

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 $\frac{1}{2}$ 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]	0.598 ± 0.419	17156417	0.995	0.830	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(3.225 \pm 119.185) \times 10^{-2}$	17156417	0.235	0.382	7.637×10^{-3}	-130	255
sulfurdioxide total vertical column precision [DU]	0.519 ± 0.855	17156417	9.715×10^{-2}	0.342	0.286	3.069×10^{-2}	93.2
sulfurdioxide slant column density corrected [DU]	$(1.547 \pm 37.180) \times 10^{-2}$	17156417	0.242	0.335	7.708×10^{-3}	-31.9	178
sulfurdioxide slant column density cobra [DU]	$(1.517 \pm 34.058) \times 10^{-2}$	17156417	0.242	0.335	7.708×10^{-3}	-31.9	39.0
sulfurdioxide slant column density cobra precision [DU]	0.266 ± 0.115	17156417	0.213	9.813×10^{-2}	0.230	8.188×10^{-2}	26.6
sulfurdioxide slant column density window1 [DU]	$(9.557 \pm 63.861) \times 10^{-2}$	17156417	0.125	0.706	9.634×10^{-2}	-77.6	64.0
sulfurdioxide slant column density window1 precision [DU]	0.266 ± 0.115	17156417	0.213	9.813×10^{-2}	0.230	8.188×10^{-2}	26.6
sulfurdioxide slant column density corrected win1 [DU]	$(3.020 \pm 61.883) \times 10^{-2}$	17156417	2.500×10^{-2}	0.675	1.601×10^{-2}	-77.6	64.2
background so2 slant column offset window1 [DU]	$(-6.538 \pm 17.291) \times 10^{-2}$	17156417	-0.180	0.224	-0.119	-1.47	2.57
sulfurdioxide slant column density window2 [DU]	1.53 ± 8.56	17156417	1.25	10.7	1.45	-2.451×10^3	733
sulfurdioxide slant column density window2 precision [DU]	7.70 ± 2.23	17156417	6.97	2.53	7.33	2.22	775
sulfurdioxide slant column density corrected win2 [DU]	0.917 ± 8.440	17156417	0.750	10.5	0.892	-2.450×10^3	733
background so2 slant column offset window2 [DU]	-0.610 ± 2.066	17156417	0.750	2.30	-0.212	-10.4	29.7
sulfurdioxide slant column density window3 [DU]	-8.16 ± 23.10	17156417	-8.40	28.5	-8.44	-637	228
sulfurdioxide slant column density window3 precision [DU]	26.3 ± 12.6	17156417	21.5	10.1	23.1	9.15	783
sulfurdioxide slant column density corrected win3 [DU]	-4.04 ± 22.34	17156417	-5.04	27.3	-3.97	-644	243
background so2 slant column offset window3 [DU]	4.12 ± 6.20	17156417	0.560	9.33	4.02	-18.0	27.8
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.21	17156417	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(4.129 \pm 12.382) \times 10^{-2}$	17156417	2.104×10^{-2}	2.621×10^{-2}	1.946×10^{-2}	3.680×10^{-4}	3.95
fitted radiance shift [nm]	$(-3.367 \pm 24.165) \times 10^{-4}$	17156417	-5.000×10^{-4}	1.602×10^{-3}	-3.917×10^{-4}	-4.776×10^{-2}	4.989×10^{-2}
fitted radiance squeeze [1]	$(-5.471 \pm 17.729) \times 10^{-5}$	17156417	-3.000×10^{-5}	2.130×10^{-4}	-4.732×10^{-5}	-1.251×10^{-2}	1.416×10^{-2}
fitted root mean square [1]	$(1.183 \pm 0.466) \times 10^{-3}$	17156417	9.250×10^{-4}	4.276×10^{-4}	1.056×10^{-3}	2.727×10^{-4}	4.211×10^{-2}
sulfurdioxide total air mass factor polluted [1]	0.984 ± 0.656	17156417	0.580	0.737	0.815	5.000×10^{-2}	3.23
sulfurdioxide total air mass factor polluted precision [1]	0.155 ± 0.161	17156417	2.500×10^{-2}	0.187	9.224×10^{-2}	2.500×10^{-3}	1.65
sulfurdioxide clear air mass factor polluted [1]	0.818 ± 0.565	17156417	0.540	0.436	0.667	3.115×10^{-2}	3.23
number of spectral points in retrieval [1]	73.4 ± 0.5	17156417	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}	7.000×10^{-2}	0.170	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	-2.64	-0.871	-0.499	-0.322	-0.180	0.202	0.353	0.548	0.969	3.07
sulfurdioxide total vertical column precision [DU]	7.236×10^{-2}	9.061×10^{-2}	0.110	0.135	0.176	0.518	0.732	1.06	1.67	4.03
sulfurdioxide slant column density corrected [DU]	-0.771	-0.444	-0.325	-0.244	-0.159	0.177	0.266	0.352	0.485	0.892
sulfurdioxide slant column density cobra [DU]	-0.771	-0.444	-0.325	-0.244	-0.159	0.177	0.266	0.352	0.485	0.892
sulfurdioxide slant column density cobra precision [DU]	0.141	0.163	0.175	0.185	0.197	0.295	0.357	0.412	0.487	0.700
sulfurdioxide slant column density window1 [DU]	-1.52	-0.874	-0.622	-0.448	-0.261	0.446	0.626	0.798	1.06	1.77
sulfurdioxide slant column density window1 precision [DU]	0.141	0.163	0.175	0.185	0.197	0.295	0.357	0.412	0.487	0.700
sulfurdioxide slant column density corrected win1 [DU]	-1.47	-0.876	-0.647	-0.489	-0.318	0.357	0.538	0.712	0.977	1.72
background so2 slant column offset window1 [DU]	-0.374	-0.273	-0.234	-0.207	-0.181	4.323×10^{-2}	0.134	0.198	0.266	0.389
sulfurdioxide slant column density window2 [DU]	-18.8	-12.1	-8.92	-6.54	-3.88	6.82	9.54	12.0	15.4	23.0
sulfurdioxide slant column density window2 precision [DU]	4.20	4.93	5.38	5.75	6.22	8.75	9.64	10.5	11.8	14.5
sulfurdioxide slant column density corrected win2 [DU]	-19.5	-12.6	-9.39	-7.01	-4.37	6.16	8.81	11.2	14.5	21.7
background so2 slant column offset window2 [DU]	-6.71	-4.22	-3.00	-2.31	-1.63	0.670	0.937	1.16	1.46	2.91
sulfurdioxide slant column density window3 [DU]	-66.5	-45.3	-36.0	-29.5	-22.4	6.07	13.7	20.6	30.1	48.9
sulfurdioxide slant column density window3 precision [DU]	13.0	14.8	16.0	17.2	18.9	29.0	33.6	38.9	49.5	79.7
sulfurdioxide slant column density corrected win3 [DU]	-61.5	-40.6	-31.2	-24.6	-17.6	9.75	16.8	23.3	32.2	50.8
background so2 slant column offset window3 [DU]	-8.73	-5.76	-3.98	-2.49	-0.480	8.85	11.0	12.5	14.0	16.6
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]	1.090×10^{-3}	3.011×10^{-3}	4.939×10^{-3}	7.000×10^{-3}	1.003×10^{-2}	3.624×10^{-2}	4.797×10^{-2}	6.276×10^{-2}	0.109	0.469
fitted radiance shift [nm]	-7.640×10^{-3}	-3.806×10^{-3}	-2.468×10^{-3}	-1.744×10^{-3}	-1.180×10^{-3}	4.219×10^{-4}	1.079×10^{-3}	1.917×10^{-3}	3.379×10^{-3}	7.403×10^{-3}
fitted radiance squeeze [1]	-5.270×10^{-4}	-3.482×10^{-4}	-2.712×10^{-4}	-2.167×10^{-4}	-1.578×10^{-4}	5.517×10^{-5}	1.054×10^{-4}	1.510×10^{-4}	2.147×10^{-4}	3.650×10^{-4}
fitted root mean square [1]	5.900×10^{-4}	7.082×10^{-4}	7.762×10^{-4}	8.298×10^{-4}	8.947×10^{-4}	1.322×10^{-3}	1.537×10^{-3}	1.769×10^{-3}	2.104×10^{-3}	2.892×10^{-3}
sulfurdioxide total air mass factor polluted [1]	8.531×10^{-2}	0.216	0.315	0.403	0.516	1.25	1.62	2.05	2.49	2.78
sulfurdioxide total air mass factor polluted precision [1]	9.630×10^{-3}	1.730×10^{-2}	2.317×10^{-2}	2.845×10^{-2}	3.768×10^{-2}	0.224	0.308	0.383	0.482	0.713
sulfurdioxide clear air mass factor polluted [1]	0.177	0.284	0.361	0.420	0.490	0.926	1.09	1.34	2.40	2.93
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 ± 0.387	5791662	0.640	1.000	0.0	1.000	0.360	1.000
sulfurdioxide total vertical column [DU]	$(6.861 \pm 181.773) \times 10^{-2}$	5791662	0.601	1.478×10^{-2}	-130	205	-0.278	0.323
sulfurdioxide total vertical column precision [DU]	0.831 ± 1.244	5791662	0.649	0.436	4.866×10^{-2}	38.3	0.259	0.908
sulfurdioxide slant column density corrected [DU]	$(2.333 \pm 40.242) \times 10^{-2}$	5791662	0.399	1.115×10^{-2}	-8.86	45.9	-0.186	0.213
sulfurdioxide slant column density cobra [DU]	$(2.328 \pm 39.979) \times 10^{-2}$	5791662	0.399	1.115×10^{-2}	-8.86	16.2	-0.186	0.213
sulfurdioxide slant column density cobra precision [DU]	0.321 ± 0.140	5791662	0.154	0.280	9.040×10^{-2}	2.61	0.225	0.379
sulfurdioxide slant column density window1 [DU]	0.170 ± 0.732	5791662	0.797	0.172	-10.7	16.6	-0.228	0.569
sulfurdioxide slant column density window1 precision [DU]	0.321 ± 0.140	5791662	0.154	0.280	9.040×10^{-2}	2.61	0.225	0.379
sulfurdioxide slant column density corrected win1 [DU]	$(5.216 \pm 72.944) \times 10^{-2}$	5791662	0.791	2.968×10^{-2}	-10.0	16.5	-0.359	0.432
background so2 slant column offset window1 [DU]	-0.118 ± 0.131	5791662	0.111	-0.131	-1.38	2.57	-0.187	-7.662×10^{-2}
sulfurdioxide slant column density window2 [DU]	2.03 ± 9.78	5791662	12.5	1.76	-77.3	77.7	-4.35	8.11
sulfurdioxide slant column density window2 precision [DU]	8.81 ± 2.28	5791662	2.83	8.49	2.37	51.5	7.23	10.1
sulfurdioxide slant column density corrected win2 [DU]	0.956 ± 9.578	5791662	12.2	0.901	-78.9	74.4	-5.17	7.00
background so2 slant column offset window2 [DU]	-1.07 ± 2.59	5791662	2.93	-0.256	-10.4	29.7	-2.38	0.549
sulfurdioxide slant column density window3 [DU]	-10.4 ± 26.3	5791662	33.1	-9.82	-198	166	-26.6	6.47
sulfurdioxide slant column density window3 precision [DU]	29.9 ± 12.5	5791662	10.0	26.9	9.41	267	22.9	32.9
sulfurdioxide slant column density corrected win3 [DU]	-4.72 ± 25.80	5791662	32.6	-4.37	-196	174	-20.8	11.8
background so2 slant column offset window3 [DU]	5.71 ± 5.37	5791662	8.55	4.80	-12.8	27.8	1.44	9.99
sulfurdioxide slant column cobra flag [1]	1.96 ± 0.27	5791662	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(8.002 \pm 20.299) \times 10^{-2}$	5791662	4.156×10^{-2}	2.985×10^{-2}	1.031×10^{-3}	3.95	1.771×10^{-2}	5.927×10^{-2}
fitted radiance shift [nm]	$(-1.618 \pm 24.970) \times 10^{-4}$	5791662	1.624×10^{-3}	-1.900×10^{-4}	-3.873×10^{-2}	4.989×10^{-2}	-9.960×10^{-4}	6.282×10^{-4}
fitted radiance squeeze [1]	$(-1.209 \pm 18.775) \times 10^{-5}$	5791662	2.165×10^{-4}	-8.539×10^{-6}	-2.567×10^{-3}	2.174×10^{-3}	-1.180×10^{-4}	9.845×10^{-5}
fitted root mean square [1]	$(1.391 \pm 0.574) \times 10^{-3}$	5791662	6.248×10^{-4}	1.226×10^{-3}	3.522×10^{-4}	8.571×10^{-3}	1.007×10^{-3}	1.631×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.700 ± 0.385	5791662	0.553	0.657	5.000×10^{-2}	2.76	0.394	0.948
sulfurdioxide total air mass factor polluted precision [1]	$(8.734 \pm 11.139) \times 10^{-2}$	5791662	7.841×10^{-2}	4.927×10^{-2}	2.500×10^{-3}	1.61	2.747×10^{-2}	0.106
sulfurdioxide clear air mass factor polluted [1]	0.641 ± 0.282	5791662	0.454	0.631	3.115×10^{-2}	1.87	0.411	0.865
number of spectral points in retrieval [1]	73.5 ± 0.5	5791662	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 ± 0.421	11364755	0.880	0.440	0.0	1.000	0.120	1.000
sulfurdioxide total vertical column [DU]	$(1.372 \pm 67.789) \times 10^{-2}$	11364755	0.310	5.683×10^{-3}	-112	255	-0.148	0.162
sulfurdioxide total vertical column precision [DU]	0.360 ± 0.490	11364755	0.257	0.238	3.069×10^{-2}	93.2	0.144	0.401
sulfurdioxide slant column density corrected [DU]	$(1.146 \pm 35.512) \times 10^{-2}$	11364755	0.309	6.344×10^{-3}	-31.9	178	-0.148	0.162
sulfurdioxide slant column density cobra [DU]	$(1.104 \pm 30.595) \times 10^{-2}$	11364755	0.309	6.344×10^{-3}	-31.9	39.0	-0.148	0.162
sulfurdioxide slant column density cobra precision [DU]	0.239 ± 0.087	11364755	6.541×10^{-2}	0.215	8.188×10^{-2}	26.6	0.190	0.255
sulfurdioxide slant column density window1 [DU]	$(5.746 \pm 58.135) \times 10^{-2}$	11364755	0.664	6.407×10^{-2}	-77.6	64.0	-0.274	0.389
sulfurdioxide slant column density window1 precision [DU]	0.239 ± 0.087	11364755	6.541×10^{-2}	0.215	8.188×10^{-2}	26.6	0.190	0.255
sulfurdioxide slant column density corrected win1 [DU]	$(1.900 \pm 55.369) \times 10^{-2}$	11364755	0.626	1.045×10^{-2}	-77.6	64.2	-0.301	0.325
background so2 slant column offset window1 [DU]	$(-3.846 \pm 18.505) \times 10^{-2}$	11364755	0.287	-9.990×10^{-2}	-1.47	2.32	-0.179	0.107
sulfurdioxide slant column density window2 [DU]	1.27 ± 7.85	11364755	9.96	1.32	-2.451×10^3	733	-3.68	6.28
sulfurdioxide slant column density window2 precision [DU]	7.14 ± 1.98	11364755	2.05	6.86	2.22	775	5.92	7.97
sulfurdioxide slant column density corrected win2 [DU]	0.897 ± 7.797	11364755	9.82	0.888	-2.450×10^3	733	-4.02	5.80
background so2 slant column offset window2 [DU]	-0.374 ± 1.695	11364755	2.20	-0.190	-8.35	17.4	-1.45	0.746
sulfurdioxide slant column density window3 [DU]	-7.00 ± 21.22	11364755	26.6	-7.87	-637	228	-20.7	5.89
sulfurdioxide slant column density window3 precision [DU]	24.4 ± 12.3	11364755	8.22	21.2	9.15	783	17.7	25.9
sulfurdioxide slant column density corrected win3 [DU]	-3.69 ± 20.33	11364755	25.2	-3.81	-644	243	-16.3	8.88
background so2 slant column offset window3 [DU]	3.31 ± 6.43	11364755	10.4	3.51	-18.0	19.9	-2.07	8.32
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.18	11364755	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.155 \pm 3.149) \times 10^{-2}$	11364755	2.133×10^{-2}	1.476×10^{-2}	3.680×10^{-4}	1.79	7.567×10^{-3}	2.890×10^{-2}
fitted radiance shift [nm]	$(-4.258 \pm 23.695) \times 10^{-4}$	11364755	1.548×10^{-3}	-4.923×10^{-4}	-4.776×10^{-2}	4.266×10^{-2}	-1.249×10^{-3}	2.990×10^{-4}
fitted radiance squeeze [1]	$(-7.642 \pm 16.759) \times 10^{-5}$	11364755	2.080×10^{-4}	-6.606×10^{-5}	-1.251×10^{-2}	1.416×10^{-2}	-1.753×10^{-4}	3.273×10^{-5}
fitted root mean square [1]	$(1.077 \pm 0.355) \times 10^{-3}$	11364755	3.286×10^{-4}	9.962×10^{-4}	2.727×10^{-4}	4.211×10^{-2}	8.602×10^{-4}	1.189×10^{-3}
sulfurdioxide total air mass factor polluted [1]	1.13 ± 0.72	11364755	0.942	0.915	5.000×10^{-2}	3.23	0.585	1.53
sulfurdioxide total air mass factor polluted precision [1]	0.190 ± 0.171	11364755	0.238	0.138	4.040×10^{-3}	1.65	4.699×10^{-2}	0.285
sulfurdioxide clear air mass factor polluted [1]	0.909 ± 0.646	11364755	0.469	0.683	0.113	3.23	0.519	0.988
number of spectral points in retrieval [1]	73.4 ± 0.5	11364755	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]	0.636 ± 0.412	12028340	0.790	1.000	0.0	1.000	0.210	1.000
sulfurdioxide total vertical column [DU]	$(2.095 \pm 89.081) \times 10^{-2}$	12028340	0.401	8.006×10^{-3}	-112	105	-0.191	0.210
sulfurdioxide total vertical column precision [DU]	0.473 ± 0.658	12028340	0.294	0.292	4.161×10^{-2}	93.2	0.198	0.492
sulfurdioxide slant column density corrected [DU]	$(1.146 \pm 28.909) \times 10^{-2}$	12028340	0.320	7.034×10^{-3}	-31.9	44.5	-0.152	0.168
sulfurdioxide slant column density cobra [DU]	$(1.145 \pm 28.805) \times 10^{-2}$	12028340	0.320	7.034×10^{-3}	-31.9	24.5	-0.152	0.168
sulfurdioxide slant column density cobra precision [DU]	0.251 ± 0.101	12028340	8.024×10^{-2}	0.221	8.280×10^{-2}	26.6	0.192	0.273
sulfurdioxide slant column density window1 [DU]	0.128 ± 0.572	12028340	0.658	0.125	-77.6	64.0	-0.204	0.454
sulfurdioxide slant column density window1 precision [DU]	0.251 ± 0.101	12028340	8.024×10^{-2}	0.221	8.280×10^{-2}	26.6	0.192	0.273
sulfurdioxide slant column density corrected win1 [DU]	$(3.579 \pm 56.128) \times 10^{-2}$	12028340	0.644	2.455×10^{-2}	-77.6	64.2	-0.295	0.349
background so2 slant column offset window1 [DU]	$(-9.258 \pm 14.679) \times 10^{-2}$	12028340	0.176	-0.131	-1.29	1.55	-0.185	-9.294×10^{-3}
sulfurdioxide slant column density window2 [DU]	1.18 ± 8.24	12028340	10.4	1.13	-2.451×10^3	681	-4.07	6.34
sulfurdioxide slant column density window2 precision [DU]	7.49 ± 2.01	12028340	2.33	7.19	2.22	495	6.14	8.47
sulfurdioxide slant column density corrected win2 [DU]	0.754 ± 8.176	12028340	10.3	0.733	-2.450×10^3	683	-4.42	5.89
background so2 slant column offset window2 [DU]	-0.426 ± 1.914	12028340	2.08	-5.473×10^{-2}	-10.4	29.7	-1.37	0.713
sulfurdioxide slant column density window3 [DU]	-5.00 ± 22.36	12028340	28.1	-5.54	-637	181	-19.2	8.87
sulfurdioxide slant column density window3 precision [DU]	25.9 ± 11.9	12028340	9.21	22.9	9.15	783	19.1	28.3
sulfurdioxide slant column density corrected win3 [DU]	-1.98 ± 21.59	12028340	27.1	-2.32	-644	180	-15.6	11.5
background so2 slant column offset window3 [DU]	3.03 ± 5.58	12028340	8.01	3.02	-18.0	27.8	-0.953	7.06
sulfurdioxide slant column cobra flag [1]	1.99 ± 0.13	12028340	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.883 \pm 5.796) \times 10^{-2}$	12028340	2.221×10^{-2}	1.992×10^{-2}	1.798×10^{-3}	3.61	1.189×10^{-2}	3.410×10^{-2}
fitted radiance shift [nm]	$(-2.915 \pm 23.674) \times 10^{-4}$	12028340	1.743×10^{-3}	-3.151×10^{-4}	-4.776×10^{-2}	4.152×10^{-2}	-1.192×10^{-3}	5.513×10^{-4}
fitted radiance squeeze [1]	$(-3.843 \pm 16.056) \times 10^{-5}$	12028340	1.924×10^{-4}	-3.373×10^{-5}	-1.129×10^{-2}	1.416×10^{-2}	-1.319×10^{-4}	6.045×10^{-5}
fitted root mean square [1]	$(1.112 \pm 0.413) \times 10^{-3}$	12028340	3.516×10^{-4}	1.006×10^{-3}	3.116×10^{-4}	4.188×10^{-2}	8.658×10^{-4}	1.218×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.856 ± 0.461	12028340	0.573	0.790	5.000×10^{-2}	2.86	0.524	1.10
sulfurdioxide total air mass factor polluted precision [1]	0.140 ± 0.140	12028340	0.162	8.059×10^{-2}	3.240×10^{-3}	1.65	3.951×10^{-2}	0.202
sulfurdioxide clear air mass factor polluted [1]	0.676 ± 0.245	12028340	0.342	0.640	5.132×10^{-2}	2.87	0.496	0.839
number of spectral points in retrieval [1]	73.5 ± 0.5	12028340	1.000	73.0	52.0	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]	0.497 ± 0.421	4578757	0.910	0.440	0.0	1.000	9.000×10^{-2}	1.000
sulfurdioxide total vertical column [DU]	$(5.220 \pm 152.705) \times 10^{-2}$	4578757	0.310	6.208×10^{-3}	-89.5	255	-0.144	0.166
sulfurdioxide total vertical column precision [DU]	0.577 ± 1.069	4578757	0.469	0.233	3.069×10^{-2}	61.9	0.109	0.579
sulfurdioxide slant column density corrected [DU]	$(2.356 \pm 50.061) \times 10^{-2}$	4578757	0.376	8.936×10^{-3}	-8.86	178	-0.177	0.199
sulfurdioxide slant column density cobra [DU]	$(2.273 \pm 43.604) \times 10^{-2}$	4578757	0.376	8.936×10^{-3}	-8.86	39.0	-0.177	0.199
sulfurdioxide slant column density cobra precision [DU]	0.300 ± 0.133	4578757	0.135	0.257	8.188×10^{-2}	12.2	0.214	0.349
sulfurdioxide slant column density window1 [DU]	$(1.268 \pm 765.315) \times 10^{-3}$	4578757	0.833	-8.833×10^{-3}	-40.6	47.7	-0.428	0.404
sulfurdioxide slant column density window1 precision [DU]	0.300 ± 0.133	4578757	0.135	0.257	8.188×10^{-2}	12.2	0.214	0.349
sulfurdioxide slant column density corrected win1 [DU]	$(1.115 \pm 73.260) \times 10^{-2}$	4578757	0.758	-1.261×10^{-2}	-40.6	47.6	-0.386	0.372
background so2 slant column offset window1 [DU]	$(9.882 \pm 212.001) \times 10^{-3}$	4578757	0.360	-5.379×10^{-2}	-1.47	2.57	-0.164	0.196
sulfurdioxide slant column density window2 [DU]	2.38 ± 9.14	4578757	11.3	2.33	-987	674	-3.30	7.97
sulfurdioxide slant column density window2 precision [DU]	8.14 ± 2.59	4578757	2.99	7.67	2.42	775	6.40	9.39
sulfurdioxide slant column density corrected win2 [DU]	1.33 ± 8.96	4578757	11.0	1.32	-986	675	-4.17	6.81
background so2 slant column offset window2 [DU]	-1.05 ± 2.28	4578757	2.82	-0.775	-10.4	29.7	-2.32	0.499
sulfurdioxide slant column density window3 [DU]	-15.8 ± 22.9	4578757	27.1	-15.5	-272	228	-29.1	-2.01
sulfurdioxide slant column density window3 precision [DU]	26.7 ± 14.0	4578757	12.0	23.1	9.30	229	17.9	29.9
sulfurdioxide slant column density corrected win3 [DU]	-8.85 ± 23.10	4578757	27.4	-7.82	-271	243	-22.0	5.39
background so2 slant column offset window3 [DU]	6.95 ± 6.78	4578757	11.2	8.84	-18.0	27.7	1.31	12.5
sulfurdioxide slant column cobra flag [1]	1.94 ± 0.33	4578757	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(6.133 \pm 18.164) \times 10^{-2}$	4578757	3.963×10^{-2}	1.415×10^{-2}	3.680×10^{-4}	3.94	3.993×10^{-3}	4.362×10^{-2}
fitted radiance shift [nm]	$(-4.728 \pm 24.508) \times 10^{-4}$	4578757	1.240×10^{-3}	-5.666×10^{-4}	-3.935×10^{-2}	4.266×10^{-2}	-1.162×10^{-3}	7.817×10^{-5}
fitted radiance squeeze [1]	$(-1.013 \pm 2.064) \times 10^{-4}$	4578757	2.616×10^{-4}	-1.015×10^{-4}	-1.251×10^{-2}	1.168×10^{-2}	-2.318×10^{-4}	2.981×10^{-5}
fitted root mean square [1]	$(1.349 \pm 0.526) \times 10^{-3}$	4578757	5.262×10^{-4}	1.214×10^{-3}	2.727×10^{-4}	4.211×10^{-2}	1.010×10^{-3}	1.536×10^{-3}
sulfurdioxide total air mass factor polluted [1]	1.35 ± 0.92	4578757	1.80	1.09	5.000×10^{-2}	3.23	0.518	2.32
sulfurdioxide total air mass factor polluted precision [1]	0.200 ± 0.202	4578757	0.267	0.139	2.500×10^{-3}	1.61	3.356×10^{-2}	0.300
sulfurdioxide clear air mass factor polluted [1]	1.22 ± 0.90	4578757	1.32	0.900	3.115×10^{-2}	3.23	0.491	1.81
number of spectral points in retrieval [1]	73.4 ± 0.5	4578757	1.000	73.0	52.0	155	73.0	74.0

3 Granule outlines

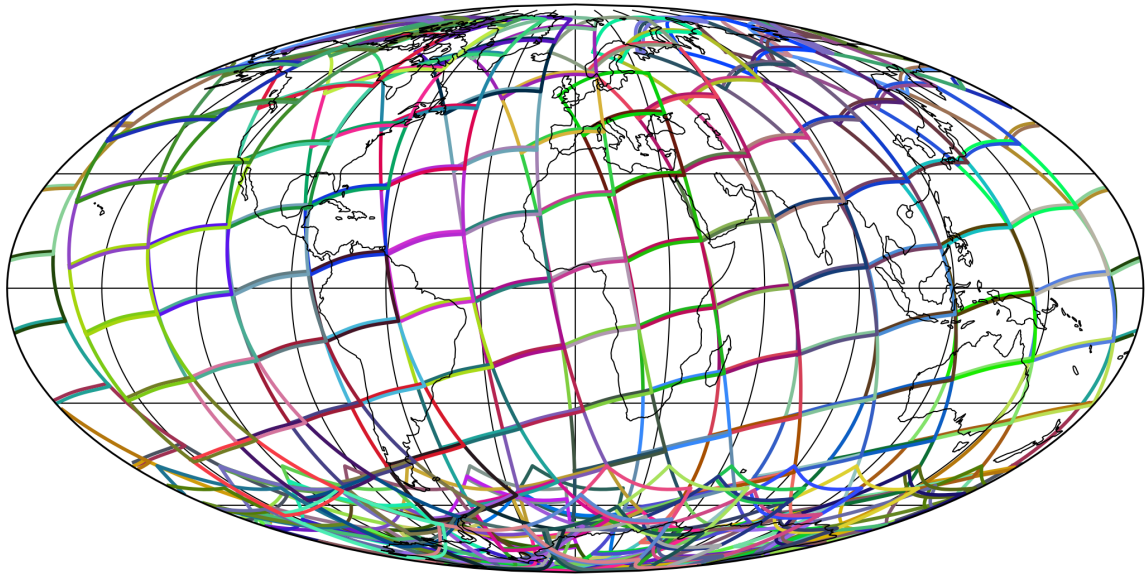


Figure 1: Outline of the granules.

4 Input data monitoring

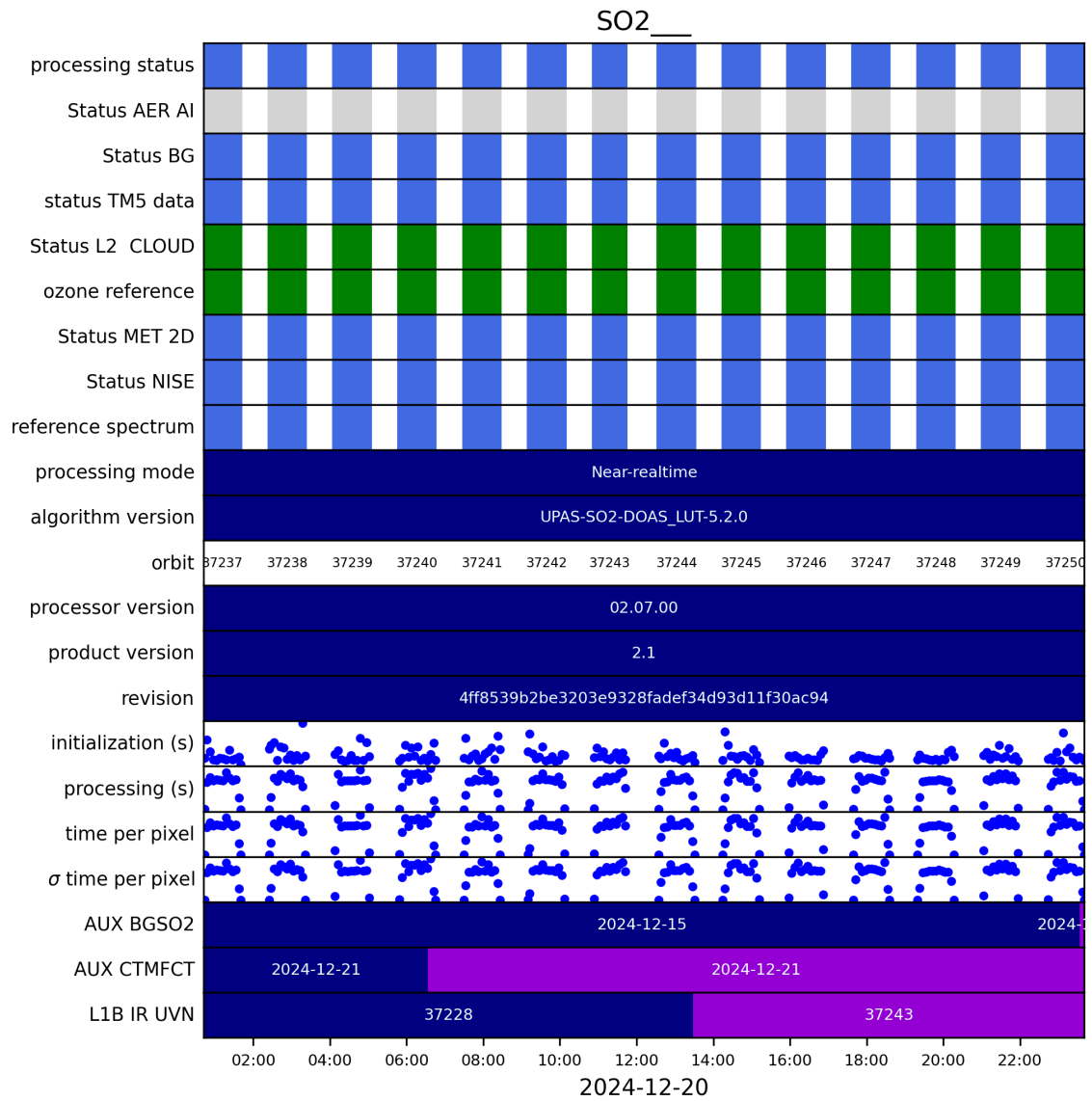


Figure 2: Input data per granule

5 Warnings and errors

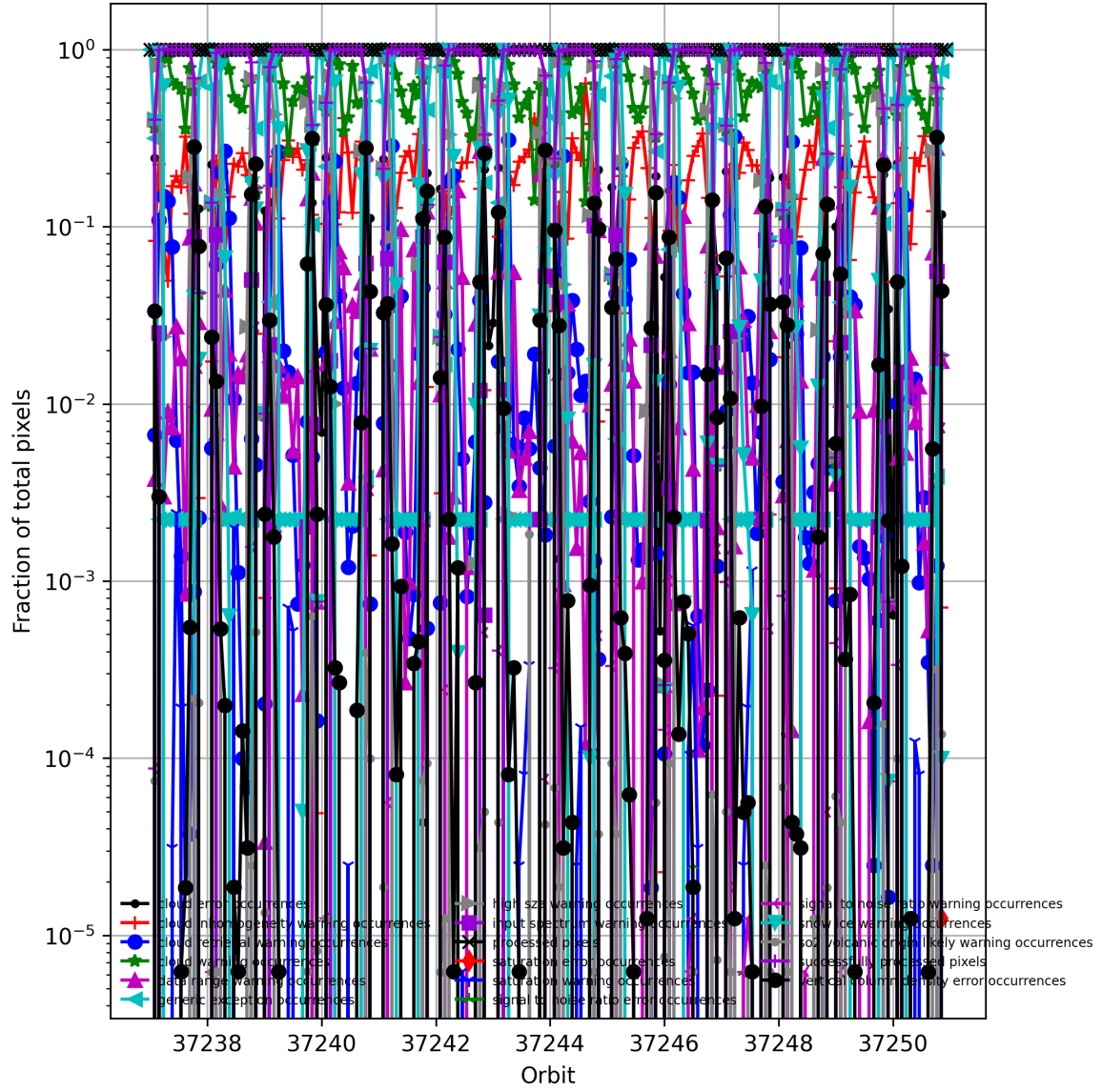


Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

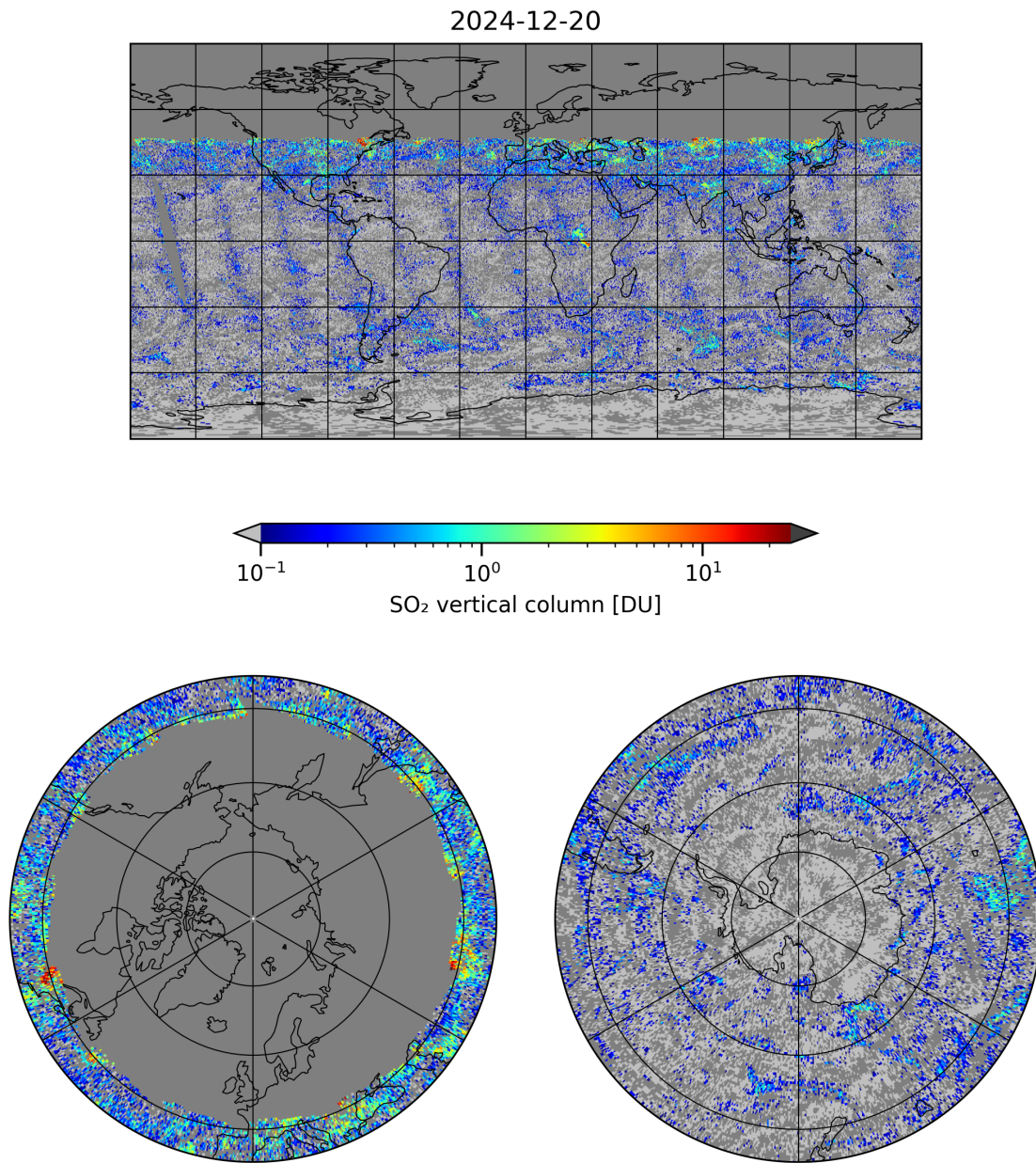


Figure 4: Map of “SO₂ vertical column” for 2024-12-20 to 2024-12-20

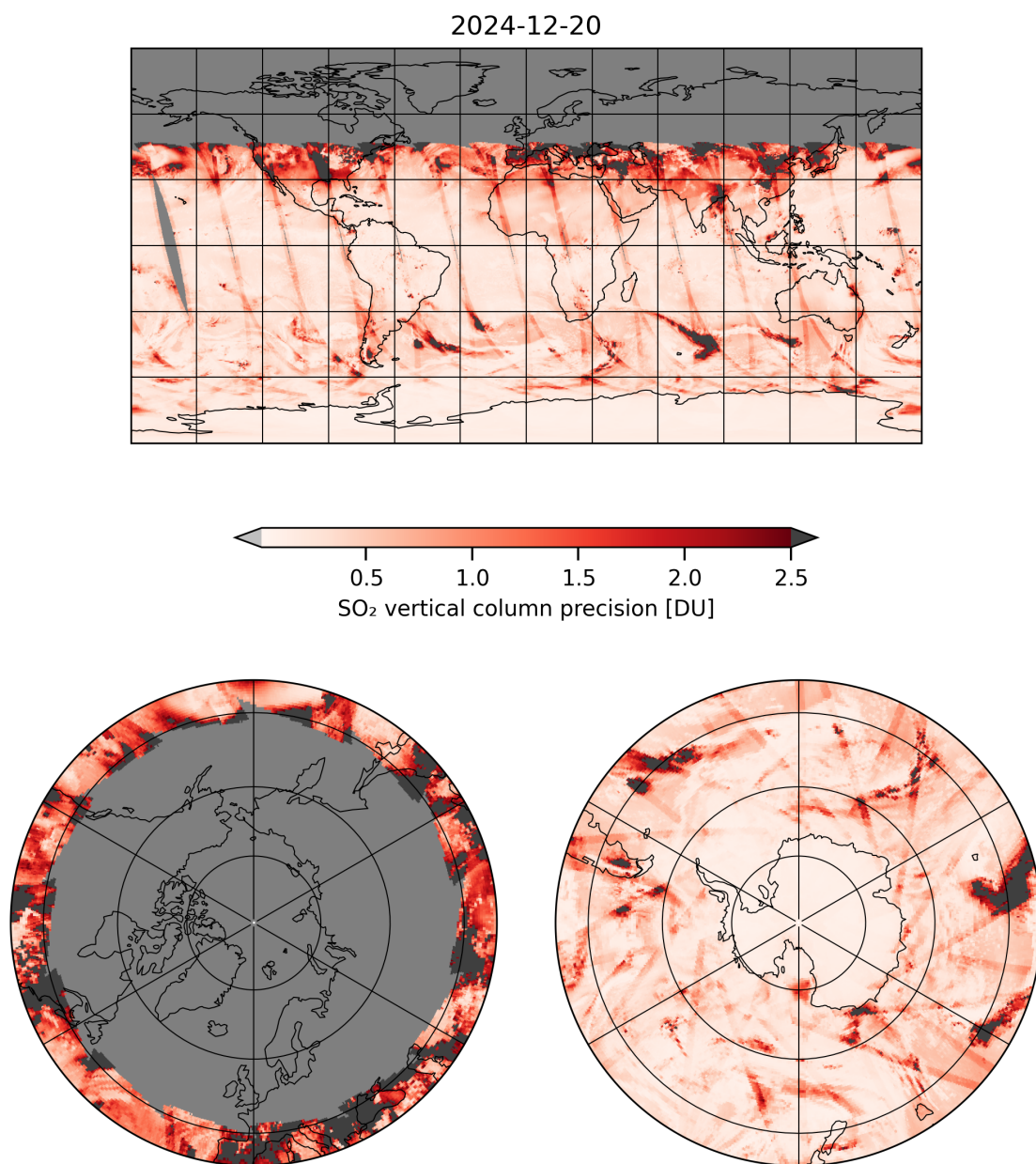


Figure 5: Map of “SO₂ vertical column precision” for 2024-12-20 to 2024-12-20

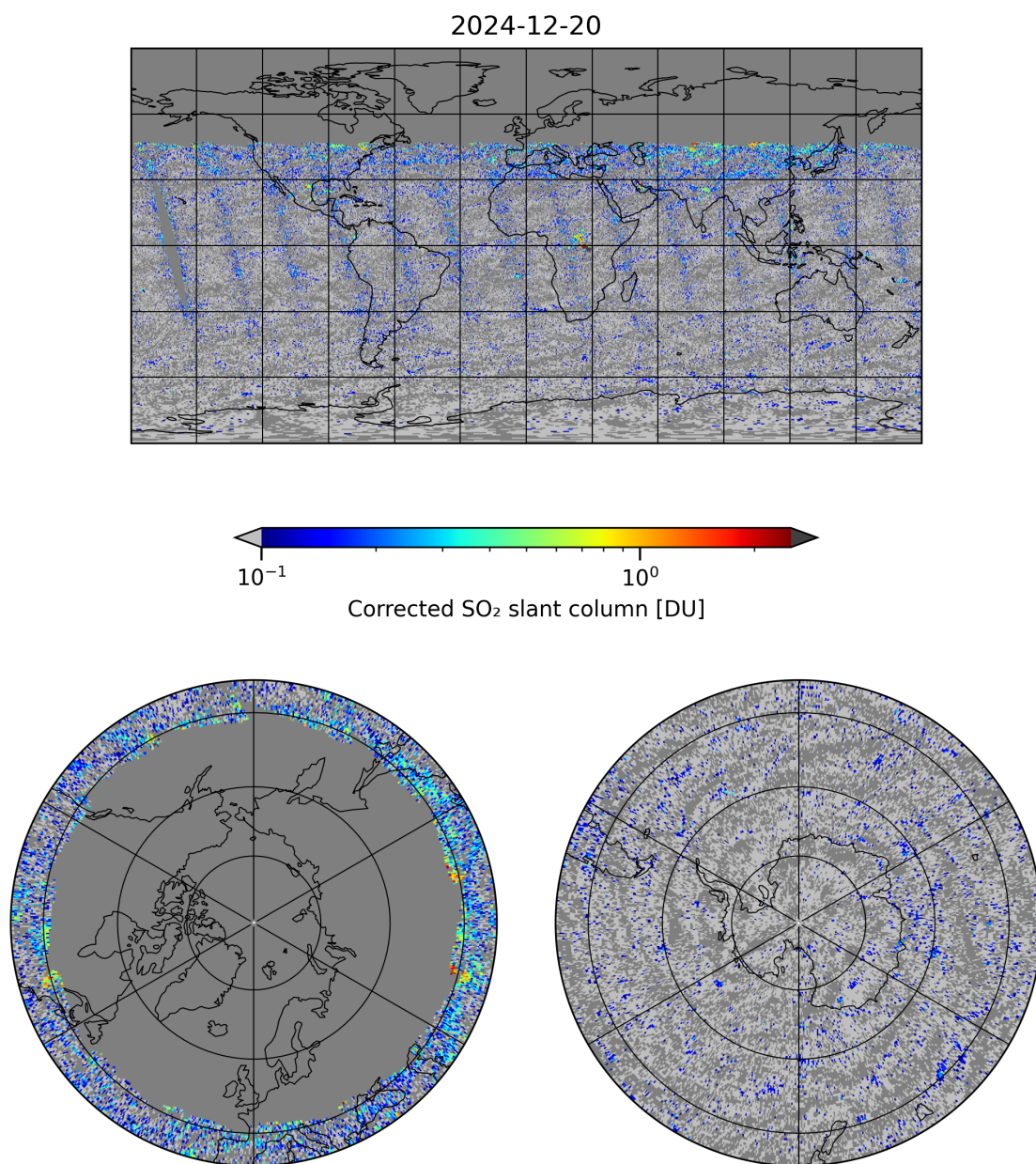


Figure 6: Map of “Corrected SO₂ slant column” for 2024-12-20 to 2024-12-20

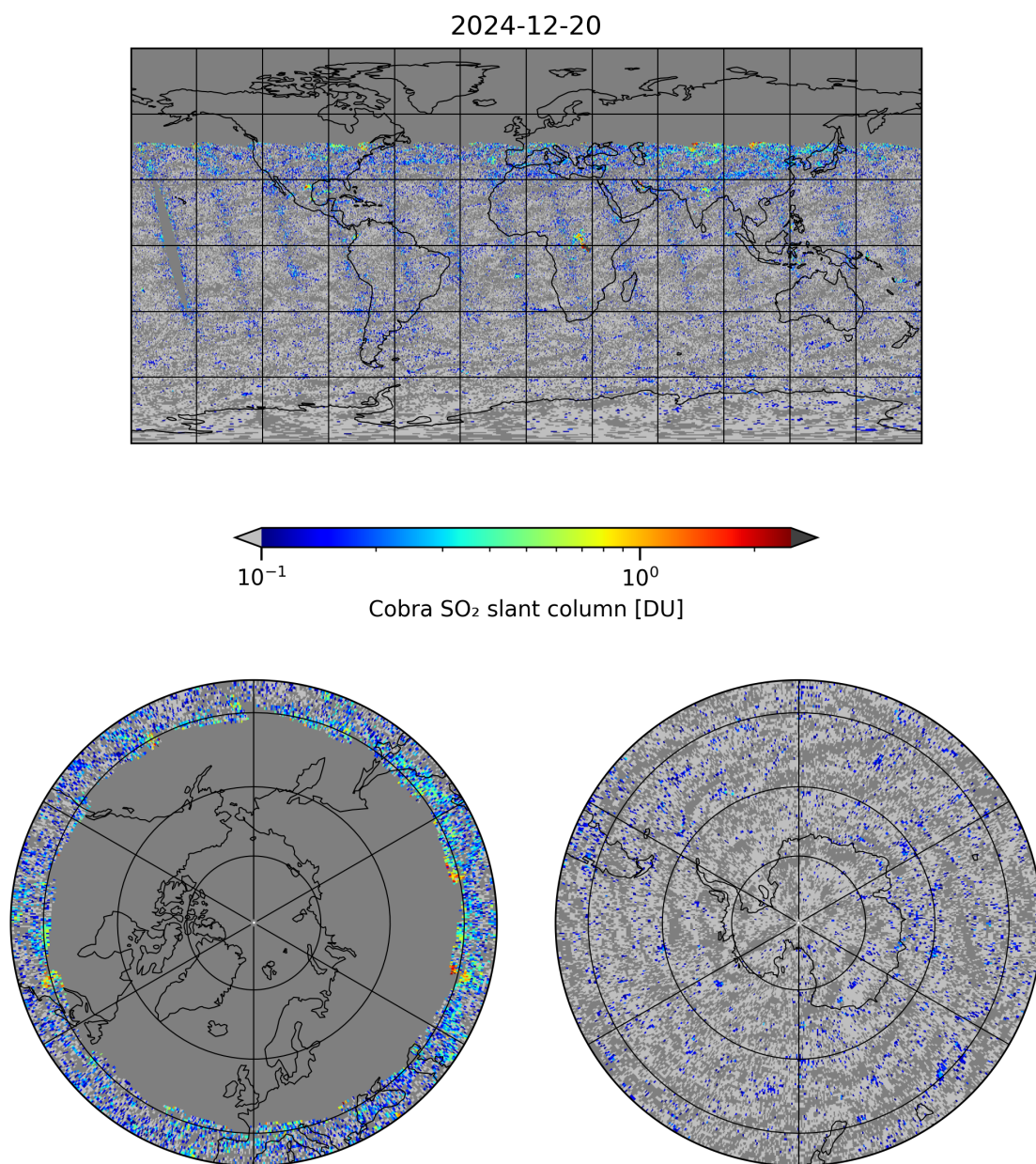


Figure 7: Map of “Cobra SO₂ slant column” for 2024-12-20 to 2024-12-20

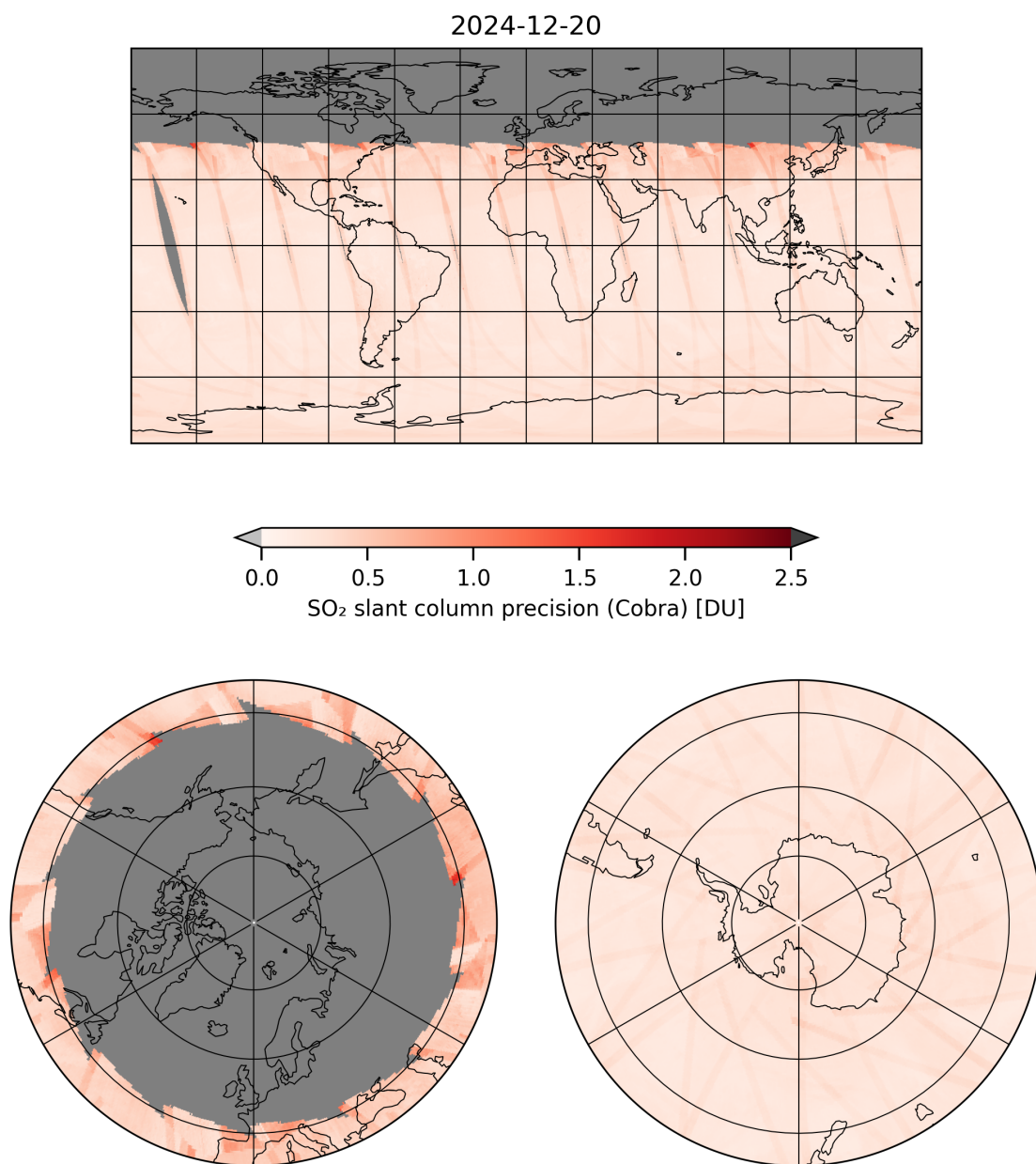


Figure 8: Map of “SO₂ slant column precision (Cobra)” for 2024-12-20 to 2024-12-20

