

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]	0.625 ± 0.418	18115869	0.995	0.820	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(2.878 \pm 116.764) \times 10^{-2}$	18115869	0.235	0.428	8.139×10^{-3}	-116	133
sulfurdioxide total vertical column precision [DU]	0.551 ± 0.872	18115869	0.222	0.347	0.308	2.179×10^{-2}	37.0
sulfurdioxide slant column density corrected [DU]	$(1.363 \pm 33.929) \times 10^{-2}$	18115869	0.242	0.362	7.729×10^{-3}	-24.8	87.1
sulfurdioxide slant column density cobra [DU]	$(1.360 \pm 33.669) \times 10^{-2}$	18115869	0.242	0.362	7.729×10^{-3}	-24.8	62.7
sulfurdioxide slant column density cobra precision [DU]	0.286 ± 0.116	18115869	0.213	0.119	0.253	6.397×10^{-2}	17.4
sulfurdioxide slant column density window1 [DU]	0.115 ± 0.647	18115869	0.125	0.736	0.119	-35.6	72.1
sulfurdioxide slant column density window1 precision [DU]	0.286 ± 0.116	18115869	0.213	0.119	0.253	6.397×10^{-2}	17.4
sulfurdioxide slant column density corrected win1 [DU]	$(-1.243 \pm 63.978) \times 10^{-2}$	18115869	-2.500×10^{-2}	0.722	-2.505×10^{-2}	-35.6	72.1
background so2 slant column offset window1 [DU]	-0.127 ± 0.122	18115869	-0.140	0.146	-0.140	-1.33	3.20
sulfurdioxide slant column density window2 [DU]	0.680 ± 8.893	18115869	0.250	11.3	0.574	-1.527×10^3	884
sulfurdioxide slant column density window2 precision [DU]	8.05 ± 2.20	18115869	7.43	2.52	7.70	2.11	694
sulfurdioxide slant column density corrected win2 [DU]	-0.947 ± 8.750	18115869	-1.25	11.1	-0.960	-1.526×10^3	883
background so2 slant column offset window2 [DU]	-1.63 ± 2.40	18115869	0.250	3.59	-1.08	-14.5	7.54
sulfurdioxide slant column density window3 [DU]	-2.23 ± 24.00	18115869	-2.80	30.0	-2.40	-504	246
sulfurdioxide slant column density window3 precision [DU]	28.4 ± 13.3	18115869	22.5	9.89	24.7	10.2	328
sulfurdioxide slant column density corrected win3 [DU]	5.07 ± 23.20	18115869	3.92	28.8	5.12	-507	249
background so2 slant column offset window3 [DU]	7.30 ± 6.44	18115869	1.68	10.2	6.77	-13.9	29.0
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.21	18115869	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(3.169 \pm 7.694) \times 10^{-2}$	18115869	1.125×10^{-2}	1.639×10^{-2}	1.291×10^{-2}	2.736×10^{-4}	1.89
fitted radiance shift [nm]	$(-5.332 \pm 25.985) \times 10^{-4}$	18115869	-5.000×10^{-4}	1.847×10^{-3}	-5.665×10^{-4}	-4.431×10^{-2}	4.650×10^{-2}
fitted radiance squeeze [1]	$(-1.386 \pm 178.409) \times 10^{-6}$	18115869	1.000×10^{-5}	2.085×10^{-4}	3.560×10^{-6}	-1.357×10^{-2}	1.434×10^{-2}
fitted root mean square [1]	$(1.256 \pm 0.477) \times 10^{-3}$	18115869	9.750×10^{-4}	4.857×10^{-4}	1.131×10^{-3}	3.417×10^{-4}	5.500×10^{-2}
sulfurdioxide total air mass factor polluted [1]	0.924 ± 0.549	18115869	0.860	0.623	0.819	5.000×10^{-2}	3.48
sulfurdioxide total air mass factor polluted precision [1]	0.122 ± 0.117	18115869	3.500×10^{-2}	0.132	8.020×10^{-2}	2.729×10^{-3}	1.71
sulfurdioxide clear air mass factor polluted [1]	0.782 ± 0.432	18115869	0.580	0.401	0.707	6.351×10^{-2}	3.49
number of spectral points in retrieval [1]	73.4 ± 0.5	18115869	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]	-2.74	-0.910	-0.532	-0.351	-0.203	0.225	0.384	0.582	1.01	3.09
sulfurdioxide total vertical column precision [DU]	7.735×10^{-2}	0.111	0.141	0.169	0.205	0.552	0.768	1.06	1.69	4.52
sulfurdioxide slant column density corrected [DU]	-0.820	-0.482	-0.353	-0.265	-0.172	0.190	0.287	0.380	0.522	0.922
sulfurdioxide slant column density cobra [DU]	-0.820	-0.482	-0.353	-0.265	-0.172	0.190	0.287	0.380	0.522	0.922
sulfurdioxide slant column density cobra precision [DU]	0.145	0.171	0.185	0.197	0.211	0.330	0.378	0.426	0.507	0.707
sulfurdioxide slant column density window1 [DU]	-1.58	-0.899	-0.631	-0.447	-0.252	0.483	0.672	0.850	1.11	1.81
sulfurdioxide slant column density window1 precision [DU]	0.145	0.171	0.185	0.197	0.211	0.330	0.378	0.426	0.507	0.707
sulfurdioxide slant column density corrected win1 [DU]	-1.60	-0.984	-0.737	-0.567	-0.383	0.339	0.532	0.717	0.997	1.75
background so2 slant column offset window1 [DU]	-0.351	-0.297	-0.267	-0.241	-0.208	-6.208×10^{-2}	-2.100×10^{-2}	1.978×10^{-2}	8.391×10^{-2}	0.243
sulfurdioxide slant column density window2 [DU]	-20.3	-13.6	-10.3	-7.81	-5.04	6.28	9.15	11.7	15.3	22.7
sulfurdioxide slant column density window2 precision [DU]	4.42	5.24	5.72	6.12	6.59	9.11	9.98	10.9	12.1	14.7
sulfurdioxide slant column density corrected win2 [DU]	-22.1	-15.1	-11.8	-9.28	-6.51	4.61	7.38	9.87	13.2	20.3
background so2 slant column offset window2 [DU]	-7.51	-5.87	-5.02	-4.29	-3.36	0.229	0.558	0.823	1.24	3.06
sulfurdioxide slant column density window3 [DU]	-62.2	-41.0	-31.5	-24.7	-17.2	12.8	20.6	27.8	37.3	56.4
sulfurdioxide slant column density window3 precision [DU]	14.7	16.8	18.3	19.5	21.0	30.9	35.7	41.6	53.6	85.8
sulfurdioxide slant column density corrected win3 [DU]	-53.8	-32.9	-23.3	-16.5	-9.22	19.6	27.0	33.7	42.9	61.7
background so2 slant column offset window3 [DU]	-4.99	-1.83	-0.442	0.605	2.00	12.2	14.5	16.3	18.3	21.4
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]	2.099×10^{-3}	3.426×10^{-3}	4.650×10^{-3}	5.790×10^{-3}	7.429×10^{-3}	2.382×10^{-2}	3.636×10^{-2}	5.888×10^{-2}	0.121	0.370
fitted radiance shift [nm]	-8.307×10^{-3}	-4.280×10^{-3}	-2.897×10^{-3}	-2.152×10^{-3}	-1.514×10^{-3}	3.337×10^{-4}	1.030×10^{-3}	1.923×10^{-3}	3.489×10^{-3}	7.763×10^{-3}
fitted radiance squeeze [1]	-4.817×10^{-4}	-2.936×10^{-4}	-2.141×10^{-4}	-1.597×10^{-4}	-1.027×10^{-4}	1.058×10^{-4}	1.576×10^{-4}	2.054×10^{-4}	2.734×10^{-4}	4.334×10^{-4}
fitted root mean square [1]	6.170×10^{-4}	7.490×10^{-4}	8.211×10^{-4}	8.780×10^{-4}	9.483×10^{-4}	1.434×10^{-3}	1.641×10^{-3}	1.846×10^{-3}	2.168×10^{-3}	2.990×10^{-3}
sulfurdioxide total air mass factor polluted [1]	7.097×10^{-2}	0.211	0.326	0.427	0.551	1.17	1.43	1.69	2.06	2.64
sulfurdioxide total air mass factor polluted precision [1]	9.794×10^{-3}	1.788×10^{-2}	2.514×10^{-2}	3.106×10^{-2}	3.956×10^{-2}	0.172	0.222	0.270	0.340	0.520
sulfurdioxide clear air mass factor polluted [1]	0.182	0.296	0.373	0.440	0.521	0.922	1.04	1.19	1.60	2.66
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]	0.691 $\pm$ 0.402	7419676	0.740	1.000	0.0	1.000	0.260	1.000
sulfurdioxide total vertical column [DU]	(4.422 $\pm$ 155.696) $\times 10^{-2}$	7419676	0.552	1.259 $\times 10^{-2}$	-116	133	-0.259	0.293
sulfurdioxide total vertical column precision [DU]	0.753 $\pm$ 1.135	7419676	0.522	0.393	5.126 $\times 10^{-2}$	37.0	0.248	0.770
sulfurdioxide slant column density corrected [DU]	(1.862 $\pm$ 35.956) $\times 10^{-2}$	7419676	0.376	9.634 $\times 10^{-3}$	-7.65	33.8	-0.177	0.200
sulfurdioxide slant column density cobra [DU]	(1.861 $\pm$ 35.909) $\times 10^{-2}$	7419676	0.376	9.634 $\times 10^{-3}$	-7.65	12.5	-0.177	0.200
sulfurdioxide slant column density cobra precision [DU]	0.300 $\pm$ 0.125	7419676	0.137	0.264	8.731 $\times 10^{-2}$	5.57	0.216	0.354
sulfurdioxide slant column density window1 [DU]	0.171 $\pm$ 0.674	7419676	0.754	0.168	-10.3	27.7	-0.208	0.546
sulfurdioxide slant column density window1 precision [DU]	0.300 $\pm$ 0.125	7419676	0.137	0.264	8.731 $\times 10^{-2}$	5.57	0.216	0.354
sulfurdioxide slant column density corrected win1 [DU]	(1.122 $\pm$ 67.203) $\times 10^{-2}$	7419676	0.747	-9.299 $\times 10^{-3}$	-9.84	27.6	-0.376	0.371
background so2 slant column offset window1 [DU]	-0.160 $\pm$ 0.114	7419676	0.117	-0.164	-1.33	3.20	-0.230	-0.114
sulfurdioxide slant column density window2 [DU]	0.443 $\pm$ 9.462	7419676	12.0	0.219	-310	168	-5.67	6.31
sulfurdioxide slant column density window2 precision [DU]	8.65 $\pm$ 2.32	7419676	2.87	8.32	2.11	206	7.04	9.92
sulfurdioxide slant column density corrected win2 [DU]	-0.776 $\pm$ 9.320	7419676	11.8	-0.774	-313	162	-6.70	5.15
background so2 slant column offset window2 [DU]	-1.22 $\pm$ 2.26	7419676	2.67	-0.577	-14.2	7.28	-2.38	0.285
sulfurdioxide slant column density window3 [DU]	-2.86 $\pm$ 25.85	7419676	32.3	-2.24	-211	193	-18.6	13.7
sulfurdioxide slant column density window3 precision [DU]	30.5 $\pm$ 13.8	7419676	11.0	27.0	10.9	259	22.8	33.7
sulfurdioxide slant column density corrected win3 [DU]	4.76 $\pm$ 25.27	7419676	31.7	5.06	-208	197	-10.8	20.8
background so2 slant column offset window3 [DU]	7.62 $\pm$ 5.75	7419676	8.98	6.48	-11.6	29.0	3.10	12.1
sulfurdioxide slant column cobra flag [1]	1.97 $\pm$ 0.24	7419676	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	(5.773 $\pm$ 11.203) $\times 10^{-2}$	7419676	3.896 $\times 10^{-2}$	2.240 $\times 10^{-2}$	2.736 $\times 10^{-4}$	1.89	1.247 $\times 10^{-2}$	5.143 $\times 10^{-2}$
fitted radiance shift [nm]	(-1.750 $\pm$ 27.200) $\times 10^{-4}$	7419676	1.774 $\times 10^{-3}$	-2.265 $\times 10^{-4}$	-4.232 $\times 10^{-2}$	4.147 $\times 10^{-2}$	-1.076 $\times 10^{-3}$	6.979 $\times 10^{-4}$
fitted radiance squeeze [1]	(3.146 $\pm$ 17.772) $\times 10^{-5}$	7419676	2.090 $\times 10^{-4}$	2.824 $\times 10^{-5}$	-7.481 $\times 10^{-3}$	3.236 $\times 10^{-3}$	-7.443 $\times 10^{-5}$	1.345 $\times 10^{-4}$
fitted root mean square [1]	(1.323 $\pm$ 0.518) $\times 10^{-3}$	7419676	5.800 $\times 10^{-4}$	1.186 $\times 10^{-3}$	3.417 $\times 10^{-4}$	2.400 $\times 10^{-2}$	9.732 $\times 10^{-4}$	1.553 $\times 10^{-3}$
sulfurdioxide total air mass factor polluted [1]	0.728 $\pm$ 0.398	7419676	0.519	0.698	5.000 $\times 10^{-2}$	3.05	0.438	0.957
sulfurdioxide total air mass factor polluted precision [1]	(9.508 $\pm$ 11.623) $\times 10^{-2}$	7419676	8.677 $\times 10^{-2}$	5.291 $\times 10^{-2}$	2.729 $\times 10^{-3}$	1.71	3.209 $\times 10^{-2}$	0.119
sulfurdioxide clear air mass factor polluted [1]	0.671 $\pm$ 0.271	7419676	0.419	0.668	6.351 $\times 10^{-2}$	2.45	0.458	0.877
number of spectral points in retrieval [1]	73.5 $\pm$ 0.5	7419676	1.000	73.0	71.0	74.0	73.0	74.0

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

Variable	mean $\pm \sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.579 ± 0.423	10696193	0.860	0.490	0.0	1.000	0.140	1.000
sulfurdioxide total vertical column [DU]	$(1.808 \pm 79.203) \times 10^{-2}$	10696193	0.364	6.029×10^{-3}	-73.6	106	-0.174	0.190
sulfurdioxide total vertical column precision [DU]	0.412 ± 0.589	10696193	0.262	0.269	2.179×10^{-2}	32.4	0.180	0.442
sulfurdioxide slant column density corrected [DU]	$(1.018 \pm 32.444) \times 10^{-2}$	10696193	0.352	6.471×10^{-3}	-24.8	87.1	-0.168	0.183
sulfurdioxide slant column density cobra [DU]	$(1.012 \pm 32.019) \times 10^{-2}$	10696193	0.352	6.471×10^{-3}	-24.8	62.7	-0.168	0.183
sulfurdioxide slant column density cobra precision [DU]	0.276 ± 0.108	10696193	0.106	0.246	6.397×10^{-2}	17.4	0.208	0.314
sulfurdioxide slant column density window1 [DU]	$(7.566 \pm 62.551) \times 10^{-2}$	10696193	0.721	8.590×10^{-2}	-35.6	72.1	-0.281	0.441
sulfurdioxide slant column density window1 precision [DU]	0.276 ± 0.108	10696193	0.106	0.246	6.397×10^{-2}	17.4	0.208	0.314
sulfurdioxide slant column density corrected win1 [DU]	$(-2.884 \pm 61.588) \times 10^{-2}$	10696193	0.705	-3.550×10^{-2}	-35.6	72.1	-0.387	0.318
background so2 slant column offset window1 [DU]	-0.104 ± 0.122	10696193	0.157	-0.111	-0.947	2.44	-0.192	-3.488×10^{-2}
sulfurdioxide slant column density window2 [DU]	0.845 ± 8.472	10696193	10.9	0.799	-1.527×10^3	884	-4.61	6.26
sulfurdioxide slant column density window2 precision [DU]	7.64 ± 2.01	10696193	2.15	7.35	2.27	694	6.38	8.53
sulfurdioxide slant column density corrected win2 [DU]	-1.07 ± 8.33	10696193	10.7	-1.08	-1.526×10^3	883	-6.40	4.26
background so2 slant column offset window2 [DU]	-1.91 ± 2.45	10696193	3.97	-1.70	-14.5	7.54	-3.79	0.174
sulfurdioxide slant column density window3 [DU]	-1.79 ± 22.61	10696193	28.6	-2.51	-504	246	-16.4	12.2
sulfurdioxide slant column density window3 precision [DU]	26.9 ± 12.8	10696193	8.06	23.4	10.2	328	20.2	28.3
sulfurdioxide slant column density corrected win3 [DU]	5.29 ± 21.64	10696193	27.0	5.16	-507	249	-8.24	18.8
background so2 slant column offset window3 [DU]	7.08 ± 6.87	10696193	11.3	7.05	-13.9	27.2	1.04	12.3
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.19	10696193	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(1.362 \pm 2.287) \times 10^{-2}$	10696193	9.692×10^{-3}	9.415×10^{-3}	8.482×10^{-4}	1.23	5.896×10^{-3}	1.559×10^{-2}
fitted radiance shift [nm]	$(-7.816 \pm 24.806) \times 10^{-4}$	10696193	1.761×10^{-3}	-8.092×10^{-4}	-4.431×10^{-2}	4.650×10^{-2}	-1.726×10^{-3}	3.500×10^{-5}
fitted radiance squeeze [1]	$(-2.417 \pm 17.531) \times 10^{-5}$	10696193	2.079×10^{-4}	-1.344×10^{-5}	-1.357×10^{-2}	1.434×10^{-2}	-1.218×10^{-4}	8.603×10^{-5}
fitted root mean square [1]	$(1.209 \pm 0.440) \times 10^{-3}$	10696193	4.237×10^{-4}	1.099×10^{-3}	3.532×10^{-4}	5.500×10^{-2}	9.351×10^{-4}	1.359×10^{-3}
sulfurdioxide total air mass factor polluted [1]	1.06 ± 0.60	10696193	0.738	0.911	5.000×10^{-2}	3.48	0.634	1.37
sulfurdioxide total air mass factor polluted precision [1]	0.140 ± 0.114	10696193	0.156	0.112	2.981×10^{-3}	1.65	4.625×10^{-2}	0.202
sulfurdioxide clear air mass factor polluted [1]	0.859 ± 0.501	10696193	0.416	0.730	8.400×10^{-2}	3.49	0.555	0.971
number of spectral points in retrieval [1]	73.4 ± 0.5	10696193	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]	0.637 ± 0.415	13450552	0.800	1.000	0.0	1.000	0.200	1.000
sulfurdioxide total vertical column [DU]	$(2.412 \pm 95.675) \times 10^{-2}$	13450552	0.412	7.835×10^{-3}	-116	104	-0.196	0.216
sulfurdioxide total vertical column precision [DU]	0.486 ± 0.708	13450552	0.298	0.293	3.211×10^{-2}	37.0	0.206	0.504
sulfurdioxide slant column density corrected [DU]	$(1.256 \pm 32.136) \times 10^{-2}$	13450552	0.351	7.341×10^{-3}	-24.8	87.1	-0.167	0.184
sulfurdioxide slant column density cobra [DU]	$(1.253 \pm 31.914) \times 10^{-2}$	13450552	0.351	7.341×10^{-3}	-24.8	62.7	-0.167	0.184
sulfurdioxide slant column density cobra precision [DU]	0.277 ± 0.111	13450552	0.104	0.245	8.105×10^{-2}	17.4	0.208	0.312
sulfurdioxide slant column density window1 [DU]	0.118 ± 0.617	13450552	0.710	0.122	-35.6	66.2	-0.236	0.474
sulfurdioxide slant column density window1 precision [DU]	0.277 ± 0.111	13450552	0.104	0.245	8.105×10^{-2}	17.4	0.208	0.312
sulfurdioxide slant column density corrected win1 [DU]	$(-9.808 \pm 611.223) \times 10^{-3}$	13450552	0.698	-2.129×10^{-2}	-35.6	66.0	-0.367	0.330
background so2 slant column offset window1 [DU]	-0.128 ± 0.119	13450552	0.146	-0.139	-1.20	3.20	-0.207	-6.095×10^{-2}
sulfurdioxide slant column density window2 [DU]	0.605 ± 8.591	13450552	11.0	0.517	-948	884	-4.95	6.06
sulfurdioxide slant column density window2 precision [DU]	7.80 ± 2.02	13450552	2.32	7.50	2.11	443	6.46	8.78
sulfurdioxide slant column density corrected win2 [DU]	-1.01 ± 8.47	13450552	10.8	-1.02	-949	883	-6.44	4.40
background so2 slant column offset window2 [DU]	-1.62 ± 2.38	13450552	3.63	-1.11	-14.5	7.54	-3.38	0.251
sulfurdioxide slant column density window3 [DU]	0.177 ± 23.137	13450552	29.3	-0.368	-243	246	-14.7	14.7
sulfurdioxide slant column density window3 precision [DU]	27.4 ± 12.3	13450552	8.75	24.0	10.2	240	20.7	29.4
sulfurdioxide slant column density corrected win3 [DU]	6.97 ± 22.19	13450552	27.9	6.63	-248	249	-7.12	20.8
background so2 slant column offset window3 [DU]	6.79 ± 6.06	13450552	9.54	6.40	-13.9	29.0	1.85	11.4
sulfurdioxide slant column cobra flag [1]	1.99 ± 0.16	13450552	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(1.975 \pm 3.575) \times 10^{-2}$	13450552	1.211×10^{-2}	1.219×10^{-2}	2.989×10^{-4}	1.63	7.612×10^{-3}	1.972×10^{-2}
fitted radiance shift [nm]	$(-5.280 \pm 24.540) \times 10^{-4}$	13450552	1.848×10^{-3}	-5.438×10^{-4}	-4.350×10^{-2}	4.650×10^{-2}	-1.501×10^{-3}	3.472×10^{-4}
fitted radiance squeeze [1]	$(-1.134 \pm 169.023) \times 10^{-6}$	13450552	1.995×10^{-4}	4.444×10^{-6}	-1.357×10^{-2}	1.434×10^{-2}	-9.738×10^{-5}	1.021×10^{-4}
fitted root mean square [1]	$(1.210 \pm 0.451) \times 10^{-3}$	13450552	4.228×10^{-4}	1.095×10^{-3}	3.417×10^{-4}	5.500×10^{-2}	9.307×10^{-4}	1.353×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.913 ± 0.485	13450552	0.559	0.837	5.000×10^{-2}	2.90	0.585	1.14
sulfurdioxide total air mass factor polluted precision [1]	0.117 ± 0.104	13450552	0.123	7.939×10^{-2}	2.981×10^{-3}	1.65	4.209×10^{-2}	0.165
sulfurdioxide clear air mass factor polluted [1]	0.753 ± 0.305	13450552	0.362	0.719	7.255×10^{-2}	3.07	0.546	0.907
number of spectral points in retrieval [1]	73.4 ± 0.5	13450552	1.000	73.0	71.0	74.0	73.0	74.0

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

Variable	mean $\pm \sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.597 ± 0.423	3899286	0.850	1.000	0.0	1.000	0.150	1.000
sulfurdioxide total vertical column [DU]	$(3.590 \pm 150.315) \times 10^{-2}$	3899286	0.465	7.702×10^{-3}	-89.1	113	-0.219	0.245
sulfurdioxide total vertical column precision [DU]	0.688 ± 1.130	3899286	0.517	0.360	2.179×10^{-2}	33.9	0.190	0.707
sulfurdioxide slant column density corrected [DU]	$(1.460 \pm 37.830) \times 10^{-2}$	3899286	0.392	7.936×10^{-3}	-13.5	37.1	-0.186	0.205
sulfurdioxide slant column density cobra [DU]	$(1.456 \pm 37.574) \times 10^{-2}$	3899286	0.392	7.936×10^{-3}	-13.5	37.0	-0.186	0.205
sulfurdioxide slant column density cobra precision [DU]	0.310 ± 0.123	3899286	0.142	0.280	6.397×10^{-2}	16.1	0.224	0.366
sulfurdioxide slant column density window1 [DU]	$(9.750 \pm 72.188) \times 10^{-2}$	3899286	0.816	0.101	-32.6	72.1	-0.312	0.504
sulfurdioxide slant column density window1 precision [DU]	0.310 ± 0.123	3899286	0.142	0.280	6.397×10^{-2}	16.1	0.224	0.366
sulfurdioxide slant column density corrected win1 [DU]	$(-2.932 \pm 70.877) \times 10^{-2}$	3899286	0.793	-4.449×10^{-2}	-32.6	72.1	-0.438	0.355
background so2 slant column offset window1 [DU]	-0.127 ± 0.130	3899286	0.143	-0.143	-1.09	2.78	-0.211	-6.795×10^{-2}
sulfurdioxide slant column density window2 [DU]	0.799 ± 9.656	3899286	12.2	0.680	-1.527×10^3	729	-5.37	6.86
sulfurdioxide slant column density window2 precision [DU]	8.71 ± 2.50	3899286	2.93	8.32	2.45	694	7.06	9.98
sulfurdioxide slant column density corrected win2 [DU]	-0.752 ± 9.476	3899286	11.9	-0.754	-1.526×10^3	729	-6.72	5.21
background so2 slant column offset window2 [DU]	-1.55 ± 2.39	3899286	3.26	-0.927	-14.5	7.54	-3.08	0.185
sulfurdioxide slant column density window3 [DU]	-9.44 ± 24.94	3899286	30.9	-9.03	-504	211	-24.6	6.24
sulfurdioxide slant column density window3 precision [DU]	31.1 ± 15.4	3899286	11.9	27.0	10.9	263	22.2	34.1
sulfurdioxide slant column density corrected win3 [DU]	-0.777 ± 24.990	3899286	30.8	-3.423×10^{-2}	-507	210	-15.8	15.0
background so2 slant column offset window3 [DU]	8.66 ± 7.27	3899286	12.7	7.89	-13.9	28.3	2.42	15.2
sulfurdioxide slant column cobra flag [1]	1.95 ± 0.30	3899286	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(6.115 \pm 12.135) \times 10^{-2}$	3899286	5.319×10^{-2}	1.741×10^{-2}	2.748×10^{-4}	1.89	6.226×10^{-3}	5.941×10^{-2}
fitted radiance shift [nm]	$(-5.807 \pm 29.397) \times 10^{-4}$	3899286	1.766×10^{-3}	-6.676×10^{-4}	-4.431×10^{-2}	4.101×10^{-2}	-1.554×10^{-3}	2.116×10^{-4}
fitted radiance squeeze [1]	$(-8.924 \pm 203.070) \times 10^{-6}$	3899286	2.387×10^{-4}	-4.841×10^{-6}	-1.340×10^{-2}	1.400×10^{-2}	-1.263×10^{-4}	1.124×10^{-4}
fitted root mean square [1]	$(1.376 \pm 0.514) \times 10^{-3}$	3899286	5.970×10^{-4}	1.260×10^{-3}	3.532×10^{-4}	5.121×10^{-2}	1.023×10^{-3}	1.620×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.996 ± 0.721	3899286	0.920	0.757	5.000×10^{-2}	3.48	0.465	1.38
sulfurdioxide total air mass factor polluted precision [1]	0.138 ± 0.149	3899286	0.167	8.649×10^{-2}	2.729×10^{-3}	1.71	3.170×10^{-2}	0.199
sulfurdioxide clear air mass factor polluted [1]	0.914 ± 0.705	3899286	0.650	0.681	6.351×10^{-2}	3.49	0.445	1.09
number of spectral points in retrieval [1]	73.4 ± 0.5	3899286	1.000	73.0	52.0	74.0	73.0	74.0

3 Granule outlines

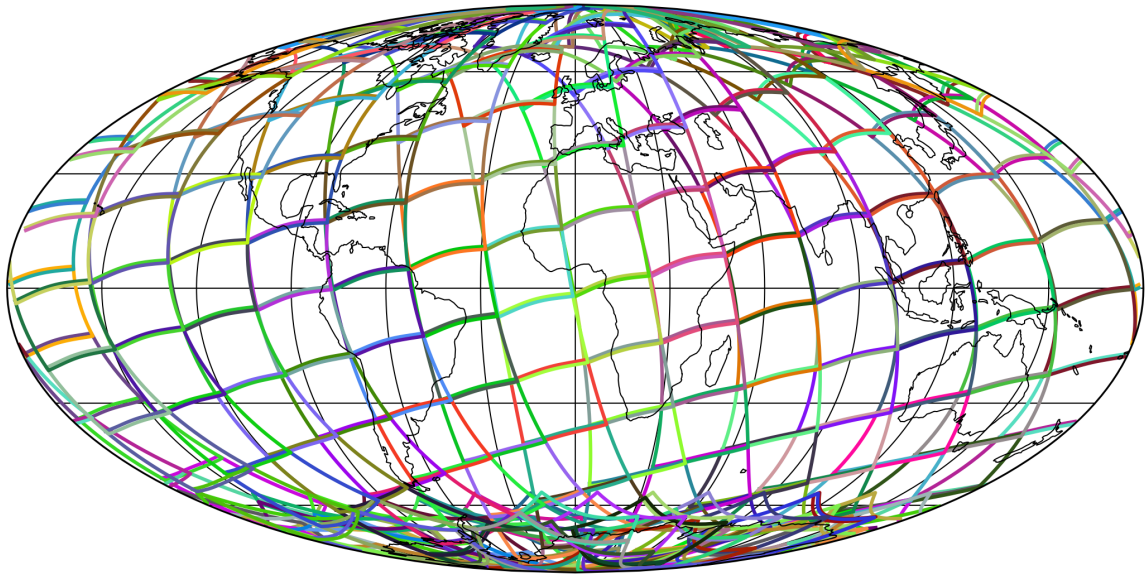


Figure 1: Outline of the granules.

4 Input data monitoring

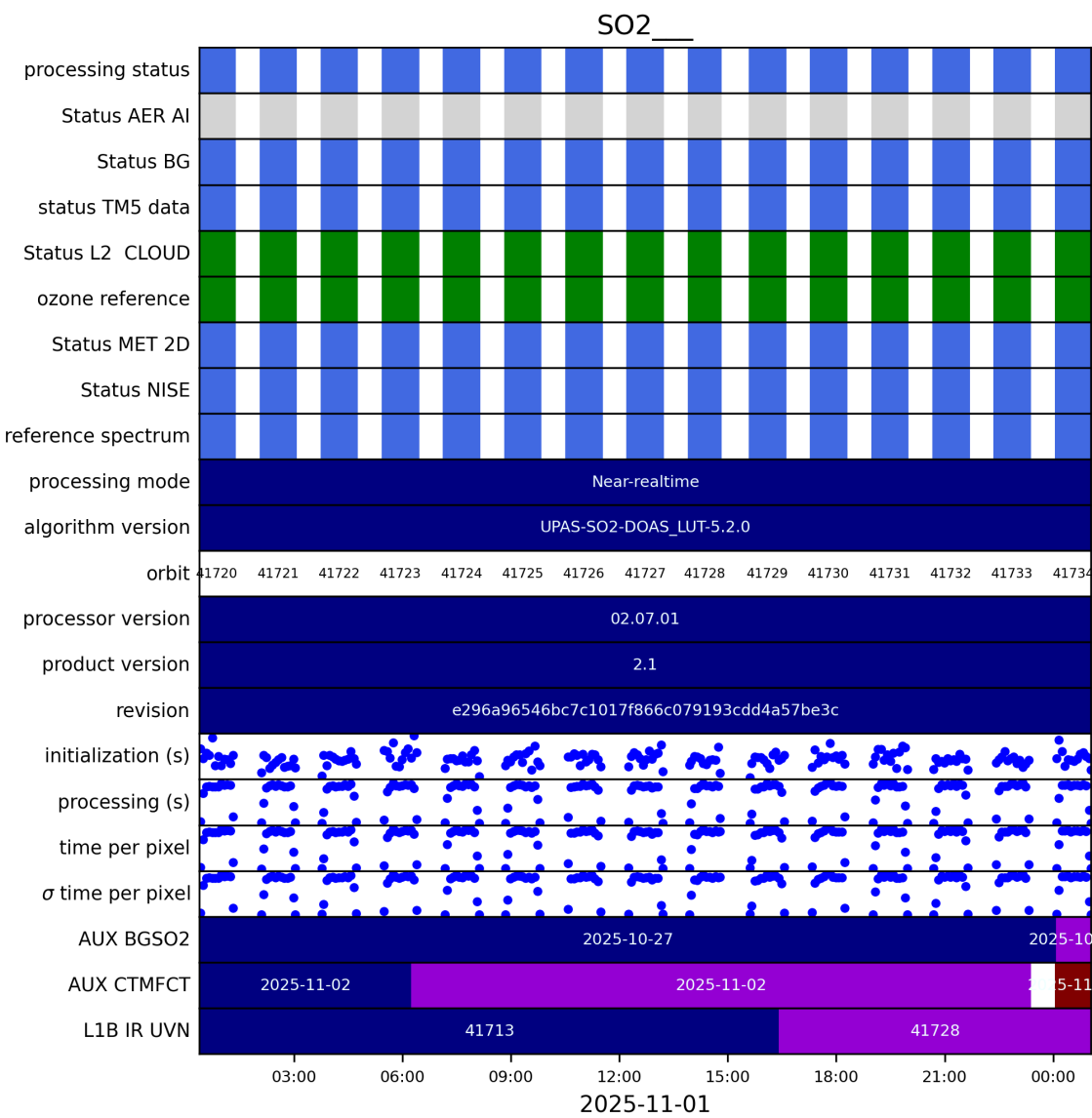


Figure 2: Input data per granule

5 Warnings and errors

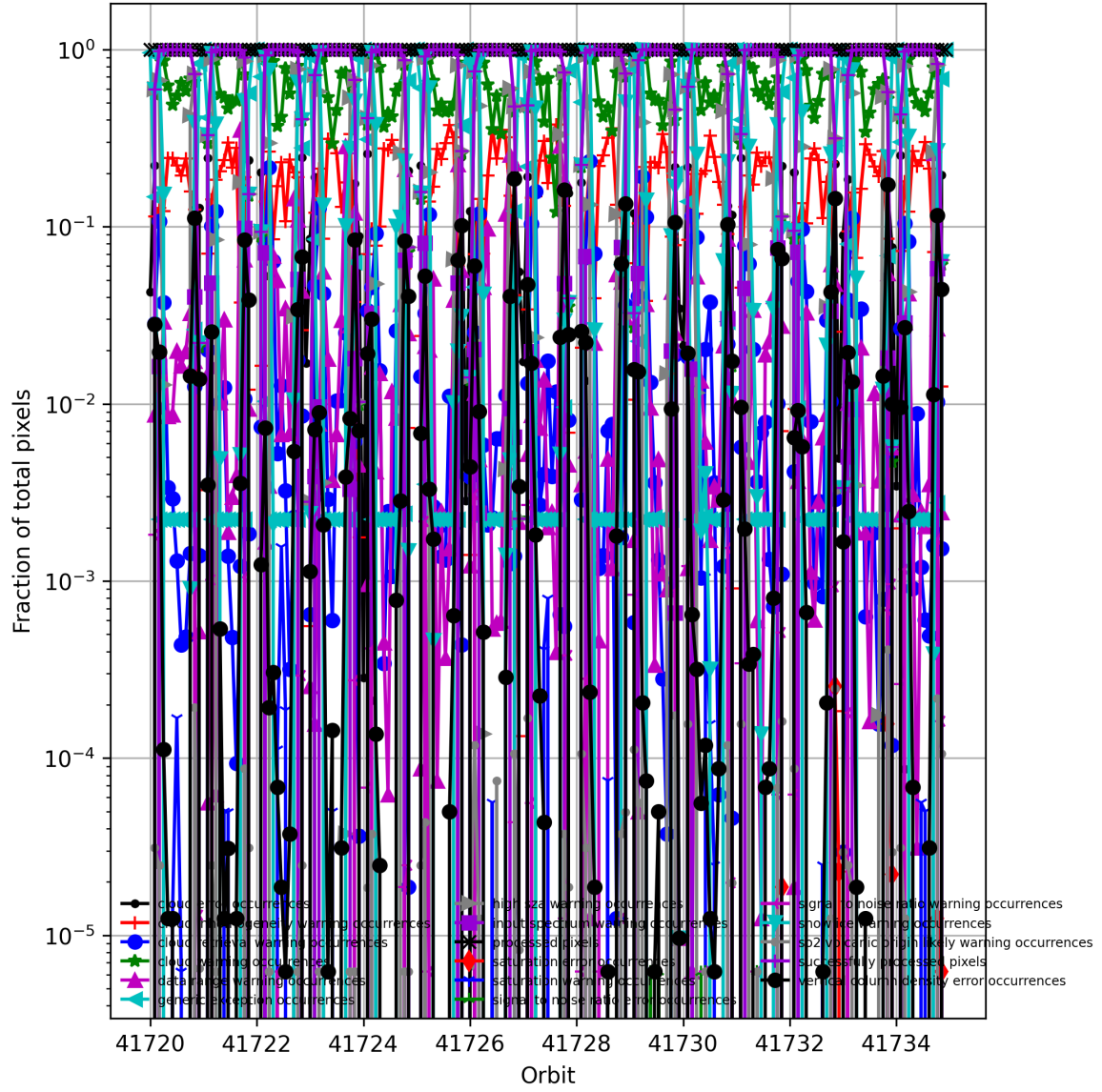


Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

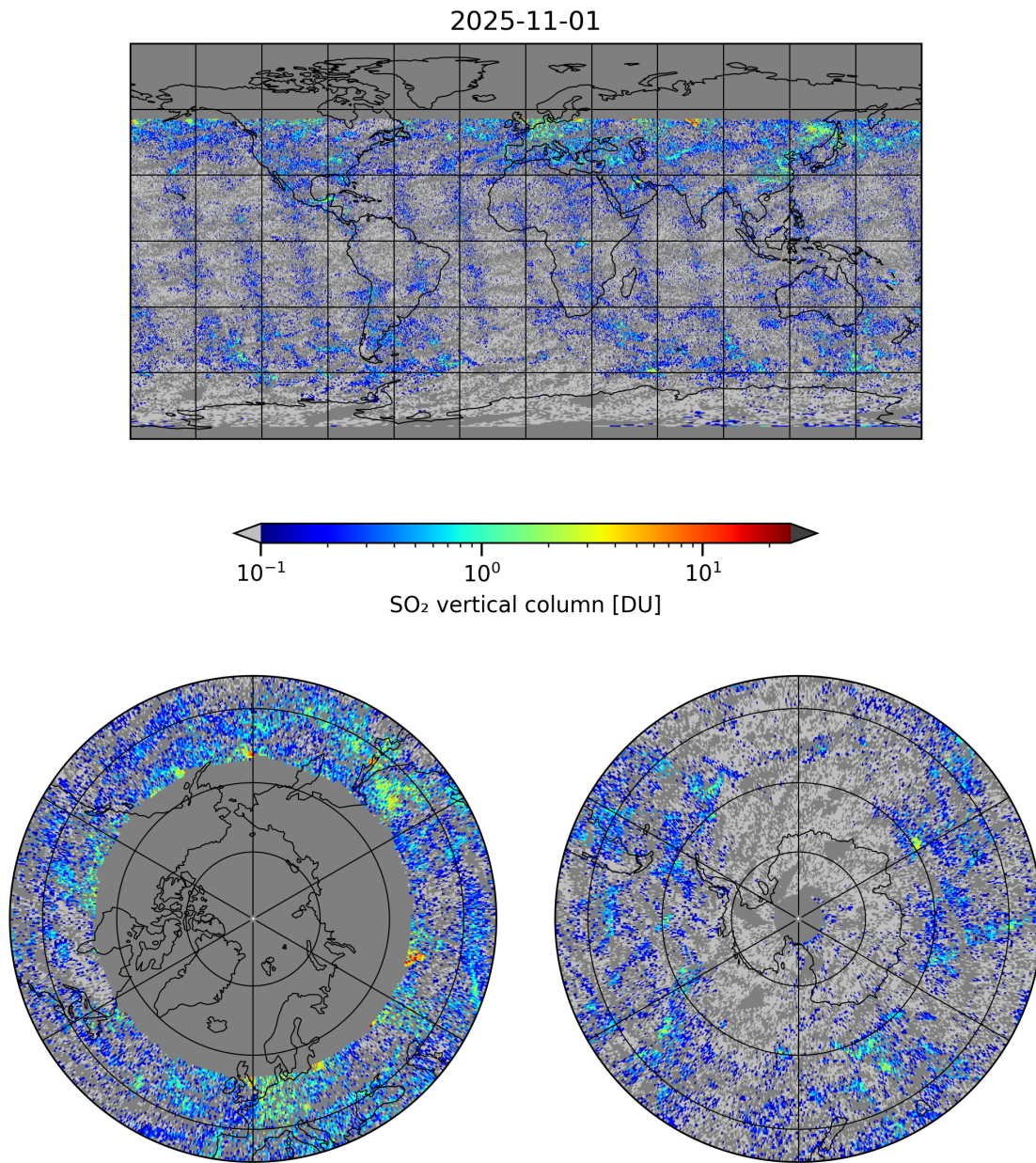


Figure 4: Map of “SO₂ vertical column” for 2025-11-01 to 2025-11-02

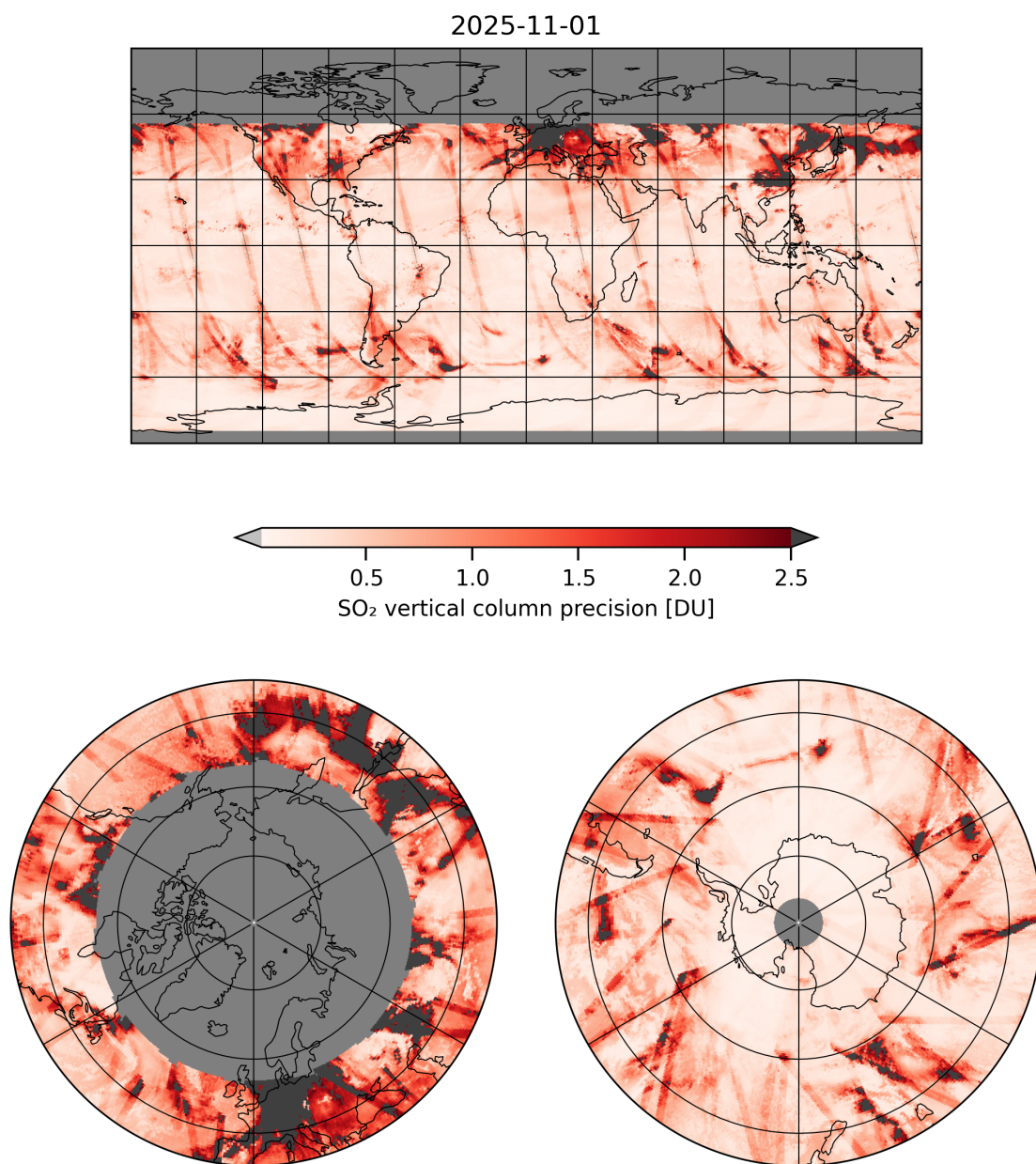


Figure 5: Map of “SO₂ vertical column precision” for 2025-11-01 to 2025-11-02

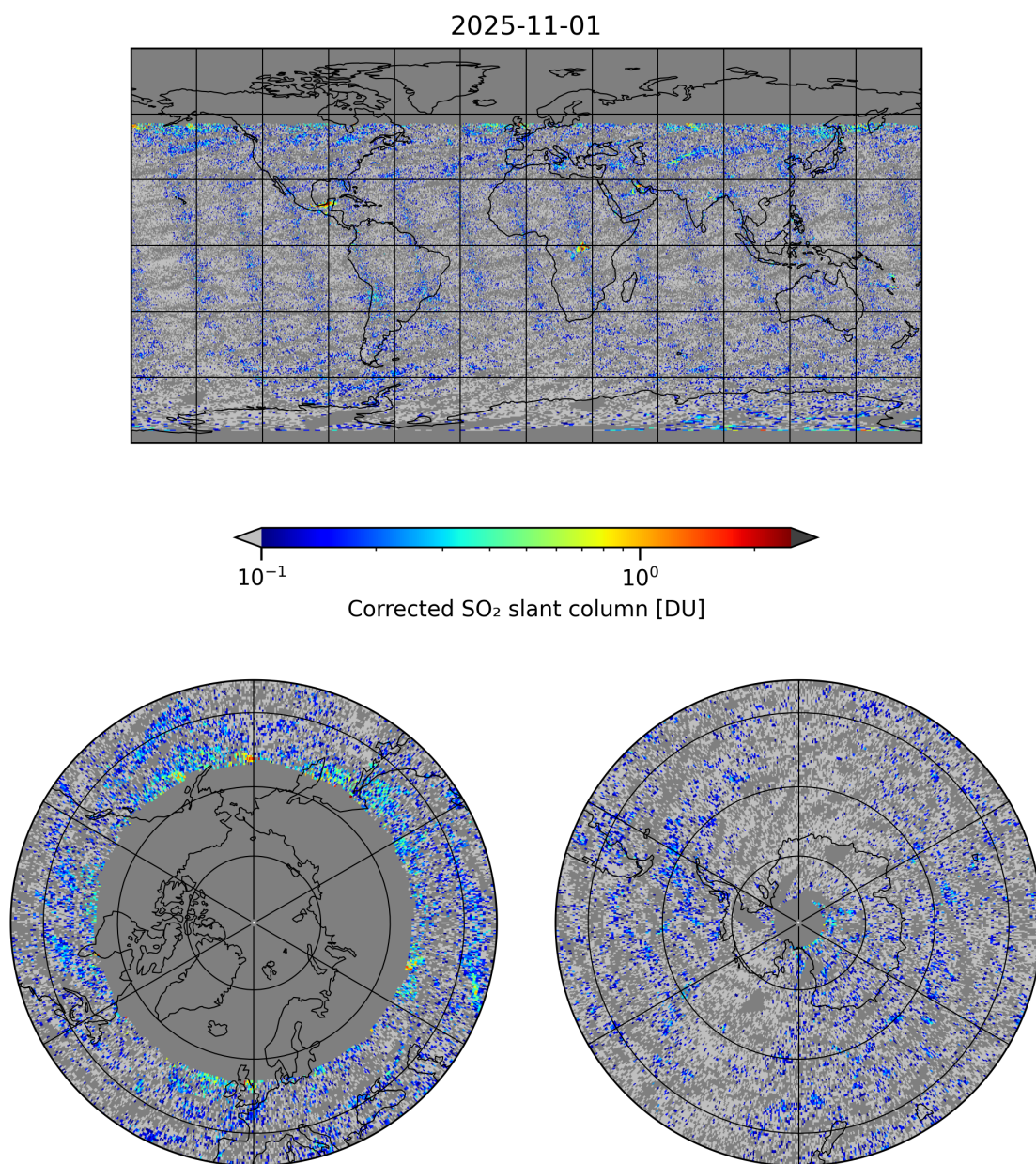


Figure 6: Map of “Corrected SO₂ slant column” for 2025-11-01 to 2025-11-02

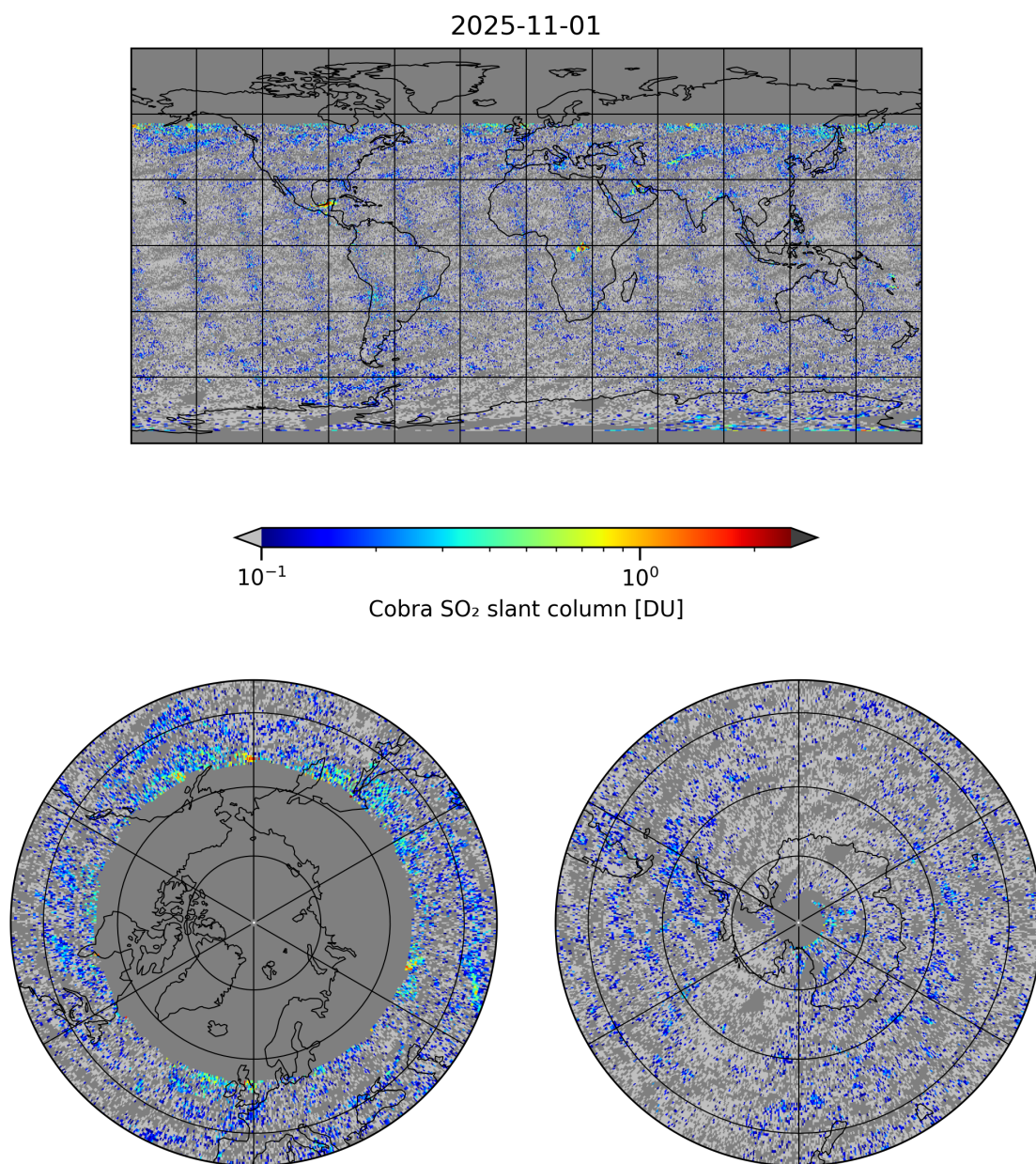


Figure 7: Map of “Cobra SO₂ slant column” for 2025-11-01 to 2025-11-02

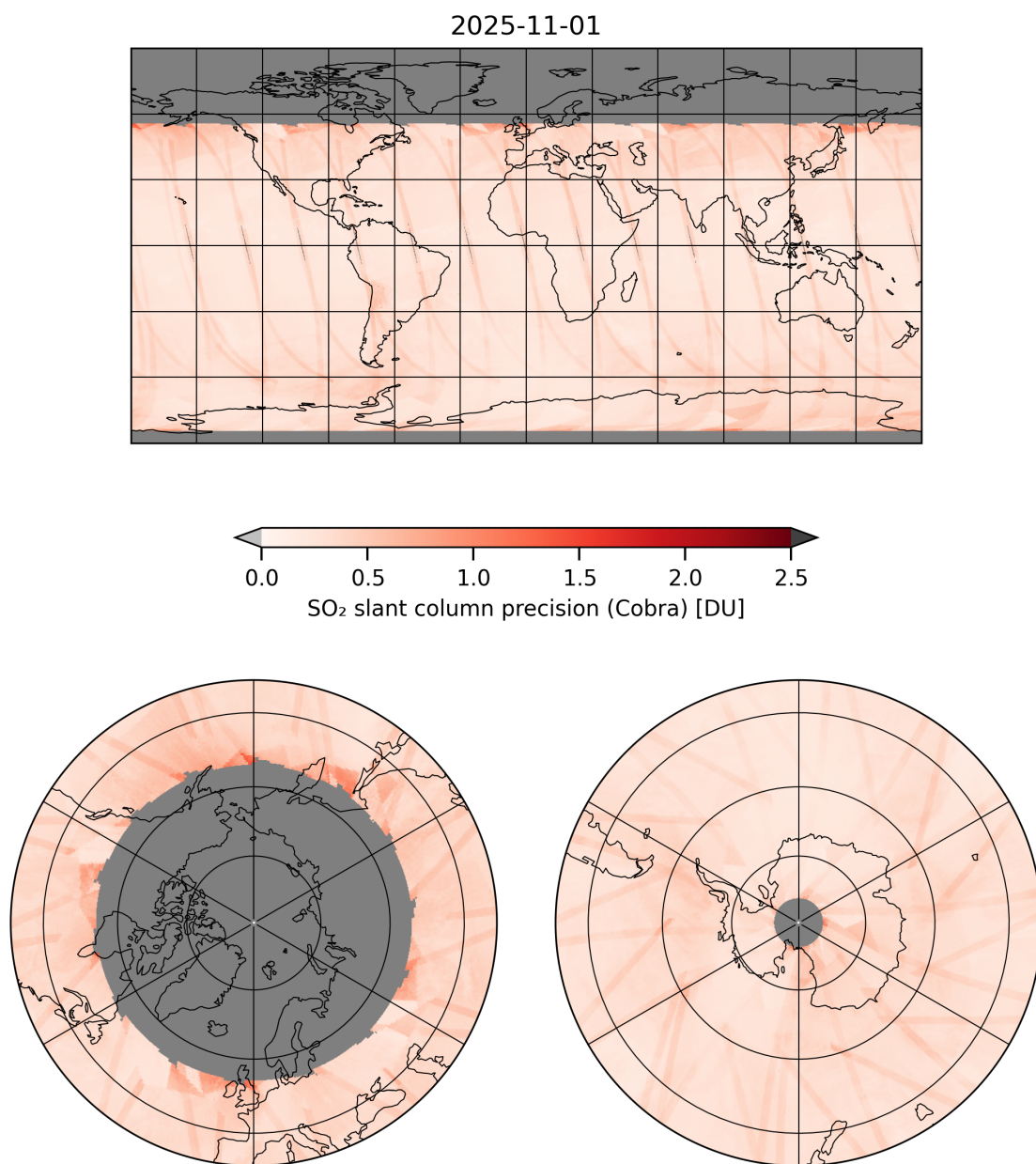


Figure 8: Map of “SO₂ slant column precision (Cobra)” for 2025-11-01 to 2025-11-02

