

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]	0.638 $\pm$ 0.408	17319825	0.995	0.790	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(6.234 \pm 190.694) \times 10^{-2}$	17319825	0.235	0.439	1.085×10^{-2}	-188	413
sulfurdioxide total vertical column precision [DU]	0.665 $\pm$ 1.341	17319825	0.222	0.369	0.306	3.870×10^{-2}	52.7
sulfurdioxide slant column density corrected [DU]	$(2.133 \pm 37.427) \times 10^{-2}$	17319825	0.242	0.352	9.573×10^{-3}	-13.8	165
sulfurdioxide slant column density cobra [DU]	$(2.123 \pm 36.645) \times 10^{-2}$	17319825	0.242	0.352	9.573×10^{-3}	-13.8	29.1
sulfurdioxide slant column density cobra precision [DU]	0.288 $\pm$ 0.142	17319825	0.188	0.144	0.240	7.751×10^{-2}	20.5
sulfurdioxide slant column density window1 [DU]	0.197 $\pm$ 0.693	17319825	0.225	0.729	0.209	-29.5	83.1
sulfurdioxide slant column density window1 precision [DU]	0.288 $\pm$ 0.142	17319825	0.188	0.144	0.240	7.751×10^{-2}	20.5
sulfurdioxide slant column density corrected win1 [DU]	$(2.491 \pm 67.900) \times 10^{-2}$	17319825	-2.500×10^{-2}	0.705	2.904×10^{-3}	-29.5	83.4
background so2 slant column offset window1 [DU]	-0.172 $\pm$ 0.188	17319825	-0.300	0.211	-0.217	-1.30	2.81
sulfurdioxide slant column density window2 [DU]	1.30 $\pm$ 8.91	17319825	0.750	11.2	1.06	-1.222×10^3	1.559×10^3
sulfurdioxide slant column density window2 precision [DU]	7.97 $\pm$ 2.20	17319825	6.97	2.52	7.61	2.28	504
sulfurdioxide slant column density corrected win2 [DU]	-2.18 $\pm$ 8.57	17319825	-1.75	10.8	-2.16	-1.223×10^3	1.554×10^3
background so2 slant column offset window2 [DU]	-3.48 $\pm$ 2.83	17319825	-1.75	3.20	-2.50	-15.6	8.29
sulfurdioxide slant column density window3 [DU]	-7.66 $\pm$ 24.02	17319825	-8.40	30.3	-7.82	-5.223×10^3	658
sulfurdioxide slant column density window3 precision [DU]	27.7 $\pm$ 12.9	17319825	21.5	9.57	24.2	9.48	1.009×10^3
sulfurdioxide slant column density corrected win3 [DU]	11.5 $\pm$ 23.0	17319825	10.6	29.0	11.4	-5.208×10^3	670
background so2 slant column offset window3 [DU]	19.2 $\pm$ 7.3	17319825	14.0	11.7	18.5	-4.20	41.5
sulfurdioxide slant column cobra flag [1]	1.97 $\pm$ 0.22	17319825	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(3.552 \pm 10.922) \times 10^{-2}$	17319825	1.664×10^{-2}	1.881×10^{-2}	1.708×10^{-2}	2.453×10^{-4}	4.15
fitted radiance shift [nm]	$(-3.061 \pm 25.616) \times 10^{-4}$	17319825	-5.000×10^{-4}	1.862×10^{-3}	-2.996×10^{-4}	-5.805×10^{-2}	4.842×10^{-2}
fitted radiance squeeze [1]	$(-3.212 \pm 18.399) \times 10^{-5}$	17319825	-1.000×10^{-5}	2.046×10^{-4}	-2.386×10^{-5}	-1.609×10^{-2}	1.725×10^{-2}
fitted root mean square [1]	$(1.265 \pm 0.583) \times 10^{-3}$	17319825	9.250×10^{-4}	5.651×10^{-4}	1.081×10^{-3}	3.255×10^{-4}	6.288×10^{-2}
sulfurdioxide total air mass factor polluted [1]	0.855 $\pm$ 0.485	17319825	0.740	0.575	0.781	5.000×10^{-2}	2.93
sulfurdioxide total air mass factor polluted precision [1]	0.127 $\pm$ 0.142	17319825	3.500×10^{-2}	0.134	7.181×10^{-2}	2.500×10^{-3}	1.97
sulfurdioxide clear air mass factor polluted [1]	0.735 $\pm$ 0.413	17319825	0.580	0.391	0.683	2.405×10^{-2}	2.96
number of spectral points in retrieval [1]	73.4 $\pm$ 0.5	17319825	73.0	1.000	73.0	52.0	74.0

Table 2: Percentile ranges

Variable	1 %	5 %	10 %	15.9 %	25 %	75 %	84.1 %	90 %	95 %	99 %
qa value [1]	0.0	0.0	5.000×10^{-2}	0.110	0.210	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	-3.69	-1.02	-0.554	-0.356	-0.204	0.235	0.404	0.633	1.19	4.63
sulfurdioxide total vertical column precision [DU]	9.089×10^{-2}	0.122	0.146	0.170	0.204	0.572	0.856	1.30	2.30	6.25
sulfurdioxide slant column density corrected [DU]	-0.863	-0.483	-0.346	-0.256	-0.164	0.188	0.286	0.385	0.548	1.09
sulfurdioxide slant column density cobra [DU]	-0.863	-0.483	-0.346	-0.256	-0.164	0.188	0.286	0.385	0.548	1.09
sulfurdioxide slant column density cobra precision [DU]	0.134	0.160	0.173	0.183	0.197	0.341	0.397	0.458	0.552	0.832
sulfurdioxide slant column density window1 [DU]	-1.72	-0.870	-0.562	-0.363	-0.162	0.568	0.756	0.937	1.22	2.04
sulfurdioxide slant column density window1 precision [DU]	0.134	0.160	0.173	0.183	0.197	0.341	0.397	0.458	0.552	0.832
sulfurdioxide slant column density corrected win1 [DU]	-1.67	-0.954	-0.695	-0.524	-0.344	0.361	0.558	0.757	1.08	2.03
background so2 slant column offset window1 [DU]	-0.413	-0.372	-0.351	-0.330	-0.302	-9.153×10^{-2}	-1.028×10^{-2}	7.569×10^{-2}	0.181	0.436
sulfurdioxide slant column density window2 [DU]	-19.2	-12.7	-9.54	-7.15	-4.46	6.77	9.70	12.4	16.1	24.2
sulfurdioxide slant column density window2 precision [DU]	4.29	5.14	5.64	6.04	6.52	9.03	9.91	10.8	12.0	14.6
sulfurdioxide slant column density corrected win2 [DU]	-23.0	-16.1	-12.8	-10.3	-7.60	3.25	5.95	8.37	11.7	18.6
background so2 slant column offset window2 [DU]	-11.8	-9.65	-7.87	-6.30	-4.73	-1.53	-1.29	-1.08	-0.768	0.596
sulfurdioxide slant column density window3 [DU]	-66.8	-46.7	-37.2	-30.4	-22.8	7.51	15.4	22.5	32.0	50.7
sulfurdioxide slant column density window3 precision [DU]	14.0	16.3	17.8	19.0	20.5	30.1	34.8	40.6	52.1	83.0
sulfurdioxide slant column density corrected win3 [DU]	-45.6	-26.0	-16.8	-10.2	-2.95	26.1	33.5	40.2	49.2	67.4
background so2 slant column offset window3 [DU]	6.12	8.59	9.97	11.3	13.2	24.9	27.4	29.3	31.5	34.9
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]	2.328×10^{-3}	4.106×10^{-3}	5.972×10^{-3}	7.831×10^{-3}	1.031×10^{-2}	2.912×10^{-2}	3.867×10^{-2}	5.446×10^{-2}	0.101	0.370
fitted radiance shift [nm]	-7.946×10^{-3}	-4.102×10^{-3}	-2.745×10^{-3}	-1.964×10^{-3}	-1.281×10^{-3}	5.808×10^{-4}	1.282×10^{-3}	2.146×10^{-3}	3.623×10^{-3}	7.701×10^{-3}
fitted radiance squeeze [1]	-5.548×10^{-4}	-3.334×10^{-4}	-2.457×10^{-4}	-1.880×10^{-4}	-1.294×10^{-4}	7.514×10^{-5}	1.252×10^{-4}	1.719×10^{-4}	2.401×10^{-4}	4.153×10^{-4}
fitted root mean square [1]	5.822×10^{-4}	7.110×10^{-4}	7.803×10^{-4}	8.334×10^{-4}	8.986×10^{-4}	1.464×10^{-3}	1.717×10^{-3}	1.972×10^{-3}	2.388×10^{-3}	3.398×10^{-3}
sulfurdioxide total air mass factor polluted [1]	6.436×10^{-2}	0.179	0.289	0.391	0.520	1.09	1.31	1.53	1.82	2.34
sulfurdioxide total air mass factor polluted precision [1]	7.003×10^{-3}	1.440×10^{-2}	2.201×10^{-2}	2.852×10^{-2}	3.653×10^{-2}	0.170	0.230	0.294	0.402	0.663
sulfurdioxide clear air mass factor polluted [1]	0.119	0.235	0.324	0.401	0.489	0.880	0.991	1.09	1.34	2.57
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]	0.665 ± 0.402	7600574	0.770	1.000	0.0	1.000	0.230	1.000
sulfurdioxide total vertical column [DU]	0.119 ± 2.781	7600574	0.587	1.546×10^{-2}	-188	413	-0.267	0.320
sulfurdioxide total vertical column precision [DU]	1.02 ± 1.89	7600574	0.721	0.410	4.534×10^{-2}	52.7	0.243	0.965
sulfurdioxide slant column density corrected [DU]	$(3.101 \pm 44.922) \times 10^{-2}$	7600574	0.394	1.200×10^{-2}	-11.3	165	-0.181	0.212
sulfurdioxide slant column density cobra [DU]	$(3.082 \pm 43.668) \times 10^{-2}$	7600574	0.394	1.200×10^{-2}	-11.3	19.7	-0.181	0.212
sulfurdioxide slant column density cobra precision [DU]	0.329 ± 0.173	7600574	0.193	0.274	8.093×10^{-2}	10.9	0.208	0.401
sulfurdioxide slant column density window1 [DU]	0.231 ± 0.804	7600574	0.801	0.245	-13.2	83.1	-0.160	0.641
sulfurdioxide slant column density window1 precision [DU]	0.329 ± 0.173	7600574	0.193	0.274	8.093×10^{-2}	10.9	0.208	0.401
sulfurdioxide slant column density corrected win1 [DU]	$(4.670 \pm 79.703) \times 10^{-2}$	7600574	0.786	1.189×10^{-2}	-12.5	83.4	-0.371	0.415
background so2 slant column offset window1 [DU]	-0.184 ± 0.210	7600574	0.211	-0.234	-0.599	2.81	-0.322	-0.112
sulfurdioxide slant column density window2 [DU]	2.17 ± 9.53	7600574	12.1	1.81	-1.131×10^3	105	-4.09	8.02
sulfurdioxide slant column density window2 precision [DU]	8.39 ± 2.26	7600574	2.75	8.03	2.28	504	6.84	9.59
sulfurdioxide slant column density corrected win2 [DU]	-2.29 ± 9.01	7600574	11.5	-2.28	-1.143×10^3	96.5	-8.02	3.43
background so2 slant column offset window2 [DU]	-4.47 ± 3.51	7600574	5.74	-3.10	-15.6	8.29	-7.37	-1.63
sulfurdioxide slant column density window3 [DU]	-10.5 ± 24.5	7600574	31.1	-10.3	-338	156	-25.9	5.21
sulfurdioxide slant column density window3 precision [DU]	28.8 ± 13.1	7600574	9.65	25.3	9.83	237	21.6	31.2
sulfurdioxide slant column density corrected win3 [DU]	11.4 ± 23.7	7600574	30.0	11.6	-313	184	-3.46	26.6
background so2 slant column offset window3 [DU]	21.9 ± 7.0	7600574	12.0	21.7	-2.653×10^{-6}	41.5	15.7	27.7
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.25	7600574	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(5.655 \pm 16.078) \times 10^{-2}$	7600574	3.276×10^{-2}	2.066×10^{-2}	2.453×10^{-4}	4.15	1.111×10^{-2}	4.386×10^{-2}
fitted radiance shift [nm]	$(-1.625 \pm 25.622) \times 10^{-4}$	7600574	1.762×10^{-3}	-1.482×10^{-4}	-4.204×10^{-2}	3.860×10^{-2}	-1.066×10^{-3}	6.966×10^{-4}
fitted radiance squeeze [1]	$(-1.687 \pm 20.809) \times 10^{-5}$	7600574	2.207×10^{-4}	-8.077×10^{-6}	-7.608×10^{-3}	1.295×10^{-2}	-1.210×10^{-4}	9.968×10^{-5}
fitted root mean square [1]	$(1.426 \pm 0.711) \times 10^{-3}$	7600574	7.666×10^{-4}	1.183×10^{-3}	3.507×10^{-4}	3.252×10^{-2}	9.492×10^{-4}	1.716×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.712 ± 0.420	7600574	0.563	0.677	5.000×10^{-2}	2.74	0.390	0.954
sulfurdioxide total air mass factor polluted precision [1]	0.105 ± 0.151	7600574	9.557×10^{-2}	5.043×10^{-2}	2.500×10^{-3}	1.97	2.814×10^{-2}	0.124
sulfurdioxide clear air mass factor polluted [1]	0.604 ± 0.299	7600574	0.457	0.590	2.405×10^{-2}	2.33	0.361	0.817
number of spectral points in retrieval [1]	73.5 ± 0.5	7600574	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]	0.618 ± 0.412	9719251	0.800	1.000	0.0	1.000	0.200	1.000
sulfurdioxide total vertical column [DU]	$(1.765 \pm 65.342) \times 10^{-2}$	9719251	0.364	8.374×10^{-3}	-44.9	74.9	-0.172	0.192
sulfurdioxide total vertical column precision [DU]	0.384 ± 0.475	9719251	0.240	0.263	3.870×10^{-2}	35.6	0.182	0.421
sulfurdioxide slant column density corrected [DU]	$(1.376 \pm 30.280) \times 10^{-2}$	9719251	0.324	7.974×10^{-3}	-13.8	90.6	-0.153	0.171
sulfurdioxide slant column density cobra [DU]	$(1.374 \pm 30.008) \times 10^{-2}$	9719251	0.324	7.974×10^{-3}	-13.8	29.1	-0.153	0.171
sulfurdioxide slant column density cobra precision [DU]	0.256 ± 0.102	9719251	0.105	0.224	7.751×10^{-2}	20.5	0.190	0.295
sulfurdioxide slant column density window1 [DU]	0.170 ± 0.591	9719251	0.680	0.185	-29.5	58.6	-0.162	0.517
sulfurdioxide slant column density window1 precision [DU]	0.256 ± 0.102	9719251	0.105	0.224	7.751×10^{-2}	20.5	0.190	0.295
sulfurdioxide slant column density corrected win1 [DU]	$(7.862 \pm 569.334) \times 10^{-3}$	9719251	0.651	-3.036×10^{-3}	-29.5	58.4	-0.326	0.325
background so2 slant column offset window1 [DU]	-0.162 ± 0.168	9719251	0.214	-0.204	-1.30	2.29	-0.289	-7.518×10^{-2}
sulfurdioxide slant column density window2 [DU]	0.610 ± 8.331	9719251	10.6	0.551	-1.222×10^3	1.559×10^3	-4.71	5.87
sulfurdioxide slant column density window2 precision [DU]	7.63 ± 2.10	9719251	2.26	7.32	2.31	447	6.32	8.57
sulfurdioxide slant column density corrected win2 [DU]	-2.09 ± 8.21	9719251	10.4	-2.08	-1.223×10^3	1.554×10^3	-7.29	3.12
background so2 slant column offset window2 [DU]	-2.70 ± 1.81	9719251	2.24	-2.26	-11.3	8.22	-3.71	-1.48
sulfurdioxide slant column density window3 [DU]	-5.43 ± 23.41	9719251	29.6	-5.96	-5.223×10^3	658	-20.4	9.17
sulfurdioxide slant column density window3 precision [DU]	26.9 ± 12.8	9719251	9.19	23.2	9.48	1.009×10^3	19.8	29.0
sulfurdioxide slant column density corrected win3 [DU]	11.6 ± 22.5	9719251	28.3	11.3	-5.208×10^3	670	-2.58	25.7
background so2 slant column offset window3 [DU]	17.0 ± 6.8	9719251	11.4	16.0	-4.20	38.0	11.2	22.6
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.19	9719251	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(1.907 \pm 2.057) \times 10^{-2}$	9719251	1.328×10^{-2}	1.559×10^{-2}	9.216×10^{-4}	1.13	9.899×10^{-3}	2.318×10^{-2}
fitted radiance shift [nm]	$(-4.184 \pm 25.555) \times 10^{-4}$	9719251	1.898×10^{-3}	-4.259×10^{-4}	-5.805×10^{-2}	4.842×10^{-2}	-1.426×10^{-3}	4.720×10^{-4}
fitted radiance squeeze [1]	$(-4.404 \pm 16.168) \times 10^{-5}$	9719251	1.926×10^{-4}	-3.464×10^{-5}	-1.609×10^{-2}	1.725×10^{-2}	-1.350×10^{-4}	5.756×10^{-5}
fitted root mean square [1]	$(1.138 \pm 0.416) \times 10^{-3}$	9719251	4.403×10^{-4}	1.024×10^{-3}	3.255×10^{-4}	6.288×10^{-2}	8.691×10^{-4}	1.309×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.966 ± 0.503	9719251	0.610	0.862	5.000×10^{-2}	2.93	0.614	1.22
sulfurdioxide total air mass factor polluted precision [1]	0.143 ± 0.132	9719251	0.157	9.942×10^{-2}	5.256×10^{-3}	1.57	4.396×10^{-2}	0.201
sulfurdioxide clear air mass factor polluted [1]	0.838 ± 0.458	9719251	0.363	0.732	0.144	2.96	0.570	0.934
number of spectral points in retrieval [1]	73.4 ± 0.5	9719251	1.000	73.0	70.0	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]	0.671 ± 0.402	12531706	0.750	1.000	0.0	1.000	0.250	1.000
sulfurdioxide total vertical column [DU]	$(3.450 \pm 133.727) \times 10^{-2}$	12531706	0.409	9.114×10^{-3}	-188	273	-0.193	0.216
sulfurdioxide total vertical column precision [DU]	0.529 ± 0.950	12531706	0.290	0.284	4.534×10^{-2}	50.8	0.201	0.491
sulfurdioxide slant column density corrected [DU]	$(1.594 \pm 34.089) \times 10^{-2}$	12531706	0.335	8.019×10^{-3}	-11.3	165	-0.158	0.177
sulfurdioxide slant column density cobra [DU]	$(1.585 \pm 33.121) \times 10^{-2}$	12531706	0.335	8.019×10^{-3}	-11.3	26.4	-0.158	0.177
sulfurdioxide slant column density cobra precision [DU]	0.270 ± 0.126	12531706	0.121	0.227	7.890×10^{-2}	13.0	0.193	0.313
sulfurdioxide slant column density window1 [DU]	0.194 ± 0.638	12531706	0.692	0.205	-29.2	83.1	-0.146	0.546
sulfurdioxide slant column density window1 precision [DU]	0.270 ± 0.126	12531706	0.121	0.227	7.890×10^{-2}	13.0	0.193	0.313
sulfurdioxide slant column density corrected win1 [DU]	$(9.545 \pm 624.458) \times 10^{-3}$	12531706	0.671	-5.837×10^{-3}	-29.2	83.4	-0.337	0.333
background so2 slant column offset window1 [DU]	-0.184 ± 0.167	12531706	0.198	-0.219	-0.901	2.81	-0.302	-0.105
sulfurdioxide slant column density window2 [DU]	0.822 ± 8.592	12531706	10.8	0.654	-1.222×10^3	1.559×10^3	-4.71	6.13
sulfurdioxide slant column density window2 precision [DU]	7.78 ± 2.09	12531706	2.38	7.44	2.31	504	6.40	8.78
sulfurdioxide slant column density corrected win2 [DU]	-2.23 ± 8.37	12531706	10.6	-2.21	-1.223×10^3	1.554×10^3	-7.54	3.09
background so2 slant column offset window2 [DU]	-3.05 ± 2.43	12531706	2.46	-2.33	-15.6	8.29	-3.96	-1.50
sulfurdioxide slant column density window3 [DU]	-4.76 ± 23.61	12531706	30.0	-5.10	-606	208	-19.8	10.2
sulfurdioxide slant column density window3 precision [DU]	27.1 ± 12.3	12531706	9.18	23.7	9.48	214	20.3	29.5
sulfurdioxide slant column density corrected win3 [DU]	13.5 ± 22.5	12531706	28.6	13.2	-590	234	-0.881	27.8
background so2 slant column offset window3 [DU]	18.3 ± 6.8	12531706	10.4	17.6	-4.20	41.5	12.9	23.4
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.18	12531706	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.329 \pm 3.700) \times 10^{-2}$	12531706	1.480×10^{-2}	1.668×10^{-2}	2.797×10^{-4}	2.18	1.093×10^{-2}	2.572×10^{-2}
fitted radiance shift [nm]	$(-2.752 \pm 24.315) \times 10^{-4}$	12531706	1.843×10^{-3}	-2.421×10^{-4}	-3.820×10^{-2}	4.842×10^{-2}	-1.230×10^{-3}	6.129×10^{-4}
fitted radiance squeeze [1]	$(-3.215 \pm 17.153) \times 10^{-5}$	12531706	1.939×10^{-4}	-2.353×10^{-5}	-1.609×10^{-2}	1.725×10^{-2}	-1.236×10^{-4}	7.032×10^{-5}
fitted root mean square [1]	$(1.192 \pm 0.522) \times 10^{-3}$	12531706	4.583×10^{-4}	1.031×10^{-3}	3.255×10^{-4}	5.245×10^{-2}	8.785×10^{-4}	1.337×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.857 ± 0.416	12531706	0.505	0.810	5.000×10^{-2}	2.74	0.577	1.08
sulfurdioxide total air mass factor polluted precision [1]	0.121 ± 0.118	12531706	0.124	7.460×10^{-2}	2.500×10^{-3}	1.60	4.037×10^{-2}	0.165
sulfurdioxide clear air mass factor polluted [1]	0.722 ± 0.276	12531706	0.343	0.707	4.321×10^{-2}	2.74	0.534	0.876
number of spectral points in retrieval [1]	73.4 ± 0.5	12531706	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]	0.574 ± 0.416	3850188	0.850	0.490	0.0	1.000	0.150	1.000
sulfurdioxide total vertical column [DU]	0.121 ± 2.755	3850188	0.519	1.487×10^{-2}	-142	413	-0.233	0.286
sulfurdioxide total vertical column precision [DU]	0.925 ± 1.877	3850188	0.622	0.376	3.870×10^{-2}	48.9	0.206	0.827
sulfurdioxide slant column density corrected [DU]	$(3.378 \pm 44.107) \times 10^{-2}$	3850188	0.399	1.380×10^{-2}	-7.50	47.0	-0.182	0.217
sulfurdioxide slant column density cobra [DU]	$(3.365 \pm 43.612) \times 10^{-2}$	3850188	0.399	1.380×10^{-2}	-7.50	21.5	-0.182	0.217
sulfurdioxide slant column density cobra precision [DU]	0.328 ± 0.166	3850188	0.172	0.284	7.751×10^{-2}	13.8	0.216	0.388
sulfurdioxide slant column density window1 [DU]	0.199 ± 0.804	3850188	0.834	0.216	-23.9	44.5	-0.212	0.622
sulfurdioxide slant column density window1 precision [DU]	0.328 ± 0.166	3850188	0.172	0.284	7.751×10^{-2}	13.8	0.216	0.388
sulfurdioxide slant column density corrected win1 [DU]	$(5.852 \pm 78.488) \times 10^{-2}$	3850188	0.796	2.617×10^{-2}	-23.9	44.3	-0.363	0.433
background so2 slant column offset window1 [DU]	-0.140 ± 0.231	3850188	0.260	-0.210	-1.30	2.67	-0.302	-4.176×10^{-2}
sulfurdioxide slant column density window2 [DU]	2.37 ± 9.53	3850188	12.1	2.12	-770	836	-3.81	8.29
sulfurdioxide slant column density window2 precision [DU]	8.41 ± 2.39	3850188	2.70	8.04	2.28	417	6.87	9.56
sulfurdioxide slant column density corrected win2 [DU]	-1.89 ± 9.00	3850188	11.4	-1.88	-772	834	-7.58	3.79
background so2 slant column offset window2 [DU]	-4.26 ± 3.23	3850188	5.01	-3.22	-15.5	8.29	-6.61	-1.59
sulfurdioxide slant column density window3 [DU]	-15.3 ± 23.3	3850188	29.3	-15.0	-671	658	-29.8	-0.487
sulfurdioxide slant column density window3 precision [DU]	29.2 ± 14.5	3850188	10.1	25.4	9.85	519	21.1	31.3
sulfurdioxide slant column density corrected win3 [DU]	5.60 ± 23.44	3850188	29.3	6.14	-662	670	-8.79	20.6
background so2 slant column offset window3 [DU]	20.9 ± 8.0	3850188	13.9	21.7	-4.20	41.5	13.8	27.7
sulfurdioxide slant column cobra flag [1]	1.95 ± 0.30	3850188	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(6.362 \pm 18.868) \times 10^{-2}$	3850188	4.157×10^{-2}	1.921×10^{-2}	2.453×10^{-4}	4.15	7.546×10^{-3}	4.911×10^{-2}
fitted radiance shift [nm]	$(-4.264 \pm 28.949) \times 10^{-4}$	3850188	1.791×10^{-3}	-5.084×10^{-4}	-4.204×10^{-2}	3.808×10^{-2}	-1.401×10^{-3}	3.903×10^{-4}
fitted radiance squeeze [1]	$(-4.502 \pm 20.381) \times 10^{-5}$	3850188	2.321×10^{-4}	-3.369×10^{-5}	-9.968×10^{-3}	1.276×10^{-2}	-1.552×10^{-4}	7.694×10^{-5}
fitted root mean square [1]	$(1.427 \pm 0.663) \times 10^{-3}$	3850188	6.824×10^{-4}	1.255×10^{-3}	3.478×10^{-4}	4.391×10^{-2}	9.904×10^{-4}	1.673×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.890 ± 0.652	3850188	0.836	0.680	5.000×10^{-2}	2.93	0.403	1.24
sulfurdioxide total air mass factor polluted precision [1]	0.147 ± 0.191	3850188	0.170	6.309×10^{-2}	2.500×10^{-3}	1.97	2.667×10^{-2}	0.197
sulfurdioxide clear air mass factor polluted [1]	0.820 ± 0.684	3850188	0.580	0.604	2.432×10^{-2}	2.96	0.369	0.949
number of spectral points in retrieval [1]	73.4 ± 0.5	3850188	1.000	73.0	52.0	74.0	73.0	74.0

3 Granule outlines

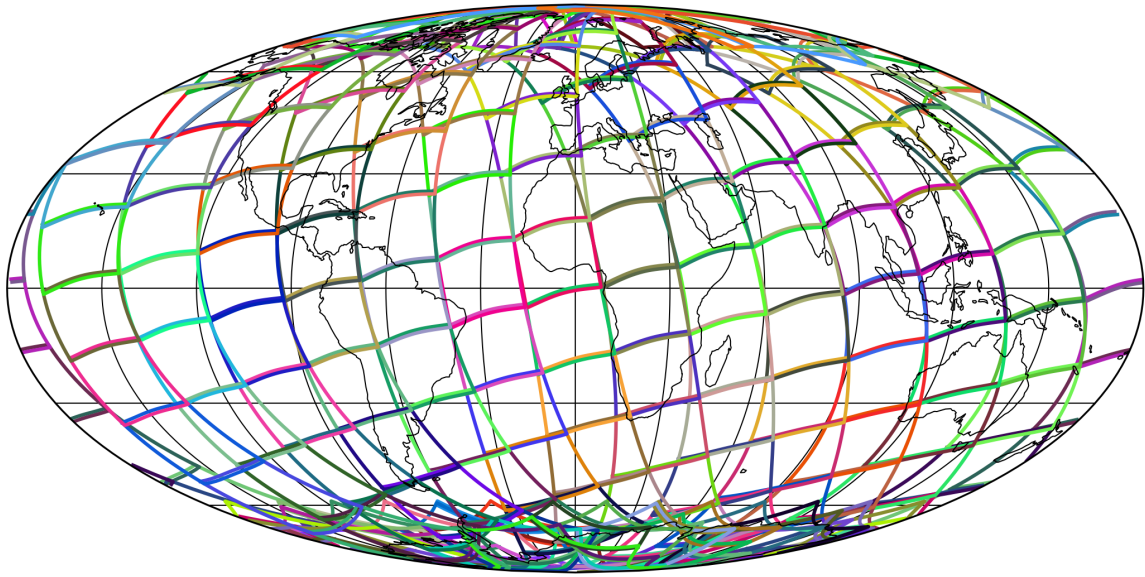


Figure 1: Outline of the granules.

4 Input data monitoring

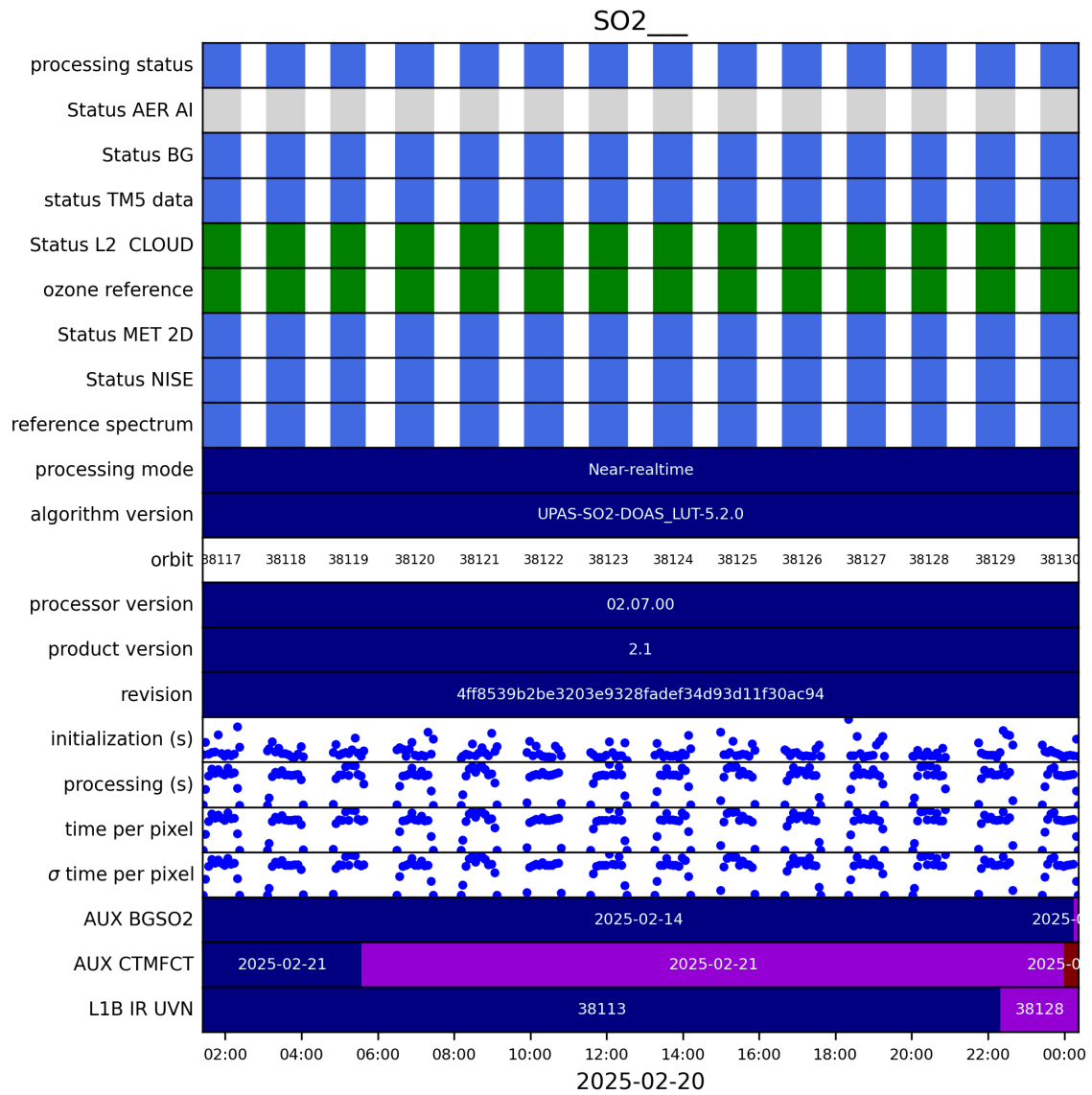


Figure 2: Input data per granule

5 Warnings and errors

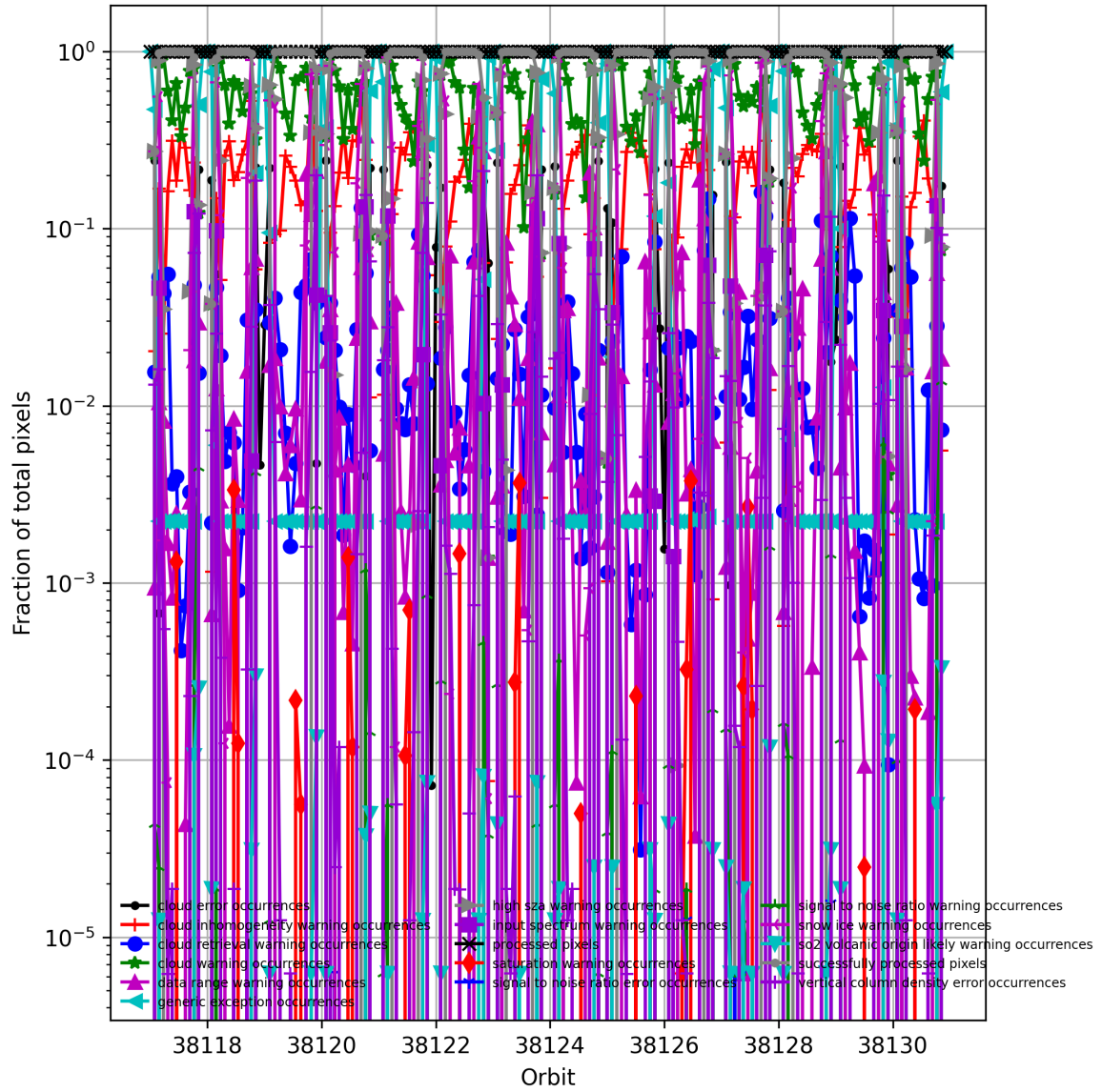


Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

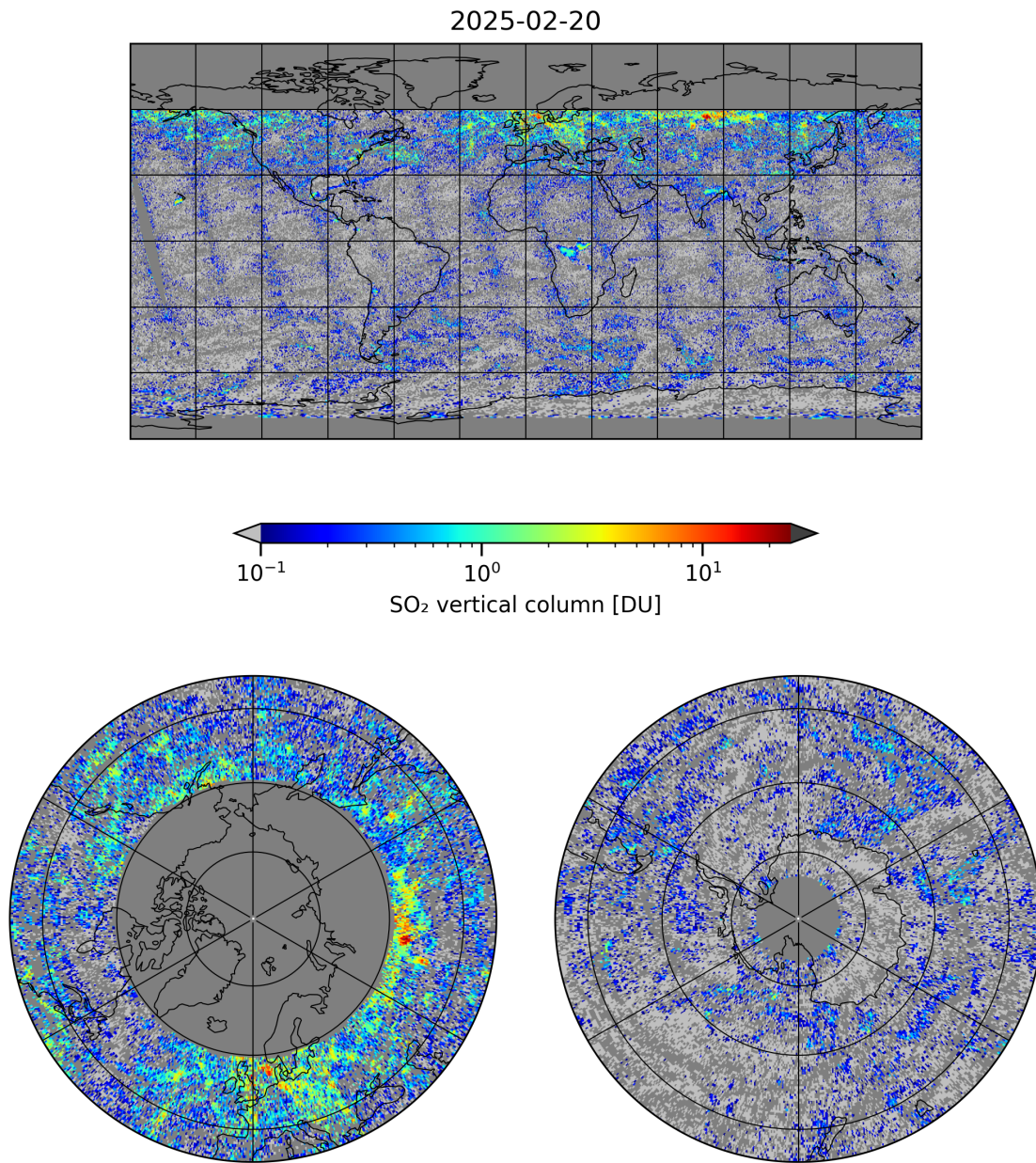


Figure 4: Map of “SO₂ vertical column” for 2025-02-20 to 2025-02-21

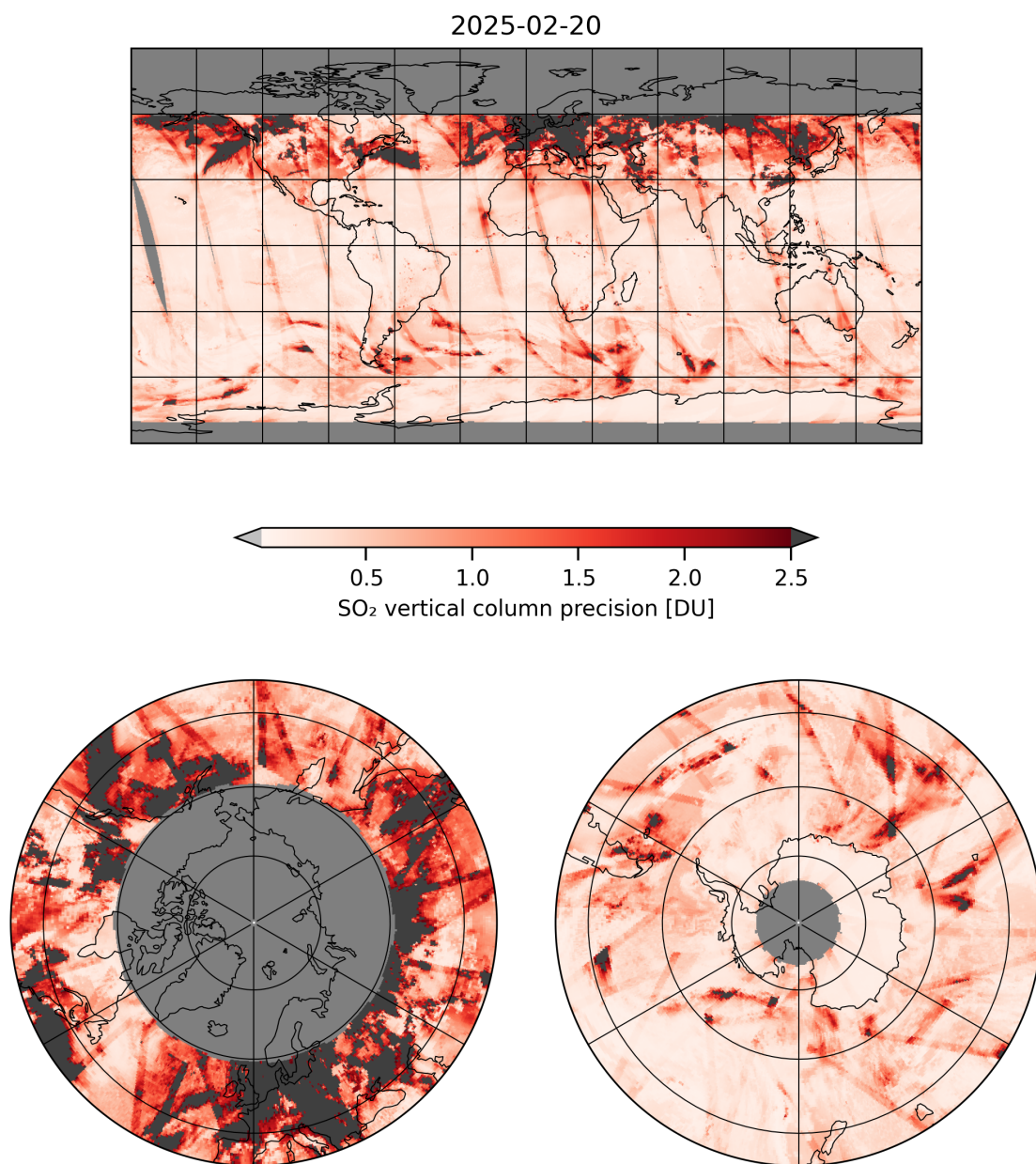


Figure 5: Map of “SO₂ vertical column precision” for 2025-02-20 to 2025-02-21

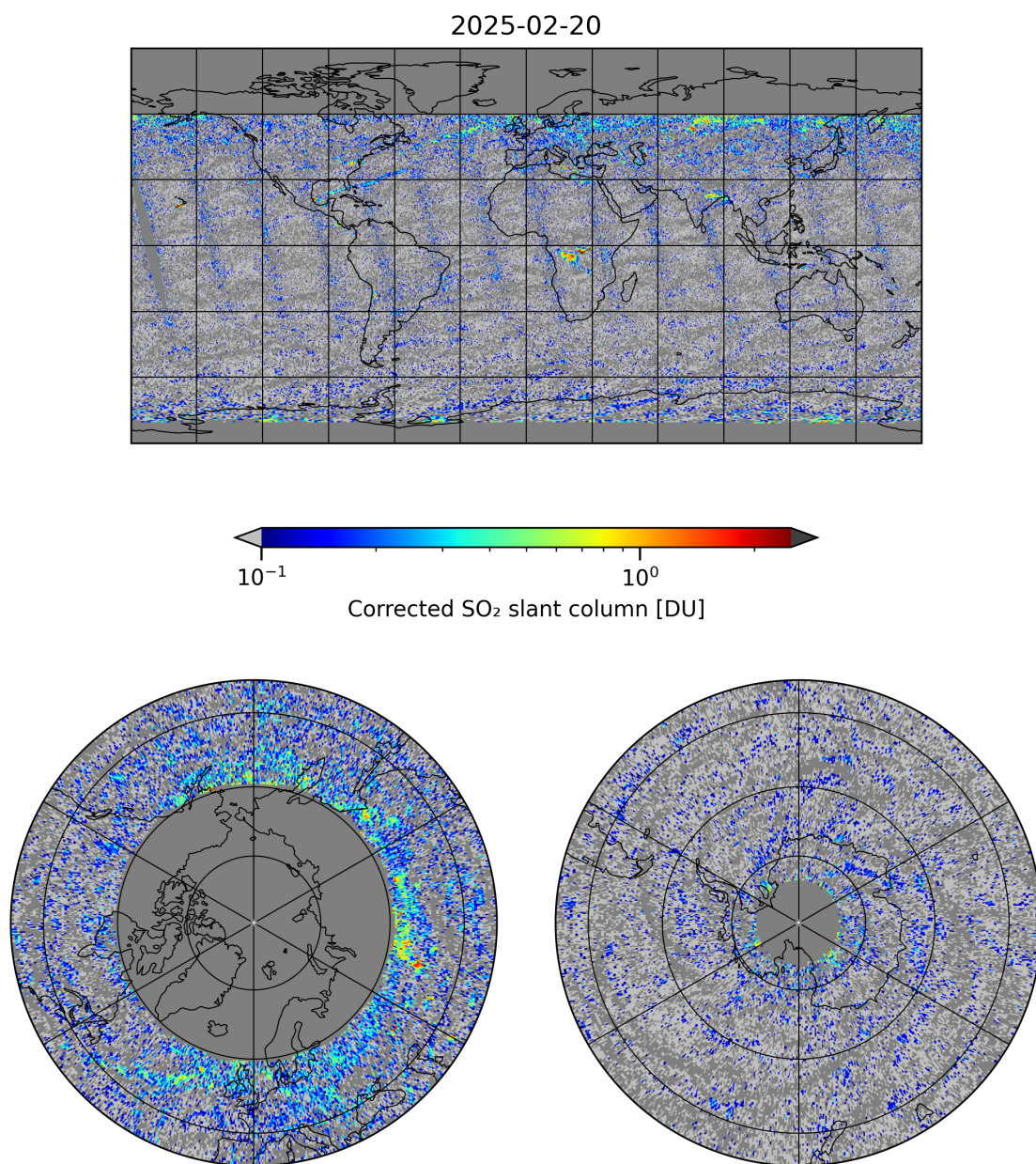


Figure 6: Map of “Corrected SO₂ slant column” for 2025-02-20 to 2025-02-21

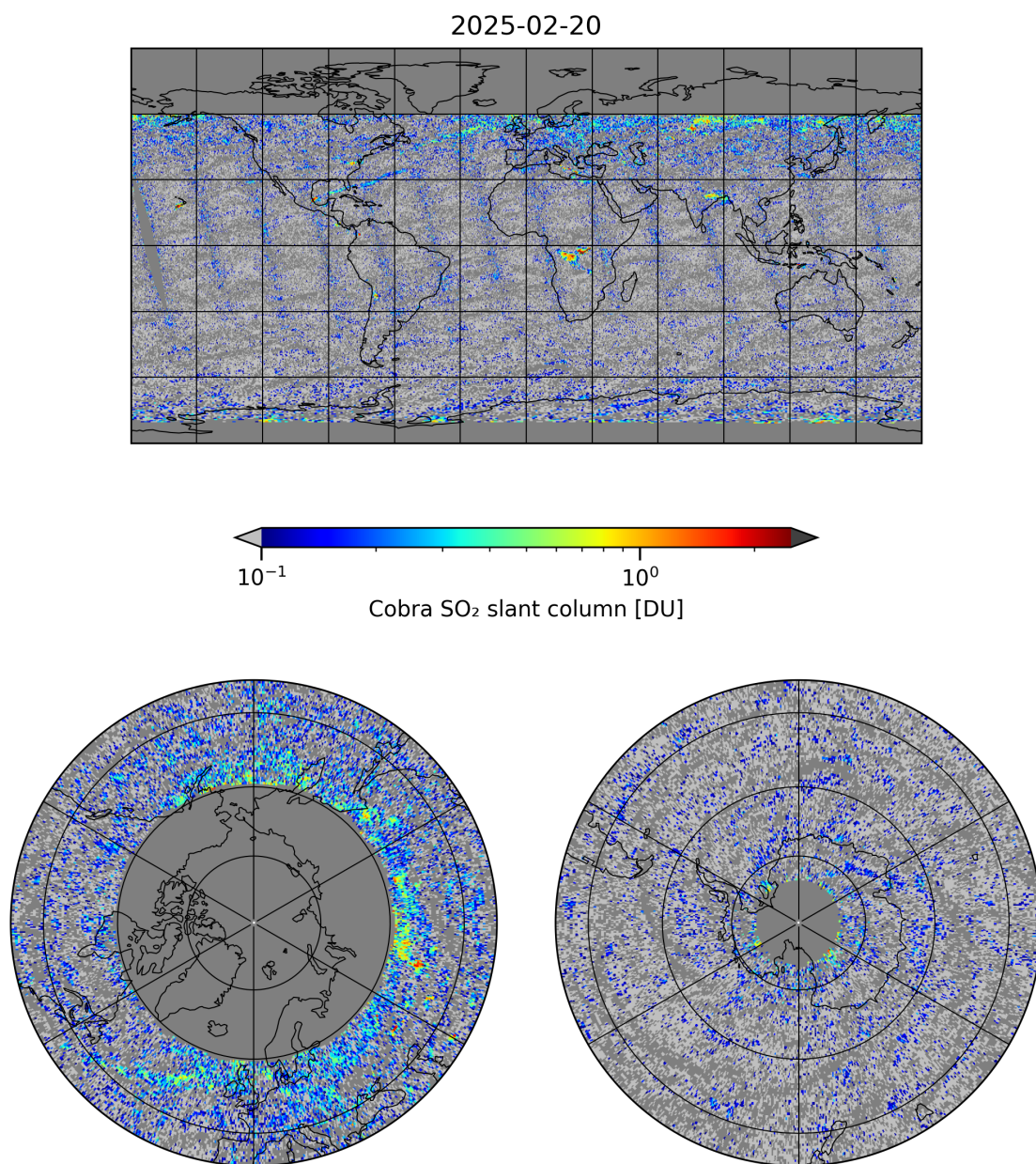


Figure 7: Map of “Cobra SO₂ slant column” for 2025-02-20 to 2025-02-21

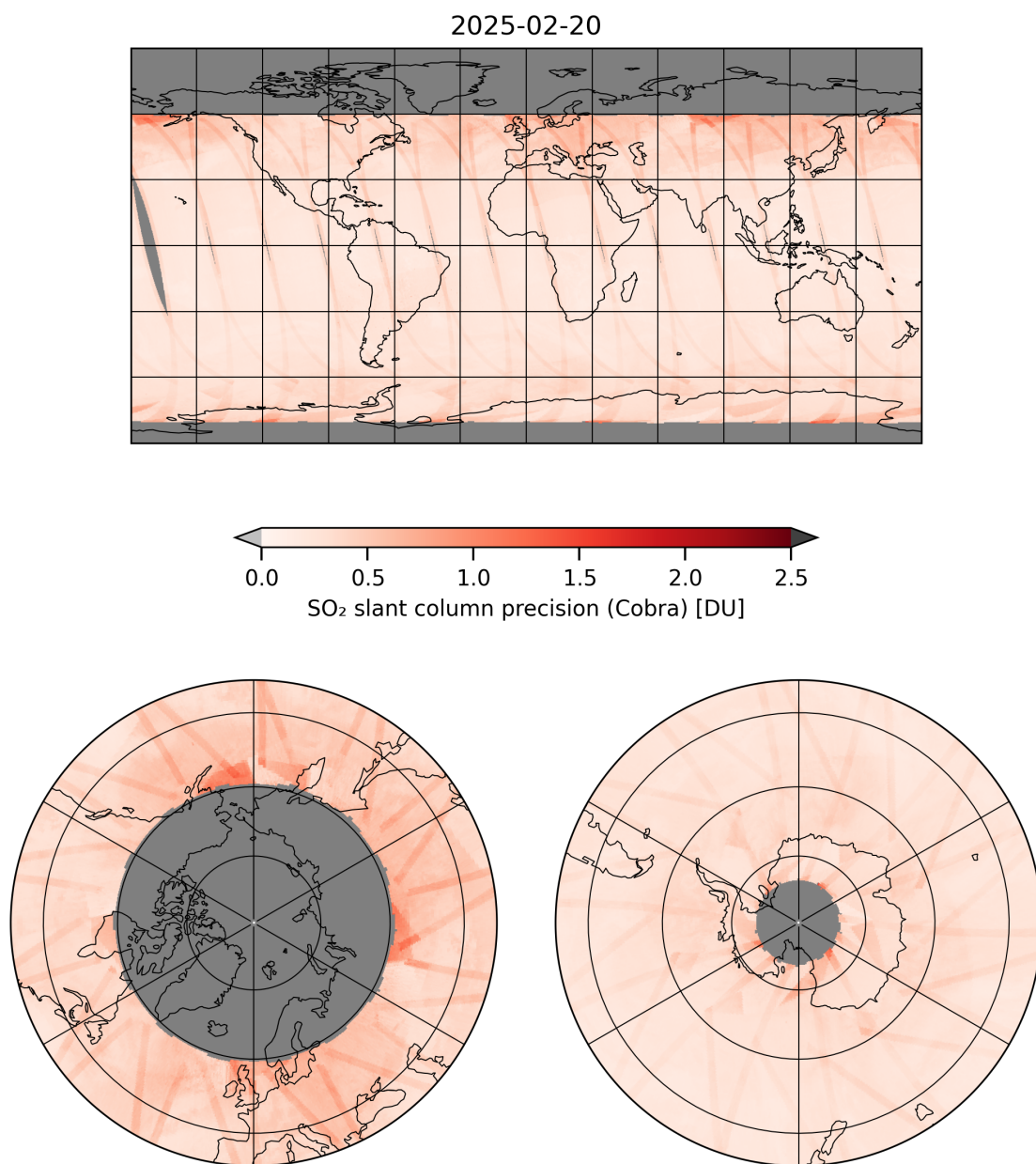


Figure 8: Map of “SO₂ slant column precision (Cobra)” for 2025-02-20 to 2025-02-21