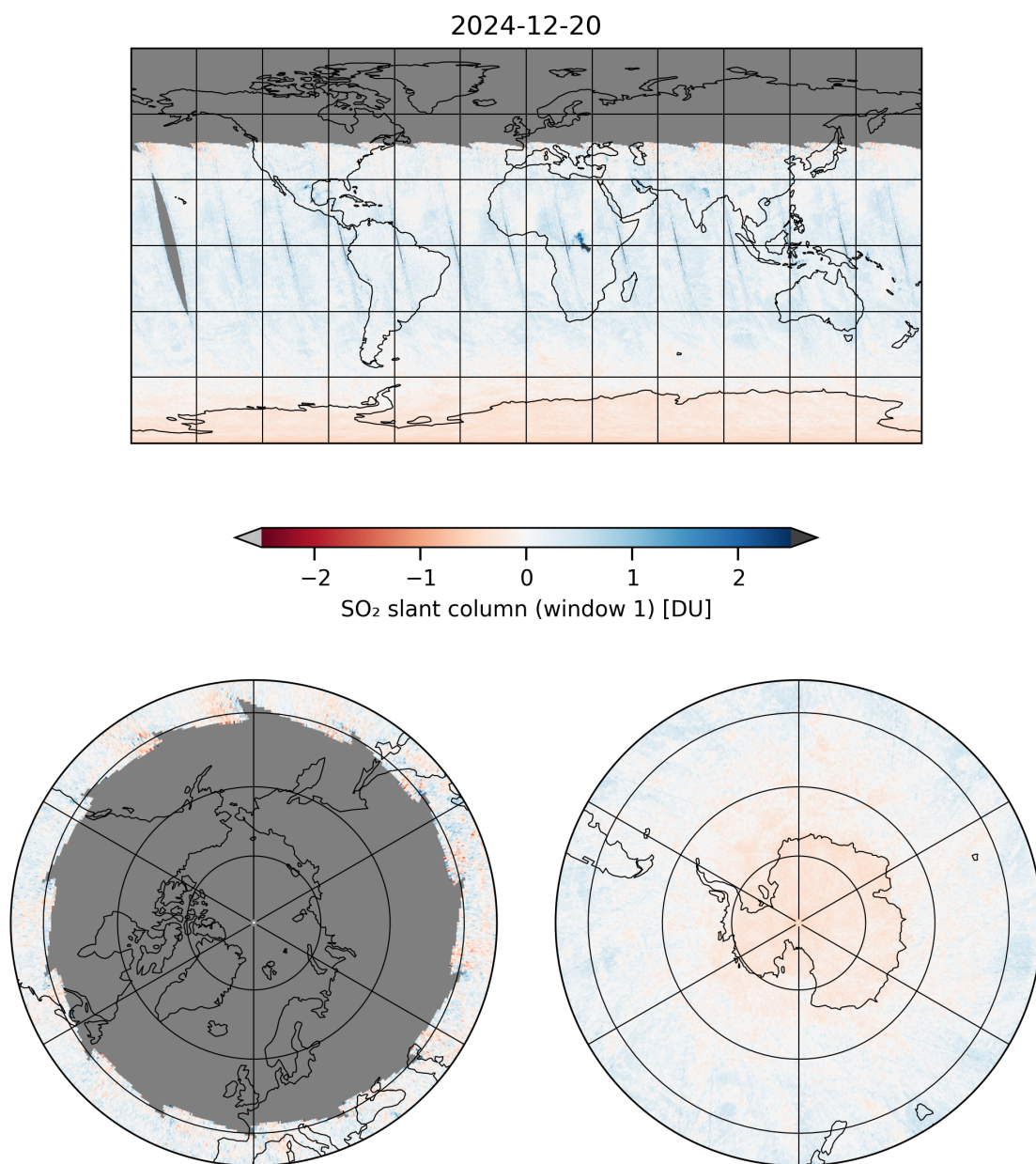


Figure 9: Map of “SO₂ slant column (window 1)” for 2024-12-20 to 2024-12-20

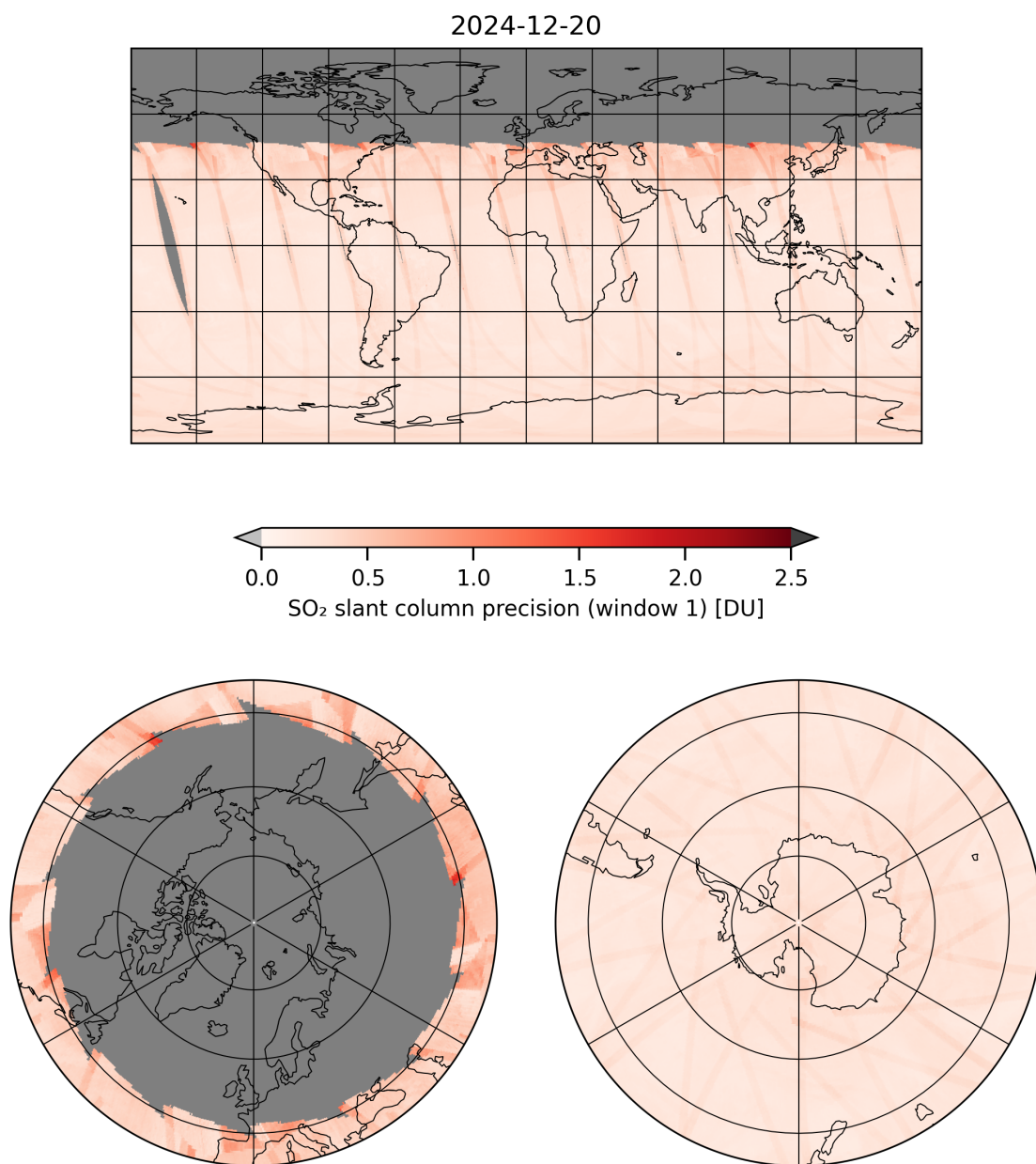


Figure 10: Map of “SO₂ slant column precision (window 1)” for 2024-12-20 to 2024-12-20

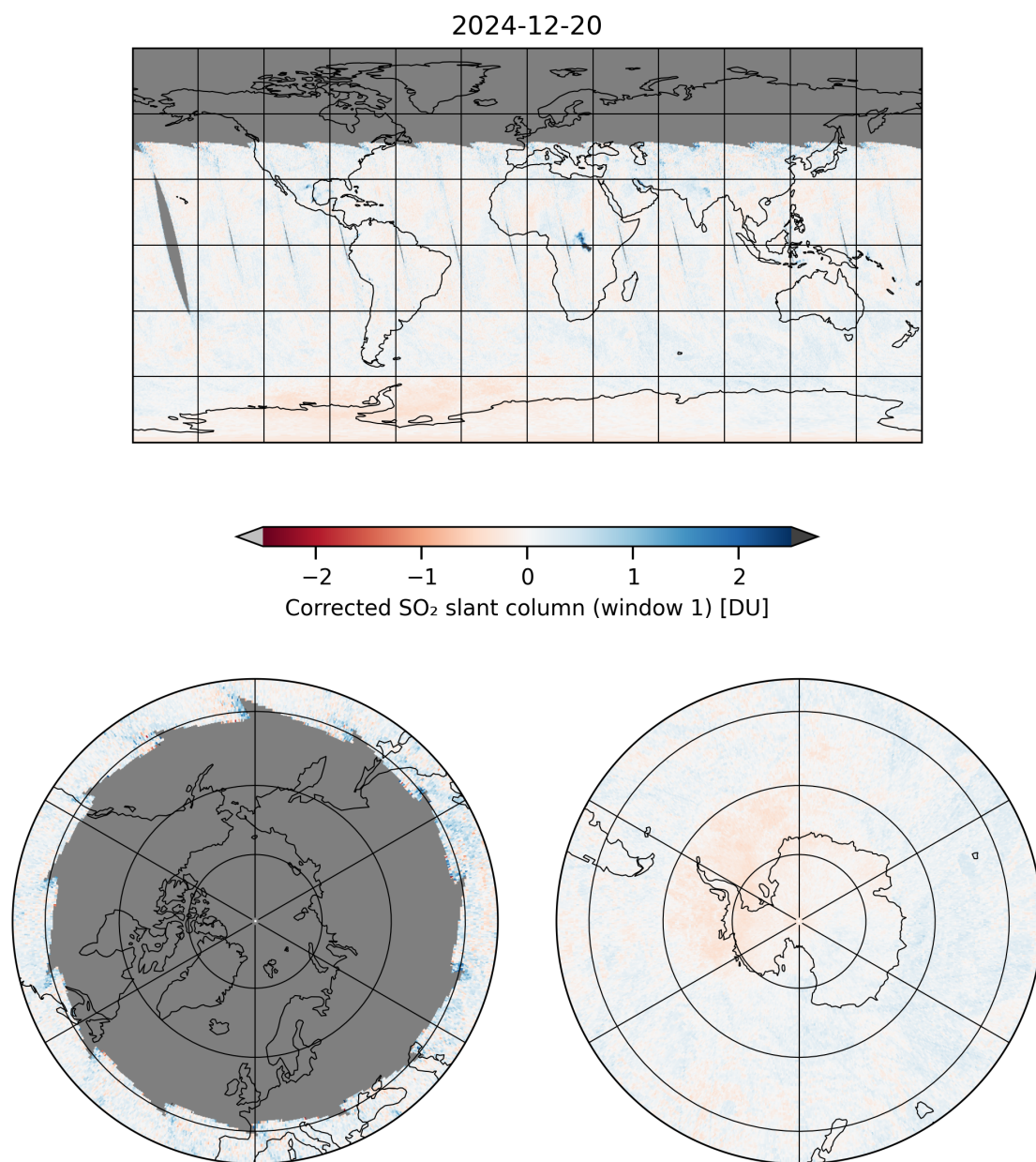


Figure 11: Map of “Corrected SO₂ slant column (window 1)” for 2024-12-20 to 2024-12-20

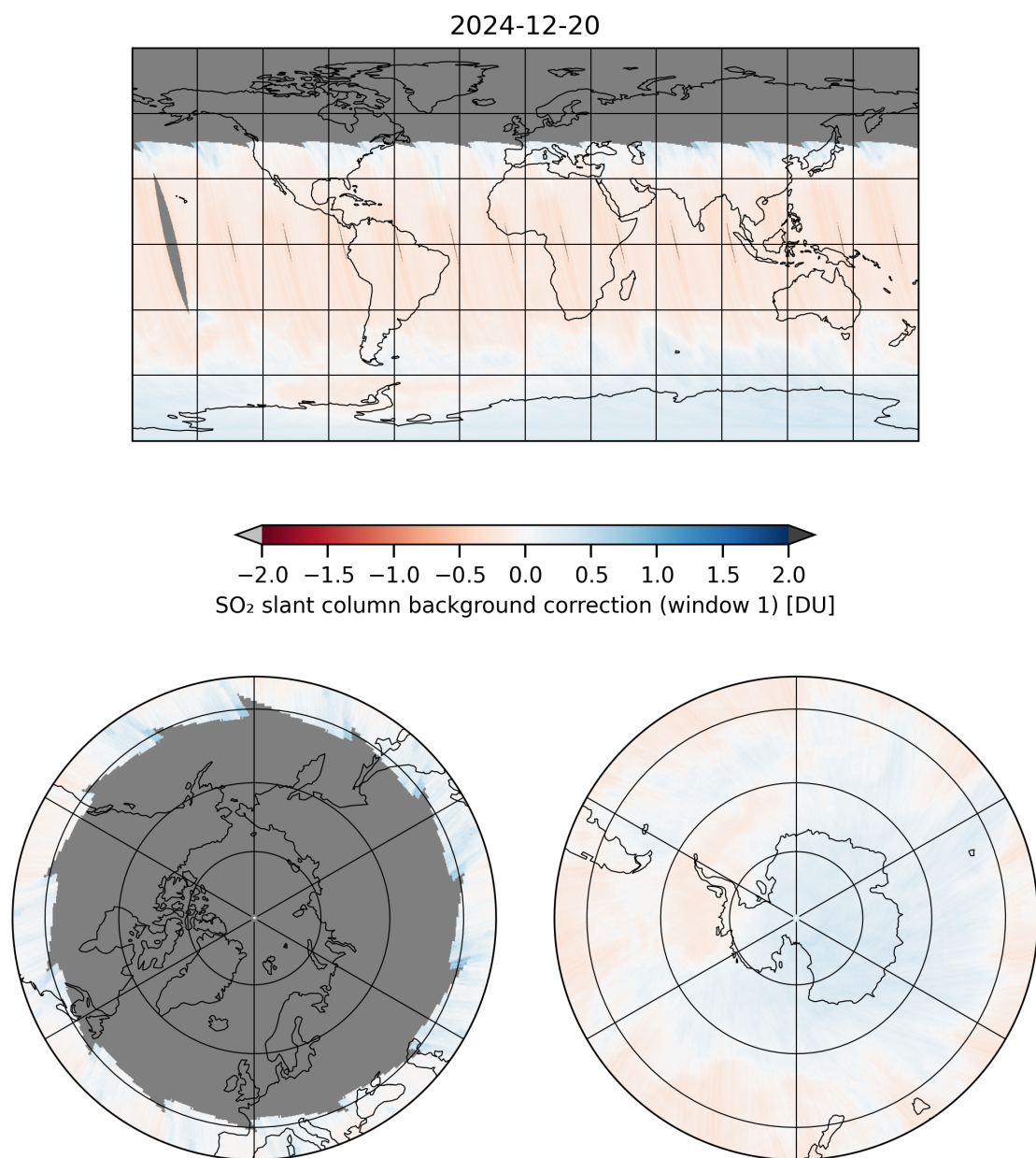


Figure 12: Map of “SO₂ slant column background correction (window 1)” for 2024-12-20 to 2024-12-20

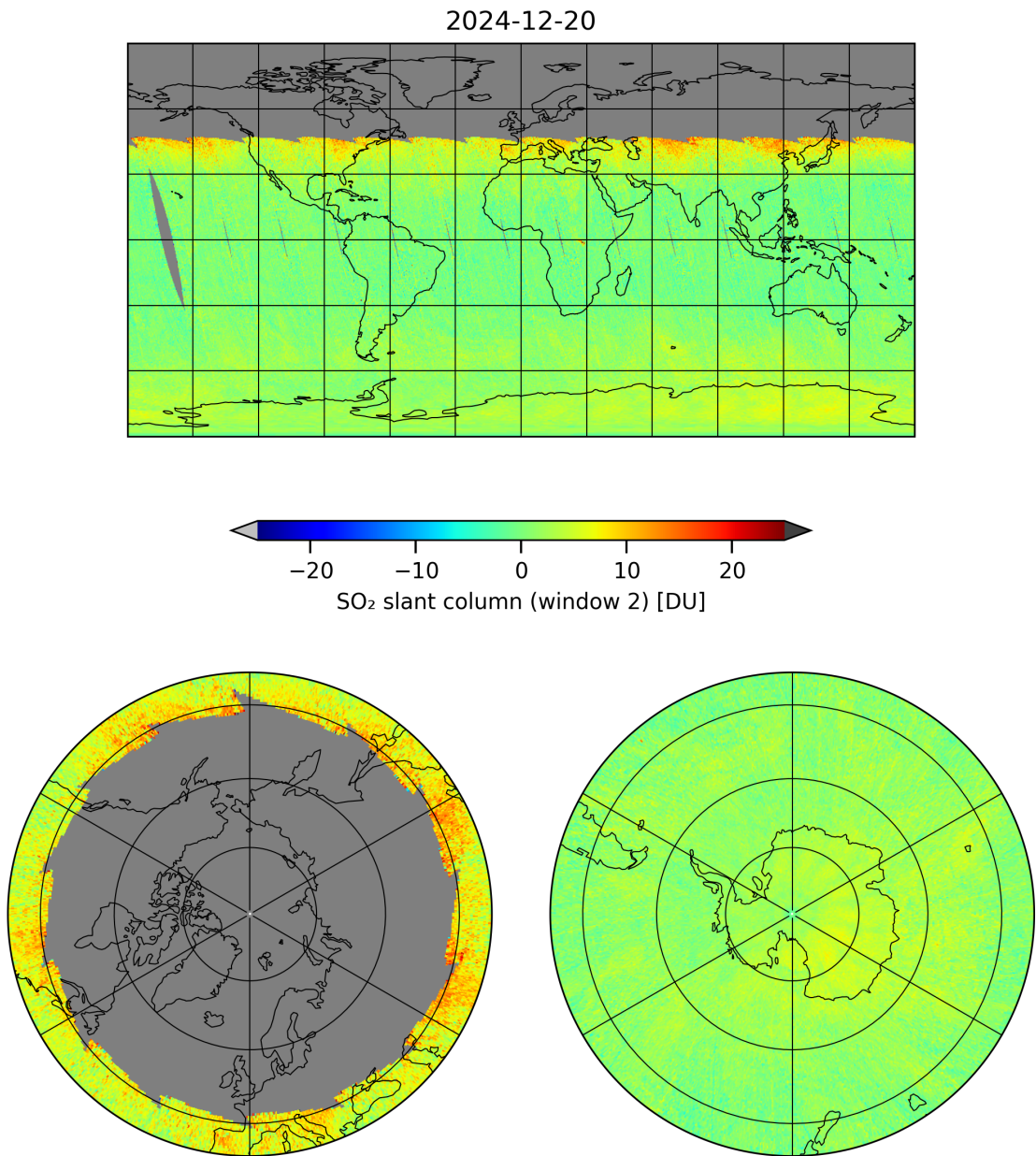


Figure 13: Map of “SO₂ slant column (window 2)” for 2024-12-20 to 2024-12-20

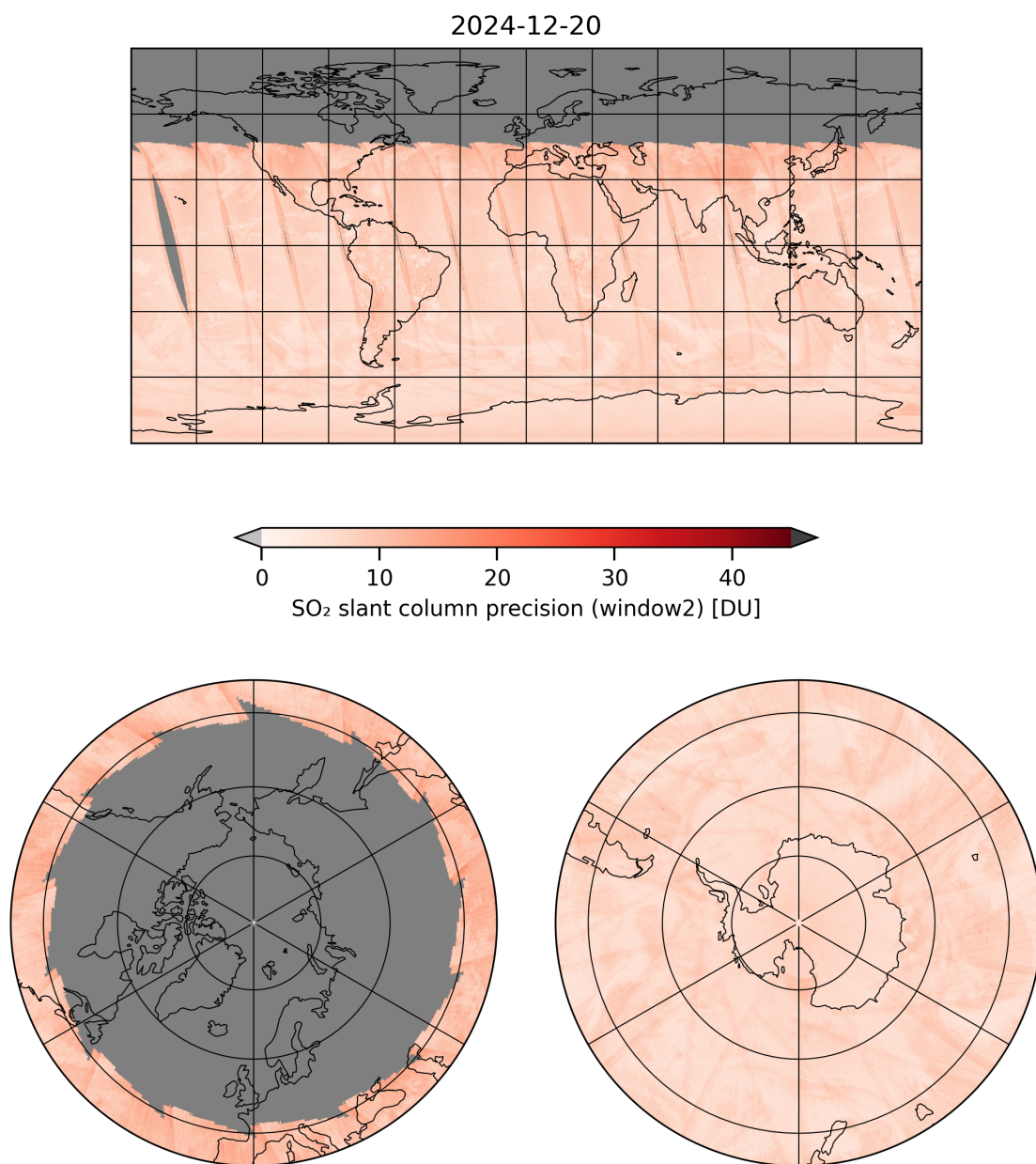


Figure 14: Map of “SO₂ slant column precision (window2)” for 2024-12-20 to 2024-12-20

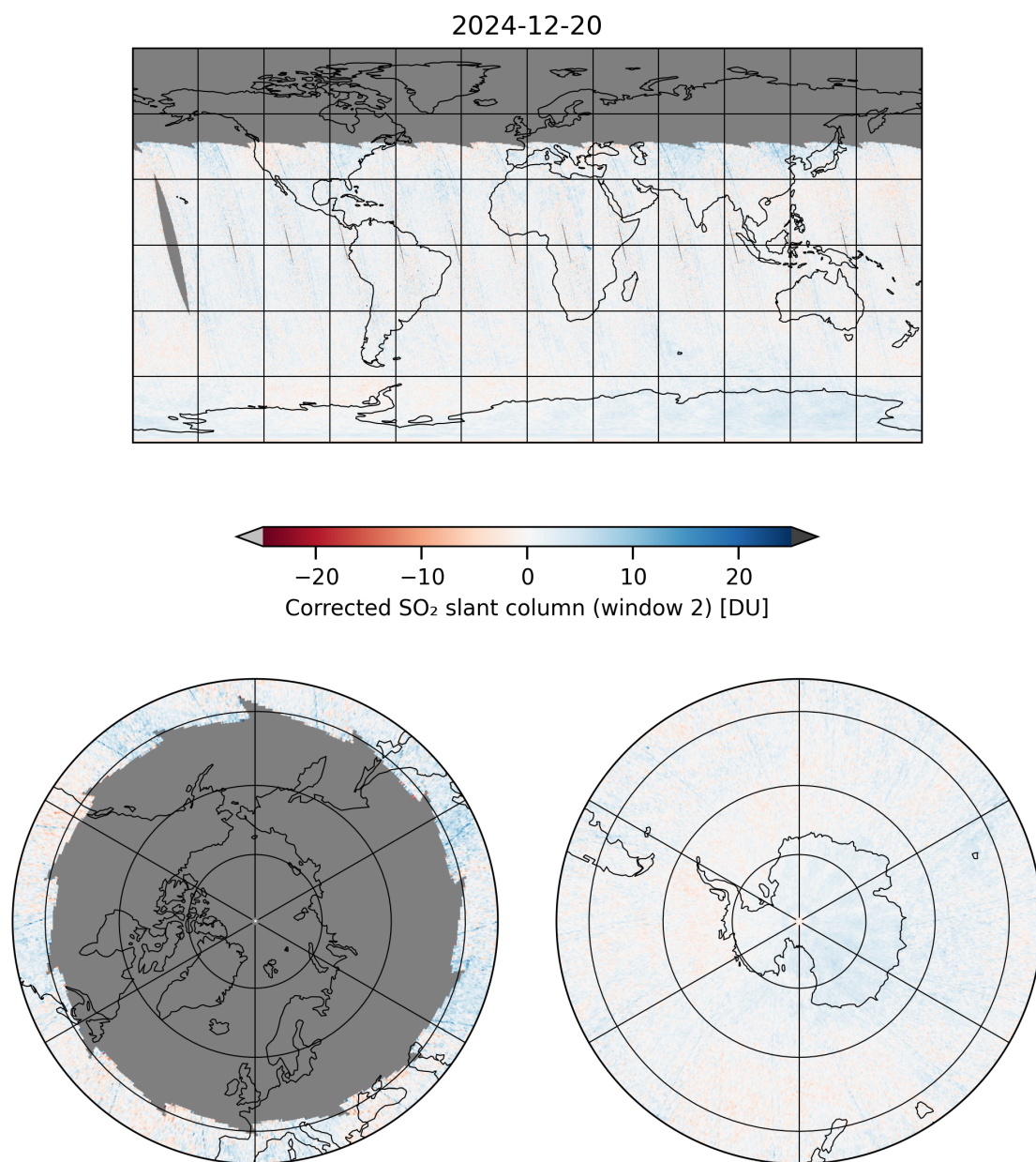


Figure 15: Map of “Corrected SO₂ slant column (window 2)” for 2024-12-20 to 2024-12-20

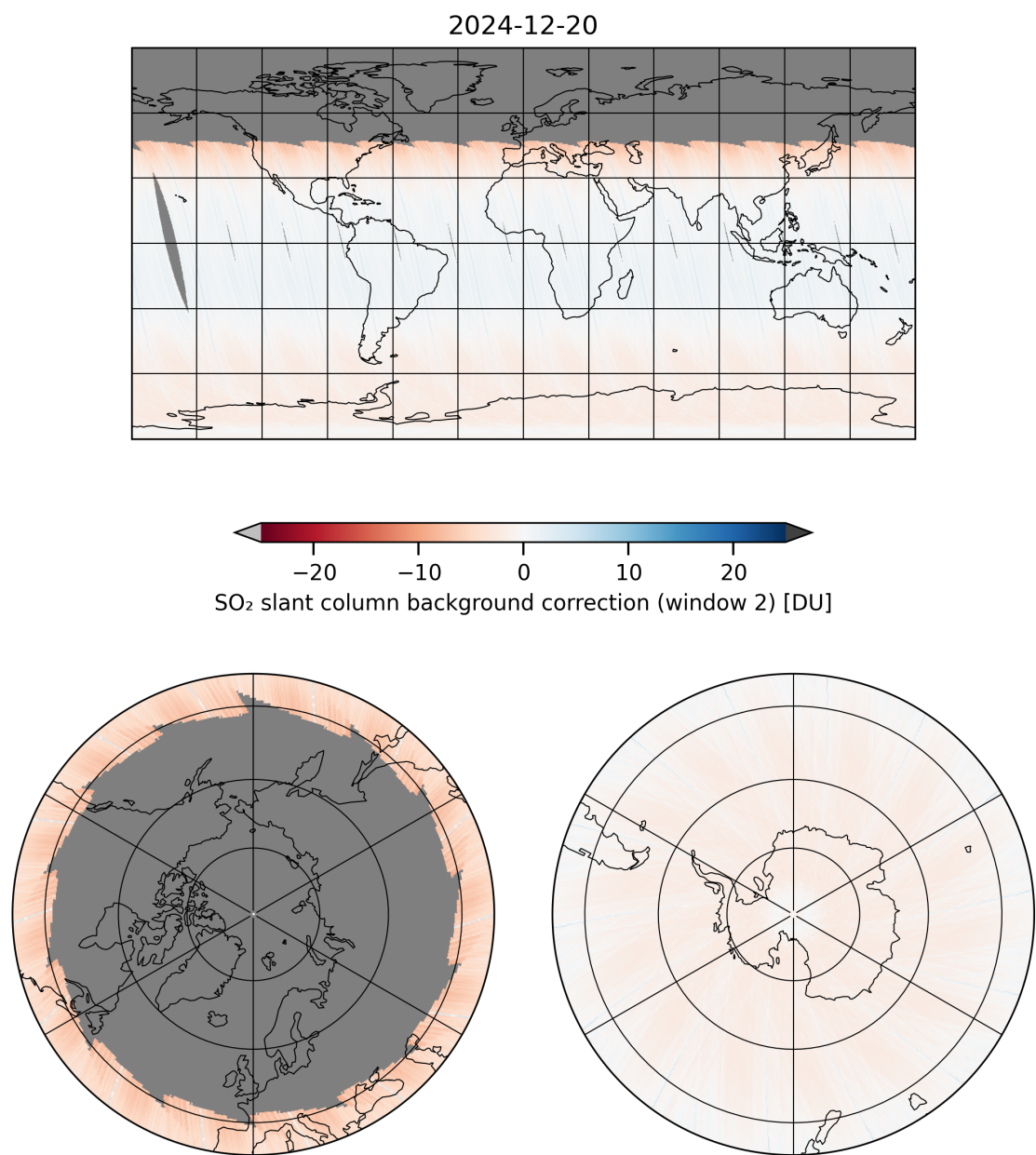


Figure 16: Map of “SO₂ slant column background correction (window 2)” for 2024-12-20 to 2024-12-20

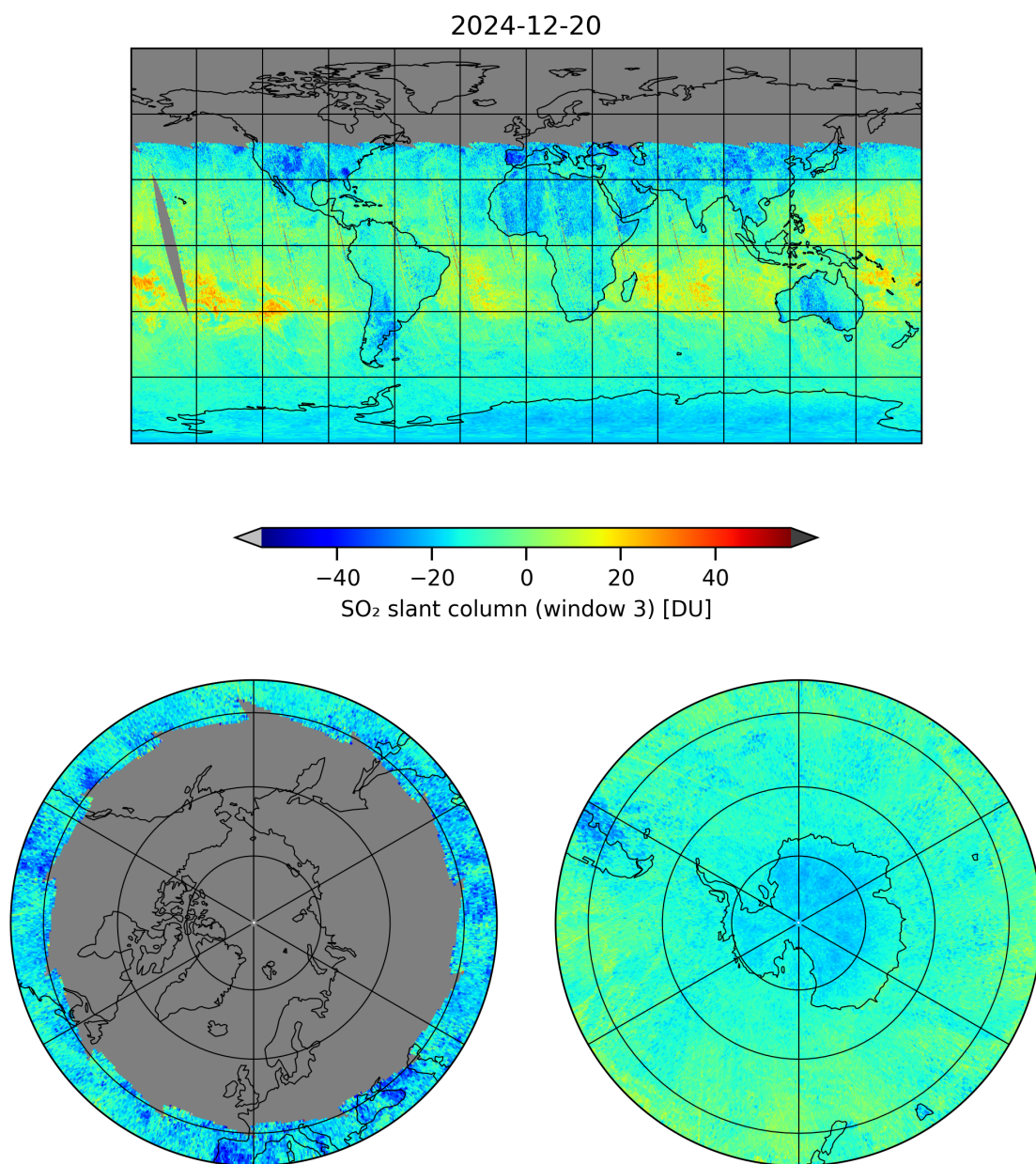


Figure 17: Map of “SO₂ slant column (window 3)” for 2024-12-20 to 2024-12-20

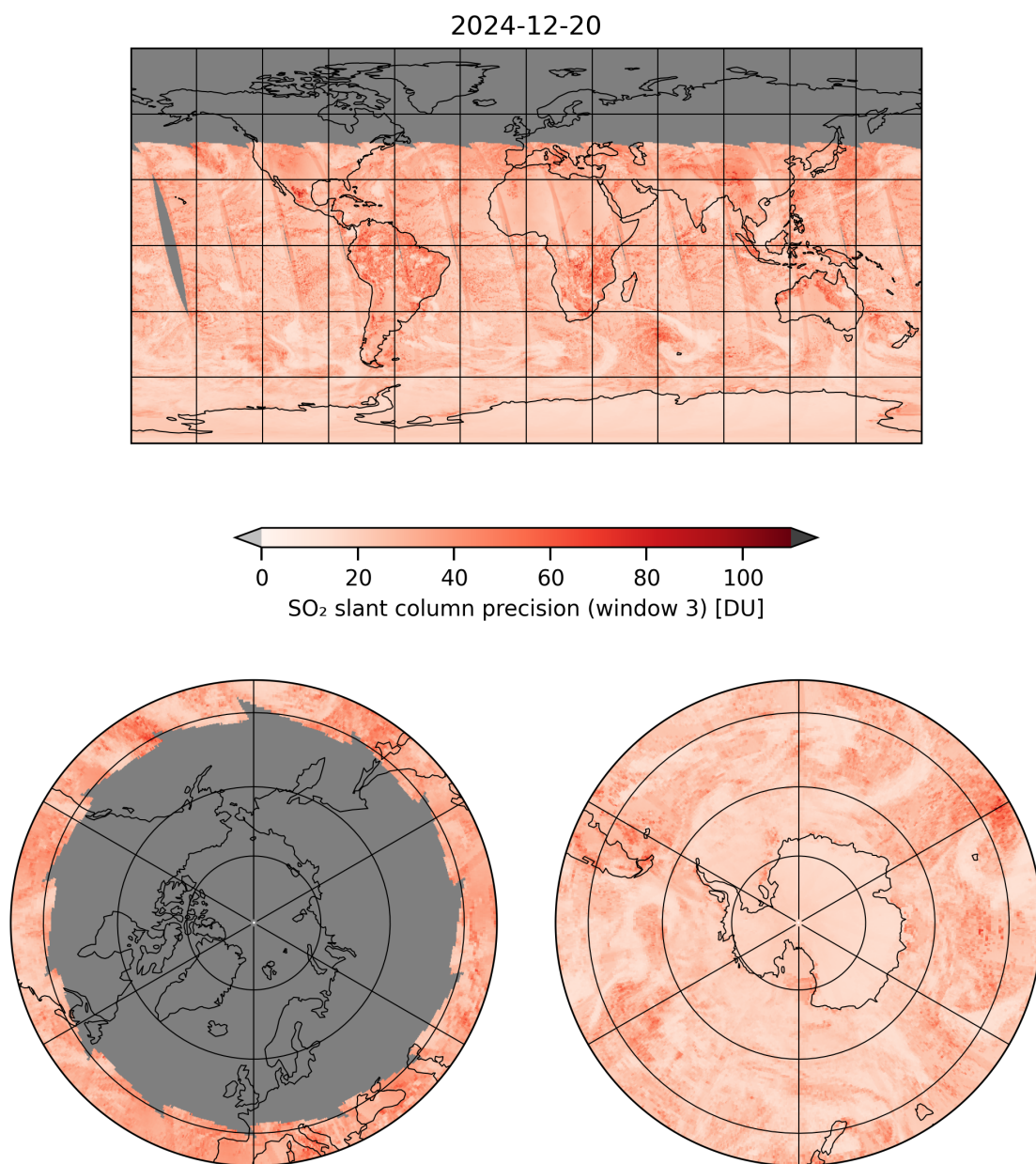


Figure 18: Map of “SO₂ slant column precision (window 3)” for 2024-12-20 to 2024-12-20

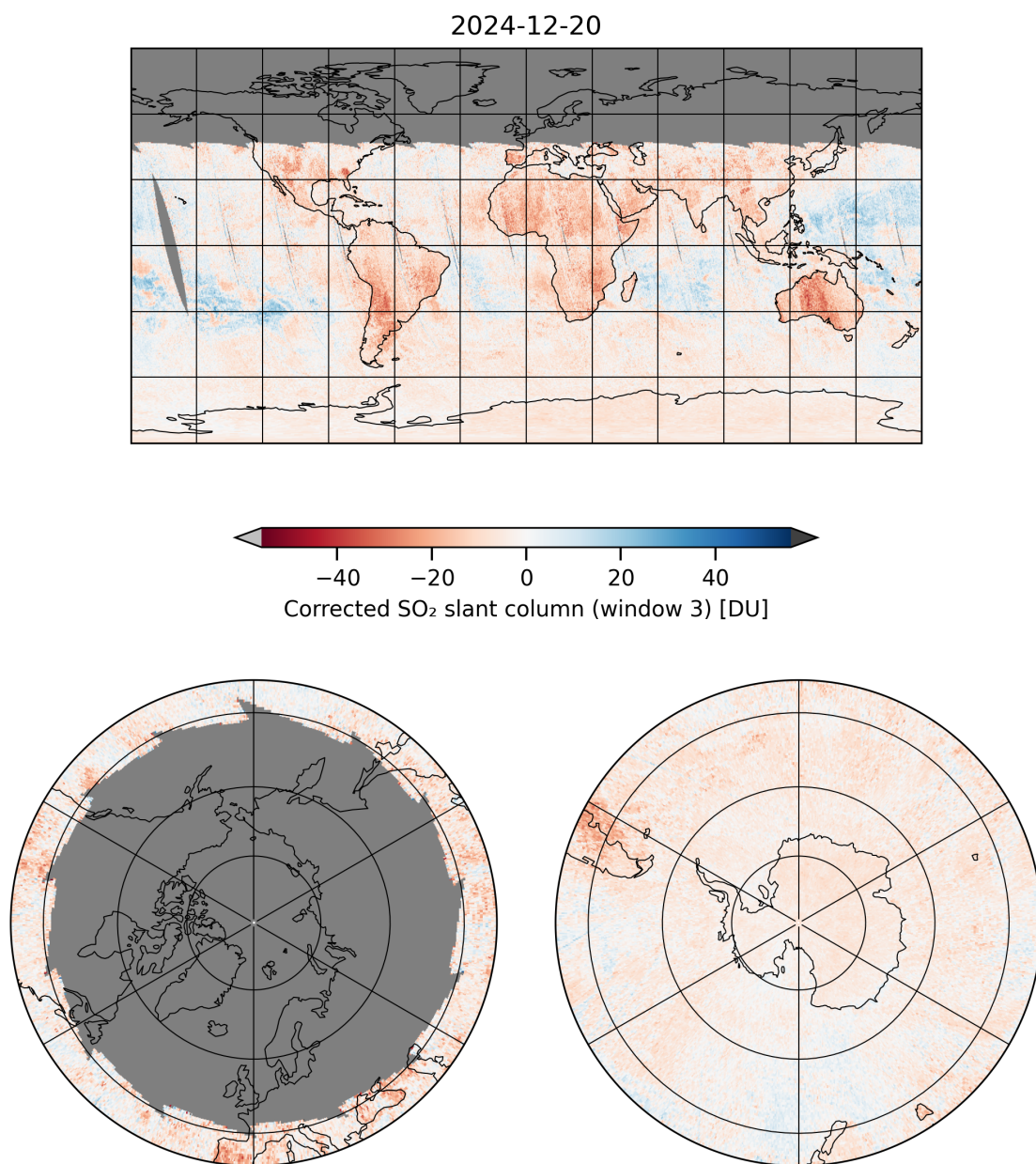


Figure 19: Map of “Corrected SO₂ slant column (window 3)” for 2024-12-20 to 2024-12-20

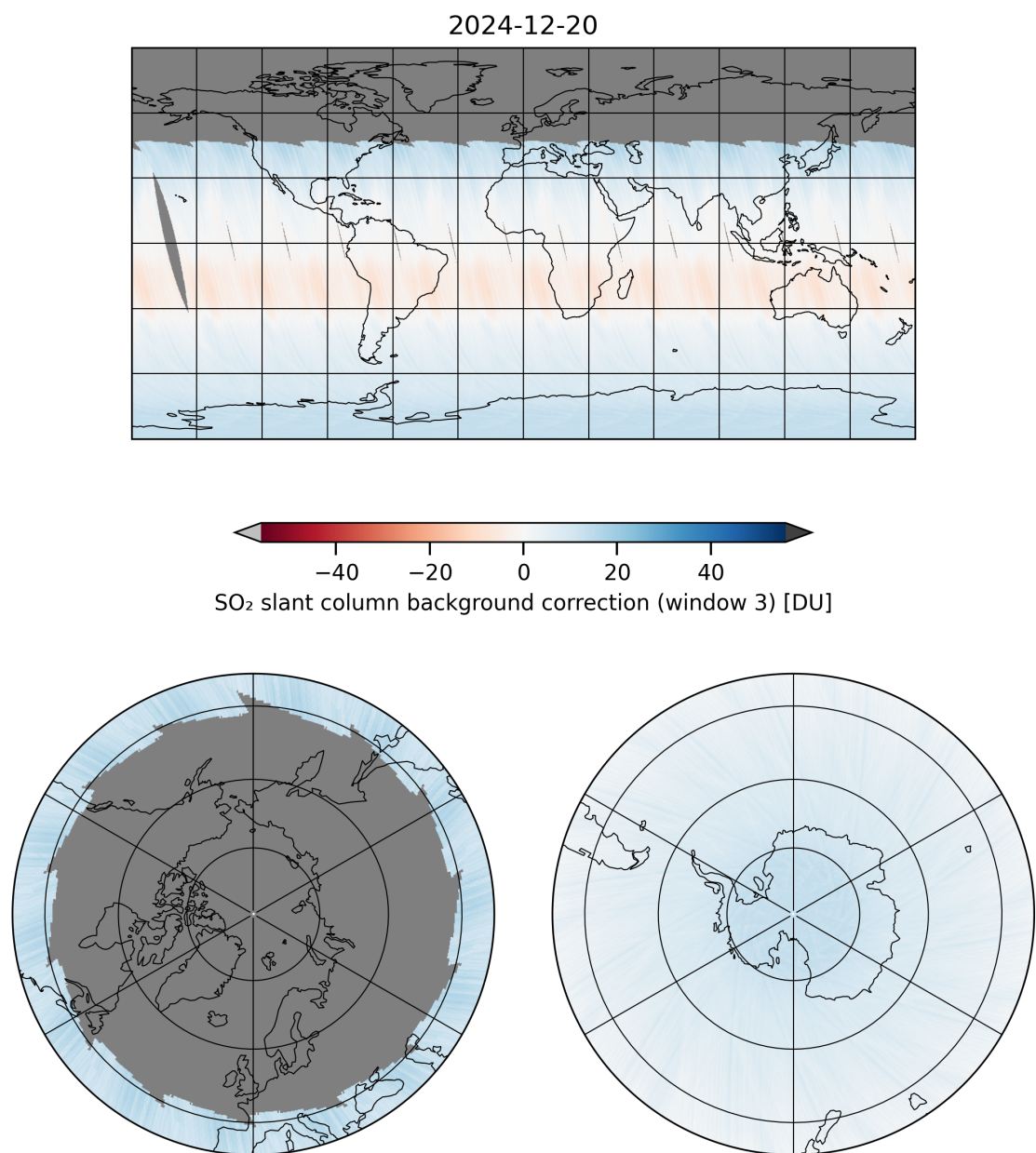


Figure 20: Map of “SO₂ slant column background correction (window 3)” for 2024-12-20 to 2024-12-20

