

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]	0.594 ± 0.422	17136476	0.995	0.850	0.490	0.0	1.000
sulfurdioxide total vertical column [DU]	$(3.118 \pm 120.616) \times 10^{-2}$	17136476	0.211	0.377	7.260×10^{-3}	-97.8	233
sulfurdioxide total vertical column precision [DU]	0.526 ± 0.899	17136476	0.222	0.334	0.284	3.016×10^{-2}	44.7
sulfurdioxide slant column density corrected [DU]	$(1.306 \pm 32.625) \times 10^{-2}$	17136476	0.227	0.332	7.464×10^{-3}	-32.4	89.3
sulfurdioxide slant column density cobra [DU]	$(1.294 \pm 31.682) \times 10^{-2}$	17136476	0.227	0.332	7.464×10^{-3}	-32.4	89.3
sulfurdioxide slant column density cobra precision [DU]	0.264 ± 0.113	17136476	0.213	9.373×10^{-2}	0.228	7.911×10^{-2}	51.6
sulfurdioxide slant column density window1 [DU]	$(8.247 \pm 61.663) \times 10^{-2}$	17136476	7.500×10^{-2}	0.704	8.423×10^{-2}	-32.4	88.9
sulfurdioxide slant column density window1 precision [DU]	0.264 ± 0.113	17136476	0.213	9.373×10^{-2}	0.228	7.911×10^{-2}	51.6
sulfurdioxide slant column density corrected win1 [DU]	$(1.528 \pm 59.856) \times 10^{-2}$	17136476	-2.500×10^{-2}	0.670	5.129×10^{-3}	-32.4	89.3
background so2 slant column offset window1 [DU]	$(-6.719 \pm 15.130) \times 10^{-2}$	17136476	-0.140	0.219	-0.109	-1.17	1.74
sulfurdioxide slant column density window2 [DU]	0.564 ± 8.552	17136476	0.750	10.5	0.514	-991	1.088×10^3
sulfurdioxide slant column density window2 precision [DU]	7.70 ± 2.26	17136476	6.97	2.59	7.31	1.80	466
sulfurdioxide slant column density corrected win2 [DU]	-0.353 ± 8.425	17136476	0.250	10.4	-0.327	-989	1.089×10^3
background so2 slant column offset window2 [DU]	-0.917 ± 2.017	17136476	0.750	2.57	-0.501	-13.7	6.84
sulfurdioxide slant column density window3 [DU]	-3.79 ± 23.08	17136476	-5.04	28.3	-4.12	-446	273
sulfurdioxide slant column density window3 precision [DU]	26.6 ± 12.8	17136476	20.3	10.2	23.3	9.44	268
sulfurdioxide slant column density corrected win3 [DU]	1.22 ± 22.35	17136476	-0.560	27.3	1.20	-446	265
background so2 slant column offset window3 [DU]	5.01 ± 6.43	17136476	2.80	9.71	4.89	-29.8	35.4
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.21	17136476	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(3.719 \pm 9.126) \times 10^{-2}$	17136476	1.539×10^{-2}	2.246×10^{-2}	1.867×10^{-2}	2.895×10^{-4}	3.24
fitted radiance shift [nm]	$(-3.708 \pm 24.219) \times 10^{-4}$	17136476	-5.000×10^{-4}	1.567×10^{-3}	-4.286×10^{-4}	-5.099×10^{-2}	9.518×10^{-2}
fitted radiance squeeze [1]	$(-4.071 \pm 17.145) \times 10^{-5}$	17136476	-3.000×10^{-5}	2.067×10^{-4}	-3.665×10^{-5}	-1.624×10^{-2}	1.452×10^{-2}
fitted root mean square [1]	$(1.171 \pm 0.459) \times 10^{-3}$	17136476	9.750×10^{-4}	4.117×10^{-4}	1.048×10^{-3}	3.332×10^{-4}	0.154
sulfurdioxide total air mass factor polluted [1]	0.996 ± 0.675	17136476	0.820	0.733	0.822	5.000×10^{-2}	3.39
sulfurdioxide total air mass factor polluted precision [1]	0.150 ± 0.155	17136476	3.500×10^{-2}	0.179	8.989×10^{-2}	2.500×10^{-3}	1.71
sulfurdioxide clear air mass factor polluted [1]	0.830 ± 0.578	17136476	0.580	0.406	0.688	2.620×10^{-2}	3.41
number of spectral points in retrieval [1]	73.4 ± 0.5	17136476	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	1.000×10^{-2}	6.000×10^{-2}	0.150	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	-2.72	-0.865	-0.494	-0.319	-0.178	0.199	0.350	0.543	0.962	3.16
sulfurdioxide total vertical column precision [DU]	6.699×10^{-2}	8.409×10^{-2}	0.105	0.133	0.174	0.508	0.725	1.05	1.70	4.35
sulfurdioxide slant column density corrected [DU]	-0.768	-0.442	-0.323	-0.243	-0.158	0.175	0.263	0.348	0.479	0.865
sulfurdioxide slant column density cobra [DU]	-0.768	-0.442	-0.323	-0.243	-0.158	0.175	0.263	0.348	0.479	0.865
sulfurdioxide slant column density cobra precision [DU]	0.134	0.160	0.174	0.184	0.196	0.290	0.357	0.415	0.486	0.675
sulfurdioxide slant column density window1 [DU]	-1.49	-0.872	-0.628	-0.458	-0.272	0.432	0.611	0.780	1.03	1.71
sulfurdioxide slant column density window1 precision [DU]	0.134	0.160	0.174	0.184	0.196	0.290	0.357	0.415	0.486	0.675
sulfurdioxide slant column density corrected win1 [DU]	-1.48	-0.886	-0.658	-0.499	-0.328	0.342	0.520	0.690	0.947	1.66
background so2 slant column offset window1 [DU]	-0.371	-0.262	-0.223	-0.197	-0.172	4.750×10^{-2}	0.111	0.151	0.197	0.286
sulfurdioxide slant column density window2 [DU]	-19.7	-12.9	-9.73	-7.37	-4.75	5.80	8.48	10.9	14.3	21.9
sulfurdioxide slant column density window2 precision [DU]	4.10	4.85	5.31	5.70	6.18	8.77	9.68	10.6	11.9	14.5
sulfurdioxide slant column density corrected win2 [DU]	-20.9	-13.8	-10.5	-8.17	-5.54	4.88	7.49	9.85	13.1	20.1
background so2 slant column offset window2 [DU]	-7.10	-4.79	-3.57	-2.77	-2.04	0.533	0.799	1.03	1.43	3.00
sulfurdioxide slant column density window3 [DU]	-62.2	-40.8	-31.5	-25.0	-18.0	10.3	17.9	25.0	34.5	53.5
sulfurdioxide slant column density window3 precision [DU]	13.3	15.2	16.5	17.6	19.2	29.4	34.1	39.3	50.2	81.2
sulfurdioxide slant column density corrected win3 [DU]	-56.2	-35.2	-25.8	-19.3	-12.4	14.9	22.1	28.6	37.7	56.5
background so2 slant column offset window3 [DU]	-7.48	-4.94	-3.54	-2.06	9.874×10^{-2}	9.81	12.1	13.8	15.5	18.1
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]	1.310×10^{-3}	3.362×10^{-3}	5.673×10^{-3}	8.094×10^{-3}	1.116×10^{-2}	3.362×10^{-2}	4.561×10^{-2}	6.133×10^{-2}	0.112	0.382
fitted radiance shift [nm]	-7.737×10^{-3}	-3.845×10^{-3}	-2.491×10^{-3}	-1.758×10^{-3}	-1.194×10^{-3}	3.732×10^{-4}	1.027×10^{-3}	1.869×10^{-3}	3.351×10^{-3}	7.414×10^{-3}
fitted radiance squeeze [1]	-4.830×10^{-4}	-3.185×10^{-4}	-2.479×10^{-4}	-1.977×10^{-4}	-1.426×10^{-4}	6.408×10^{-5}	1.143×10^{-4}	1.603×10^{-4}	2.254×10^{-4}	3.798×10^{-4}
fitted root mean square [1]	5.676×10^{-4}	6.920×10^{-4}	7.689×10^{-4}	8.261×10^{-4}	8.917×10^{-4}	1.304×10^{-3}	1.522×10^{-3}	1.760×10^{-3}	2.090×10^{-3}	2.841×10^{-3}
sulfurdioxide total air mass factor polluted [1]	7.541×10^{-2}	0.203	0.302	0.404	0.527	1.26	1.62	2.08	2.55	2.92
sulfurdioxide total air mass factor polluted precision [1]	8.416×10^{-3}	1.535×10^{-2}	2.241×10^{-2}	2.900×10^{-2}	3.804×10^{-2}	0.217	0.292	0.363	0.458	0.690
sulfurdioxide clear air mass factor polluted [1]	0.167	0.276	0.364	0.429	0.507	0.913	1.08	1.35	2.48	3.02
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]	0.733 ± 0.379	5793694	0.610	1.000	0.0	1.000	0.390	1.000
sulfurdioxide total vertical column [DU]	$(6.565 \pm 187.494) \times 10^{-2}$	5793694	0.594	1.469×10^{-2}	-97.8	233	-0.275	0.319
sulfurdioxide total vertical column precision [DU]	0.864 ± 1.336	5793694	0.653	0.422	5.163×10^{-2}	38.8	0.260	0.913
sulfurdioxide slant column density corrected [DU]	$(2.061 \pm 39.141) \times 10^{-2}$	5793694	0.399	1.128×10^{-2}	-8.56	50.6	-0.187	0.212
sulfurdioxide slant column density cobra [DU]	$(2.054 \pm 38.802) \times 10^{-2}$	5793694	0.399	1.128×10^{-2}	-8.56	12.1	-0.187	0.212
sulfurdioxide slant column density cobra precision [DU]	0.321 ± 0.137	5793694	0.160	0.282	8.579×10^{-2}	4.50	0.224	0.384
sulfurdioxide slant column density window1 [DU]	0.155 ± 0.723	5793694	0.797	0.157	-9.81	31.8	-0.243	0.554
sulfurdioxide slant column density window1 precision [DU]	0.321 ± 0.137	5793694	0.160	0.282	8.579×10^{-2}	4.50	0.224	0.384
sulfurdioxide slant column density corrected win1 [DU]	$(3.825 \pm 72.206) \times 10^{-2}$	5793694	0.791	1.912×10^{-2}	-9.12	32.2	-0.371	0.421
background so2 slant column offset window1 [DU]	-0.117 ± 0.123	5793694	0.104	-0.126	-0.751	1.74	-0.180	-7.564×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.03 ± 9.94	5793694	12.4	0.801	-113	151	-5.27	7.11
sulfurdioxide slant column density window2 precision [DU]	8.87 ± 2.34	5793694	2.90	8.55	2.25	79.6	7.26	10.2
sulfurdioxide slant column density corrected win2 [DU]	-0.304 ± 9.712	5793694	12.1	-0.256	-116	150	-6.33	5.81
background so2 slant column offset window2 [DU]	-1.33 ± 2.46	5793694	3.07	-0.450	-13.7	6.36	-2.67	0.400
sulfurdioxide slant column density window3 [DU]	-5.66 ± 26.45	5793694	33.3	-5.00	-216	161	-21.9	11.4
sulfurdioxide slant column density window3 precision [DU]	30.6 ± 12.8	5793694	10.4	27.5	10.1	217	23.4	33.8
sulfurdioxide slant column density corrected win3 [DU]	0.804 ± 25.938	5793694	32.7	1.10	-206	169	-15.4	17.4
background so2 slant column offset window3 [DU]	6.47 ± 5.36	5793694	8.12	5.40	-22.0	35.4	2.37	10.5
sulfurdioxide slant column cobra flag [1]	1.96 ± 0.27	5793694	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(6.921 \pm 14.701) \times 10^{-2}$	5793694	4.148×10^{-2}	2.957×10^{-2}	6.926×10^{-4}	3.24	1.682×10^{-2}	5.830×10^{-2}
fitted radiance shift [nm]	$(-2.098 \pm 25.271) \times 10^{-4}$	5793694	1.666×10^{-3}	-2.359×10^{-4}	-3.457×10^{-2}	4.039×10^{-2}	-1.065×10^{-3}	6.009×10^{-4}
fitted radiance squeeze [1]	$(-8.415 \pm 1876.367) \times 10^{-7}$	5793694	2.175×10^{-4}	1.246×10^{-6}	-2.125×10^{-3}	1.117×10^{-2}	-1.082×10^{-4}	1.093×10^{-4}
fitted root mean square [1]	$(1.394 \pm 0.565) \times 10^{-3}$	5793694	6.454×10^{-4}	1.236×10^{-3}	3.517×10^{-4}	2.320×10^{-2}	1.007×10^{-3}	1.652×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.709 ± 0.396	5793694	0.545	0.691	5.000×10^{-2}	2.87	0.394	0.940
sulfurdioxide total air mass factor polluted precision [1]	$(8.505 \pm 11.137) \times 10^{-2}$	5793694	7.746×10^{-2}	4.810×10^{-2}	2.500×10^{-3}	1.69	2.735×10^{-2}	0.105
sulfurdioxide clear air mass factor polluted [1]	0.645 ± 0.288	5793694	0.464	0.658	2.620×10^{-2}	2.18	0.400	0.864
number of spectral points in retrieval [1]	73.5 ± 0.5	5793694	1.000	73.0	71.0	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]	0.523 ± 0.426	11342782	0.900	0.410	0.0	1.000	0.1000	1.000
sulfurdioxide total vertical column [DU]	$(1.358 \pm 63.355) \times 10^{-2}$	11342782	0.305	5.260×10^{-3}	-33.8	76.0	-0.145	0.160
sulfurdioxide total vertical column precision [DU]	0.354 ± 0.471	11342782	0.254	0.237	3.016×10^{-2}	44.7	0.143	0.397
sulfurdioxide slant column density corrected [DU]	$(9.203 \pm 287.251) \times 10^{-3}$	11342782	0.305	5.946×10^{-3}	-32.4	89.3	-0.146	0.159
sulfurdioxide slant column density cobra [DU]	$(9.051 \pm 273.303) \times 10^{-3}$	11342782	0.305	5.946×10^{-3}	-32.4	89.3	-0.146	0.159
sulfurdioxide slant column density cobra precision [DU]	0.235 ± 0.085	11342782	6.036×10^{-2}	0.214	7.911×10^{-2}	51.6	0.189	0.249
sulfurdioxide slant column density window1 [DU]	$(4.545 \pm 55.067) \times 10^{-2}$	11342782	0.661	5.316×10^{-2}	-32.4	88.9	-0.284	0.377
sulfurdioxide slant column density window1 precision [DU]	0.235 ± 0.085	11342782	6.036×10^{-2}	0.214	7.911×10^{-2}	51.6	0.189	0.249
sulfurdioxide slant column density corrected win1 [DU]	$(3.544 \pm 523.987) \times 10^{-3}$	11342782	0.620	-5.962×10^{-4}	-32.4	89.3	-0.310	0.310
background so2 slant column offset window1 [DU]	$(-4.191 \pm 15.796) \times 10^{-2}$	11342782	0.264	-7.266×10^{-2}	-1.17	0.805	-0.169	9.511×10^{-2}
sulfurdioxide slant column density window2 [DU]	0.328 ± 7.739	11342782	9.78	0.398	-991	1.088×10^3	-4.52	5.26
sulfurdioxide slant column density window2 precision [DU]	7.09 ± 1.97	11342782	2.08	6.82	1.80	466	5.86	7.94
sulfurdioxide slant column density corrected win2 [DU]	-0.378 ± 7.684	11342782	9.68	-0.355	-989	1.089×10^3	-5.20	4.47
background so2 slant column offset window2 [DU]	-0.705 ± 1.710	11342782	2.49	-0.526	-9.29	6.84	-1.88	0.614
sulfurdioxide slant column density window3 [DU]	-2.84 ± 21.09	11342782	26.2	-3.77	-446	273	-16.4	9.82
sulfurdioxide slant column density window3 precision [DU]	24.6 ± 12.3	11342782	7.87	21.3	9.44	268	18.1	25.9
sulfurdioxide slant column density corrected win3 [DU]	1.43 ± 20.27	11342782	25.1	1.24	-446	265	-11.1	13.9
background so2 slant column offset window3 [DU]	4.27 ± 6.80	11342782	11.2	4.54	-29.8	22.5	-1.69	9.47
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.18	11342782	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.084 \pm 2.743) \times 10^{-2}$	11342782	1.728×10^{-2}	1.517×10^{-2}	2.895×10^{-4}	2.50	8.939×10^{-3}	2.622×10^{-2}
fitted radiance shift [nm]	$(-4.530 \pm 23.621) \times 10^{-4}$	11342782	1.484×10^{-3}	-5.172×10^{-4}	-5.099×10^{-2}	9.518×10^{-2}	-1.242×10^{-3}	2.424×10^{-4}
fitted radiance squeeze [1]	$(-6.107 \pm 15.875) \times 10^{-5}$	11342782	1.984×10^{-4}	-5.418×10^{-5}	-1.624×10^{-2}	1.452×10^{-2}	-1.571×10^{-4}	4.139×10^{-5}
fitted root mean square [1]	$(1.057 \pm 0.342) \times 10^{-3}$	11342782	3.037×10^{-4}	9.887×10^{-4}	3.332×10^{-4}	0.154	8.576×10^{-4}	1.161×10^{-3}
sulfurdioxide total air mass factor polluted [1]	1.14 ± 0.74	11342782	0.925	0.920	5.000×10^{-2}	3.39	0.597	1.52
sulfurdioxide total air mass factor polluted precision [1]	0.183 ± 0.164	11342782	0.226	0.138	4.254×10^{-3}	1.71	4.625×10^{-2}	0.272
sulfurdioxide clear air mass factor polluted [1]	0.924 ± 0.660	11342782	0.428	0.699	0.132	3.41	0.540	0.968
number of spectral points in retrieval [1]	73.4 ± 0.5	11342782	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]	0.634 ± 0.415	12038969	0.800	1.000	0.0	1.000	0.200	1.000
sulfurdioxide total vertical column [DU]	$(2.455 \pm 97.437) \times 10^{-2}$	12038969	0.397	7.913×10^{-3}	-93.5	163	-0.189	0.209
sulfurdioxide total vertical column precision [DU]	0.479 ± 0.730	12038969	0.285	0.289	4.684×10^{-2}	44.7	0.196	0.481
sulfurdioxide slant column density corrected [DU]	$(1.160 \pm 29.068) \times 10^{-2}$	12038969	0.321	7.026×10^{-3}	-23.4	36.0	-0.153	0.169
sulfurdioxide slant column density cobra [DU]	$(1.159 \pm 29.023) \times 10^{-2}$	12038969	0.321	7.026×10^{-3}	-23.4	34.5	-0.153	0.169
sulfurdioxide slant column density cobra precision [DU]	0.253 ± 0.102	12038969	7.978×10^{-2}	0.223	7.911×10^{-2}	15.3	0.193	0.273
sulfurdioxide slant column density window1 [DU]	0.118 ± 0.573	12038969	0.660	0.116	-27.5	49.2	-0.215	0.446
sulfurdioxide slant column density window1 precision [DU]	0.253 ± 0.102	12038969	7.978×10^{-2}	0.223	7.911×10^{-2}	15.3	0.193	0.273
sulfurdioxide slant column density corrected win1 [DU]	$(3.706 \pm 56.251) \times 10^{-2}$	12038969	0.643	2.722×10^{-2}	-27.5	49.3	-0.292	0.352
background so2 slant column offset window1 [DU]	$(-8.063 \pm 14.253) \times 10^{-2}$	12038969	0.194	-0.117	-0.867	1.74	-0.175	1.878×10^{-2}
sulfurdioxide slant column density window2 [DU]	0.401 ± 8.283	12038969	10.3	0.362	-403	670	-4.80	5.55
sulfurdioxide slant column density window2 precision [DU]	7.51 ± 2.09	12038969	2.42	7.19	2.25	466	6.11	8.53
sulfurdioxide slant column density corrected win2 [DU]	-0.246 ± 8.177	12038969	10.2	-0.214	-402	670	-5.34	4.90
background so2 slant column offset window2 [DU]	-0.646 ± 1.826	12038969	2.23	-0.265	-13.7	6.84	-1.64	0.587
sulfurdioxide slant column density window3 [DU]	-0.788 ± 22.422	12038969	27.9	-1.39	-357	189	-14.9	13.0
sulfurdioxide slant column density window3 precision [DU]	26.3 ± 12.3	12038969	9.48	23.1	9.63	217	19.3	28.8
sulfurdioxide slant column density corrected win3 [DU]	3.11 ± 21.63	12038969	27.1	2.63	-359	186	-10.6	16.5
background so2 slant column offset window3 [DU]	3.90 ± 5.73	12038969	8.45	3.94	-29.8	35.4	-0.354	8.09
sulfurdioxide slant column cobra flag [1]	1.99 ± 0.13	12038969	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.880 \pm 4.214) \times 10^{-2}$	12038969	1.968×10^{-2}	1.950×10^{-2}	1.353×10^{-3}	2.50	1.251×10^{-2}	3.219×10^{-2}
fitted radiance shift [nm]	$(-3.401 \pm 23.912) \times 10^{-4}$	12038969	1.727×10^{-3}	-3.702×10^{-4}	-3.796×10^{-2}	4.039×10^{-2}	-1.232×10^{-3}	4.955×10^{-4}
fitted radiance squeeze [1]	$(-2.782 \pm 15.973) \times 10^{-5}$	12038969	1.909×10^{-4}	-2.453×10^{-5}	-1.160×10^{-2}	1.452×10^{-2}	-1.217×10^{-4}	6.920×10^{-5}
fitted root mean square [1]	$(1.119 \pm 0.423) \times 10^{-3}$	12038969	3.533×10^{-4}	1.011×10^{-3}	3.332×10^{-4}	3.394×10^{-2}	8.685×10^{-4}	1.222×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.871 ± 0.470	12038969	0.565	0.801	5.000×10^{-2}	2.79	0.544	1.11
sulfurdioxide total air mass factor polluted precision [1]	0.132 ± 0.128	12038969	0.153	7.939×10^{-2}	3.203×10^{-3}	1.68	3.946×10^{-2}	0.193
sulfurdioxide clear air mass factor polluted [1]	0.688 ± 0.245	12038969	0.320	0.662	5.777×10^{-2}	2.83	0.515	0.835
number of spectral points in retrieval [1]	73.4 ± 0.5	12038969	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]	0.486 ± 0.423	4557828	0.930	0.380	0.0	1.000	7.000×10^{-2}	1.000
sulfurdioxide total vertical column [DU]	$(4.166 \pm 150.271) \times 10^{-2}$	4557828	0.297	5.588×10^{-3}	-89.1	233	-0.138	0.159
sulfurdioxide total vertical column precision [DU]	0.586 ± 1.112	4557828	0.488	0.235	3.016×10^{-2}	38.8	9.927×10^{-2}	0.587
sulfurdioxide slant column density corrected [DU]	$(1.558 \pm 39.631) \times 10^{-2}$	4557828	0.358	8.195×10^{-3}	-32.4	89.3	-0.170	0.189
sulfurdioxide slant column density cobra [DU]	$(1.518 \pm 36.924) \times 10^{-2}$	4557828	0.358	8.195×10^{-3}	-32.4	89.3	-0.170	0.189
sulfurdioxide slant column density cobra precision [DU]	0.287 ± 0.130	4557828	0.132	0.242	8.128×10^{-2}	51.6	0.205	0.337
sulfurdioxide slant column density window1 [DU]	$(-1.725 \pm 69.912) \times 10^{-2}$	4557828	0.806	-2.801×10^{-2}	-30.7	88.9	-0.432	0.374
sulfurdioxide slant column density window1 precision [DU]	0.287 ± 0.130	4557828	0.132	0.242	8.128×10^{-2}	51.6	0.205	0.337
sulfurdioxide slant column density corrected win1 [DU]	$(-4.445 \pm 66.810) \times 10^{-2}$	4557828	0.731	-6.190×10^{-2}	-30.7	89.3	-0.424	0.307
background so2 slant column offset window1 [DU]	$(-2.720 \pm 16.724) \times 10^{-2}$	4557828	0.277	-6.563×10^{-2}	-1.17	1.39	-0.160	0.117
sulfurdioxide slant column density window2 [DU]	0.960 ± 9.035	4557828	10.9	0.922	-541	789	-4.55	6.40
sulfurdioxide slant column density window2 precision [DU]	8.06 ± 2.55	4557828	2.98	7.59	1.80	426	6.32	9.30
sulfurdioxide slant column density corrected win2 [DU]	-0.625 ± 8.876	4557828	10.8	-0.627	-541	790	-6.00	4.76
background so2 slant column offset window2 [DU]	-1.58 ± 2.24	4557828	3.34	-1.43	-13.0	6.84	-3.03	0.310
sulfurdioxide slant column density window3 [DU]	-11.1 ± 22.8	4557828	27.0	-10.8	-446	273	-24.4	2.63
sulfurdioxide slant column density window3 precision [DU]	27.0 ± 13.7	4557828	11.5	23.5	9.95	233	18.6	30.1
sulfurdioxide slant column density corrected win3 [DU]	-3.19 ± 23.12	4557828	27.5	-2.15	-446	265	-16.4	11.1
background so2 slant column offset window3 [DU]	7.91 ± 7.19	4557828	12.0	9.68	-25.0	35.3	1.93	13.9
sulfurdioxide slant column cobra flag [1]	1.94 ± 0.33	4557828	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(5.012 \pm 13.651) \times 10^{-2}$	4557828	3.188×10^{-2}	1.441×10^{-2}	2.895×10^{-4}	3.24	5.153×10^{-3}	3.704×10^{-2}
fitted radiance shift [nm]	$(-4.679 \pm 24.251) \times 10^{-4}$	4557828	1.190×10^{-3}	-5.551×10^{-4}	-5.099×10^{-2}	9.518×10^{-2}	-1.132×10^{-3}	5.873×10^{-5}
fitted radiance squeeze [1]	$(-7.855 \pm 19.222) \times 10^{-5}$	4557828	2.395×10^{-4}	-8.190×10^{-5}	-1.624×10^{-2}	1.288×10^{-2}	-1.996×10^{-4}	3.987×10^{-5}
fitted root mean square [1]	$(1.291 \pm 0.504) \times 10^{-3}$	4557828	5.015×10^{-4}	1.159×10^{-3}	3.520×10^{-4}	0.154	9.666×10^{-4}	1.468×10^{-3}
sulfurdioxide total air mass factor polluted [1]	1.36 ± 0.96	4557828	1.87	1.04	5.000×10^{-2}	3.39	0.504	2.37
sulfurdioxide total air mass factor polluted precision [1]	0.201 ± 0.203	4557828	0.278	0.141	2.500×10^{-3}	1.71	3.460×10^{-2}	0.312
sulfurdioxide clear air mass factor polluted [1]	1.23 ± 0.93	4557828	1.32	0.887	2.620×10^{-2}	3.41	0.493	1.81
number of spectral points in retrieval [1]	73.4 ± 0.5	4557828	1.000	73.0	52.0	74.0	73.0	74.0

