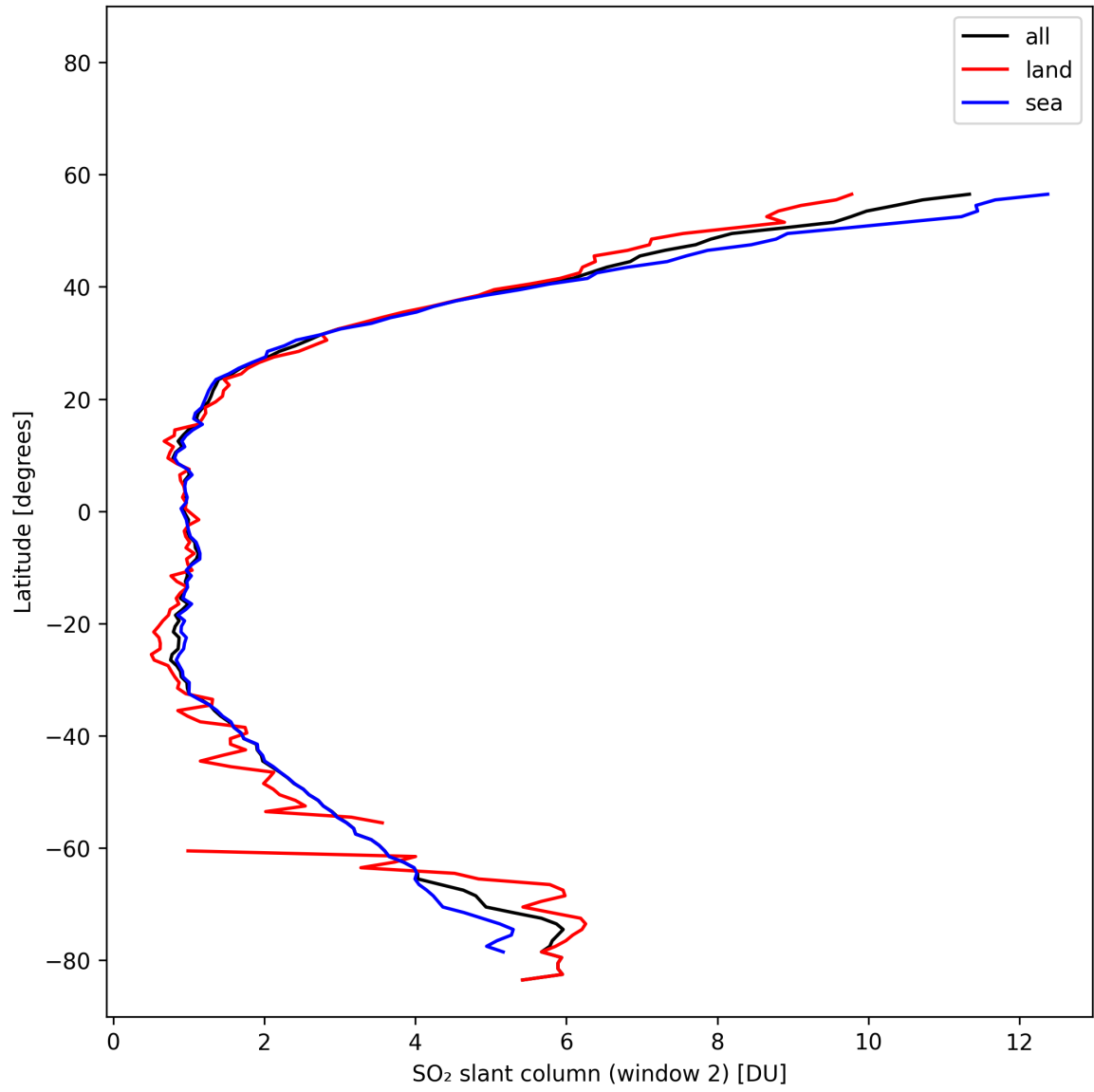


Figure 40: Zonal average of “SO₂ slant column (window 2)” for 2025-02-13 to 2025-02-14.

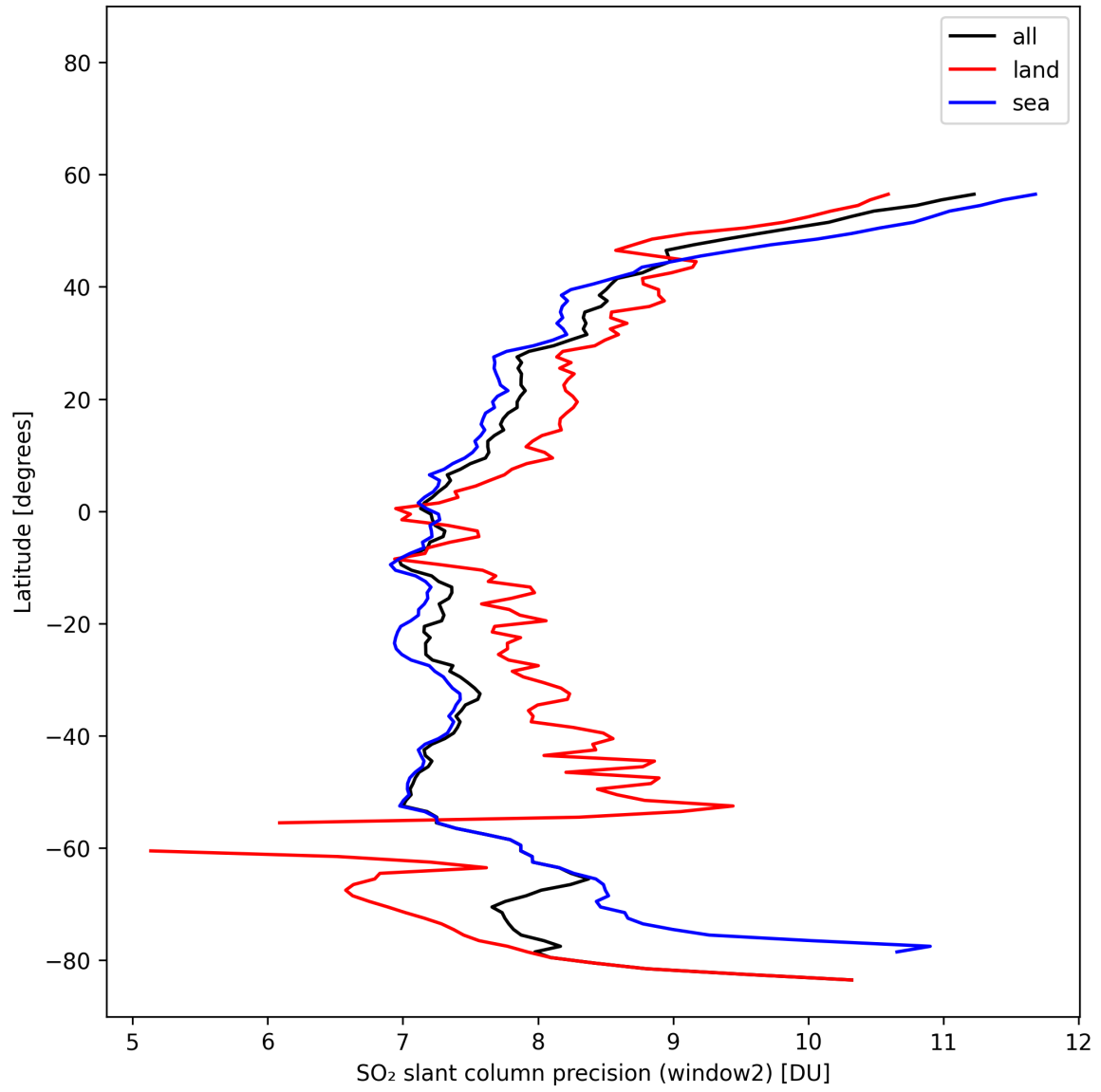


Figure 41: Zonal average of “SO₂ slant column precision (window2)” for 2025-02-13 to 2025-02-14.

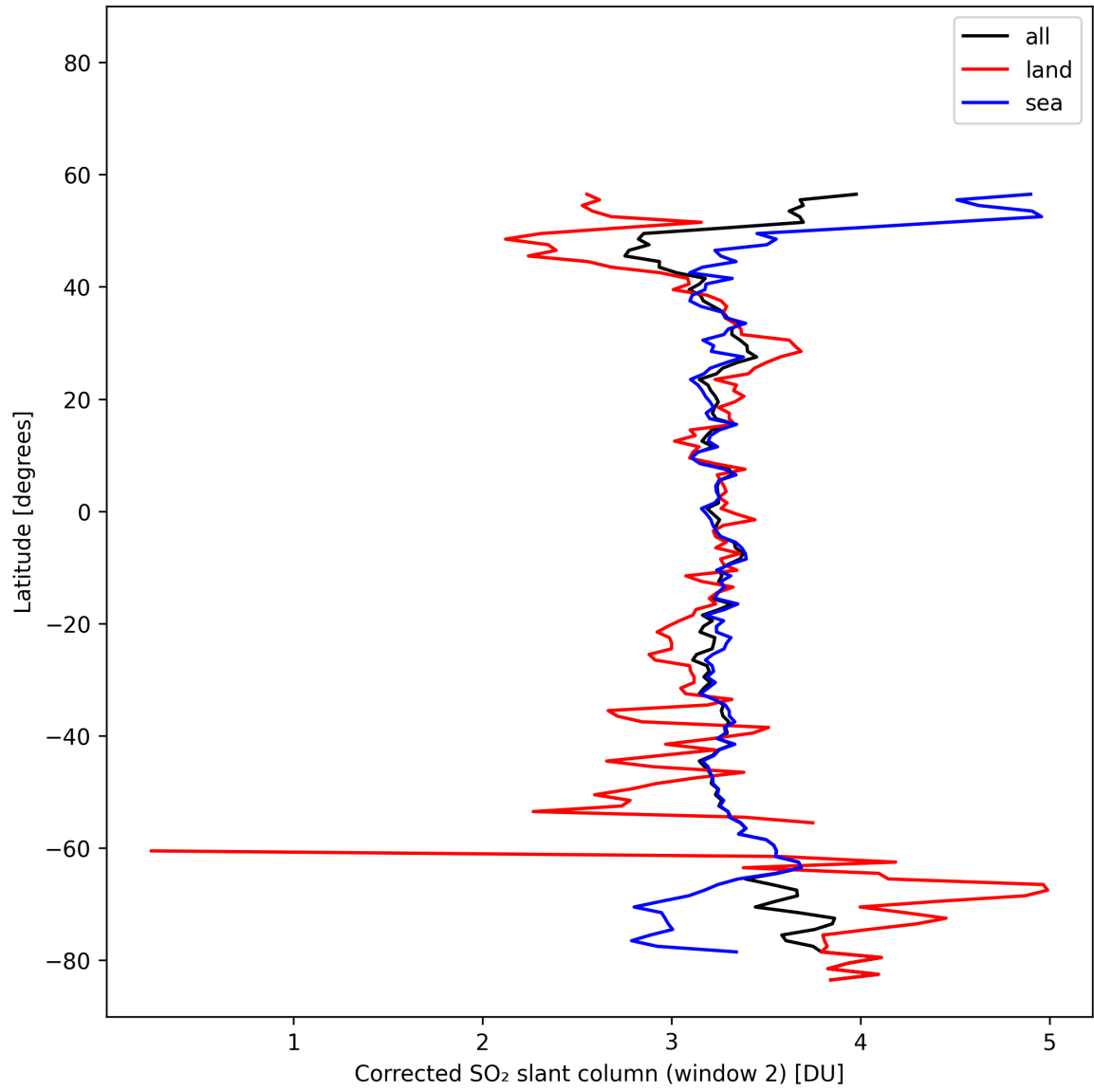


Figure 42: Zonal average of “Corrected SO₂ slant column (window 2)” for 2025-02-13 to 2025-02-14.

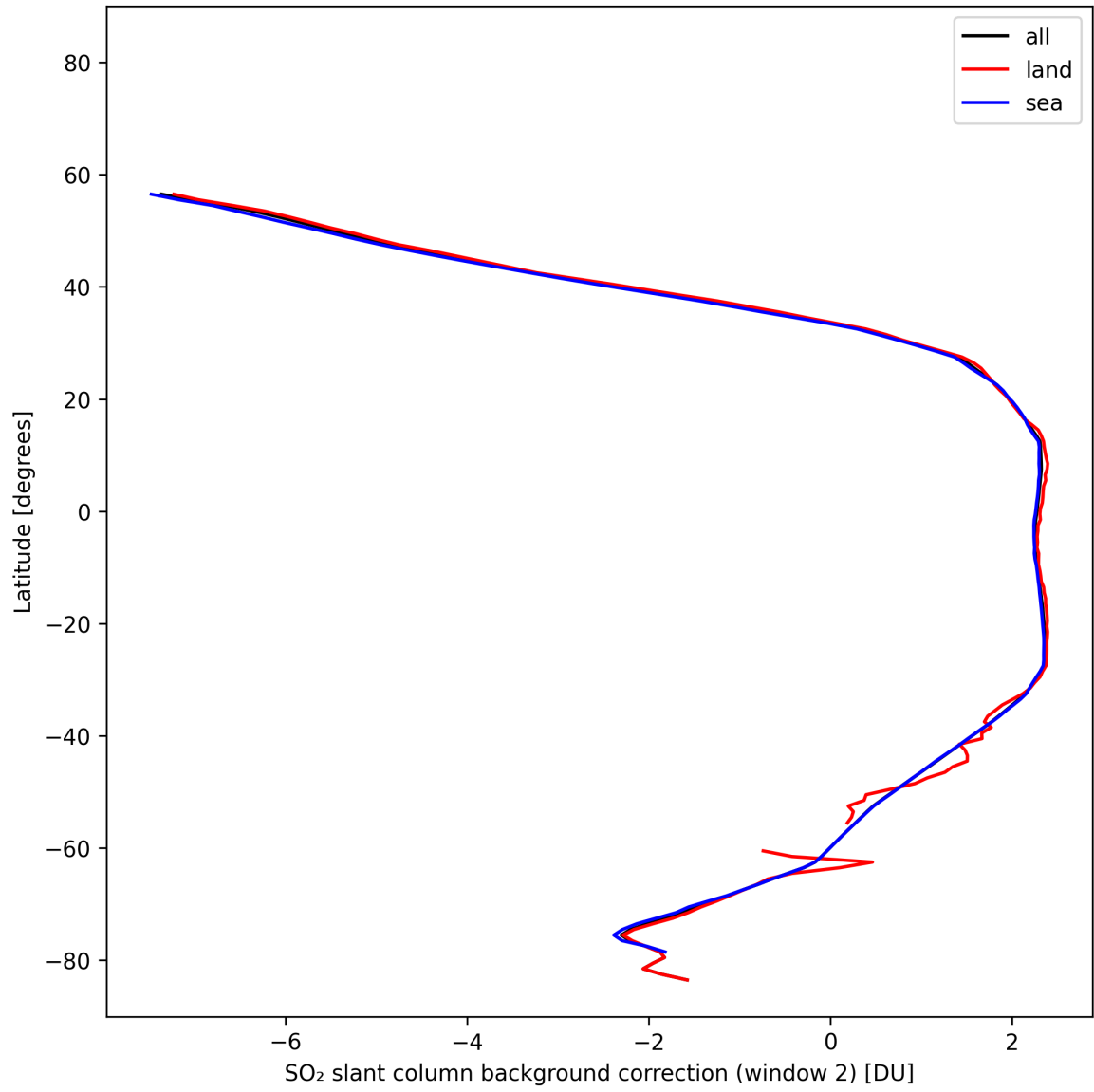


Figure 43: Zonal average of “SO₂ slant column background correction (window 2)” for 2025-02-13 to 2025-02-14.

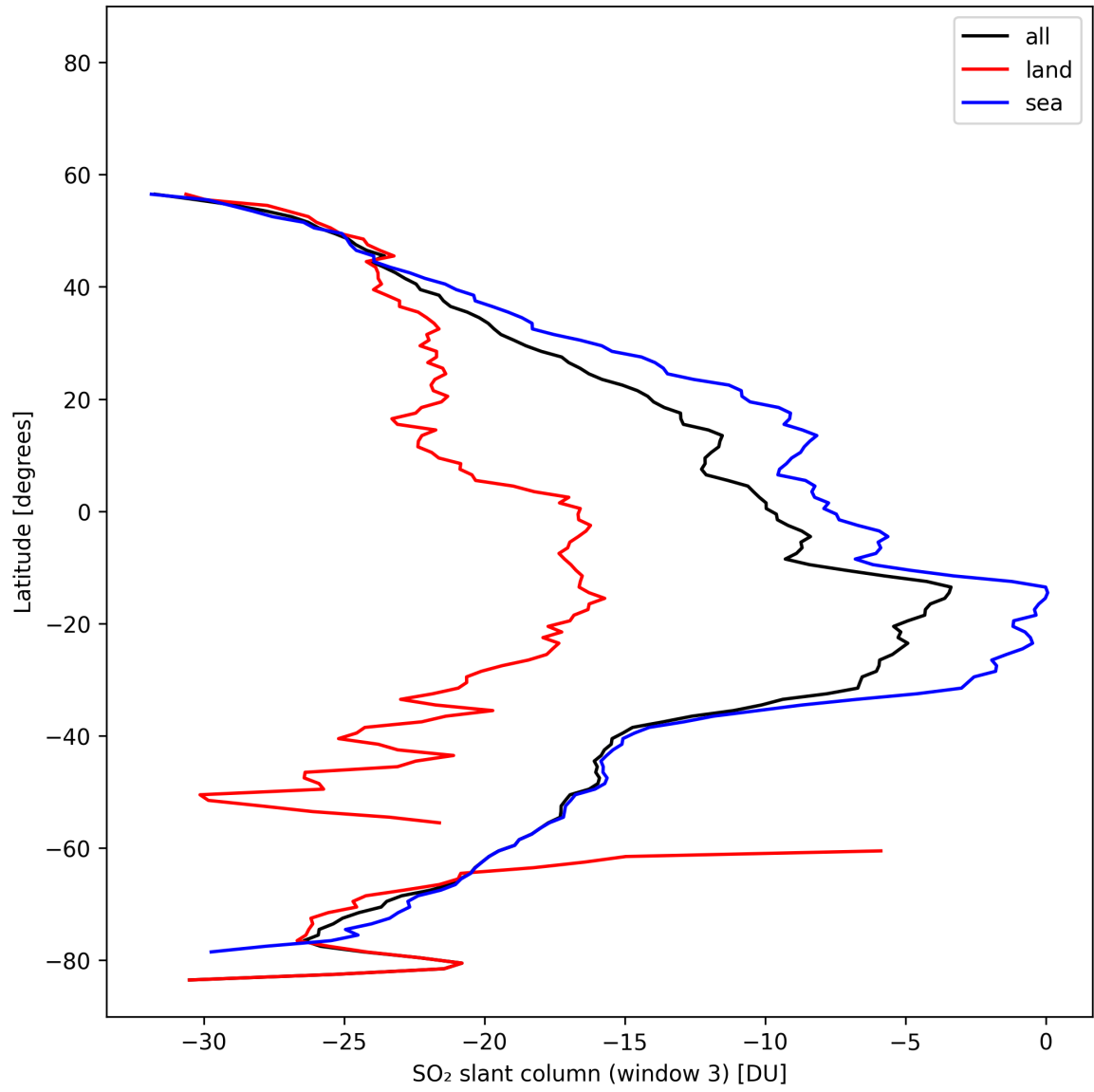


Figure 44: Zonal average of “SO₂ slant column (window 3)” for 2025-02-13 to 2025-02-14.

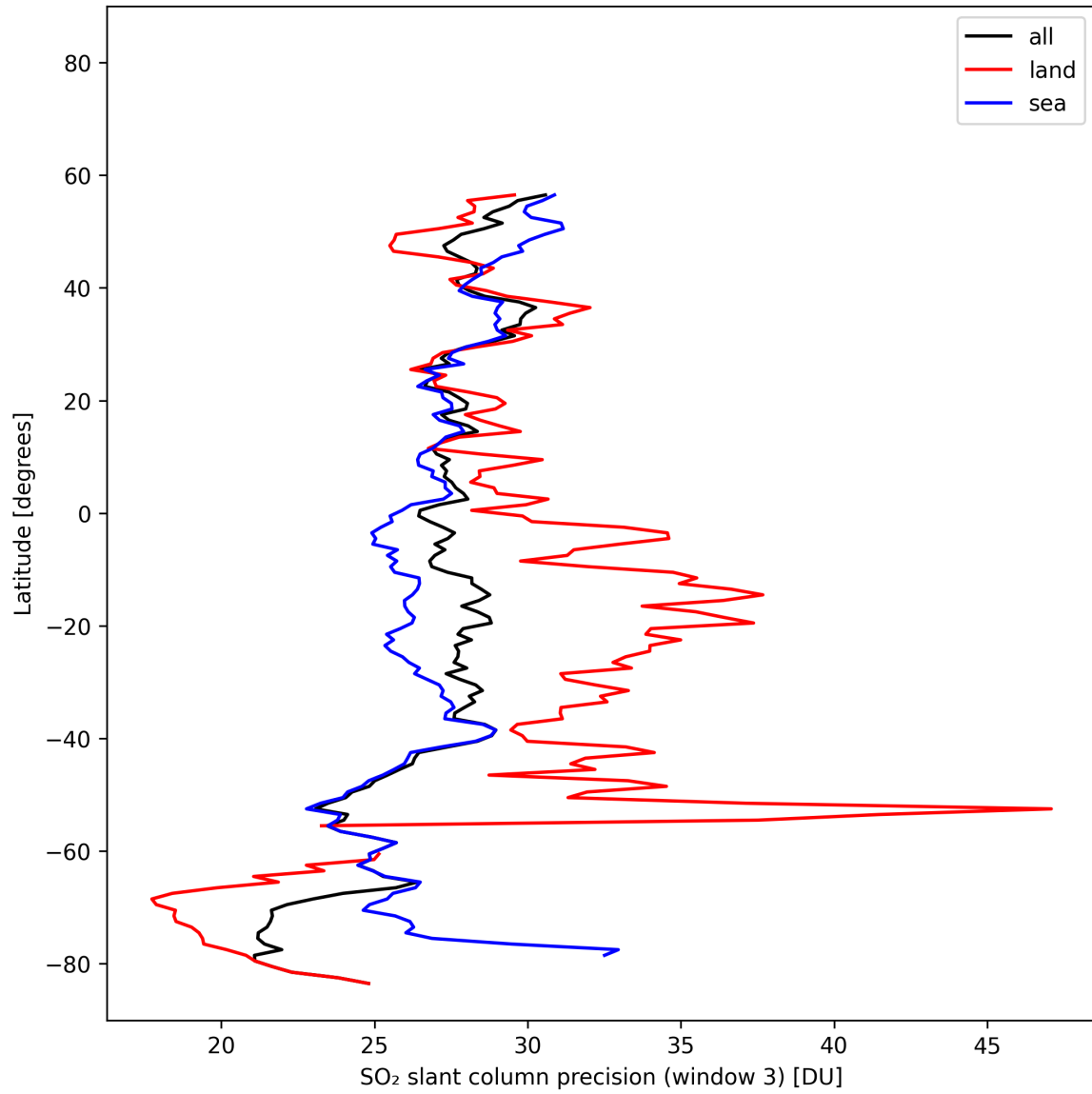


Figure 45: Zonal average of “SO₂ slant column precision (window 3)” for 2025-02-13 to 2025-02-14.

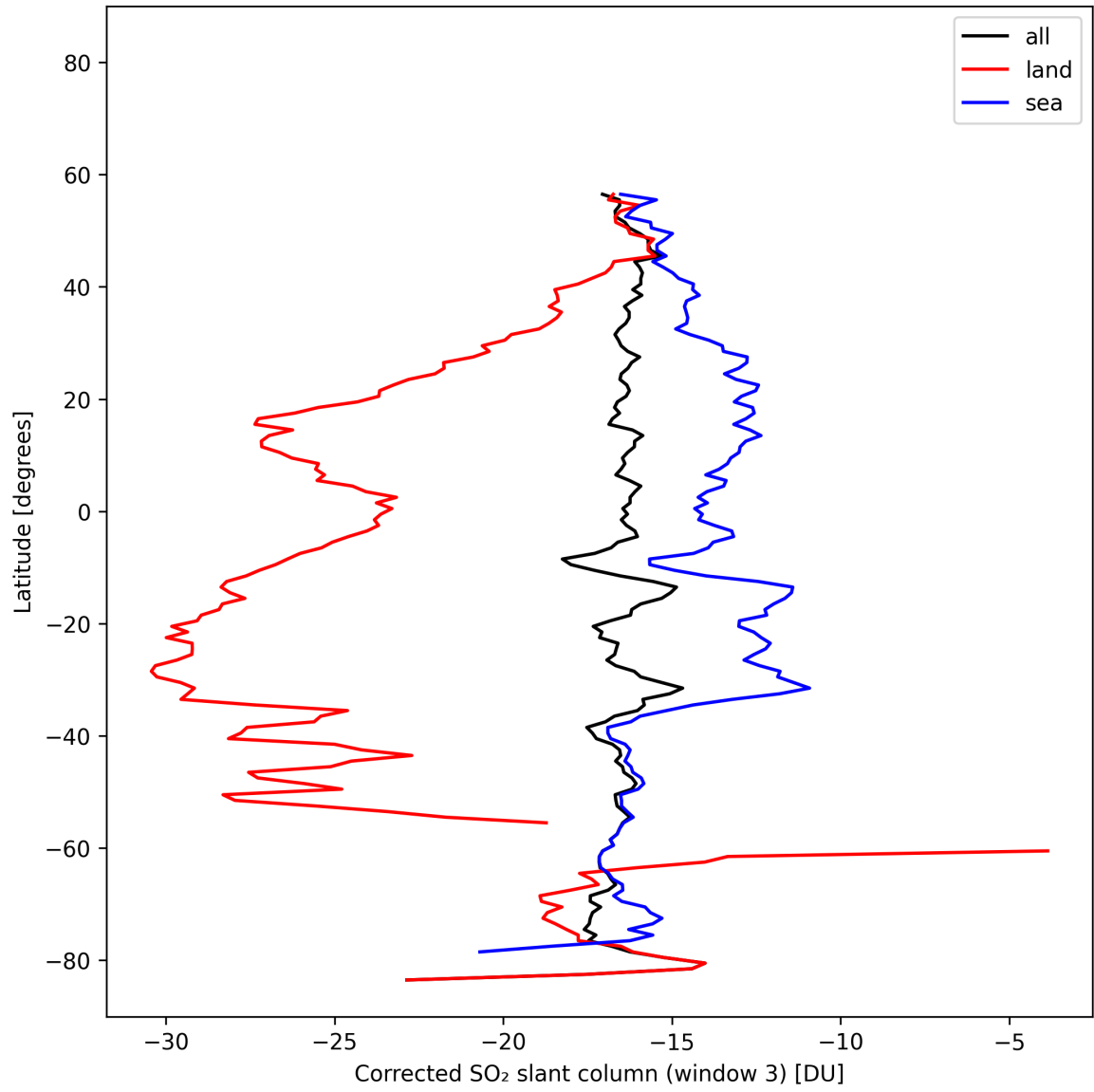


Figure 46: Zonal average of “Corrected SO₂ slant column (window 3)” for 2025-02-13 to 2025-02-14.

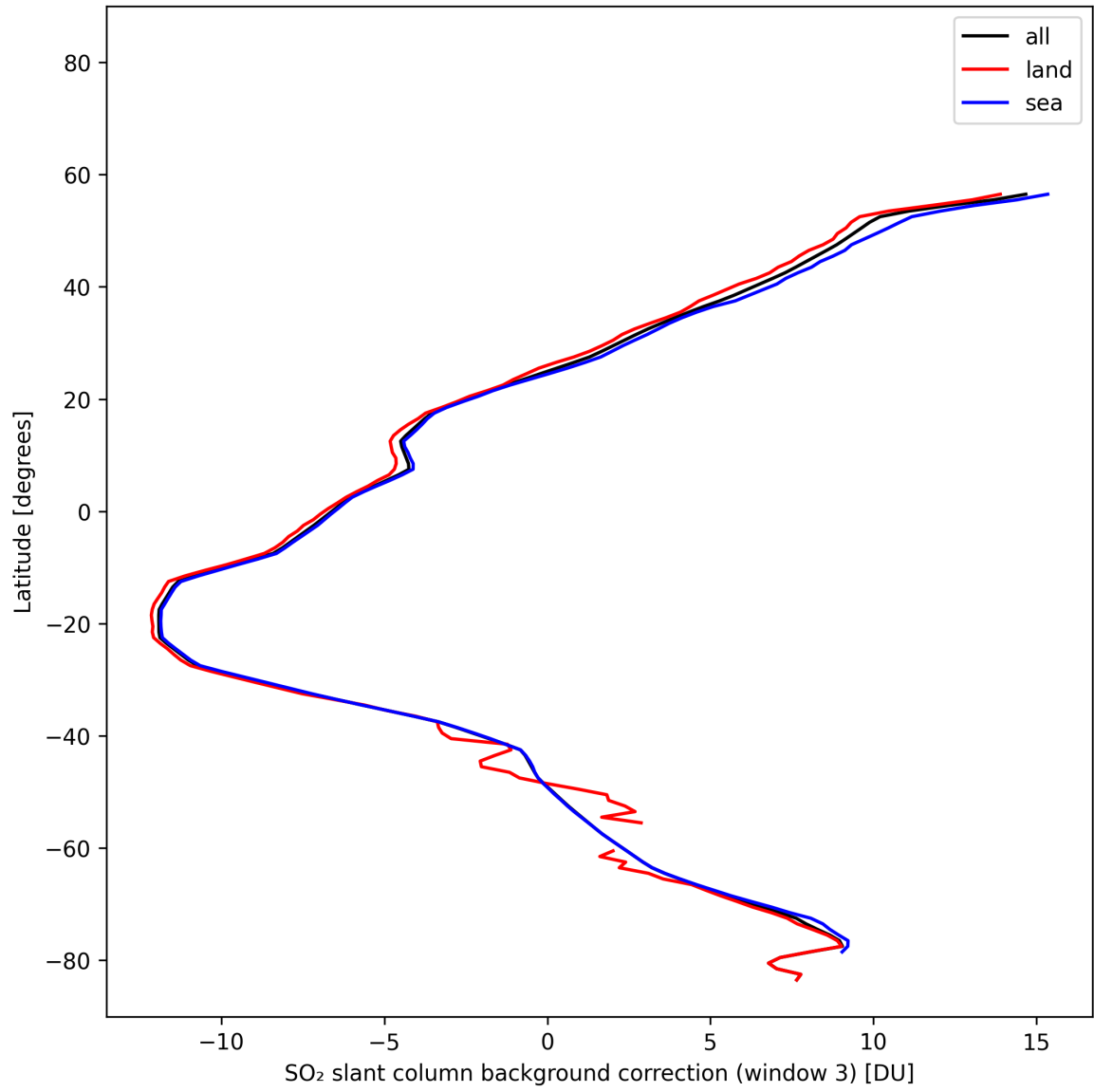


Figure 47: Zonal average of “SO₂ slant column background correction (window 3)” for 2025-02-13 to 2025-02-14.

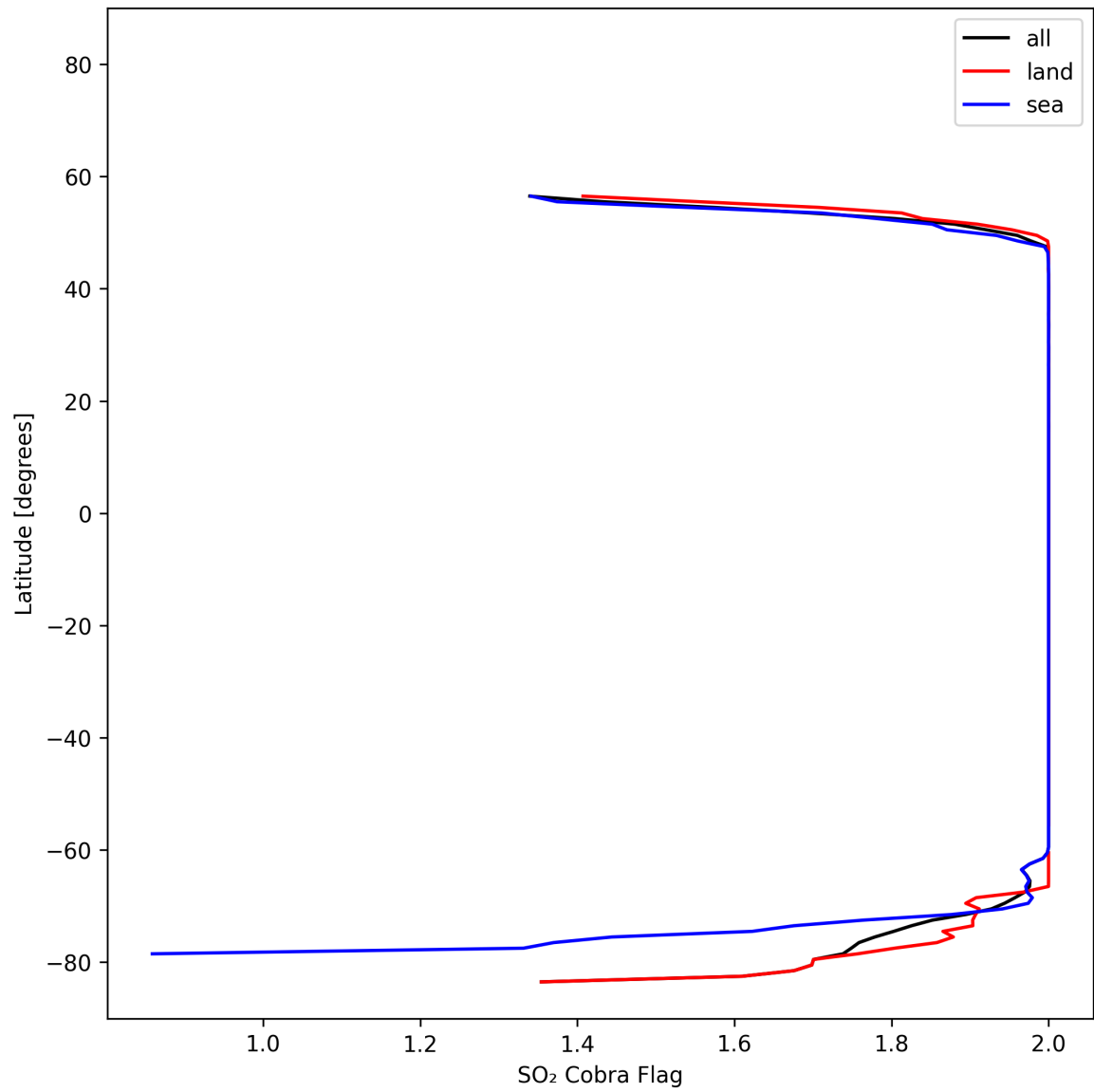


Figure 48: Zonal average of “SO₂ Cobra Flag” for 2025-02-13 to 2025-02-14.