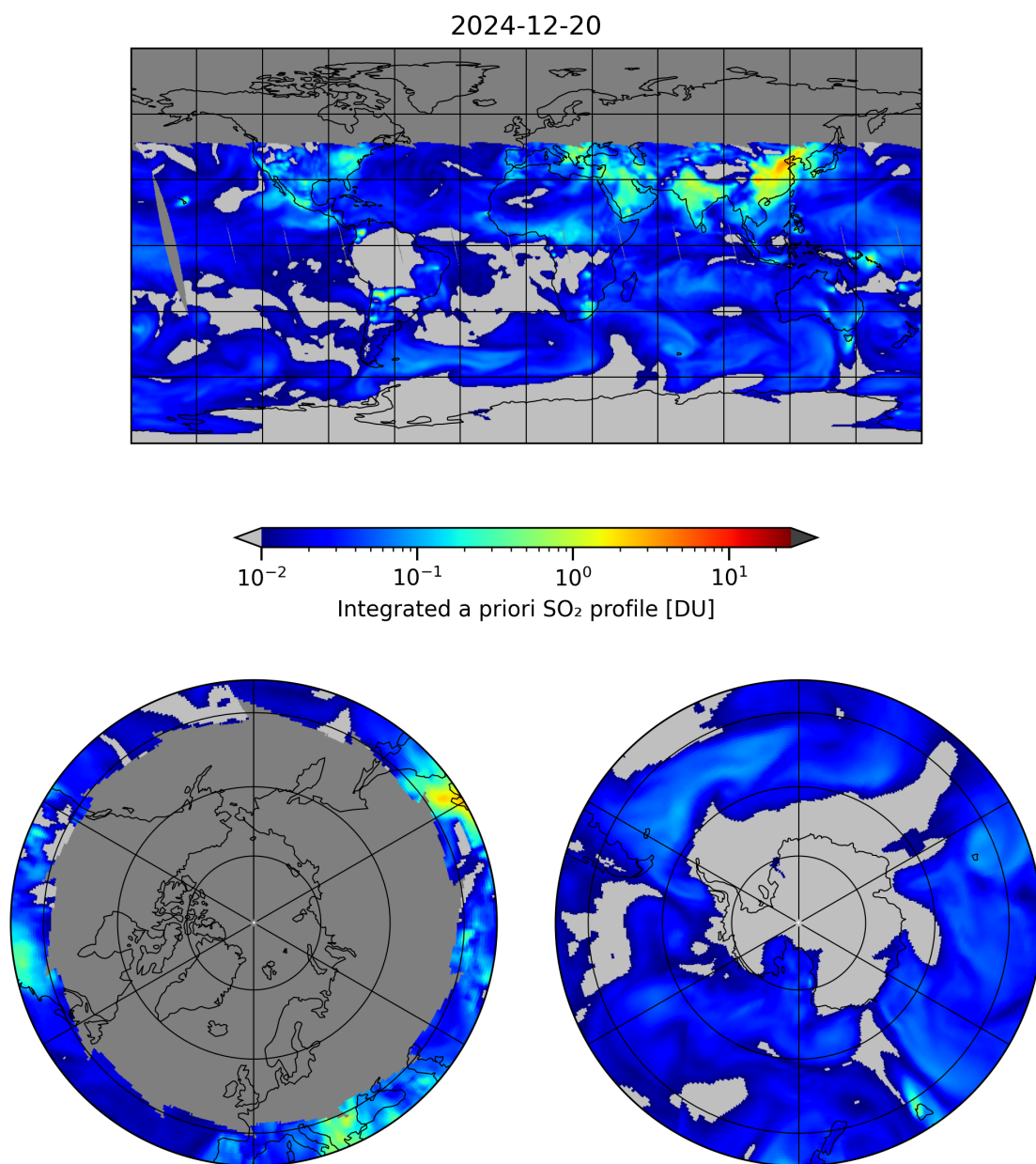


Figure 21: Map of “Integrated a priori SO₂ profile” for 2024-12-20 to 2024-12-20

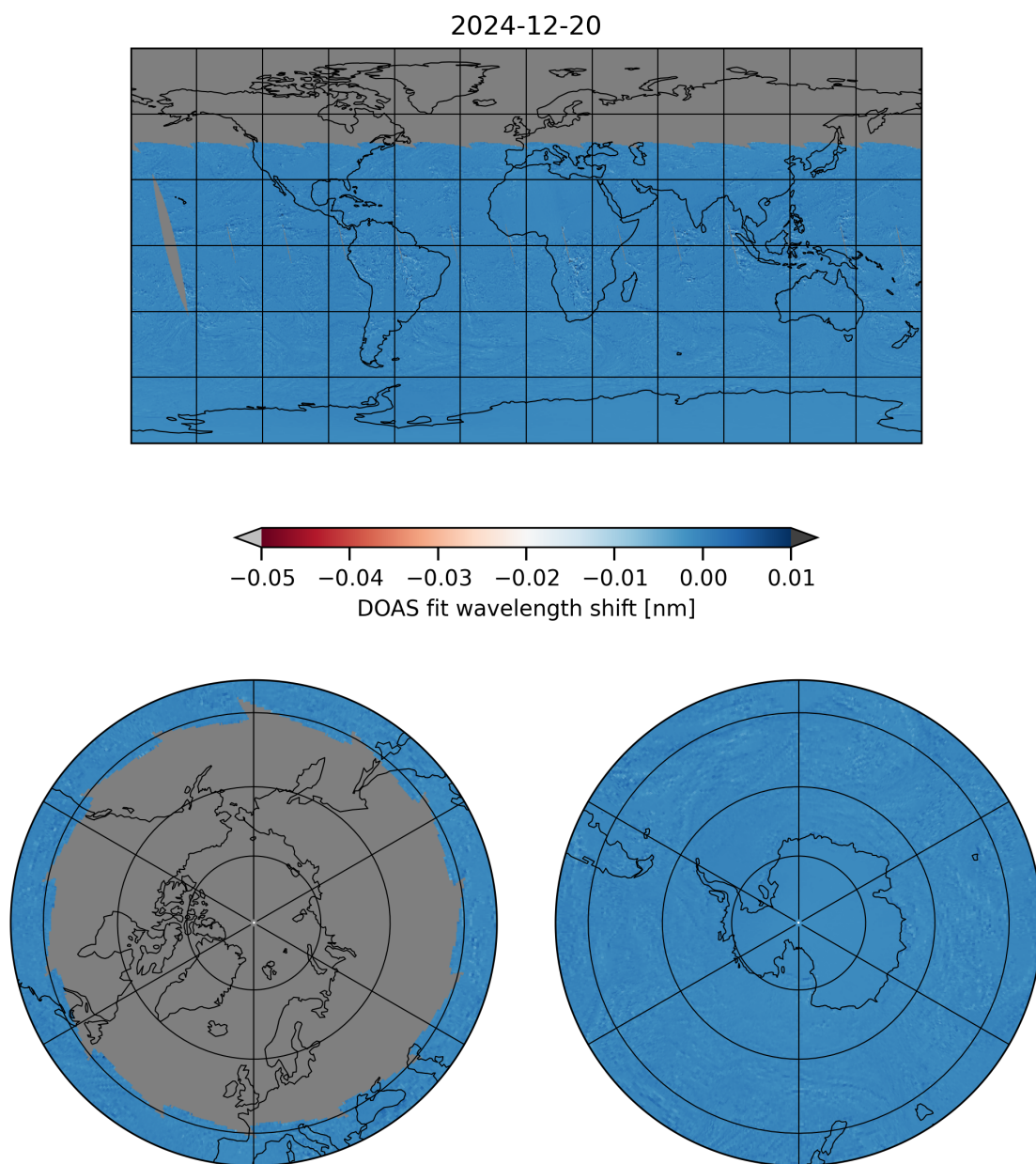


Figure 22: Map of “DOAS fit wavelength shift” for 2024-12-20 to 2024-12-20

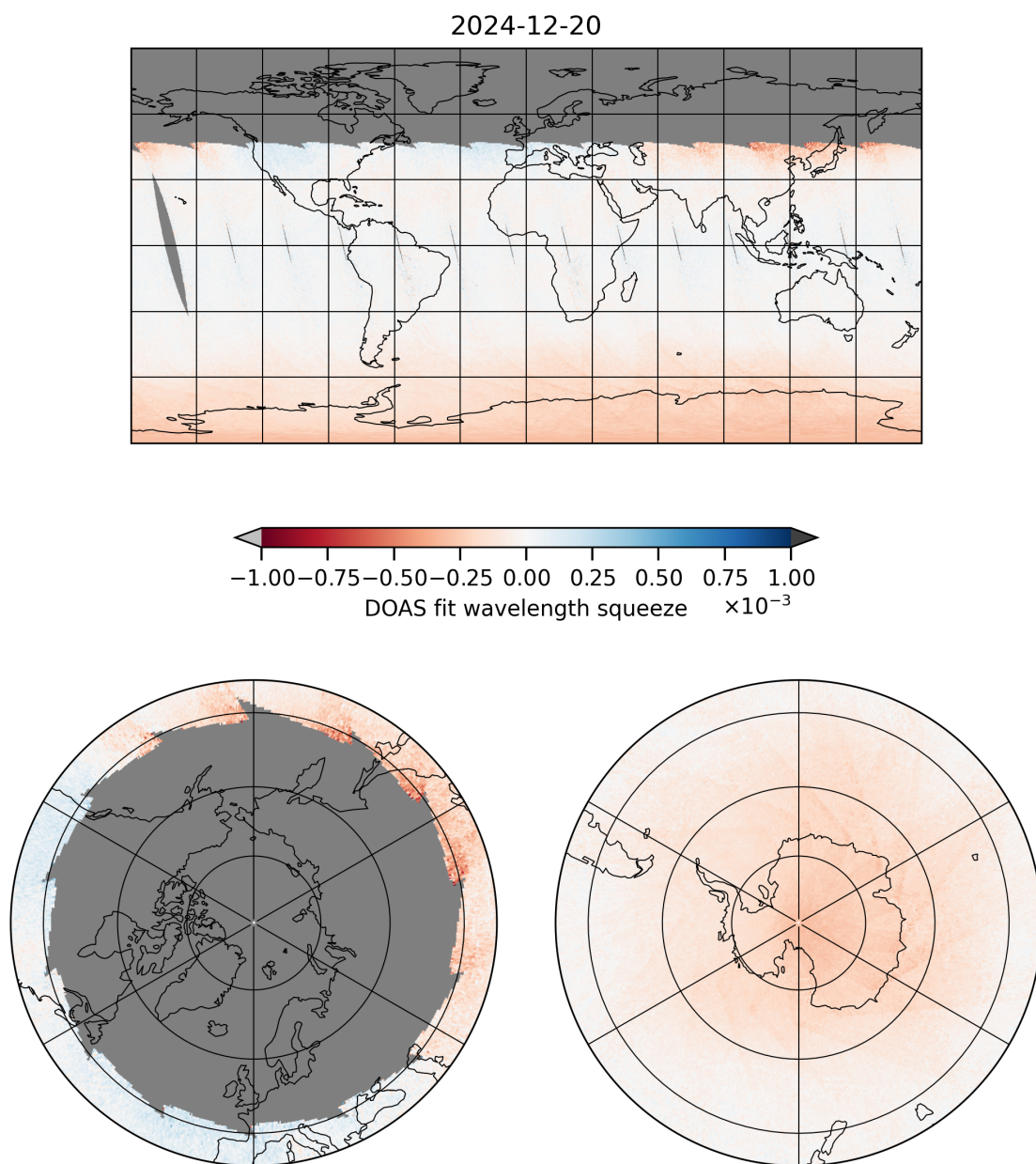


Figure 23: Map of “DOAS fit wavelength squeeze” for 2024-12-20 to 2024-12-20

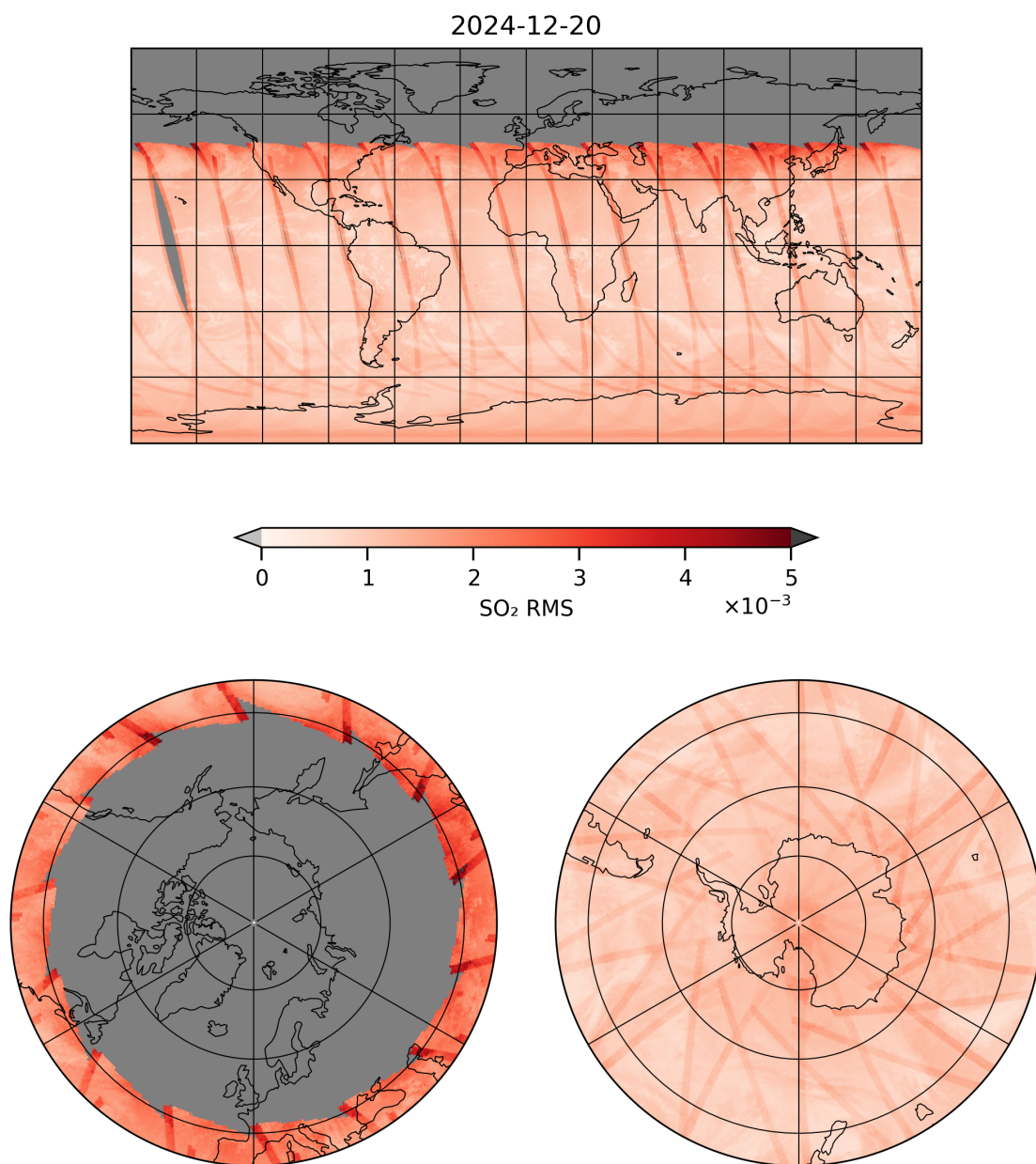


Figure 24: Map of “SO₂ RMS” for 2024-12-20 to 2024-12-20

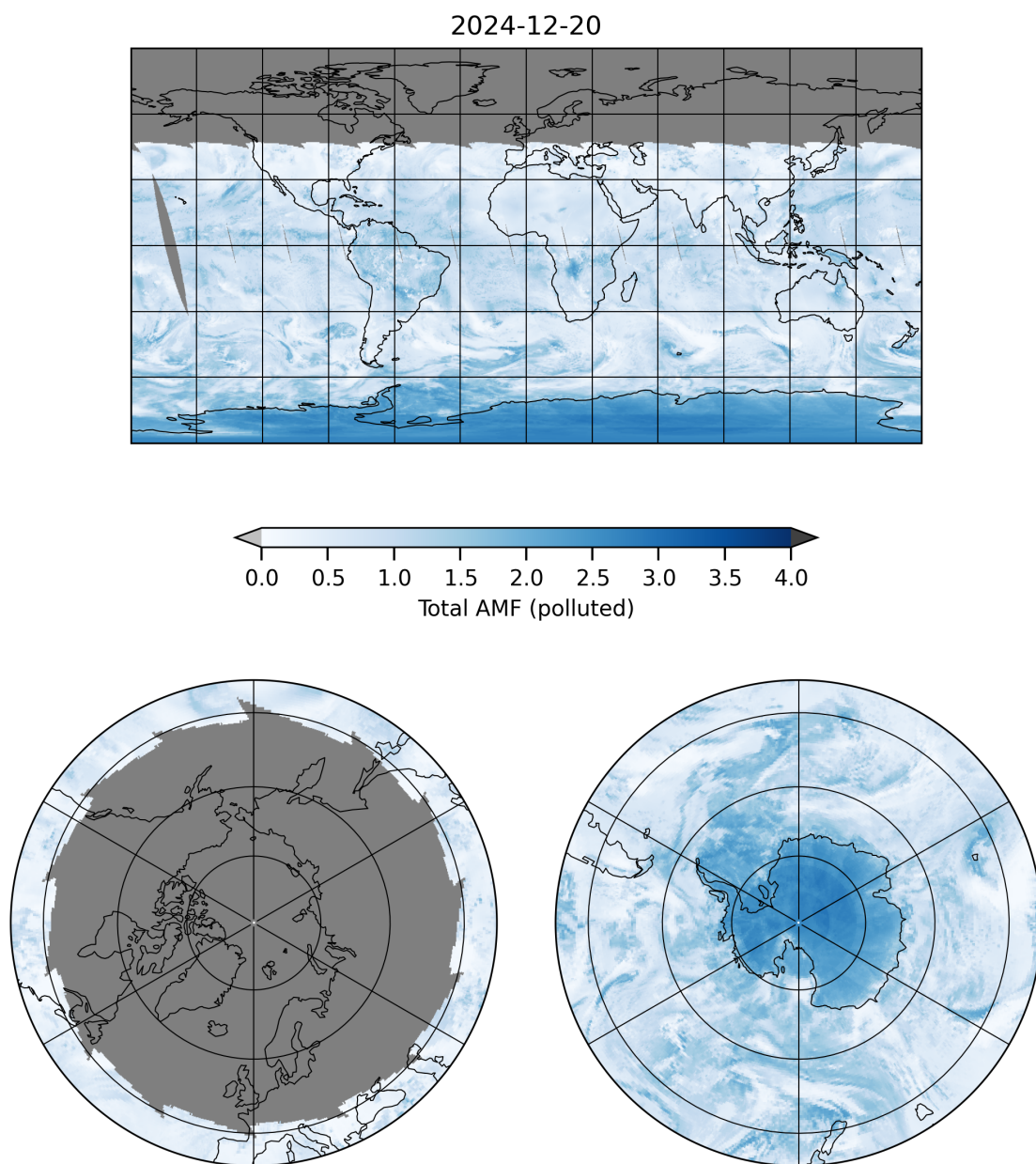


Figure 25: Map of “Total AMF (polluted)” for 2024-12-20 to 2024-12-20

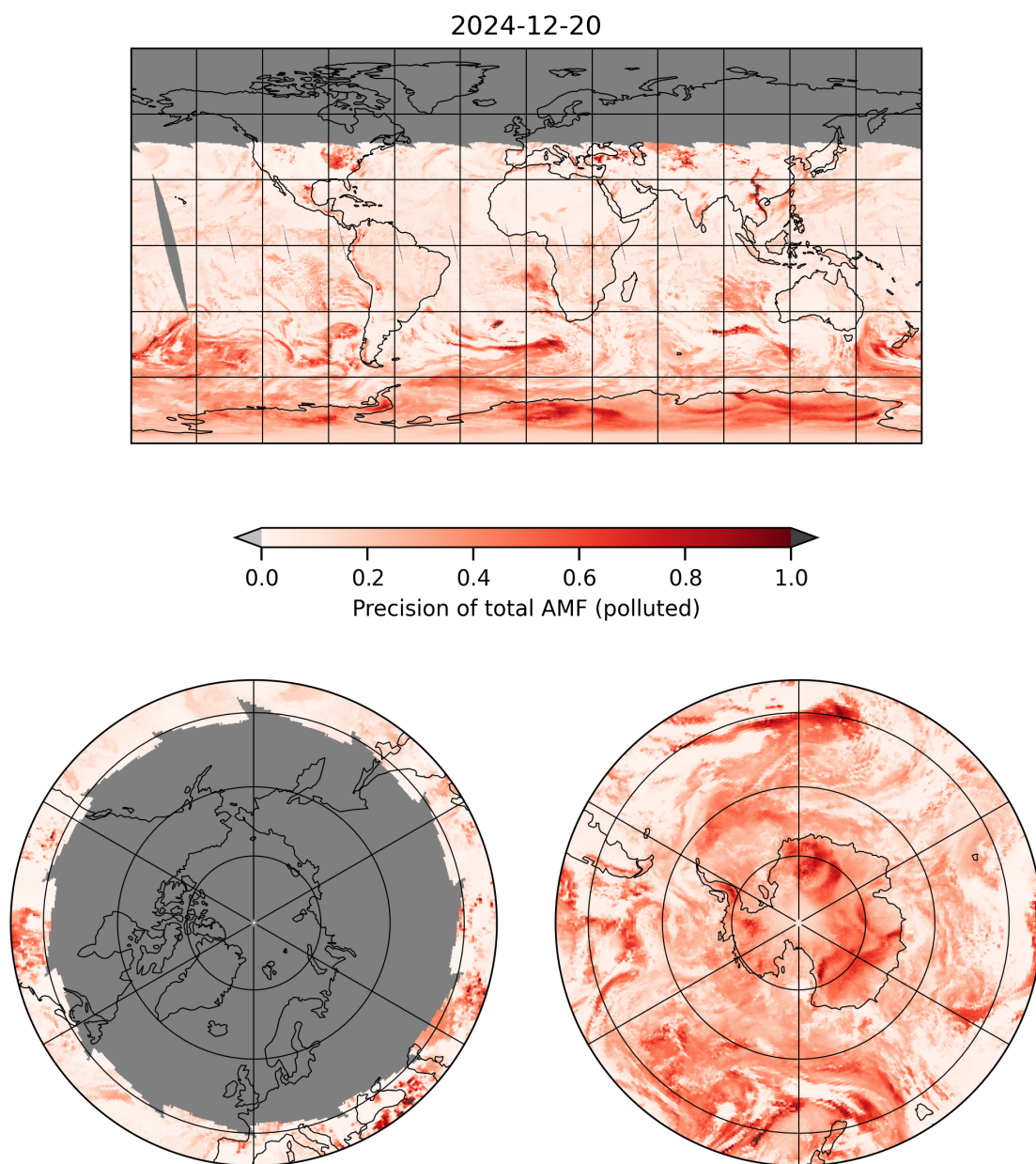


Figure 26: Map of “Precision of total AMF (polluted)” for 2024-12-20 to 2024-12-20

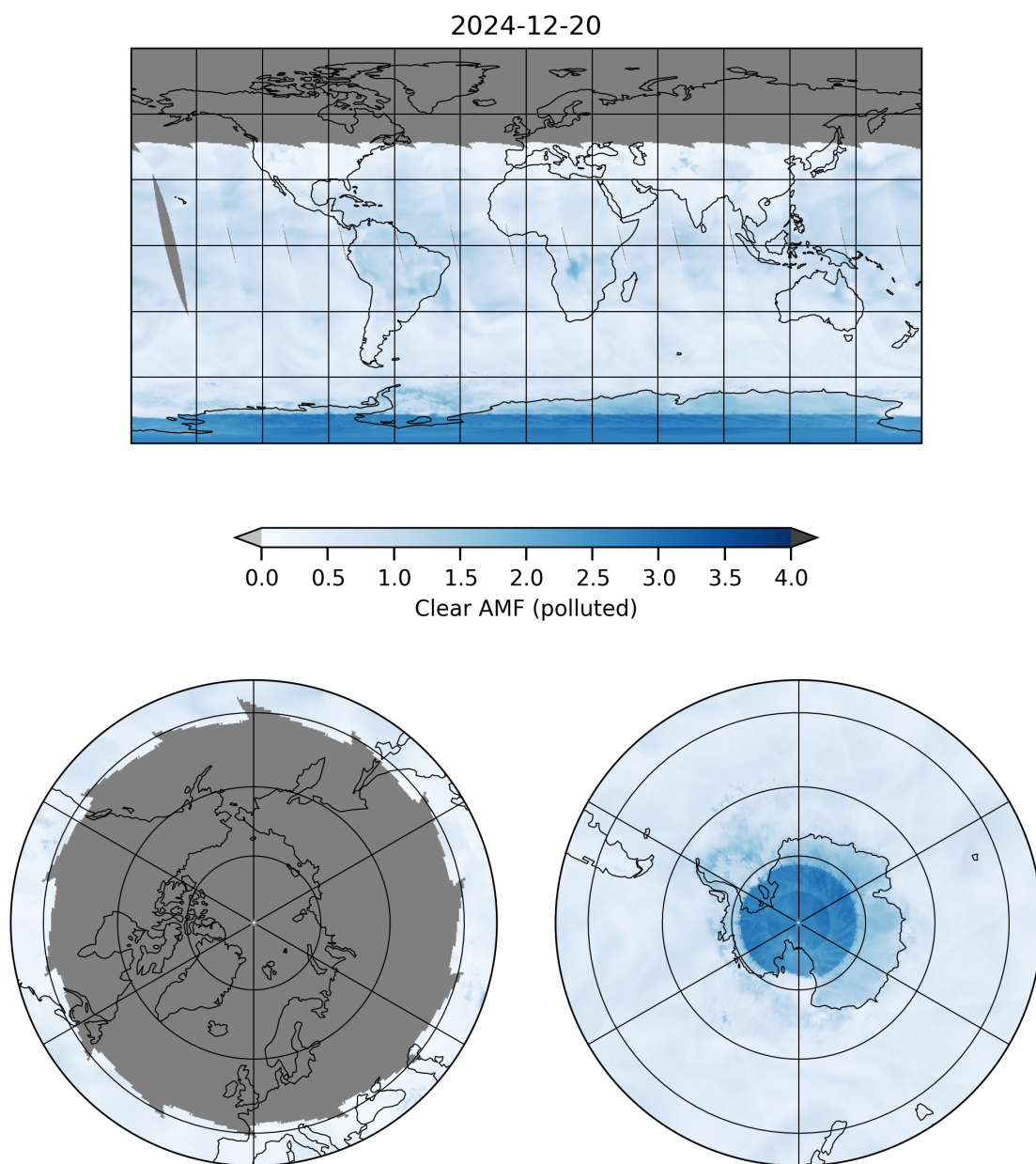


Figure 27: Map of “Clear AMF (polluted)” for 2024-12-20 to 2024-12-20

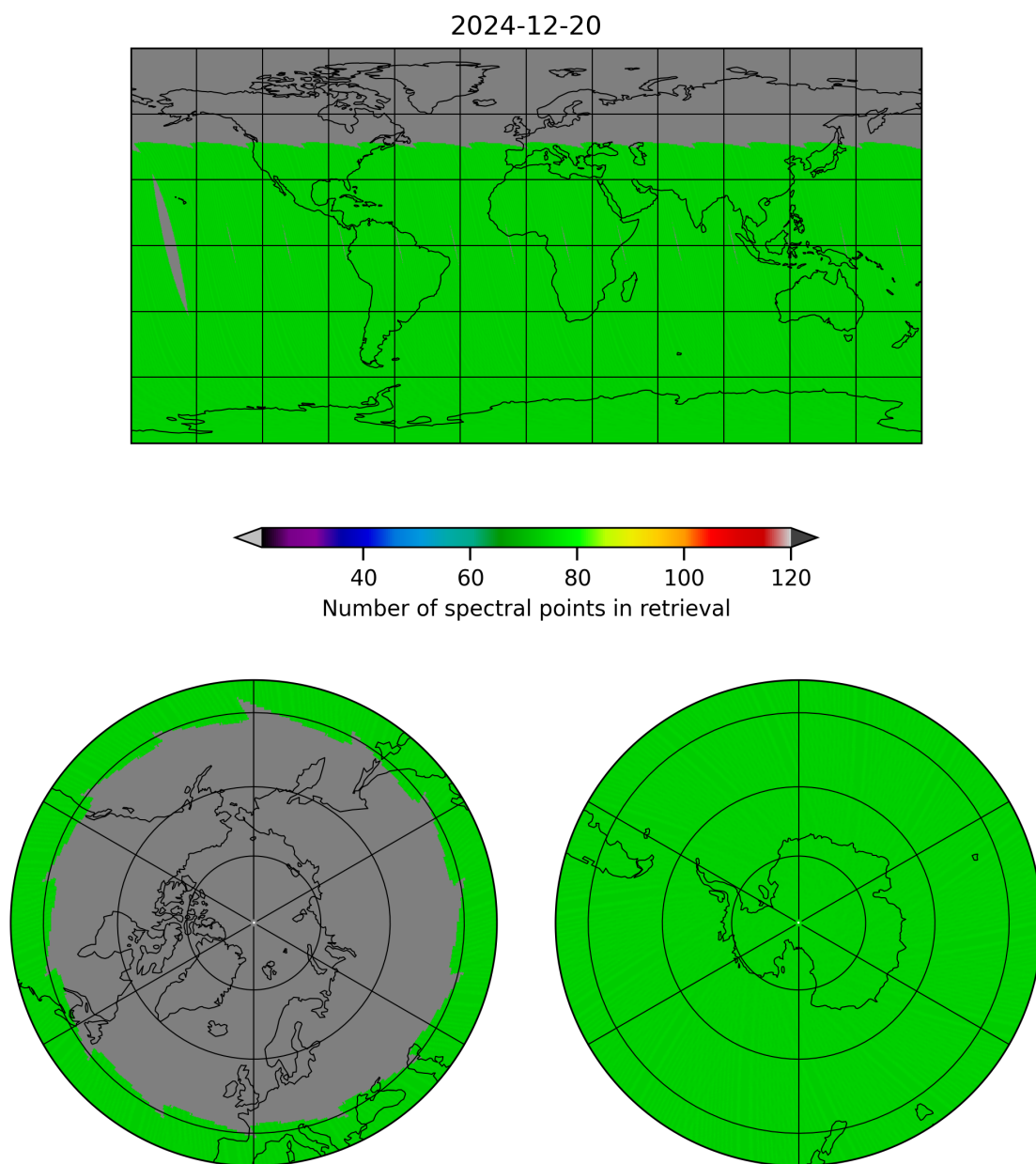


Figure 28: Map of “Number of spectral points in retrieval” for 2024-12-20 to 2024-12-20

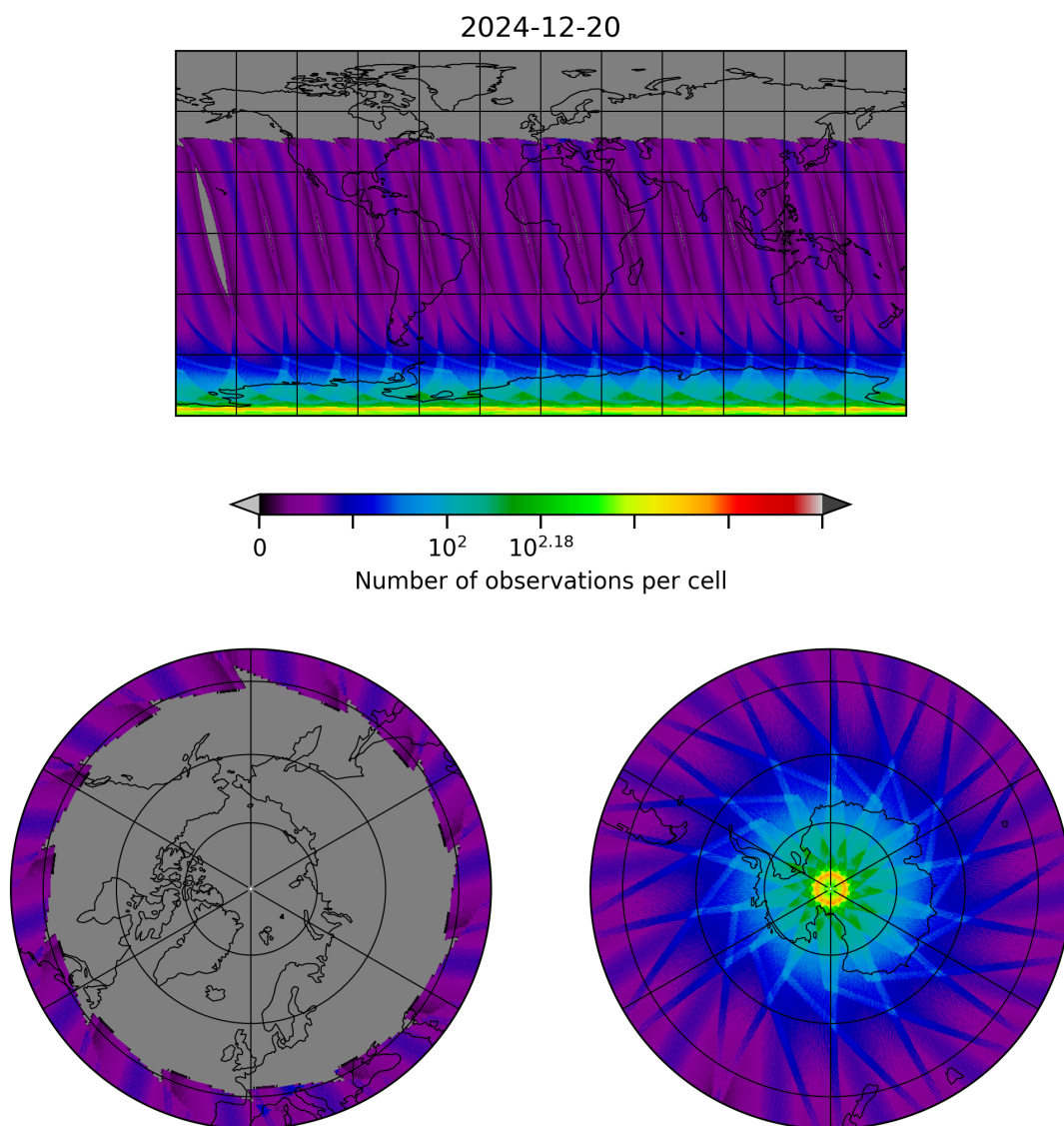


Figure 29: Map of the number of observations for 2024-12-20 to 2024-12-20

7 Zonal average

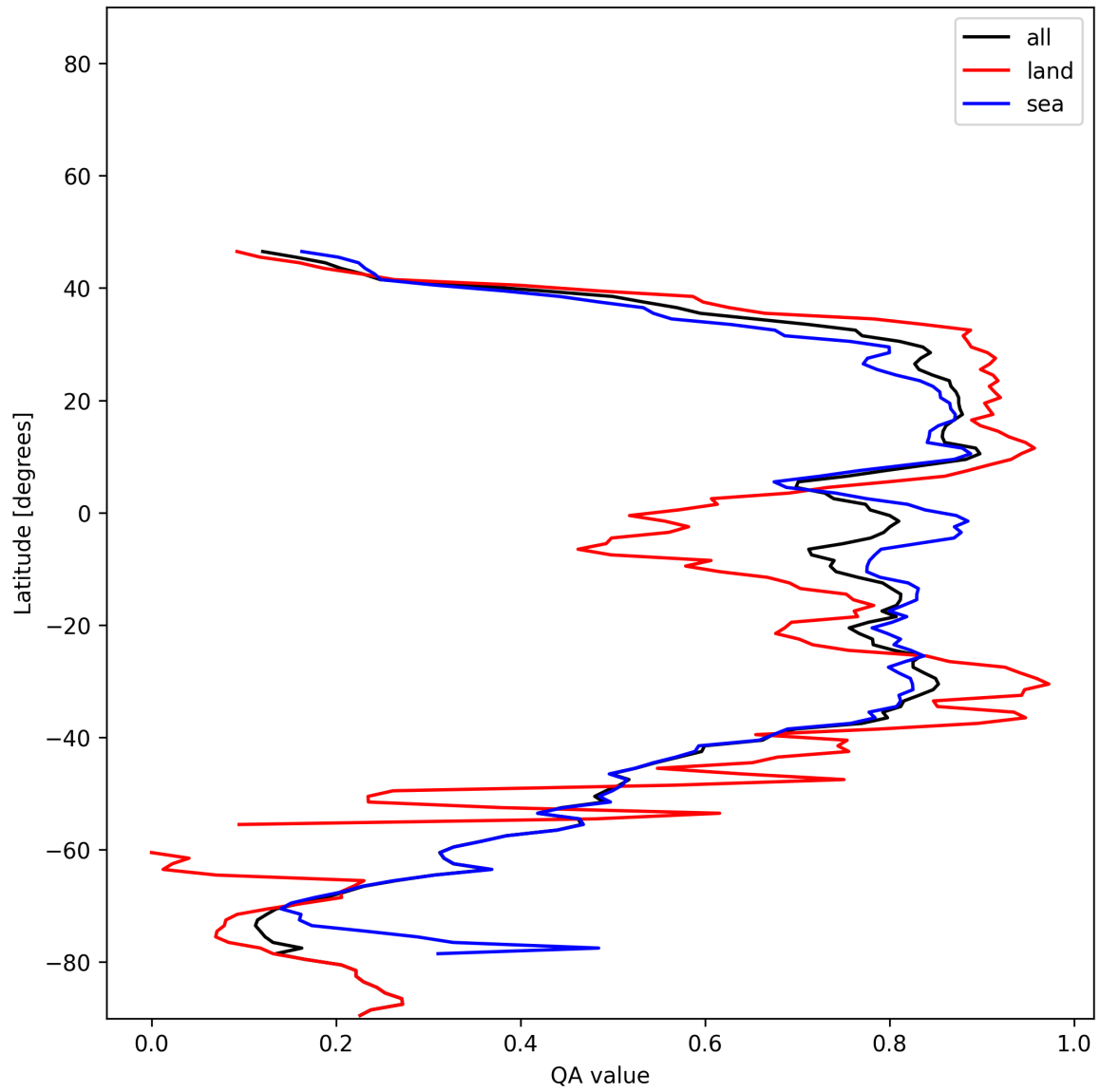


Figure 30: Zonal average of “QA value” for 2024-12-20 to 2024-12-20.

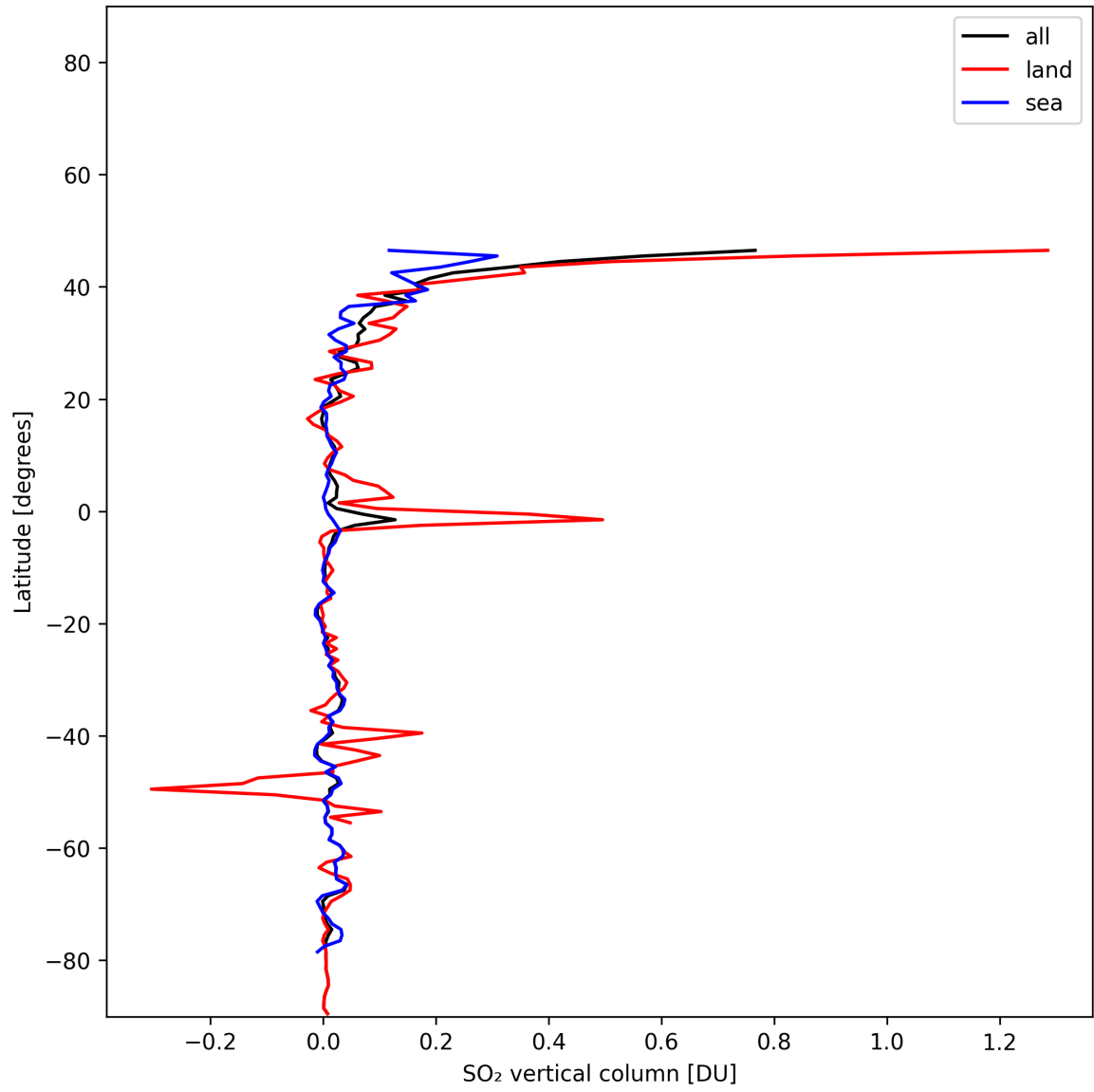


Figure 31: Zonal average of “SO₂ vertical column” for 2024-12-20 to 2024-12-20.

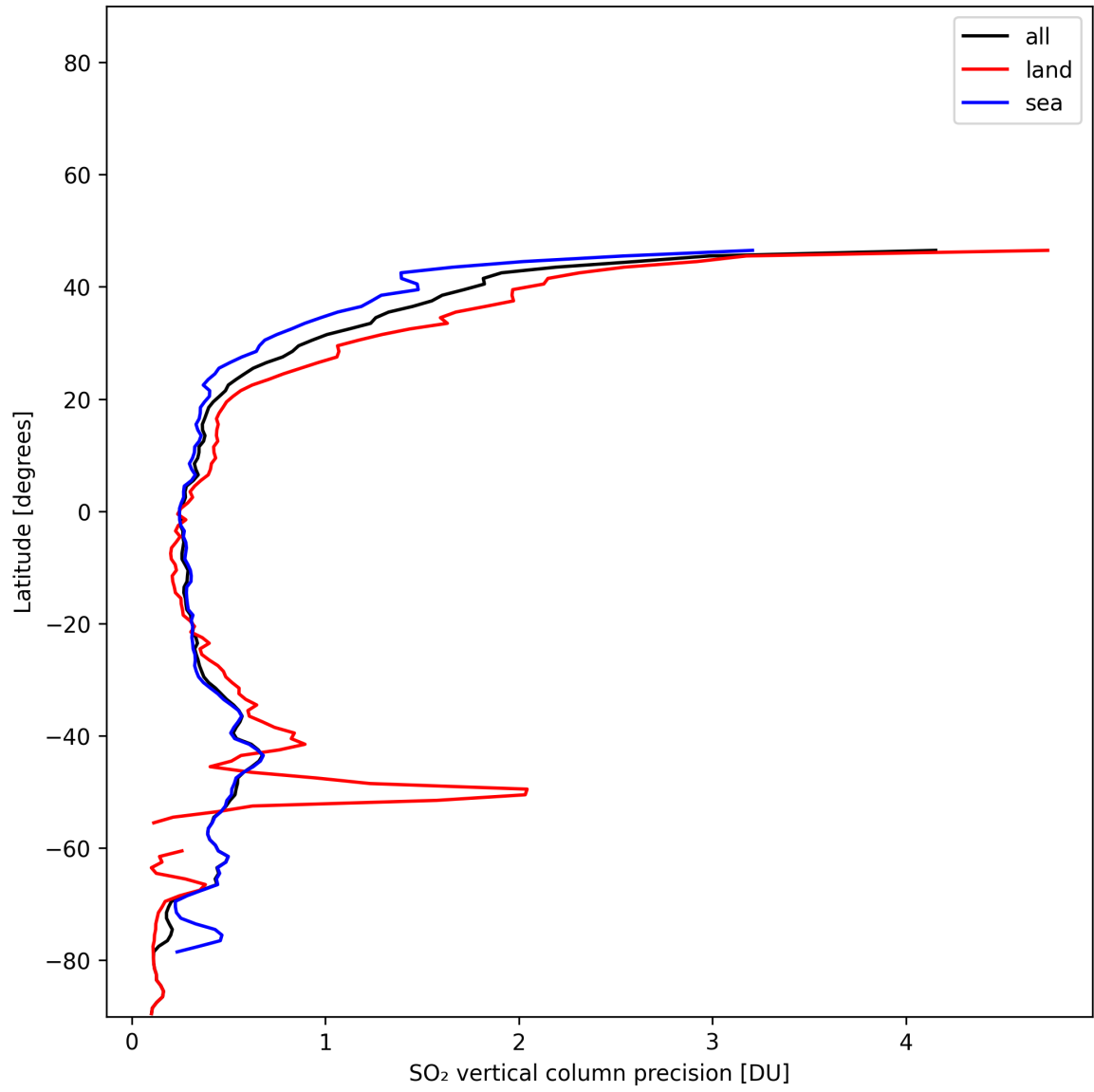


Figure 32: Zonal average of “SO₂ vertical column precision” for 2024-12-20 to 2024-12-20.

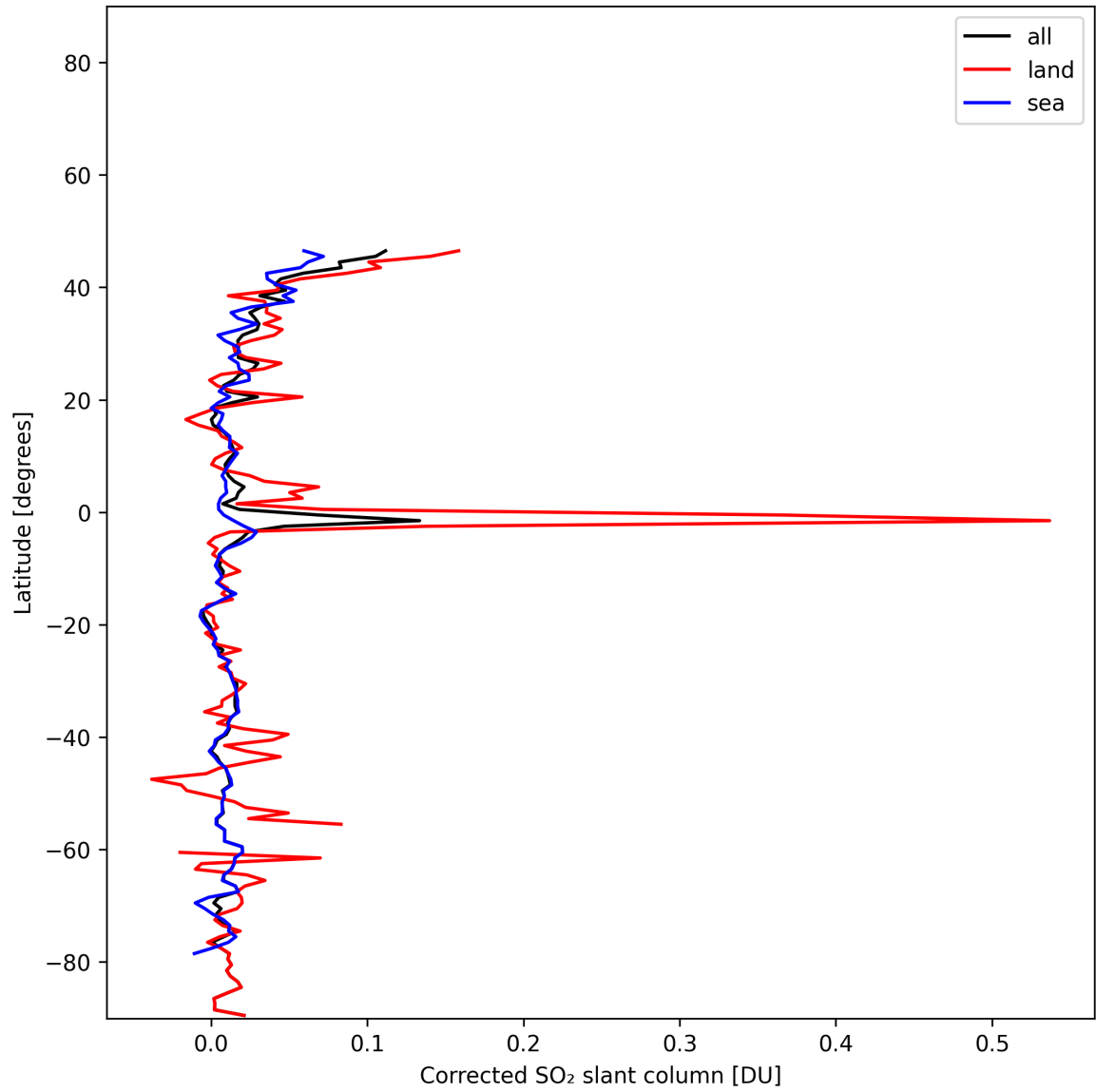


Figure 33: Zonal average of “Corrected SO₂ slant column” for 2024-12-20 to 2024-12-20.

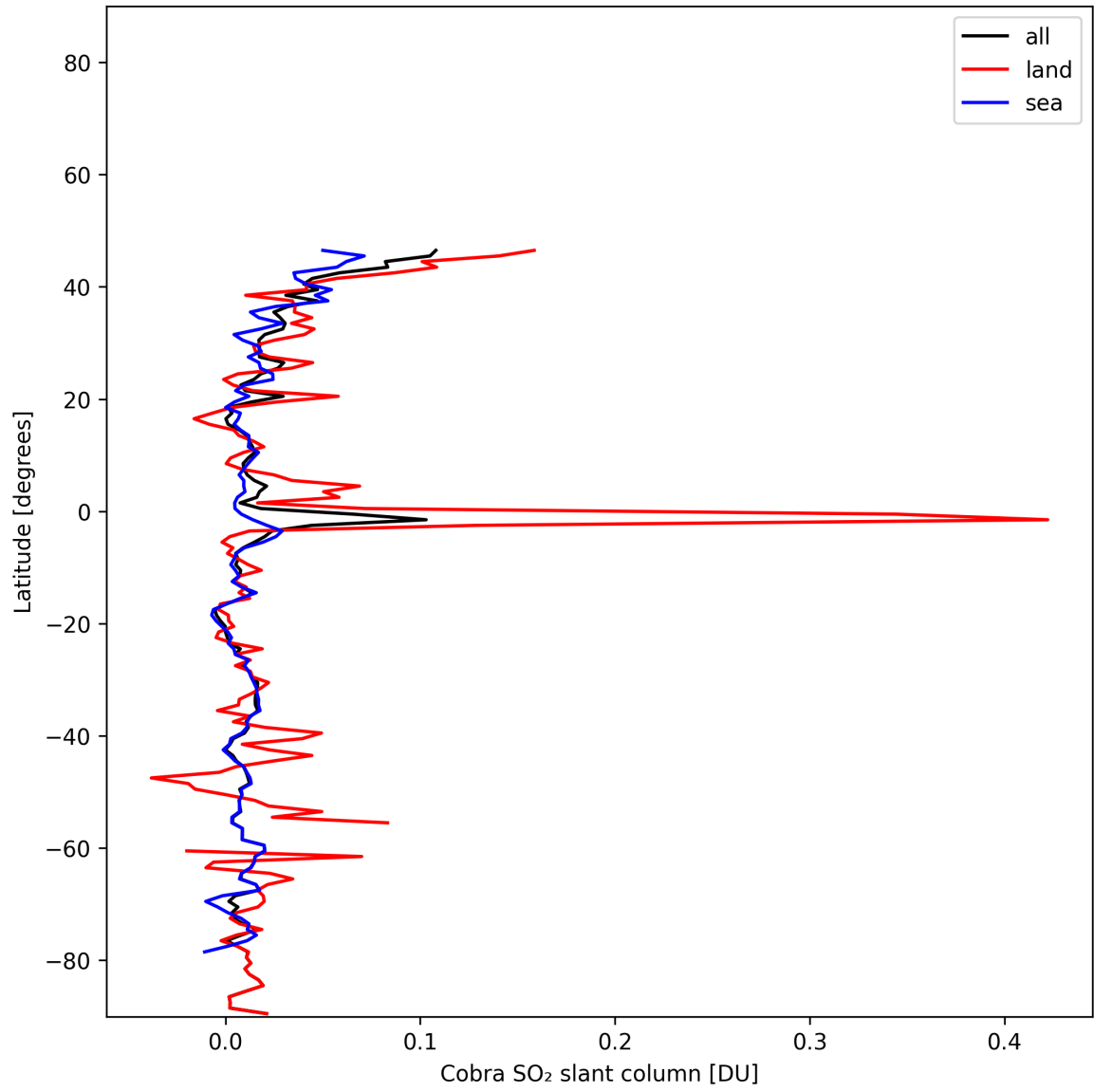


Figure 34: Zonal average of “Cobra SO₂ slant column” for 2024-12-20 to 2024-12-20.

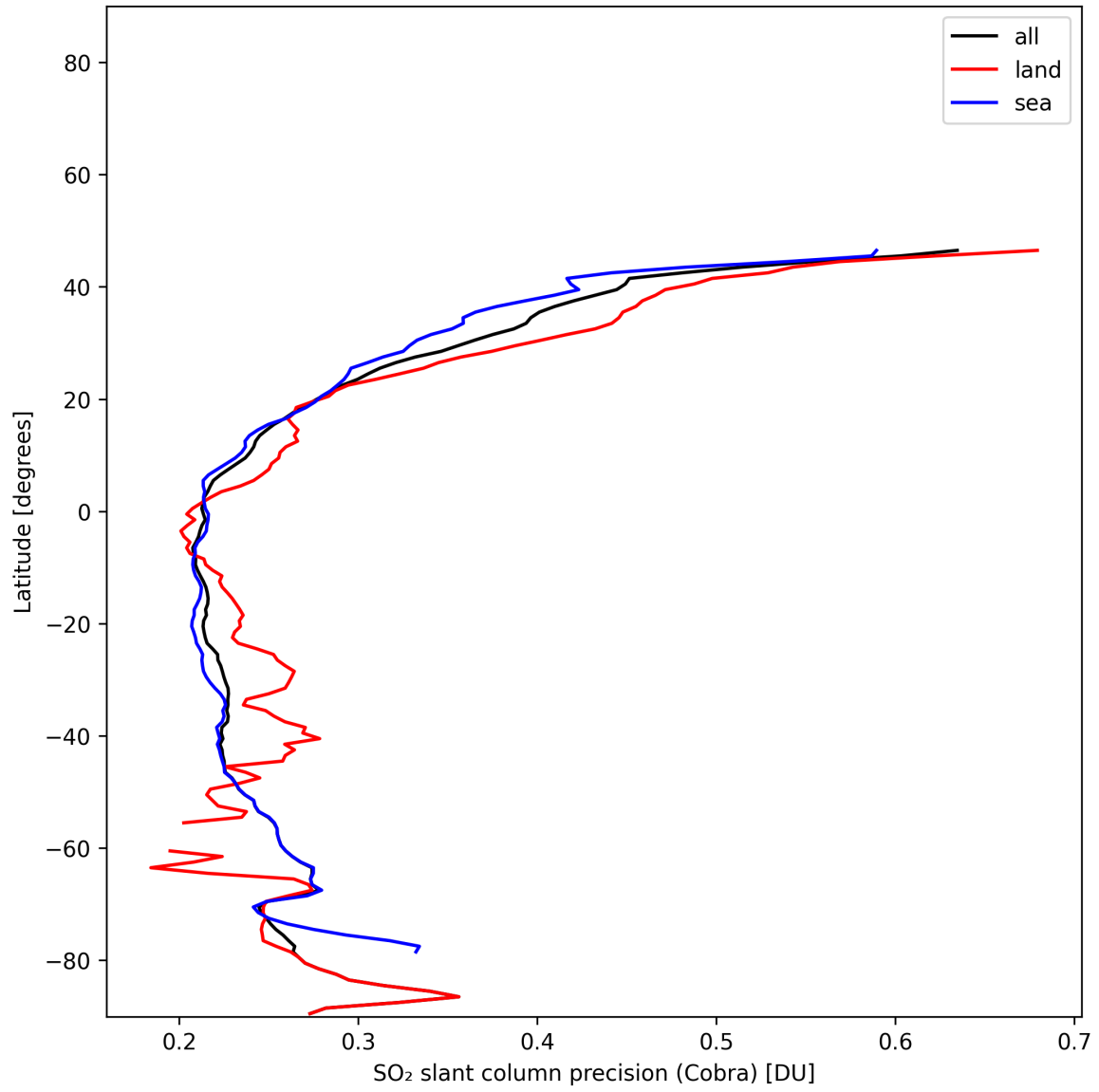


Figure 35: Zonal average of “SO₂ slant column precision (Cobra)” for 2024-12-20 to 2024-12-20.

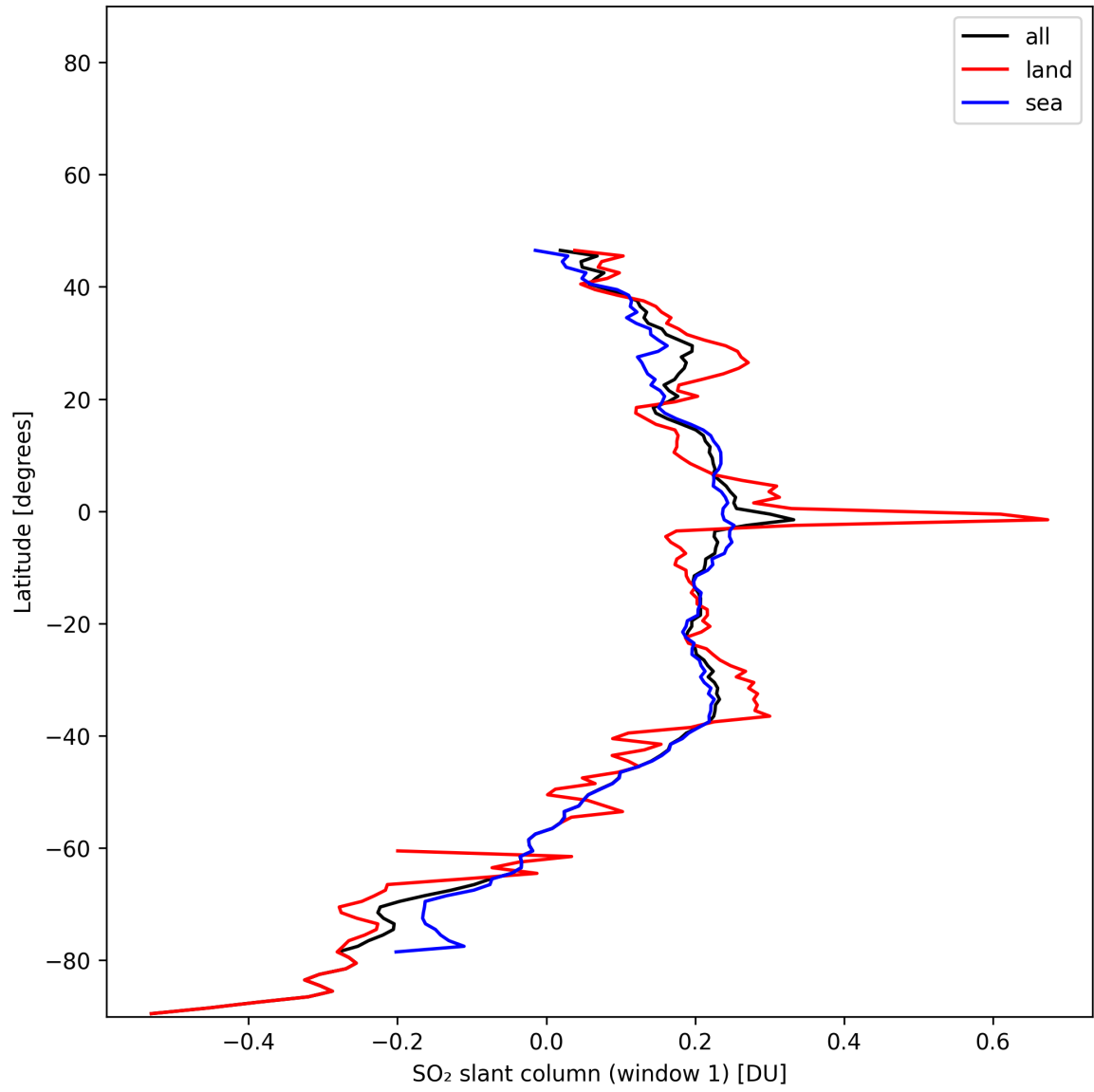


Figure 36: Zonal average of “SO₂ slant column (window 1)” for 2024-12-20 to 2024-12-20.

