

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]	0.595 ± 0.421	17109575	0.995	0.840	0.490	0.0	1.000
sulfurdioxide total vertical column [DU]	$(3.465 \pm 130.560) \times 10^{-2}$	17109575	0.223	0.381	7.835×10^{-3}	-150	354
sulfurdioxide total vertical column precision [DU]	0.515 ± 0.941	17109575	0.197	0.325	0.287	3.118×10^{-2}	53.7
sulfurdioxide slant column density corrected [DU]	$(1.542 \pm 33.942) \times 10^{-2}$	17109575	0.227	0.337	7.953×10^{-3}	-43.5	102
sulfurdioxide slant column density cobra [DU]	$(1.529 \pm 32.987) \times 10^{-2}$	17109575	0.227	0.337	7.953×10^{-3}	-43.5	24.0
sulfurdioxide slant column density cobra precision [DU]	0.267 ± 0.113	17109575	0.213	9.809×10^{-2}	0.232	6.761×10^{-2}	14.3
sulfurdioxide slant column density window1 [DU]	$(8.429 \pm 63.069) \times 10^{-2}$	17109575	7.500×10^{-2}	0.708	8.555×10^{-2}	-43.3	52.7
sulfurdioxide slant column density window1 precision [DU]	0.267 ± 0.113	17109575	0.213	9.809×10^{-2}	0.232	6.761×10^{-2}	14.3
sulfurdioxide slant column density corrected win1 [DU]	$(2.361 \pm 61.191) \times 10^{-2}$	17109575	-2.500×10^{-2}	0.677	9.941×10^{-3}	-43.3	52.7
background so2 slant column offset window1 [DU]	$(-6.068 \pm 15.333) \times 10^{-2}$	17109575	-0.140	0.206	-0.104	-1.42	2.92
sulfurdioxide slant column density window2 [DU]	0.892 ± 8.499	17109575	0.250	10.7	0.812	-1.046×10^3	789
sulfurdioxide slant column density window2 precision [DU]	7.73 ± 2.21	17109575	6.97	2.57	7.36	2.18	421
sulfurdioxide slant column density corrected win2 [DU]	-0.215 ± 8.357	17109575	0.250	10.5	-0.192	-1.046×10^3	789
background so2 slant column offset window2 [DU]	-1.11 ± 2.11	17109575	0.250	2.57	-0.613	-17.4	6.34
sulfurdioxide slant column density window3 [DU]	-4.37 ± 23.05	17109575	-6.16	28.5	-4.76	-1.729×10^3	371
sulfurdioxide slant column density window3 precision [DU]	26.8 ± 13.1	17109575	20.3	10.4	23.3	9.46	383
sulfurdioxide slant column density corrected win3 [DU]	2.53 ± 22.29	17109575	2.80	27.4	2.47	-1.733×10^3	365
background so2 slant column offset window3 [DU]	6.90 ± 6.44	17109575	2.80	9.30	6.97	-16.1	25.3
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.21	17109575	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(3.905 \pm 9.600) \times 10^{-2}$	17109575	2.104×10^{-2}	2.424×10^{-2}	1.991×10^{-2}	5.524×10^{-4}	3.21
fitted radiance shift [nm]	$(-3.909 \pm 24.986) \times 10^{-4}$	17109575	-5.000×10^{-4}	1.666×10^{-3}	-4.436×10^{-4}	-4.954×10^{-2}	8.738×10^{-2}
fitted radiance squeeze [1]	$(-4.639 \pm 17.705) \times 10^{-5}$	17109575	-3.000×10^{-5}	2.109×10^{-4}	-4.010×10^{-5}	-1.656×10^{-2}	1.677×10^{-2}
fitted root mean square [1]	$(1.186 \pm 0.465) \times 10^{-3}$	17109575	9.750×10^{-4}	4.334×10^{-4}	1.059×10^{-3}	3.145×10^{-4}	6.384×10^{-2}
sulfurdioxide total air mass factor polluted [1]	0.994 ± 0.654	17109575	0.580	0.730	0.819	5.000×10^{-2}	3.32
sulfurdioxide total air mass factor polluted precision [1]	0.149 ± 0.152	17109575	2.500×10^{-2}	0.175	9.235×10^{-2}	2.500×10^{-3}	1.74
sulfurdioxide clear air mass factor polluted [1]	0.822 ± 0.542	17109575	0.580	0.422	0.690	3.389×10^{-2}	3.35
number of spectral points in retrieval [1]	73.4 ± 0.5	17109575	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	2.000×10^{-2}	7.000×10^{-2}	0.160	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	-2.57	-0.831	-0.486	-0.317	-0.179	0.202	0.350	0.537	0.929	3.00
sulfurdioxide total vertical column precision [DU]	7.045×10^{-2}	9.145×10^{-2}	0.112	0.137	0.177	0.501	0.695	0.966	1.57	4.31
sulfurdioxide slant column density corrected [DU]	-0.768	-0.446	-0.326	-0.245	-0.159	0.178	0.268	0.355	0.489	0.893
sulfurdioxide slant column density cobra [DU]	-0.768	-0.446	-0.326	-0.245	-0.159	0.178	0.268	0.355	0.489	0.893
sulfurdioxide slant column density cobra precision [DU]	0.138	0.162	0.175	0.186	0.199	0.297	0.355	0.412	0.485	0.677
sulfurdioxide slant column density window1 [DU]	-1.52	-0.886	-0.634	-0.460	-0.273	0.436	0.617	0.789	1.05	1.76
sulfurdioxide slant column density window1 precision [DU]	0.138	0.162	0.175	0.186	0.199	0.297	0.355	0.412	0.485	0.677
sulfurdioxide slant column density corrected win1 [DU]	-1.48	-0.886	-0.656	-0.497	-0.325	0.351	0.533	0.707	0.972	1.72
background so2 slant column offset window1 [DU]	-0.323	-0.254	-0.219	-0.194	-0.168	3.765×10^{-2}	0.110	0.166	0.232	0.347
sulfurdioxide slant column density window2 [DU]	-19.4	-12.7	-9.52	-7.15	-4.50	6.17	8.88	11.3	14.8	22.3
sulfurdioxide slant column density window2 precision [DU]	4.17	4.91	5.37	5.76	6.23	8.80	9.70	10.6	11.8	14.4
sulfurdioxide slant column density corrected win2 [DU]	-20.8	-13.8	-10.5	-8.11	-5.46	5.05	7.68	10.0	13.3	20.2
background so2 slant column offset window2 [DU]	-7.70	-5.19	-3.93	-3.04	-2.21	0.361	0.643	0.913	1.32	2.64
sulfurdioxide slant column density window3 [DU]	-62.0	-41.3	-32.1	-25.7	-18.7	9.80	17.5	24.5	34.1	52.9
sulfurdioxide slant column density window3 precision [DU]	13.3	15.2	16.5	17.6	19.2	29.6	34.3	39.8	51.2	82.2
sulfurdioxide slant column density corrected win3 [DU]	-54.1	-33.7	-24.5	-18.1	-11.1	16.3	23.4	30.0	39.0	57.6
background so2 slant column offset window3 [DU]	-7.33	-3.84	-1.70	0.213	2.35	11.6	13.8	15.5	17.2	19.8
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]	1.697×10^{-3}	4.226×10^{-3}	6.286×10^{-3}	8.334×10^{-3}	1.130×10^{-2}	3.554×10^{-2}	4.784×10^{-2}	6.481×10^{-2}	0.118	0.380
fitted radiance shift [nm]	-7.942×10^{-3}	-4.027×10^{-3}	-2.634×10^{-3}	-1.867×10^{-3}	-1.264×10^{-3}	4.012×10^{-4}	1.097×10^{-3}	1.972×10^{-3}	3.482×10^{-3}	7.575×10^{-3}
fitted radiance squeeze [1]	-5.165×10^{-4}	-3.372×10^{-4}	-2.607×10^{-4}	-2.069×10^{-4}	-1.491×10^{-4}	6.184×10^{-5}	1.125×10^{-4}	1.588×10^{-4}	2.245×10^{-4}	3.810×10^{-4}
fitted root mean square [1]	5.785×10^{-4}	7.022×10^{-4}	7.750×10^{-4}	8.306×10^{-4}	8.966×10^{-4}	1.330×10^{-3}	1.547×10^{-3}	1.776×10^{-3}	2.102×10^{-3}	2.889×10^{-3}
sulfurdioxide total air mass factor polluted [1]	7.759×10^{-2}	0.217	0.329	0.426	0.537	1.27	1.65	2.06	2.45	2.84
sulfurdioxide total air mass factor polluted precision [1]	9.387×10^{-3}	1.734×10^{-2}	2.374×10^{-2}	2.954×10^{-2}	3.903×10^{-2}	0.214	0.286	0.354	0.446	0.693
sulfurdioxide clear air mass factor polluted [1]	0.181	0.295	0.368	0.432	0.507	0.929	1.07	1.35	2.25	2.91
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]	0.700 ± 0.394	5795132	0.710	1.000	0.0	1.000	0.290	1.000
sulfurdioxide total vertical column [DU]	$(7.539 \pm 205.563) \times 10^{-2}$	5795132	0.588	1.523×10^{-2}	-150	201	-0.271	0.316
sulfurdioxide total vertical column precision [DU]	0.827 ± 1.423	5795132	0.548	0.426	4.961×10^{-2}	53.7	0.264	0.812
sulfurdioxide slant column density corrected [DU]	$(2.335 \pm 39.412) \times 10^{-2}$	5795132	0.394	1.155×10^{-2}	-7.48	80.0	-0.183	0.211
sulfurdioxide slant column density cobra [DU]	$(2.330 \pm 39.041) \times 10^{-2}$	5795132	0.394	1.155×10^{-2}	-7.48	18.2	-0.183	0.211
sulfurdioxide slant column density cobra precision [DU]	0.316 ± 0.139	5795132	0.150	0.280	8.856×10^{-2}	8.88	0.223	0.373
sulfurdioxide slant column density window1 [DU]	0.164 ± 0.720	5795132	0.787	0.163	-10.5	20.5	-0.230	0.557
sulfurdioxide slant column density window1 precision [DU]	0.316 ± 0.139	5795132	0.150	0.280	8.856×10^{-2}	8.88	0.223	0.373
sulfurdioxide slant column density corrected win1 [DU]	$(5.427 \pm 71.958) \times 10^{-2}$	5795132	0.781	3.274×10^{-2}	-9.93	20.4	-0.351	0.430
background so2 slant column offset window1 [DU]	-0.110 ± 0.118	5795132	0.107	-0.121	-1.33	2.92	-0.174	-6.798×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.33 ± 9.71	5795132	12.3	1.05	-566	184	-4.97	7.32
sulfurdioxide slant column density window2 precision [DU]	8.78 ± 2.31	5795132	2.92	8.49	2.37	122	7.18	10.1
sulfurdioxide slant column density corrected win2 [DU]	-0.154 ± 9.469	5795132	12.0	-0.138	-568	179	-6.16	5.86
background so2 slant column offset window2 [DU]	-1.49 ± 2.52	5795132	3.07	-0.551	-17.4	5.71	-2.82	0.251
sulfurdioxide slant column density window3 [DU]	-6.17 ± 25.91	5795132	32.6	-5.60	-344	163	-22.1	10.5
sulfurdioxide slant column density window3 precision [DU]	30.4 ± 13.1	5795132	10.5	27.4	9.88	209	23.0	33.5
sulfurdioxide slant column density corrected win3 [DU]	2.12 ± 25.52	5795132	32.1	2.32	-342	180	-13.8	18.4
background so2 slant column offset window3 [DU]	8.29 ± 5.16	5795132	7.93	7.42	-12.5	25.3	4.25	12.2
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.26	5795132	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(7.200 \pm 15.456) \times 10^{-2}$	5795132	4.646×10^{-2}	3.055×10^{-2}	9.143×10^{-4}	3.21	1.702×10^{-2}	6.347×10^{-2}
fitted radiance shift [nm]	$(-1.976 \pm 26.147) \times 10^{-4}$	5795132	1.788×10^{-3}	-2.144×10^{-4}	-3.265×10^{-2}	3.347×10^{-2}	-1.105×10^{-3}	6.829×10^{-4}
fitted radiance squeeze [1]	$(-5.044 \pm 1874.992) \times 10^{-7}$	5795132	2.147×10^{-4}	5.756×10^{-7}	-2.340×10^{-3}	9.572×10^{-3}	-1.068×10^{-4}	1.079×10^{-4}
fitted root mean square [1]	$(1.380 \pm 0.572) \times 10^{-3}$	5795132	6.228×10^{-4}	1.225×10^{-3}	3.691×10^{-4}	1.902×10^{-2}	9.984×10^{-4}	1.621×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.715 ± 0.397	5795132	0.522	0.676	5.000×10^{-2}	2.77	0.417	0.939
sulfurdioxide total air mass factor polluted precision [1]	$(9.131 \pm 11.415) \times 10^{-2}$	5795132	8.320×10^{-2}	5.112×10^{-2}	2.500×10^{-3}	1.69	2.892×10^{-2}	0.112
sulfurdioxide clear air mass factor polluted [1]	0.652 ± 0.283	5795132	0.451	0.656	3.389×10^{-2}	1.93	0.418	0.869
number of spectral points in retrieval [1]	73.5 ± 0.5	5795132	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]	0.541 $\pm$ 0.423	11314443	0.890	0.450	0.0	1.000	0.110	1.000
sulfurdioxide total vertical column [DU]	(1.378 $\pm$ 64.192) $\times 10^{-2}$	11314443	0.312	5.767 $\times 10^{-3}$	-39.4	354	-0.148	0.163
sulfurdioxide total vertical column precision [DU]	0.356 $\pm$ 0.476	11314443	0.244	0.239	3.118 $\times 10^{-2}$	26.8	0.147	0.391
sulfurdioxide slant column density corrected [DU]	(1.135 $\pm$ 30.758) $\times 10^{-2}$	11314443	0.313	6.450 $\times 10^{-3}$	-43.5	102	-0.149	0.164
sulfurdioxide slant column density cobra [DU]	(1.120 $\pm$ 29.400) $\times 10^{-2}$	11314443	0.313	6.450 $\times 10^{-3}$	-43.5	24.0	-0.149	0.164
sulfurdioxide slant column density cobra precision [DU]	0.242 $\pm$ 0.087	11314443	6.738 $\times 10^{-2}$	0.219	6.761 $\times 10^{-2}$	14.3	0.192	0.259
sulfurdioxide slant column density window1 [DU]	(4.326 $\pm$ 57.508) $\times 10^{-2}$	11314443	0.670	5.131 $\times 10^{-2}$	-43.3	52.7	-0.290	0.379
sulfurdioxide slant column density window1 precision [DU]	0.242 $\pm$ 0.087	11314443	6.738 $\times 10^{-2}$	0.219	6.761 $\times 10^{-2}$	14.3	0.192	0.259
sulfurdioxide slant column density corrected win1 [DU]	(7.902 $\pm$ 547.986) $\times 10^{-3}$	11314443	0.632	3.835 $\times 10^{-4}$	-43.3	52.7	-0.314	0.318
background so2 slant column offset window1 [DU]	(-3.536 $\pm$ 16.272) $\times 10^{-2}$	11314443	0.254	-7.412 $\times 10^{-2}$	-1.42	1.12	-0.166	8.820 $\times 10^{-2}$
sulfurdioxide slant column density window2 [DU]	0.667 $\pm$ 7.796	11314443	9.97	0.711	-1.046 $\times 10^3$	789	-4.29	5.68
sulfurdioxide slant column density window2 precision [DU]	7.19 $\pm$ 1.94	11314443	2.10	6.91	2.18	421	5.95	8.05
sulfurdioxide slant column density corrected win2 [DU]	-0.246 $\pm$ 7.726	11314443	9.86	-0.215	-1.046 $\times 10^3$	789	-5.16	4.70
background so2 slant column offset window2 [DU]	-0.912 $\pm$ 1.832	11314443	2.48	-0.652	-12.5	6.34	-2.06	0.429
sulfurdioxide slant column density window3 [DU]	-3.44 $\pm$ 21.37	11314443	26.8	-4.40	-1.729 $\times 10^3$	371	-17.3	9.49
sulfurdioxide slant column density window3 precision [DU]	25.0 $\pm$ 12.7	11314443	8.19	21.5	9.46	383	18.2	26.4
sulfurdioxide slant column density corrected win3 [DU]	2.74 $\pm$ 20.44	11314443	25.4	2.53	-1.733 $\times 10^3$	365	-10.0	15.4
background so2 slant column offset window3 [DU]	6.18 $\pm$ 6.90	11314443	10.7	6.65	-16.1	25.3	0.658	11.4
sulfurdioxide slant column cobra flag [1]	1.98 $\pm$ 0.18	11314443	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	(2.218 $\pm$ 2.934) $\times 10^{-2}$	11314443	1.859 $\times 10^{-2}$	1.637 $\times 10^{-2}$	5.524 $\times 10^{-4}$	1.44	9.178 $\times 10^{-3}$	2.777 $\times 10^{-2}$
fitted radiance shift [nm]	(-4.898 $\pm$ 24.310) $\times 10^{-4}$	11314443	1.561 $\times 10^{-3}$	-5.491 $\times 10^{-4}$	-4.954 $\times 10^{-2}$	8.738 $\times 10^{-2}$	-1.321 $\times 10^{-3}$	2.394 $\times 10^{-4}$
fitted radiance squeeze [1]	(-6.989 $\pm$ 16.662) $\times 10^{-5}$	11314443	2.058 $\times 10^{-4}$	-5.989 $\times 10^{-5}$	-1.656 $\times 10^{-2}$	1.677 $\times 10^{-2}$	-1.677 $\times 10^{-4}$	3.807 $\times 10^{-5}$
fitted root mean square [1]	(1.086 $\pm$ 0.362) $\times 10^{-3}$	11314443	3.314 $\times 10^{-4}$	1.002 $\times 10^{-3}$	3.145 $\times 10^{-4}$	6.384 $\times 10^{-2}$	8.662 $\times 10^{-4}$	1.198 $\times 10^{-3}$
sulfurdioxide total air mass factor polluted [1]	1.14 $\pm$ 0.71	11314443	0.944	0.921	5.000 $\times 10^{-2}$	3.32	0.604	1.55
sulfurdioxide total air mass factor polluted precision [1]	0.178 $\pm$ 0.160	11314443	0.216	0.132	4.294 $\times 10^{-3}$	1.74	4.771 $\times 10^{-2}$	0.264
sulfurdioxide clear air mass factor polluted [1]	0.909 $\pm$ 0.617	11314443	0.449	0.703	0.129	3.35	0.539	0.988
number of spectral points in retrieval [1]	73.4 $\pm$ 0.5	11314443	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]	0.640 ± 0.411	12051499	0.790	1.000	0.0	1.000	0.210	1.000
sulfurdioxide total vertical column [DU]	$(2.428 \pm 97.334) \times 10^{-2}$	12051499	0.398	7.731×10^{-3}	-69.2	126	-0.189	0.209
sulfurdioxide total vertical column precision [DU]	0.461 ± 0.691	12051499	0.277	0.292	4.142×10^{-2}	34.0	0.198	0.475
sulfurdioxide slant column density corrected [DU]	$(1.215 \pm 29.509) \times 10^{-2}$	12051499	0.324	6.862×10^{-3}	-17.4	27.0	-0.154	0.170
sulfurdioxide slant column density cobra [DU]	$(1.215 \pm 29.492) \times 10^{-2}$	12051499	0.324	6.862×10^{-3}	-17.4	24.0	-0.154	0.170
sulfurdioxide slant column density cobra precision [DU]	0.255 ± 0.104	12051499	8.080×10^{-2}	0.224	8.072×10^{-2}	11.0	0.195	0.275
sulfurdioxide slant column density window1 [DU]	0.116 ± 0.580	12051499	0.665	0.114	-43.3	43.7	-0.220	0.446
sulfurdioxide slant column density window1 precision [DU]	0.255 ± 0.104	12051499	8.080×10^{-2}	0.224	8.072×10^{-2}	11.0	0.195	0.275
sulfurdioxide slant column density corrected win1 [DU]	$(3.676 \pm 56.930) \times 10^{-2}$	12051499	0.647	2.502×10^{-2}	-43.3	43.7	-0.295	0.352
background so2 slant column offset window1 [DU]	$(-7.926 \pm 13.477) \times 10^{-2}$	12051499	0.178	-0.112	-0.965	2.73	-0.171	7.113×10^{-3}
sulfurdioxide slant column density window2 [DU]	0.628 ± 8.271	12051499	10.5	0.570	-1.046×10^3	544	-4.65	5.81
sulfurdioxide slant column density window2 precision [DU]	7.57 ± 2.07	12051499	2.39	7.24	2.24	421	6.17	8.57
sulfurdioxide slant column density corrected win2 [DU]	-0.162 ± 8.169	12051499	10.4	-0.120	-1.046×10^3	546	-5.32	5.04
background so2 slant column offset window2 [DU]	-0.789 ± 1.880	12051499	2.12	-0.381	-17.4	6.34	-1.70	0.419
sulfurdioxide slant column density window3 [DU]	-1.39 ± 22.58	12051499	28.3	-1.97	-1.729×10^3	371	-15.7	12.6
sulfurdioxide slant column density window3 precision [DU]	26.6 ± 12.6	12051499	9.82	23.2	9.55	223	19.4	29.3
sulfurdioxide slant column density corrected win3 [DU]	4.43 ± 21.78	12051499	27.3	4.00	-1.733×10^3	365	-9.38	17.9
background so2 slant column offset window3 [DU]	5.82 ± 5.81	12051499	8.15	6.03	-16.1	25.3	1.90	10.0
sulfurdioxide slant column cobra flag [1]	1.99 ± 0.14	12051499	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.922 \pm 4.967) \times 10^{-2}$	12051499	2.059×10^{-2}	2.026×10^{-2}	1.120×10^{-3}	3.04	1.249×10^{-2}	3.308×10^{-2}
fitted radiance shift [nm]	$(-3.435 \pm 24.698) \times 10^{-4}$	12051499	1.801×10^{-3}	-3.690×10^{-4}	-4.411×10^{-2}	4.647×10^{-2}	-1.272×10^{-3}	5.289×10^{-4}
fitted radiance squeeze [1]	$(-3.156 \pm 16.344) \times 10^{-5}$	12051499	1.936×10^{-4}	-2.739×10^{-5}	-1.656×10^{-2}	1.357×10^{-2}	-1.263×10^{-4}	6.735×10^{-5}
fitted root mean square [1]	$(1.127 \pm 0.427) \times 10^{-3}$	12051499	3.562×10^{-4}	1.016×10^{-3}	3.408×10^{-4}	4.048×10^{-2}	8.742×10^{-4}	1.230×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.872 ± 0.460	12051499	0.544	0.796	5.000×10^{-2}	2.86	0.553	1.10
sulfurdioxide total air mass factor polluted precision [1]	0.133 ± 0.128	12051499	0.151	8.181×10^{-2}	3.495×10^{-3}	1.74	4.078×10^{-2}	0.192
sulfurdioxide clear air mass factor polluted [1]	0.693 ± 0.245	12051499	0.335	0.665	4.998×10^{-2}	2.87	0.516	0.851
number of spectral points in retrieval [1]	73.4 ± 0.5	12051499	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]	0.478 ± 0.422	4513850	0.920	0.310	0.0	1.000	8.000×10^{-2}	1.000
sulfurdioxide total vertical column [DU]	$(4.912 \pm 173.486) \times 10^{-2}$	4513850	0.312	7.176×10^{-3}	-150	354	-0.144	0.168
sulfurdioxide total vertical column precision [DU]	0.592 ± 1.268	4513850	0.450	0.241	3.118×10^{-2}	53.7	0.111	0.561
sulfurdioxide slant column density corrected [DU]	$(2.139 \pm 41.869) \times 10^{-2}$	4513850	0.373	1.026×10^{-2}	-8.13	102	-0.174	0.198
sulfurdioxide slant column density cobra [DU]	$(2.102 \pm 39.436) \times 10^{-2}$	4513850	0.373	1.026×10^{-2}	-8.13	23.8	-0.174	0.198
sulfurdioxide slant column density cobra precision [DU]	0.294 ± 0.125	4513850	0.124	0.259	6.761×10^{-2}	9.73	0.213	0.338
sulfurdioxide slant column density window1 [DU]	$(-8.017 \pm 727.678) \times 10^{-3}$	4513850	0.819	-1.563×10^{-2}	-27.3	52.7	-0.428	0.391
sulfurdioxide slant column density window1 precision [DU]	0.294 ± 0.125	4513850	0.124	0.259	6.761×10^{-2}	9.73	0.213	0.338
sulfurdioxide slant column density corrected win1 [DU]	$(-1.505 \pm 69.596) \times 10^{-2}$	4513850	0.755	-3.780×10^{-2}	-27.3	52.7	-0.409	0.345
background so2 slant column offset window1 [DU]	$(-7.032 \pm 185.208) \times 10^{-3}$	4513850	0.305	-6.185×10^{-2}	-1.42	2.92	-0.154	0.151
sulfurdioxide slant column density window2 [DU]	1.55 ± 8.92	4513850	11.1	1.47	-326	789	-4.05	7.04
sulfurdioxide slant column density window2 precision [DU]	8.07 ± 2.42	4513850	2.94	7.66	2.18	403	6.38	9.32
sulfurdioxide slant column density corrected win2 [DU]	-0.361 ± 8.729	4513850	10.9	-0.394	-320	789	-5.81	5.05
background so2 slant column offset window2 [DU]	-1.91 ± 2.38	4513850	3.65	-1.78	-17.4	6.34	-3.53	0.116
sulfurdioxide slant column density window3 [DU]	-11.7 ± 22.3	4513850	26.9	-11.5	-372	173	-25.0	1.87
sulfurdioxide slant column density window3 precision [DU]	26.8 ± 13.8	4513850	11.5	23.3	9.46	383	18.5	29.9
sulfurdioxide slant column density corrected win3 [DU]	-1.94 ± 22.63	4513850	27.2	-1.10	-378	180	-15.1	12.1
background so2 slant column offset window3 [DU]	9.73 ± 7.12	4513850	11.5	11.4	-16.1	25.3	4.03	15.6
sulfurdioxide slant column cobra flag [1]	1.95 ± 0.32	4513850	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(5.406 \pm 13.174) \times 10^{-2}$	4513850	3.913×10^{-2}	1.696×10^{-2}	5.524×10^{-4}	3.19	6.607×10^{-3}	4.573×10^{-2}
fitted radiance shift [nm]	$(-5.324 \pm 24.890) \times 10^{-4}$	4513850	1.295×10^{-3}	-6.141×10^{-4}	-4.954×10^{-2}	8.738×10^{-2}	-1.249×10^{-3}	4.571×10^{-5}
fitted radiance squeeze [1]	$(-8.962 \pm 20.126) \times 10^{-5}$	4513850	2.509×10^{-4}	-8.877×10^{-5}	-1.641×10^{-2}	1.677×10^{-2}	-2.144×10^{-4}	3.656×10^{-5}
fitted root mean square [1]	$(1.323 \pm 0.507) \times 10^{-3}$	4513850	5.319×10^{-4}	1.211×10^{-3}	3.145×10^{-4}	6.384×10^{-2}	9.904×10^{-4}	1.522×10^{-3}
sulfurdioxide total air mass factor polluted [1]	1.35 ± 0.92	4513850	1.77	1.11	5.000×10^{-2}	3.32	0.512	2.28
sulfurdioxide total air mass factor polluted precision [1]	0.195 ± 0.195	4513850	0.261	0.136	2.500×10^{-3}	1.69	3.511×10^{-2}	0.296
sulfurdioxide clear air mass factor polluted [1]	1.19 ± 0.87	4513850	1.25	0.885	3.389×10^{-2}	3.35	0.494	1.74
number of spectral points in retrieval [1]	73.4 ± 0.5	4513850	1.000	73.0	52.0	74.0	73.0	74.0

3 Granule outlines

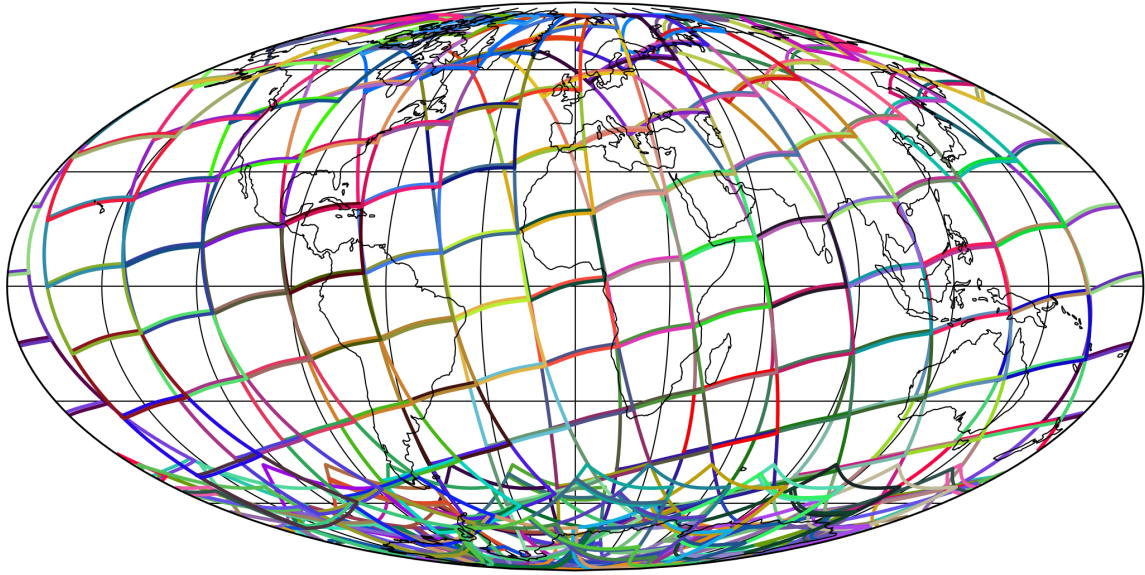


Figure 1: Outline of the granules.

4 Input data monitoring

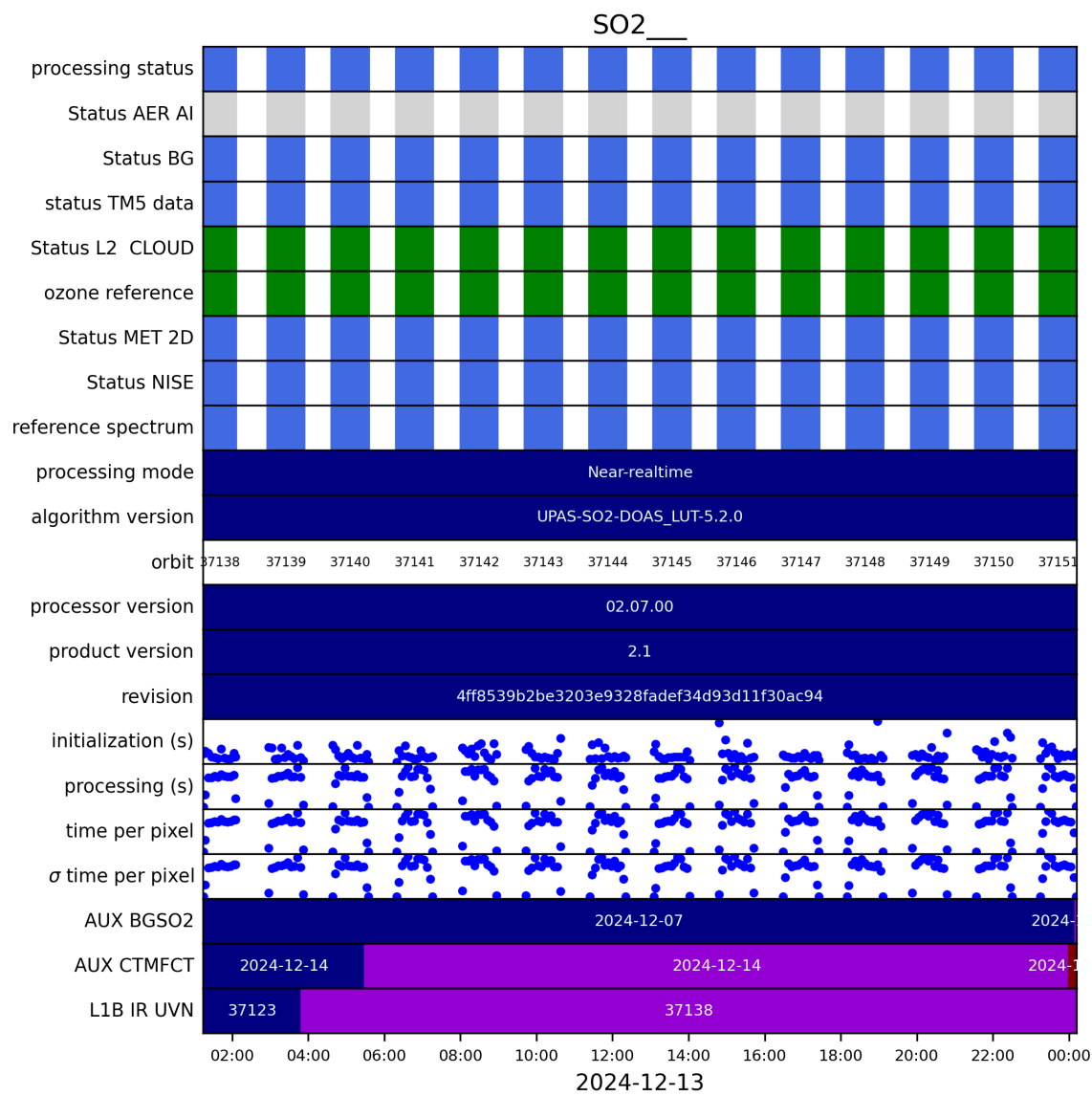


Figure 2: Input data per granule

5 Warnings and errors

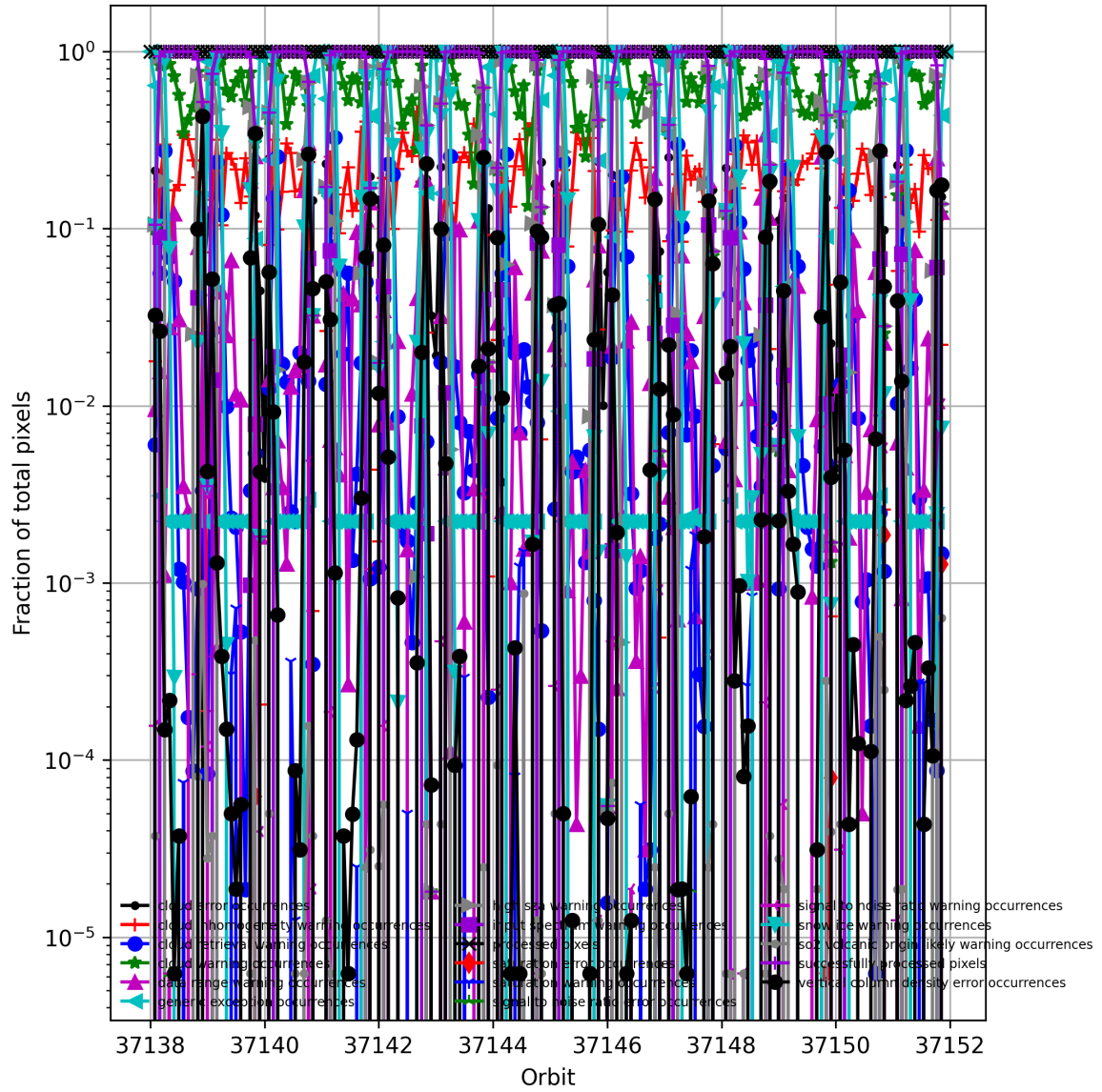


Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

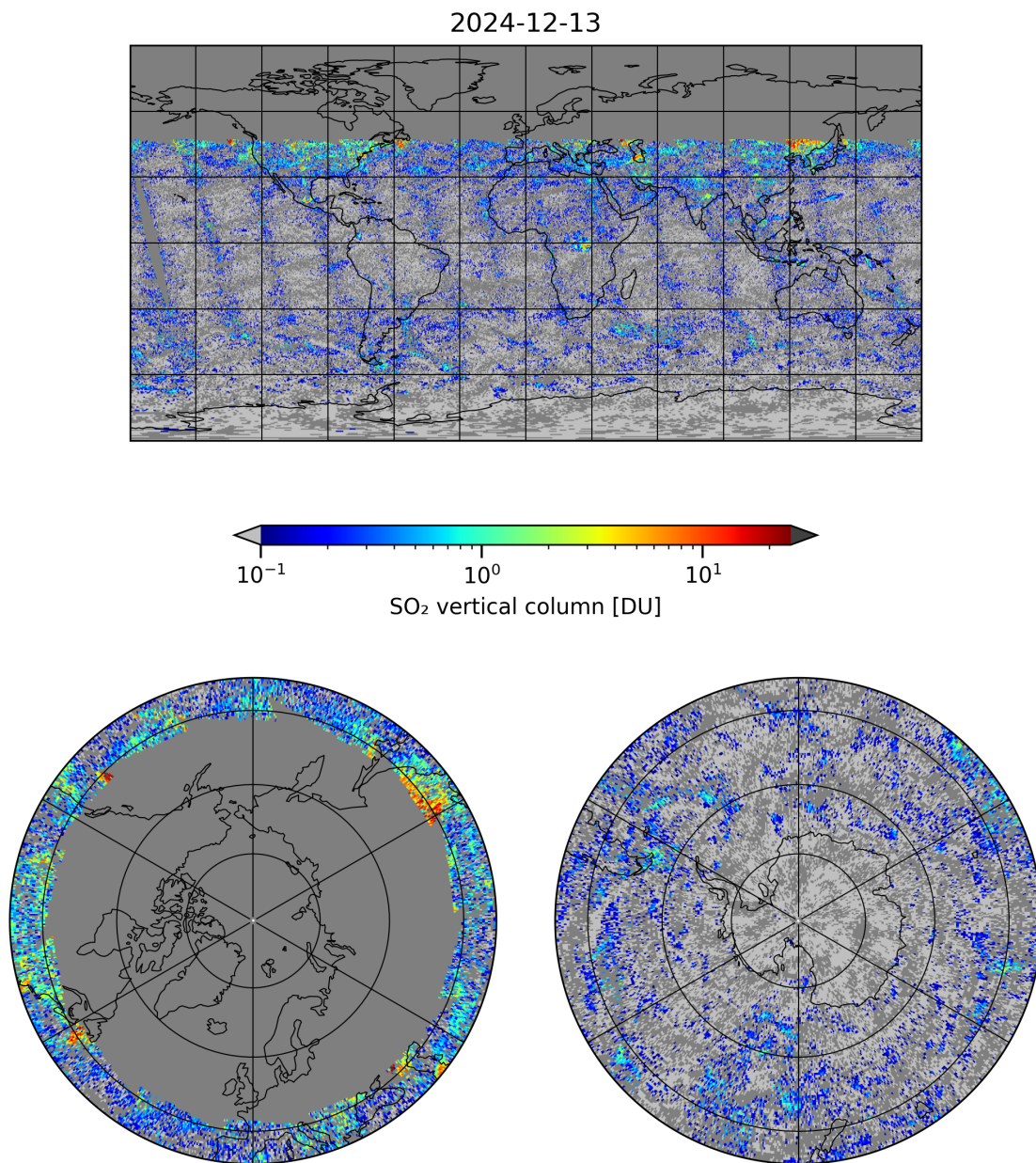


Figure 4: Map of “SO₂ vertical column” for 2024-12-13 to 2024-12-14

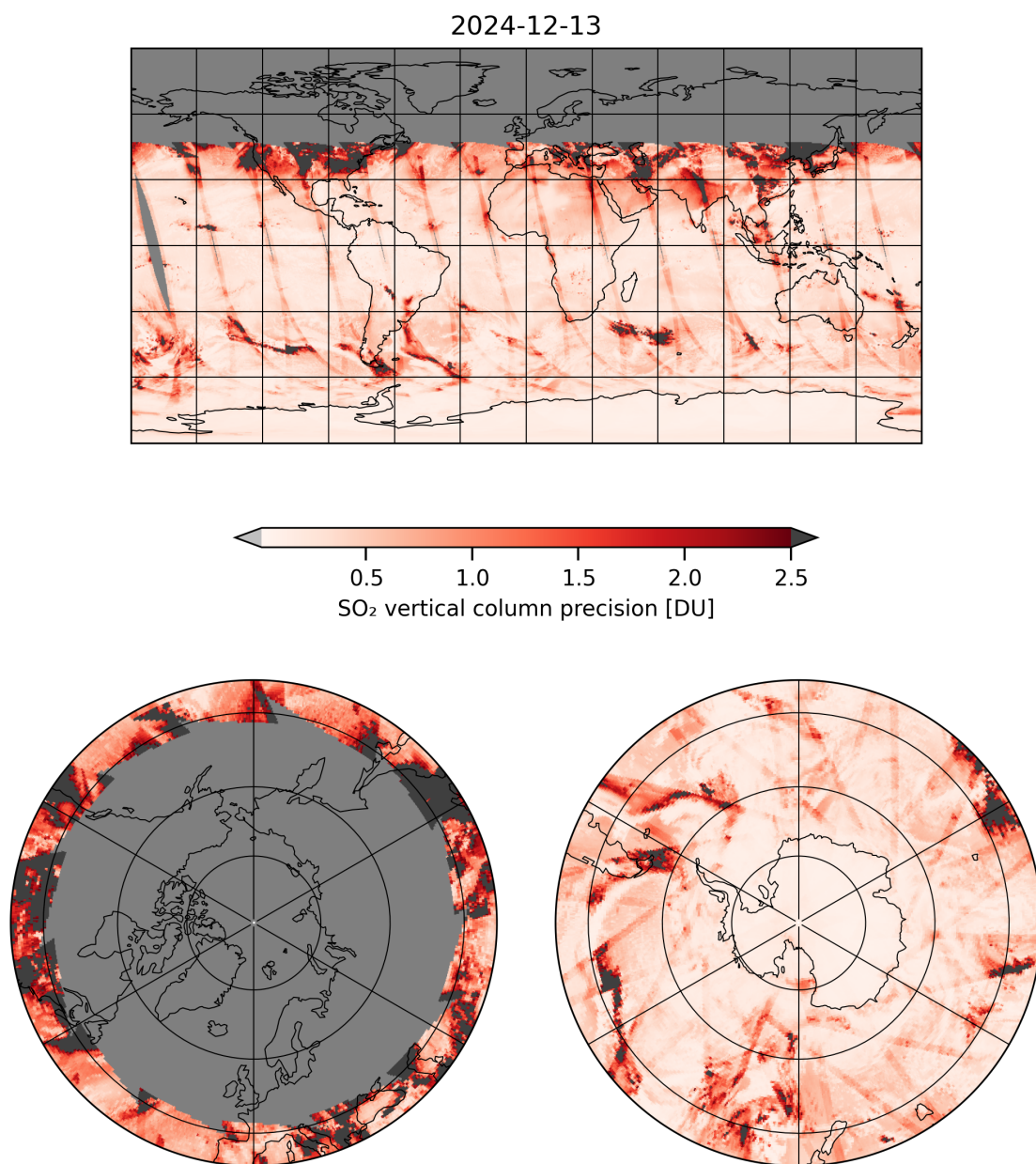


Figure 5: Map of “SO₂ vertical column precision” for 2024-12-13 to 2024-12-14

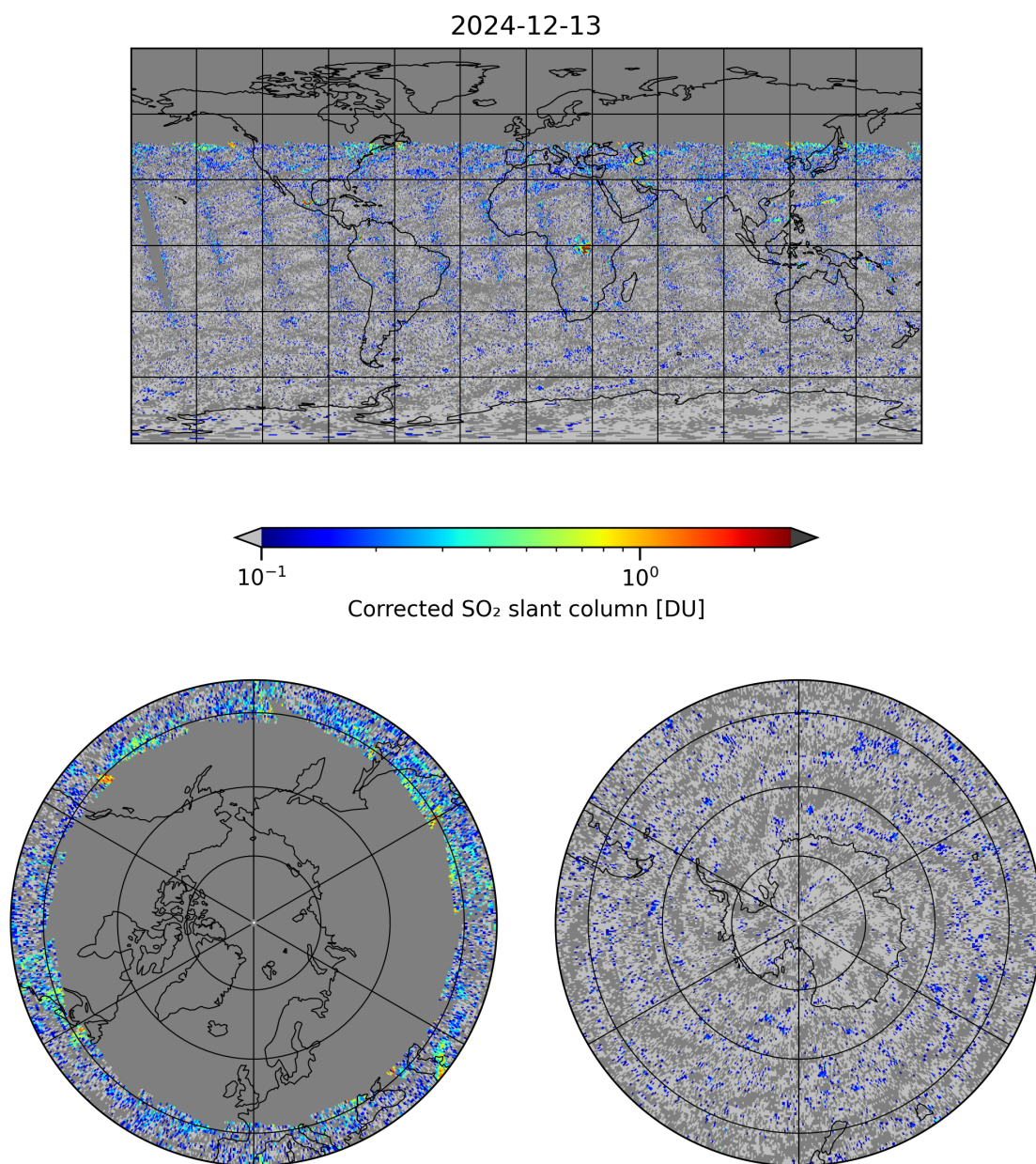


Figure 6: Map of “Corrected SO₂ slant column” for 2024-12-13 to 2024-12-14

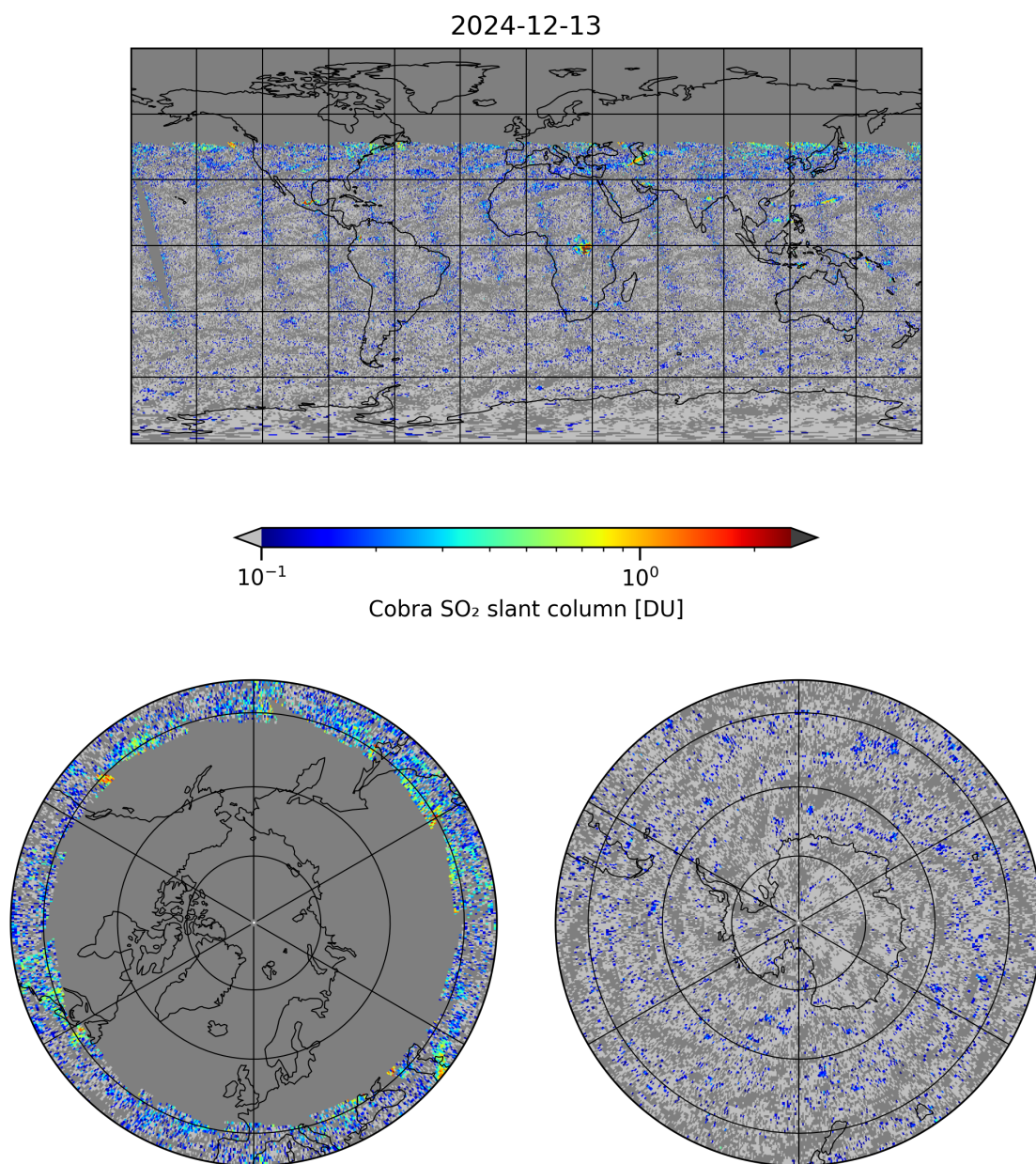


Figure 7: Map of “Cobra SO₂ slant column” for 2024-12-13 to 2024-12-14

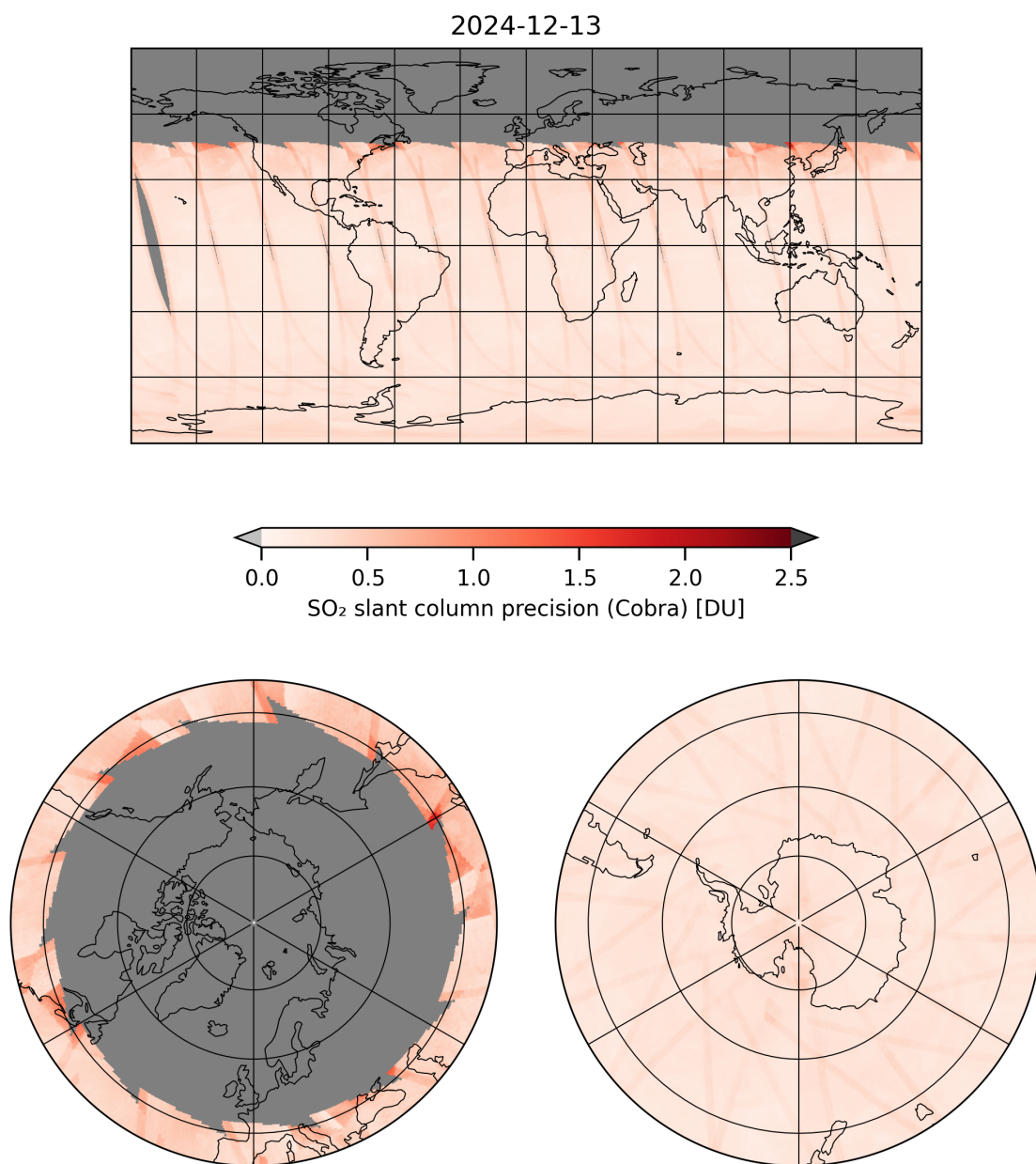


Figure 8: Map of “SO₂ slant column precision (Cobra)” for 2024-12-13 to 2024-12-14

