

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]	0.600 ± 0.421	17050188	0.995	0.840	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(3.421 \pm 115.460) \times 10^{-2}$	17050188	0.249	0.420	8.057×10^{-3}	-123	553
sulfurdioxide total vertical column precision [DU]	0.547 ± 0.823	17050188	0.222	0.370	0.324	2.422×10^{-2}	171
sulfurdioxide slant column density corrected [DU]	$(1.522 \pm 34.764) \times 10^{-2}$	17050188	0.235	0.341	7.921×10^{-3}	-21.3	145
sulfurdioxide slant column density cobra [DU]	$(1.504 \pm 33.065) \times 10^{-2}$	17050188	0.235	0.341	7.921×10^{-3}	-21.3	95.3
sulfurdioxide slant column density cobra precision [DU]	0.270 ± 0.113	17050188	0.213	0.103	0.235	6.973×10^{-2}	22.3
sulfurdioxide slant column density window1 [DU]	$(7.421 \pm 62.618) \times 10^{-2}$	17050188	7.500×10^{-2}	0.708	7.423×10^{-2}	-34.2	85.3
sulfurdioxide slant column density window1 precision [DU]	0.270 ± 0.113	17050188	0.213	0.103	0.235	6.973×10^{-2}	22.3
sulfurdioxide slant column density corrected win1 [DU]	$(1.763 \pm 61.619) \times 10^{-2}$	17050188	-2.500×10^{-2}	0.690	5.396×10^{-3}	-34.2	85.4
background so2 slant column offset window1 [DU]	$(-5.658 \pm 13.019) \times 10^{-2}$	17050188	-1.000×10^{-1}	0.152	-8.609×10^{-2}	-1.40	2.26
sulfurdioxide slant column density window2 [DU]	0.349 ± 8.575	17050188	0.750	10.8	0.266	-830	1.102×10^3
sulfurdioxide slant column density window2 precision [DU]	7.76 ± 2.24	17050188	6.97	2.59	7.40	2.30	612
sulfurdioxide slant column density corrected win2 [DU]	-1.34 ± 8.46	17050188	-1.25	10.6	-1.32	-830	1.103×10^3
background so2 slant column offset window2 [DU]	-1.69 ± 2.08	17050188	-0.250	2.65	-1.28	-19.2	4.08
sulfurdioxide slant column density window3 [DU]	-2.83 ± 23.33	17050188	-5.04	28.9	-3.22	-488	731
sulfurdioxide slant column density window3 precision [DU]	26.9 ± 12.8	17050188	21.5	9.84	23.6	9.59	606
sulfurdioxide slant column density corrected win3 [DU]	7.08 ± 22.50	17050188	7.28	27.6	7.09	-489	722
background so2 slant column offset window3 [DU]	9.90 ± 6.62	17050188	6.16	9.88	9.58	-12.2	30.4
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.21	17050188	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(3.640 \pm 10.752) \times 10^{-2}$	17050188	1.539×10^{-2}	1.998×10^{-2}	1.524×10^{-2}	3.571×10^{-4}	3.44
fitted radiance shift [nm]	$(-4.343 \pm 24.505) \times 10^{-4}$	17050188	-5.000×10^{-4}	1.595×10^{-3}	-4.797×10^{-4}	-4.948×10^{-2}	3.931×10^{-2}
fitted radiance squeeze [1]	$(-3.545 \pm 17.079) \times 10^{-5}$	17050188	-3.000×10^{-5}	2.021×10^{-4}	-3.146×10^{-5}	-1.656×10^{-2}	1.281×10^{-2}
fitted root mean square [1]	$(1.189 \pm 0.464) \times 10^{-3}$	17050188	9.750×10^{-4}	4.349×10^{-4}	1.064×10^{-3}	2.968×10^{-4}	5.038×10^{-2}
sulfurdioxide total air mass factor polluted [1]	0.943 ± 0.682	17050188	0.620	0.679	0.743	5.000×10^{-2}	3.50
sulfurdioxide total air mass factor polluted precision [1]	0.155 ± 0.187	17050188	3.500×10^{-2}	0.175	7.966×10^{-2}	2.648×10^{-3}	2.03
sulfurdioxide clear air mass factor polluted [1]	0.789 ± 0.588	17050188	0.540	0.406	0.640	4.475×10^{-2}	3.57
number of spectral points in retrieval [1]	73.4 ± 0.5	17050188	73.0	1.000	73.0	52.0	155

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}	6.000×10^{-2}	0.160	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	-2.68	-0.933	-0.546	-0.355	-0.197	0.222	0.392	0.603	1.04	3.13
sulfurdioxide total vertical column precision [DU]	5.850×10^{-2}	8.376×10^{-2}	0.117	0.146	0.193	0.564	0.793	1.11	1.74	3.98
sulfurdioxide slant column density corrected [DU]	-0.778	-0.453	-0.331	-0.249	-0.161	0.180	0.271	0.359	0.495	0.895
sulfurdioxide slant column density cobra [DU]	-0.778	-0.453	-0.331	-0.249	-0.161	0.180	0.271	0.359	0.495	0.895
sulfurdioxide slant column density cobra precision [DU]	0.140	0.163	0.176	0.186	0.200	0.303	0.363	0.417	0.486	0.678
sulfurdioxide slant column density window1 [DU]	-1.53	-0.889	-0.639	-0.467	-0.282	0.426	0.608	0.779	1.03	1.72
sulfurdioxide slant column density window1 precision [DU]	0.140	0.163	0.176	0.186	0.200	0.303	0.363	0.417	0.486	0.678
sulfurdioxide slant column density corrected win1 [DU]	-1.50	-0.907	-0.674	-0.512	-0.337	0.353	0.536	0.712	0.977	1.71
background so2 slant column offset window1 [DU]	-0.320	-0.228	-0.191	-0.163	-0.140	1.245×10^{-2}	7.199×10^{-2}	0.127	0.197	0.312
sulfurdioxide slant column density window2 [DU]	-20.0	-13.4	-10.1	-7.75	-5.09	5.66	8.39	10.9	14.3	21.9
sulfurdioxide slant column density window2 precision [DU]	4.21	4.94	5.39	5.77	6.25	8.84	9.72	10.6	11.9	14.5
sulfurdioxide slant column density corrected win2 [DU]	-22.1	-15.0	-11.7	-9.30	-6.64	3.98	6.64	9.02	12.3	19.2
background so2 slant column offset window2 [DU]	-8.08	-5.55	-4.27	-3.52	-2.83	-0.173	0.114	0.357	0.713	1.98
sulfurdioxide slant column density window3 [DU]	-61.0	-40.2	-31.0	-24.4	-17.3	11.5	19.3	26.4	36.1	55.2
sulfurdioxide slant column density window3 precision [DU]	13.4	15.4	16.8	18.0	19.6	29.5	34.0	39.3	50.4	82.1
sulfurdioxide slant column density corrected win3 [DU]	-50.5	-29.7	-20.3	-13.7	-6.63	21.0	28.1	34.7	43.8	62.5
background so2 slant column offset window3 [DU]	-3.95	-0.534	1.46	3.12	4.99	14.9	17.2	19.0	20.9	23.6
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]	1.497×10^{-3}	3.008×10^{-3}	4.076×10^{-3}	5.481×10^{-3}	7.992×10^{-3}	2.798×10^{-2}	4.085×10^{-2}	6.176×10^{-2}	0.121	0.411
fitted radiance shift [nm]	-7.897×10^{-3}	-3.969×10^{-3}	-2.606×10^{-3}	-1.860×10^{-3}	-1.269×10^{-3}	3.256×10^{-4}	9.816×10^{-4}	1.828×10^{-3}	3.321×10^{-3}	7.453×10^{-3}
fitted radiance squeeze [1]	-4.868×10^{-4}	-3.131×10^{-4}	-2.396×10^{-4}	-1.886×10^{-4}	-1.344×10^{-4}	6.770×10^{-5}	1.177×10^{-4}	1.638×10^{-4}	2.289×10^{-4}	3.828×10^{-4}
fitted root mean square [1]	5.913×10^{-4}	7.075×10^{-4}	7.757×10^{-4}	8.307×10^{-4}	8.979×10^{-4}	1.333×10^{-3}	1.553×10^{-3}	1.785×10^{-3}	2.102×10^{-3}	2.875×10^{-3}
sulfurdioxide total air mass factor polluted [1]	9.077×10^{-2}	0.202	0.294	0.380	0.490	1.17	1.53	1.97	2.55	3.08
sulfurdioxide total air mass factor polluted precision [1]	9.532×10^{-3}	1.561×10^{-2}	2.152×10^{-2}	2.694×10^{-2}	3.409×10^{-2}	0.209	0.289	0.380	0.527	0.906
sulfurdioxide clear air mass factor polluted [1]	0.163	0.264	0.338	0.397	0.467	0.873	1.03	1.24	2.36	3.24
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]	0.720 ± 0.390	5921550	0.660	1.000	0.0	1.000	0.340	1.000
sulfurdioxide total vertical column [DU]	$(6.691 \pm 170.038) \times 10^{-2}$	5921550	0.644	1.665×10^{-2}	-123	139	-0.299	0.346
sulfurdioxide total vertical column precision [DU]	0.844 ± 1.165	5921550	0.644	0.460	4.776×10^{-2}	154	0.287	0.930
sulfurdioxide slant column density corrected [DU]	$(2.252 \pm 39.517) \times 10^{-2}$	5921550	0.400	1.169×10^{-2}	-7.06	53.4	-0.186	0.214
sulfurdioxide slant column density cobra [DU]	$(2.243 \pm 39.088) \times 10^{-2}$	5921550	0.400	1.169×10^{-2}	-7.06	20.3	-0.186	0.214
sulfurdioxide slant column density cobra precision [DU]	0.320 ± 0.136	5921550	0.158	0.281	9.433×10^{-2}	15.0	0.226	0.384
sulfurdioxide slant column density window1 [DU]	0.137 ± 0.724	5921550	0.795	0.139	-10.6	23.1	-0.260	0.535
sulfurdioxide slant column density window1 precision [DU]	0.320 ± 0.136	5921550	0.158	0.281	9.433×10^{-2}	15.0	0.226	0.384
sulfurdioxide slant column density corrected win1 [DU]	$(4.554 \pm 72.369) \times 10^{-2}$	5921550	0.791	2.487×10^{-2}	-10.3	23.0	-0.364	0.427
background so2 slant column offset window1 [DU]	$(-9.134 \pm 11.897) \times 10^{-2}$	5921550	0.107	-0.105	-1.34	2.26	-0.157	-4.955×10^{-2}
sulfurdioxide slant column density window2 [DU]	0.763 ± 9.751	5921550	12.4	0.496	-521	73.8	-5.58	6.81
sulfurdioxide slant column density window2 precision [DU]	8.82 ± 2.30	5921550	2.85	8.53	2.51	317	7.24	10.1
sulfurdioxide slant column density corrected win2 [DU]	-1.27 ± 9.53	5921550	12.1	-1.26	-521	67.4	-7.34	4.80
background so2 slant column offset window2 [DU]	-2.04 ± 2.51	5921550	3.15	-1.12	-19.2	3.70	-3.40	-0.244
sulfurdioxide slant column density window3 [DU]	-4.45 ± 26.22	5921550	33.1	-3.89	-192	173	-20.7	12.4
sulfurdioxide slant column density window3 precision [DU]	30.2 ± 12.7	5921550	9.88	27.3	9.74	218	23.2	33.1
sulfurdioxide slant column density corrected win3 [DU]	6.44 ± 25.81	5921550	32.6	6.71	-176	187	-9.66	22.9
background so2 slant column offset window3 [DU]	10.9 ± 5.3	5921550	8.12	9.97	-9.34	30.4	6.83	14.9
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.25	5921550	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(7.479 \pm 17.167) \times 10^{-2}$	5921550	4.697×10^{-2}	2.964×10^{-2}	3.764×10^{-4}	3.44	1.626×10^{-2}	6.323×10^{-2}
fitted radiance shift [nm]	$(-2.199 \pm 25.435) \times 10^{-4}$	5921550	1.630×10^{-3}	-2.595×10^{-4}	-4.948×10^{-2}	3.795×10^{-2}	-1.060×10^{-3}	5.703×10^{-4}
fitted radiance squeeze [1]	$(-1.802 \pm 18614.168) \times 10^{-8}$	5921550	2.158×10^{-4}	1.242×10^{-6}	-1.420×10^{-2}	4.502×10^{-3}	-1.069×10^{-4}	1.089×10^{-4}
fitted root mean square [1]	$(1.393 \pm 0.568) \times 10^{-3}$	5921550	6.408×10^{-4}	1.234×10^{-3}	3.593×10^{-4}	5.038×10^{-2}	1.010×10^{-3}	1.651×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.657 ± 0.359	5921550	0.485	0.629	5.000×10^{-2}	2.90	0.379	0.864
sulfurdioxide total air mass factor polluted precision [1]	$(8.707 \pm 11.759) \times 10^{-2}$	5921550	7.249×10^{-2}	4.500×10^{-2}	2.648×10^{-3}	2.03	2.718×10^{-2}	9.967×10^{-2}
sulfurdioxide clear air mass factor polluted [1]	0.611 ± 0.267	5921550	0.423	0.620	4.475×10^{-2}	1.63	0.389	0.812
number of spectral points in retrieval [1]	73.5 ± 0.5	5921550	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]	0.536 ± 0.424	11128638	0.890	0.440	0.0	1.000	0.110	1.000
sulfurdioxide total vertical column [DU]	$(1.682 \pm 70.930) \times 10^{-2}$	11128638	0.337	5.733×10^{-3}	-69.5	553	-0.160	0.177
sulfurdioxide total vertical column precision [DU]	0.389 ± 0.495	11128638	0.287	0.269	2.422×10^{-2}	171	0.155	0.442
sulfurdioxide slant column density corrected [DU]	$(1.133 \pm 31.942) \times 10^{-2}$	11128638	0.315	6.331×10^{-3}	-21.3	145	-0.150	0.165
sulfurdioxide slant column density cobra [DU]	$(1.111 \pm 29.353) \times 10^{-2}$	11128638	0.315	6.331×10^{-3}	-21.3	95.3	-0.150	0.165
sulfurdioxide slant column density cobra precision [DU]	0.243 ± 0.087	11128638	7.252×10^{-2}	0.220	6.973×10^{-2}	22.3	0.192	0.264
sulfurdioxide slant column density window1 [DU]	$(4.087 \pm 56.414) \times 10^{-2}$	11128638	0.664	4.515×10^{-2}	-34.2	85.3	-0.291	0.373
sulfurdioxide slant column density window1 precision [DU]	0.243 ± 0.087	11128638	7.252×10^{-2}	0.220	6.973×10^{-2}	22.3	0.192	0.264
sulfurdioxide slant column density corrected win1 [DU]	$(2.780 \pm 549.924) \times 10^{-3}$	11128638	0.645	-3.203×10^{-3}	-34.2	85.4	-0.325	0.320
background so2 slant column offset window1 [DU]	$(-3.809 \pm 13.210) \times 10^{-2}$	11128638	0.173	-6.663×10^{-2}	-1.40	1.59	-0.132	4.129×10^{-2}
sulfurdioxide slant column density window2 [DU]	0.129 ± 7.869	11128638	10.0	0.167	-830	1.102×10^3	-4.86	5.16
sulfurdioxide slant column density window2 precision [DU]	7.19 ± 1.98	11128638	2.11	6.91	2.30	612	5.95	8.06
sulfurdioxide slant column density corrected win2 [DU]	-1.37 ± 7.83	11128638	9.92	-1.35	-830	1.103×10^3	-6.32	3.61
background so2 slant column offset window2 [DU]	-1.50 ± 1.79	11128638	2.56	-1.36	-15.9	4.08	-2.68	-0.118
sulfurdioxide slant column density window3 [DU]	-1.96 ± 21.59	11128638	27.0	-2.93	-488	731	-15.9	11.1
sulfurdioxide slant column density window3 precision [DU]	25.1 ± 12.6	11128638	7.88	21.8	9.59	606	18.6	26.4
sulfurdioxide slant column density corrected win3 [DU]	7.41 ± 20.52	11128638	25.4	7.25	-489	722	-5.32	20.1
background so2 slant column offset window3 [DU]	9.38 ± 7.18	11128638	11.3	9.28	-12.2	29.5	3.56	14.8
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.18	11128638	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(1.598 \pm 2.879) \times 10^{-2}$	11128638	1.295×10^{-2}	1.109×10^{-2}	3.571×10^{-4}	1.80	5.747×10^{-3}	1.869×10^{-2}
fitted radiance shift [nm]	$(-5.484 \pm 23.918) \times 10^{-4}$	11128638	1.530×10^{-3}	-5.902×10^{-4}	-4.135×10^{-2}	3.931×10^{-2}	-1.355×10^{-3}	1.753×10^{-4}
fitted radiance squeeze [1]	$(-5.430 \pm 15.884) \times 10^{-5}$	11128638	1.931×10^{-4}	-4.700×10^{-5}	-1.656×10^{-2}	1.281×10^{-2}	-1.466×10^{-4}	4.653×10^{-5}
fitted root mean square [1]	$(1.081 \pm 0.354) \times 10^{-3}$	11128638	3.333×10^{-4}	1.002×10^{-3}	2.968×10^{-4}	4.474×10^{-2}	8.626×10^{-4}	1.196×10^{-3}
sulfurdioxide total air mass factor polluted [1]	1.10 ± 0.76	11128638	0.901	0.838	5.000×10^{-2}	3.50	0.550	1.45
sulfurdioxide total air mass factor polluted precision [1]	0.191 ± 0.205	11128638	0.223	0.128	4.527×10^{-3}	1.63	4.032×10^{-2}	0.263
sulfurdioxide clear air mass factor polluted [1]	0.884 ± 0.682	11128638	0.447	0.650	0.119	3.57	0.497	0.944
number of spectral points in retrieval [1]	73.4 ± 0.5	11128638	1.000	73.0	52.0	155	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]	0.634 ± 0.414	12091364	0.800	1.000	0.0	1.000	0.200	1.000
sulfurdioxide total vertical column [DU]	$(2.813 \pm 103.887) \times 10^{-2}$	12091364	0.445	9.199×10^{-3}	-74.4	553	-0.211	0.234
sulfurdioxide total vertical column precision [DU]	0.523 ± 0.740	12091364	0.326	0.330	4.476×10^{-2}	171	0.218	0.544
sulfurdioxide slant column density corrected [DU]	$(1.354 \pm 31.336) \times 10^{-2}$	12091364	0.331	7.577×10^{-3}	-6.89	145	-0.157	0.174
sulfurdioxide slant column density cobra [DU]	$(1.348 \pm 30.716) \times 10^{-2}$	12091364	0.331	7.577×10^{-3}	-6.89	95.3	-0.157	0.174
sulfurdioxide slant column density cobra precision [DU]	0.260 ± 0.104	12091364	8.579×10^{-2}	0.230	8.114×10^{-2}	22.3	0.198	0.284
sulfurdioxide slant column density window1 [DU]	$(9.507 \pm 58.944) \times 10^{-2}$	12091364	0.675	9.555×10^{-2}	-26.0	85.3	-0.244	0.431
sulfurdioxide slant column density window1 precision [DU]	0.260 ± 0.104	12091364	8.579×10^{-2}	0.230	8.114×10^{-2}	22.3	0.198	0.284
sulfurdioxide slant column density corrected win1 [DU]	$(3.731 \pm 58.066) \times 10^{-2}$	12091364	0.660	2.714×10^{-2}	-26.0	85.4	-0.301	0.360
background so2 slant column offset window1 [DU]	$(-5.776 \pm 12.628) \times 10^{-2}$	12091364	0.155	-8.571×10^{-2}	-1.34	1.92	-0.140	1.508×10^{-2}
sulfurdioxide slant column density window2 [DU]	0.172 ± 8.323	12091364	10.5	0.129	-830	1.031×10^3	-5.13	5.40
sulfurdioxide slant column density window2 precision [DU]	7.58 ± 2.08	12091364	2.40	7.27	2.30	612	6.19	8.59
sulfurdioxide slant column density corrected win2 [DU]	-1.36 ± 8.25	12091364	10.4	-1.32	-830	1.031×10^3	-6.55	3.87
background so2 slant column offset window2 [DU]	-1.53 ± 1.97	12091364	2.45	-1.15	-19.2	4.05	-2.59	-0.139
sulfurdioxide slant column density window3 [DU]	0.261 ± 22.645	12091364	28.4	-0.397	-430	731	-14.2	14.2
sulfurdioxide slant column density window3 precision [DU]	26.5 ± 12.3	12091364	9.08	23.4	9.59	213	19.7	28.8
sulfurdioxide slant column density corrected win3 [DU]	9.05 ± 21.78	12091364	27.2	8.66	-428	722	-4.71	22.5
background so2 slant column offset window3 [DU]	8.79 ± 5.87	12091364	8.43	8.74	-12.2	30.4	4.61	13.0
sulfurdioxide slant column cobra flag [1]	1.99 ± 0.15	12091364	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.500 \pm 5.017) \times 10^{-2}$	12091364	1.611×10^{-2}	1.572×10^{-2}	8.871×10^{-4}	2.03	9.336×10^{-3}	2.545×10^{-2}
fitted radiance shift [nm]	$(-3.995 \pm 24.289) \times 10^{-4}$	12091364	1.756×10^{-3}	-4.218×10^{-4}	-4.948×10^{-2}	3.931×10^{-2}	-1.310×10^{-3}	4.453×10^{-4}
fitted radiance squeeze [1]	$(-2.866 \pm 16.399) \times 10^{-5}$	12091364	1.935×10^{-4}	-2.362×10^{-5}	-1.656×10^{-2}	1.281×10^{-2}	-1.224×10^{-4}	7.110×10^{-5}
fitted root mean square [1]	$(1.144 \pm 0.430) \times 10^{-3}$	12091364	3.754×10^{-4}	1.034×10^{-3}	3.649×10^{-4}	5.038×10^{-2}	8.846×10^{-4}	1.260×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.807 ± 0.454	12091364	0.530	0.720	5.000×10^{-2}	2.78	0.494	1.02
sulfurdioxide total air mass factor polluted precision [1]	0.133 ± 0.142	12091364	0.155	6.936×10^{-2}	3.262×10^{-3}	1.52	3.473×10^{-2}	0.190
sulfurdioxide clear air mass factor polluted [1]	0.647 ± 0.239	12091364	0.325	0.616	6.159×10^{-2}	2.91	0.472	0.797
number of spectral points in retrieval [1]	73.4 ± 0.5	12091364	1.000	73.0	52.0	155	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]	0.504 ± 0.425	4395719	0.910	0.430	0.0	1.000	9.000×10^{-2}	1.000
sulfurdioxide total vertical column [DU]	$(4.267 \pm 129.024) \times 10^{-2}$	4395719	0.319	5.414×10^{-3}	-79.9	139	-0.148	0.171
sulfurdioxide total vertical column precision [DU]	0.561 ± 0.929	4395719	0.476	0.272	2.422×10^{-2}	154	0.112	0.587
sulfurdioxide slant column density corrected [DU]	$(1.724 \pm 40.557) \times 10^{-2}$	4395719	0.363	8.025×10^{-3}	-21.3	95.4	-0.172	0.191
sulfurdioxide slant column density cobra [DU]	$(1.683 \pm 37.524) \times 10^{-2}$	4395719	0.363	8.025×10^{-3}	-21.3	34.7	-0.172	0.191
sulfurdioxide slant column density cobra precision [DU]	0.290 ± 0.126	4395719	0.144	0.253	6.973×10^{-2}	15.0	0.204	0.348
sulfurdioxide slant column density window1 [DU]	$(9.238 \pm 695.904) \times 10^{-3}$	4395719	0.784	-5.620×10^{-4}	-34.2	47.5	-0.392	0.392
sulfurdioxide slant column density window1 precision [DU]	0.290 ± 0.126	4395719	0.144	0.253	6.973×10^{-2}	15.0	0.204	0.348
sulfurdioxide slant column density corrected win1 [DU]	$(-4.308 \pm 68.273) \times 10^{-2}$	4395719	0.759	-6.753×10^{-2}	-34.2	47.4	-0.440	0.319
background so2 slant column offset window1 [DU]	$(-5.232 \pm 13.951) \times 10^{-2}$	4395719	0.145	-8.587×10^{-2}	-1.40	2.26	-0.139	6.384×10^{-3}
sulfurdioxide slant column density window2 [DU]	0.746 ± 9.054	4395719	11.2	0.609	-803	1.102×10^3	-4.95	6.27
sulfurdioxide slant column density window2 precision [DU]	8.12 ± 2.50	4395719	3.01	7.69	2.33	399	6.39	9.40
sulfurdioxide slant column density corrected win2 [DU]	-1.30 ± 8.89	4395719	11.0	-1.35	-804	1.103×10^3	-6.84	4.20
background so2 slant column offset window2 [DU]	-2.05 ± 2.24	4395719	3.11	-1.73	-19.2	4.08	-3.40	-0.295
sulfurdioxide slant column density window3 [DU]	-10.6 ± 23.0	4395719	27.7	-10.5	-488	273	-24.3	3.35
sulfurdioxide slant column density window3 precision [DU]	27.4 ± 13.8	4395719	11.2	23.9	10.1	606	19.2	30.4
sulfurdioxide slant column density corrected win3 [DU]	2.31 ± 23.27	4395719	27.9	3.27	-489	276	-11.1	16.8
background so2 slant column offset window3 [DU]	12.9 ± 7.5	4395719	12.9	14.6	-12.2	30.4	6.46	19.4
sulfurdioxide slant column cobra flag [1]	1.95 ± 0.31	4395719	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(5.538 \pm 15.568) \times 10^{-2}$	4395719	3.769×10^{-2}	1.108×10^{-2}	3.571×10^{-4}	3.38	4.037×10^{-3}	4.173×10^{-2}
fitted radiance shift [nm]	$(-5.357 \pm 24.400) \times 10^{-4}$	4395719	1.198×10^{-3}	-6.007×10^{-4}	-4.135×10^{-2}	3.835×10^{-2}	-1.191×10^{-3}	6.896×10^{-6}
fitted radiance squeeze [1]	$(-5.682 \pm 18.374) \times 10^{-5}$	4395719	2.190×10^{-4}	-5.810×10^{-5}	-1.162×10^{-2}	1.069×10^{-2}	-1.671×10^{-4}	5.195×10^{-5}
fitted root mean square [1]	$(1.287 \pm 0.507) \times 10^{-3}$	4395719	5.512×10^{-4}	1.161×10^{-3}	2.968×10^{-4}	3.973×10^{-2}	9.447×10^{-4}	1.496×10^{-3}
sulfurdioxide total air mass factor polluted [1]	1.35 ± 0.99	4395719	1.83	0.944	5.000×10^{-2}	3.50	0.507	2.33
sulfurdioxide total air mass factor polluted precision [1]	0.220 ± 0.267	4395719	0.245	0.132	2.653×10^{-3}	2.03	3.328×10^{-2}	0.278
sulfurdioxide clear air mass factor polluted [1]	1.21 ± 0.96	4395719	1.21	0.808	4.475×10^{-2}	3.57	0.478	1.69
number of spectral points in retrieval [1]	73.4 ± 0.5	4395719	1.000	73.0	52.0	74.0	73.0	74.0

3 Granule outlines

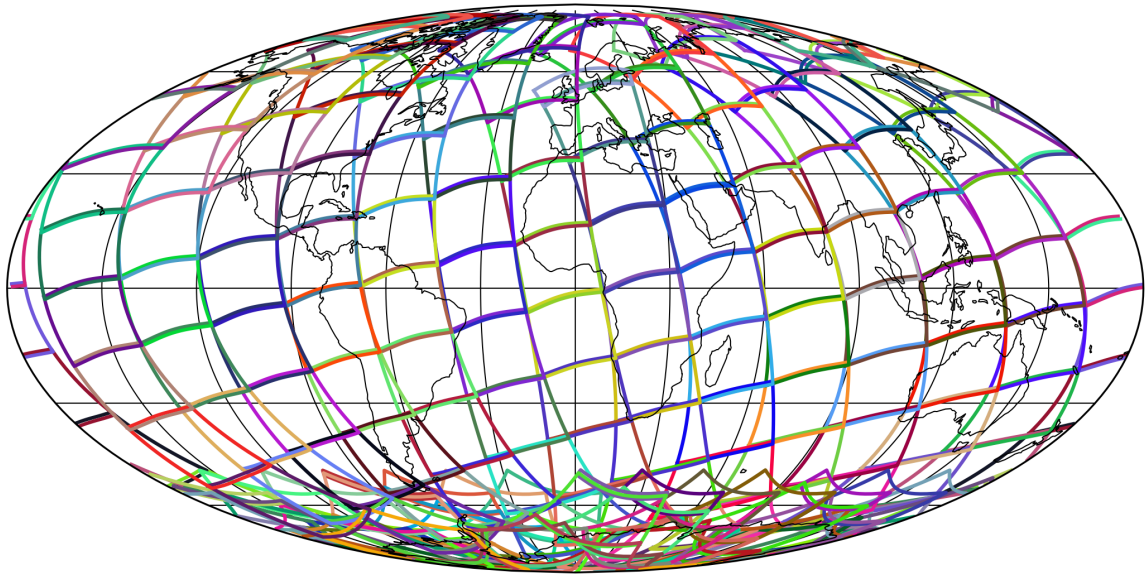


Figure 1: Outline of the granules.

4 Input data monitoring

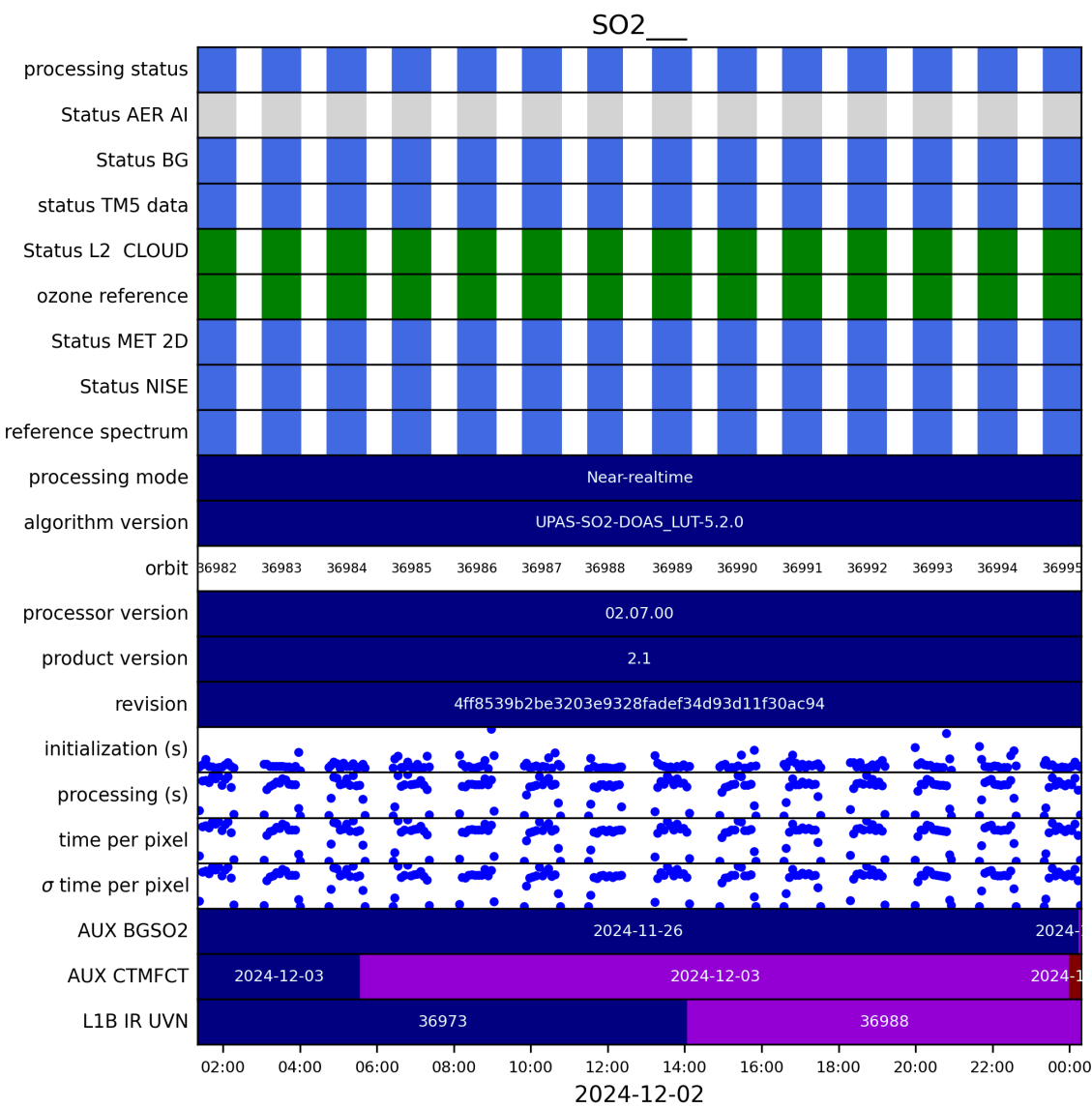


Figure 2: Input data per granule

5 Warnings and errors

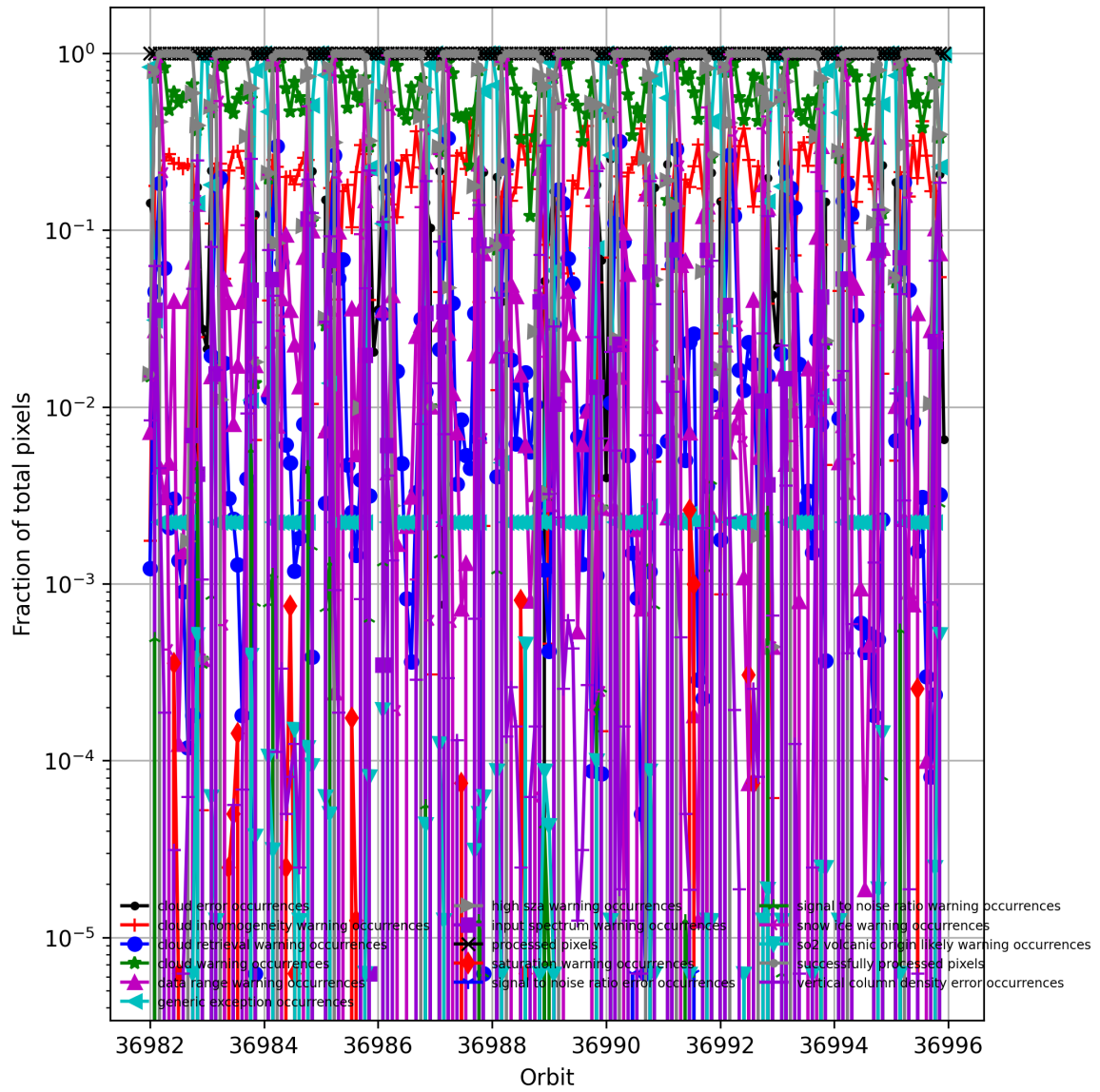


Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

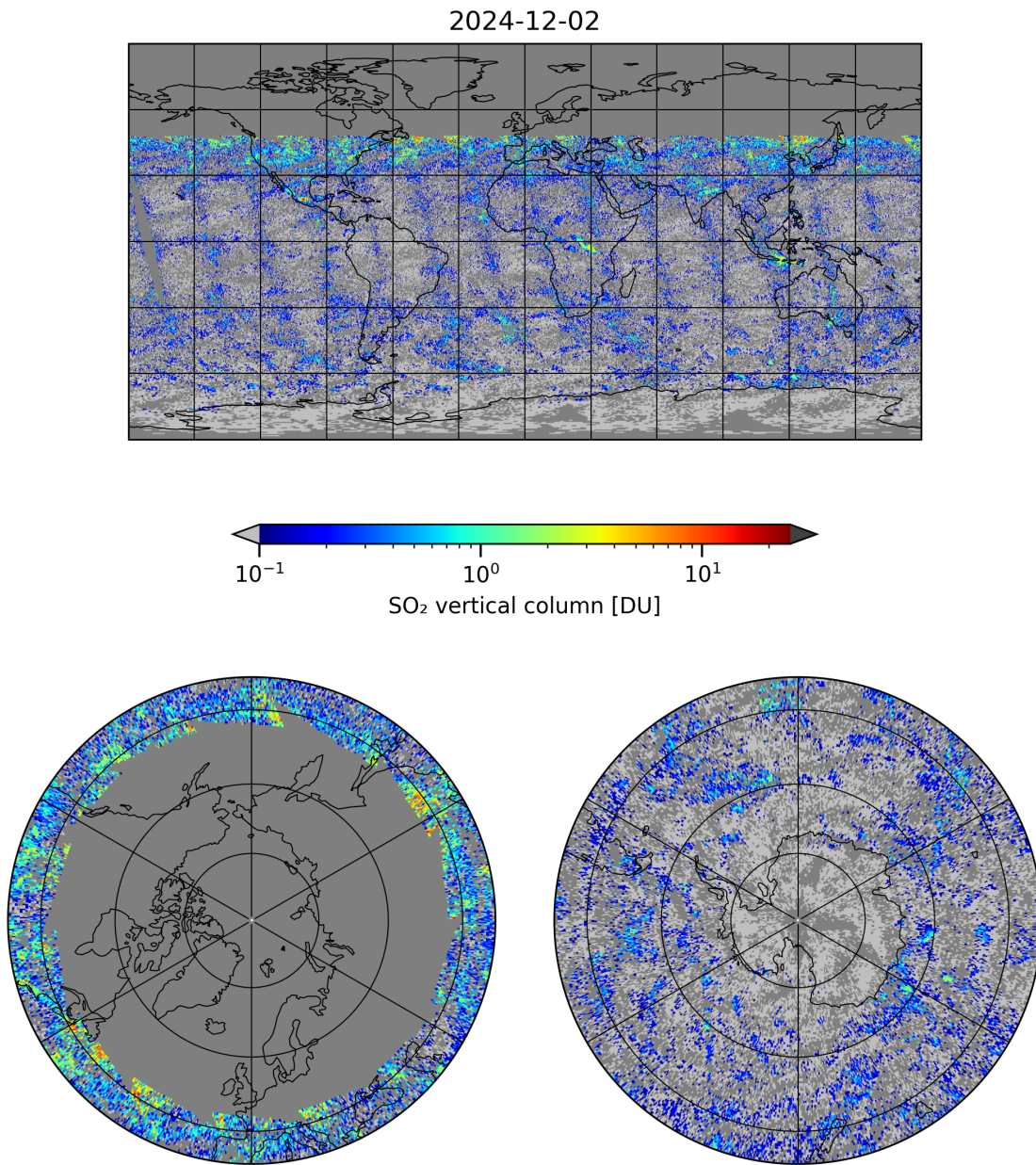


Figure 4: Map of “SO₂ vertical column” for 2024-12-02 to 2024-12-03

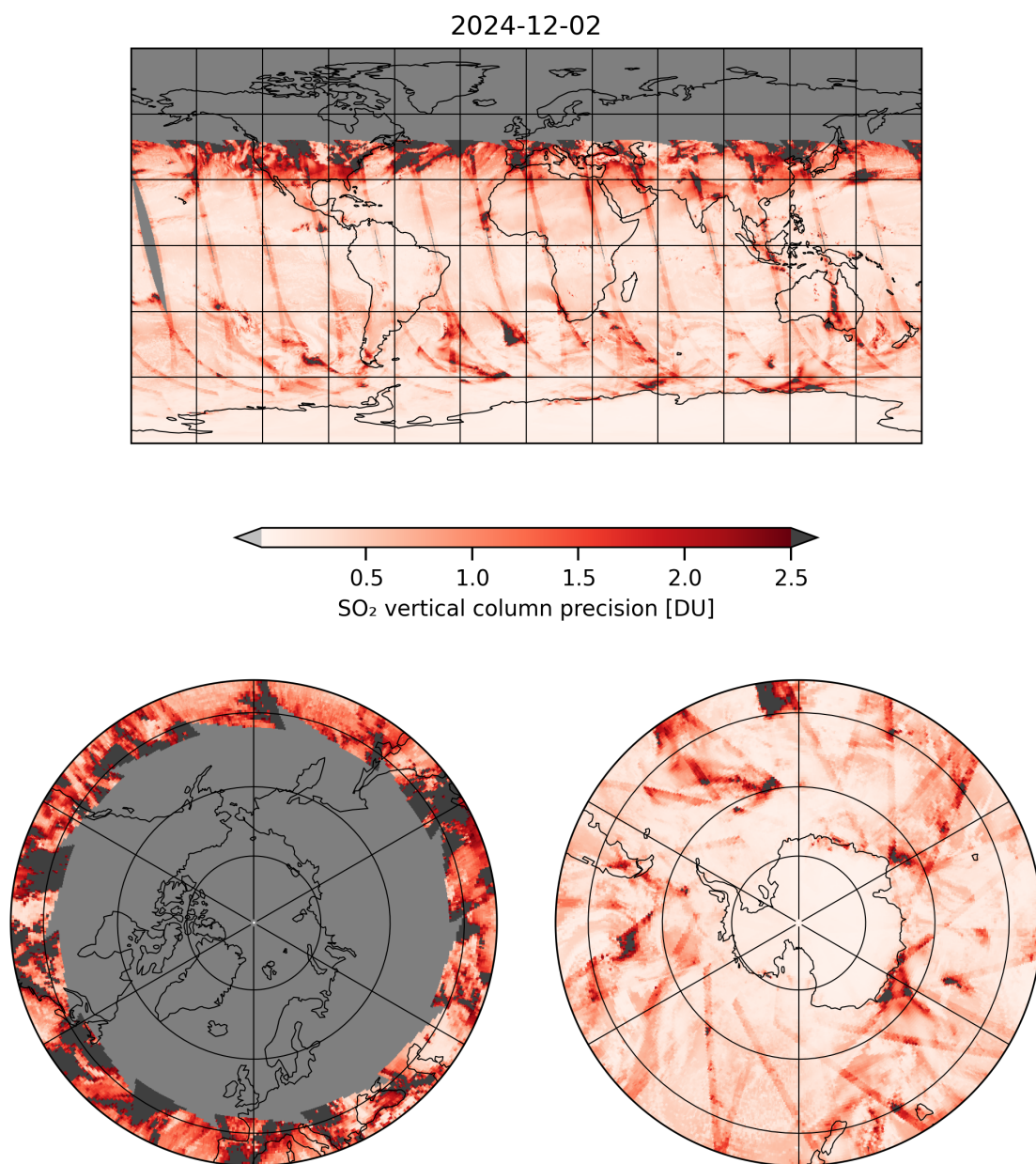


Figure 5: Map of “SO₂ vertical column precision” for 2024-12-02 to 2024-12-03

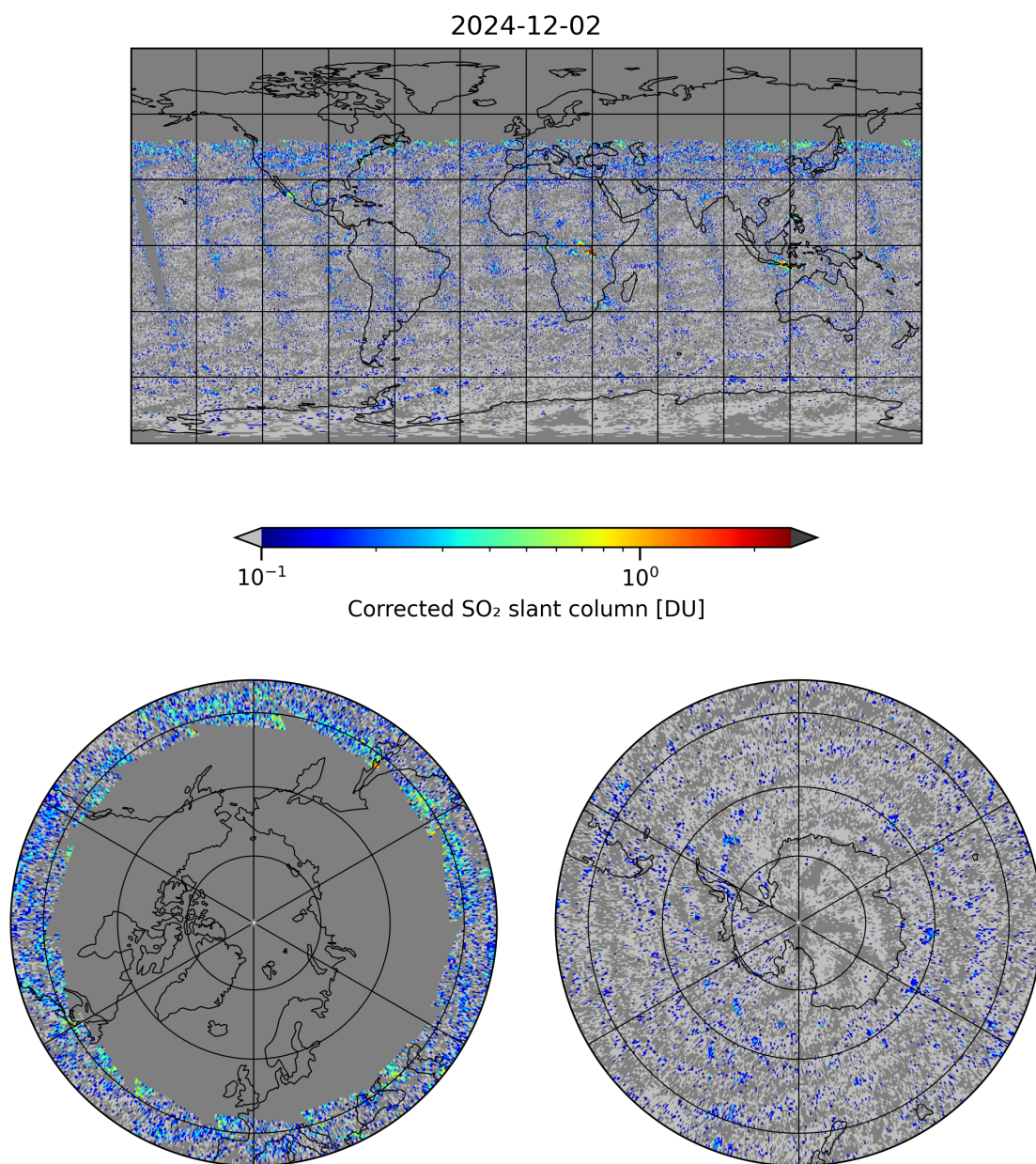


Figure 6: Map of “Corrected SO₂ slant column” for 2024-12-02 to 2024-12-03

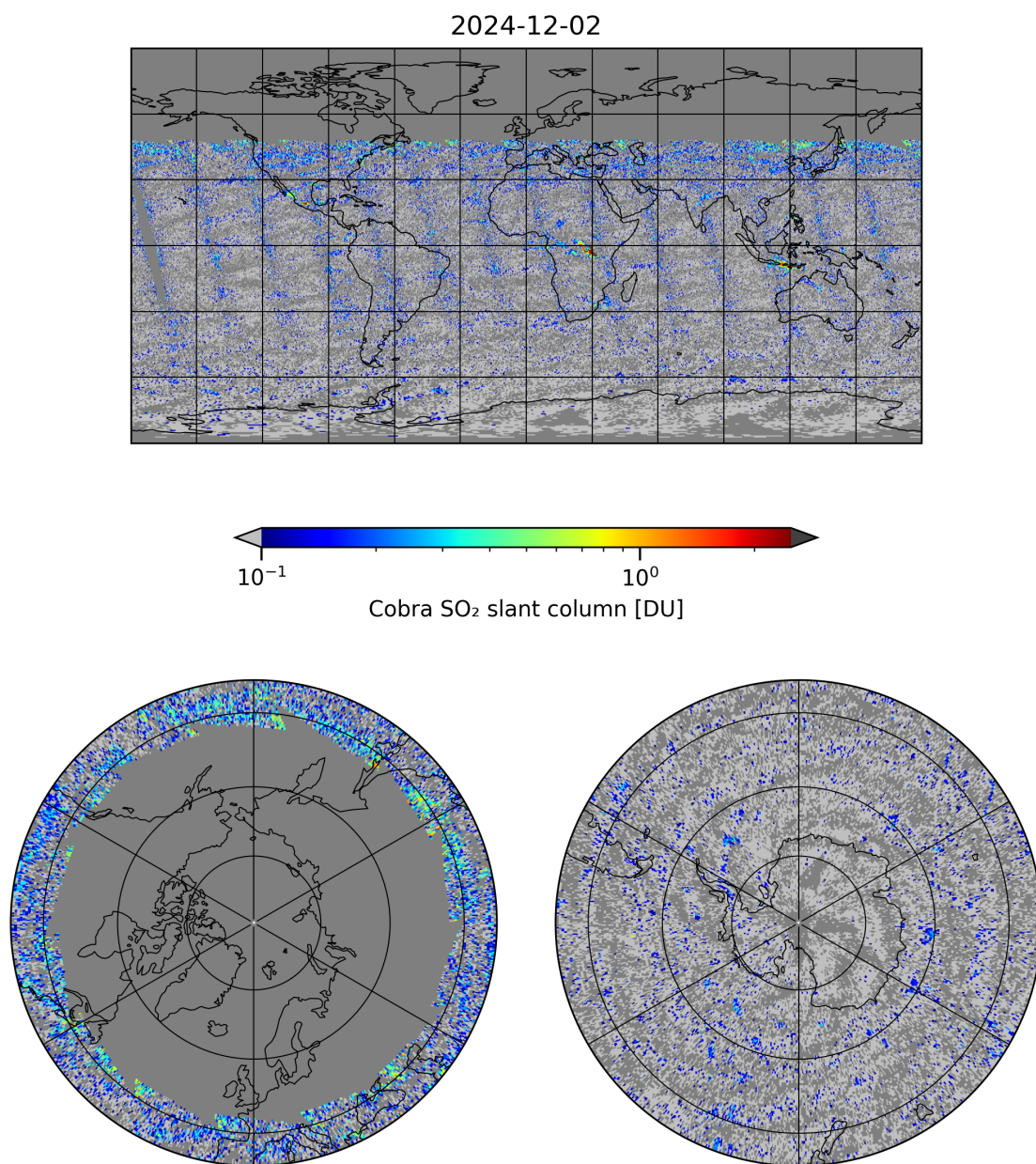


Figure 7: Map of “Cobra SO₂ slant column” for 2024-12-02 to 2024-12-03

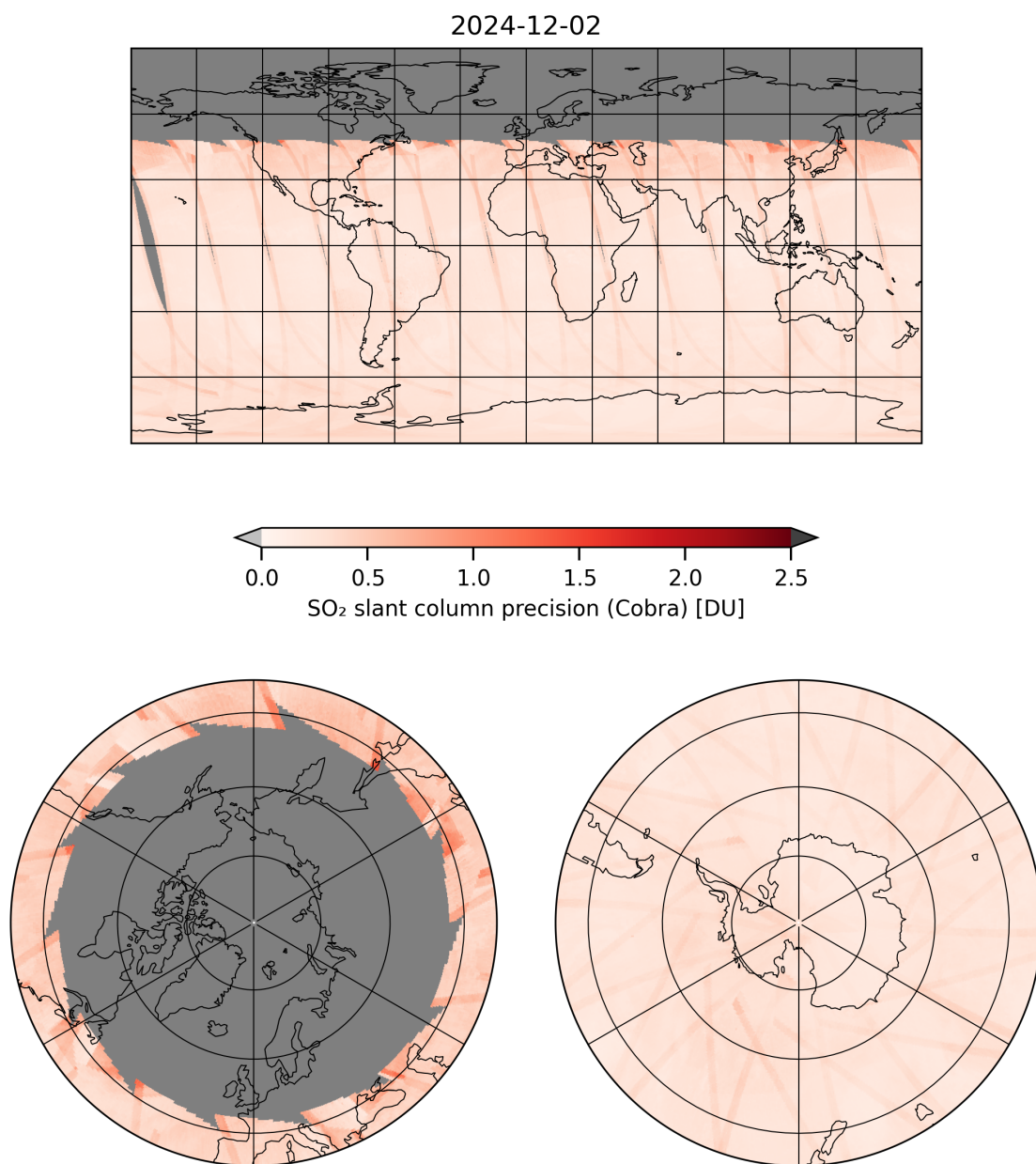


Figure 8: Map of “SO₂ slant column precision (Cobra)” for 2024-12-02 to 2024-12-03