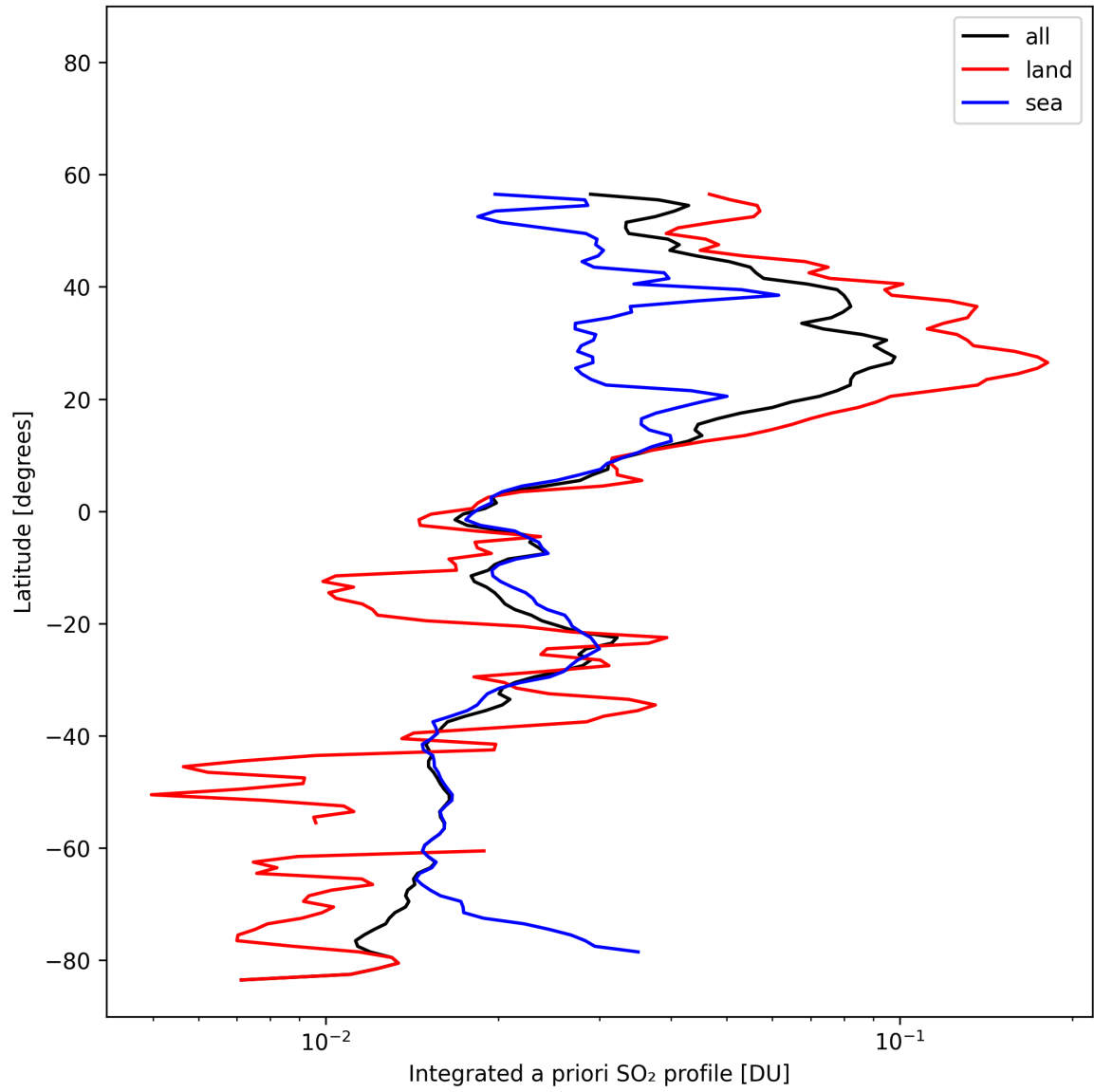


Figure 49: Zonal average of “Integrated a priori SO₂ profile” for 2025-02-13 to 2025-02-14.

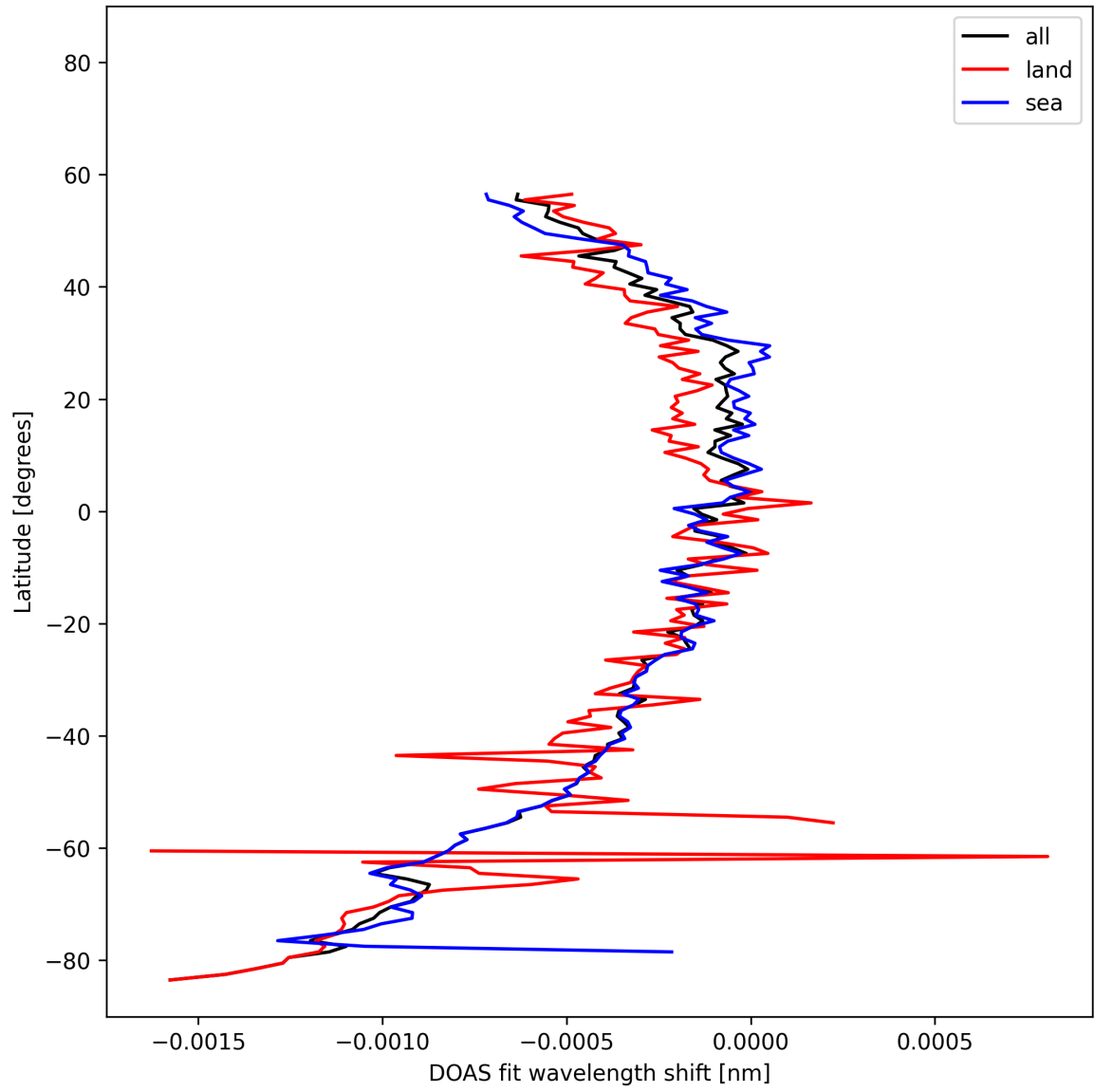


Figure 50: Zonal average of "DOAS fit wavelength shift" for 2025-02-13 to 2025-02-14.

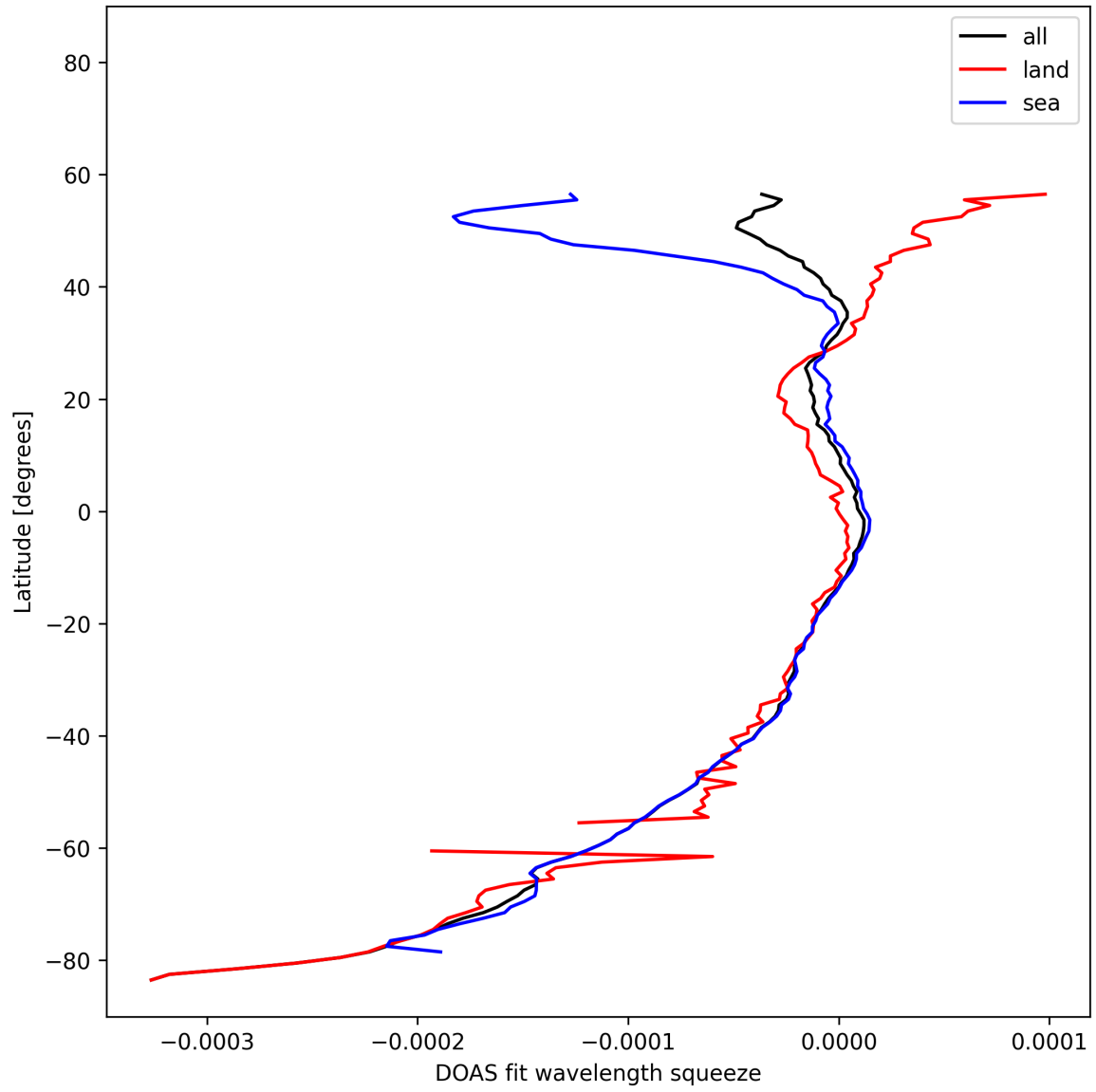


Figure 51: Zonal average of "DOAS fit wavelength squeeze" for 2025-02-13 to 2025-02-14.

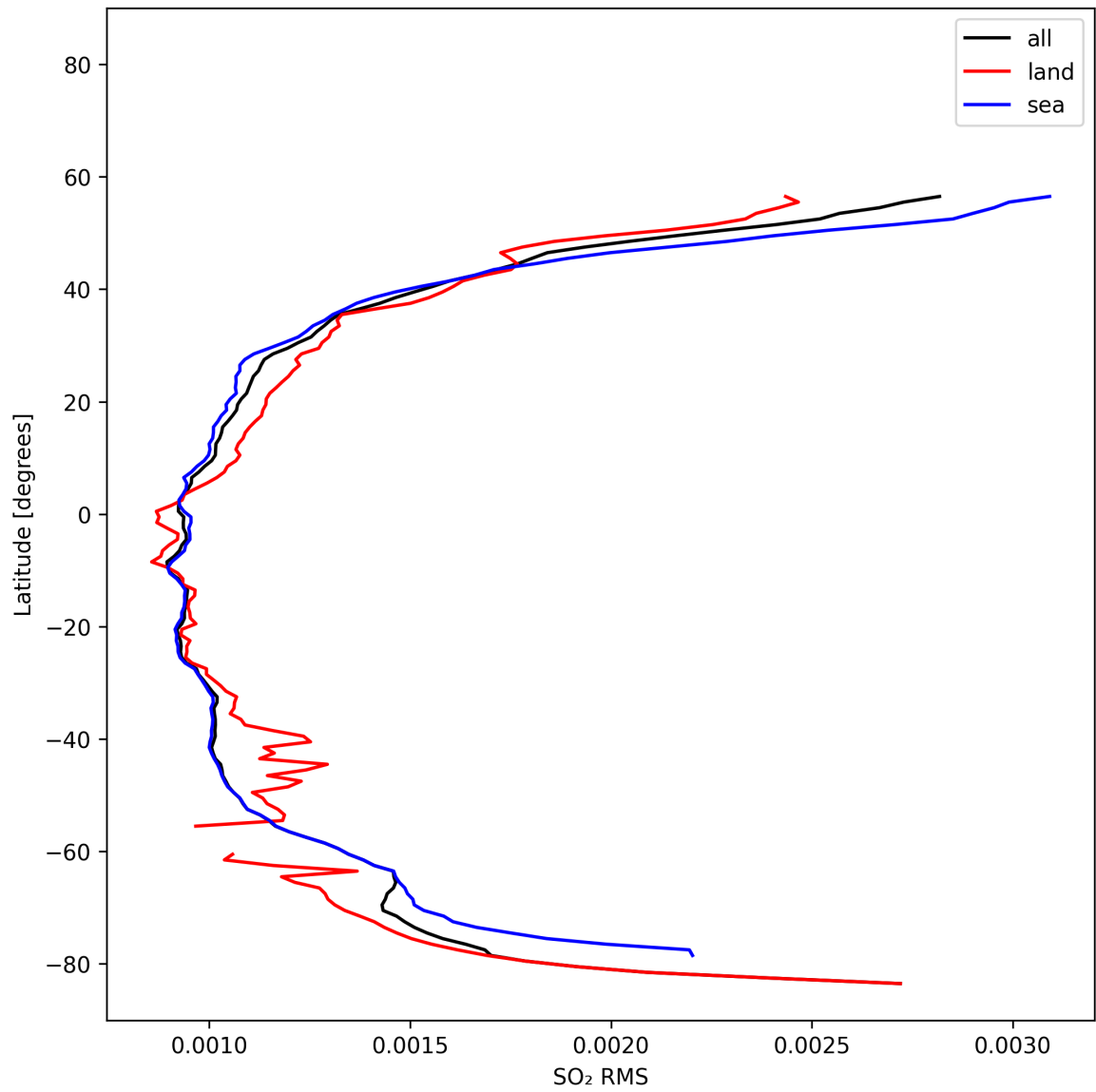


Figure 52: Zonal average of “SO₂ RMS” for 2025-02-13 to 2025-02-14.

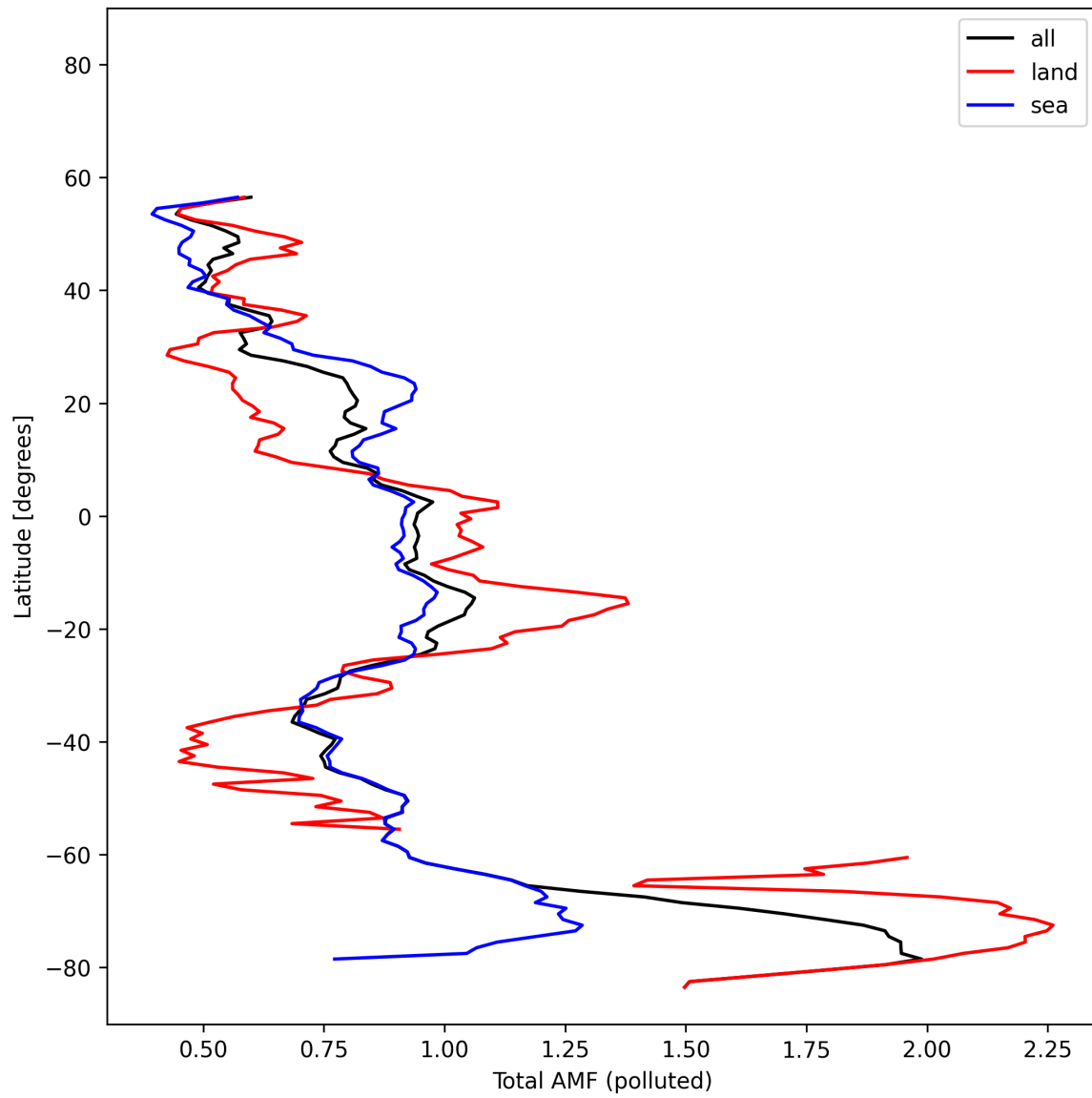


Figure 53: Zonal average of “Total AMF (polluted)” for 2025-02-13 to 2025-02-14.

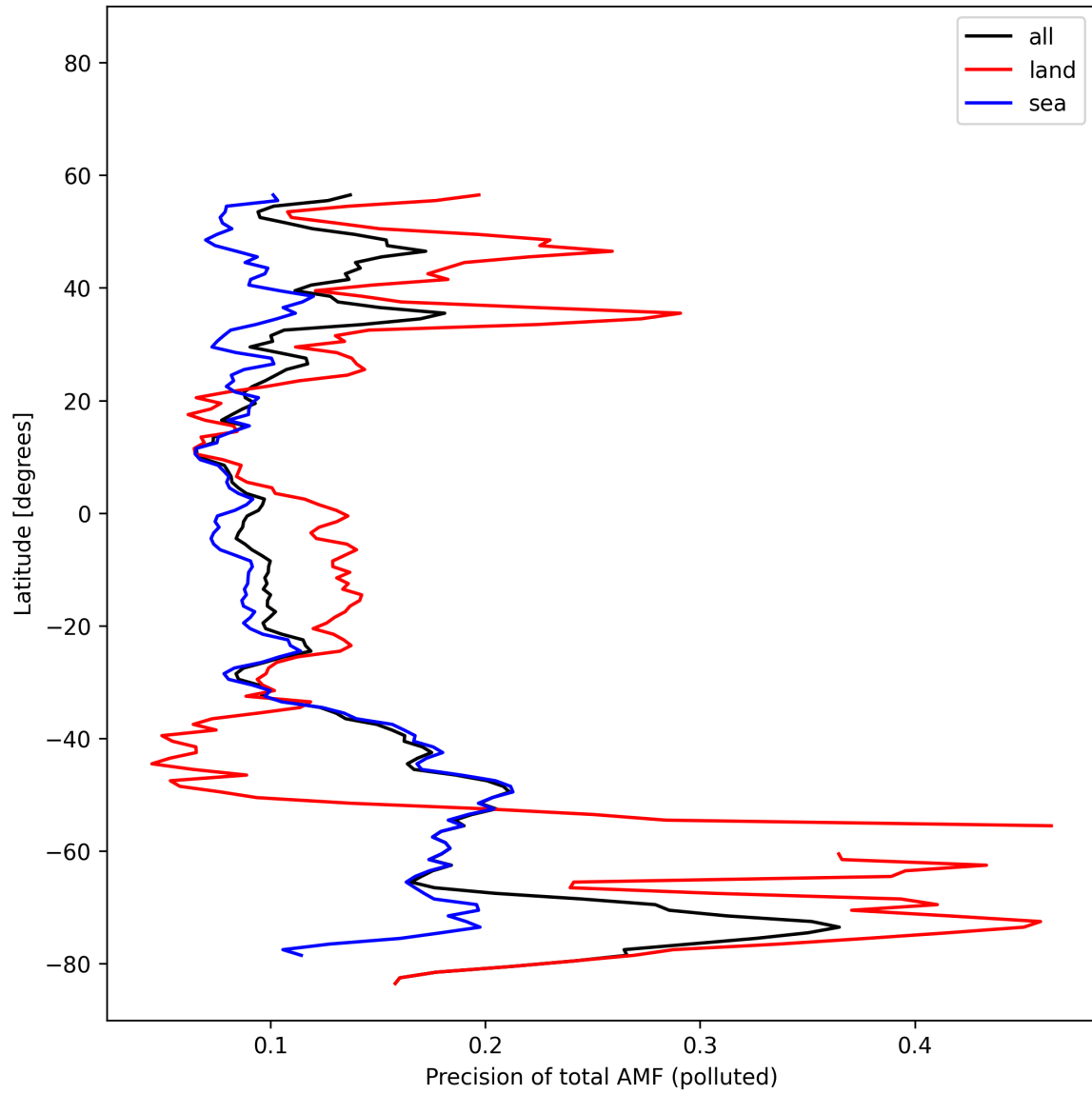


Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-02-13 to 2025-02-14.

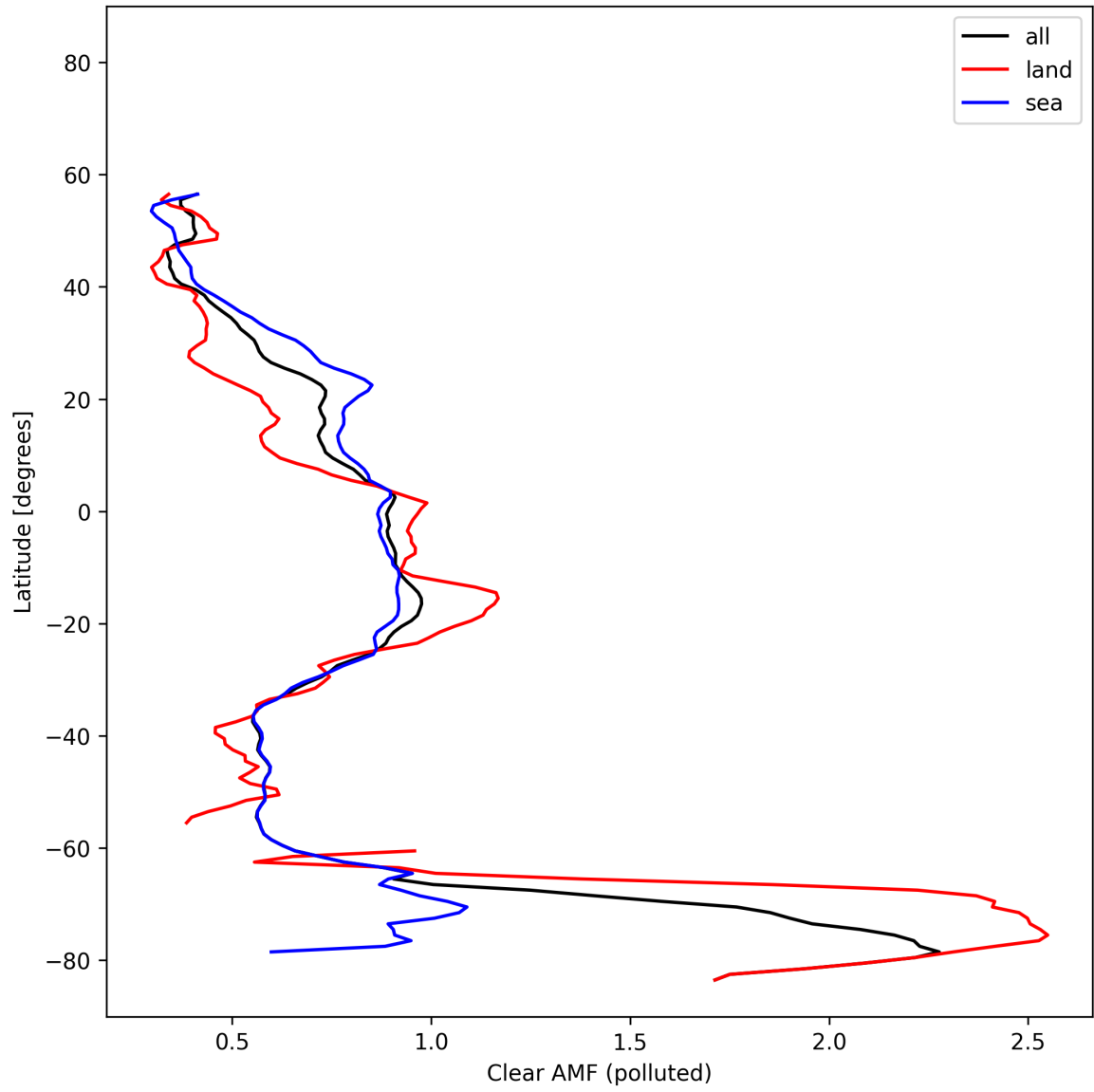


Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-02-13 to 2025-02-14.

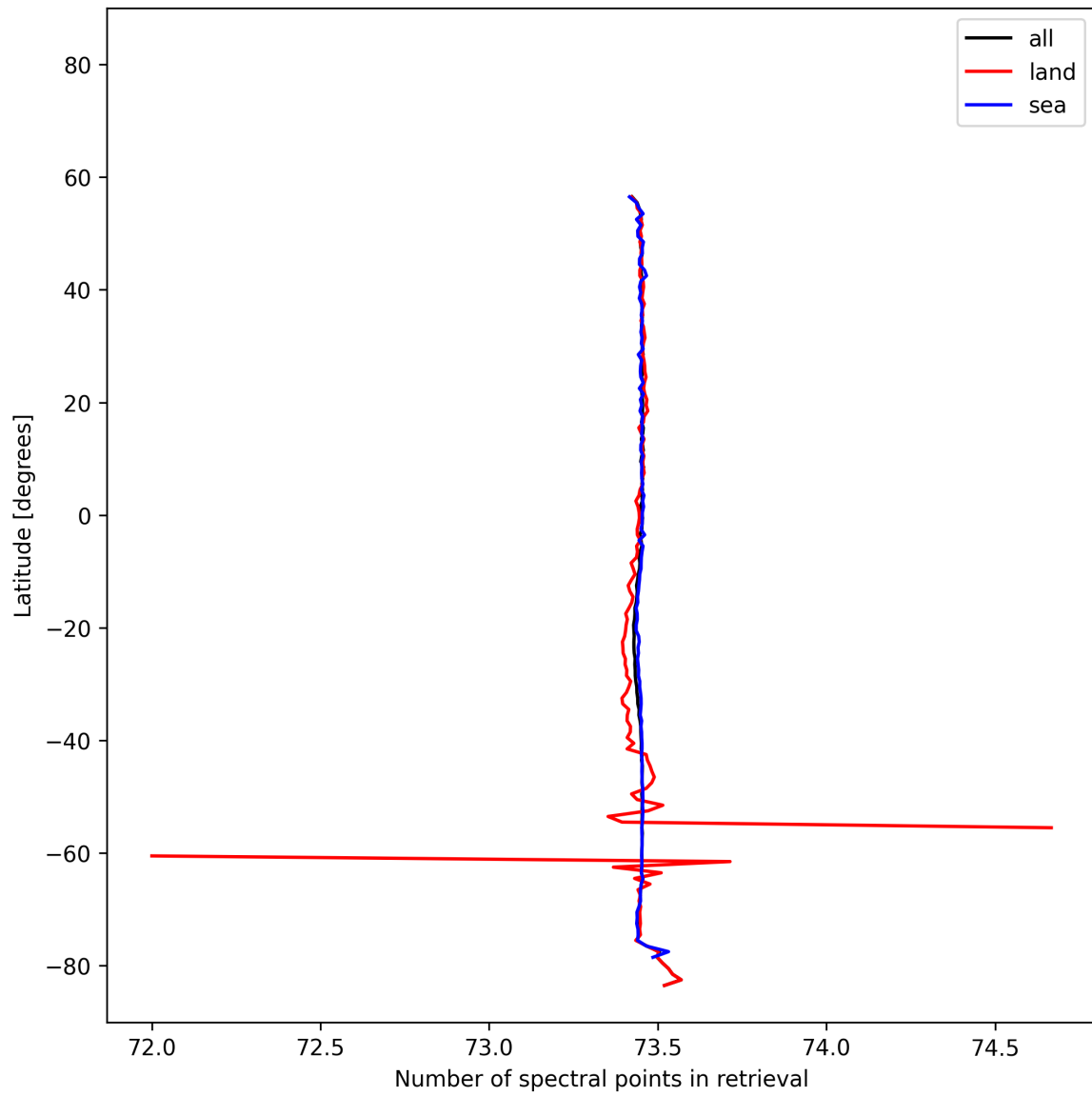


Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-02-13 to 2025-02-14.

