

PyCAMA report generated by tropl2-proc

tropl2-proc

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1 Short Introduction

1.1 The list of parameters

You may want to keep the list given in table 1 at hand when viewing the results.

2 Definitions

The averages shown here are *unweighed* averages:

$$\bar{x} = \frac{1}{N} \sum_{i=1}^N x_i \quad (1)$$

with N the number of observations in the dataset.

The spread of the measurements is indicated with the variance $V(x)$, or rather the standard deviation $\sigma(x) = \sqrt{V(x)}$.

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

We also report the more robust statistics median, minimum, maximum, various percentiles and inter quartile range.

The median m is the value of parameter x for which half of the observations of x is smaller than m :

$$P(x \leq m) = P(x \geq m) = \int_{-\infty}^m f(x) dx = \frac{1}{2} \quad (3)$$

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

The median is a special case of a percentile. Instead of 1/2 in equation 3, other threshold values can be used. We report results for 1 %, 5 %, 10 %, 15.9 %, 25 %, 75 %, 84.1 %, 90 %, 95 % and 99 %. The inter quartile range is the difference between the 75 % and 25 % percentiles. Similarly the minimum and maximum values correspond to the 0 % and 100 % percentiles respectively.

For normally distributed parameters the mean and median are the same, while the $\mu \pm \sigma$ values and the 15.9 % and 84.1 % percentiles coincide.

To get a measure for the relation of one variable $x_{(k)}$ with another $x_{(l)}$, we calculate the covariance matrix C_{kl} .

$$C_{kl} = C(x_{(k)}, x_{(l)}) = \frac{1}{N-1} \sum_{i=1}^N (x_{(k),i} - \bar{x}_{(k)})(x_{(l),i} - \bar{x}_{(l)}) \quad (4)$$

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

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

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

Table 1: Parameterlist and basic statistics for the analysis

Variable	mean $\pm \sigma$	Count	Mode	IQR	Median	Minimum	Maximum
qa value [1]	0.597 ± 0.422	17098704	0.995	0.850	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(3.201 \pm 128.108) \times 10^{-2}$	17098704	0.223	0.409	8.335×10^{-3}	-110	248
sulfurdioxide total vertical column precision [DU]	0.566 ± 0.962	17098704	0.122	0.355	0.308	3.704×10^{-2}	69.4
sulfurdioxide slant column density corrected [DU]	$(1.605 \pm 37.351) \times 10^{-2}$	17098704	0.242	0.342	7.958×10^{-3}	-36.0	216
sulfurdioxide slant column density cobra [DU]	$(1.579 \pm 34.130) \times 10^{-2}$	17098704	0.242	0.342	7.958×10^{-3}	-36.0	50.0
sulfurdioxide slant column density cobra precision [DU]	0.271 ± 0.113	17098704	0.213	0.100	0.236	8.385×10^{-2}	19.1
sulfurdioxide slant column density window1 [DU]	$(7.647 \pm 64.117) \times 10^{-2}$	17098704	0.125	0.716	8.062×10^{-2}	-125	83.2
sulfurdioxide slant column density window1 precision [DU]	0.271 ± 0.113	17098704	0.213	0.100	0.236	8.385×10^{-2}	19.1
sulfurdioxide slant column density corrected win1 [DU]	$(2.797 \pm 62.328) \times 10^{-2}$	17098704	2.500×10^{-2}	0.684	1.471×10^{-2}	-125	83.0
background so2 slant column offset window1 [DU]	$(-4.850 \pm 15.616) \times 10^{-2}$	17098704	-0.140	0.198	-9.292×10^{-2}	-0.760	2.02
sulfurdioxide slant column density window2 [DU]	1.08 ± 8.54	17098704	0.750	10.8	0.980	-995	830
sulfurdioxide slant column density window2 precision [DU]	7.76 ± 2.21	17098704	6.97	2.54	7.40	2.11	625
sulfurdioxide slant column density corrected win2 [DU]	0.141 ± 8.386	17098704	0.250	10.6	0.120	-994	831
background so2 slant column offset window2 [DU]	-0.937 ± 2.092	17098704	0.750	2.53	-0.512	-17.4	8.31
sulfurdioxide slant column density window3 [DU]	-7.07 ± 23.14	17098704	-8.40	28.6	-7.46	-828	213
sulfurdioxide slant column density window3 precision [DU]	26.7 ± 12.9	17098704	21.5	10.1	23.4	8.90	339
sulfurdioxide slant column density corrected win3 [DU]	-3.73 ± 22.35	17098704	-6.16	27.5	-3.71	-834	213
background so2 slant column offset window3 [DU]	3.34 ± 6.45	17098704	0.560	9.30	3.42	-20.8	23.3
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.21	17098704	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(3.834 \pm 9.380) \times 10^{-2}$	17098704	1.664×10^{-2}	2.365×10^{-2}	1.981×10^{-2}	3.725×10^{-4}	3.23
fitted radiance shift [nm]	$(-4.784 \pm 24.801) \times 10^{-4}$	17098704	-5.000×10^{-4}	1.685×10^{-3}	-5.394×10^{-4}	-7.478×10^{-2}	4.167×10^{-2}
fitted radiance squeeze [1]	$(-5.130 \pm 18.069) \times 10^{-5}$	17098704	-3.000×10^{-5}	2.159×10^{-4}	-4.272×10^{-5}	-2.053×10^{-2}	2.284×10^{-2}
fitted root mean square [1]	$(1.201 \pm 0.466) \times 10^{-3}$	17098704	9.750×10^{-4}	4.413×10^{-4}	1.076×10^{-3}	3.192×10^{-4}	0.110
sulfurdioxide total air mass factor polluted [1]	0.943 ± 0.633	17098704	0.620	0.700	0.775	5.000×10^{-2}	3.18
sulfurdioxide total air mass factor polluted precision [1]	0.149 ± 0.168	17098704	3.500×10^{-2}	0.176	8.550×10^{-2}	2.500×10^{-3}	2.01
sulfurdioxide clear air mass factor polluted [1]	0.785 ± 0.521	17098704	0.580	0.401	0.653	2.455×10^{-2}	3.19
number of spectral points in retrieval [1]	73.4 ± 0.5	17098704	73.0	1.000	73.0	52.0	74.0

Table 2: Percentile ranges

Variable	1 %	5 %	10 %	15.9 %	25 %	75 %	84.1 %	90 %	95 %	99 %
qa value [1]	0.0	0.0	2.000×10^{-2}	6.000×10^{-2}	0.150	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	-2.96	-0.925	-0.531	-0.343	-0.192	0.216	0.378	0.585	1.03	3.41
sulfurdioxide total vertical column precision [DU]	7.983×10^{-2}	0.101	0.120	0.144	0.187	0.542	0.774	1.10	1.82	4.87
sulfurdioxide slant column density corrected [DU]	-0.777	-0.452	-0.331	-0.249	-0.162	0.180	0.272	0.360	0.495	0.901
sulfurdioxide slant column density cobra [DU]	-0.777	-0.452	-0.331	-0.249	-0.162	0.180	0.272	0.360	0.495	0.901
sulfurdioxide slant column density cobra precision [DU]	0.141	0.165	0.178	0.189	0.202	0.302	0.359	0.416	0.492	0.684
sulfurdioxide slant column density window1 [DU]	-1.56	-0.908	-0.650	-0.472	-0.282	0.434	0.615	0.785	1.04	1.73
sulfurdioxide slant column density window1 precision [DU]	0.141	0.165	0.178	0.189	0.202	0.302	0.359	0.416	0.492	0.684
sulfurdioxide slant column density corrected win1 [DU]	-1.49	-0.893	-0.660	-0.498	-0.325	0.360	0.542	0.716	0.981	1.73
background so2 slant column offset window1 [DU]	-0.335	-0.242	-0.205	-0.178	-0.152	4.588×10^{-2}	0.122	0.184	0.248	0.374
sulfurdioxide slant column density window2 [DU]	-19.1	-12.6	-9.40	-7.03	-4.37	6.39	9.12	11.6	15.0	22.6
sulfurdioxide slant column density window2 precision [DU]	4.21	4.96	5.42	5.80	6.28	8.82	9.70	10.6	11.8	14.4
sulfurdioxide slant column density corrected win2 [DU]	-20.1	-13.4	-10.2	-7.81	-5.16	5.41	8.07	10.5	13.7	20.8
background so2 slant column offset window2 [DU]	-7.18	-4.88	-3.72	-2.89	-2.01	0.512	0.801	1.04	1.38	3.04
sulfurdioxide slant column density window3 [DU]	-64.8	-44.1	-35.0	-28.5	-21.5	7.17	14.9	22.0	31.5	50.4
sulfurdioxide slant column density window3 precision [DU]	13.1	15.0	16.4	17.6	19.3	29.4	34.0	39.4	50.8	81.9
sulfurdioxide slant column density corrected win3 [DU]	-60.8	-40.3	-30.9	-24.4	-17.4	10.1	17.3	23.8	32.7	51.1
background so2 slant column offset window3 [DU]	-11.4	-7.55	-5.24	-3.36	-1.09	8.21	10.3	11.9	13.4	15.9
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]	1.647×10^{-3}	4.080×10^{-3}	6.674×10^{-3}	9.192×10^{-3}	1.178×10^{-2}	3.543×10^{-2}	4.876×10^{-2}	6.444×10^{-2}	0.104	0.414
fitted radiance shift [nm]	-8.004×10^{-3}	-4.031×10^{-3}	-2.662×10^{-3}	-1.941×10^{-3}	-1.369×10^{-3}	3.165×10^{-4}	9.984×10^{-4}	1.863×10^{-3}	3.368×10^{-3}	7.462×10^{-3}
fitted radiance squeeze [1]	-5.385×10^{-4}	-3.530×10^{-4}	-2.725×10^{-4}	-2.158×10^{-4}	-1.552×10^{-4}	6.065×10^{-5}	1.113×10^{-4}	1.573×10^{-4}	2.219×10^{-4}	3.731×10^{-4}
fitted root mean square [1]	5.929×10^{-4}	7.146×10^{-4}	7.864×10^{-4}	8.424×10^{-4}	9.097×10^{-4}	1.351×10^{-3}	1.568×10^{-3}	1.793×10^{-3}	2.113×10^{-3}	2.896×10^{-3}
sulfurdioxide total air mass factor polluted [1]	6.148×10^{-2}	0.186	0.296	0.390	0.501	1.20	1.57	1.98	2.37	2.70
sulfurdioxide total air mass factor polluted precision [1]	9.171×10^{-3}	1.634×10^{-2}	2.245×10^{-2}	2.771×10^{-2}	3.536×10^{-2}	0.211	0.286	0.360	0.464	0.766
sulfurdioxide clear air mass factor polluted [1]	0.176	0.286	0.362	0.419	0.485	0.885	1.02	1.24	2.20	2.80
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]	0.707 ± 0.396	5837373	0.690	1.000	0.0	1.000	0.310	1.000
sulfurdioxide total vertical column [DU]	$(6.423 \pm 194.095) \times 10^{-2}$	5837373	0.620	1.540×10^{-2}	-103	248	-0.287	0.333
sulfurdioxide total vertical column precision [DU]	0.896 ± 1.413	5837373	0.626	0.444	4.711×10^{-2}	40.8	0.275	0.901
sulfurdioxide slant column density corrected [DU]	$(2.333 \pm 39.783) \times 10^{-2}$	5837373	0.397	1.123×10^{-2}	-6.87	45.2	-0.185	0.212
sulfurdioxide slant column density cobra [DU]	$(2.327 \pm 39.453) \times 10^{-2}$	5837373	0.397	1.123×10^{-2}	-6.87	13.7	-0.185	0.212
sulfurdioxide slant column density cobra precision [DU]	0.318 ± 0.134	5837373	0.152	0.279	8.617×10^{-2}	5.71	0.225	0.377
sulfurdioxide slant column density window1 [DU]	0.148 ± 0.722	5837373	0.795	0.147	-15.7	15.8	-0.251	0.544
sulfurdioxide slant column density window1 precision [DU]	0.318 ± 0.134	5837373	0.152	0.279	8.617×10^{-2}	5.71	0.225	0.377
sulfurdioxide slant column density corrected win1 [DU]	$(5.262 \pm 72.246) \times 10^{-2}$	5837373	0.789	2.815×10^{-2}	-15.7	15.6	-0.359	0.430
background so2 slant column offset window1 [DU]	$(-9.585 \pm 12.775) \times 10^{-2}$	5837373	0.111	-0.110	-0.760	2.02	-0.164	-5.251×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.50 ± 9.71	5837373	12.4	1.20	-81.8	142	-4.86	7.53
sulfurdioxide slant column density window2 precision [DU]	8.80 ± 2.25	5837373	2.82	8.51	2.48	90.0	7.24	10.1
sulfurdioxide slant column density corrected win2 [DU]	0.231 ± 9.463	5837373	12.1	0.179	-81.4	143	-5.86	6.26
background so2 slant column offset window2 [DU]	-1.26 ± 2.45	5837373	2.93	-0.418	-17.4	7.83	-2.54	0.391
sulfurdioxide slant column density window3 [DU]	-8.86 ± 26.03	5837373	32.9	-8.33	-197	189	-25.0	7.93
sulfurdioxide slant column density window3 precision [DU]	30.2 ± 12.8	5837373	10.0	27.3	9.36	229	23.1	33.1
sulfurdioxide slant column density corrected win3 [DU]	-4.03 ± 25.64	5837373	32.5	-3.73	-200	187	-20.0	12.4
background so2 slant column offset window3 [DU]	4.83 ± 5.27	5837373	8.14	3.77	-16.4	21.6	0.788	8.93
sulfurdioxide slant column cobra flag [1]	1.96 ± 0.27	5837373	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(6.925 \pm 15.101) \times 10^{-2}$	5837373	4.643×10^{-2}	2.987×10^{-2}	8.684×10^{-4}	3.23	1.620×10^{-2}	6.263×10^{-2}
fitted radiance shift [nm]	$(-2.587 \pm 25.821) \times 10^{-4}$	5837373	1.728×10^{-3}	-2.889×10^{-4}	-4.233×10^{-2}	3.890×10^{-2}	-1.138×10^{-3}	5.896×10^{-4}
fitted radiance squeeze [1]	$(-4.223 \pm 183.483) \times 10^{-6}$	5837373	2.152×10^{-4}	-3.386×10^{-6}	-1.047×10^{-2}	2.709×10^{-3}	-1.113×10^{-4}	1.039×10^{-4}
fitted root mean square [1]	$(1.385 \pm 0.556) \times 10^{-3}$	5837373	6.090×10^{-4}	1.232×10^{-3}	3.619×10^{-4}	2.463×10^{-2}	1.012×10^{-3}	1.621×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.681 ± 0.379	5837373	0.513	0.646	5.000×10^{-2}	2.87	0.395	0.908
sulfurdioxide total air mass factor polluted precision [1]	$(9.023 \pm 12.099) \times 10^{-2}$	5837373	7.861×10^{-2}	4.623×10^{-2}	2.500×10^{-3}	1.57	2.764×10^{-2}	0.106
sulfurdioxide clear air mass factor polluted [1]	0.624 ± 0.263	5837373	0.412	0.622	2.455×10^{-2}	1.79	0.413	0.825
number of spectral points in retrieval [1]	73.5 ± 0.5	5837373	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]	0.539 ± 0.424	11261331	0.890	0.450	0.0	1.000	0.110	1.000
sulfurdioxide total vertical column [DU]	$(1.530 \pm 73.367) \times 10^{-2}$	11261331	0.336	6.279×10^{-3}	-110	176	-0.160	0.176
sulfurdioxide total vertical column precision [DU]	0.395 ± 0.535	11261331	0.277	0.257	3.704×10^{-2}	69.4	0.154	0.431
sulfurdioxide slant column density corrected [DU]	$(1.228 \pm 36.021) \times 10^{-2}$	11261331	0.318	6.591×10^{-3}	-36.0	216	-0.152	0.167
sulfurdioxide slant column density cobra [DU]	$(1.192 \pm 31.006) \times 10^{-2}$	11261331	0.318	6.591×10^{-3}	-36.0	50.0	-0.152	0.167
sulfurdioxide slant column density cobra precision [DU]	0.247 ± 0.091	11261331	7.200×10^{-2}	0.223	8.385×10^{-2}	19.1	0.194	0.266
sulfurdioxide slant column density window1 [DU]	$(3.915 \pm 59.128) \times 10^{-2}$	11261331	0.678	5.074×10^{-2}	-125	83.2	-0.296	0.382
sulfurdioxide slant column density window1 precision [DU]	0.247 ± 0.091	11261331	7.200×10^{-2}	0.223	8.385×10^{-2}	19.1	0.194	0.266
sulfurdioxide slant column density corrected win1 [DU]	$(1.519 \pm 56.464) \times 10^{-2}$	11261331	0.639	8.939×10^{-3}	-125	83.0	-0.309	0.330
background so2 slant column offset window1 [DU]	$(-2.396 \pm 16.371) \times 10^{-2}$	11261331	0.243	-6.946×10^{-2}	-0.610	0.963	-0.149	9.455×10^{-2}
sulfurdioxide slant column density window2 [DU]	0.863 ± 7.860	11261331	10.0	0.887	-995	830	-4.15	5.90
sulfurdioxide slant column density window2 precision [DU]	7.22 ± 1.99	11261331	2.09	6.95	2.11	625	5.99	8.08
sulfurdioxide slant column density corrected win2 [DU]	$(9.483 \pm 776.957) \times 10^{-2}$	11261331	9.90	9.496×10^{-2}	-994	831	-4.86	5.04
background so2 slant column offset window2 [DU]	-0.768 ± 1.858	11261331	2.45	-0.568	-14.4	8.31	-1.86	0.594
sulfurdioxide slant column density window3 [DU]	-6.14 ± 21.43	11261331	26.8	-7.10	-828	213	-20.0	6.81
sulfurdioxide slant column density window3 precision [DU]	24.9 ± 12.6	11261331	8.06	21.5	8.90	339	18.2	26.2
sulfurdioxide slant column density corrected win3 [DU]	-3.57 ± 20.43	11261331	25.4	-3.70	-834	213	-16.3	9.11
background so2 slant column offset window3 [DU]	2.56 ± 6.86	11261331	10.8	3.14	-20.8	23.3	-2.89	7.87
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.18	11261331	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.232 \pm 2.803) \times 10^{-2}$	11261331	1.762×10^{-2}	1.701×10^{-2}	3.725×10^{-4}	1.16	1.014×10^{-2}	2.776×10^{-2}
fitted radiance shift [nm]	$(-5.922 \pm 24.177) \times 10^{-4}$	11261331	1.605×10^{-3}	-6.636×10^{-4}	-7.478×10^{-2}	4.167×10^{-2}	-1.452×10^{-3}	1.528×10^{-4}
fitted radiance squeeze [1]	$(-7.571 \pm 17.430) \times 10^{-5}$	11261331	2.137×10^{-4}	-6.267×10^{-5}	-2.053×10^{-2}	2.284×10^{-2}	-1.759×10^{-4}	3.779×10^{-5}
fitted root mean square [1]	$(1.106 \pm 0.379) \times 10^{-3}$	11261331	3.462×10^{-4}	1.018×10^{-3}	3.192×10^{-4}	0.110	8.766×10^{-4}	1.223×10^{-3}
sulfurdioxide total air mass factor polluted [1]	1.08 ± 0.69	11261331	0.917	0.869	5.000×10^{-2}	3.18	0.560	1.48
sulfurdioxide total air mass factor polluted precision [1]	0.180 ± 0.180	11261331	0.217	0.129	4.497×10^{-3}	2.01	4.284×10^{-2}	0.259
sulfurdioxide clear air mass factor polluted [1]	0.868 ± 0.597	11261331	0.427	0.668	0.116	3.19	0.511	0.938
number of spectral points in retrieval [1]	73.4 ± 0.5	11261331	1.000	73.0	52.0	74.0	73.0	74.0

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

Variable	mean $\pm \sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.642 ± 0.414	12043025	0.800	1.000	0.0	1.000	0.200	1.000
sulfurdioxide total vertical column [DU]	$(2.371 \pm 105.942) \times 10^{-2}$	12043025	0.429	8.323×10^{-3}	-82.7	86.8	-0.204	0.225
sulfurdioxide total vertical column precision [DU]	0.531 ± 0.795	12043025	0.318	0.314	4.921×10^{-2}	31.3	0.209	0.527
sulfurdioxide slant column density corrected [DU]	$(1.180 \pm 29.488) \times 10^{-2}$	12043025	0.327	6.984×10^{-3}	-27.8	45.2	-0.155	0.171
sulfurdioxide slant column density cobra [DU]	$(1.179 \pm 29.414) \times 10^{-2}$	12043025	0.327	6.984×10^{-3}	-27.8	13.8	-0.155	0.171
sulfurdioxide slant column density cobra precision [DU]	0.257 ± 0.102	12043025	7.927×10^{-2}	0.226	8.780×10^{-2}	10.3	0.197	0.276
sulfurdioxide slant column density window1 [DU]	0.104 ± 0.578	12043025	0.672	0.106	-125	36.5	-0.232	0.439
sulfurdioxide slant column density window1 precision [DU]	0.257 ± 0.102	12043025	7.927×10^{-2}	0.226	8.780×10^{-2}	10.3	0.197	0.276
sulfurdioxide slant column density corrected win1 [DU]	$(3.196 \pm 56.739) \times 10^{-2}$	12043025	0.653	2.306×10^{-2}	-125	36.3	-0.301	0.352
background so2 slant column offset window1 [DU]	$(-7.198 \pm 13.391) \times 10^{-2}$	12043025	0.164	-0.103	-0.760	2.02	-0.157	6.615×10^{-3}
sulfurdioxide slant column density window2 [DU]	0.723 ± 8.254	12043025	10.5	0.655	-664	707	-4.57	5.91
sulfurdioxide slant column density window2 precision [DU]	7.57 ± 2.03	12043025	2.36	7.27	2.11	449	6.21	8.56
sulfurdioxide slant column density corrected win2 [DU]	$(7.527 \pm 816.226) \times 10^{-2}$	12043025	10.4	7.159×10^{-2}	-663	707	-5.13	5.26
background so2 slant column offset window2 [DU]	-0.648 ± 1.878	12043025	2.11	-0.286	-17.4	8.31	-1.54	0.569
sulfurdioxide slant column density window3 [DU]	-4.07 ± 22.62	12043025	28.4	-4.70	-828	207	-18.5	9.95
sulfurdioxide slant column density window3 precision [DU]	26.3 ± 12.2	12043025	9.16	23.2	8.90	339	19.5	28.7
sulfurdioxide slant column density corrected win3 [DU]	-1.77 ± 21.76	12043025	27.4	-2.13	-834	207	-15.6	11.8
background so2 slant column offset window3 [DU]	2.30 ± 5.90	12043025	8.13	2.50	-20.8	23.3	-1.54	6.59
sulfurdioxide slant column cobra flag [1]	1.99 ± 0.15	12043025	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.740 \pm 3.812) \times 10^{-2}$	12043025	1.913×10^{-2}	1.949×10^{-2}	1.500×10^{-3}	2.40	1.267×10^{-2}	3.180×10^{-2}
fitted radiance shift [nm]	$(-4.052 \pm 23.982) \times 10^{-4}$	12043025	1.742×10^{-3}	-4.369×10^{-4}	-4.945×10^{-2}	3.374×10^{-2}	-1.305×10^{-3}	4.370×10^{-4}
fitted radiance squeeze [1]	$(-3.572 \pm 16.253) \times 10^{-5}$	12043025	1.952×10^{-4}	-3.017×10^{-5}	-1.225×10^{-2}	1.379×10^{-2}	-1.303×10^{-4}	6.496×10^{-5}
fitted root mean square [1]	$(1.133 \pm 0.418) \times 10^{-3}$	12043025	3.555×10^{-4}	1.027×10^{-3}	3.482×10^{-4}	5.735×10^{-2}	8.837×10^{-4}	1.239×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.819 ± 0.453	12043025	0.545	0.747	5.000×10^{-2}	2.73	0.500	1.05
sulfurdioxide total air mass factor polluted precision [1]	0.131 ± 0.134	12043025	0.154	7.213×10^{-2}	3.034×10^{-3}	1.47	3.582×10^{-2}	0.190
sulfurdioxide clear air mass factor polluted [1]	0.659 ± 0.237	12043025	0.324	0.627	6.410×10^{-2}	2.72	0.484	0.808
number of spectral points in retrieval [1]	73.5 ± 0.5	12043025	1.000	73.0	70.0	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]	0.479 ± 0.420	4504134	0.920	0.330	0.0	1.000	8.000×10^{-2}	1.000
sulfurdioxide total vertical column [DU]	$(4.755 \pm 153.077) \times 10^{-2}$	4504134	0.334	7.730×10^{-3}	-95.1	176	-0.154	0.179
sulfurdioxide total vertical column precision [DU]	0.591 ± 1.156	4504134	0.431	0.262	3.704×10^{-2}	69.4	0.123	0.554
sulfurdioxide slant column density corrected [DU]	$(2.555 \pm 51.857) \times 10^{-2}$	4504134	0.386	1.042×10^{-2}	-8.78	216	-0.181	0.205
sulfurdioxide slant column density cobra [DU]	$(2.465 \pm 43.383) \times 10^{-2}$	4504134	0.386	1.042×10^{-2}	-8.78	50.0	-0.181	0.205
sulfurdioxide slant column density cobra precision [DU]	0.304 ± 0.129	4504134	0.127	0.271	8.385×10^{-2}	19.1	0.222	0.349
sulfurdioxide slant column density window1 [DU]	$(-4.069 \pm 770.336) \times 10^{-3}$	4504134	0.838	-8.730×10^{-3}	-93.4	83.2	-0.434	0.404
sulfurdioxide slant column density window1 precision [DU]	0.304 ± 0.129	4504134	0.127	0.271	8.385×10^{-2}	19.1	0.222	0.349
sulfurdioxide slant column density corrected win1 [DU]	$(1.348 \pm 74.089) \times 10^{-2}$	4504134	0.775	-1.328×10^{-2}	-93.4	83.0	-0.394	0.380
background so2 slant column offset window1 [DU]	$(1.755 \pm 19.082) \times 10^{-2}$	4504134	0.320	-3.526×10^{-2}	-0.648	1.97	-0.137	0.183
sulfurdioxide slant column density window2 [DU]	1.98 ± 9.09	4504134	11.3	1.89	-995	830	-3.73	7.57
sulfurdioxide slant column density window2 precision [DU]	8.19 ± 2.53	4504134	2.96	7.76	2.24	625	6.48	9.44
sulfurdioxide slant column density corrected win2 [DU]	0.307 ± 8.861	4504134	11.0	0.249	-994	831	-5.22	5.77
background so2 slant column offset window2 [DU]	-1.67 ± 2.36	4504134	3.55	-1.49	-17.4	8.31	-3.28	0.278
sulfurdioxide slant column density window3 [DU]	-14.5 ± 22.6	4504134	27.1	-14.2	-276	213	-27.8	-0.719
sulfurdioxide slant column density window3 precision [DU]	27.3 ± 14.4	4504134	12.0	23.6	9.43	272	18.5	30.6
sulfurdioxide slant column density corrected win3 [DU]	-8.40 ± 22.86	4504134	27.4	-7.45	-280	213	-21.6	5.83
background so2 slant column offset window3 [DU]	6.06 ± 7.03	4504134	11.3	7.94	-20.8	23.3	0.536	11.9
sulfurdioxide slant column cobra flag [1]	1.95 ± 0.32	4504134	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(5.807 \pm 14.662) \times 10^{-2}$	4504134	4.199×10^{-2}	2.001×10^{-2}	3.725×10^{-4}	3.23	7.471×10^{-3}	4.946×10^{-2}
fitted radiance shift [nm]	$(-6.882 \pm 25.946) \times 10^{-4}$	4504134	1.402×10^{-3}	-7.967×10^{-4}	-7.478×10^{-2}	4.167×10^{-2}	-1.470×10^{-3}	-6.740×10^{-5}
fitted radiance squeeze [1]	$(-9.734 \pm 21.499) \times 10^{-5}$	4504134	2.706×10^{-4}	-9.472×10^{-5}	-2.053×10^{-2}	2.284×10^{-2}	-2.316×10^{-4}	3.896×10^{-5}
fitted root mean square [1]	$(1.370 \pm 0.525) \times 10^{-3}$	4504134	5.561×10^{-4}	1.254×10^{-3}	3.192×10^{-4}	0.110	1.025×10^{-3}	1.581×10^{-3}
sulfurdioxide total air mass factor polluted [1]	1.30 ± 0.87	4504134	1.68	1.03	5.000×10^{-2}	3.18	0.535	2.22
sulfurdioxide total air mass factor polluted precision [1]	0.201 ± 0.229	4504134	0.237	0.134	2.500×10^{-3}	2.01	3.531×10^{-2}	0.273
sulfurdioxide clear air mass factor polluted [1]	1.14 ± 0.83	4504134	1.11	0.826	2.455×10^{-2}	3.19	0.513	1.62
number of spectral points in retrieval [1]	73.4 ± 0.5	4504134	1.000	73.0	52.0	74.0	73.0	74.0

3 Granule outlines

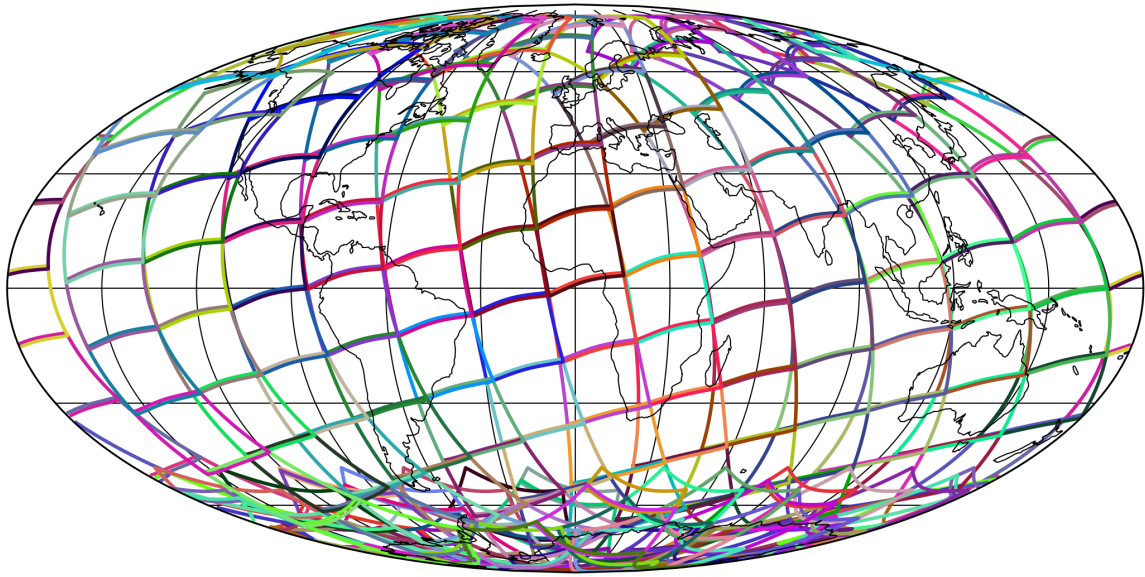


Figure 1: Outline of the granules.

4 Input data monitoring

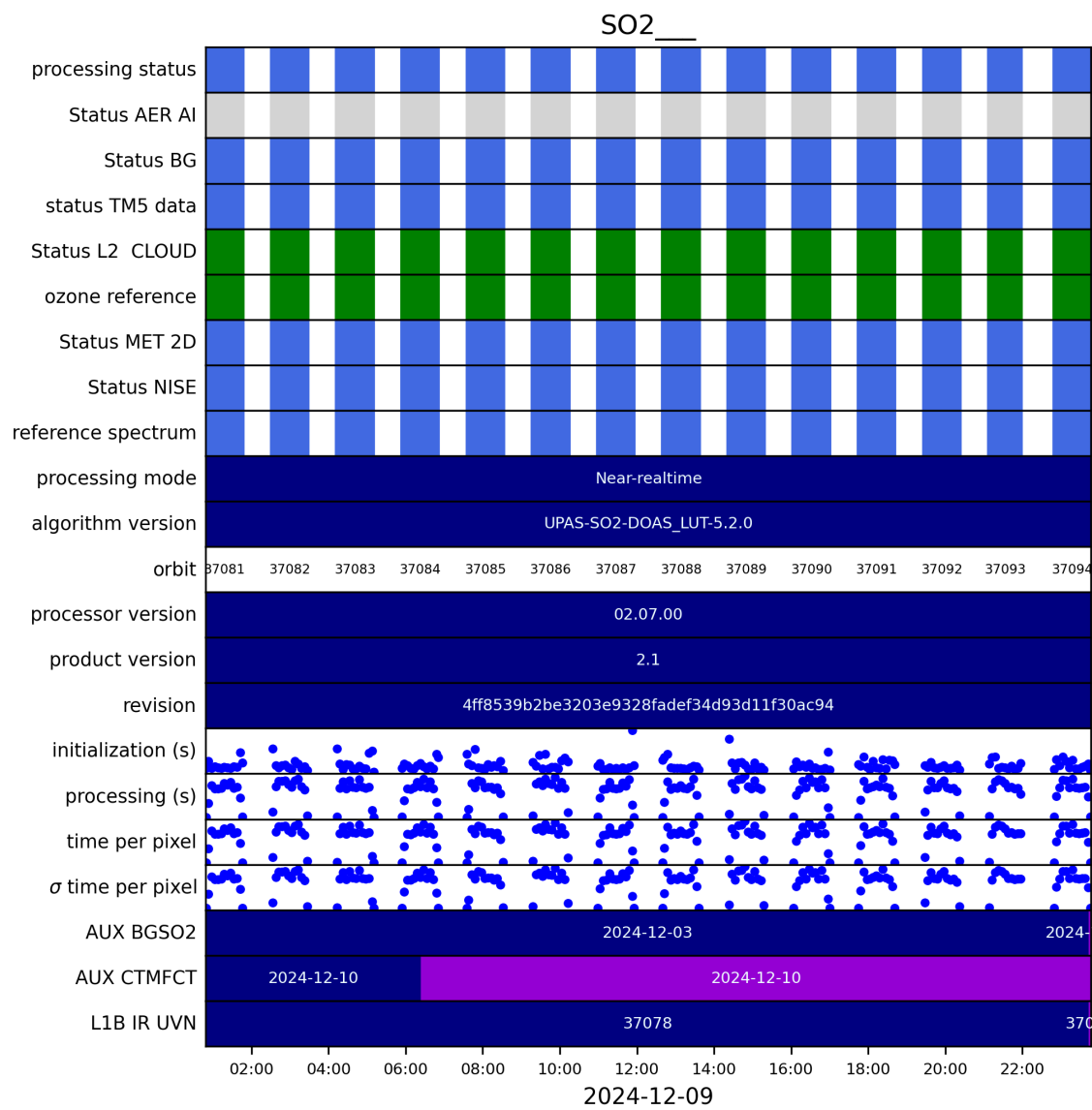


Figure 2: Input data per granule

5 Warnings and errors

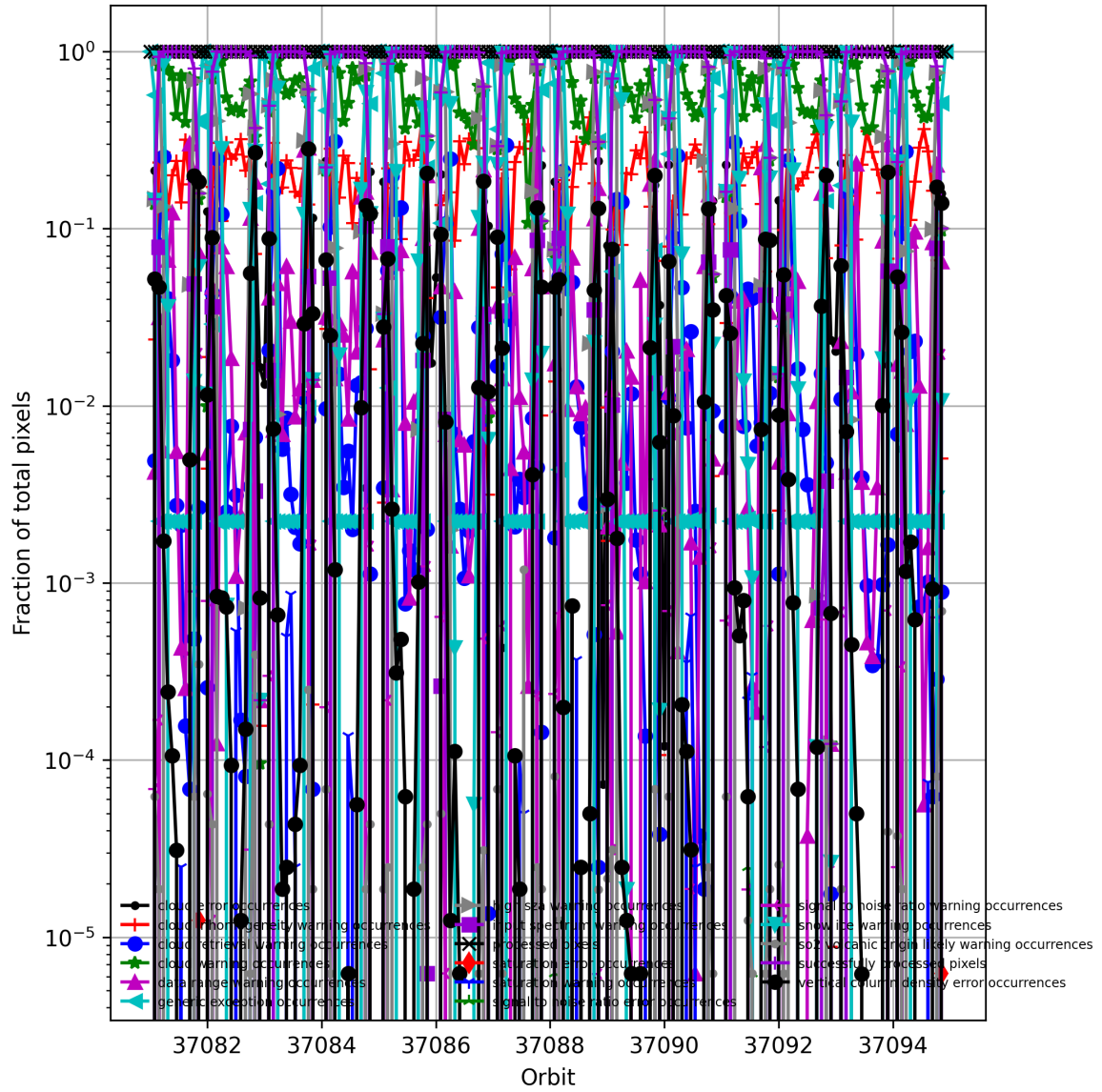


Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

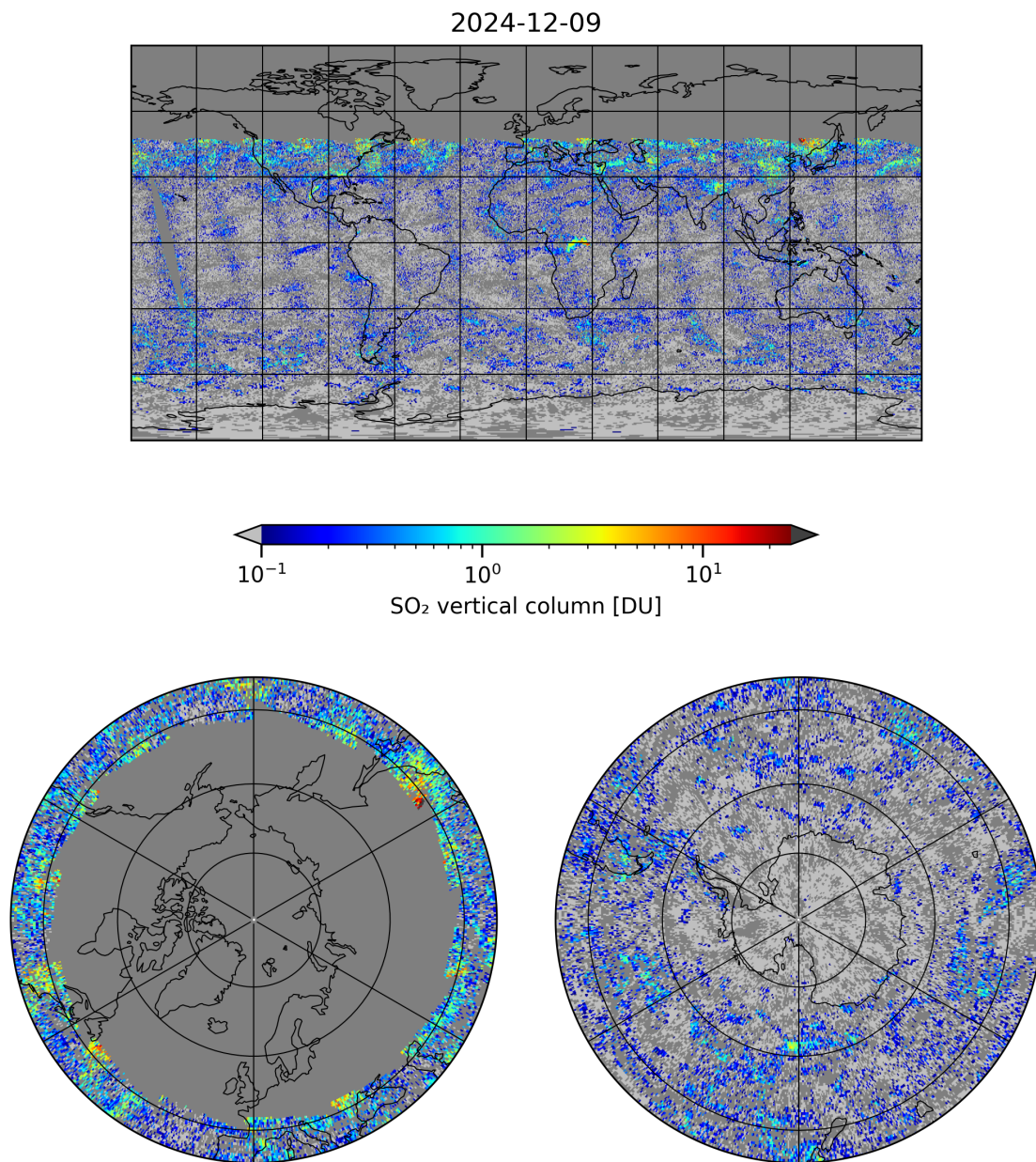


Figure 4: Map of “SO₂ vertical column” for 2024-12-09 to 2024-12-09

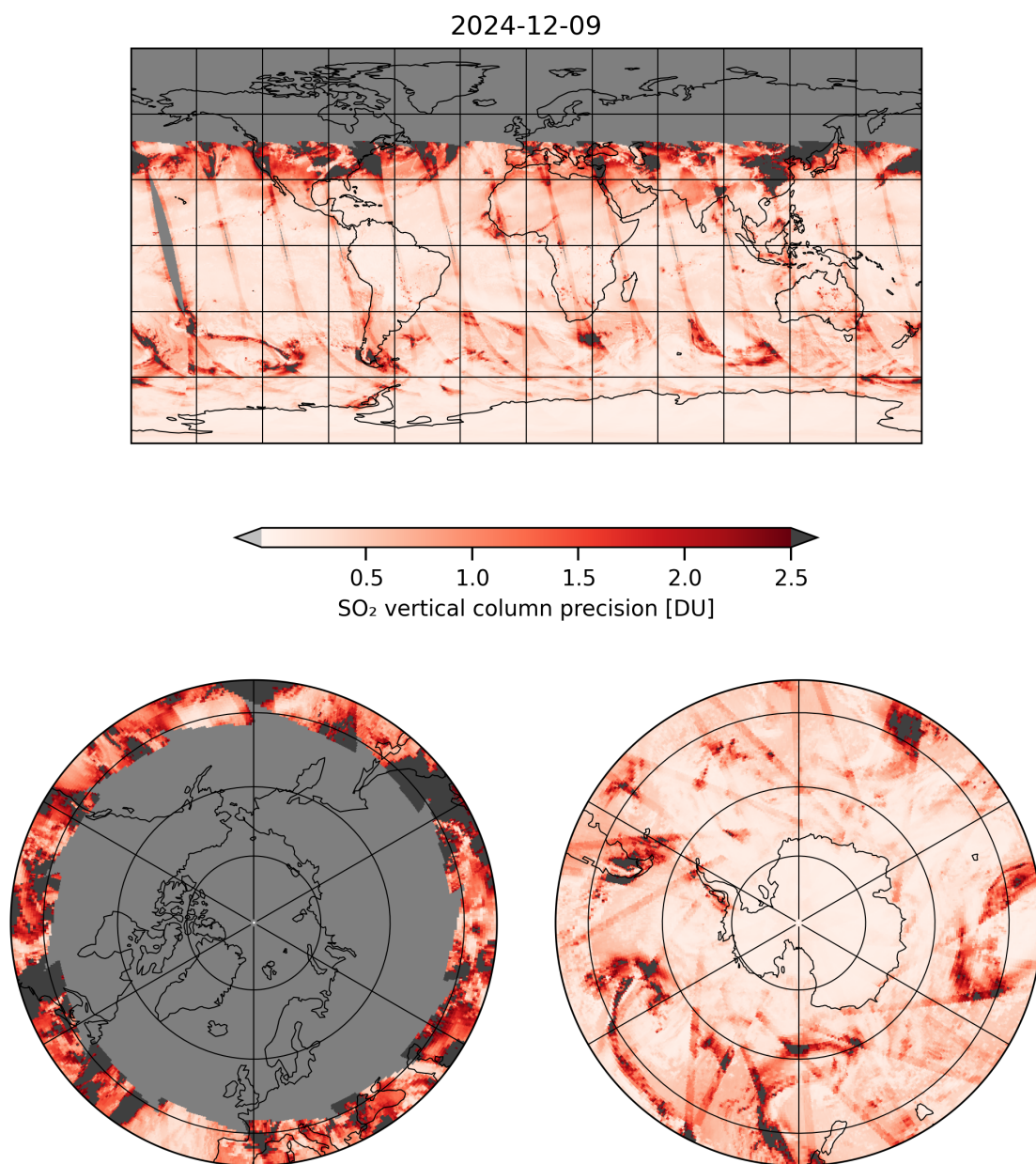


Figure 5: Map of “SO₂ vertical column precision” for 2024-12-09 to 2024-12-09

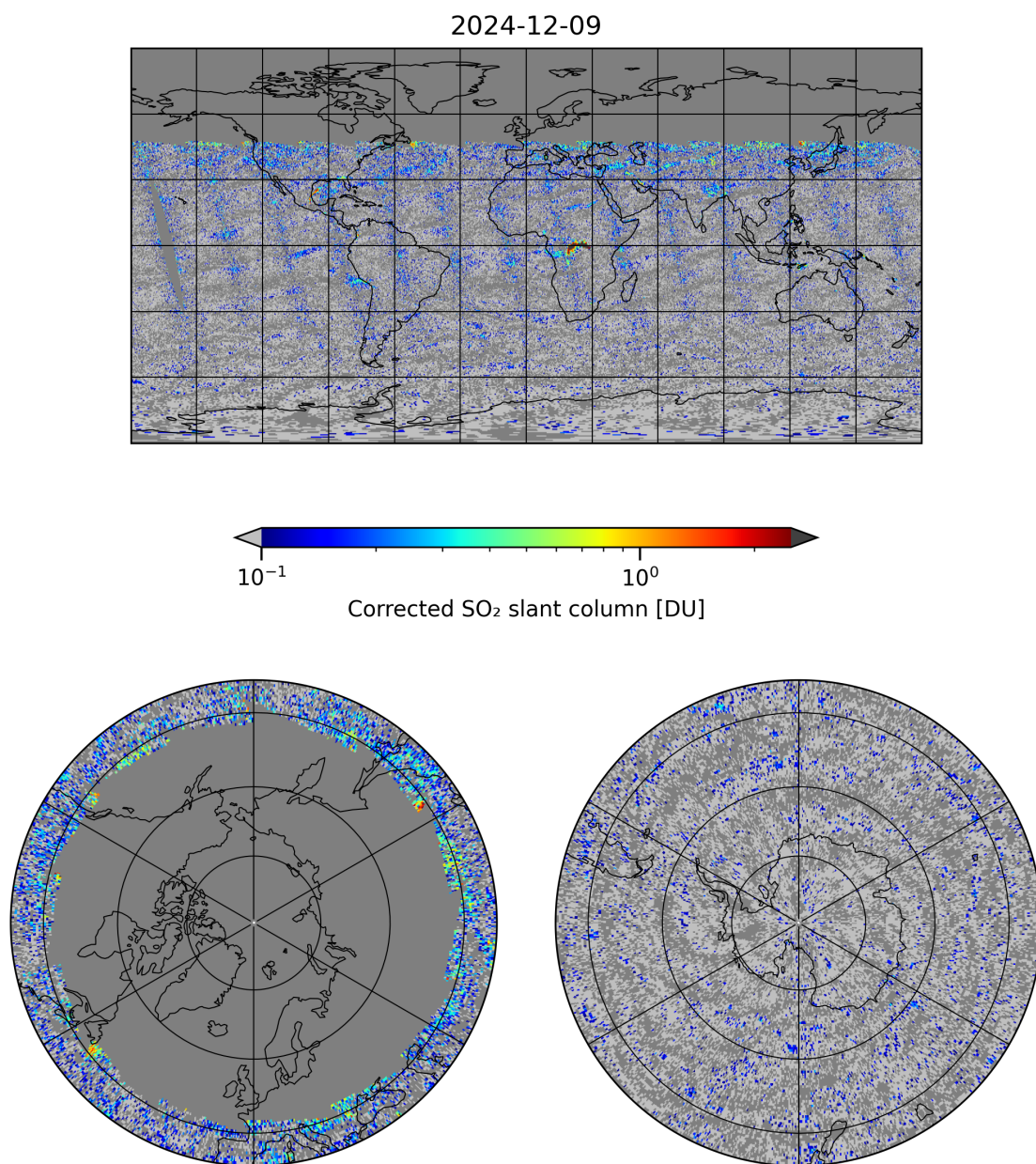


Figure 6: Map of “Corrected SO₂ slant column” for 2024-12-09 to 2024-12-09

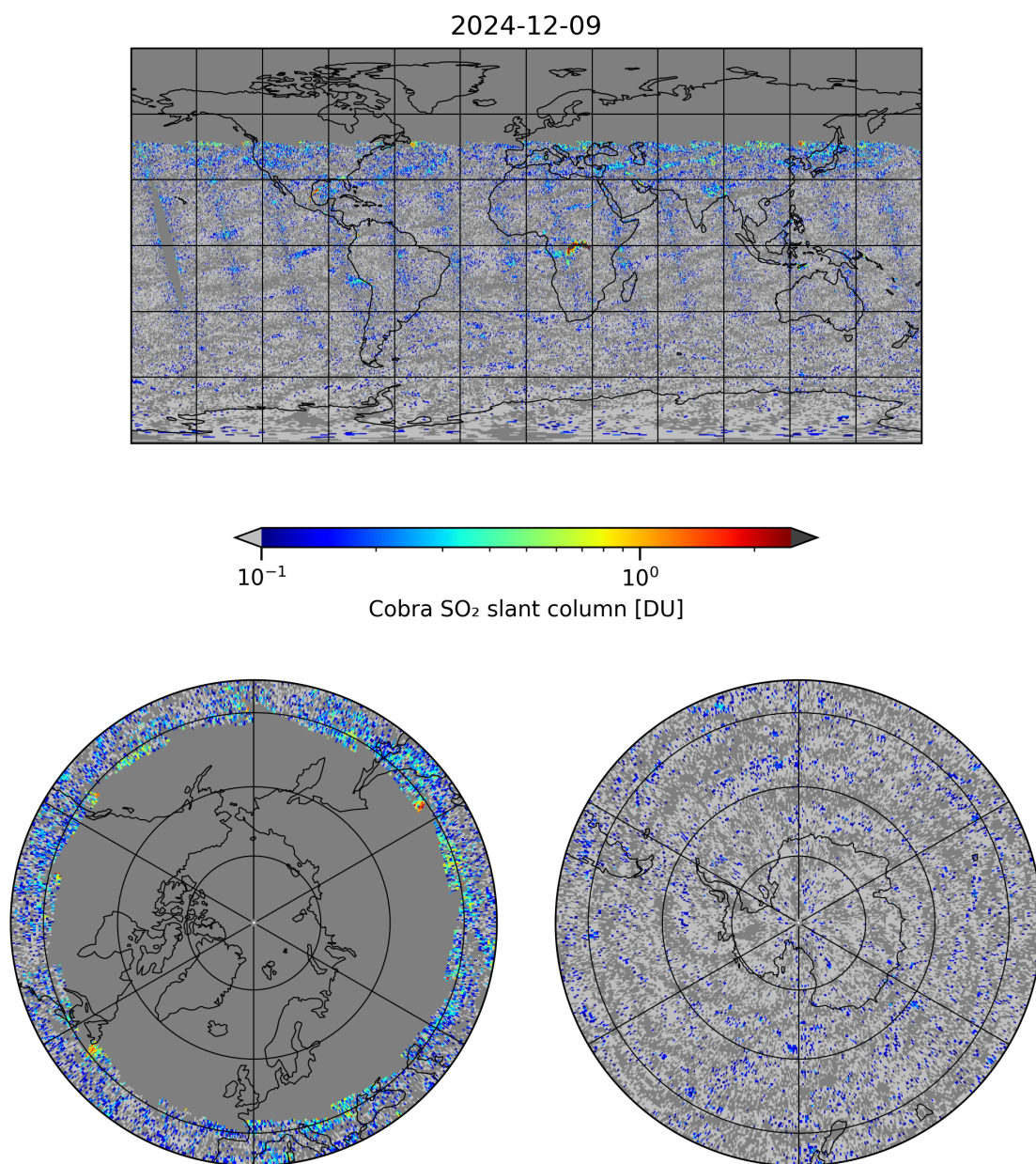


Figure 7: Map of “Cobra SO₂ slant column” for 2024-12-09 to 2024-12-09

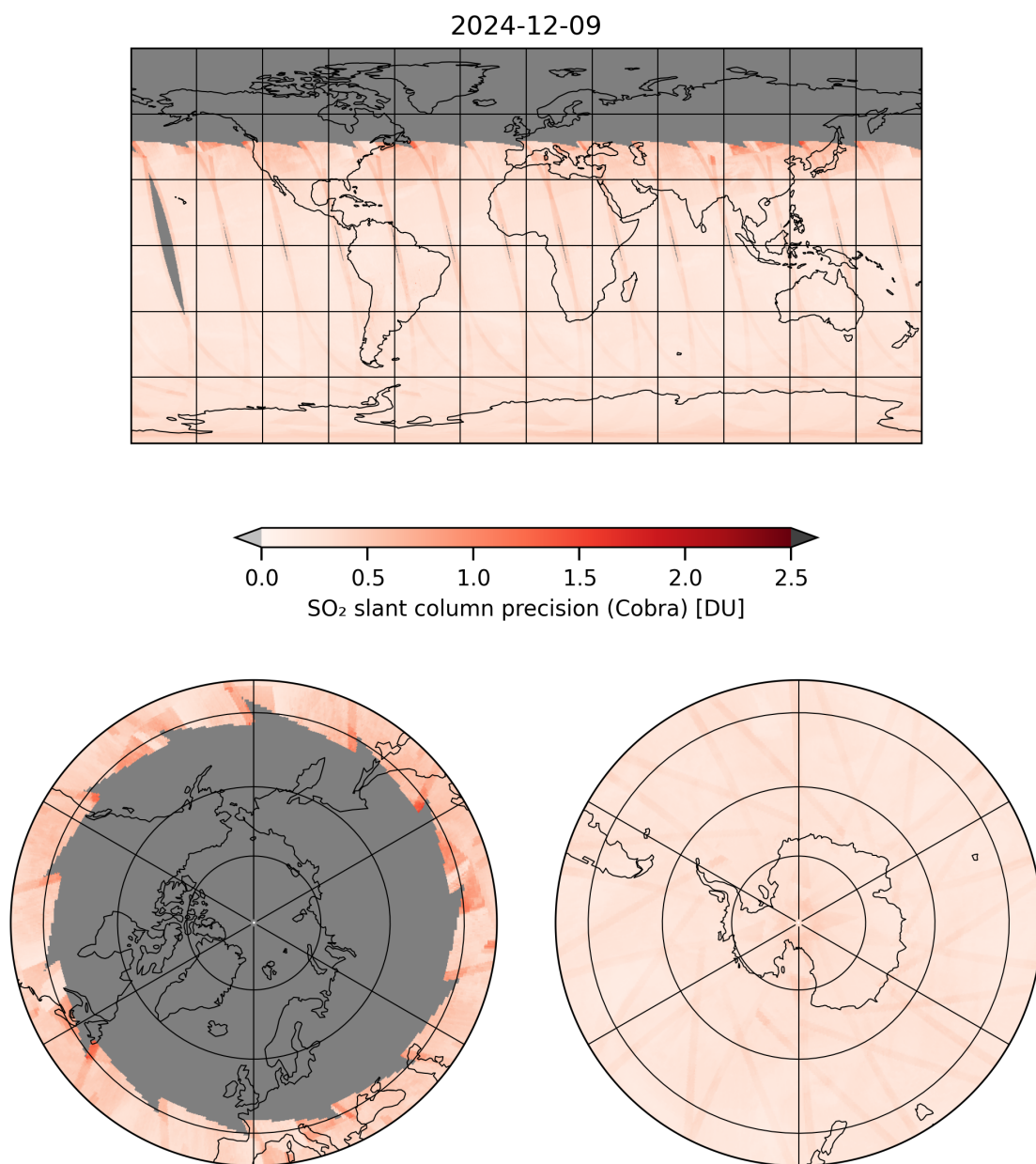


Figure 8: Map of “SO₂ slant column precision (Cobra)” for 2024-12-09 to 2024-12-09