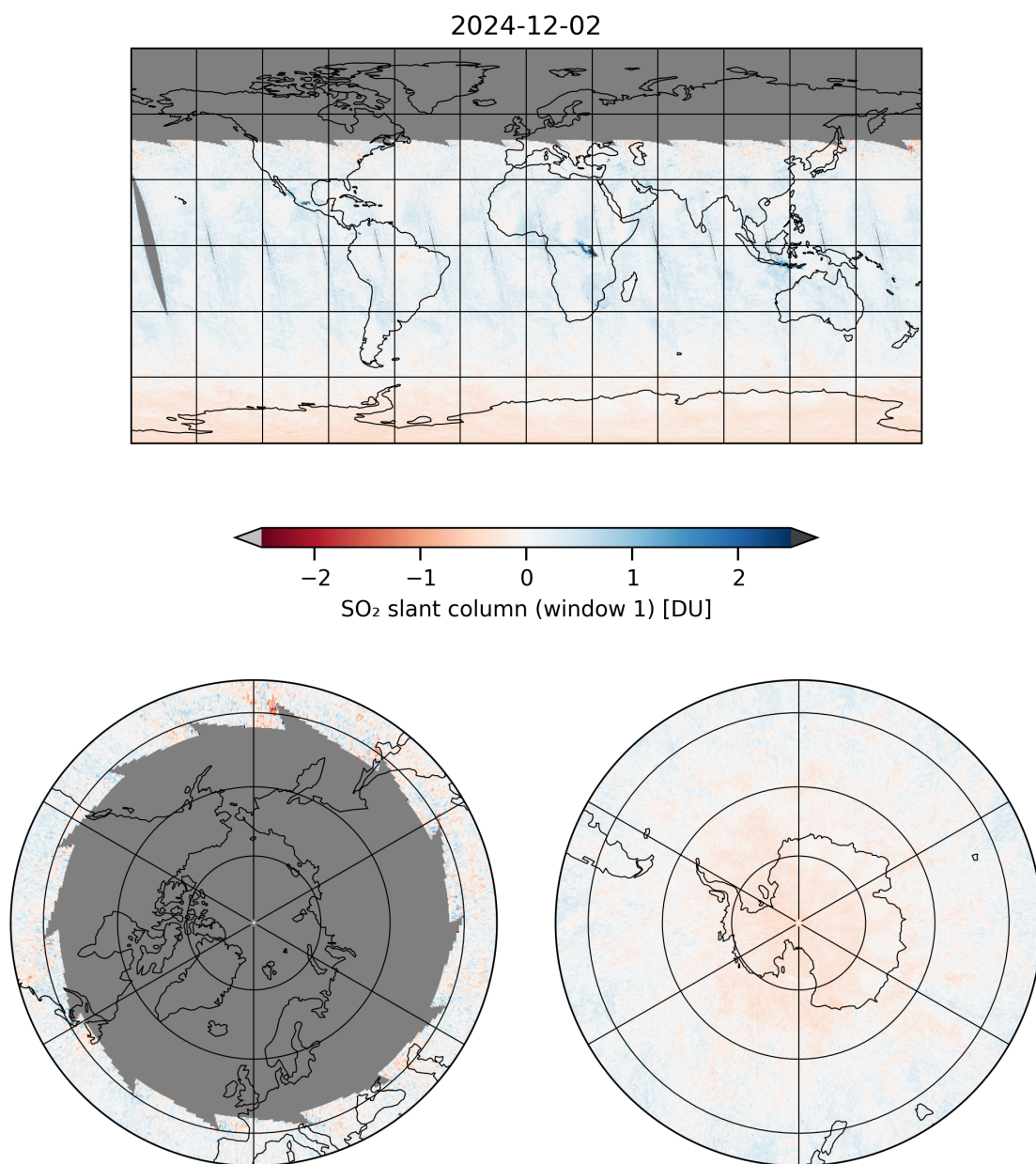


Figure 9: Map of “SO₂ slant column (window 1)” for 2024-12-02 to 2024-12-03

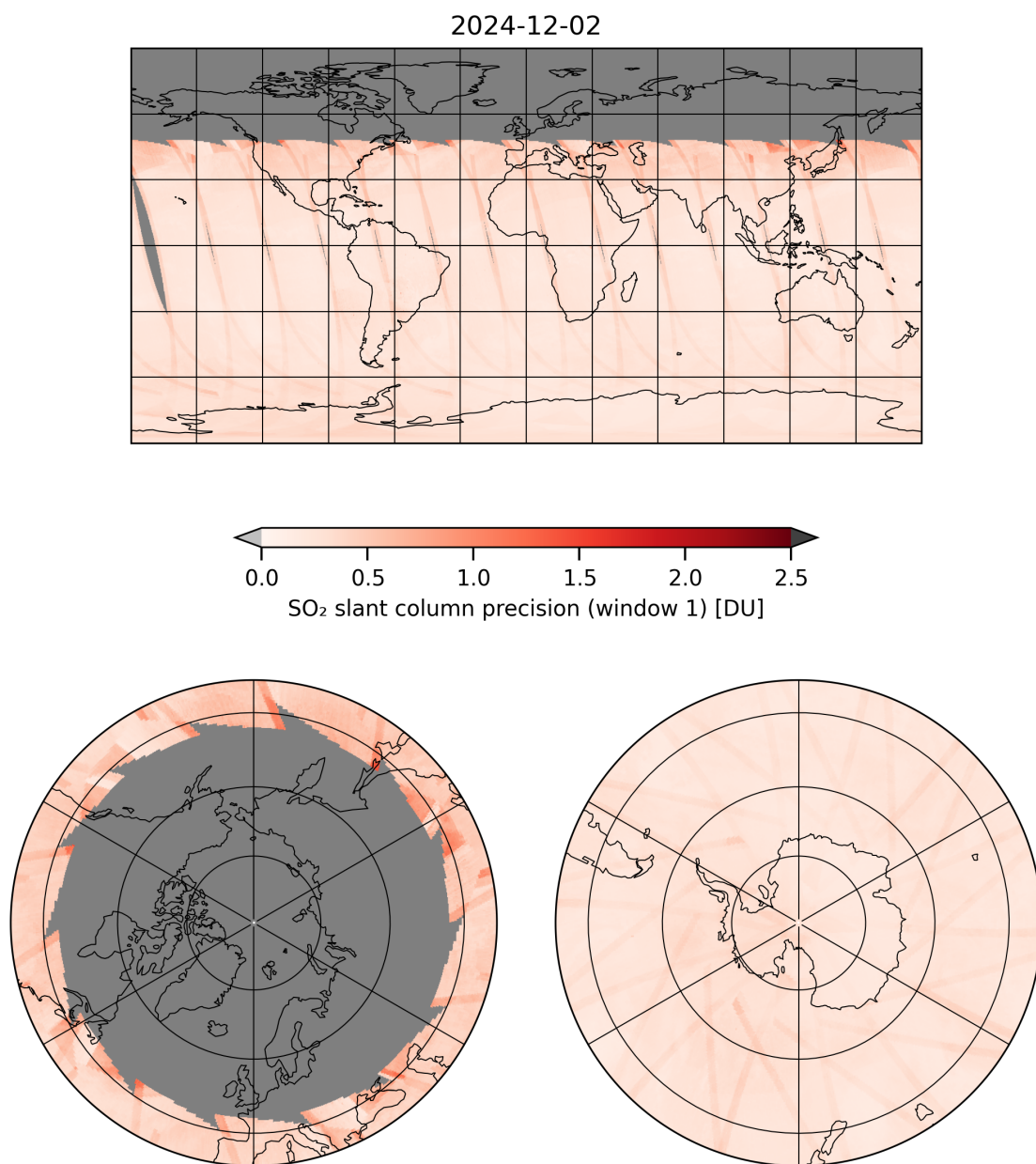


Figure 10: Map of “SO₂ slant column precision (window 1)” for 2024-12-02 to 2024-12-03

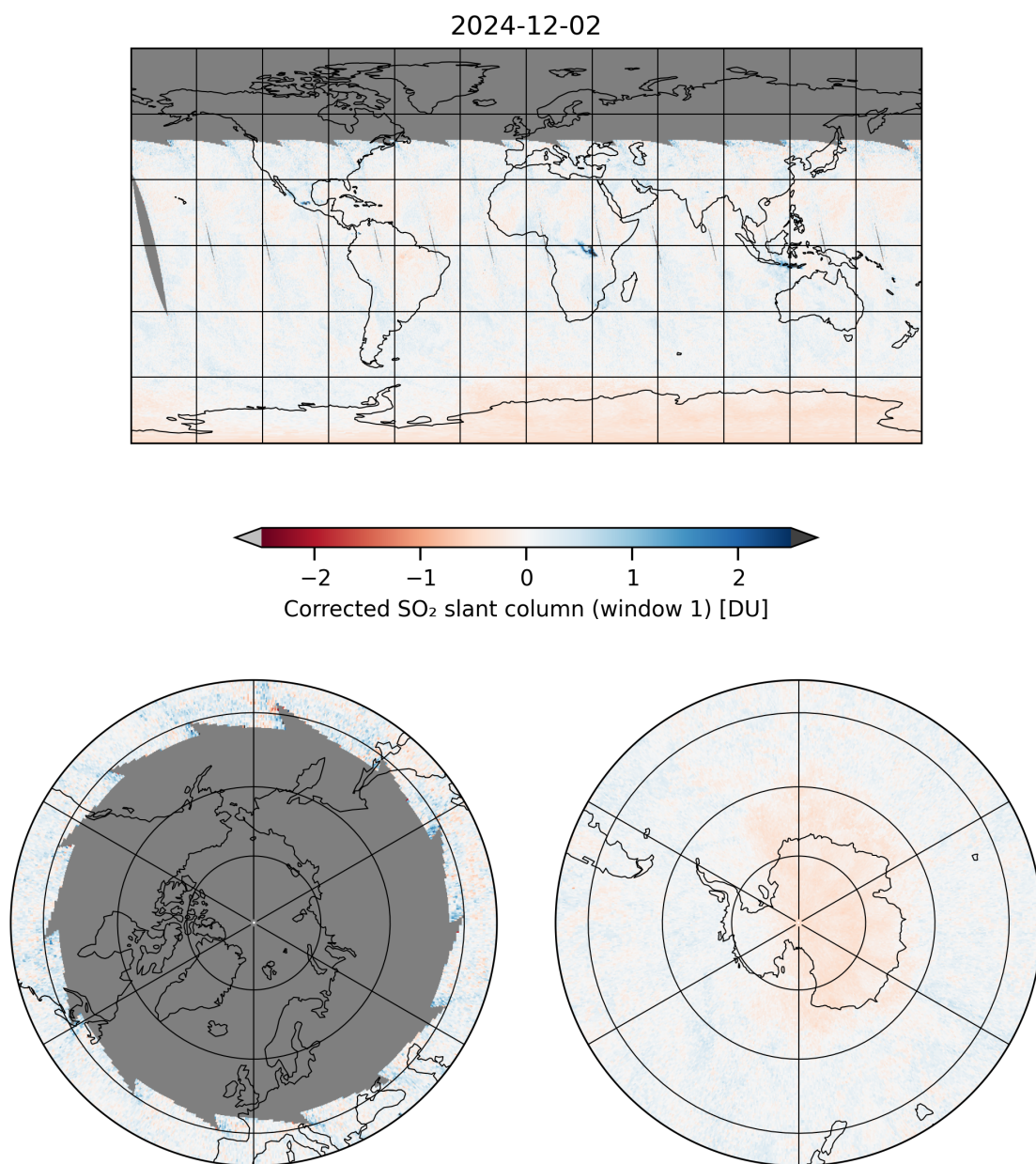


Figure 11: Map of “Corrected SO₂ slant column (window 1)” for 2024-12-02 to 2024-12-03

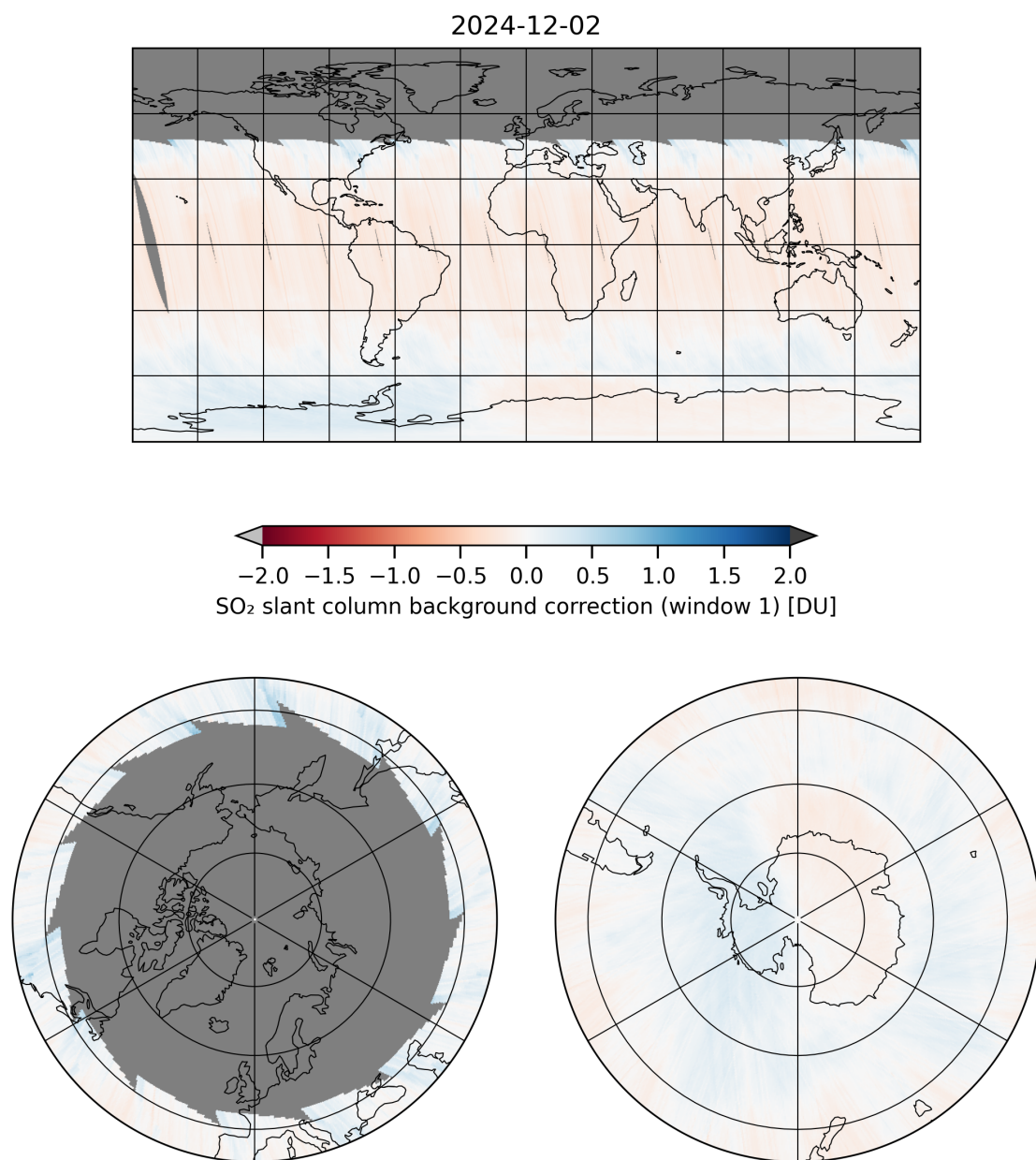


Figure 12: Map of “SO₂ slant column background correction (window 1)” for 2024-12-02 to 2024-12-03

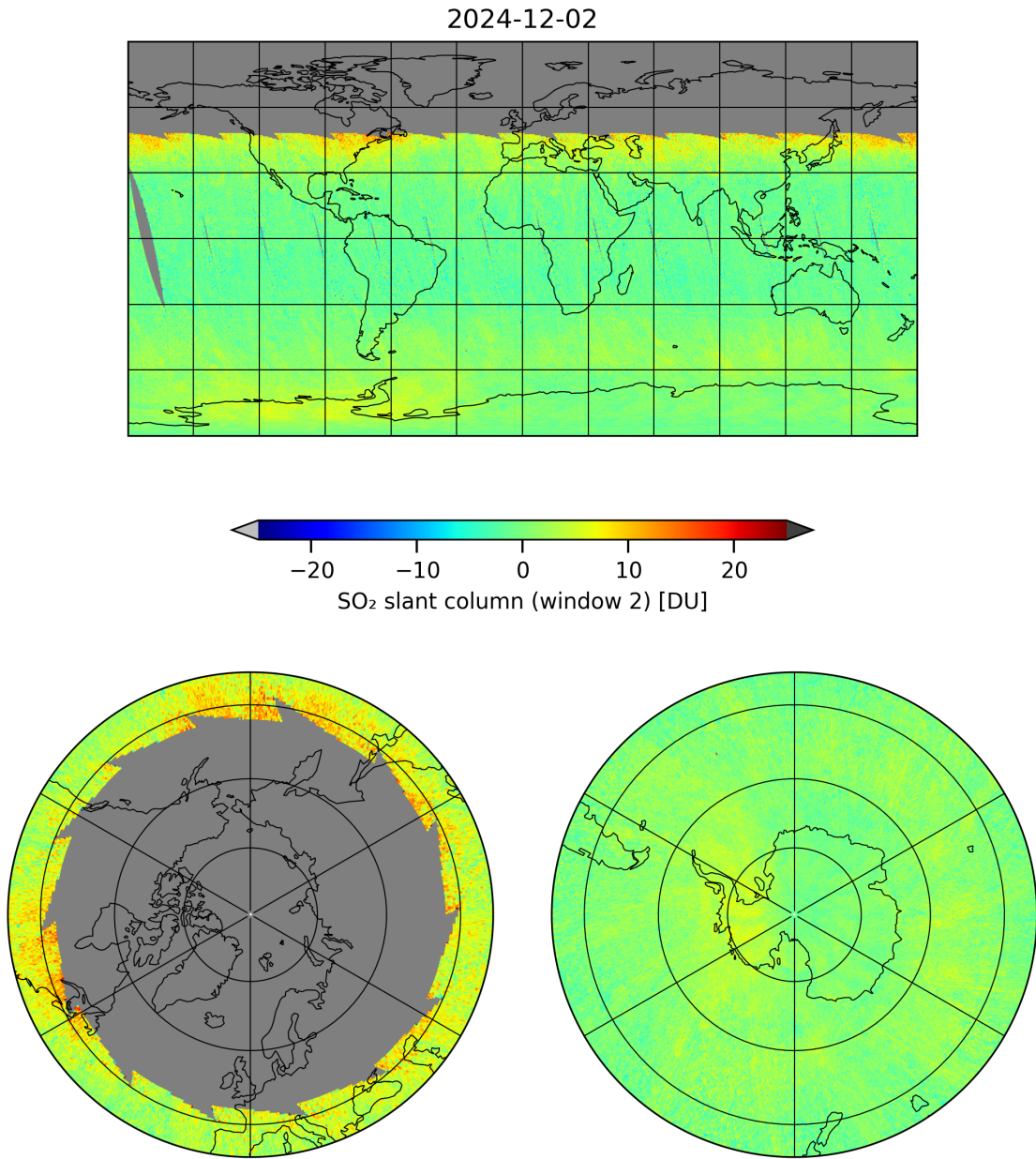


Figure 13: Map of “SO₂ slant column (window 2)” for 2024-12-02 to 2024-12-03

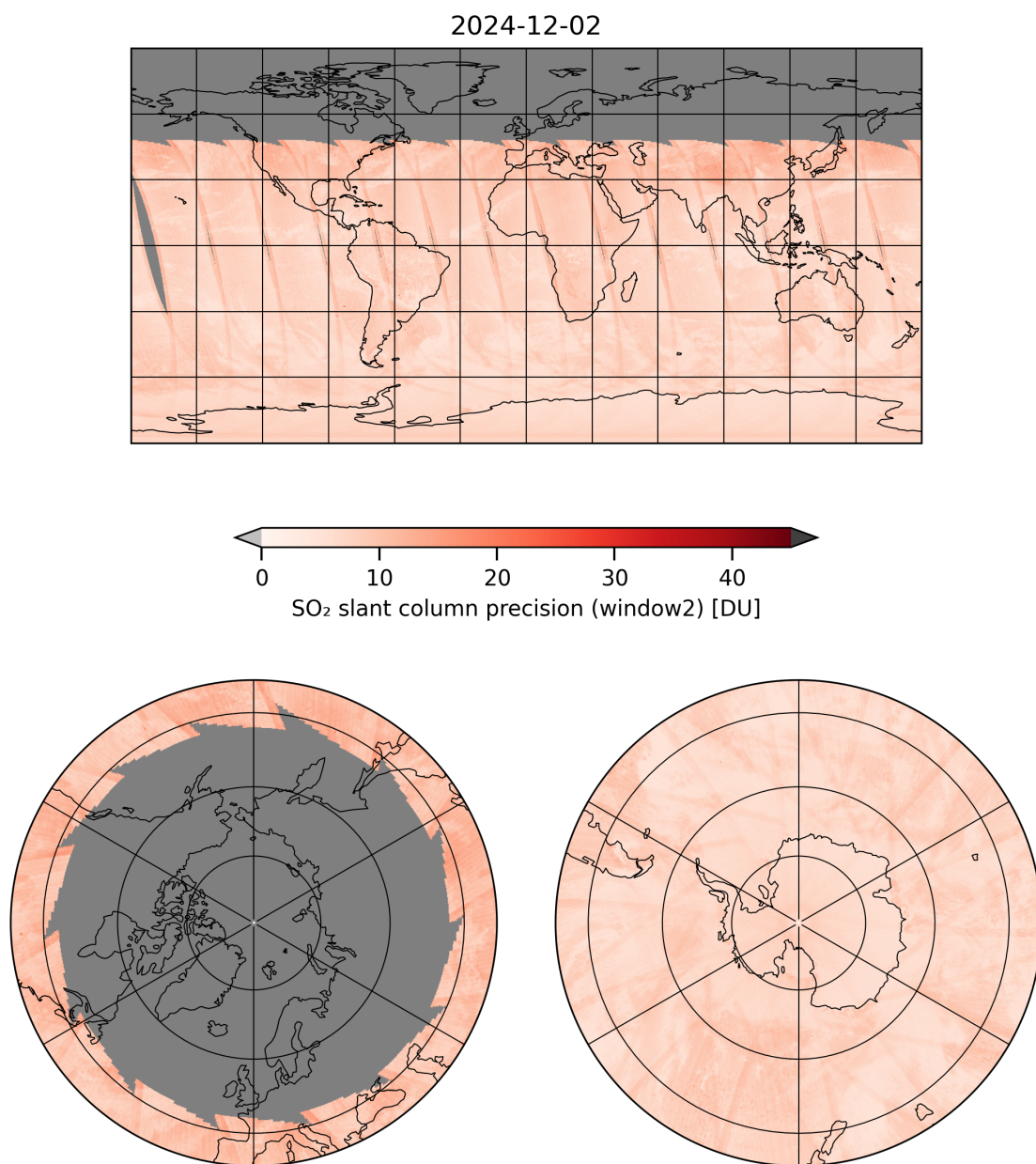


Figure 14: Map of “SO₂ slant column precision (window2)” for 2024-12-02 to 2024-12-03

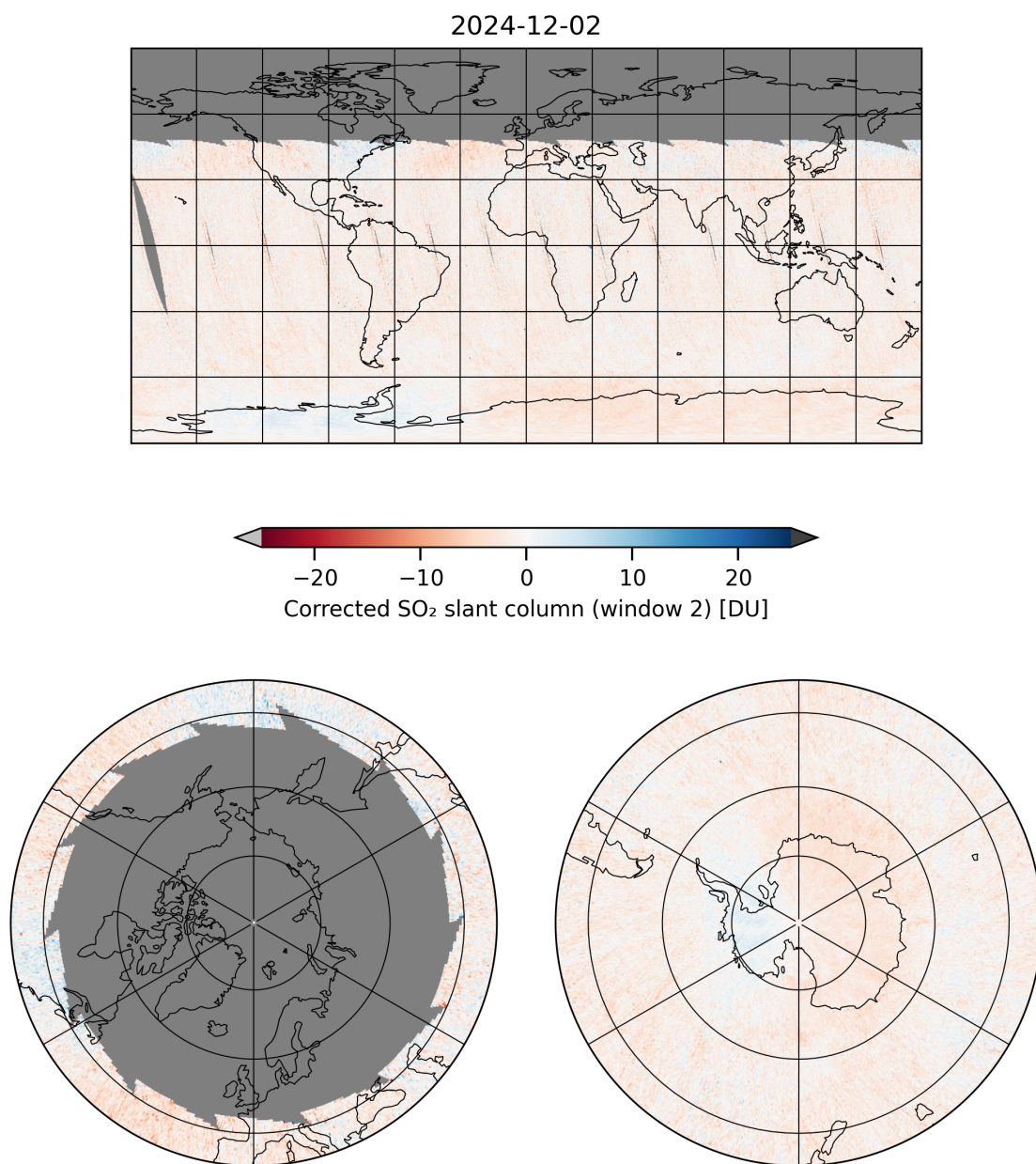


Figure 15: Map of "Corrected SO₂ slant column (window 2)" for 2024-12-02 to 2024-12-03

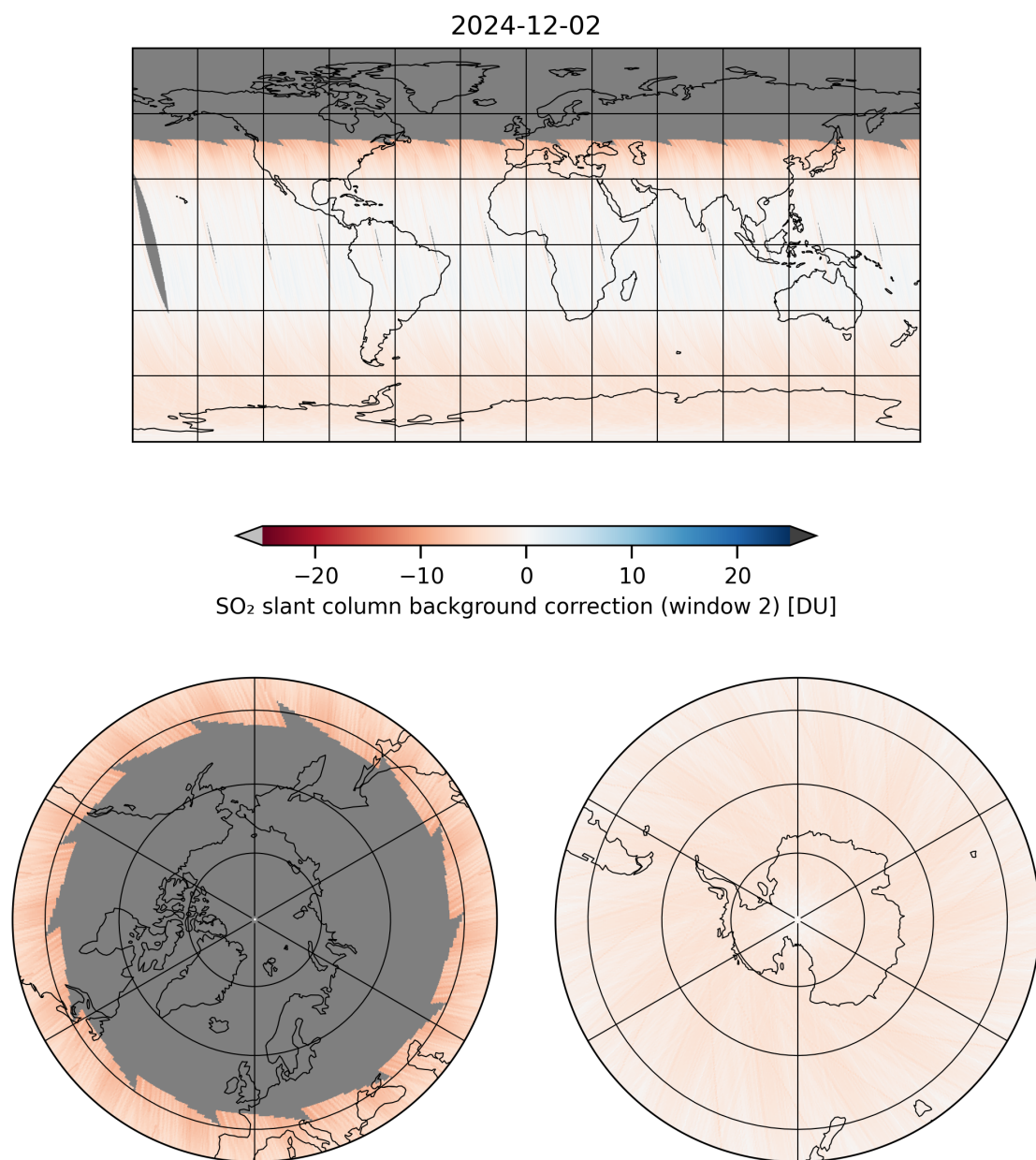


Figure 16: Map of “SO₂ slant column background correction (window 2)” for 2024-12-02 to 2024-12-03

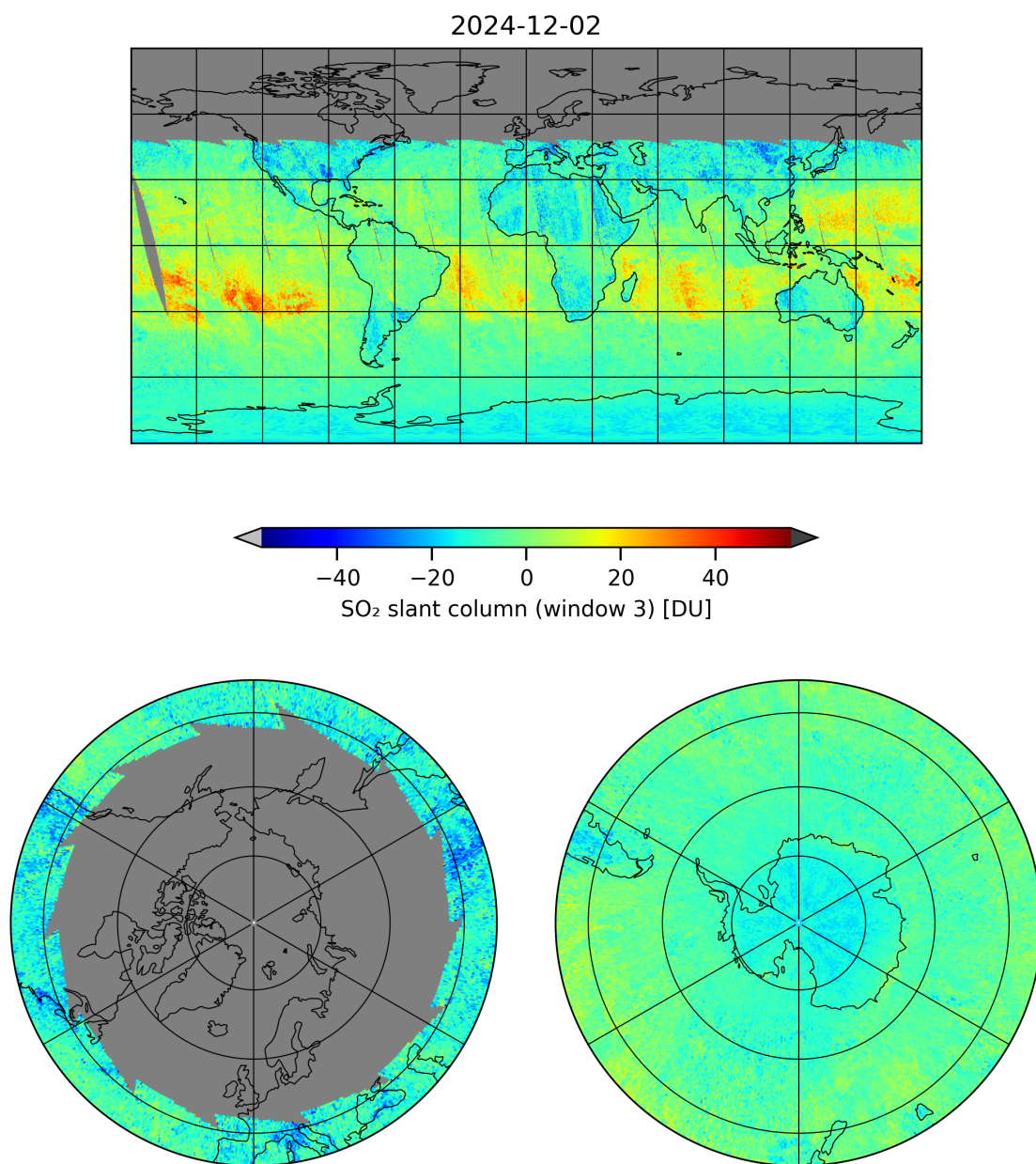


Figure 17: Map of “SO₂ slant column (window 3)” for 2024-12-02 to 2024-12-03

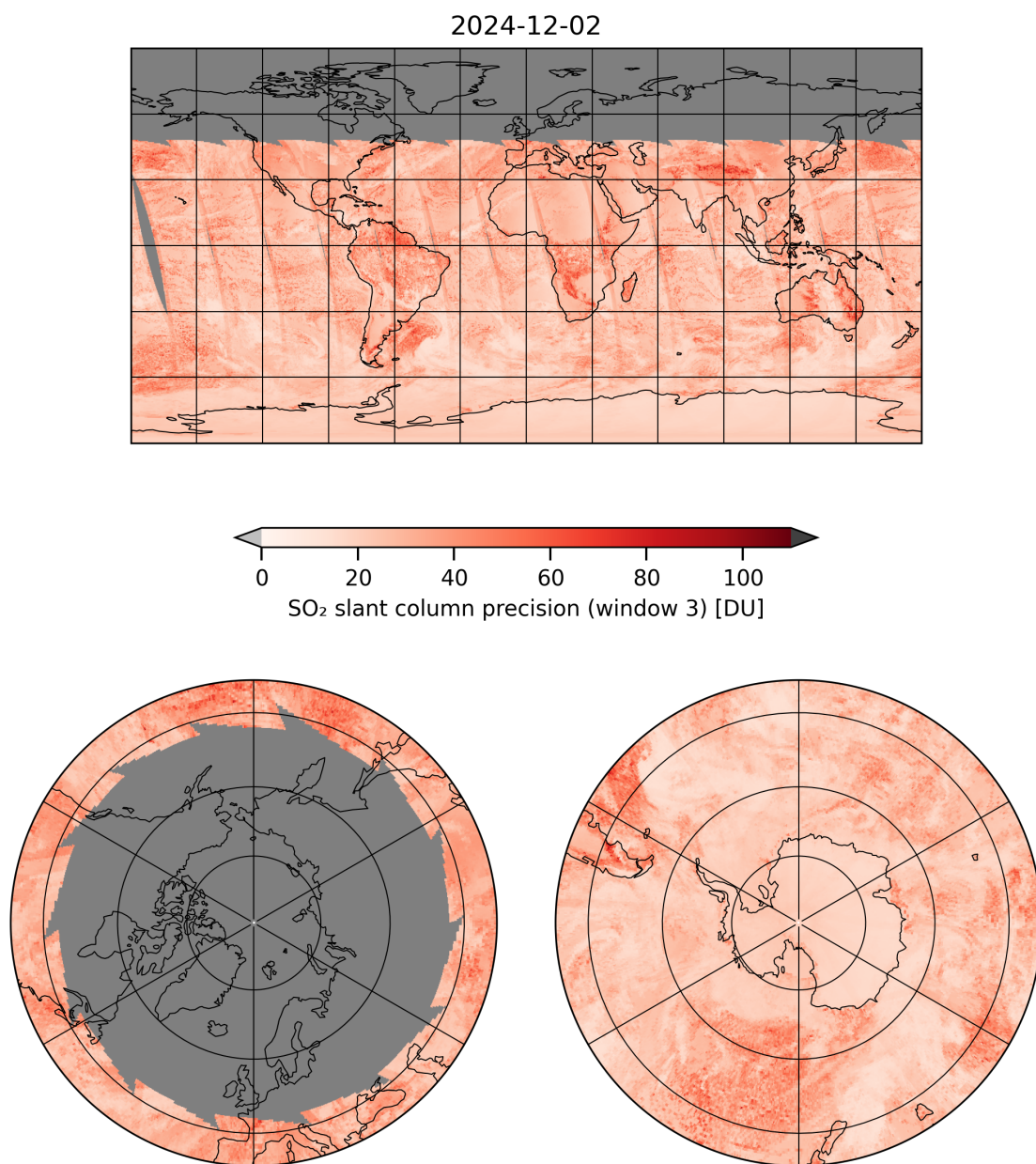


Figure 18: Map of “SO₂ slant column precision (window 3)” for 2024-12-02 to 2024-12-03

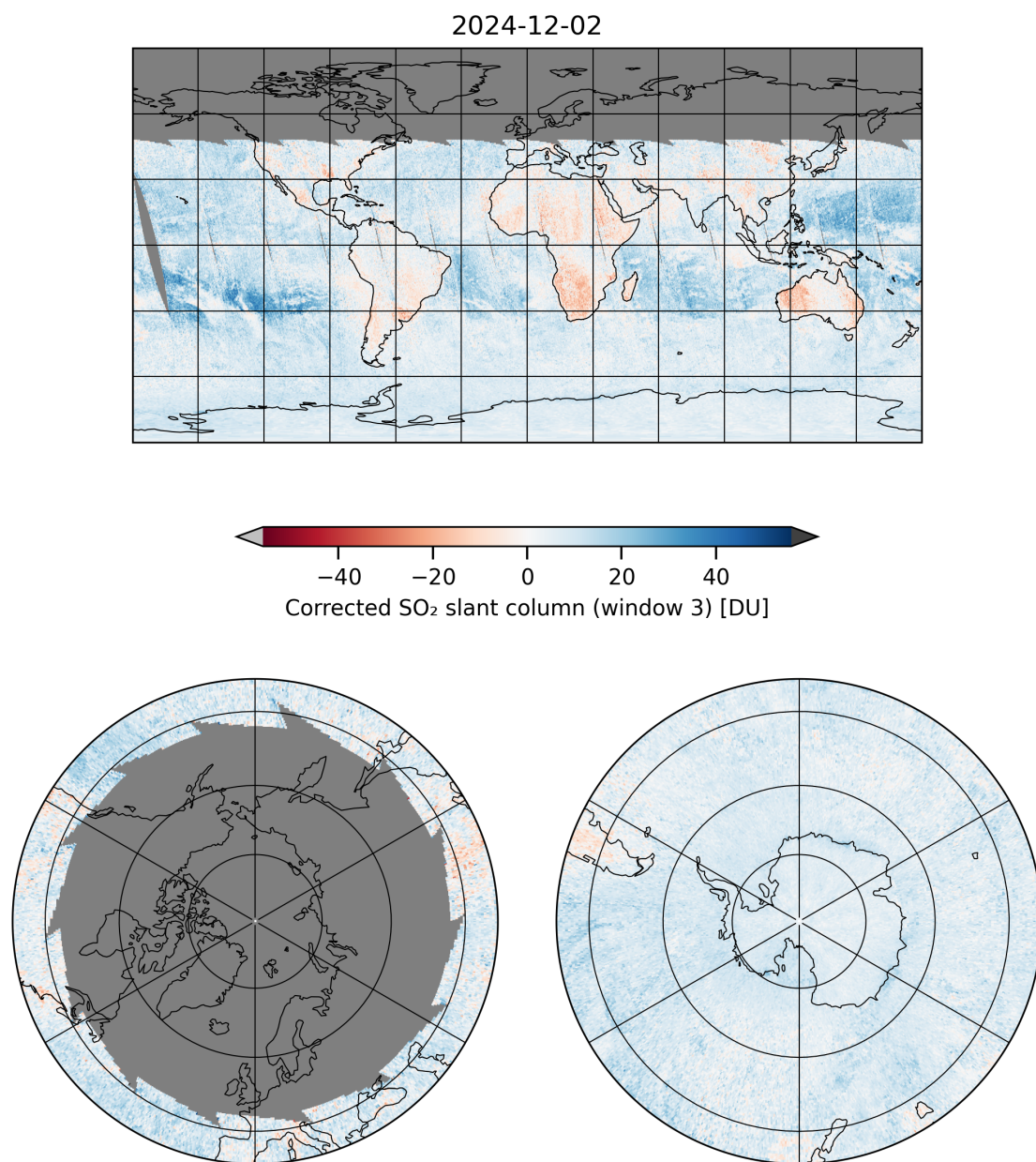


Figure 19: Map of "Corrected SO₂ slant column (window 3)" for 2024-12-02 to 2024-12-03

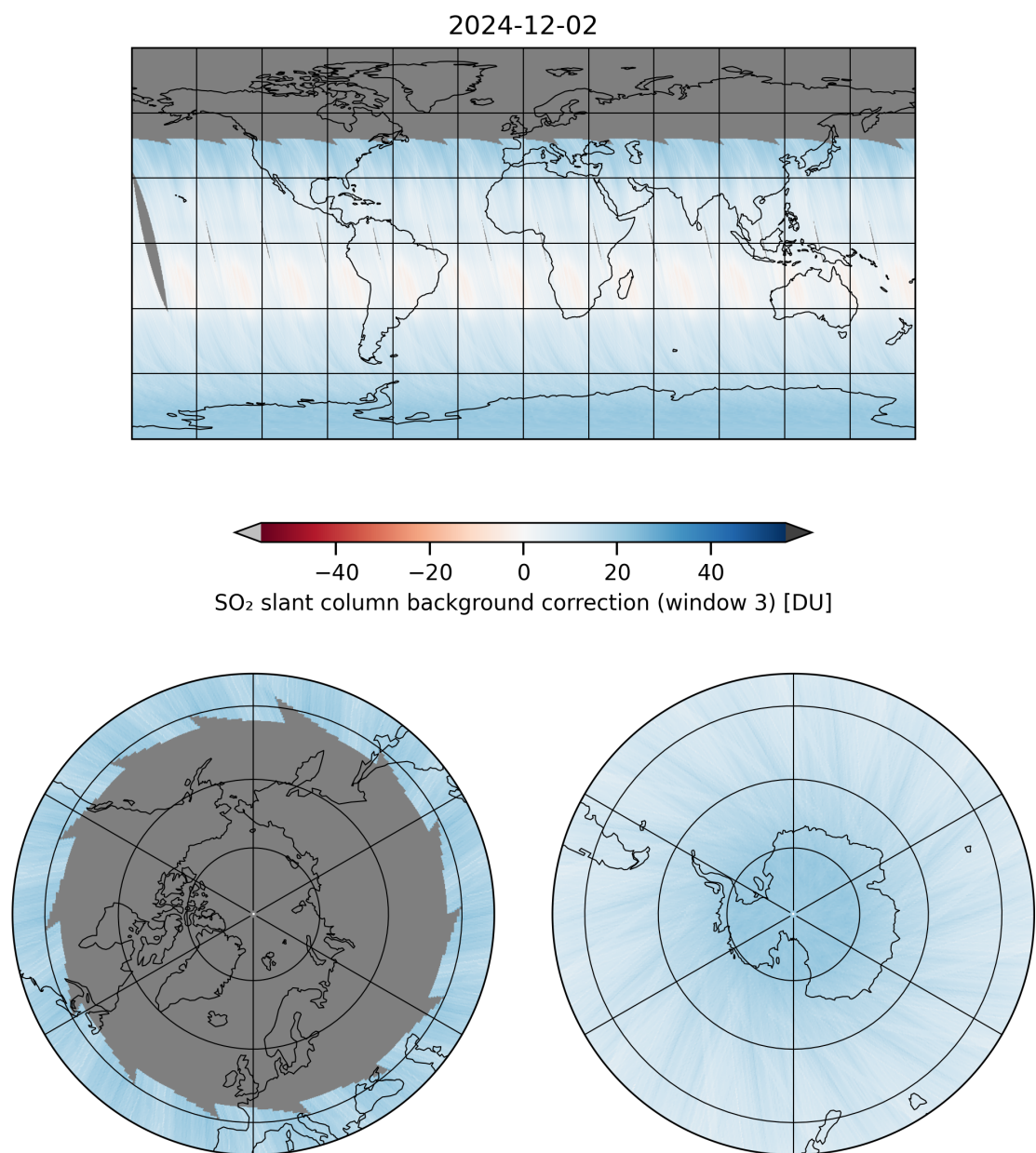


Figure 20: Map of “SO₂ slant column background correction (window 3)” for 2024-12-02 to 2024-12-03