8 Histograms

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

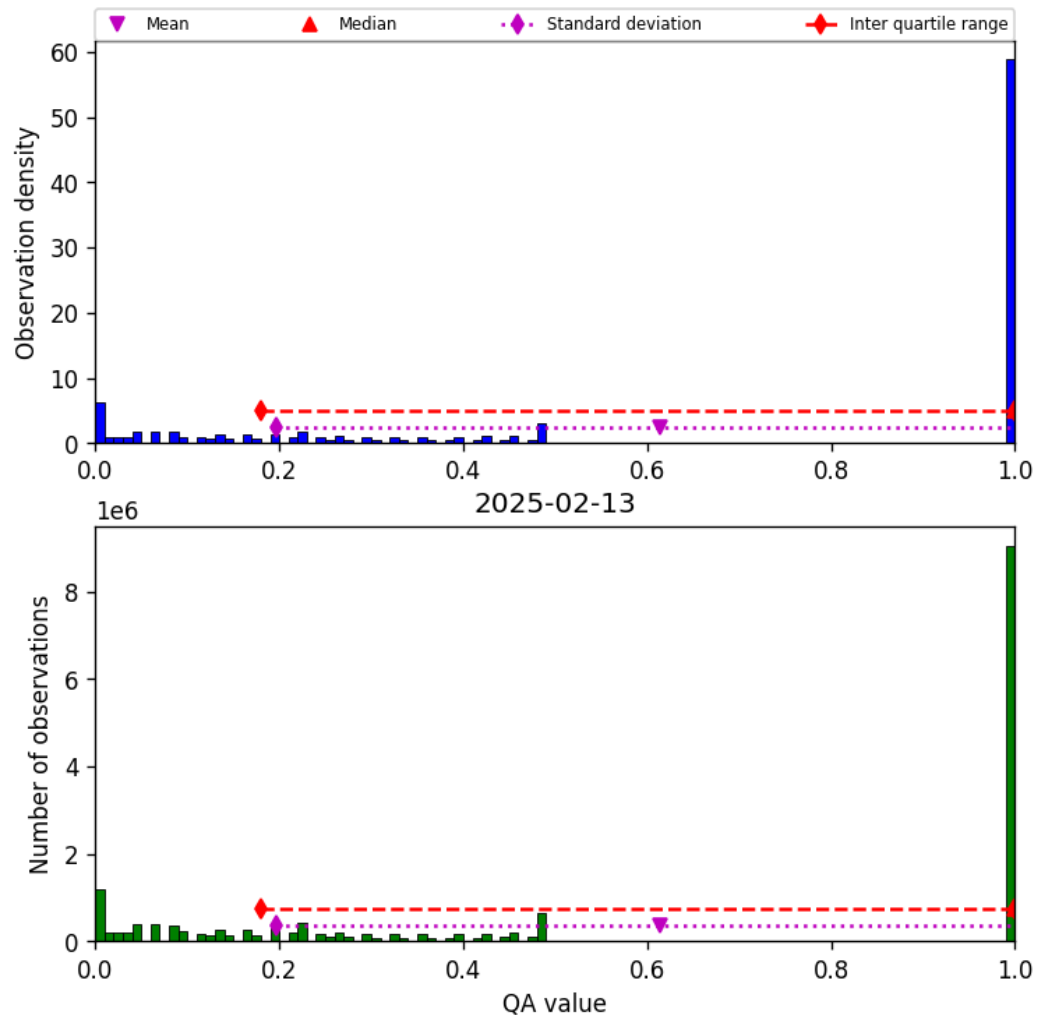


Figure 57: Histogram of “QA value” for 2025-02-13 to 2025-02-14

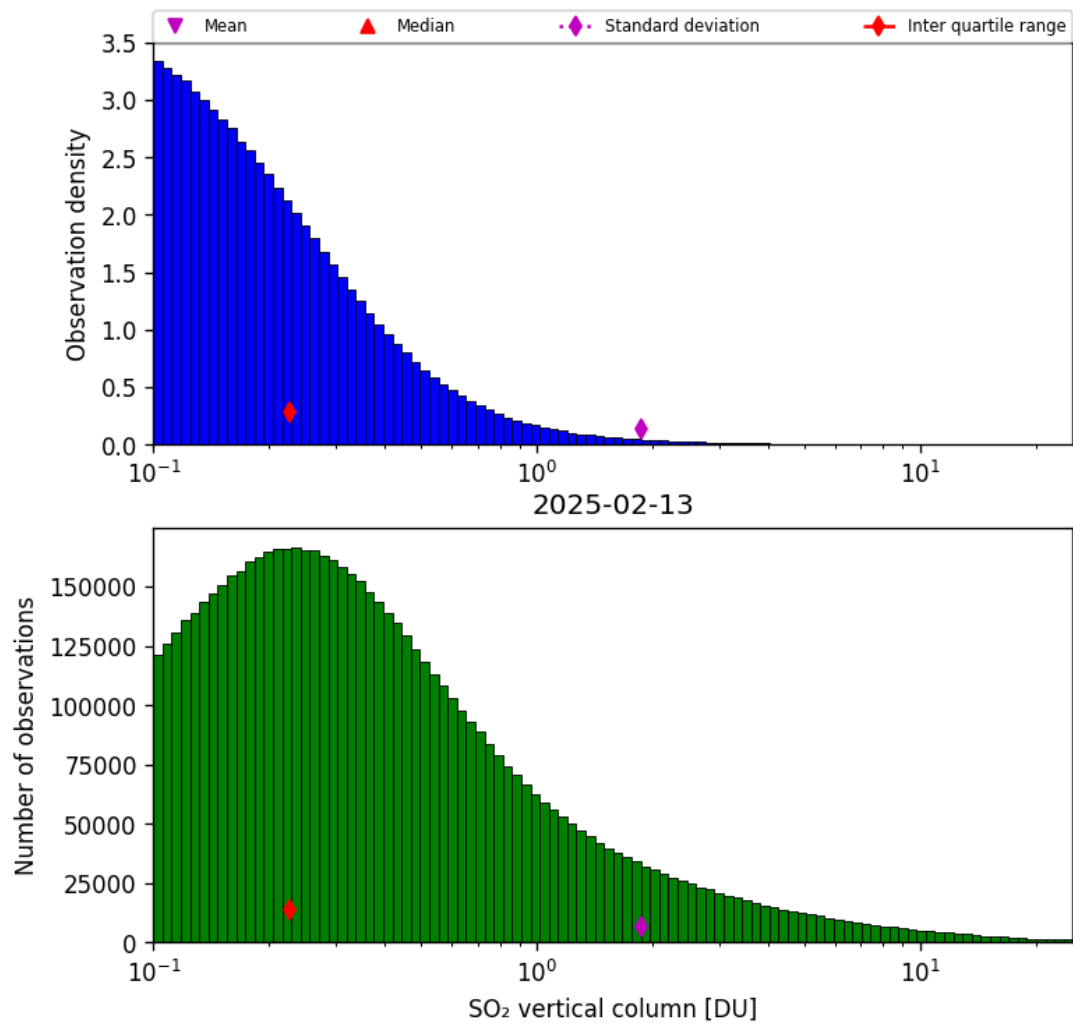


Figure 58: Histogram of “SO₂ vertical column” for 2025-02-13 to 2025-02-14

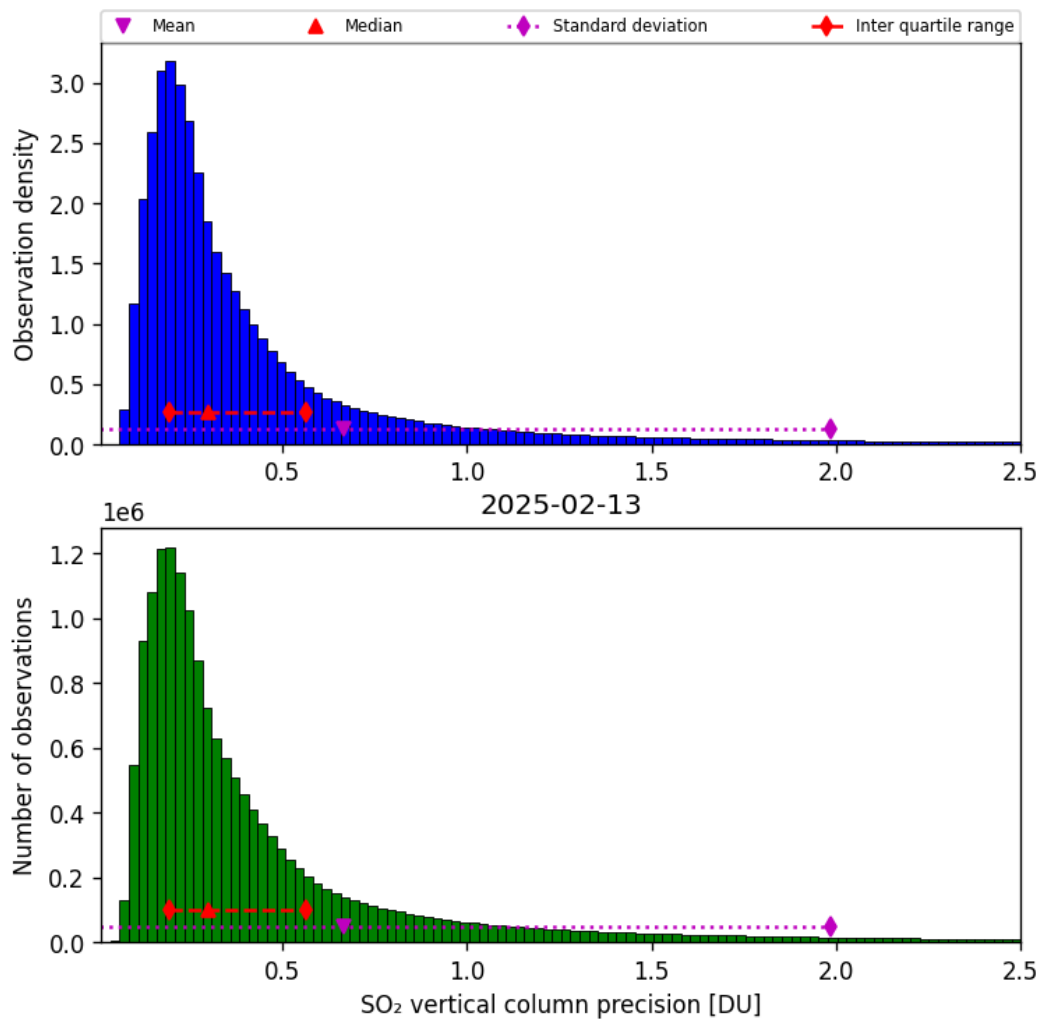


Figure 59: Histogram of “SO₂ vertical column precision” for 2025-02-13 to 2025-02-14

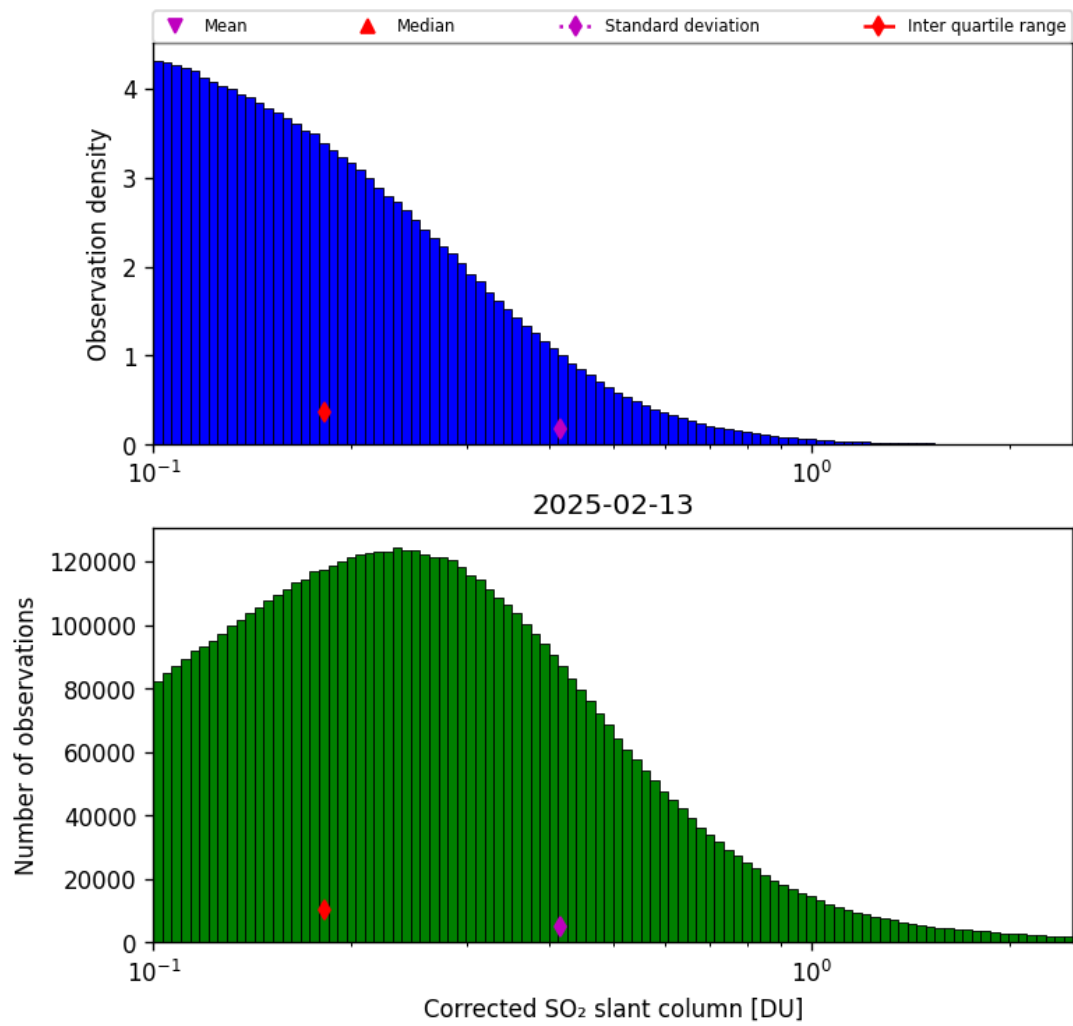


Figure 60: Histogram of "Corrected SO₂ slant column" for 2025-02-13 to 2025-02-14

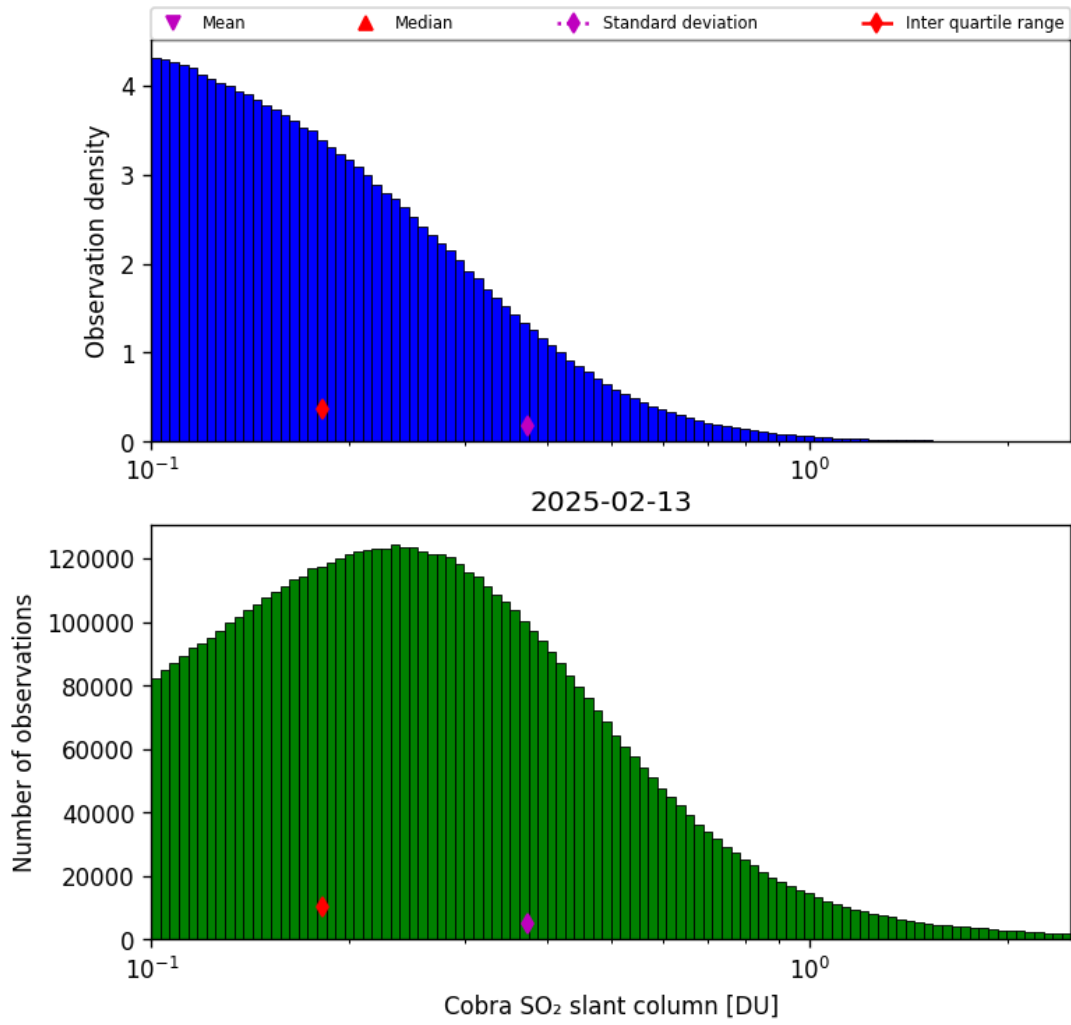


Figure 61: Histogram of “Cobra SO₂ slant column” for 2025-02-13 to 2025-02-14

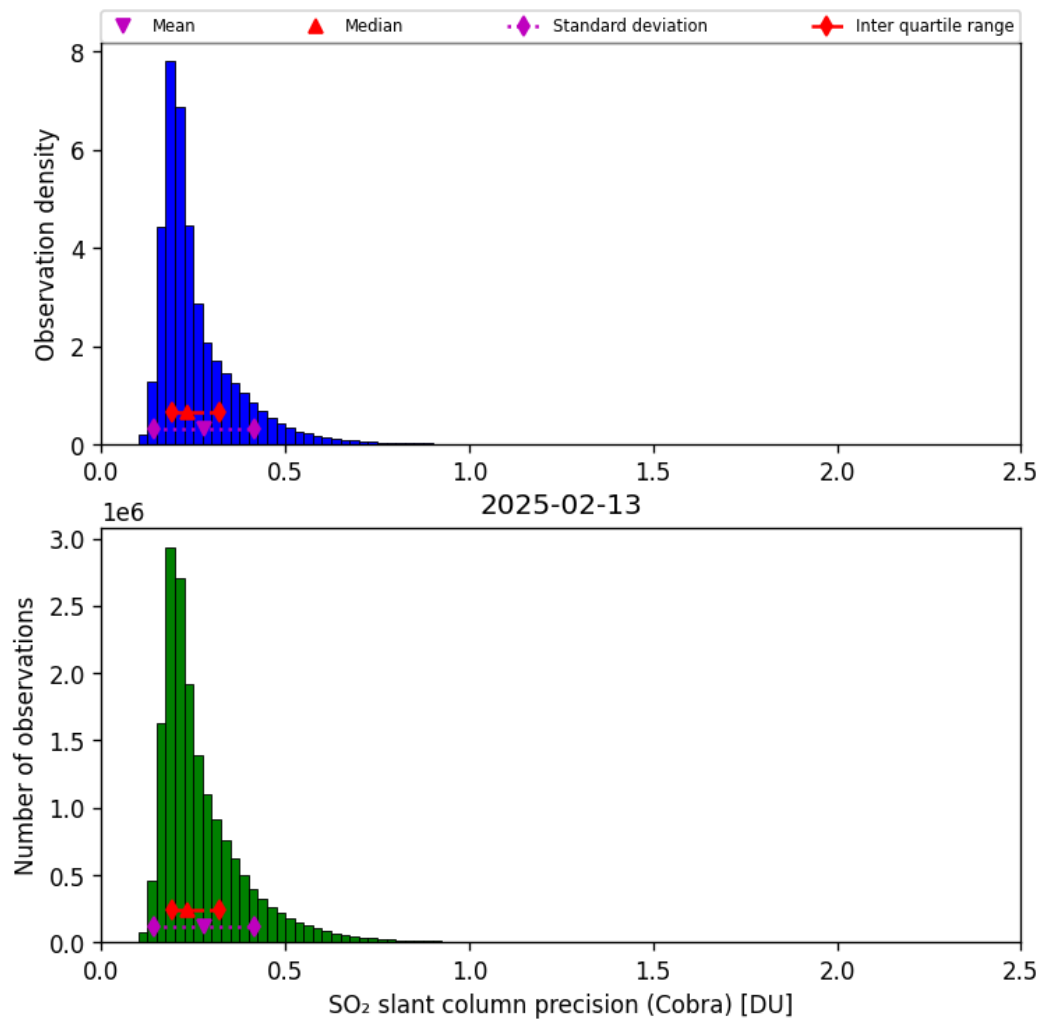


Figure 62: Histogram of “SO₂ slant column precision (Cobra)” for 2025-02-13 to 2025-02-14

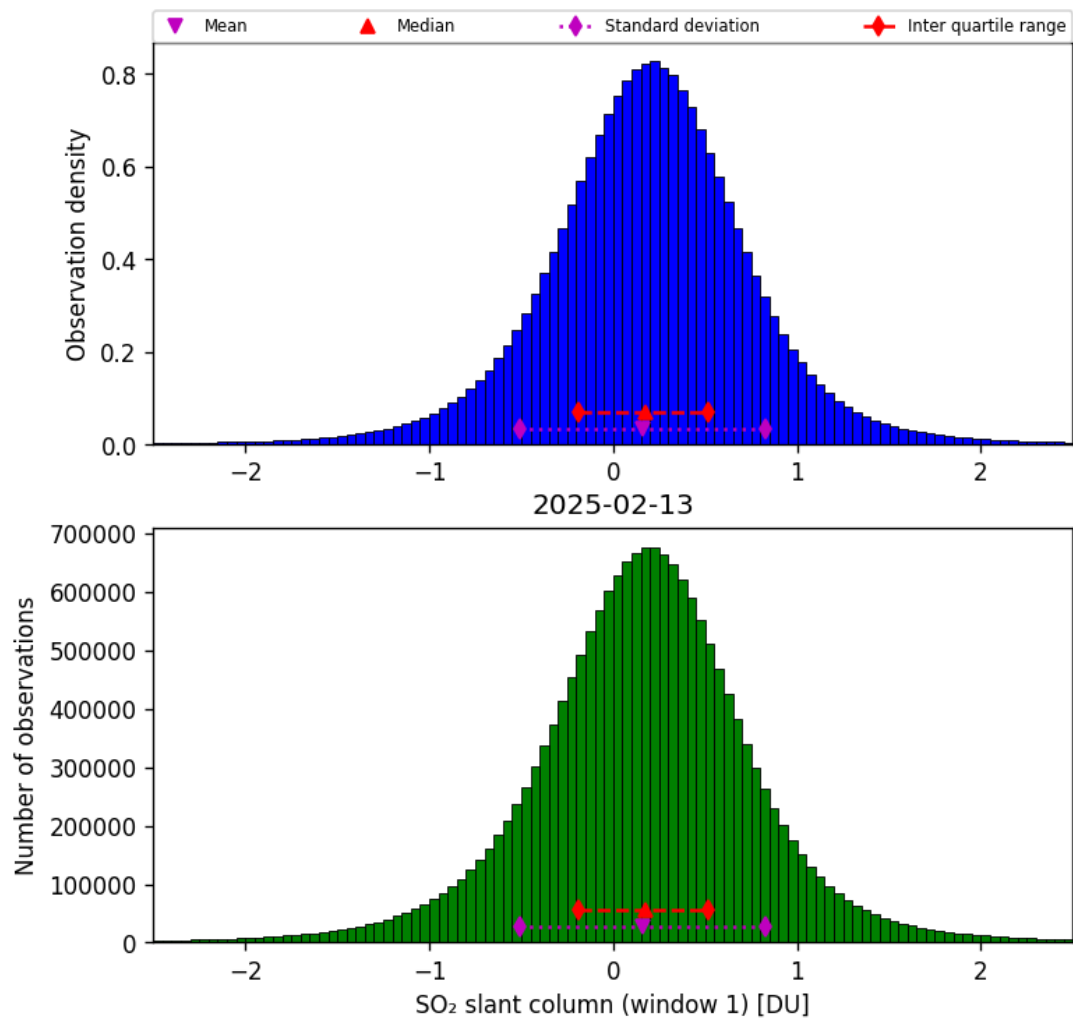


Figure 63: Histogram of “SO₂ slant column (window 1)” for 2025-02-13 to 2025-02-14

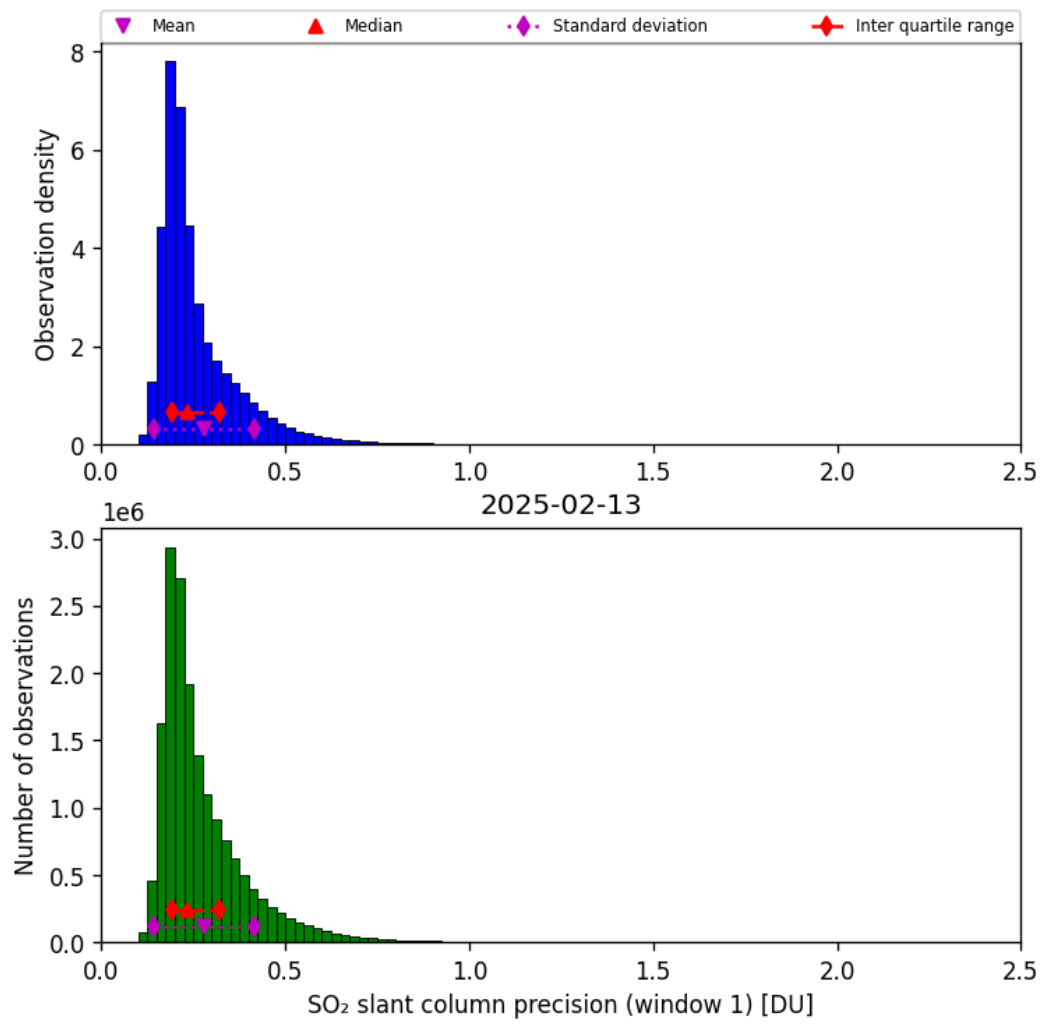


Figure 64: Histogram of “SO₂ slant column precision (window 1)” for 2025-02-13 to 2025-02-14

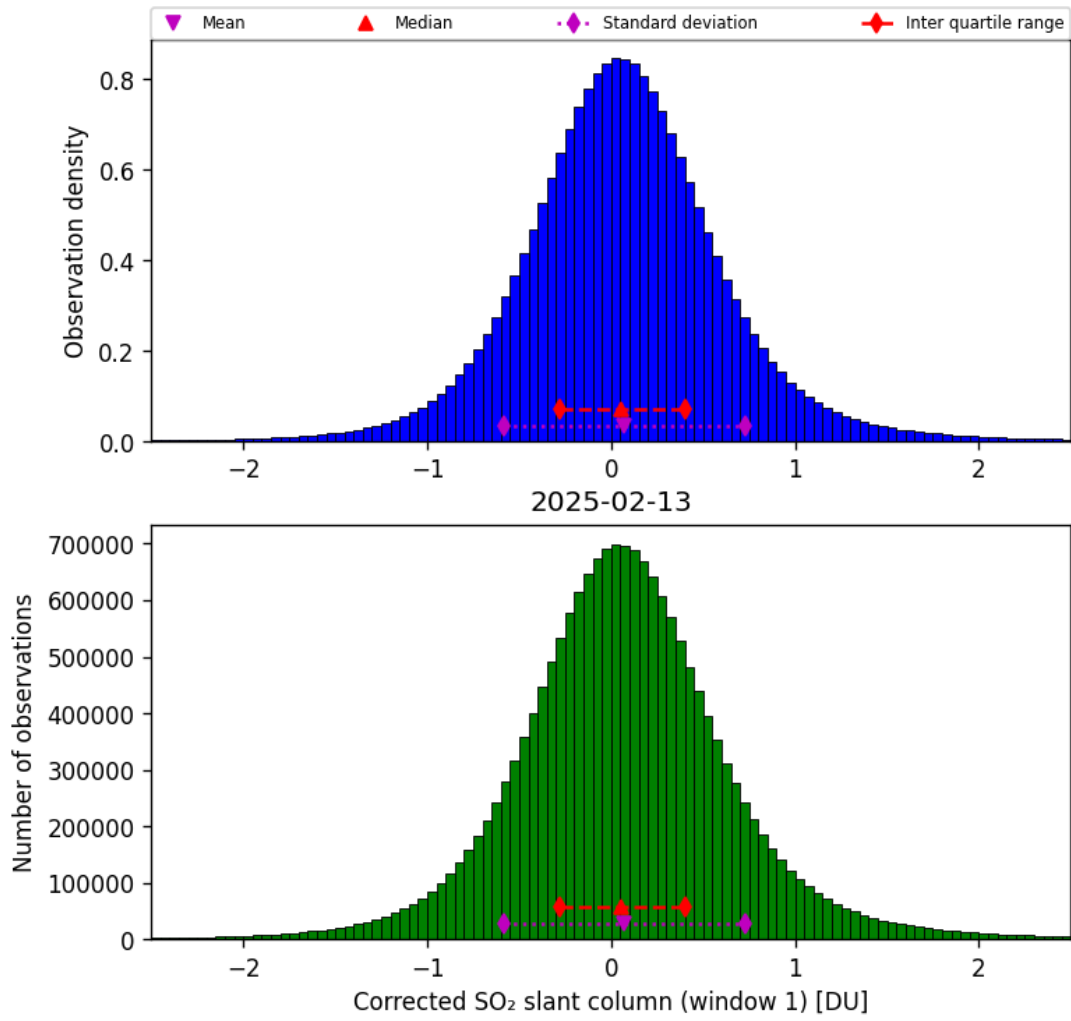


Figure 65: Histogram of “Corrected SO₂ slant column (window 1)” for 2025-02-13 to 2025-02-14

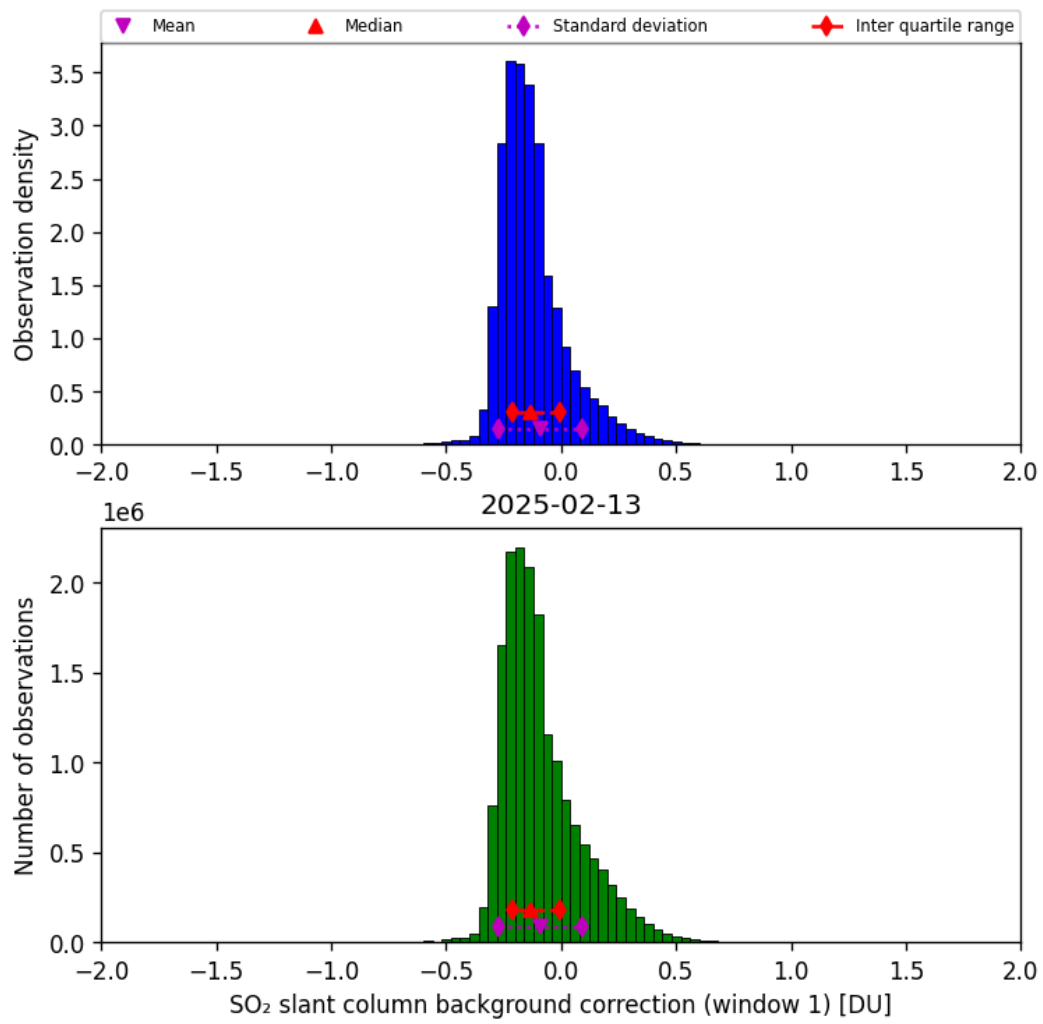


Figure 66: Histogram of “SO₂ slant column background correction (window 1)” for 2025-02-13 to 2025-02-14

