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:

$$\overline{x} = \frac{1}{N}\sum_{i=1}^{N} x_i \tag{1}$$

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 $\sigma(x) = \sqrt{V(x)}$.

$$V(x) = \frac{1}{N-1}\sum_{i=1}^{N}(x_i - \overline{x})^2 \tag{2}$$

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:

$$P(x \leq m) = P(x \geq m) = \int_{-\infty}^{m} f(x)\,\mathrm{d}x = \frac{1}{2} \tag{3}$$

with $f(x)$ the probability density function.

The median is a special case of a percentile. Instead of ½ 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}.

$$C_{kl} = C(x_{(k)}, x_{(l)}) = \frac{1}{N-1}\sum_{i=1}^{N}(x_{(k),i} - \overline{x_{(k)}})(x_{(l),i} - \overline{x_{(l)}}) \tag{4}$$

Rather than a dimensionally dependent covariance, it is often easier to interpret a correlation matrix R_{kl}, a matrix of Pearson's r coefficients:

$$R_{kl} = R(x_{(k)}, x_{(l)}) = \frac{C_{kl}}{\sqrt{C_{kk}C_{ll}}} = \frac{C_{kl}}{\sqrt{V(x_k)V(x_l)}} \tag{5}$$

The diagonal elements of the covariance matrix are the variances of the elements, $V(x_{(k)}) = C_{kk}$ and obviously $R_{kk} = 1$.

Table 1: Parameterlist and basic statistics for the analysis

Variable	mean $\pm\sigma$	Count	Mode	IQR	Median	Minimum	Maximum
qa value [1]	0.595 ± 0.418	6062248	0.995	0.830	0.490	0.0	1.000
sulfurdioxide total vertical column [DU]	$(3.165 \pm 120.589) \times 10^{-2}$	6062248	0.223	0.394	8.190×10^{-3}	-137	470
sulfurdioxide total vertical column precision [DU]	0.524 ± 0.875	6062248	0.122	0.341	0.290	4.373×10^{-2}	63.4
sulfurdioxide slant column density corrected [DU]	$(1.412 \pm 35.760) \times 10^{-2}$	6062248	0.227	0.337	7.857×10^{-3}	-12.1	338
sulfurdioxide slant column density cobra [DU]	$(1.400 \pm 32.628) \times 10^{-2}$	6062248	0.227	0.337	7.857×10^{-3}	-12.1	73.8
sulfurdioxide slant column density cobra precision [DU]	0.267 ± 0.114	6062248	0.213	9.832×10^{-2}	0.233	8.781×10^{-2}	31.2
sulfurdioxide slant column density window1 [DU]	$(8.715 \pm 62.650) \times 10^{-2}$	6062248	0.125	0.698	9.190×10^{-2}	-213	63.4
sulfurdioxide slant column density window1 precision [DU]	0.267 ± 0.114	6062248	0.213	9.832×10^{-2}	0.233	8.781×10^{-2}	31.2
sulfurdioxide slant column density corrected win1 [DU]	$(-9.889 \pm 605.707) \times 10^{-3}$	6062248	-2.500×10^{-2}	0.664	-2.506×10^{-2}	-213	62.9
background so2 slant column offset window1 [DU]	$(-9.704 \pm 17.904) \times 10^{-2}$	6062248	-0.220	0.209	-0.153	-1.48	5.84
sulfurdioxide slant column density window2 [DU]	-0.482 ± 8.521	6062248	-0.750	10.6	-0.565	-1.802×10^{3}	800
sulfurdioxide slant column density window2 precision [DU]	7.70 ± 2.21	6062248	6.97	2.44	7.35	2.12	412
sulfurdioxide slant column density corrected win2 [DU]	-2.21 ± 8.40	6062248	-2.25	10.5	-2.21	-1.803×10^{3}	800
background so2 slant column offset window2 [DU]	-1.73 ± 2.14	6062248	-0.250	2.29	-1.18	-16.4	8.95
sulfurdioxide slant column density window3 [DU]	2.28 ± 22.55	6062248	1.68	27.9	1.99	-286	371
sulfurdioxide slant column density window3 precision [DU]	27.4 ± 12.6	6062248	20.3	9.63	23.9	11.0	263
sulfurdioxide slant column density corrected win3 [DU]	11.5 ± 21.9	6062248	10.6	27.1	11.6	-284	372
background so2 slant column offset window3 [DU]	9.25 ± 6.17	6062248	7.28	8.79	9.19	-17.5	31.1
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.22	6062248	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(2.308 \pm 4.467) \times 10^{-2}$	6062248	1.125×10^{-2}	1.332×10^{-2}	1.362×10^{-2}	6.361×10^{-4}	1.48
fitted radiance shift [nm]	$(-2.594 \pm 25.461) \times 10^{-4}$	6062248	-5.000×10^{-4}	1.782×10^{-3}	-3.163×10^{-4}	-4.339×10^{-2}	4.793×10^{-2}
fitted radiance squeeze [1]	$(-4.705 \pm 18.511) \times 10^{-5}$	6062248	-3.000×10^{-5}	2.162×10^{-4}	-3.962×10^{-5}	-1.459×10^{-2}	2.873×10^{-2}
fitted root mean square [1]	$(1.175 \pm 0.459) \times 10^{-3}$	6062248	9.250×10^{-4}	4.325×10^{-4}	1.052×10^{-3}	3.463×10^{-4}	9.873×10^{-2}
sulfurdioxide total air mass factor polluted [1]	0.950 ± 0.602	6062248	0.700	0.696	0.806	5.000×10^{-2}	3.01
sulfurdioxide total air mass factor polluted precision [1]	0.149 ± 0.151	6062248	3.500×10^{-2}	0.173	9.466×10^{-2}	2.963×10^{-3}	1.57
sulfurdioxide clear air mass factor polluted [1]	0.815 ± 0.528	6062248	0.620	0.458	0.677	3.292×10^{-2}	3.02
number of spectral points in retrieval [1]	73.4 ± 0.5	6062248	73.0	1.000	73.0	53.0	74.0

Table 2: Percentile ranges

Variable	1 %	5 %	10 %	15.9 %	25 %	75 %	84.1 %	90 %	95 %	99 %
qa value [1]	0.0	0.0	3.000×10^{-2}	8.000×10^{-2}	0.170	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	−2.58	−0.867	−0.503	−0.327	−0.186	0.207	0.357	0.547	0.955	3.01
sulfurdioxide total vertical column precision [DU]	8.340×10^{-2}	0.105	0.123	0.144	0.181	0.522	0.738	1.02	1.60	4.24
sulfurdioxide slant column density corrected [DU]	−0.770	−0.445	−0.326	−0.246	−0.159	0.178	0.267	0.353	0.484	0.873
sulfurdioxide slant column density cobra [DU]	−0.770	−0.445	−0.326	−0.246	−0.159	0.178	0.267	0.353	0.484	0.873
sulfurdioxide slant column density cobra precision [DU]	0.142	0.164	0.176	0.186	0.198	0.296	0.351	0.405	0.485	0.689
sulfurdioxide slant column density window1 [DU]	−1.51	−0.874	−0.621	−0.447	−0.262	0.436	0.613	0.780	1.03	1.70
sulfurdioxide slant column density window1 precision [DU]	0.142	0.164	0.176	0.186	0.198	0.296	0.351	0.405	0.485	0.689
sulfurdioxide slant column density corrected win1 [DU]	−1.46	−0.897	−0.675	−0.520	−0.353	0.311	0.489	0.661	0.922	1.65
background so2 slant column offset window1 [DU]	−0.374	−0.292	−0.262	−0.238	−0.216	-7.251×10^{-3}	9.761×10^{-2}	0.182	0.257	0.407
sulfurdioxide slant column density window2 [DU]	−20.5	−14.0	−10.8	−8.46	−5.84	4.77	7.45	9.90	13.3	20.6
sulfurdioxide slant column density window2 precision [DU]	4.25	4.99	5.44	5.81	6.27	8.72	9.55	10.4	11.6	14.2
sulfurdioxide slant column density corrected win2 [DU]	−22.4	−15.6	−12.4	−10.1	−7.44	3.02	5.63	7.99	11.2	18.0
background so2 slant column offset window2 [DU]	−8.57	−5.97	−4.61	−3.63	−2.66	−0.374	−0.116	0.115	0.524	2.57
sulfurdioxide slant column density window3 [DU]	−54.0	−34.0	−25.0	−18.6	−11.7	16.2	23.6	30.4	39.7	58.3
sulfurdioxide slant column density window3 precision [DU]	14.9	16.7	17.9	19.0	20.2	29.9	34.5	39.8	50.8	81.0
sulfurdioxide slant column density corrected win3 [DU]	−44.1	−24.2	−15.2	−8.82	−1.93	25.2	32.1	38.4	47.1	65.1
background so2 slant column offset window3 [DU]	−4.02	−0.919	0.900	2.66	5.07	13.9	15.9	17.5	19.0	21.4
sulfurdioxide slant column cobra flag [1]	0.0	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
integrated so2 profile apriori [DU]	1.426×10^{-3}	3.825×10^{-3}	5.692×10^{-3}	7.181×10^{-3}	8.849×10^{-3}	2.217×10^{-2}	3.003×10^{-2}	3.897×10^{-2}	6.286×10^{-2}	0.203
fitted radiance shift [nm]	-7.827×10^{-3}	-3.922×10^{-3}	-2.551×10^{-3}	-1.805×10^{-3}	-1.203×10^{-3}	5.786×10^{-4}	1.294×10^{-3}	2.175×10^{-3}	3.687×10^{-3}	7.807×10^{-3}
fitted radiance squeeze [1]	-5.426×10^{-4}	-3.524×10^{-4}	-2.700×10^{-4}	-2.125×10^{-4}	-1.517×10^{-4}	6.457×10^{-5}	1.167×10^{-4}	1.646×10^{-4}	2.330×10^{-4}	3.958×10^{-4}
fitted root mean square [1]	5.913×10^{-4}	7.084×10^{-4}	7.754×10^{-4}	8.279×10^{-4}	8.912×10^{-4}	1.324×10^{-3}	1.535×10^{-3}	1.741×10^{-3}	2.036×10^{-3}	2.850×10^{-3}
sulfurdioxide total air mass factor polluted [1]	8.027×10^{-2}	0.199	0.307	0.400	0.522	1.22	1.55	1.91	2.29	2.58
sulfurdioxide total air mass factor polluted precision [1]	9.117×10^{-3}	1.720×10^{-2}	2.344×10^{-2}	2.926×10^{-2}	3.720×10^{-2}	0.210	0.286	0.366	0.465	0.678
sulfurdioxide clear air mass factor polluted [1]	0.166	0.299	0.364	0.420	0.491	0.949	1.09	1.36	2.24	2.68
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]	0.721 ± 0.385	2014507	0.660	1.000	0.0	1.000	0.340	1.000
sulfurdioxide total vertical column [DU]	$(6.790 \pm 174.609) \times 10^{-2}$	2014507	0.591	1.516×10^{-2}	-137	140	-0.273	0.318
sulfurdioxide total vertical column precision [DU]	0.773 ± 1.188	2014507	0.569	0.441	5.703×10^{-2}	54.1	0.260	0.830
sulfurdioxide slant column density corrected [DU]	$(2.377 \pm 40.646) \times 10^{-2}$	2014507	0.387	1.127×10^{-2}	-7.10	37.9	-0.180	0.207
sulfurdioxide slant column density cobra [DU]	$(2.360 \pm 39.775) \times 10^{-2}$	2014507	0.387	1.127×10^{-2}	-7.10	17.3	-0.180	0.207
sulfurdioxide slant column density cobra precision [DU]	0.310 ± 0.135	2014507	0.139	0.268	0.102	13.3	0.223	0.362
sulfurdioxide slant column density window1 [DU]	0.176 ± 0.704	2014507	0.769	0.170	-11.1	19.8	-0.213	0.555
sulfurdioxide slant column density window1 precision [DU]	0.310 ± 0.135	2014507	0.139	0.268	0.102	13.3	0.223	0.362
sulfurdioxide slant column density corrected win1 [DU]	$(2.914 \pm 70.538) \times 10^{-2}$	2014507	0.764	1.915×10^{-3}	-11.3	19.7	-0.372	0.391
background so2 slant column offset window1 [DU]	-0.147 ± 0.132	2014507	0.111	-0.161	-0.853	1.82	-0.217	-0.106
sulfurdioxide slant column density window2 [DU]	$(-1.723 \pm 9459.248) \times 10^{-3}$	2014507	12.1	-0.231	-373	79.0	-6.19	5.92
sulfurdioxide slant column density window2 precision [DU]	8.61 ± 2.14	2014507	2.67	8.32	2.58	110	7.13	9.80
sulfurdioxide slant column density corrected win2 [DU]	-2.17 ± 9.24	2014507	11.9	-2.17	-379	73.1	-8.11	3.76
background so2 slant column offset window2 [DU]	-2.17 ± 2.61	2014507	2.75	-1.24	-16.4	8.95	-3.25	-0.500
sulfurdioxide slant column density window3 [DU]	$(-1.774 \pm 2492.143) \times 10^{-2}$	2014507	31.6	0.422	-165	149	-15.5	16.1
sulfurdioxide slant column density window3 precision [DU]	30.5 ± 12.4	2014507	10.1	27.3	11.3	214	23.4	33.4
sulfurdioxide slant column density corrected win3 [DU]	11.0 ± 24.5	2014507	31.1	11.2	-156	161	-4.39	26.7
background so2 slant column offset window3 [DU]	11.0 ± 5.1	2014507	7.64	9.98	-13.8	31.1	7.26	14.9
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.26	2014507	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(3.540 \pm 6.419) \times 10^{-2}$	2014507	2.125×10^{-2}	1.748×10^{-2}	1.349×10^{-3}	1.22	1.129×10^{-2}	3.254×10^{-2}
fitted radiance shift [nm]	$(-7.697 \pm 266.526) \times 10^{-5}$	2014507	1.837×10^{-3}	-1.125×10^{-4}	-3.276×10^{-2}	3.380×10^{-2}	-1.013×10^{-3}	8.238×10^{-4}
fitted radiance squeeze [1]	$(2.331 \pm 17.892) \times 10^{-5}$	2014507	2.114×10^{-4}	1.959×10^{-5}	-1.794×10^{-3}	1.623×10^{-3}	-8.441×10^{-5}	1.269×10^{-4}
fitted root mean square [1]	$(1.338 \pm 0.531) \times 10^{-3}$	2014507	5.567×10^{-4}	1.185×10^{-3}	3.688×10^{-4}	7.240×10^{-3}	9.884×10^{-4}	1.545×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.689 ± 0.369	2014507	0.512	0.635	5.000×10^{-2}	2.62	0.410	0.923
sulfurdioxide total air mass factor polluted precision [1]	$(7.906 \pm 9.117) \times 10^{-2}$	2014507	7.094×10^{-2}	4.612×10^{-2}	2.963×10^{-3}	1.43	2.790×10^{-2}	9.885×10^{-2}
sulfurdioxide clear air mass factor polluted [1]	0.653 ± 0.273	2014507	0.427	0.641	3.292×10^{-2}	1.50	0.439	0.866
number of spectral points in retrieval [1]	73.5 ± 0.5	2014507	1.000	73.0	53.0	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]	0.532 ± 0.419	4047741	0.880	0.430	0.0	1.000	0.120	1.000
sulfurdioxide total vertical column [DU]	$(1.361 \pm 81.212) \times 10^{-2}$	4047741	0.329	6.160×10^{-3}	-31.8	470	-0.157	0.171
sulfurdioxide total vertical column precision [DU]	0.400 ± 0.631	4047741	0.245	0.245	4.373×10^{-2}	63.4	0.154	0.399
sulfurdioxide slant column density corrected [DU]	$(9.308 \pm 330.506) \times 10^{-3}$	4047741	0.316	6.448×10^{-3}	-12.1	338	-0.151	0.165
sulfurdioxide slant column density cobra [DU]	$(9.220 \pm 283.973) \times 10^{-3}$	4047741	0.316	6.448×10^{-3}	-12.1	73.8	-0.151	0.165
sulfurdioxide slant column density cobra precision [DU]	0.246 ± 0.095	4047741	7.734×10^{-2}	0.219	8.781×10^{-2}	31.2	0.191	0.268
sulfurdioxide slant column density window1 [DU]	$(4.312 \pm 57.898) \times 10^{-2}$	4047741	0.664	5.797×10^{-2}	-213	63.4	-0.282	0.382
sulfurdioxide slant column density window1 precision [DU]	0.246 ± 0.095	4047741	7.734×10^{-2}	0.219	8.781×10^{-2}	31.2	0.191	0.268
sulfurdioxide slant column density corrected win1 [DU]	$(-2.931 \pm 54.837) \times 10^{-2}$	4047741	0.622	-3.613×10^{-2}	-213	62.9	-0.345	0.277
background so2 slant column offset window1 [DU]	$(-7.243 \pm 19.357) \times 10^{-2}$	4047741	0.279	-0.143	-1.48	5.84	-0.216	6.301×10^{-2}
sulfurdioxide slant column density window2 [DU]	-0.721 ± 8.003	4047741	9.97	-0.701	-1.802×10^{3}	800	-5.69	4.28
sulfurdioxide slant column density window2 precision [DU]	7.24 ± 2.11	4047741	2.09	6.94	2.12	412	6.00	8.08
sulfurdioxide slant column density corrected win2 [DU]	-2.23 ± 7.94	4047741	9.85	-2.23	-1.803×10^{3}	800	-7.16	2.69
background so2 slant column offset window2 [DU]	-1.51 ± 1.83	4047741	2.19	-1.15	-11.9	8.59	-2.50	-0.310
sulfurdioxide slant column density window3 [DU]	3.43 ± 21.17	4047741	26.4	2.64	-286	371	-10.1	16.3
sulfurdioxide slant column density window3 precision [DU]	25.9 ± 12.4	4047741	7.78	22.2	11.0	263	19.4	27.2
sulfurdioxide slant column density corrected win3 [DU]	11.8 ± 20.4	4047741	25.4	11.7	-284	372	-0.883	24.5
background so2 slant column offset window3 [DU]	8.37 ± 6.47	4047741	10.3	8.62	-17.5	25.9	3.14	13.4
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.20	4047741	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(1.695 \pm 2.871) \times 10^{-2}$	4047741	1.112×10^{-2}	1.210×10^{-2}	6.361×10^{-4}	1.48	7.980×10^{-3}	1.910×10^{-2}
fitted radiance shift [nm]	$(-3.502 \pm 24.797) \times 10^{-4}$	4047741	1.720×10^{-3}	-4.183×10^{-4}	-4.339×10^{-2}	4.793×10^{-2}	-1.270×10^{-3}	4.495×10^{-4}
fitted radiance squeeze [1]	$(-8.207 \pm 17.803) \times 10^{-5}$	4047741	2.123×10^{-4}	-6.847×10^{-5}	-1.459×10^{-2}	2.873×10^{-2}	-1.811×10^{-4}	3.125×10^{-5}
fitted root mean square [1]	$(1.094 \pm 0.394) \times 10^{-3}$	4047741	3.564×10^{-4}	9.977×10^{-4}	3.463×10^{-4}	9.873×10^{-2}	8.585×10^{-4}	1.215×10^{-3}
sulfurdioxide total air mass factor polluted [1]	1.08 ± 0.65	4047741	0.854	0.926	5.000×10^{-2}	3.01	0.604	1.46
sulfurdioxide total air mass factor polluted precision [1]	0.184 ± 0.163	4047741	0.215	0.139	4.247×10^{-3}	1.57	4.950×10^{-2}	0.264
sulfurdioxide clear air mass factor polluted [1]	0.895 ± 0.600	4047741	0.503	0.692	0.135	3.02	0.512	1.02
number of spectral points in retrieval [1]	73.4 ± 0.5	4047741	1.000	73.0	71.0	74.0	73.0	74.0

Table 5: Parameterlist and basic statistics for the analysis for observations over water

Variable	mean $\pm\sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.649 ± 0.406	4459214	0.770	1.000	0.0	1.000	0.230	1.000
sulfurdioxide total vertical column [DU]	$(2.216 \pm 96.953) \times 10^{-2}$	4459214	0.418	8.024×10^{-3}	-42.7	470	-0.199	0.218
sulfurdioxide total vertical column precision [DU]	0.503 ± 0.723	4459214	0.313	0.306	4.830×10^{-2}	63.4	0.204	0.517
sulfurdioxide slant column density corrected [DU]	$(1.049 \pm 32.633) \times 10^{-2}$	4459214	0.322	6.879×10^{-3}	-12.1	338	-0.153	0.169
sulfurdioxide slant column density cobra [DU]	$(1.041 \pm 28.369) \times 10^{-2}$	4459214	0.322	6.879×10^{-3}	-12.1	64.5	-0.153	0.169
sulfurdioxide slant column density cobra precision [DU]	0.252 ± 0.096	4459214	8.007×10^{-2}	0.224	8.781×10^{-2}	31.2	0.195	0.275
sulfurdioxide slant column density window1 [DU]	0.116 ± 0.570	4459214	0.663	0.113	-213	46.7	-0.219	0.444
sulfurdioxide slant column density window1 precision [DU]	0.252 ± 0.096	4459214	8.007×10^{-2}	0.224	8.781×10^{-2}	31.2	0.195	0.275
sulfurdioxide slant column density corrected win1 [DU]	$(-1.478 \pm 55.784) \times 10^{-2}$	4459214	0.640	-2.559×10^{-2}	-213	46.5	-0.343	0.297
background so2 slant column offset window1 [DU]	-0.131 ± 0.137	4459214	0.157	-0.162	-1.48	5.84	-0.218	-6.179×10^{-2}
sulfurdioxide slant column density window2 [DU]	-0.841 ± 8.195	4459214	10.4	-0.887	-733	800	-6.07	4.32
sulfurdioxide slant column density window2 precision [DU]	7.54 ± 1.99	4459214	2.32	7.26	2.12	412	6.22	8.53
sulfurdioxide slant column density corrected win2 [DU]	-2.25 ± 8.17	4459214	10.4	-2.24	-735	800	-7.43	2.93
background so2 slant column offset window2 [DU]	-1.41 ± 1.88	4459214	1.81	-1.02	-16.4	8.95	-2.15	-0.343
sulfurdioxide slant column density window3 [DU]	4.45 ± 22.25	4459214	27.9	4.01	-242	371	-9.64	18.3
sulfurdioxide slant column density window3 precision [DU]	26.8 ± 11.5	4459214	8.69	23.8	11.0	214	20.3	29.0
sulfurdioxide slant column density corrected win3 [DU]	12.9 ± 21.5	4459214	27.1	12.7	-239	372	-0.659	26.4
background so2 slant column offset window3 [DU]	8.49 ± 5.55	4459214	7.50	8.65	-17.5	31.1	4.95	12.5
sulfurdioxide slant column cobra flag [1]	1.99 ± 0.12	4459214	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(1.784 \pm 1.631) \times 10^{-2}$	4459214	1.087×10^{-2}	1.347×10^{-2}	2.078×10^{-3}	0.482	9.392×10^{-3}	2.026×10^{-2}
fitted radiance shift [nm]	$(-1.942 \pm 23.817) \times 10^{-4}$	4459214	1.763×10^{-3}	-2.268×10^{-4}	-3.950×10^{-2}	4.225×10^{-2}	-1.110×10^{-3}	6.526×10^{-4}
fitted radiance squeeze [1]	$(-2.712 \pm 16.524) \times 10^{-5}$	4459214	1.971×10^{-4}	-2.663×10^{-5}	-1.385×10^{-2}	2.873×10^{-2}	-1.258×10^{-4}	7.126×10^{-5}
fitted root mean square [1]	$(1.110 \pm 0.394) \times 10^{-3}$	4459214	3.461×10^{-4}	1.013×10^{-3}	3.598×10^{-4}	9.873×10^{-2}	8.745×10^{-4}	1.221×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.832 ± 0.458	4459214	0.538	0.754	5.000×10^{-2}	2.54	0.518	1.06
sulfurdioxide total air mass factor polluted precision [1]	0.136 ± 0.143	4459214	0.157	7.361×10^{-2}	3.452×10^{-3}	1.43	3.581×10^{-2}	0.193
sulfurdioxide clear air mass factor polluted [1]	0.666 ± 0.245	4459214	0.324	0.638	6.529×10^{-2}	2.55	0.487	0.811
number of spectral points in retrieval [1]	73.4 ± 0.5	4459214	1.000	73.0	71.0	74.0	73.0	74.0

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

Variable	mean $\pm\sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.427 ± 0.408	1373181	0.930	0.230	0.0	1.000	7.000×10^{-2}	1.000
sulfurdioxide total vertical column [DU]	$(4.717 \pm 136.921) \times 10^{-2}$	1373181	0.307	7.670×10^{-3}	-109	133	-0.142	0.164
sulfurdioxide total vertical column precision [DU]	0.500 ± 0.973	1373181	0.349	0.203	4.373×10^{-2}	48.3	0.127	0.476
sulfurdioxide slant column density corrected [DU]	$(2.269 \pm 42.759) \times 10^{-2}$	1373181	0.386	1.055×10^{-2}	-10.4	73.8	-0.180	0.206
sulfurdioxide slant column density cobra [DU]	$(2.252 \pm 41.911) \times 10^{-2}$	1373181	0.386	1.055×10^{-2}	-10.4	73.8	-0.180	0.206
sulfurdioxide slant column density cobra precision [DU]	0.307 ± 0.140	1373181	0.138	0.269	9.260×10^{-2}	15.7	0.218	0.355
sulfurdioxide slant column density window1 [DU]	$(-1.638 \pm 75.138) \times 10^{-2}$	1373181	0.820	-1.837×10^{-3}	-30.0	63.4	-0.429	0.392
sulfurdioxide slant column density window1 precision [DU]	0.307 ± 0.140	1373181	0.138	0.269	9.260×10^{-2}	15.7	0.218	0.355
sulfurdioxide slant column density corrected win1 [DU]	$(-1.539 \pm 714.758) \times 10^{-3}$	1373181	0.741	-2.594×10^{-2}	-30.0	62.9	-0.390	0.351
background so2 slant column offset window1 [DU]	$(1.484 \pm 24.222) \times 10^{-2}$	1373181	0.432	-2.115×10^{-2}	-1.43	2.11	-0.206	0.226
sulfurdioxide slant column density window2 [DU]	0.542 ± 9.215	1373181	11.0	0.468	-1.802×10^{3}	626	-5.01	6.01
sulfurdioxide slant column density window2 precision [DU]	8.05 ± 2.67	1373181	2.78	7.56	2.28	401	6.40	9.19
sulfurdioxide slant column density corrected win2 [DU]	-2.11 ± 8.94	1373181	10.6	-2.14	-1.803×10^{3}	625	-7.45	3.20
background so2 slant column offset window2 [DU]	-2.65 ± 2.47	1373181	3.89	-2.52	-16.4	8.85	-4.40	-0.509
sulfurdioxide slant column density window3 [DU]	-3.86 ± 21.93	1373181	26.2	-3.55	-286	164	-16.8	9.40
sulfurdioxide slant column density window3 precision [DU]	28.4 ± 14.8	1373181	11.9	23.4	11.3	263	19.9	31.8
sulfurdioxide slant column density corrected win3 [DU]	7.75 ± 22.18	1373181	26.6	8.64	-284	166	-5.02	21.6
background so2 slant column offset window3 [DU]	11.6 ± 7.3	1373181	12.1	14.1	-17.5	31.1	5.56	17.7
sulfurdioxide slant column cobra flag [1]	1.92 ± 0.38	1373181	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(3.583 \pm 8.058) \times 10^{-2}$	1373181	2.435×10^{-2}	1.319×10^{-2}	6.361×10^{-4}	1.48	5.060×10^{-3}	2.942×10^{-2}
fitted radiance shift [nm]	$(-4.768 \pm 28.773) \times 10^{-4}$	1373181	1.624×10^{-3}	-6.355×10^{-4}	-4.339×10^{-2}	4.793×10^{-2}	-1.377×10^{-3}	2.473×10^{-4}
fitted radiance squeeze [1]	$(-1.172 \pm 2.233) \times 10^{-4}$	1373181	2.841×10^{-4}	-1.079×10^{-4}	-1.459×10^{-2}	1.340×10^{-2}	-2.558×10^{-4}	2.829×10^{-5}
fitted root mean square [1]	$(1.352 \pm 0.545) \times 10^{-3}$	1373181	5.995×10^{-4}	1.242×10^{-3}	3.608×10^{-4}	5.437×10^{-2}	9.867×10^{-4}	1.586×10^{-3}
sulfurdioxide total air mass factor polluted [1]	1.36 ± 0.81	1373181	1.58	1.28	5.000×10^{-2}	3.01	0.604	2.18
sulfurdioxide total air mass factor polluted precision [1]	0.193 ± 0.168	1373181	0.199	0.150	2.963×10^{-3}	1.57	6.390×10^{-2}	0.263
sulfurdioxide clear air mass factor polluted [1]	1.33 ± 0.82	1373181	1.49	1.13	3.292×10^{-2}	3.02	0.624	2.11
number of spectral points in retrieval [1]	73.4 ± 0.5	1373181	1.000	73.0	53.0	74.0	73.0	74.0

3 Granule outlines

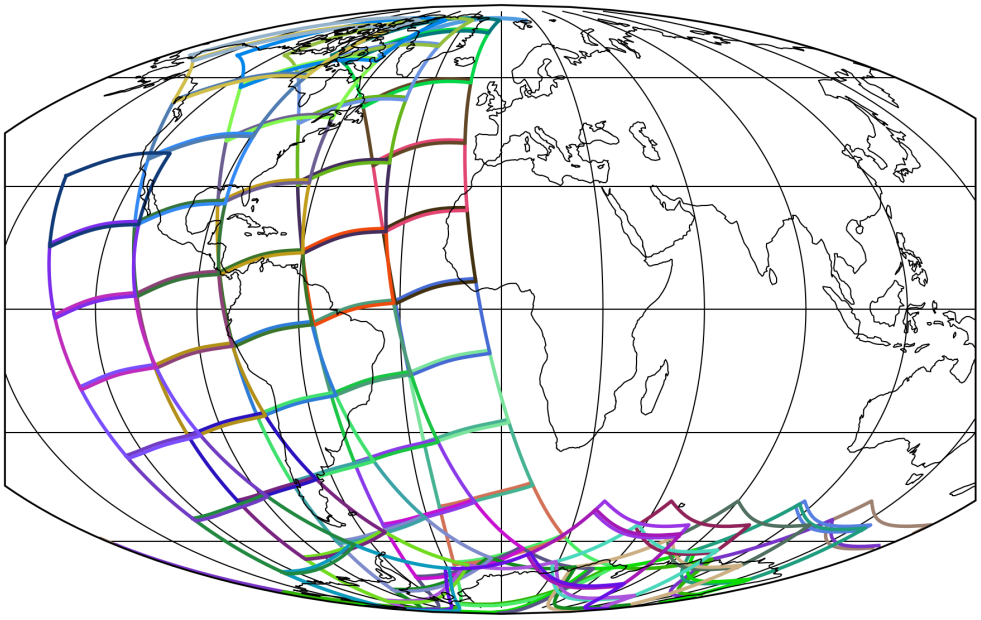

Figure 1: Outline of the granules.

4 Input data monitoring

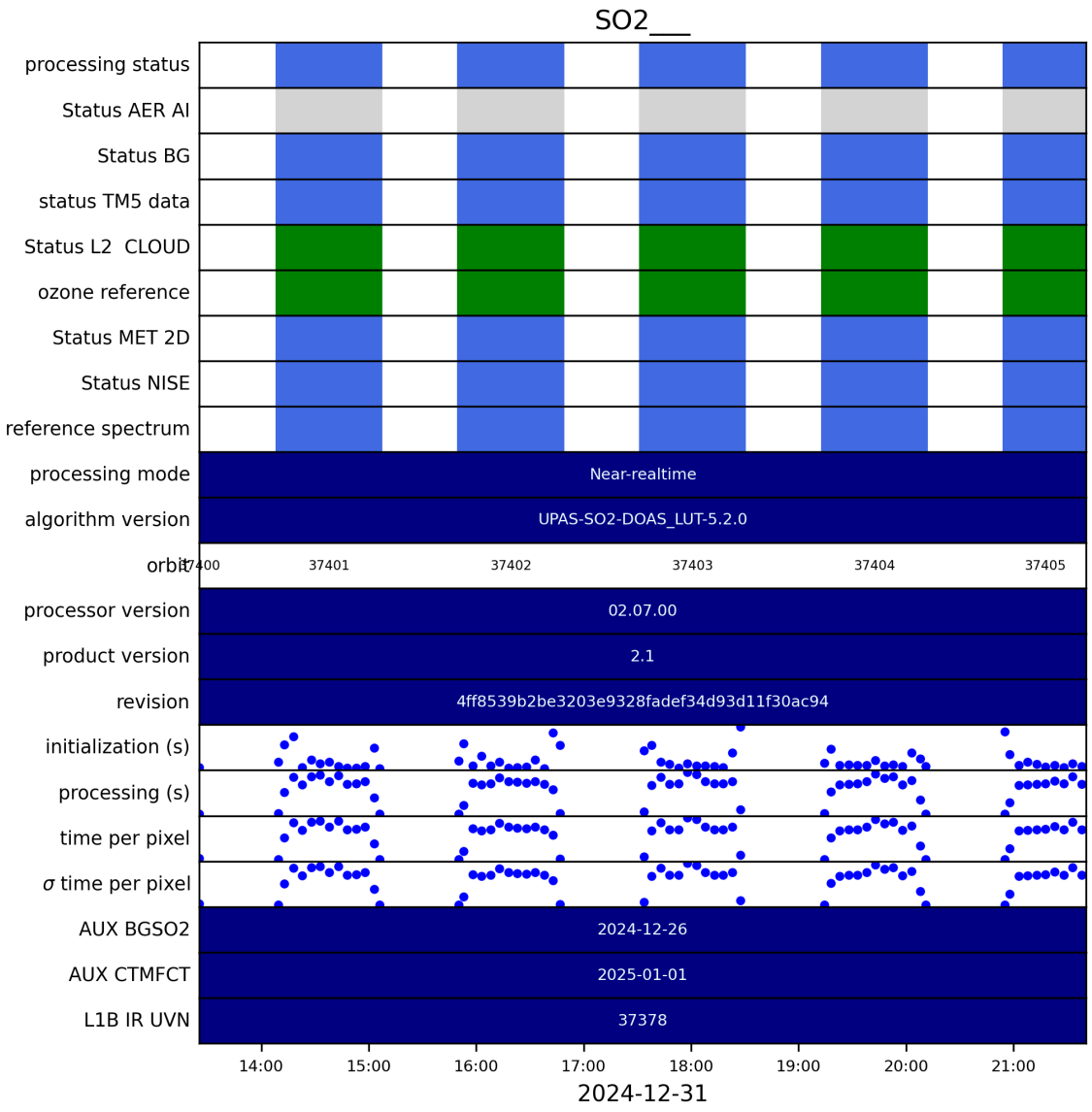

Figure 2: Input data per granule

5 Warnings and errors

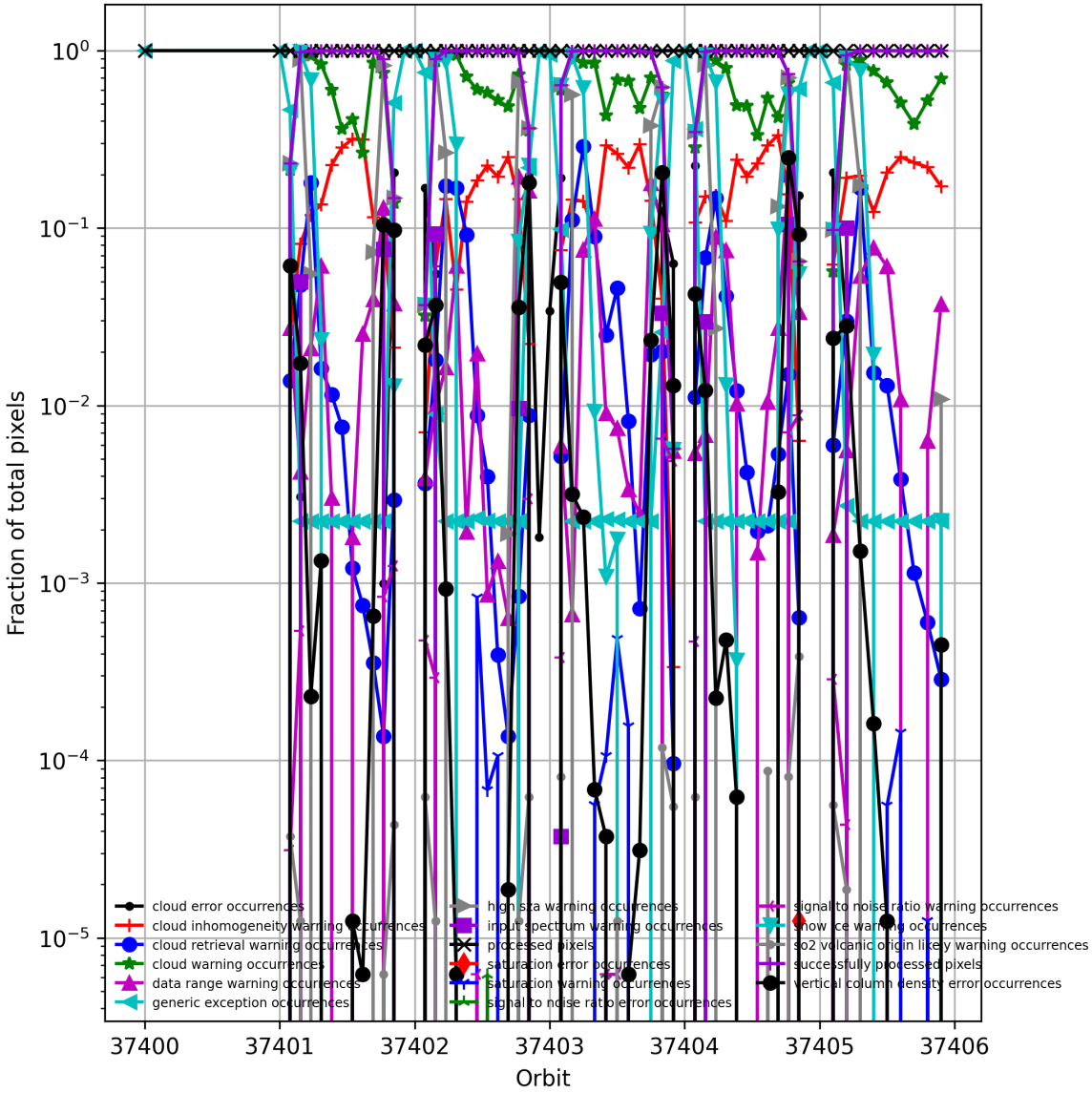

Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

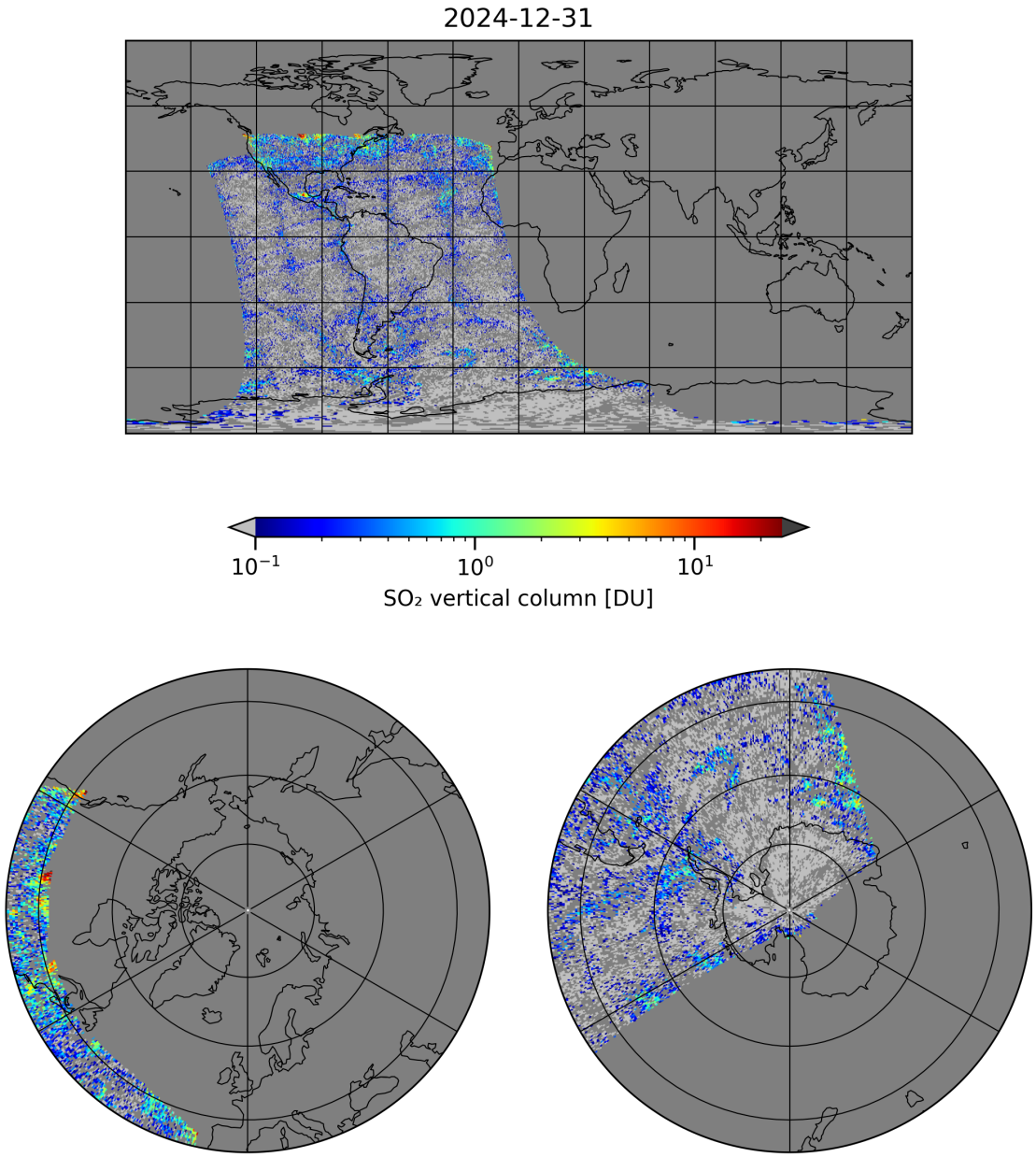

Figure 4: Map of "SO_2 vertical column" for 2024-12-31 to 2024-12-31

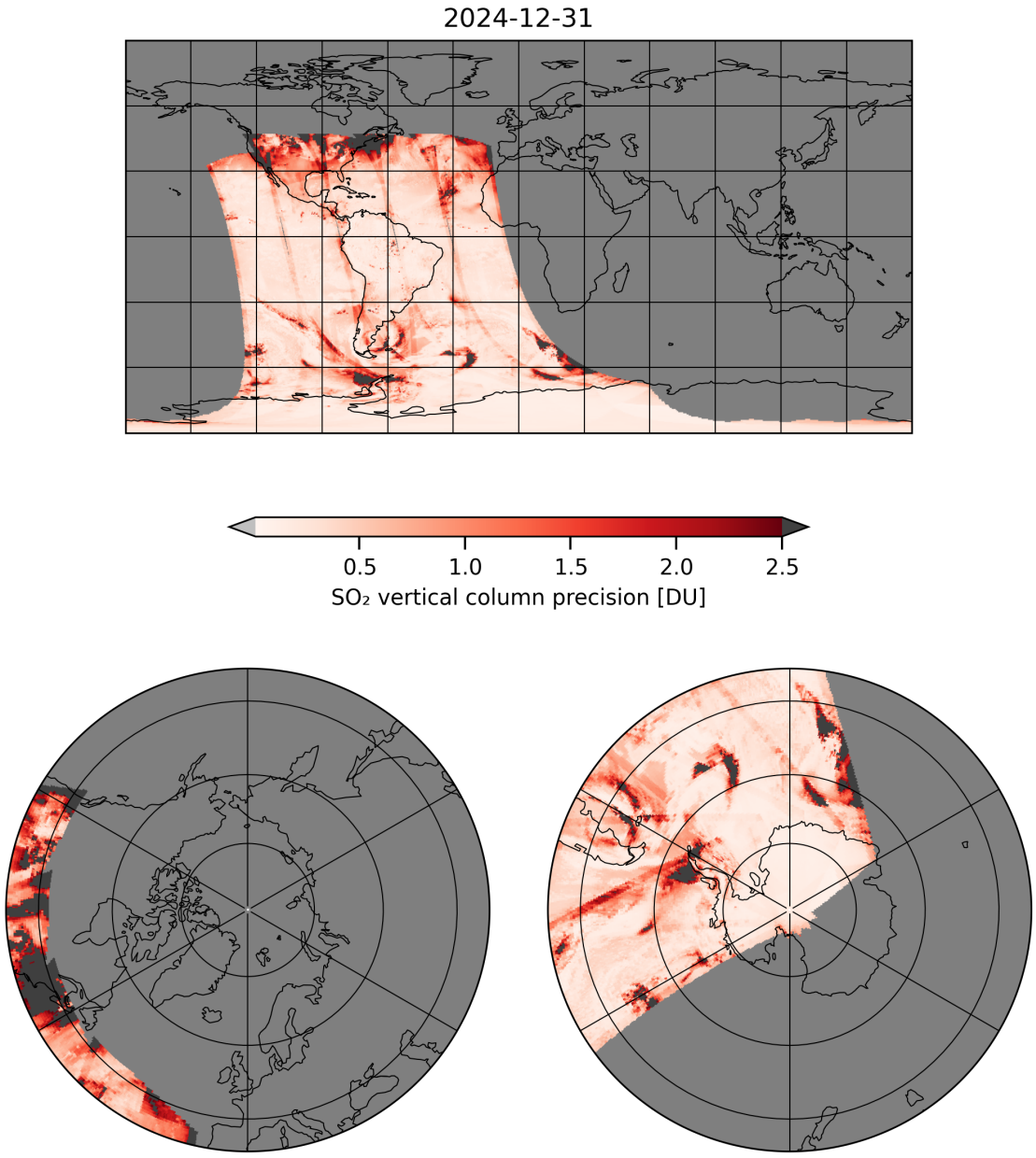

Figure 5: Map of "SO_2 vertical column precision" for 2024-12-31 to 2024-12-31

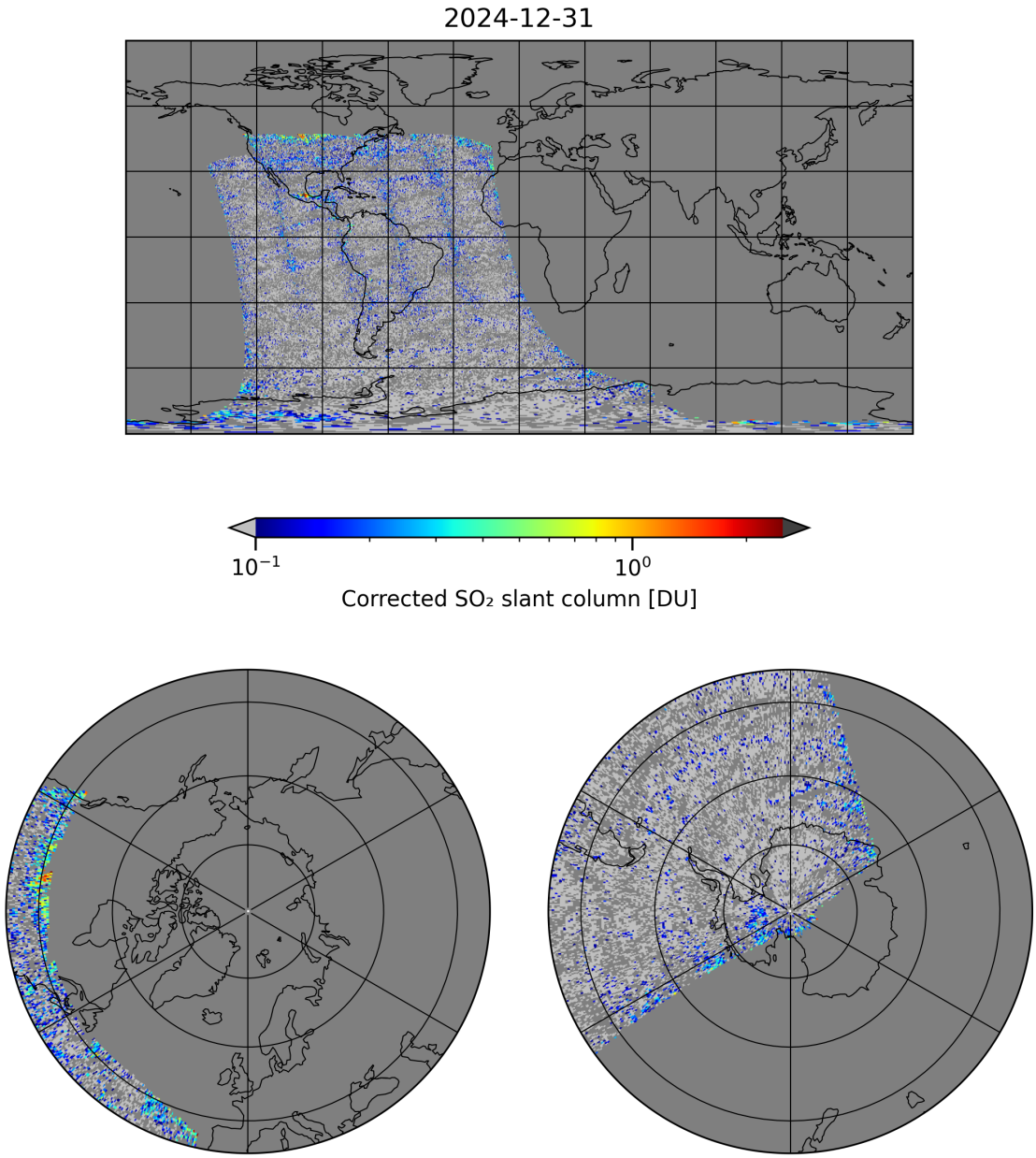

Figure 6: Map of “Corrected SO_2 slant column” for 2024-12-31 to 2024-12-31

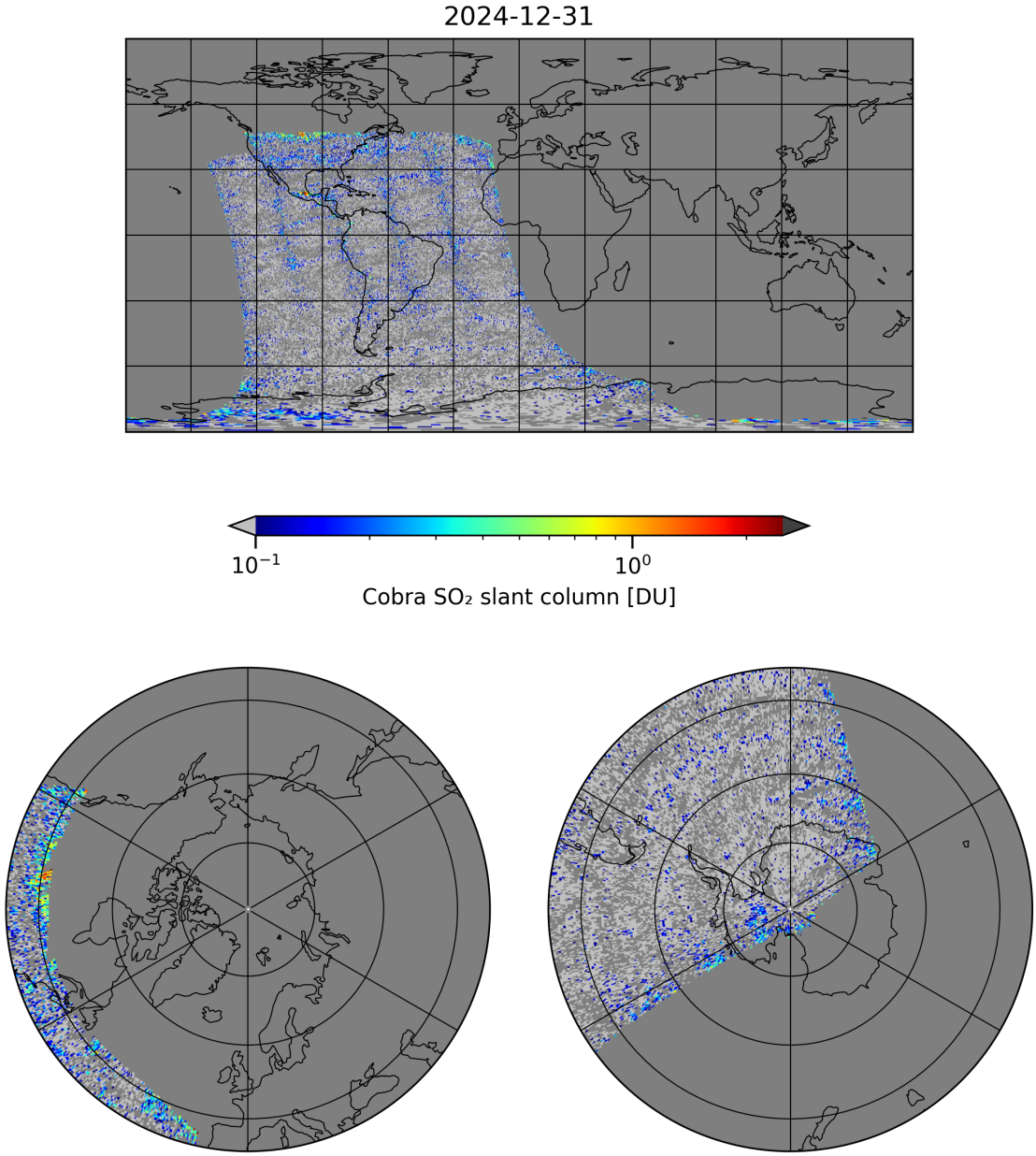

Figure 7: Map of “Cobra SO_2 slant column” for 2024-12-31 to 2024-12-31

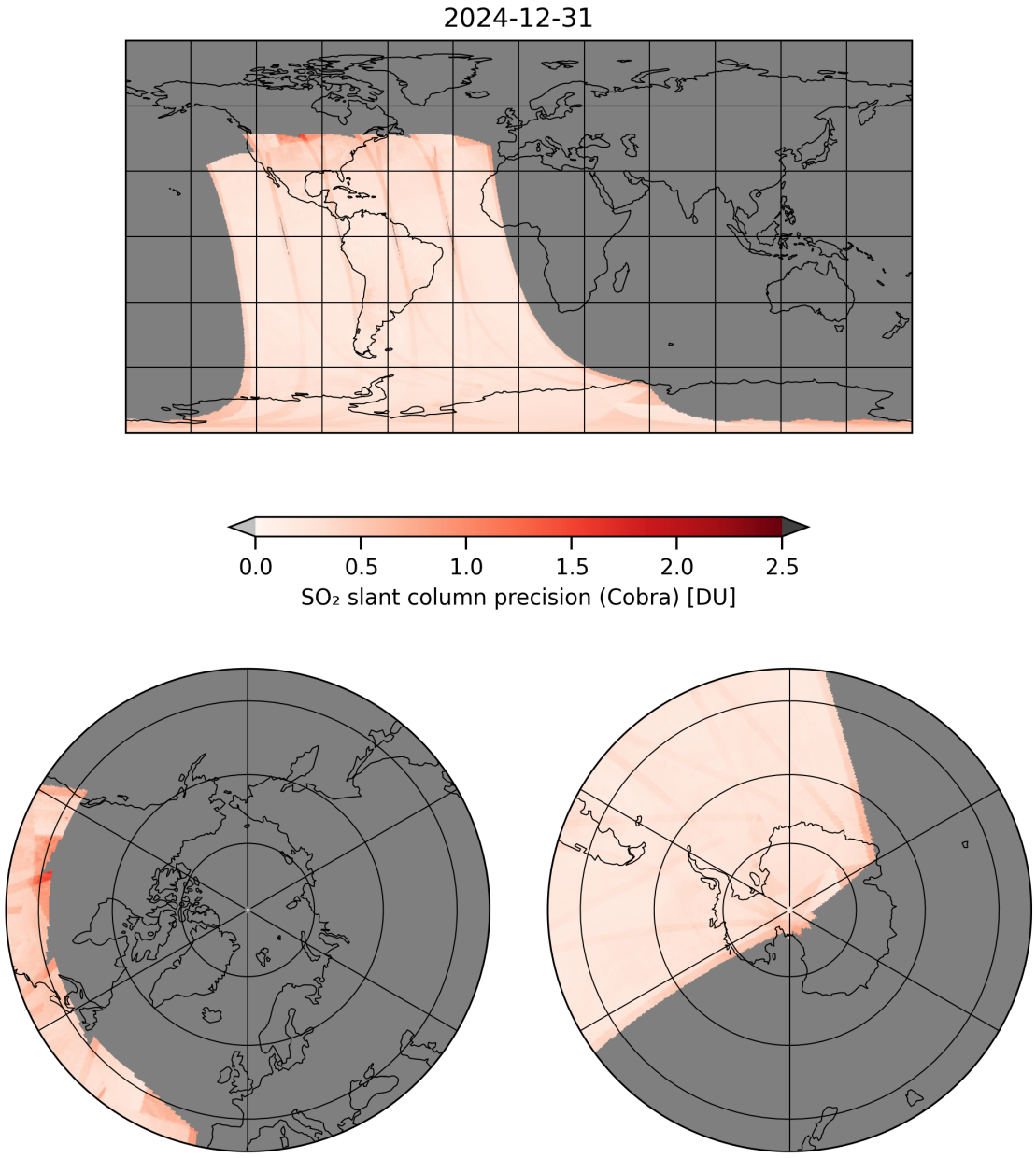

Figure 8: Map of "SO_2 slant column precision (Cobra)" for 2024-12-31 to 2024-12-31