3 Granule outlines

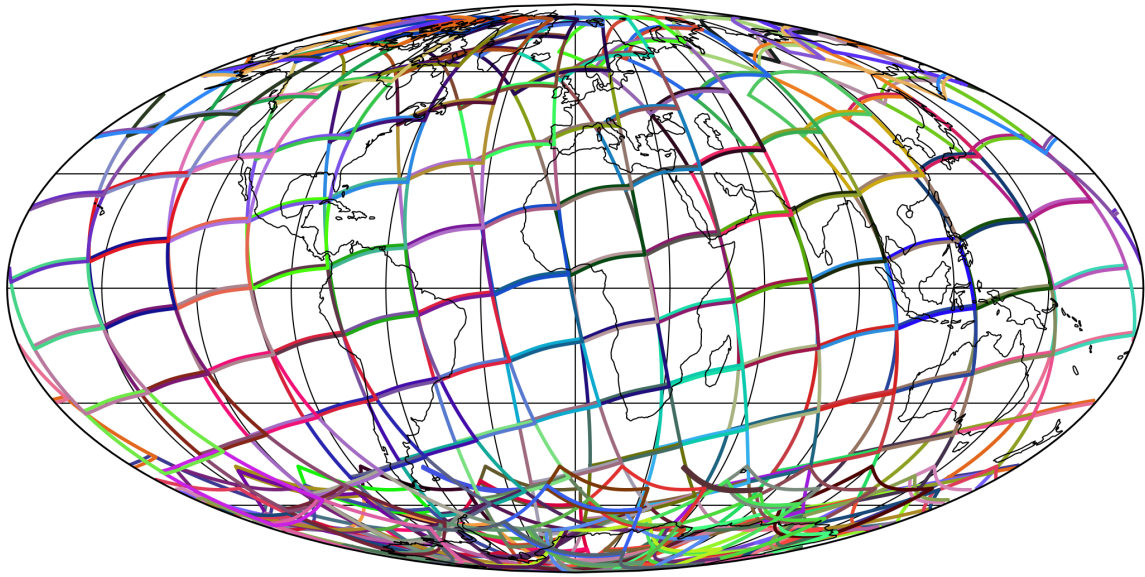


Figure 1: Outline of the granules.