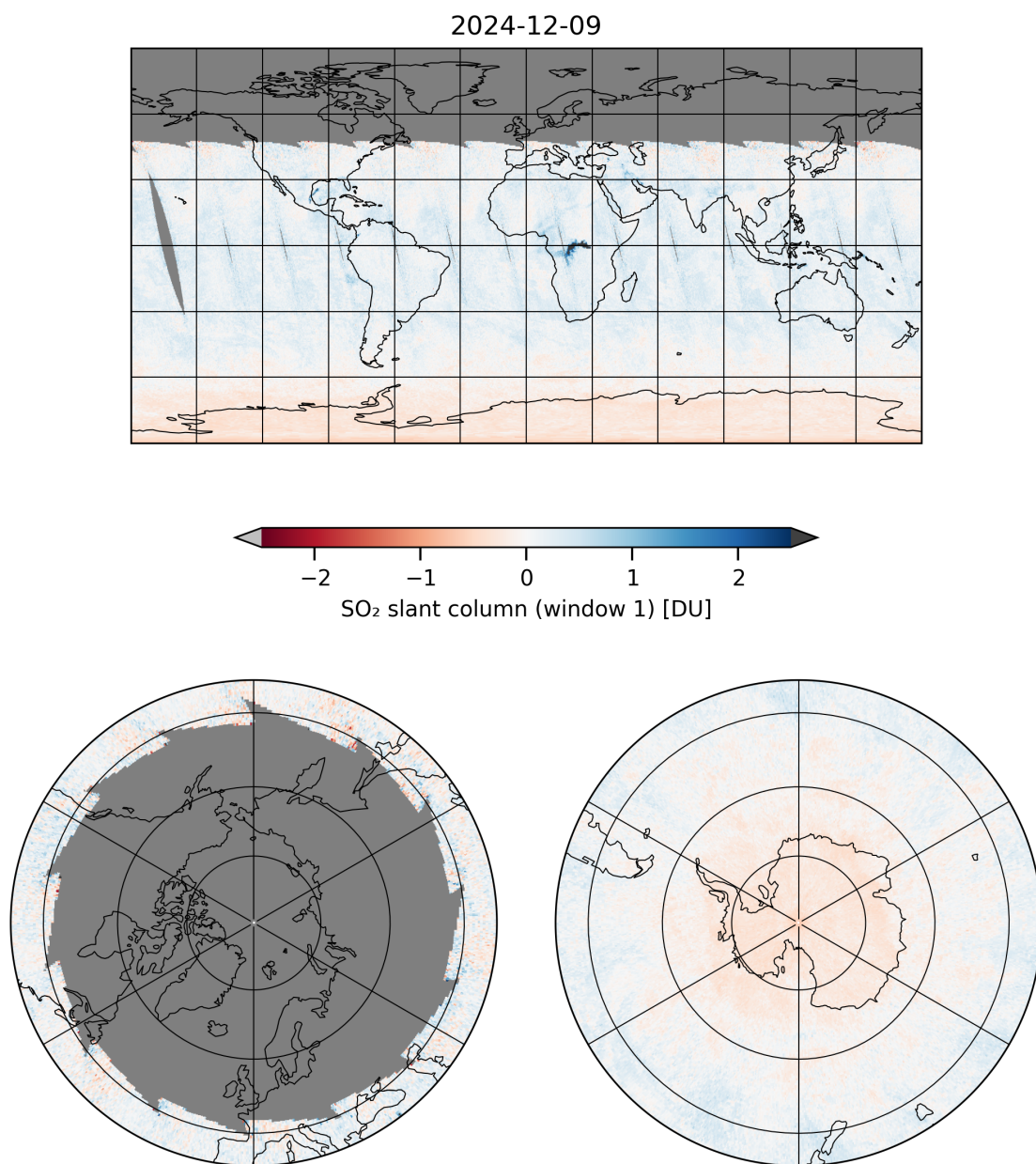


Figure 9: Map of “SO₂ slant column (window 1)” for 2024-12-09 to 2024-12-09

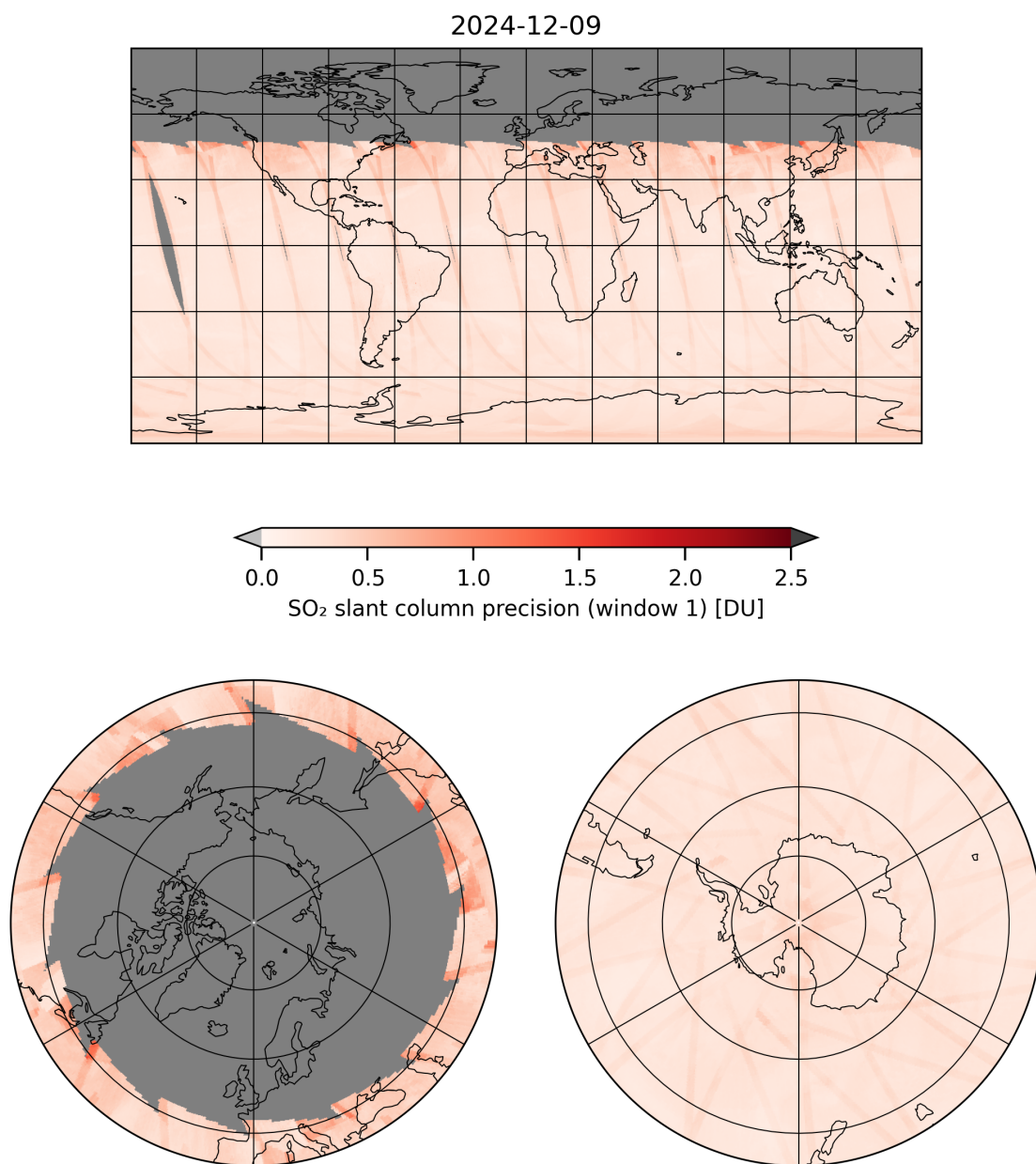


Figure 10: Map of “SO₂ slant column precision (window 1)” for 2024-12-09 to 2024-12-09

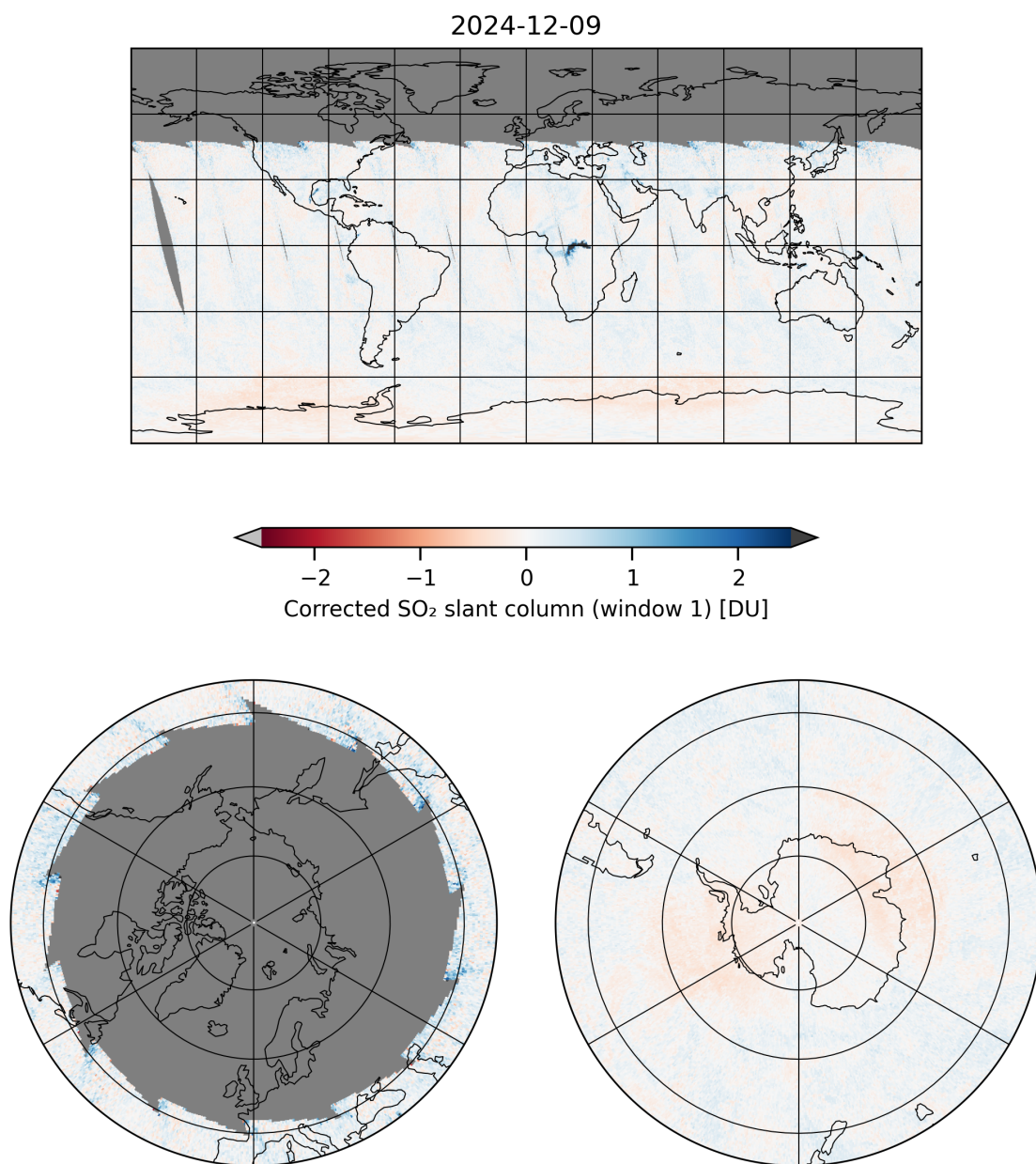


Figure 11: Map of “Corrected SO₂ slant column (window 1)” for 2024-12-09 to 2024-12-09

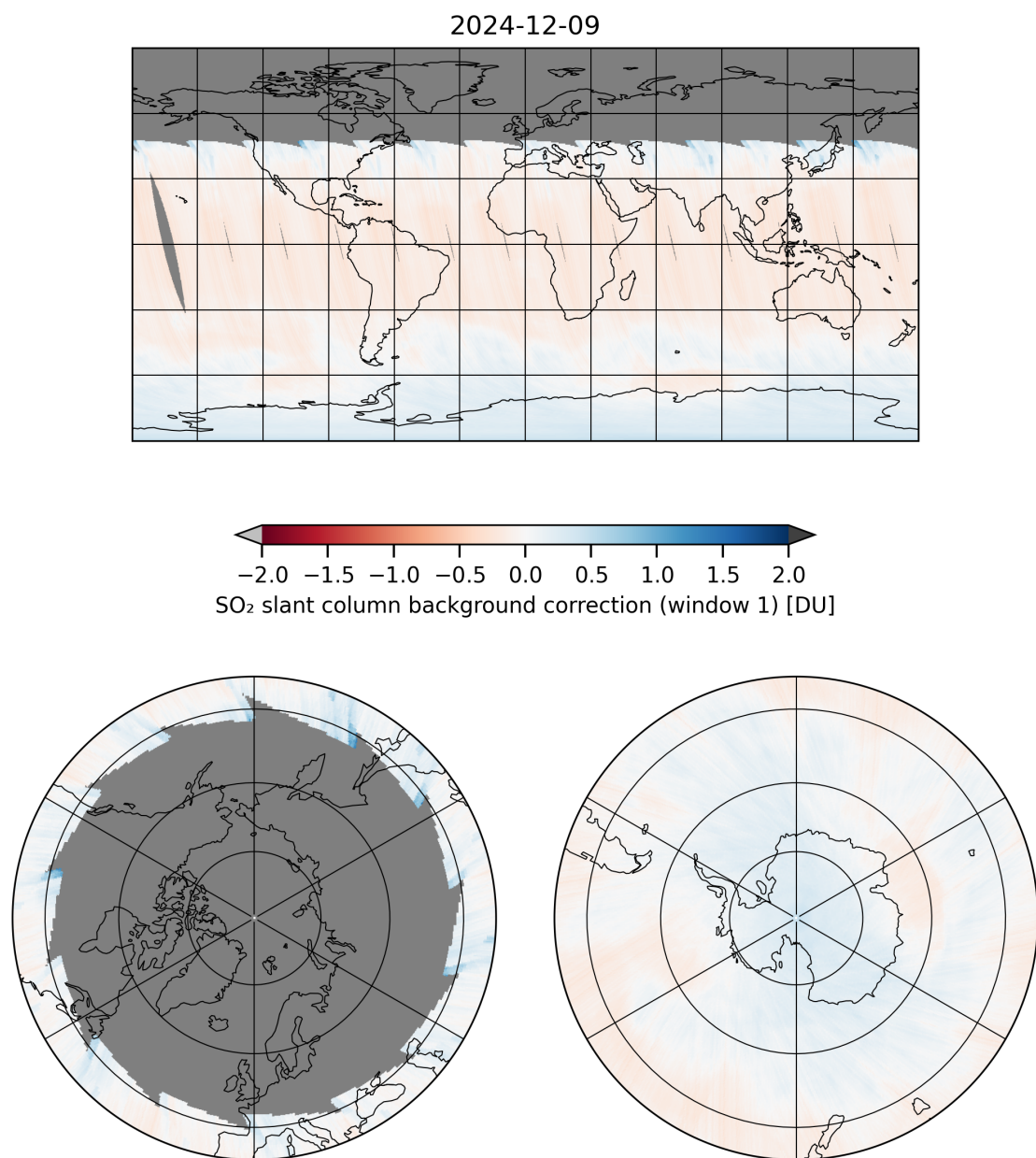


Figure 12: Map of “SO₂ slant column background correction (window 1)” for 2024-12-09 to 2024-12-09

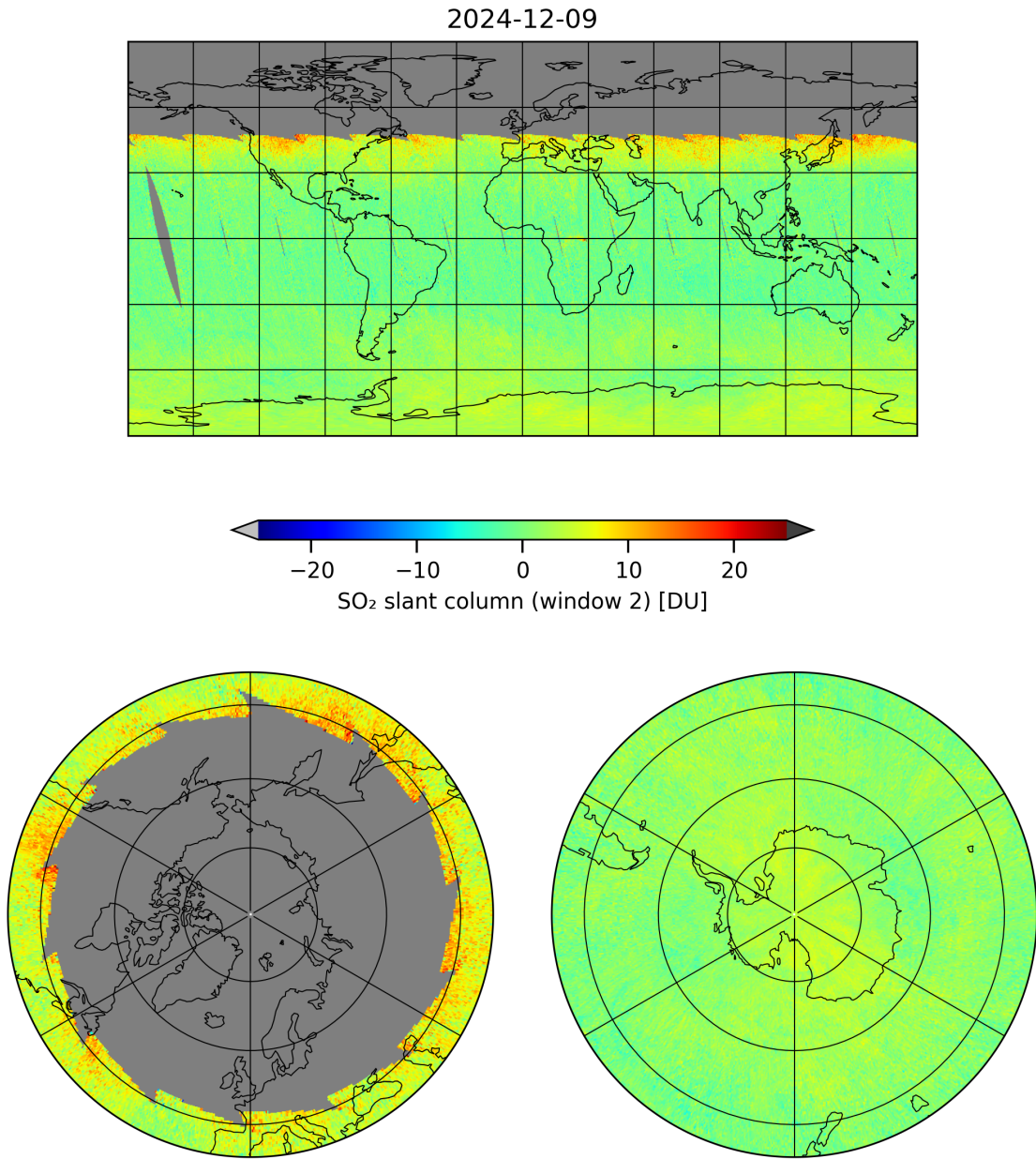


Figure 13: Map of “SO₂ slant column (window 2)” for 2024-12-09 to 2024-12-09

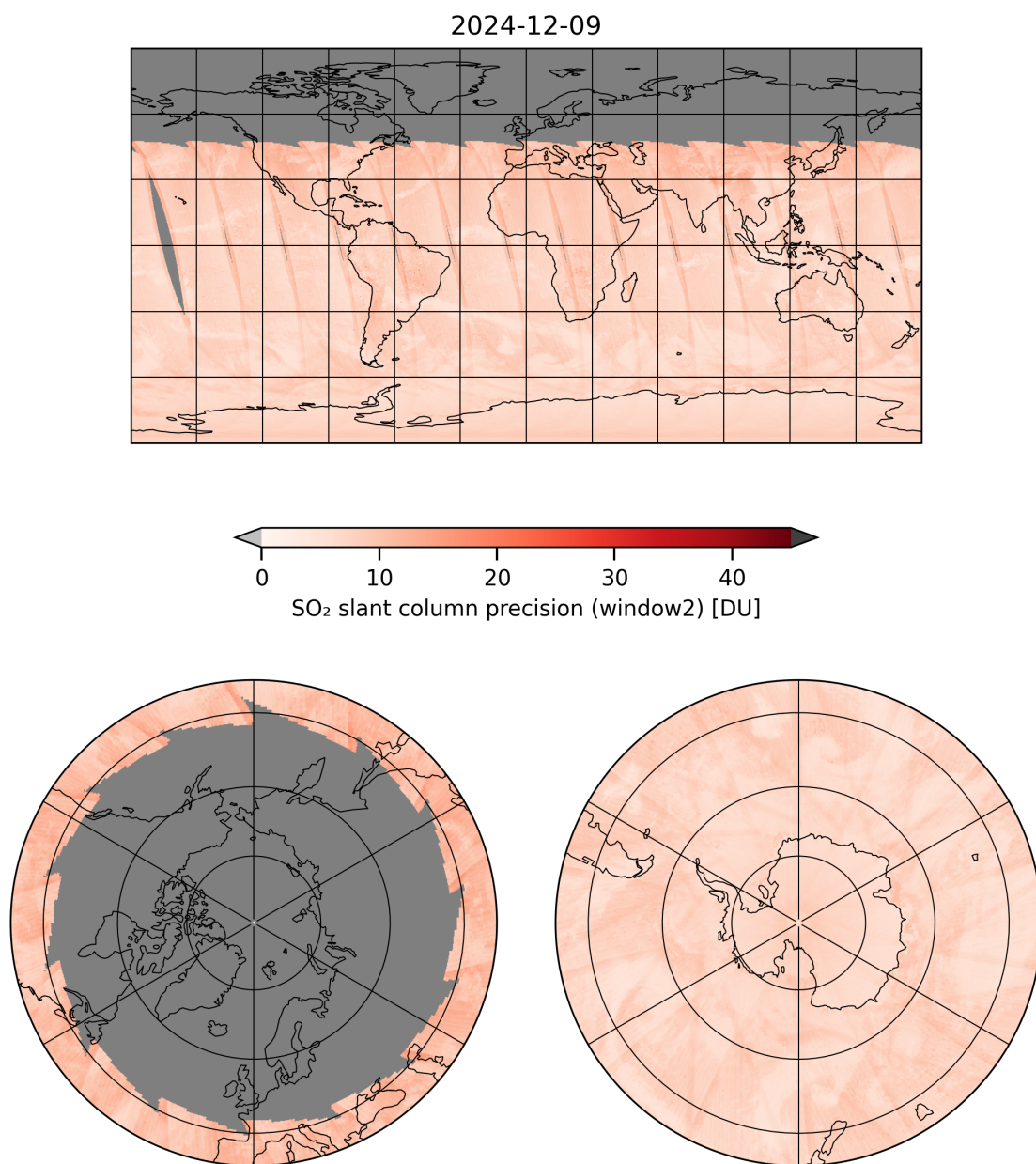


Figure 14: Map of “SO₂ slant column precision (window2)” for 2024-12-09 to 2024-12-09

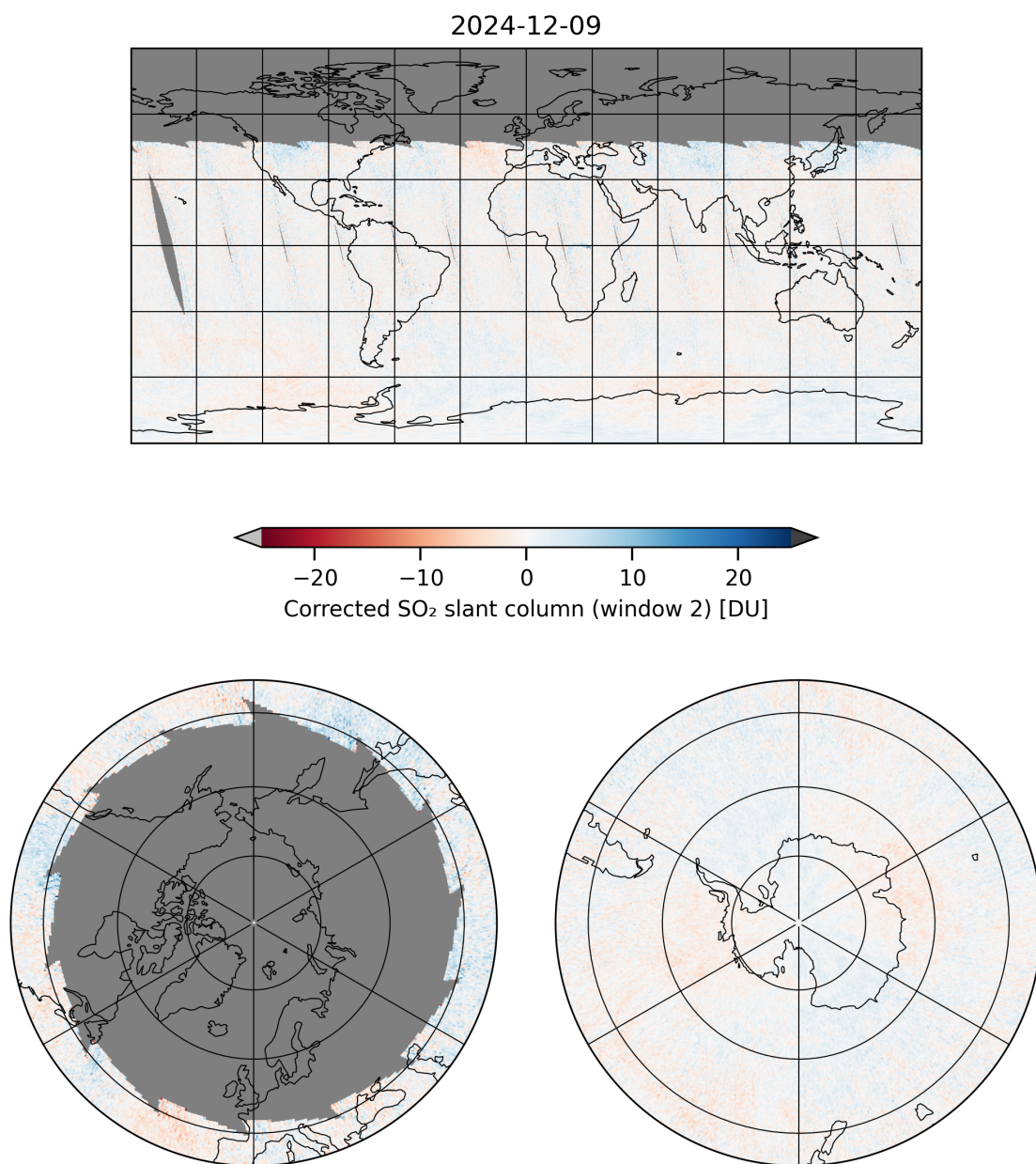


Figure 15: Map of "Corrected SO₂ slant column (window 2)" for 2024-12-09 to 2024-12-09

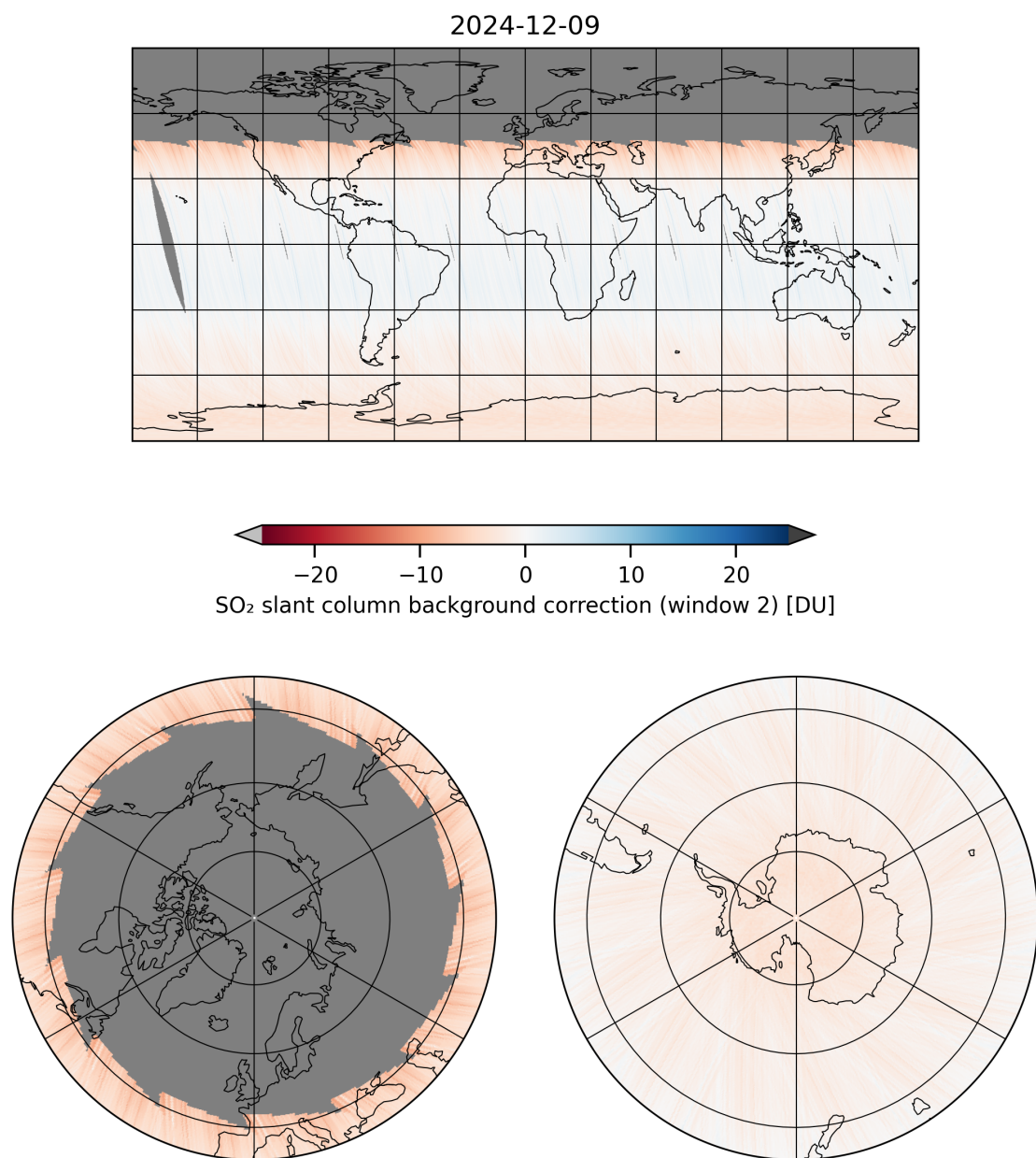


Figure 16: Map of “SO₂ slant column background correction (window 2)” for 2024-12-09 to 2024-12-09

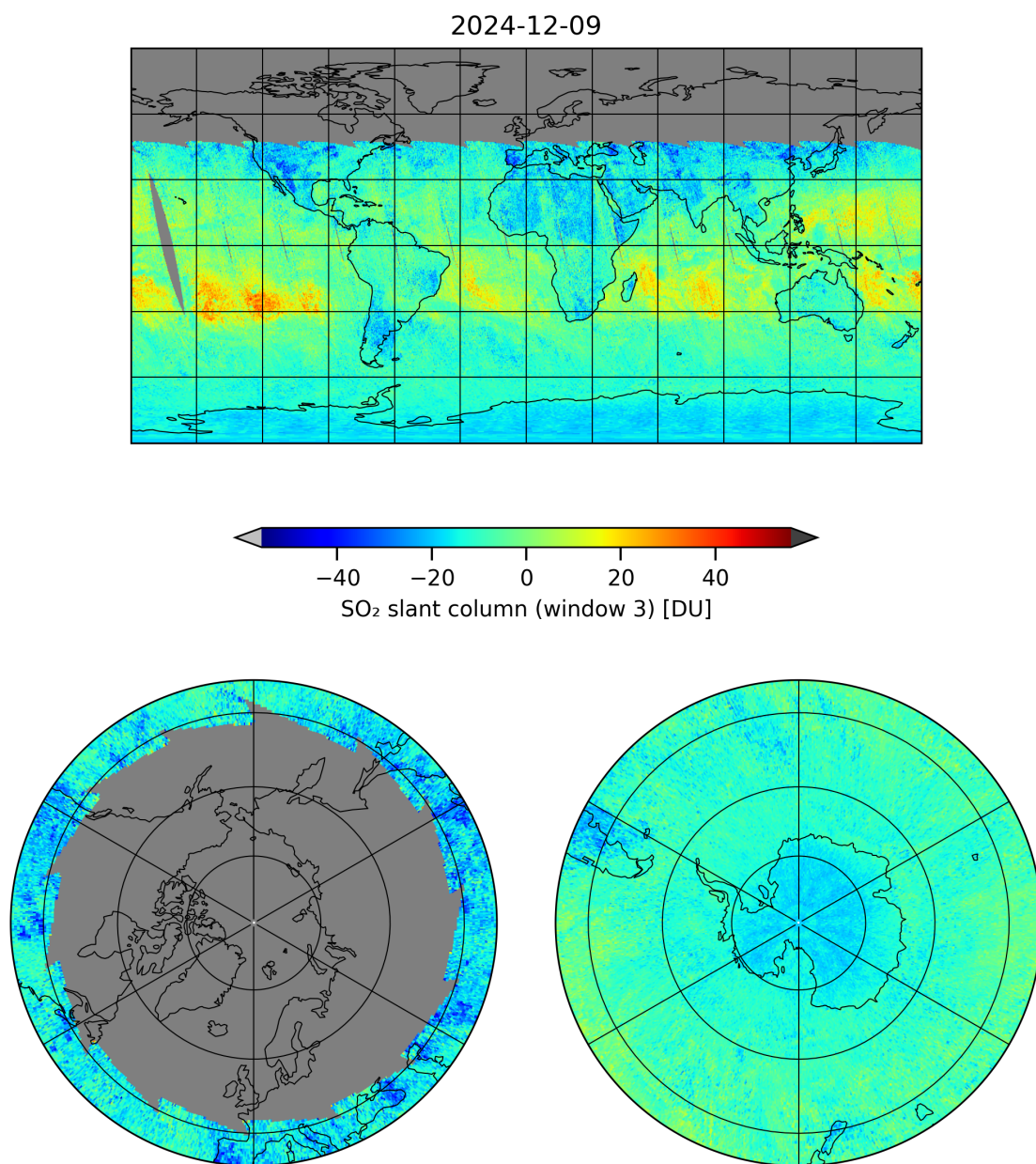


Figure 17: Map of “SO₂ slant column (window 3)” for 2024-12-09 to 2024-12-09

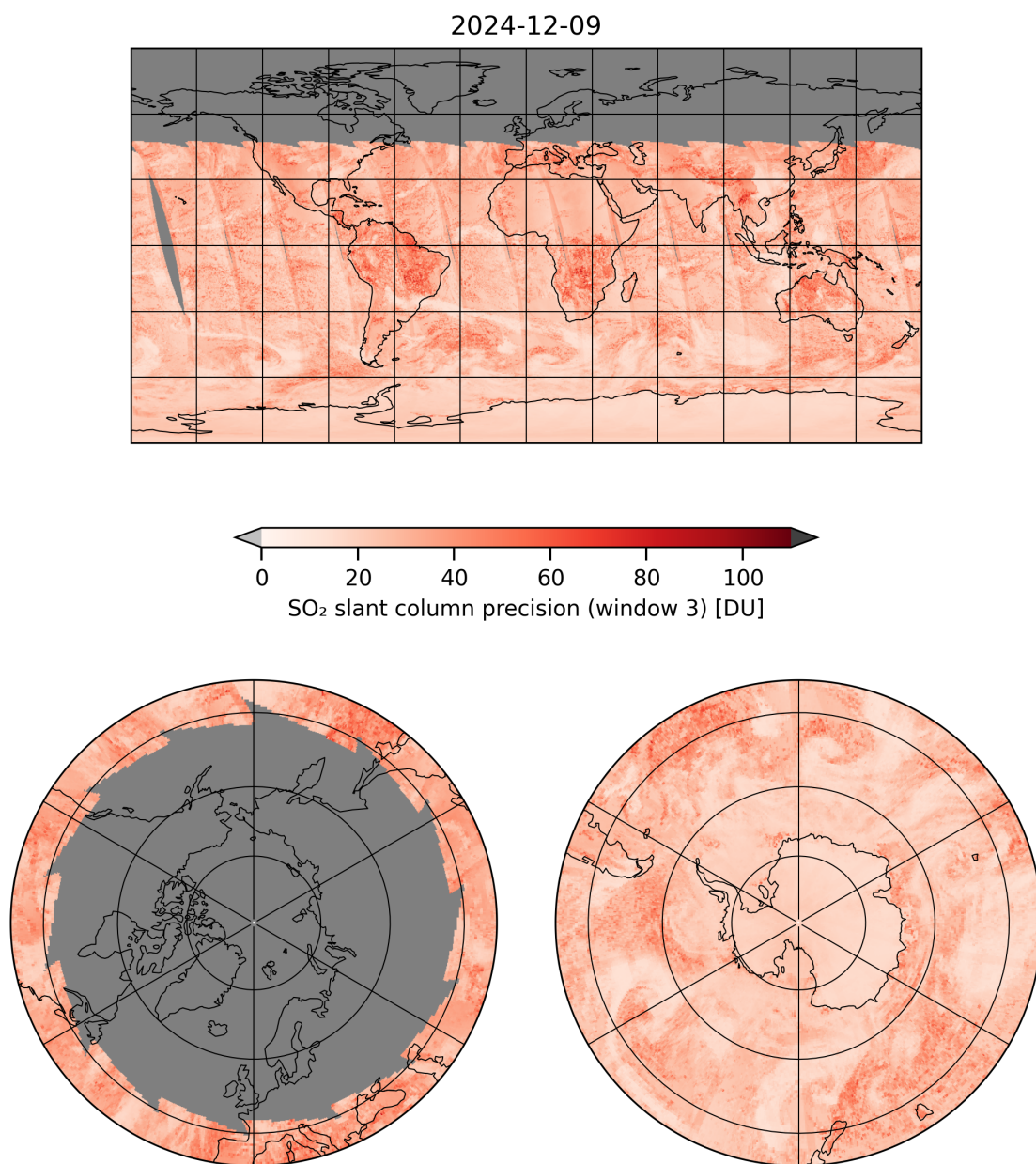


Figure 18: Map of “SO₂ slant column precision (window 3)” for 2024-12-09 to 2024-12-09

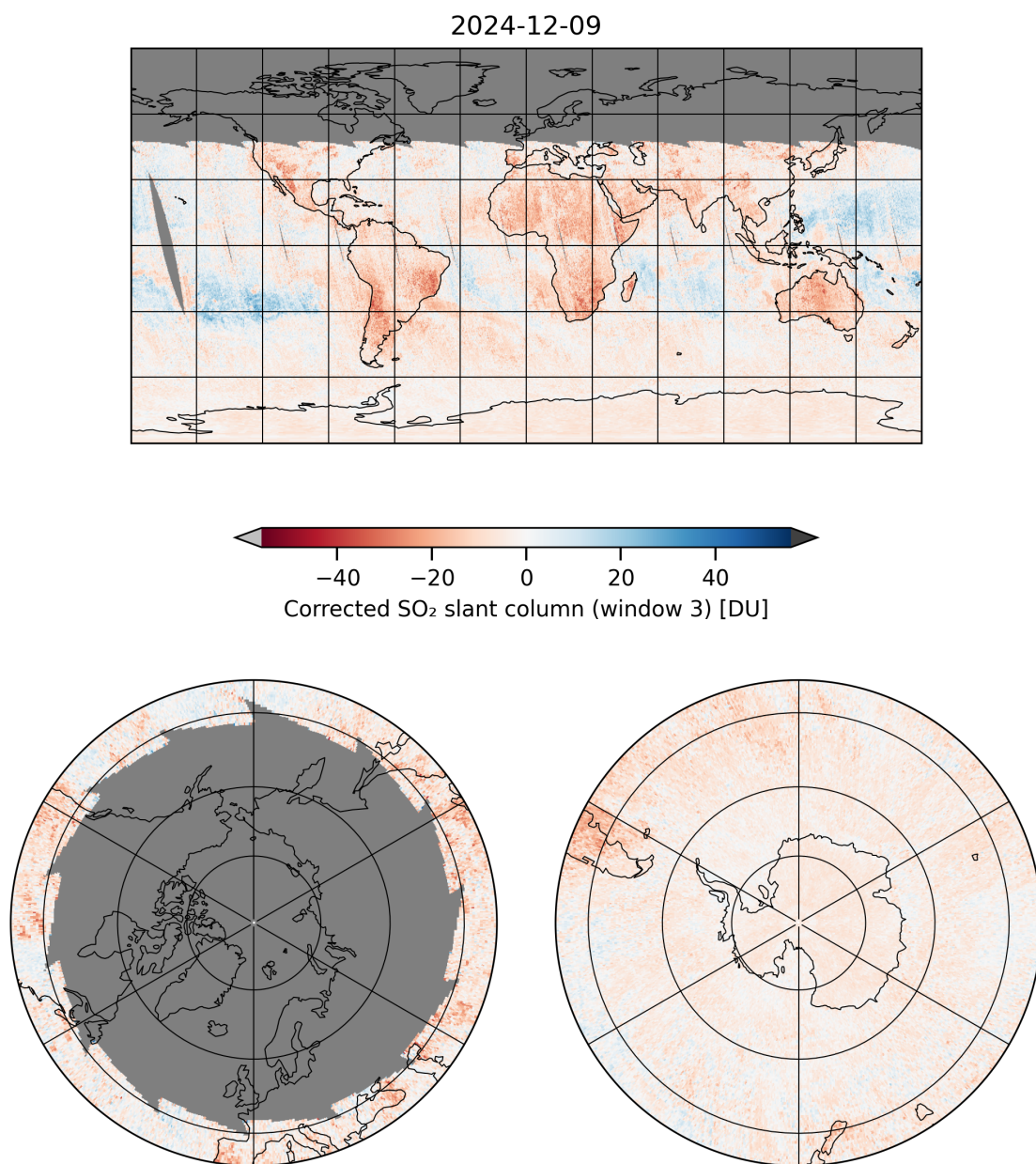


Figure 19: Map of “Corrected SO₂ slant column (window 3)” for 2024-12-09 to 2024-12-09

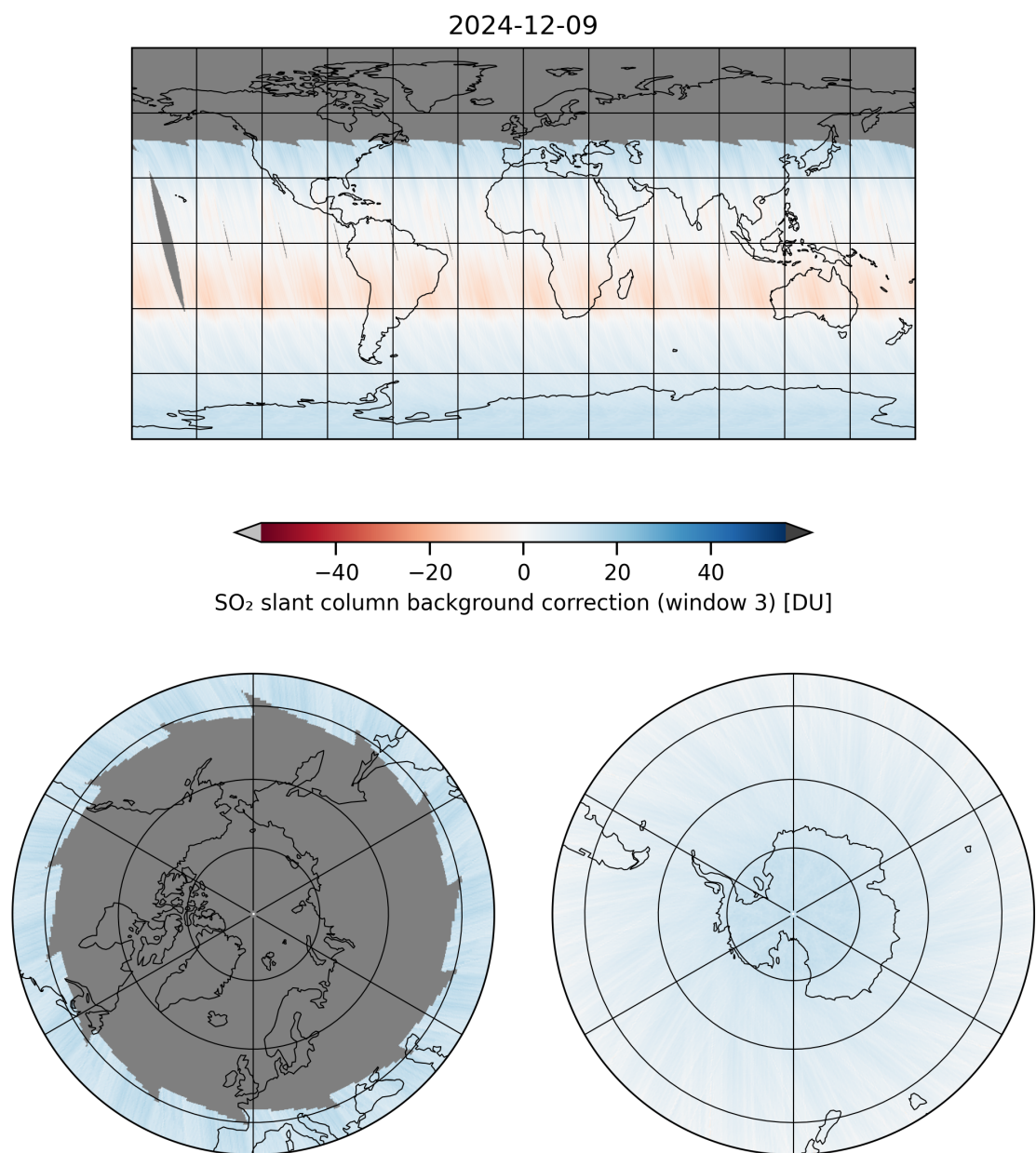


Figure 20: Map of “SO₂ slant column background correction (window 3)” for 2024-12-09 to 2024-12-09