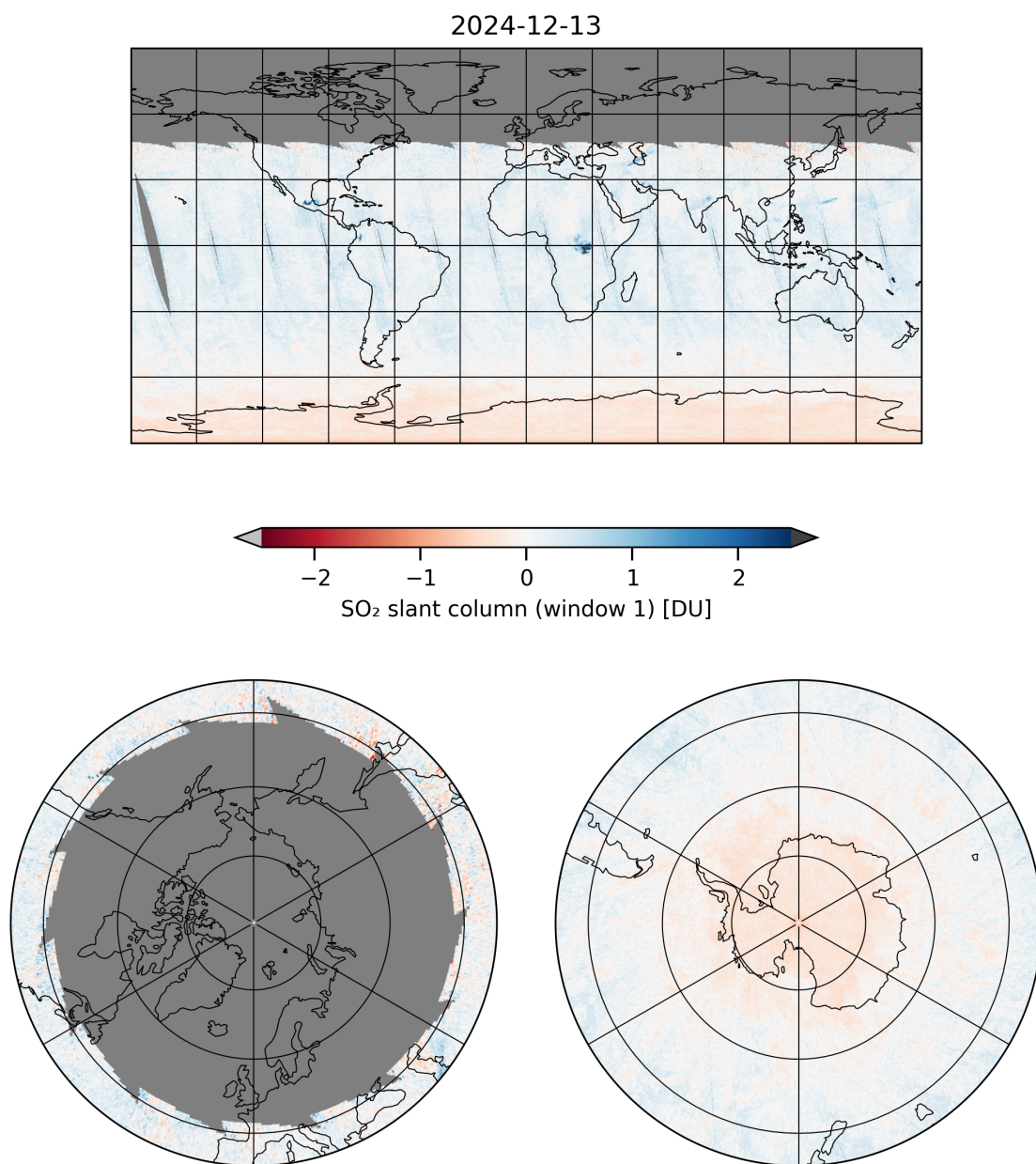


Figure 9: Map of “SO₂ slant column (window 1)” for 2024-12-13 to 2024-12-14

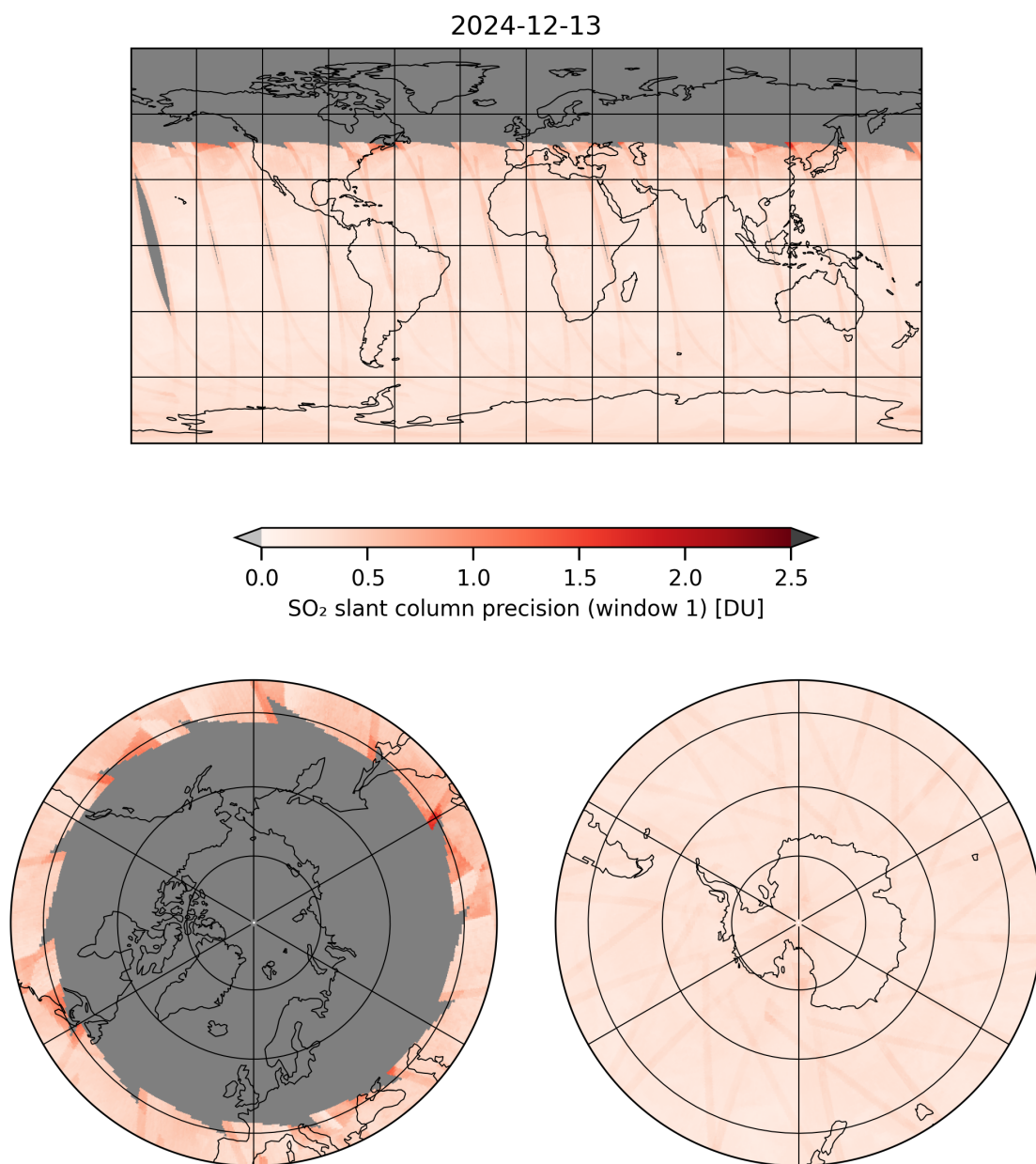


Figure 10: Map of “SO₂ slant column precision (window 1)” for 2024-12-13 to 2024-12-14

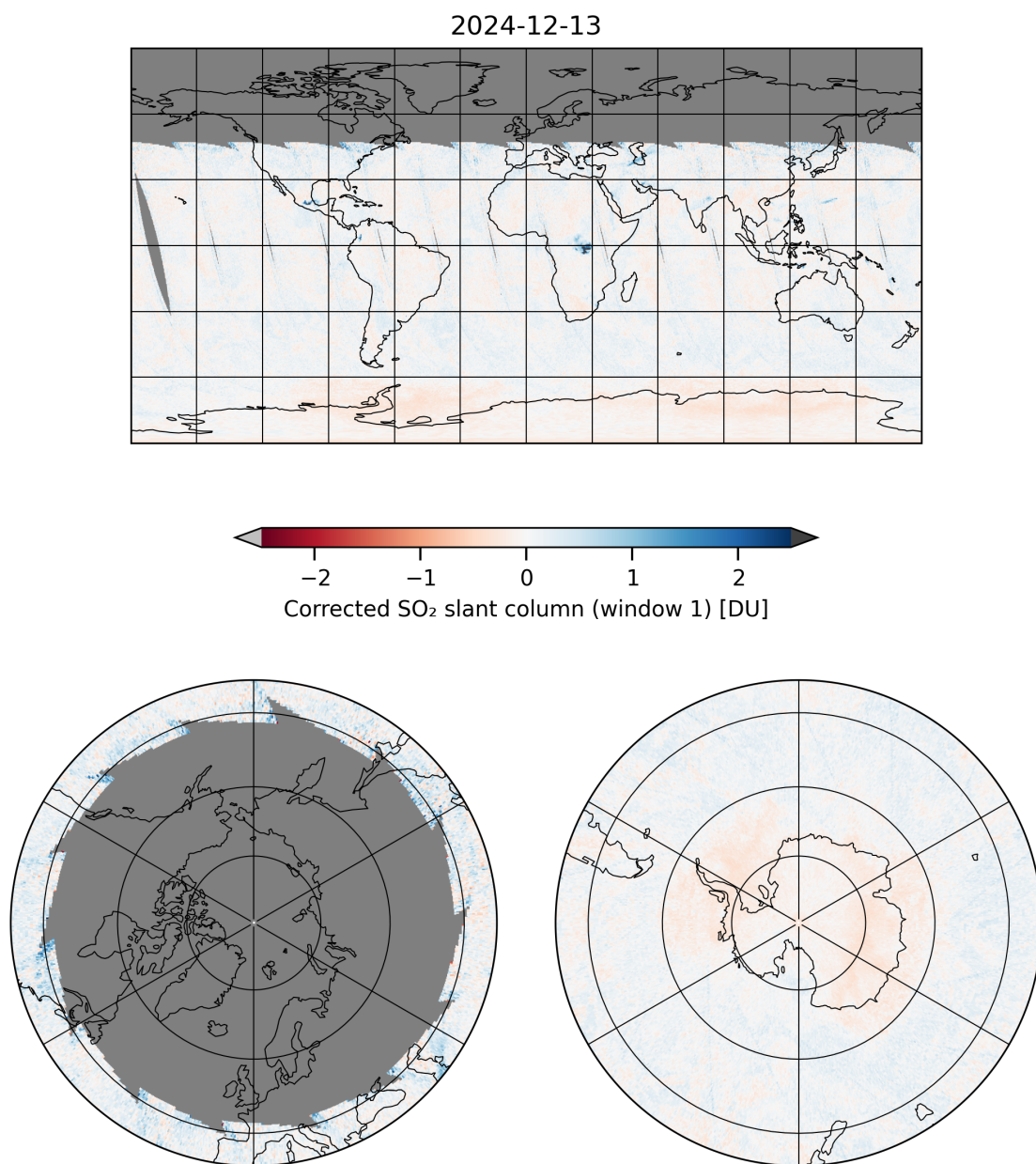


Figure 11: Map of “Corrected SO₂ slant column (window 1)” for 2024-12-13 to 2024-12-14

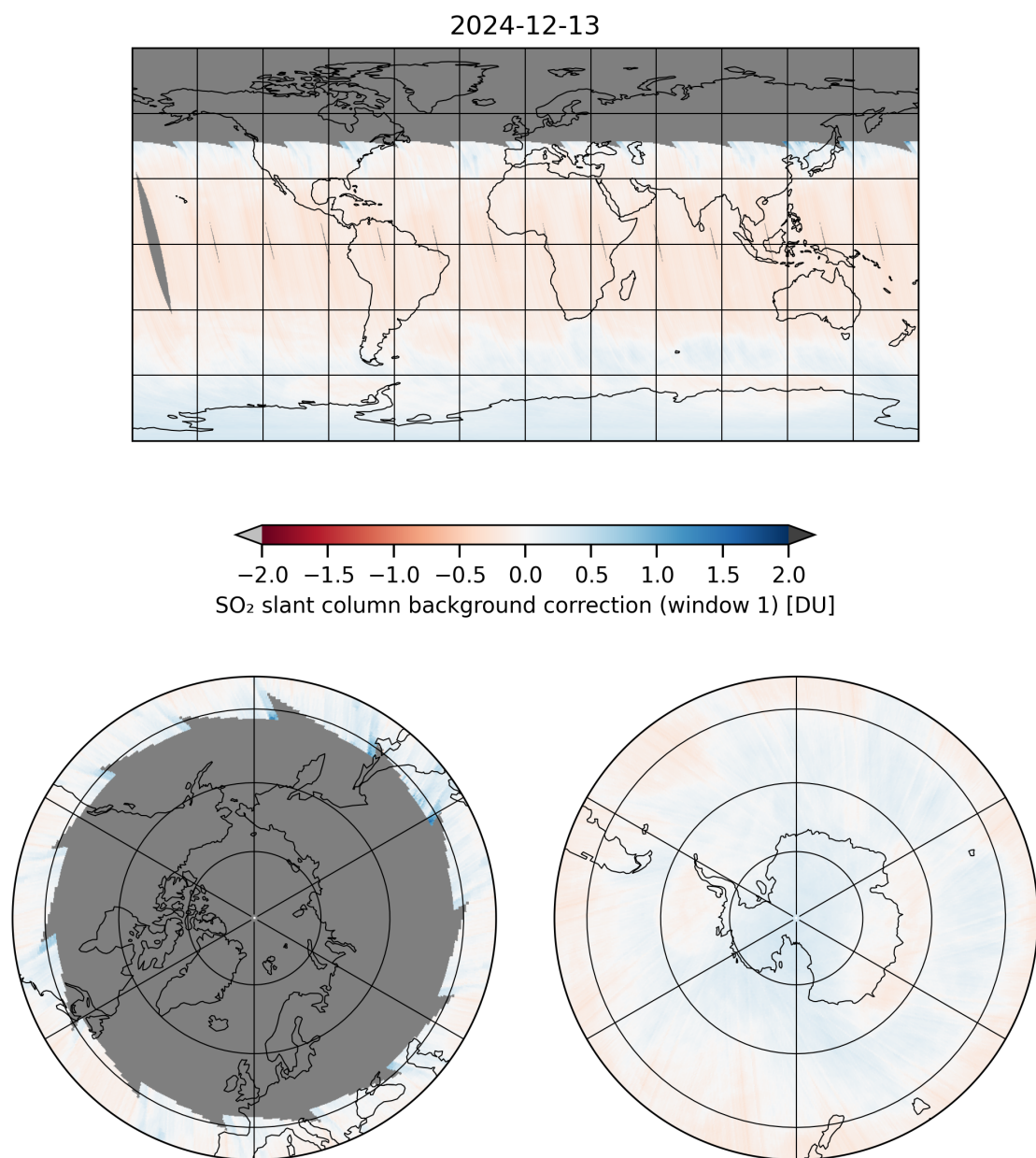


Figure 12: Map of “SO₂ slant column background correction (window 1)” for 2024-12-13 to 2024-12-14

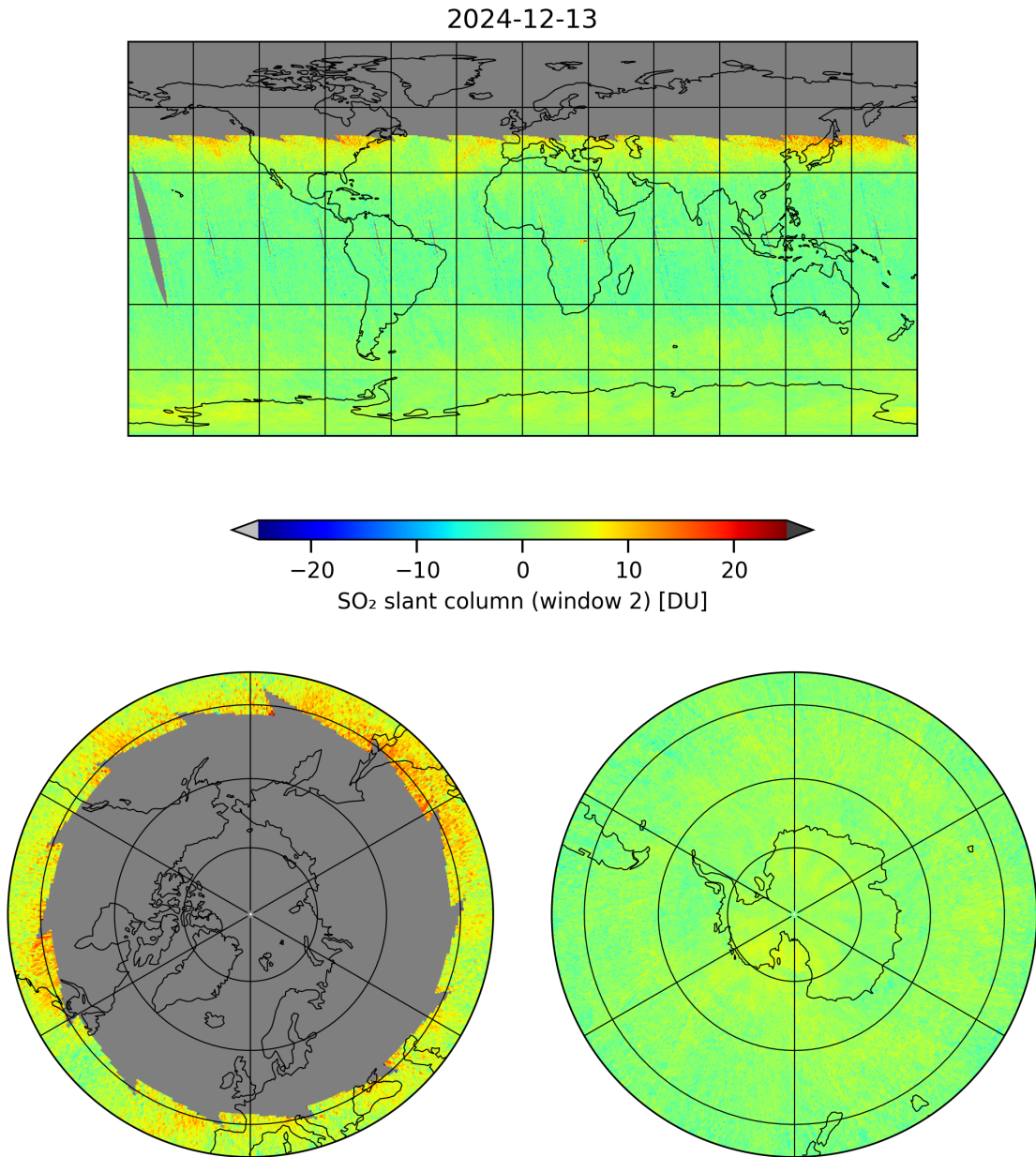


Figure 13: Map of “SO₂ slant column (window 2)” for 2024-12-13 to 2024-12-14

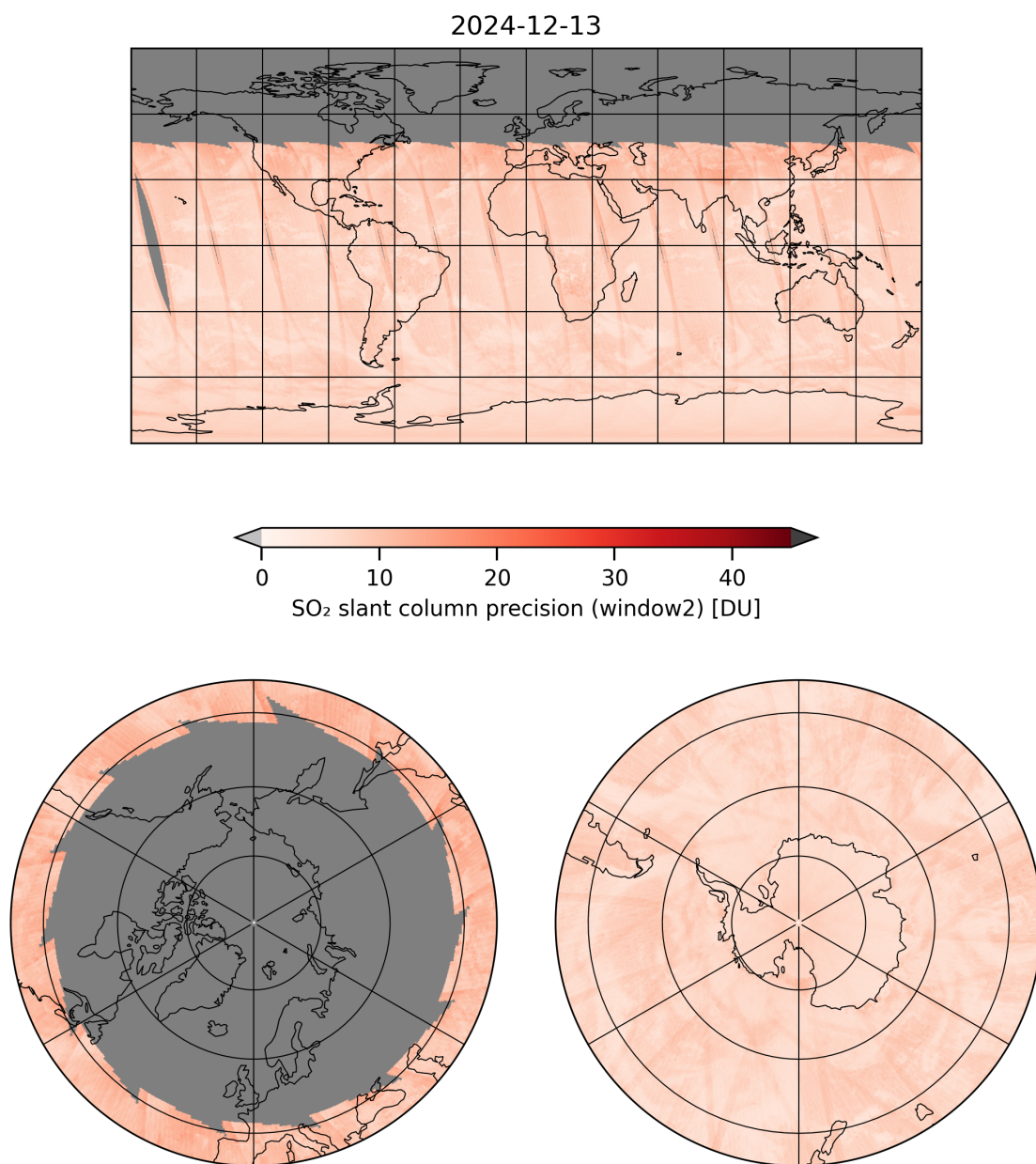


Figure 14: Map of “SO₂ slant column precision (window2)” for 2024-12-13 to 2024-12-14

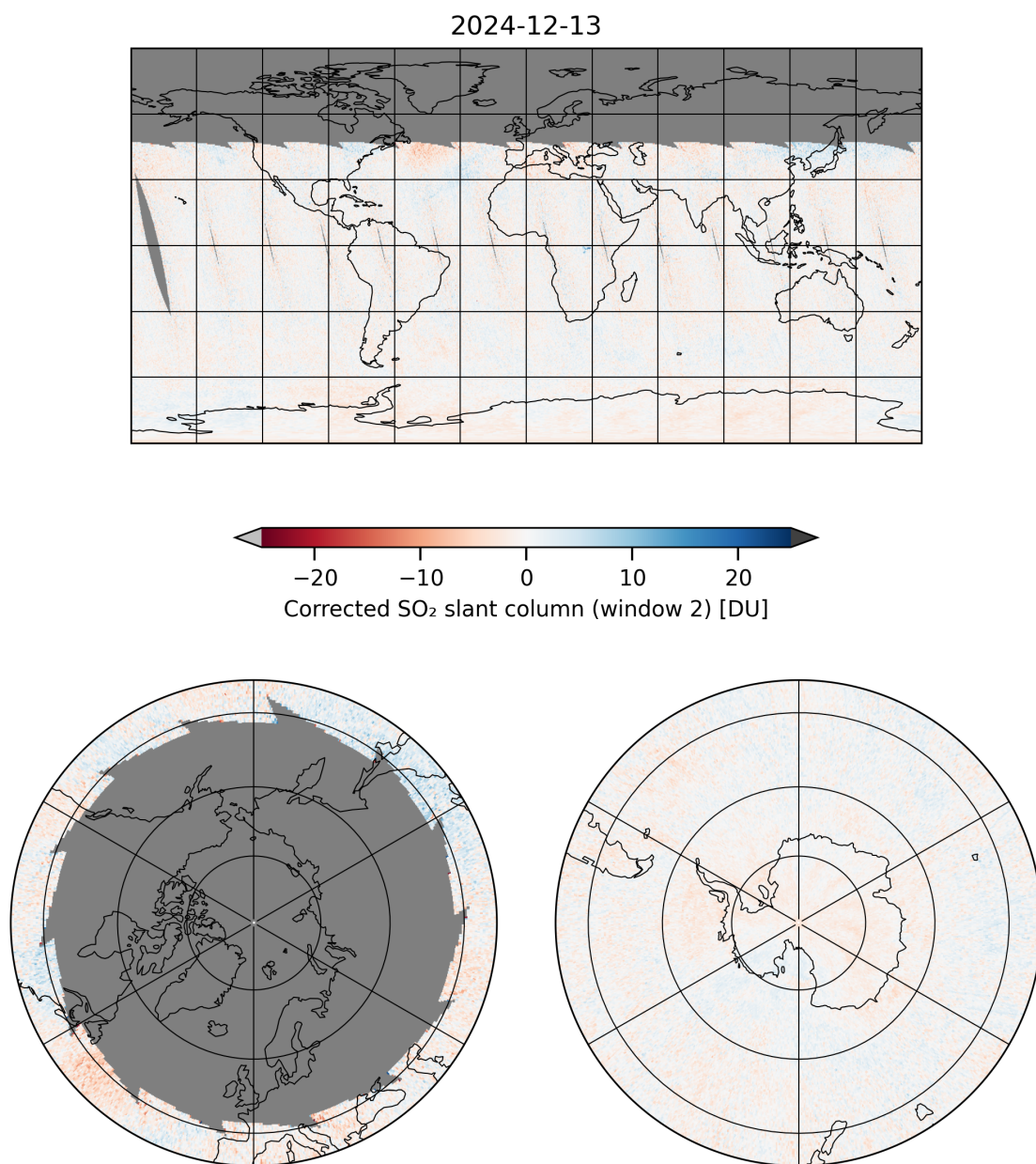


Figure 15: Map of “Corrected SO₂ slant column (window 2)” for 2024-12-13 to 2024-12-14

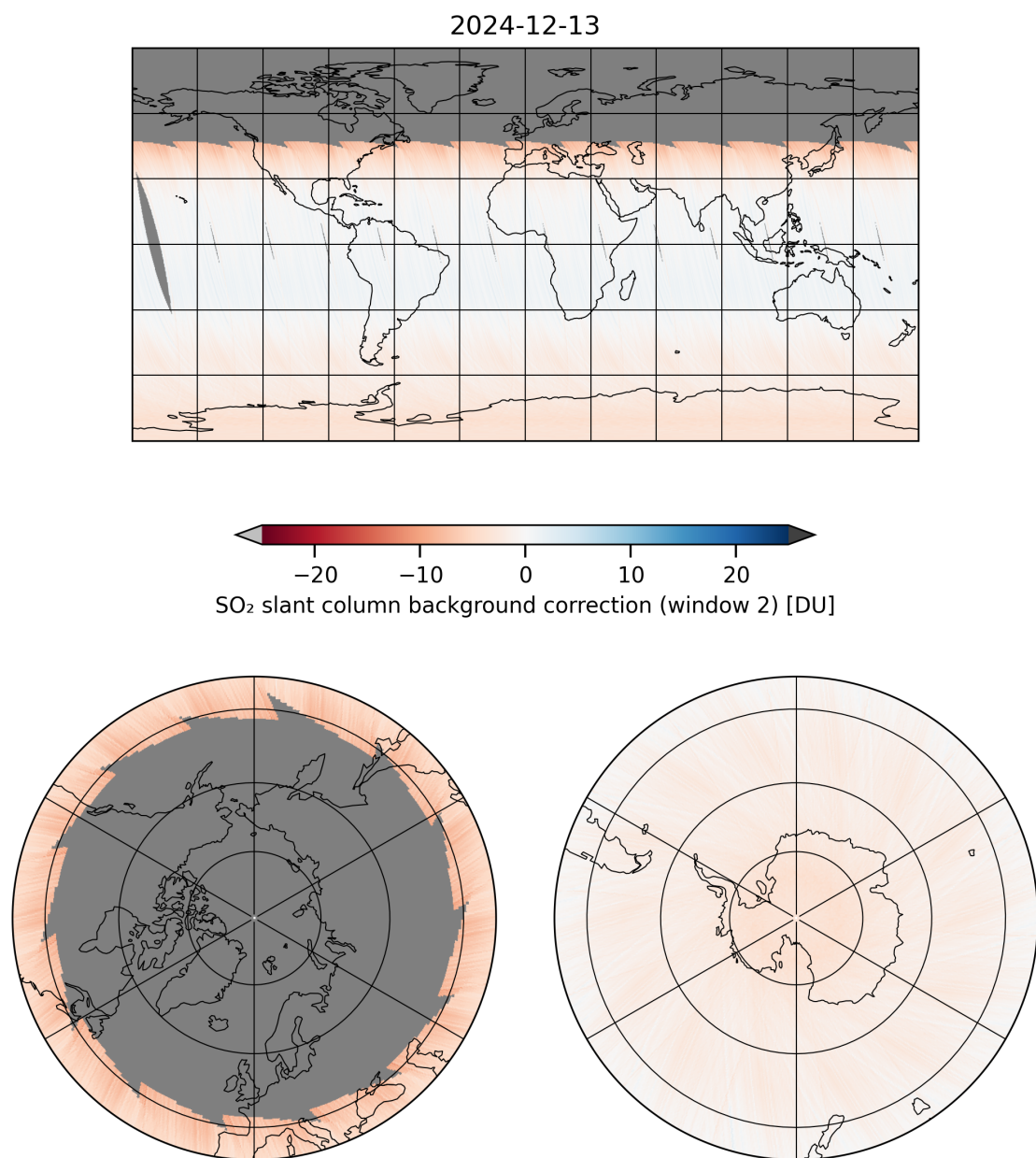


Figure 16: Map of “SO₂ slant column background correction (window 2)” for 2024-12-13 to 2024-12-14

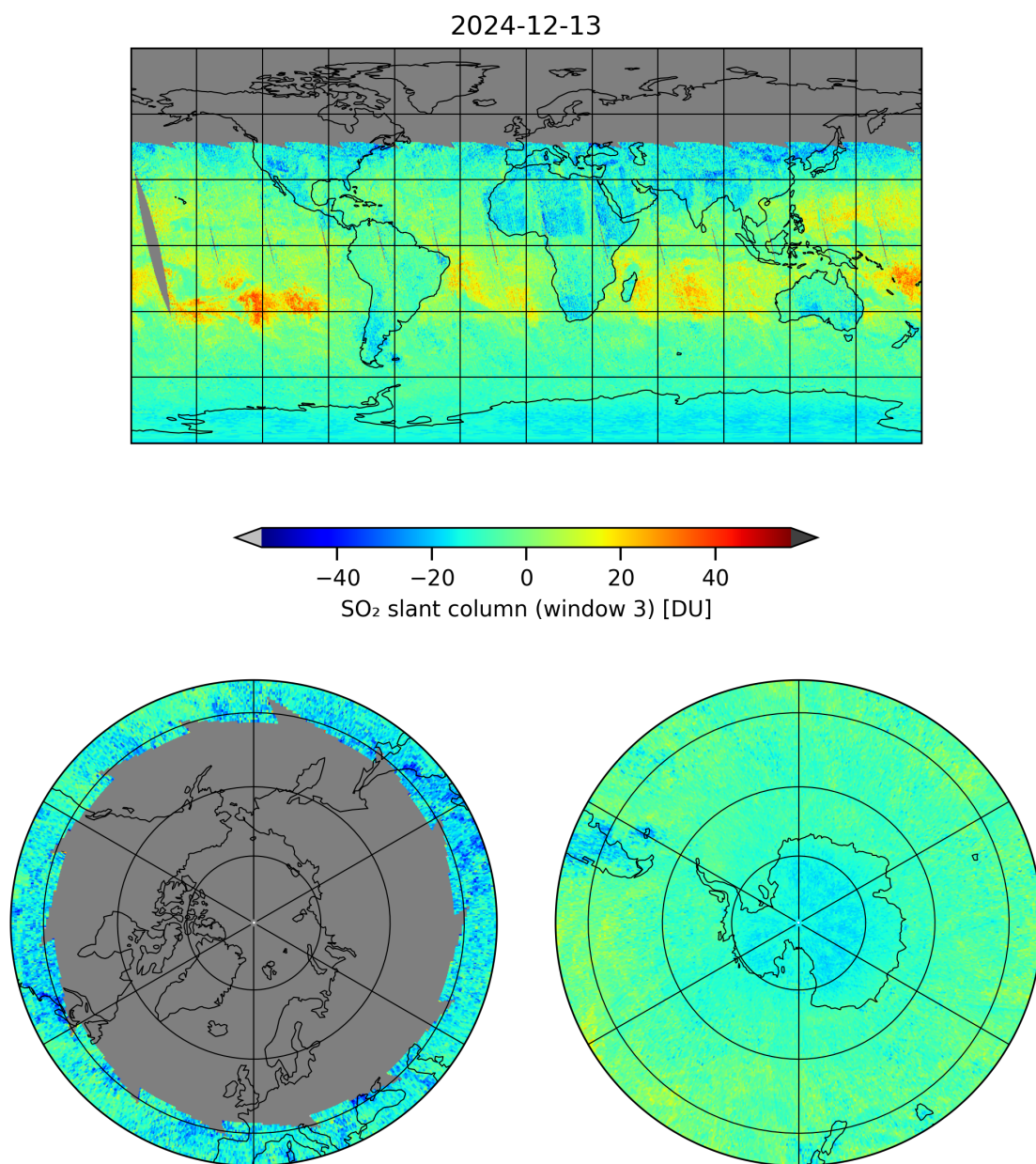


Figure 17: Map of “SO₂ slant column (window 3)” for 2024-12-13 to 2024-12-14

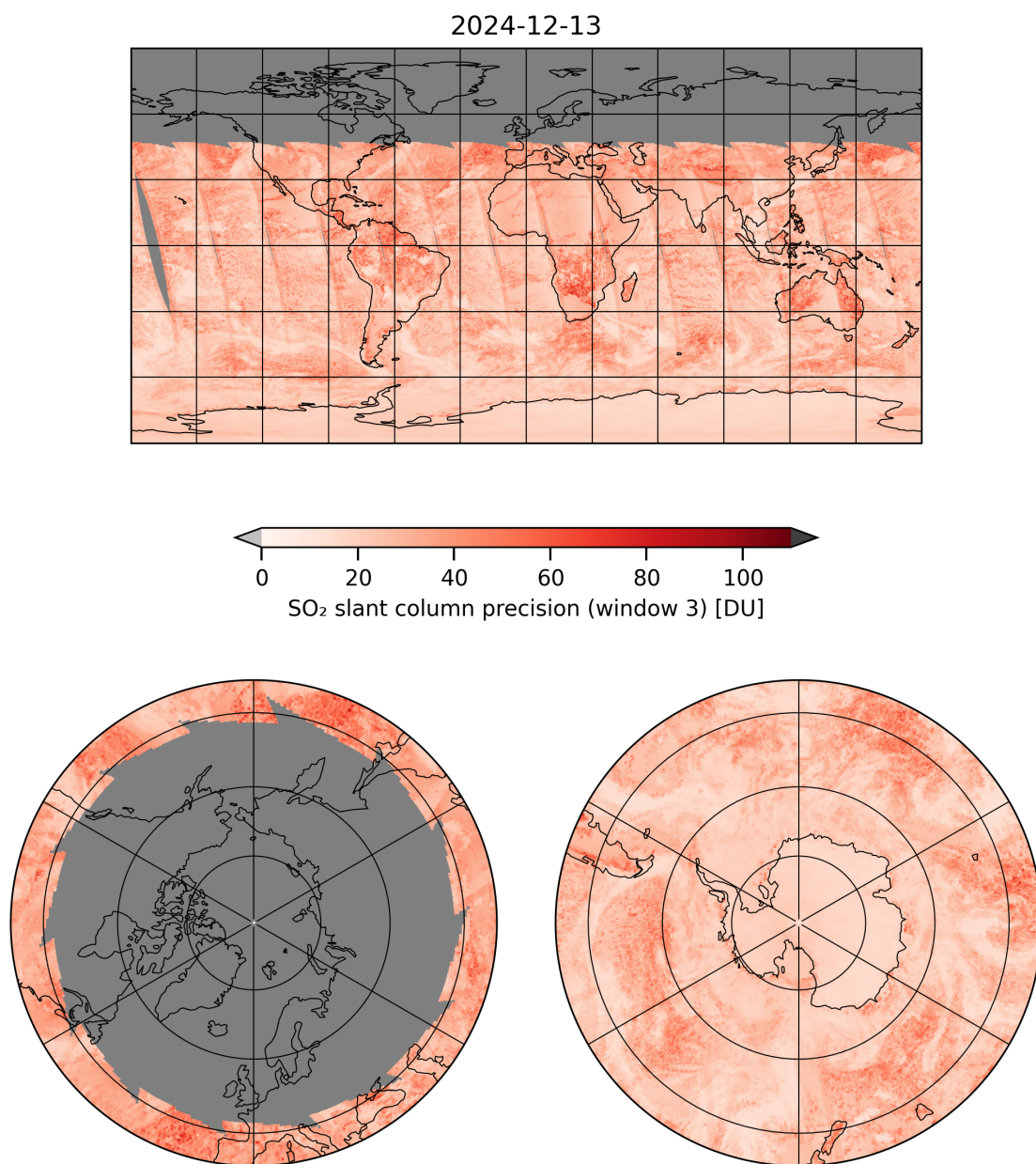


Figure 18: Map of “SO₂ slant column precision (window 3)” for 2024-12-13 to 2024-12-14

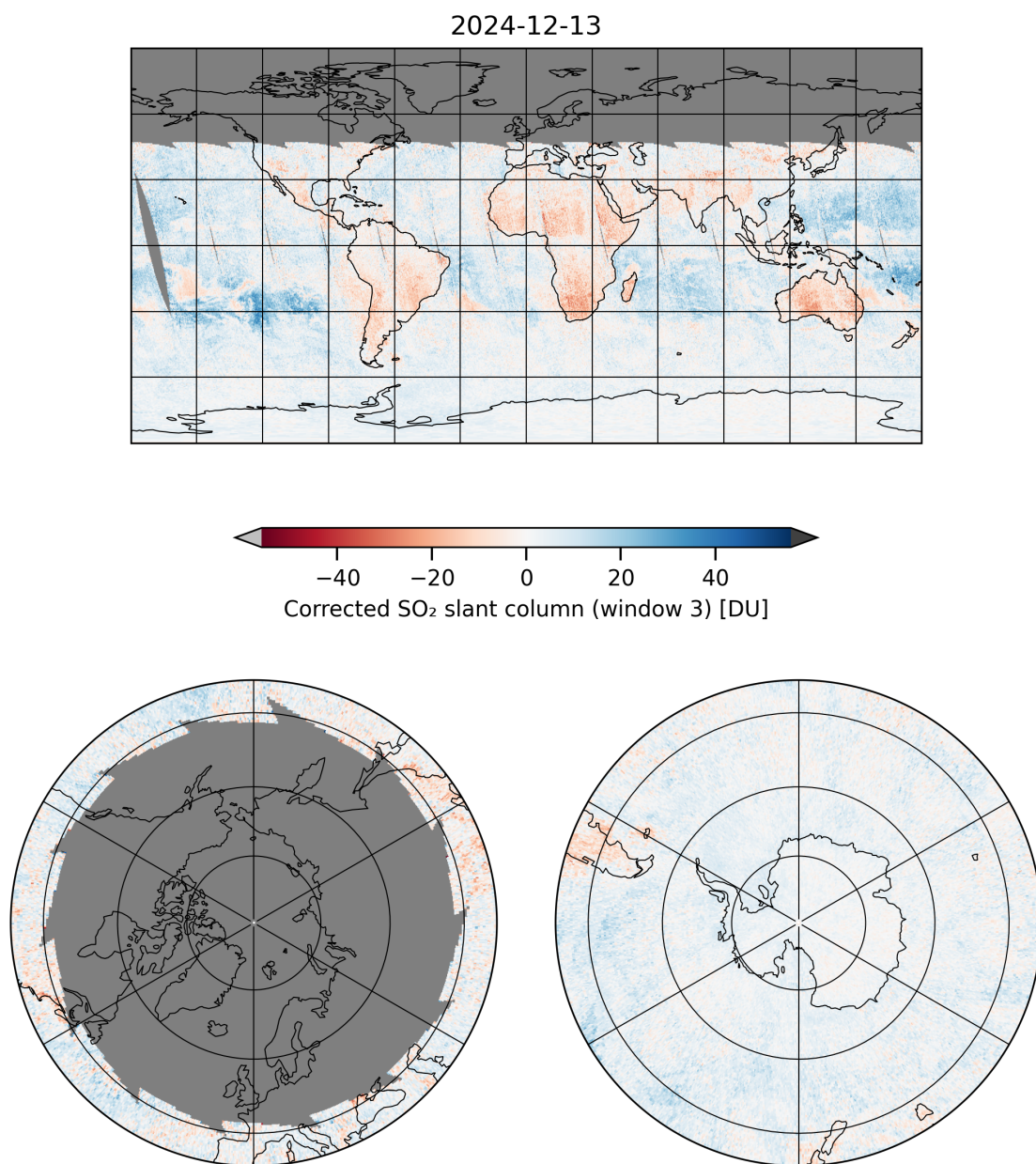


Figure 19: Map of “Corrected SO₂ slant column (window 3)” for 2024-12-13 to 2024-12-14

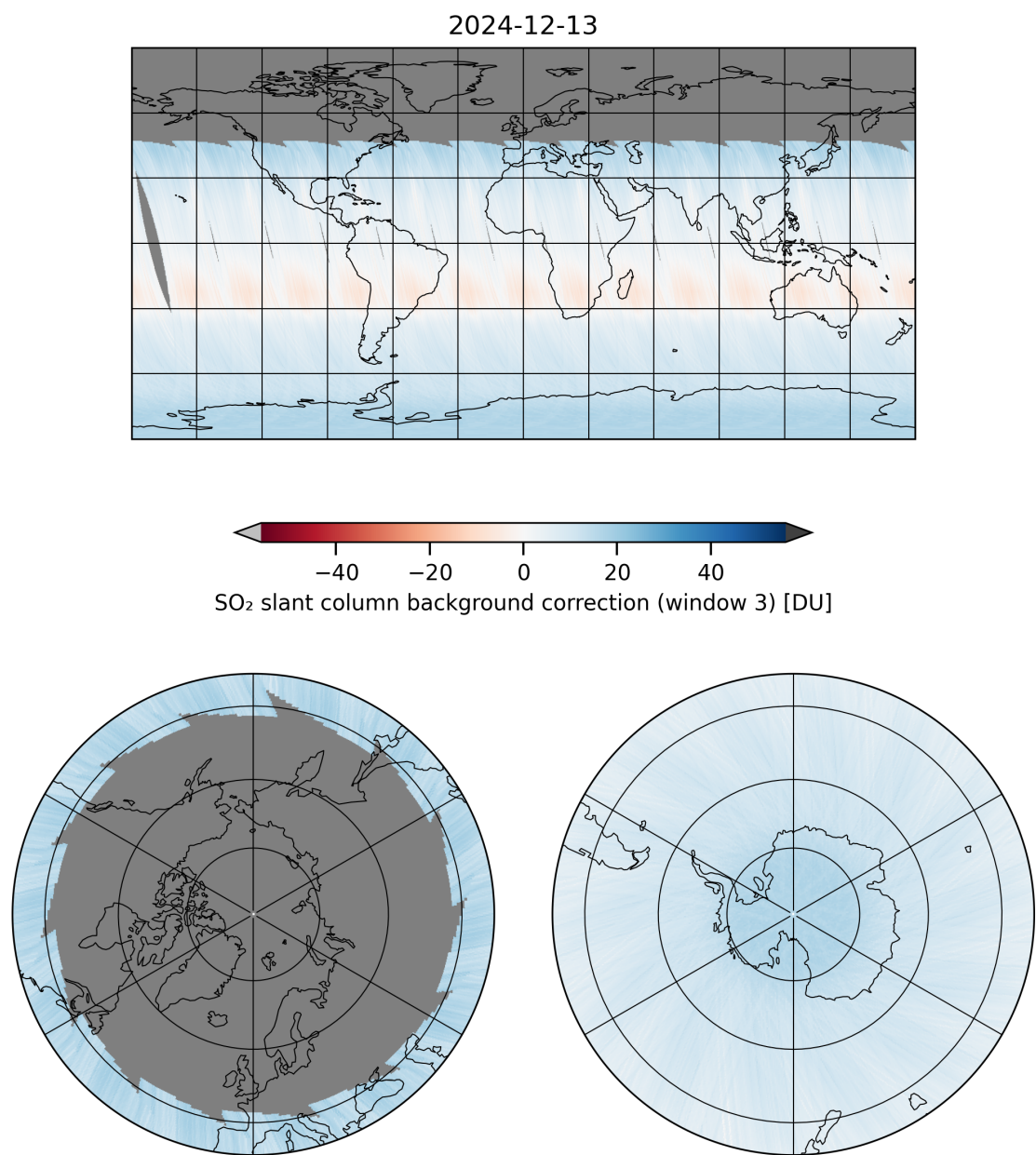


Figure 20: Map of “SO₂ slant column background correction (window 3)” for 2024-12-13 to 2024-12-14