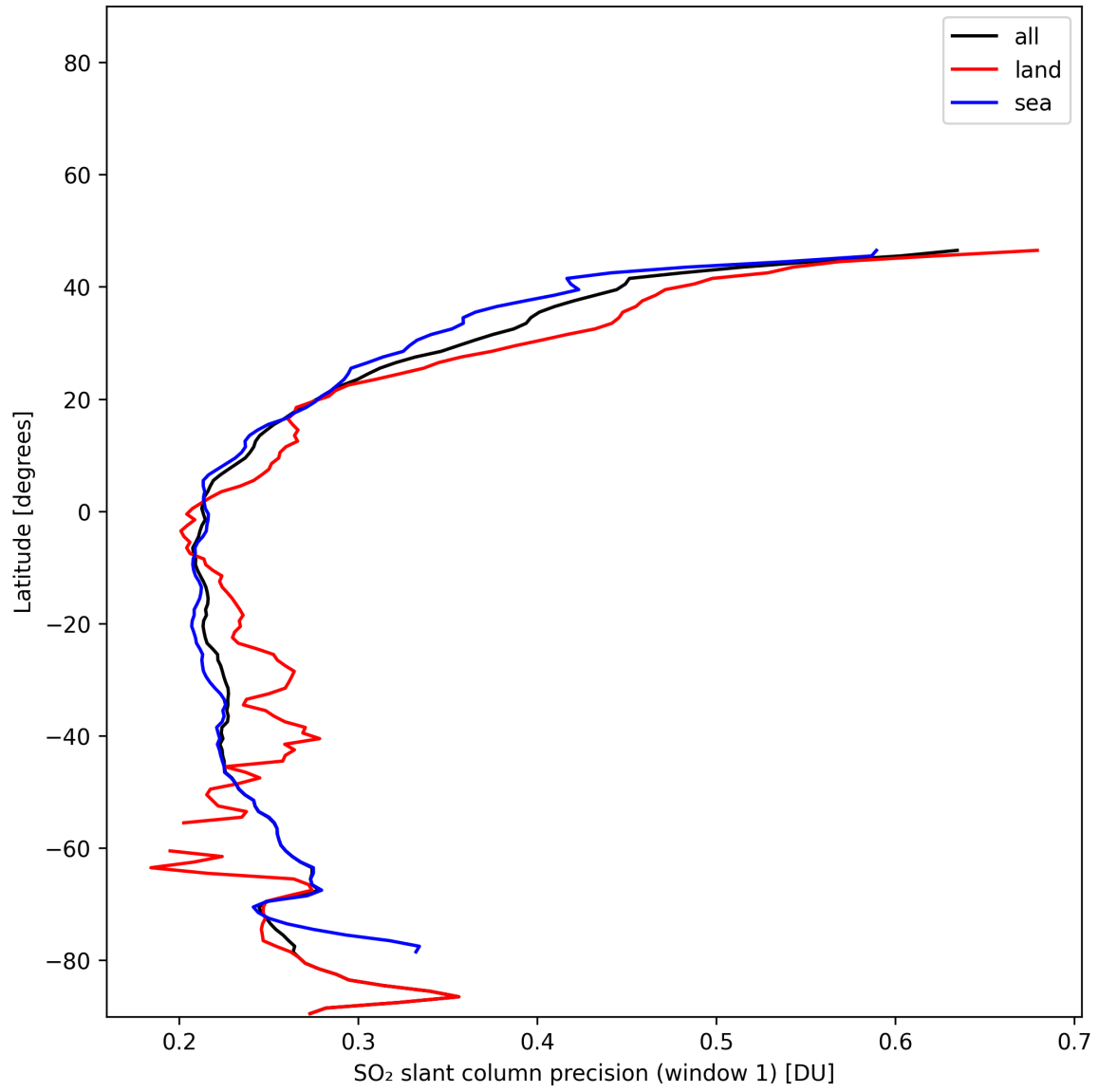


Figure 37: Zonal average of “SO₂ slant column precision (window 1)” for 2024-12-20 to 2024-12-20.

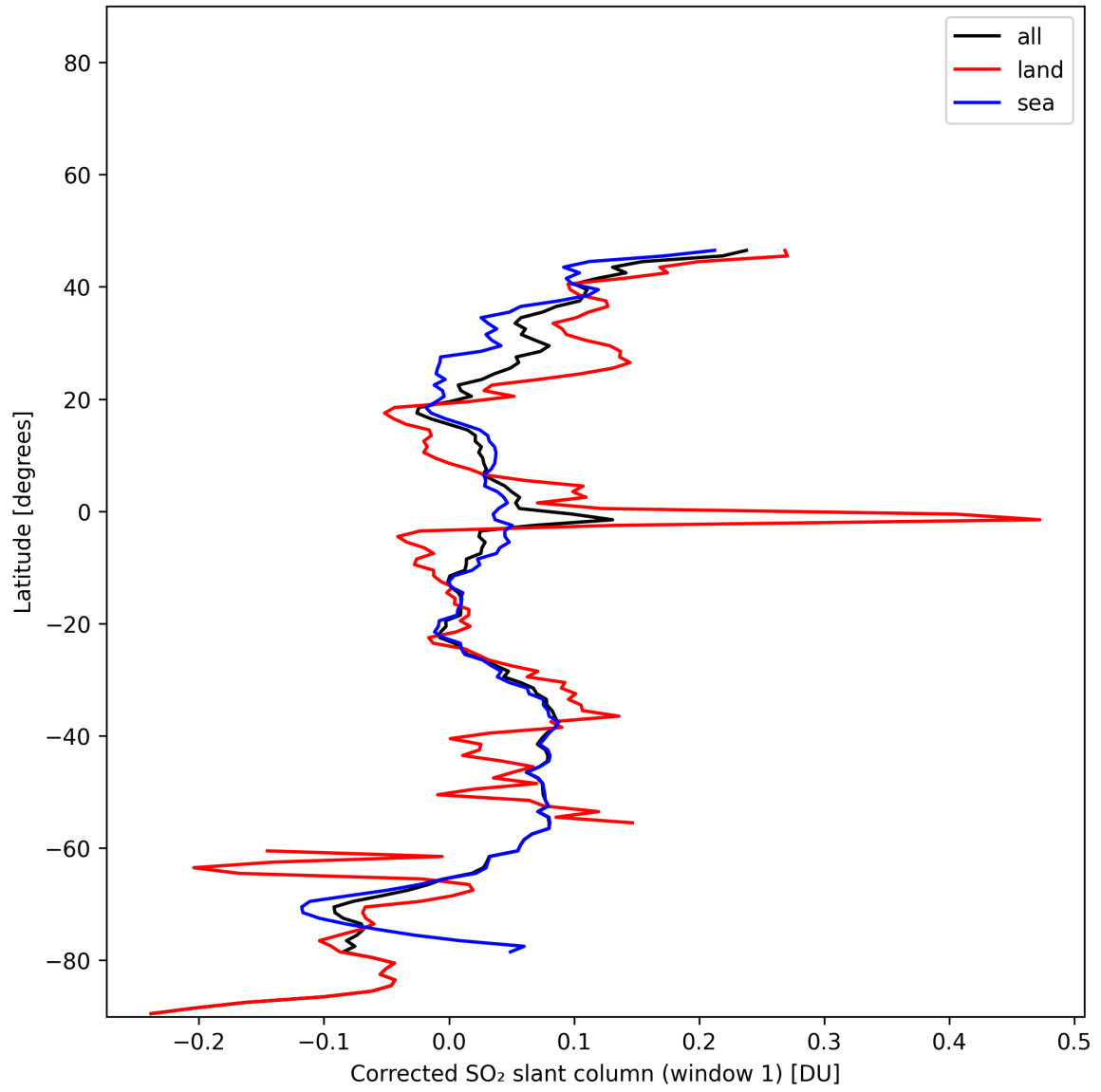


Figure 38: Zonal average of “Corrected SO₂ slant column (window 1)” for 2024-12-20 to 2024-12-20.

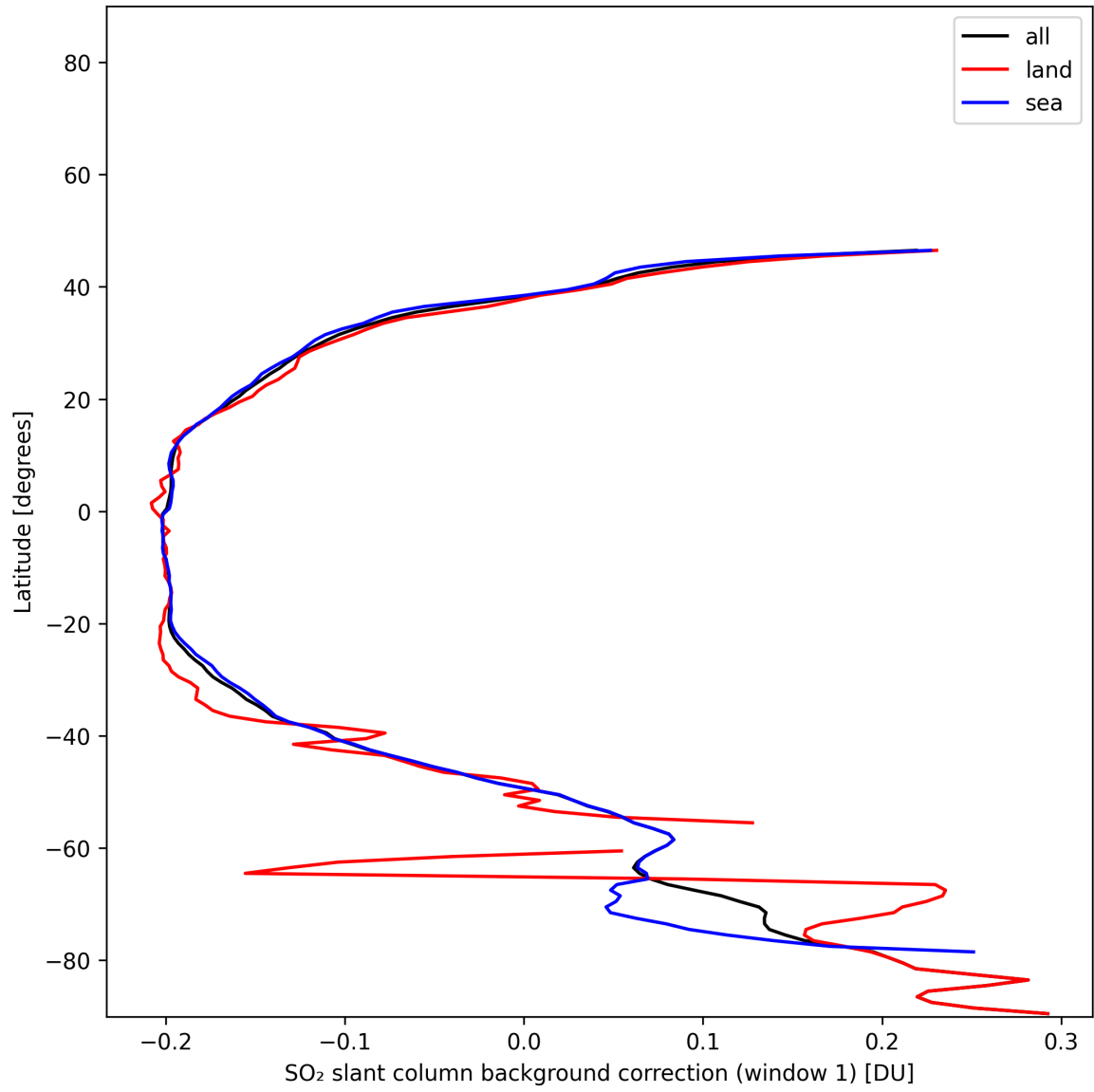


Figure 39: Zonal average of “SO₂ slant column background correction (window 1)” for 2024-12-20 to 2024-12-20.

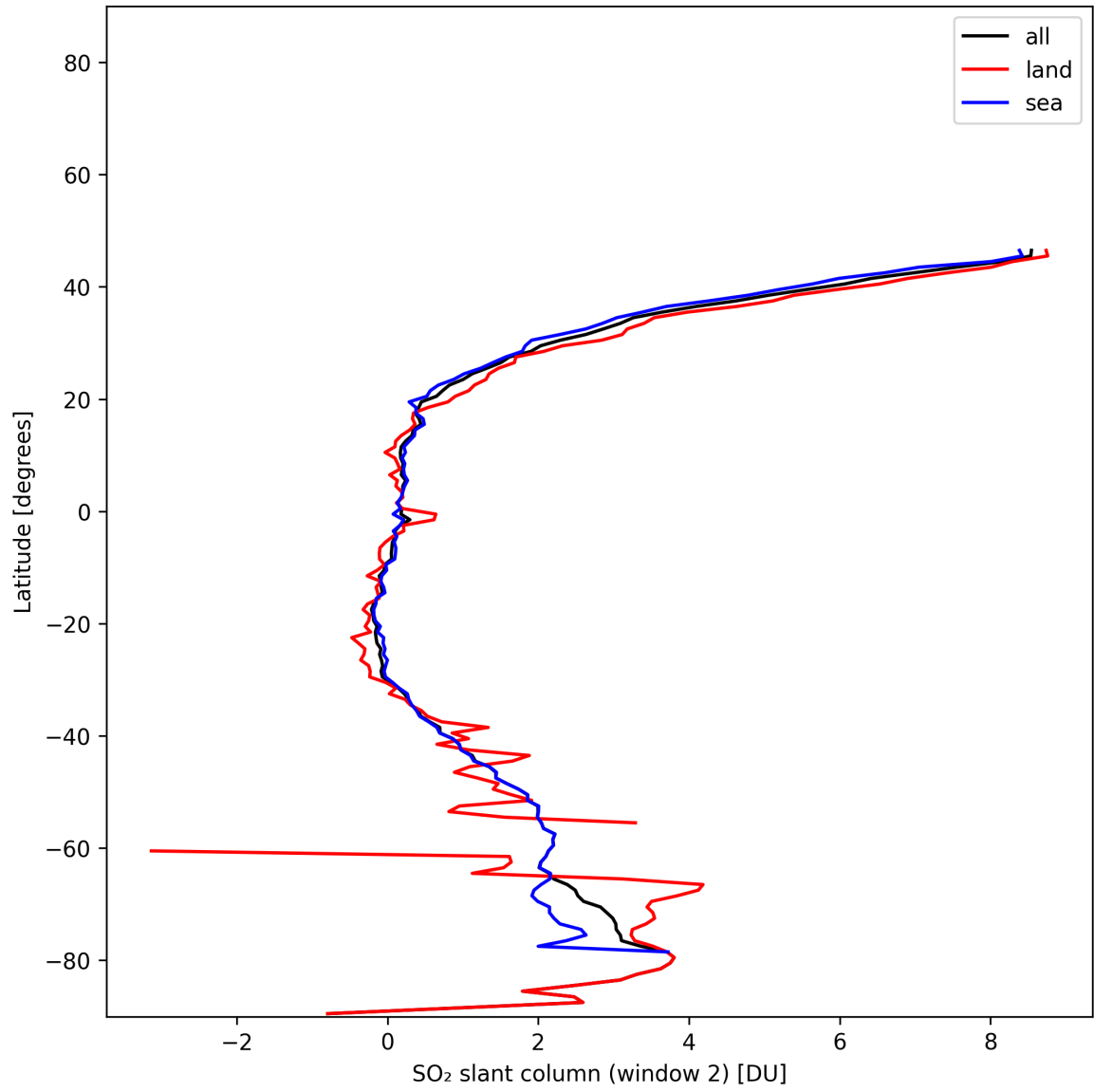


Figure 40: Zonal average of “SO₂ slant column (window 2)” for 2024-12-20 to 2024-12-20.

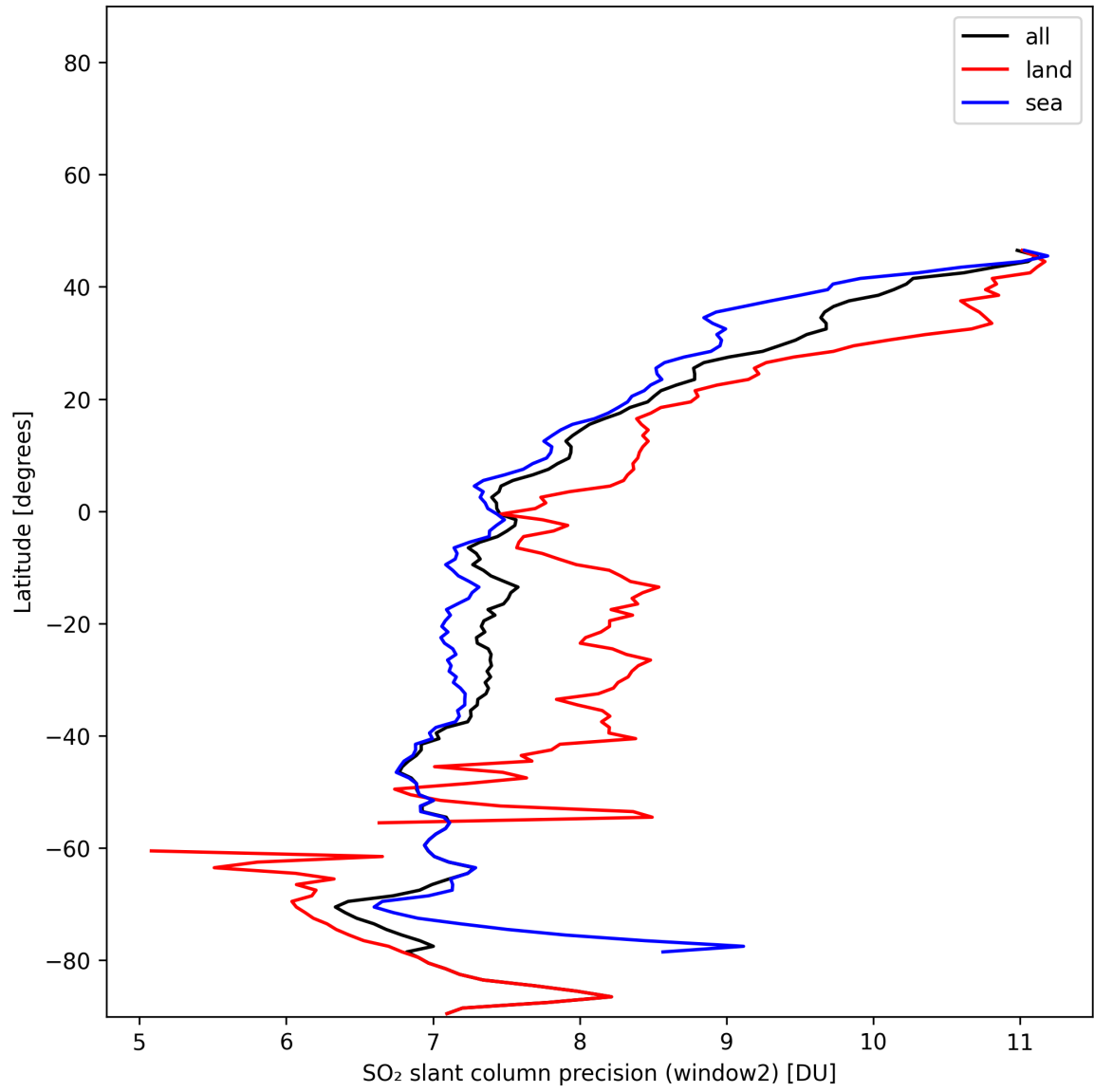


Figure 41: Zonal average of “SO₂ slant column precision (window2)” for 2024-12-20 to 2024-12-20.

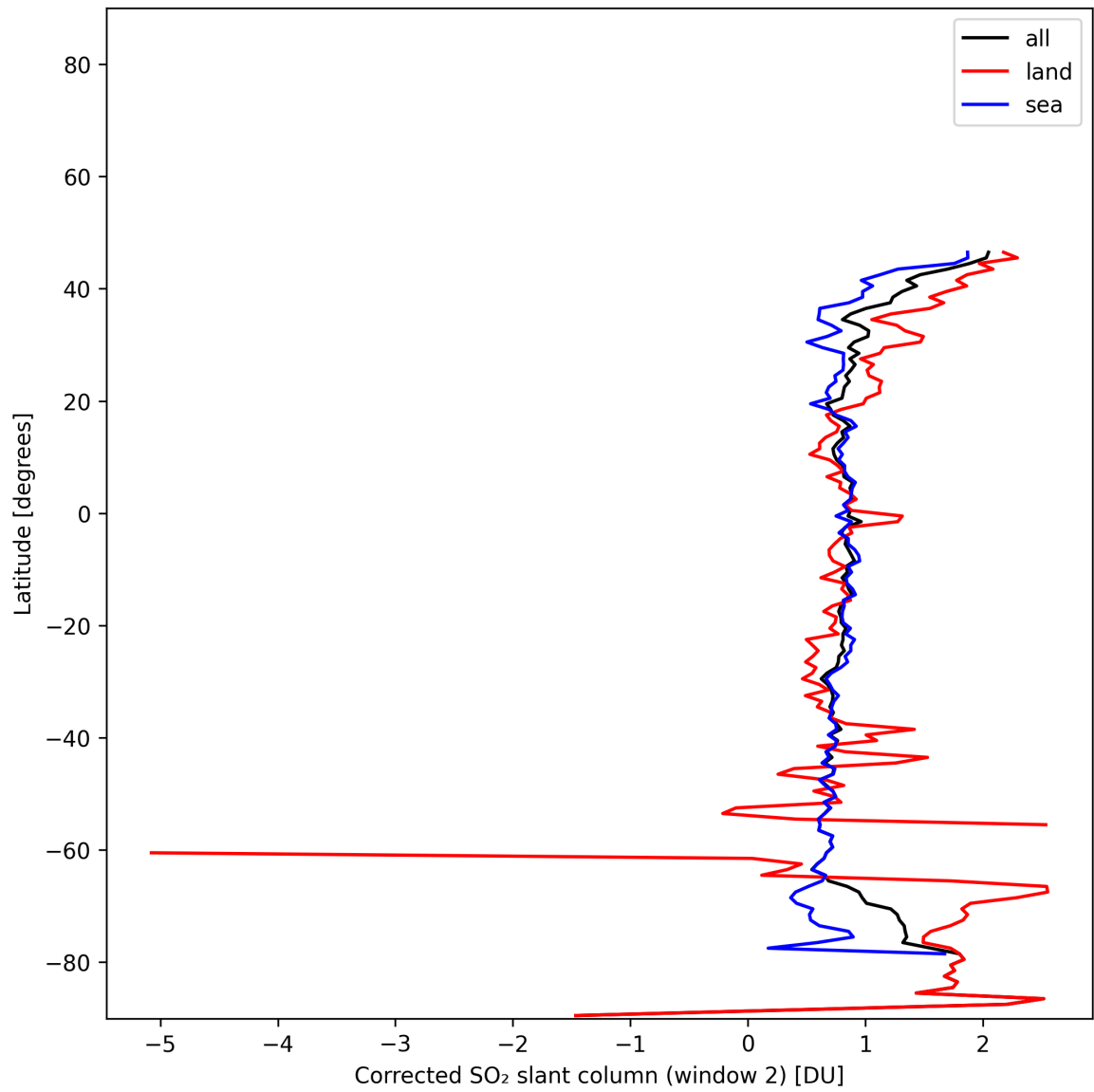


Figure 42: Zonal average of “Corrected SO₂ slant column (window 2)” for 2024-12-20 to 2024-12-20.

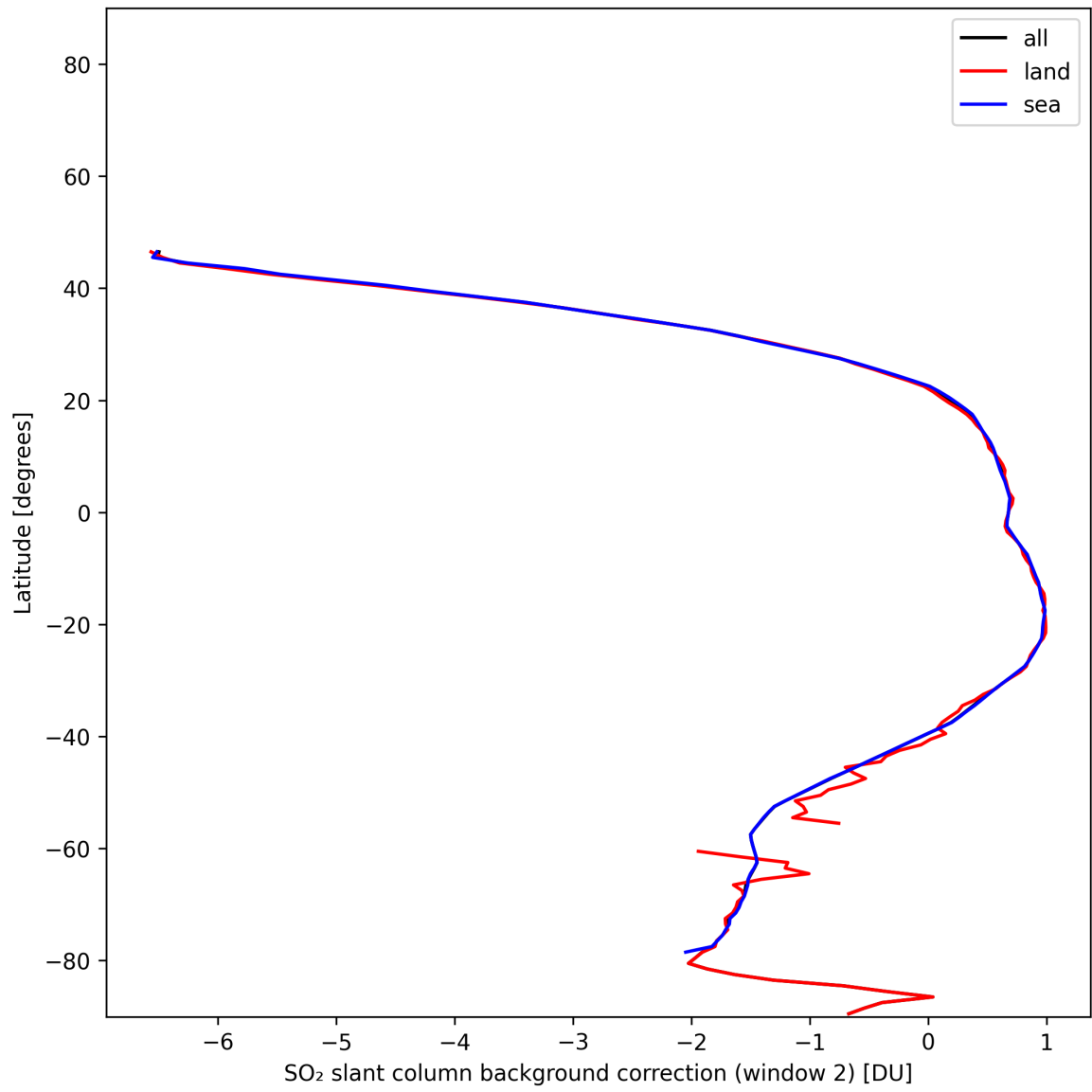


Figure 43: Zonal average of “SO₂ slant column background correction (window 2)” for 2024-12-20 to 2024-12-20.

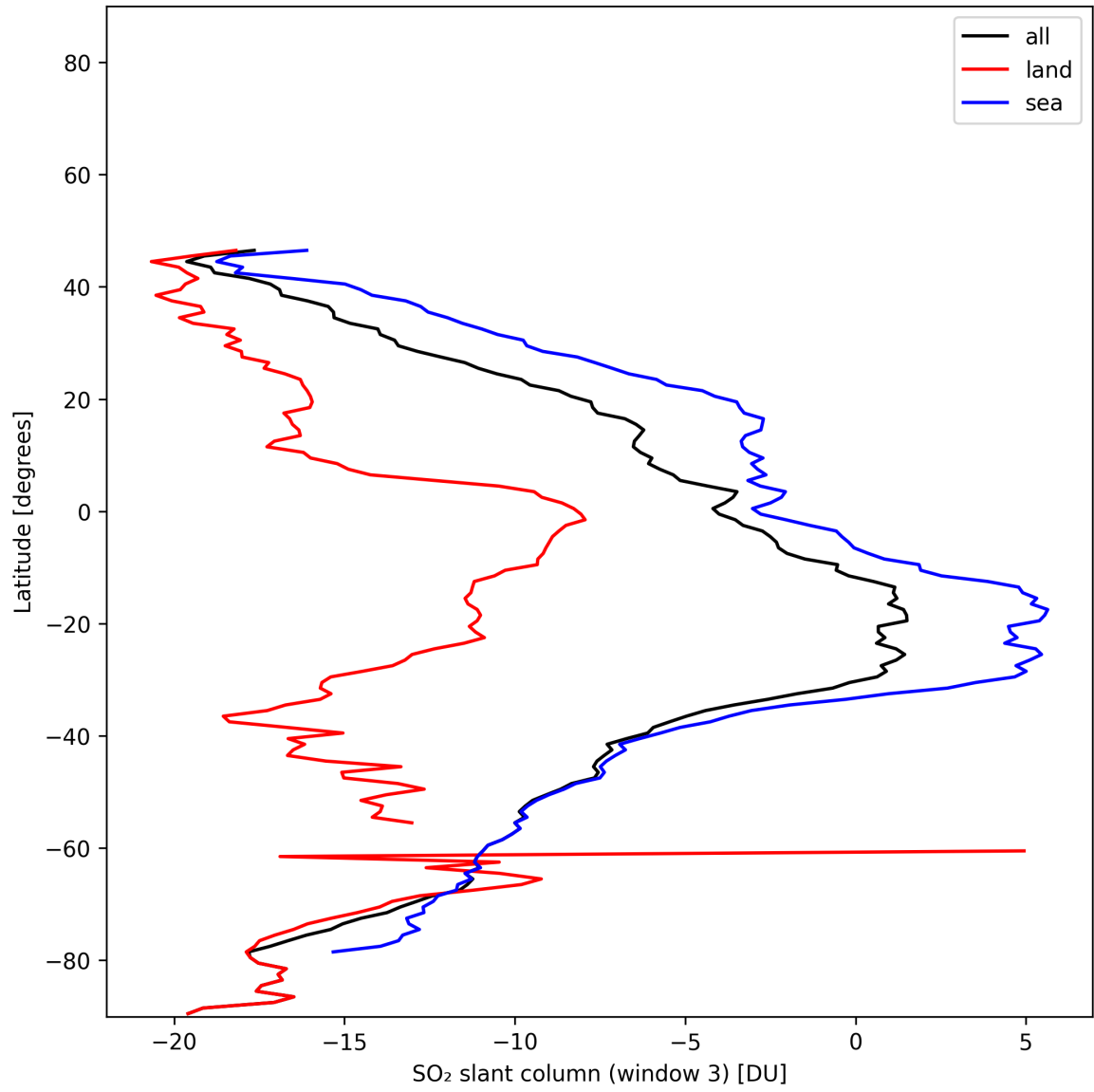


Figure 44: Zonal average of “SO₂ slant column (window 3)” for 2024-12-20 to 2024-12-20.

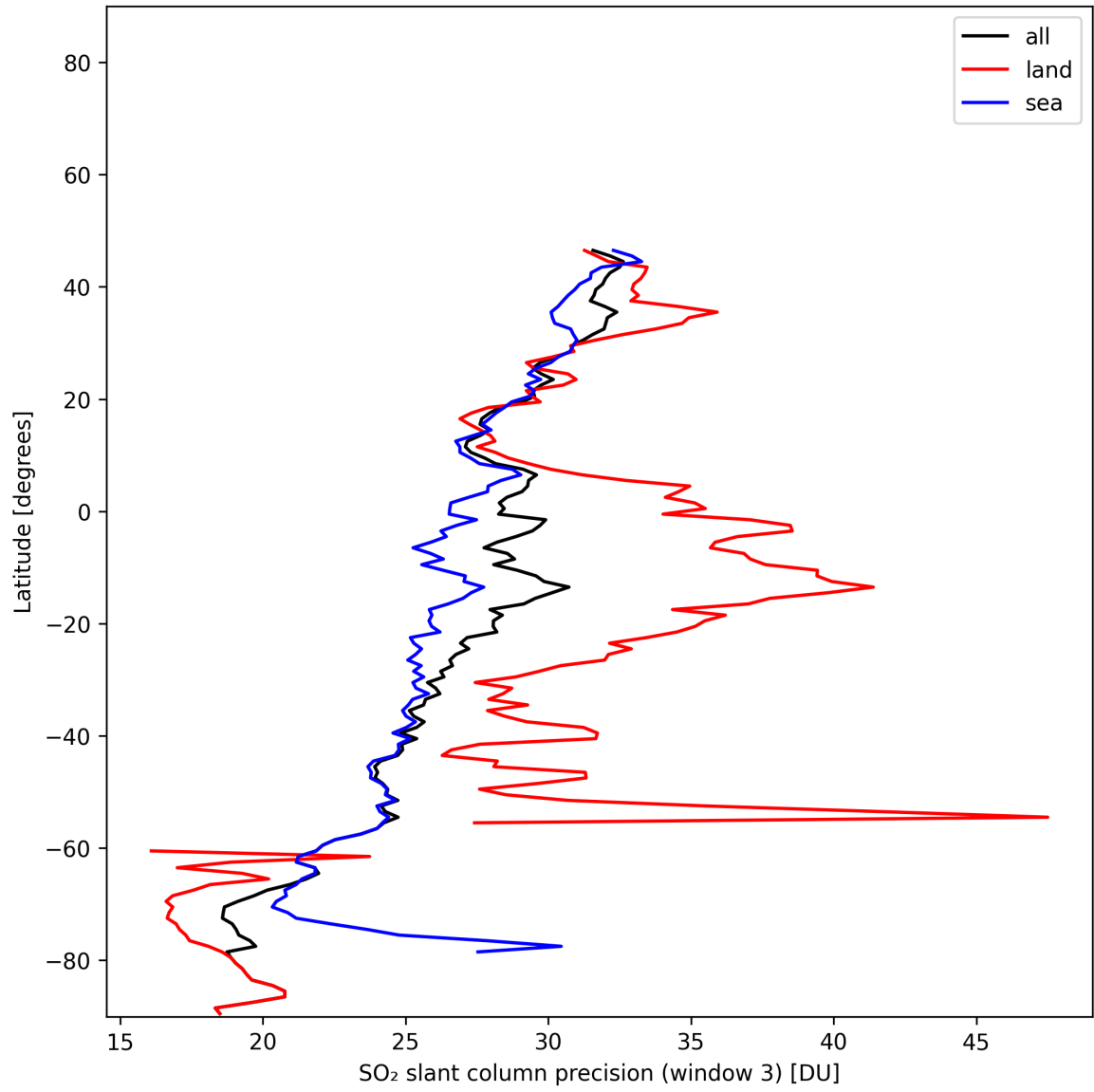


Figure 45: Zonal average of “SO₂ slant column precision (window 3)” for 2024-12-20 to 2024-12-20.

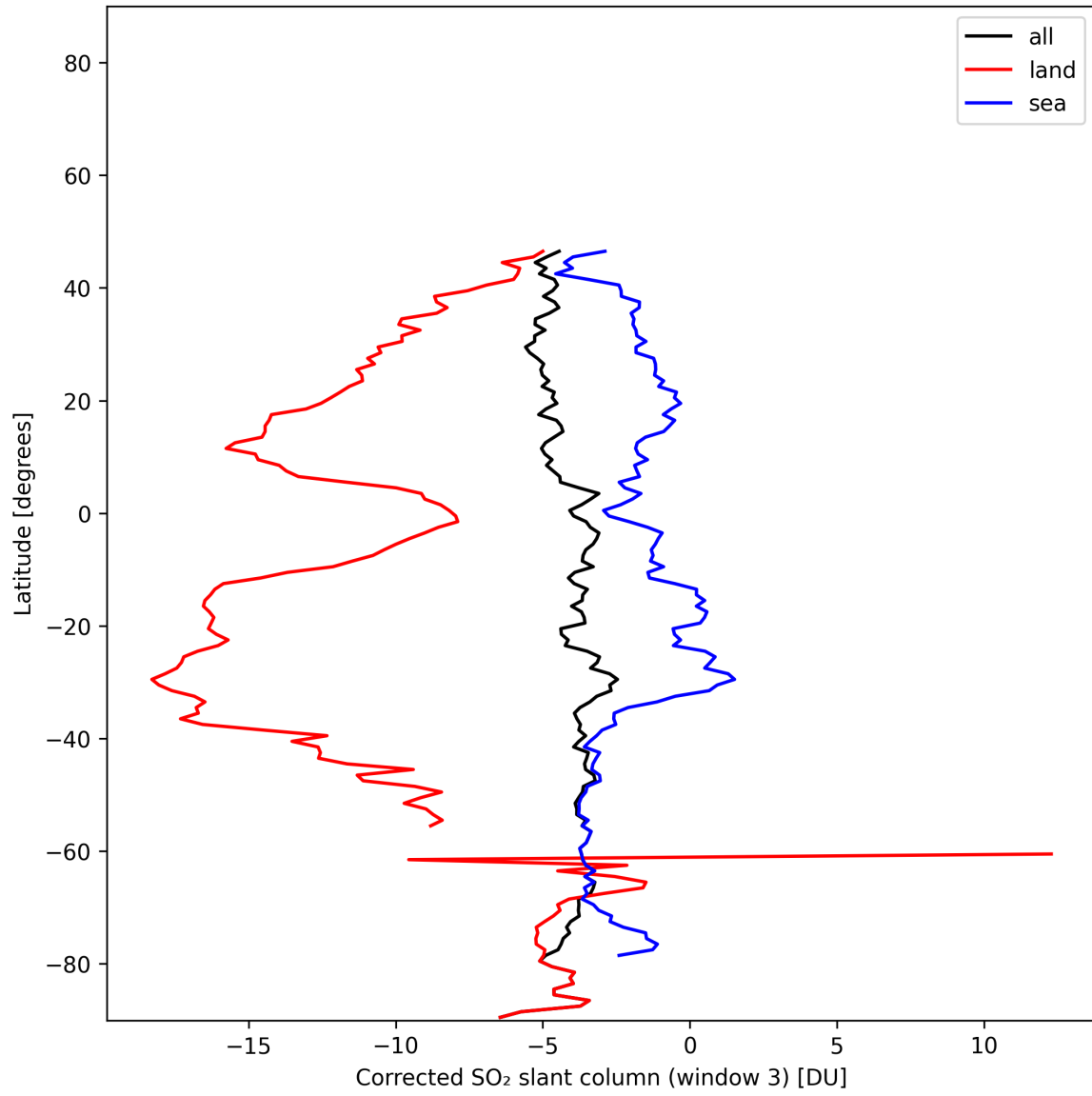


Figure 46: Zonal average of “Corrected SO₂ slant column (window 3)” for 2024-12-20 to 2024-12-20.

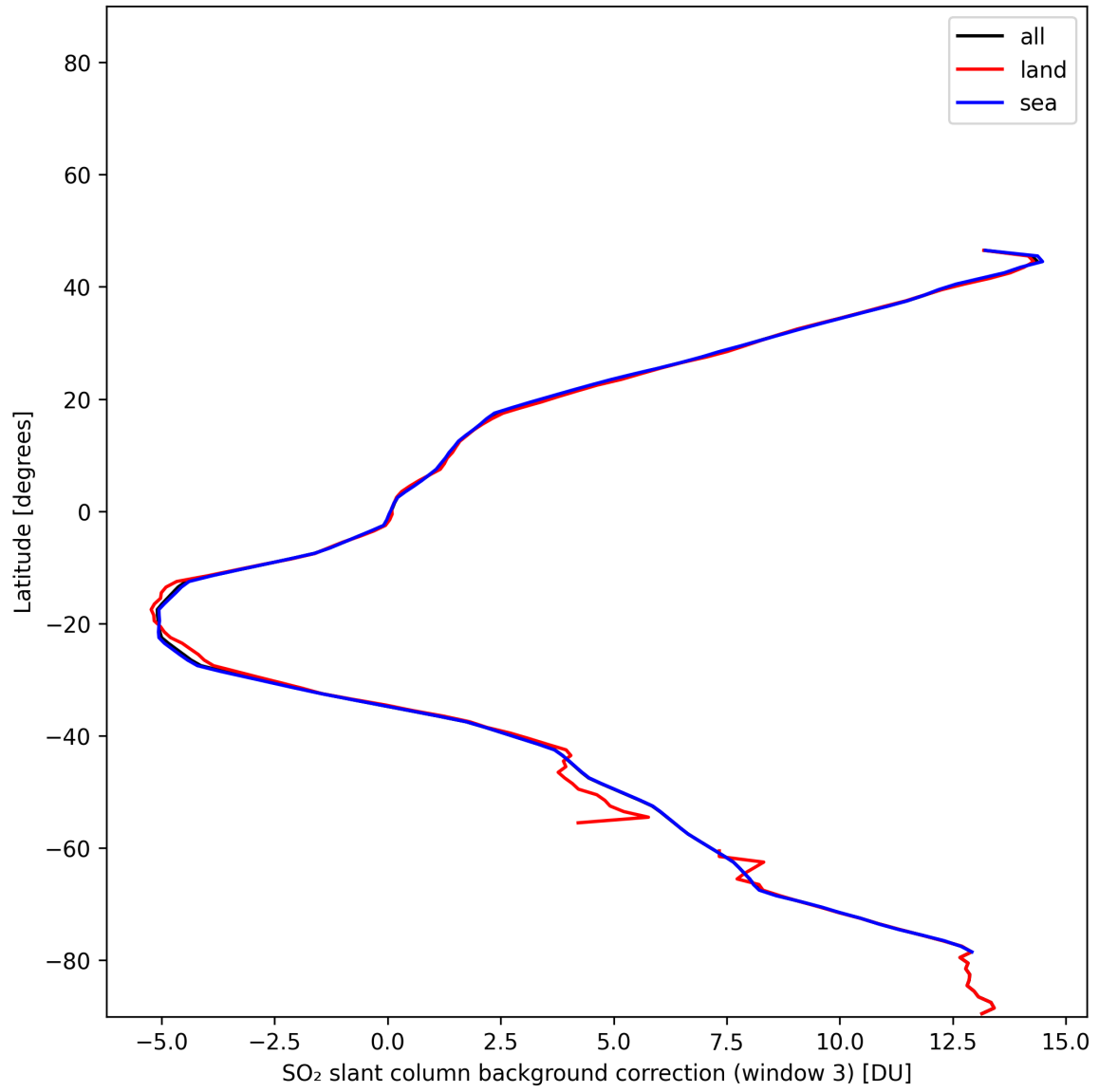


Figure 47: Zonal average of “SO₂ slant column background correction (window 3)” for 2024-12-20 to 2024-12-20.

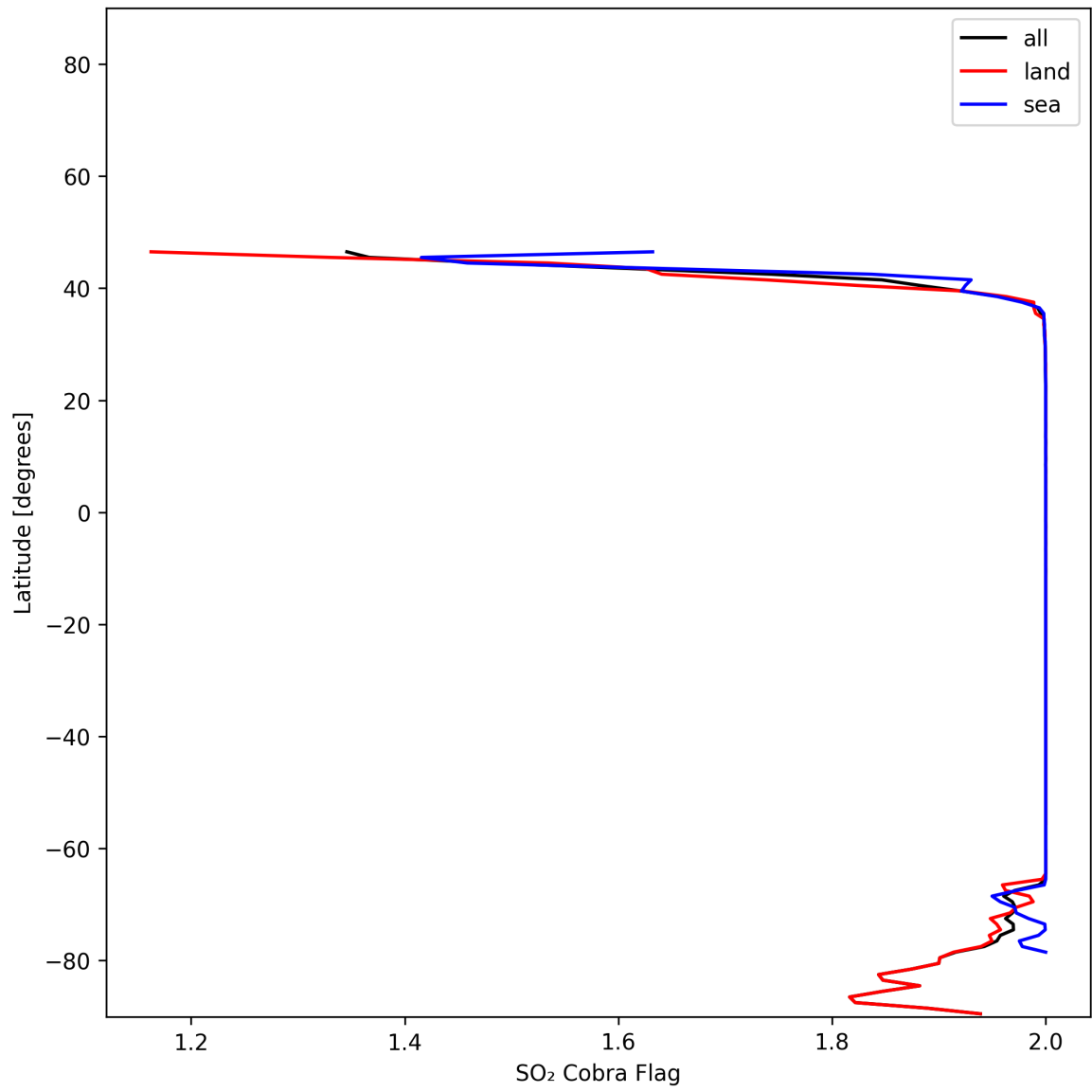


Figure 48: Zonal average of “SO₂ Cobra Flag” for 2024-12-20 to 2024-12-20.

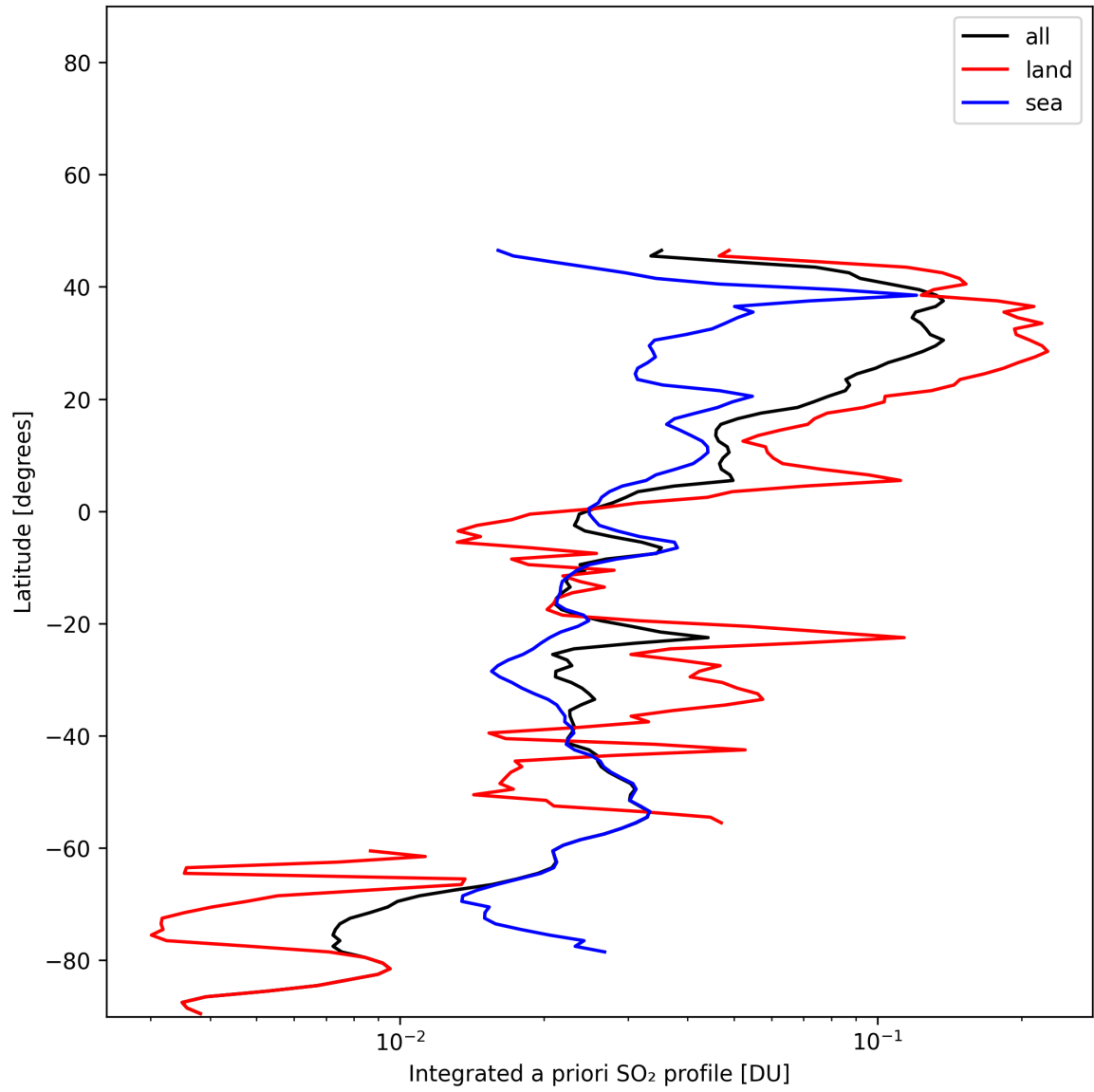


Figure 49: Zonal average of “Integrated a priori SO₂ profile” for 2024-12-20 to 2024-12-20.

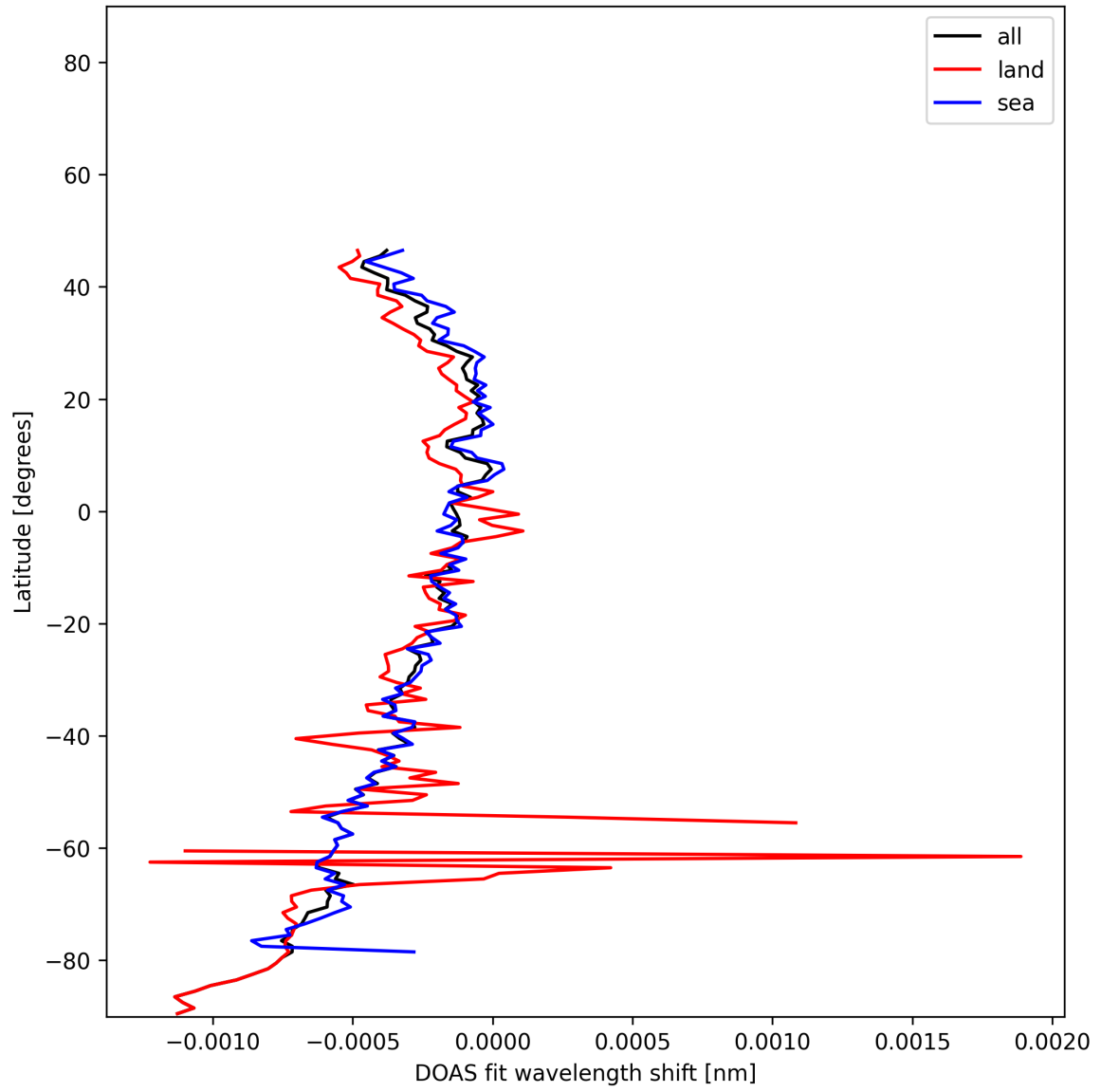


Figure 50: Zonal average of "DOAS fit wavelength shift" for 2024-12-20 to 2024-12-20.

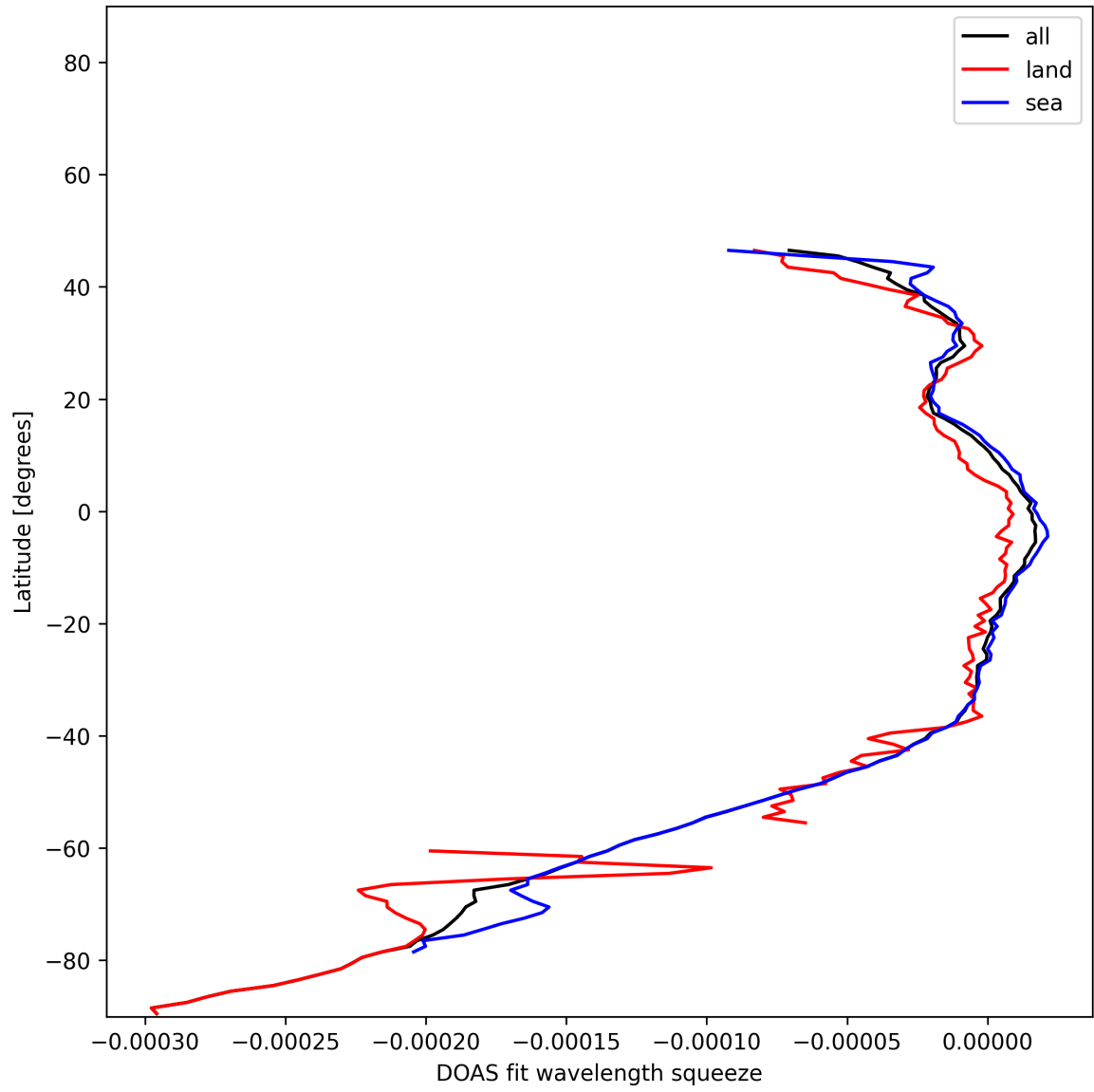


Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2024-12-20 to 2024-12-20.