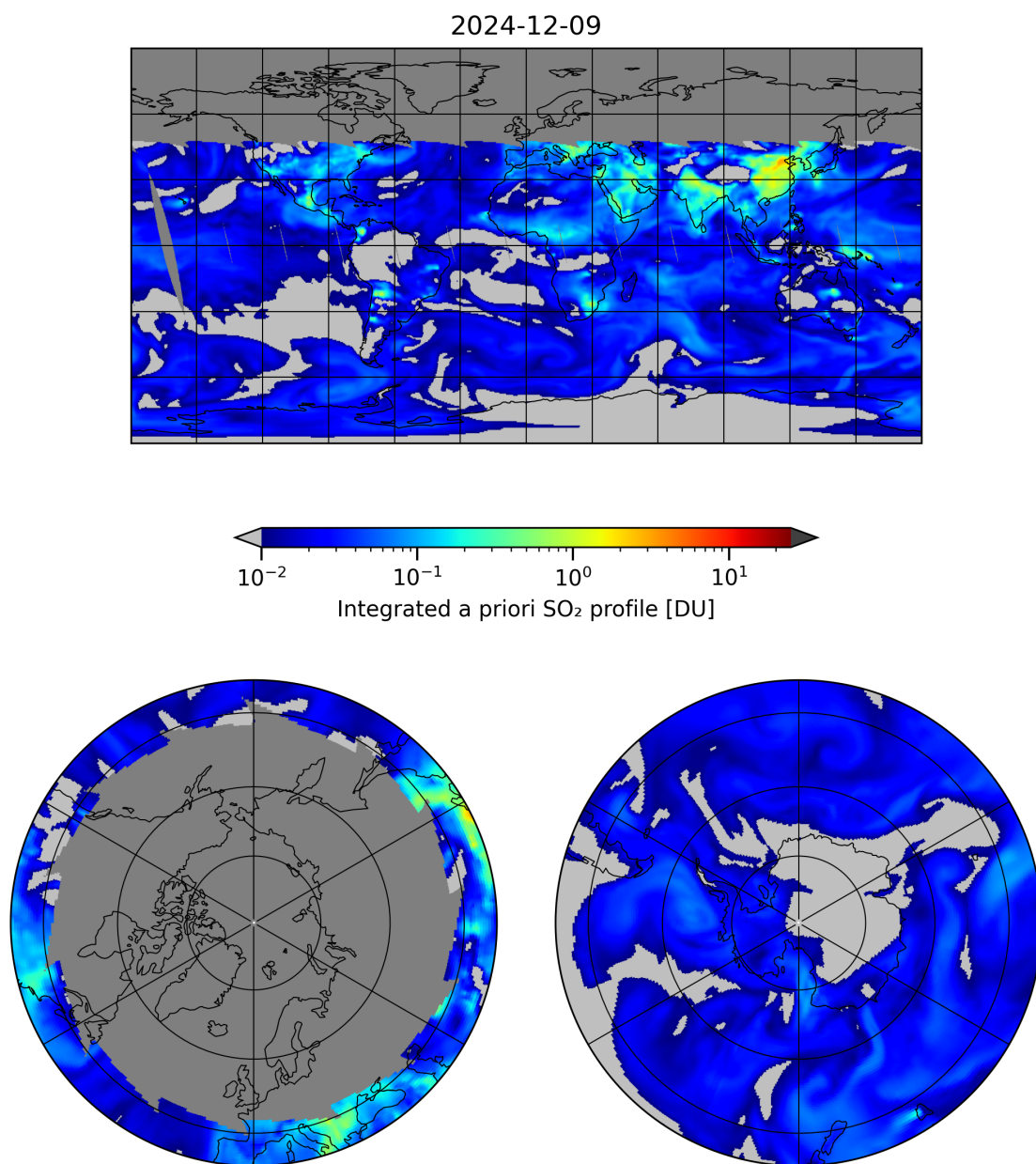


Figure 21: Map of “Integrated a priori SO₂ profile” for 2024-12-09 to 2024-12-09

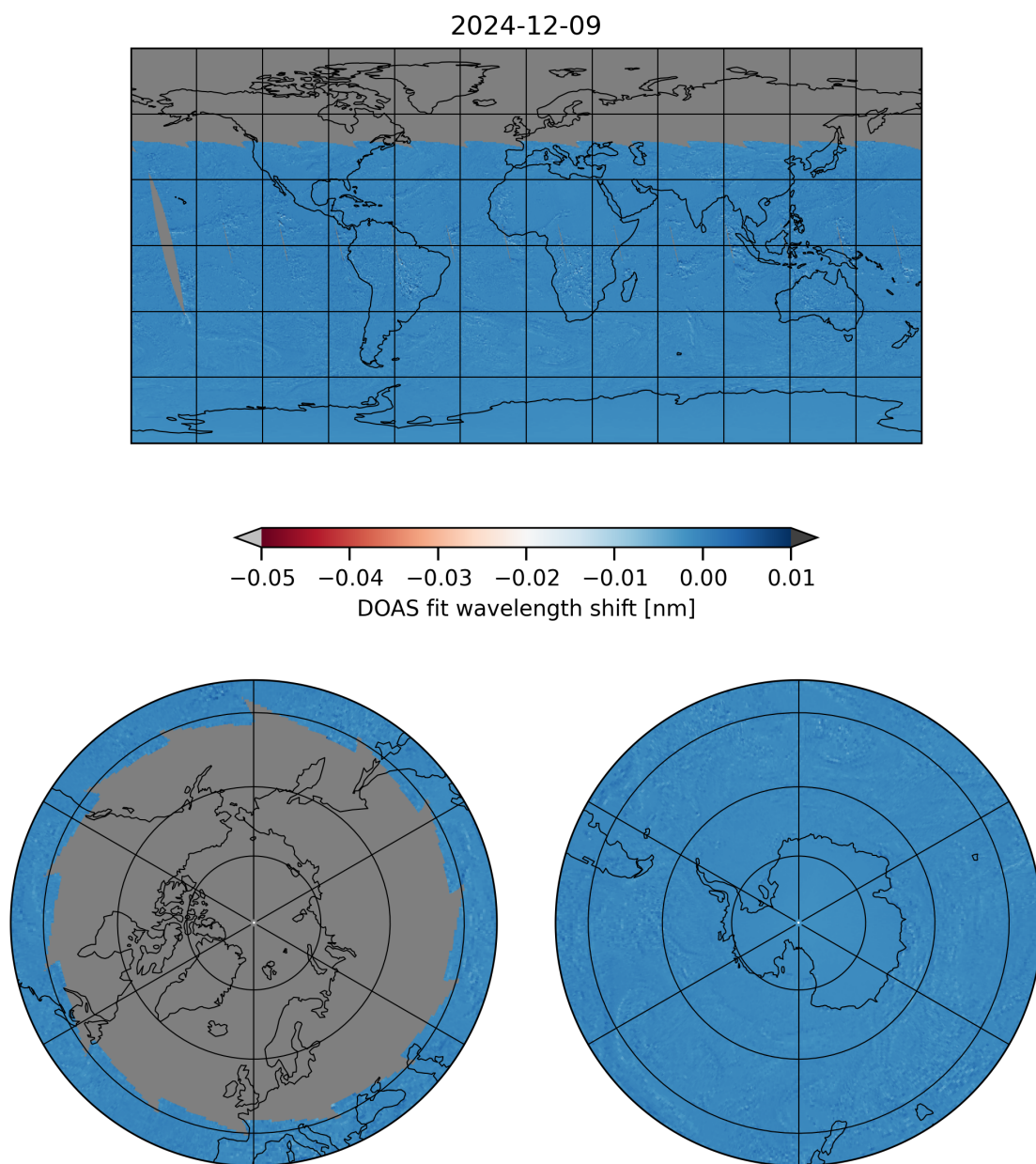


Figure 22: Map of “DOAS fit wavelength shift” for 2024-12-09 to 2024-12-09

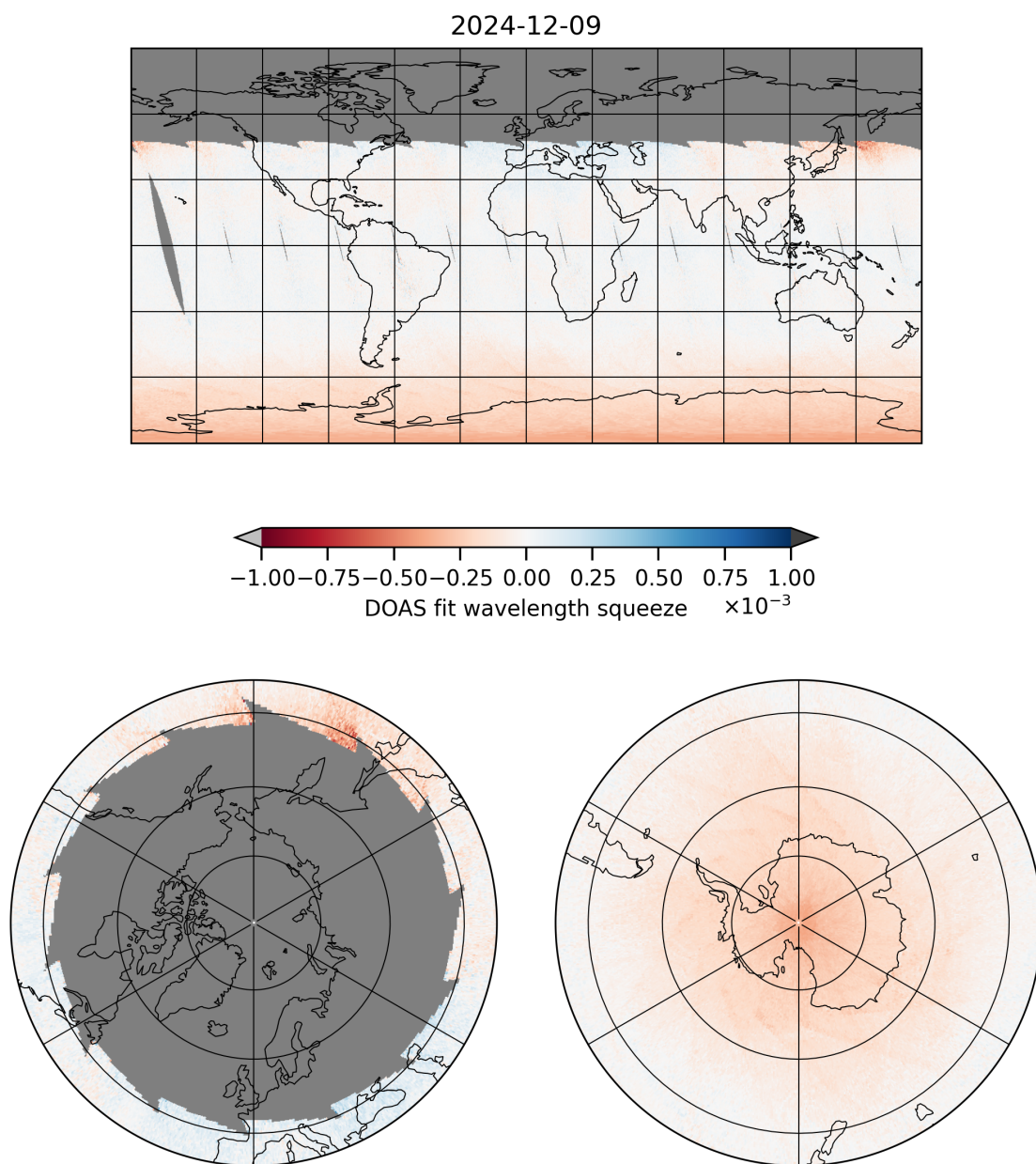


Figure 23: Map of “DOAS fit wavelength squeeze” for 2024-12-09 to 2024-12-09

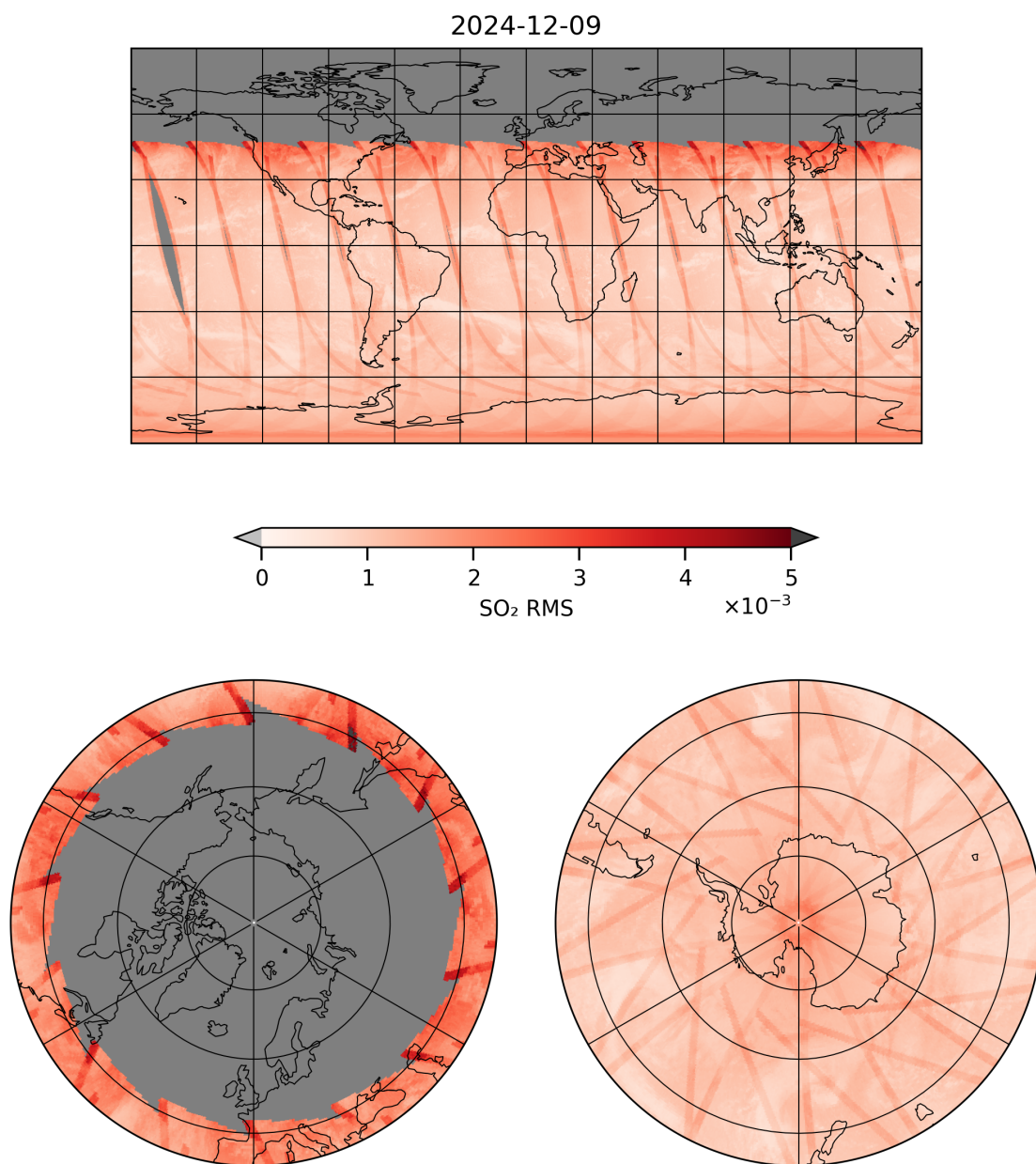


Figure 24: Map of “SO₂ RMS” for 2024-12-09 to 2024-12-09

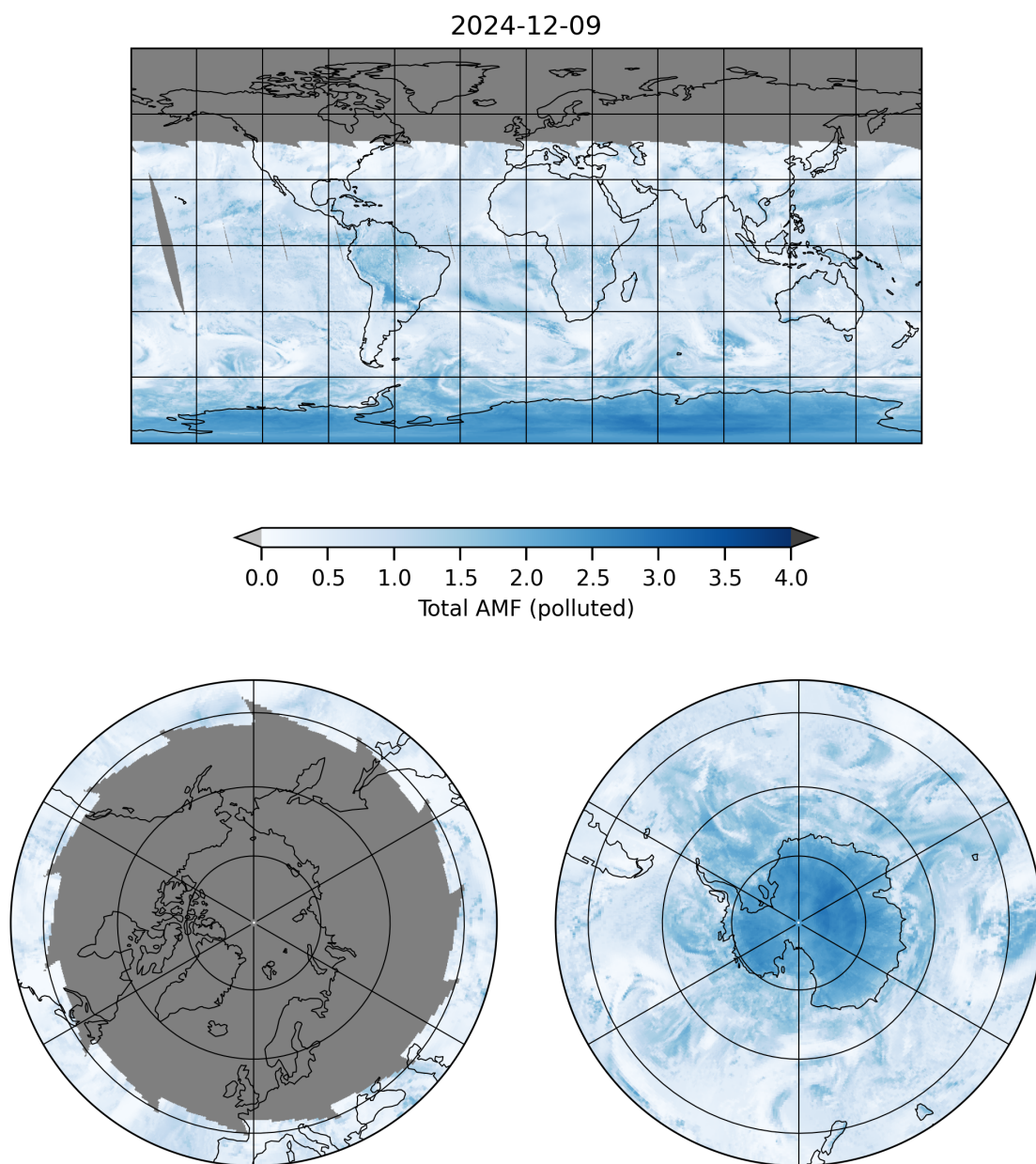


Figure 25: Map of “Total AMF (polluted)” for 2024-12-09 to 2024-12-09

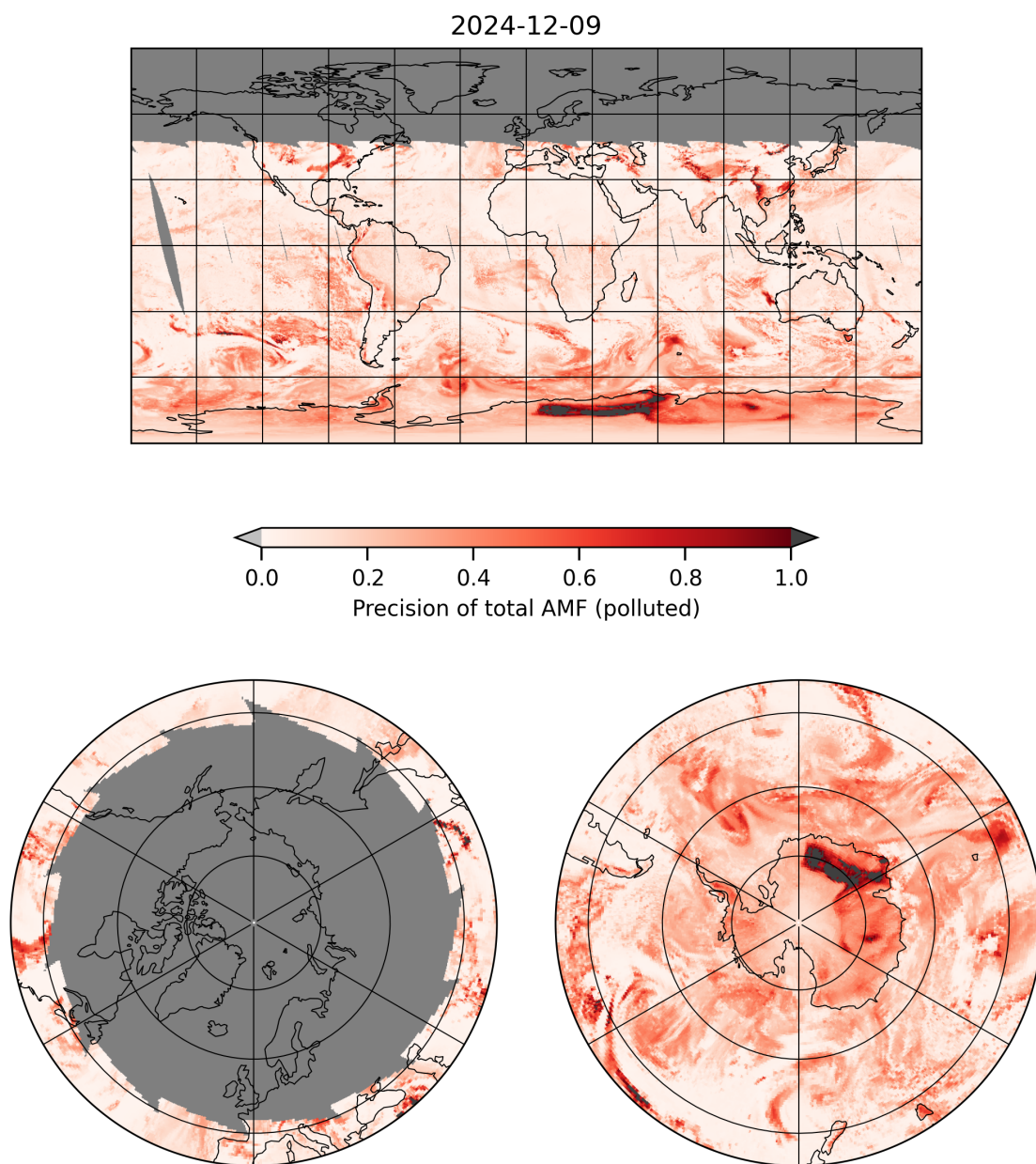


Figure 26: Map of “Precision of total AMF (polluted)” for 2024-12-09 to 2024-12-09

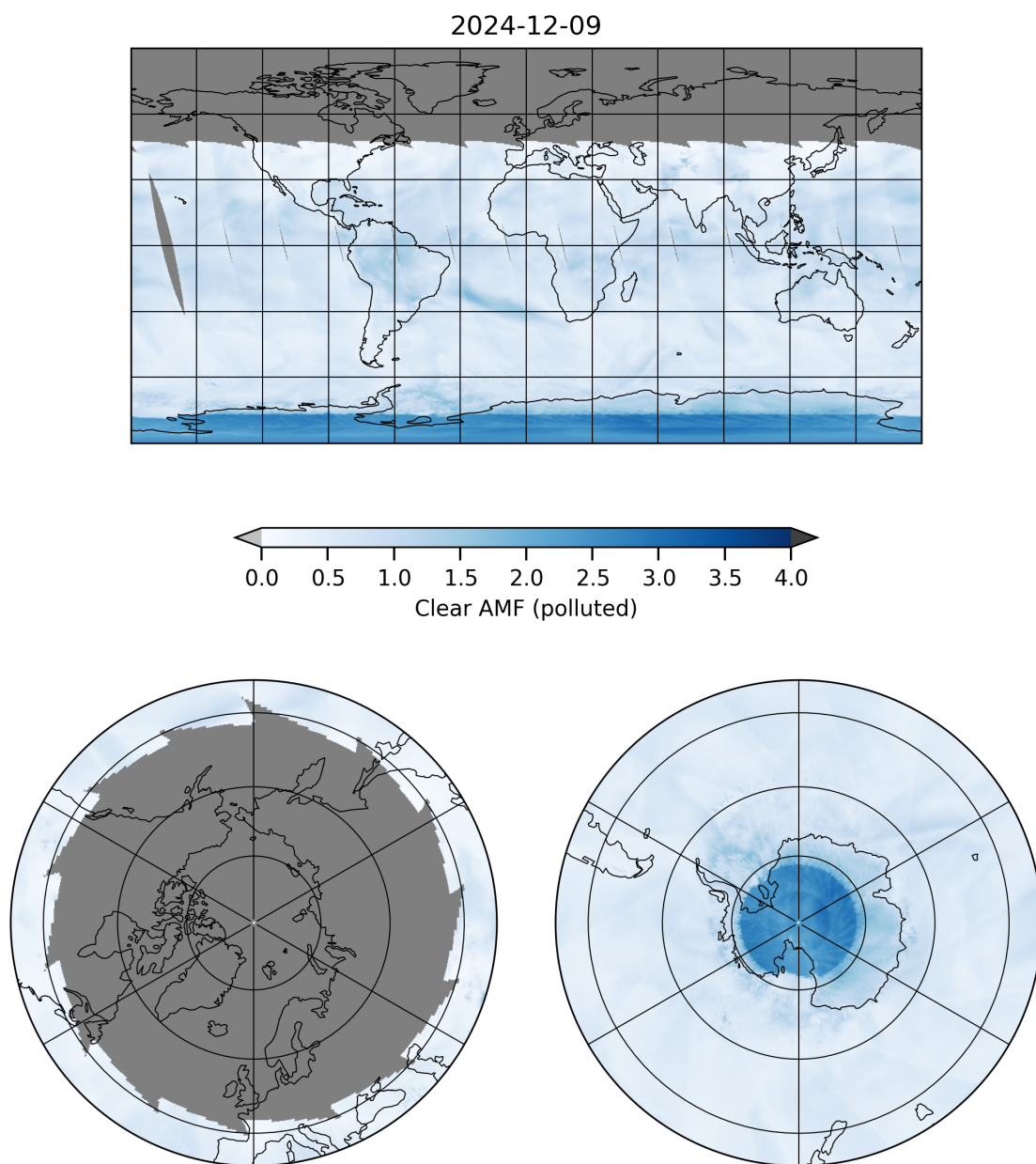


Figure 27: Map of “Clear AMF (polluted)” for 2024-12-09 to 2024-12-09

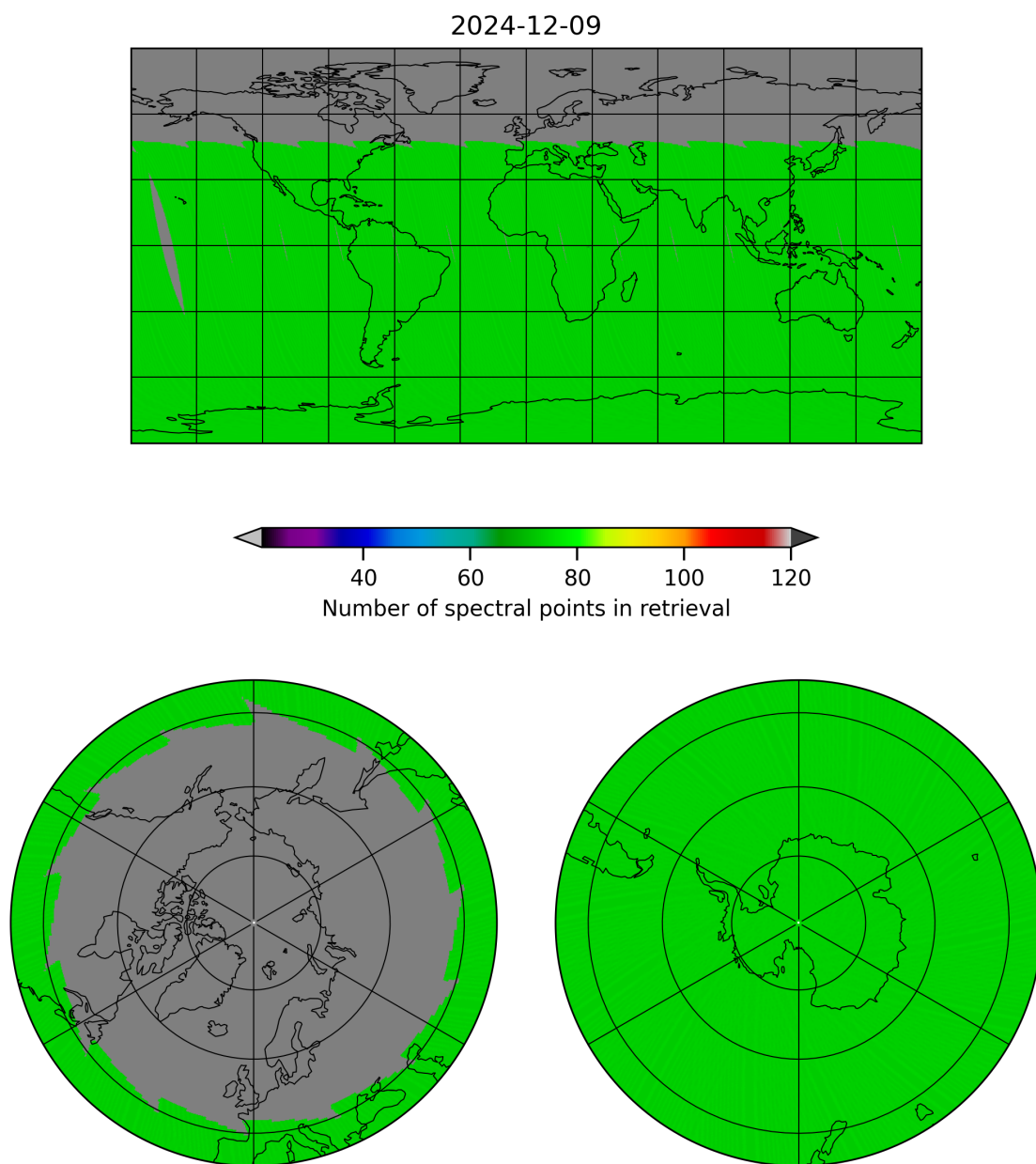


Figure 28: Map of “Number of spectral points in retrieval” for 2024-12-09 to 2024-12-09

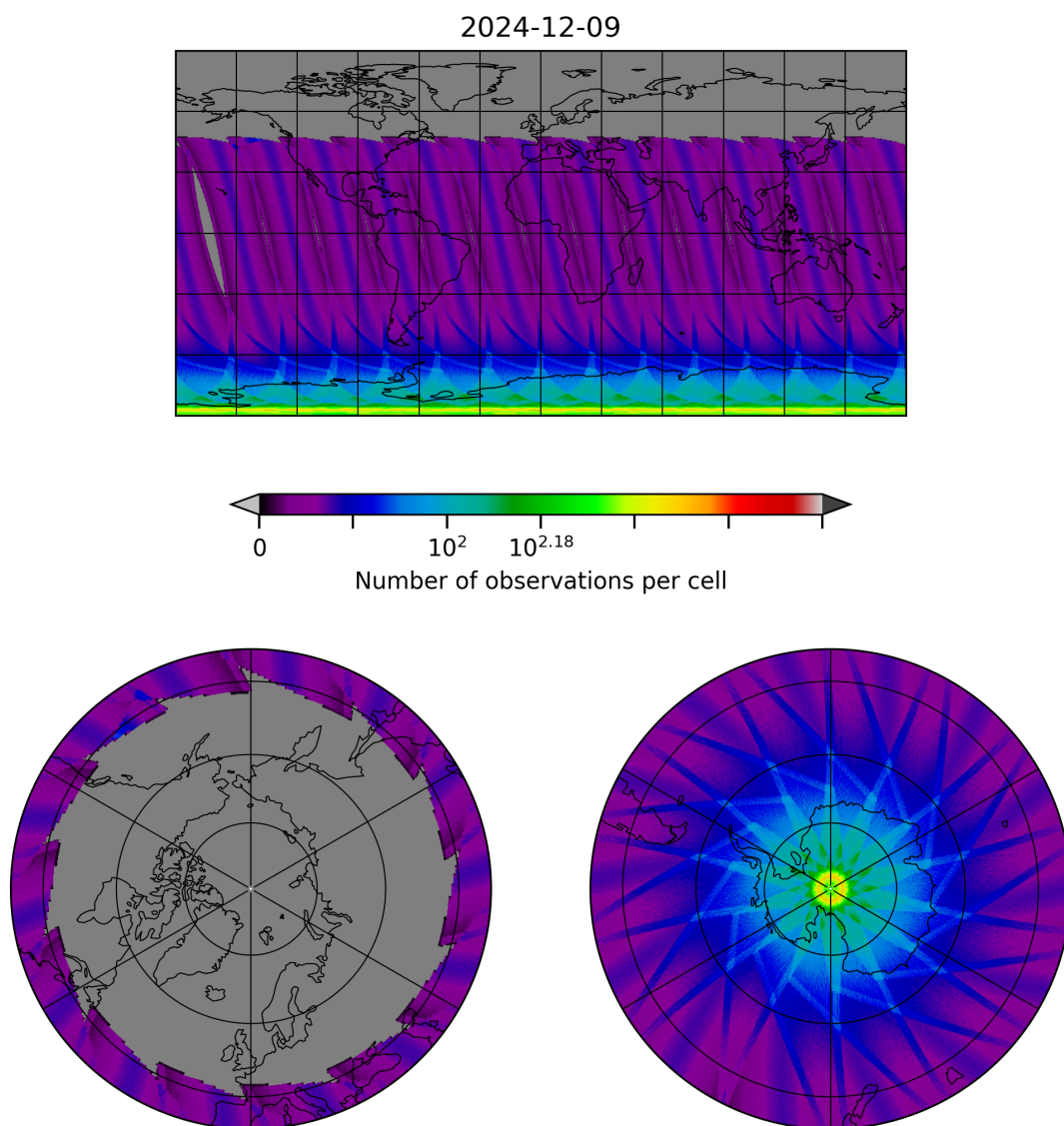


Figure 29: Map of the number of observations for 2024-12-09 to 2024-12-09

7 Zonal average

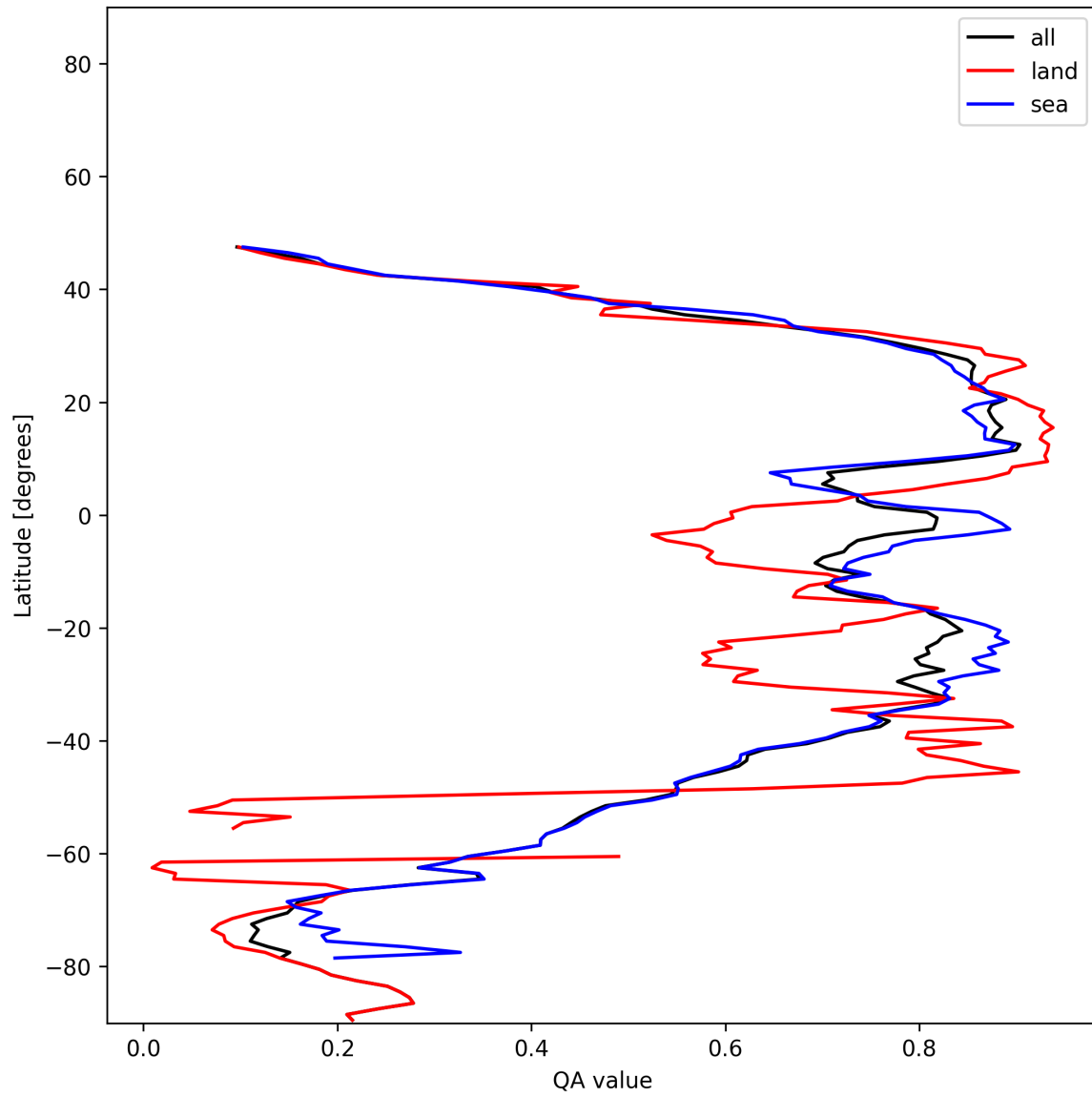


Figure 30: Zonal average of “QA value” for 2024-12-09 to 2024-12-09.

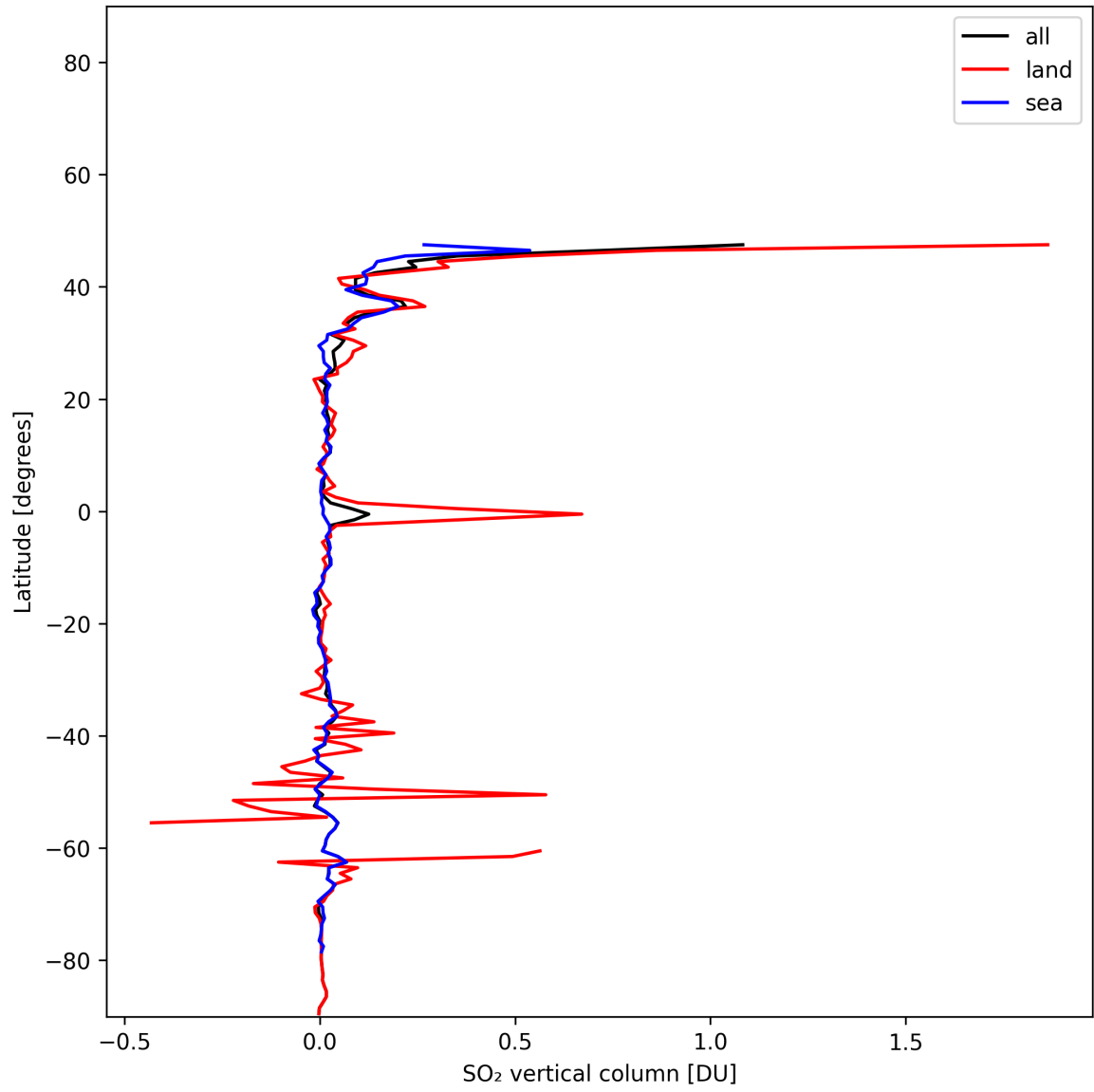


Figure 31: Zonal average of “SO₂ vertical column” for 2024-12-09 to 2024-12-09.

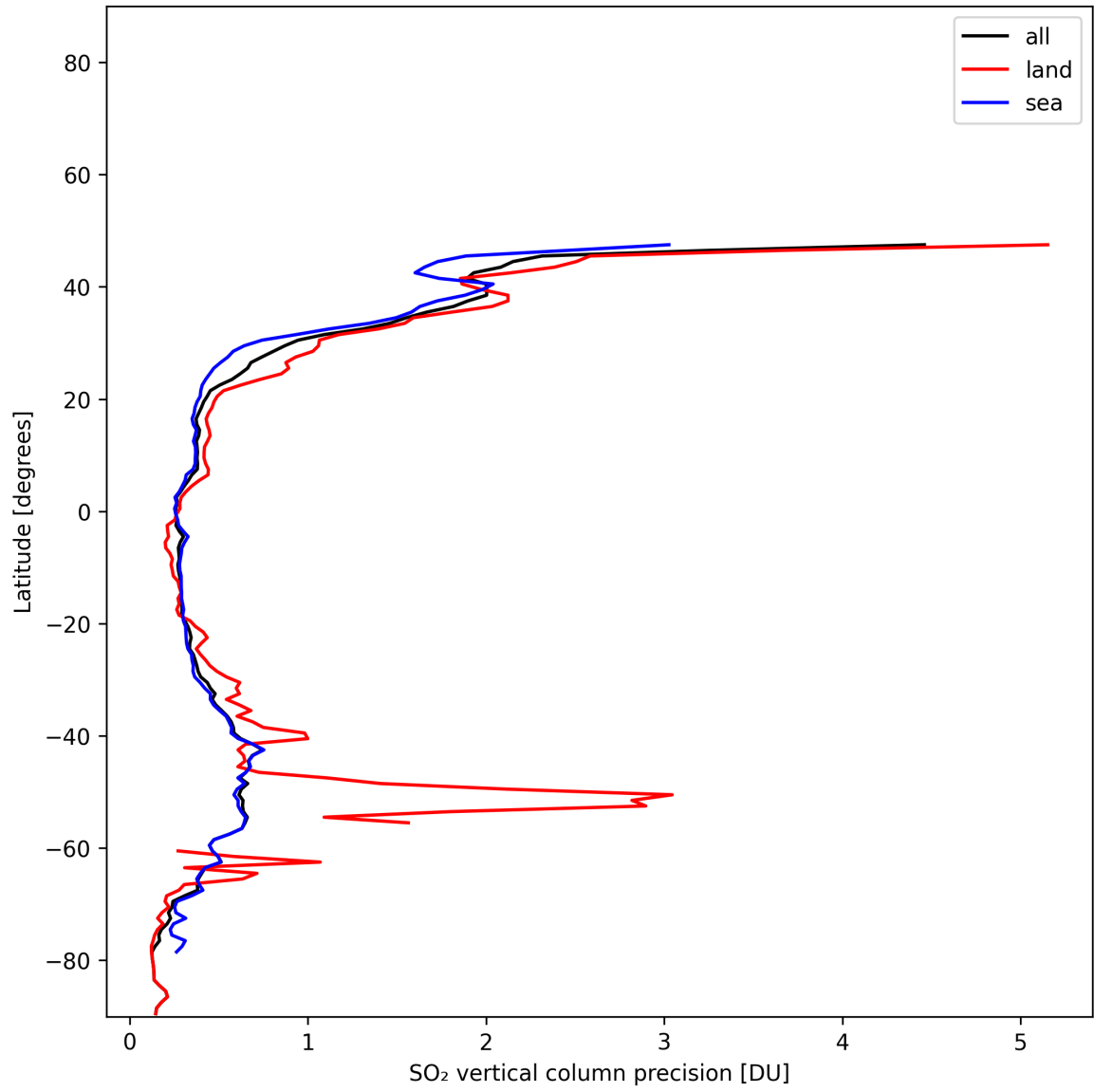


Figure 32: Zonal average of “SO₂ vertical column precision” for 2024-12-09 to 2024-12-09.

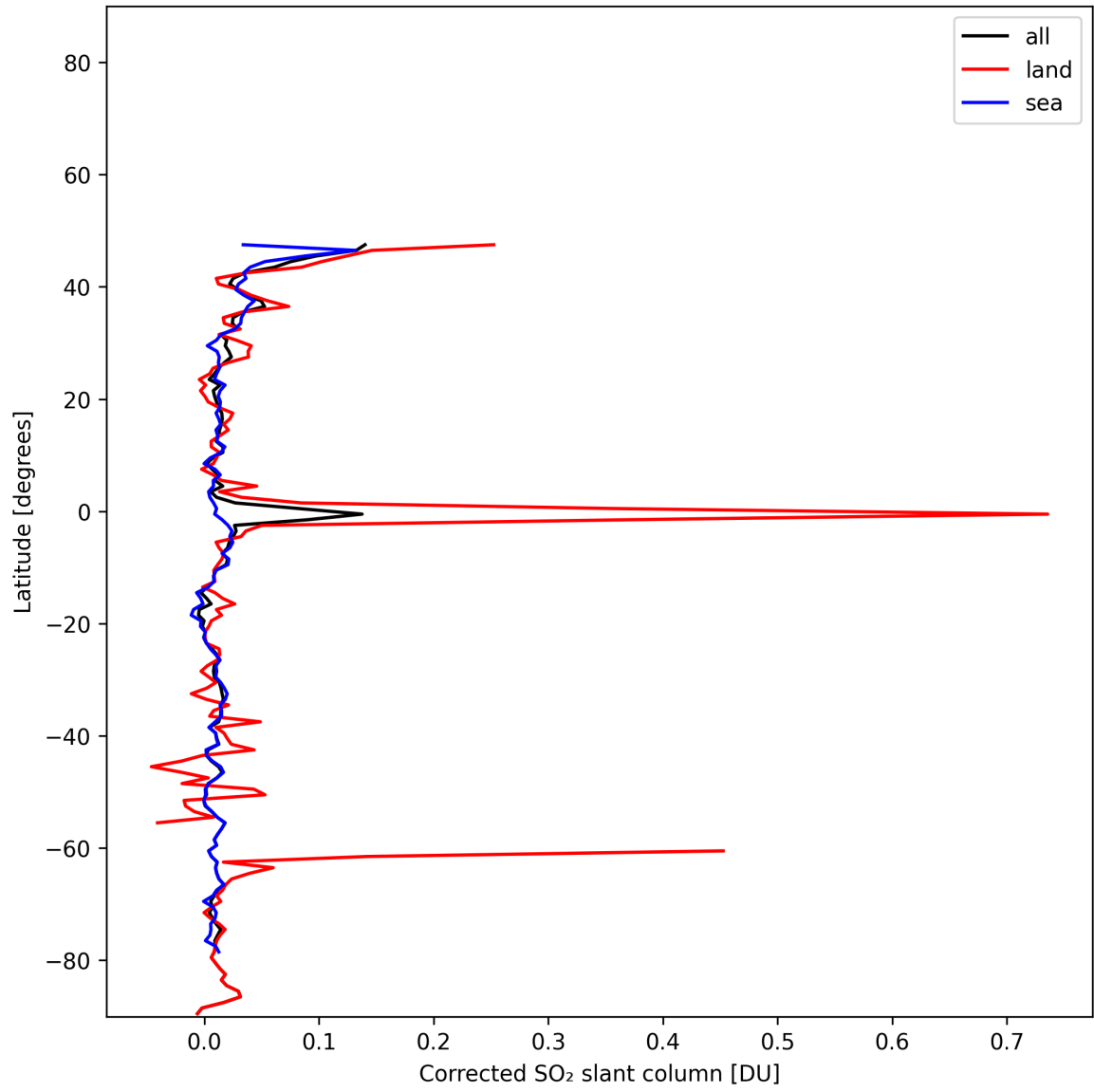


Figure 33: Zonal average of “Corrected SO₂ slant column” for 2024-12-09 to 2024-12-09.

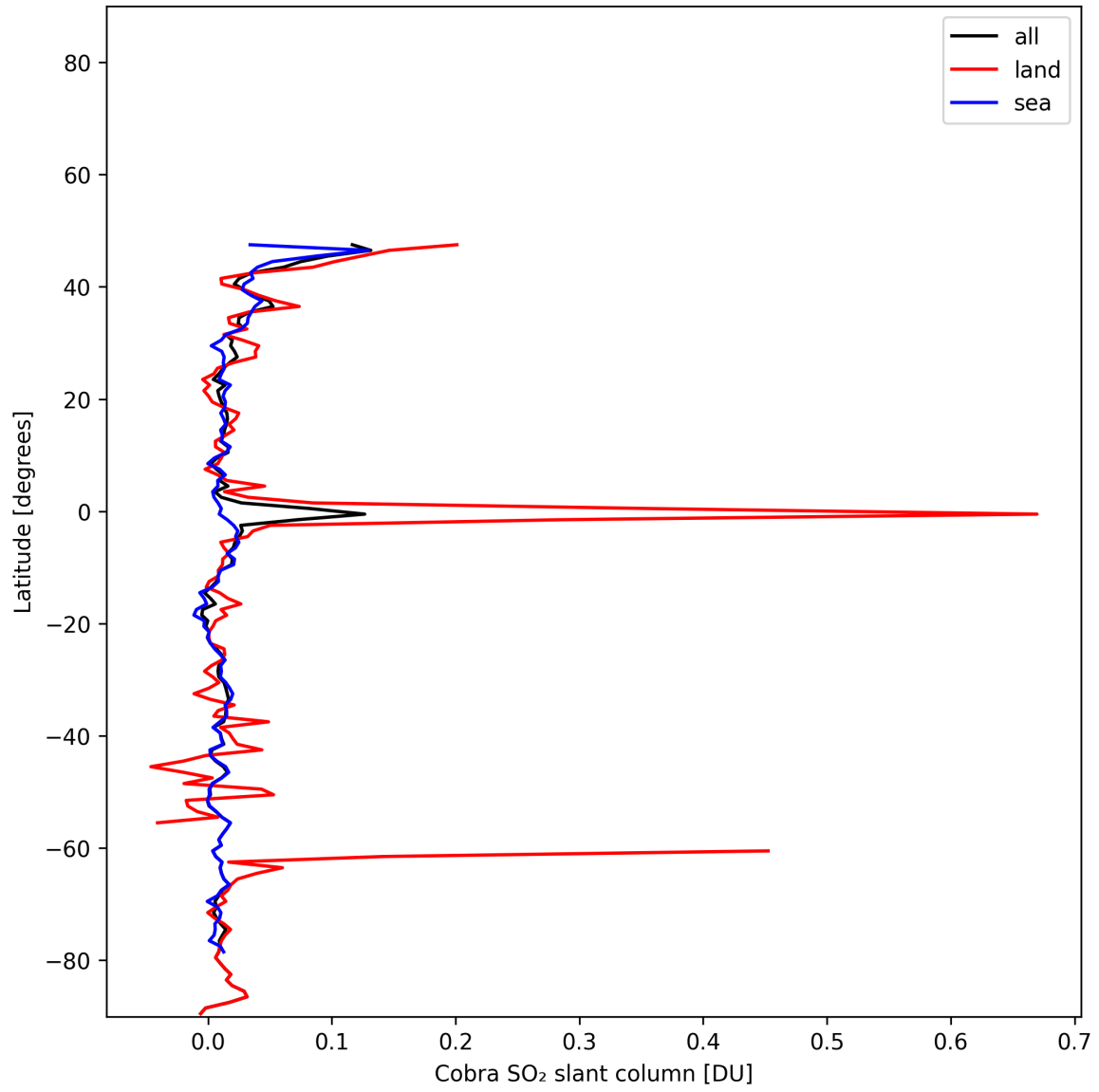


Figure 34: Zonal average of “Cobra SO₂ slant column” for 2024-12-09 to 2024-12-09.

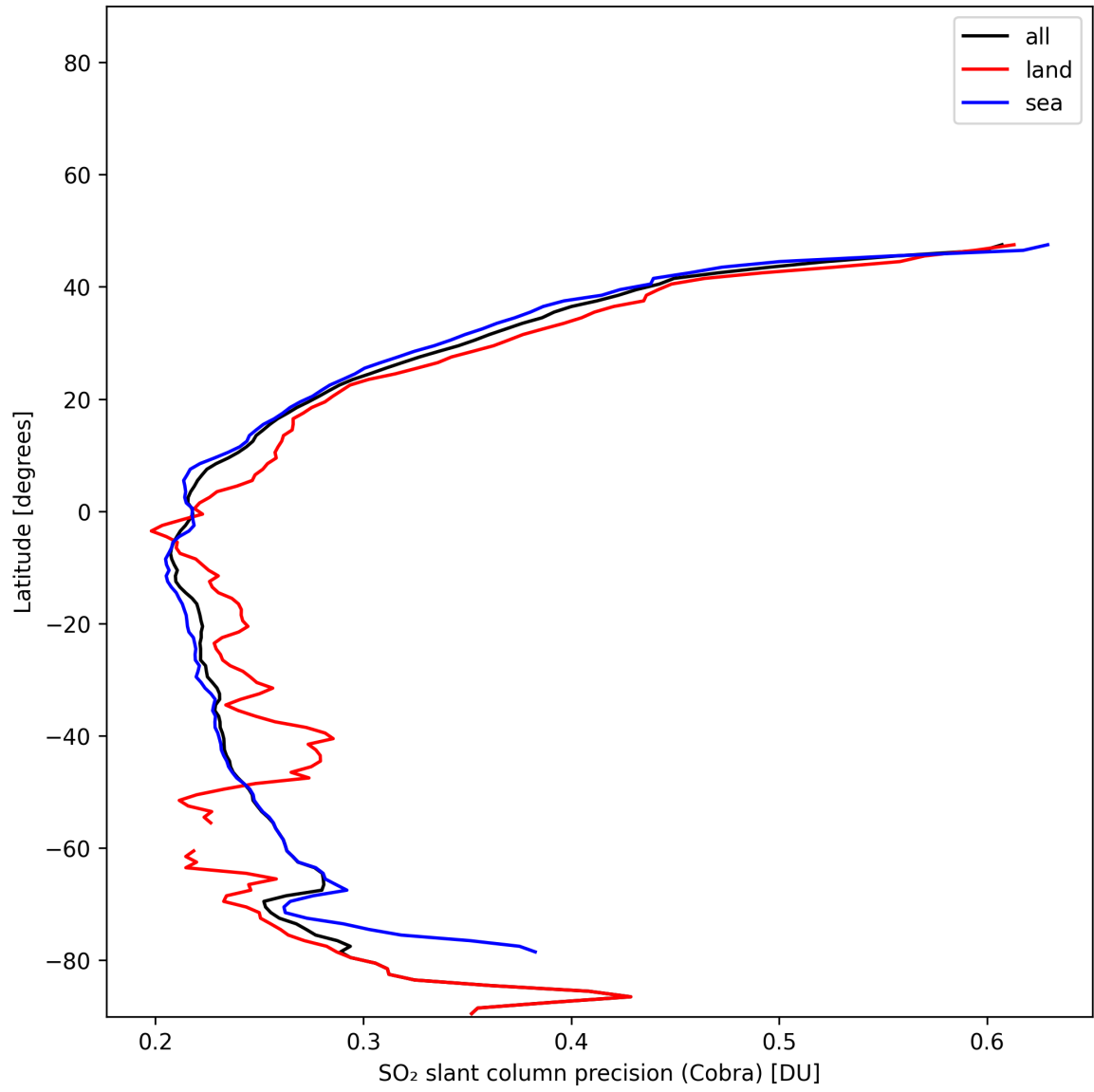


Figure 35: Zonal average of “SO₂ slant column precision (Cobra)” for 2024-12-09 to 2024-12-09.

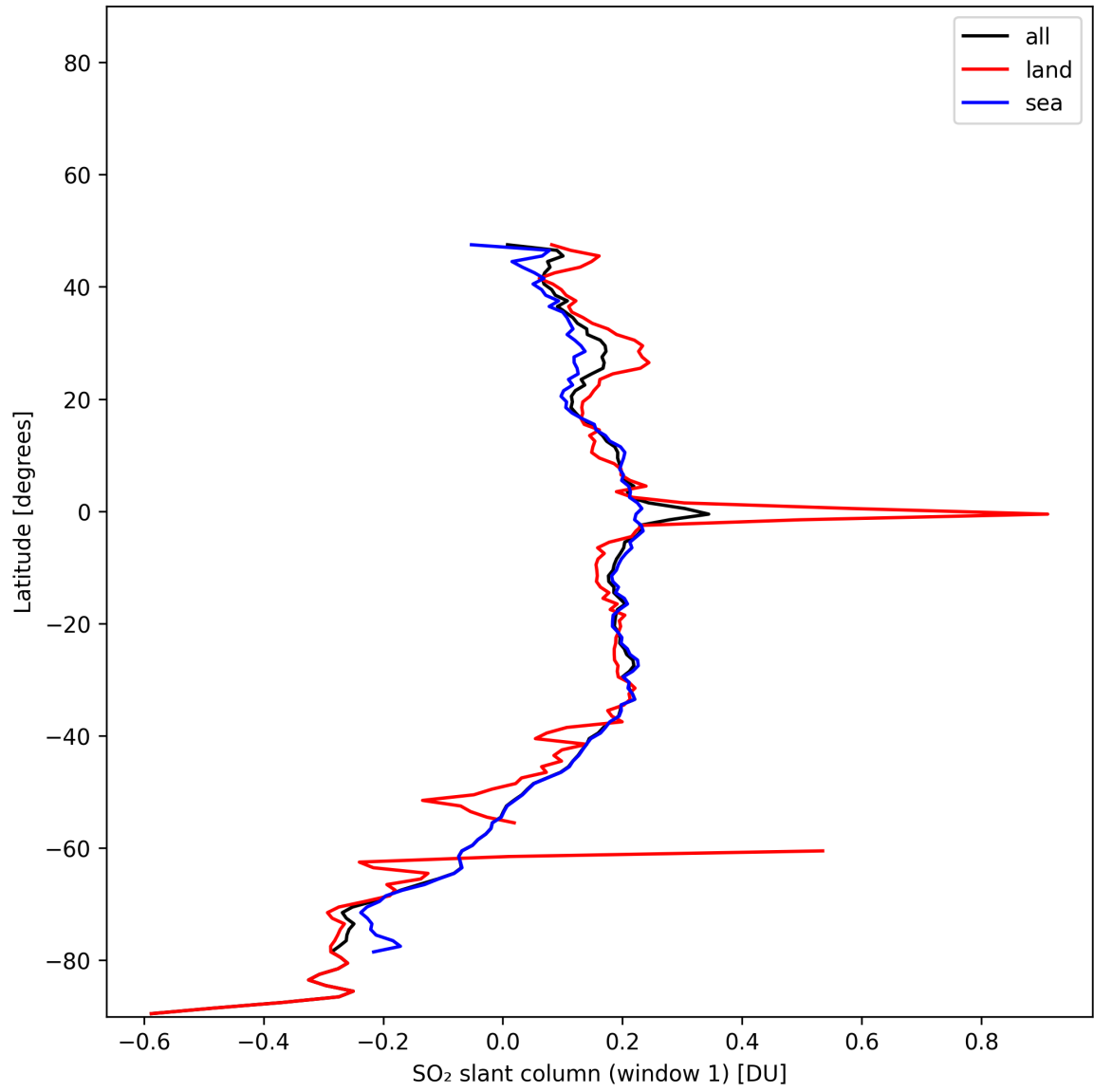


Figure 36: Zonal average of “SO₂ slant column (window 1)” for 2024-12-09 to 2024-12-09.