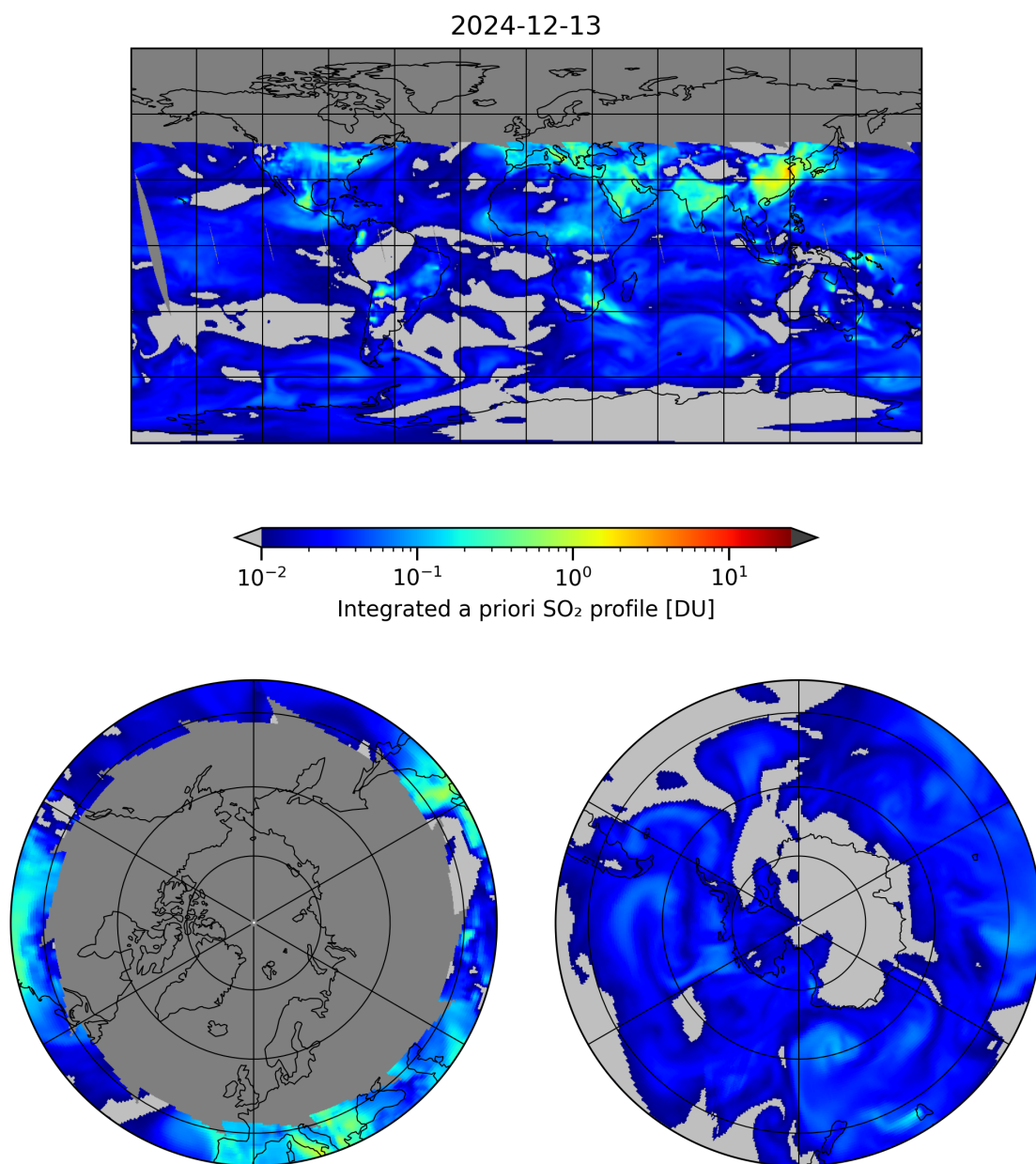


Figure 21: Map of “Integrated a priori SO₂ profile” for 2024-12-13 to 2024-12-14

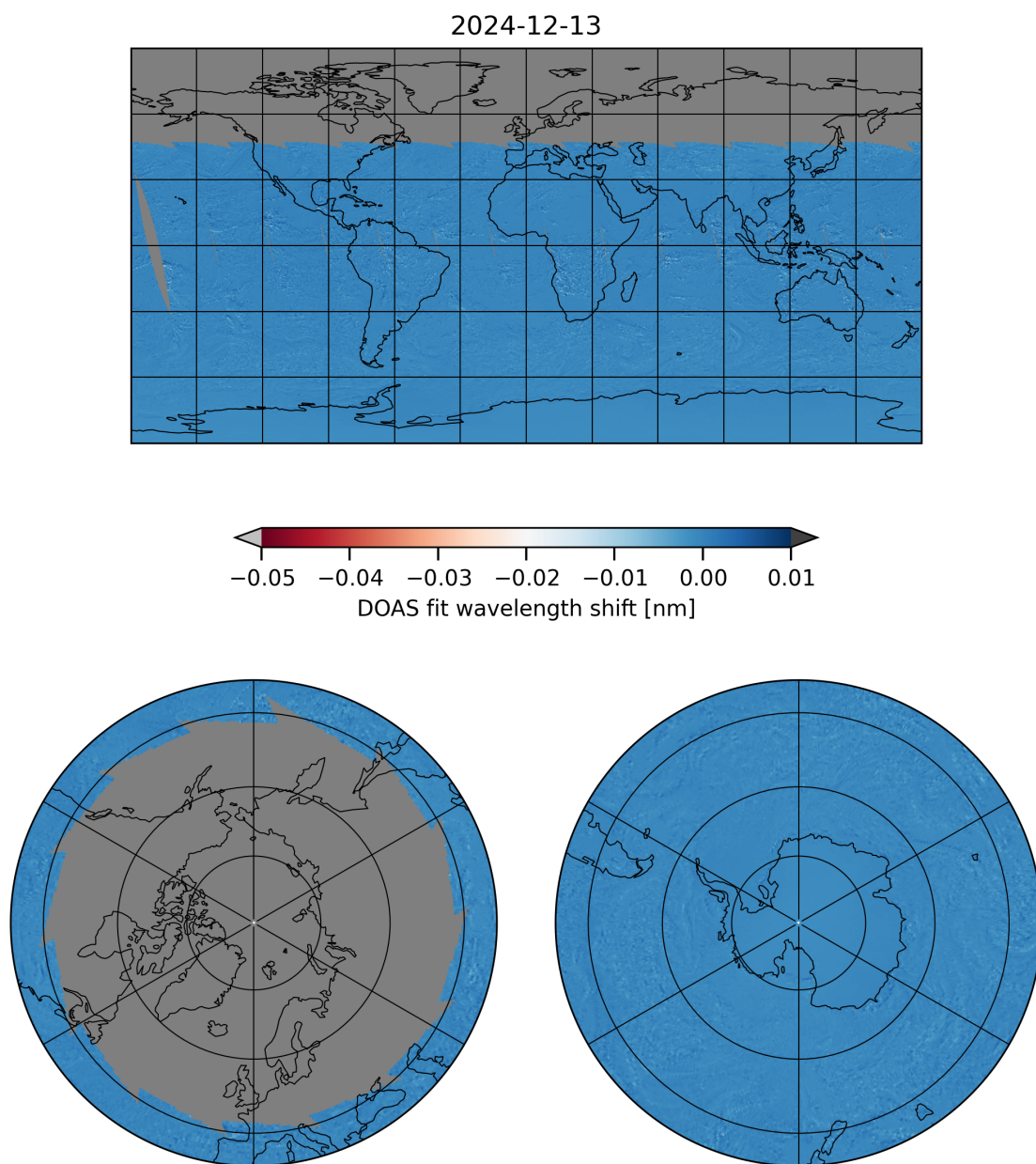


Figure 22: Map of “DOAS fit wavelength shift” for 2024-12-13 to 2024-12-14

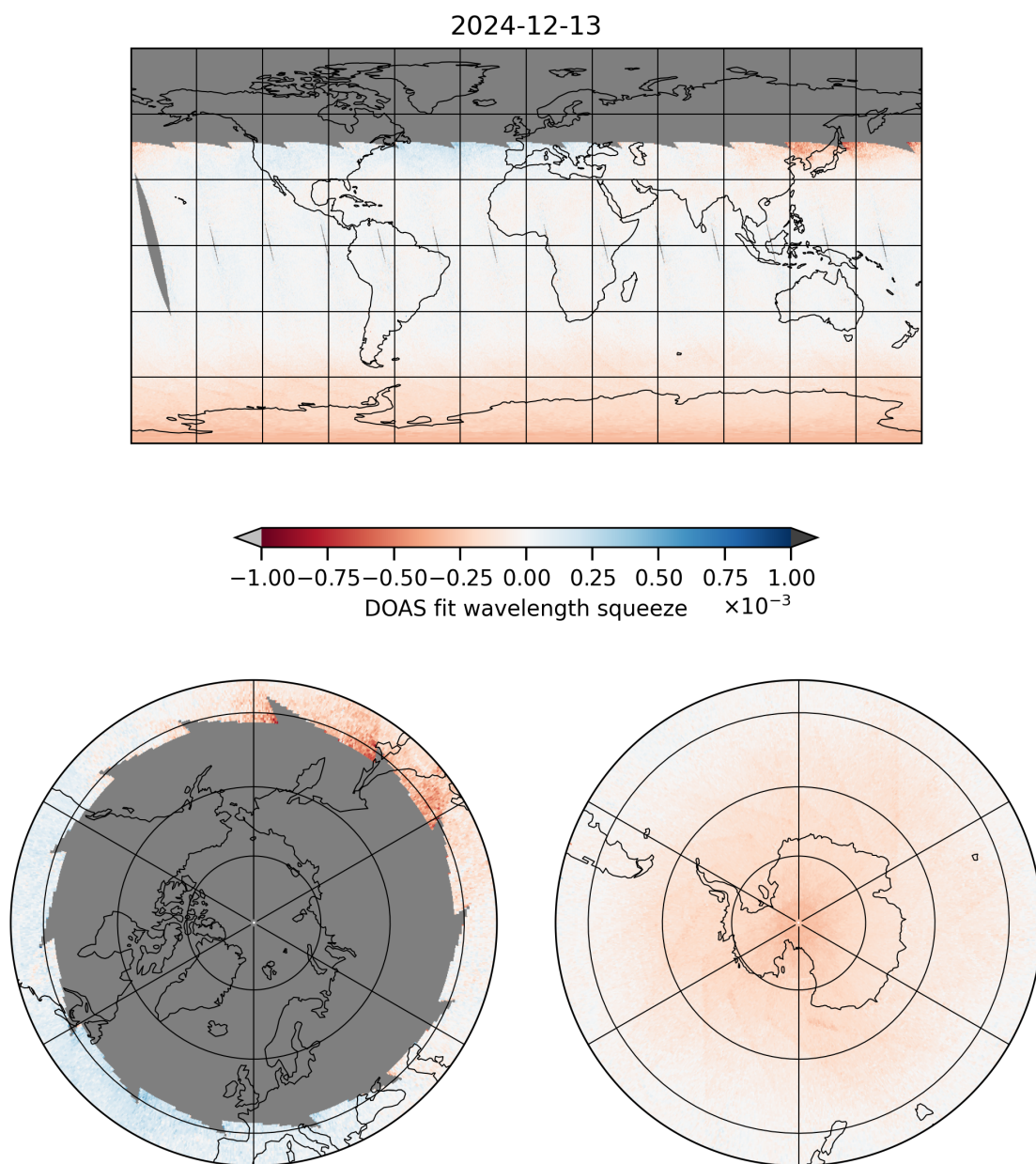


Figure 23: Map of “DOAS fit wavelength squeeze” for 2024-12-13 to 2024-12-14

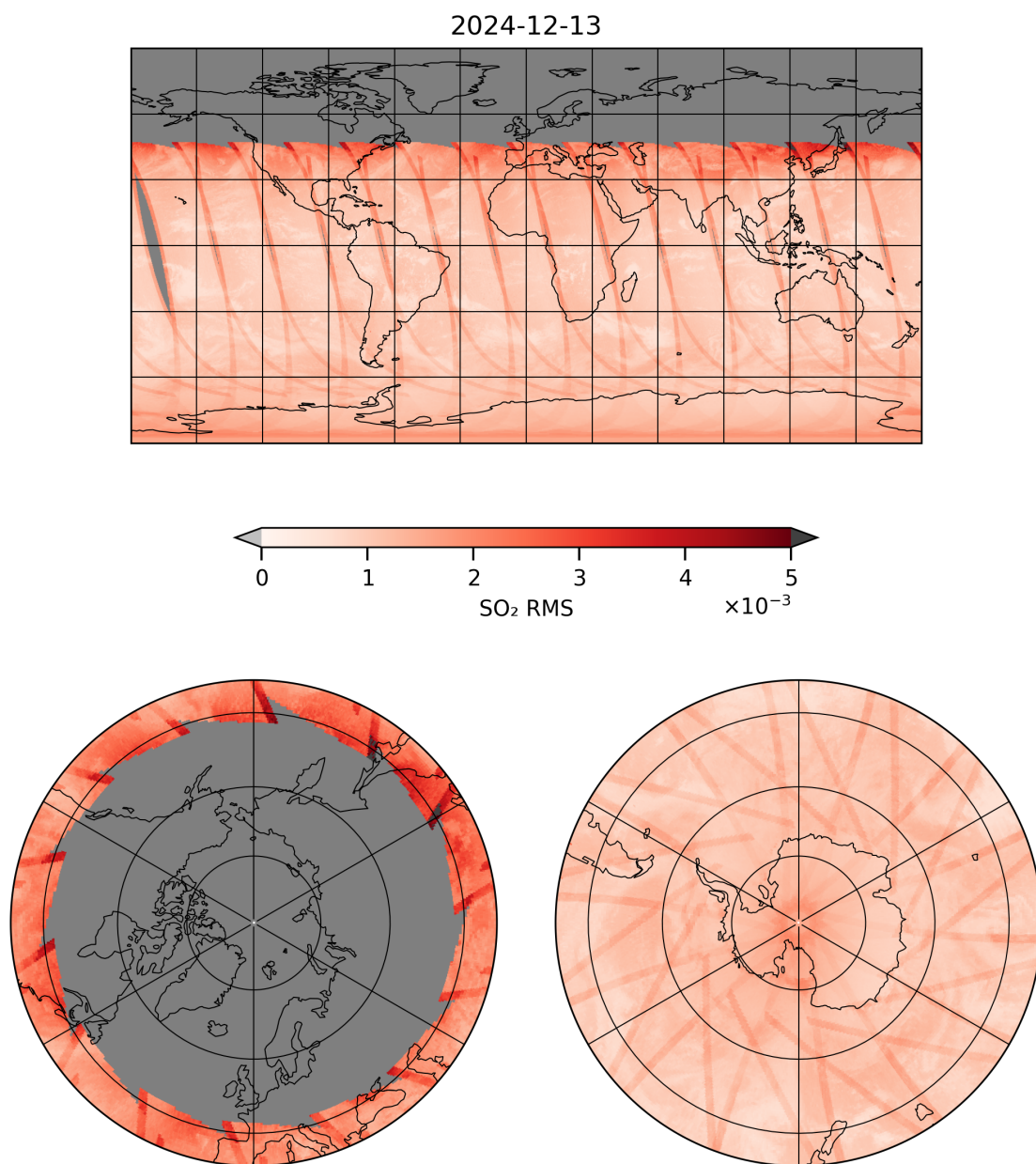


Figure 24: Map of “SO₂ RMS” for 2024-12-13 to 2024-12-14

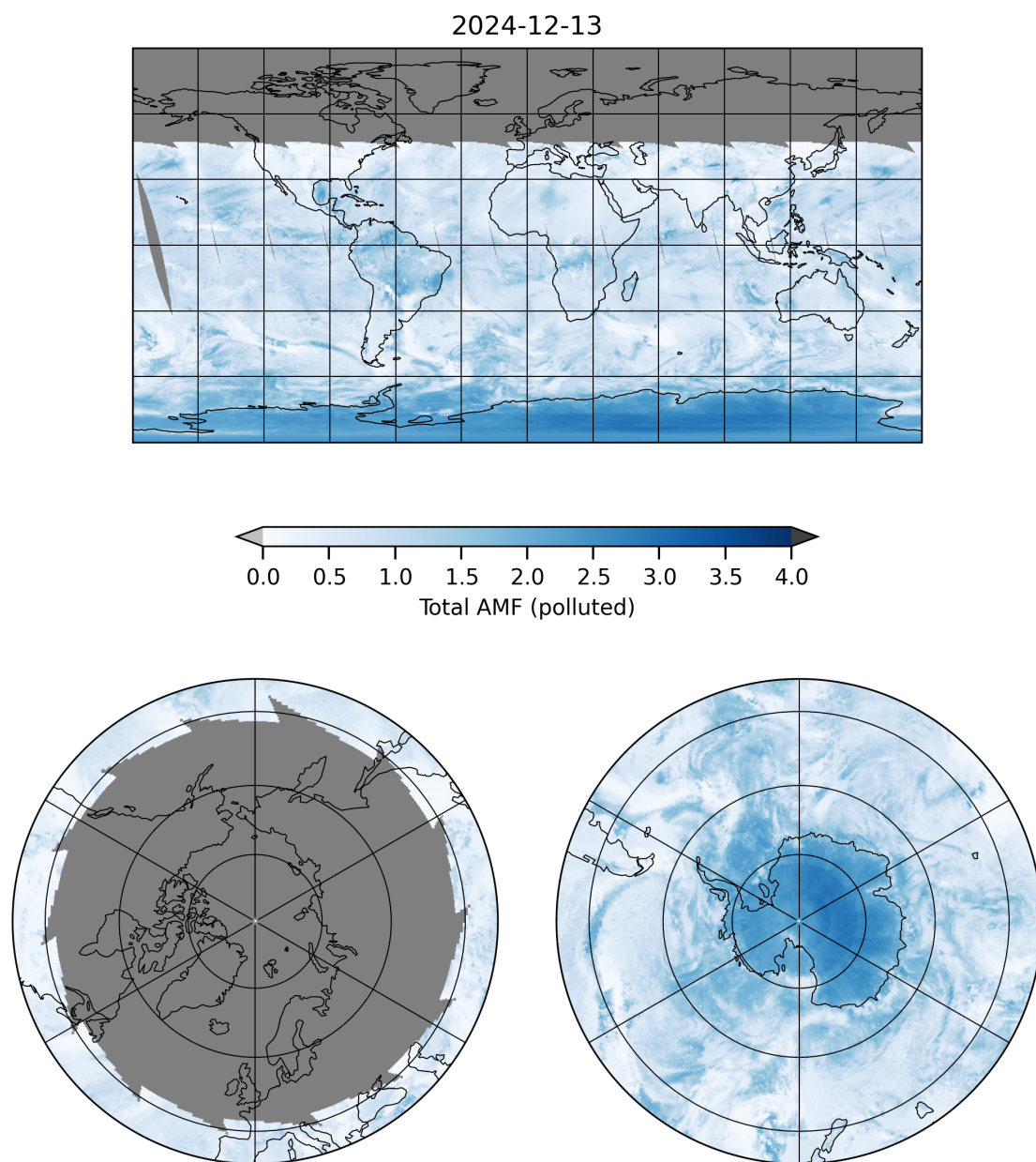


Figure 25: Map of “Total AMF (polluted)” for 2024-12-13 to 2024-12-14

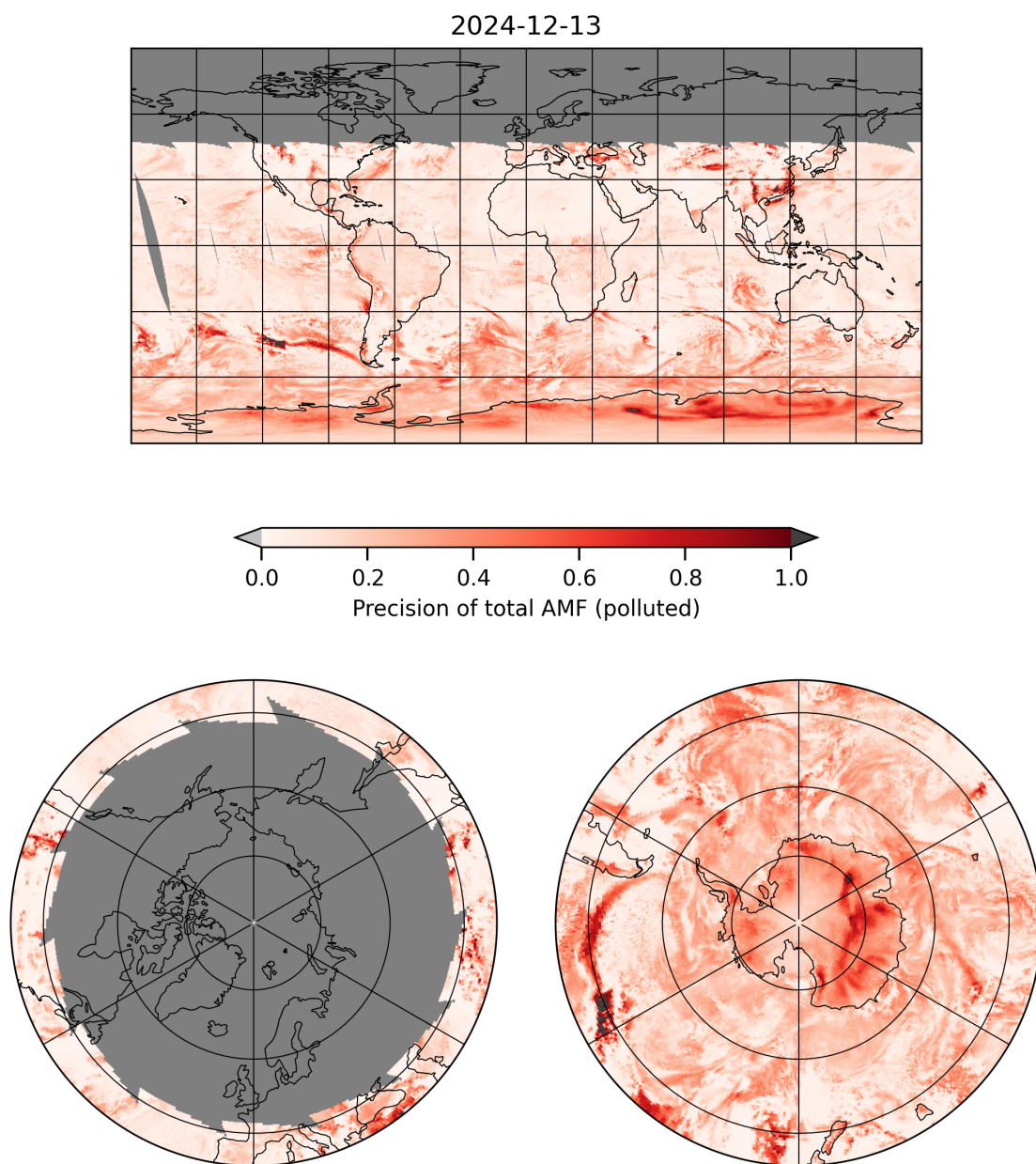


Figure 26: Map of “Precision of total AMF (polluted)” for 2024-12-13 to 2024-12-14

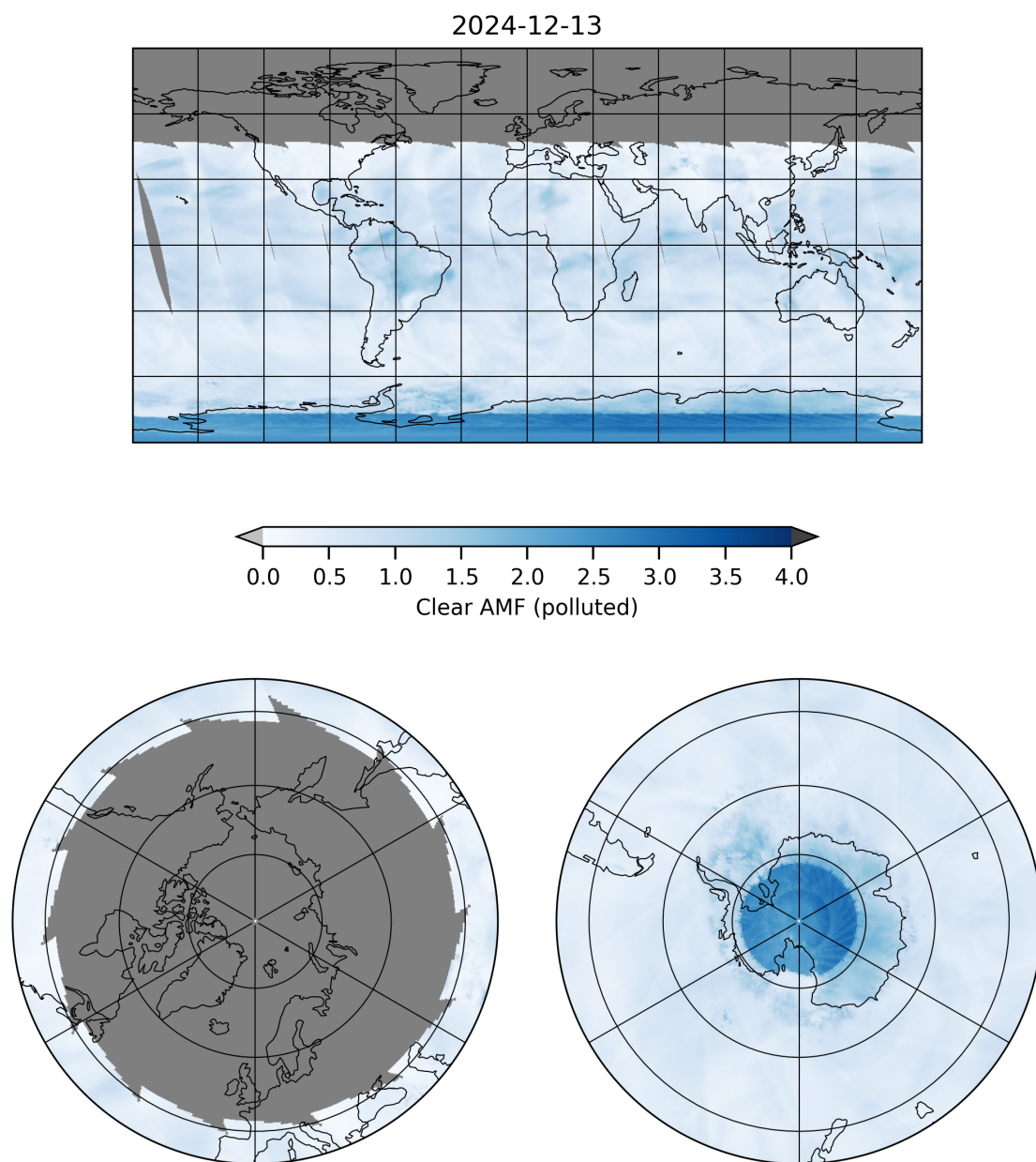


Figure 27: Map of “Clear AMF (polluted)” for 2024-12-13 to 2024-12-14

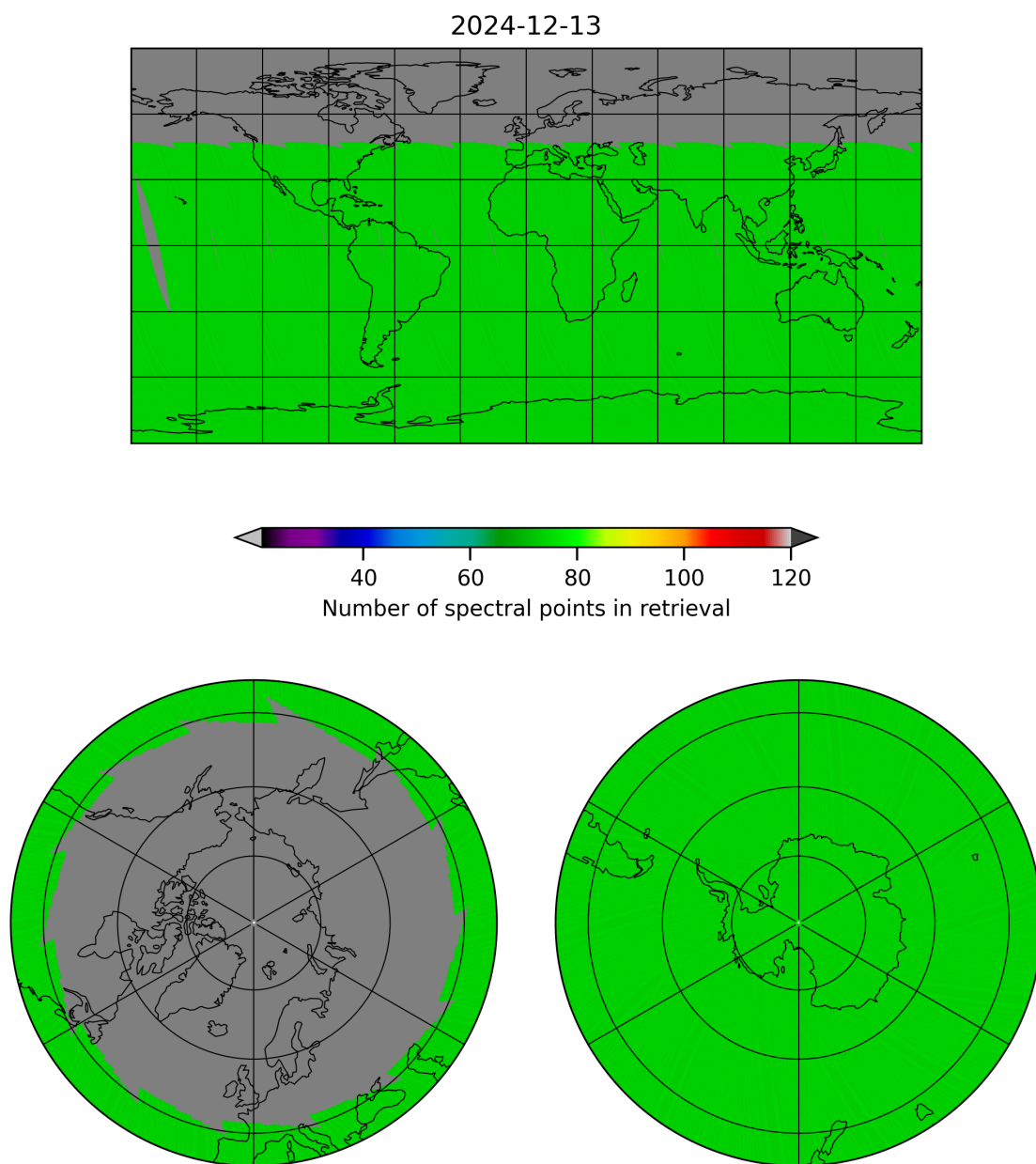


Figure 28: Map of “Number of spectral points in retrieval” for 2024-12-13 to 2024-12-14

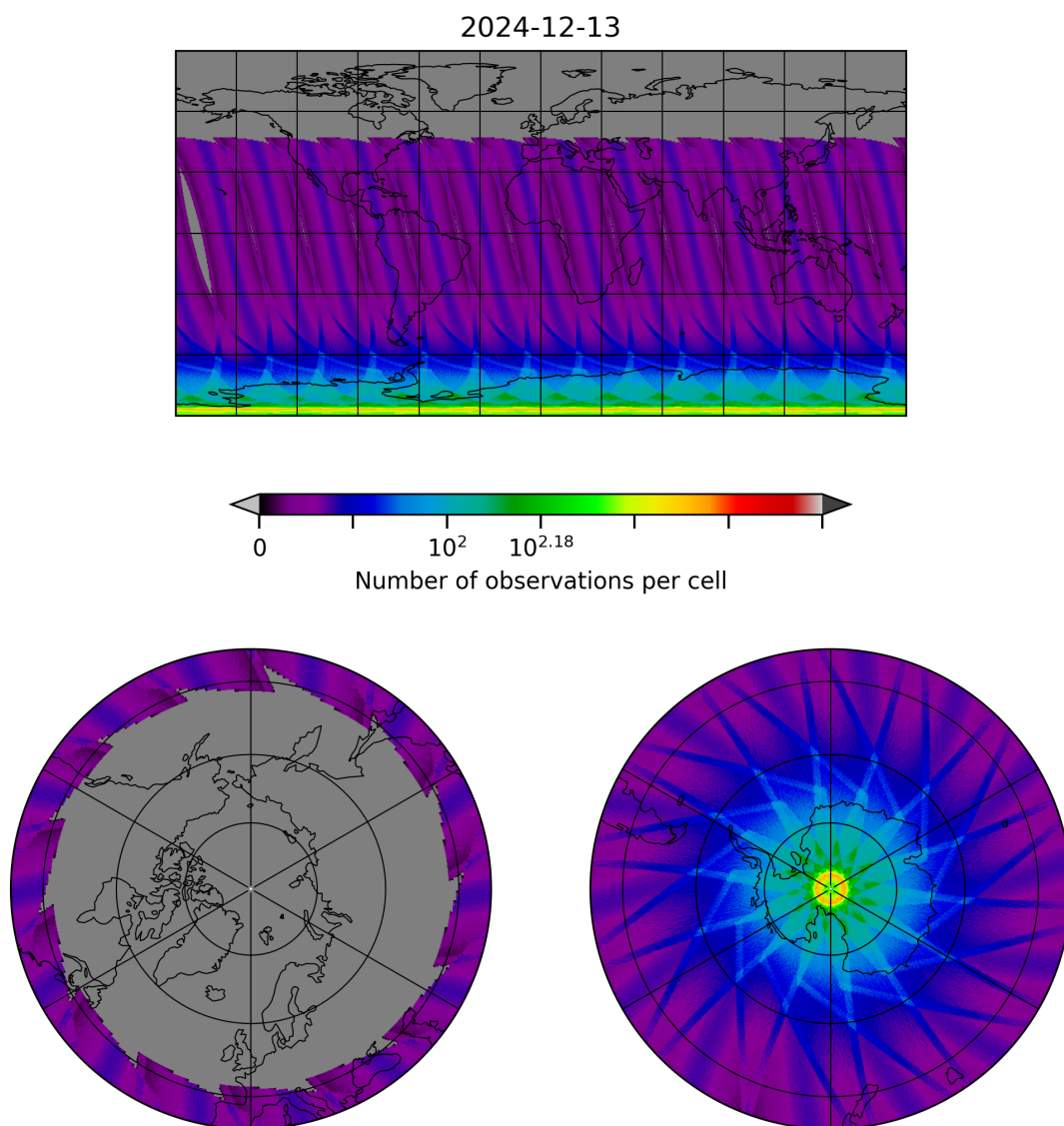


Figure 29: Map of the number of observations for 2024-12-13 to 2024-12-14

7 Zonal average

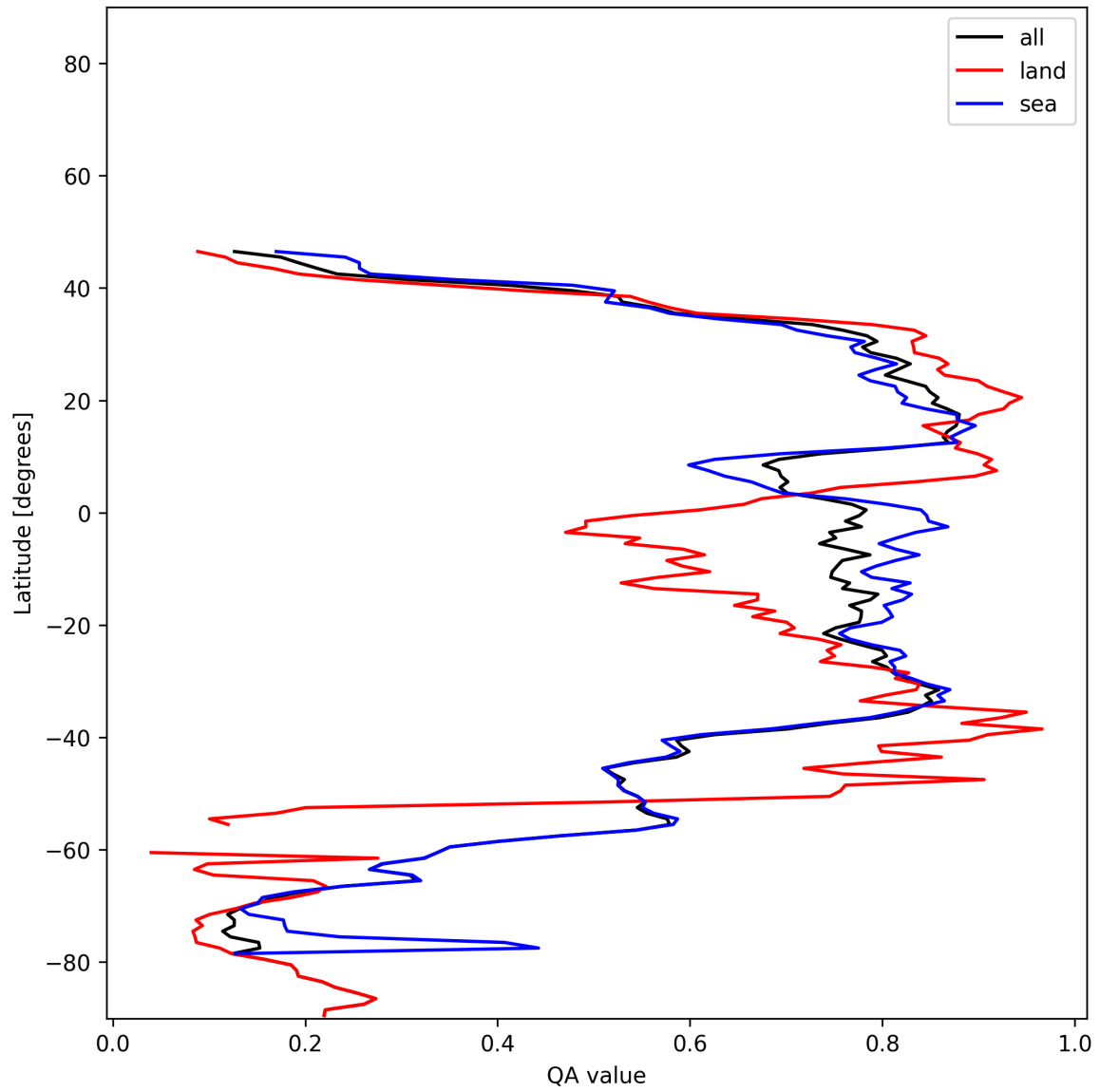


Figure 30: Zonal average of “QA value” for 2024-12-13 to 2024-12-14.

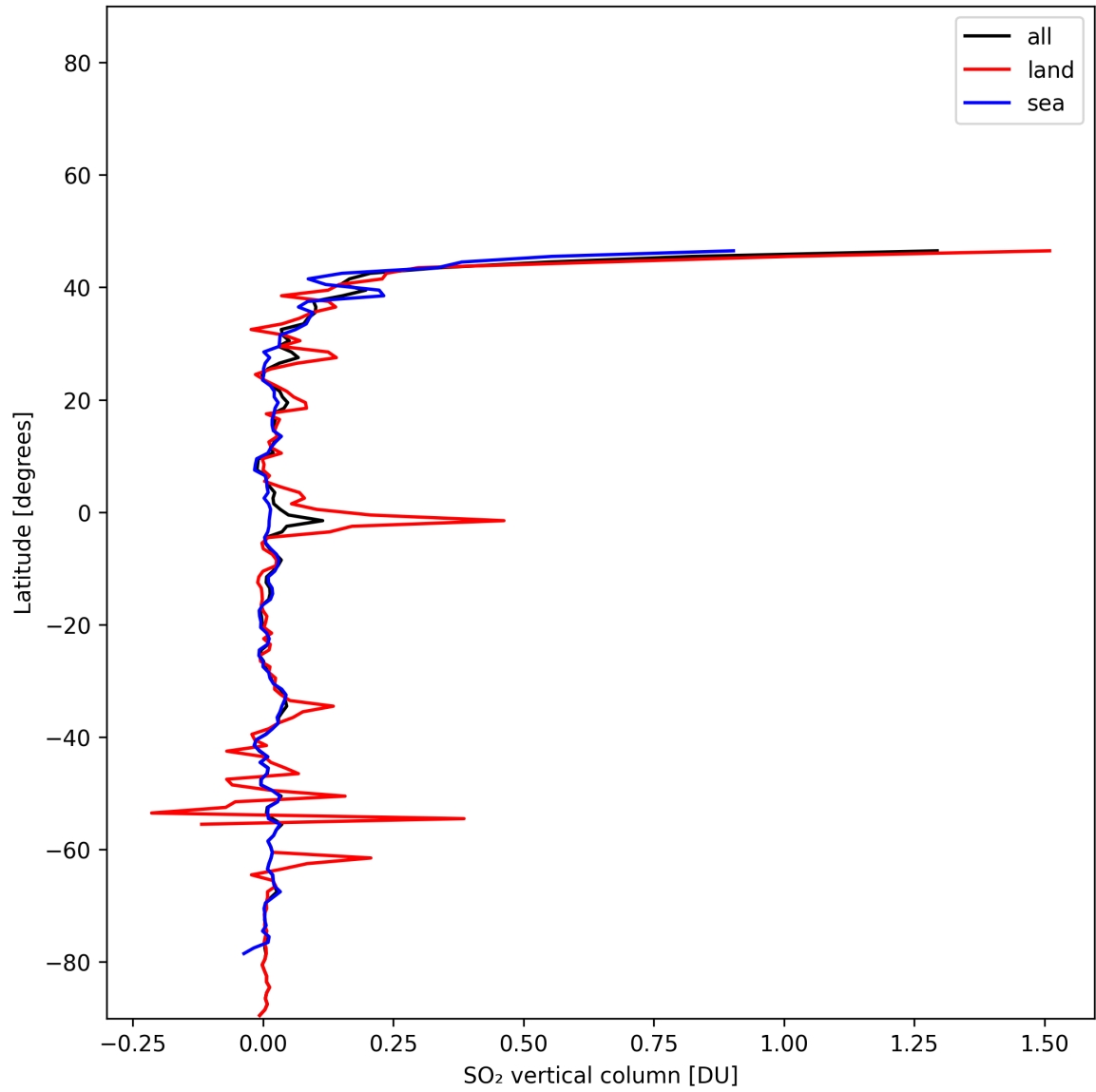


Figure 31: Zonal average of “SO₂ vertical column” for 2024-12-13 to 2024-12-14.

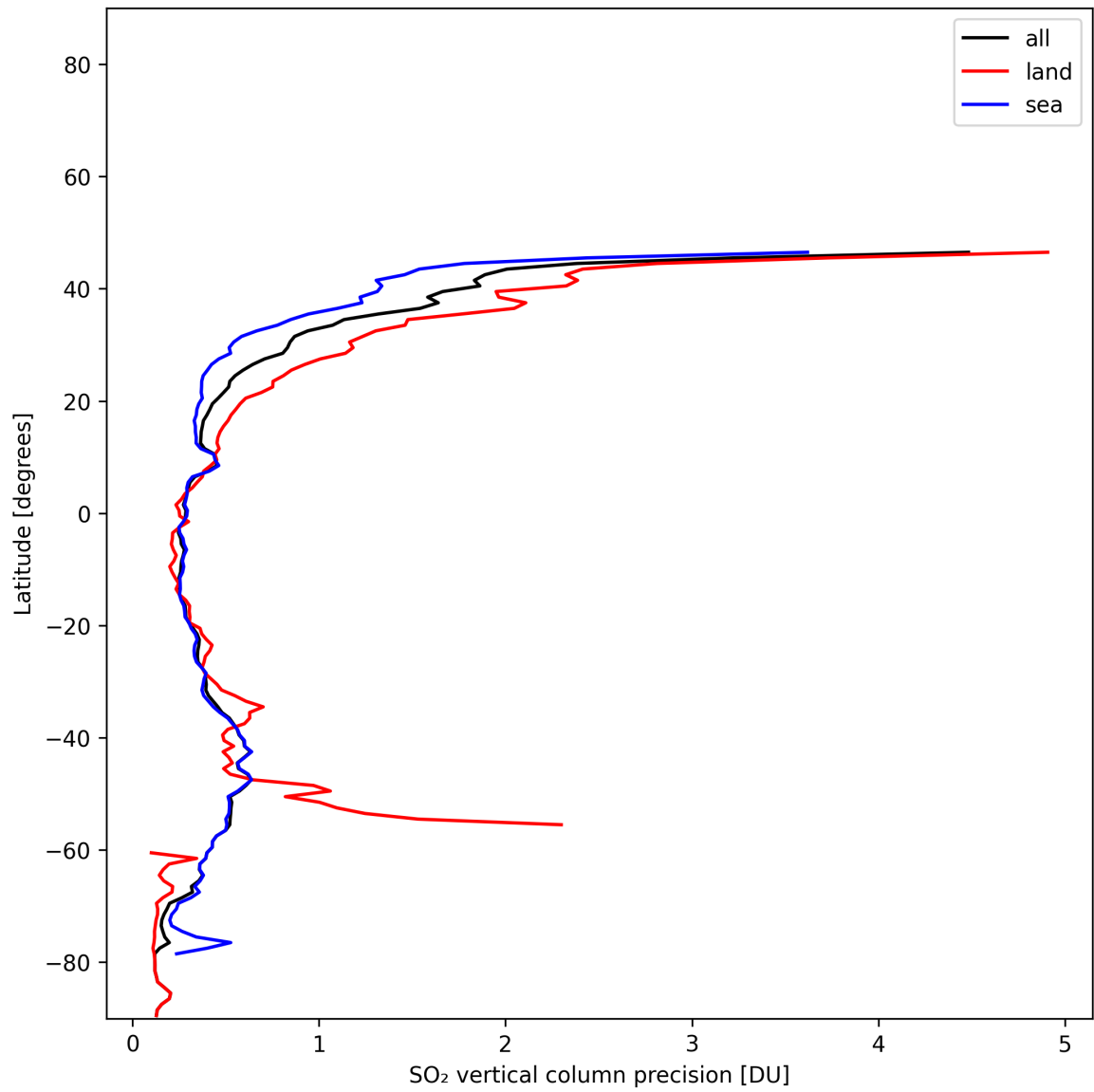


Figure 32: Zonal average of “SO₂ vertical column precision” for 2024-12-13 to 2024-12-14.

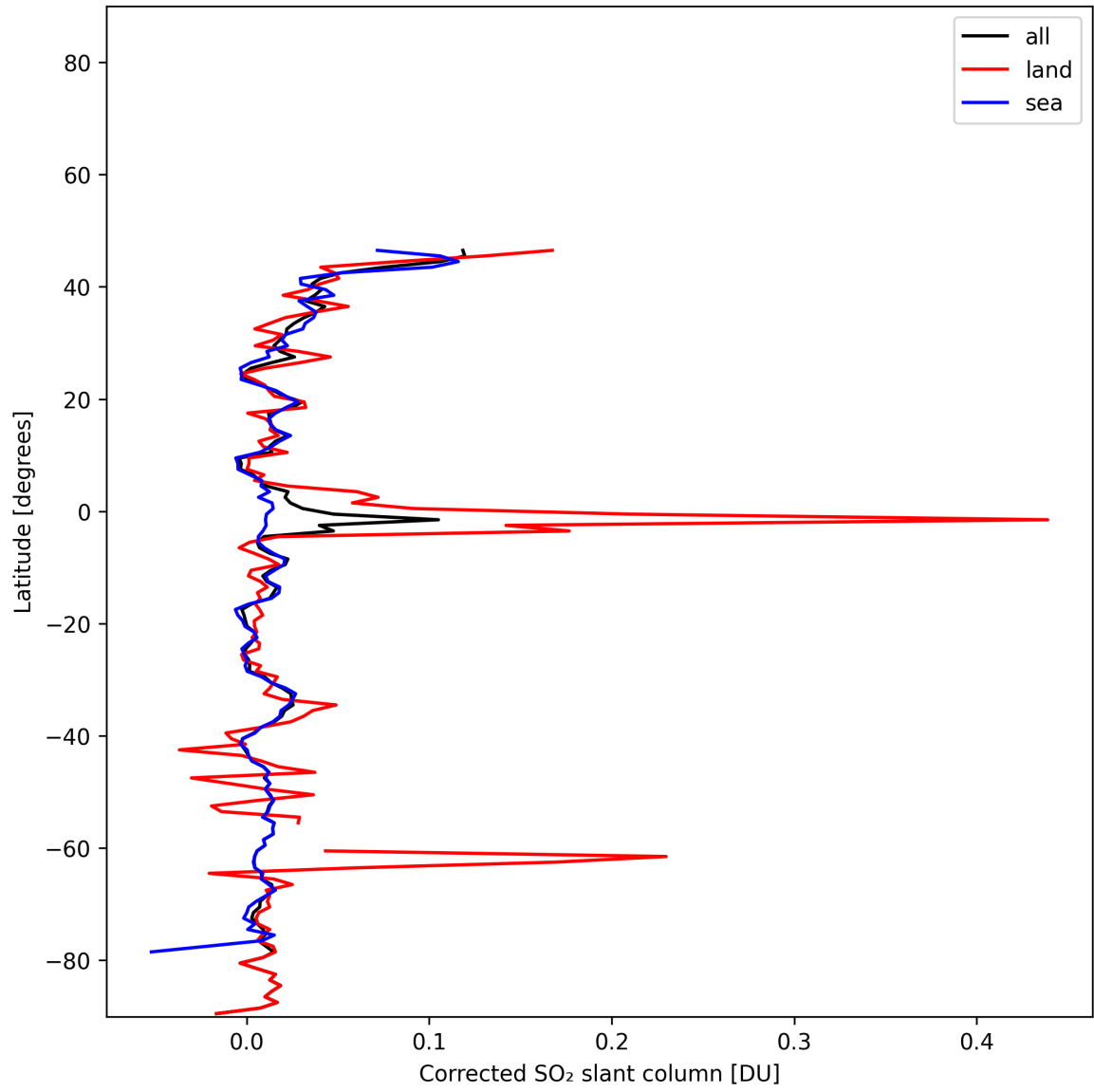


Figure 33: Zonal average of “Corrected SO₂ slant column” for 2024-12-13 to 2024-12-14.

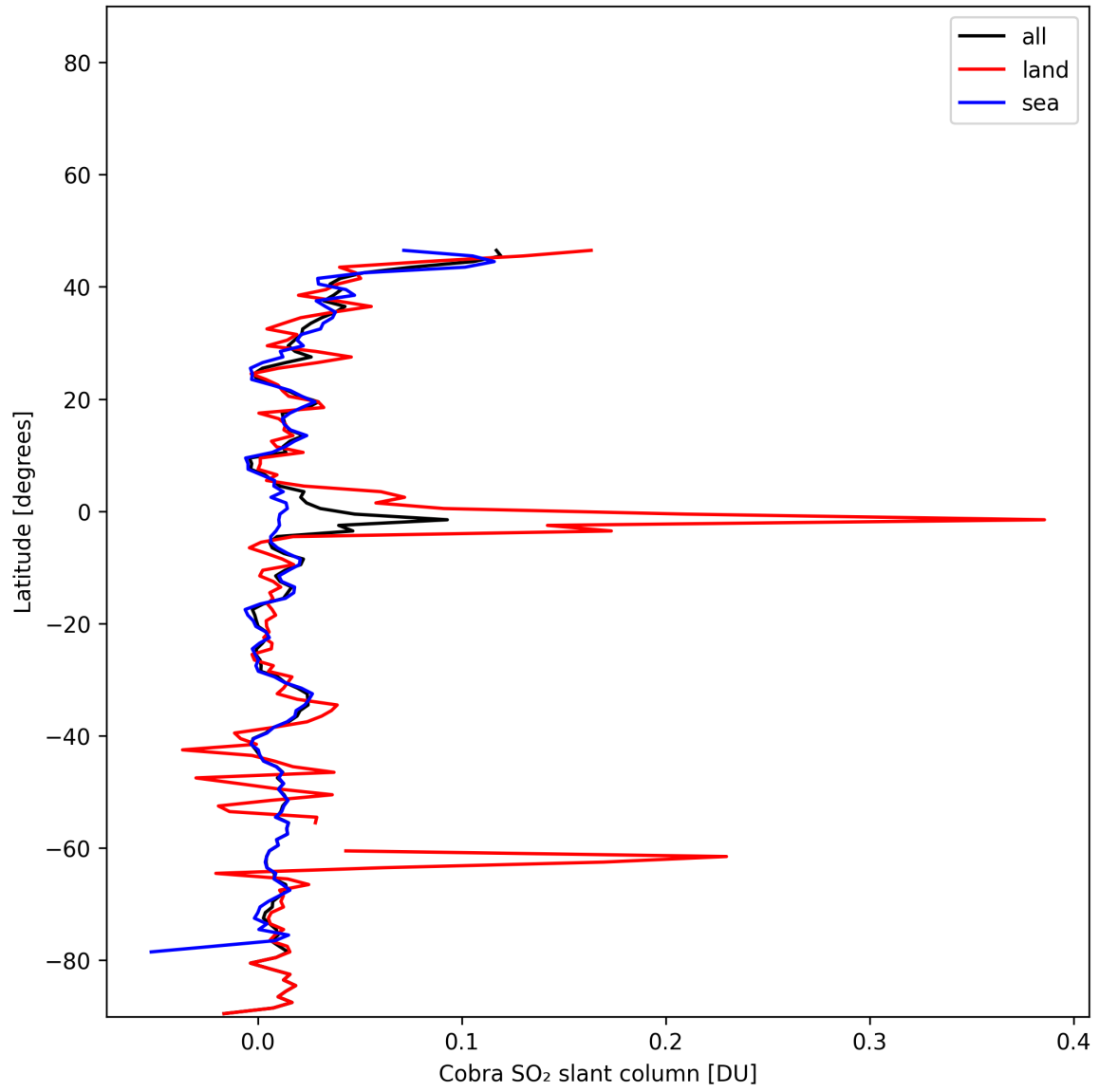


Figure 34: Zonal average of “Cobra SO₂ slant column” for 2024-12-13 to 2024-12-14.

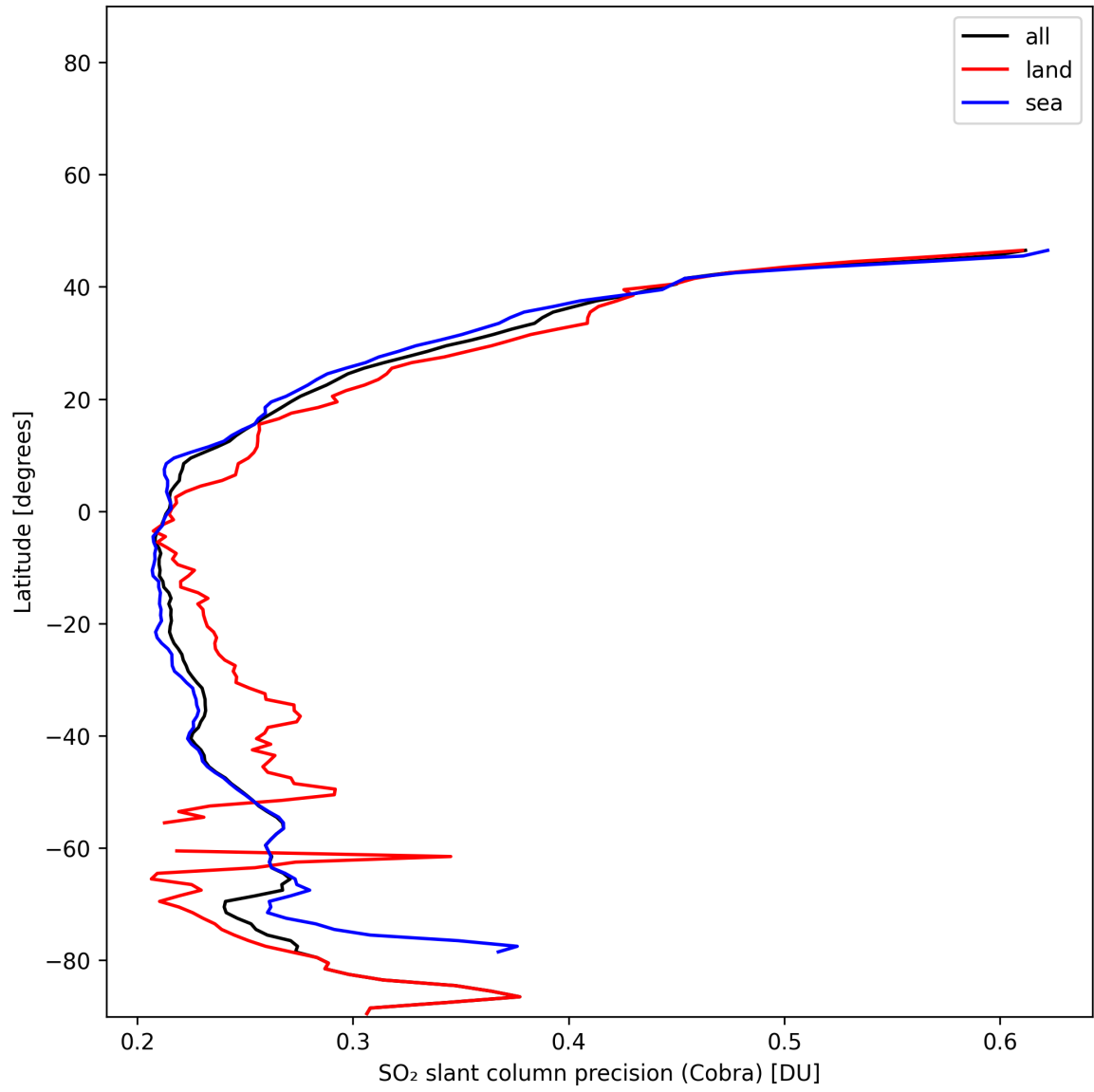


Figure 35: Zonal average of “SO₂ slant column precision (Cobra)” for 2024-12-13 to 2024-12-14.

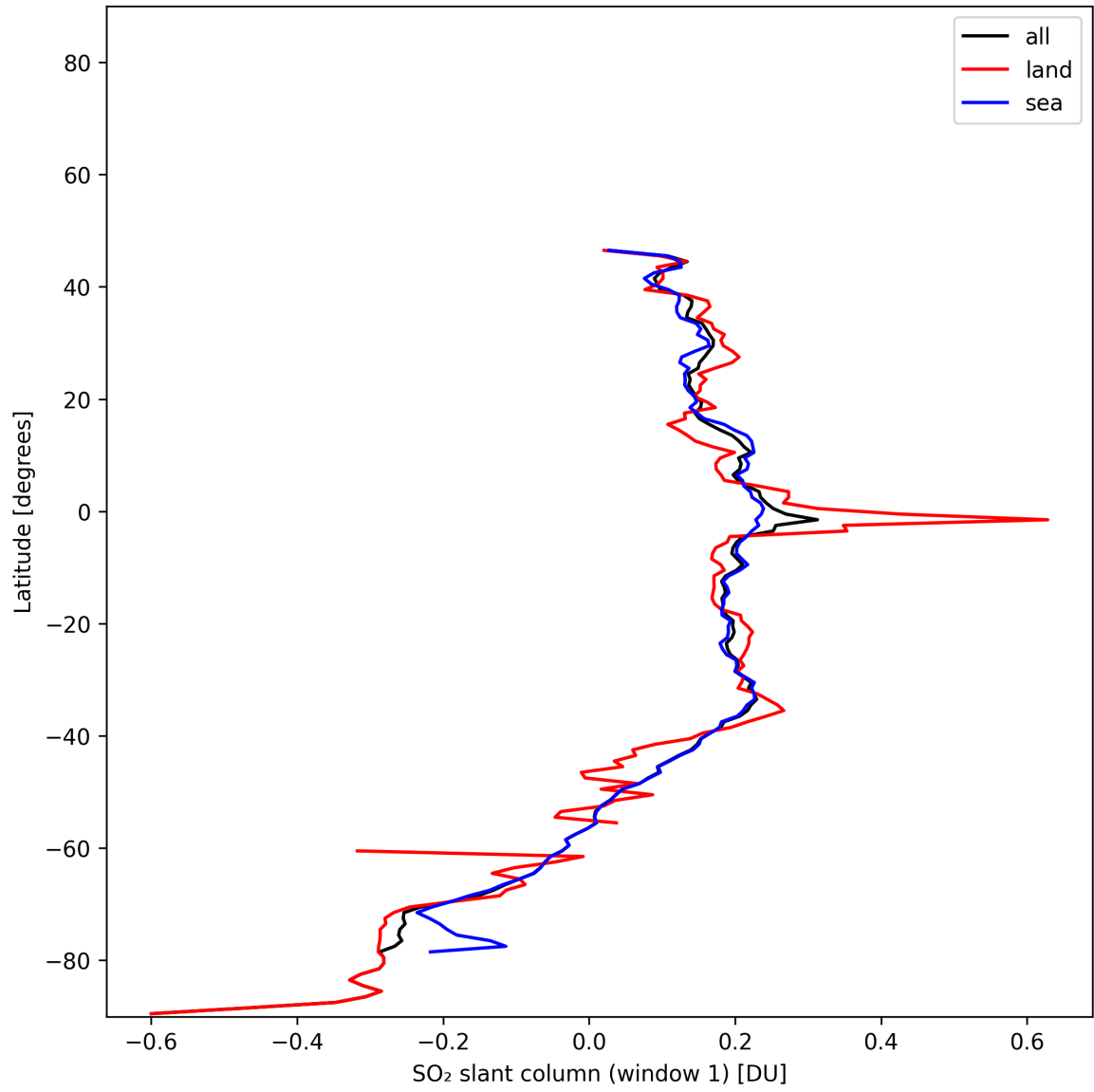


Figure 36: Zonal average of “SO₂ slant column (window 1)” for 2024-12-13 to 2024-12-14.