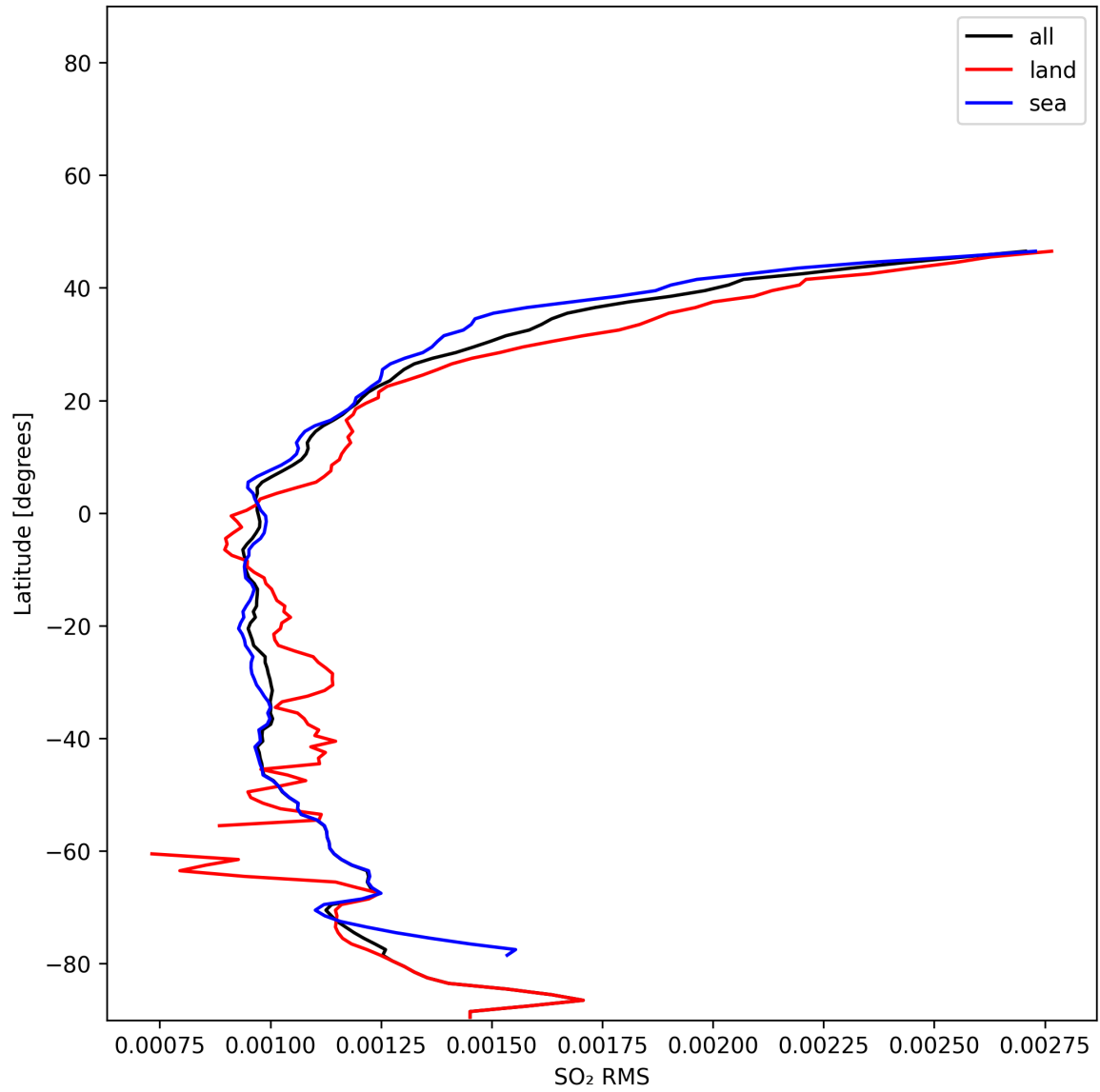


Figure 52: Zonal average of “SO₂ RMS” for 2024-12-20 to 2024-12-20.

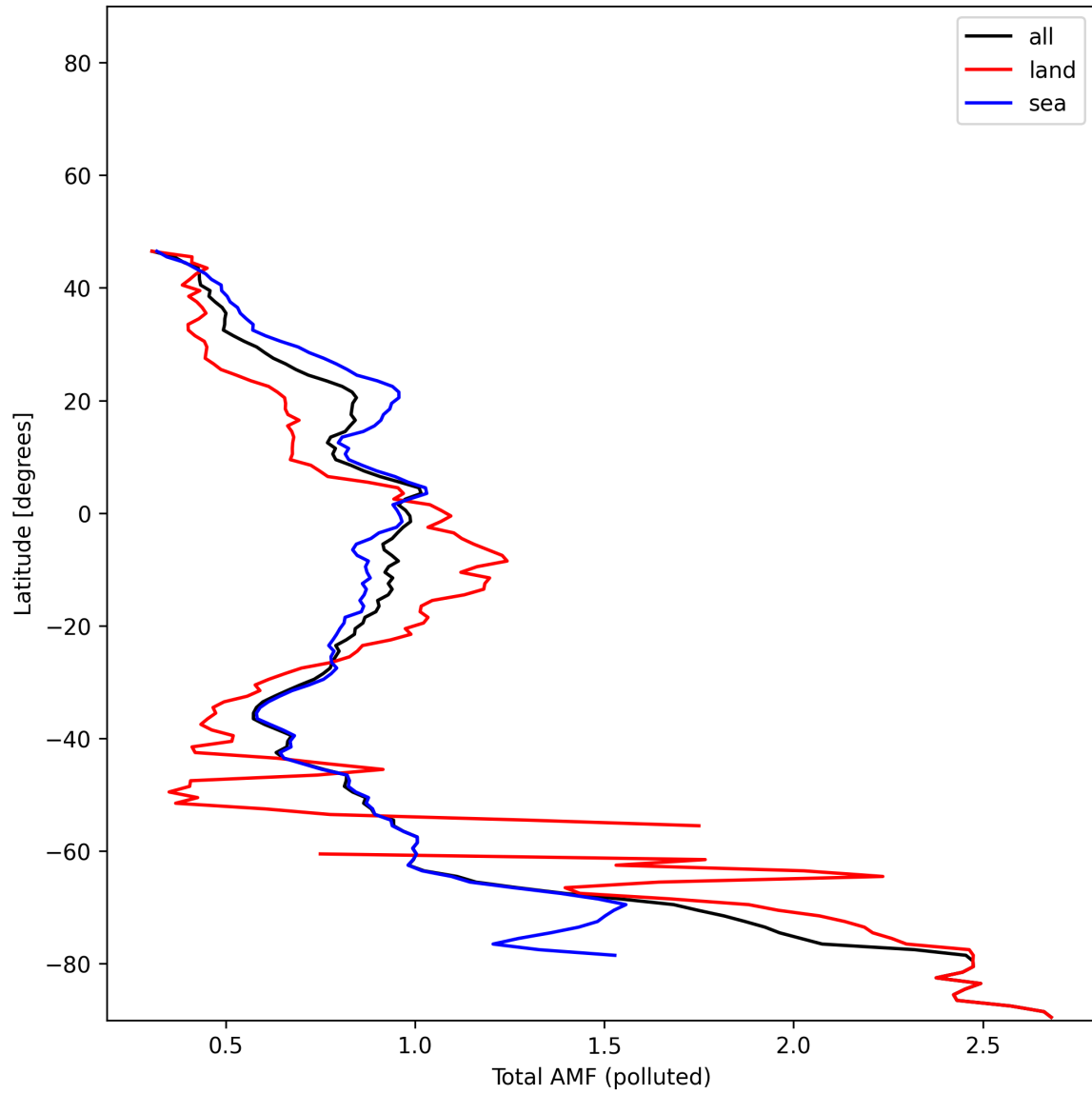


Figure 53: Zonal average of “Total AMF (polluted)” for 2024-12-20 to 2024-12-20.

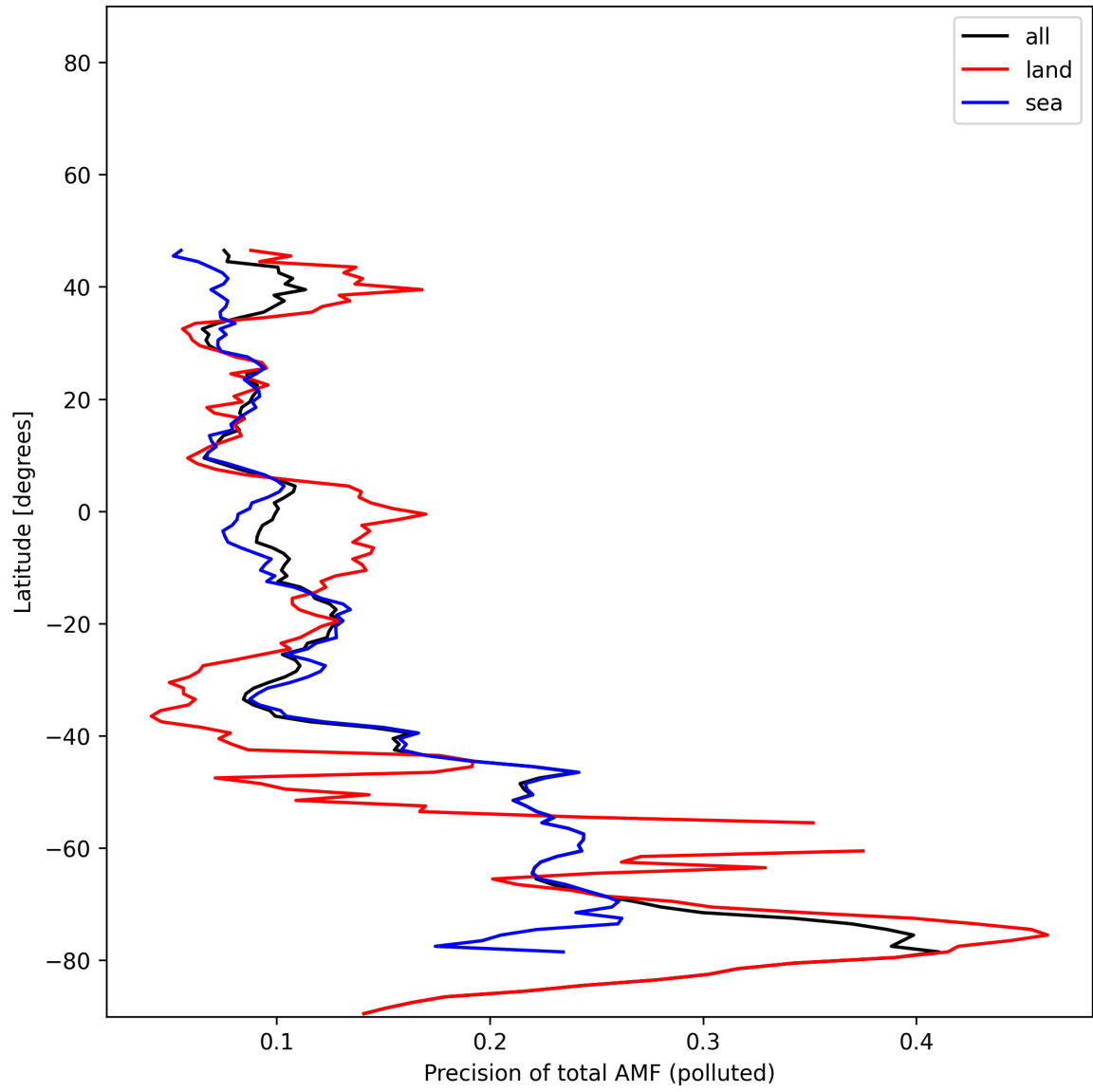


Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2024-12-20 to 2024-12-20.

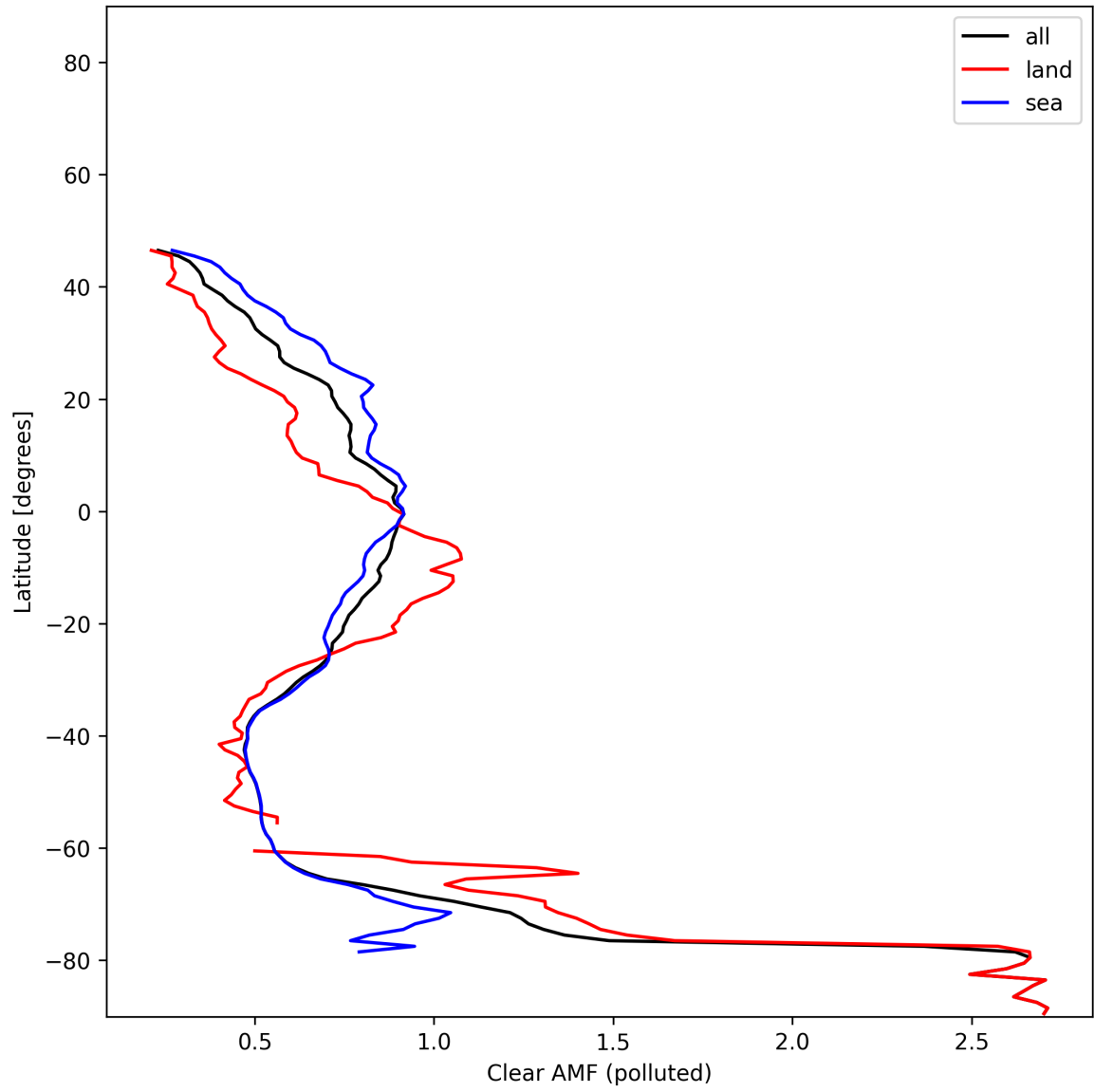


Figure 55: Zonal average of “Clear AMF (polluted)” for 2024-12-20 to 2024-12-20.

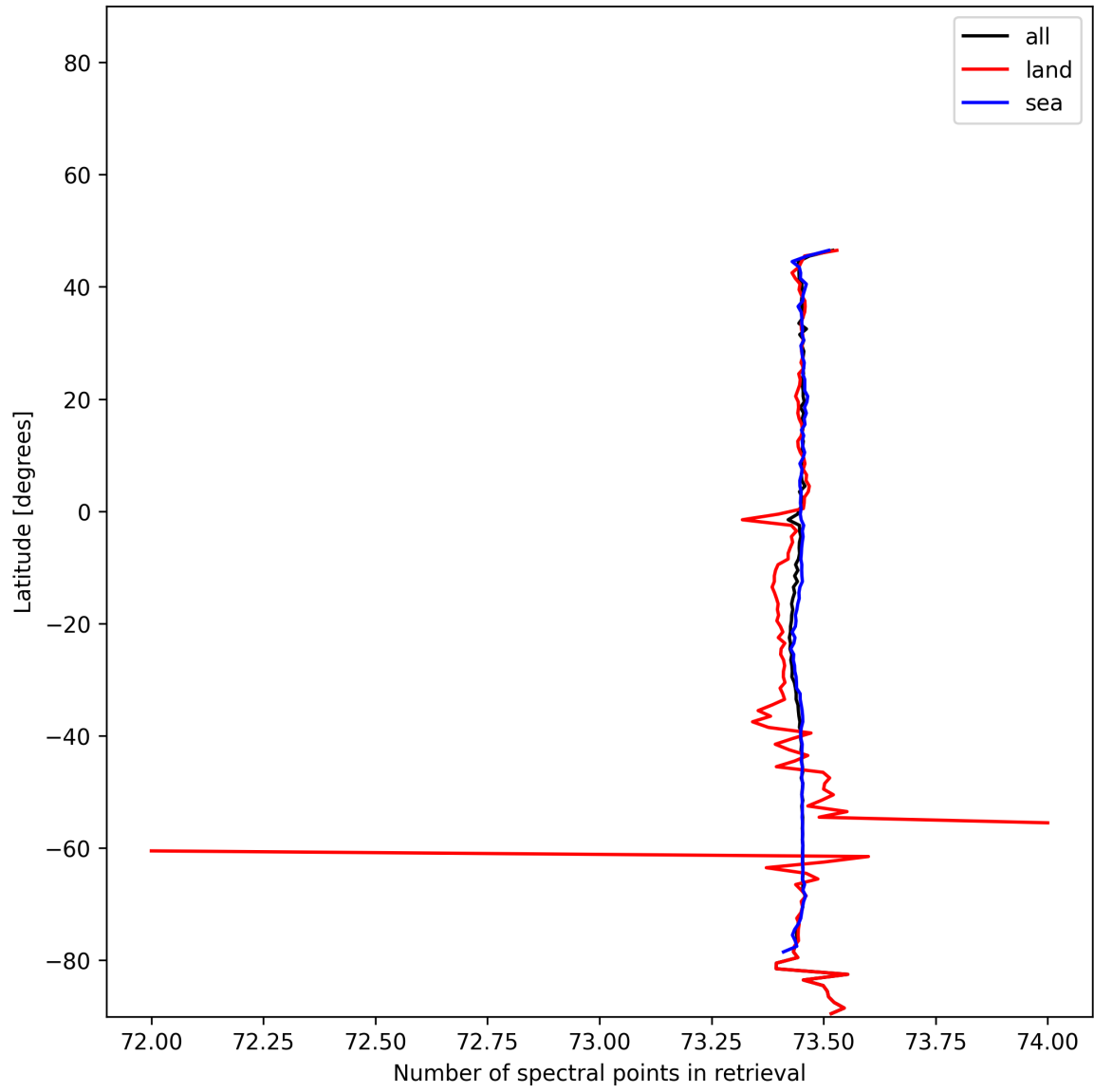


Figure 56: Zonal average of “Number of spectral points in retrieval” for 2024-12-20 to 2024-12-20.

8 Histograms

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

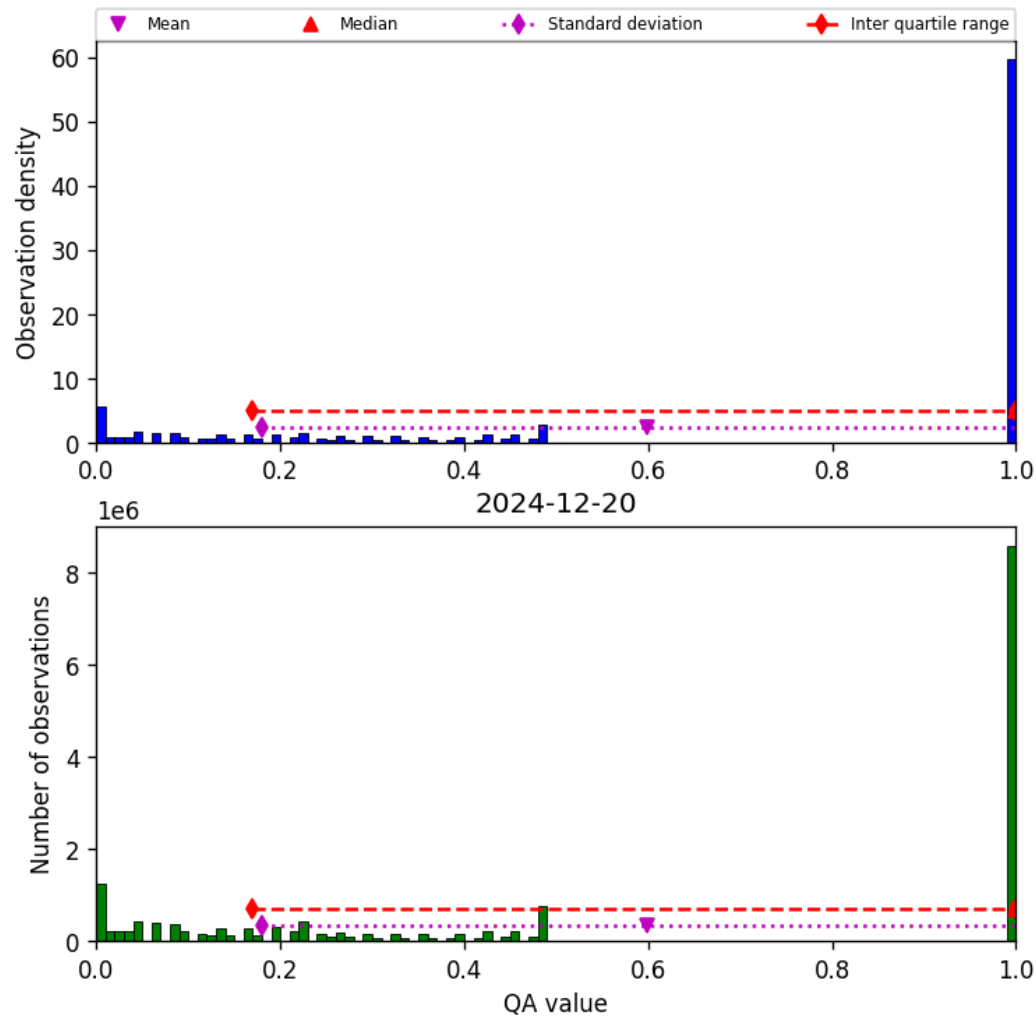


Figure 57: Histogram of “QA value” for 2024-12-20 to 2024-12-20

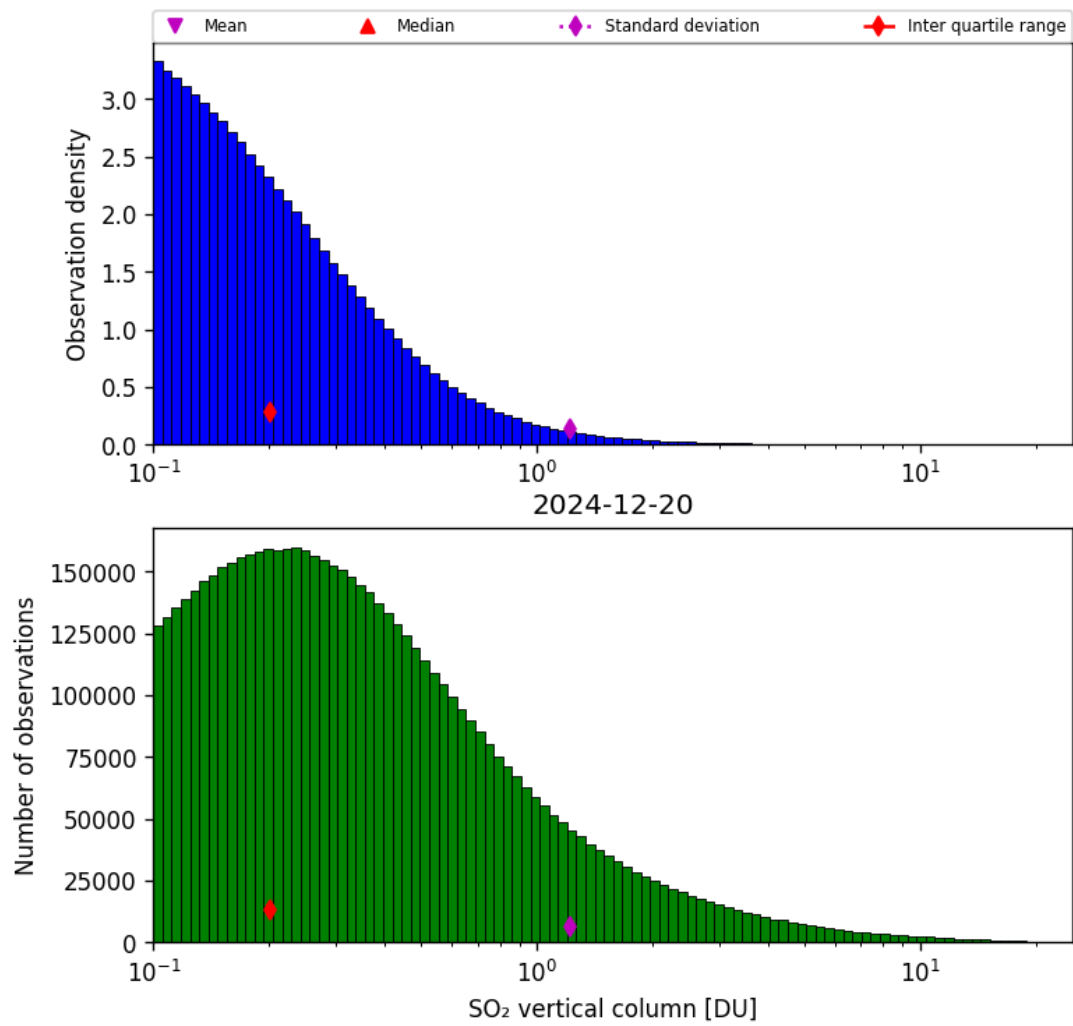


Figure 58: Histogram of “SO₂ vertical column” for 2024-12-20 to 2024-12-20

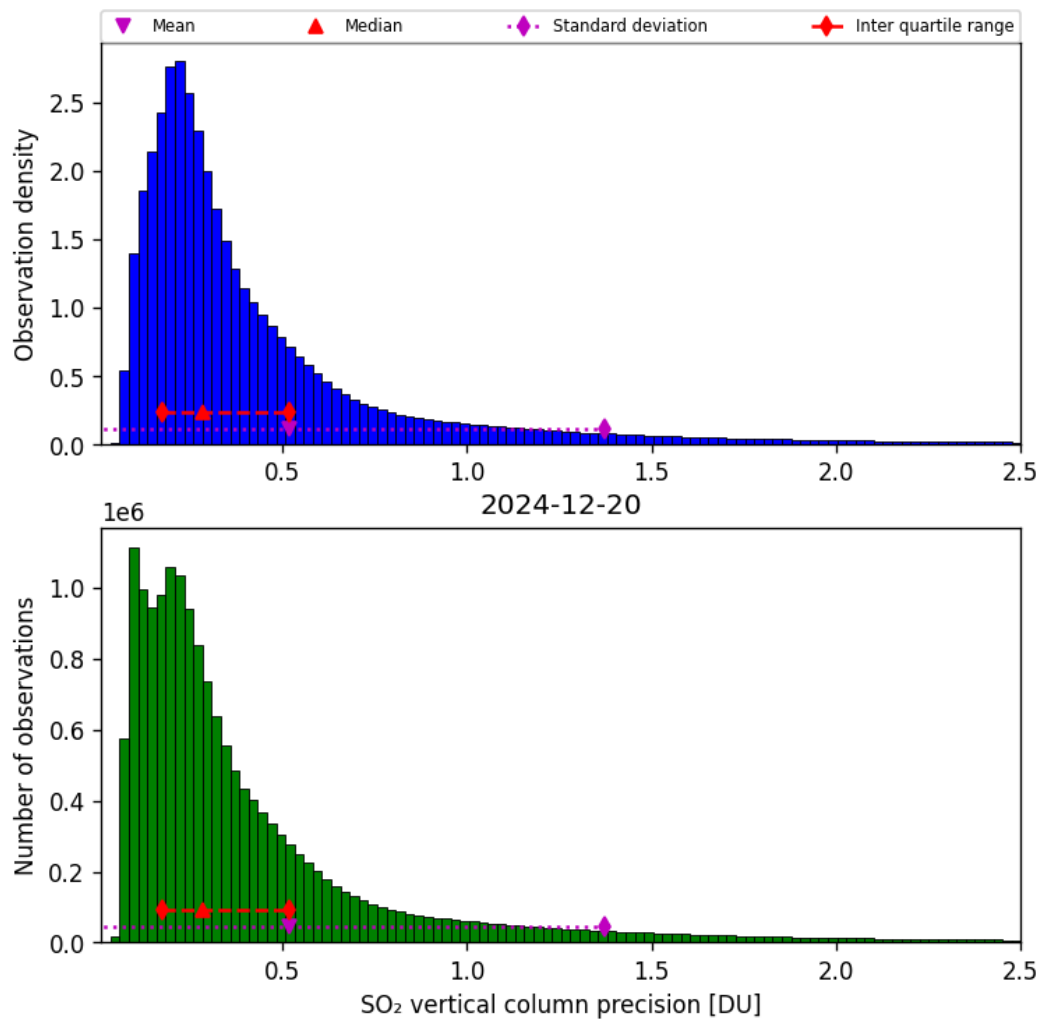


Figure 59: Histogram of “SO₂ vertical column precision” for 2024-12-20 to 2024-12-20

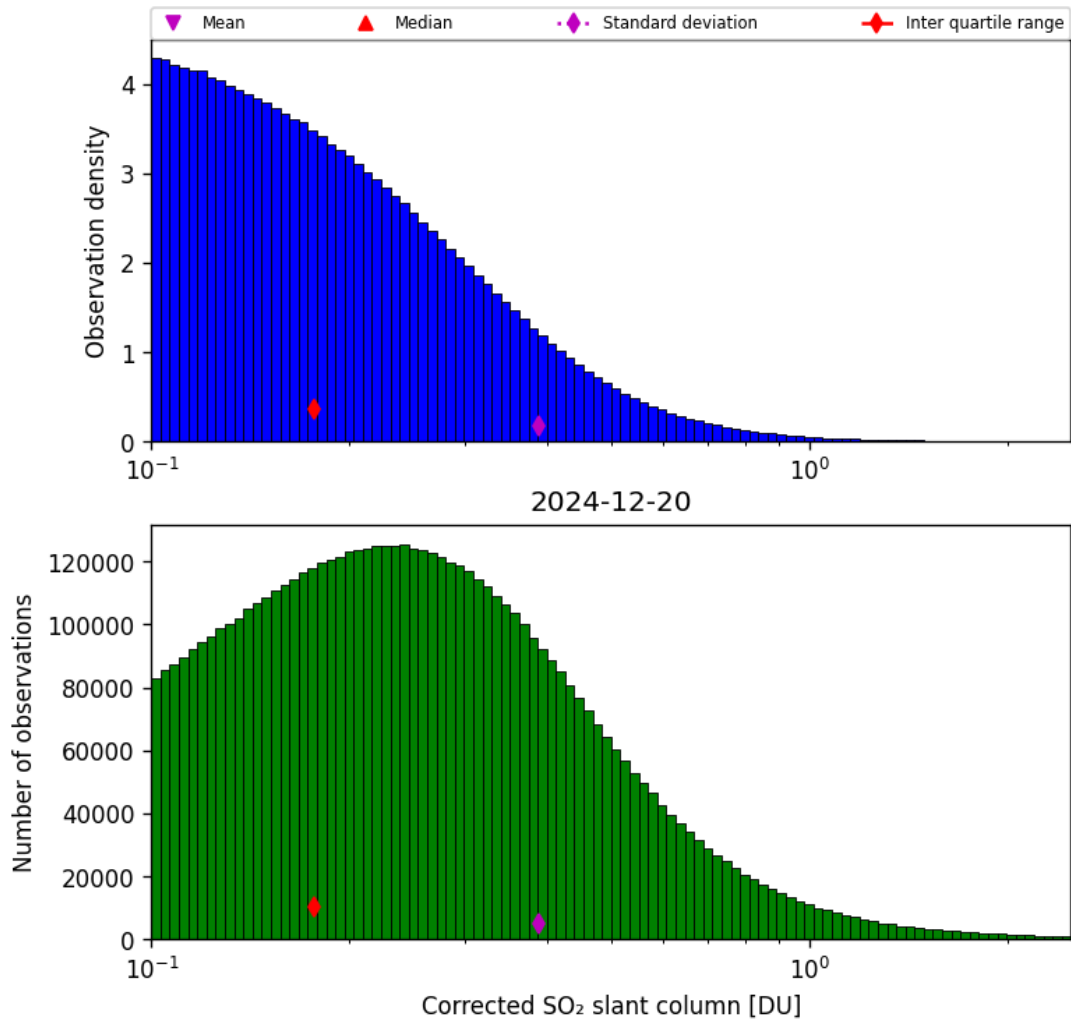


Figure 60: Histogram of “Corrected SO₂ slant column” for 2024-12-20 to 2024-12-20

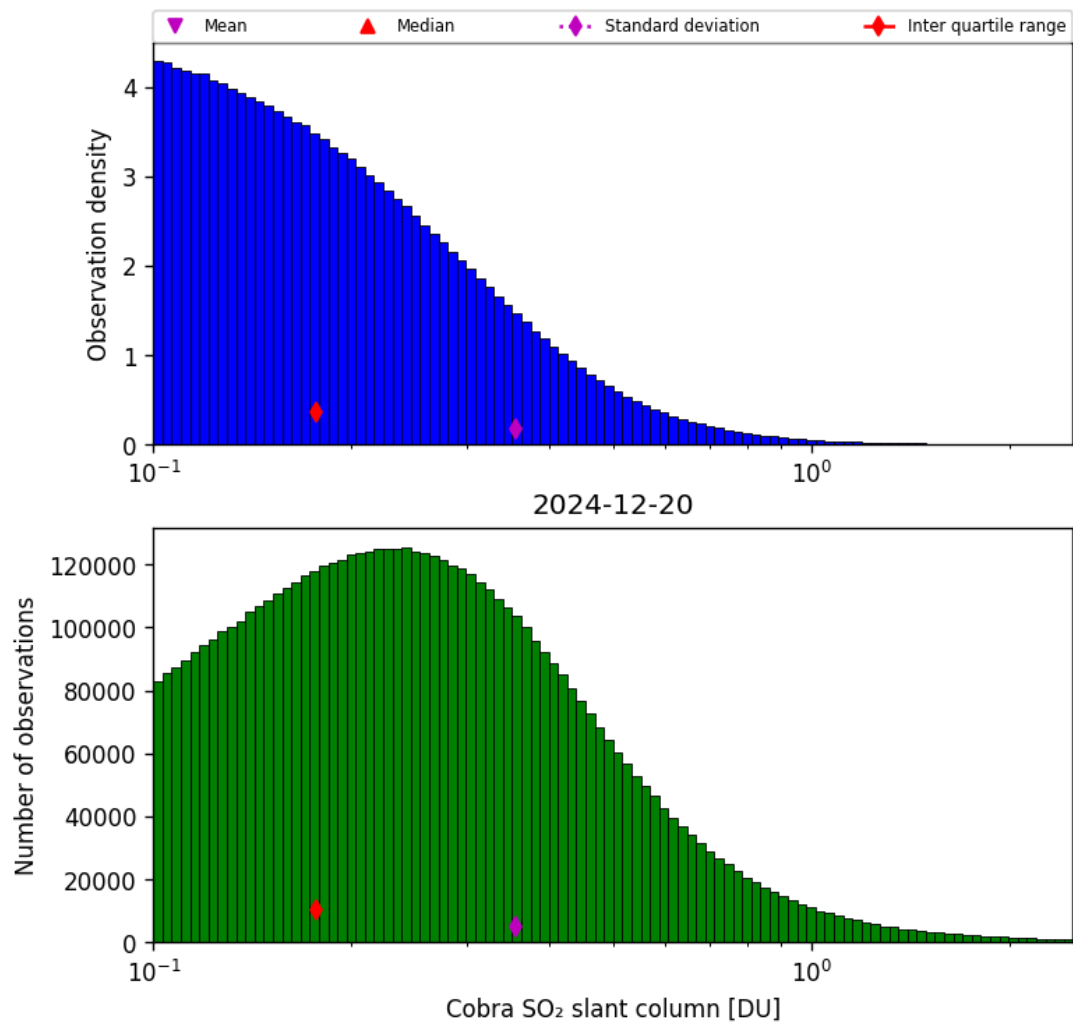


Figure 61: Histogram of “Cobra SO₂ slant column” for 2024-12-20 to 2024-12-20

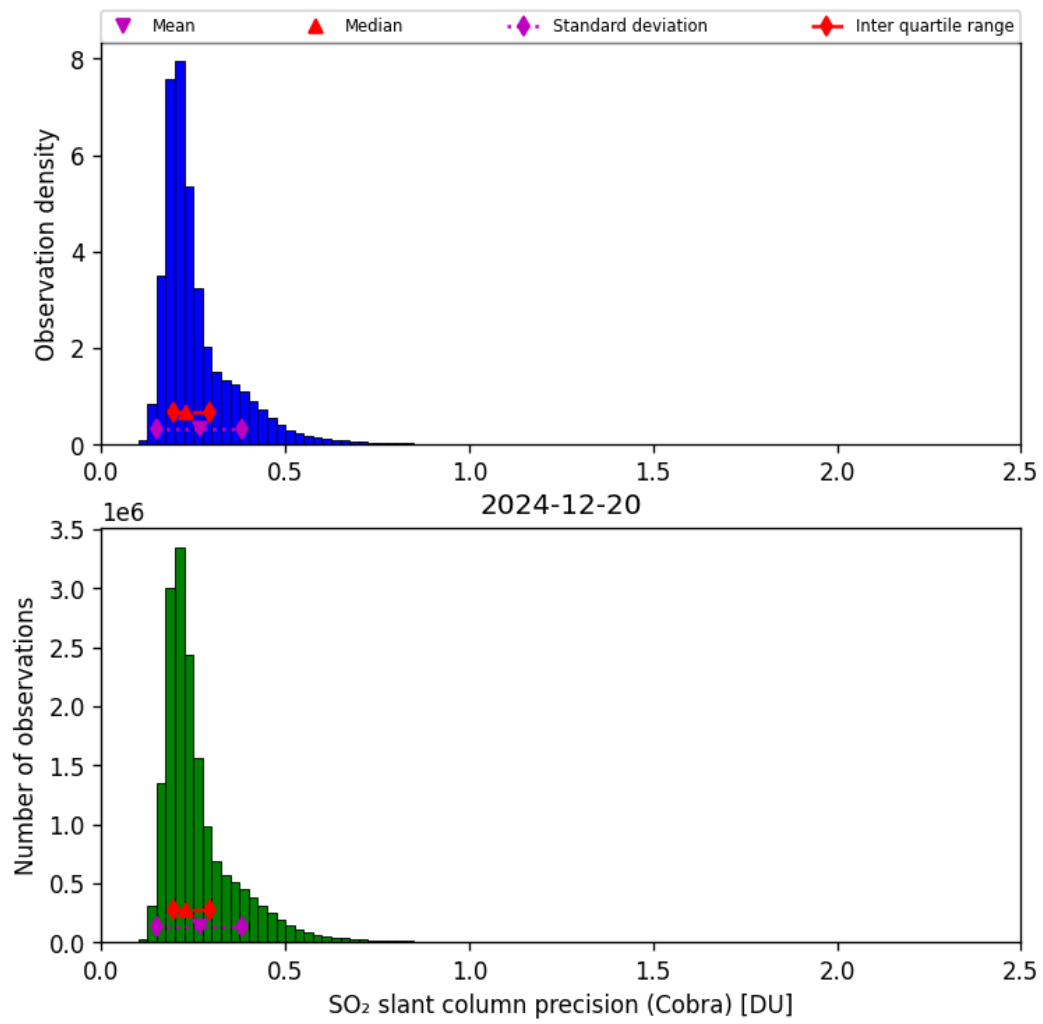


Figure 62: Histogram of “SO₂ slant column precision (Cobra)” for 2024-12-20 to 2024-12-20

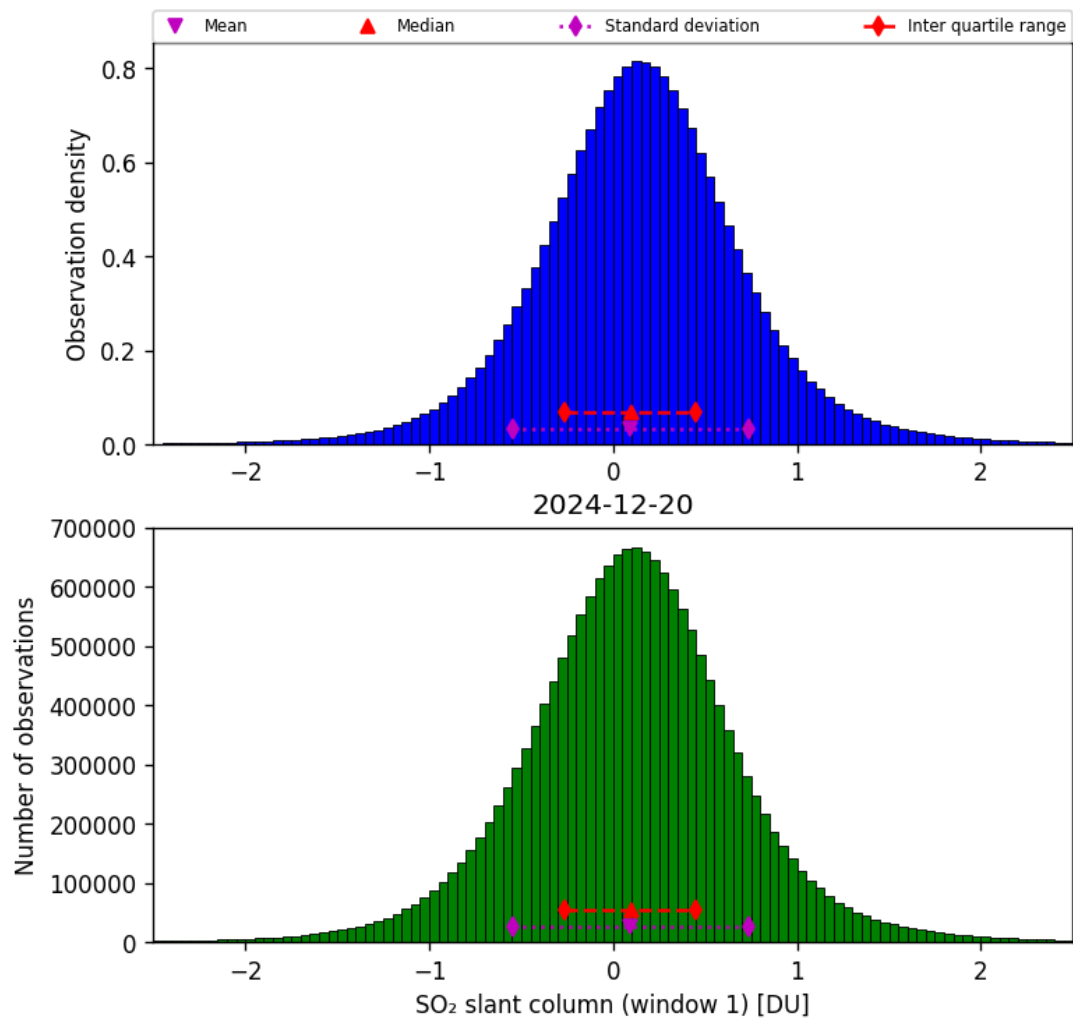


Figure 63: Histogram of “SO₂ slant column (window 1)” for 2024-12-20 to 2024-12-20

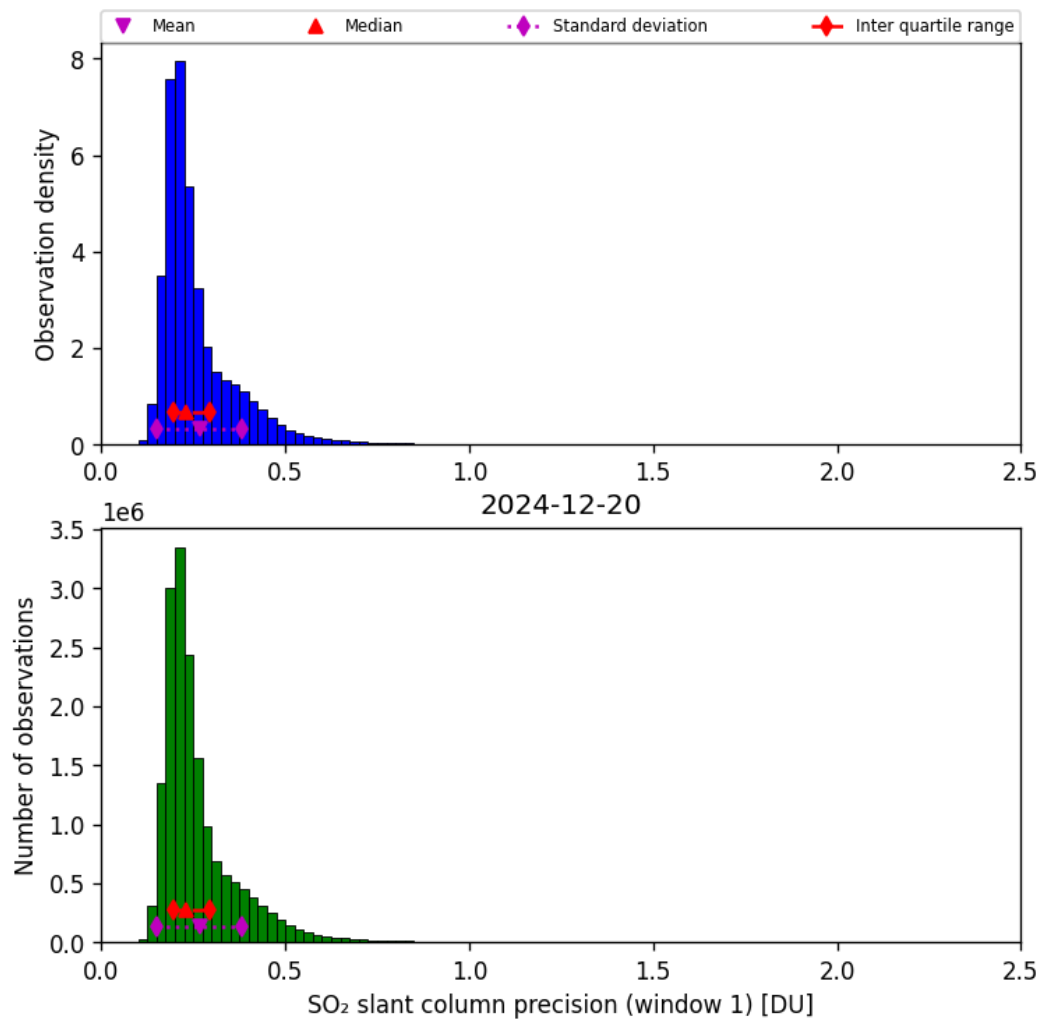


Figure 64: Histogram of “SO₂ slant column precision (window 1)” for 2024-12-20 to 2024-12-20

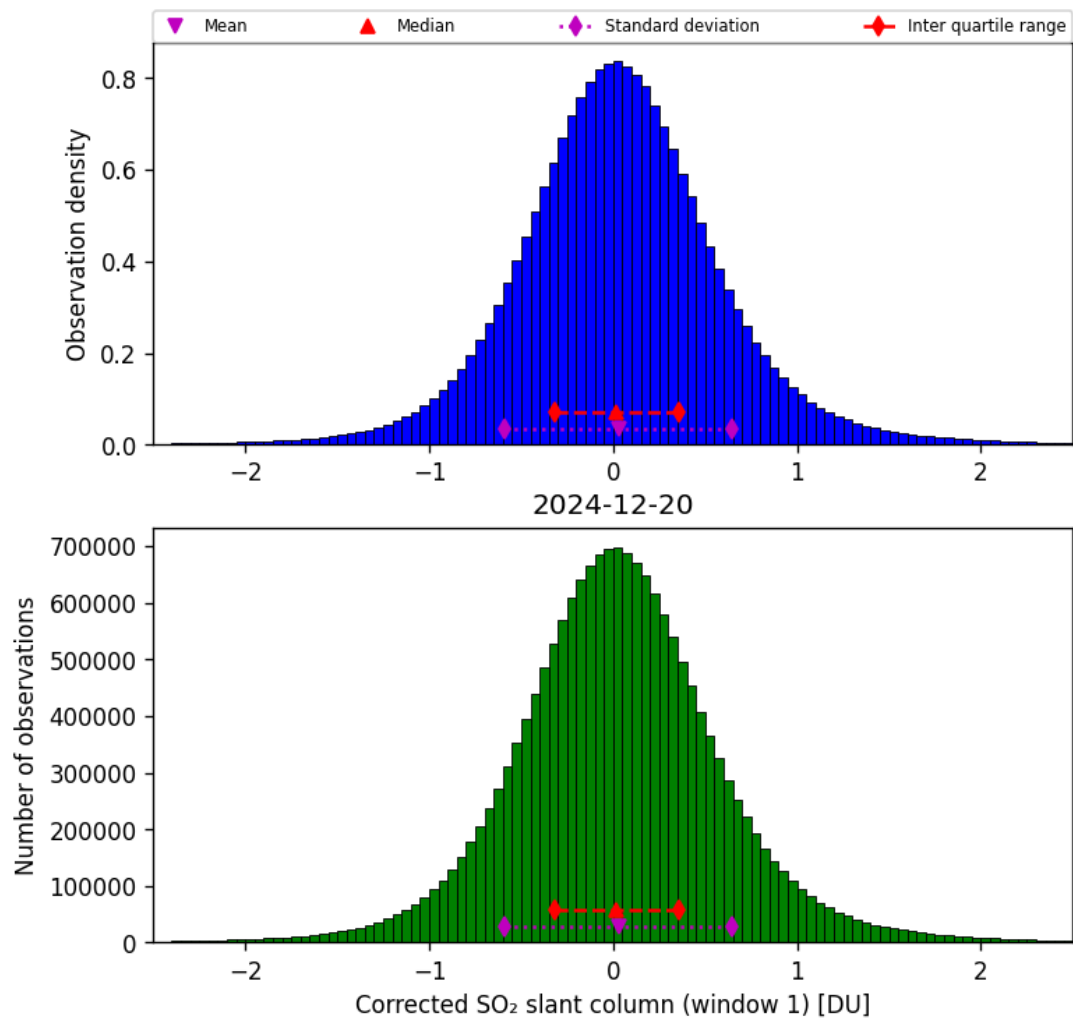


Figure 65: Histogram of “Corrected SO₂ slant column (window 1)” for 2024-12-20 to 2024-12-20

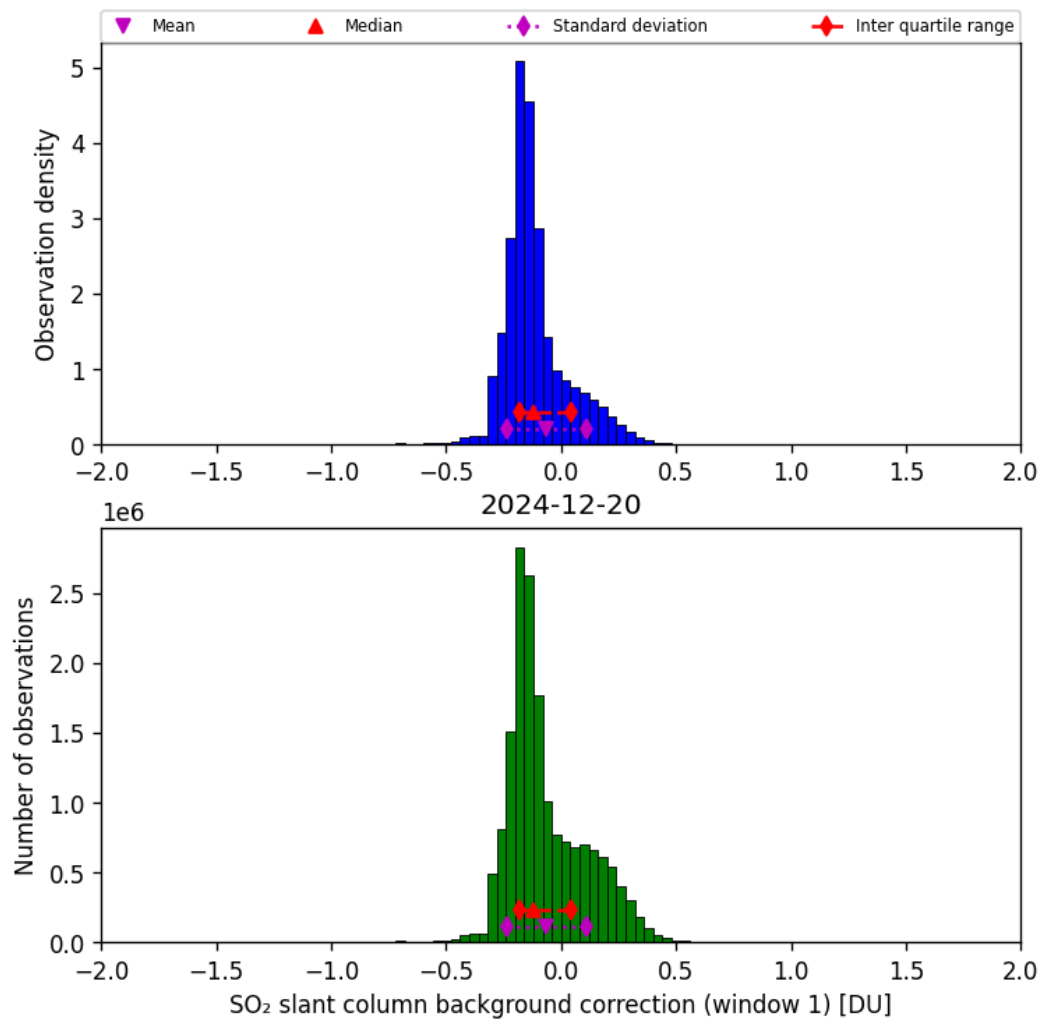


Figure 66: Histogram of “SO₂ slant column background correction (window 1)” for 2024-12-20 to 2024-12-20