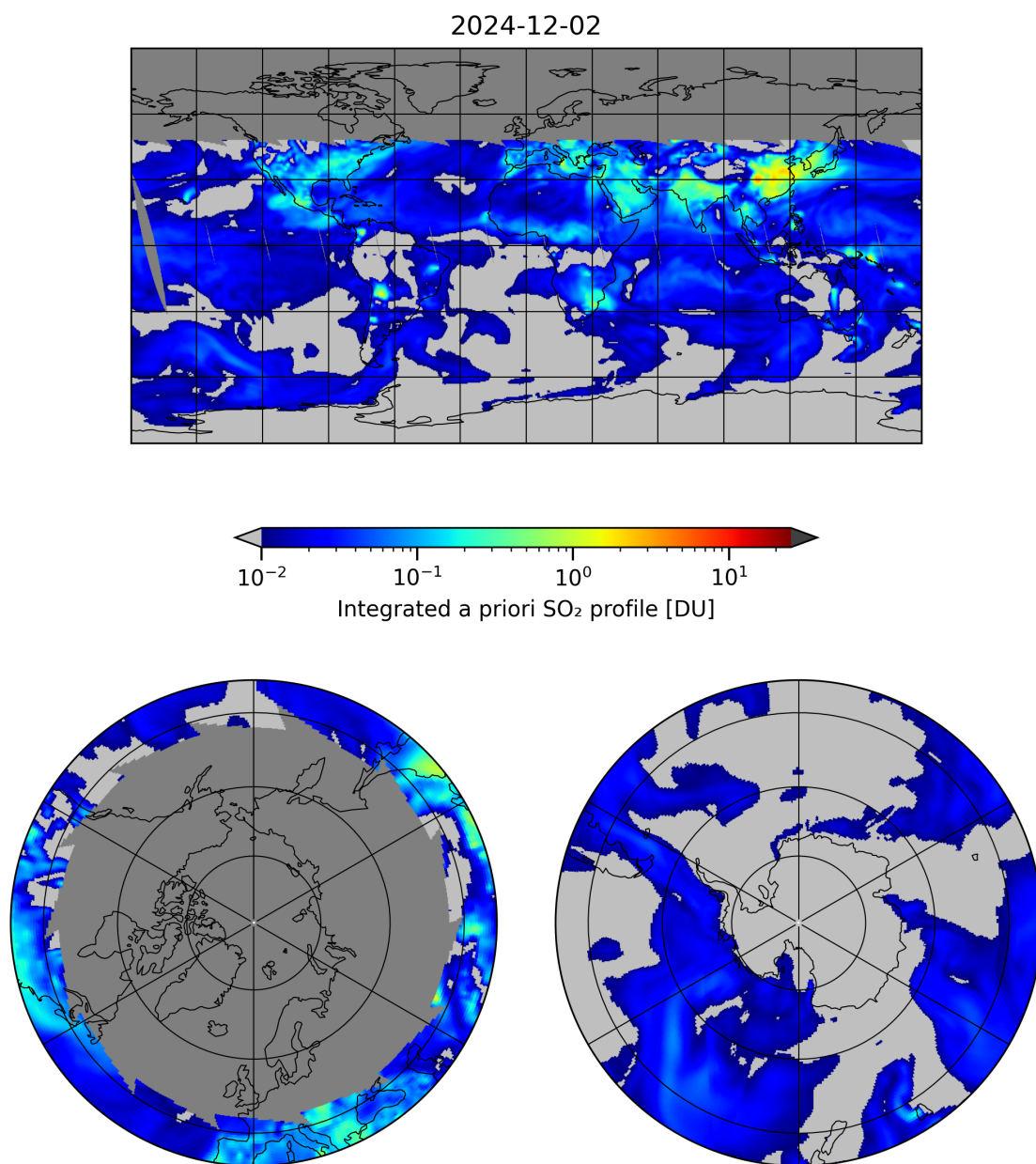


Figure 21: Map of “Integrated a priori SO₂ profile” for 2024-12-02 to 2024-12-03

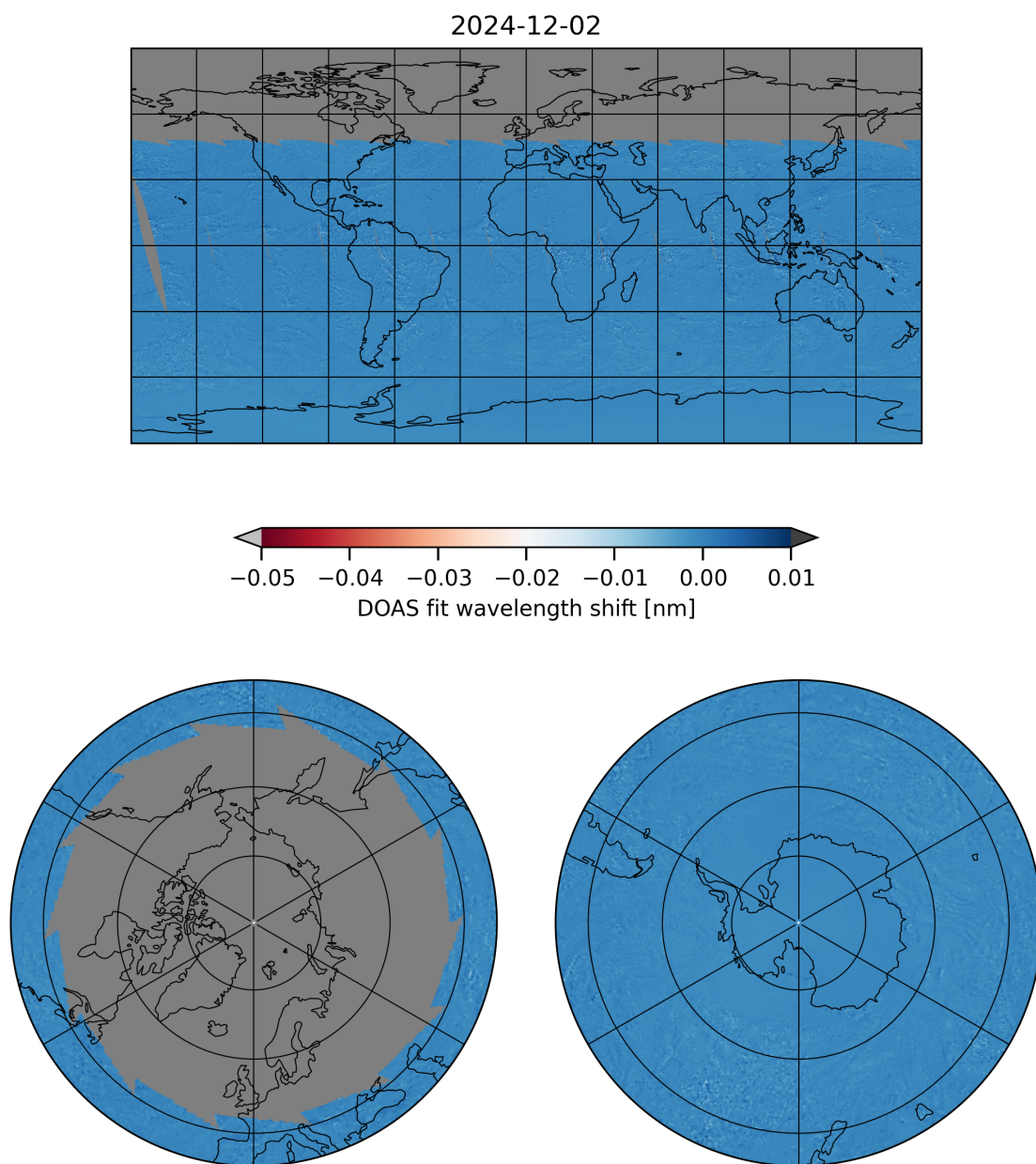


Figure 22: Map of “DOAS fit wavelength shift” for 2024-12-02 to 2024-12-03

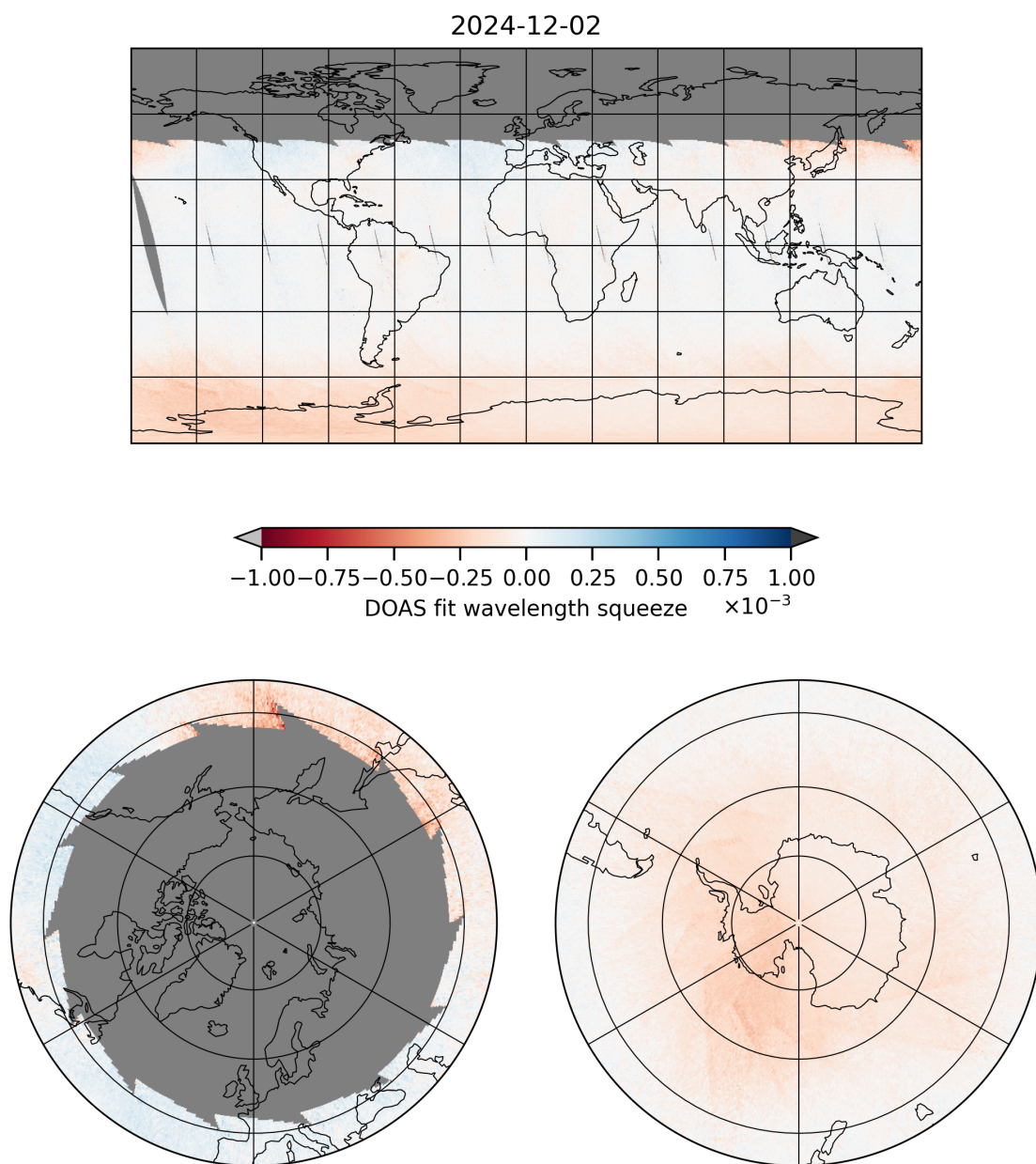


Figure 23: Map of “DOAS fit wavelength squeeze” for 2024-12-02 to 2024-12-03

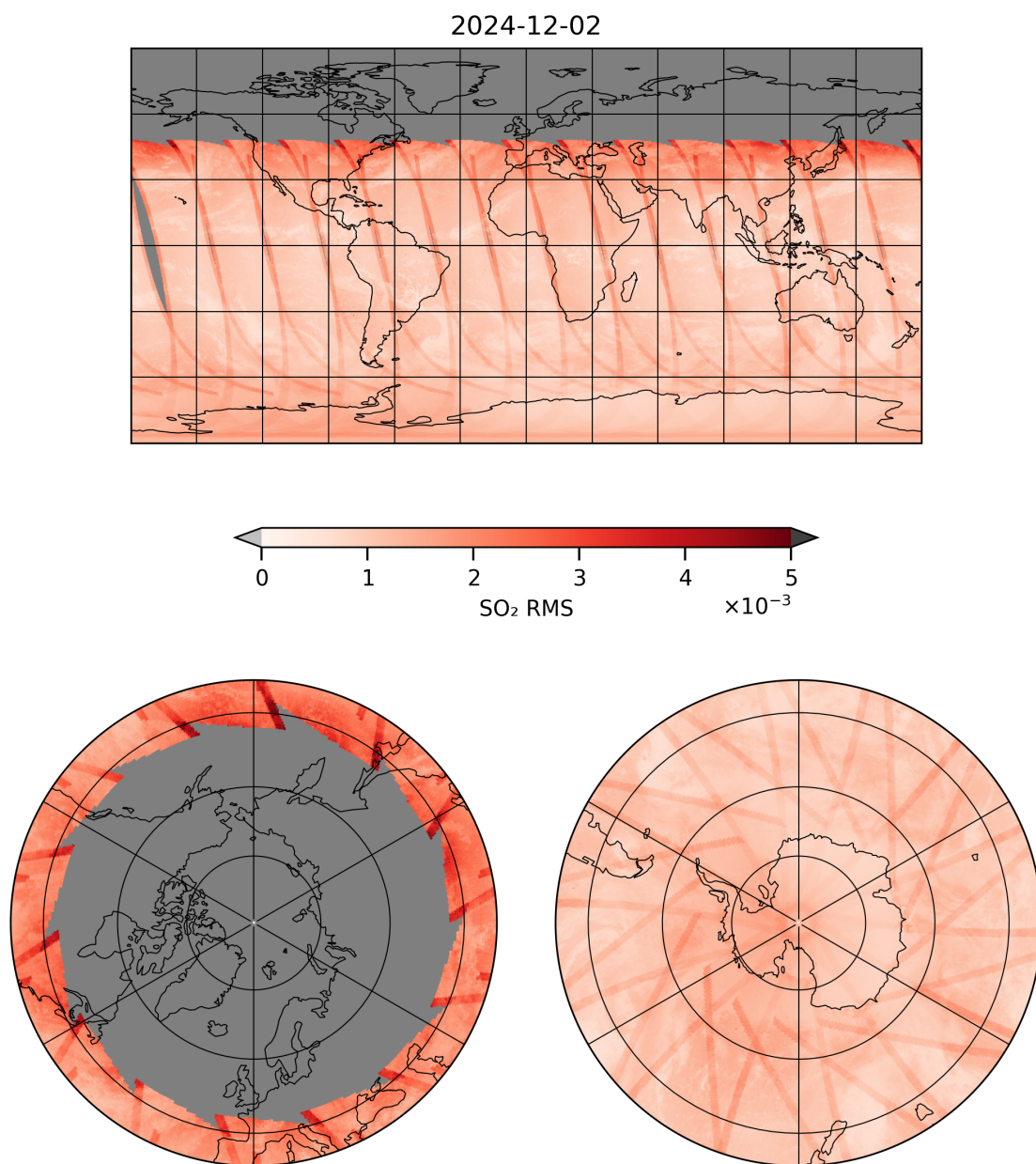


Figure 24: Map of “SO₂ RMS” for 2024-12-02 to 2024-12-03

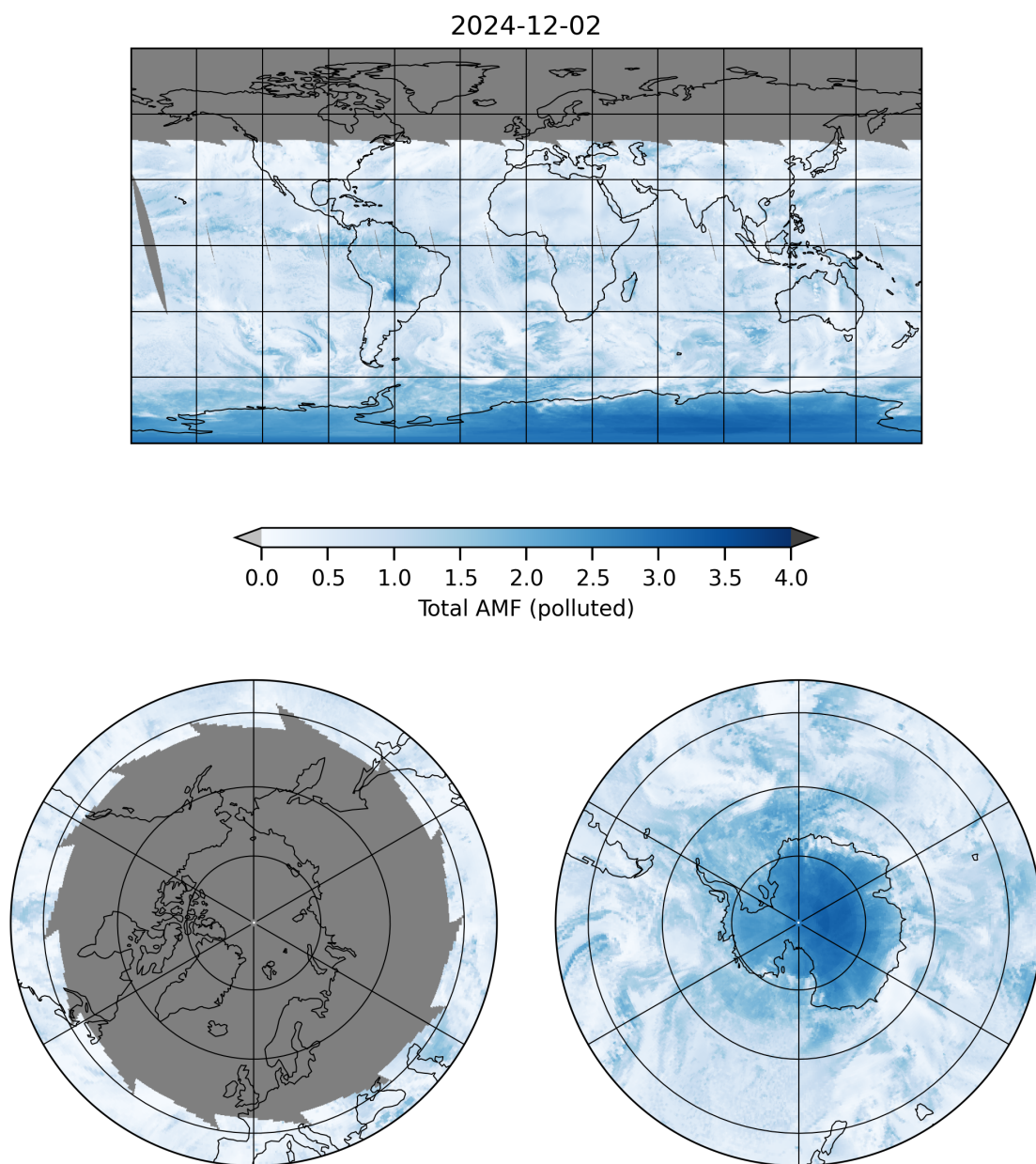


Figure 25: Map of “Total AMF (polluted)” for 2024-12-02 to 2024-12-03

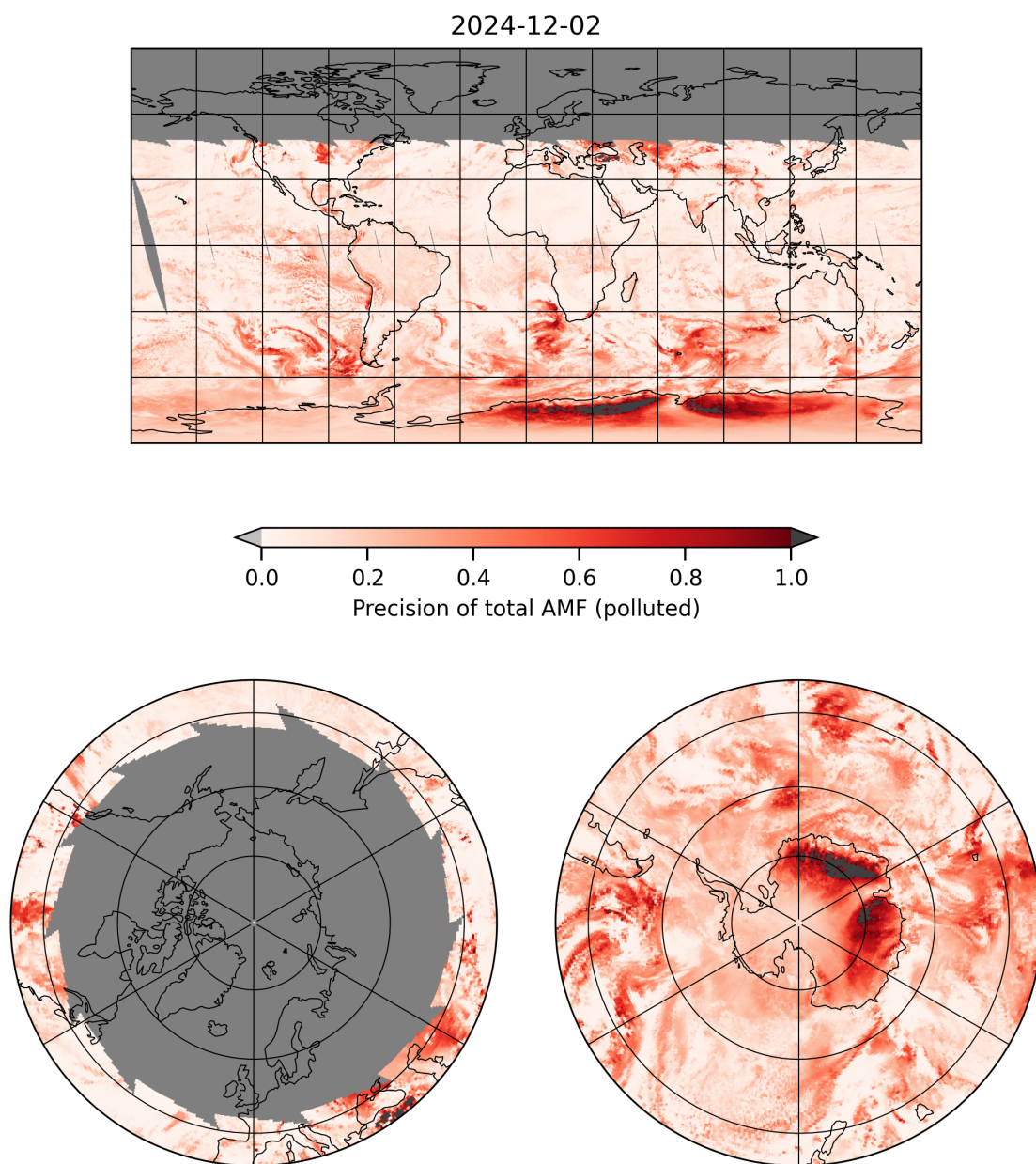


Figure 26: Map of “Precision of total AMF (polluted)” for 2024-12-02 to 2024-12-03

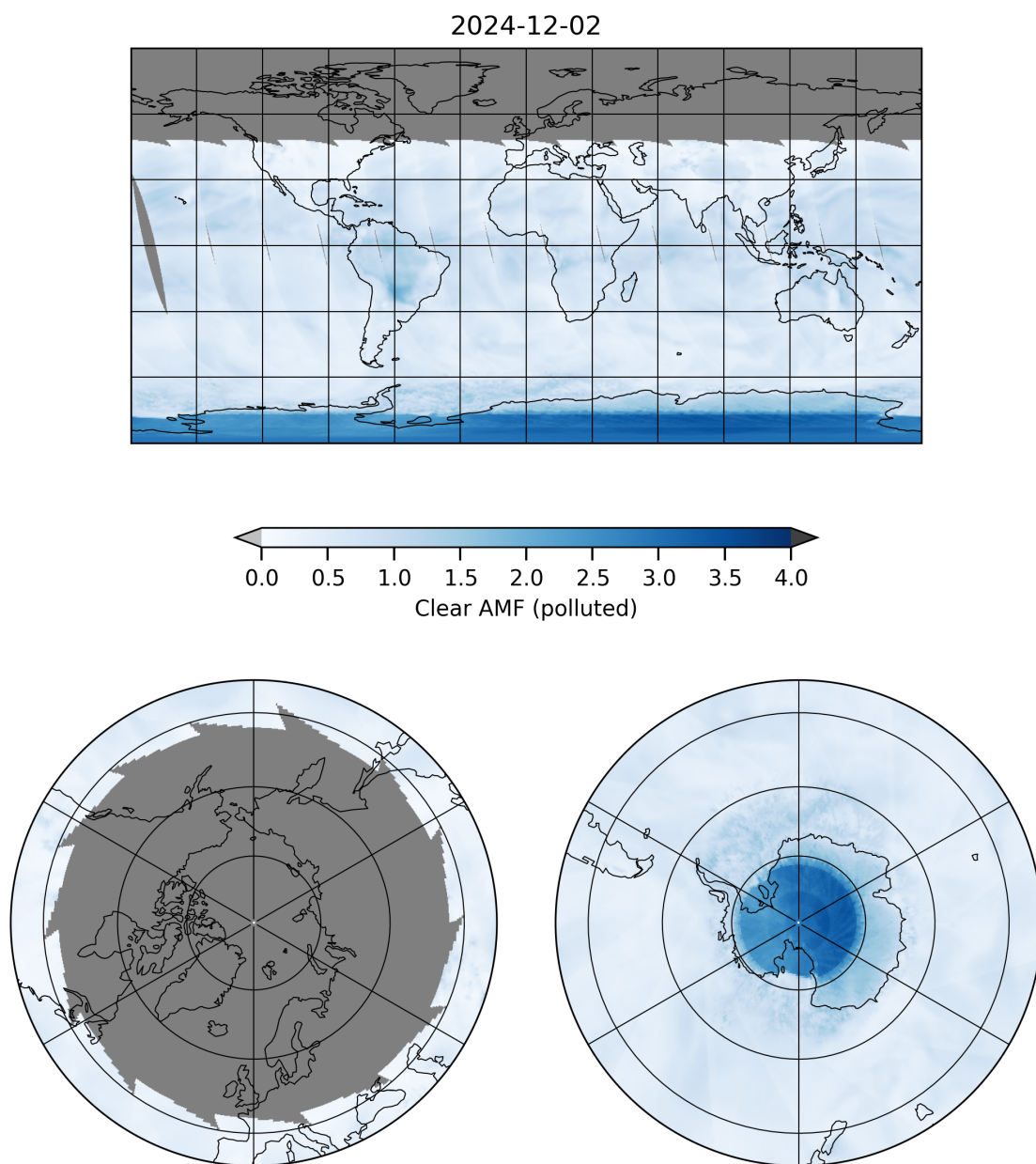


Figure 27: Map of “Clear AMF (polluted)” for 2024-12-02 to 2024-12-03

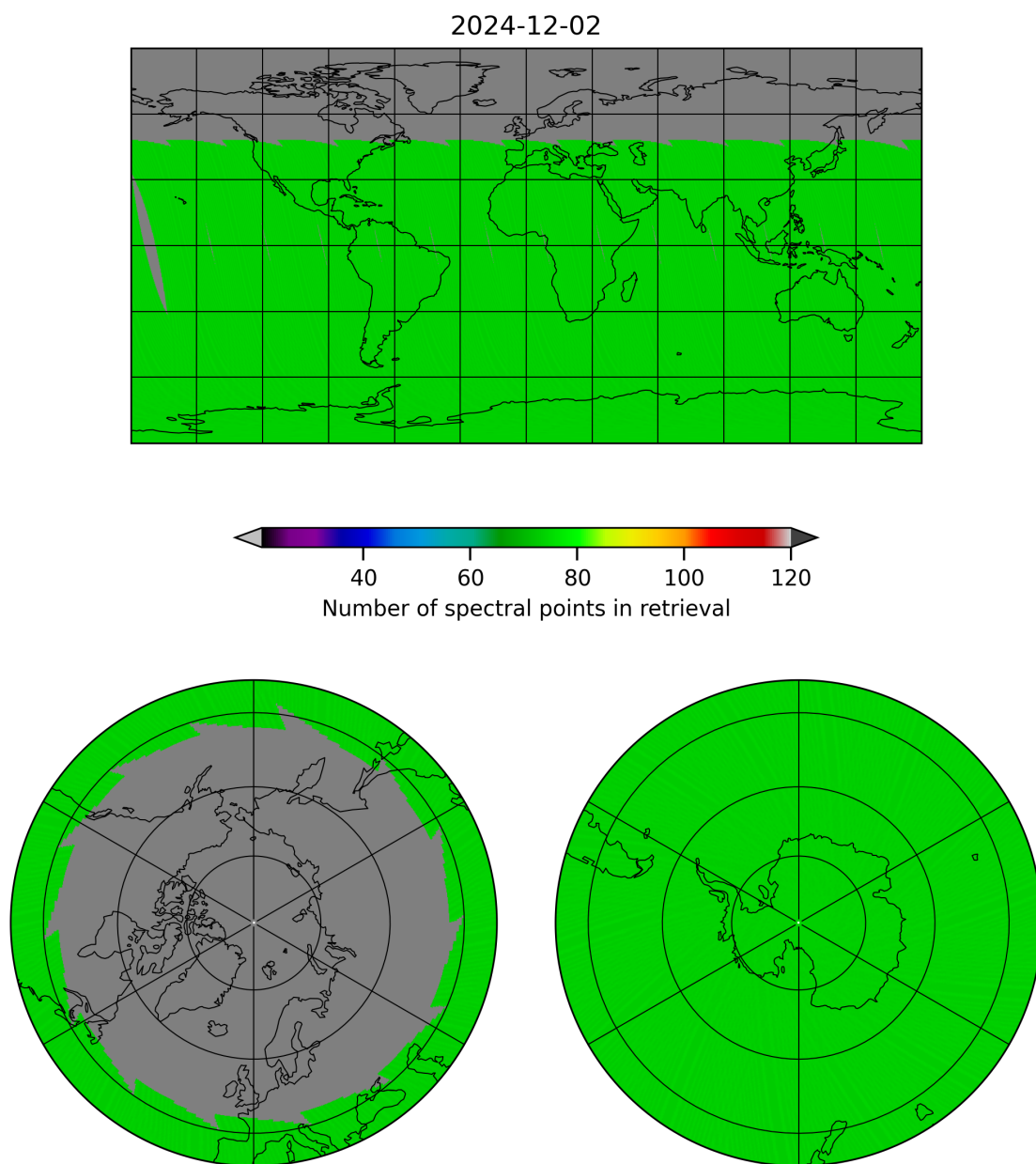


Figure 28: Map of “Number of spectral points in retrieval” for 2024-12-02 to 2024-12-03

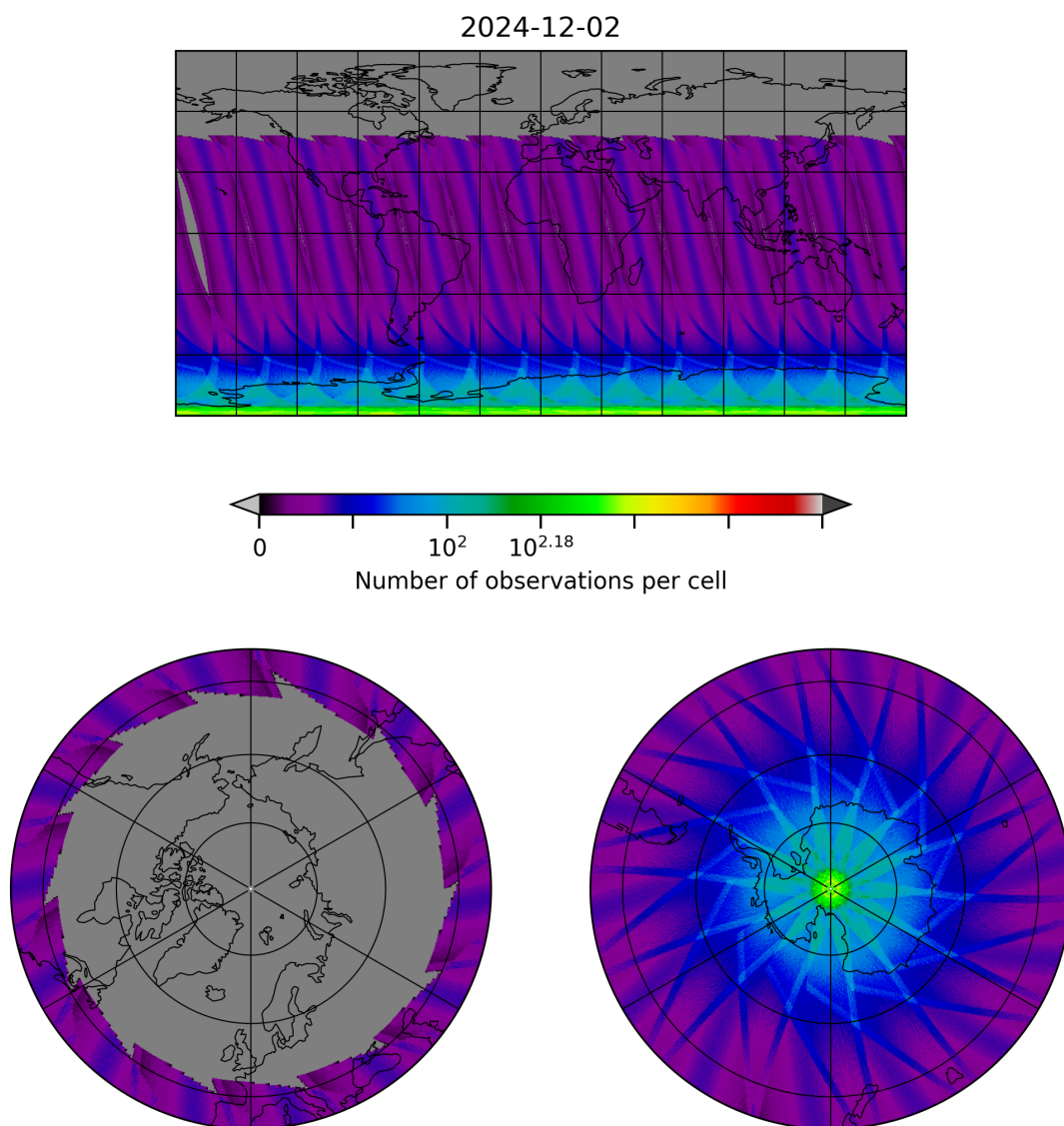


Figure 29: Map of the number of observations for 2024-12-02 to 2024-12-03

7 Zonal average

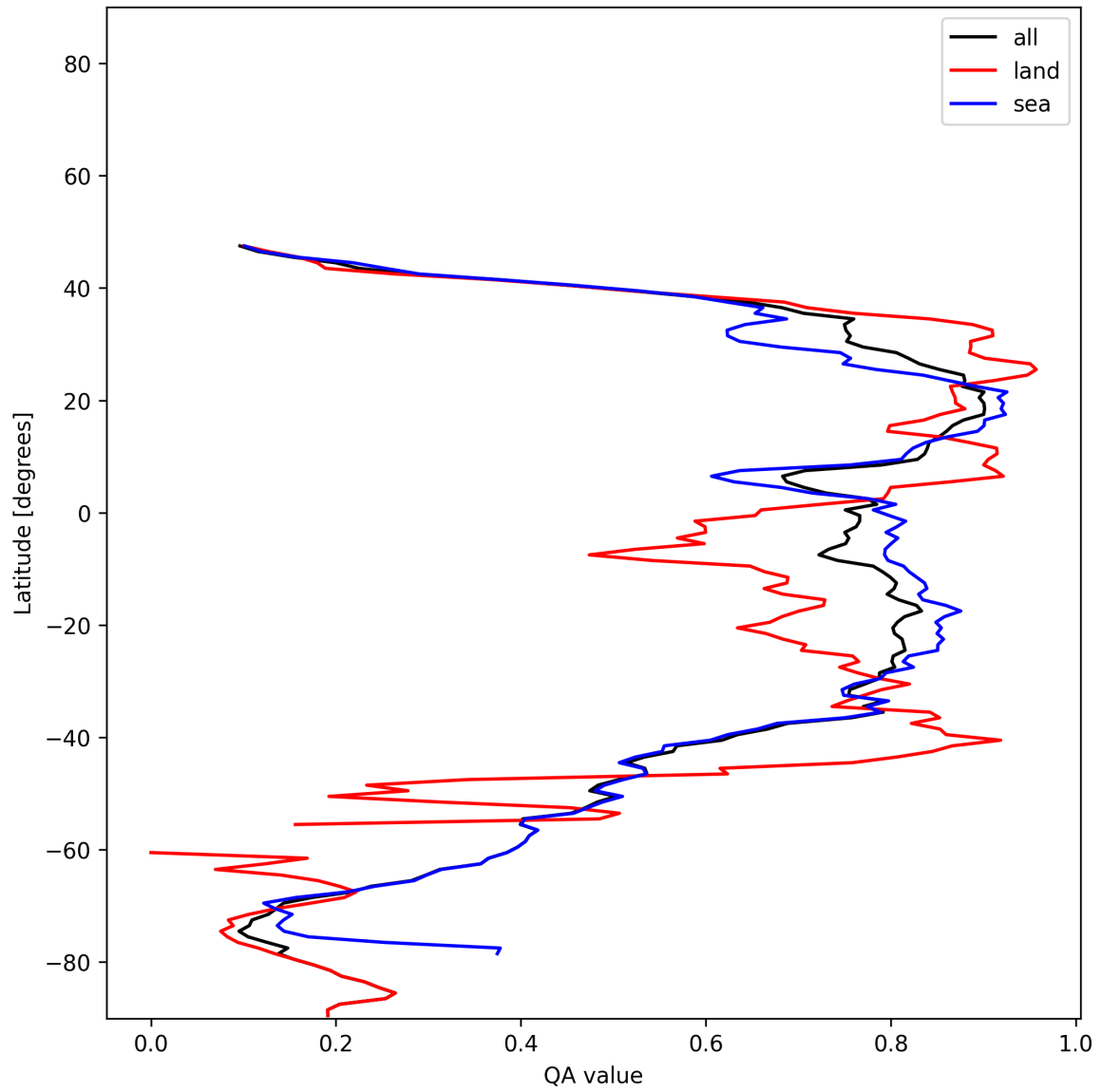


Figure 30: Zonal average of “QA value” for 2024-12-02 to 2024-12-03.

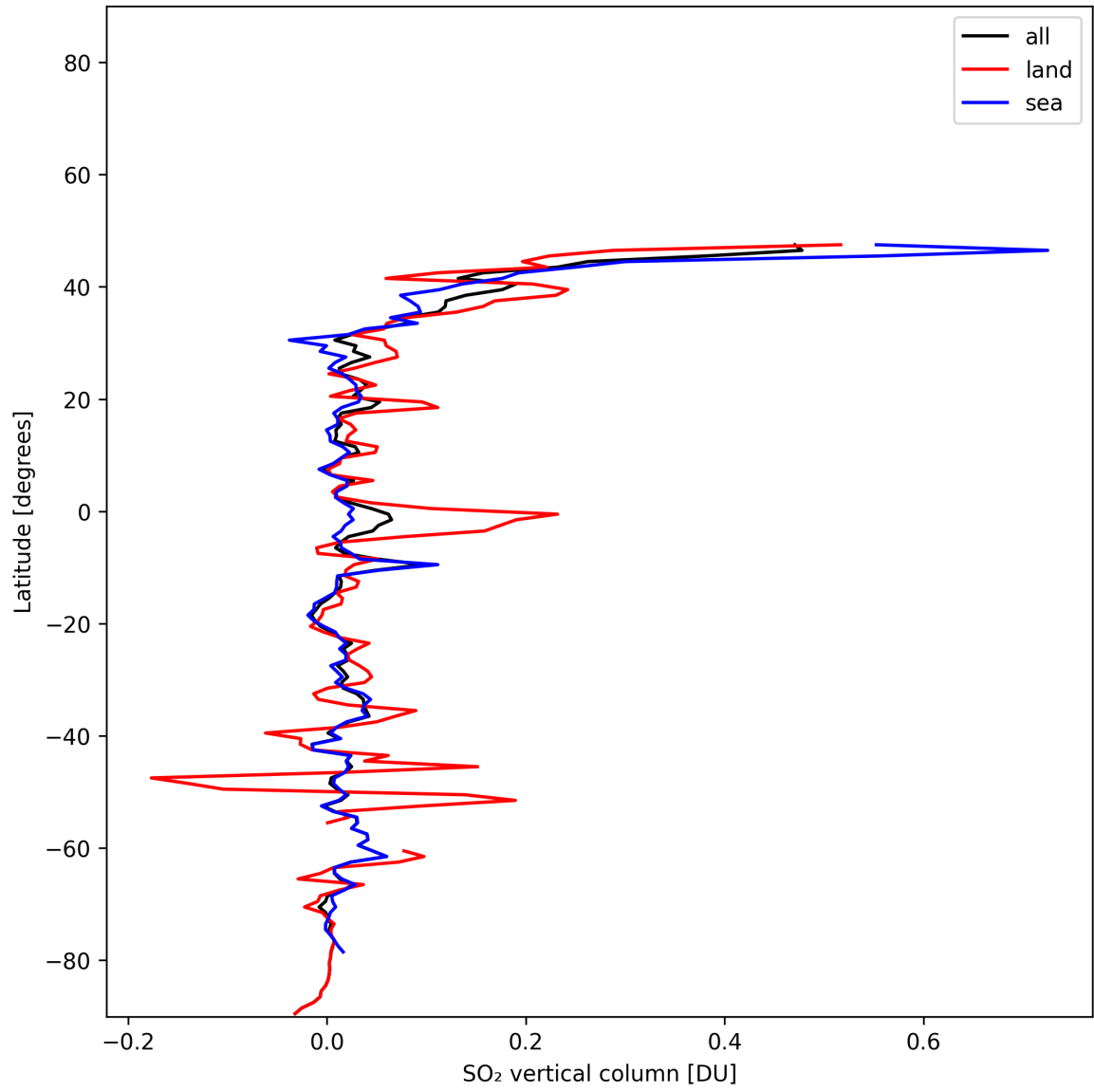


Figure 31: Zonal average of “SO₂ vertical column” for 2024-12-02 to 2024-12-03.

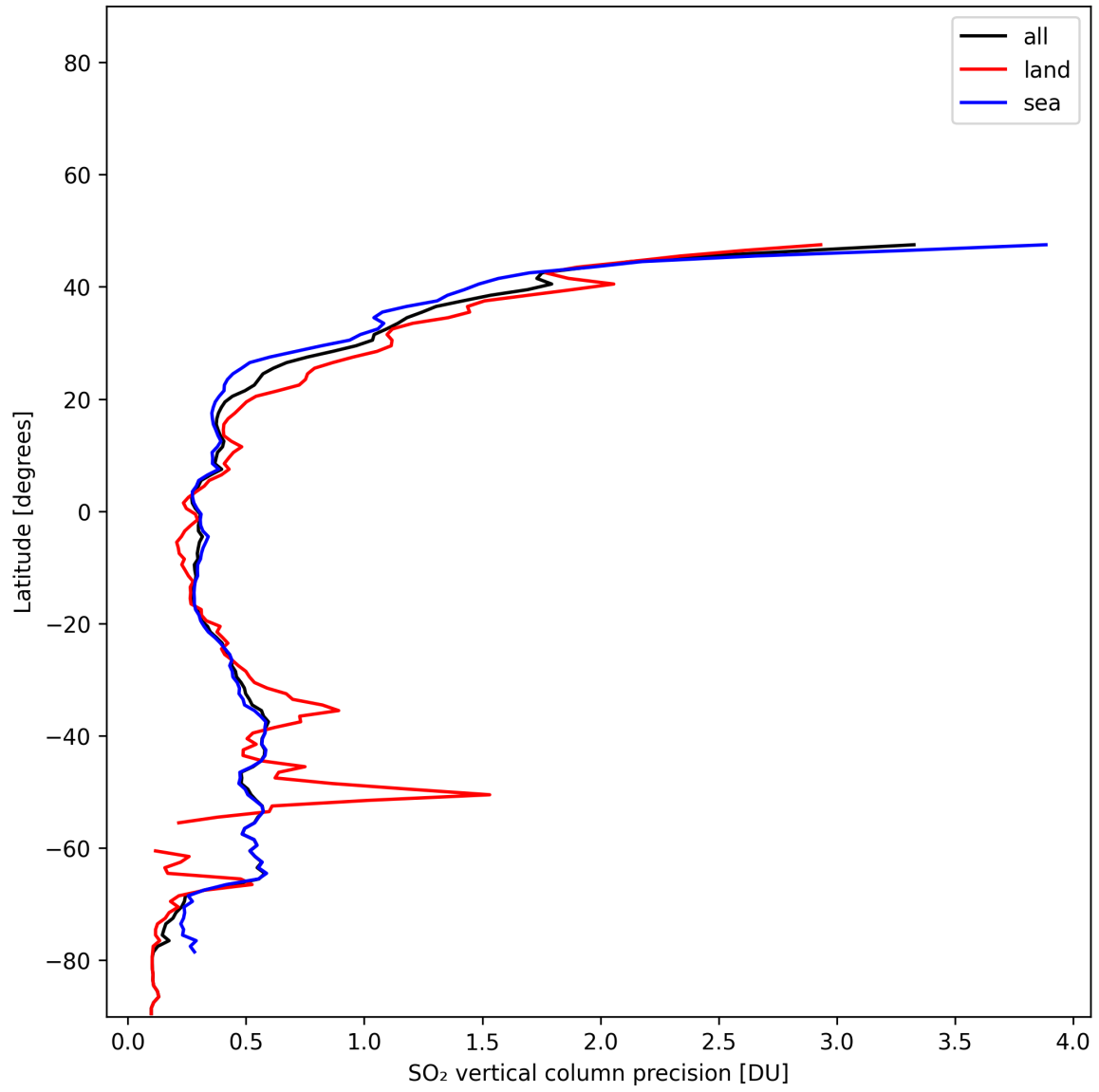


Figure 32: Zonal average of “SO₂ vertical column precision” for 2024-12-02 to 2024-12-03.

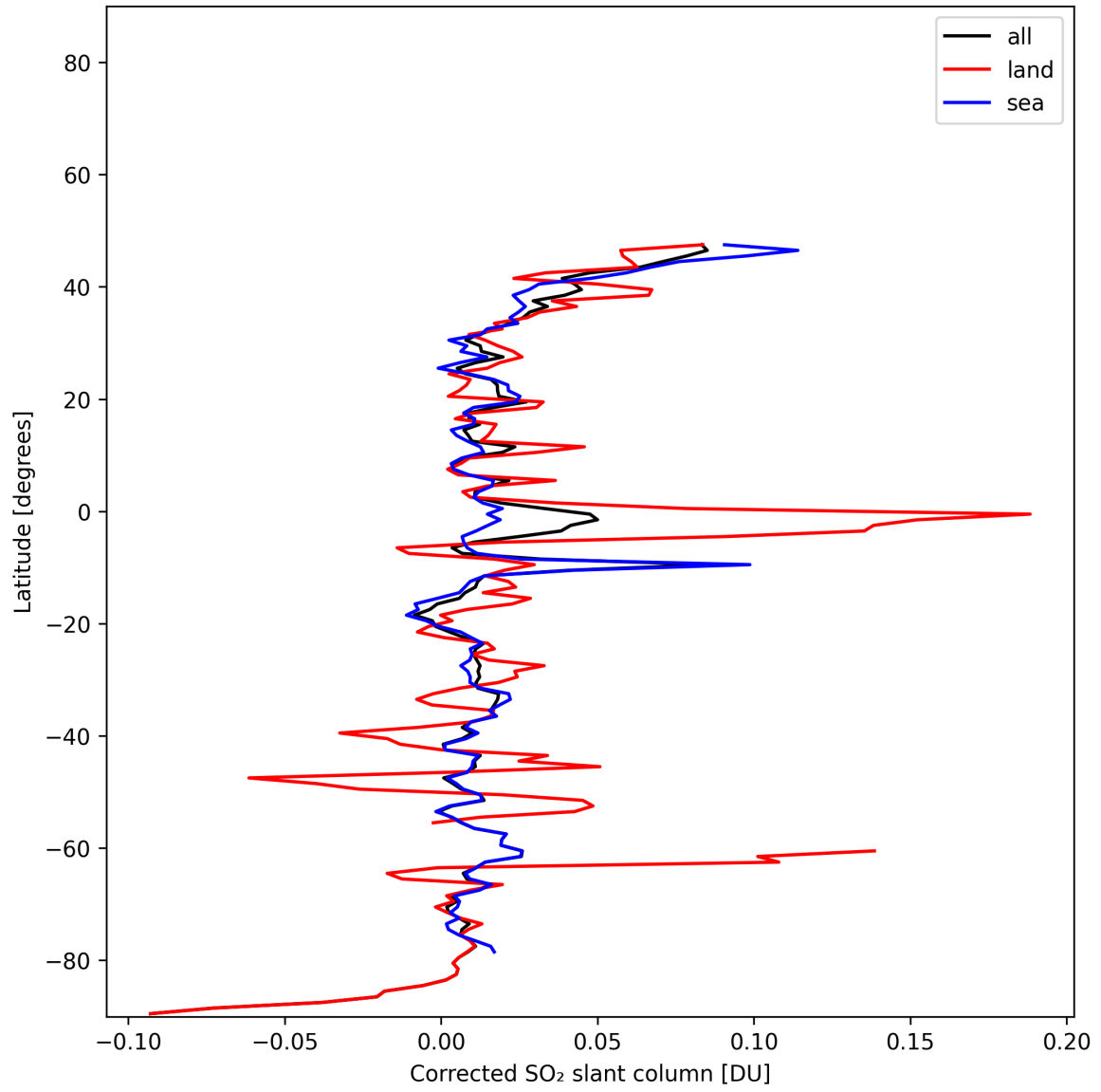


Figure 33: Zonal average of “Corrected SO₂ slant column” for 2024-12-02 to 2024-12-03.

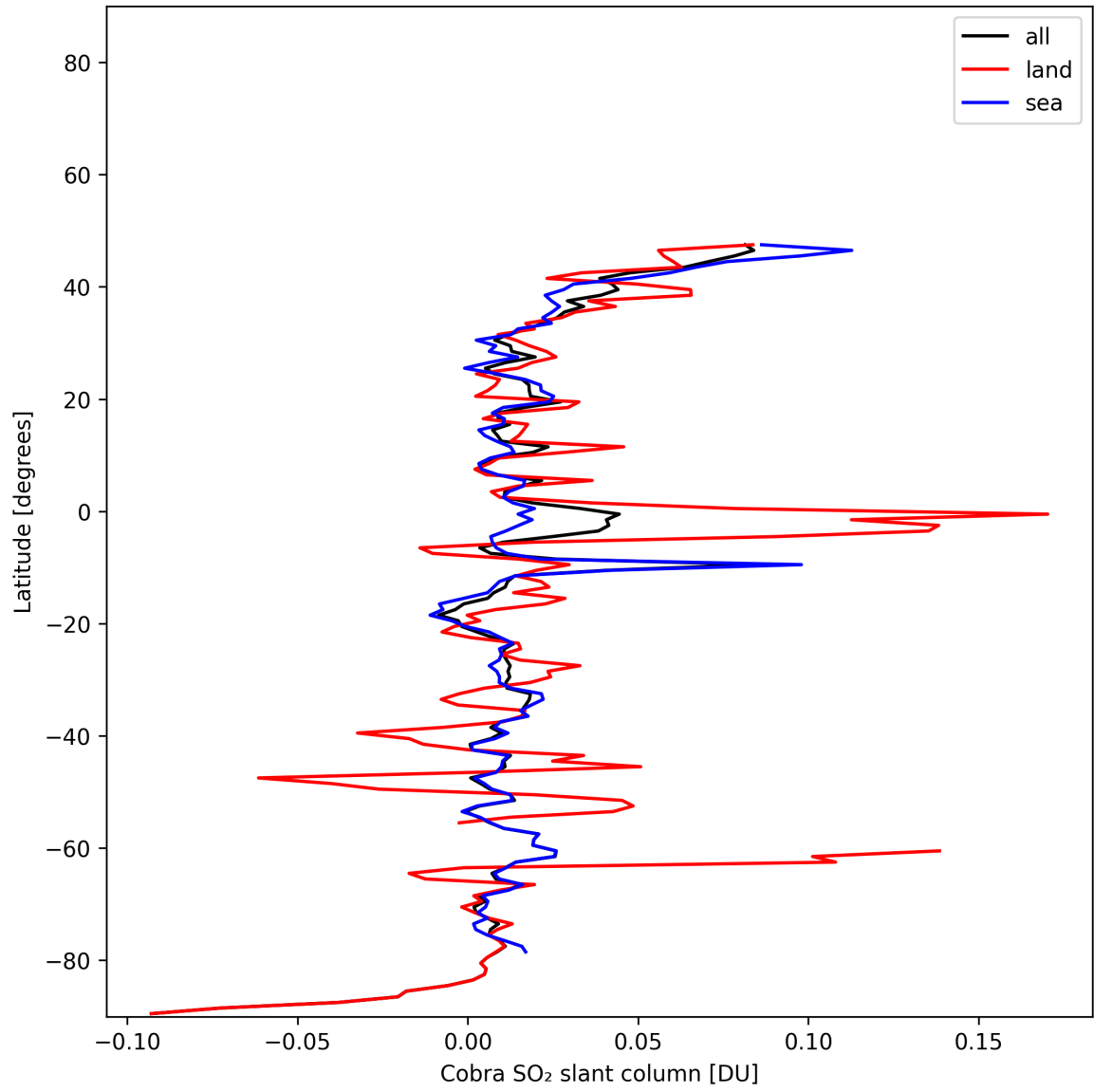


Figure 34: Zonal average of “Cobra SO₂ slant column” for 2024-12-02 to 2024-12-03.

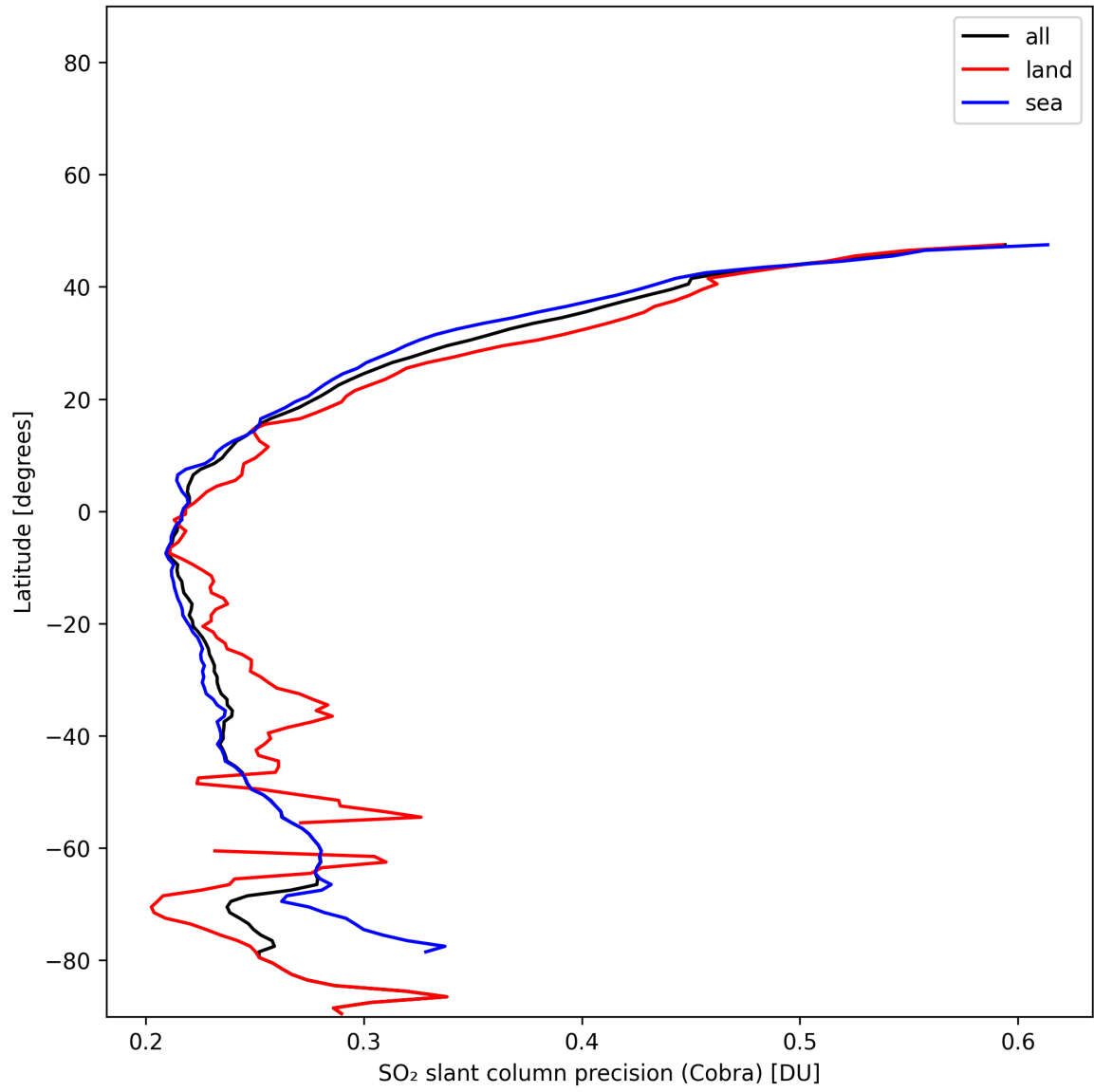


Figure 35: Zonal average of “SO₂ slant column precision (Cobra)” for 2024-12-02 to 2024-12-03.

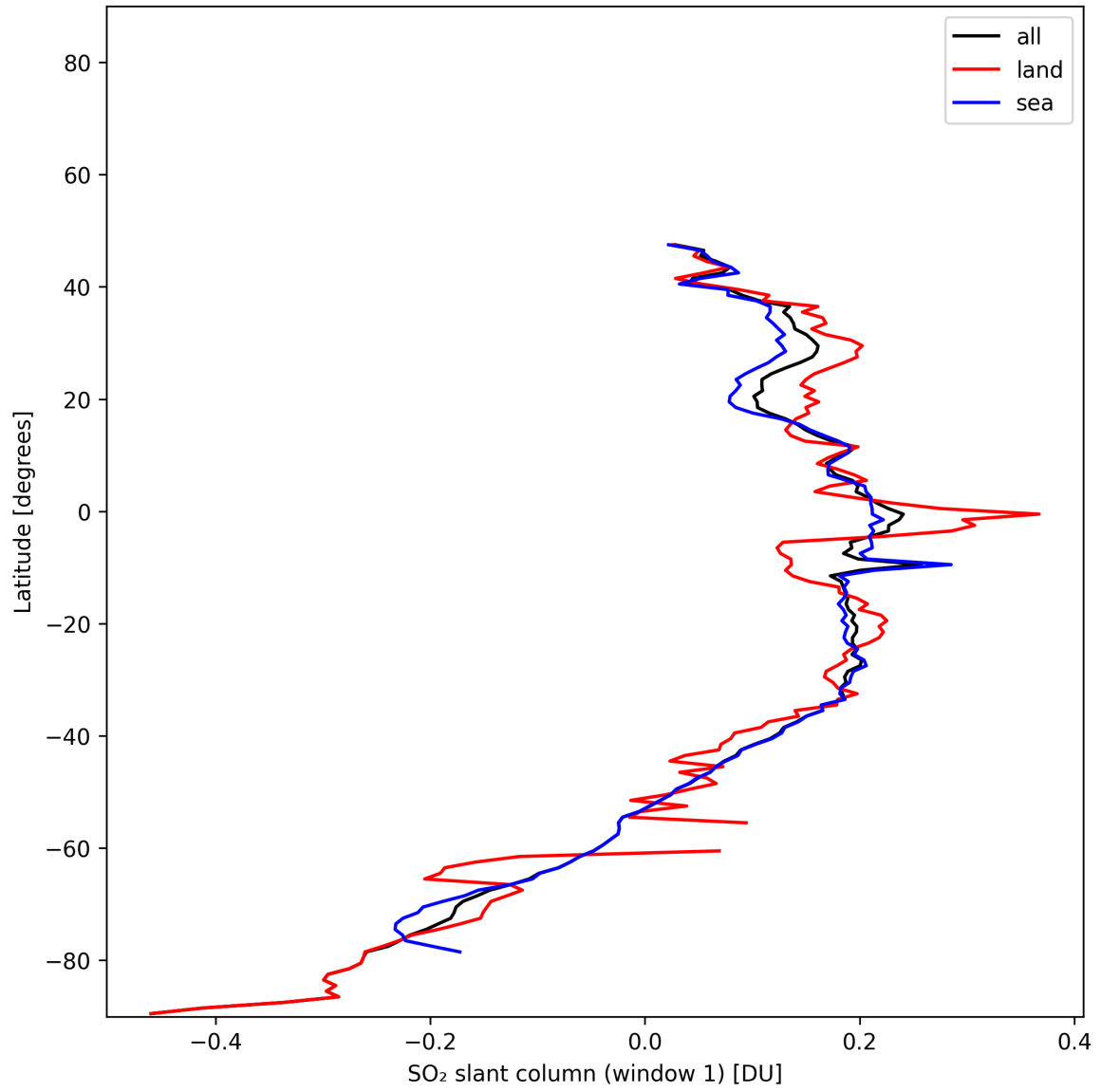


Figure 36: Zonal average of “SO₂ slant column (window 1)” for 2024-12-02 to 2024-12-03.