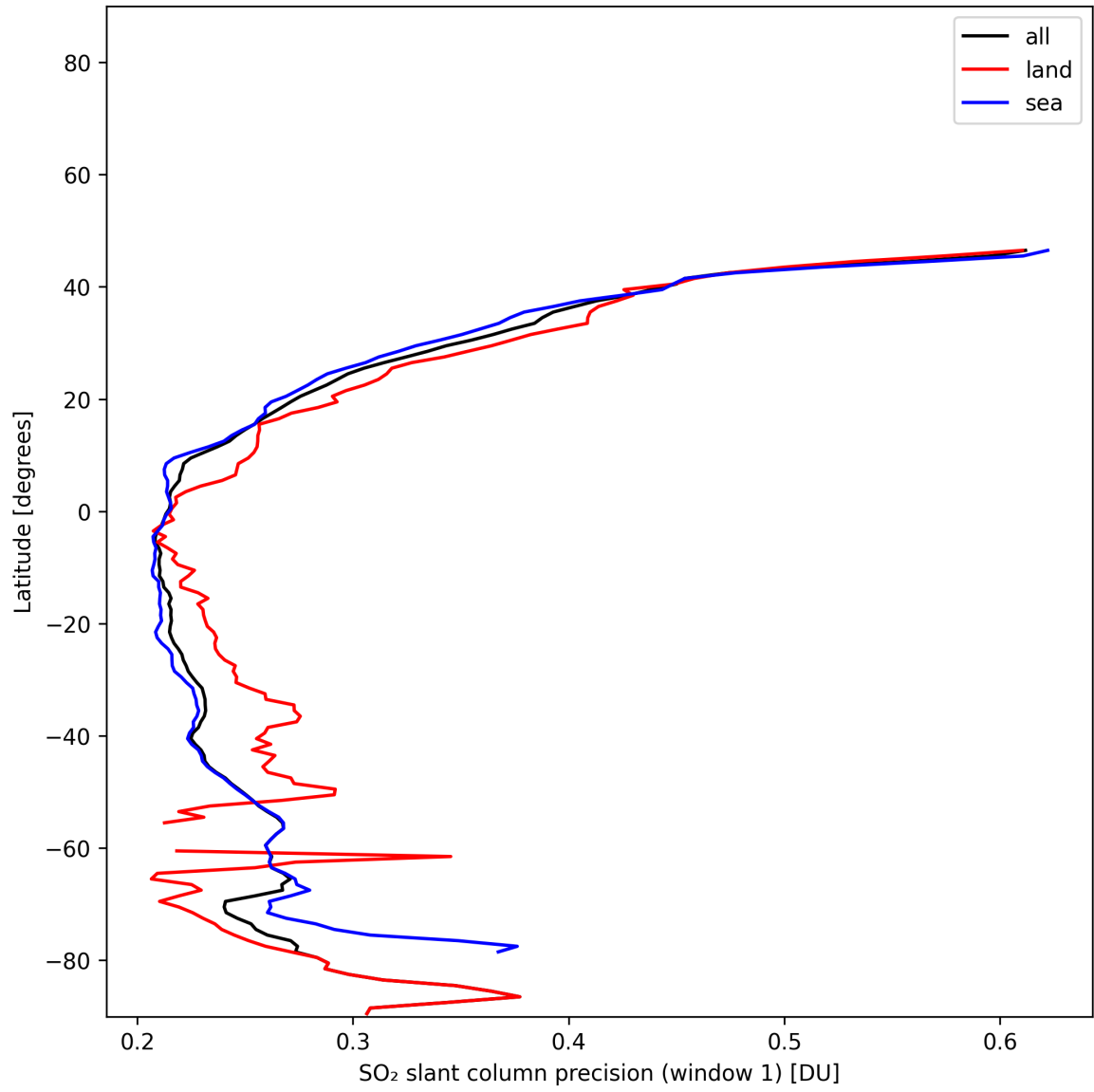


Figure 37: Zonal average of “SO₂ slant column precision (window 1)” for 2024-12-13 to 2024-12-14.

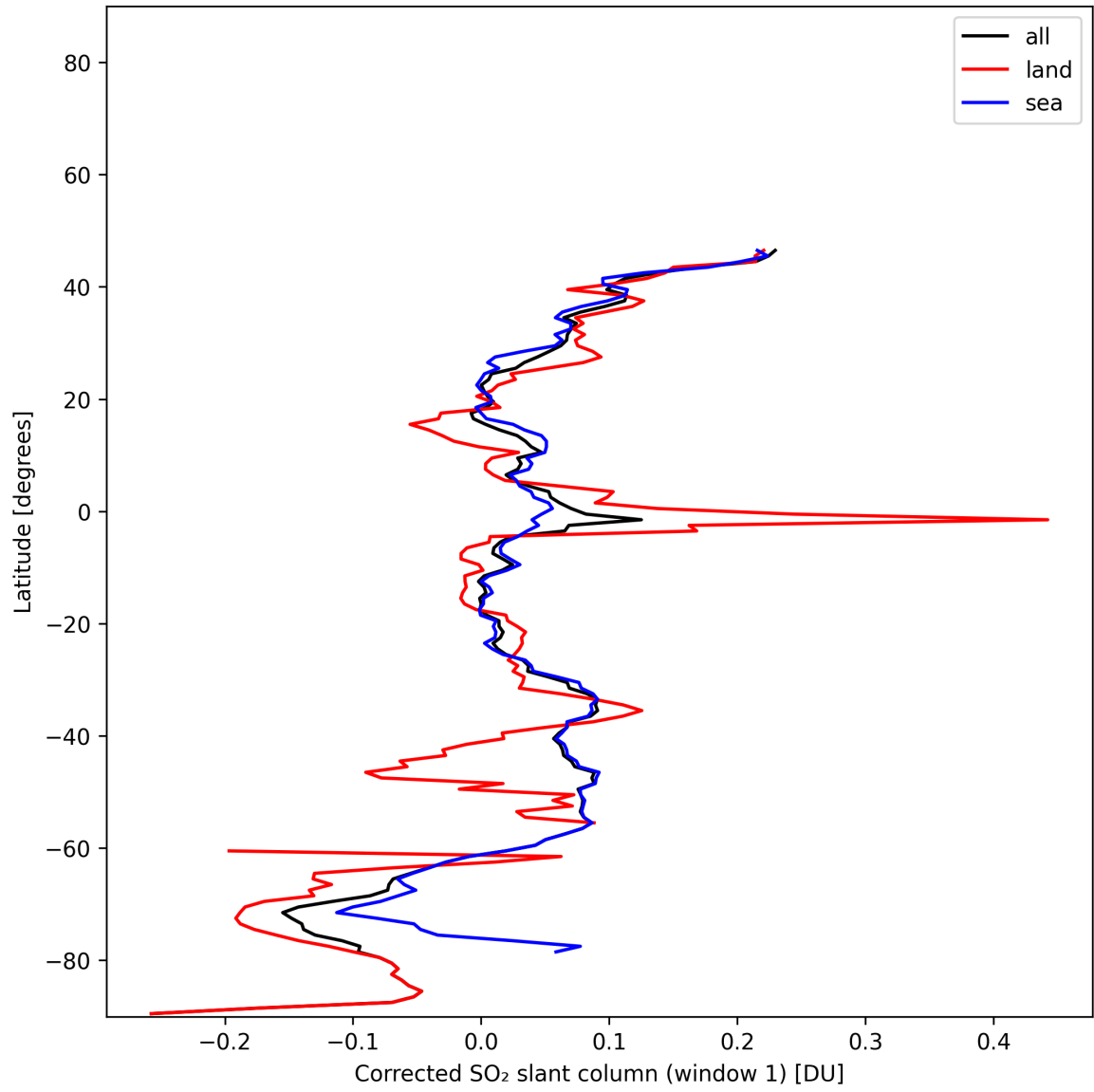


Figure 38: Zonal average of “Corrected SO₂ slant column (window 1)” for 2024-12-13 to 2024-12-14.

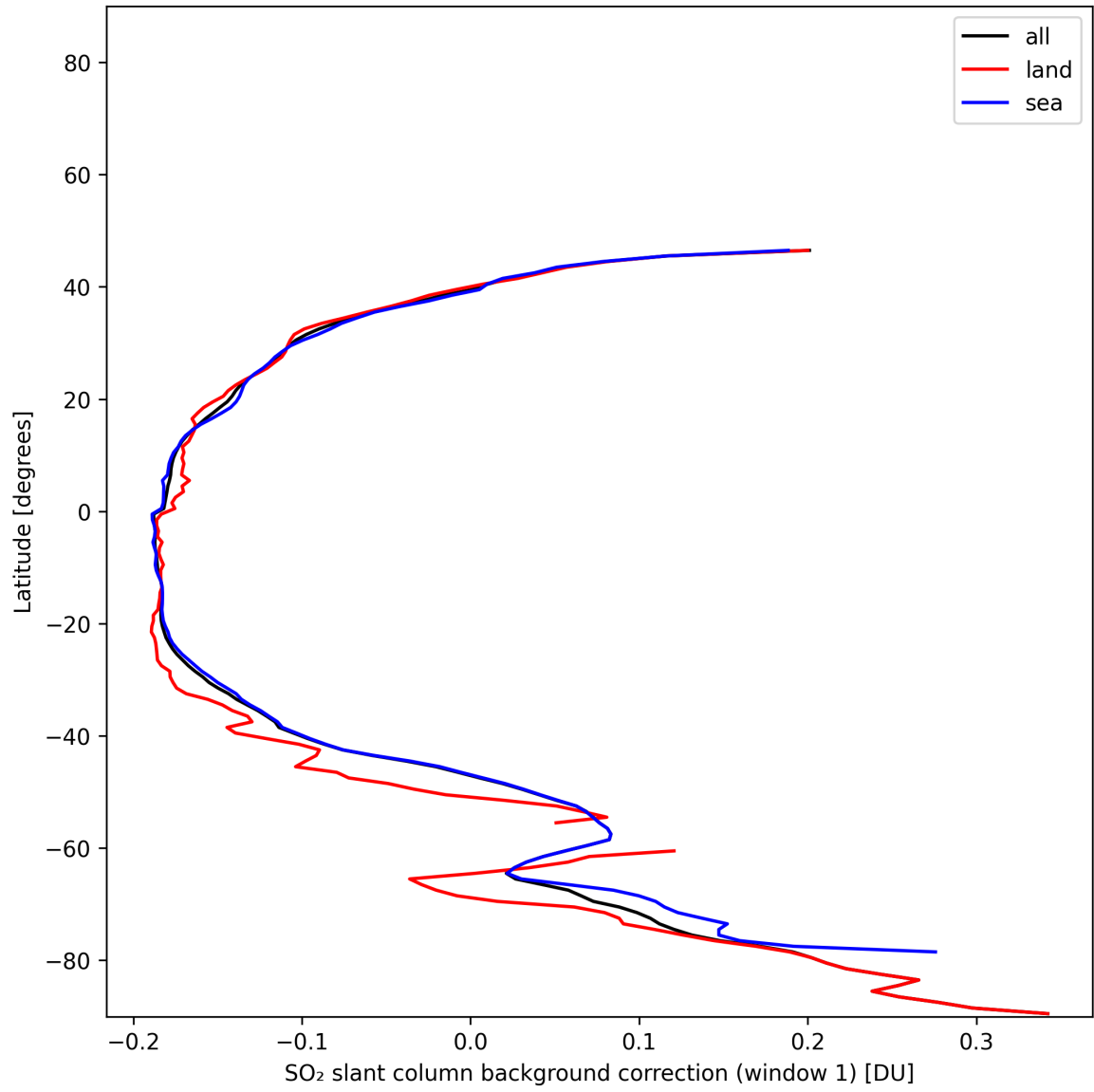


Figure 39: Zonal average of "SO₂ slant column background correction (window 1)" for 2024-12-13 to 2024-12-14.

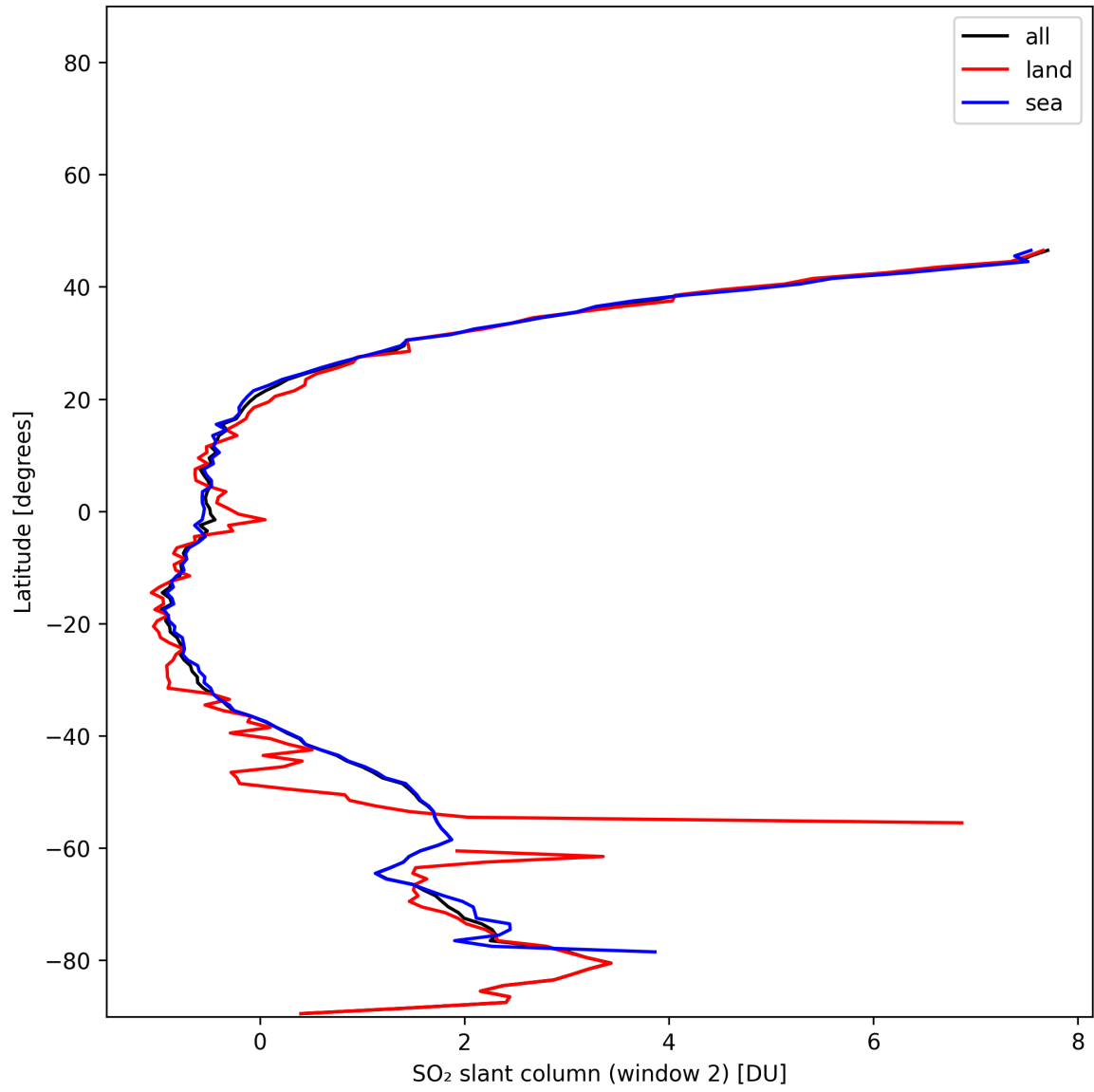


Figure 40: Zonal average of “SO₂ slant column (window 2)” for 2024-12-13 to 2024-12-14.

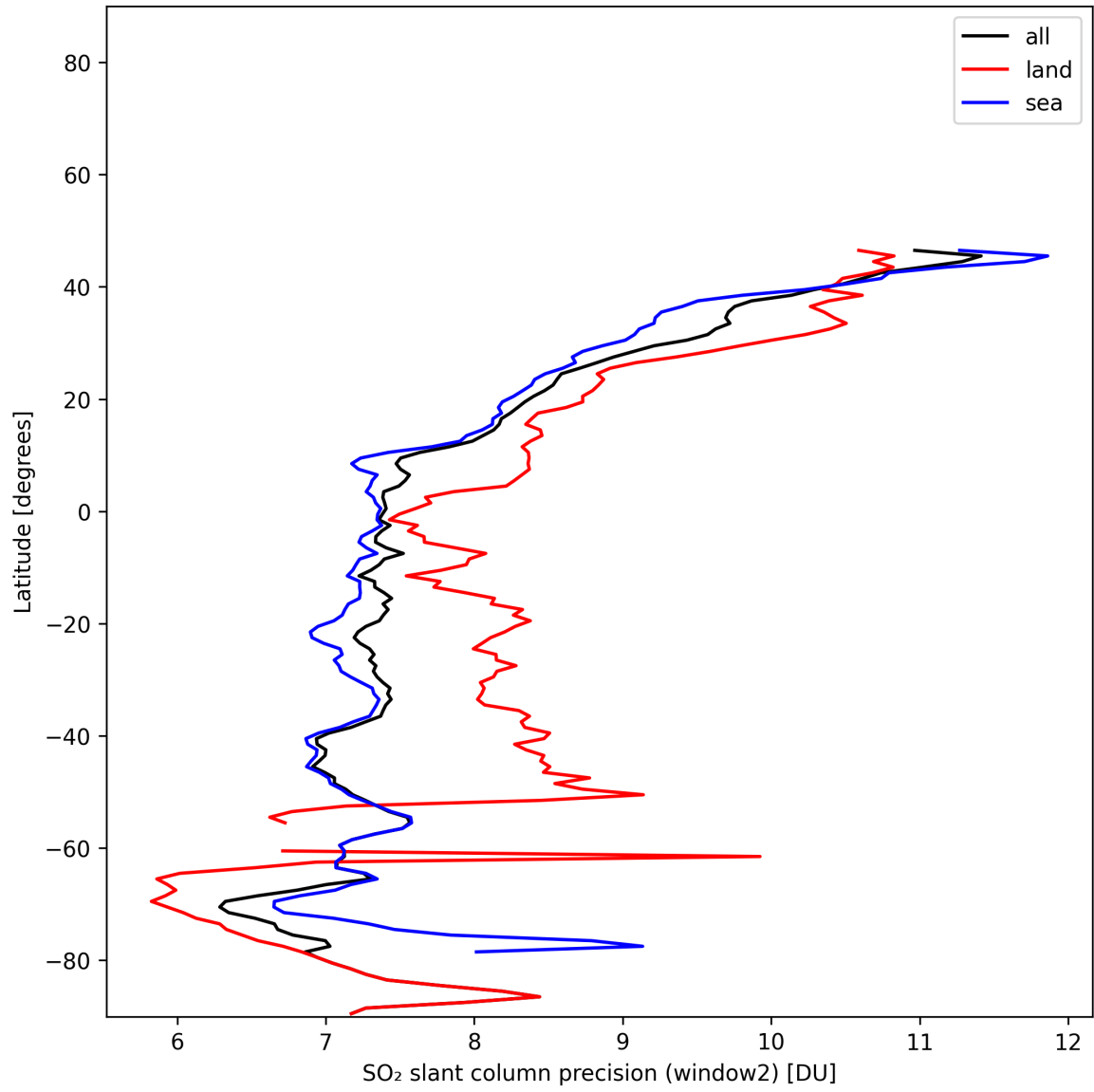


Figure 41: Zonal average of “SO₂ slant column precision (window2)” for 2024-12-13 to 2024-12-14.

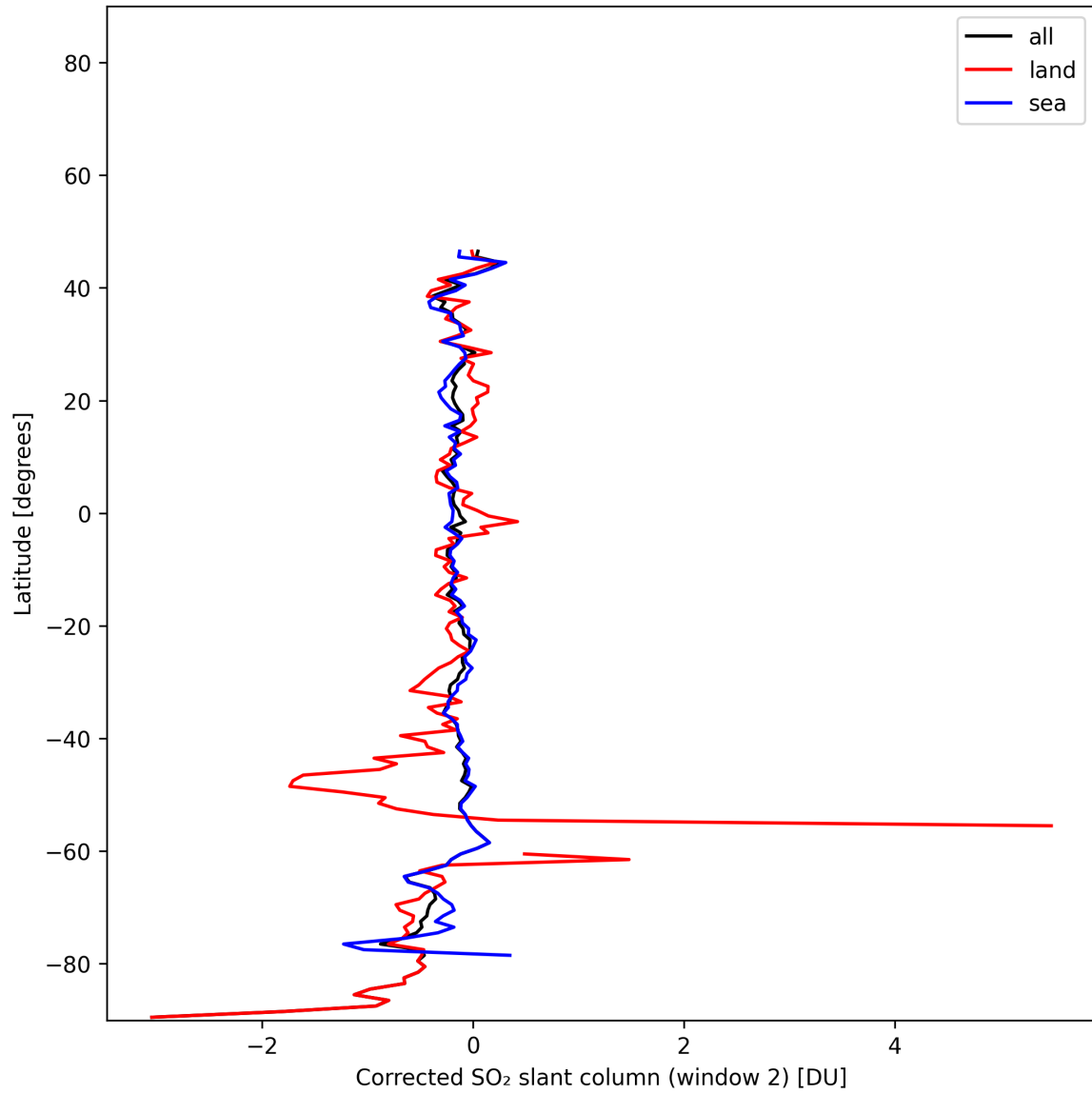


Figure 42: Zonal average of “Corrected SO₂ slant column (window 2)” for 2024-12-13 to 2024-12-14.

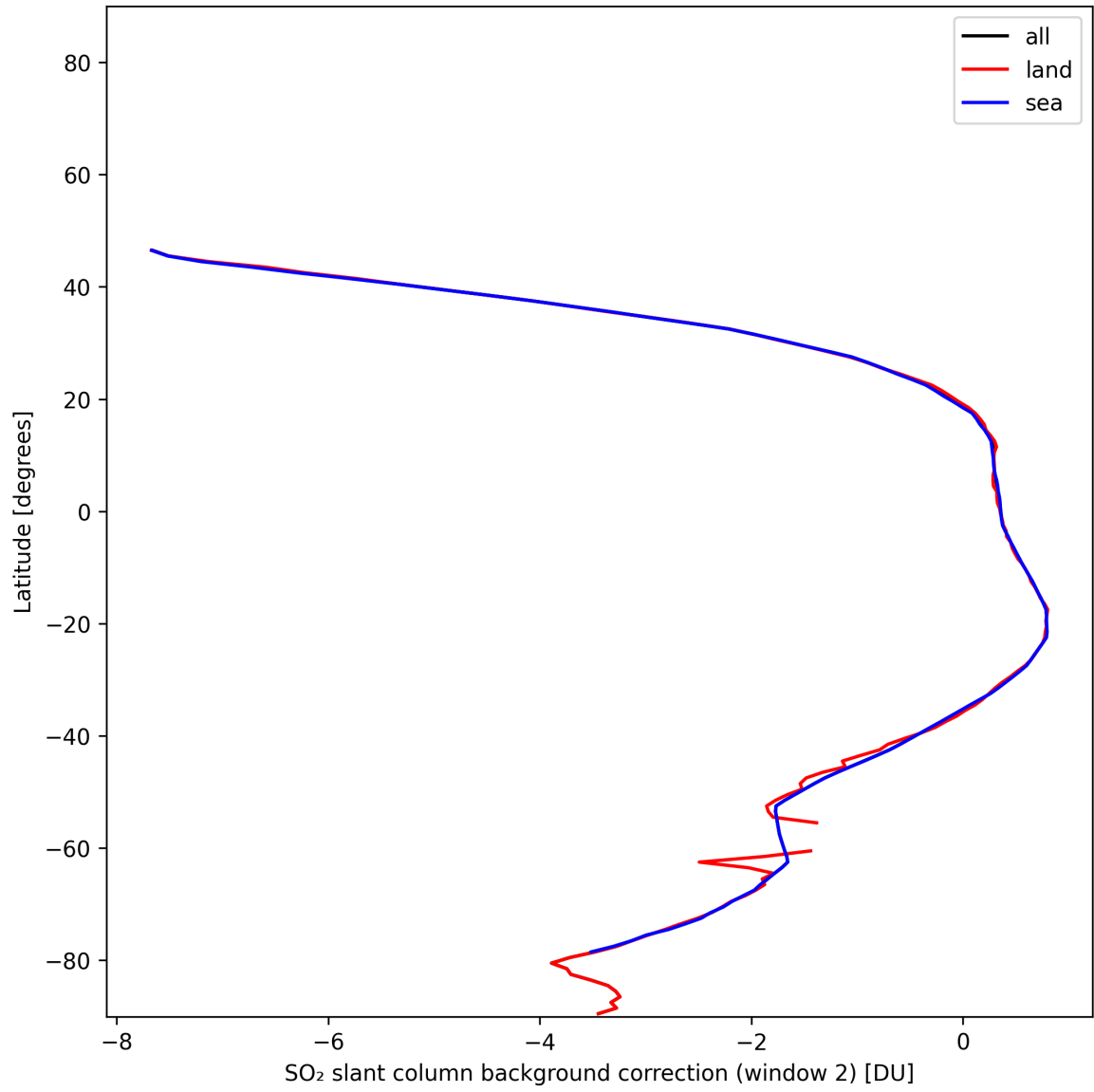


Figure 43: Zonal average of “SO₂ slant column background correction (window 2)” for 2024-12-13 to 2024-12-14.

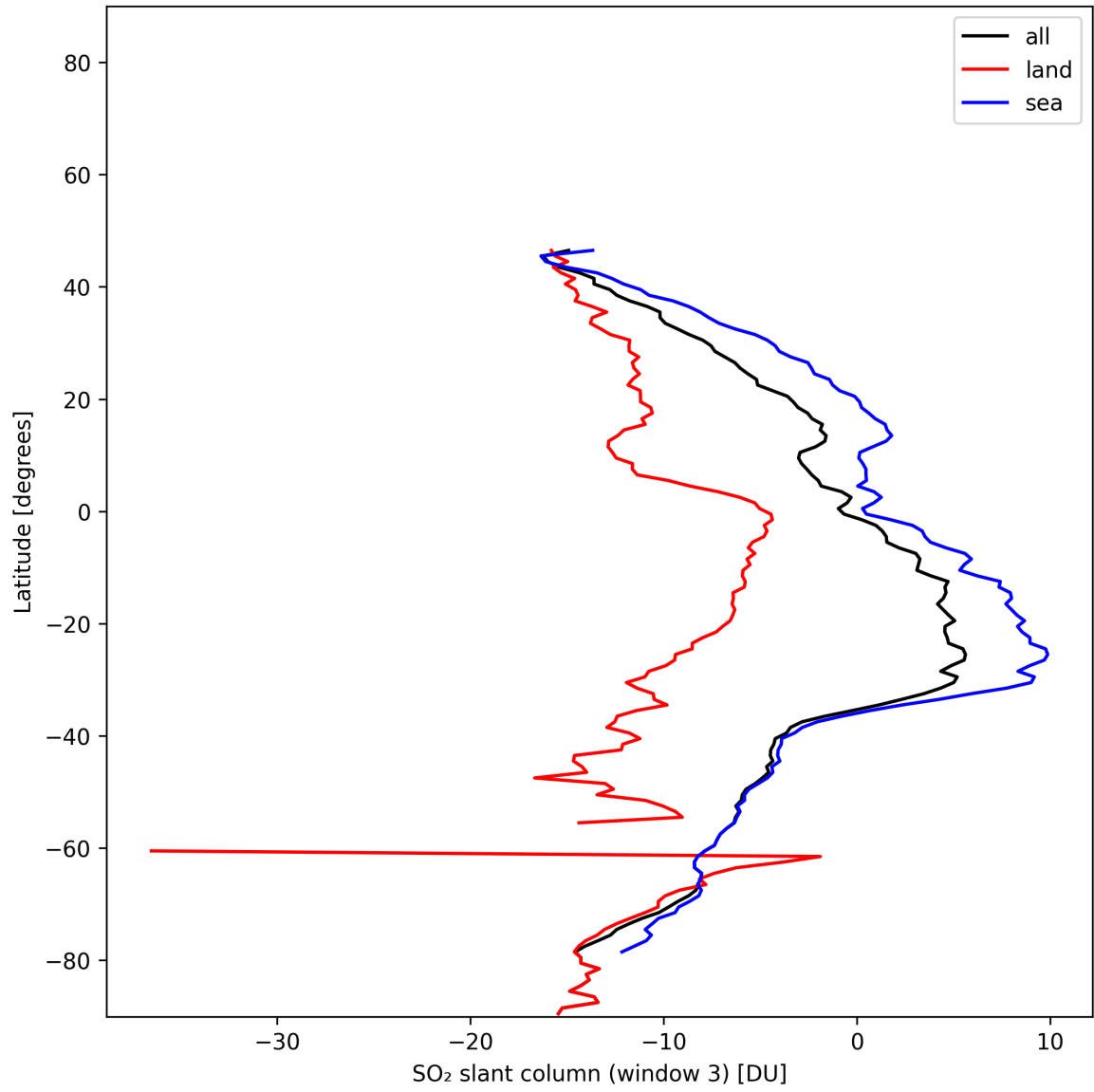


Figure 44: Zonal average of “SO₂ slant column (window 3)” for 2024-12-13 to 2024-12-14.

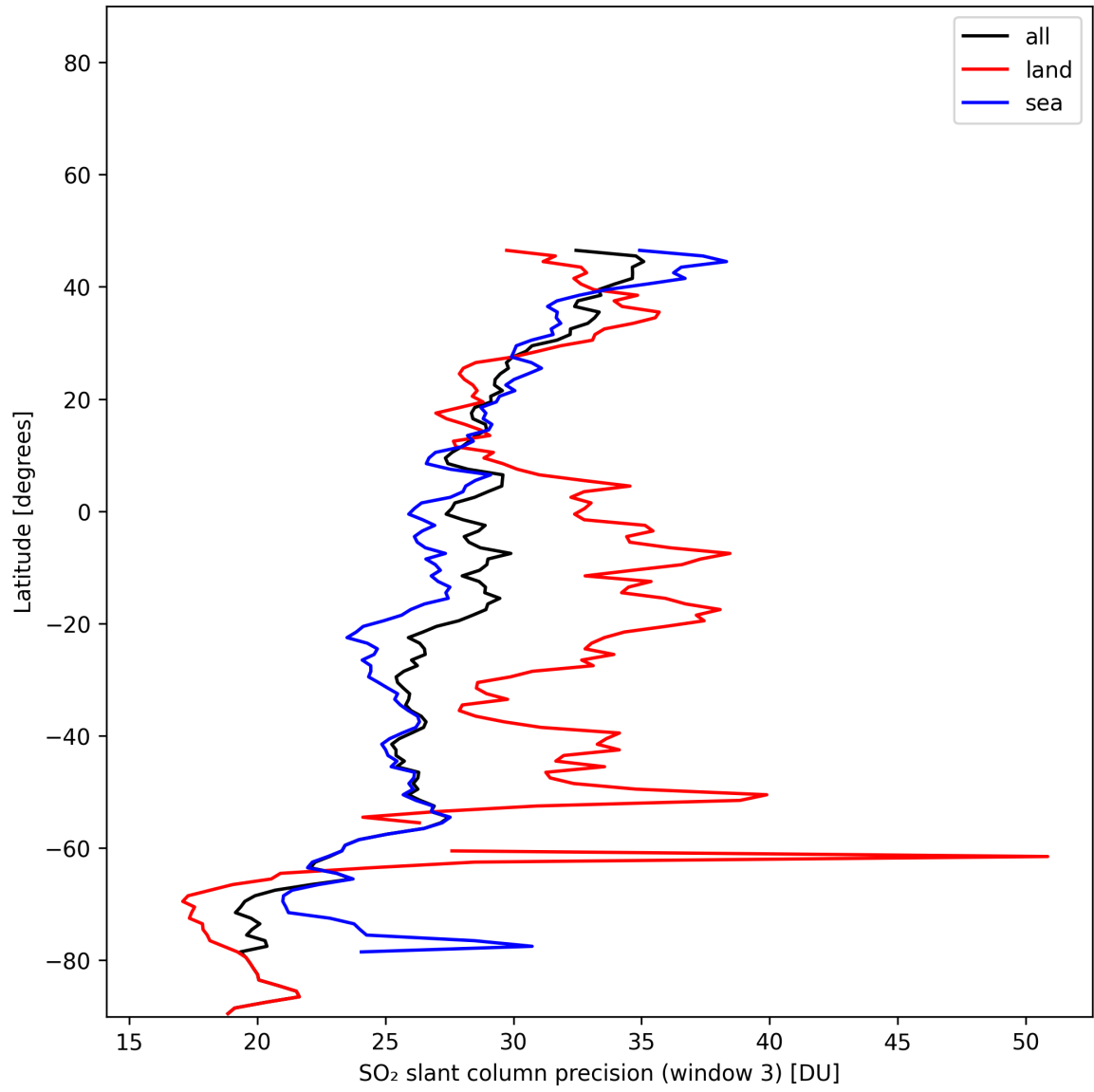


Figure 45: Zonal average of “SO₂ slant column precision (window 3)” for 2024-12-13 to 2024-12-14.

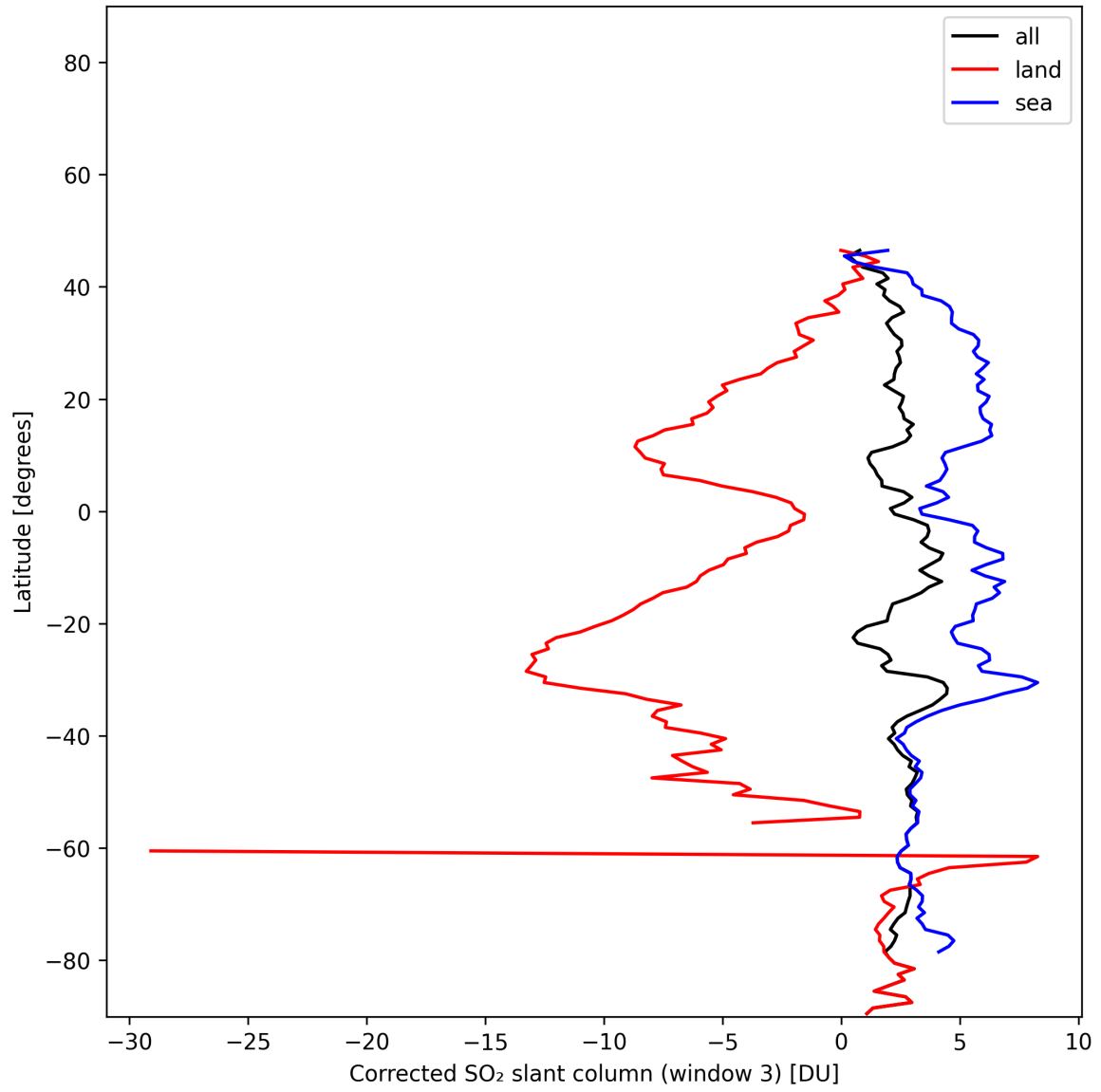


Figure 46: Zonal average of “Corrected SO₂ slant column (window 3)” for 2024-12-13 to 2024-12-14.

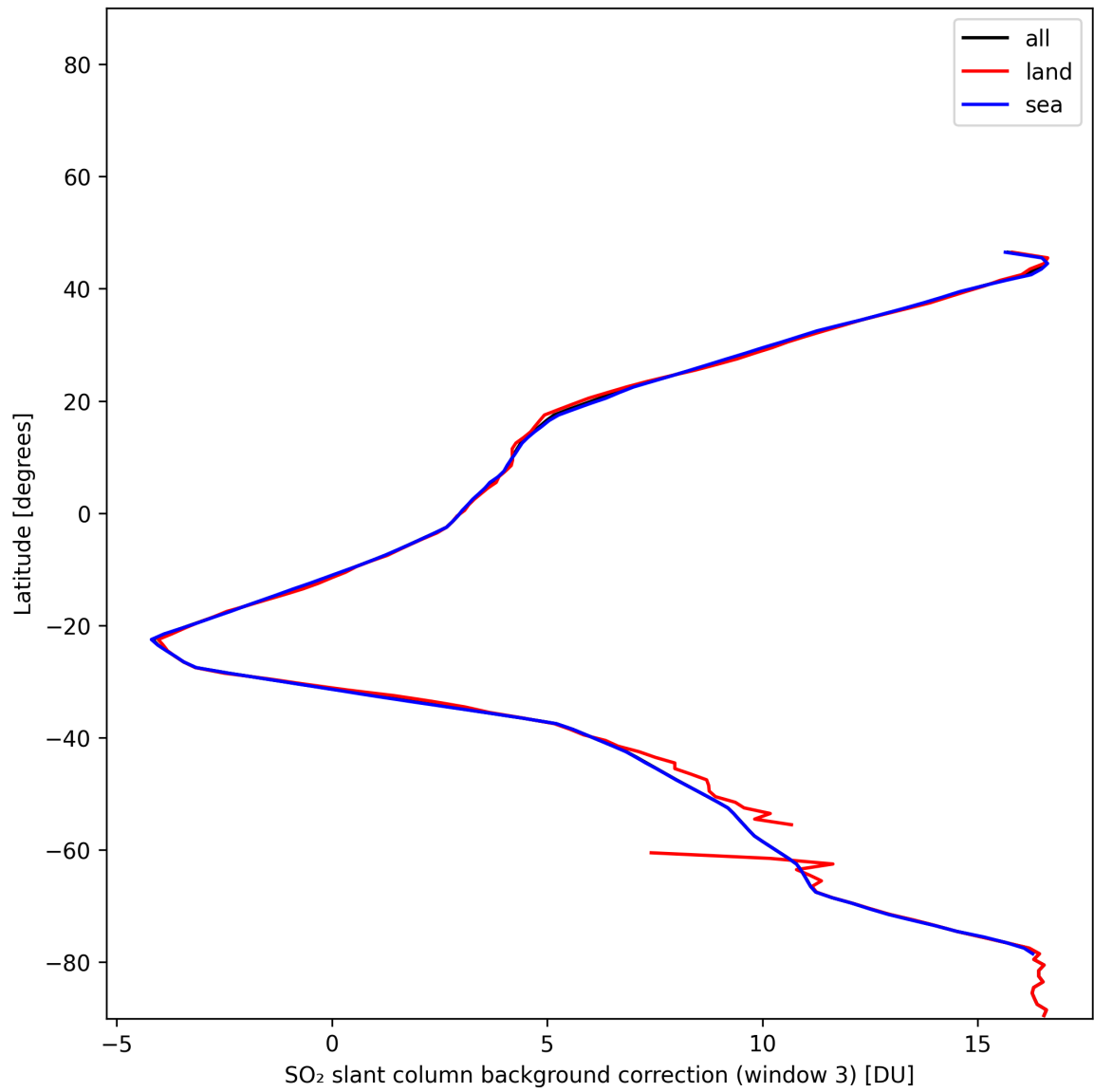


Figure 47: Zonal average of “SO₂ slant column background correction (window 3)” for 2024-12-13 to 2024-12-14.

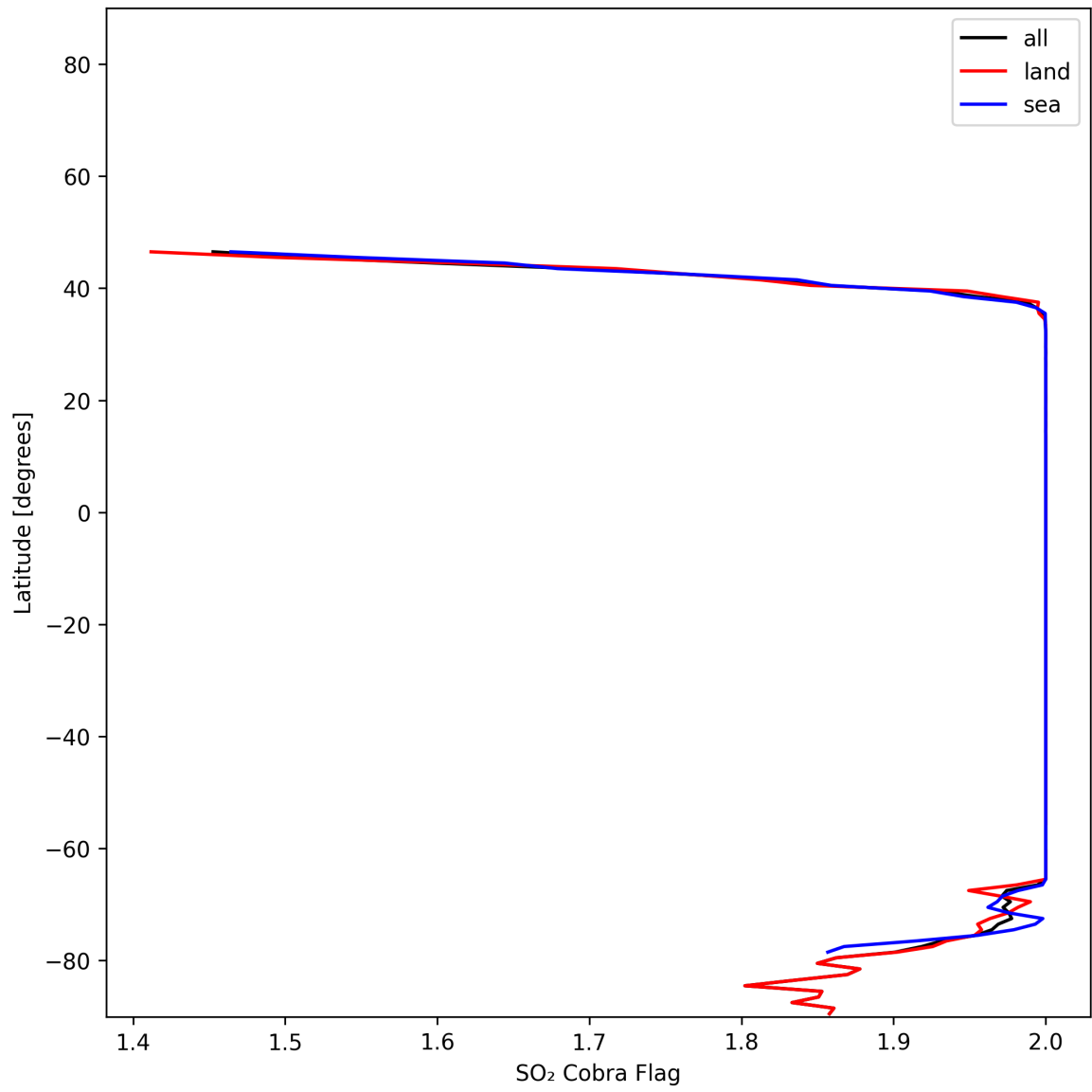


Figure 48: Zonal average of “SO₂ Cobra Flag” for 2024-12-13 to 2024-12-14.

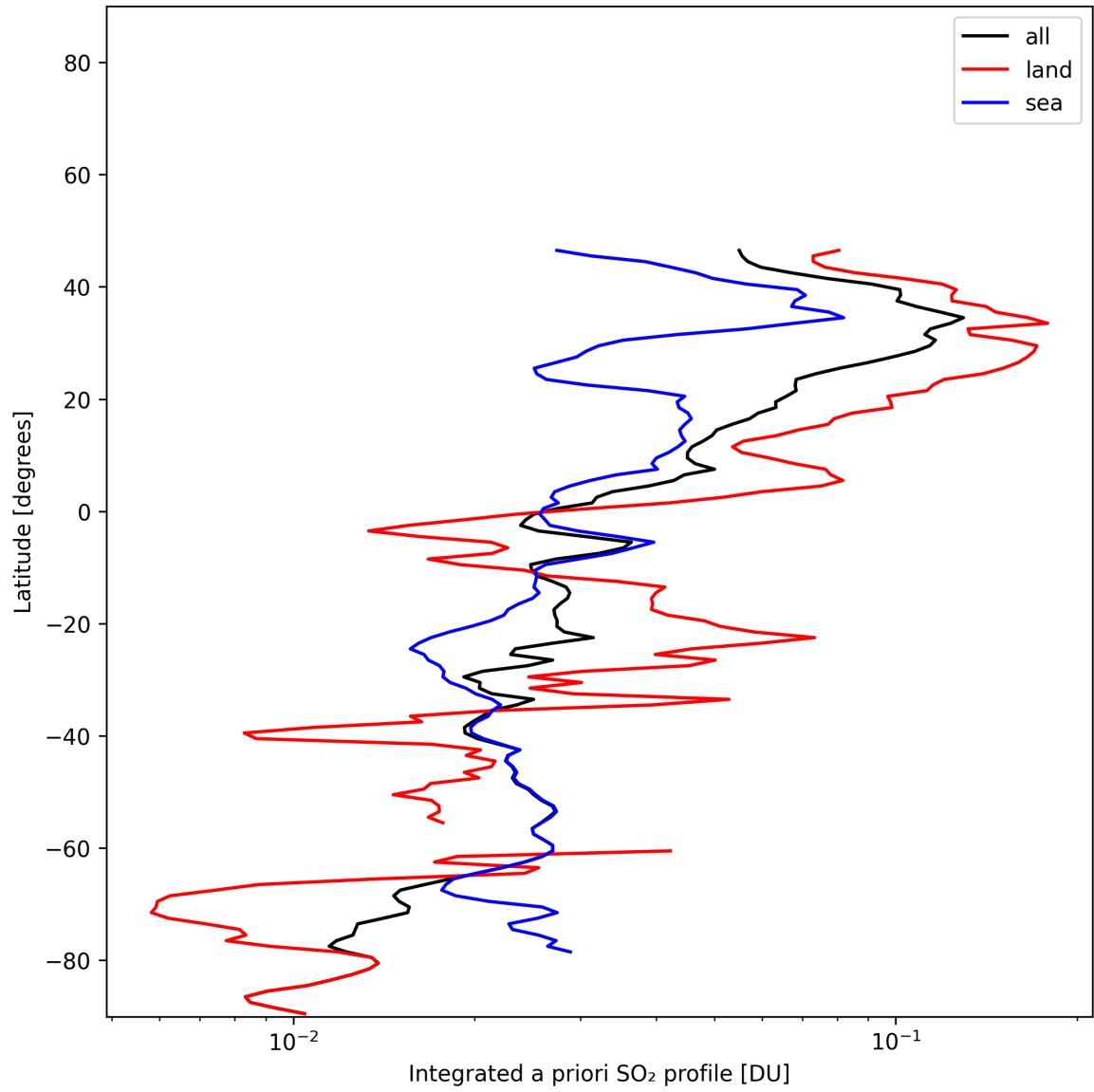


Figure 49: Zonal average of “Integrated a priori SO₂ profile” for 2024-12-13 to 2024-12-14.

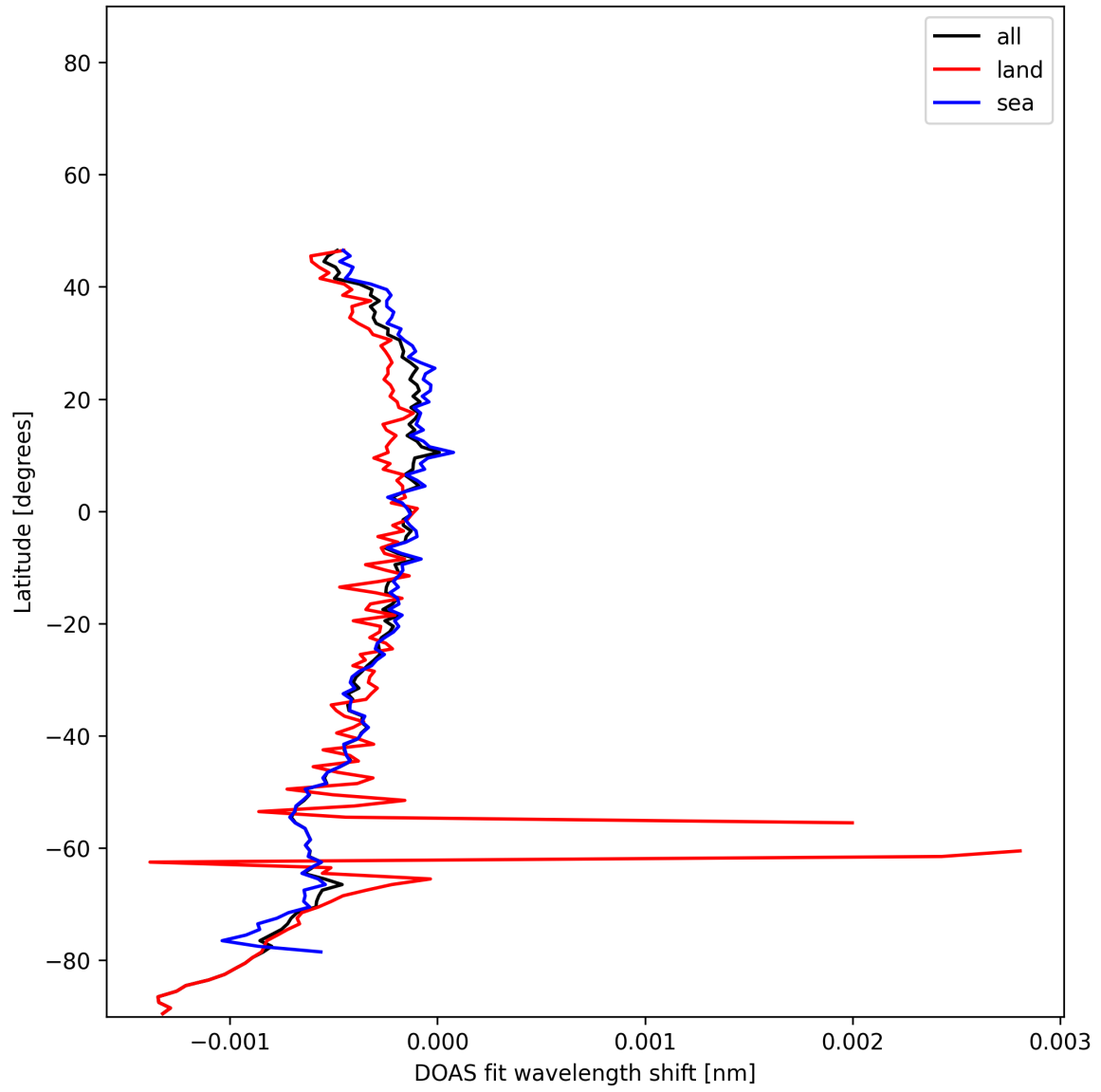


Figure 50: Zonal average of “DOAS fit wavelength shift” for 2024-12-13 to 2024-12-14.

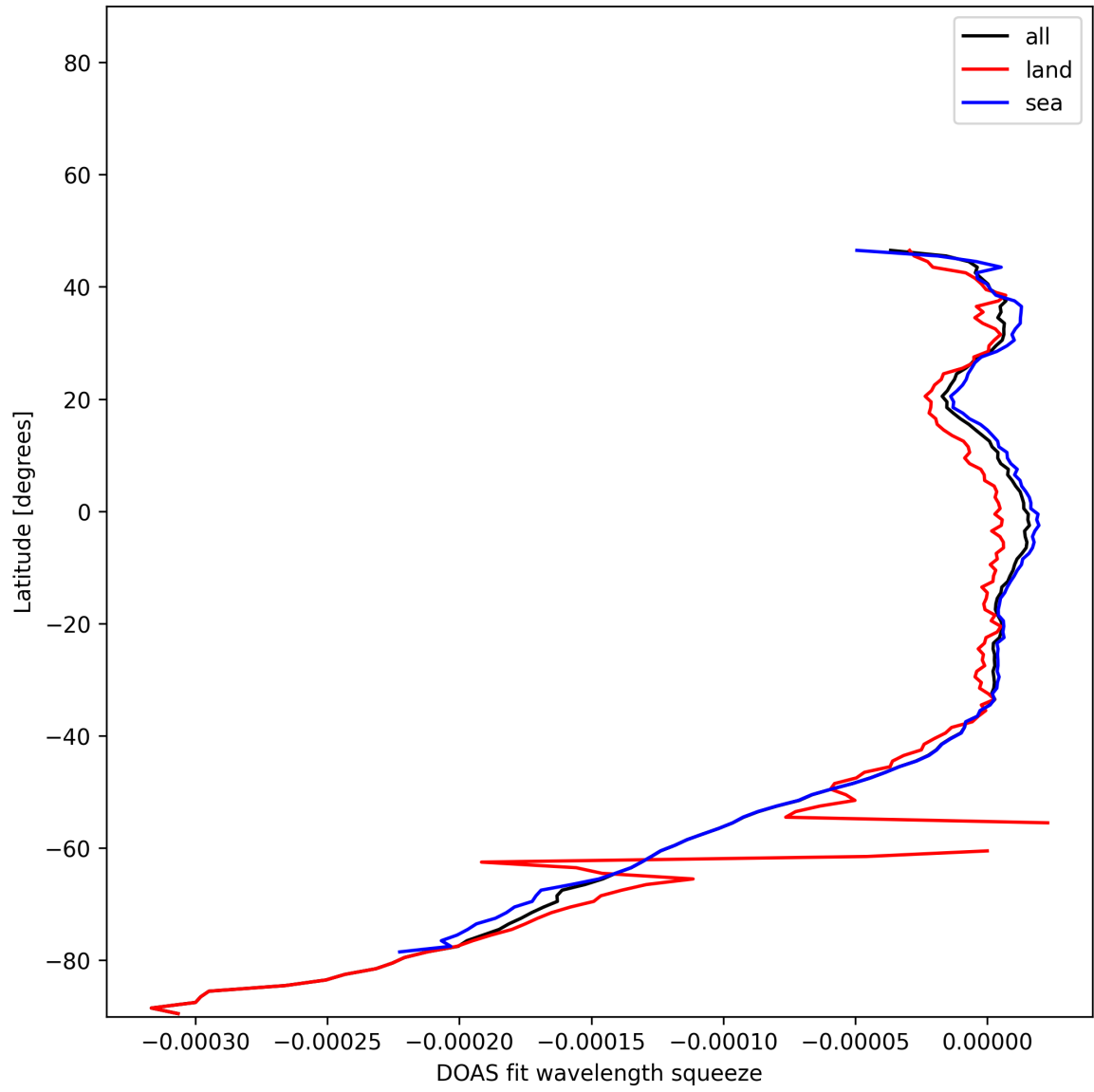


Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2024-12-13 to 2024-12-14.