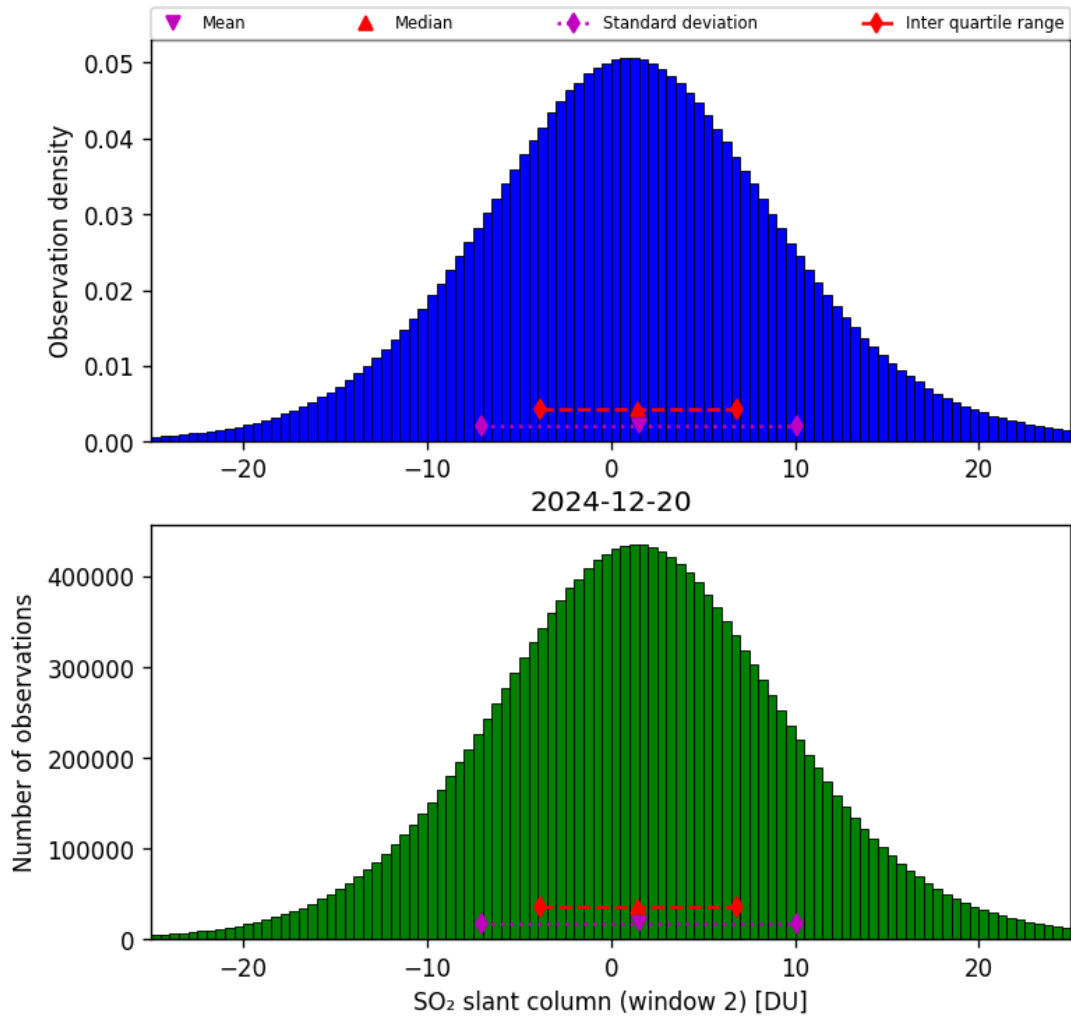


Figure 67: Histogram of “SO₂ slant column (window 2)” for 2024-12-20 to 2024-12-20

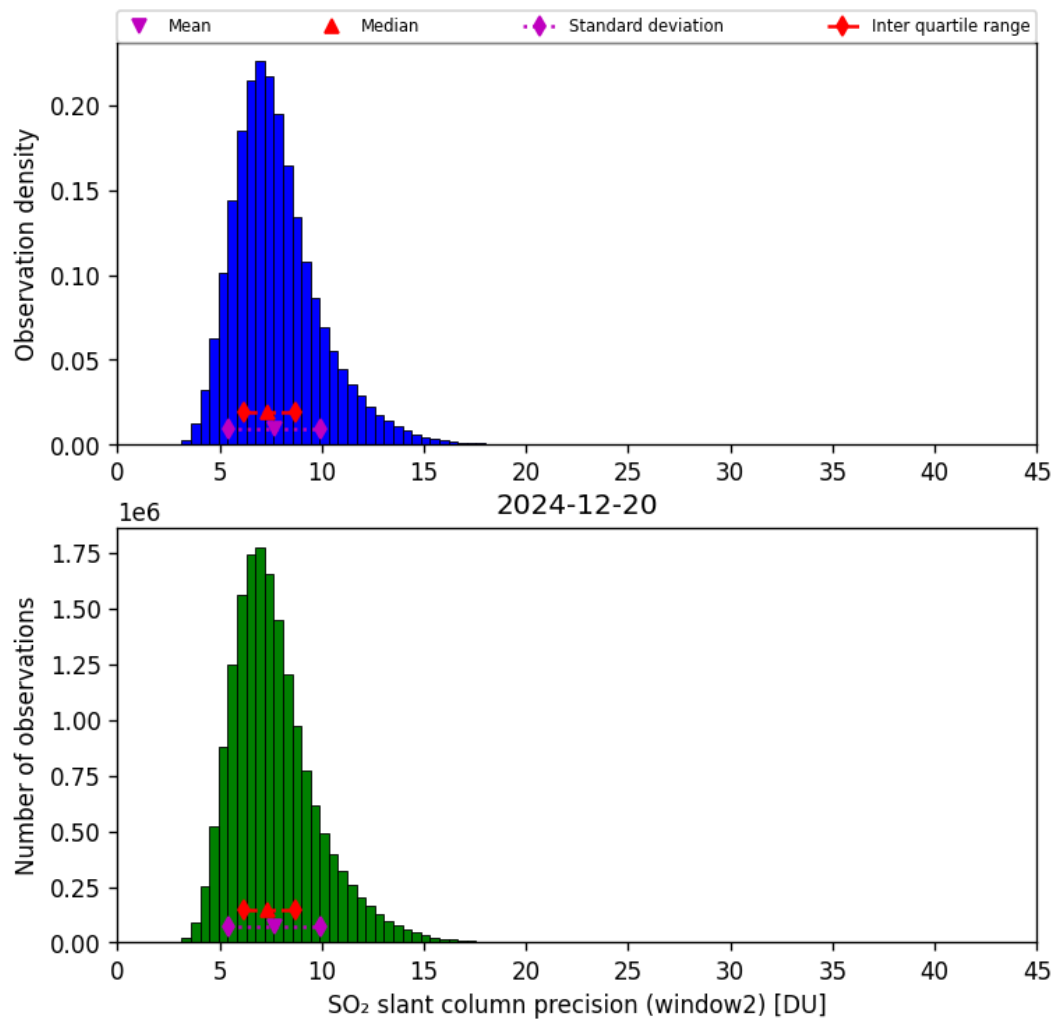


Figure 68: Histogram of “SO₂ slant column precision (window2)” for 2024-12-20 to 2024-12-20

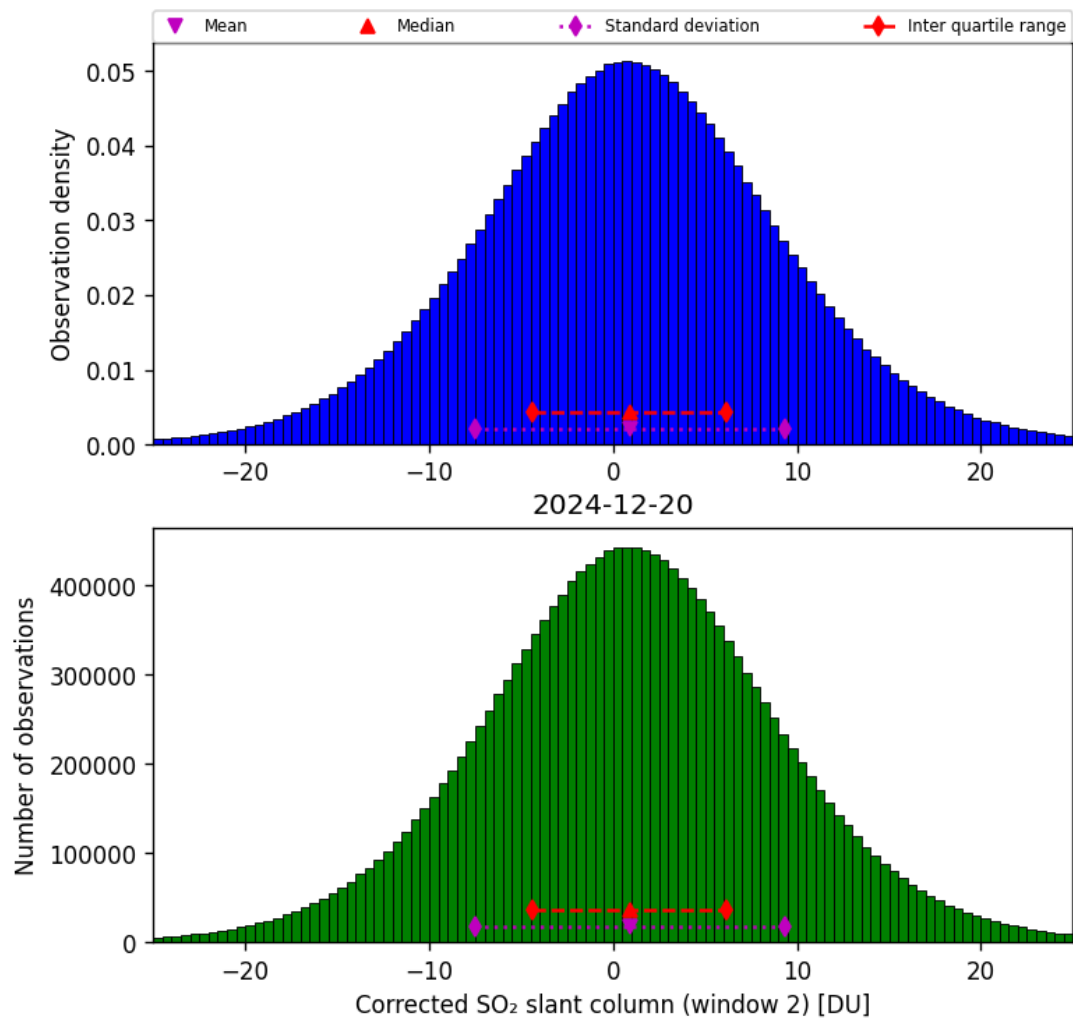


Figure 69: Histogram of “Corrected SO₂ slant column (window 2)” for 2024-12-20 to 2024-12-20

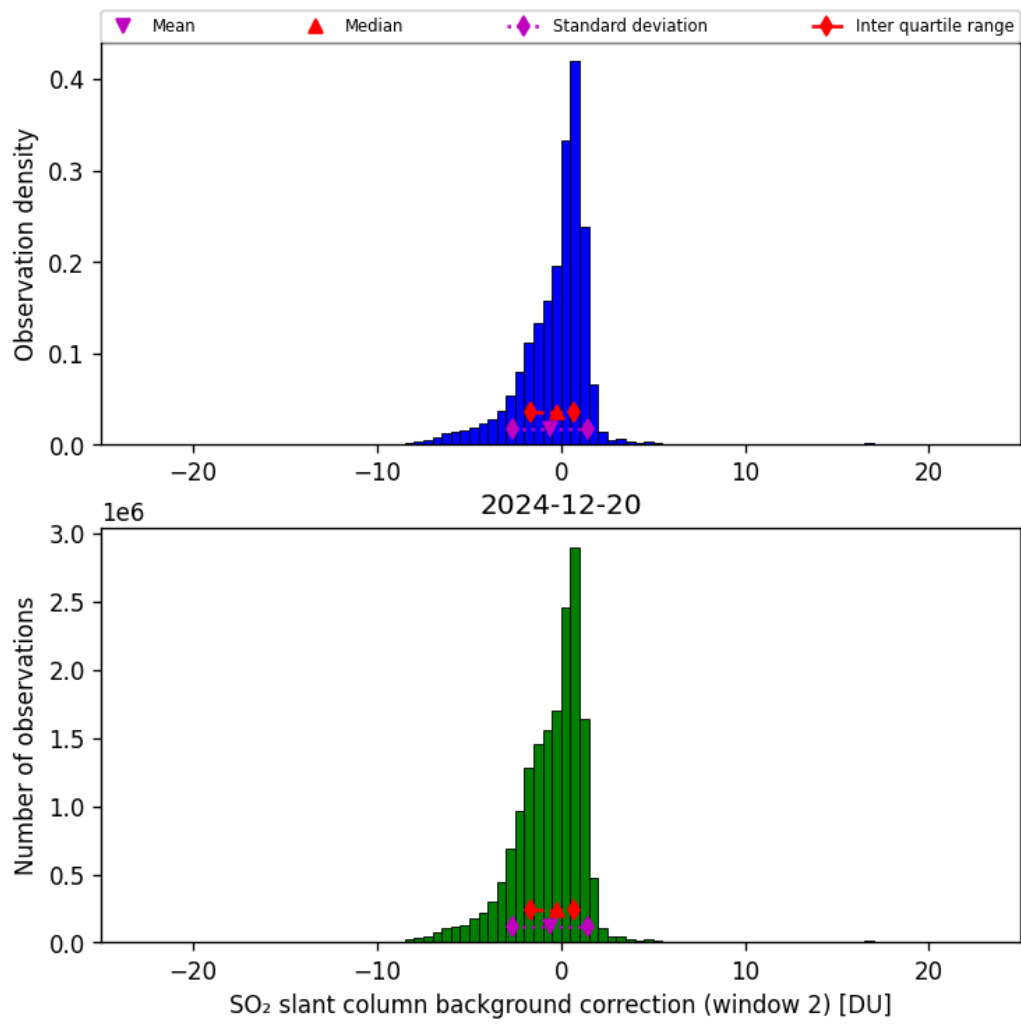


Figure 70: Histogram of “SO₂ slant column background correction (window 2)” for 2024-12-20 to 2024-12-20

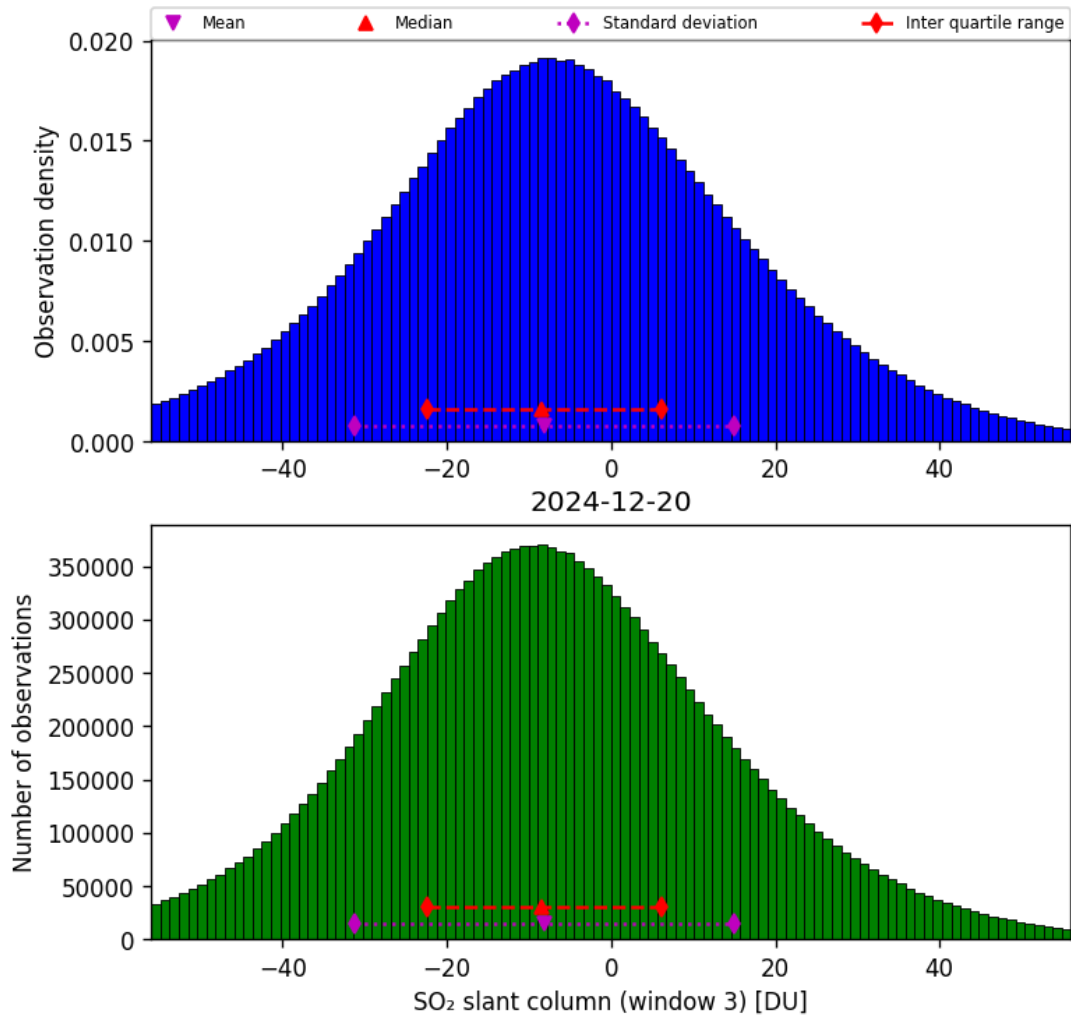


Figure 71: Histogram of “SO₂ slant column (window 3)” for 2024-12-20 to 2024-12-20

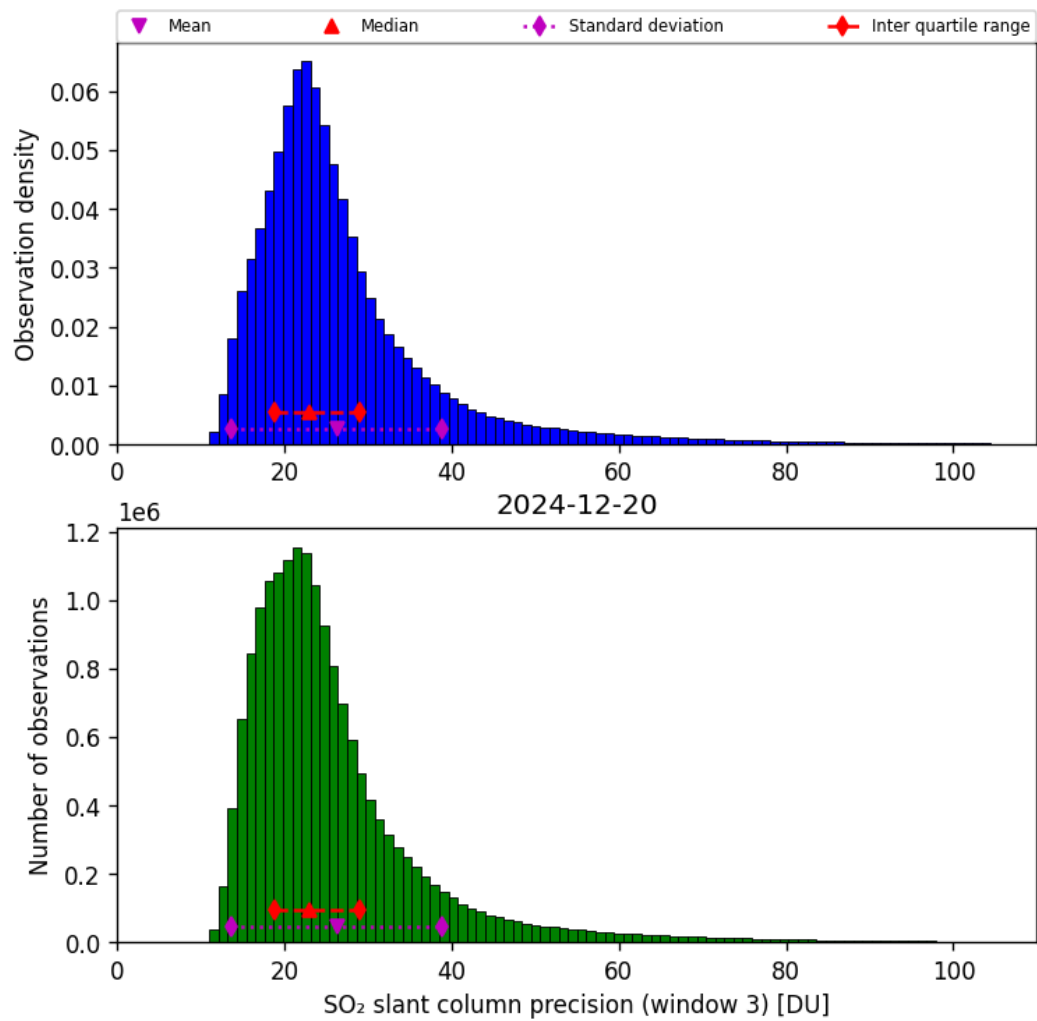


Figure 72: Histogram of “SO₂ slant column precision (window 3)” for 2024-12-20 to 2024-12-20

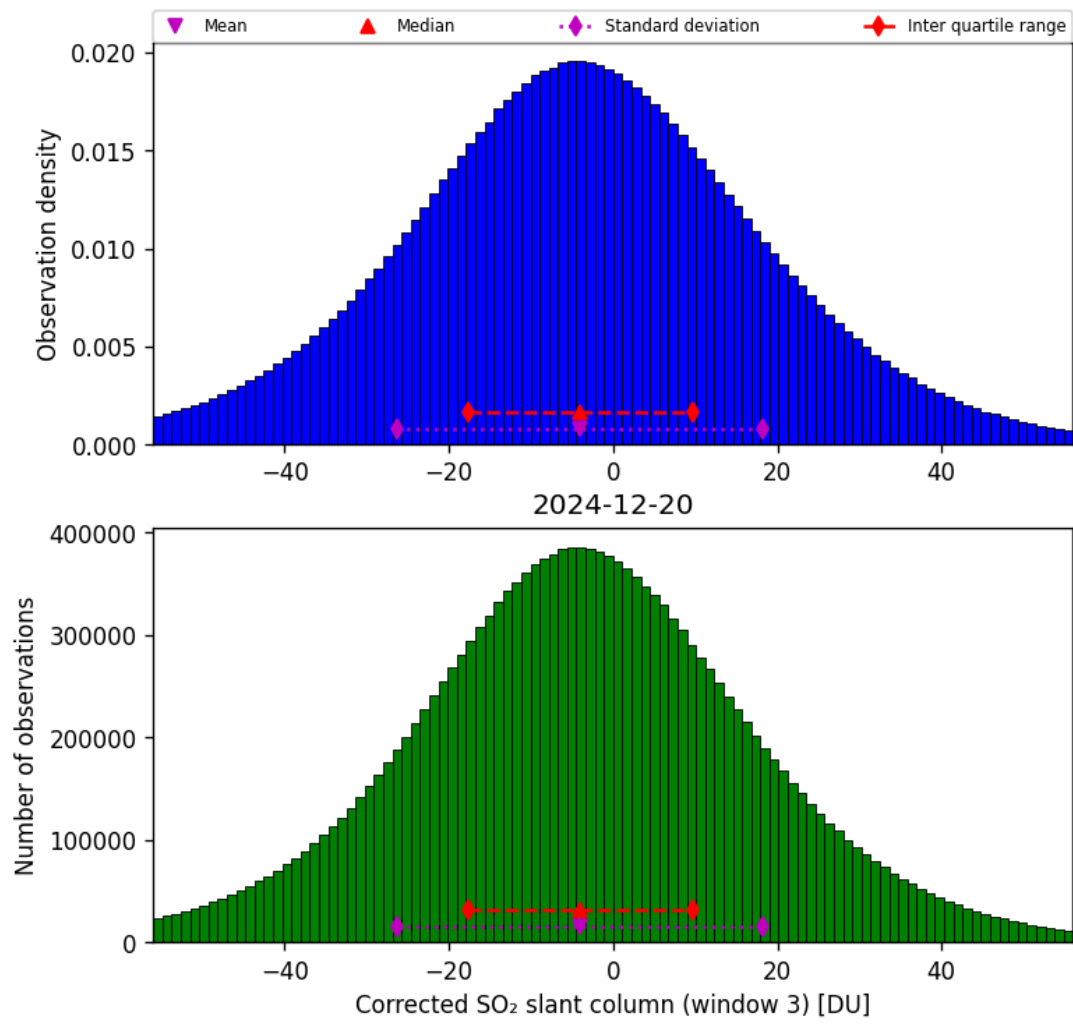


Figure 73: Histogram of “Corrected SO₂ slant column (window 3)” for 2024-12-20 to 2024-12-20

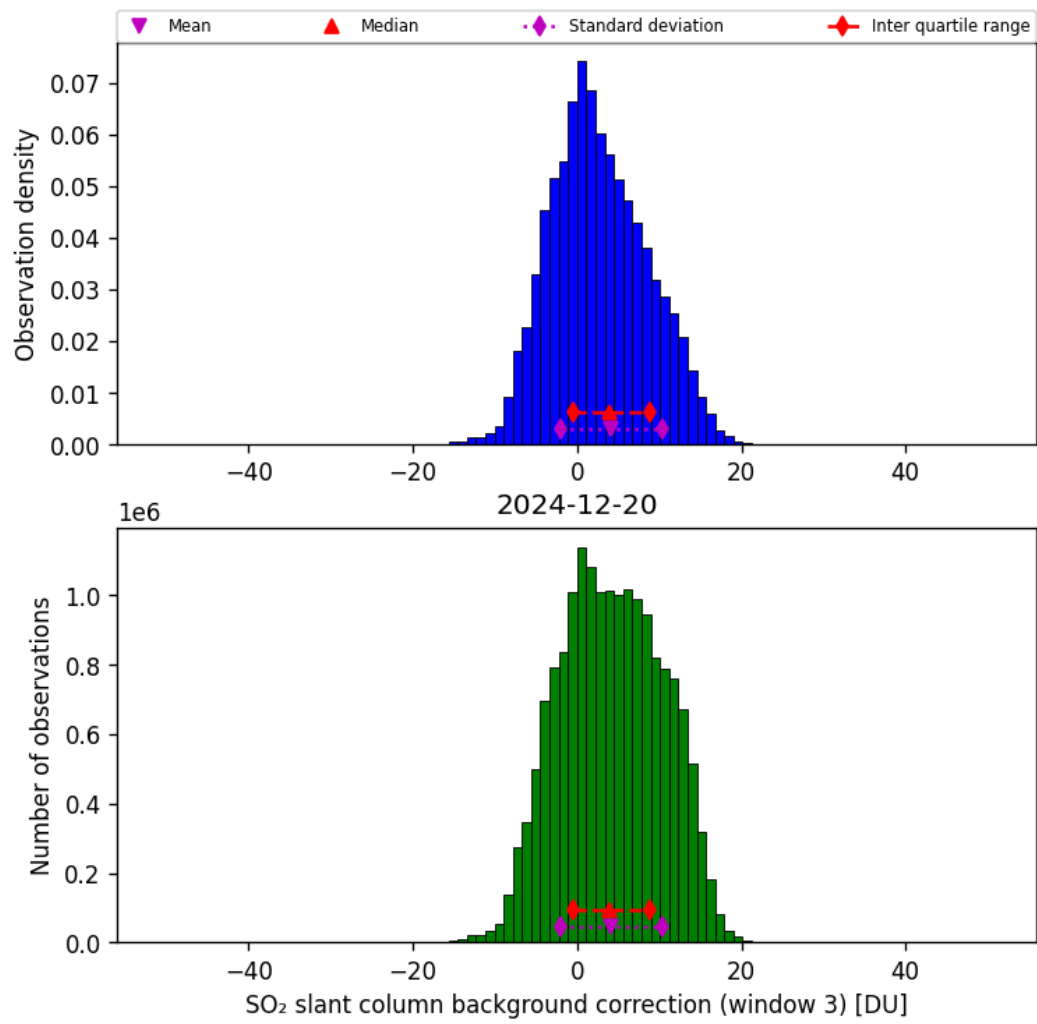


Figure 74: Histogram of “SO₂ slant column background correction (window 3)” for 2024-12-20 to 2024-12-20

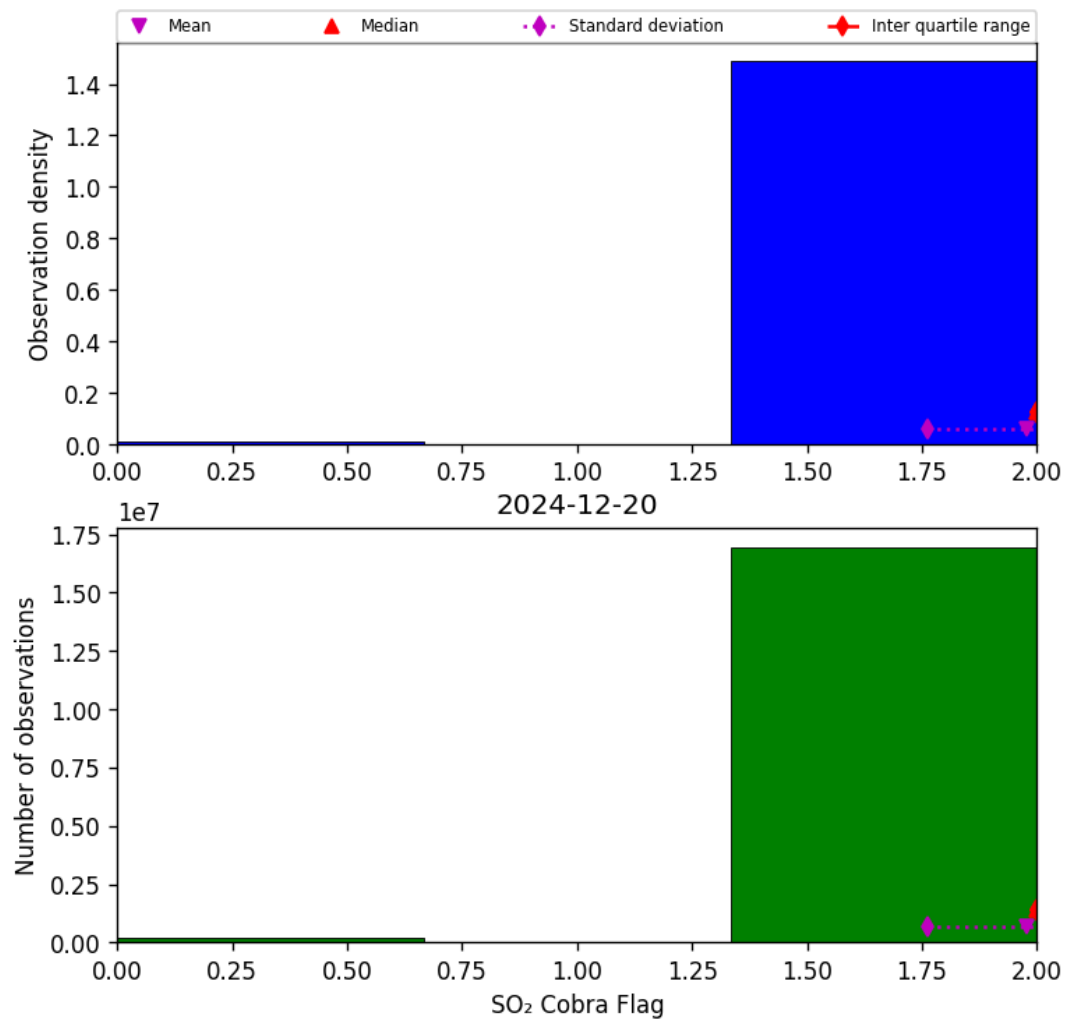


Figure 75: Histogram of “SO₂ Cobra Flag” for 2024-12-20 to 2024-12-20

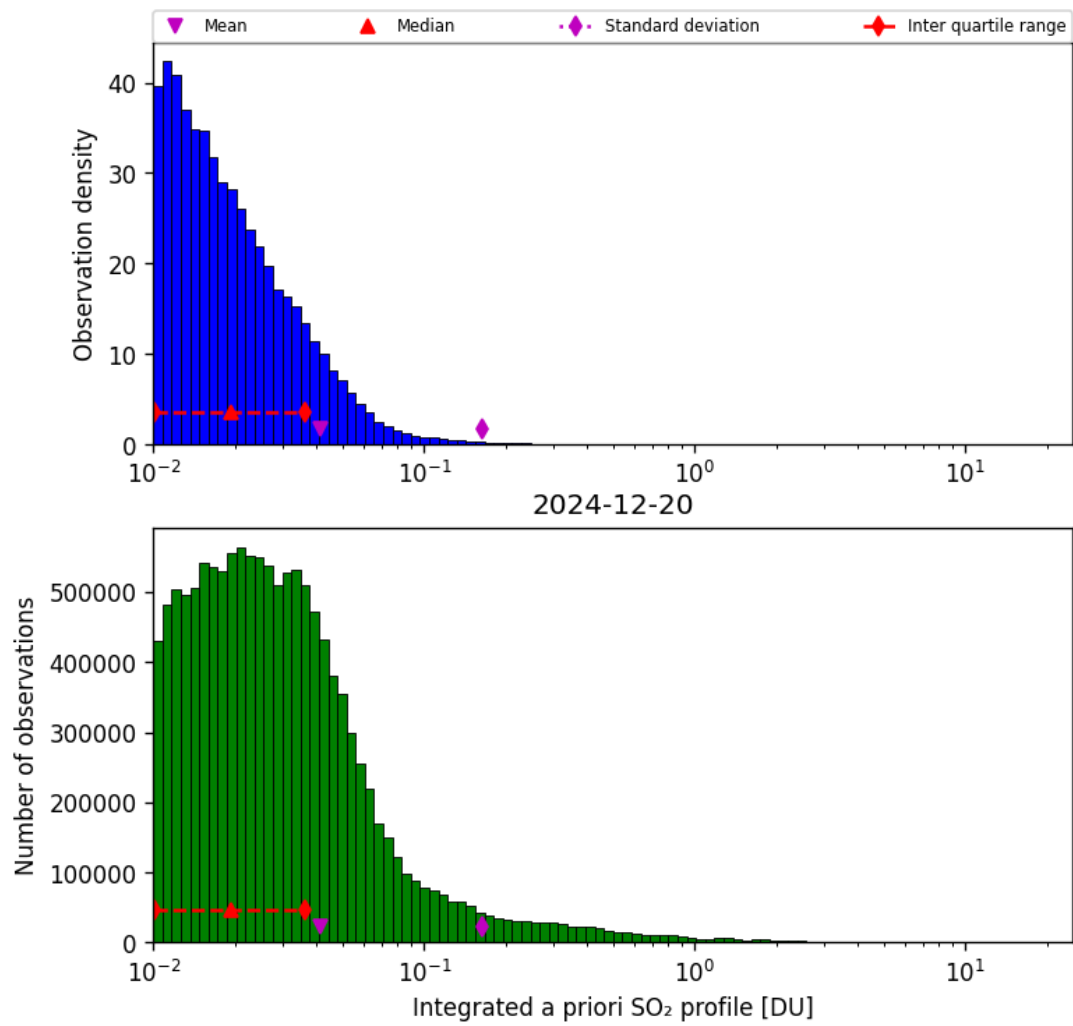


Figure 76: Histogram of “Integrated a priori SO₂ profile” for 2024-12-20 to 2024-12-20

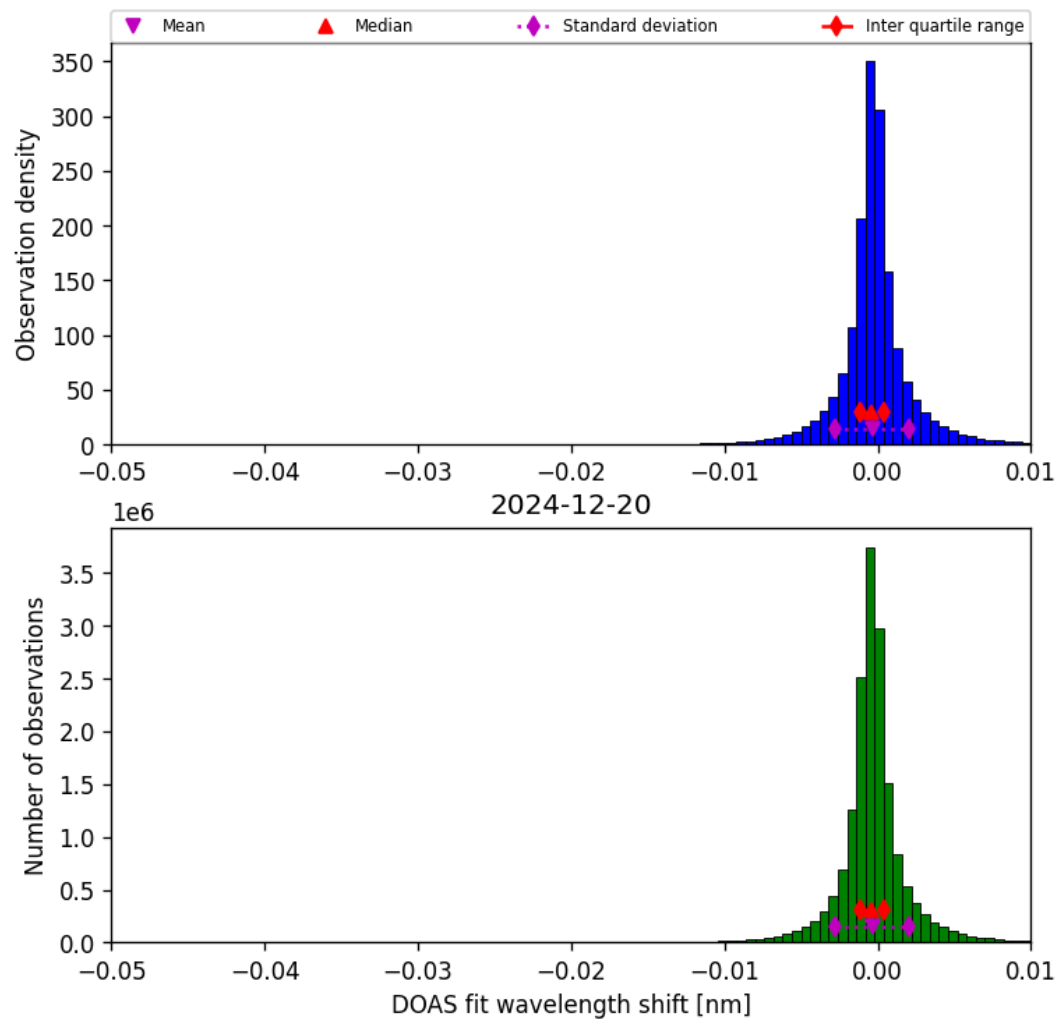


Figure 77: Histogram of “DOAS fit wavelength shift” for 2024-12-20 to 2024-12-20

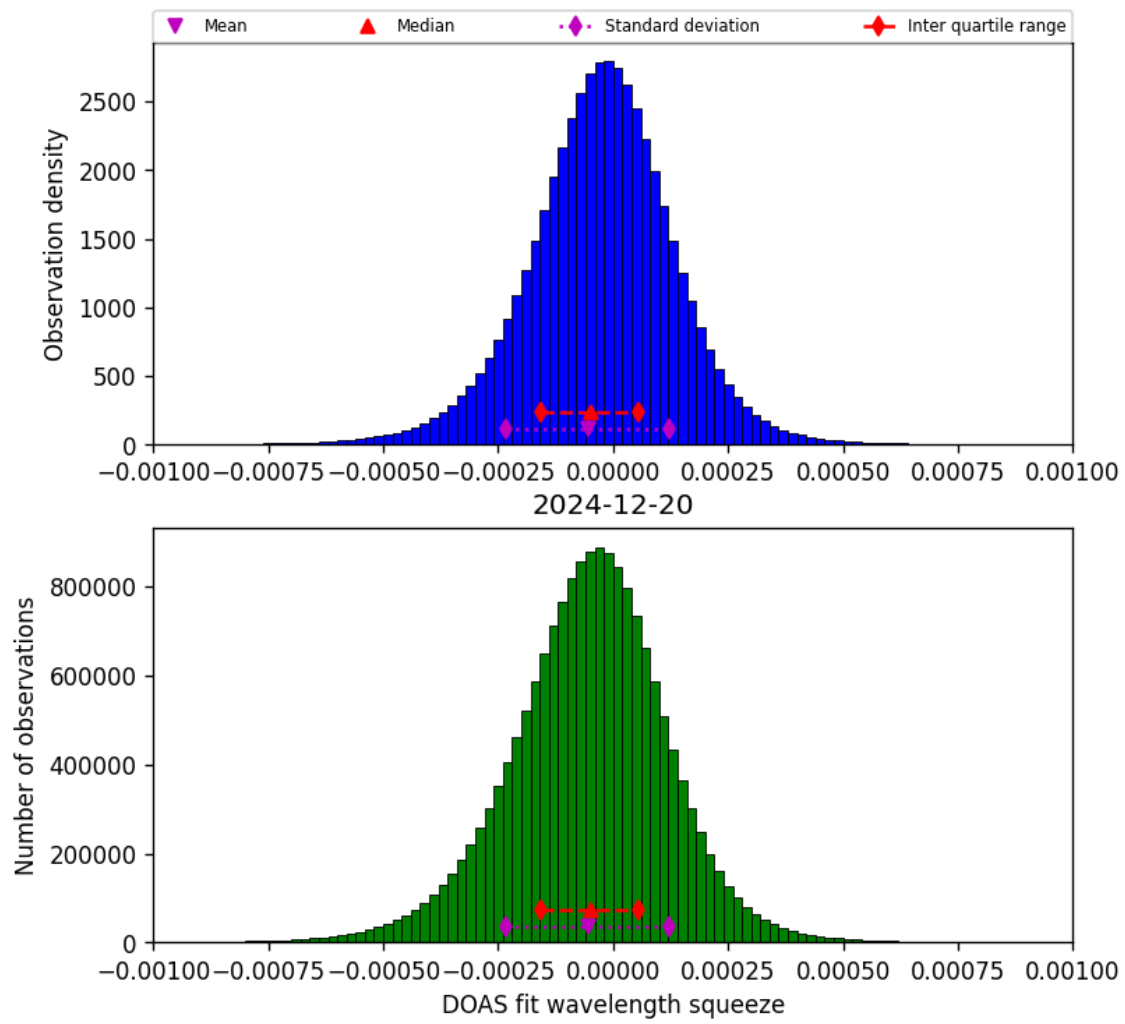


Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2024-12-20 to 2024-12-20

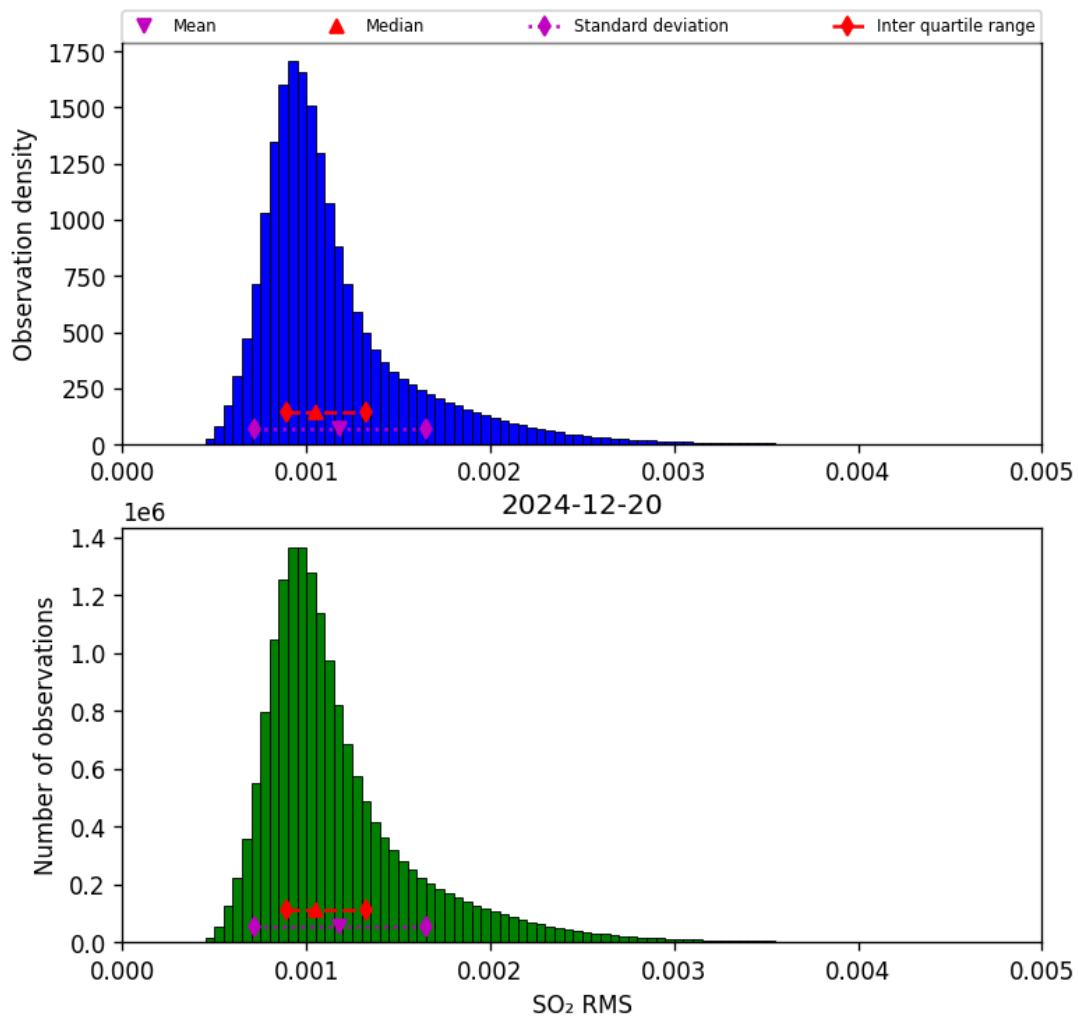


Figure 79: Histogram of “SO₂ RMS” for 2024-12-20 to 2024-12-20

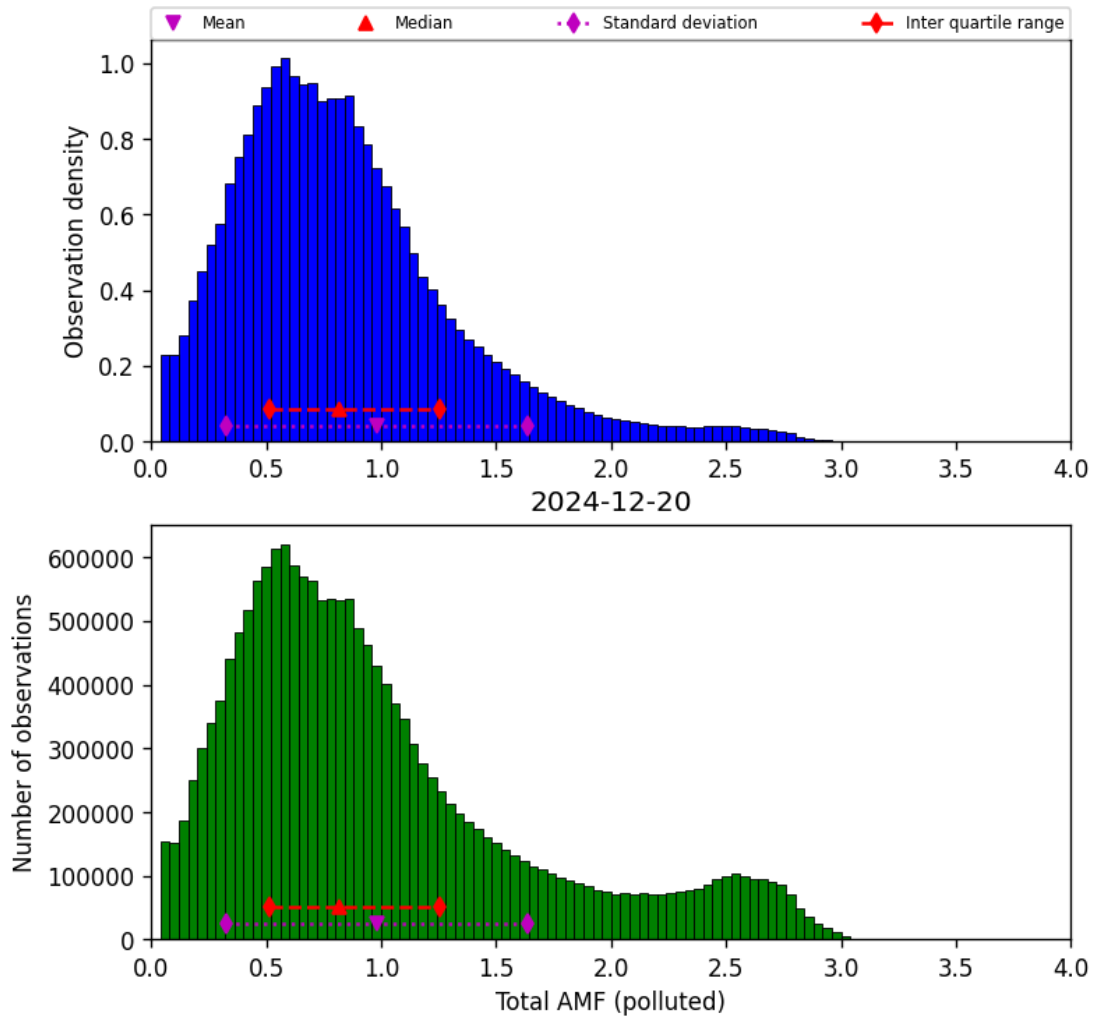


Figure 80: Histogram of “Total AMF (polluted)” for 2024-12-20 to 2024-12-20

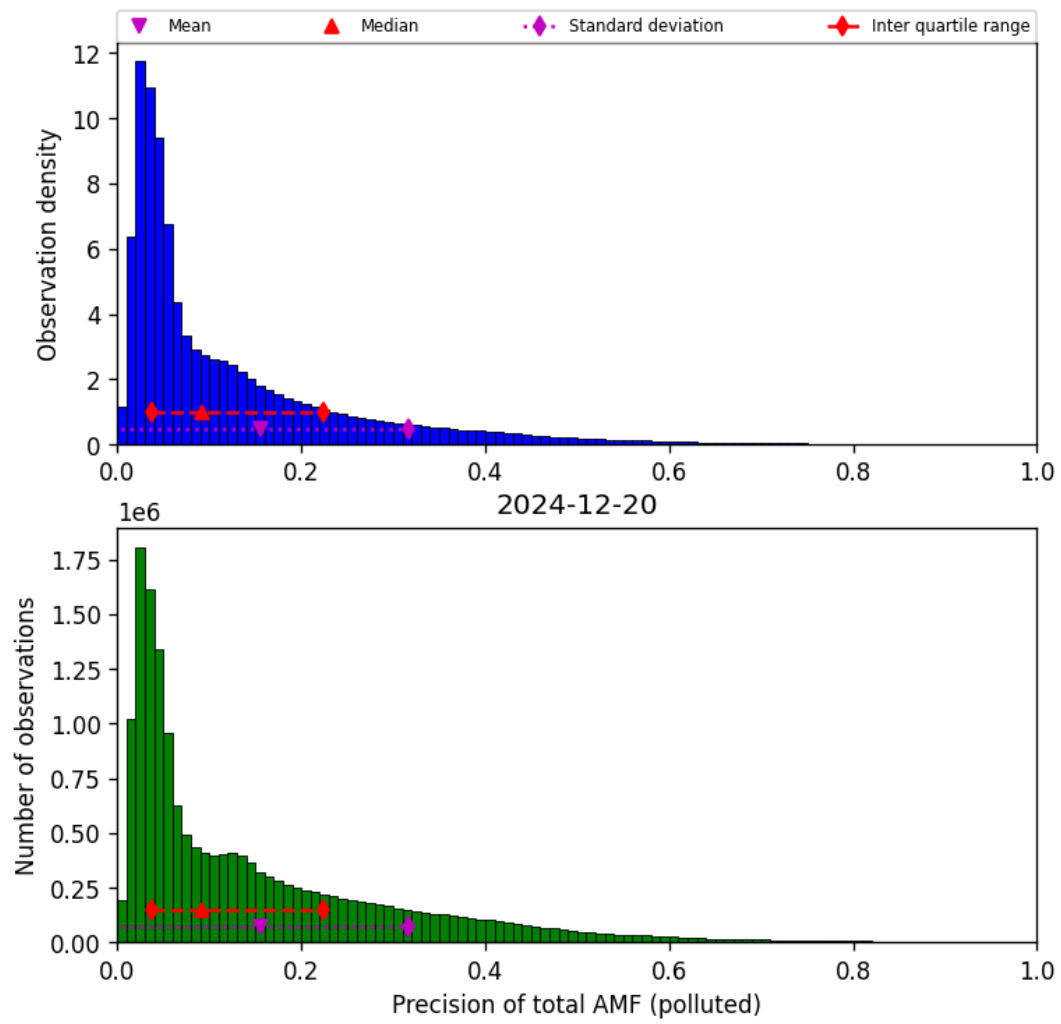


Figure 81: Histogram of “Precision of total AMF (polluted)” for 2024-12-20 to 2024-12-20

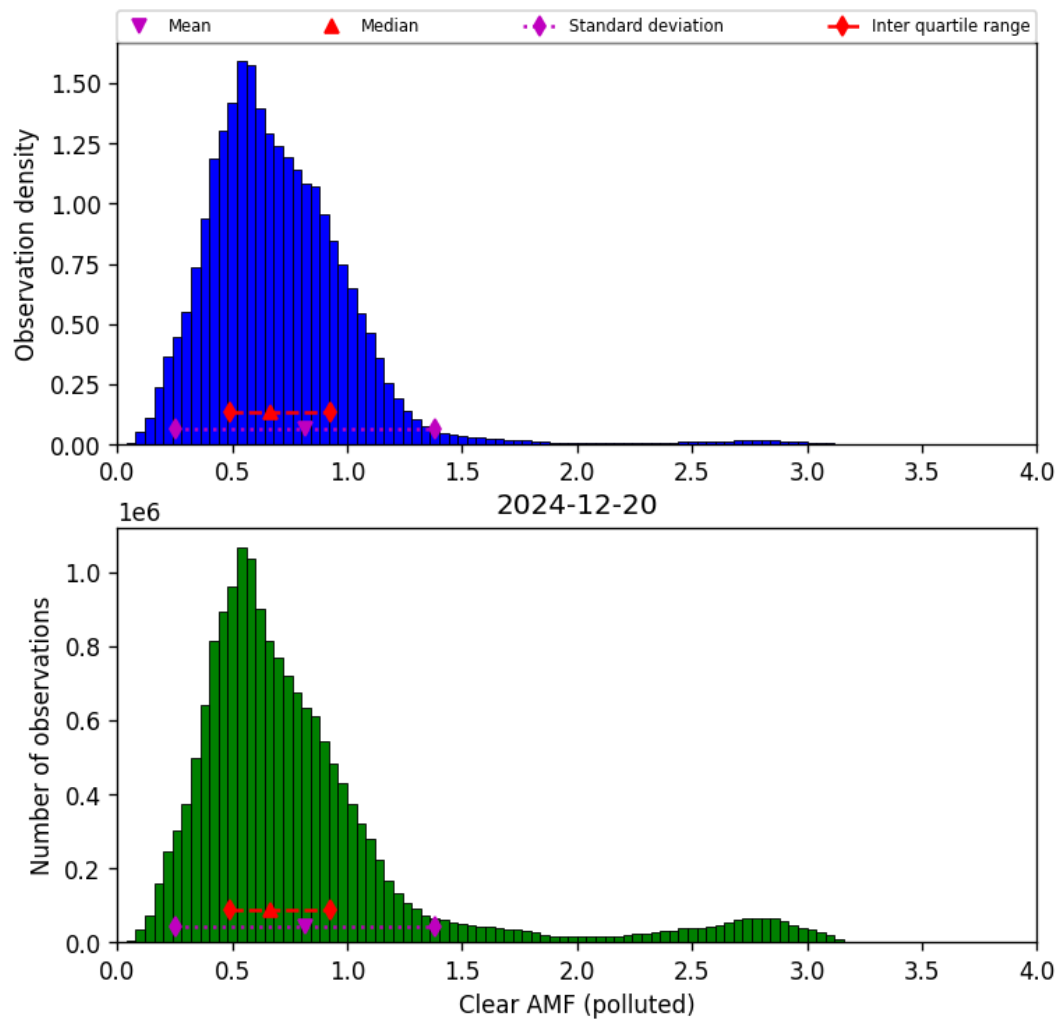


Figure 82: Histogram of “Clear AMF (polluted)” for 2024-12-20 to 2024-12-20

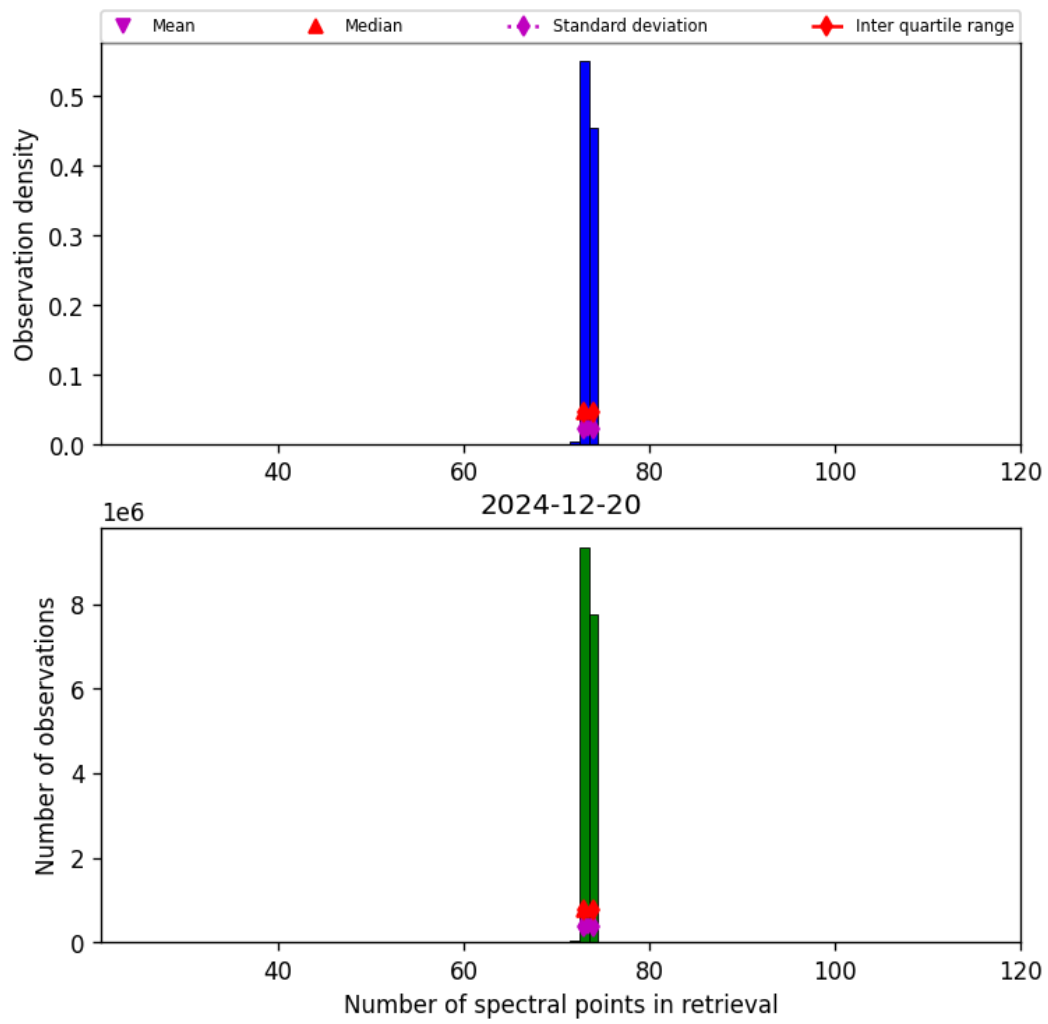


Figure 83: Histogram of “Number of spectral points in retrieval” for 2024-12-20 to 2024-12-20

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.