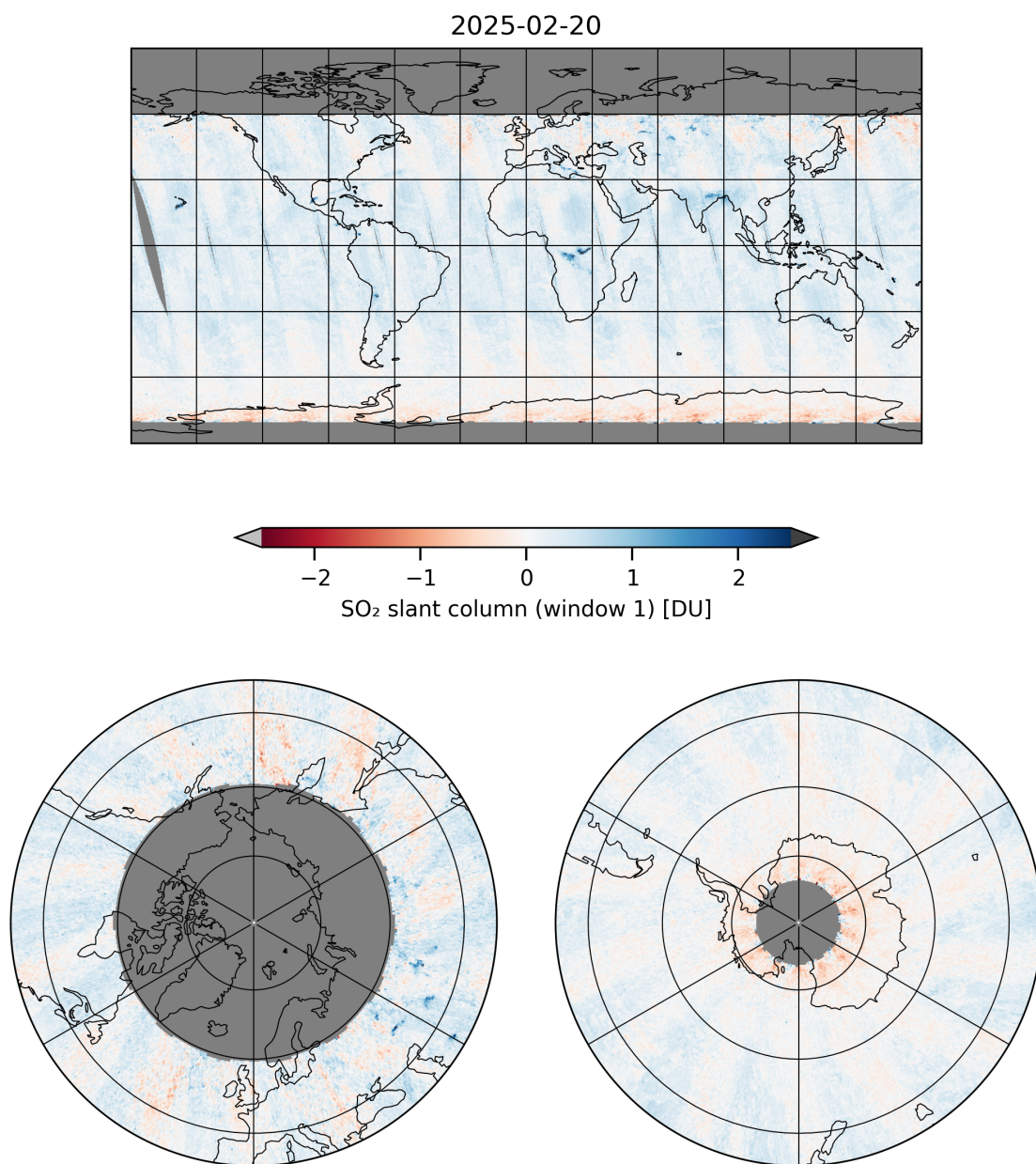


Figure 9: Map of “SO₂ slant column (window 1)” for 2025-02-20 to 2025-02-21

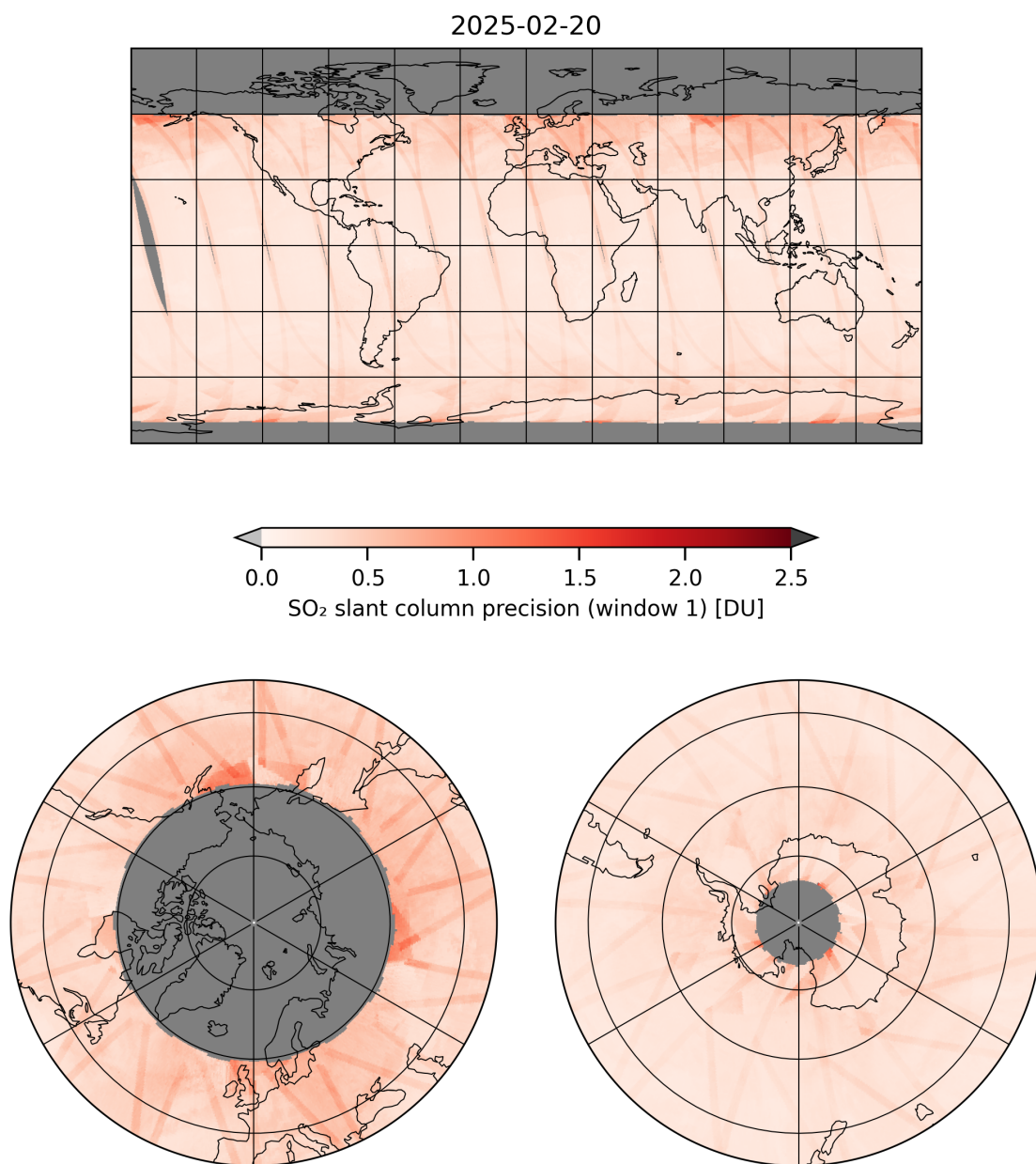


Figure 10: Map of “SO₂ slant column precision (window 1)” for 2025-02-20 to 2025-02-21

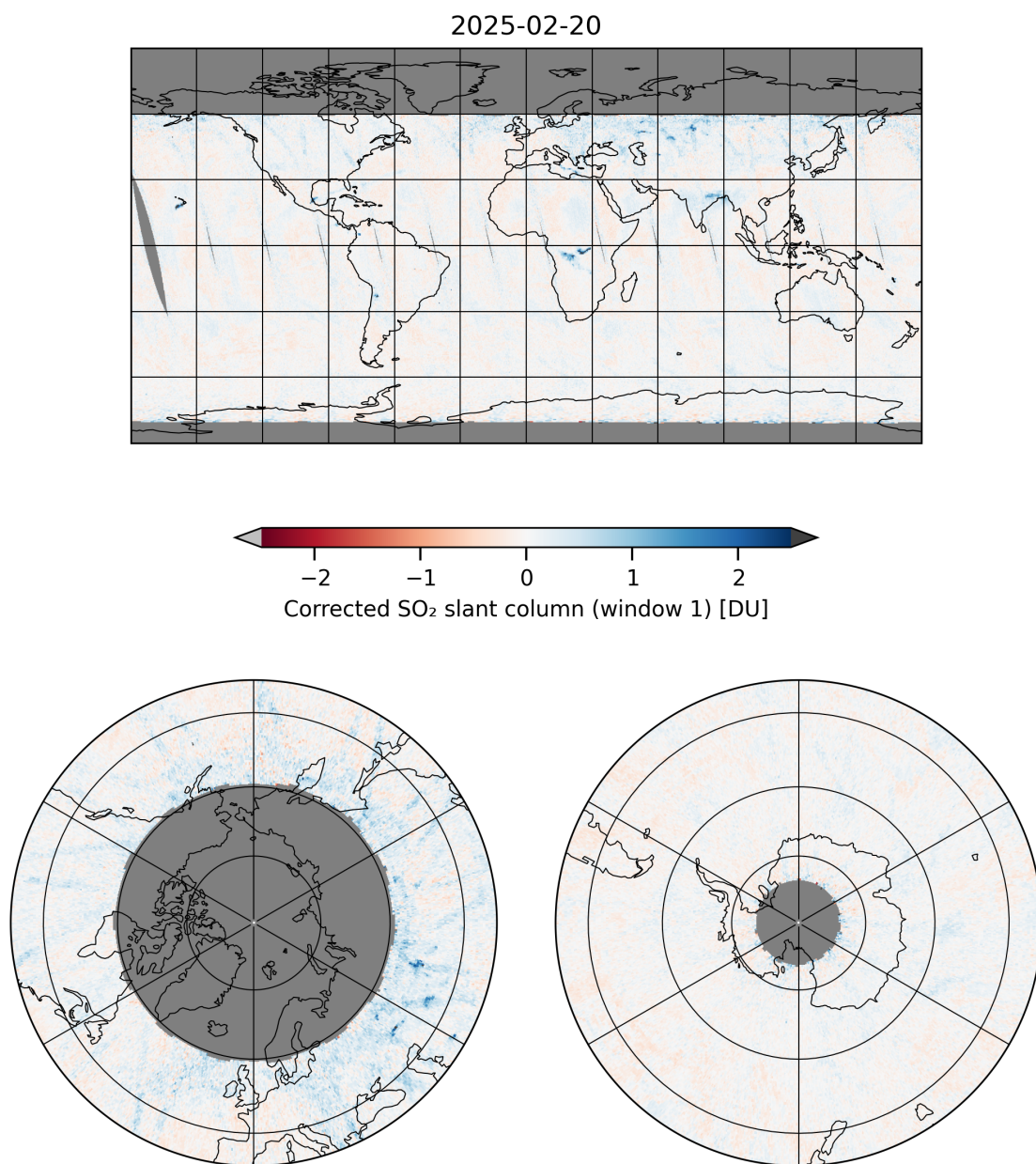


Figure 11: Map of “Corrected SO₂ slant column (window 1)” for 2025-02-20 to 2025-02-21

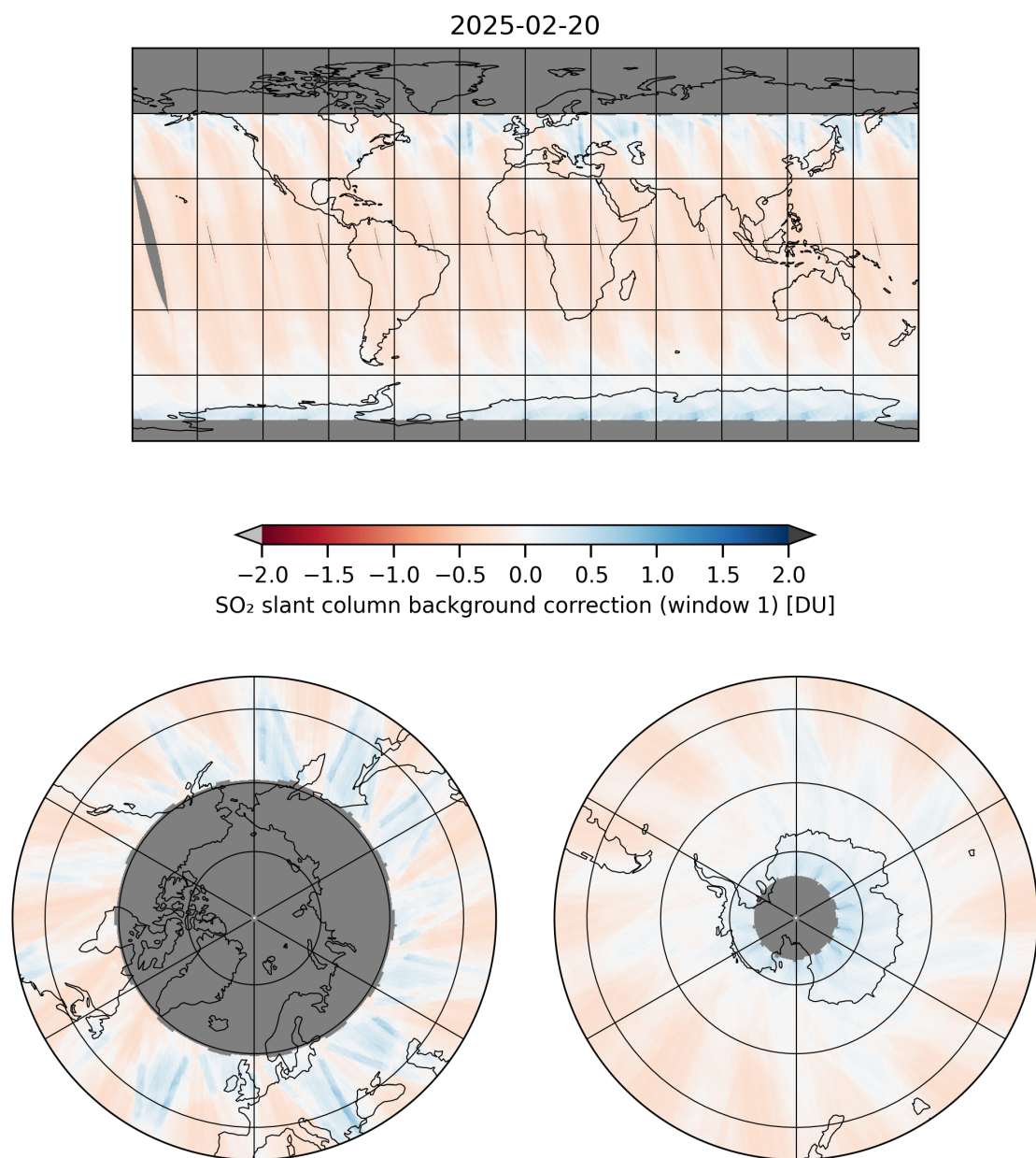


Figure 12: Map of “SO₂ slant column background correction (window 1)” for 2025-02-20 to 2025-02-21

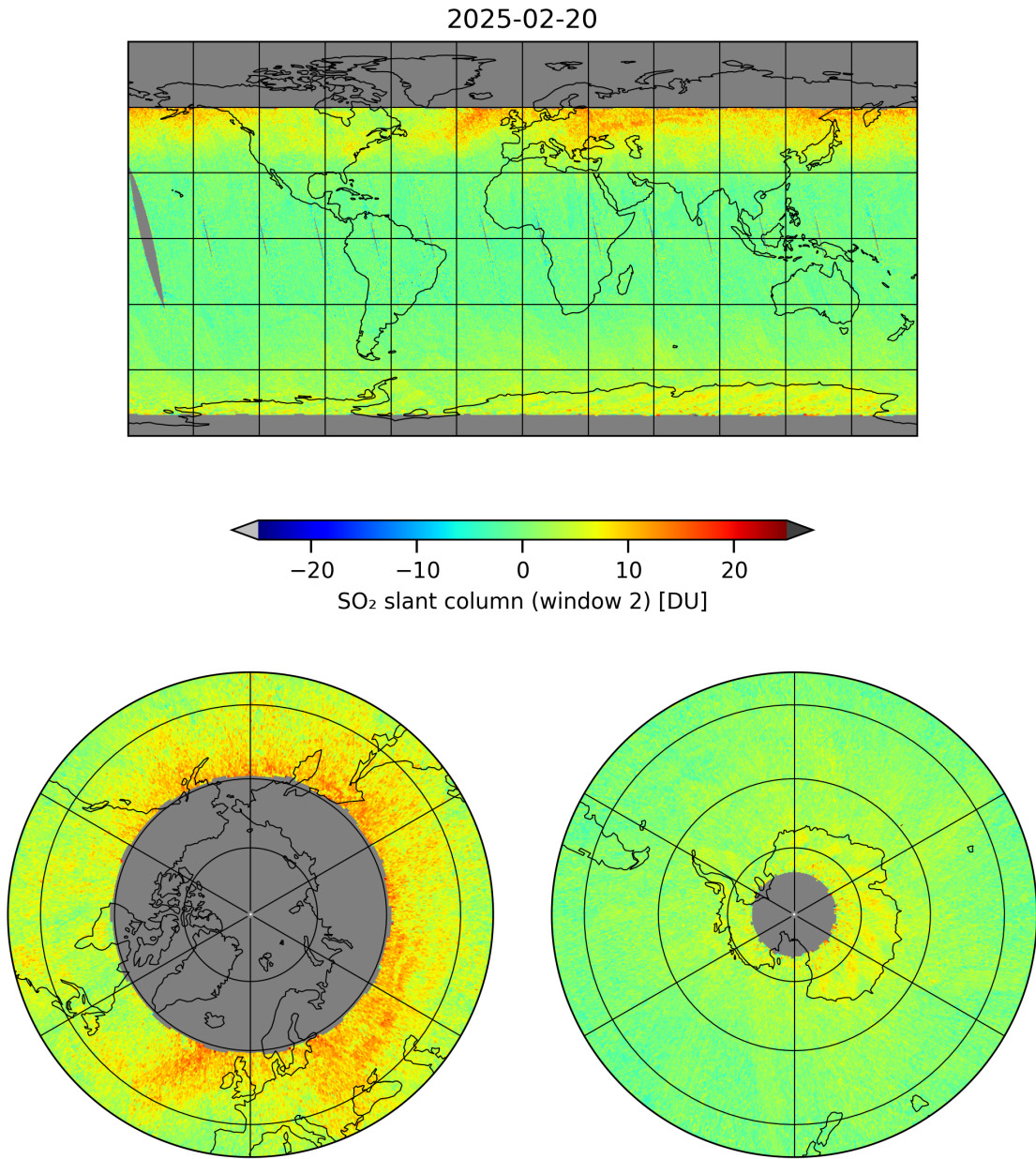


Figure 13: Map of “SO₂ slant column (window 2)” for 2025-02-20 to 2025-02-21

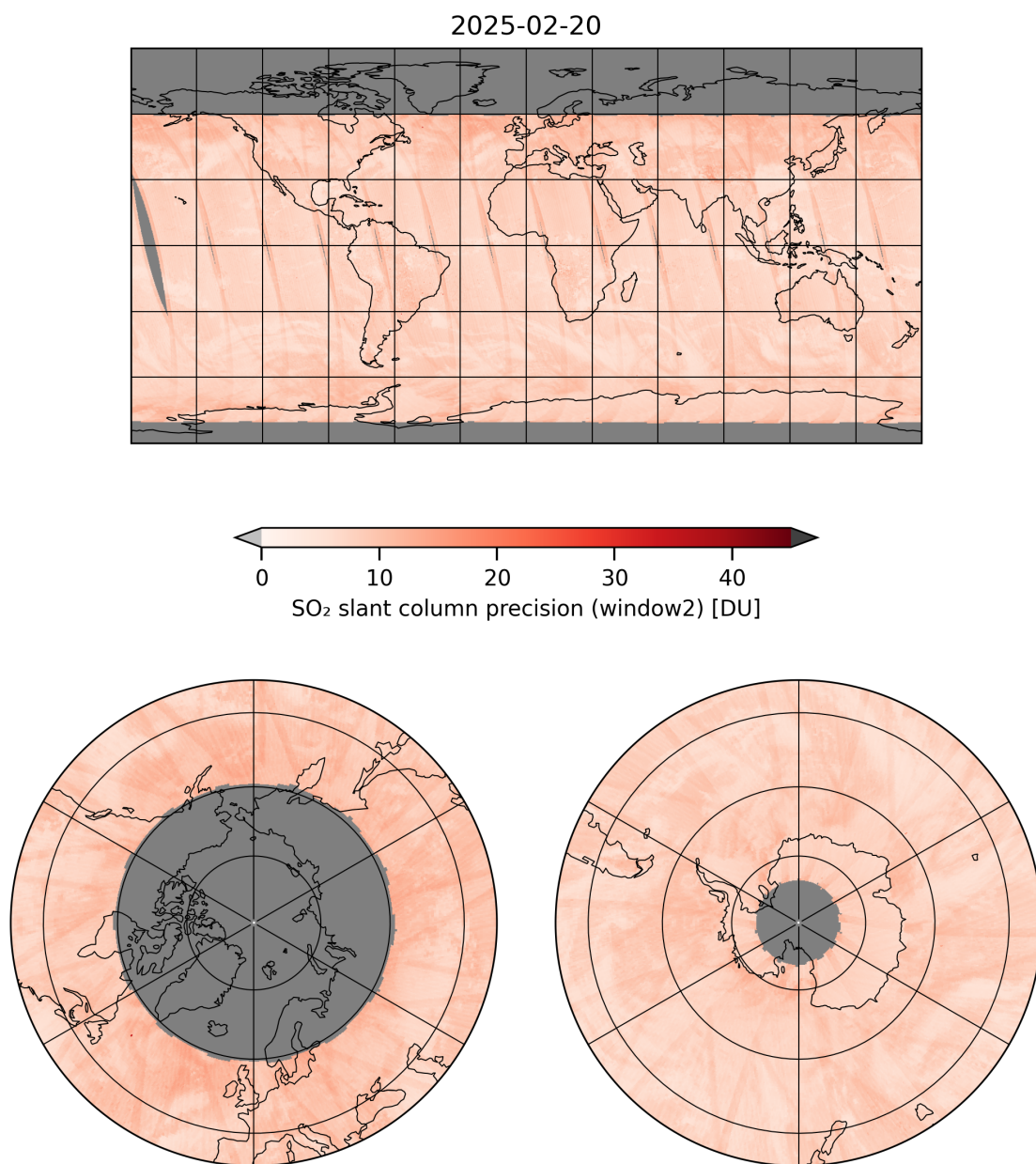


Figure 14: Map of “SO₂ slant column precision (window2)” for 2025-02-20 to 2025-02-21

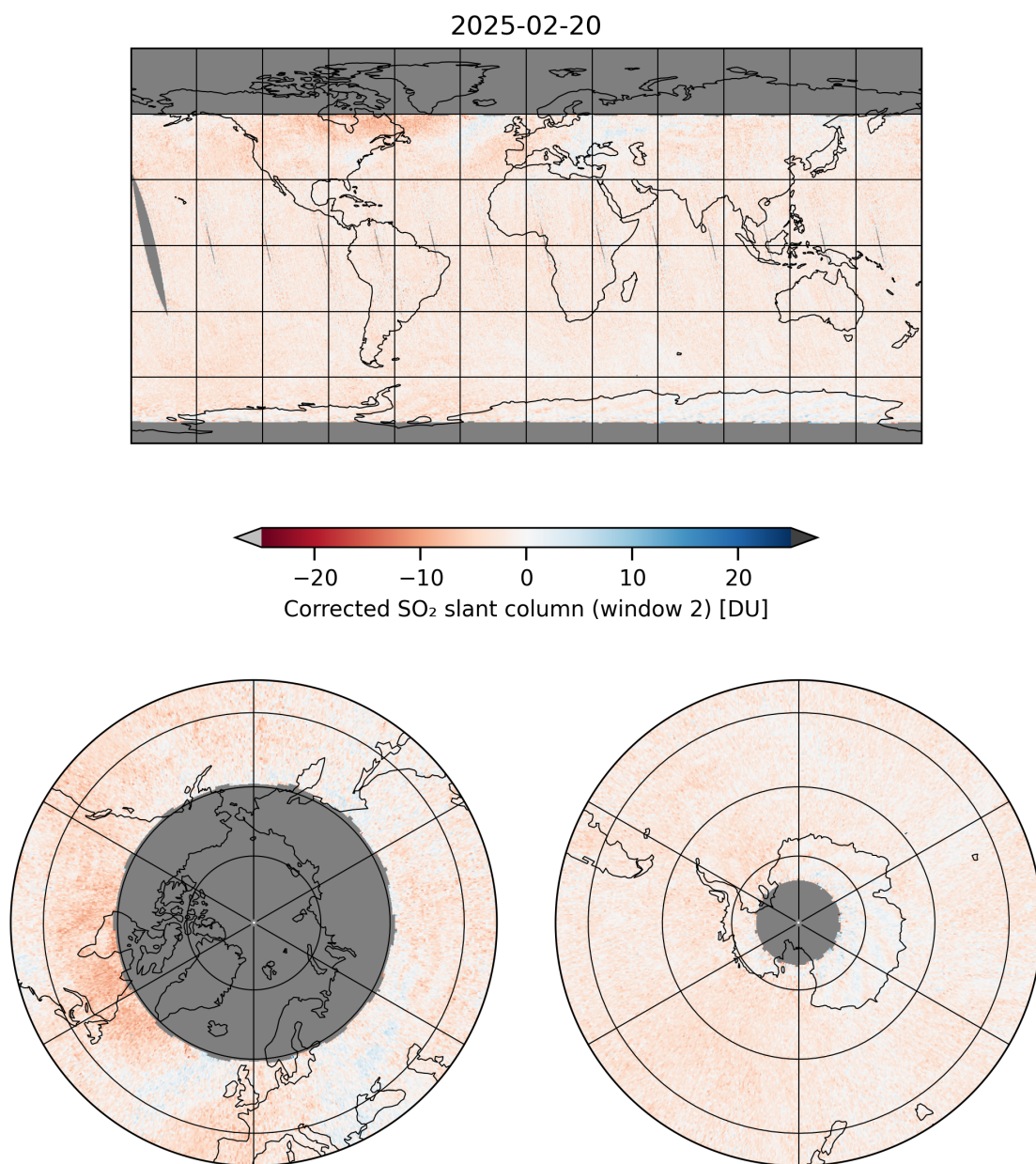


Figure 15: Map of “Corrected SO₂ slant column (window 2)” for 2025-02-20 to 2025-02-21

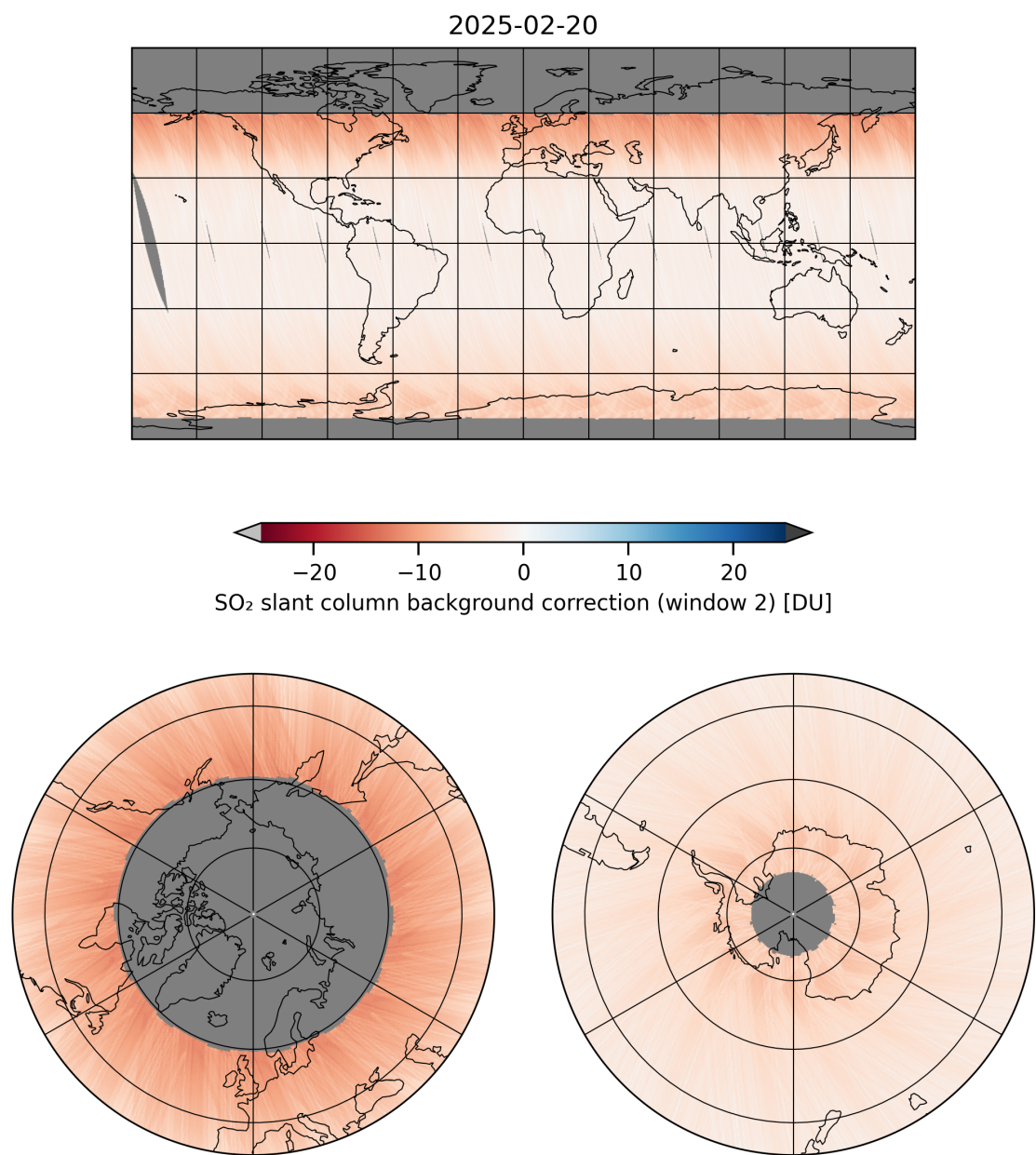


Figure 16: Map of “SO₂ slant column background correction (window 2)” for 2025-02-20 to 2025-02-21

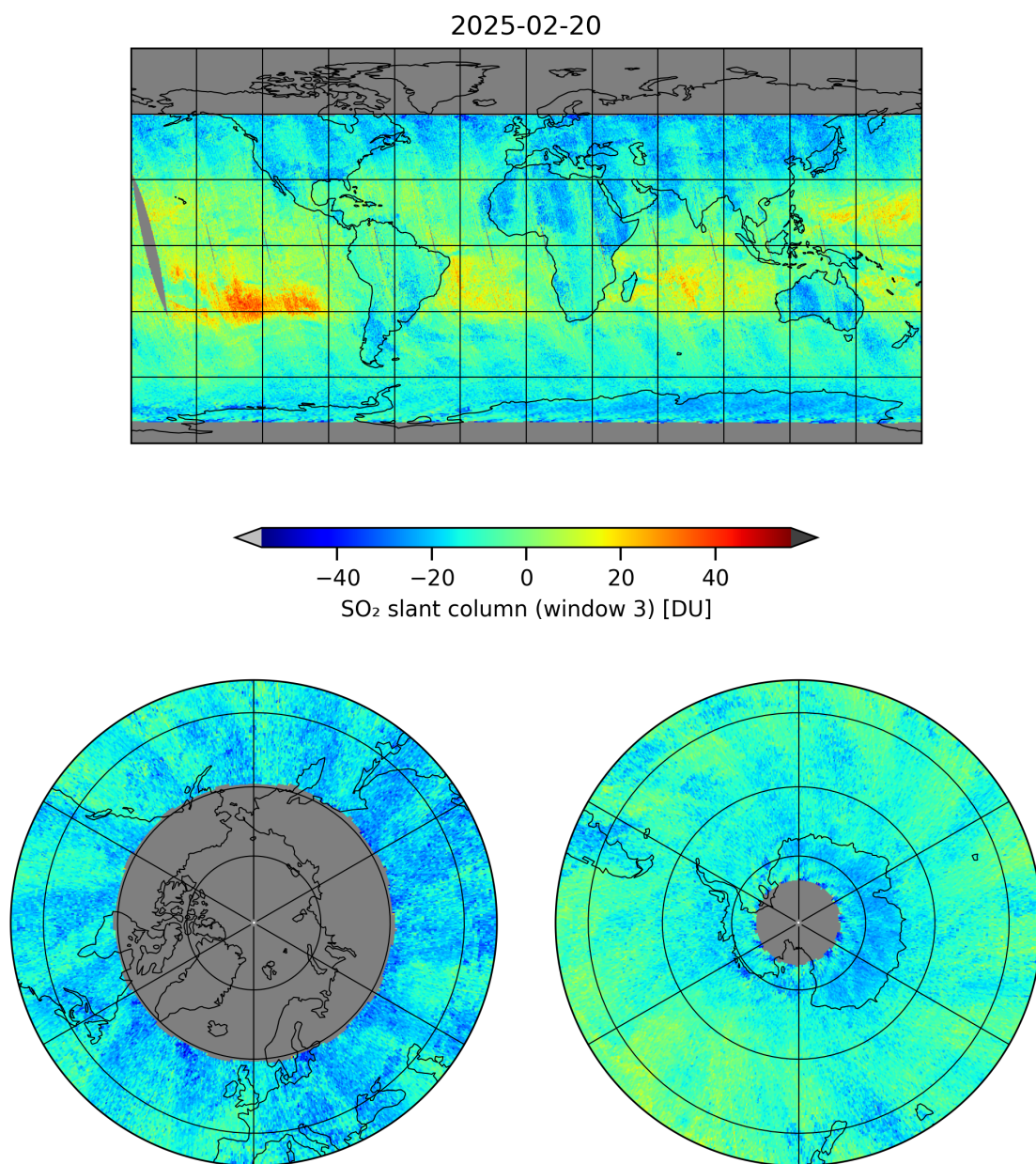


Figure 17: Map of “SO₂ slant column (window 3)” for 2025-02-20 to 2025-02-21

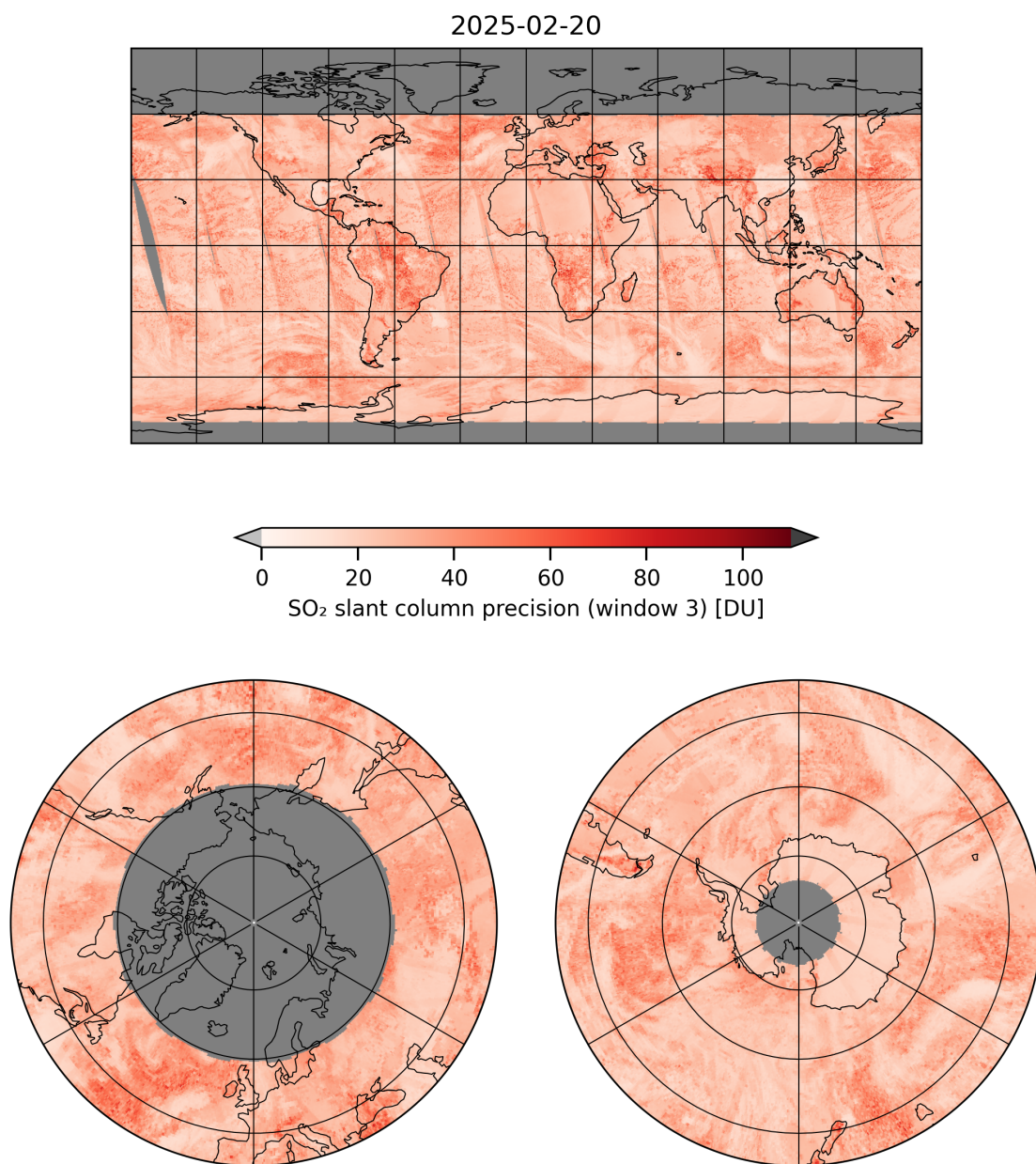


Figure 18: Map of “SO₂ slant column precision (window 3)” for 2025-02-20 to 2025-02-21

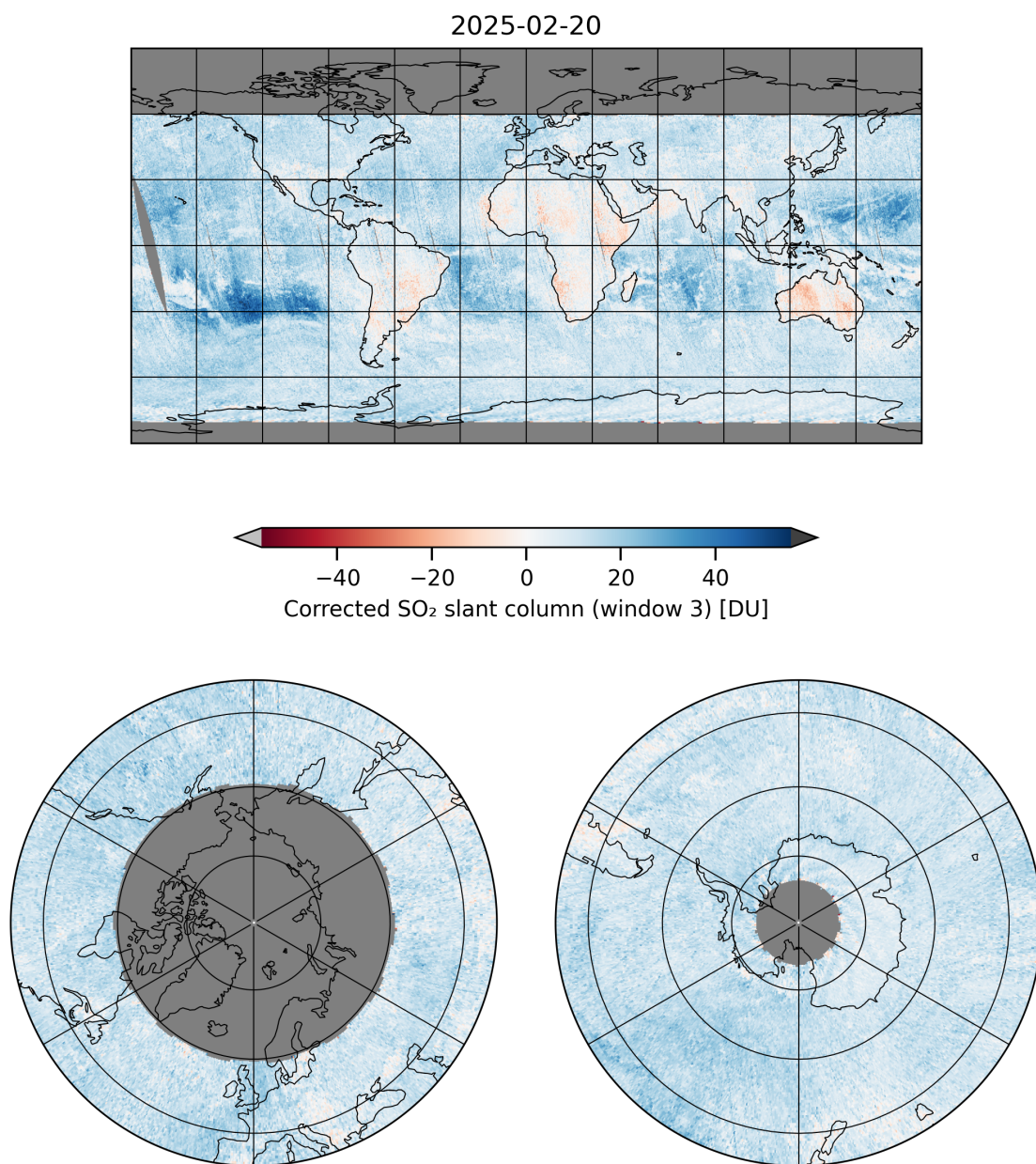


Figure 19: Map of “Corrected SO₂ slant column (window 3)” for 2025-02-20 to 2025-02-21

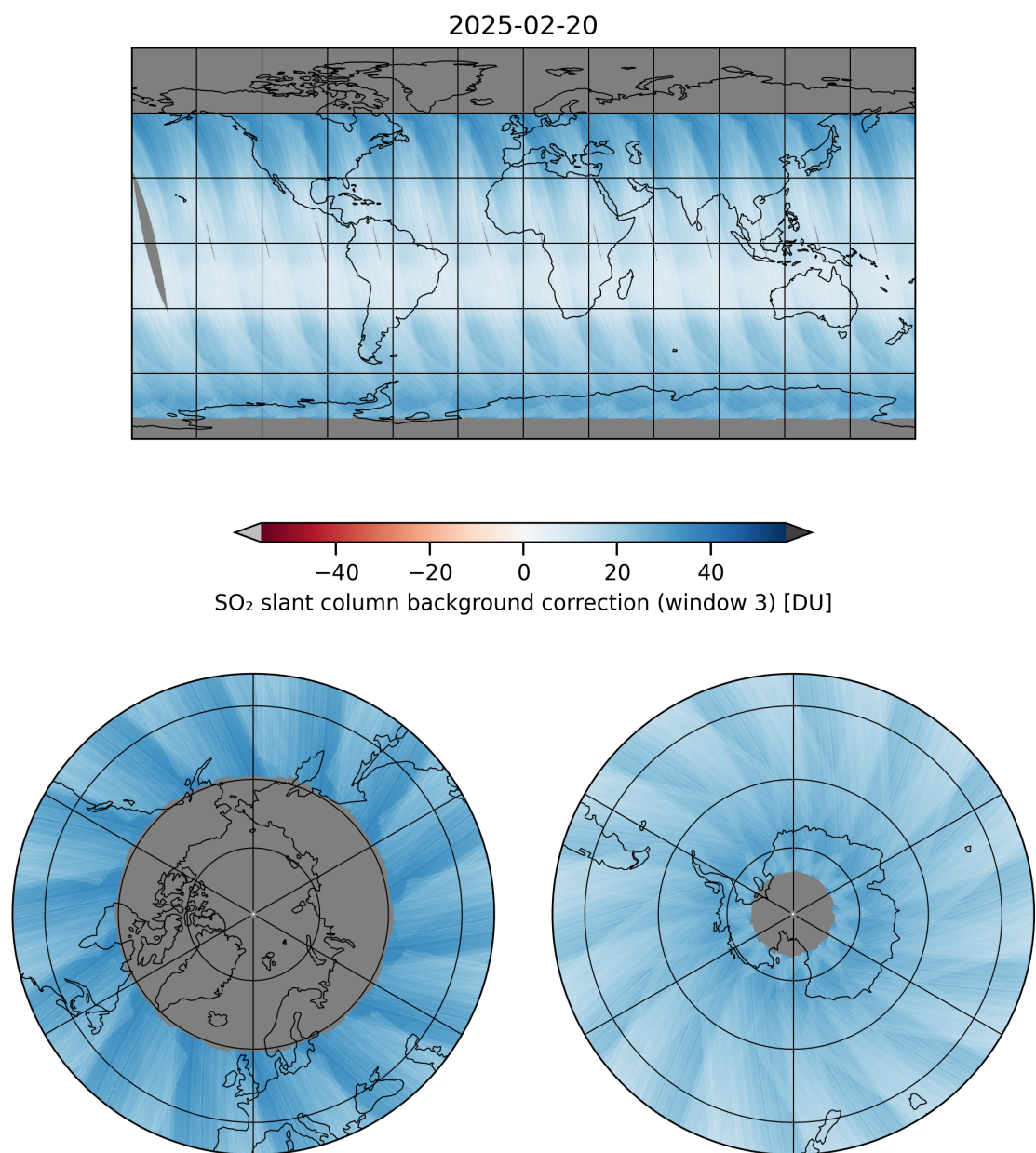


Figure 20: Map of “SO₂ slant column background correction (window 3)” for 2025-02-20 to 2025-02-21