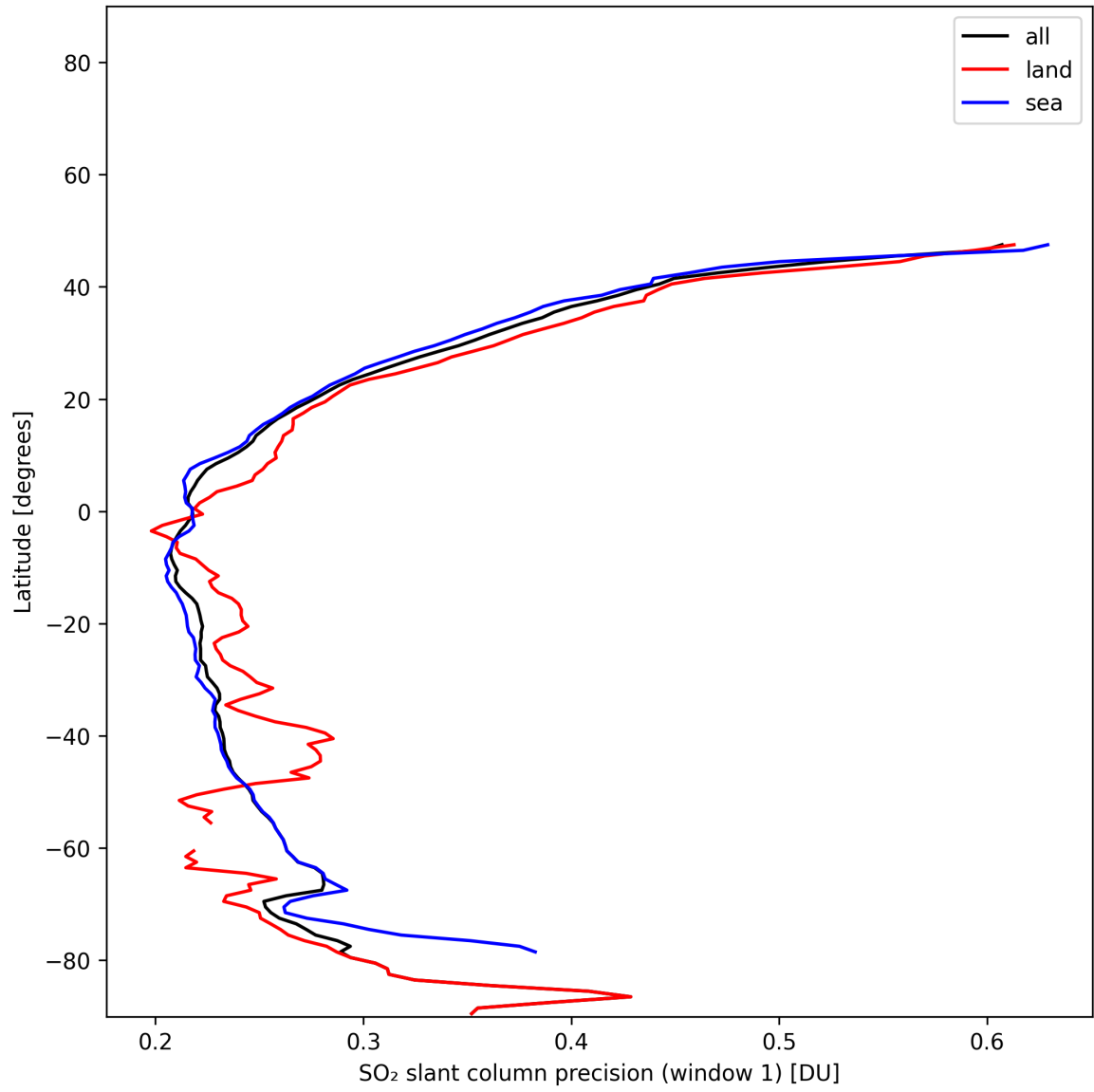


Figure 37: Zonal average of “SO₂ slant column precision (window 1)” for 2024-12-09 to 2024-12-09.

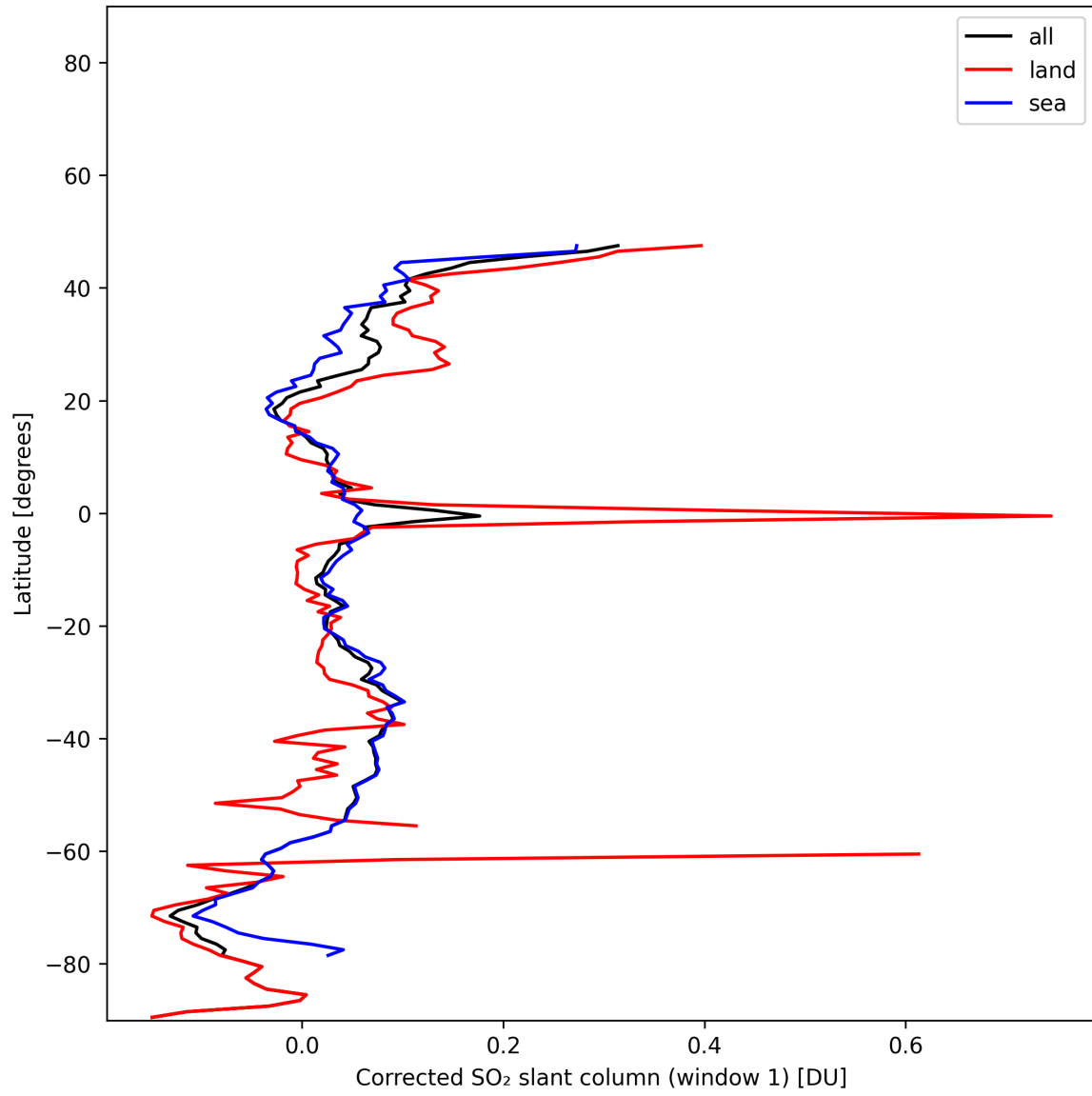


Figure 38: Zonal average of “Corrected SO₂ slant column (window 1)” for 2024-12-09 to 2024-12-09.

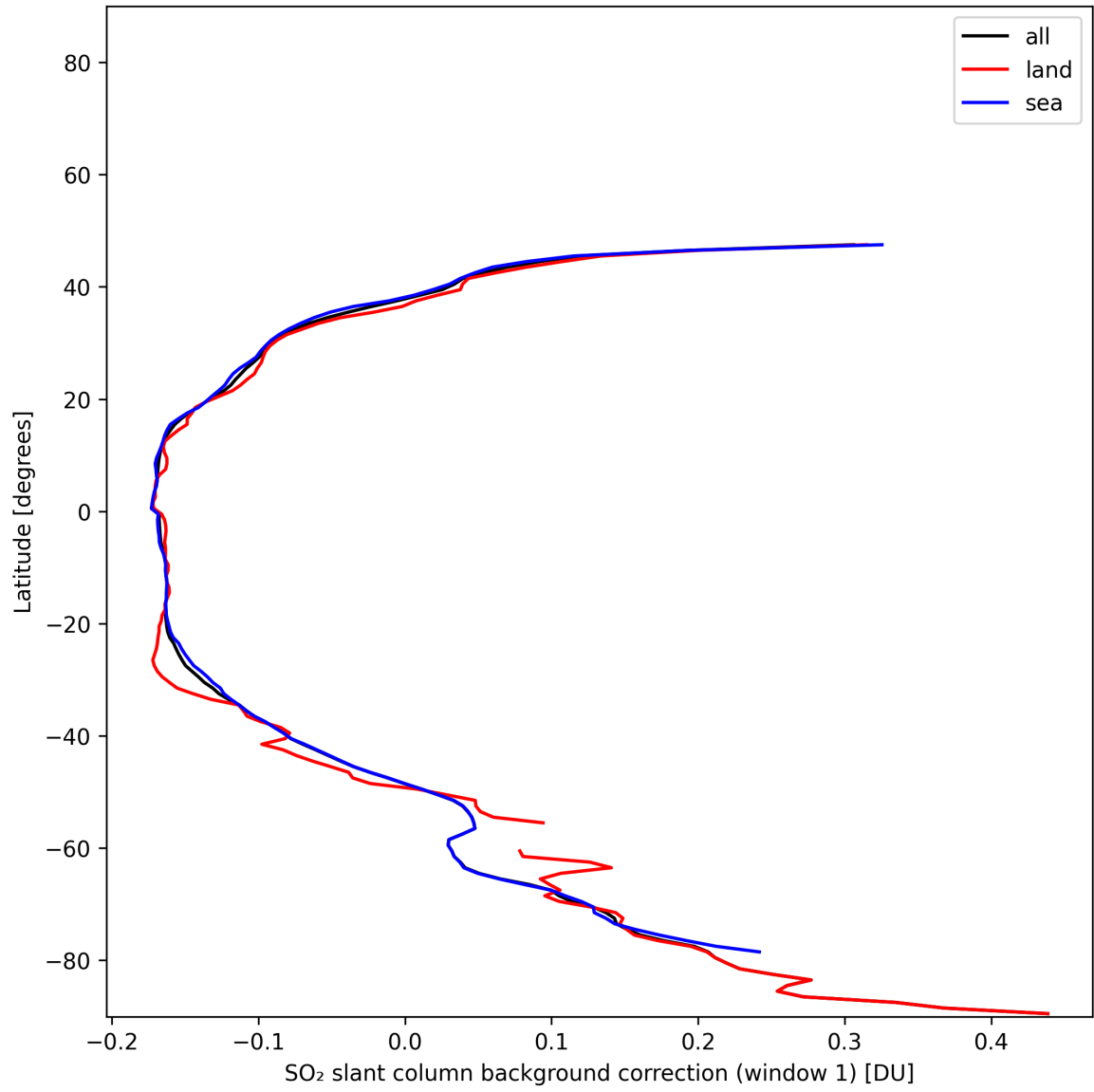


Figure 39: Zonal average of “SO₂ slant column background correction (window 1)” for 2024-12-09 to 2024-12-09.

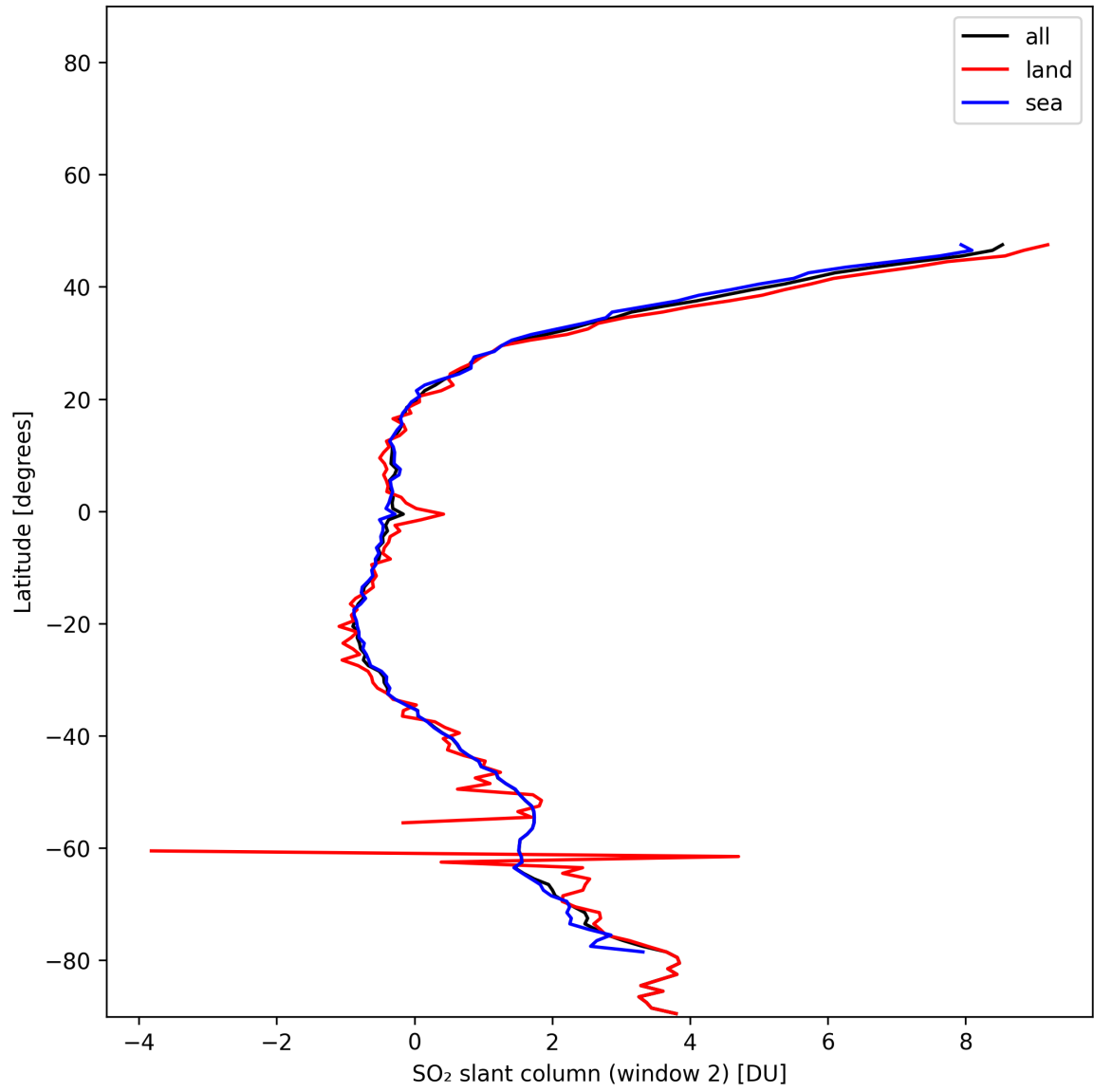


Figure 40: Zonal average of “SO₂ slant column (window 2)” for 2024-12-09 to 2024-12-09.

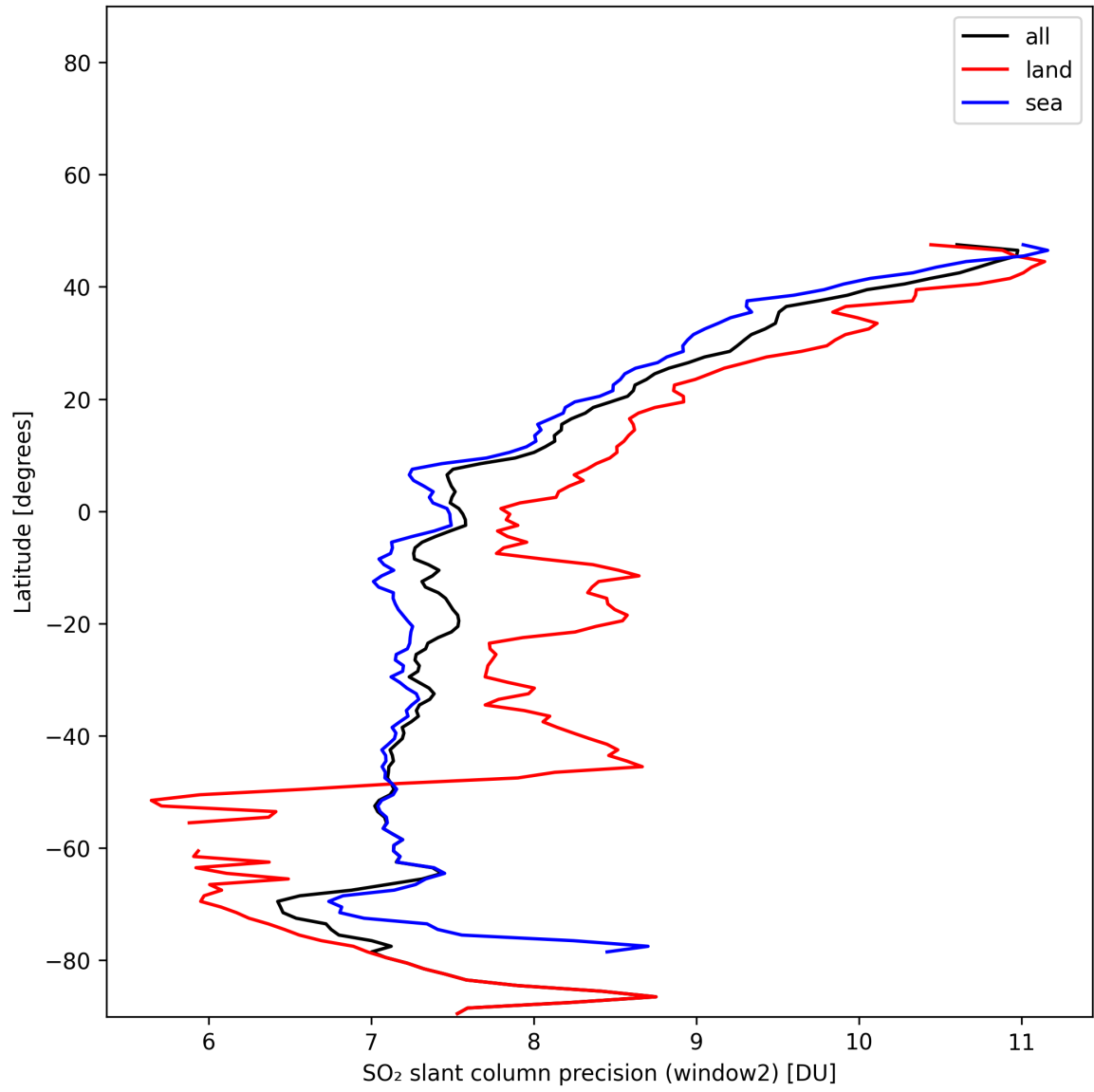


Figure 41: Zonal average of “SO₂ slant column precision (window2)” for 2024-12-09 to 2024-12-09.

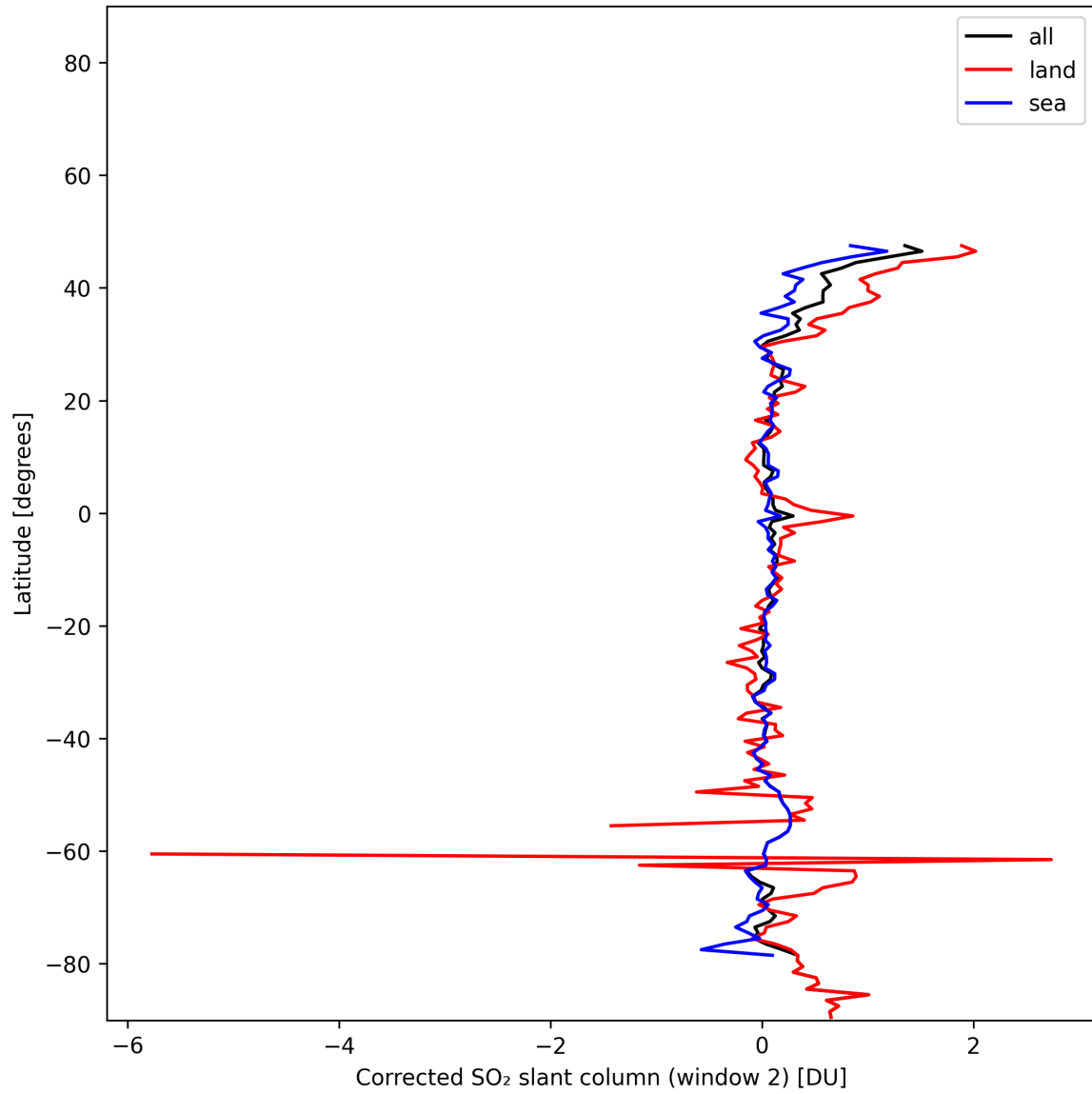


Figure 42: Zonal average of “Corrected SO₂ slant column (window 2)” for 2024-12-09 to 2024-12-09.

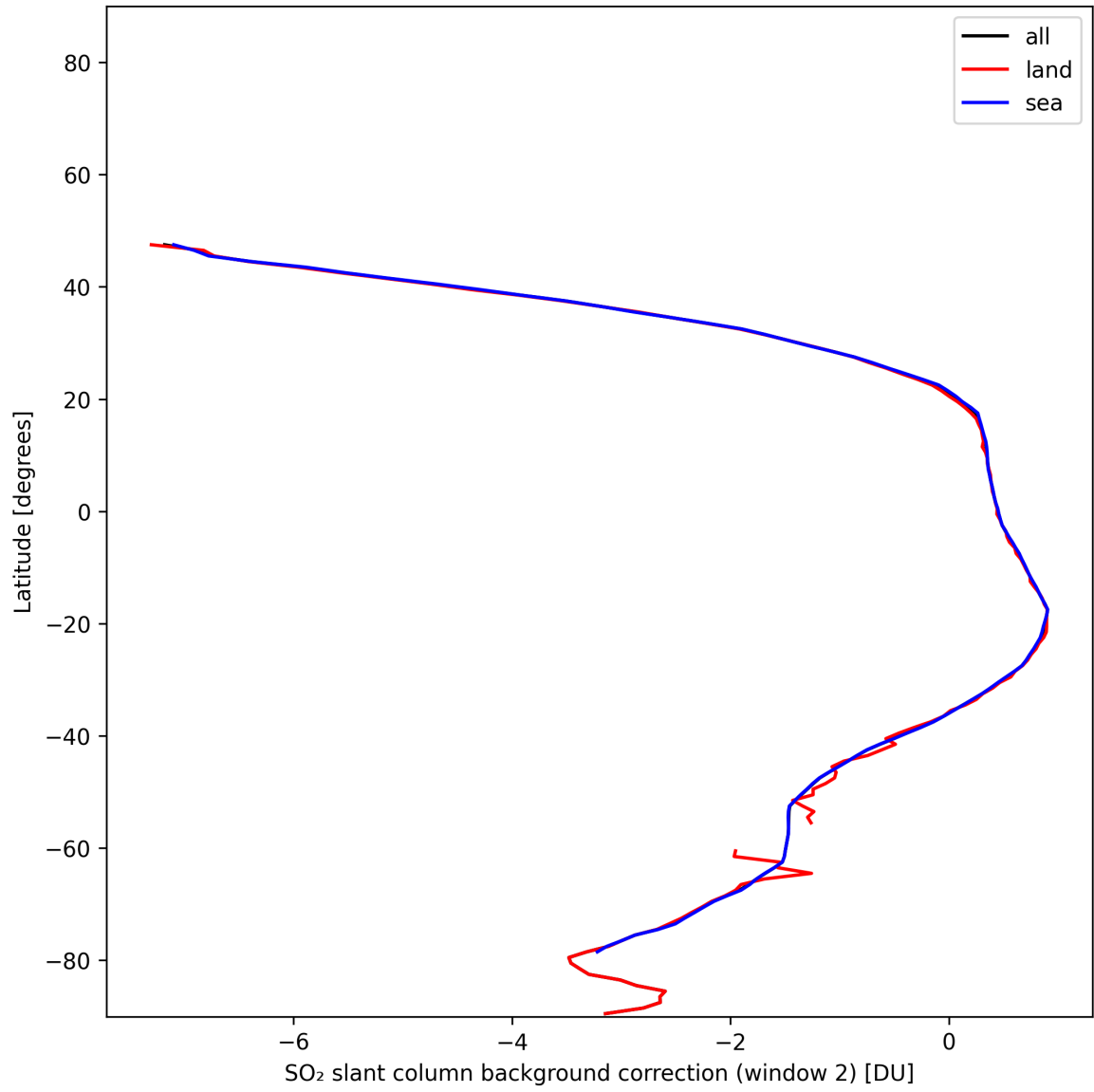


Figure 43: Zonal average of “SO₂ slant column background correction (window 2)” for 2024-12-09 to 2024-12-09.

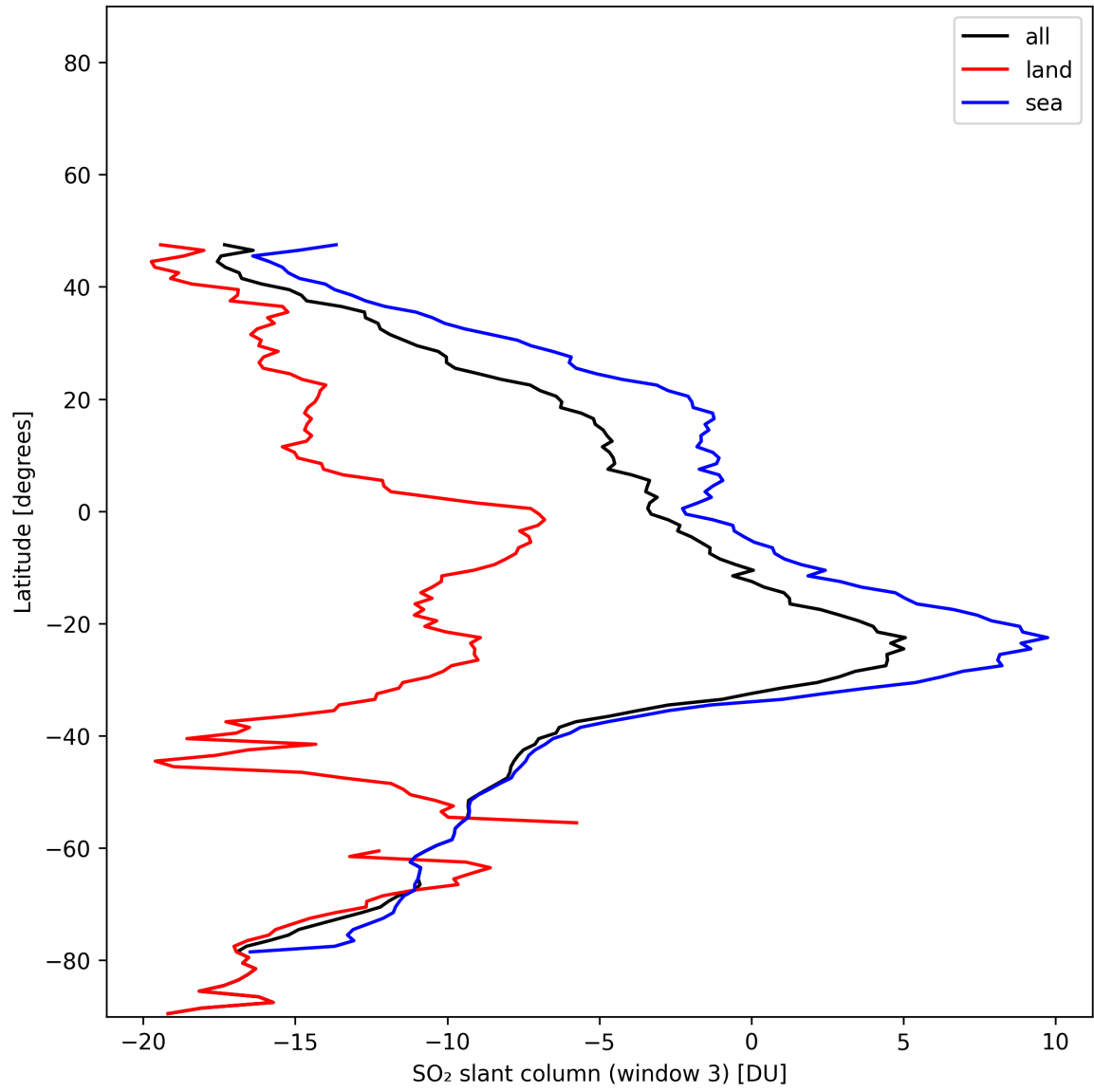


Figure 44: Zonal average of “SO₂ slant column (window 3)” for 2024-12-09 to 2024-12-09.

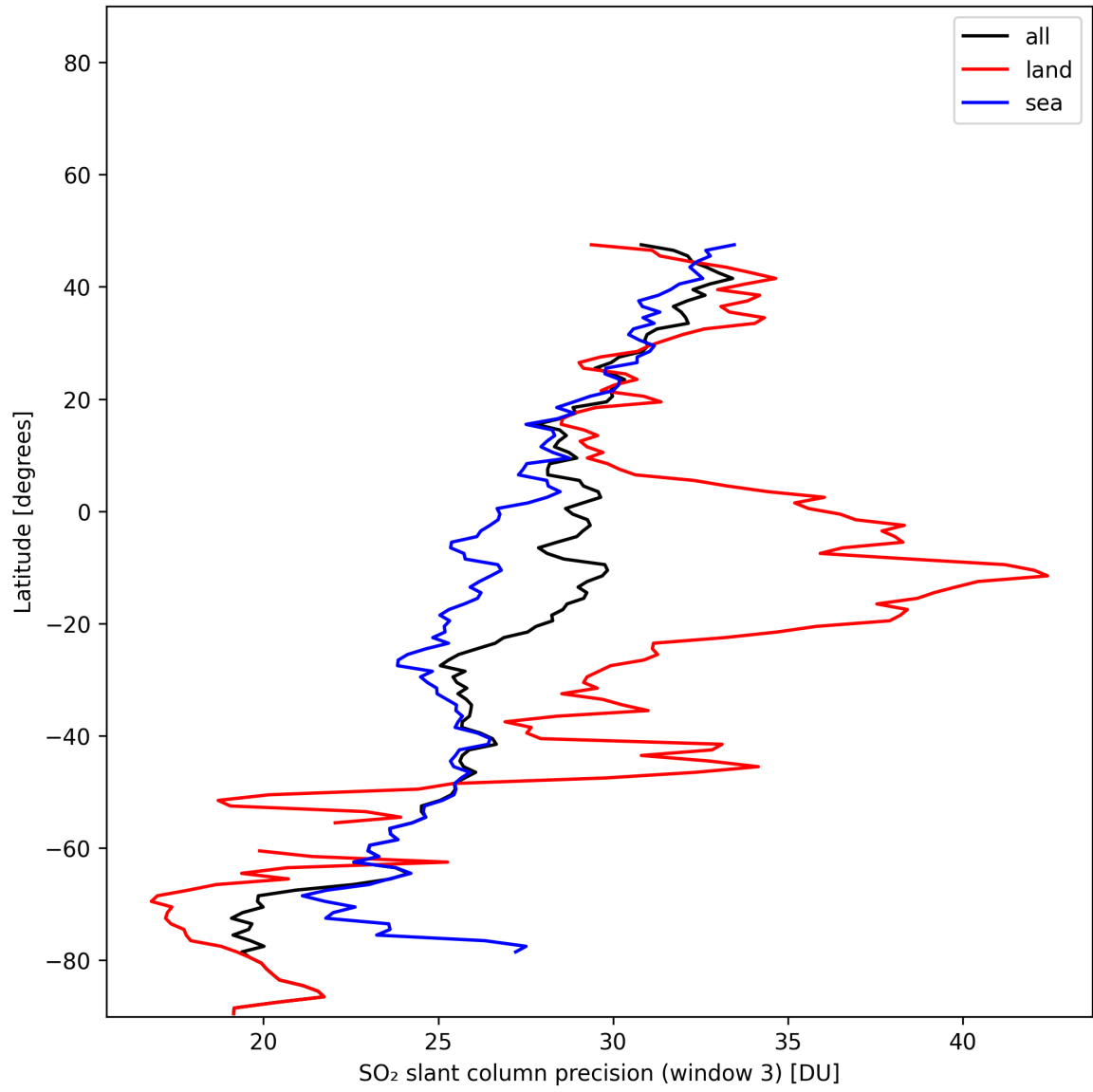


Figure 45: Zonal average of “SO₂ slant column precision (window 3)” for 2024-12-09 to 2024-12-09.

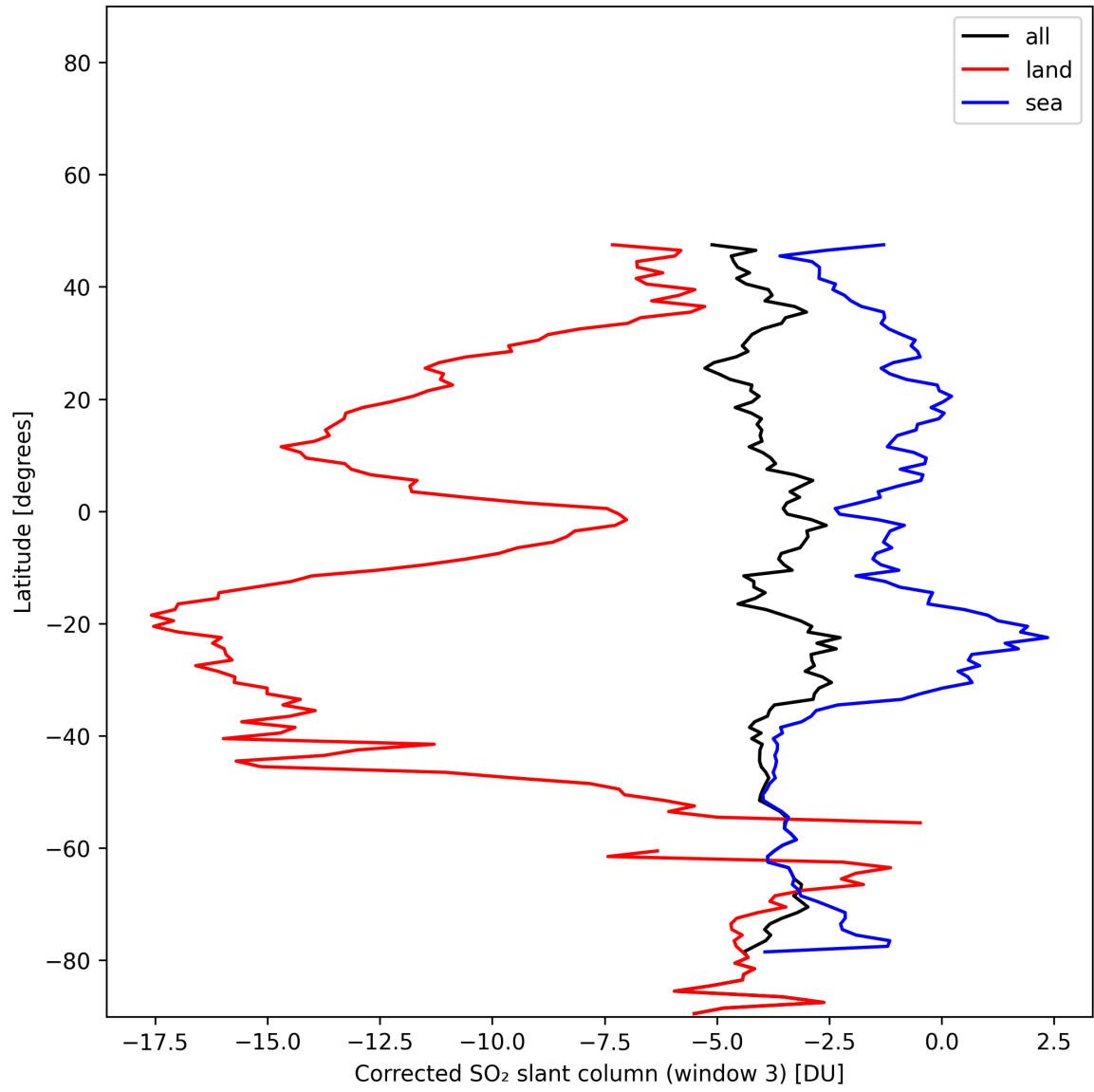


Figure 46: Zonal average of “Corrected SO₂ slant column (window 3)” for 2024-12-09 to 2024-12-09.

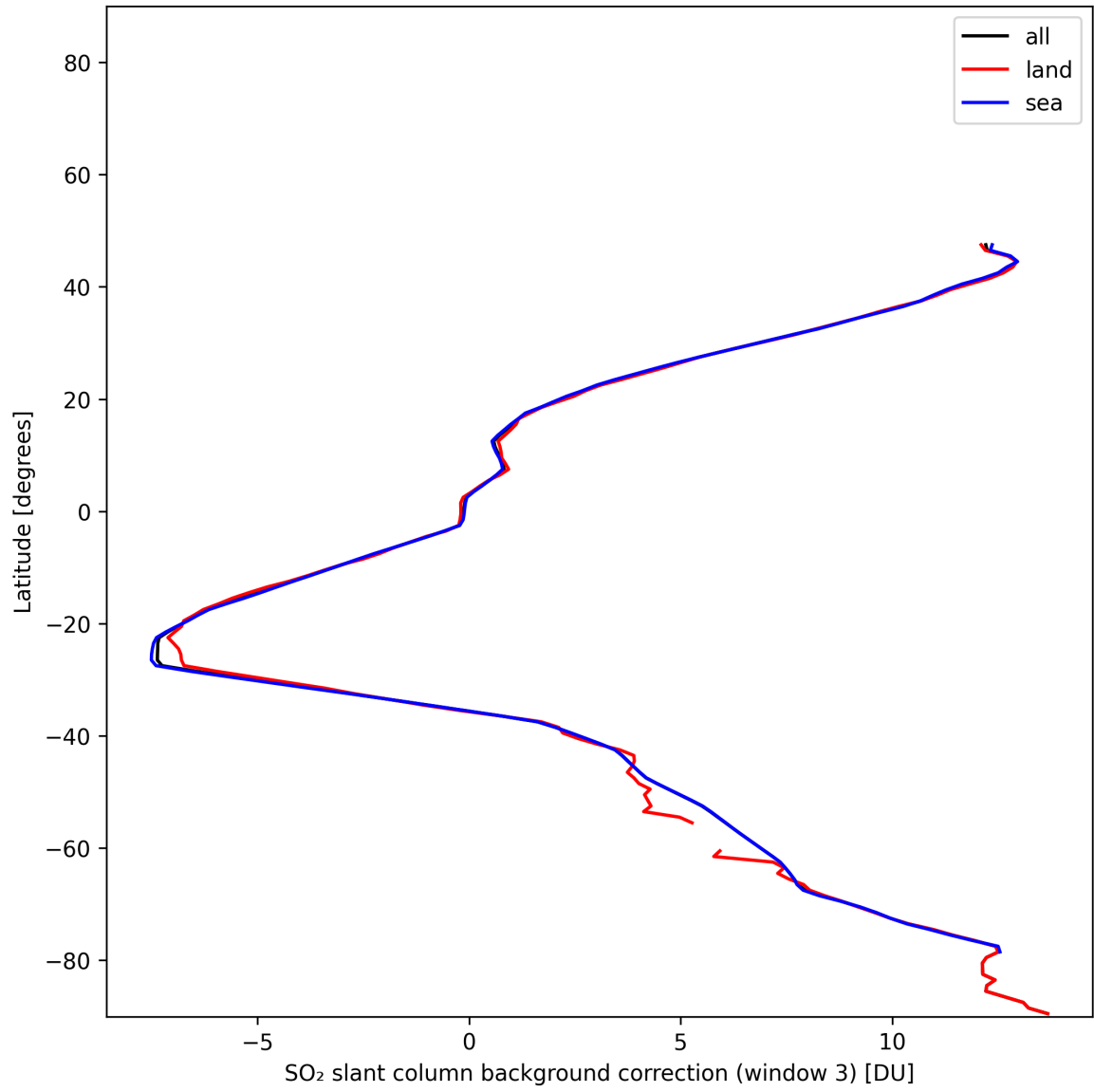


Figure 47: Zonal average of “SO₂ slant column background correction (window 3)” for 2024-12-09 to 2024-12-09.

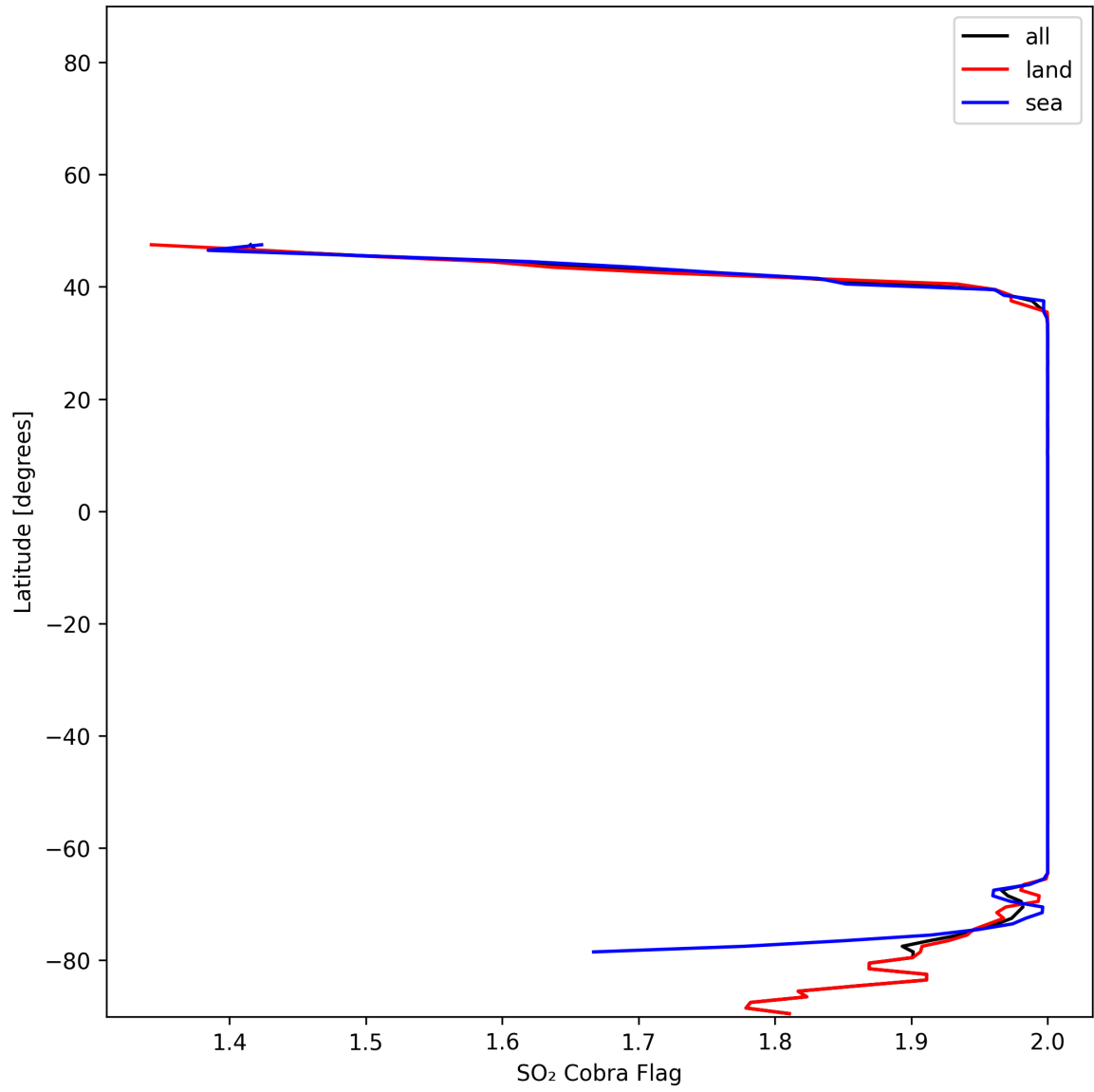


Figure 48: Zonal average of “SO₂ Cobra Flag” for 2024-12-09 to 2024-12-09.

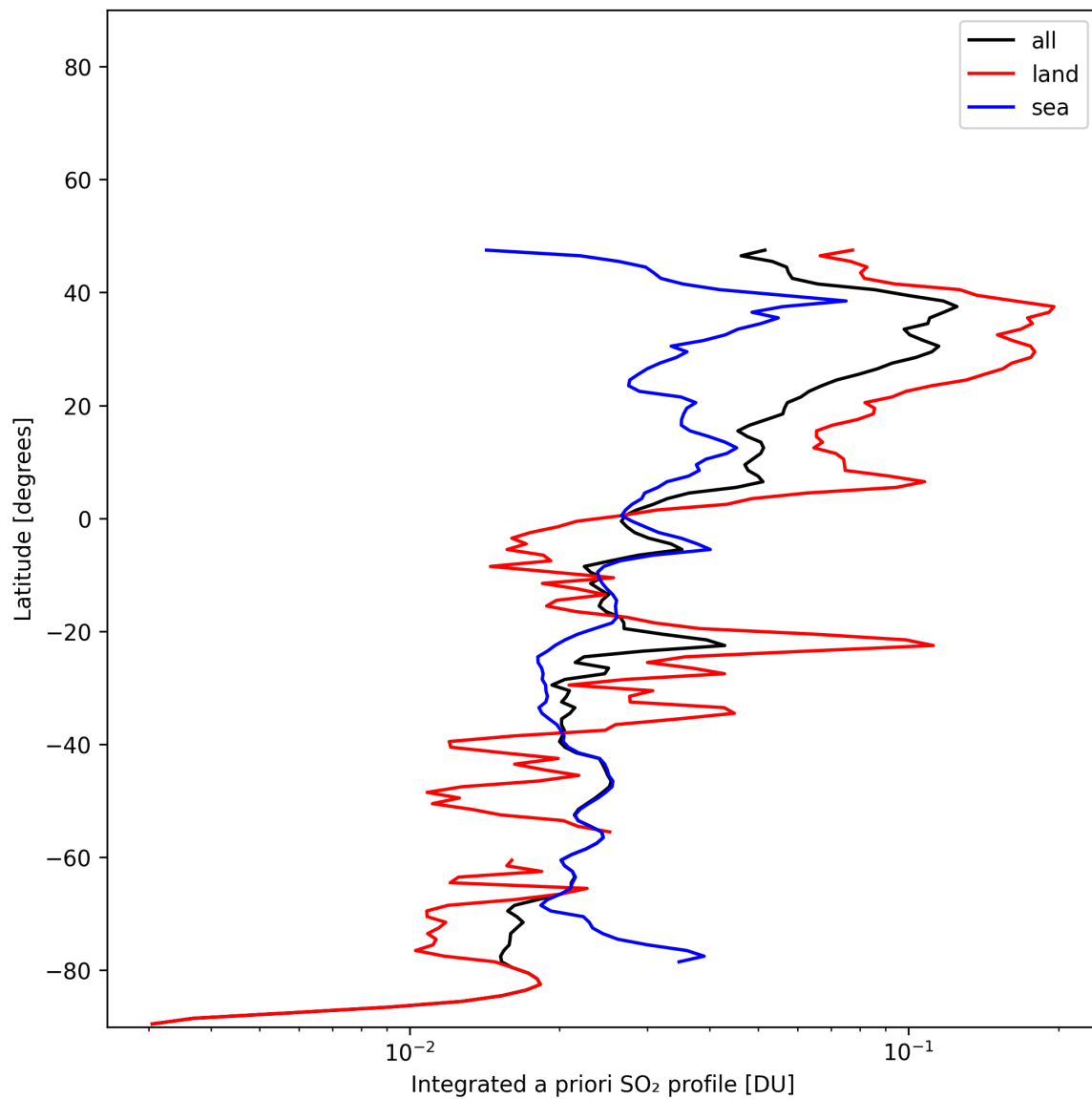


Figure 49: Zonal average of “Integrated a priori SO₂ profile” for 2024-12-09 to 2024-12-09.

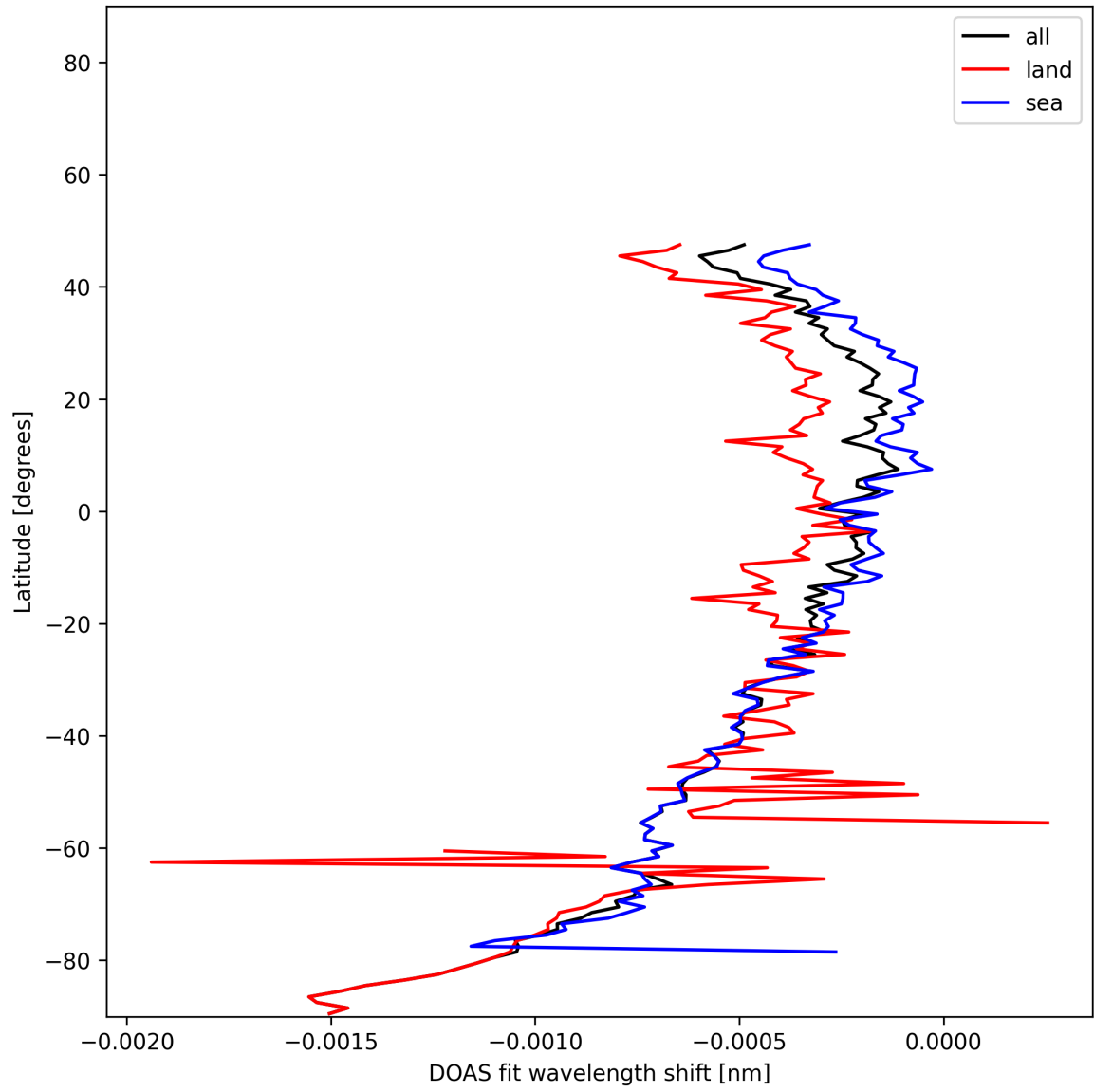


Figure 50: Zonal average of “DOAS fit wavelength shift” for 2024-12-09 to 2024-12-09.