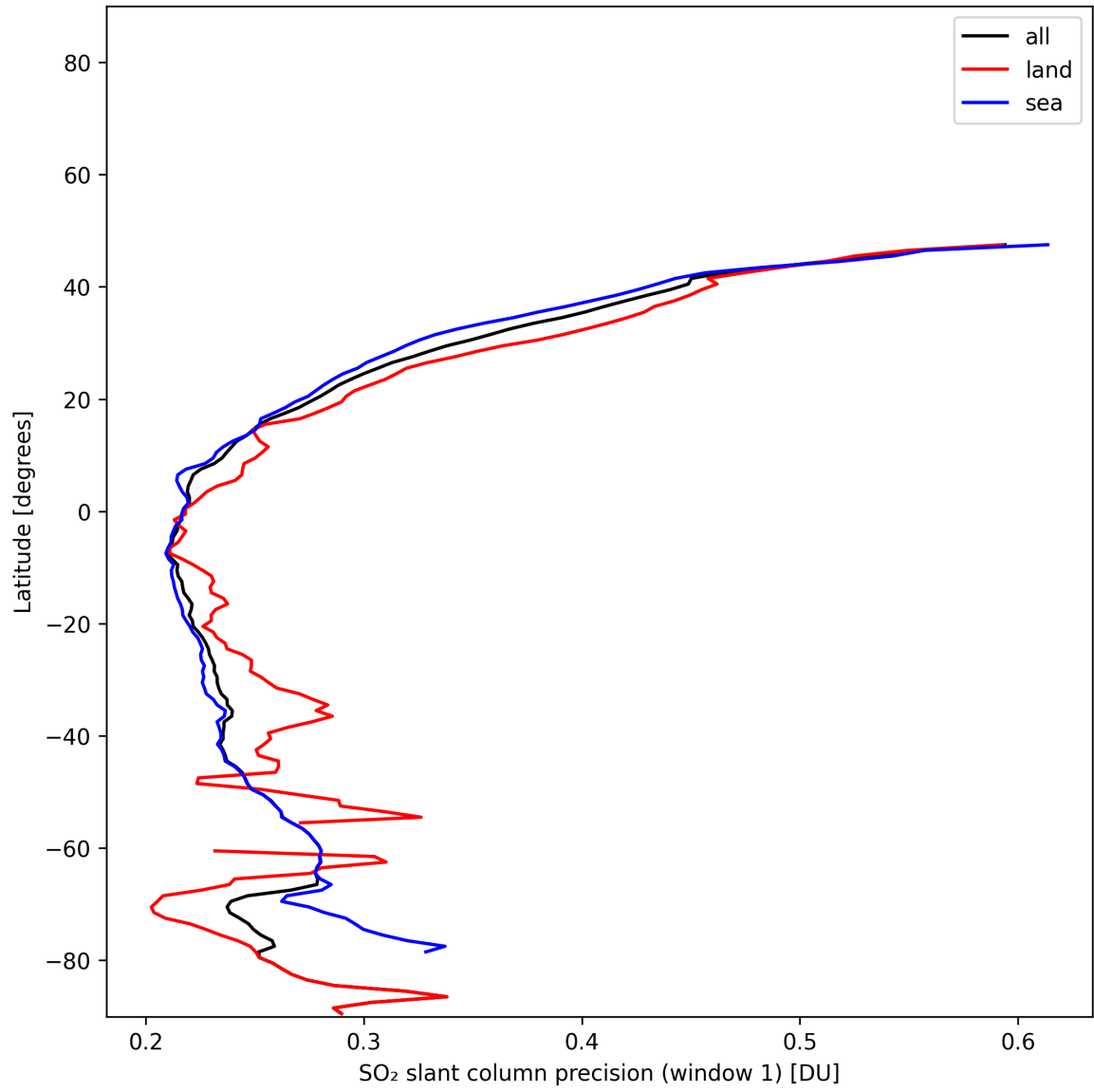


Figure 37: Zonal average of “SO₂ slant column precision (window 1)” for 2024-12-02 to 2024-12-03.

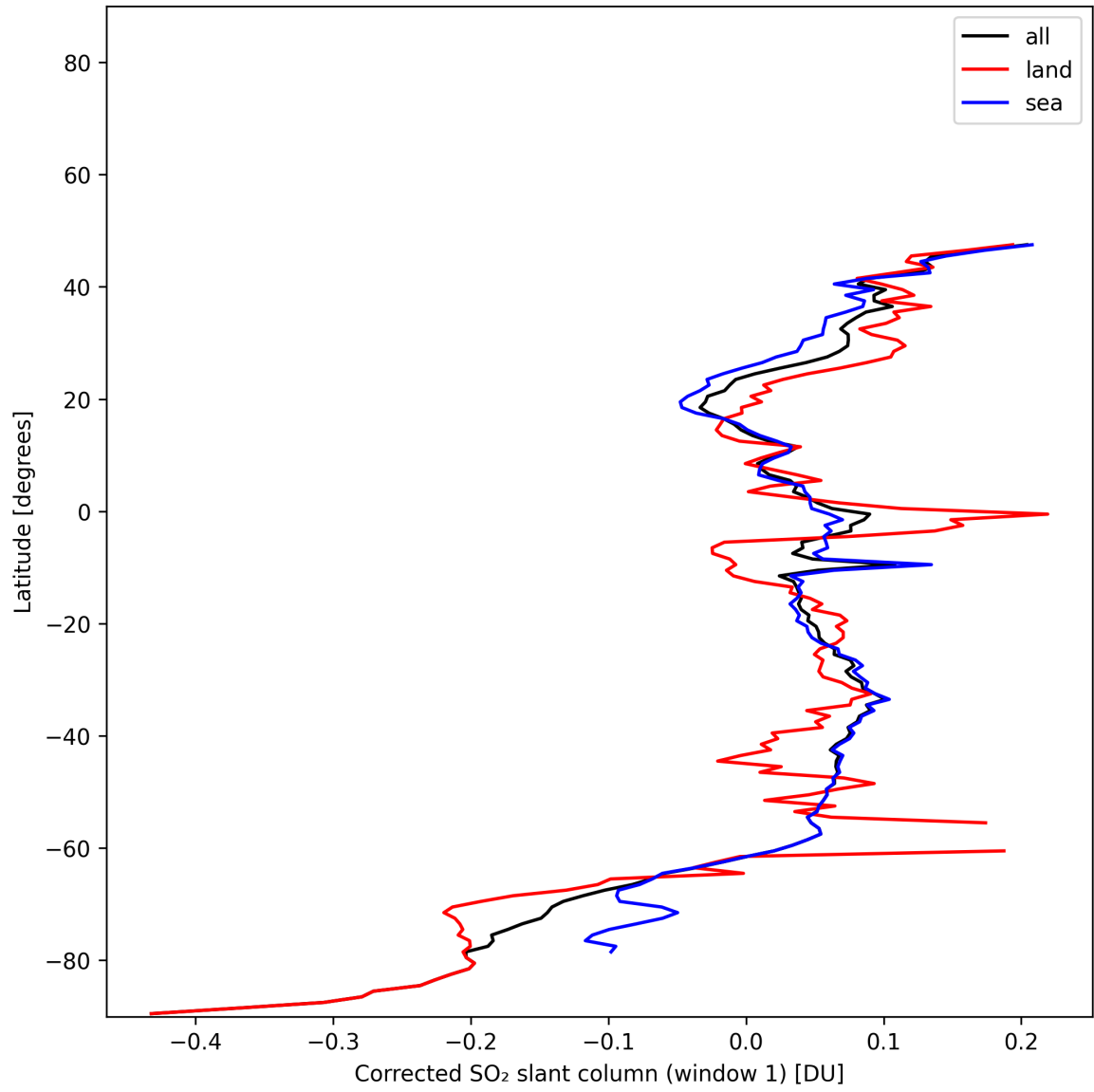


Figure 38: Zonal average of “Corrected SO₂ slant column (window 1)” for 2024-12-02 to 2024-12-03.

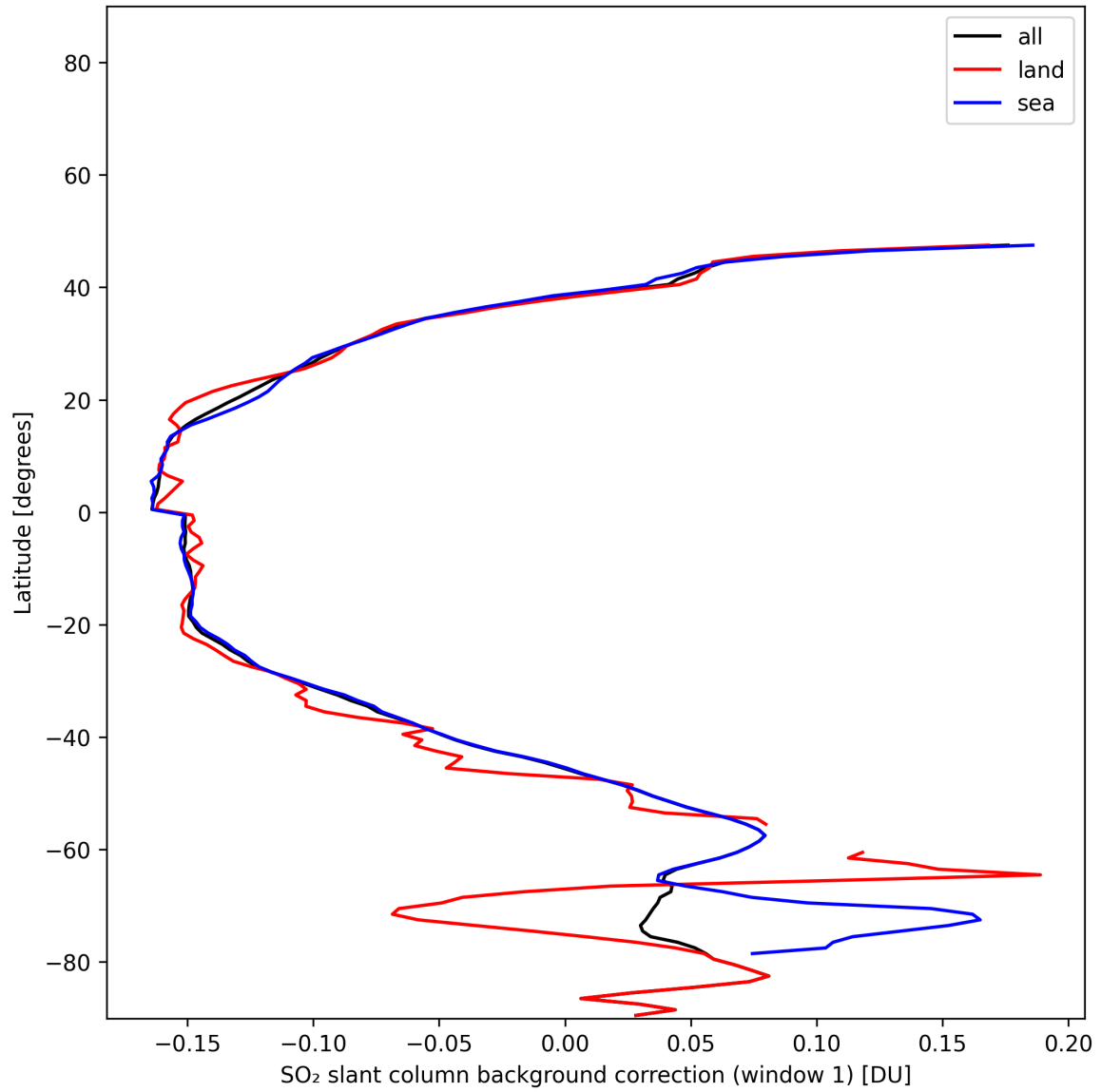


Figure 39: Zonal average of “SO₂ slant column background correction (window 1)” for 2024-12-02 to 2024-12-03.

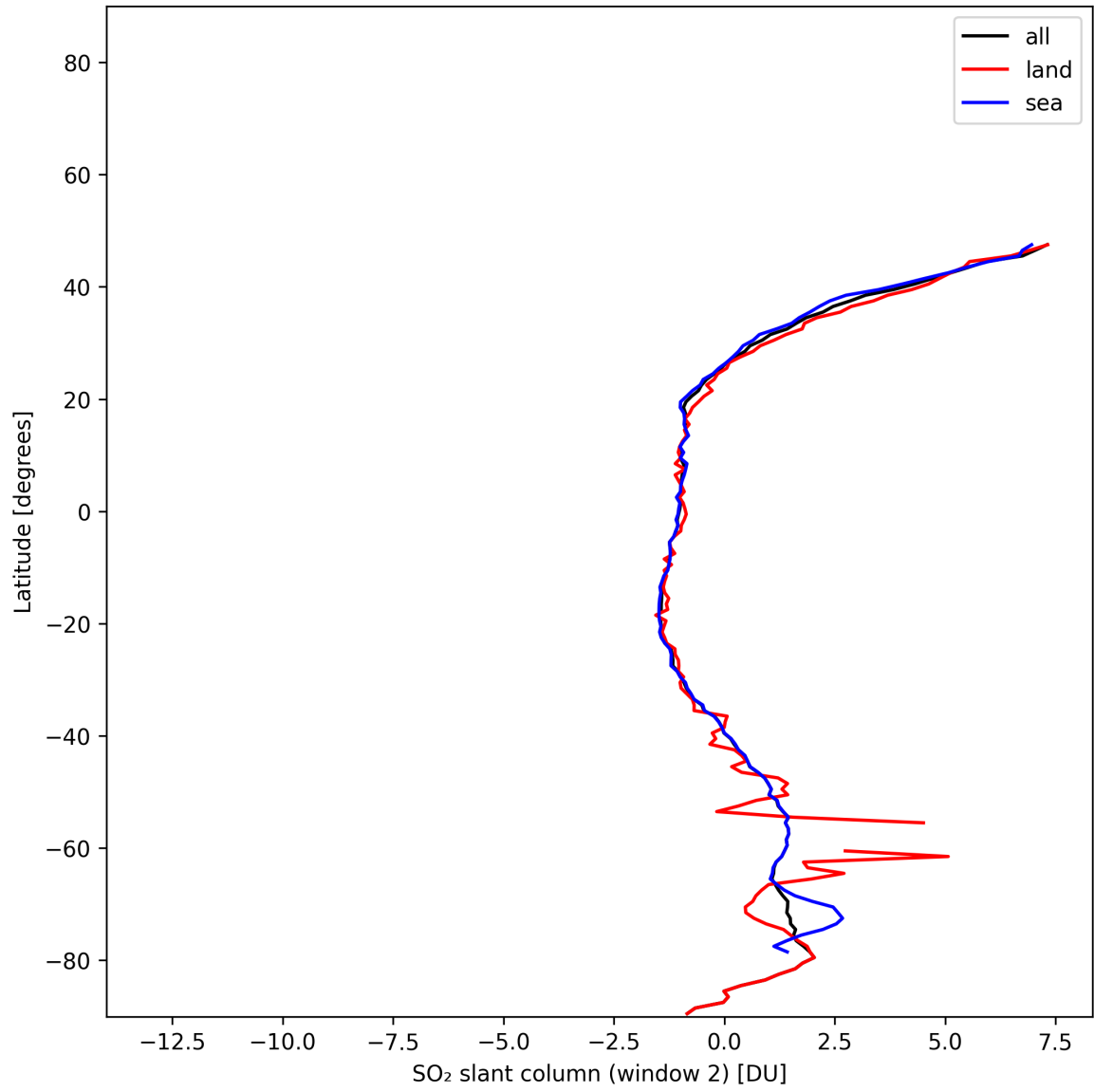


Figure 40: Zonal average of “SO₂ slant column (window 2)” for 2024-12-02 to 2024-12-03.

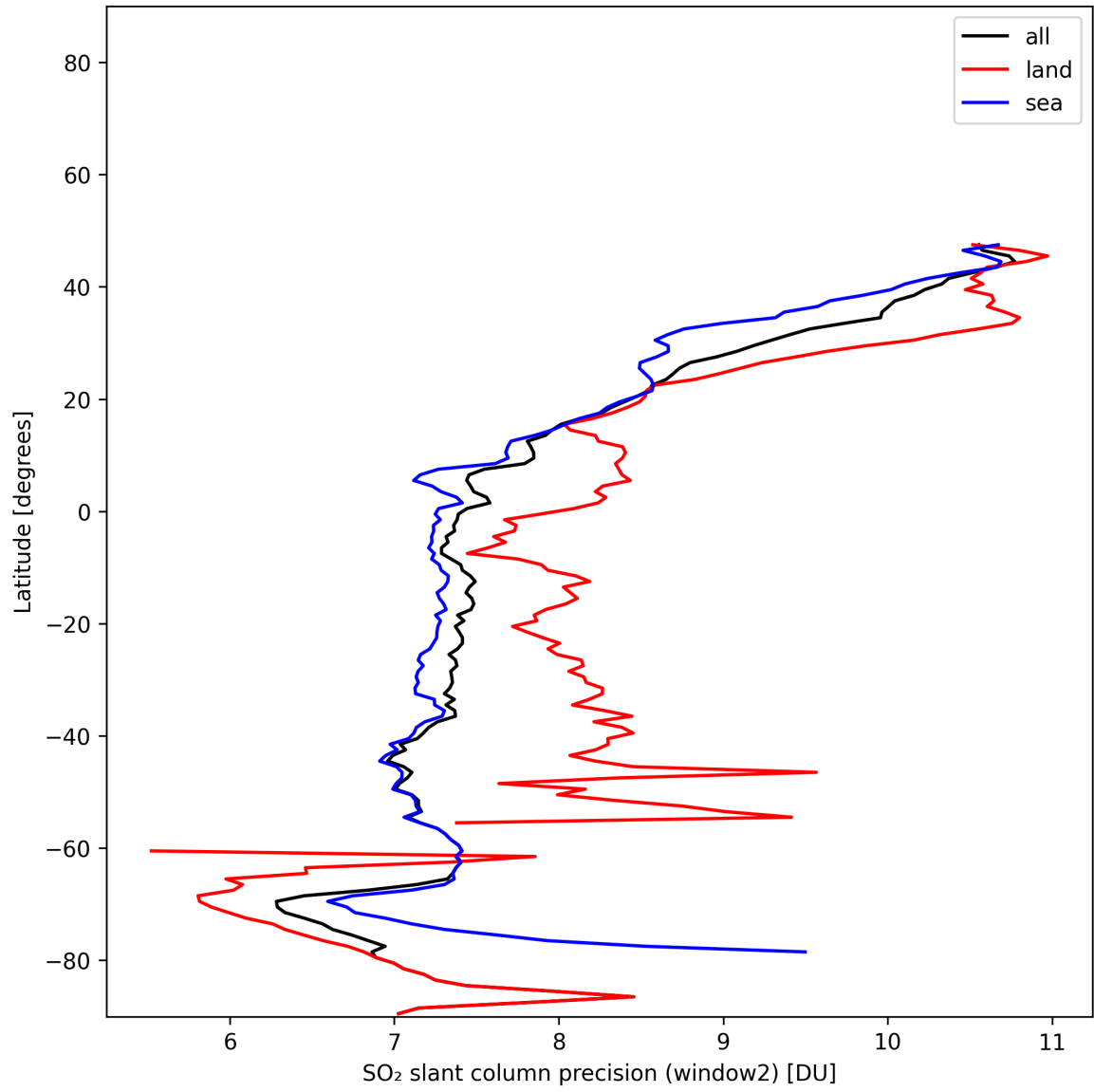


Figure 41: Zonal average of “SO₂ slant column precision (window2)” for 2024-12-02 to 2024-12-03.

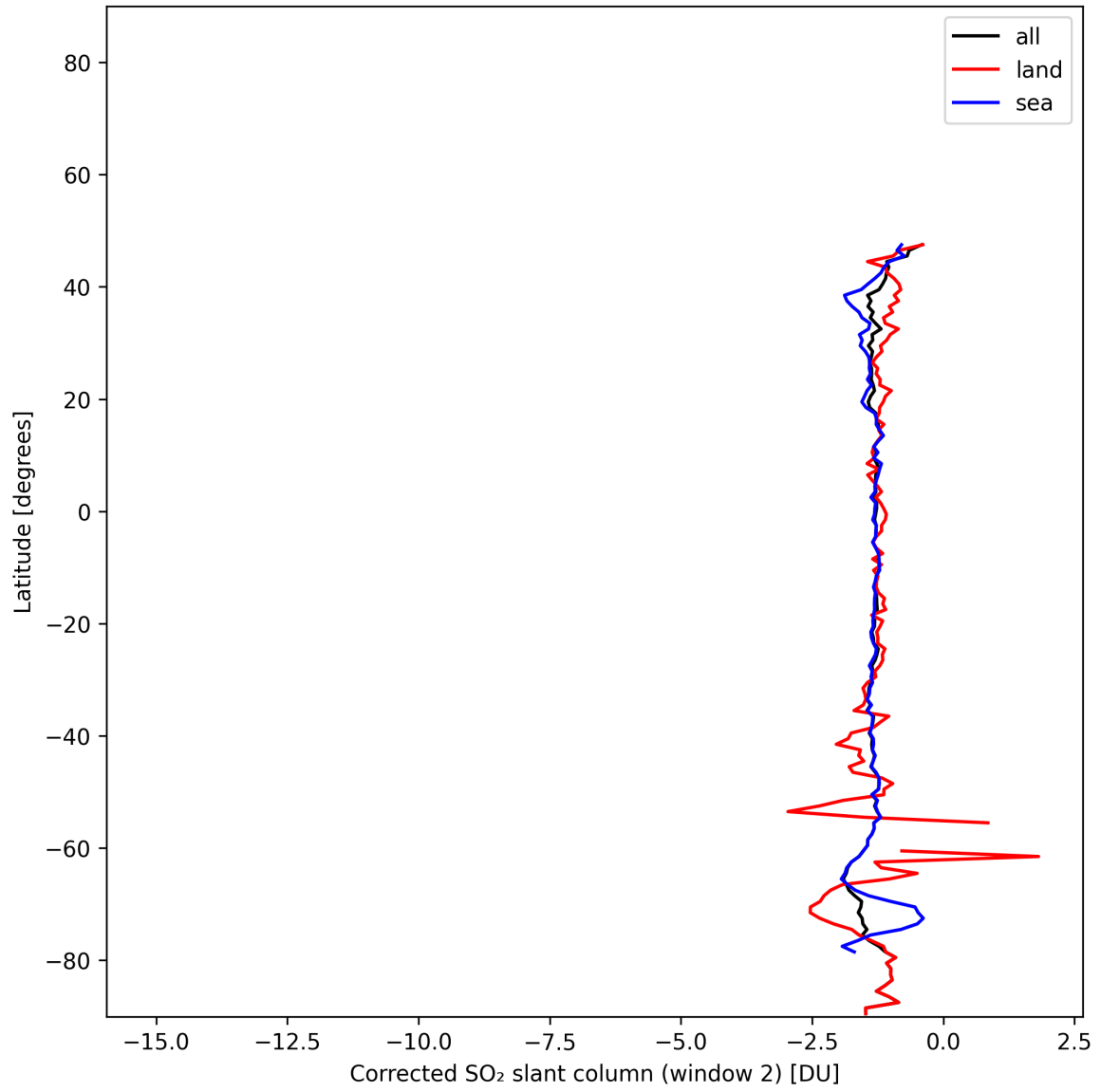


Figure 42: Zonal average of “Corrected SO₂ slant column (window 2)” for 2024-12-02 to 2024-12-03.

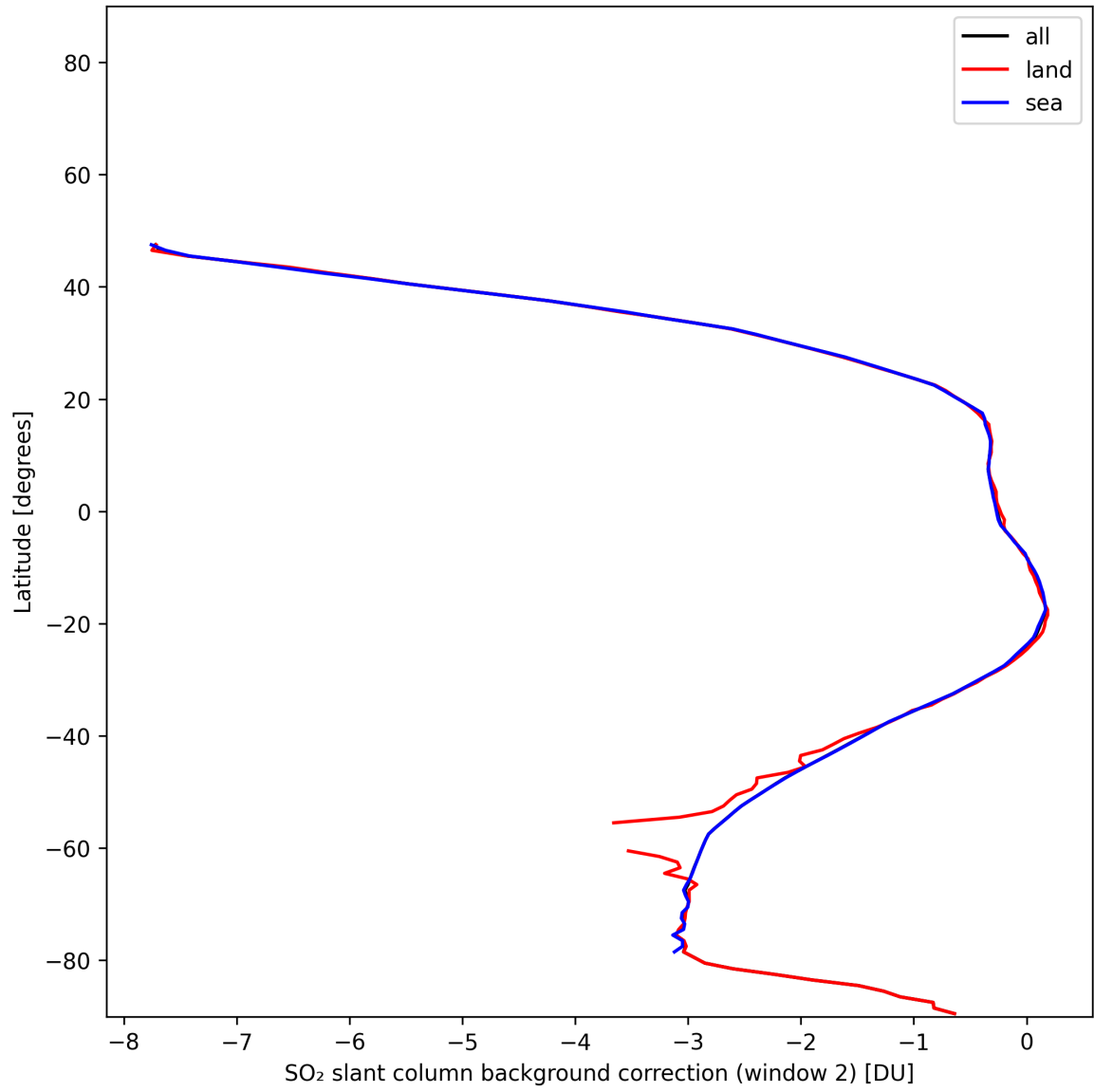


Figure 43: Zonal average of “SO₂ slant column background correction (window 2)” for 2024-12-02 to 2024-12-03.

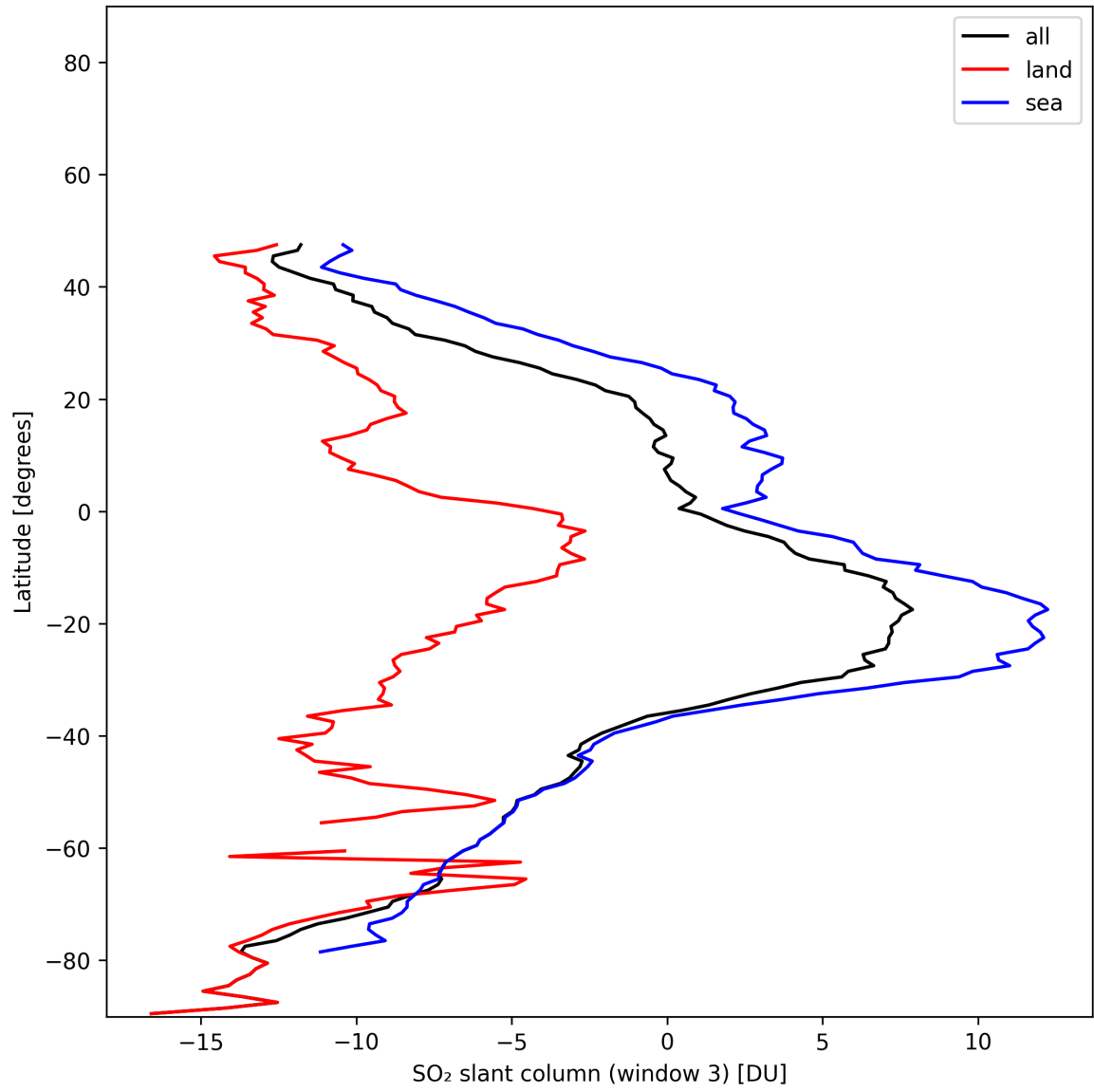


Figure 44: Zonal average of “SO₂ slant column (window 3)” for 2024-12-02 to 2024-12-03.

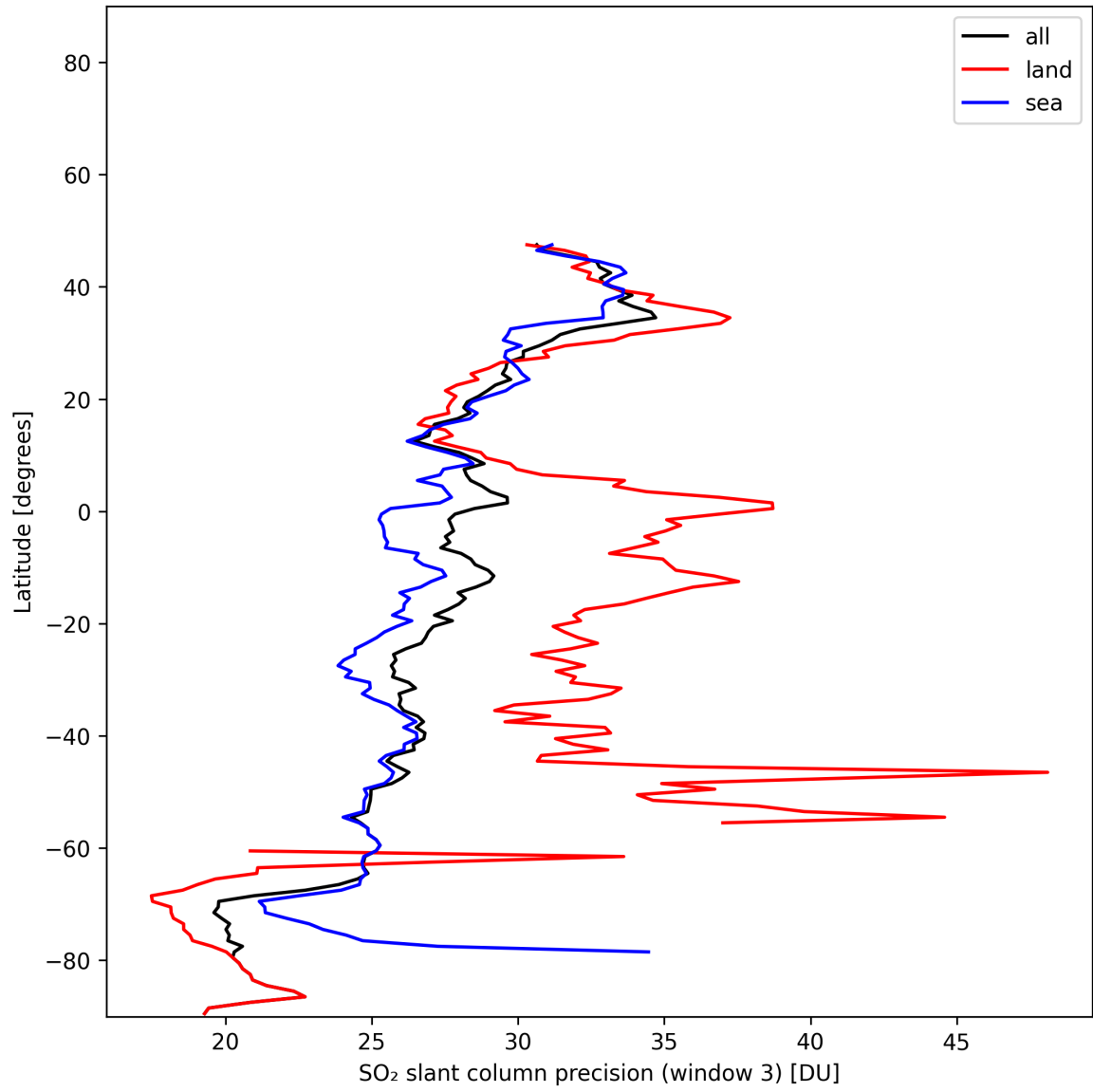


Figure 45: Zonal average of “SO₂ slant column precision (window 3)” for 2024-12-02 to 2024-12-03.

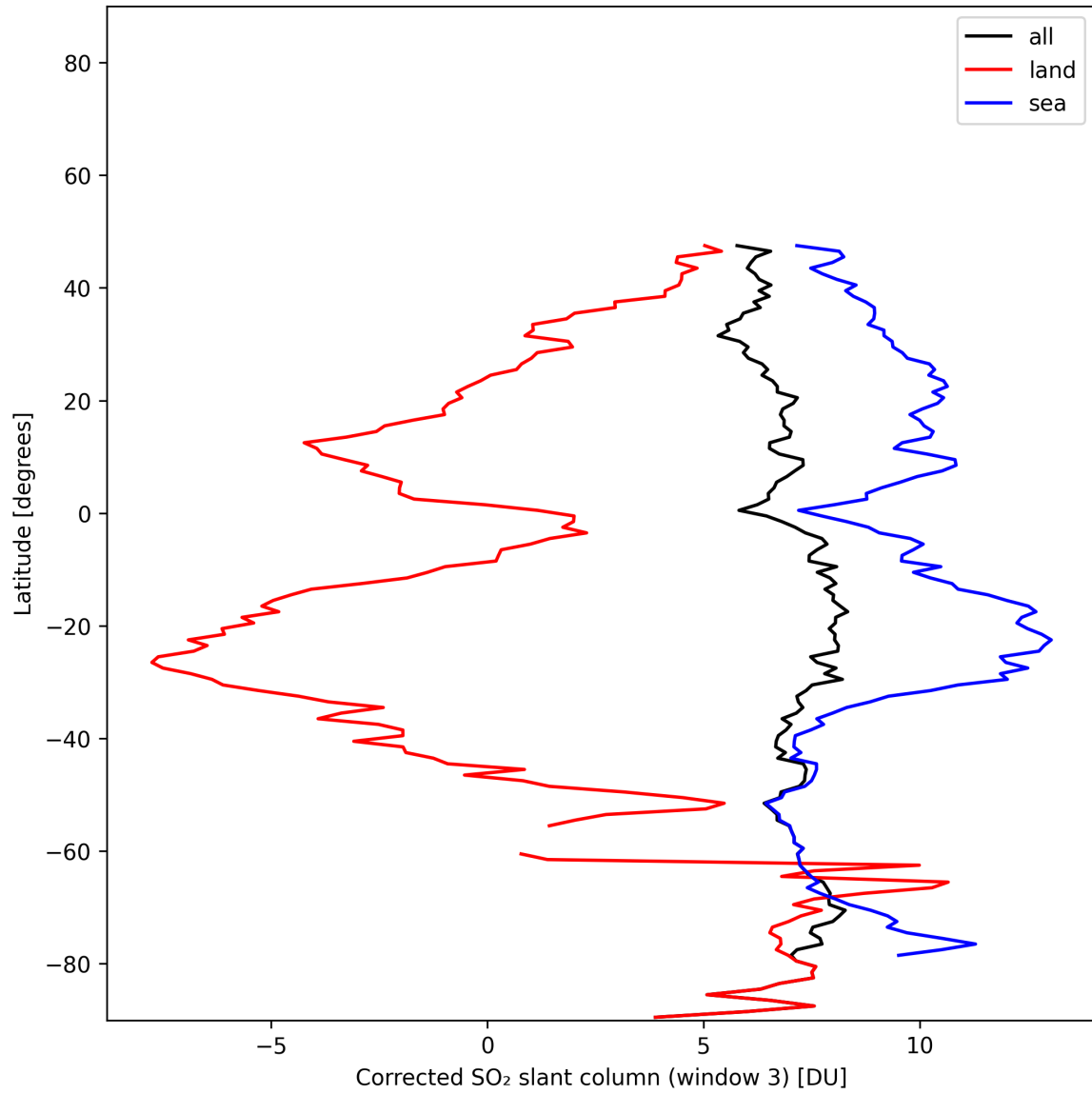


Figure 46: Zonal average of “Corrected SO₂ slant column (window 3)” for 2024-12-02 to 2024-12-03.

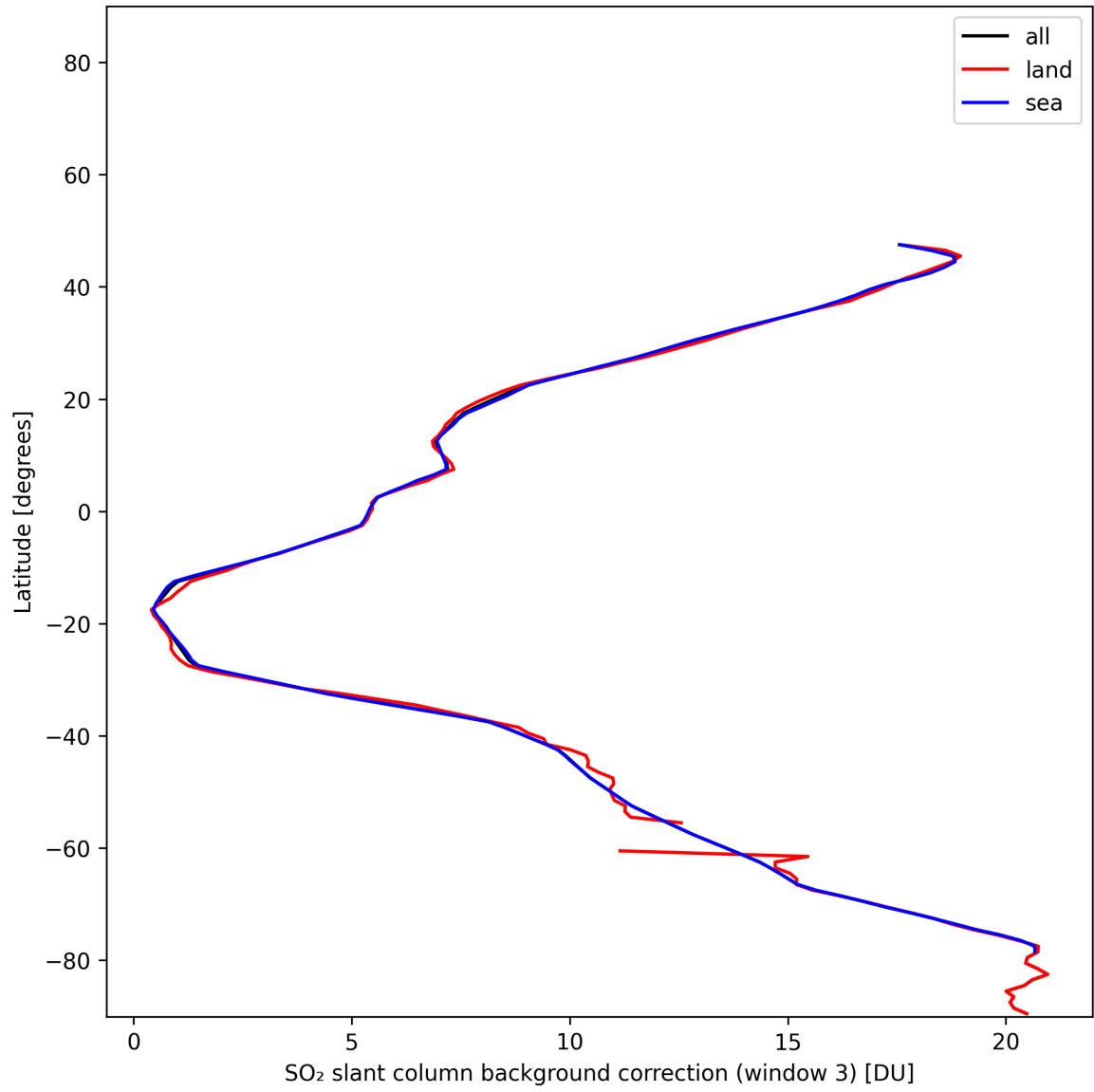


Figure 47: Zonal average of “SO₂ slant column background correction (window 3)” for 2024-12-02 to 2024-12-03.

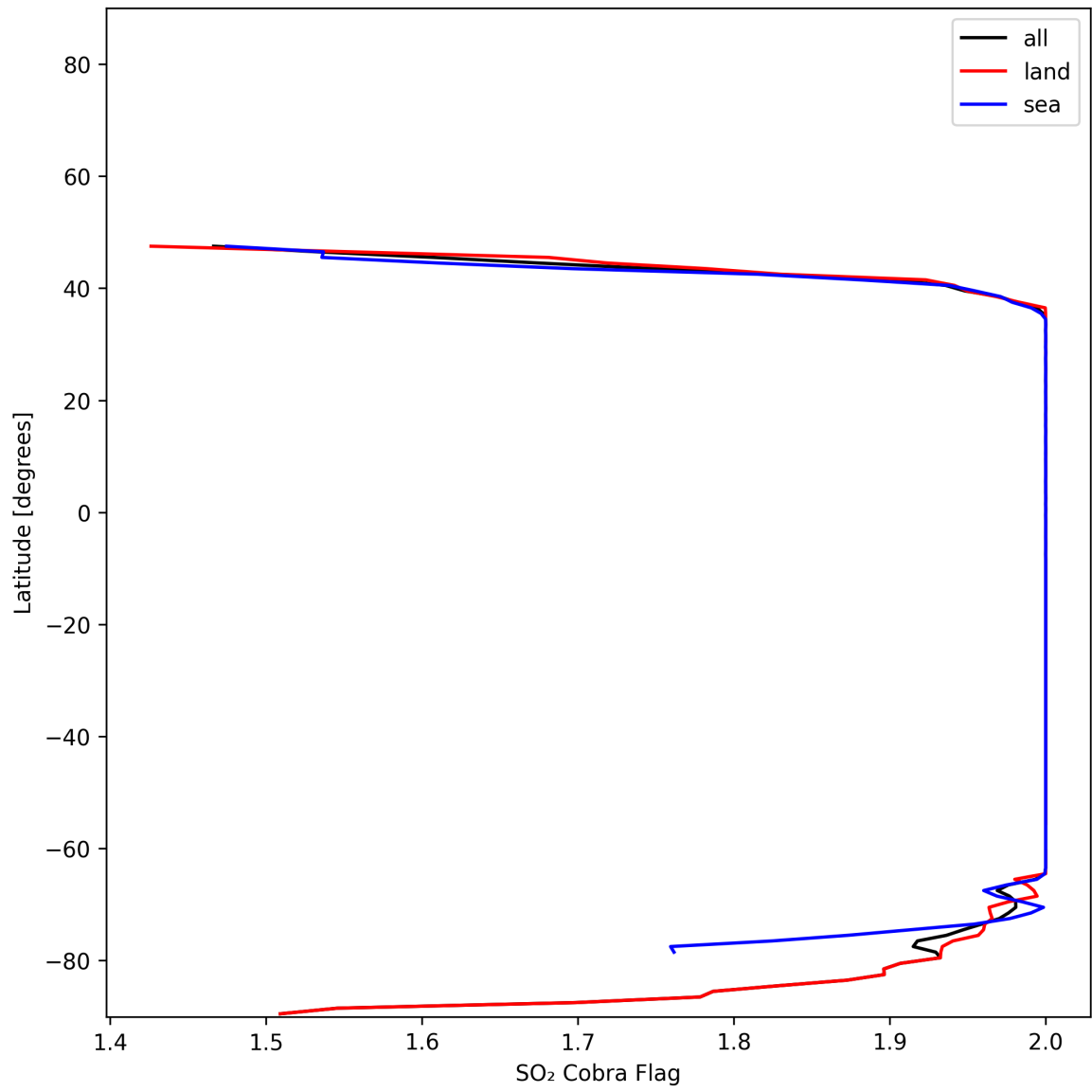


Figure 48: Zonal average of "SO₂ Cobra Flag" for 2024-12-02 to 2024-12-03.

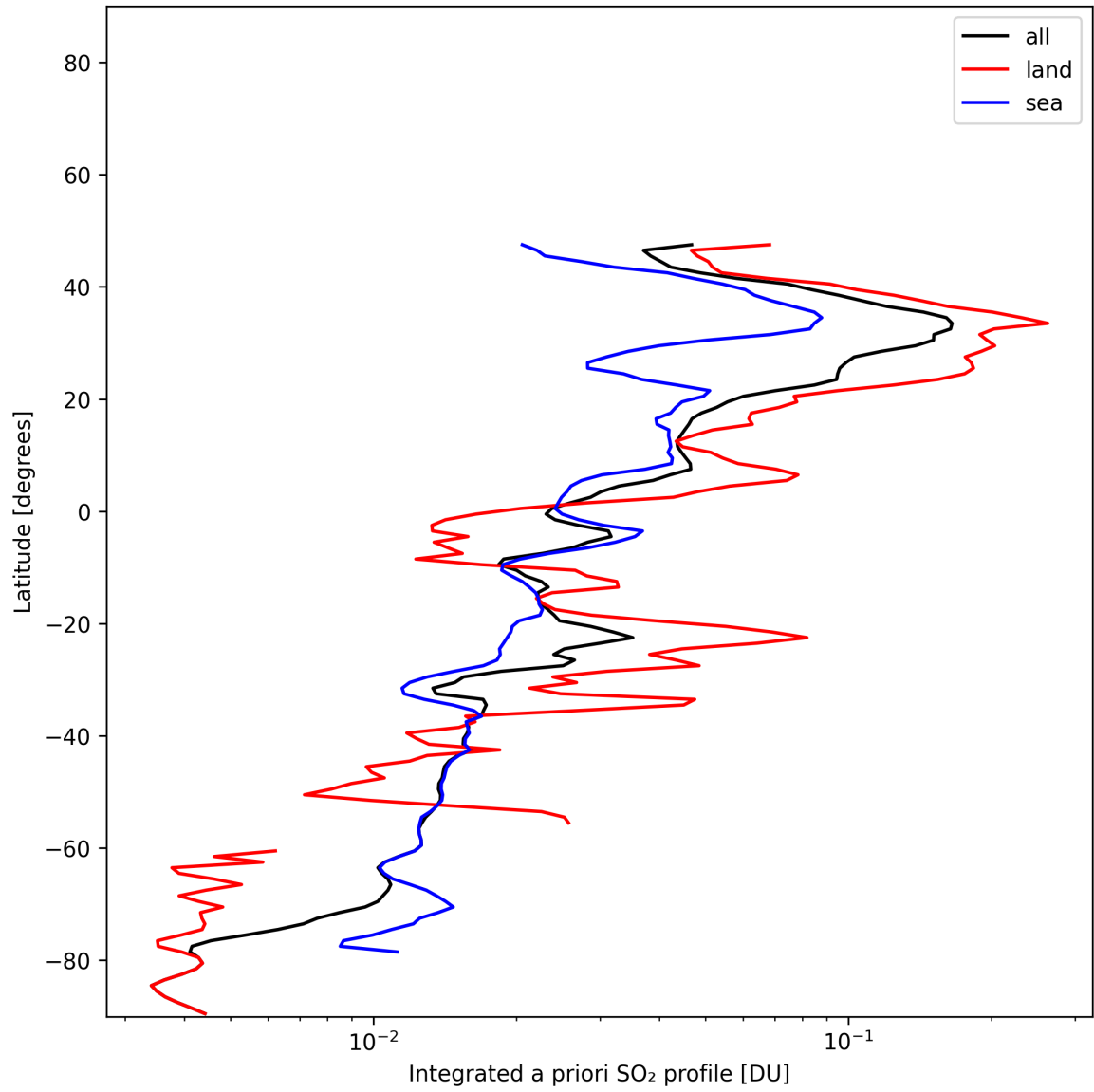


Figure 49: Zonal average of “Integrated a priori SO₂ profile” for 2024-12-02 to 2024-12-03.

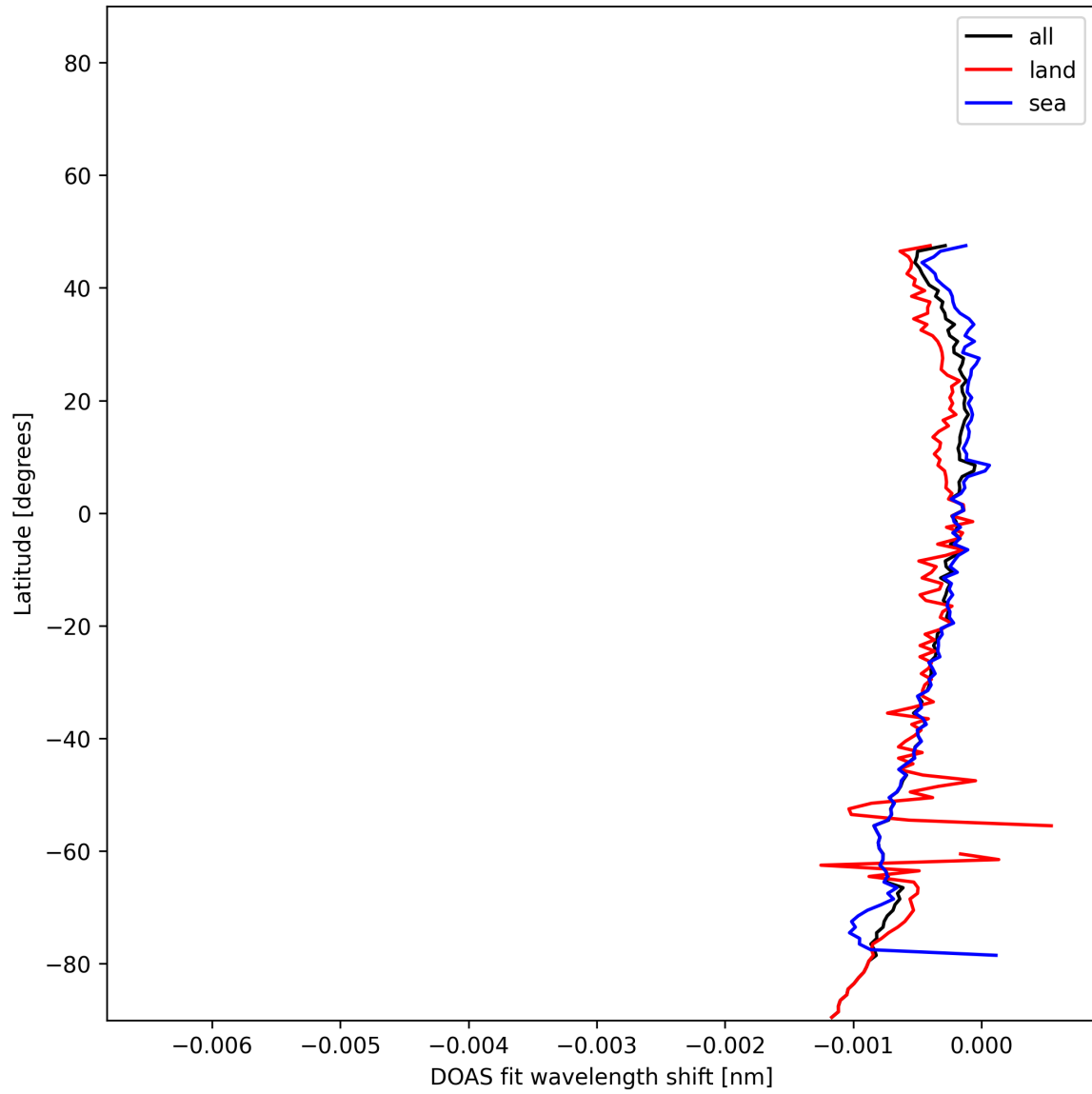


Figure 50: Zonal average of “DOAS fit wavelength shift” for 2024-12-02 to 2024-12-03.

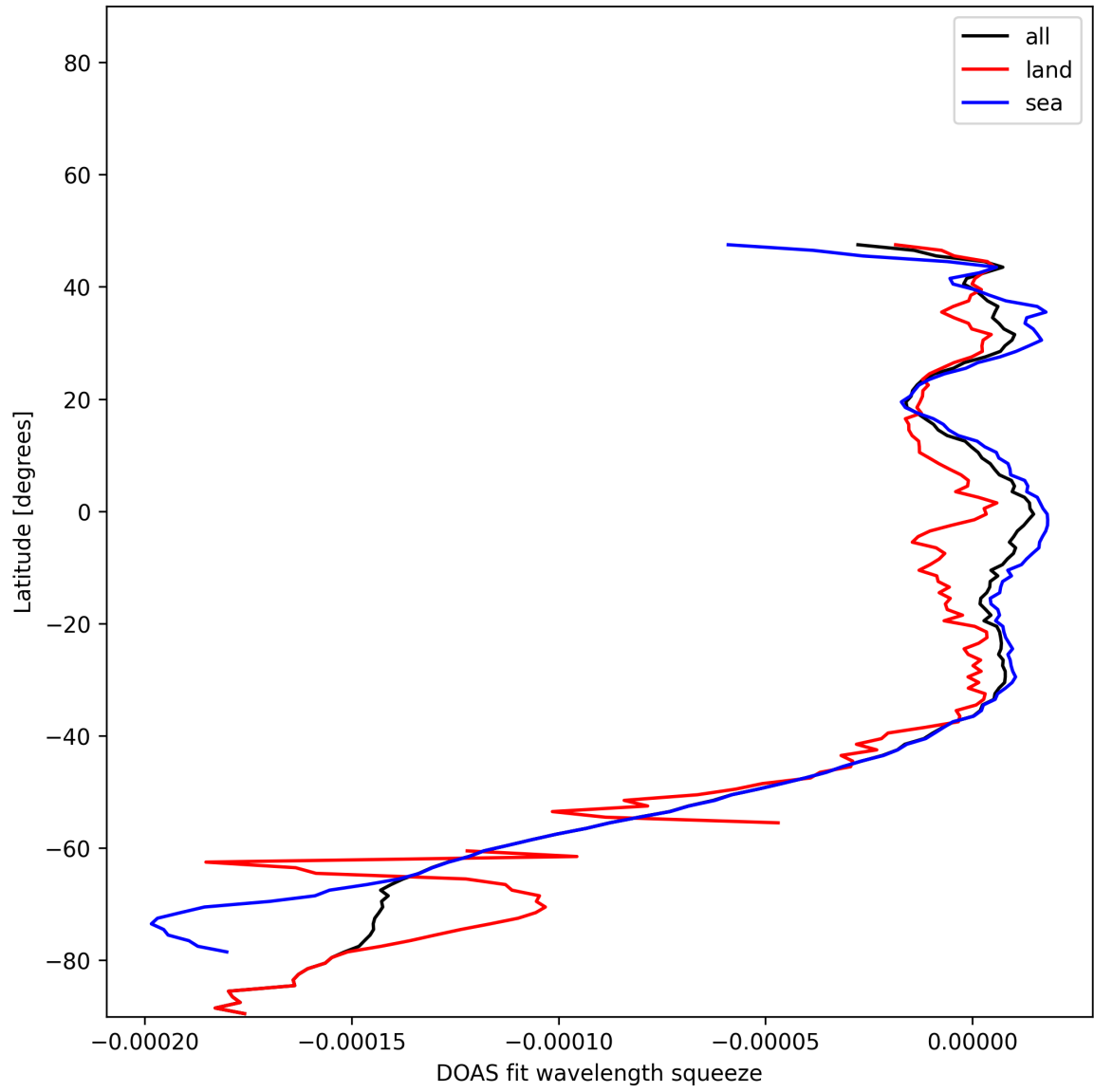


Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2024-12-02 to 2024-12-03.