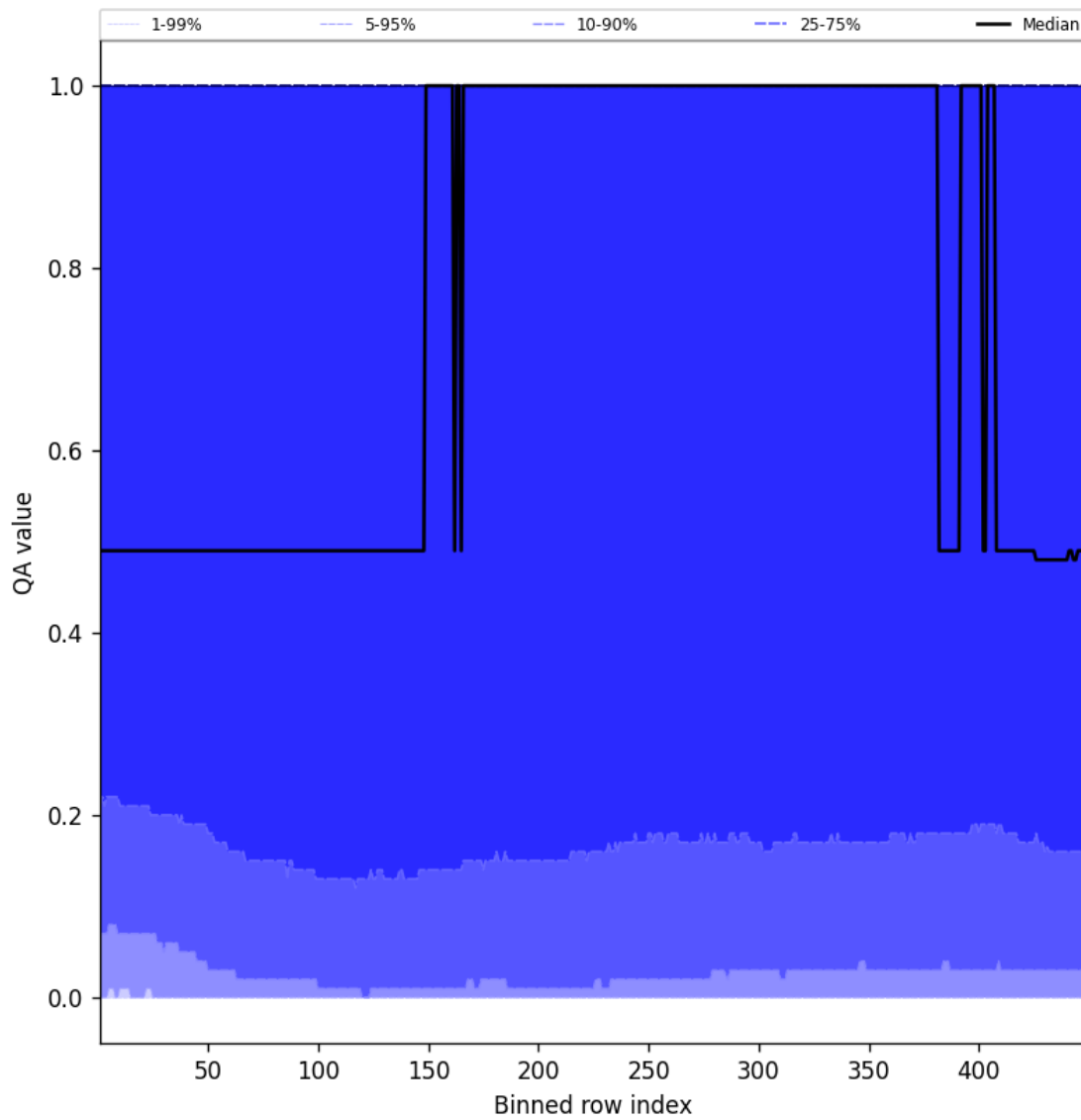


Figure 84: Along track statistics of “QA value” for 2024-12-20 to 2024-12-20

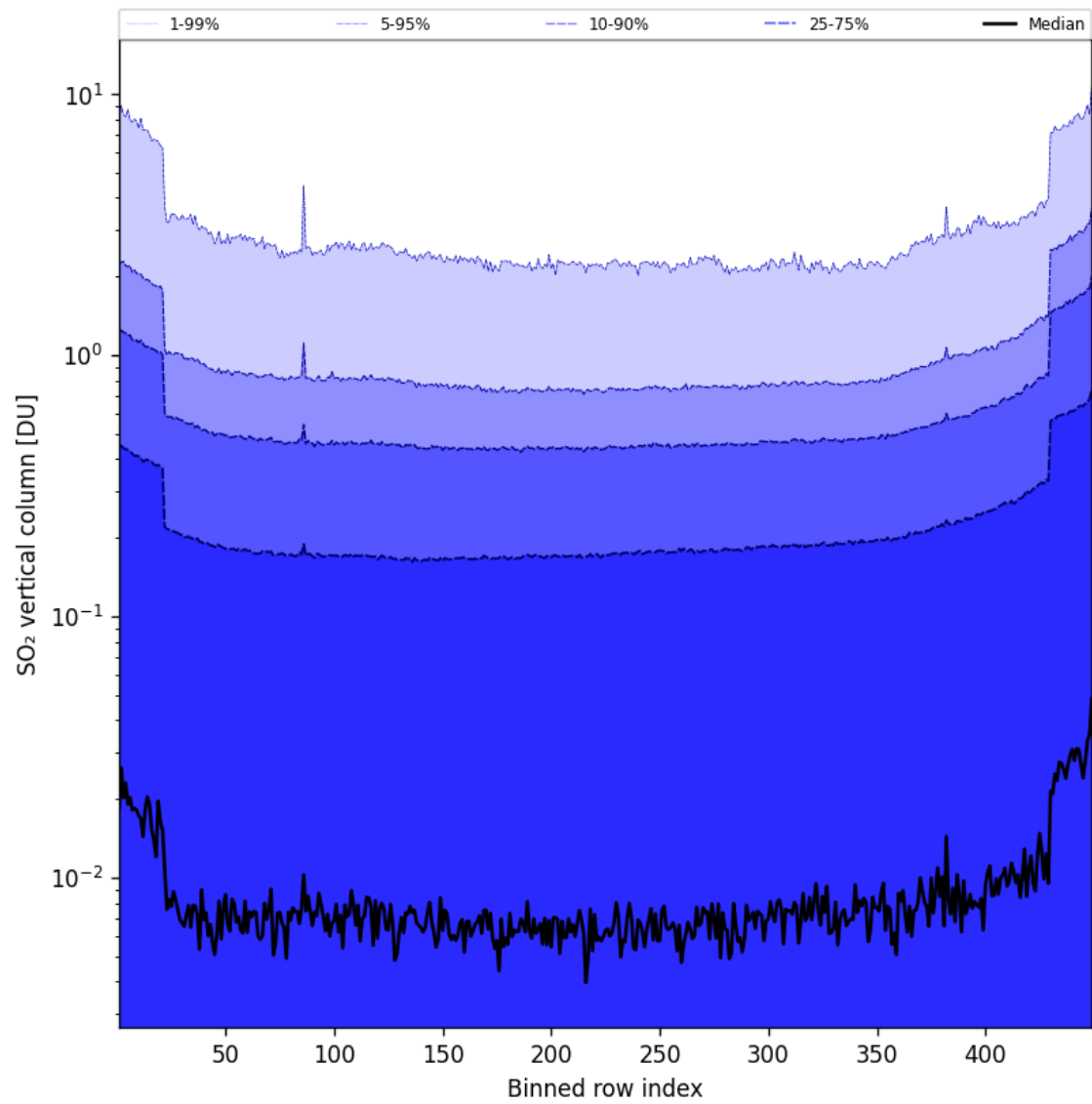


Figure 85: Along track statistics of “SO₂ vertical column” for 2024-12-20 to 2024-12-20

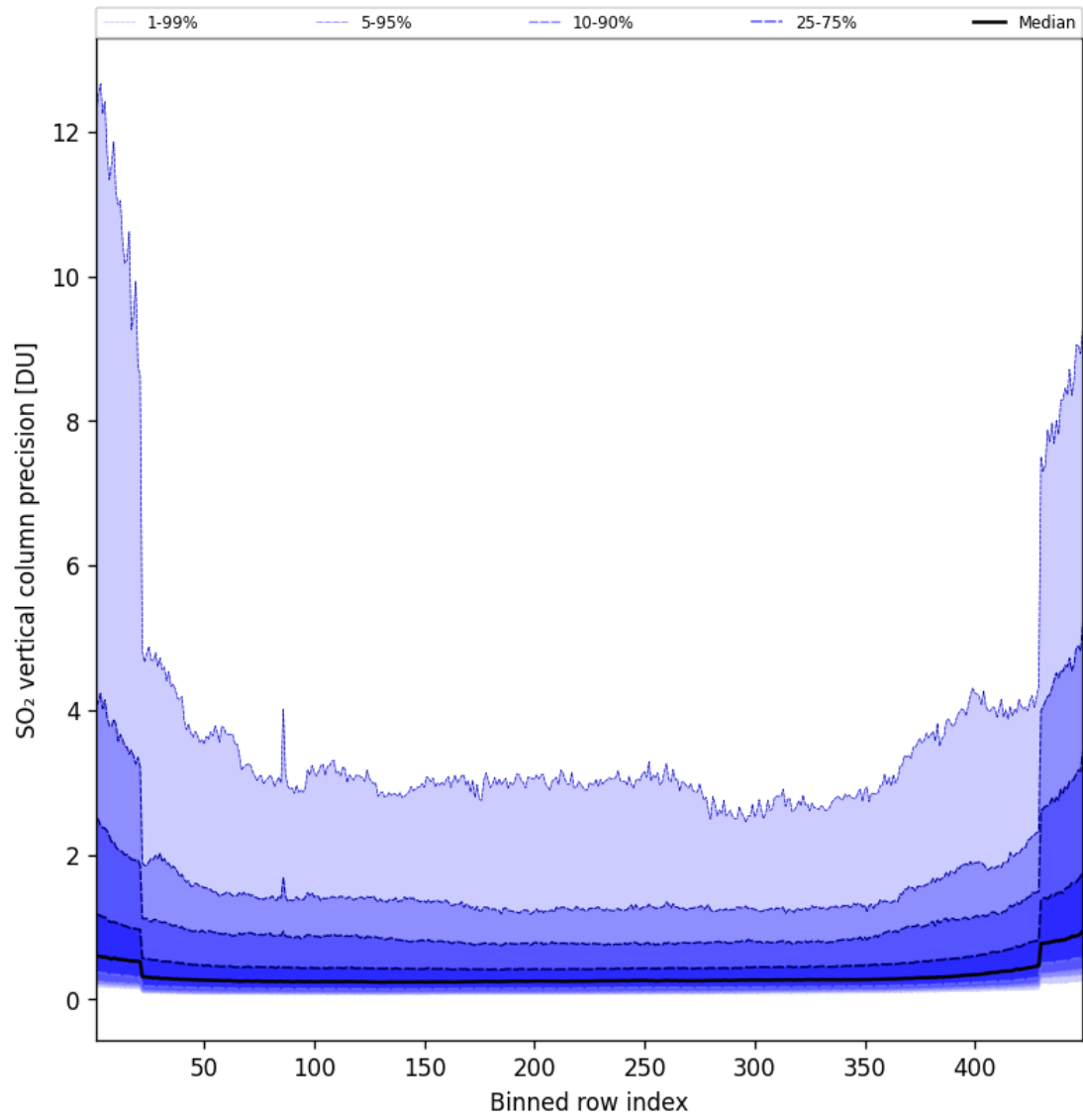


Figure 86: Along track statistics of “SO₂ vertical column precision” for 2024-12-20 to 2024-12-20

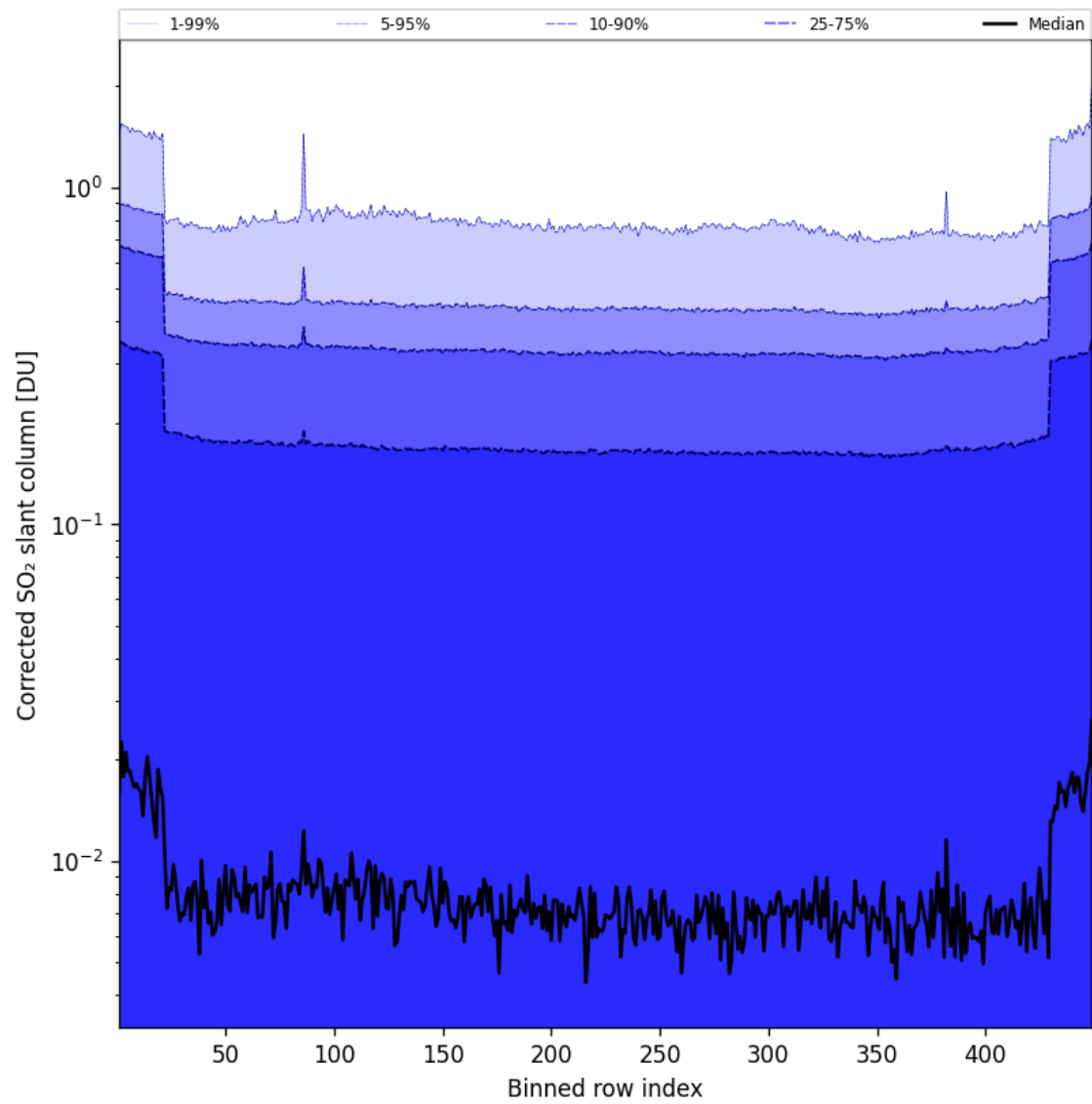


Figure 87: Along track statistics of "Corrected SO₂ slant column" for 2024-12-20 to 2024-12-20

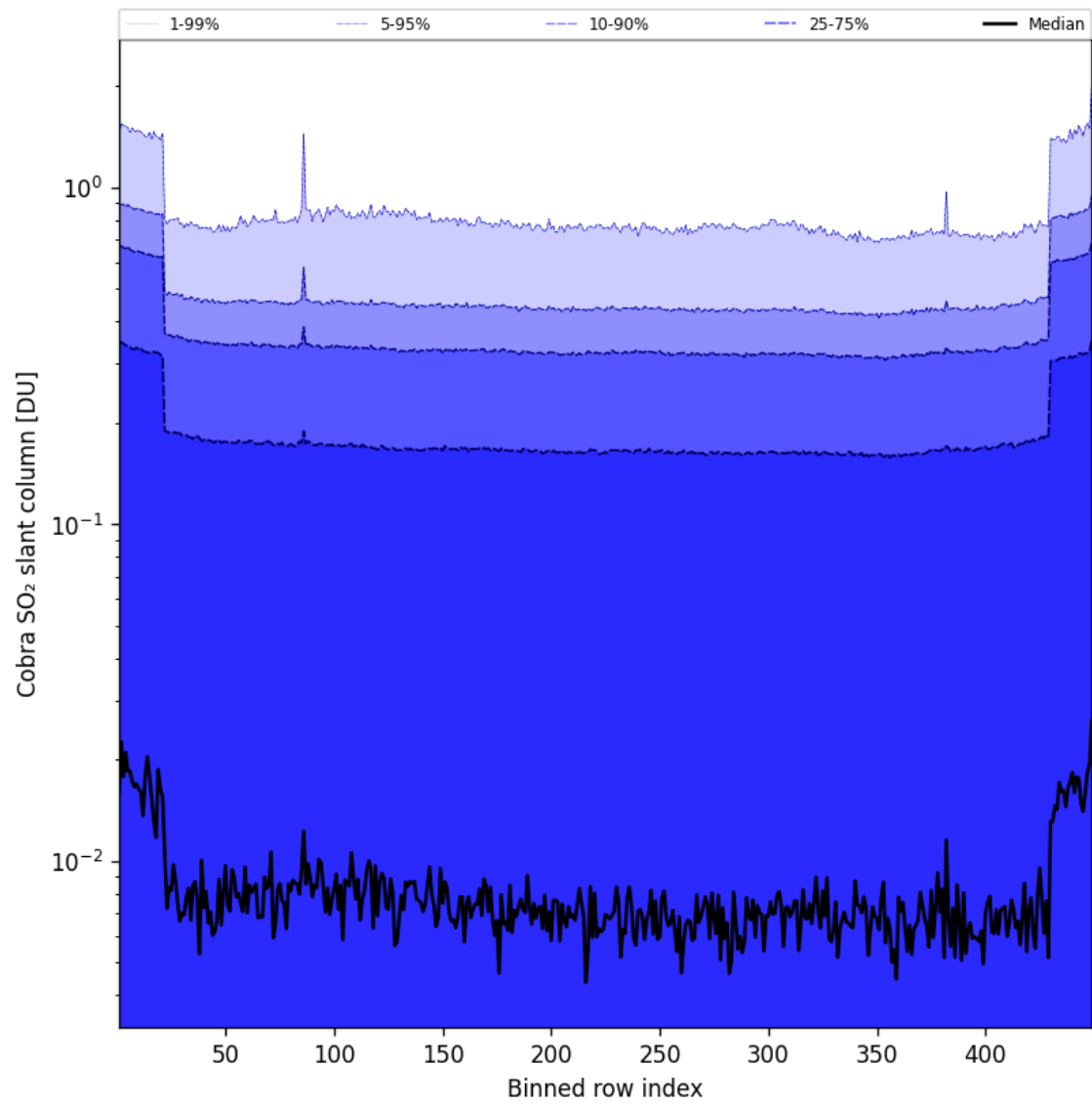


Figure 88: Along track statistics of “Cobra SO₂ slant column” for 2024-12-20 to 2024-12-20

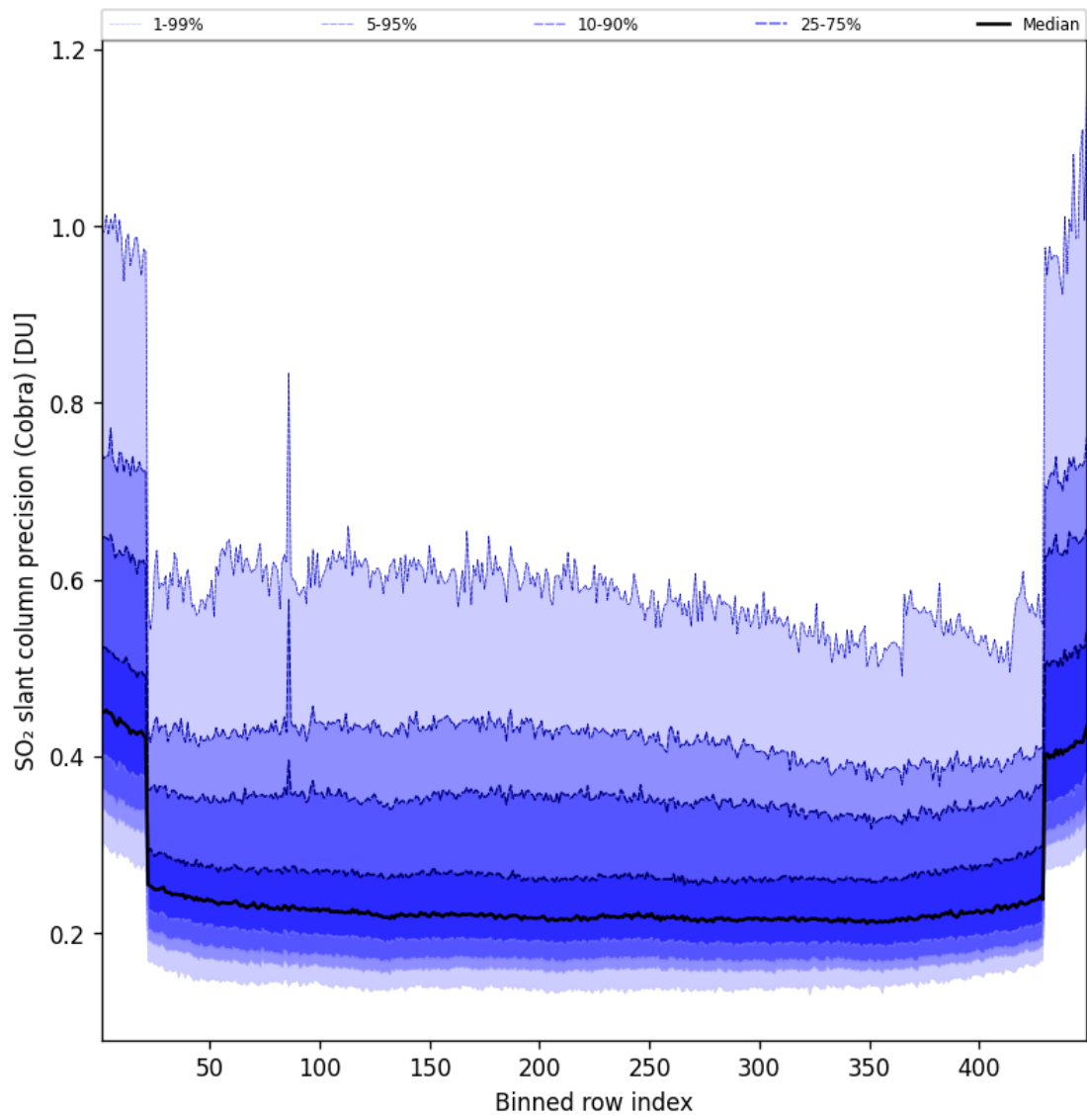


Figure 89: Along track statistics of “SO₂ slant column precision (Cobra)” for 2024-12-20 to 2024-12-20

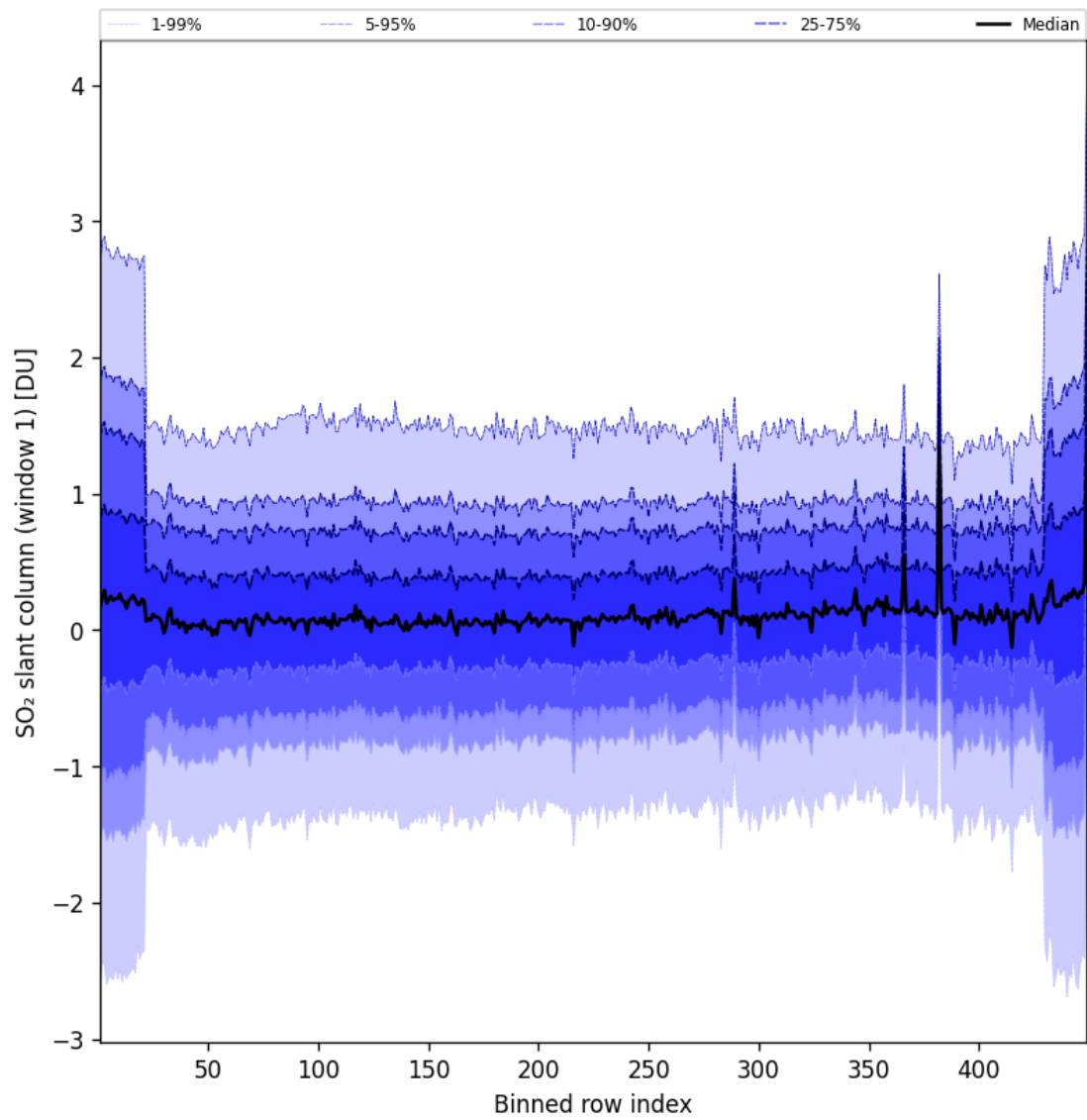


Figure 90: Along track statistics of “SO₂ slant column (window 1)” for 2024-12-20 to 2024-12-20

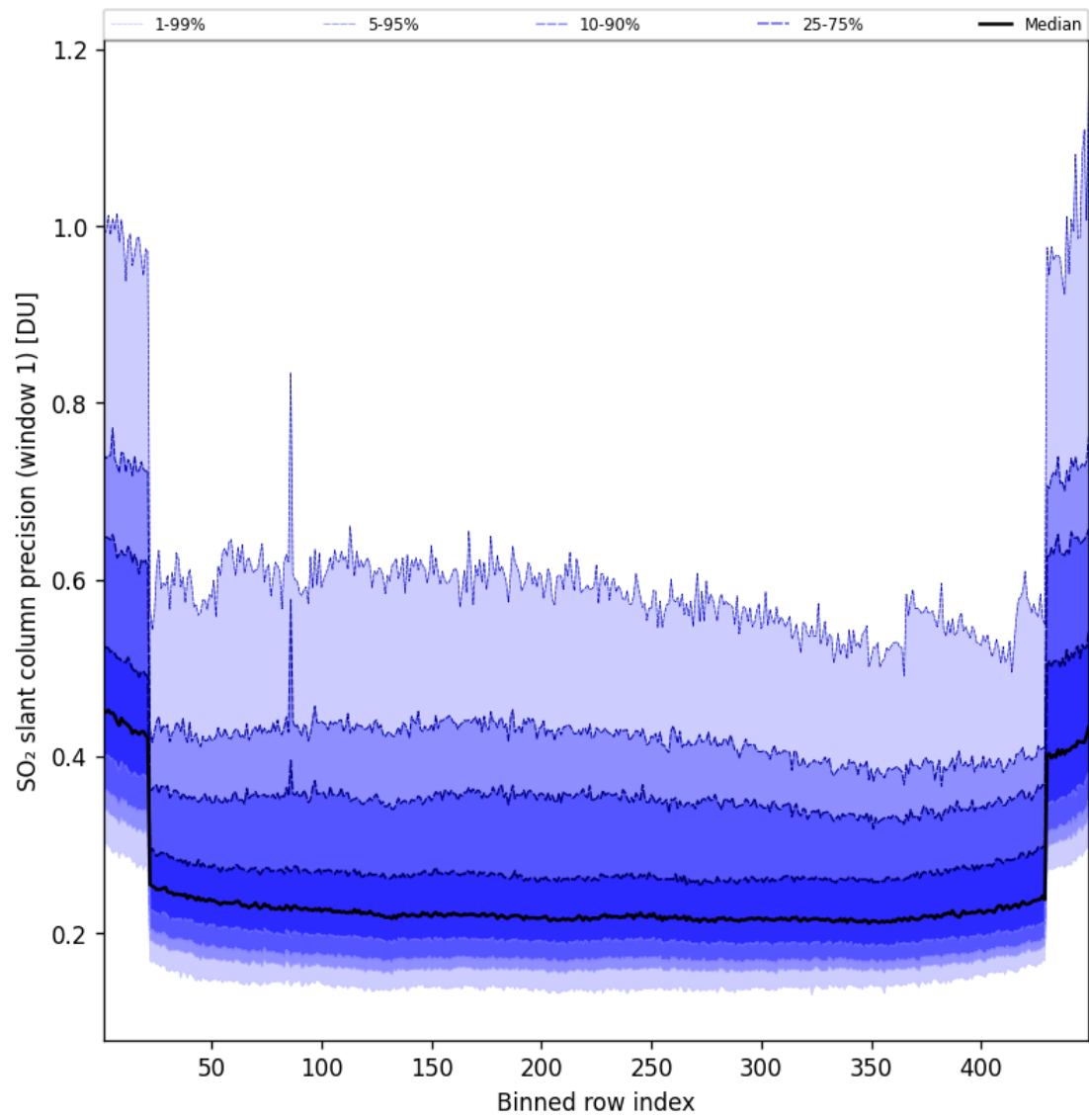


Figure 91: Along track statistics of "SO₂ slant column precision (window 1)" for 2024-12-20 to 2024-12-20

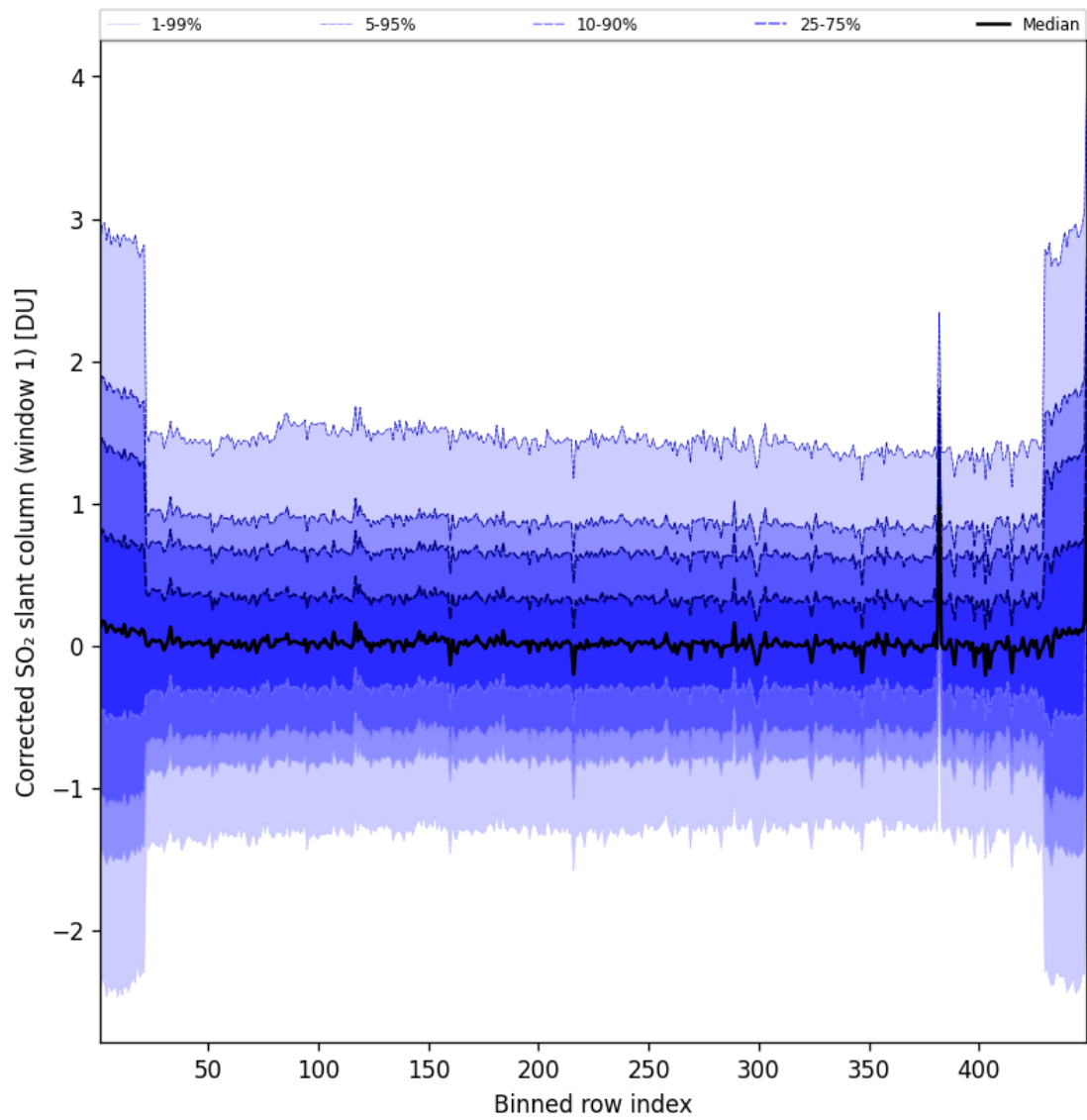


Figure 92: Along track statistics of “Corrected SO₂ slant column (window 1)” for 2024-12-20 to 2024-12-20

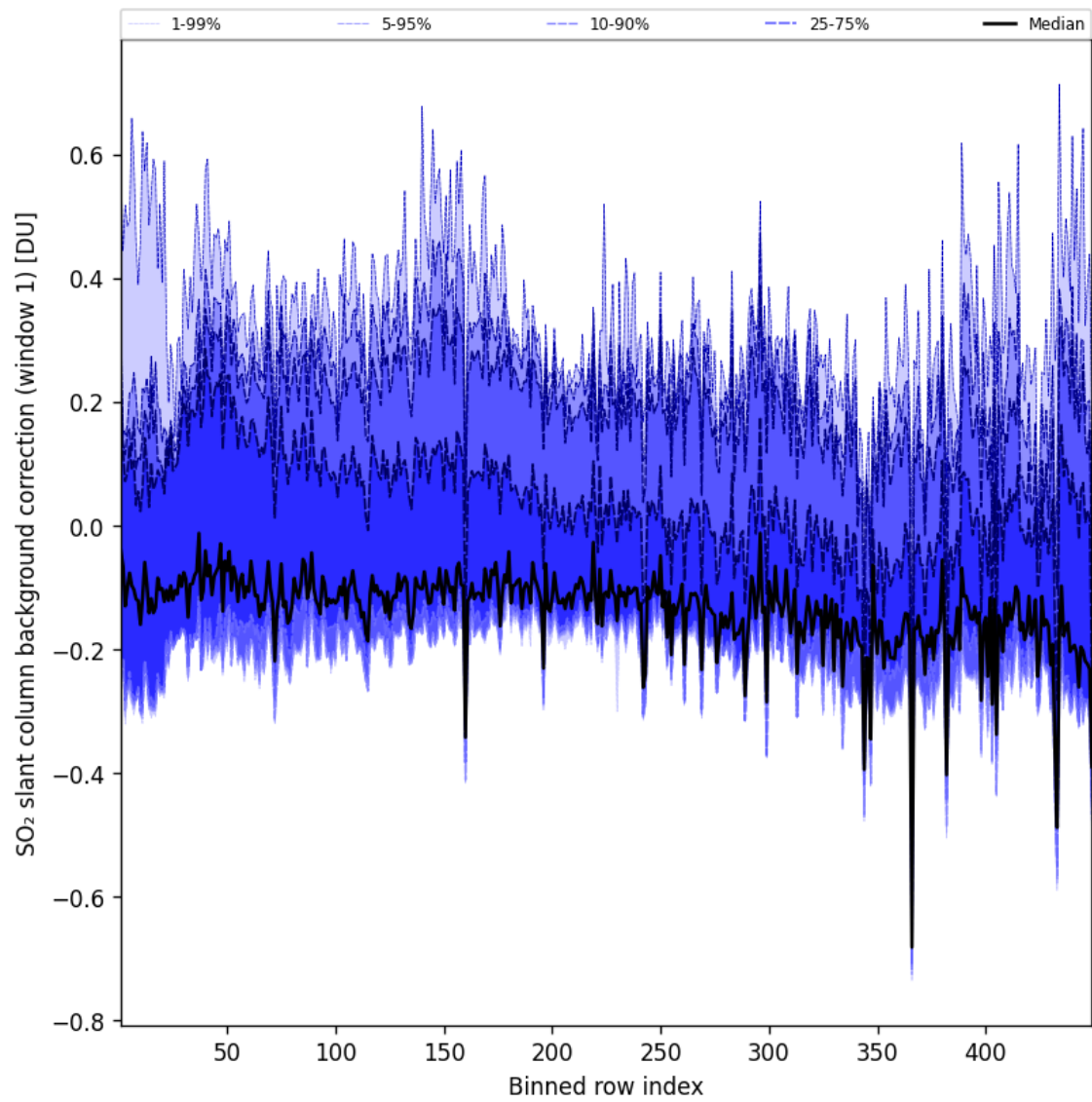


Figure 93: Along track statistics of “SO₂ slant column background correction (window 1)” for 2024-12-20 to 2024-12-20

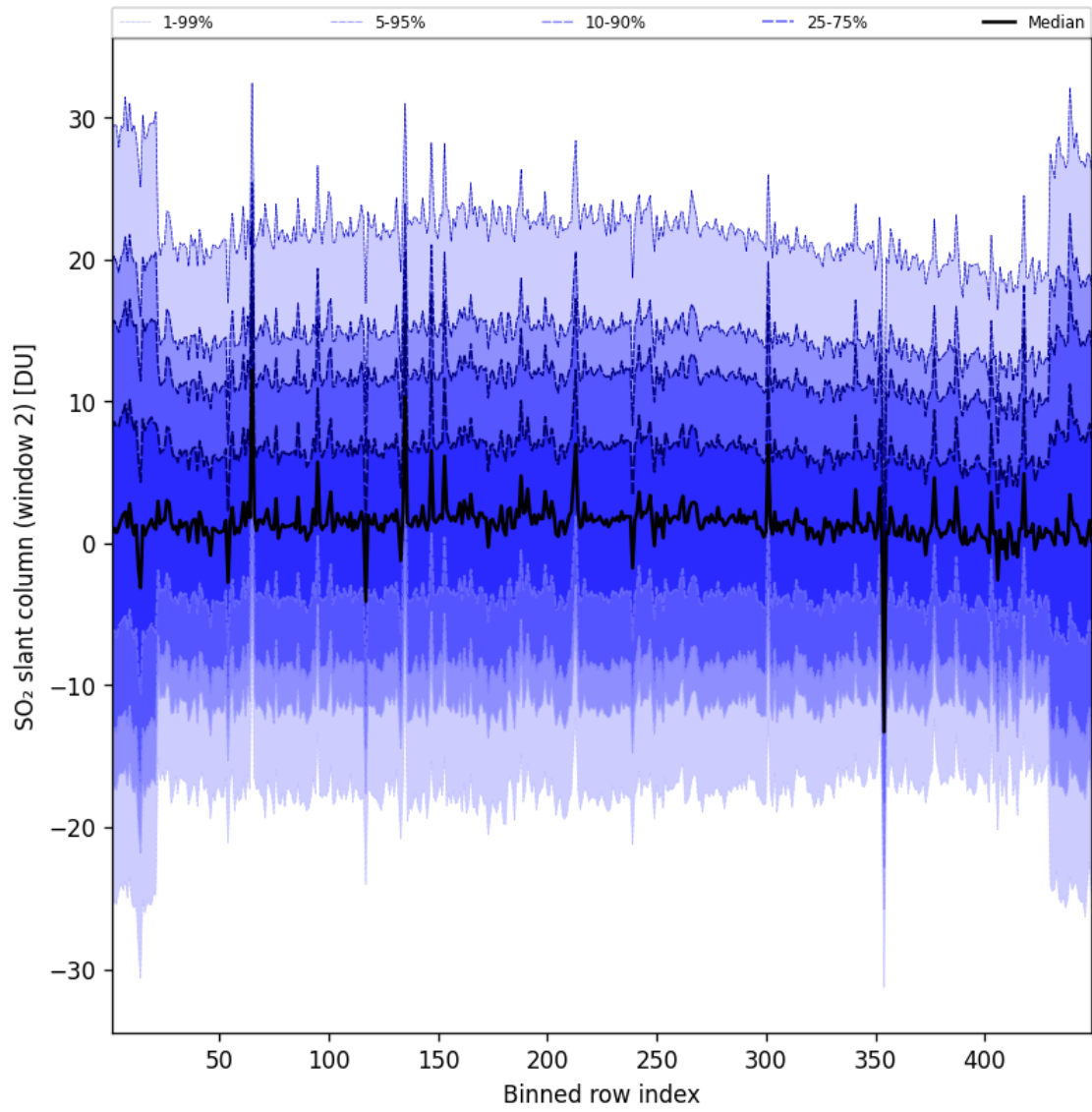


Figure 94: Along track statistics of “SO₂ slant column (window 2)” for 2024-12-20 to 2024-12-20

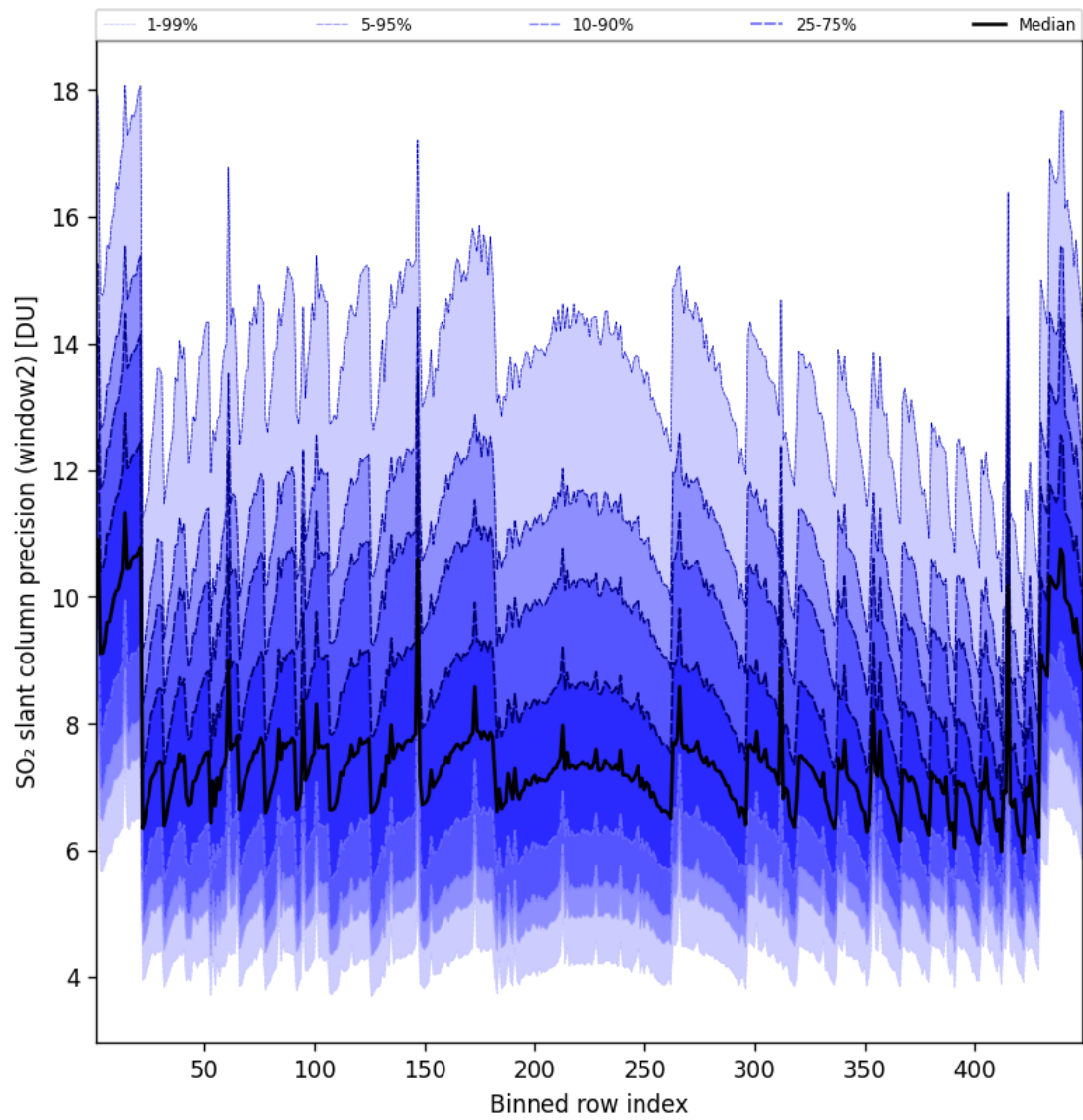


Figure 95: Along track statistics of “SO₂ slant column precision (window2)” for 2024-12-20 to 2024-12-20

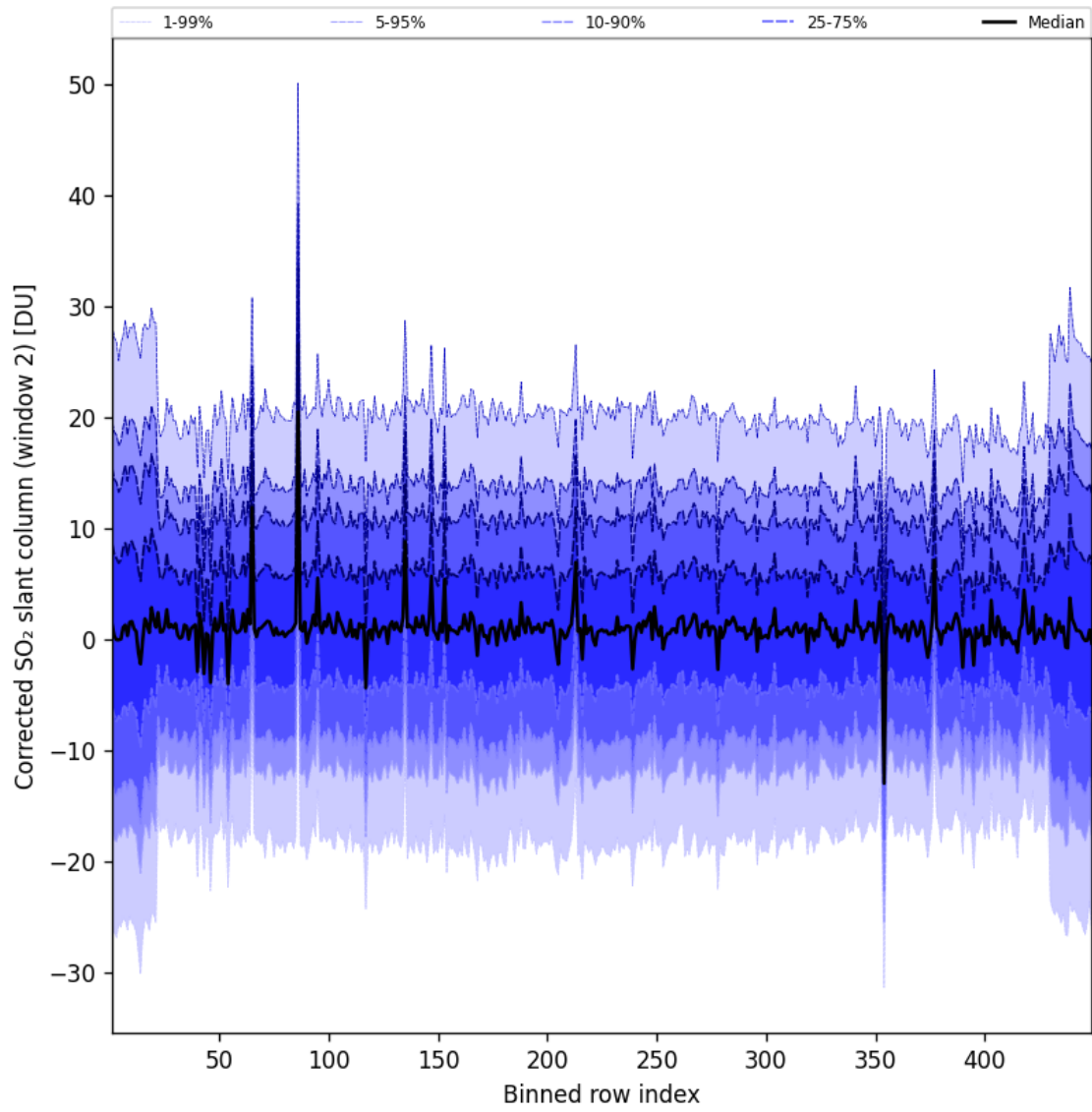


Figure 96: Along track statistics of “Corrected SO₂ slant column (window 2)” for 2024-12-20 to 2024-12-20