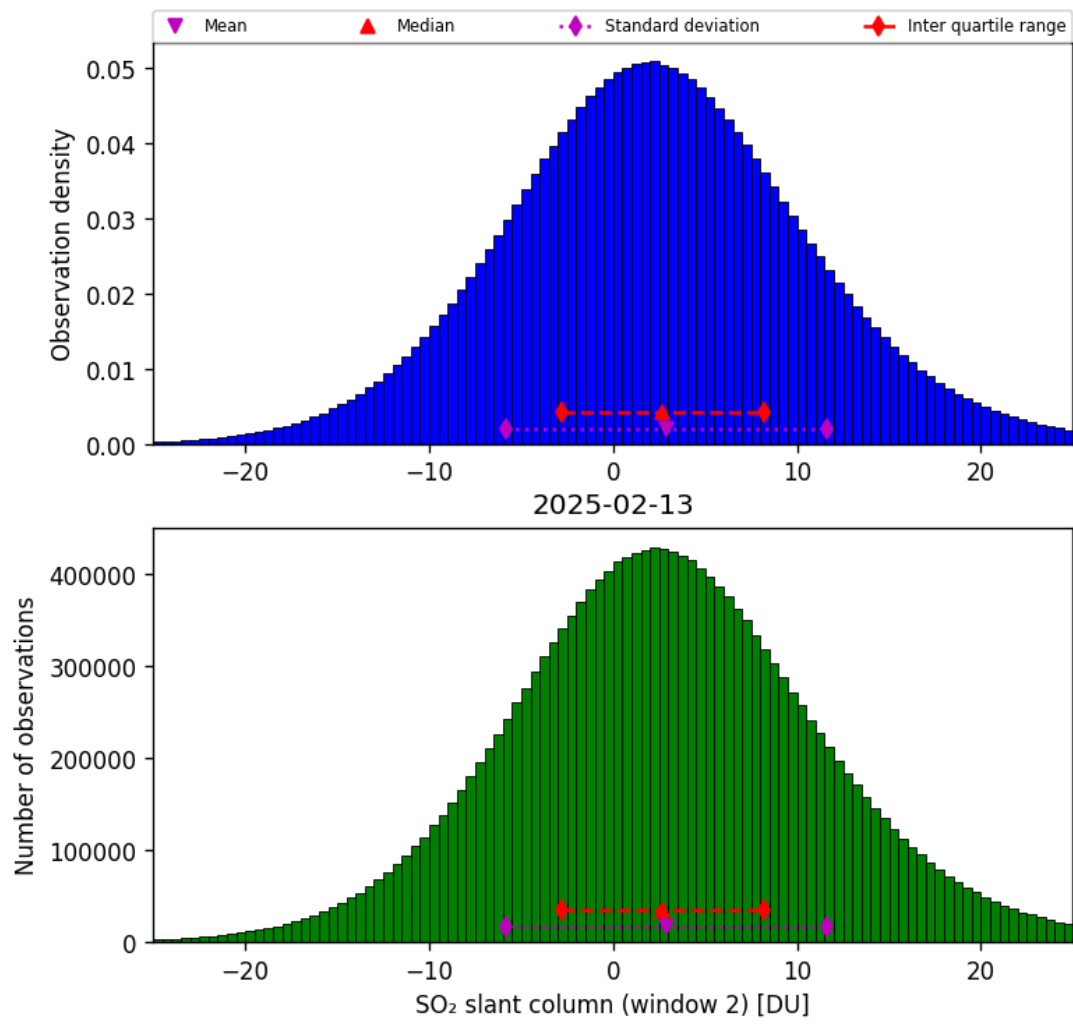


Figure 67: Histogram of “SO₂ slant column (window 2)” for 2025-02-13 to 2025-02-14

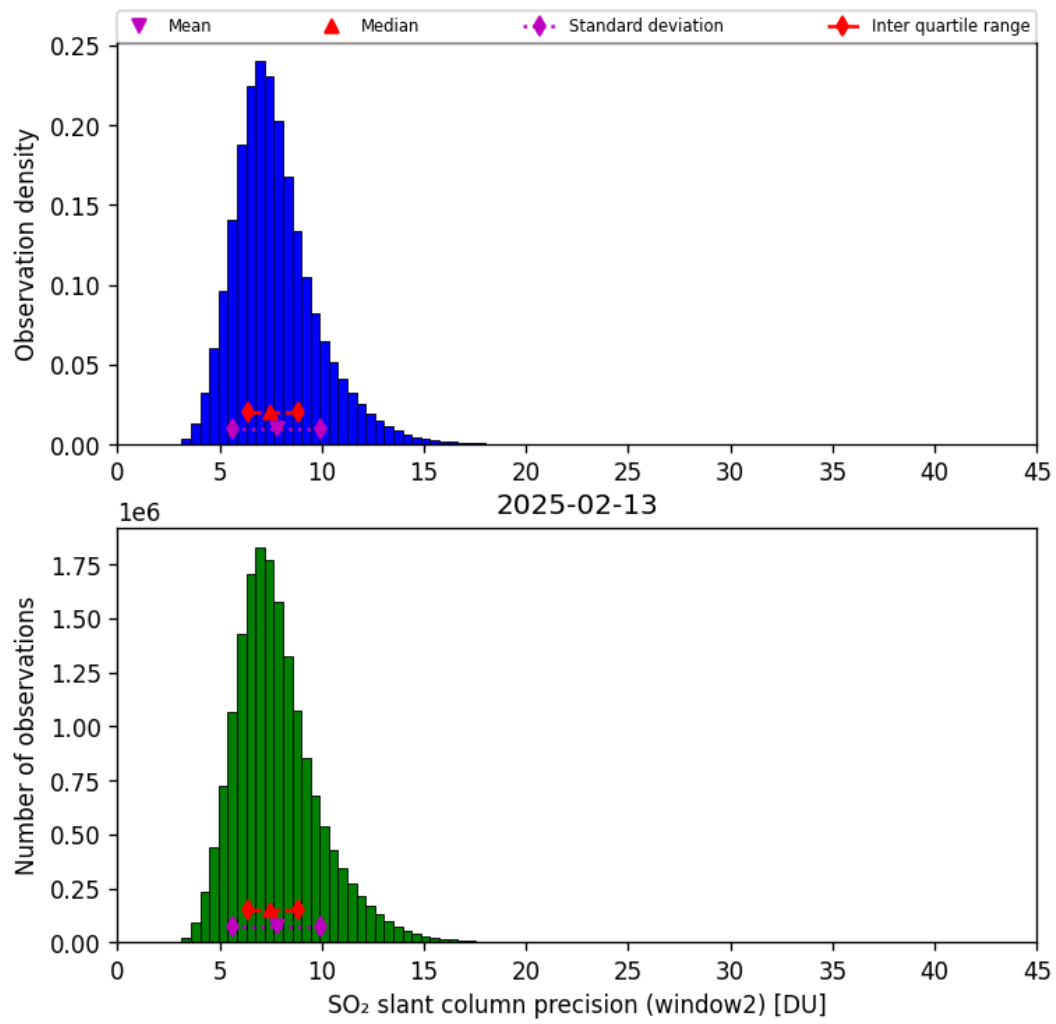


Figure 68: Histogram of “SO₂ slant column precision (window2)” for 2025-02-13 to 2025-02-14

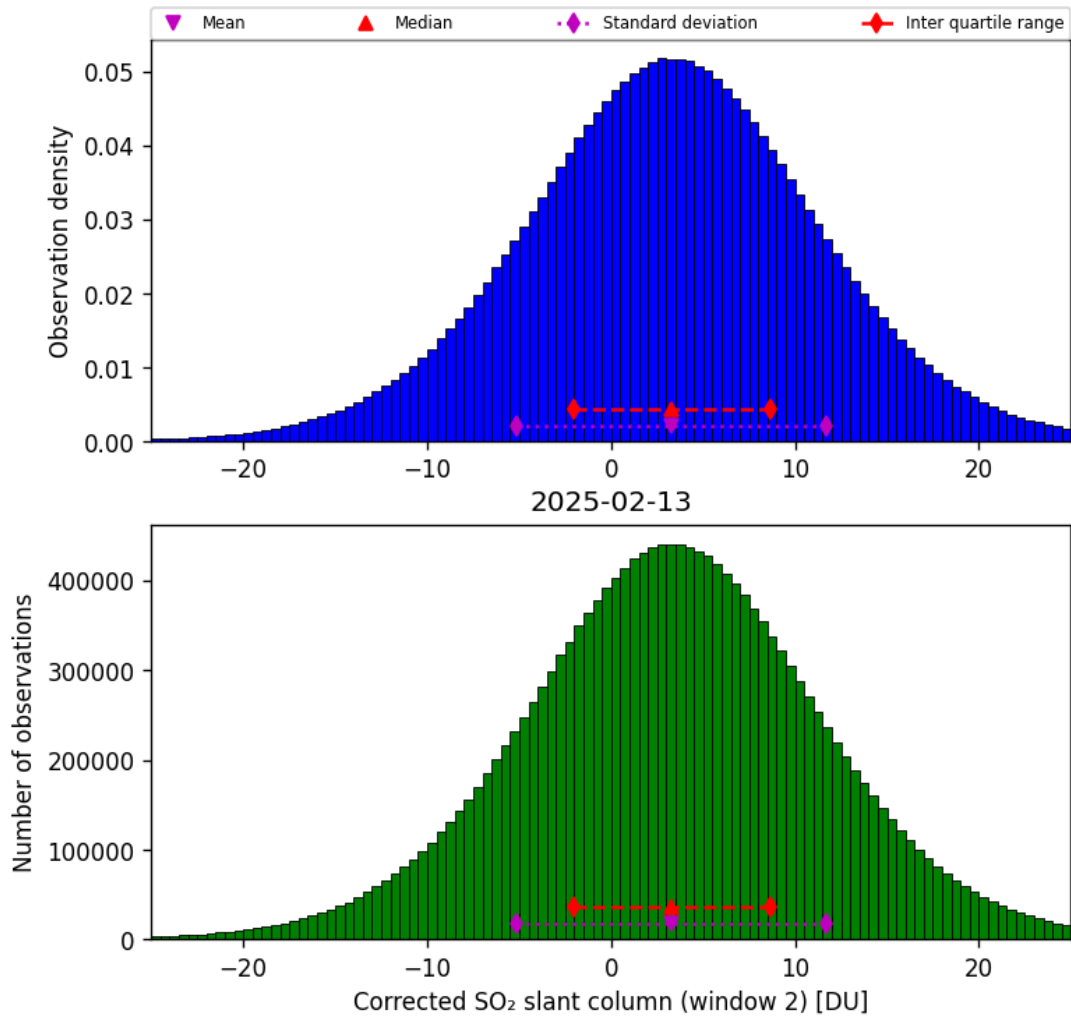


Figure 69: Histogram of “Corrected SO₂ slant column (window 2)” for 2025-02-13 to 2025-02-14

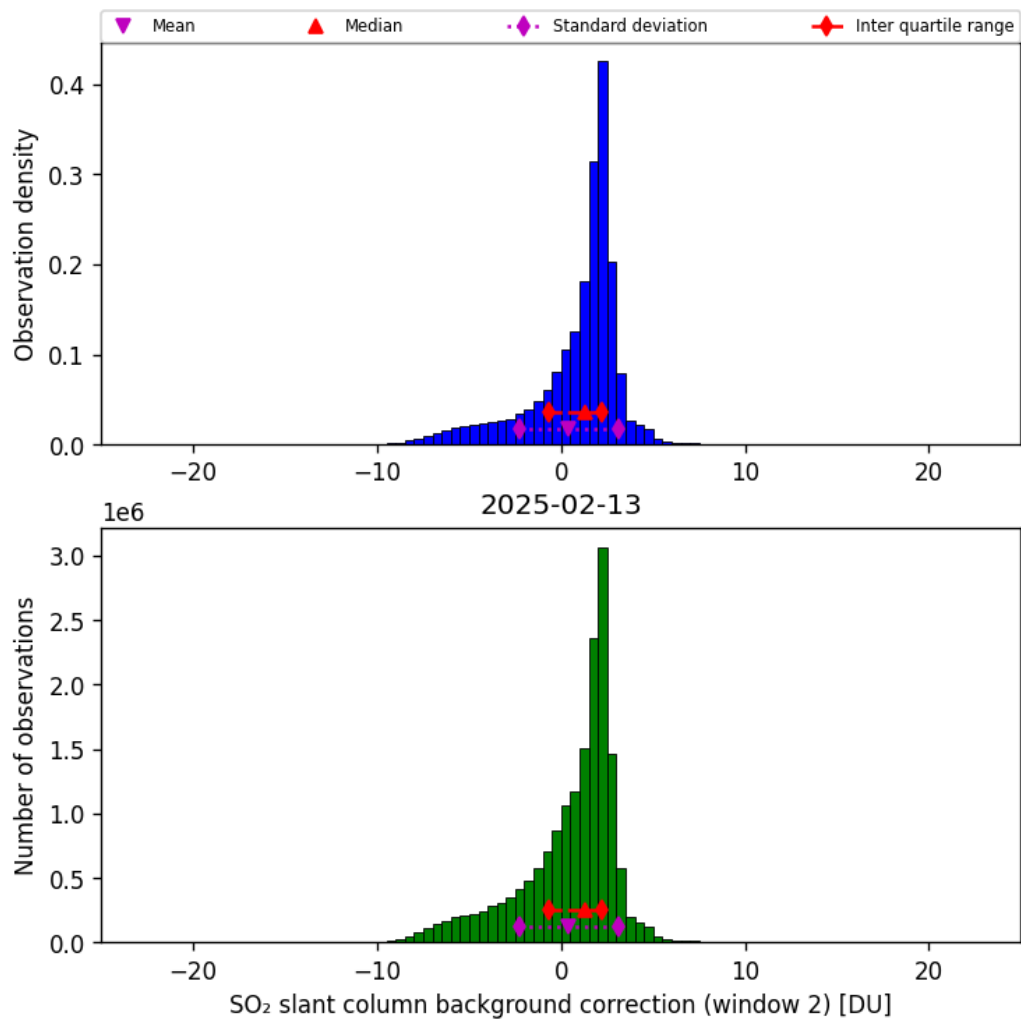


Figure 70: Histogram of “SO₂ slant column background correction (window 2)” for 2025-02-13 to 2025-02-14

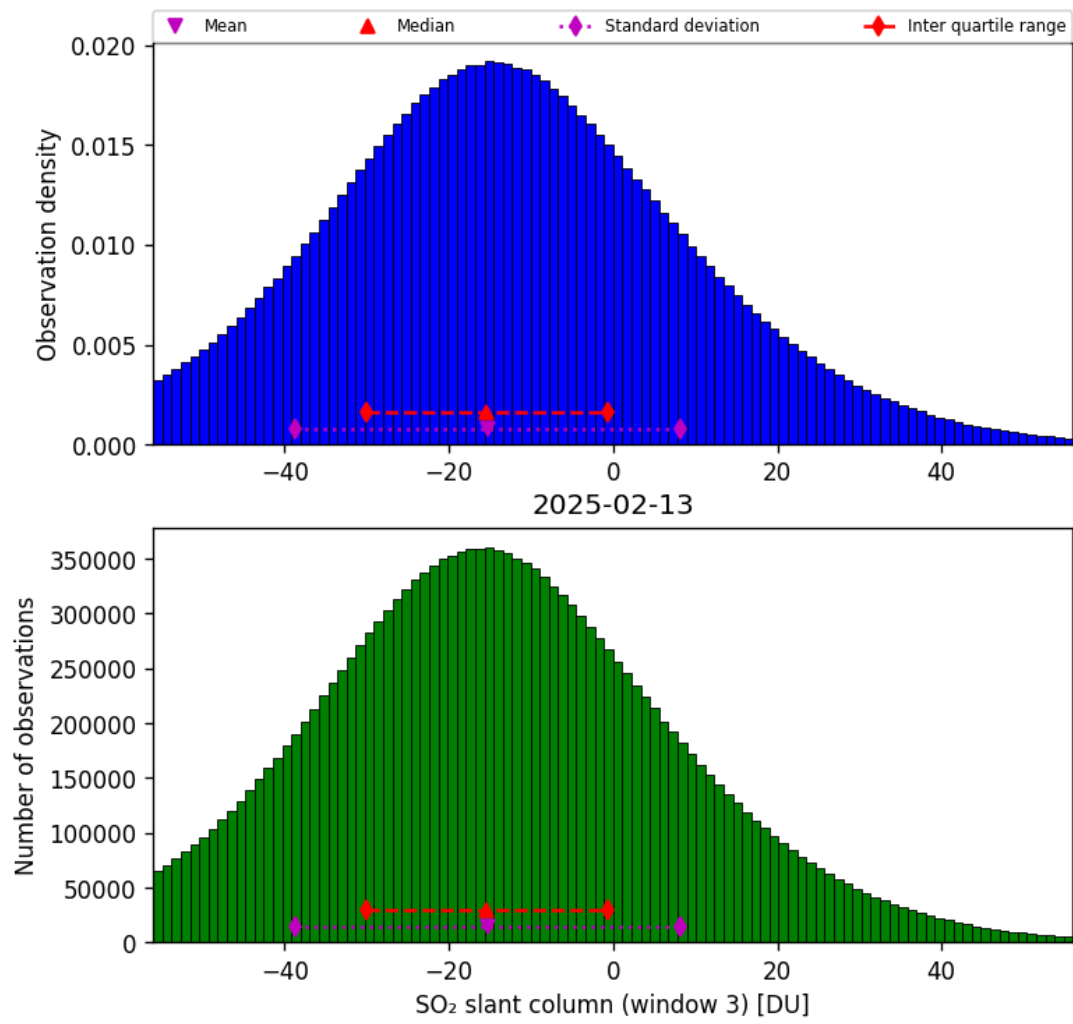


Figure 71: Histogram of “SO₂ slant column (window 3)” for 2025-02-13 to 2025-02-14

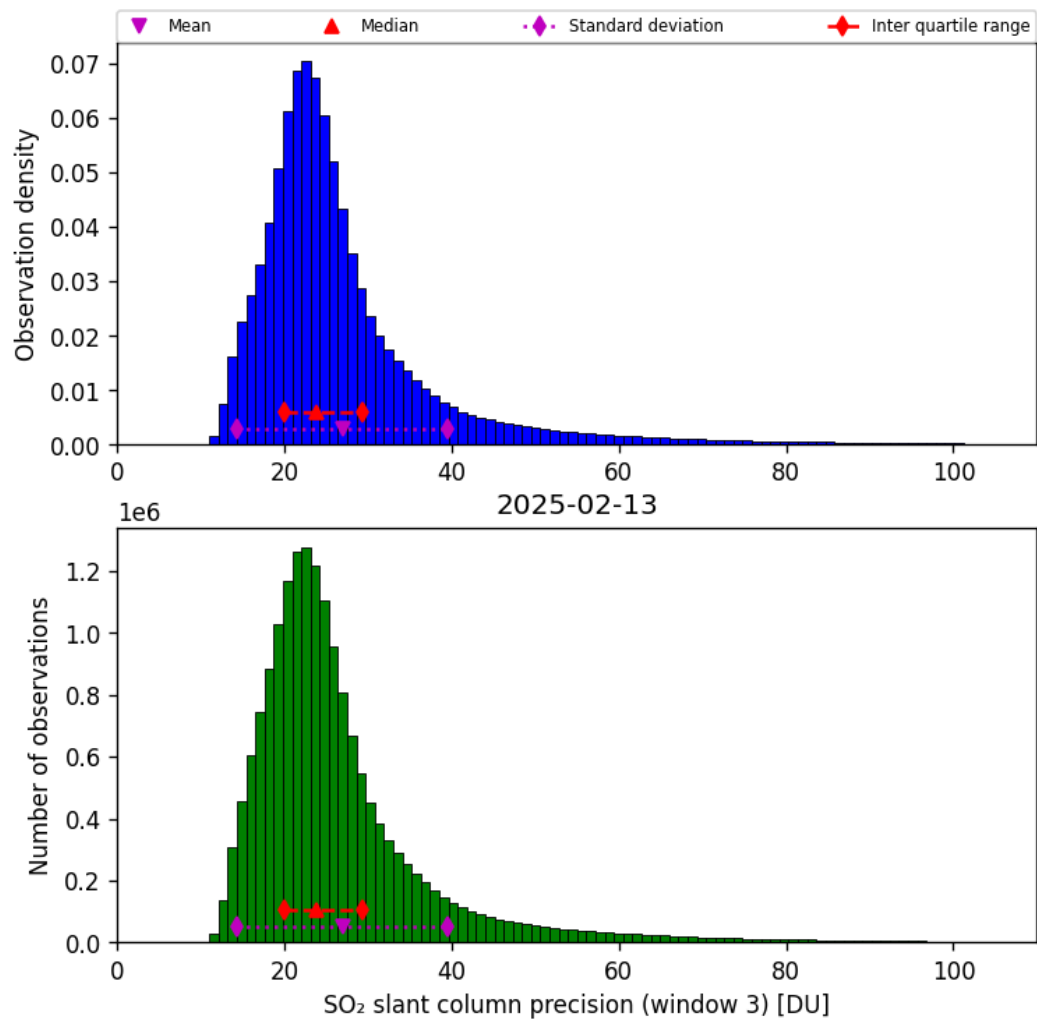


Figure 72: Histogram of “SO₂ slant column precision (window 3)” for 2025-02-13 to 2025-02-14

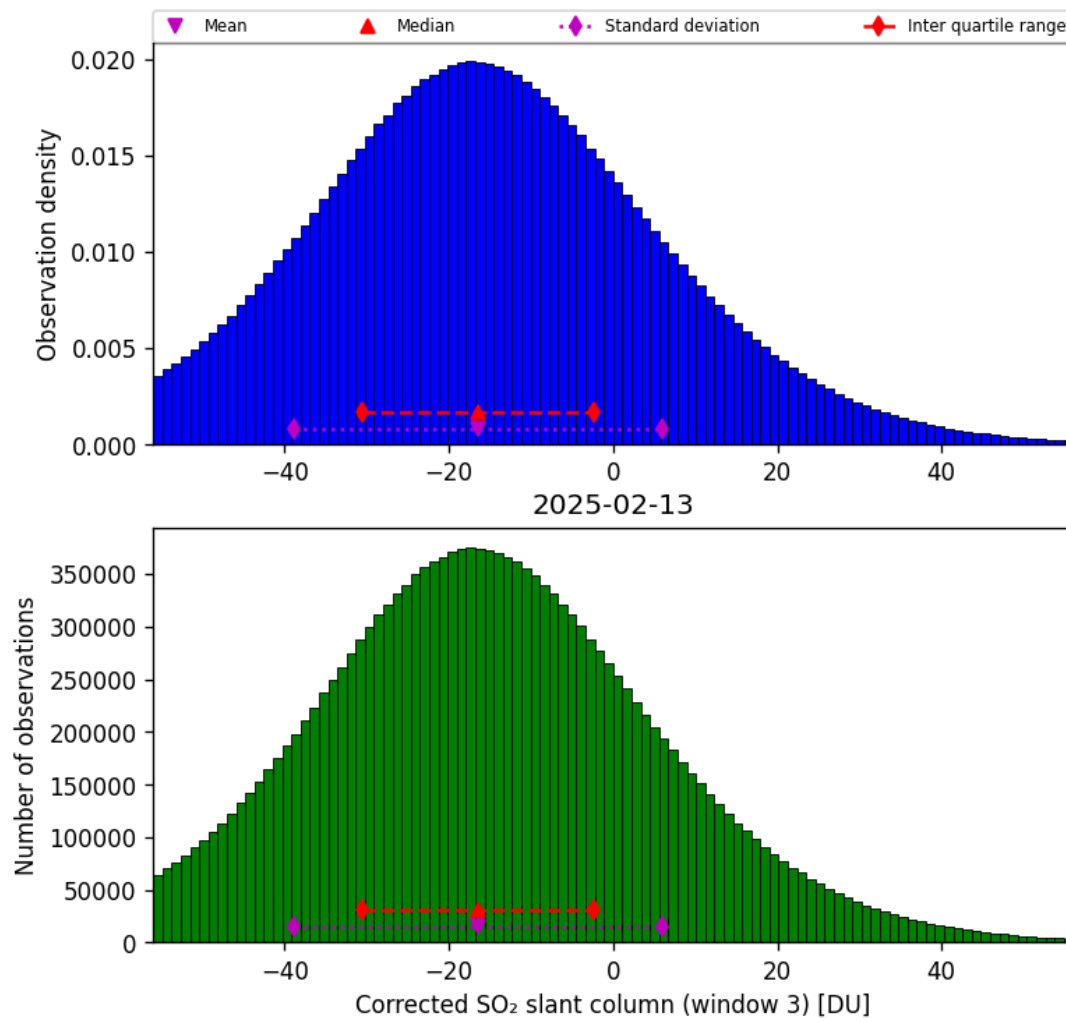


Figure 73: Histogram of “Corrected SO₂ slant column (window 3)” for 2025-02-13 to 2025-02-14

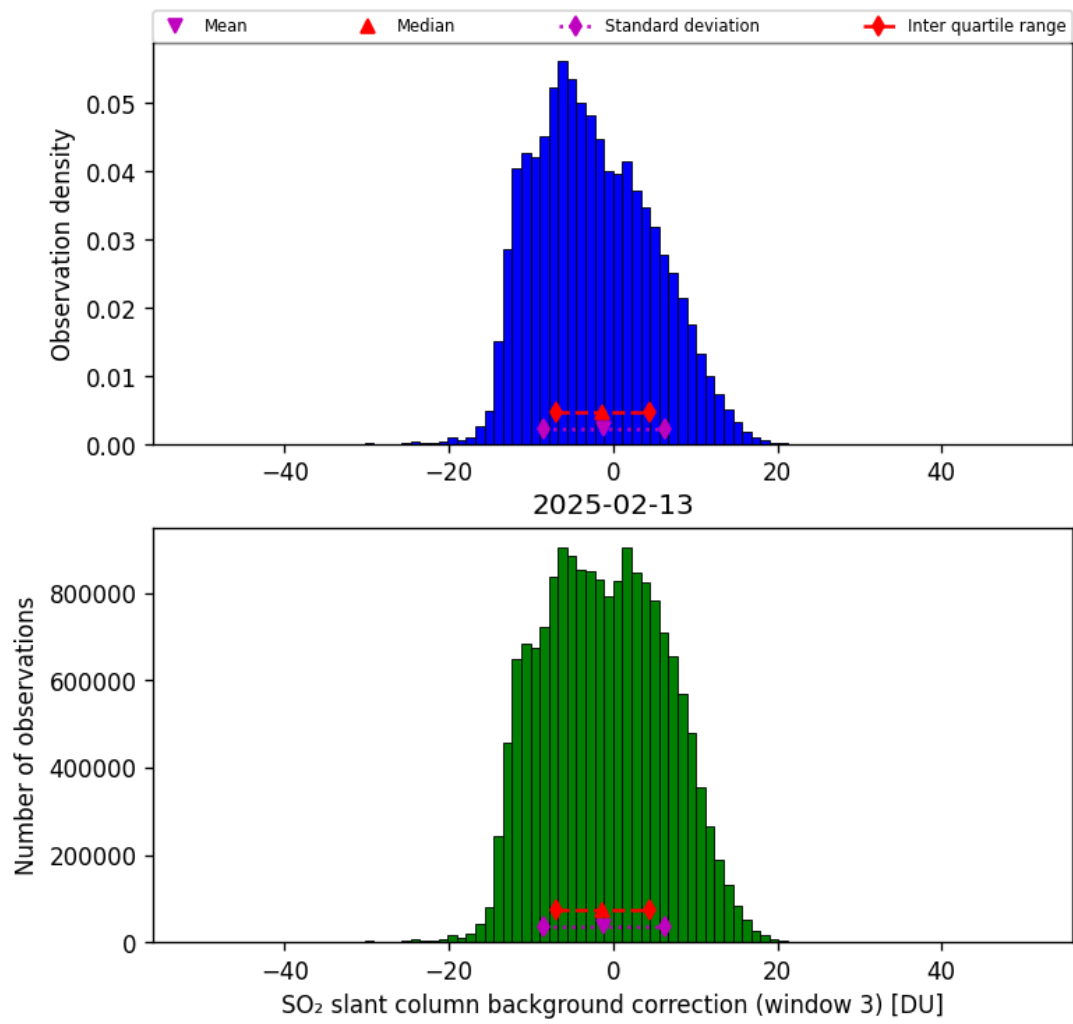


Figure 74: Histogram of “SO₂ slant column background correction (window 3)” for 2025-02-13 to 2025-02-14

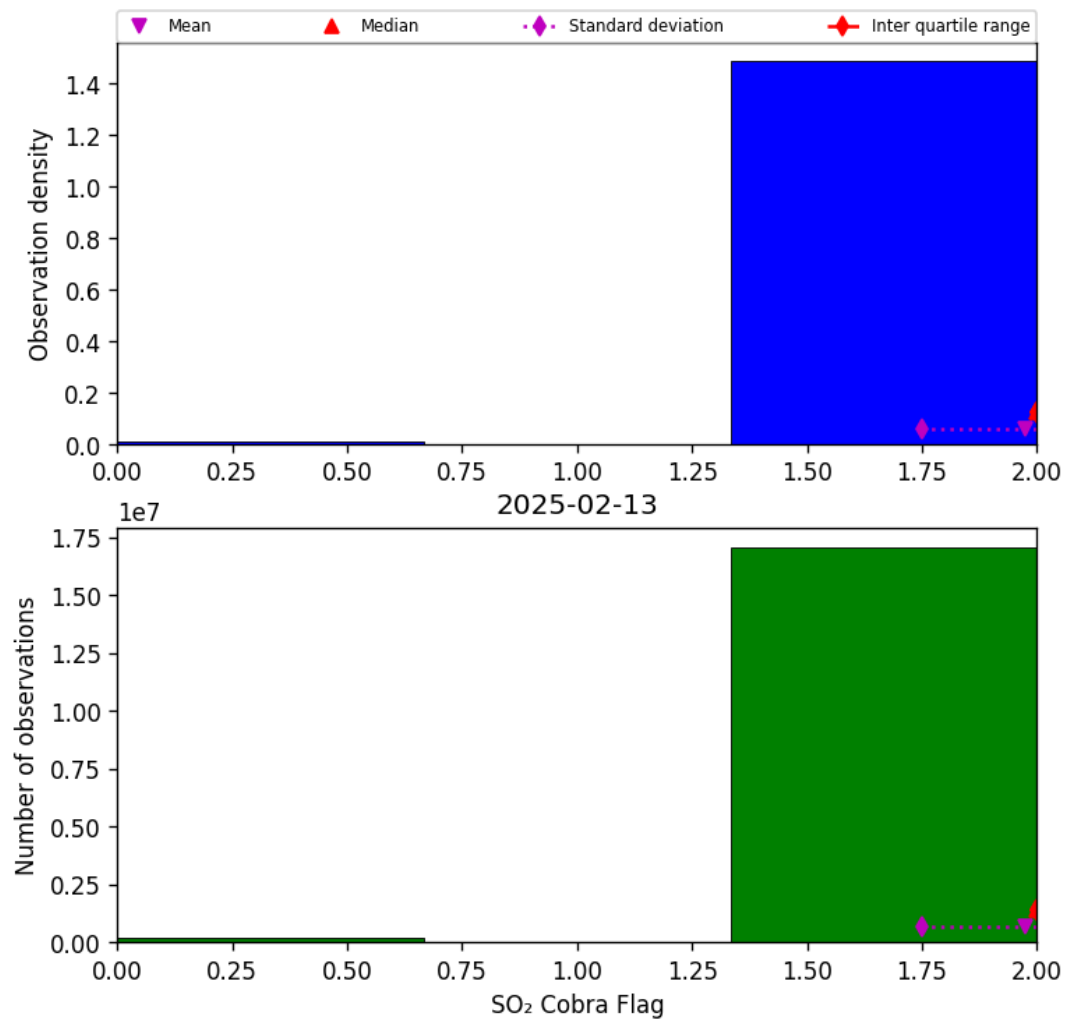


Figure 75: Histogram of “SO₂ Cobra Flag” for 2025-02-13 to 2025-02-14

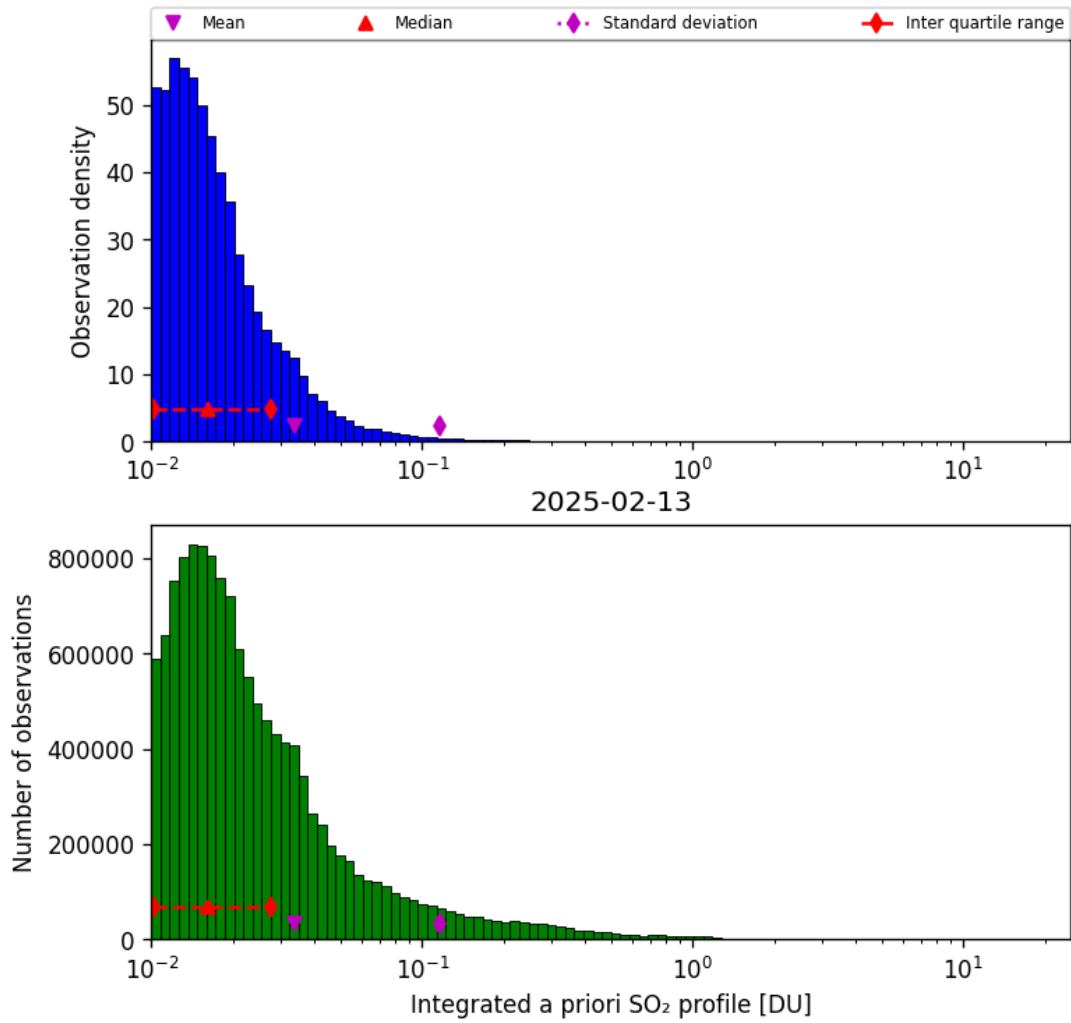


Figure 76: Histogram of “Integrated a priori SO₂ profile” for 2025-02-13 to 2025-02-14