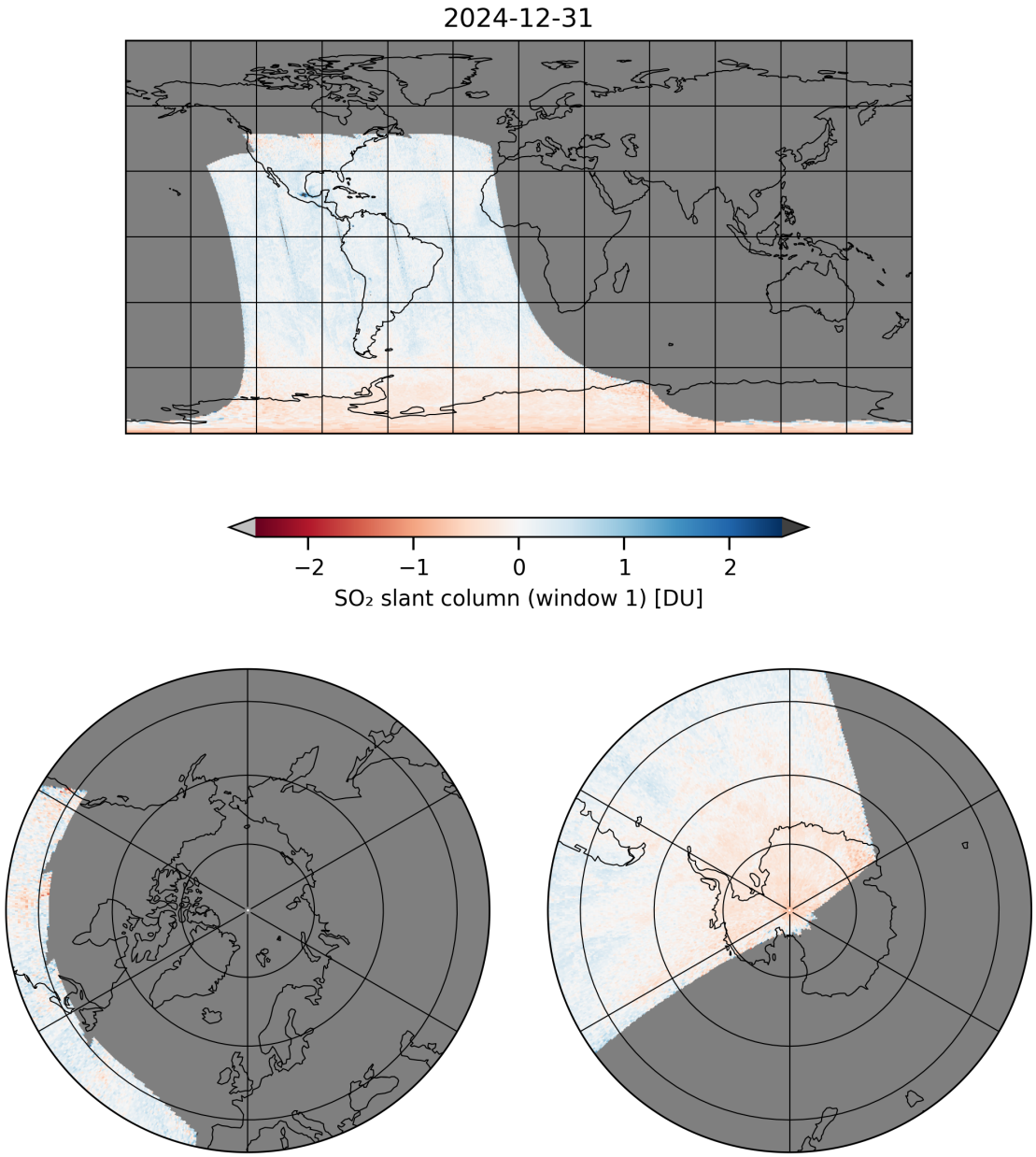

Figure 9: Map of "SO_2 slant column (window 1)" for 2024-12-31 to 2024-12-31

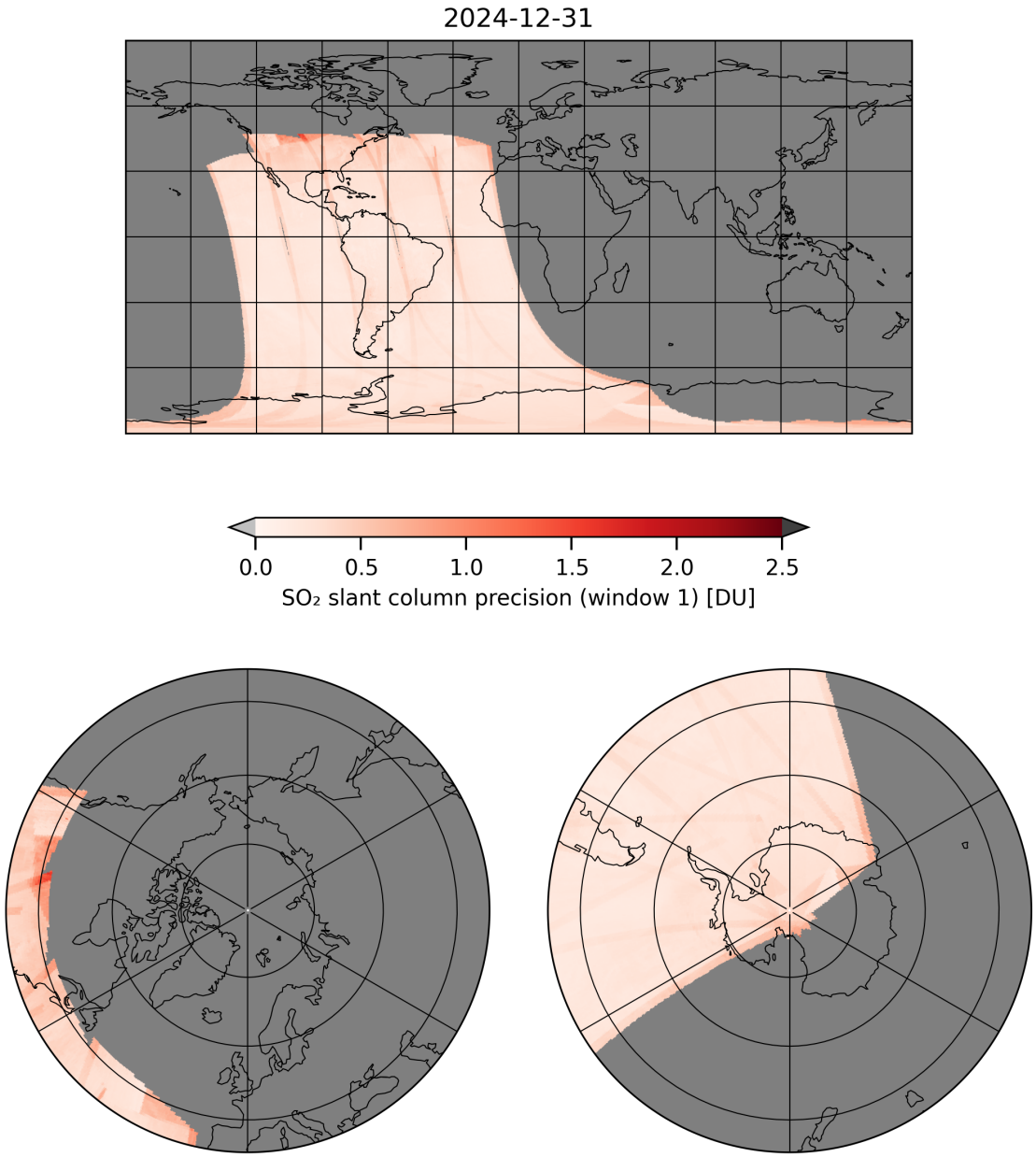

Figure 10: Map of "SO_2 slant column precision (window 1)" for 2024-12-31 to 2024-12-31

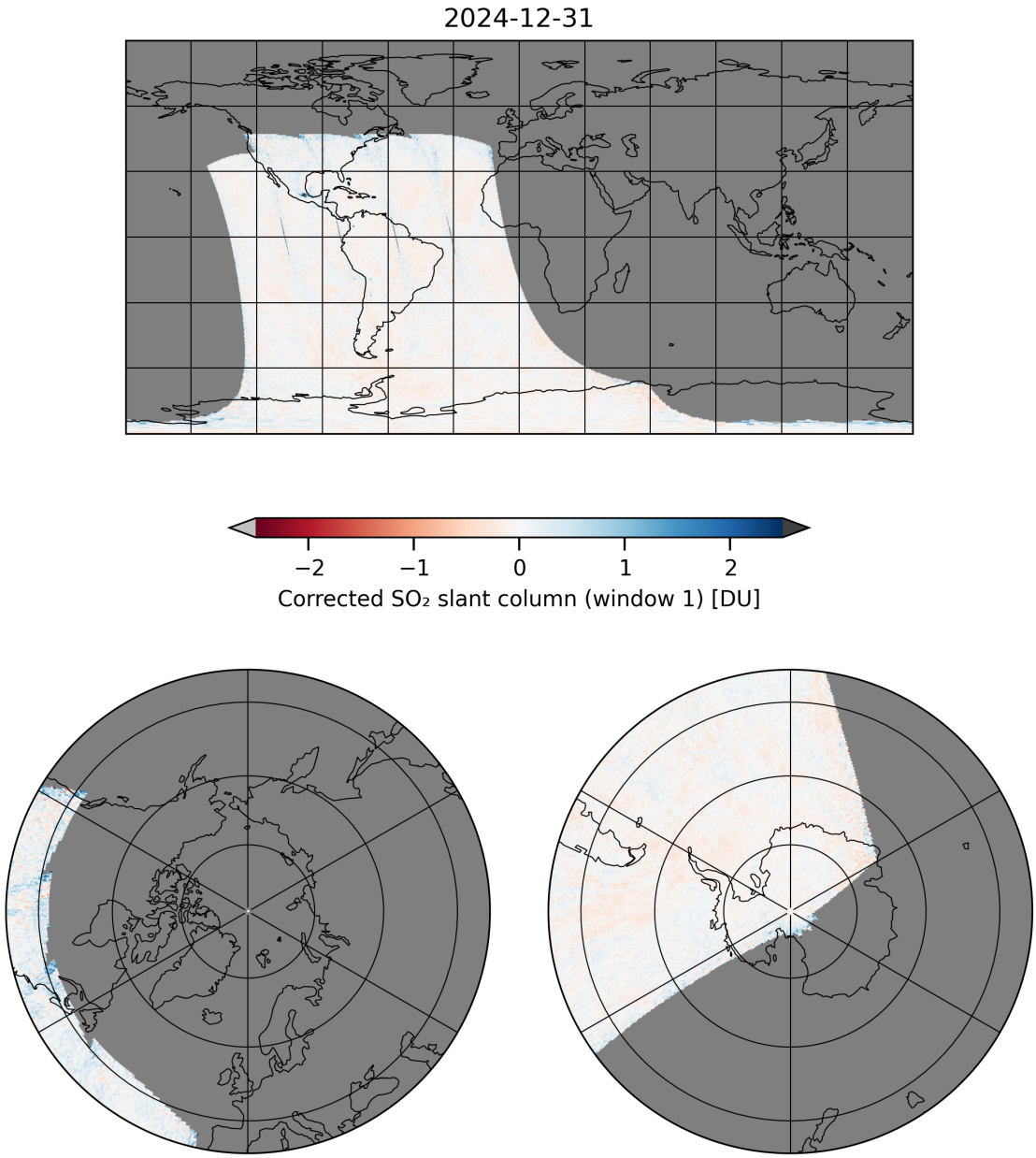

Figure 11: Map of “Corrected SO_2 slant column (window 1)” for 2024-12-31 to 2024-12-31

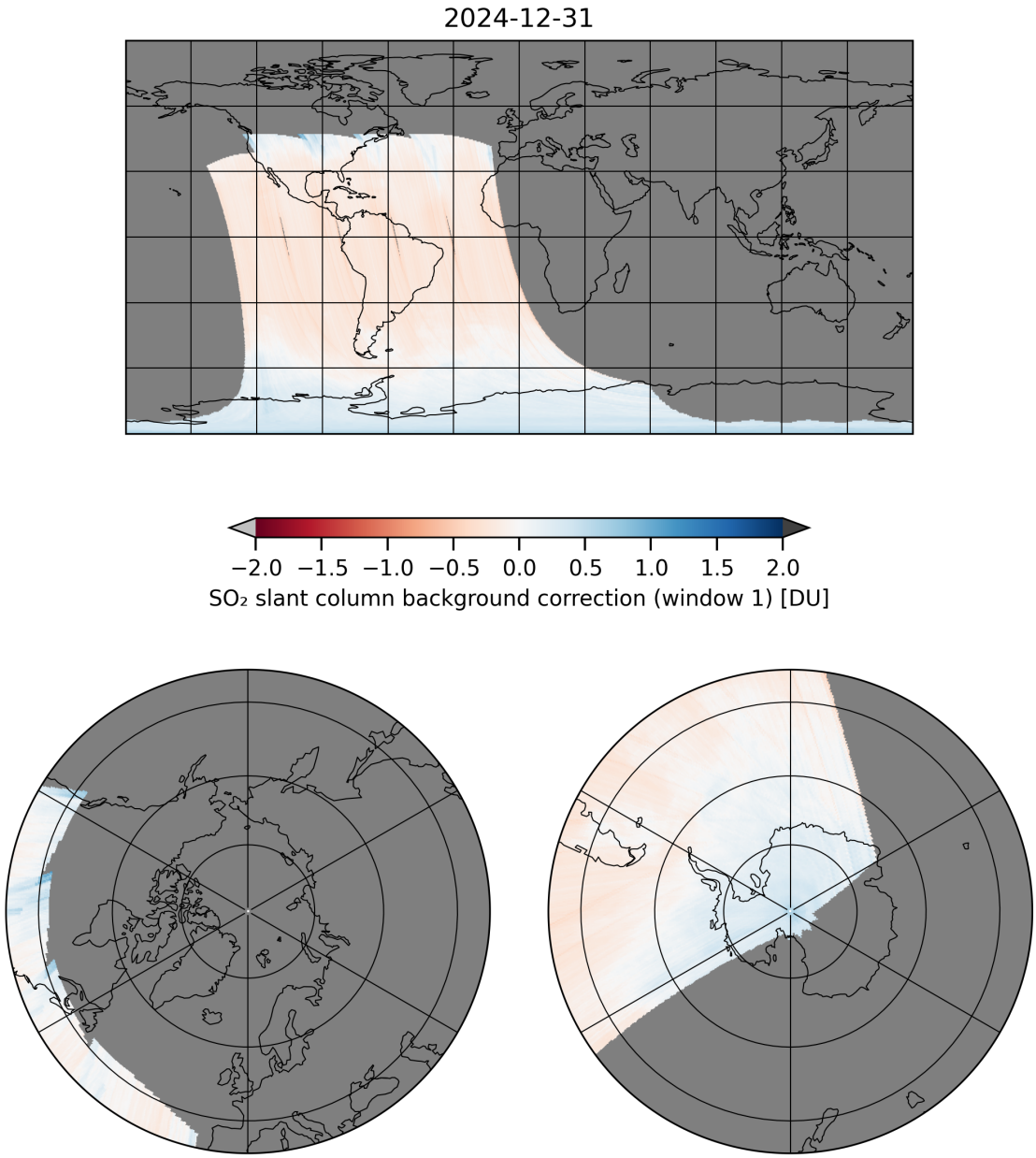

Figure 12: Map of "SO_2 slant column background correction (window 1)" for 2024-12-31 to 2024-12-31

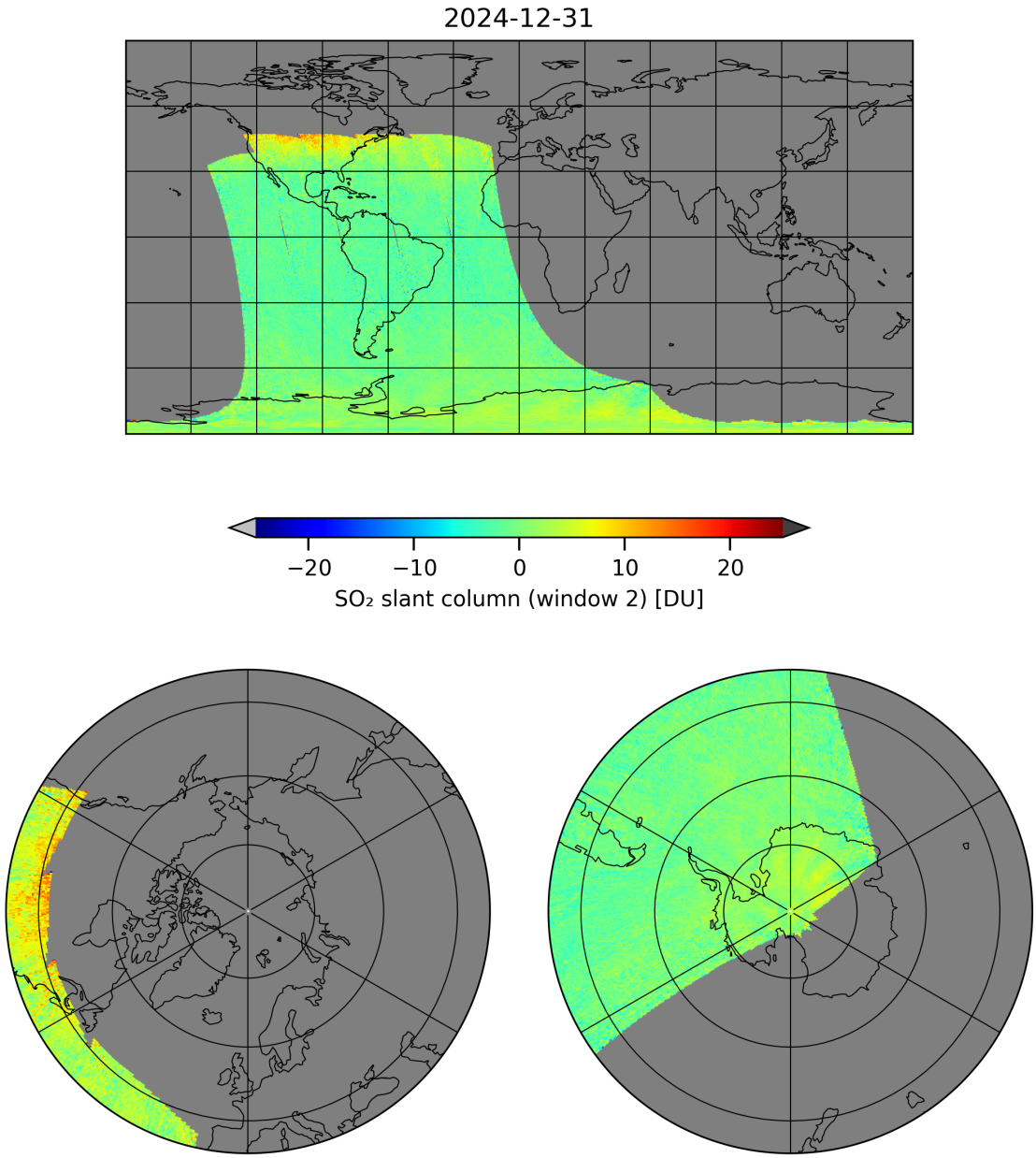

Figure 13: Map of "SO_2 slant column (window 2)" for 2024-12-31 to 2024-12-31

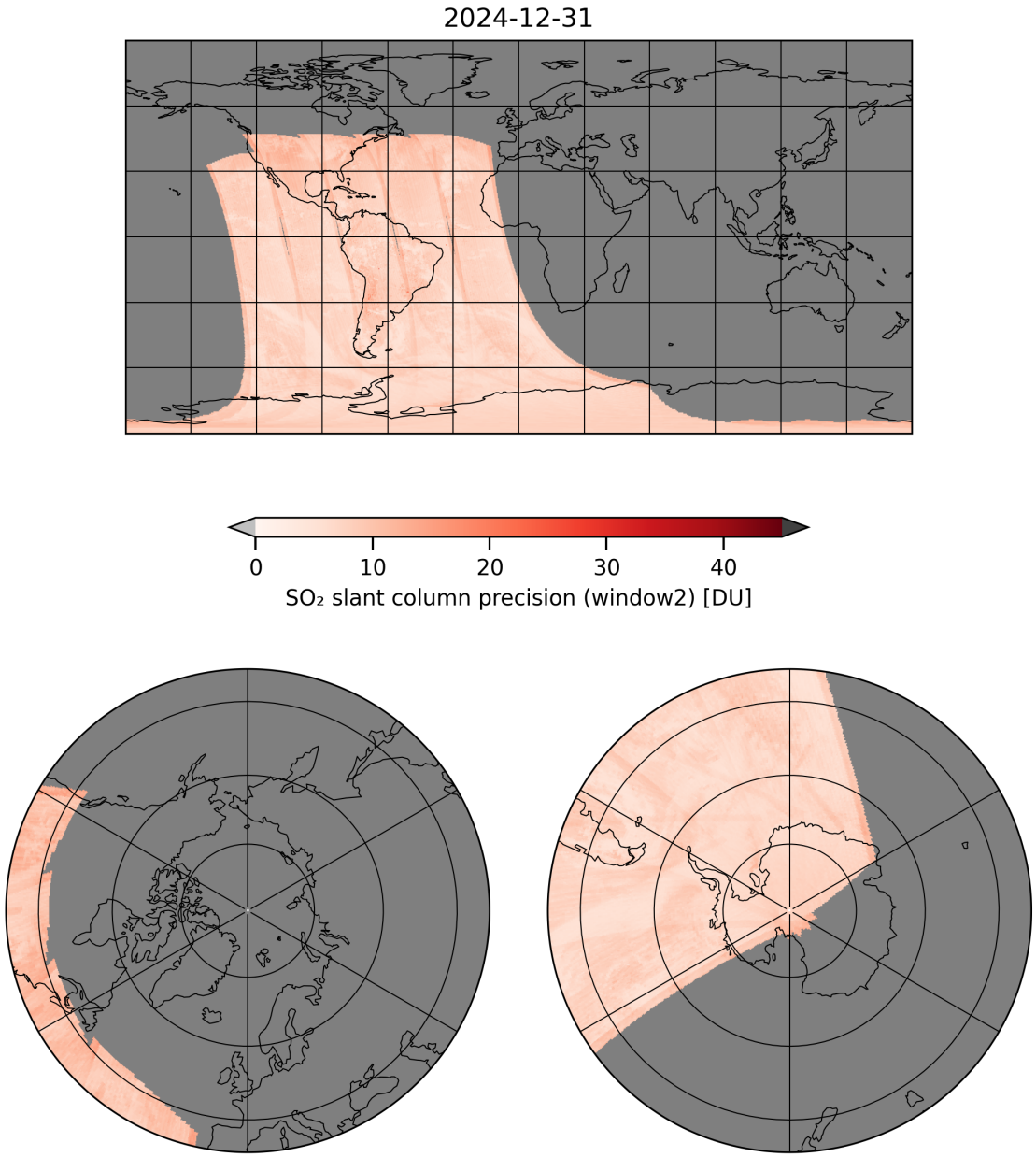

Figure 14: Map of "SO_2 slant column precision (window2)" for 2024-12-31 to 2024-12-31

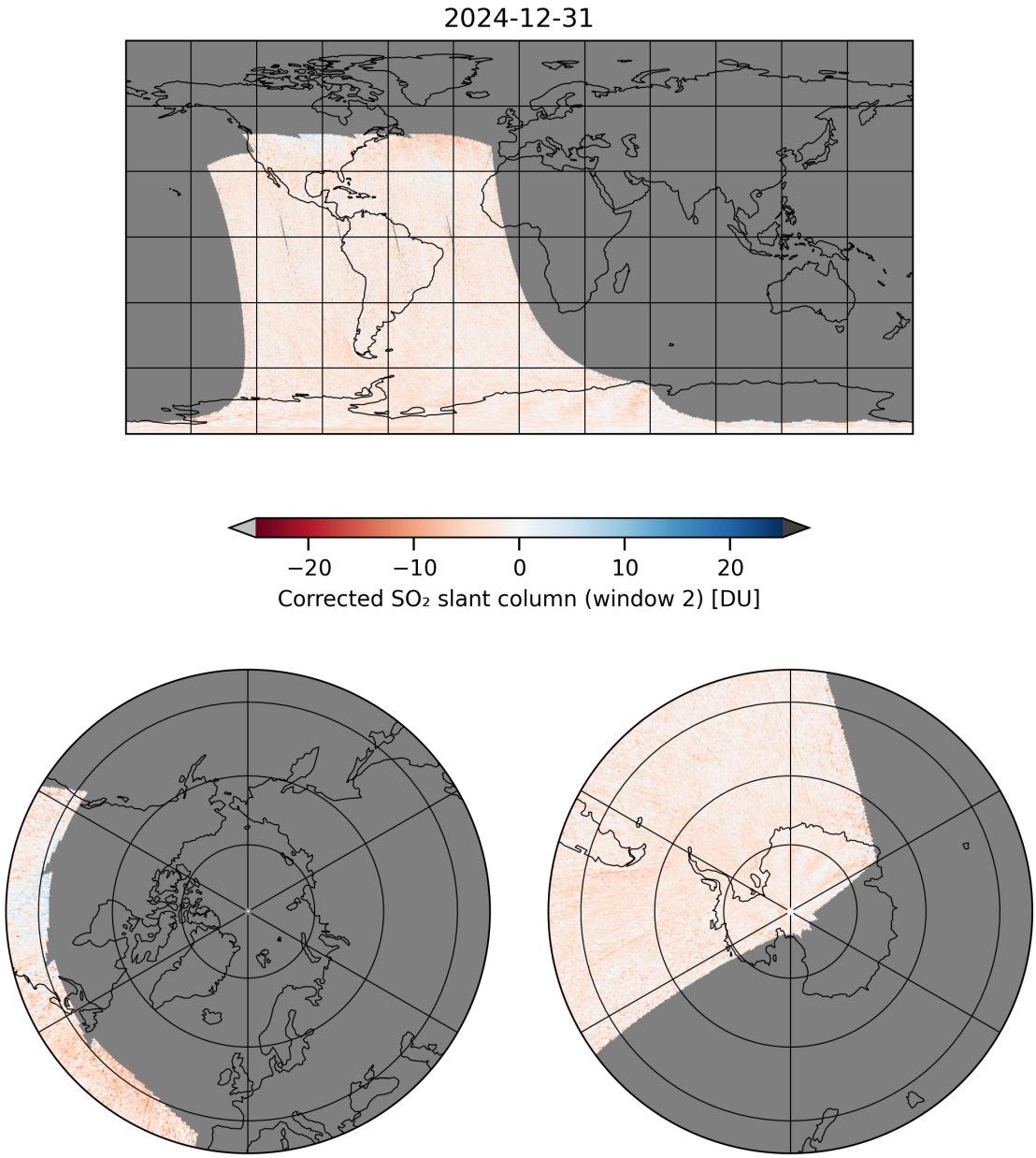

Figure 15: Map of “Corrected SO_2 slant column (window 2)” for 2024-12-31 to 2024-12-31

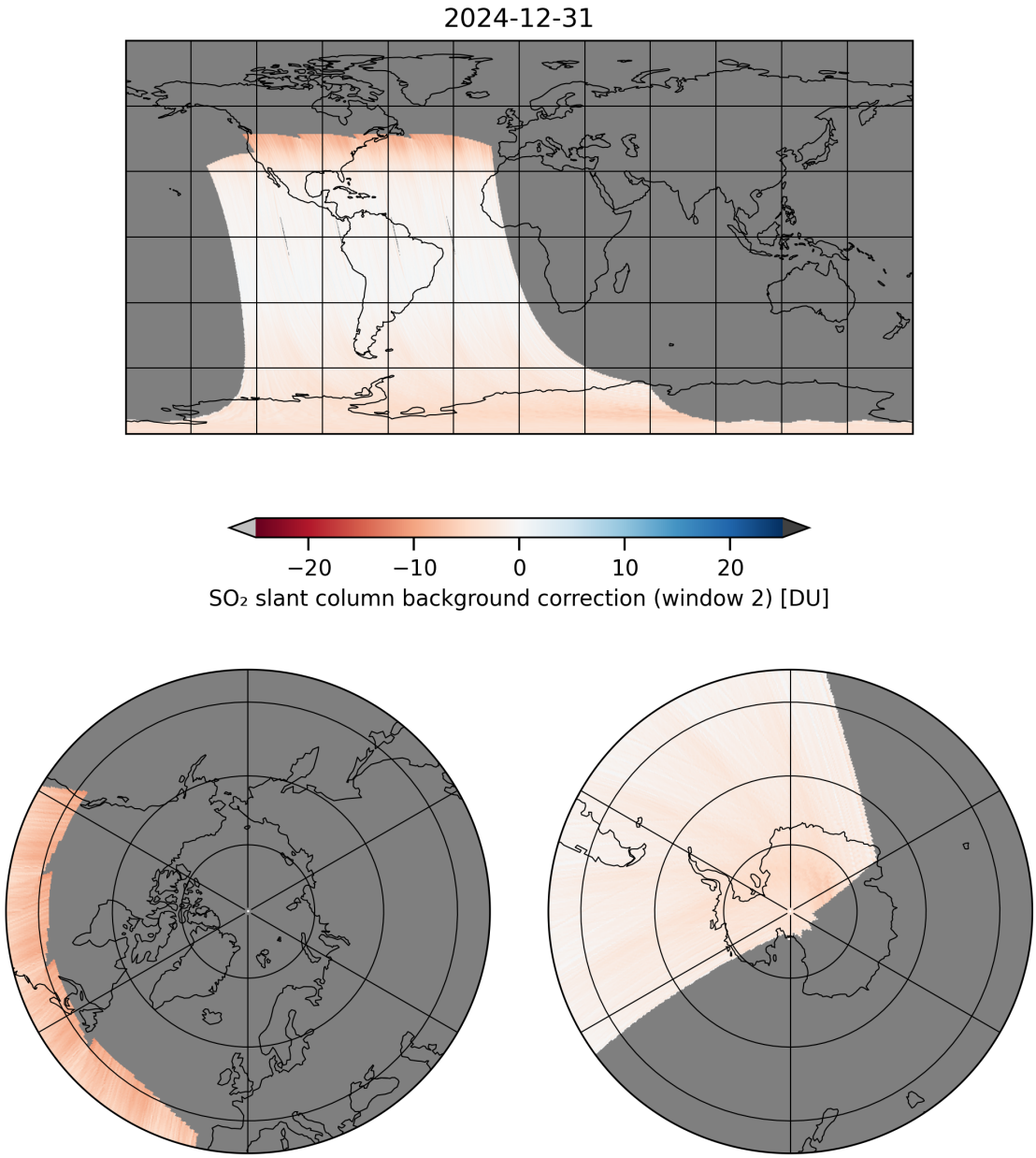

Figure 16: Map of "SO_2 slant column background correction (window 2)" for 2024-12-31 to 2024-12-31

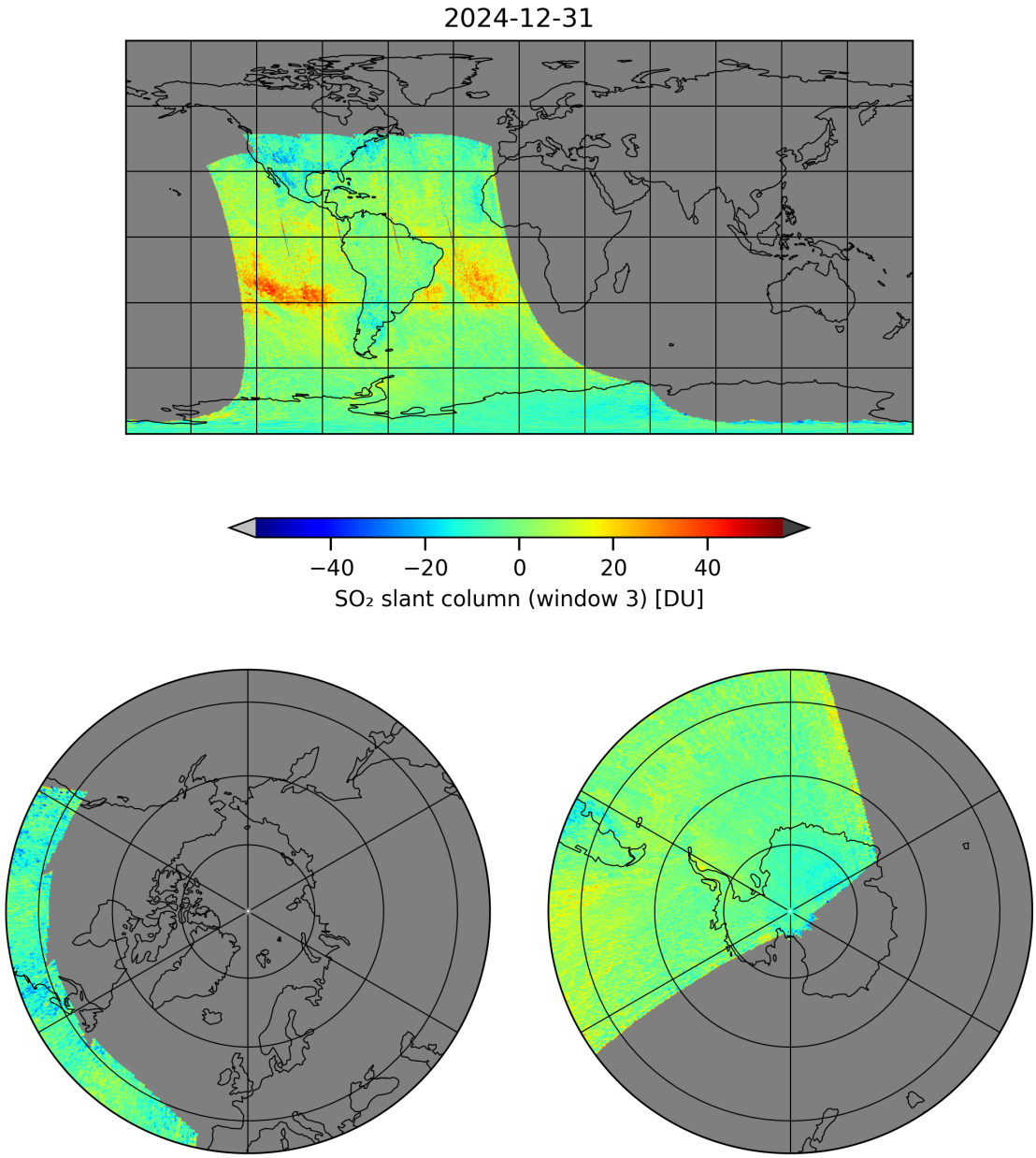

Figure 17: Map of "SO_2 slant column (window 3)" for 2024-12-31 to 2024-12-31

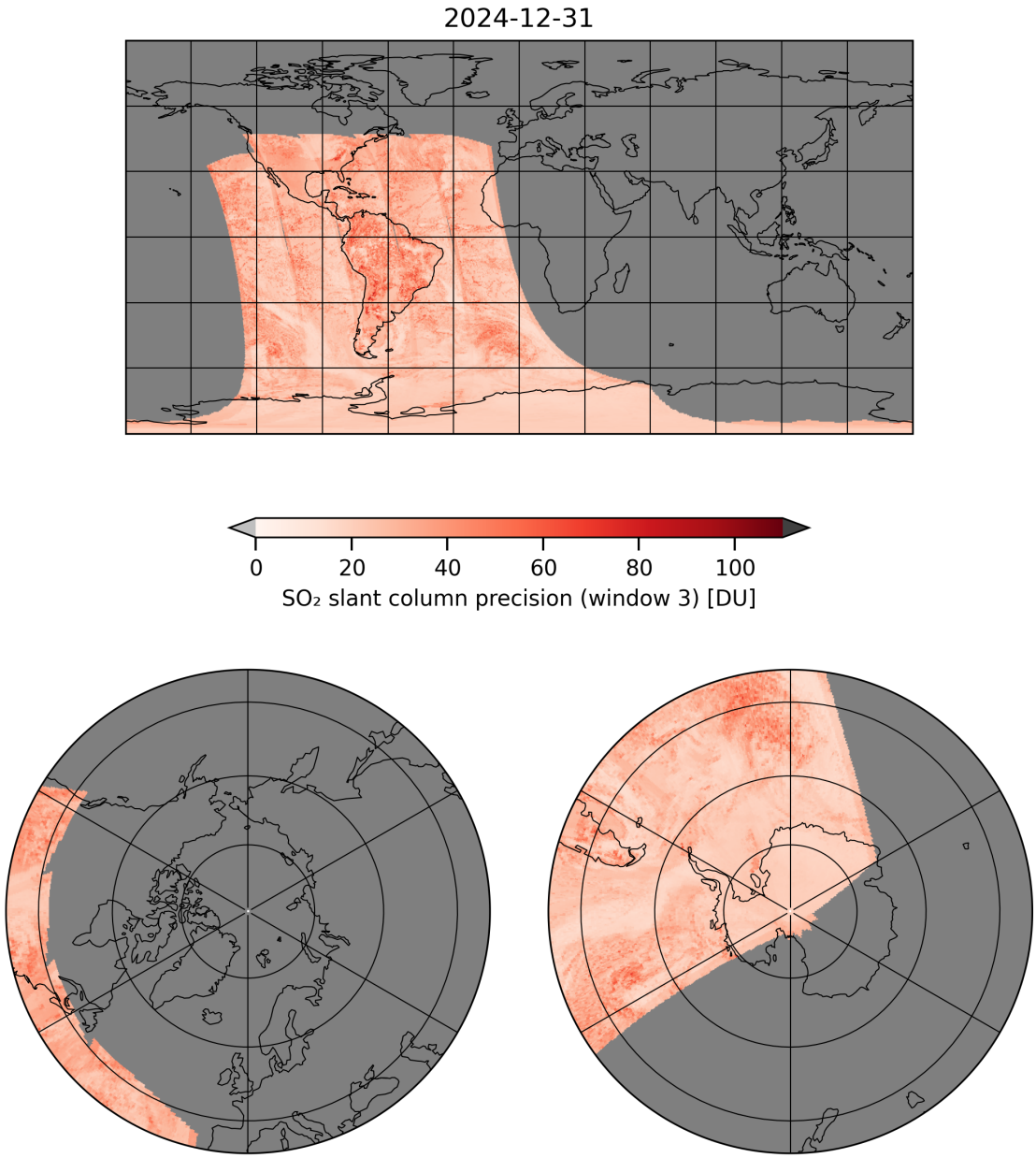

Figure 18: Map of "SO_2 slant column precision (window 3)" for 2024-12-31 to 2024-12-31

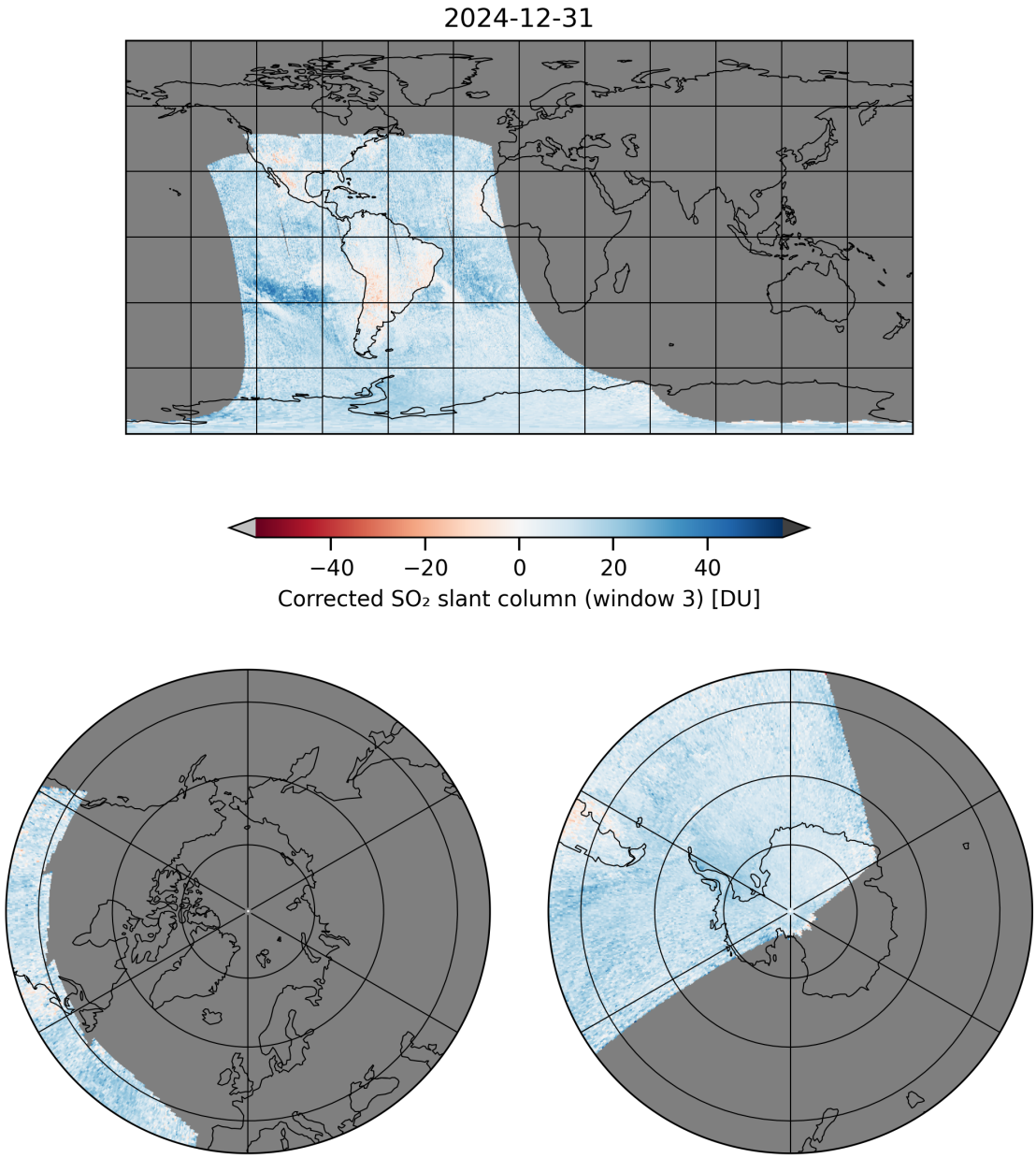

Figure 19: Map of “Corrected SO_2 slant column (window 3)” for 2024-12-31 to 2024-12-31

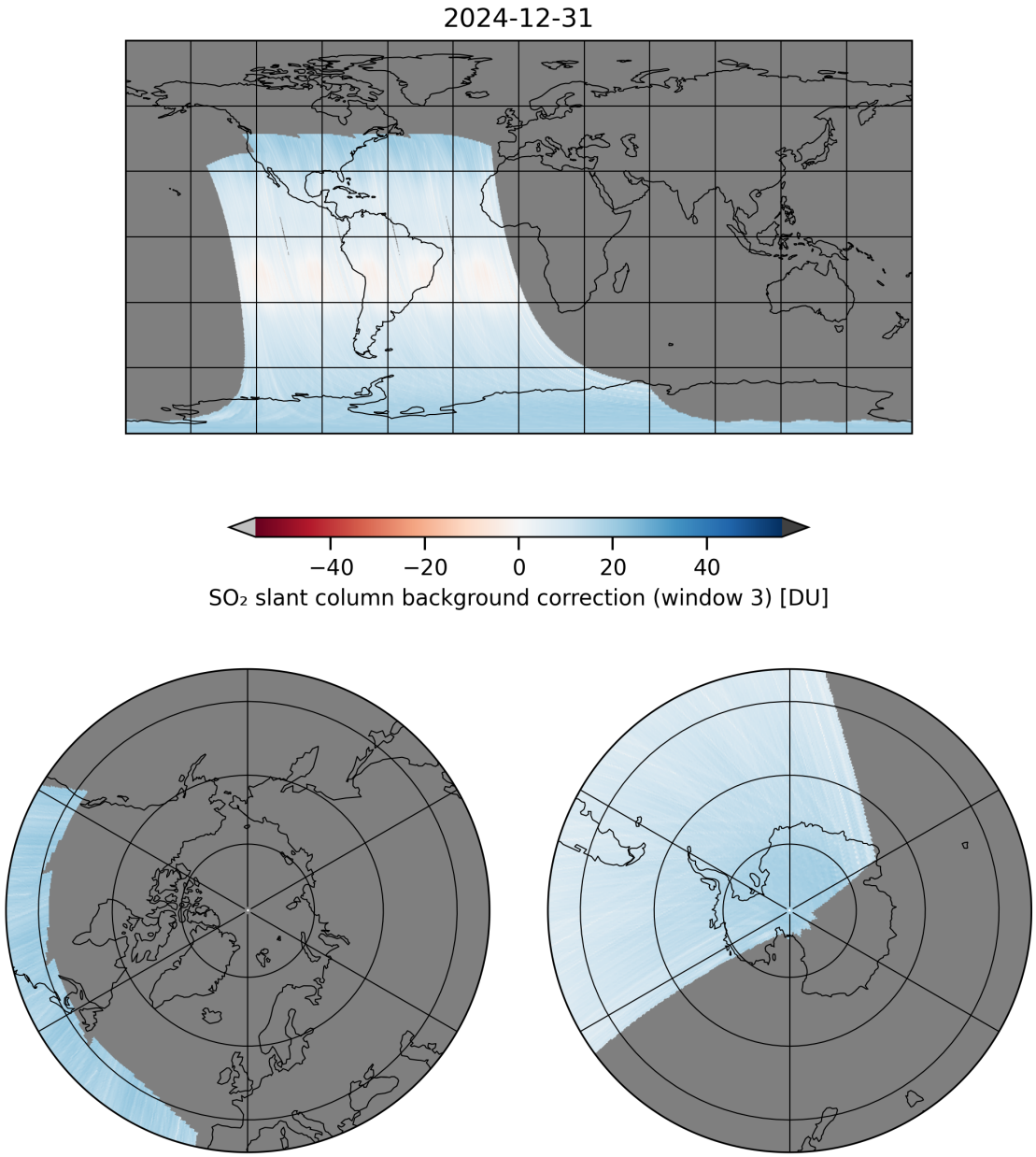

Figure 20: Map of "SO_2 slant column background correction (window 3)" for 2024-12-31 to 2024-12-31

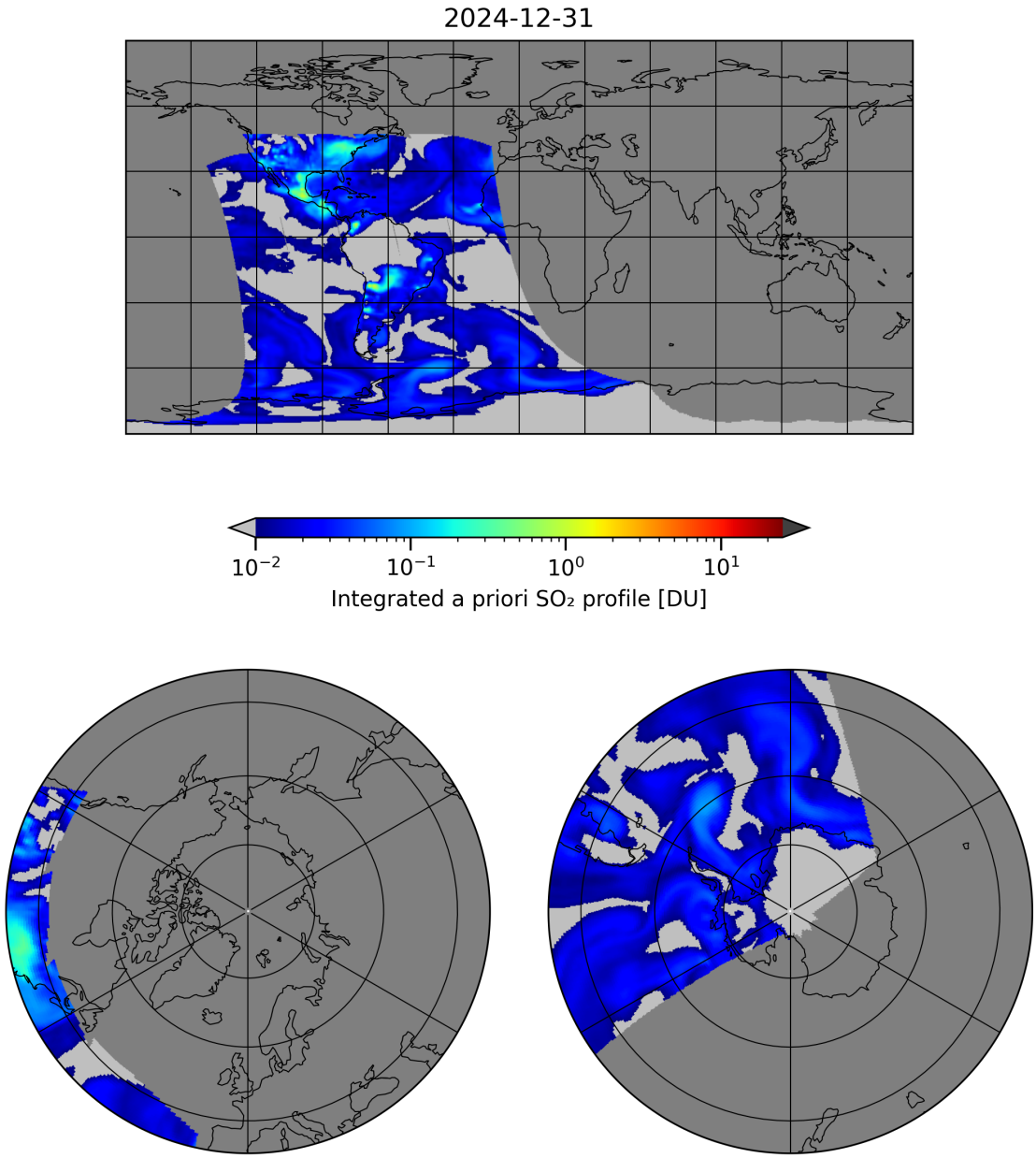

Figure 21: Map of “Integrated a priori SO_2 profile” for 2024-12-31 to 2024-12-31