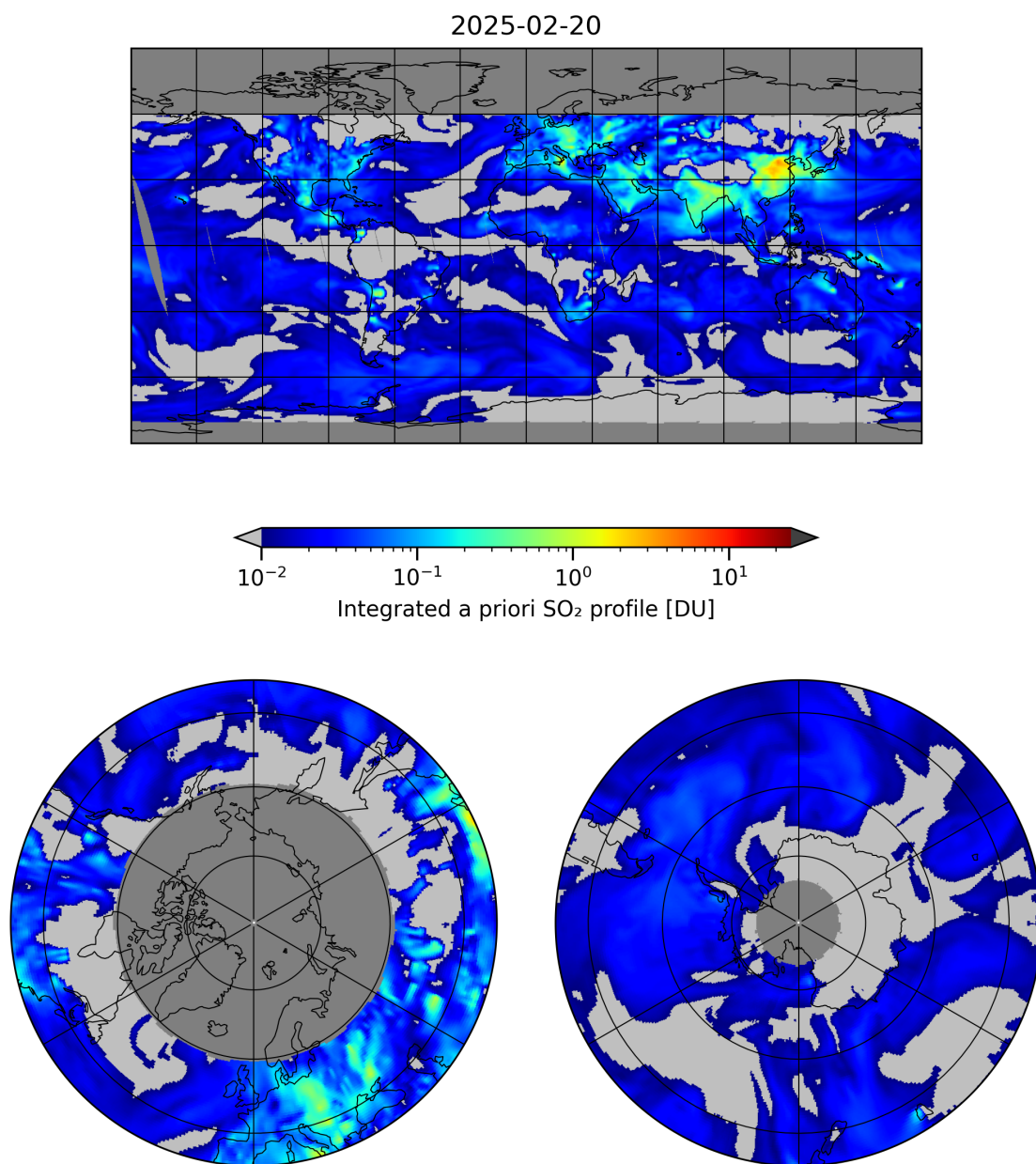


Figure 21: Map of “Integrated a priori SO₂ profile” for 2025-02-20 to 2025-02-21

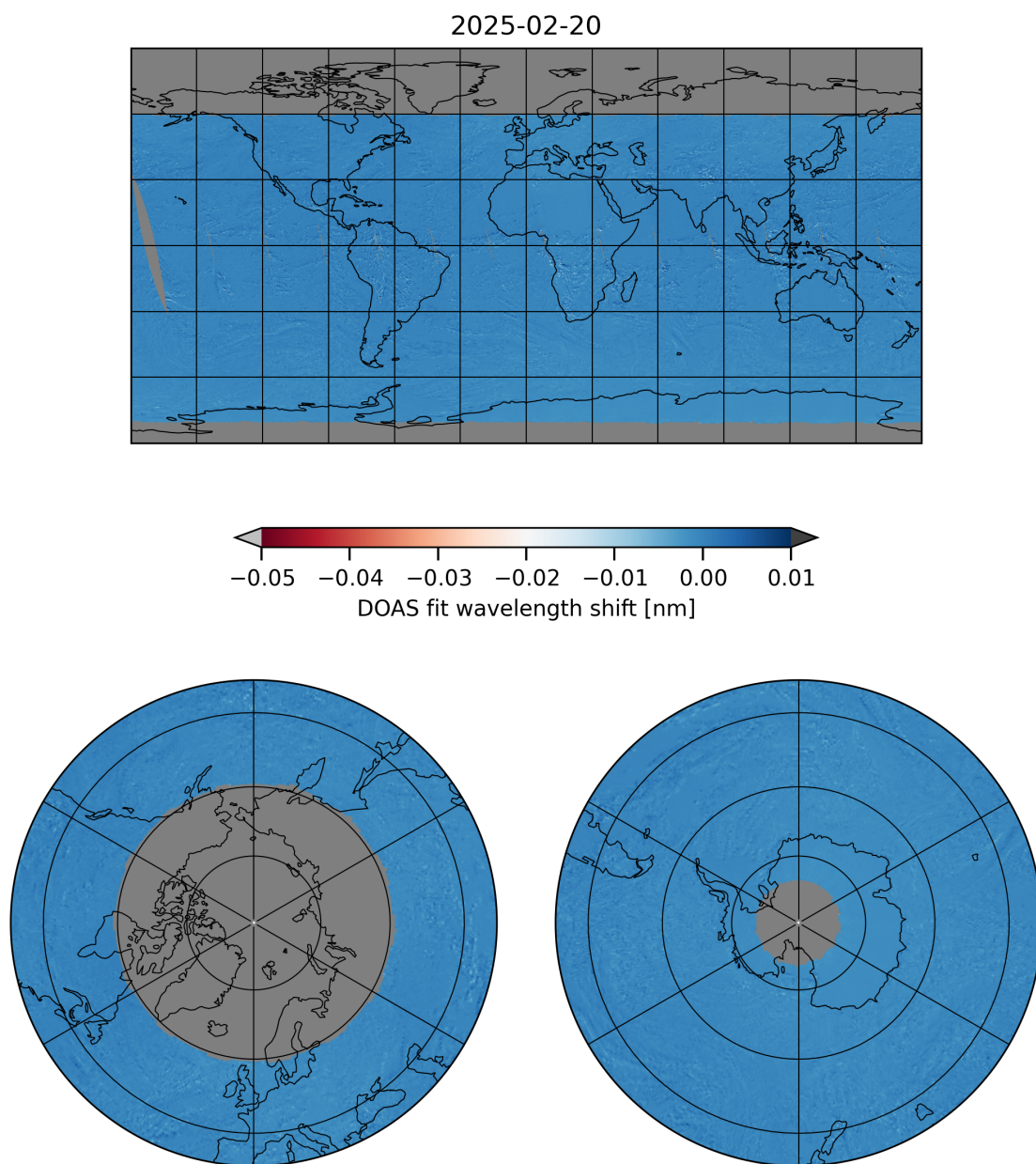


Figure 22: Map of “DOAS fit wavelength shift” for 2025-02-20 to 2025-02-21

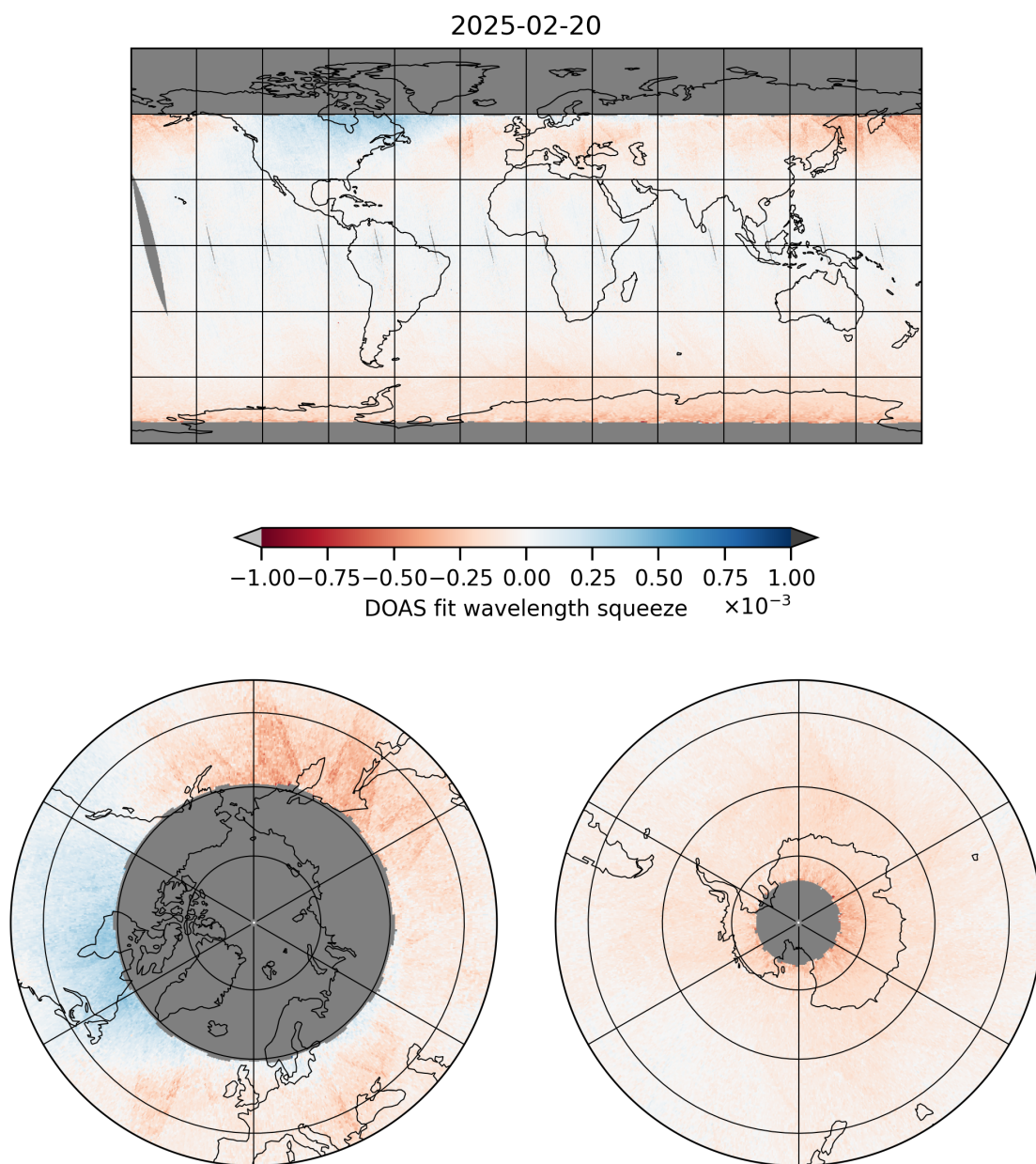


Figure 23: Map of “DOAS fit wavelength squeeze” for 2025-02-20 to 2025-02-21

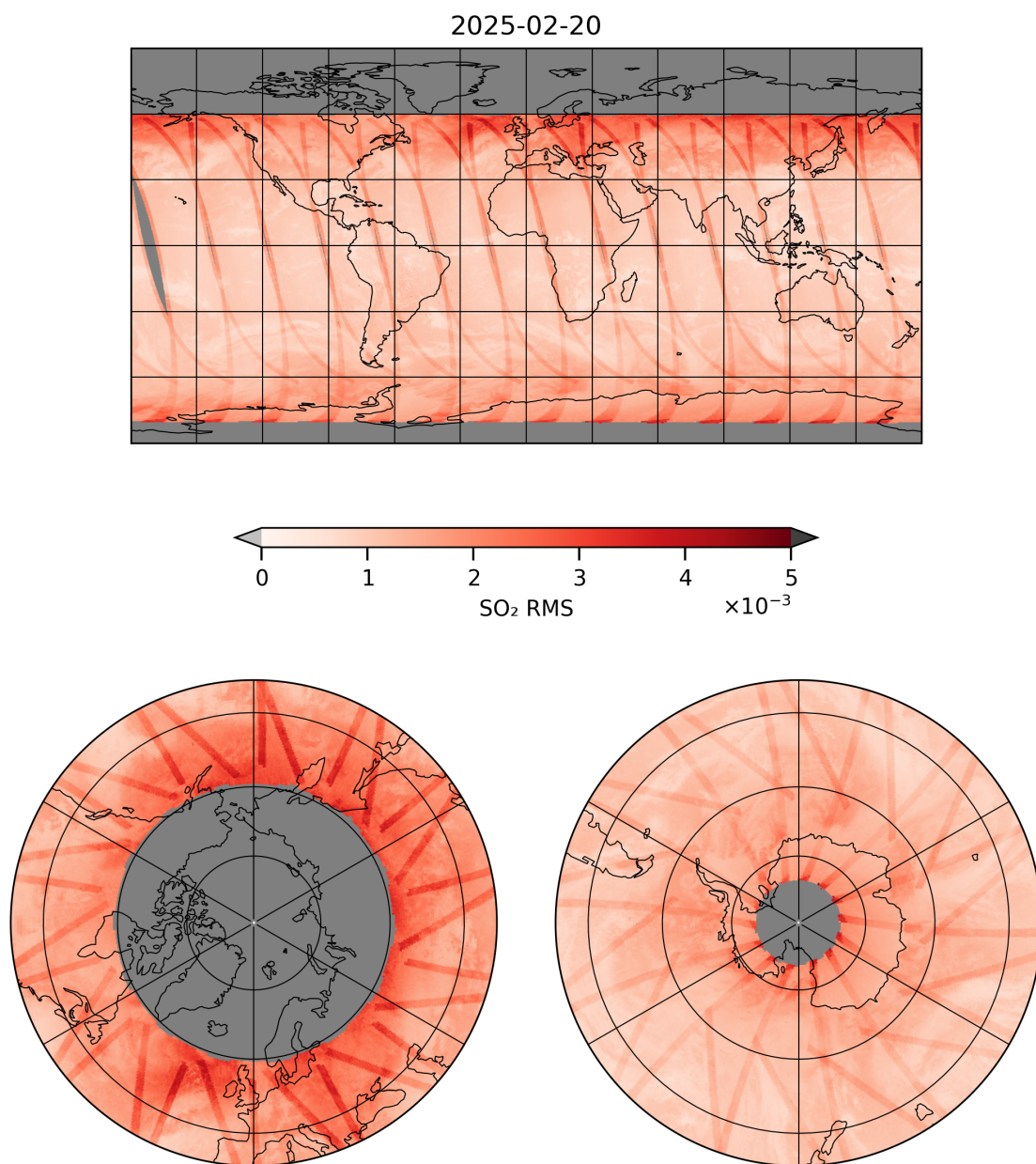


Figure 24: Map of “SO₂ RMS” for 2025-02-20 to 2025-02-21

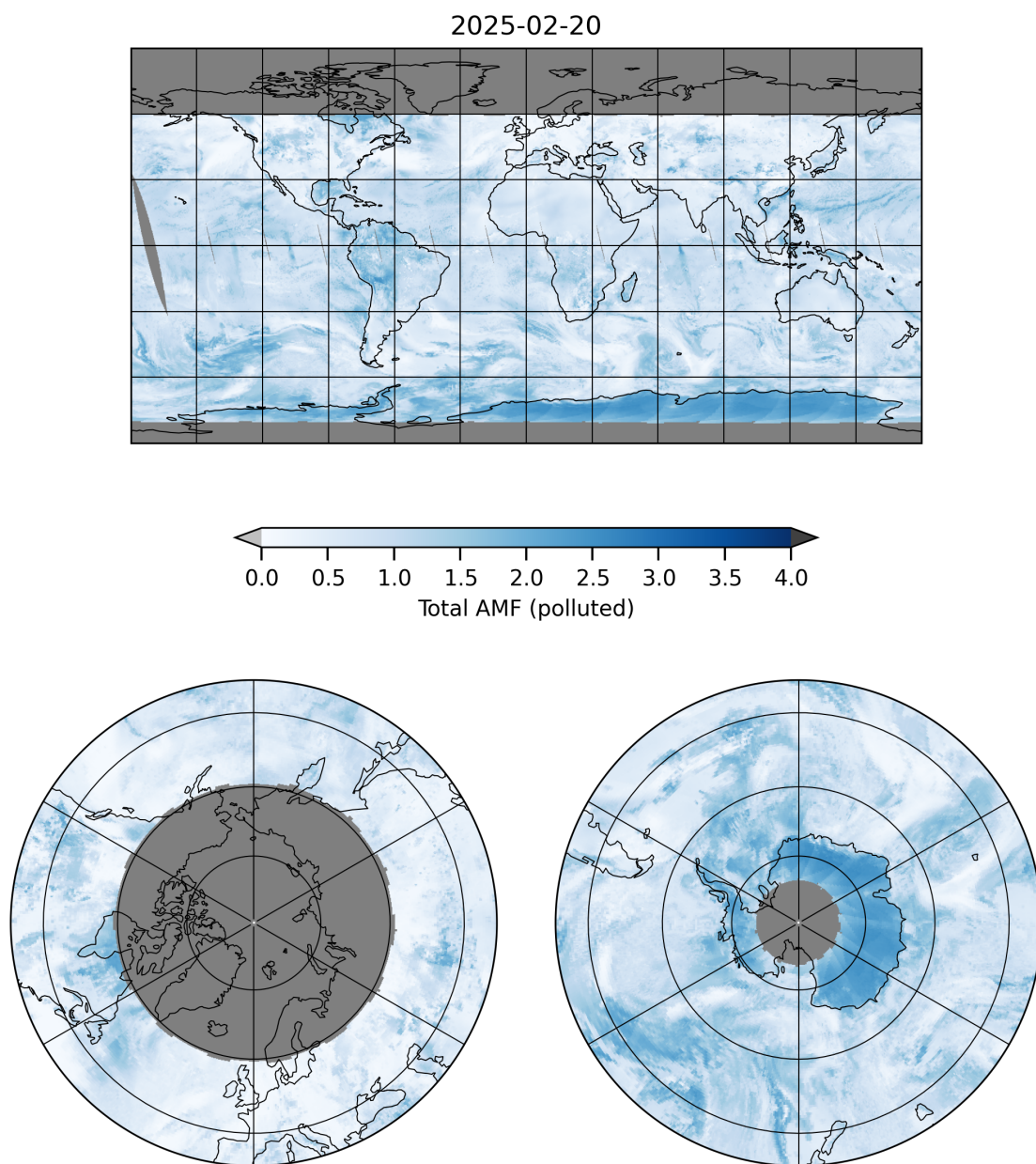


Figure 25: Map of “Total AMF (polluted)” for 2025-02-20 to 2025-02-21

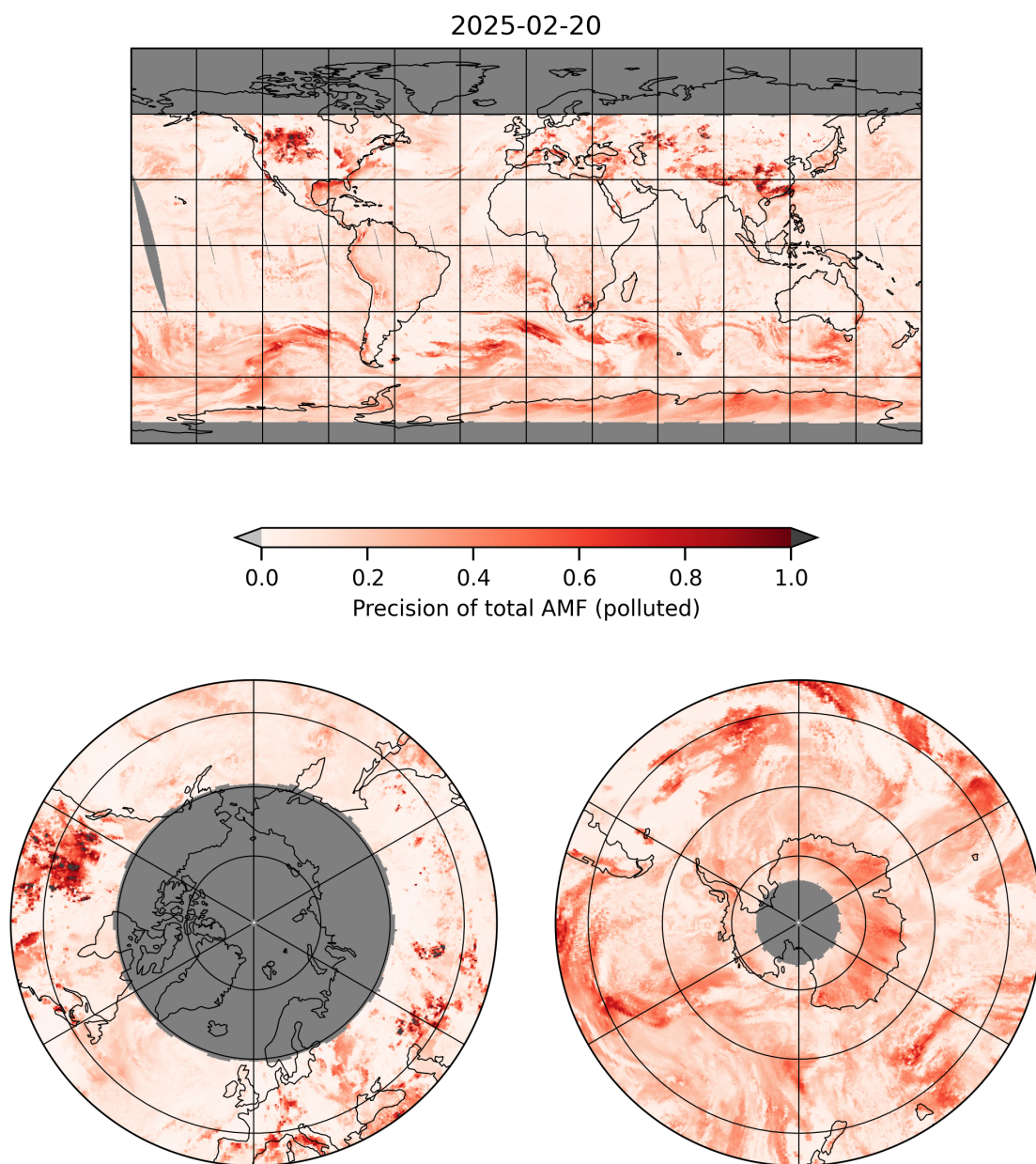


Figure 26: Map of “Precision of total AMF (polluted)” for 2025-02-20 to 2025-02-21

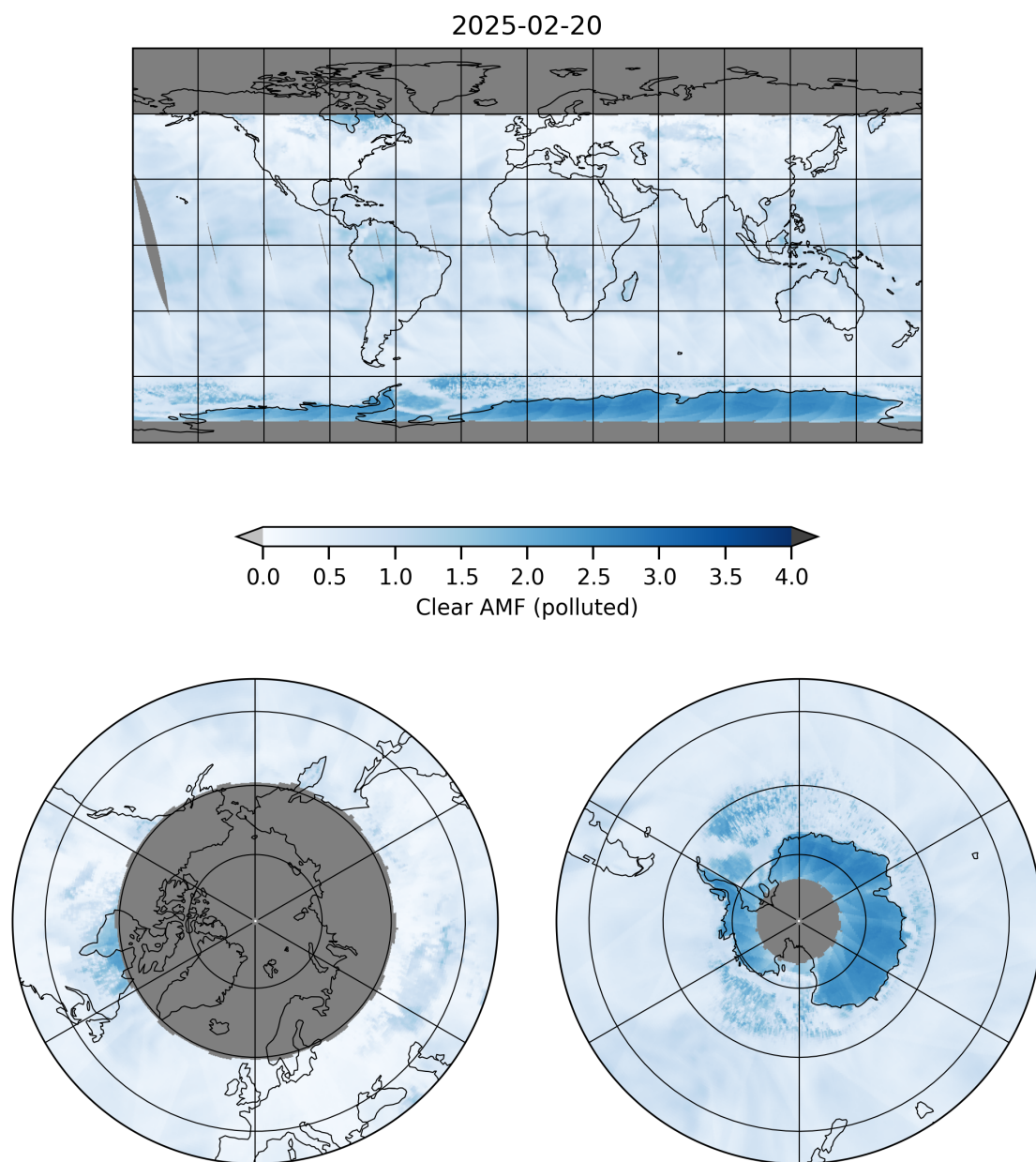


Figure 27: Map of “Clear AMF (polluted)” for 2025-02-20 to 2025-02-21

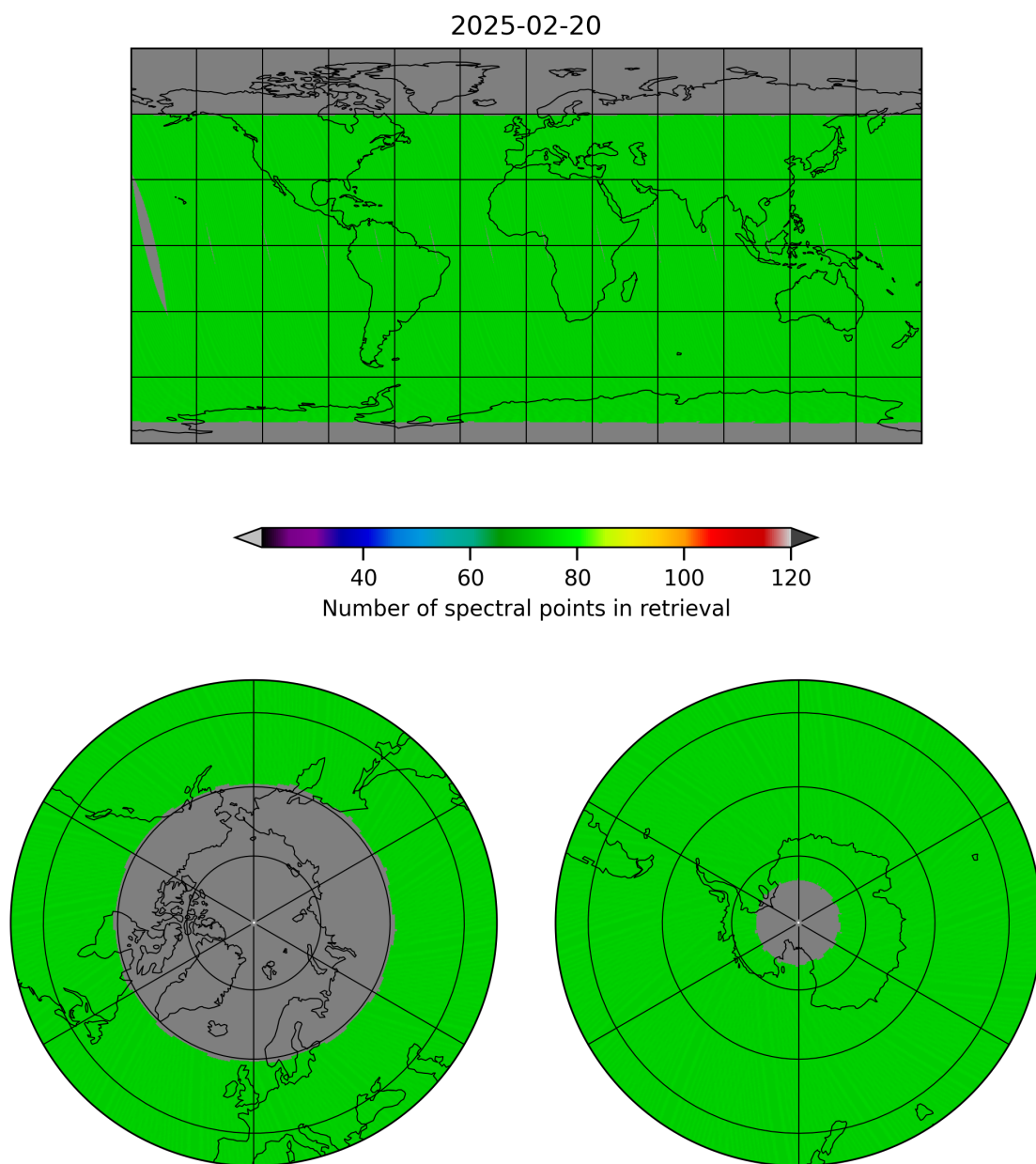


Figure 28: Map of “Number of spectral points in retrieval” for 2025-02-20 to 2025-02-21

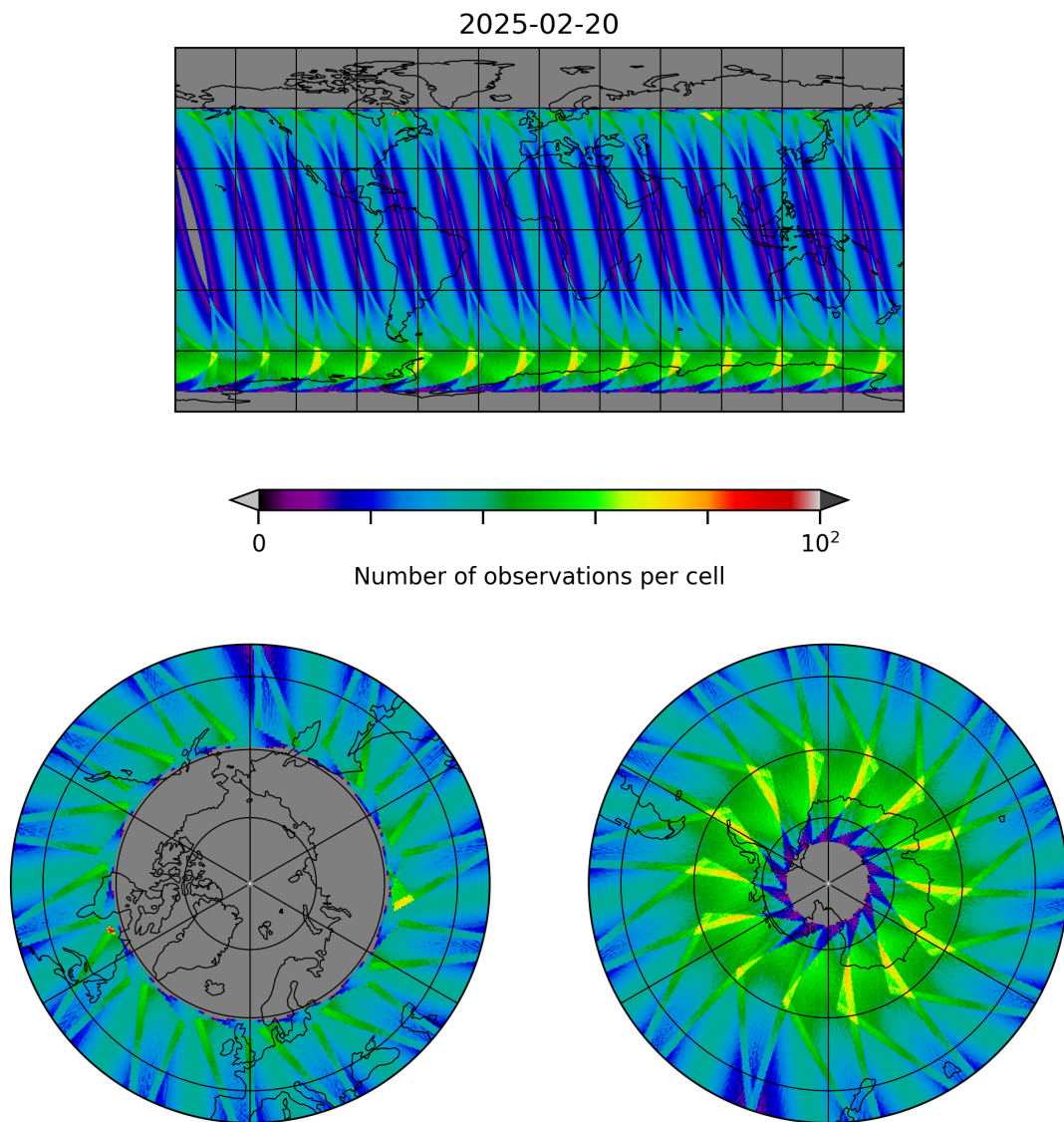


Figure 29: Map of the number of observations for 2025-02-20 to 2025-02-21

7 Zonal average

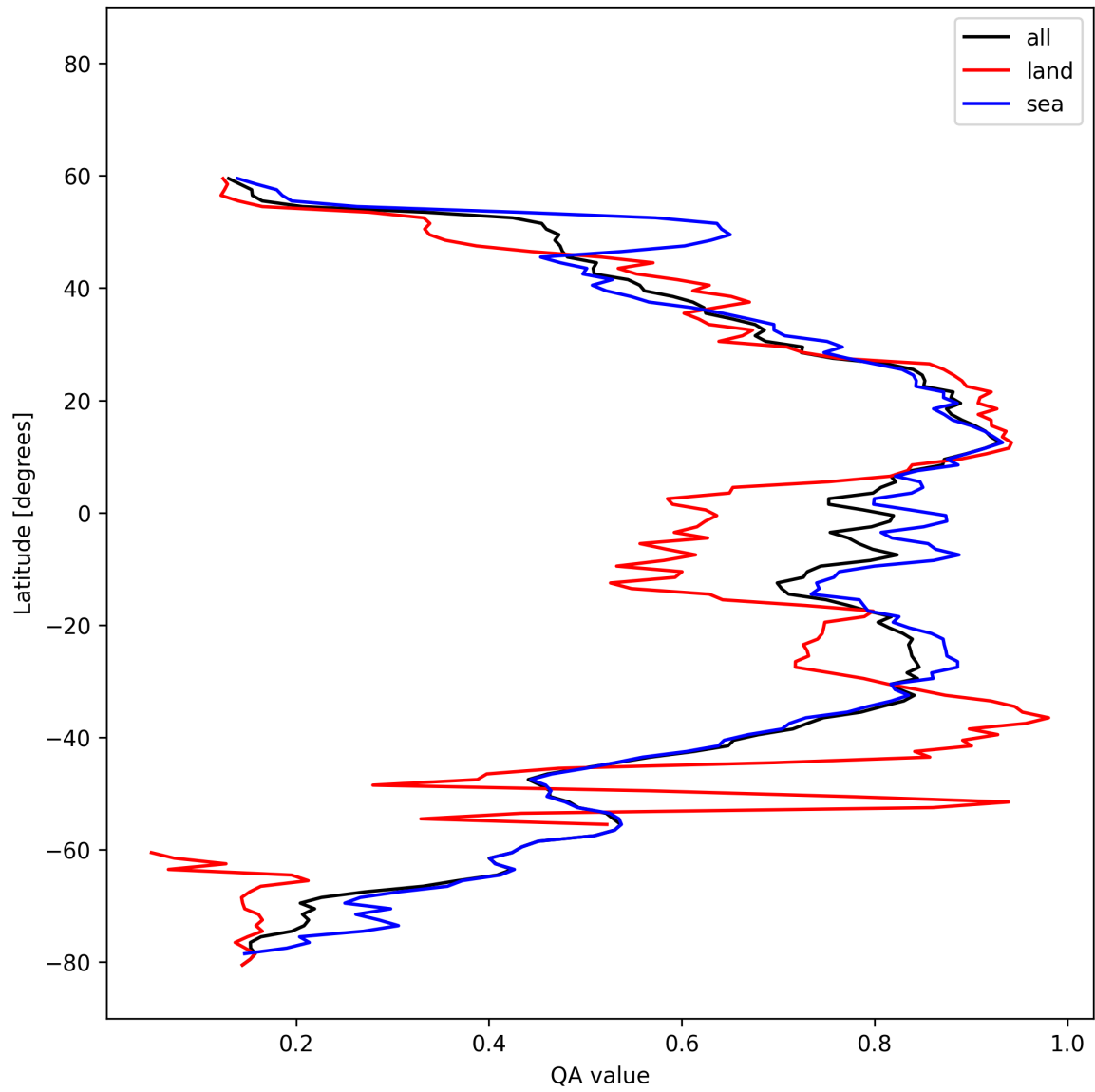


Figure 30: Zonal average of “QA value” for 2025-02-20 to 2025-02-21.

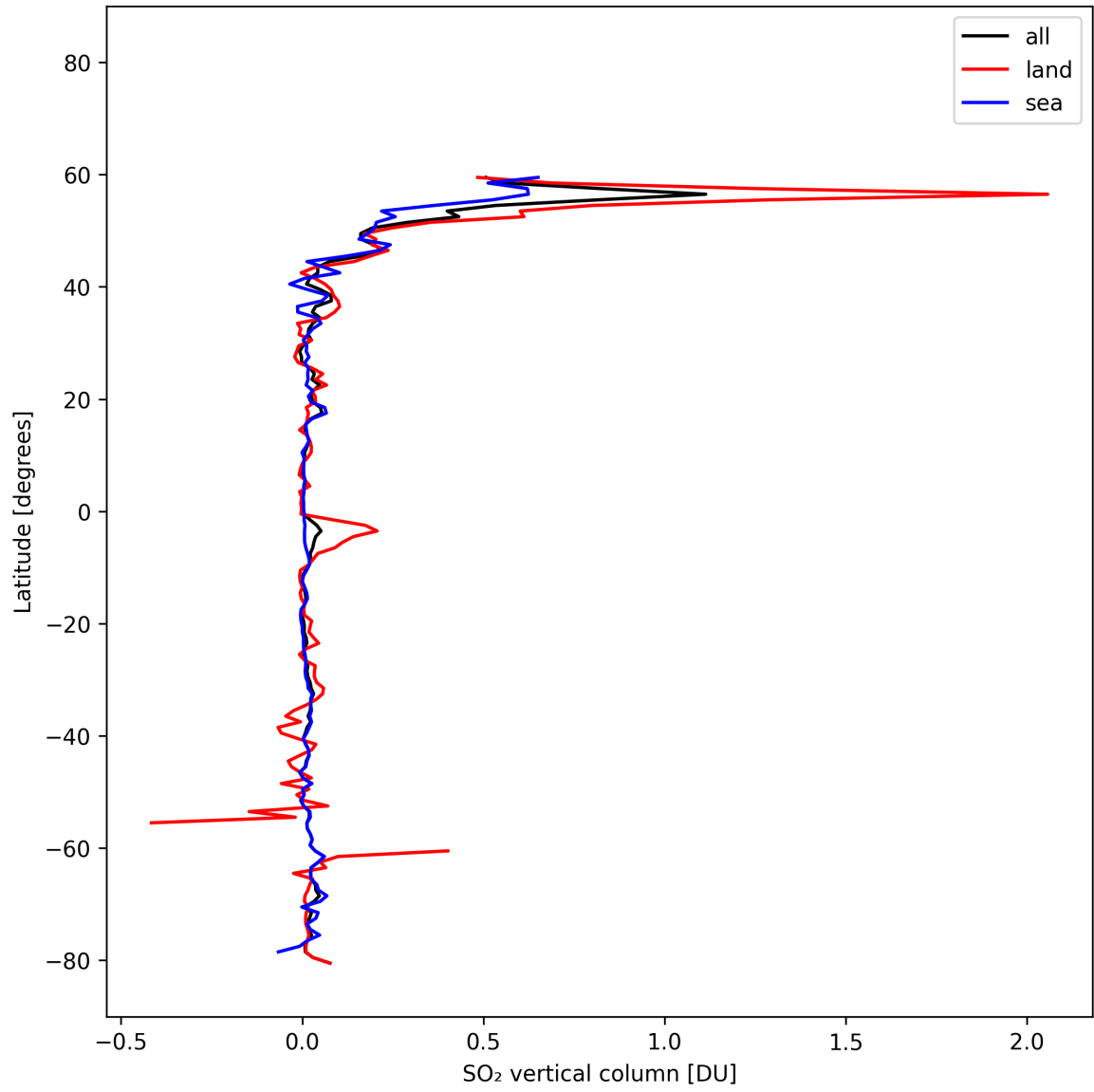


Figure 31: Zonal average of “SO₂ vertical column” for 2025-02-20 to 2025-02-21.

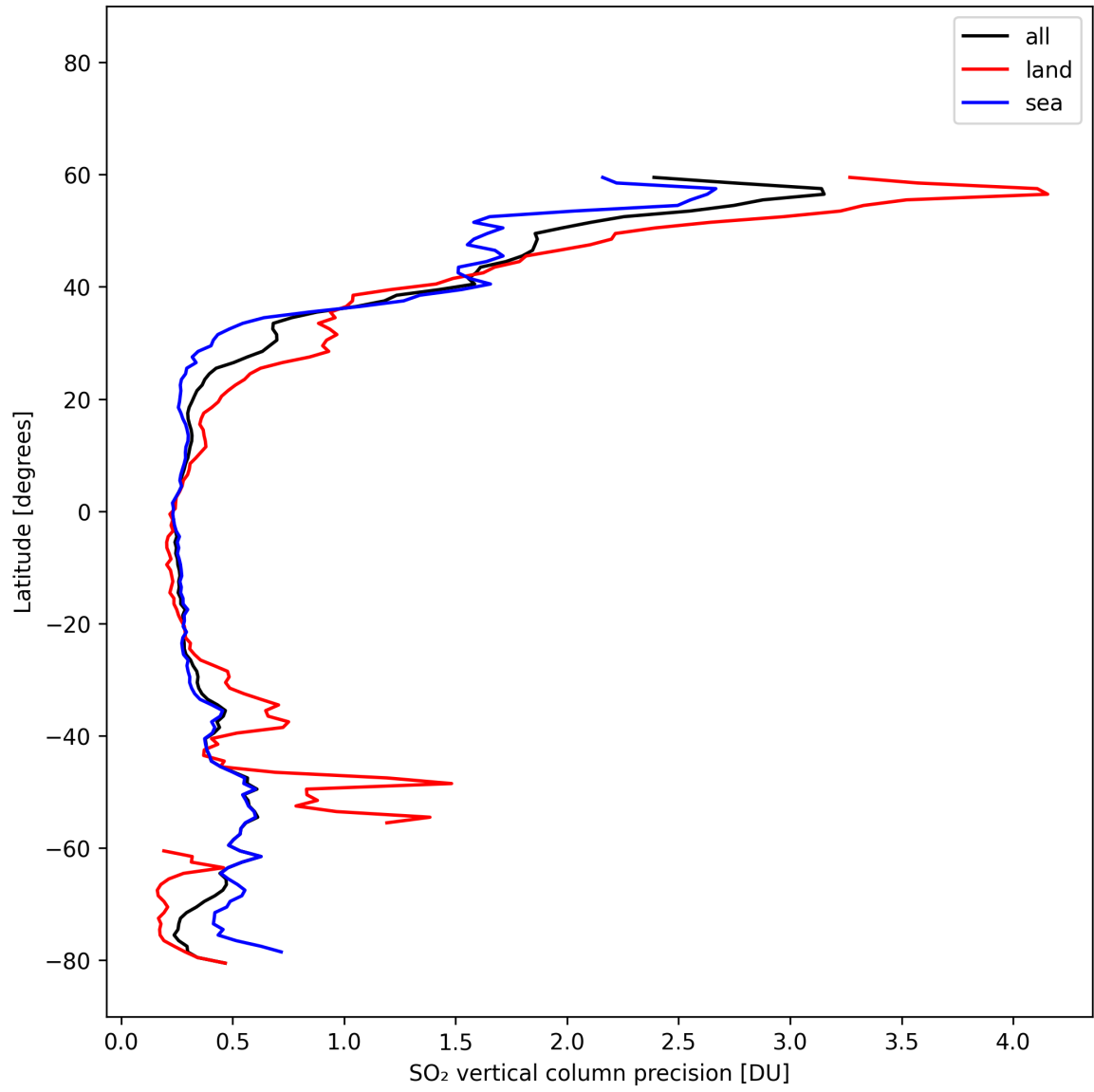


Figure 32: Zonal average of “SO₂ vertical column precision” for 2025-02-20 to 2025-02-21.

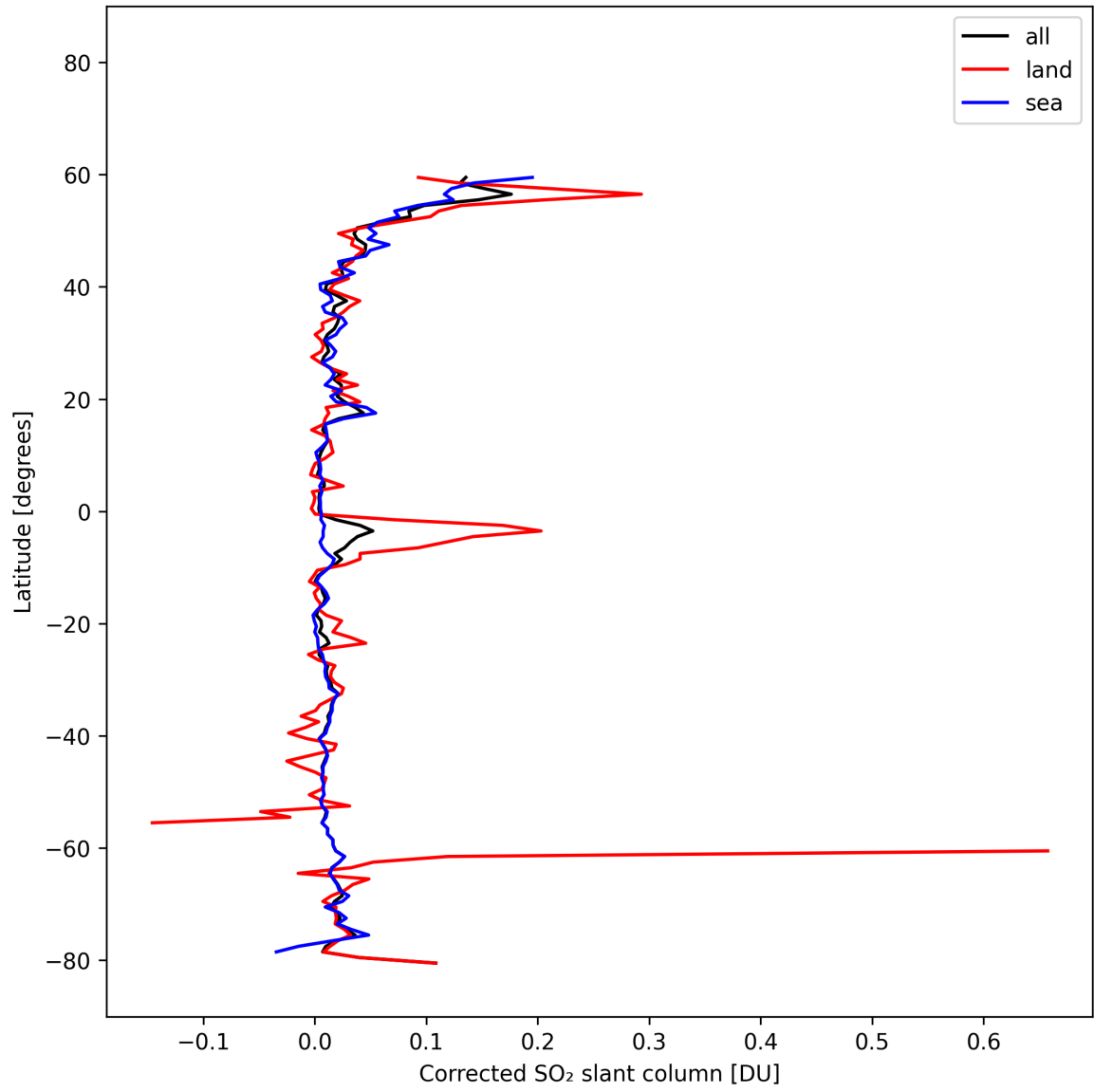


Figure 33: Zonal average of “Corrected SO₂ slant column” for 2025-02-20 to 2025-02-21.

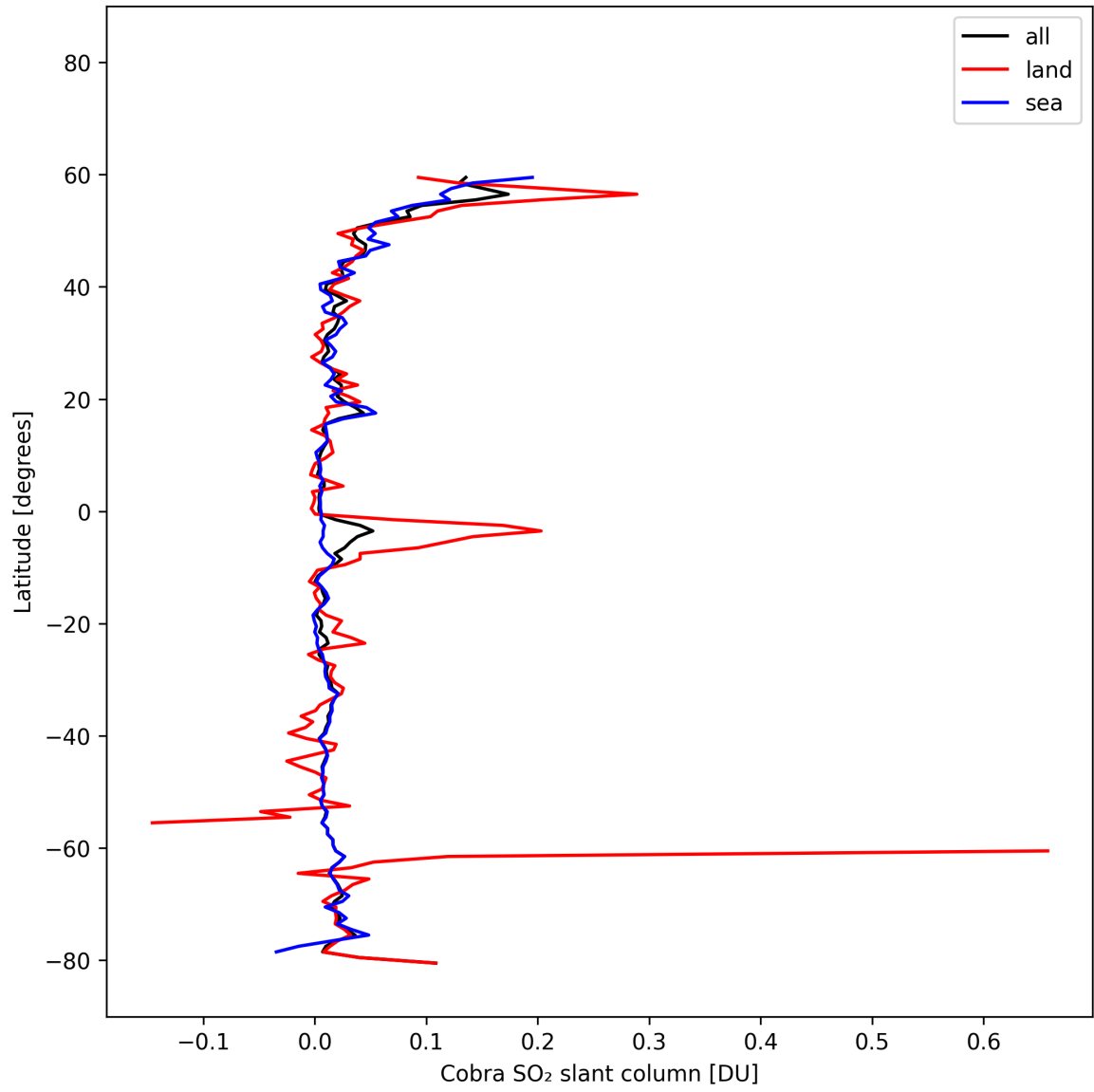


Figure 34: Zonal average of “Cobra SO₂ slant column” for 2025-02-20 to 2025-02-21.

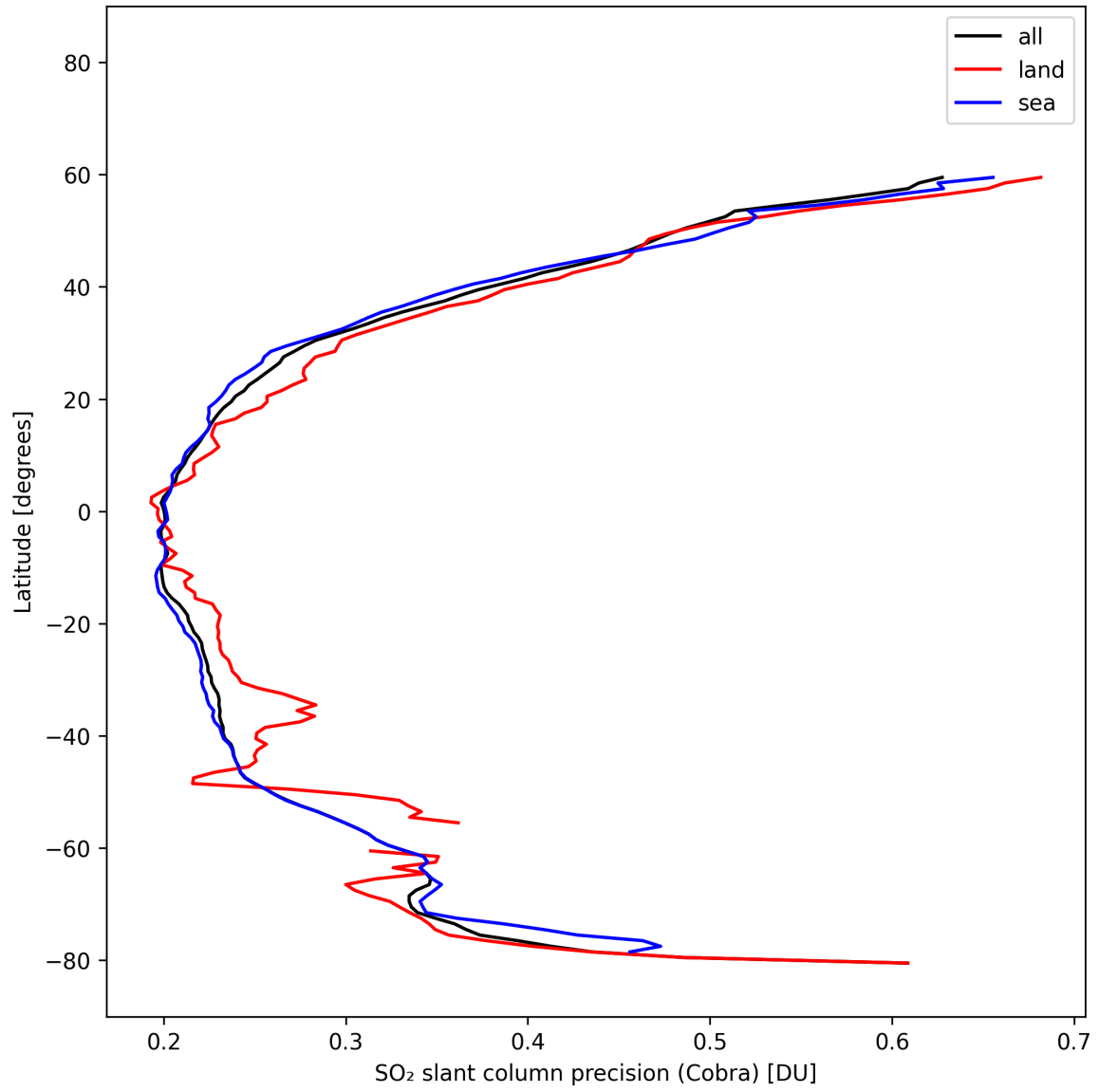


Figure 35: Zonal average of “SO₂ slant column precision (Cobra)” for 2025-02-20 to 2025-02-21.

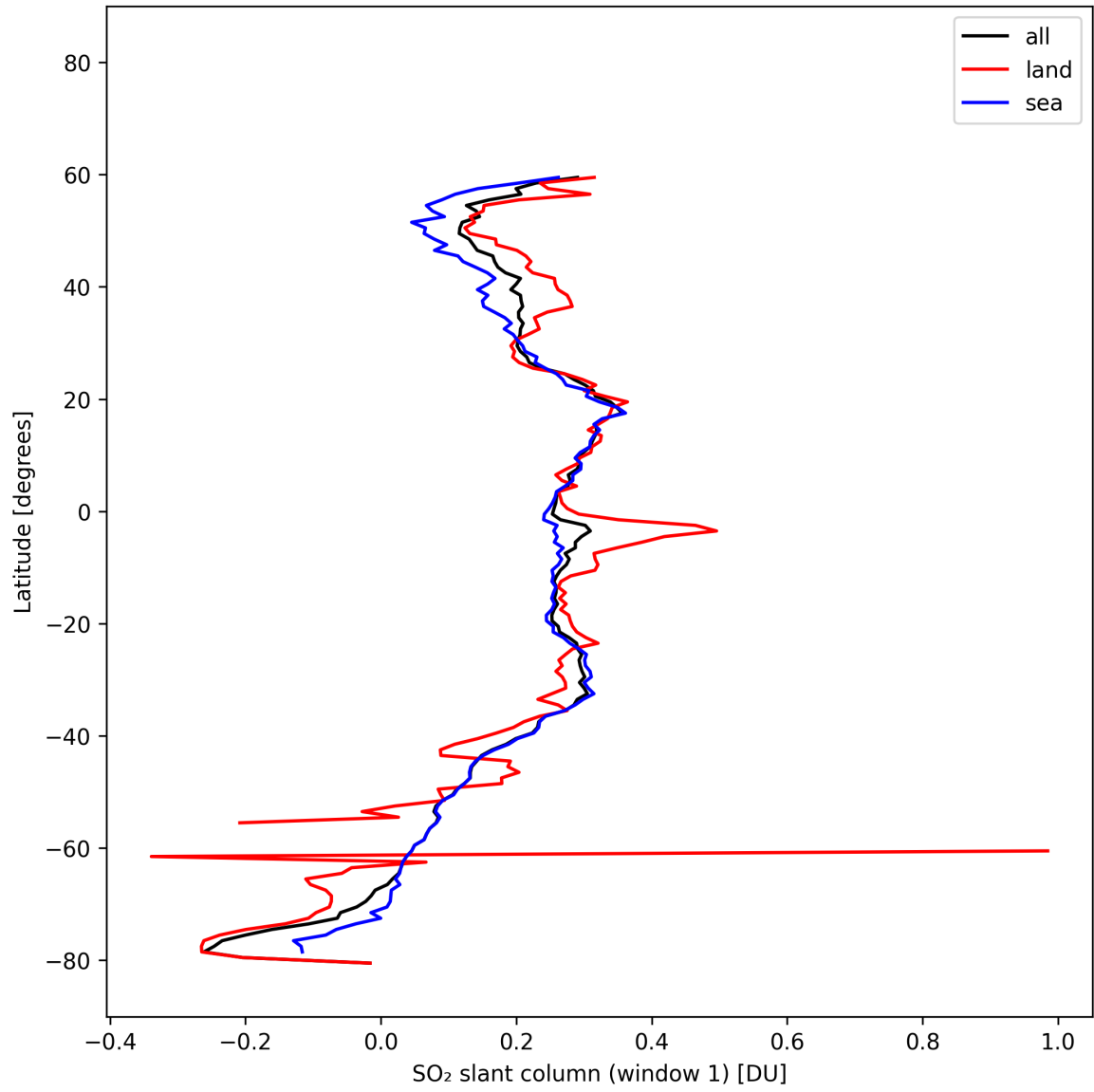


Figure 36: Zonal average of “SO₂ slant column (window 1)” for 2025-02-20 to 2025-02-21.