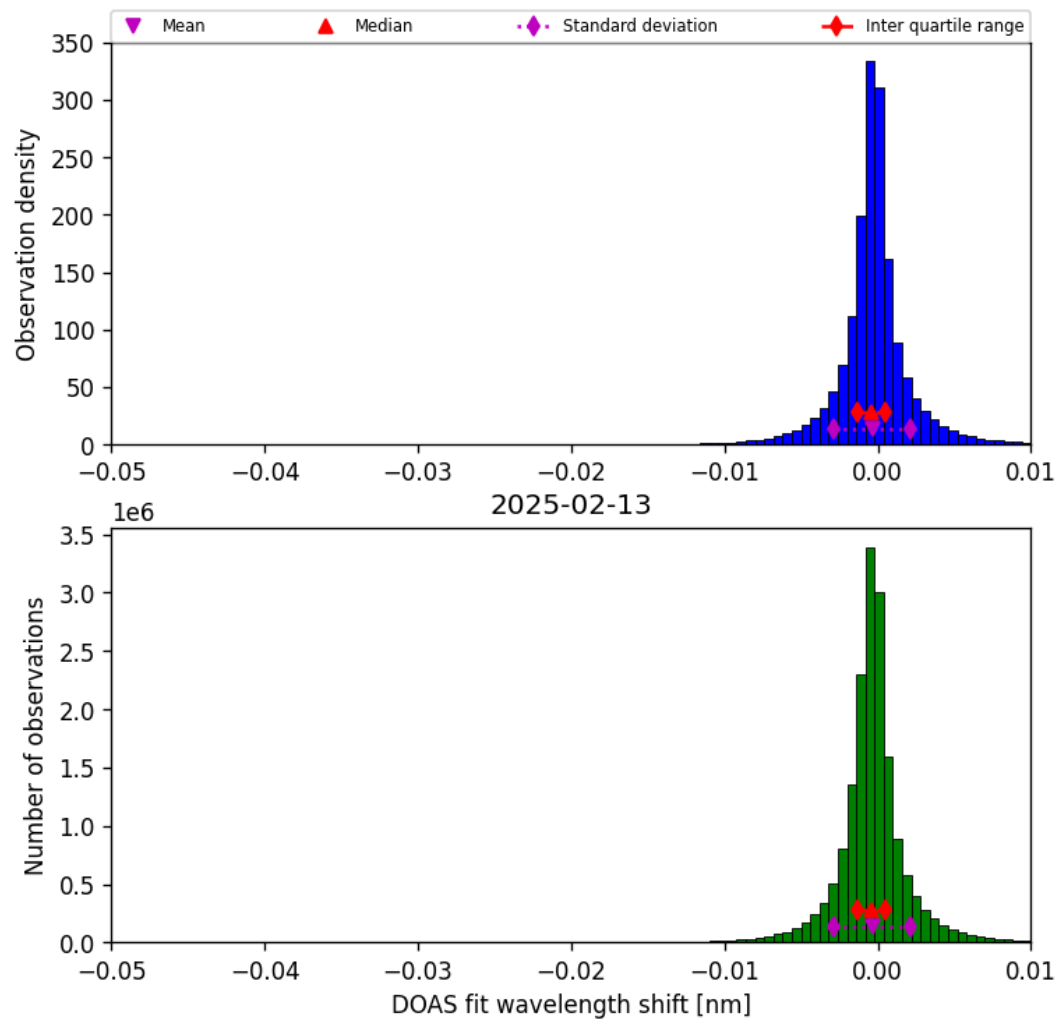


Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-02-13 to 2025-02-14

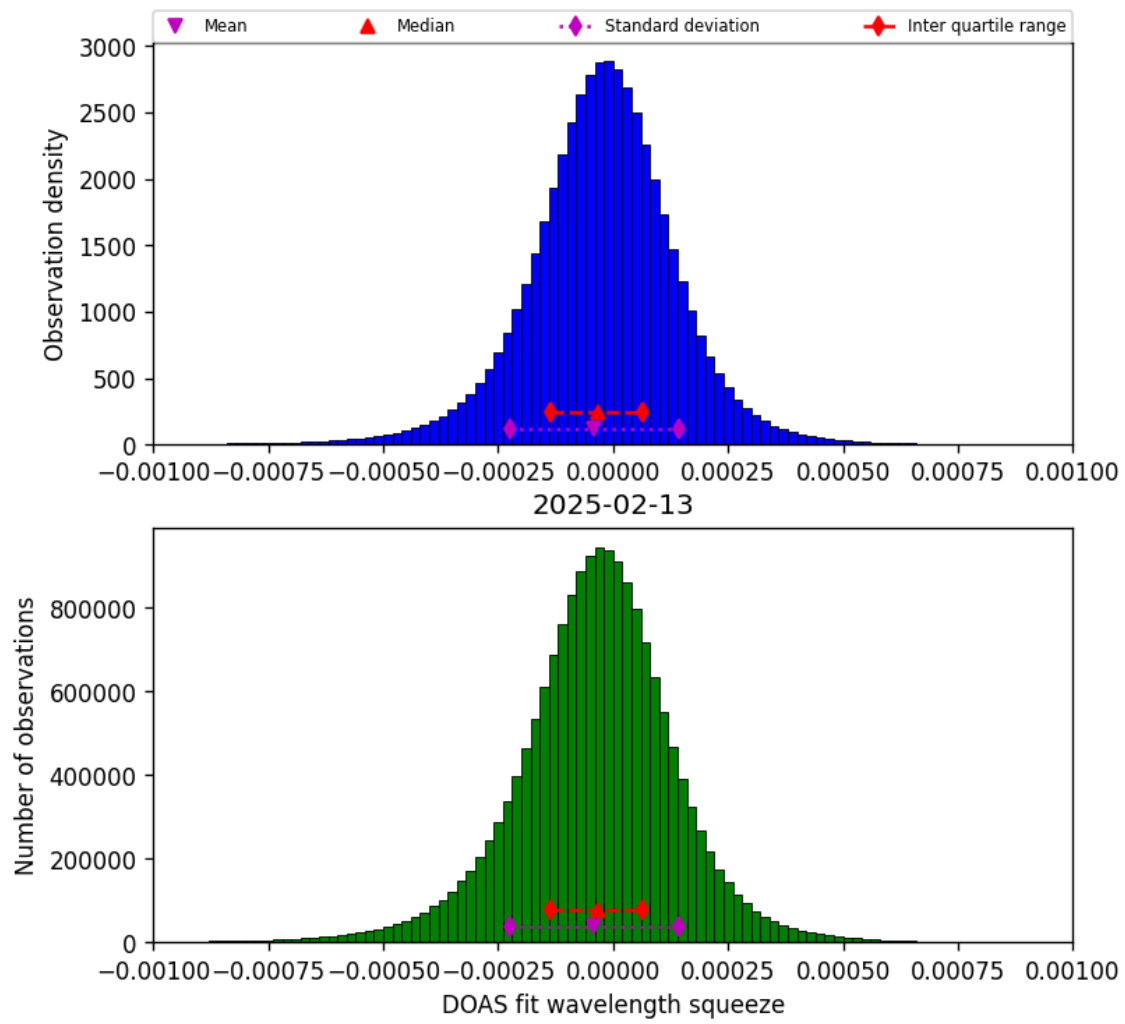


Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-02-13 to 2025-02-14

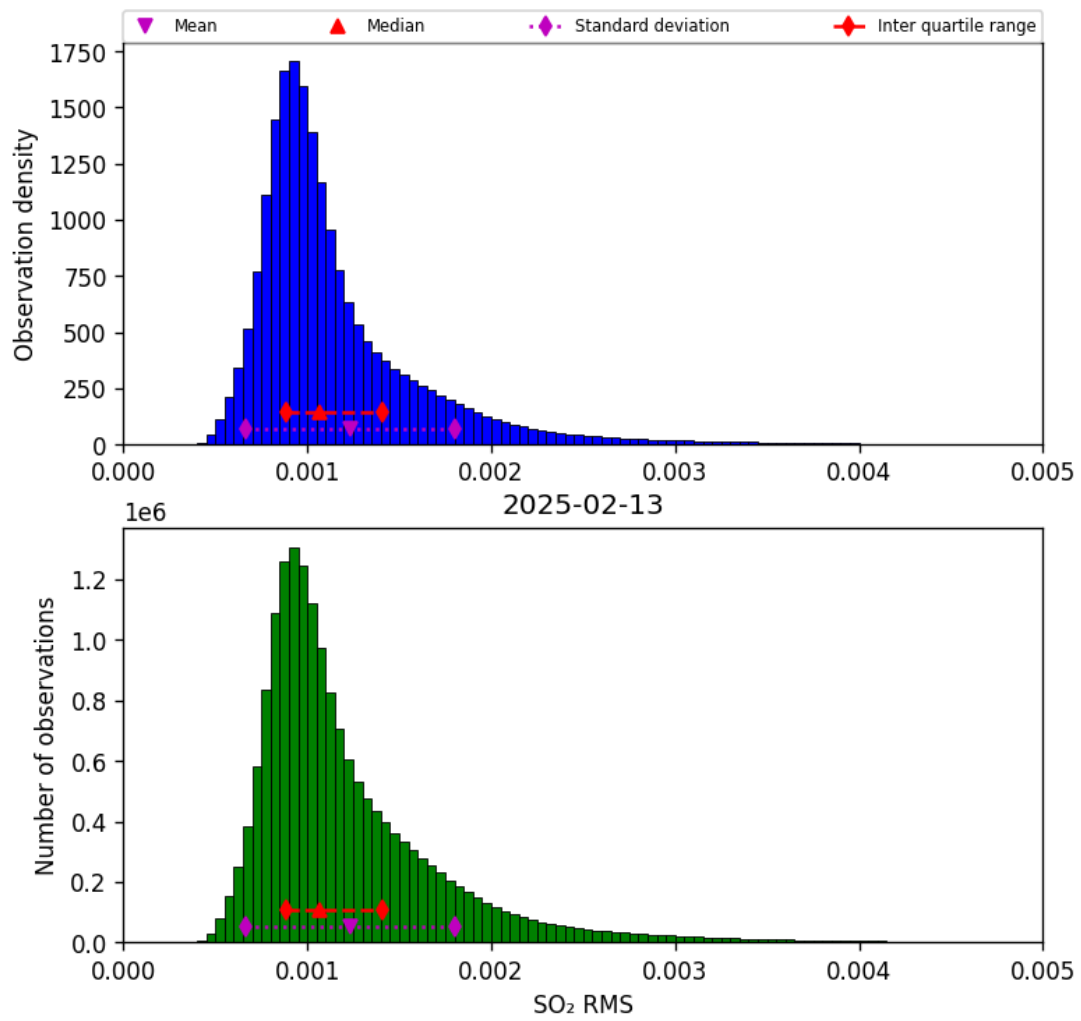


Figure 79: Histogram of “SO₂ RMS” for 2025-02-13 to 2025-02-14

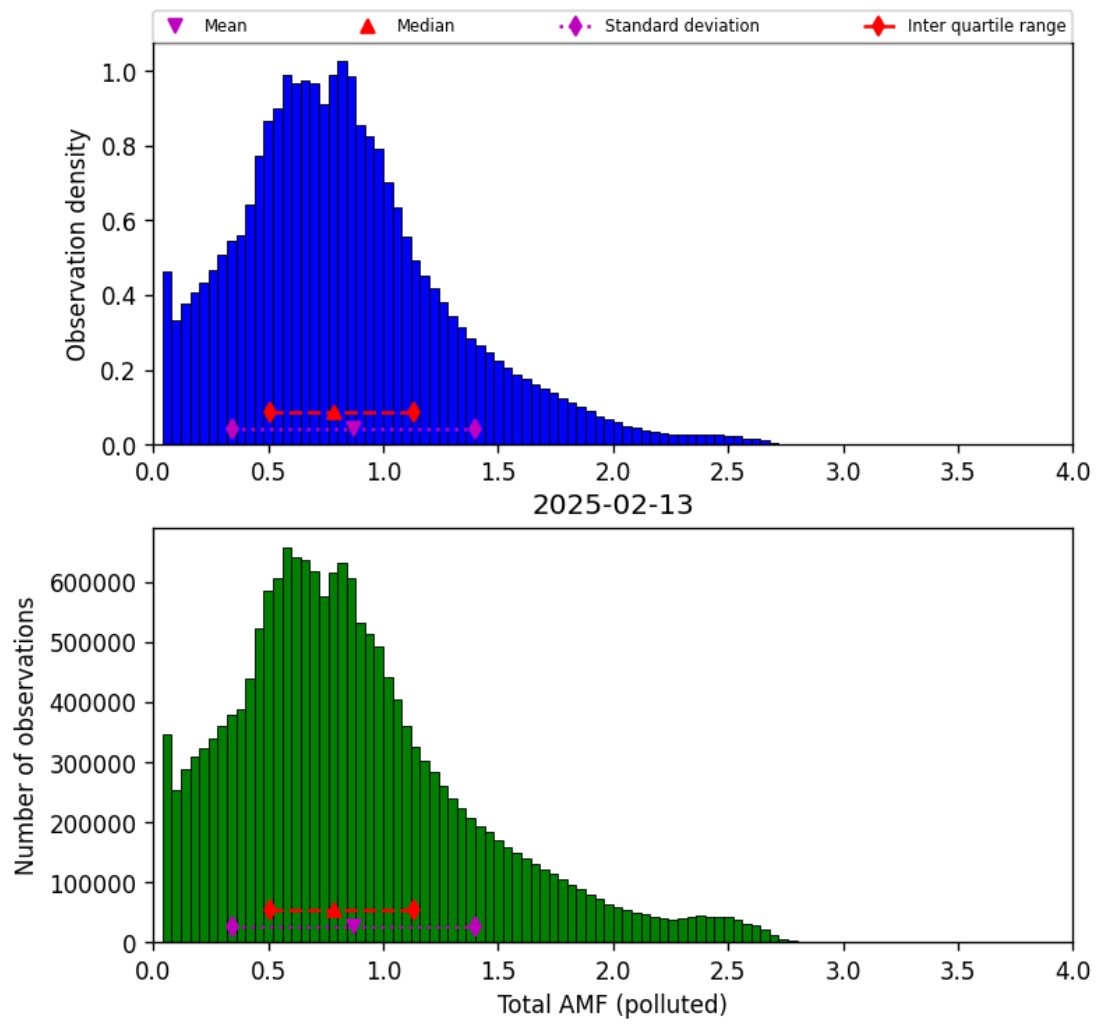


Figure 80: Histogram of “Total AMF (polluted)” for 2025-02-13 to 2025-02-14

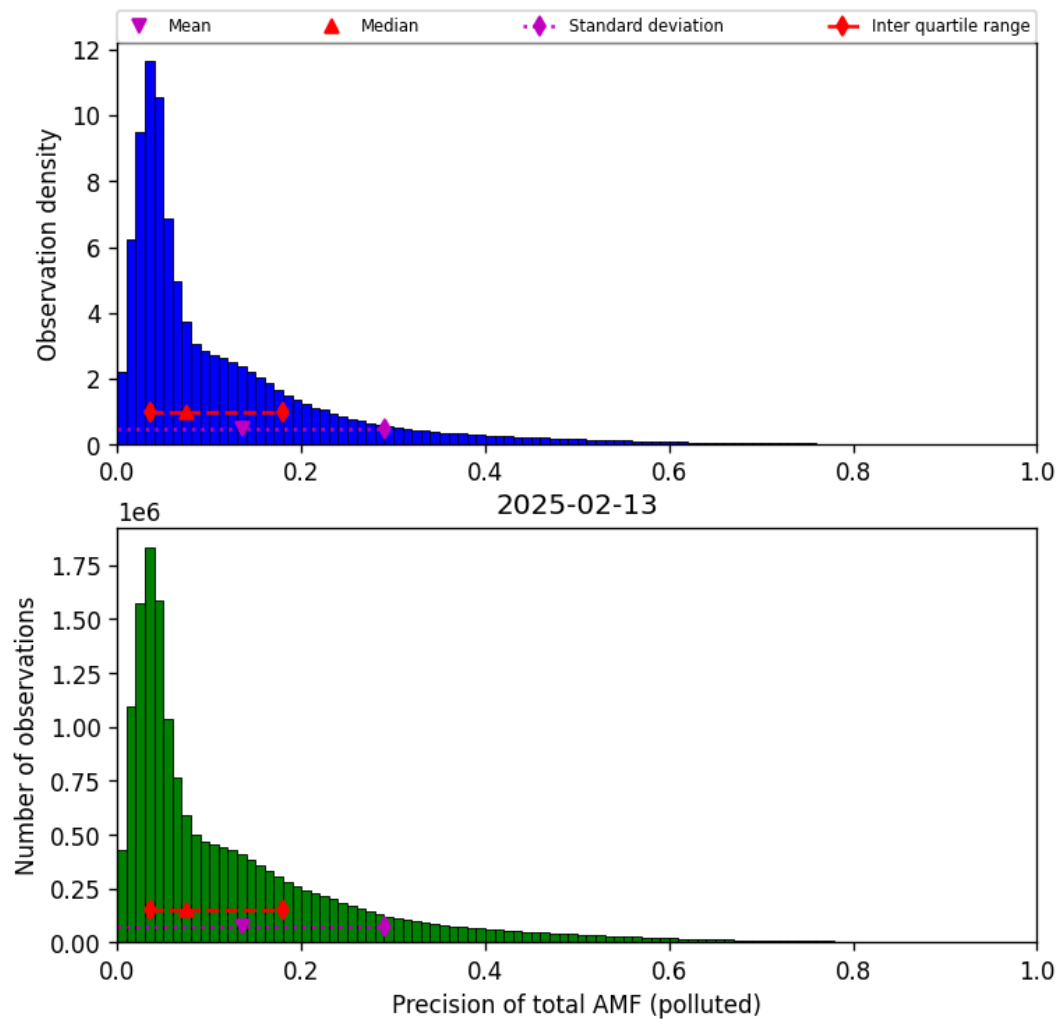


Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-02-13 to 2025-02-14

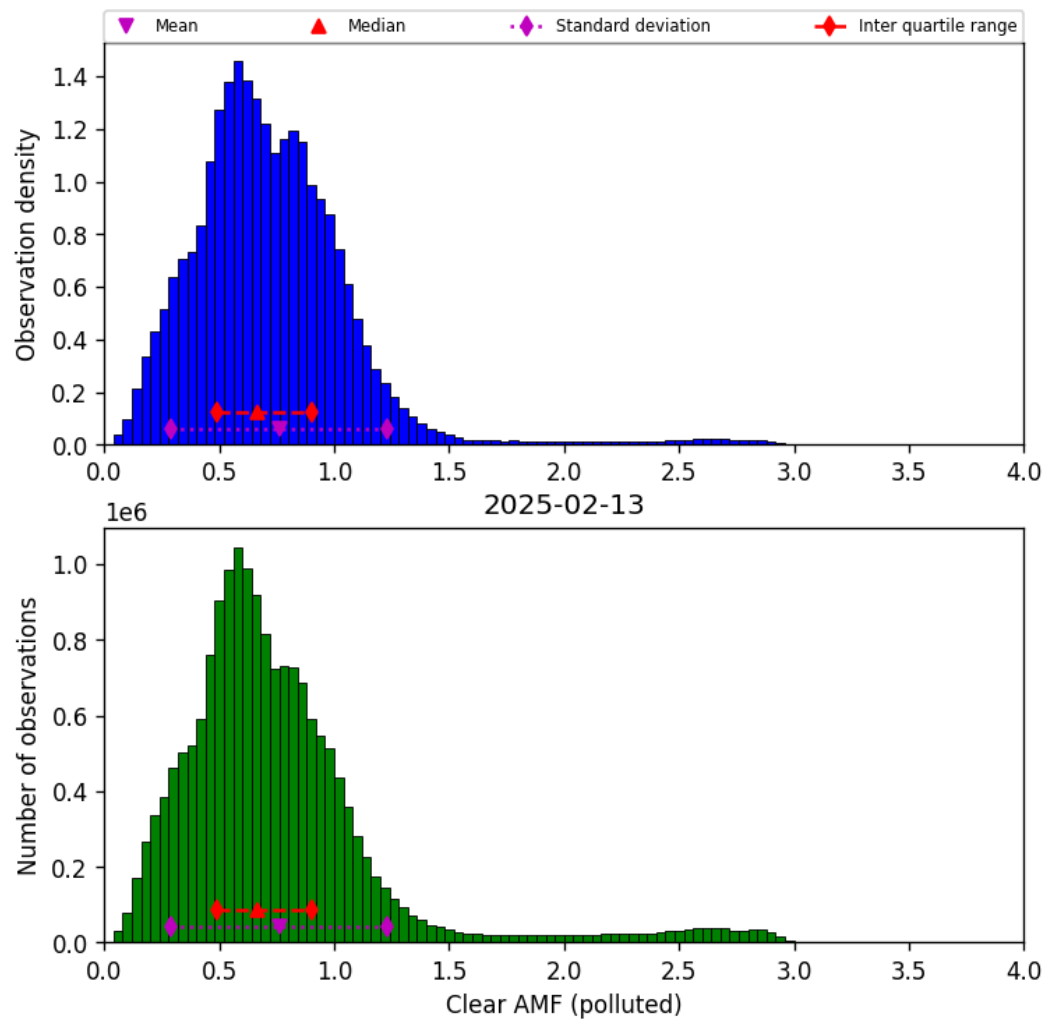


Figure 82: Histogram of “Clear AMF (polluted)” for 2025-02-13 to 2025-02-14

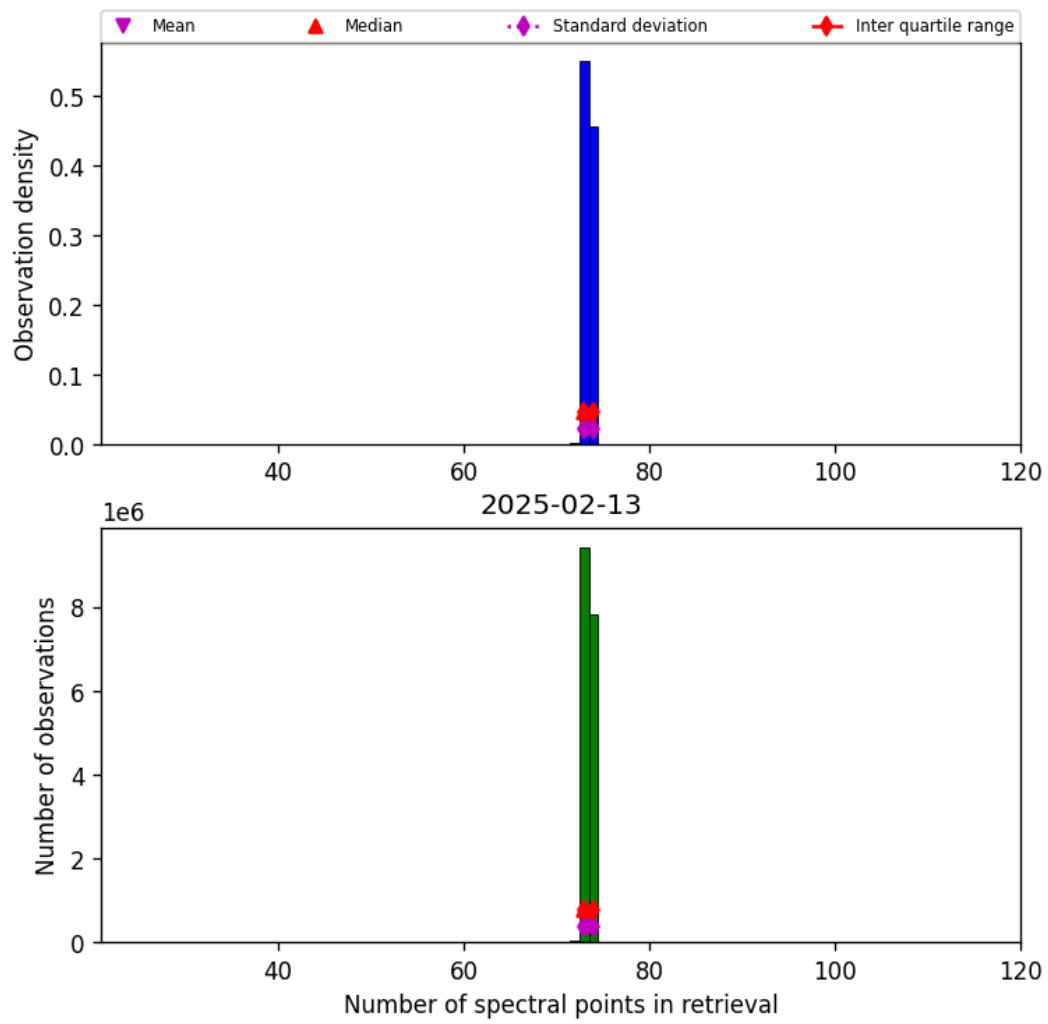


Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-02-13 to 2025-02-14

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.

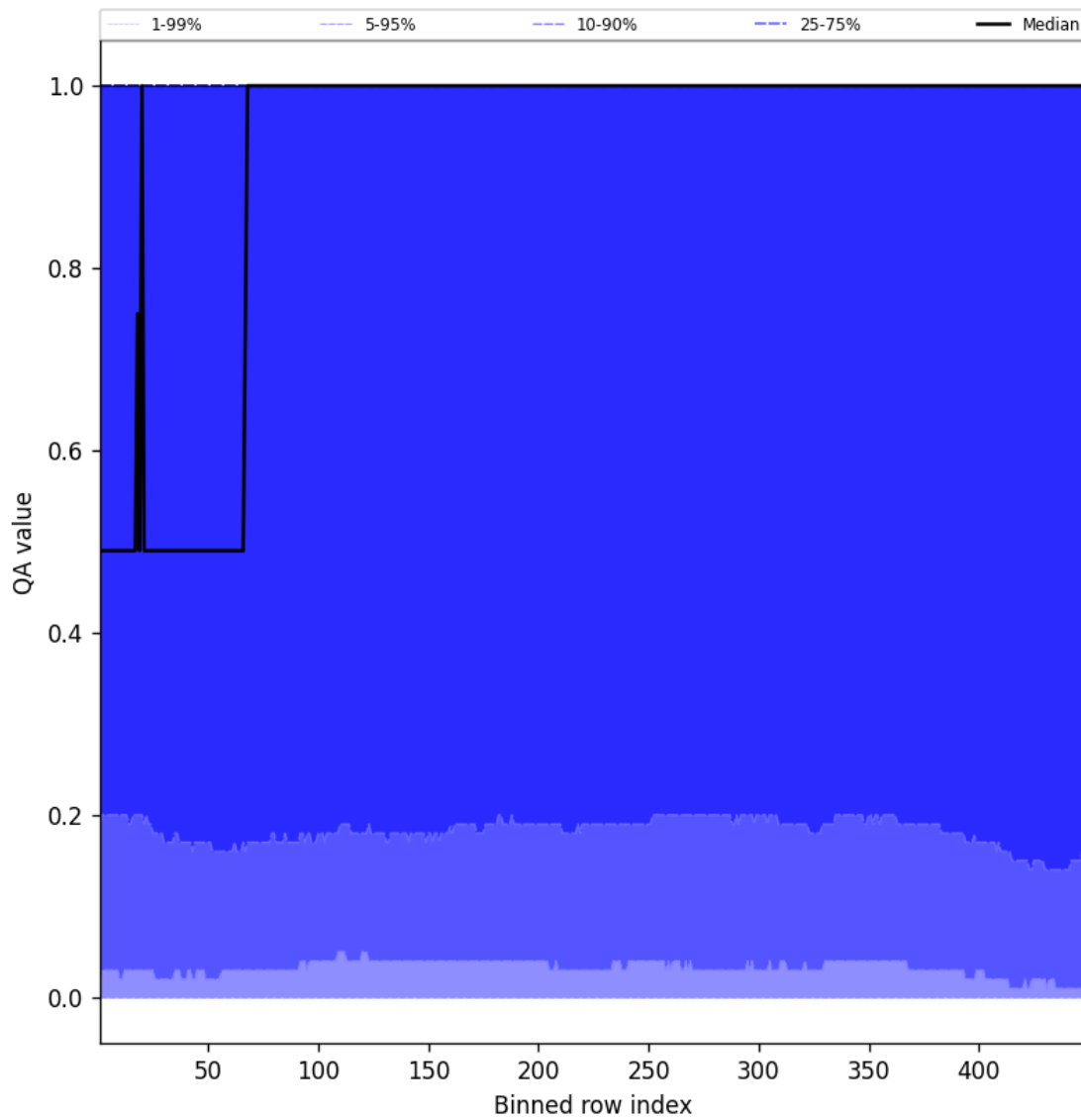


Figure 84: Along track statistics of “QA value” for 2025-02-13 to 2025-02-14

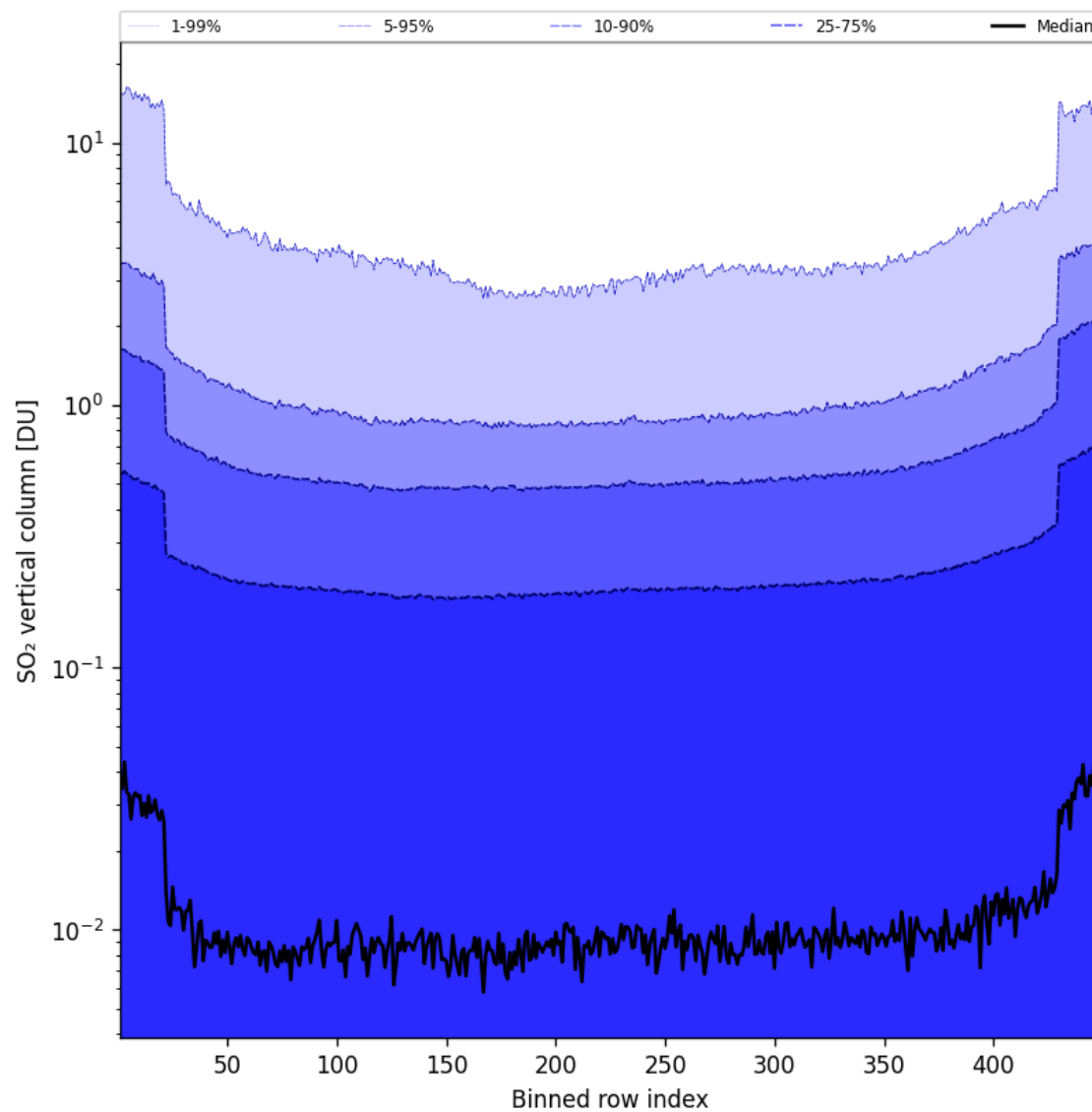


Figure 85: Along track statistics of “SO₂ vertical column” for 2025-02-13 to 2025-02-14

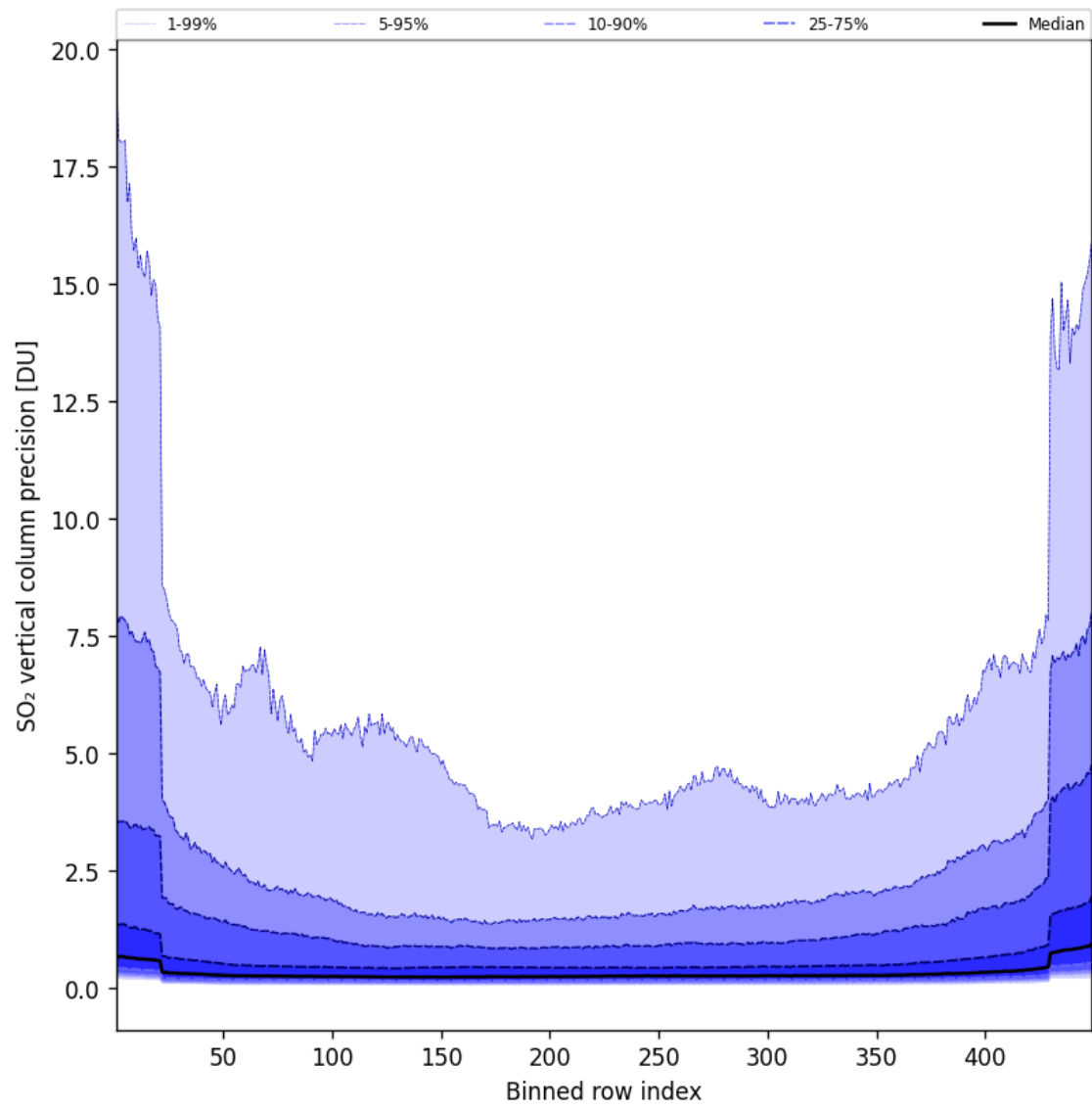


Figure 86: Along track statistics of “SO₂ vertical column precision” for 2025-02-13 to 2025-02-14