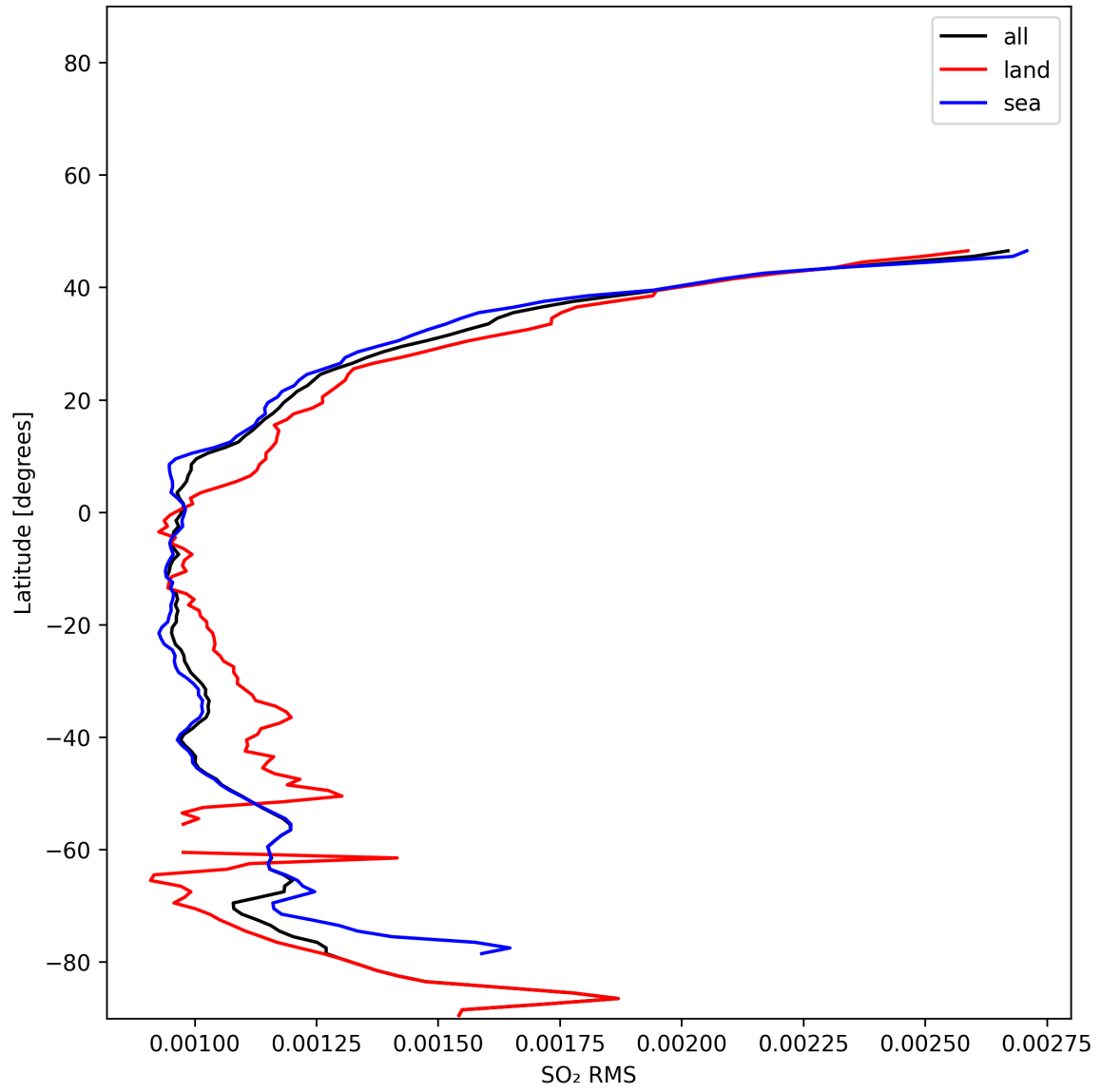


Figure 52: Zonal average of “SO₂ RMS” for 2024-12-13 to 2024-12-14.

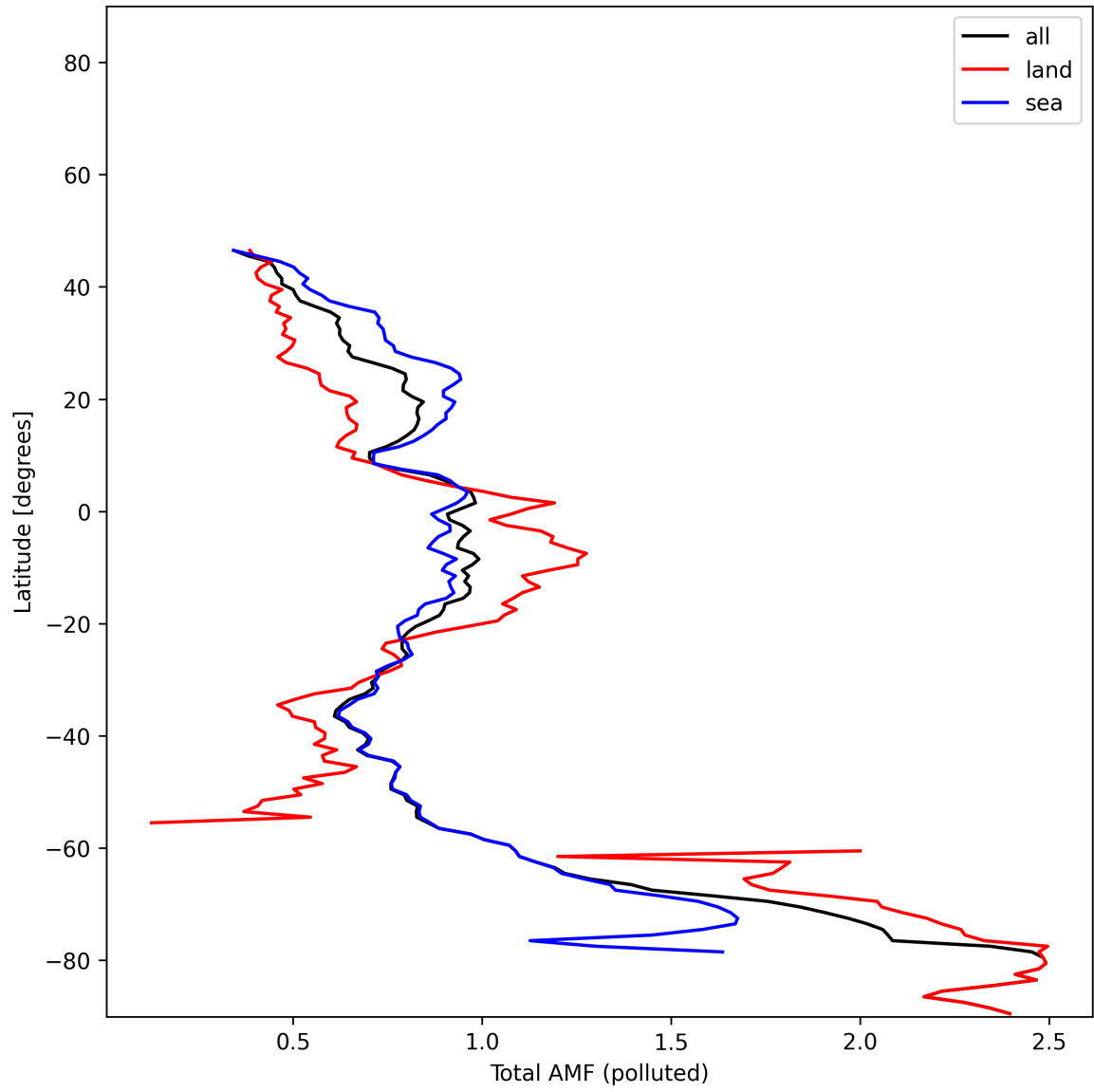


Figure 53: Zonal average of “Total AMF (polluted)” for 2024-12-13 to 2024-12-14.

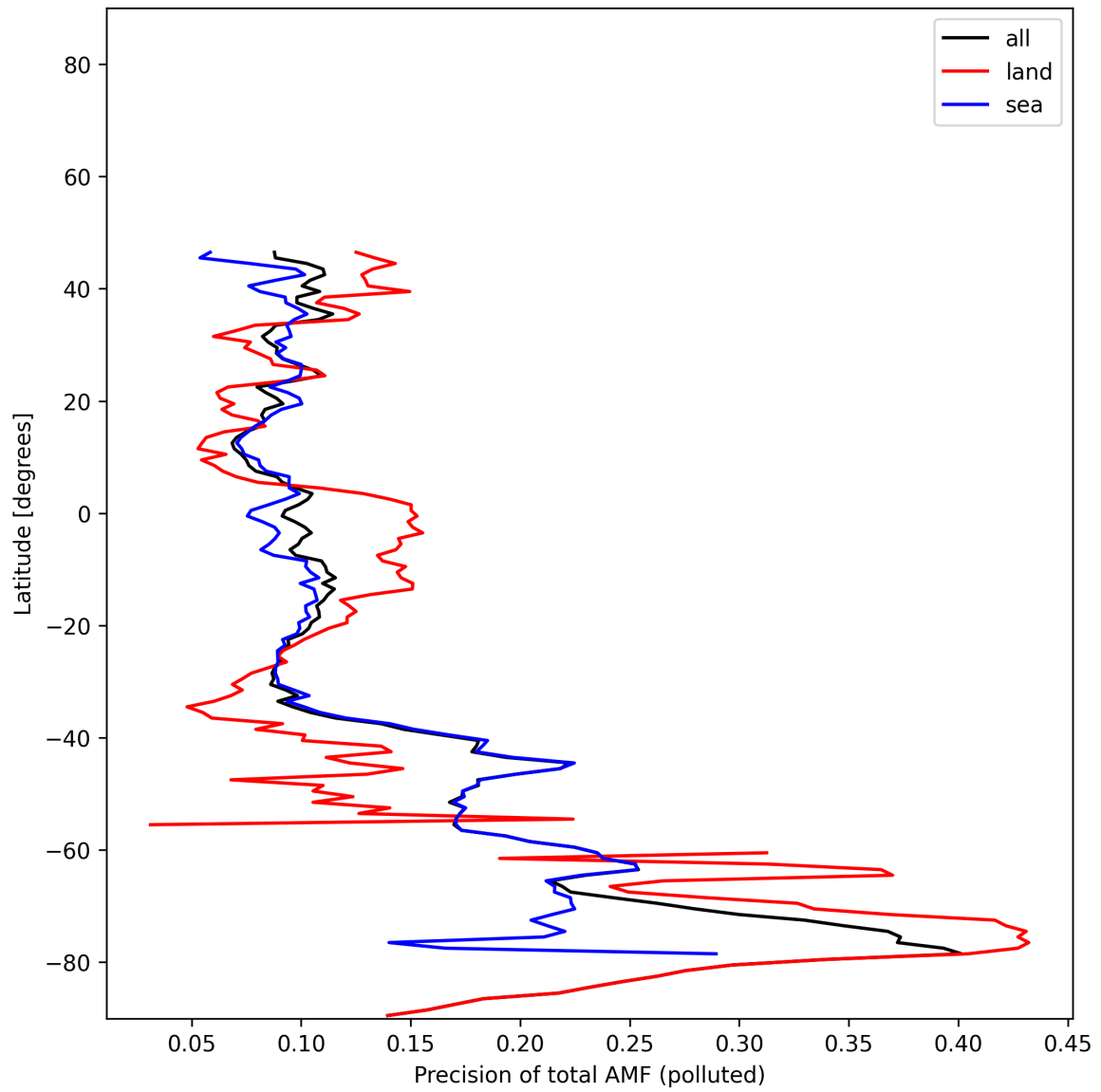


Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2024-12-13 to 2024-12-14.

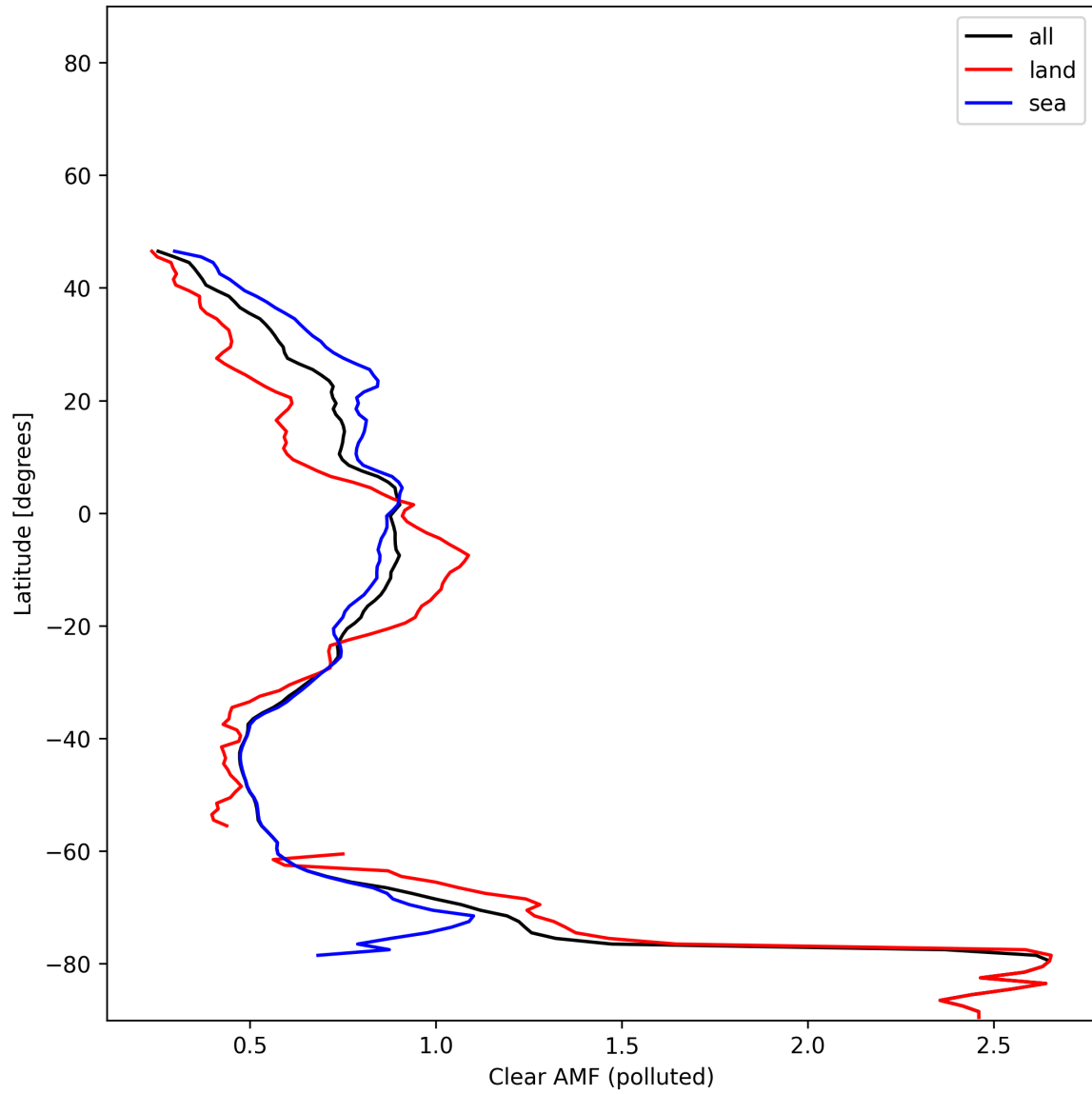


Figure 55: Zonal average of “Clear AMF (polluted)” for 2024-12-13 to 2024-12-14.

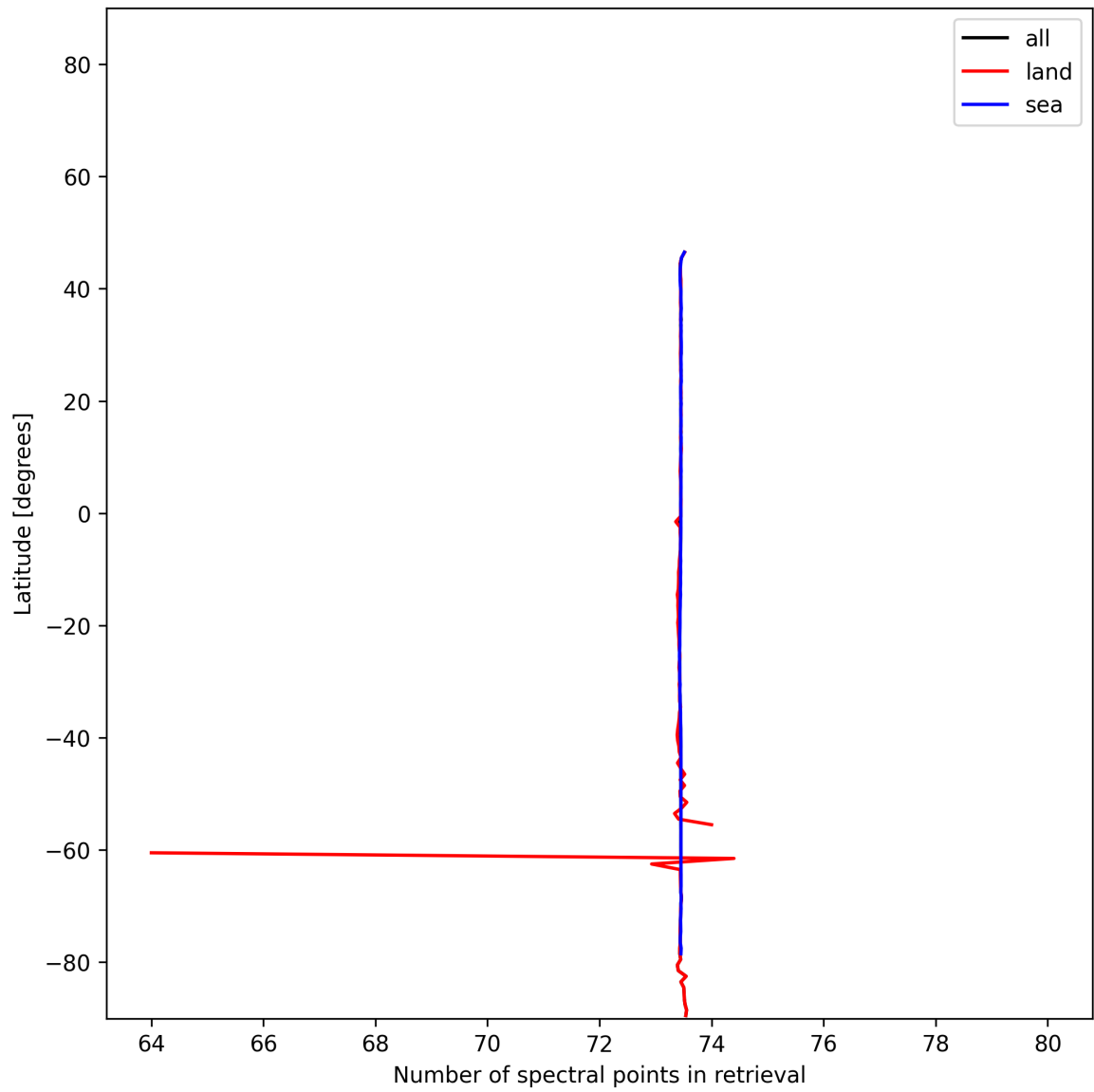


Figure 56: Zonal average of “Number of spectral points in retrieval” for 2024-12-13 to 2024-12-14.

8 Histograms

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

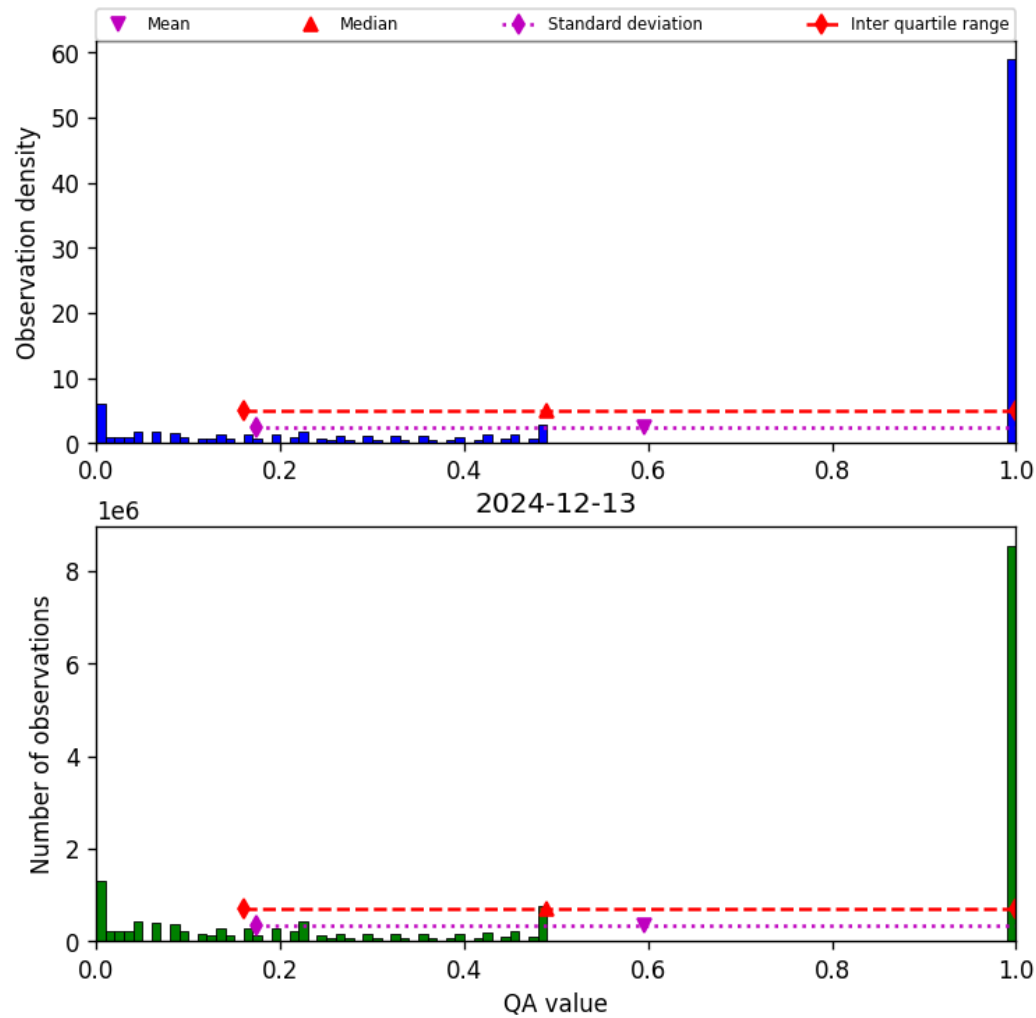


Figure 57: Histogram of “QA value” for 2024-12-13 to 2024-12-14

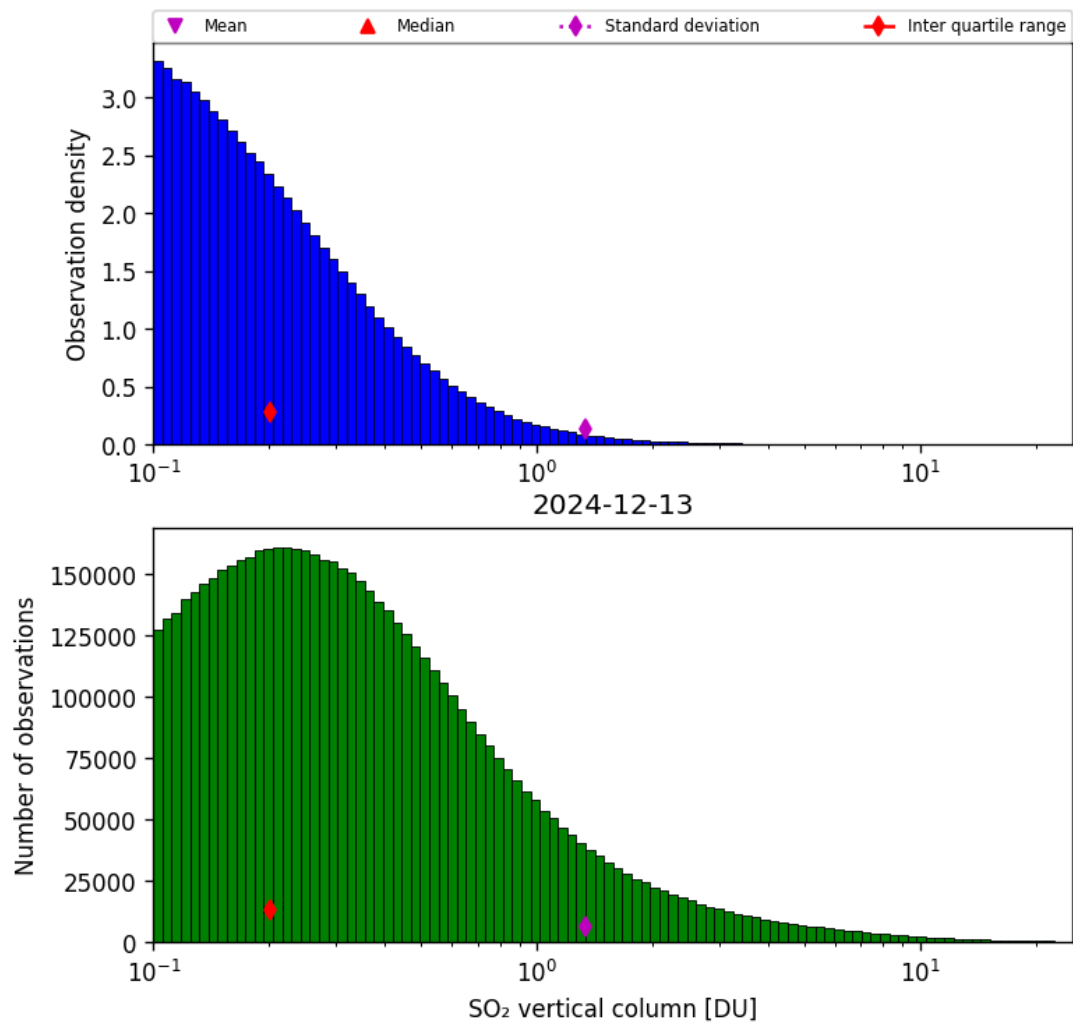


Figure 58: Histogram of “SO₂ vertical column” for 2024-12-13 to 2024-12-14

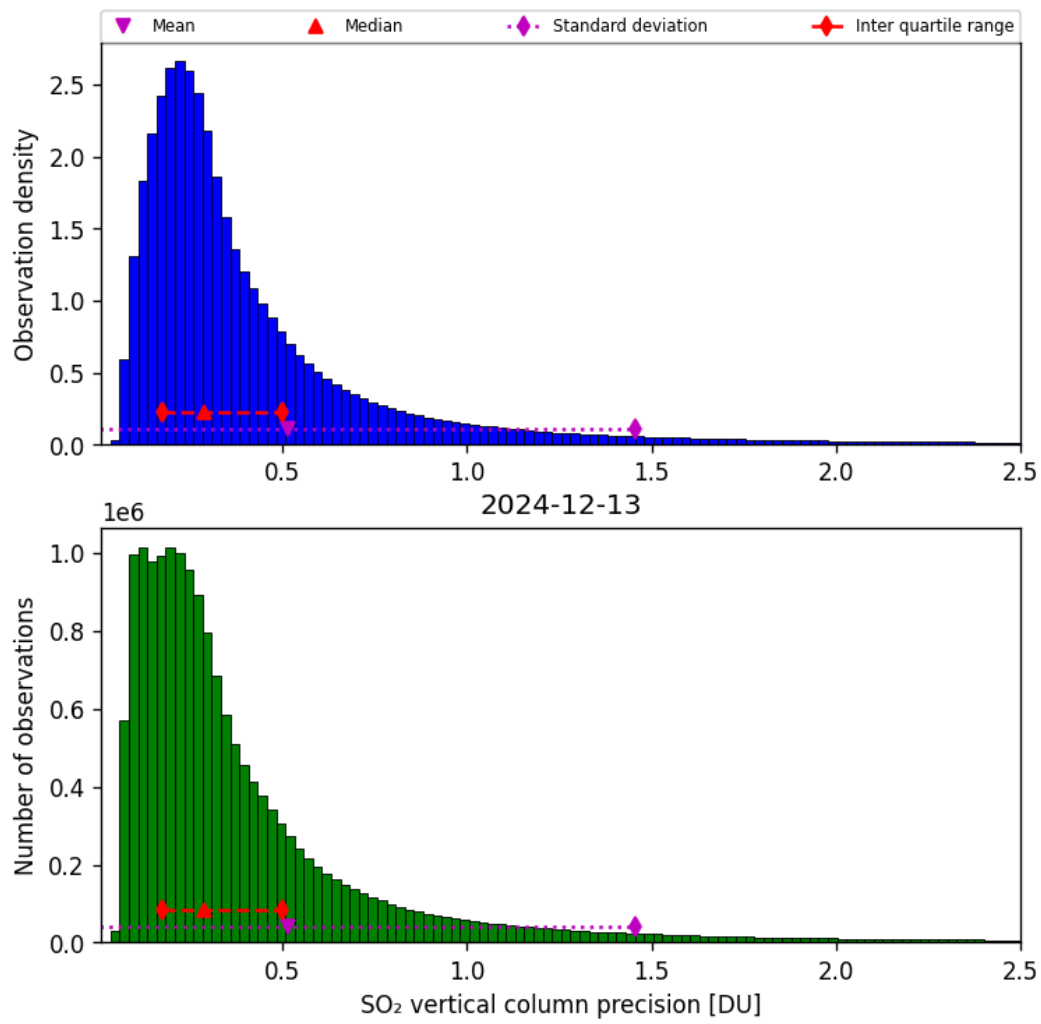


Figure 59: Histogram of “SO₂ vertical column precision” for 2024-12-13 to 2024-12-14

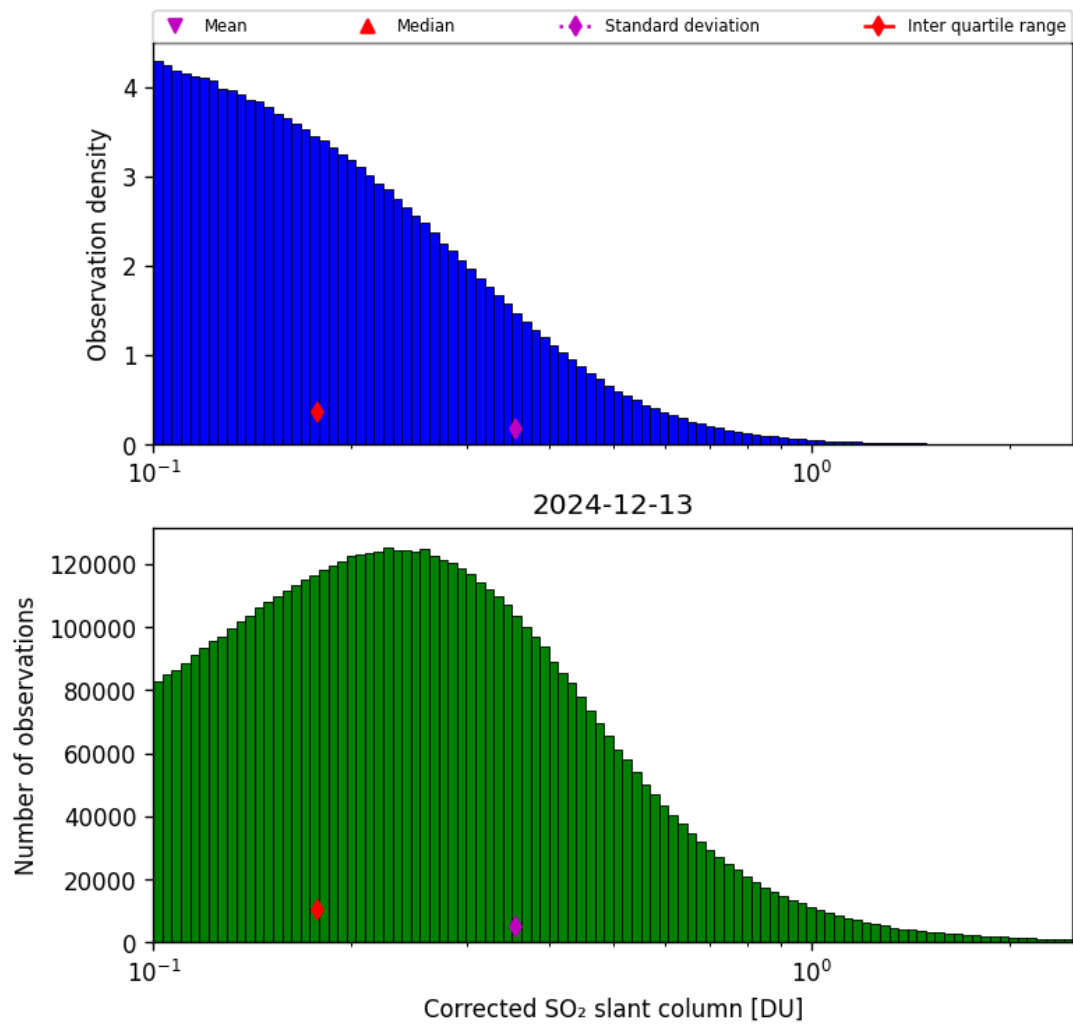


Figure 60: Histogram of “Corrected SO₂ slant column” for 2024-12-13 to 2024-12-14

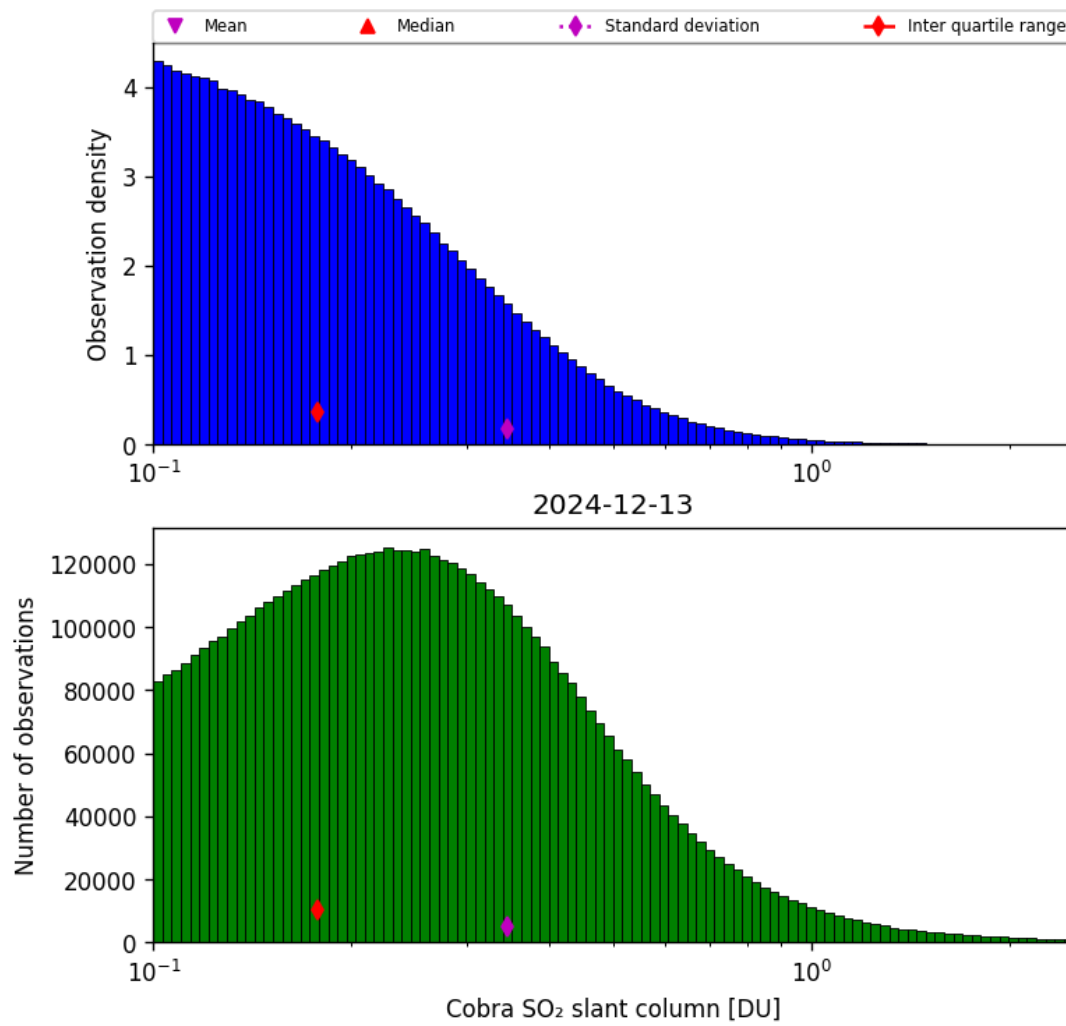


Figure 61: Histogram of “Cobra SO₂ slant column” for 2024-12-13 to 2024-12-14

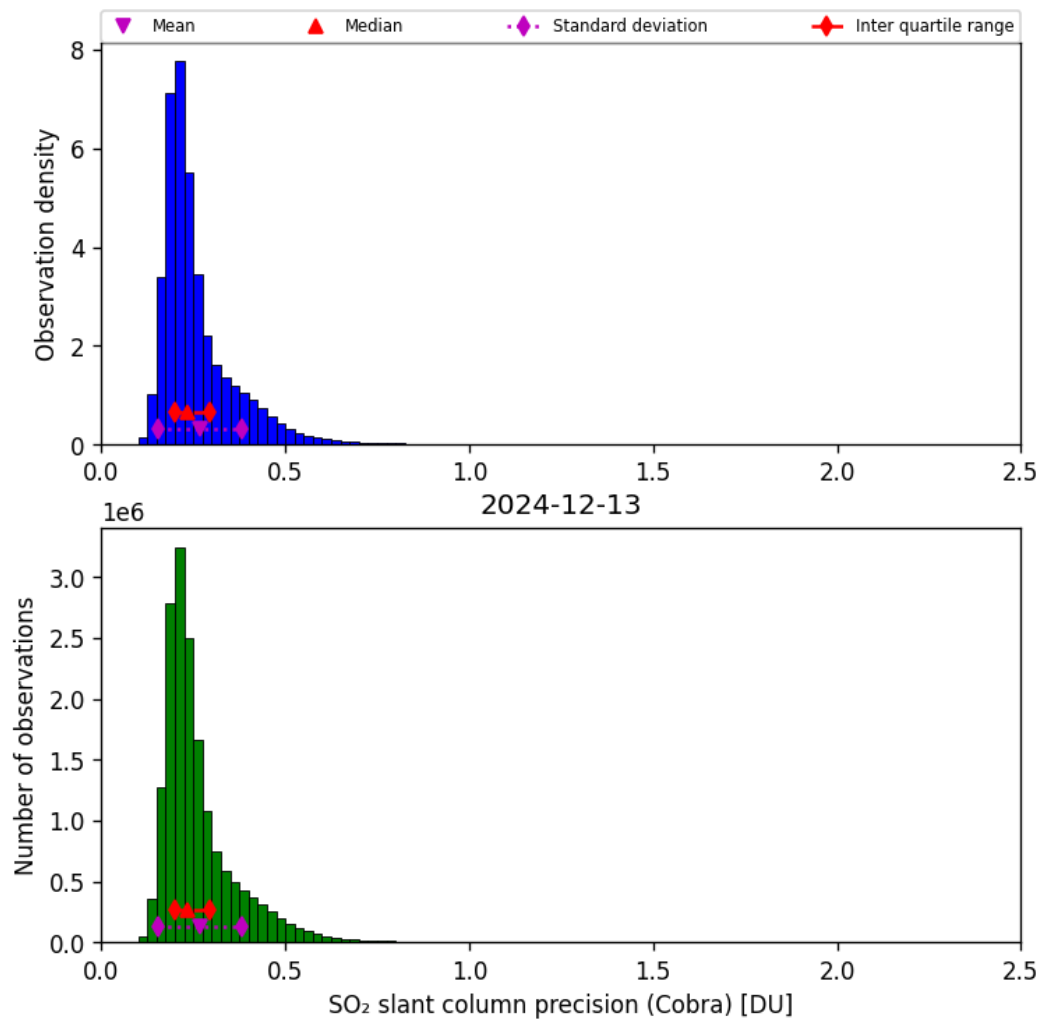


Figure 62: Histogram of “SO₂ slant column precision (Cobra)” for 2024-12-13 to 2024-12-14

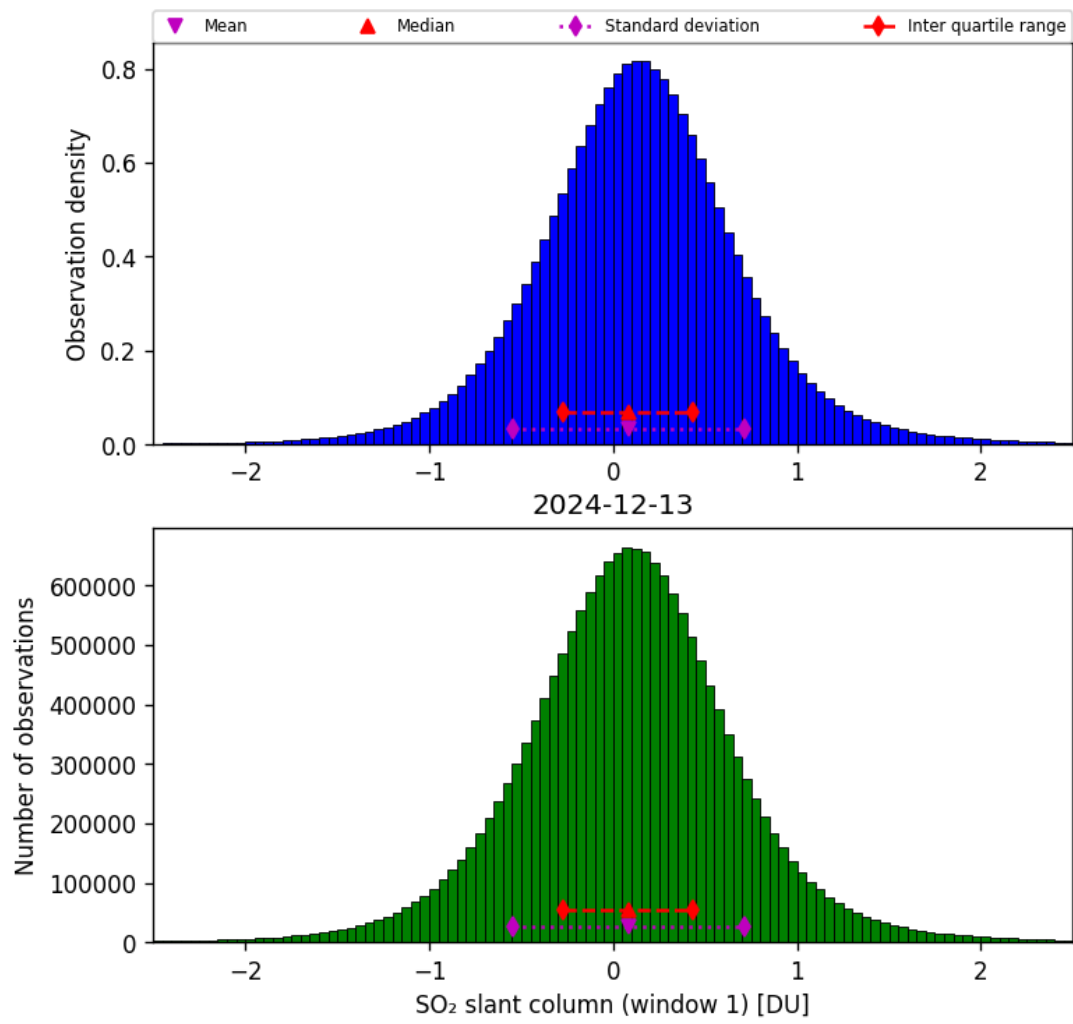


Figure 63: Histogram of “SO₂ slant column (window 1)” for 2024-12-13 to 2024-12-14

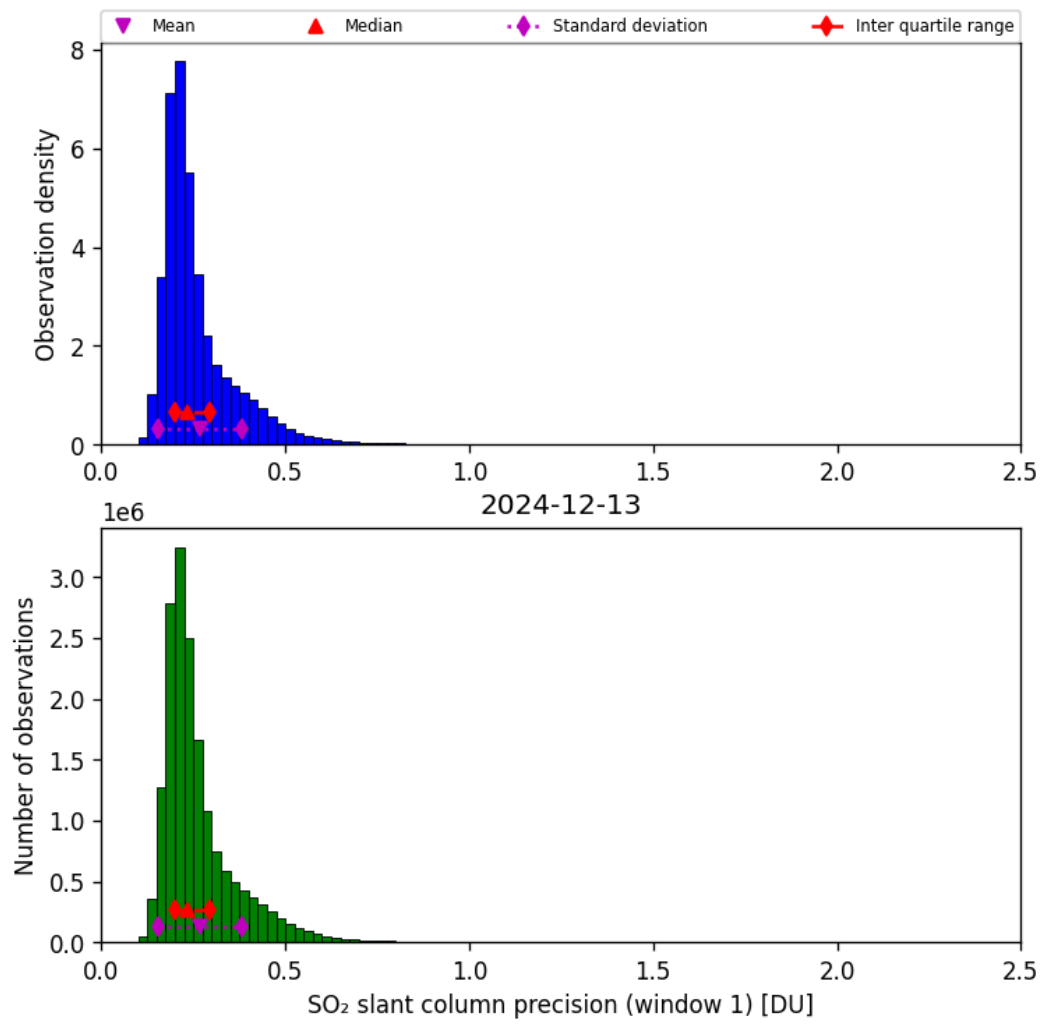


Figure 64: Histogram of “SO₂ slant column precision (window 1)” for 2024-12-13 to 2024-12-14

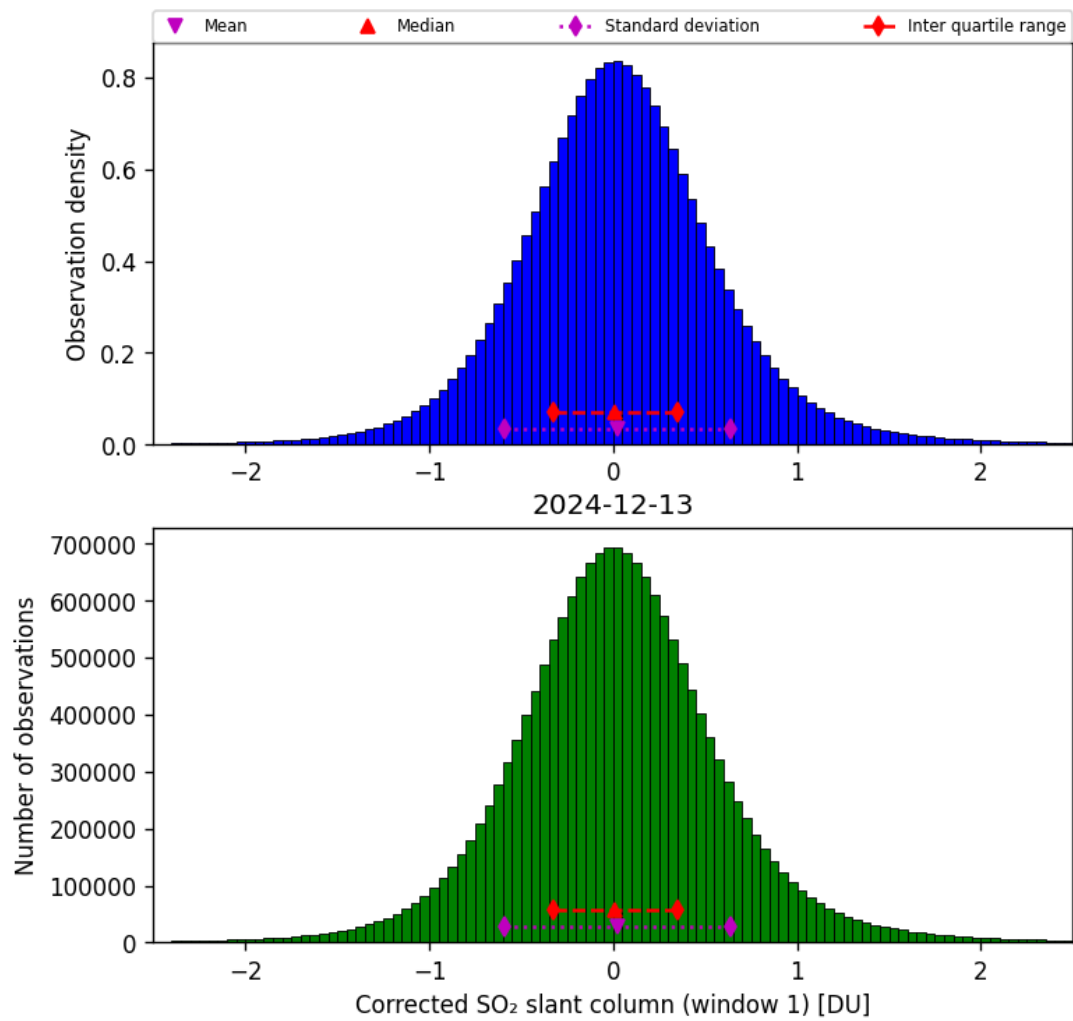


Figure 65: Histogram of “Corrected SO₂ slant column (window 1)” for 2024-12-13 to 2024-12-14

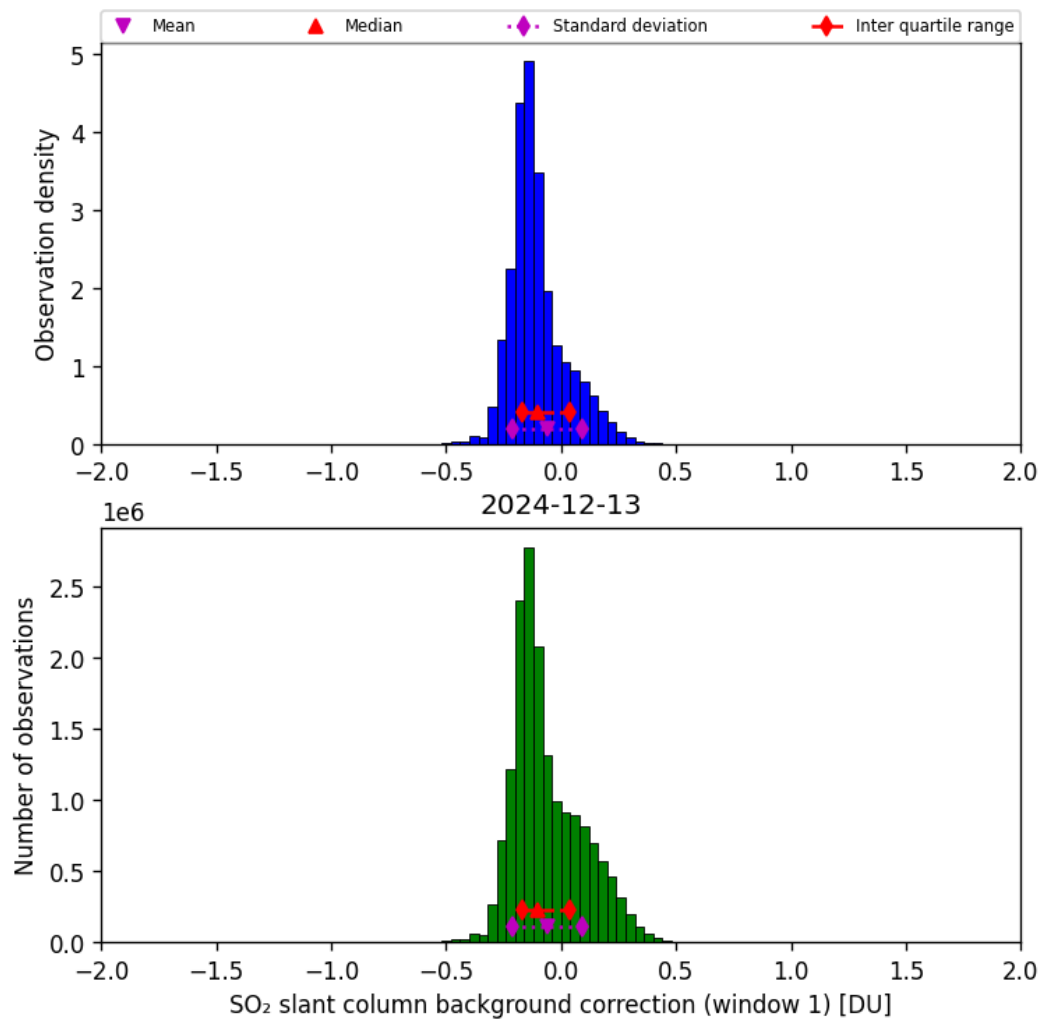


Figure 66: Histogram of “SO₂ slant column background correction (window 1)” for 2024-12-13 to 2024-12-14