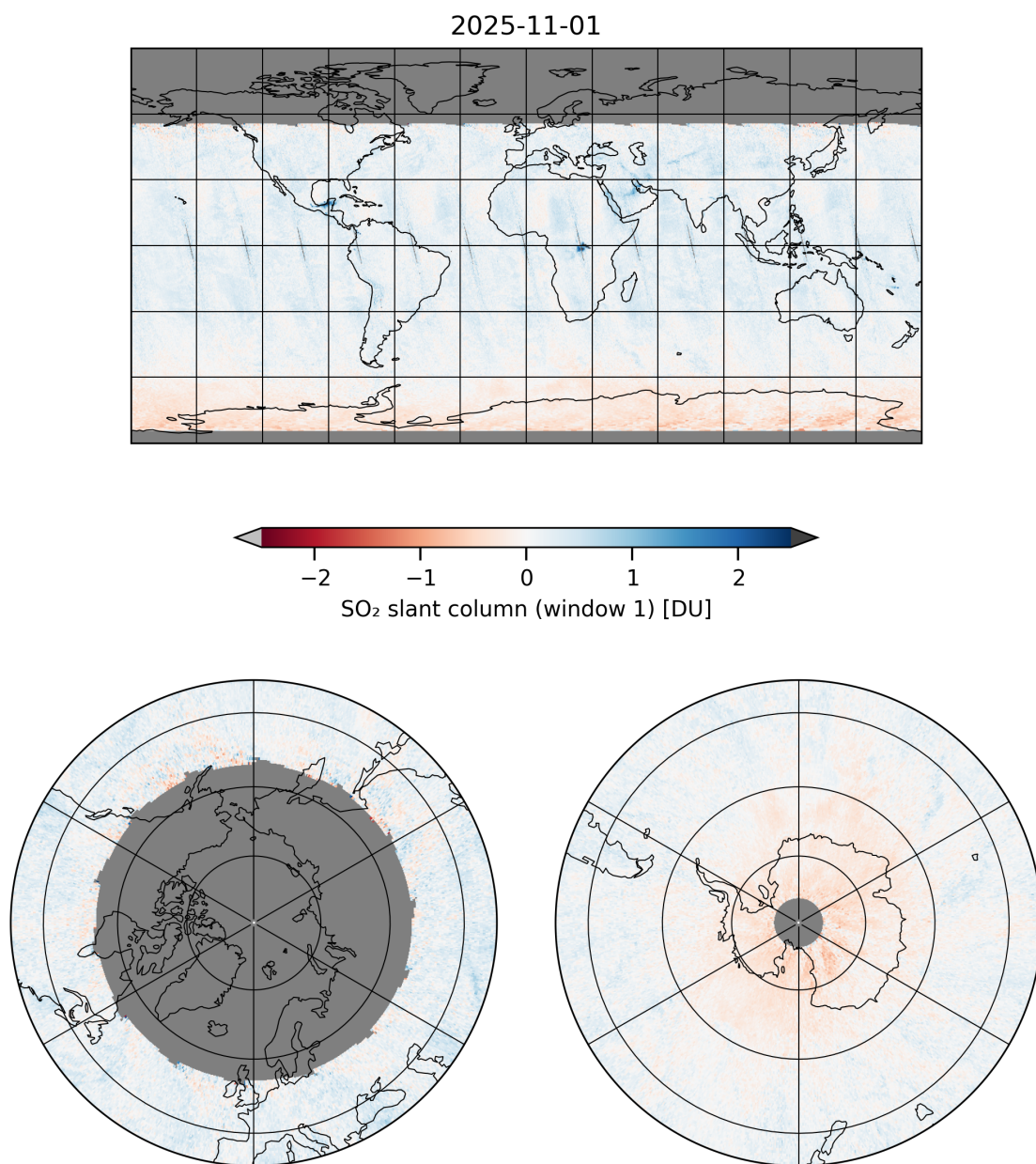


Figure 9: Map of “SO₂ slant column (window 1)” for 2025-11-01 to 2025-11-02

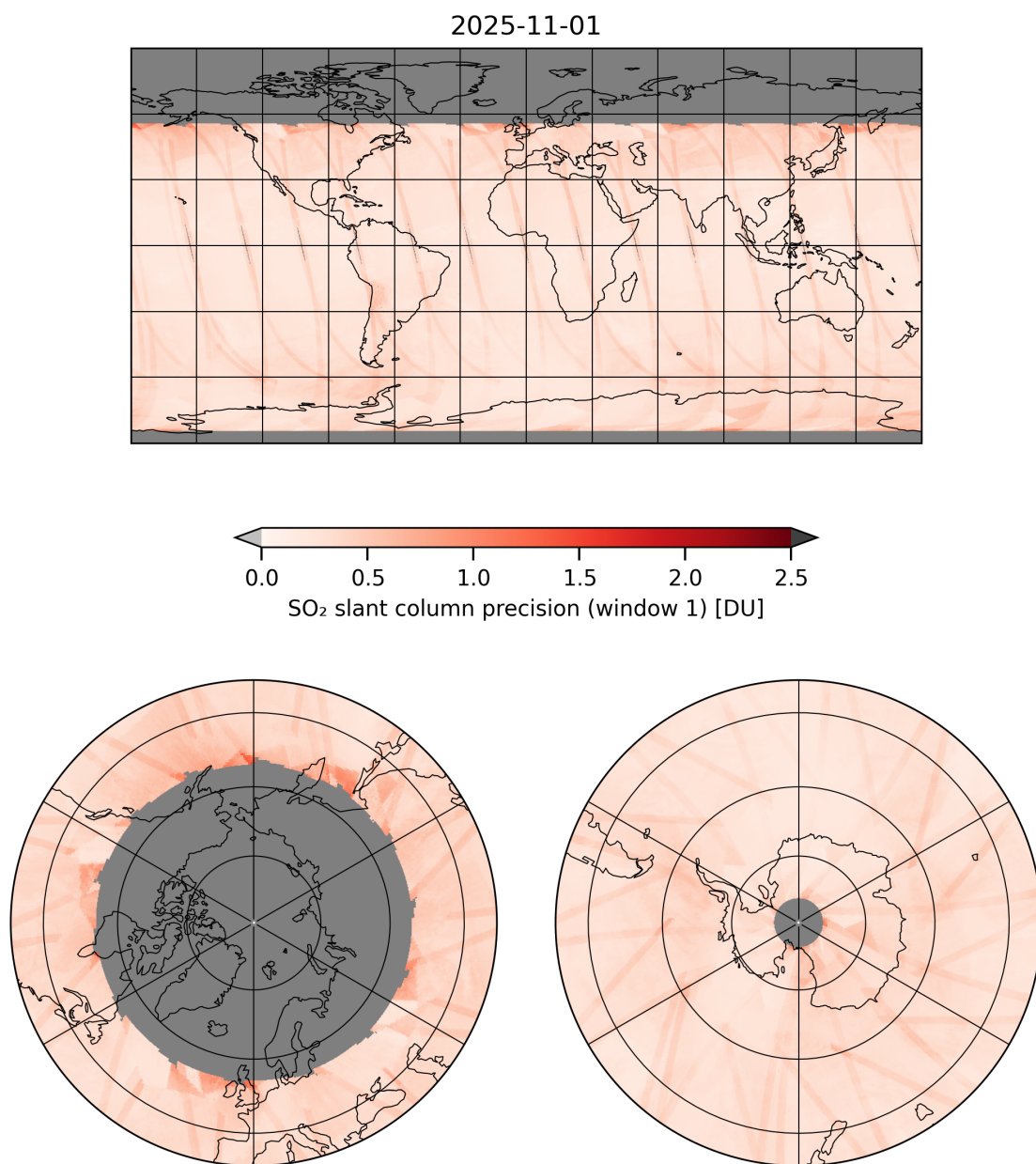


Figure 10: Map of “SO₂ slant column precision (window 1)” for 2025-11-01 to 2025-11-02

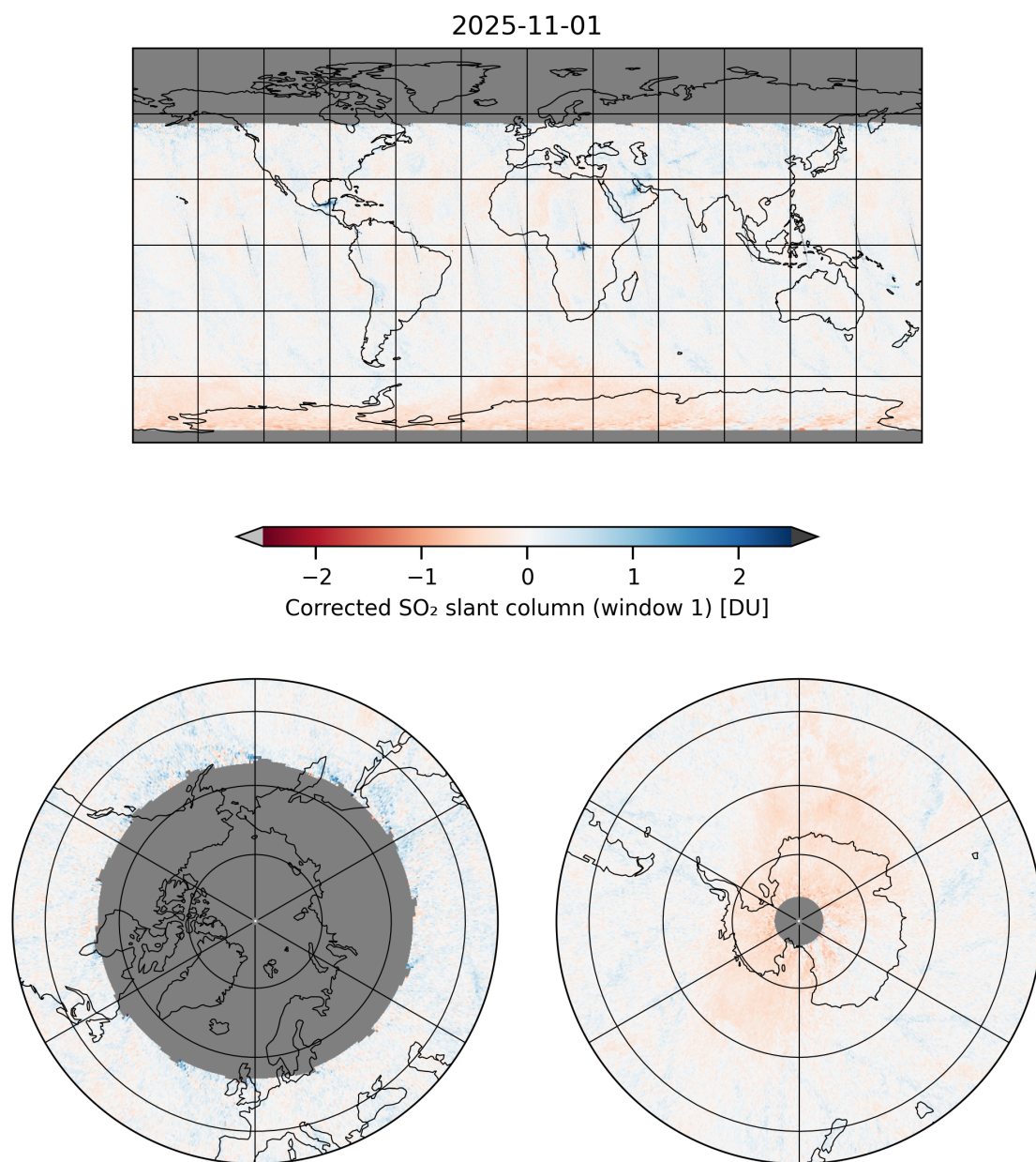


Figure 11: Map of “Corrected SO₂ slant column (window 1)” for 2025-11-01 to 2025-11-02

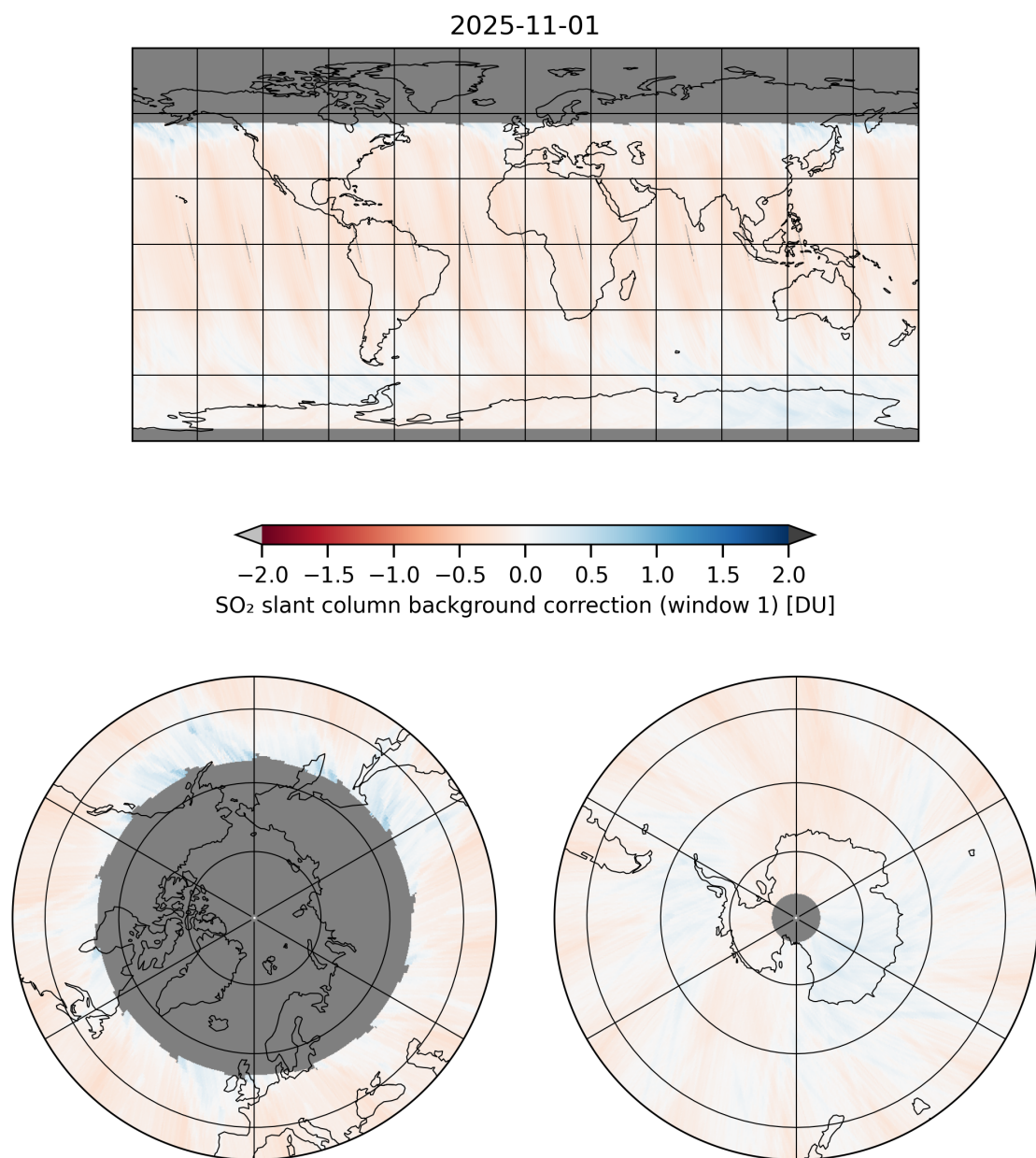


Figure 12: Map of “SO₂ slant column background correction (window 1)” for 2025-11-01 to 2025-11-02

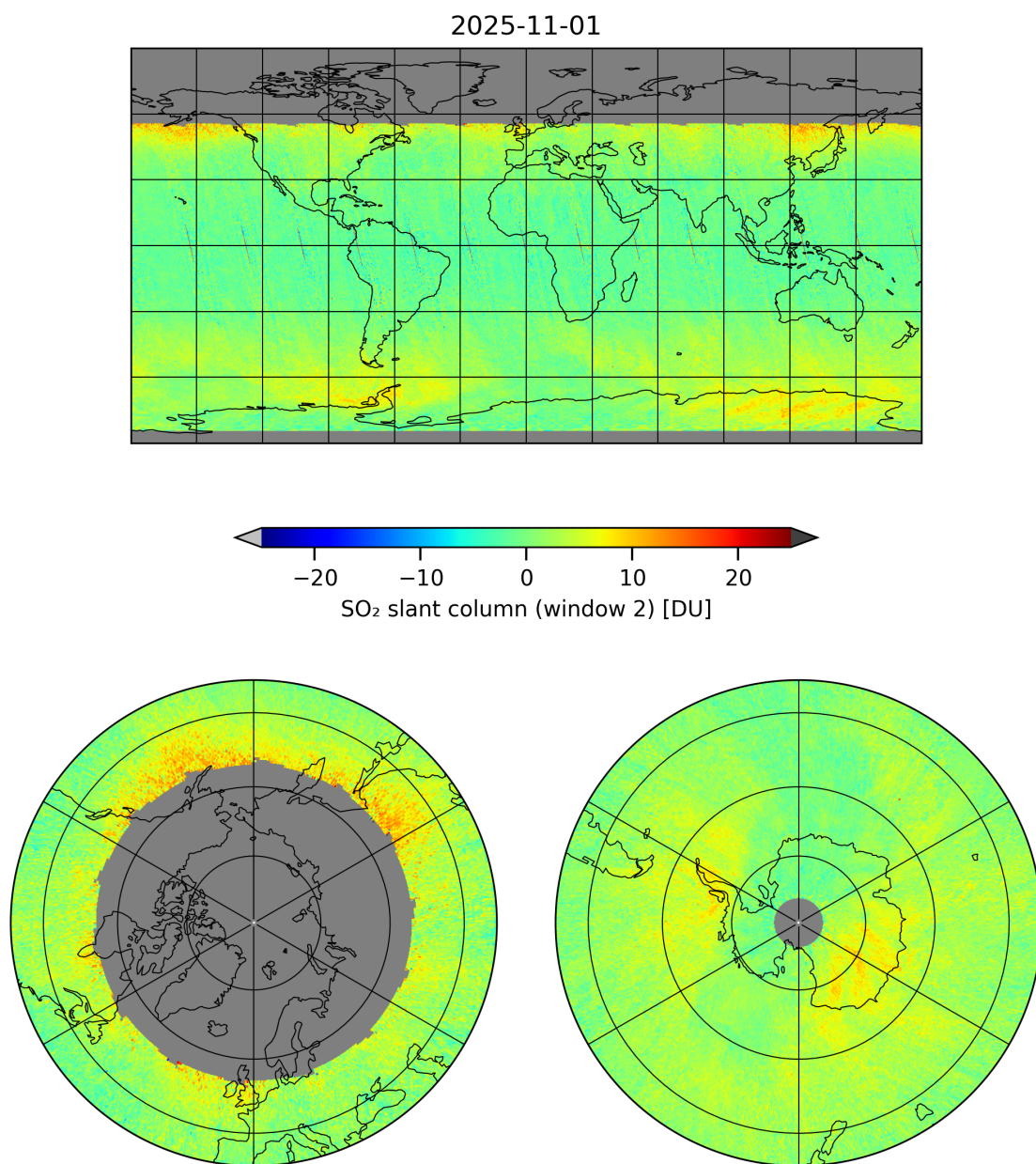


Figure 13: Map of “SO₂ slant column (window 2)” for 2025-11-01 to 2025-11-02

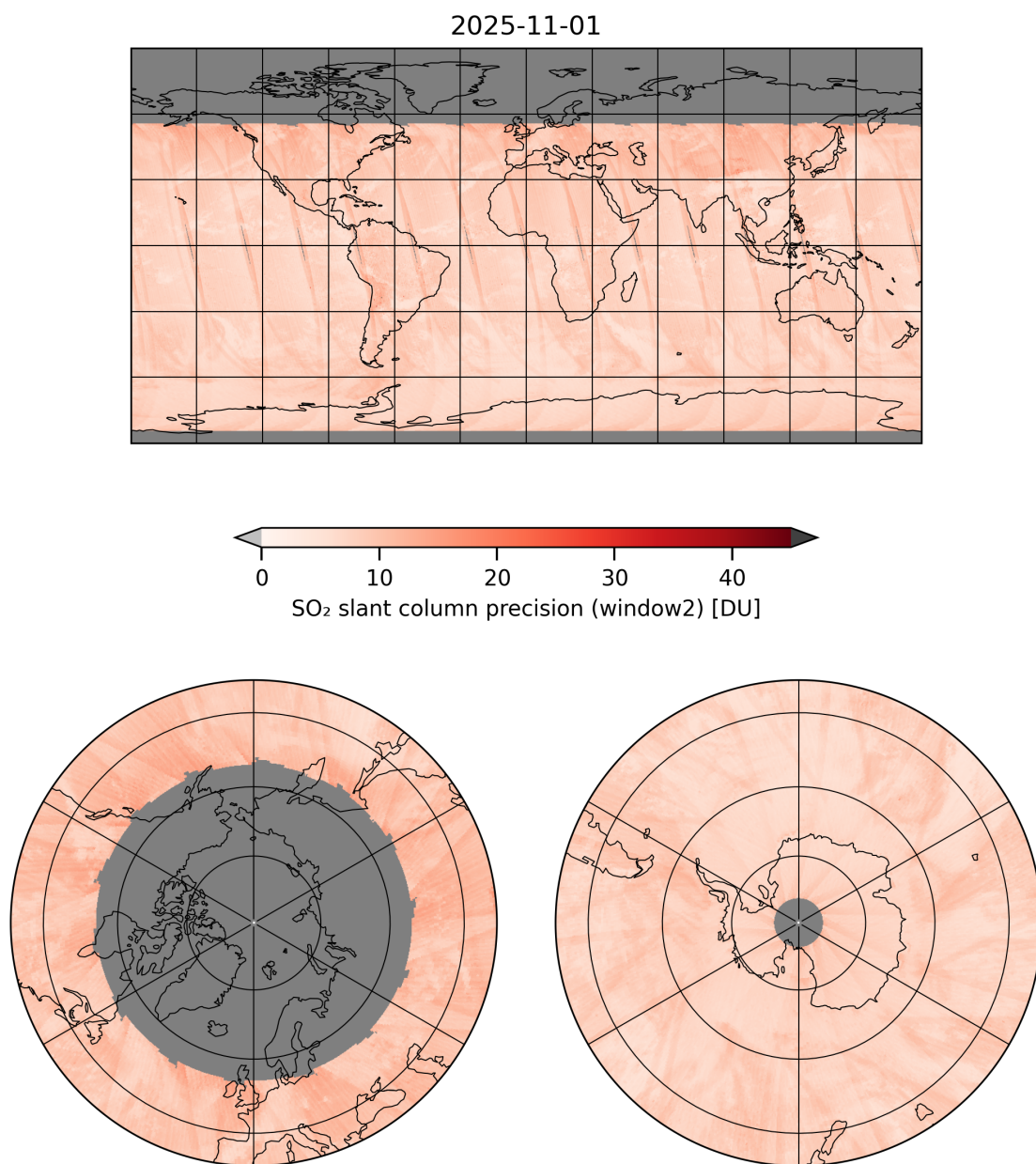


Figure 14: Map of “SO₂ slant column precision (window2)” for 2025-11-01 to 2025-11-02

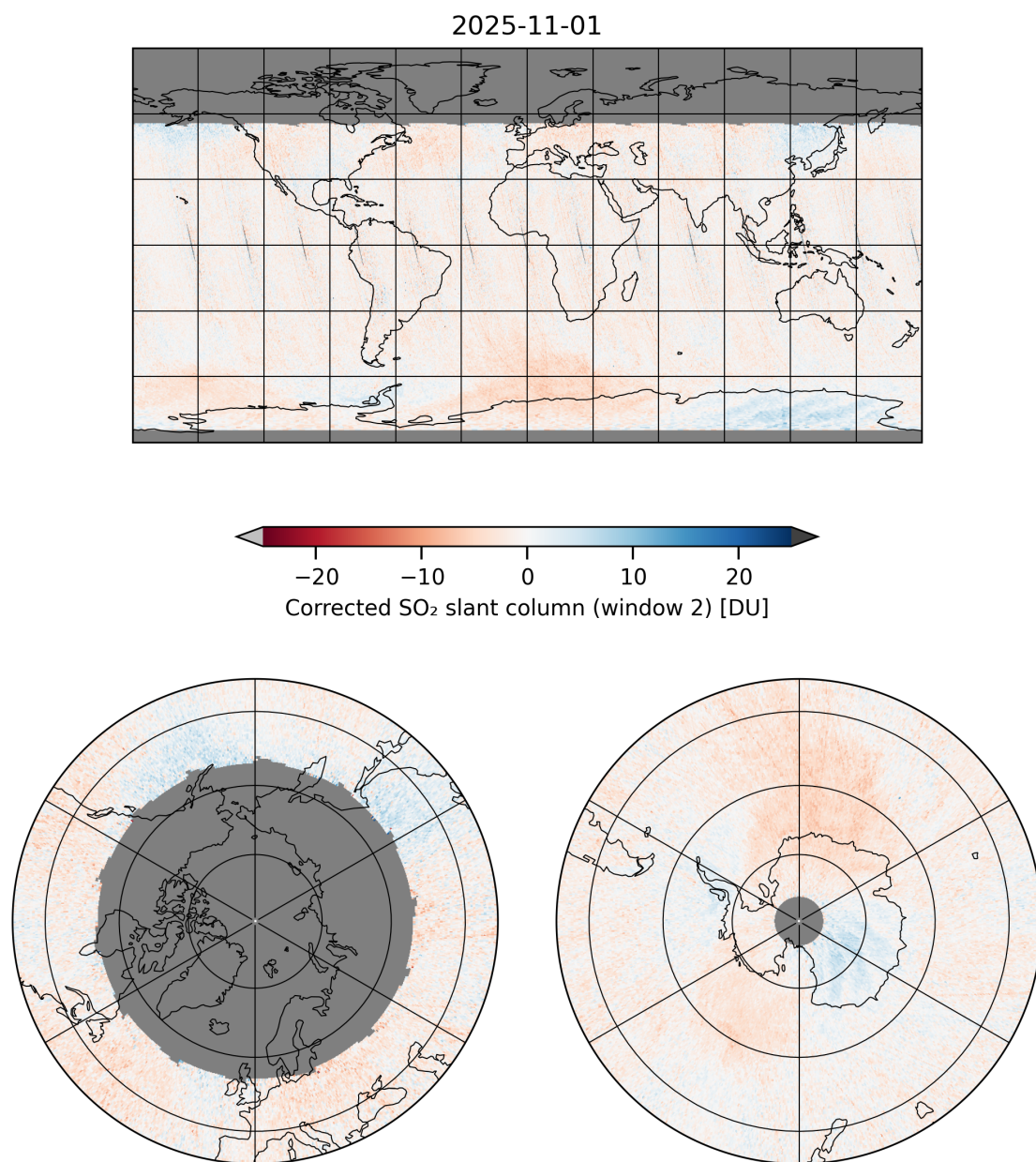


Figure 15: Map of “Corrected SO₂ slant column (window 2)” for 2025-11-01 to 2025-11-02

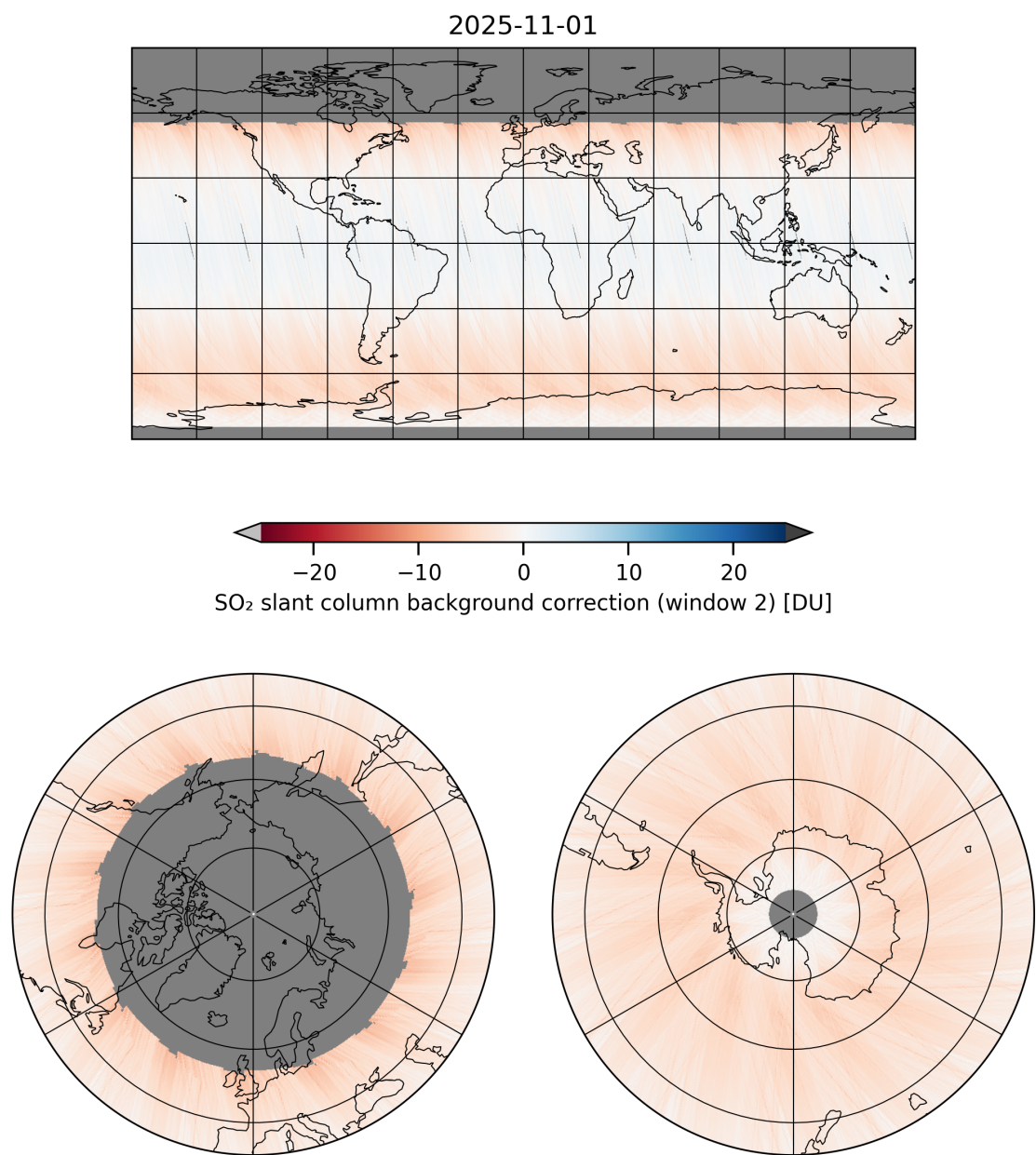


Figure 16: Map of “SO₂ slant column background correction (window 2)” for 2025-11-01 to 2025-11-02

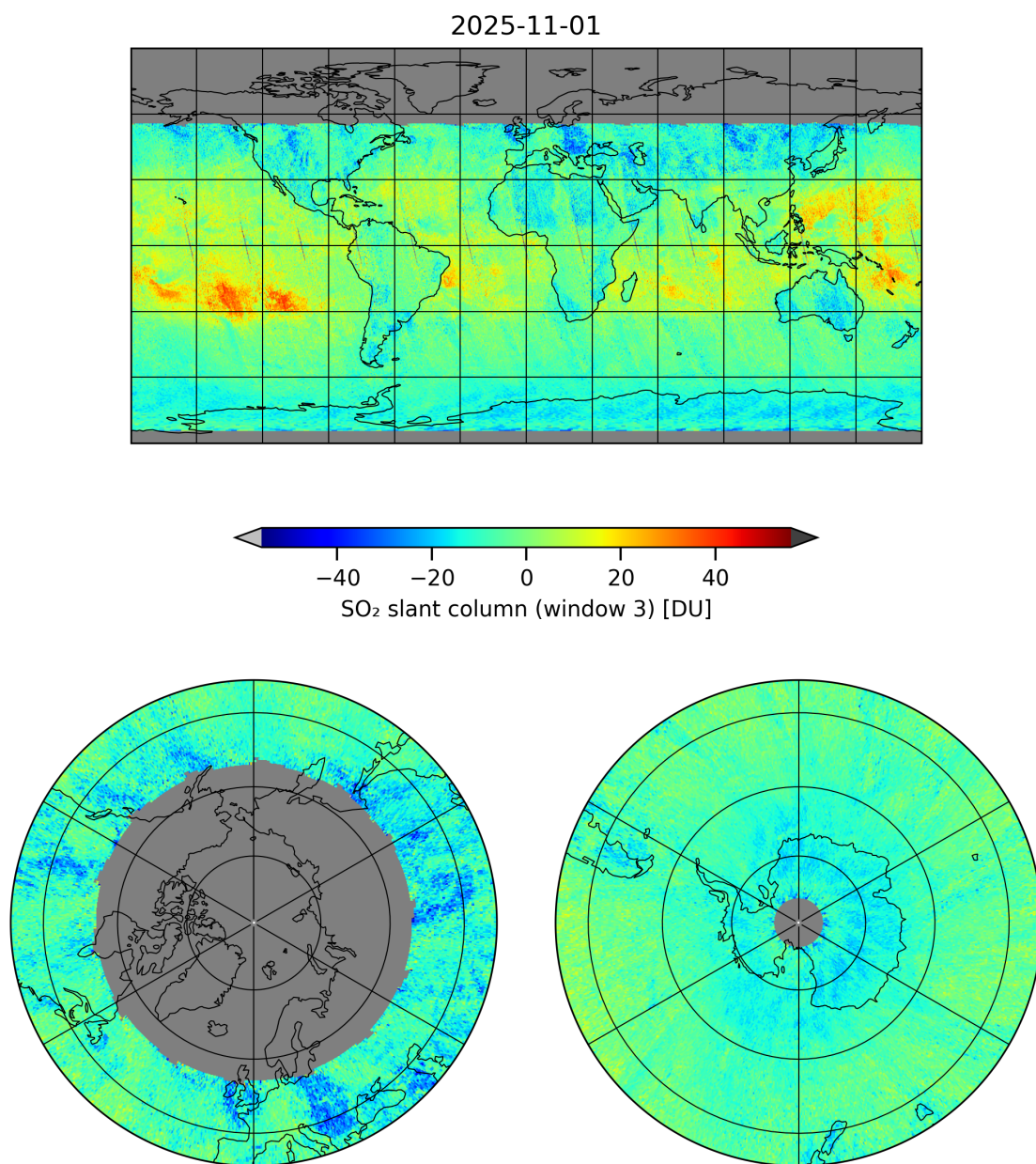


Figure 17: Map of “SO₂ slant column (window 3)” for 2025-11-01 to 2025-11-02

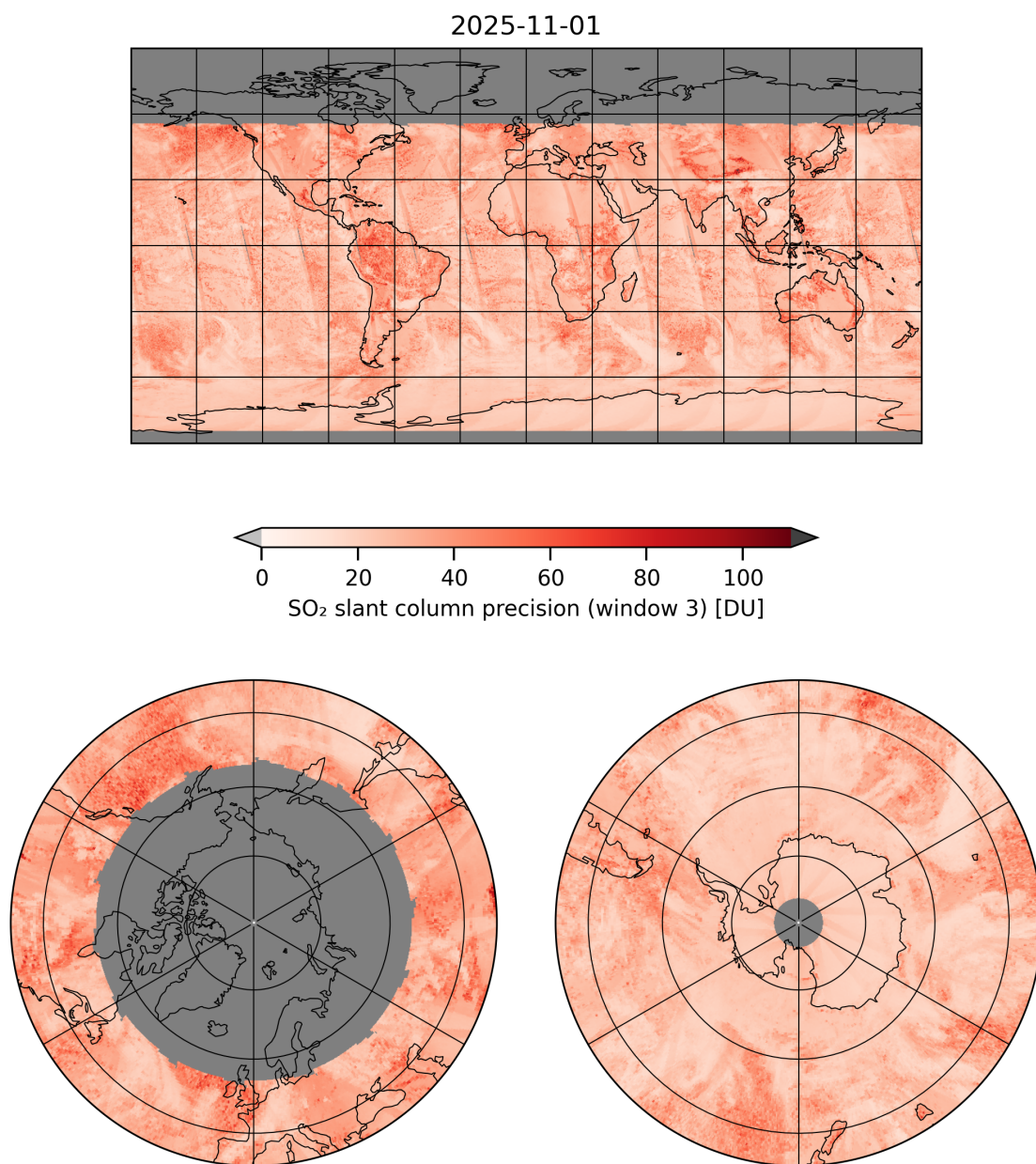


Figure 18: Map of “SO₂ slant column precision (window 3)” for 2025-11-01 to 2025-11-02

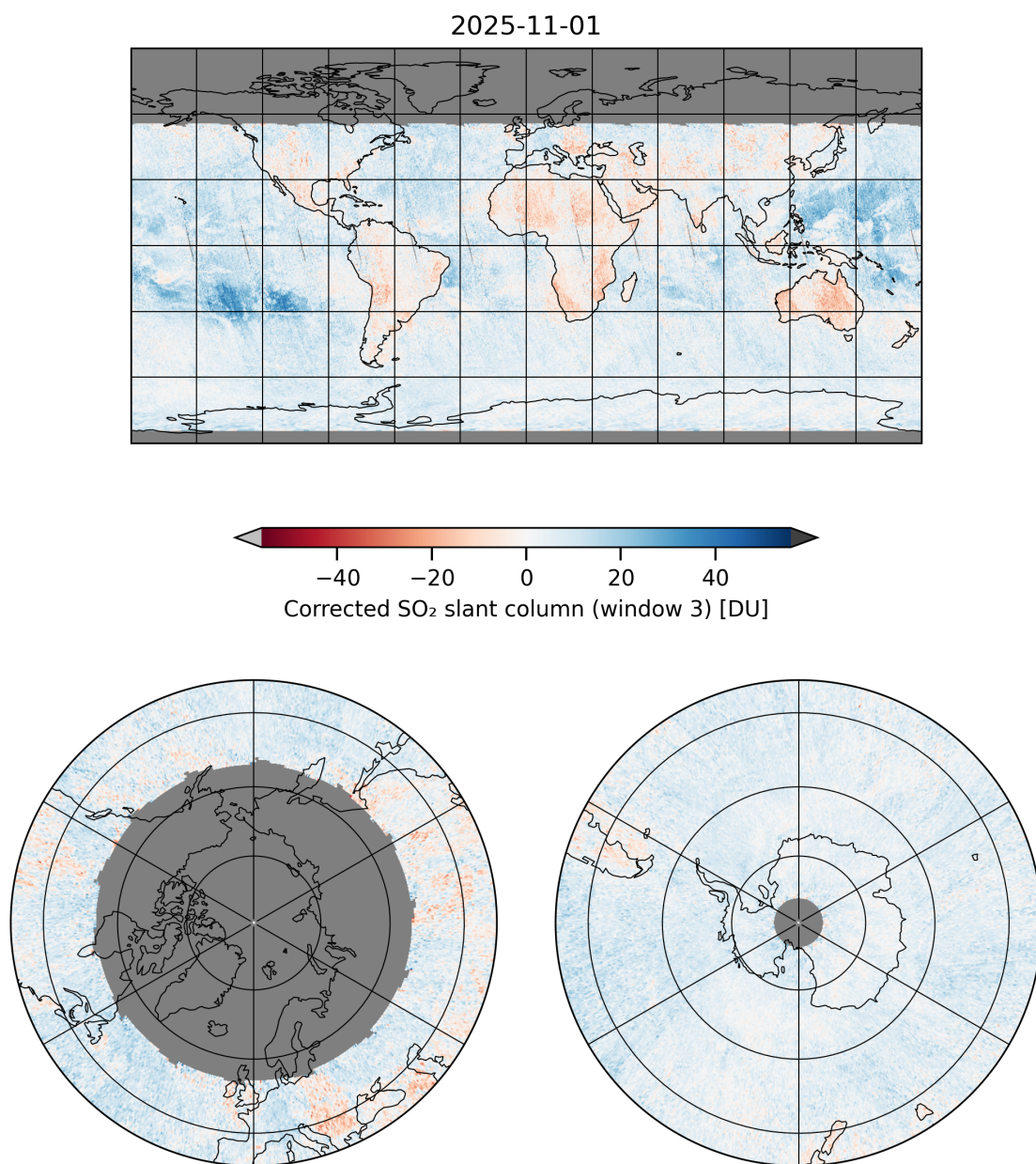


Figure 19: Map of “Corrected SO₂ slant column (window 3)” for 2025-11-01 to 2025-11-02

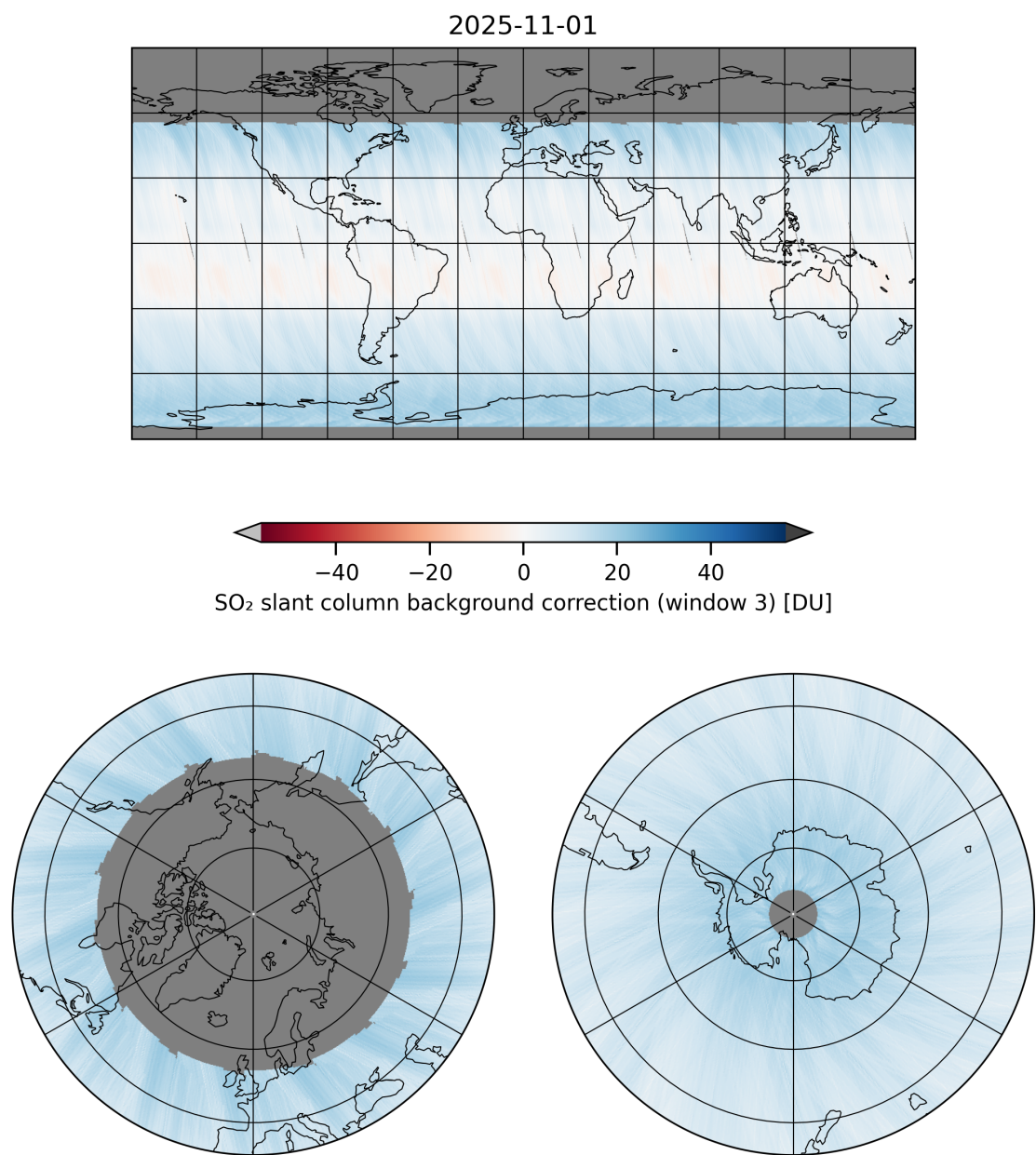


Figure 20: Map of “SO₂ slant column background correction (window 3)” for 2025-11-01 to 2025-11-02