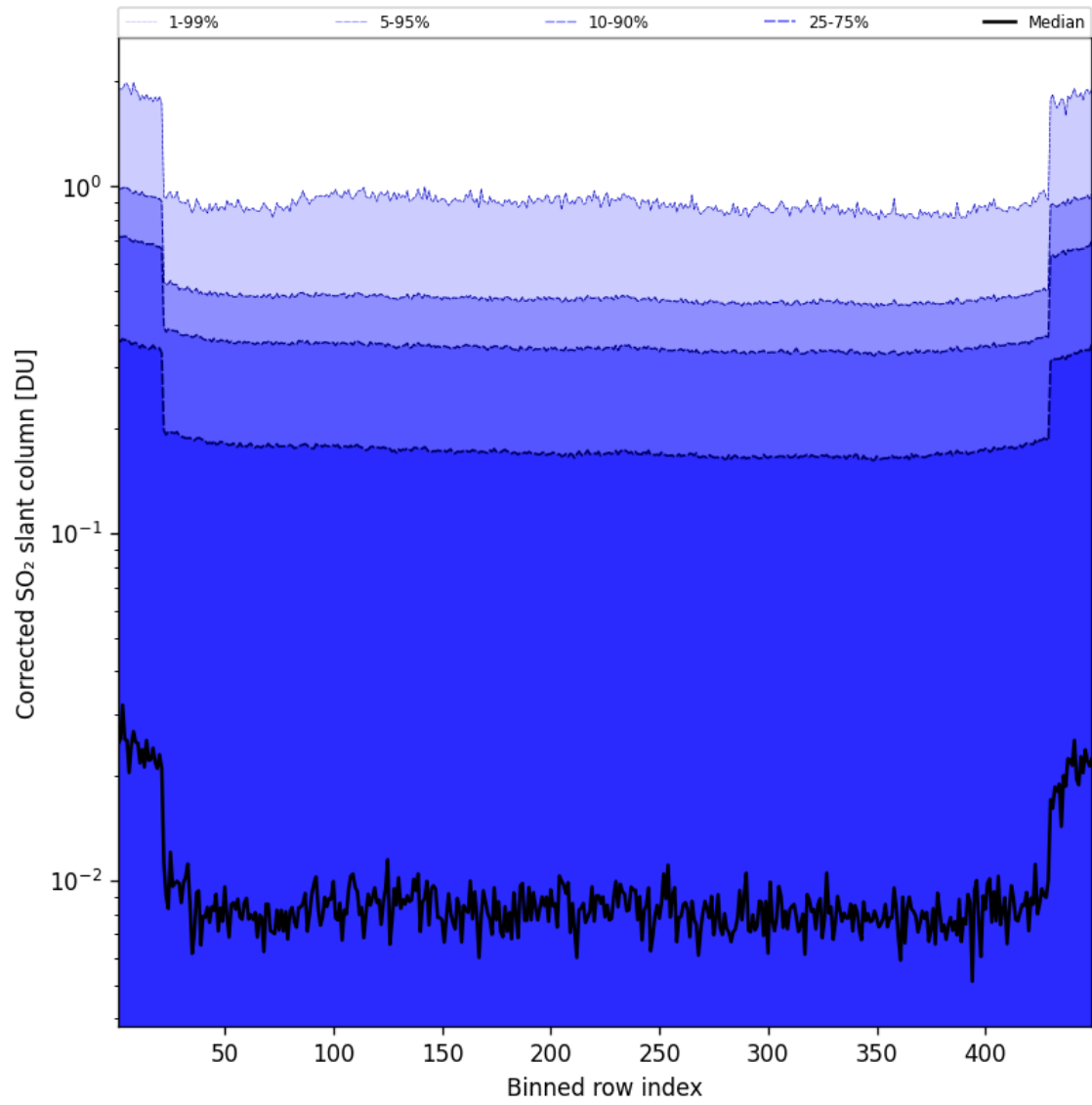


Figure 87: Along track statistics of “Corrected SO₂ slant column” for 2025-02-13 to 2025-02-14

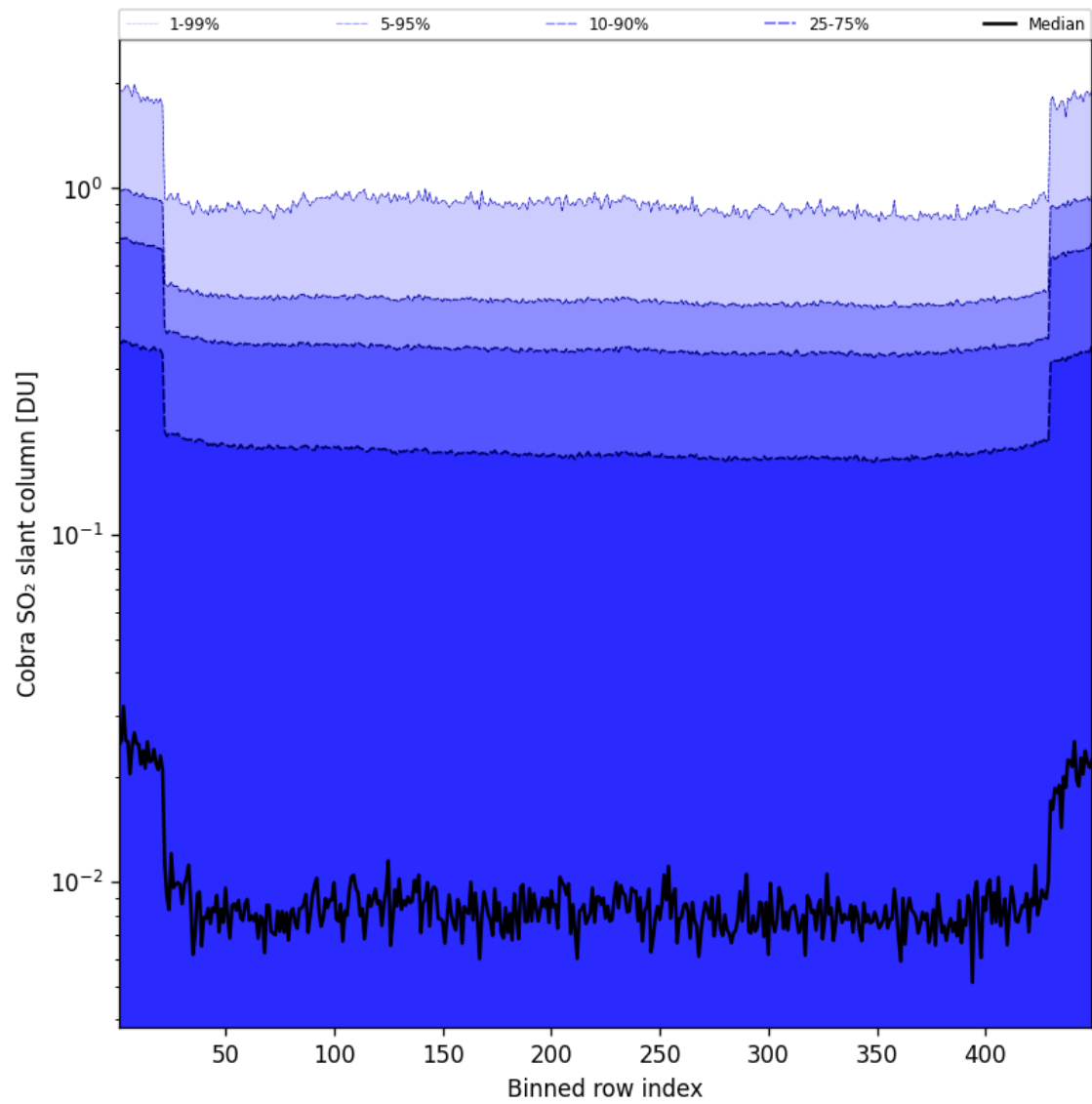


Figure 88: Along track statistics of "Cobra SO₂ slant column" for 2025-02-13 to 2025-02-14

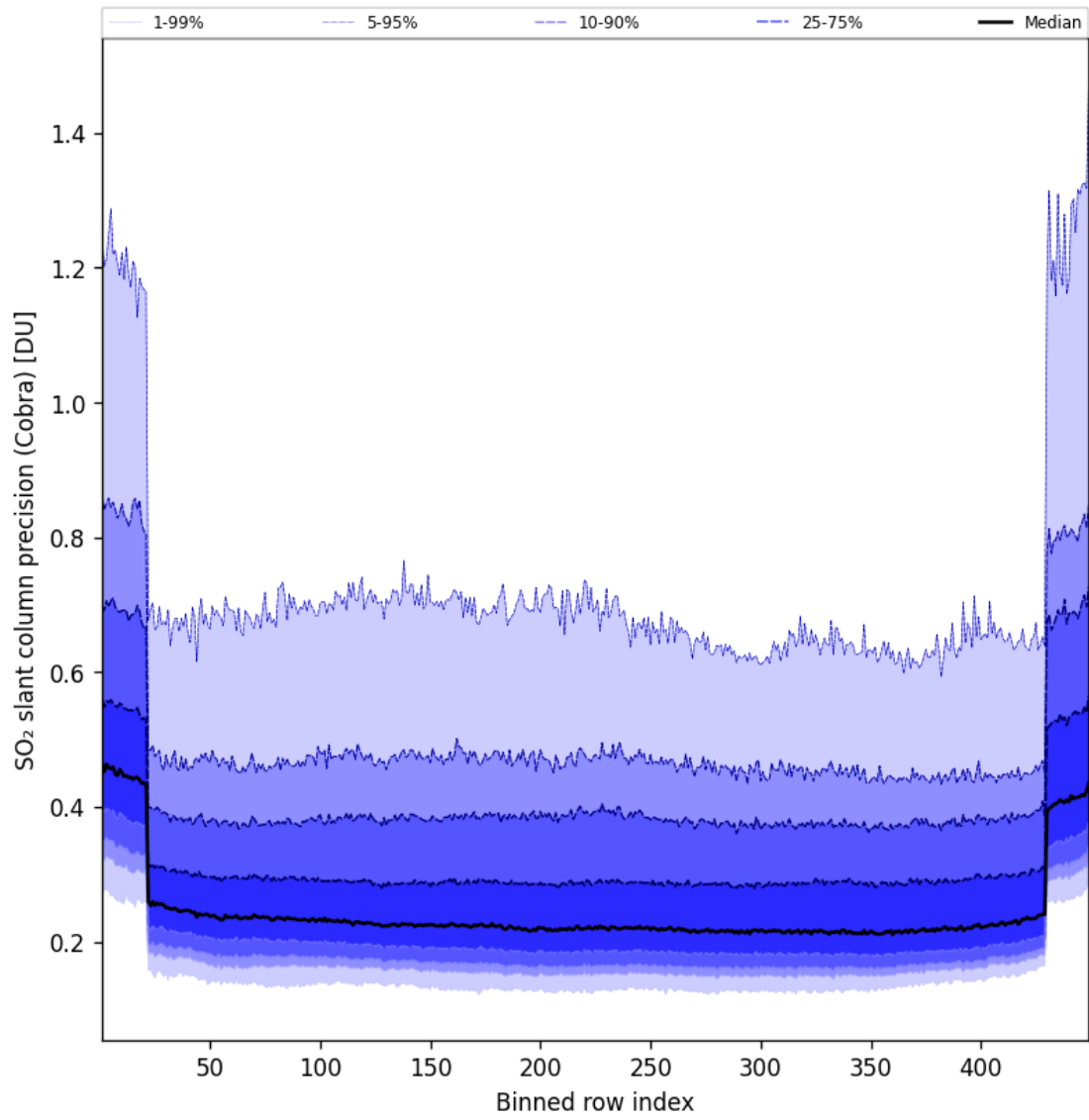


Figure 89: Along track statistics of “SO₂ slant column precision (Cobra)” for 2025-02-13 to 2025-02-14

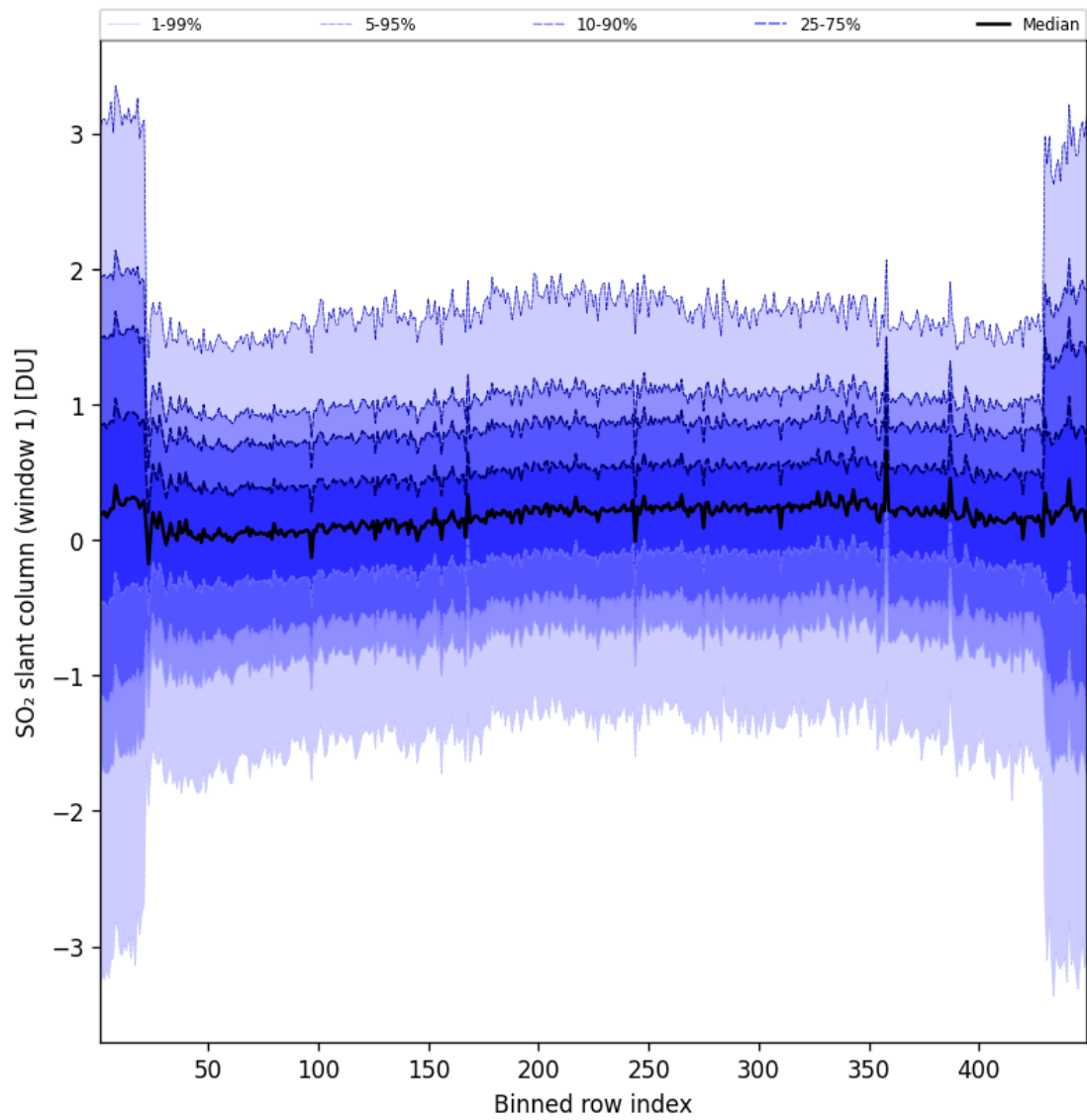


Figure 90: Along track statistics of “SO₂ slant column (window 1)” for 2025-02-13 to 2025-02-14

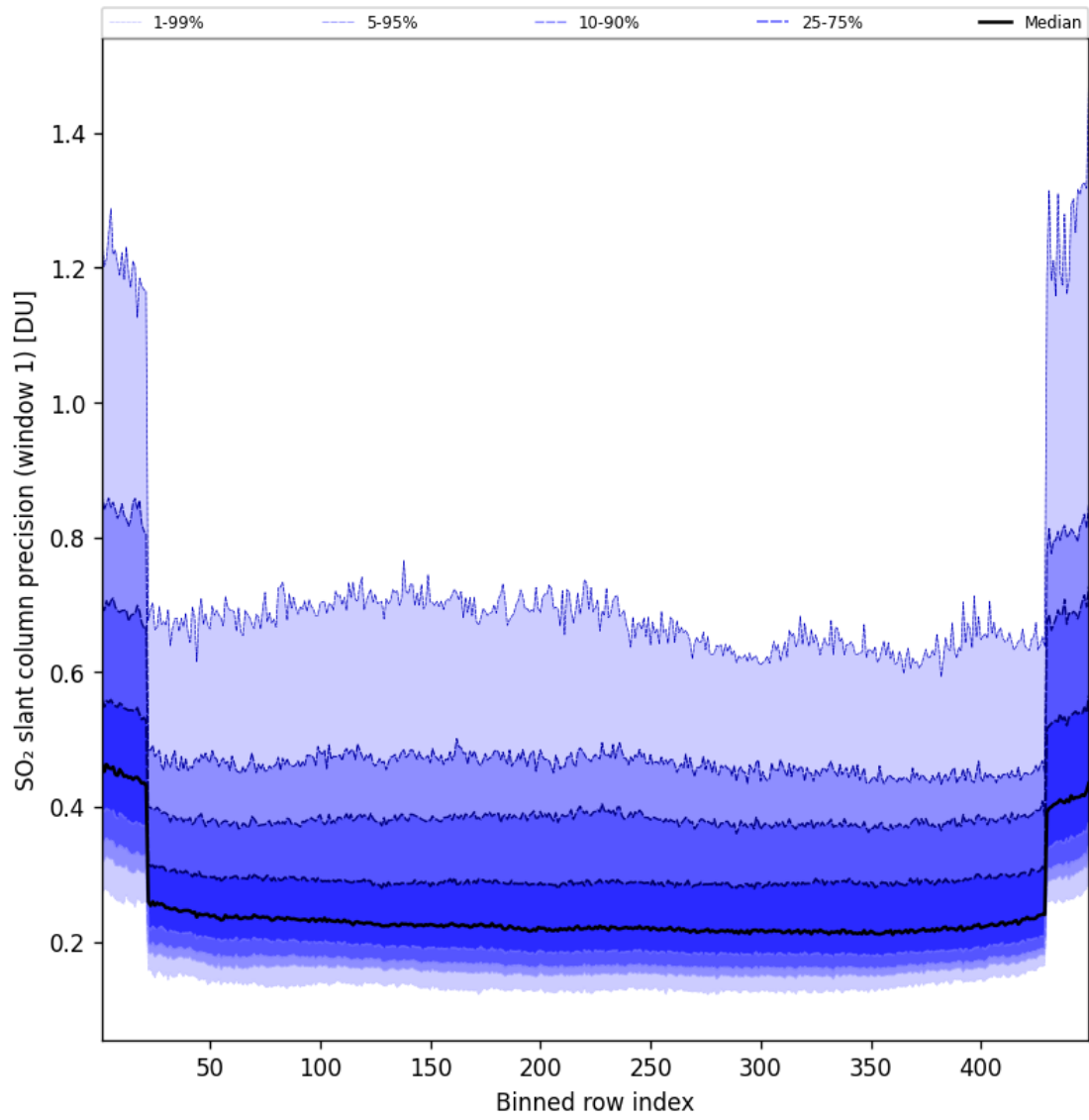


Figure 91: Along track statistics of “SO₂ slant column precision (window 1)” for 2025-02-13 to 2025-02-14

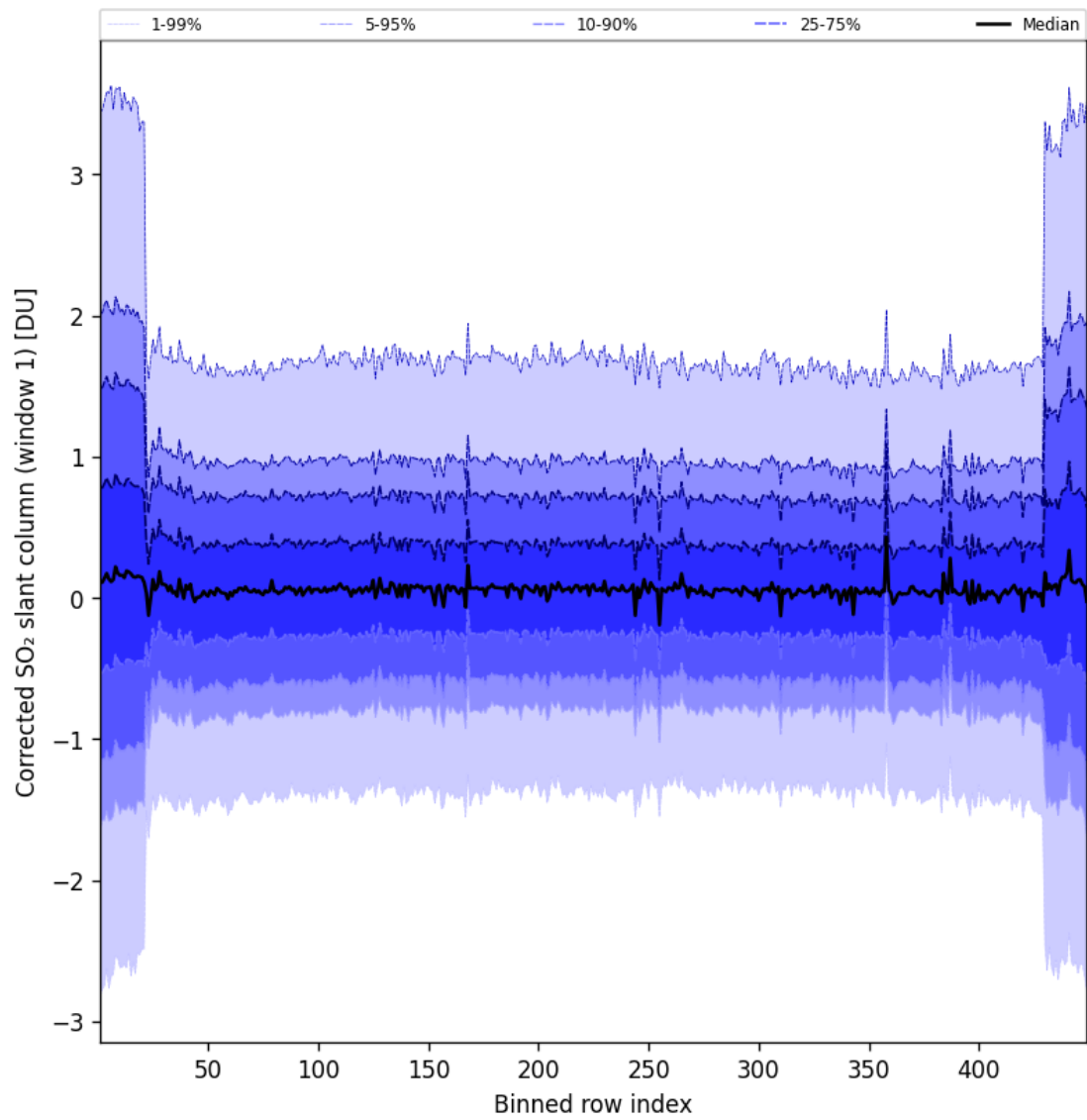


Figure 92: Along track statistics of “Corrected SO₂ slant column (window 1)” for 2025-02-13 to 2025-02-14

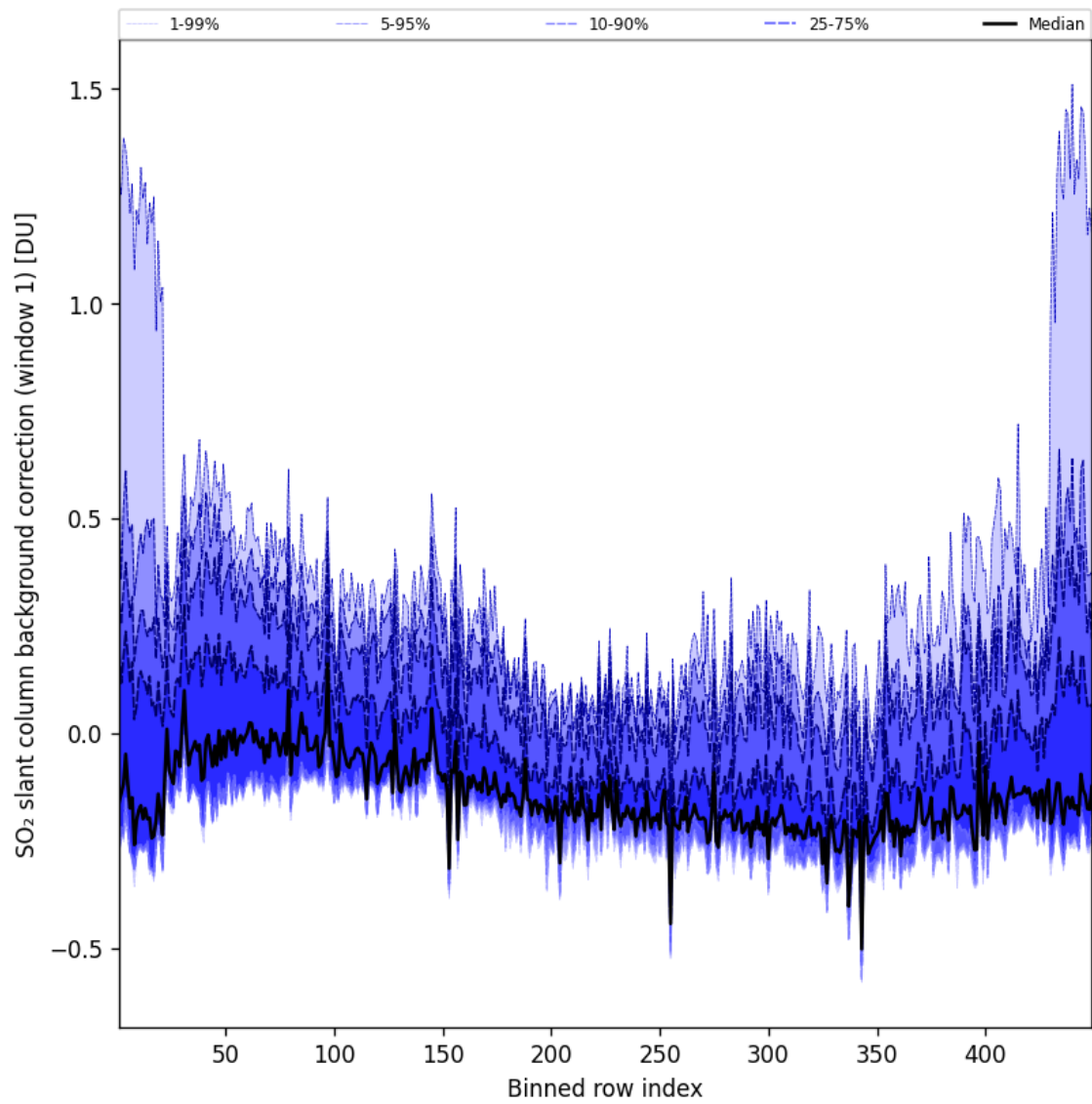


Figure 93: Along track statistics of “SO₂ slant column background correction (window 1)” for 2025-02-13 to 2025-02-14

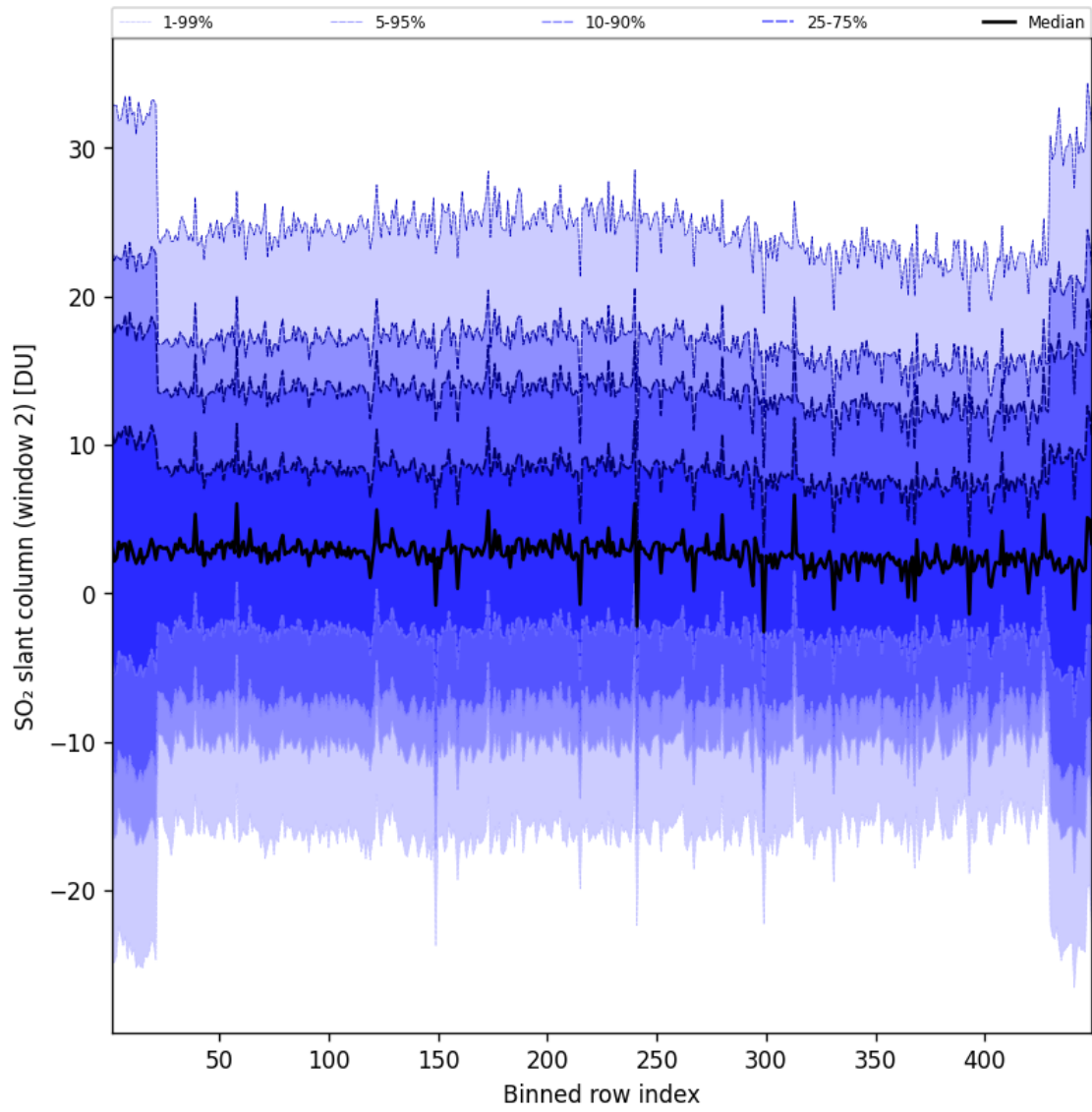


Figure 94: Along track statistics of “SO₂ slant column (window 2)” for 2025-02-13 to 2025-02-14