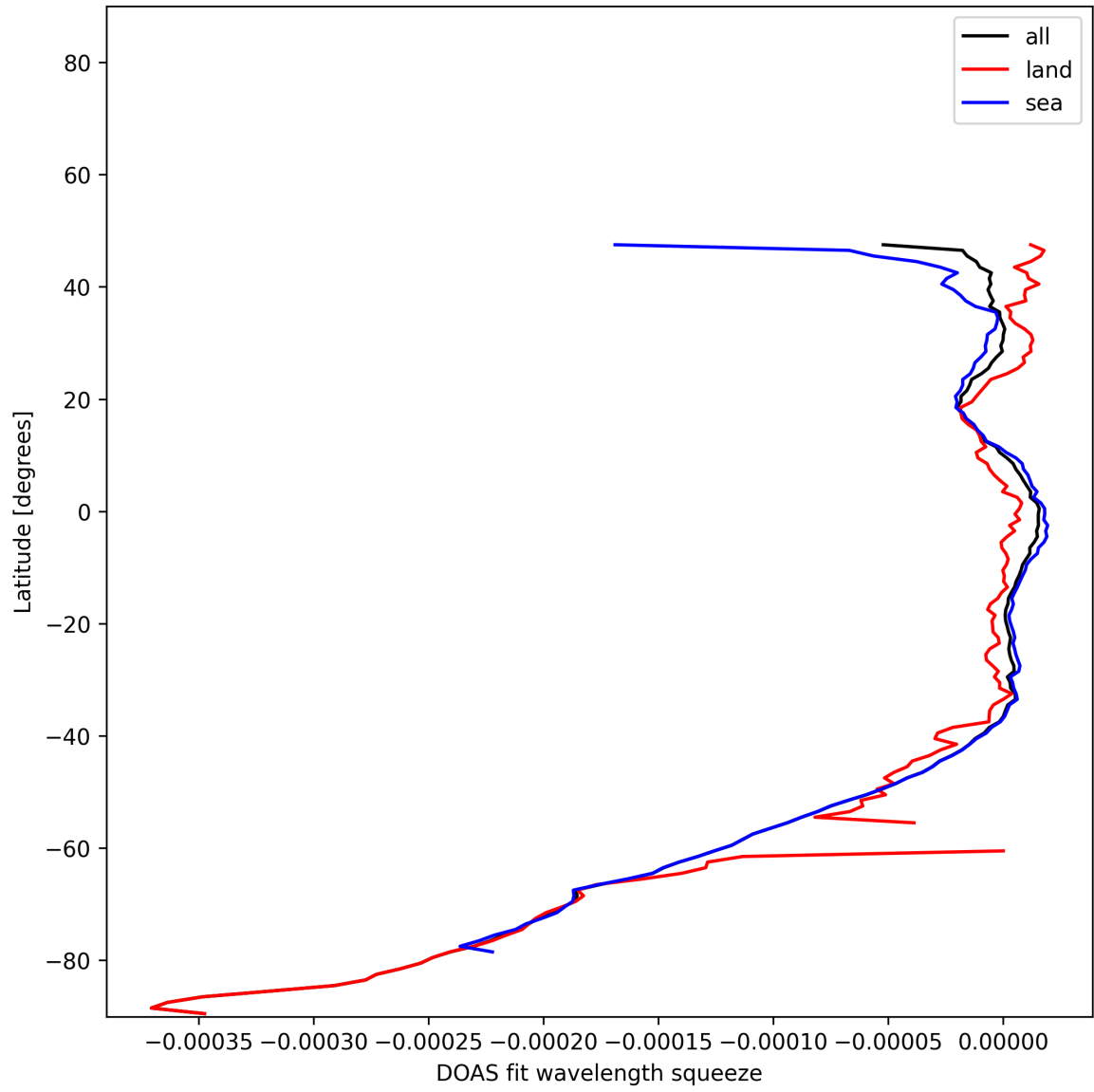


Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2024-12-09 to 2024-12-09.

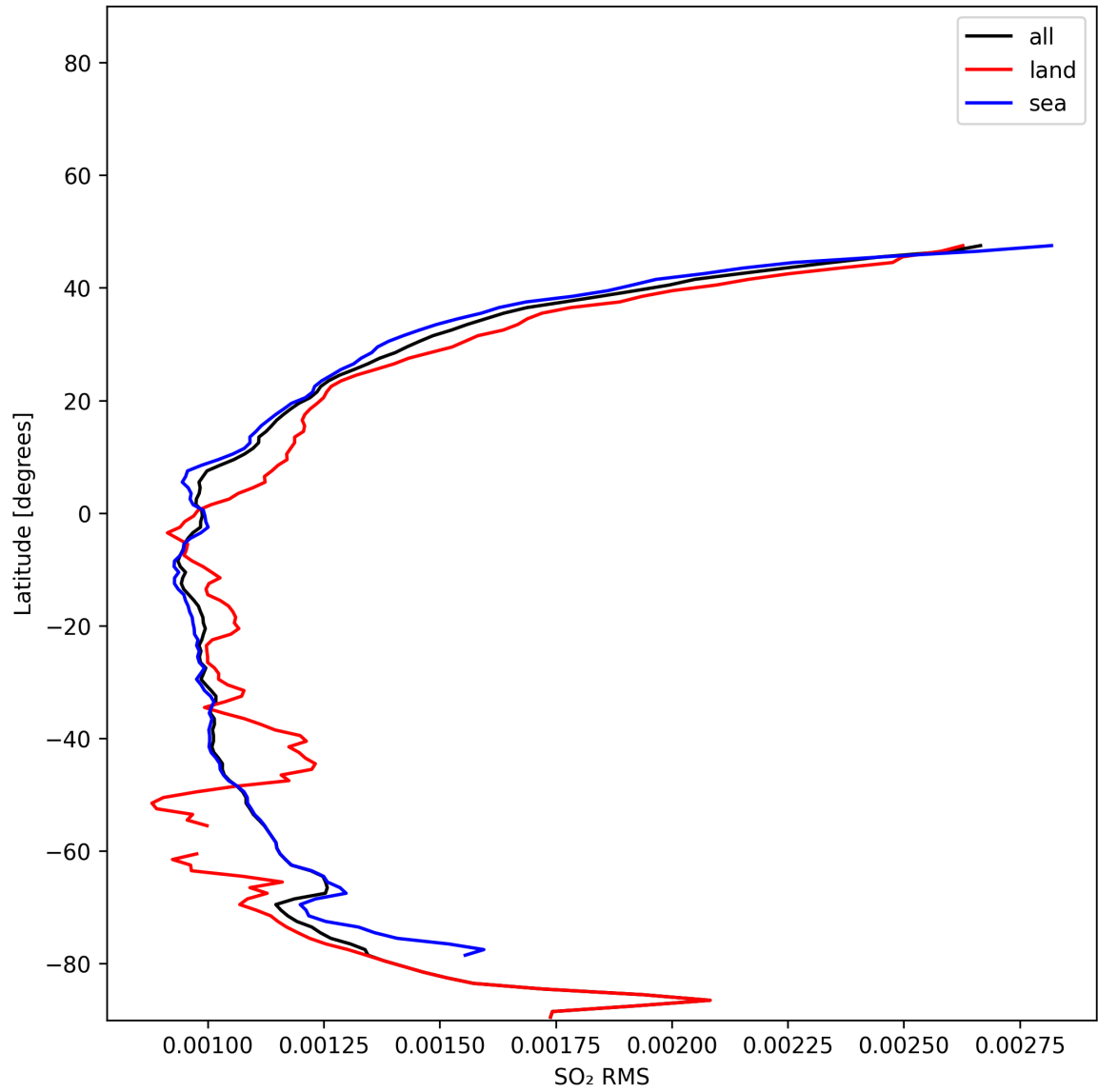


Figure 52: Zonal average of “SO₂ RMS” for 2024-12-09 to 2024-12-09.

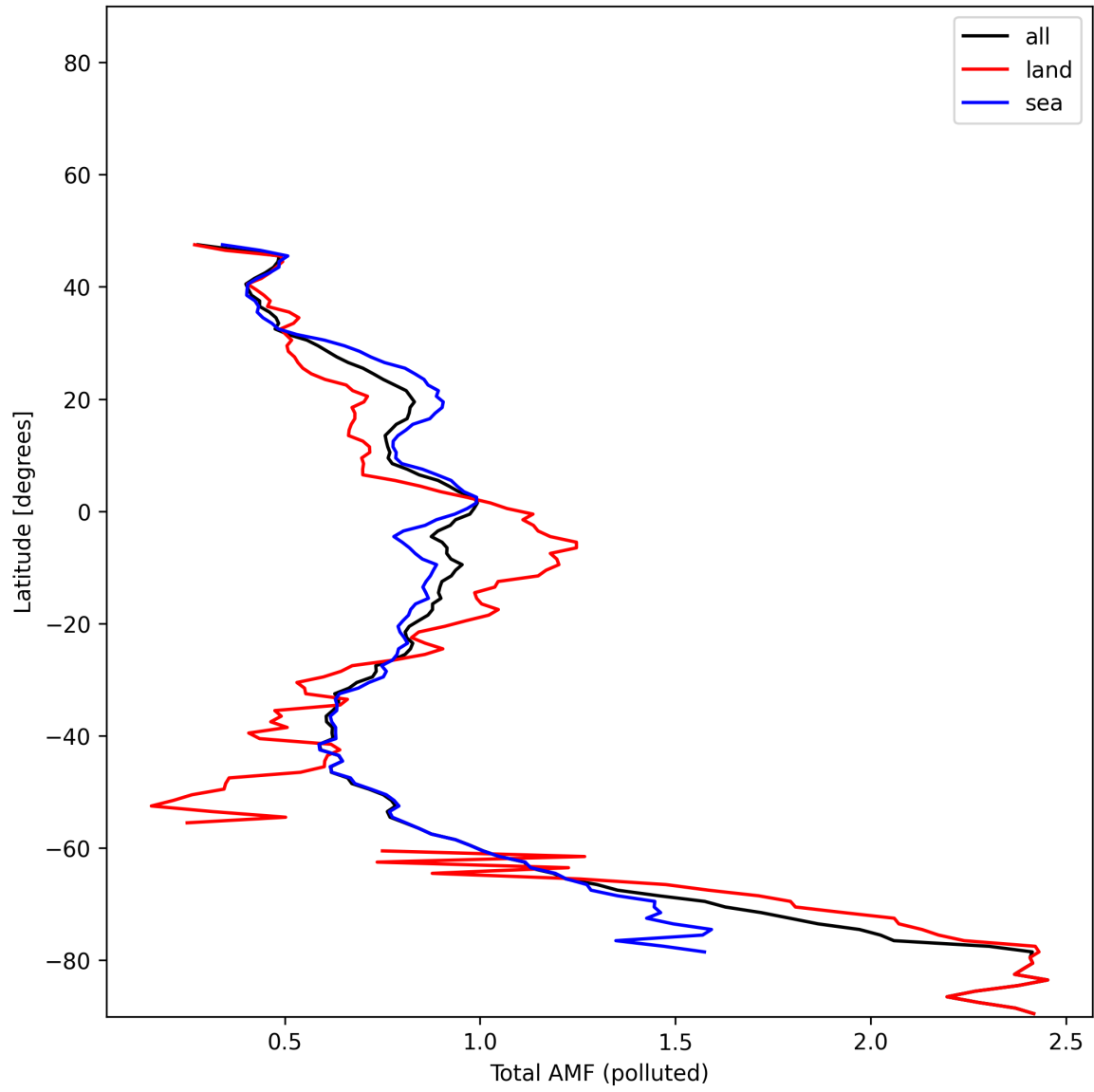


Figure 53: Zonal average of “Total AMF (polluted)” for 2024-12-09 to 2024-12-09.

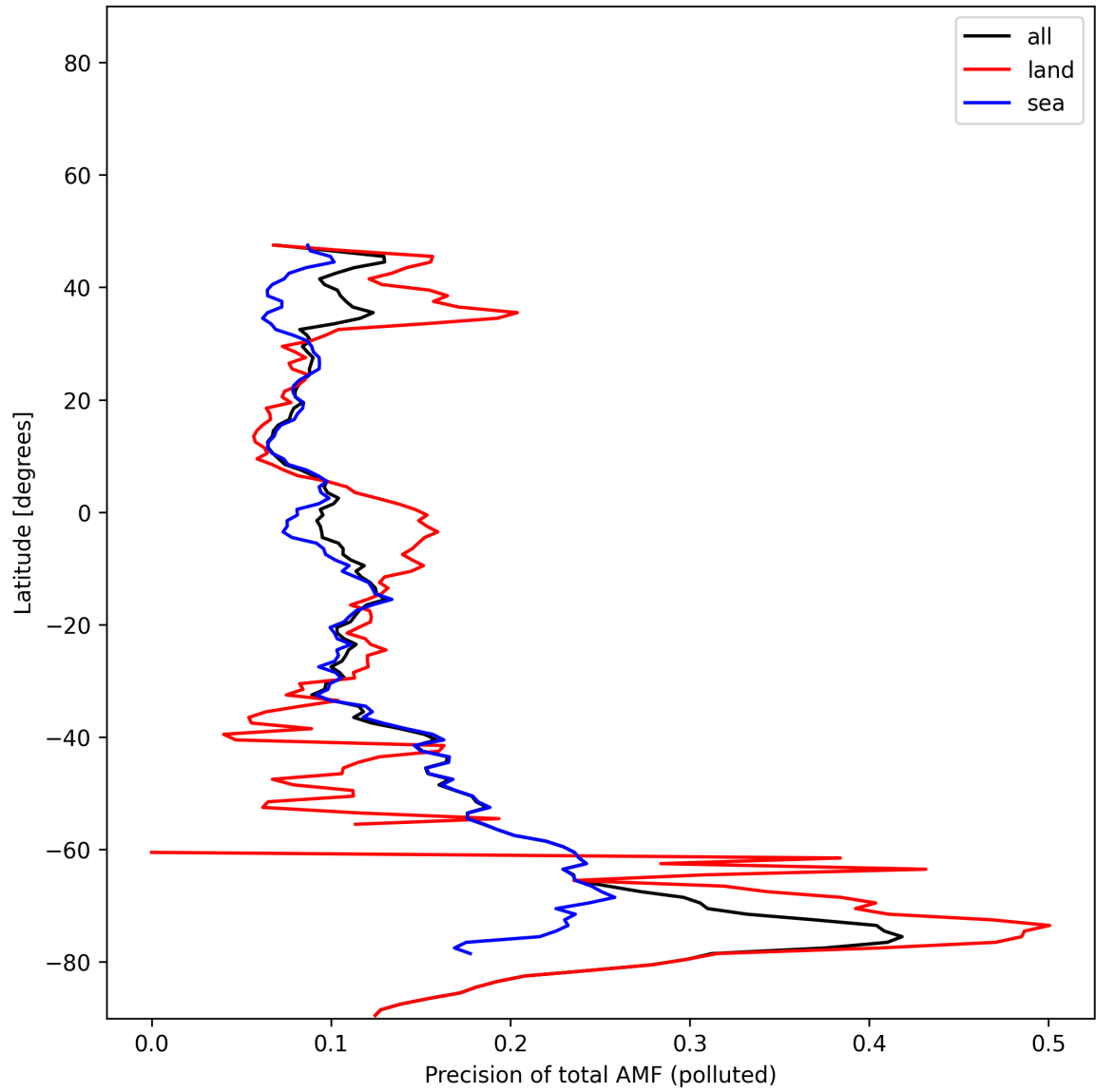


Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2024-12-09 to 2024-12-09.

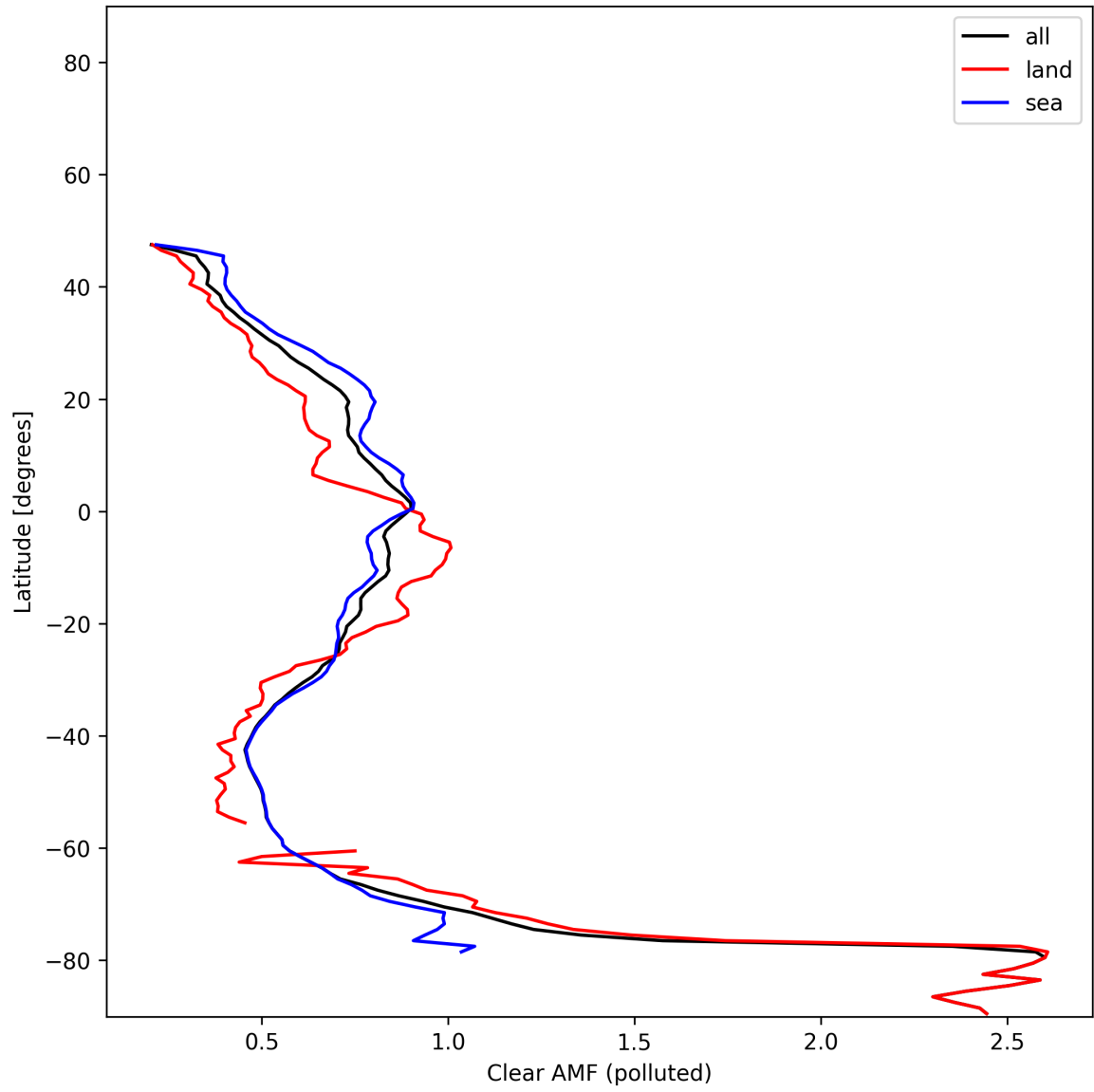


Figure 55: Zonal average of “Clear AMF (polluted)” for 2024-12-09 to 2024-12-09.

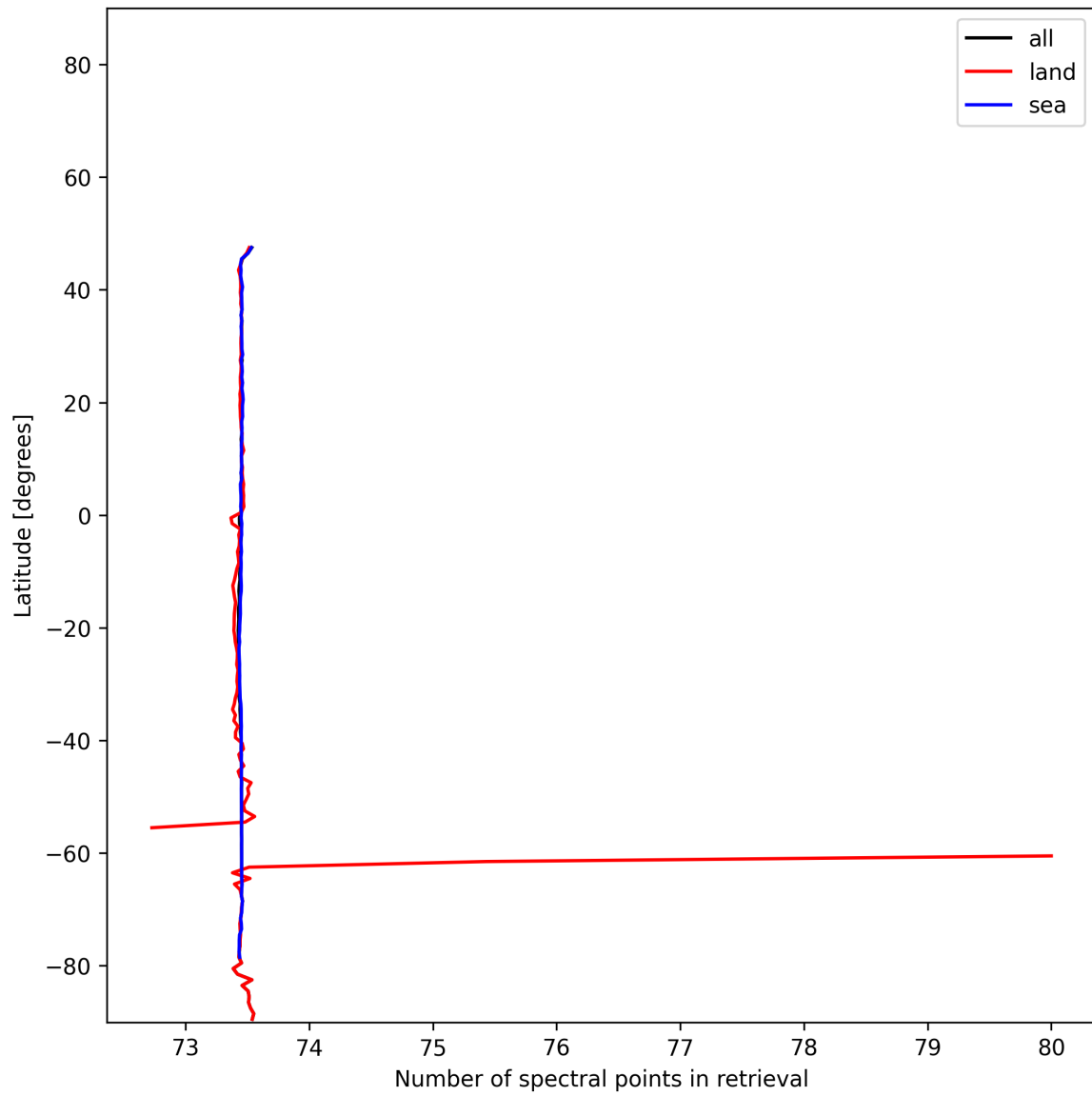


Figure 56: Zonal average of “Number of spectral points in retrieval” for 2024-12-09 to 2024-12-09.

8 Histograms

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

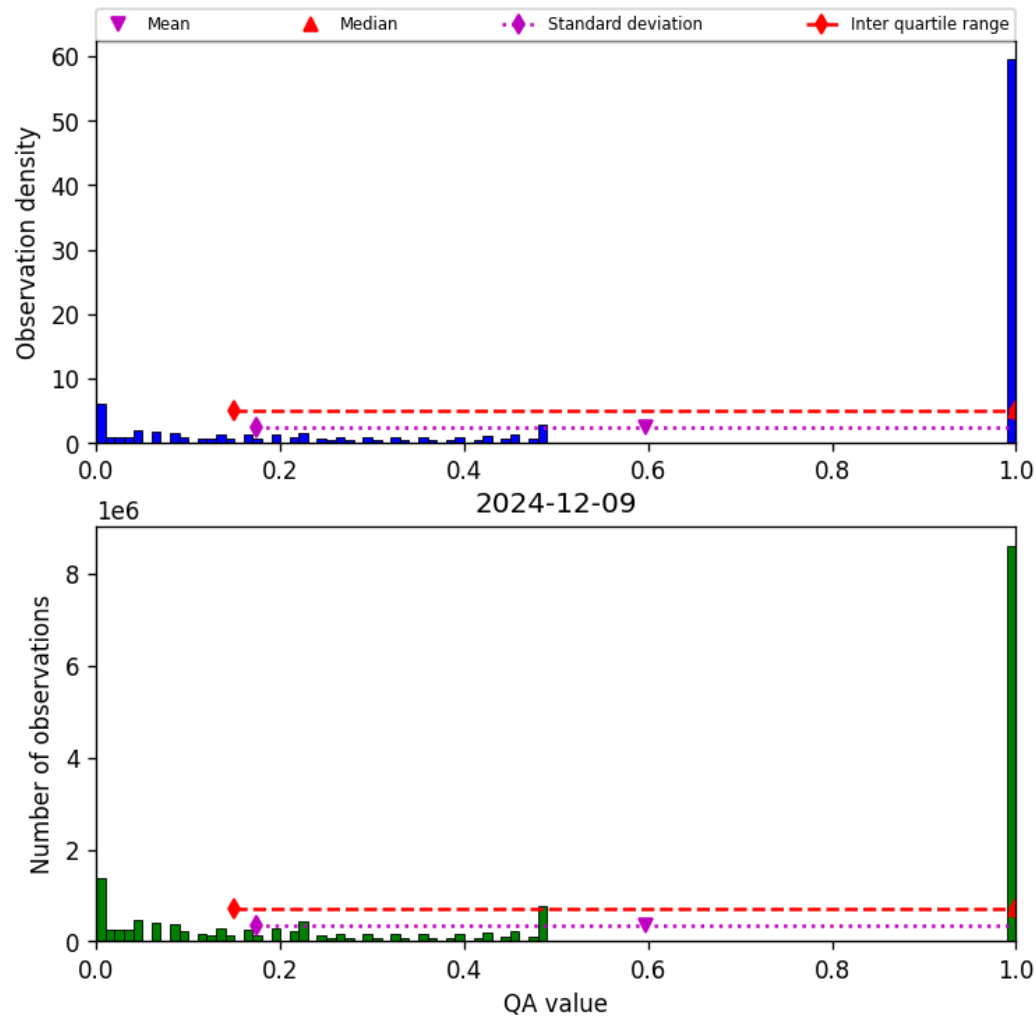


Figure 57: Histogram of “QA value” for 2024-12-09 to 2024-12-09

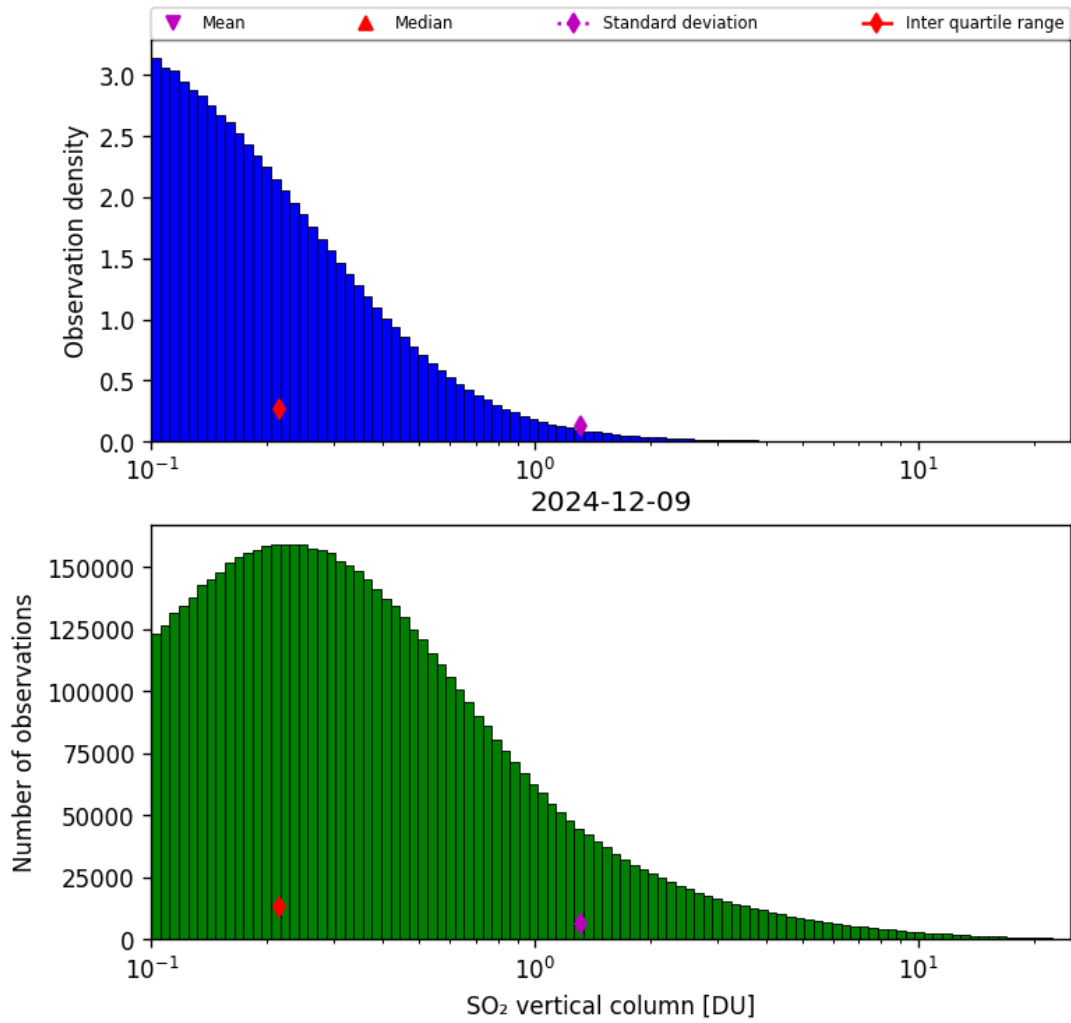


Figure 58: Histogram of “SO₂ vertical column” for 2024-12-09 to 2024-12-09

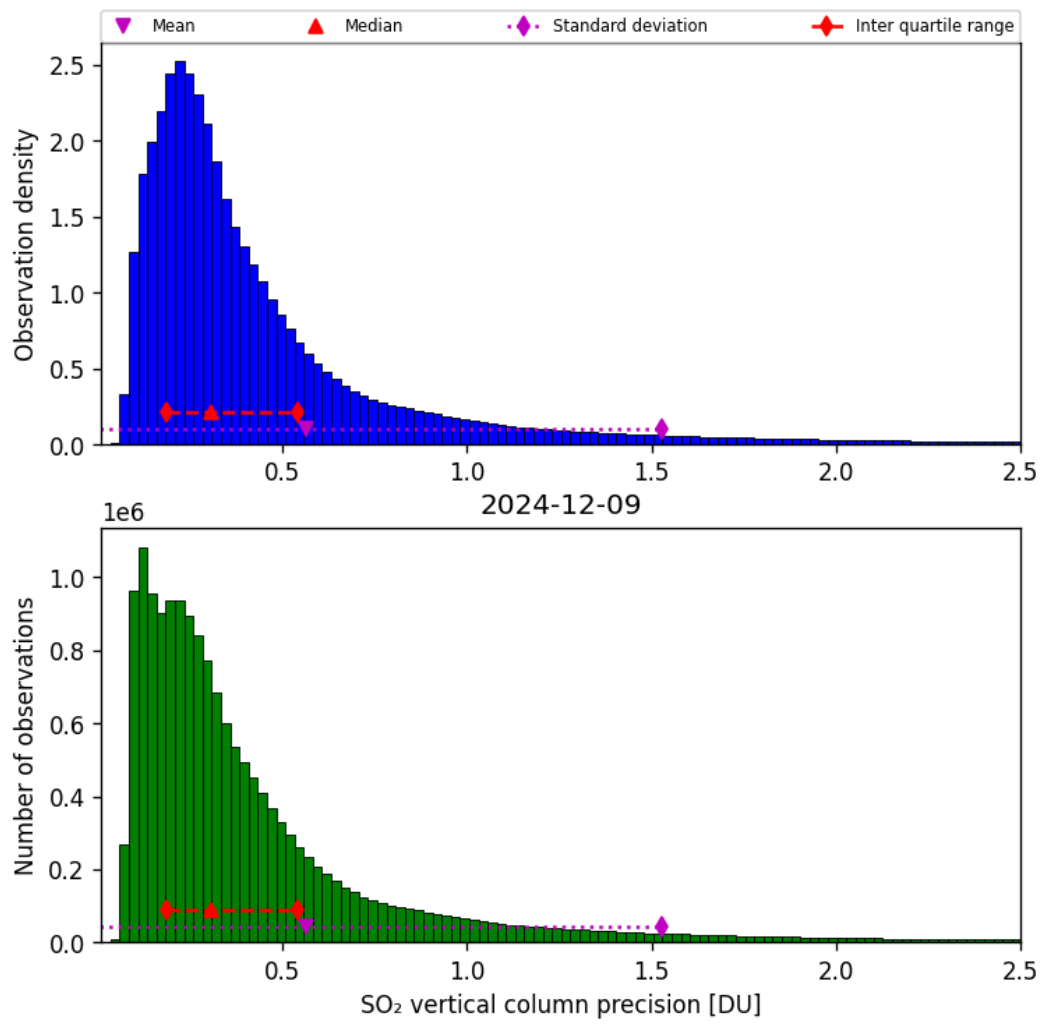


Figure 59: Histogram of “SO₂ vertical column precision” for 2024-12-09 to 2024-12-09

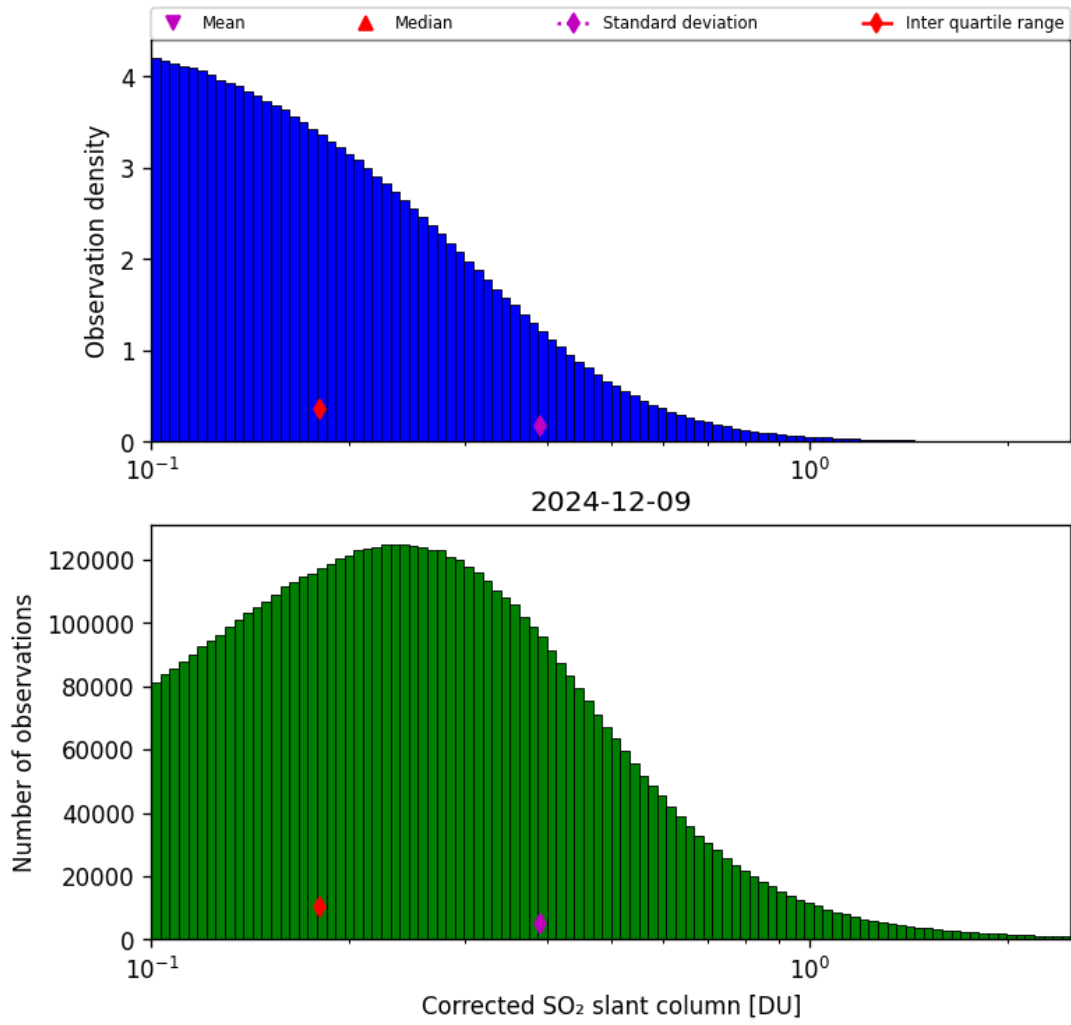


Figure 60: Histogram of “Corrected SO₂ slant column” for 2024-12-09 to 2024-12-09

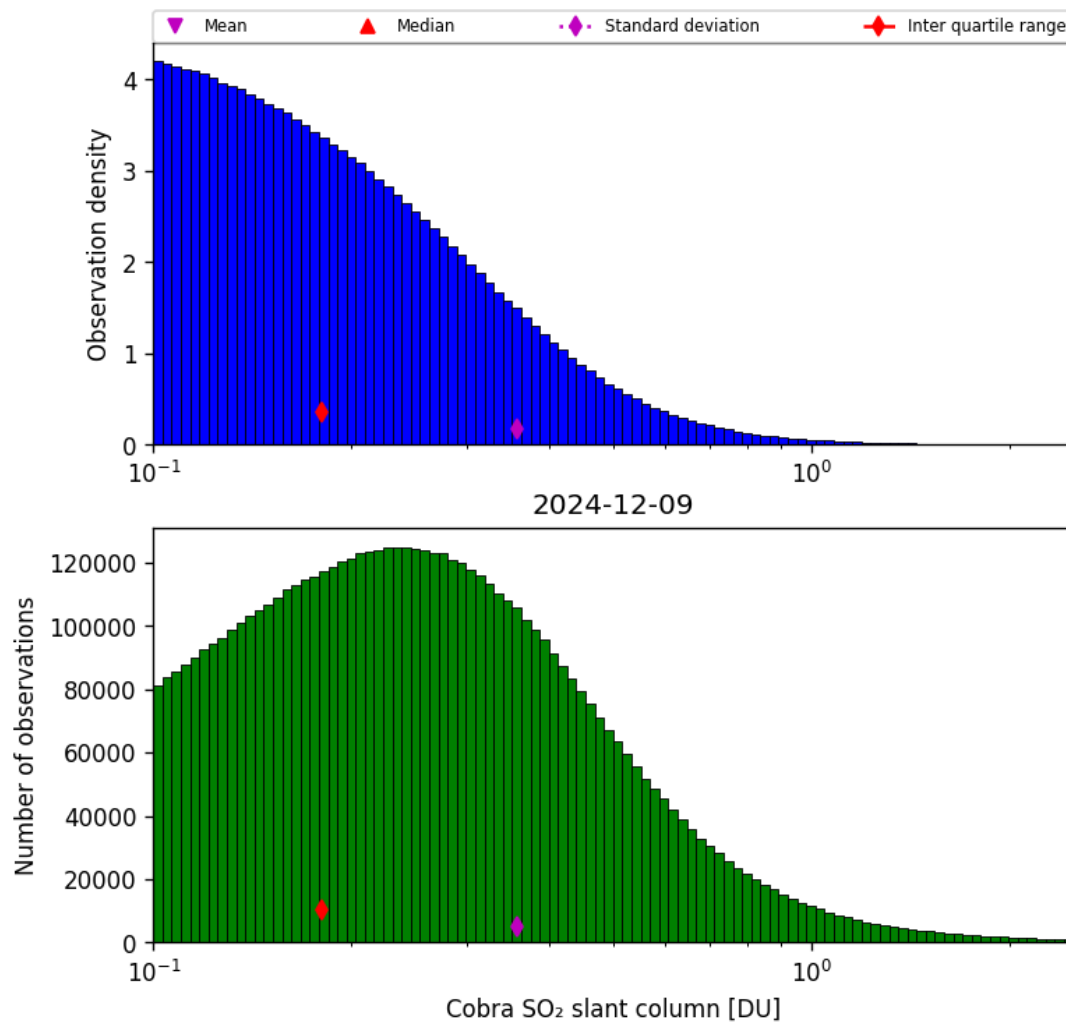


Figure 61: Histogram of “Cobra SO₂ slant column” for 2024-12-09 to 2024-12-09

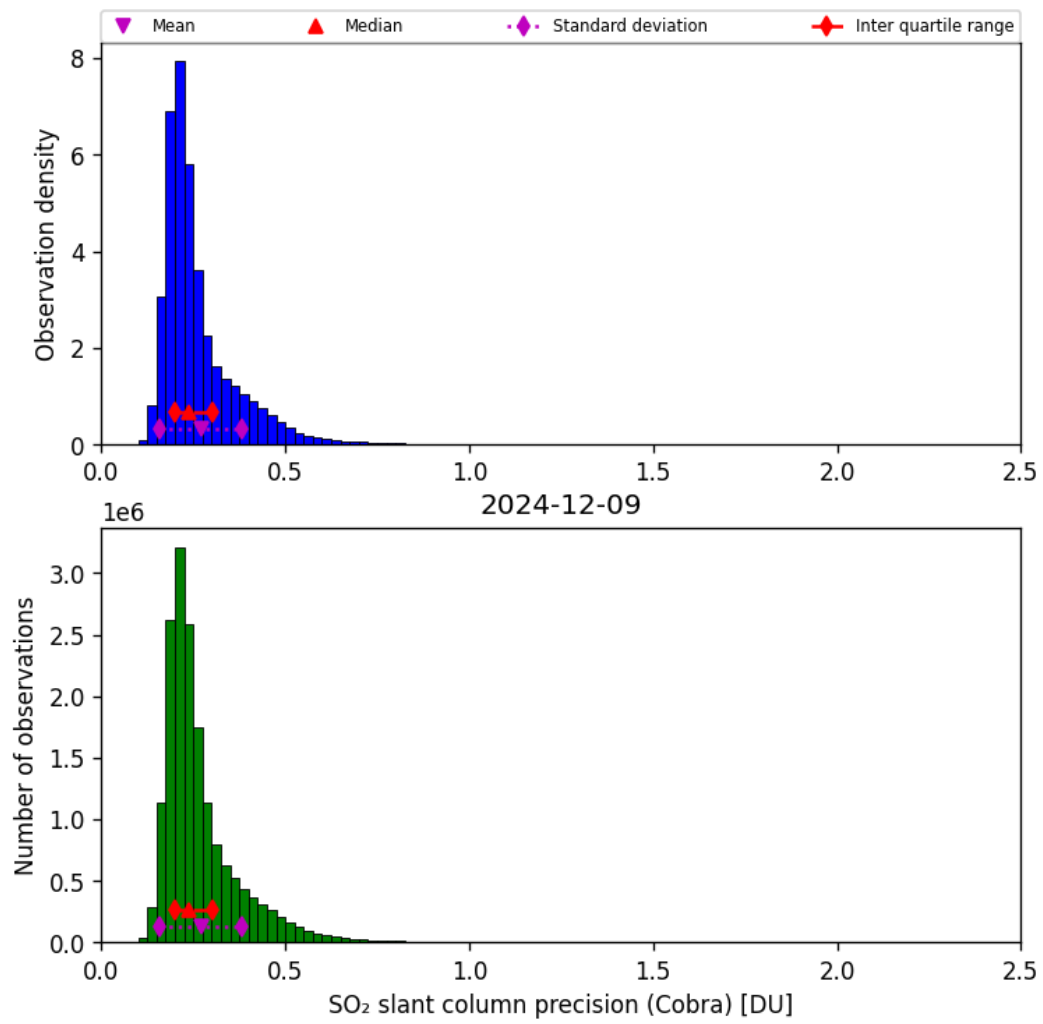


Figure 62: Histogram of “SO₂ slant column precision (Cobra)” for 2024-12-09 to 2024-12-09

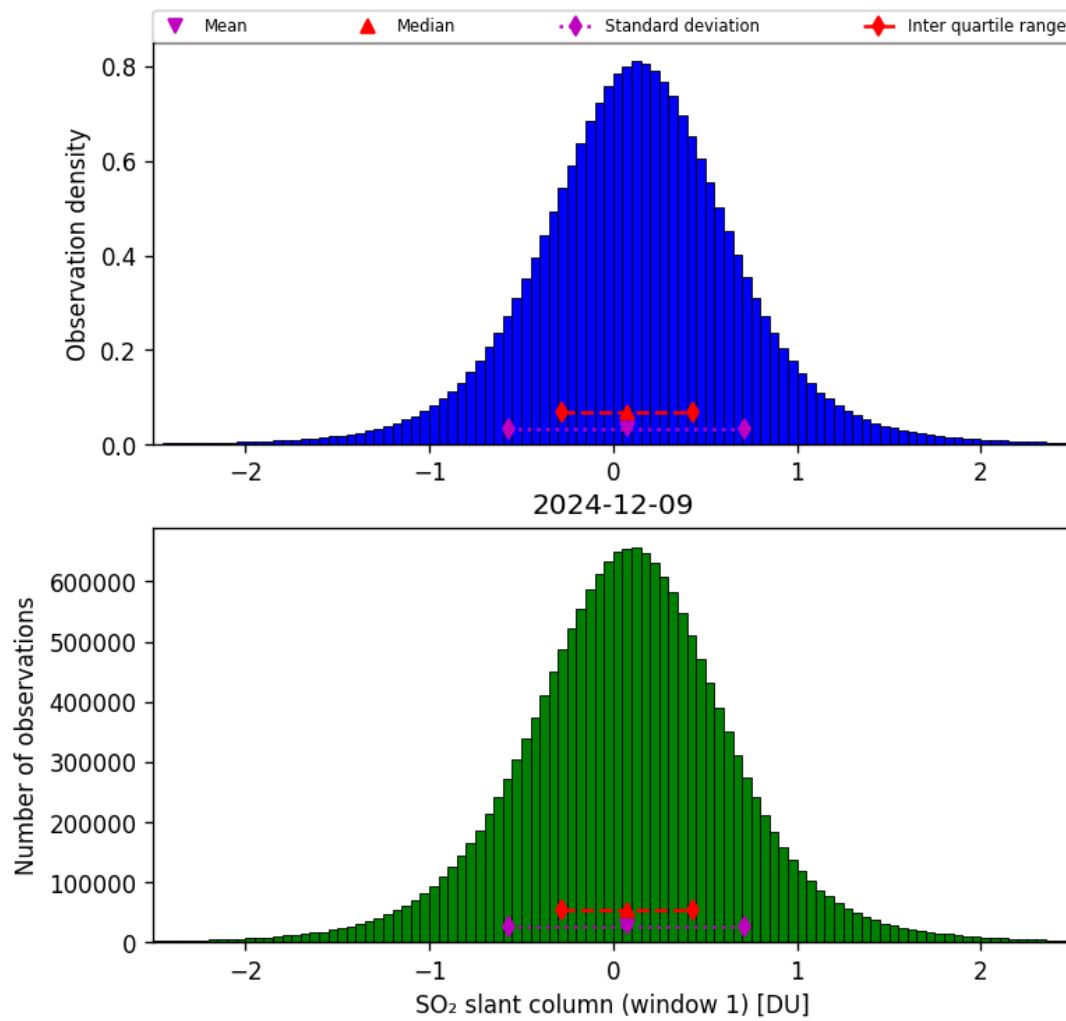


Figure 63: Histogram of “SO₂ slant column (window 1)” for 2024-12-09 to 2024-12-09

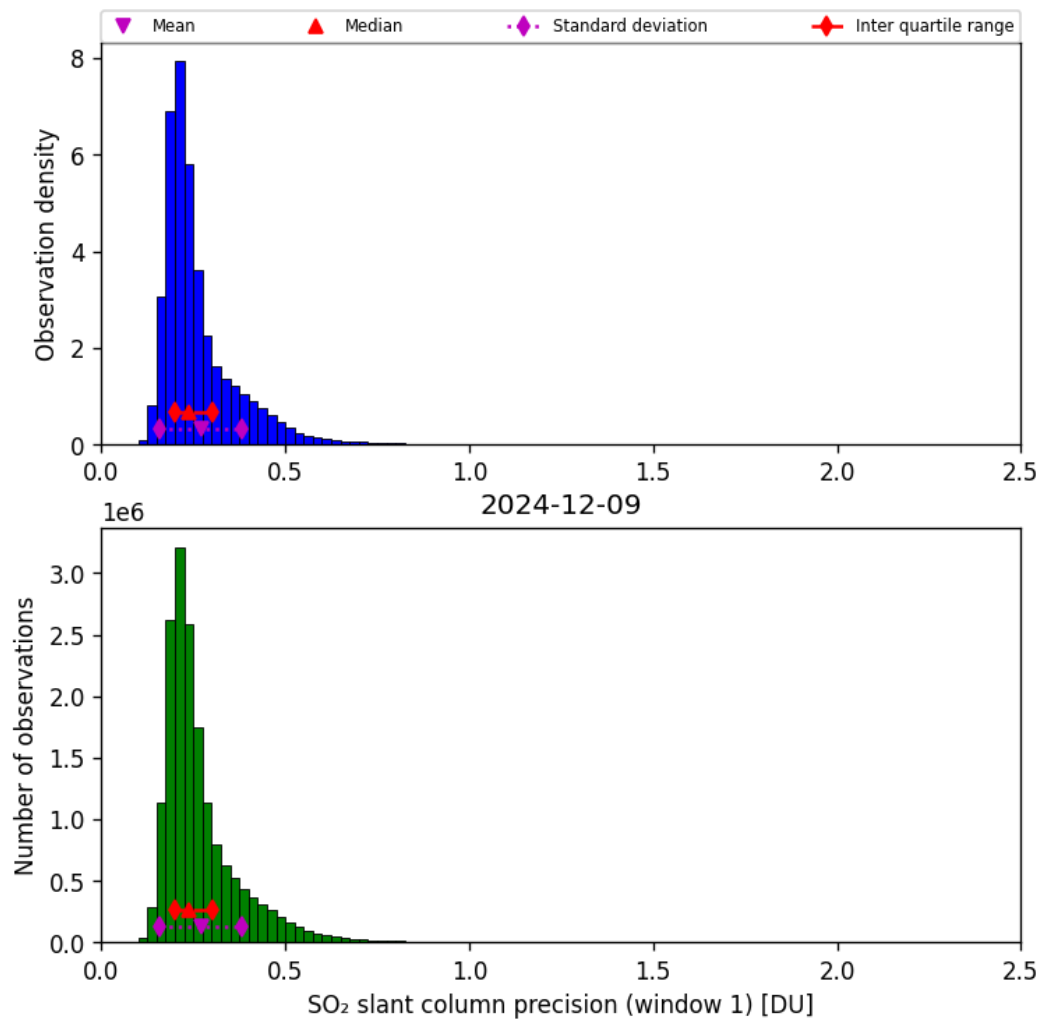


Figure 64: Histogram of “SO₂ slant column precision (window 1)” for 2024-12-09 to 2024-12-09

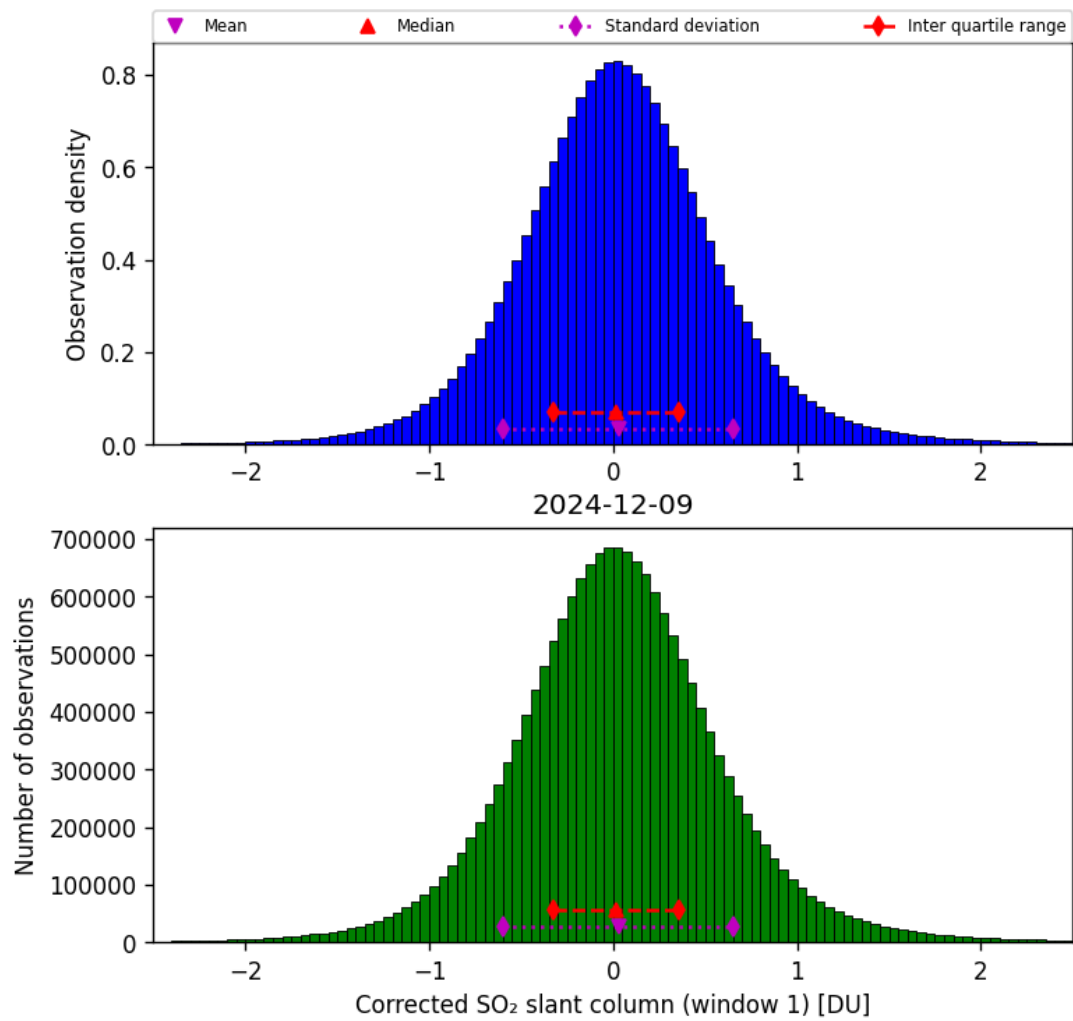


Figure 65: Histogram of “Corrected SO₂ slant column (window 1)” for 2024-12-09 to 2024-12-09

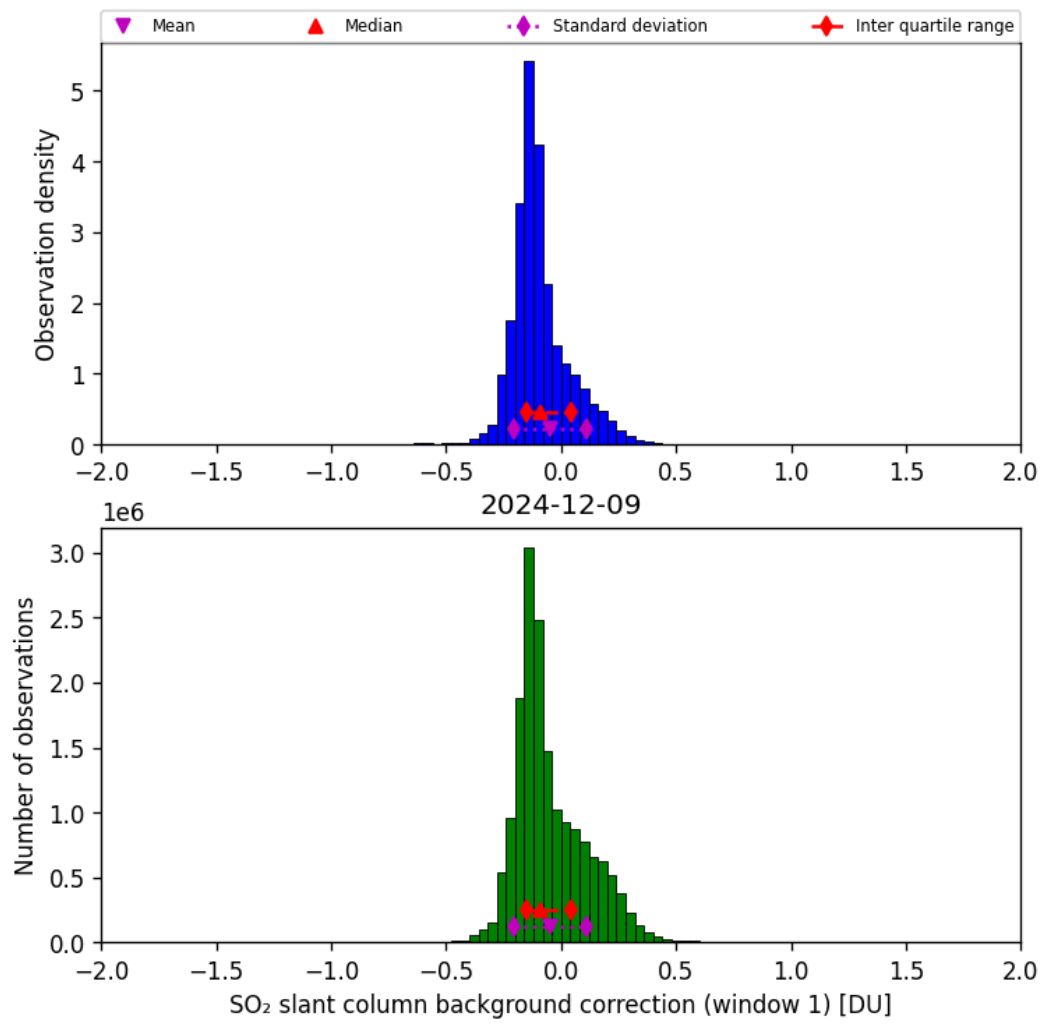


Figure 66: Histogram of “SO₂ slant column background correction (window 1)” for 2024-12-09 to 2024-12-09