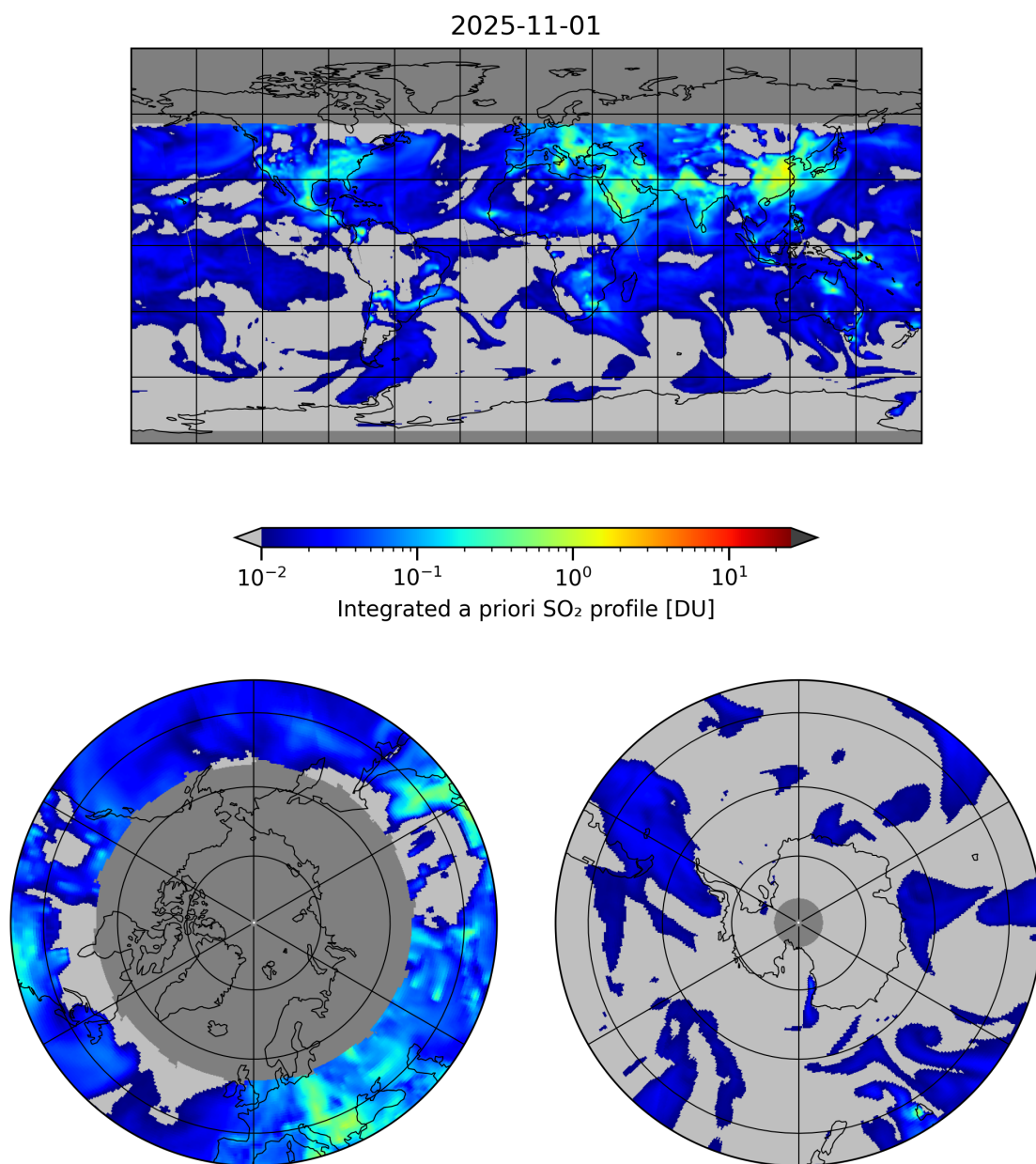


Figure 21: Map of “Integrated a priori SO₂ profile” for 2025-11-01 to 2025-11-02

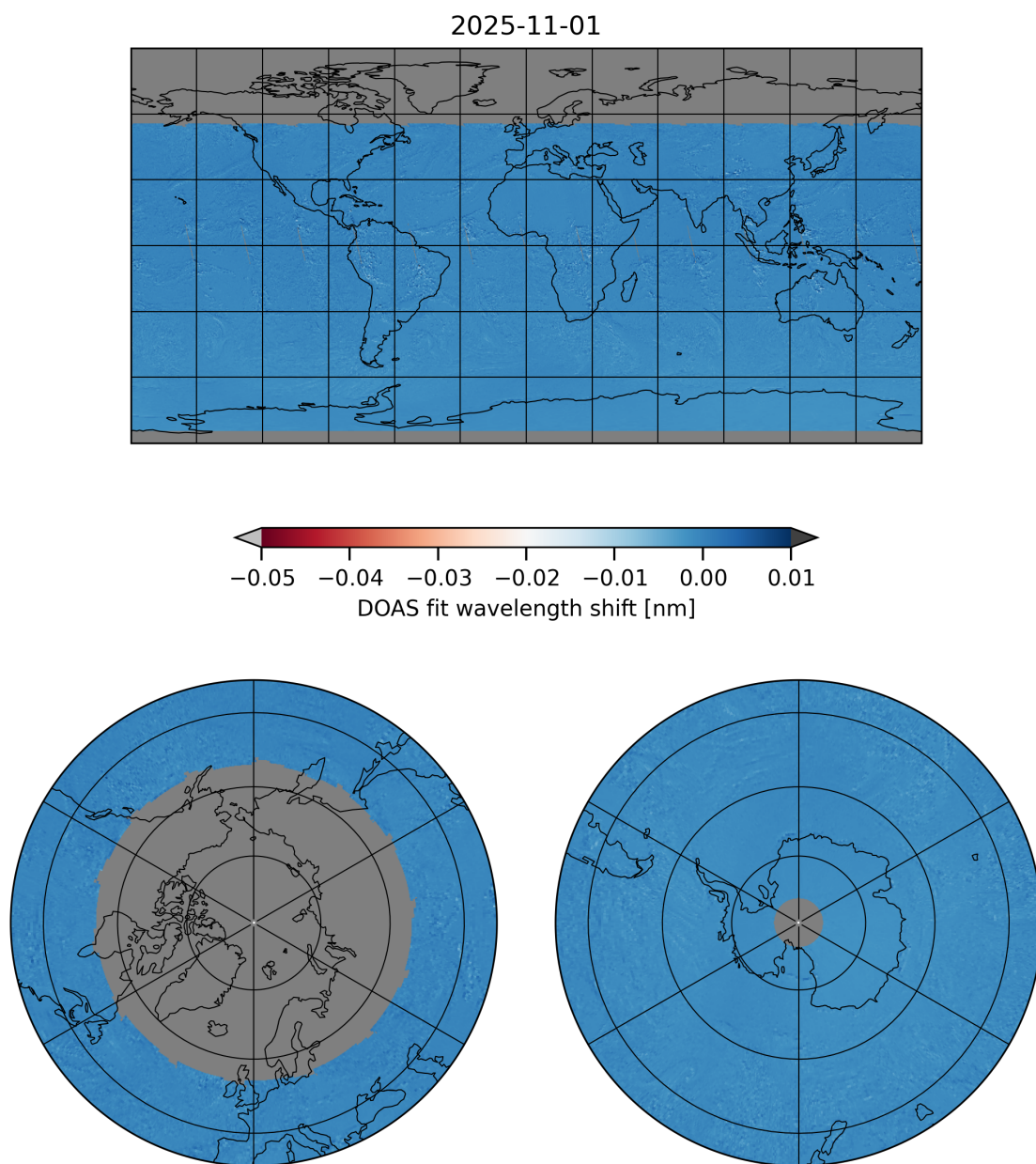


Figure 22: Map of “DOAS fit wavelength shift” for 2025-11-01 to 2025-11-02

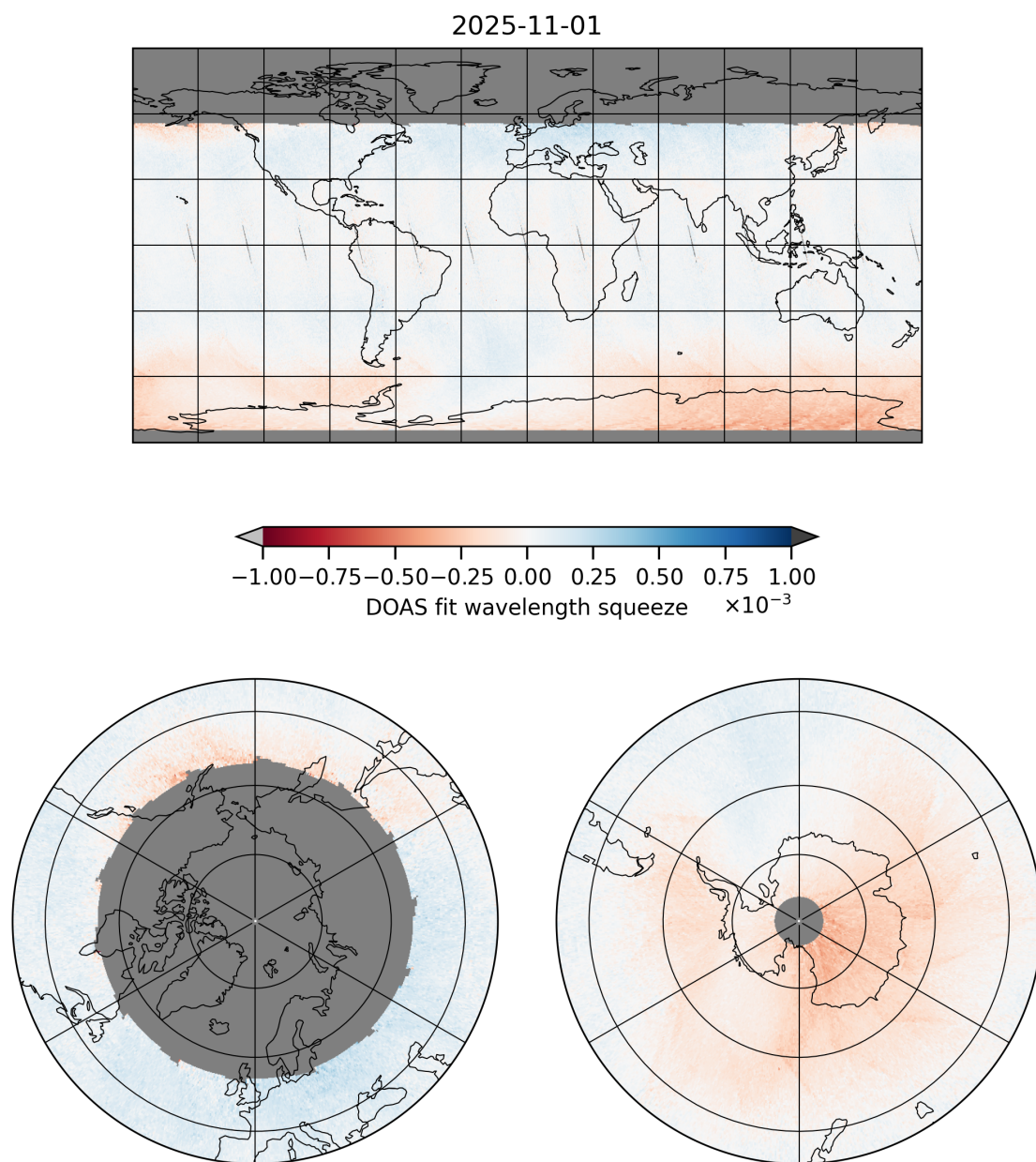


Figure 23: Map of “DOAS fit wavelength squeeze” for 2025-11-01 to 2025-11-02

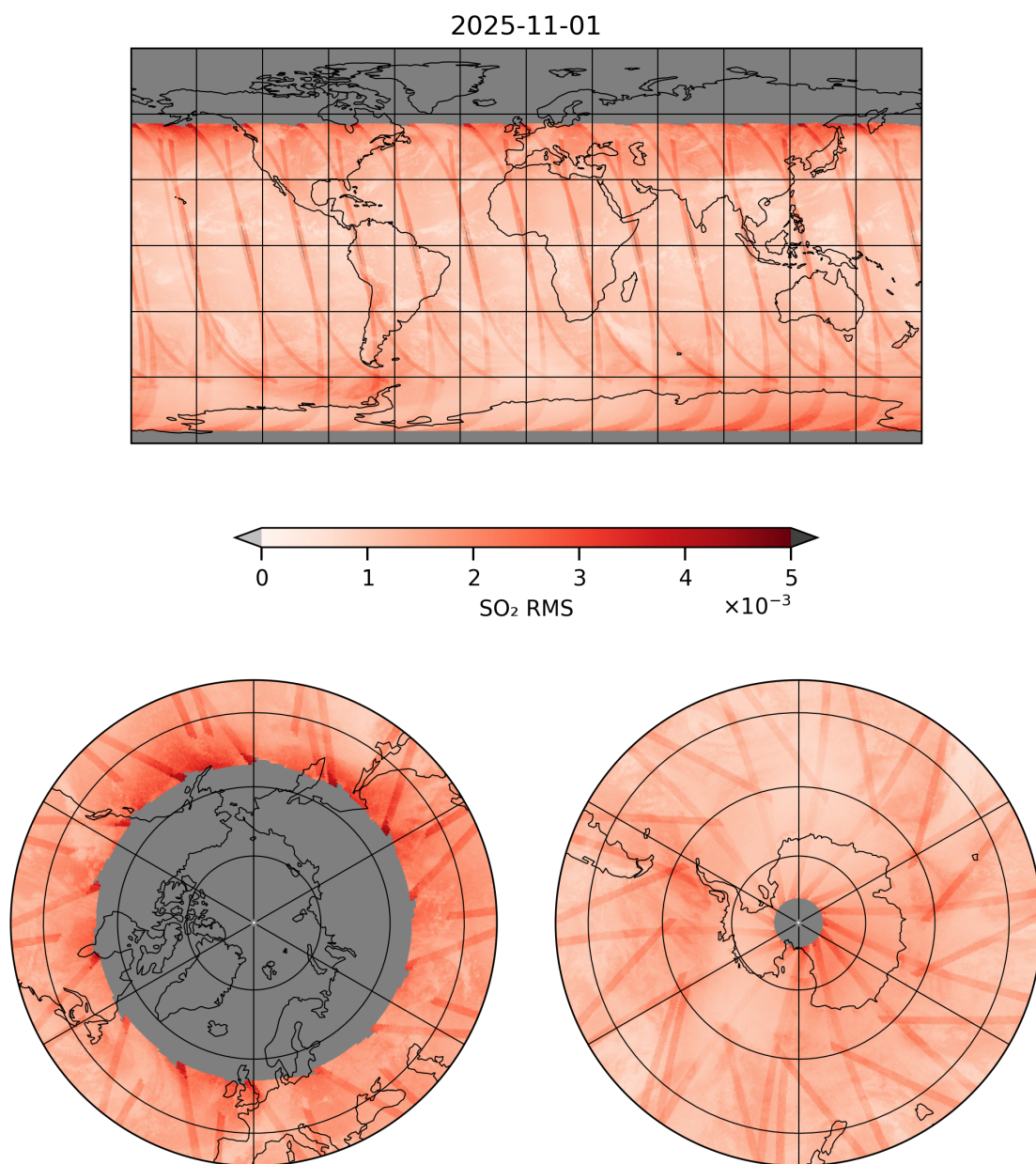


Figure 24: Map of “SO₂ RMS” for 2025-11-01 to 2025-11-02

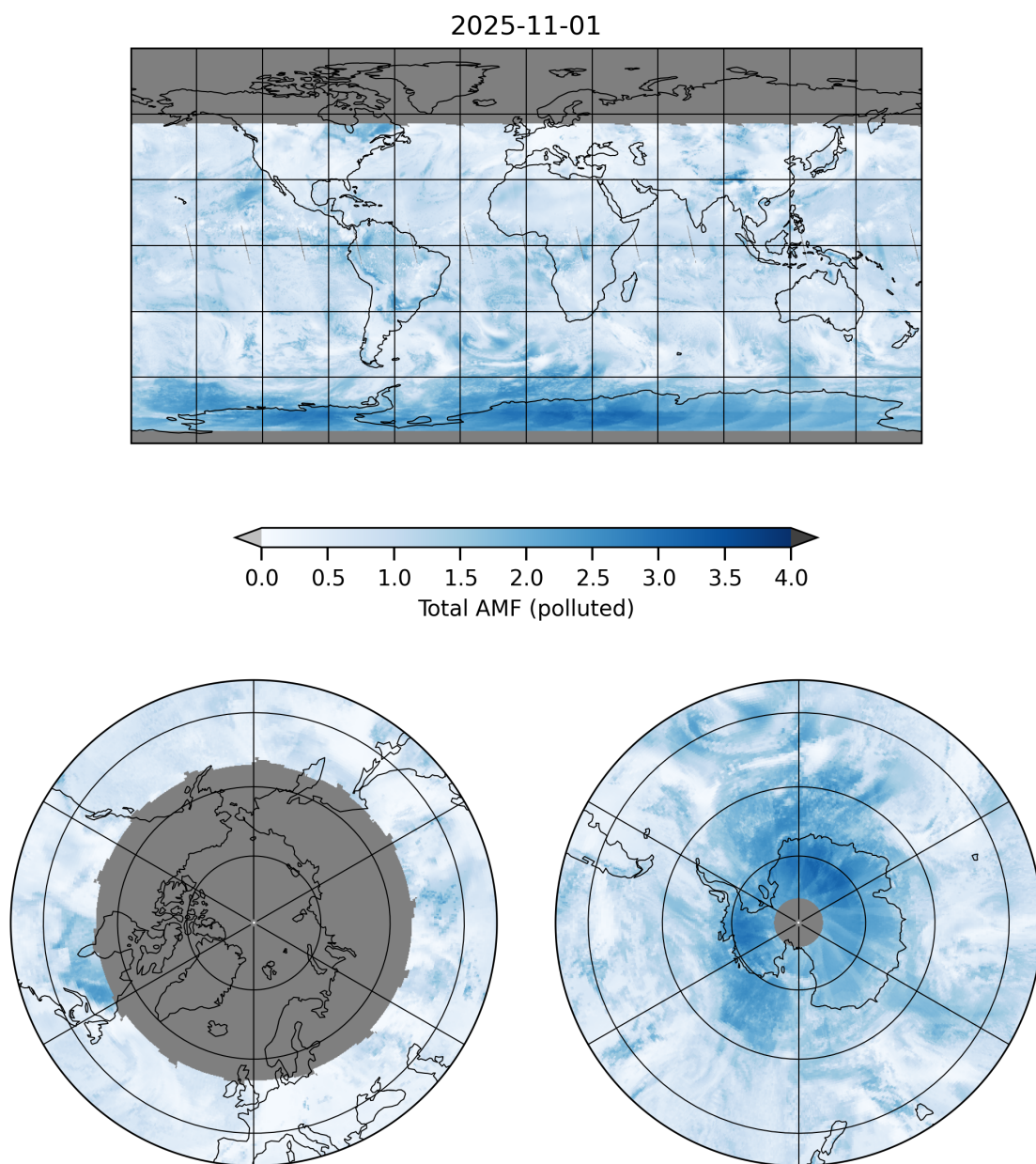


Figure 25: Map of “Total AMF (polluted)” for 2025-11-01 to 2025-11-02

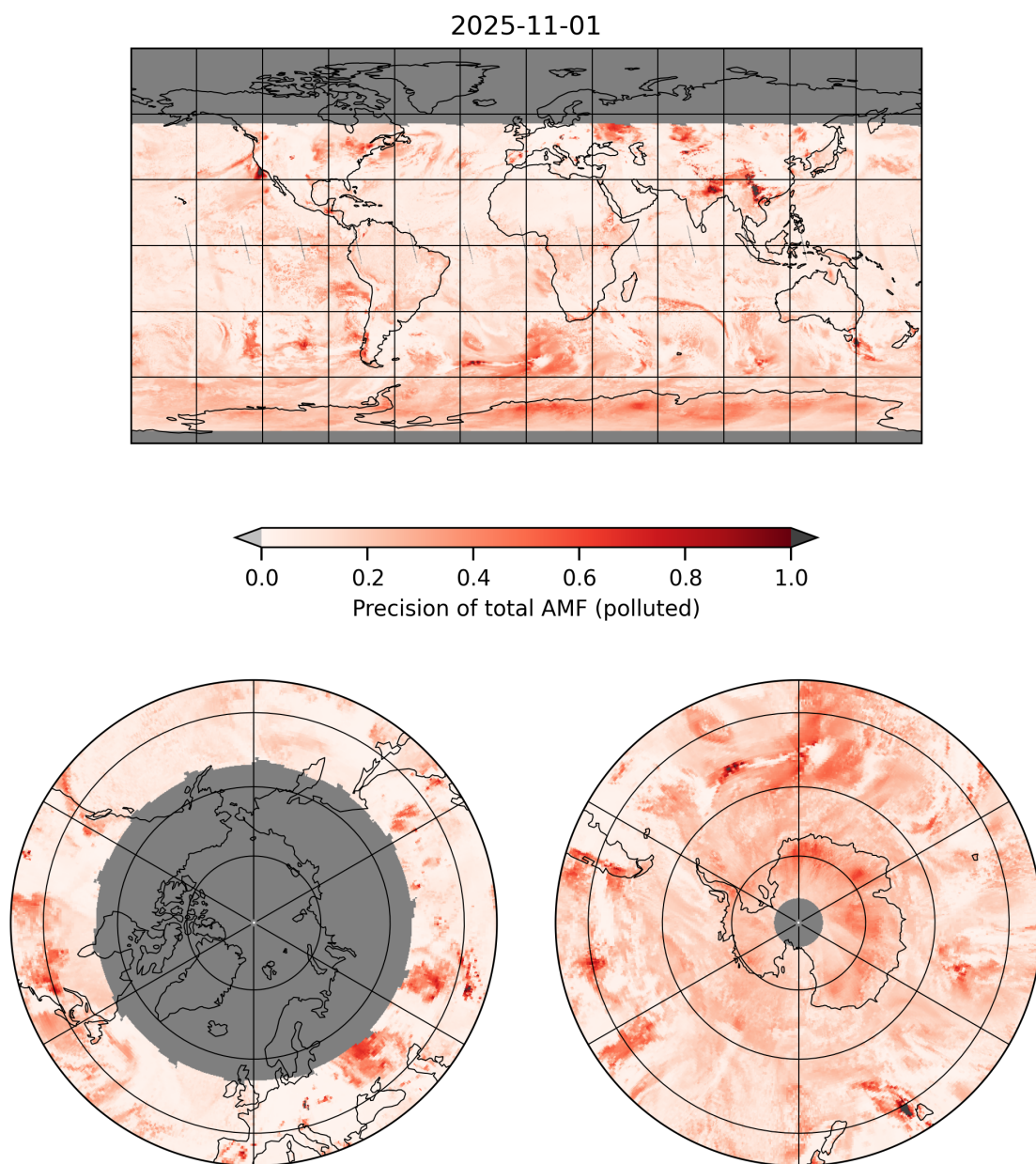


Figure 26: Map of “Precision of total AMF (polluted)” for 2025-11-01 to 2025-11-02

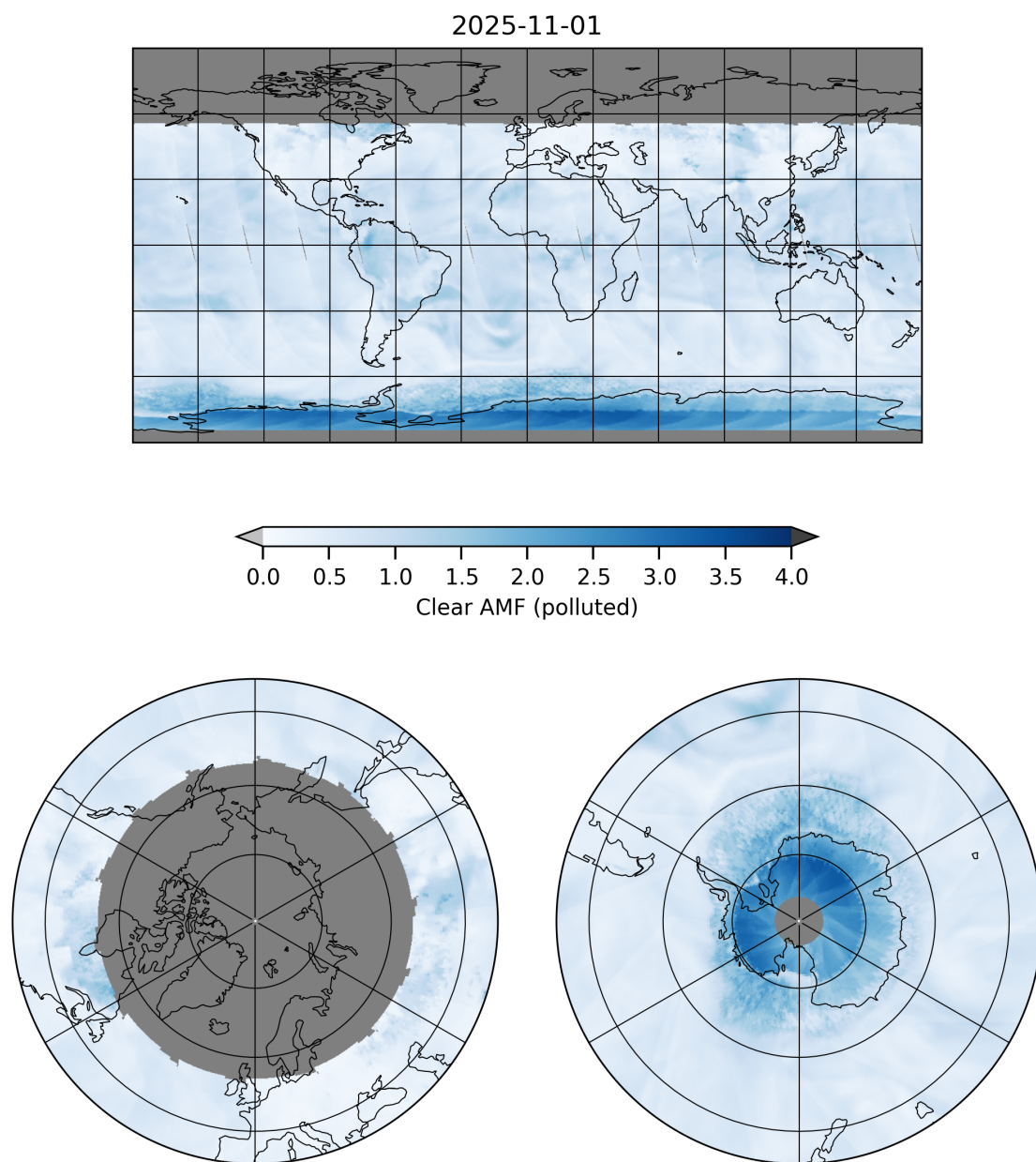


Figure 27: Map of “Clear AMF (polluted)” for 2025-11-01 to 2025-11-02

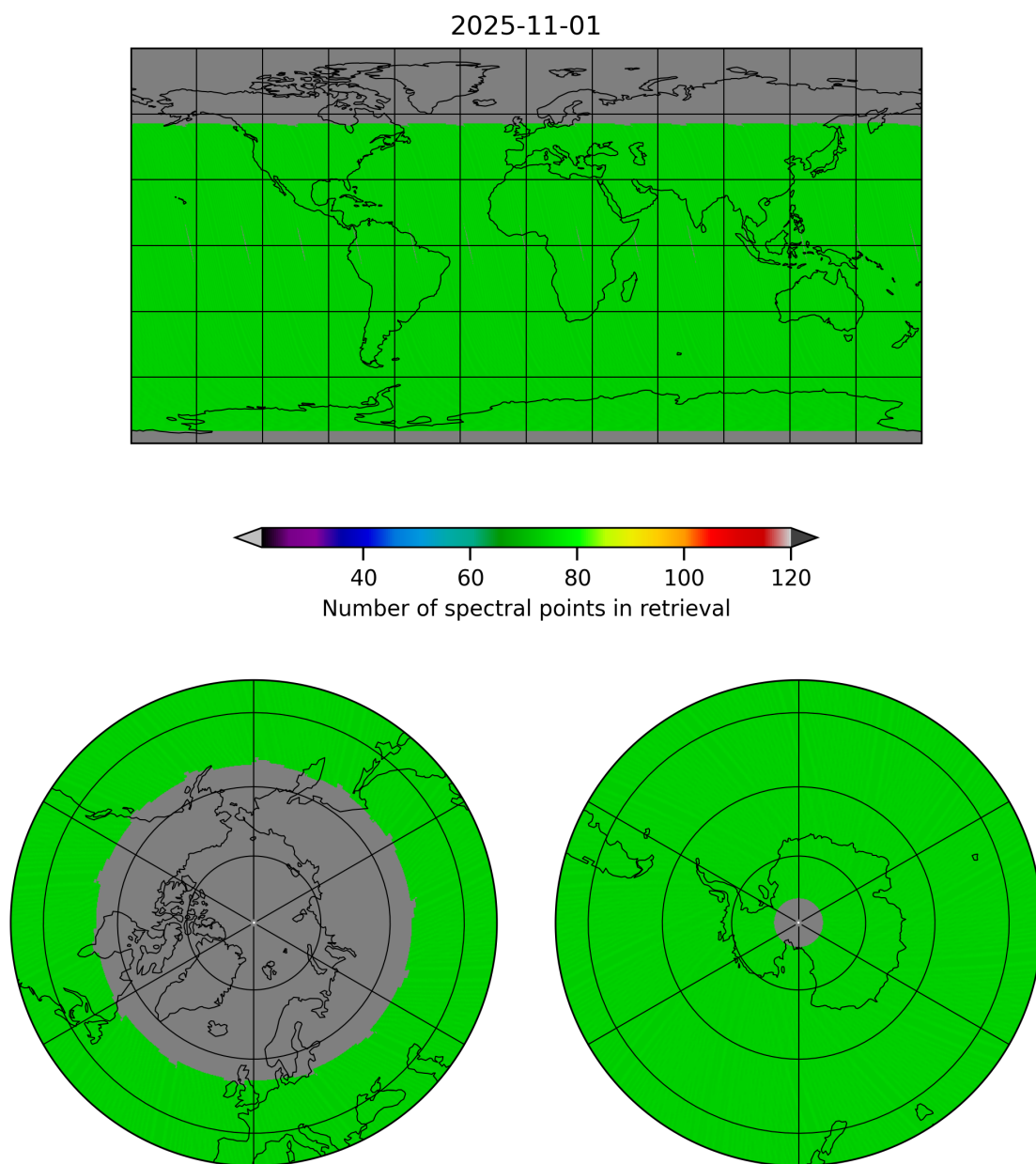


Figure 28: Map of “Number of spectral points in retrieval” for 2025-11-01 to 2025-11-02

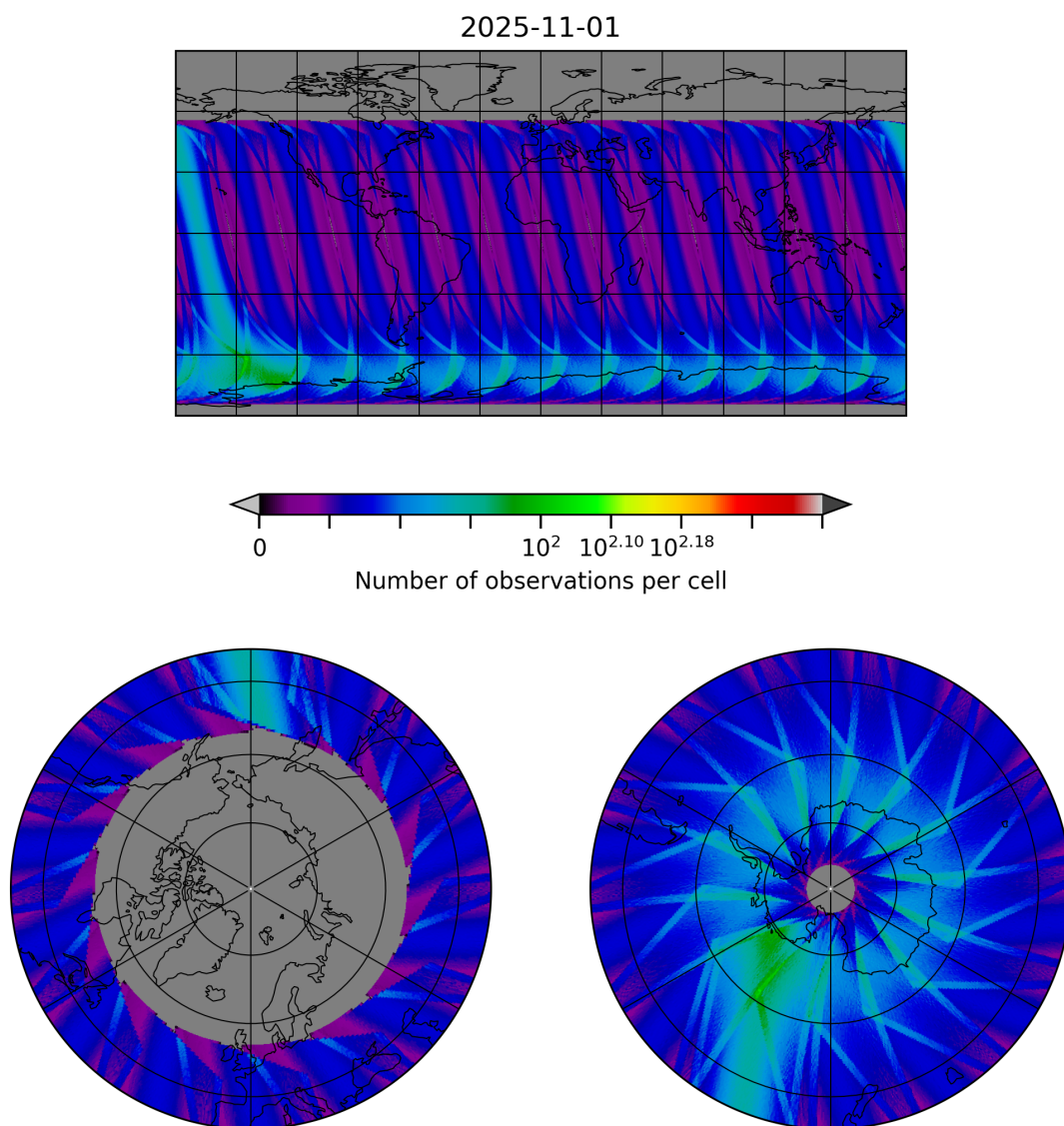


Figure 29: Map of the number of observations for 2025-11-01 to 2025-11-02

7 Zonal average

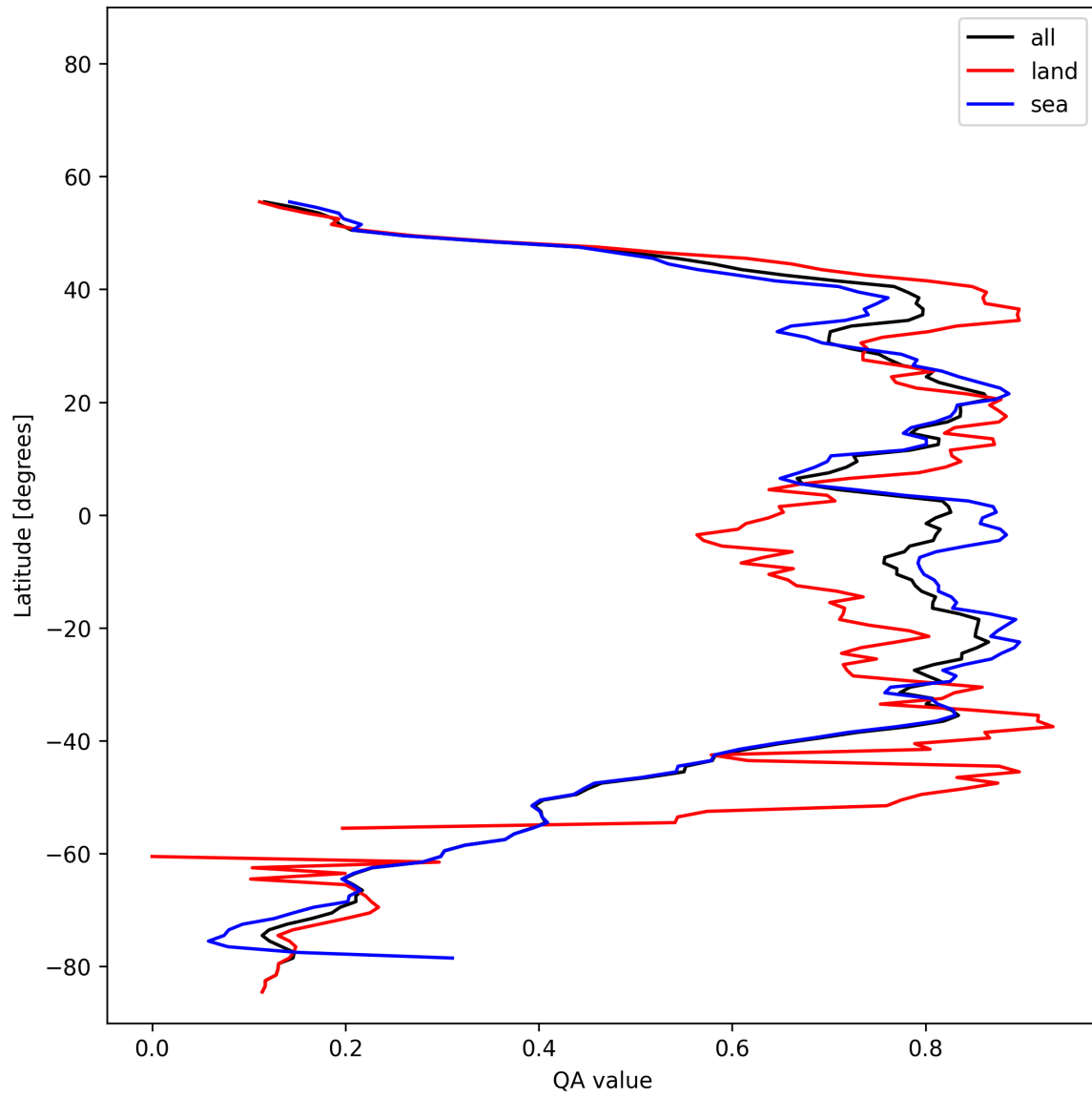


Figure 30: Zonal average of “QA value” for 2025-11-01 to 2025-11-02.

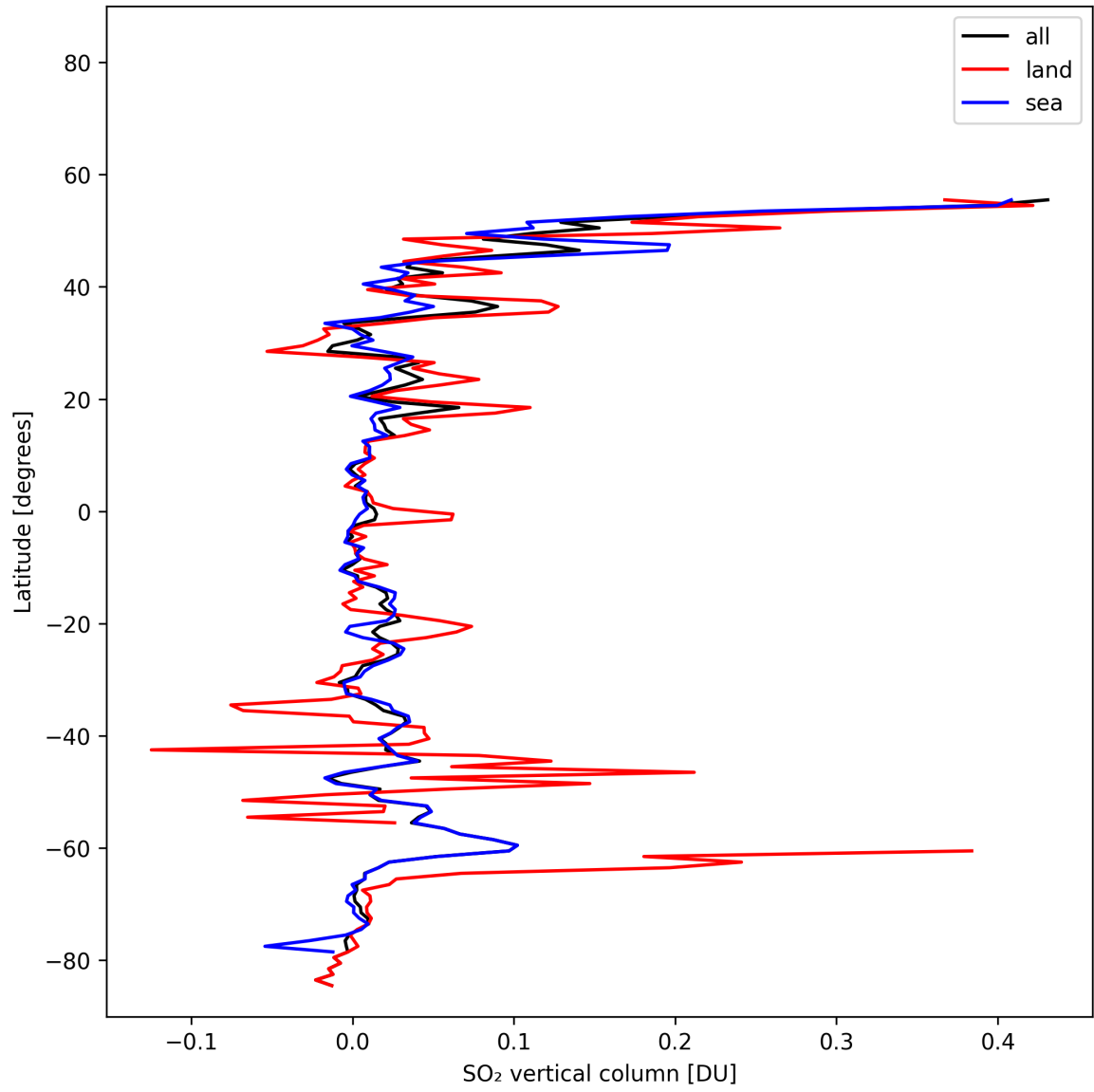


Figure 31: Zonal average of “SO₂ vertical column” for 2025-11-01 to 2025-11-02.

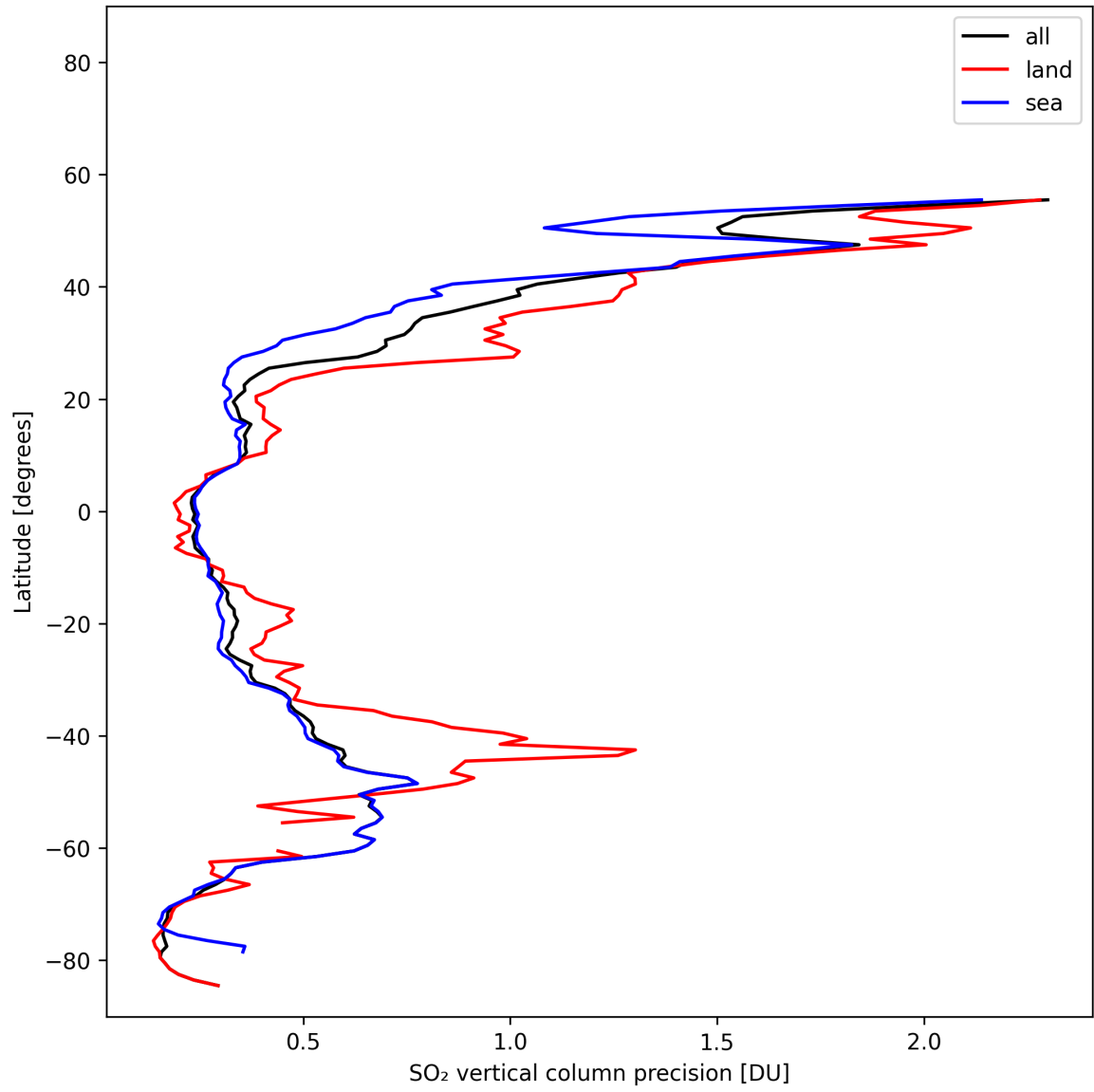


Figure 32: Zonal average of “SO₂ vertical column precision” for 2025-11-01 to 2025-11-02.

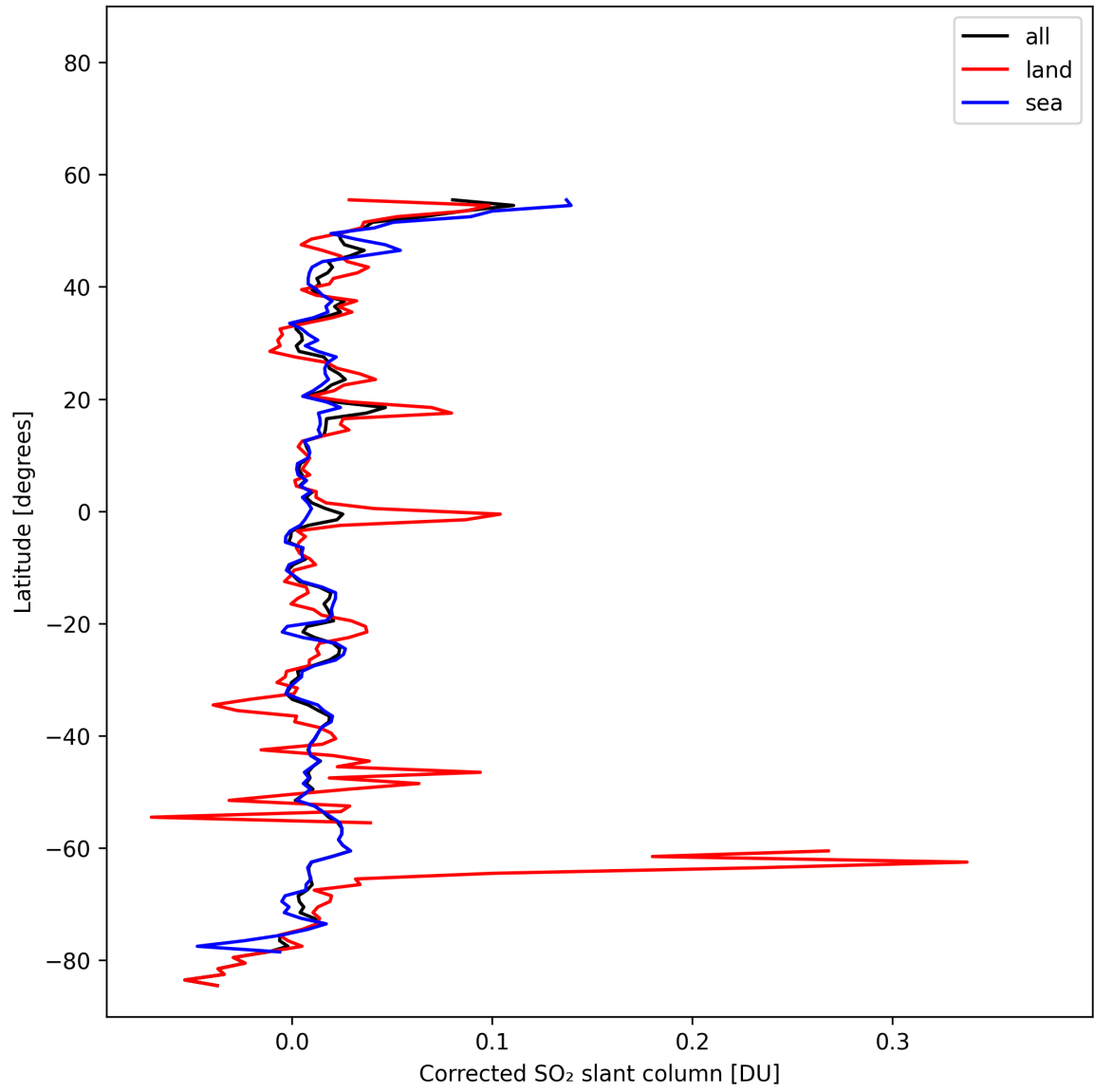


Figure 33: Zonal average of “Corrected SO₂ slant column” for 2025-11-01 to 2025-11-02.

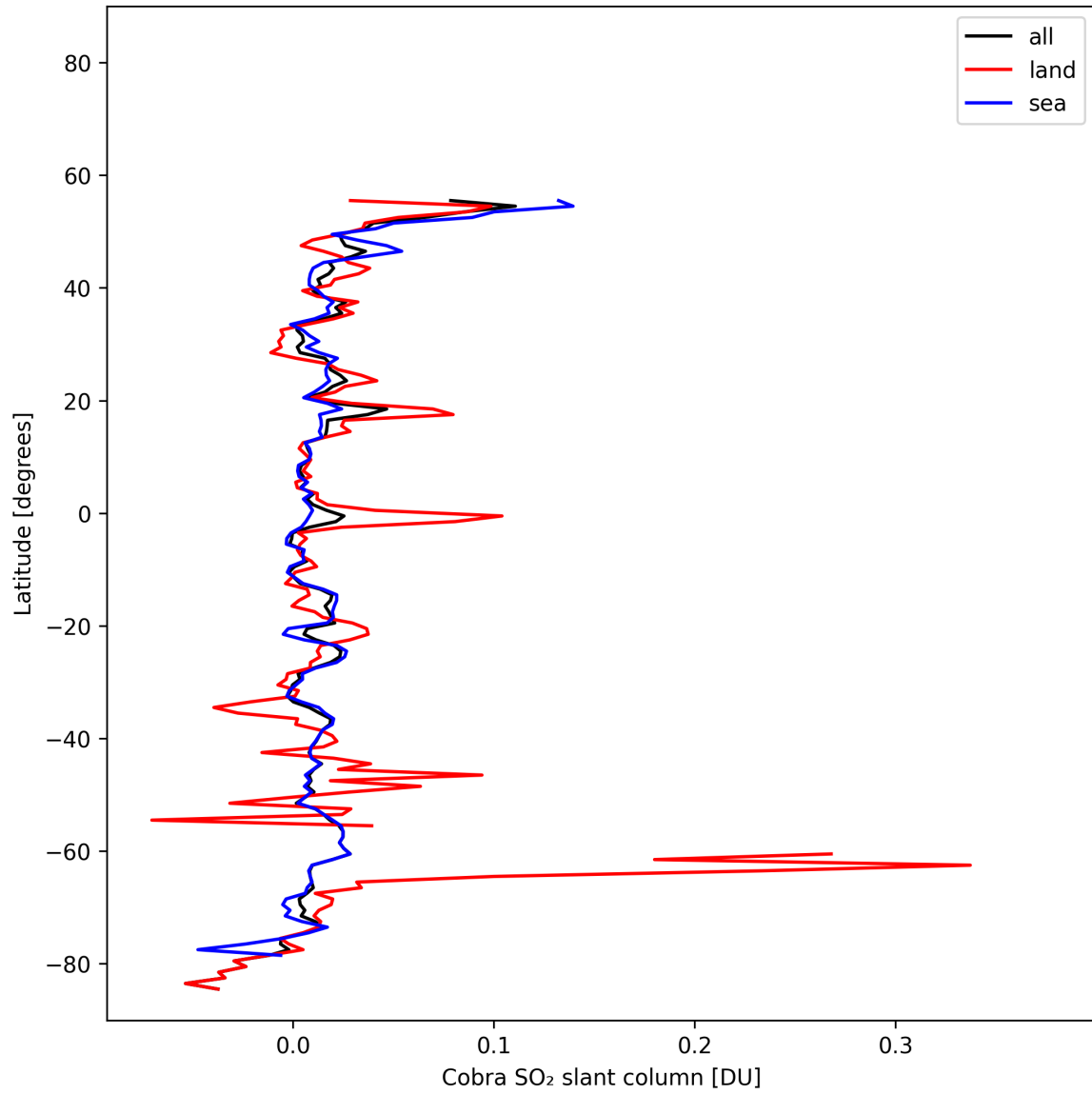


Figure 34: Zonal average of “Cobra SO₂ slant column” for 2025-11-01 to 2025-11-02.

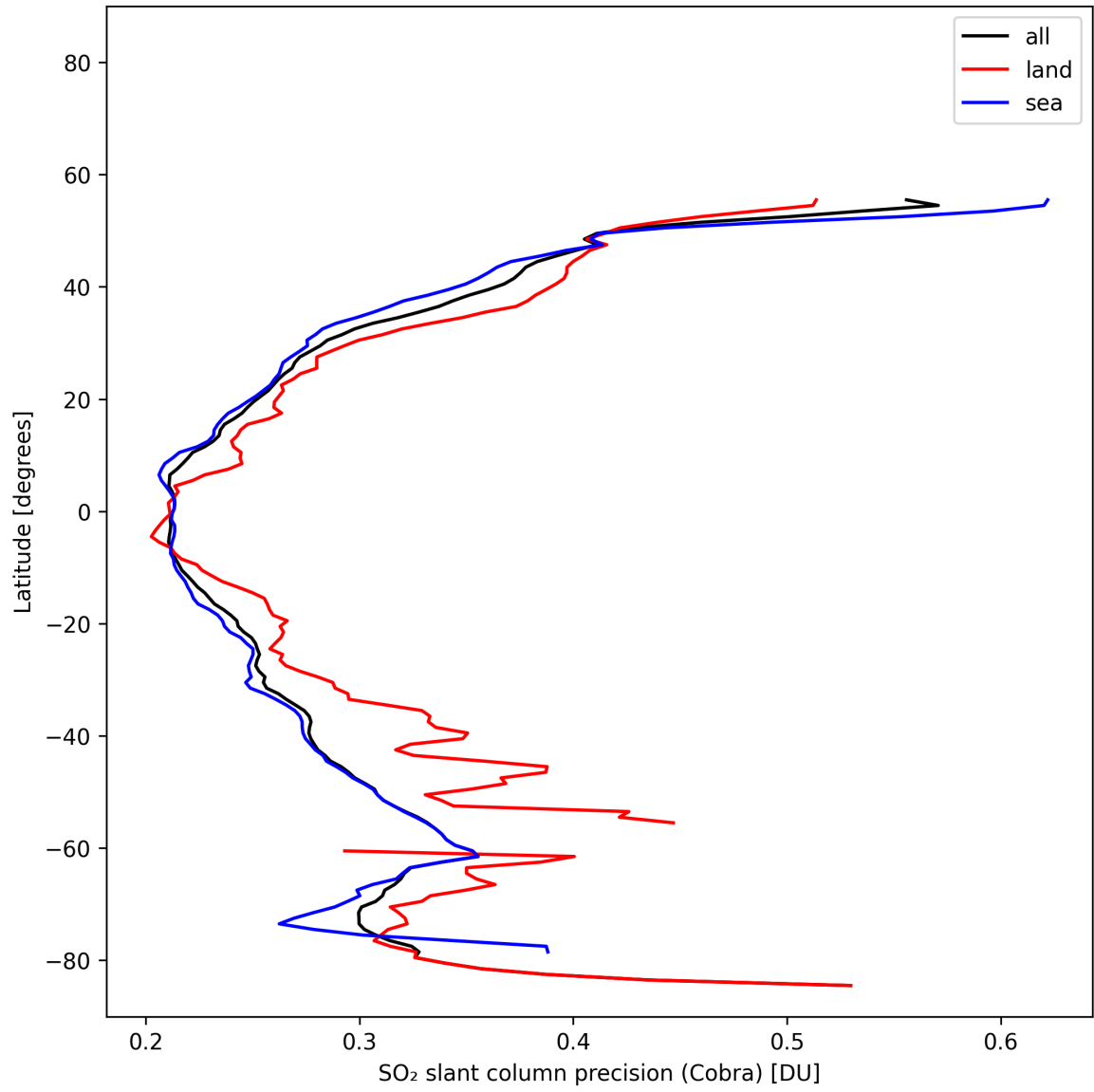


Figure 35: Zonal average of “SO₂ slant column precision (Cobra)” for 2025-11-01 to 2025-11-02.

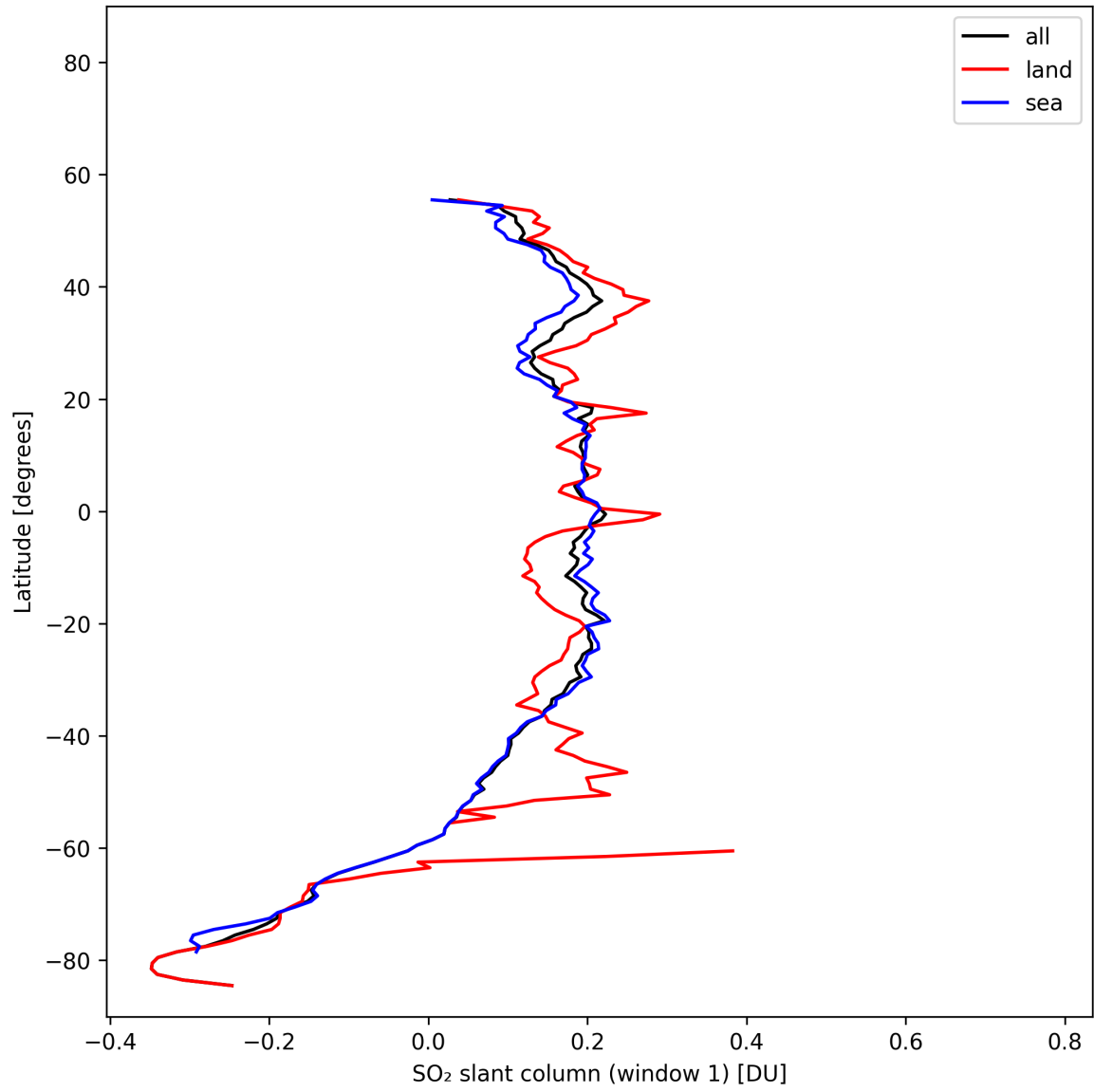


Figure 36: Zonal average of “SO₂ slant column (window 1)” for 2025-11-01 to 2025-11-02.