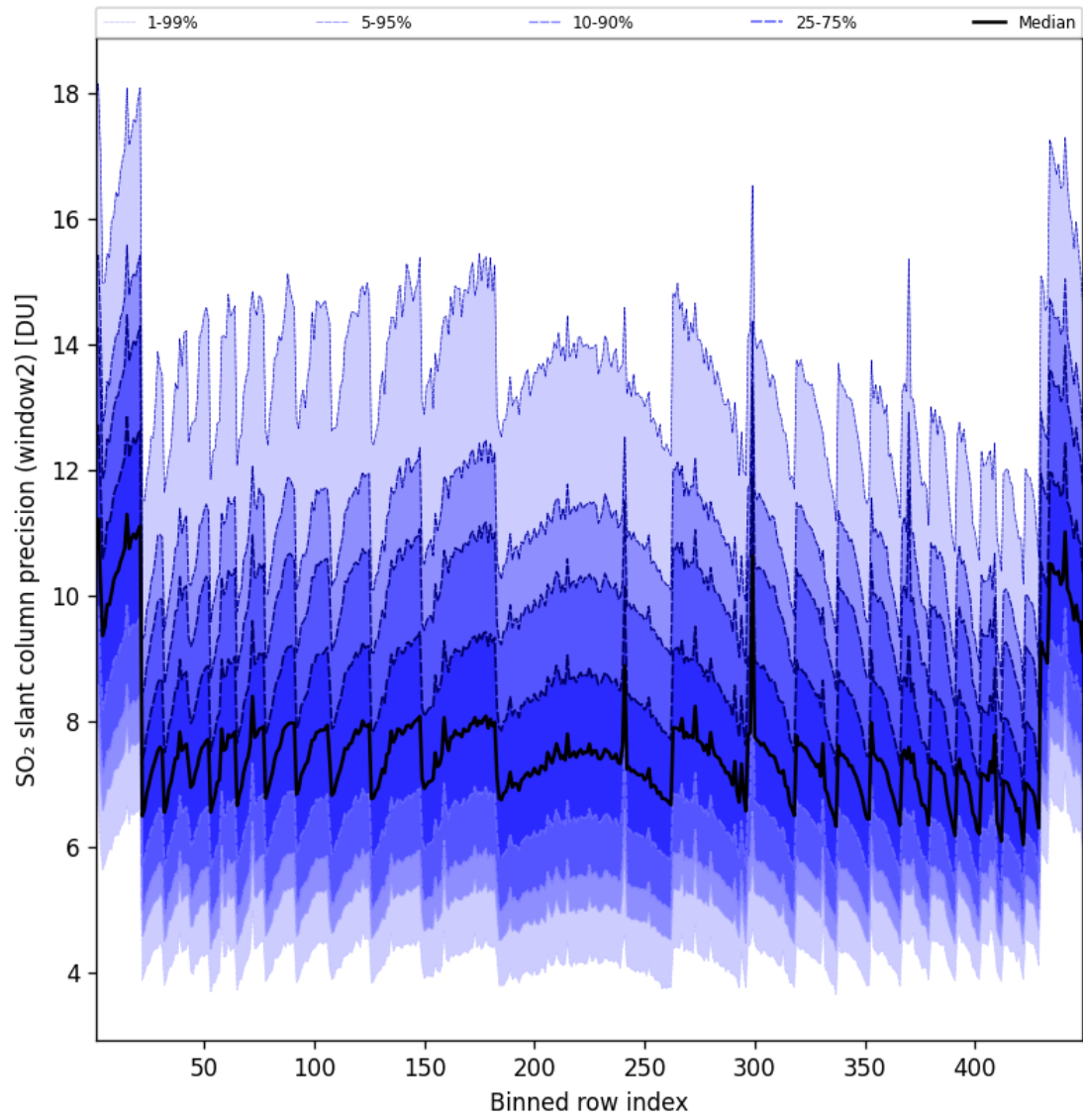


Figure 95: Along track statistics of “SO₂ slant column precision (window2)” for 2025-02-13 to 2025-02-14

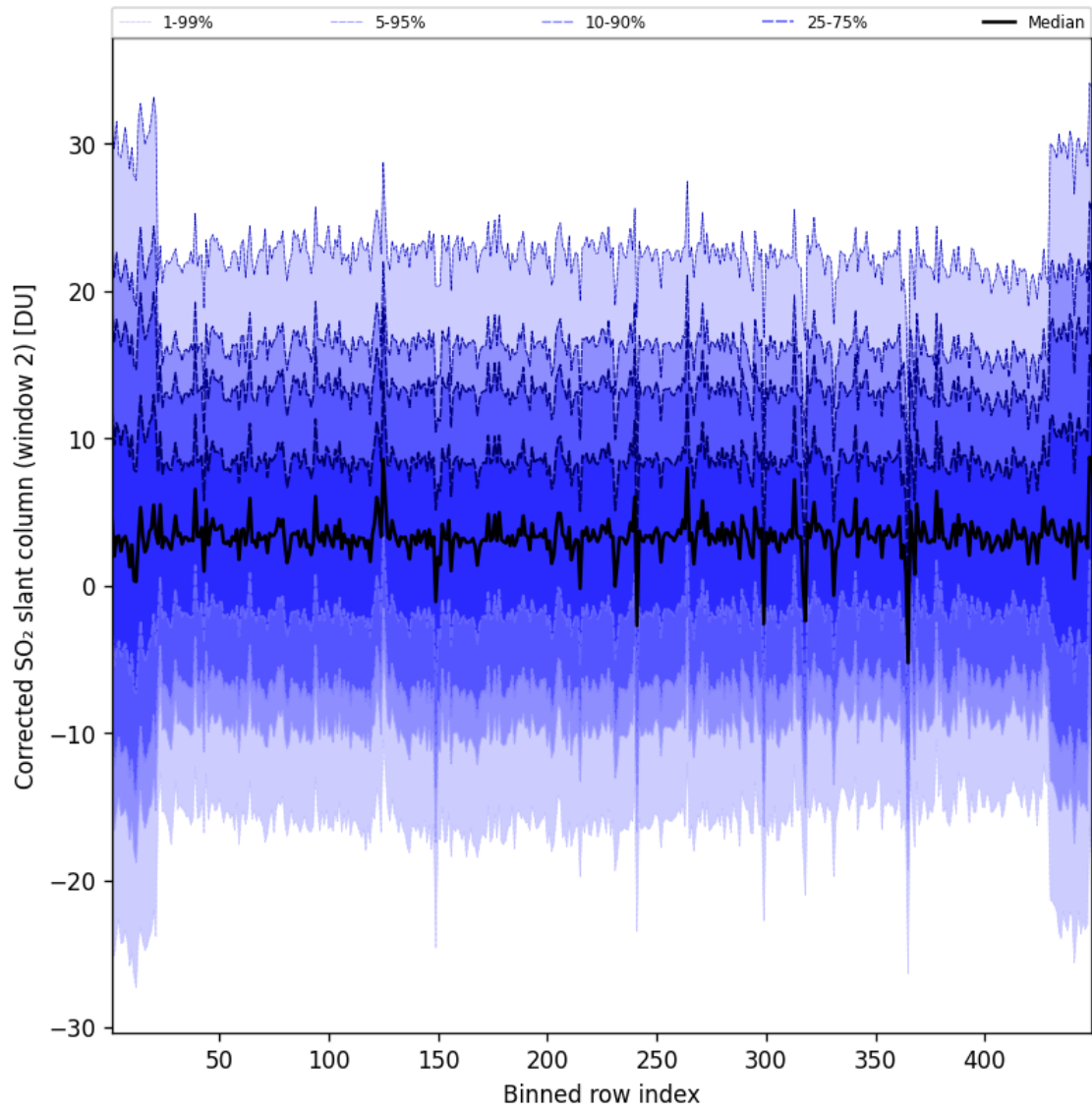


Figure 96: Along track statistics of “Corrected SO₂ slant column (window 2)” for 2025-02-13 to 2025-02-14

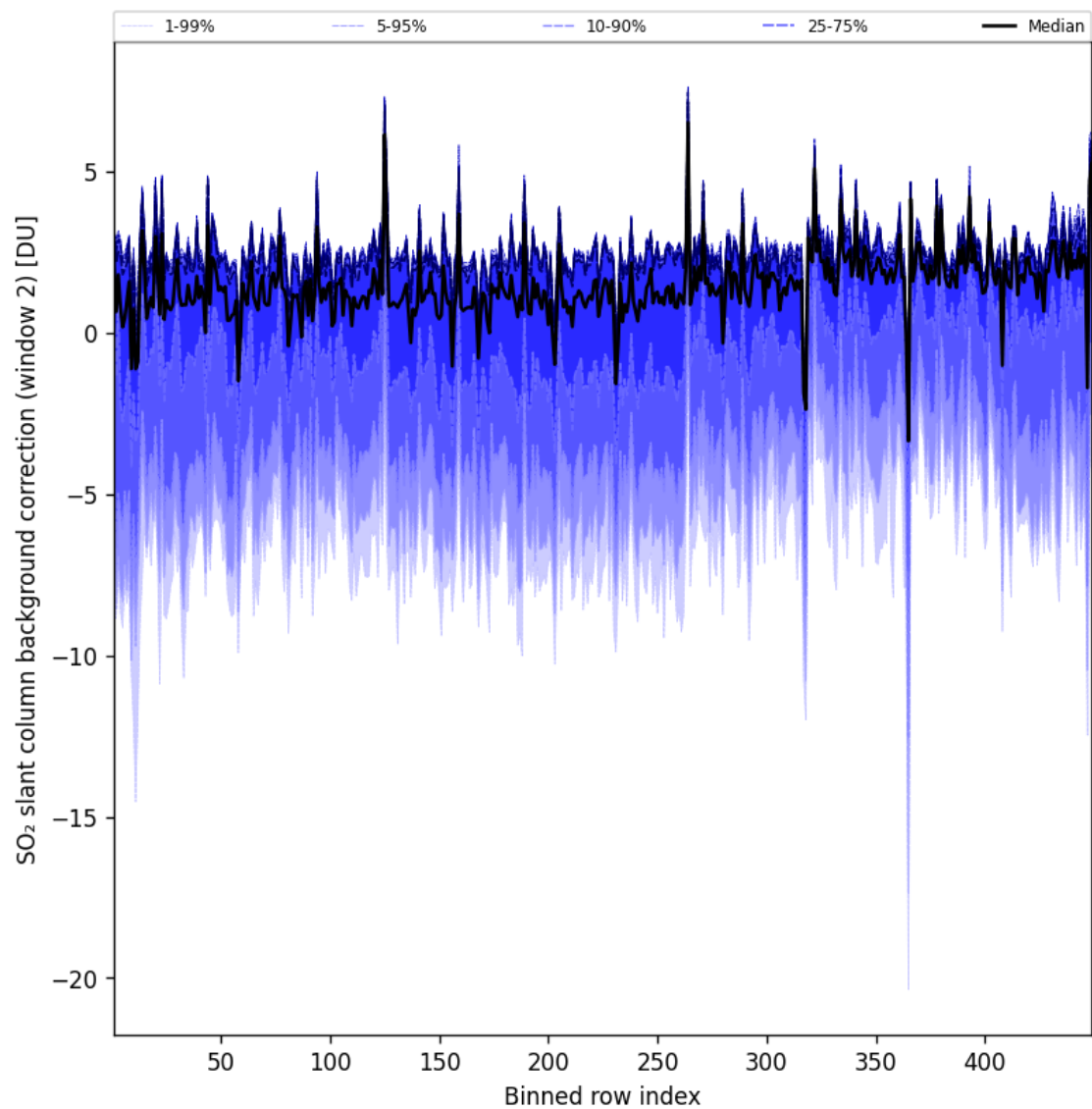


Figure 97: Along track statistics of “SO₂ slant column background correction (window 2)” for 2025-02-13 to 2025-02-14

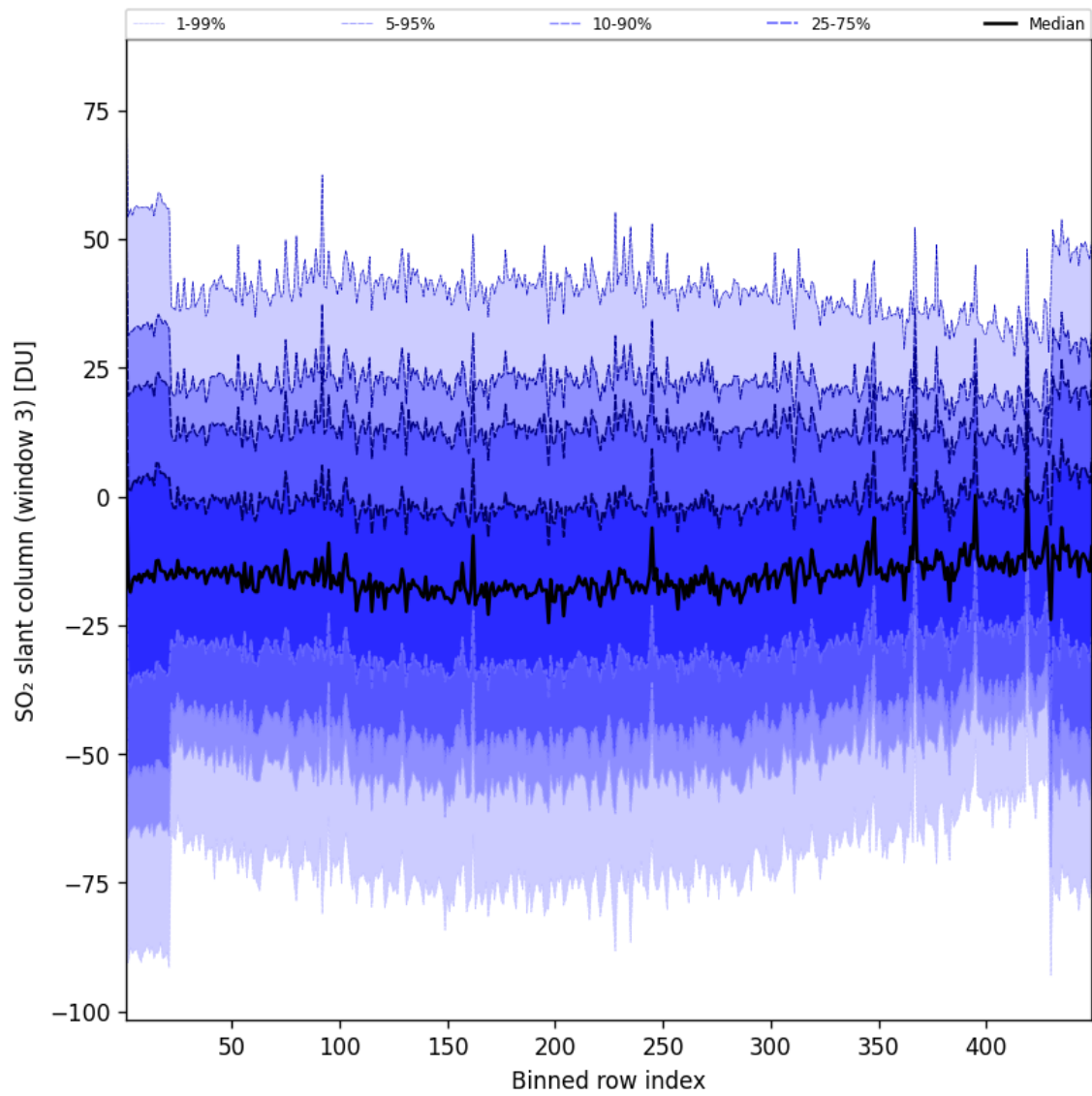


Figure 98: Along track statistics of “SO₂ slant column (window 3)” for 2025-02-13 to 2025-02-14

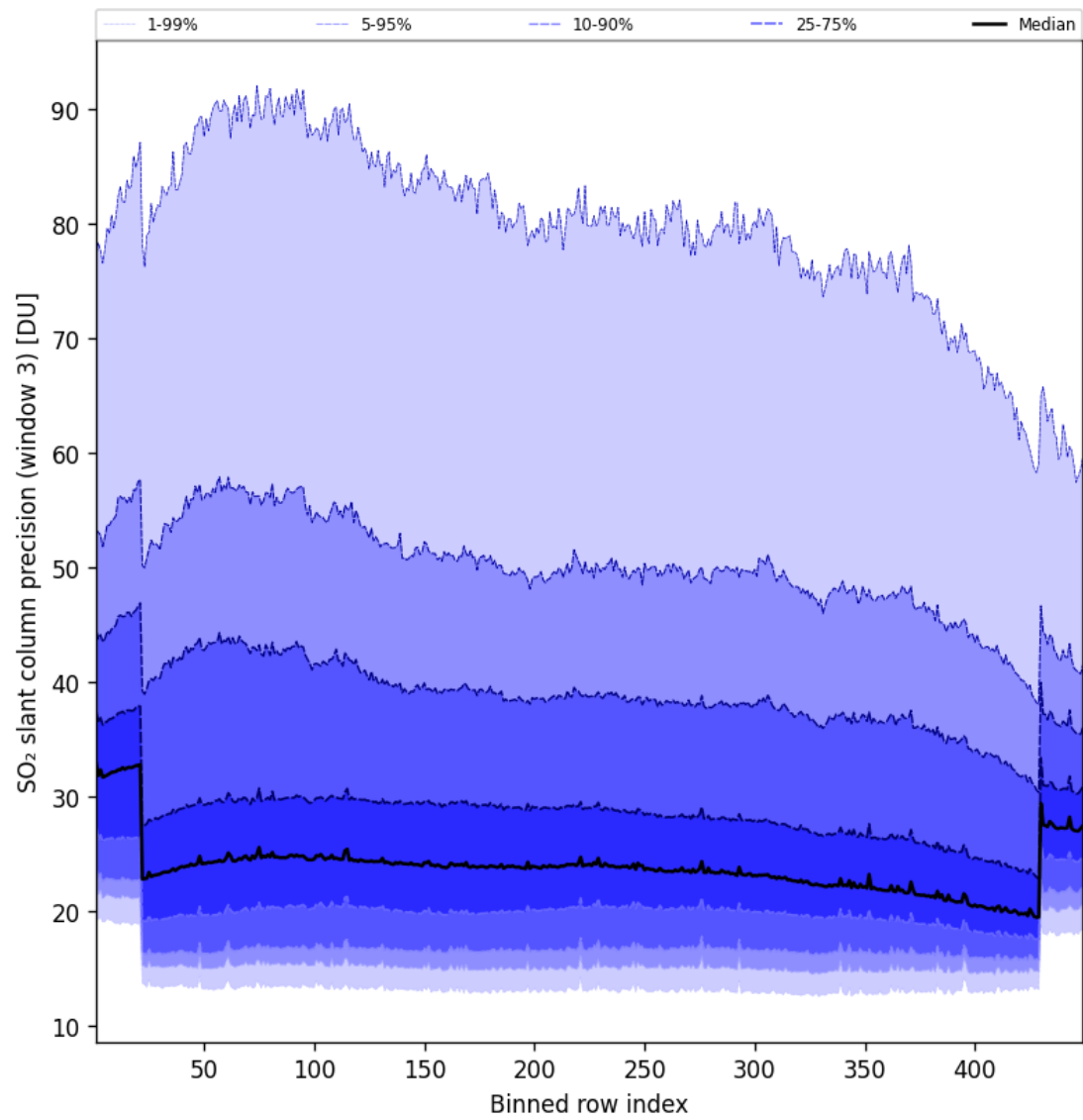


Figure 99: Along track statistics of “SO₂ slant column precision (window 3)” for 2025-02-13 to 2025-02-14

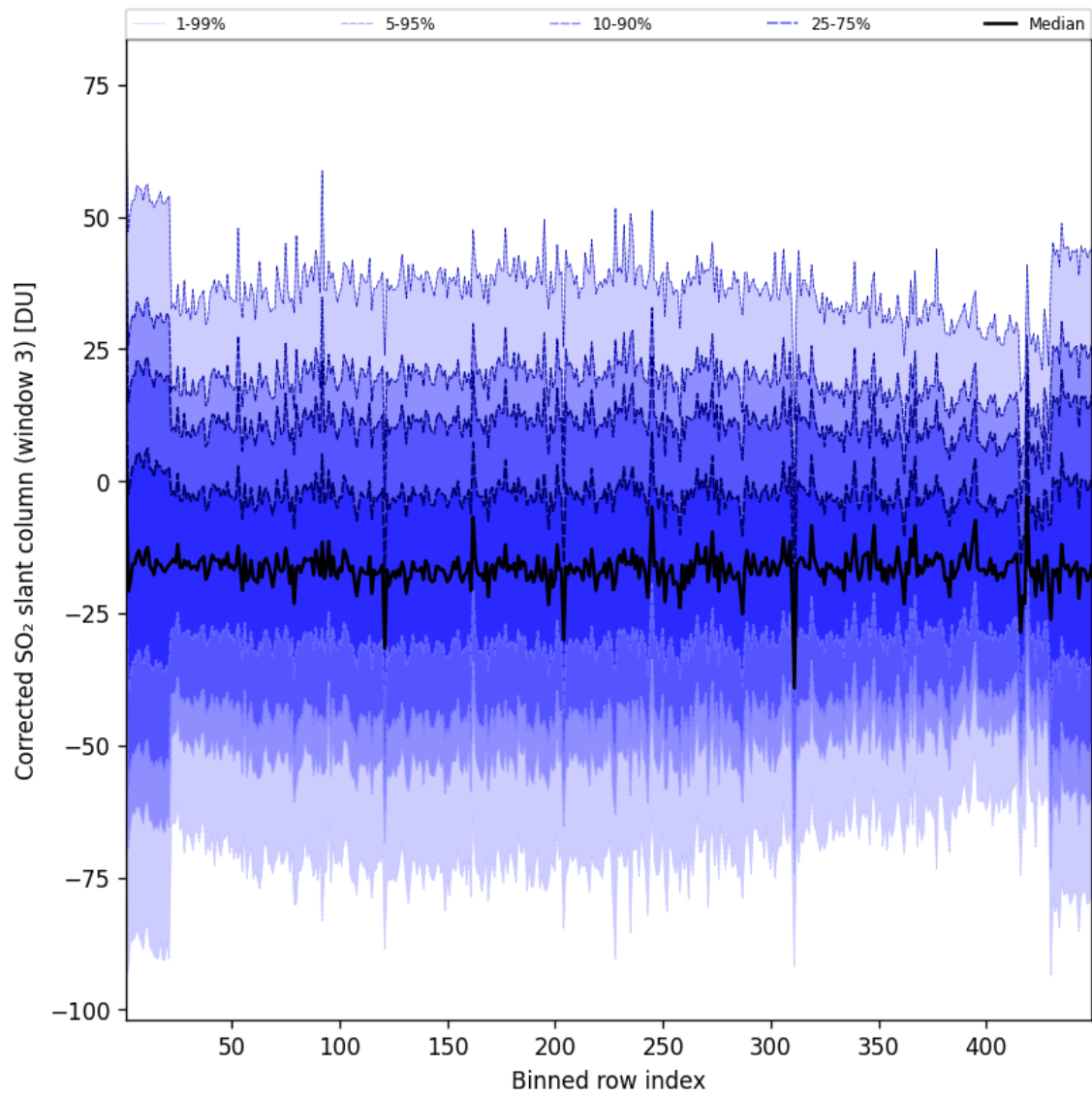


Figure 100: Along track statistics of “Corrected SO₂ slant column (window 3)” for 2025-02-13 to 2025-02-14

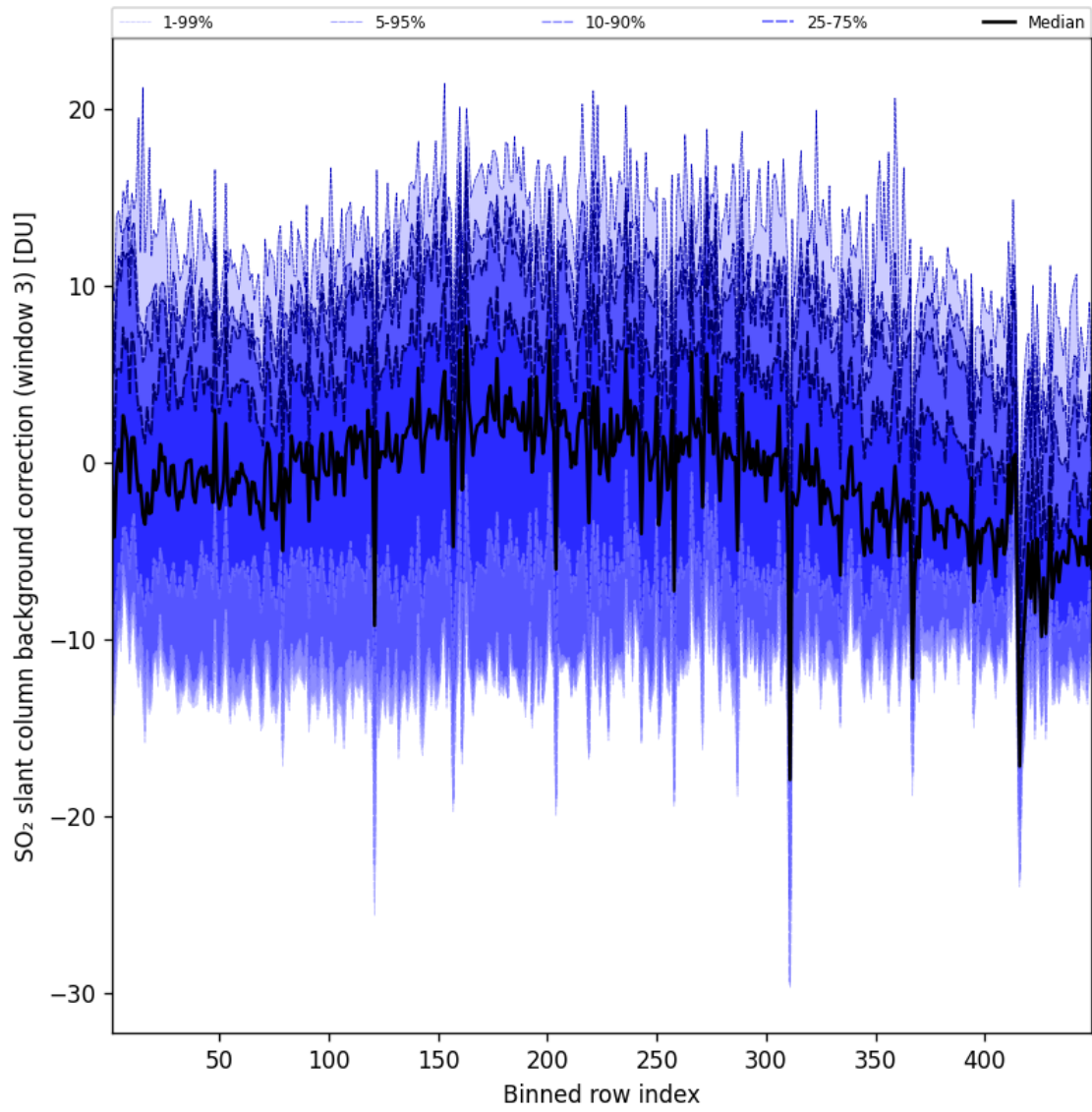


Figure 101: Along track statistics of “SO₂ slant column background correction (window 3)” for 2025-02-13 to 2025-02-14

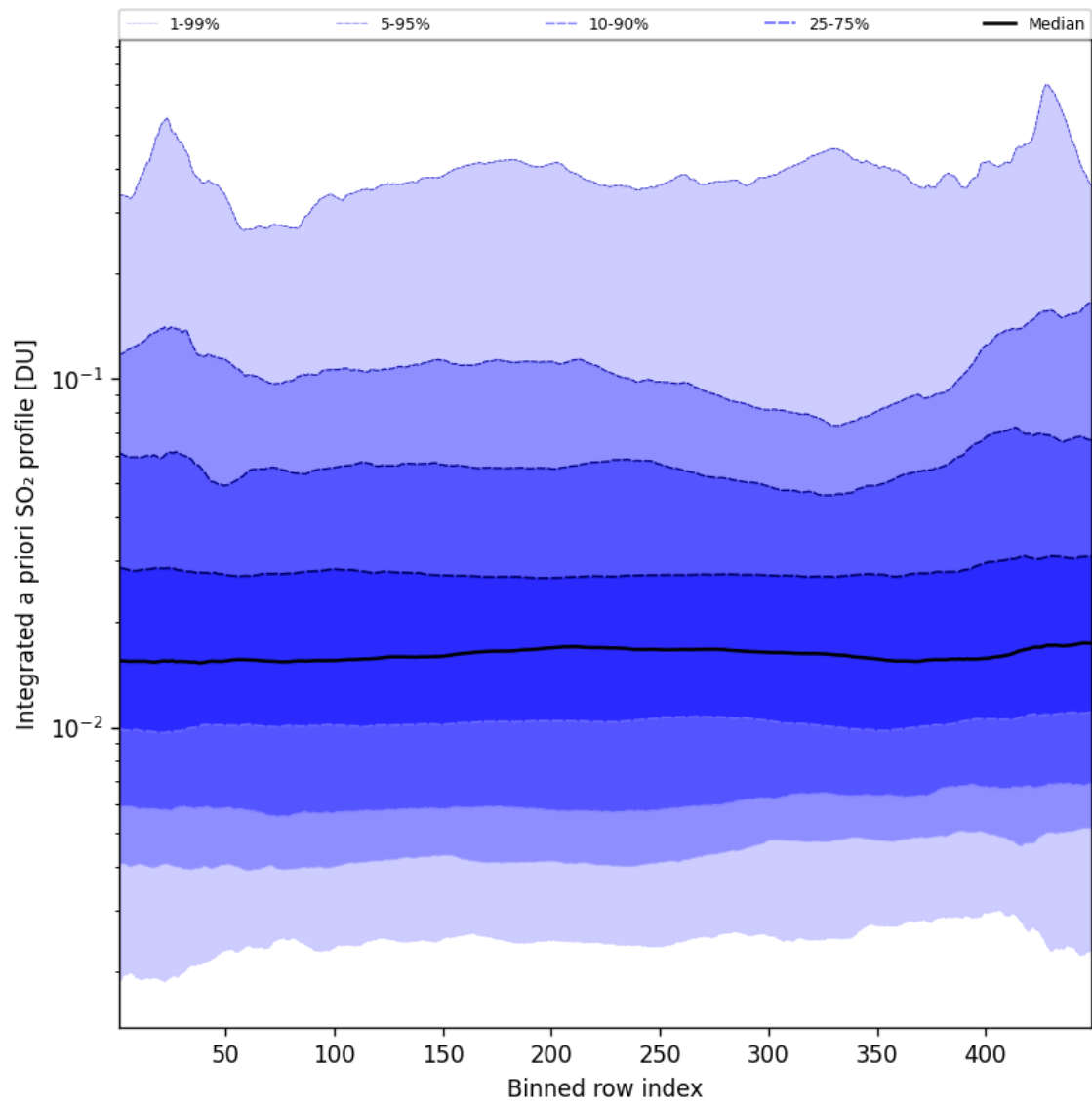


Figure 103: Along track statistics of “Integrated a priori SO₂ profile” for 2025-02-13 to 2025-02-14