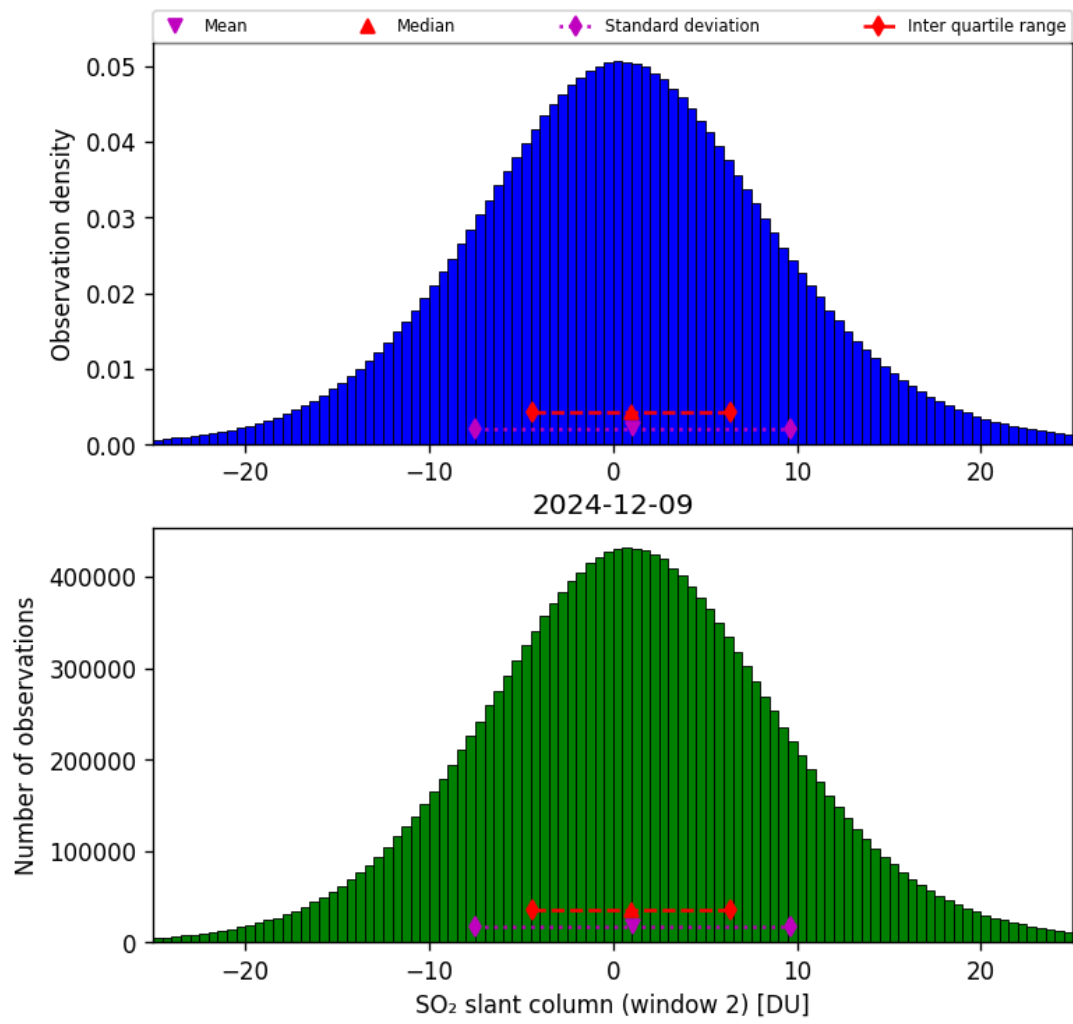


Figure 67: Histogram of “SO₂ slant column (window 2)” for 2024-12-09 to 2024-12-09

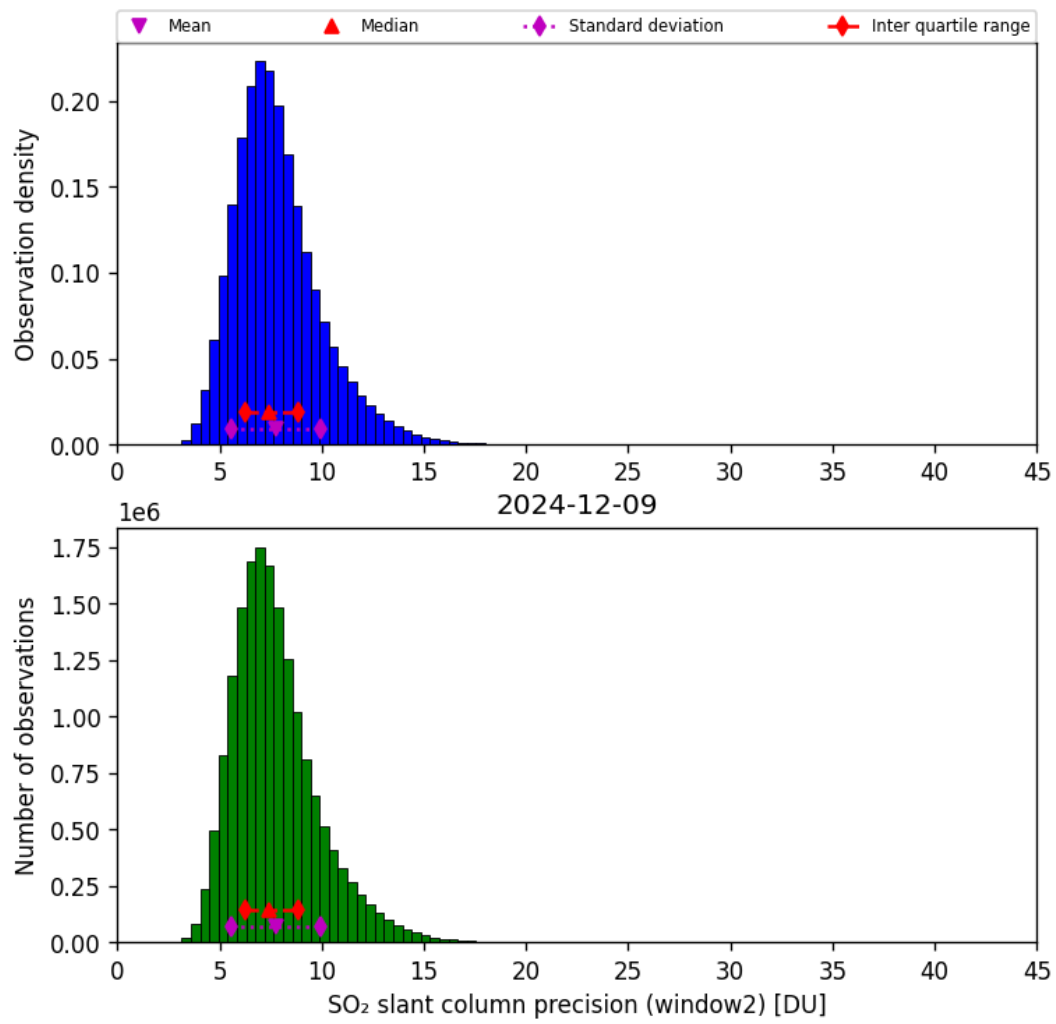


Figure 68: Histogram of “SO₂ slant column precision (window2)” for 2024-12-09 to 2024-12-09

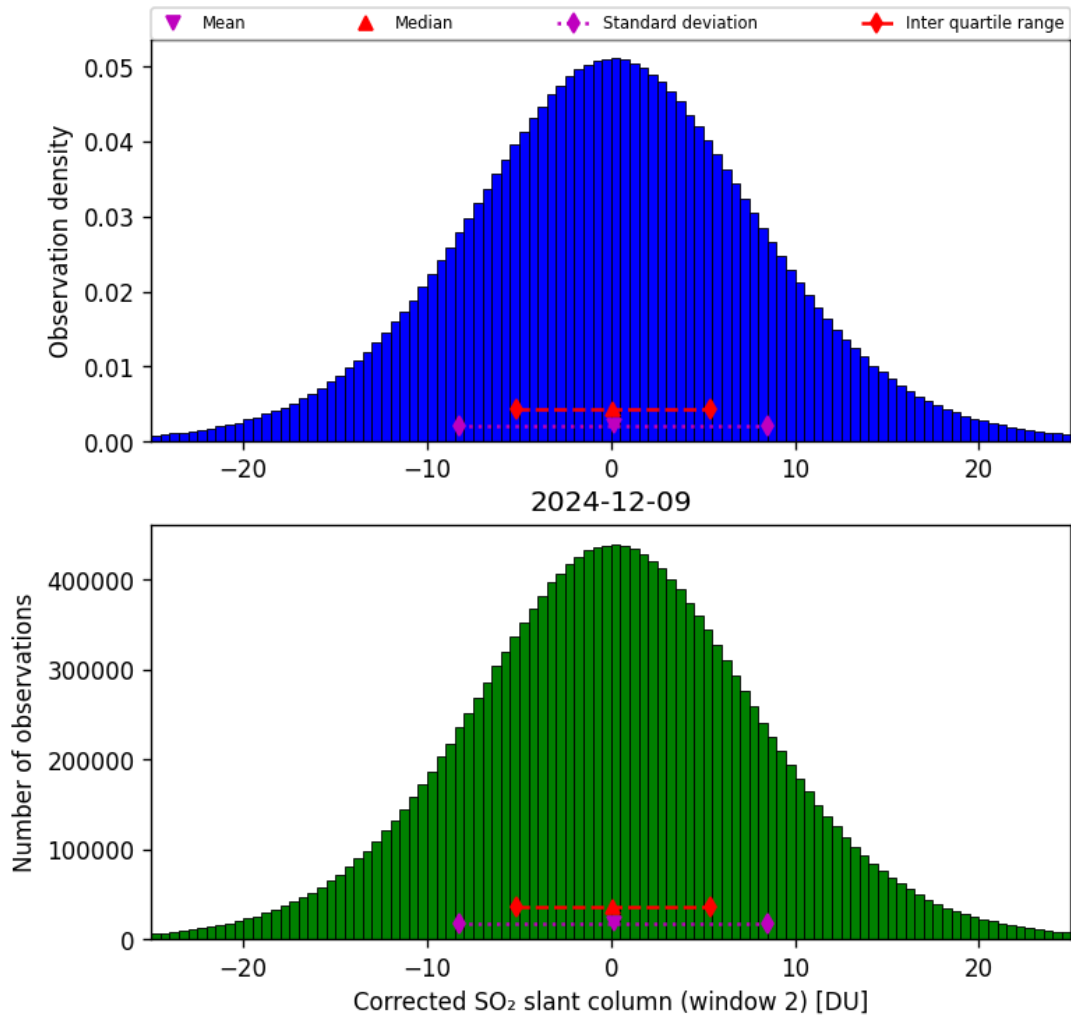


Figure 69: Histogram of “Corrected SO₂ slant column (window 2)” for 2024-12-09 to 2024-12-09

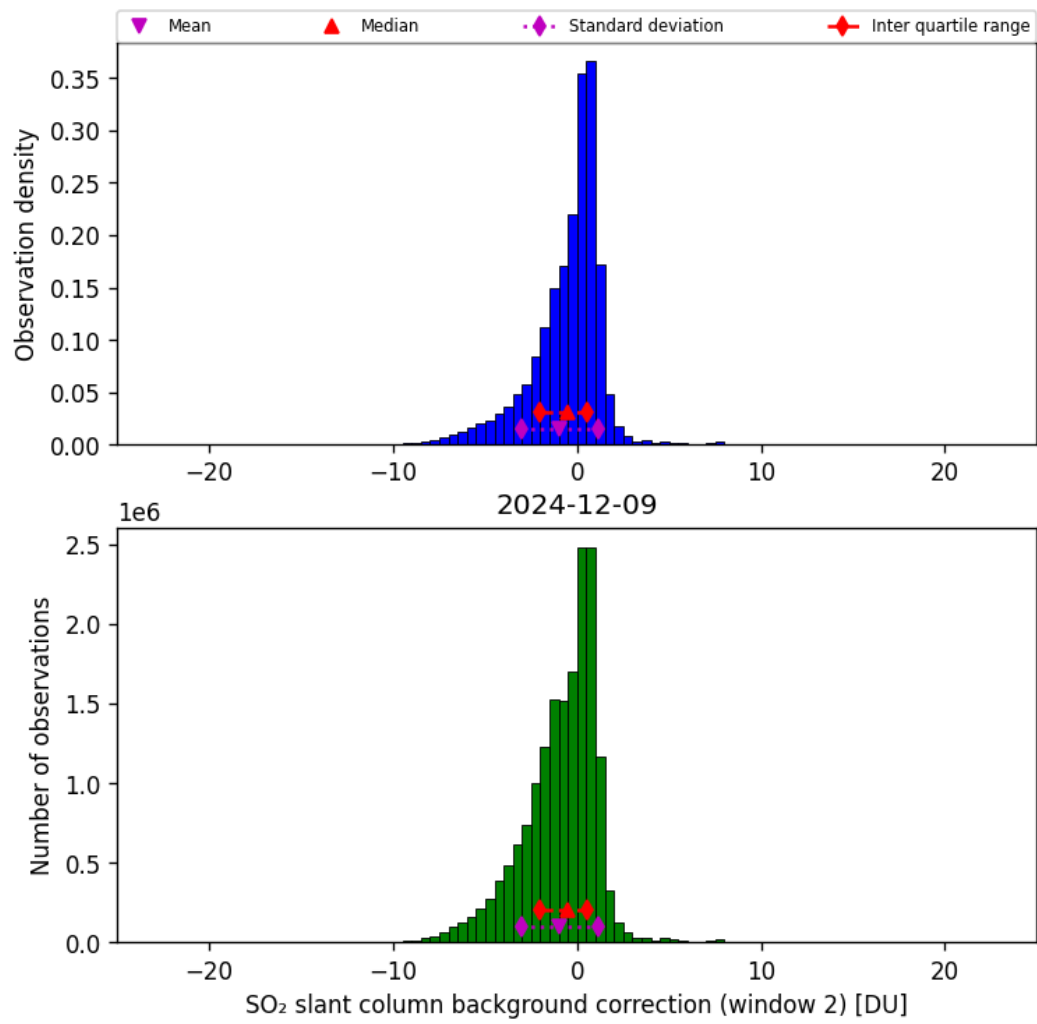


Figure 70: Histogram of “SO₂ slant column background correction (window 2)” for 2024-12-09 to 2024-12-09

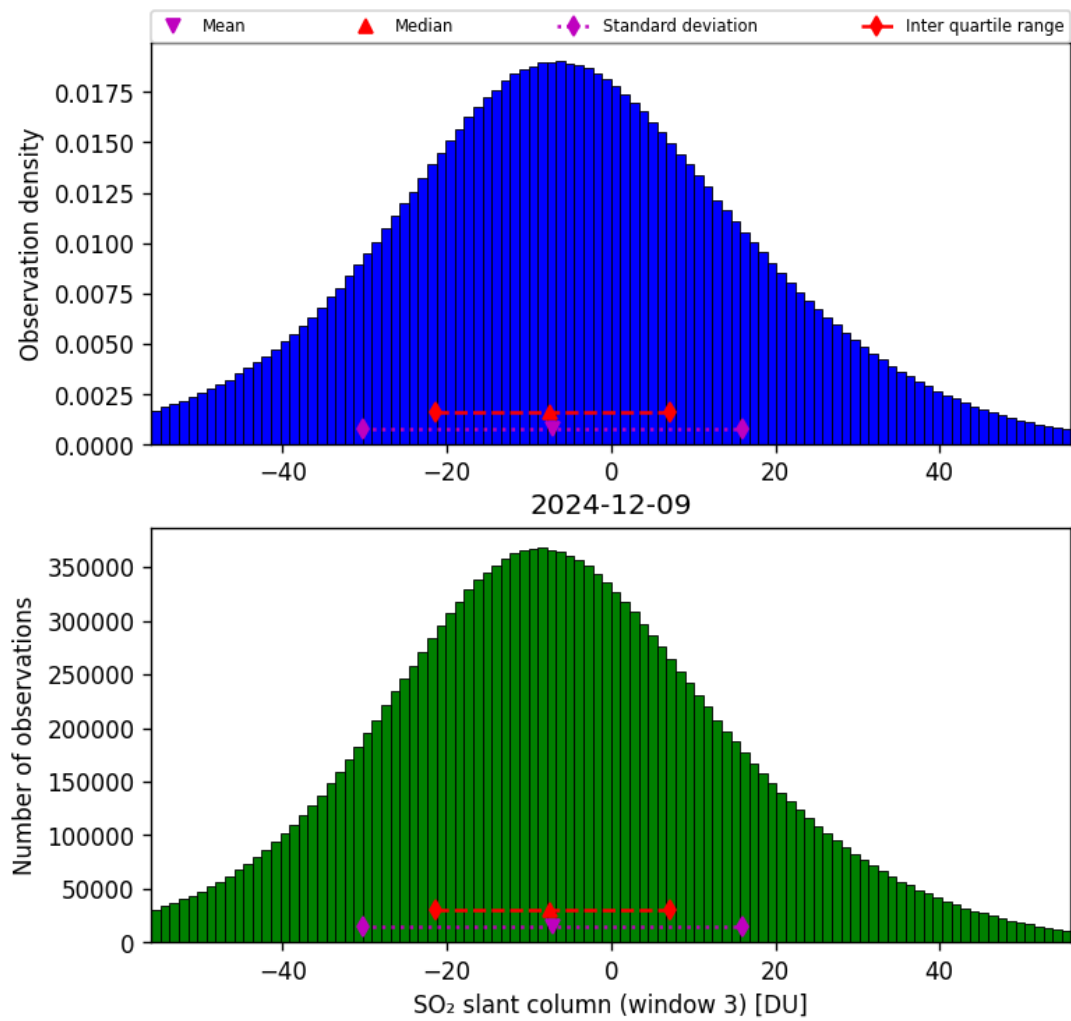


Figure 71: Histogram of “SO₂ slant column (window 3)” for 2024-12-09 to 2024-12-09

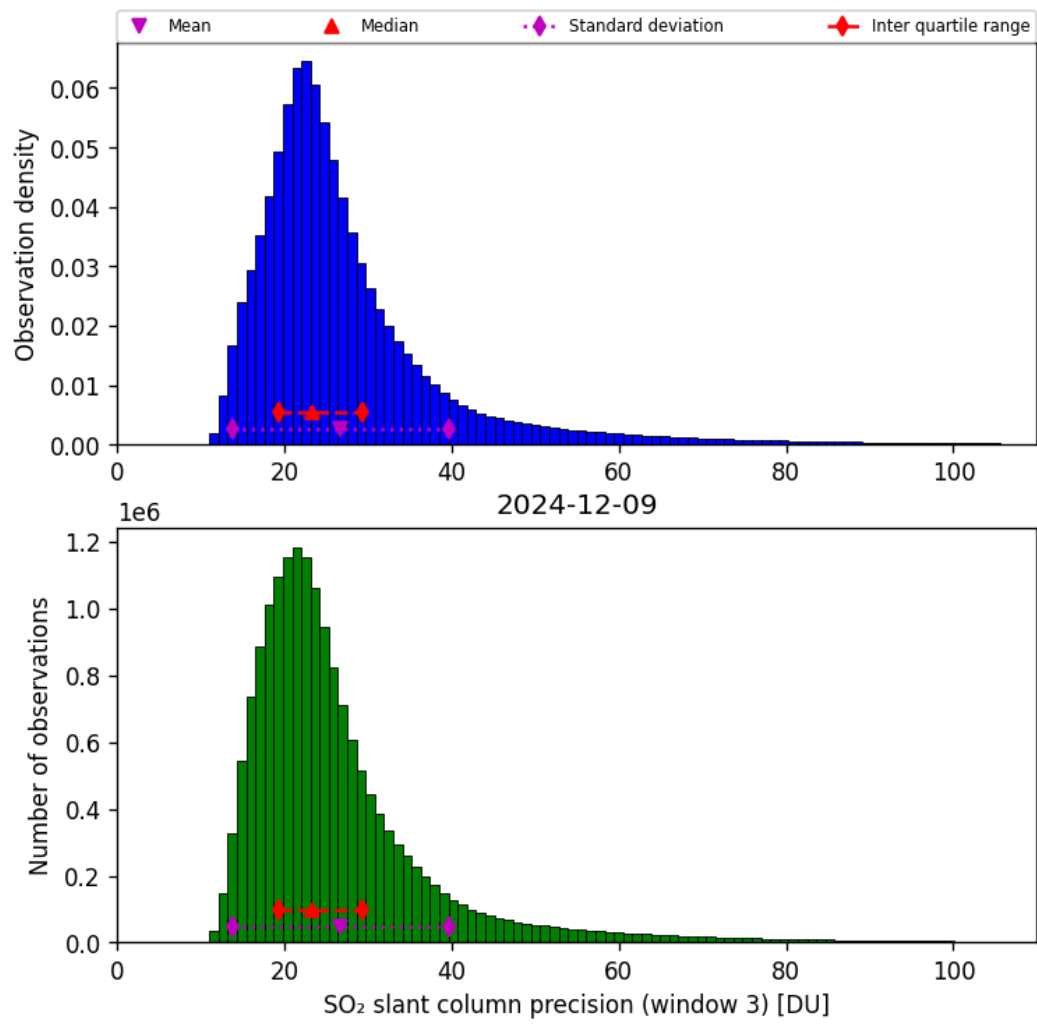


Figure 72: Histogram of “SO₂ slant column precision (window 3)” for 2024-12-09 to 2024-12-09

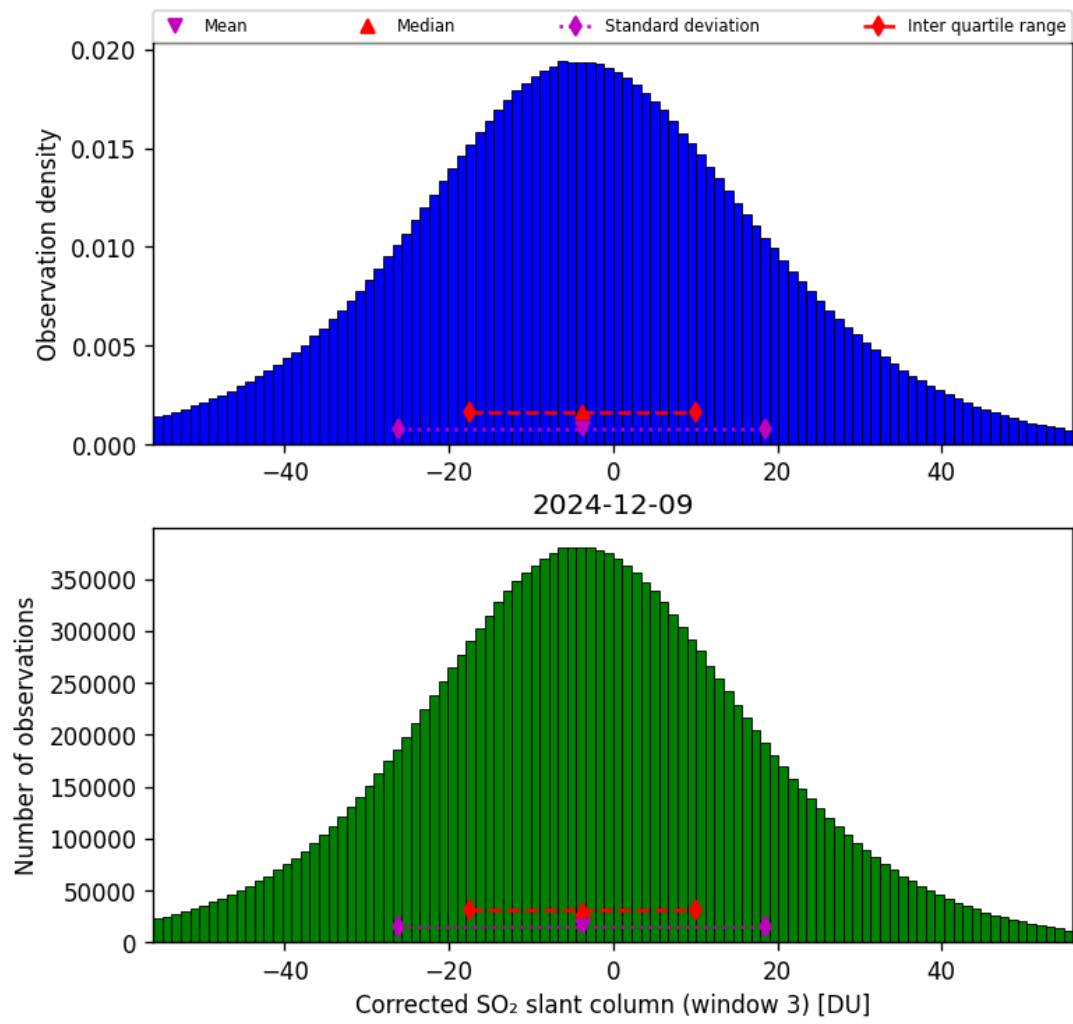


Figure 73: Histogram of “Corrected SO₂ slant column (window 3)” for 2024-12-09 to 2024-12-09

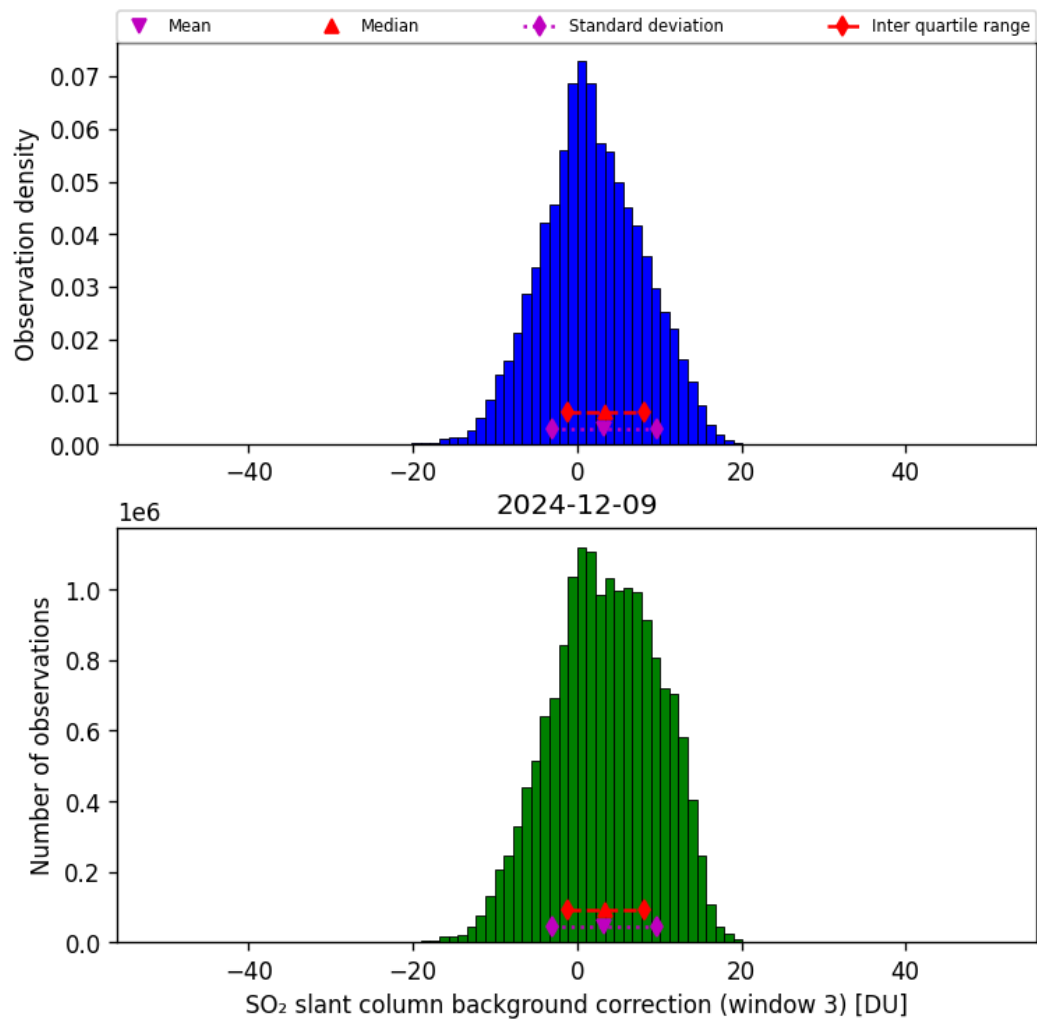


Figure 74: Histogram of “SO₂ slant column background correction (window 3)” for 2024-12-09 to 2024-12-09

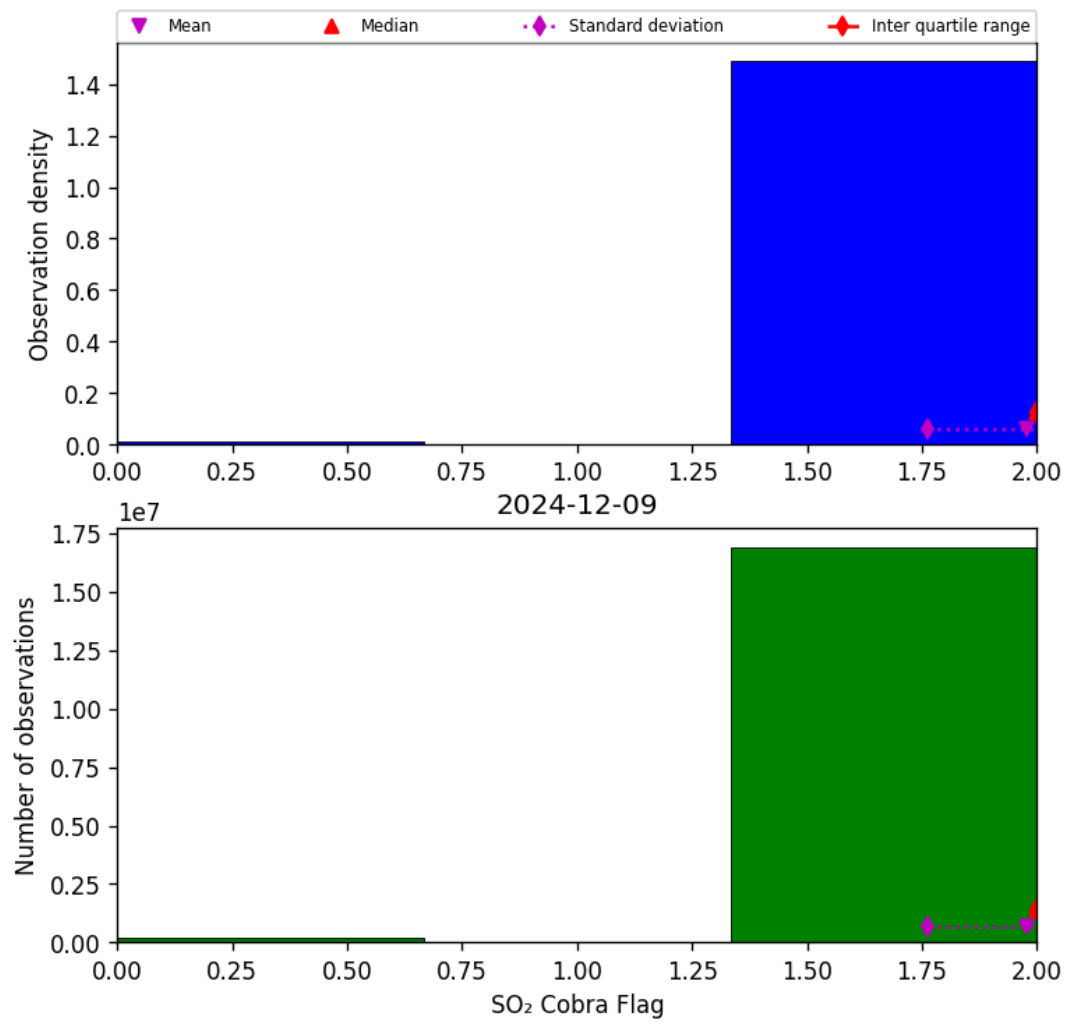


Figure 75: Histogram of “SO₂ Cobra Flag” for 2024-12-09 to 2024-12-09

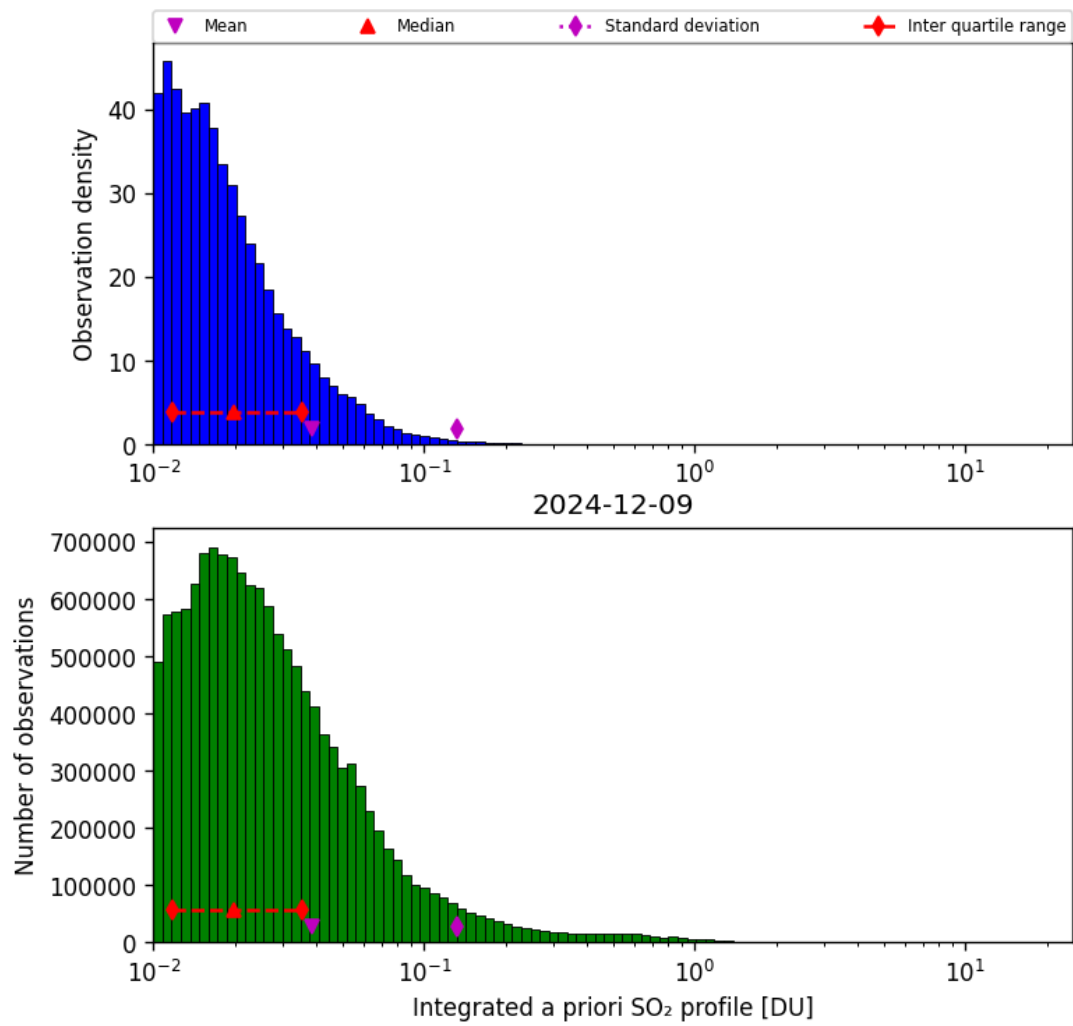


Figure 76: Histogram of “Integrated a priori SO₂ profile” for 2024-12-09 to 2024-12-09

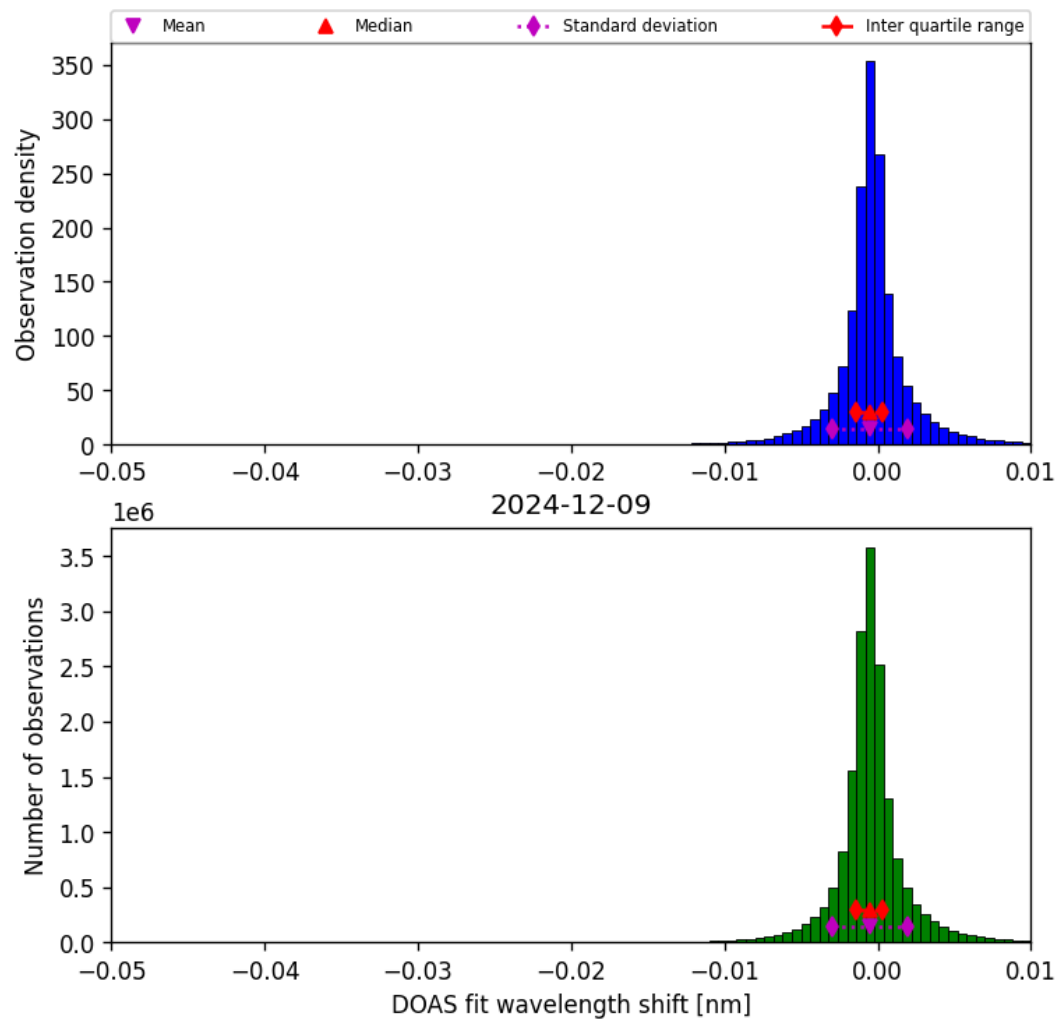


Figure 77: Histogram of “DOAS fit wavelength shift” for 2024-12-09 to 2024-12-09

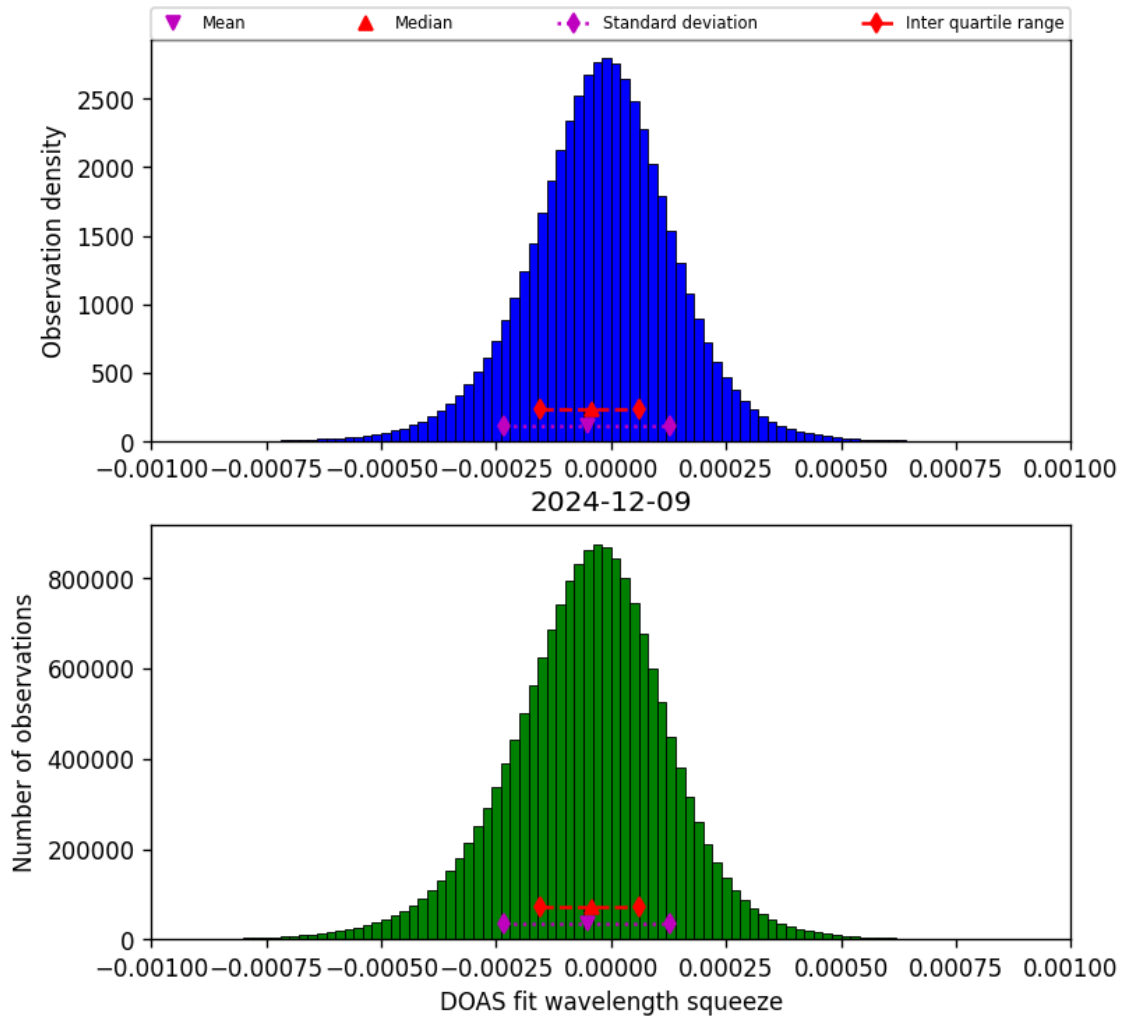


Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2024-12-09 to 2024-12-09

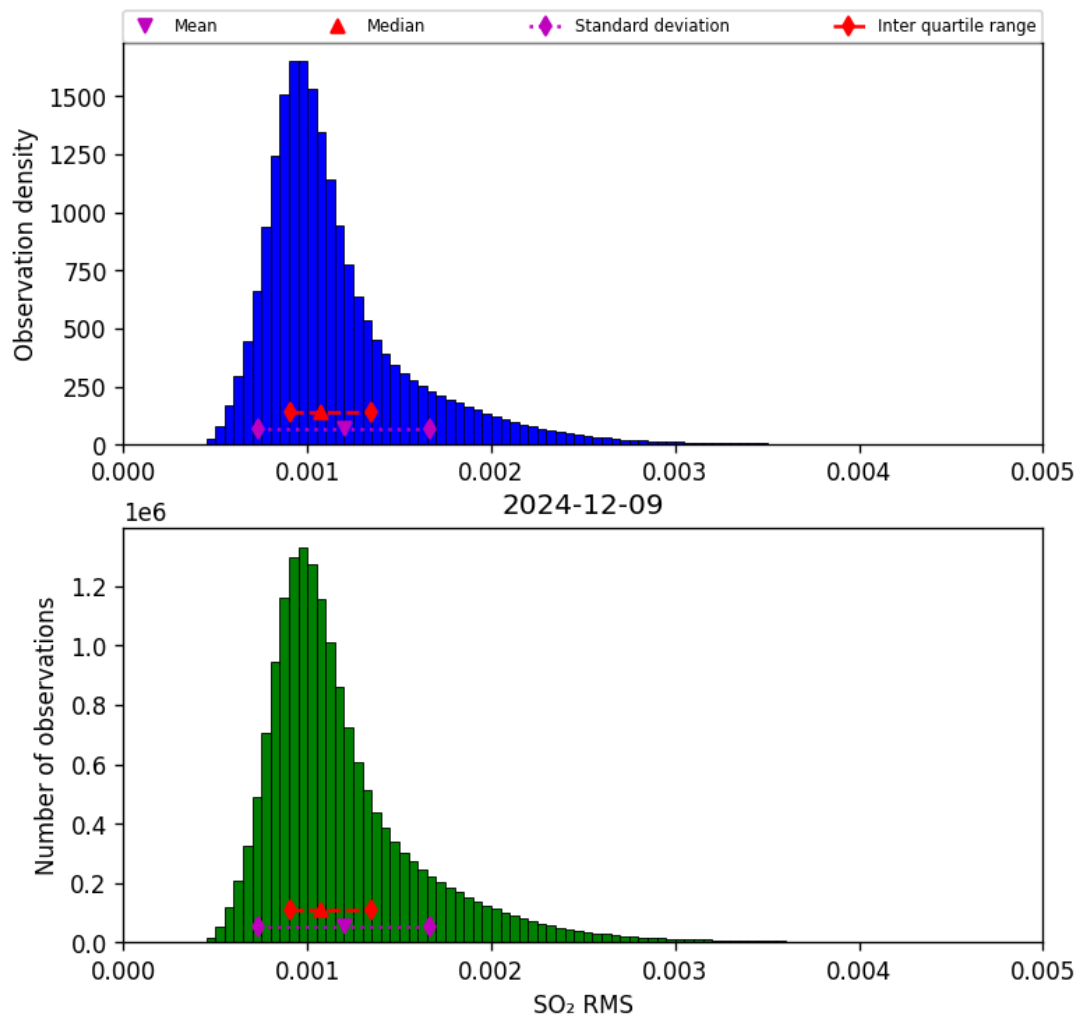


Figure 79: Histogram of “SO₂ RMS” for 2024-12-09 to 2024-12-09

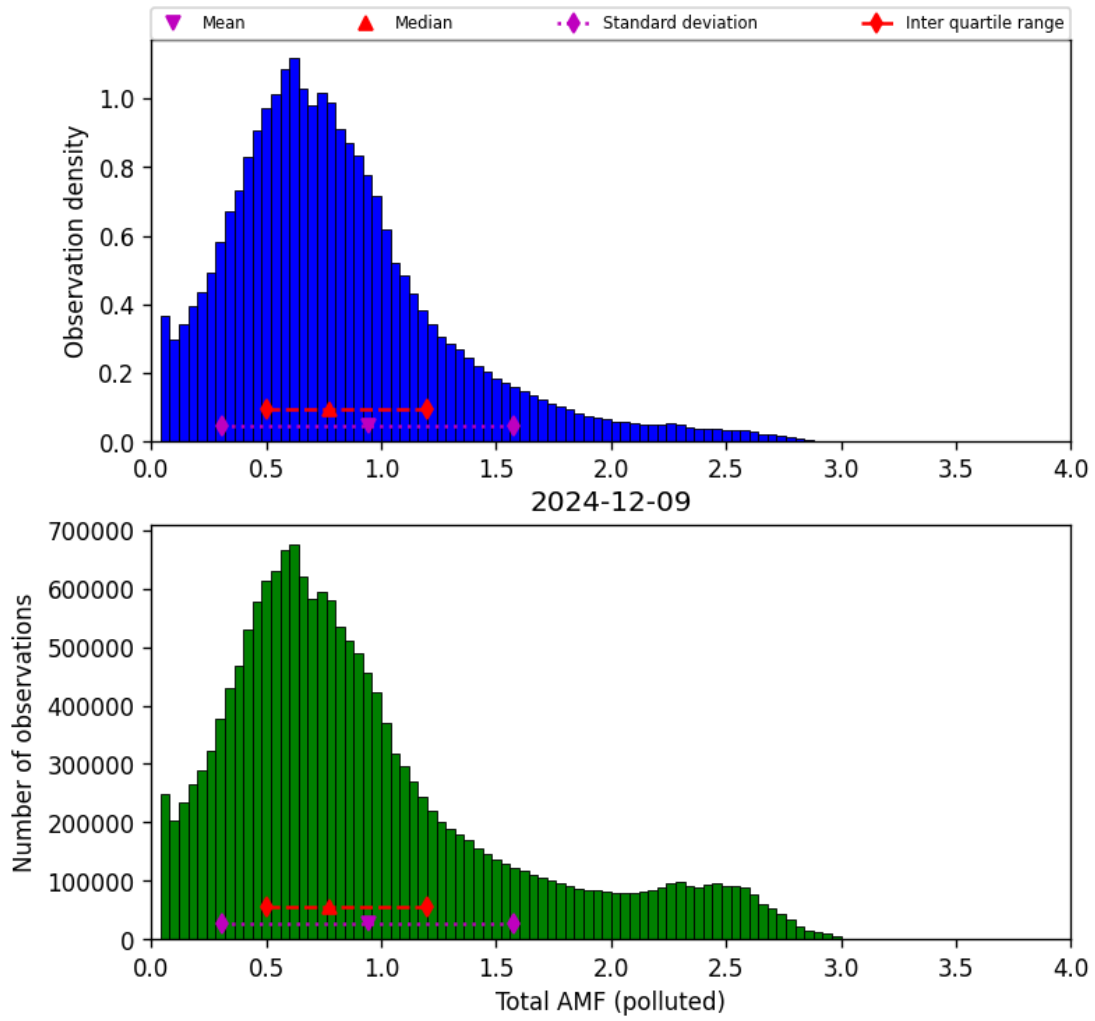


Figure 80: Histogram of “Total AMF (polluted)” for 2024-12-09 to 2024-12-09

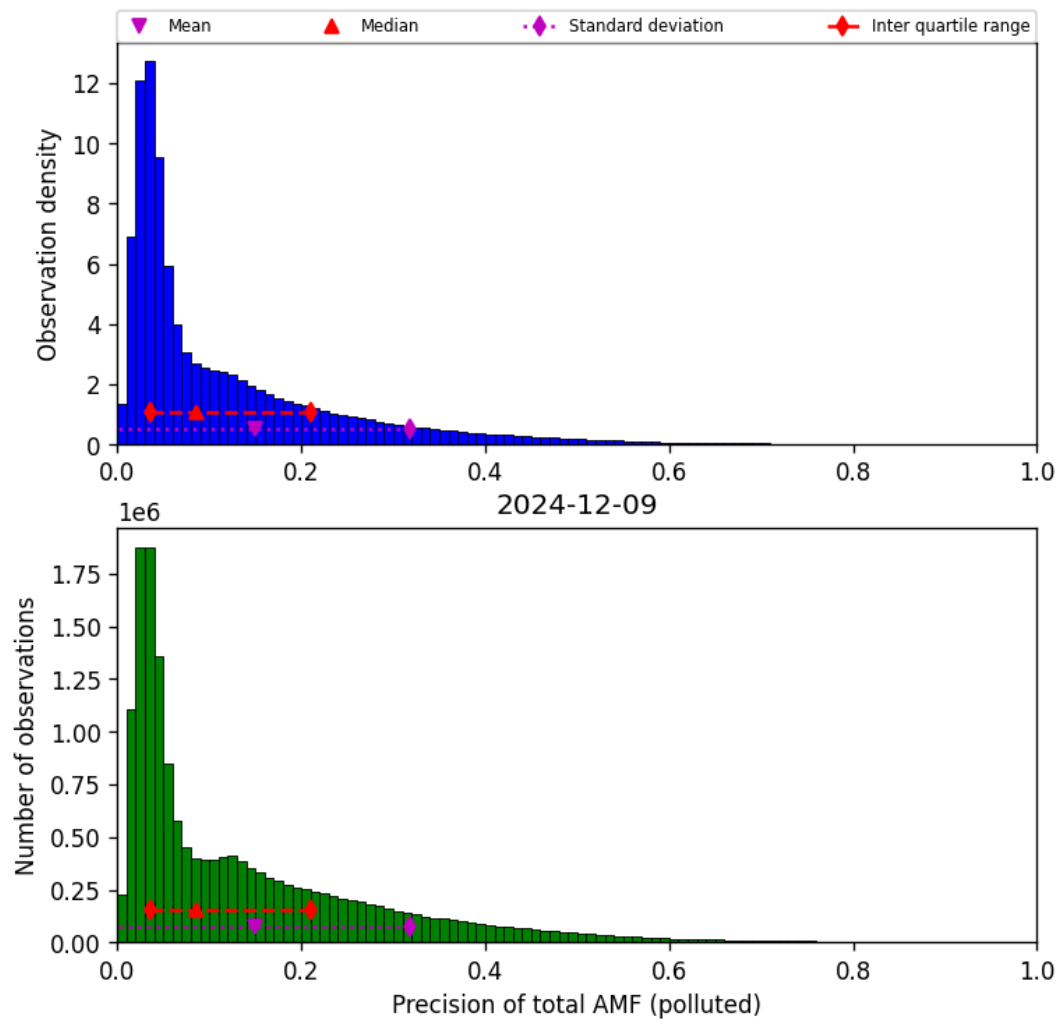


Figure 81: Histogram of “Precision of total AMF (polluted)” for 2024-12-09 to 2024-12-09

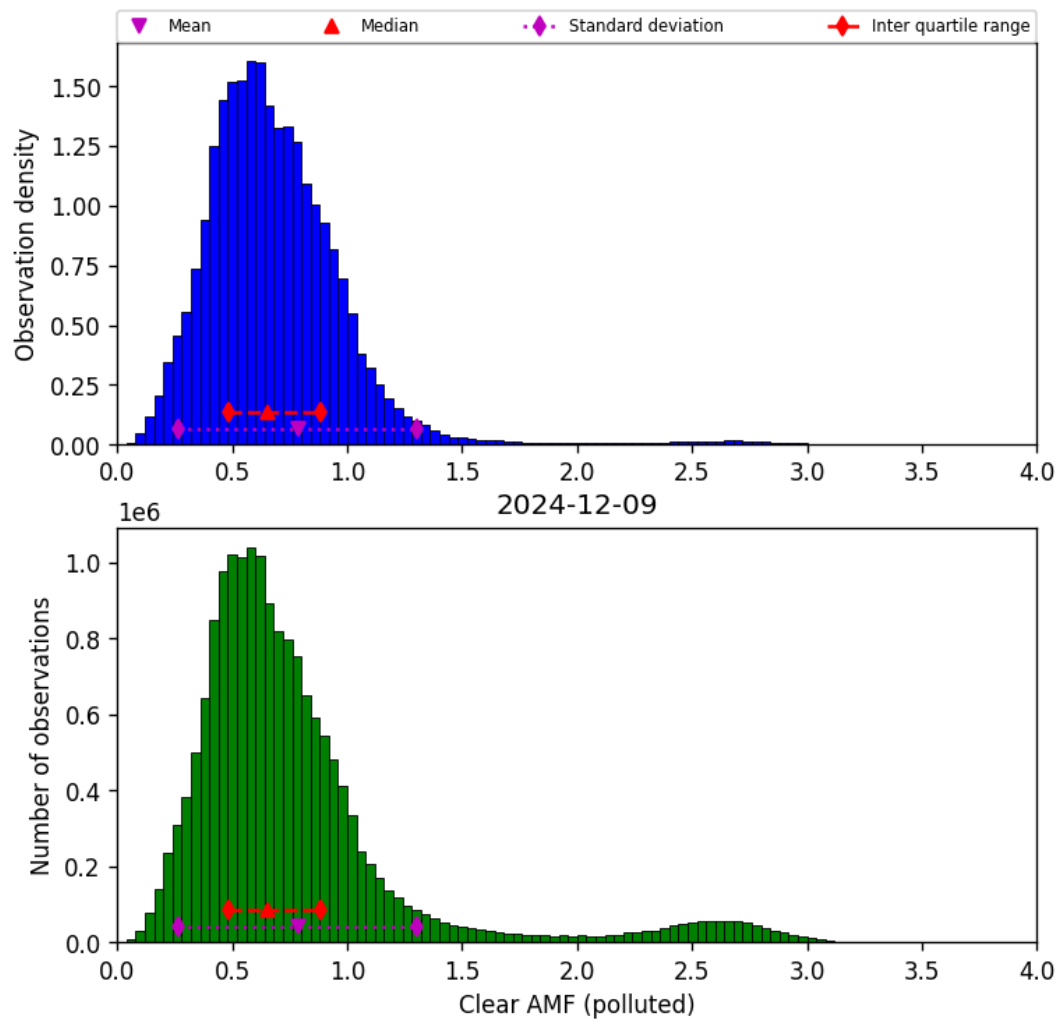


Figure 82: Histogram of “Clear AMF (polluted)” for 2024-12-09 to 2024-12-09

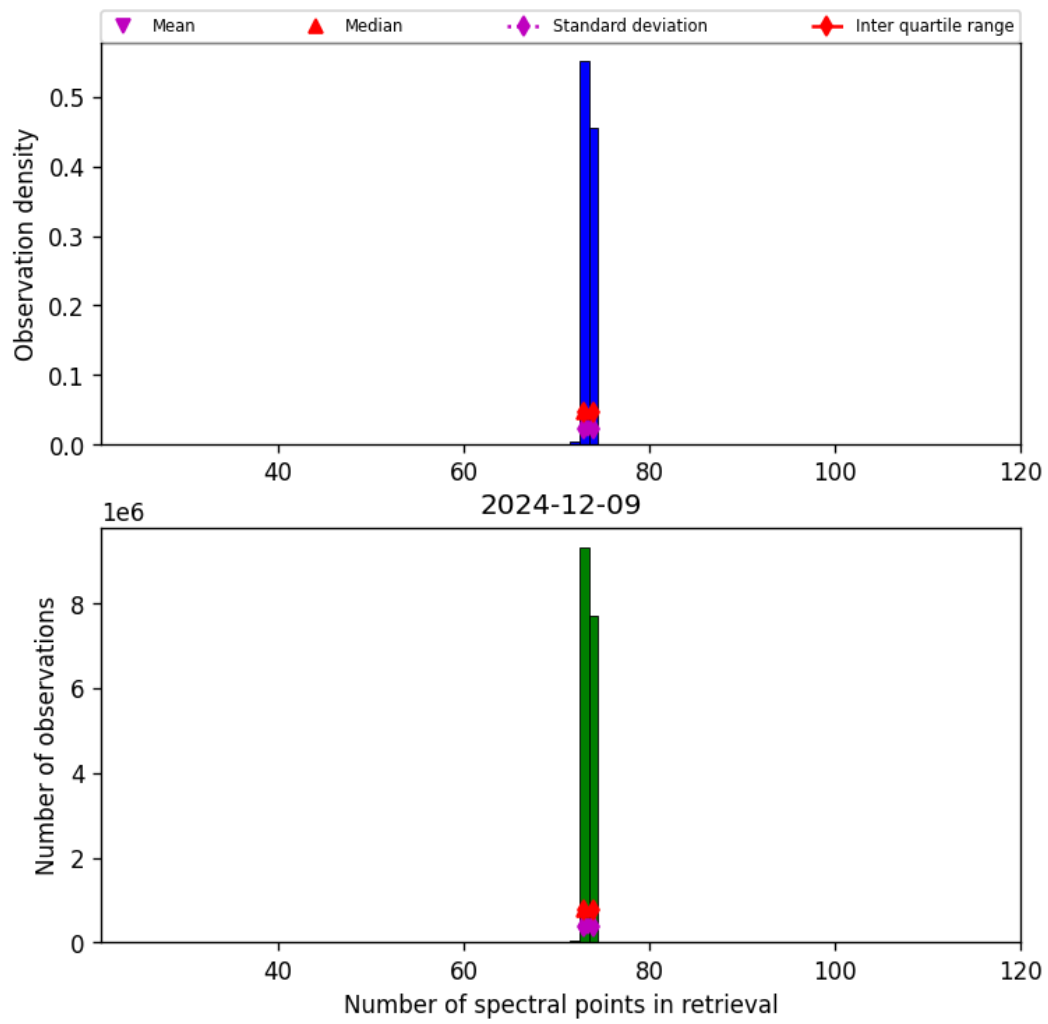


Figure 83: Histogram of “Number of spectral points in retrieval” for 2024-12-09 to 2024-12-09

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.