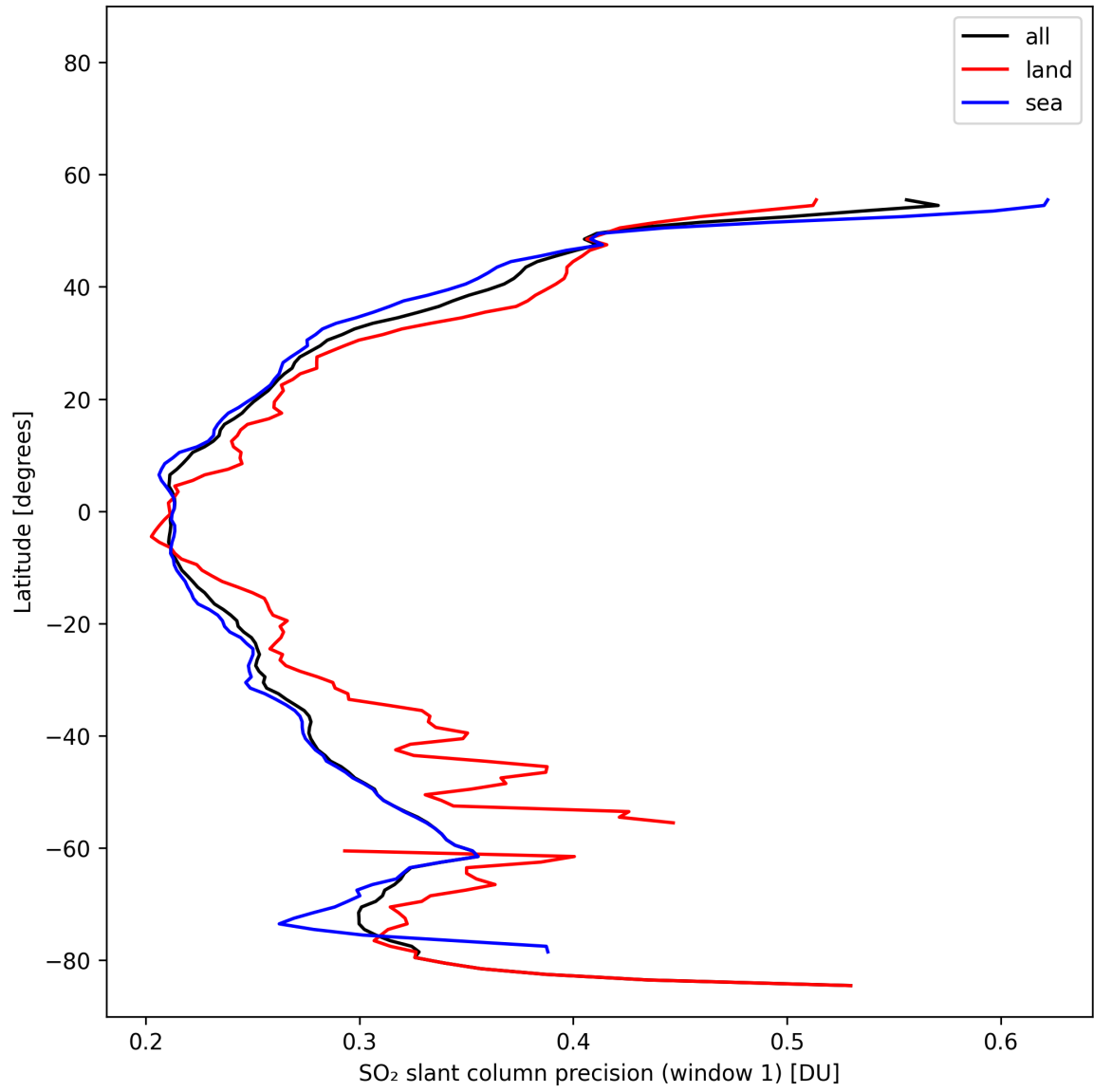


Figure 37: Zonal average of “SO₂ slant column precision (window 1)” for 2025-11-01 to 2025-11-02.

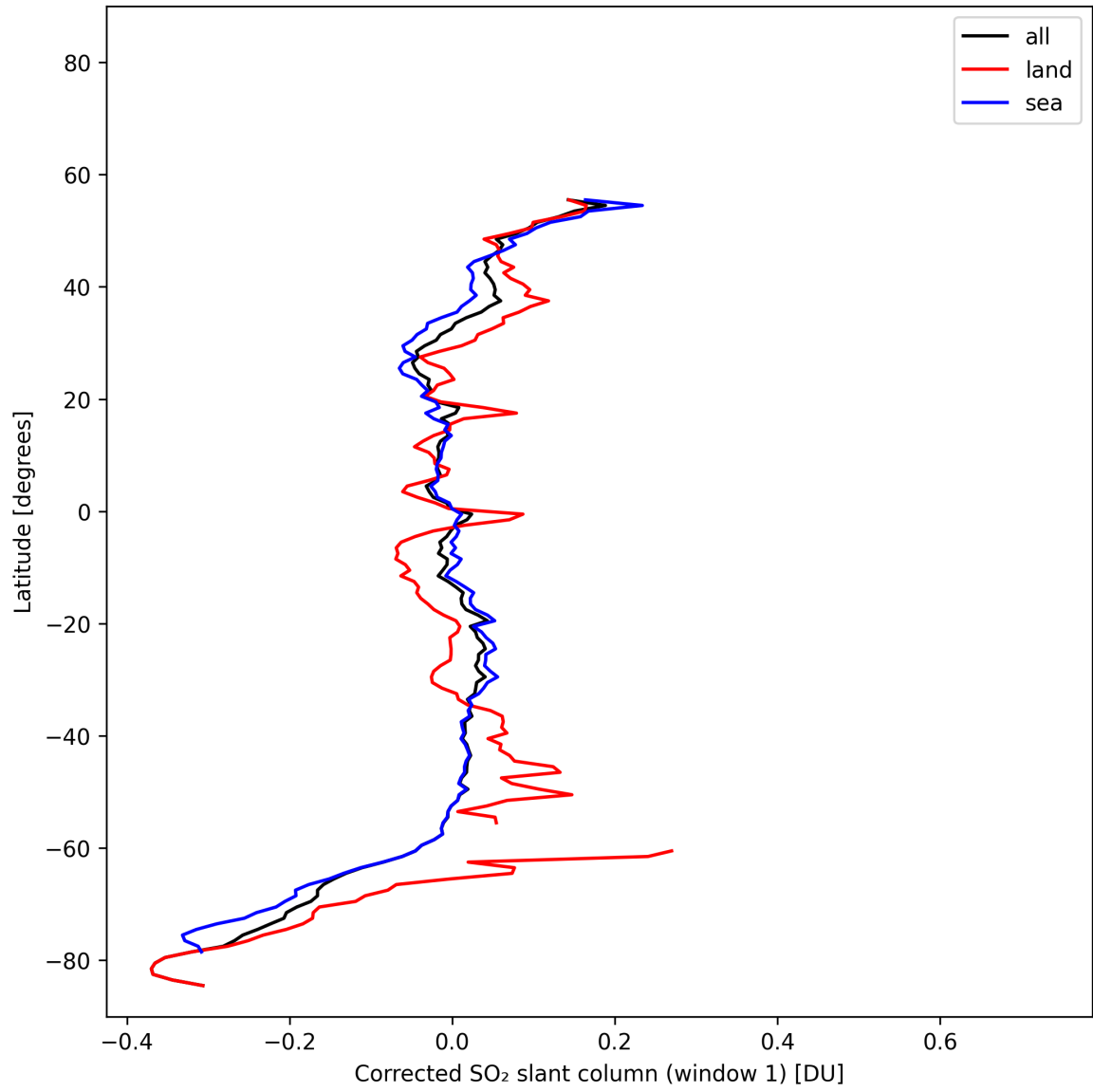


Figure 38: Zonal average of “Corrected SO₂ slant column (window 1)” for 2025-11-01 to 2025-11-02.

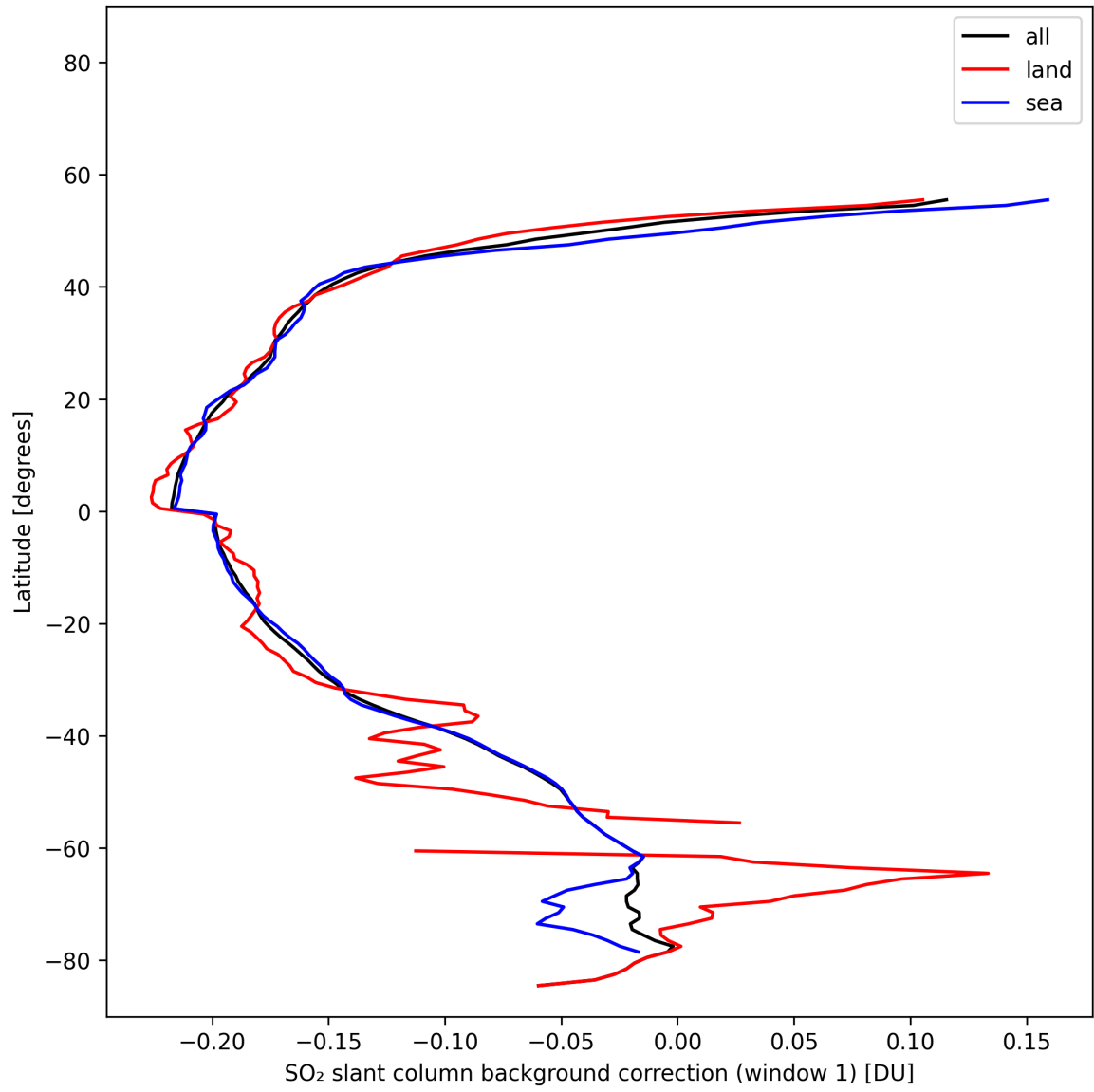


Figure 39: Zonal average of “SO₂ slant column background correction (window 1)” for 2025-11-01 to 2025-11-02.

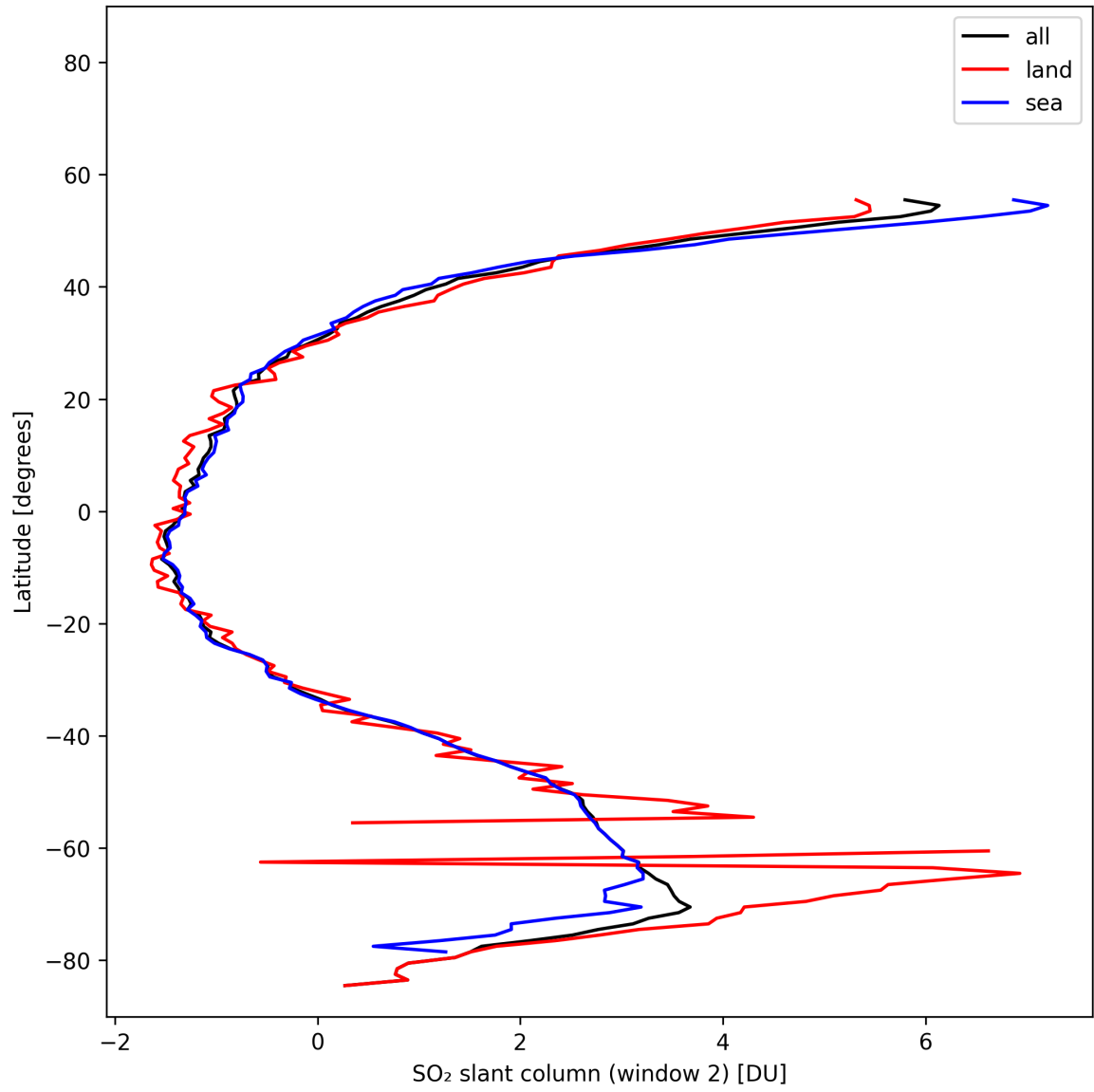


Figure 40: Zonal average of “SO₂ slant column (window 2)” for 2025-11-01 to 2025-11-02.

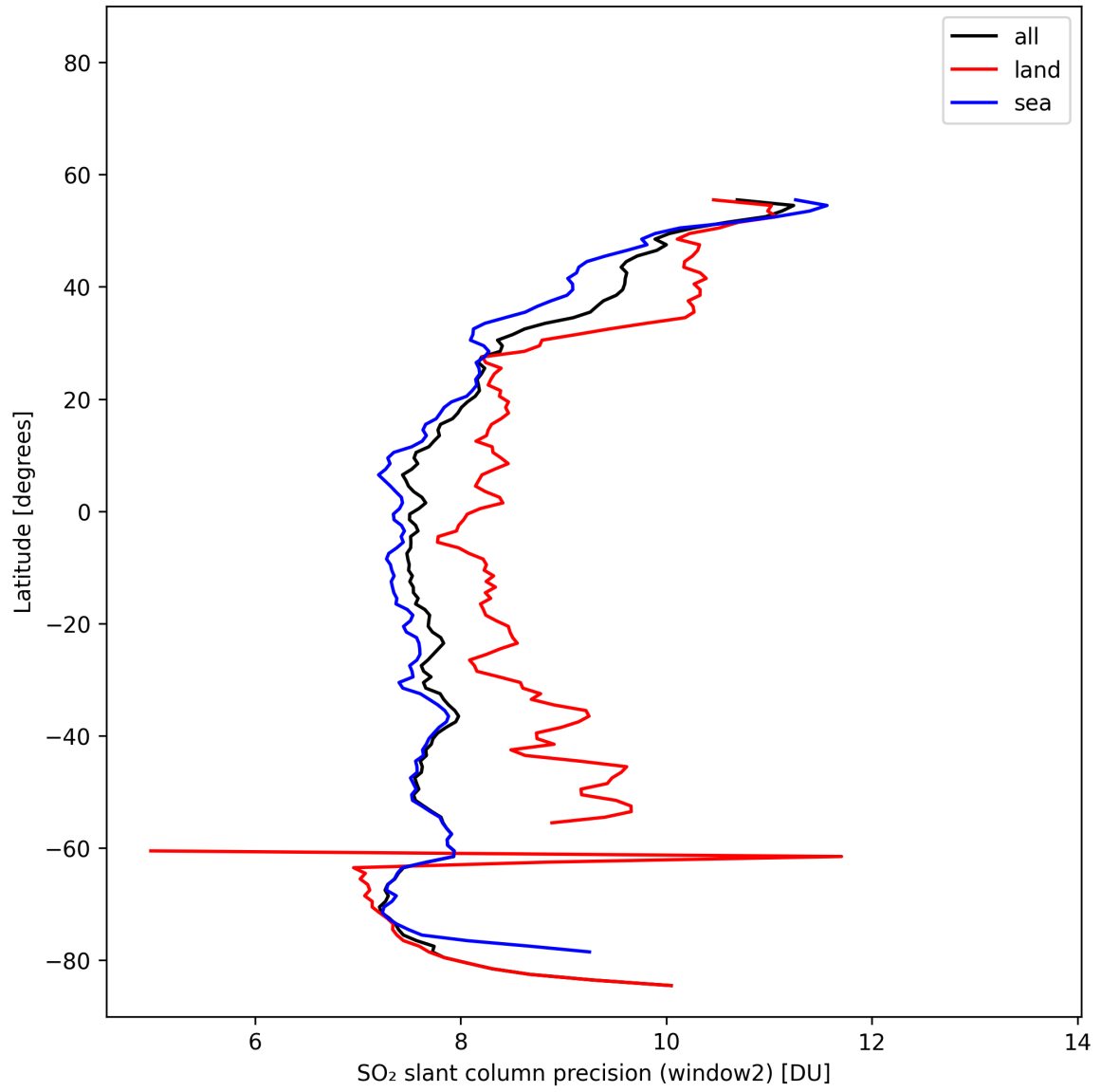


Figure 41: Zonal average of “SO₂ slant column precision (window2)” for 2025-11-01 to 2025-11-02.

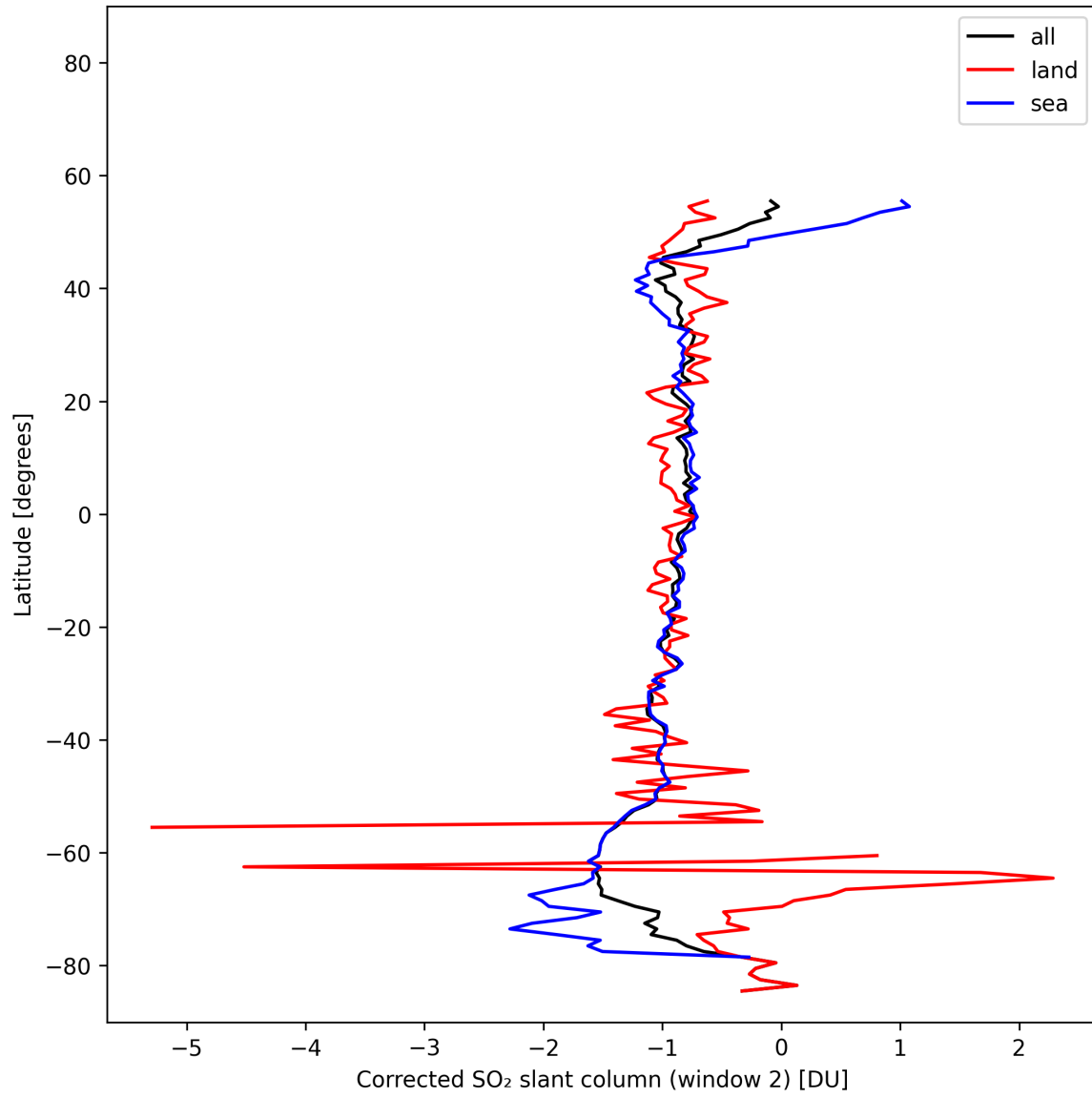


Figure 42: Zonal average of “Corrected SO₂ slant column (window 2)” for 2025-11-01 to 2025-11-02.

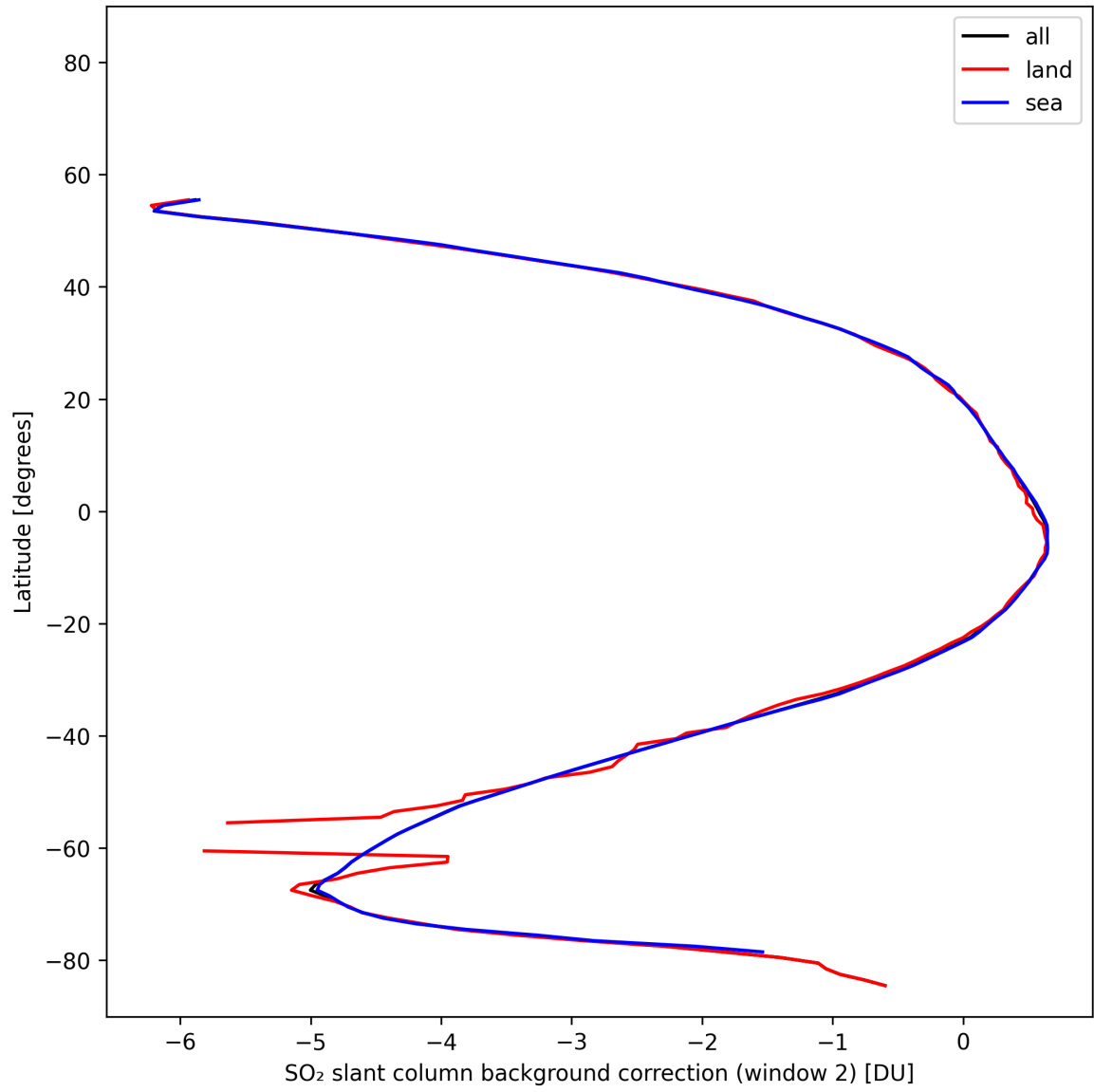


Figure 43: Zonal average of “SO₂ slant column background correction (window 2)” for 2025-11-01 to 2025-11-02.

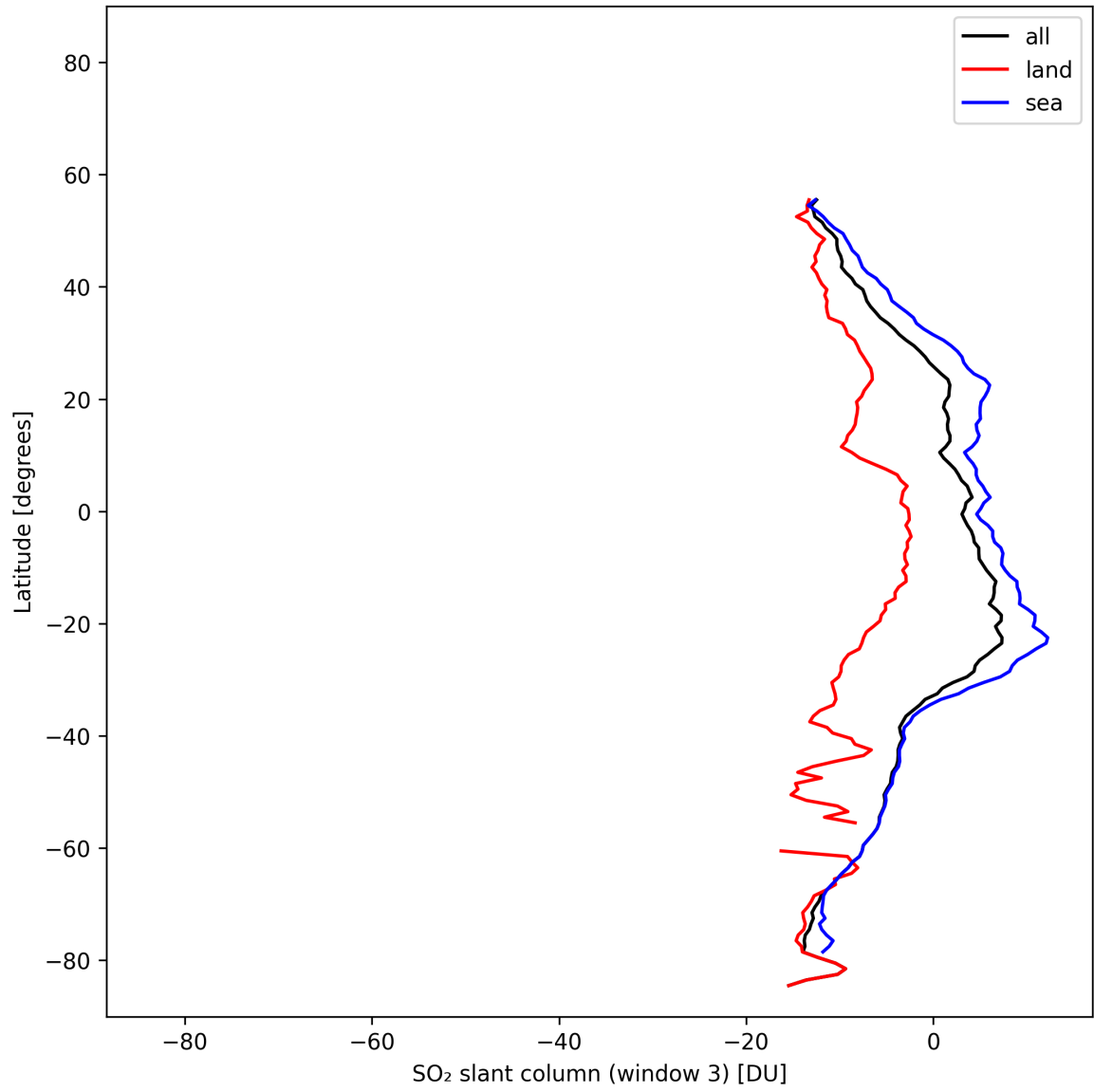


Figure 44: Zonal average of “SO₂ slant column (window 3)” for 2025-11-01 to 2025-11-02.

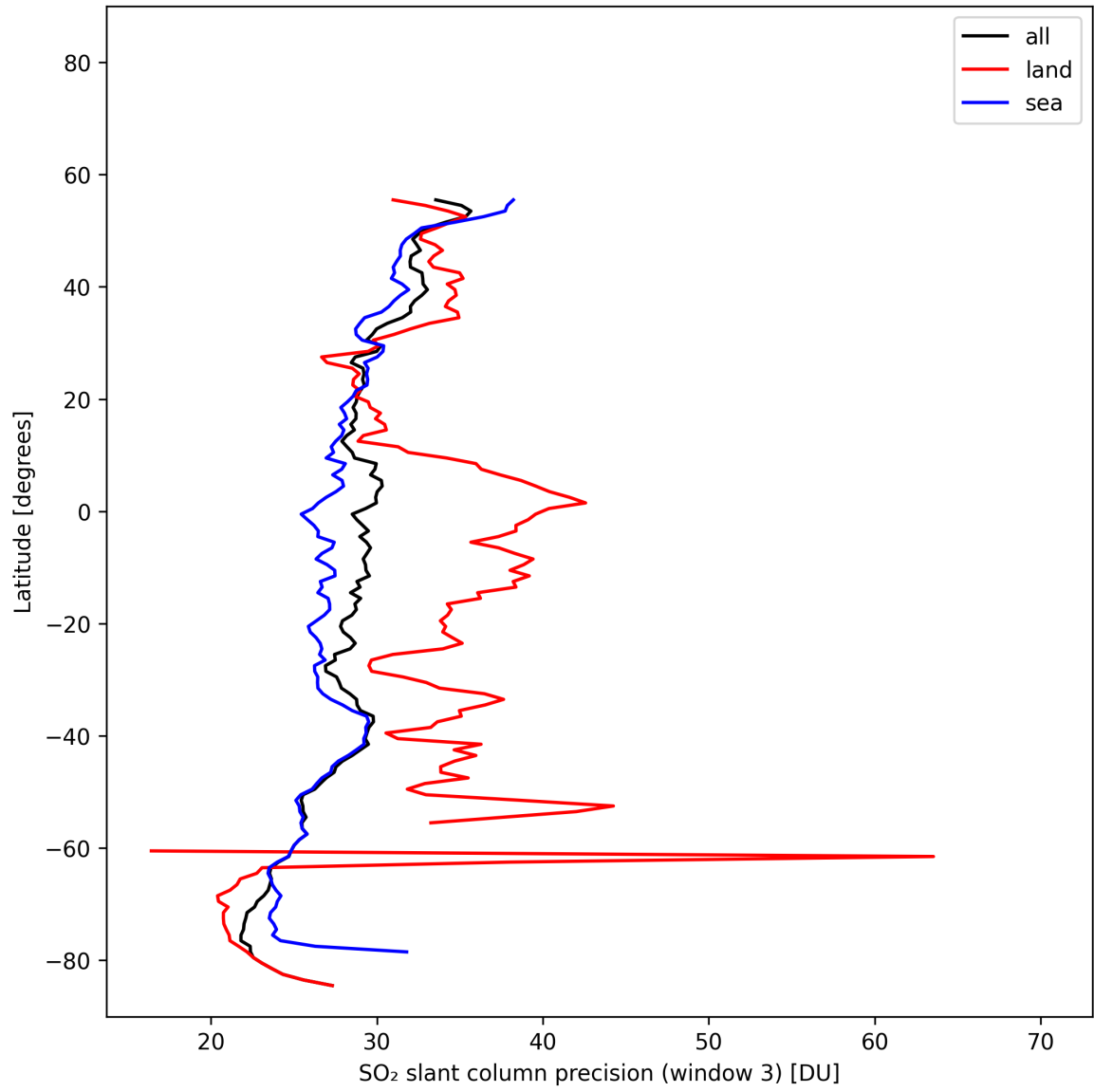


Figure 45: Zonal average of “SO₂ slant column precision (window 3)” for 2025-11-01 to 2025-11-02.

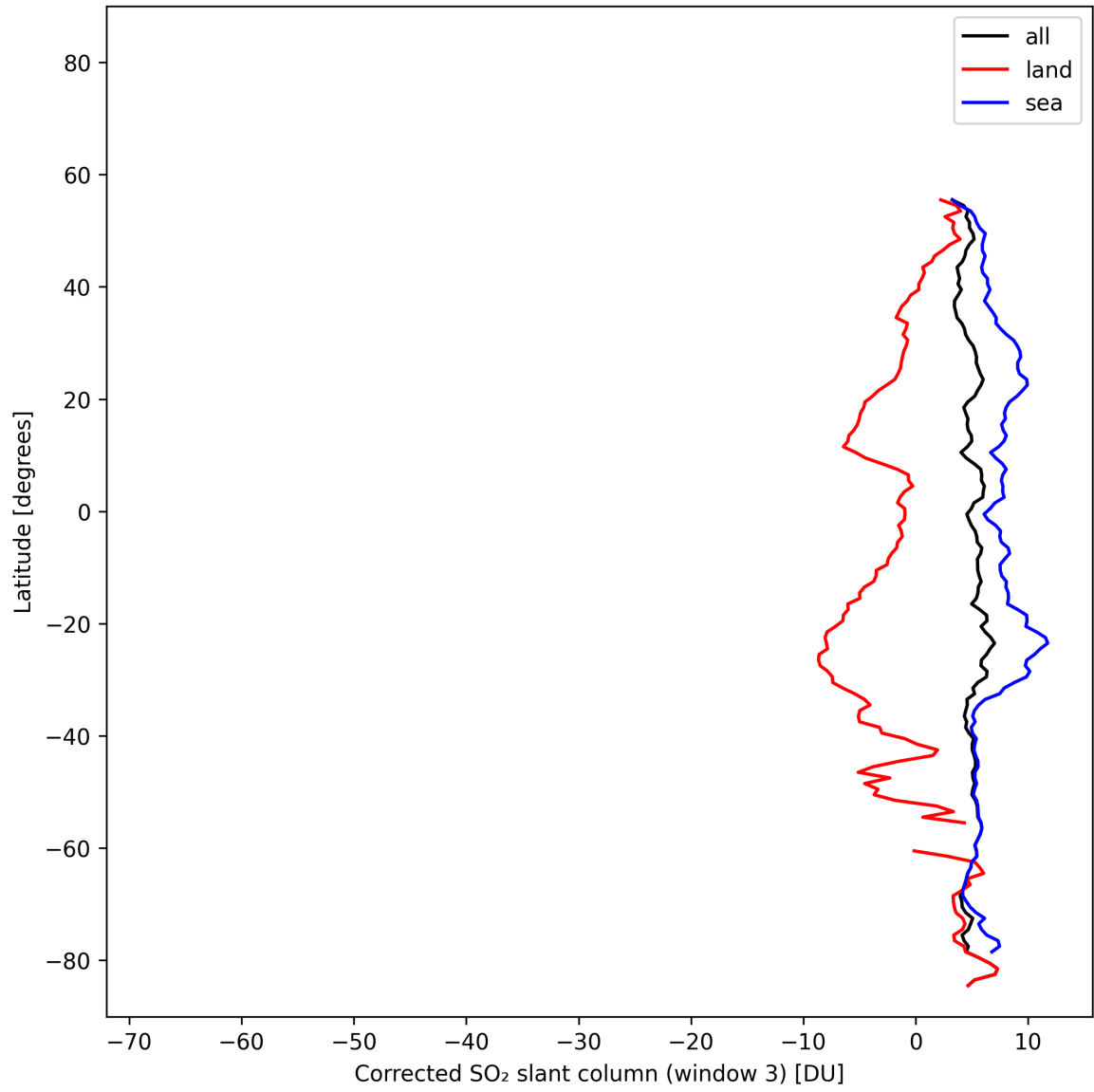


Figure 46: Zonal average of “Corrected SO₂ slant column (window 3)” for 2025-11-01 to 2025-11-02.

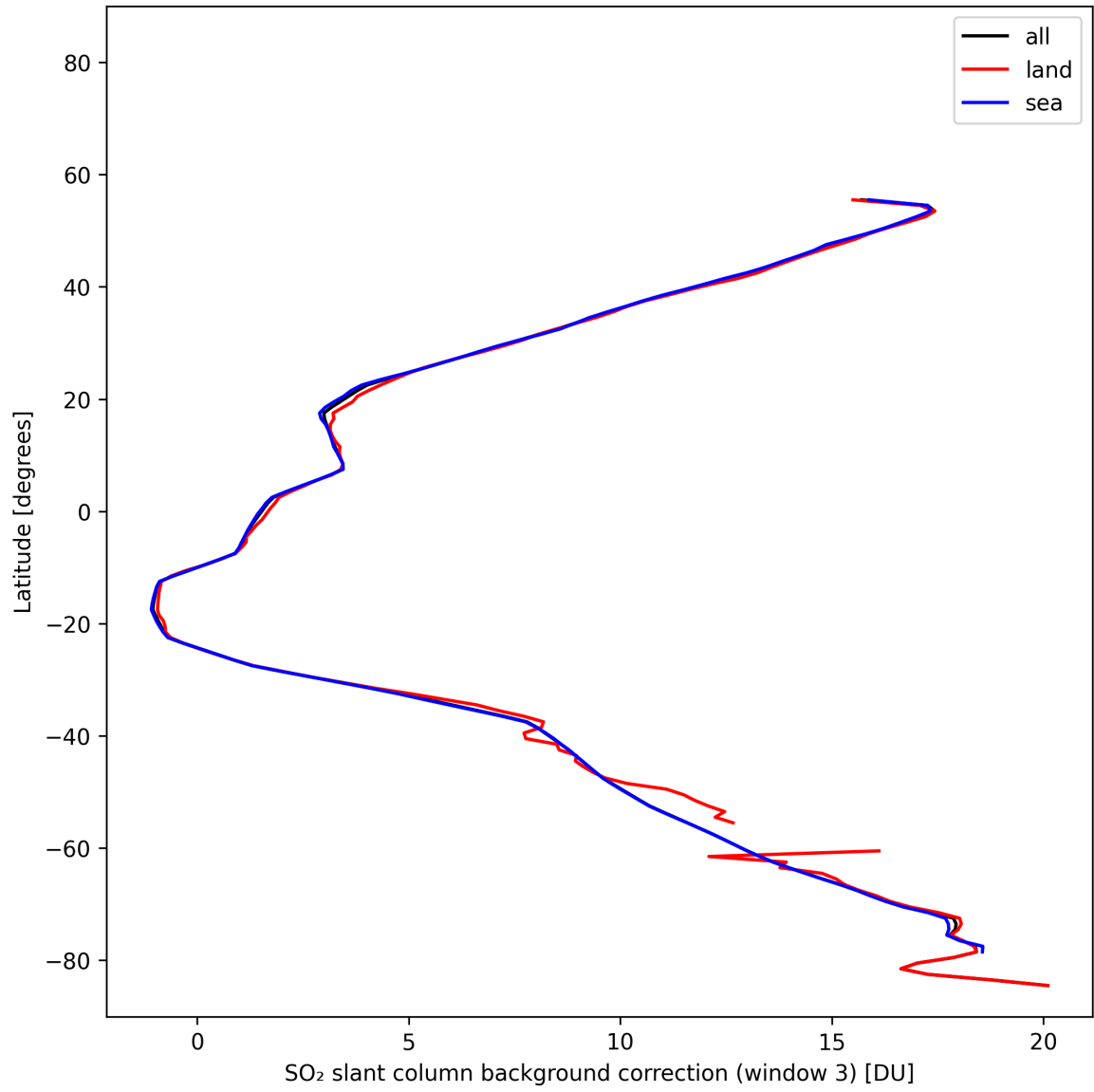


Figure 47: Zonal average of “SO₂ slant column background correction (window 3)” for 2025-11-01 to 2025-11-02.

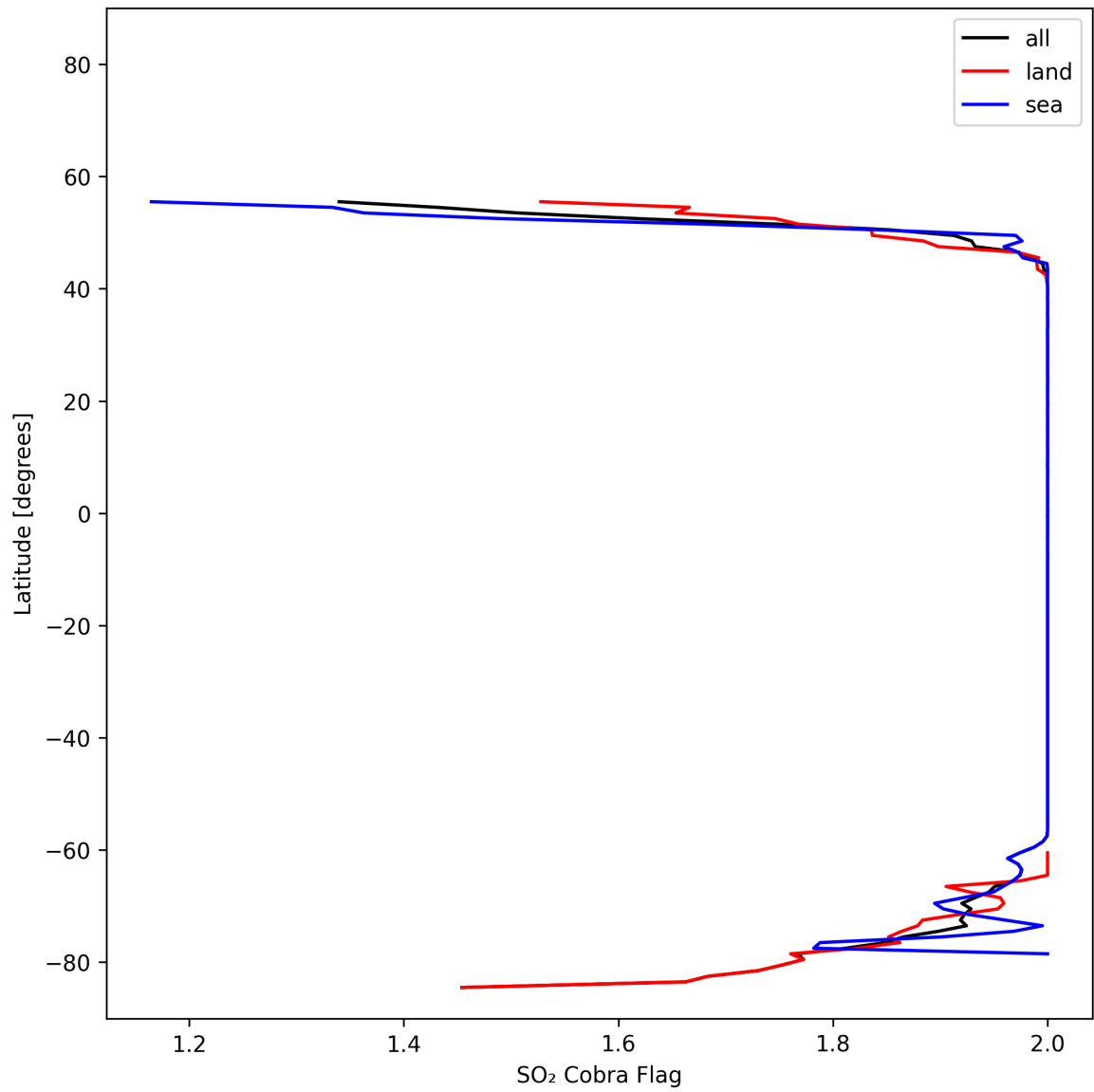


Figure 48: Zonal average of “SO₂ Cobra Flag” for 2025-11-01 to 2025-11-02.

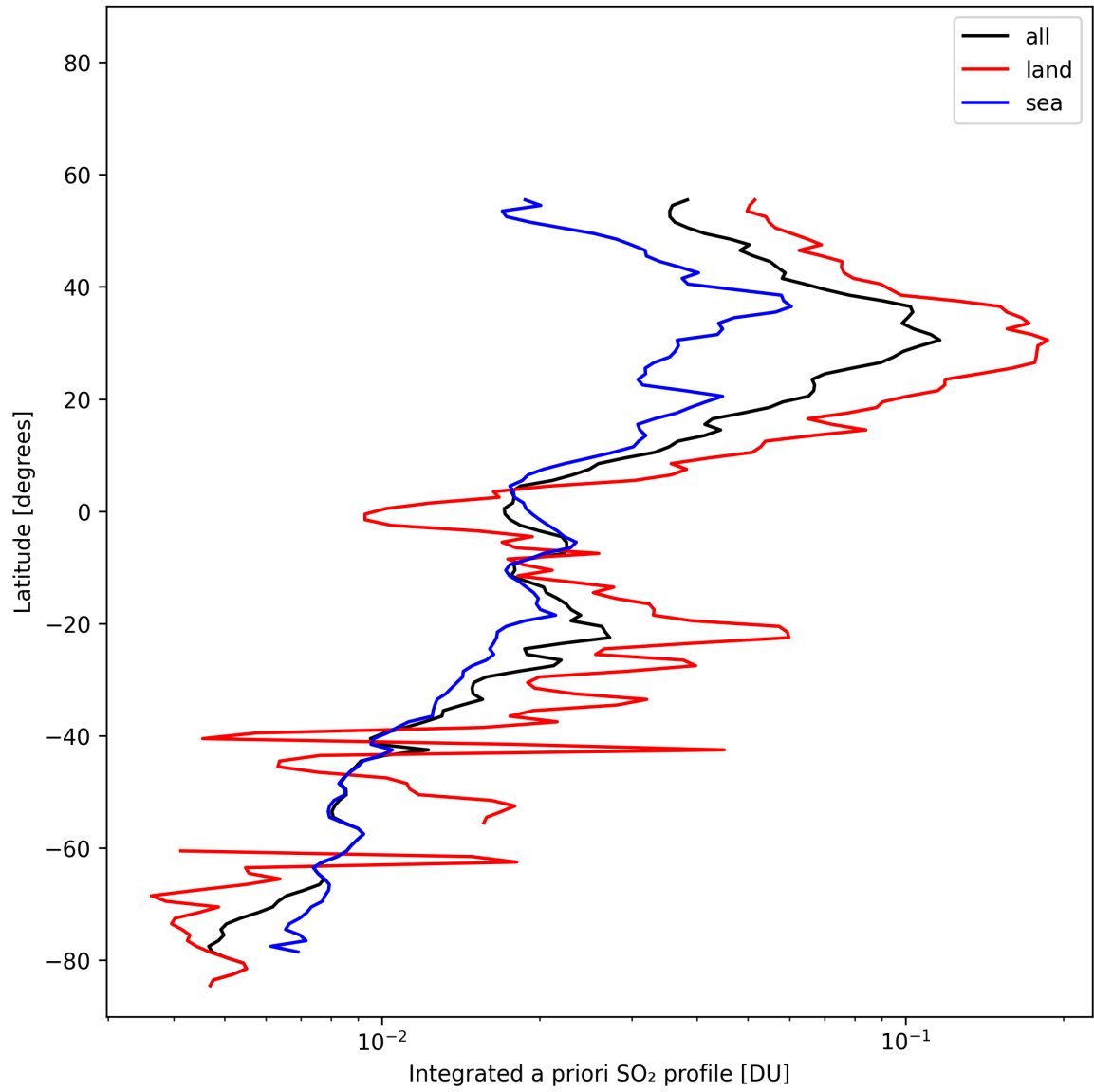


Figure 49: Zonal average of “Integrated a priori SO₂ profile” for 2025-11-01 to 2025-11-02.

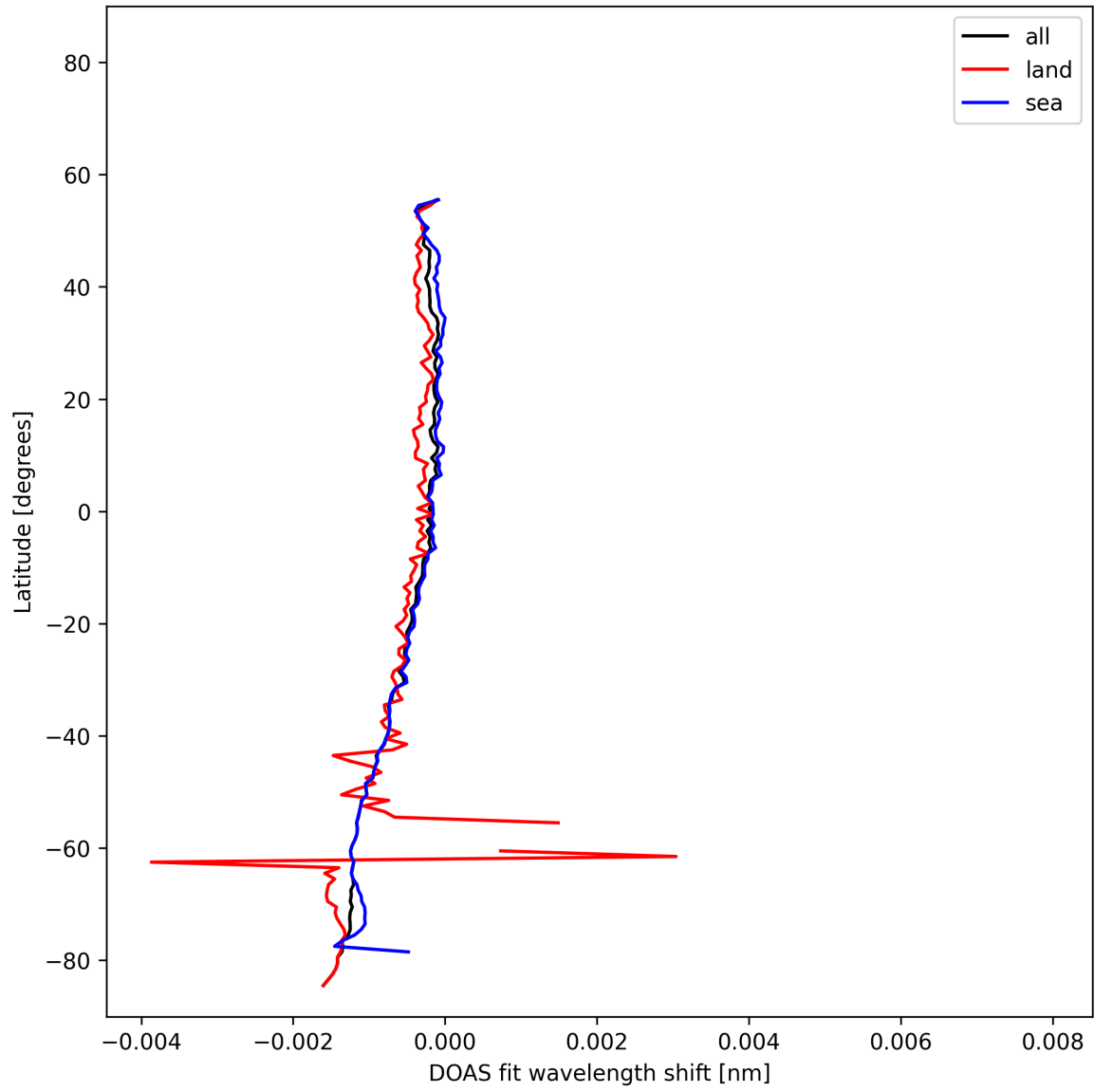


Figure 50: Zonal average of “DOAS fit wavelength shift” for 2025-11-01 to 2025-11-02.

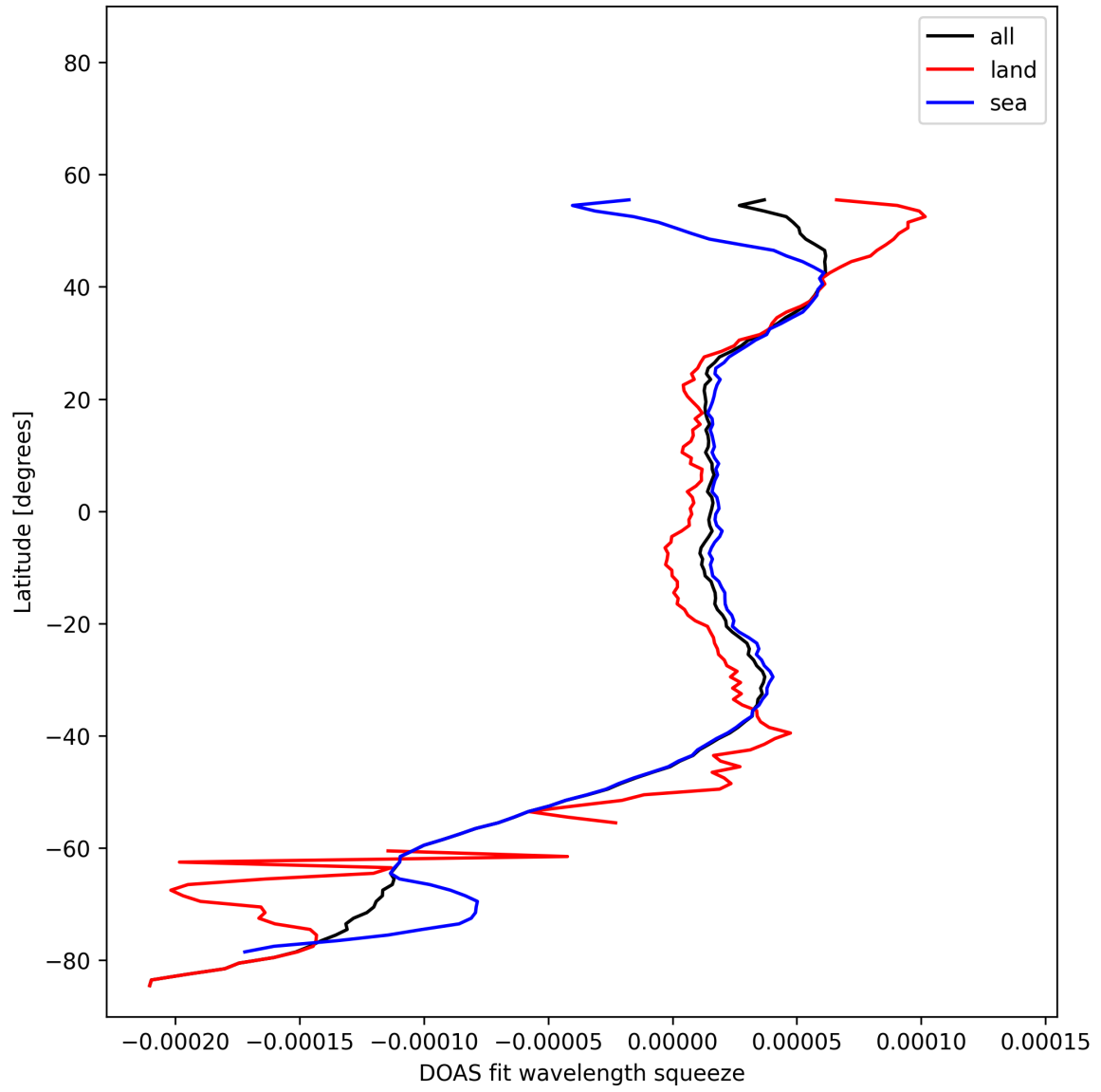


Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-11-01 to 2025-11-02.