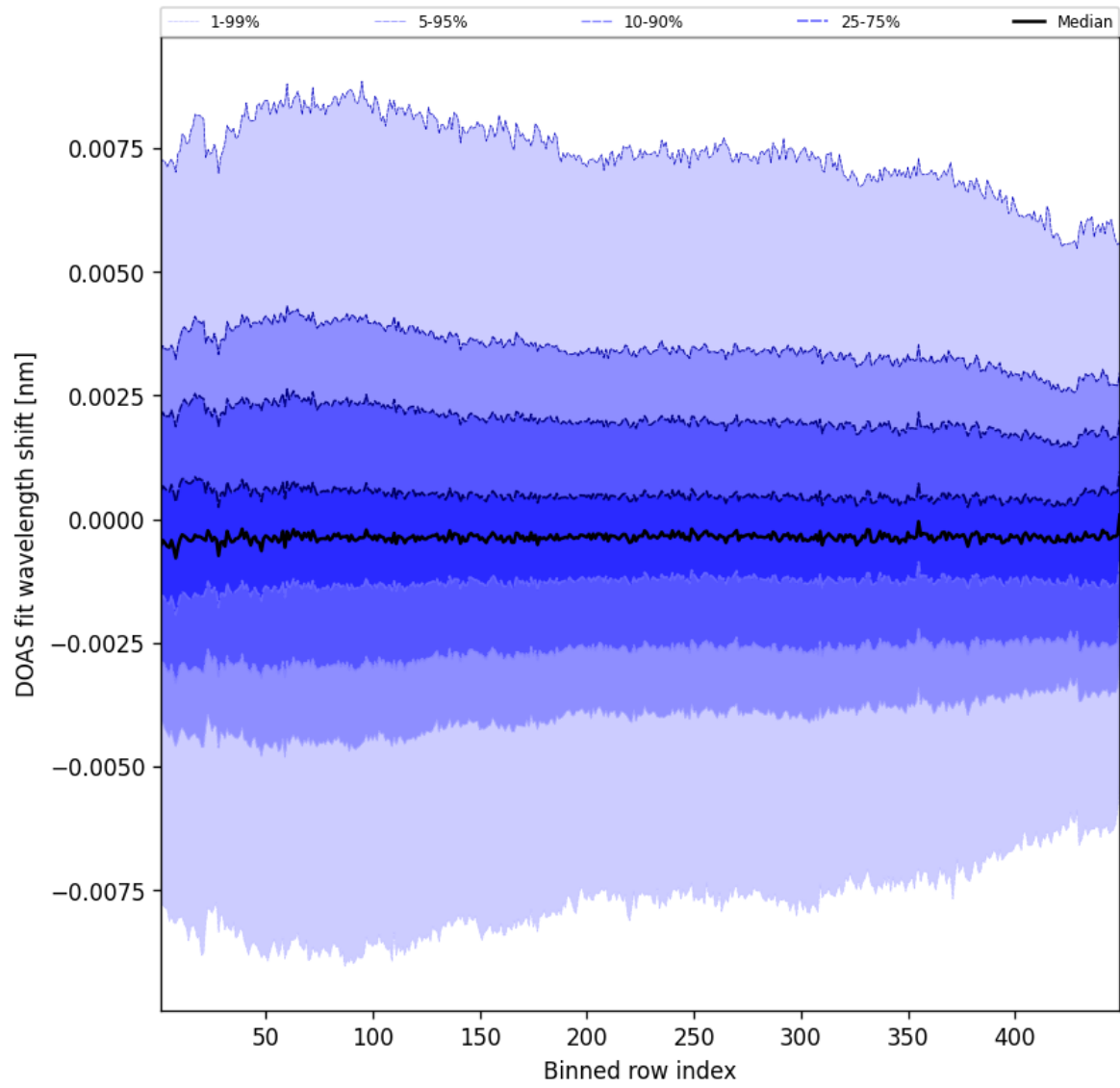


Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2025-02-13 to 2025-02-14

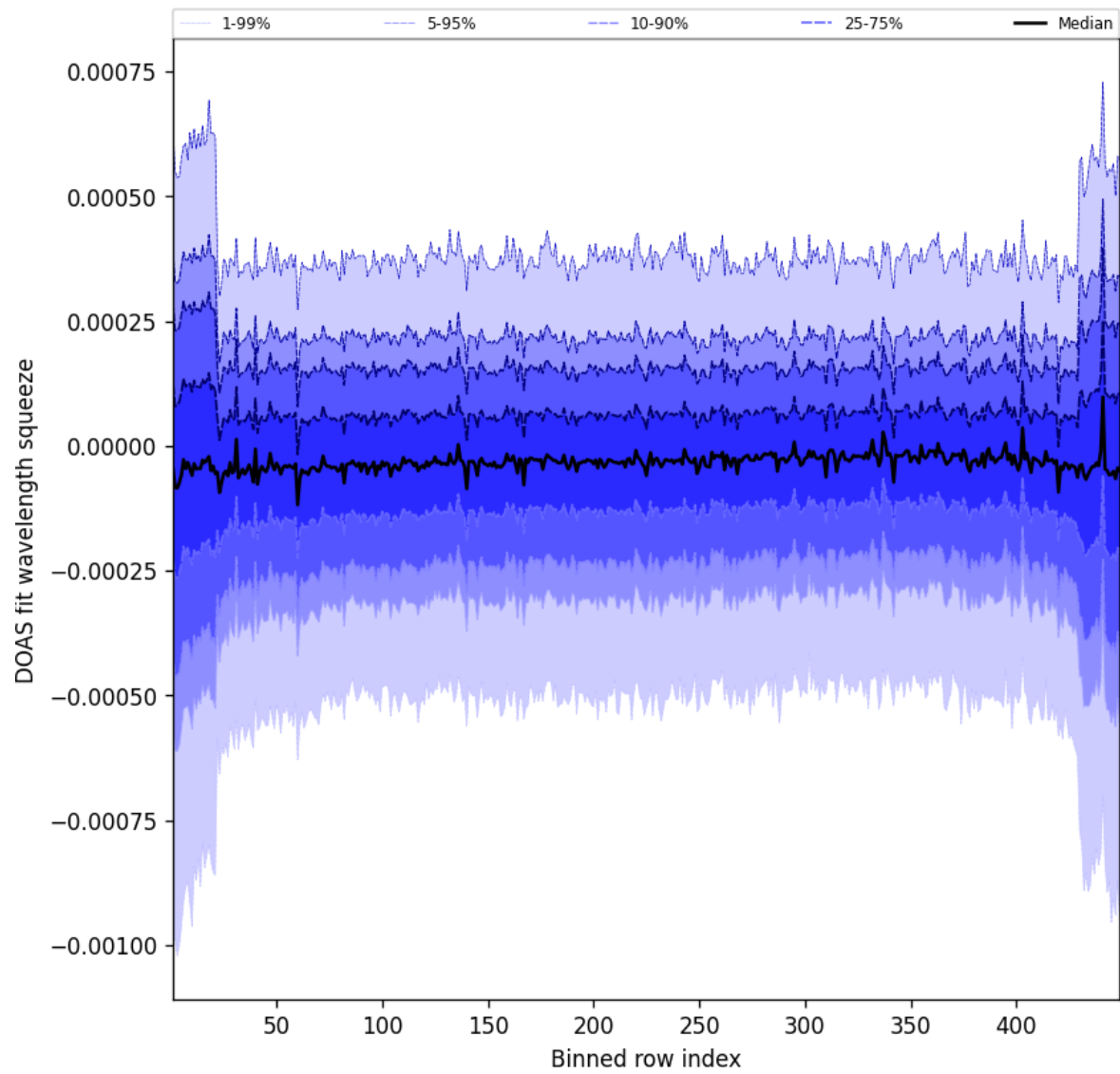


Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2025-02-13 to 2025-02-14

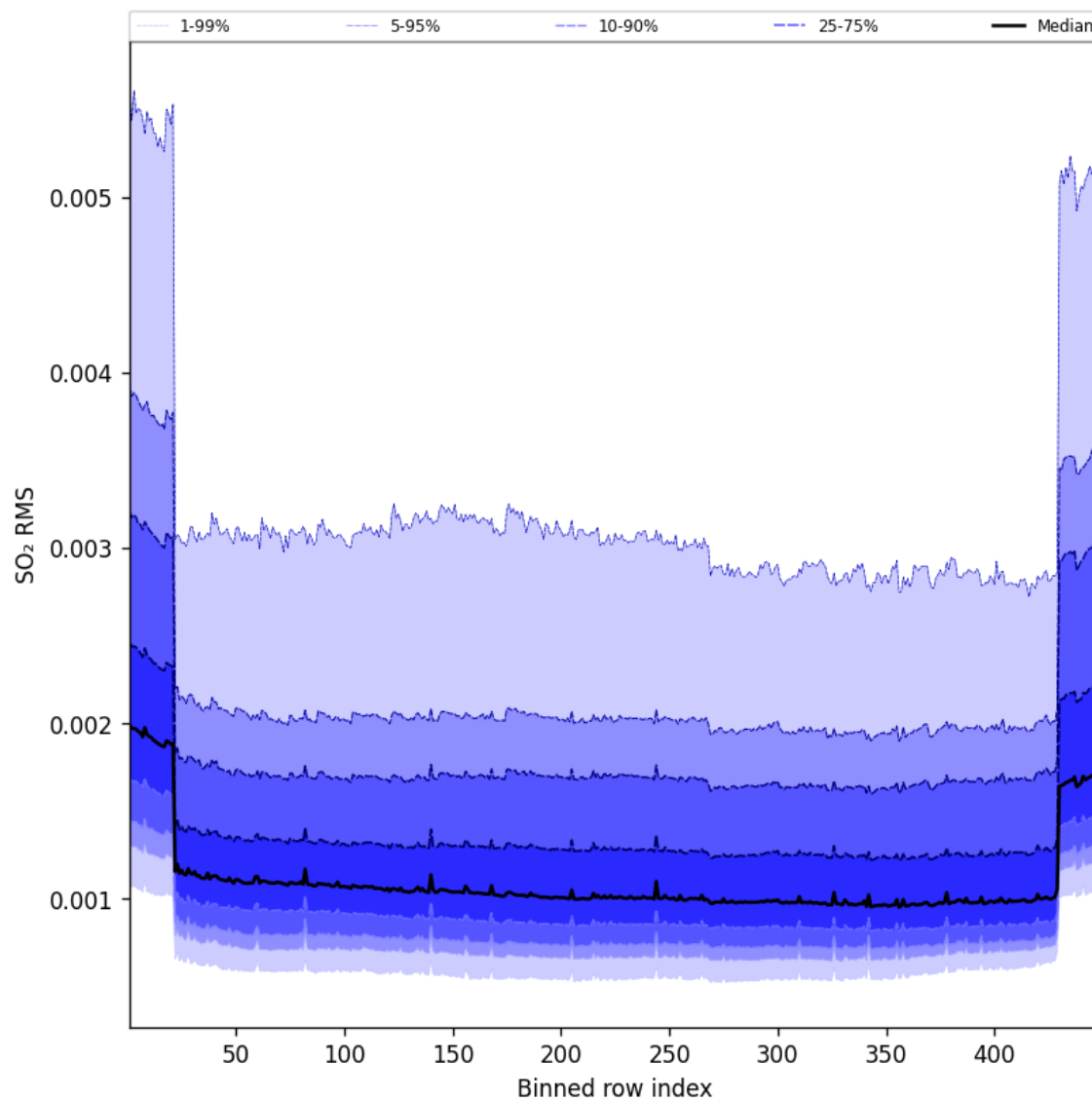


Figure 106: Along track statistics of “SO₂ RMS” for 2025-02-13 to 2025-02-14

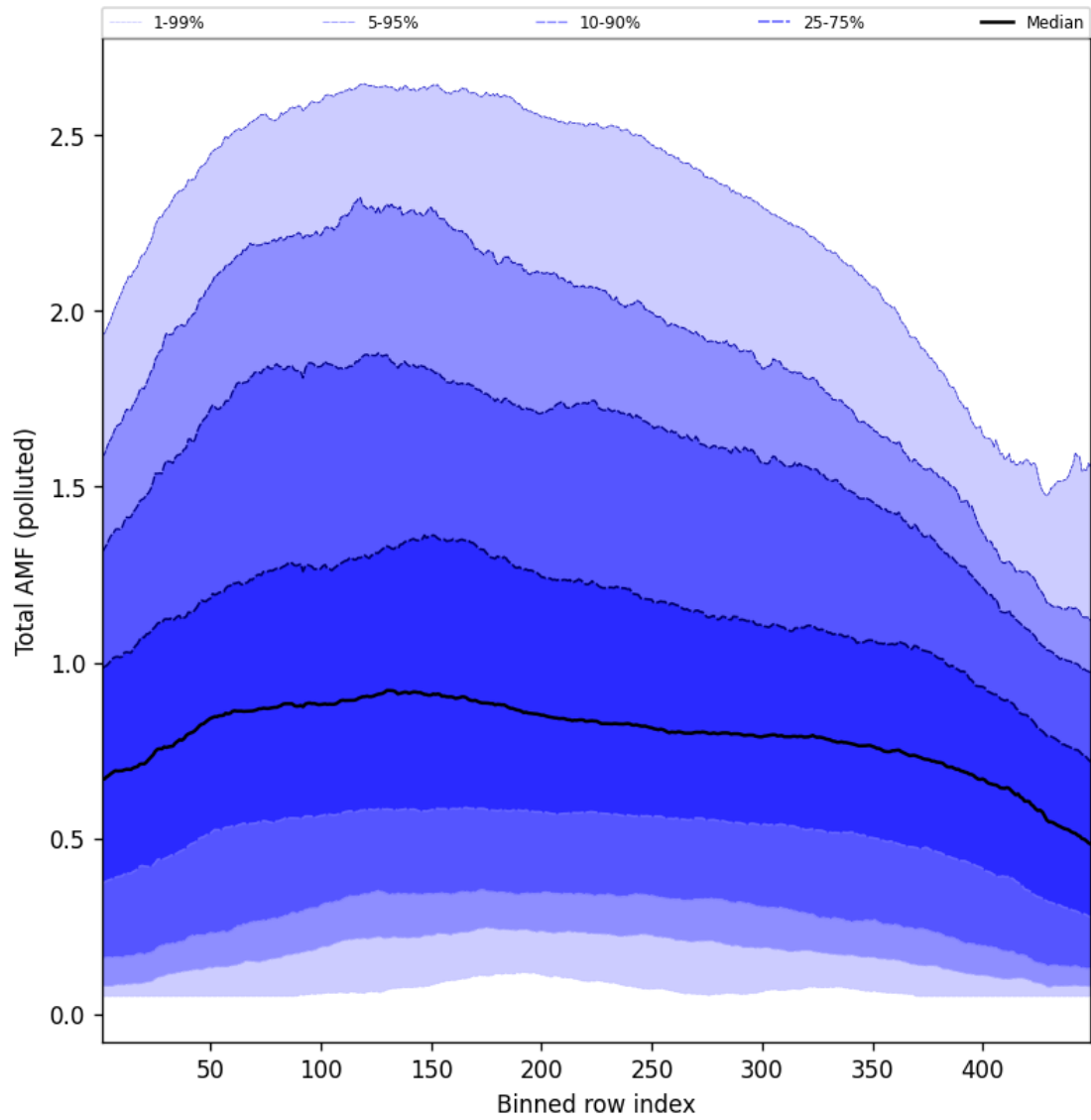


Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-02-13 to 2025-02-14

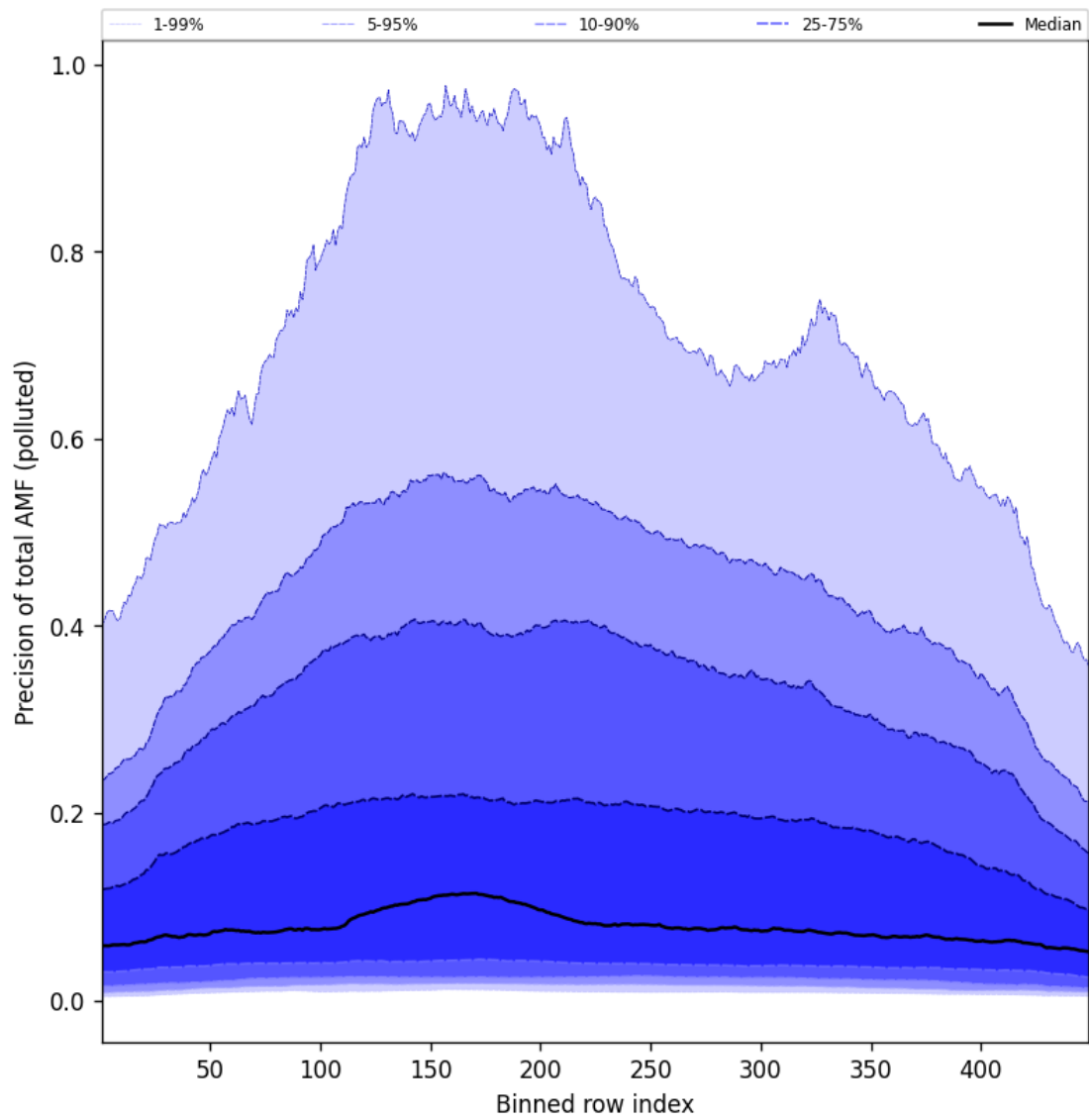


Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-02-13 to 2025-02-14

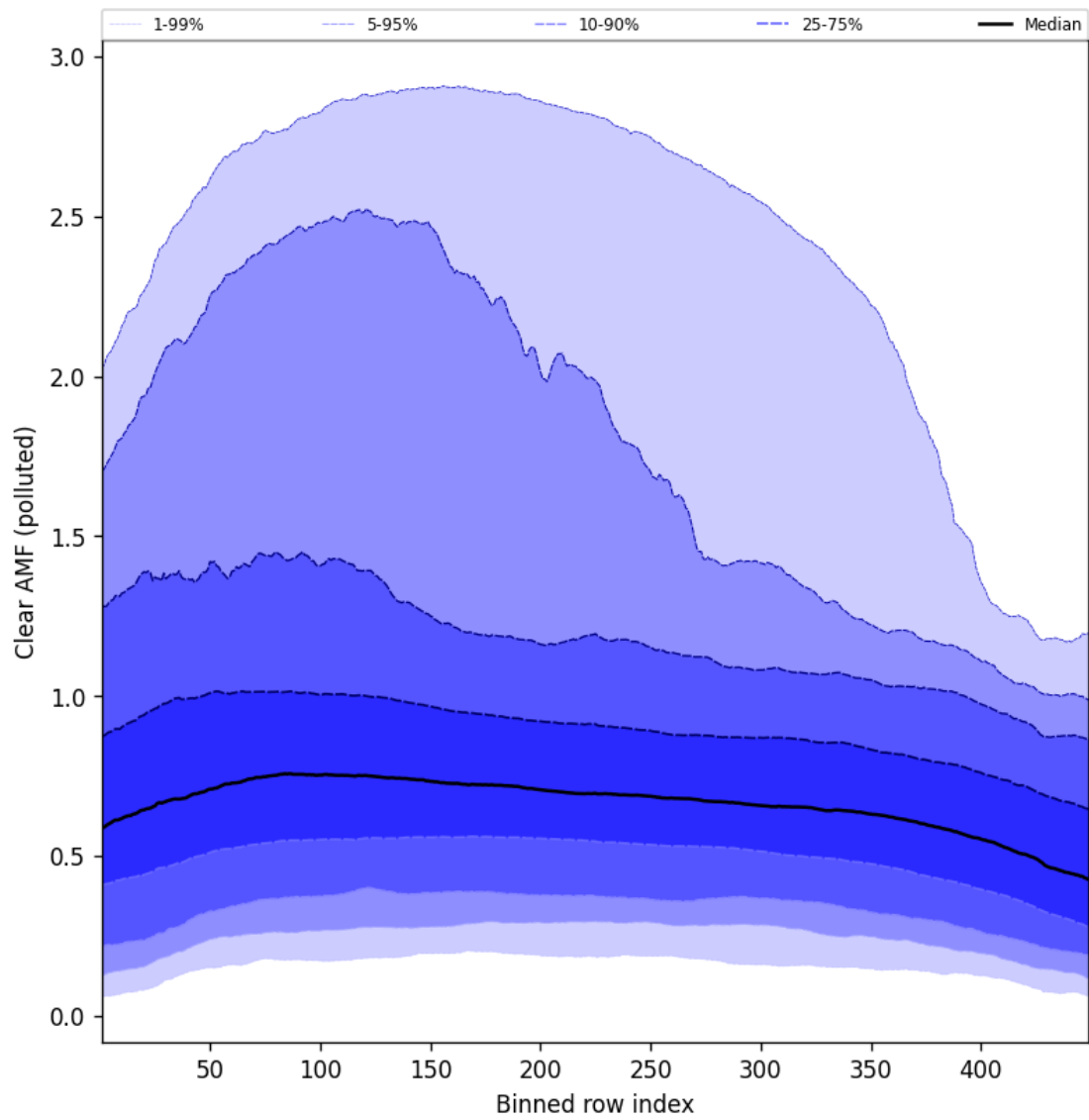


Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-02-13 to 2025-02-14

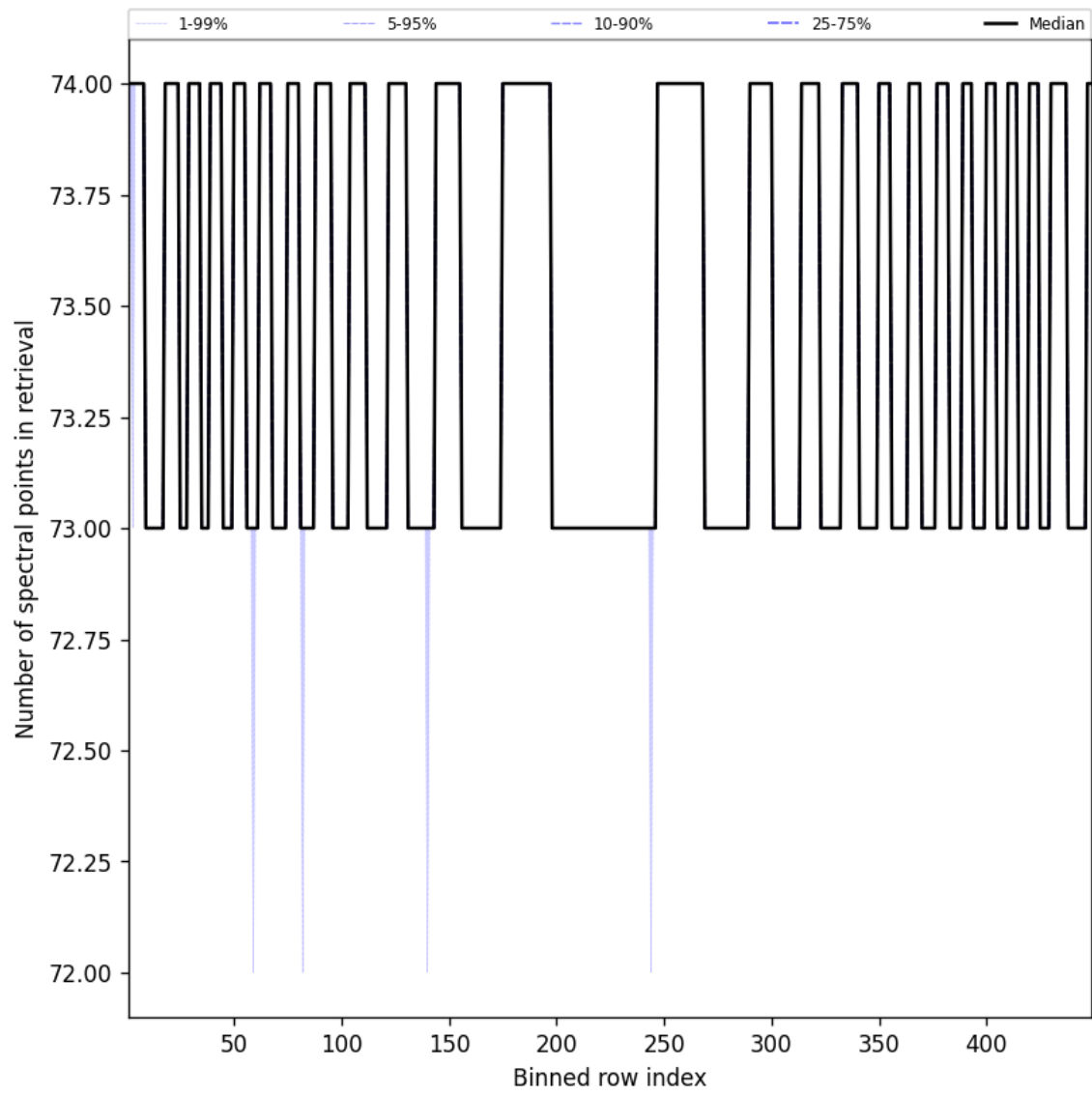


Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-02-13 to 2025-02-14

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.

Contents

1	Short Introduction	1
1.1	The list of parameters	1
2	Definitions	1
3	Granule outlines	8
4	Input data monitoring	9
5	Warnings and errors	10
6	World maps	11
7	Zonal average	37
8	Histograms	64
9	Along track statistics	91
10	Coincidence density	118
11	Copyright information of ‘PyCAMA’	118

List of Figures

1	Outline of the granules.	8
2	Input data per granule	9
3	Fraction of pixels with specific warnings and errors during processing	10
4	Map of “SO ₂ vertical column” for 2025-02-13 to 2025-02-14	11
5	Map of “SO ₂ vertical column precision” for 2025-02-13 to 2025-02-14	12
6	Map of “Corrected SO ₂ slant column” for 2025-02-13 to 2025-02-14	13
7	Map of “Cobra SO ₂ slant column” for 2025-02-13 to 2025-02-14	14
8	Map of “SO ₂ slant column precision (Cobra)” for 2025-02-13 to 2025-02-14	15
9	Map of “SO ₂ slant column (window 1)” for 2025-02-13 to 2025-02-14	16
10	Map of “SO ₂ slant column precision (window 1)” for 2025-02-13 to 2025-02-14	17
11	Map of “Corrected SO ₂ slant column (window 1)” for 2025-02-13 to 2025-02-14	18
12	Map of “SO ₂ slant column background correction (window 1)” for 2025-02-13 to 2025-02-14	19
13	Map of “SO ₂ slant column (window 2)” for 2025-02-13 to 2025-02-14	20
14	Map of “SO ₂ slant column precision (window2)” for 2025-02-13 to 2025-02-14	21
15	Map of “Corrected SO ₂ slant column (window 2)” for 2025-02-13 to 2025-02-14	22
16	Map of “SO ₂ slant column background correction (window 2)” for 2025-02-13 to 2025-02-14	23
17	Map of “SO ₂ slant column (window 3)” for 2025-02-13 to 2025-02-14	24
18	Map of “SO ₂ slant column precision (window 3)” for 2025-02-13 to 2025-02-14	25
19	Map of “Corrected SO ₂ slant column (window 3)” for 2025-02-13 to 2025-02-14	26
20	Map of “SO ₂ slant column background correction (window 3)” for 2025-02-13 to 2025-02-14	27
21	Map of “Integrated a priori SO ₂ profile” for 2025-02-13 to 2025-02-14	28
22	Map of “DOAS fit wavelength shift” for 2025-02-13 to 2025-02-14	29
23	Map of “DOAS fit wavelength squeeze” for 2025-02-13 to 2025-02-14	30
24	Map of “SO ₂ RMS” for 2025-02-13 to 2025-02-14	31
25	Map of “Total AMF (polluted)” for 2025-02-13 to 2025-02-14	32
26	Map of “Precision of total AMF (polluted)” for 2025-02-13 to 2025-02-14	33
27	Map of “Clear AMF (polluted)” for 2025-02-13 to 2025-02-14	34
28	Map of “Number of spectral points in retrieval” for 2025-02-13 to 2025-02-14	35
29	Map of the number of observations for 2025-02-13 to 2025-02-14	36

30	Zonal average of “QA value” for 2025-02-13 to 2025-02-14.	37
31	Zonal average of “SO ₂ vertical column” for 2025-02-13 to 2025-02-14.	38
32	Zonal average of “SO ₂ vertical column precision” for 2025-02-13 to 2025-02-14.	39
33	Zonal average of “Corrected SO ₂ slant column” for 2025-02-13 to 2025-02-14.	40
34	Zonal average of “Cobra SO ₂ slant column” for 2025-02-13 to 2025-02-14.	41
35	Zonal average of “SO ₂ slant column precision (Cobra)” for 2025-02-13 to 2025-02-14.	42
36	Zonal average of “SO ₂ slant column (window 1)” for 2025-02-13 to 2025-02-14.	43
37	Zonal average of “SO ₂ slant column precision (window 1)” for 2025-02-13 to 2025-02-14.	44
38	Zonal average of “Corrected SO ₂ slant column (window 1)” for 2025-02-13 to 2025-02-14.	45
39	Zonal average of “SO ₂ slant column background correction (window 1)” for 2025-02-13 to 2025-02-14.	46
40	Zonal average of “SO ₂ slant column (window 2)” for 2025-02-13 to 2025-02-14.	47
41	Zonal average of “SO ₂ slant column precision (window2)” for 2025-02-13 to 2025-02-14.	48
42	Zonal average of “Corrected SO ₂ slant column (window 2)” for 2025-02-13 to 2025-02-14.	49
43	Zonal average of “SO ₂ slant column background correction (window 2)” for 2025-02-13 to 2025-02-14.	50
44	Zonal average of “SO ₂ slant column (window 3)” for 2025-02-13 to 2025-02-14.	51
45	Zonal average of “SO ₂ slant column precision (window 3)” for 2025-02-13 to 2025-02-14.	52
46	Zonal average of “Corrected SO ₂ slant column (window 3)” for 2025-02-13 to 2025-02-14.	53
47	Zonal average of “SO ₂ slant column background correction (window 3)” for 2025-02-13 to 2025-02-14.	54
48	Zonal average of “SO ₂ Cobra Flag” for 2025-02-13 to 2025-02-14.	55
49	Zonal average of “Integrated a priori SO ₂ profile” for 2025-02-13 to 2025-02-14.	56
50	Zonal average of “DOAS fit wavelength shift” for 2025-02-13 to 2025-02-14.	57
51	Zonal average of “DOAS fit wavelength squeeze” for 2025-02-13 to 2025-02-14.	58
52	Zonal average of “SO ₂ RMS” for 2025-02-13 to 2025-02-14.	59
53	Zonal average of “Total AMF (polluted)” for 2025-02-13 to 2025-02-14.	60
54	Zonal average of “Precision of total AMF (polluted)” for 2025-02-13 to 2025-02-14.	61
55	Zonal average of “Clear AMF (polluted)” for 2025-02-13 to 2025-02-14.	62
56	Zonal average of “Number of spectral points in retrieval” for 2025-02-13 to 2025-02-14.	63
57	Histogram of “QA value” for 2025-02-13 to 2025-02-14	64
58	Histogram of “SO ₂ vertical column” for 2025-02-13 to 2025-02-14	65
59	Histogram of “SO ₂ vertical column precision” for 2025-02-13 to 2025-02-14	66
60	Histogram of “Corrected SO ₂ slant column” for 2025-02-13 to 2025-02-14	67
61	Histogram of “Cobra SO ₂ slant column” for 2025-02-13 to 2025-02-14	68
62	Histogram of “SO ₂ slant column precision (Cobra)” for 2025-02-13 to 2025-02-14	69
63	Histogram of “SO ₂ slant column (window 1)” for 2025-02-13 to 2025-02-14	70
64	Histogram of “SO ₂ slant column precision (window 1)” for 2025-02-13 to 2025-02-14	71
65	Histogram of “Corrected SO ₂ slant column (window 1)” for 2025-02-13 to 2025-02-14	72
66	Histogram of “SO ₂ slant column background correction (window 1)” for 2025-02-13 to 2025-02-14	73
67	Histogram of “SO ₂ slant column (window 2)” for 2025-02-13 to 2025-02-14	74
68	Histogram of “SO ₂ slant column precision (window2)” for 2025-02-13 to 2025-02-14	75
69	Histogram of “Corrected SO ₂ slant column (window 2)” for 2025-02-13 to 2025-02-14	76
70	Histogram of “SO ₂ slant column background correction (window 2)” for 2025-02-13 to 2025-02-14	77
71	Histogram of “SO ₂ slant column (window 3)” for 2025-02-13 to 2025-02-14	78
72	Histogram of “SO ₂ slant column precision (window 3)” for 2025-02-13 to 2025-02-14	79
73	Histogram of “Corrected SO ₂ slant column (window 3)” for 2025-02-13 to 2025-02-14	80
74	Histogram of “SO ₂ slant column background correction (window 3)” for 2025-02-13 to 2025-02-14	81
75	Histogram of “SO ₂ Cobra Flag” for 2025-02-13 to 2025-02-14	82
76	Histogram of “Integrated a priori SO ₂ profile” for 2025-02-13 to 2025-02-14	83
77	Histogram of “DOAS fit wavelength shift” for 2025-02-13 to 2025-02-14	84
78	Histogram of “DOAS fit wavelength squeeze” for 2025-02-13 to 2025-02-14	85
79	Histogram of “SO ₂ RMS” for 2025-02-13 to 2025-02-14	86
80	Histogram of “Total AMF (polluted)” for 2025-02-13 to 2025-02-14	87
81	Histogram of “Precision of total AMF (polluted)” for 2025-02-13 to 2025-02-14	88
82	Histogram of “Clear AMF (polluted)” for 2025-02-13 to 2025-02-14	89
83	Histogram of “Number of spectral points in retrieval” for 2025-02-13 to 2025-02-14	90
84	Along track statistics of “QA value” for 2025-02-13 to 2025-02-14	91
85	Along track statistics of “SO ₂ vertical column” for 2025-02-13 to 2025-02-14	92
86	Along track statistics of “SO ₂ vertical column precision” for 2025-02-13 to 2025-02-14	93
87	Along track statistics of “Corrected SO ₂ slant column” for 2025-02-13 to 2025-02-14	94
88	Along track statistics of “Cobra SO ₂ slant column” for 2025-02-13 to 2025-02-14	95
89	Along track statistics of “SO ₂ slant column precision (Cobra)” for 2025-02-13 to 2025-02-14	96
90	Along track statistics of “SO ₂ slant column (window 1)” for 2025-02-13 to 2025-02-14	97
91	Along track statistics of “SO ₂ slant column precision (window 1)” for 2025-02-13 to 2025-02-14	98

92	Along track statistics of “Corrected SO ₂ slant column (window 1)” for 2025-02-13 to 2025-02-14	99
93	Along track statistics of “SO ₂ slant column background correction (window 1)” for 2025-02-13 to 2025-02-14	100
94	Along track statistics of “SO ₂ slant column (window 2)” for 2025-02-13 to 2025-02-14	101
95	Along track statistics of “SO ₂ slant column precision (window 2)” for 2025-02-13 to 2025-02-14	102
96	Along track statistics of “Corrected SO ₂ slant column (window 2)” for 2025-02-13 to 2025-02-14	103
97	Along track statistics of “SO ₂ slant column background correction (window 2)” for 2025-02-13 to 2025-02-14	104
98	Along track statistics of “SO ₂ slant column (window 3)” for 2025-02-13 to 2025-02-14	105
99	Along track statistics of “SO ₂ slant column precision (window 3)” for 2025-02-13 to 2025-02-14	106
100	Along track statistics of “Corrected SO ₂ slant column (window 3)” for 2025-02-13 to 2025-02-14	107
101	Along track statistics of “SO ₂ slant column background correction (window 3)” for 2025-02-13 to 2025-02-14	108
102	Along track statistics of “SO ₂ Cobra Flag” for 2025-02-13 to 2025-02-14	109
103	Along track statistics of “Integrated a priori SO ₂ profile” for 2025-02-13 to 2025-02-14	110
104	Along track statistics of “DOAS fit wavelength shift” for 2025-02-13 to 2025-02-14	111
105	Along track statistics of “DOAS fit wavelength squeeze” for 2025-02-13 to 2025-02-14	112
106	Along track statistics of “SO ₂ RMS” for 2025-02-13 to 2025-02-14	113
107	Along track statistics of “Total AMF (polluted)” for 2025-02-13 to 2025-02-14	114
108	Along track statistics of “Precision of total AMF (polluted)” for 2025-02-13 to 2025-02-14	115
109	Along track statistics of “Clear AMF (polluted)” for 2025-02-13 to 2025-02-14	116
110	Along track statistics of “Number of spectral points in retrieval” for 2025-02-13 to 2025-02-14	117

List of Tables

1	Parameterlist and basic statistics for the analysis	2
2	Percentile ranges	3
3	Parameterlist and basic statistics for the analysis for observations in the northern hemisphere	4
4	Parameterlist and basic statistics for the analysis for observations in the southern hemisphere	5
5	Parameterlist and basic statistics for the analysis for observations over water	6
6	Parameterlist and basic statistics for the analysis for observations over land	7

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