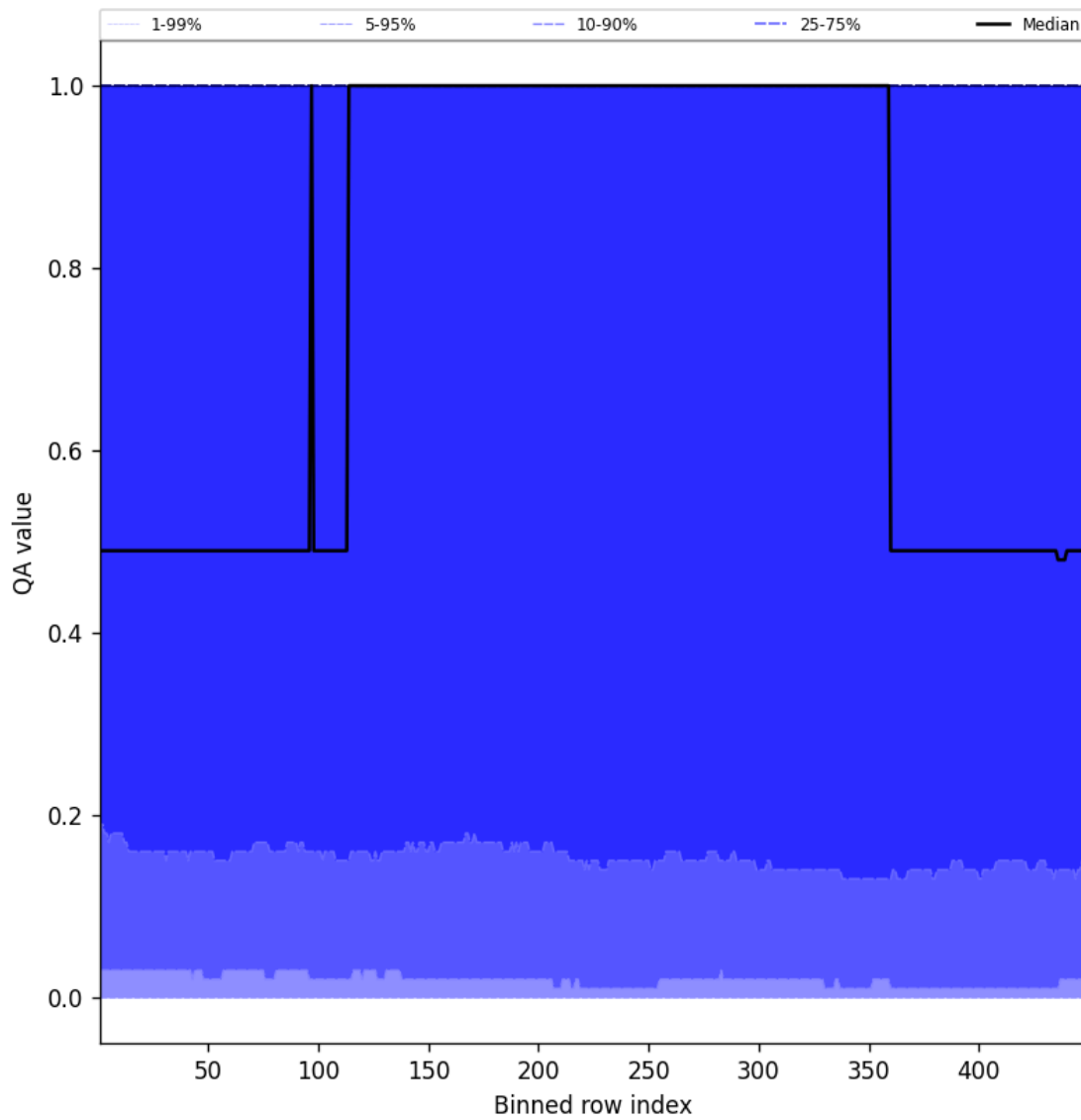


Figure 84: Along track statistics of "QA value" for 2024-12-09 to 2024-12-09

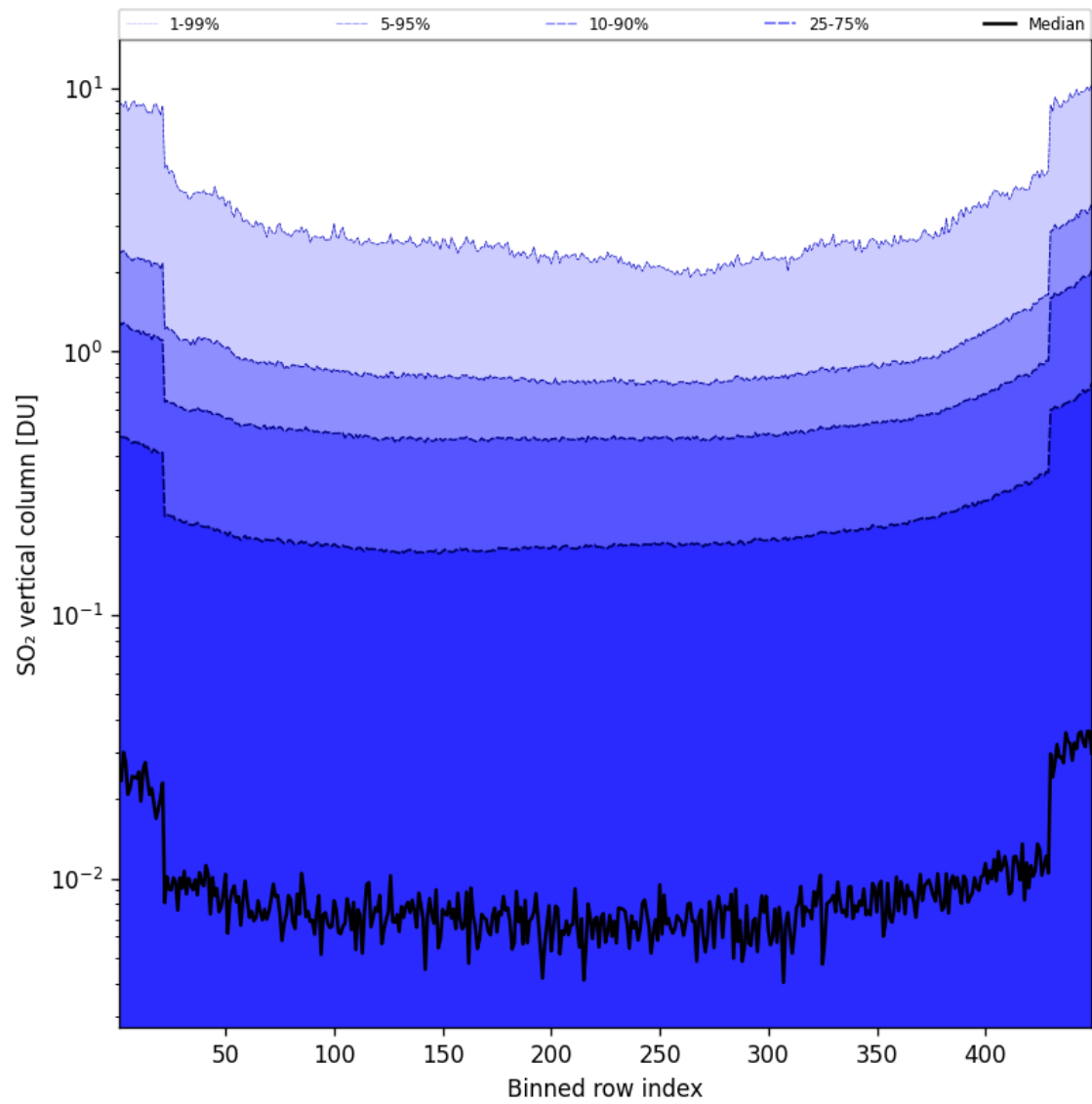


Figure 85: Along track statistics of “SO₂ vertical column” for 2024-12-09 to 2024-12-09

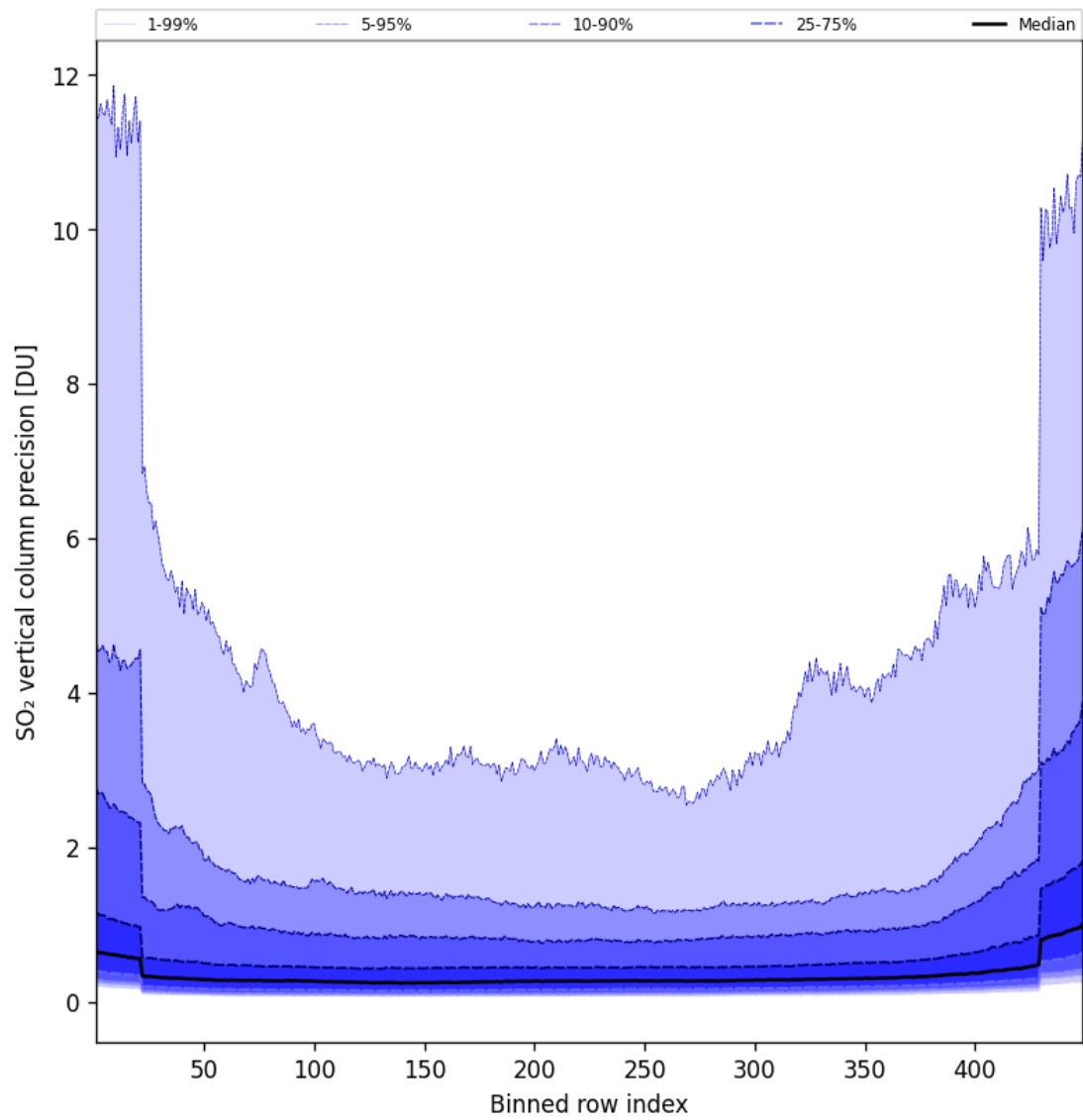


Figure 86: Along track statistics of “SO₂ vertical column precision” for 2024-12-09 to 2024-12-09

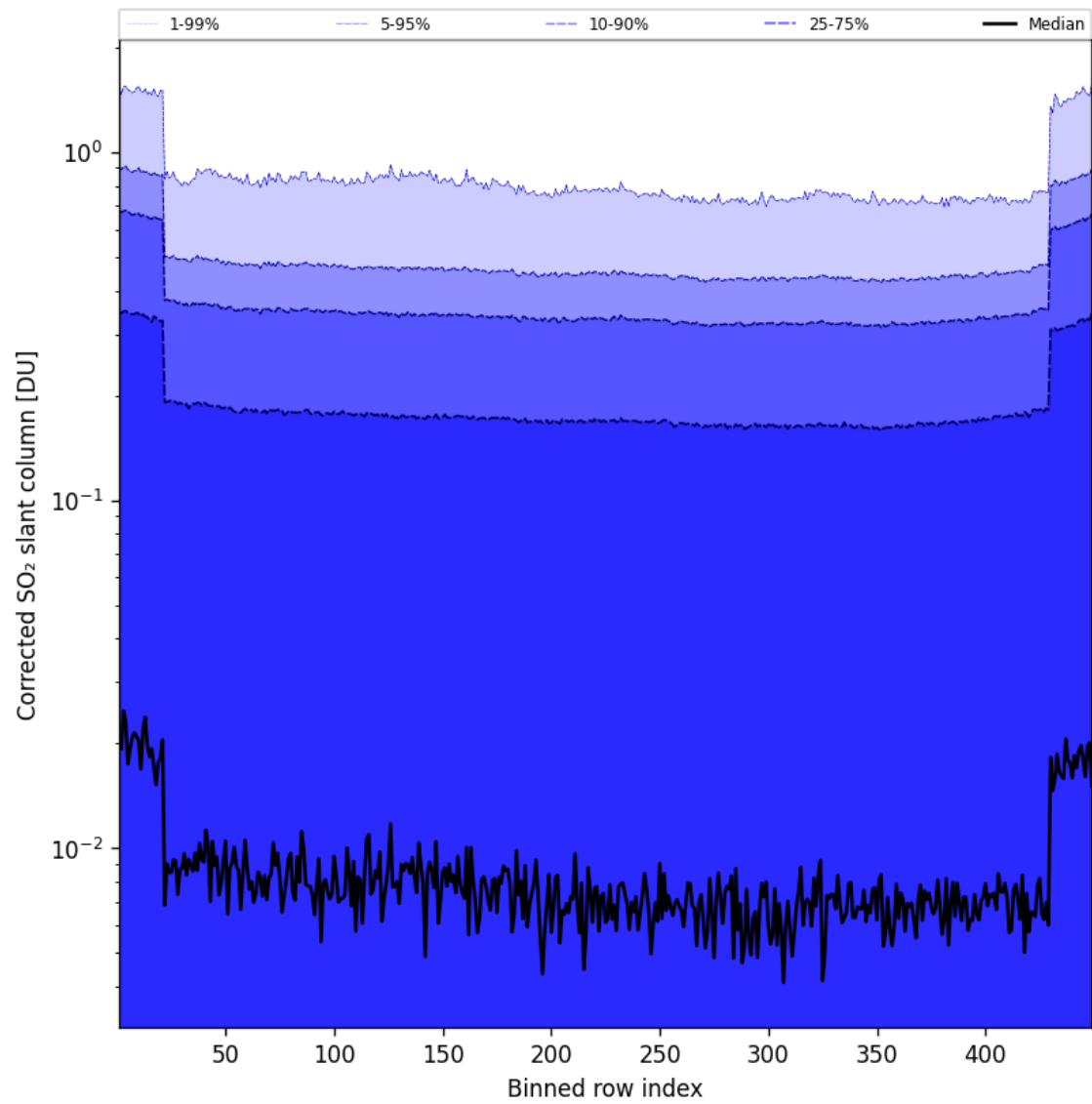


Figure 87: Along track statistics of "Corrected SO₂ slant column" for 2024-12-09 to 2024-12-09

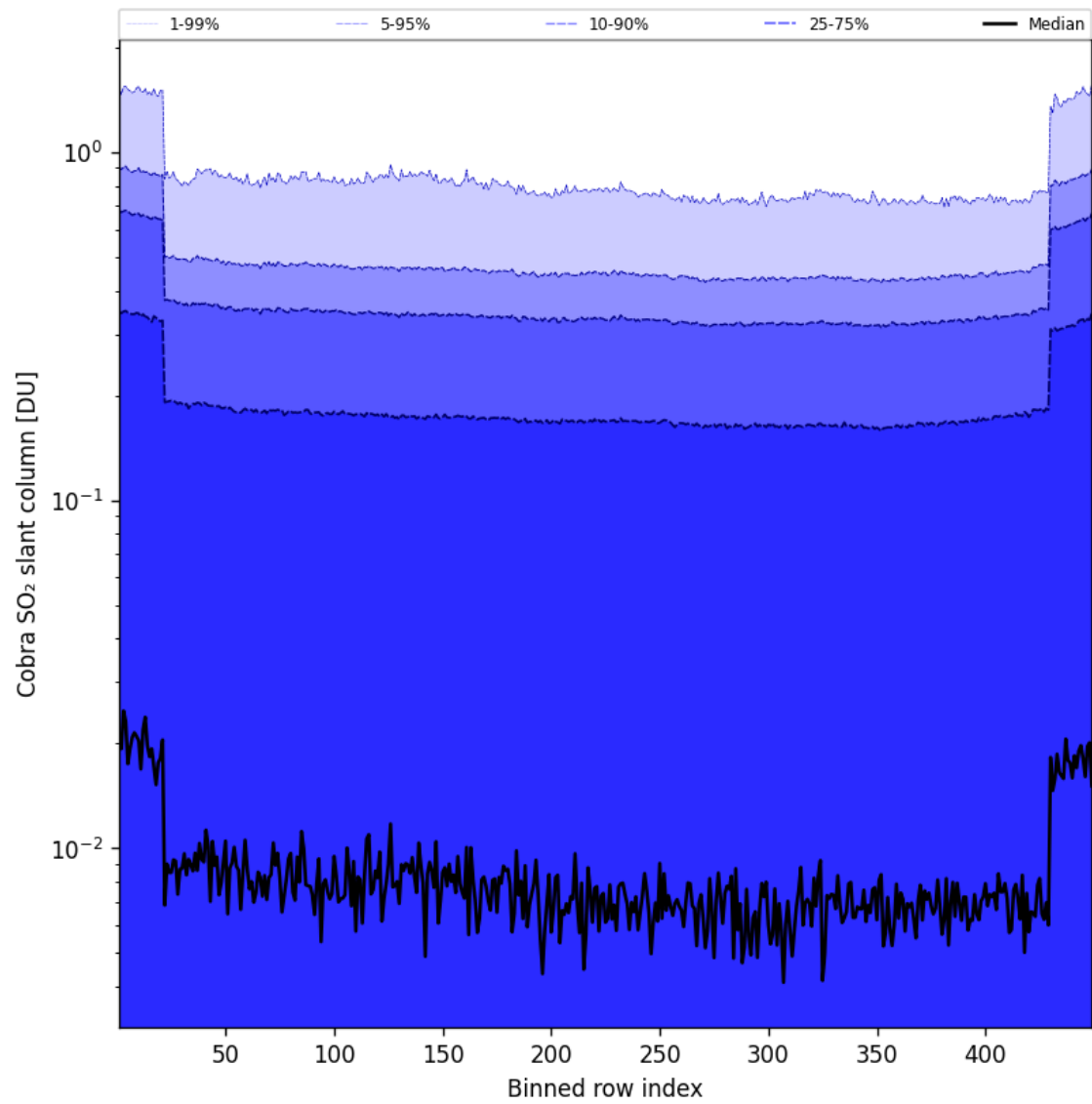


Figure 88: Along track statistics of “Cobra SO₂ slant column” for 2024-12-09 to 2024-12-09

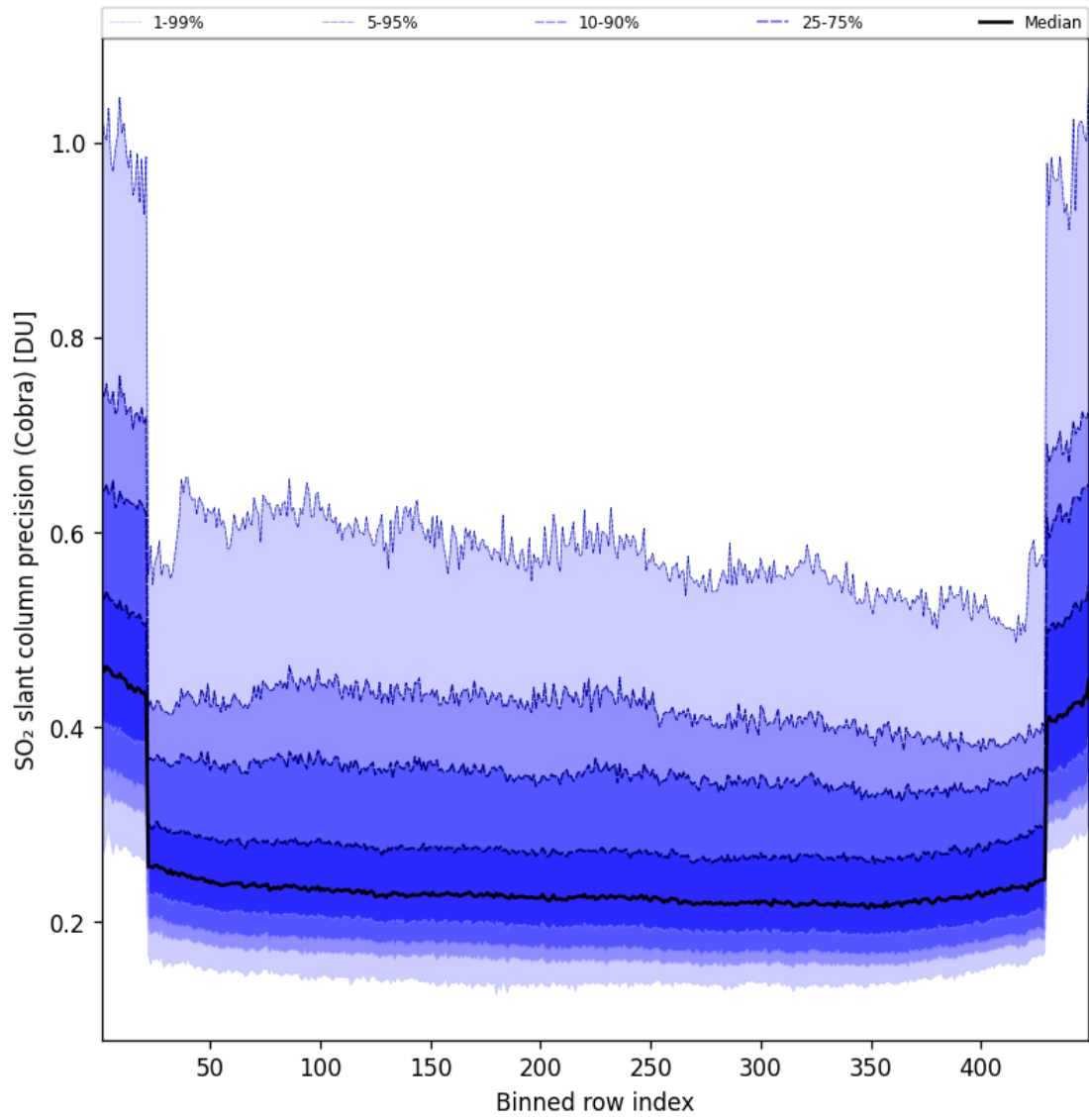


Figure 89: Along track statistics of “SO₂ slant column precision (Cobra)” for 2024-12-09 to 2024-12-09

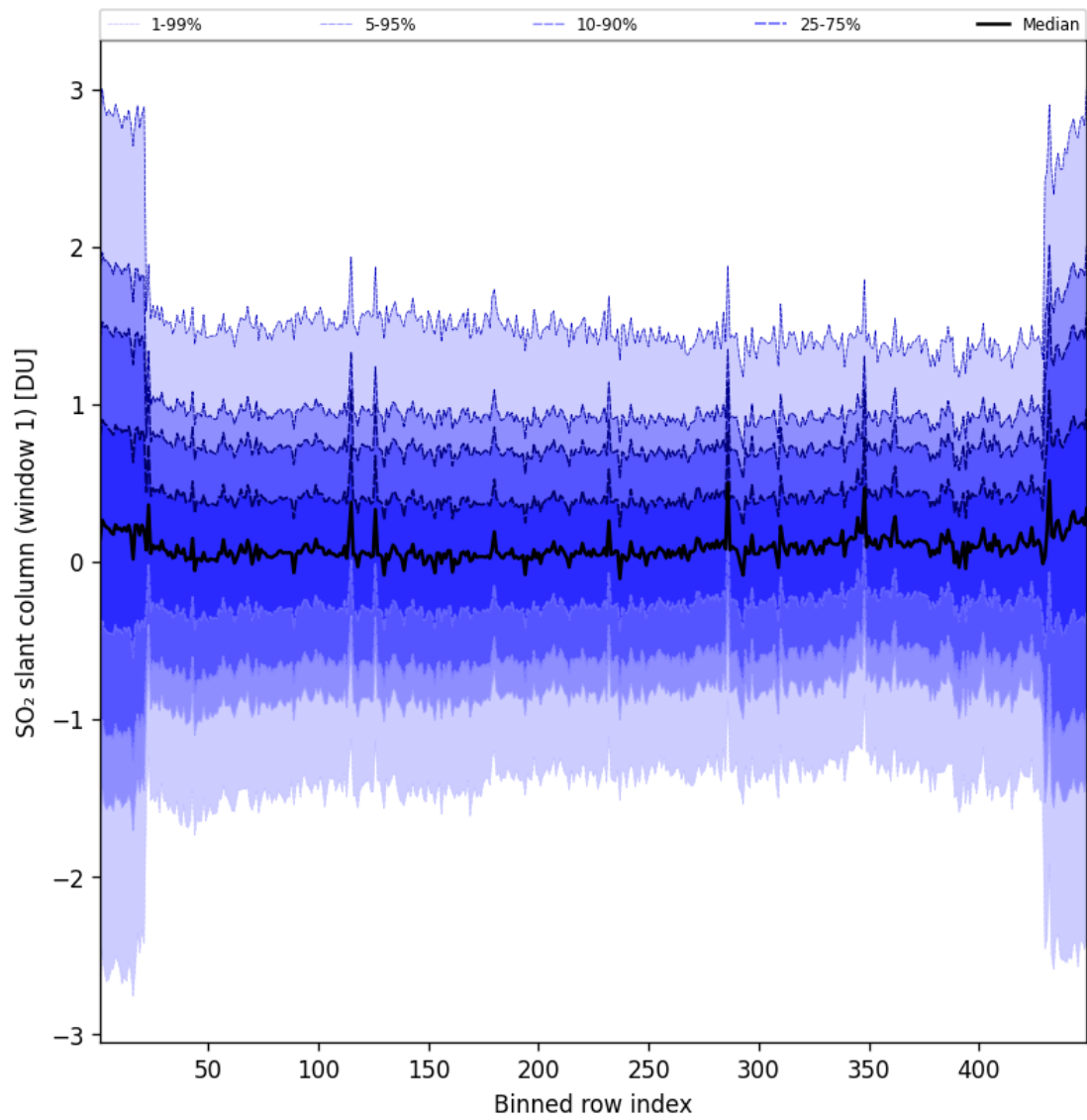


Figure 90: Along track statistics of “SO₂ slant column (window 1)” for 2024-12-09 to 2024-12-09

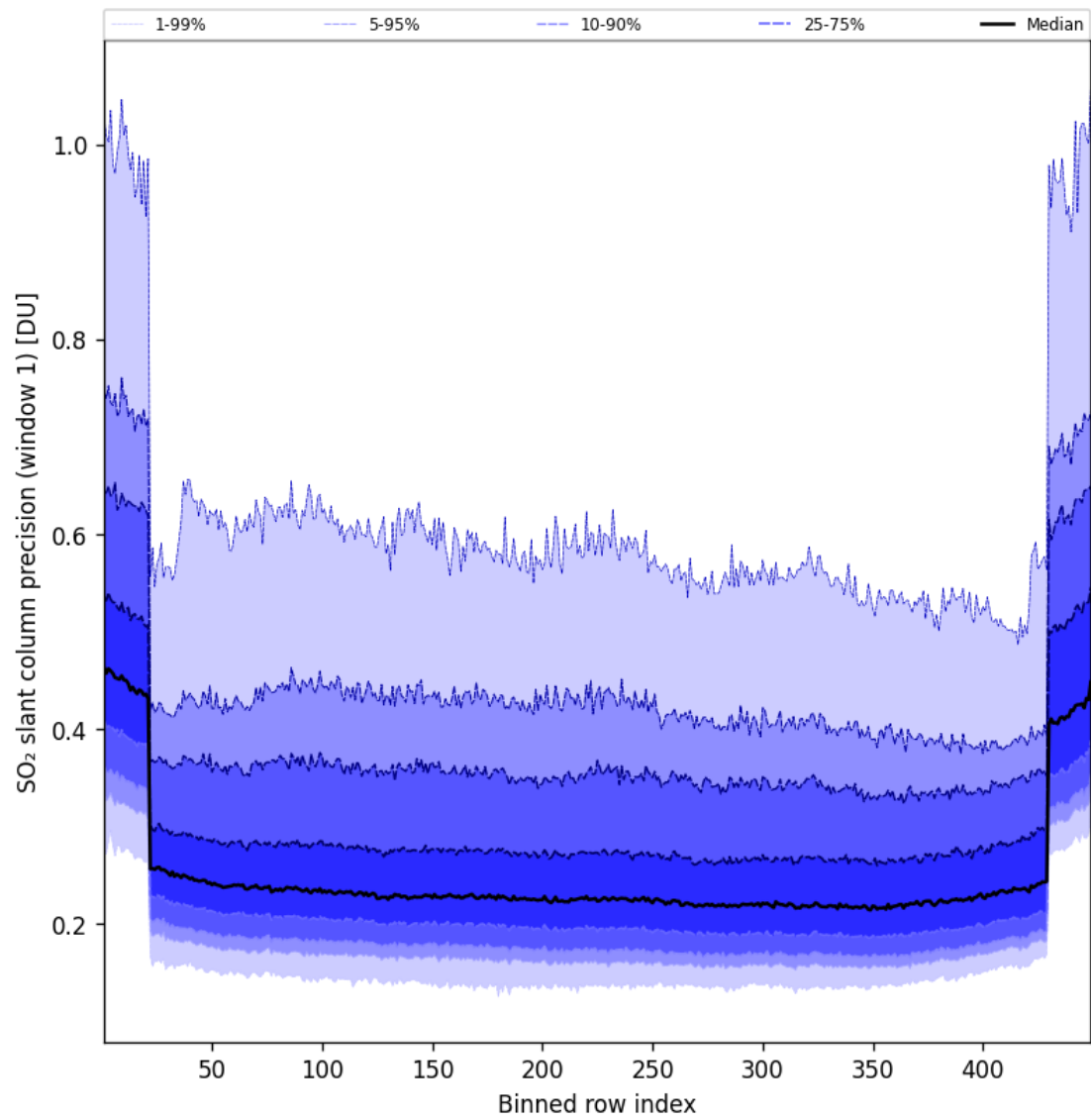


Figure 91: Along track statistics of “SO₂ slant column precision (window 1)” for 2024-12-09 to 2024-12-09

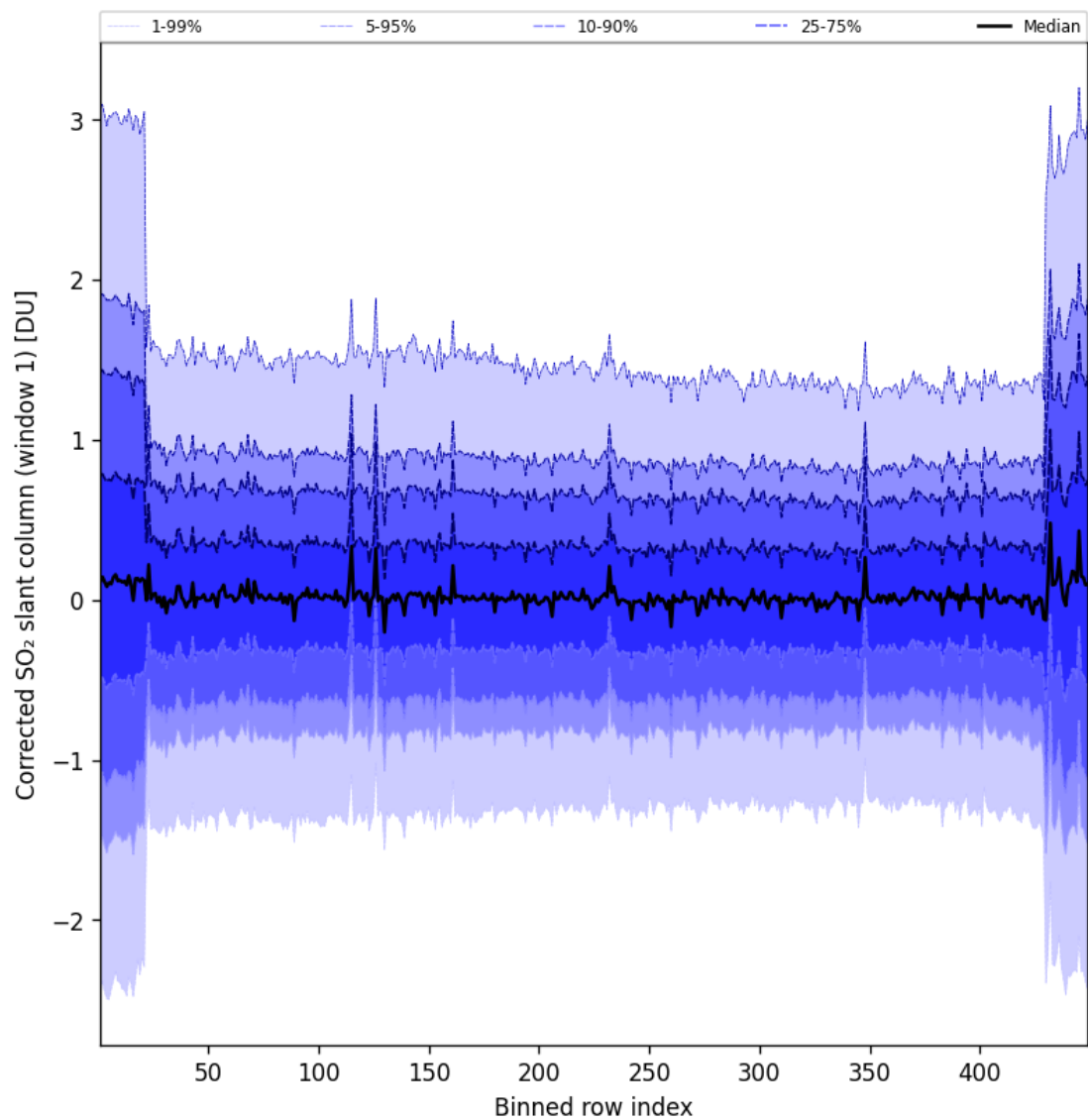


Figure 92: Along track statistics of “Corrected SO₂ slant column (window 1)” for 2024-12-09 to 2024-12-09

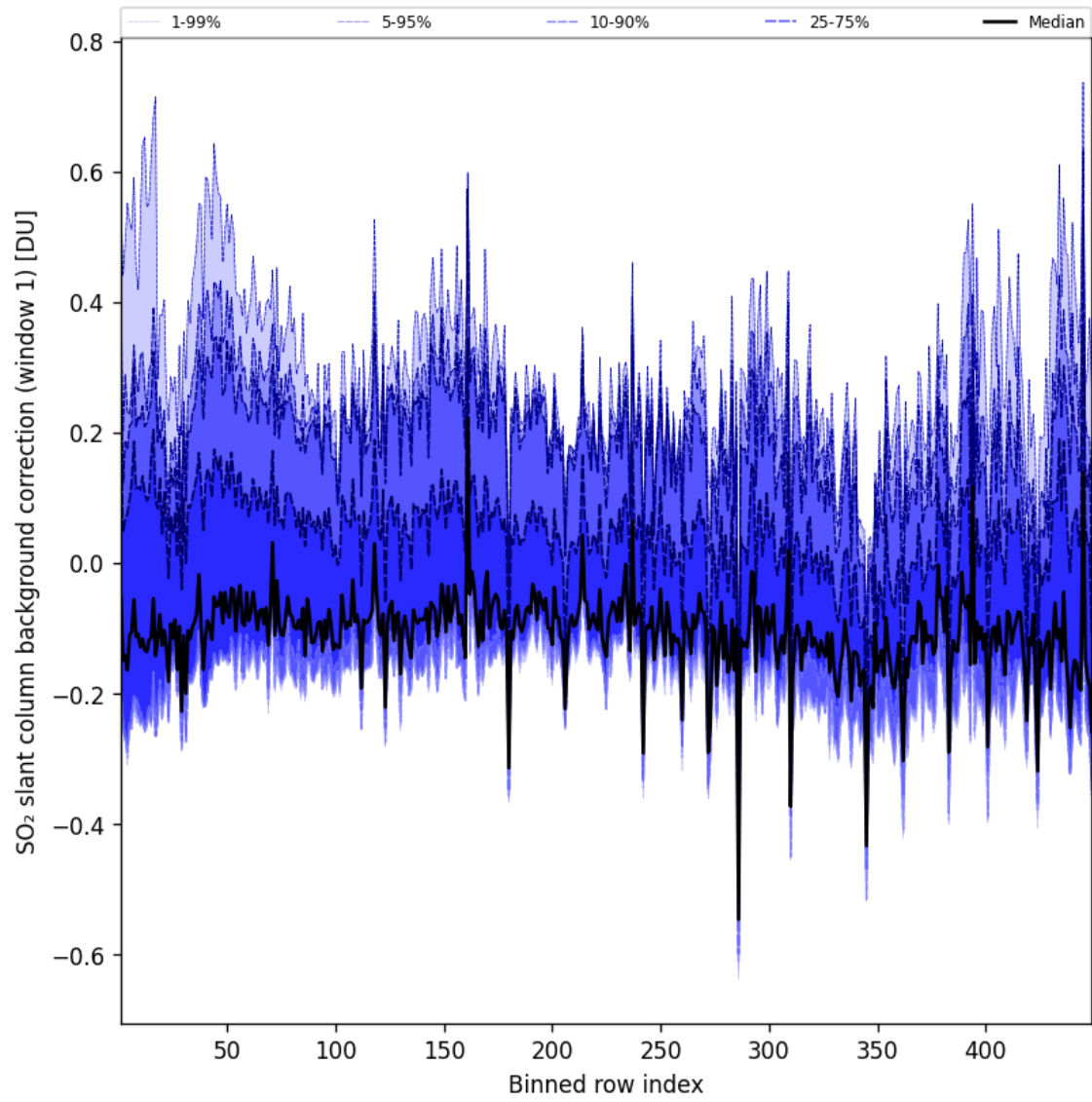


Figure 93: Along track statistics of “SO₂ slant column background correction (window 1)” for 2024-12-09 to 2024-12-09

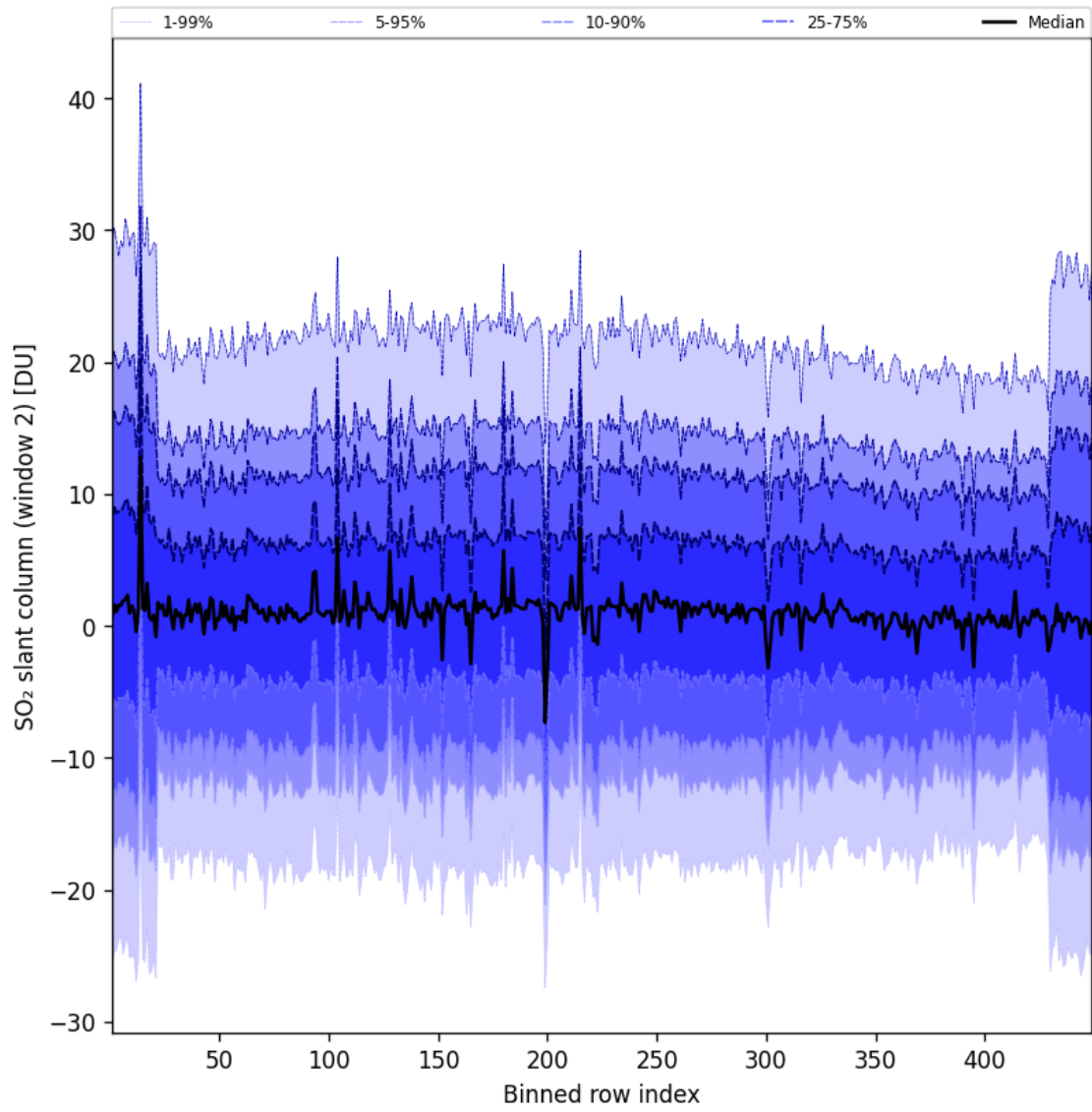


Figure 94: Along track statistics of “SO₂ slant column (window 2)” for 2024-12-09 to 2024-12-09

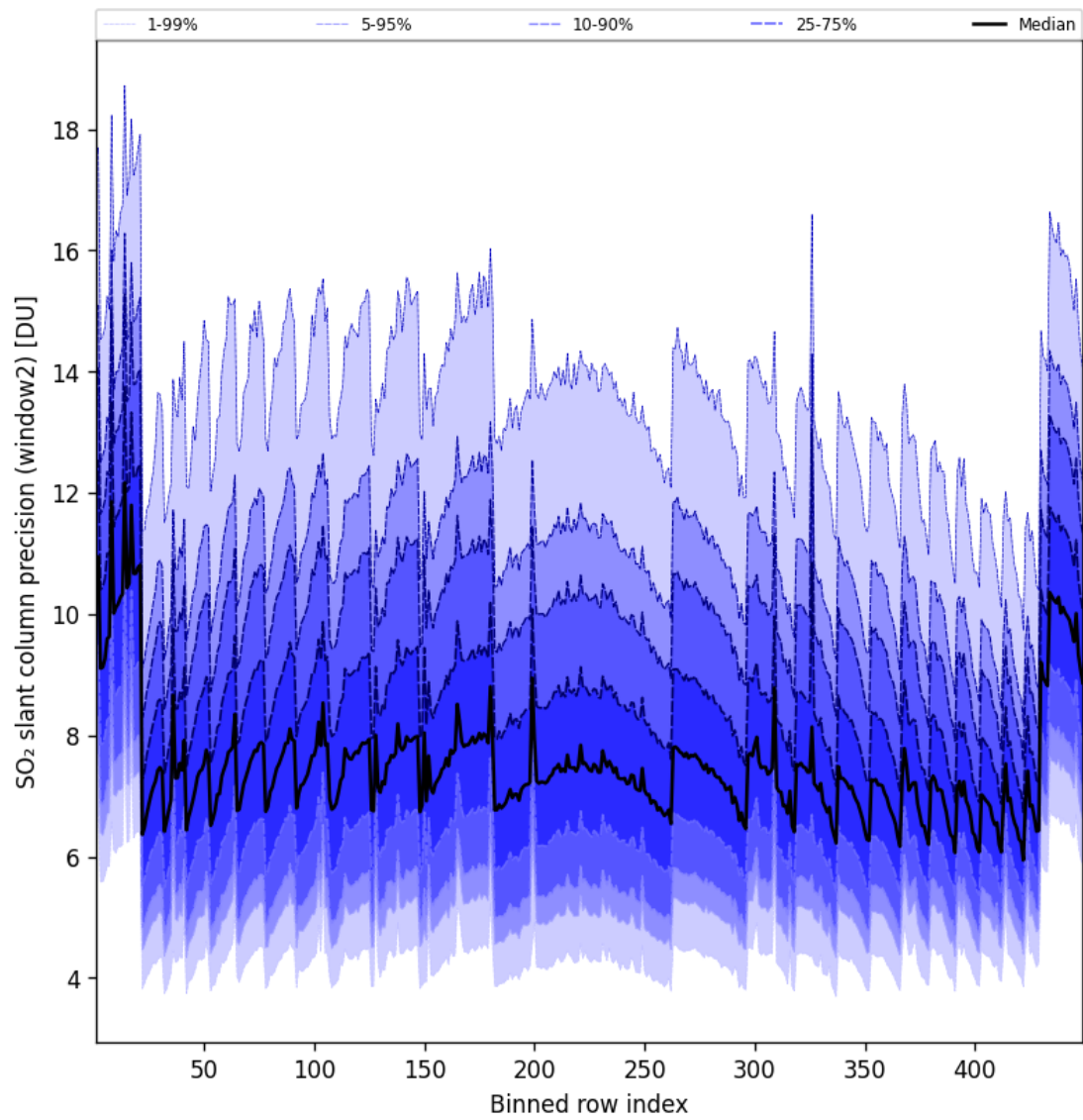


Figure 95: Along track statistics of “SO₂ slant column precision (window2)” for 2024-12-09 to 2024-12-09

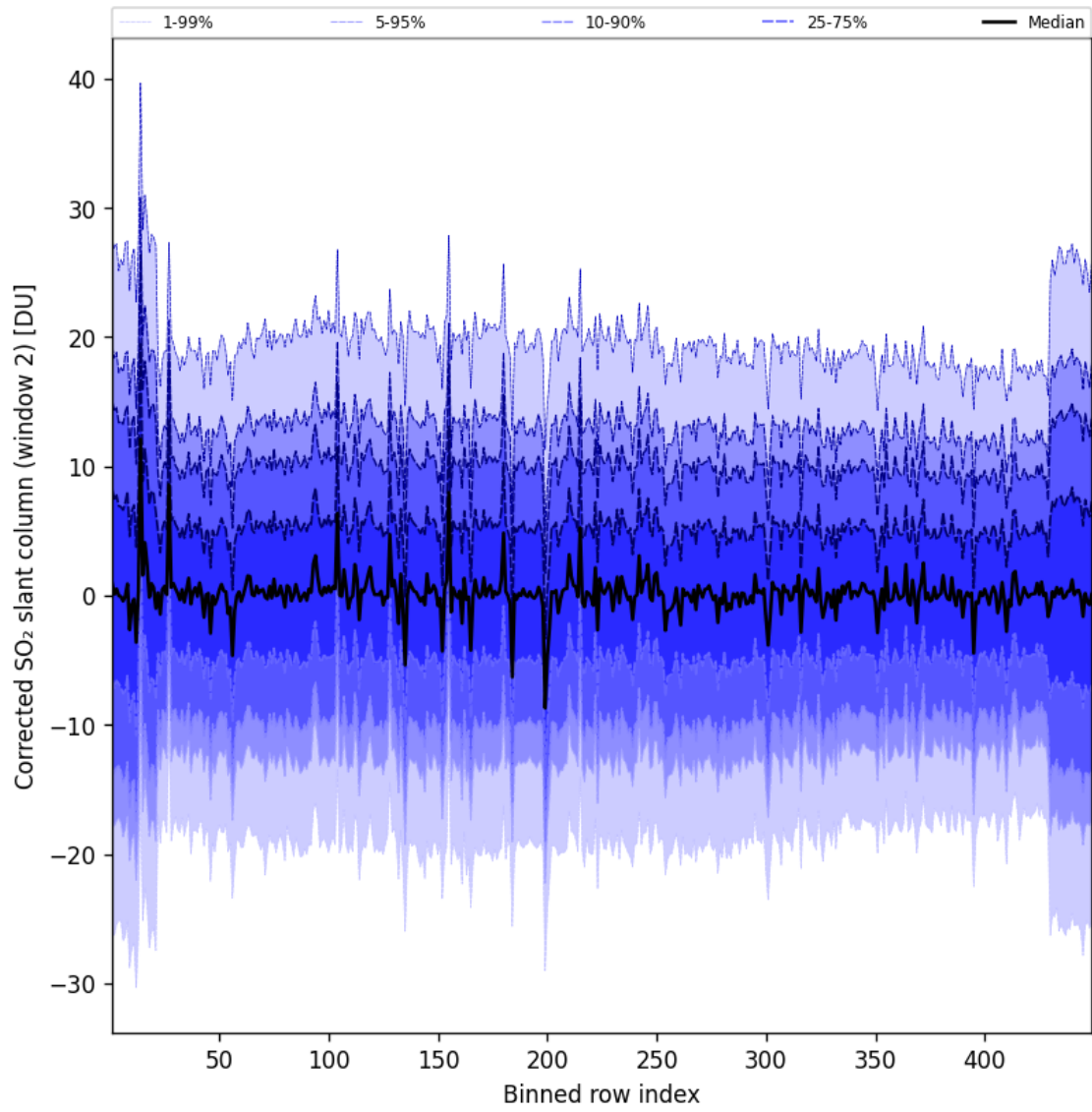


Figure 96: Along track statistics of “Corrected SO₂ slant column (window 2)” for 2024-12-09 to 2024-12-09