4 Input data monitoring

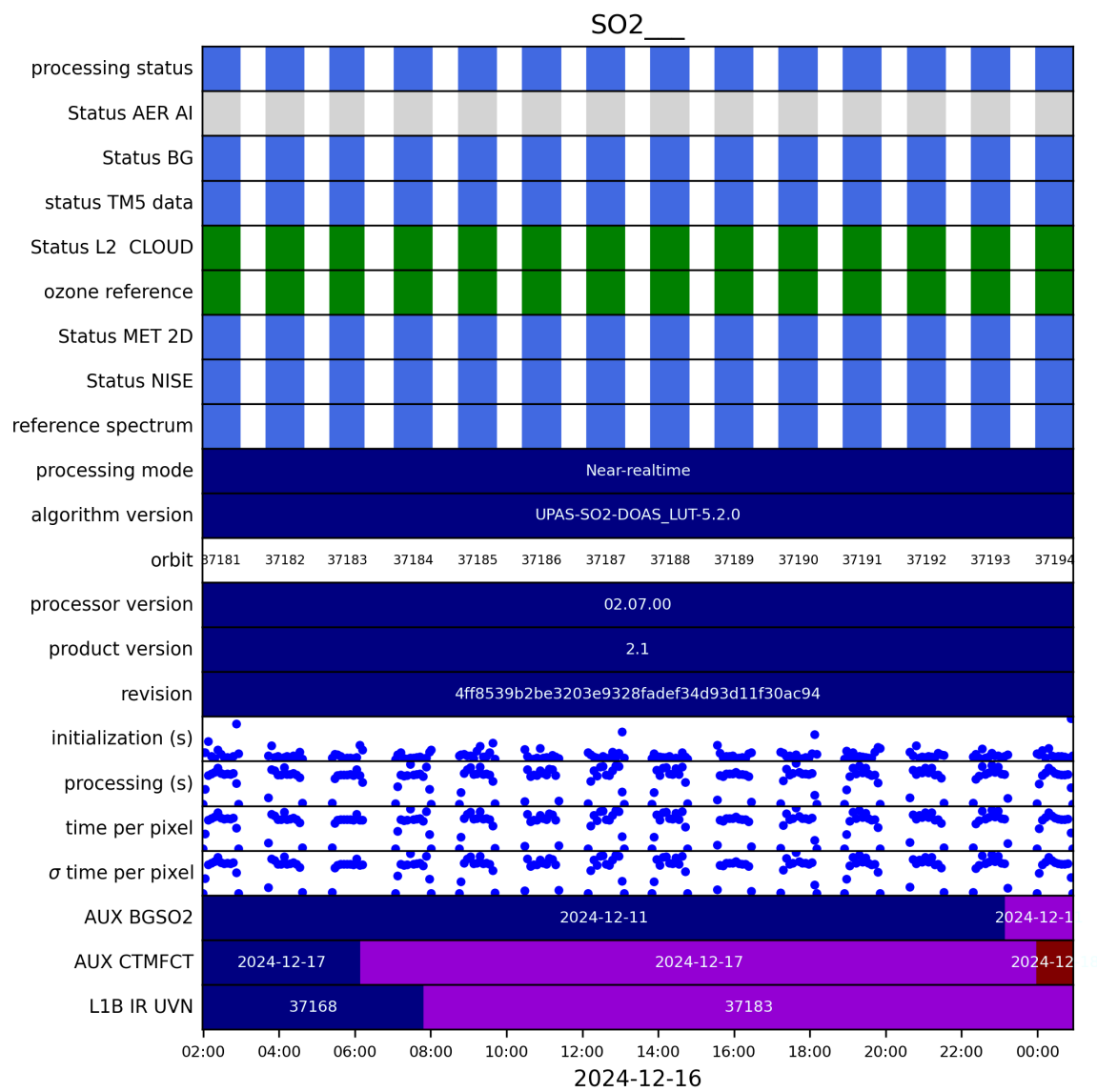


Figure 2: Input data per granule

5 Warnings and errors

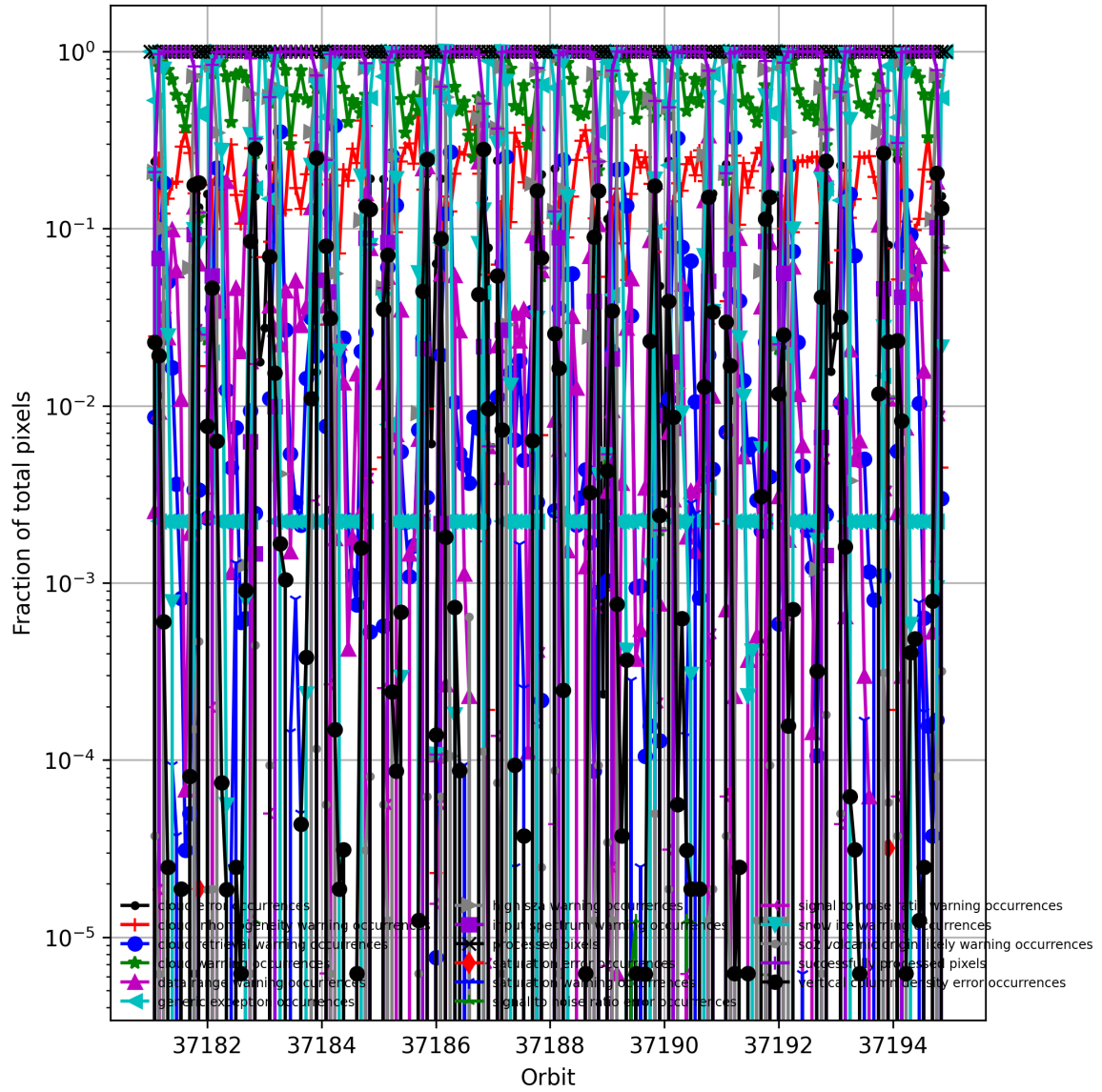


Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

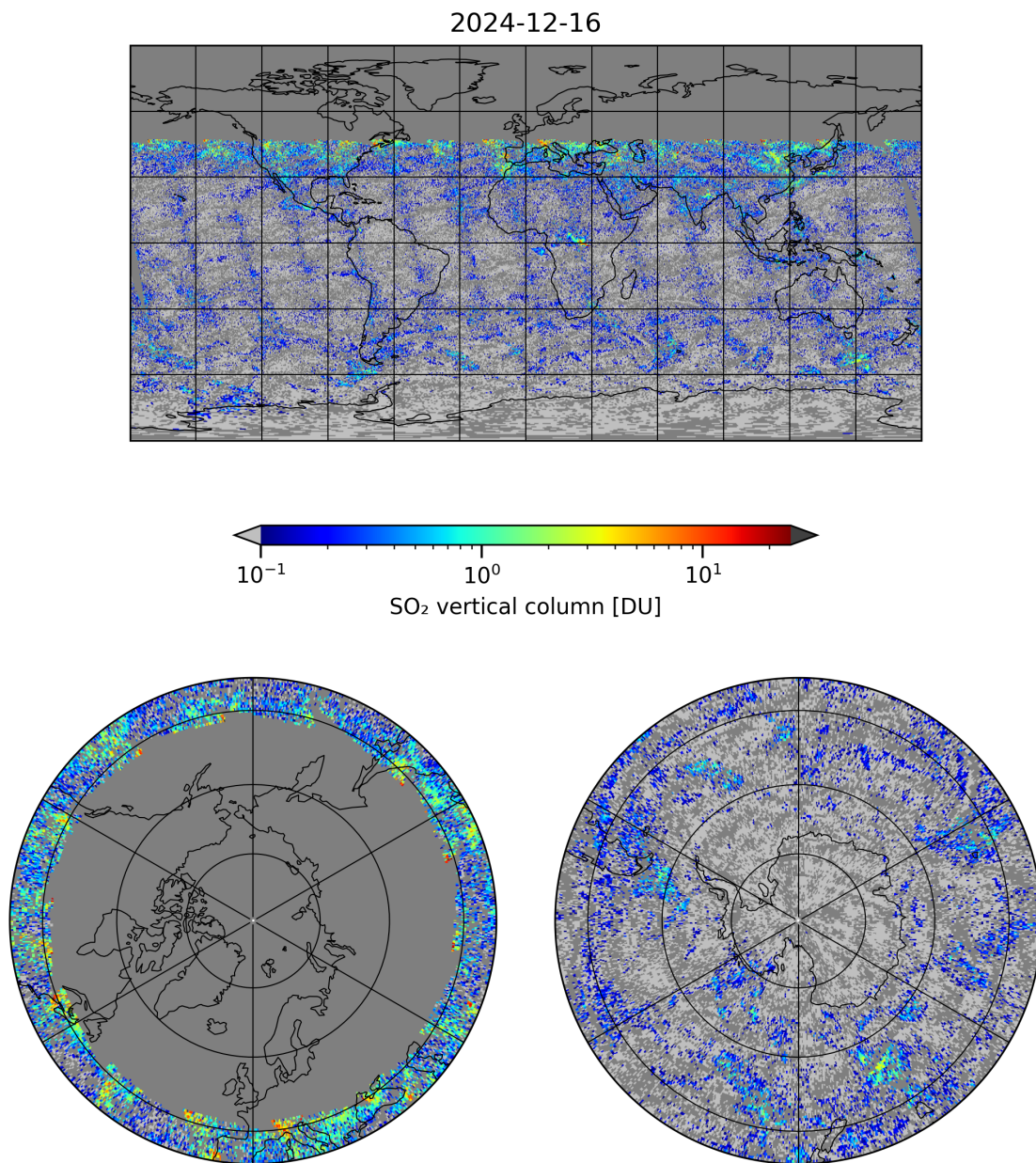


Figure 4: Map of “SO₂ vertical column” for 2024-12-16 to 2024-12-17

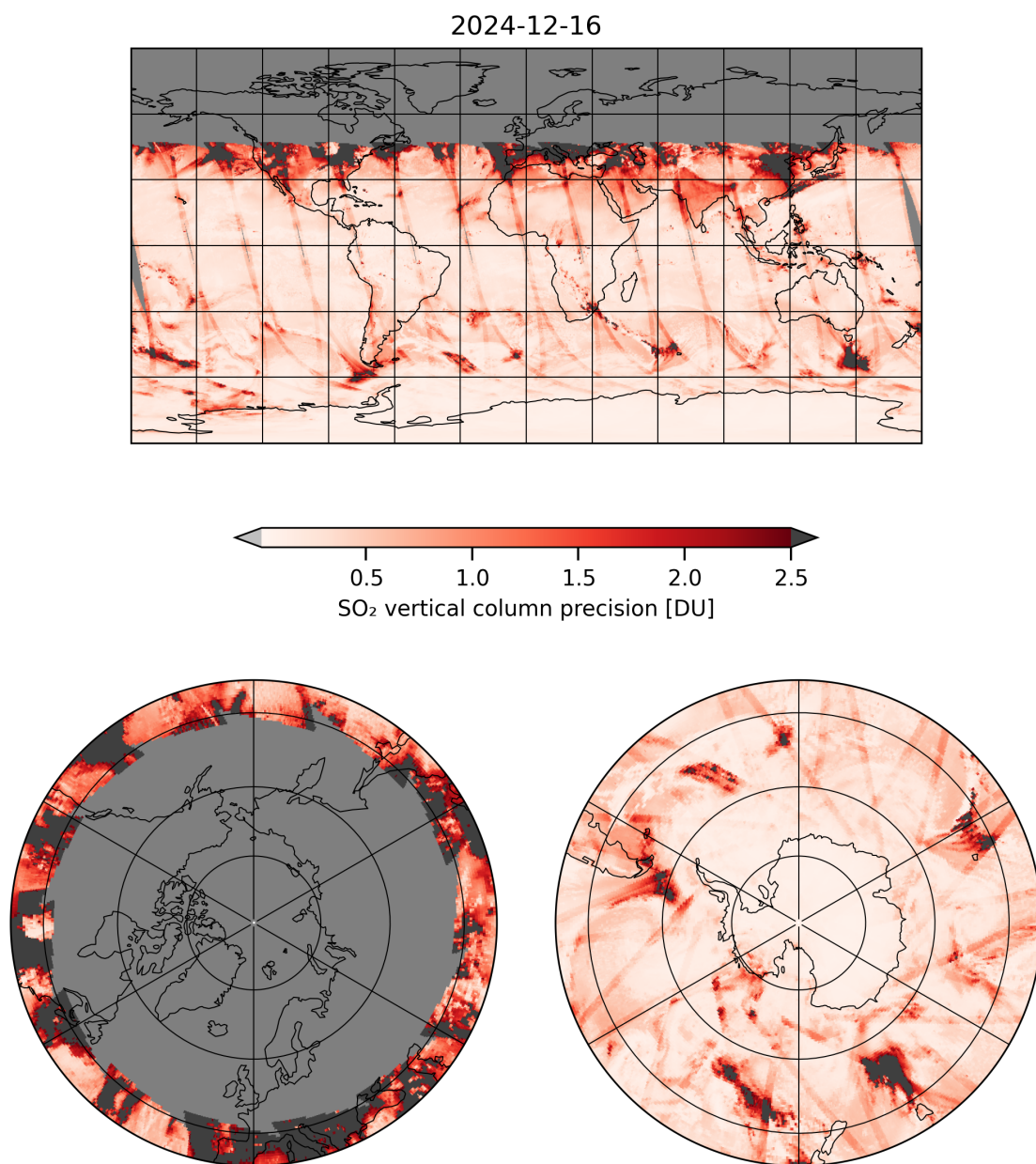


Figure 5: Map of “SO₂ vertical column precision” for 2024-12-16 to 2024-12-17

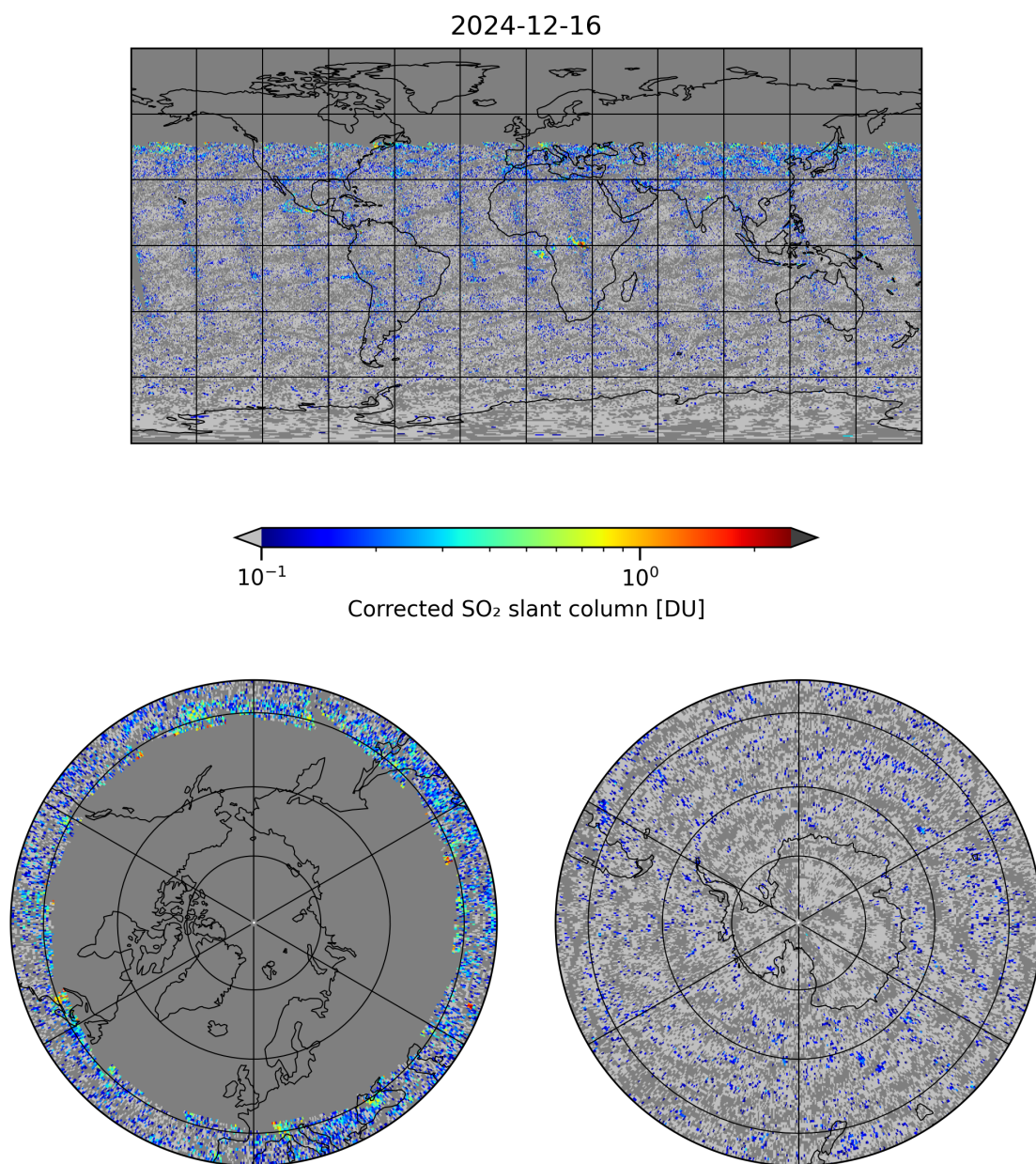


Figure 6: Map of “Corrected SO₂ slant column” for 2024-12-16 to 2024-12-17

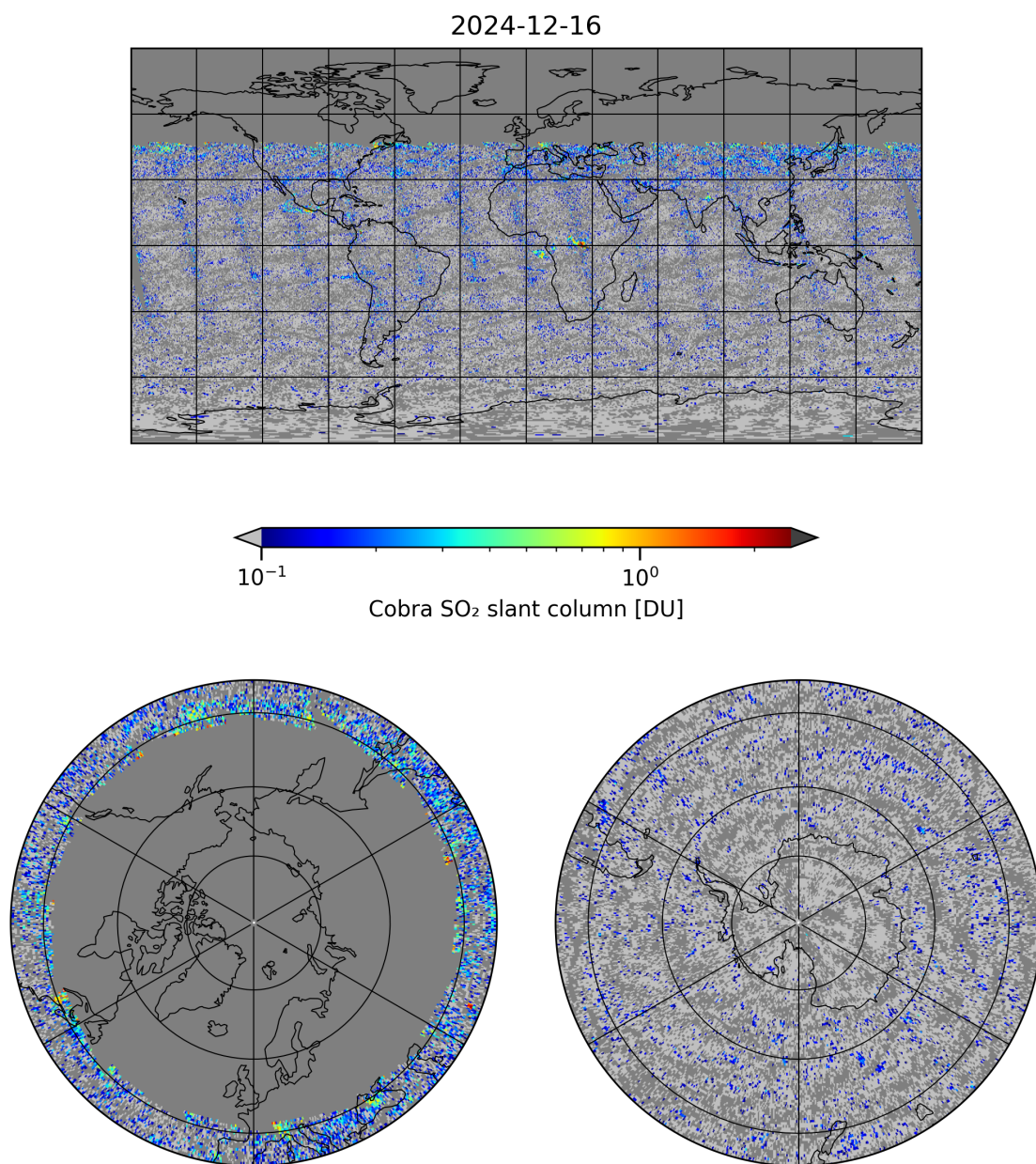


Figure 7: Map of “Cobra SO₂ slant column” for 2024-12-16 to 2024-12-17

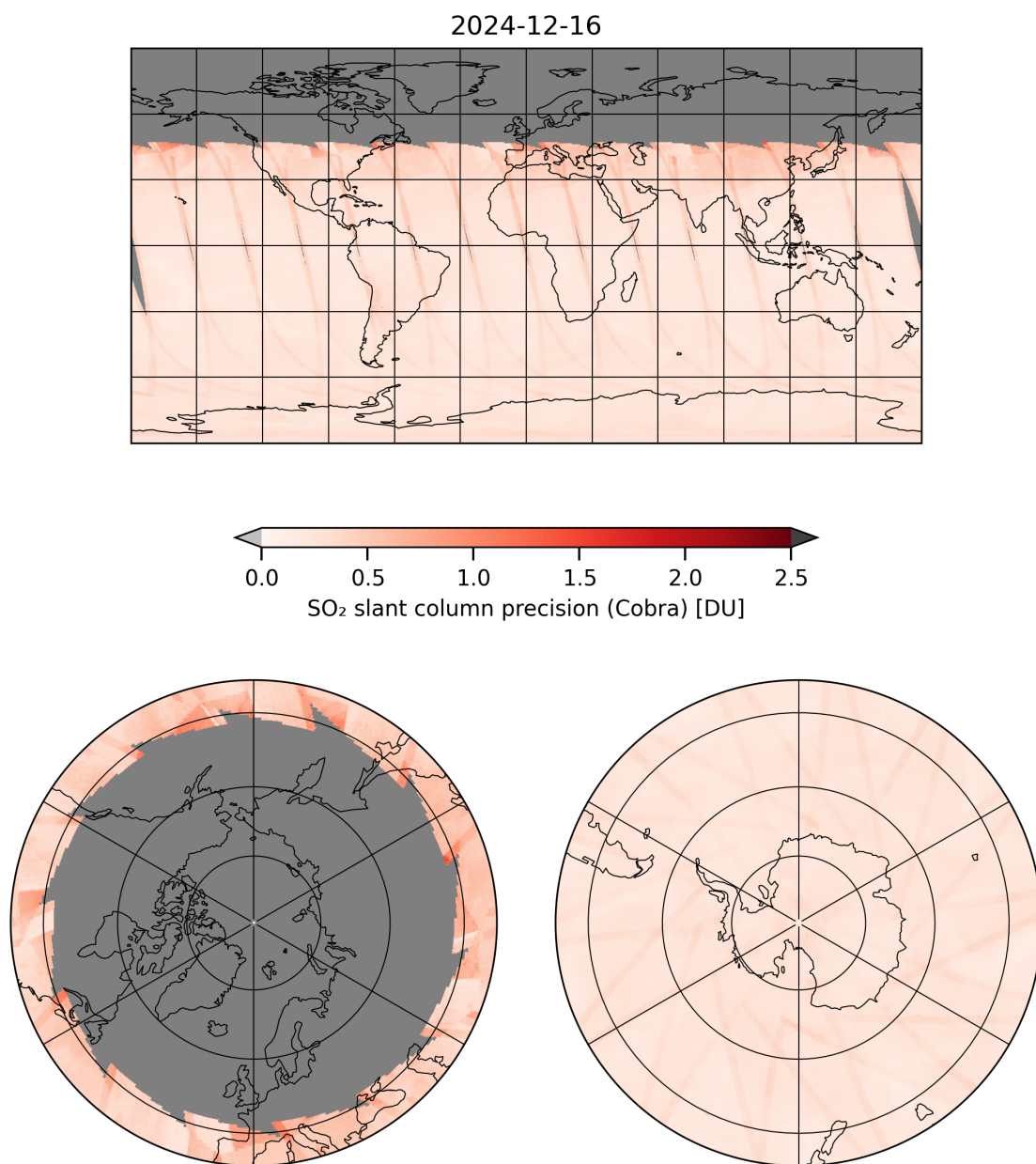


Figure 8: Map of “SO₂ slant column precision (Cobra)” for 2024-12-16 to 2024-12-17