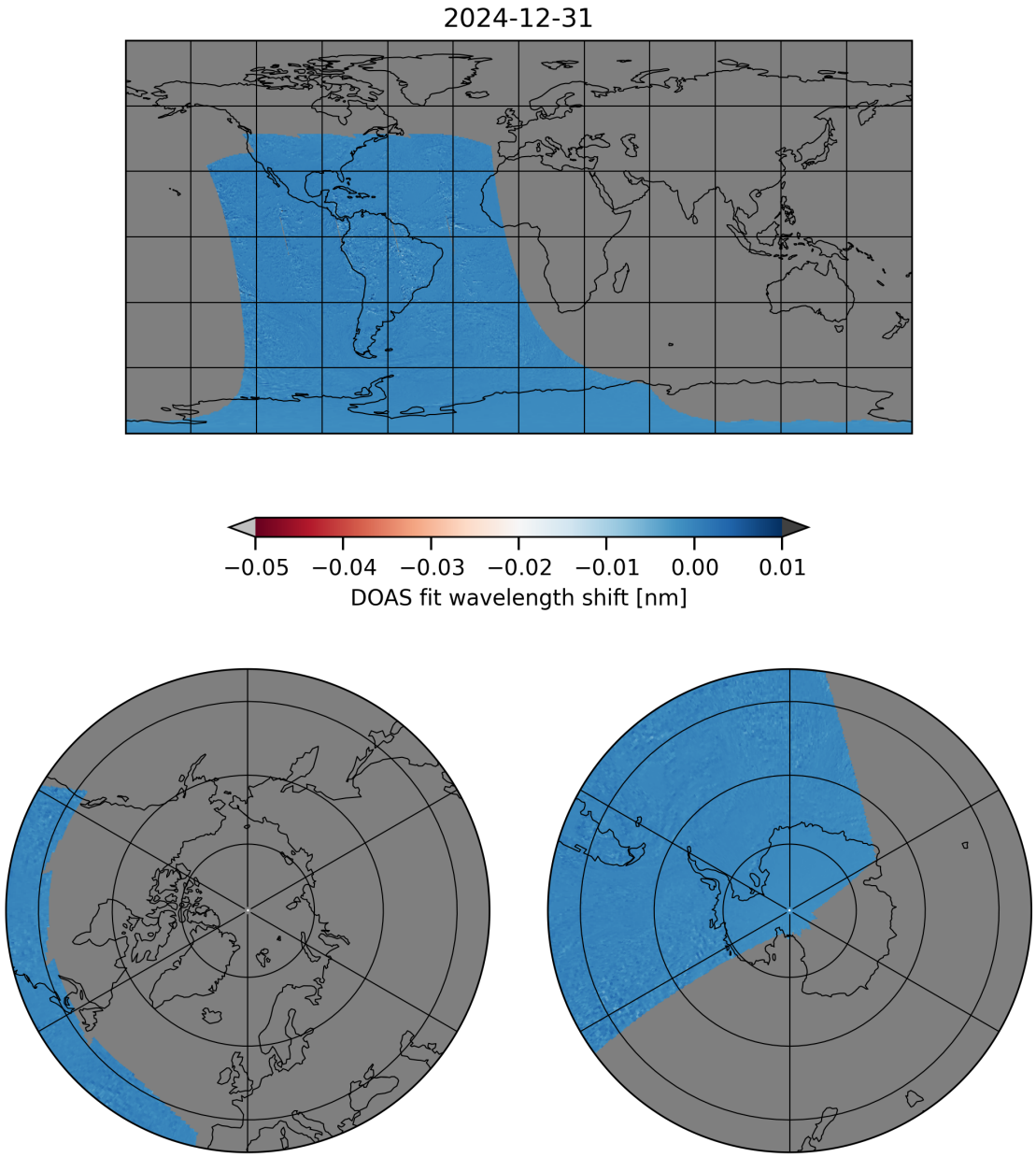

Figure 22: Map of “DOAS fit wavelength shift” for 2024-12-31 to 2024-12-31

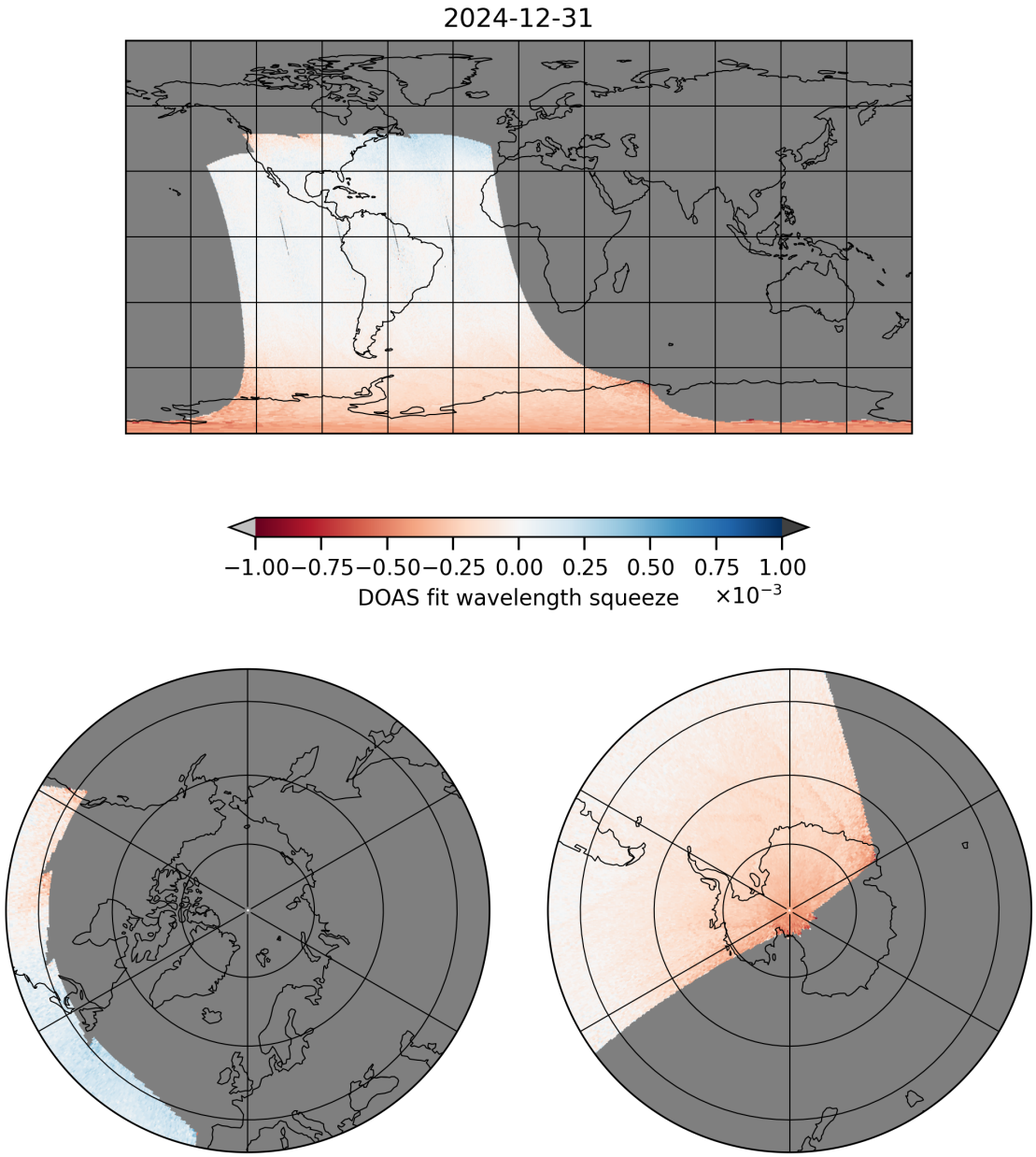

Figure 23: Map of “DOAS fit wavelength squeeze” for 2024-12-31 to 2024-12-31

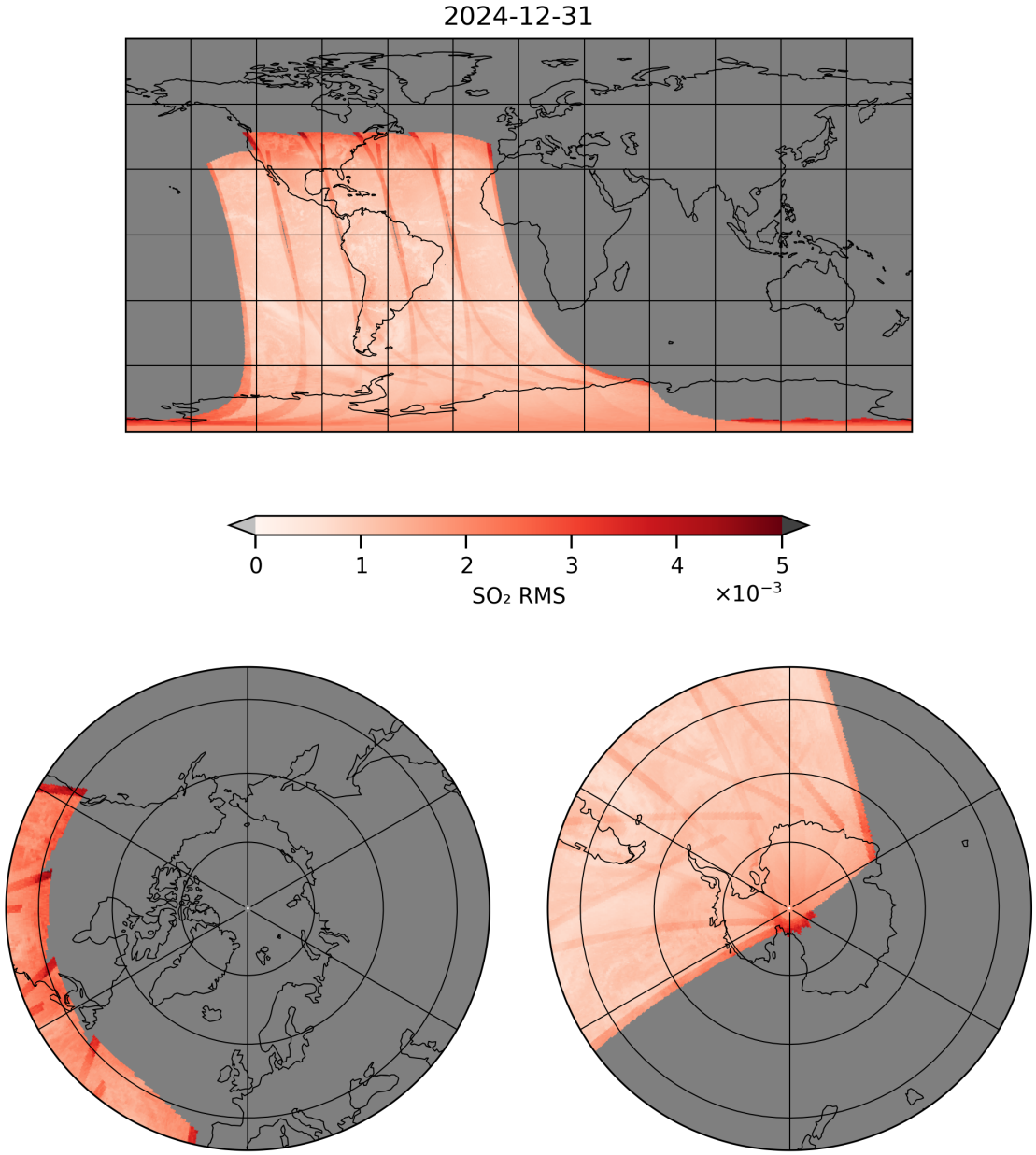

Figure 24: Map of "SO_2 RMS" for 2024-12-31 to 2024-12-31

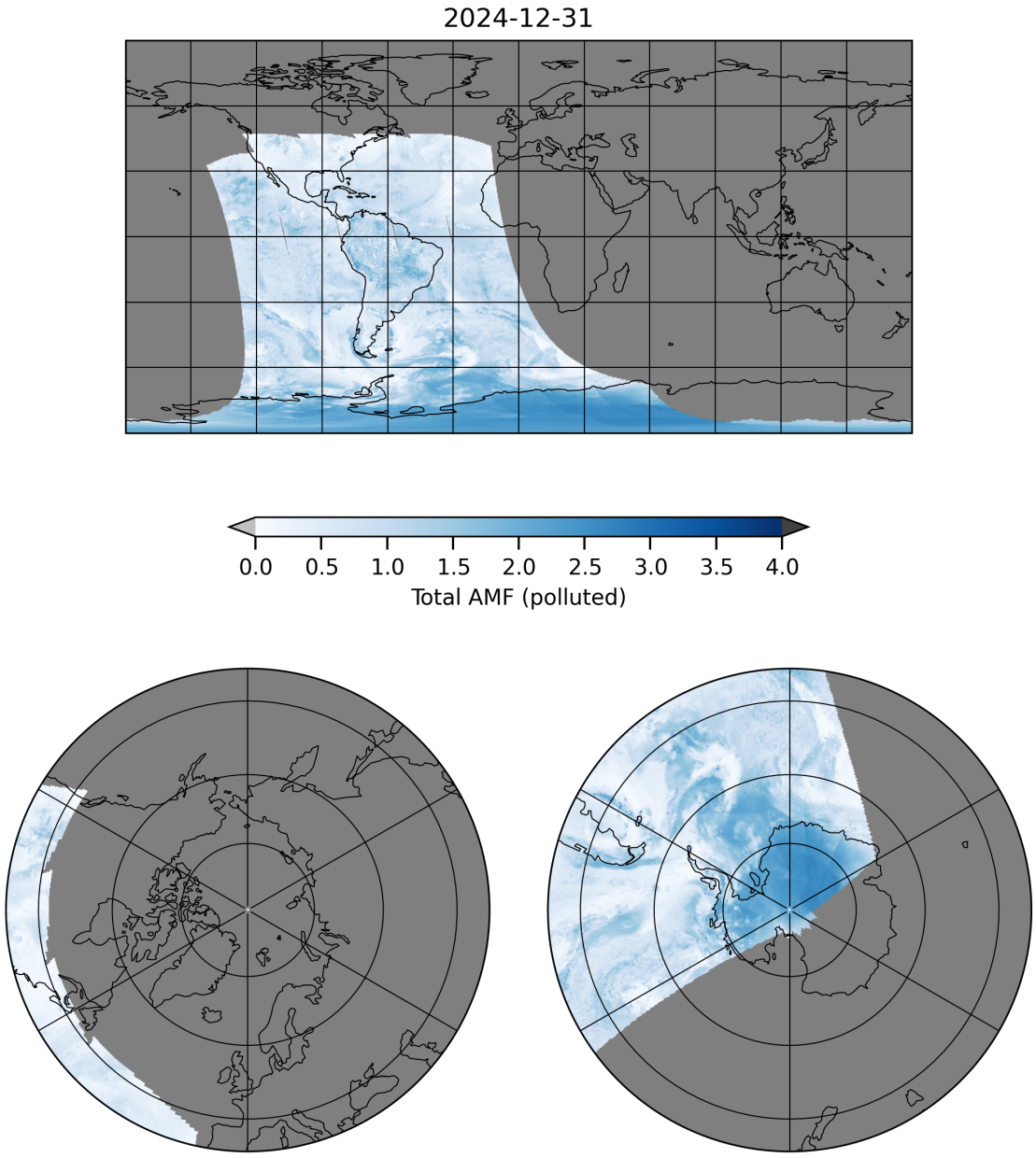

Figure 25: Map of “Total AMF (polluted)” for 2024-12-31 to 2024-12-31

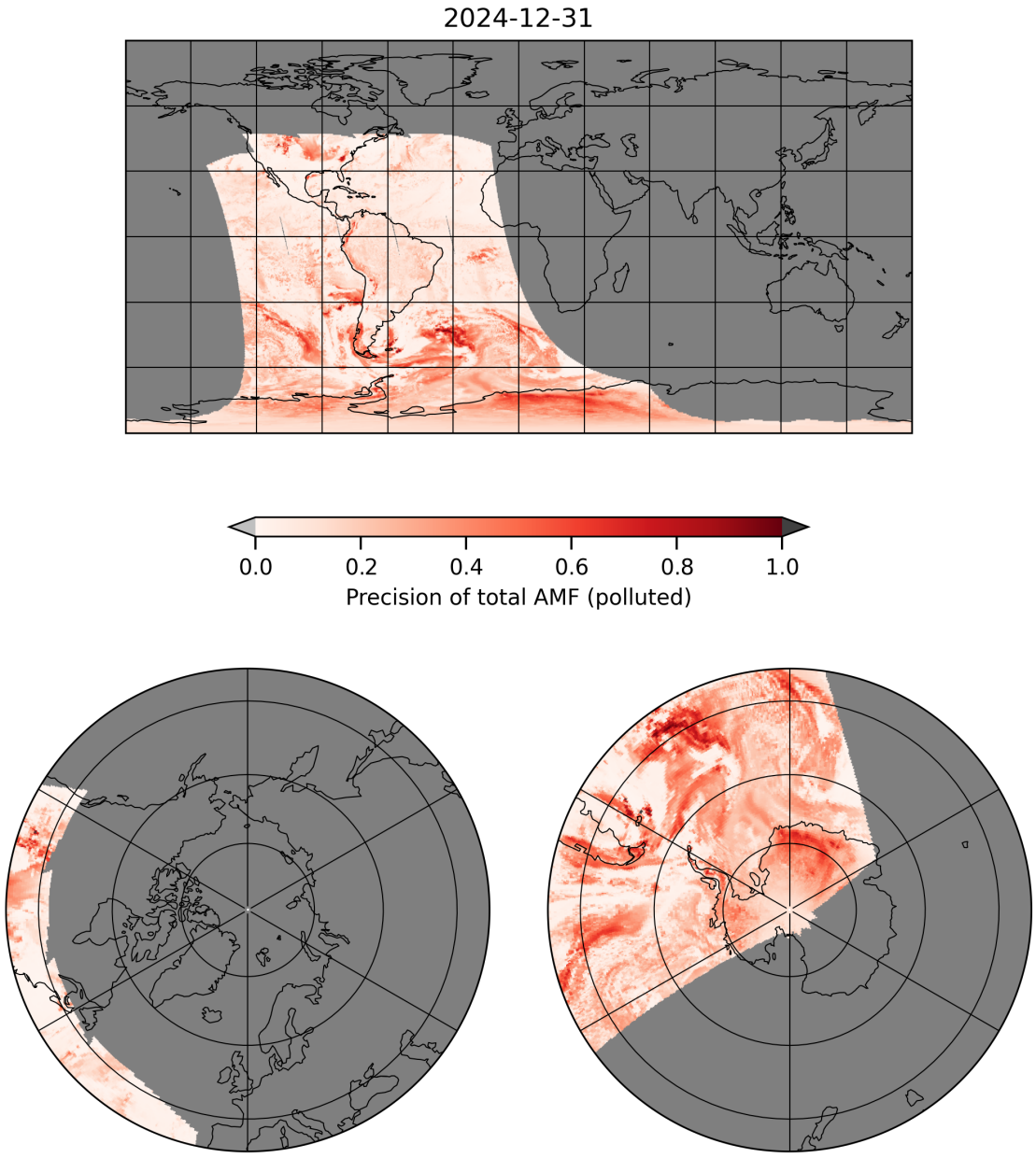

Figure 26: Map of “Precision of total AMF (polluted)” for 2024-12-31 to 2024-12-31

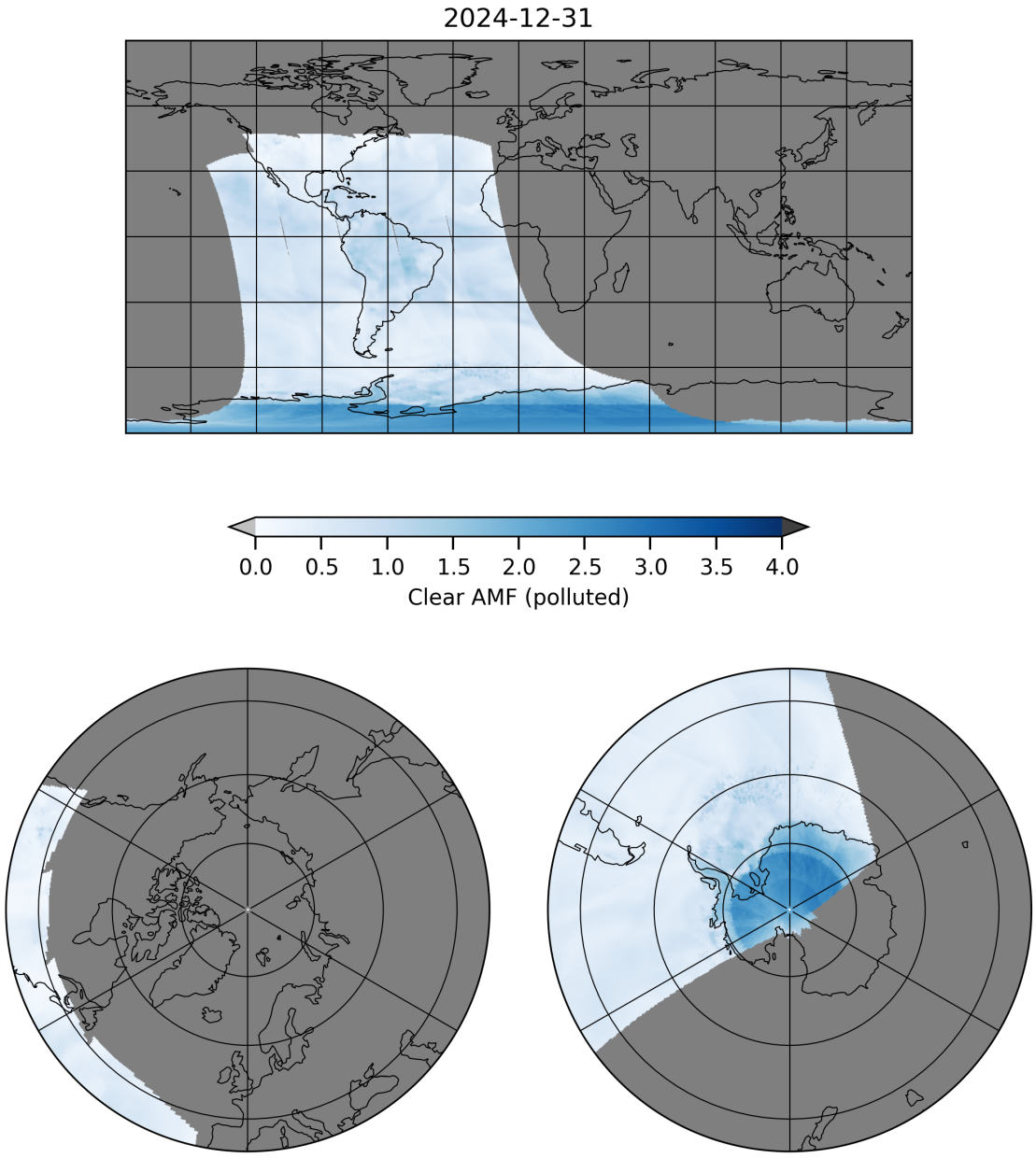

Figure 27: Map of “Clear AMF (polluted)” for 2024-12-31 to 2024-12-31

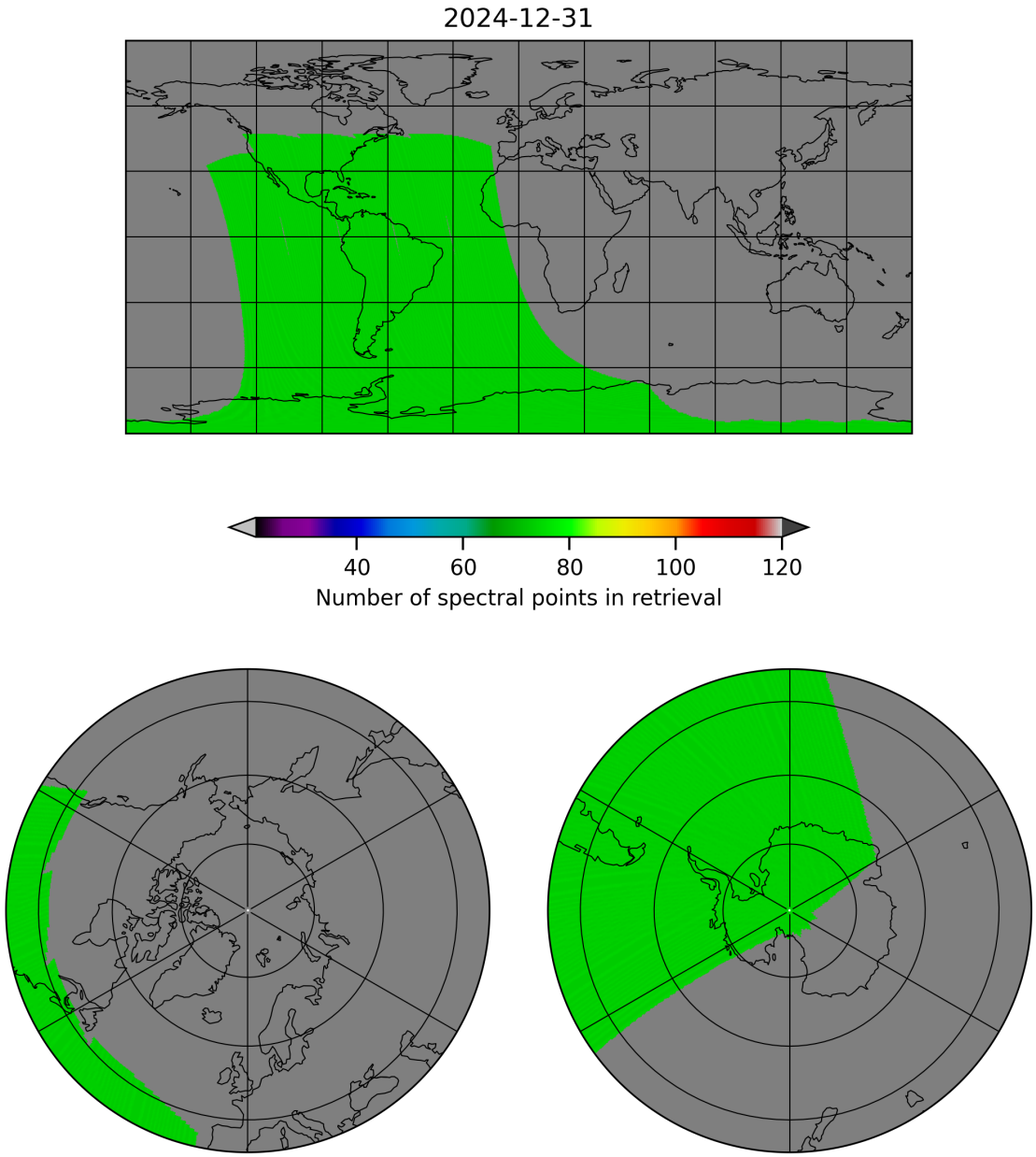

Figure 28: Map of “Number of spectral points in retrieval” for 2024-12-31 to 2024-12-31

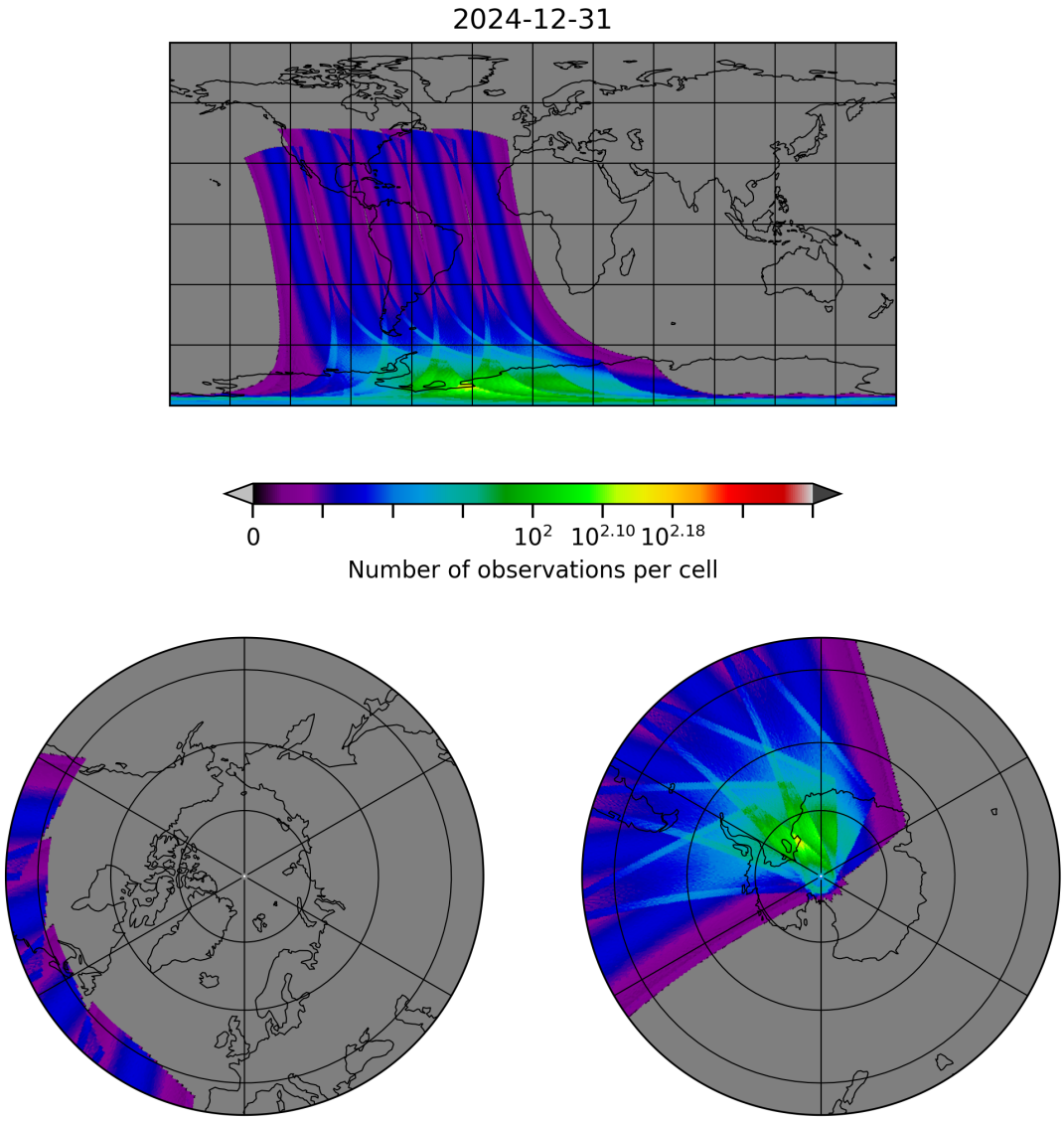

Figure 29: Map of the number of observations for 2024-12-31 to 2024-12-31

7 Zonal average

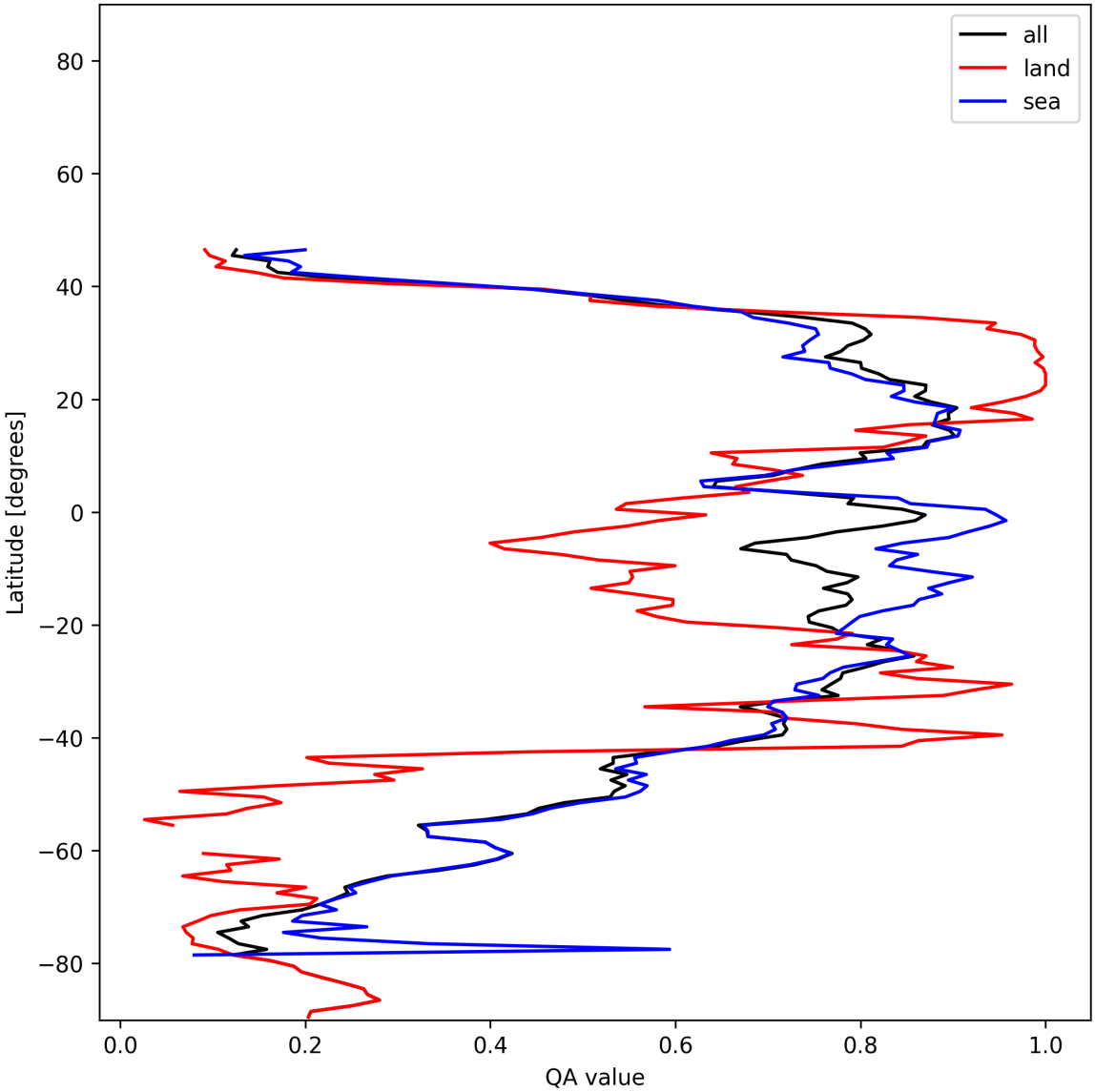

Figure 30: Zonal average of “QA value” for 2024-12-31 to 2024-12-31.

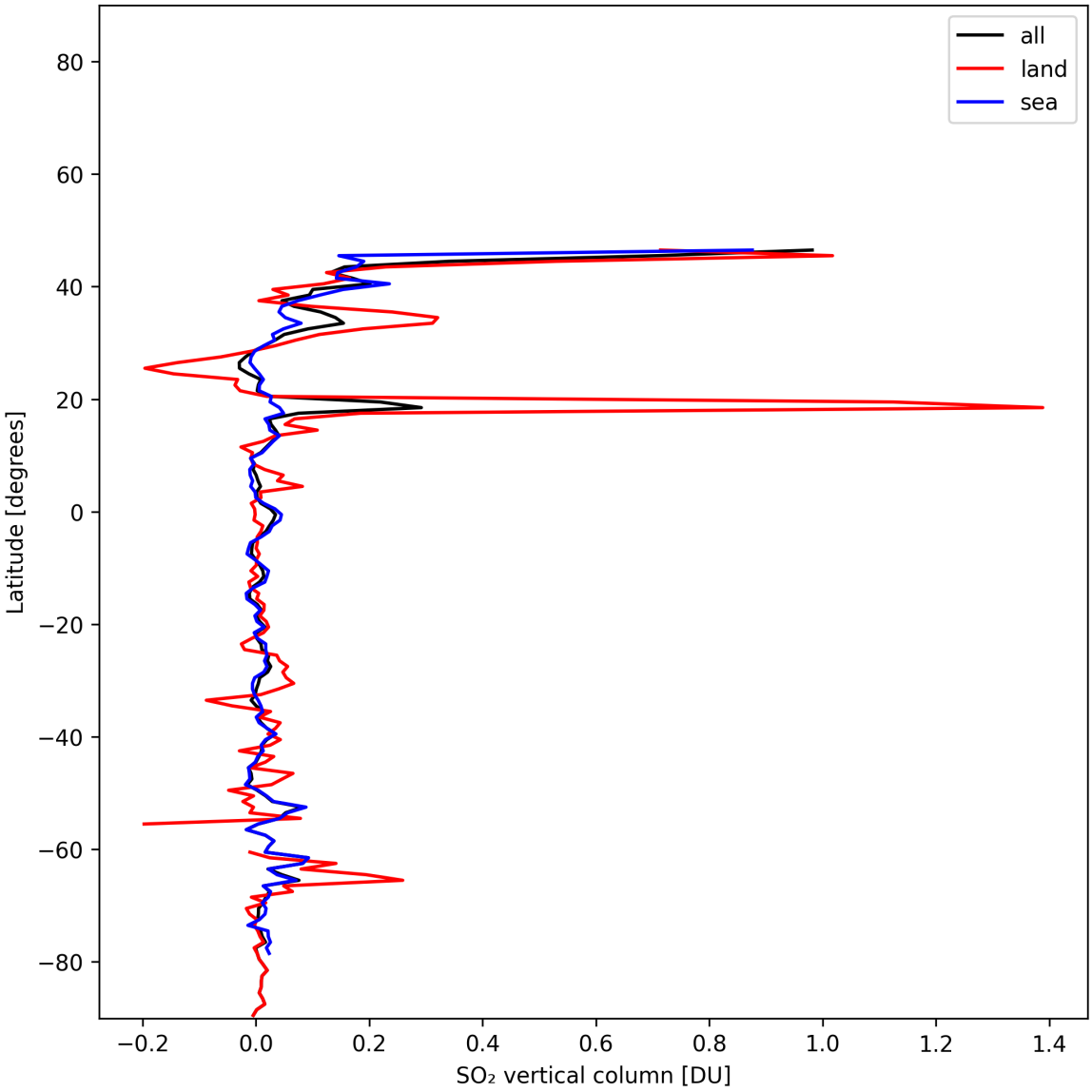

Figure 31: Zonal average of "SO_2 vertical column" for 2024-12-31 to 2024-12-31.

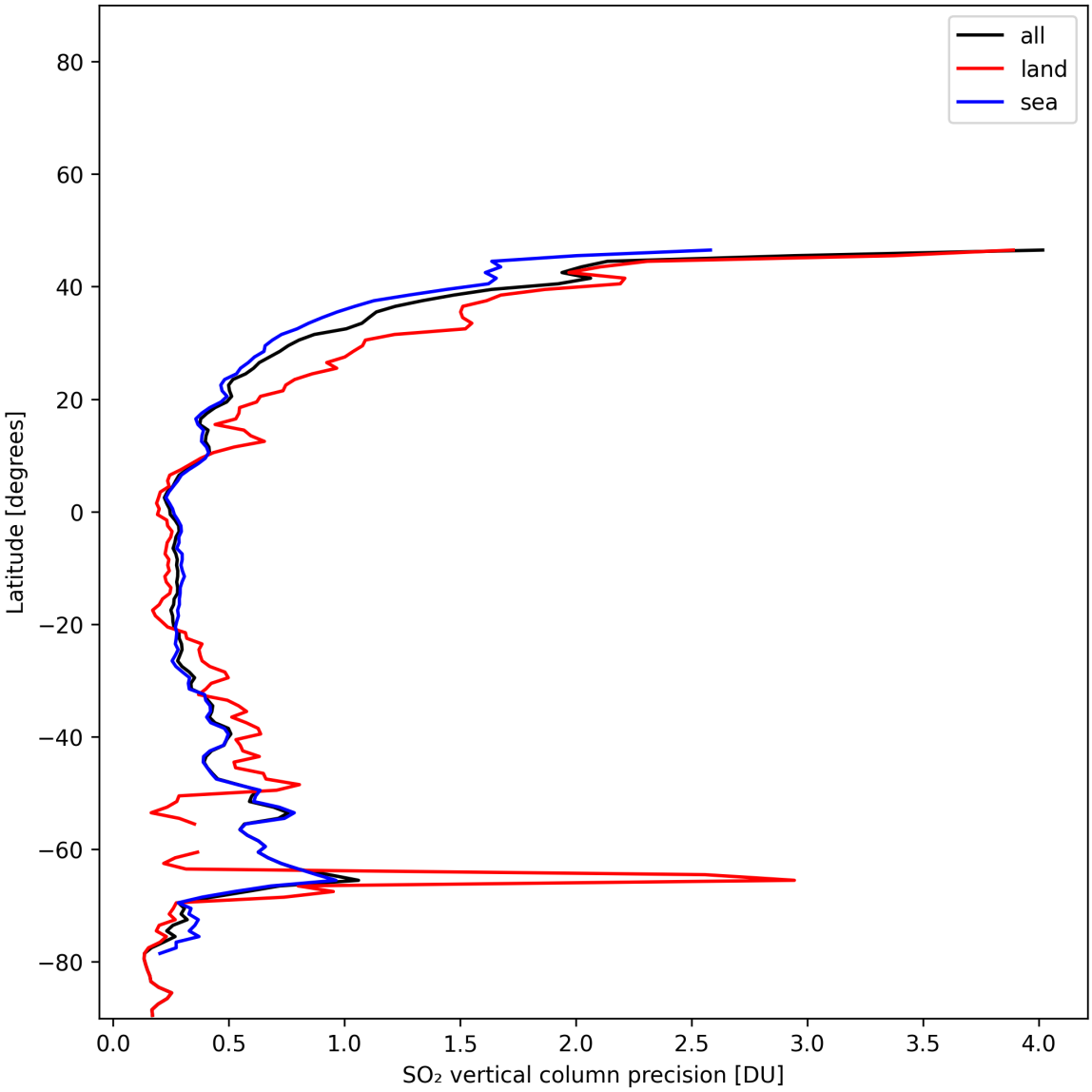

Figure 32: Zonal average of "SO_2 vertical column precision" for 2024-12-31 to 2024-12-31.

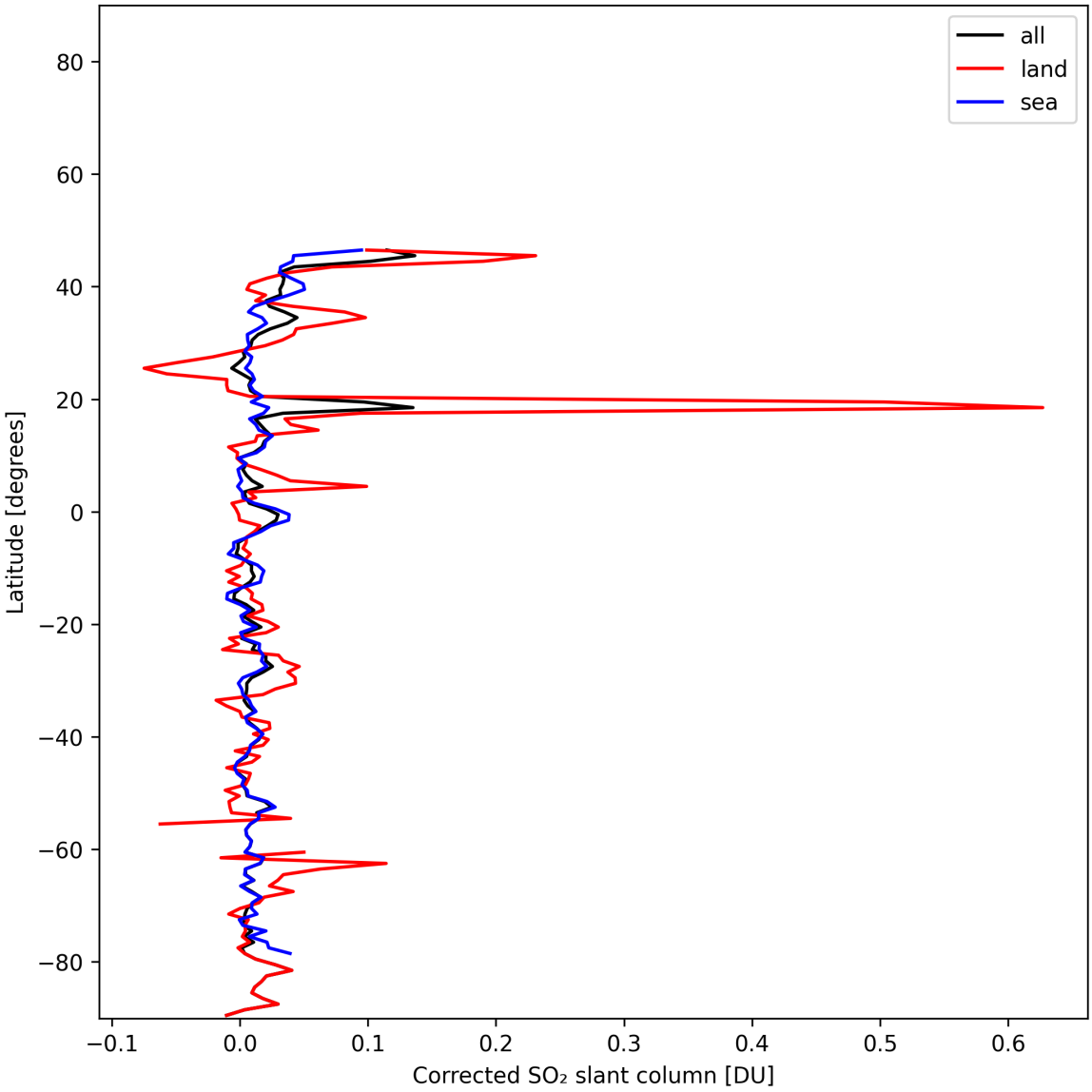

Figure 33: Zonal average of “Corrected SO_2 slant column” for 2024-12-31 to 2024-12-31.

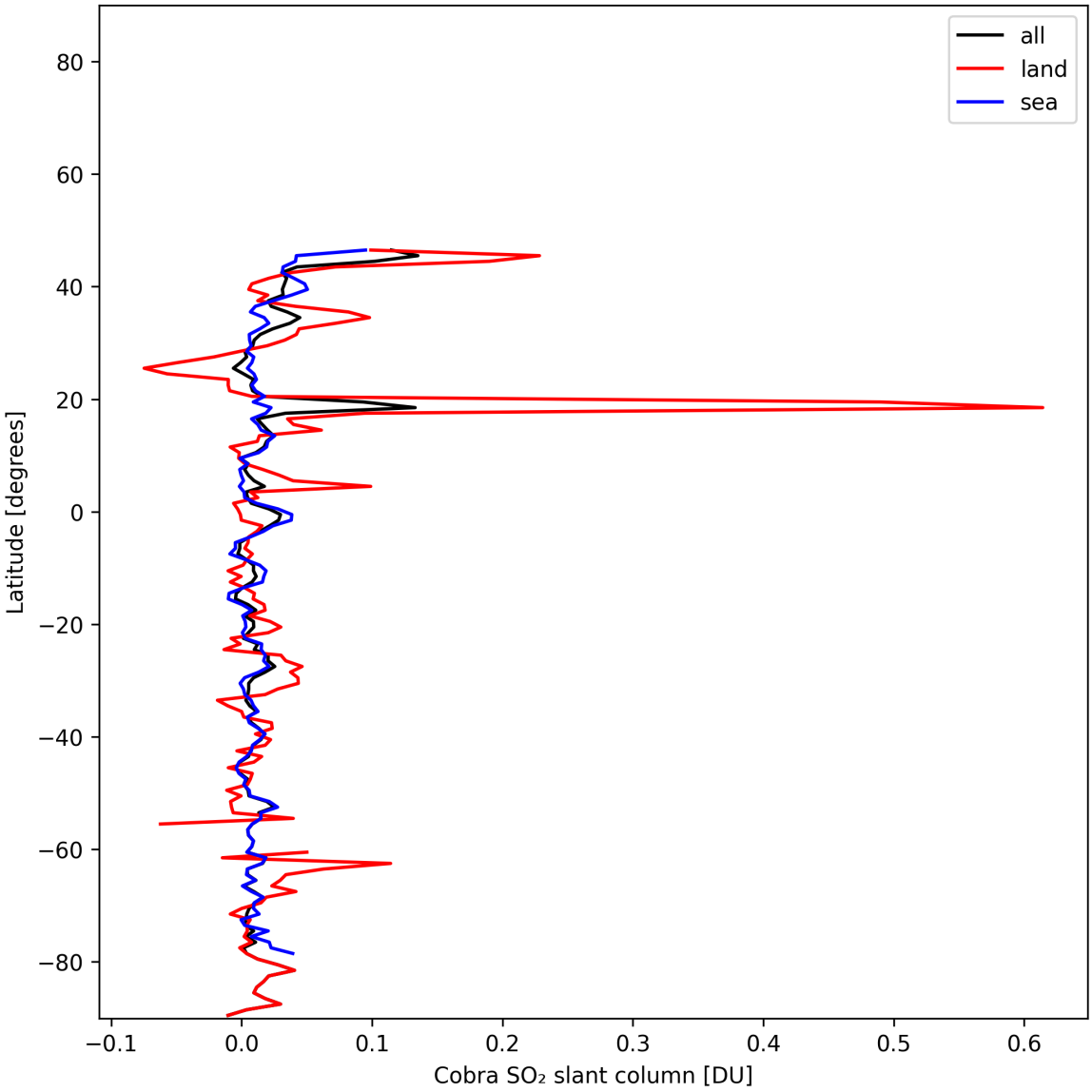

Figure 34: Zonal average of "Cobra SO_2 slant column" for 2024-12-31 to 2024-12-31.

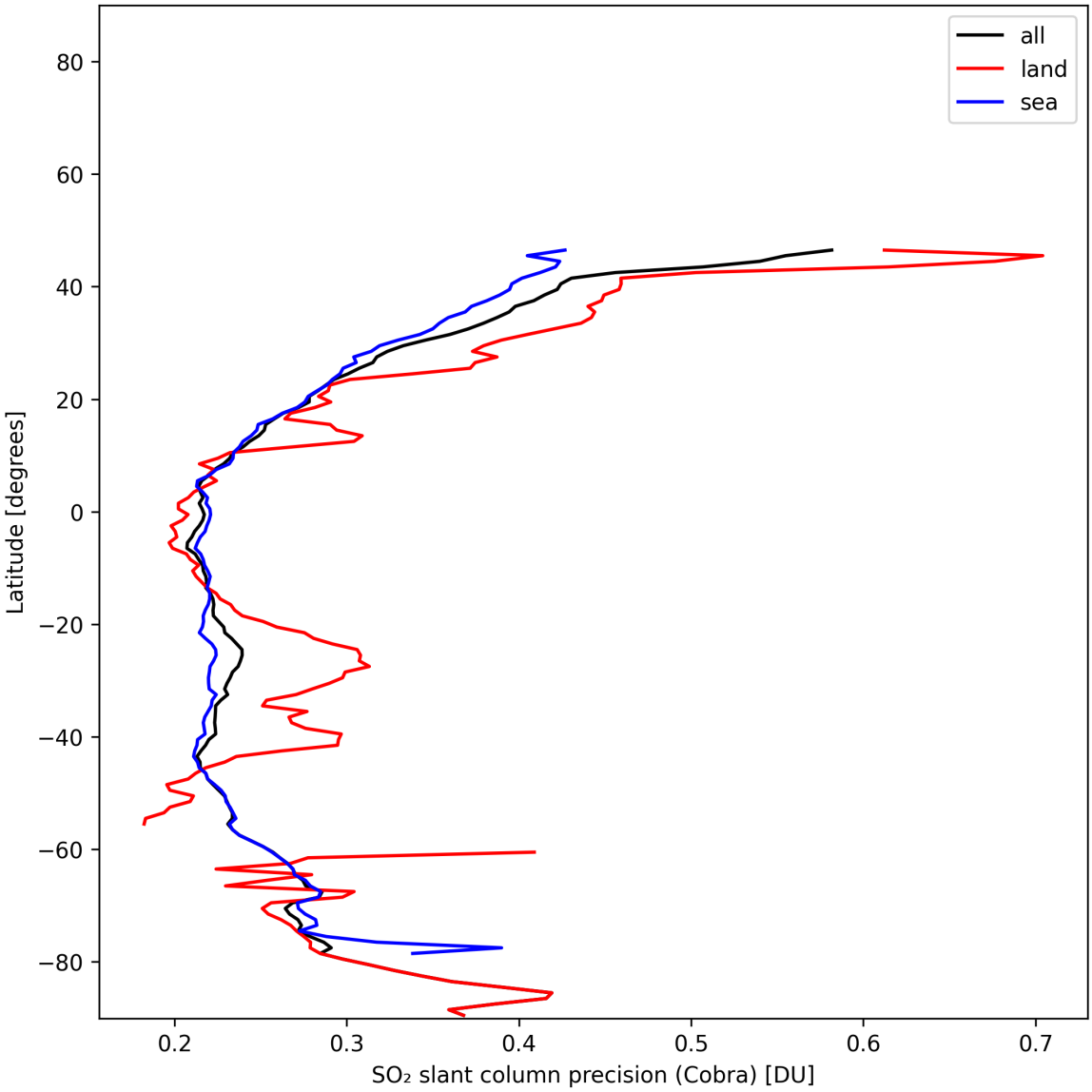

Figure 35: Zonal average of "SO_2 slant column precision (Cobra)" for 2024-12-31 to 2024-12-31.

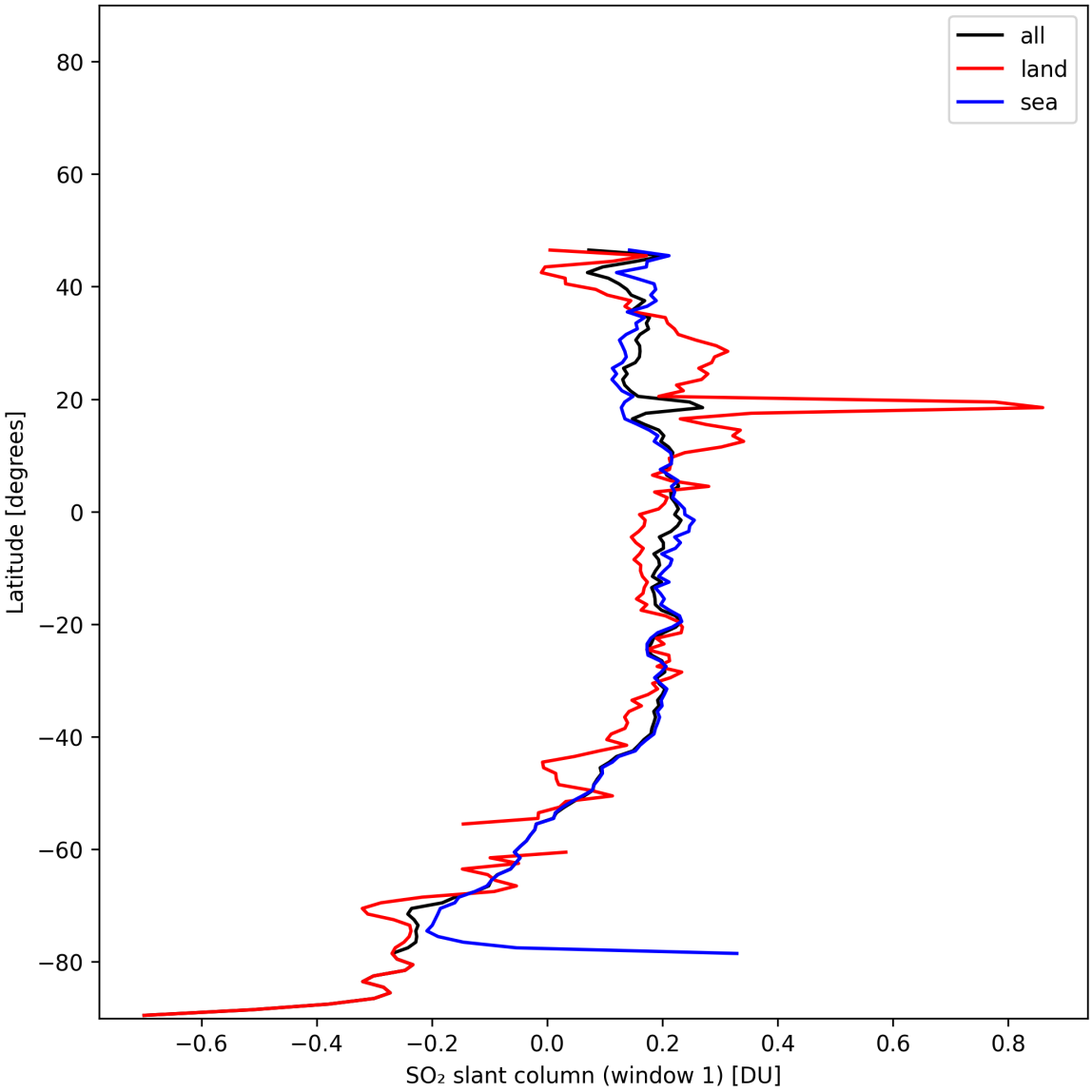

Figure 36: Zonal average of "SO_2 slant column (window 1)" for 2024-12-31 to 2024-12-31.