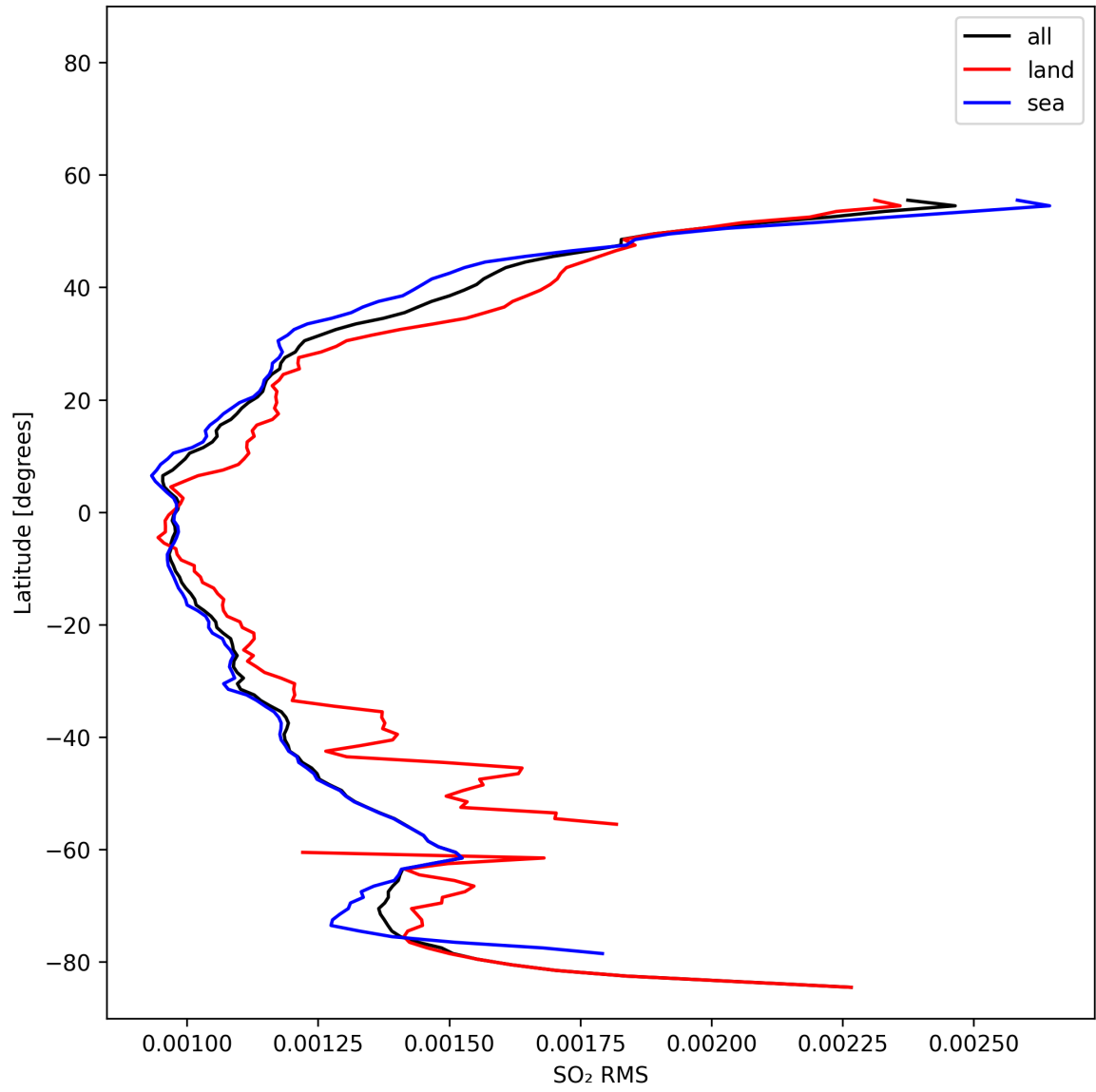


Figure 52: Zonal average of “SO₂ RMS” for 2025-11-01 to 2025-11-02.

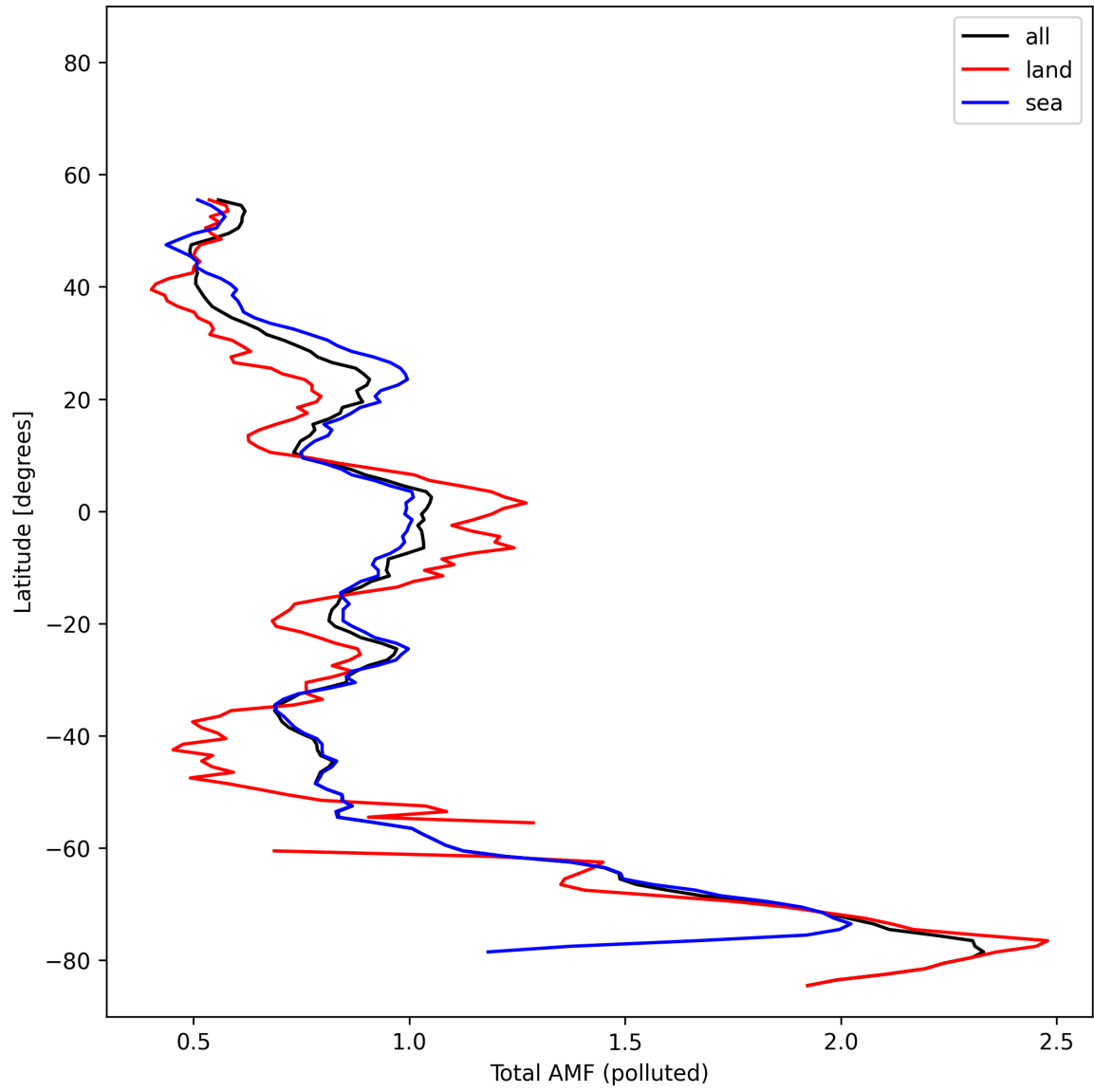


Figure 53: Zonal average of “Total AMF (polluted)” for 2025-11-01 to 2025-11-02.

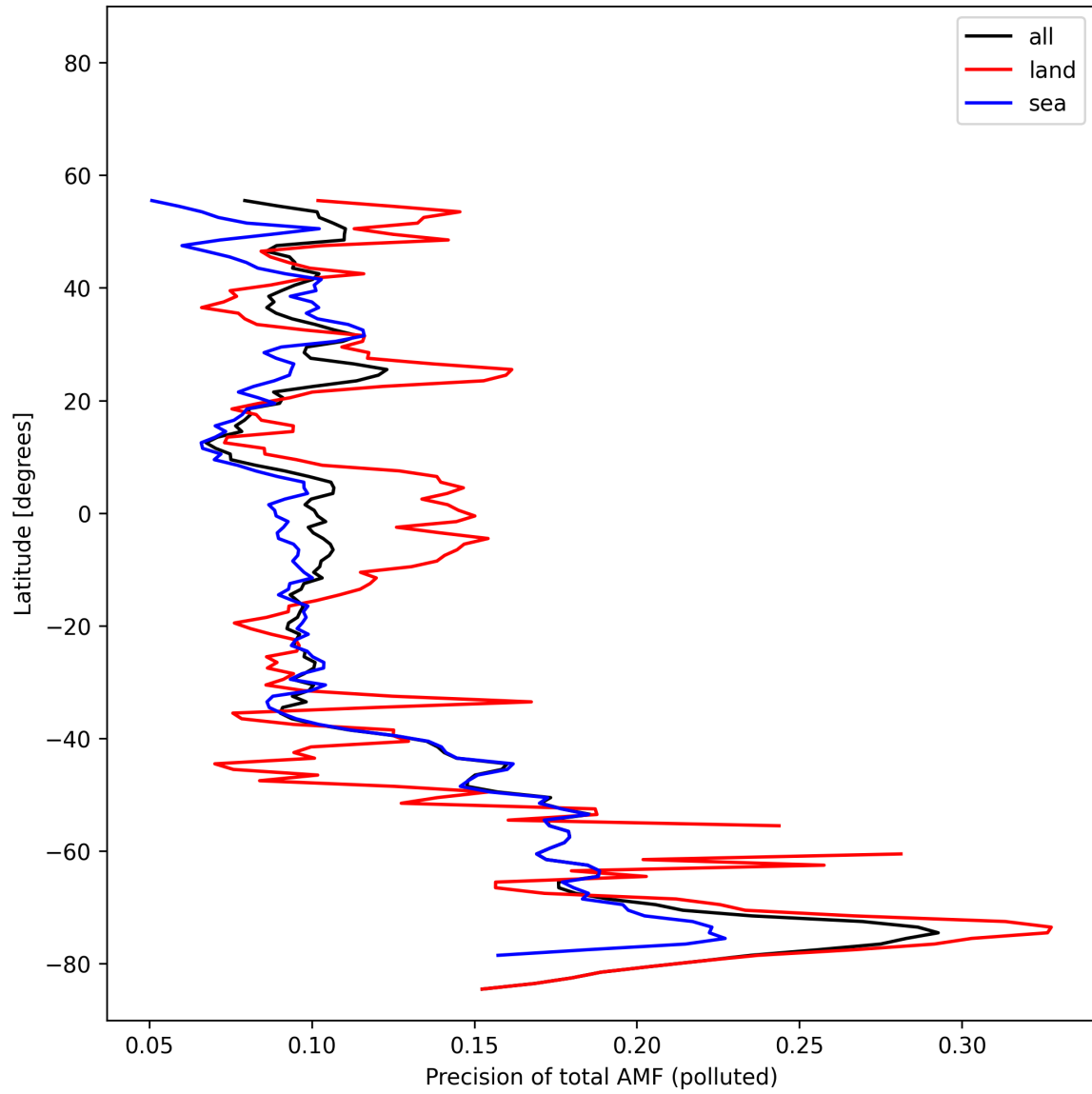


Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-11-01 to 2025-11-02.

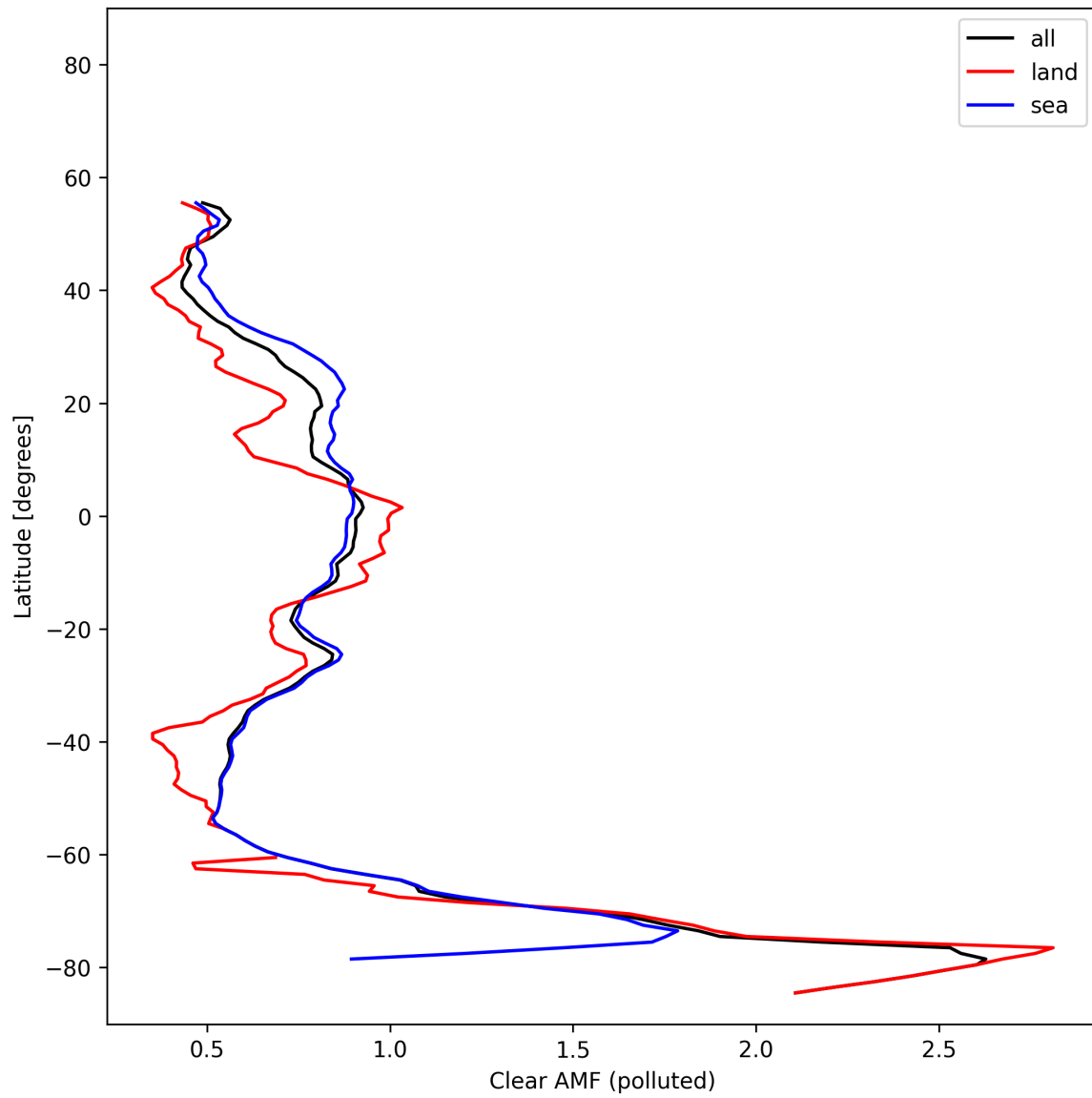


Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-11-01 to 2025-11-02.

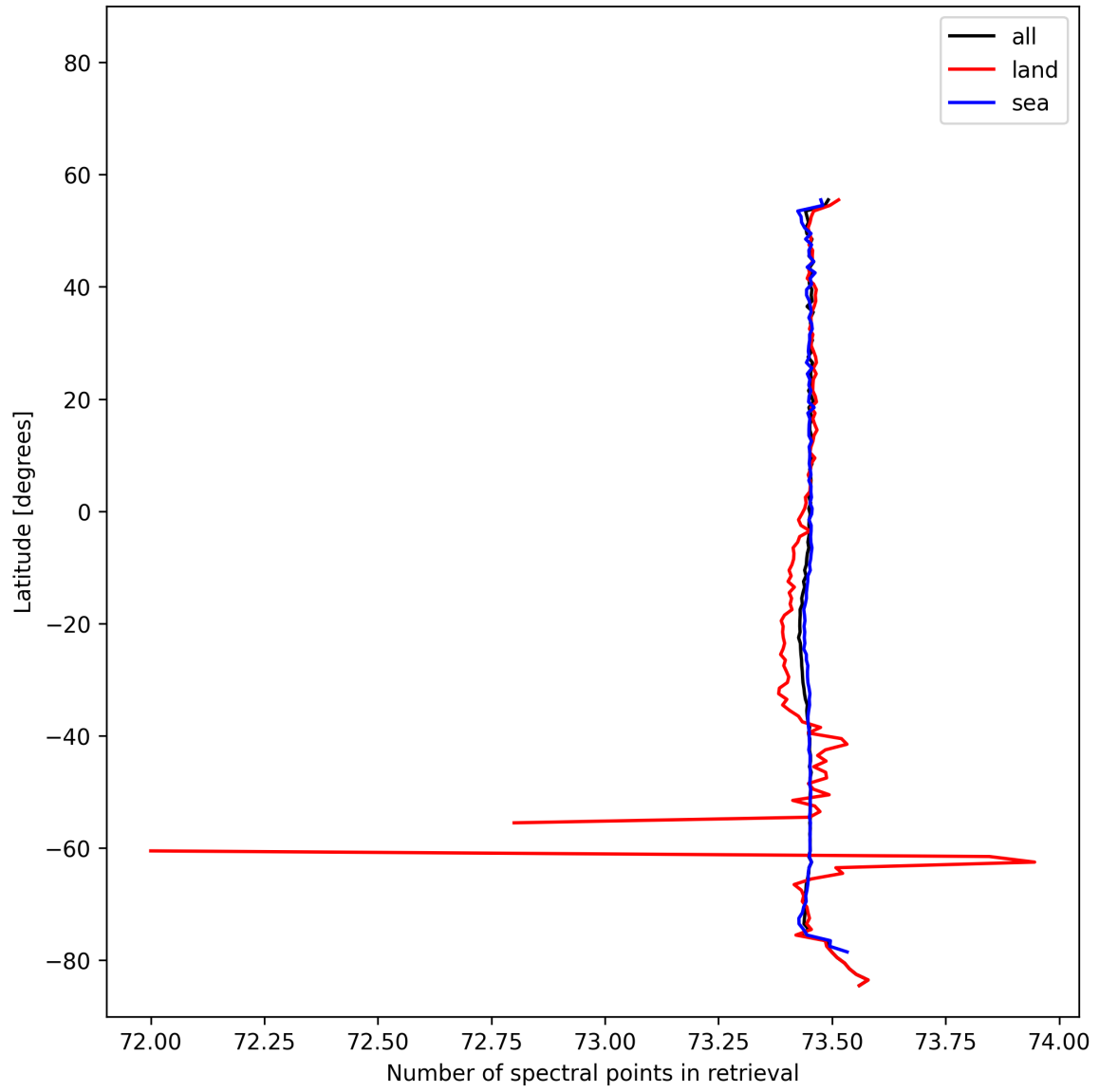


Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-11-01 to 2025-11-02.

8 Histograms

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

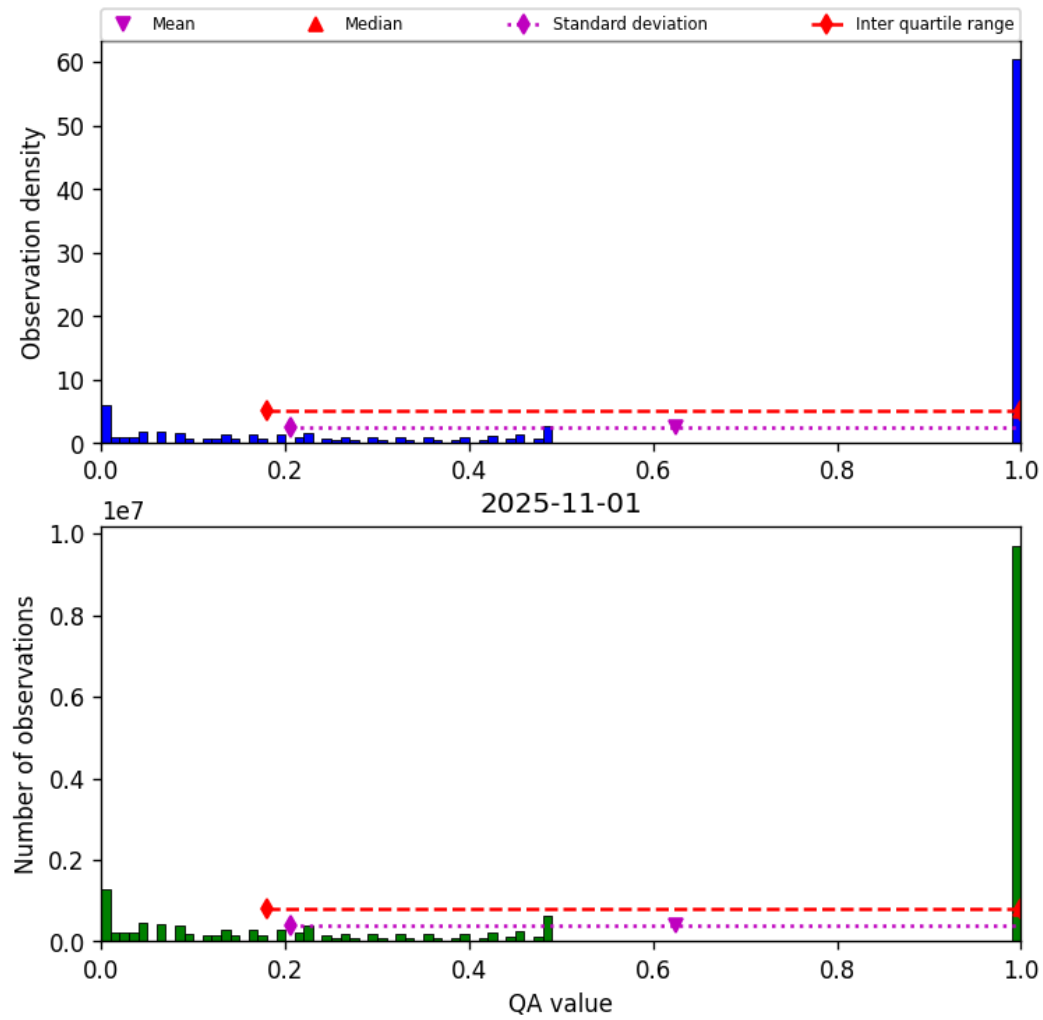


Figure 57: Histogram of “QA value” for 2025-11-01 to 2025-11-02

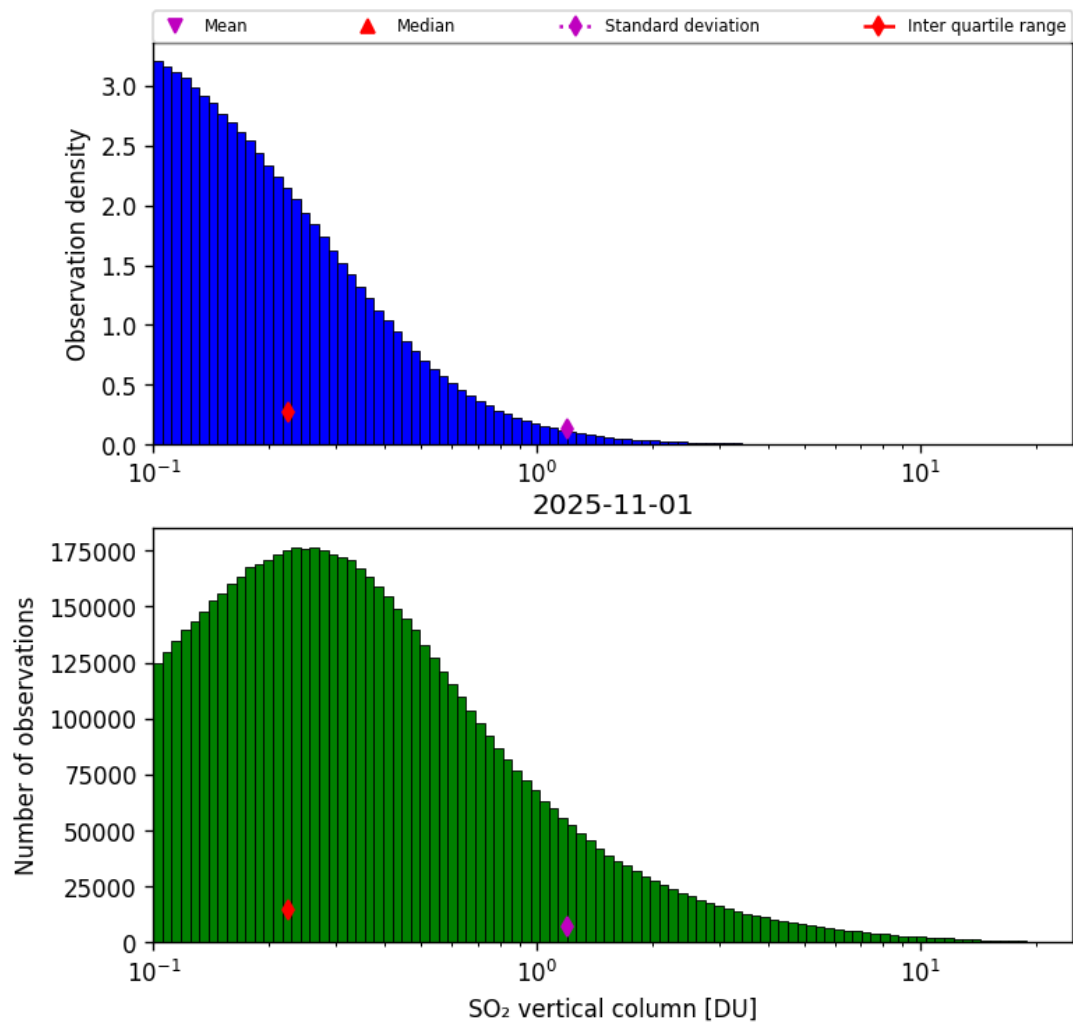


Figure 58: Histogram of “SO₂ vertical column” for 2025-11-01 to 2025-11-02

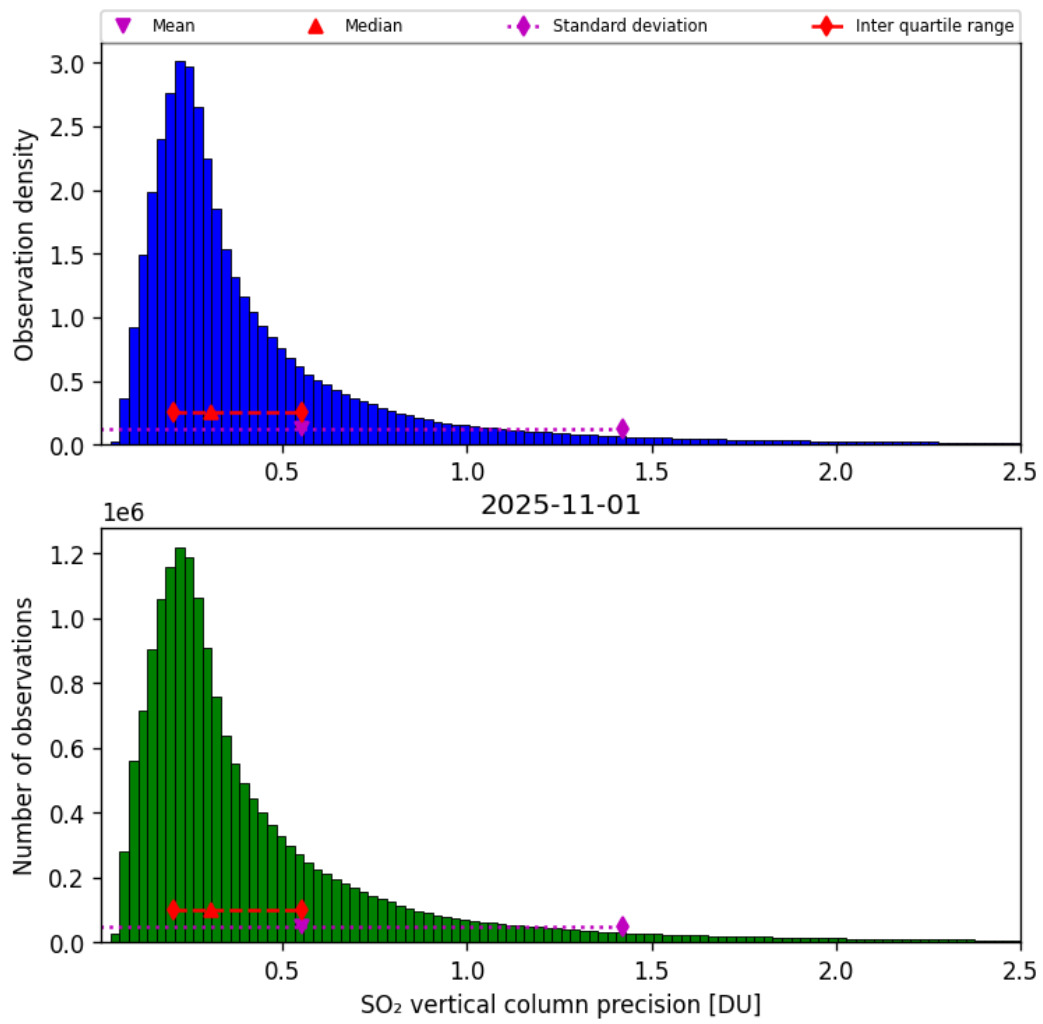


Figure 59: Histogram of “SO₂ vertical column precision” for 2025-11-01 to 2025-11-02

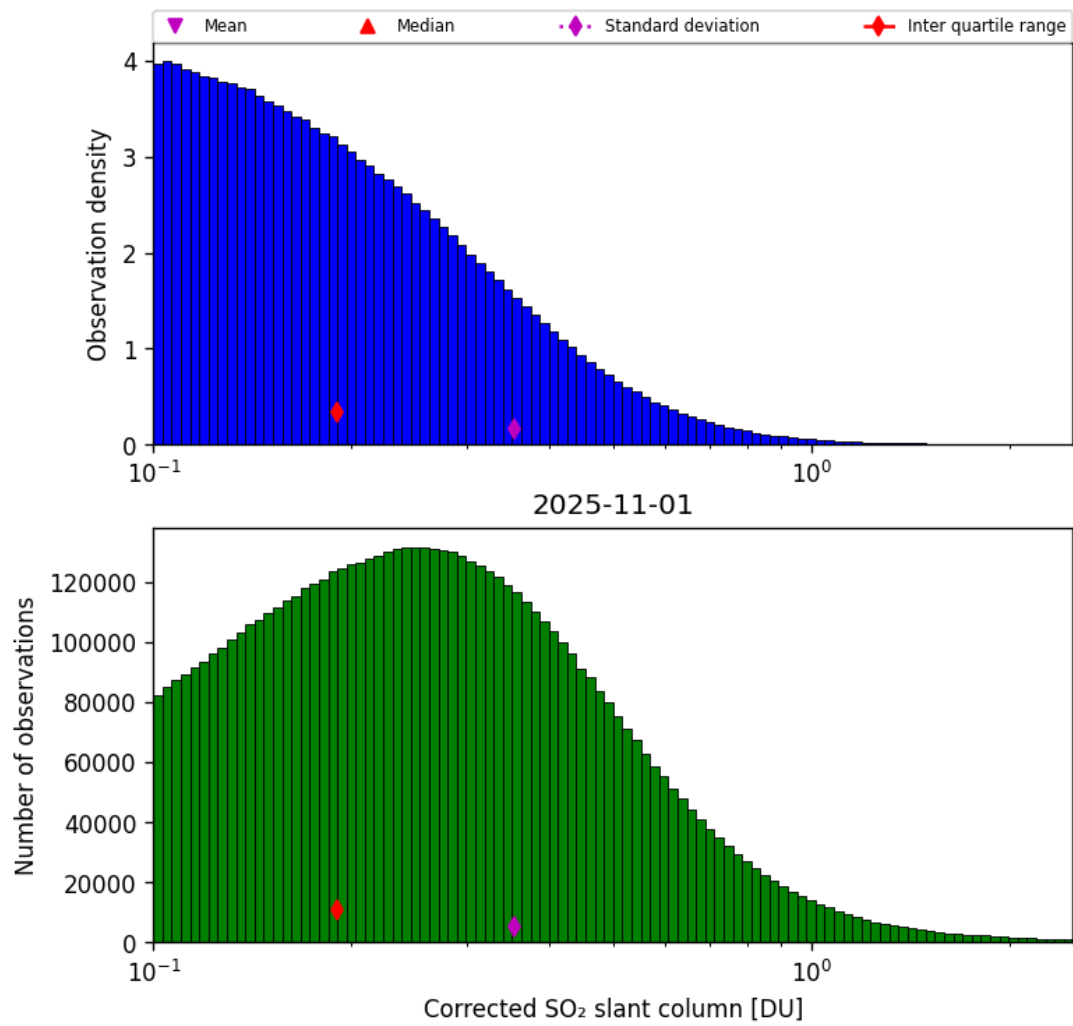


Figure 60: Histogram of “Corrected SO₂ slant column” for 2025-11-01 to 2025-11-02

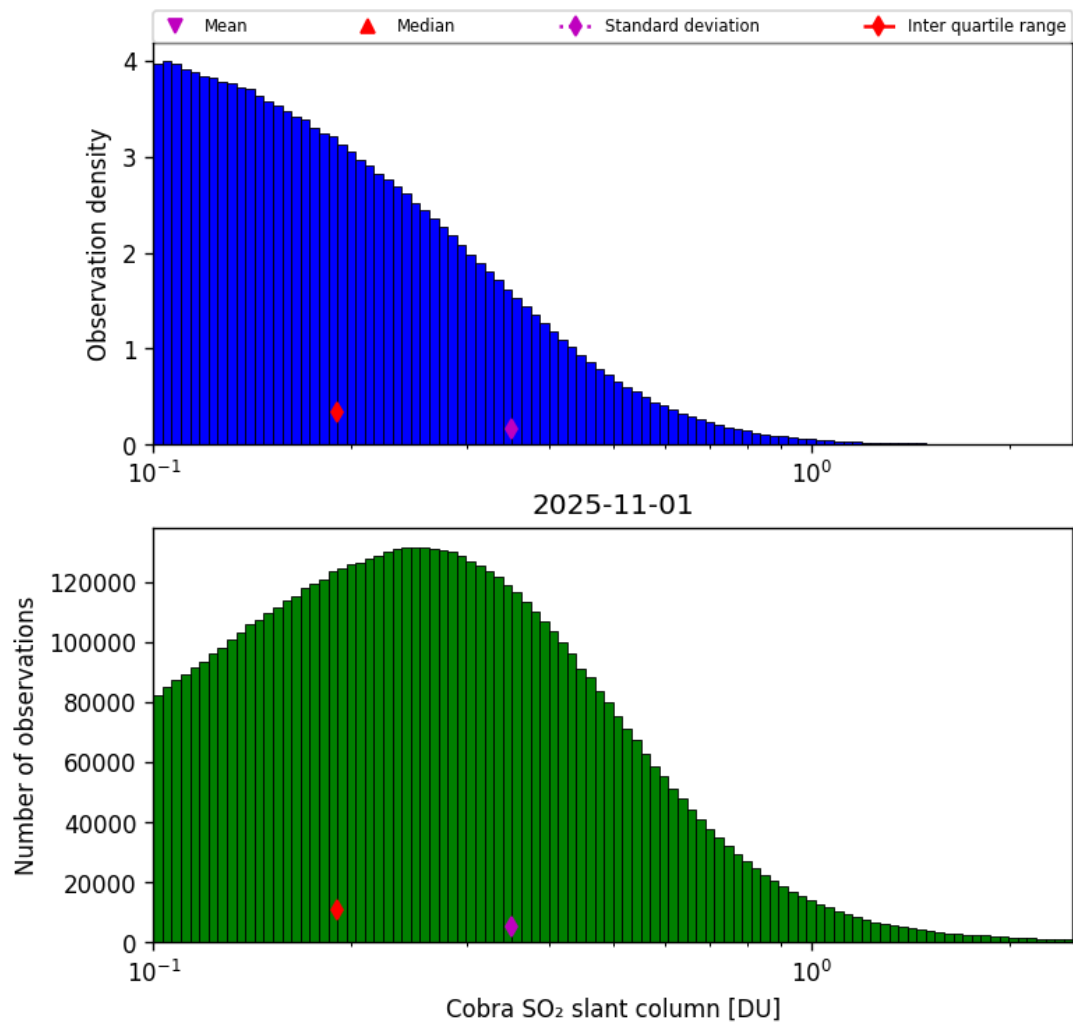


Figure 61: Histogram of “Cobra SO₂ slant column” for 2025-11-01 to 2025-11-02

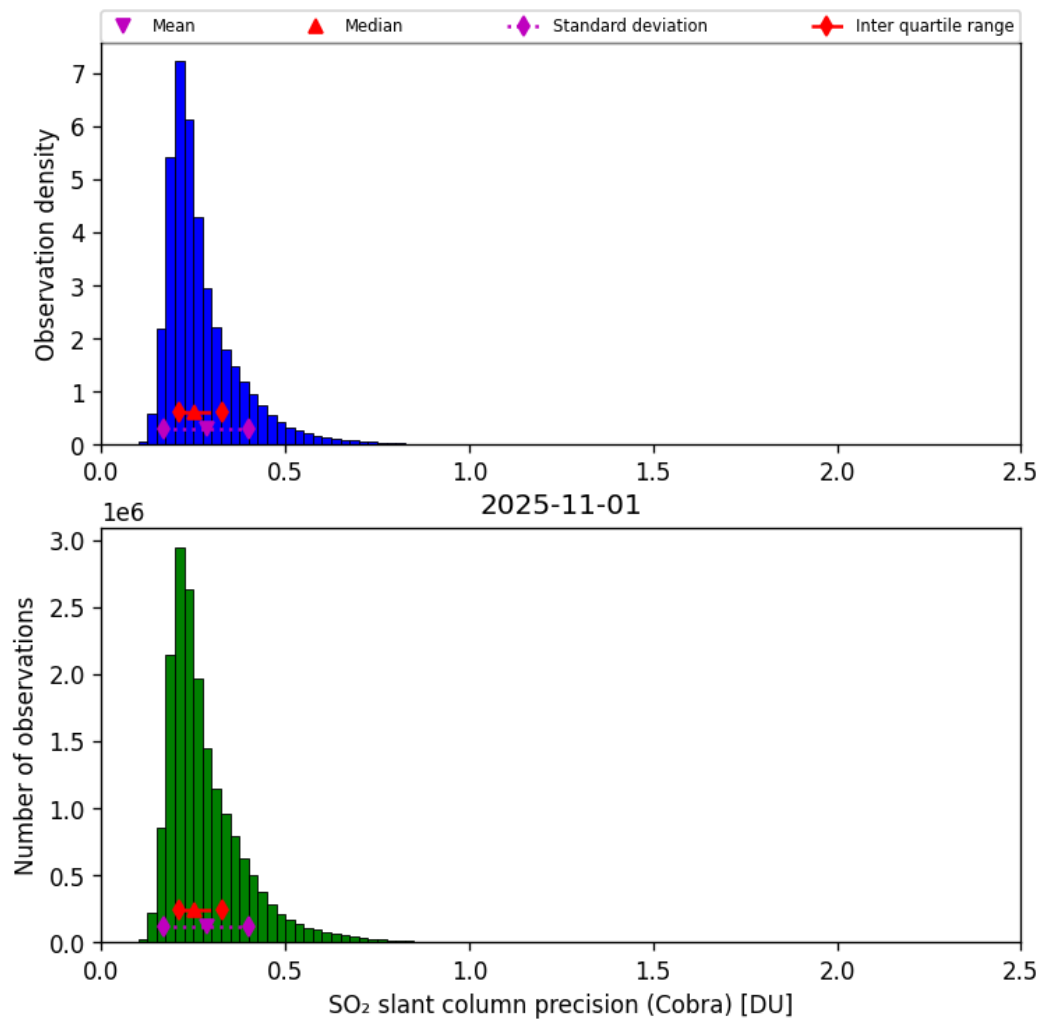


Figure 62: Histogram of “SO₂ slant column precision (Cobra)” for 2025-11-01 to 2025-11-02

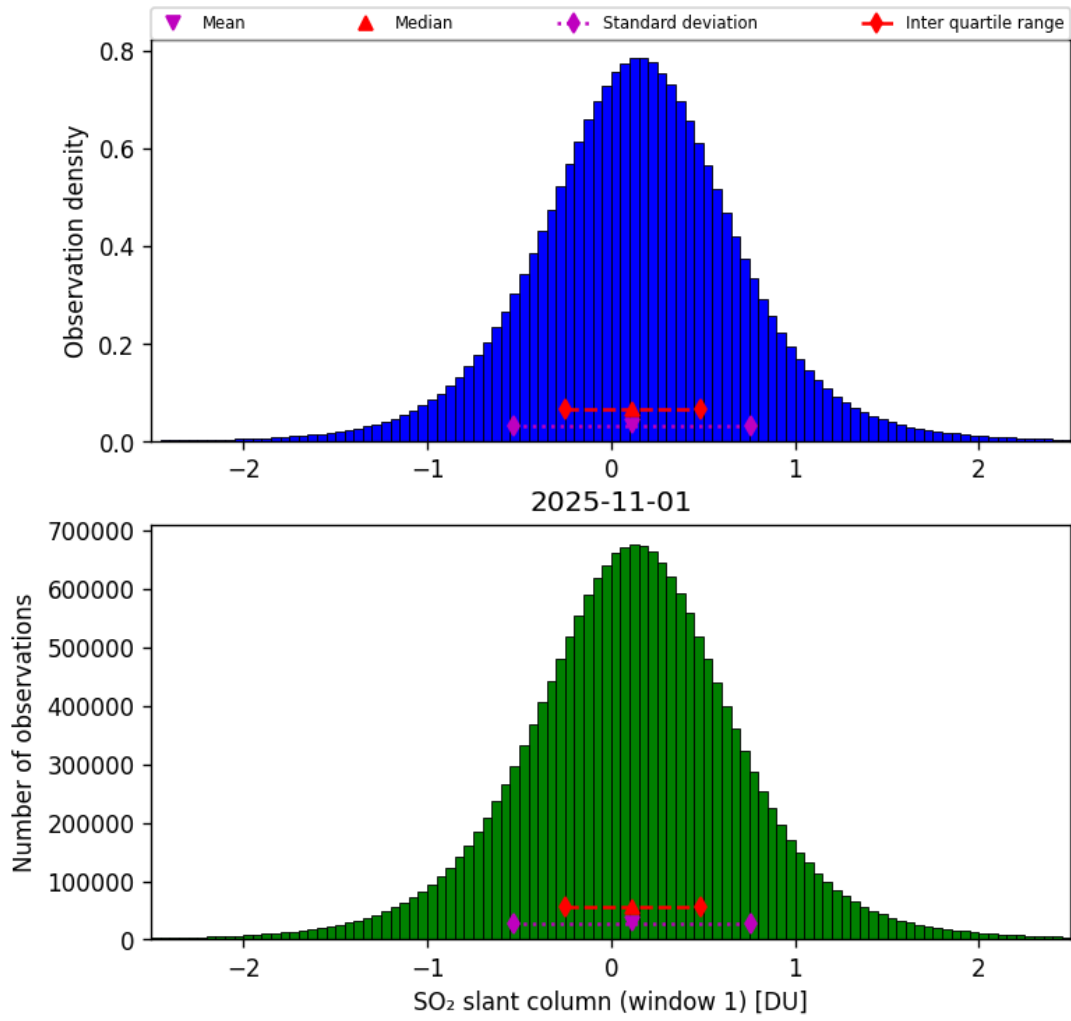


Figure 63: Histogram of “SO₂ slant column (window 1)” for 2025-11-01 to 2025-11-02

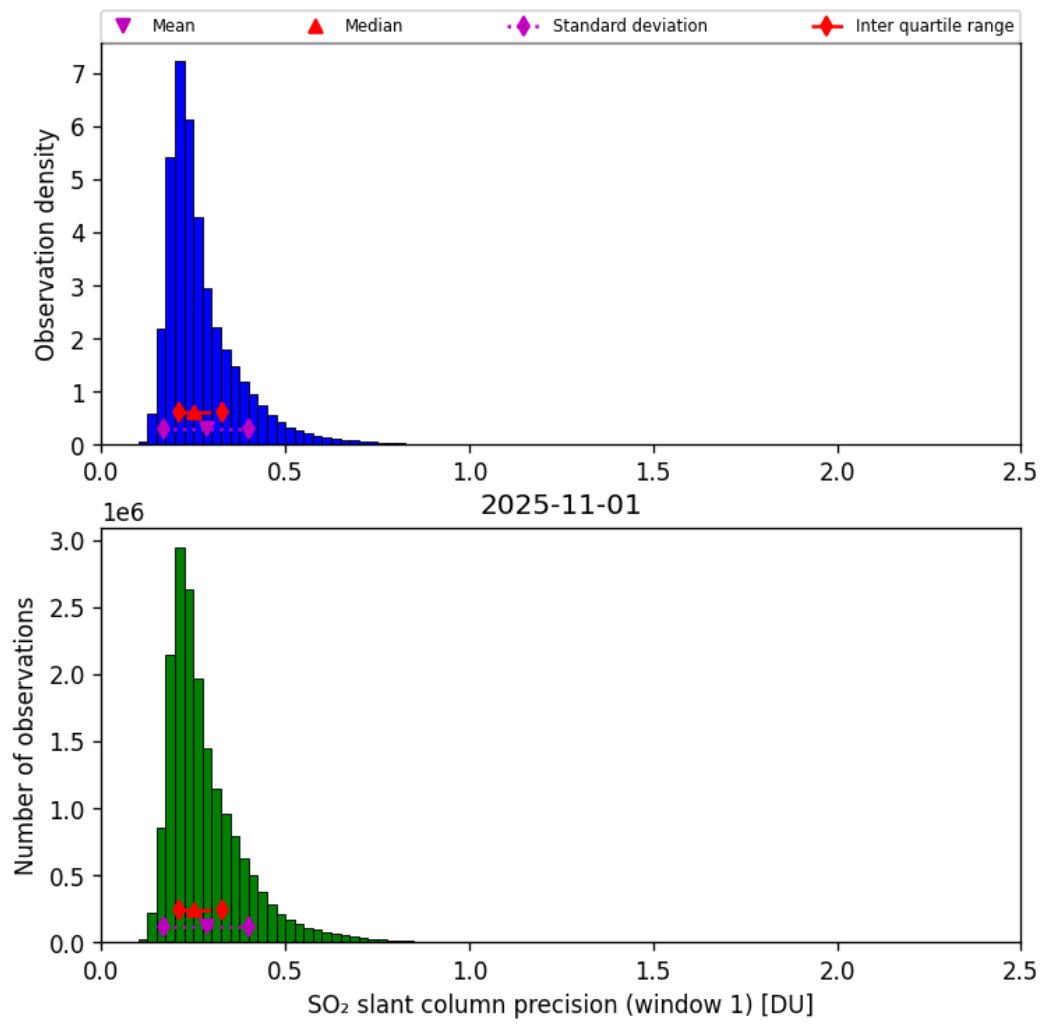


Figure 64: Histogram of “SO₂ slant column precision (window 1)” for 2025-11-01 to 2025-11-02

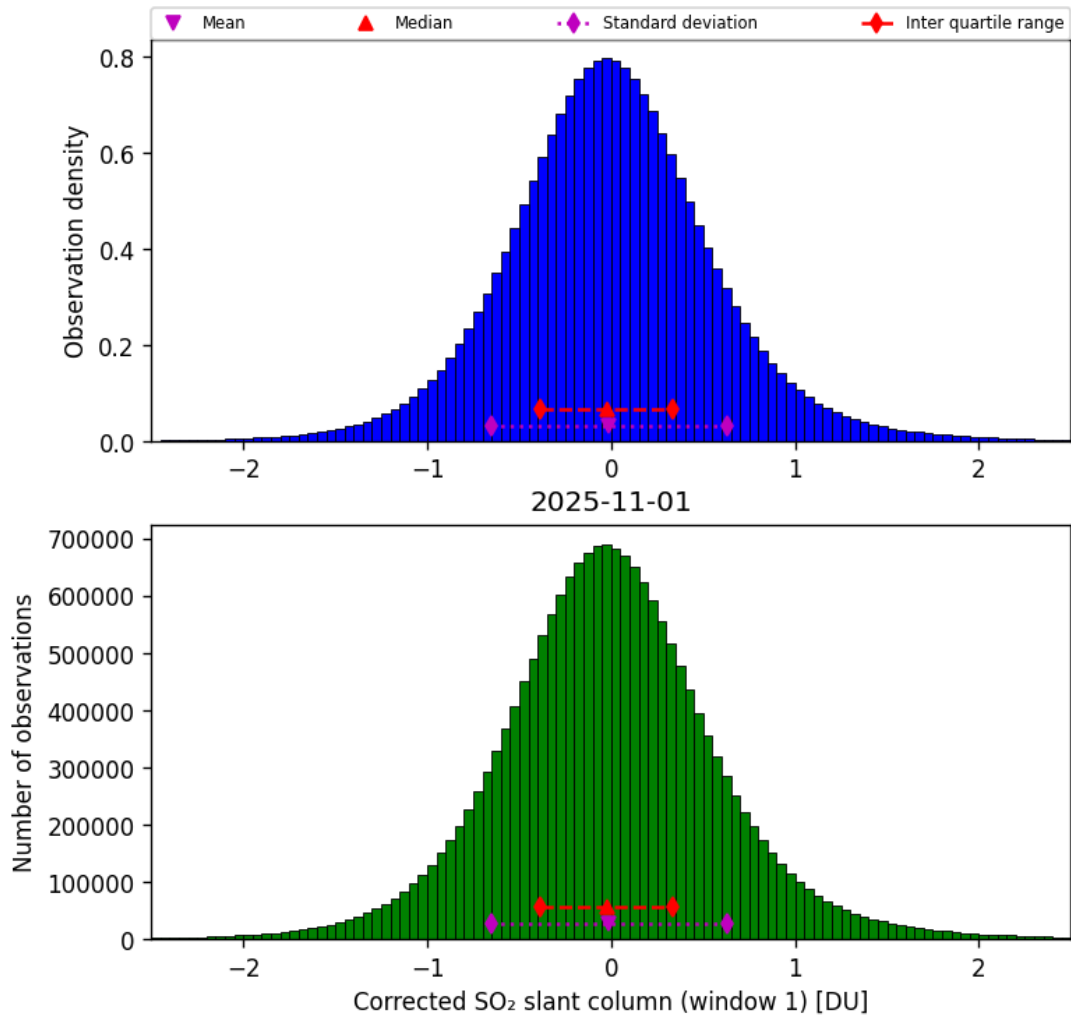


Figure 65: Histogram of “Corrected SO₂ slant column (window 1)” for 2025-11-01 to 2025-11-02

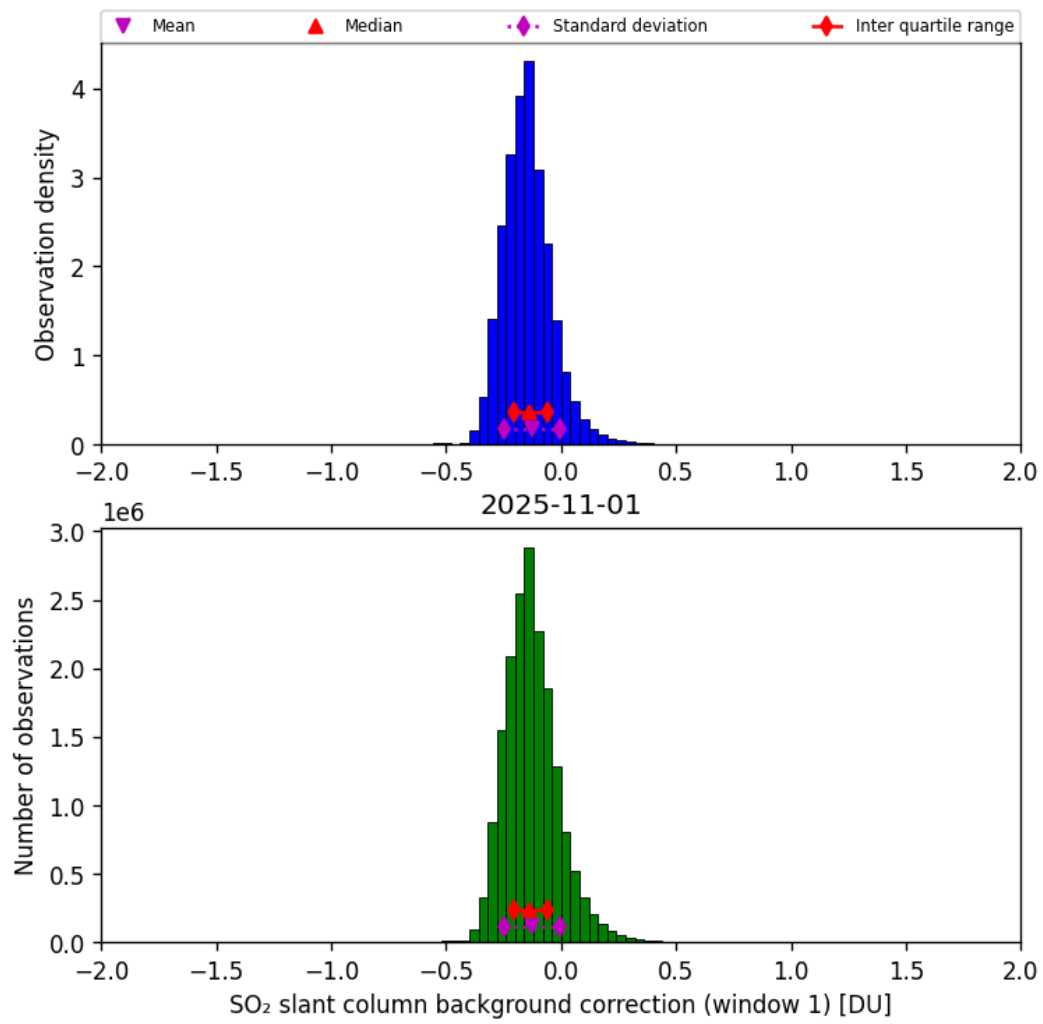


Figure 66: Histogram of “SO₂ slant column background correction (window 1)” for 2025-11-01 to 2025-11-02