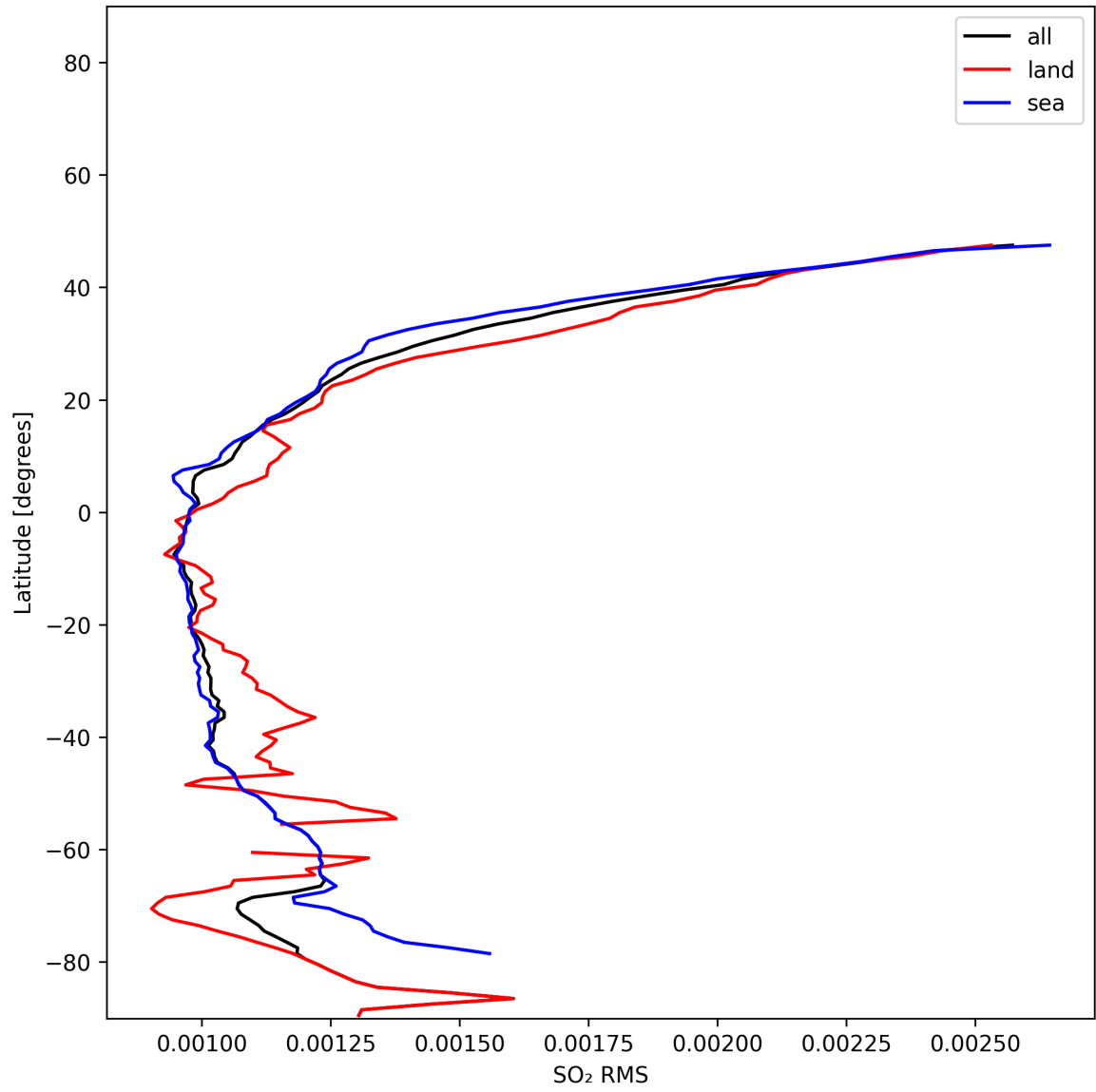


Figure 52: Zonal average of “SO₂ RMS” for 2024-12-02 to 2024-12-03.

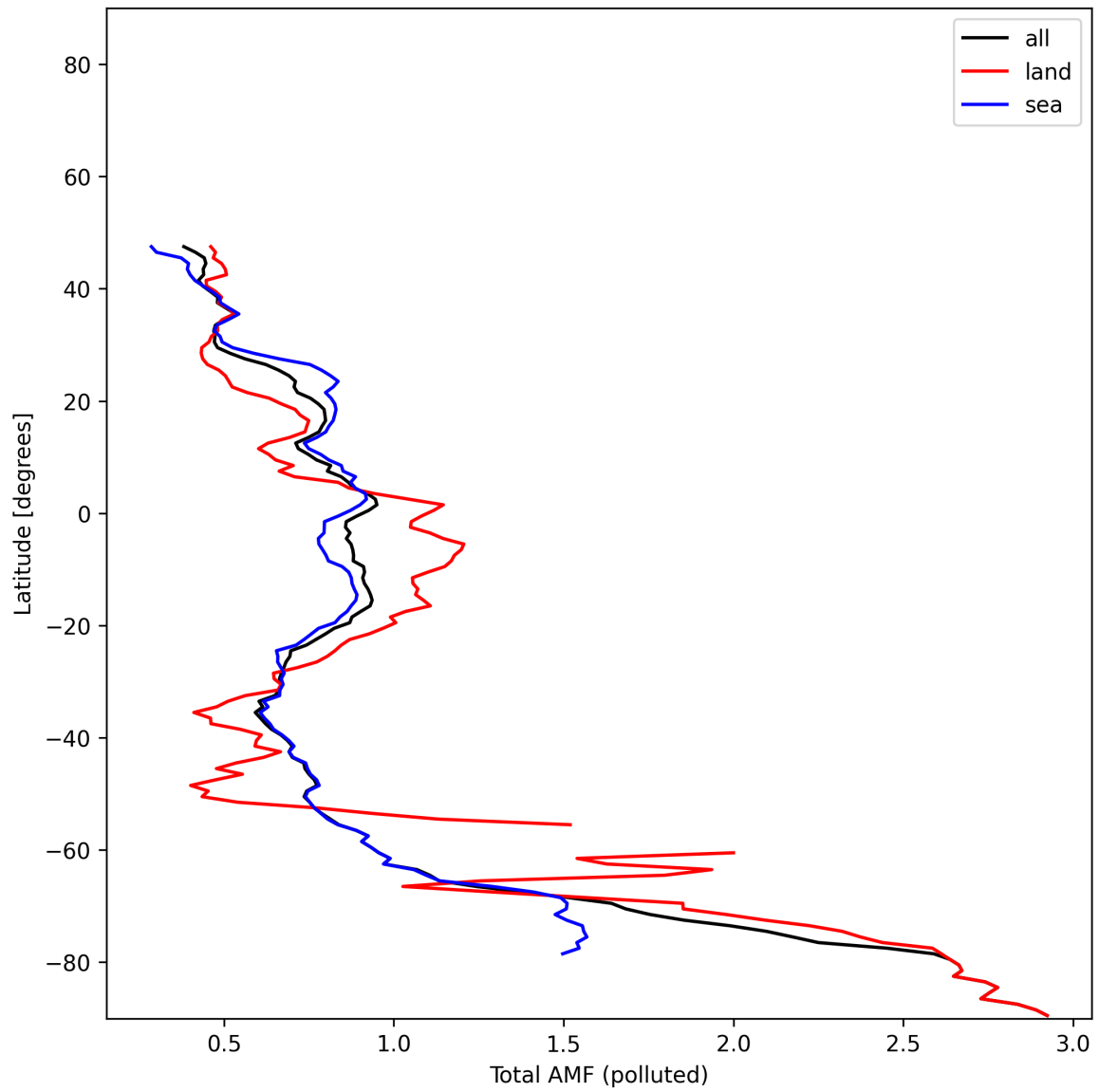


Figure 53: Zonal average of “Total AMF (polluted)” for 2024-12-02 to 2024-12-03.

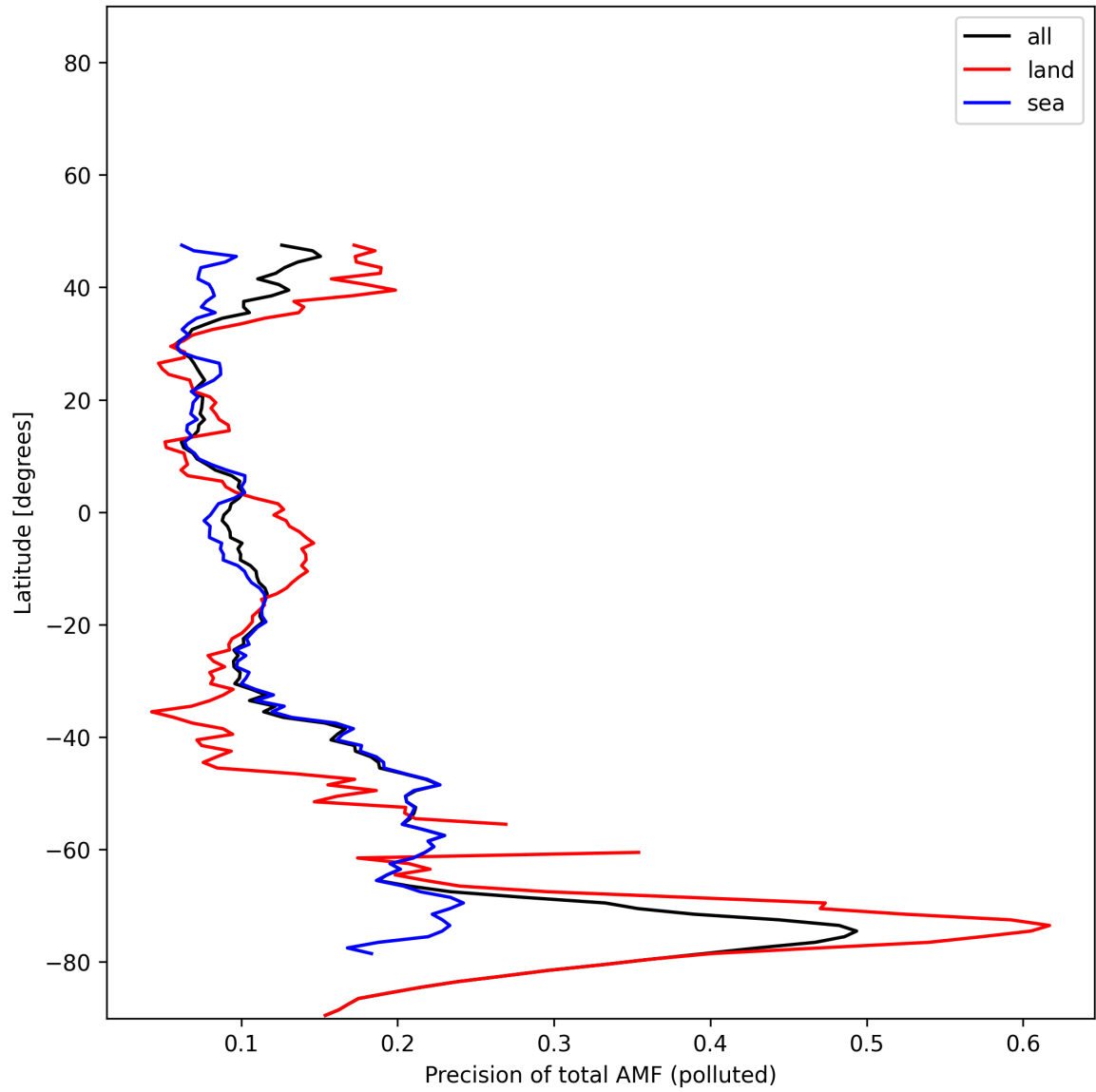


Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2024-12-02 to 2024-12-03.

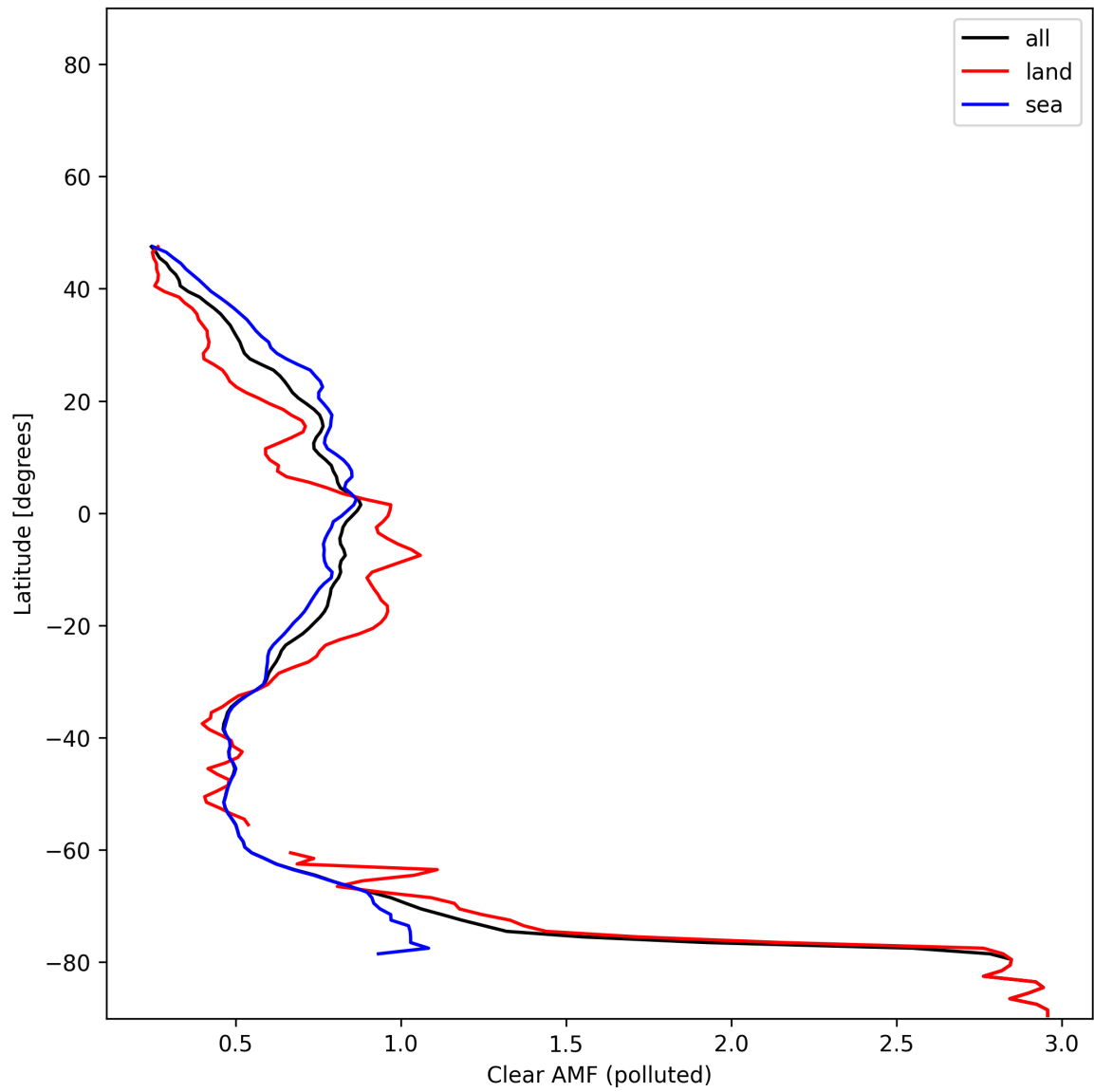


Figure 55: Zonal average of “Clear AMF (polluted)” for 2024-12-02 to 2024-12-03.

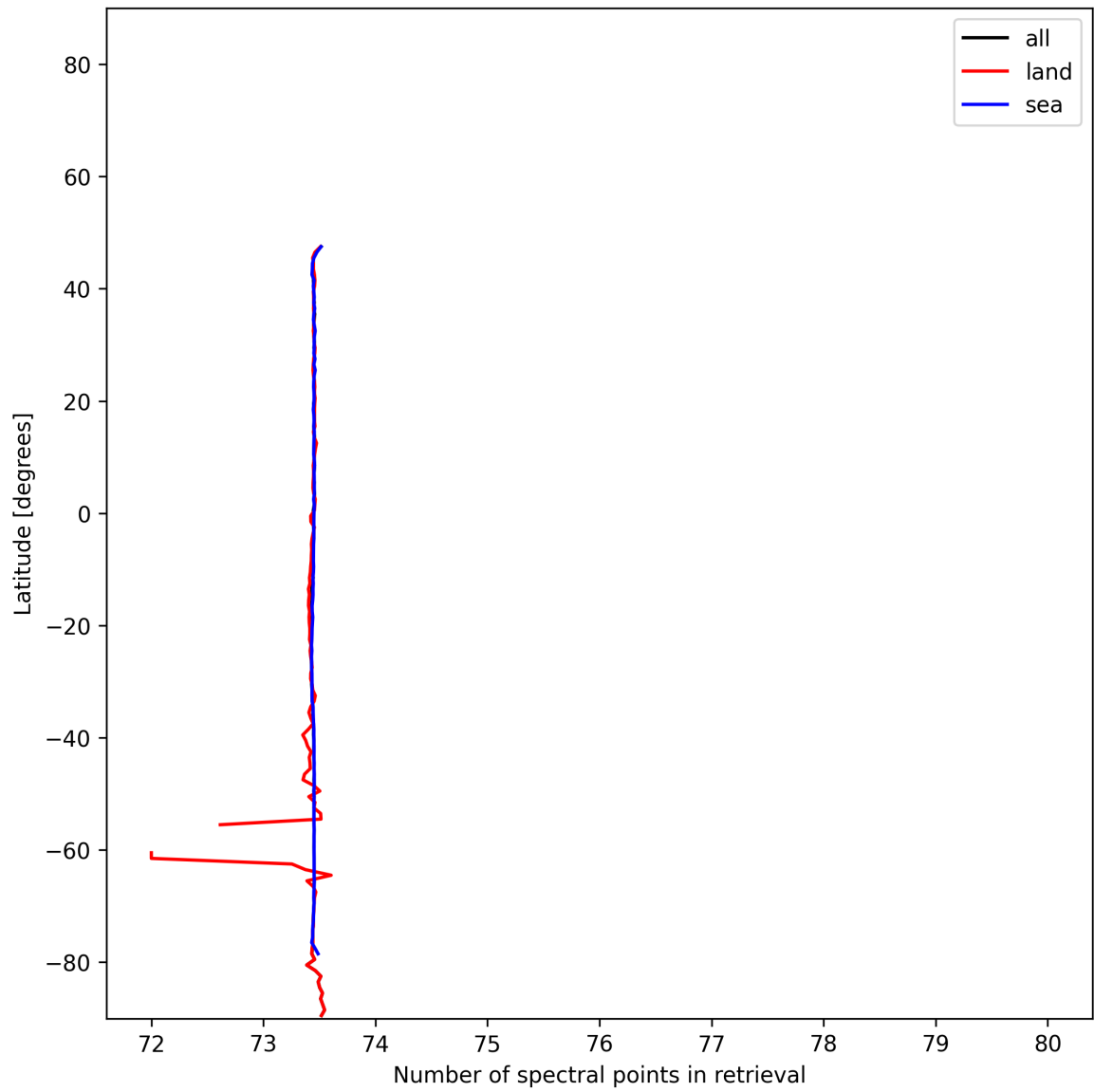


Figure 56: Zonal average of “Number of spectral points in retrieval” for 2024-12-02 to 2024-12-03.

8 Histograms

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

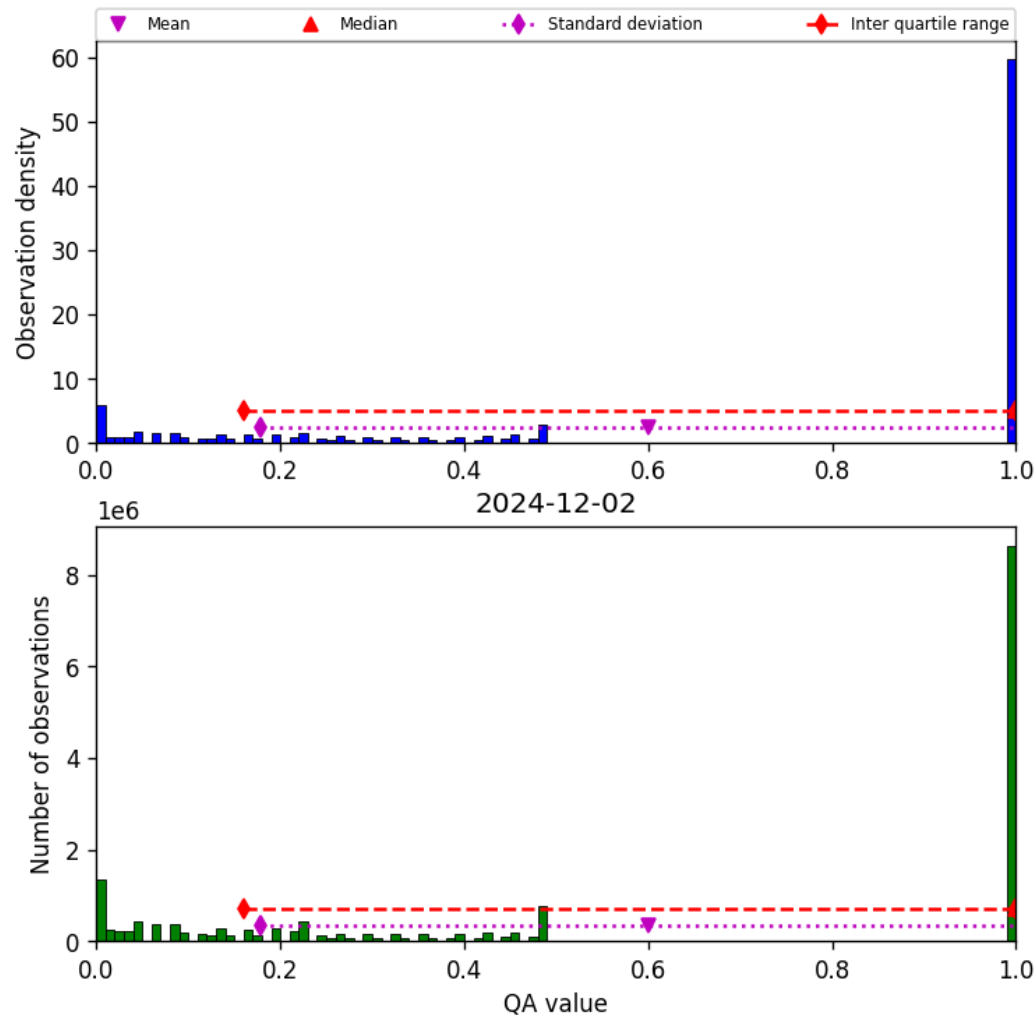


Figure 57: Histogram of “QA value” for 2024-12-02 to 2024-12-03

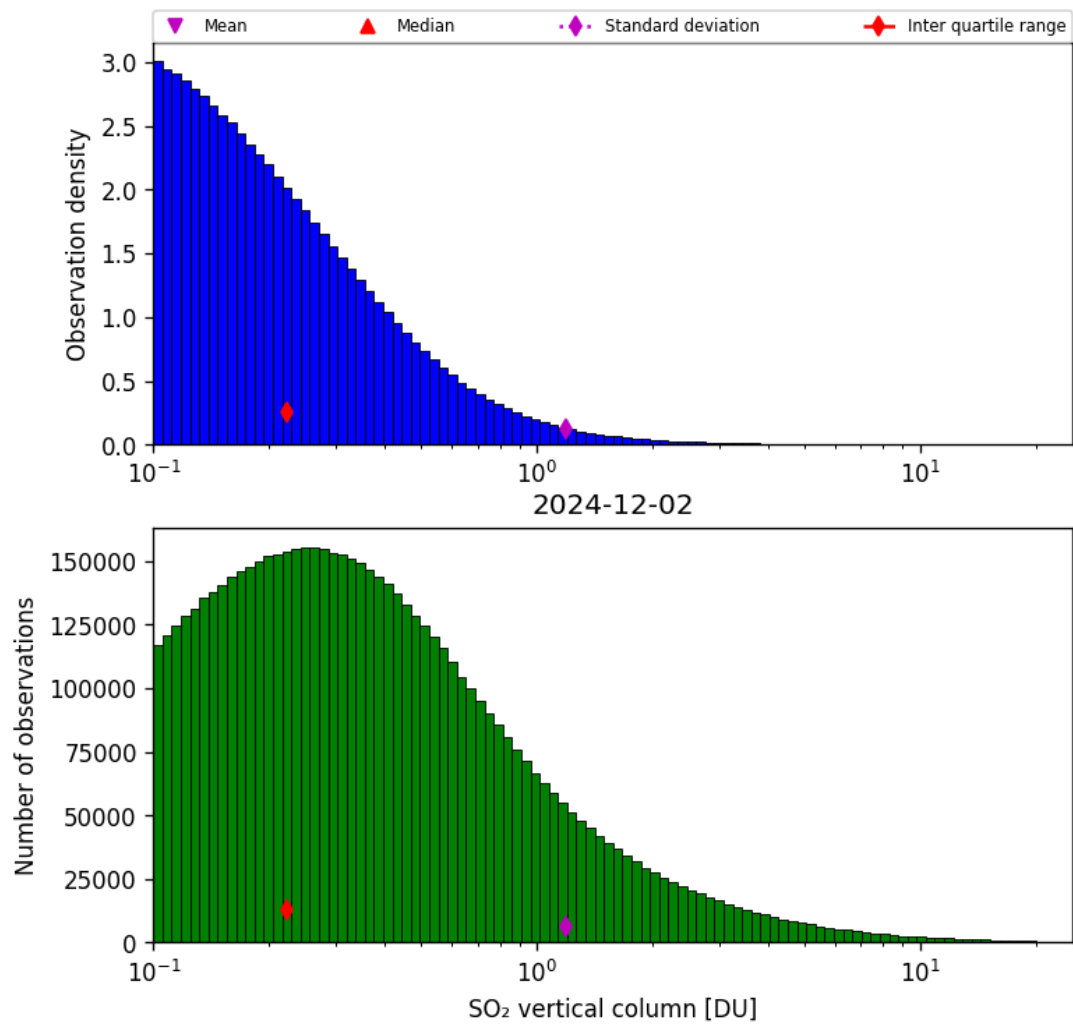


Figure 58: Histogram of “SO₂ vertical column” for 2024-12-02 to 2024-12-03

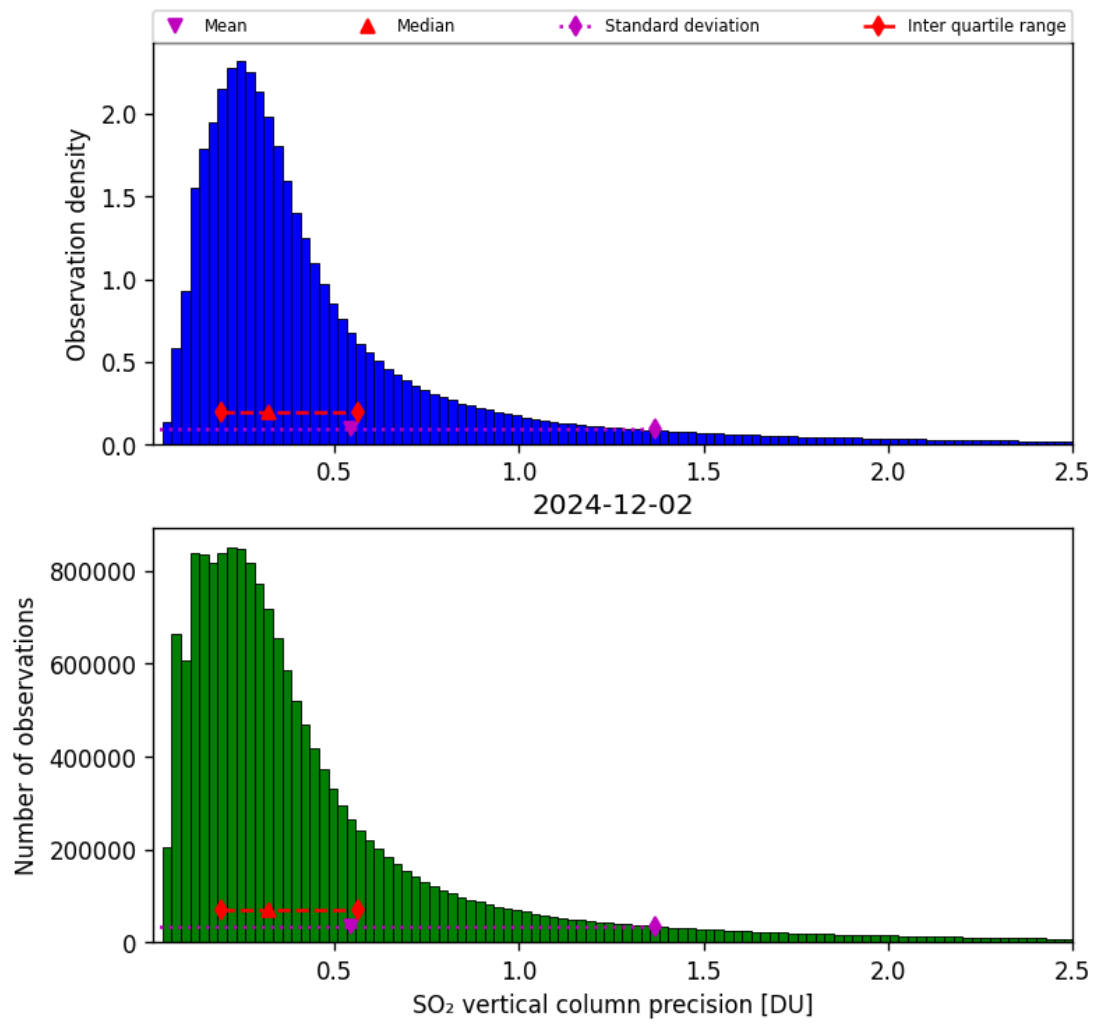


Figure 59: Histogram of “SO₂ vertical column precision” for 2024-12-02 to 2024-12-03

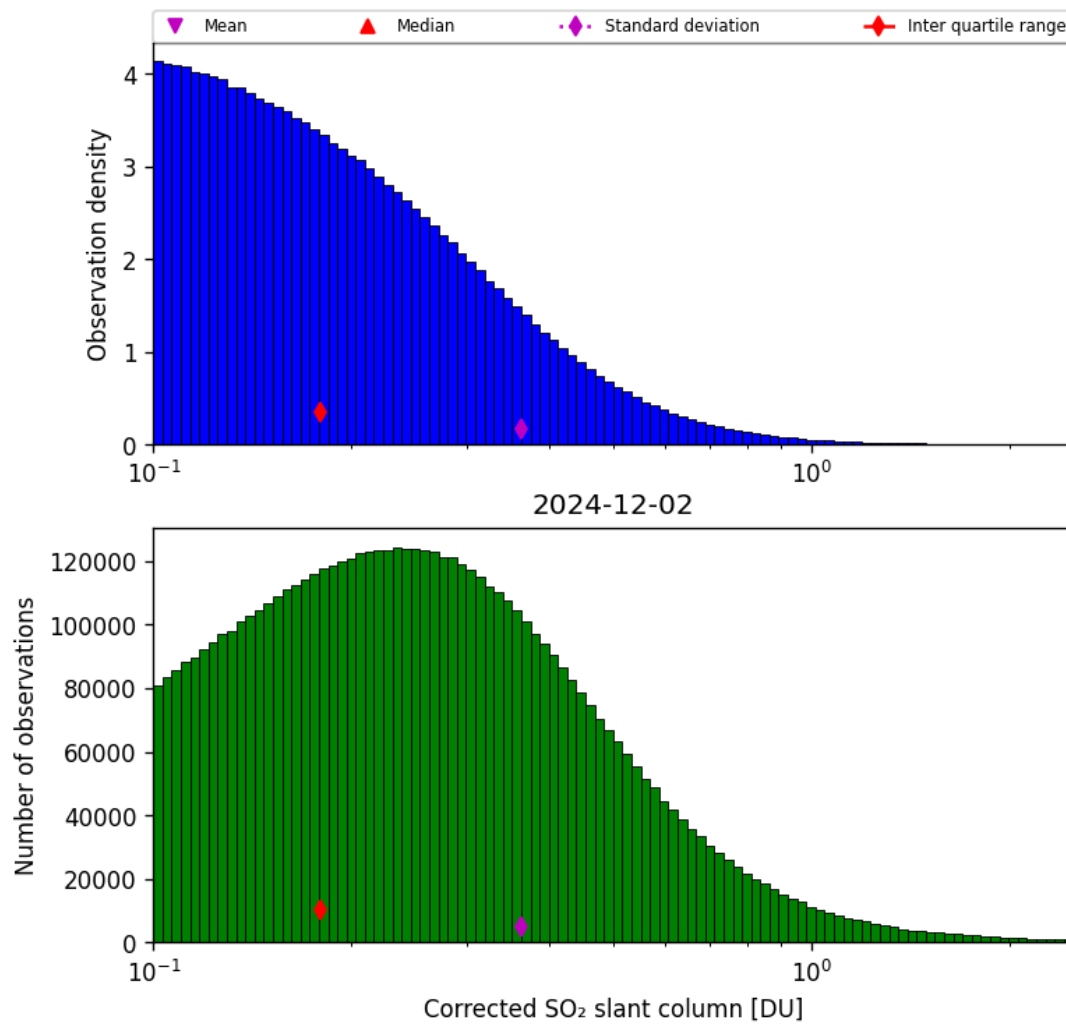


Figure 60: Histogram of “Corrected SO₂ slant column” for 2024-12-02 to 2024-12-03

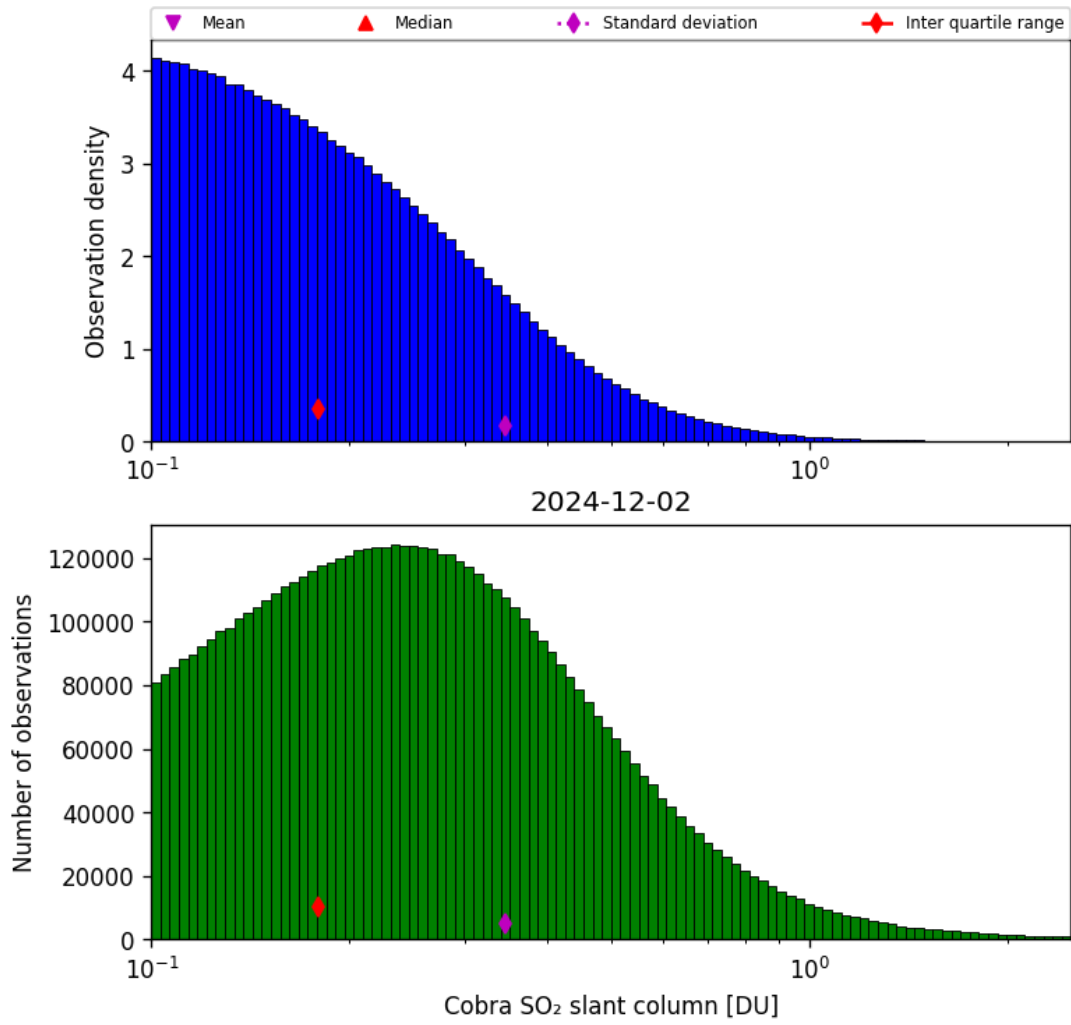


Figure 61: Histogram of “Cobra SO₂ slant column” for 2024-12-02 to 2024-12-03

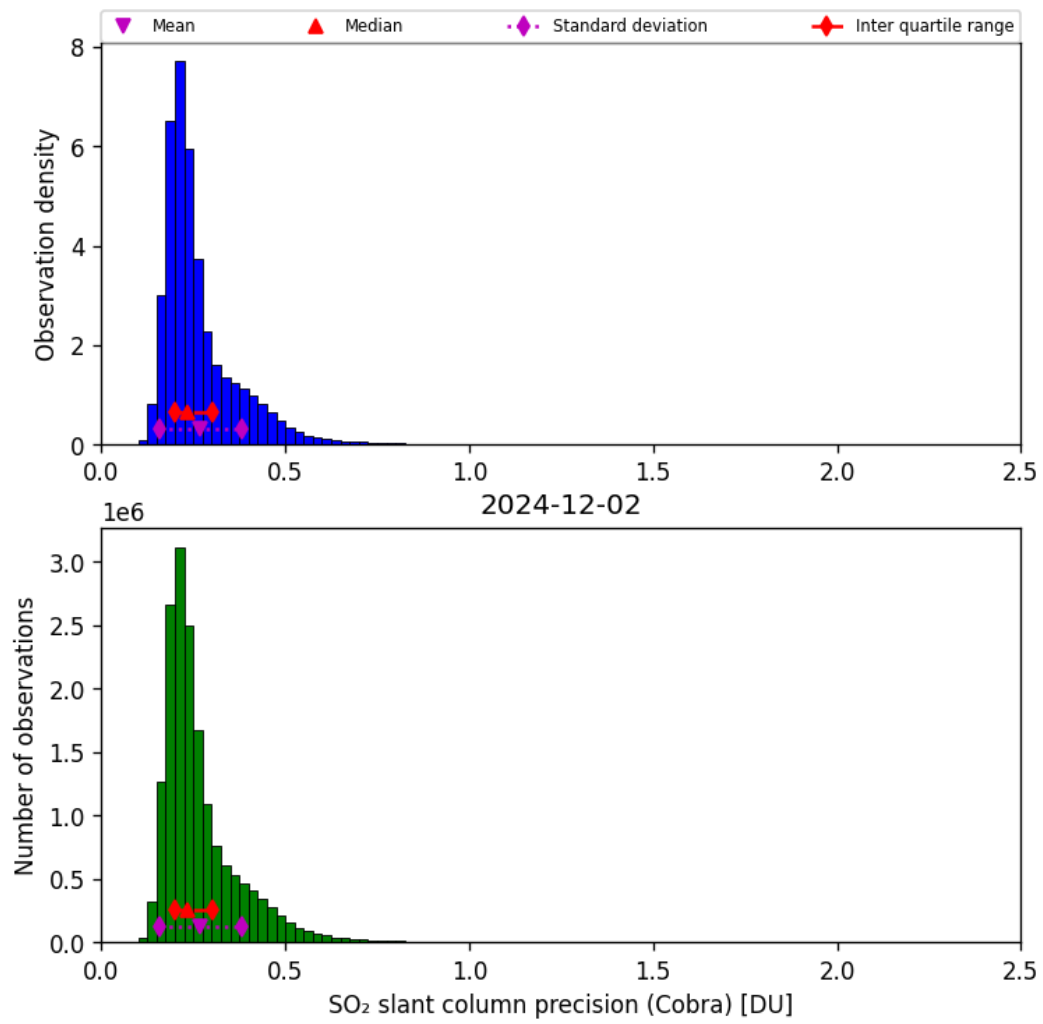


Figure 62: Histogram of “SO₂ slant column precision (Cobra)” for 2024-12-02 to 2024-12-03

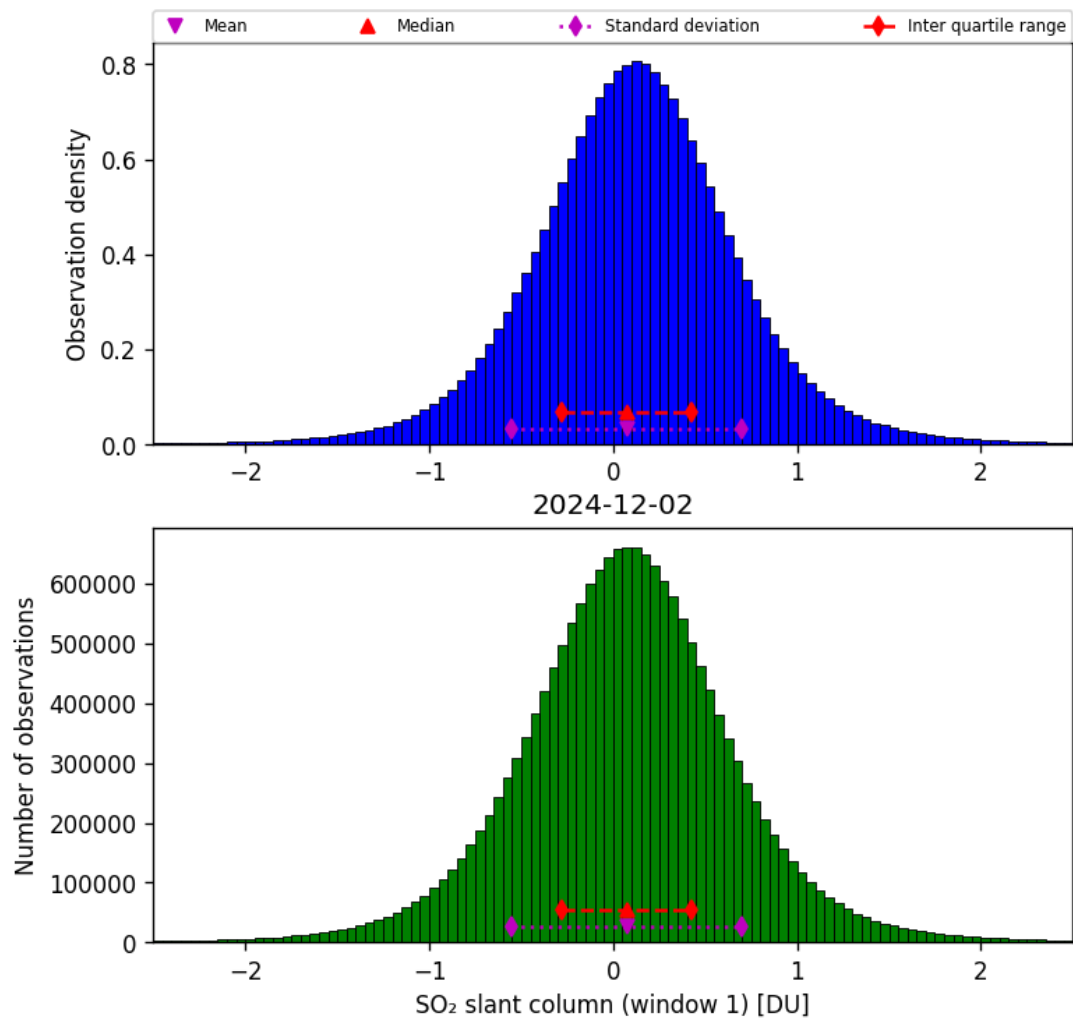


Figure 63: Histogram of “SO₂ slant column (window 1)” for 2024-12-02 to 2024-12-03

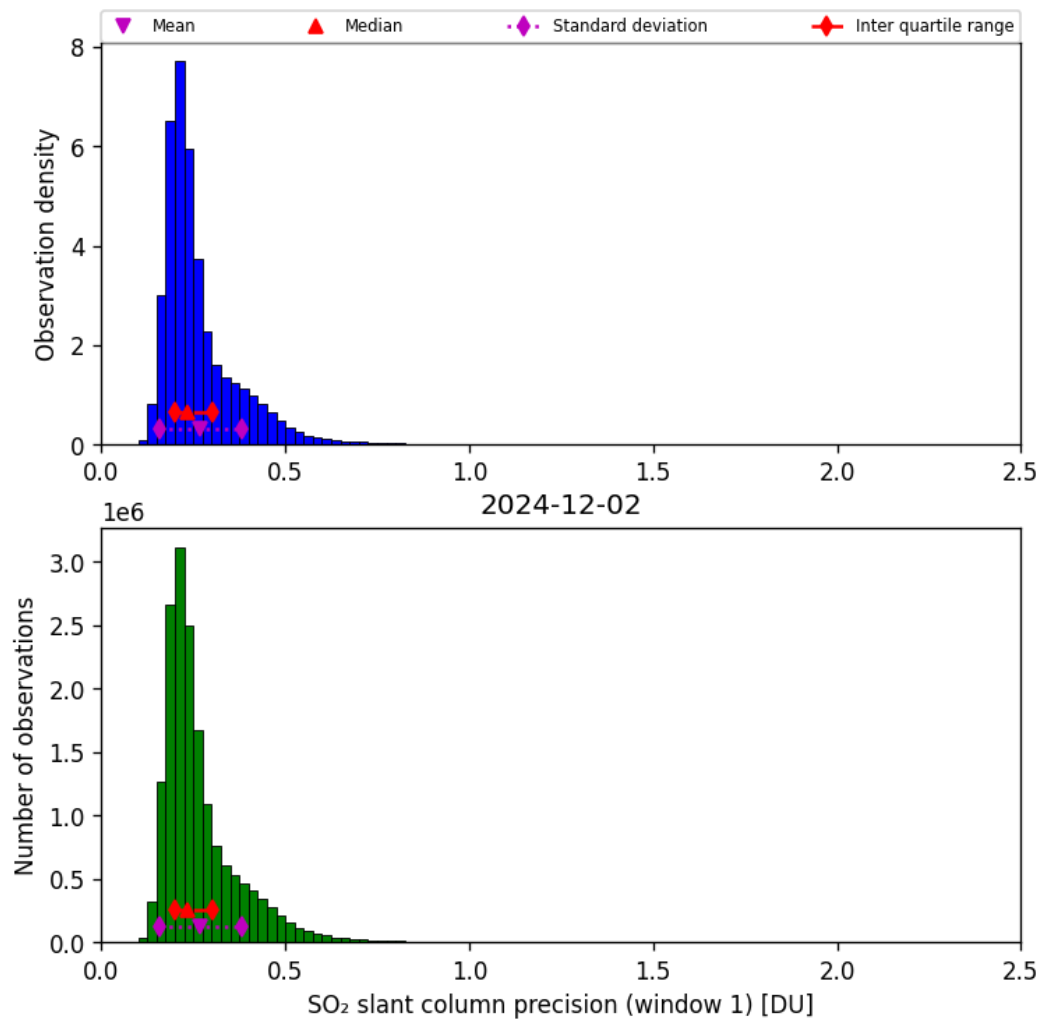


Figure 64: Histogram of “SO₂ slant column precision (window 1)” for 2024-12-02 to 2024-12-03

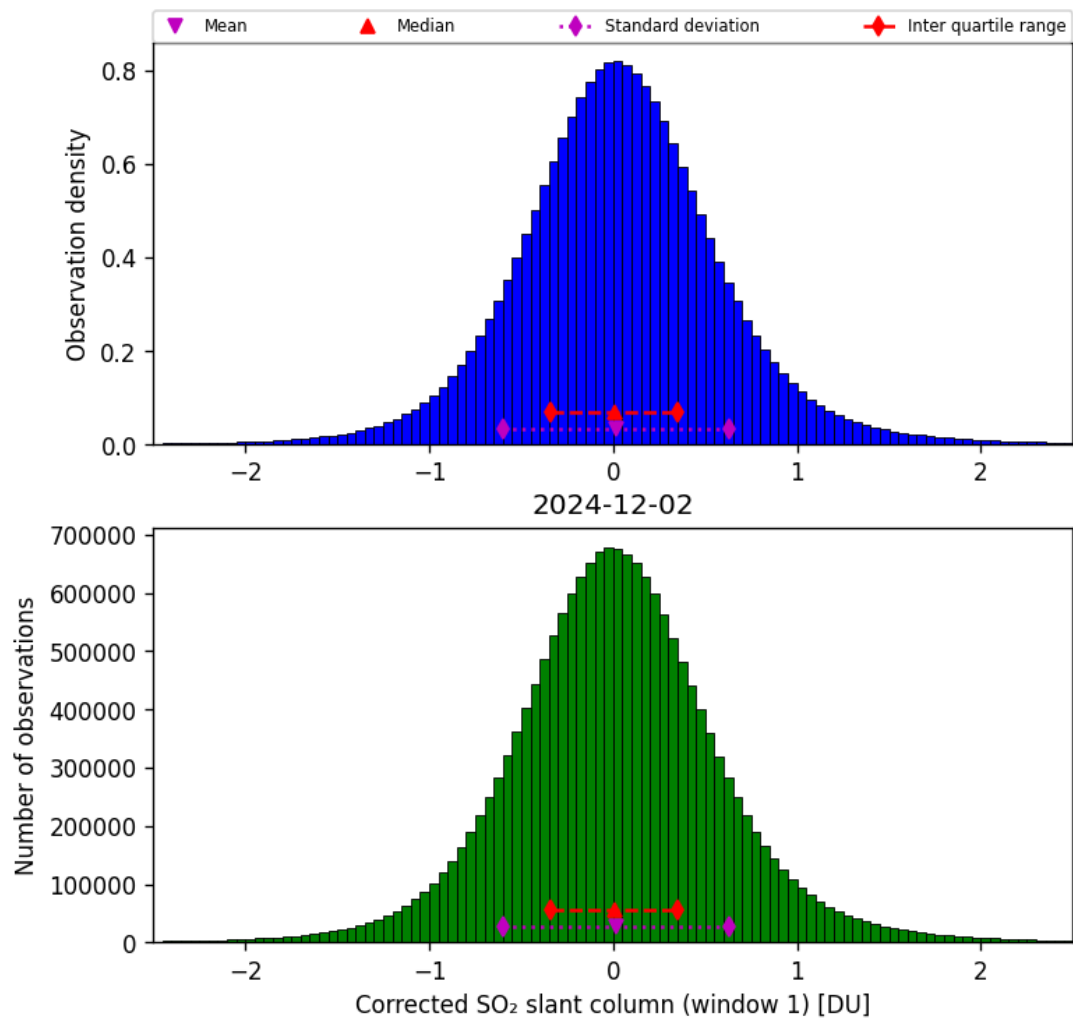


Figure 65: Histogram of “Corrected SO₂ slant column (window 1)” for 2024-12-02 to 2024-12-03

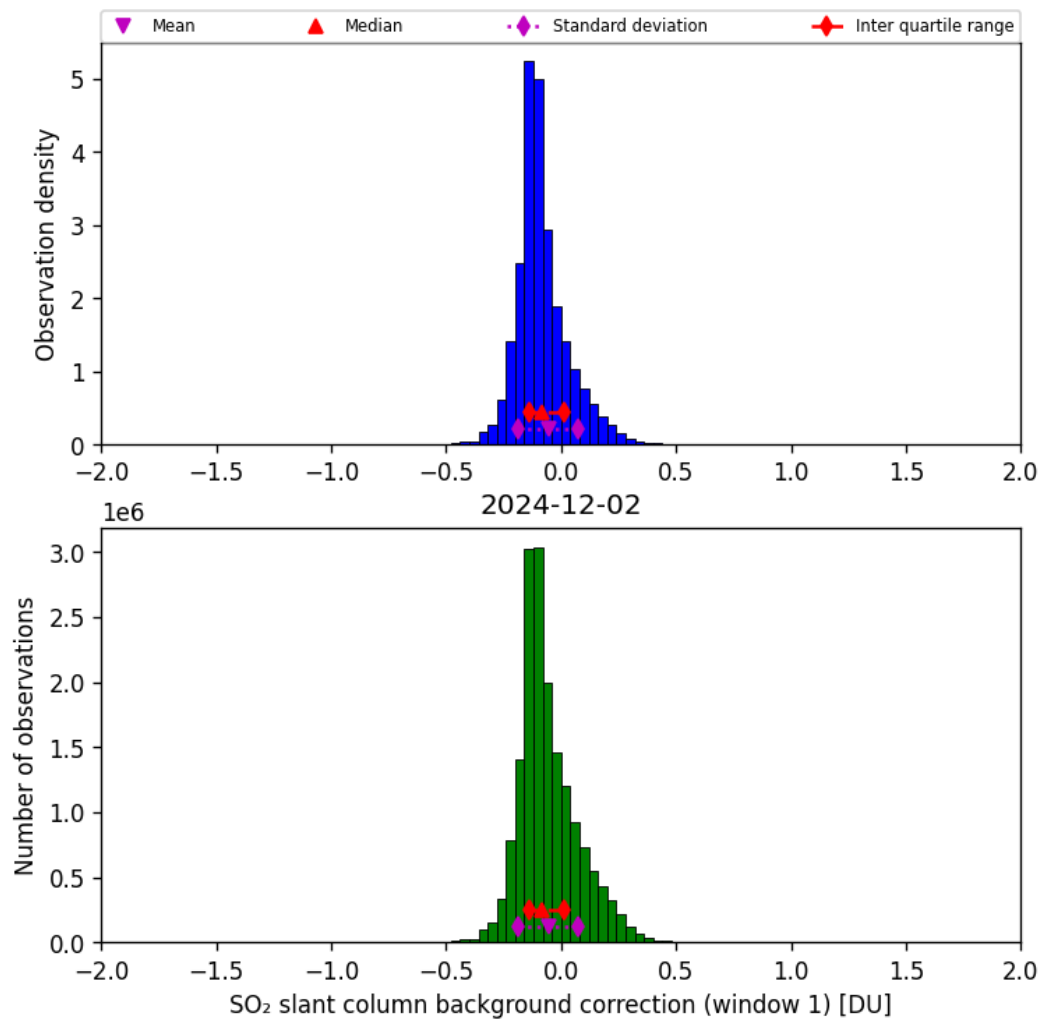


Figure 66: Histogram of “SO₂ slant column background correction (window 1)” for 2024-12-02 to 2024-12-03