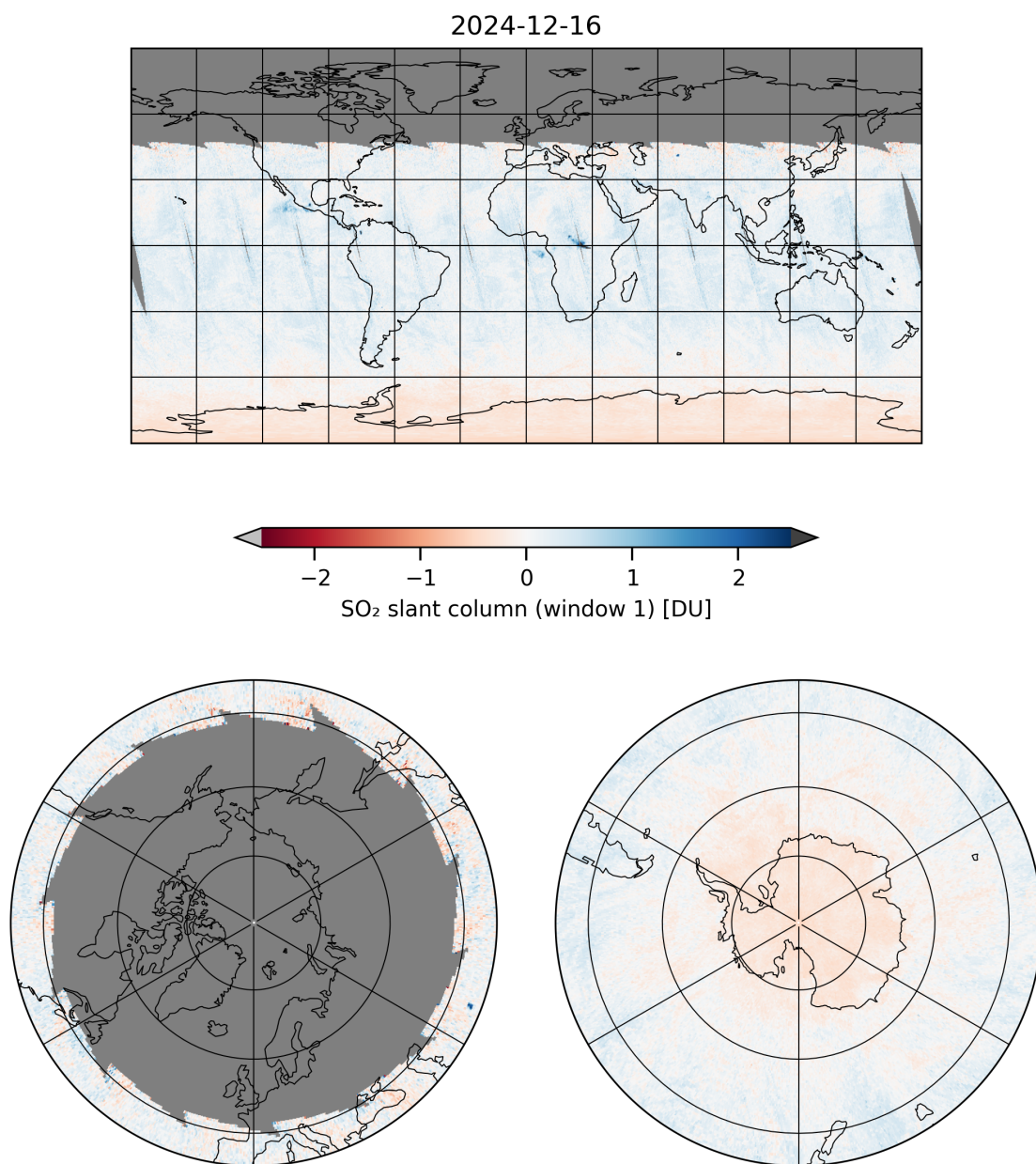


Figure 9: Map of “SO₂ slant column (window 1)” for 2024-12-16 to 2024-12-17

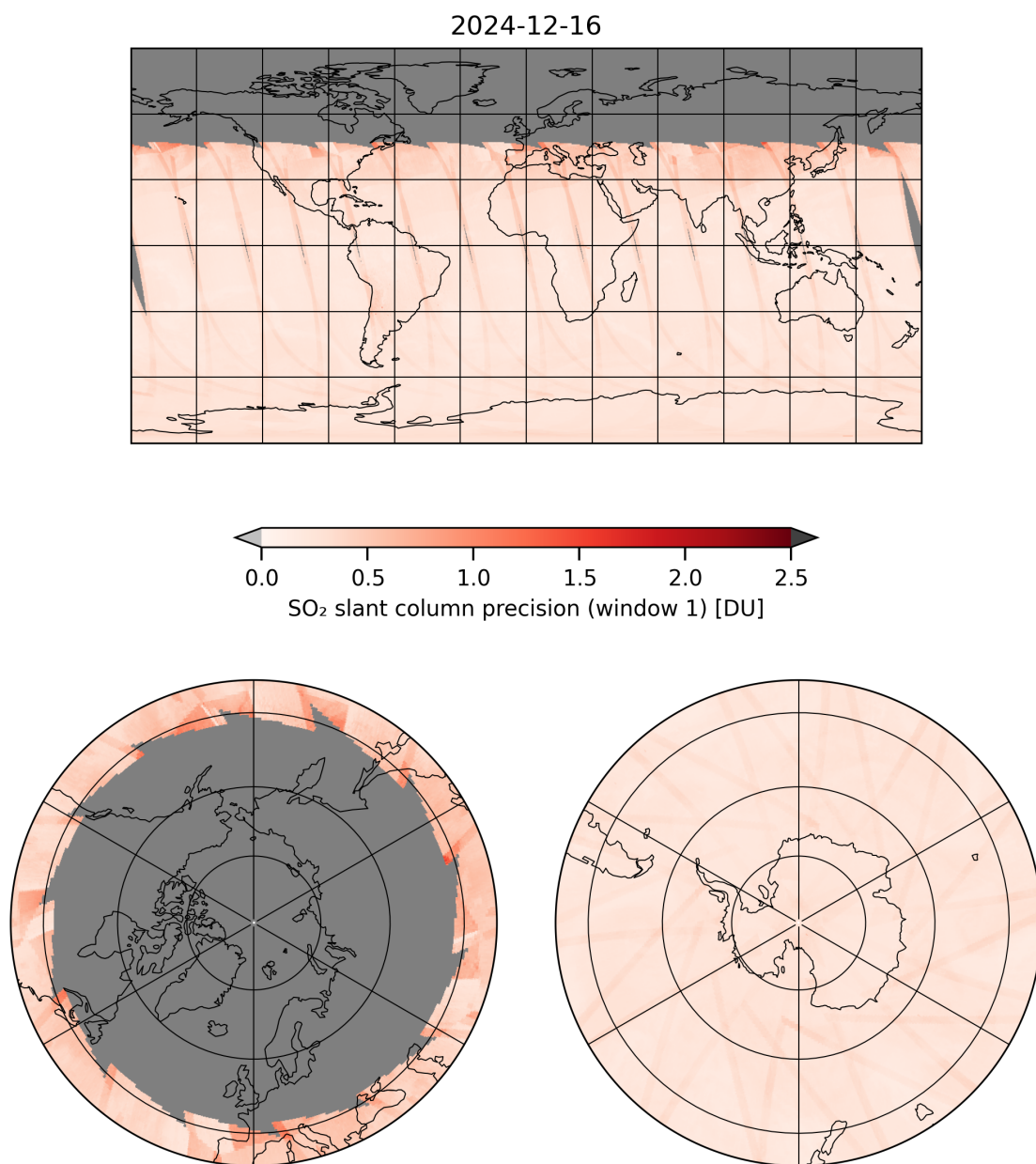


Figure 10: Map of “SO₂ slant column precision (window 1)” for 2024-12-16 to 2024-12-17

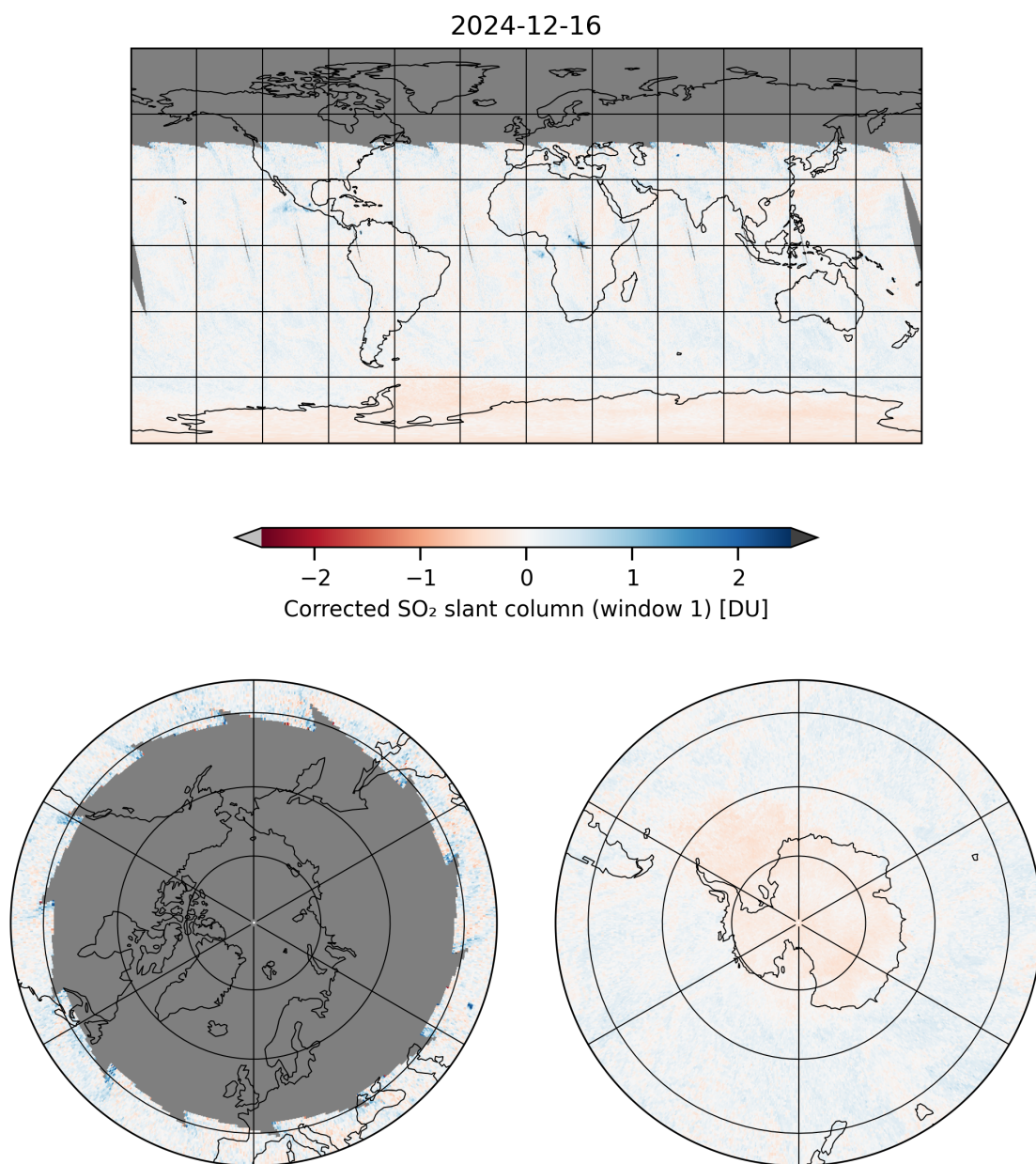


Figure 11: Map of “Corrected SO₂ slant column (window 1)” for 2024-12-16 to 2024-12-17

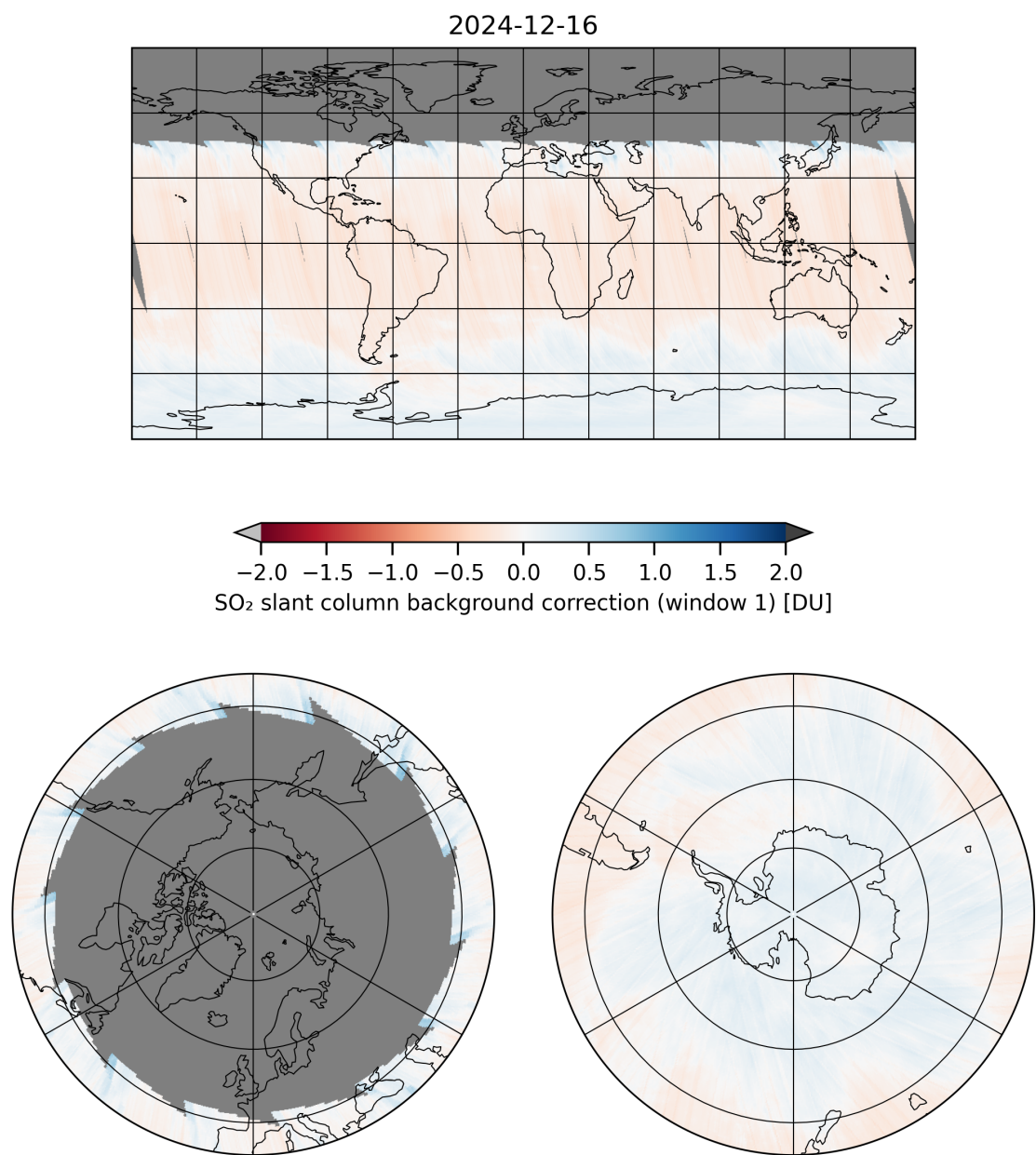


Figure 12: Map of “SO₂ slant column background correction (window 1)” for 2024-12-16 to 2024-12-17

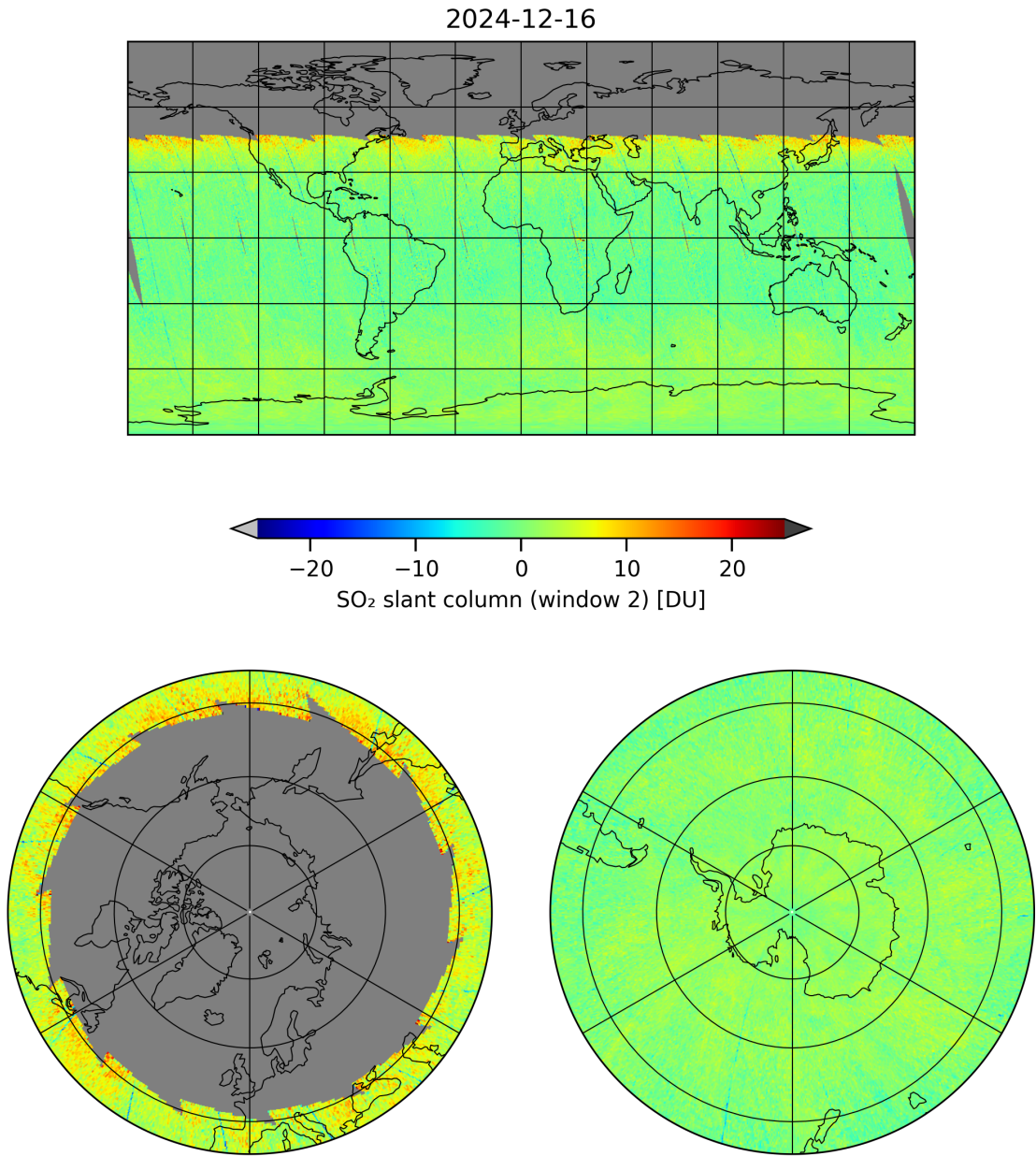


Figure 13: Map of “SO₂ slant column (window 2)” for 2024-12-16 to 2024-12-17

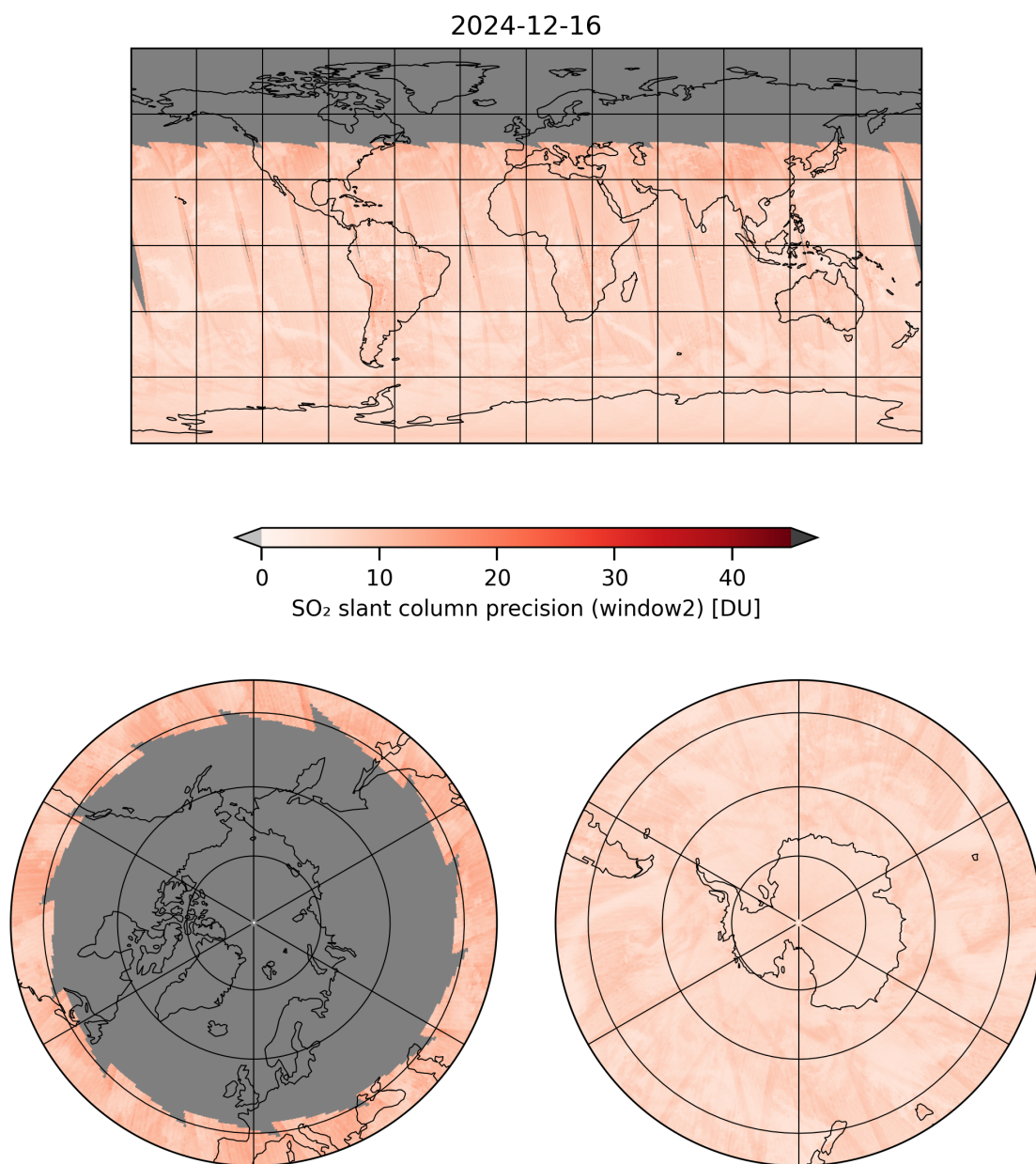


Figure 14: Map of “SO₂ slant column precision (window2)” for 2024-12-16 to 2024-12-17