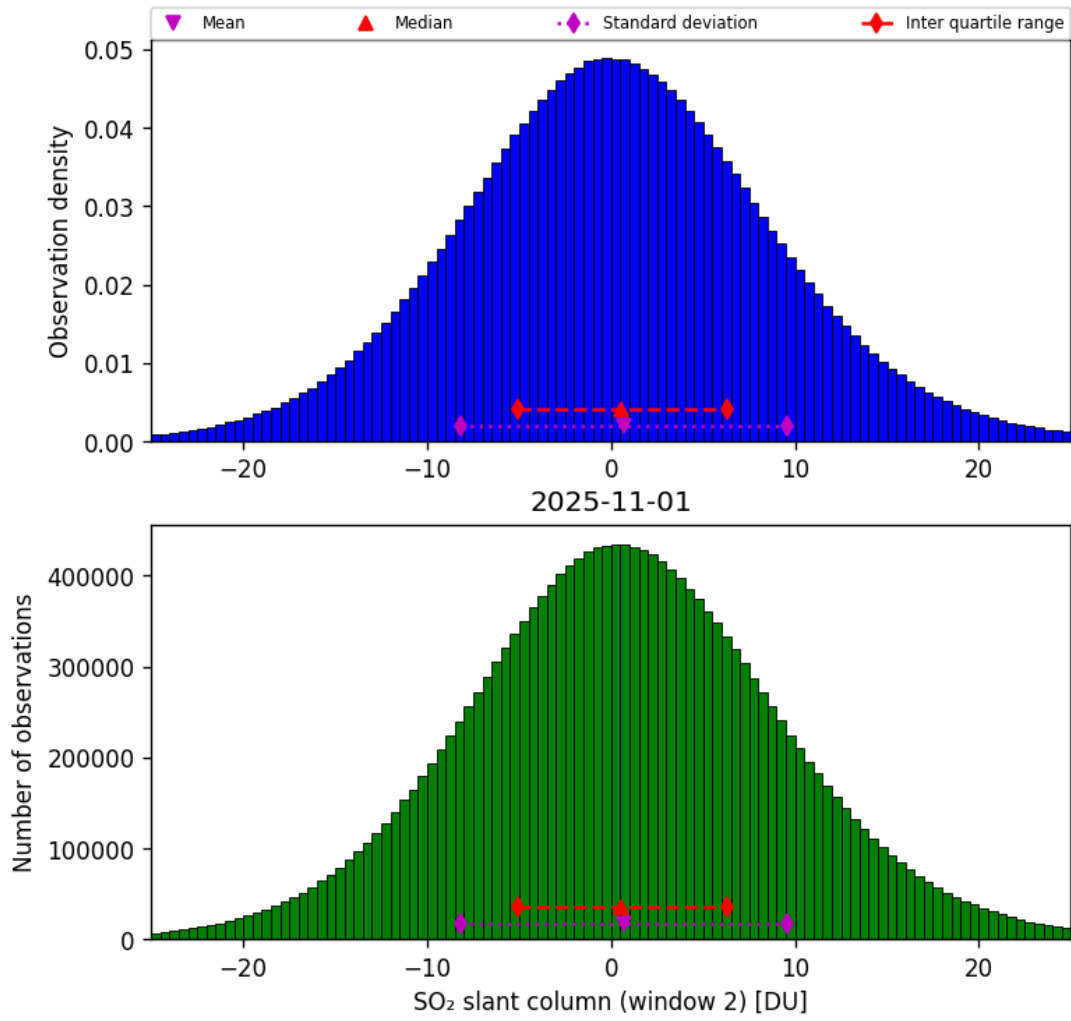


Figure 67: Histogram of “SO₂ slant column (window 2)” for 2025-11-01 to 2025-11-02

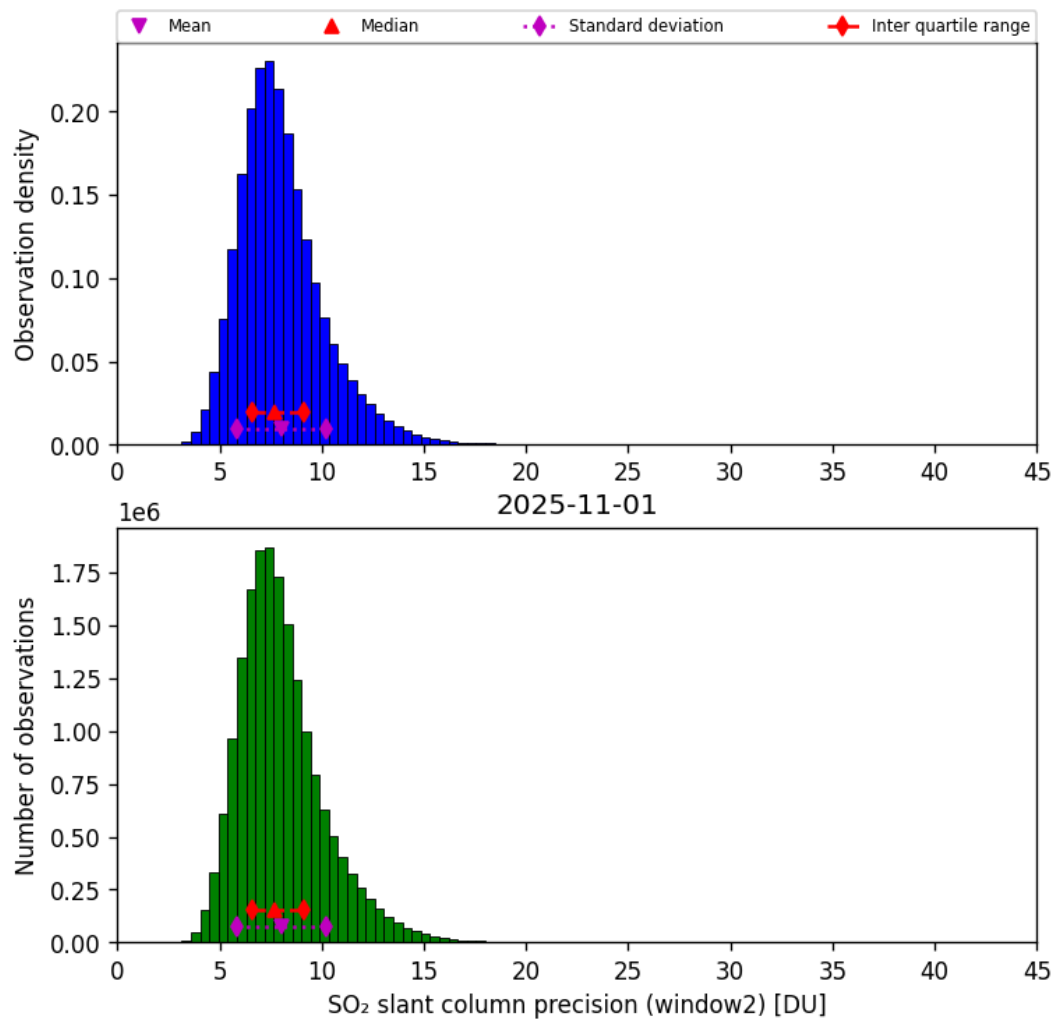


Figure 68: Histogram of “SO₂ slant column precision (window2)” for 2025-11-01 to 2025-11-02

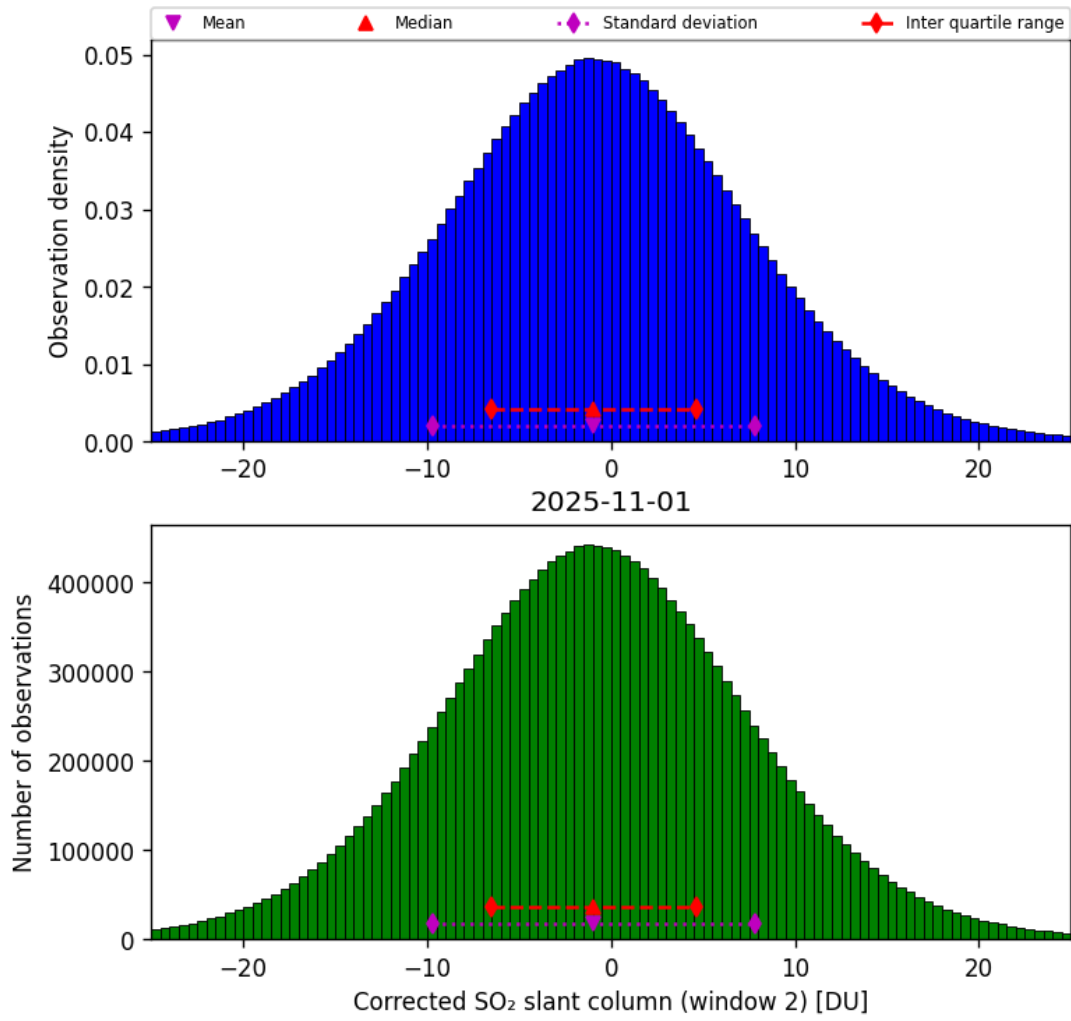


Figure 69: Histogram of “Corrected SO₂ slant column (window 2)” for 2025-11-01 to 2025-11-02

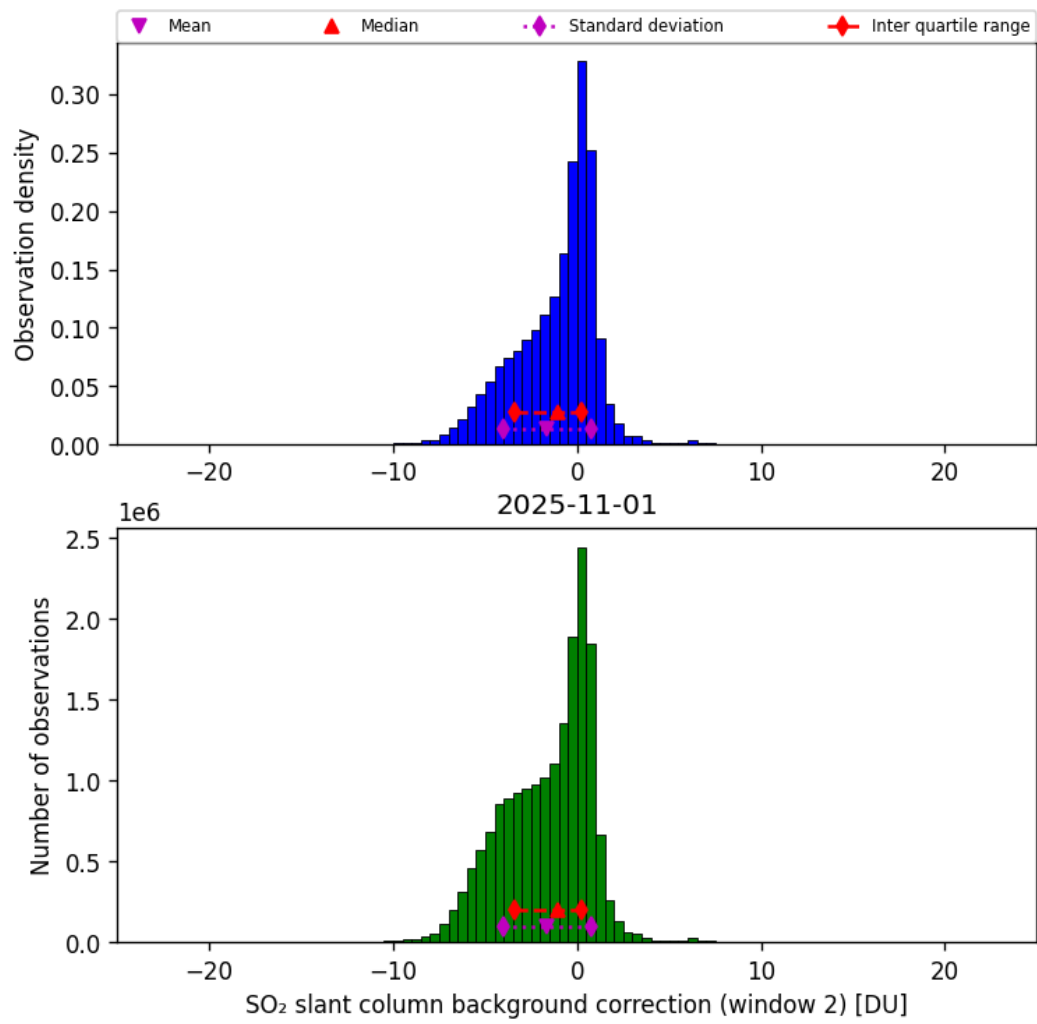


Figure 70: Histogram of “SO₂ slant column background correction (window 2)” for 2025-11-01 to 2025-11-02

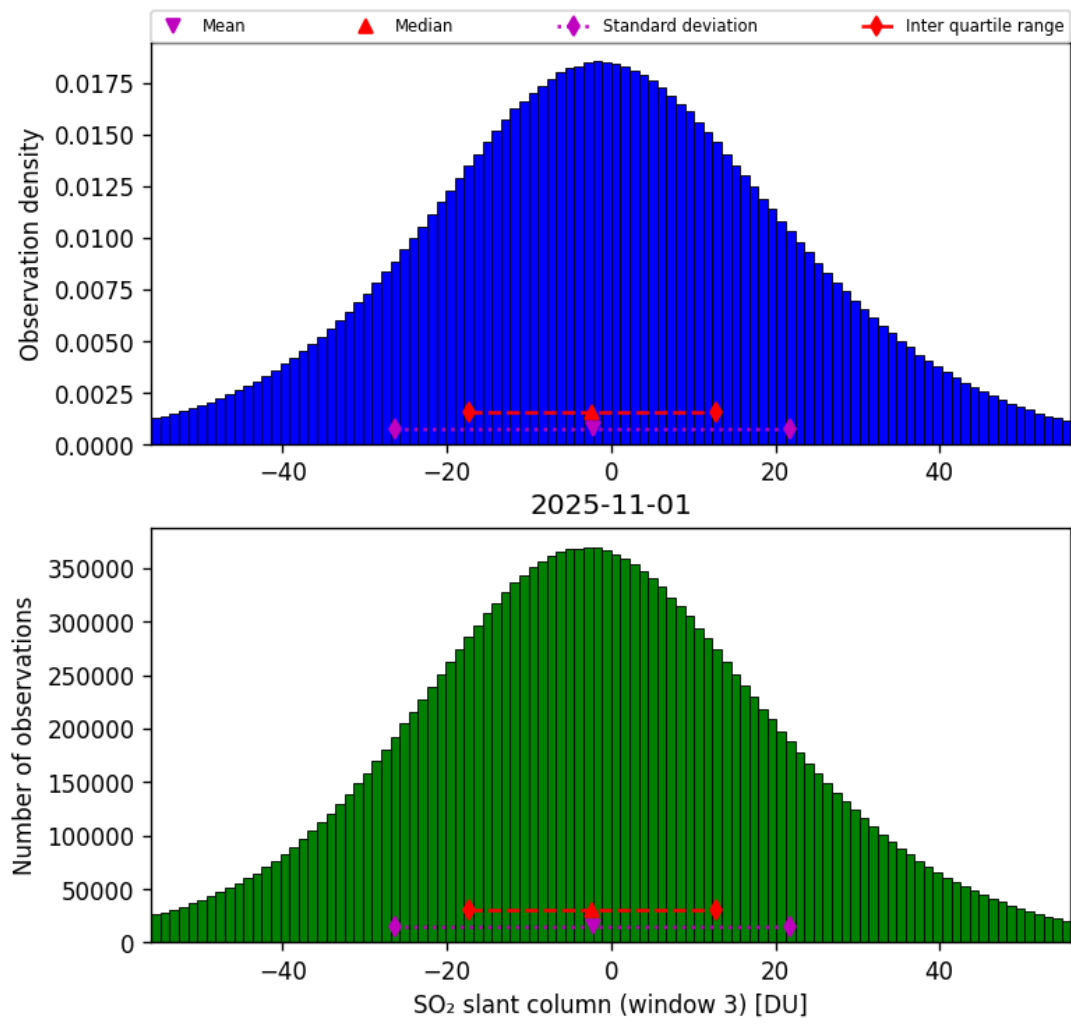


Figure 71: Histogram of “SO₂ slant column (window 3)” for 2025-11-01 to 2025-11-02

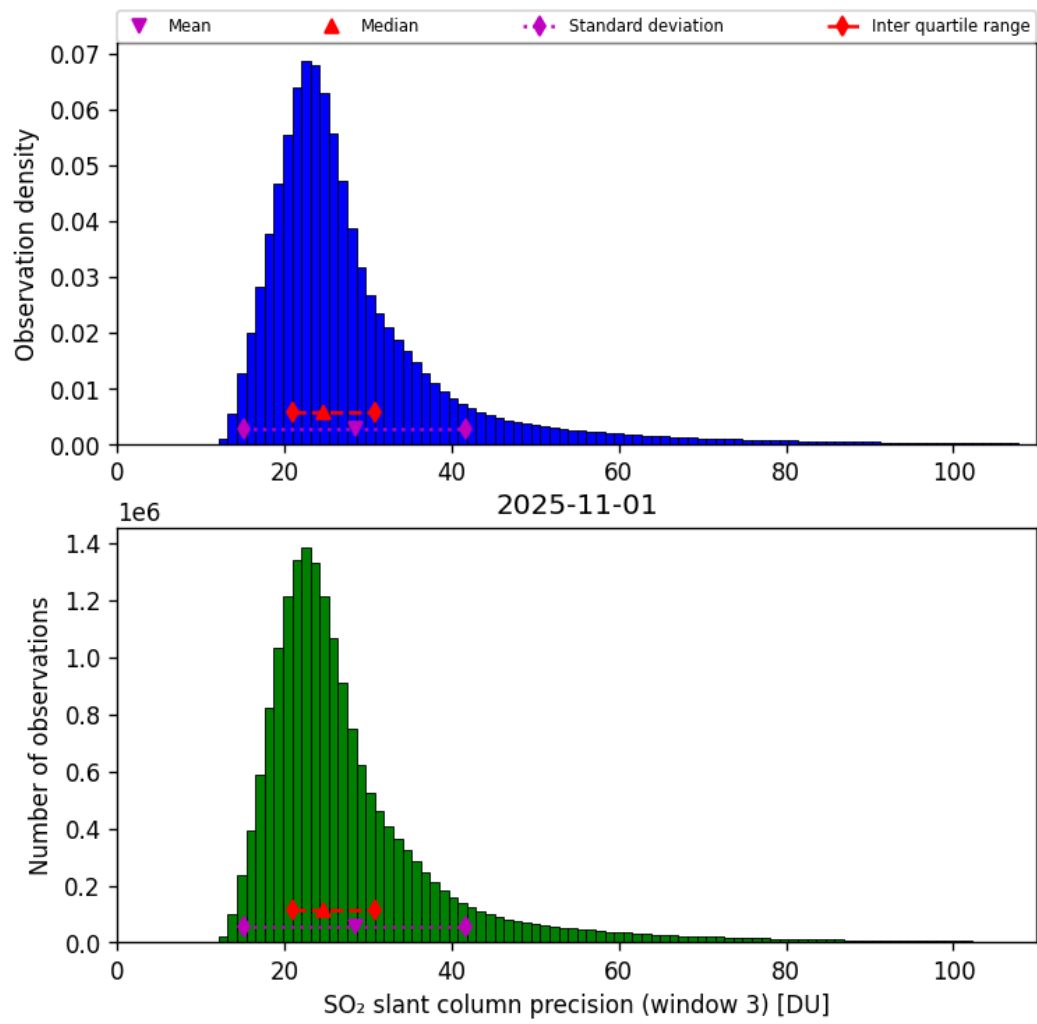


Figure 72: Histogram of “SO₂ slant column precision (window 3)” for 2025-11-01 to 2025-11-02

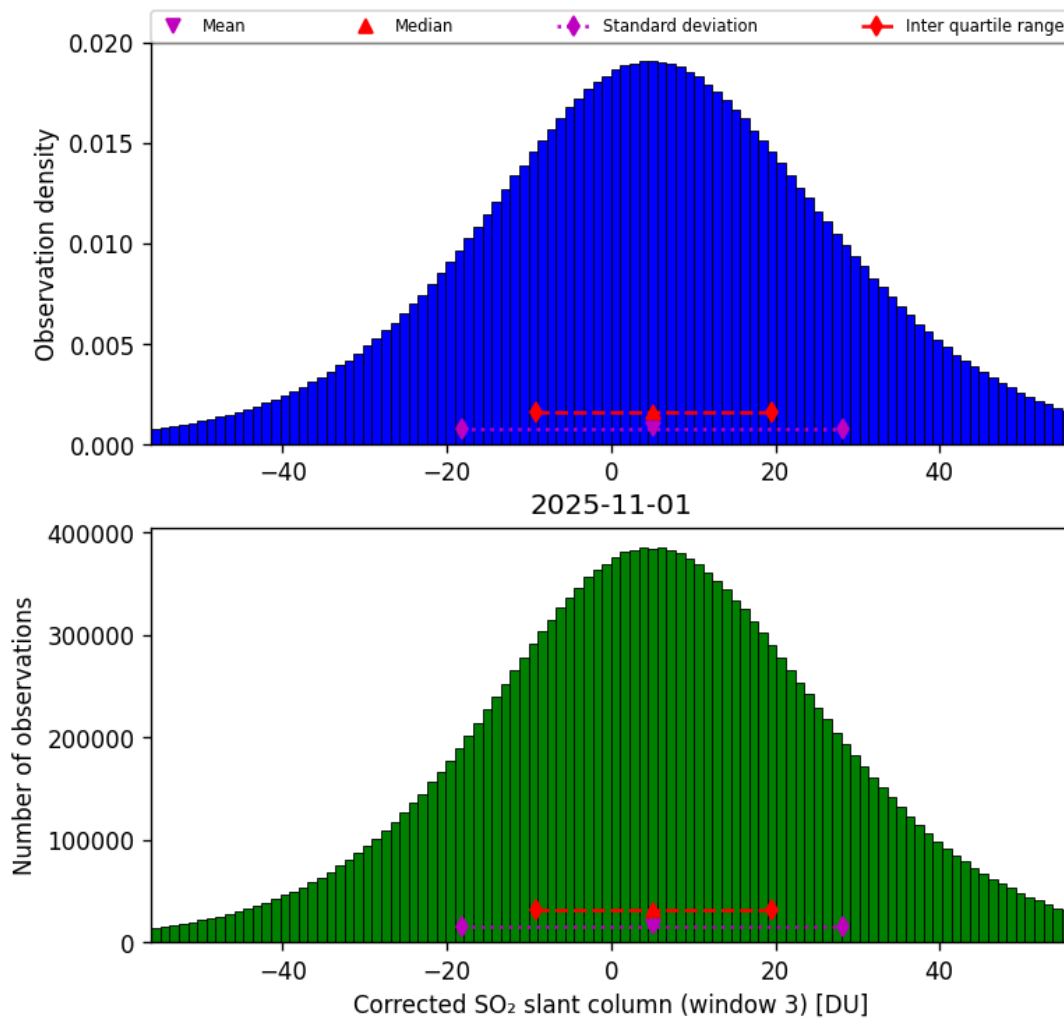


Figure 73: Histogram of “Corrected SO₂ slant column (window 3)” for 2025-11-01 to 2025-11-02

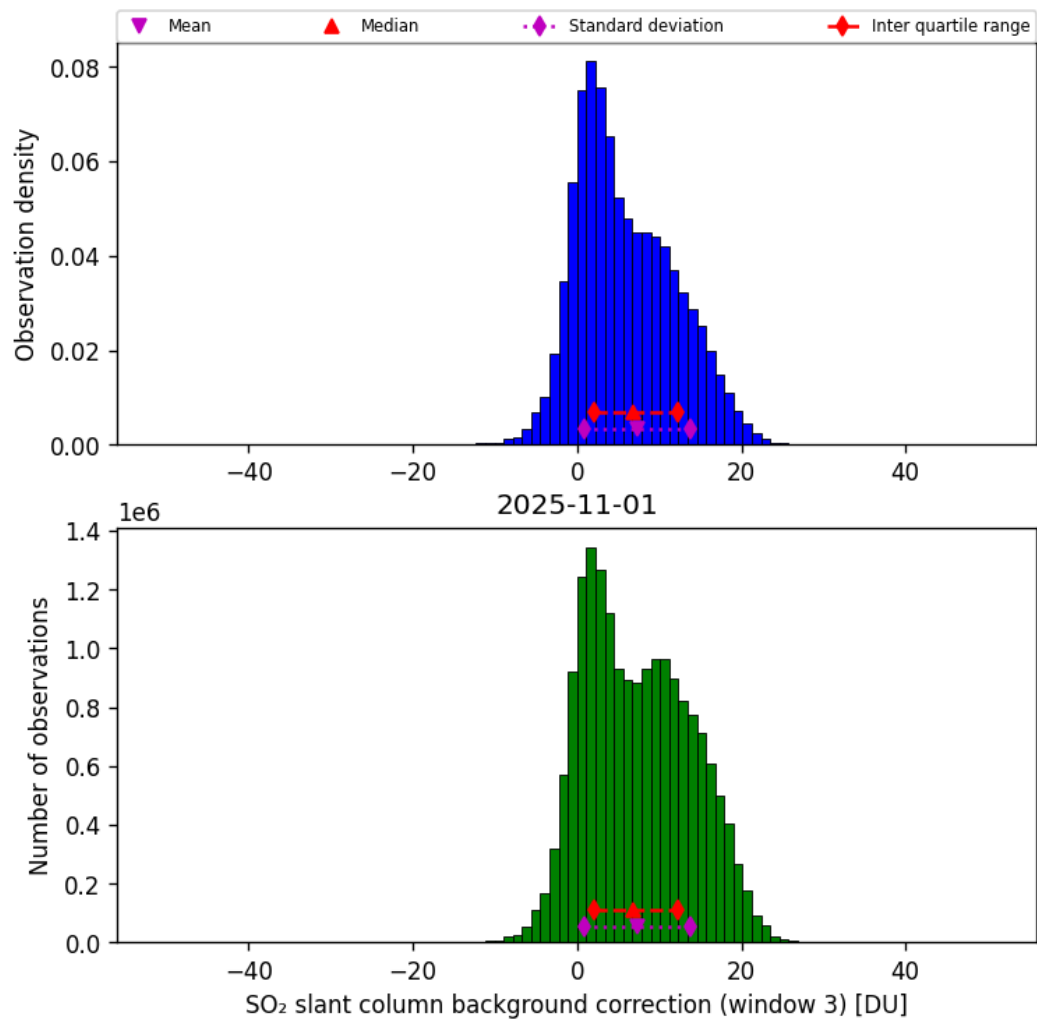


Figure 74: Histogram of “SO₂ slant column background correction (window 3)” for 2025-11-01 to 2025-11-02

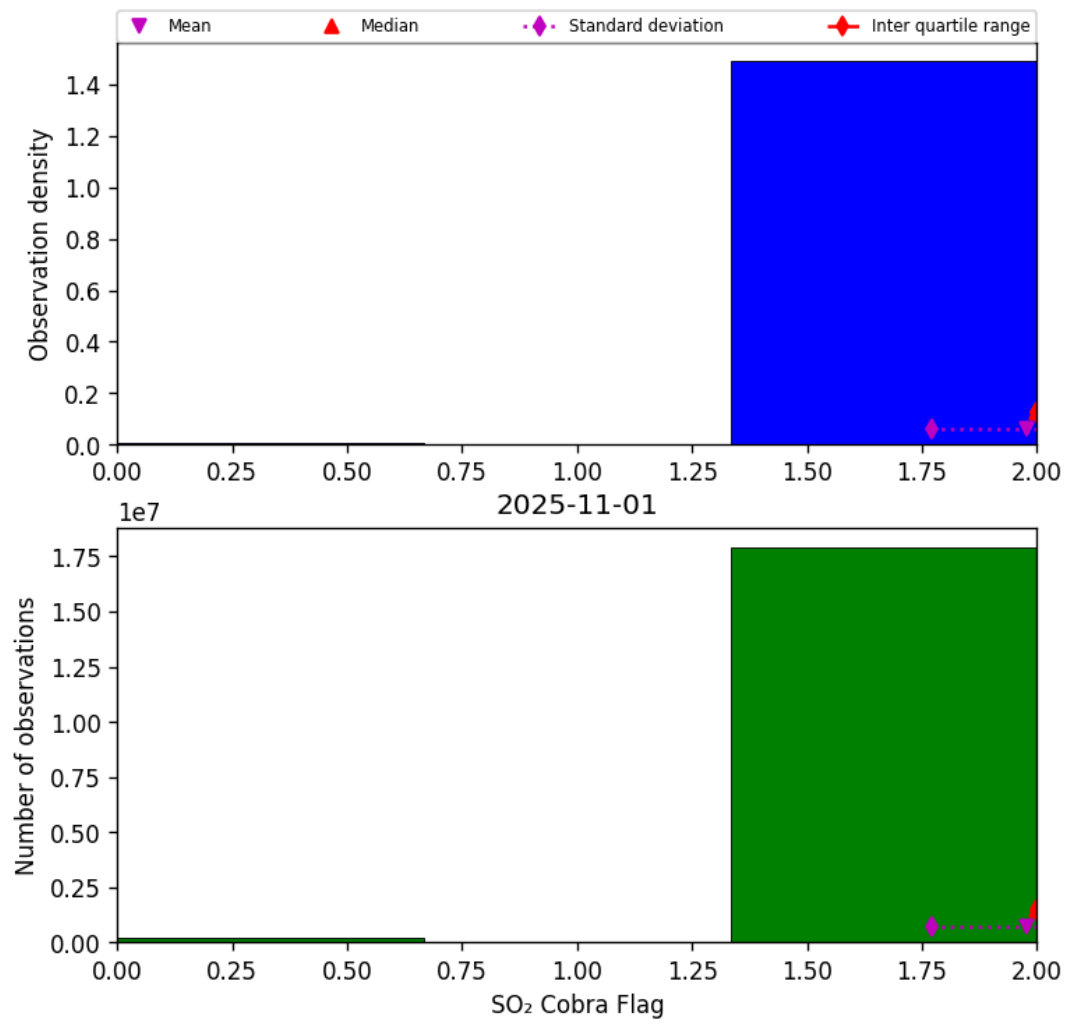


Figure 75: Histogram of “SO₂ Cobra Flag” for 2025-11-01 to 2025-11-02

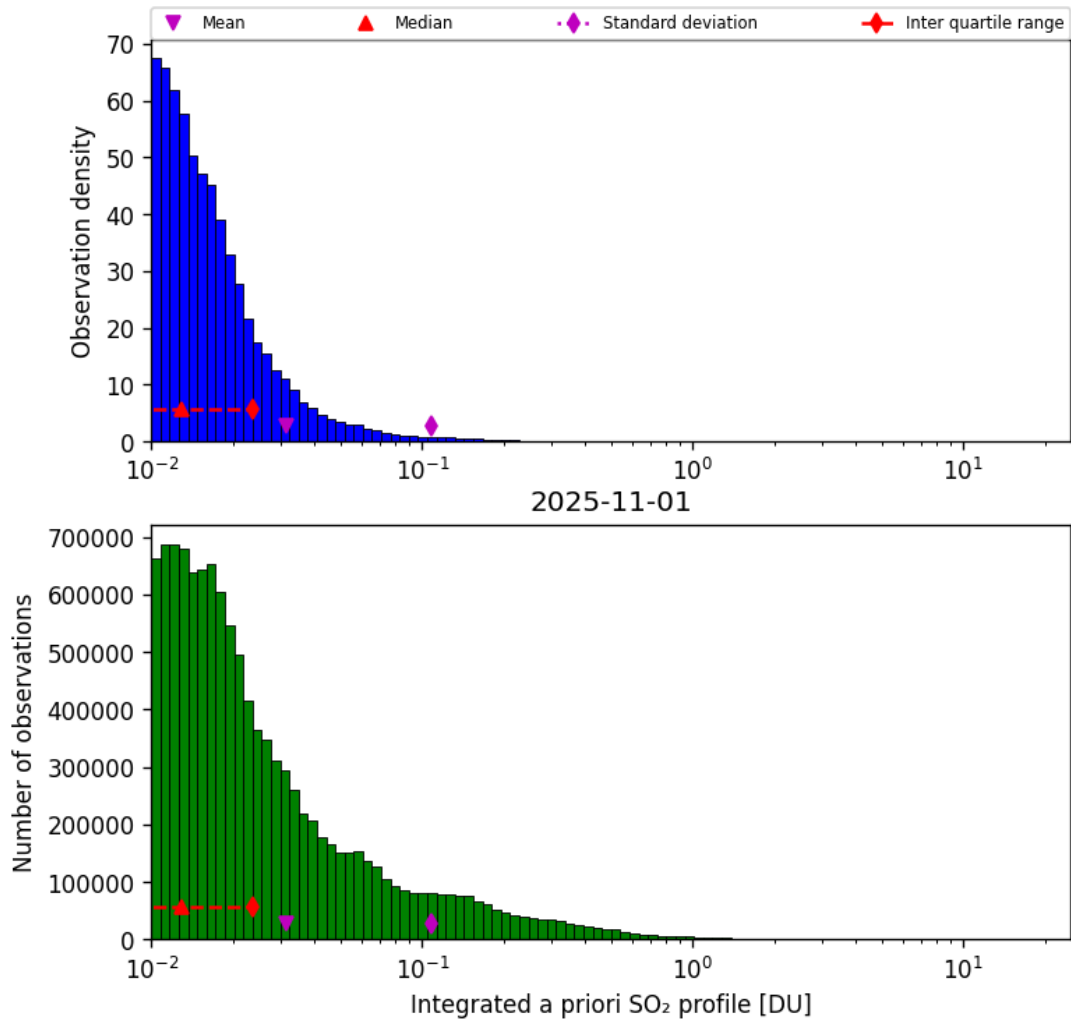


Figure 76: Histogram of “Integrated a priori SO₂ profile” for 2025-11-01 to 2025-11-02

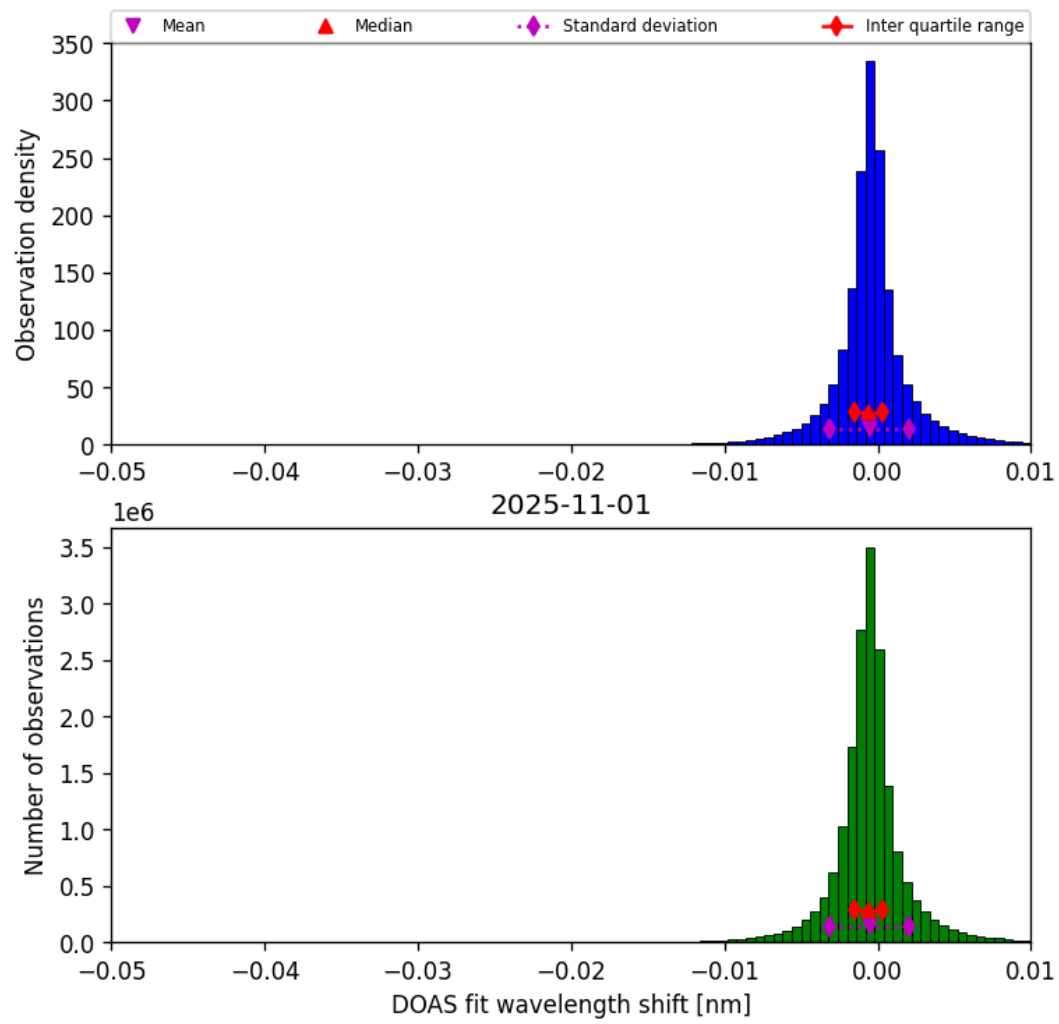


Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-11-01 to 2025-11-02

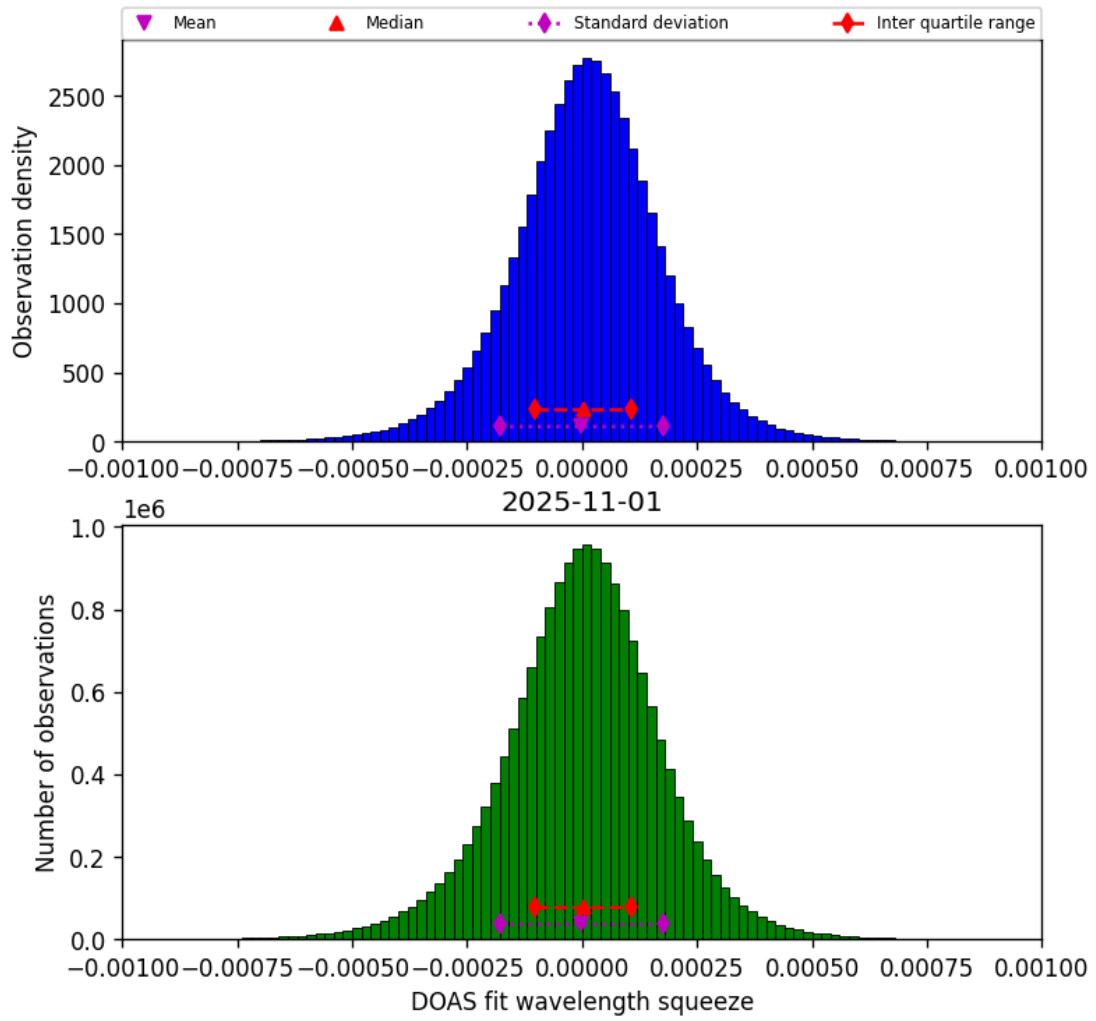


Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-11-01 to 2025-11-02

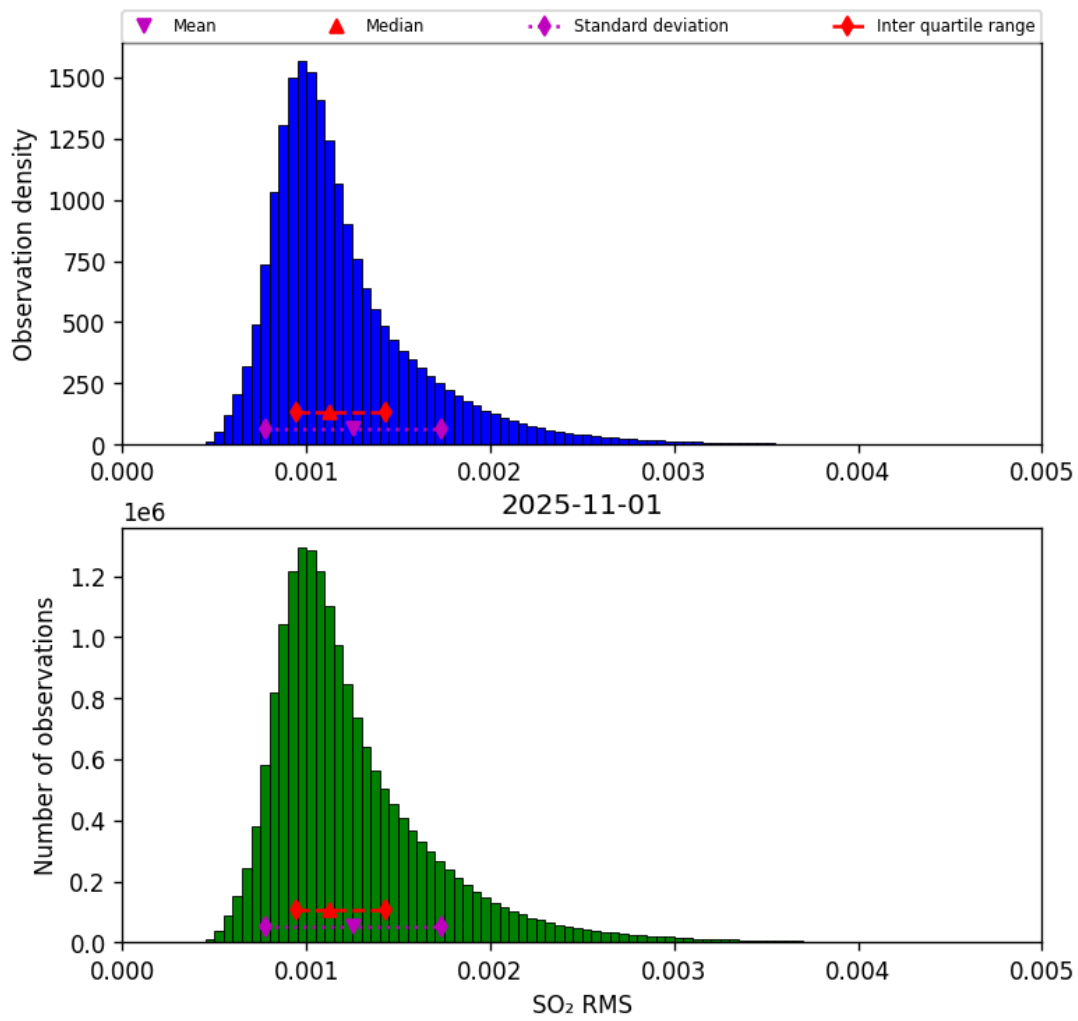


Figure 79: Histogram of “SO₂ RMS” for 2025-11-01 to 2025-11-02

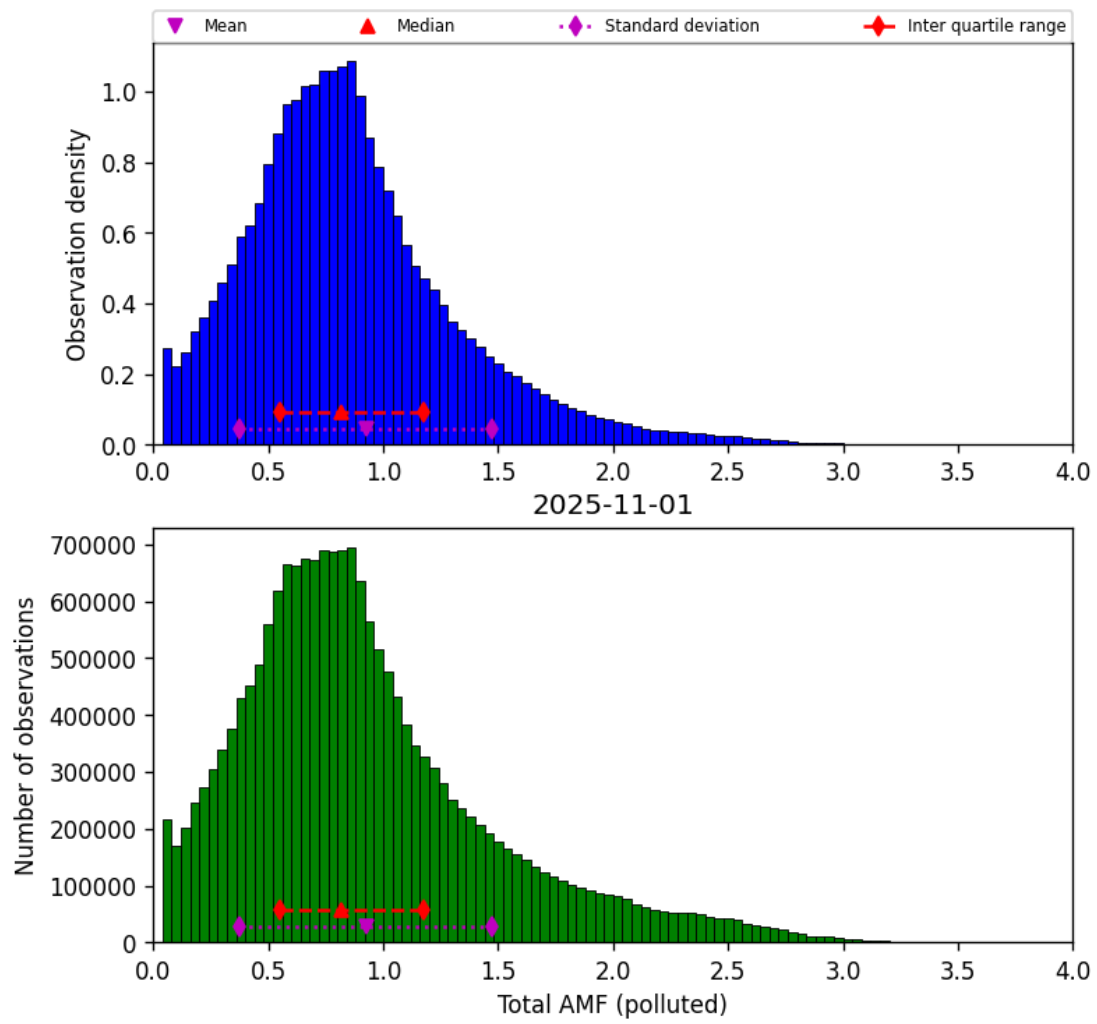


Figure 80: Histogram of “Total AMF (polluted)” for 2025-11-01 to 2025-11-02

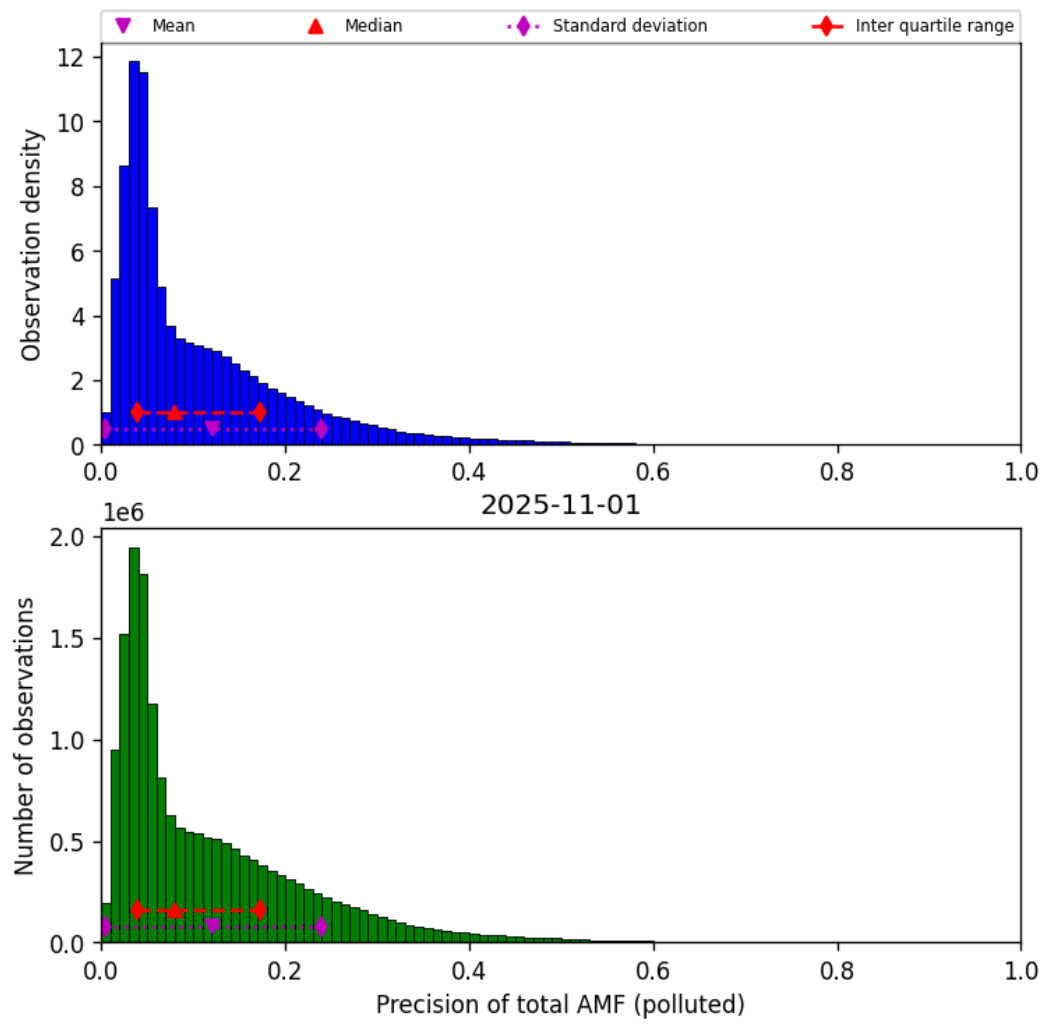


Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-11-01 to 2025-11-02

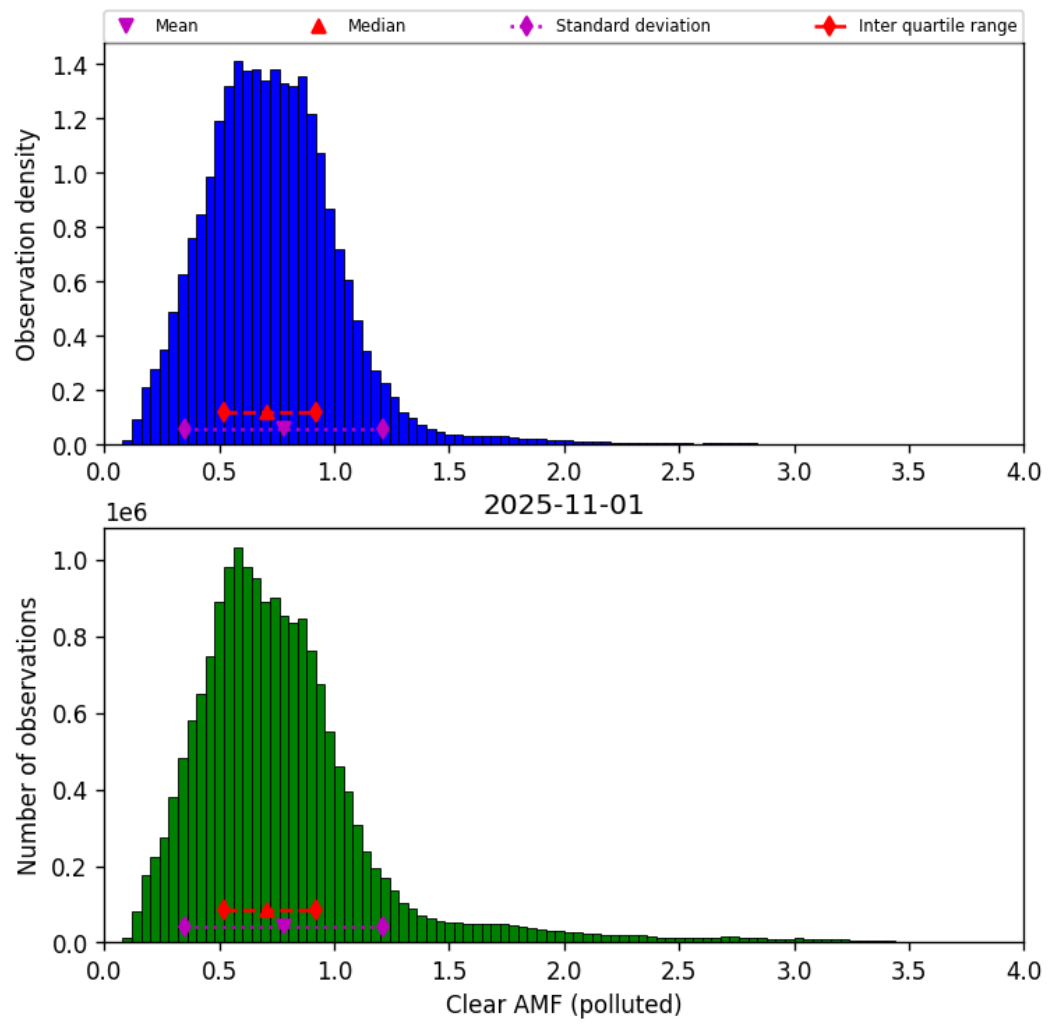


Figure 82: Histogram of “Clear AMF (polluted)” for 2025-11-01 to 2025-11-02

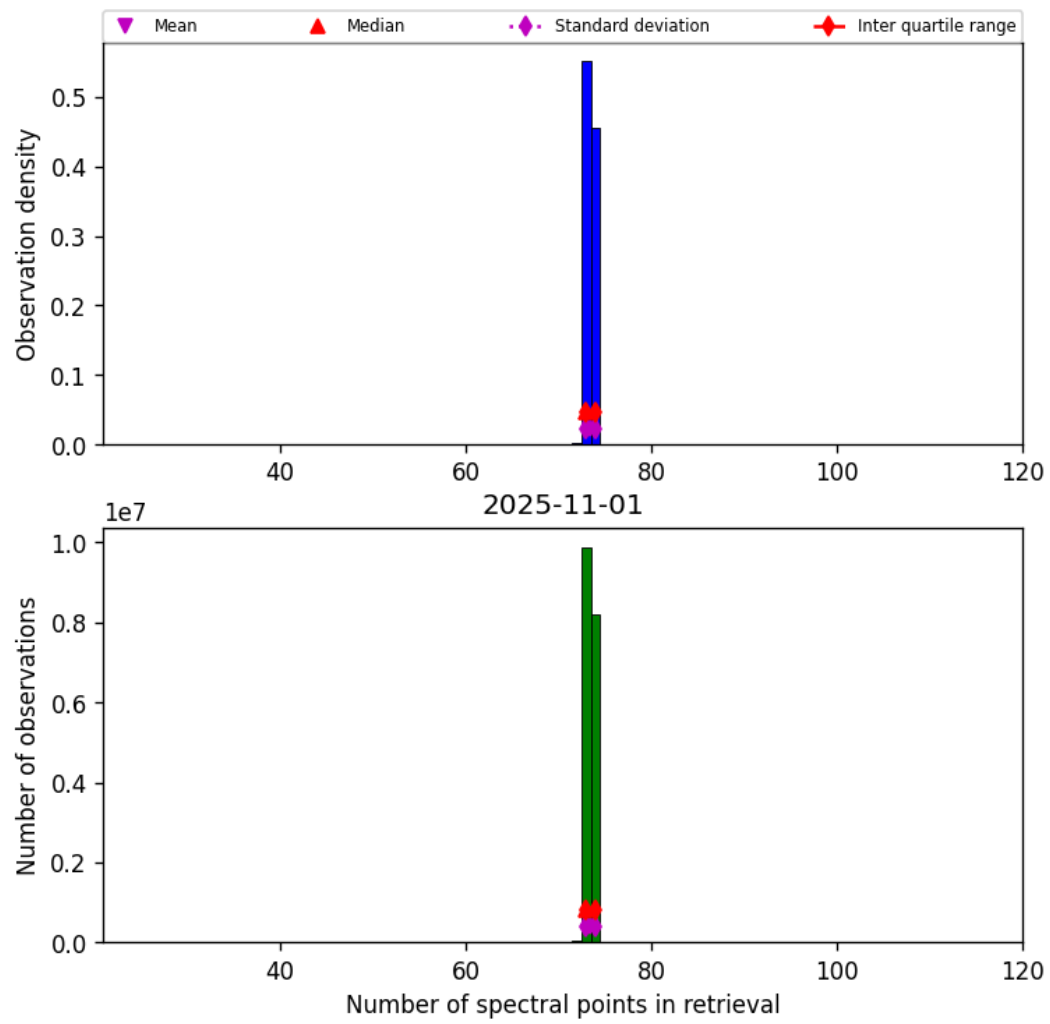


Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-11-01 to 2025-11-02

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.