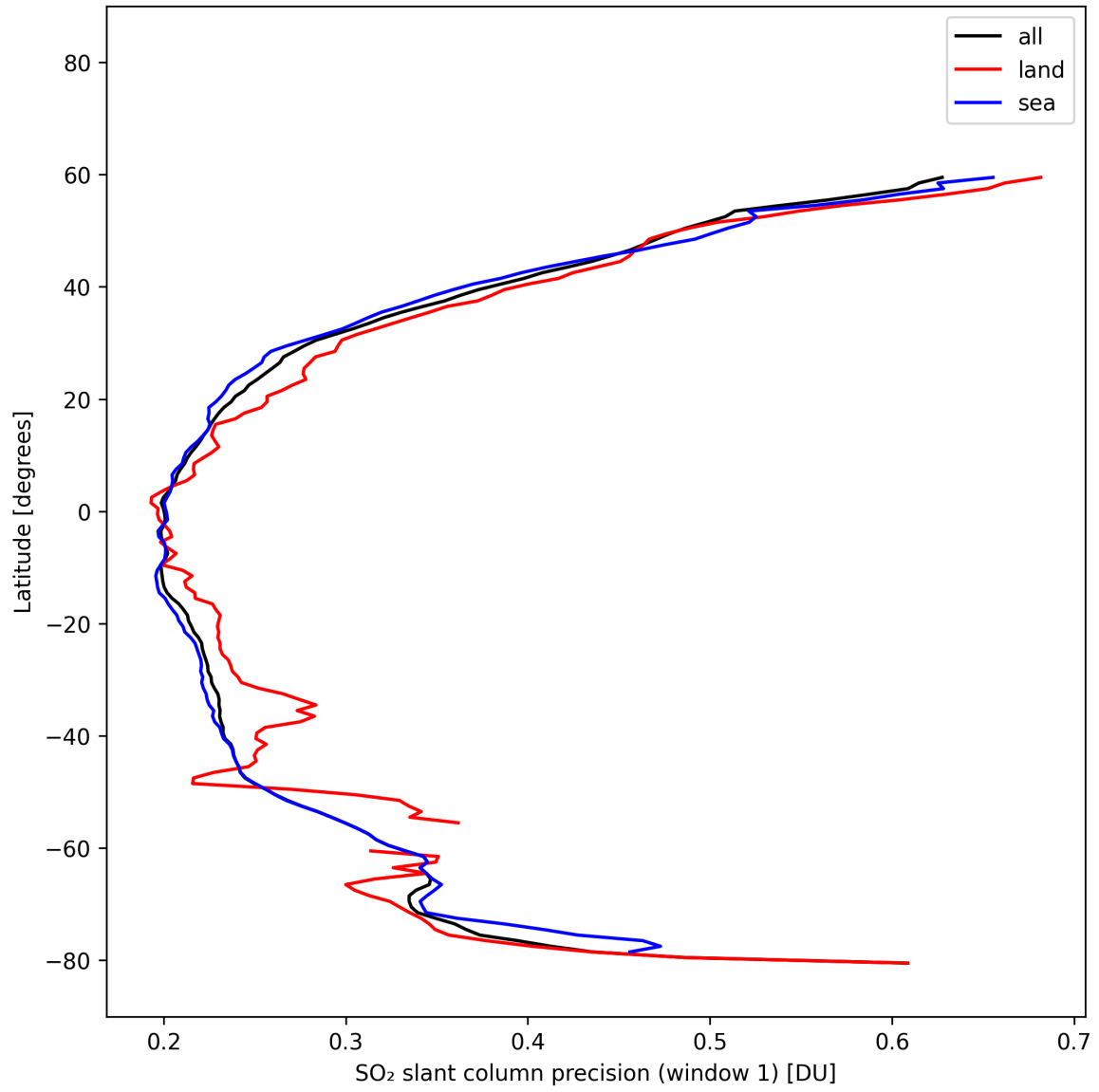


Figure 37: Zonal average of “SO₂ slant column precision (window 1)” for 2025-02-20 to 2025-02-21.

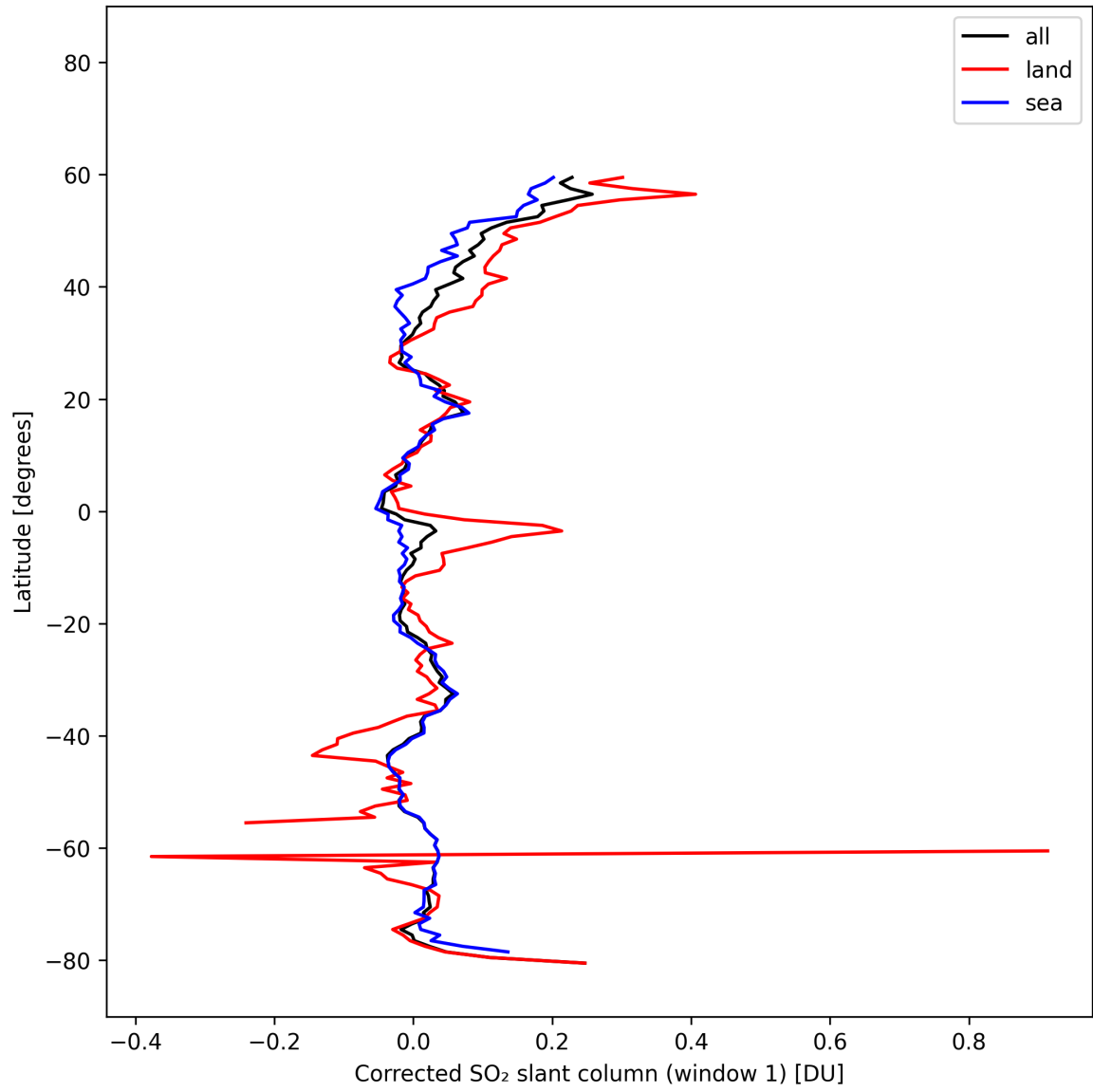


Figure 38: Zonal average of “Corrected SO₂ slant column (window 1)” for 2025-02-20 to 2025-02-21.

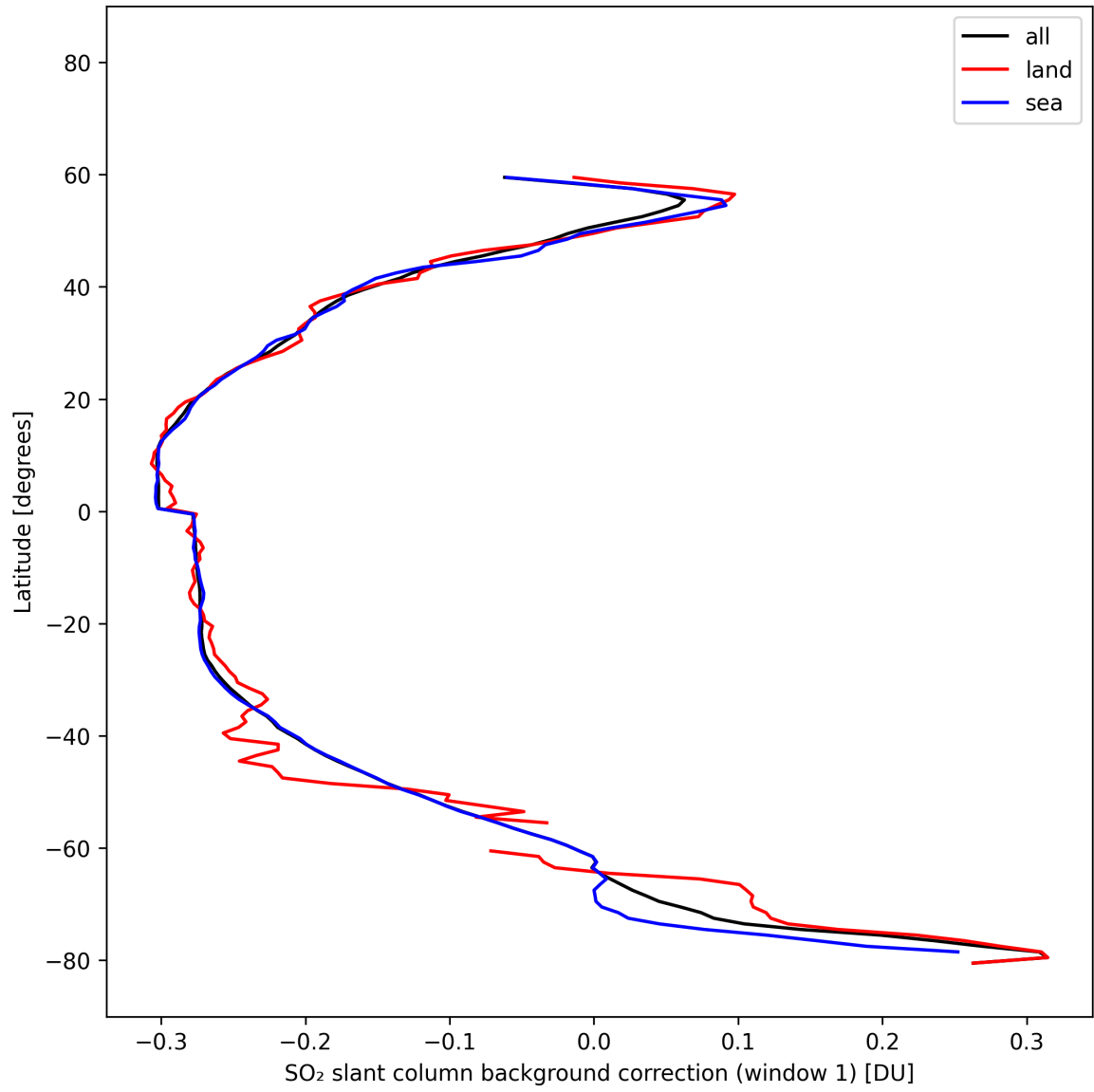


Figure 39: Zonal average of “SO₂ slant column background correction (window 1)” for 2025-02-20 to 2025-02-21.

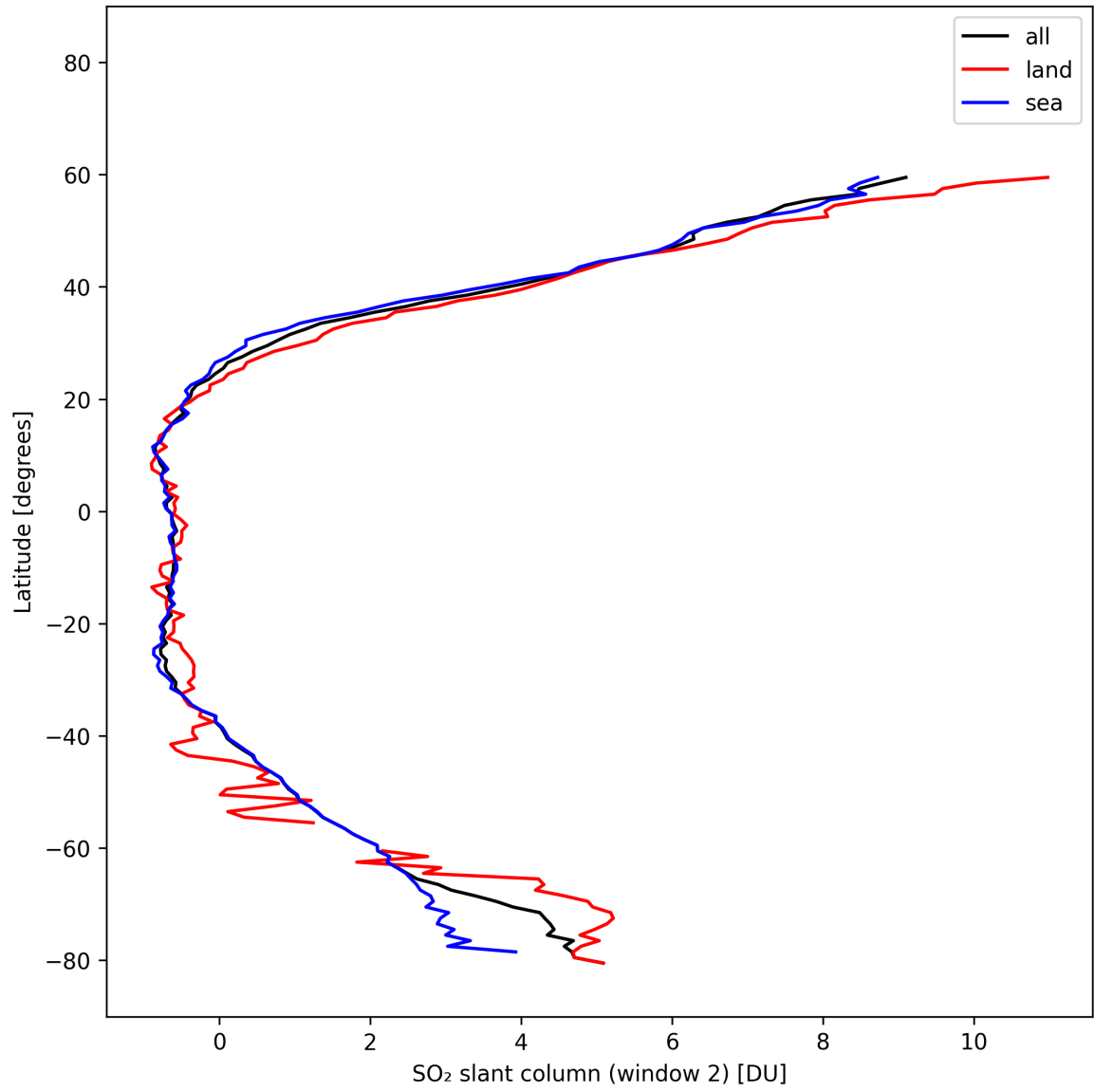


Figure 40: Zonal average of “SO₂ slant column (window 2)” for 2025-02-20 to 2025-02-21.

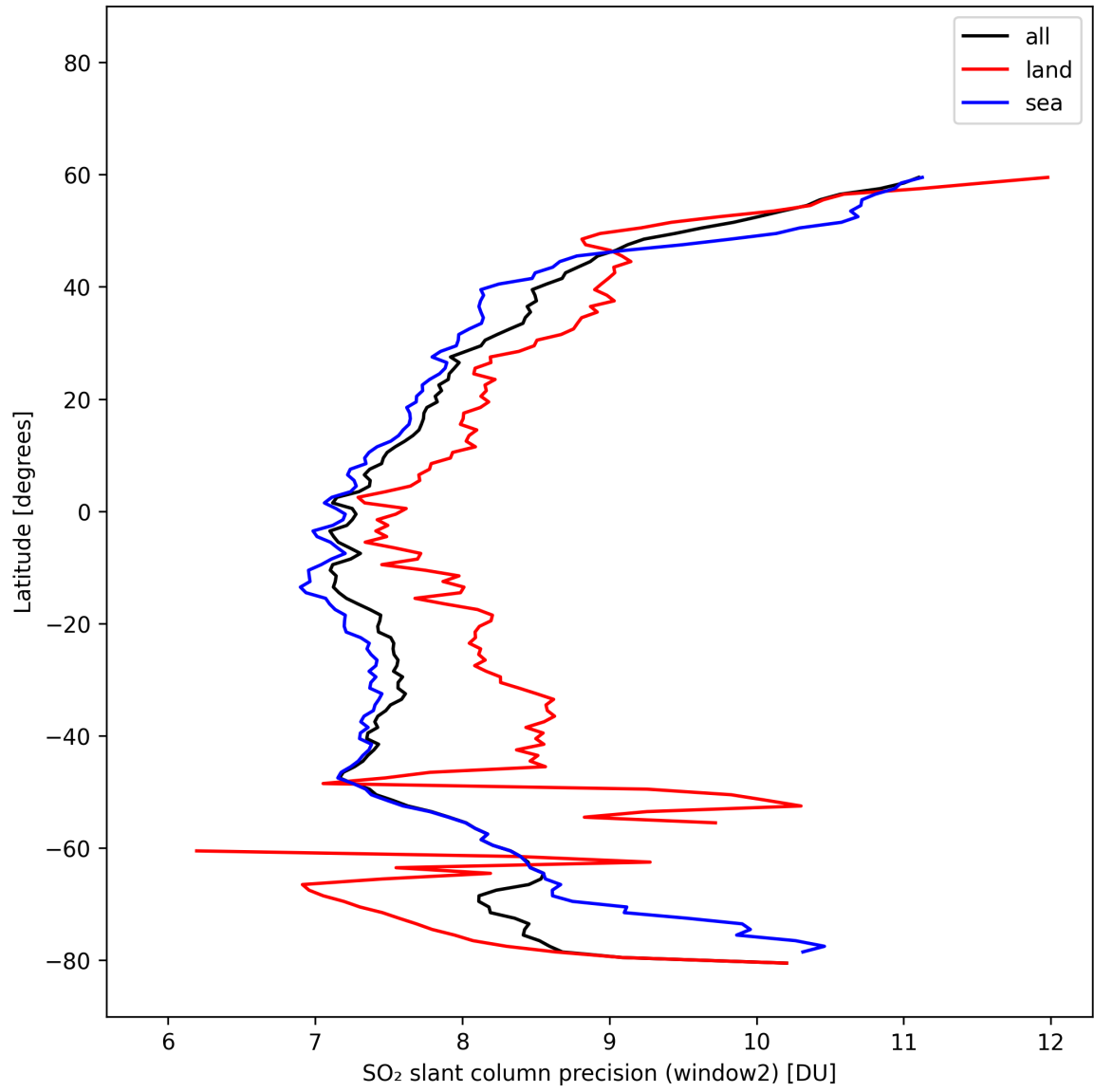


Figure 41: Zonal average of “SO₂ slant column precision (window2)” for 2025-02-20 to 2025-02-21.

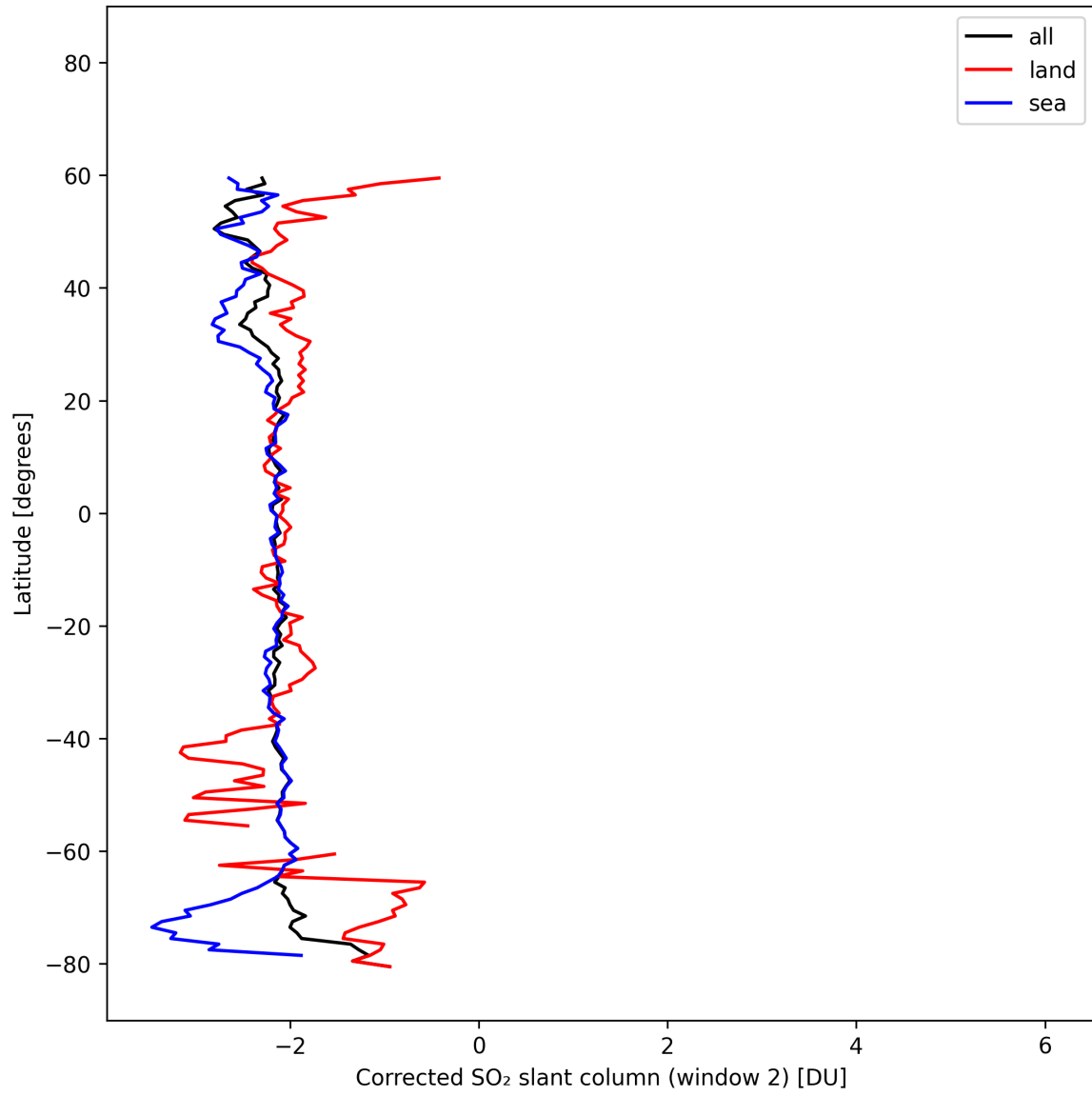


Figure 42: Zonal average of “Corrected SO₂ slant column (window 2)” for 2025-02-20 to 2025-02-21.

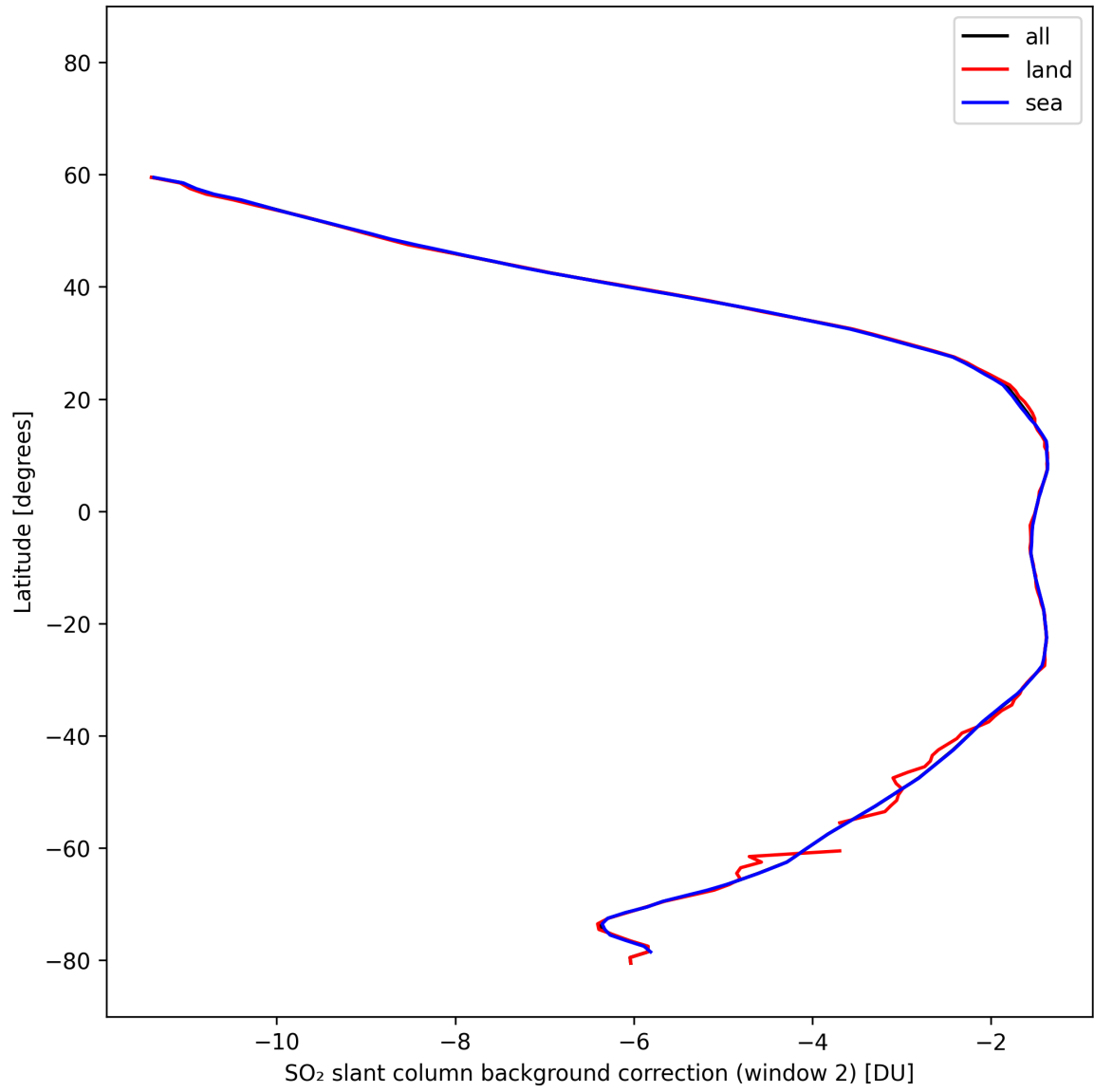


Figure 43: Zonal average of “SO₂ slant column background correction (window 2)” for 2025-02-20 to 2025-02-21.

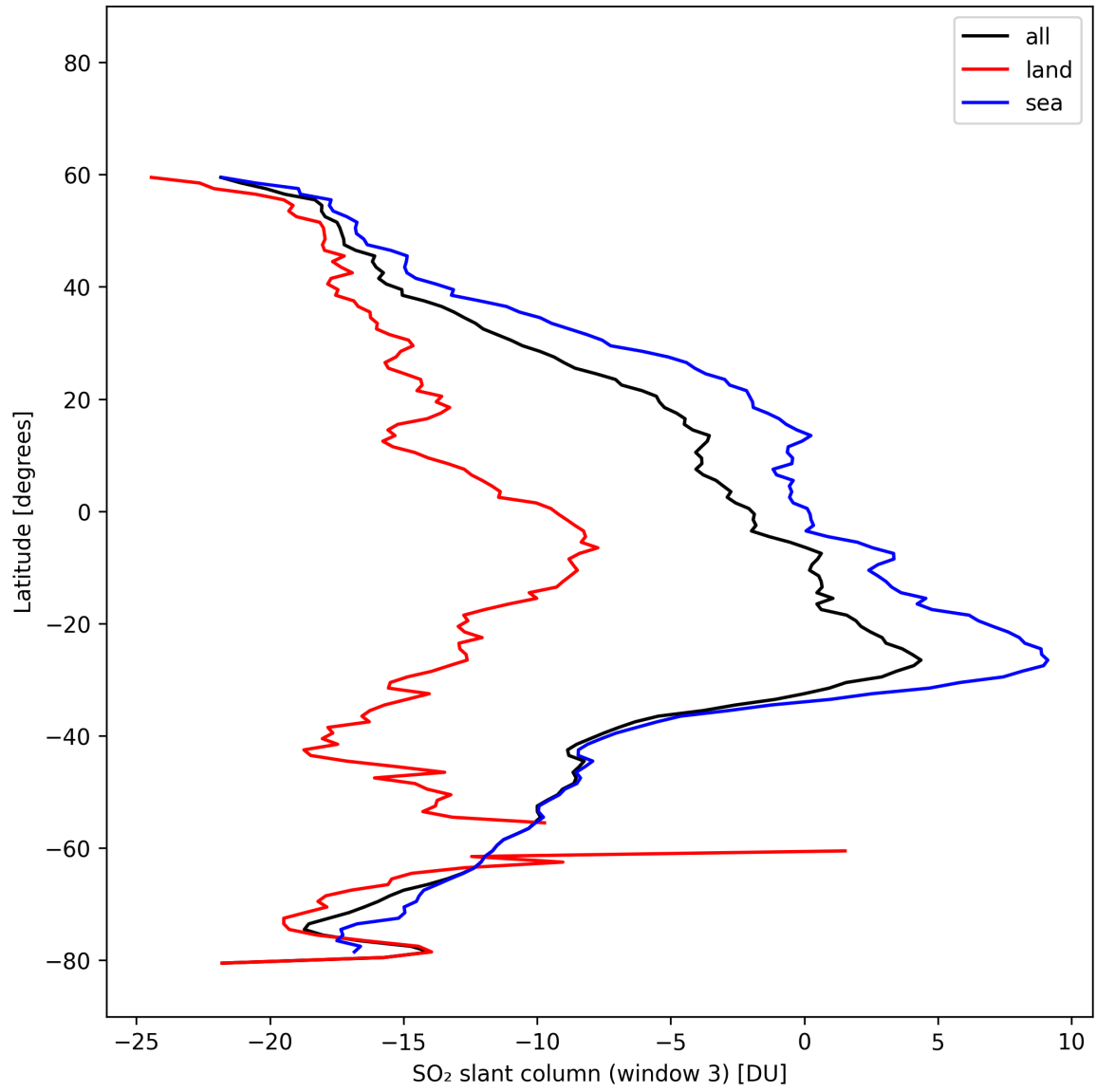


Figure 44: Zonal average of “SO₂ slant column (window 3)” for 2025-02-20 to 2025-02-21.

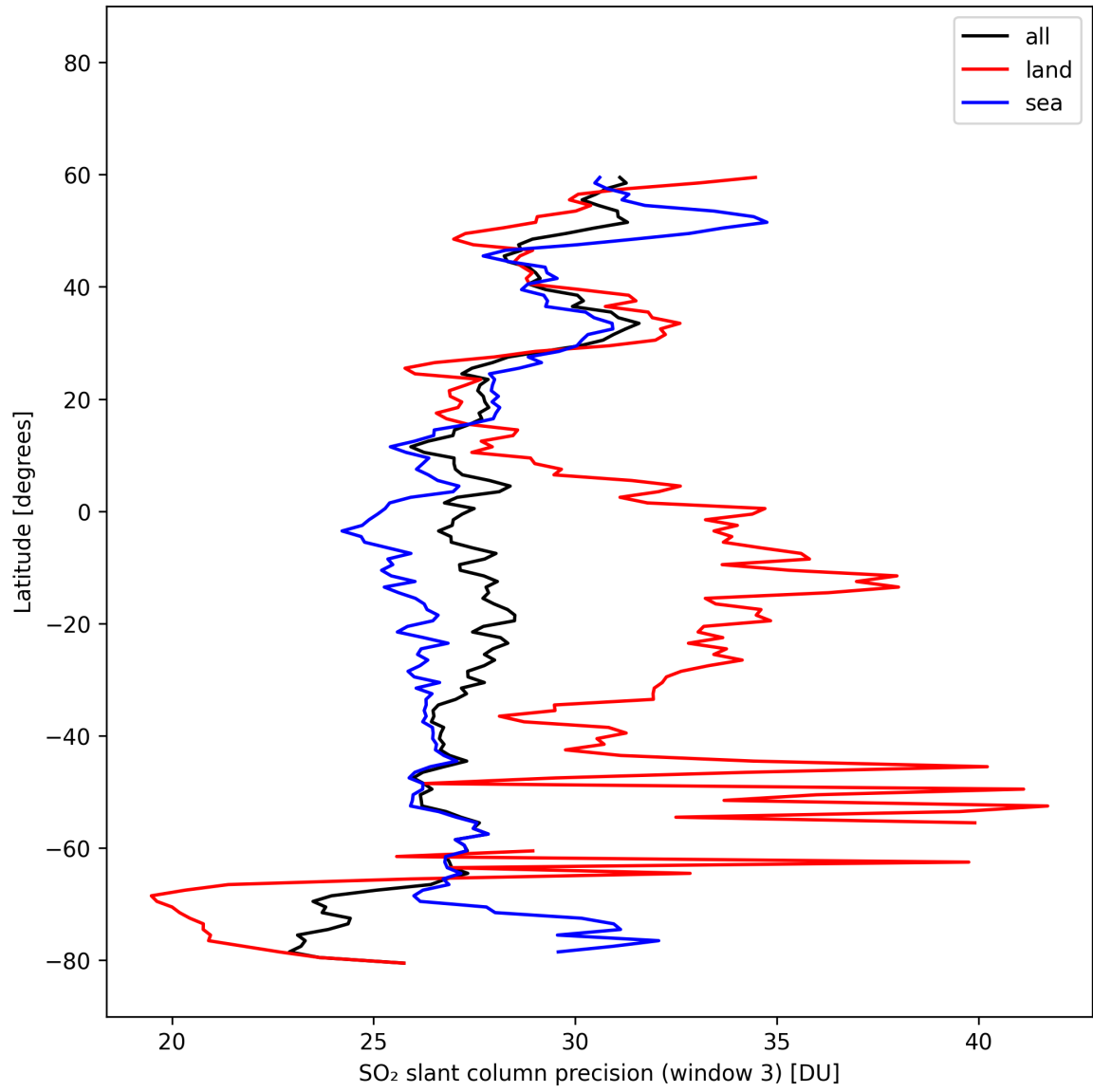


Figure 45: Zonal average of “SO₂ slant column precision (window 3)” for 2025-02-20 to 2025-02-21.

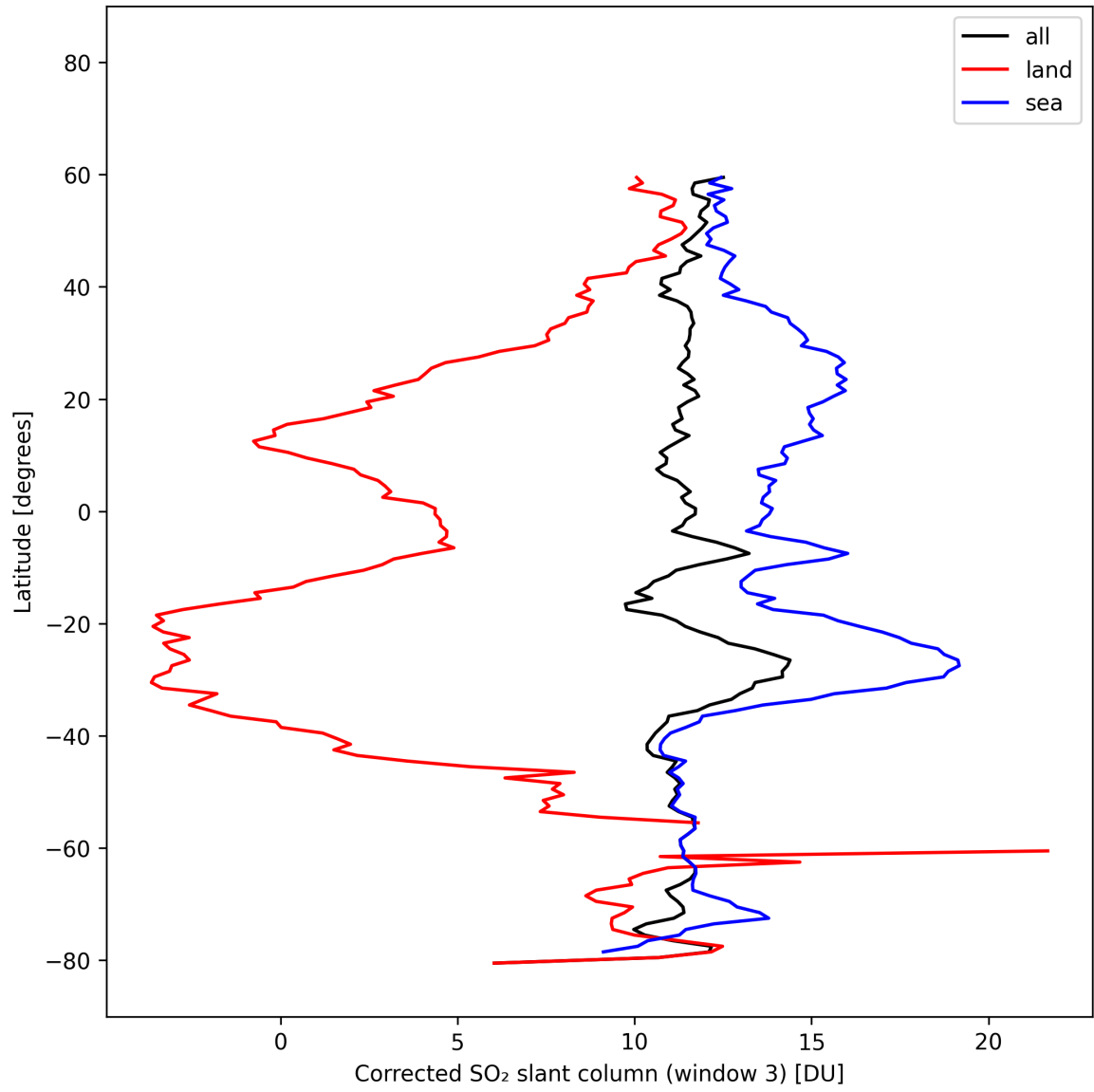


Figure 46: Zonal average of “Corrected SO₂ slant column (window 3)” for 2025-02-20 to 2025-02-21.

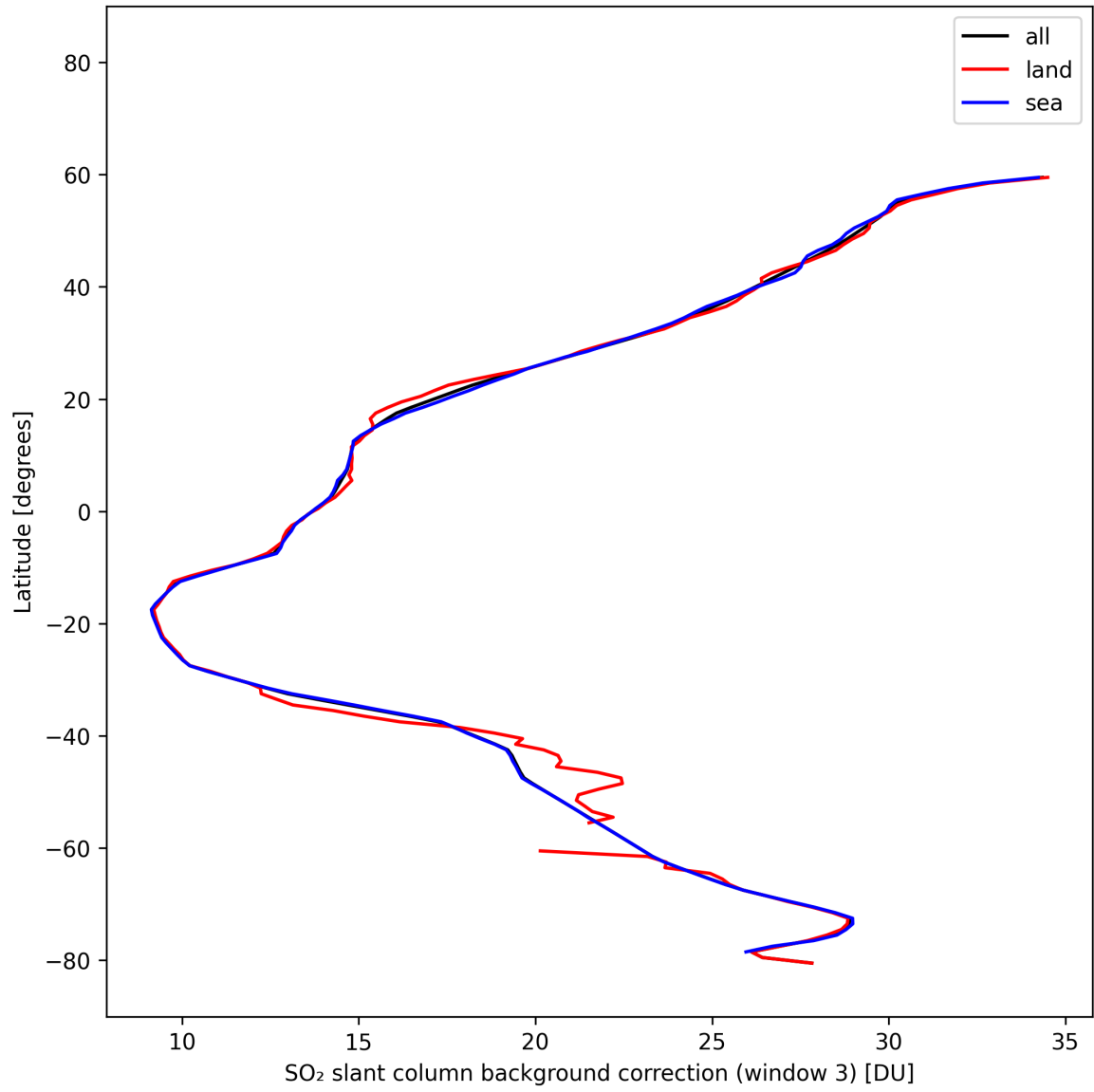


Figure 47: Zonal average of “SO₂ slant column background correction (window 3)” for 2025-02-20 to 2025-02-21.

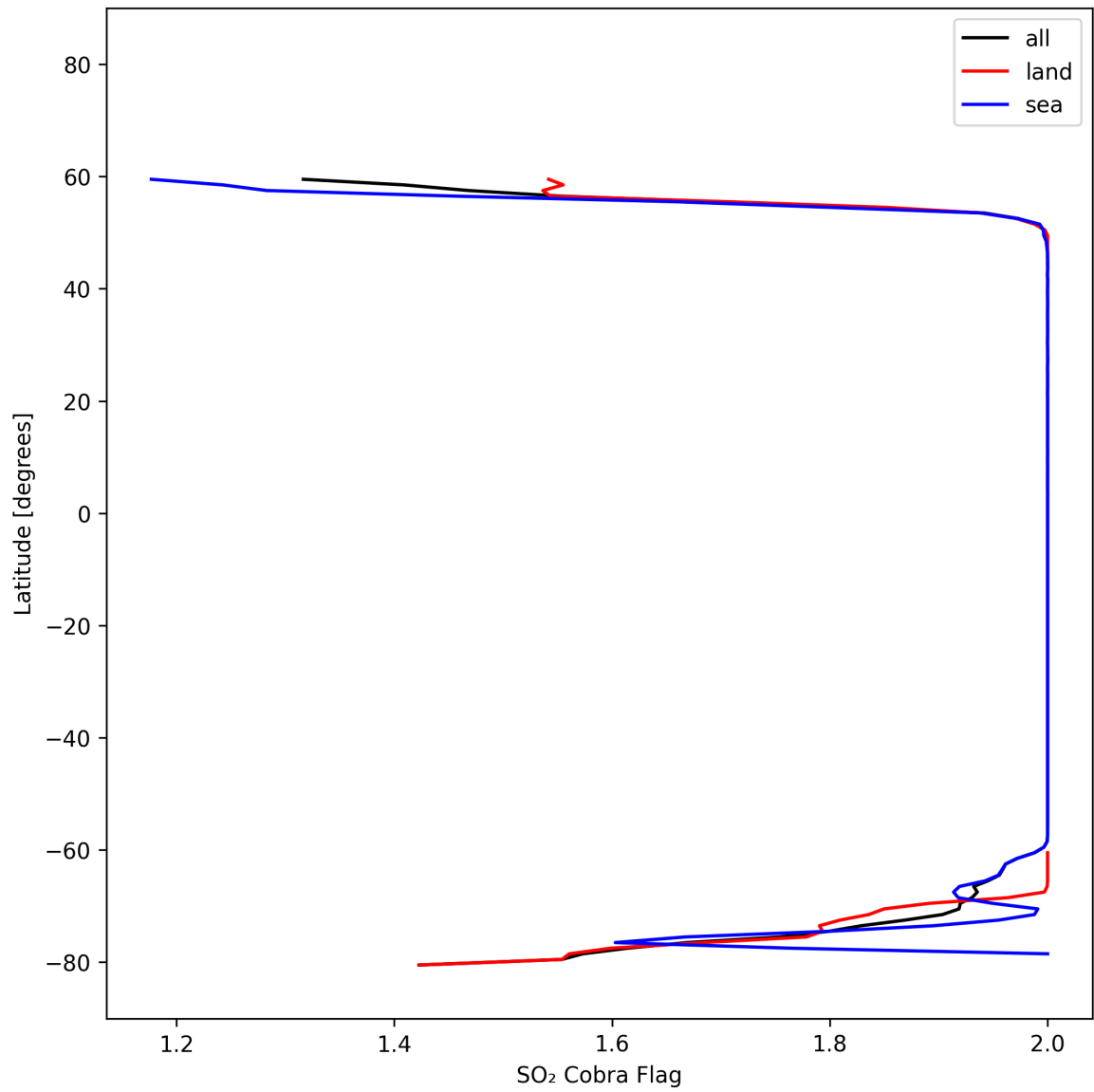


Figure 48: Zonal average of “SO₂ Cobra Flag” for 2025-02-20 to 2025-02-21.

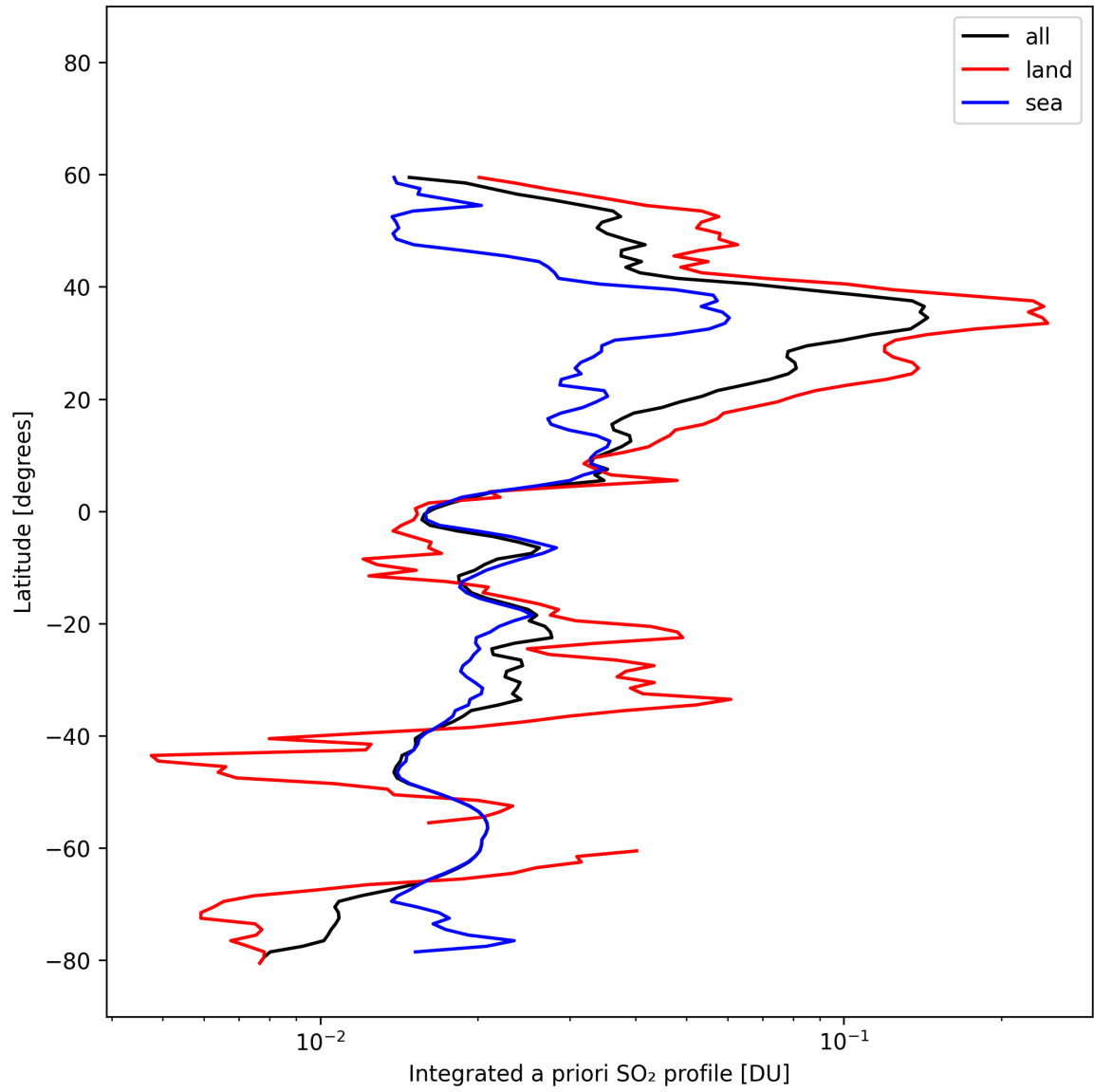


Figure 49: Zonal average of “Integrated a priori SO₂ profile” for 2025-02-20 to 2025-02-21.

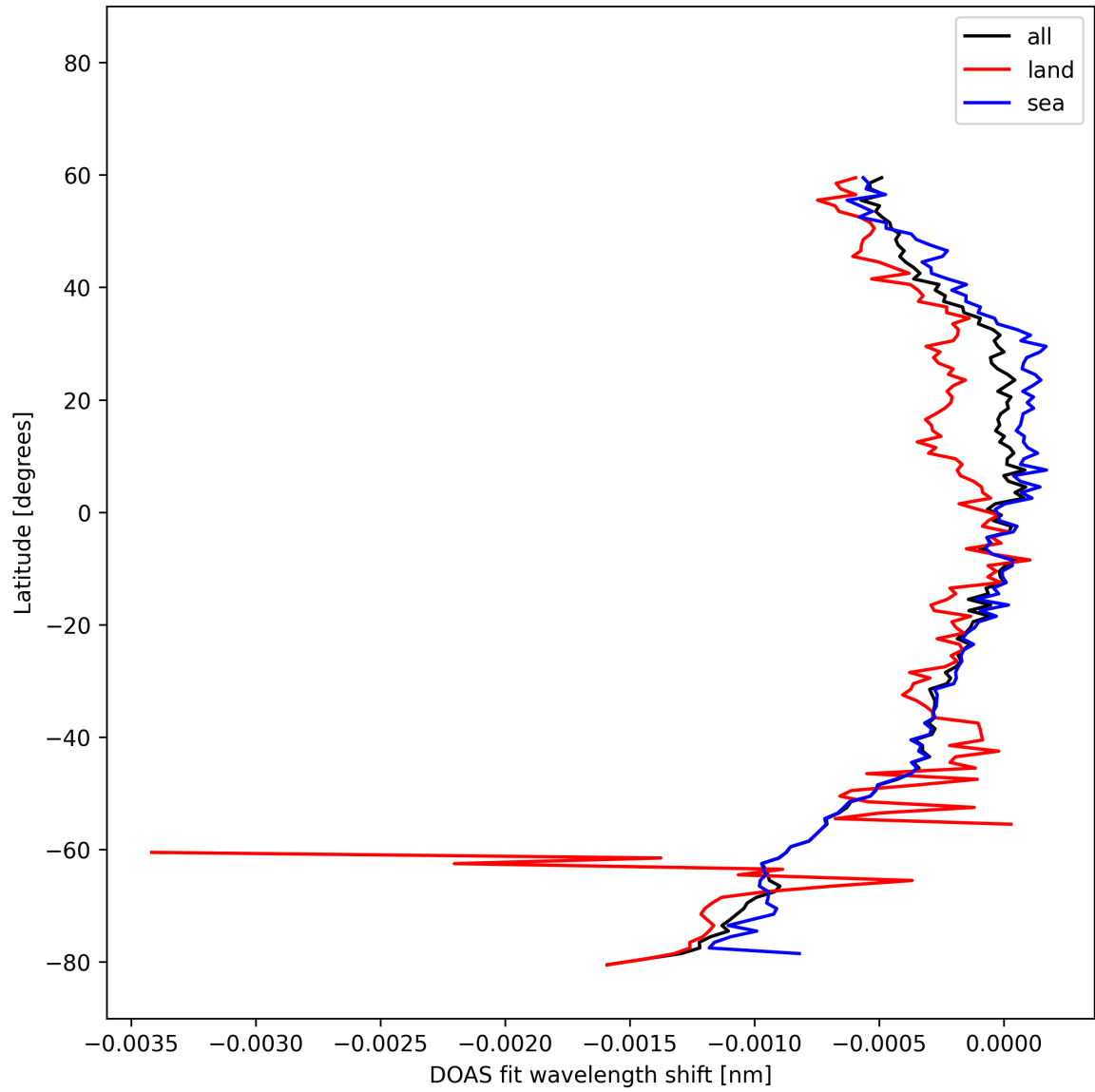


Figure 50: Zonal average of "DOAS fit wavelength shift" for 2025-02-20 to 2025-02-21.

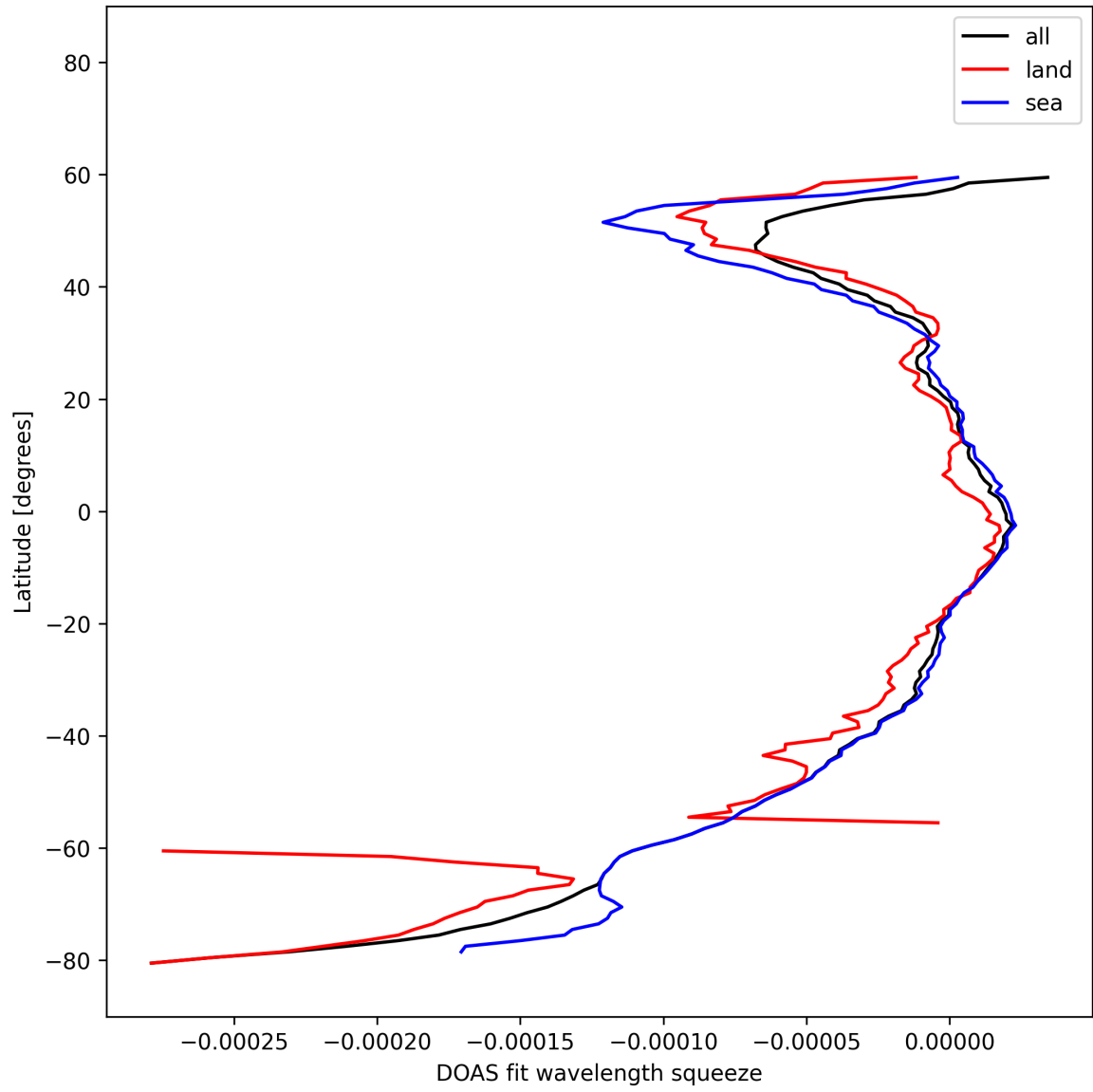


Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-02-20 to 2025-02-21.