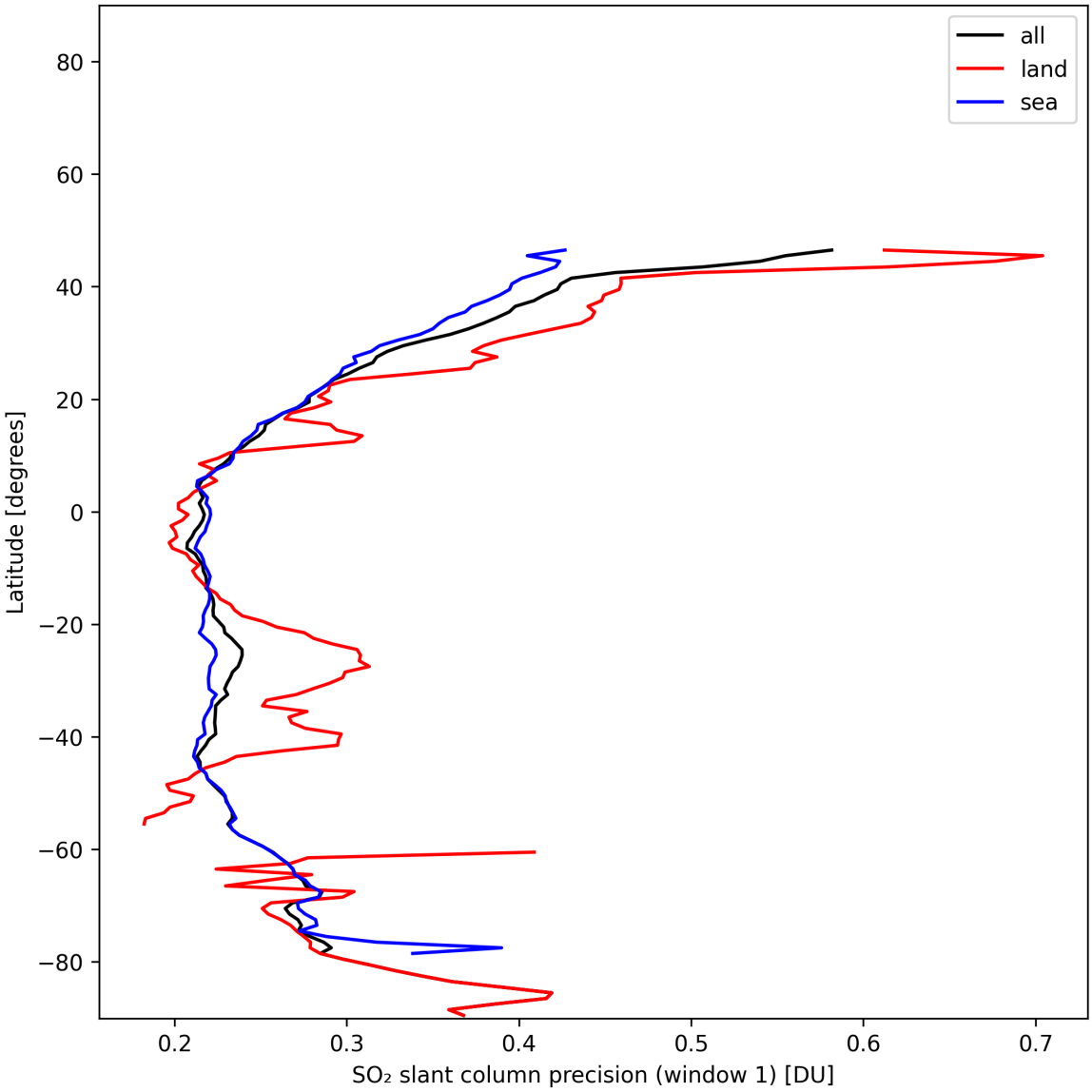

Figure 37: Zonal average of "SO_2 slant column precision (window 1)" for 2024-12-31 to 2024-12-31.

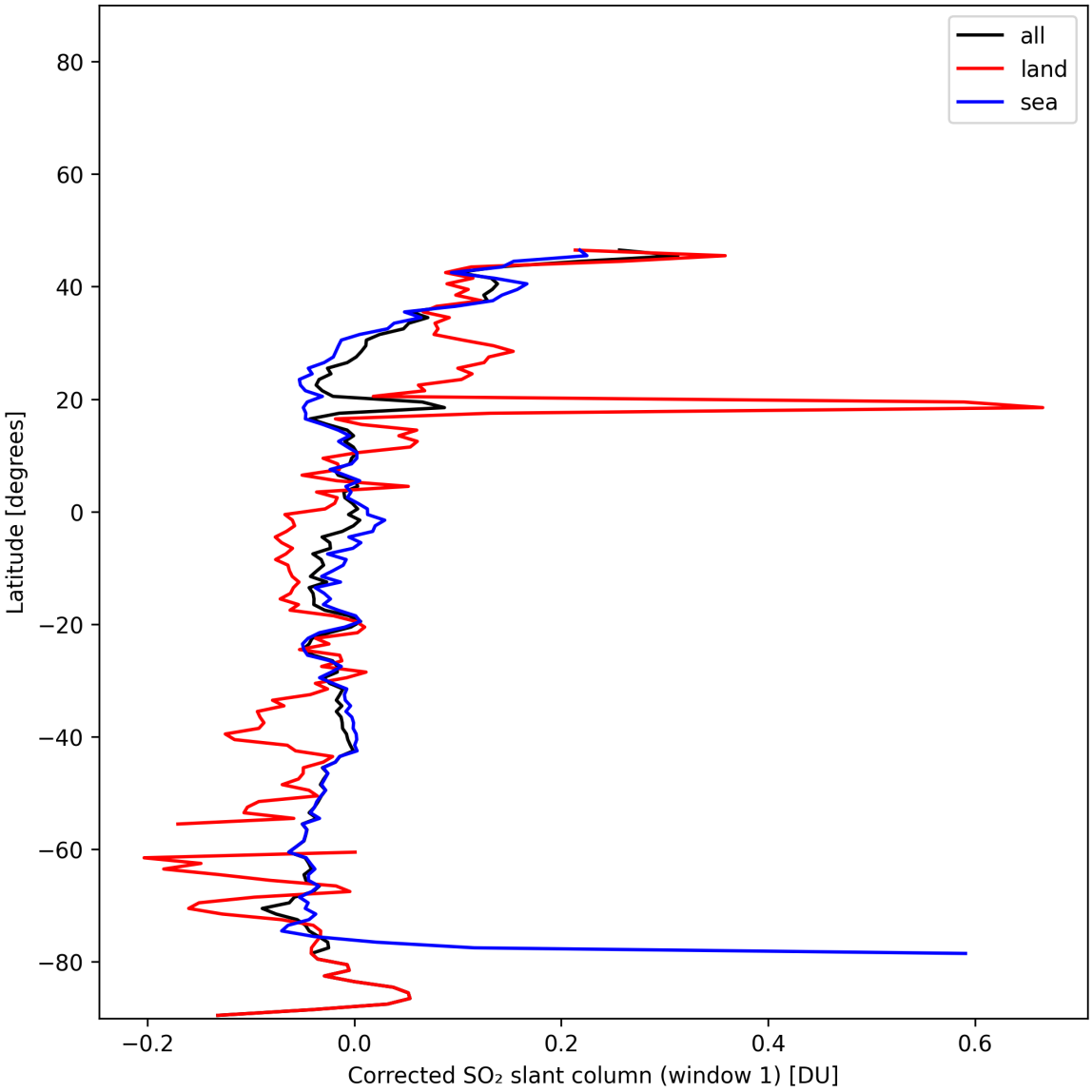

Figure 38: Zonal average of "Corrected SO_2 slant column (window 1)" for 2024-12-31 to 2024-12-31.

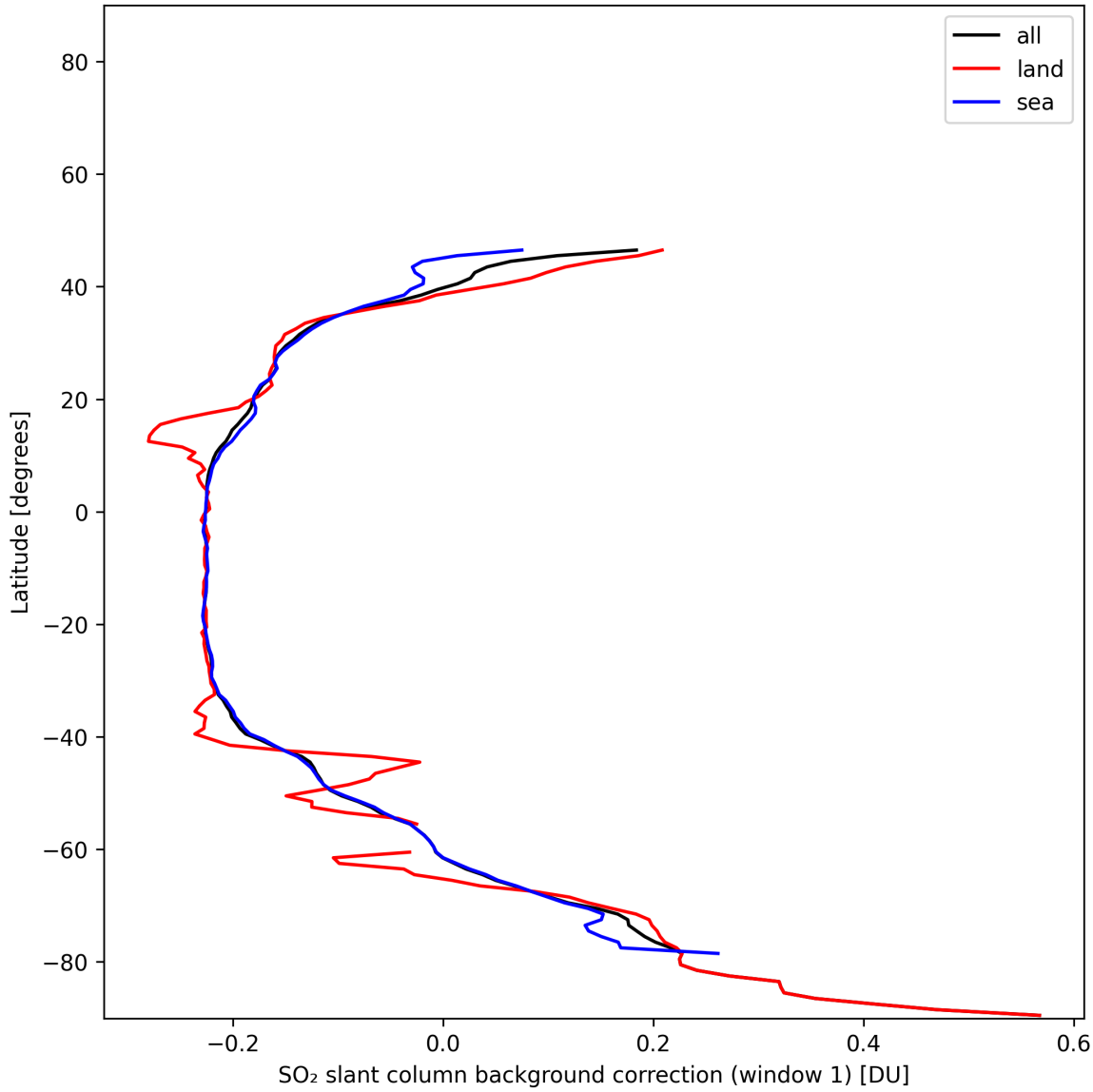

Figure 39: Zonal average of "SO_2 slant column background correction (window 1)" for 2024-12-31 to 2024-12-31.

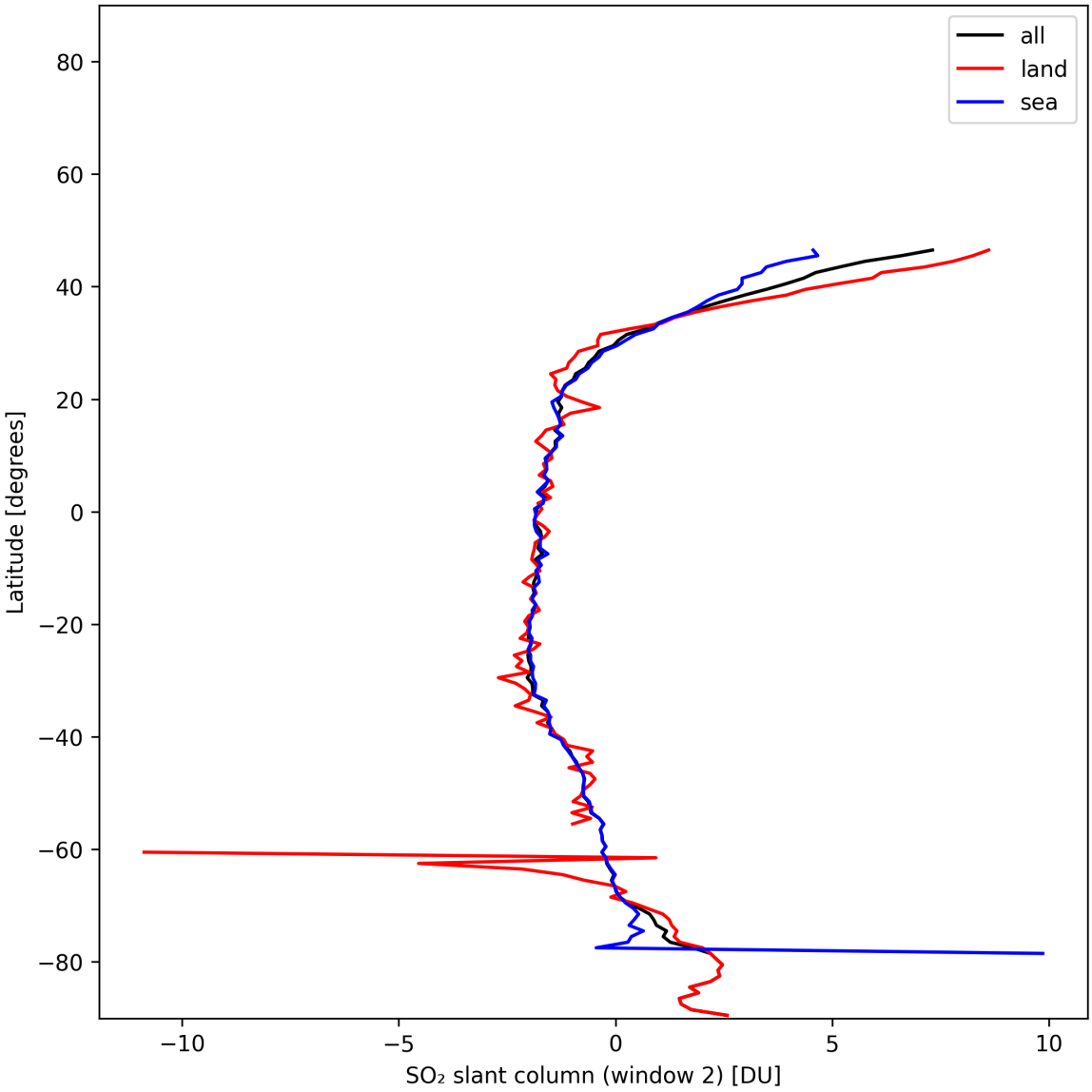

Figure 40: Zonal average of "SO_2 slant column (window 2)" for 2024-12-31 to 2024-12-31.

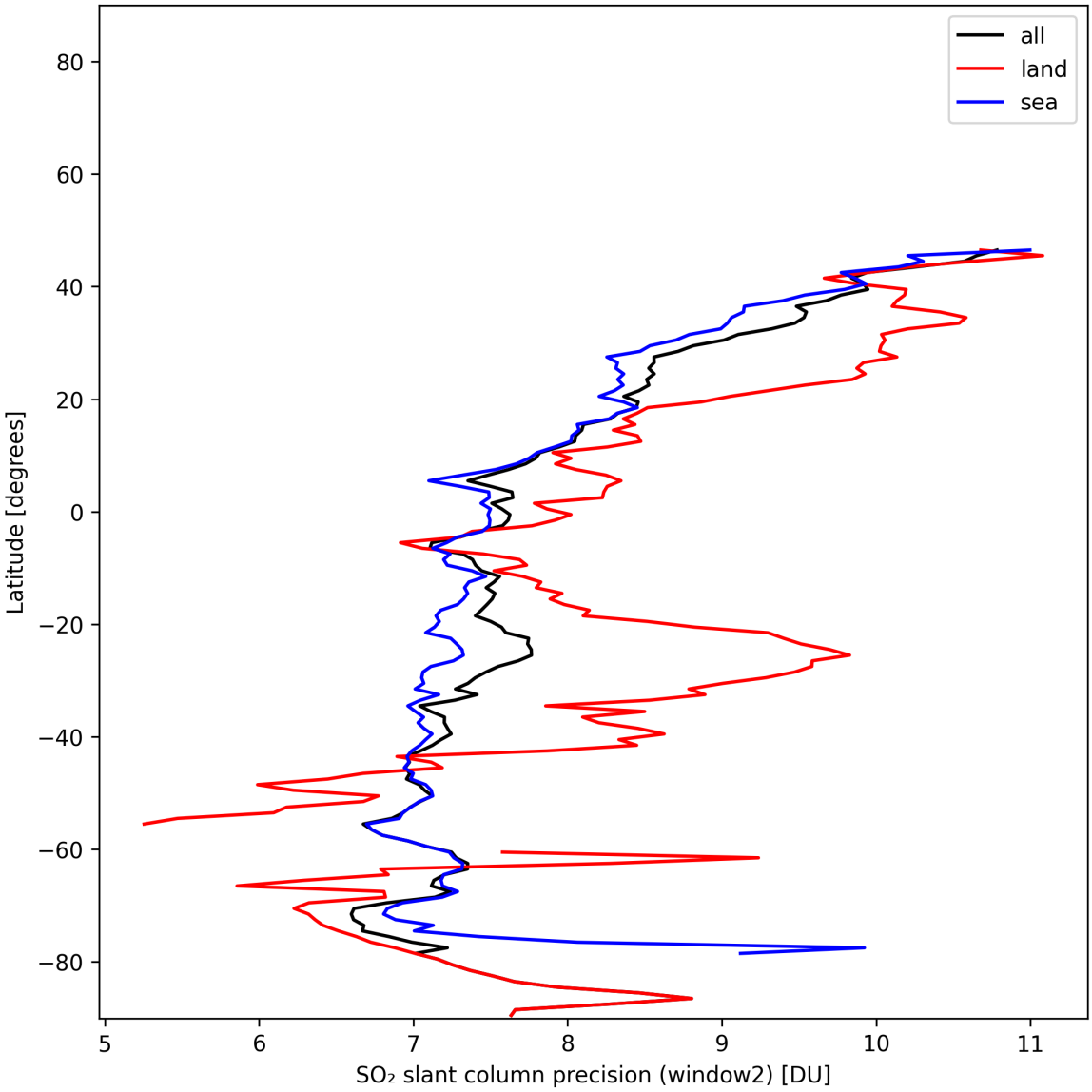

Figure 41: Zonal average of "SO_2 slant column precision (window2)" for 2024-12-31 to 2024-12-31.

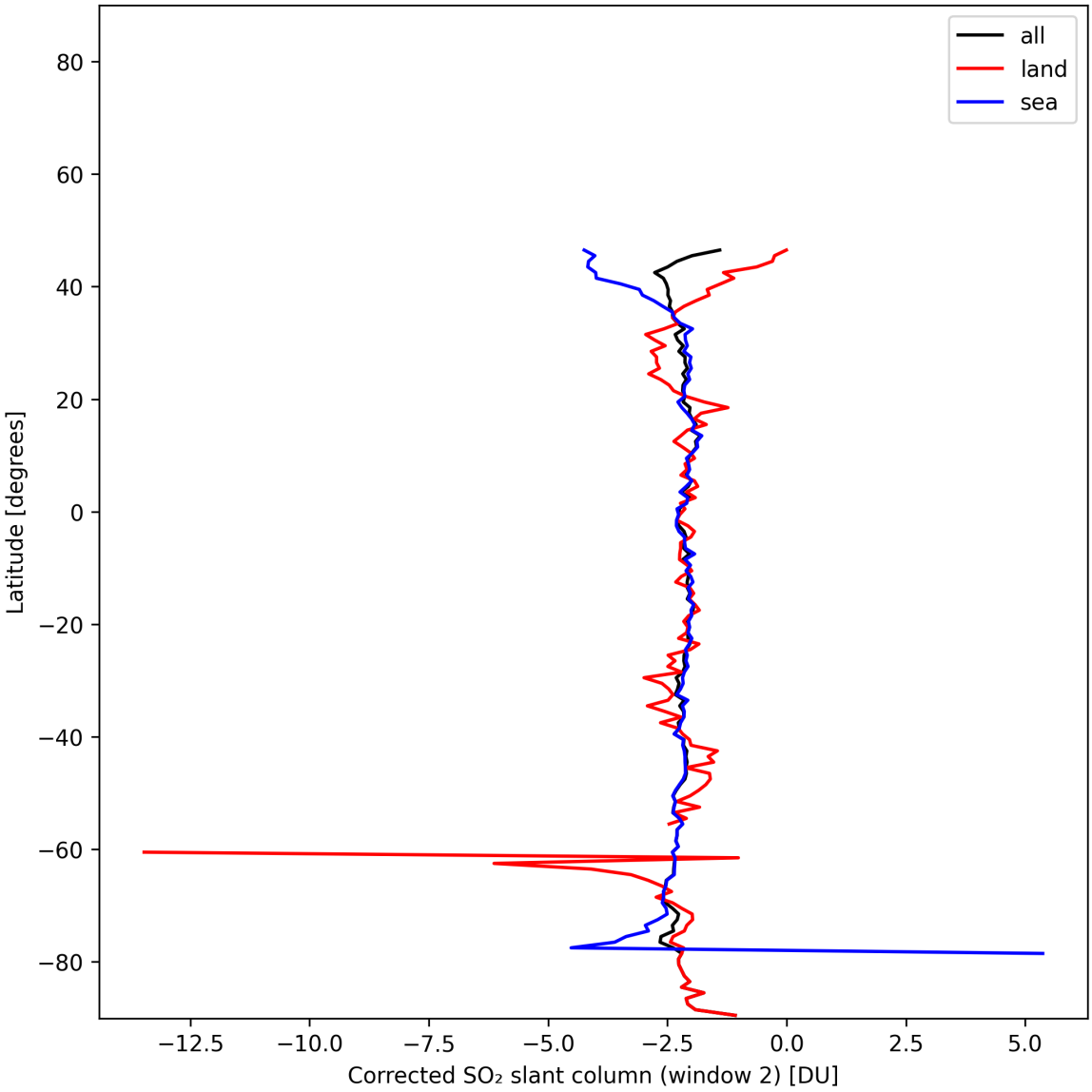

Figure 42: Zonal average of "Corrected SO_2 slant column (window 2)" for 2024-12-31 to 2024-12-31.

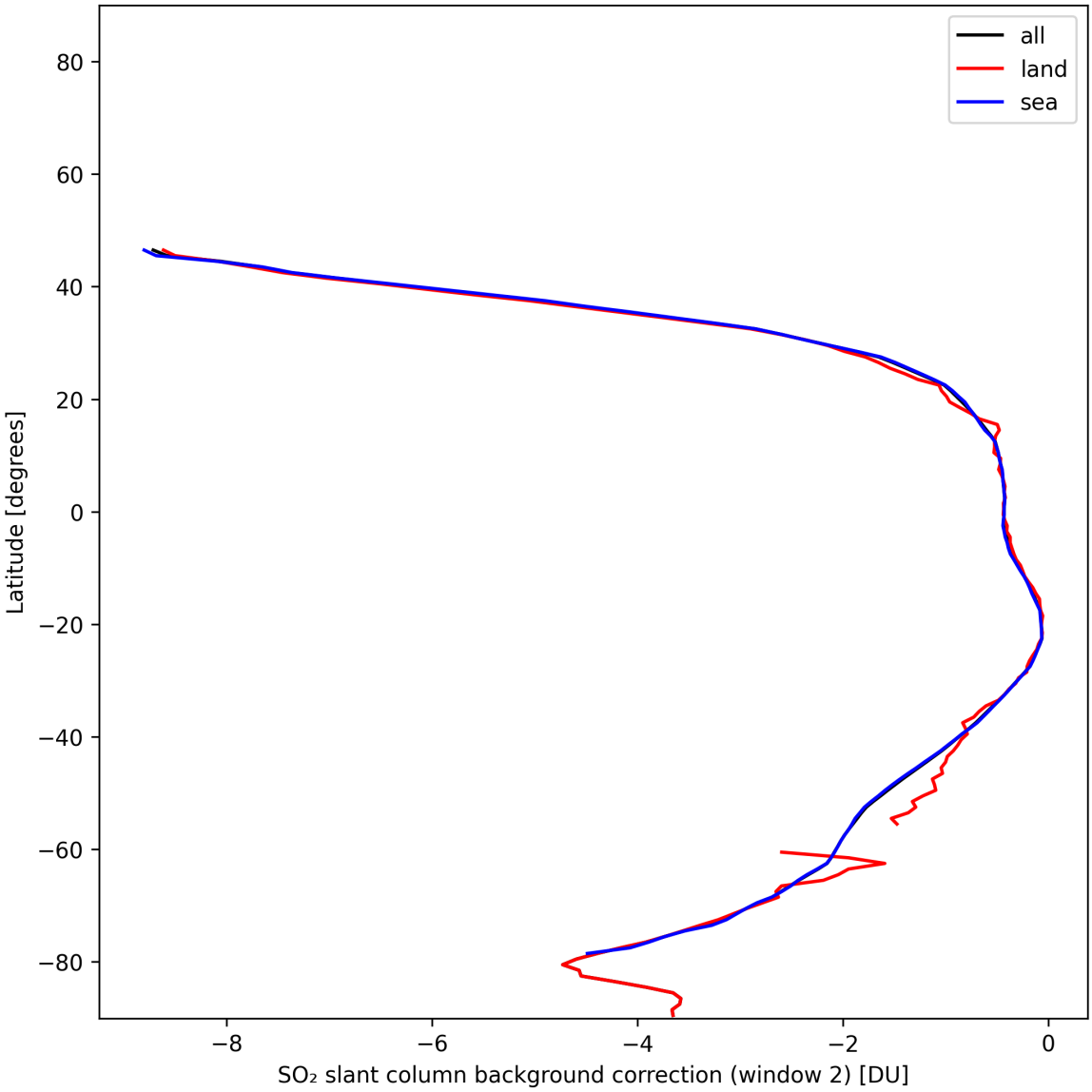

Figure 43: Zonal average of "SO_2 slant column background correction (window 2)" for 2024-12-31 to 2024-12-31.

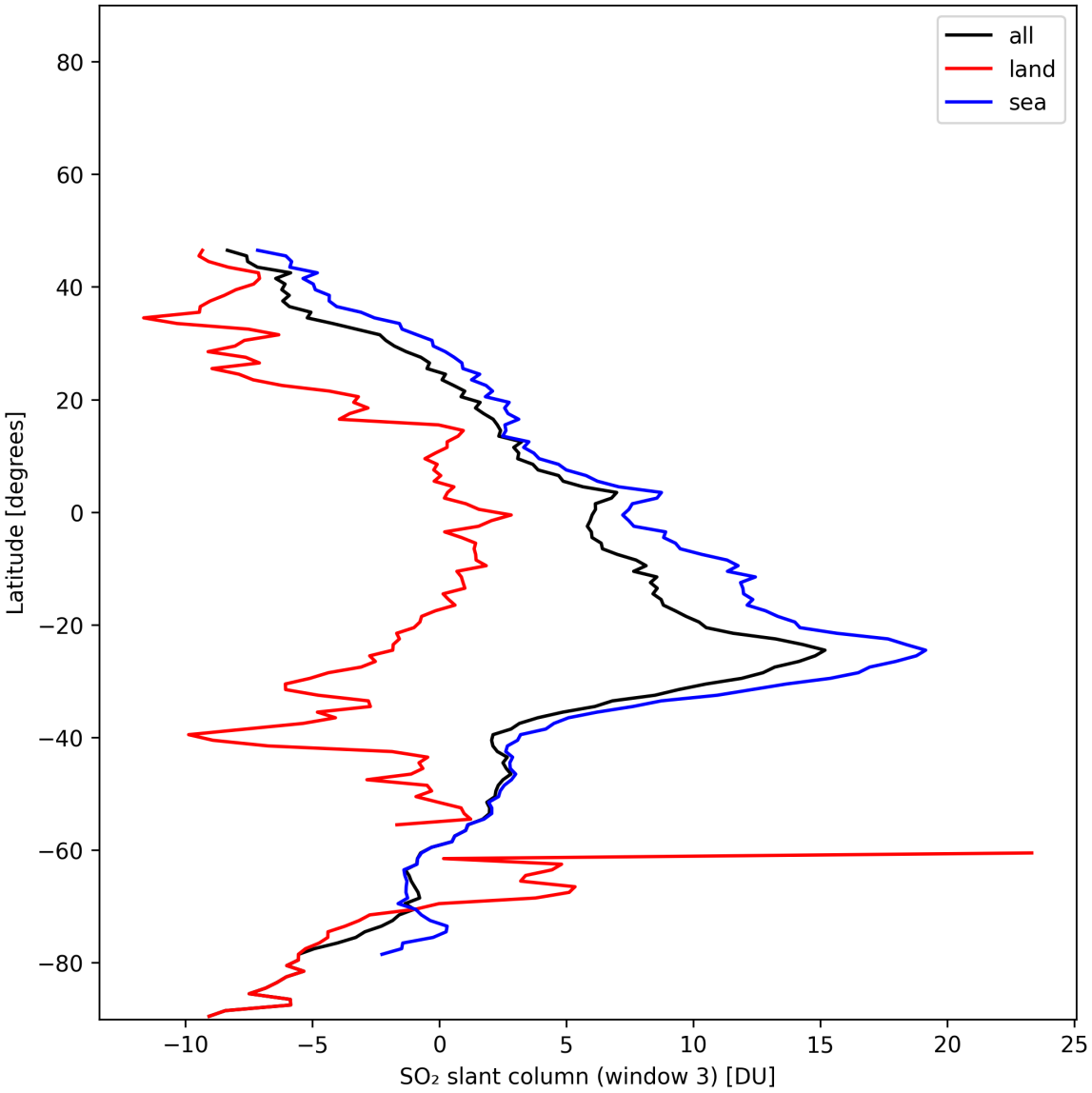

Figure 44: Zonal average of "SO_2 slant column (window 3)" for 2024-12-31 to 2024-12-31.

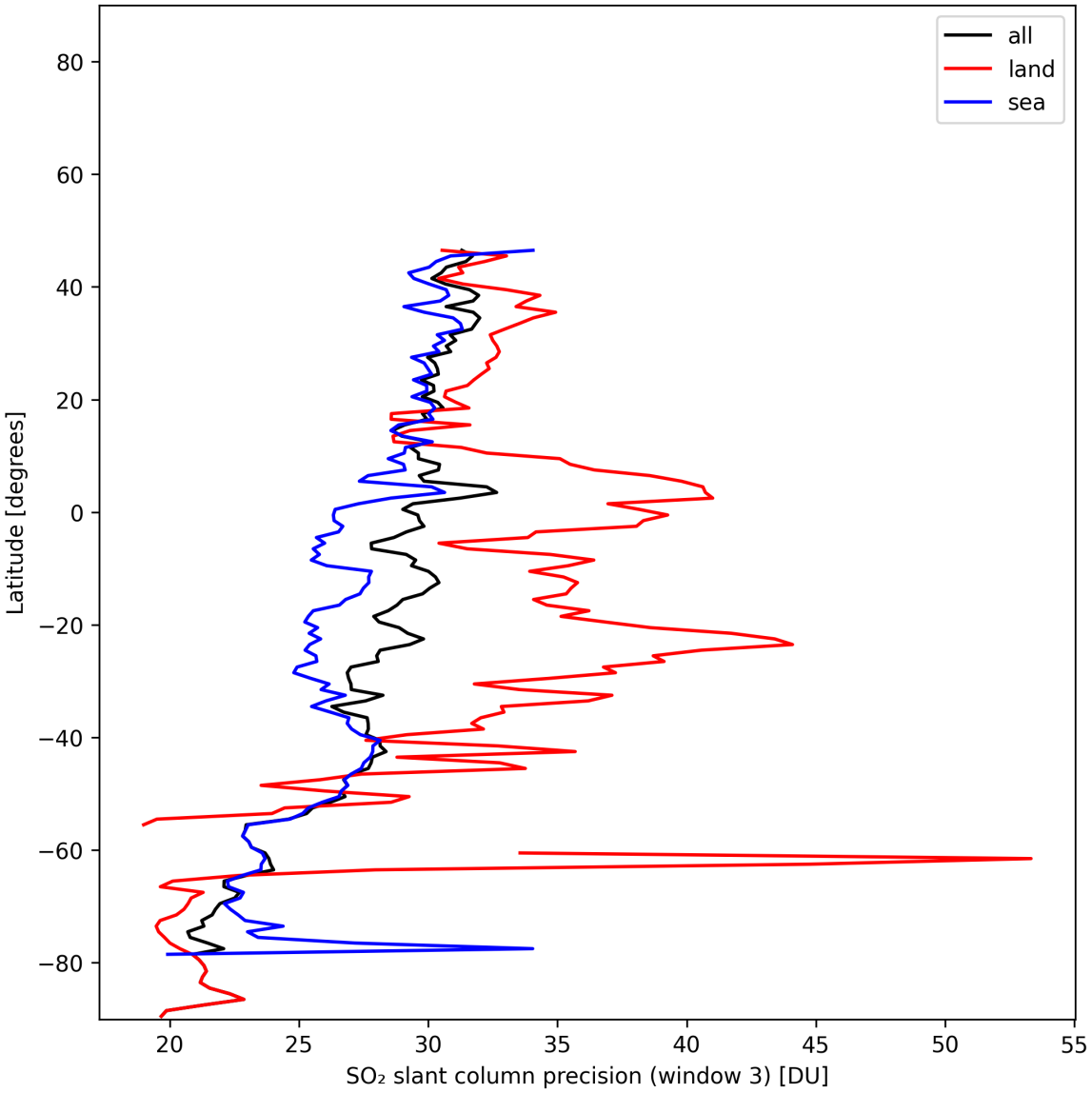

Figure 45: Zonal average of "SO_2 slant column precision (window 3)" for 2024-12-31 to 2024-12-31.

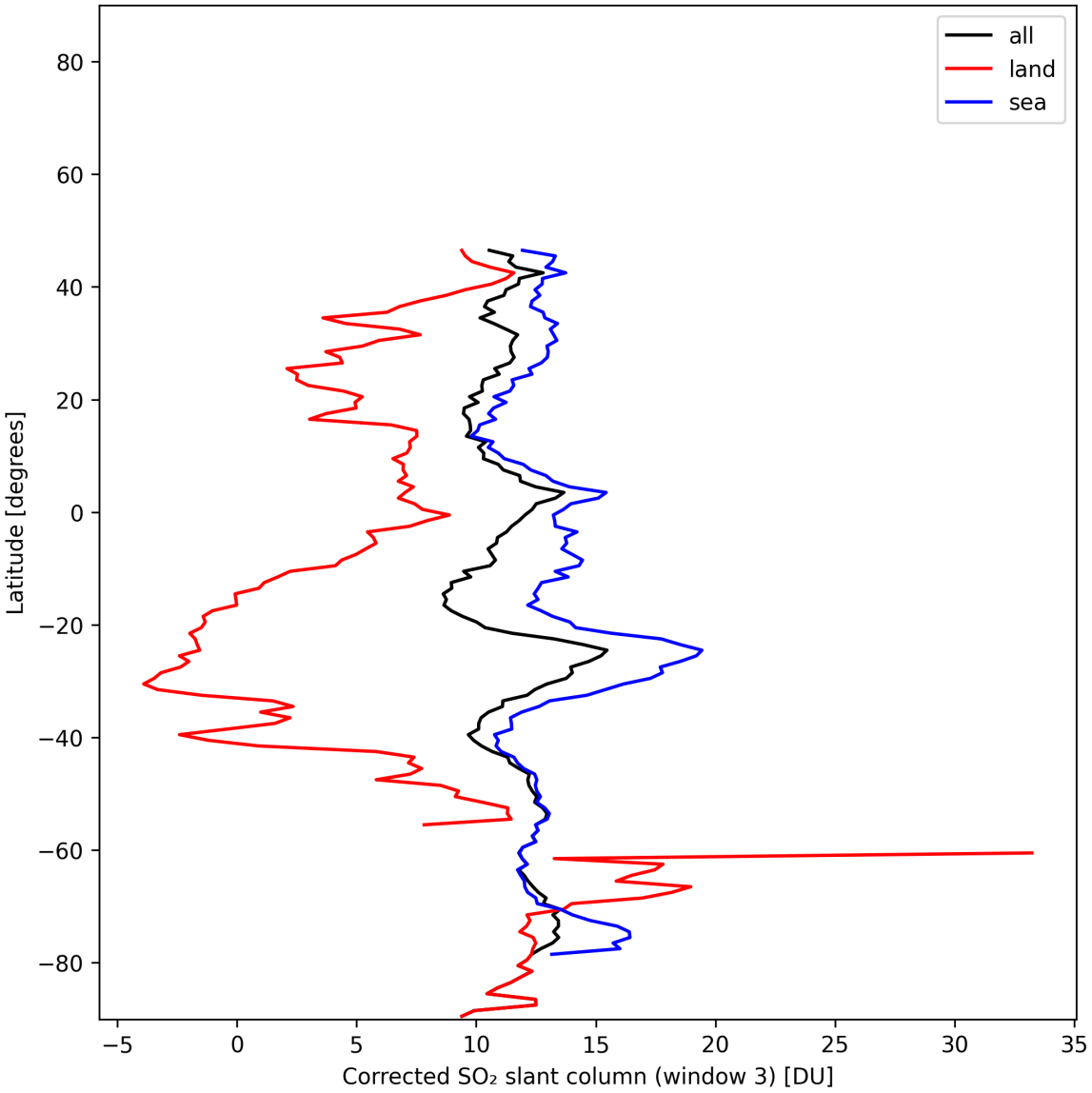

Figure 46: Zonal average of “Corrected SO_2 slant column (window 3)” for 2024-12-31 to 2024-12-31.

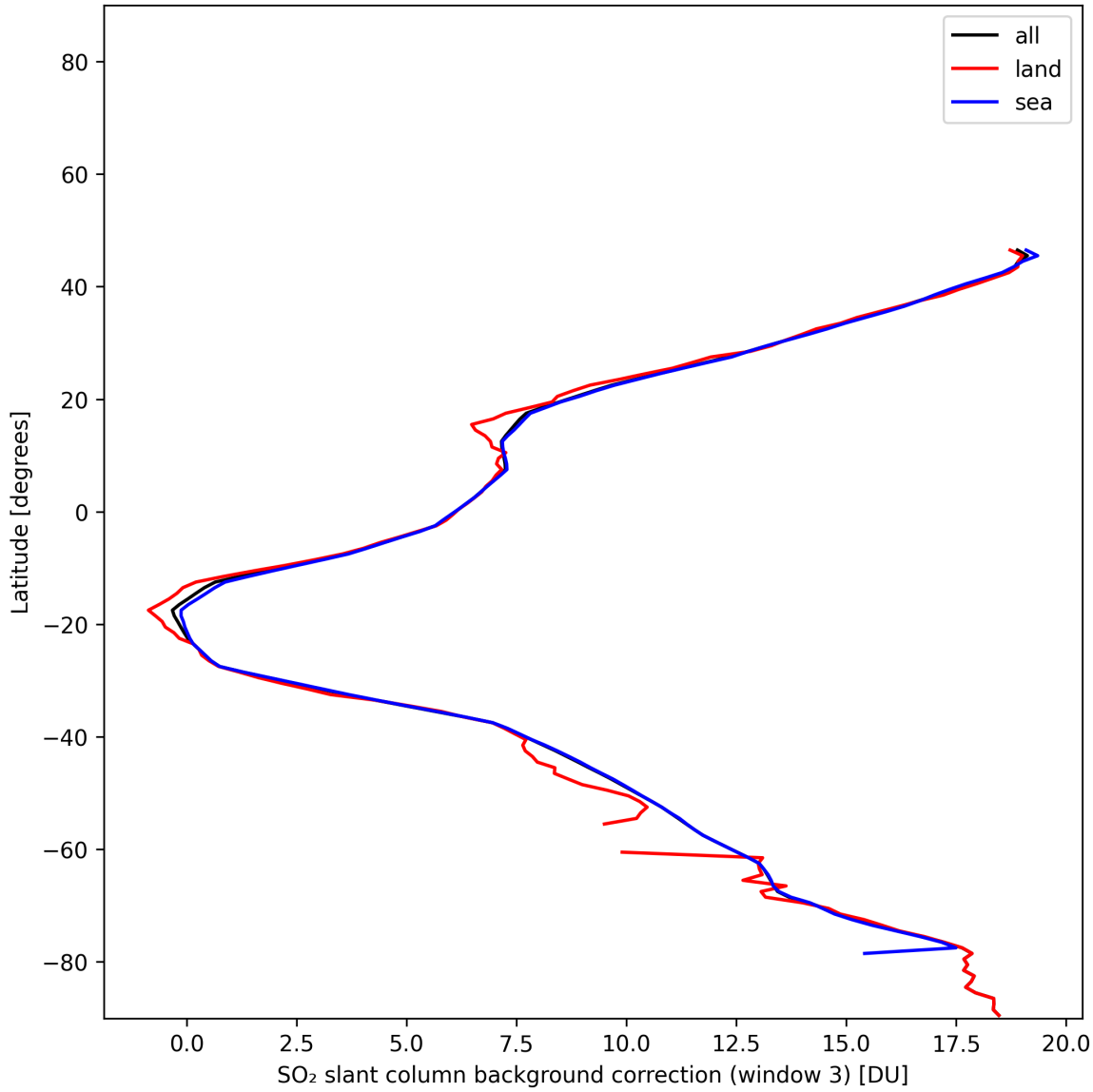

Figure 47: Zonal average of "SO_2 slant column background correction (window 3)" for 2024-12-31 to 2024-12-31.

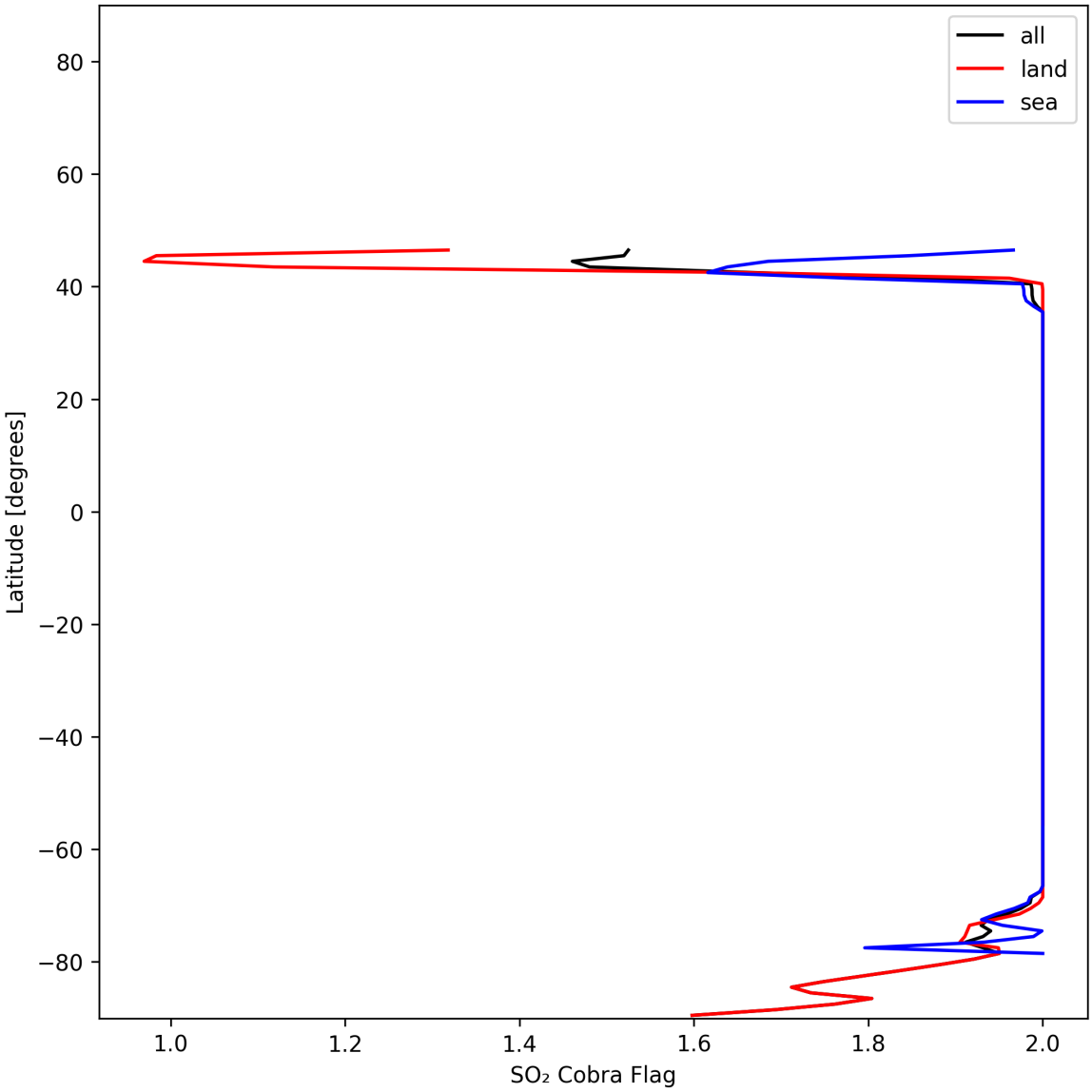

Figure 48: Zonal average of "SO_2 Cobra Flag" for 2024-12-31 to 2024-12-31.

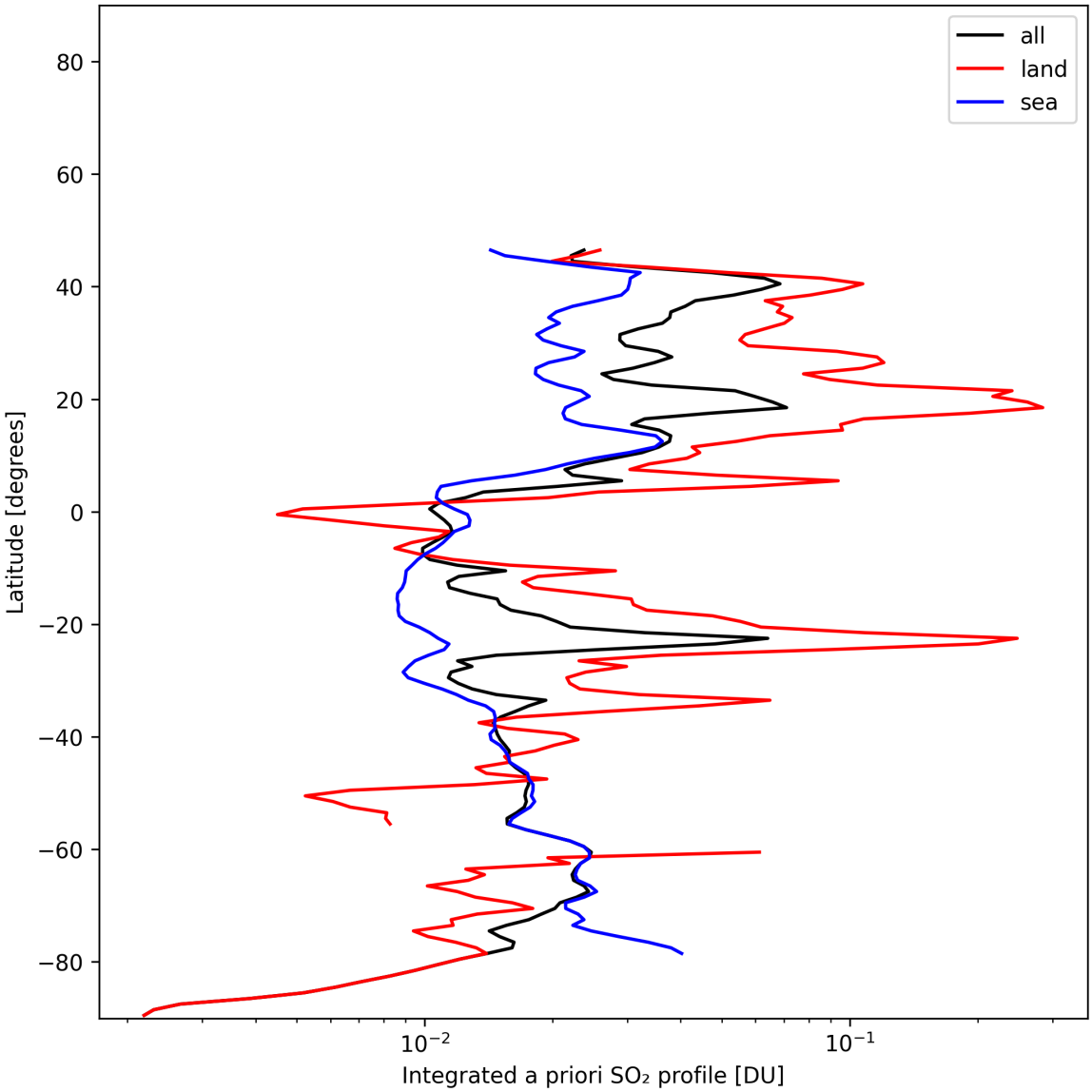

Figure 49: Zonal average of “Integrated a priori SO_2 profile” for 2024-12-31 to 2024-12-31.

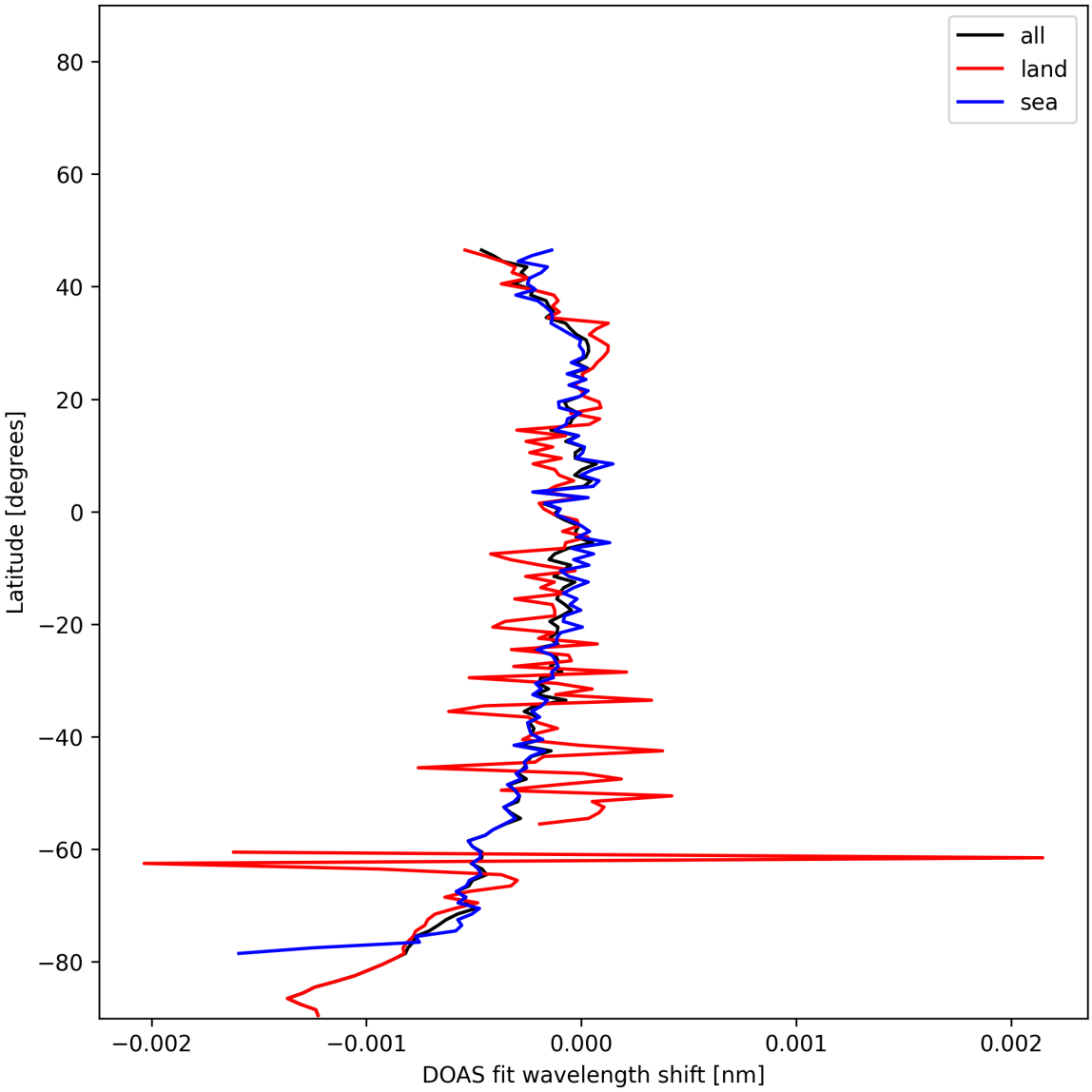

Figure 50: Zonal average of “DOAS fit wavelength shift” for 2024-12-31 to 2024-12-31.

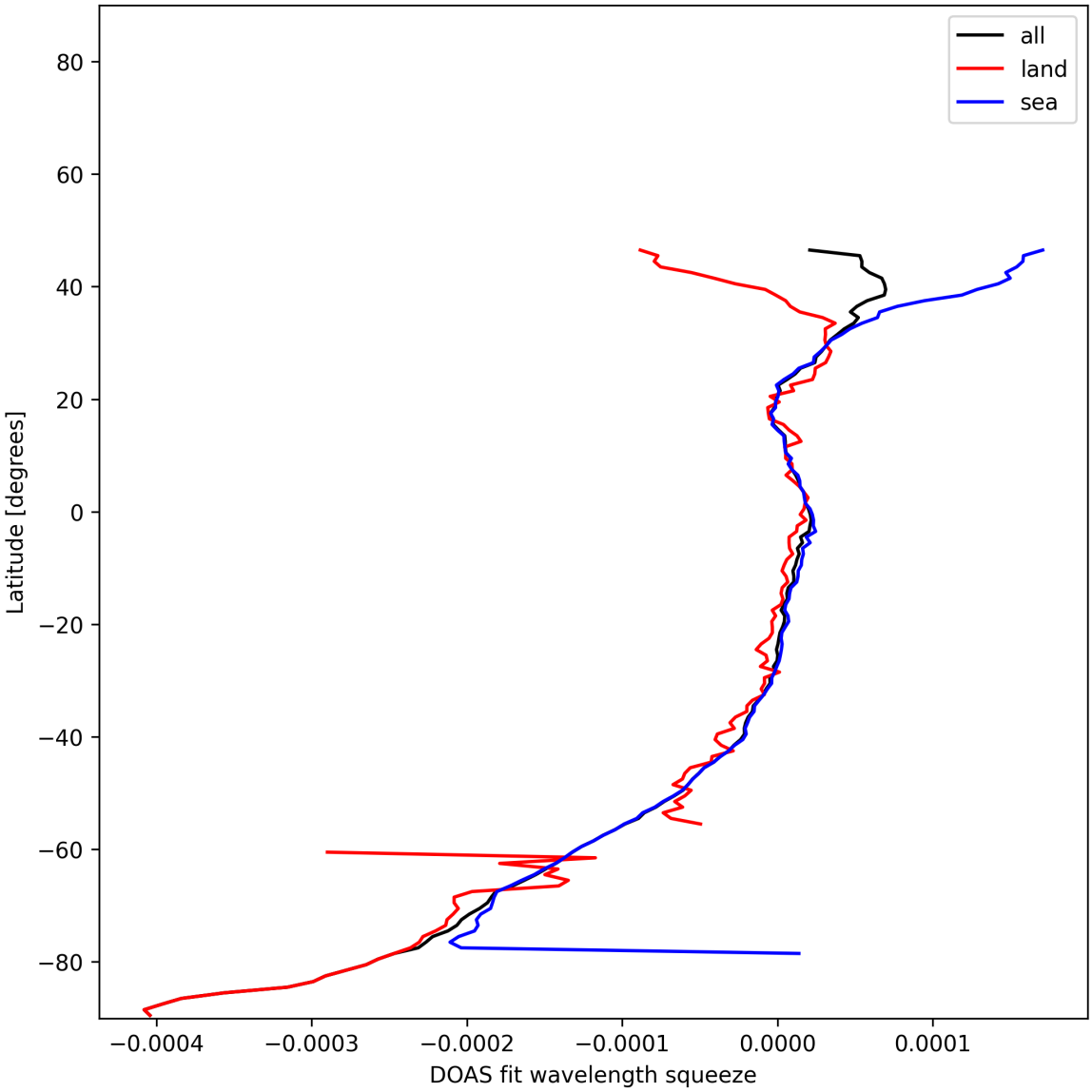

Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2024-12-31 to 2024-12-31.