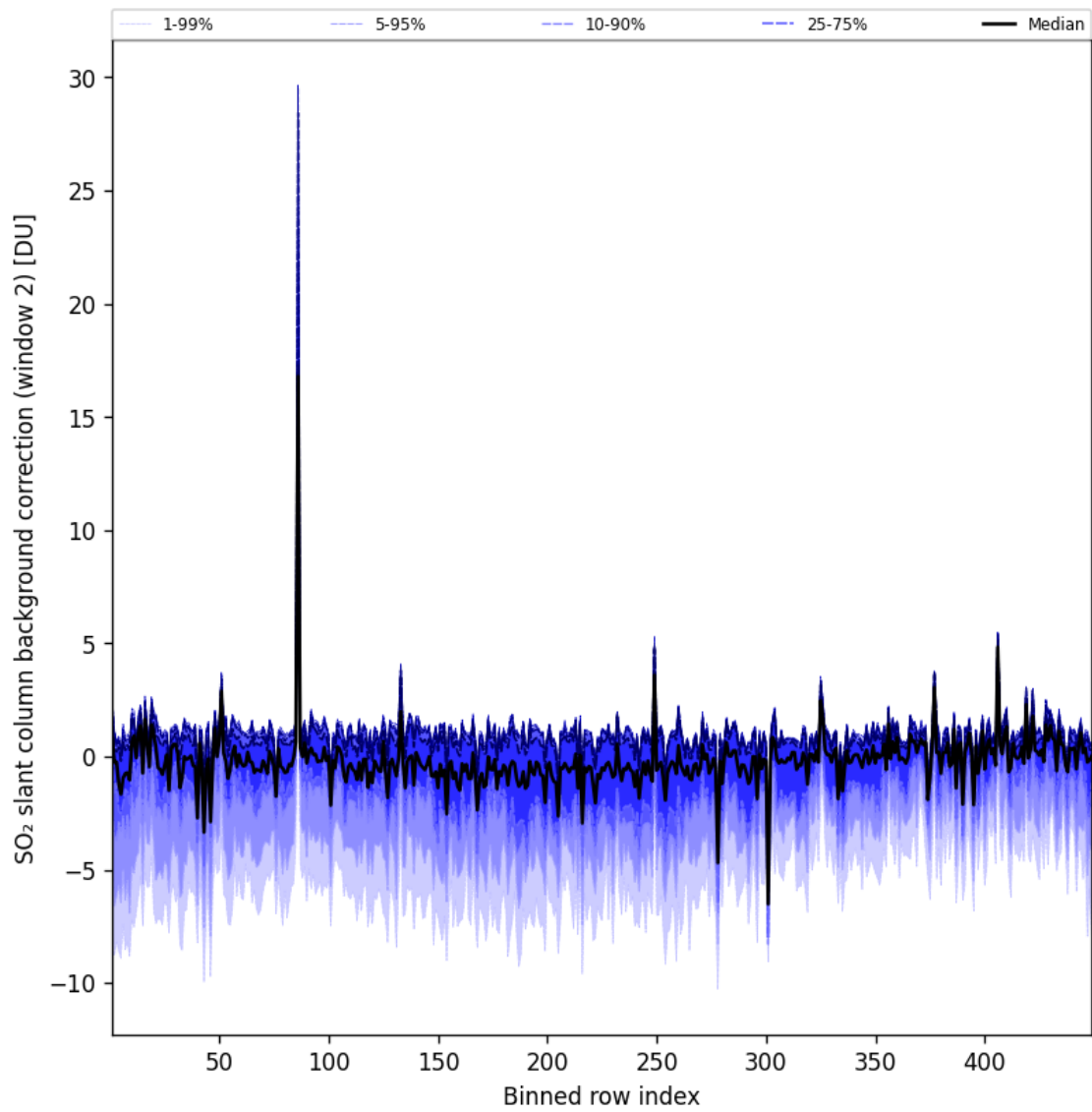


Figure 97: Along track statistics of “SO₂ slant column background correction (window 2)” for 2024-12-20 to 2024-12-20

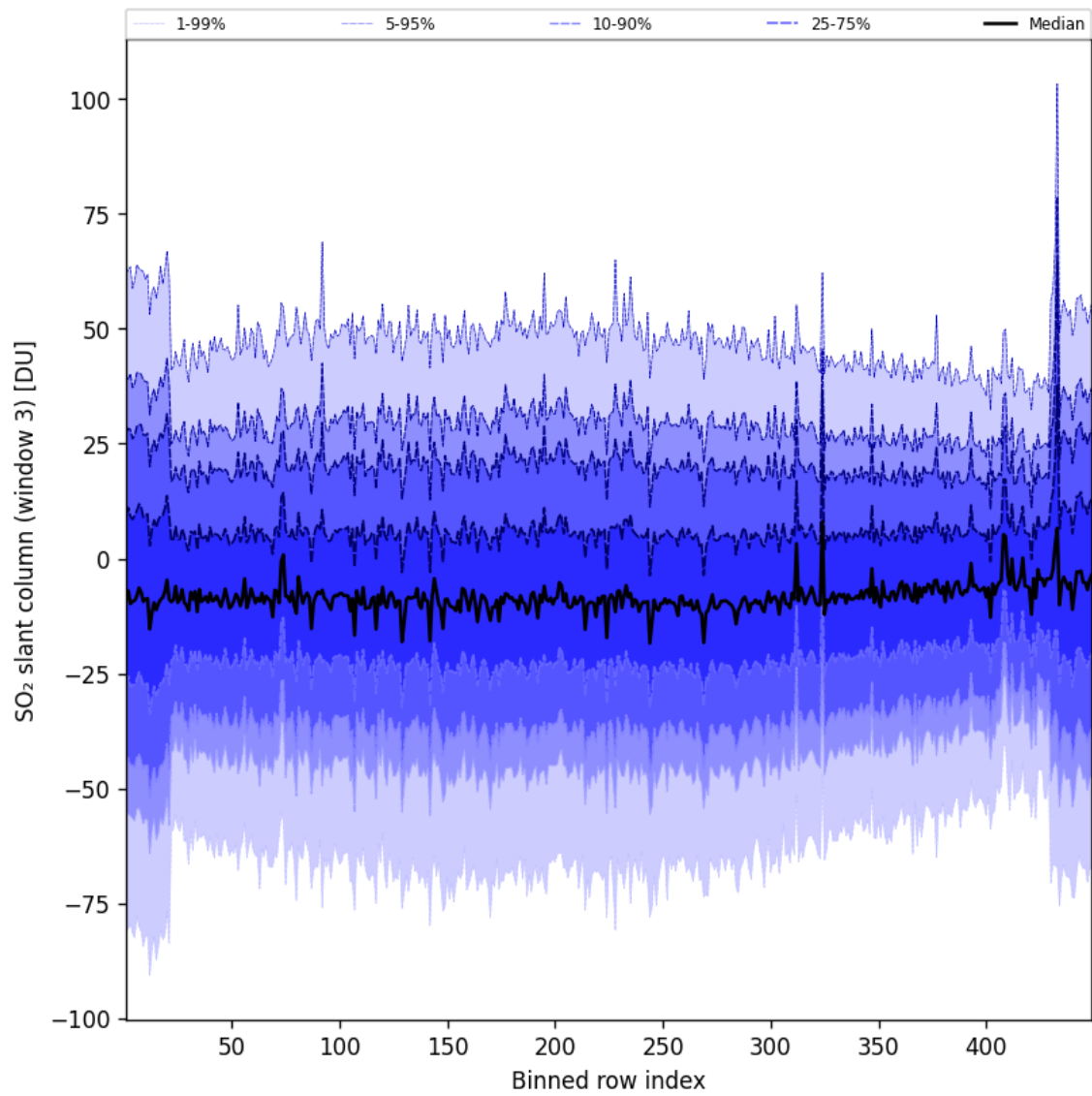


Figure 98: Along track statistics of “SO₂ slant column (window 3)” for 2024-12-20 to 2024-12-20

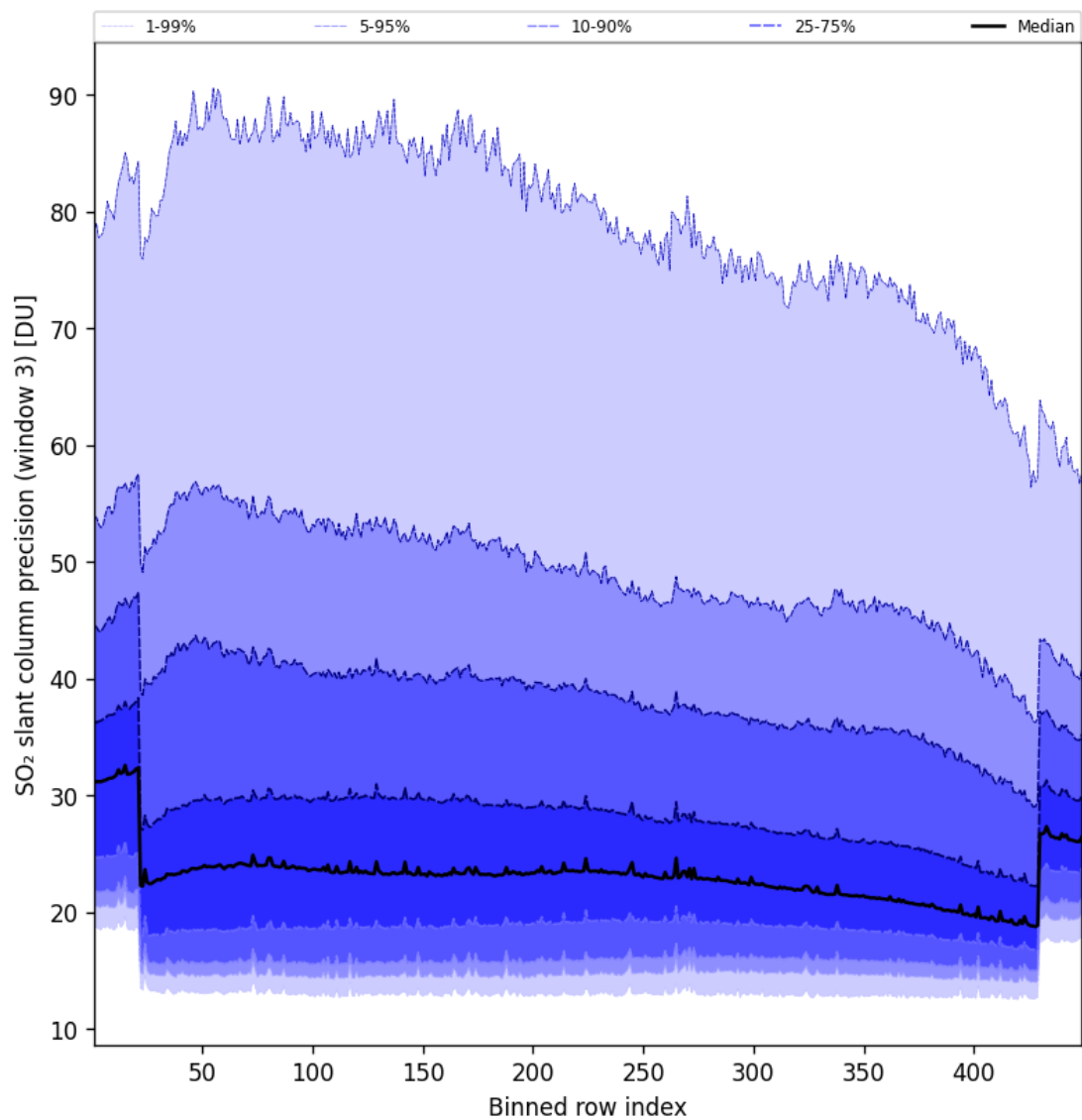


Figure 99: Along track statistics of “SO₂ slant column precision (window 3)” for 2024-12-20 to 2024-12-20

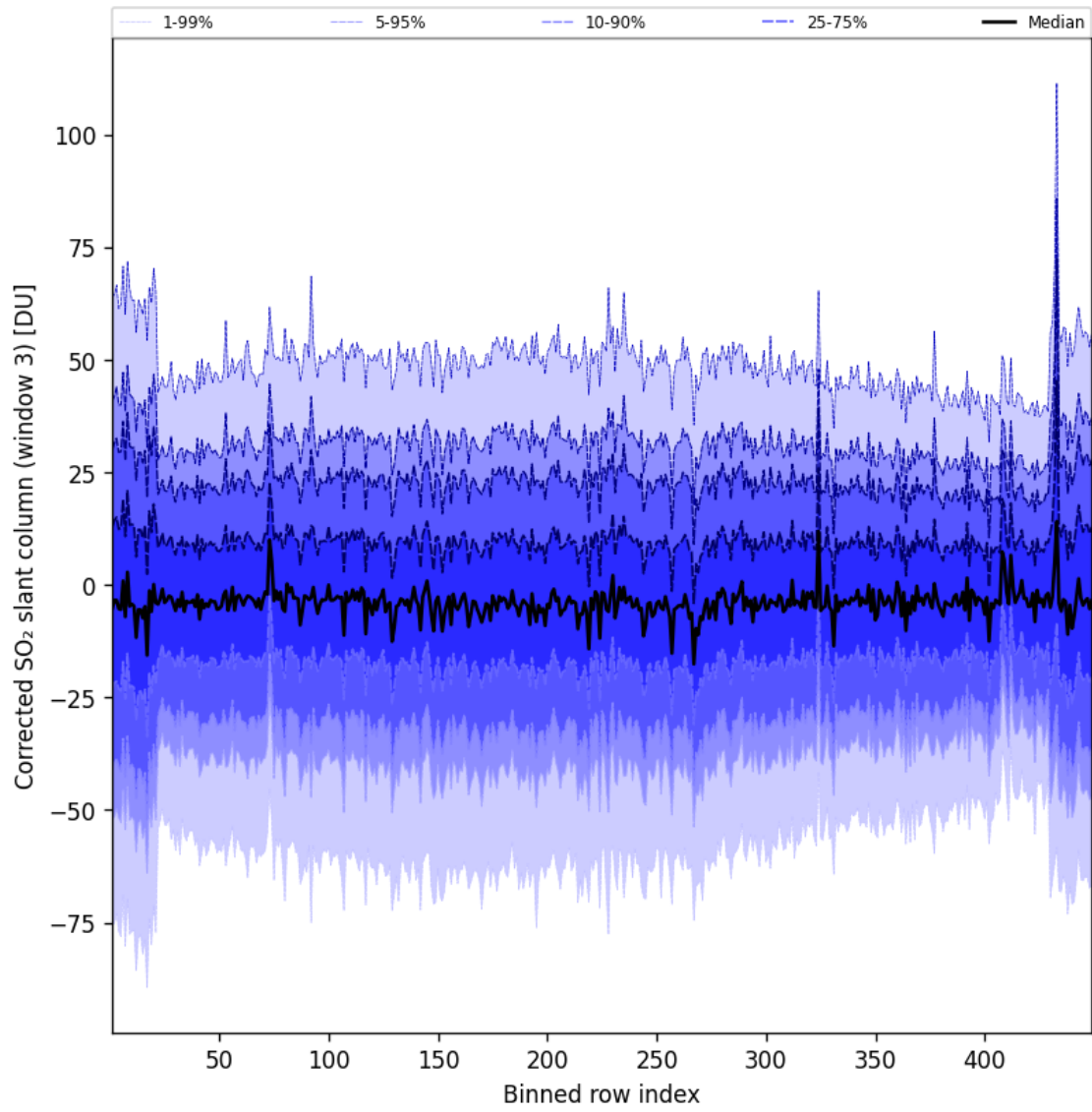


Figure 100: Along track statistics of “Corrected SO₂ slant column (window 3)” for 2024-12-20 to 2024-12-20

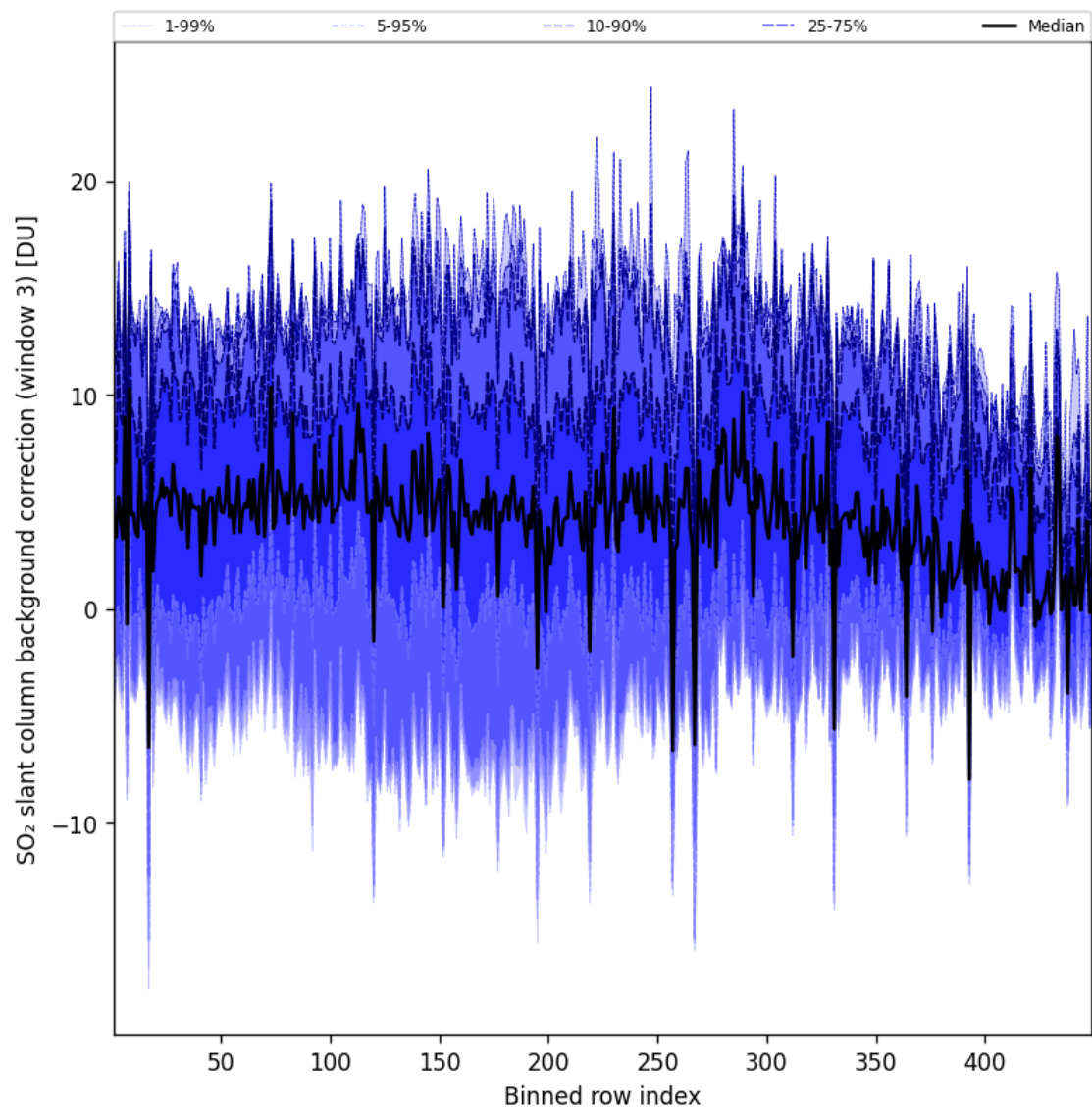


Figure 101: Along track statistics of “SO₂ slant column background correction (window 3)” for 2024-12-20 to 2024-12-20

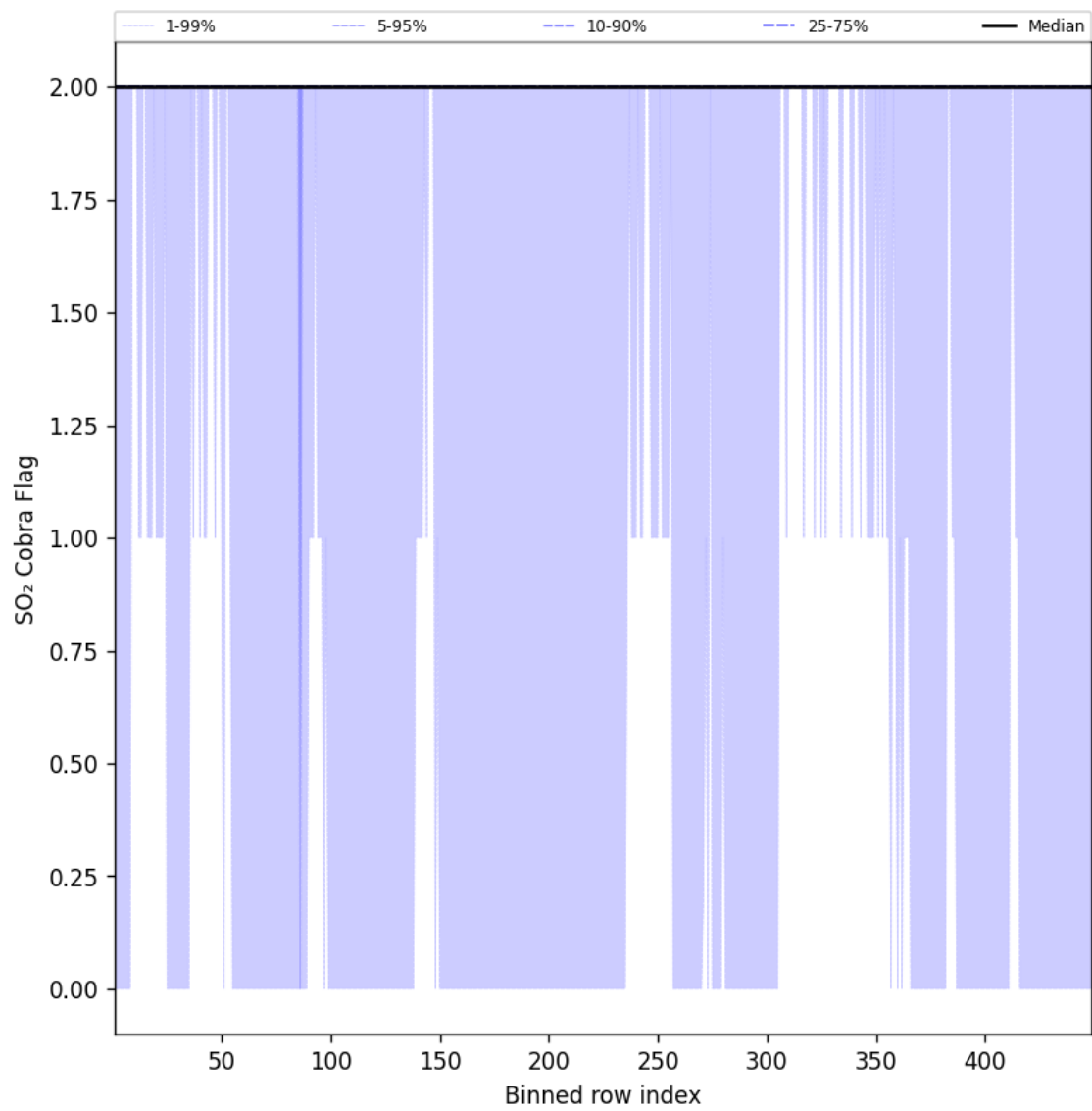


Figure 102: Along track statistics of “SO₂ Cobra Flag” for 2024-12-20 to 2024-12-20

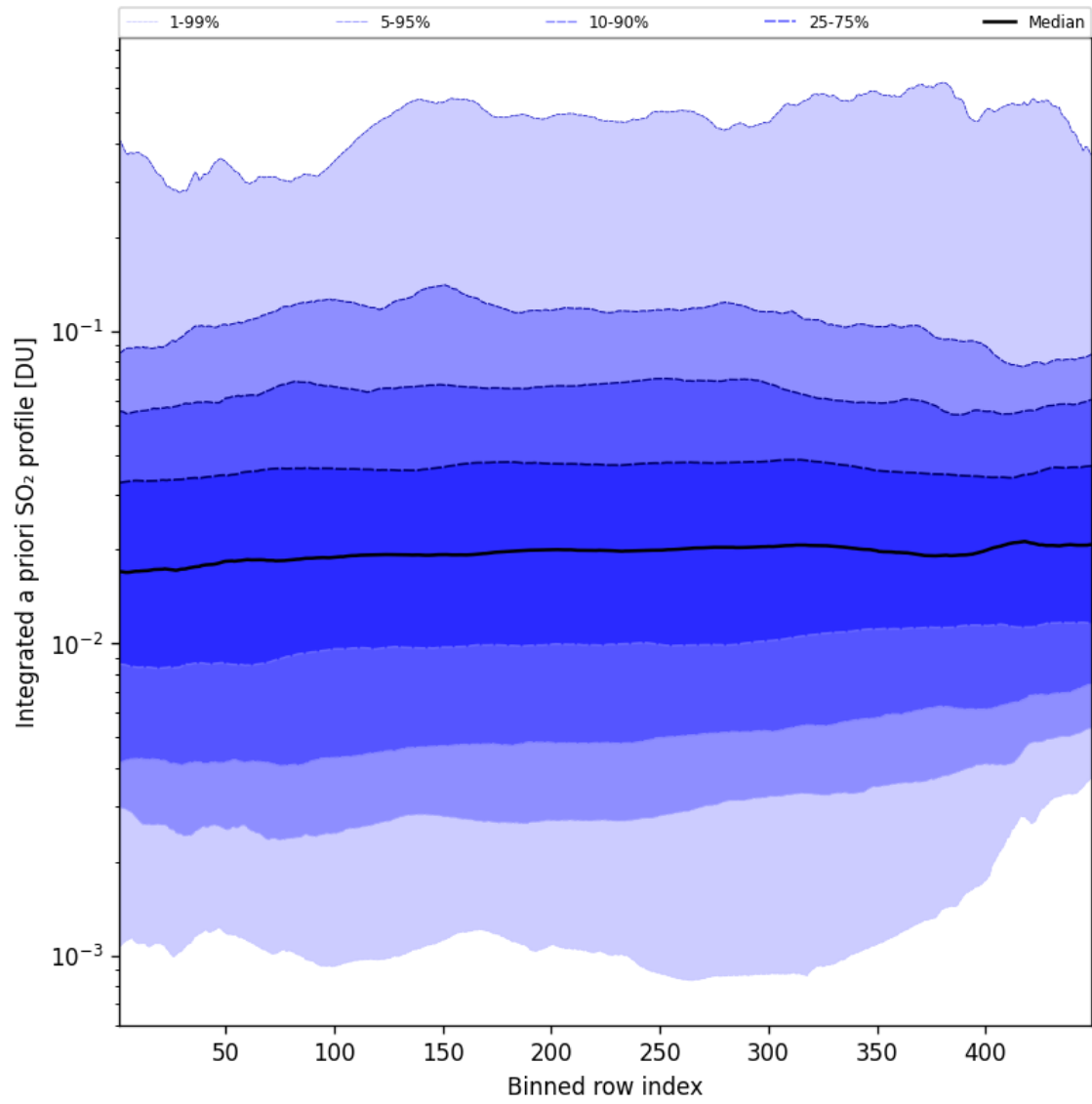


Figure 103: Along track statistics of “Integrated a priori SO₂ profile” for 2024-12-20 to 2024-12-20

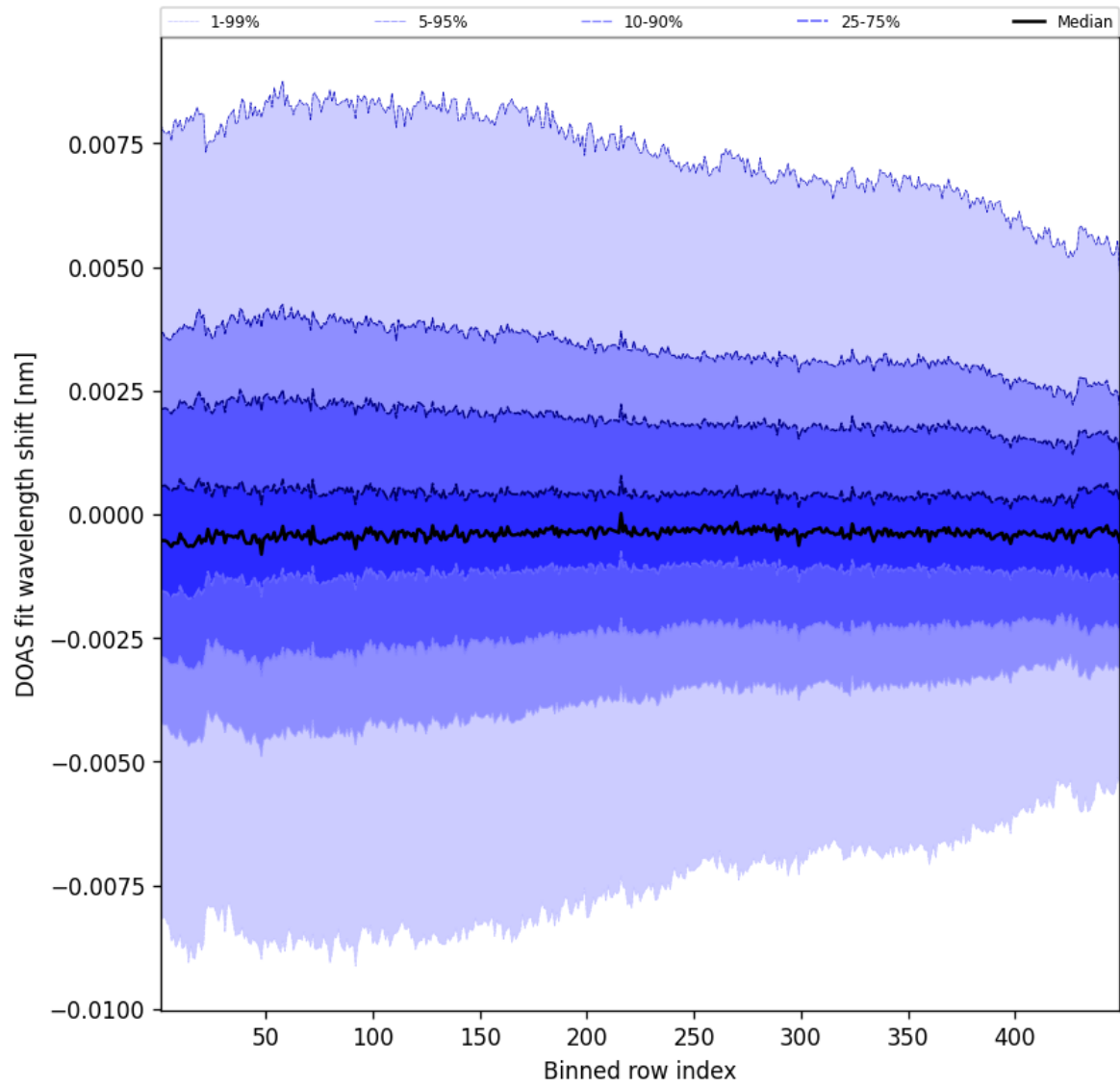


Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2024-12-20 to 2024-12-20

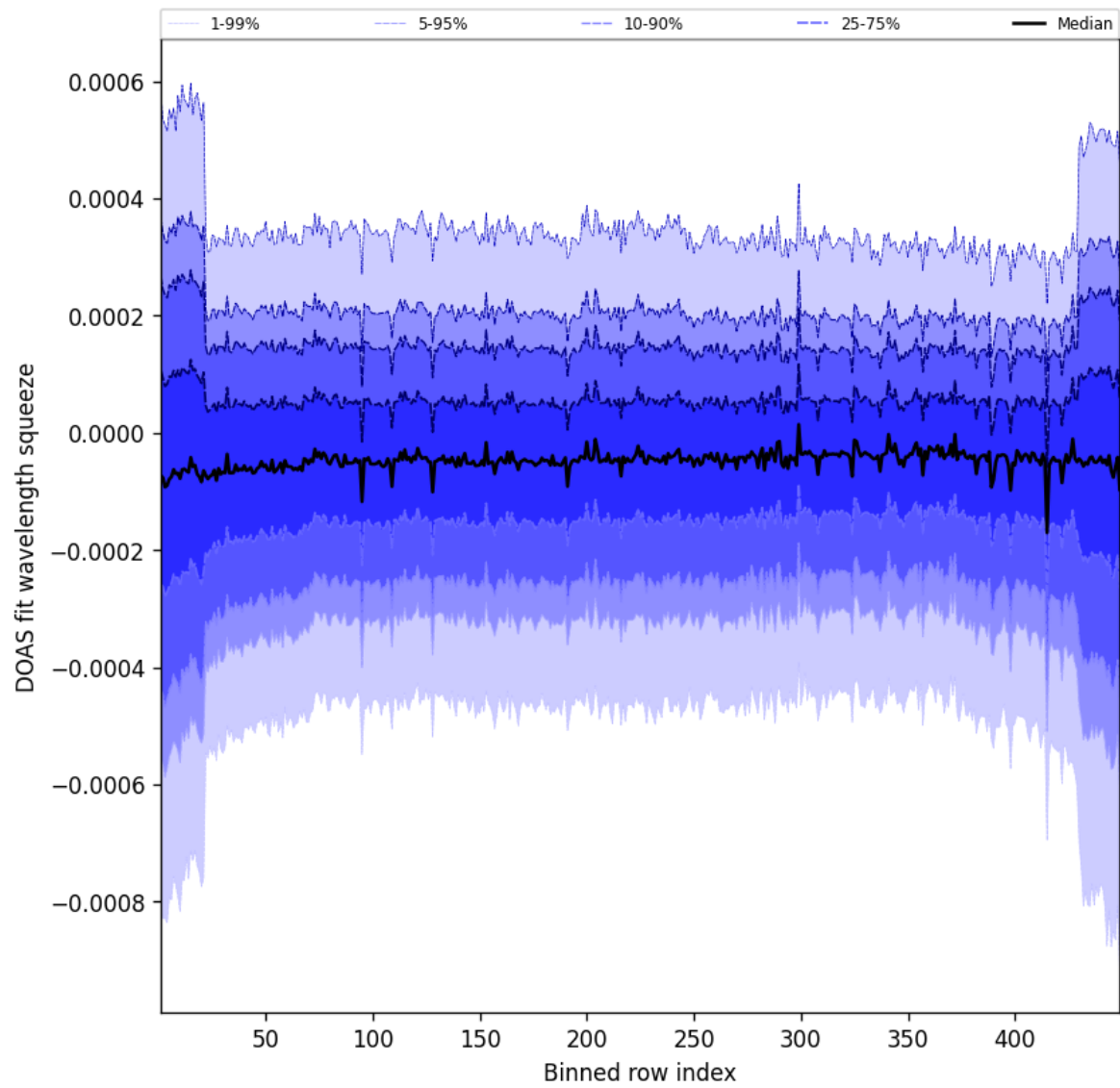


Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2024-12-20 to 2024-12-20

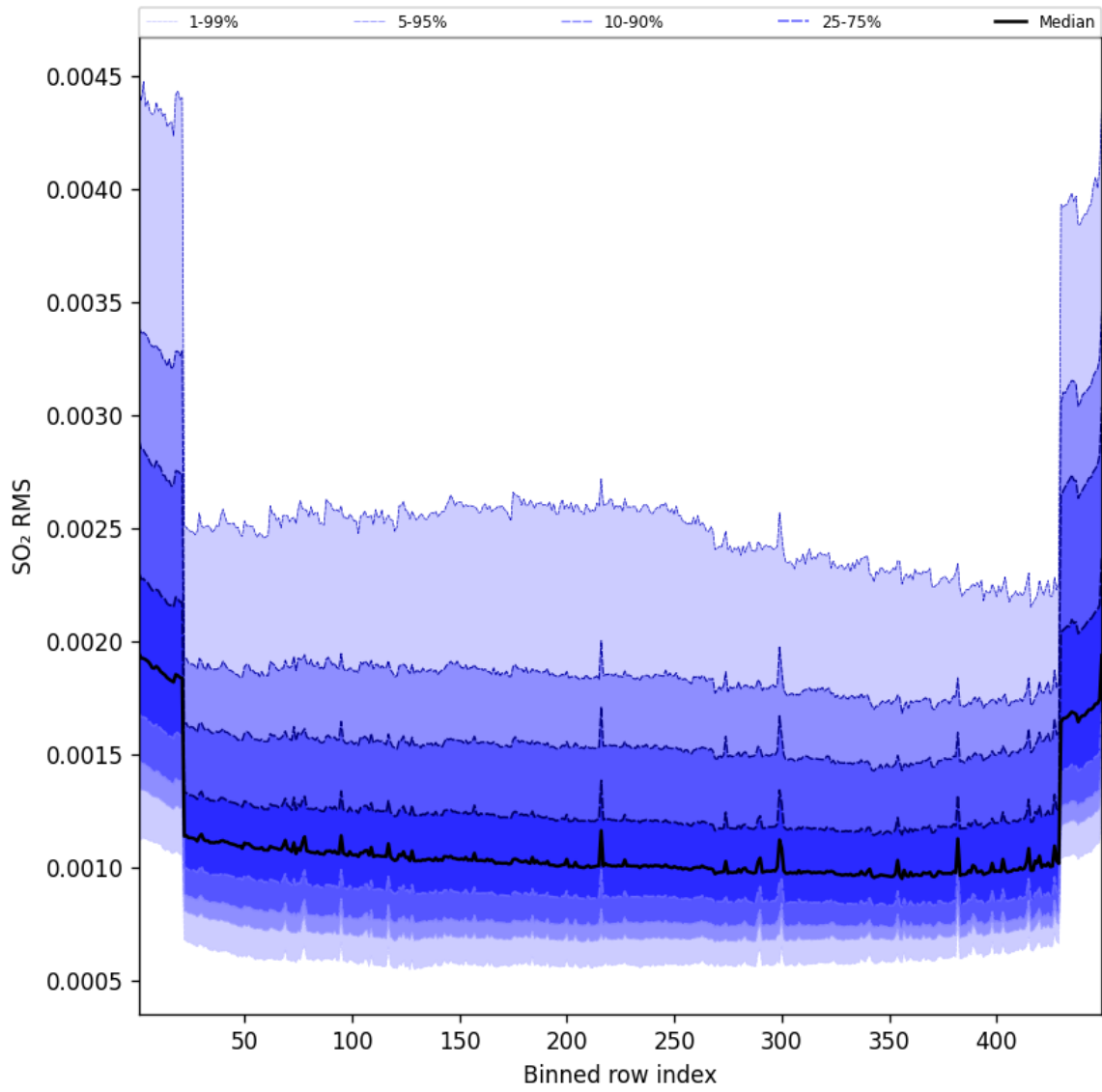


Figure 106: Along track statistics of “SO₂ RMS” for 2024-12-20 to 2024-12-20

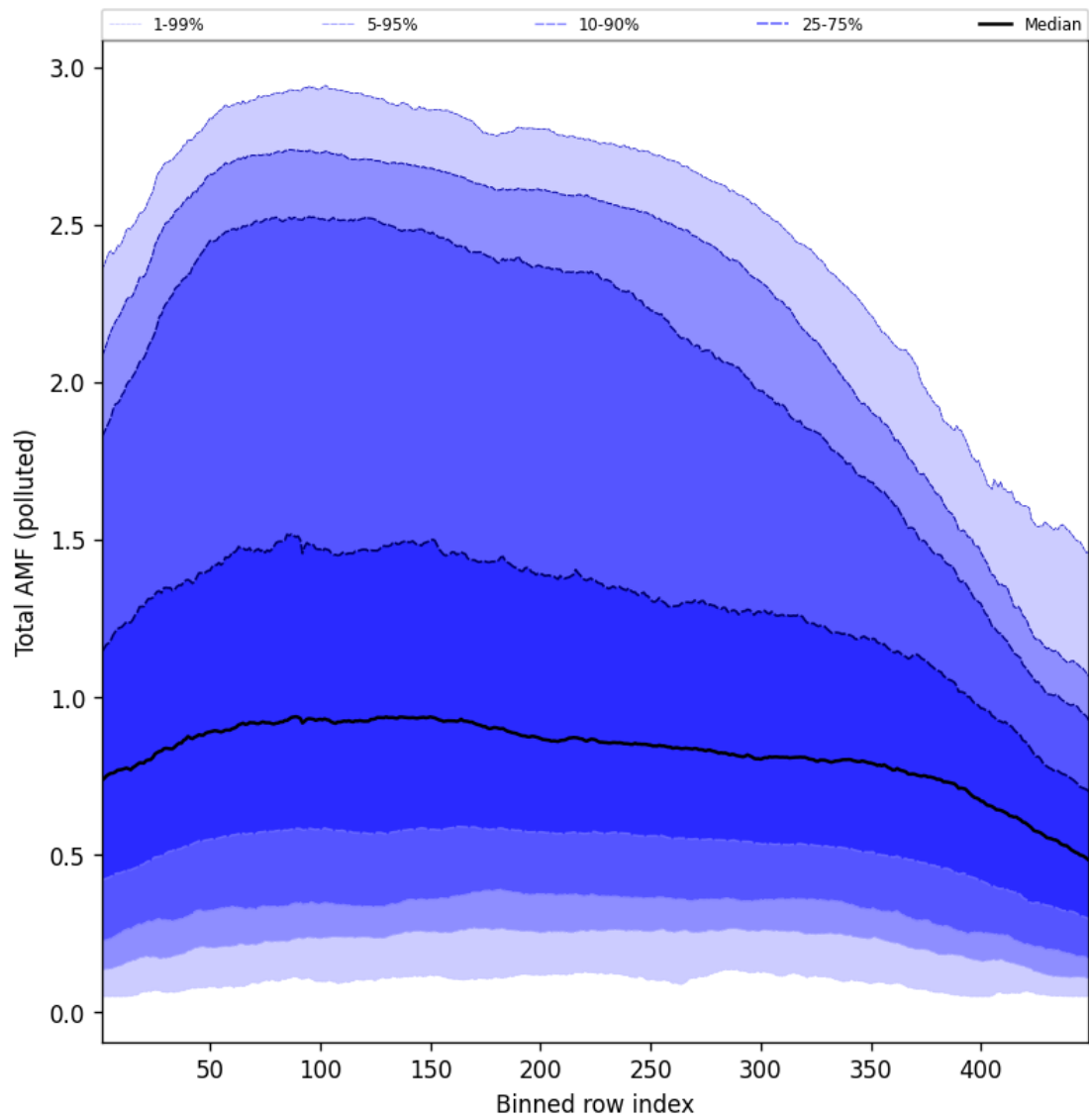


Figure 107: Along track statistics of “Total AMF (polluted)” for 2024-12-20 to 2024-12-20

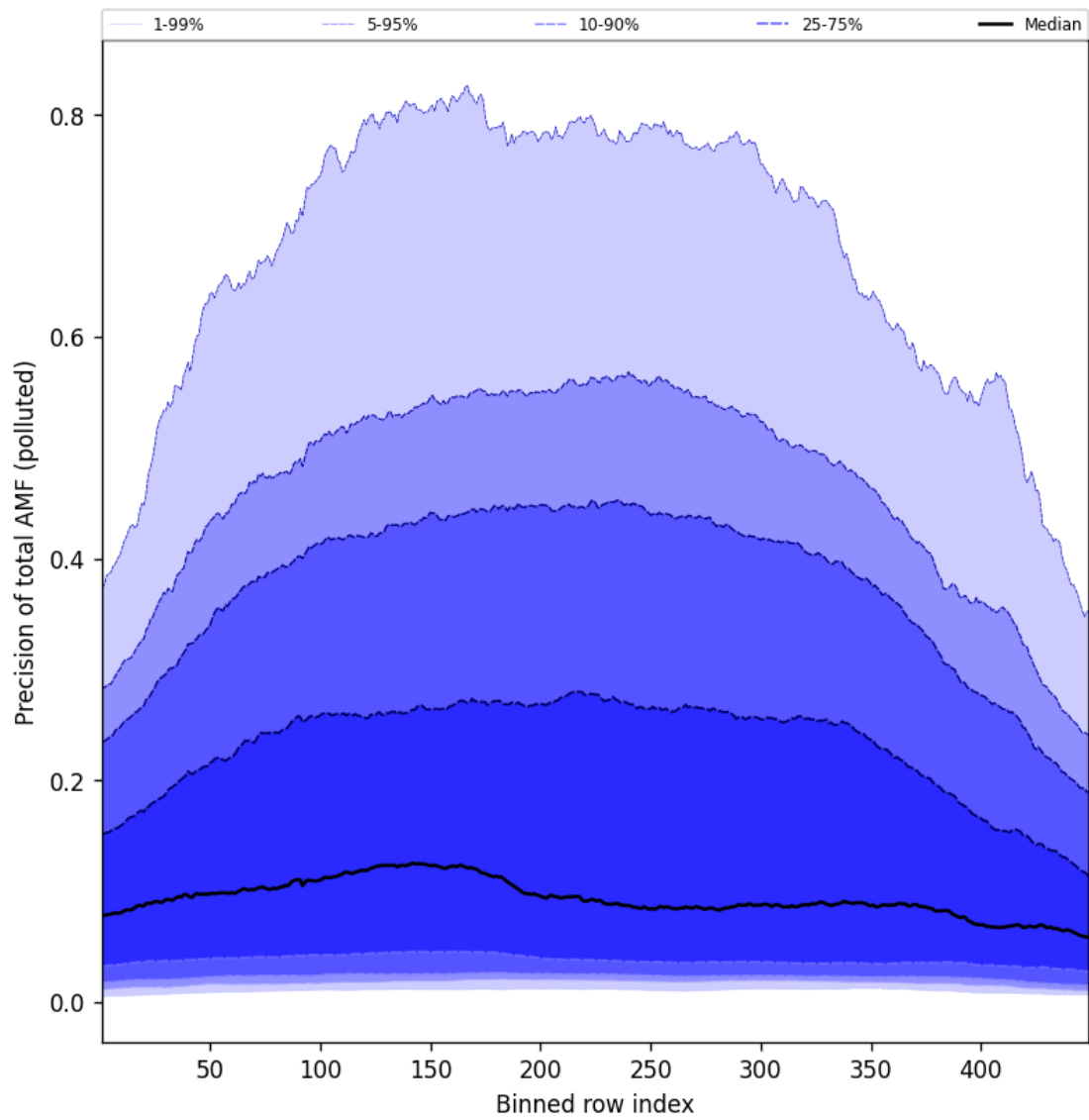


Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2024-12-20 to 2024-12-20

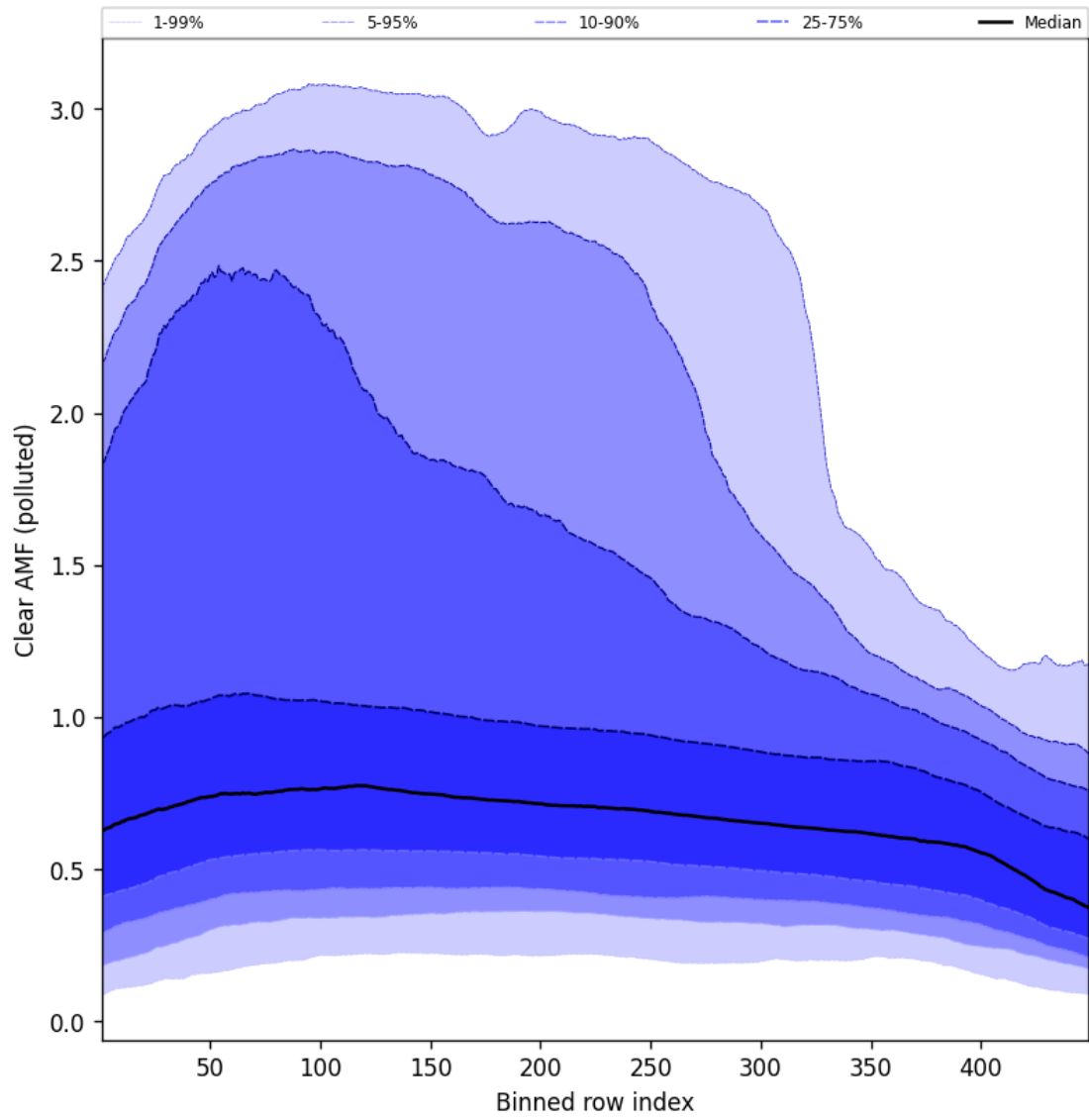


Figure 109: Along track statistics of “Clear AMF (polluted)” for 2024-12-20 to 2024-12-20

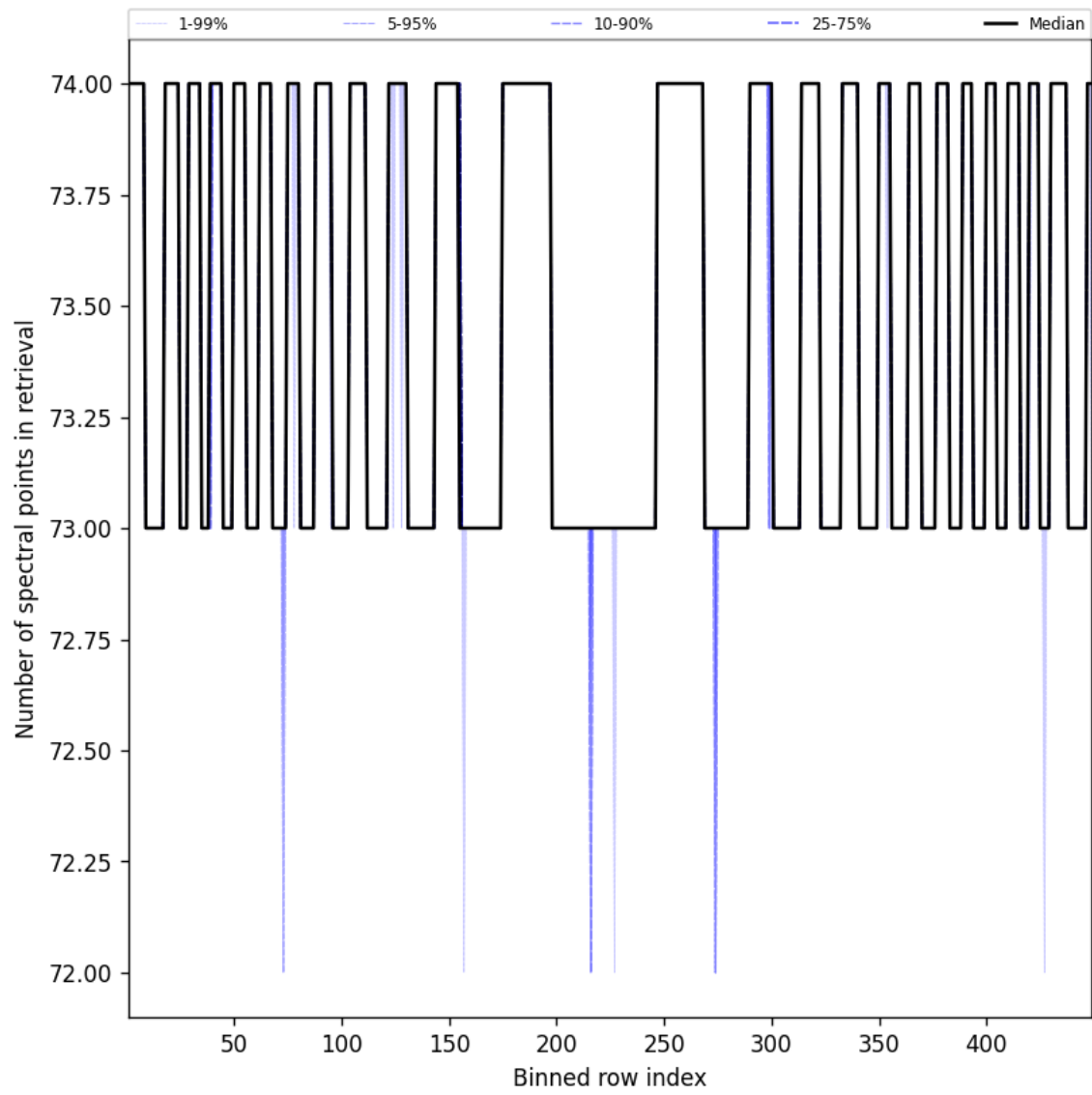


Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2024-12-20 to 2024-12-20

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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