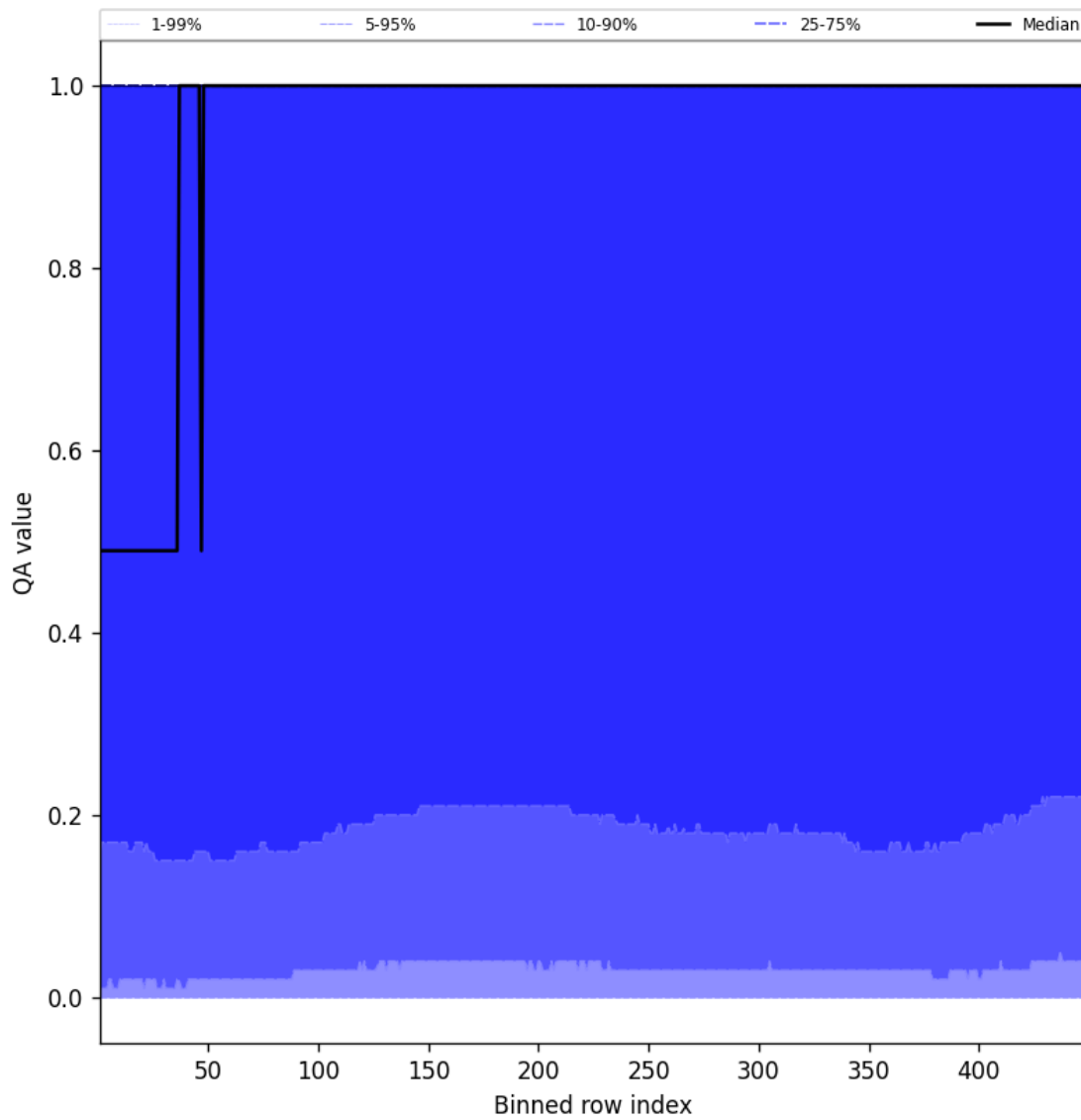


Figure 84: Along track statistics of “QA value” for 2025-11-01 to 2025-11-02

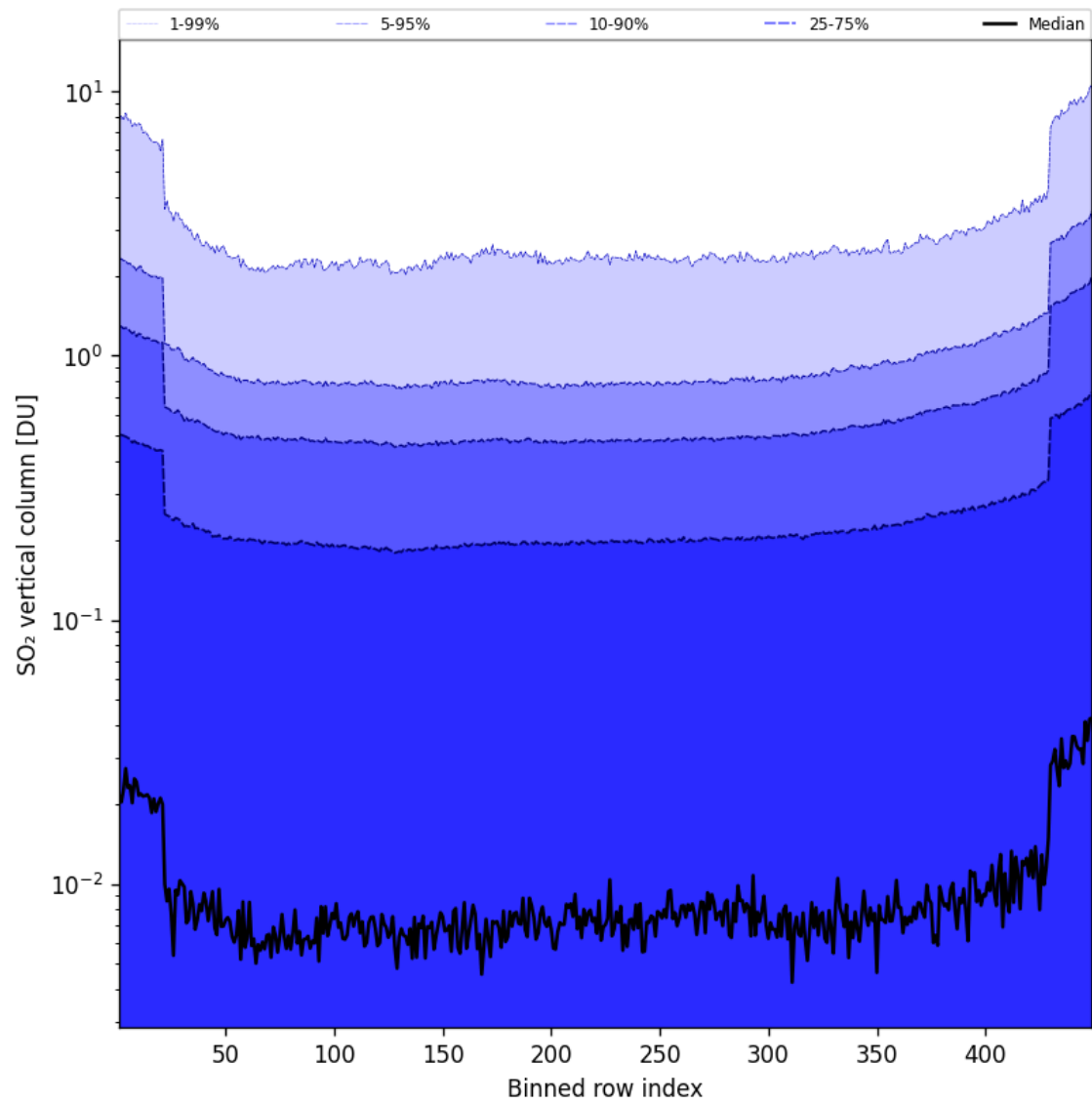


Figure 85: Along track statistics of “SO₂ vertical column” for 2025-11-01 to 2025-11-02

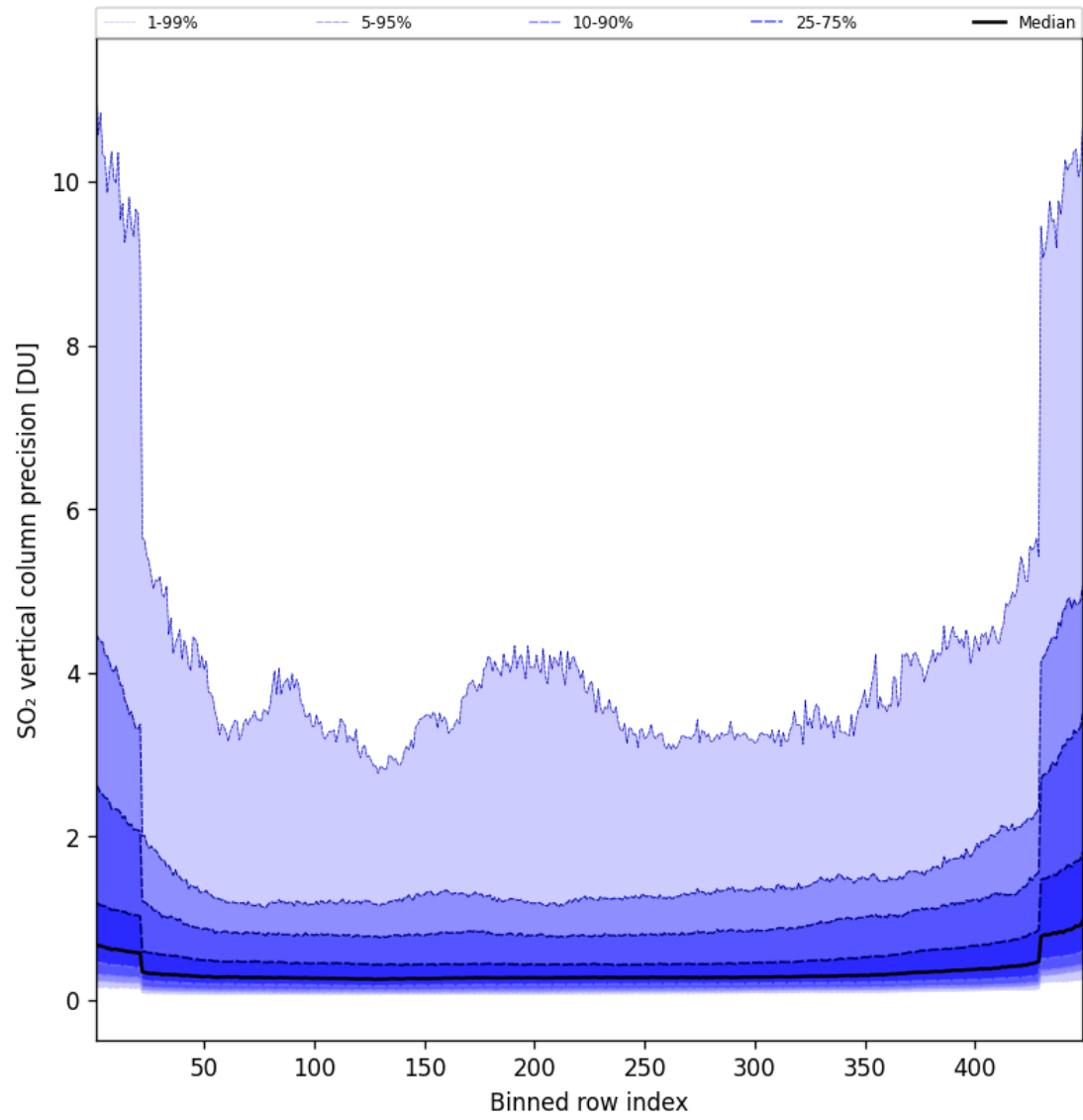


Figure 86: Along track statistics of “SO₂ vertical column precision” for 2025-11-01 to 2025-11-02

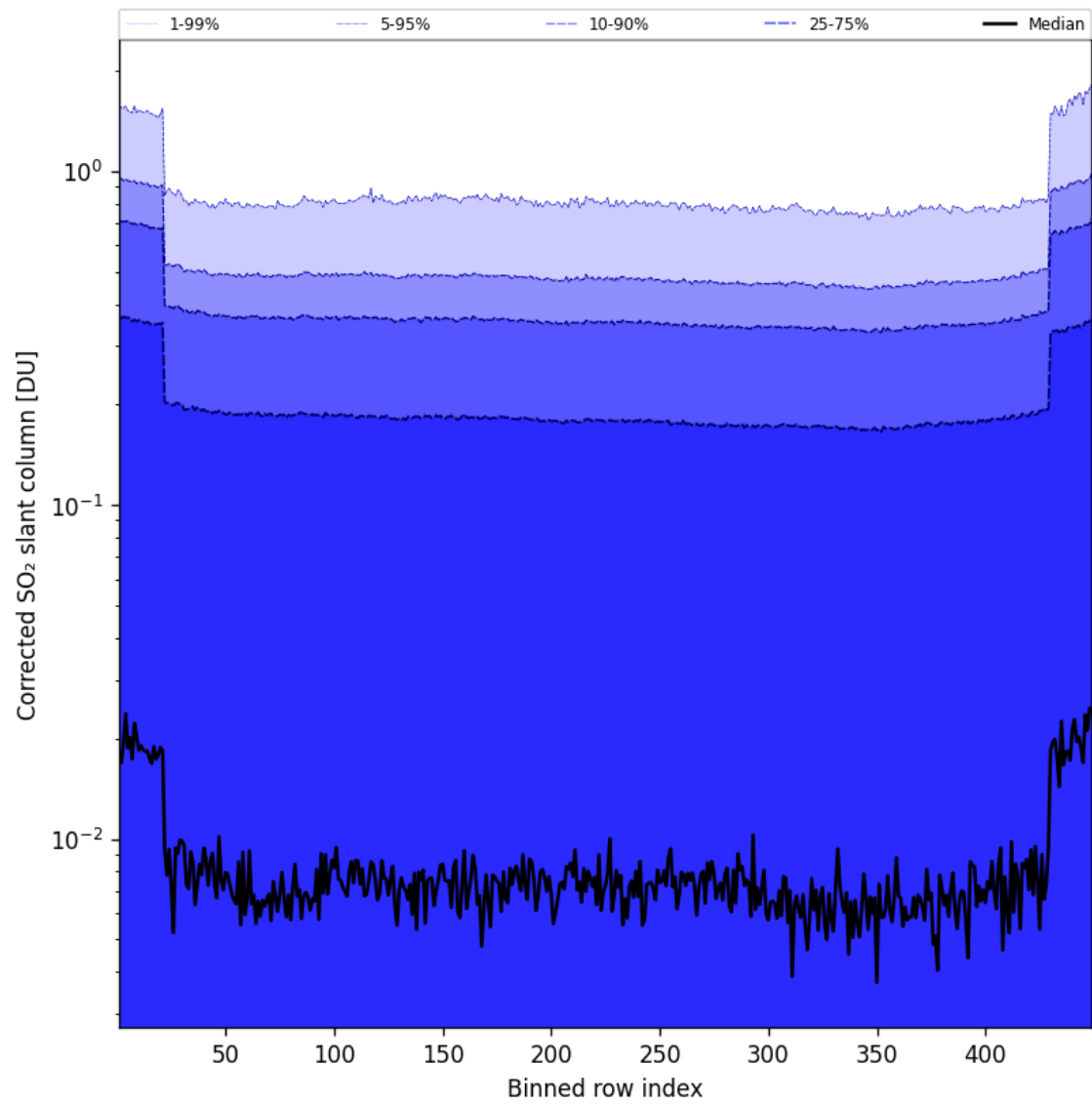


Figure 87: Along track statistics of "Corrected SO₂ slant column" for 2025-11-01 to 2025-11-02

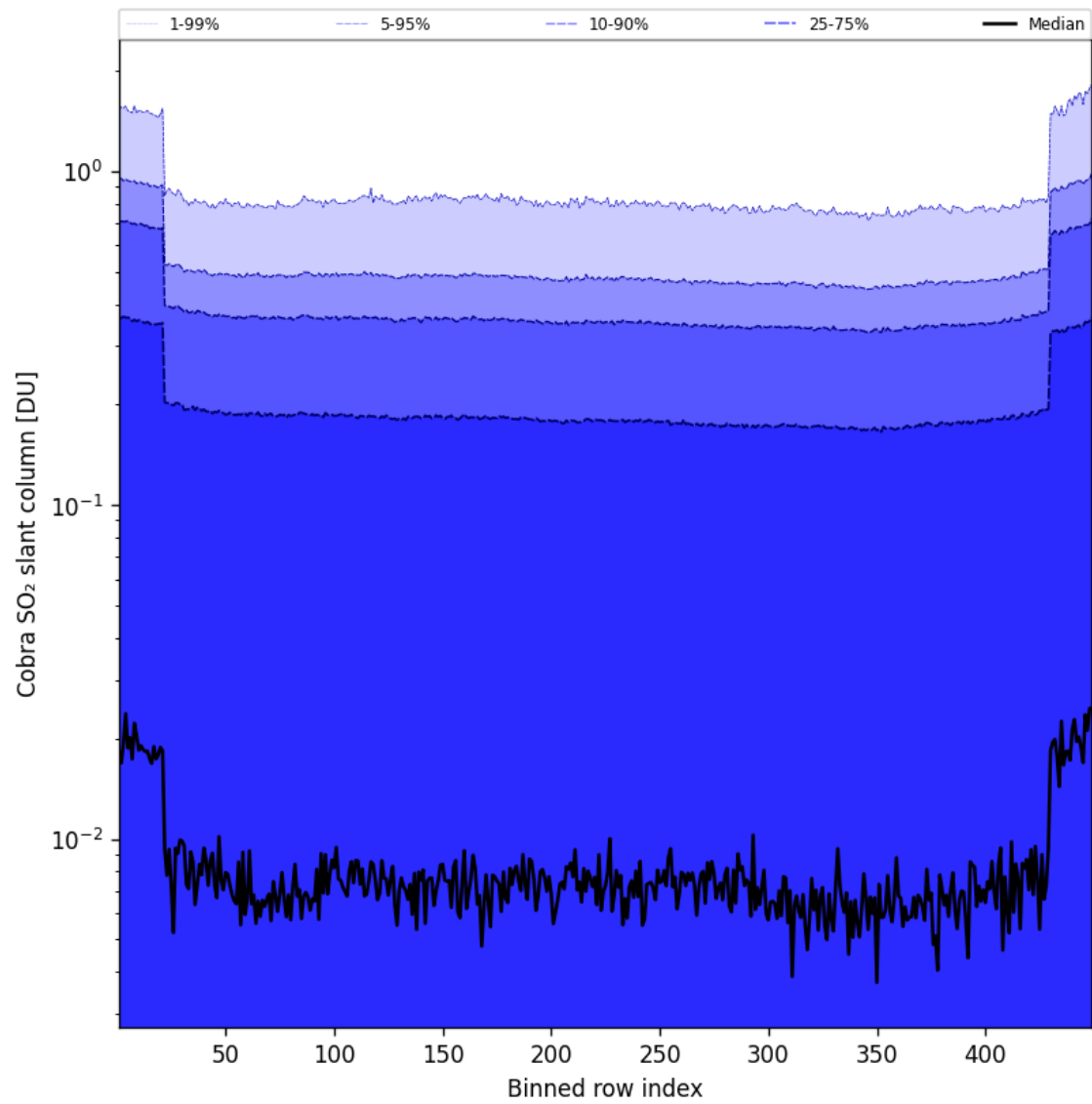


Figure 88: Along track statistics of “Cobra SO₂ slant column” for 2025-11-01 to 2025-11-02

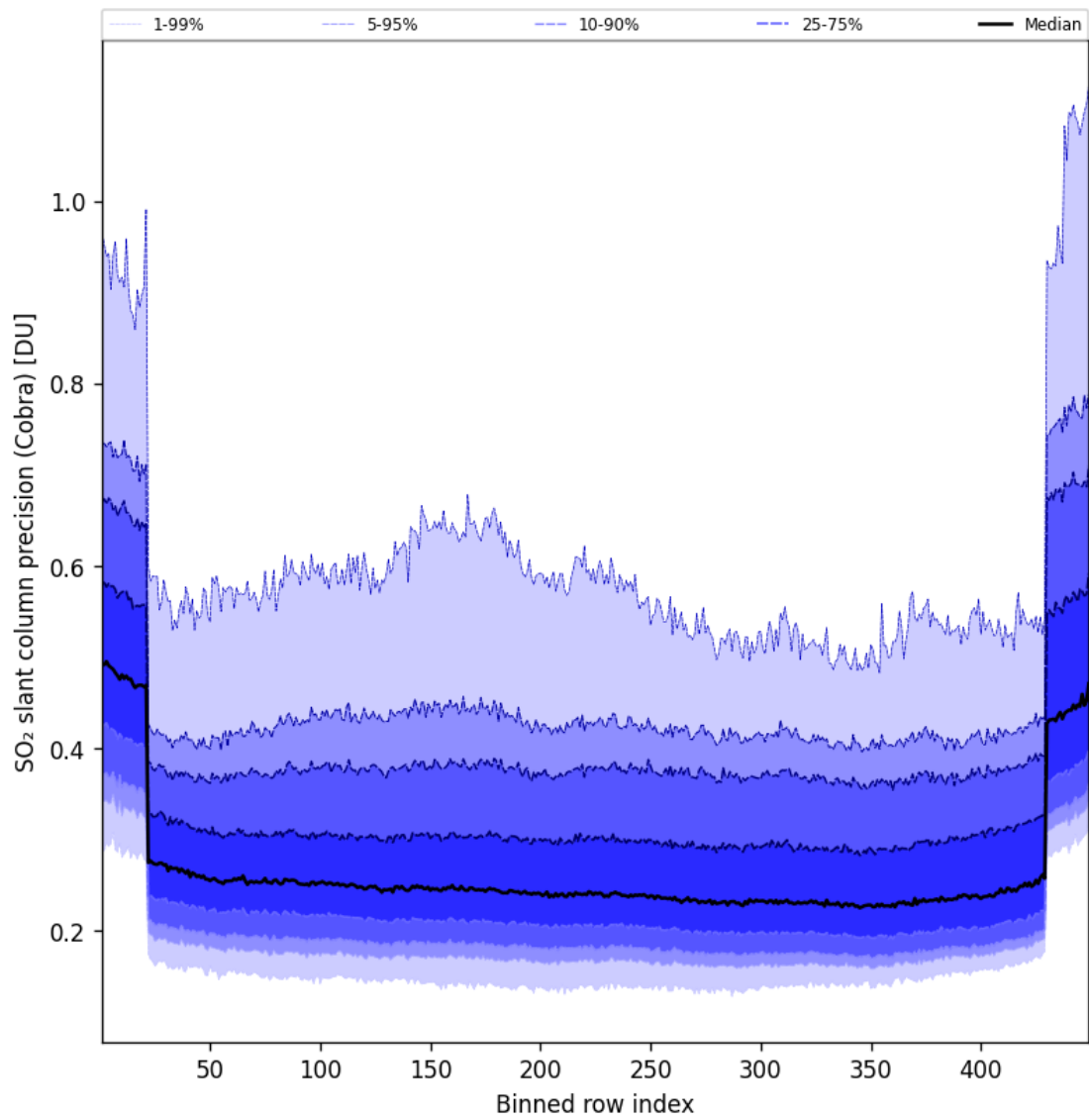


Figure 89: Along track statistics of “SO₂ slant column precision (Cobra)” for 2025-11-01 to 2025-11-02

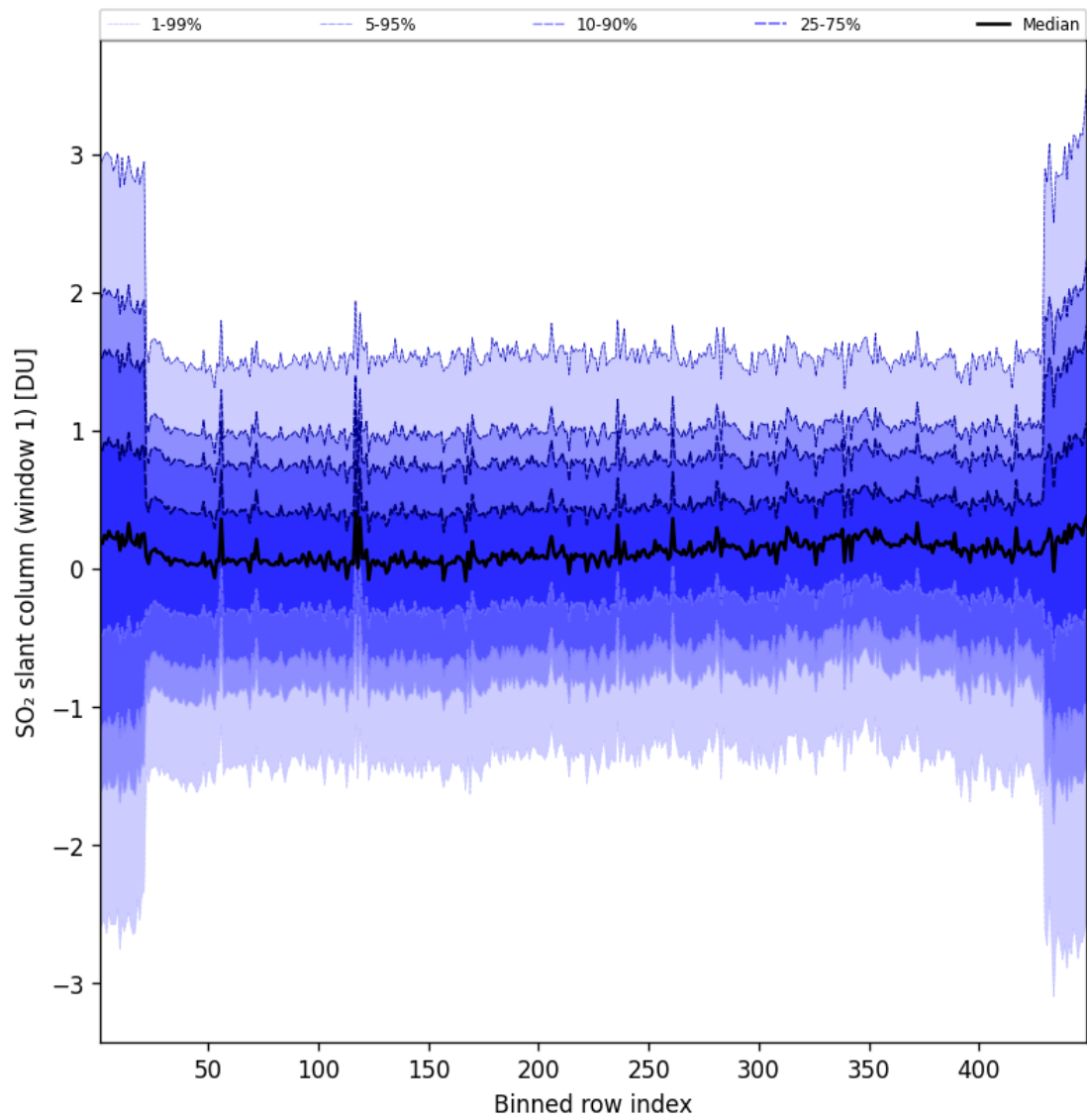


Figure 90: Along track statistics of “SO₂ slant column (window 1)” for 2025-11-01 to 2025-11-02

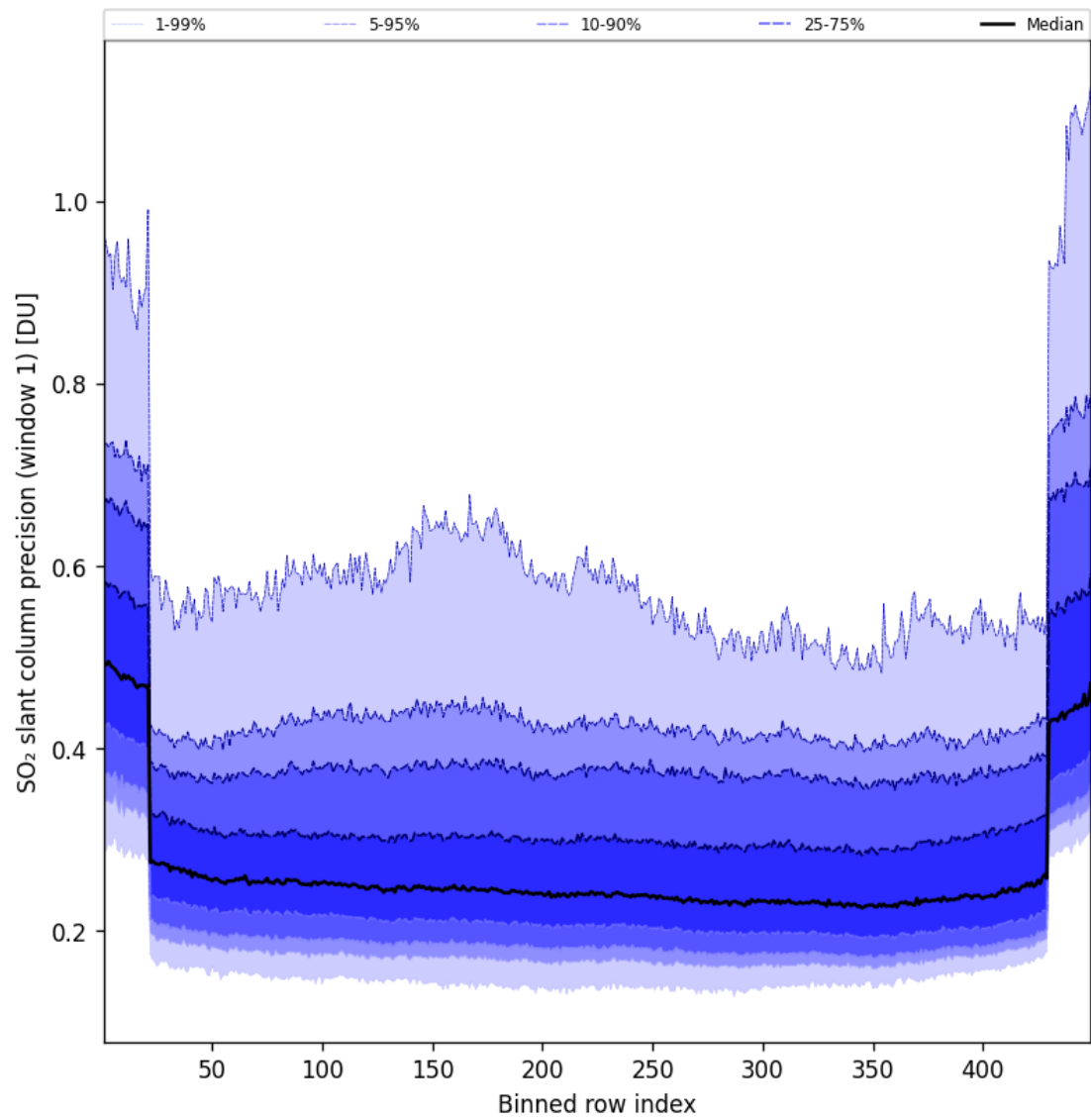


Figure 91: Along track statistics of “SO₂ slant column precision (window 1)” for 2025-11-01 to 2025-11-02

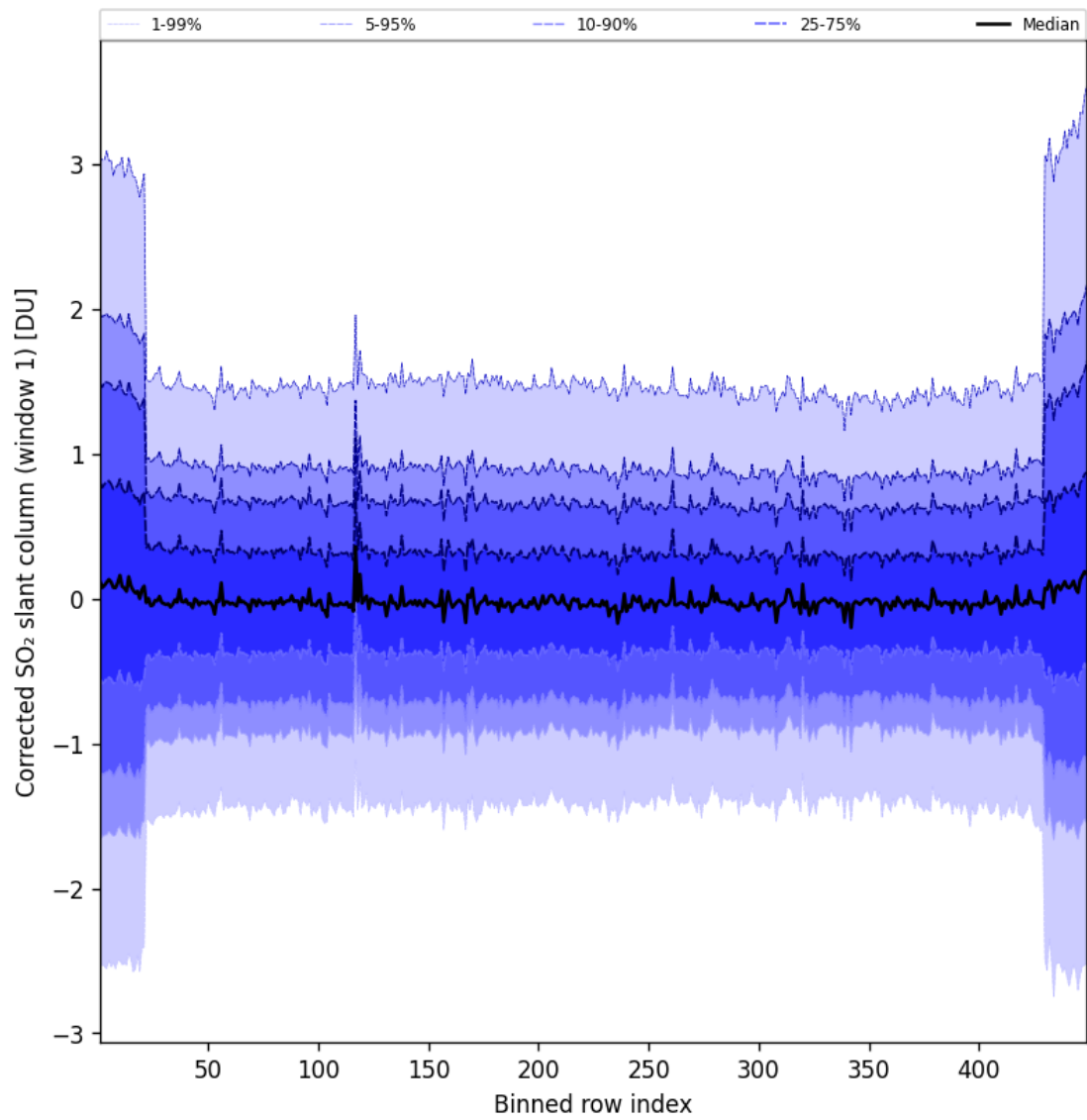


Figure 92: Along track statistics of “Corrected SO₂ slant column (window 1)” for 2025-11-01 to 2025-11-02

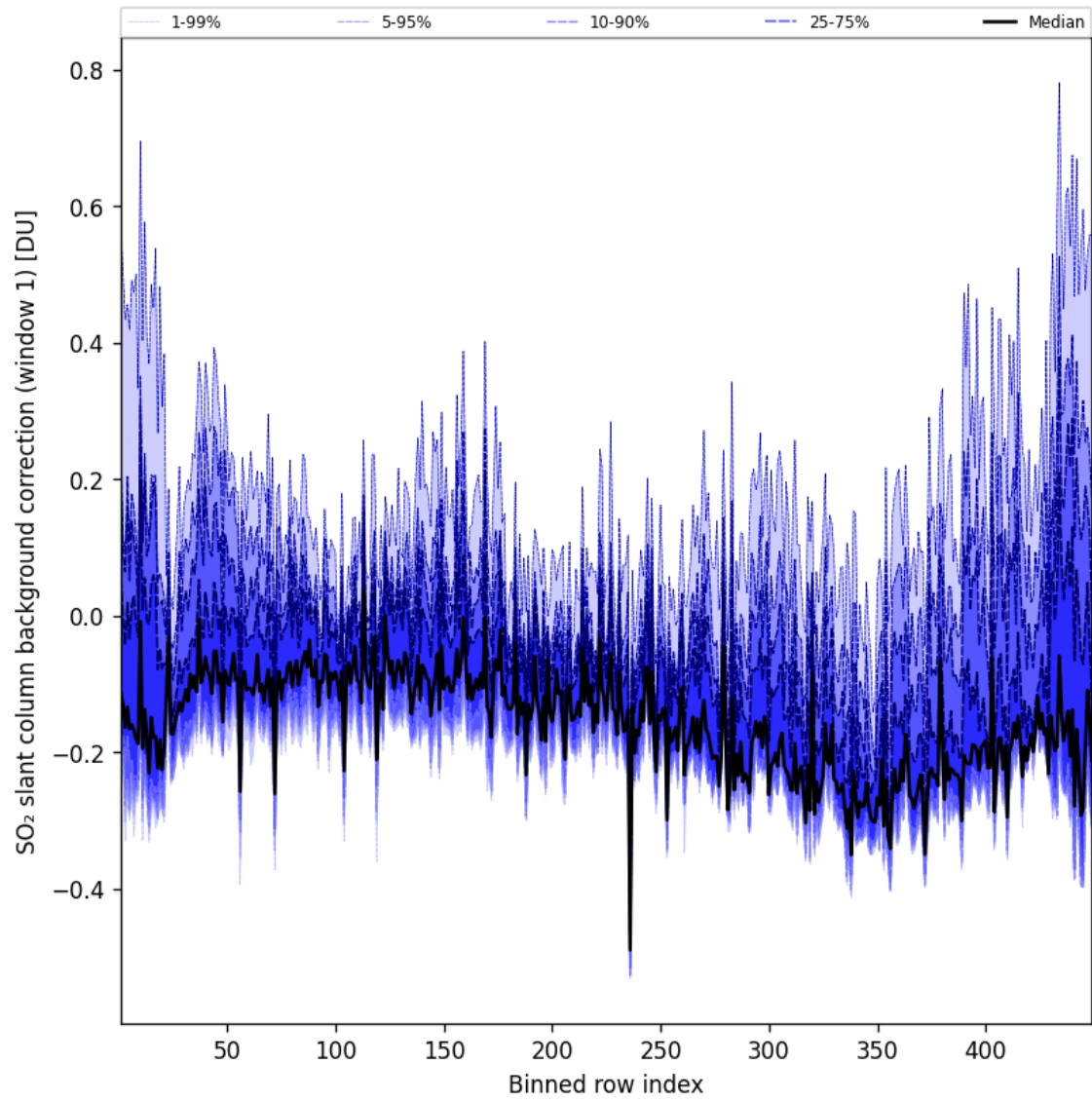


Figure 93: Along track statistics of “SO₂ slant column background correction (window 1)” for 2025-11-01 to 2025-11-02

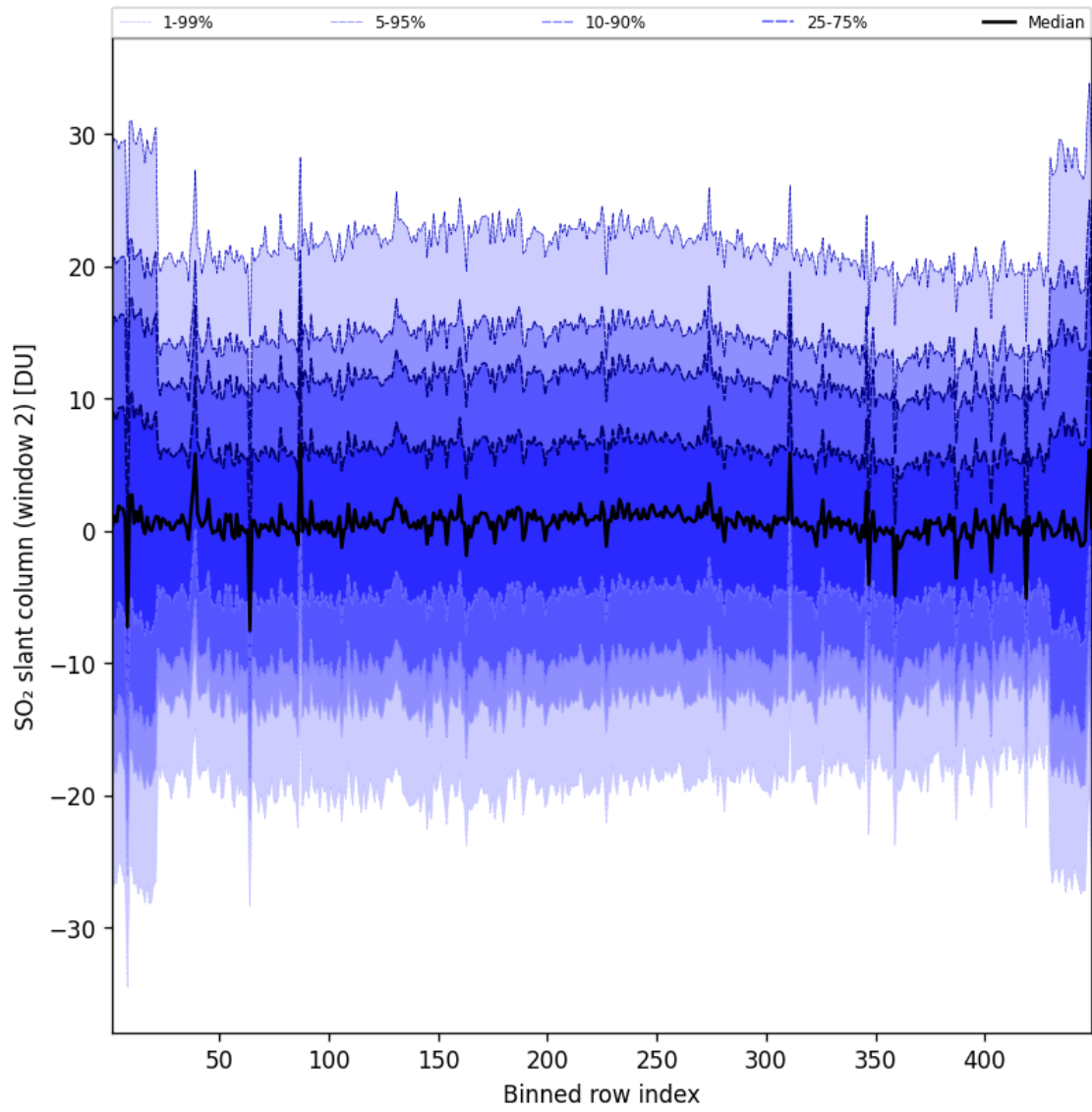


Figure 94: Along track statistics of “SO₂ slant column (window 2)” for 2025-11-01 to 2025-11-02

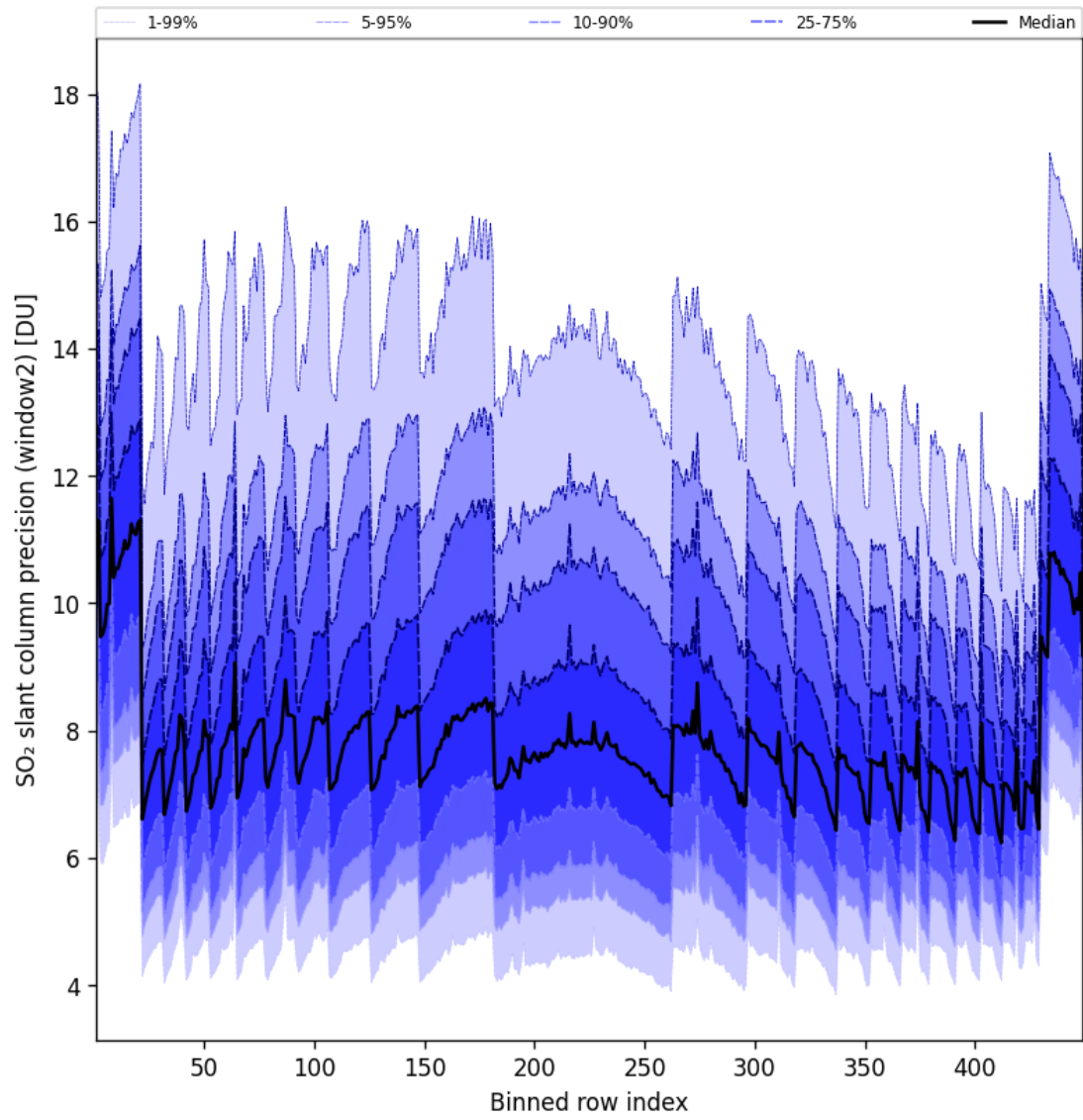


Figure 95: Along track statistics of “SO₂ slant column precision (window2)” for 2025-11-01 to 2025-11-02

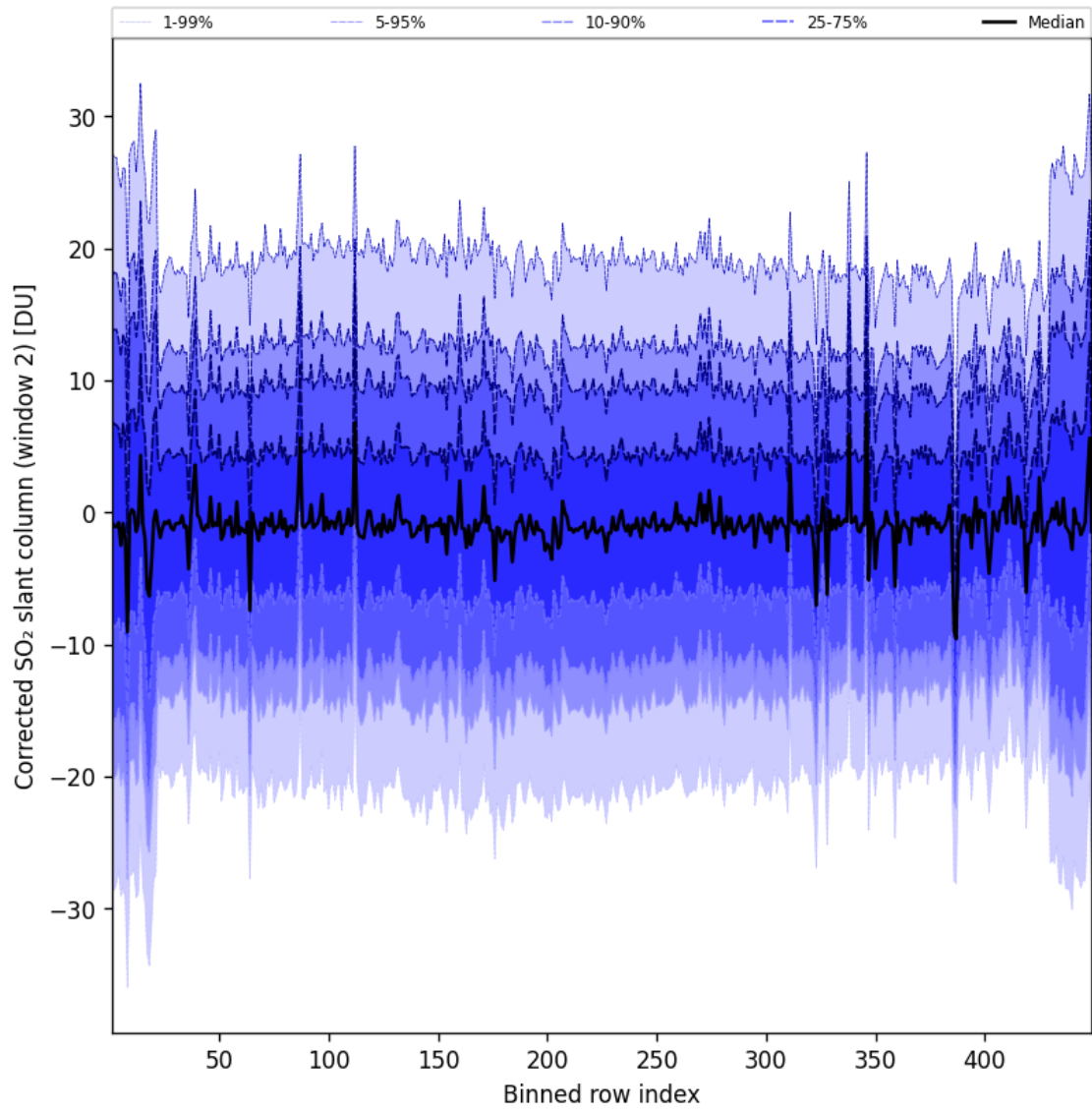


Figure 96: Along track statistics of “Corrected SO₂ slant column (window 2)” for 2025-11-01 to 2025-11-02