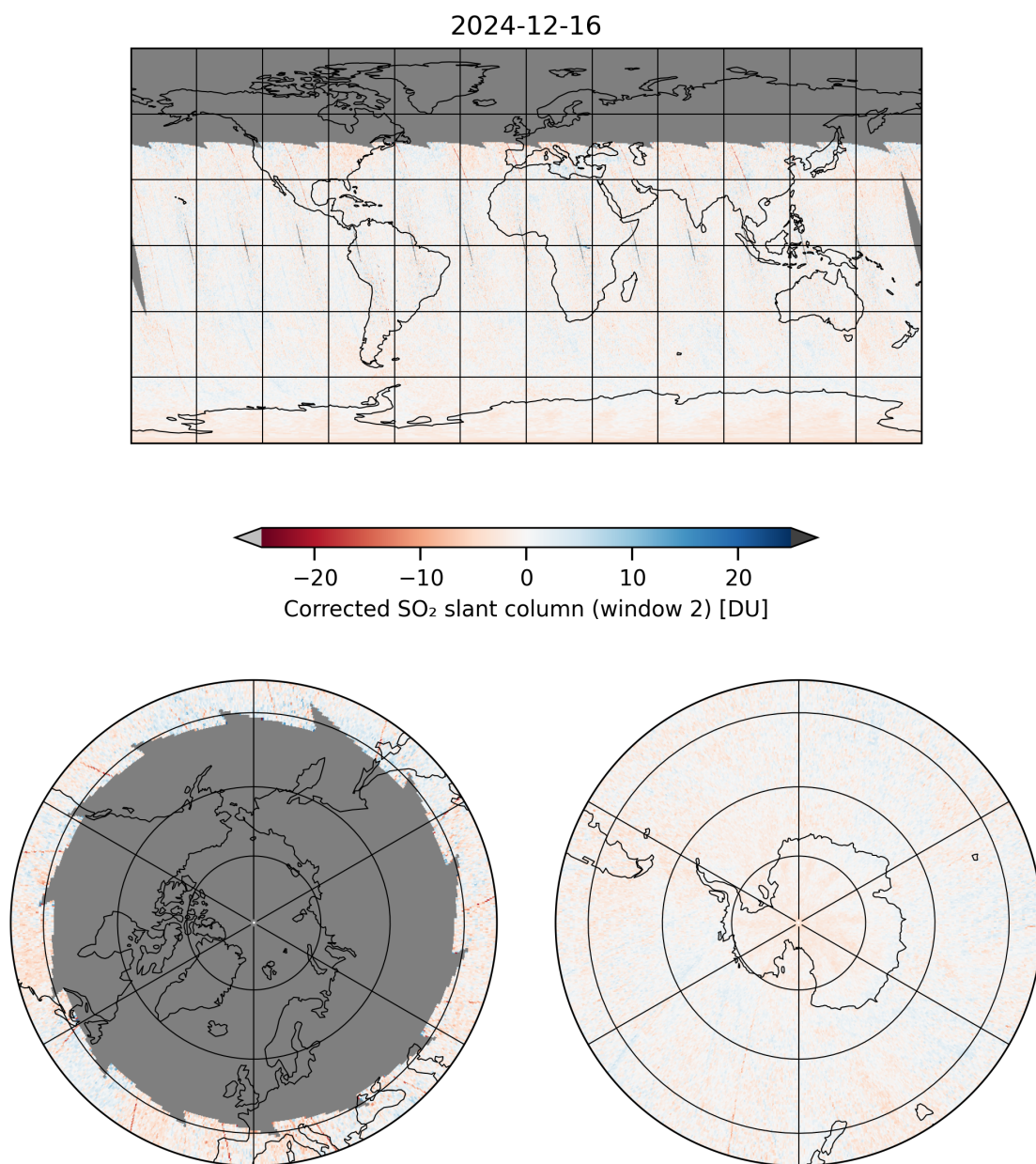


Figure 15: Map of “Corrected SO₂ slant column (window 2)” for 2024-12-16 to 2024-12-17

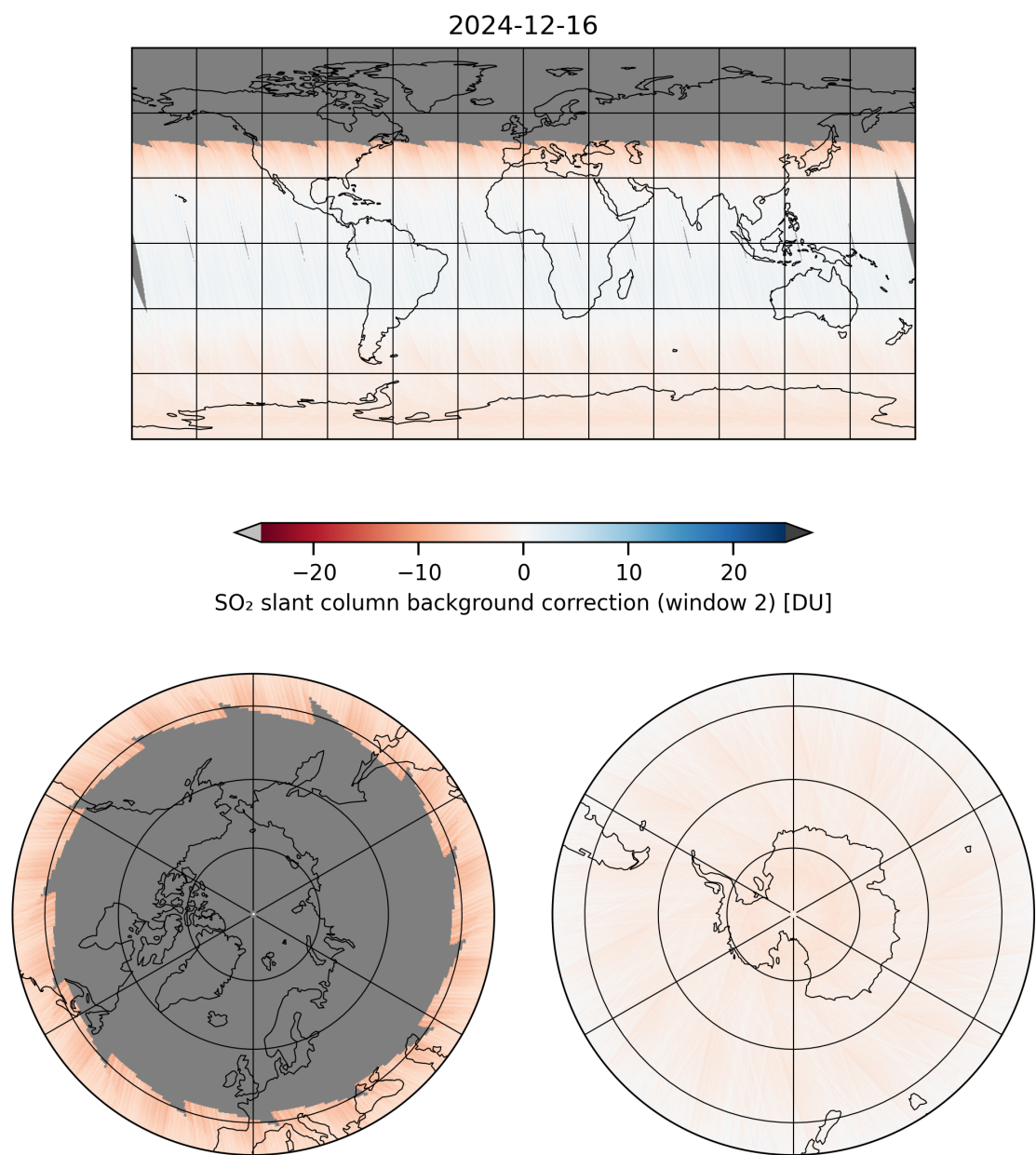


Figure 16: Map of “SO₂ slant column background correction (window 2)” for 2024-12-16 to 2024-12-17

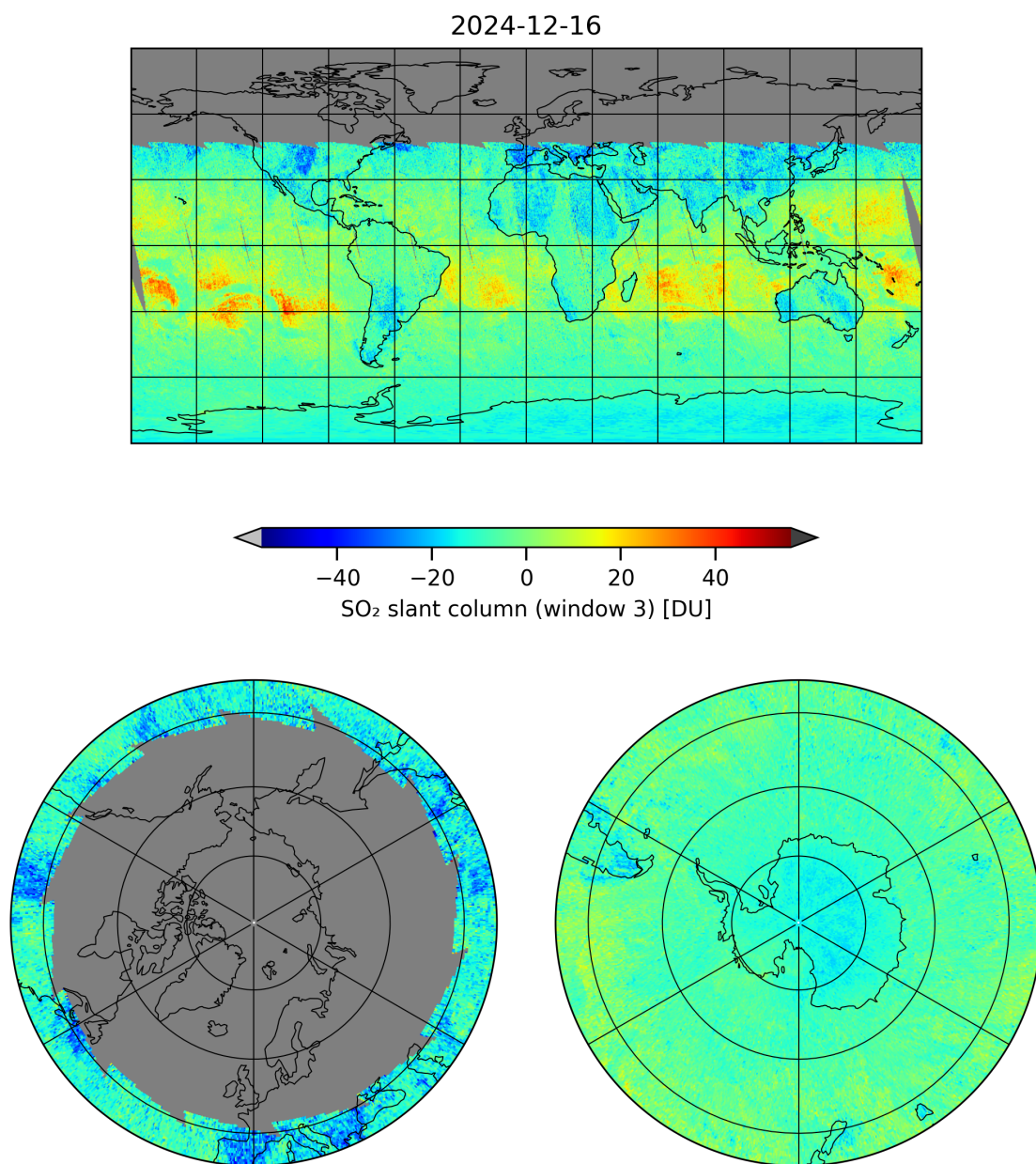


Figure 17: Map of “SO₂ slant column (window 3)” for 2024-12-16 to 2024-12-17

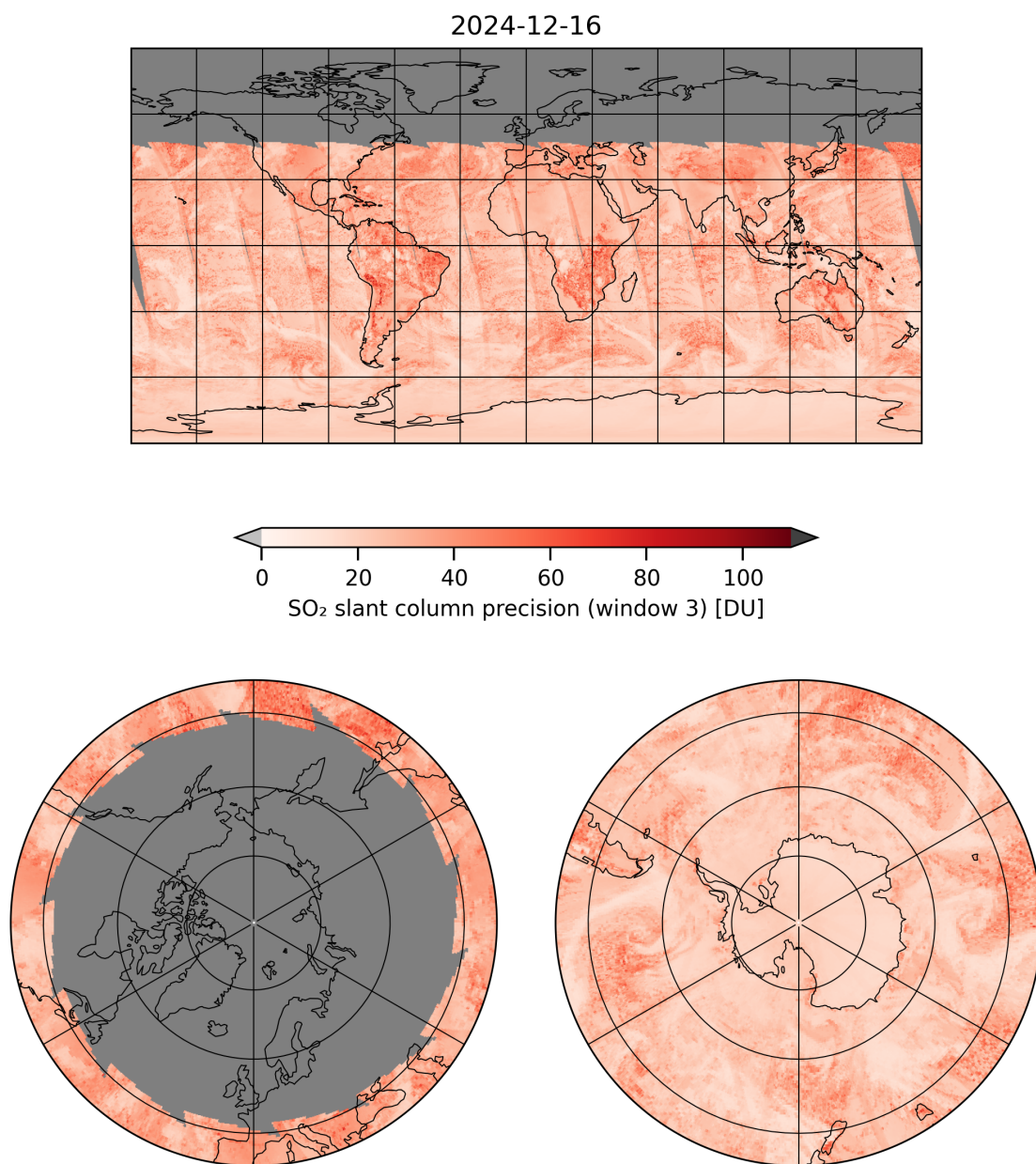


Figure 18: Map of “SO₂ slant column precision (window 3)” for 2024-12-16 to 2024-12-17

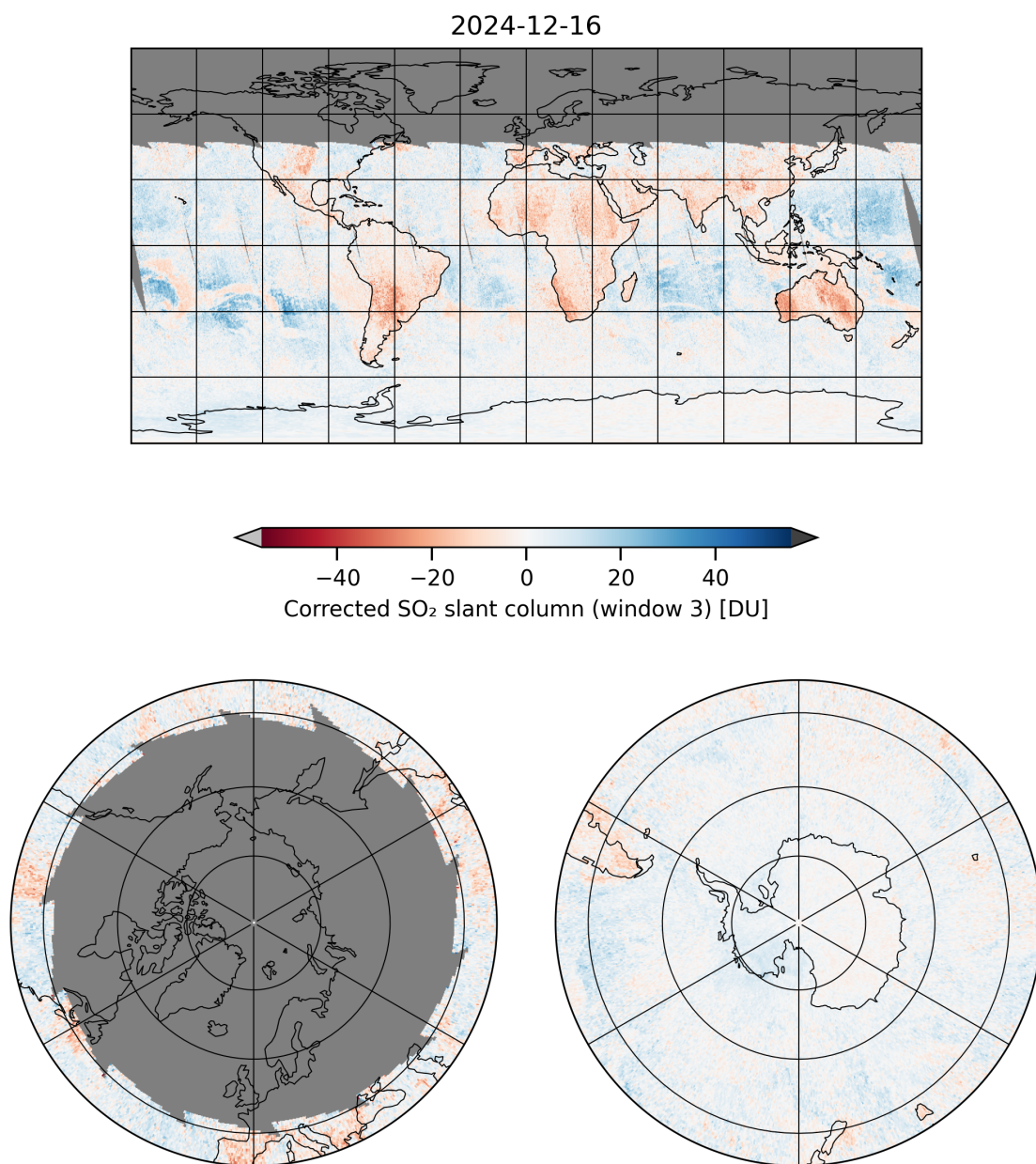


Figure 19: Map of “Corrected SO₂ slant column (window 3)” for 2024-12-16 to 2024-12-17