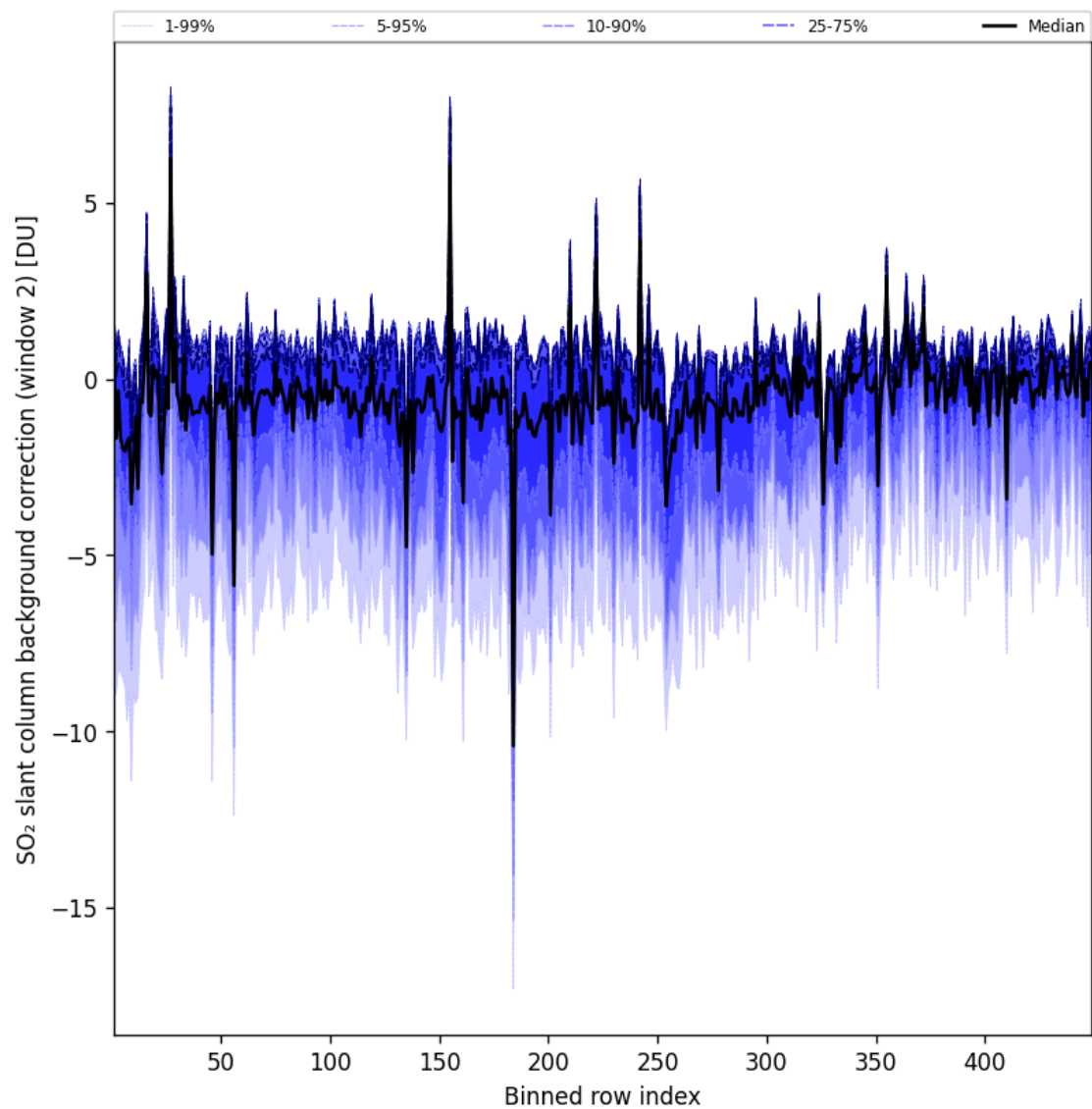


Figure 97: Along track statistics of “SO₂ slant column background correction (window 2)” for 2024-12-09 to 2024-12-09

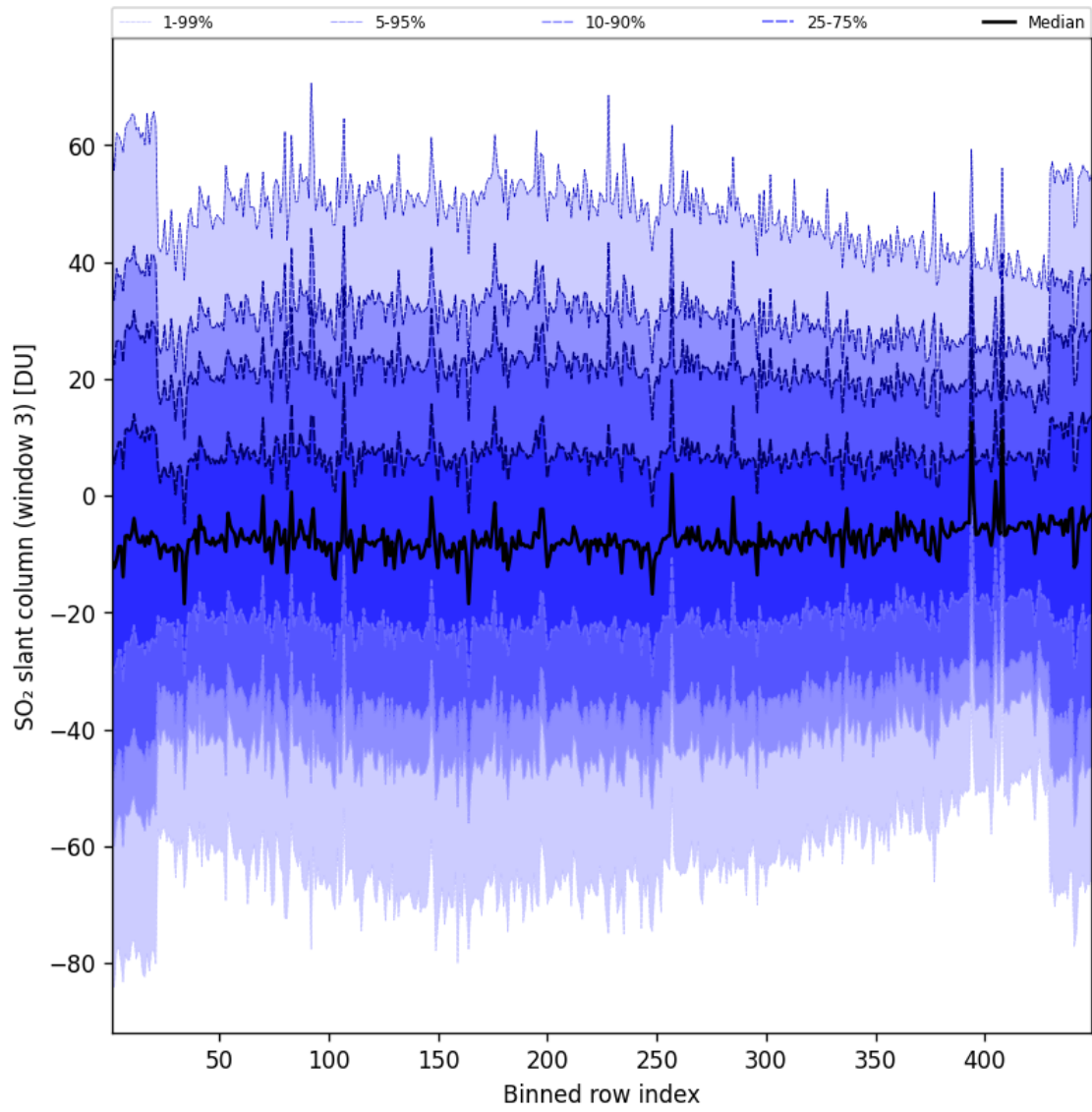


Figure 98: Along track statistics of “SO₂ slant column (window 3)” for 2024-12-09 to 2024-12-09

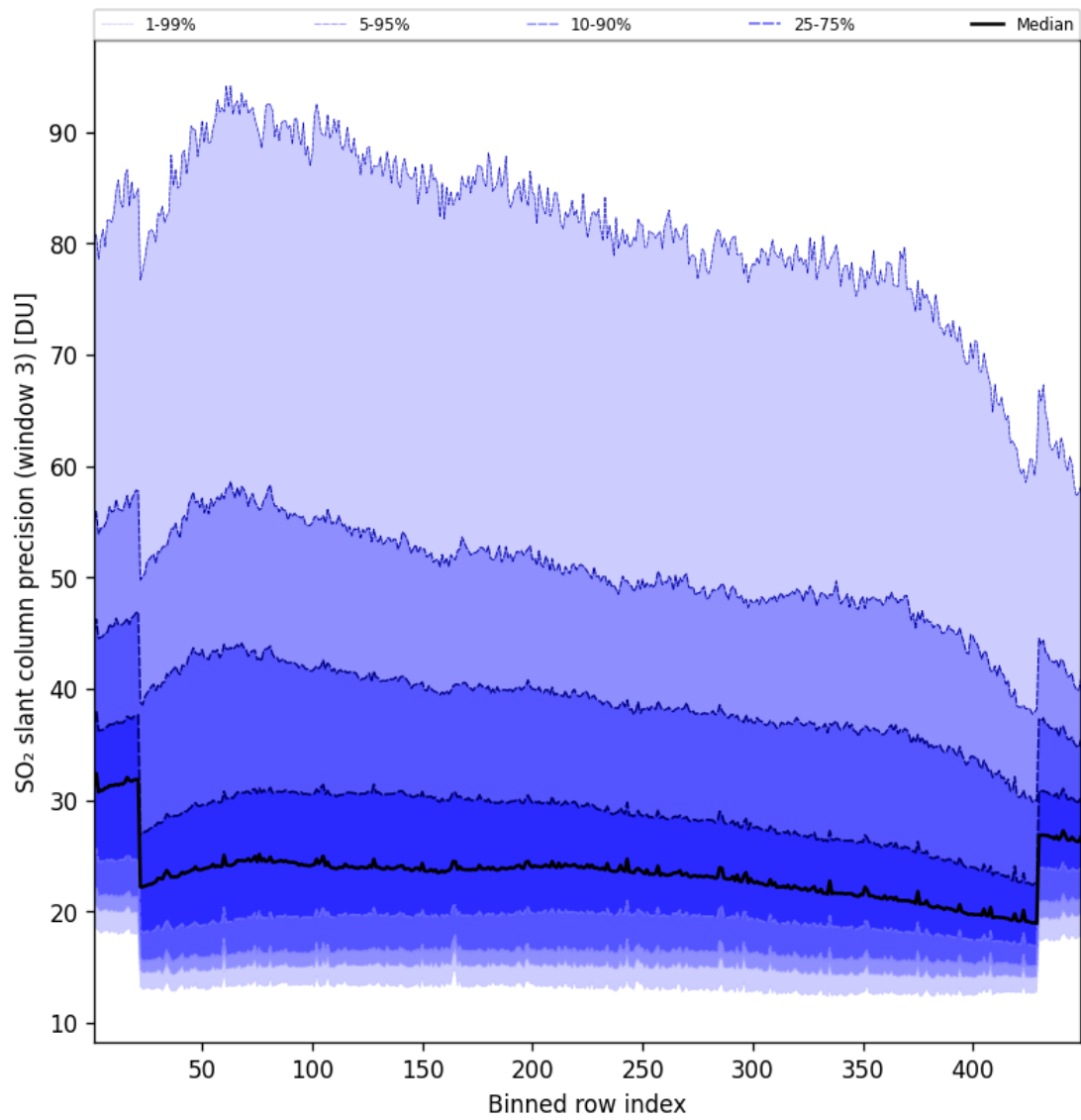


Figure 99: Along track statistics of “SO₂ slant column precision (window 3)” for 2024-12-09 to 2024-12-09

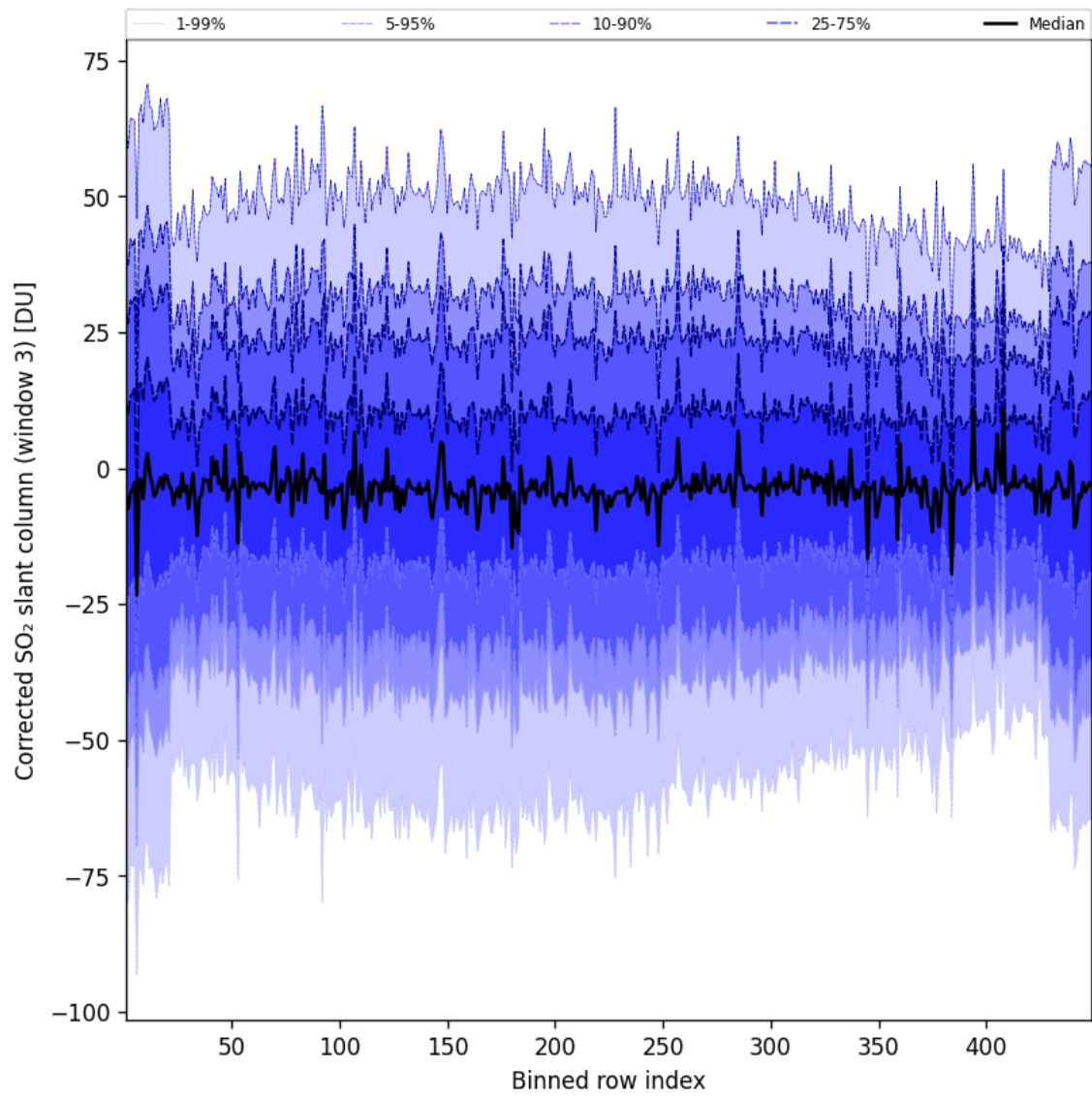


Figure 100: Along track statistics of “Corrected SO₂ slant column (window 3)” for 2024-12-09 to 2024-12-09

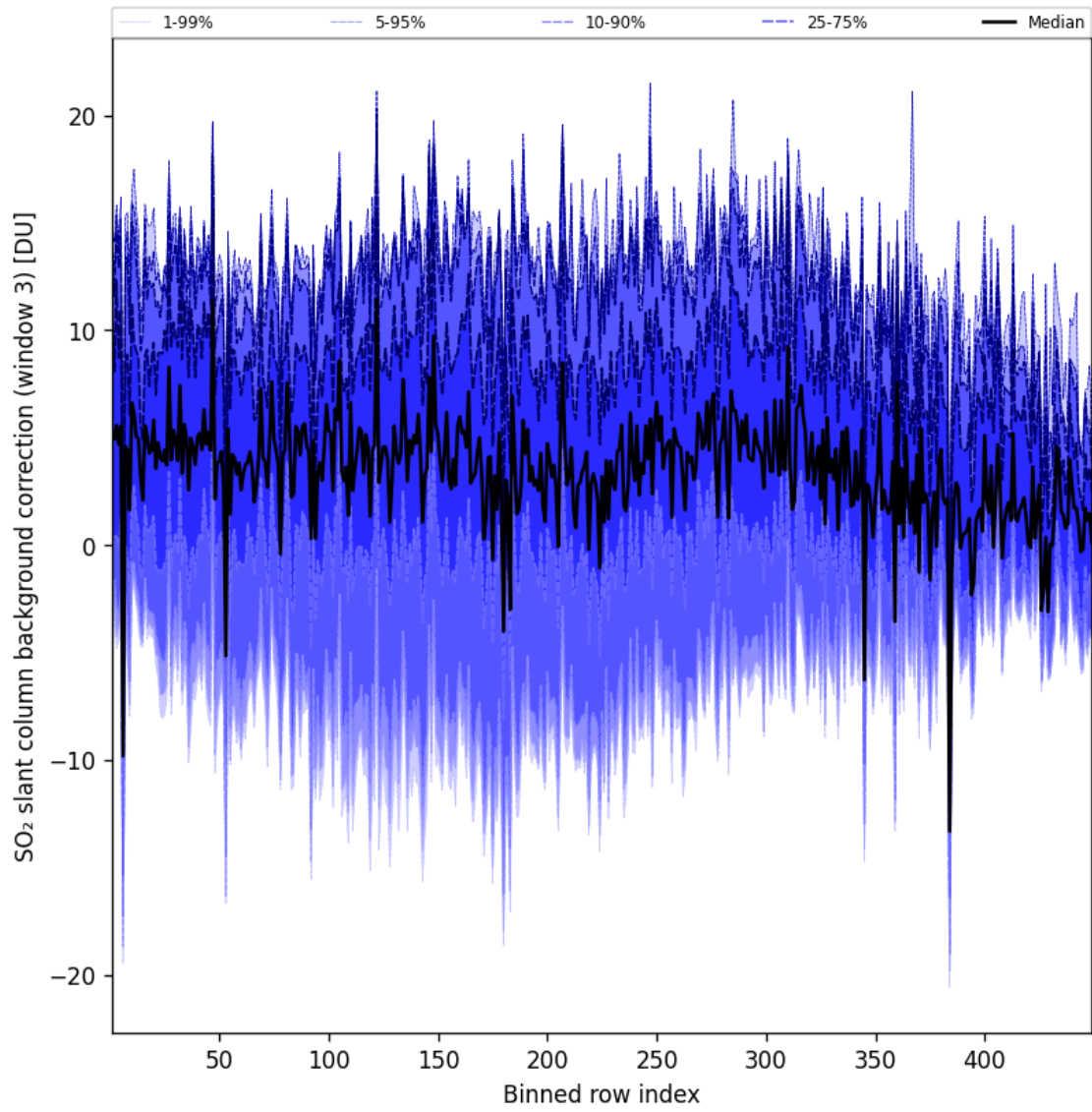


Figure 101: Along track statistics of “SO₂ slant column background correction (window 3)” for 2024-12-09 to 2024-12-09

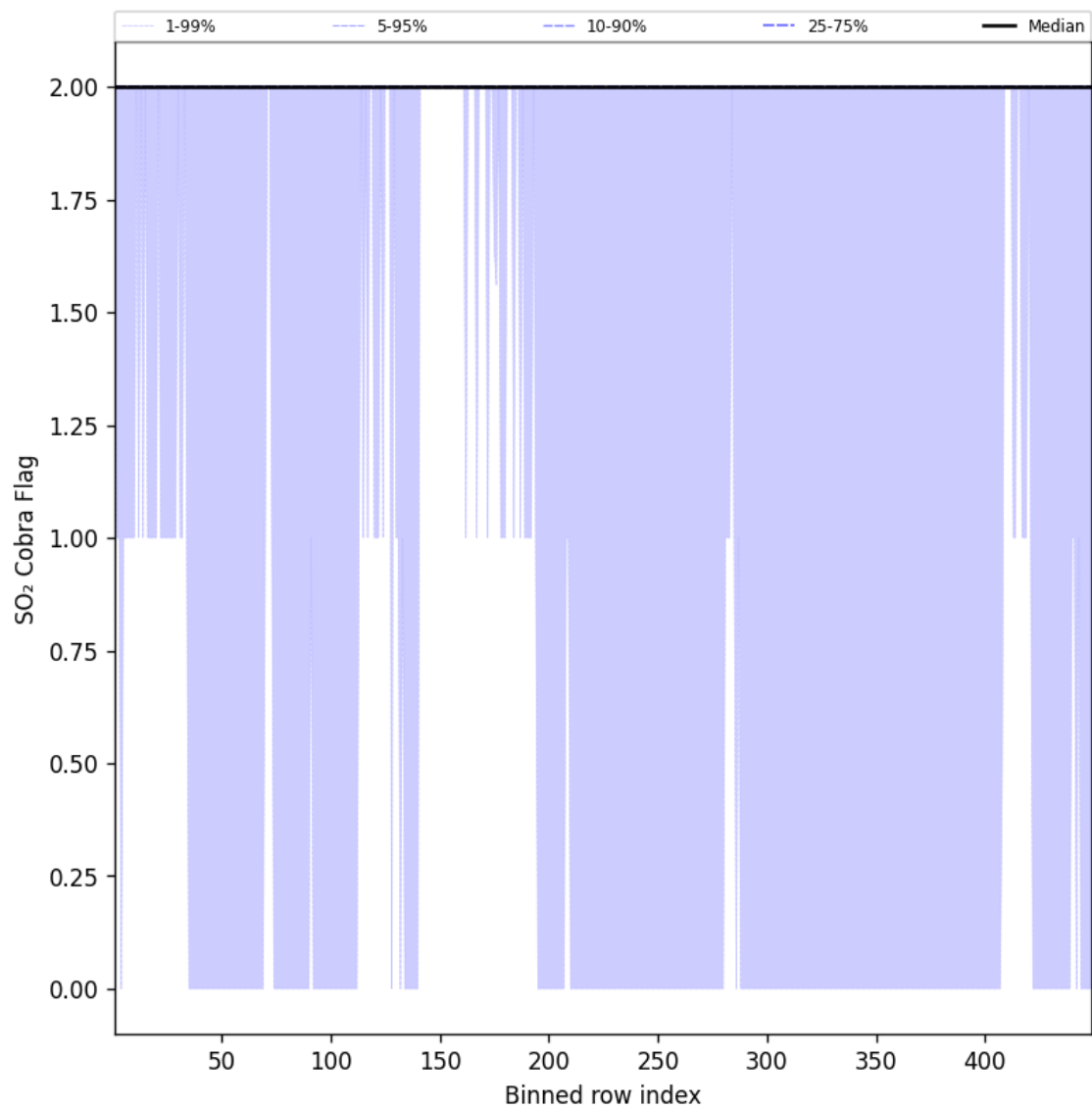


Figure 102: Along track statistics of “SO₂ Cobra Flag” for 2024-12-09 to 2024-12-09

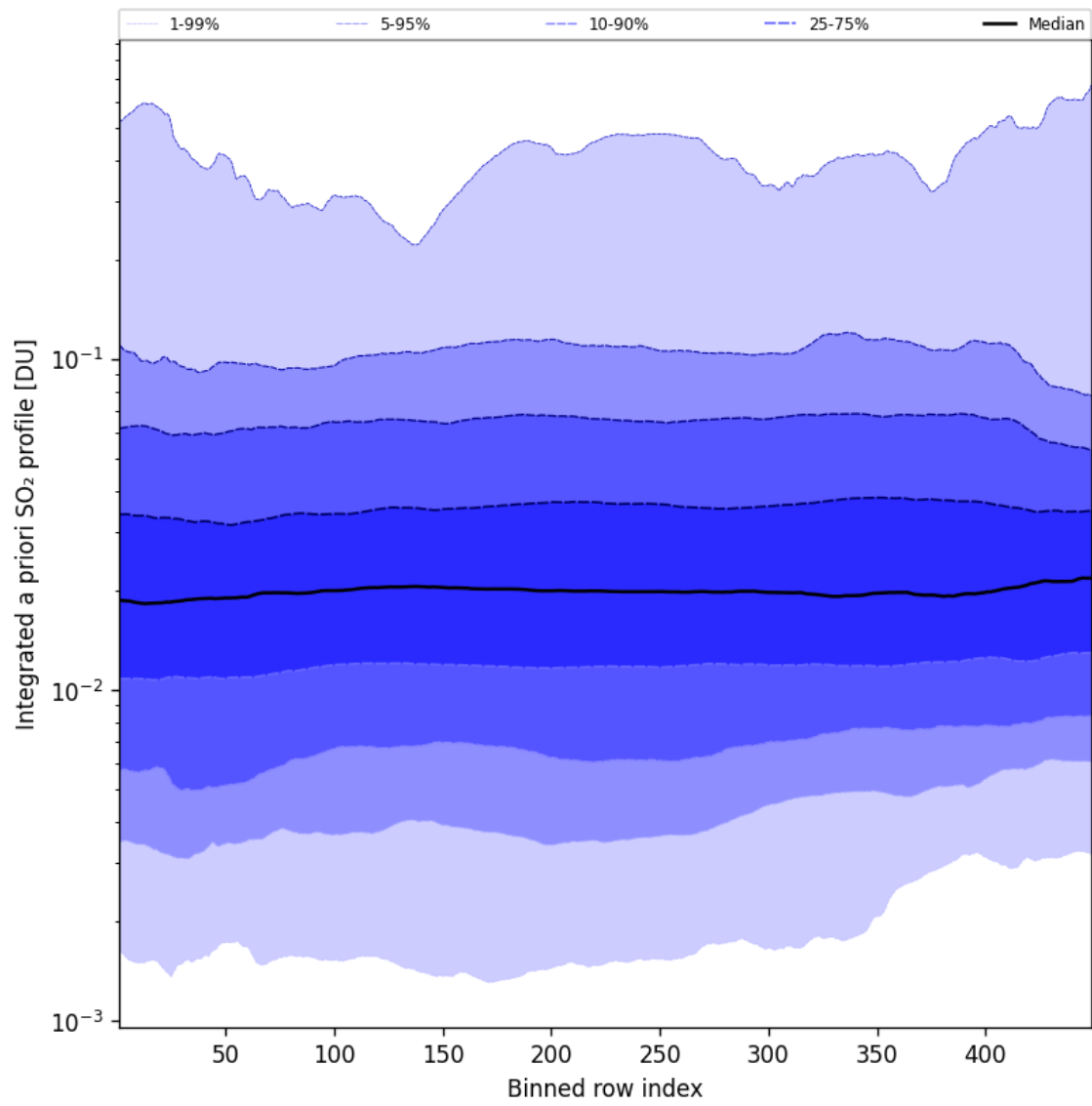


Figure 103: Along track statistics of “Integrated a priori SO₂ profile” for 2024-12-09 to 2024-12-09

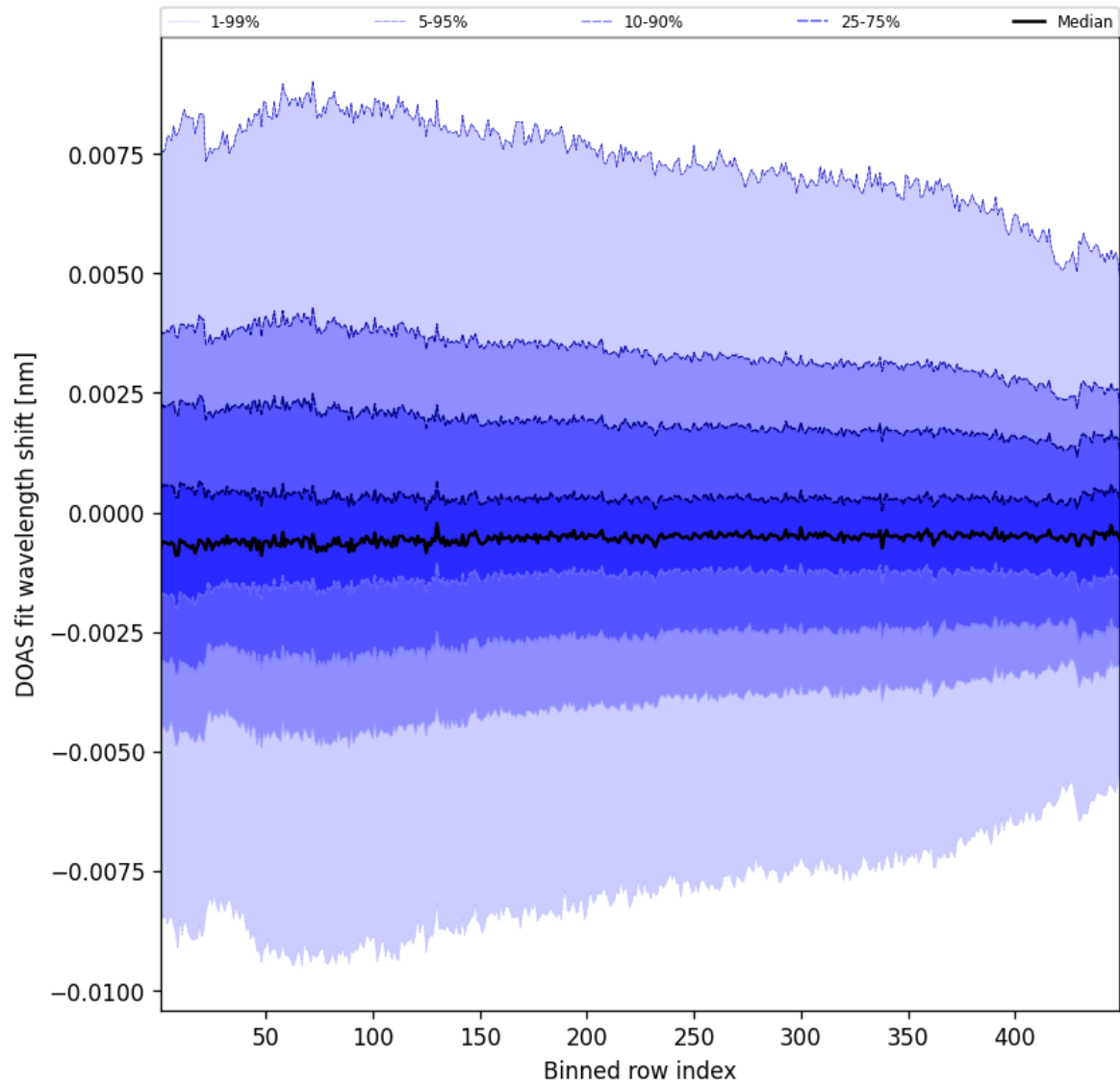


Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2024-12-09 to 2024-12-09

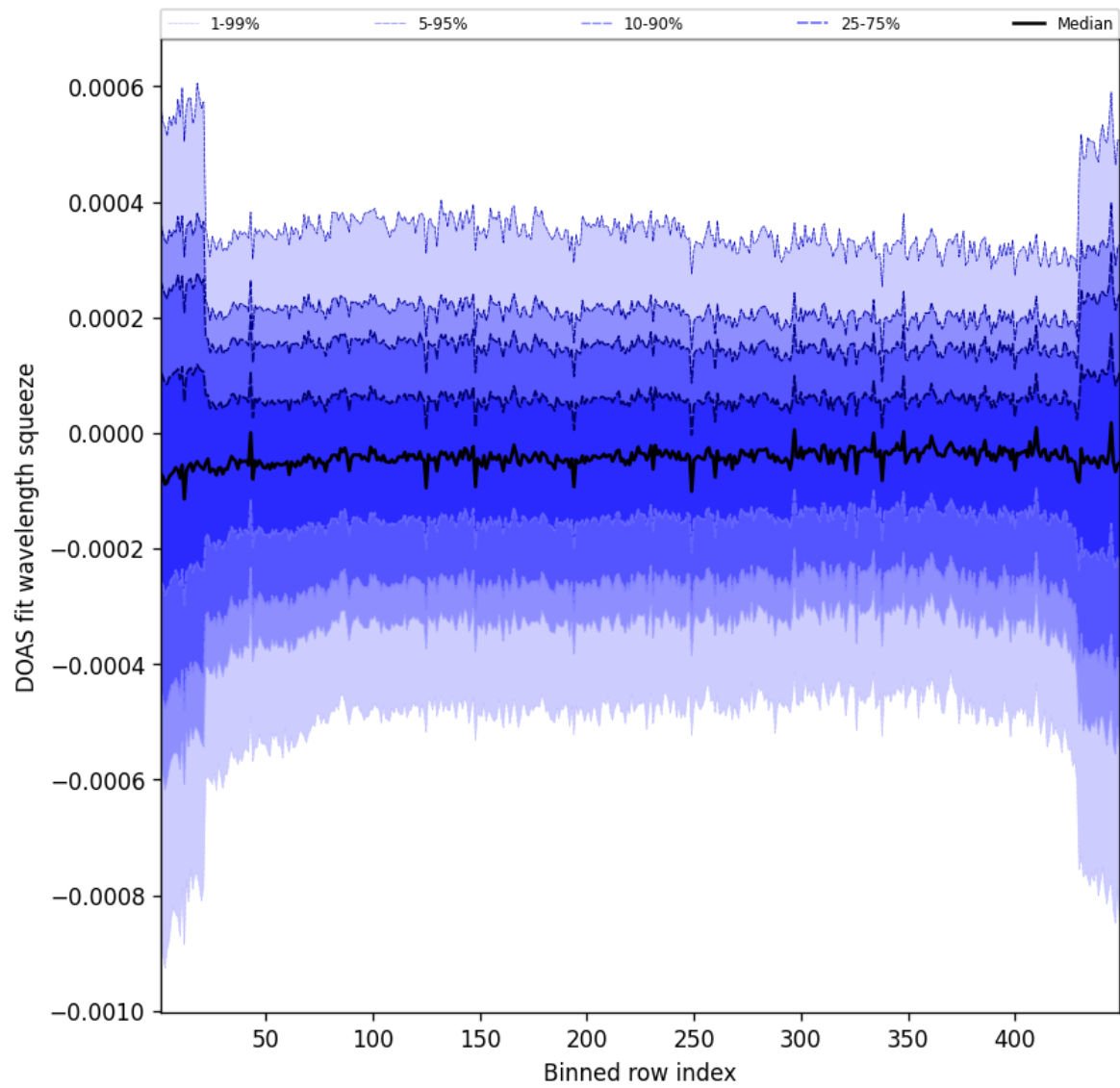


Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2024-12-09 to 2024-12-09

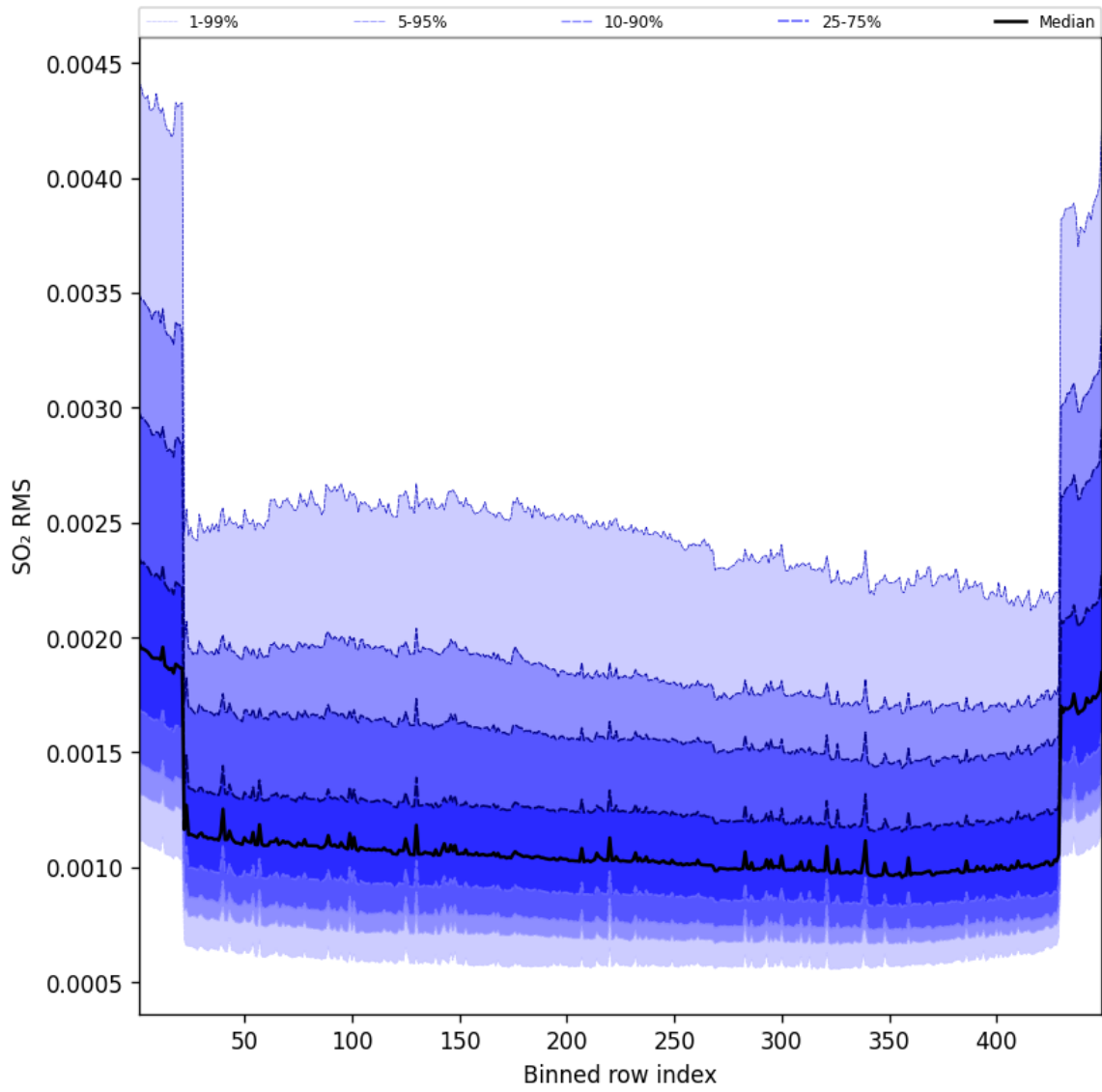


Figure 106: Along track statistics of "SO₂ RMS" for 2024-12-09 to 2024-12-09

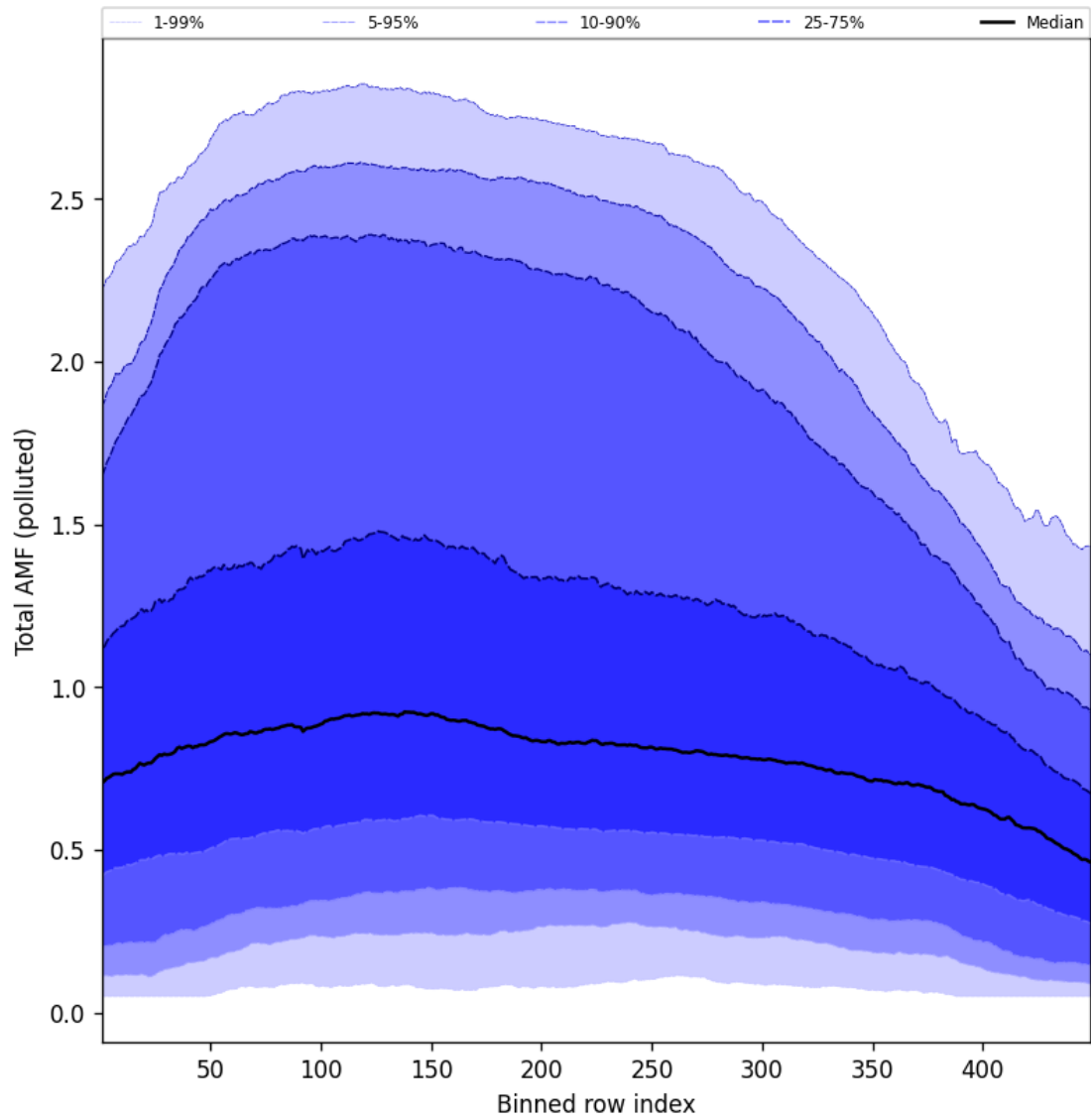


Figure 107: Along track statistics of “Total AMF (polluted)” for 2024-12-09 to 2024-12-09

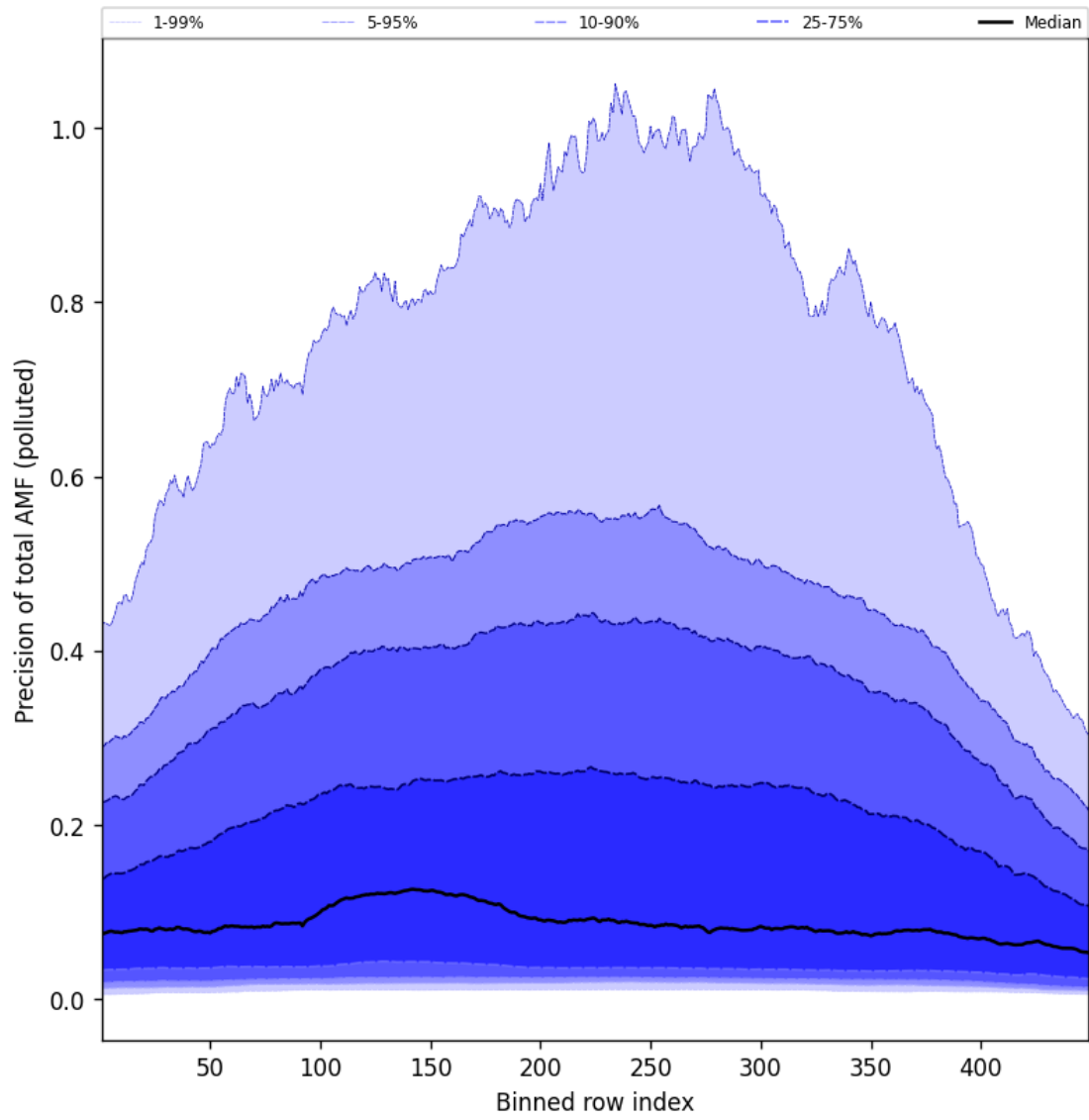


Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2024-12-09 to 2024-12-09

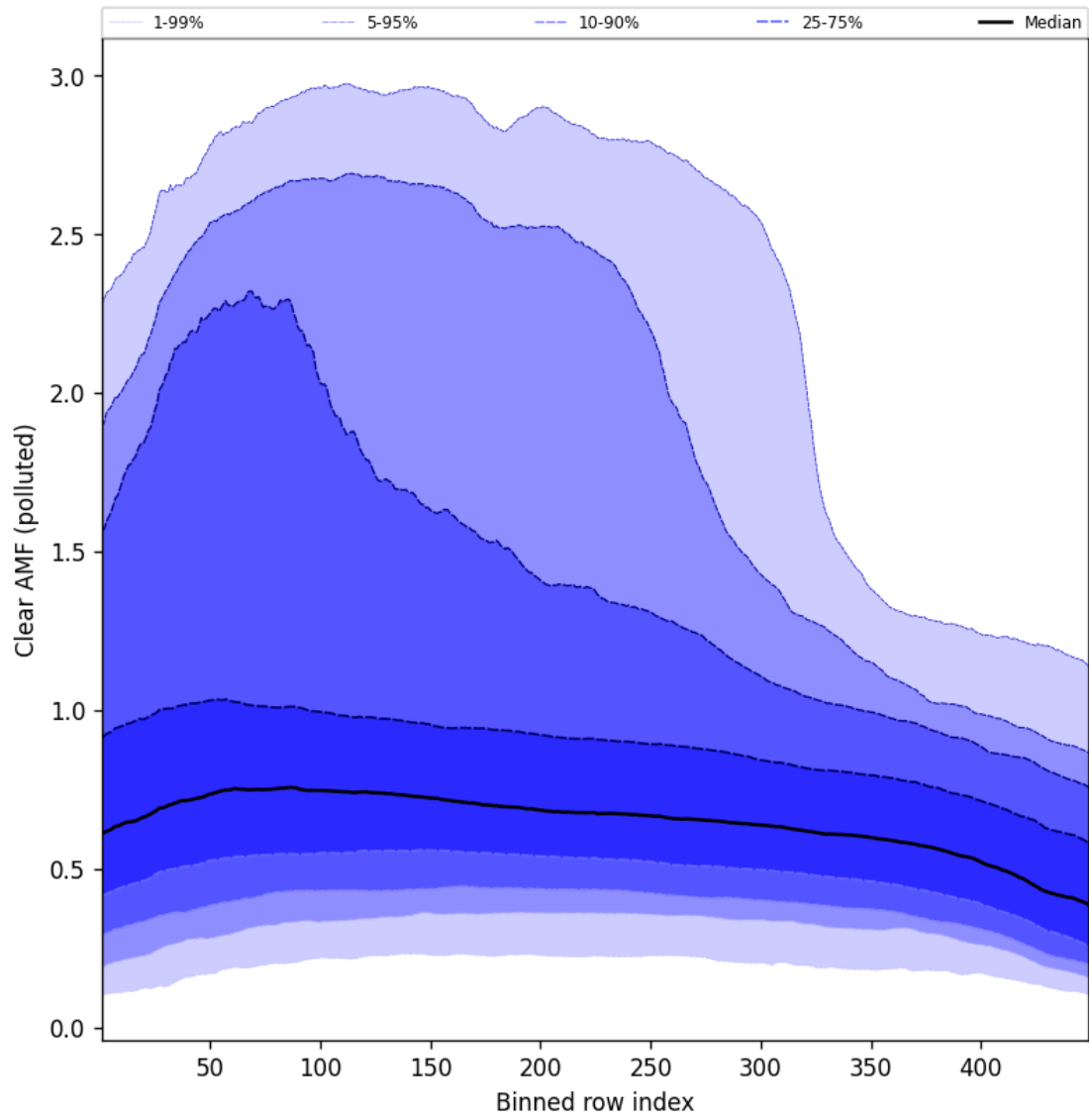


Figure 109: Along track statistics of “Clear AMF (polluted)” for 2024-12-09 to 2024-12-09

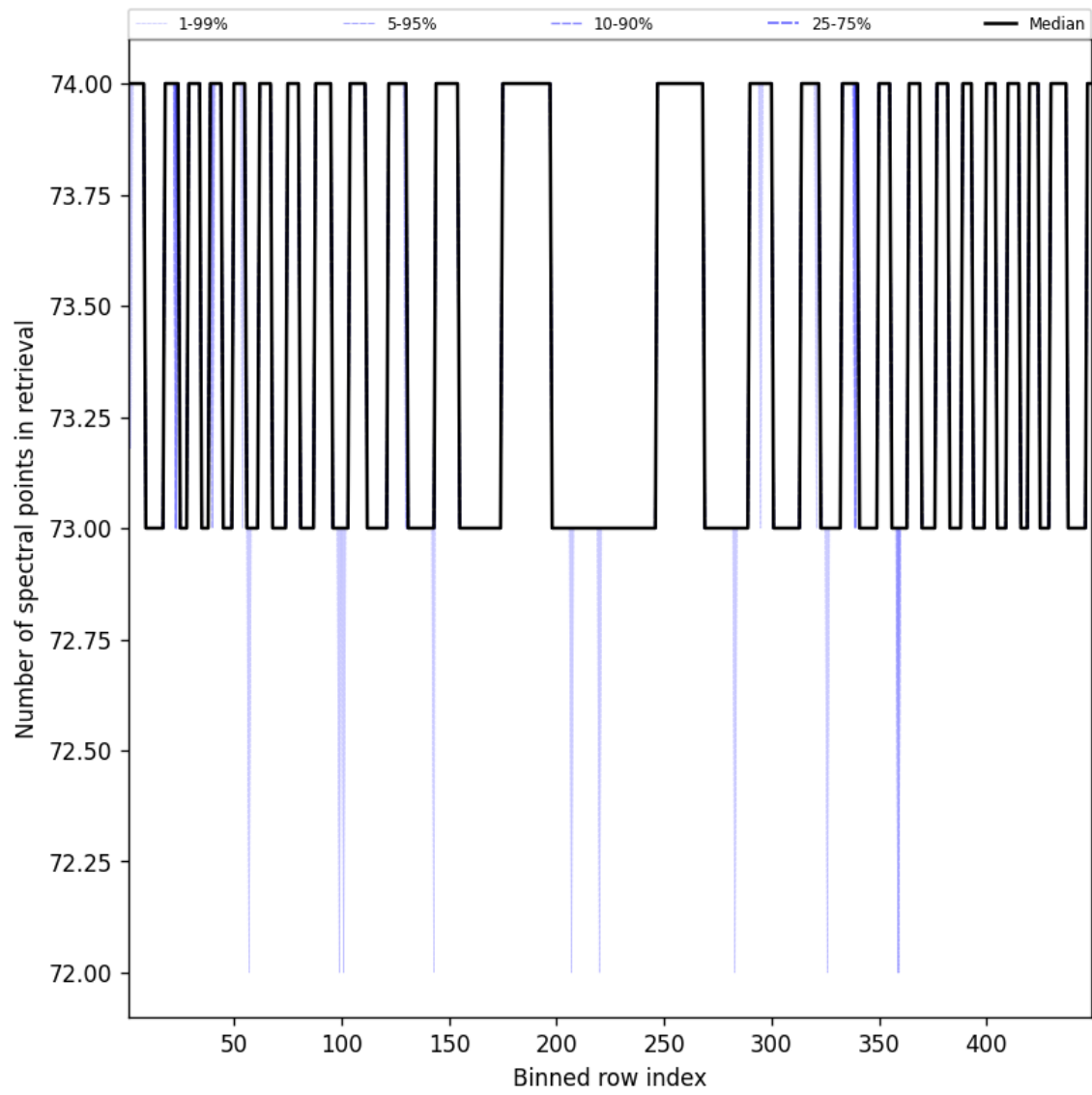


Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2024-12-09 to 2024-12-09

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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