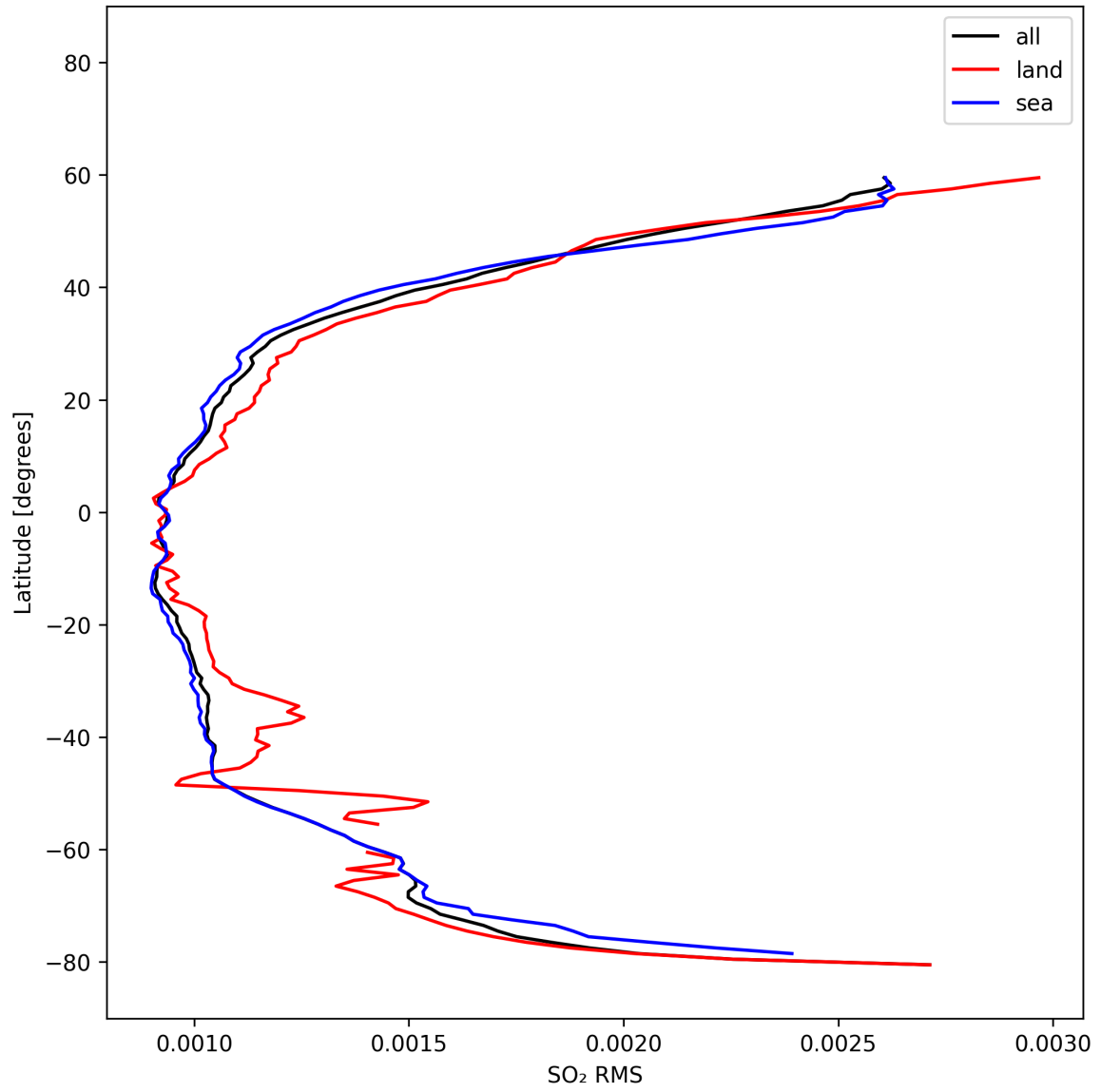


Figure 52: Zonal average of “SO₂ RMS” for 2025-02-20 to 2025-02-21.

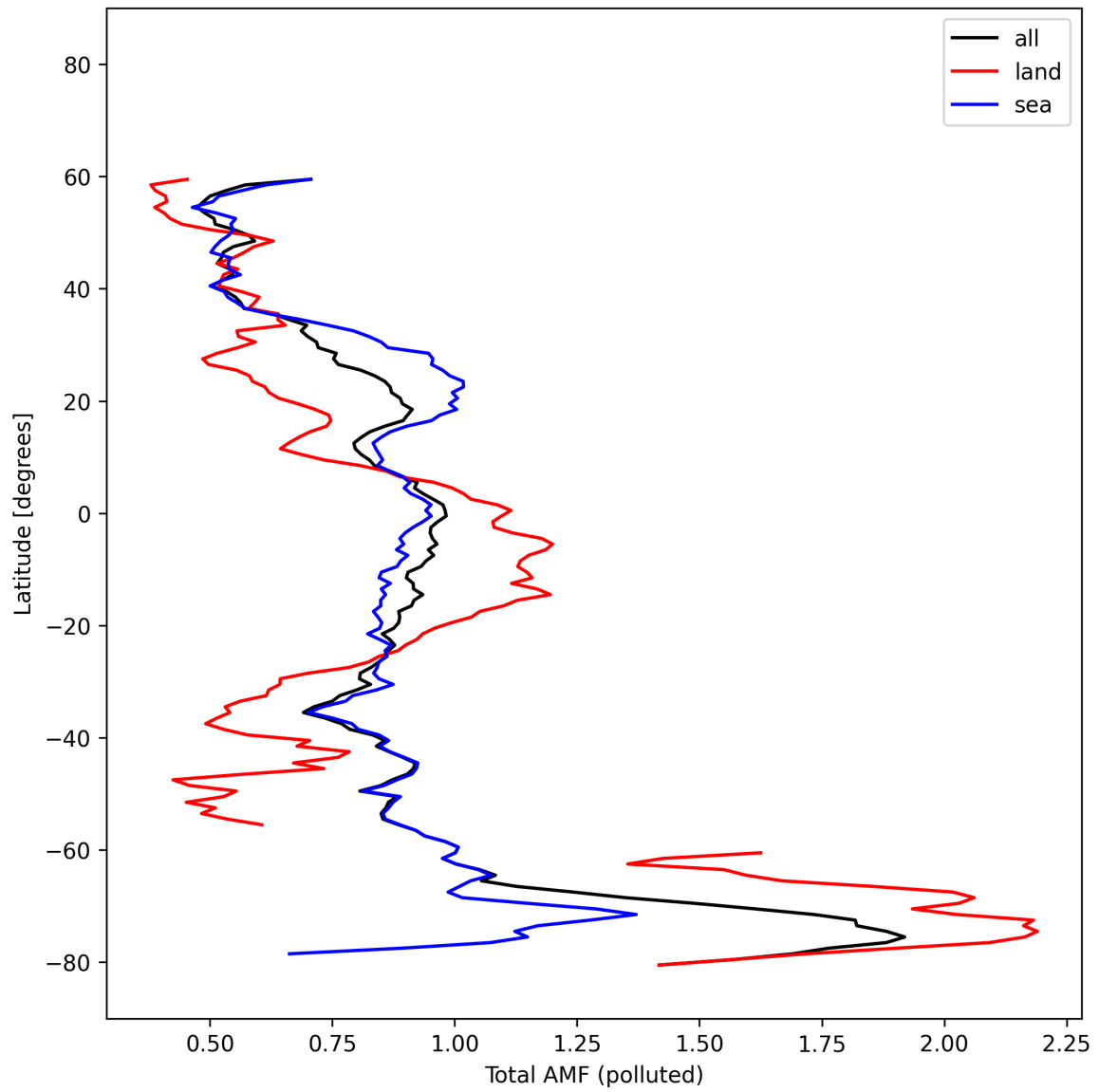


Figure 53: Zonal average of “Total AMF (polluted)” for 2025-02-20 to 2025-02-21.

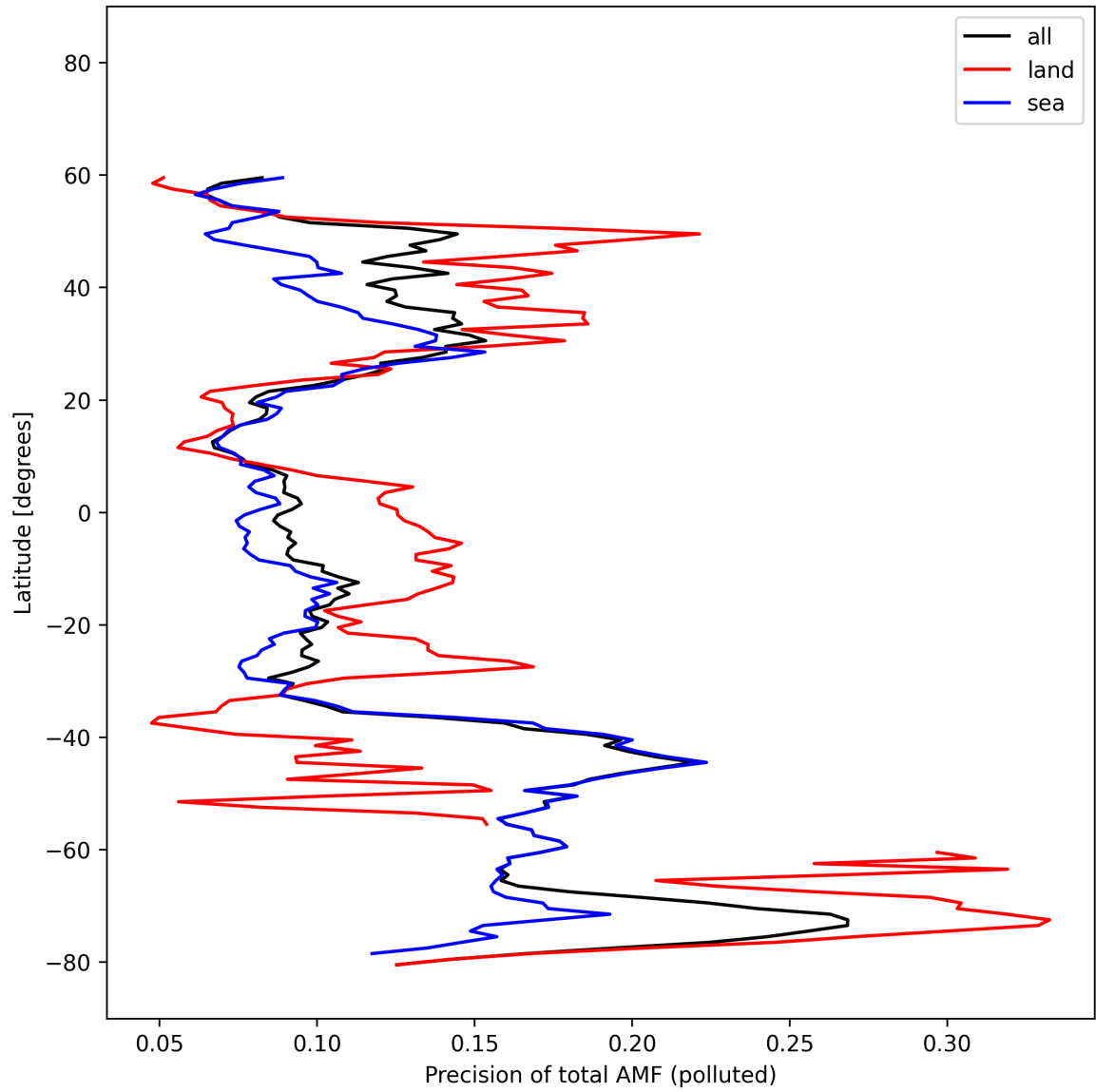


Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-02-20 to 2025-02-21.

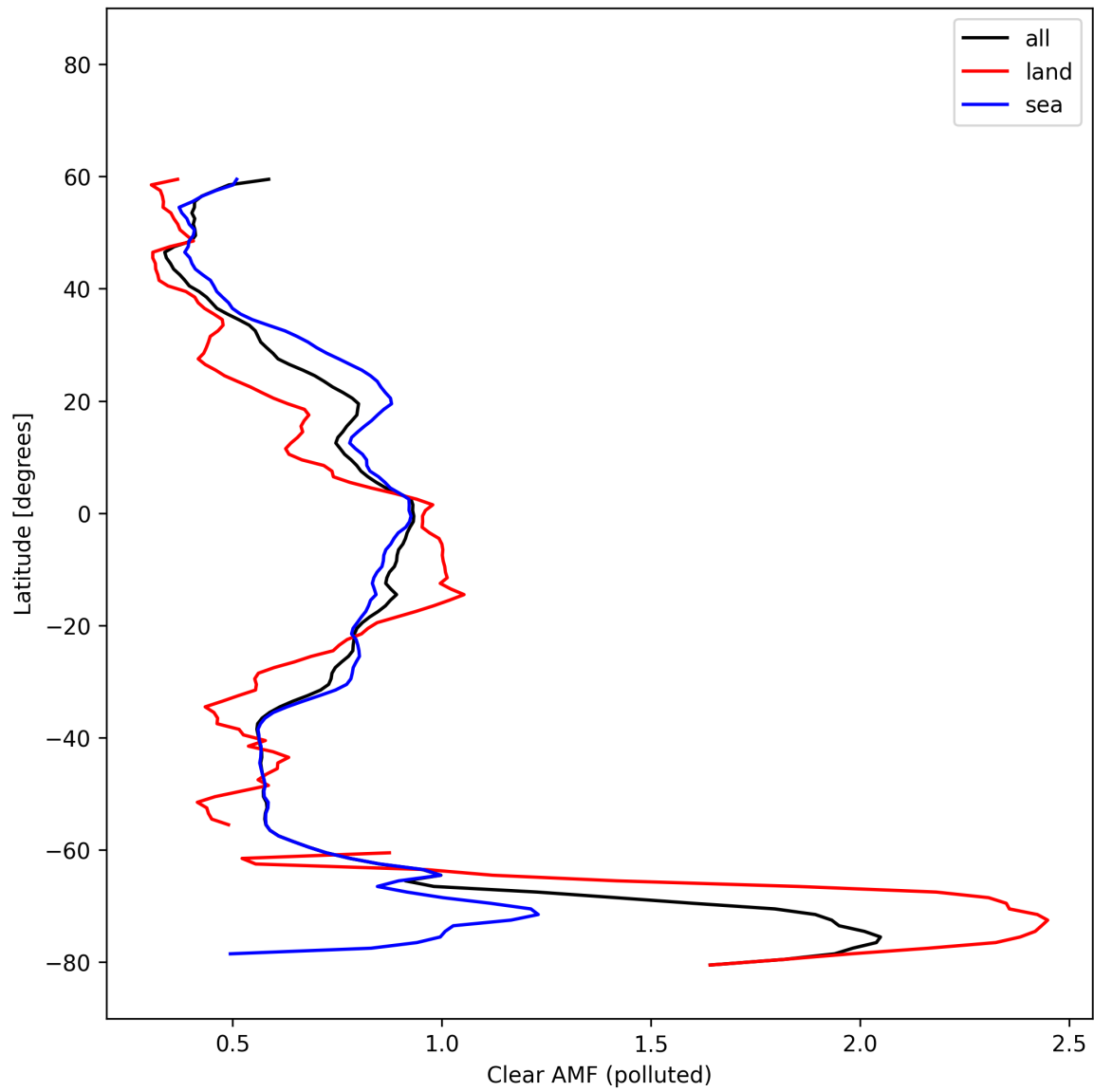


Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-02-20 to 2025-02-21.

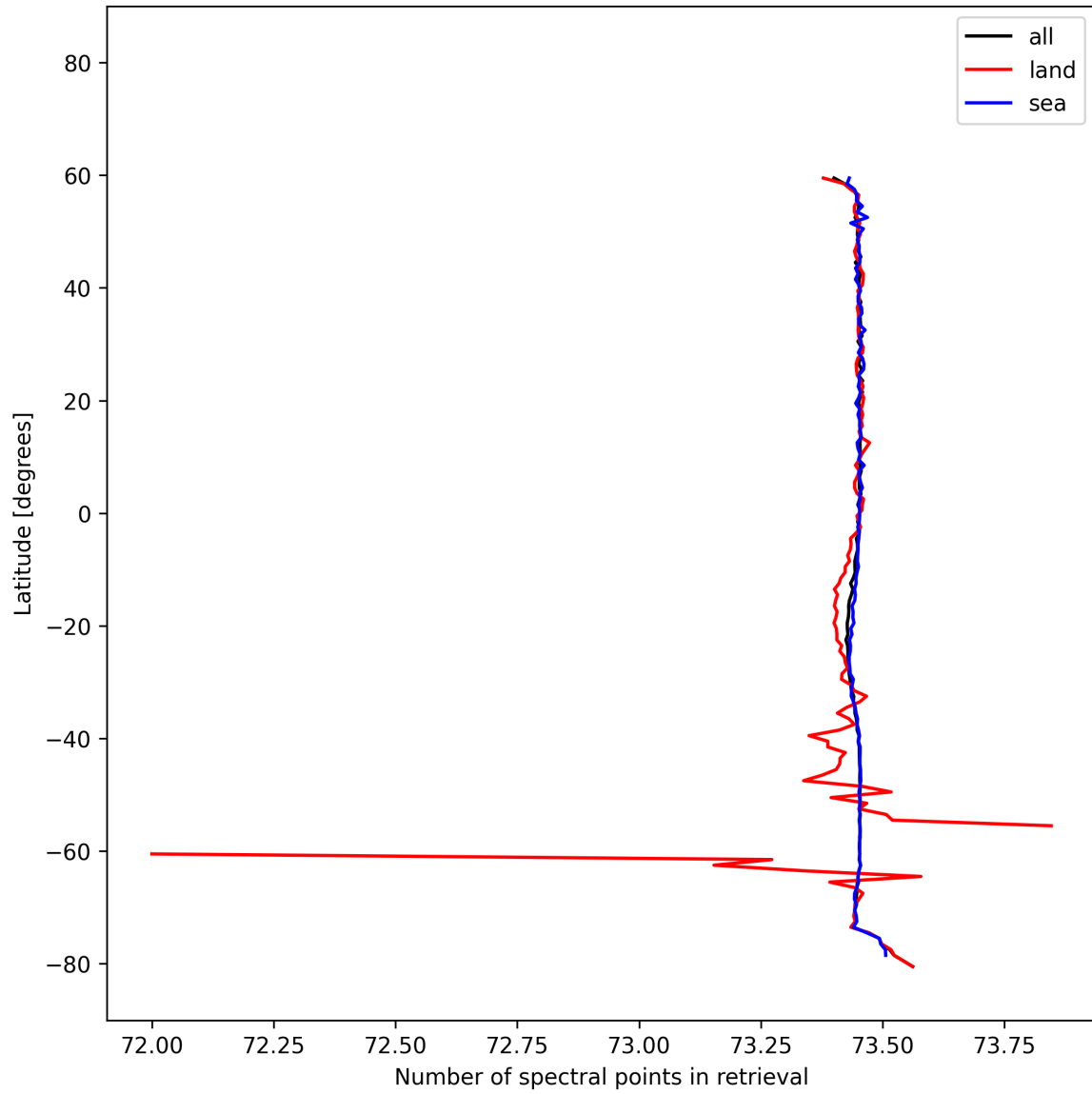


Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-02-20 to 2025-02-21.

8 Histograms

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

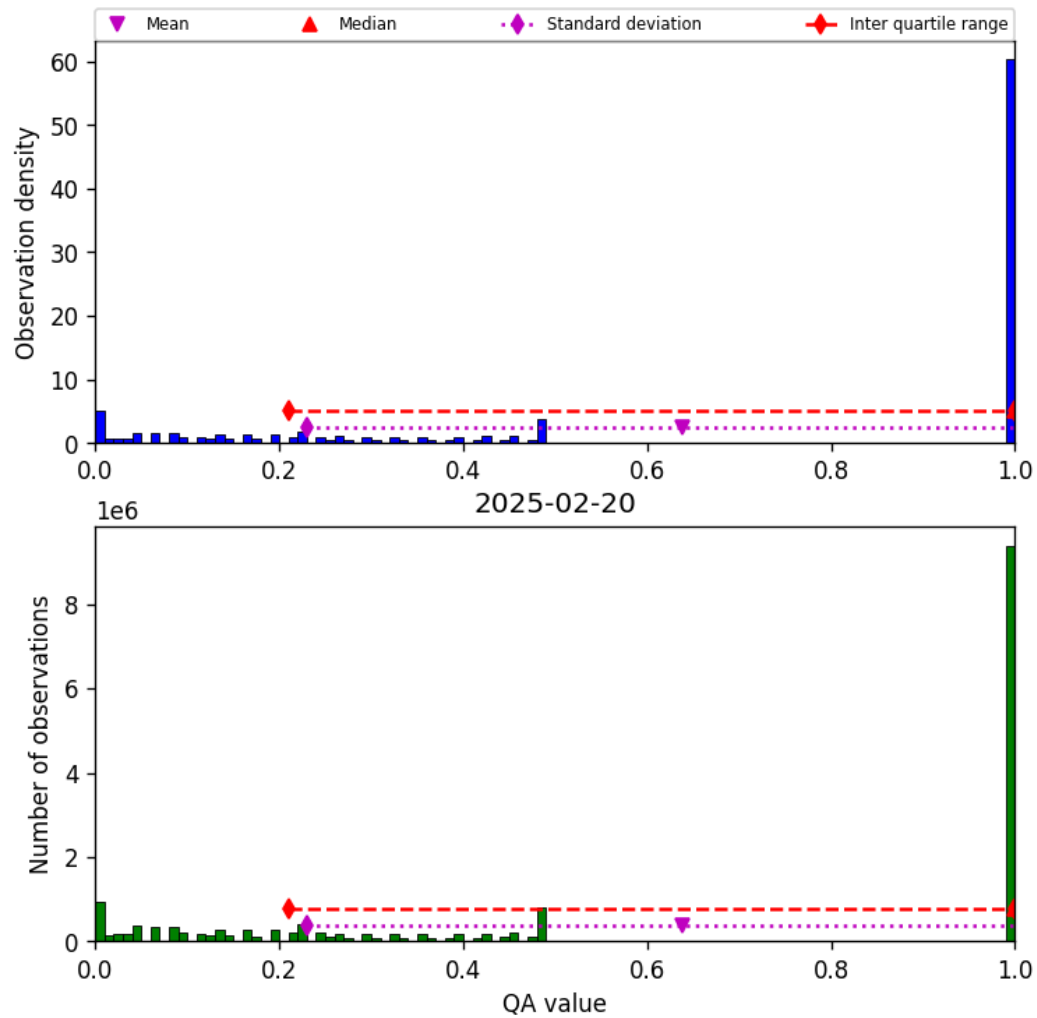


Figure 57: Histogram of “QA value” for 2025-02-20 to 2025-02-21

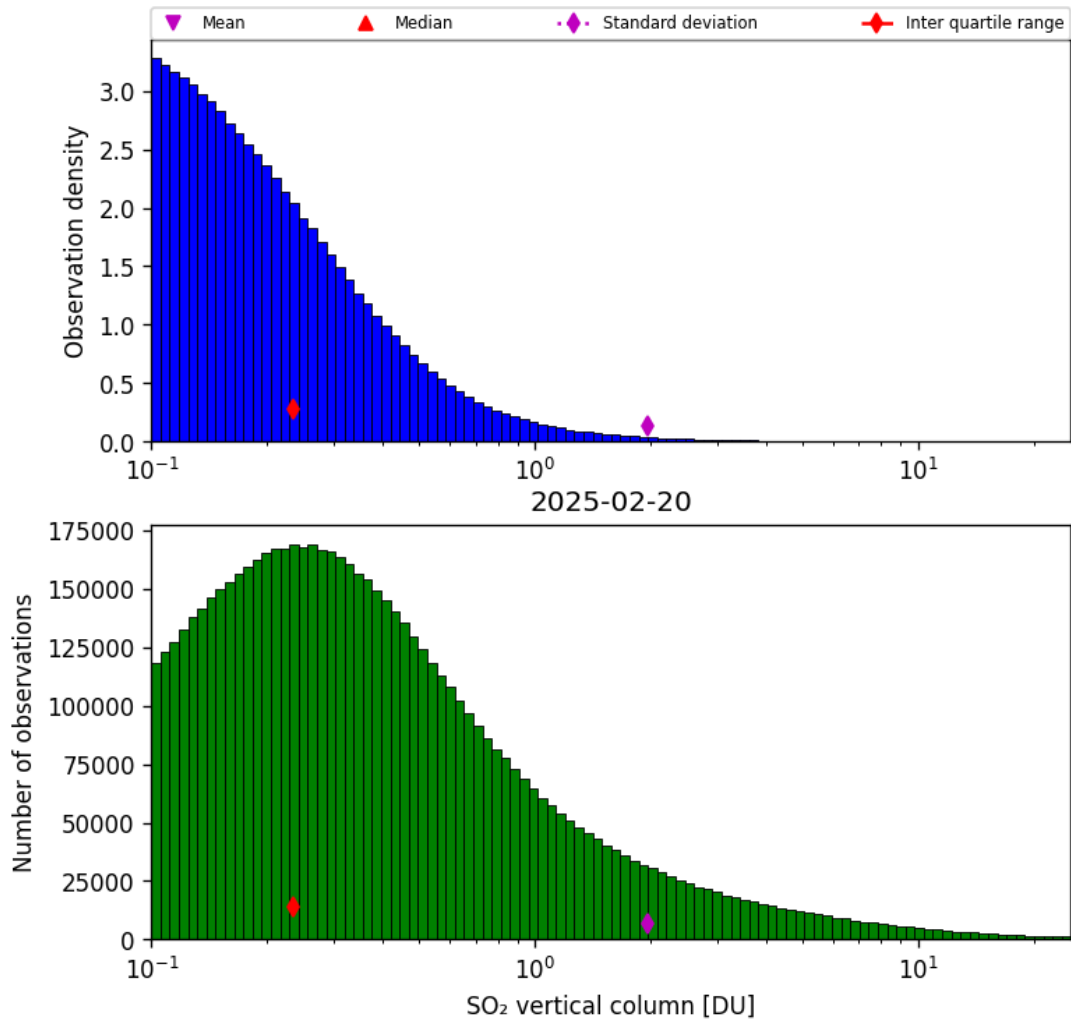


Figure 58: Histogram of “SO₂ vertical column” for 2025-02-20 to 2025-02-21

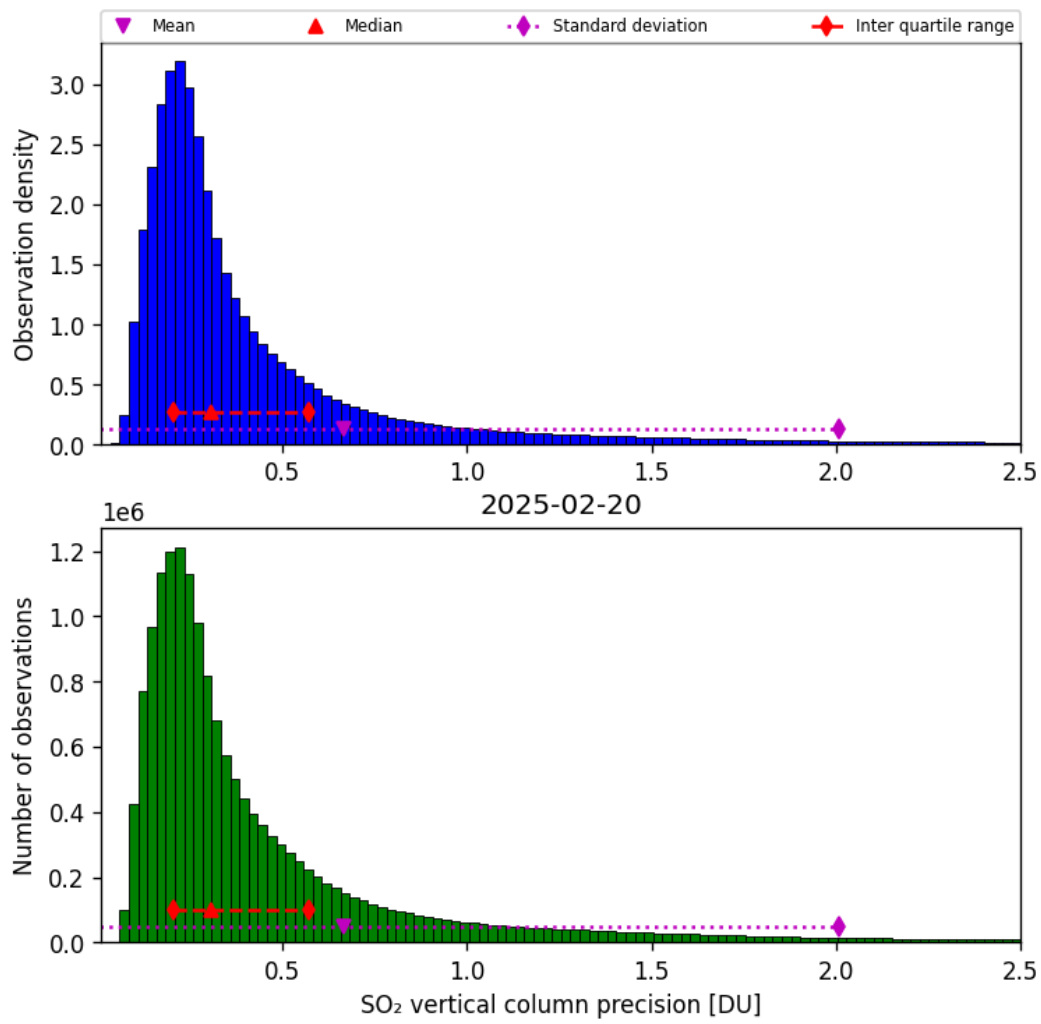


Figure 59: Histogram of “SO₂ vertical column precision” for 2025-02-20 to 2025-02-21

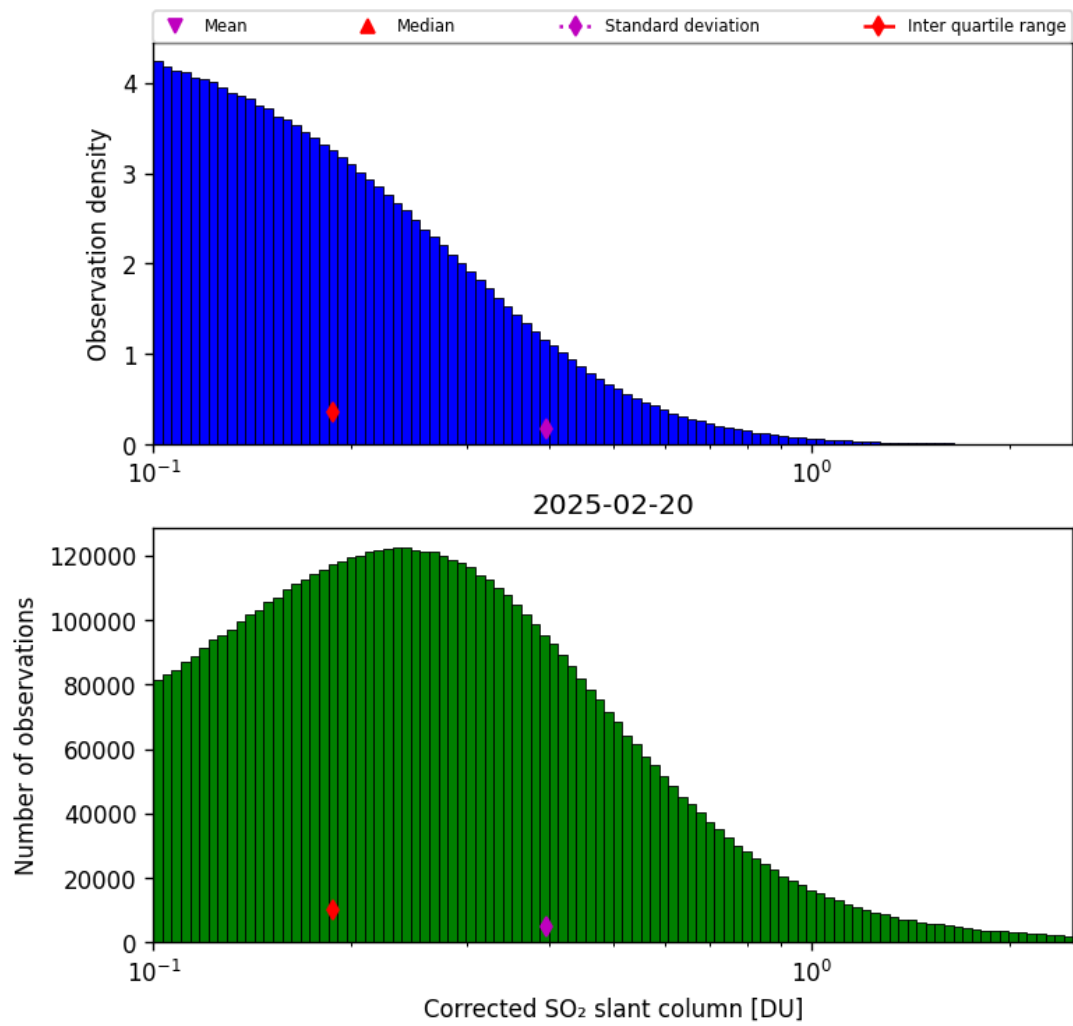


Figure 60: Histogram of “Corrected SO₂ slant column” for 2025-02-20 to 2025-02-21

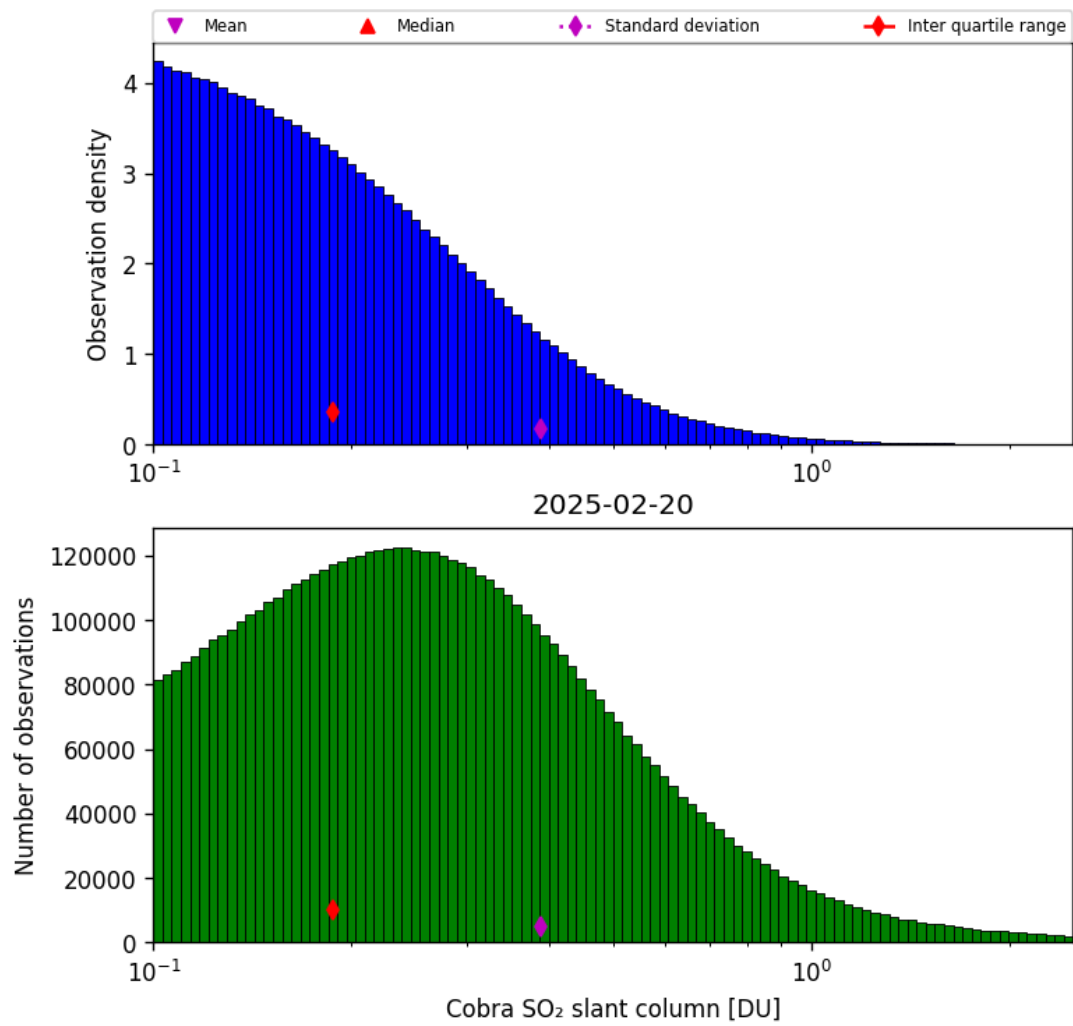


Figure 61: Histogram of “Cobra SO₂ slant column” for 2025-02-20 to 2025-02-21

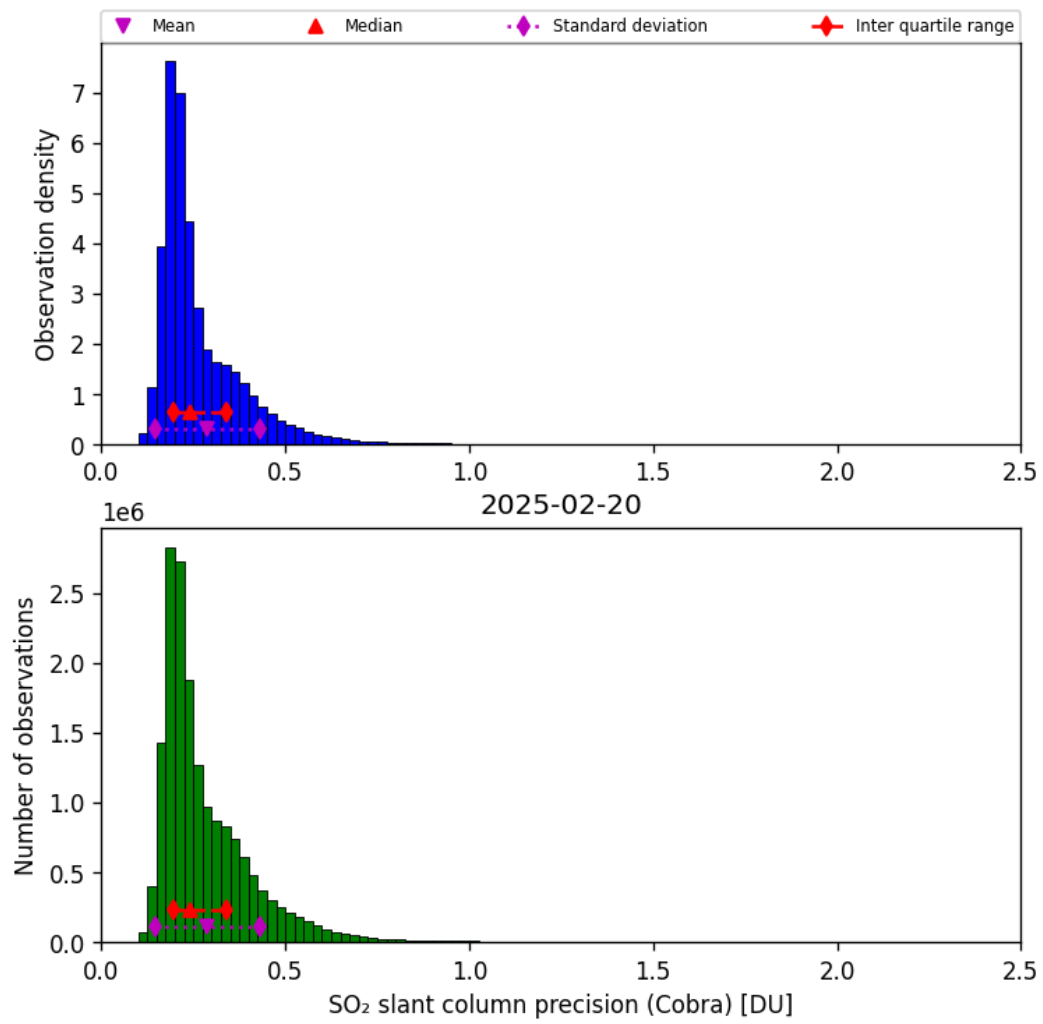


Figure 62: Histogram of “SO₂ slant column precision (Cobra)” for 2025-02-20 to 2025-02-21

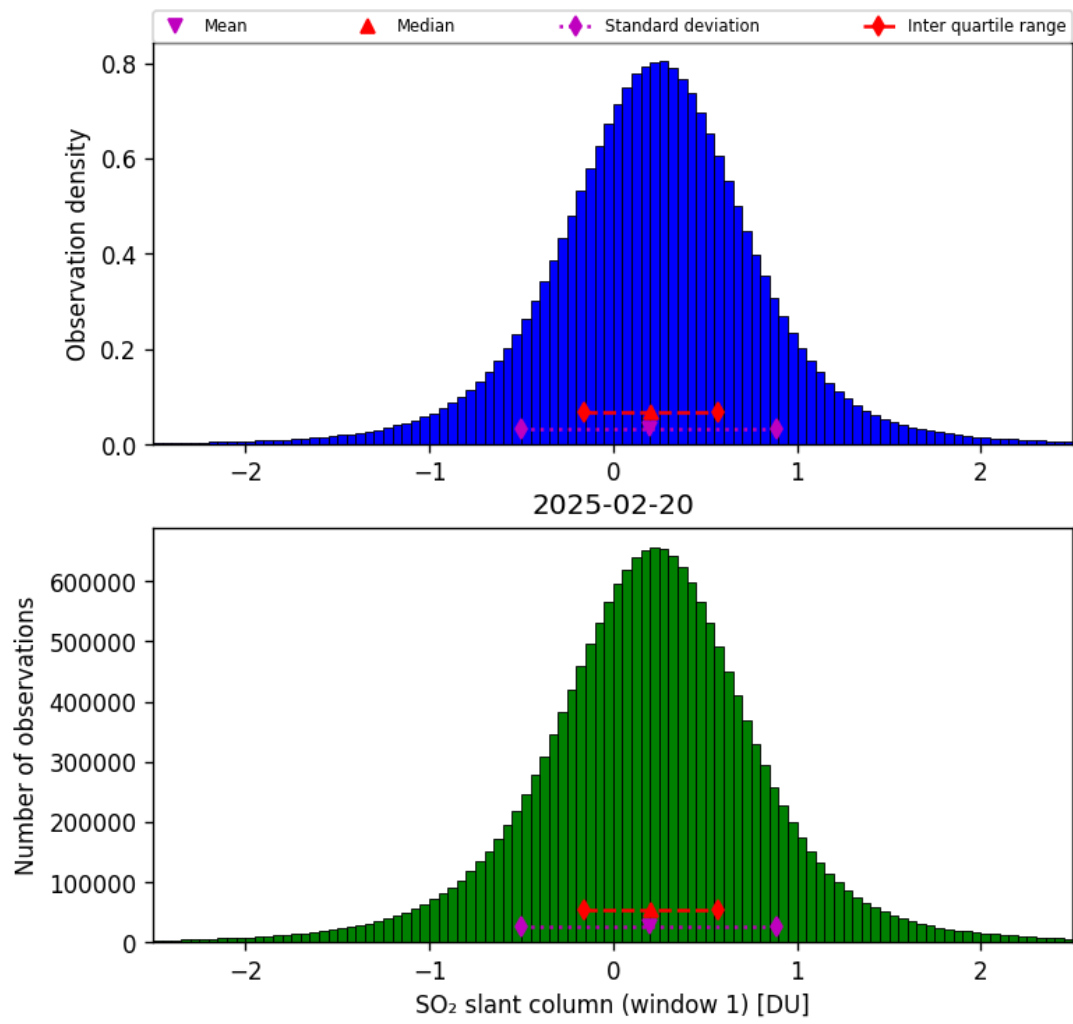


Figure 63: Histogram of “SO₂ slant column (window 1)” for 2025-02-20 to 2025-02-21

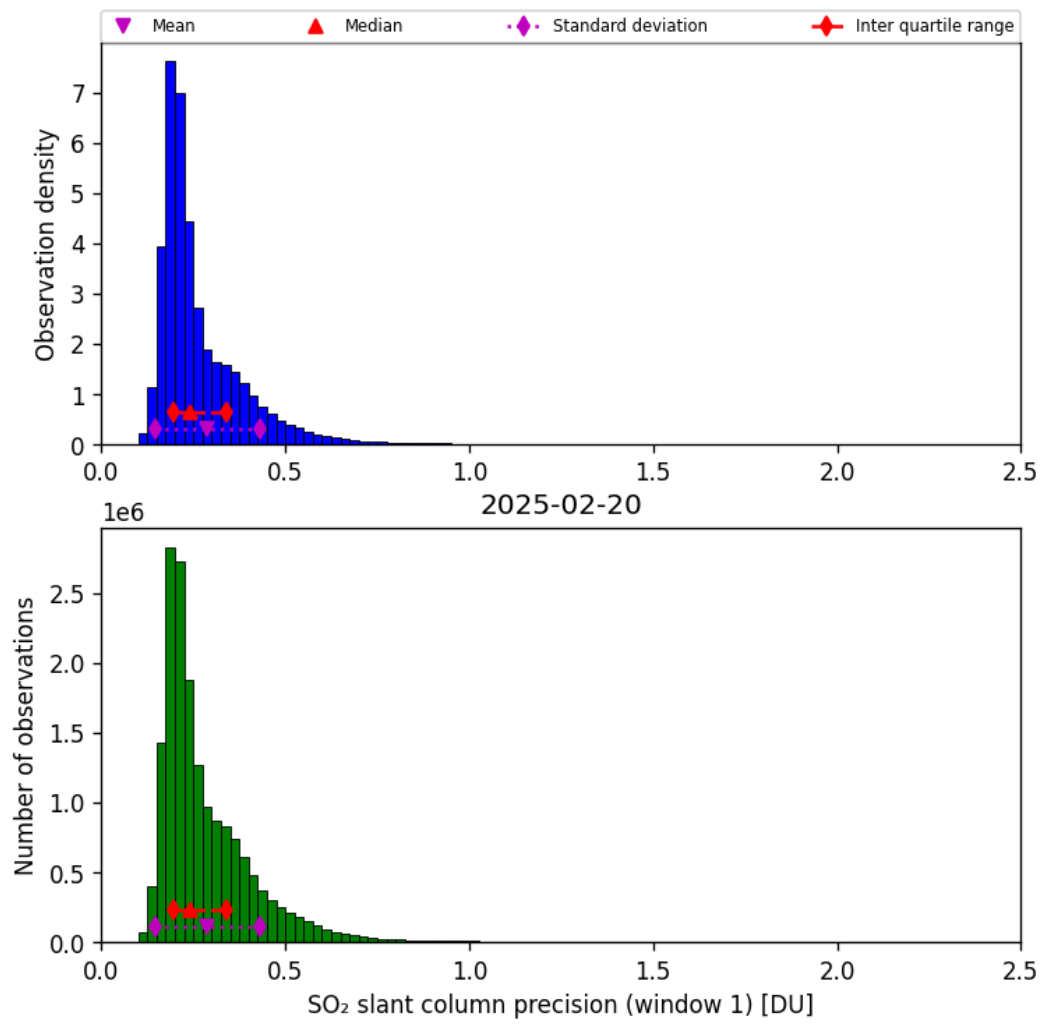


Figure 64: Histogram of “SO₂ slant column precision (window 1)” for 2025-02-20 to 2025-02-21

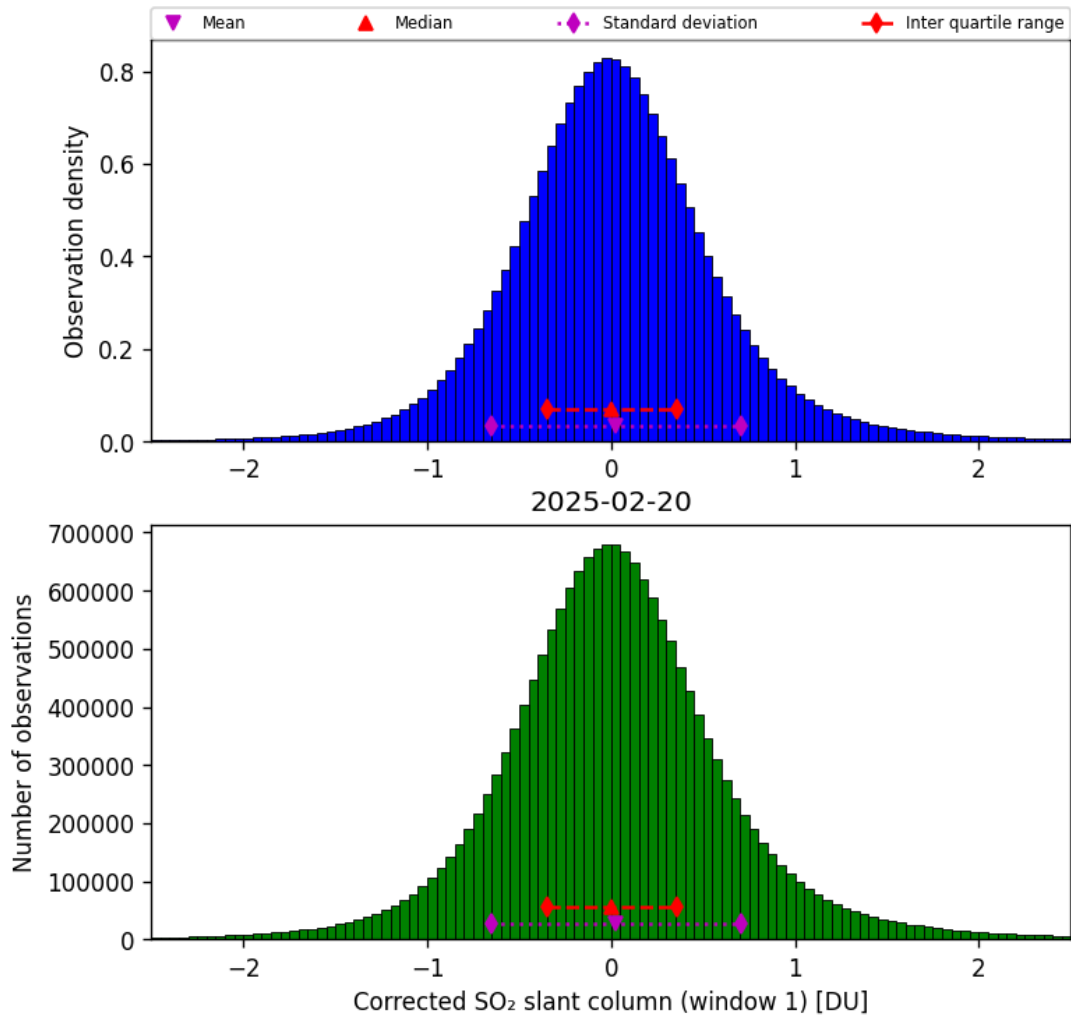


Figure 65: Histogram of “Corrected SO₂ slant column (window 1)” for 2025-02-20 to 2025-02-21

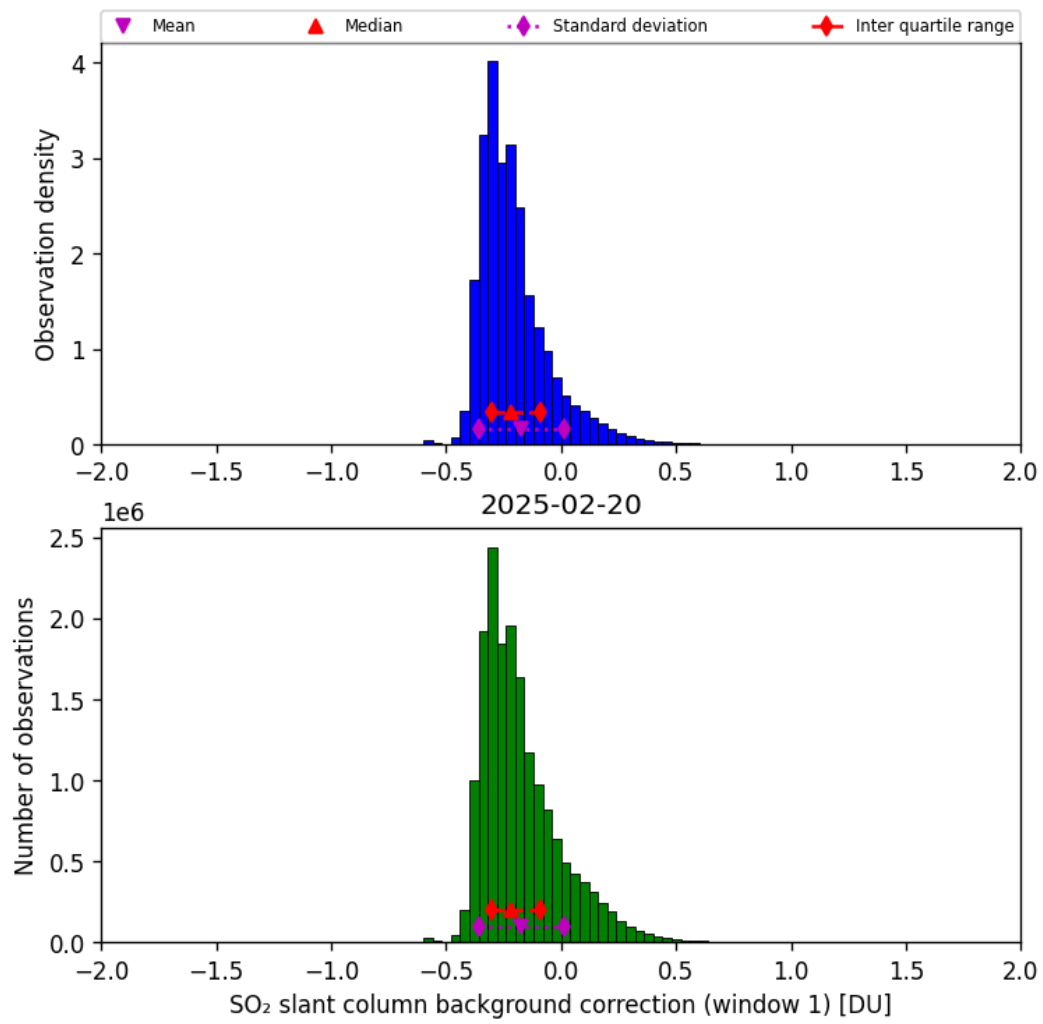


Figure 66: Histogram of “SO₂ slant column background correction (window 1)” for 2025-02-20 to 2025-02-21