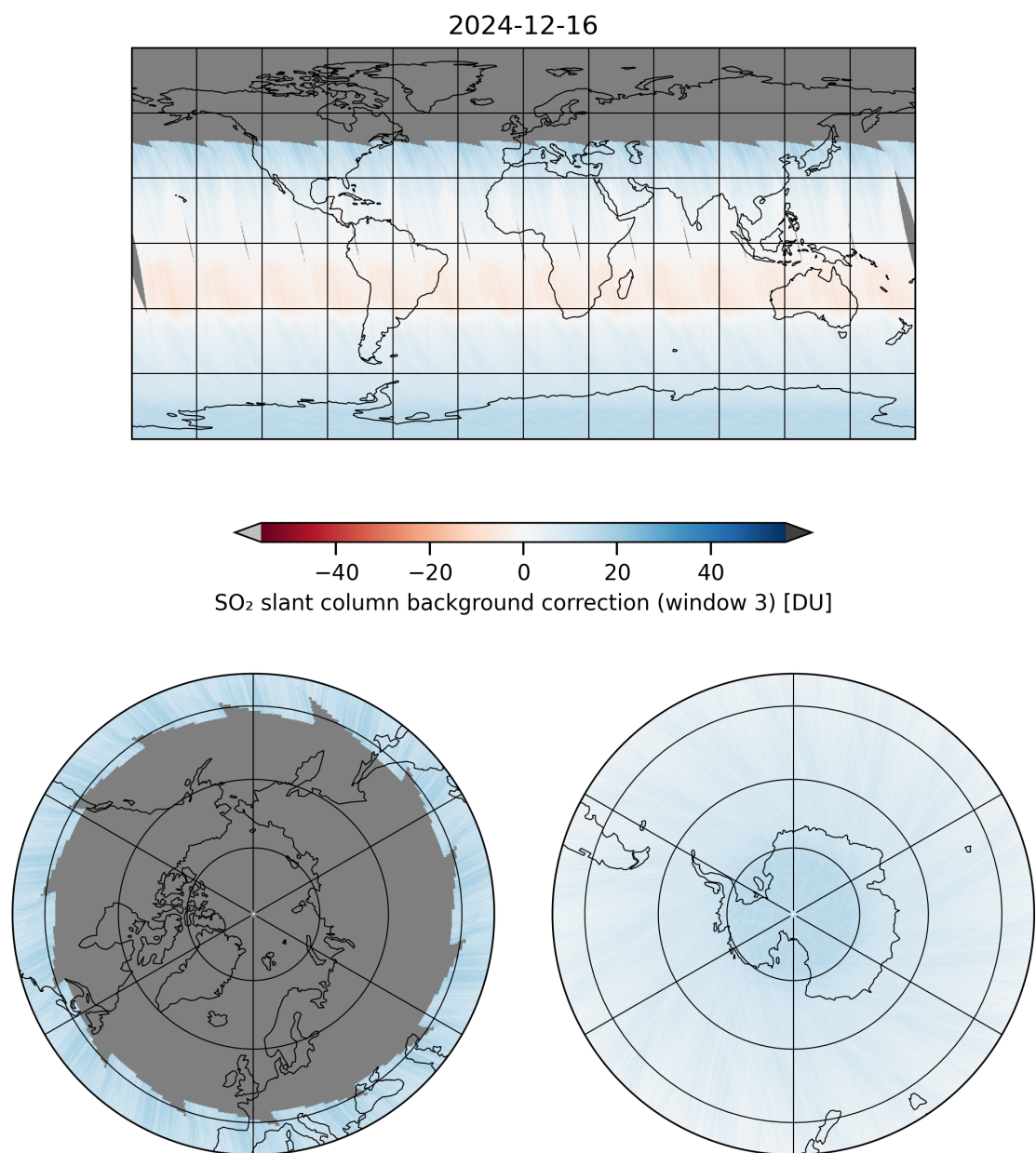


Figure 20: Map of “SO₂ slant column background correction (window 3)” for 2024-12-16 to 2024-12-17