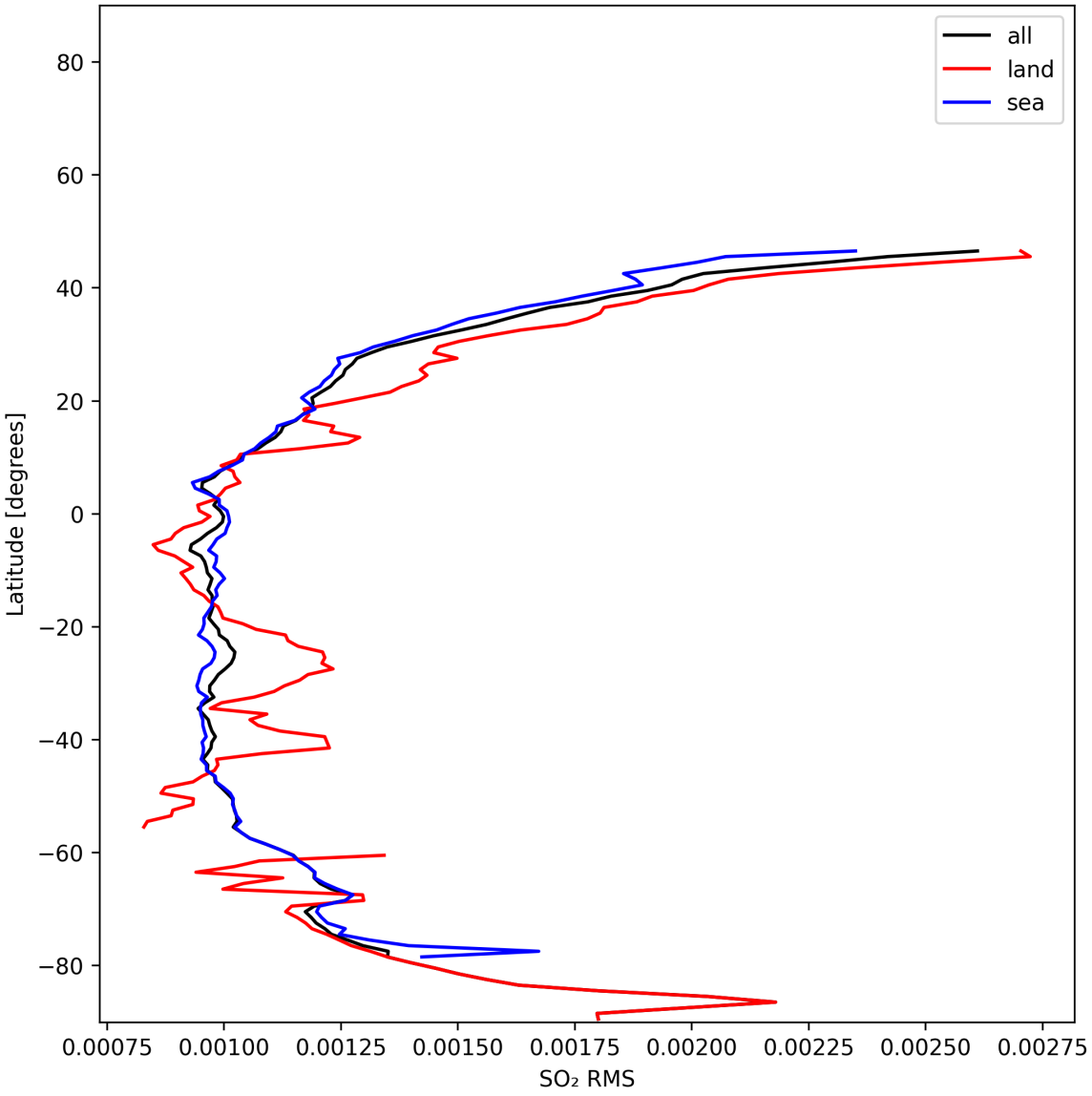

Figure 52: Zonal average of "SO_2 RMS" for 2024-12-31 to 2024-12-31.

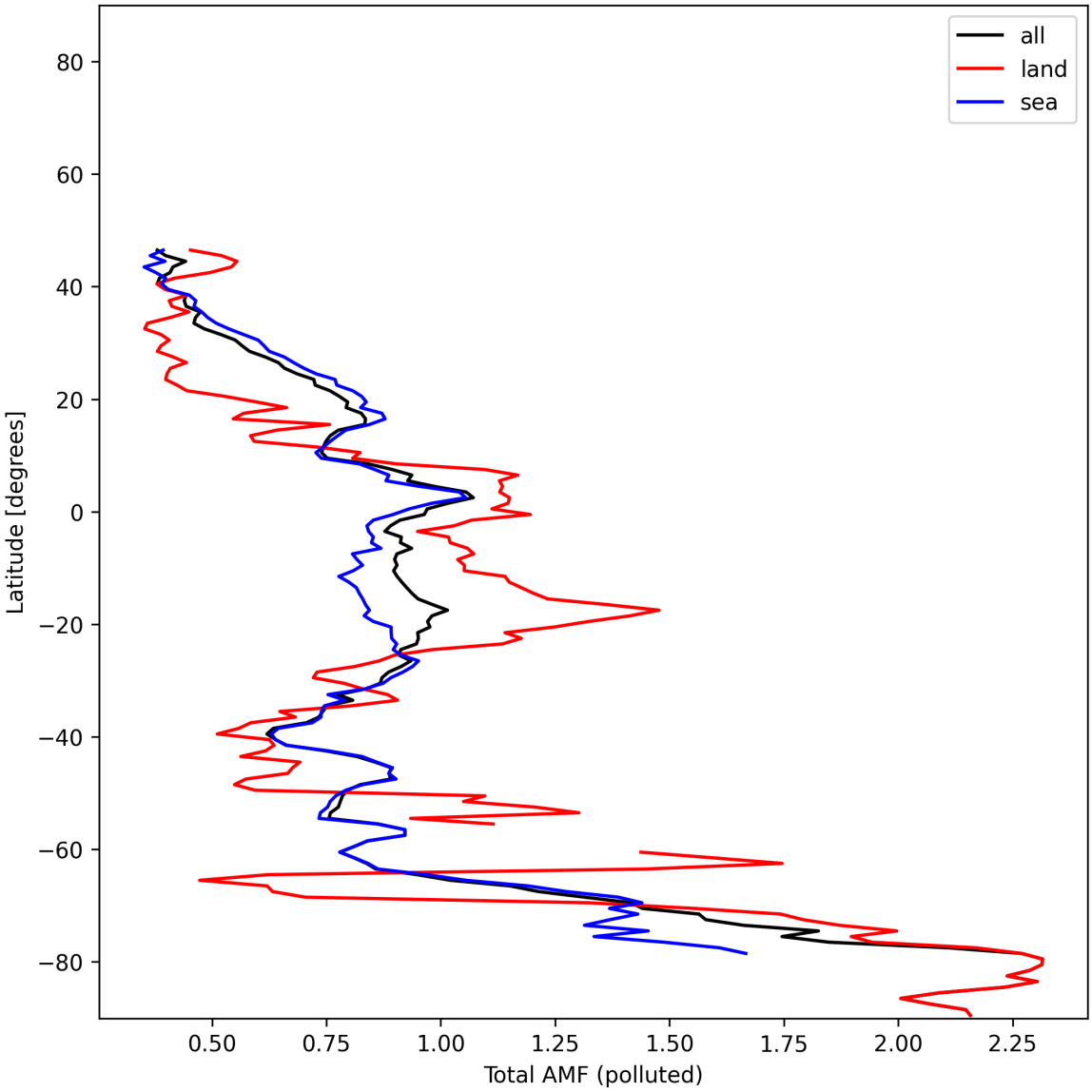

Figure 53: Zonal average of “Total AMF (polluted)” for 2024-12-31 to 2024-12-31.

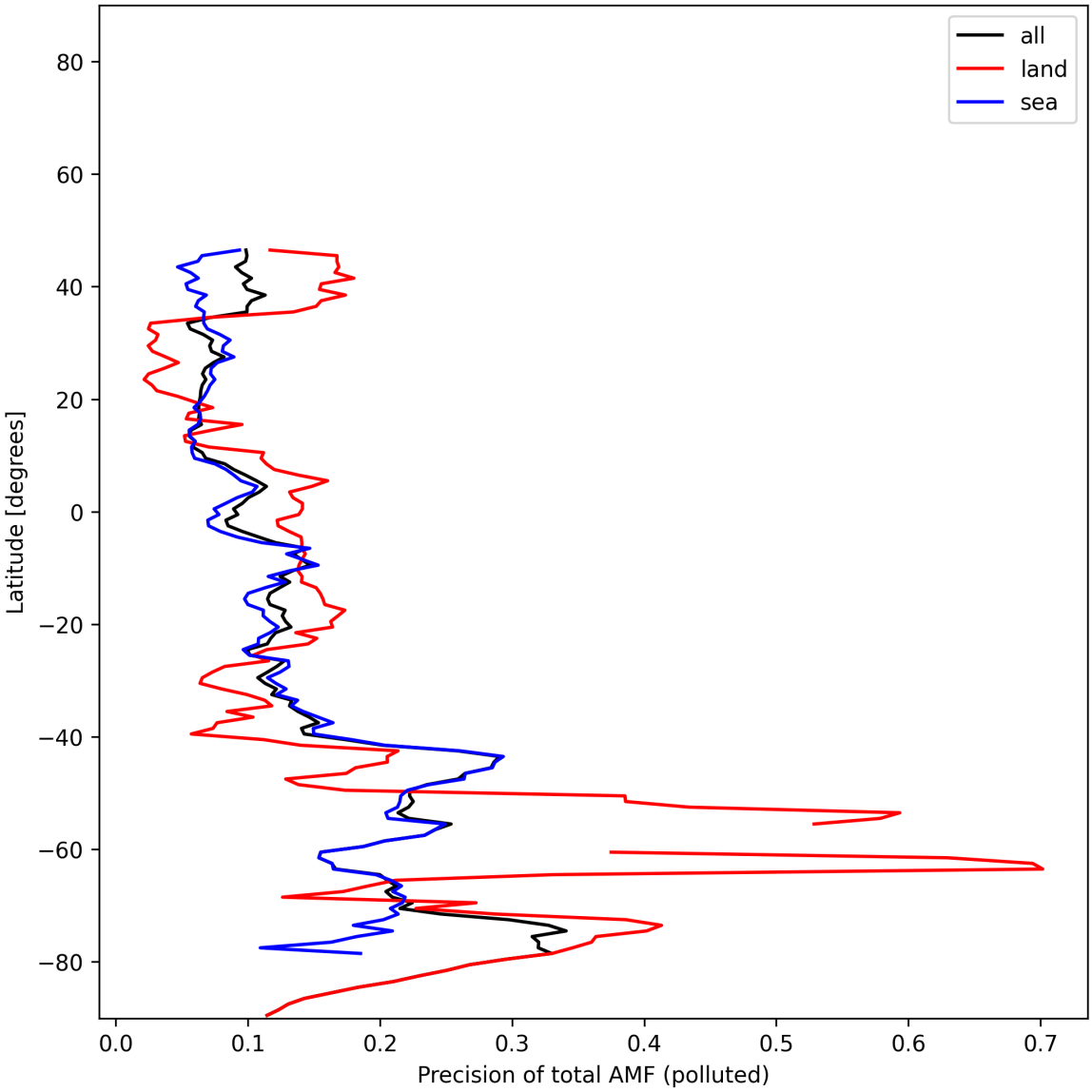

Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2024-12-31 to 2024-12-31.

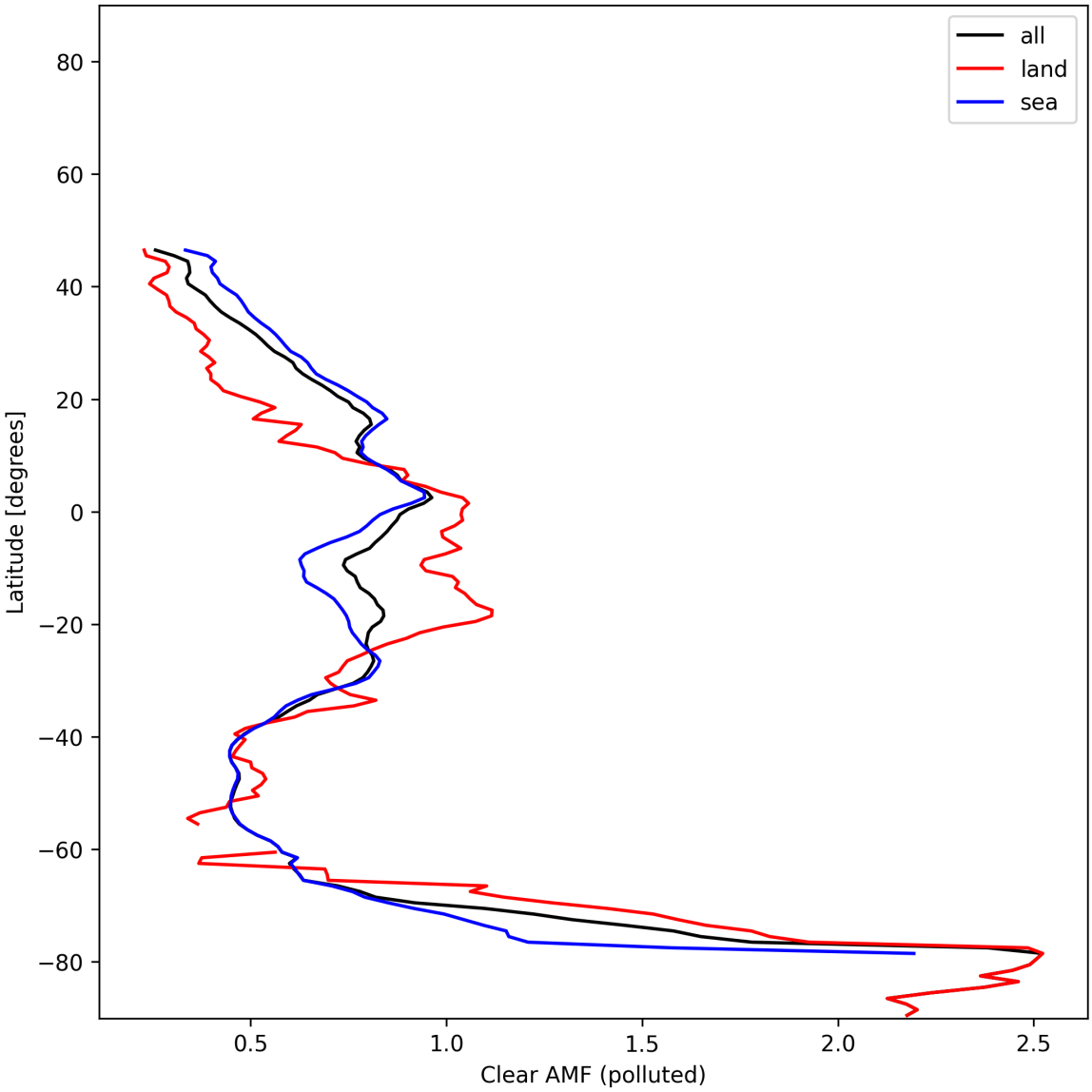

Figure 55: Zonal average of “Clear AMF (polluted)” for 2024-12-31 to 2024-12-31.

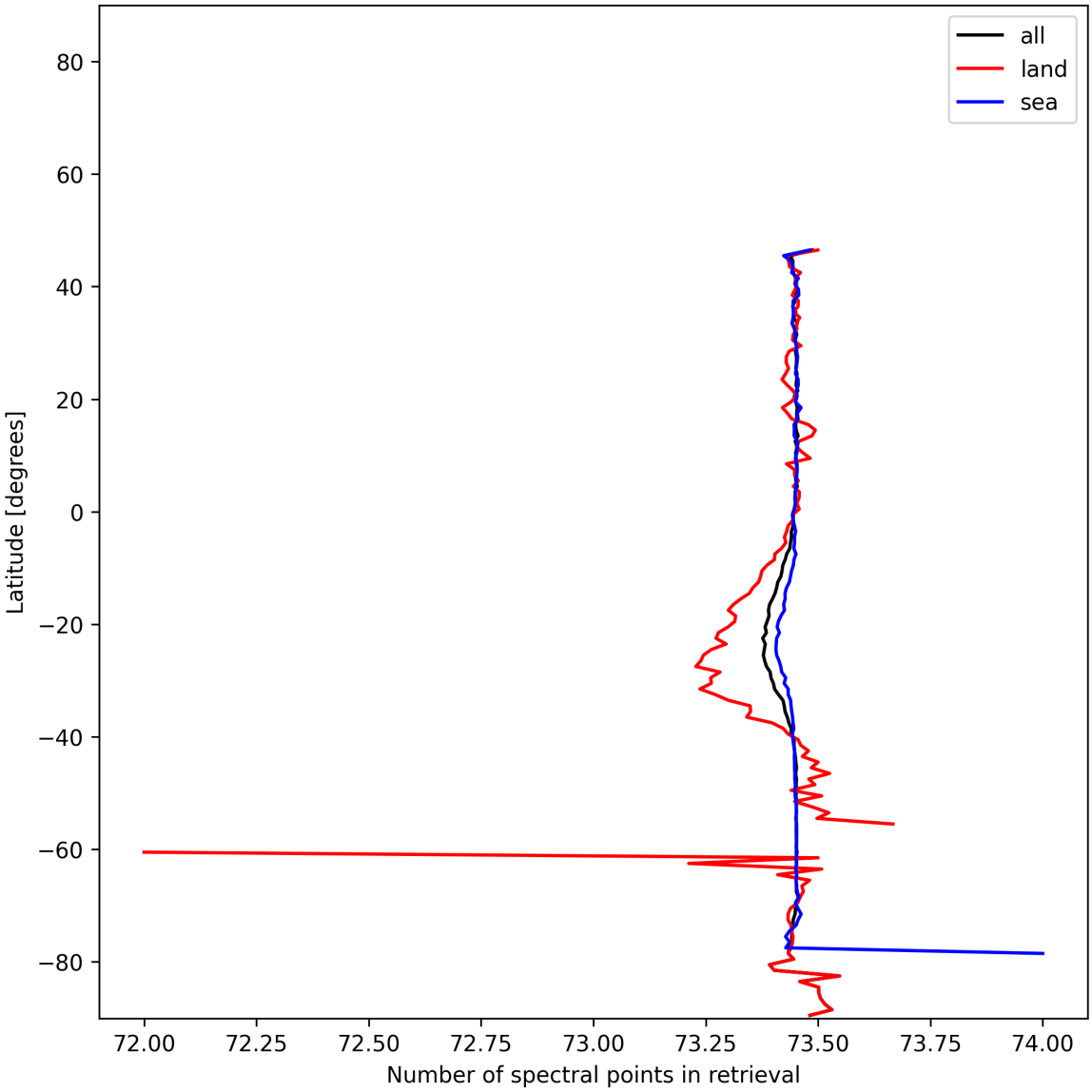

Figure 56: Zonal average of “Number of spectral points in retrieval” for 2024-12-31 to 2024-12-31.

8 Histograms

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

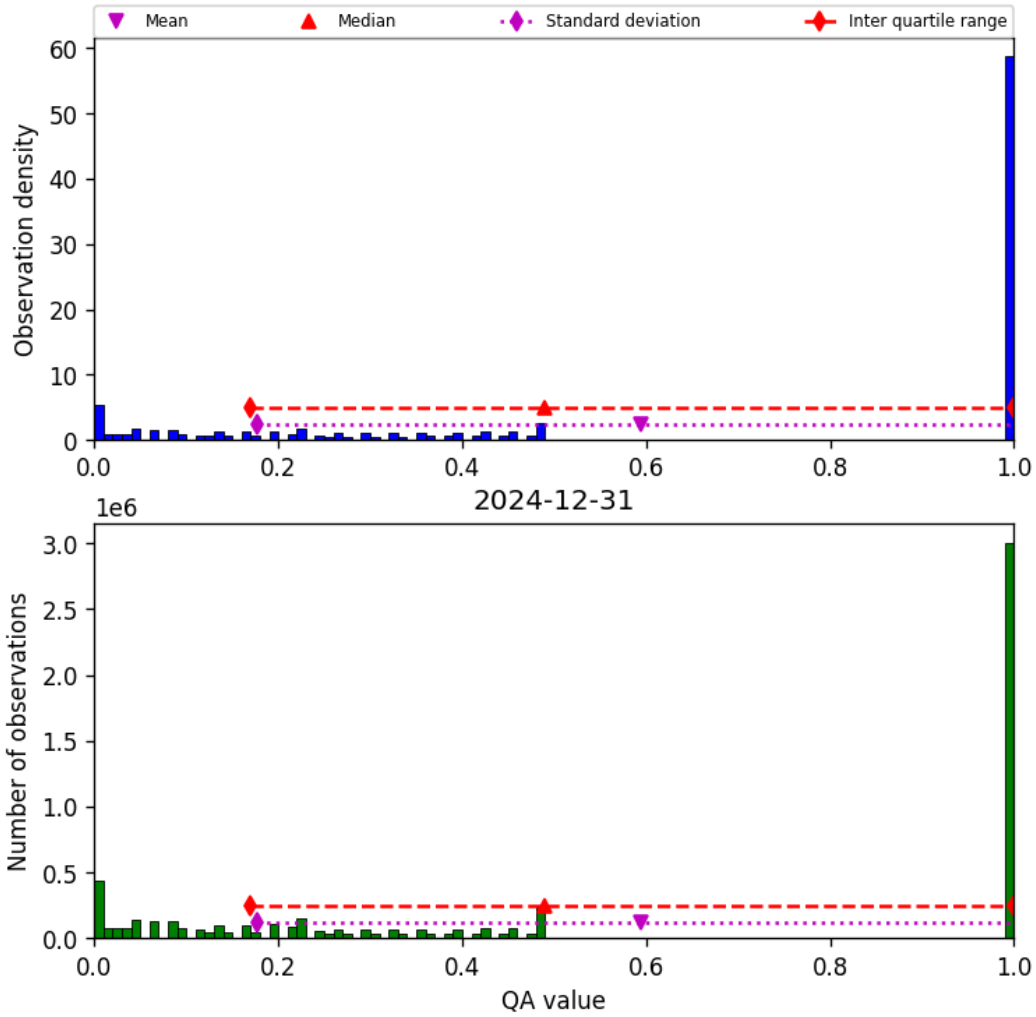

Figure 57: Histogram of “QA value” for 2024-12-31 to 2024-12-31

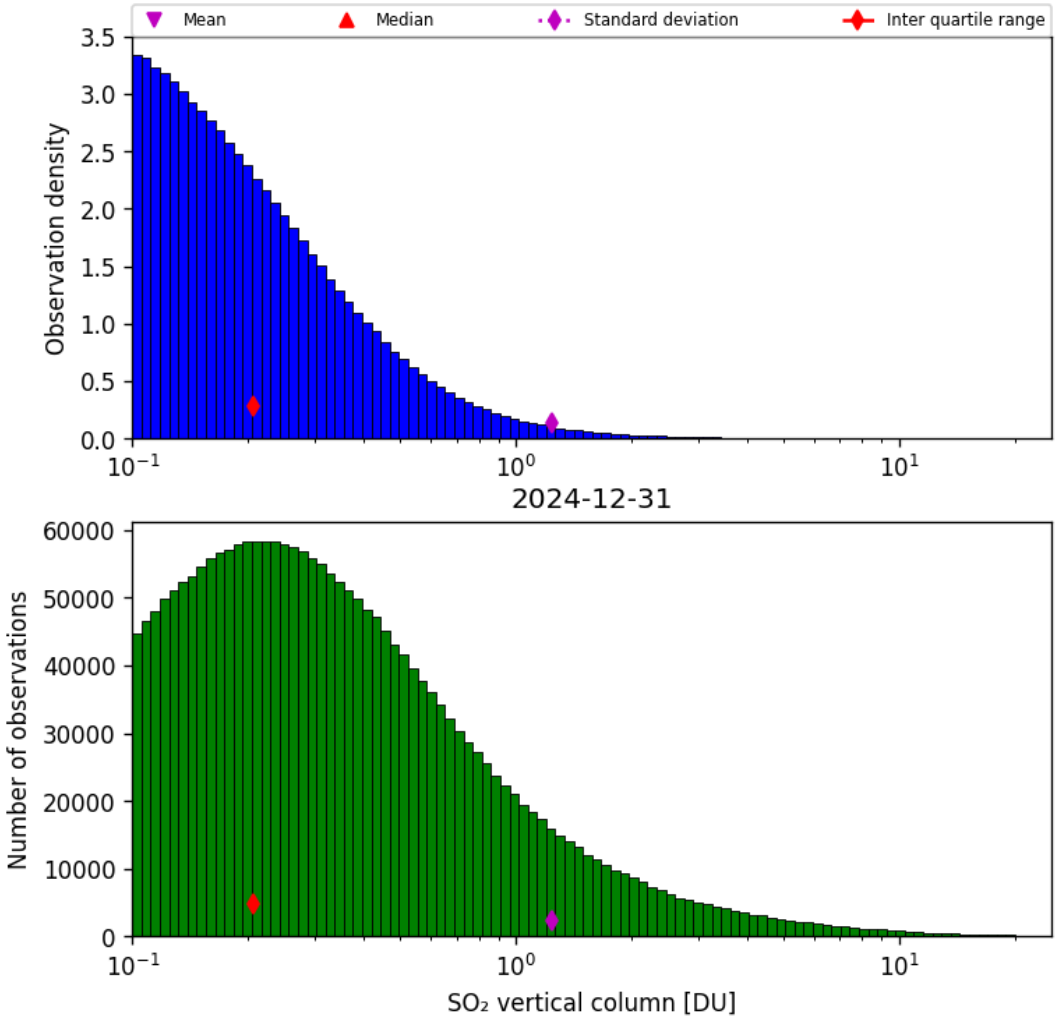

Figure 58: Histogram of "SO_2 vertical column" for 2024-12-31 to 2024-12-31

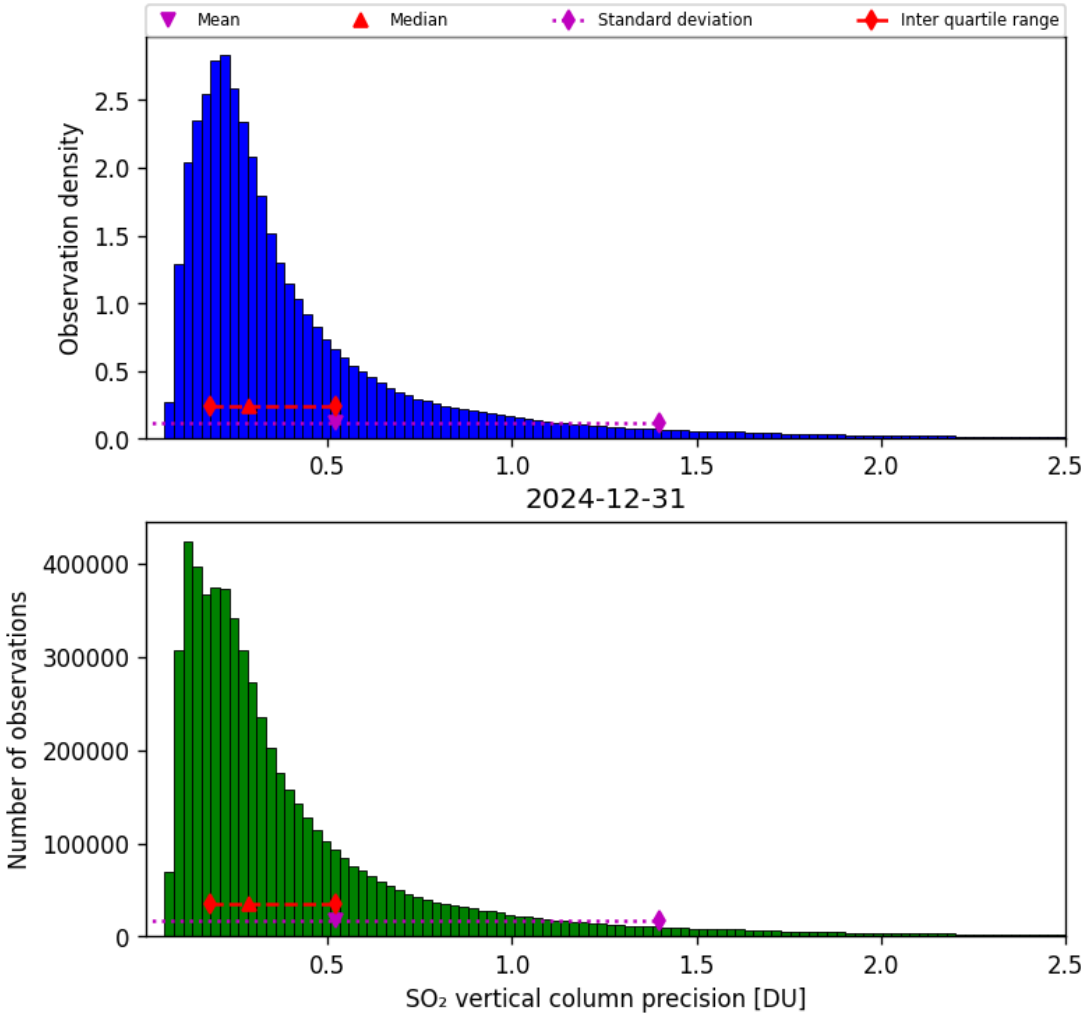

Figure 59: Histogram of "SO_2 vertical column precision" for 2024-12-31 to 2024-12-31

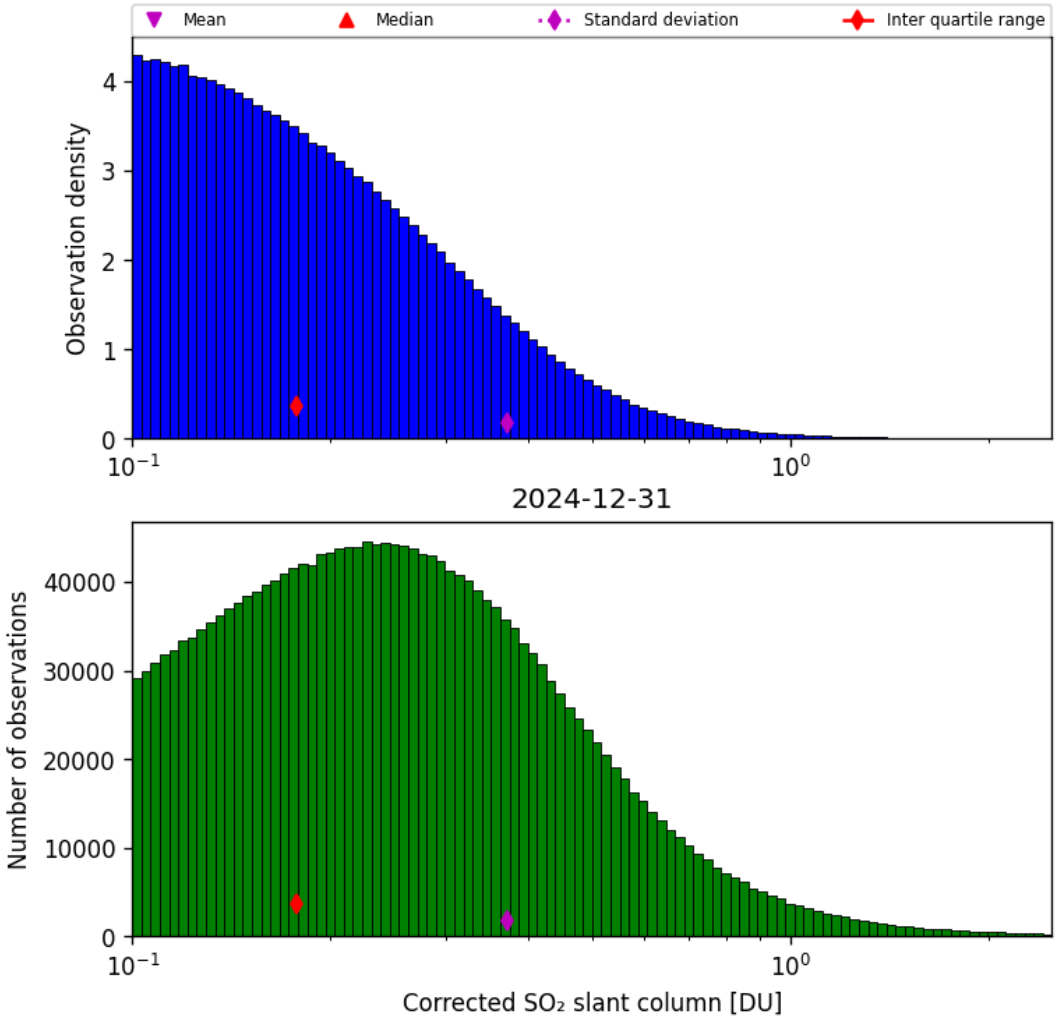

Figure 60: Histogram of "Corrected SO_2 slant column" for 2024-12-31 to 2024-12-31

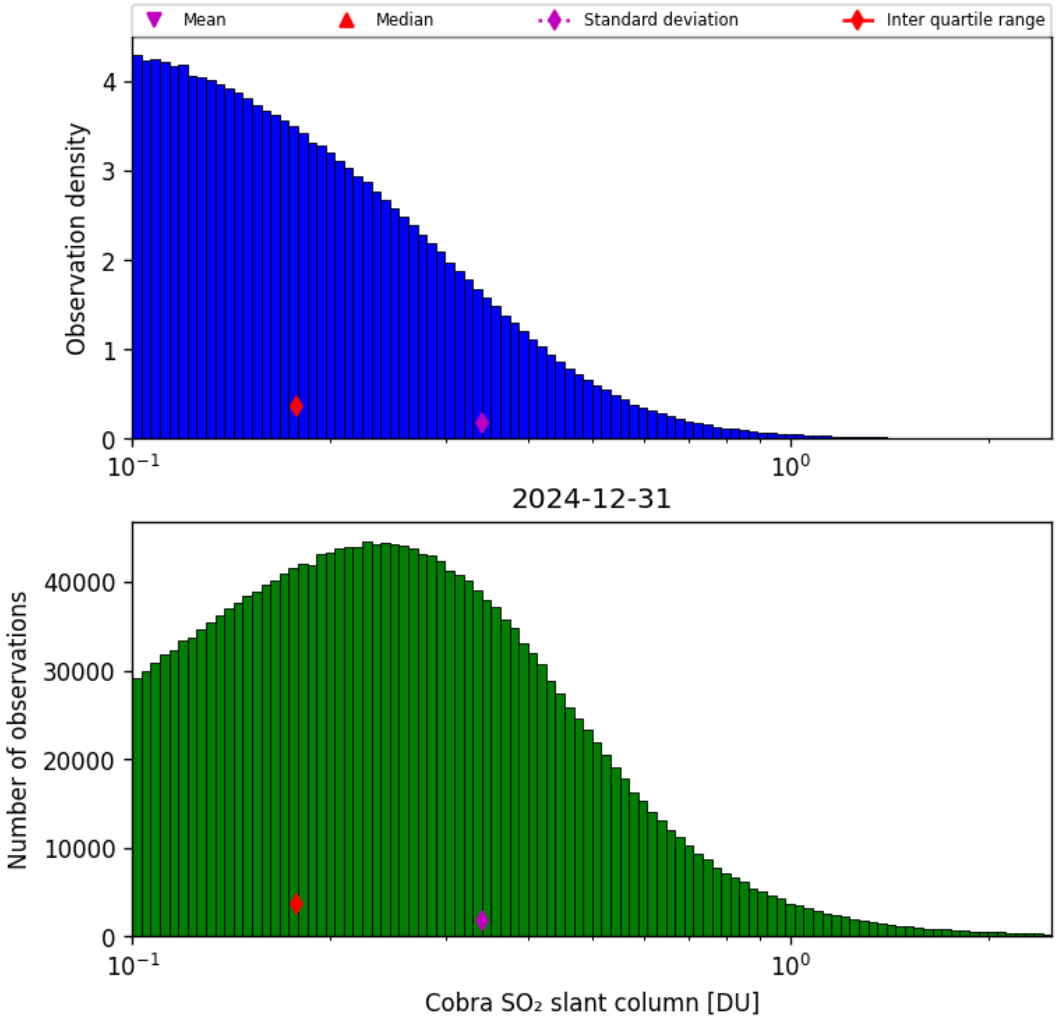

Figure 61: Histogram of "Cobra SO_2 slant column" for 2024-12-31 to 2024-12-31

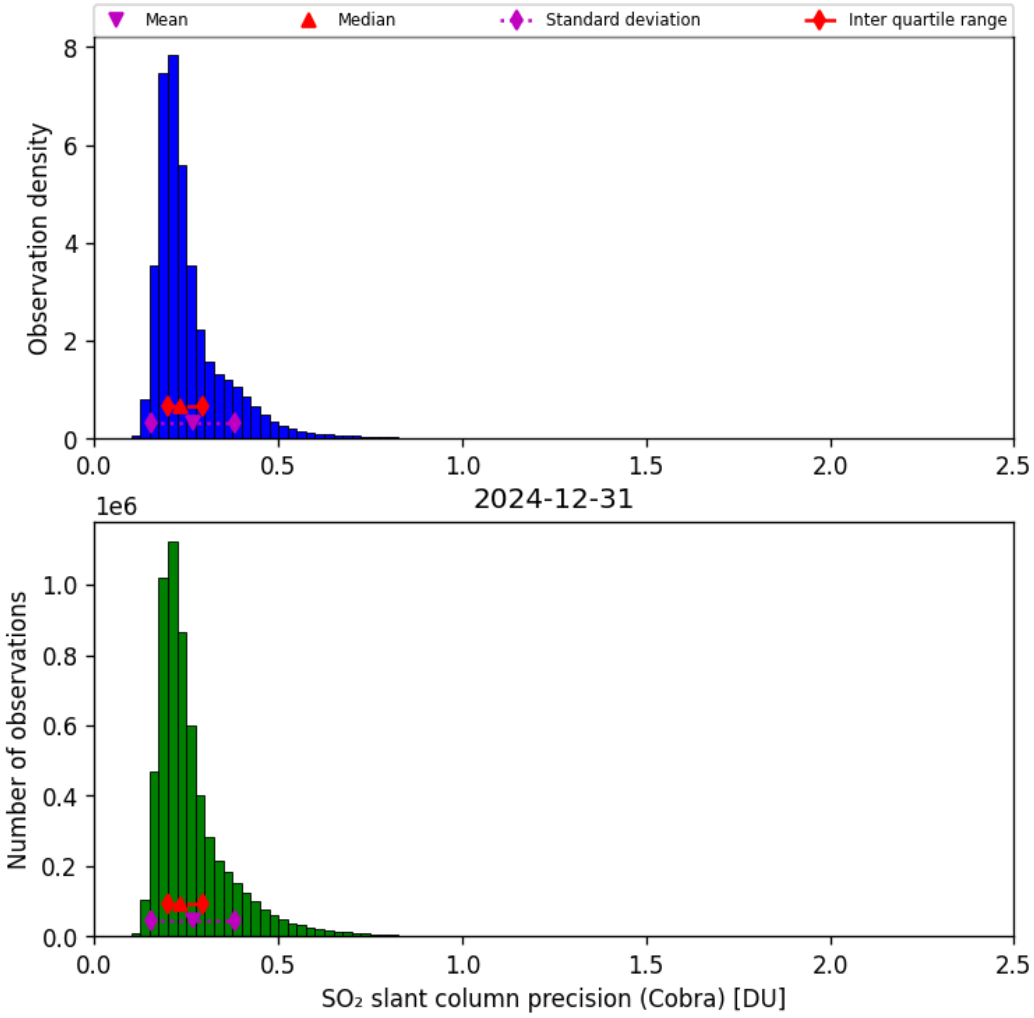

Figure 62: Histogram of "SO_2 slant column precision (Cobra)" for 2024-12-31 to 2024-12-31

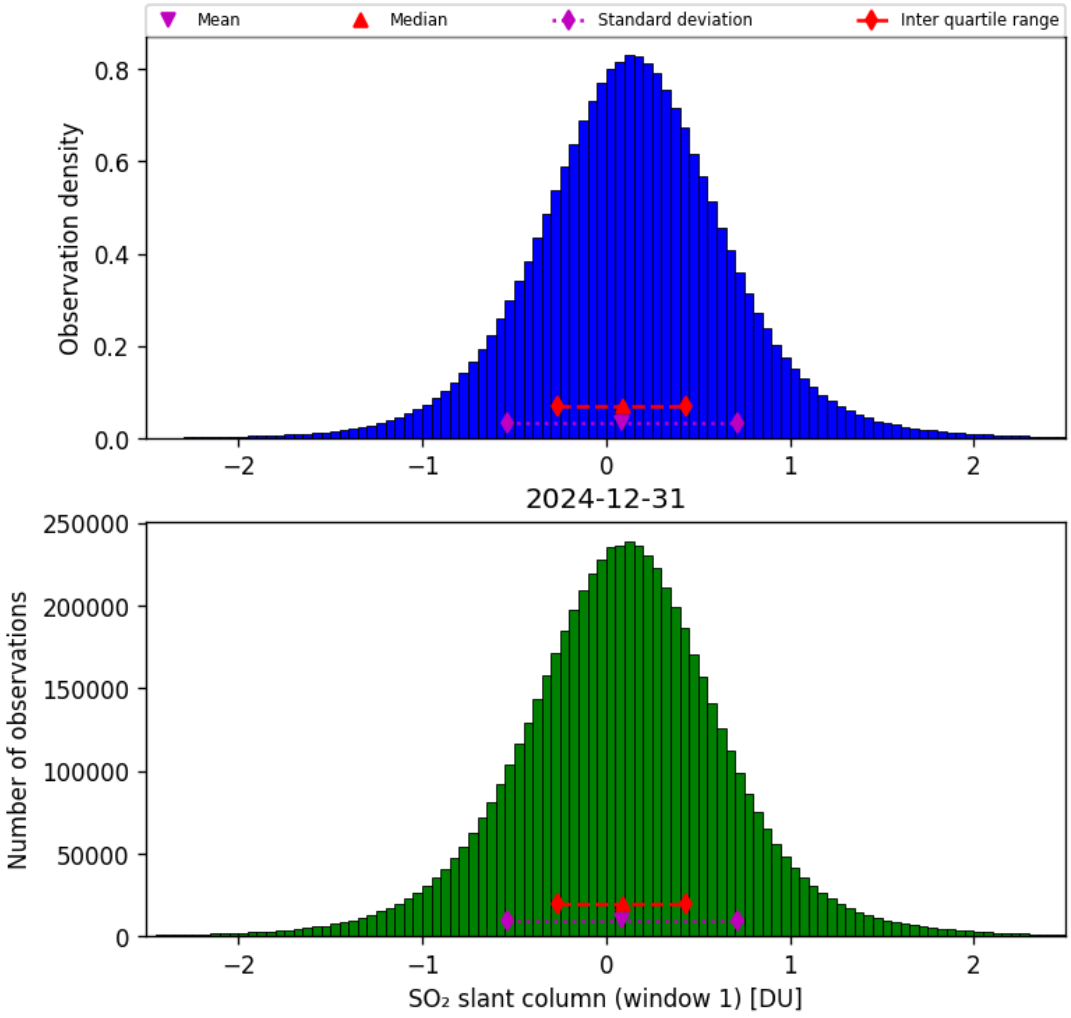

Figure 63: Histogram of "SO_2 slant column (window 1)" for 2024-12-31 to 2024-12-31

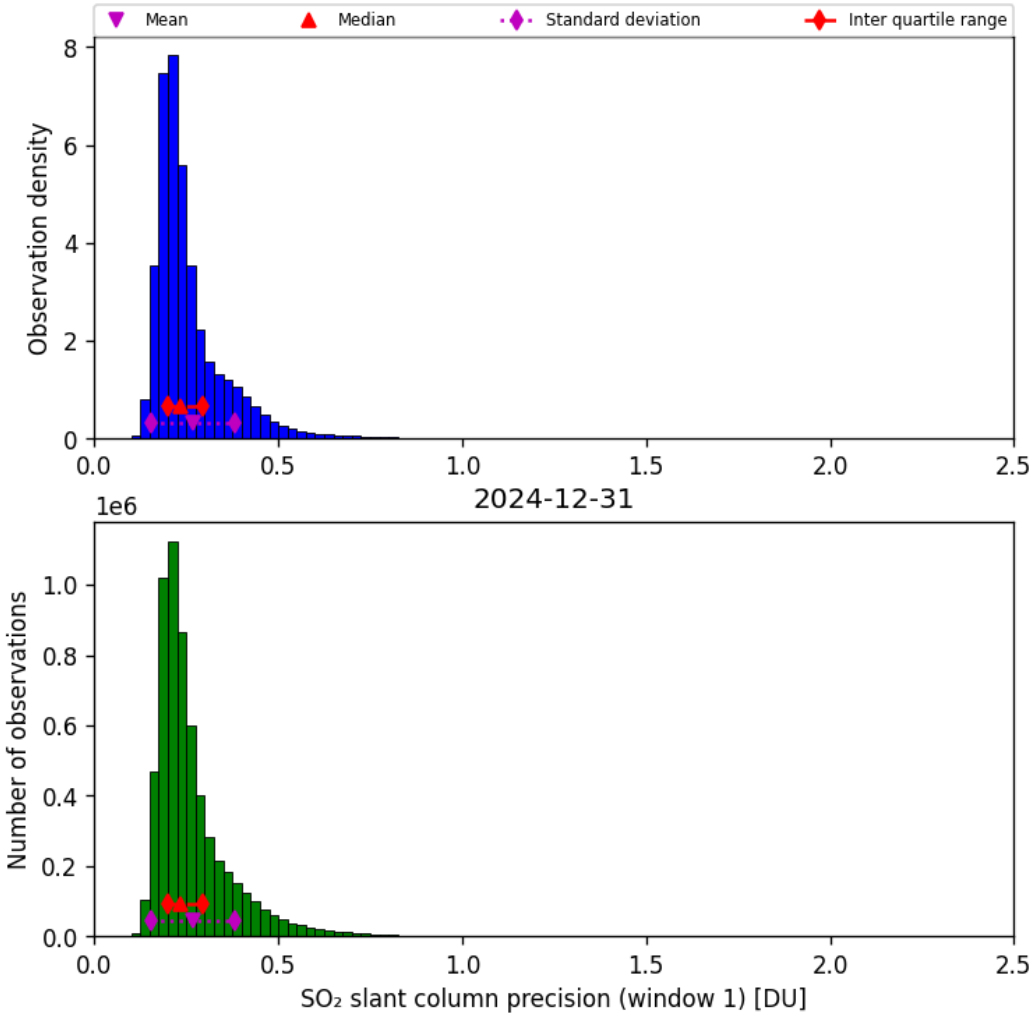

Figure 64: Histogram of "SO_2 slant column precision (window 1)" for 2024-12-31 to 2024-12-31

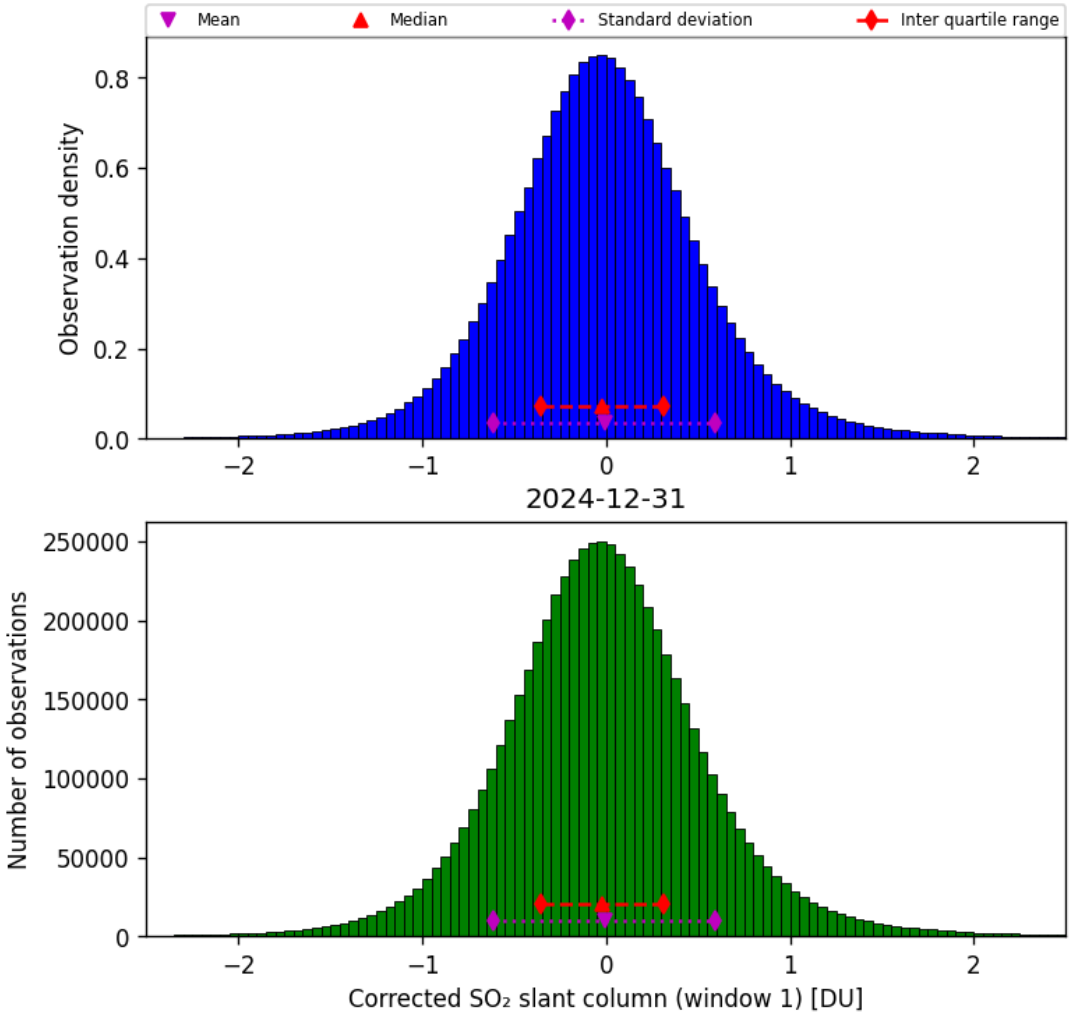

Figure 65: Histogram of "Corrected SO_2 slant column (window 1)" for 2024-12-31 to 2024-12-31

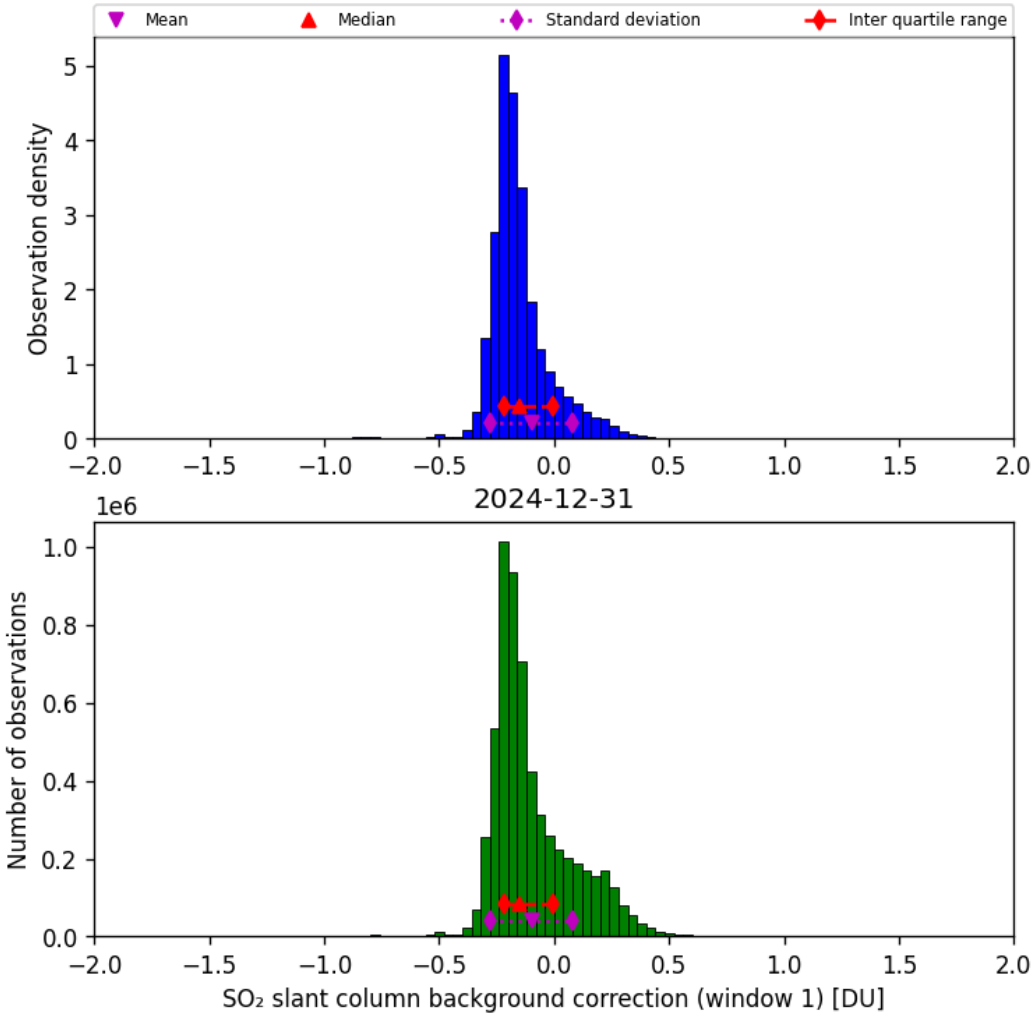

Figure 66: Histogram of "SO_2 slant column background correction (window 1)" for 2024-12-31 to 2024-12-31