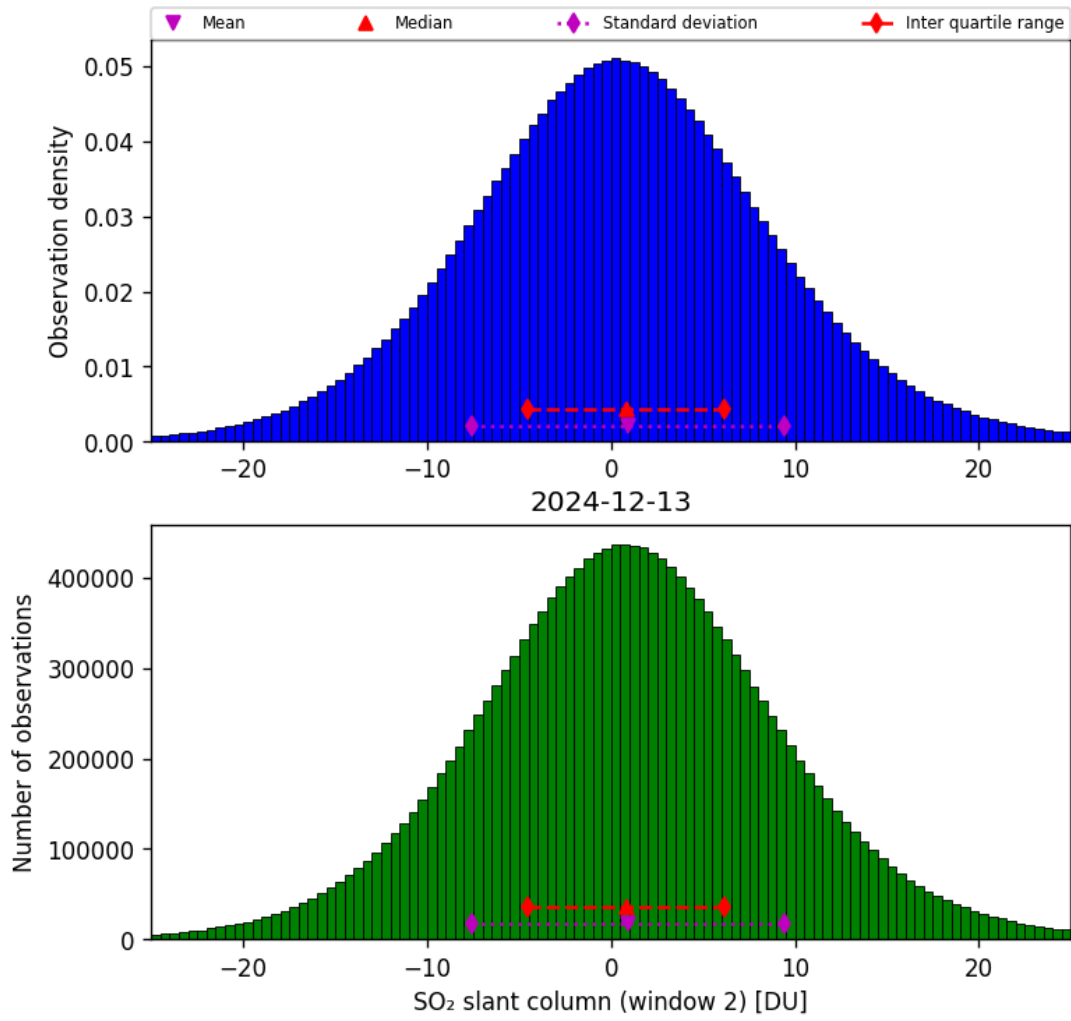


Figure 67: Histogram of “SO₂ slant column (window 2)” for 2024-12-13 to 2024-12-14

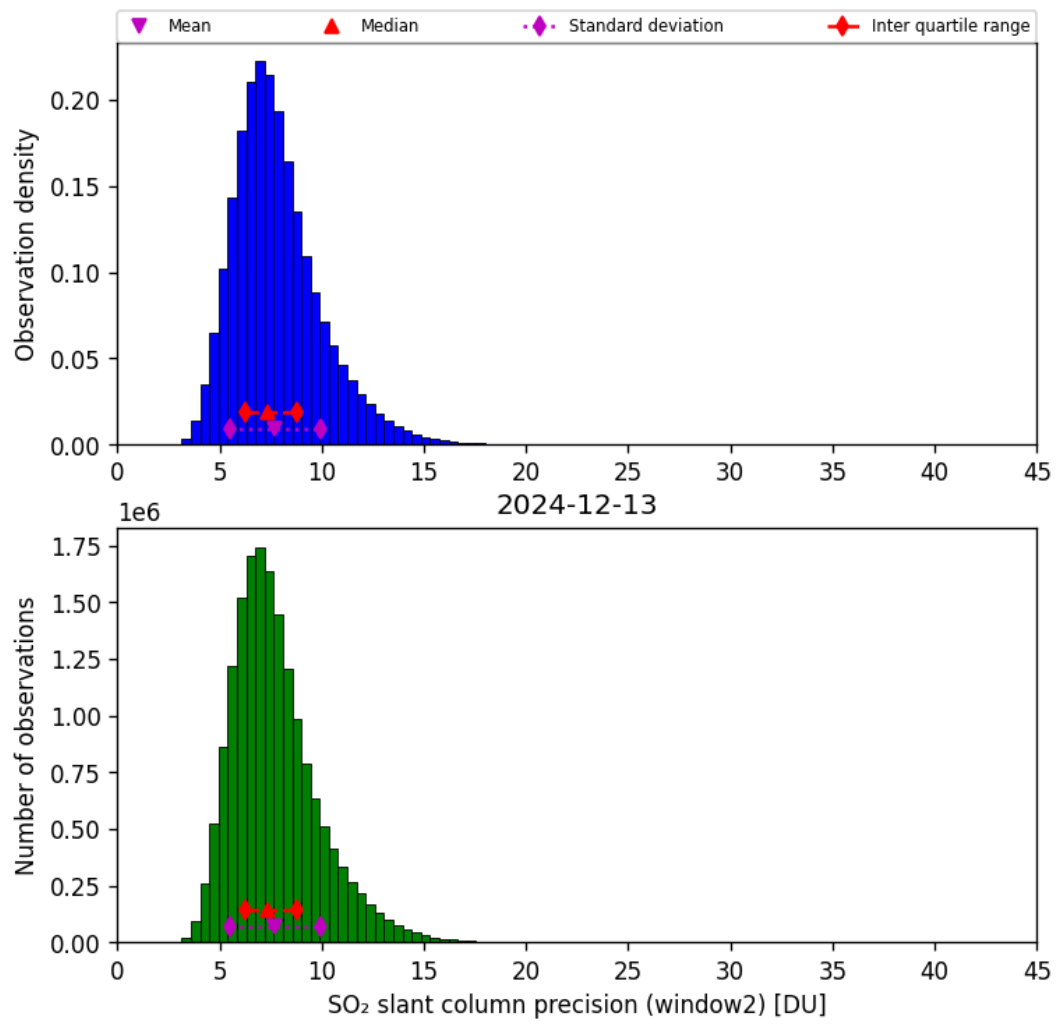


Figure 68: Histogram of “SO₂ slant column precision (window2)” for 2024-12-13 to 2024-12-14

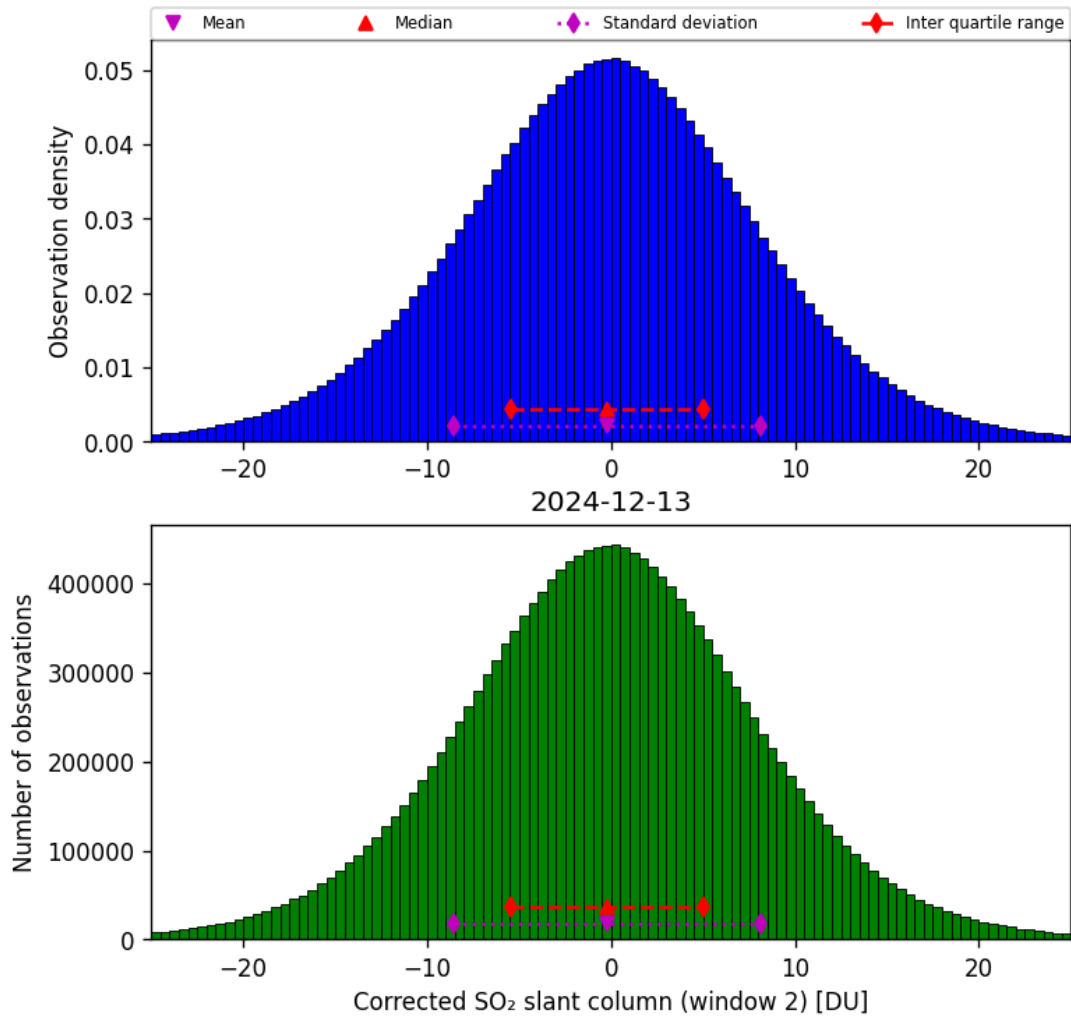


Figure 69: Histogram of “Corrected SO₂ slant column (window 2)” for 2024-12-13 to 2024-12-14

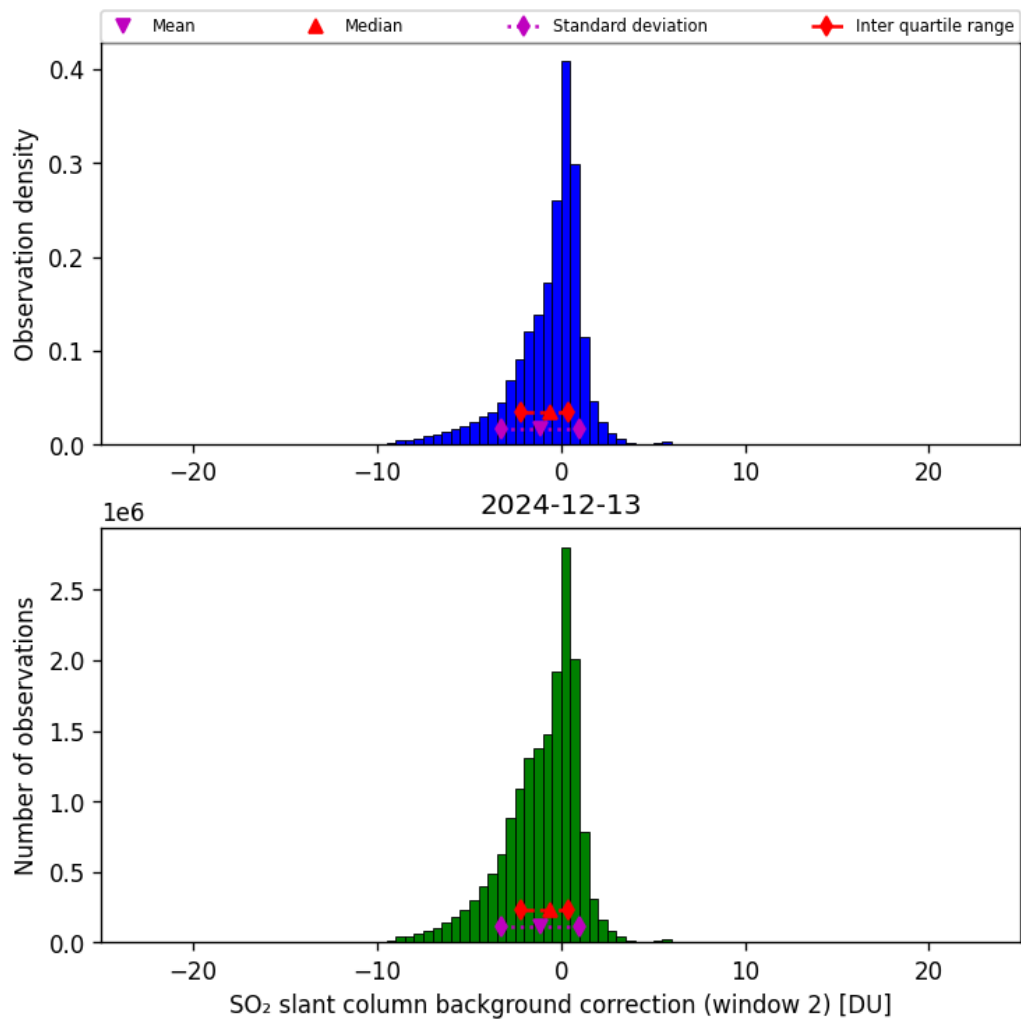


Figure 70: Histogram of “SO₂ slant column background correction (window 2)” for 2024-12-13 to 2024-12-14

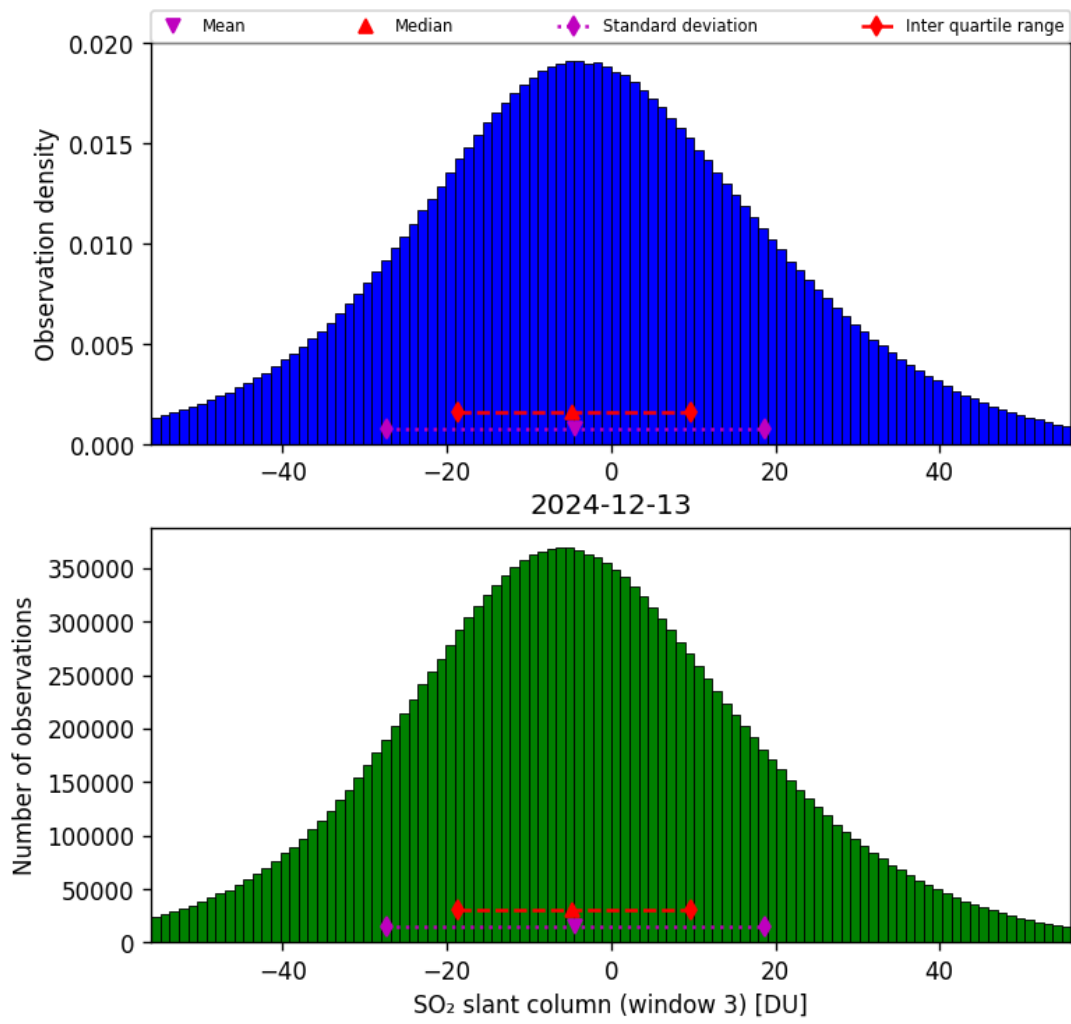


Figure 71: Histogram of “SO₂ slant column (window 3)” for 2024-12-13 to 2024-12-14

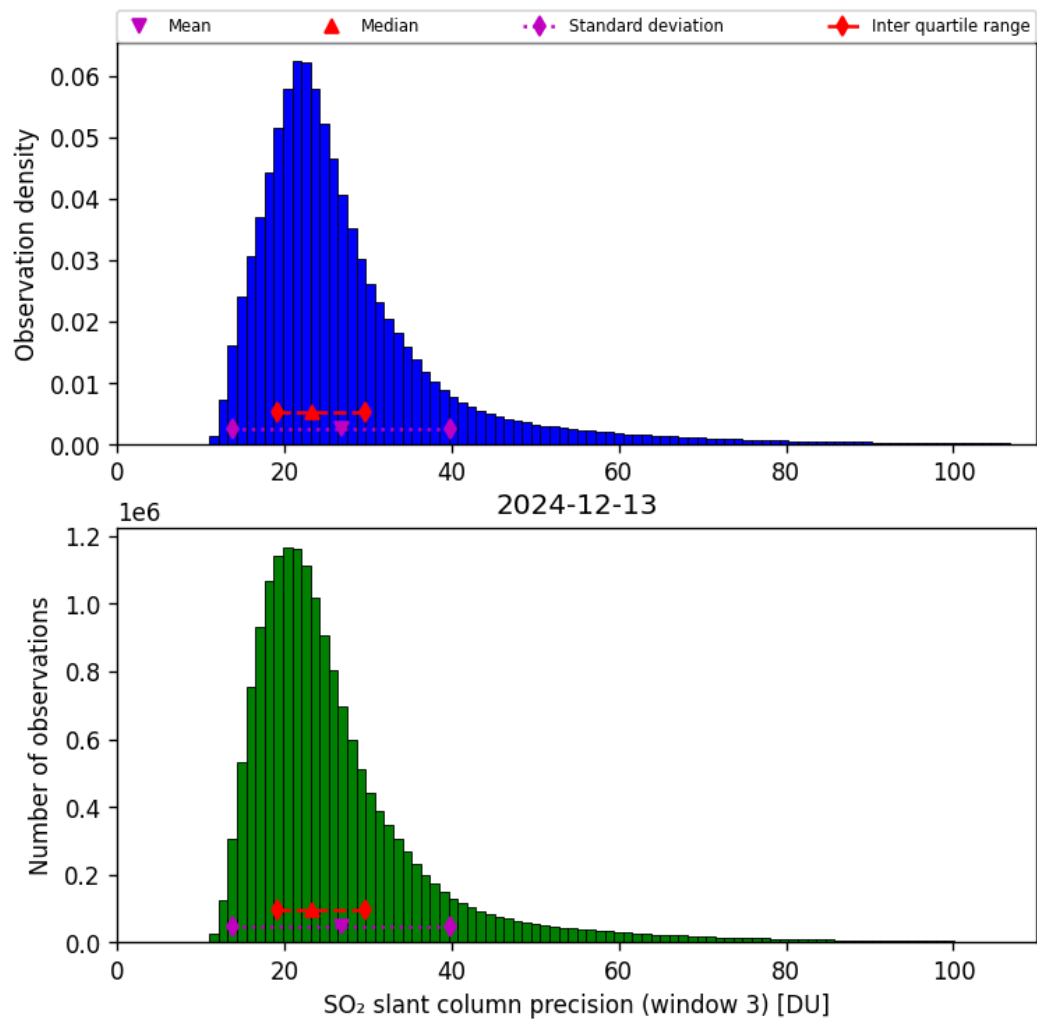


Figure 72: Histogram of “SO₂ slant column precision (window 3)” for 2024-12-13 to 2024-12-14

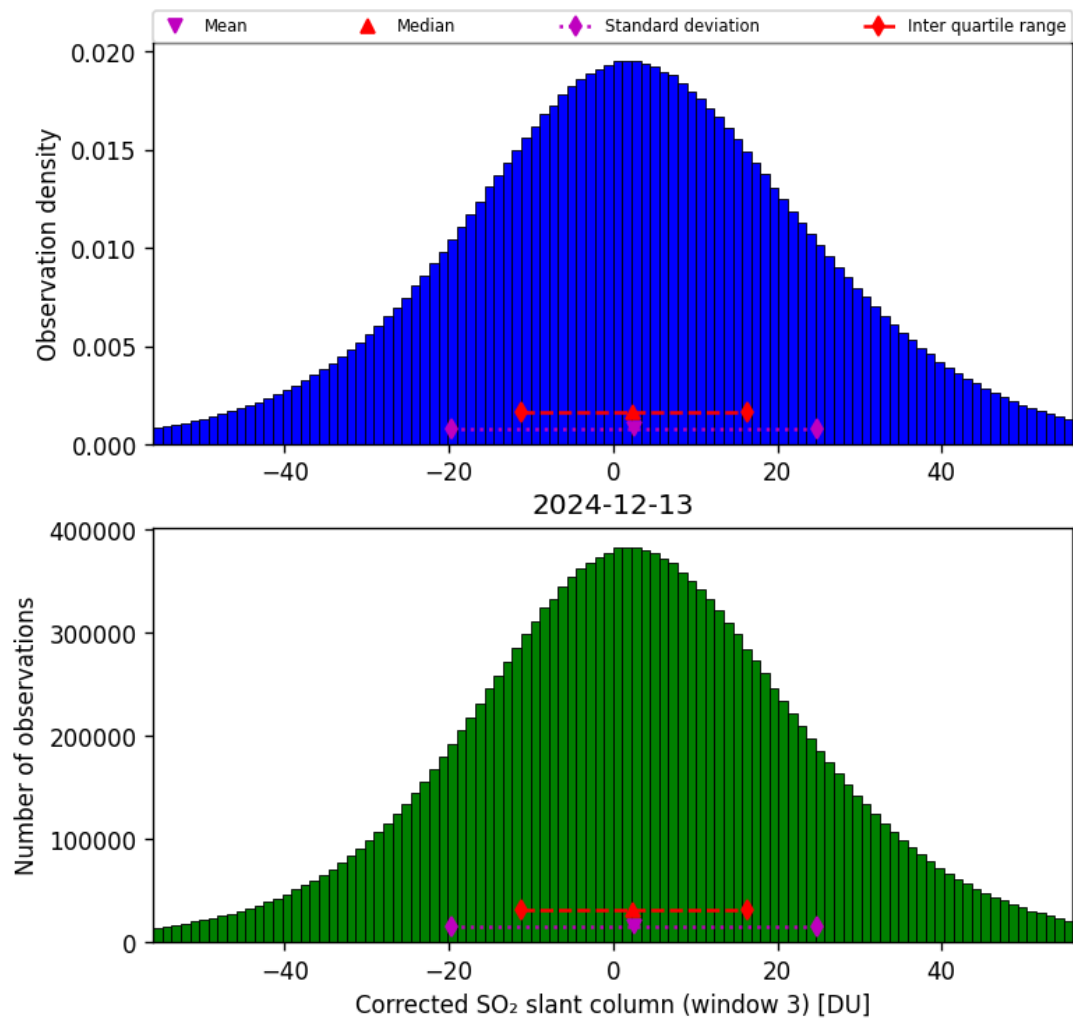


Figure 73: Histogram of “Corrected SO₂ slant column (window 3)” for 2024-12-13 to 2024-12-14

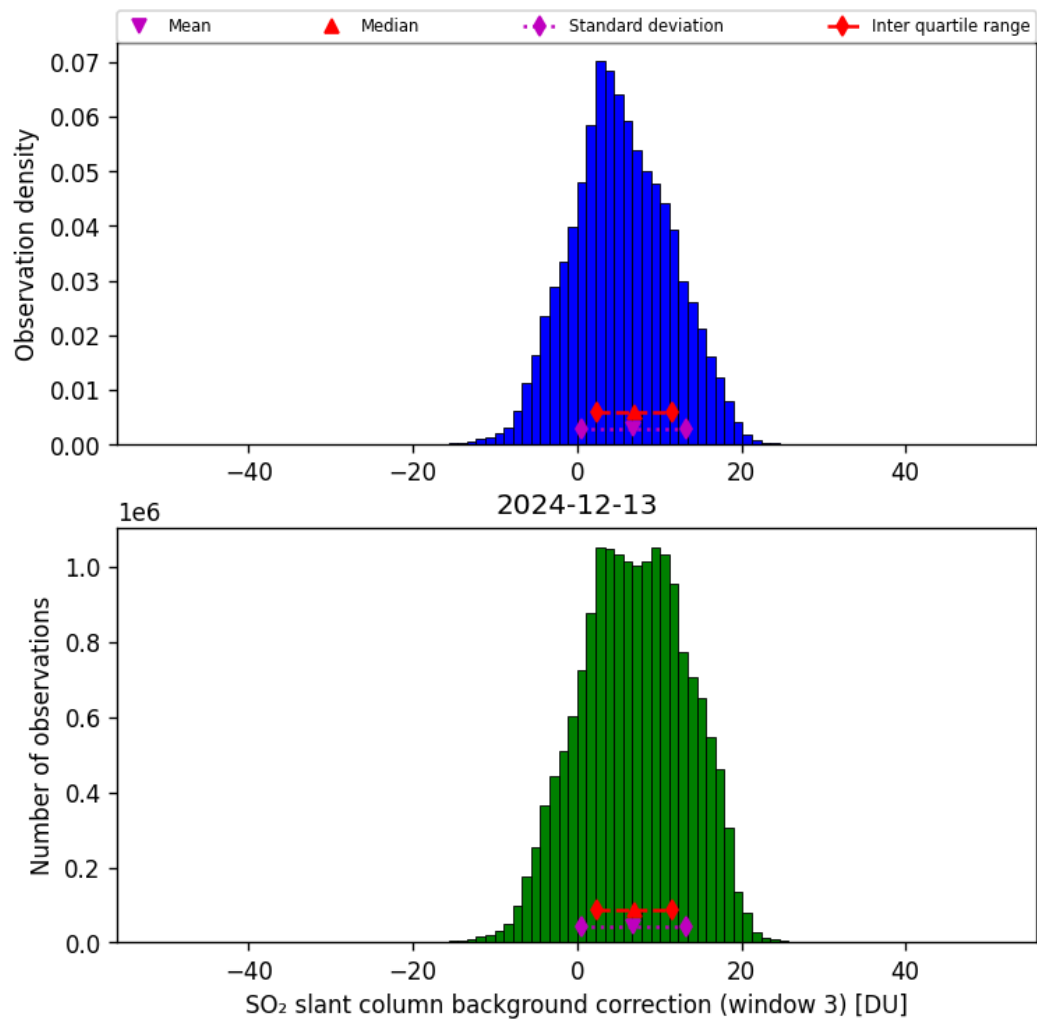


Figure 74: Histogram of “SO₂ slant column background correction (window 3)” for 2024-12-13 to 2024-12-14

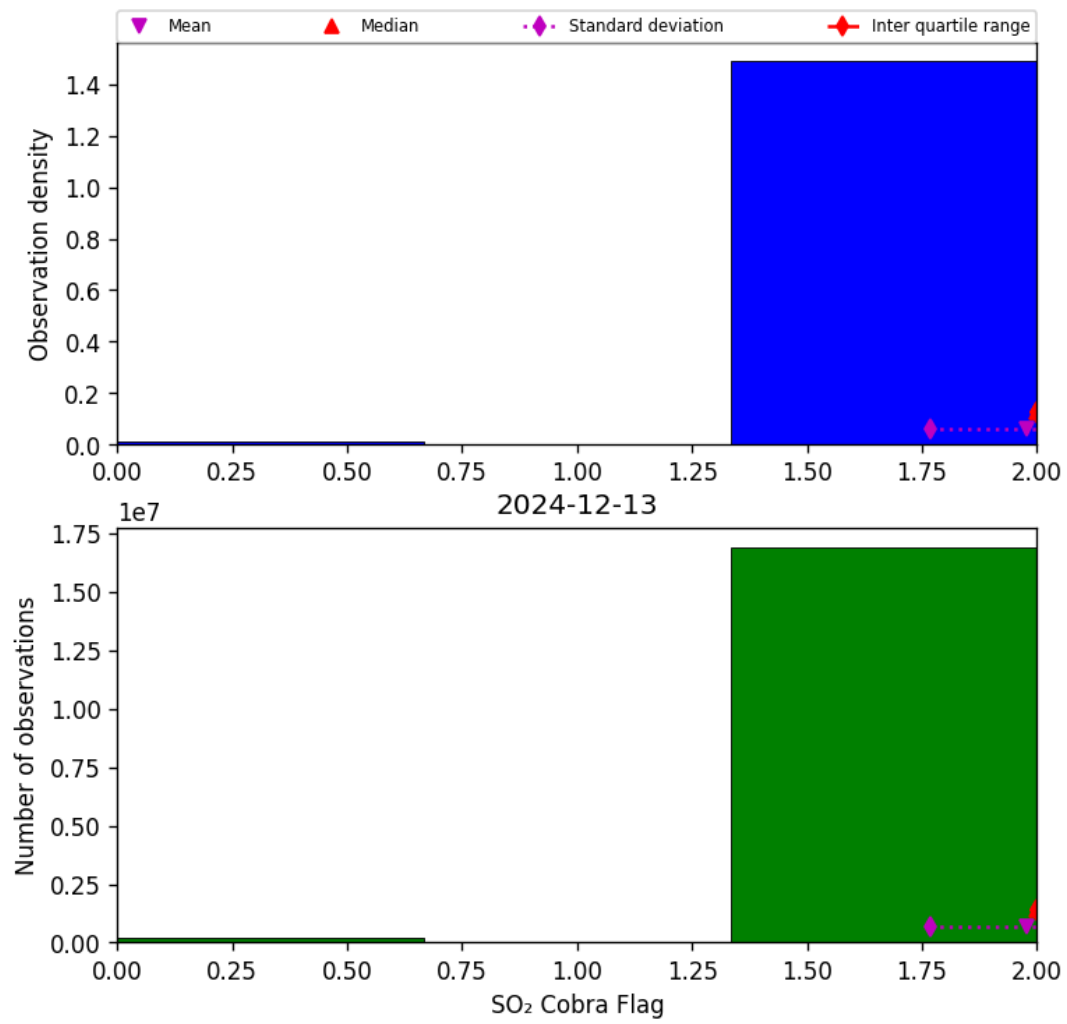


Figure 75: Histogram of “SO₂ Cobra Flag” for 2024-12-13 to 2024-12-14

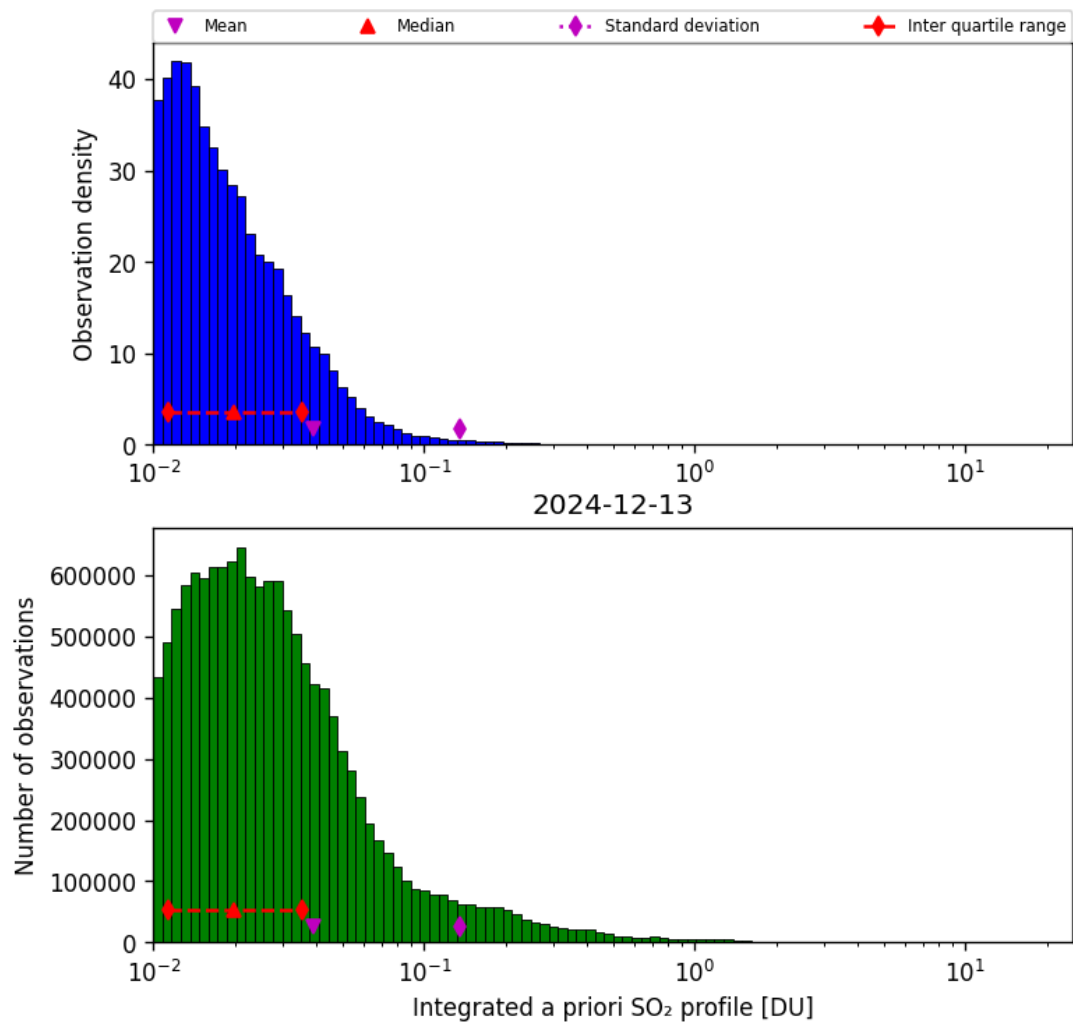


Figure 76: Histogram of “Integrated a priori SO₂ profile” for 2024-12-13 to 2024-12-14

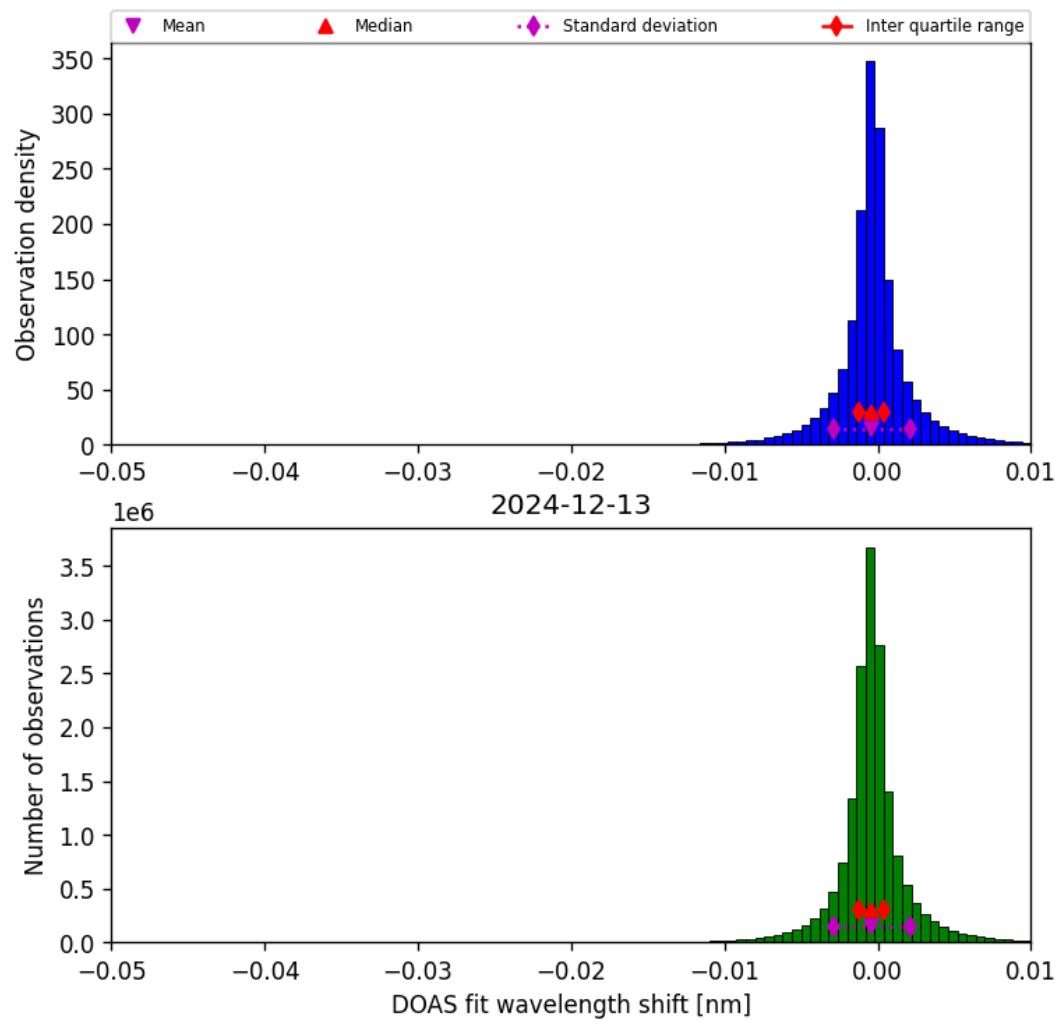


Figure 77: Histogram of “DOAS fit wavelength shift” for 2024-12-13 to 2024-12-14

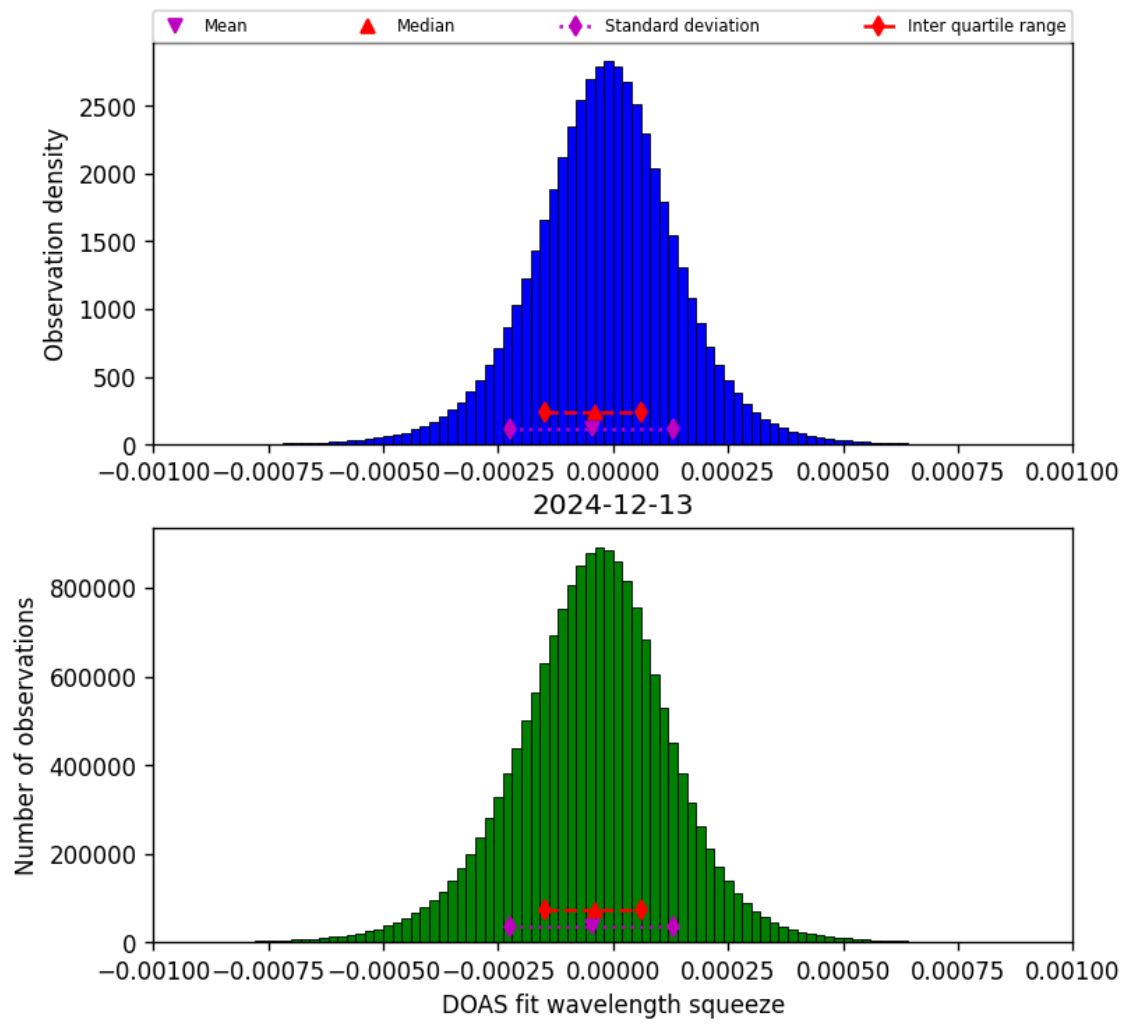


Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2024-12-13 to 2024-12-14

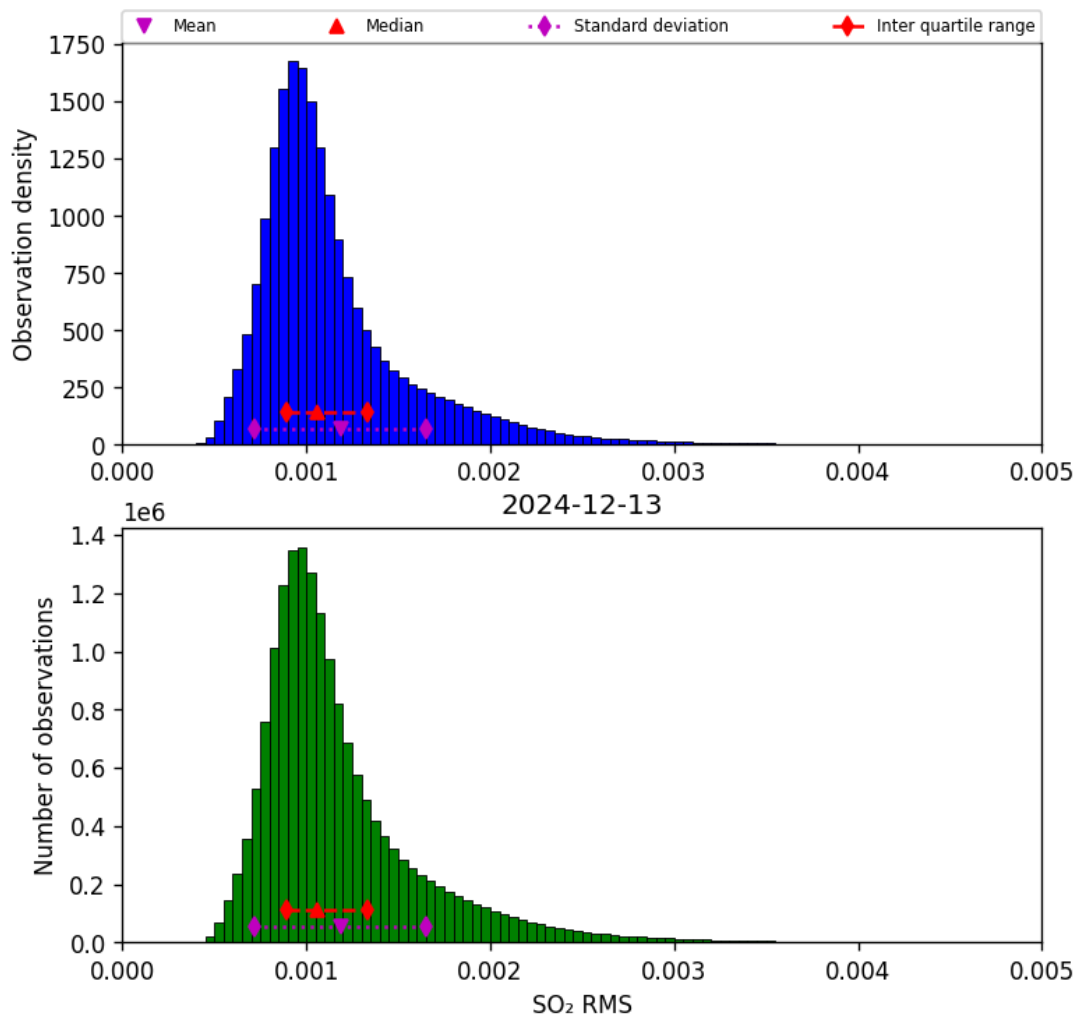


Figure 79: Histogram of “SO₂ RMS” for 2024-12-13 to 2024-12-14

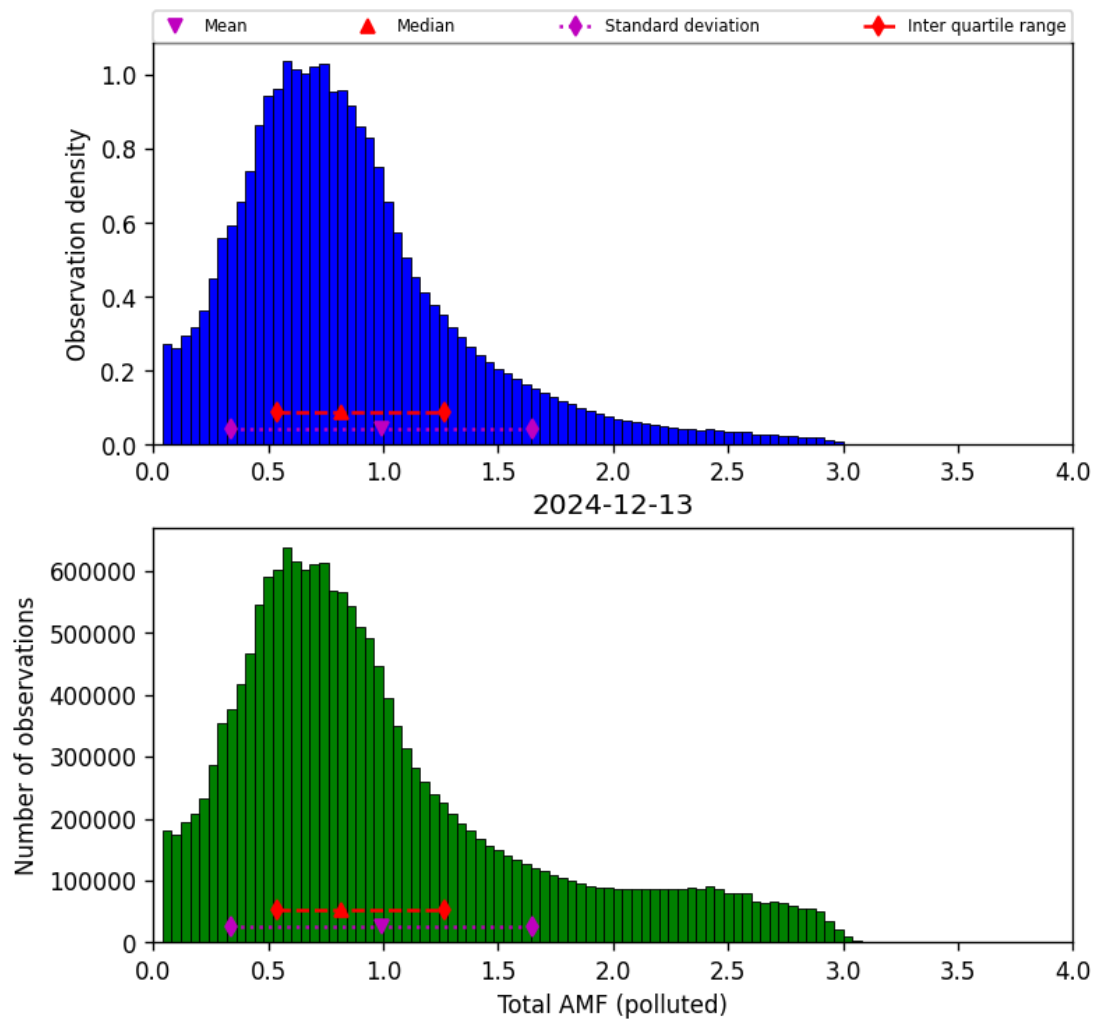


Figure 80: Histogram of “Total AMF (polluted)” for 2024-12-13 to 2024-12-14

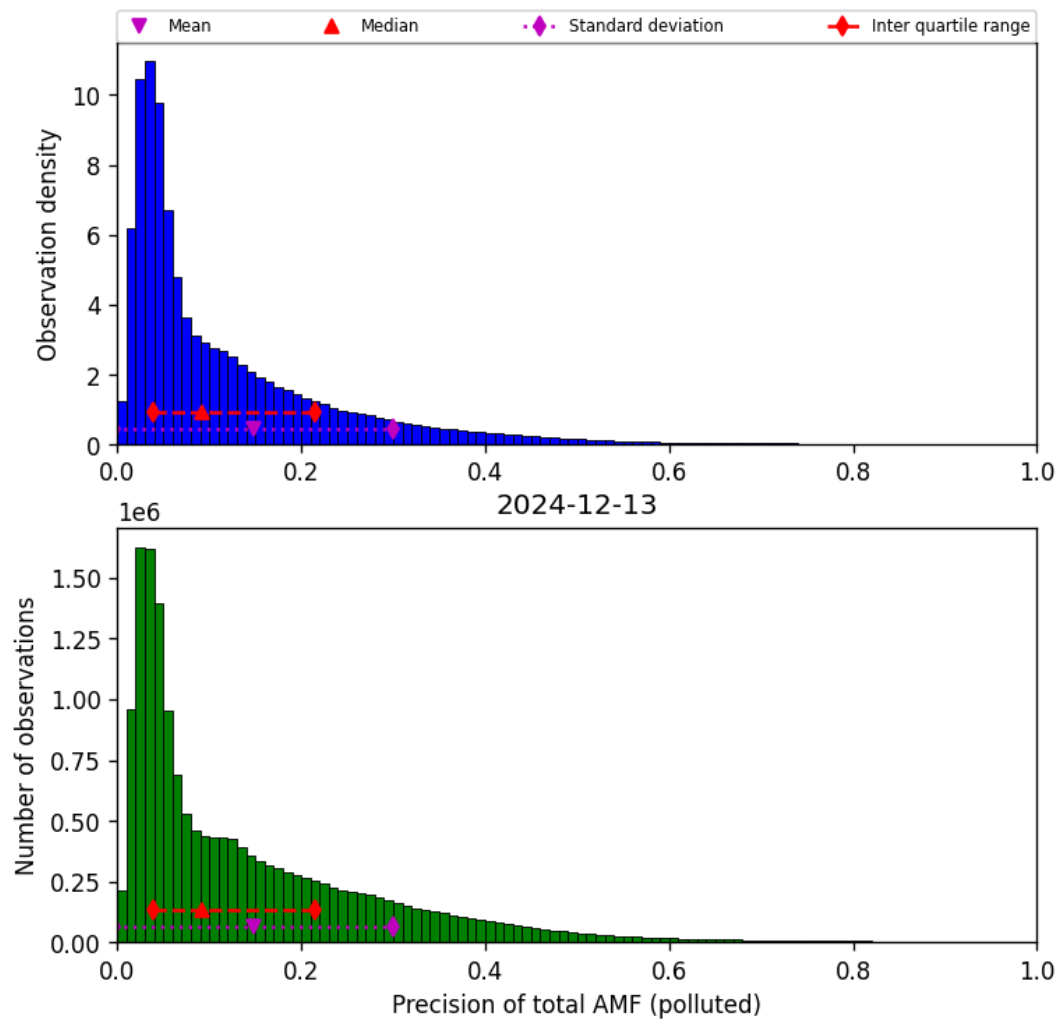


Figure 81: Histogram of “Precision of total AMF (polluted)” for 2024-12-13 to 2024-12-14

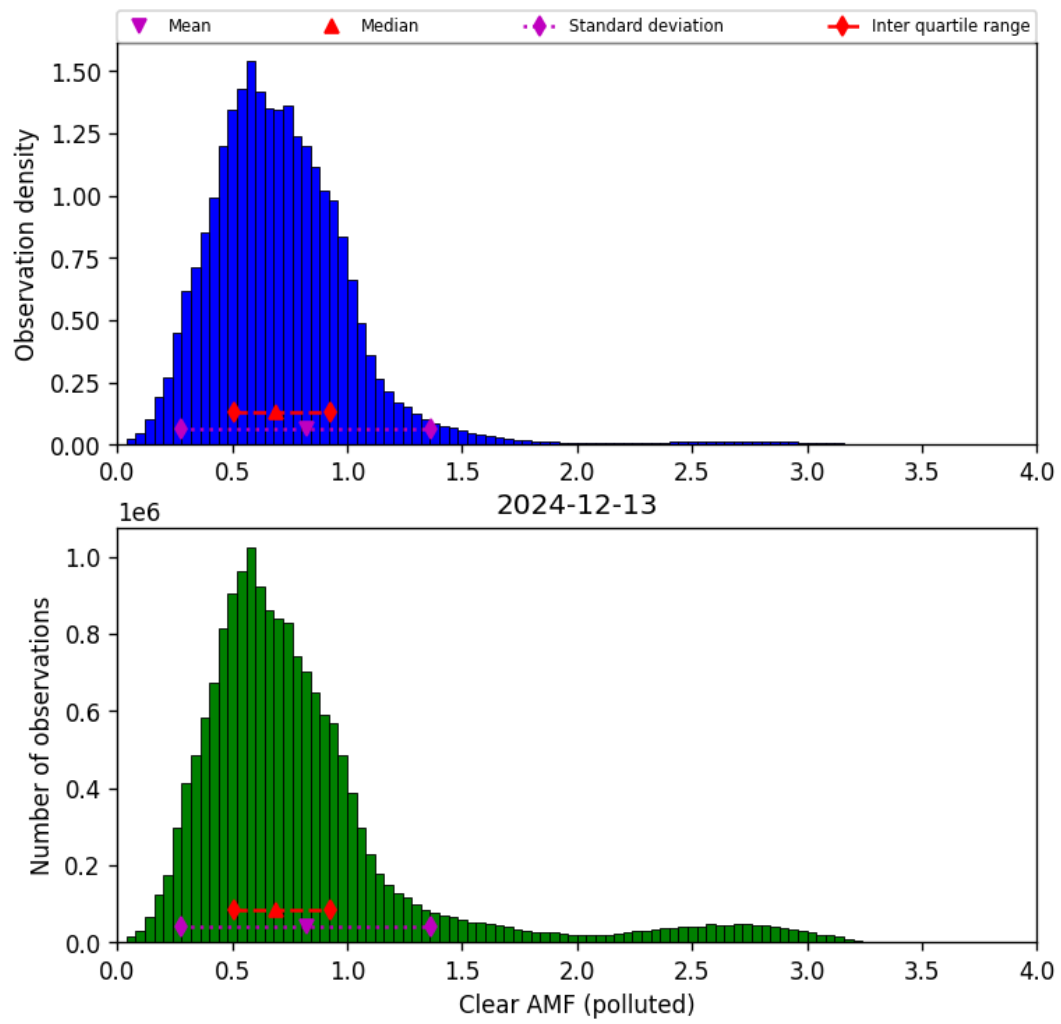


Figure 82: Histogram of “Clear AMF (polluted)” for 2024-12-13 to 2024-12-14

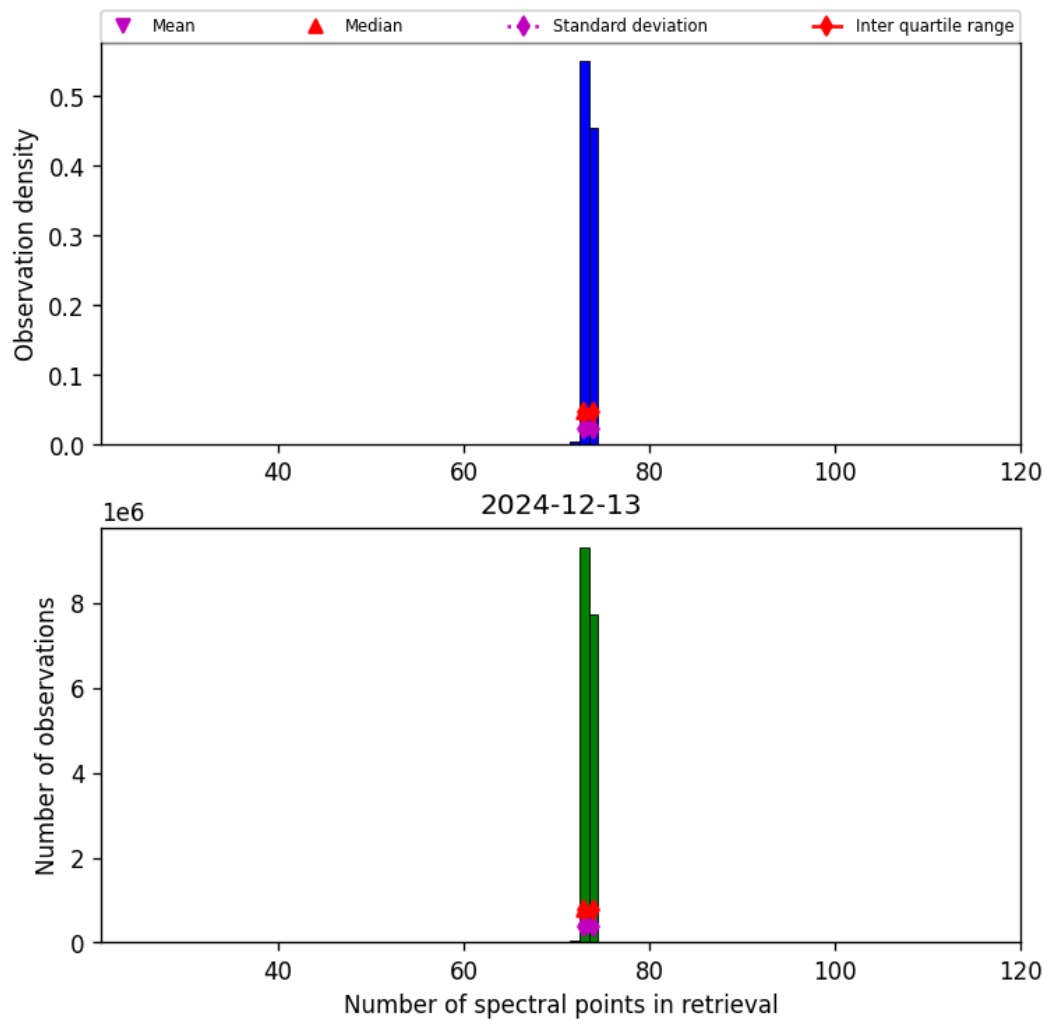


Figure 83: Histogram of “Number of spectral points in retrieval” for 2024-12-13 to 2024-12-14

9 Along track statistics

The TROPOMI instrument uses different binned detector rows for different viewing directions. In this section statistics are presented for each of the binned rows in the instrument.