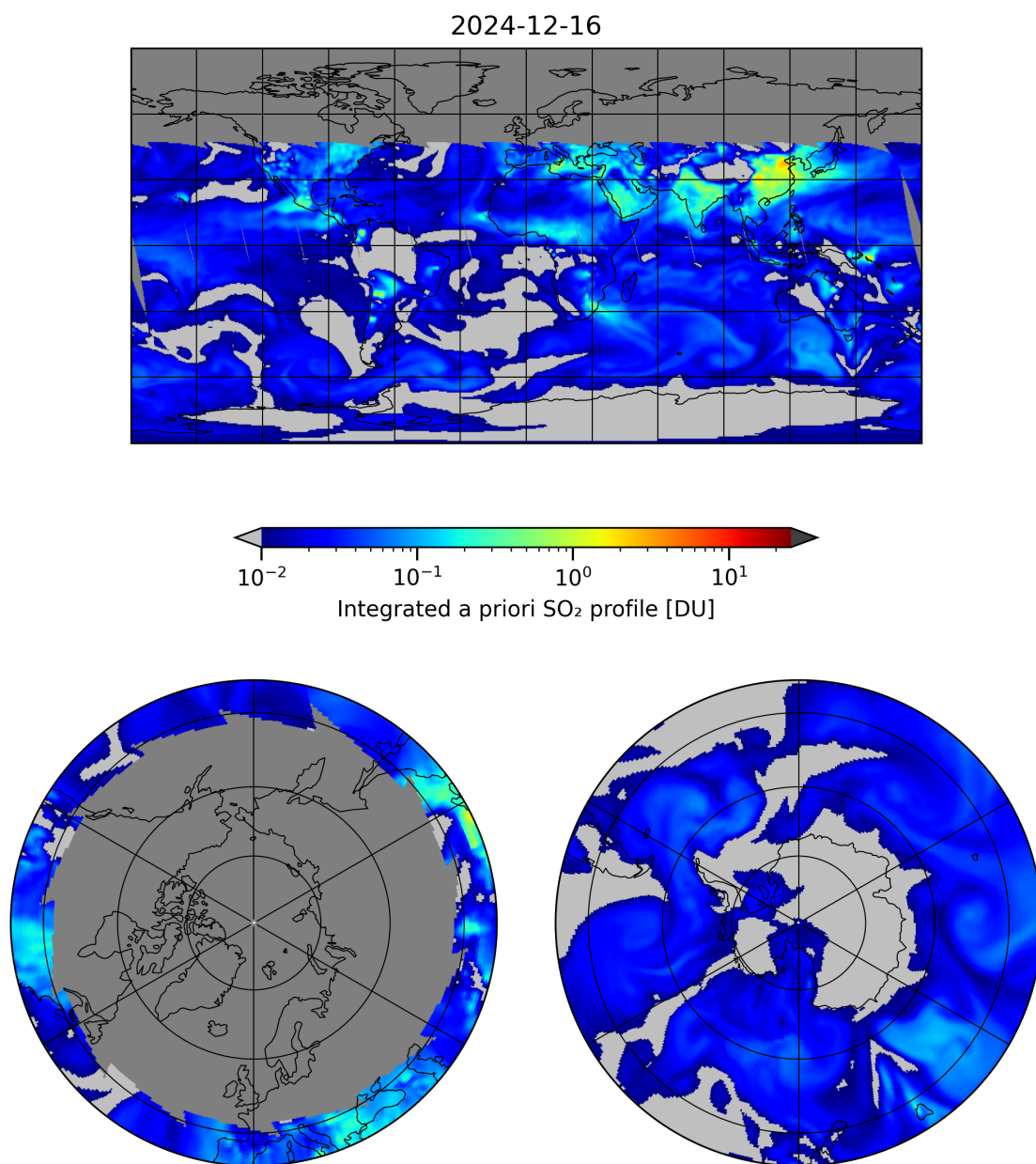


Figure 21: Map of “Integrated a priori SO₂ profile” for 2024-12-16 to 2024-12-17

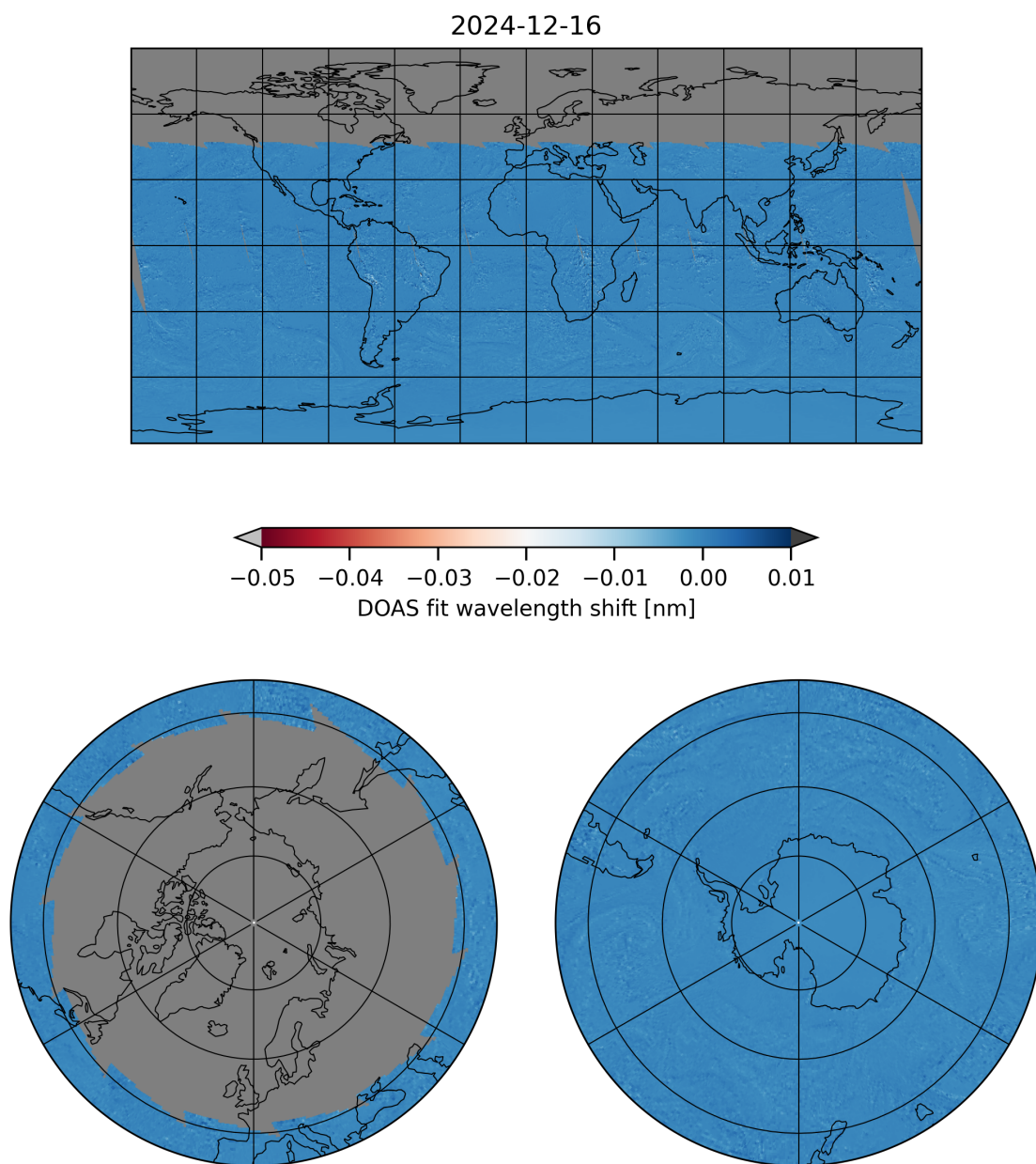


Figure 22: Map of “DOAS fit wavelength shift” for 2024-12-16 to 2024-12-17

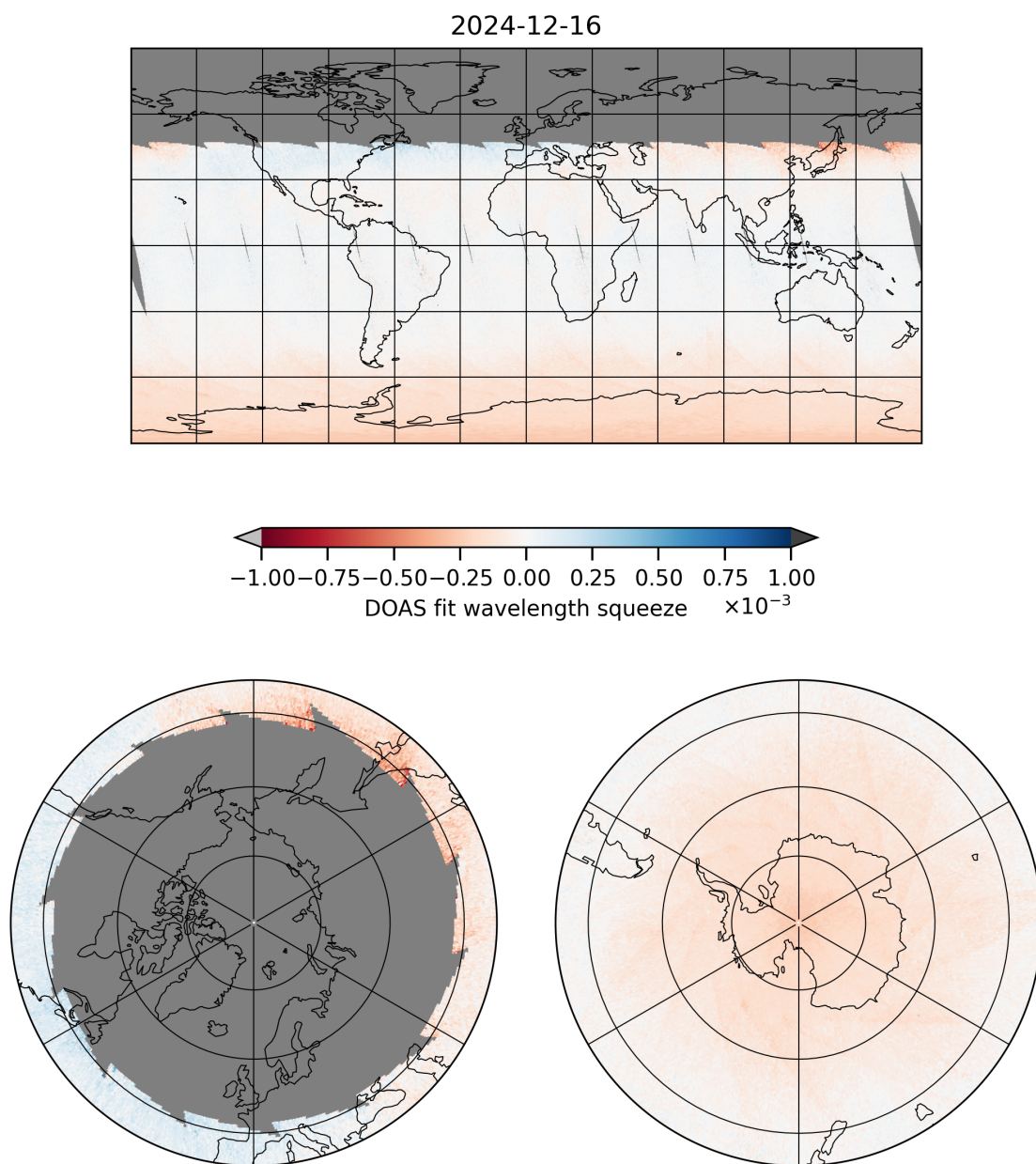


Figure 23: Map of “DOAS fit wavelength squeeze” for 2024-12-16 to 2024-12-17

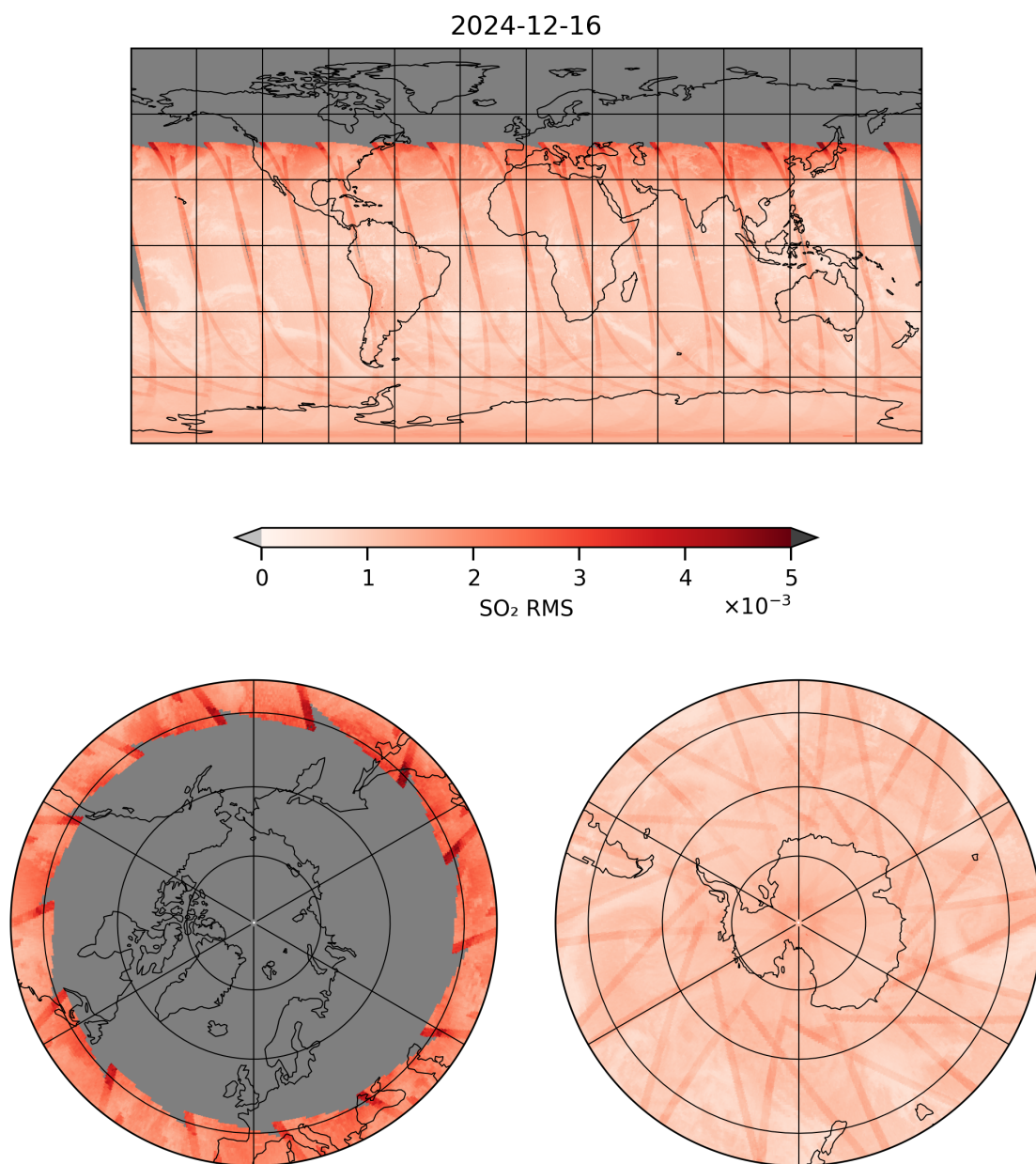


Figure 24: Map of “SO₂ RMS” for 2024-12-16 to 2024-12-17

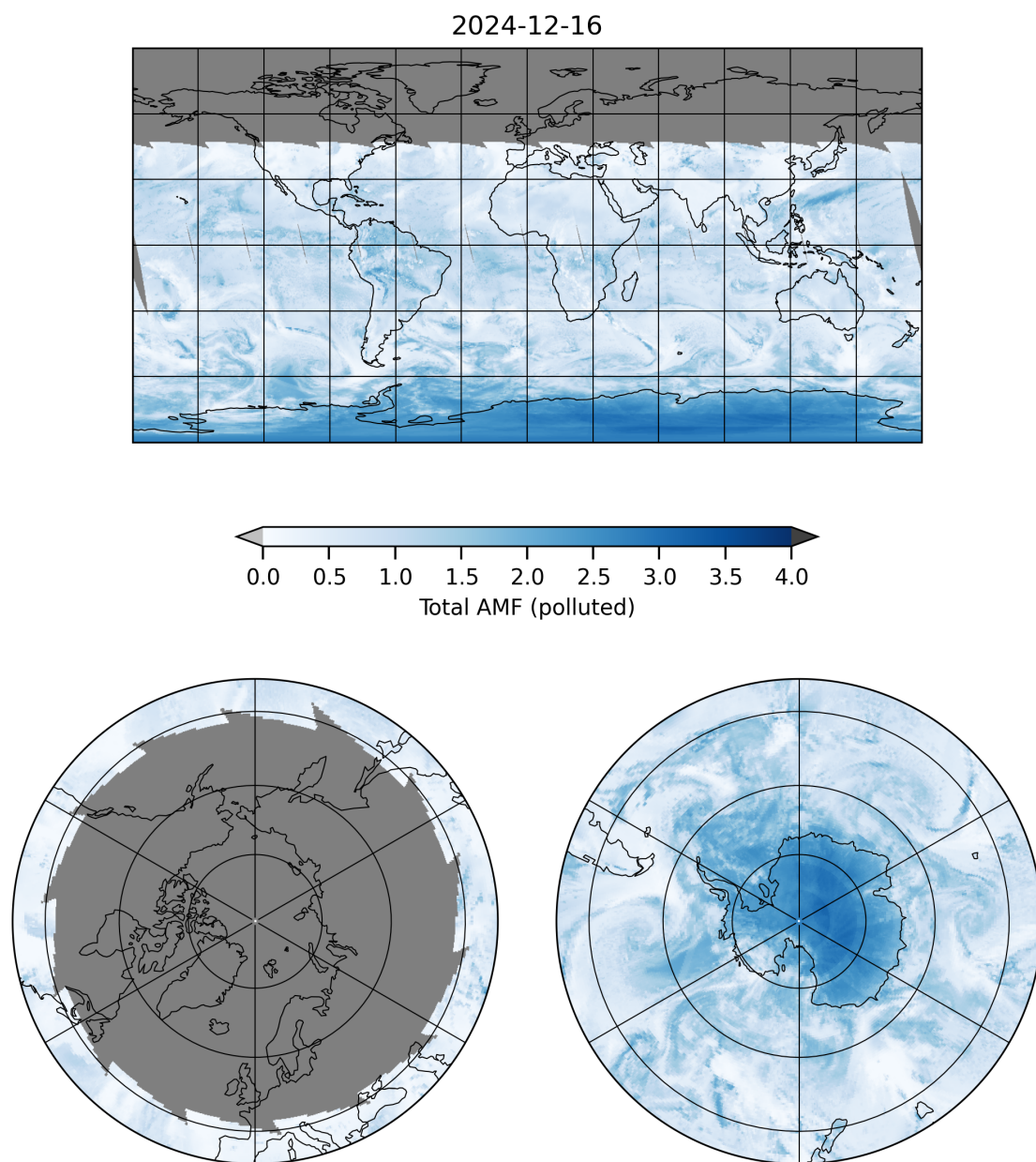


Figure 25: Map of “Total AMF (polluted)” for 2024-12-16 to 2024-12-17

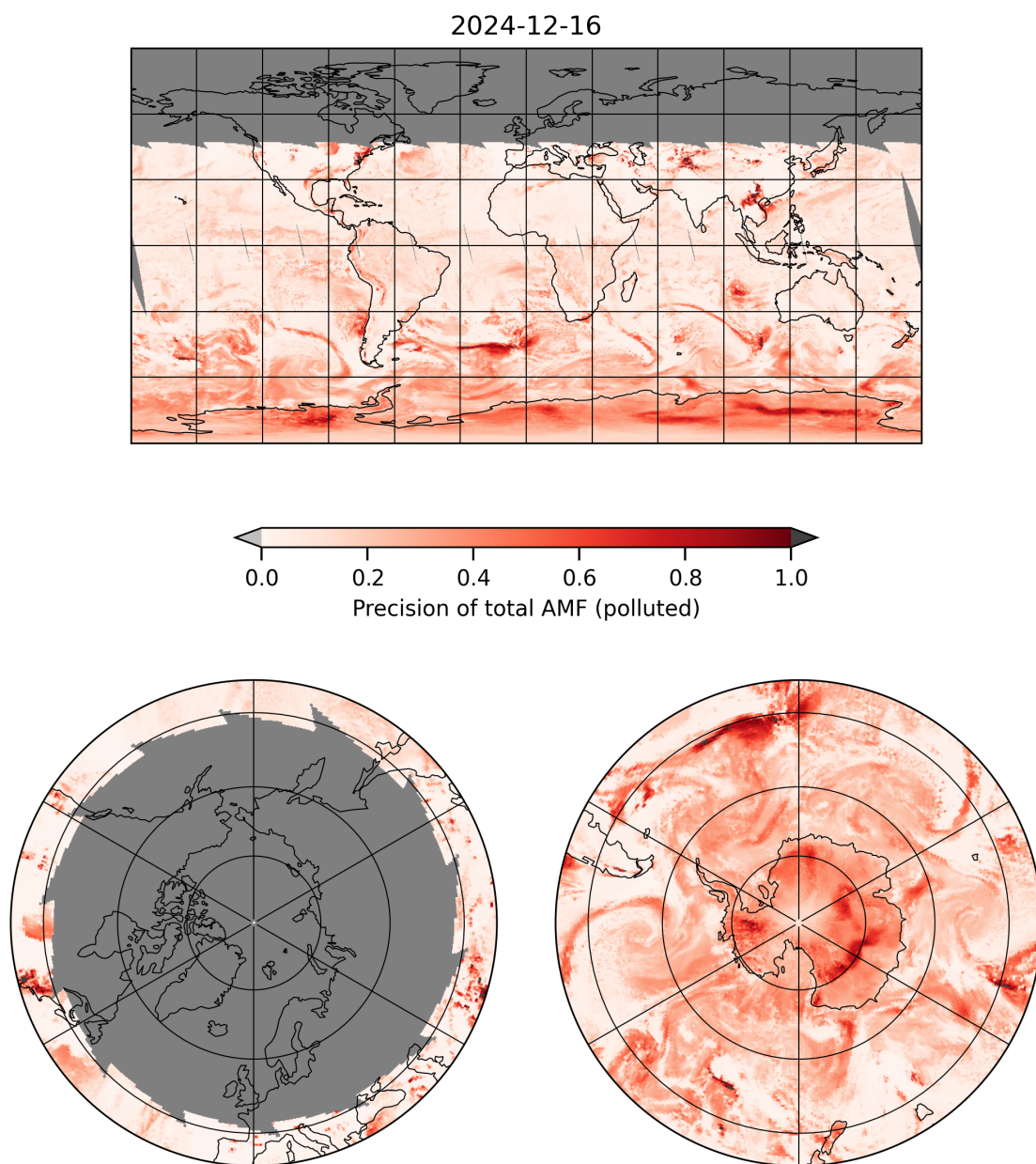


Figure 26: Map of “Precision of total AMF (polluted)” for 2024-12-16 to 2024-12-17

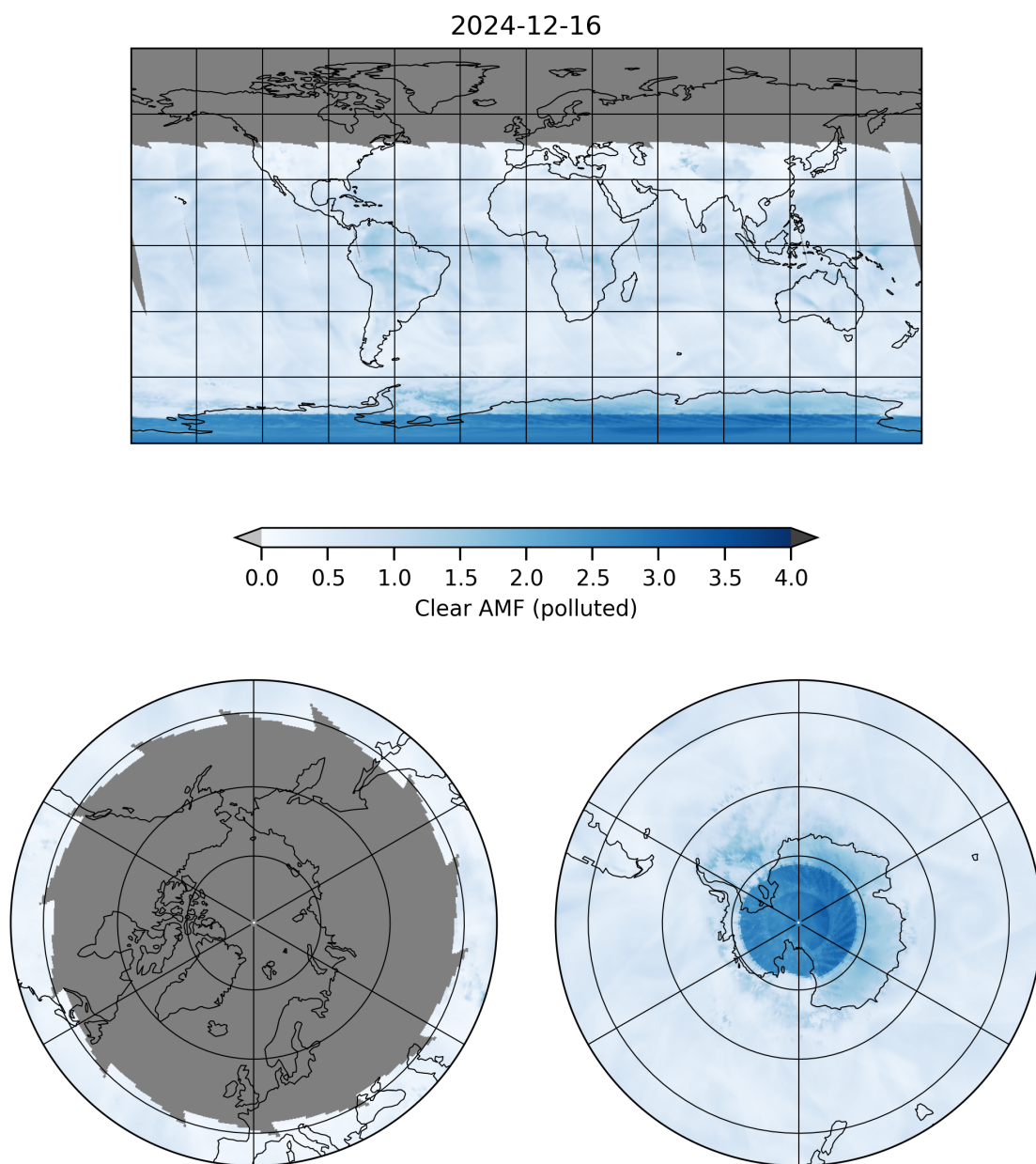


Figure 27: Map of “Clear AMF (polluted)” for 2024-12-16 to 2024-12-17

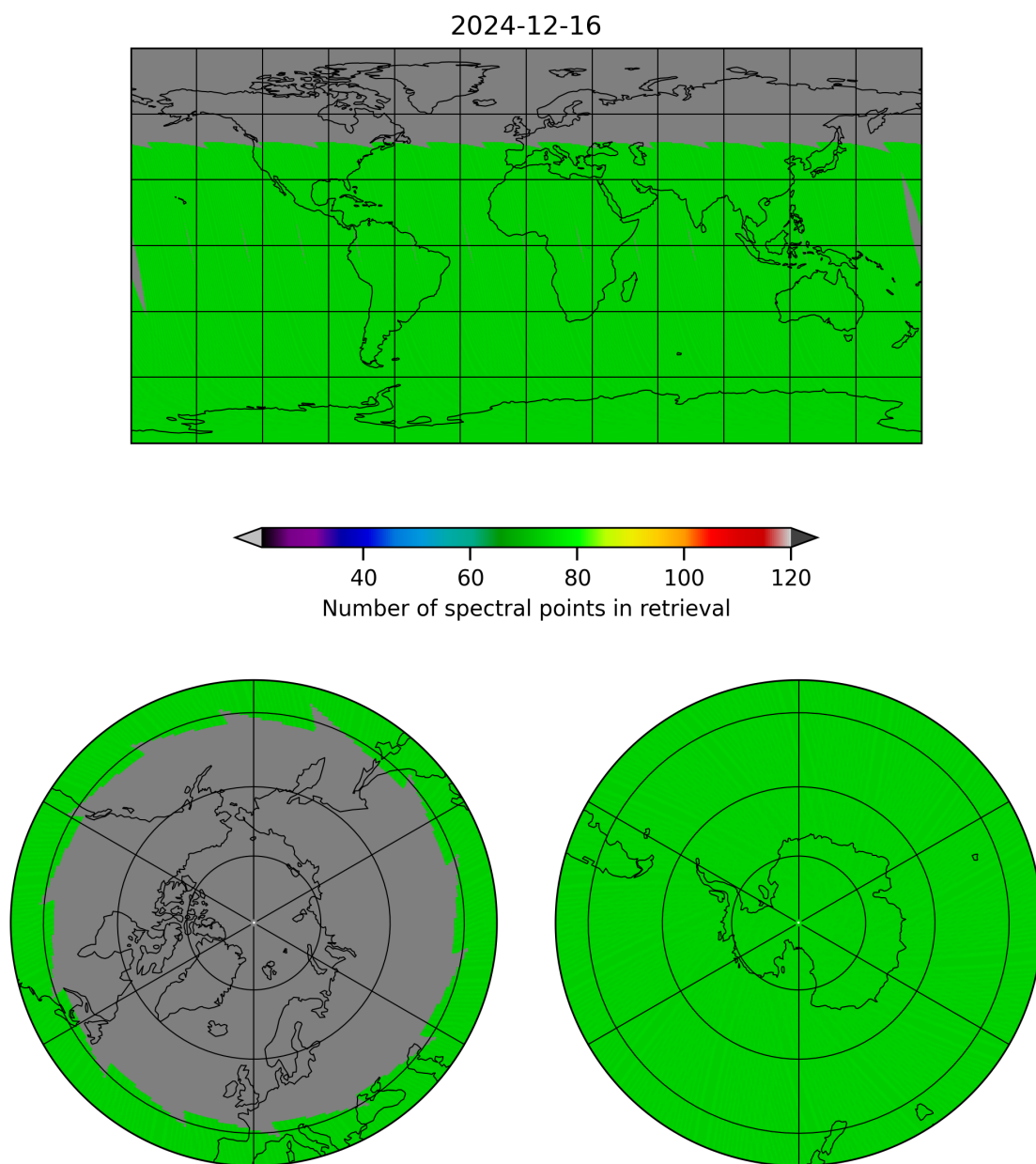


Figure 28: Map of “Number of spectral points in retrieval” for 2024-12-16 to 2024-12-17

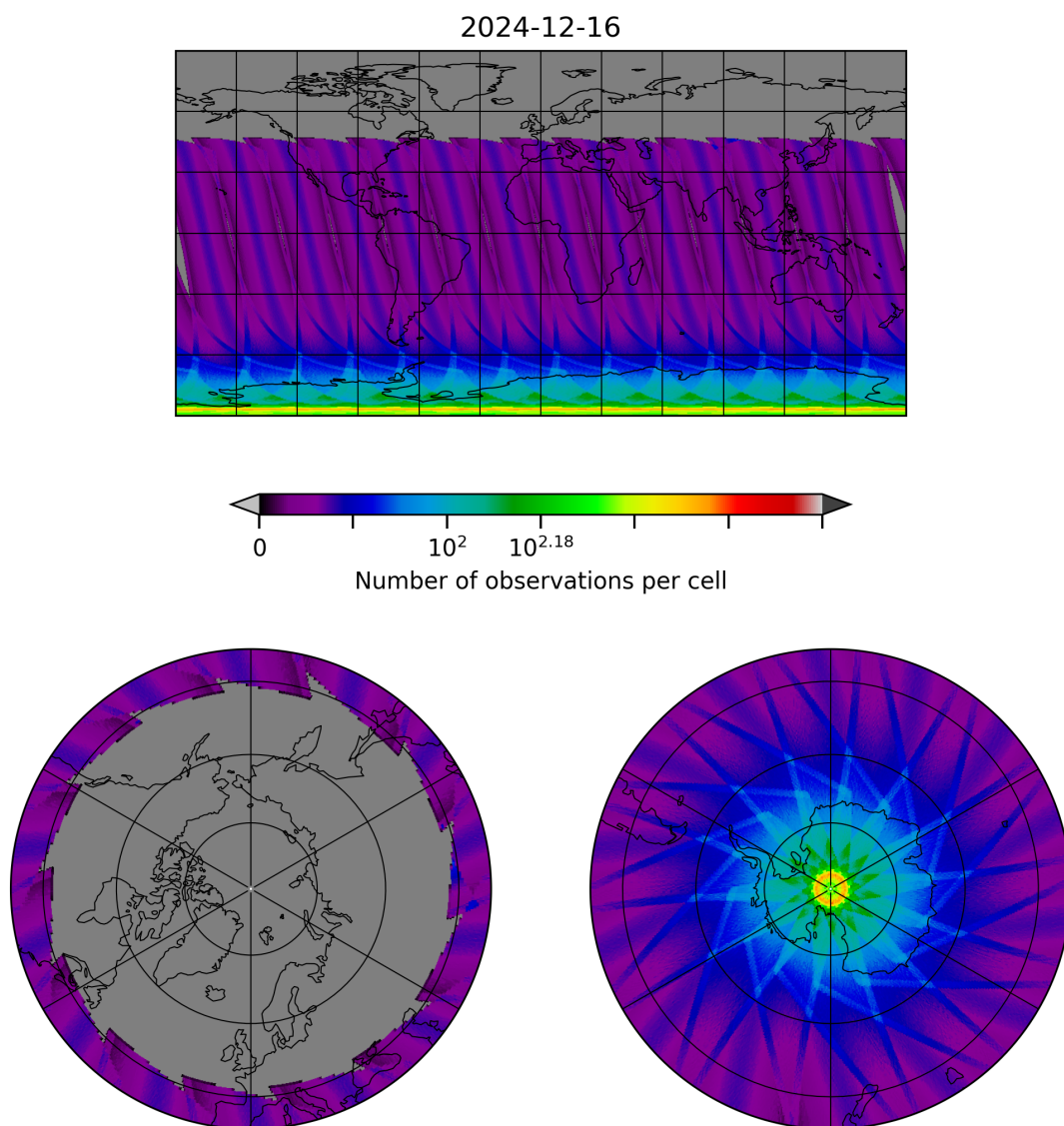


Figure 29: Map of the number of observations for 2024-12-16 to 2024-12-17

7 Zonal average

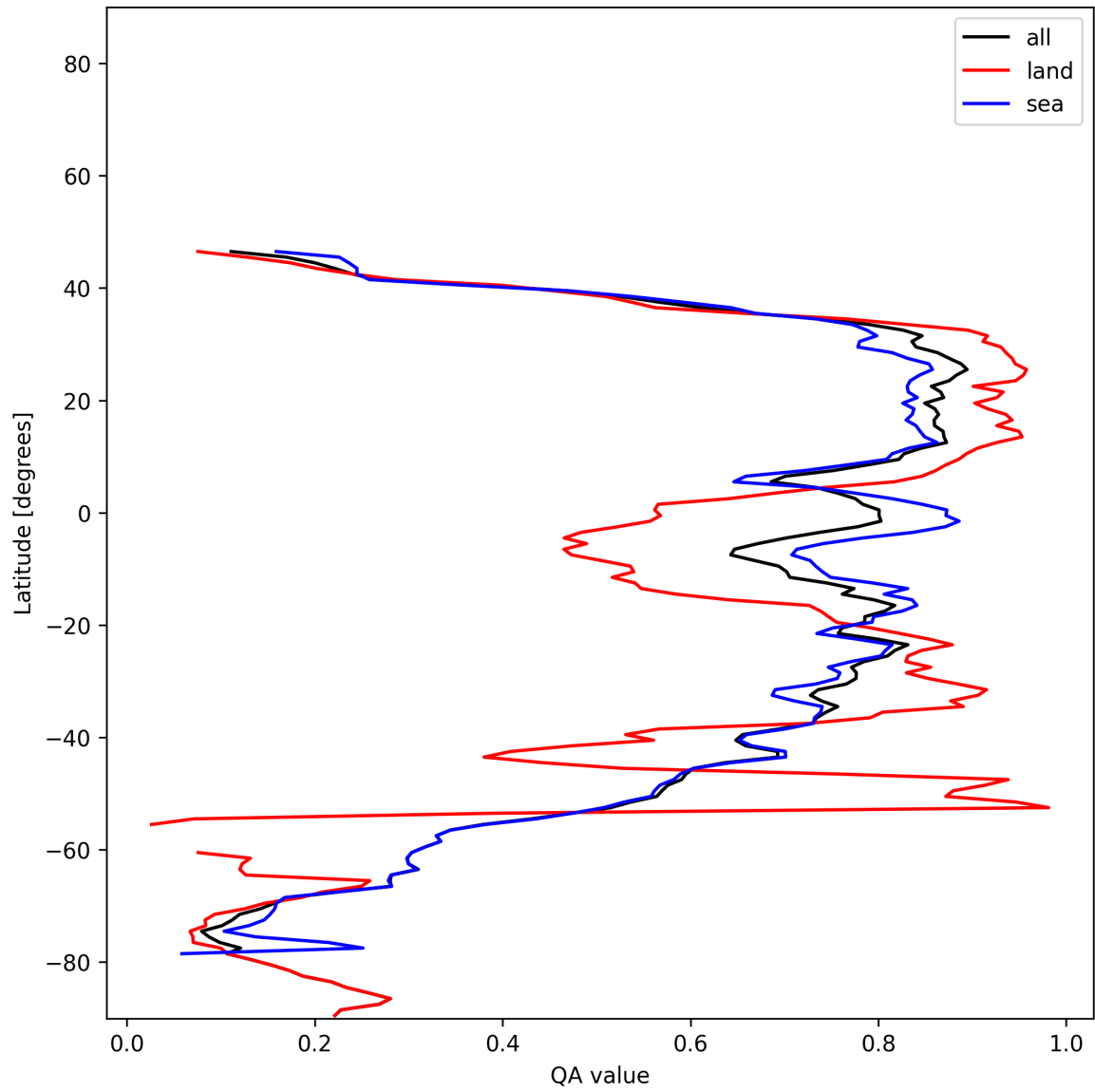


Figure 30: Zonal average of “QA value” for 2024-12-16 to 2024-12-17.