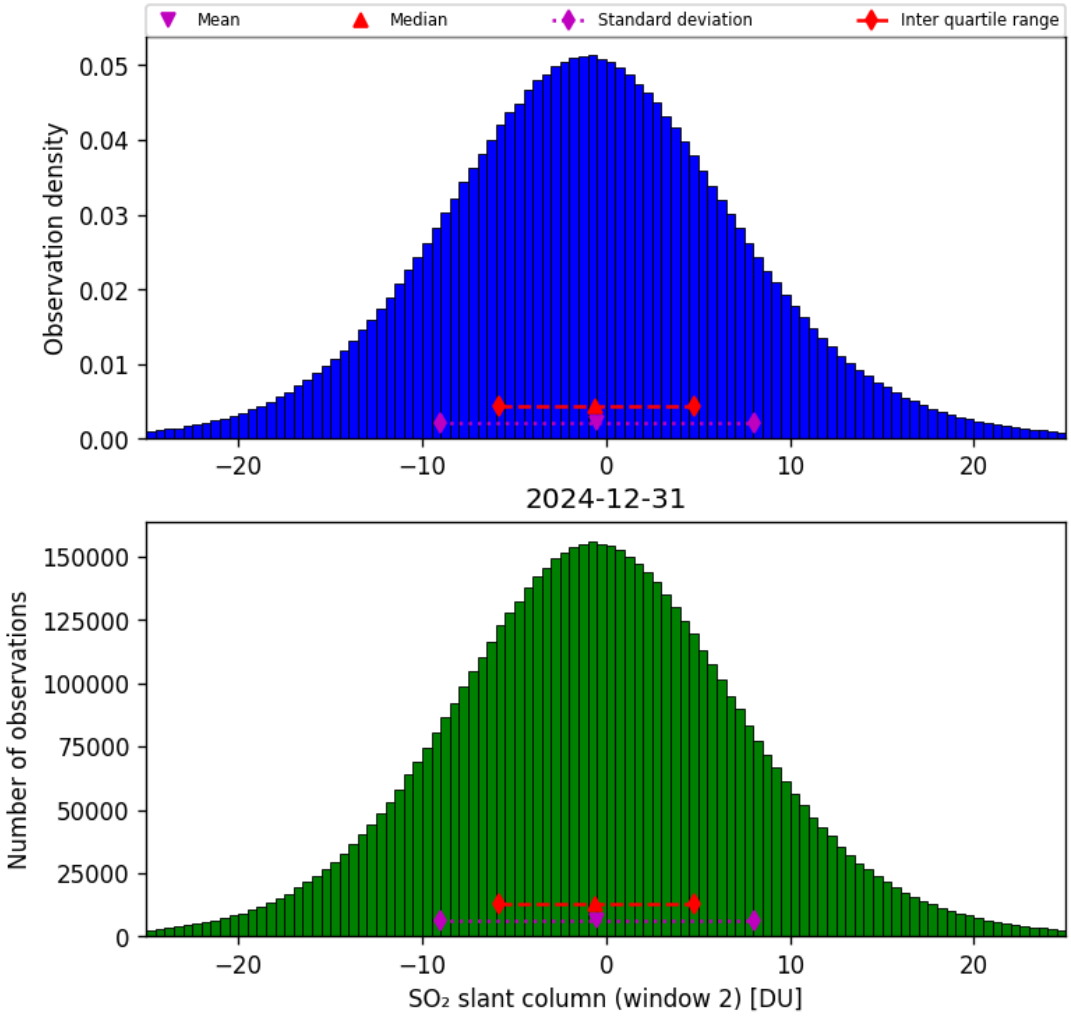

Figure 67: Histogram of "SO_2 slant column (window 2)" for 2024-12-31 to 2024-12-31

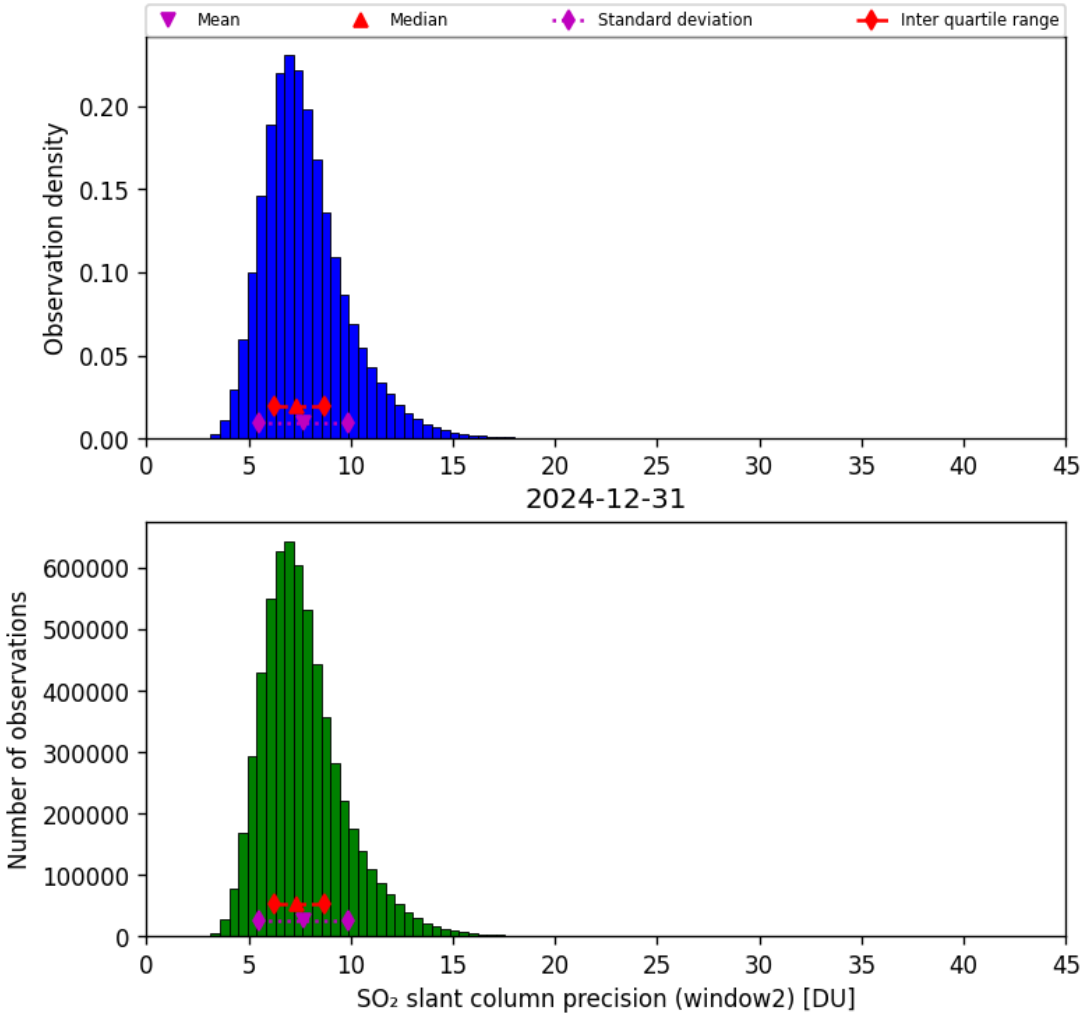

Figure 68: Histogram of "SO_2 slant column precision (window2)" for 2024-12-31 to 2024-12-31

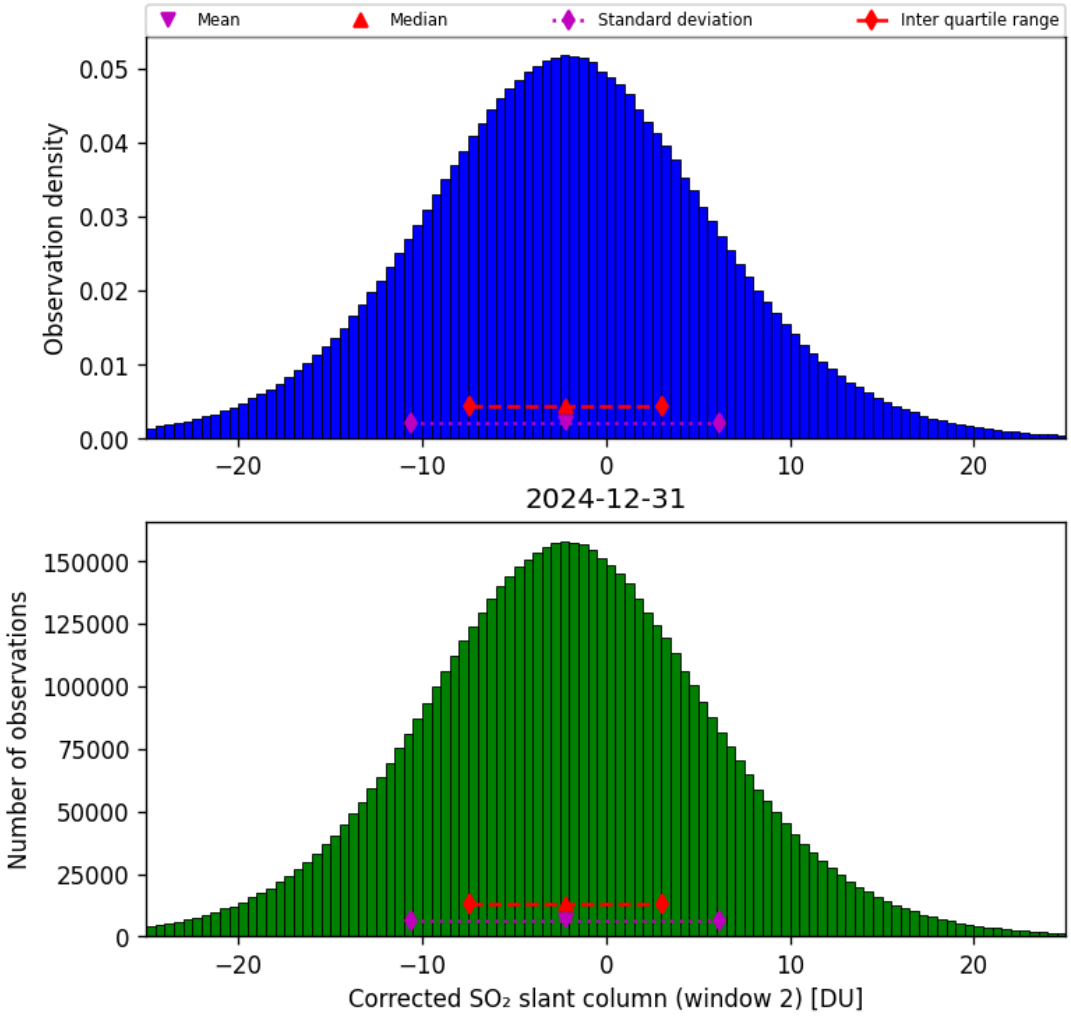

Figure 69: Histogram of "Corrected SO_2 slant column (window 2)" for 2024-12-31 to 2024-12-31

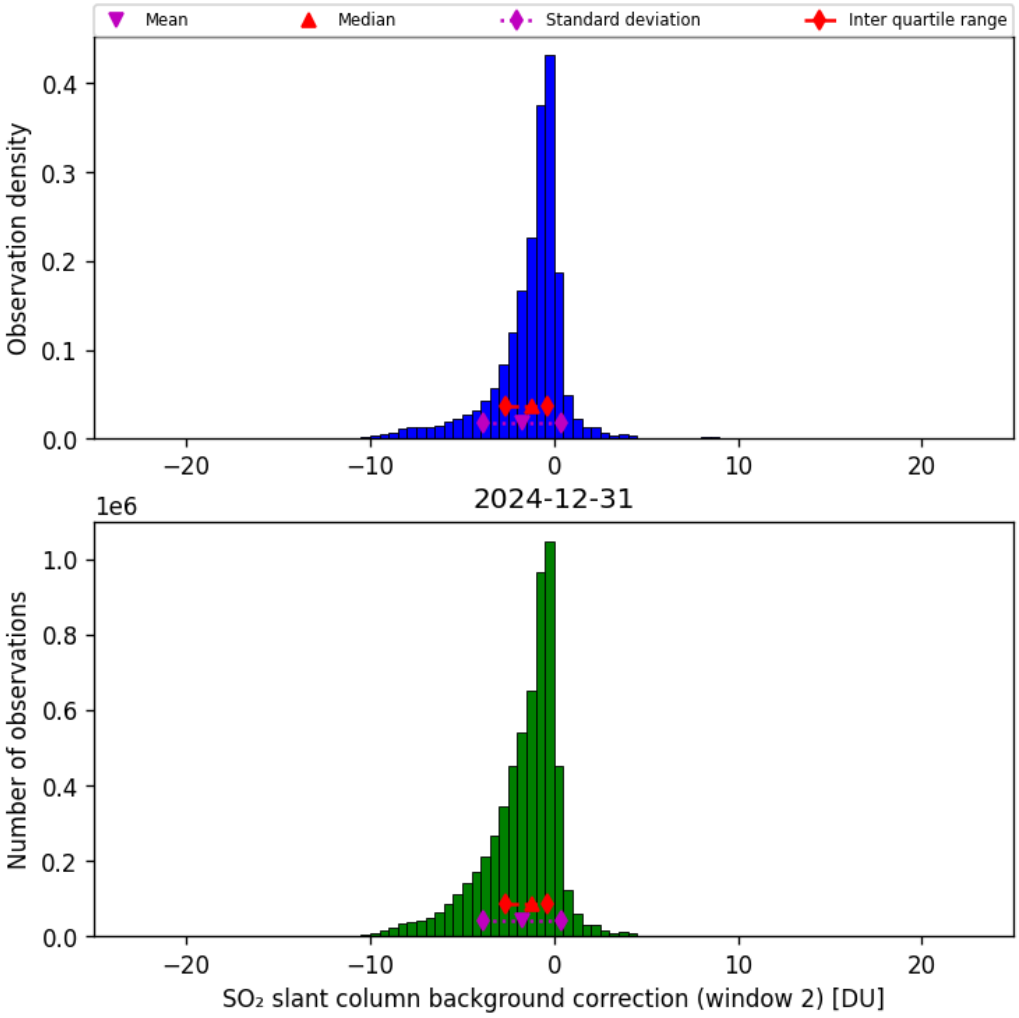

Figure 70: Histogram of "SO_2 slant column background correction (window 2)" for 2024-12-31 to 2024-12-31

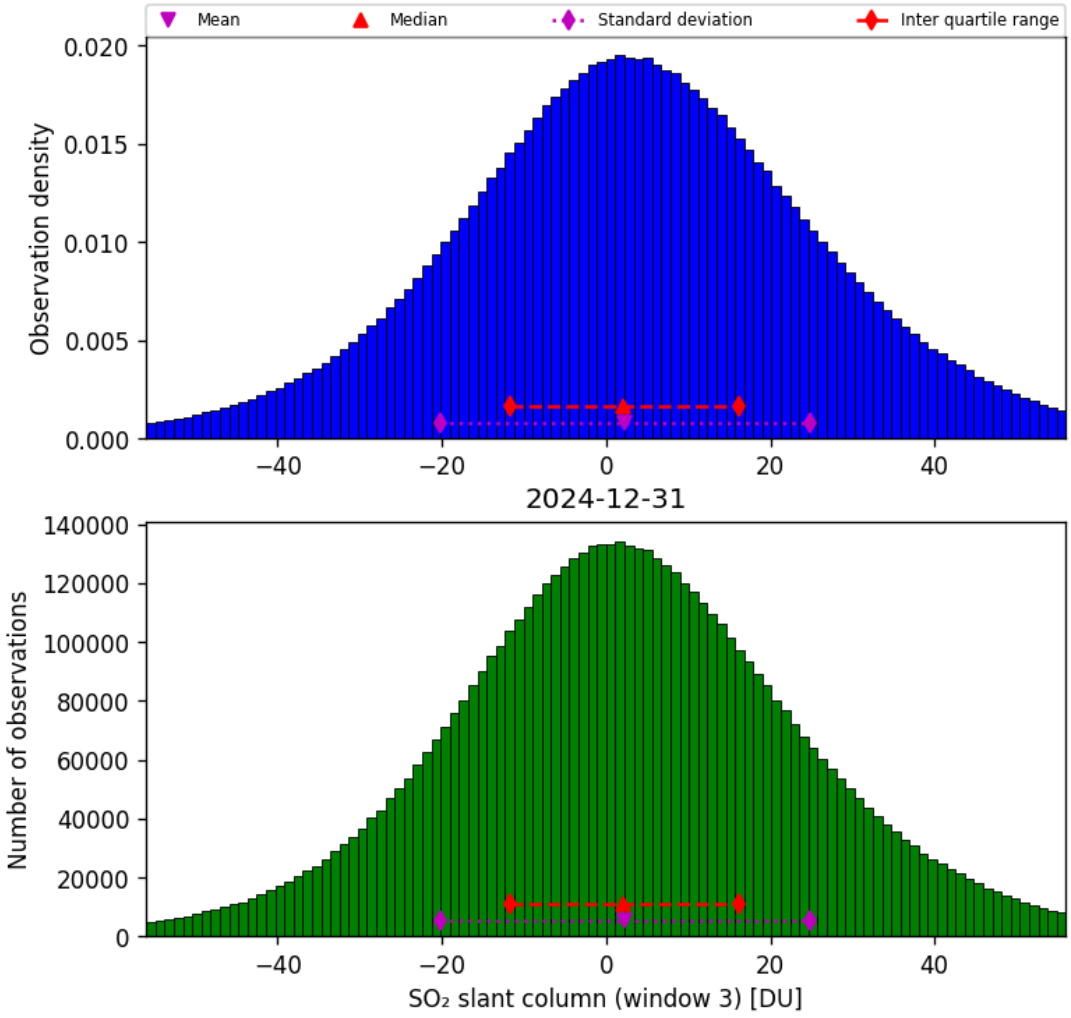

Figure 71: Histogram of "SO_2 slant column (window 3)" for 2024-12-31 to 2024-12-31

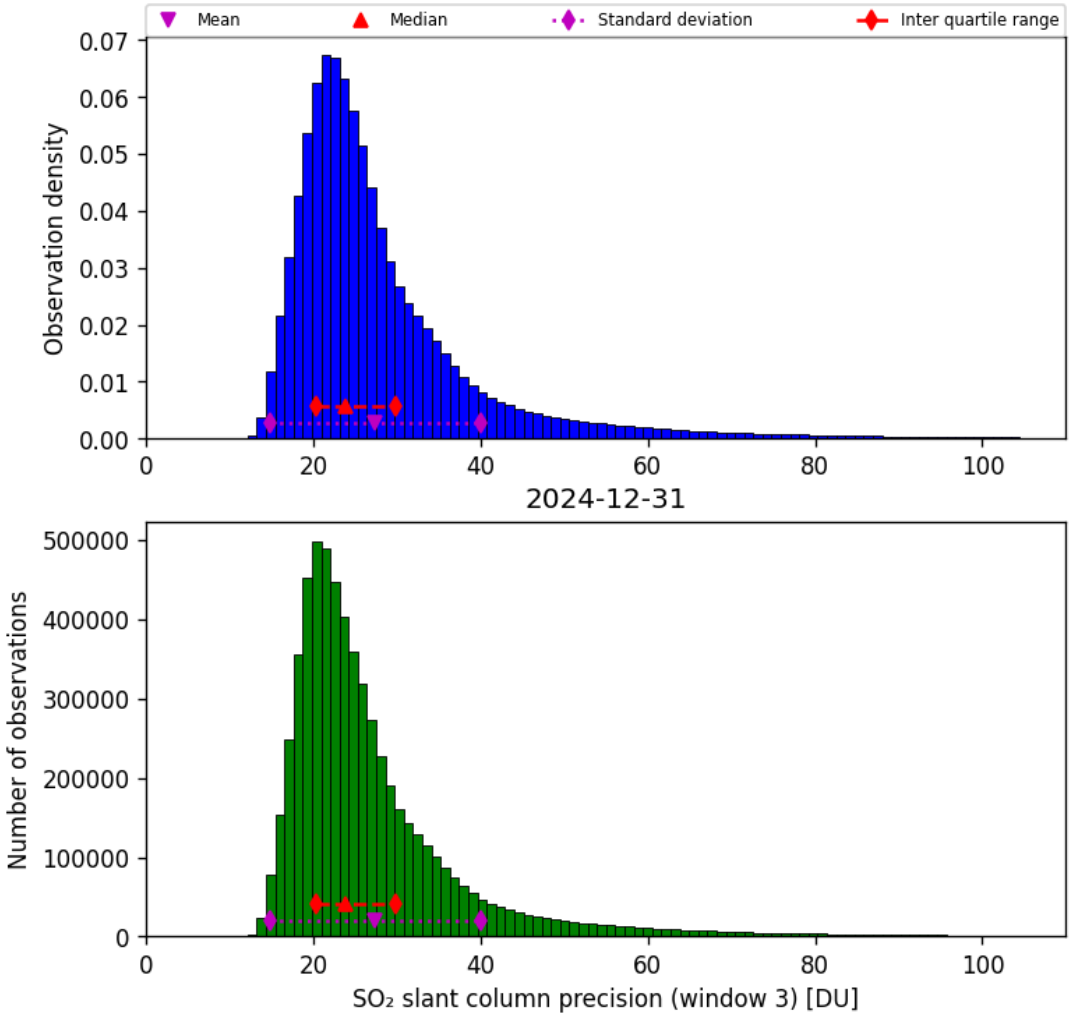

Figure 72: Histogram of "SO_2 slant column precision (window 3)" for 2024-12-31 to 2024-12-31

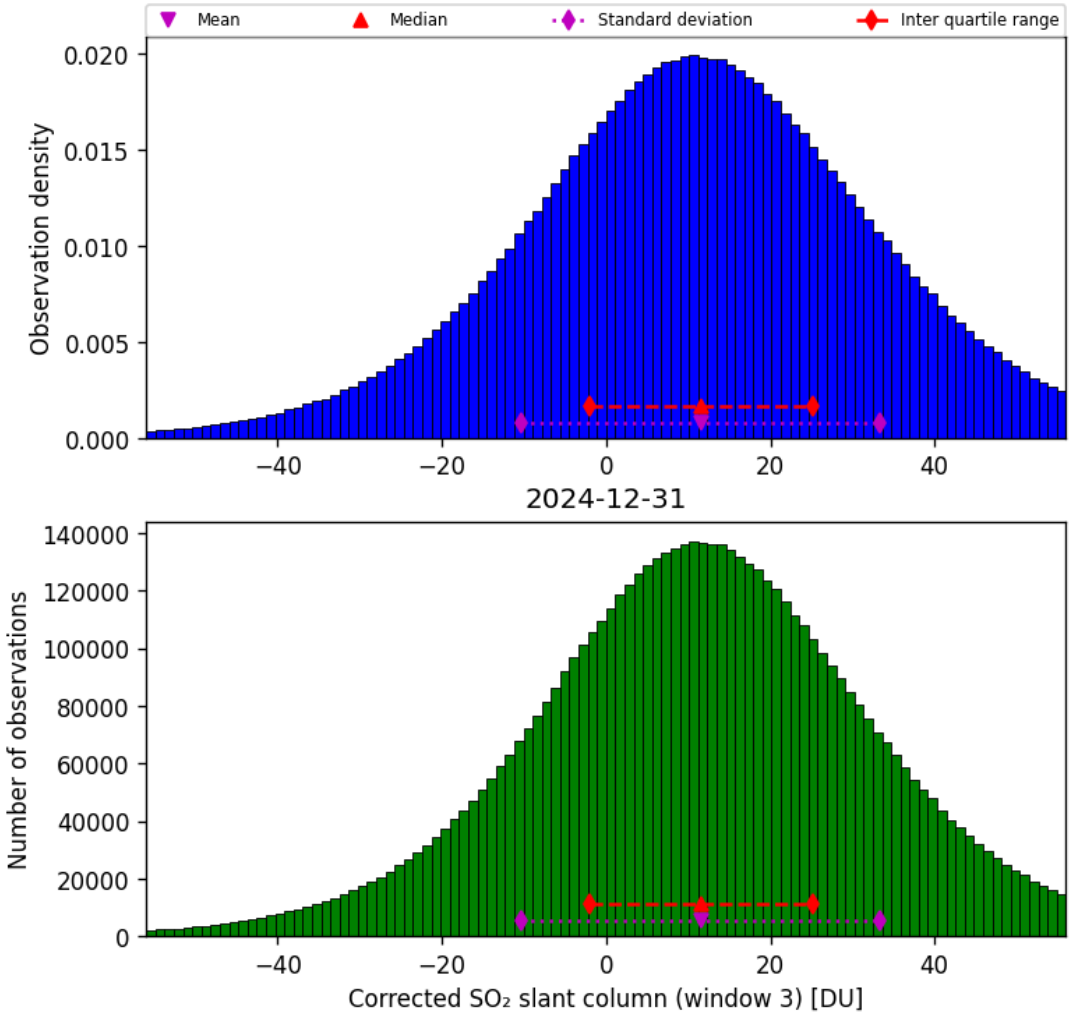

Figure 73: Histogram of "Corrected SO_2 slant column (window 3)" for 2024-12-31 to 2024-12-31

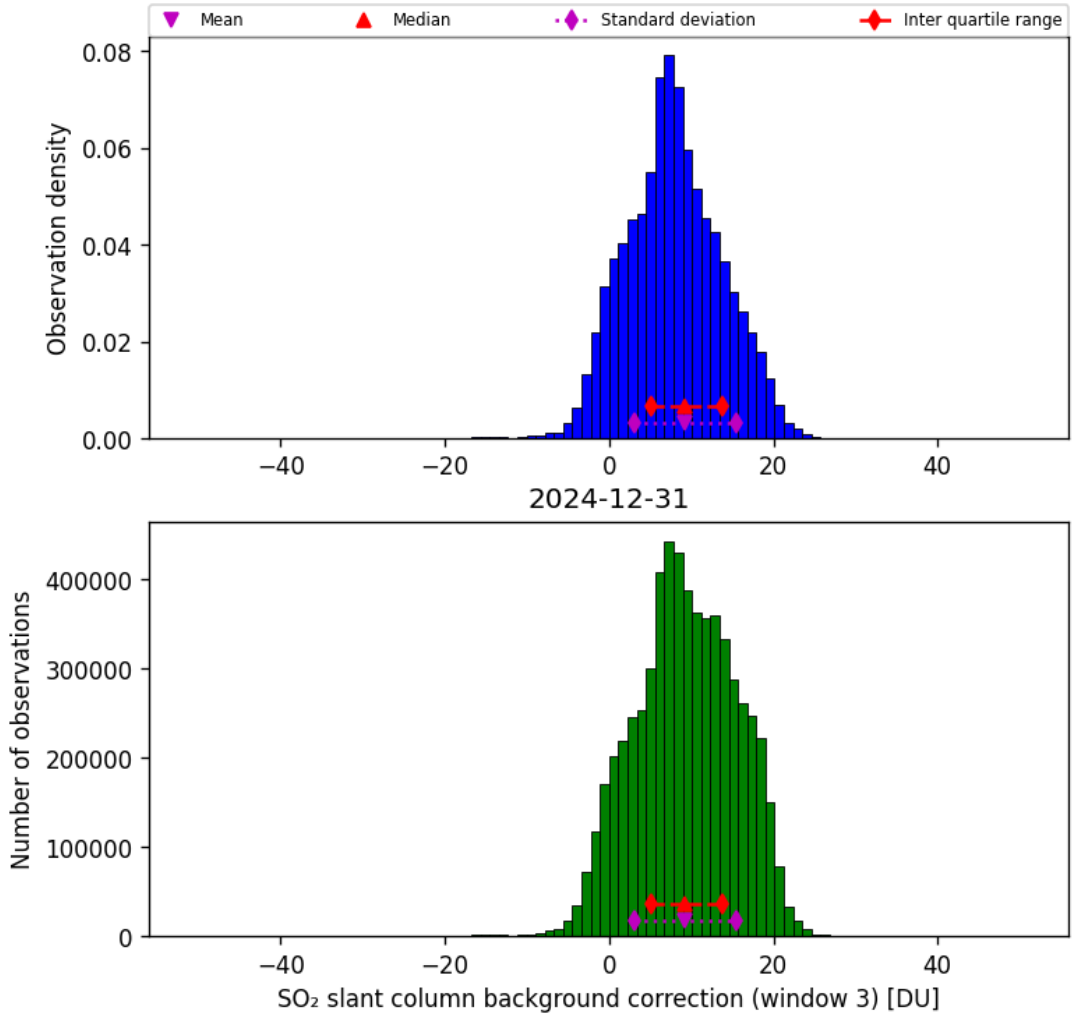

Figure 74: Histogram of "SO_2 slant column background correction (window 3)" for 2024-12-31 to 2024-12-31

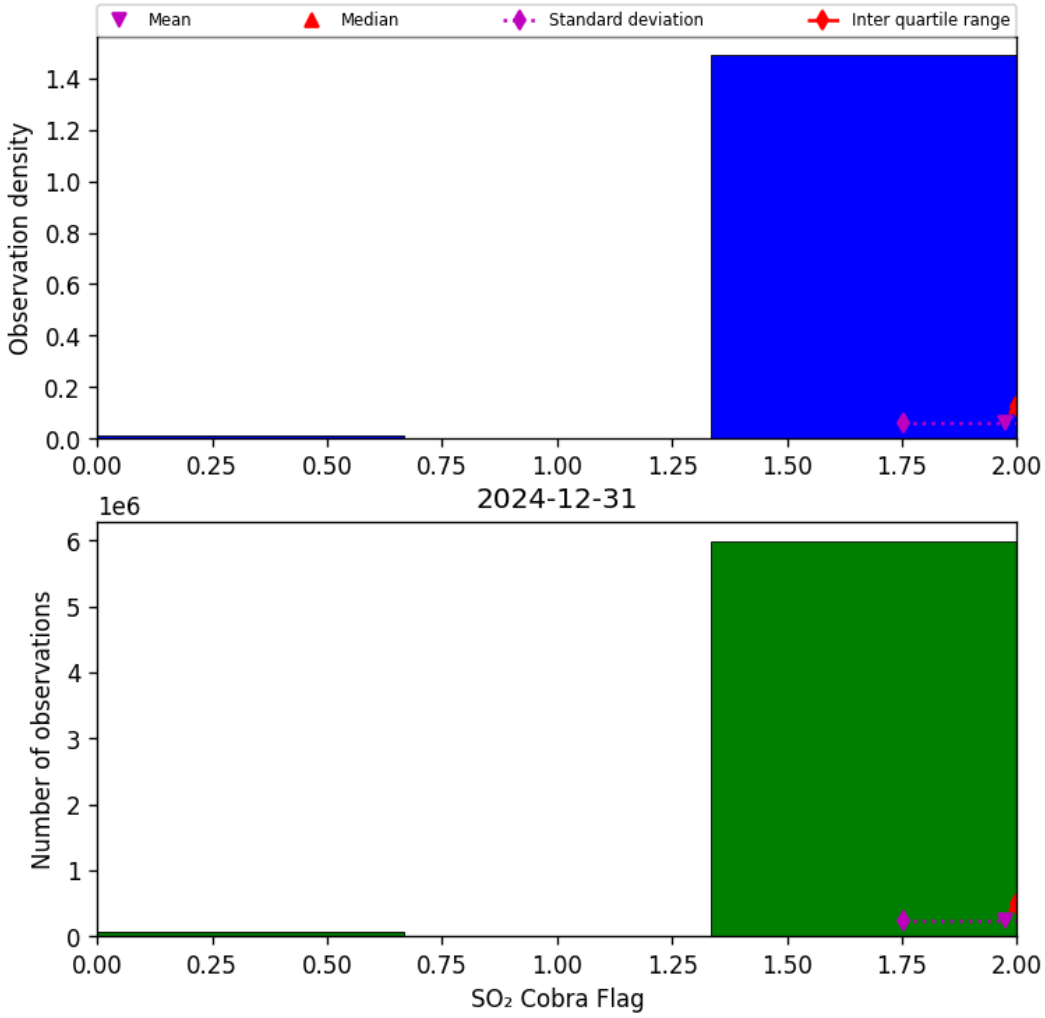

Figure 75: Histogram of "SO_2 Cobra Flag" for 2024-12-31 to 2024-12-31

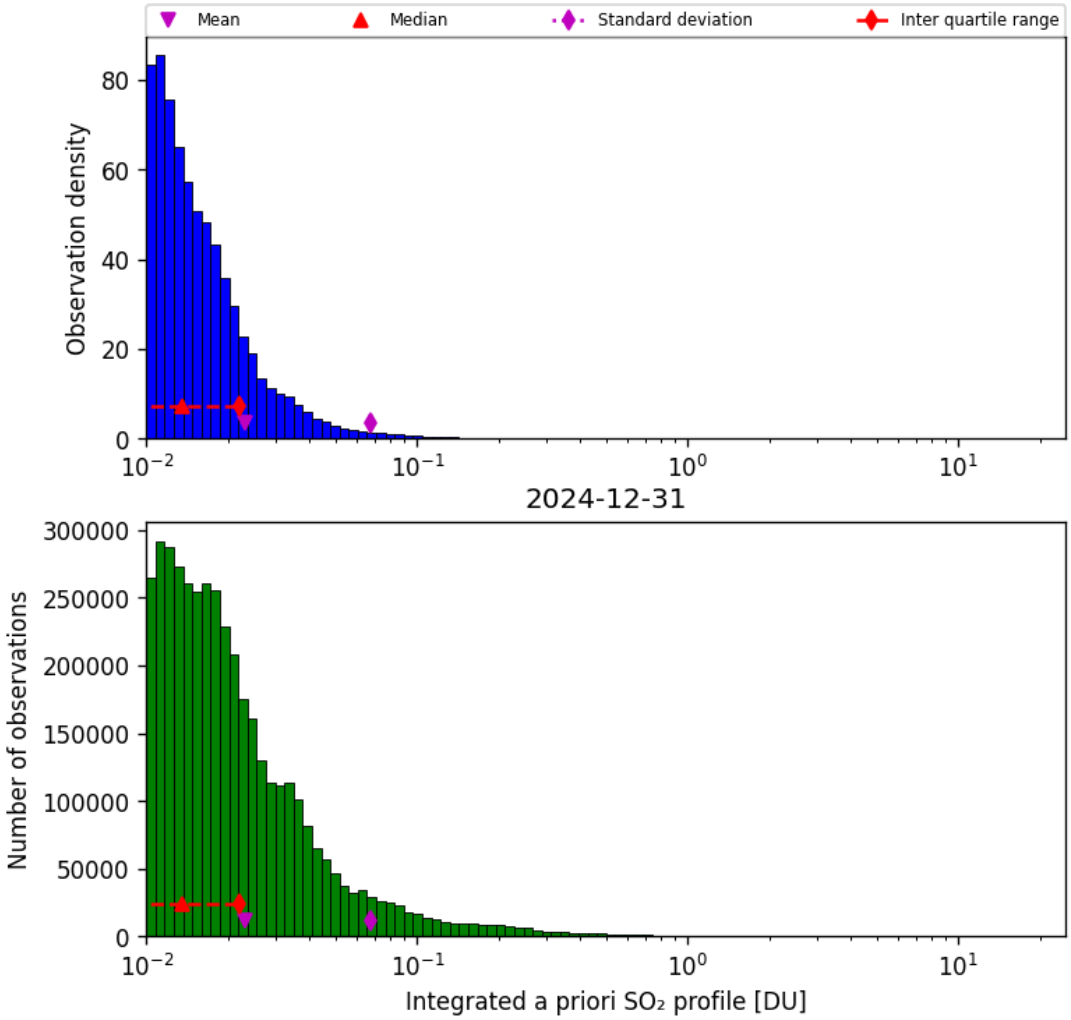

Figure 76: Histogram of “Integrated a priori SO_2 profile” for 2024-12-31 to 2024-12-31

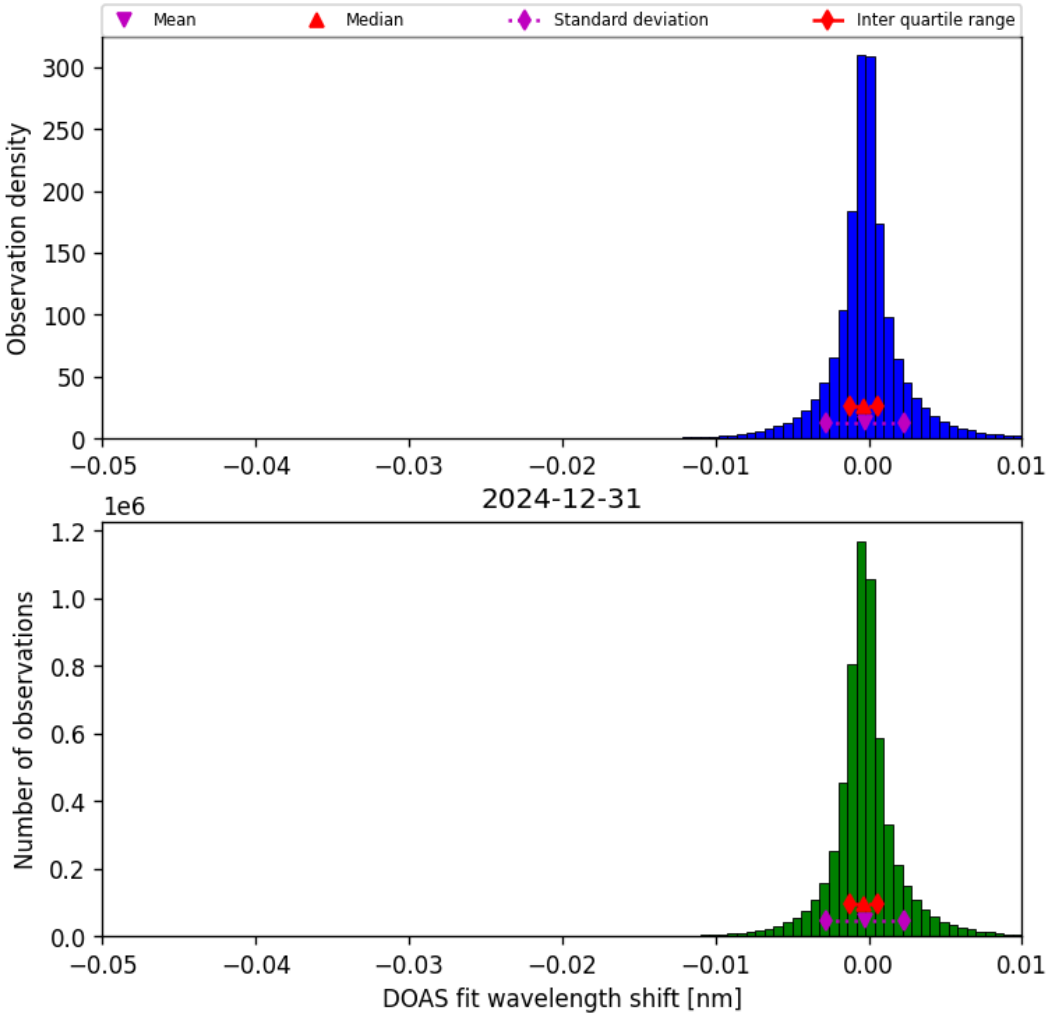

Figure 77: Histogram of “DOAS fit wavelength shift” for 2024-12-31 to 2024-12-31

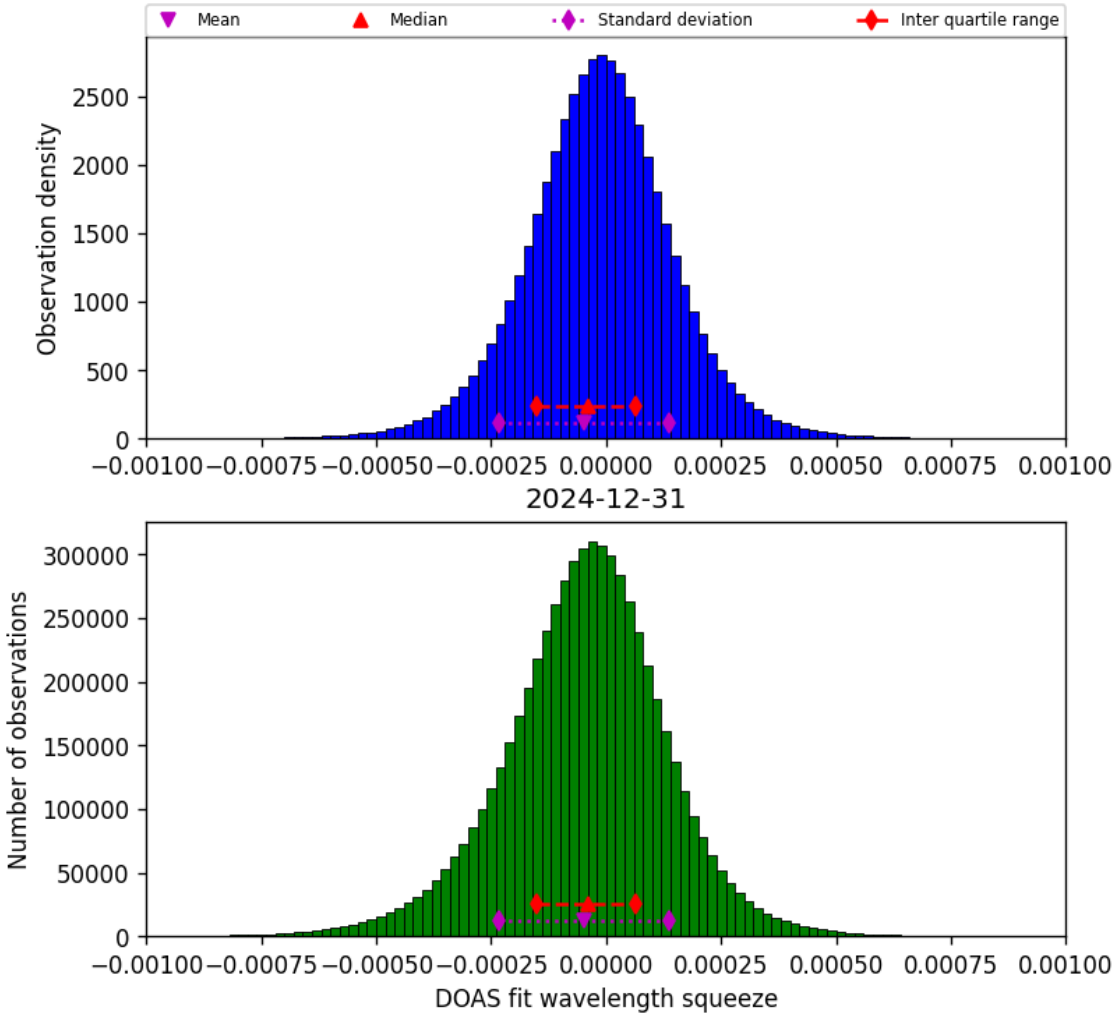

Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2024-12-31 to 2024-12-31

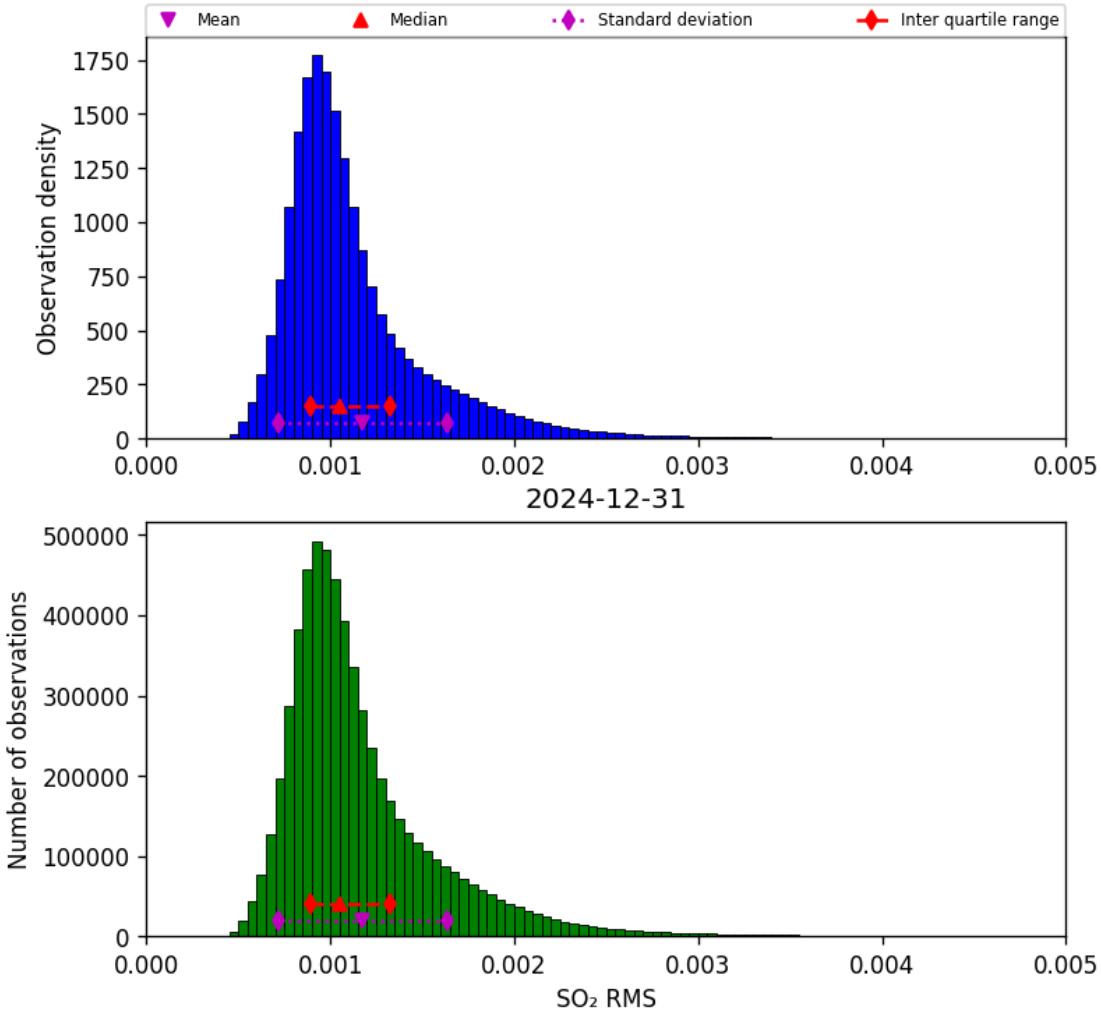

Figure 79: Histogram of "SO_2 RMS" for 2024-12-31 to 2024-12-31

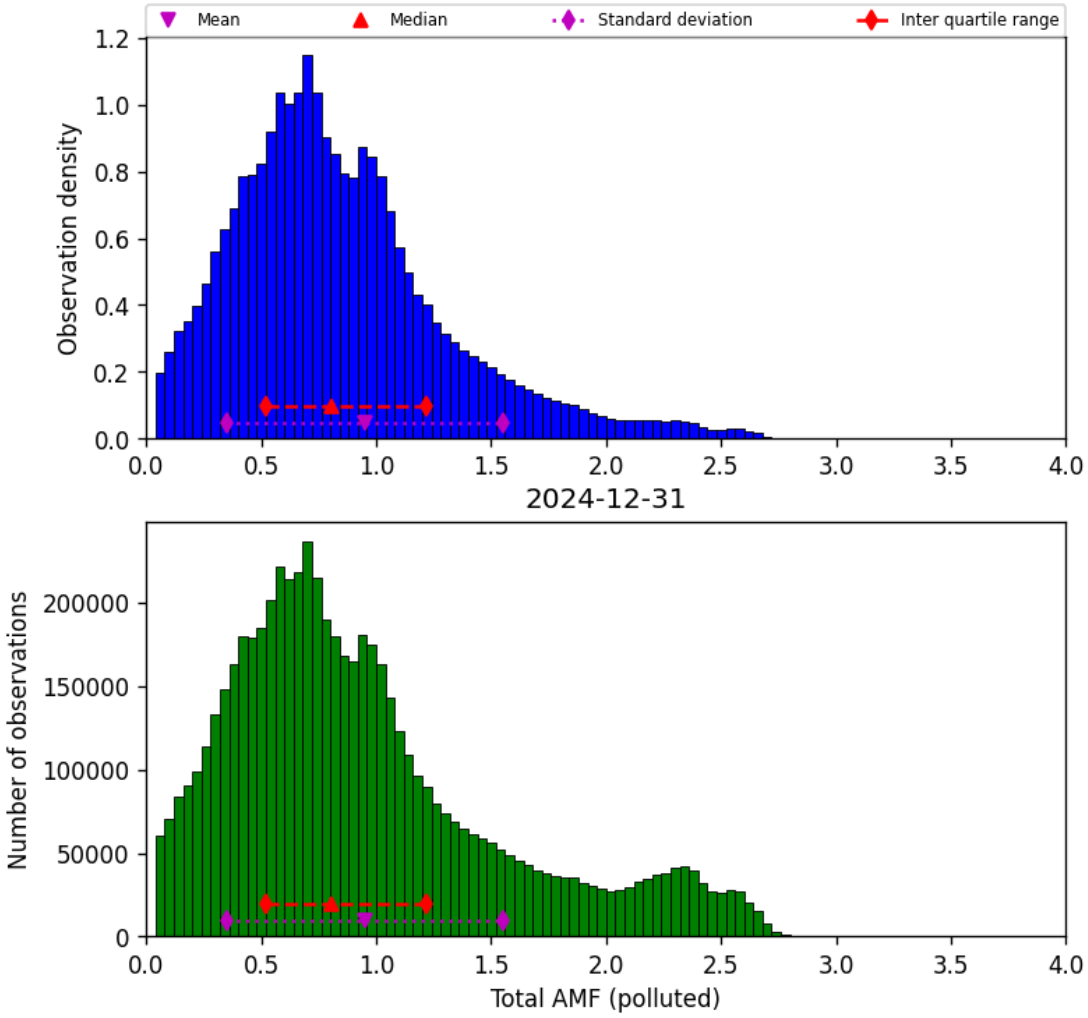

Figure 80: Histogram of “Total AMF (polluted)” for 2024-12-31 to 2024-12-31

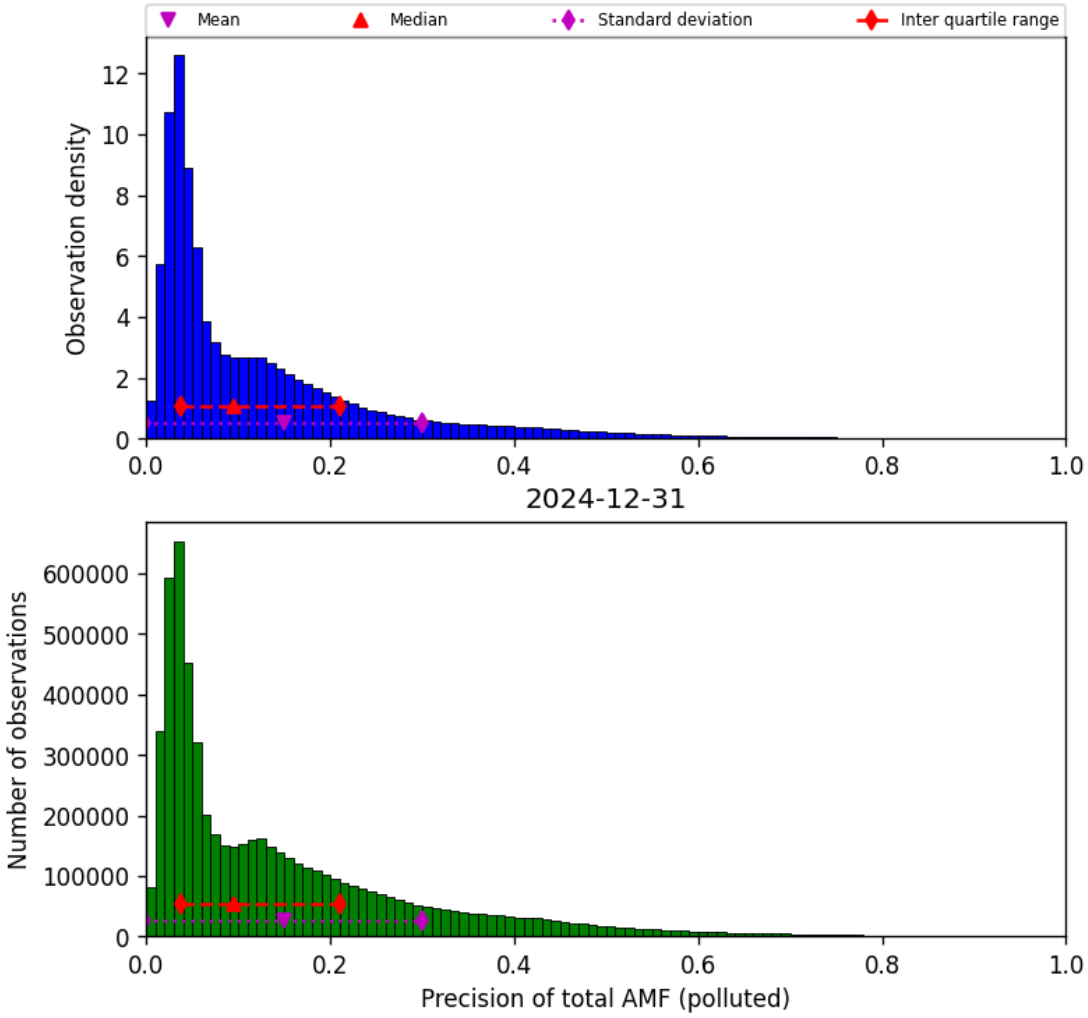

Figure 81: Histogram of “Precision of total AMF (polluted)” for 2024-12-31 to 2024-12-31

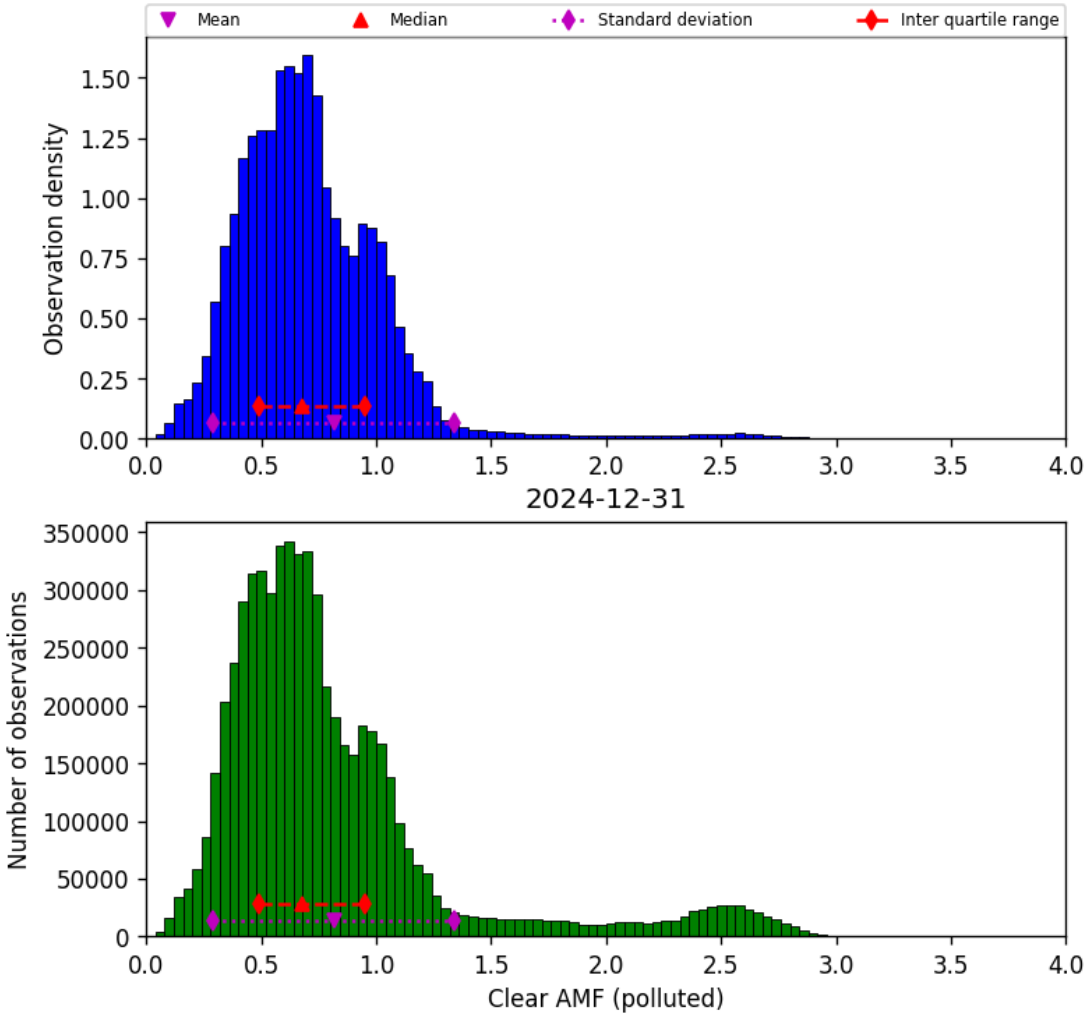

Figure 82: Histogram of “Clear AMF (polluted)” for 2024-12-31 to 2024-12-31

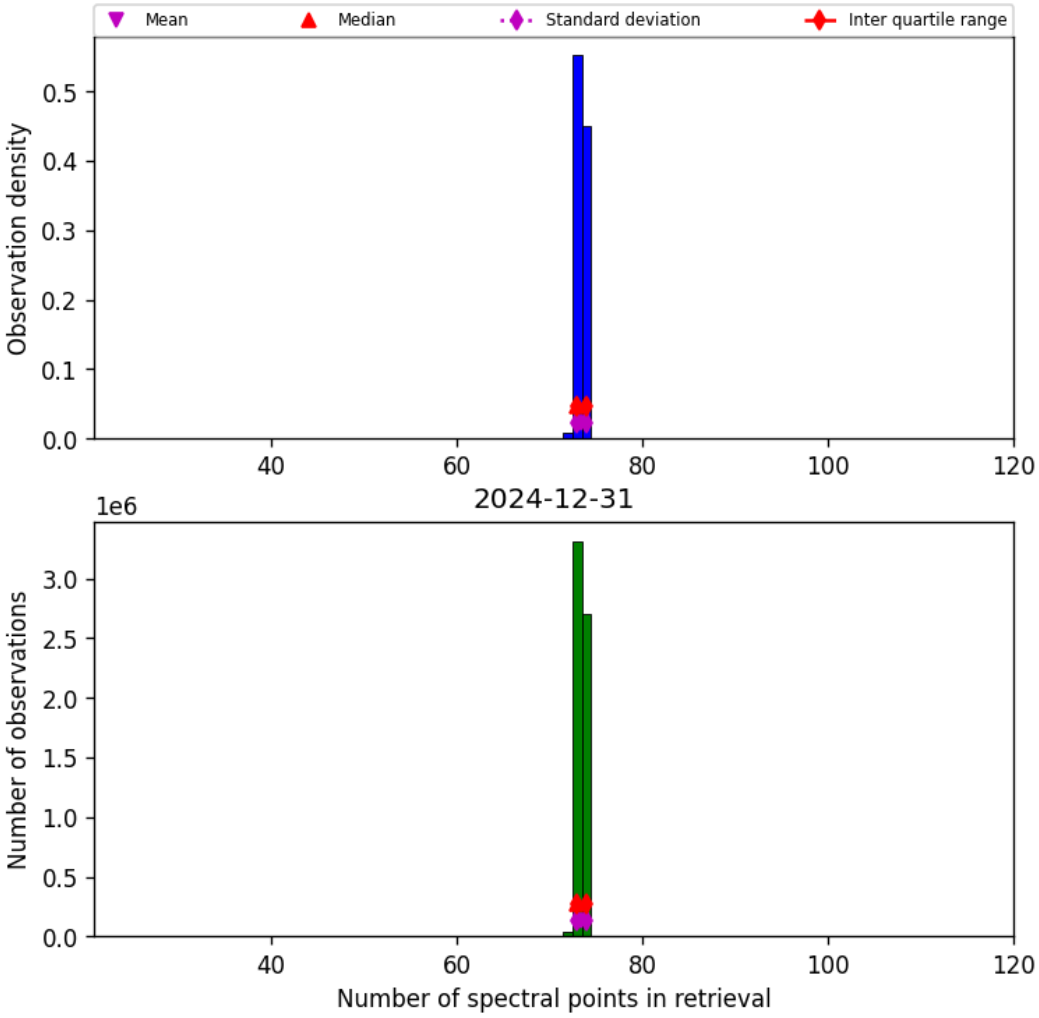

Figure 83: Histogram of “Number of spectral points in retrieval” for 2024-12-31 to 2024-12-31

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.