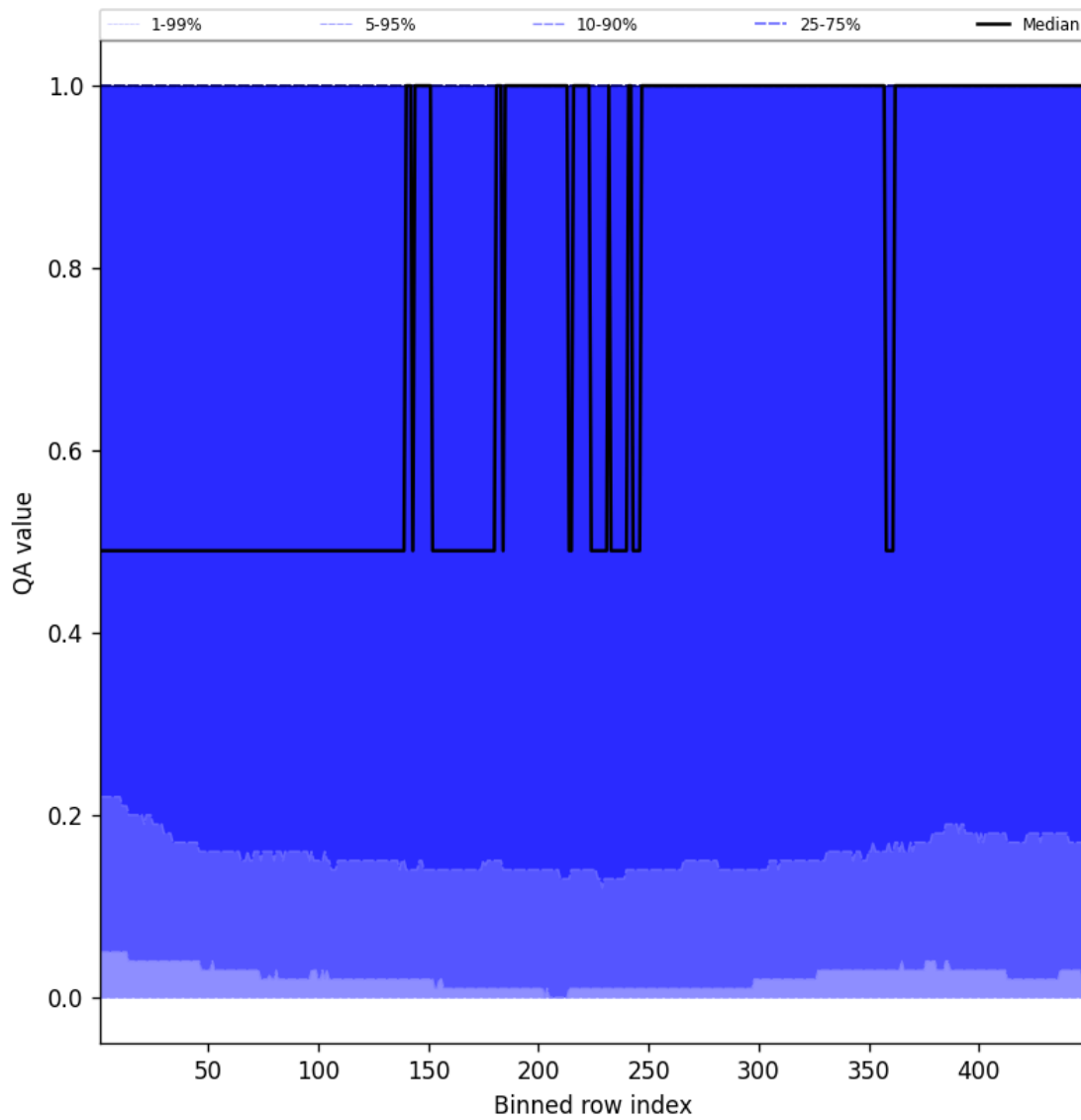


Figure 84: Along track statistics of “QA value” for 2024-12-13 to 2024-12-14

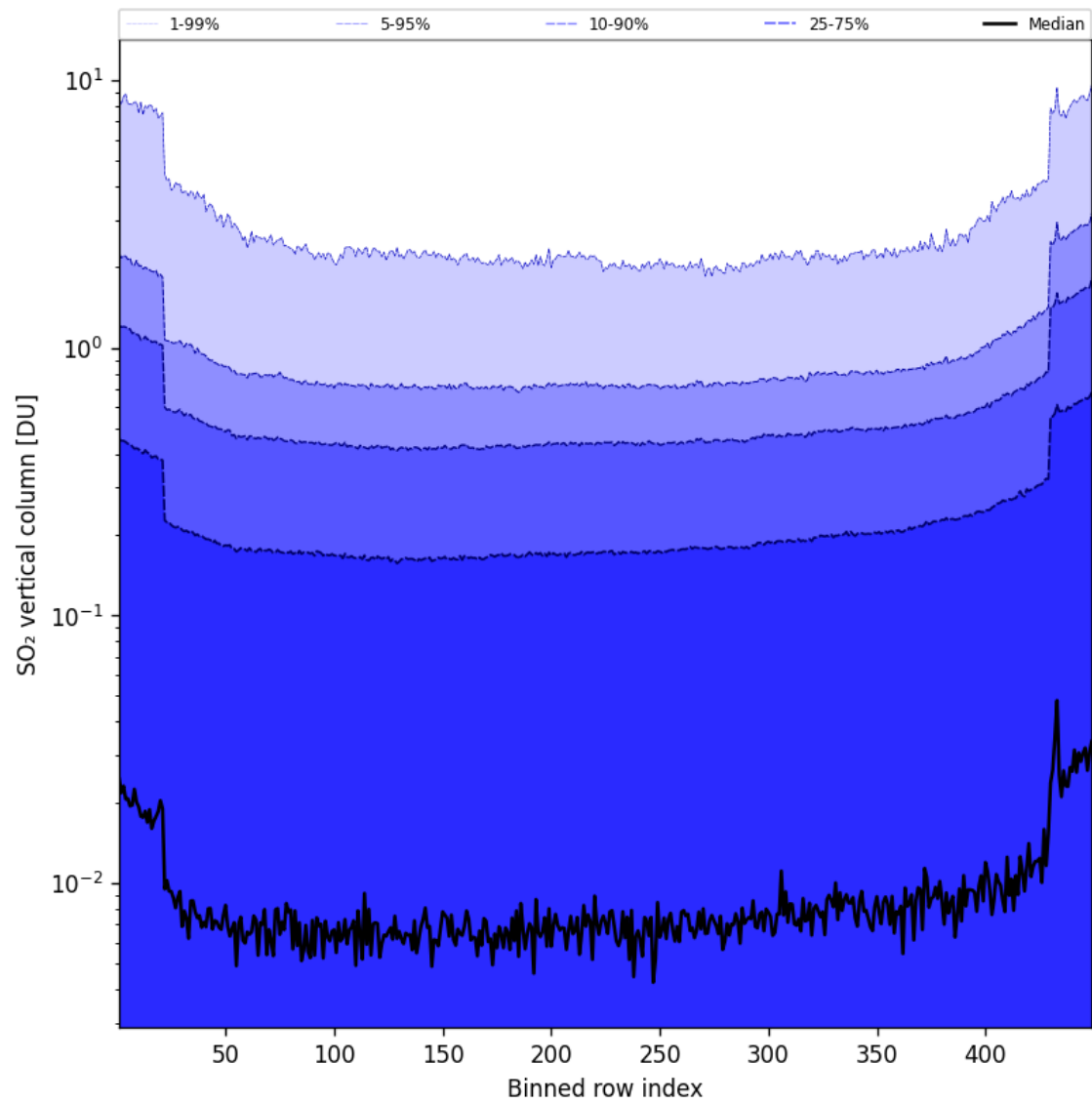


Figure 85: Along track statistics of “SO₂ vertical column” for 2024-12-13 to 2024-12-14

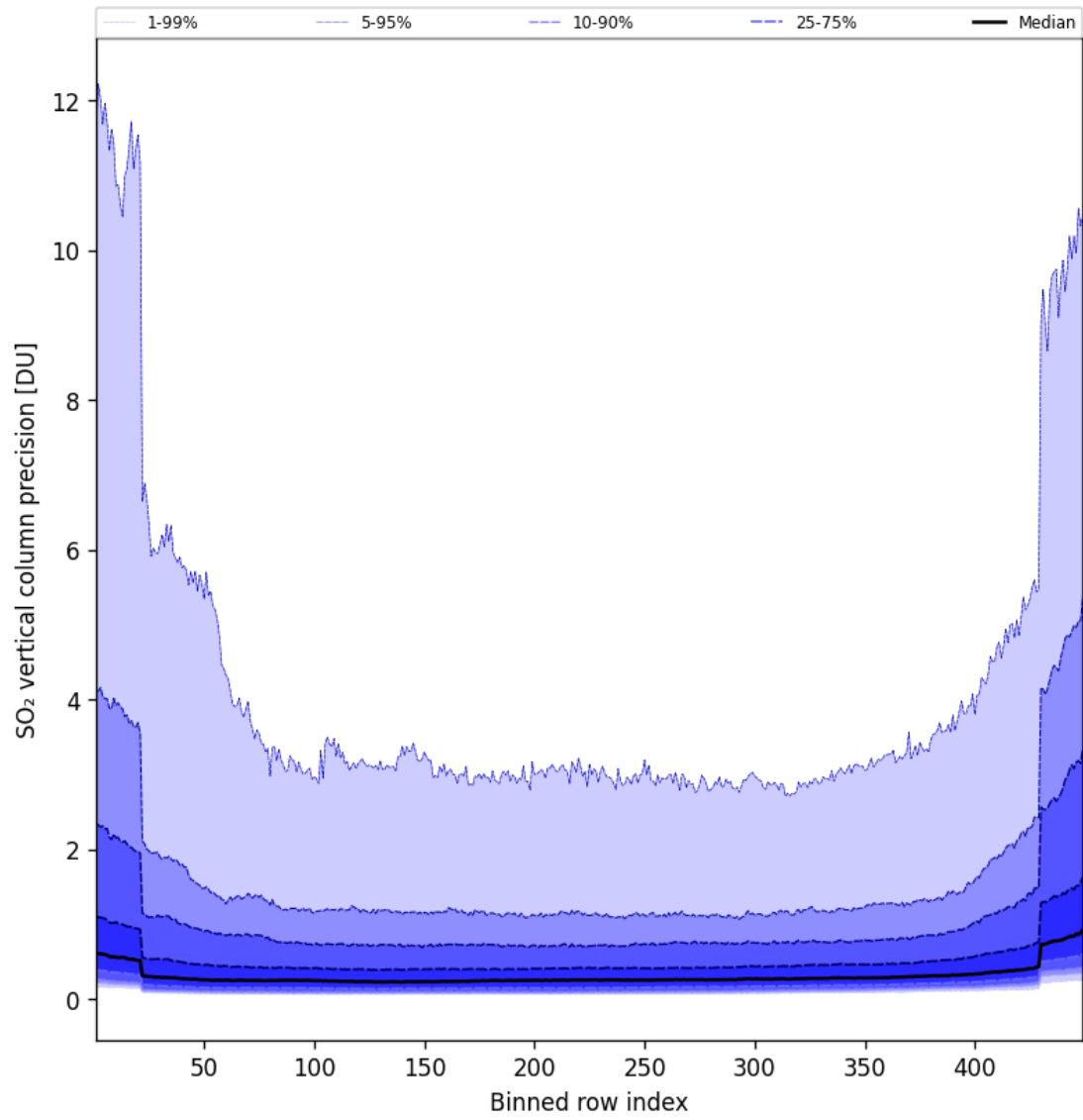


Figure 86: Along track statistics of “SO₂ vertical column precision” for 2024-12-13 to 2024-12-14

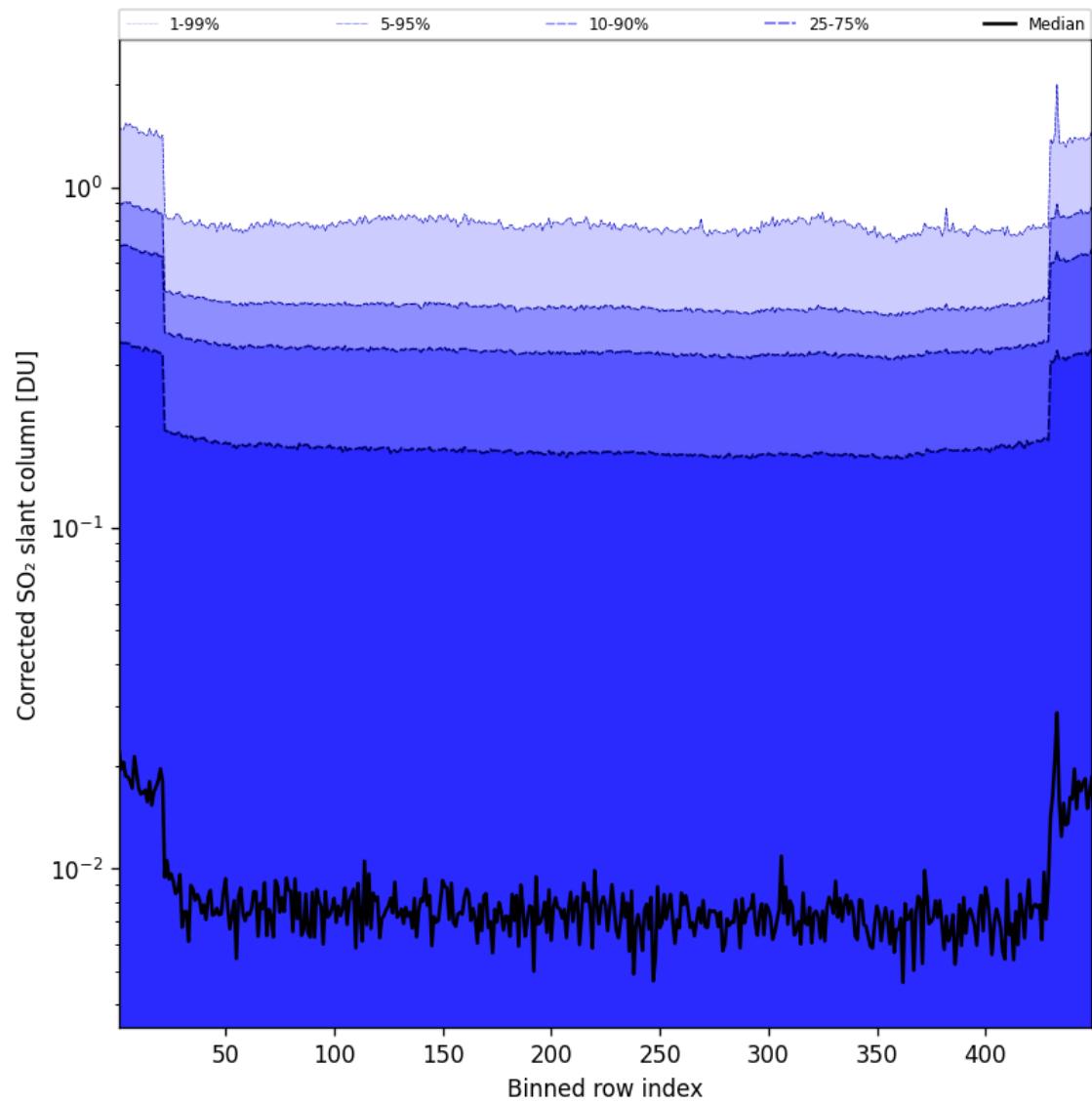


Figure 87: Along track statistics of “Corrected SO₂ slant column” for 2024-12-13 to 2024-12-14

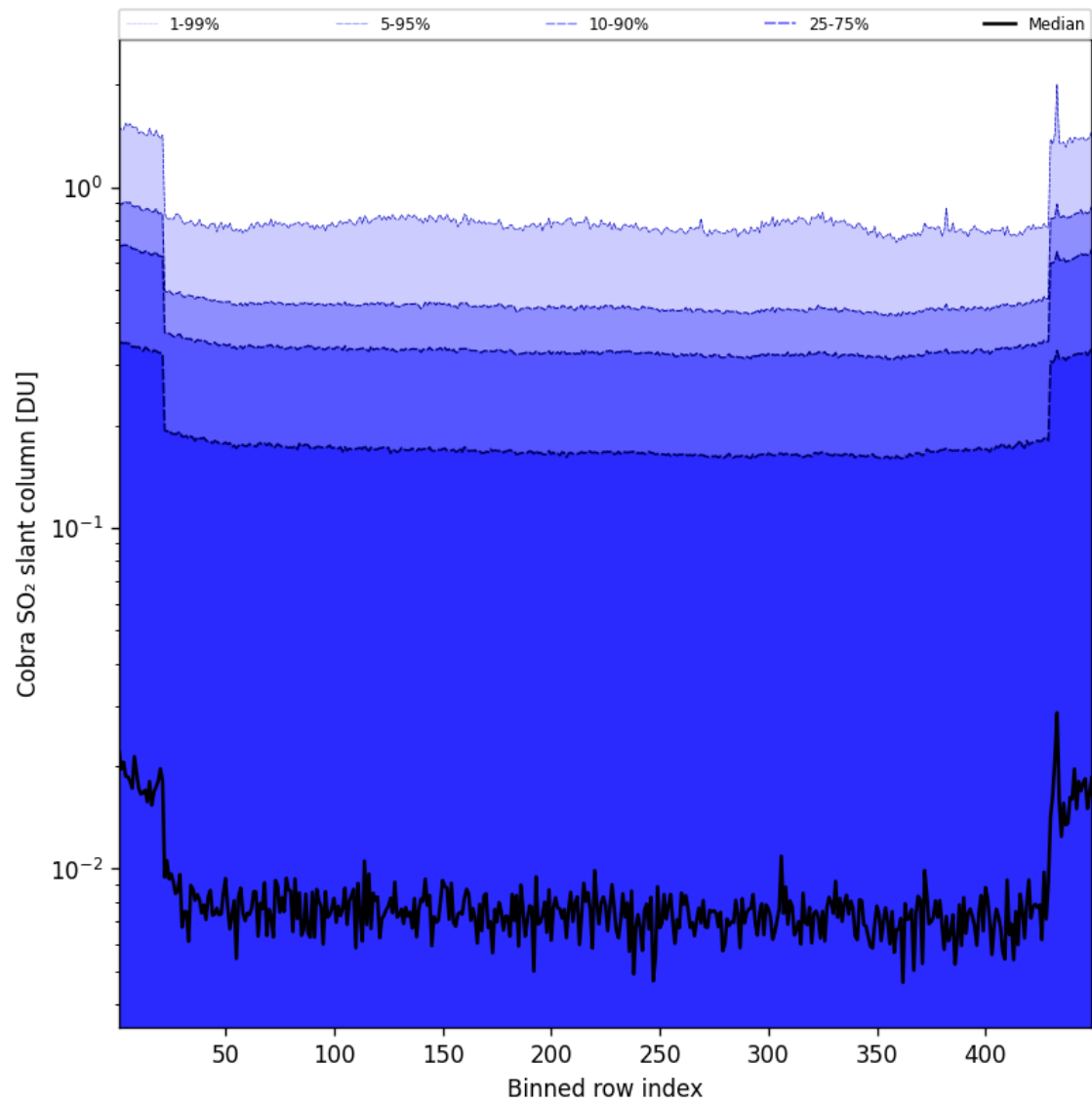


Figure 88: Along track statistics of “Cobra SO₂ slant column” for 2024-12-13 to 2024-12-14

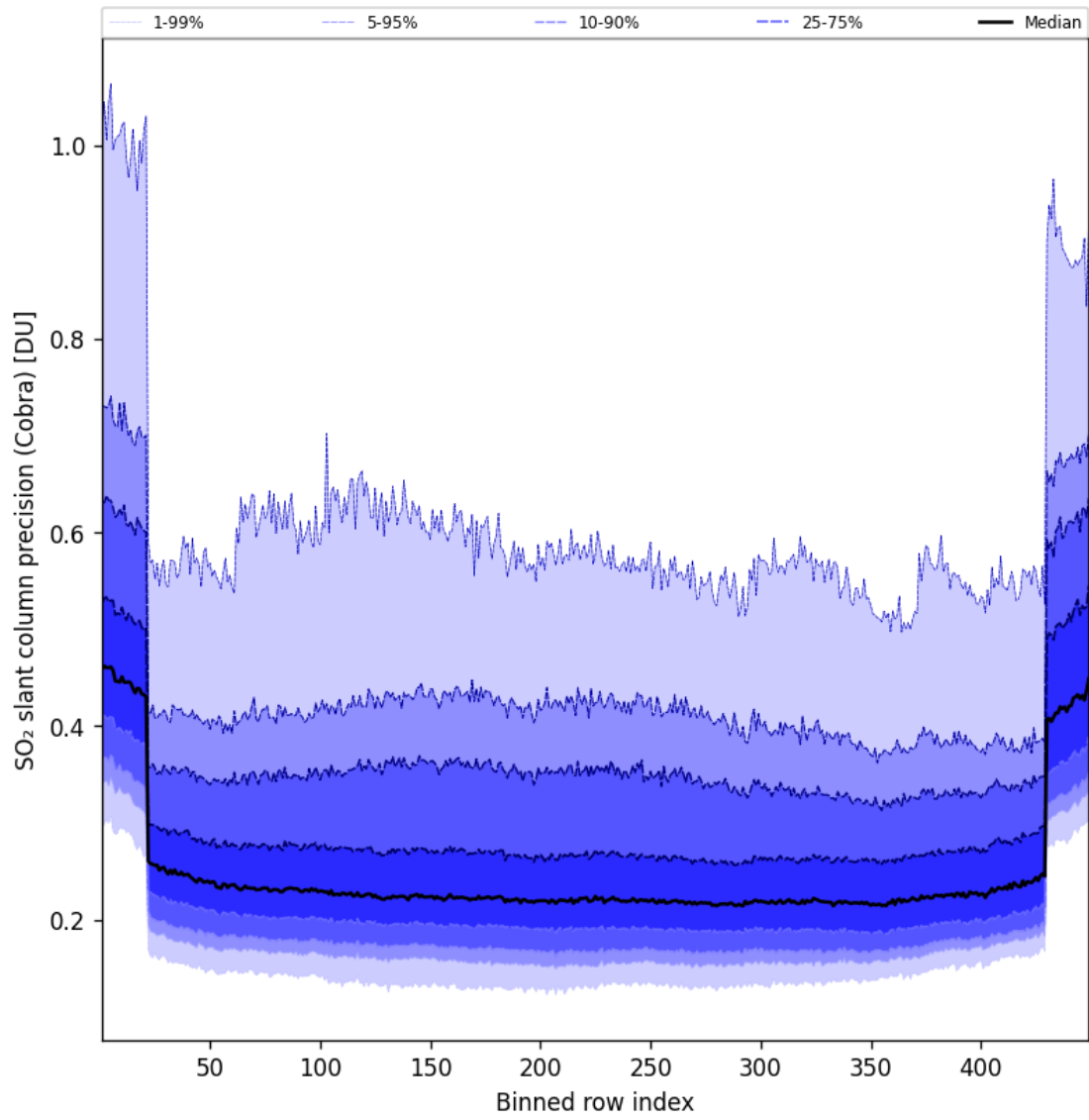


Figure 89: Along track statistics of “SO₂ slant column precision (Cobra)” for 2024-12-13 to 2024-12-14

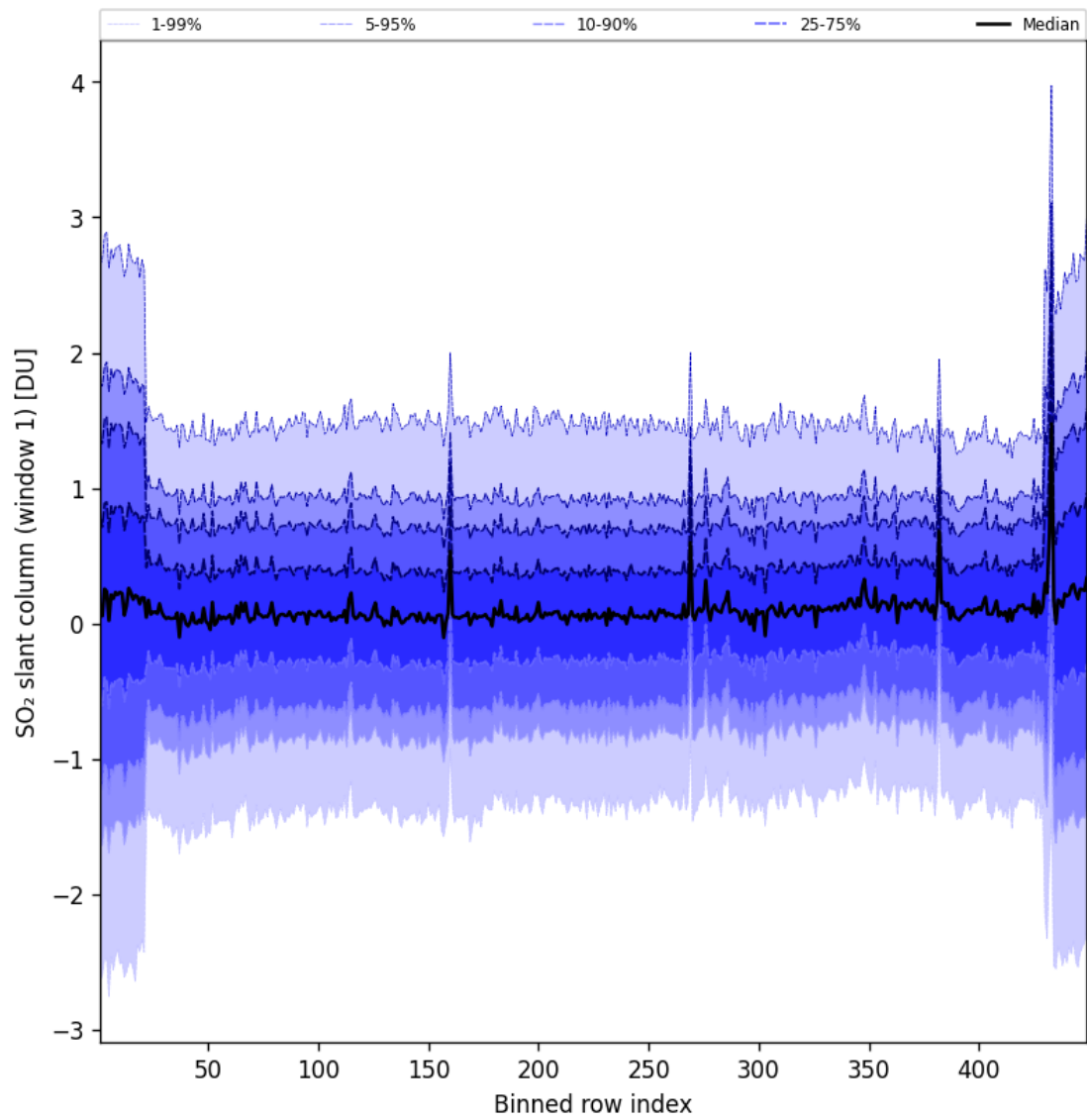


Figure 90: Along track statistics of “SO₂ slant column (window 1)” for 2024-12-13 to 2024-12-14

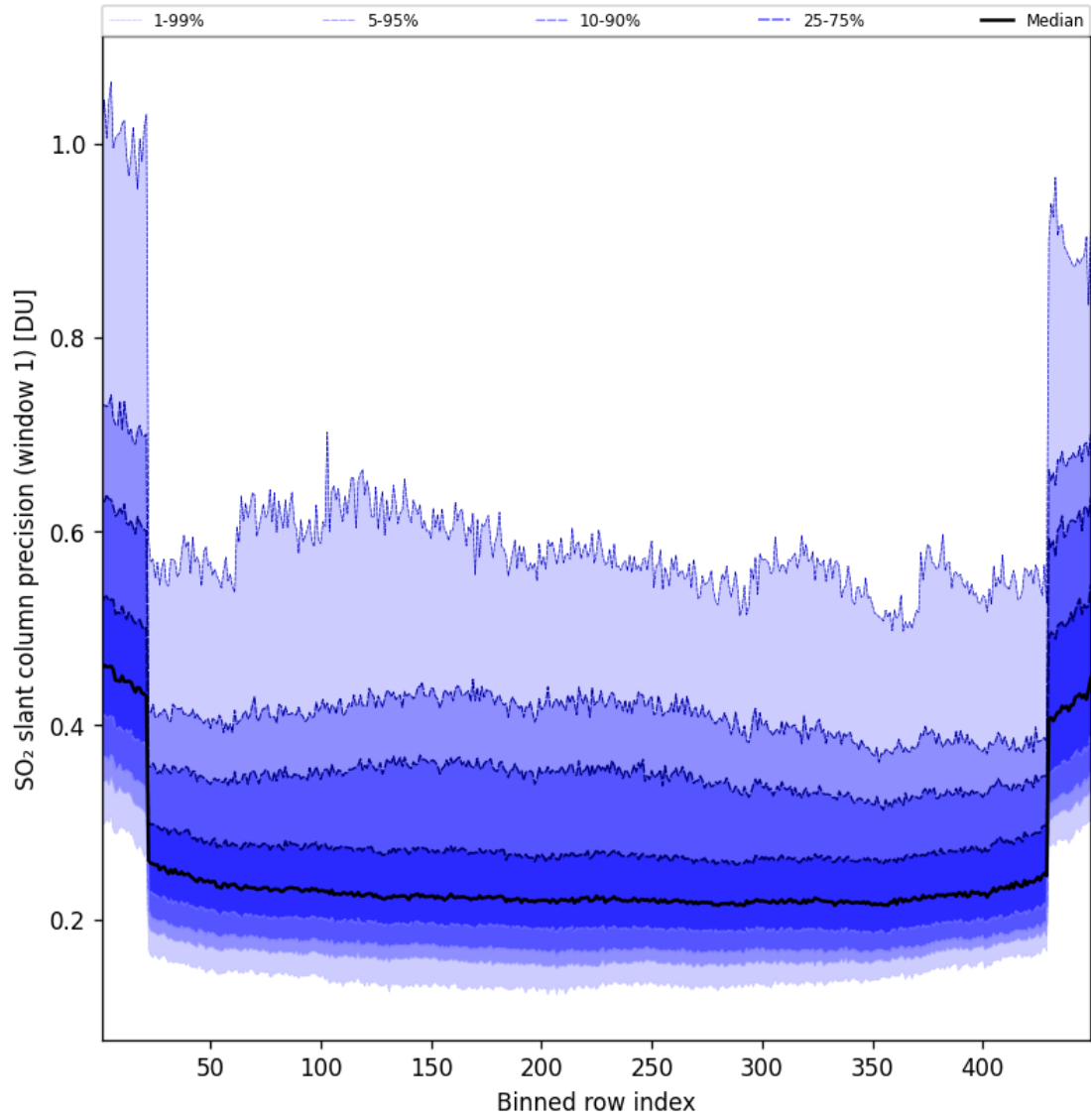


Figure 91: Along track statistics of “SO₂ slant column precision (window 1)” for 2024-12-13 to 2024-12-14

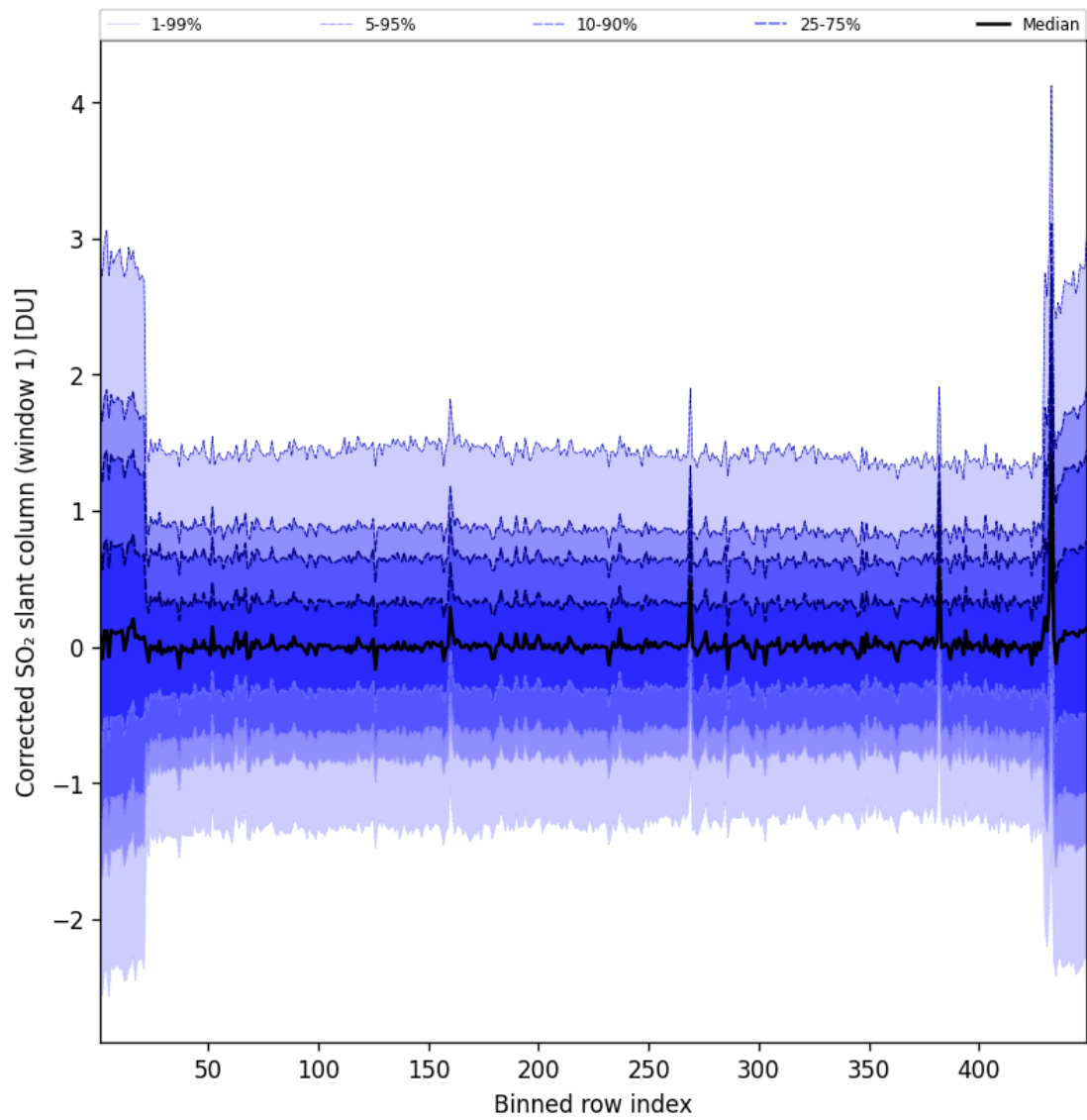


Figure 92: Along track statistics of “Corrected SO₂ slant column (window 1)” for 2024-12-13 to 2024-12-14

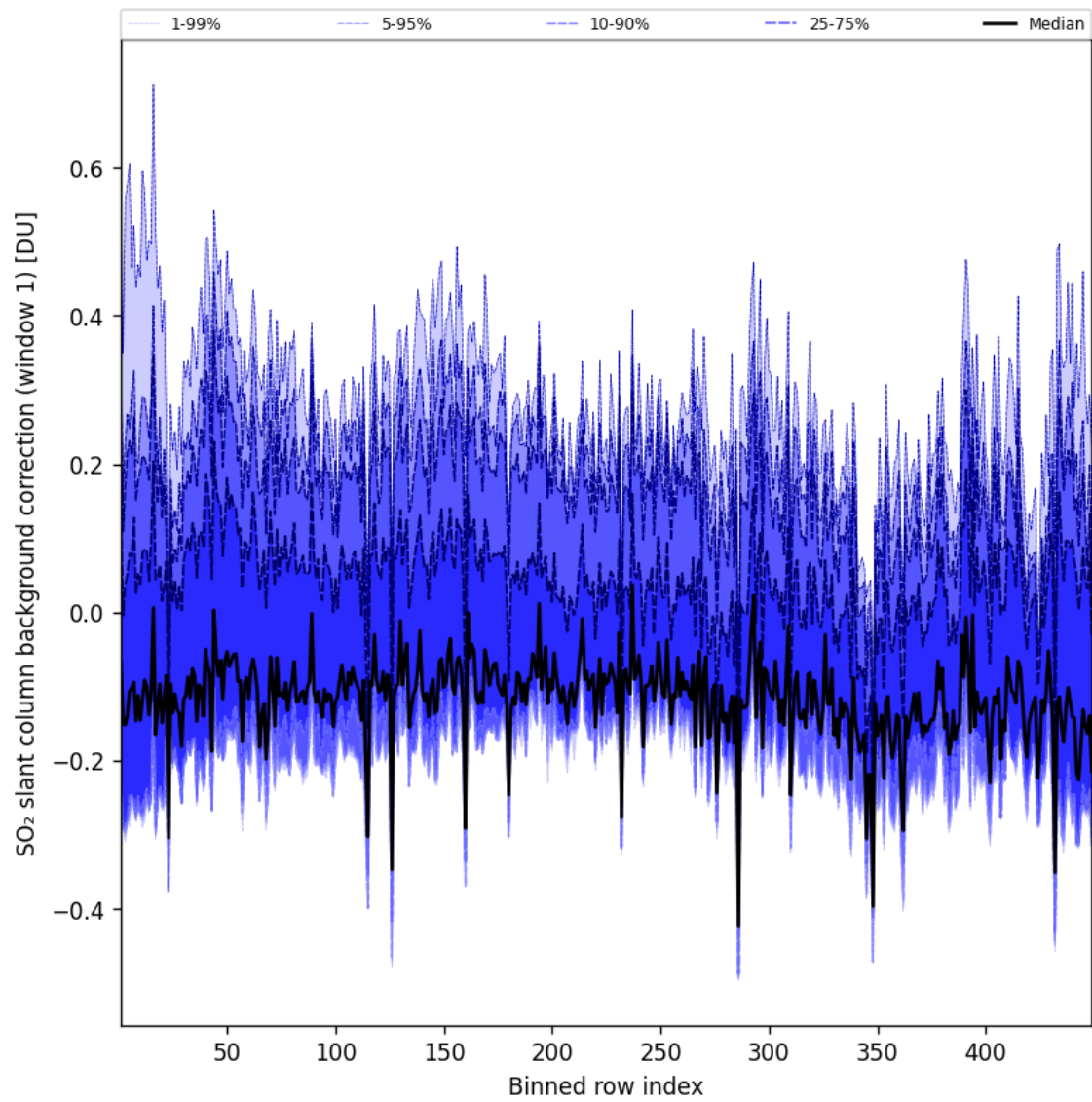


Figure 93: Along track statistics of “SO₂ slant column background correction (window 1)” for 2024-12-13 to 2024-12-14

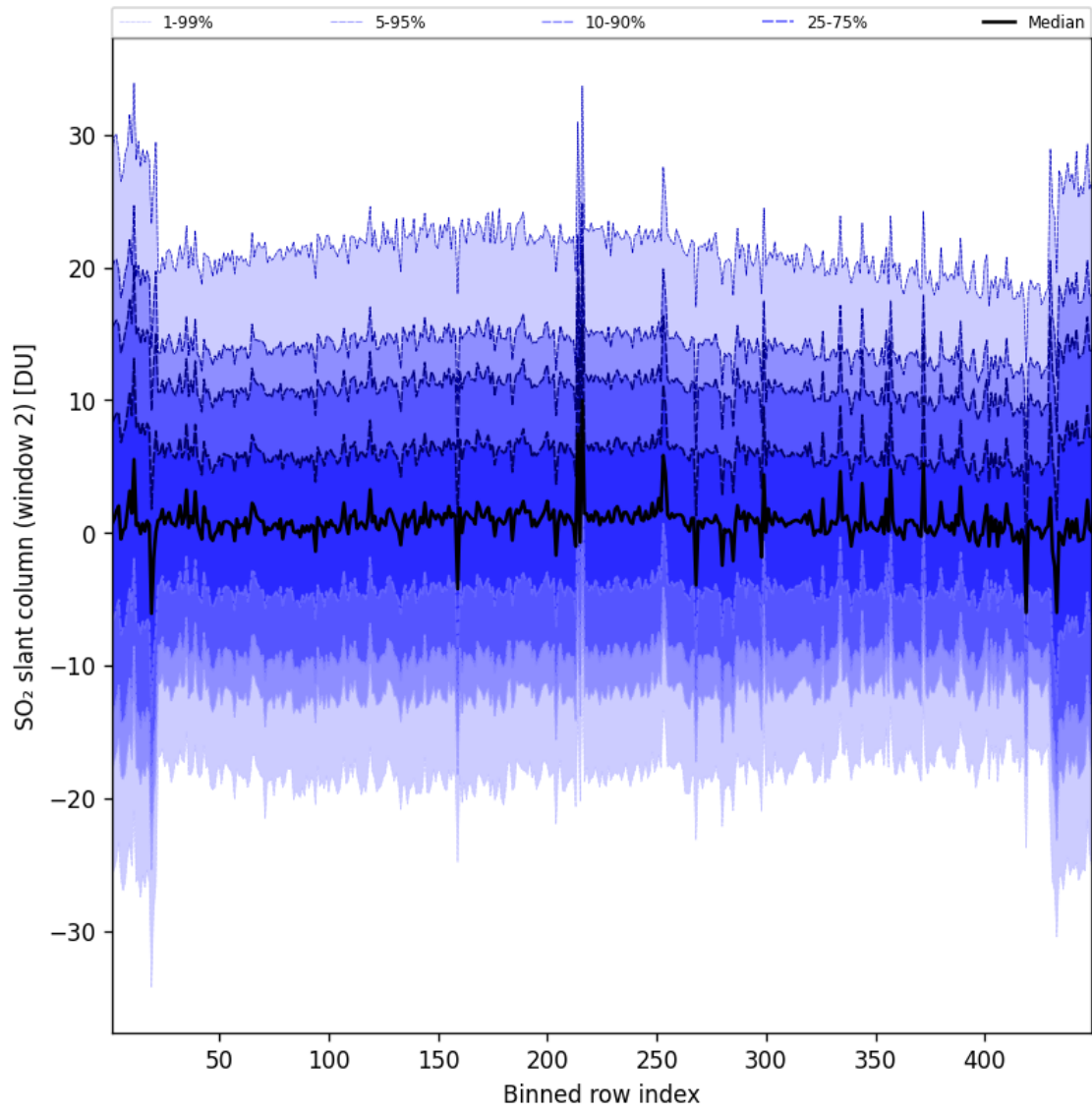


Figure 94: Along track statistics of “SO₂ slant column (window 2)” for 2024-12-13 to 2024-12-14

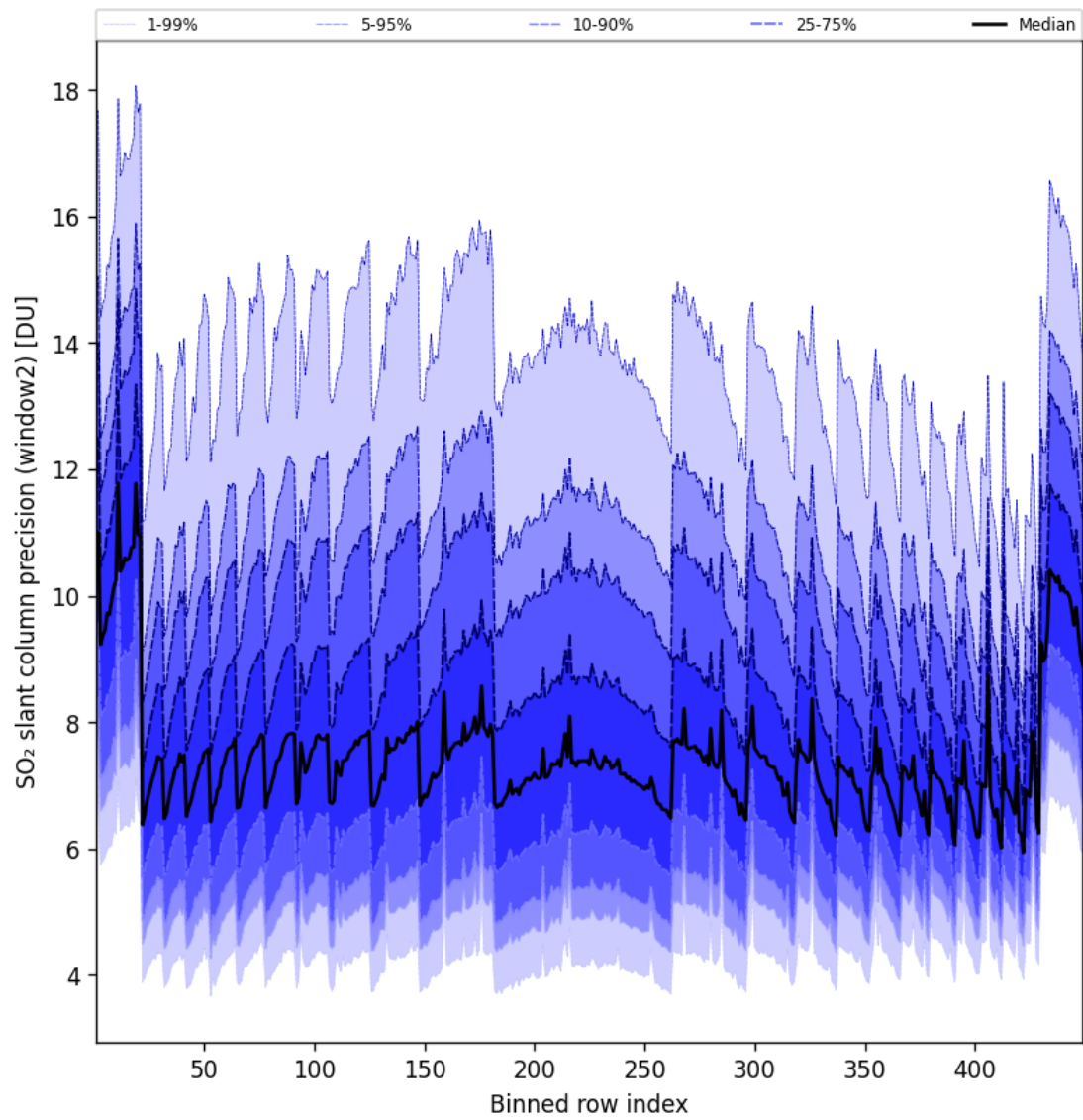


Figure 95: Along track statistics of “SO₂ slant column precision (window2)” for 2024-12-13 to 2024-12-14

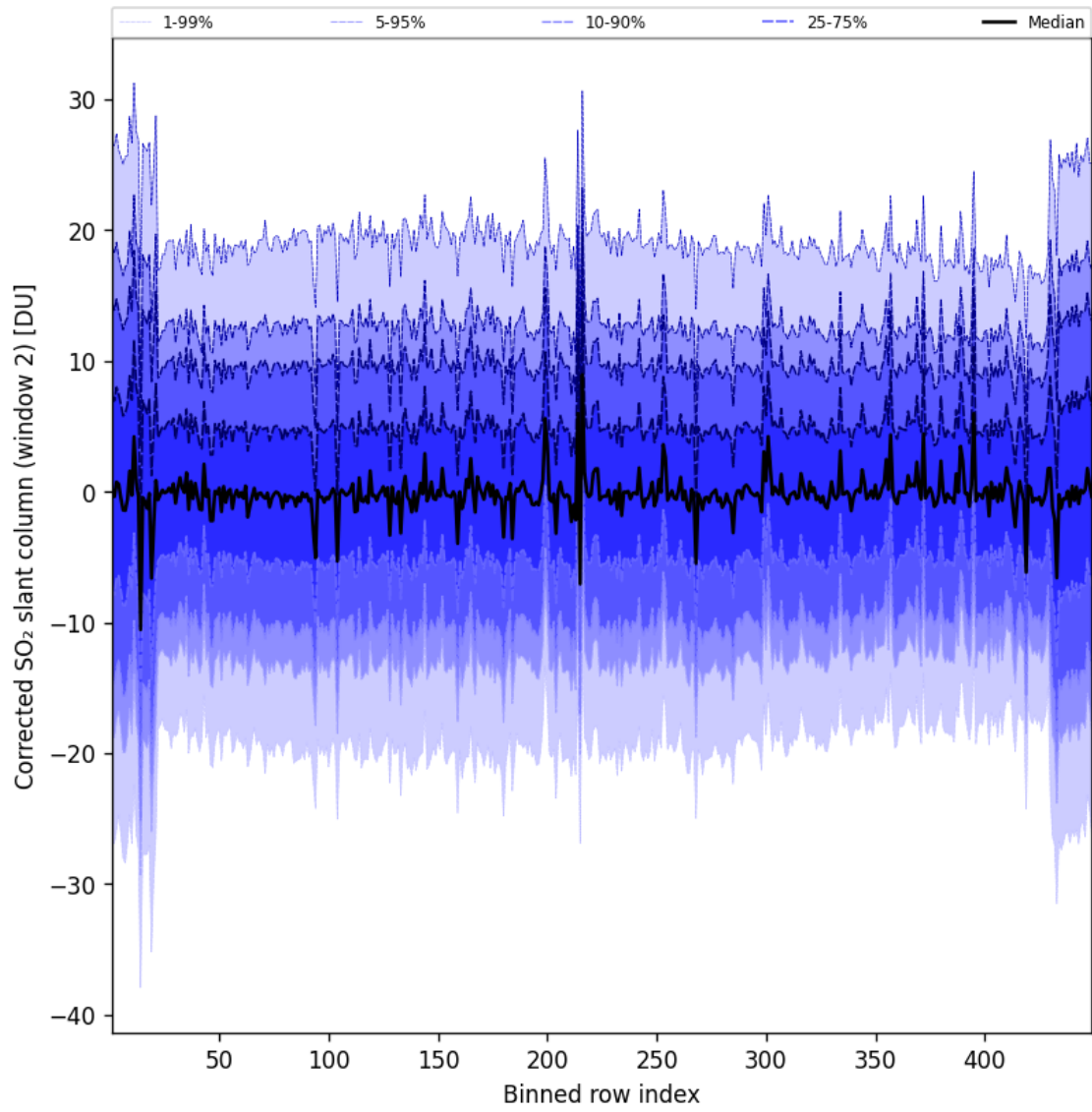


Figure 96: Along track statistics of “Corrected SO₂ slant column (window 2)” for 2024-12-13 to 2024-12-14