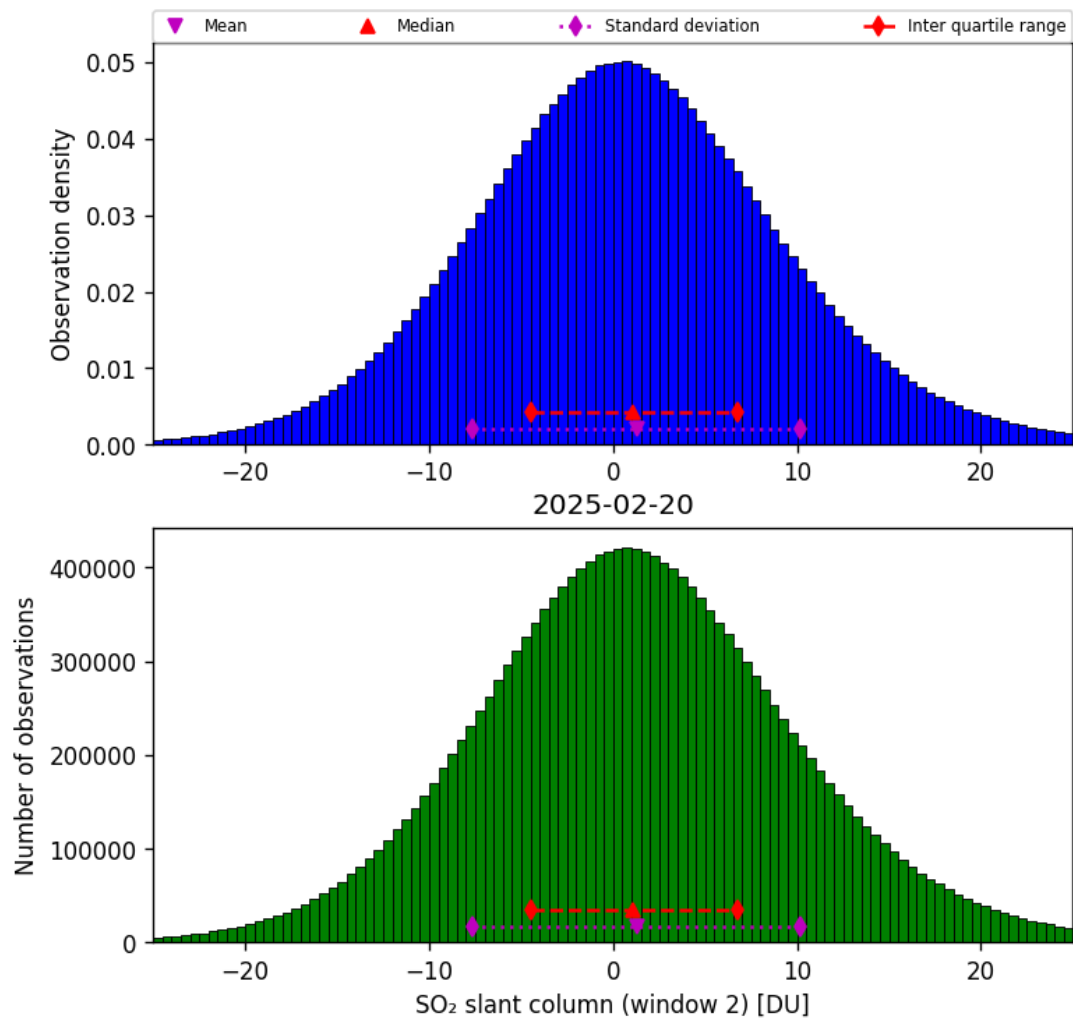


Figure 67: Histogram of “SO₂ slant column (window 2)” for 2025-02-20 to 2025-02-21

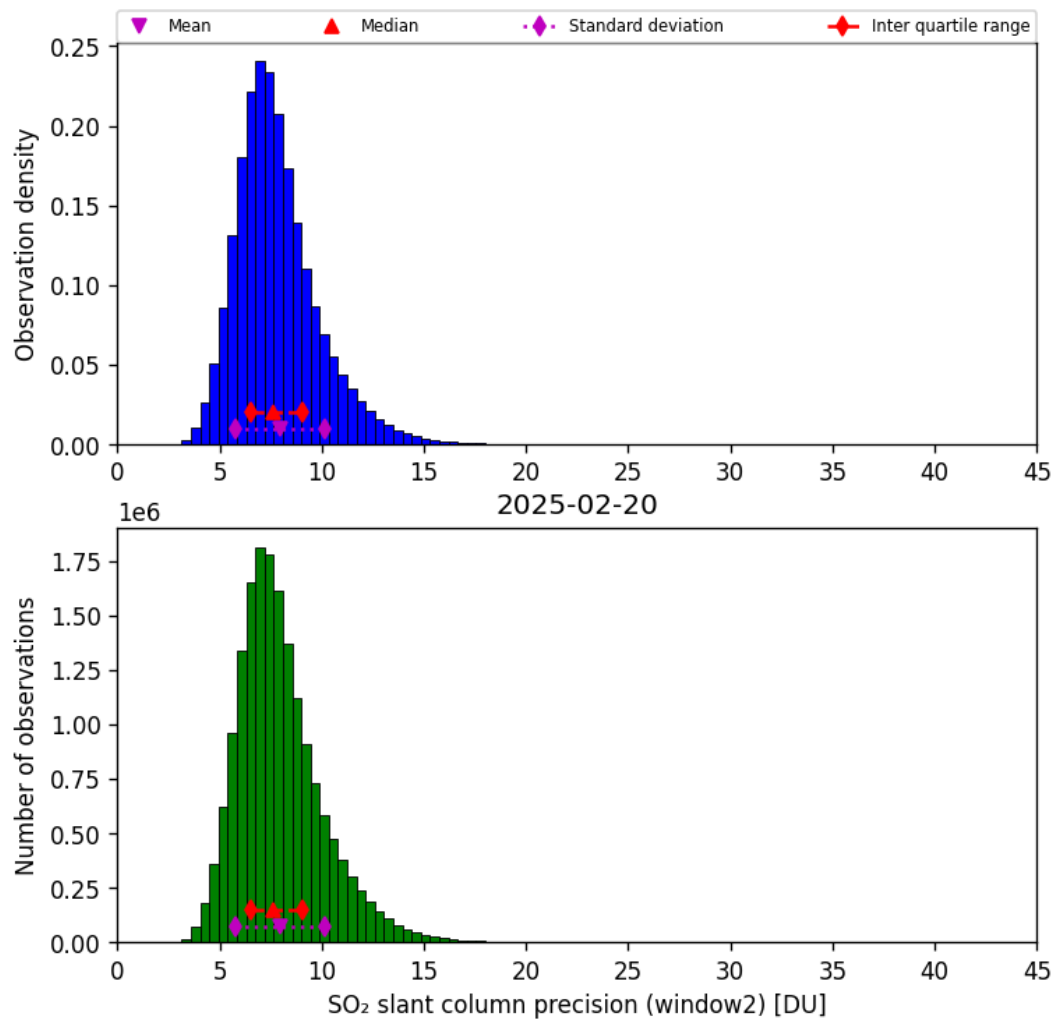


Figure 68: Histogram of “SO₂ slant column precision (window2)” for 2025-02-20 to 2025-02-21

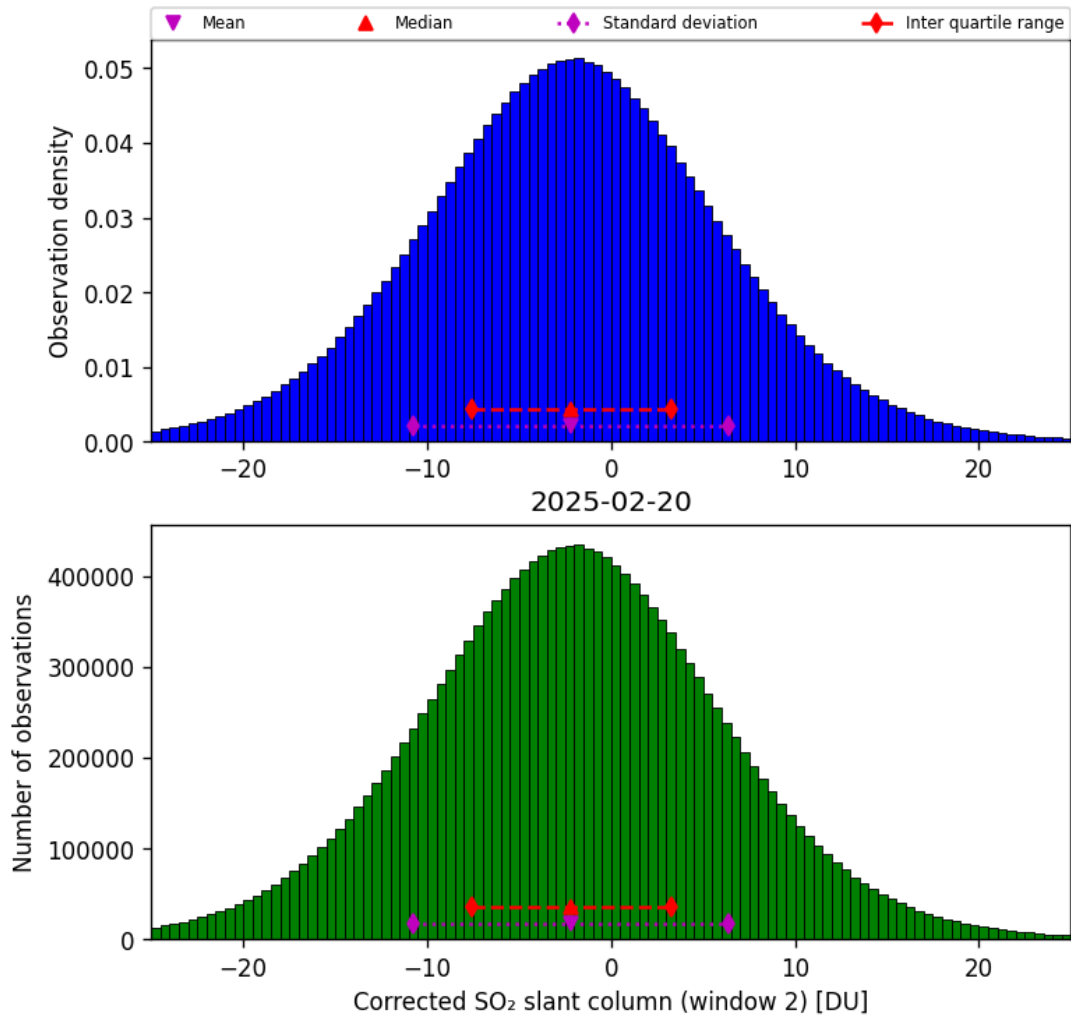


Figure 69: Histogram of “Corrected SO₂ slant column (window 2)” for 2025-02-20 to 2025-02-21

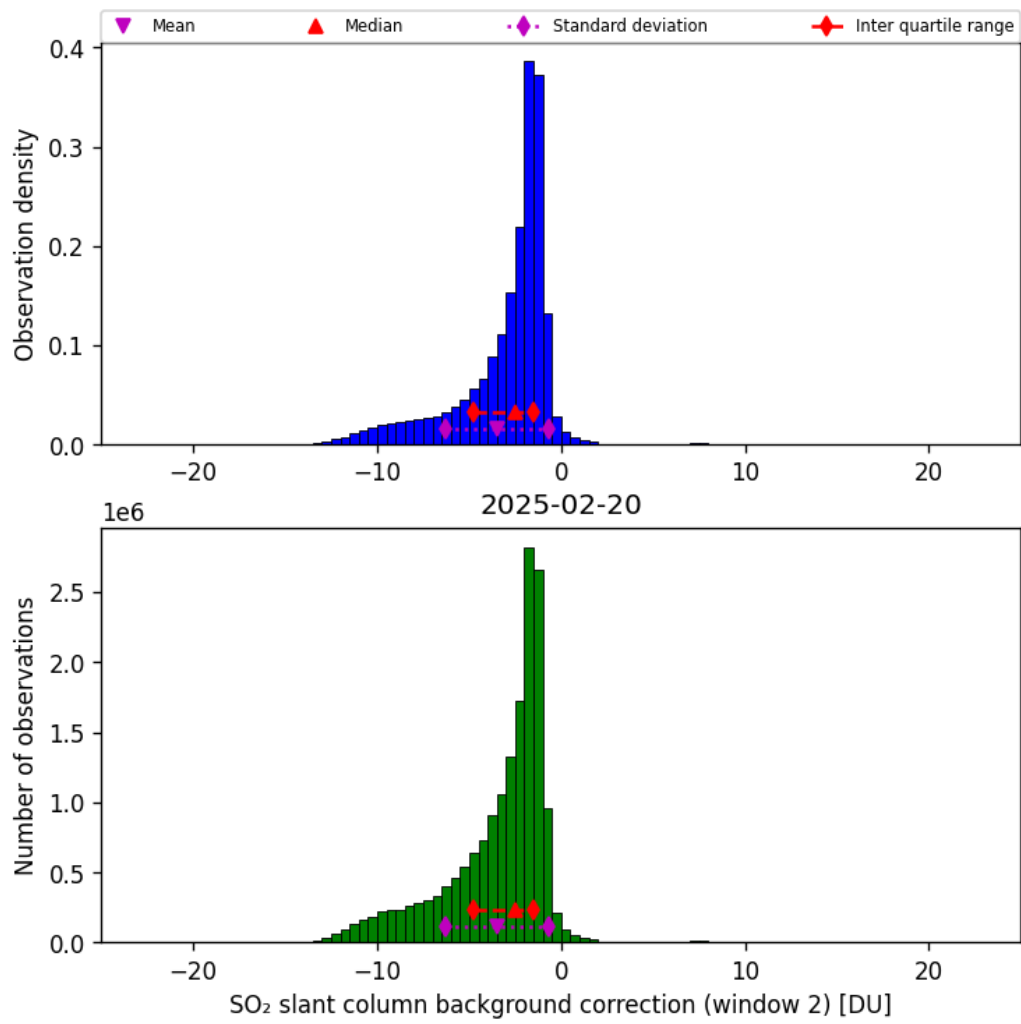


Figure 70: Histogram of “SO₂ slant column background correction (window 2)” for 2025-02-20 to 2025-02-21

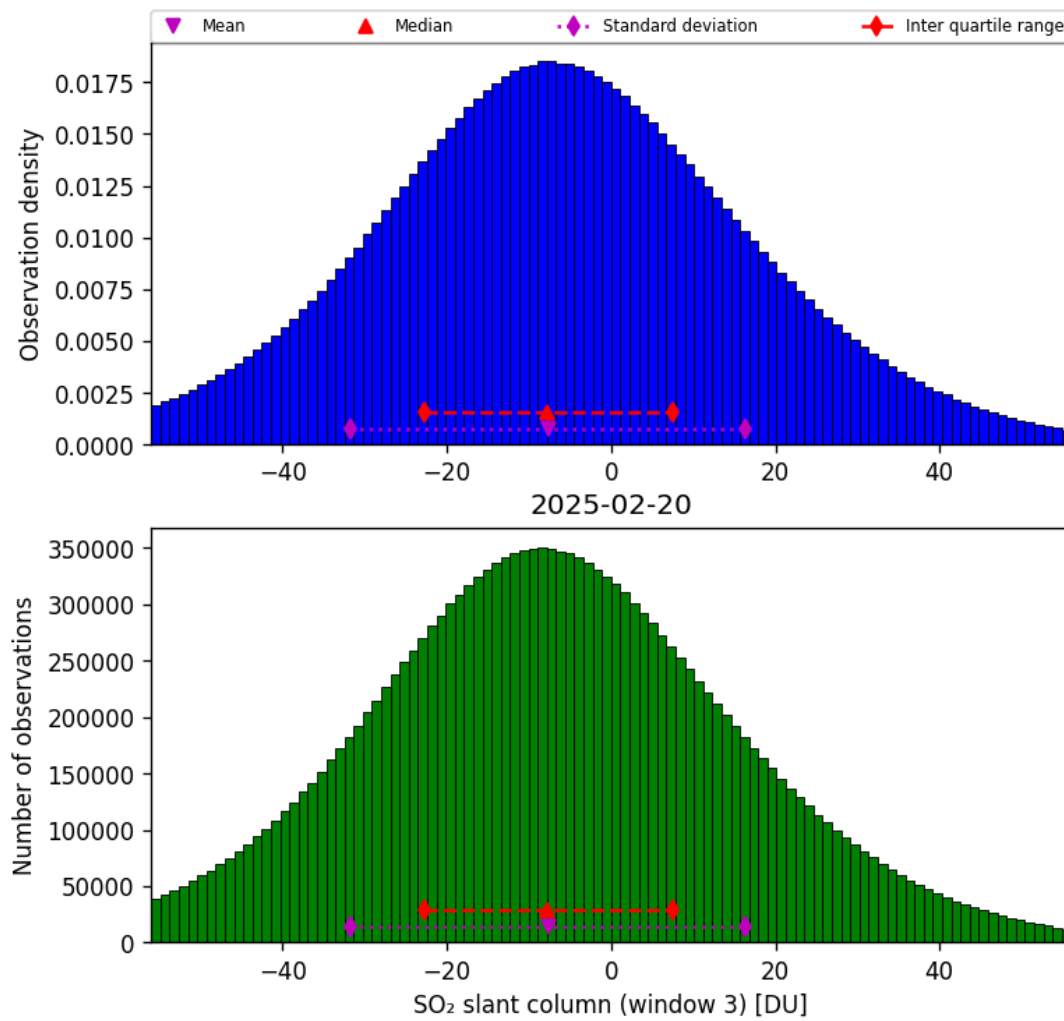


Figure 71: Histogram of “SO₂ slant column (window 3)” for 2025-02-20 to 2025-02-21

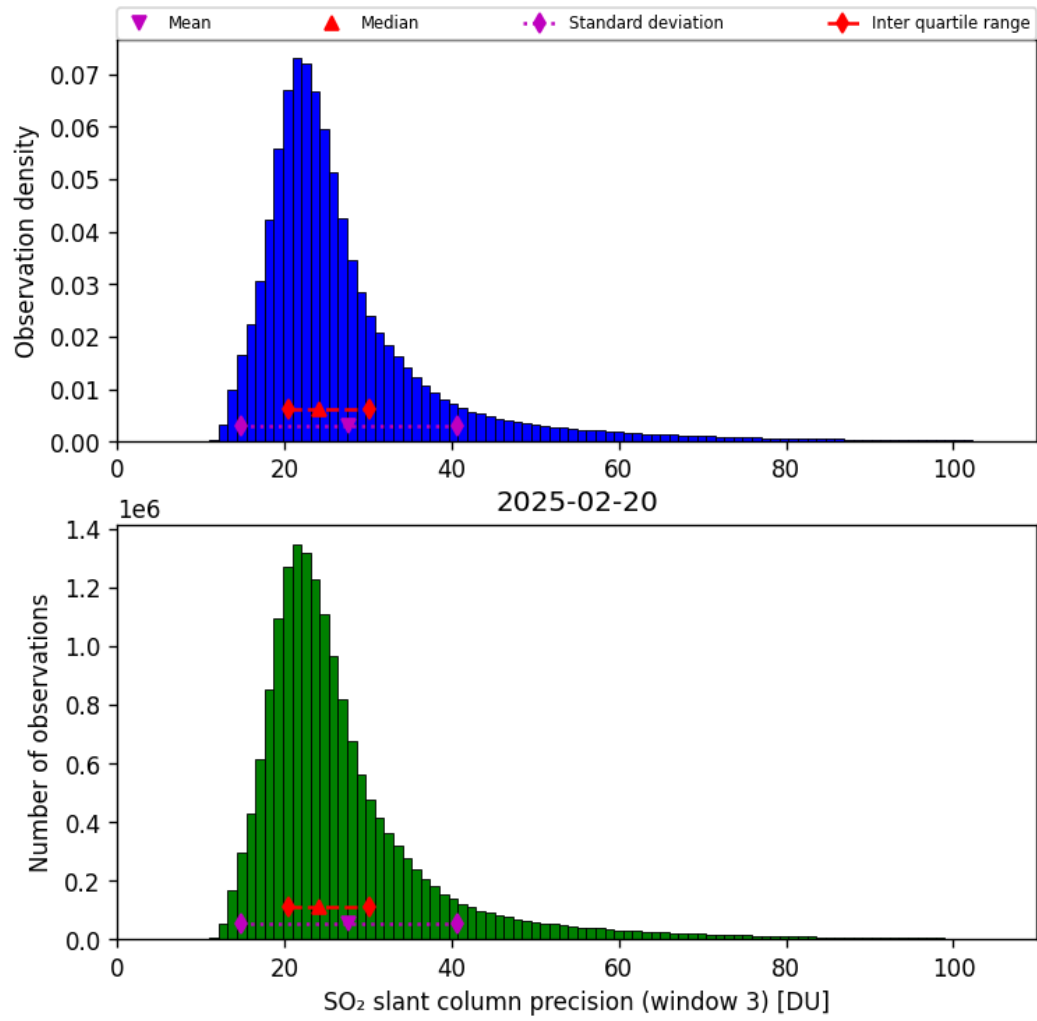


Figure 72: Histogram of “SO₂ slant column precision (window 3)” for 2025-02-20 to 2025-02-21

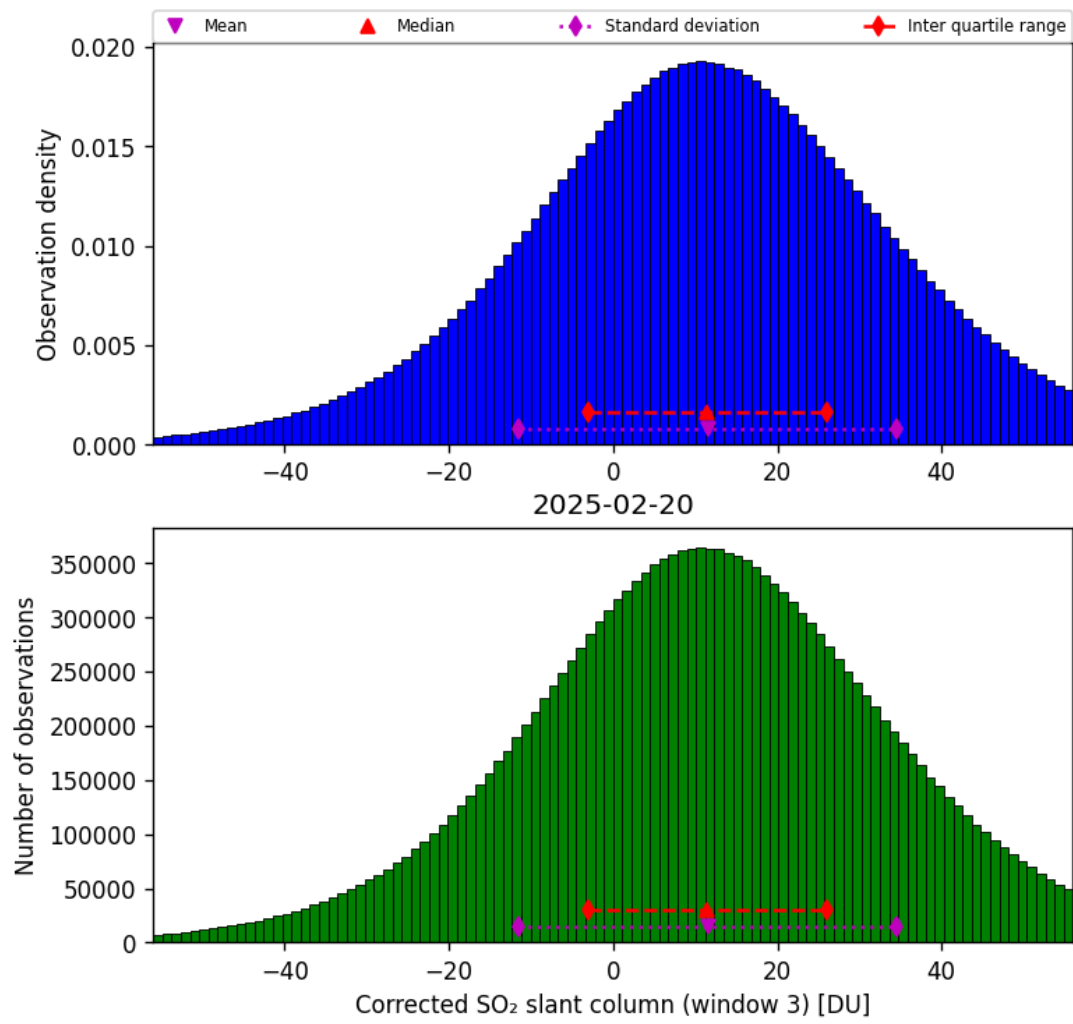


Figure 73: Histogram of “Corrected SO₂ slant column (window 3)” for 2025-02-20 to 2025-02-21

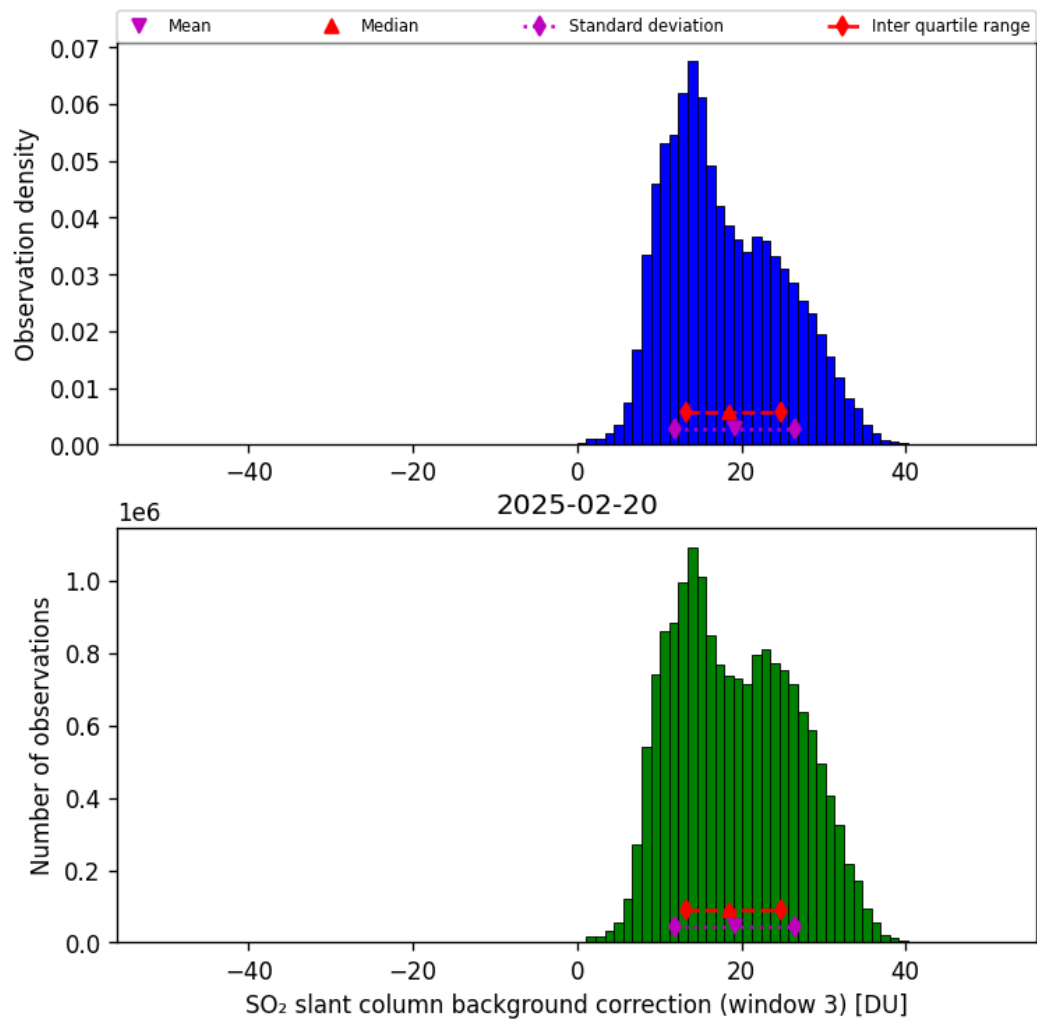


Figure 74: Histogram of “SO₂ slant column background correction (window 3)” for 2025-02-20 to 2025-02-21

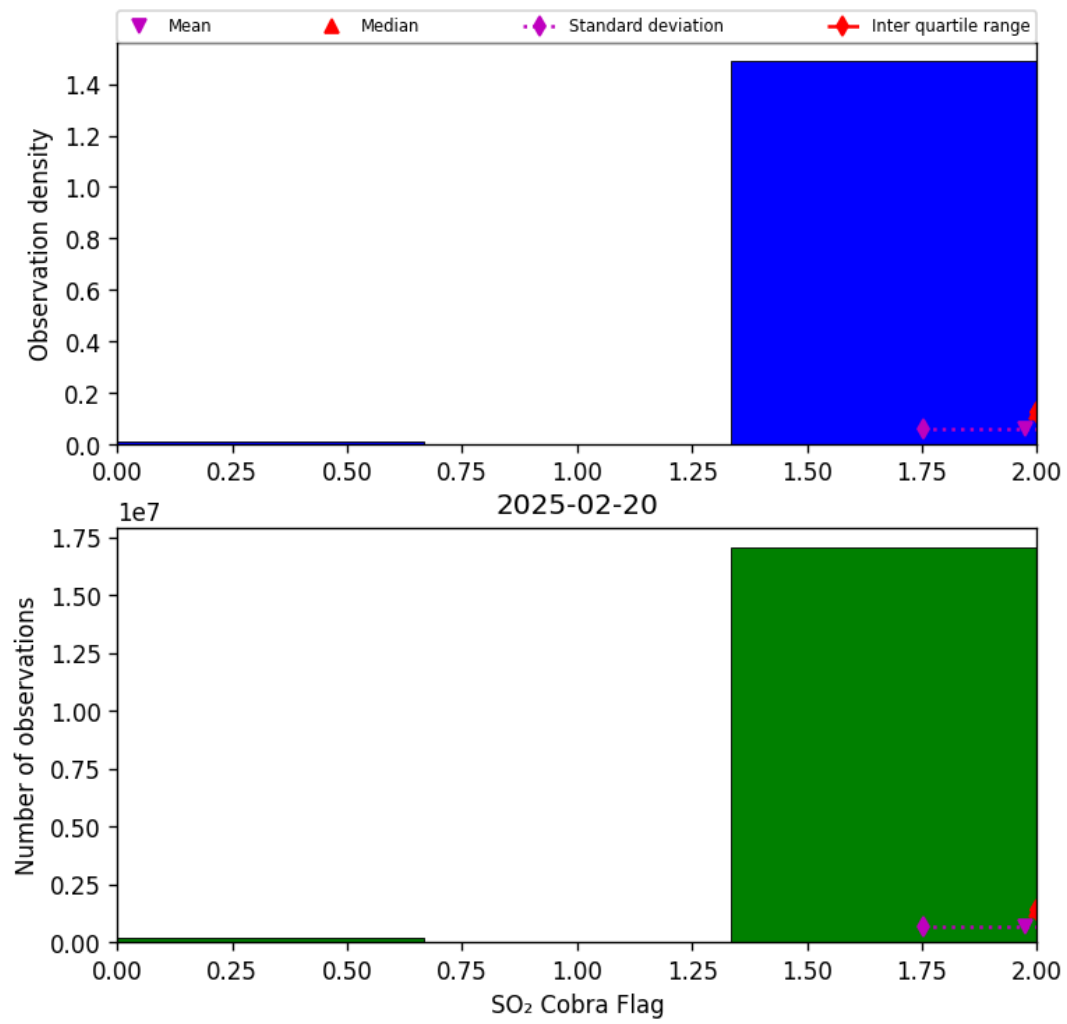


Figure 75: Histogram of “SO₂ Cobra Flag” for 2025-02-20 to 2025-02-21

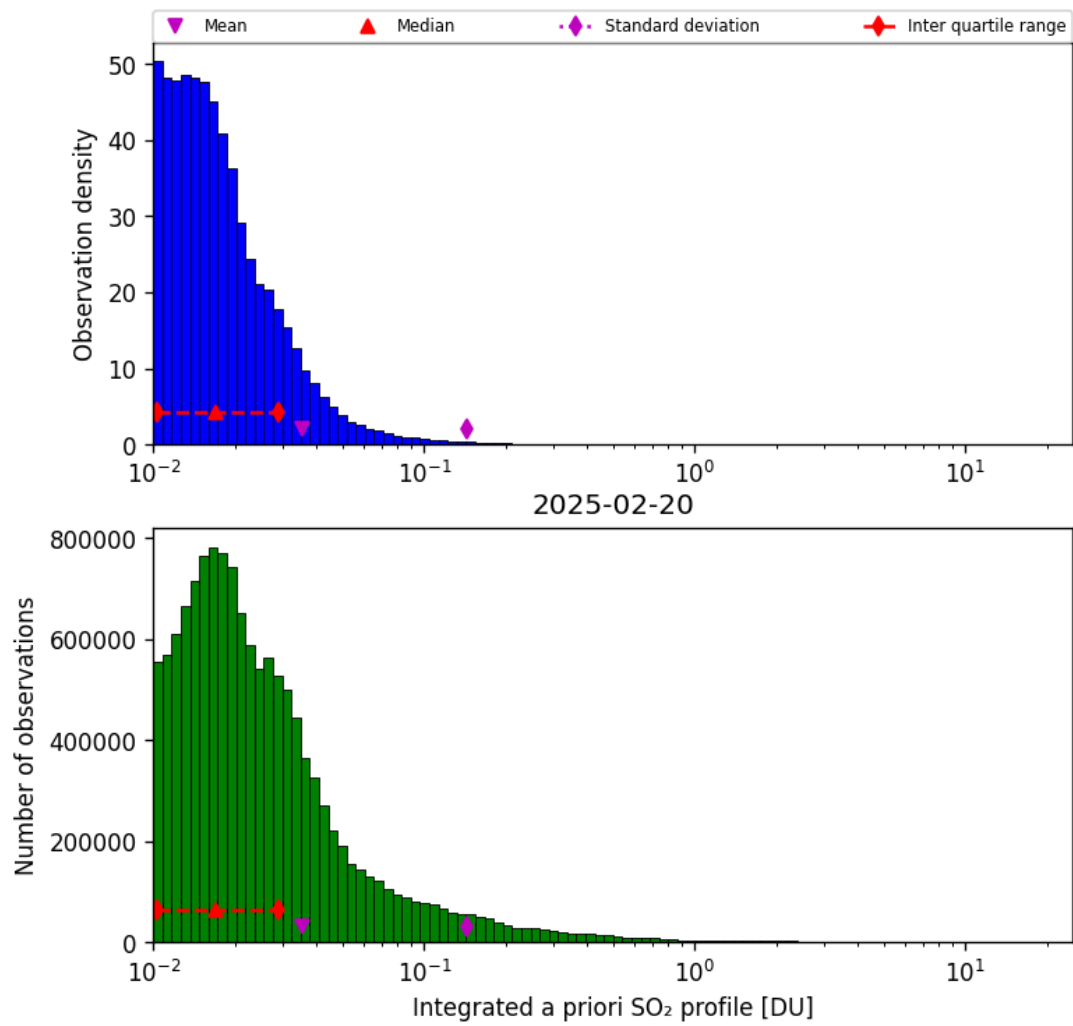


Figure 76: Histogram of “Integrated a priori SO₂ profile” for 2025-02-20 to 2025-02-21

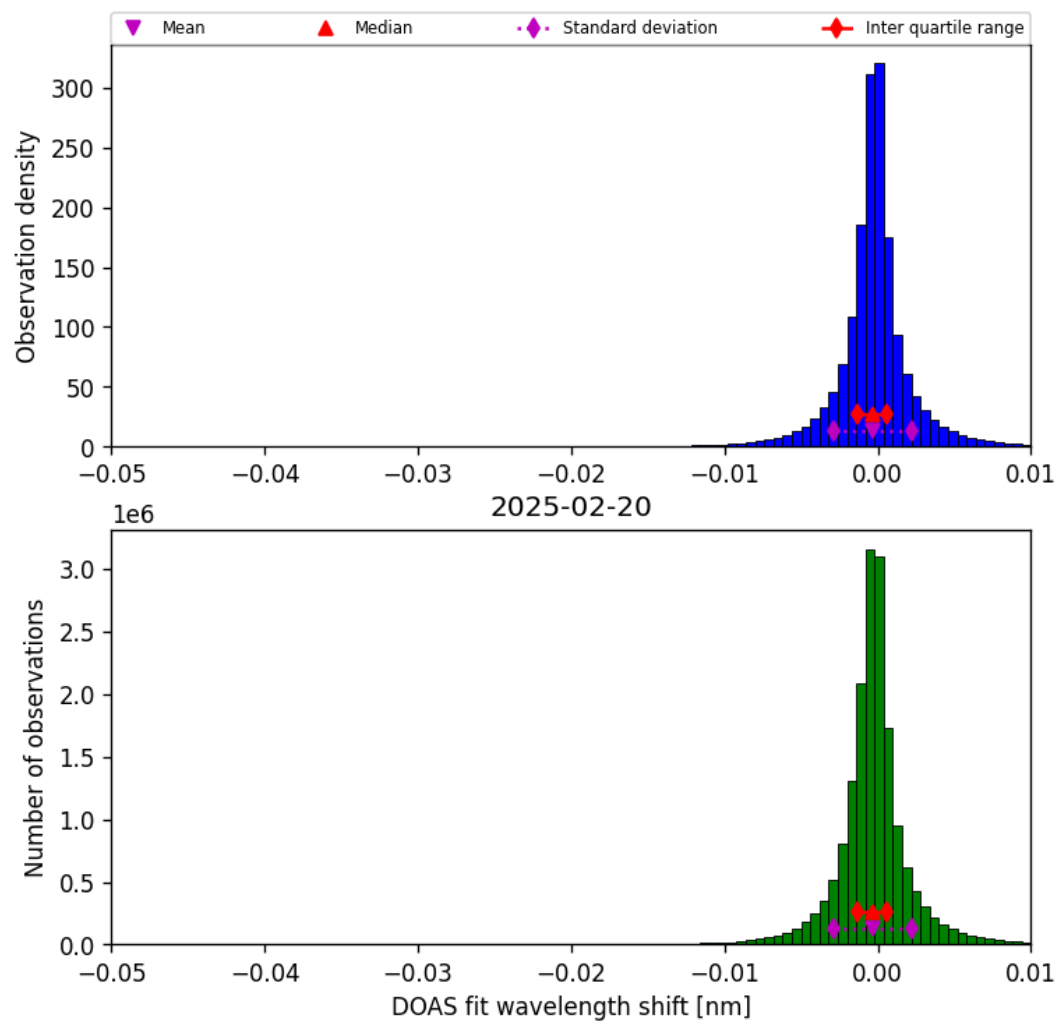


Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-02-20 to 2025-02-21

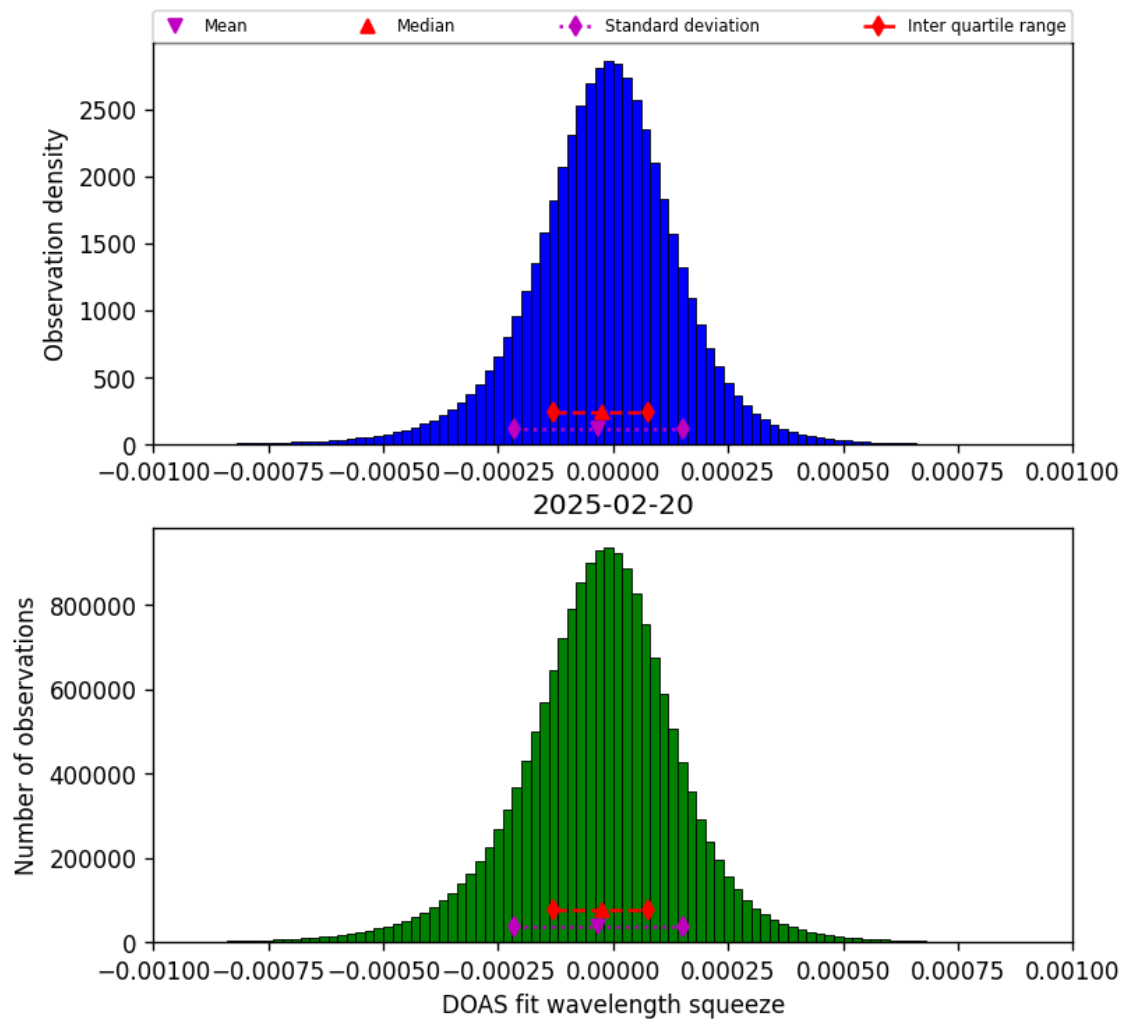


Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-02-20 to 2025-02-21

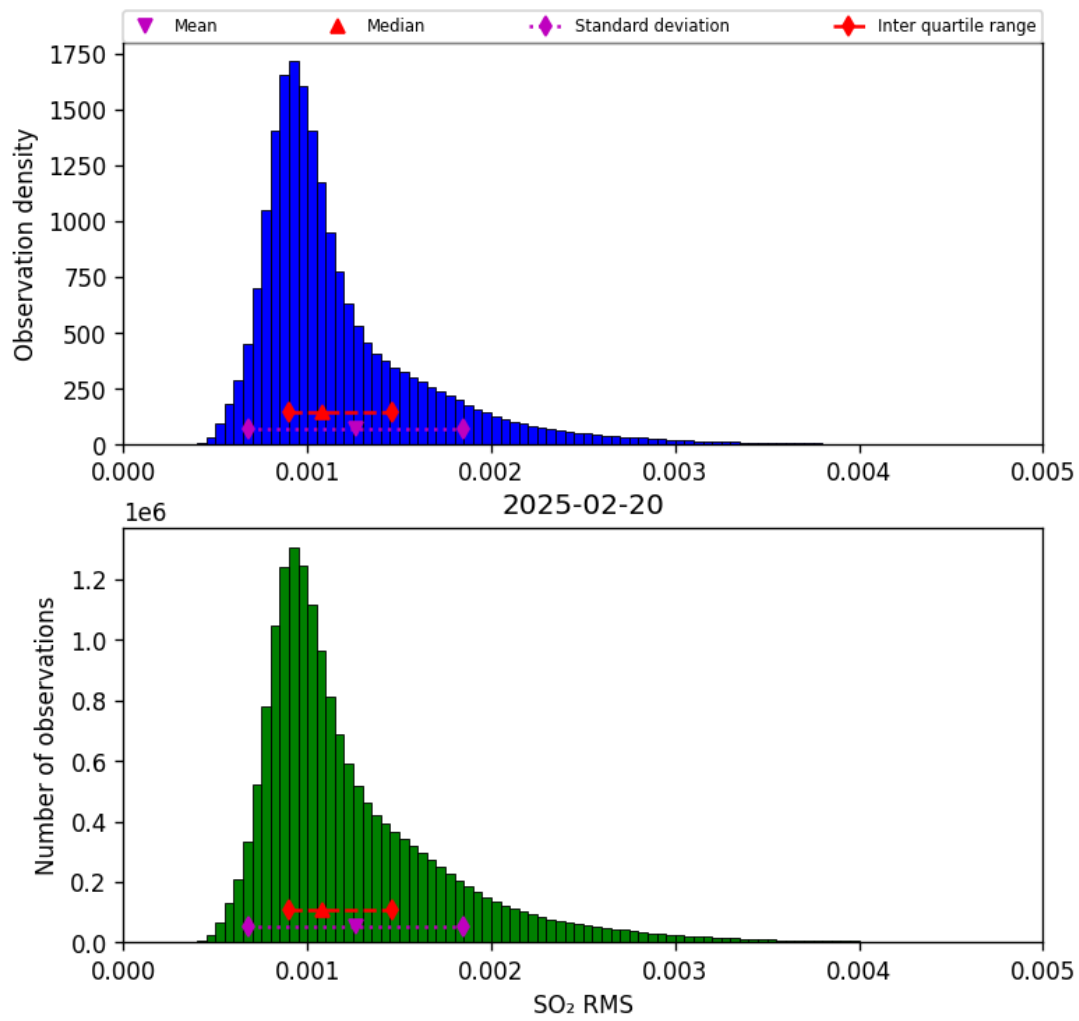


Figure 79: Histogram of “SO₂ RMS” for 2025-02-20 to 2025-02-21

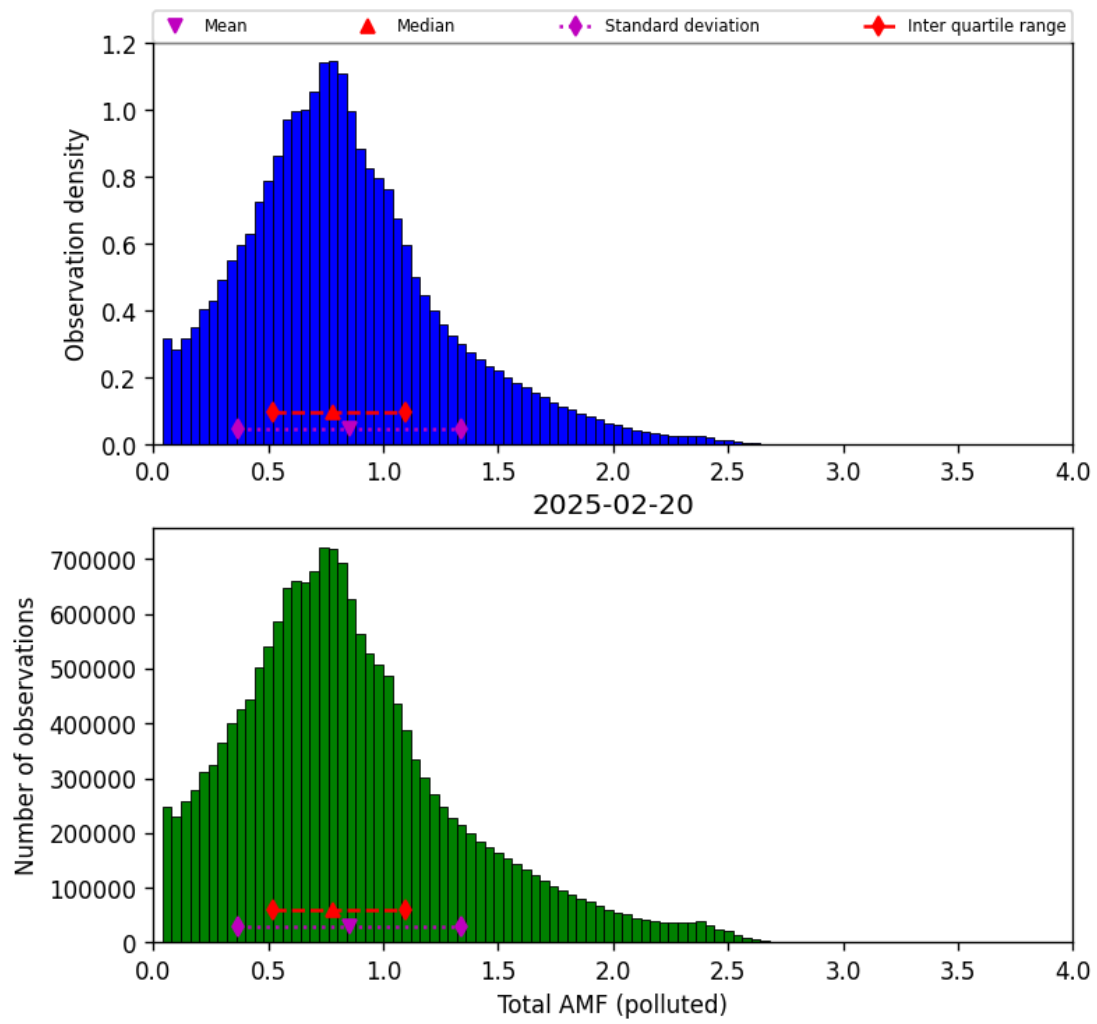


Figure 80: Histogram of “Total AMF (polluted)” for 2025-02-20 to 2025-02-21

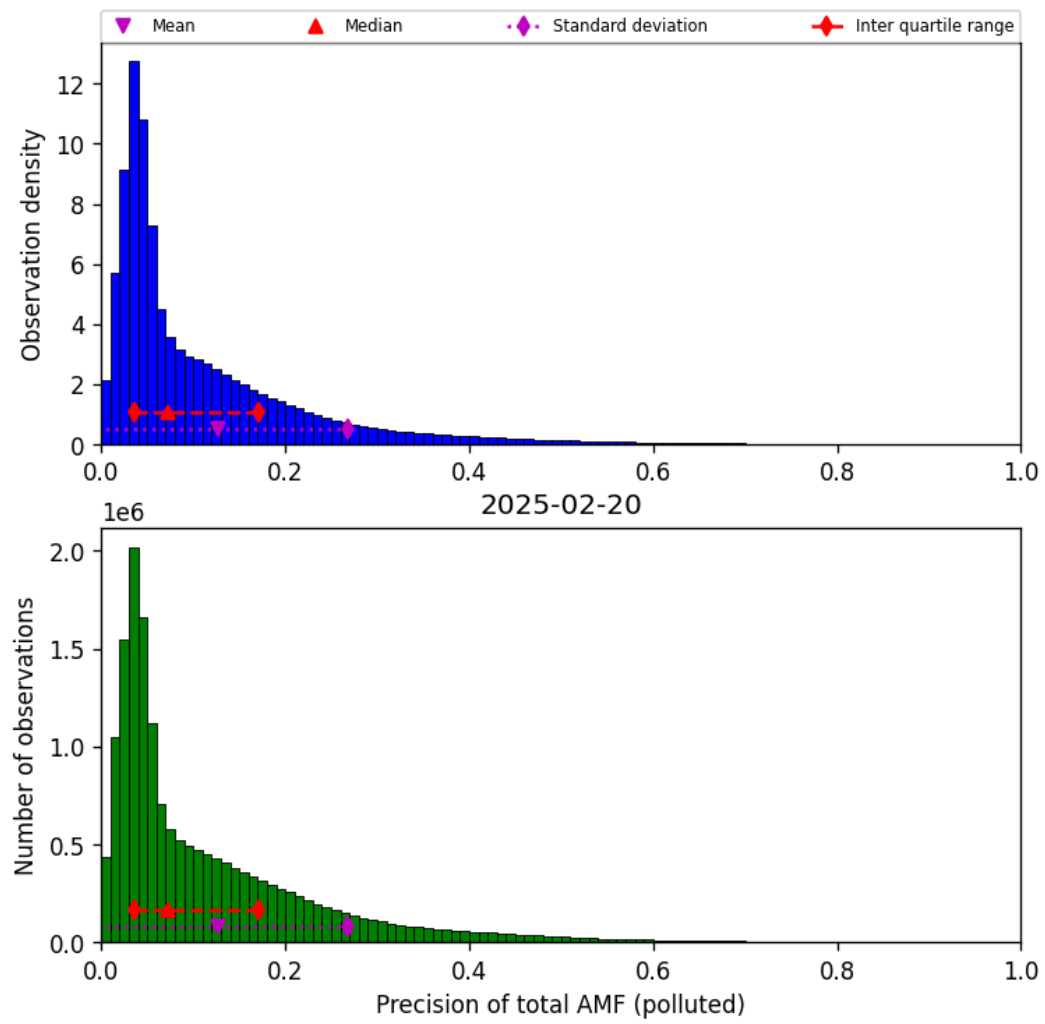


Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-02-20 to 2025-02-21

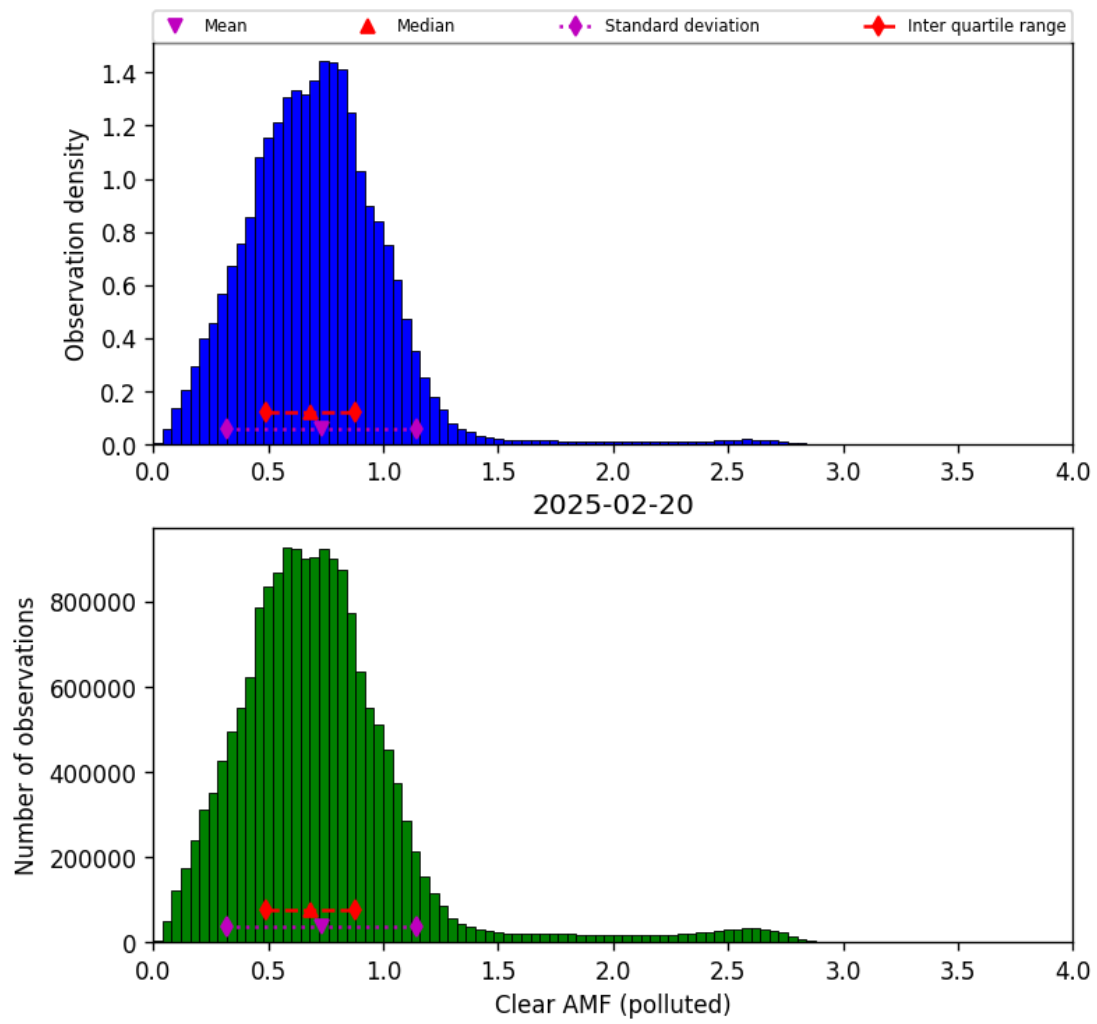


Figure 82: Histogram of “Clear AMF (polluted)” for 2025-02-20 to 2025-02-21

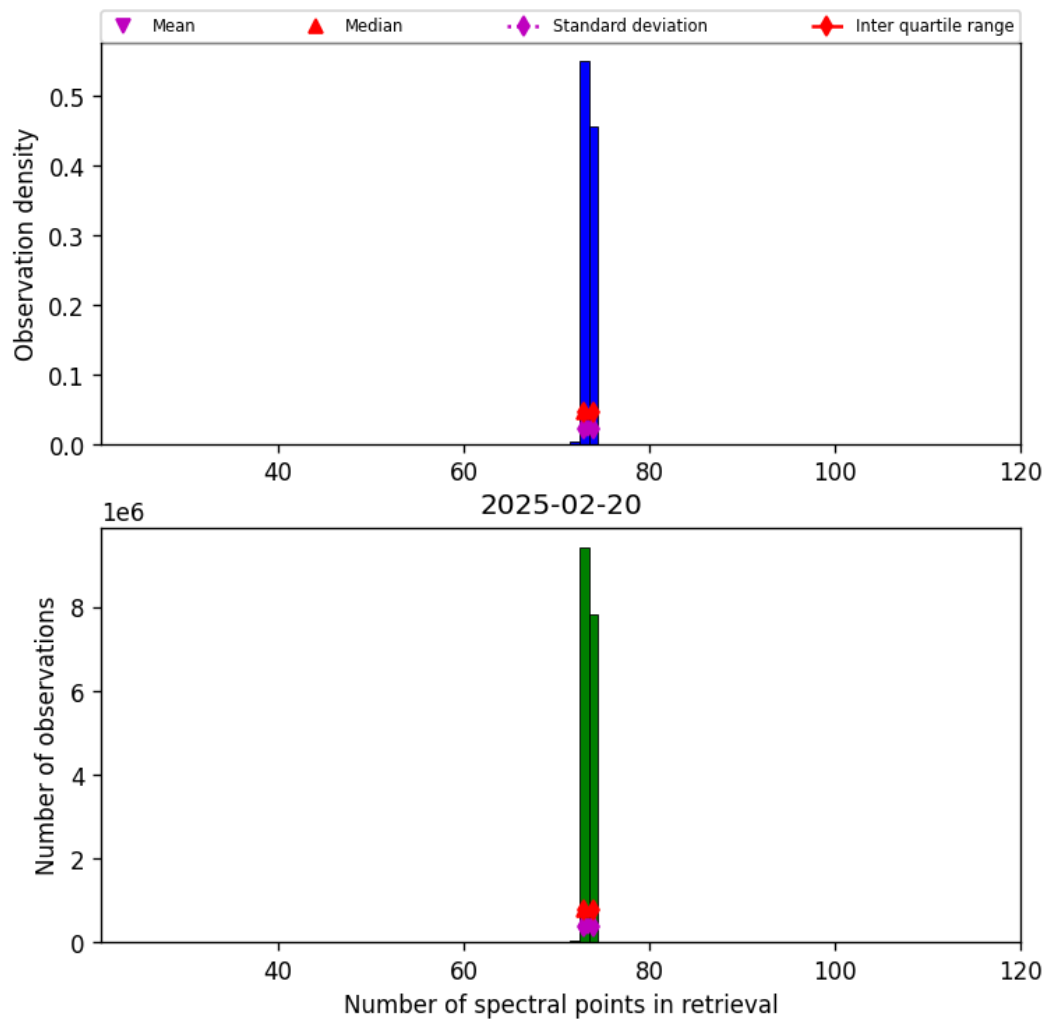


Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-02-20 to 2025-02-21

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.