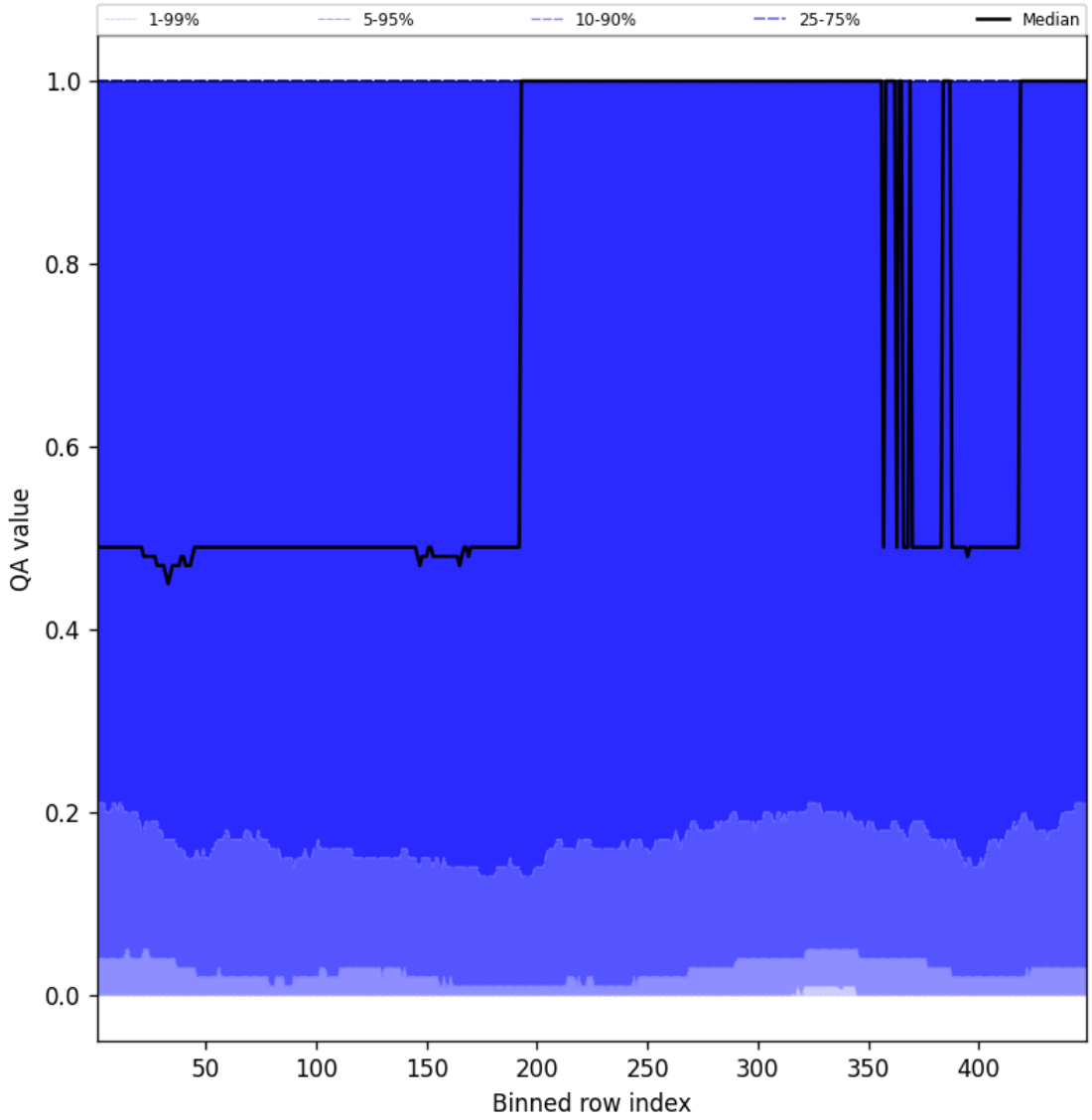

Figure 84: Along track statistics of “QA value” for 2024-12-31 to 2024-12-31

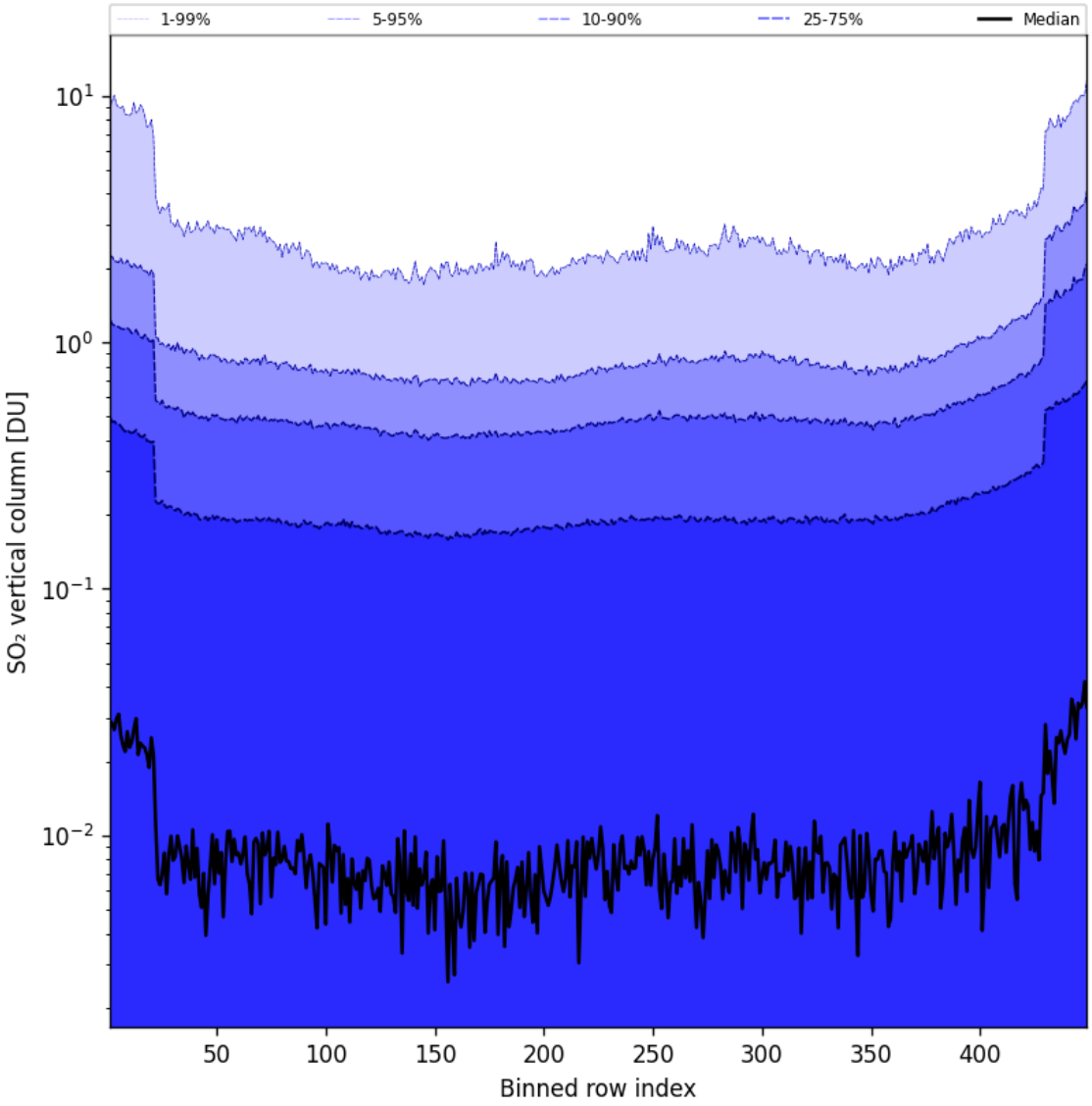

Figure 85: Along track statistics of "SO_2 vertical column" for 2024-12-31 to 2024-12-31

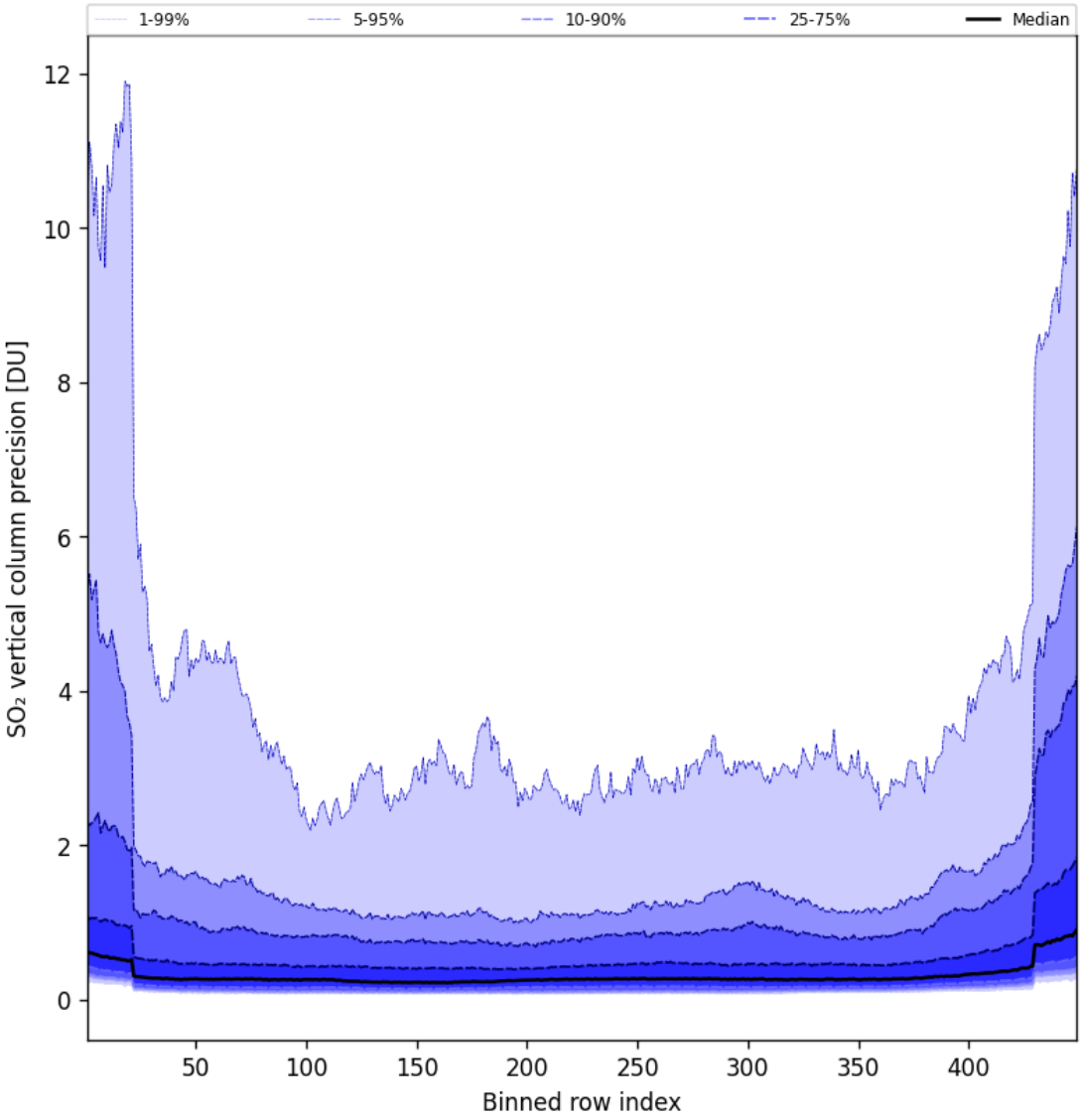

Figure 86: Along track statistics of "SO_2 vertical column precision" for 2024-12-31 to 2024-12-31

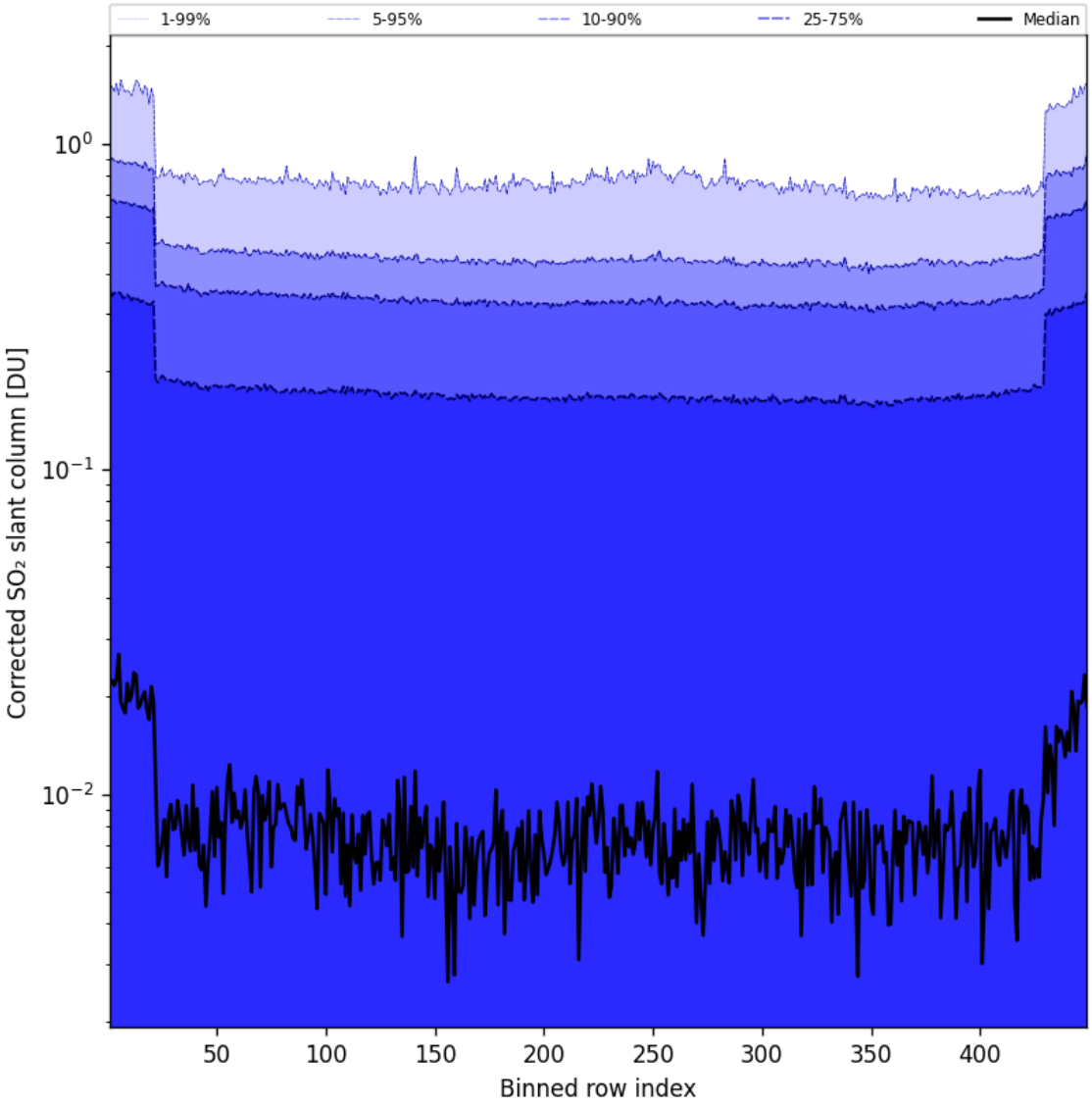

Figure 87: Along track statistics of "Corrected SO_2 slant column" for 2024-12-31 to 2024-12-31

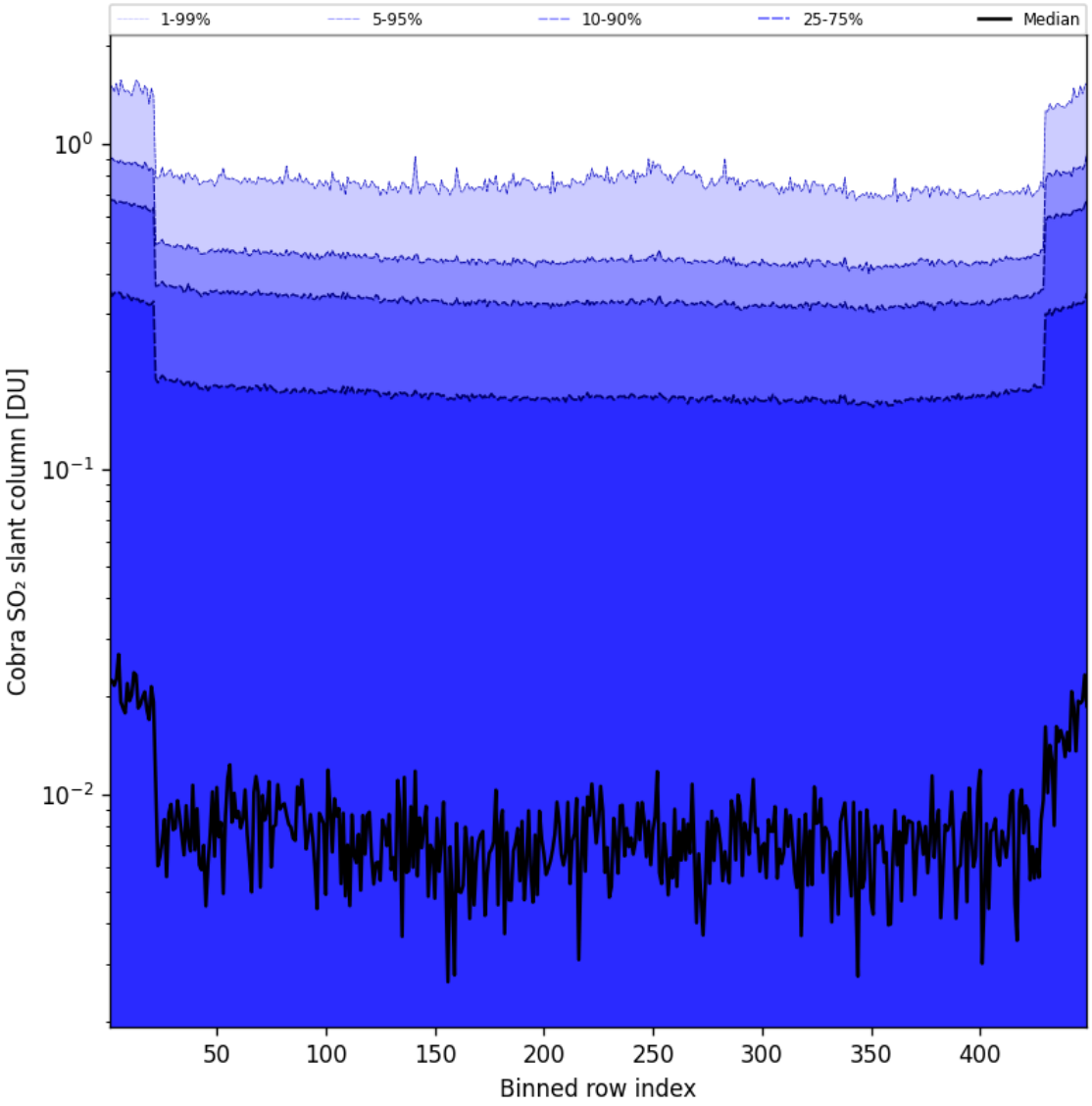

Figure 88: Along track statistics of "Cobra SO_2 slant column" for 2024-12-31 to 2024-12-31

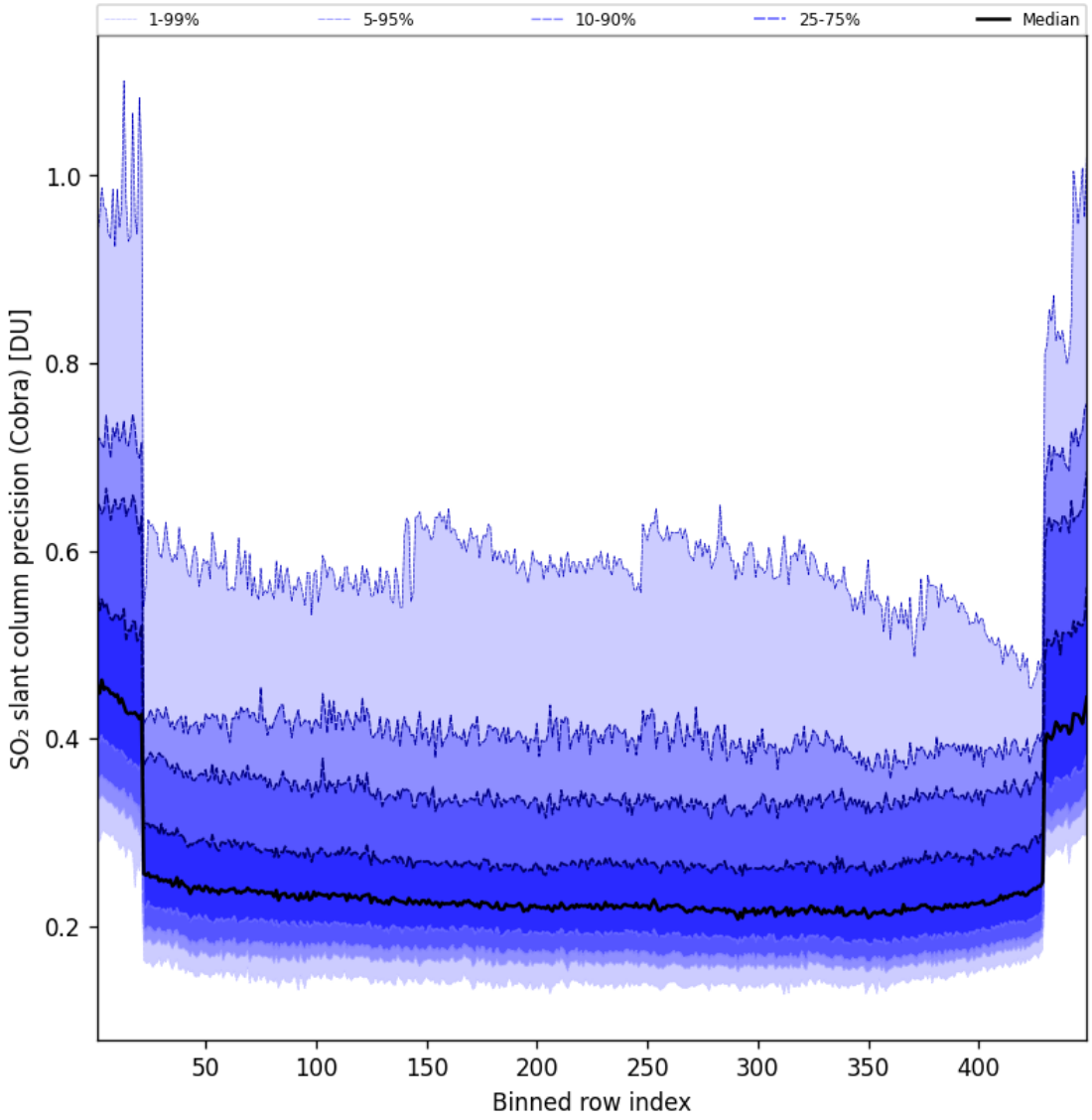

Figure 89: Along track statistics of "SO_2 slant column precision (Cobra)" for 2024-12-31 to 2024-12-31

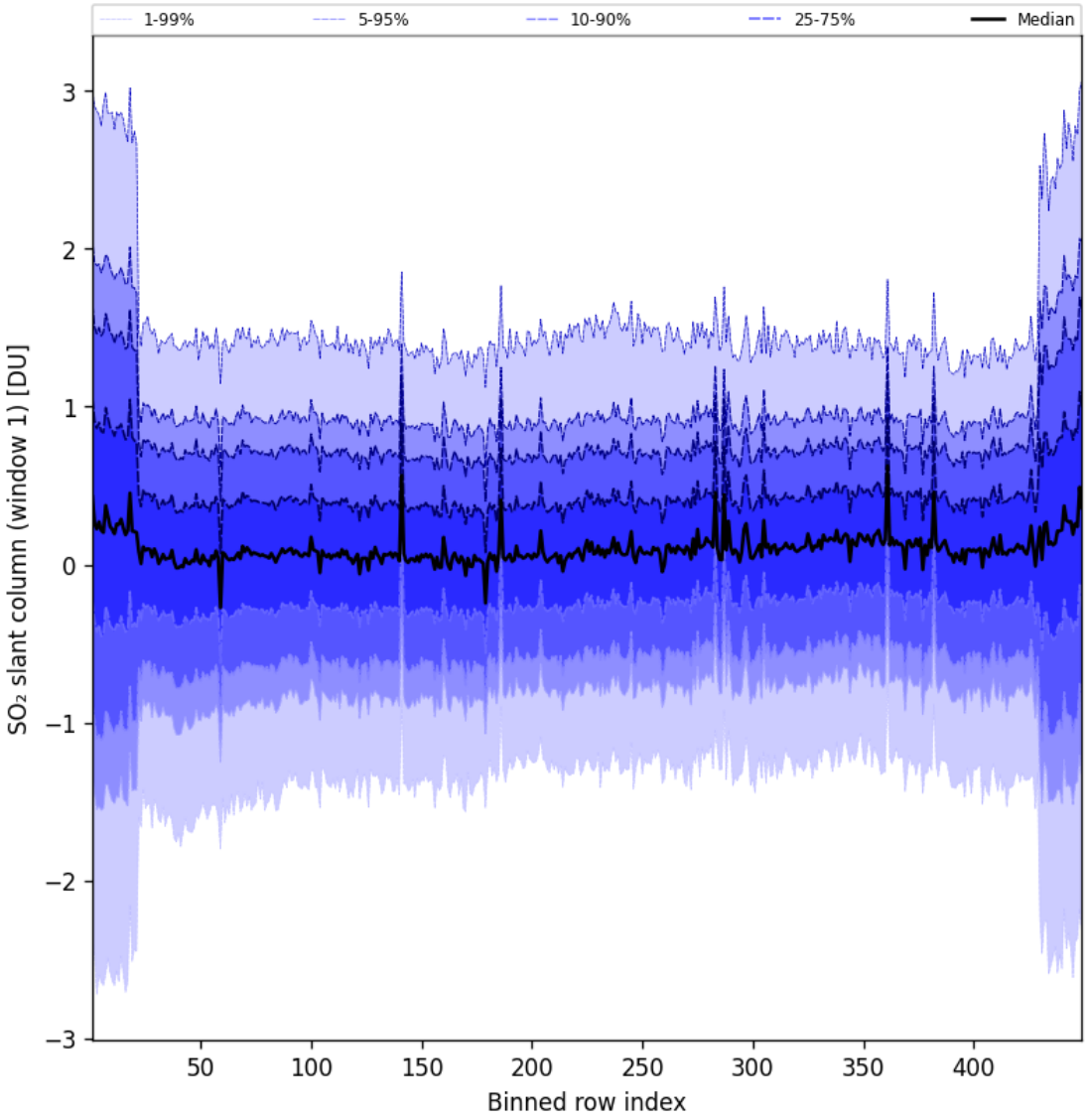

Figure 90: Along track statistics of "SO_2 slant column (window 1)" for 2024-12-31 to 2024-12-31

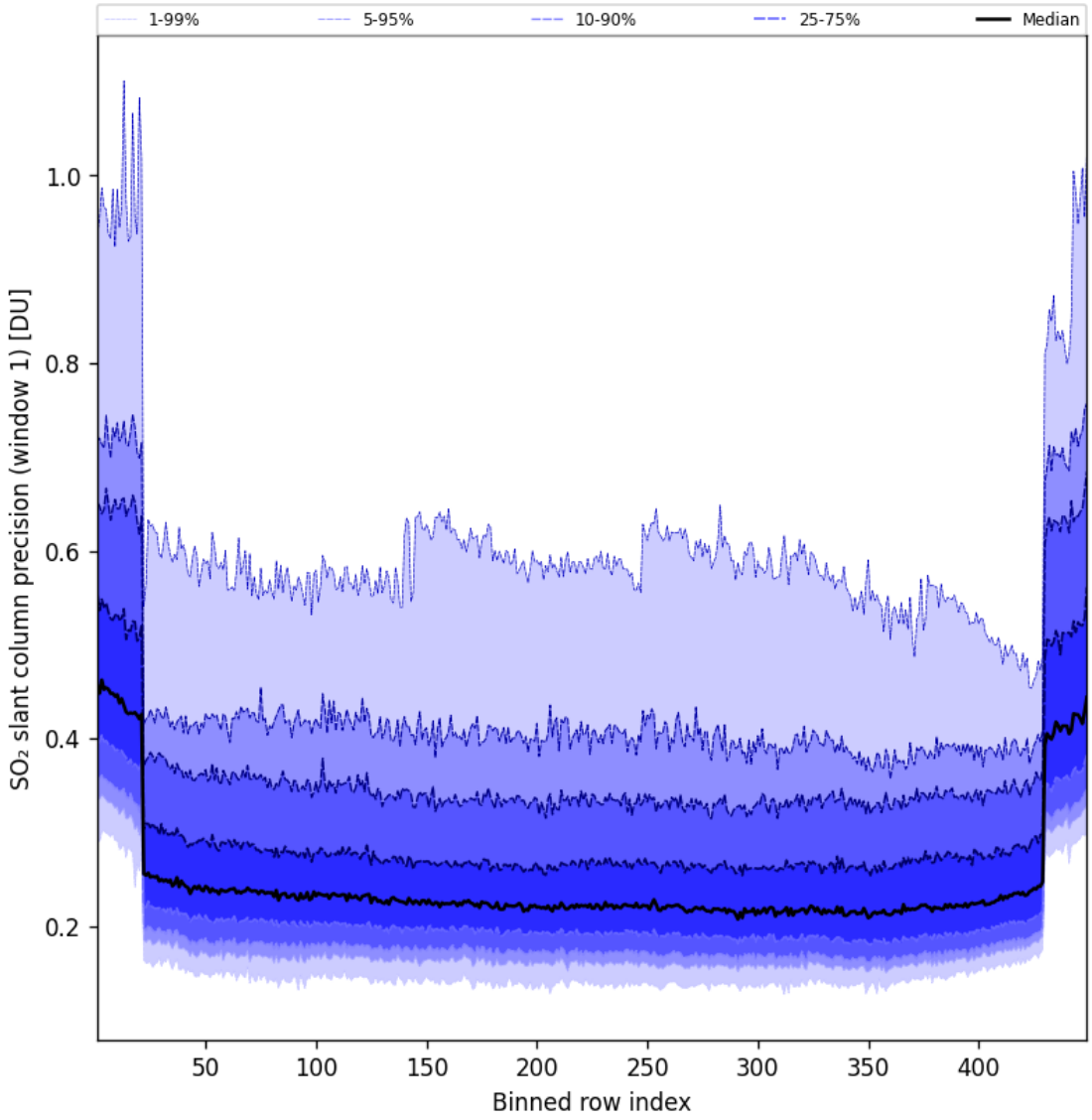

Figure 91: Along track statistics of "SO_2 slant column precision (window 1)" for 2024-12-31 to 2024-12-31

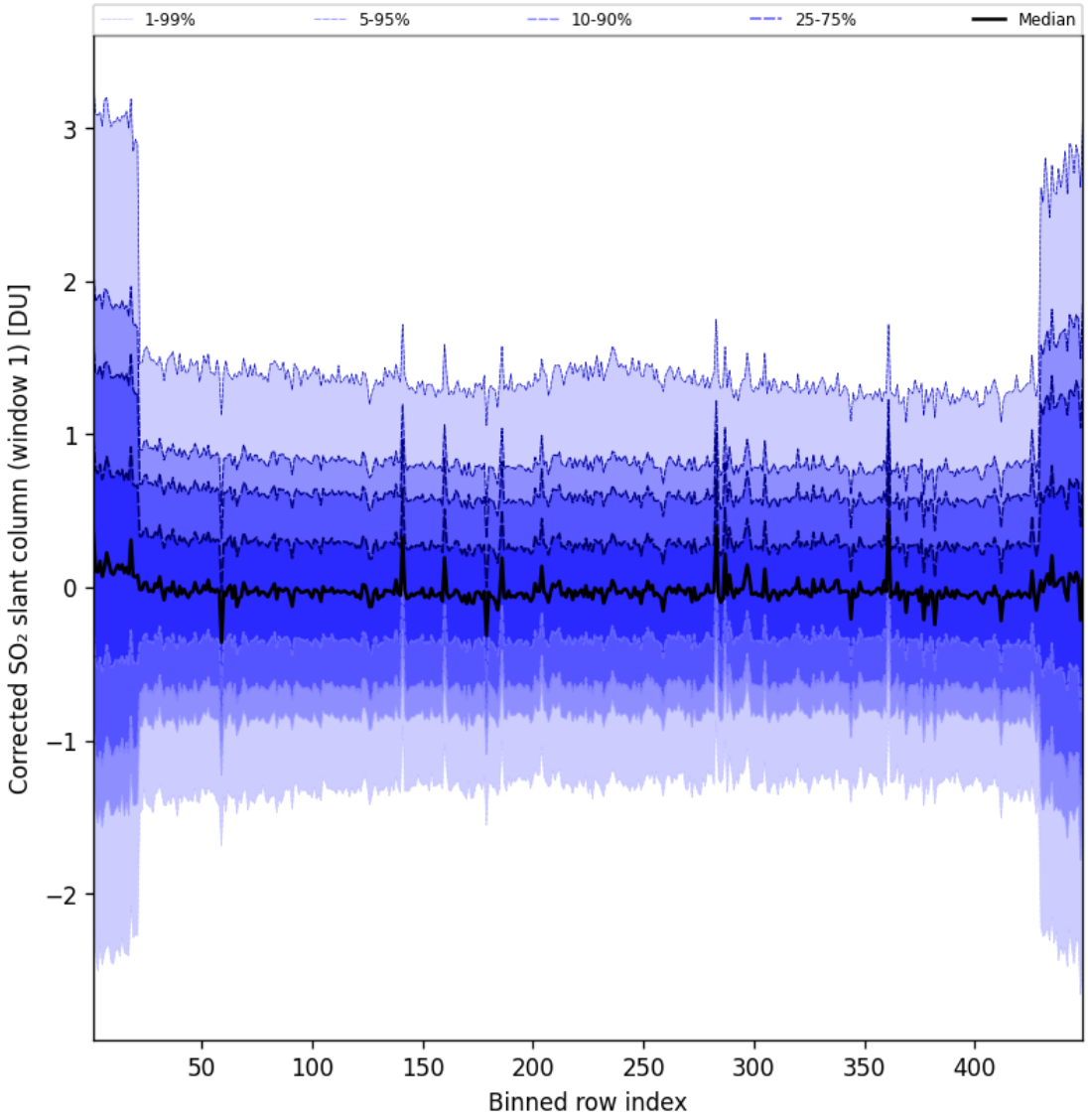

Figure 92: Along track statistics of “Corrected SO_2 slant column (window 1)” for 2024-12-31 to 2024-12-31

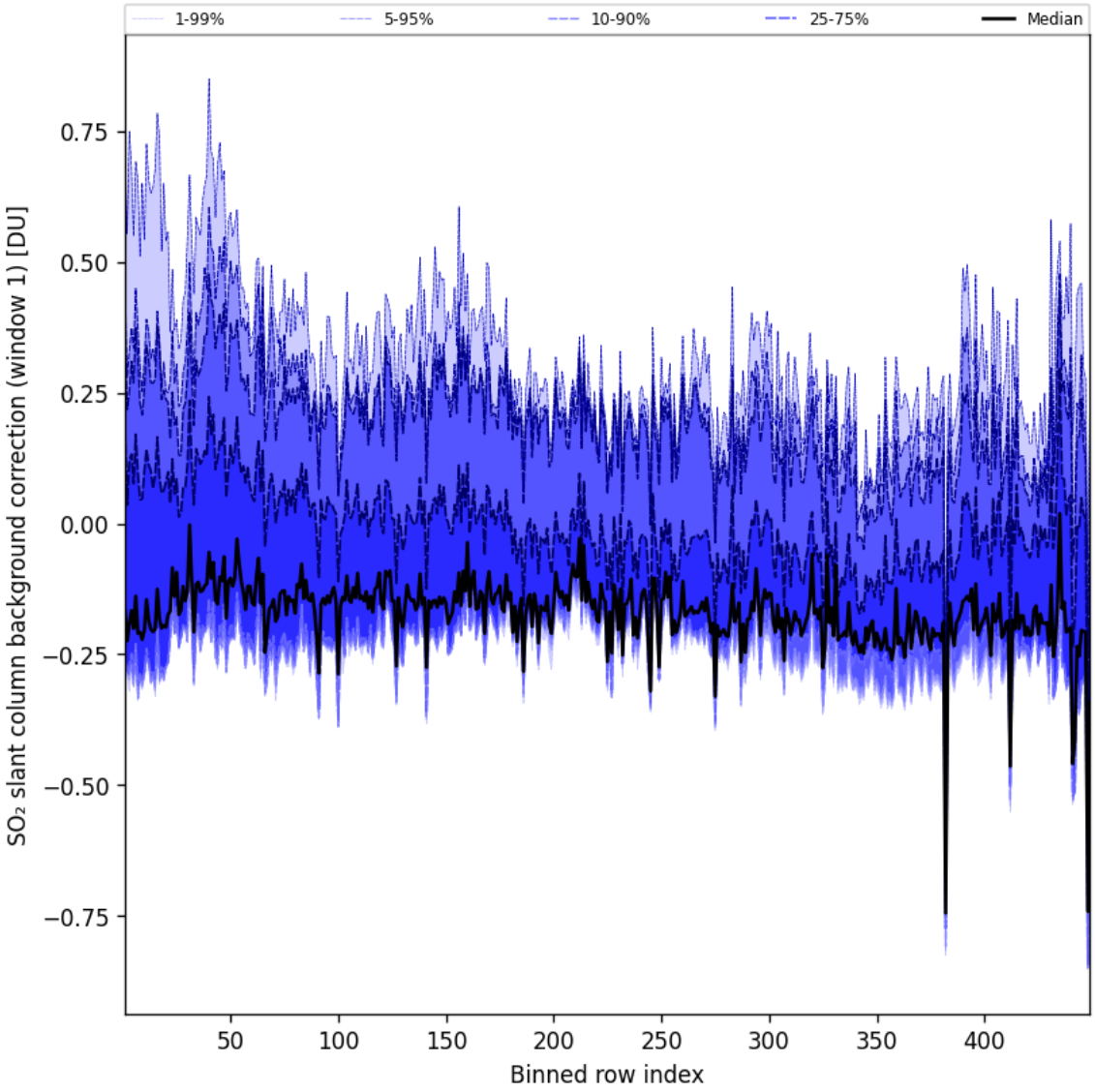

Figure 93: Along track statistics of "SO_2 slant column background correction (window 1)" for 2024-12-31 to 2024-12-31

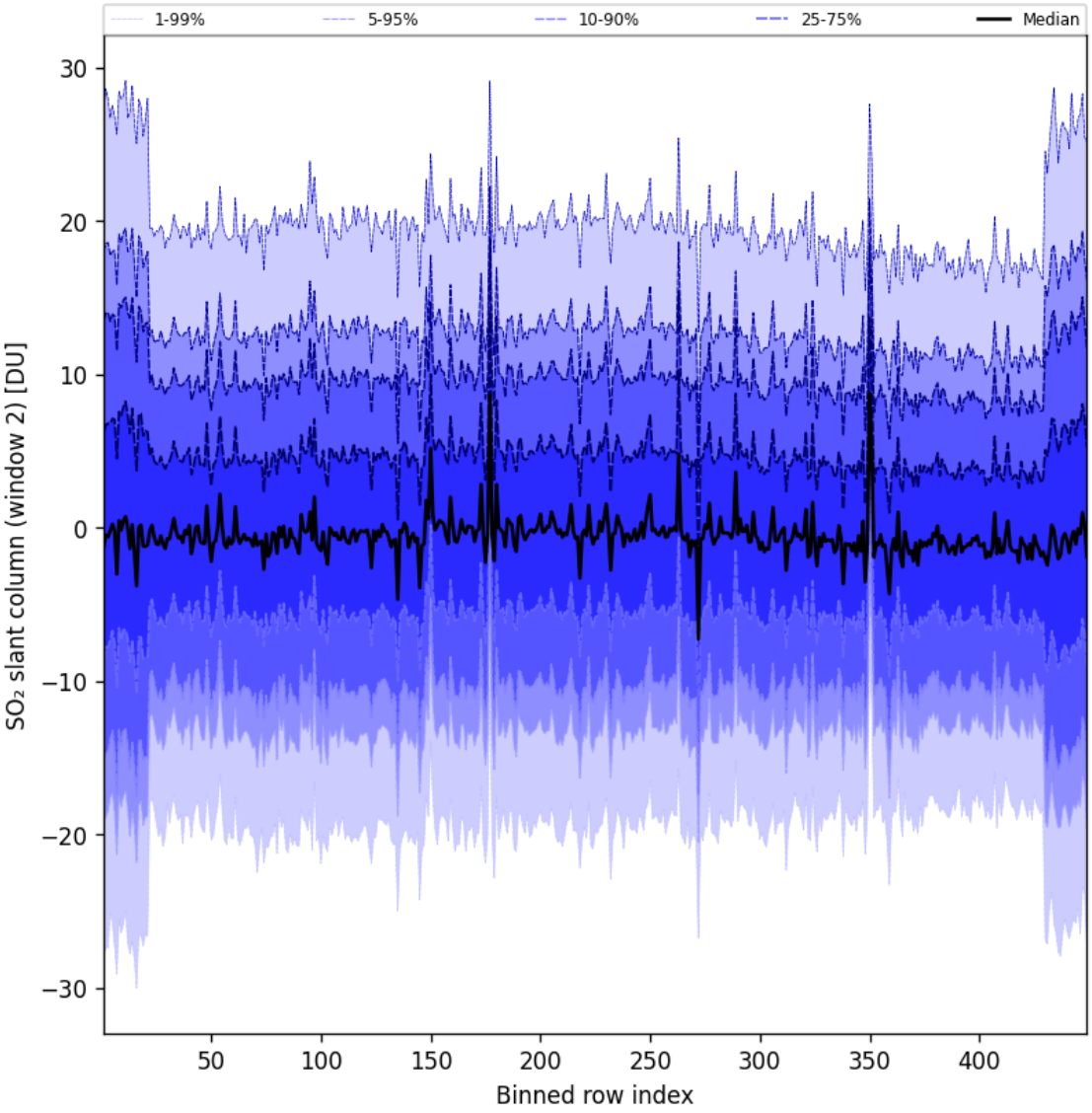

Figure 94: Along track statistics of "SO_2 slant column (window 2)" for 2024-12-31 to 2024-12-31

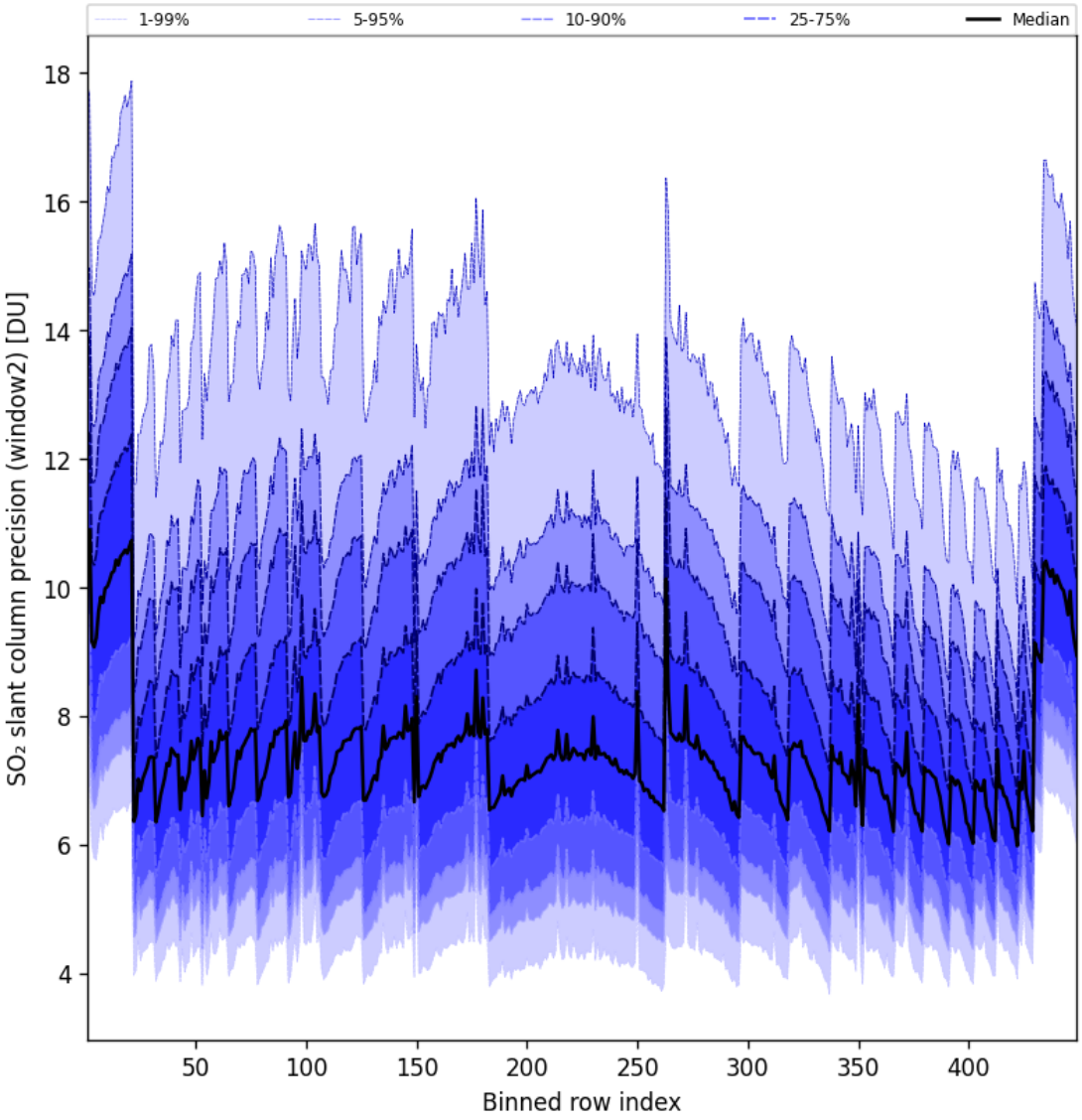

Figure 95: Along track statistics of "SO_2 slant column precision (window2)" for 2024-12-31 to 2024-12-31

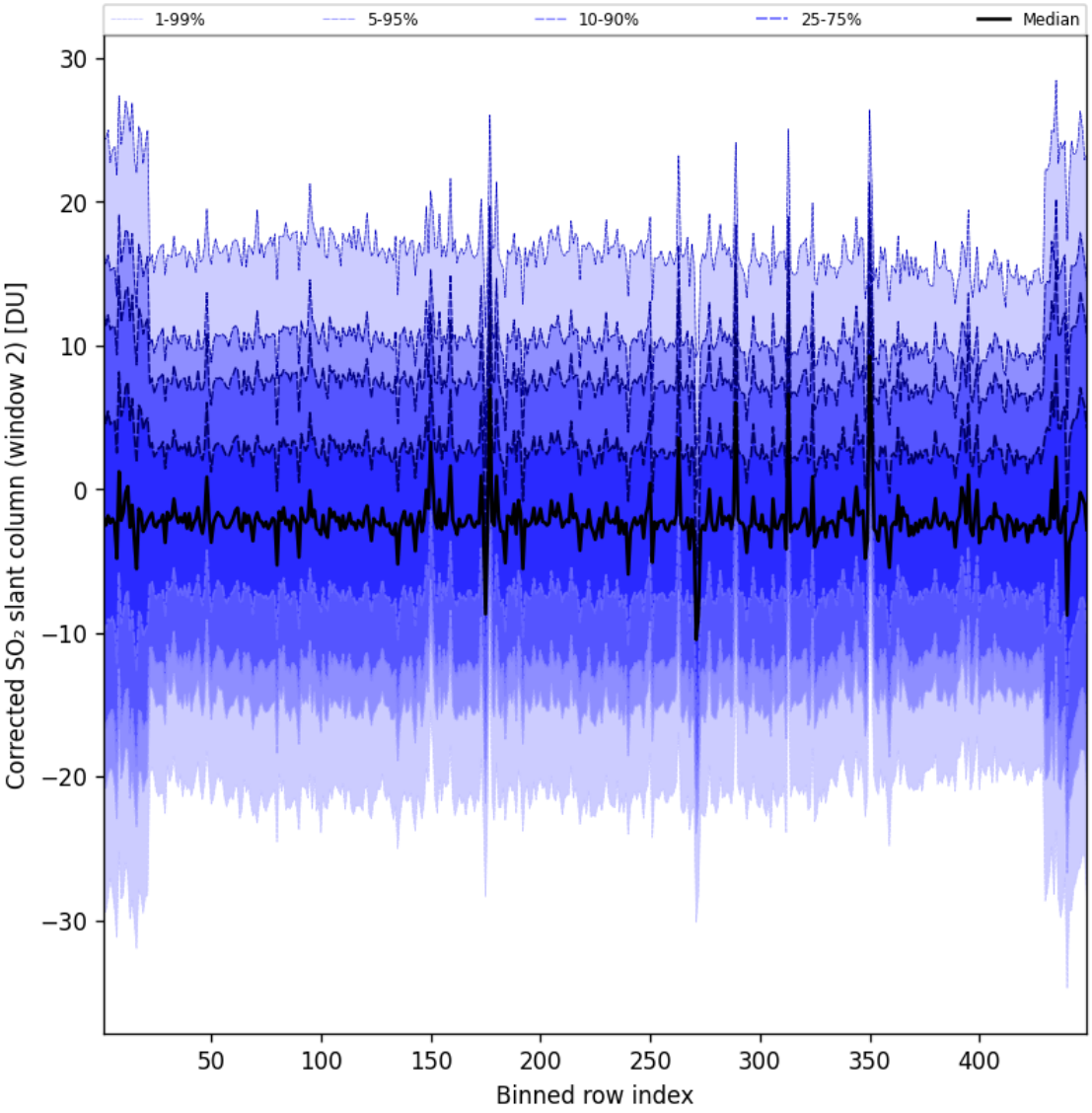

Figure 96: Along track statistics of “Corrected SO_2 slant column (window 2)” for 2024-12-31 to 2024-12-31