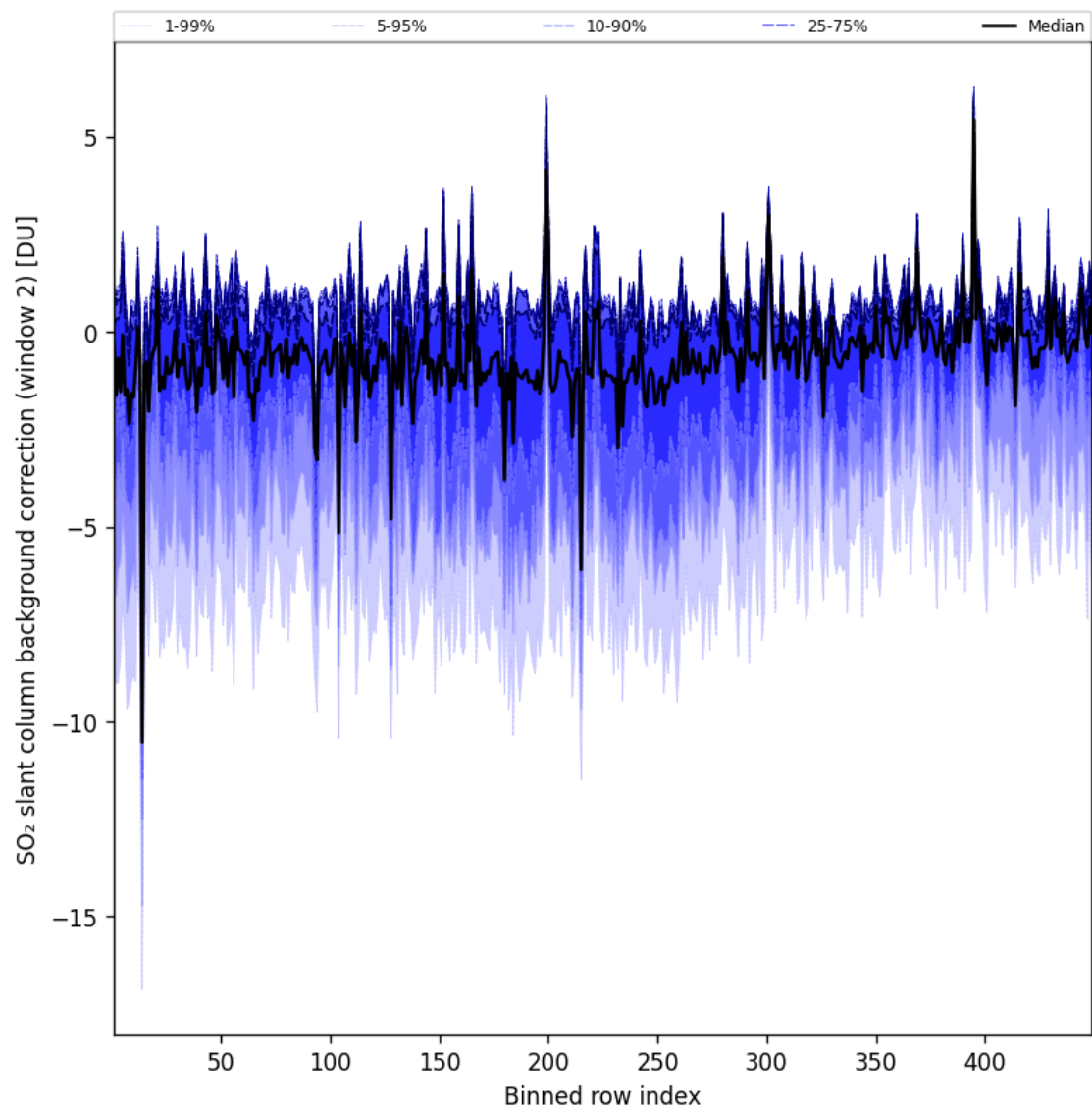


Figure 97: Along track statistics of “SO₂ slant column background correction (window 2)” for 2024-12-13 to 2024-12-14

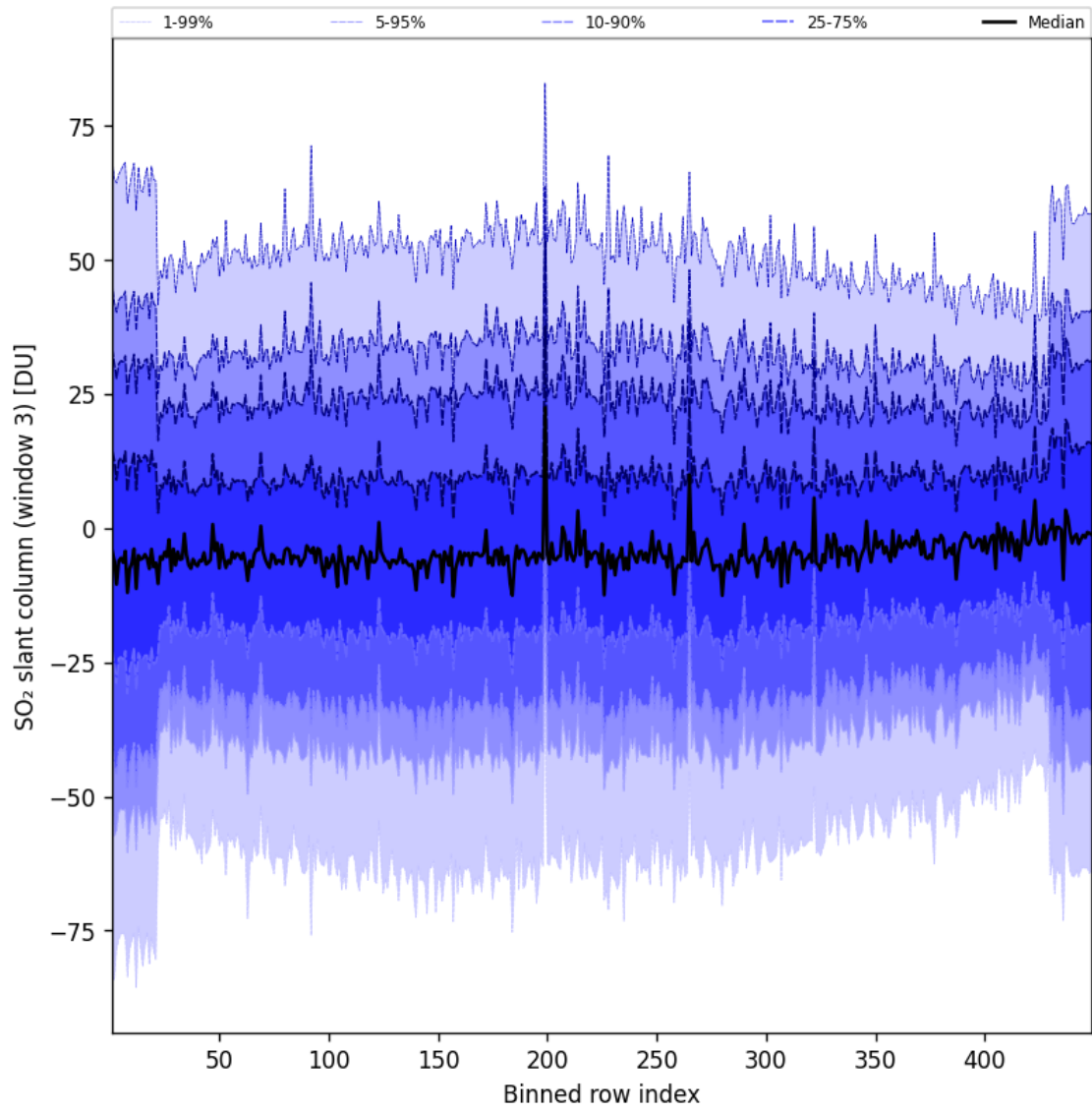


Figure 98: Along track statistics of “SO₂ slant column (window 3)” for 2024-12-13 to 2024-12-14

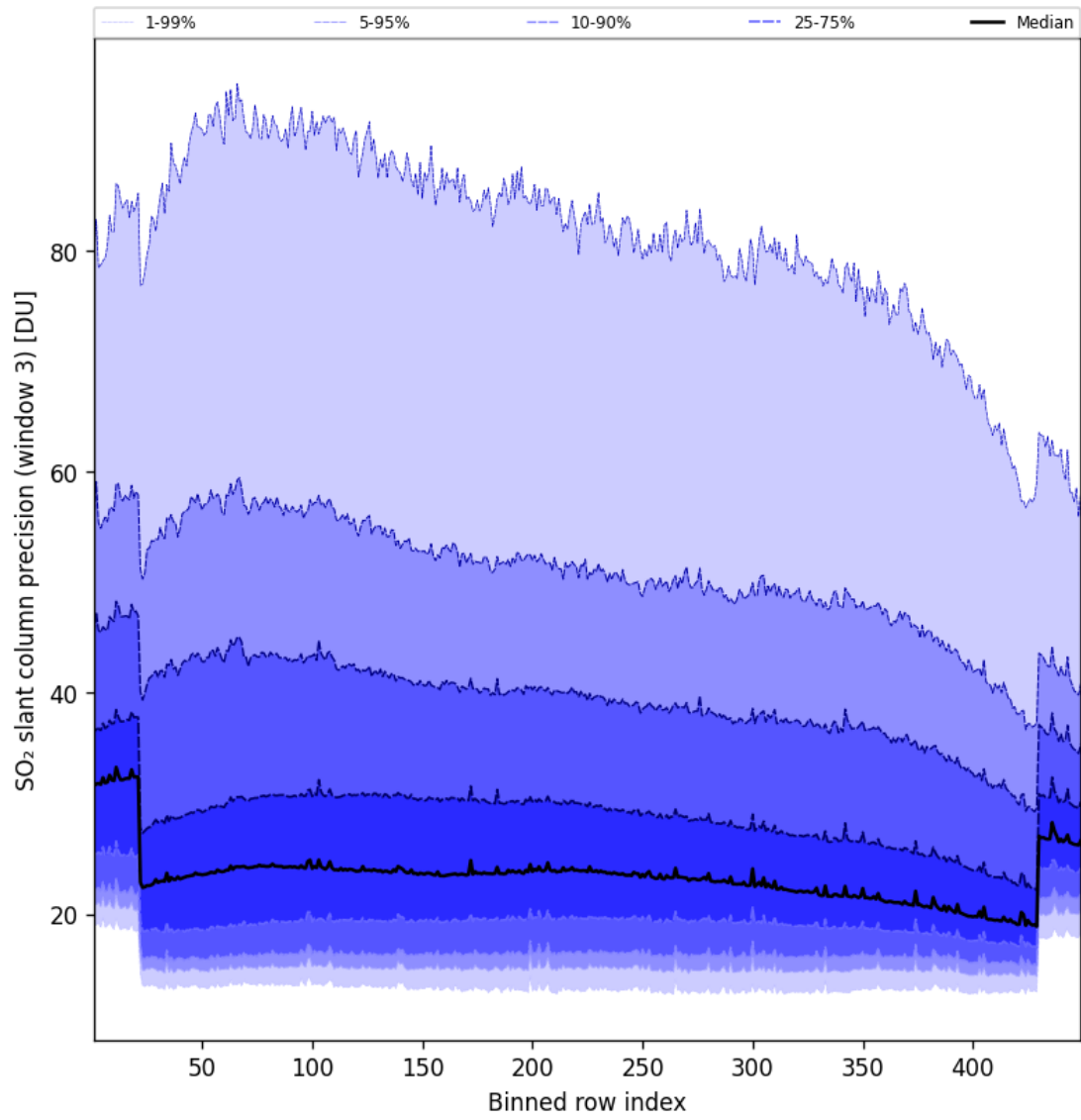


Figure 99: Along track statistics of “SO₂ slant column precision (window 3)” for 2024-12-13 to 2024-12-14

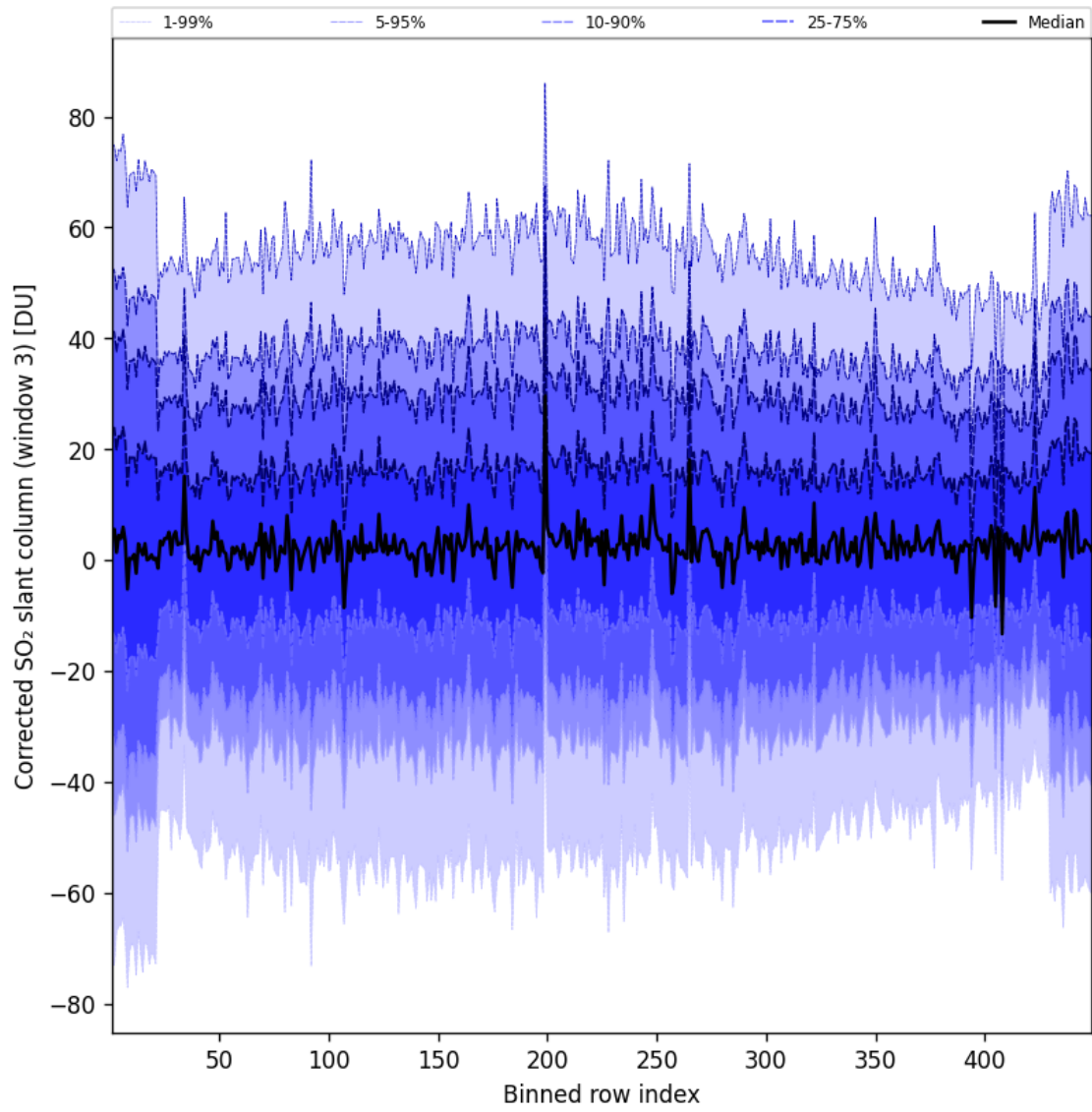


Figure 100: Along track statistics of “Corrected SO₂ slant column (window 3)” for 2024-12-13 to 2024-12-14

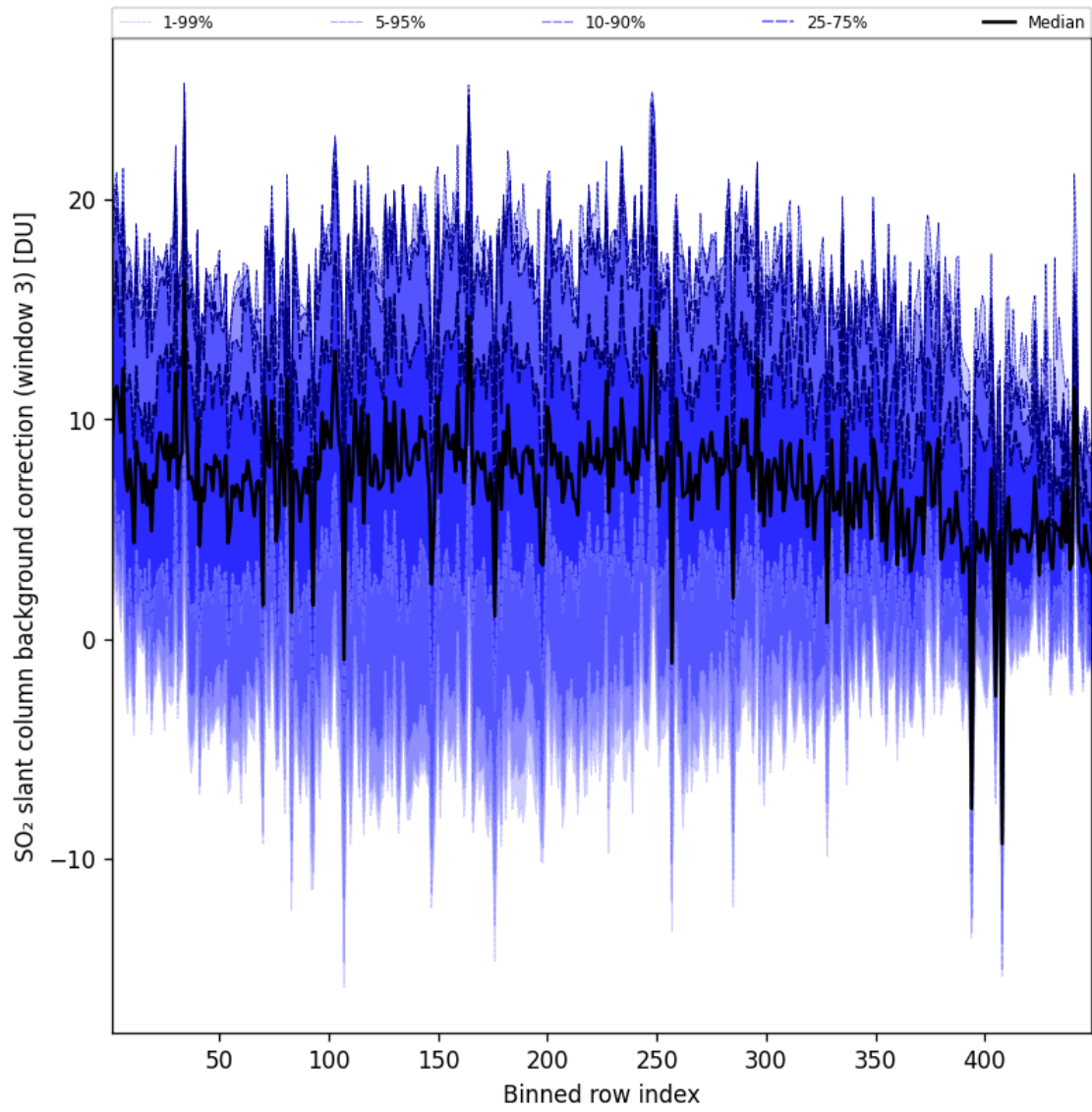


Figure 101: Along track statistics of “SO₂ slant column background correction (window 3)” for 2024-12-13 to 2024-12-14

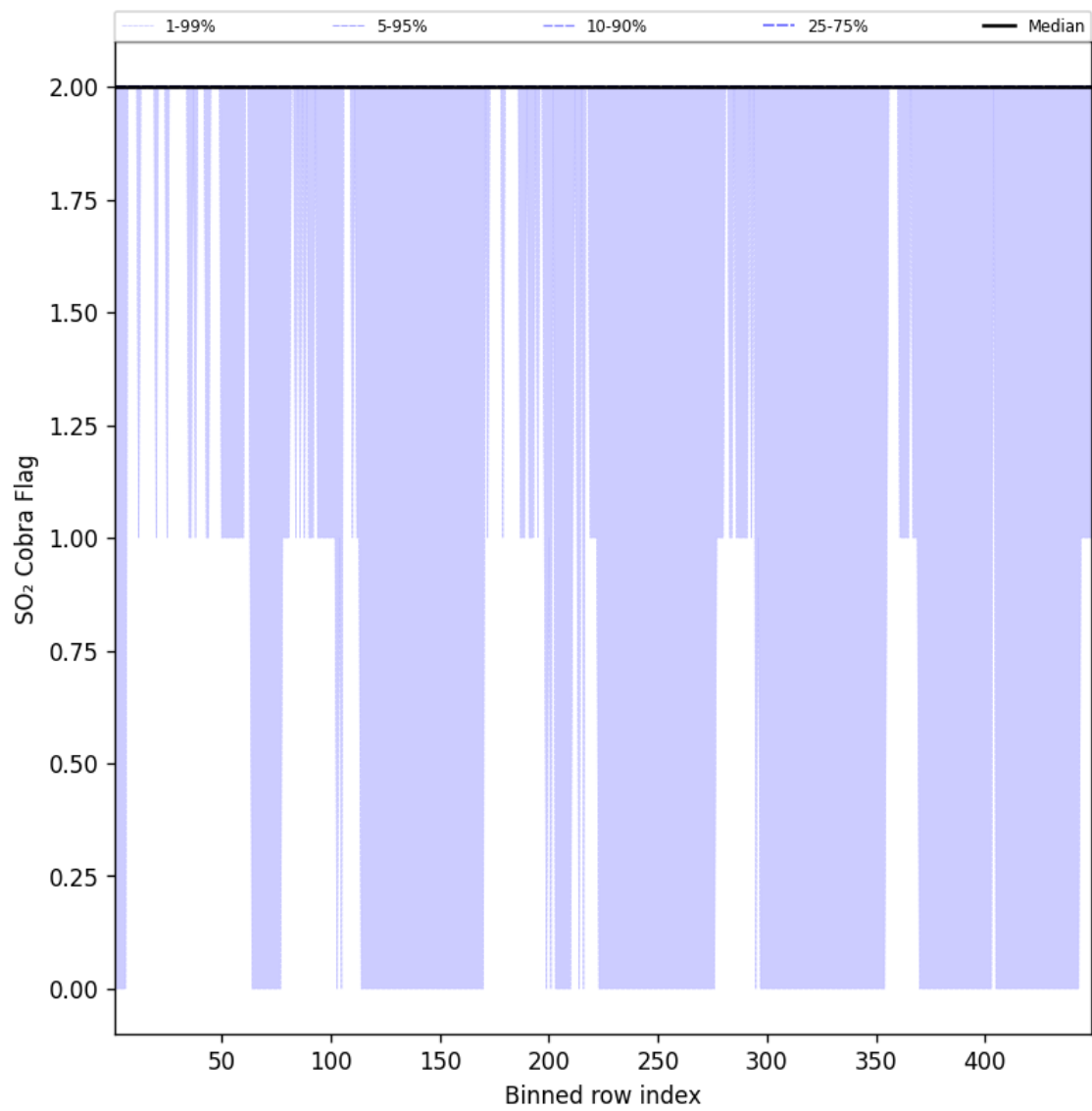


Figure 102: Along track statistics of “SO₂ Cobra Flag” for 2024-12-13 to 2024-12-14

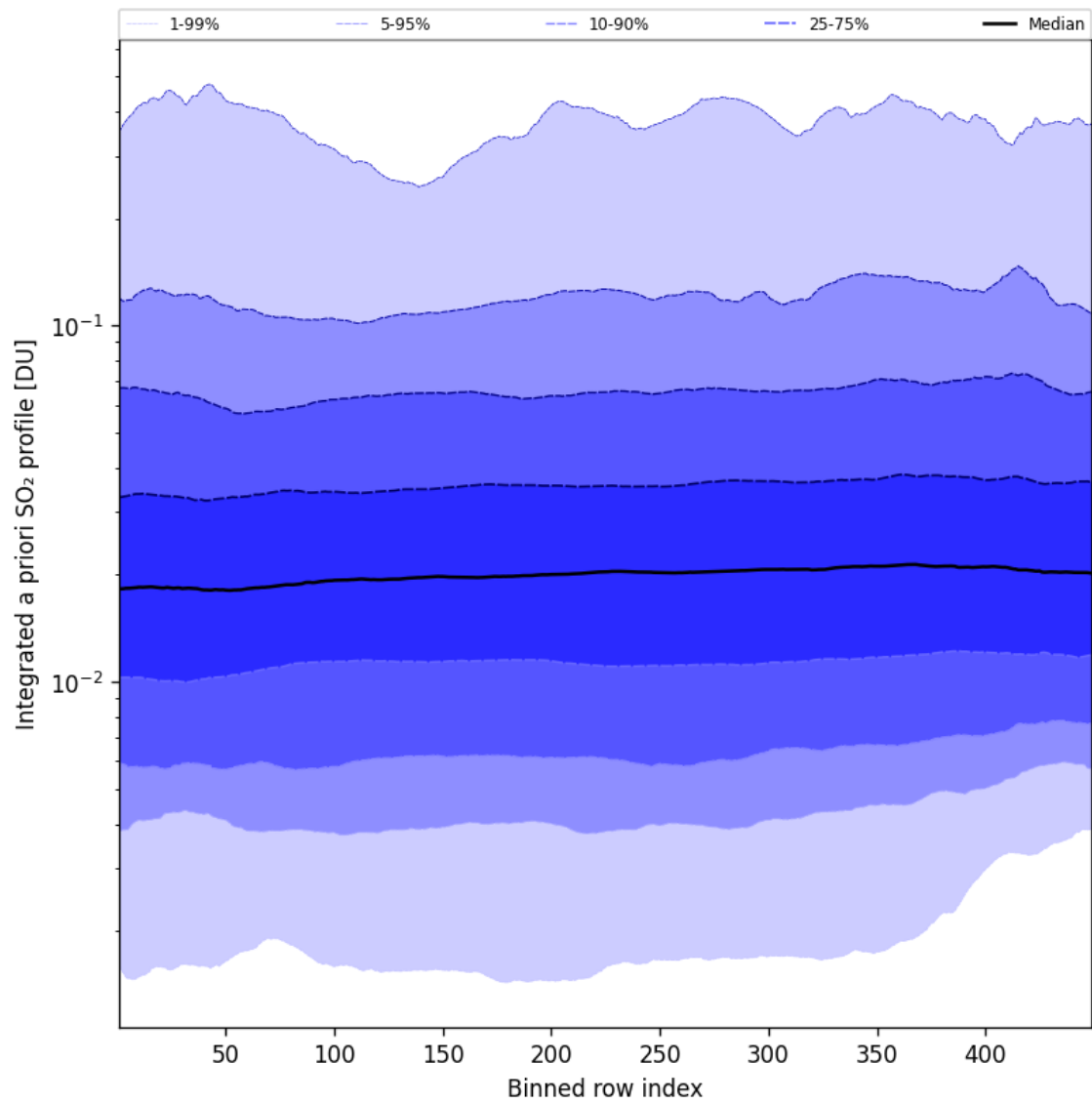


Figure 103: Along track statistics of “Integrated a priori SO₂ profile” for 2024-12-13 to 2024-12-14

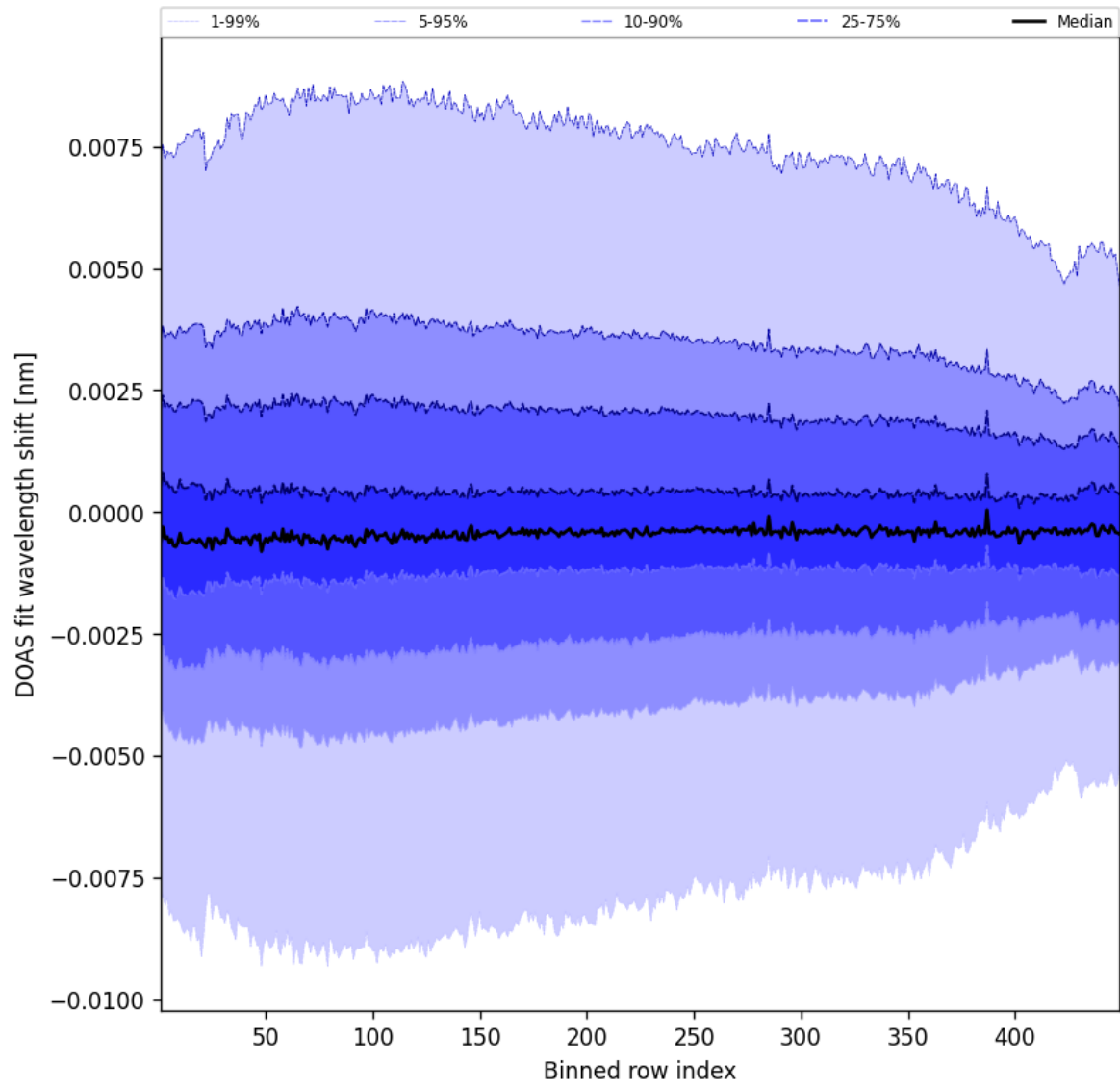


Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2024-12-13 to 2024-12-14

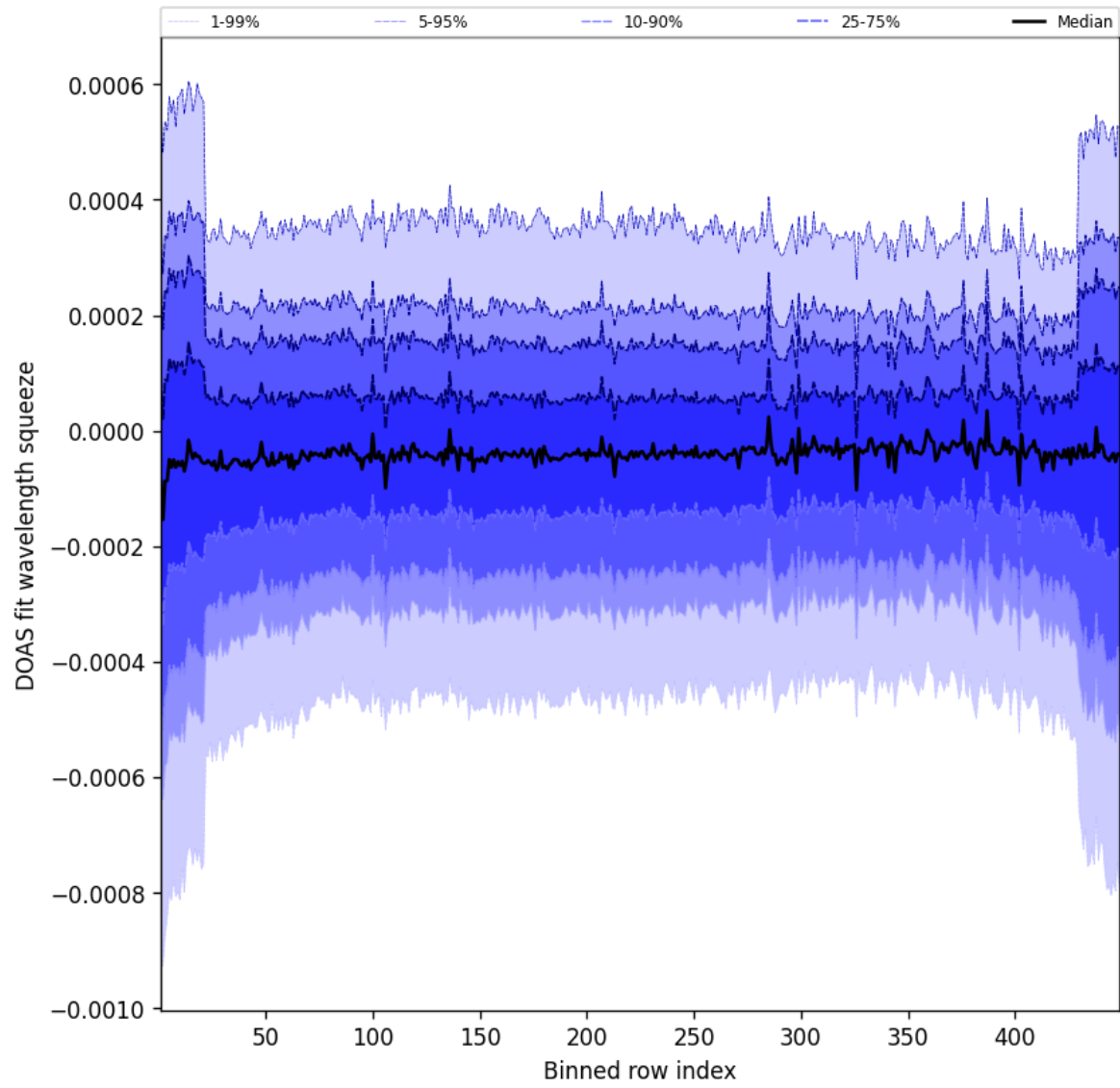


Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2024-12-13 to 2024-12-14

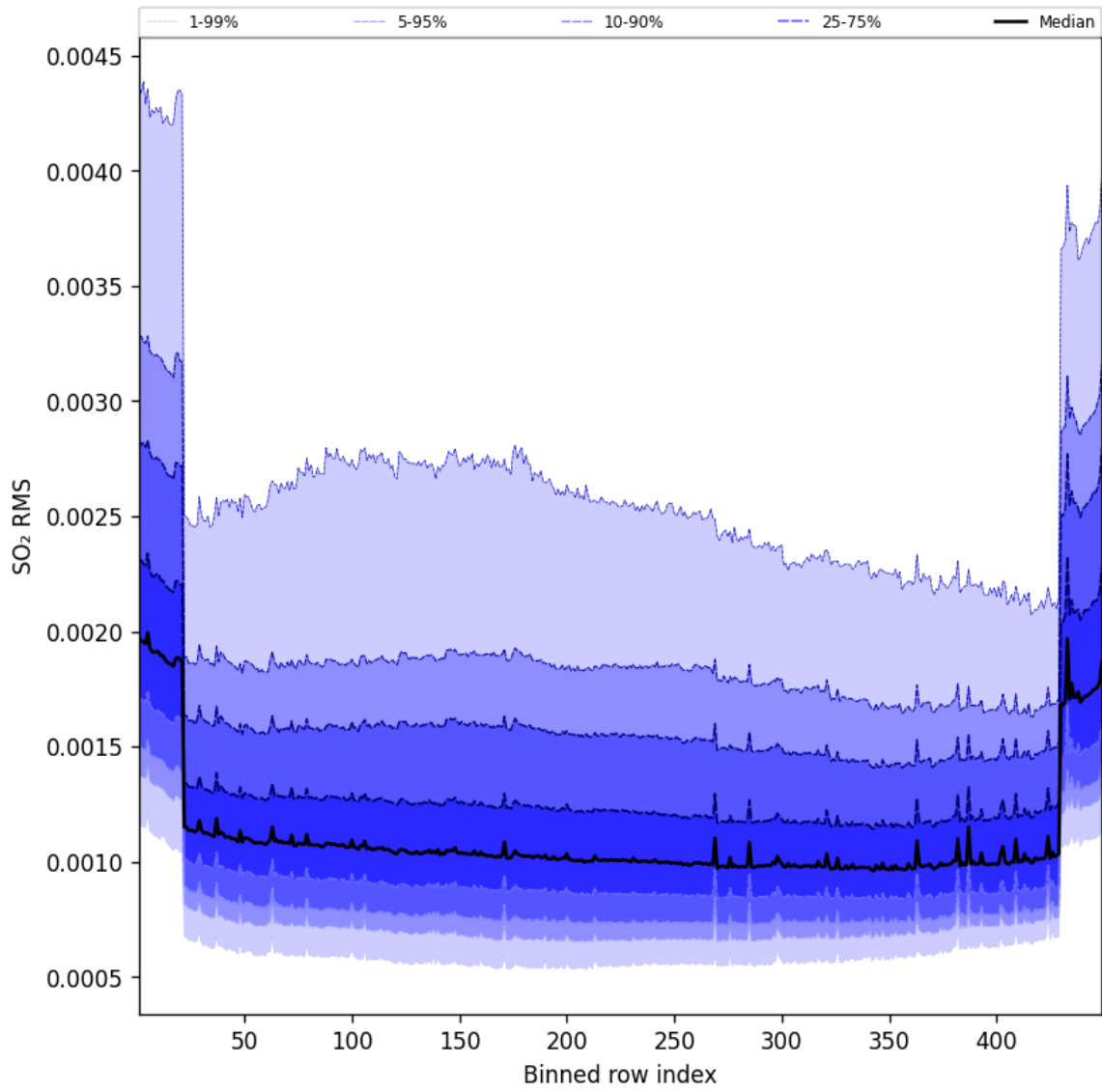


Figure 106: Along track statistics of “SO₂ RMS” for 2024-12-13 to 2024-12-14

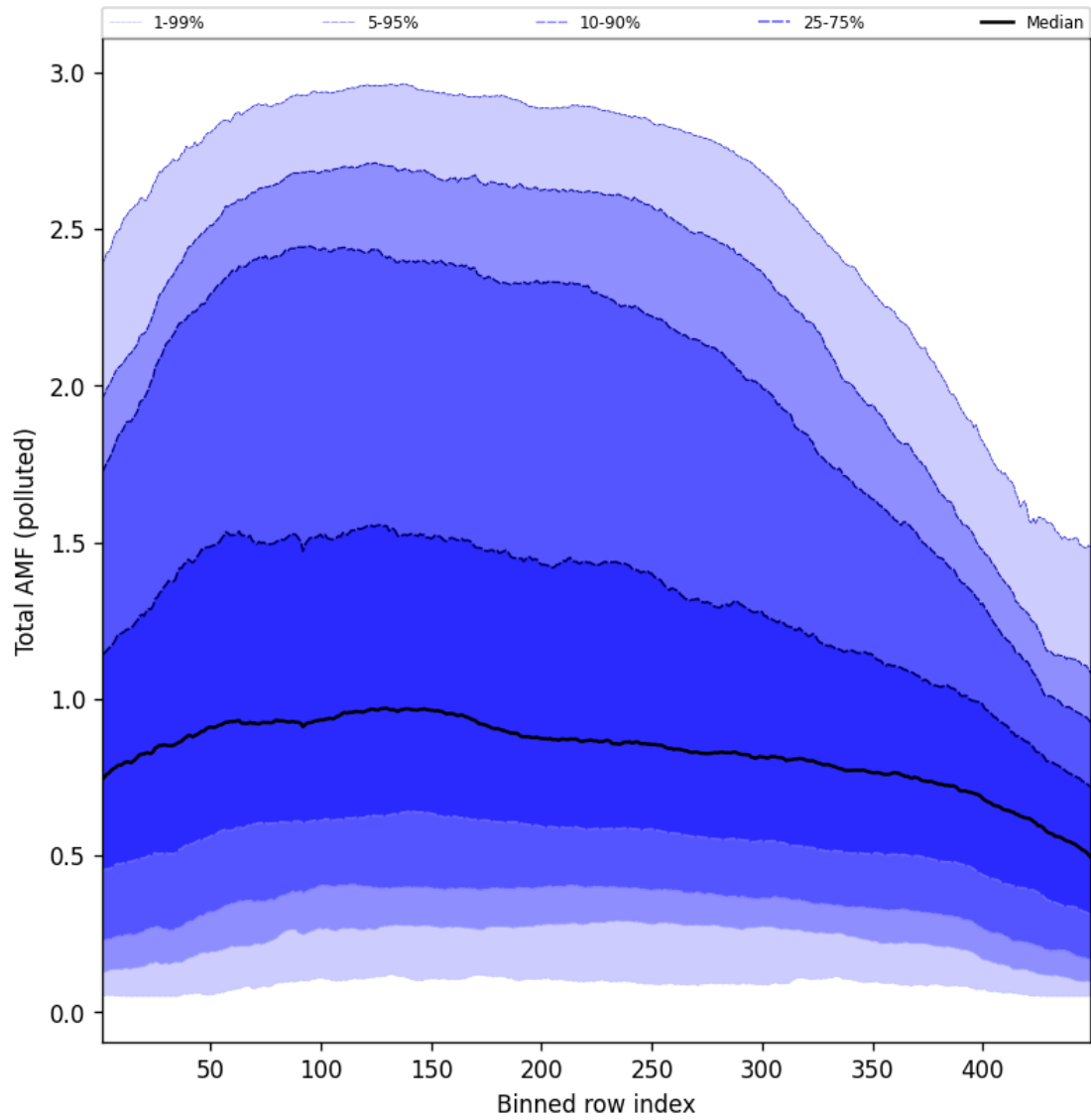


Figure 107: Along track statistics of “Total AMF (polluted)” for 2024-12-13 to 2024-12-14

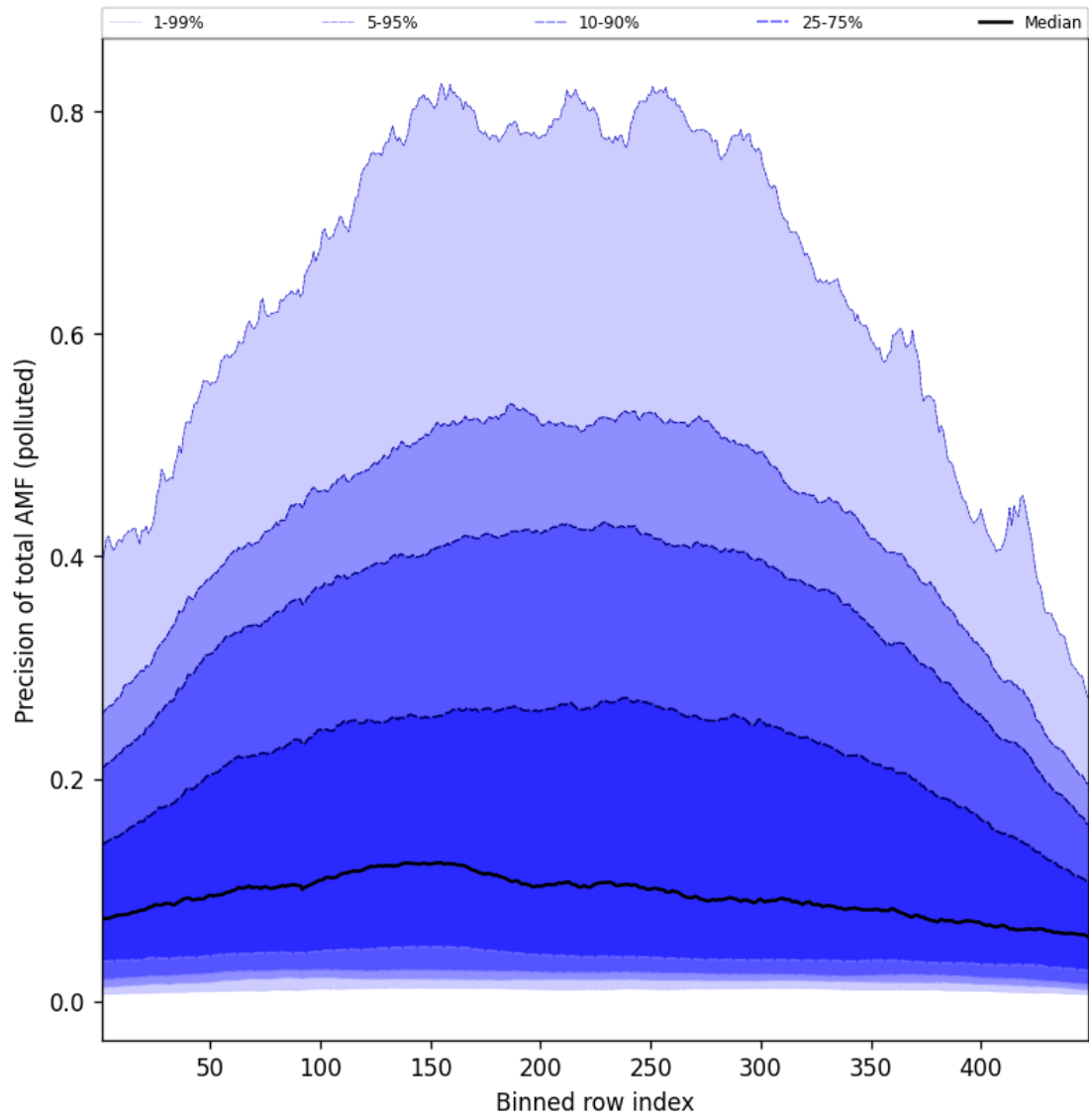


Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2024-12-13 to 2024-12-14

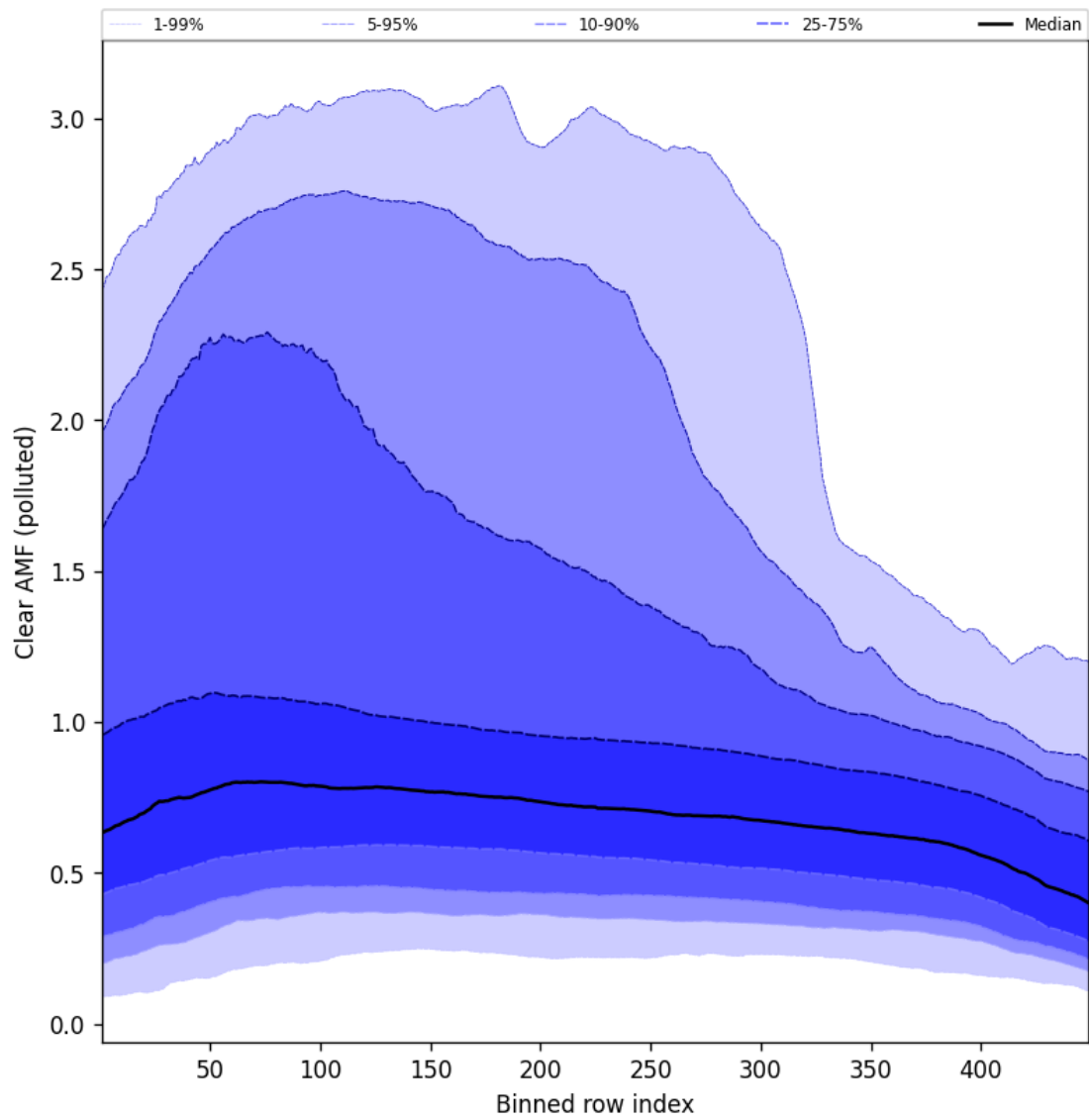


Figure 109: Along track statistics of “Clear AMF (polluted)” for 2024-12-13 to 2024-12-14

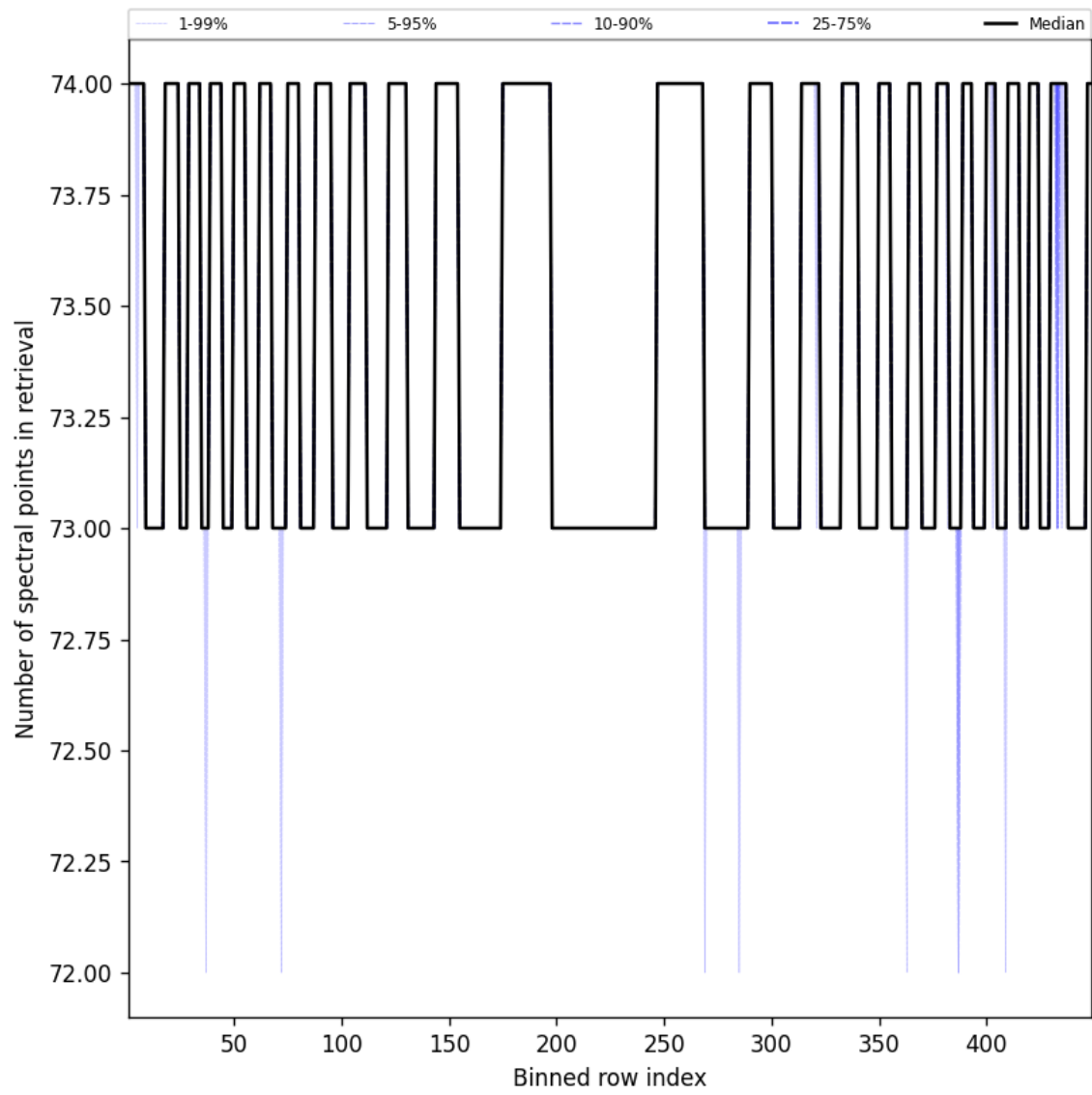


Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2024-12-13 to 2024-12-14

10 Coincidence density

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

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