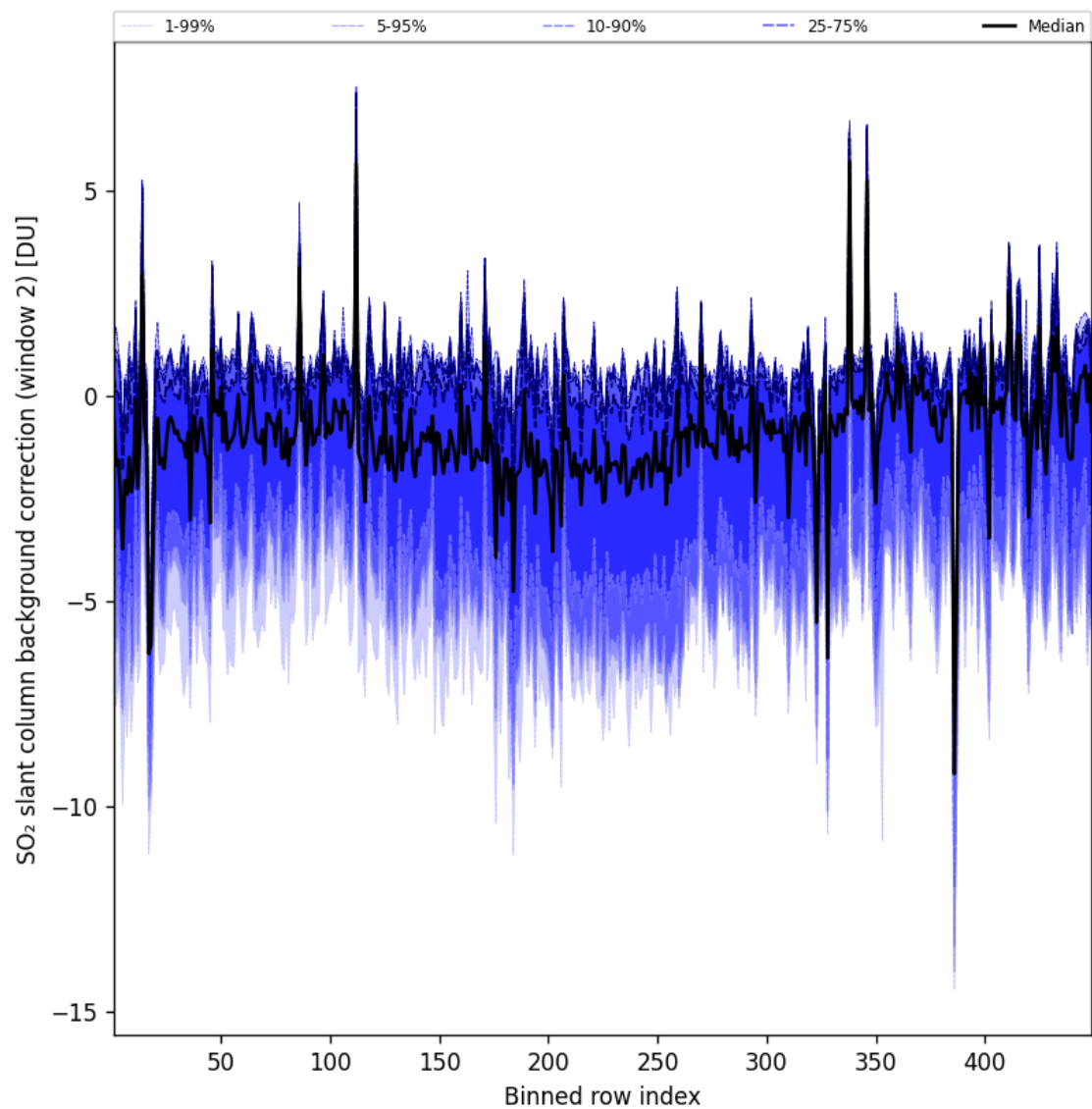


Figure 97: Along track statistics of “SO₂ slant column background correction (window 2)” for 2025-11-01 to 2025-11-02

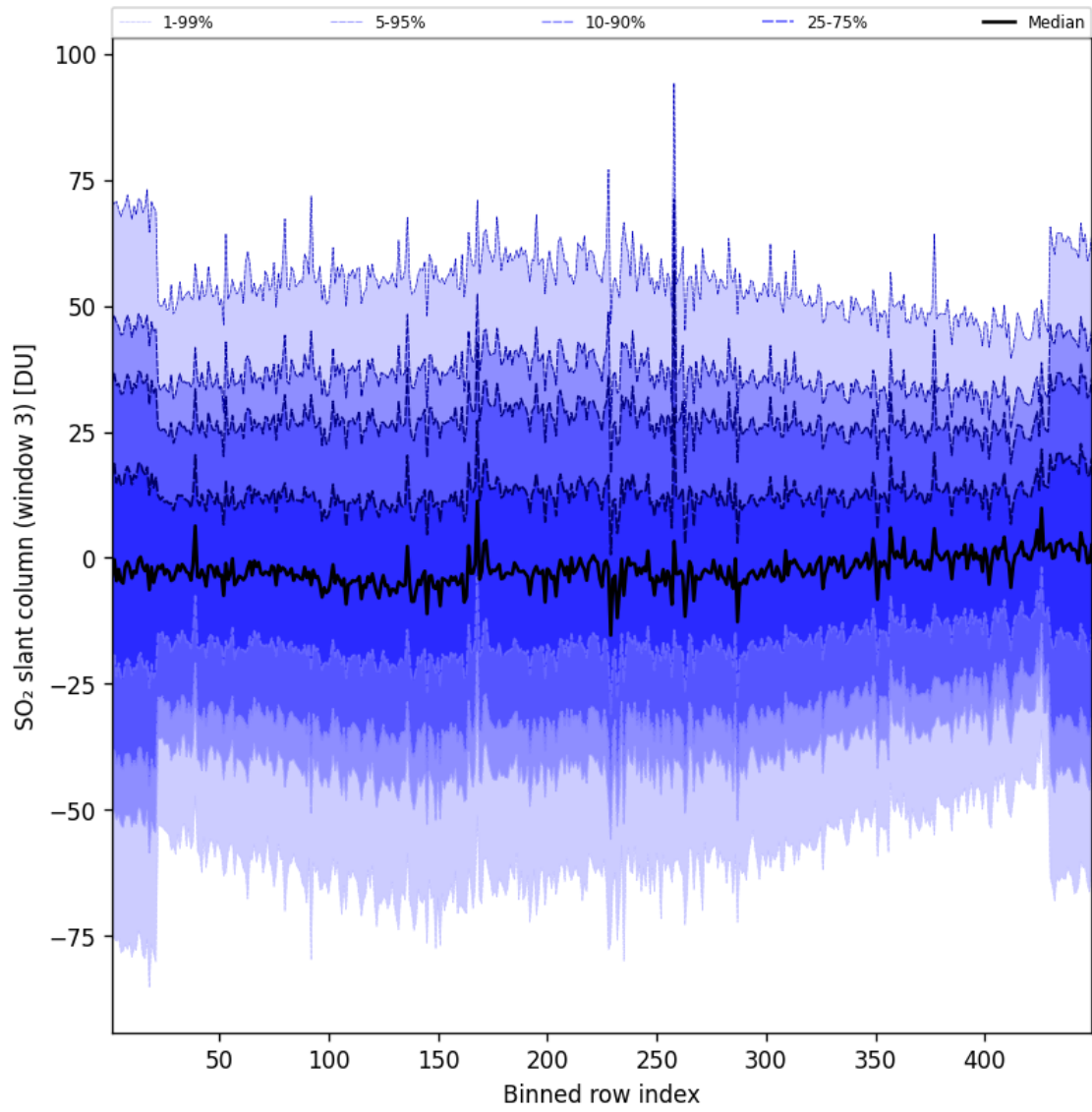


Figure 98: Along track statistics of “SO₂ slant column (window 3)” for 2025-11-01 to 2025-11-02

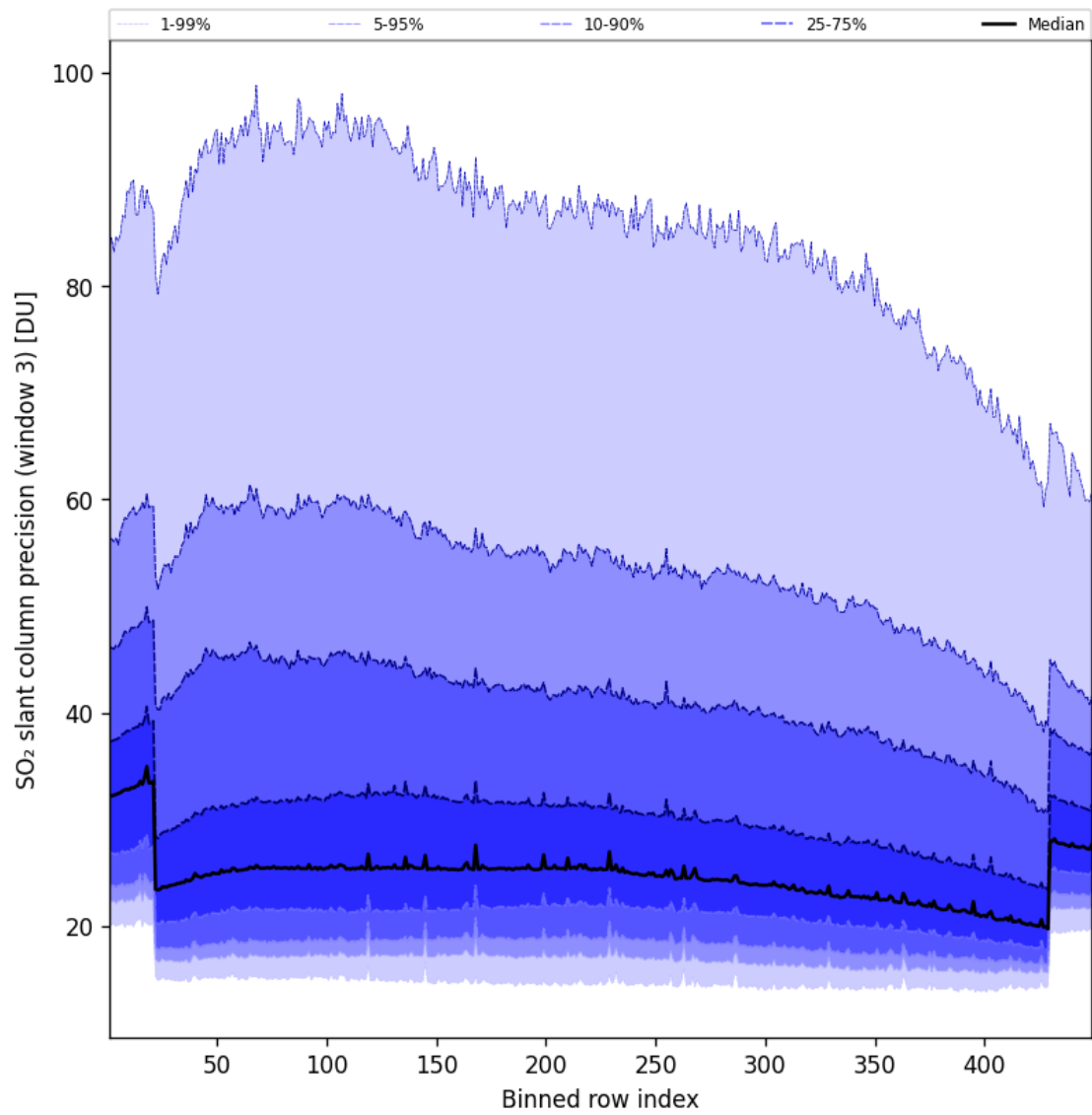


Figure 99: Along track statistics of “SO₂ slant column precision (window 3)” for 2025-11-01 to 2025-11-02

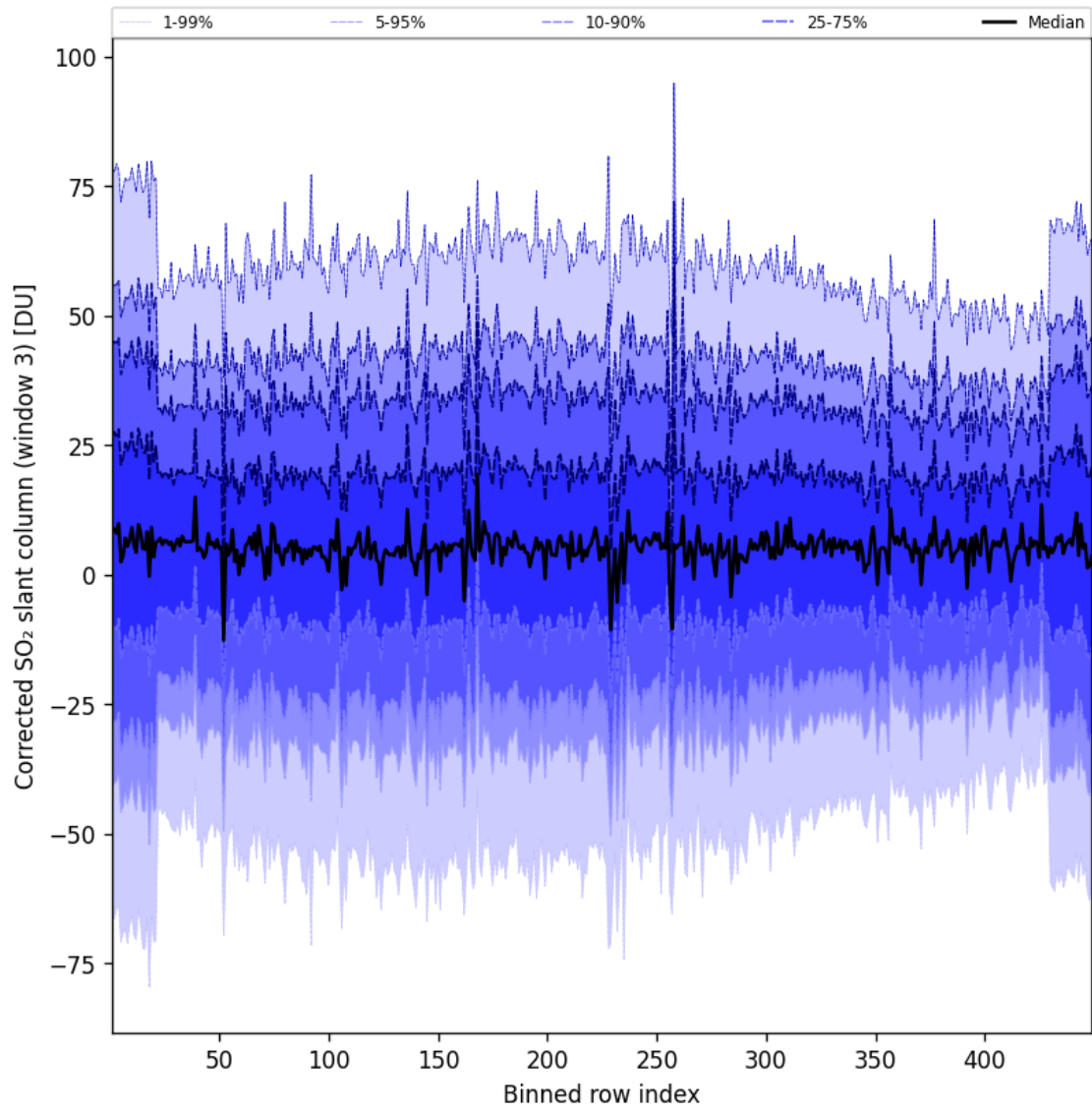


Figure 100: Along track statistics of “Corrected SO₂ slant column (window 3)” for 2025-11-01 to 2025-11-02

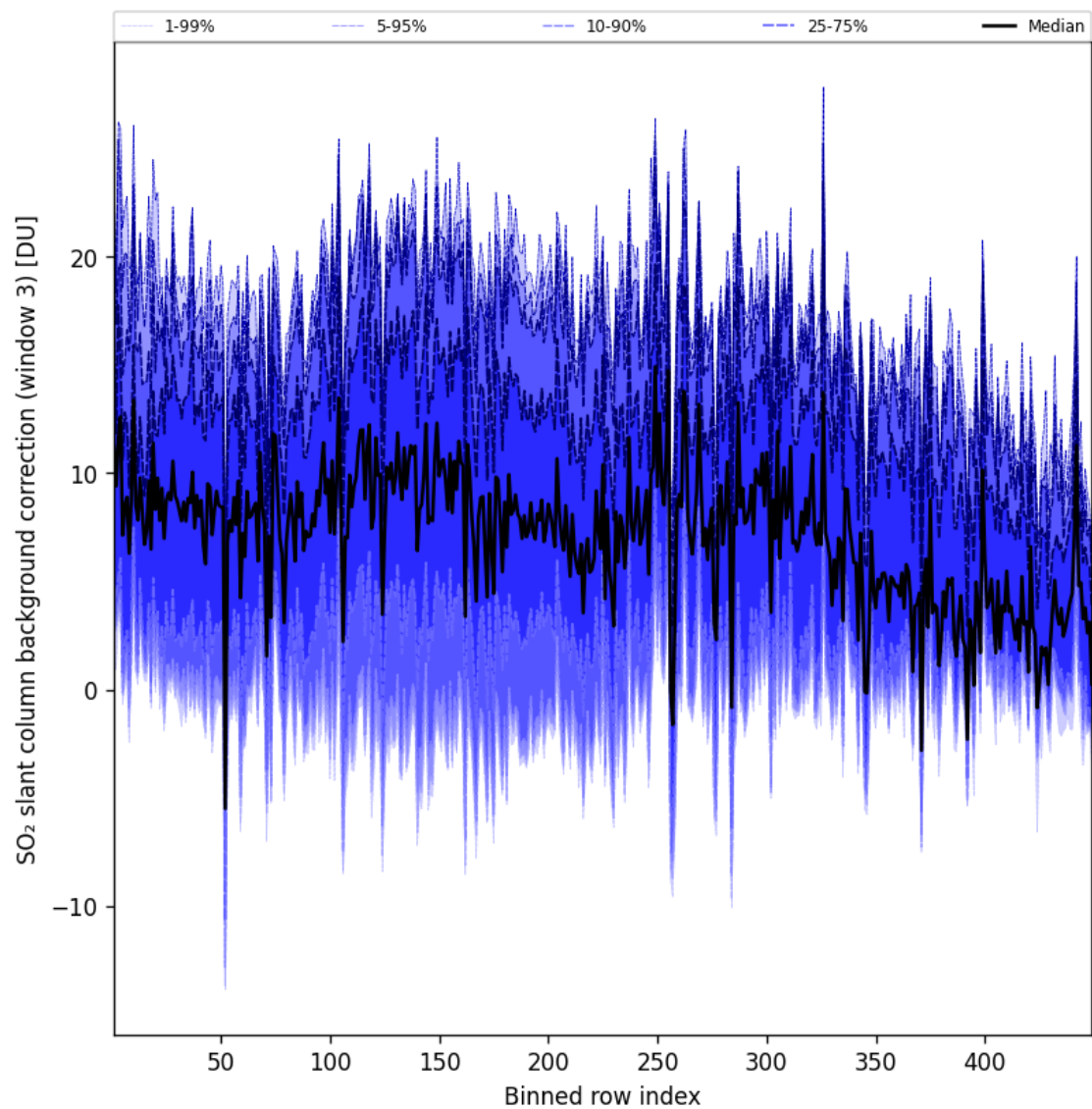


Figure 101: Along track statistics of “SO₂ slant column background correction (window 3)” for 2025-11-01 to 2025-11-02

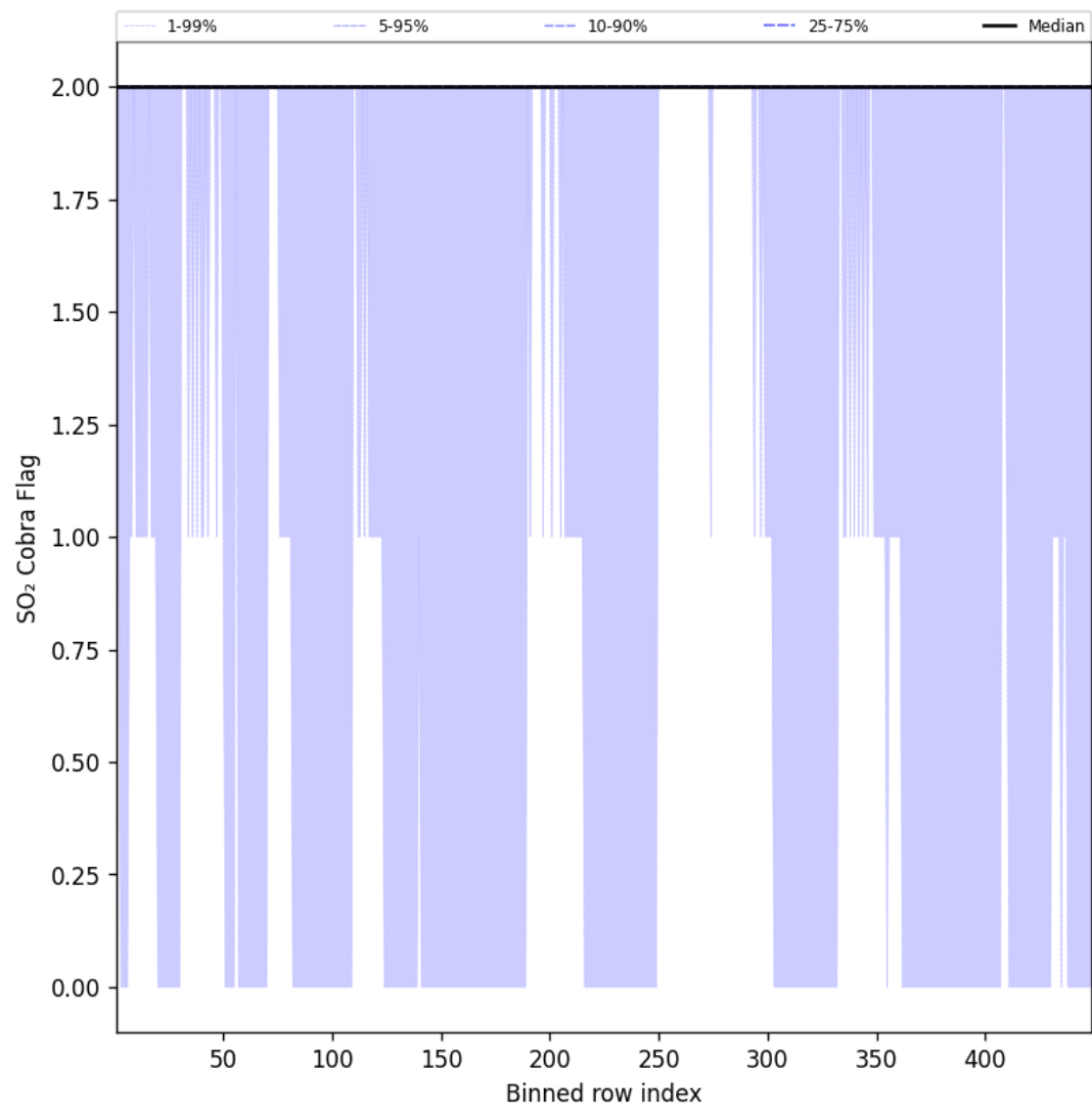


Figure 102: Along track statistics of “SO₂ Cobra Flag” for 2025-11-01 to 2025-11-02

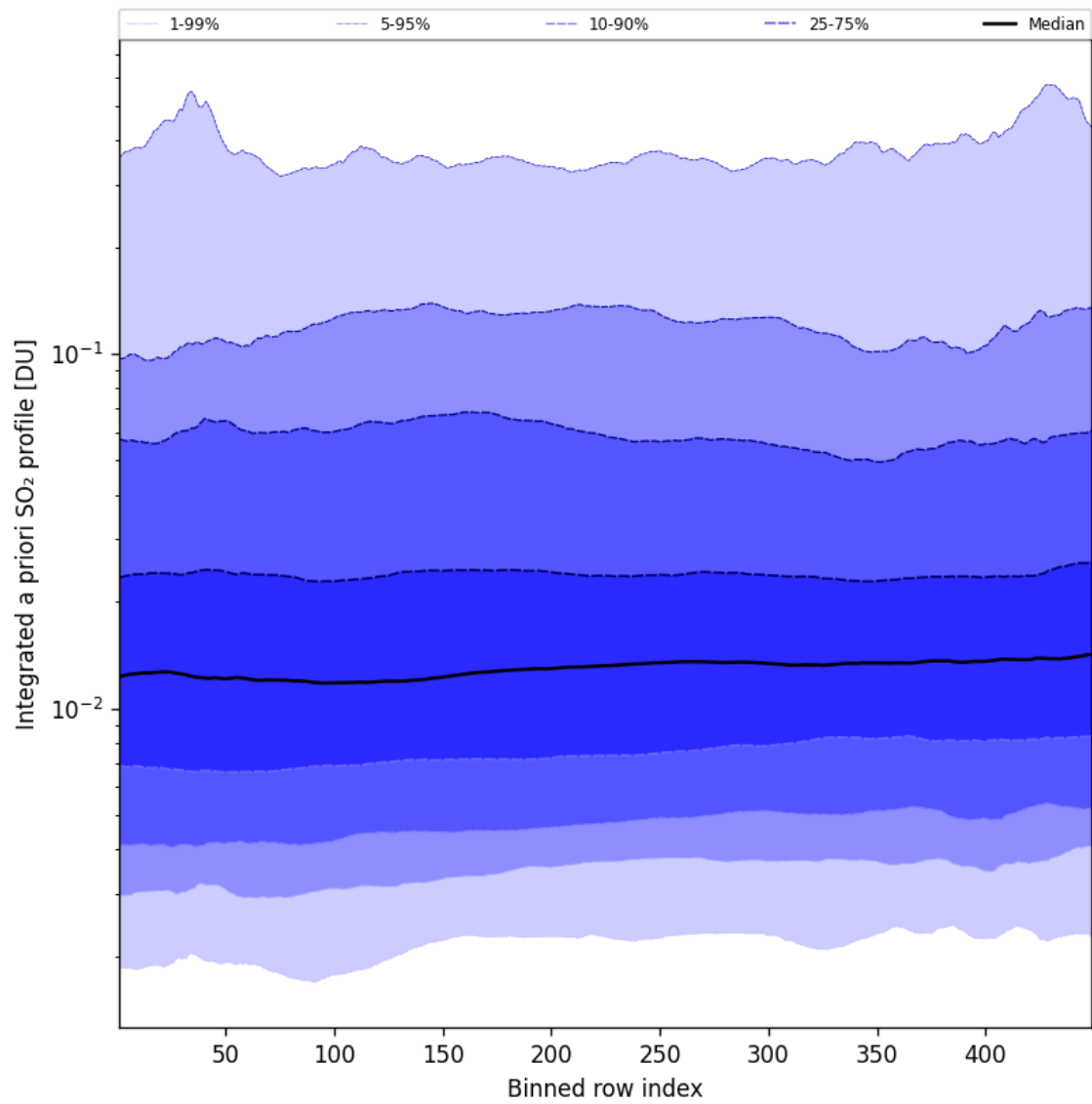


Figure 103: Along track statistics of “Integrated a priori SO₂ profile” for 2025-11-01 to 2025-11-02

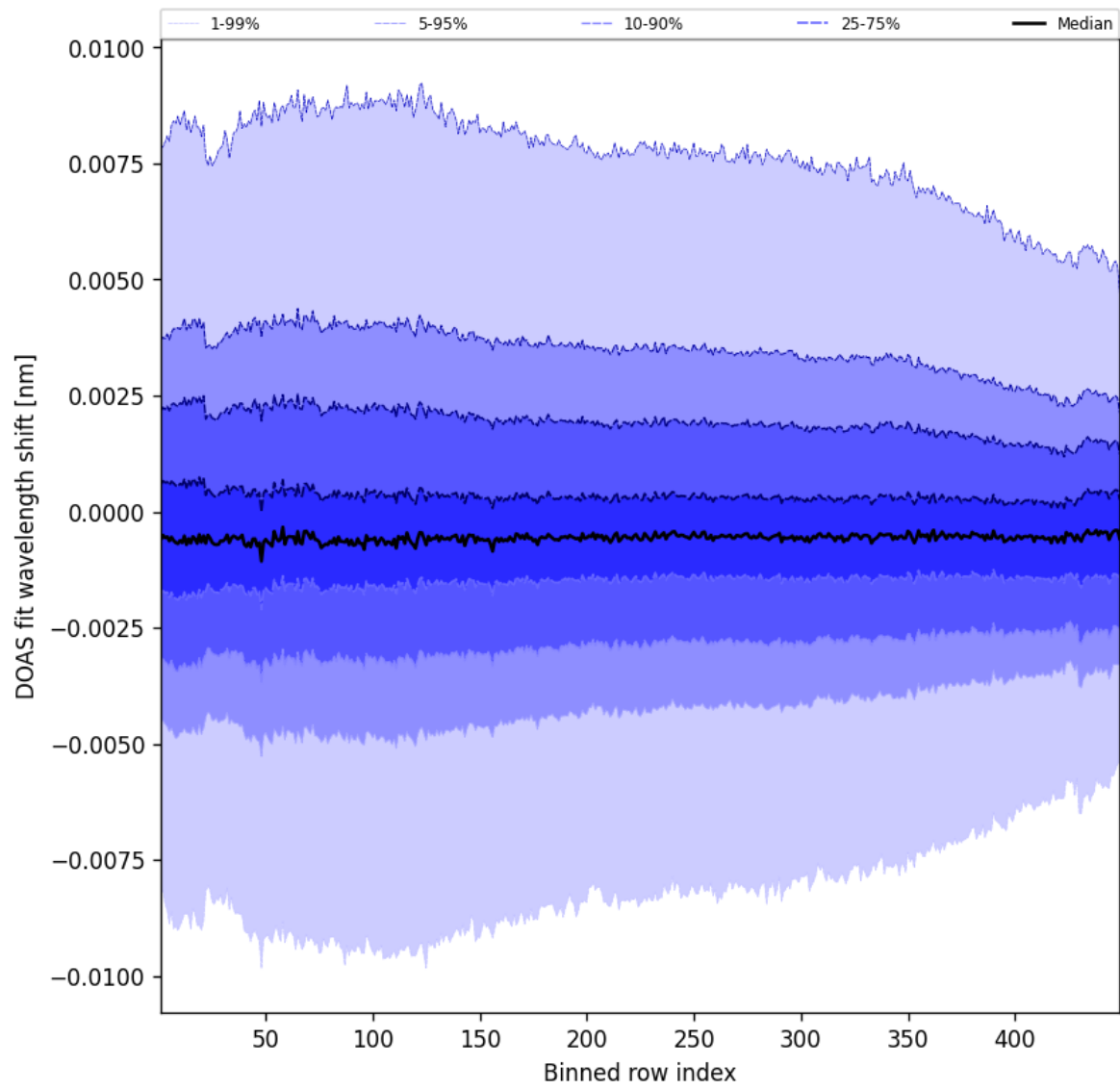


Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2025-11-01 to 2025-11-02

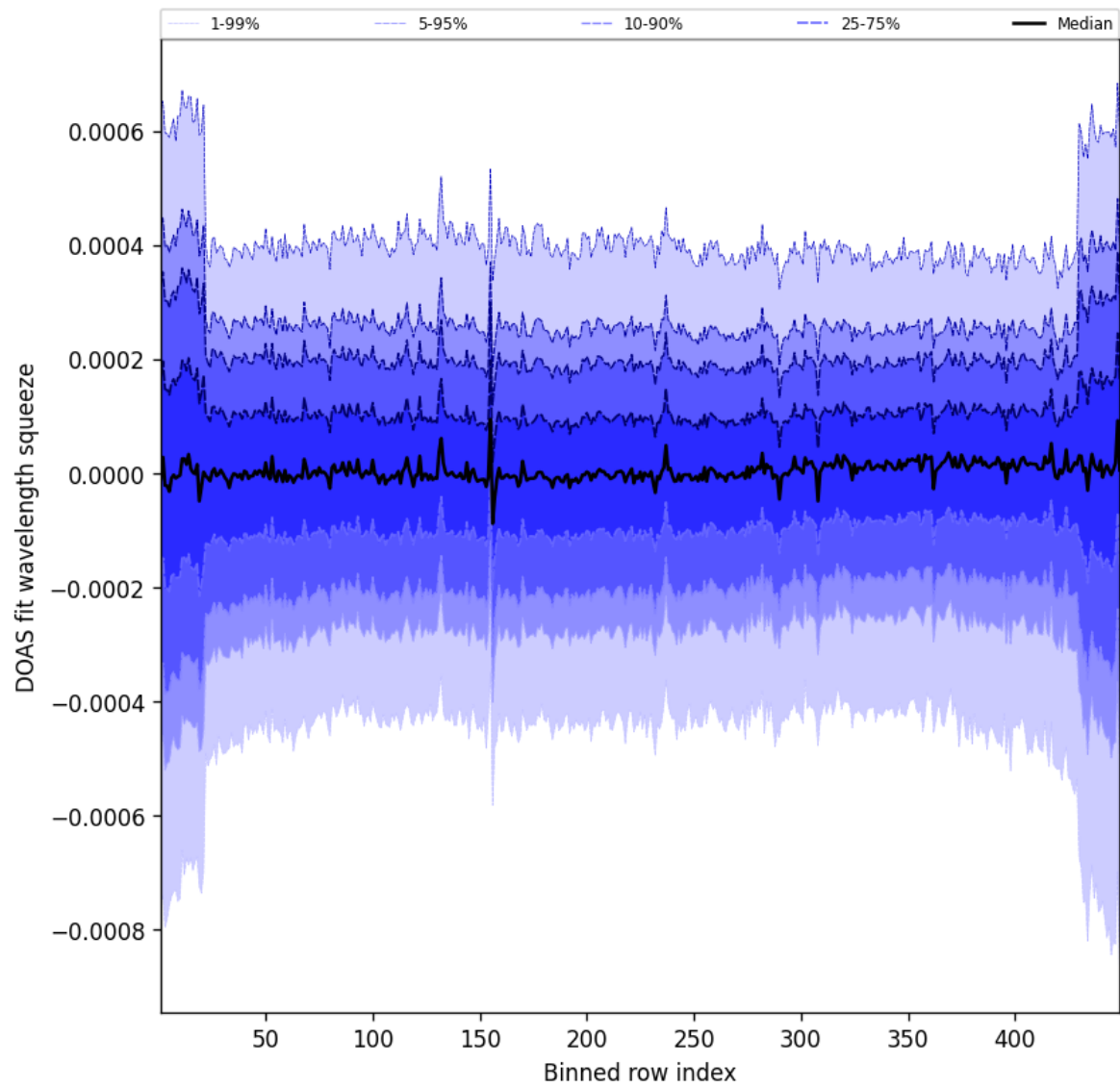


Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2025-11-01 to 2025-11-02

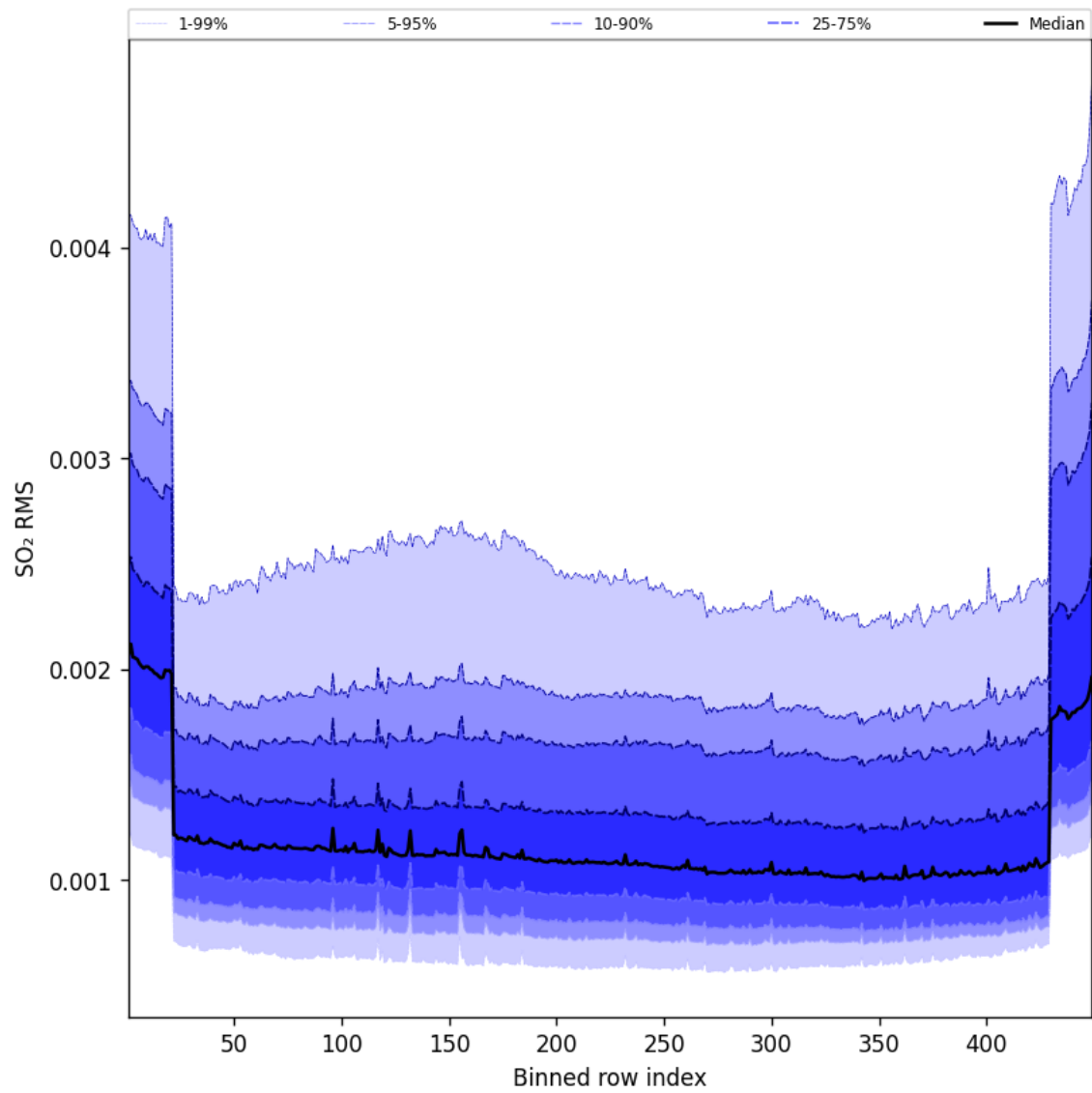


Figure 106: Along track statistics of “SO₂ RMS” for 2025-11-01 to 2025-11-02

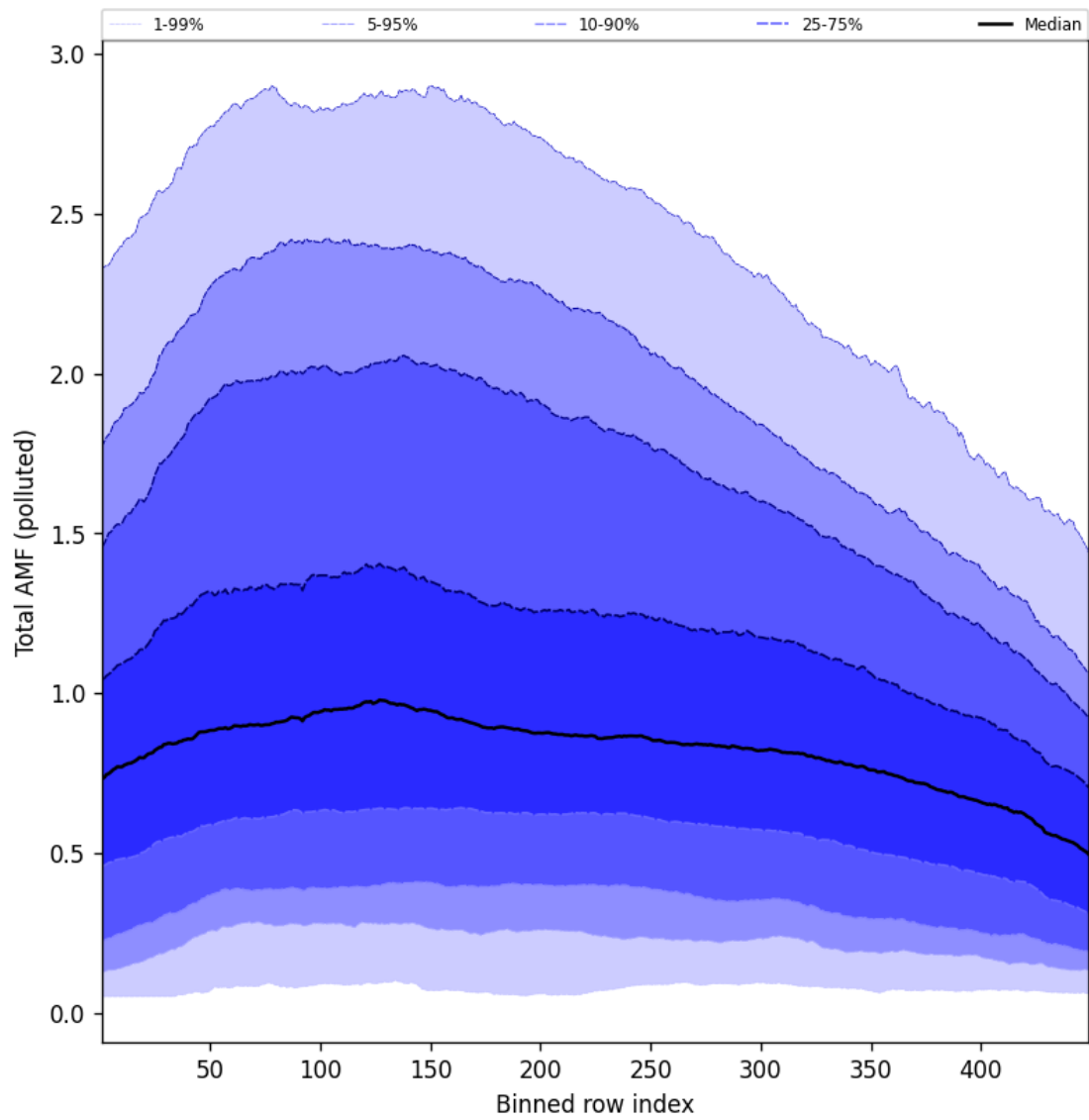


Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-11-01 to 2025-11-02

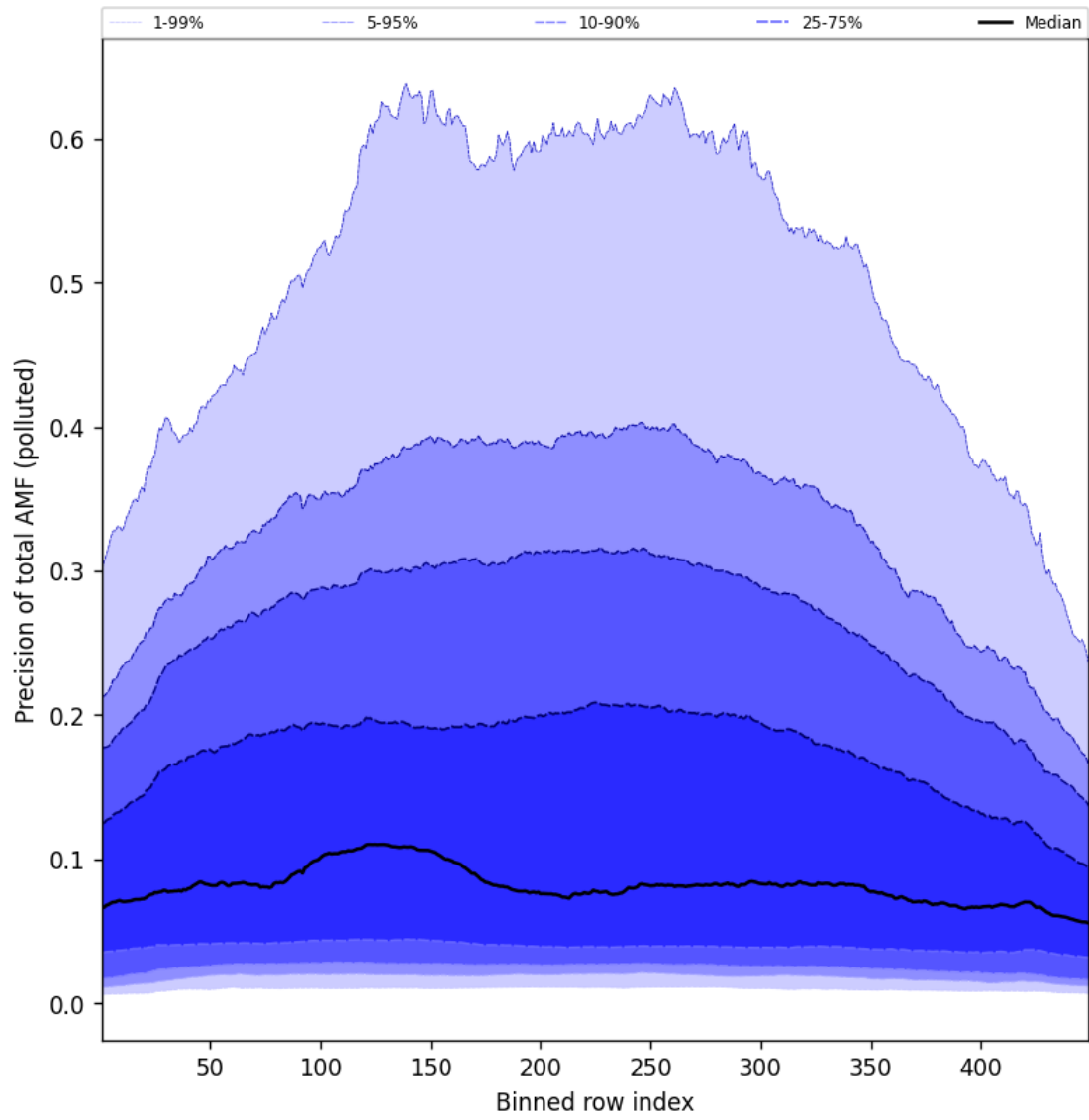


Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-11-01 to 2025-11-02

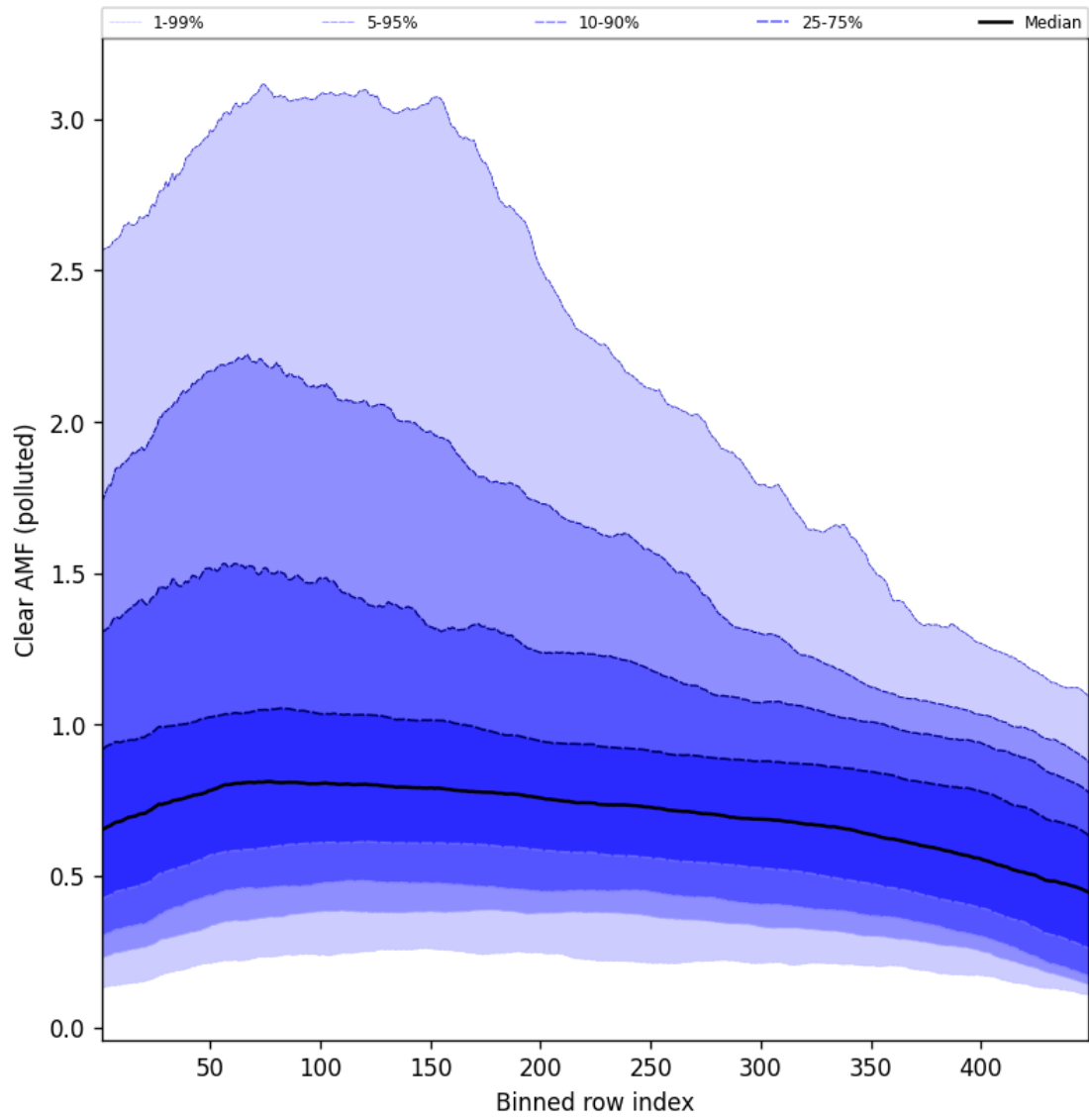


Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-11-01 to 2025-11-02

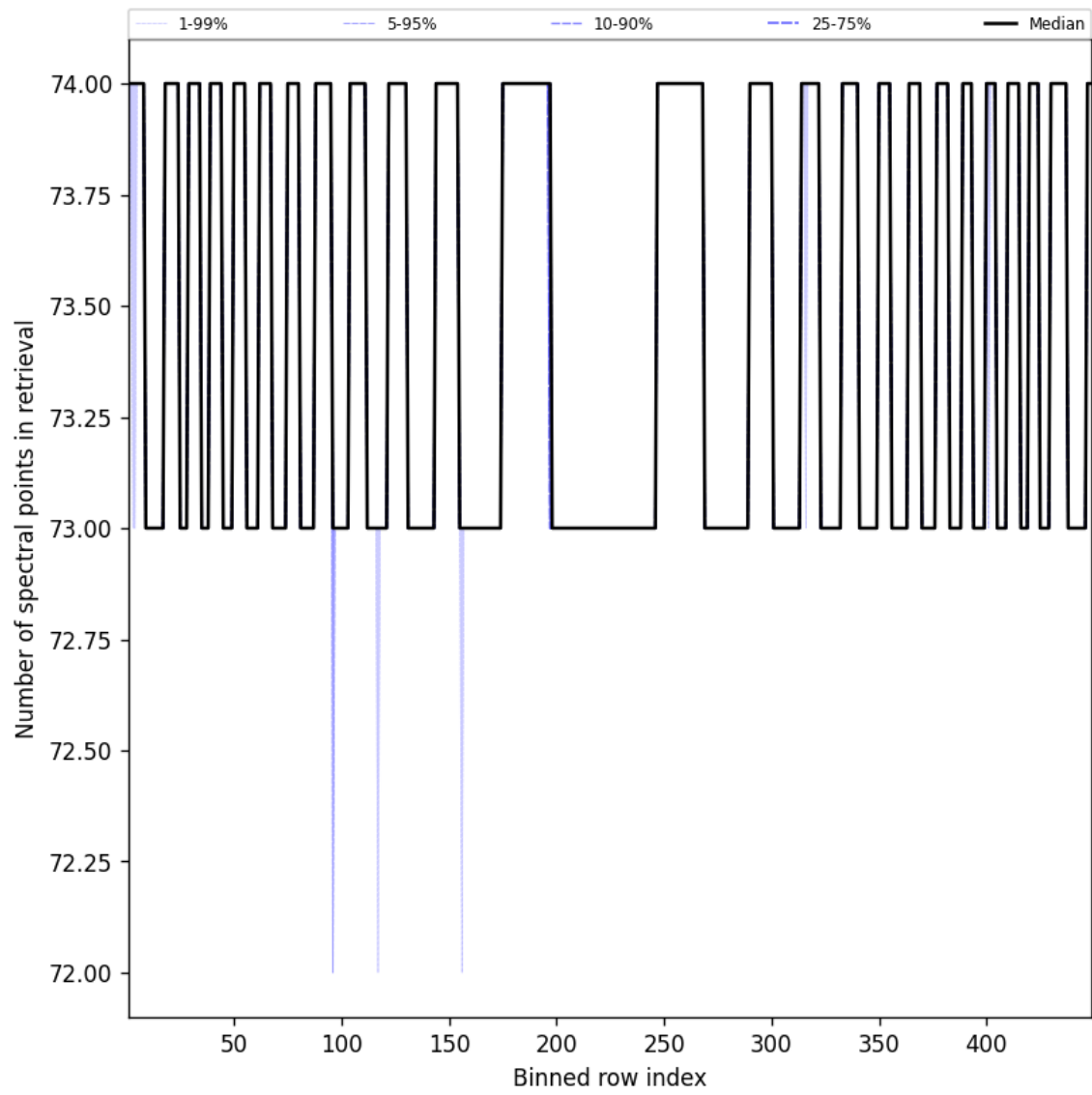


Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-11-01 to 2025-11-02

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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