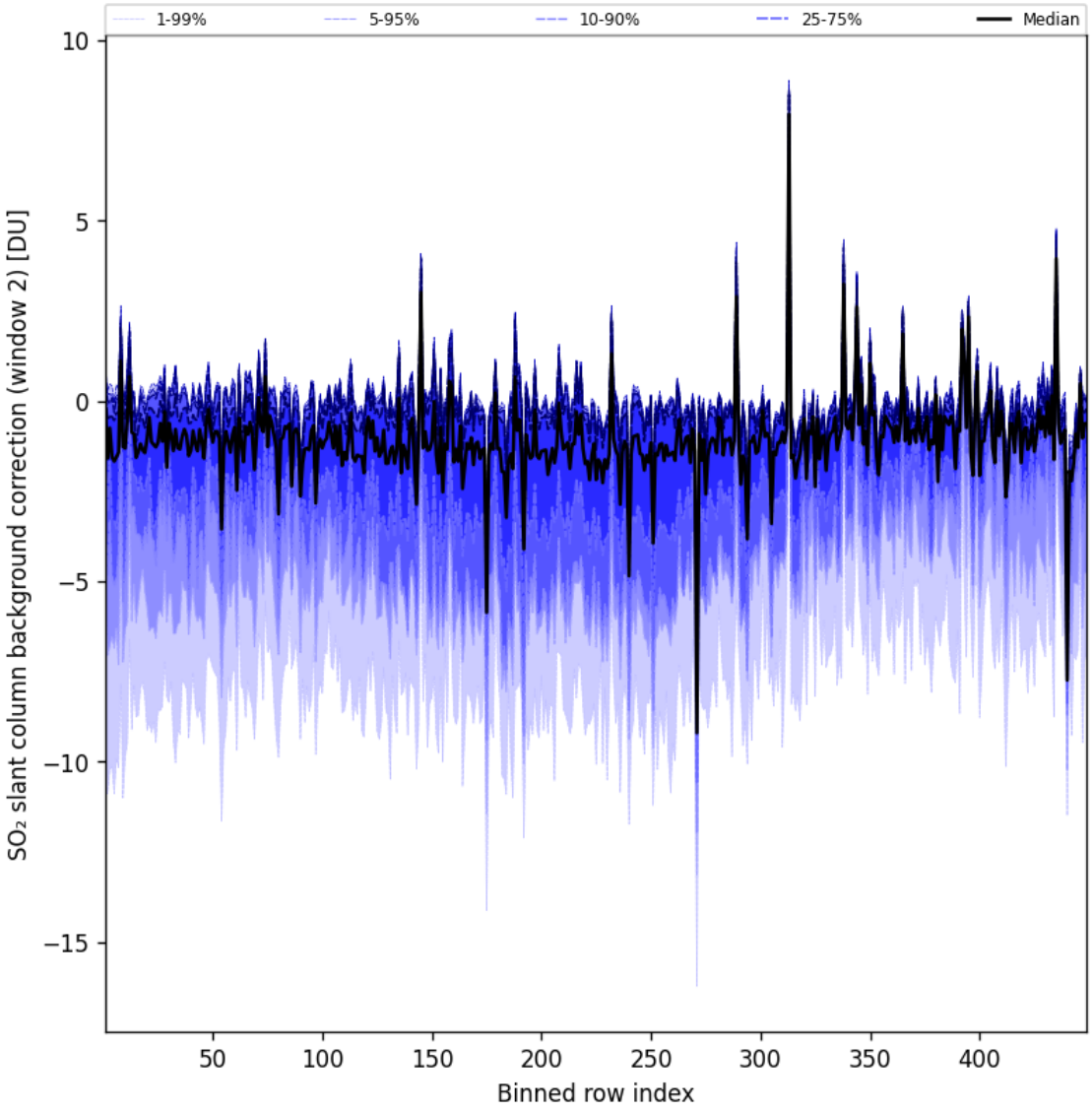

Figure 97: Along track statistics of "SO_2 slant column background correction (window 2)" for 2024-12-31 to 2024-12-31

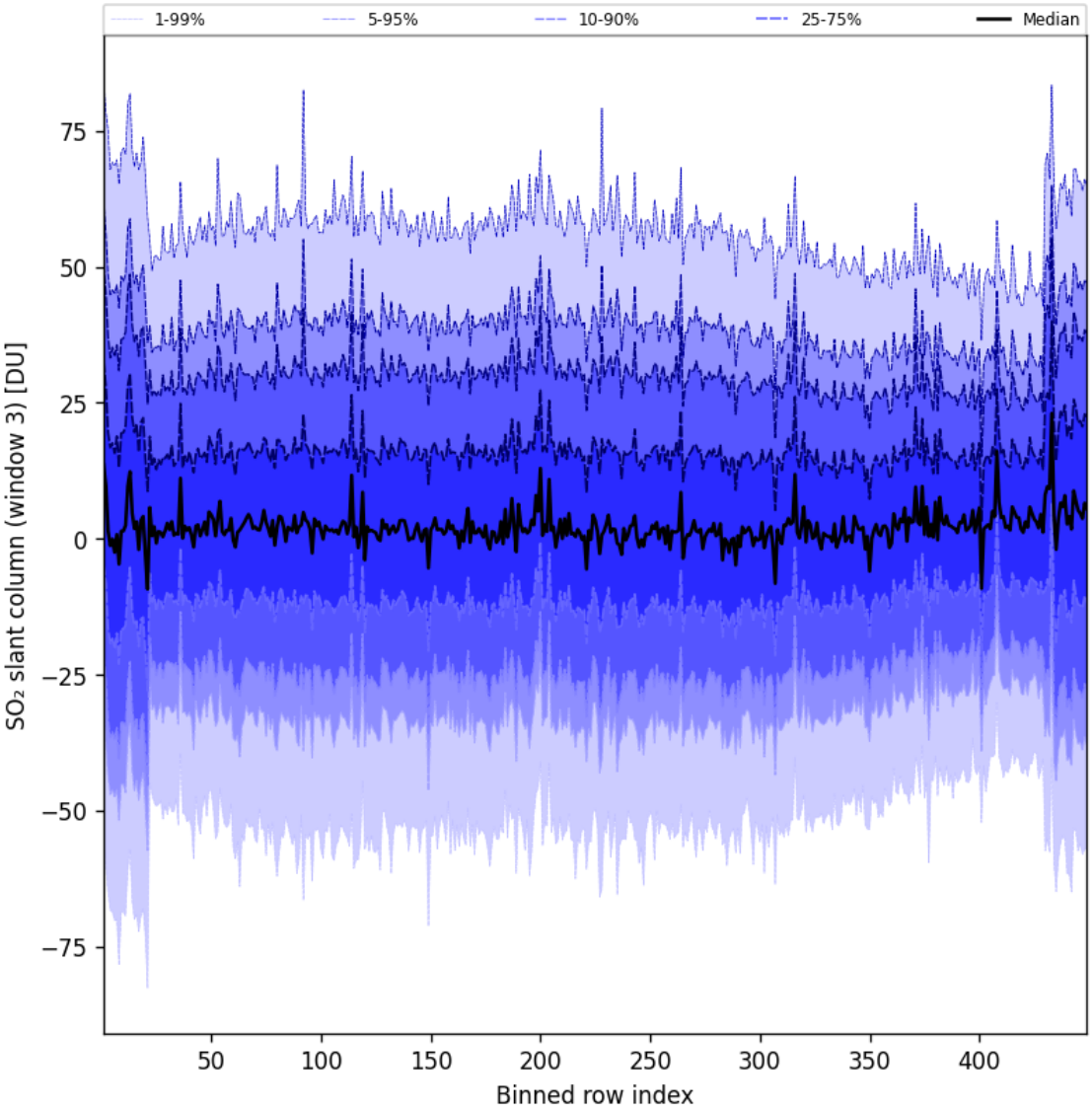

Figure 98: Along track statistics of "SO_2 slant column (window 3)" for 2024-12-31 to 2024-12-31

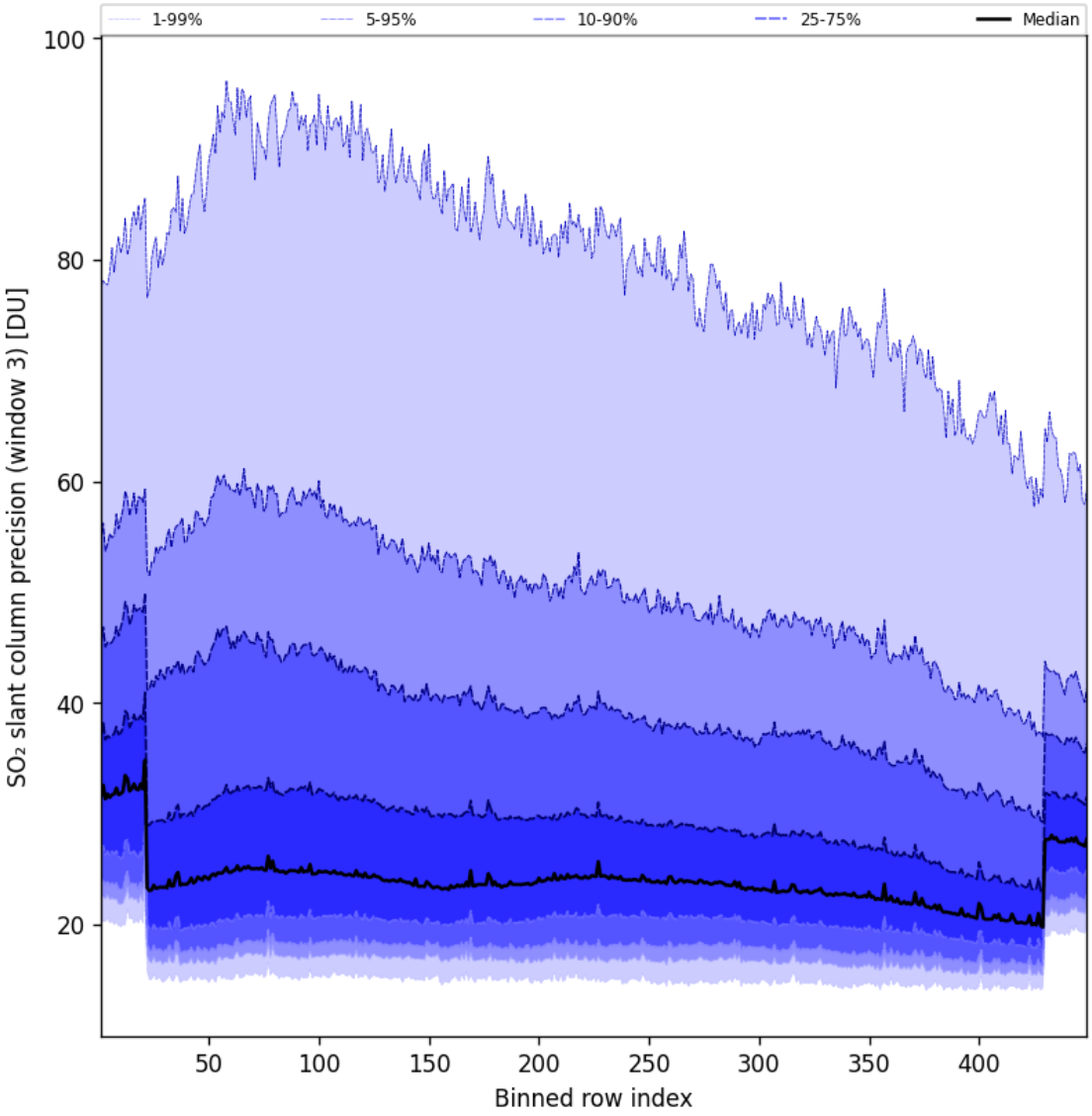

Figure 99: Along track statistics of "SO_2 slant column precision (window 3)" for 2024-12-31 to 2024-12-31

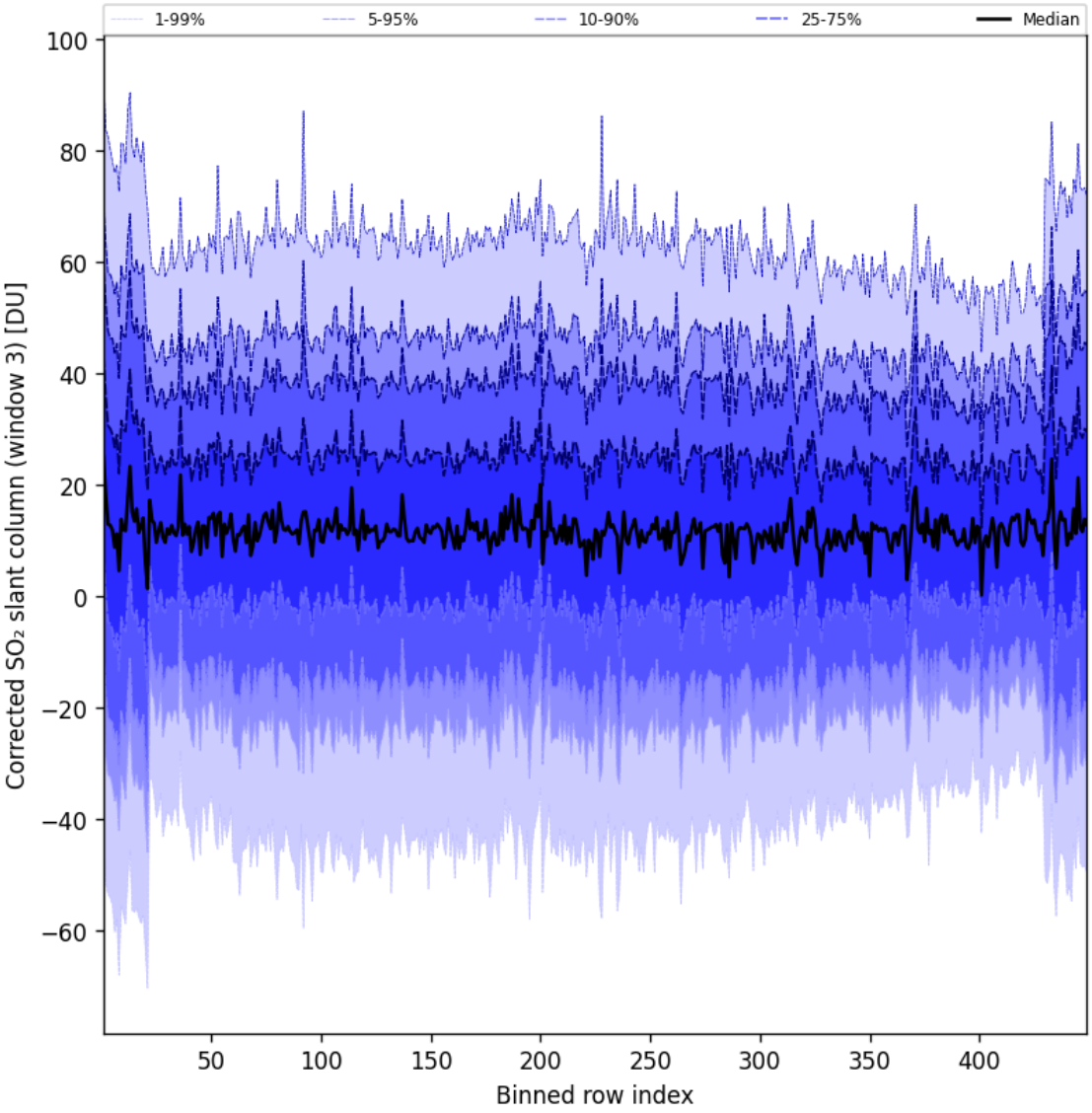

Figure 100: Along track statistics of “Corrected SO_2 slant column (window 3)” for 2024-12-31 to 2024-12-31

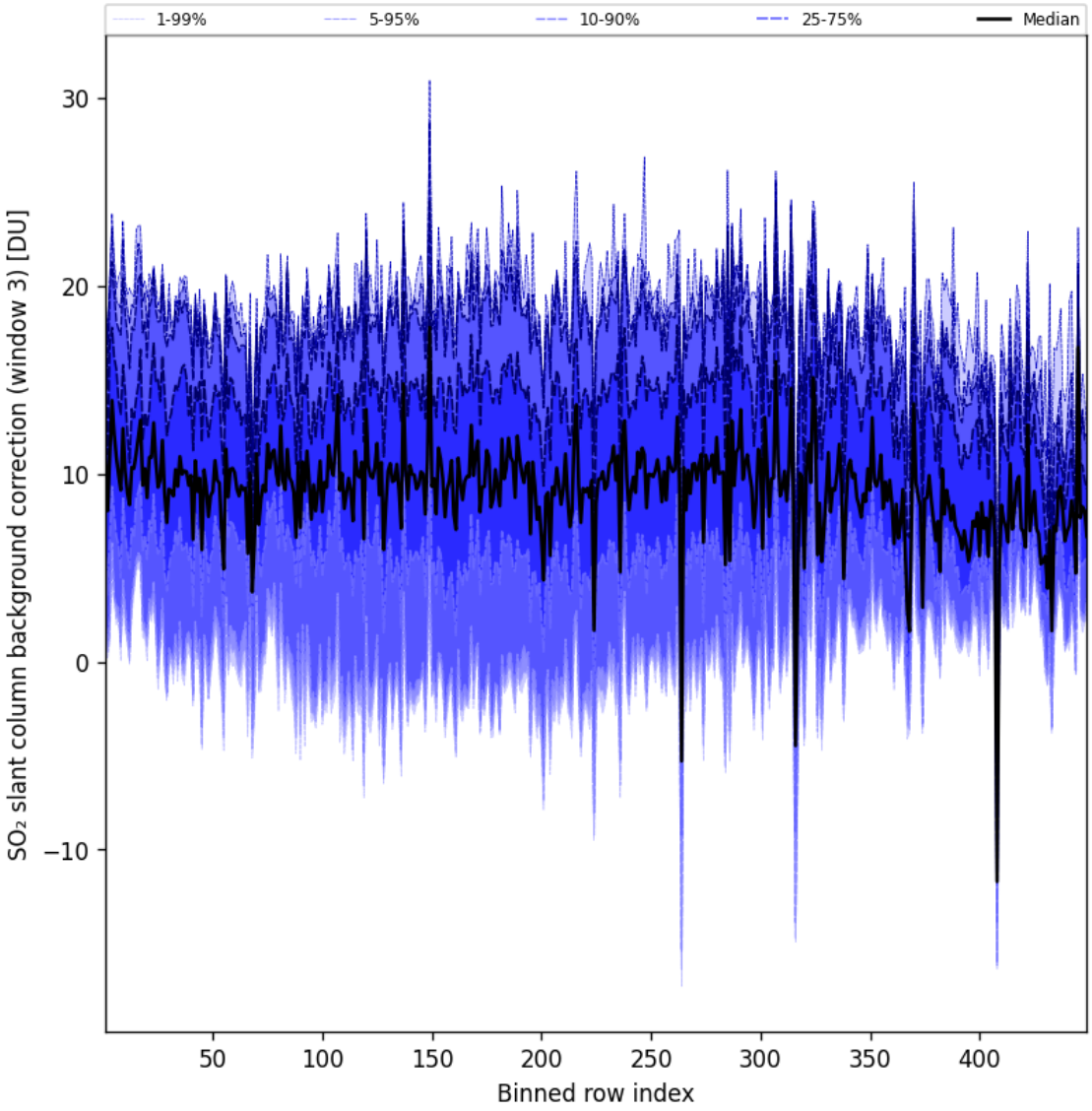

Figure 101: Along track statistics of "SO_2 slant column background correction (window 3)" for 2024-12-31 to 2024-12-31

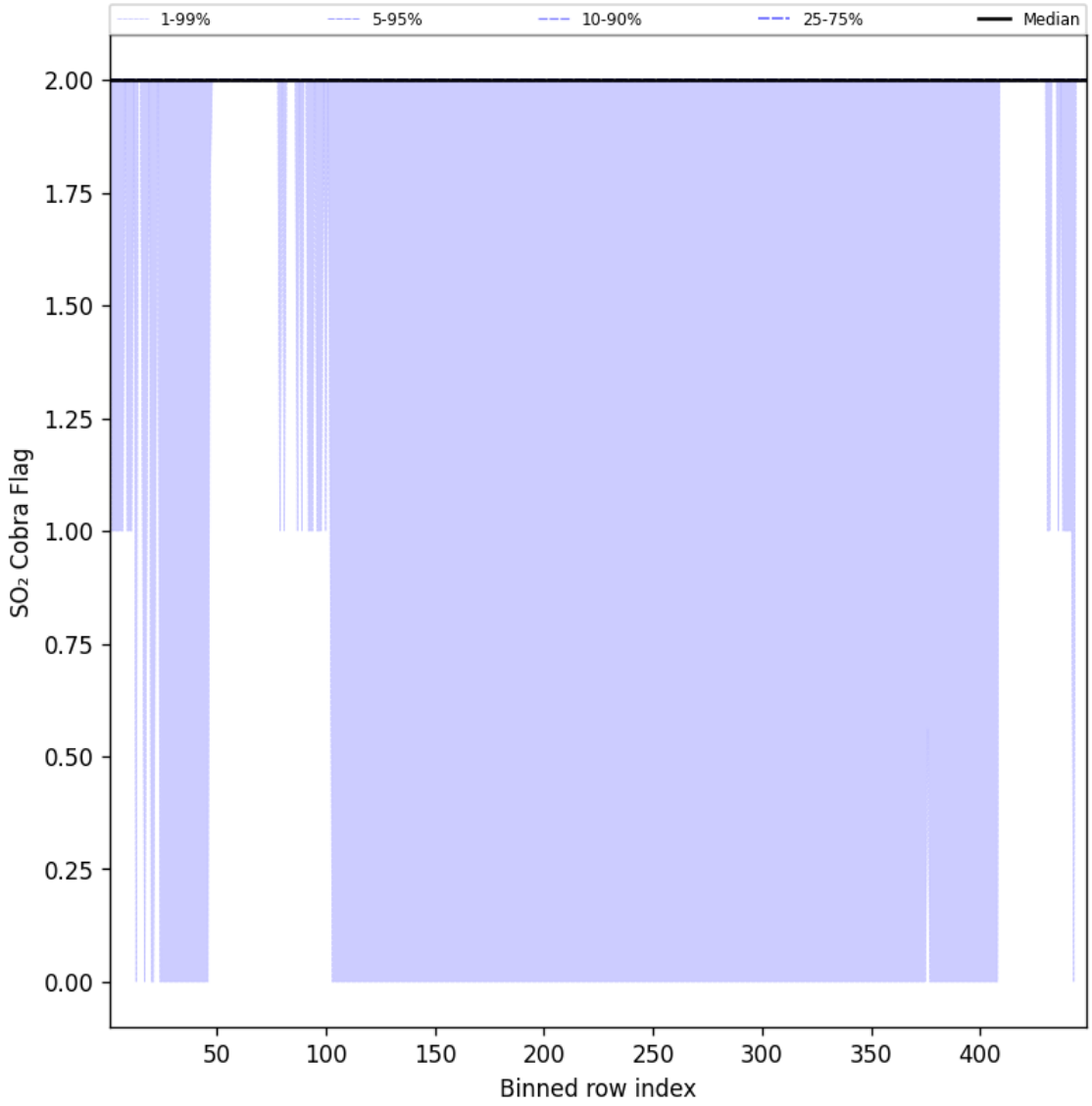

Figure 102: Along track statistics of "SO_2 Cobra Flag" for 2024-12-31 to 2024-12-31

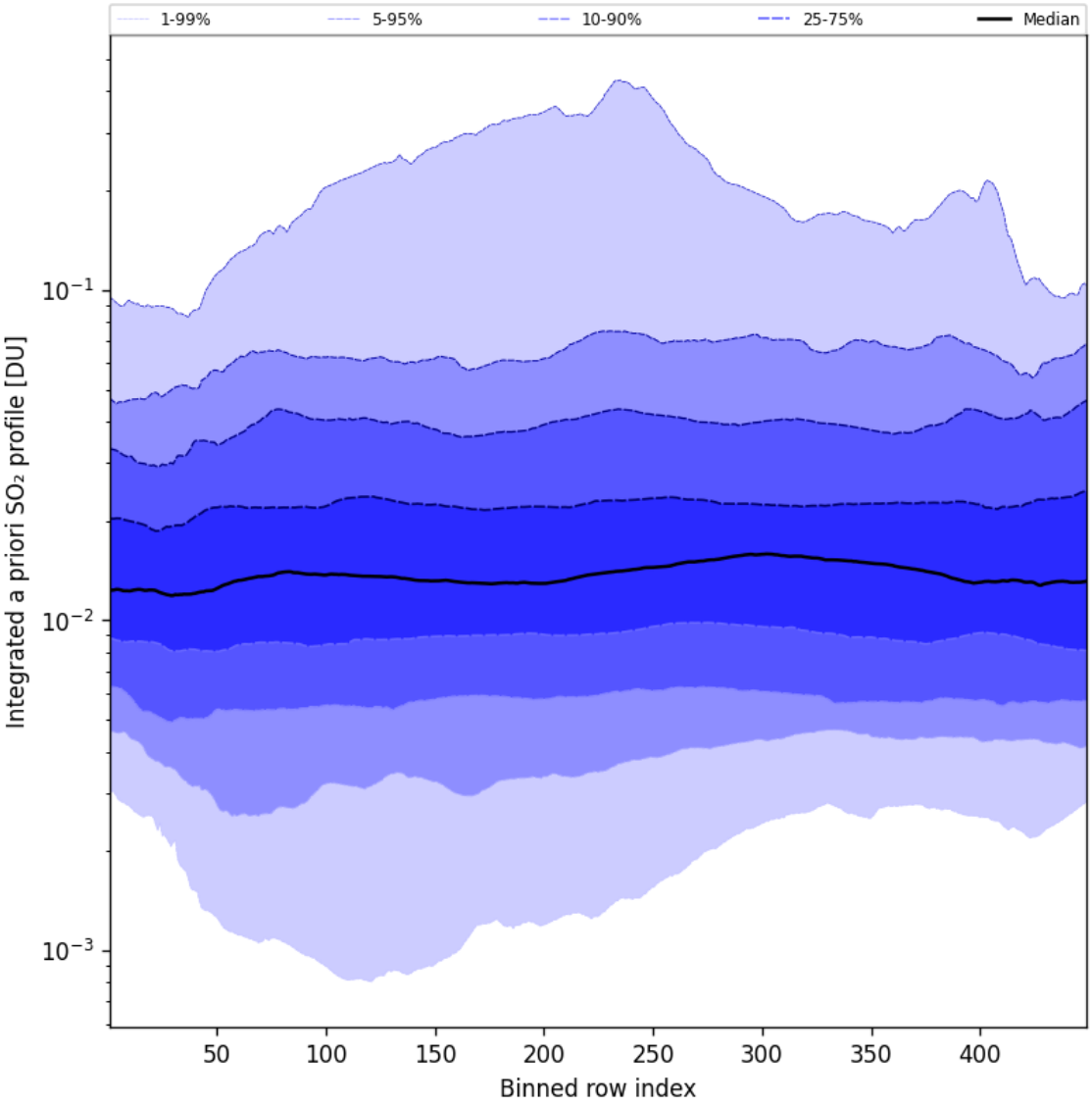

Figure 103: Along track statistics of “Integrated a priori SO_2 profile” for 2024-12-31 to 2024-12-31

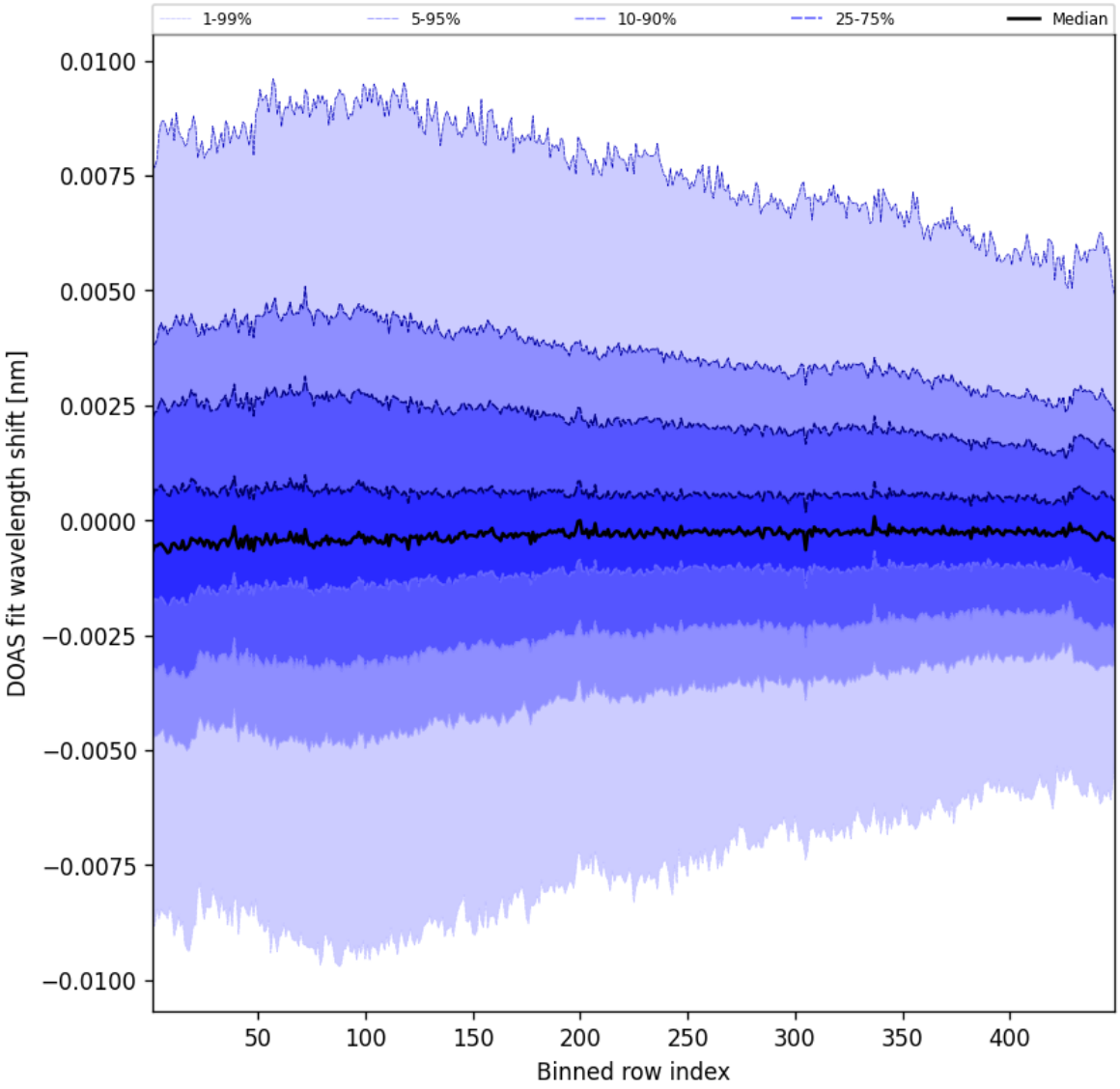

Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2024-12-31 to 2024-12-31

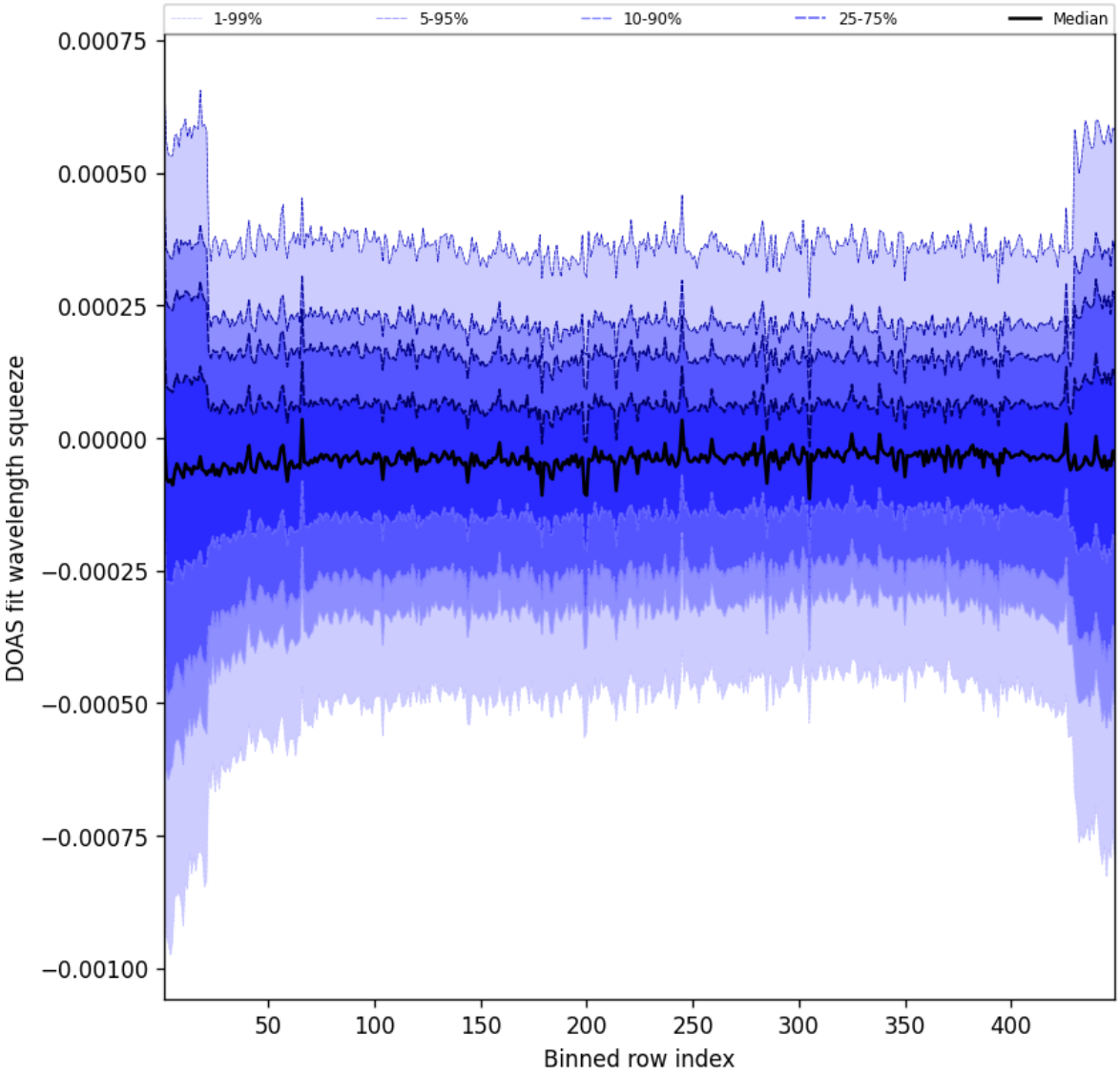

Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2024-12-31 to 2024-12-31

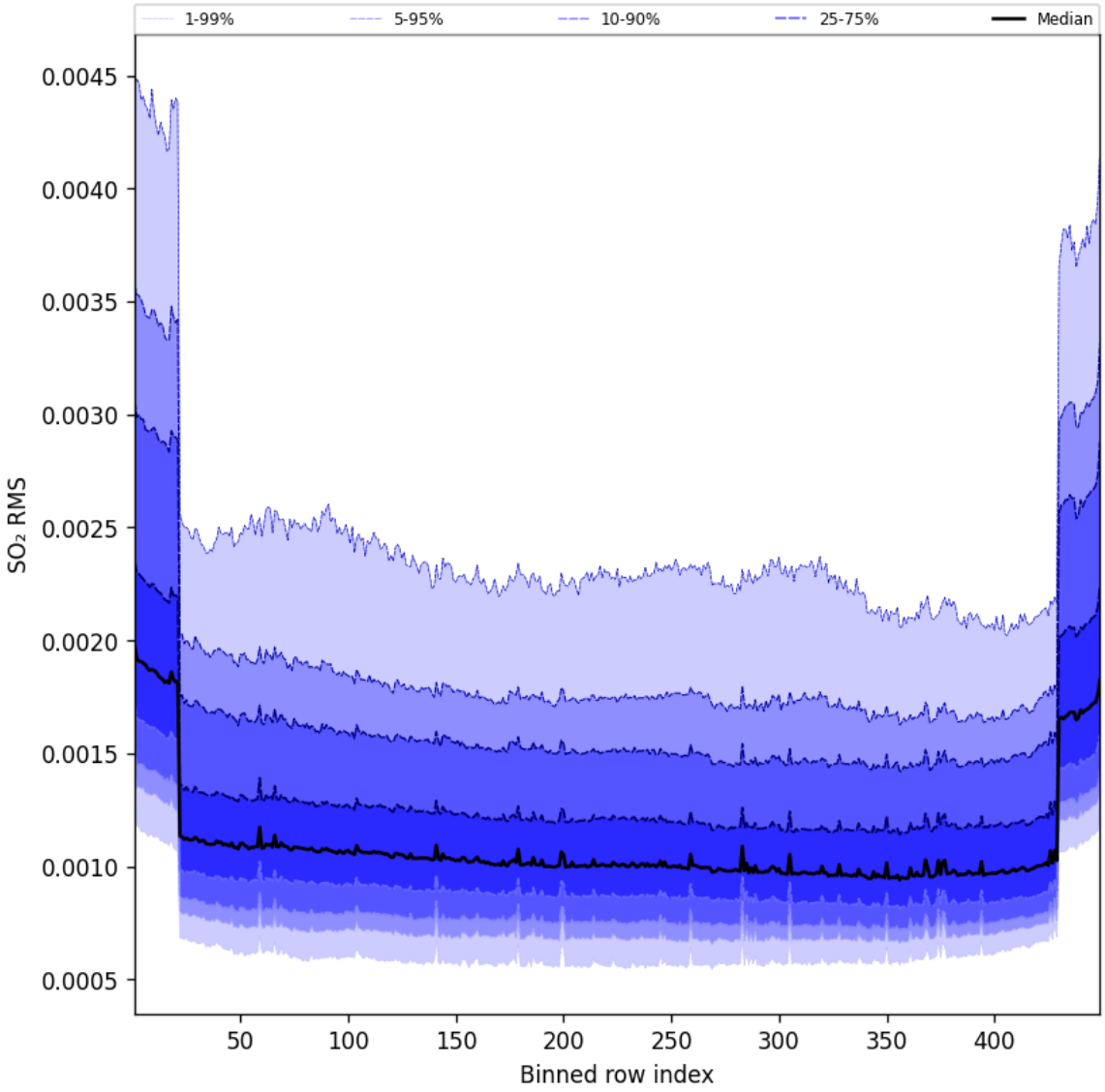

Figure 106: Along track statistics of "SO_2 RMS" for 2024-12-31 to 2024-12-31

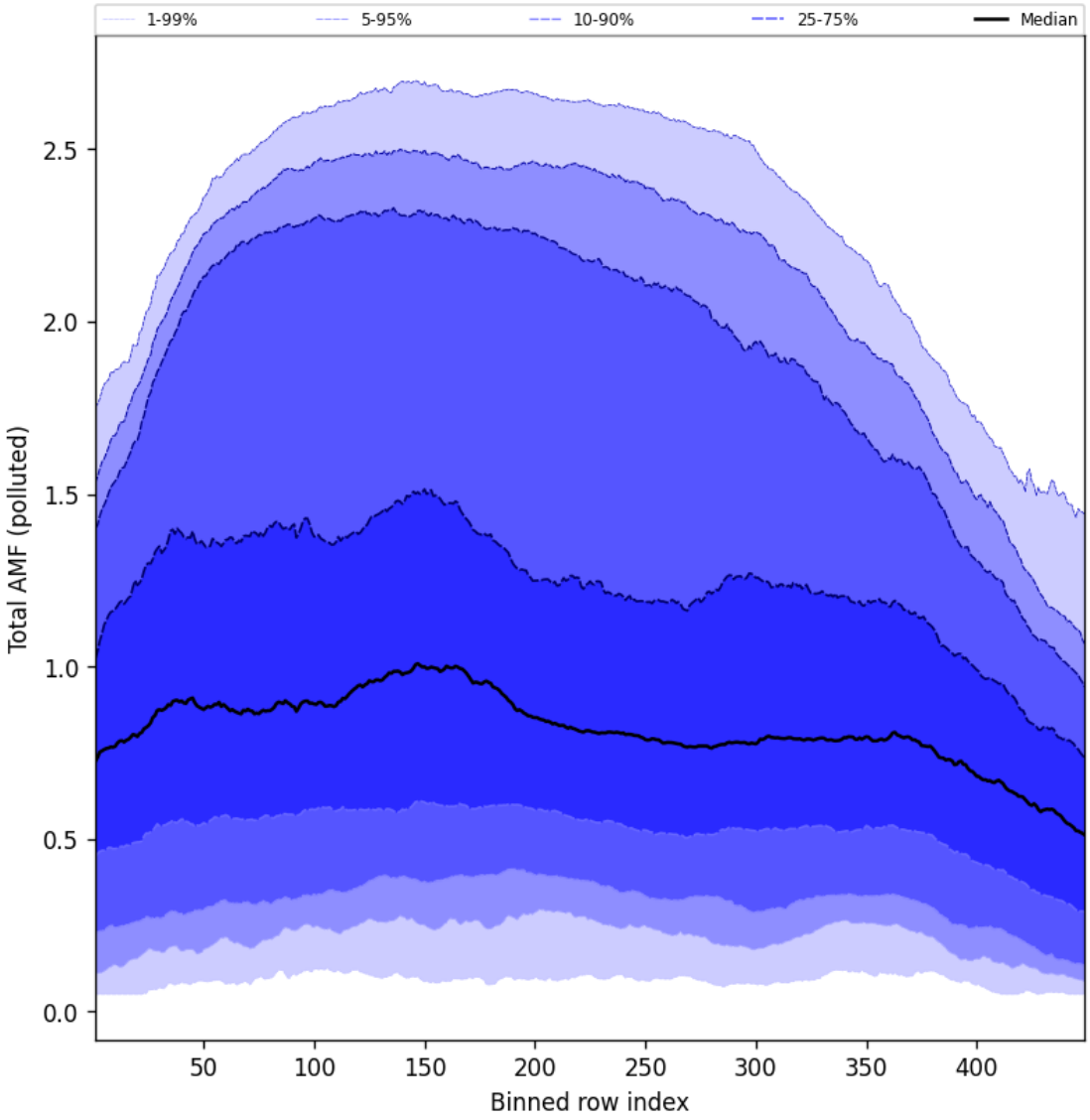

Figure 107: Along track statistics of “Total AMF (polluted)” for 2024-12-31 to 2024-12-31

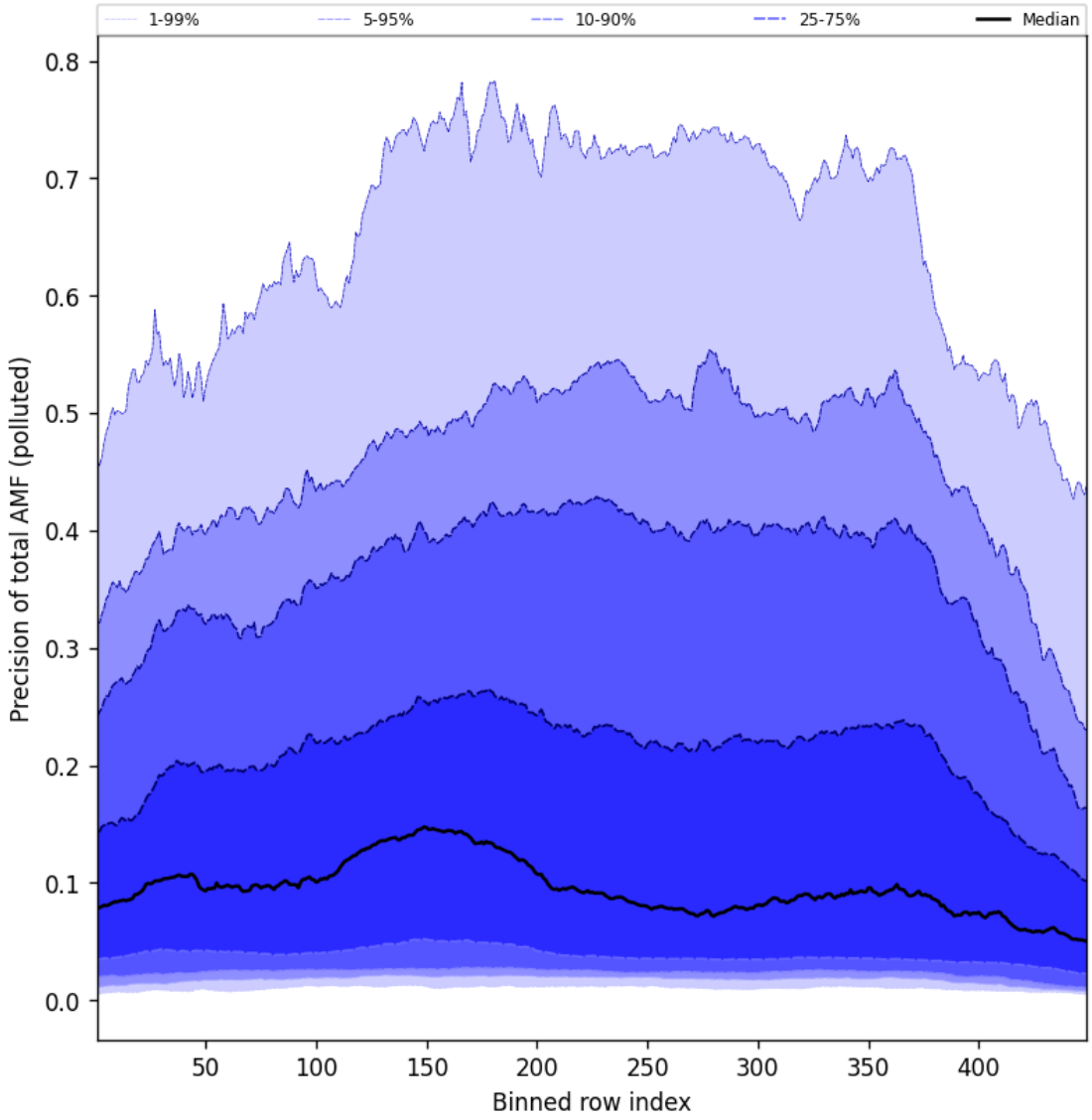

Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2024-12-31 to 2024-12-31

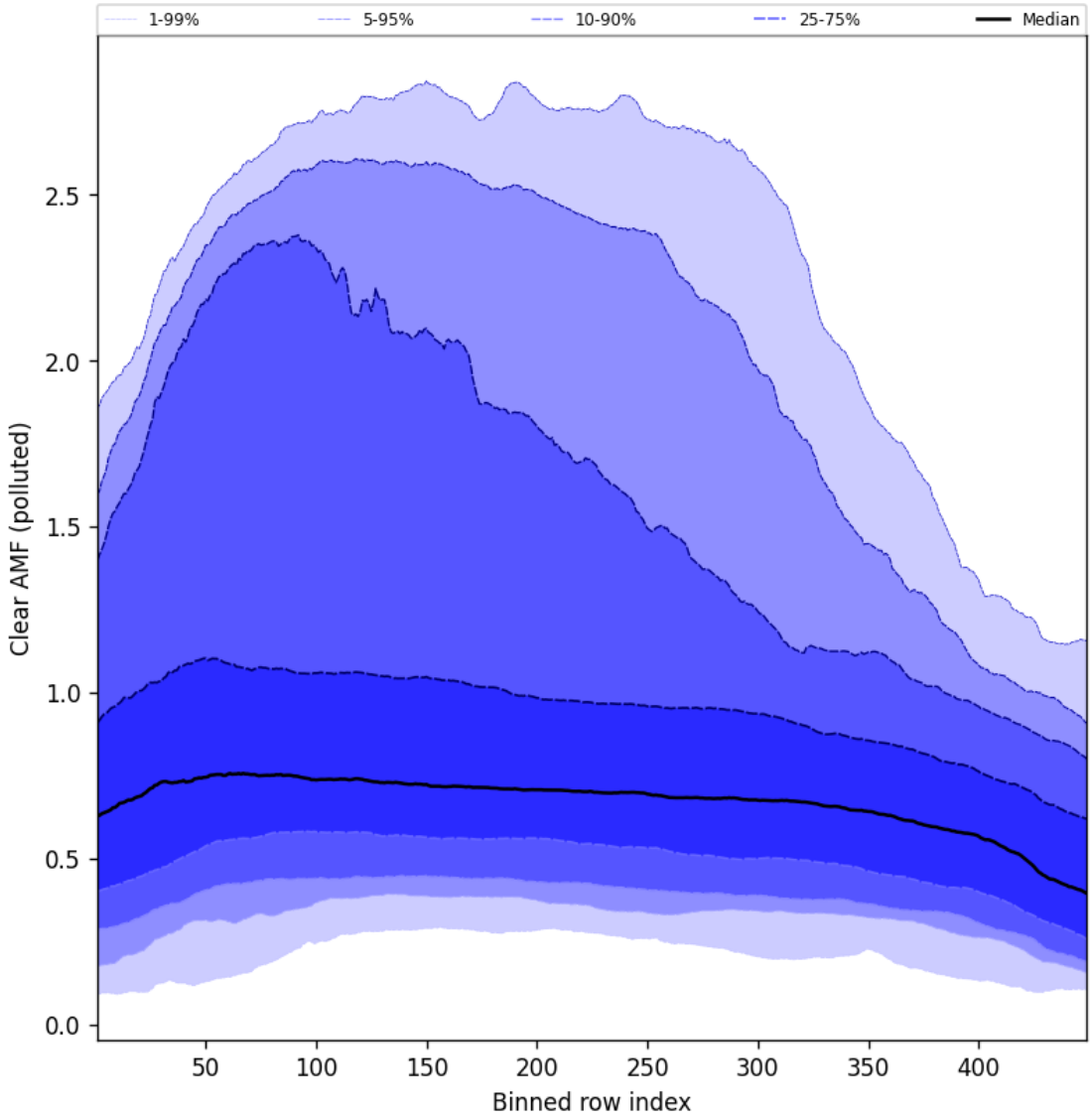

Figure 109: Along track statistics of “Clear AMF (polluted)” for 2024-12-31 to 2024-12-31

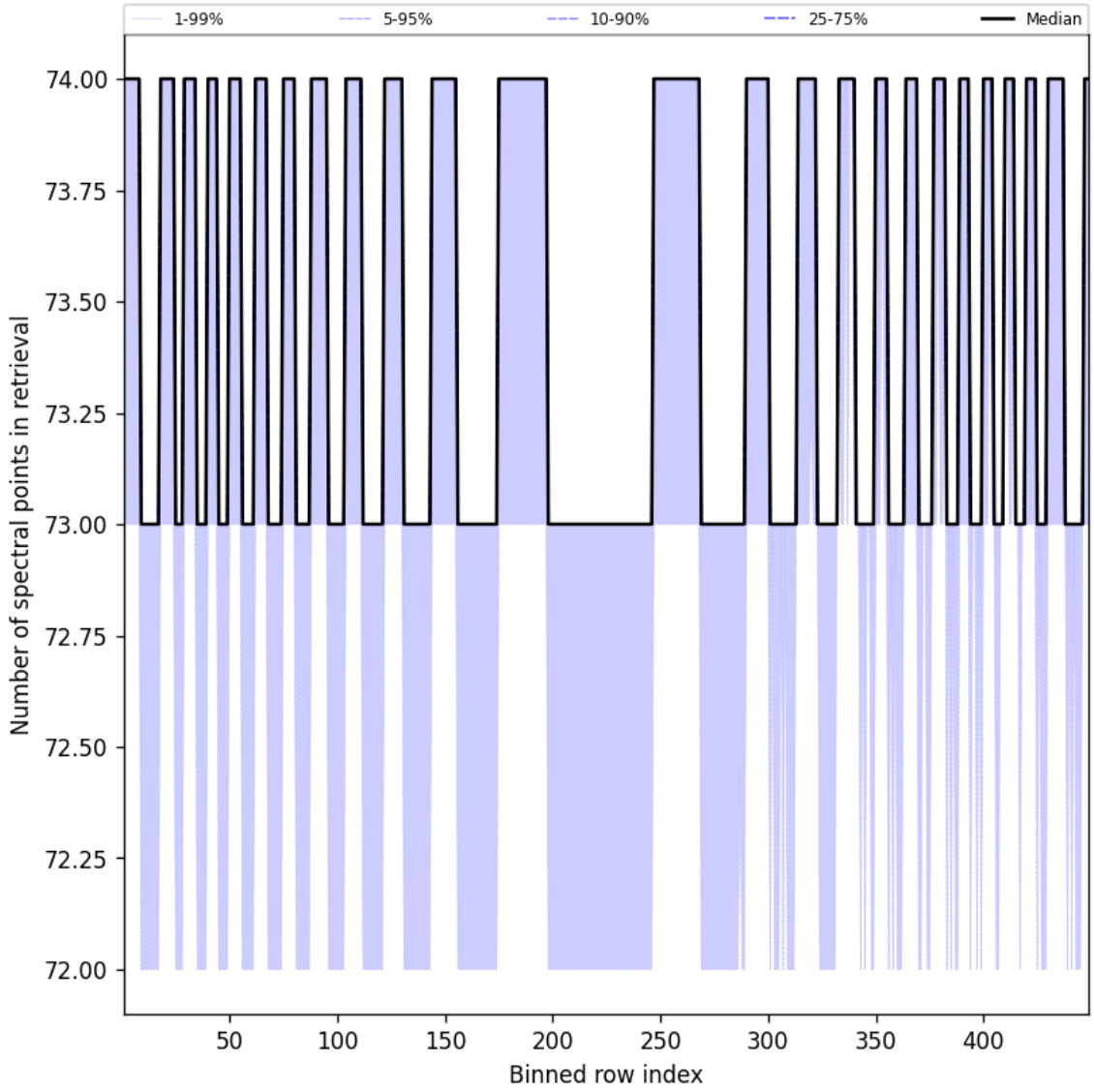

Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2024-12-31 to 2024-12-31

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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11 Copyright information of 'PyCAMA'

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