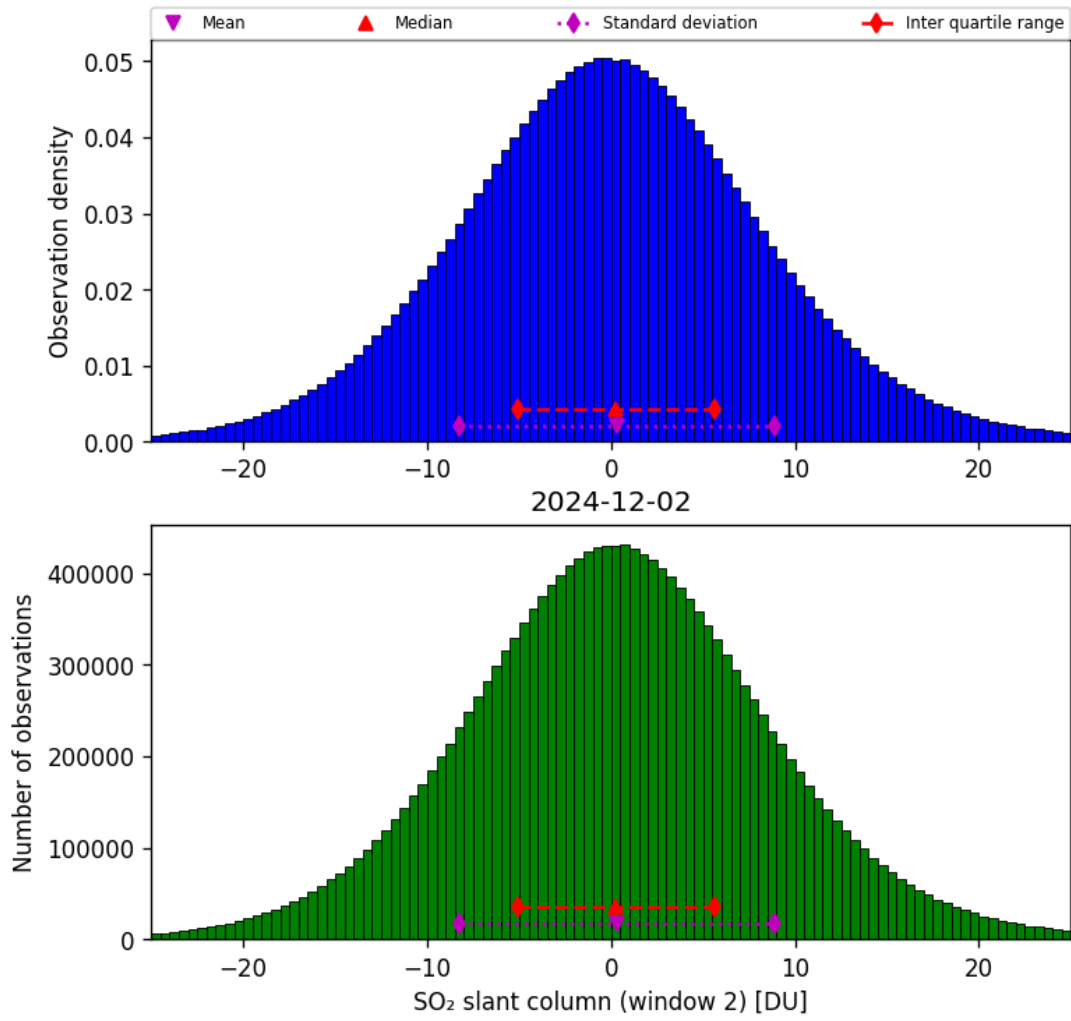


Figure 67: Histogram of “SO₂ slant column (window 2)” for 2024-12-02 to 2024-12-03

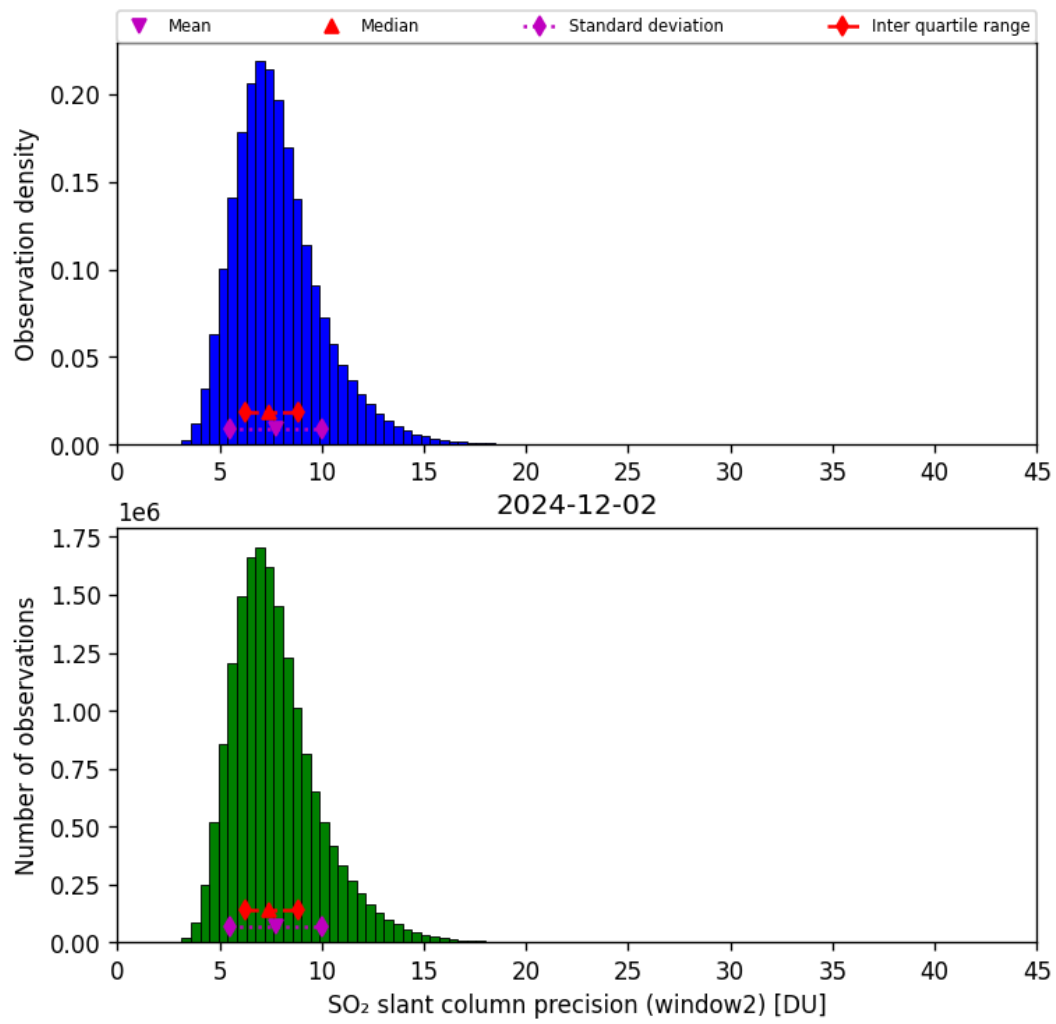


Figure 68: Histogram of “SO₂ slant column precision (window2)” for 2024-12-02 to 2024-12-03

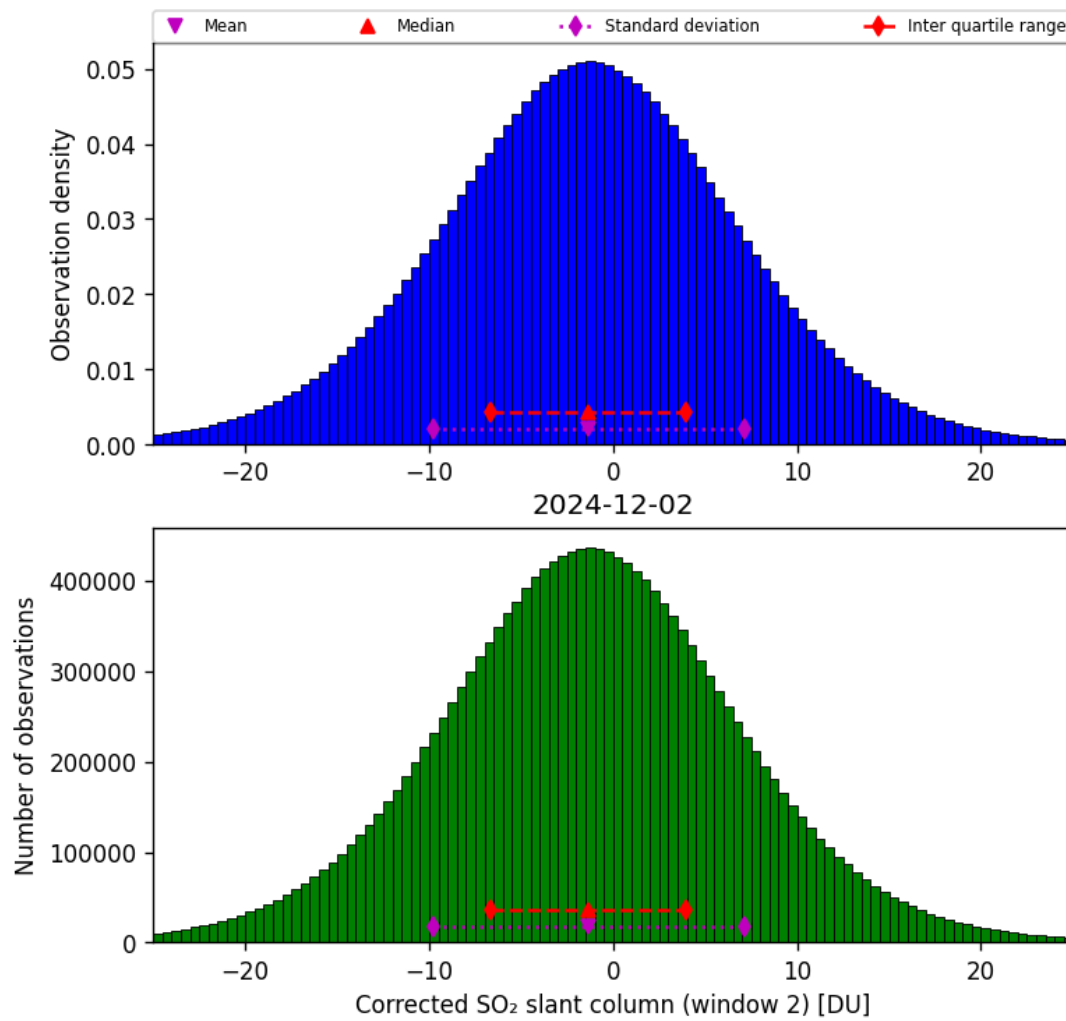


Figure 69: Histogram of “Corrected SO₂ slant column (window 2)” for 2024-12-02 to 2024-12-03

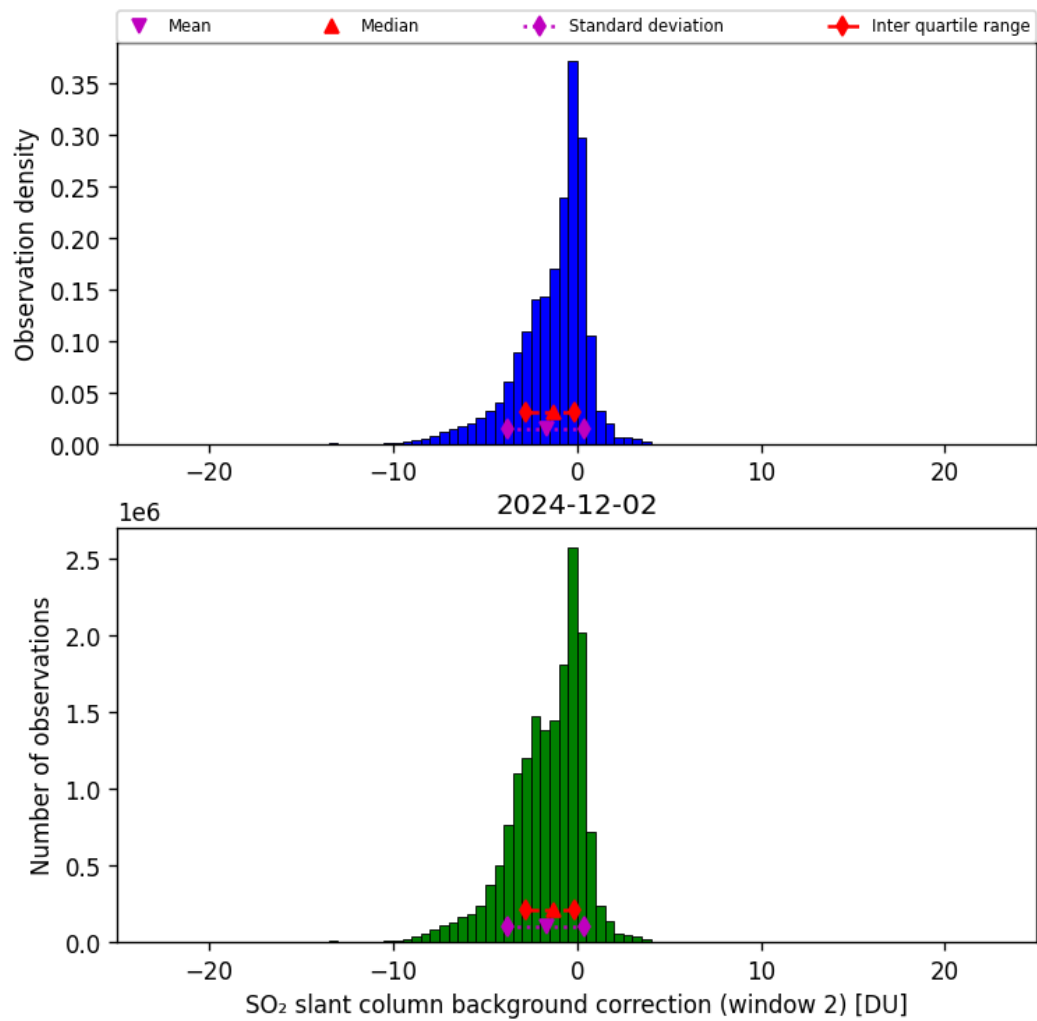


Figure 70: Histogram of “SO₂ slant column background correction (window 2)” for 2024-12-02 to 2024-12-03

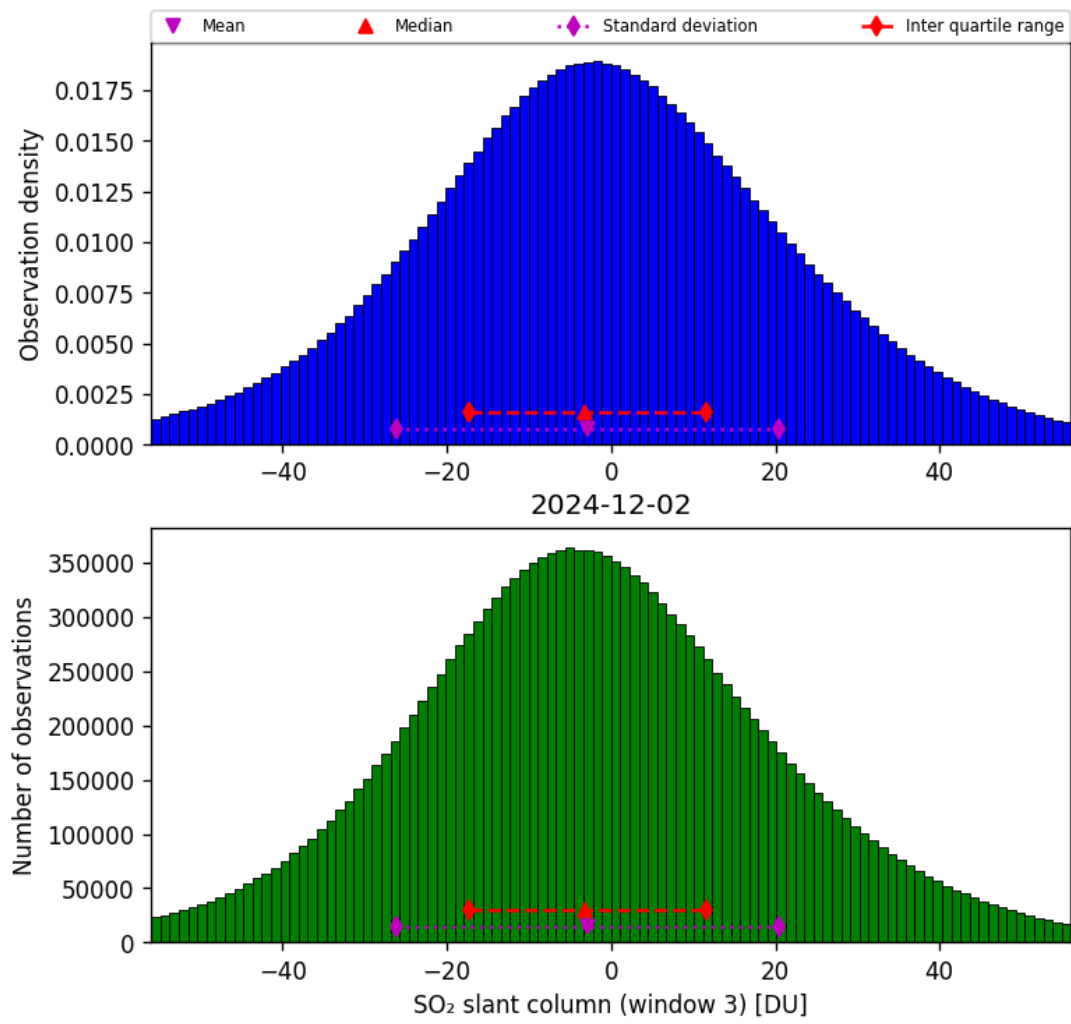


Figure 71: Histogram of “SO₂ slant column (window 3)” for 2024-12-02 to 2024-12-03

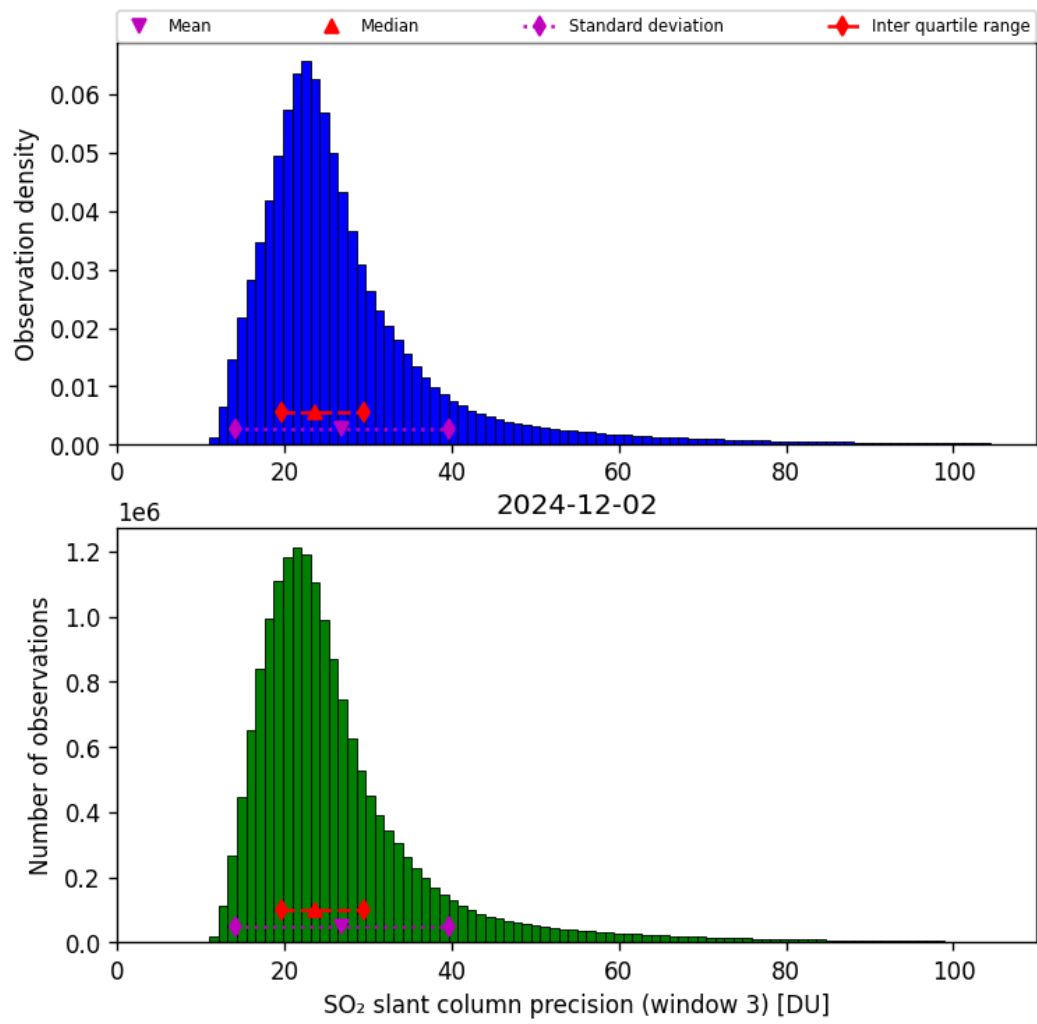


Figure 72: Histogram of “SO₂ slant column precision (window 3)” for 2024-12-02 to 2024-12-03

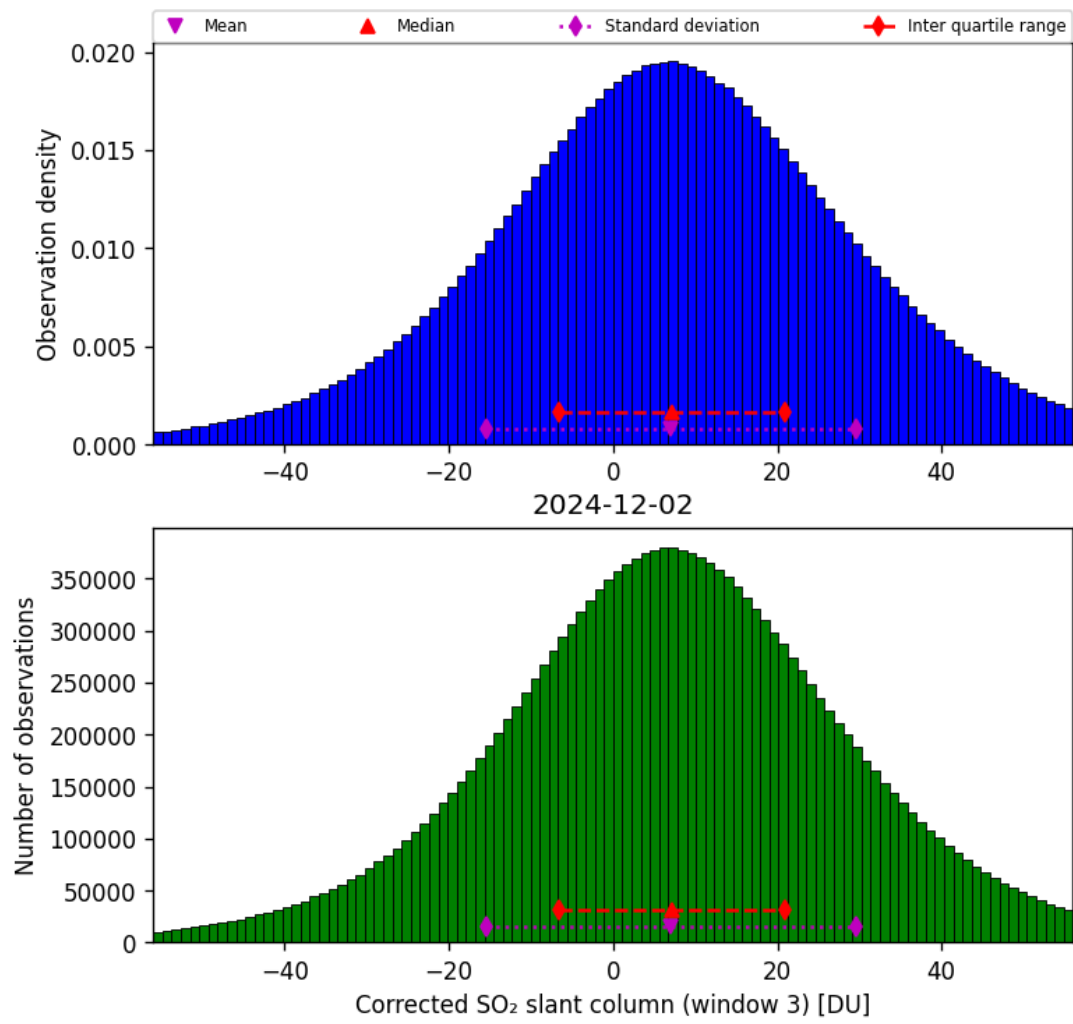


Figure 73: Histogram of “Corrected SO₂ slant column (window 3)” for 2024-12-02 to 2024-12-03

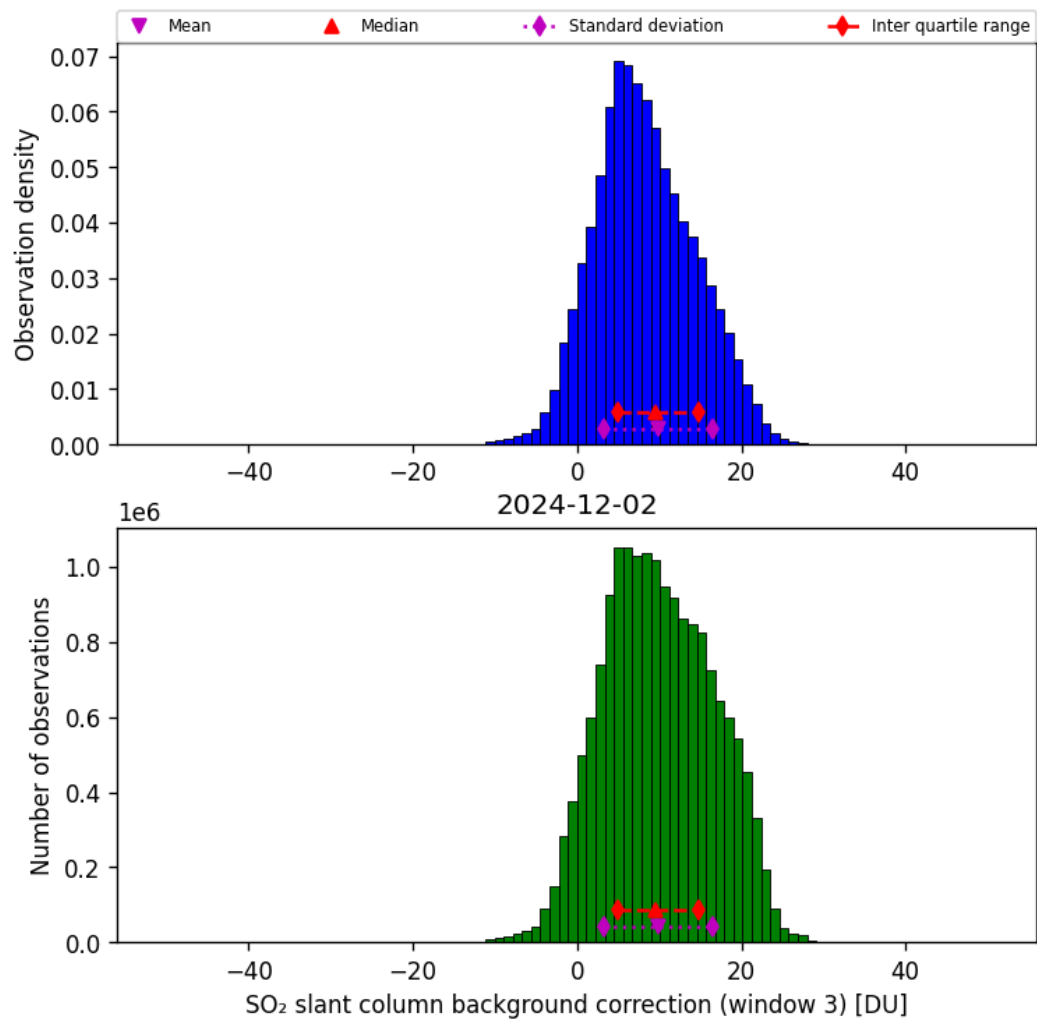


Figure 74: Histogram of “SO₂ slant column background correction (window 3)” for 2024-12-02 to 2024-12-03

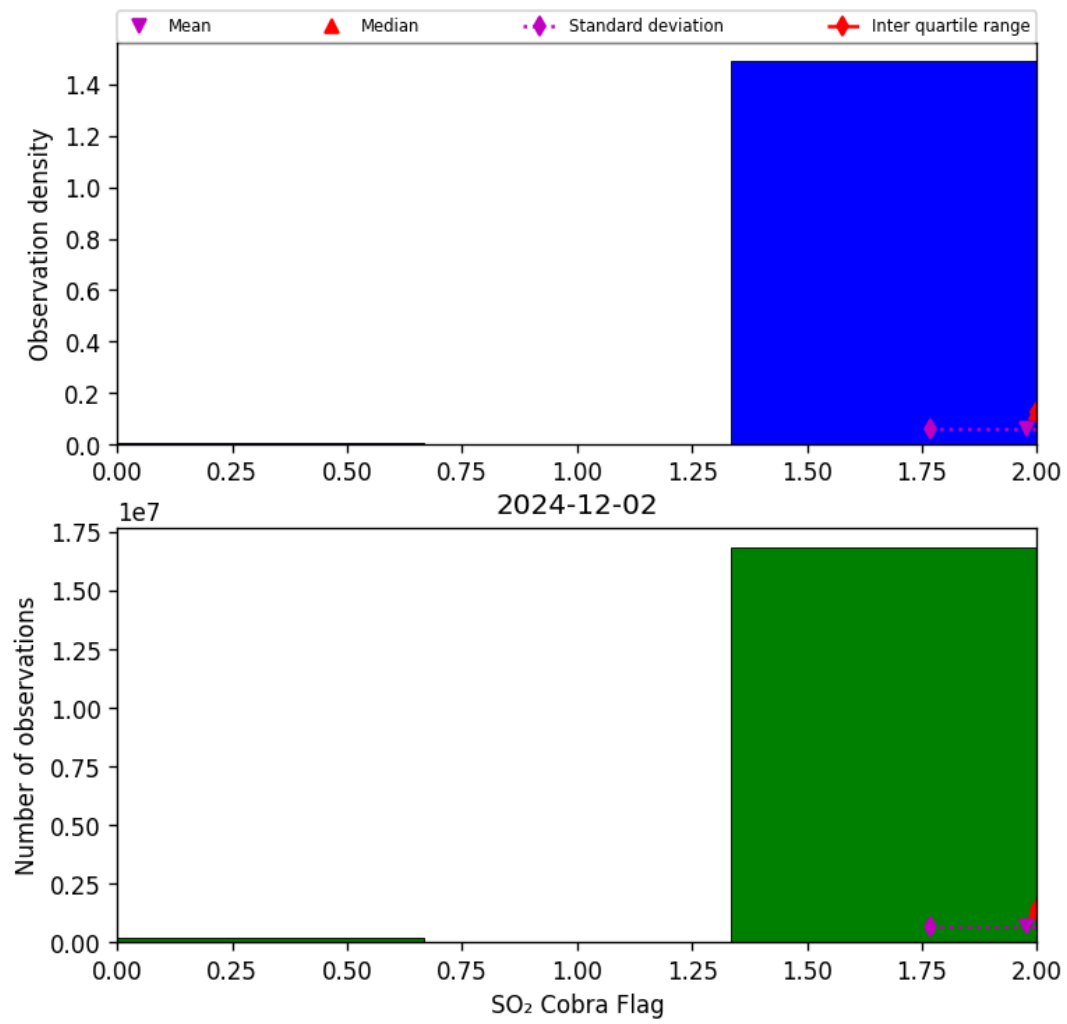


Figure 75: Histogram of "SO₂ Cobra Flag" for 2024-12-02 to 2024-12-03

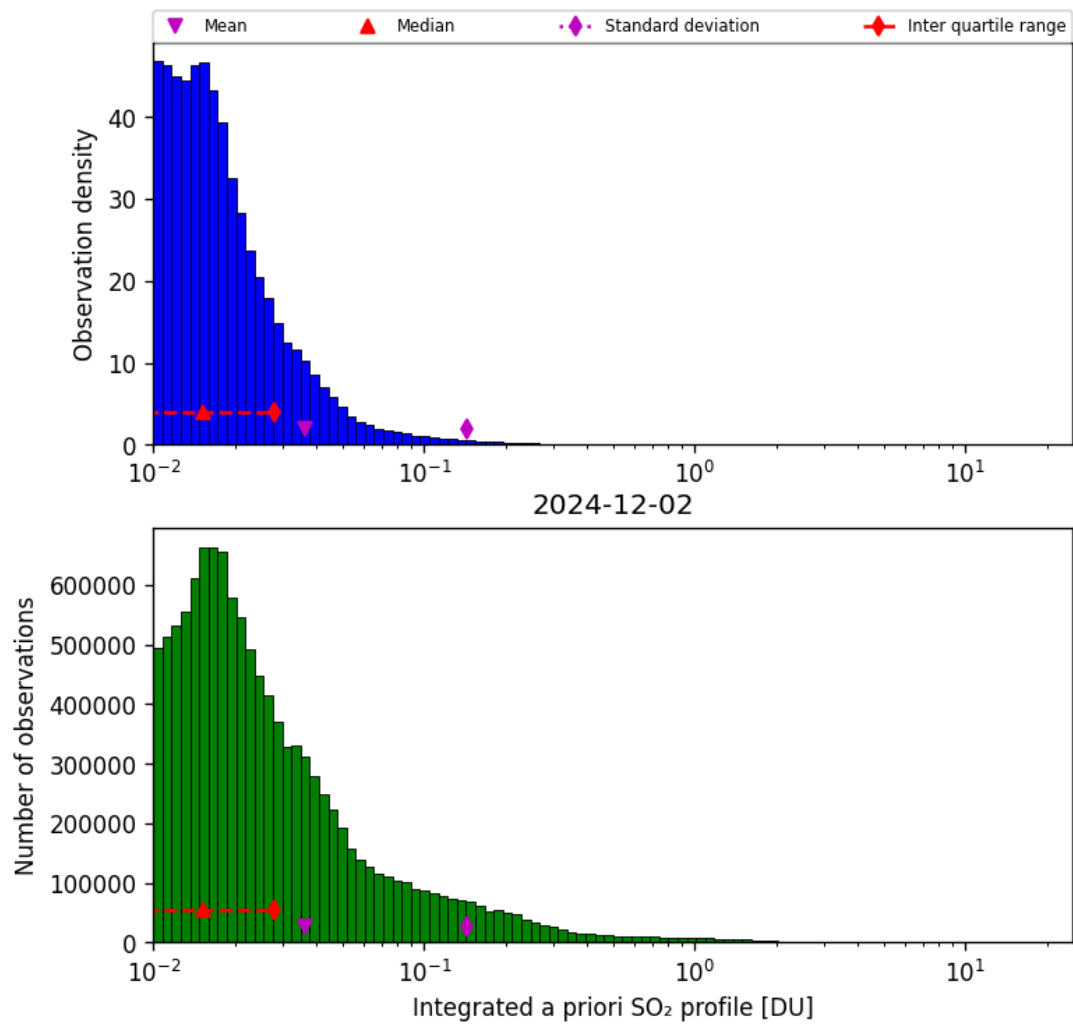


Figure 76: Histogram of “Integrated a priori SO₂ profile” for 2024-12-02 to 2024-12-03

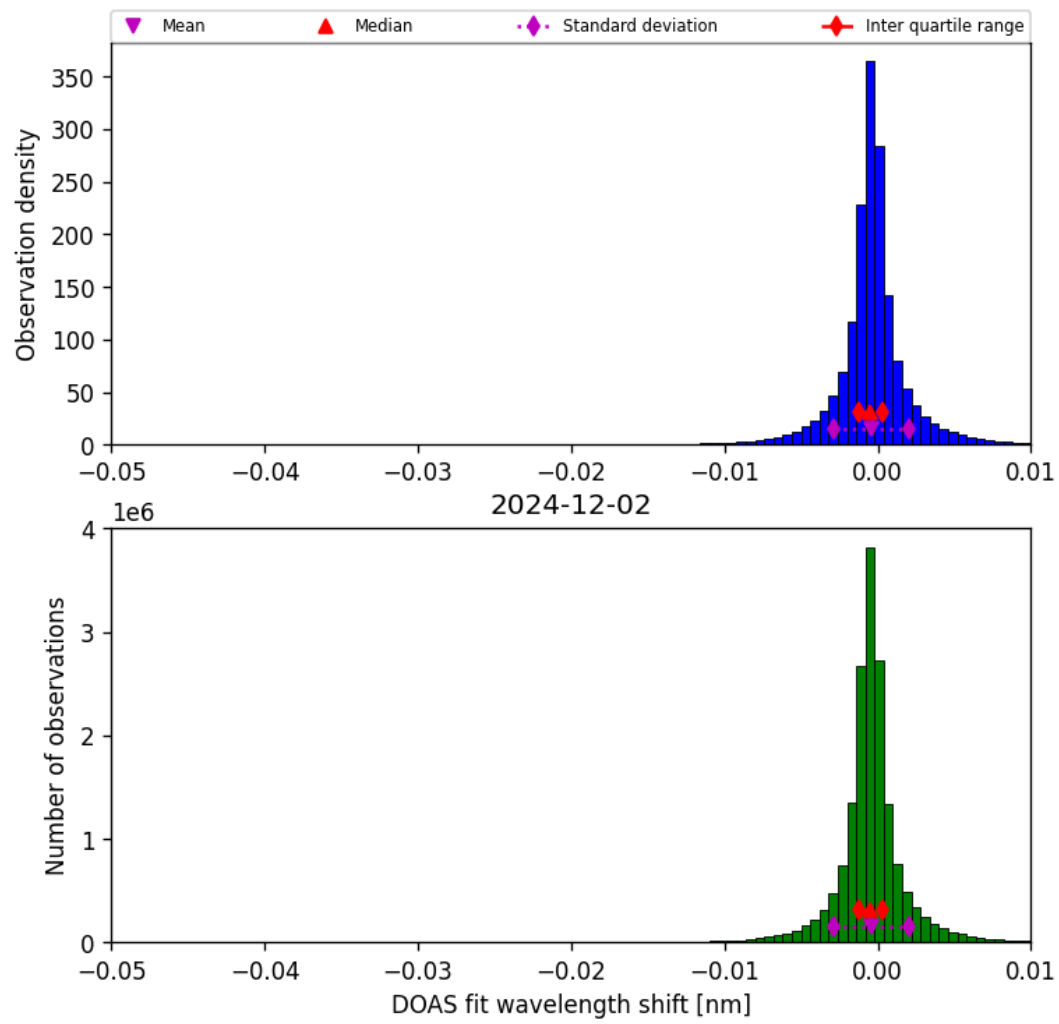


Figure 77: Histogram of “DOAS fit wavelength shift” for 2024-12-02 to 2024-12-03

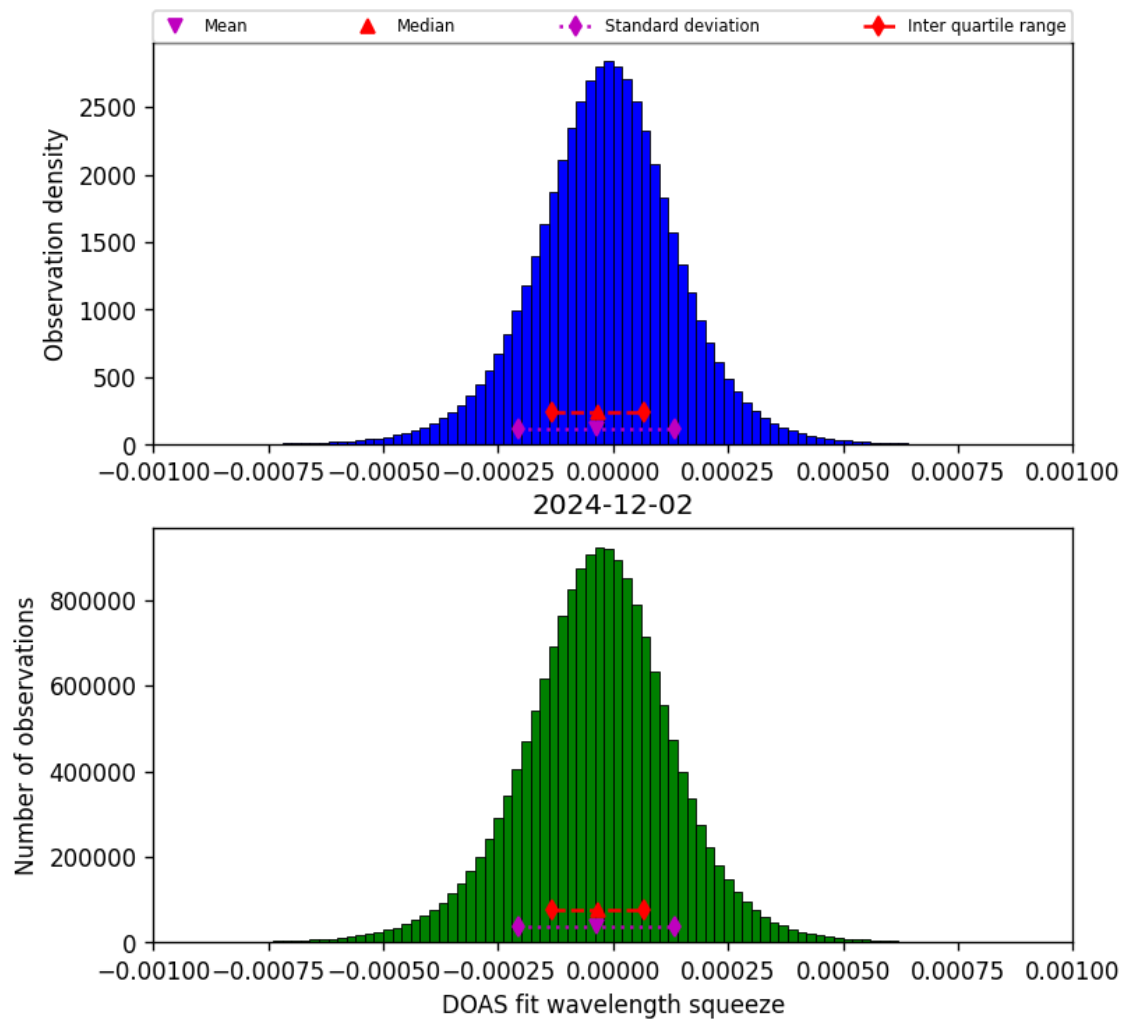


Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2024-12-02 to 2024-12-03

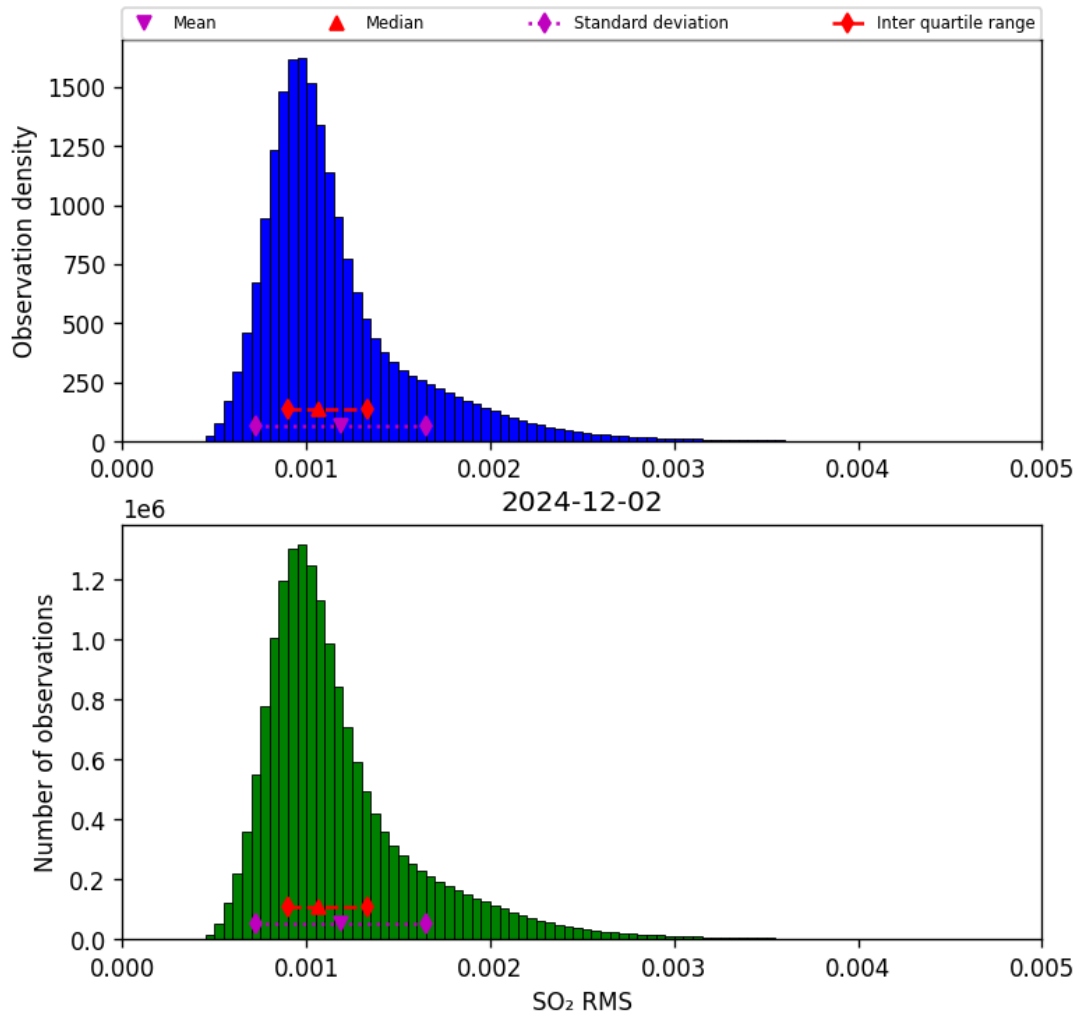


Figure 79: Histogram of “SO₂ RMS” for 2024-12-02 to 2024-12-03

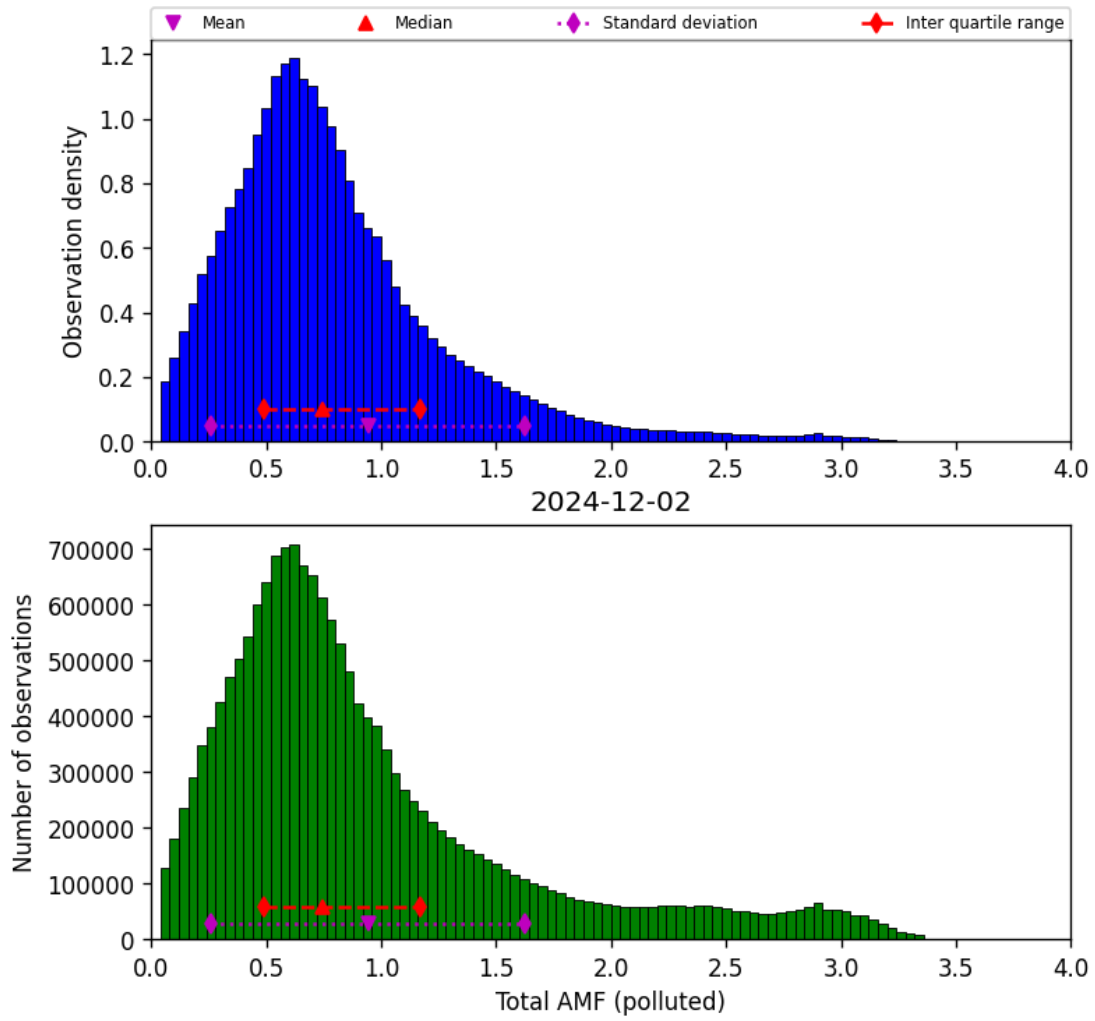


Figure 80: Histogram of “Total AMF (polluted)” for 2024-12-02 to 2024-12-03

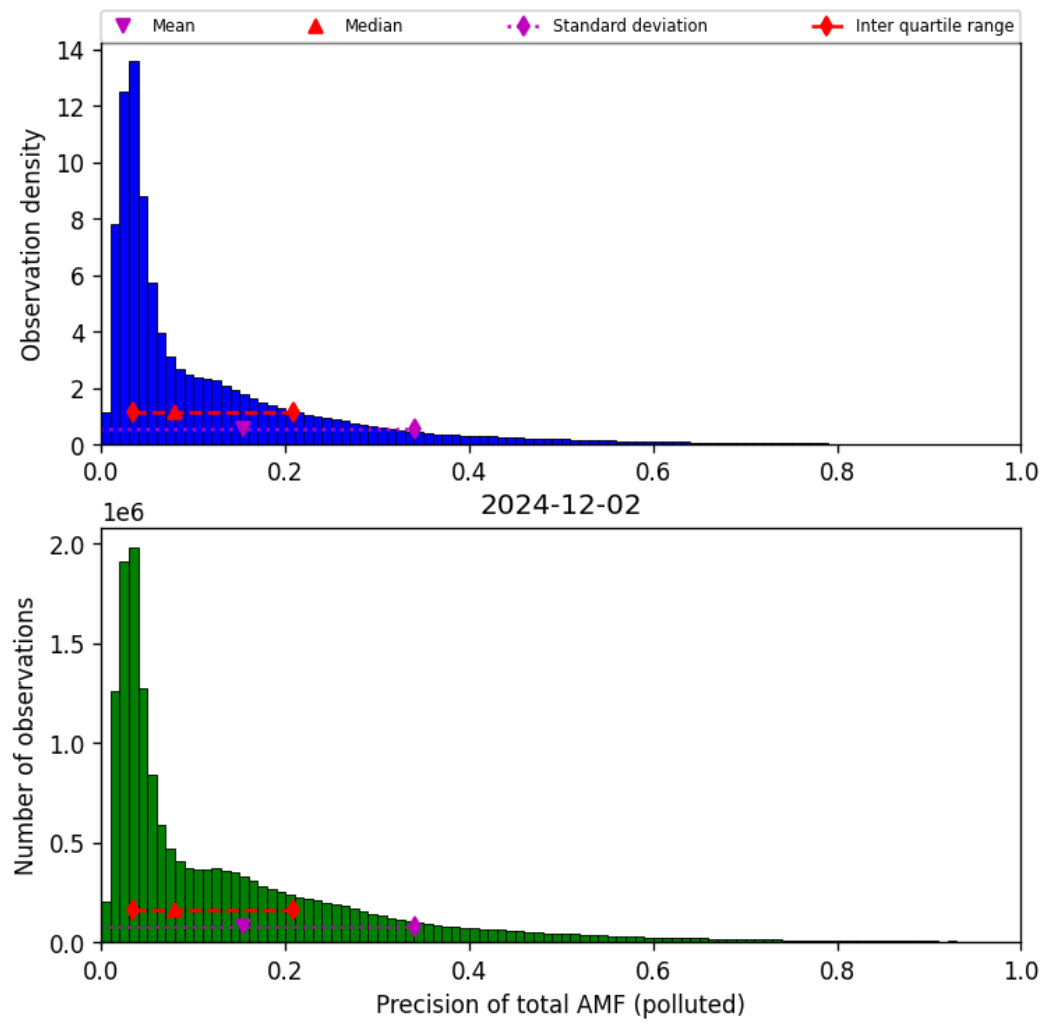


Figure 81: Histogram of “Precision of total AMF (polluted)” for 2024-12-02 to 2024-12-03

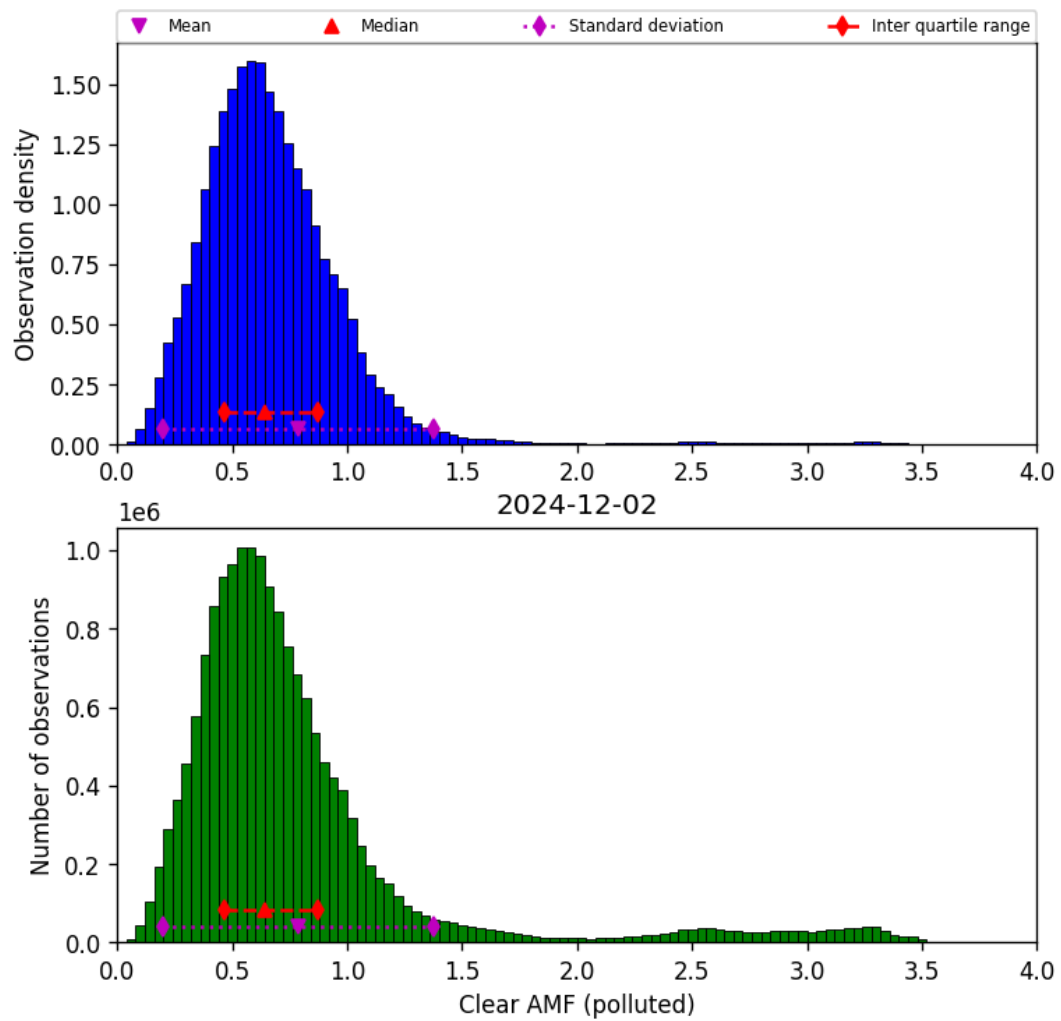


Figure 82: Histogram of “Clear AMF (polluted)” for 2024-12-02 to 2024-12-03

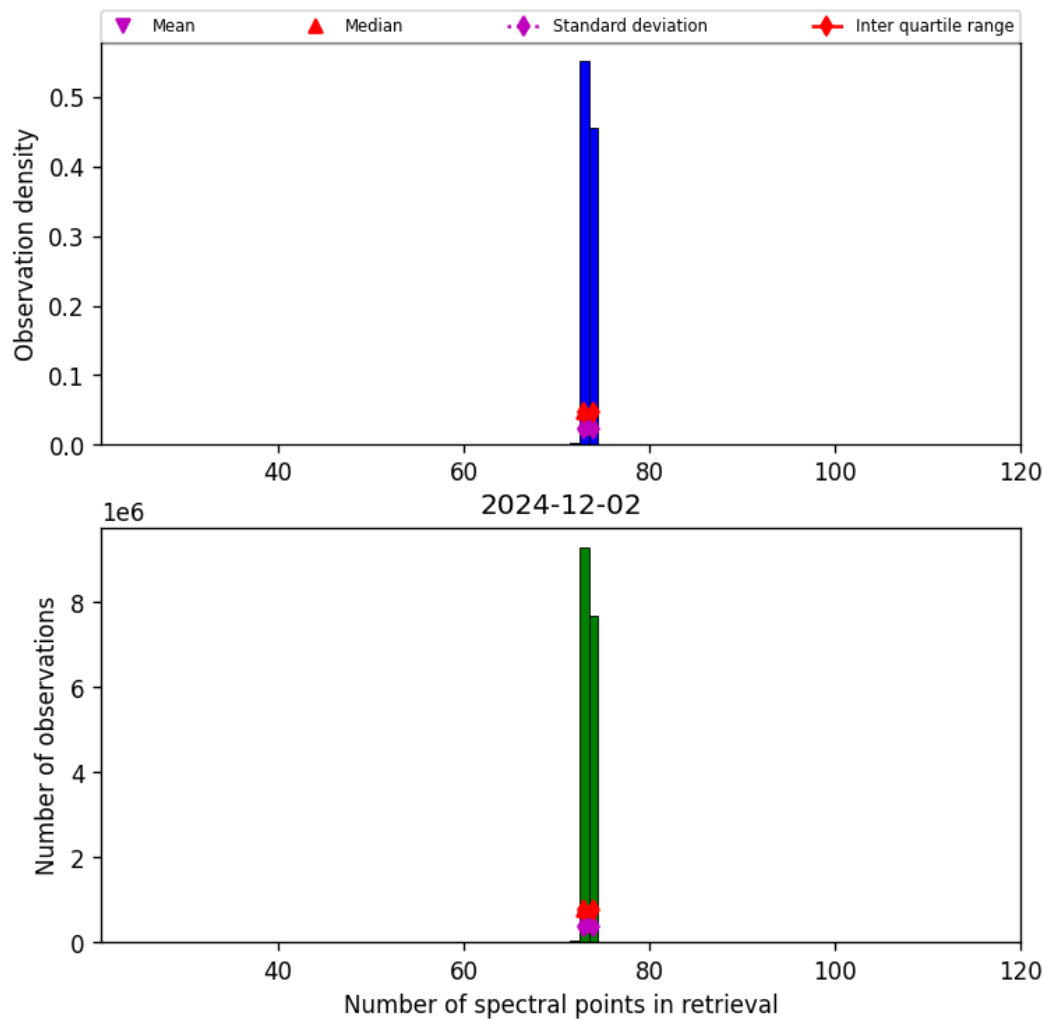


Figure 83: Histogram of “Number of spectral points in retrieval” for 2024-12-02 to 2024-12-03

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.