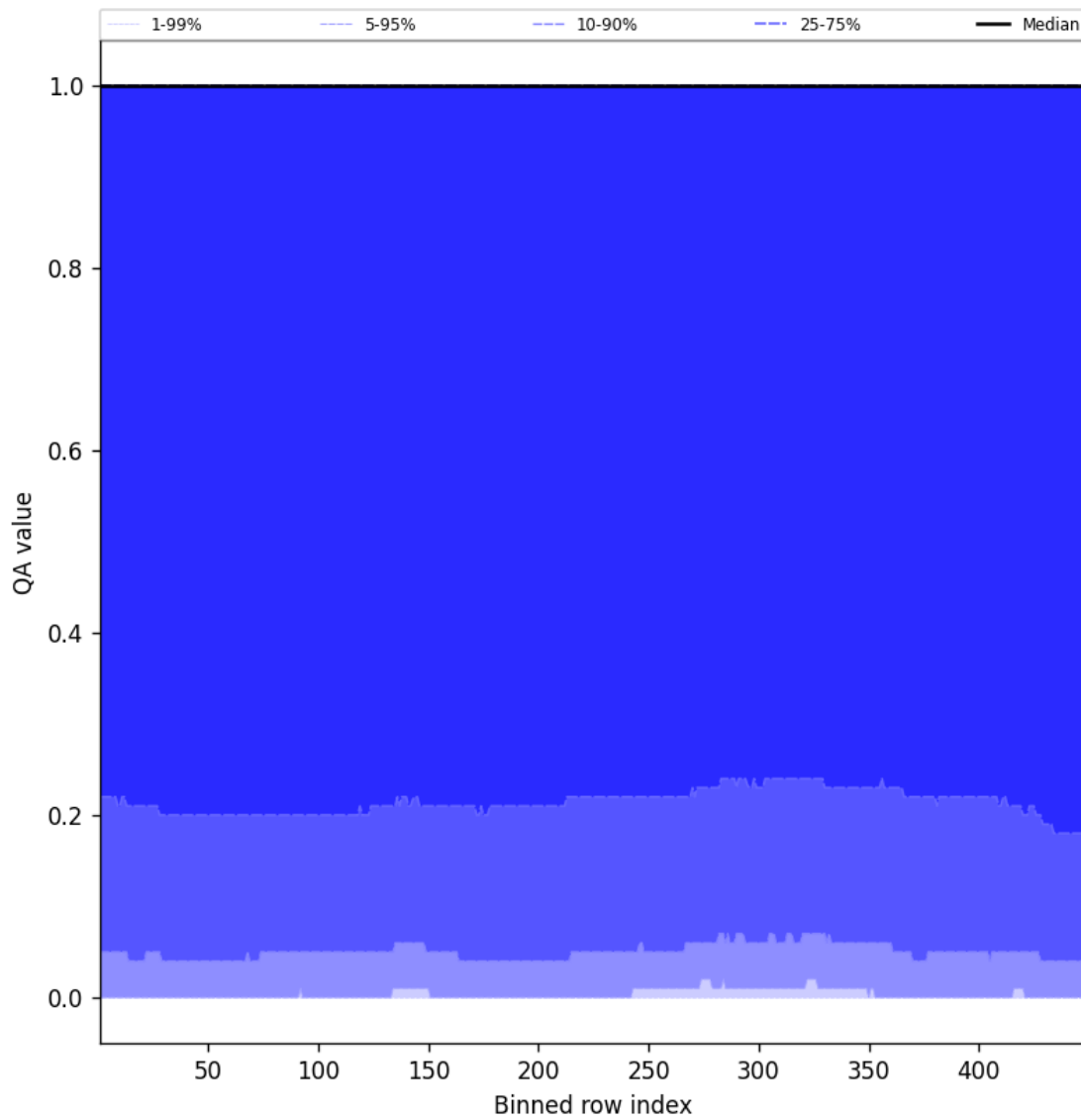


Figure 84: Along track statistics of “QA value” for 2025-02-20 to 2025-02-21

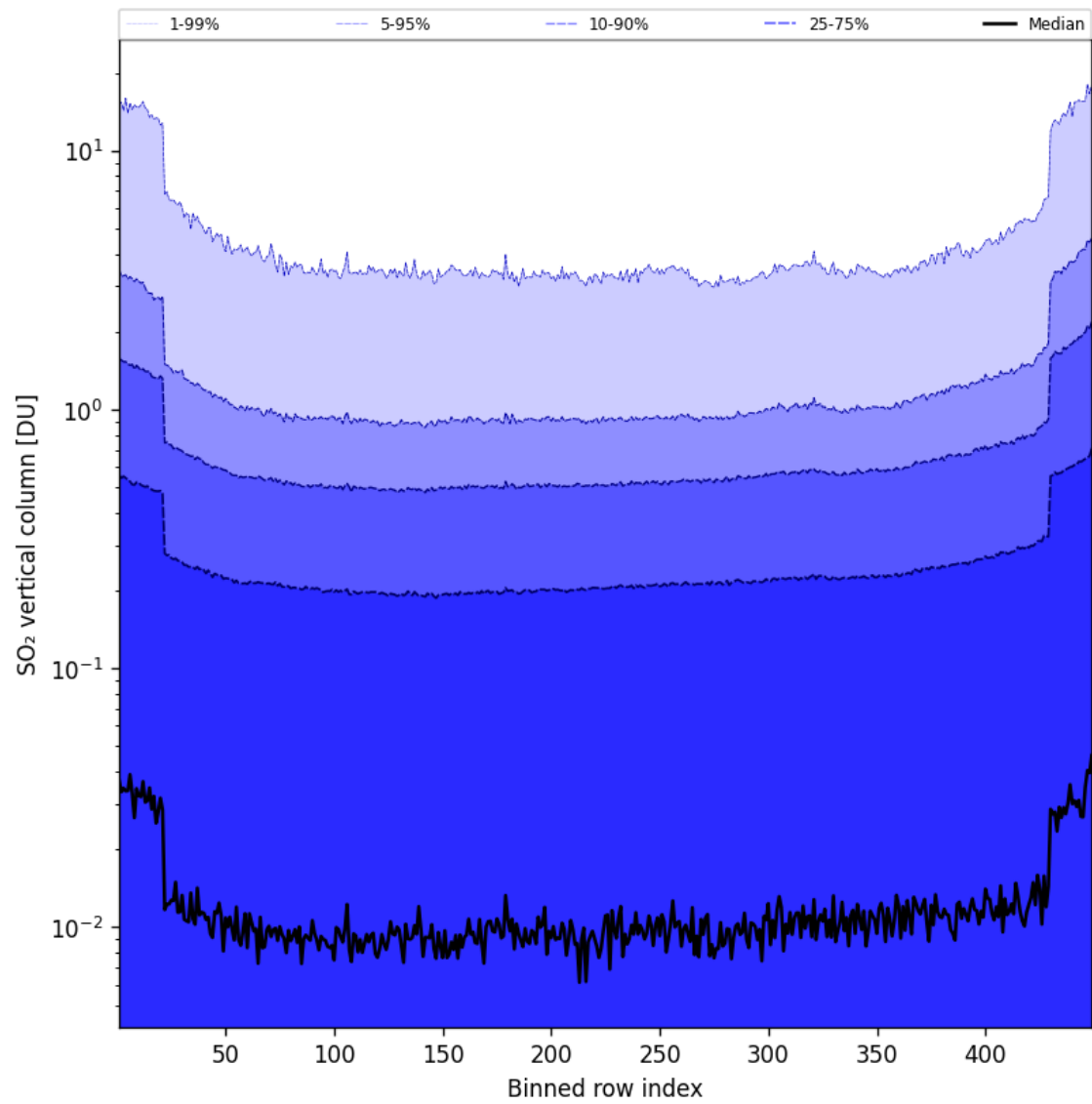


Figure 85: Along track statistics of “SO₂ vertical column” for 2025-02-20 to 2025-02-21

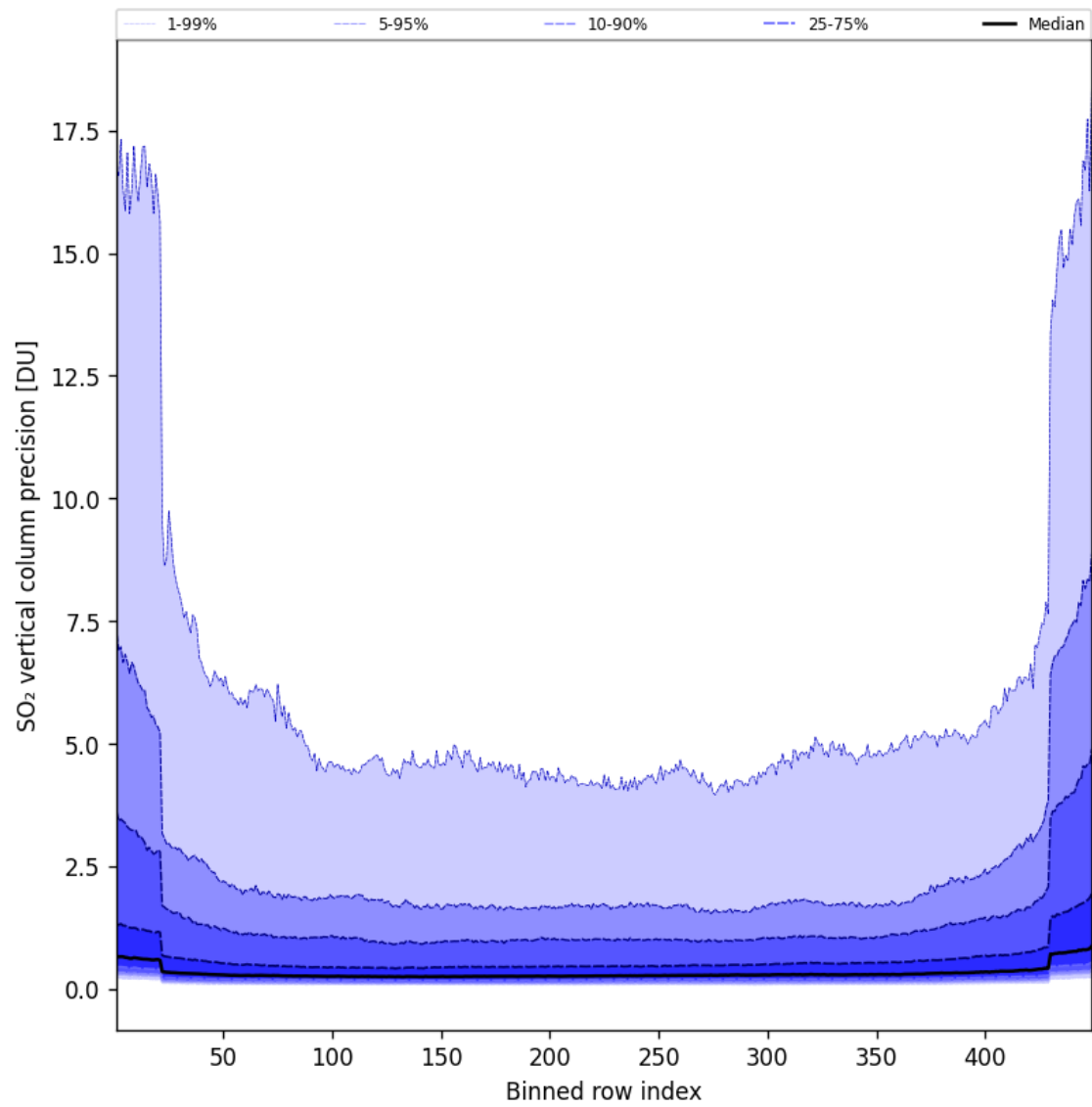


Figure 86: Along track statistics of “SO₂ vertical column precision” for 2025-02-20 to 2025-02-21

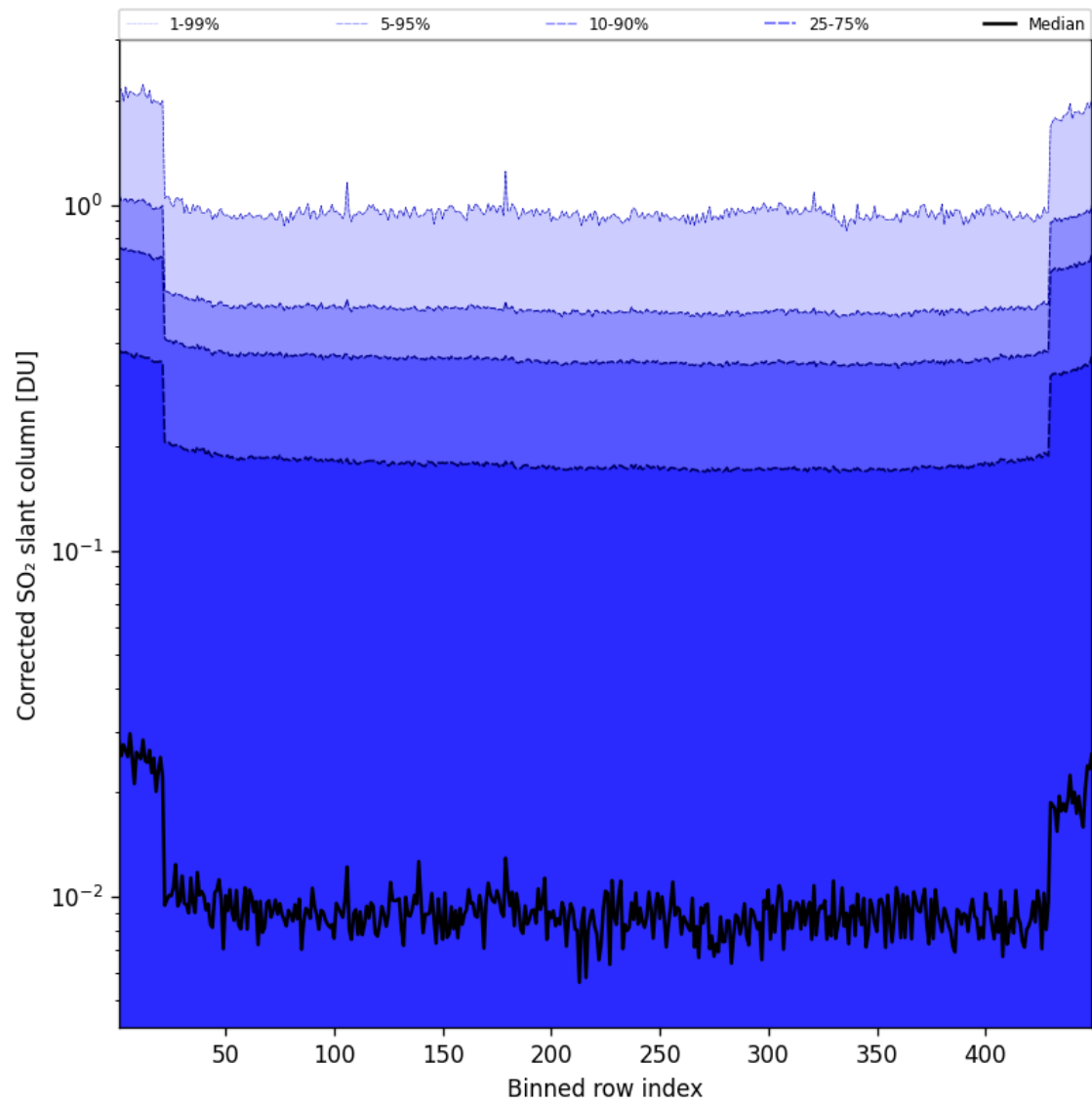


Figure 87: Along track statistics of “Corrected SO₂ slant column” for 2025-02-20 to 2025-02-21

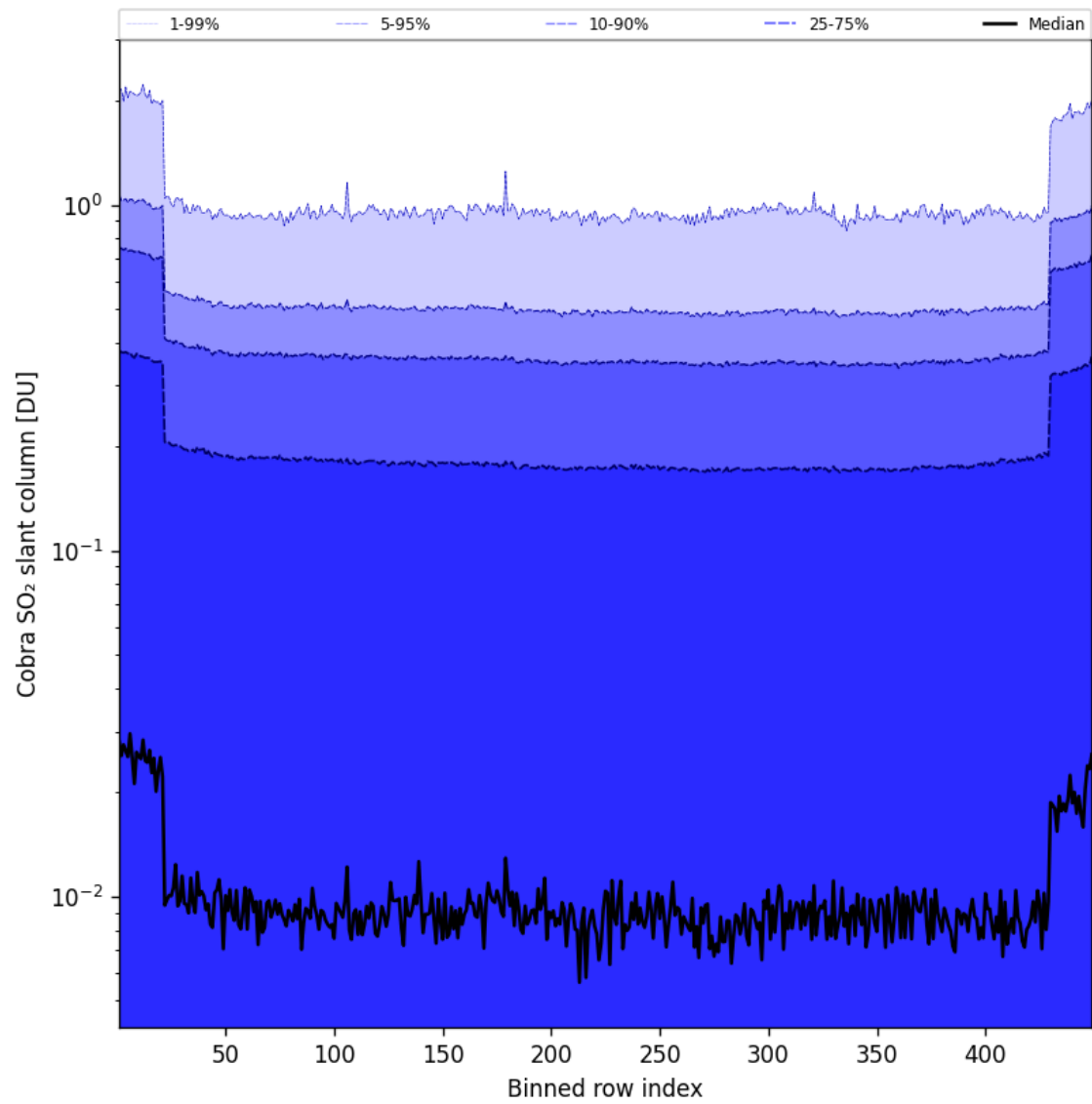


Figure 88: Along track statistics of “Cobra SO₂ slant column” for 2025-02-20 to 2025-02-21

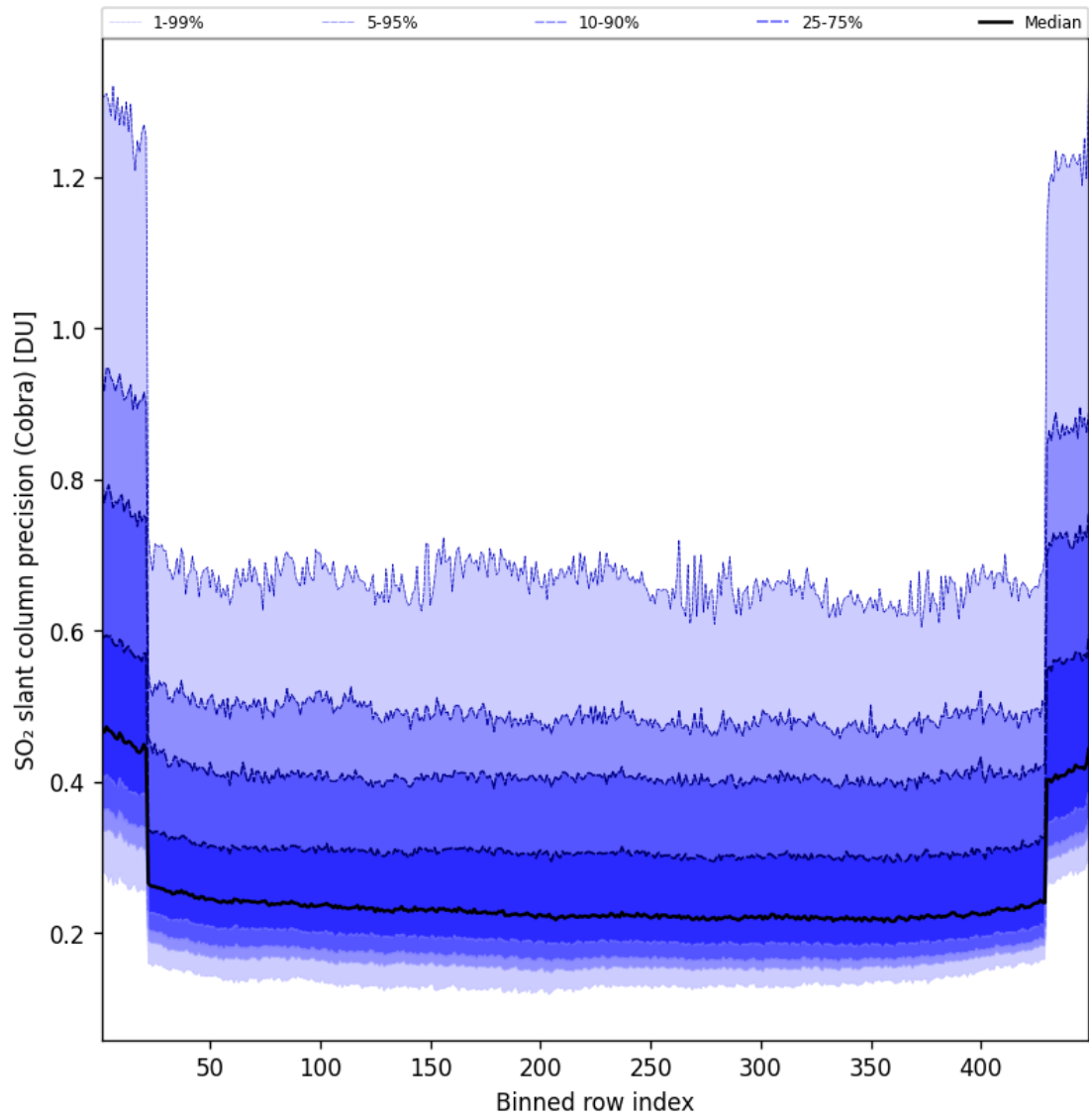


Figure 89: Along track statistics of “SO₂ slant column precision (Cobra)” for 2025-02-20 to 2025-02-21

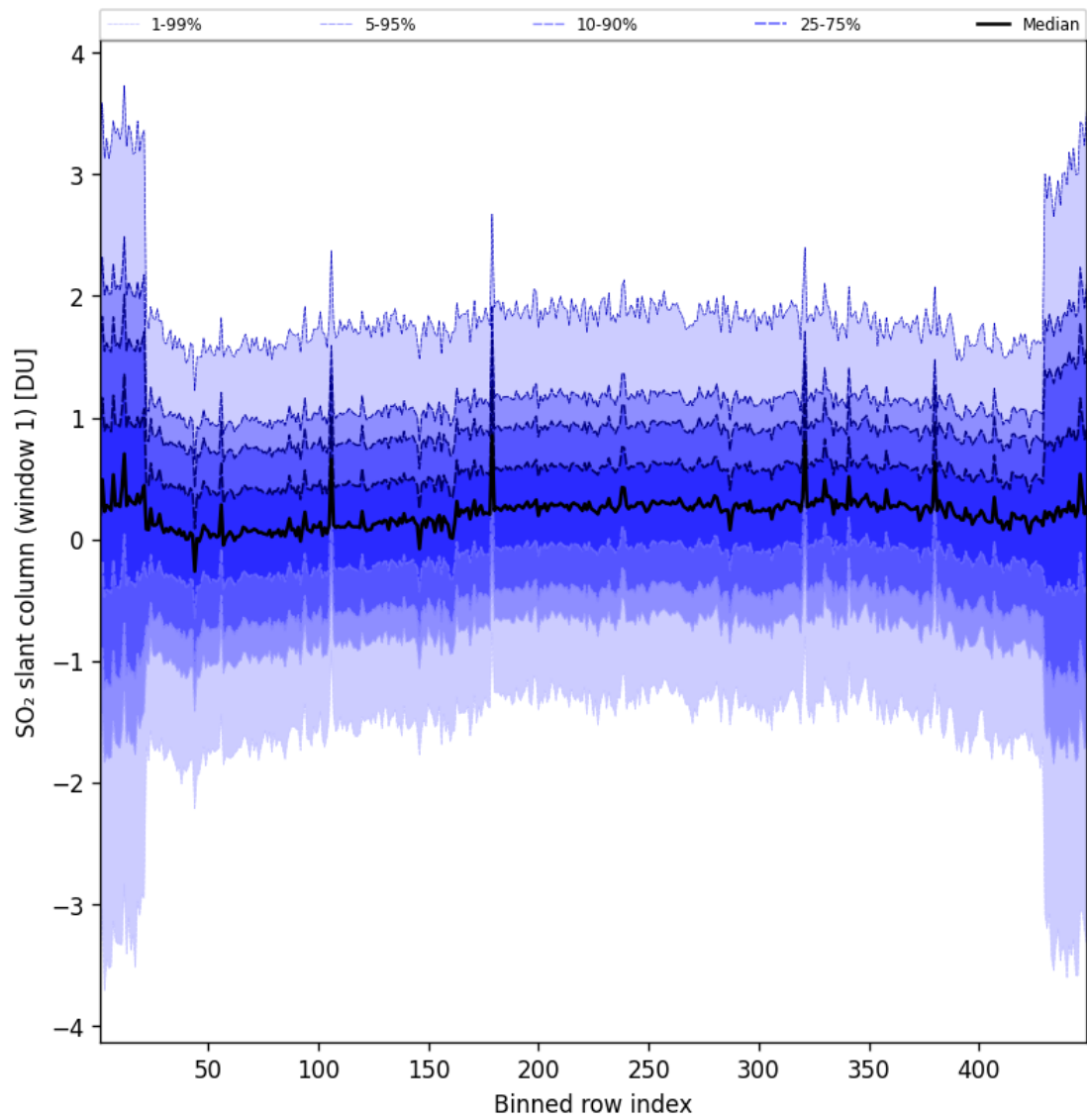


Figure 90: Along track statistics of “SO₂ slant column (window 1)” for 2025-02-20 to 2025-02-21

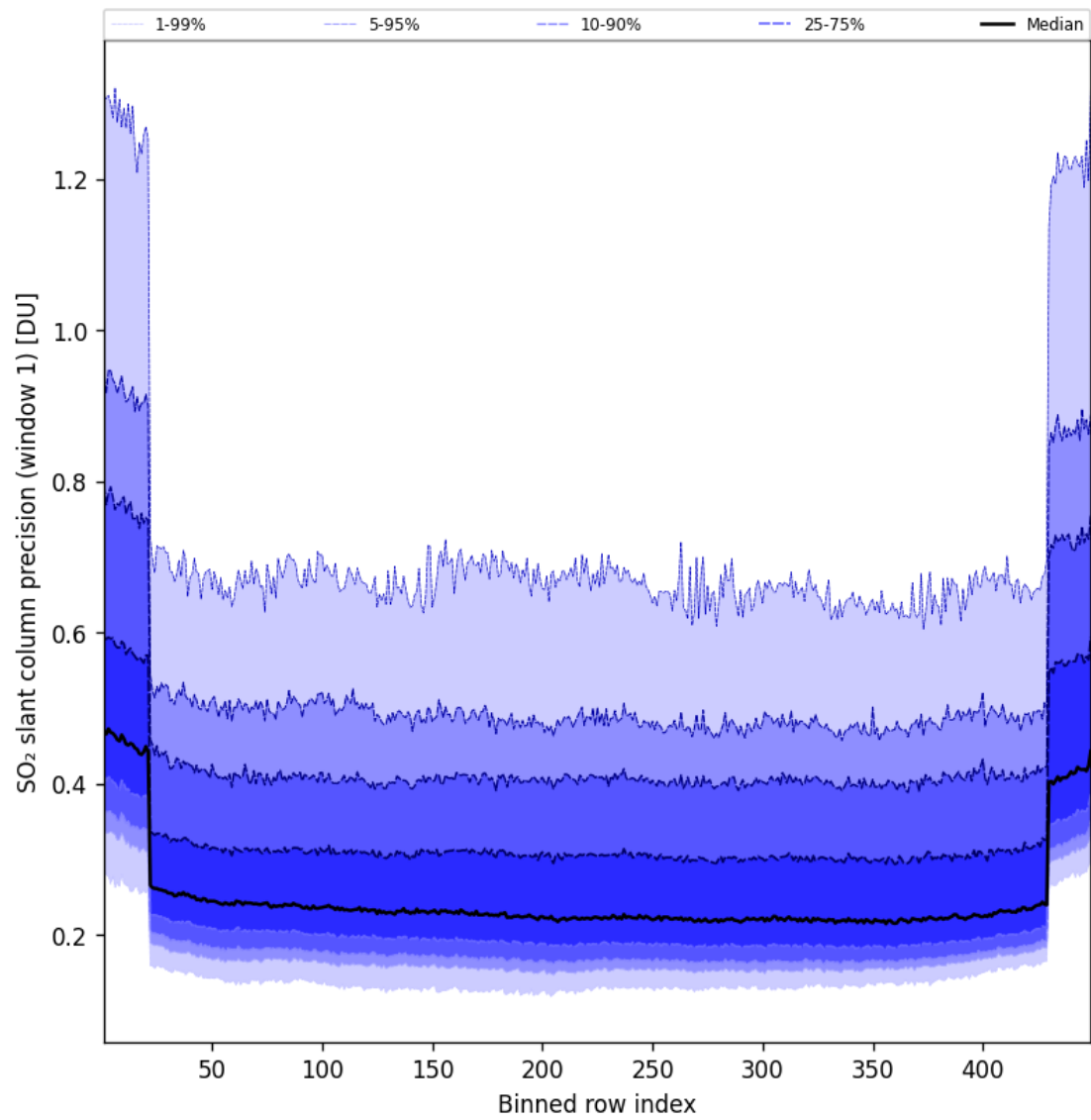


Figure 91: Along track statistics of “SO₂ slant column precision (window 1)” for 2025-02-20 to 2025-02-21

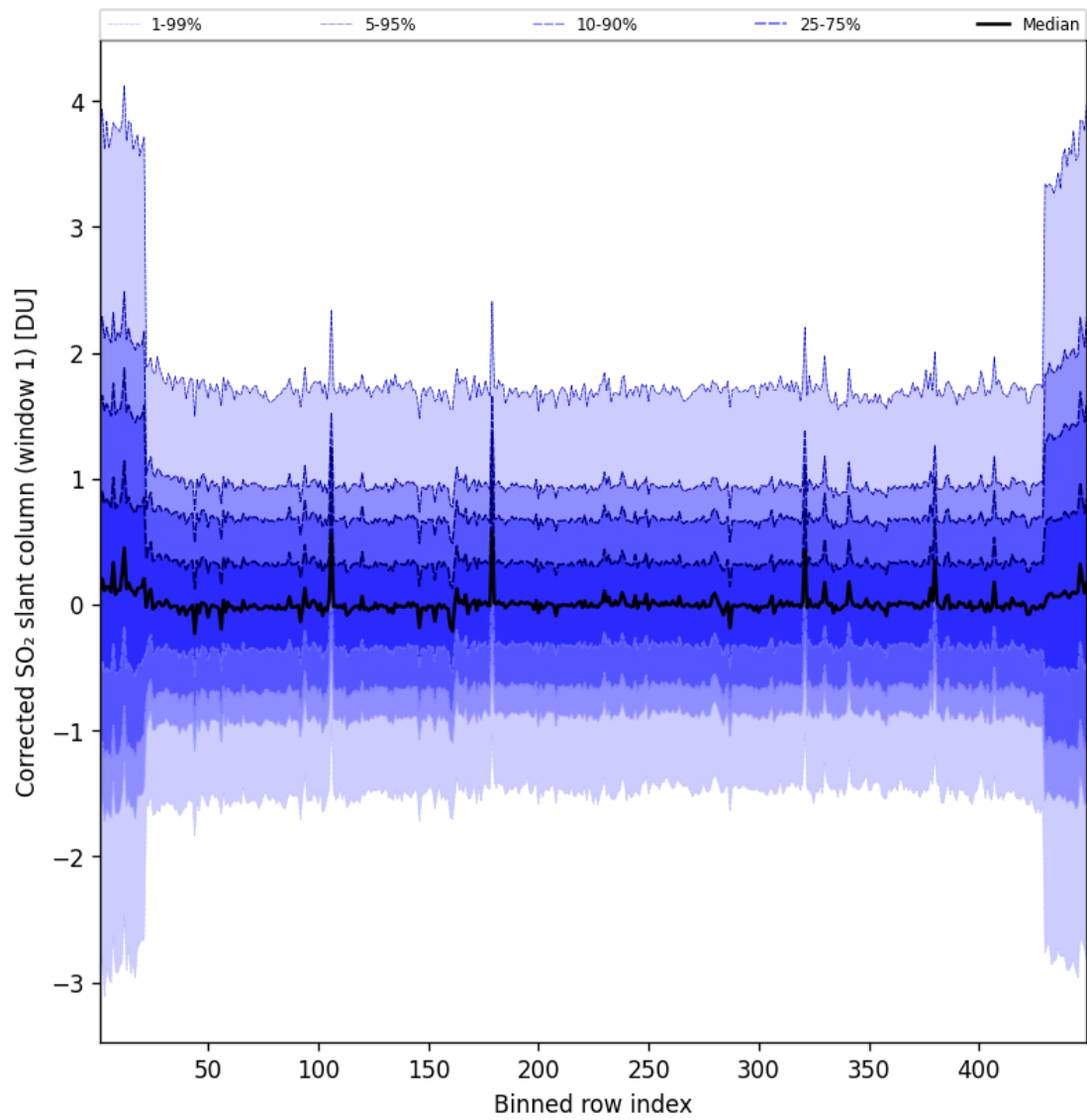


Figure 92: Along track statistics of “Corrected SO₂ slant column (window 1)” for 2025-02-20 to 2025-02-21

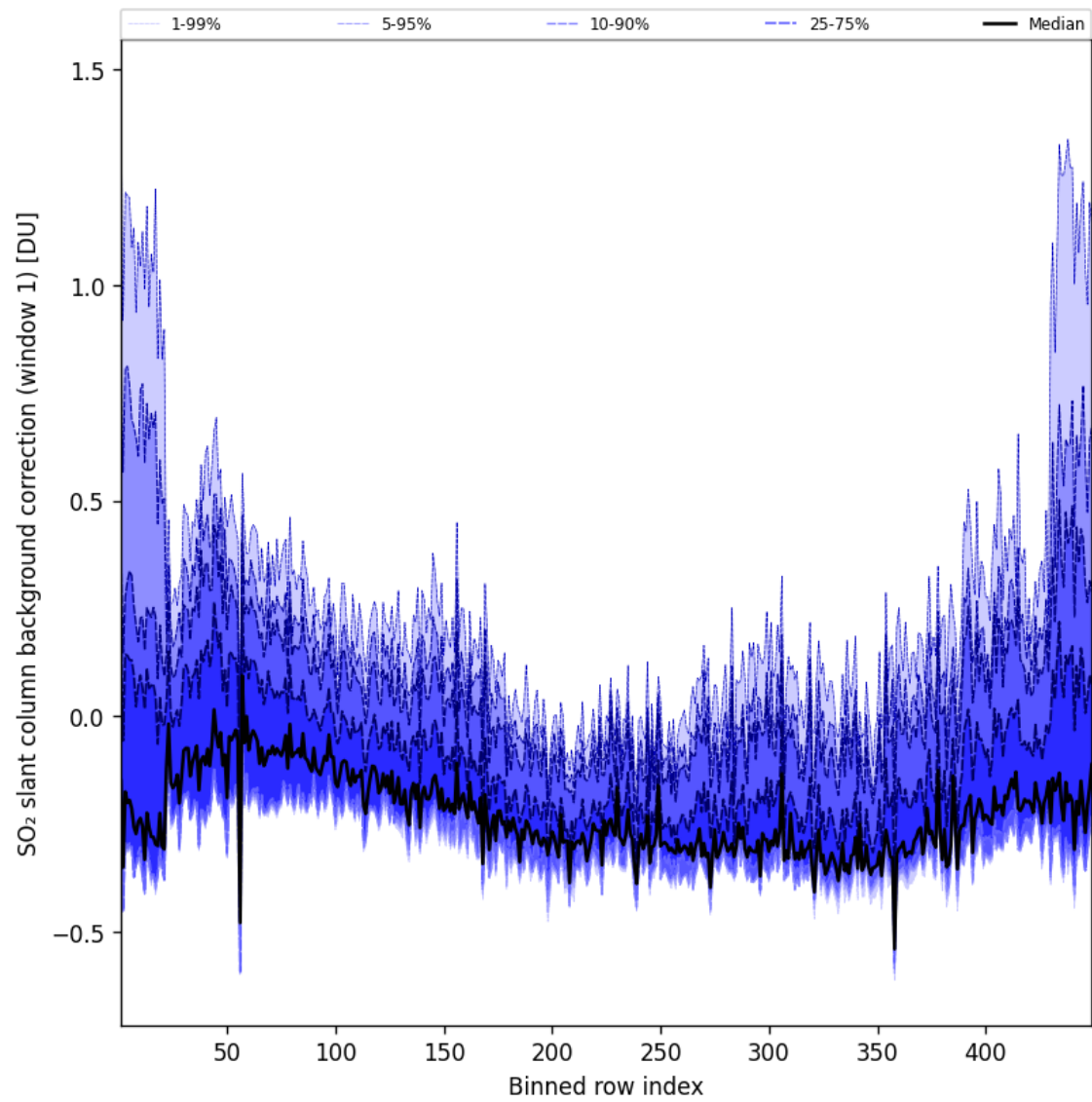


Figure 93: Along track statistics of “SO₂ slant column background correction (window 1)” for 2025-02-20 to 2025-02-21

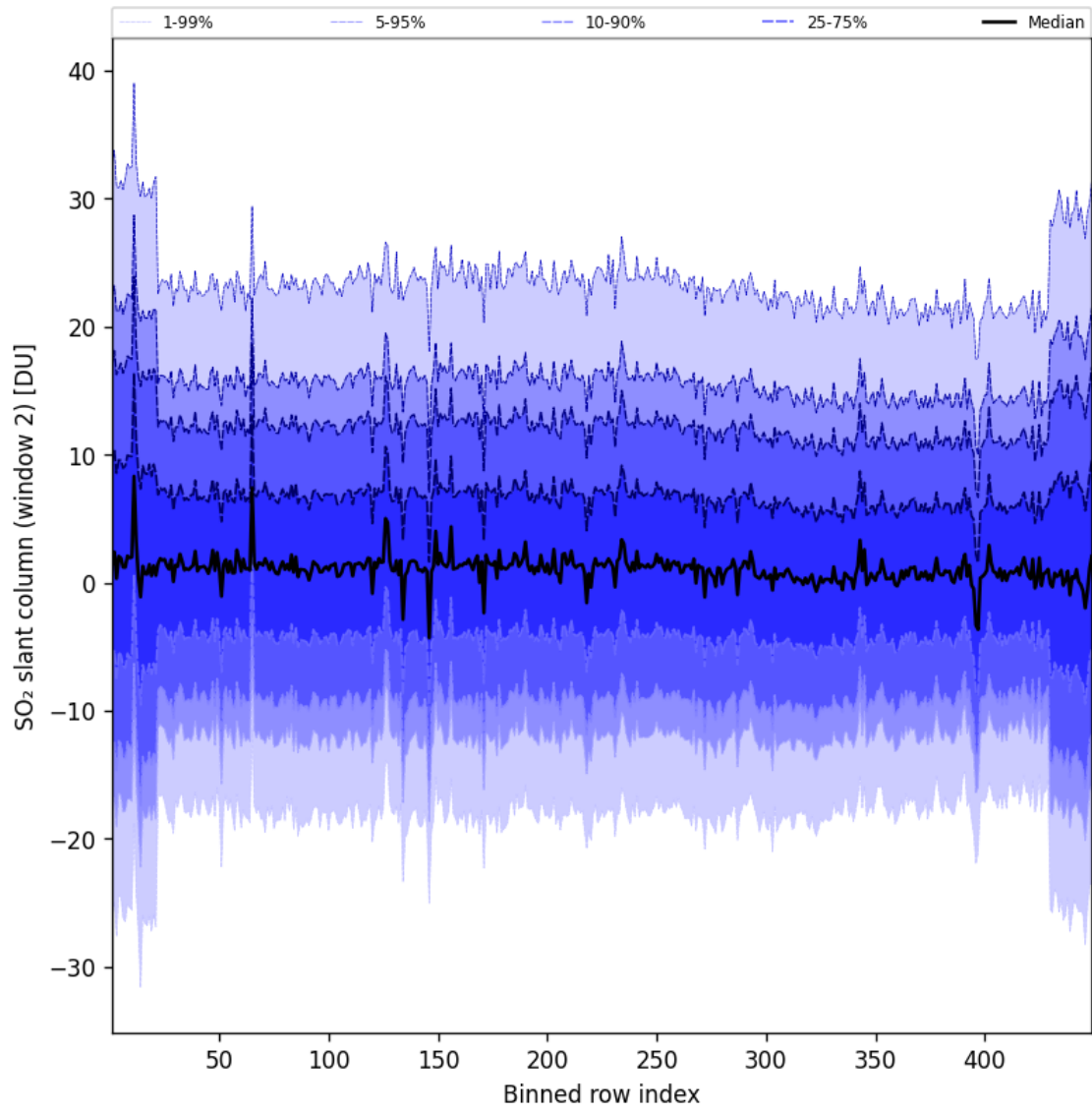


Figure 94: Along track statistics of “SO₂ slant column (window 2)” for 2025-02-20 to 2025-02-21

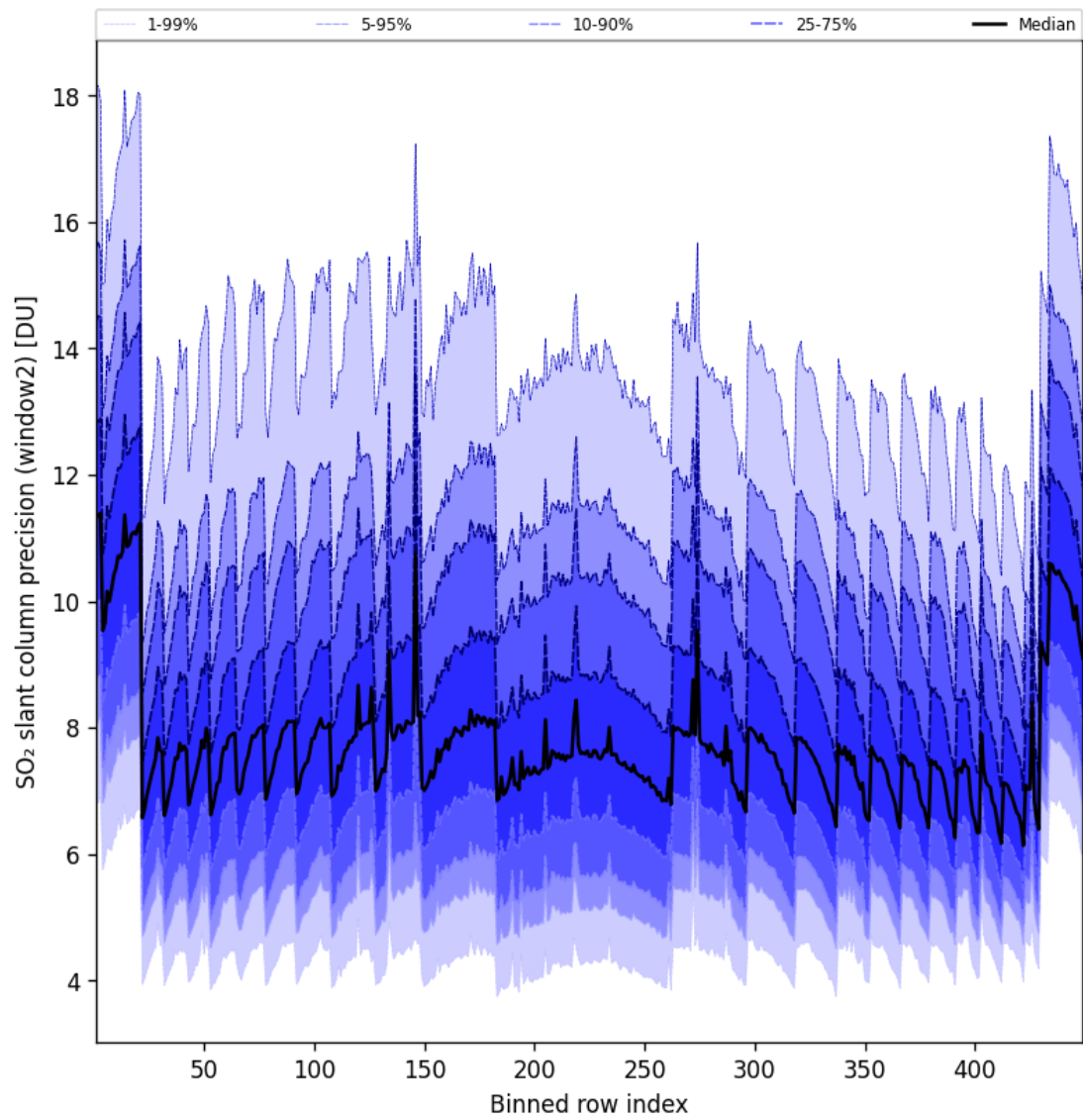


Figure 95: Along track statistics of “SO₂ slant column precision (window2)” for 2025-02-20 to 2025-02-21

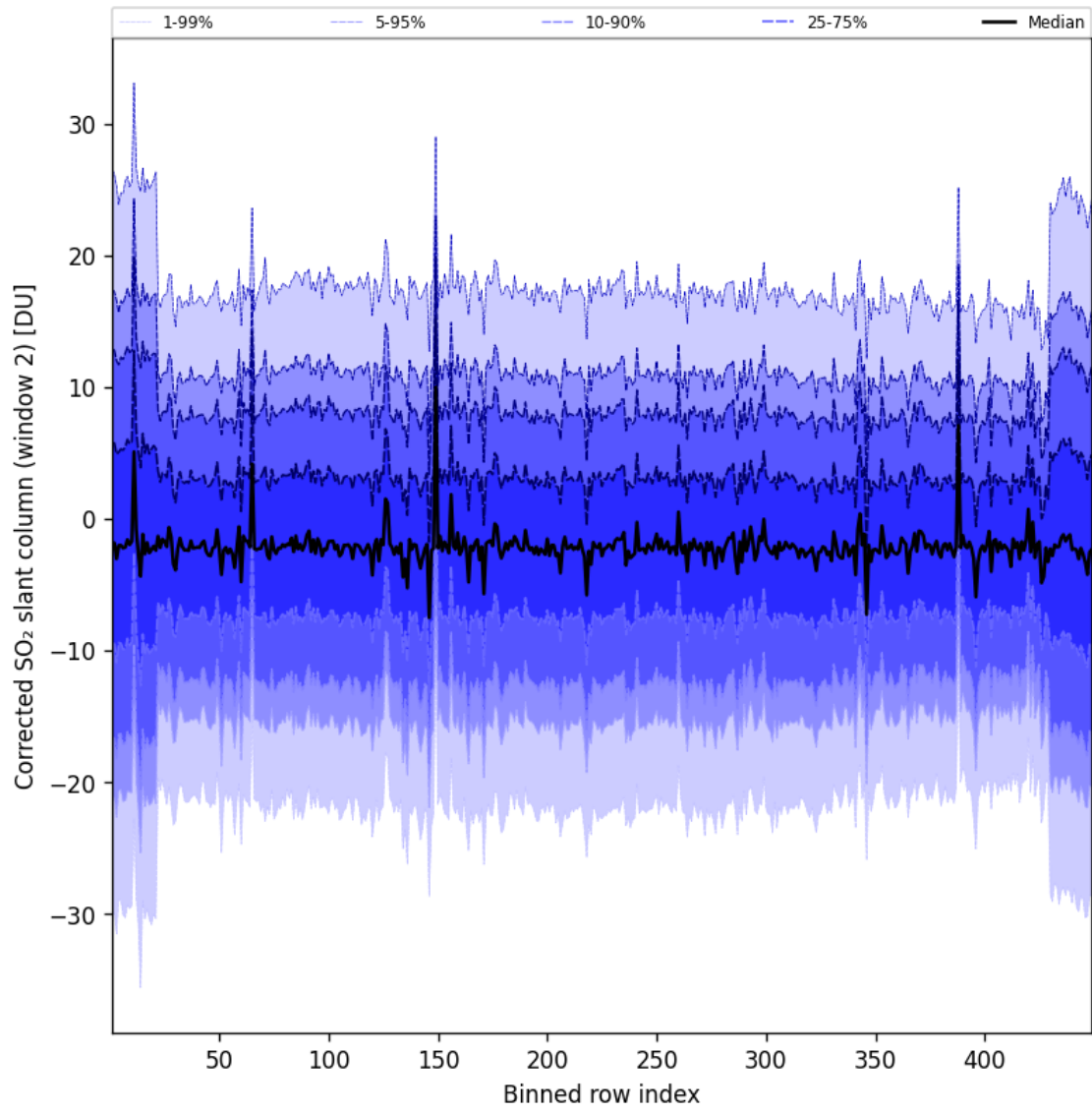


Figure 96: Along track statistics of “Corrected SO₂ slant column (window 2)” for 2025-02-20 to 2025-02-21

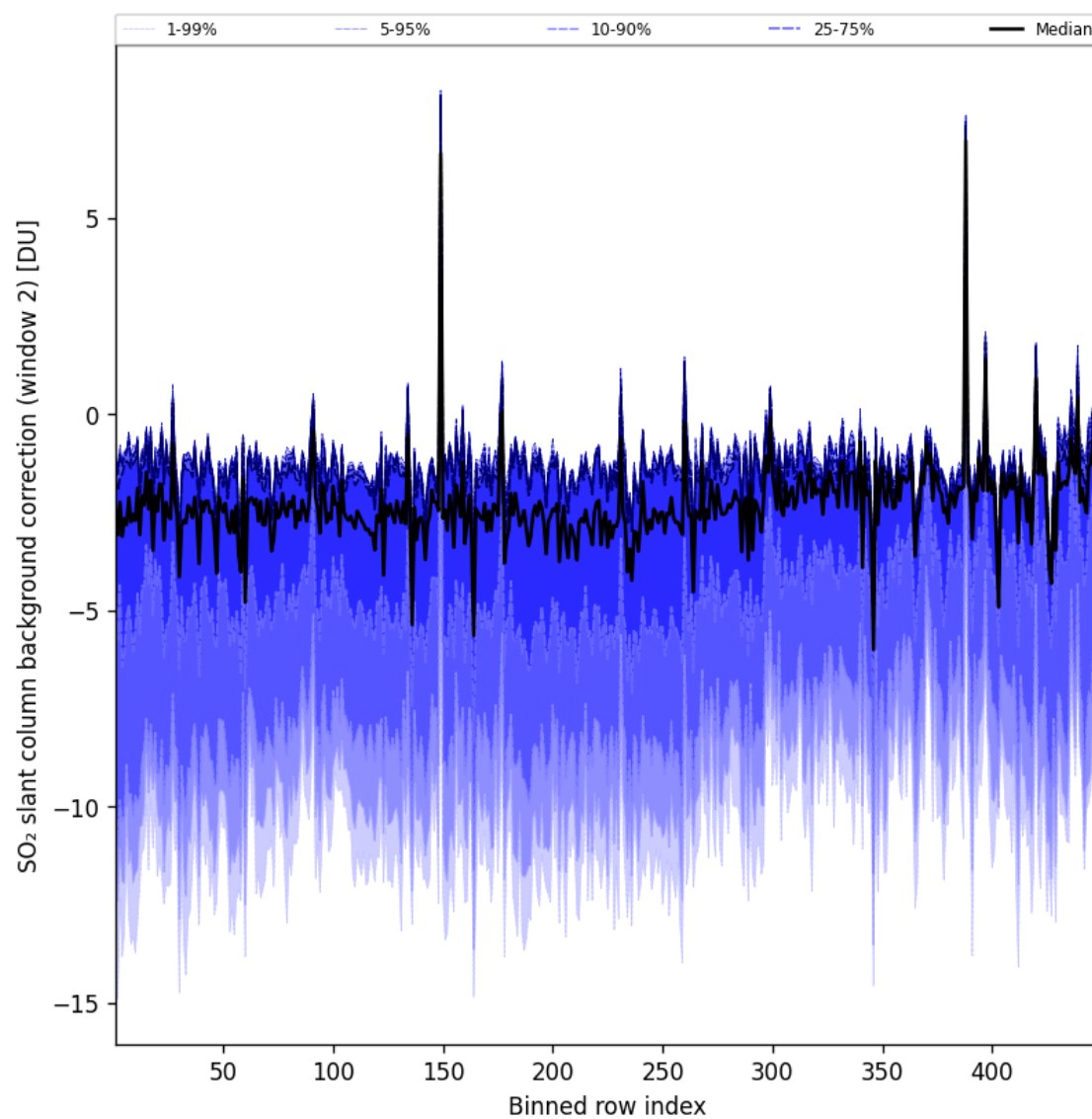


Figure 97: Along track statistics of “SO₂ slant column background correction (window 2)” for 2025-02-20 to 2025-02-21

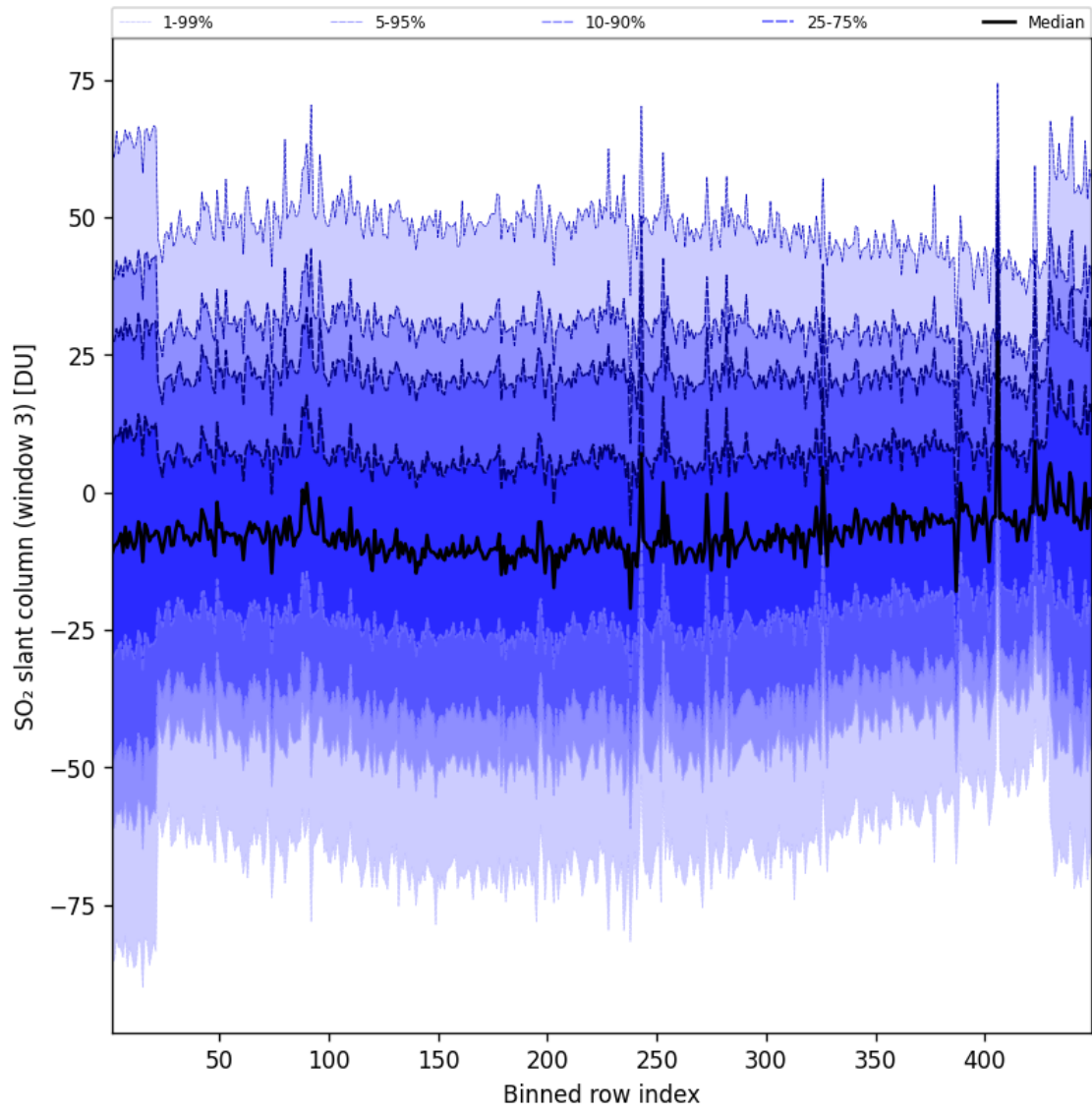


Figure 98: Along track statistics of “SO₂ slant column (window 3)” for 2025-02-20 to 2025-02-21

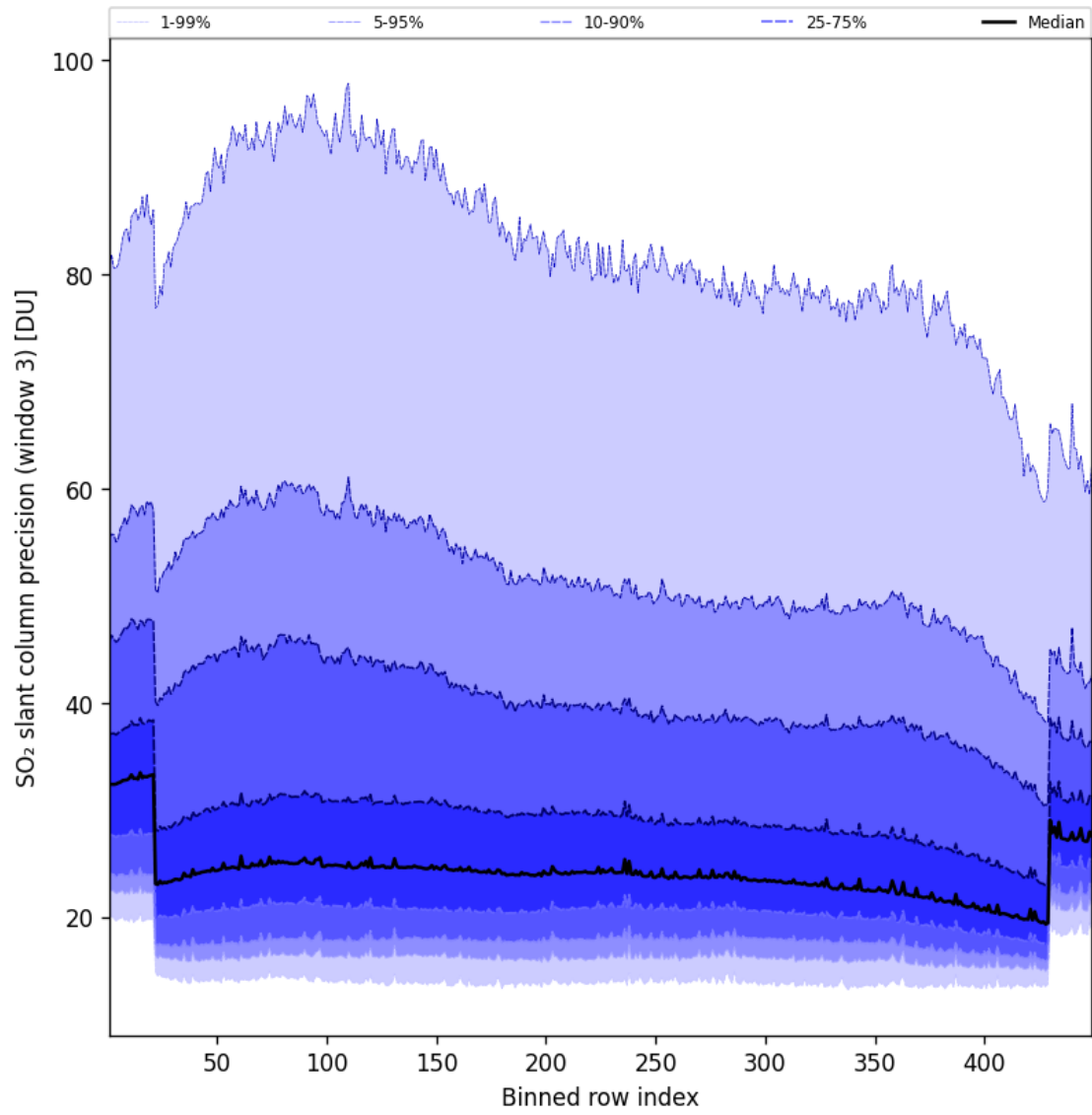


Figure 99: Along track statistics of “SO₂ slant column precision (window 3)” for 2025-02-20 to 2025-02-21

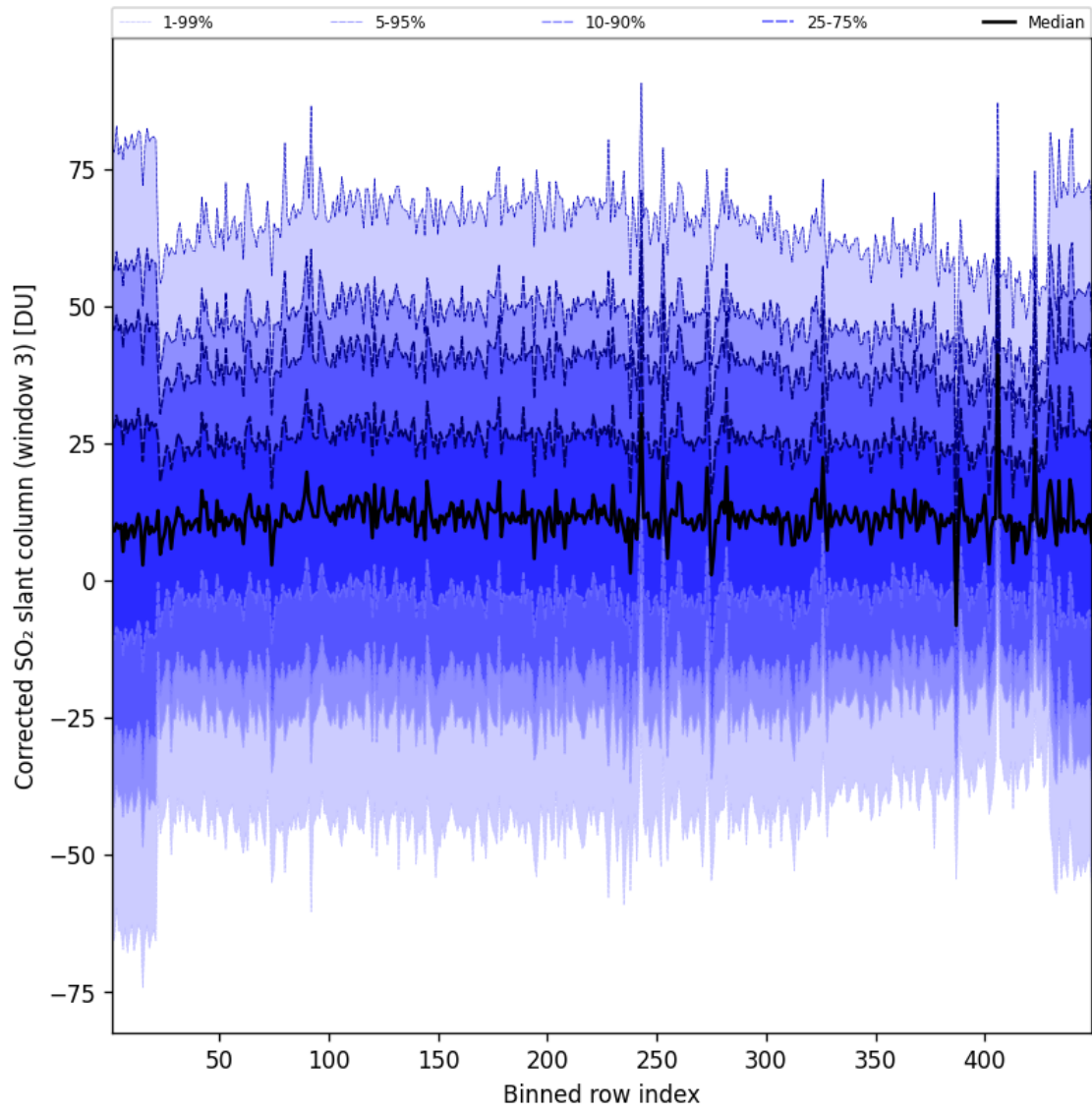


Figure 100: Along track statistics of “Corrected SO₂ slant column (window 3)” for 2025-02-20 to 2025-02-21

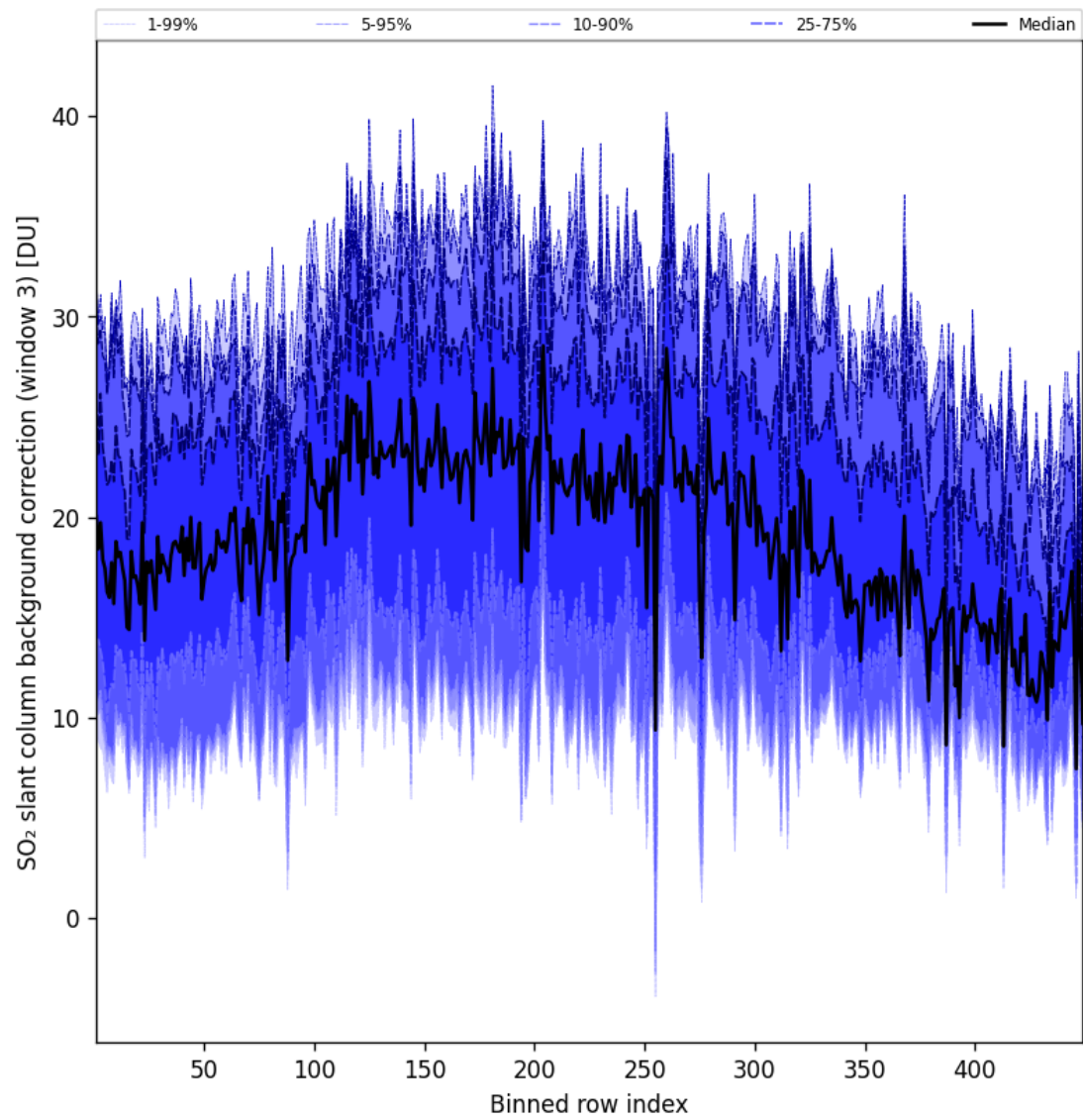


Figure 101: Along track statistics of “SO₂ slant column background correction (window 3)” for 2025-02-20 to 2025-02-21

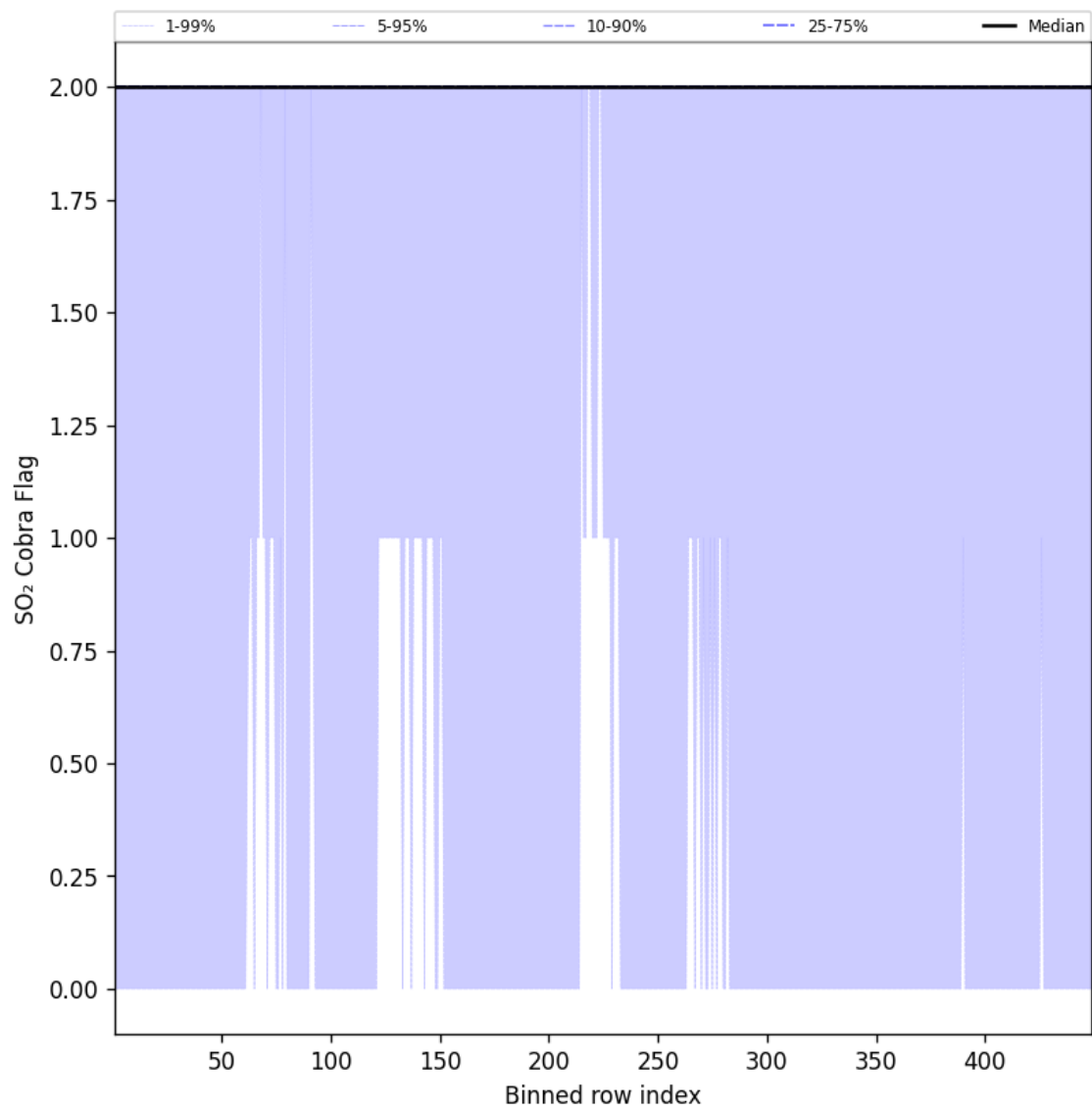


Figure 102: Along track statistics of “SO₂ Cobra Flag” for 2025-02-20 to 2025-02-21

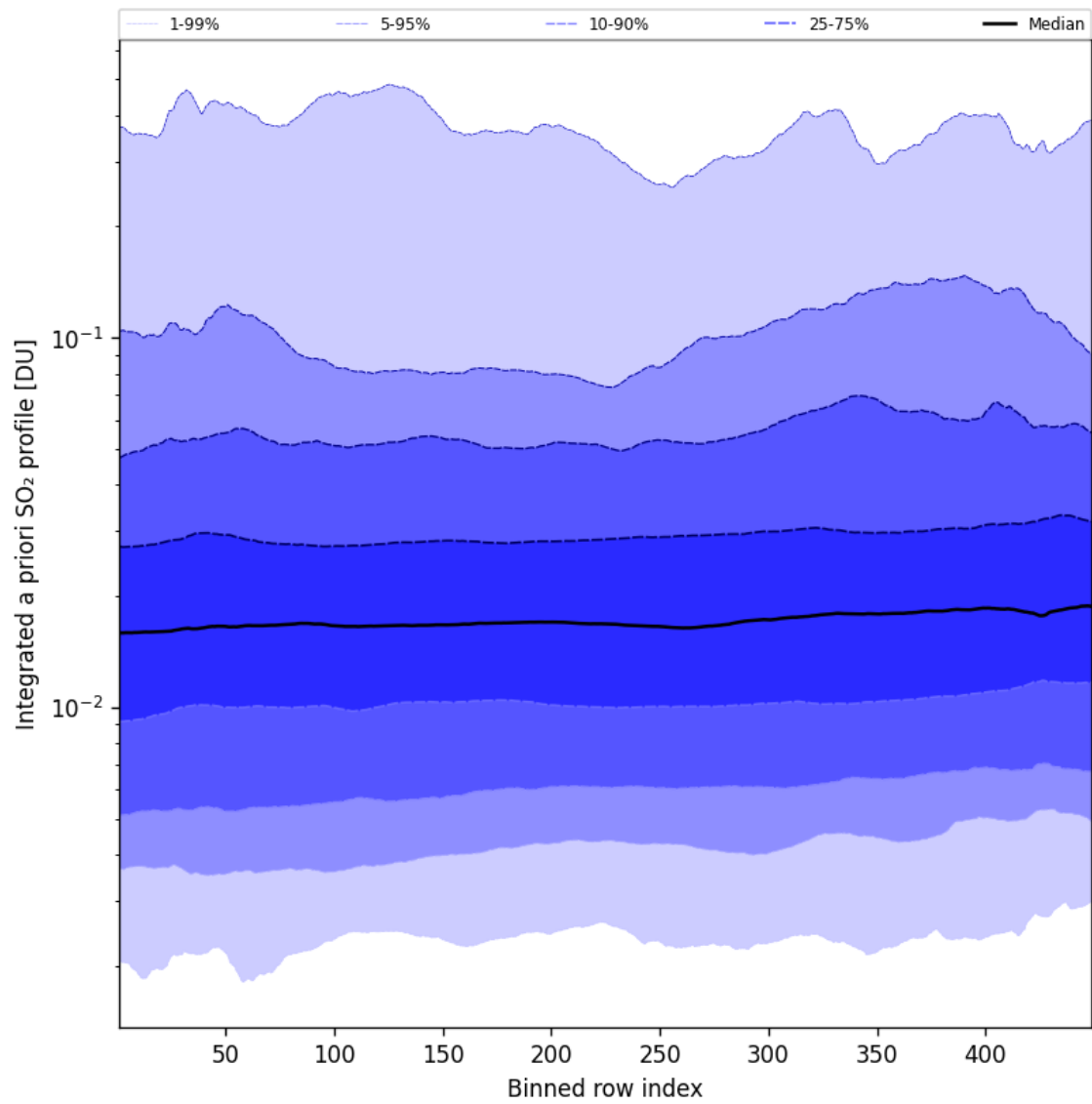


Figure 103: Along track statistics of “Integrated a priori SO₂ profile” for 2025-02-20 to 2025-02-21

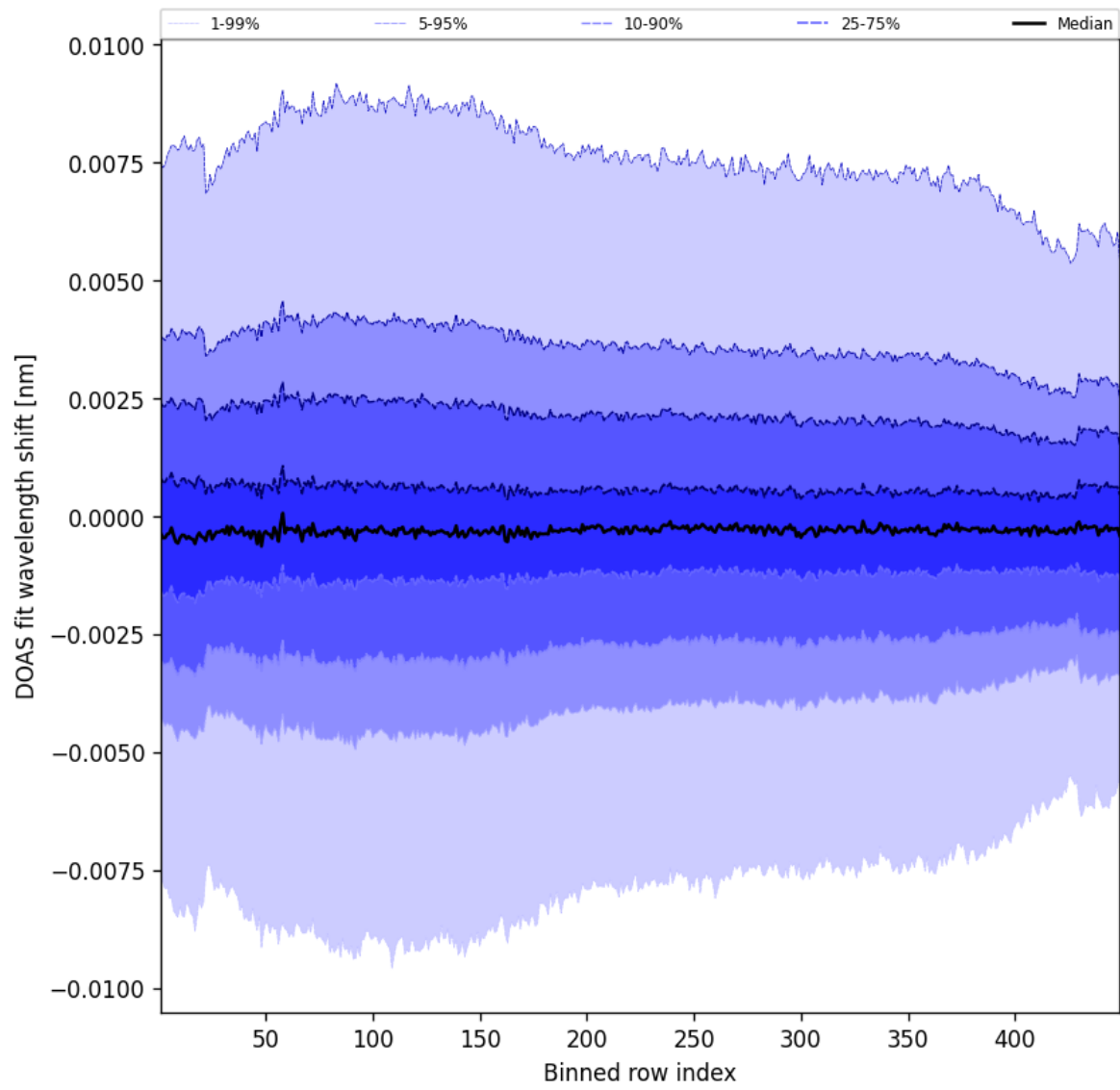


Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2025-02-20 to 2025-02-21

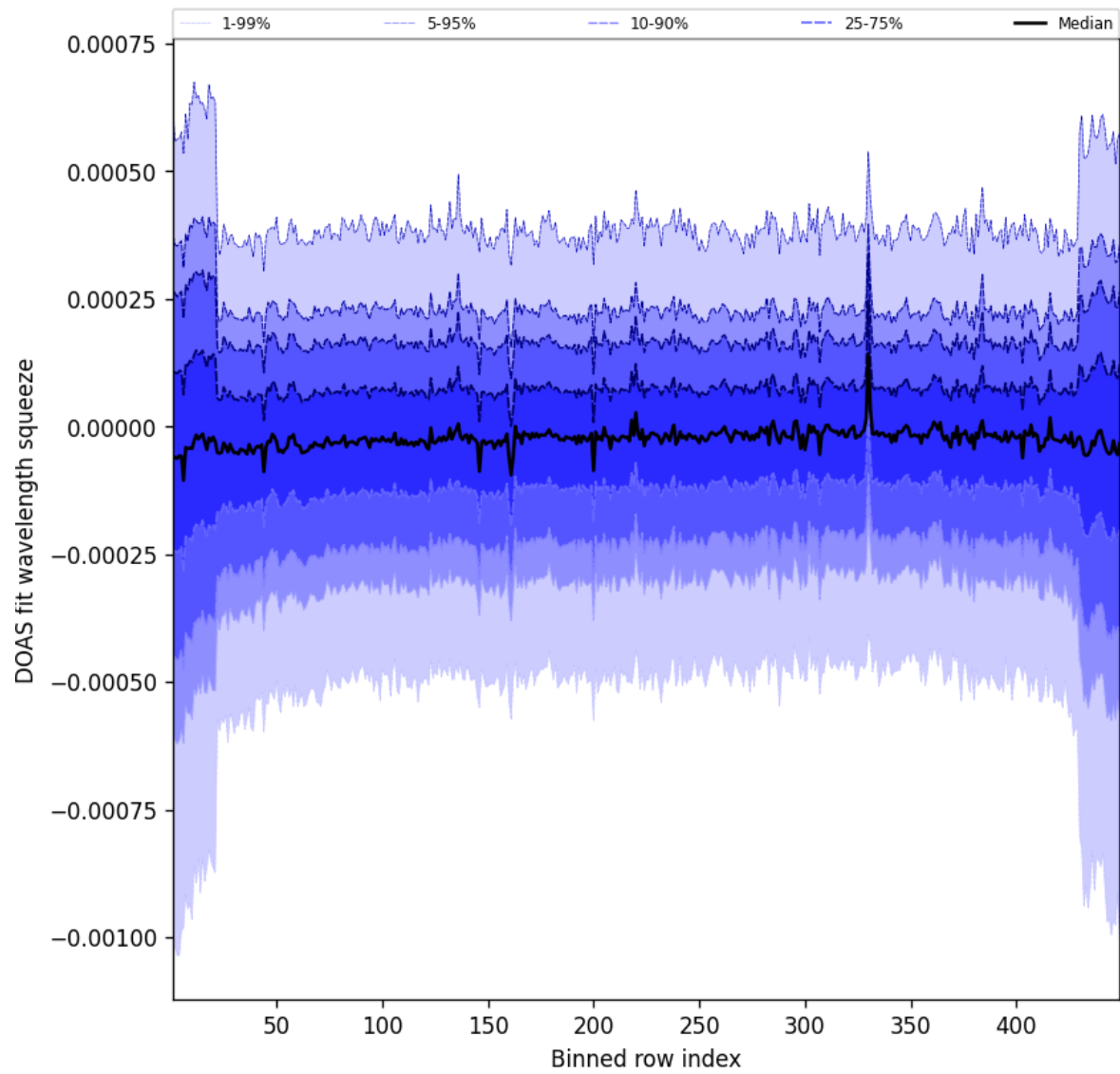


Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2025-02-20 to 2025-02-21

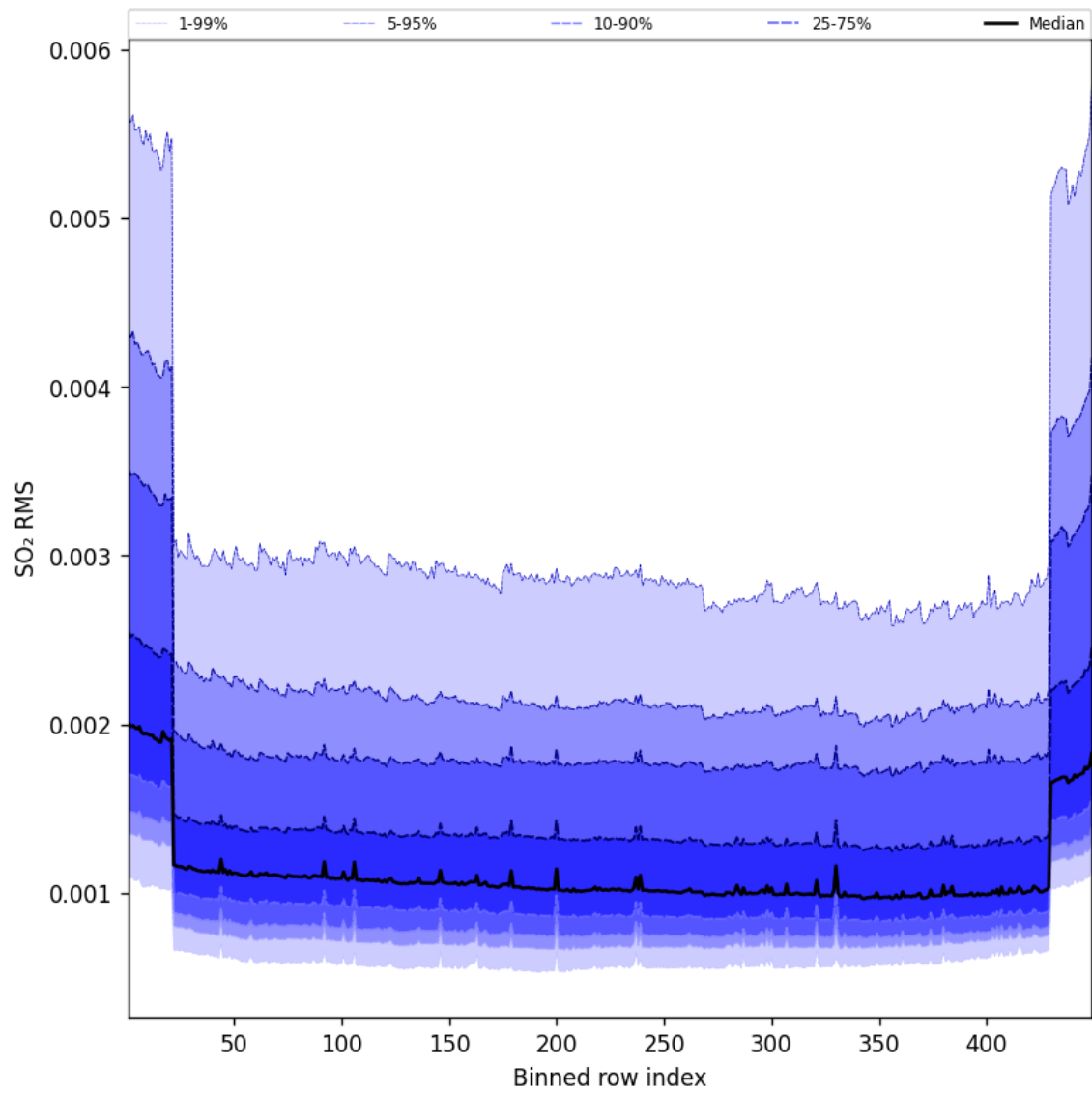


Figure 106: Along track statistics of “SO₂ RMS” for 2025-02-20 to 2025-02-21

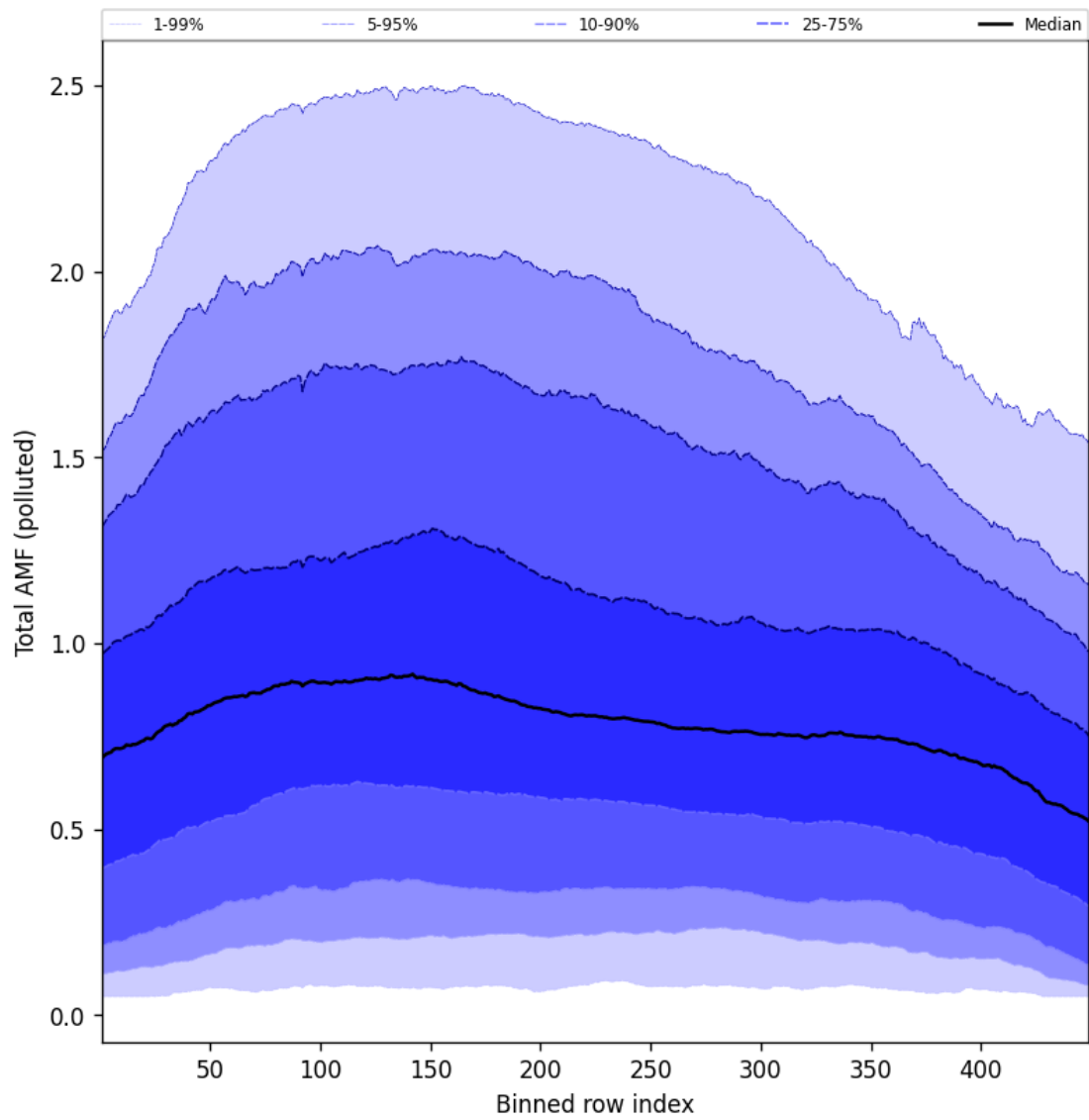


Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-02-20 to 2025-02-21

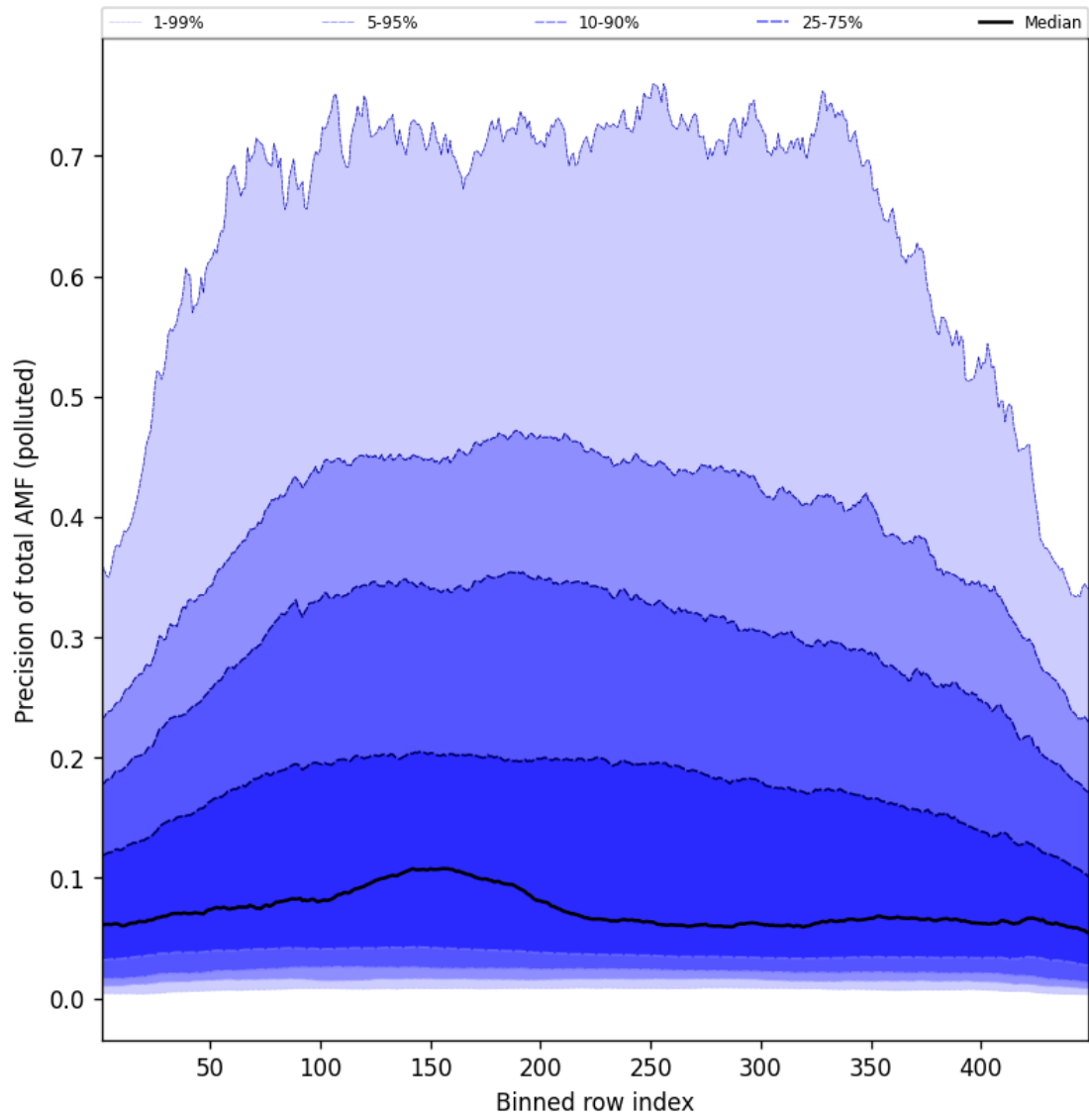


Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-02-20 to 2025-02-21

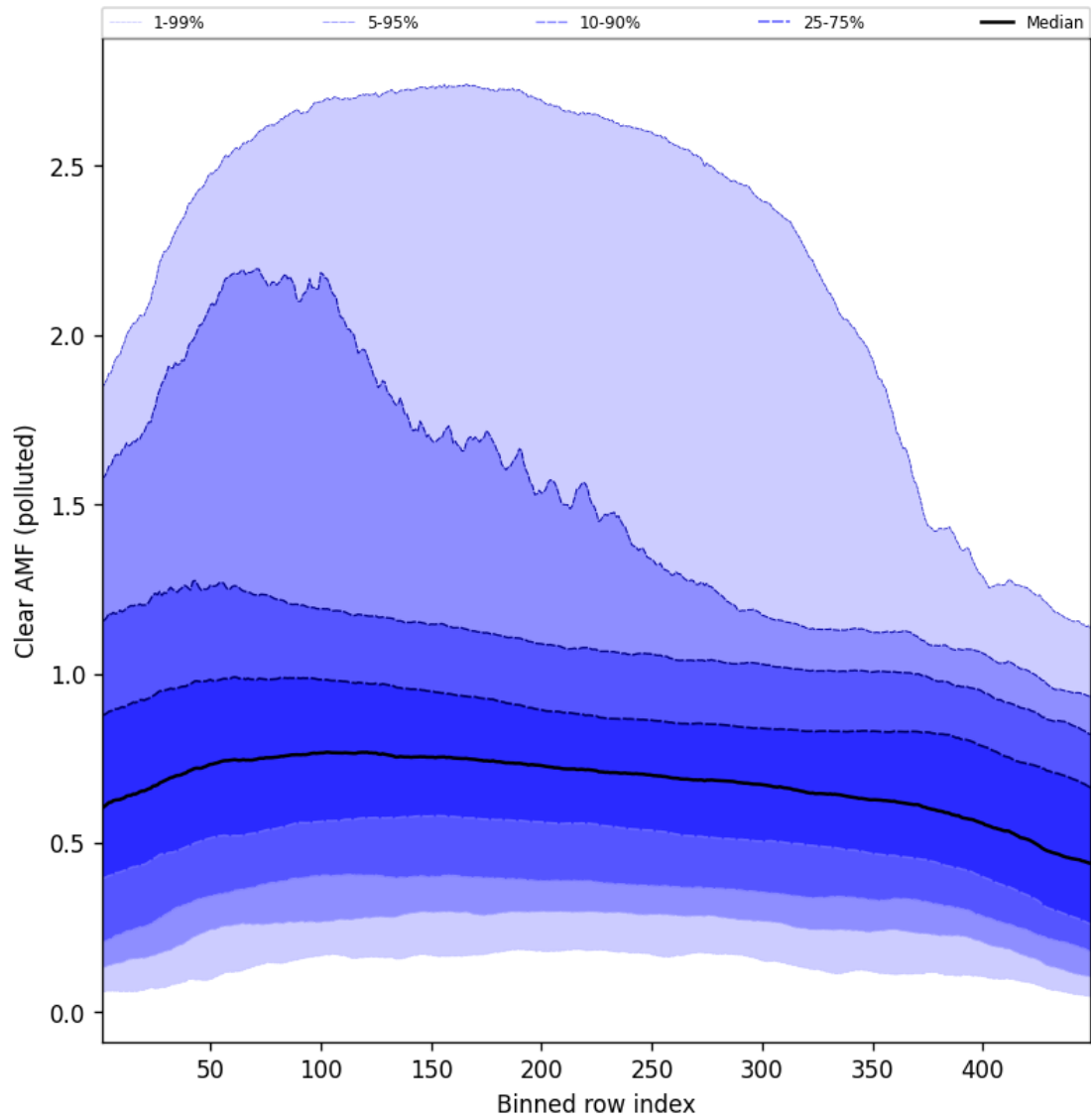


Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-02-20 to 2025-02-21

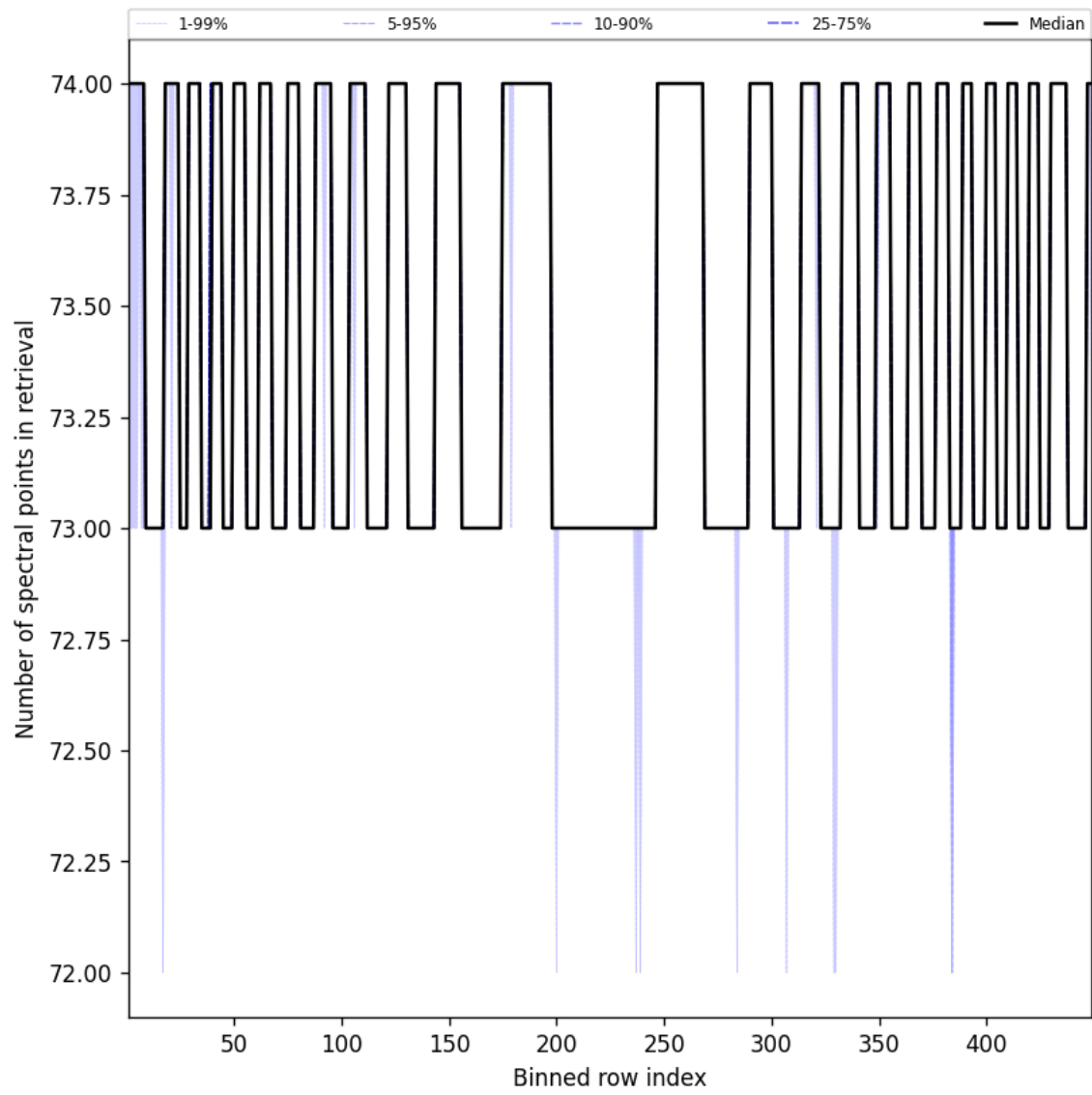


Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-02-20 to 2025-02-21

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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Maarten Sneep (maarten.sneep@knmi.nl).