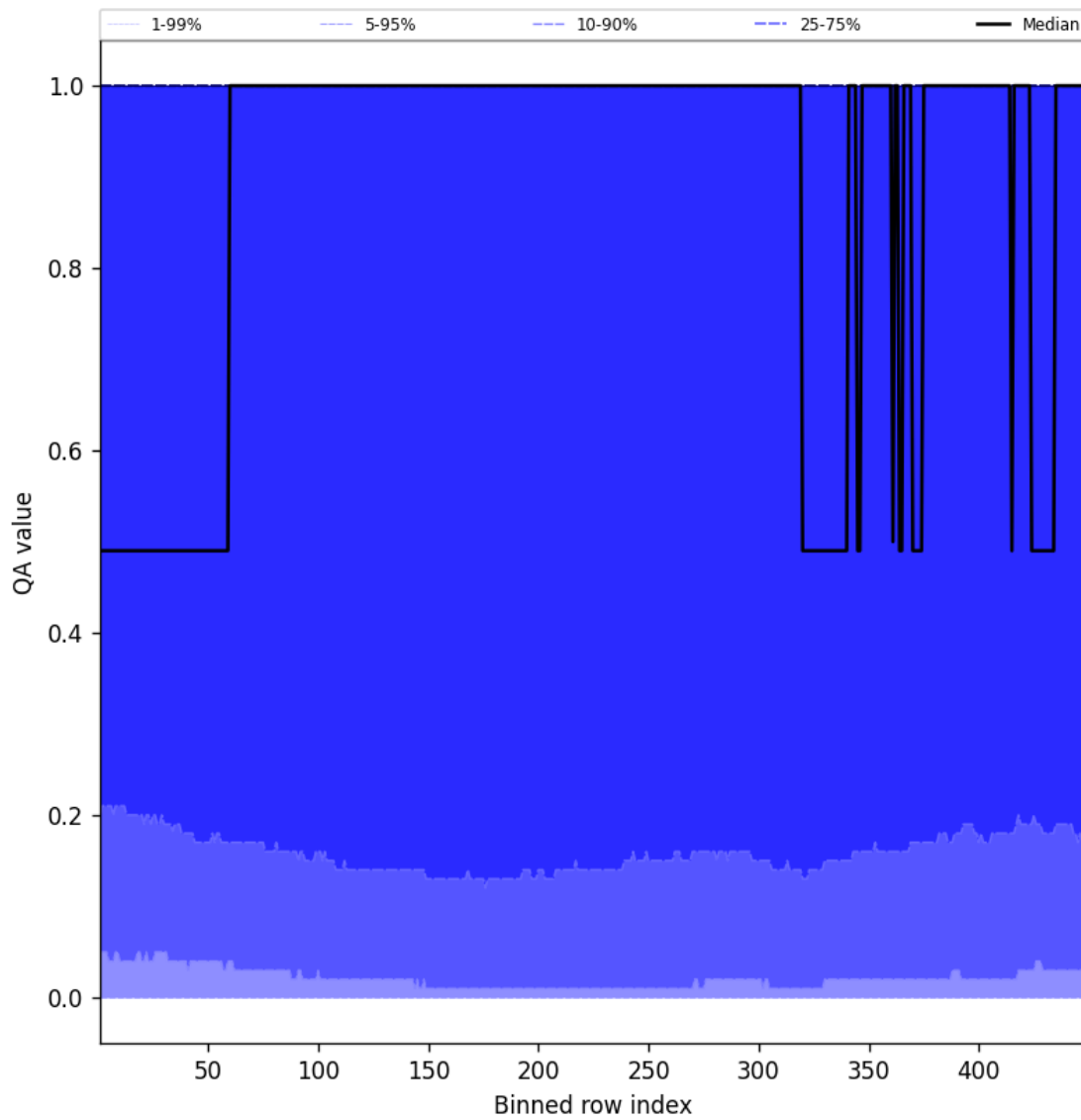


Figure 84: Along track statistics of “QA value” for 2024-12-02 to 2024-12-03

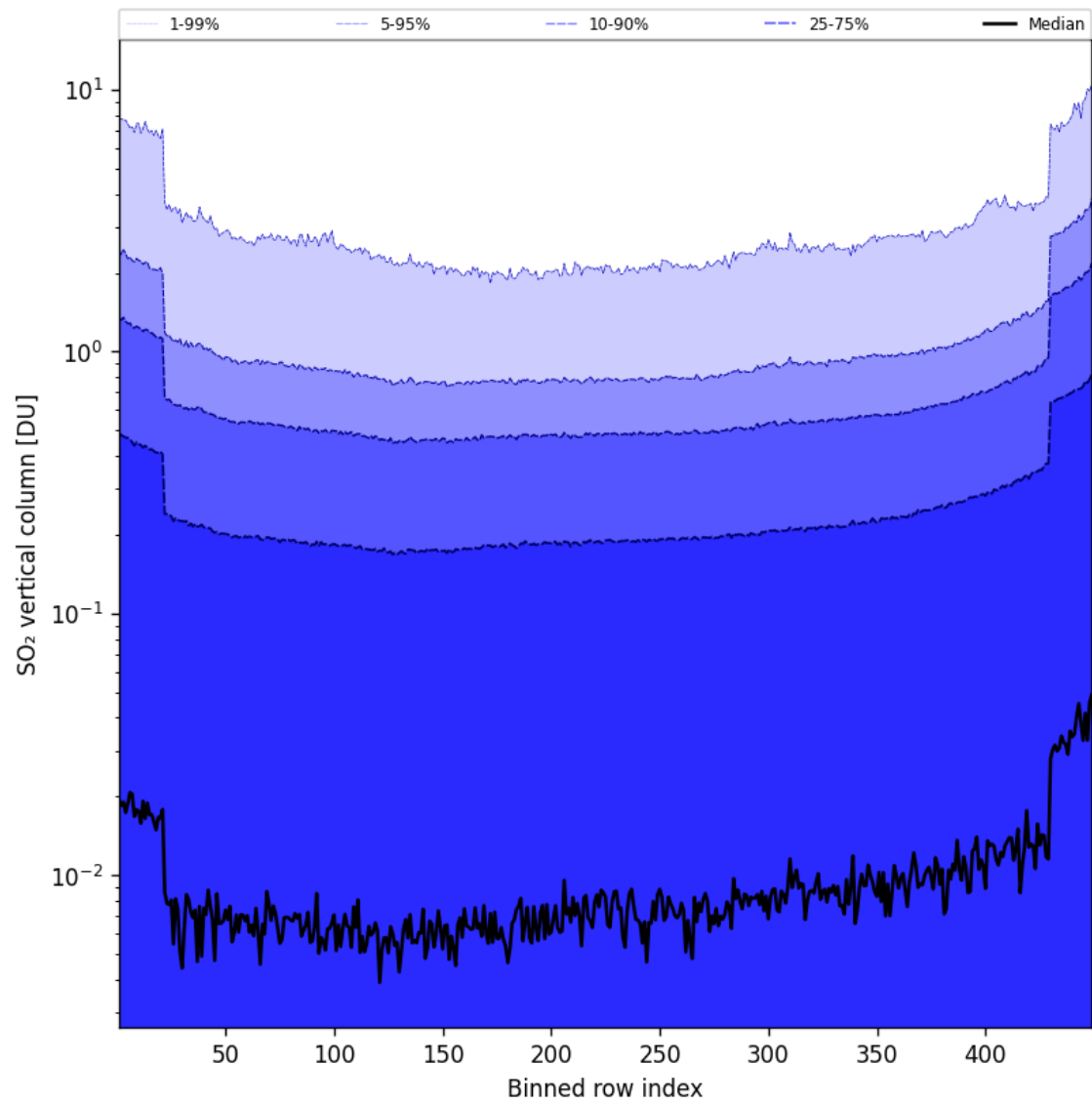


Figure 85: Along track statistics of “SO₂ vertical column” for 2024-12-02 to 2024-12-03

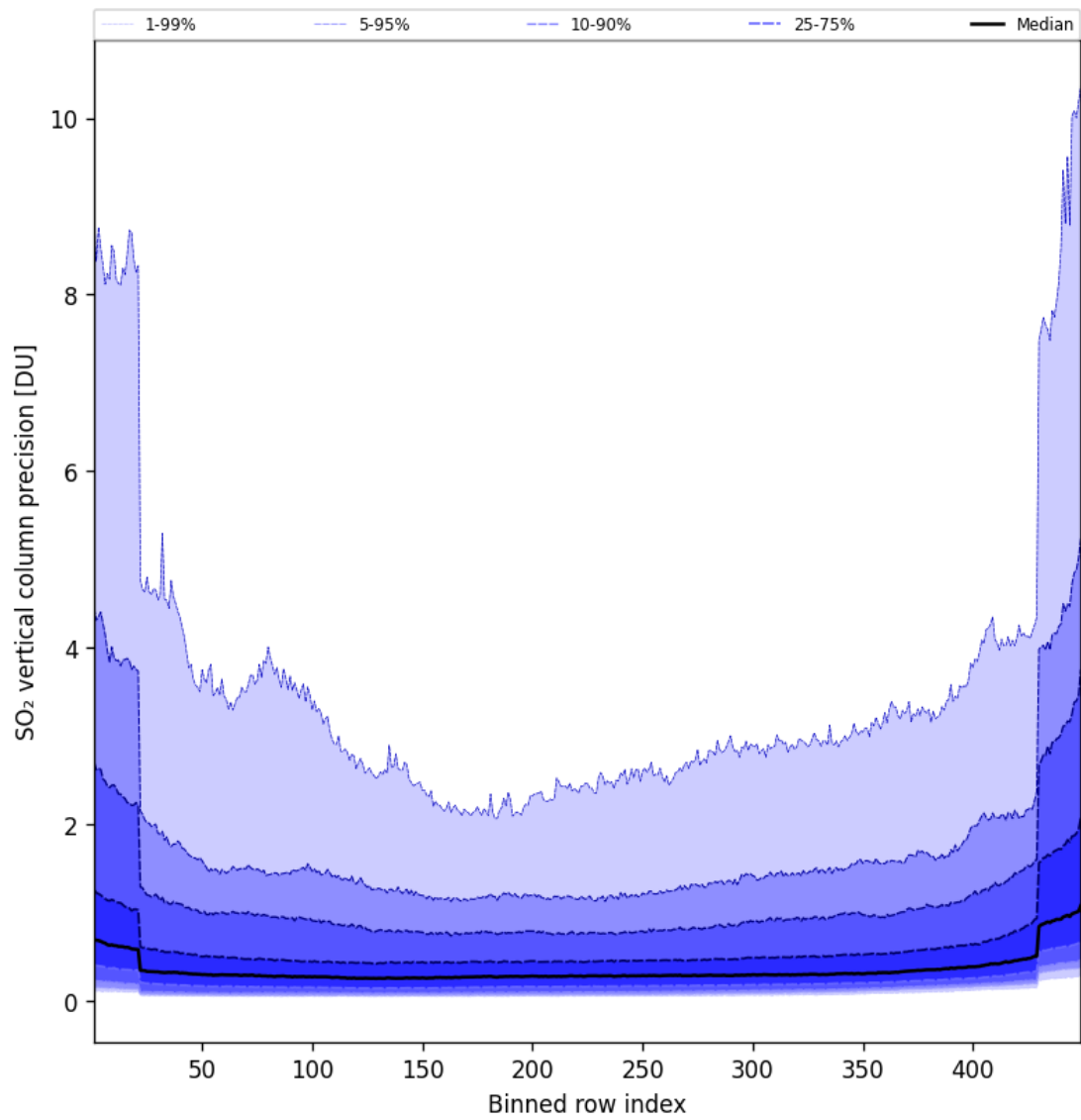


Figure 86: Along track statistics of “SO₂ vertical column precision” for 2024-12-02 to 2024-12-03

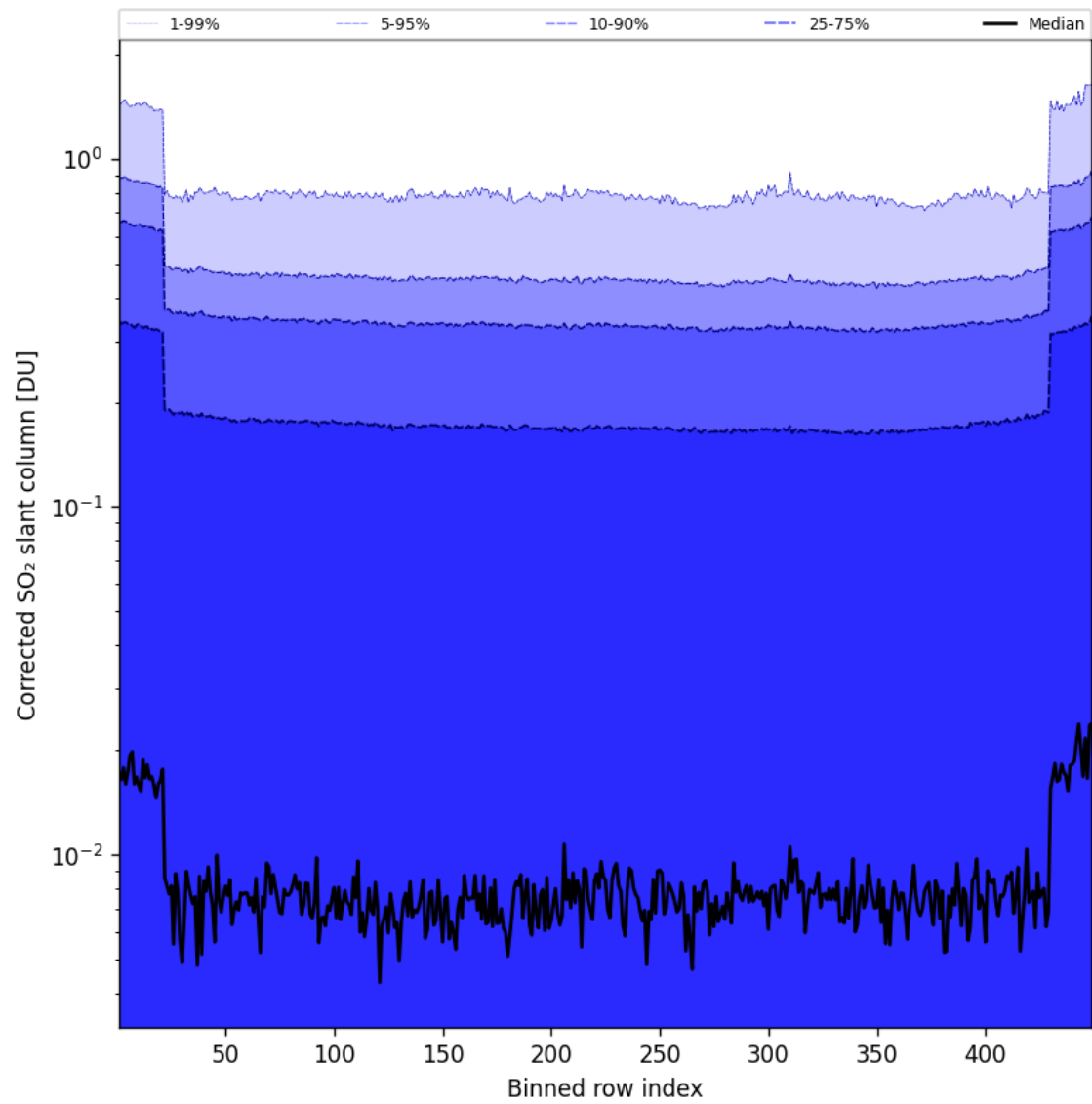


Figure 87: Along track statistics of “Corrected SO₂ slant column” for 2024-12-02 to 2024-12-03

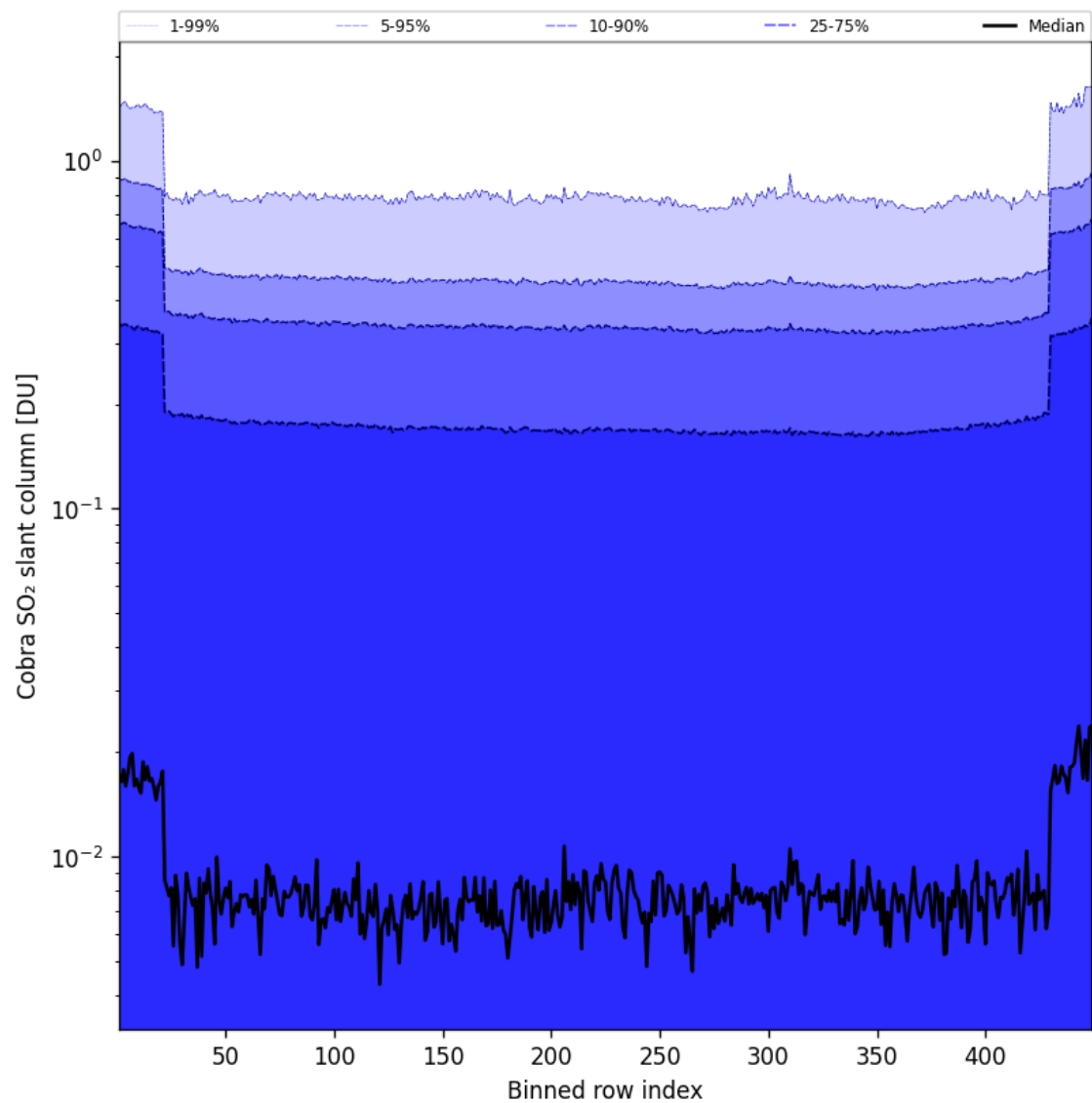


Figure 88: Along track statistics of “Cobra SO₂ slant column” for 2024-12-02 to 2024-12-03

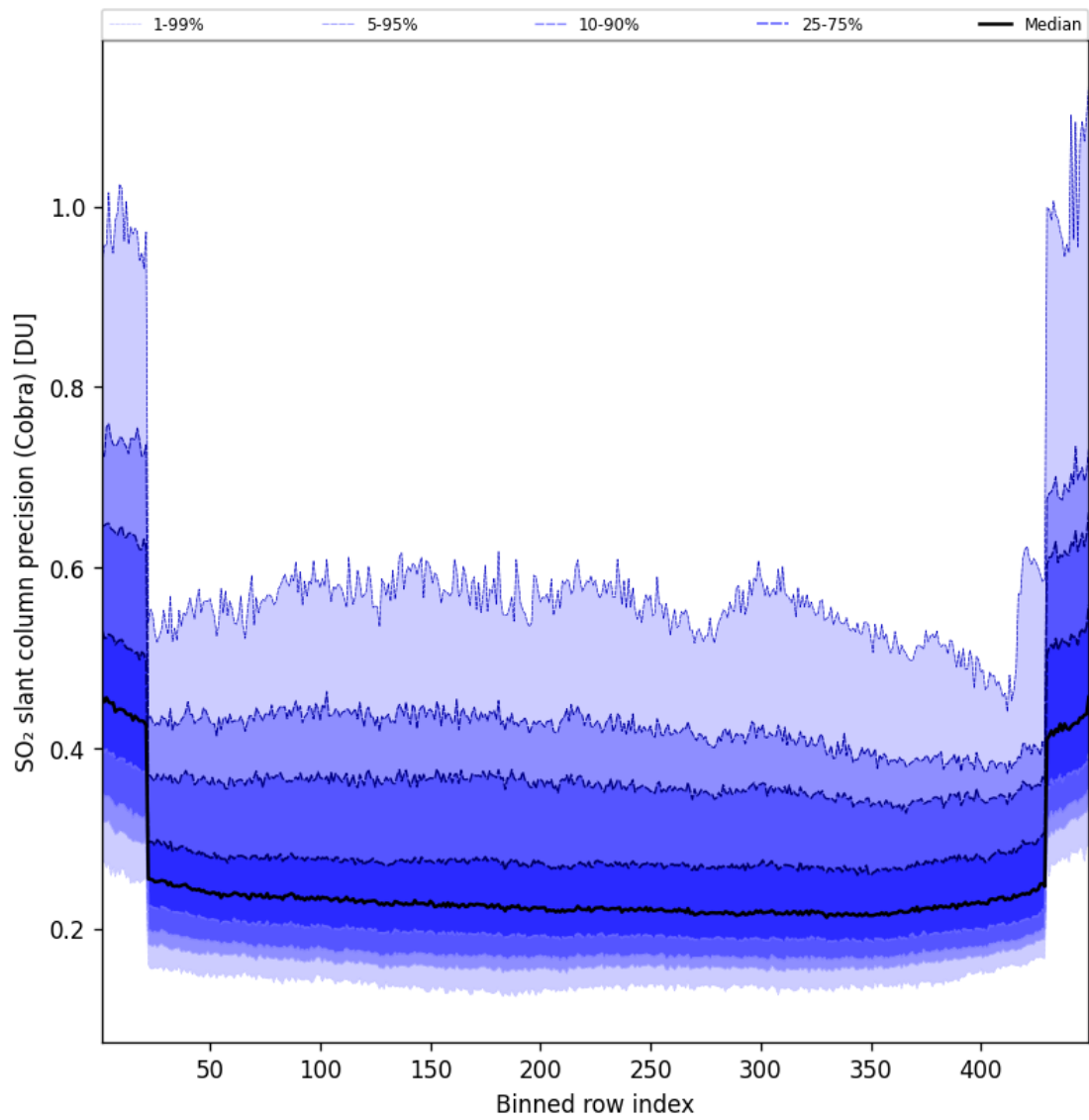


Figure 89: Along track statistics of “SO₂ slant column precision (Cobra)” for 2024-12-02 to 2024-12-03

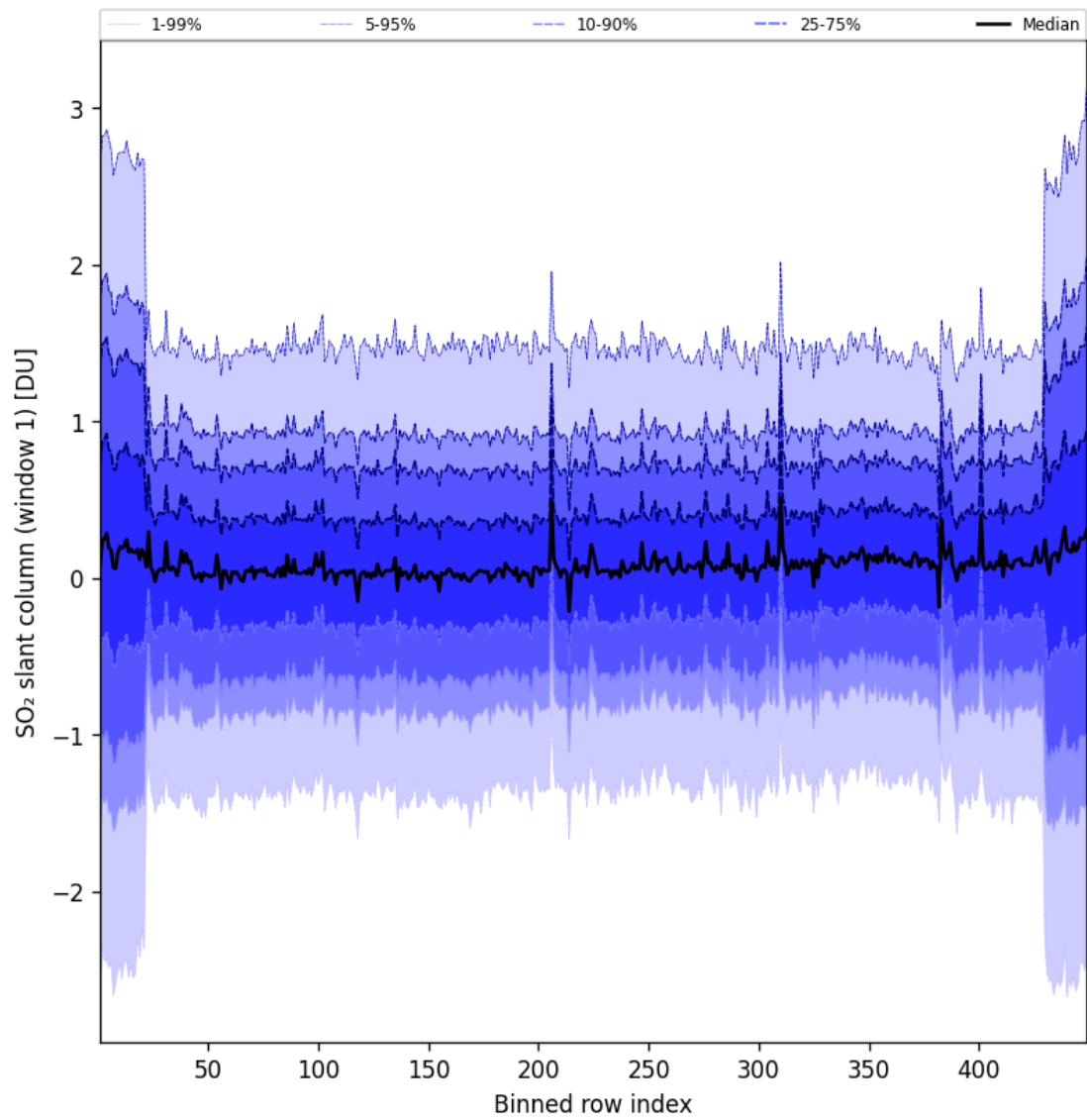


Figure 90: Along track statistics of “SO₂ slant column (window 1)” for 2024-12-02 to 2024-12-03

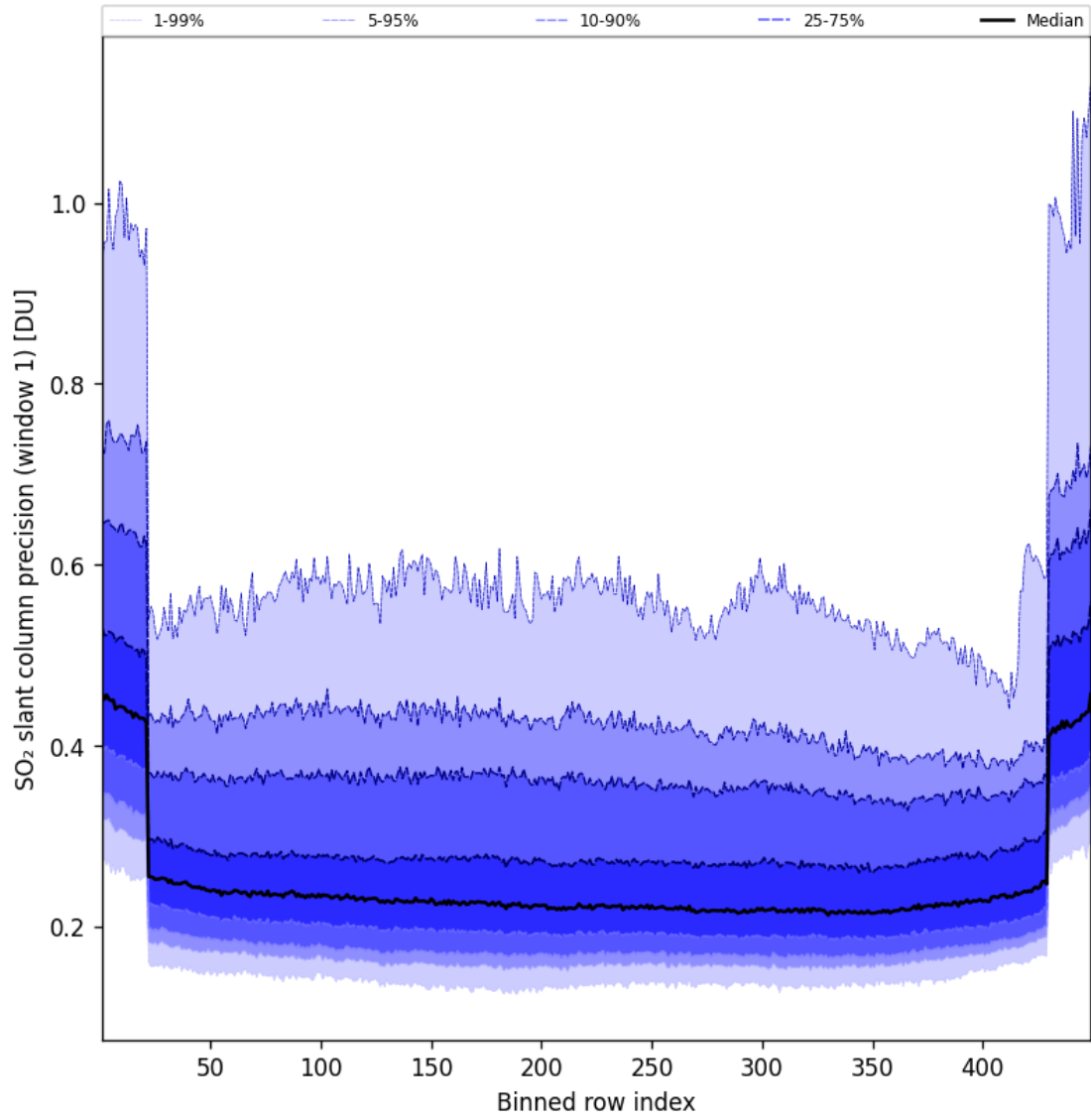


Figure 91: Along track statistics of “SO₂ slant column precision (window 1)” for 2024-12-02 to 2024-12-03

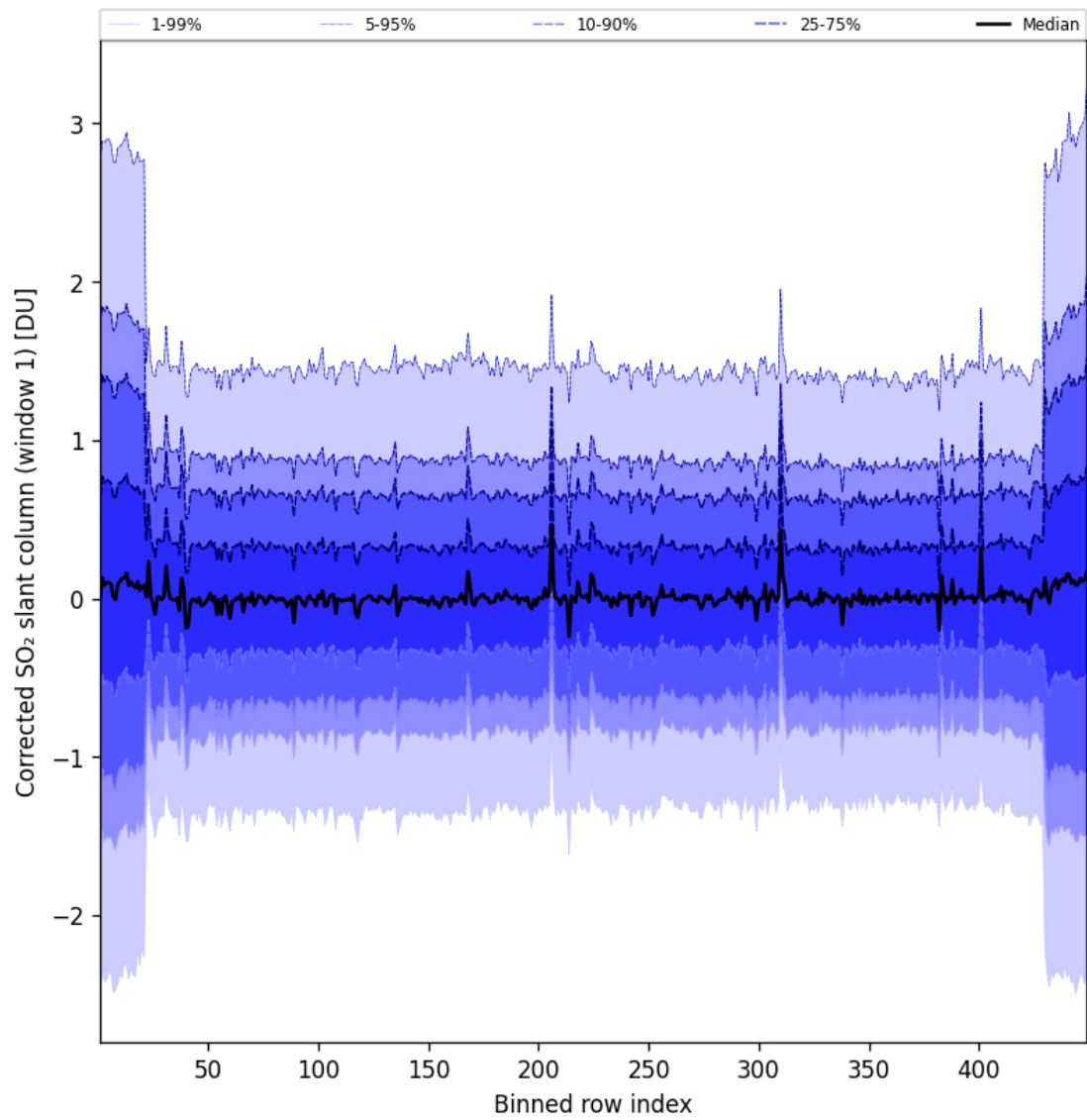


Figure 92: Along track statistics of “Corrected SO₂ slant column (window 1)” for 2024-12-02 to 2024-12-03

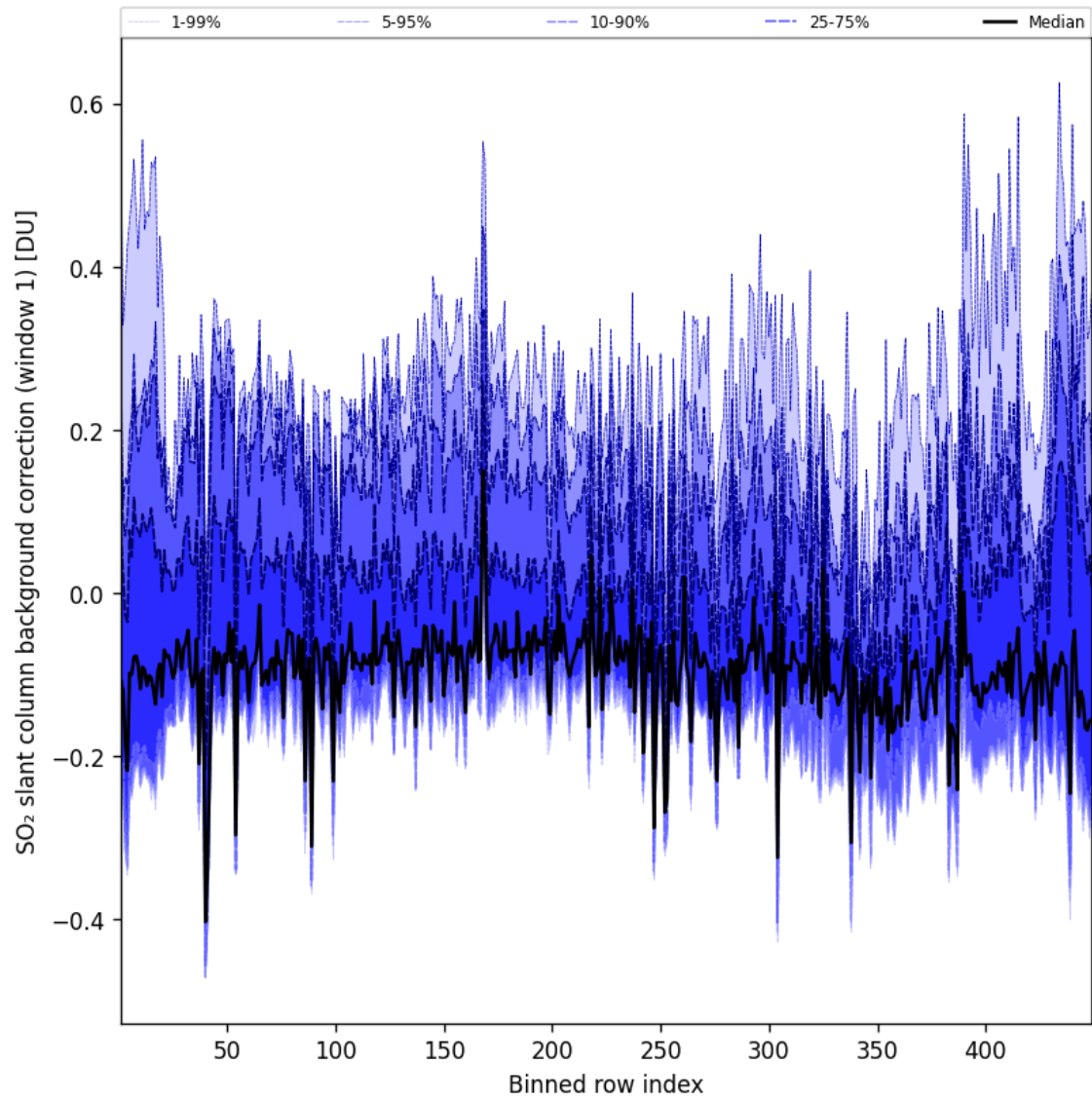


Figure 93: Along track statistics of “SO₂ slant column background correction (window 1)” for 2024-12-02 to 2024-12-03

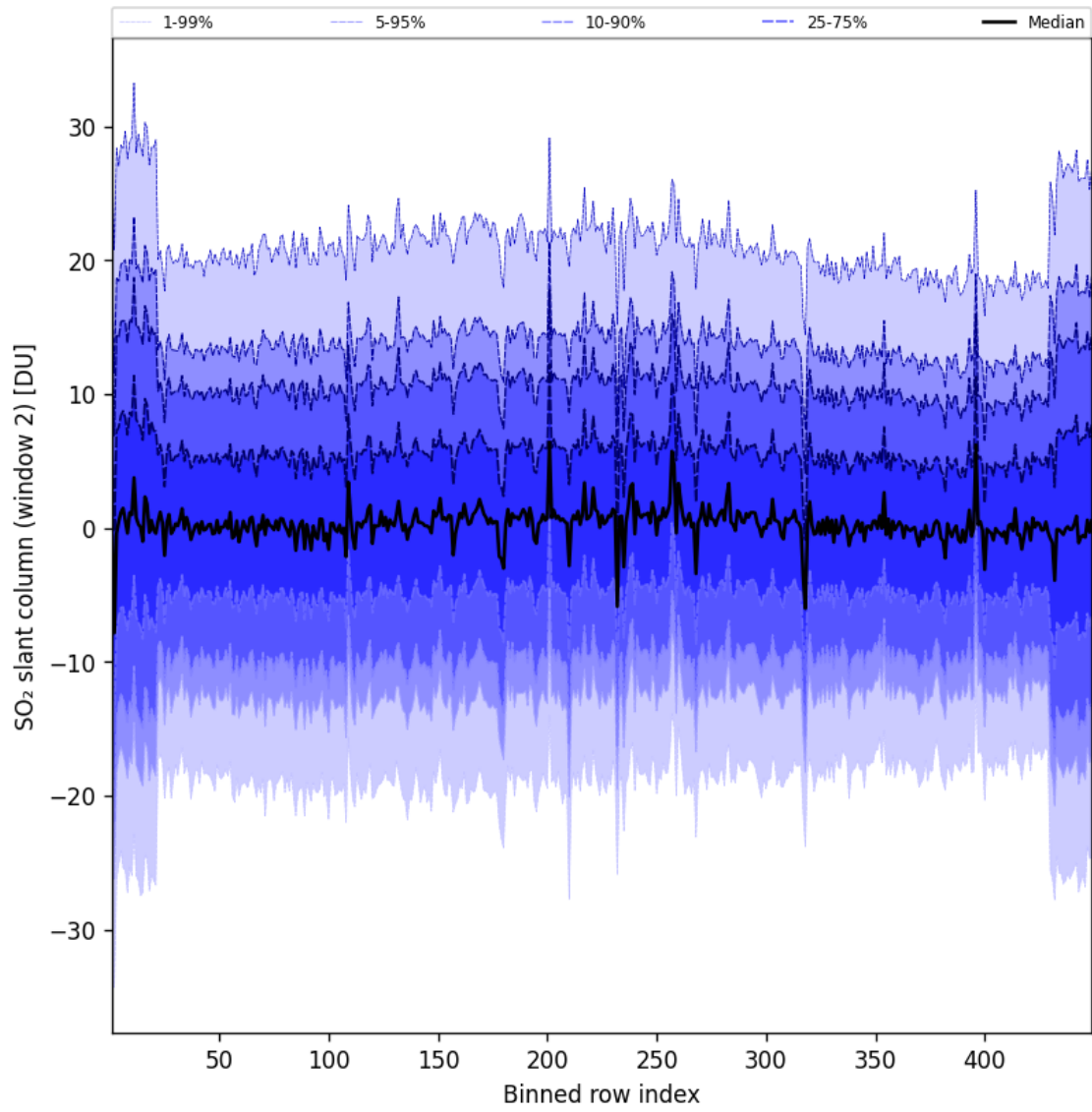


Figure 94: Along track statistics of “SO₂ slant column (window 2)” for 2024-12-02 to 2024-12-03

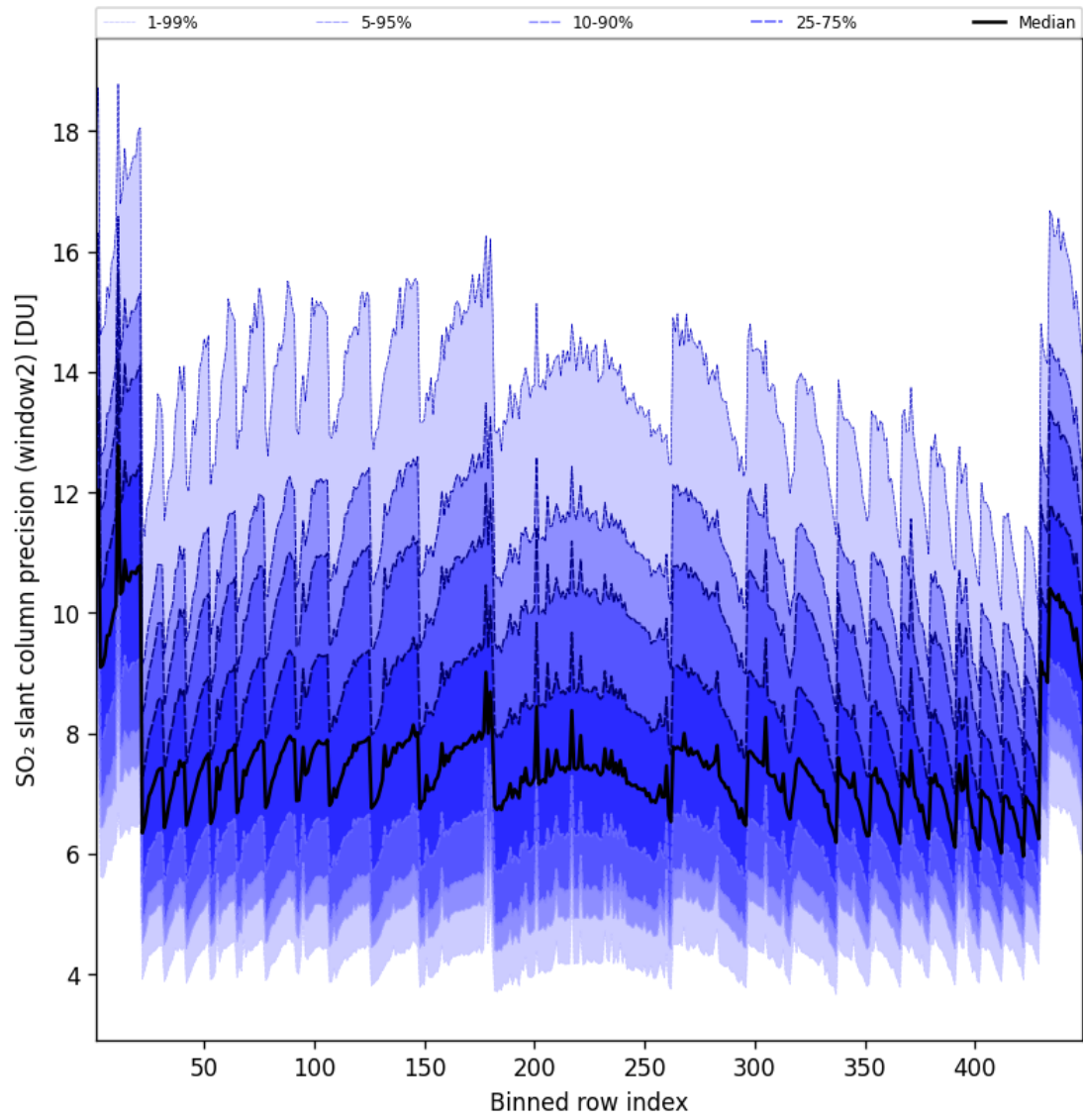


Figure 95: Along track statistics of “SO₂ slant column precision (window2)” for 2024-12-02 to 2024-12-03

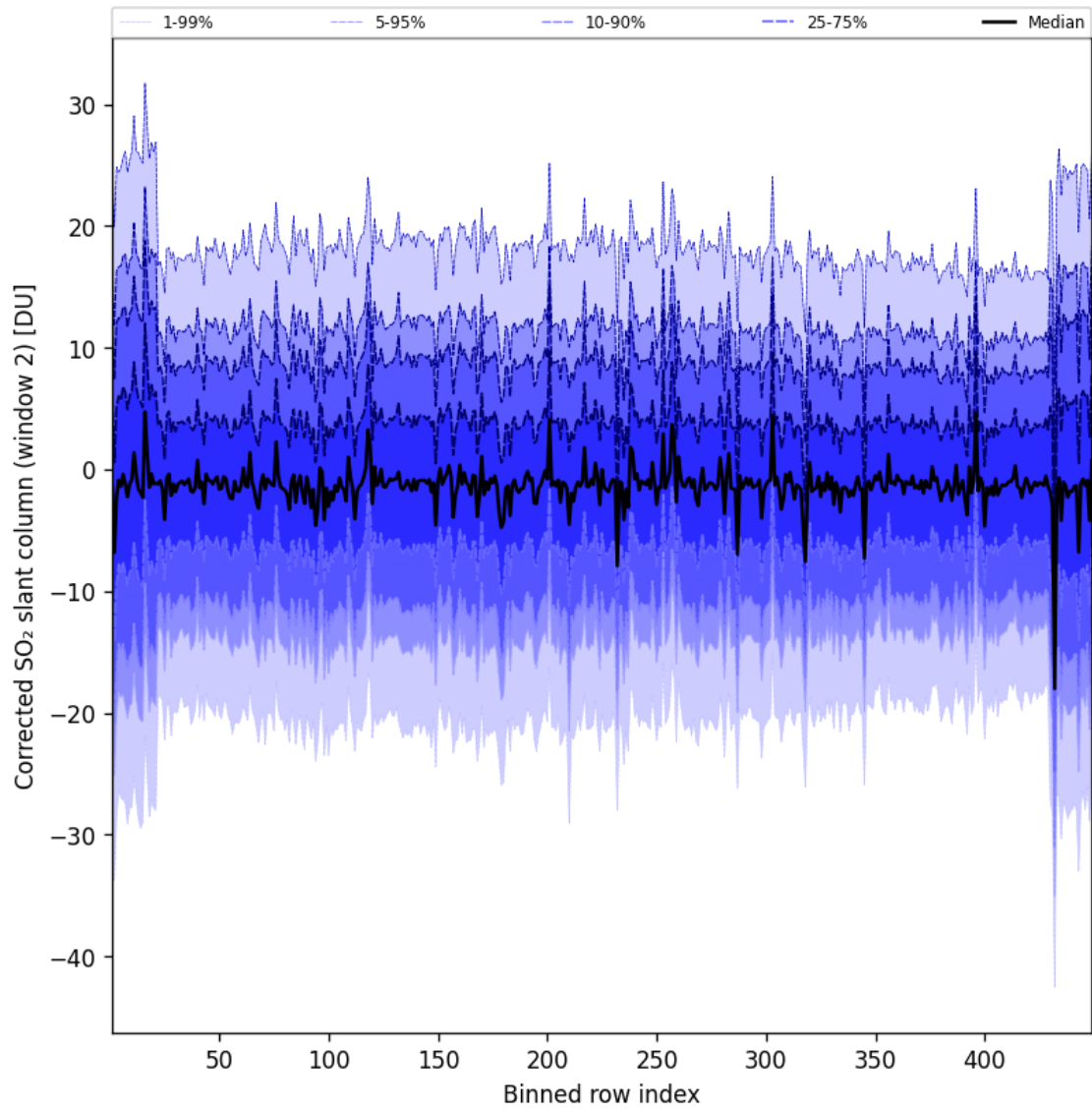


Figure 96: Along track statistics of “Corrected SO₂ slant column (window 2)” for 2024-12-02 to 2024-12-03

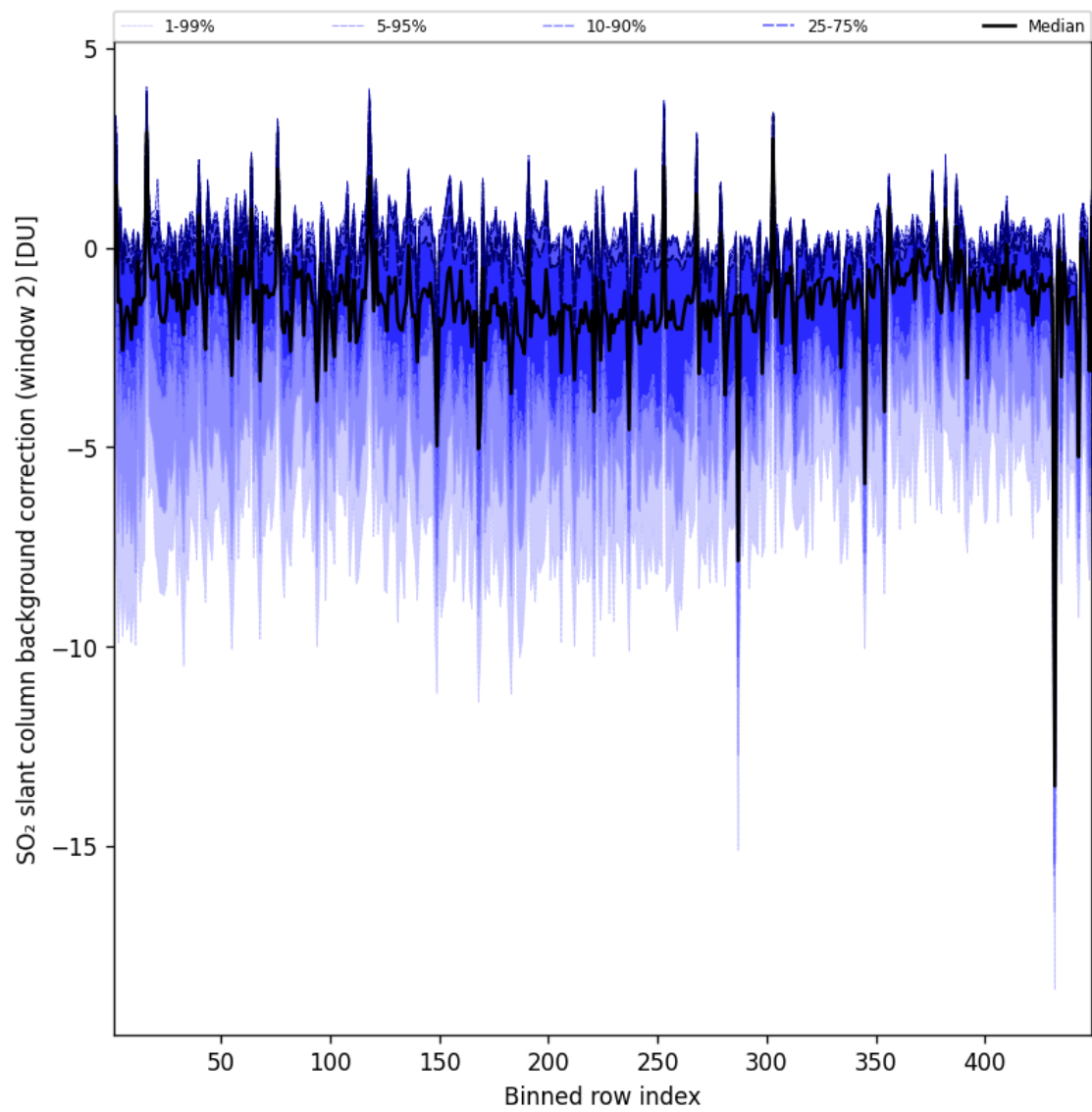


Figure 97: Along track statistics of “SO₂ slant column background correction (window 2)” for 2024-12-02 to 2024-12-03

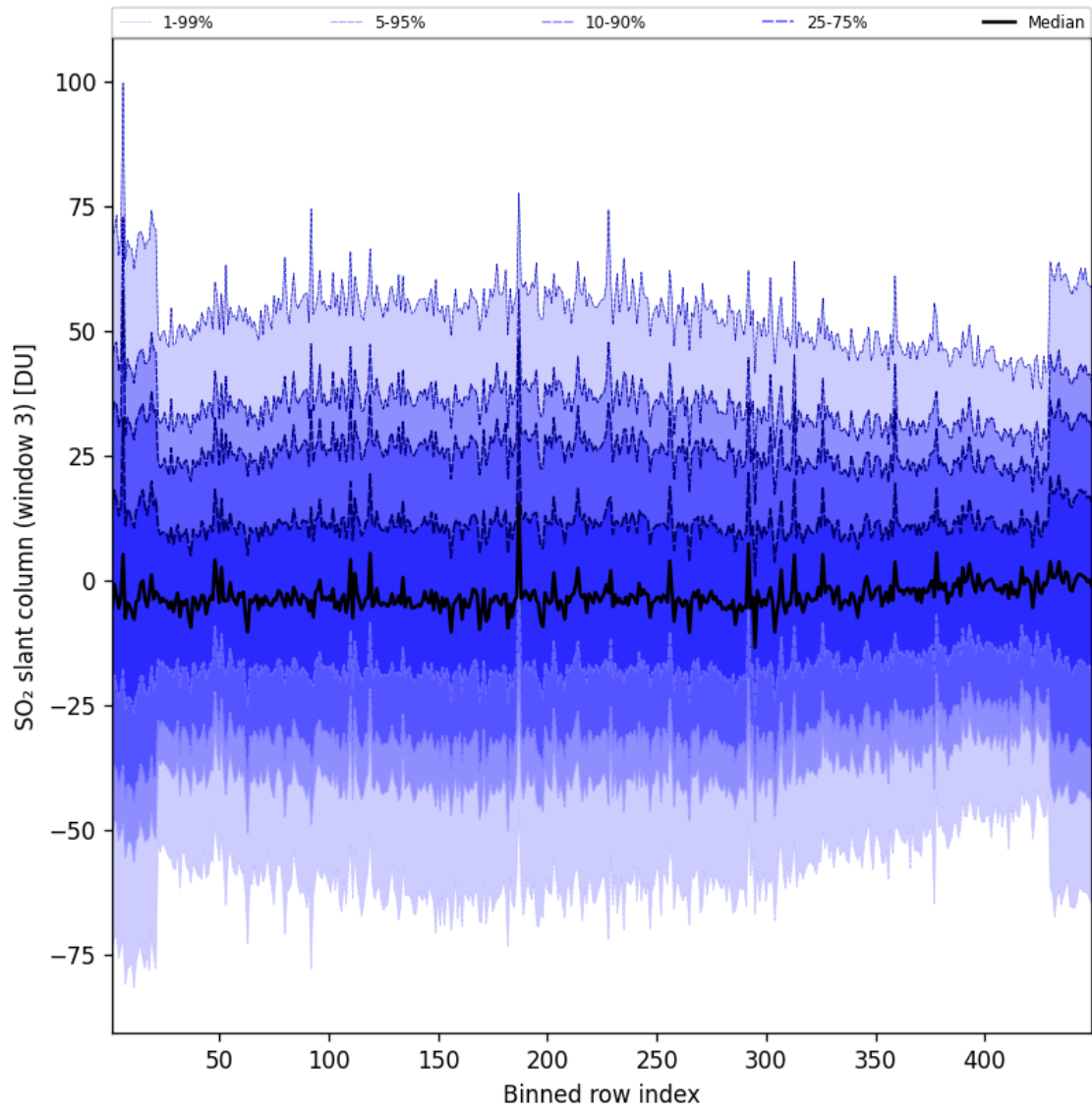


Figure 98: Along track statistics of “SO₂ slant column (window 3)” for 2024-12-02 to 2024-12-03

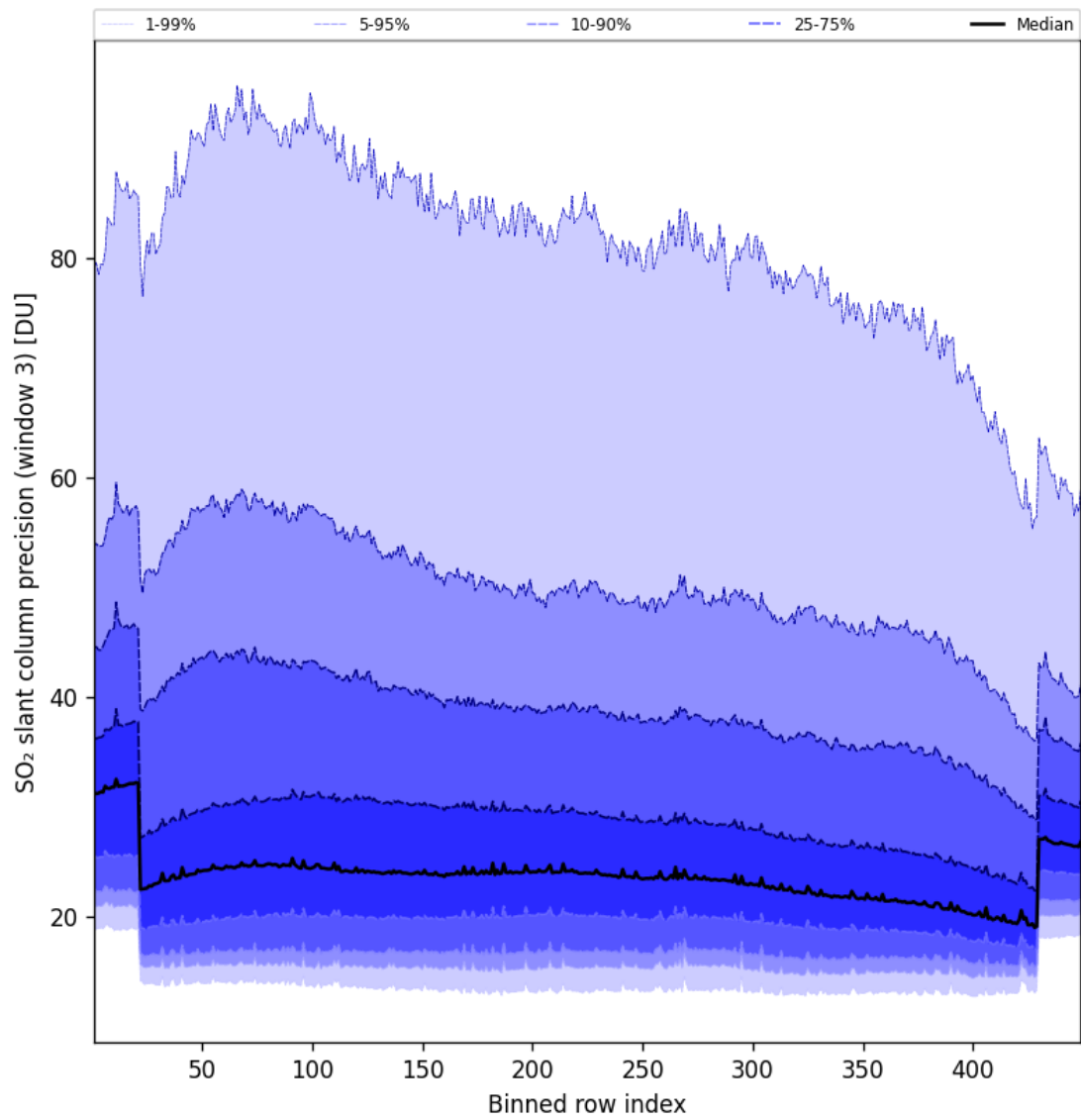


Figure 99: Along track statistics of “SO₂ slant column precision (window 3)” for 2024-12-02 to 2024-12-03

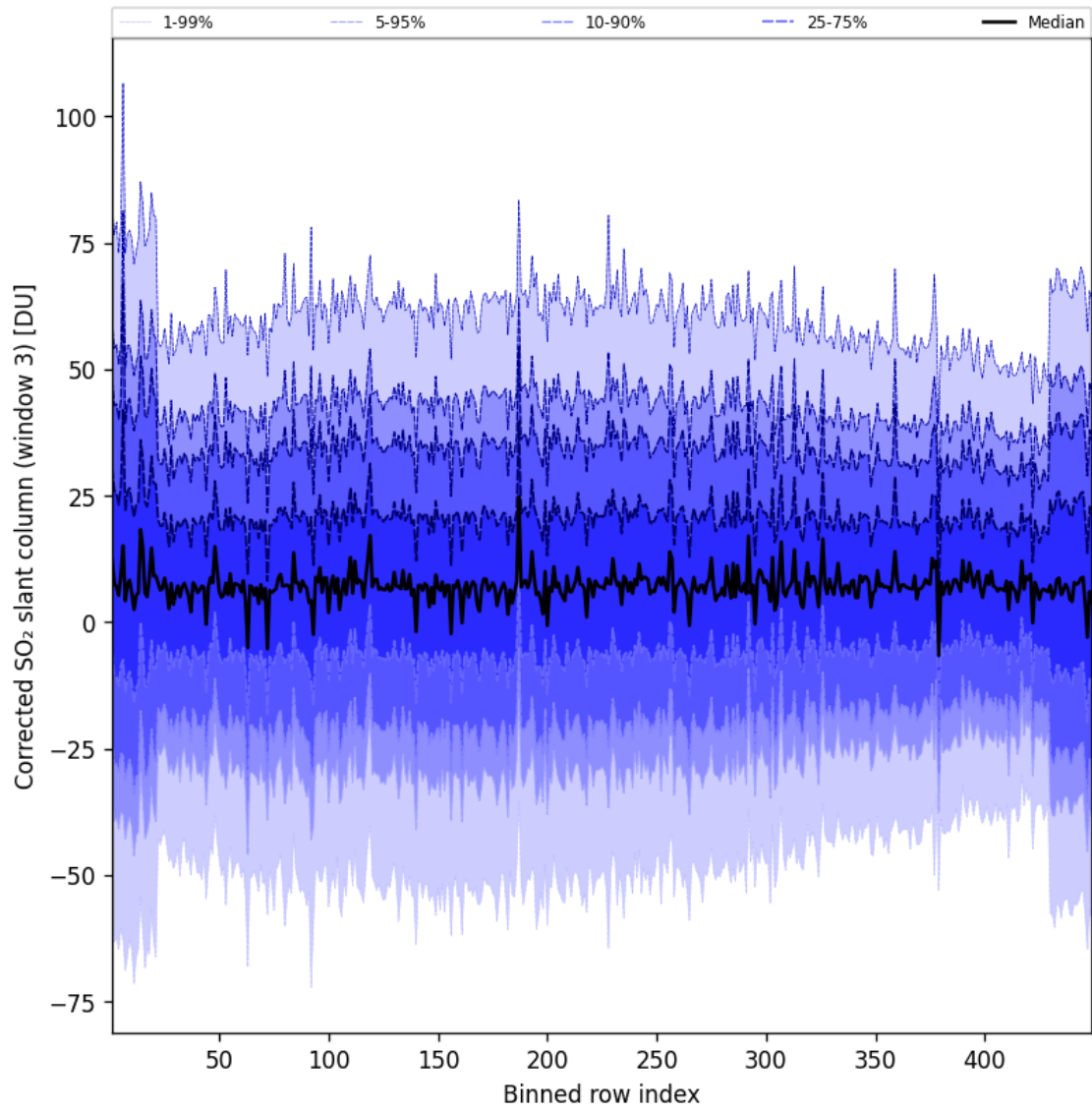


Figure 100: Along track statistics of “Corrected SO₂ slant column (window 3)” for 2024-12-02 to 2024-12-03

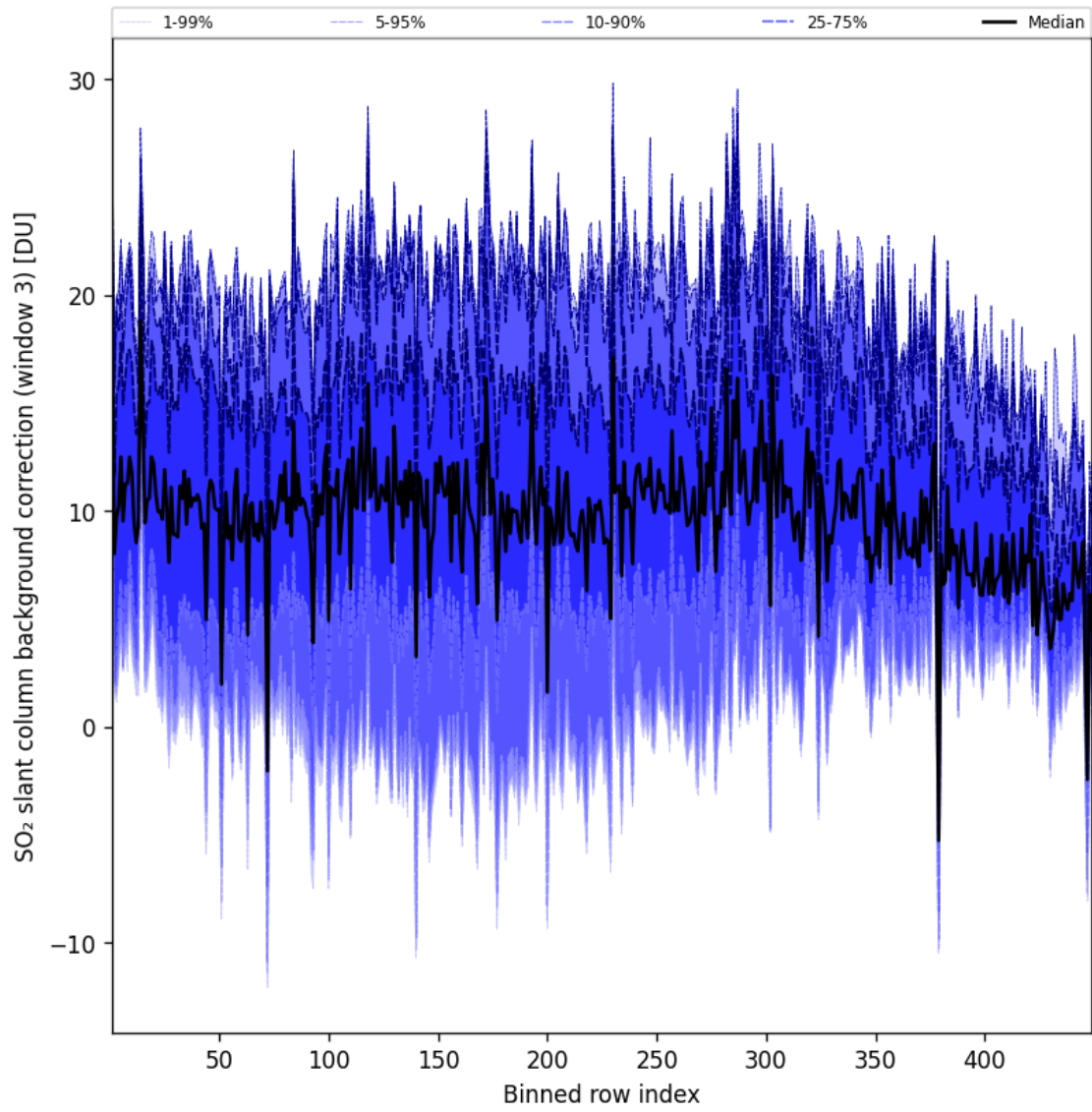


Figure 101: Along track statistics of “SO₂ slant column background correction (window 3)” for 2024-12-02 to 2024-12-03

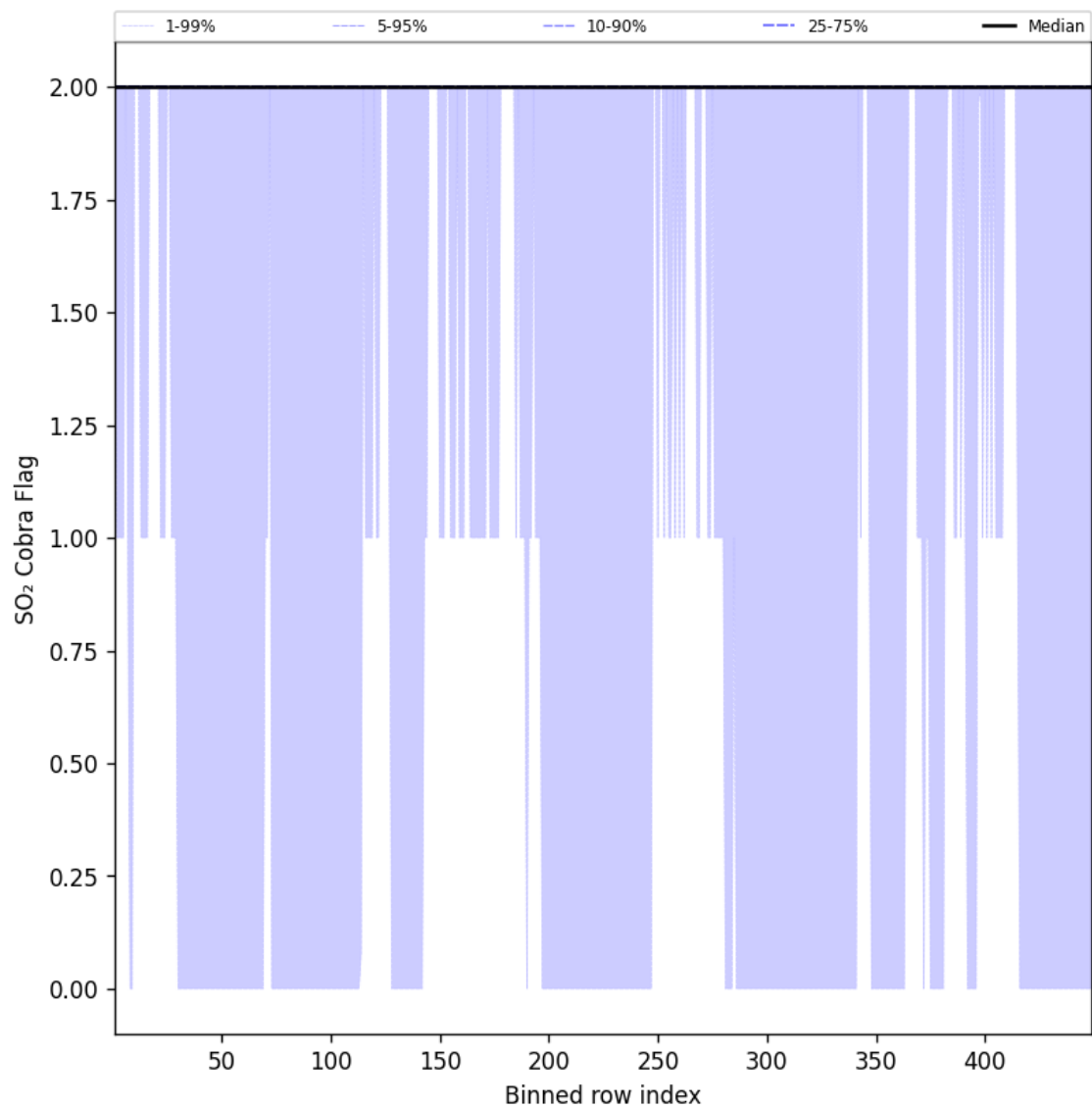


Figure 102: Along track statistics of "SO₂ Cobra Flag" for 2024-12-02 to 2024-12-03

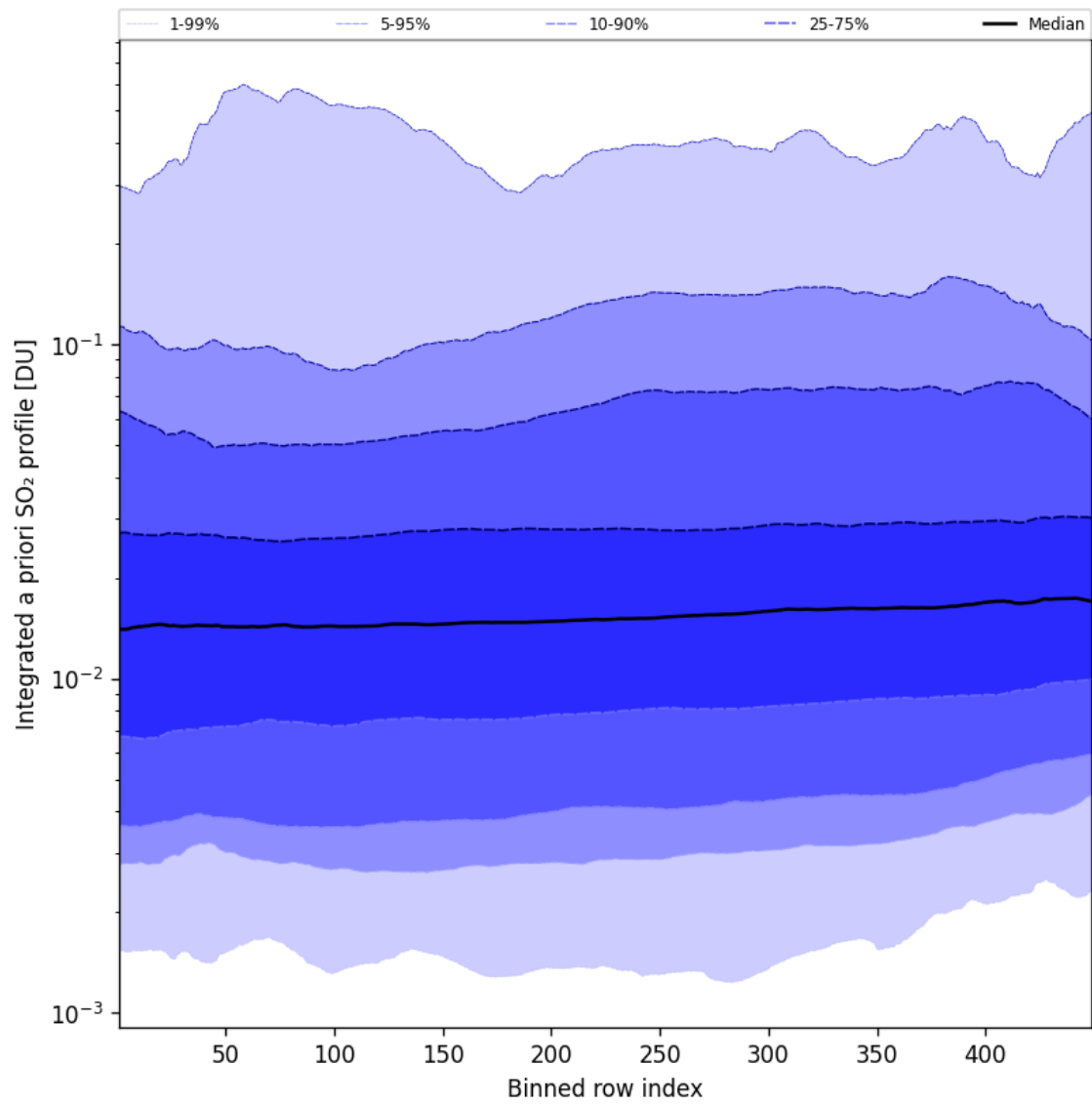


Figure 103: Along track statistics of “Integrated a priori SO₂ profile” for 2024-12-02 to 2024-12-03

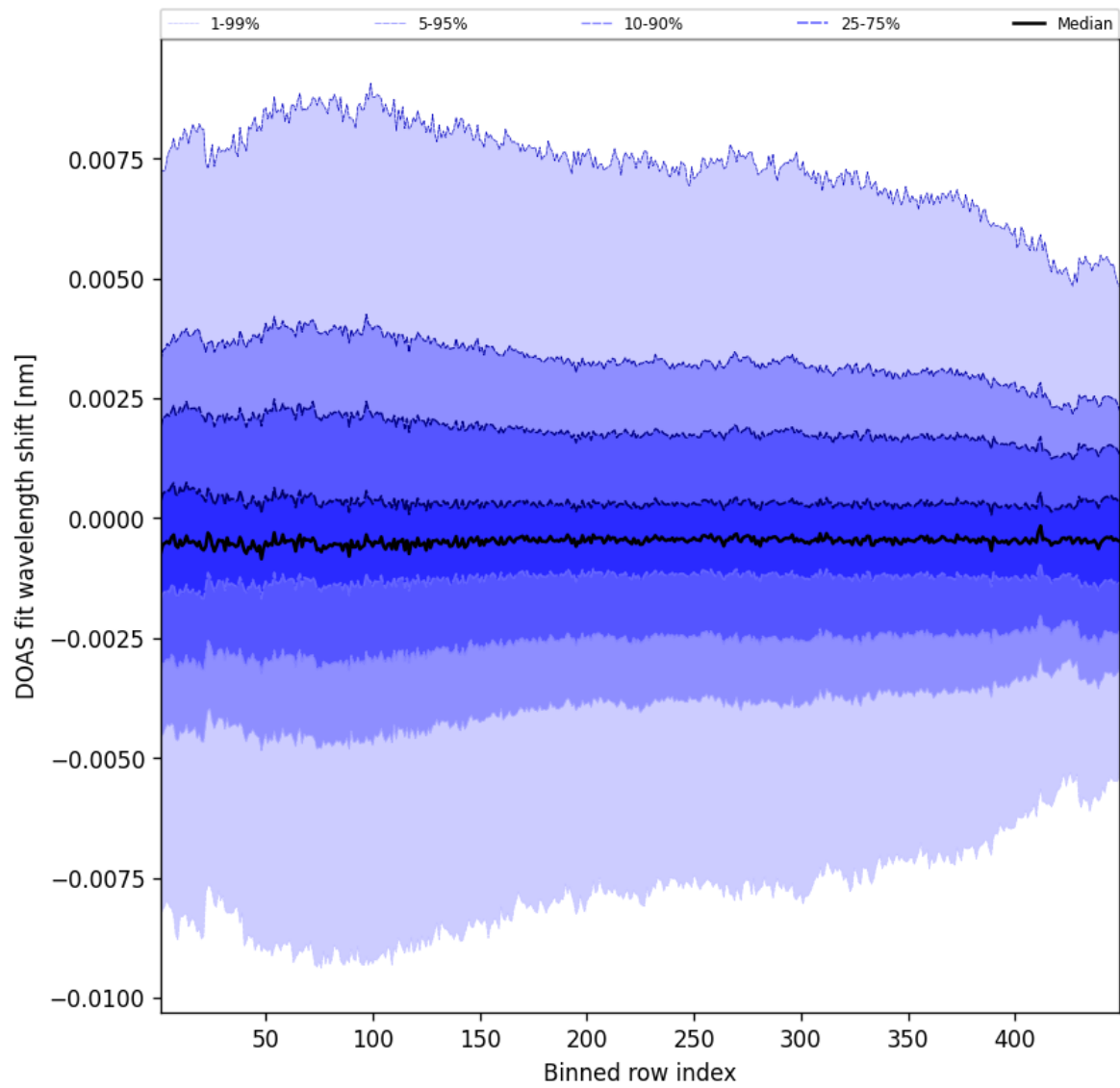


Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2024-12-02 to 2024-12-03

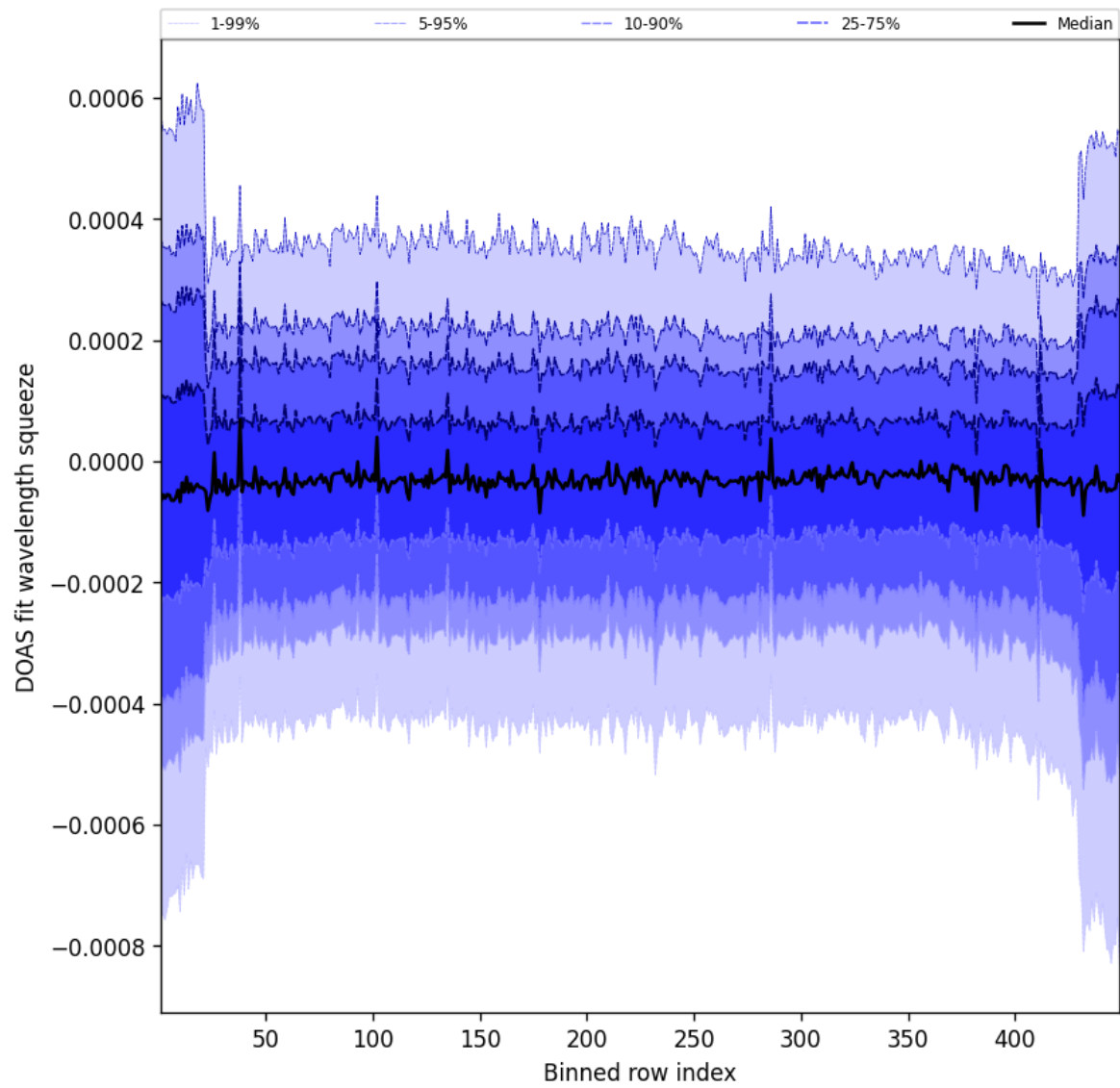


Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2024-12-02 to 2024-12-03

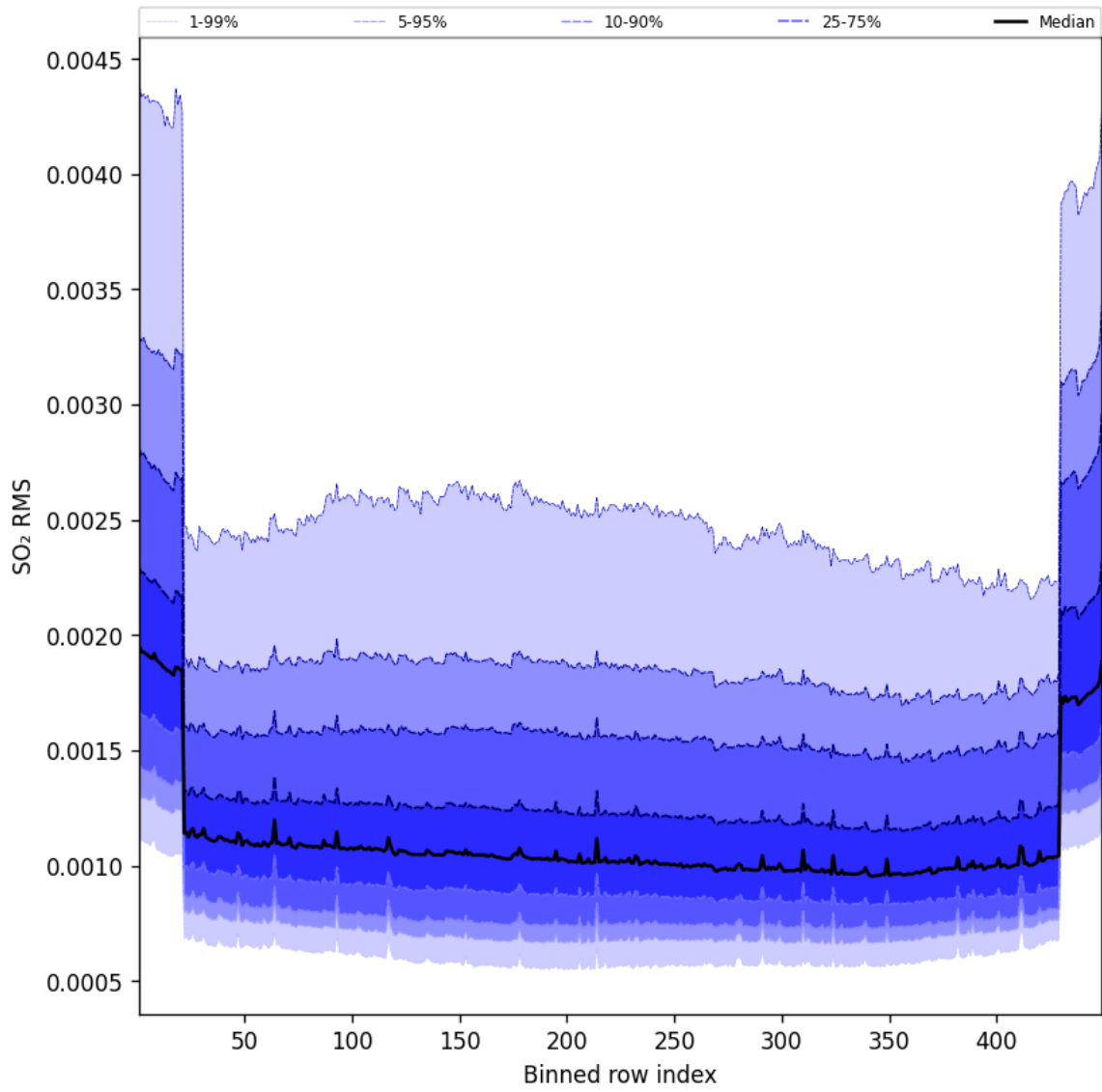


Figure 106: Along track statistics of “SO₂ RMS” for 2024-12-02 to 2024-12-03

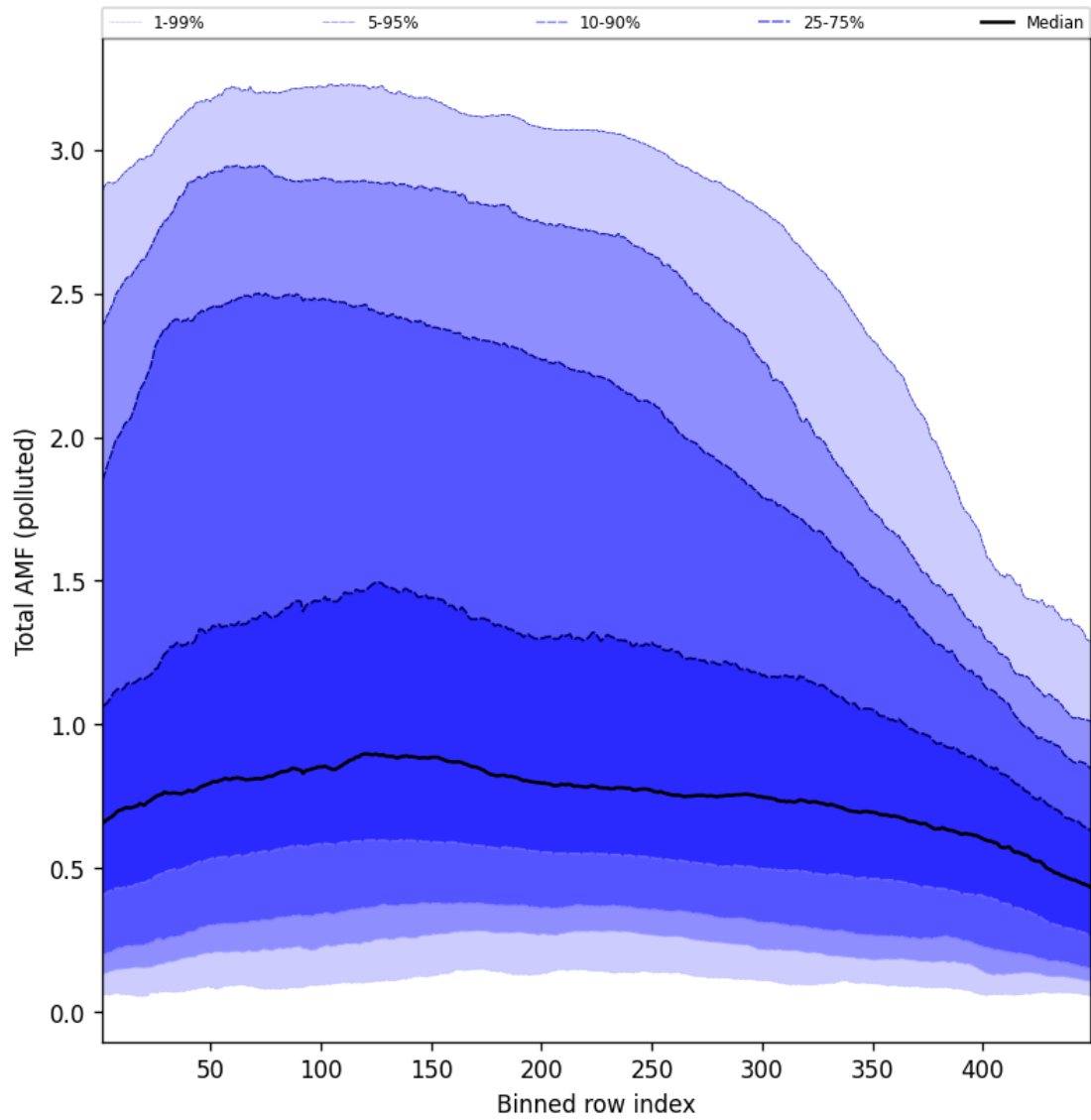


Figure 107: Along track statistics of “Total AMF (polluted)” for 2024-12-02 to 2024-12-03

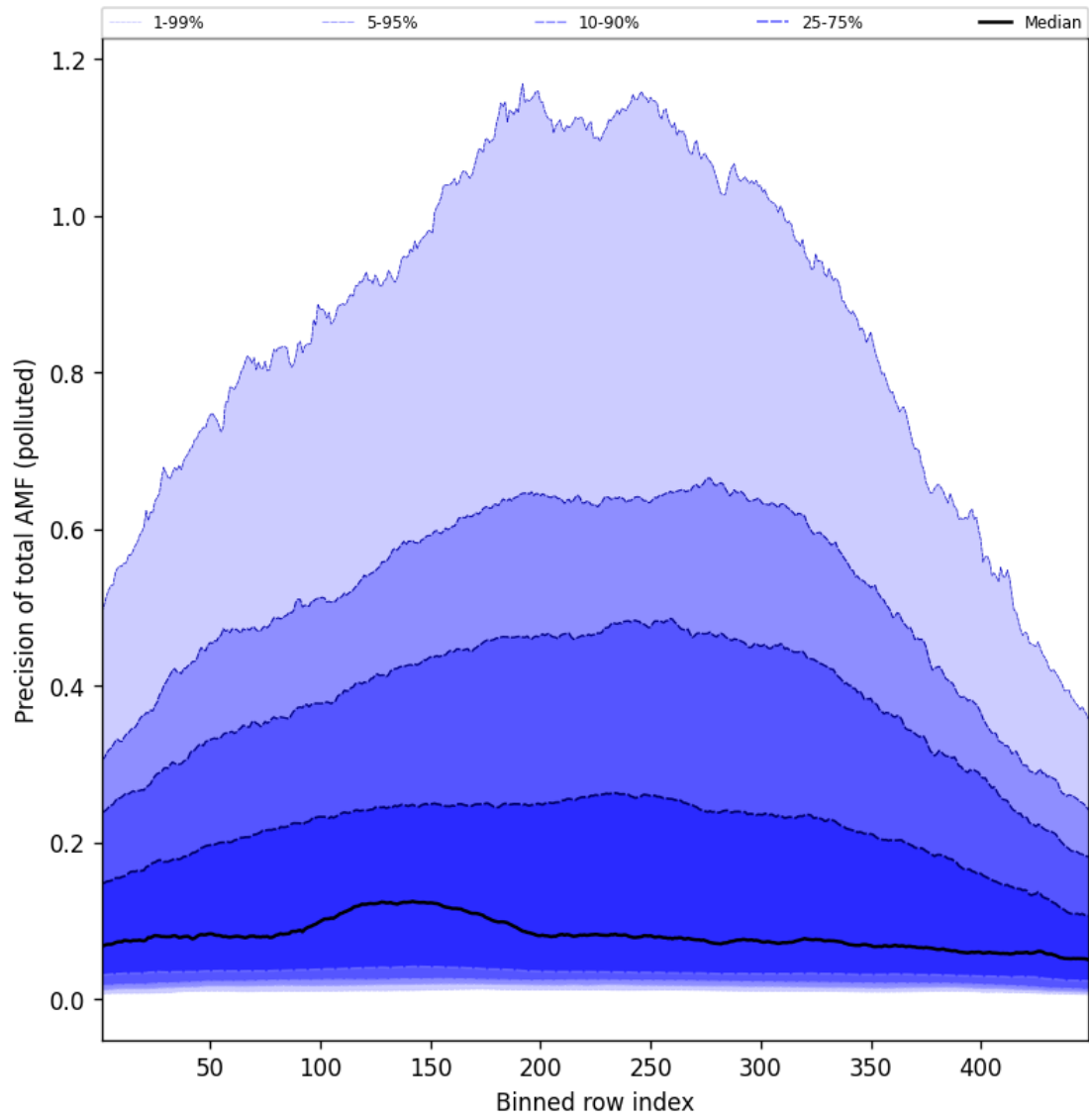


Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2024-12-02 to 2024-12-03

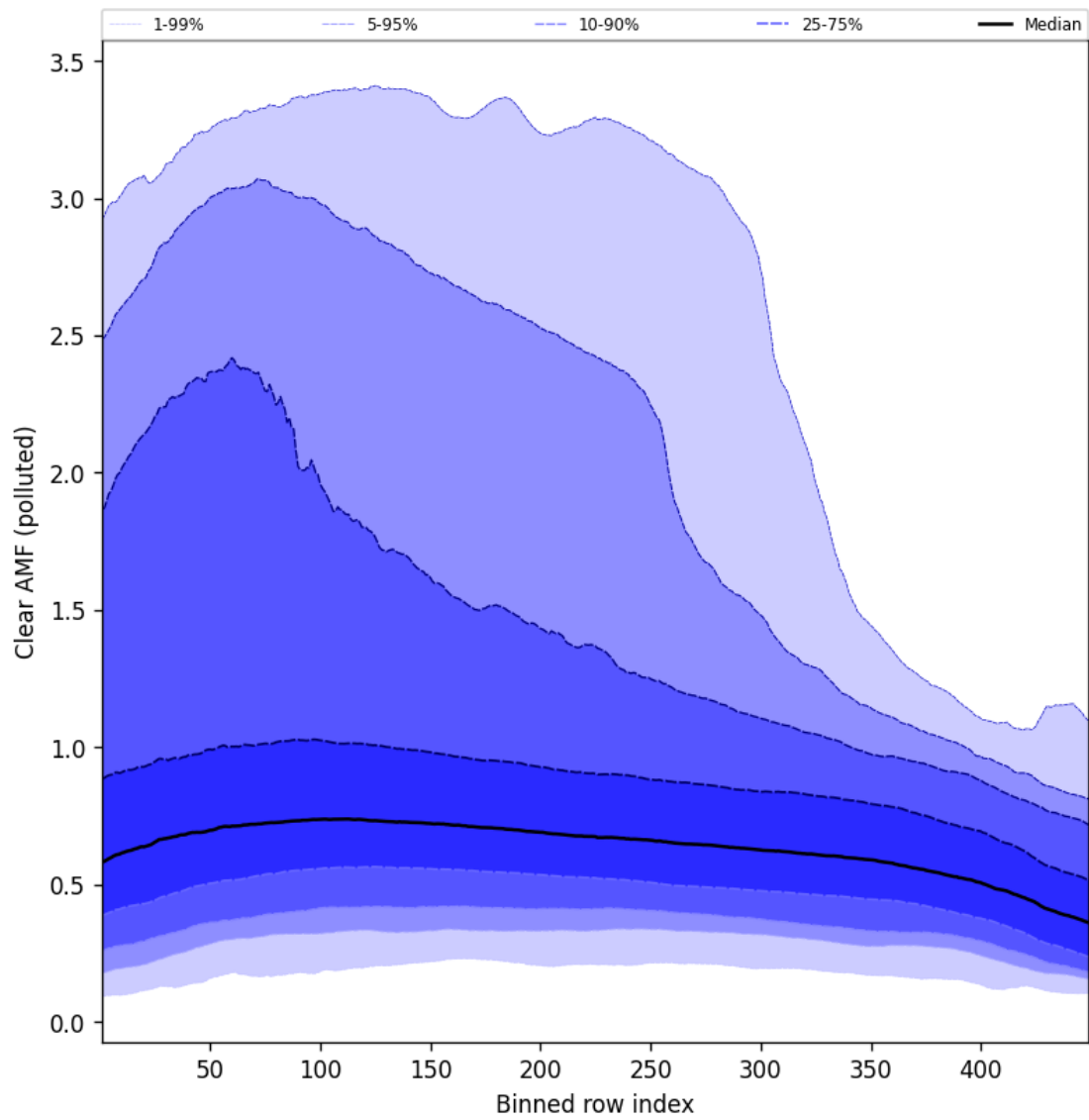


Figure 109: Along track statistics of “Clear AMF (polluted)” for 2024-12-02 to 2024-12-03

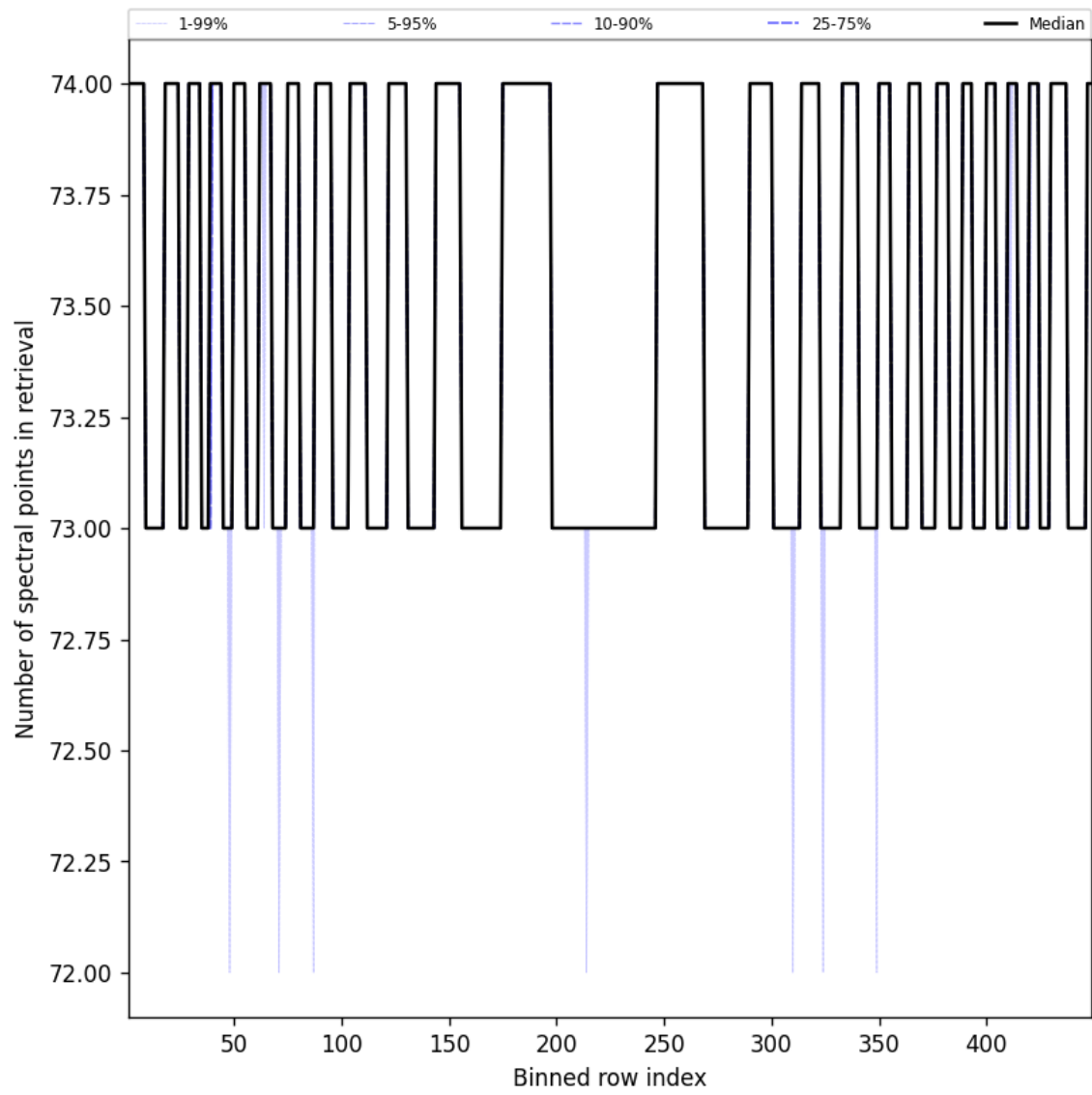


Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2024-12-02 to 2024-12-03

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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