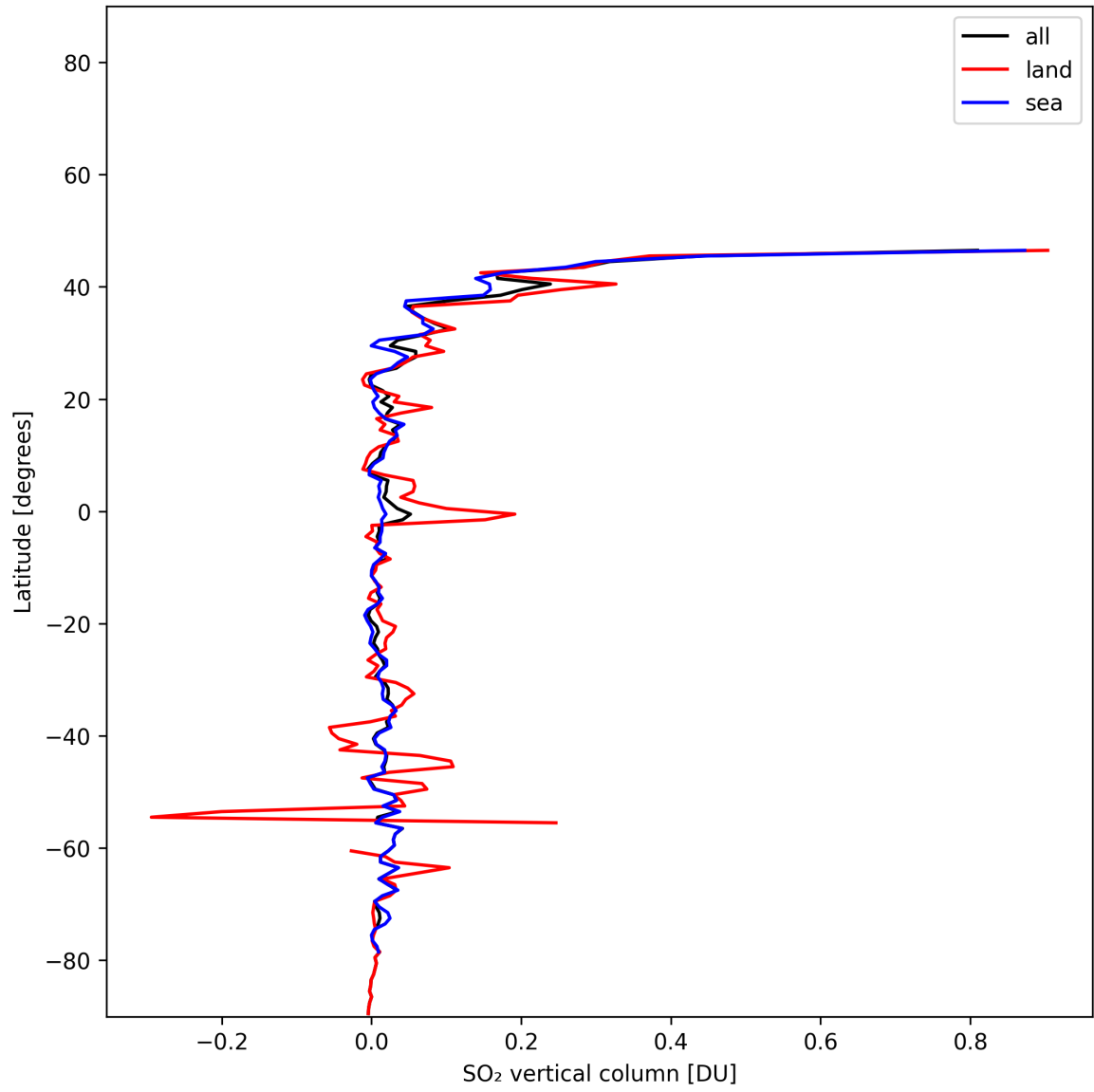


Figure 31: Zonal average of “SO₂ vertical column” for 2024-12-16 to 2024-12-17.

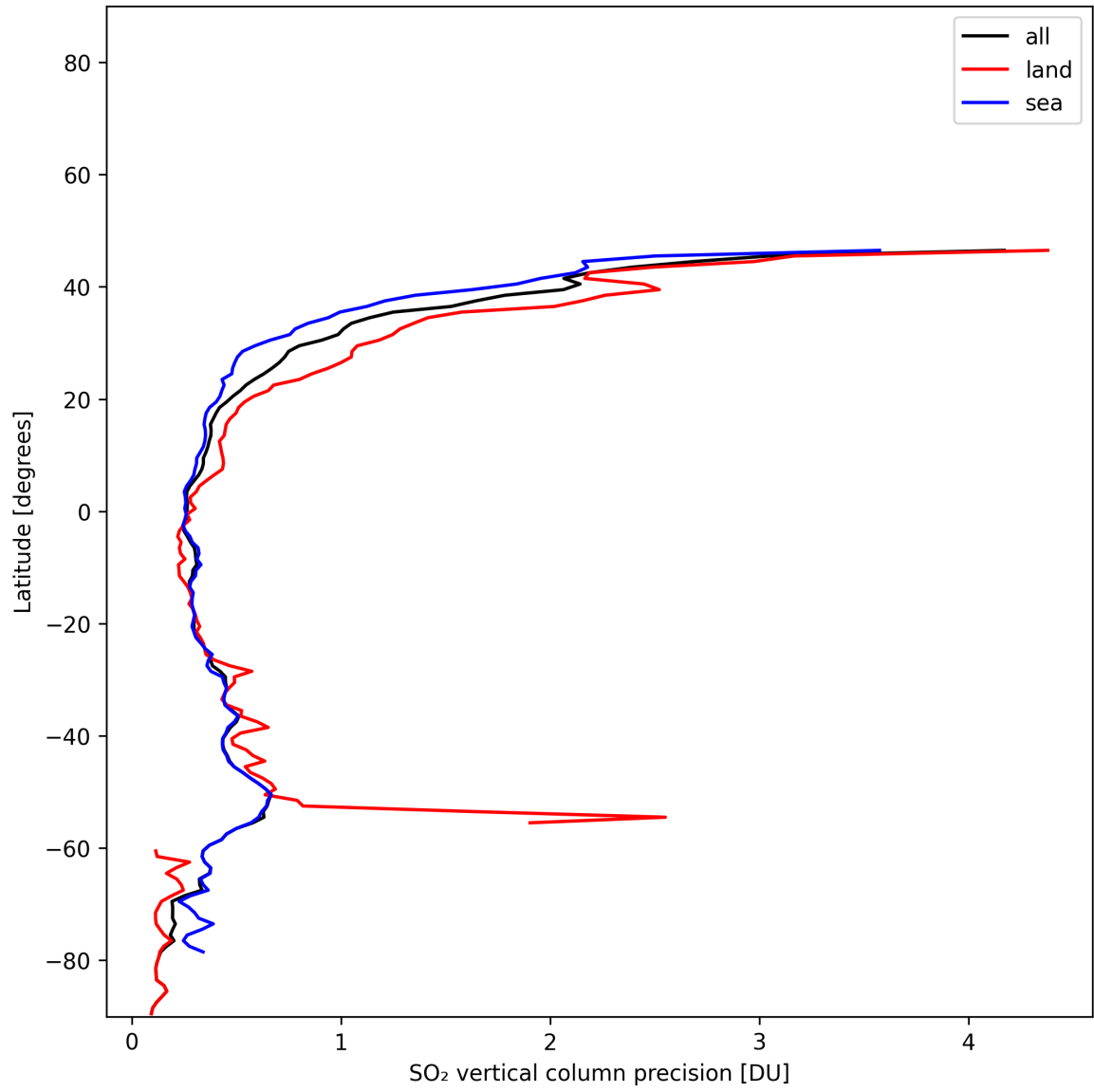


Figure 32: Zonal average of “SO₂ vertical column precision” for 2024-12-16 to 2024-12-17.

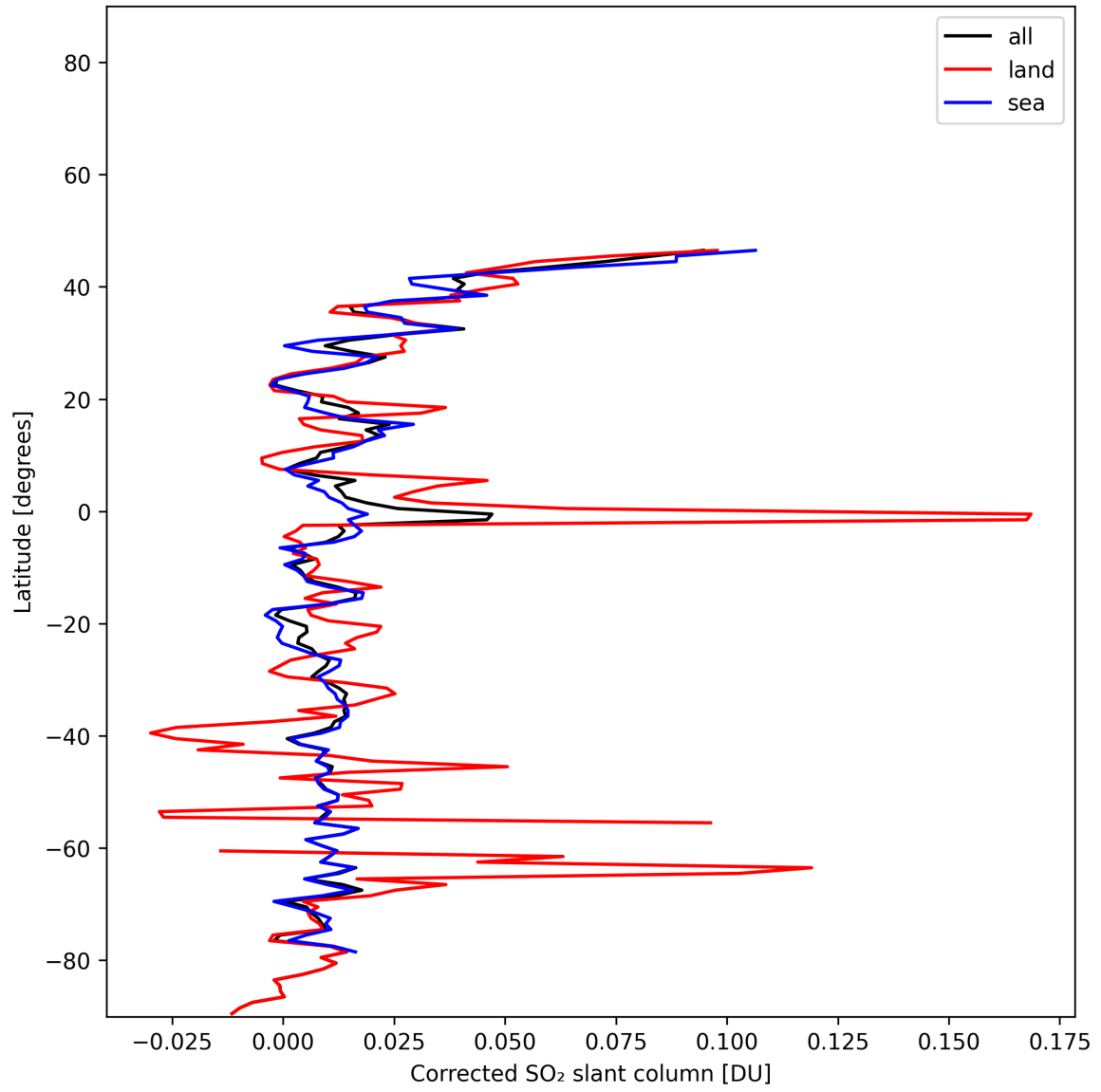


Figure 33: Zonal average of “Corrected SO₂ slant column” for 2024-12-16 to 2024-12-17.

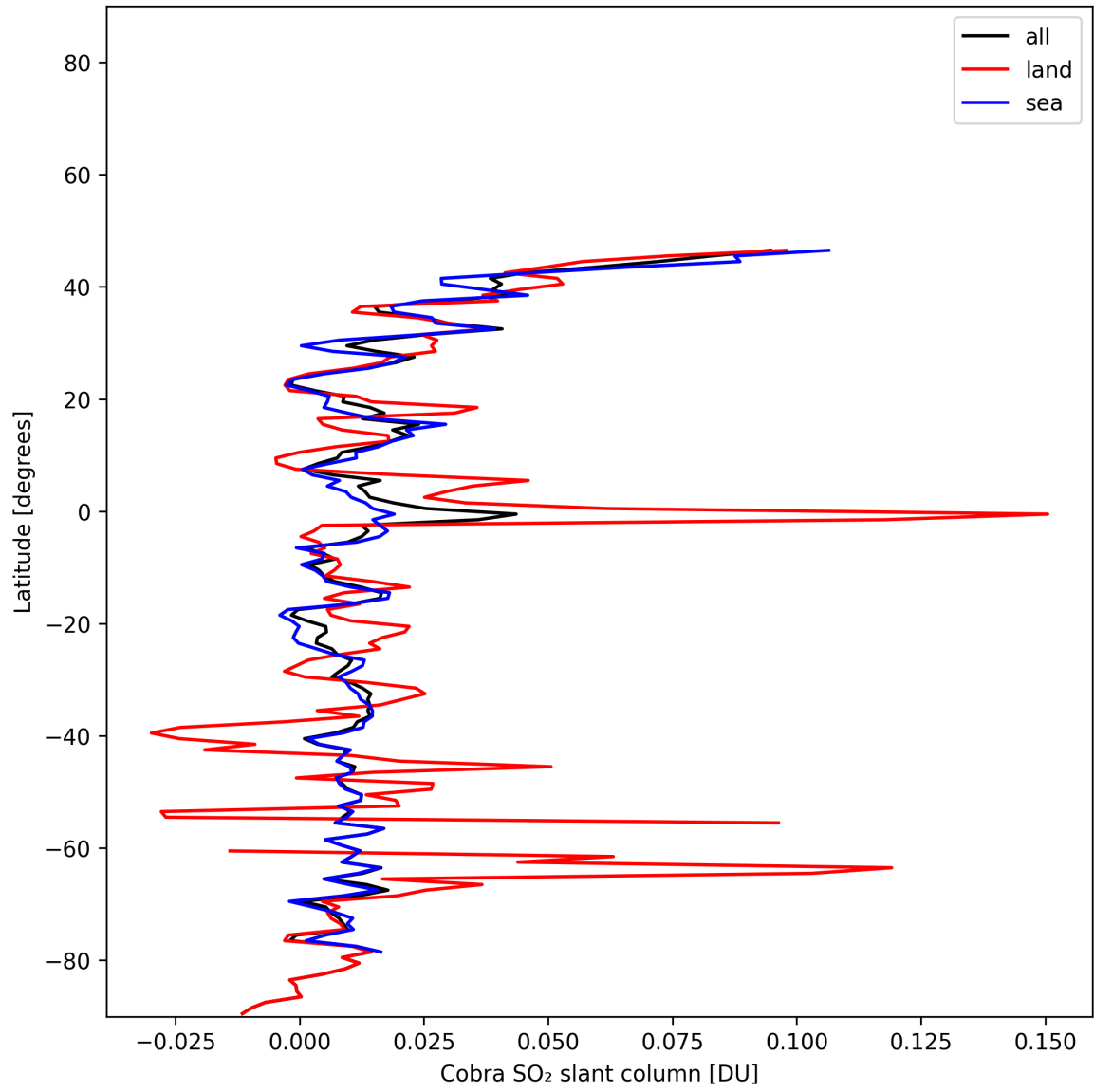


Figure 34: Zonal average of “Cobra SO₂ slant column” for 2024-12-16 to 2024-12-17.

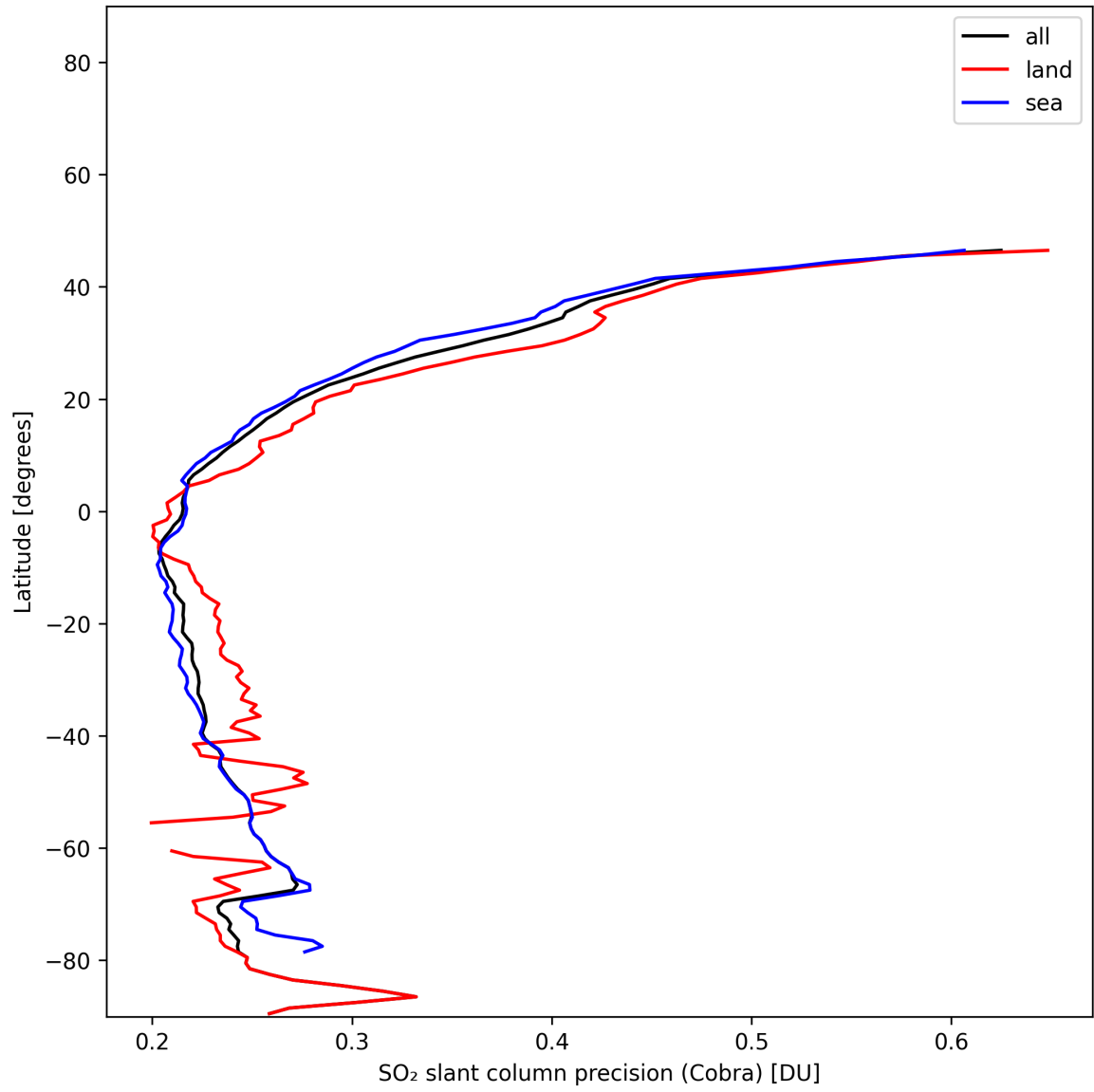


Figure 35: Zonal average of “SO₂ slant column precision (Cobra)” for 2024-12-16 to 2024-12-17.

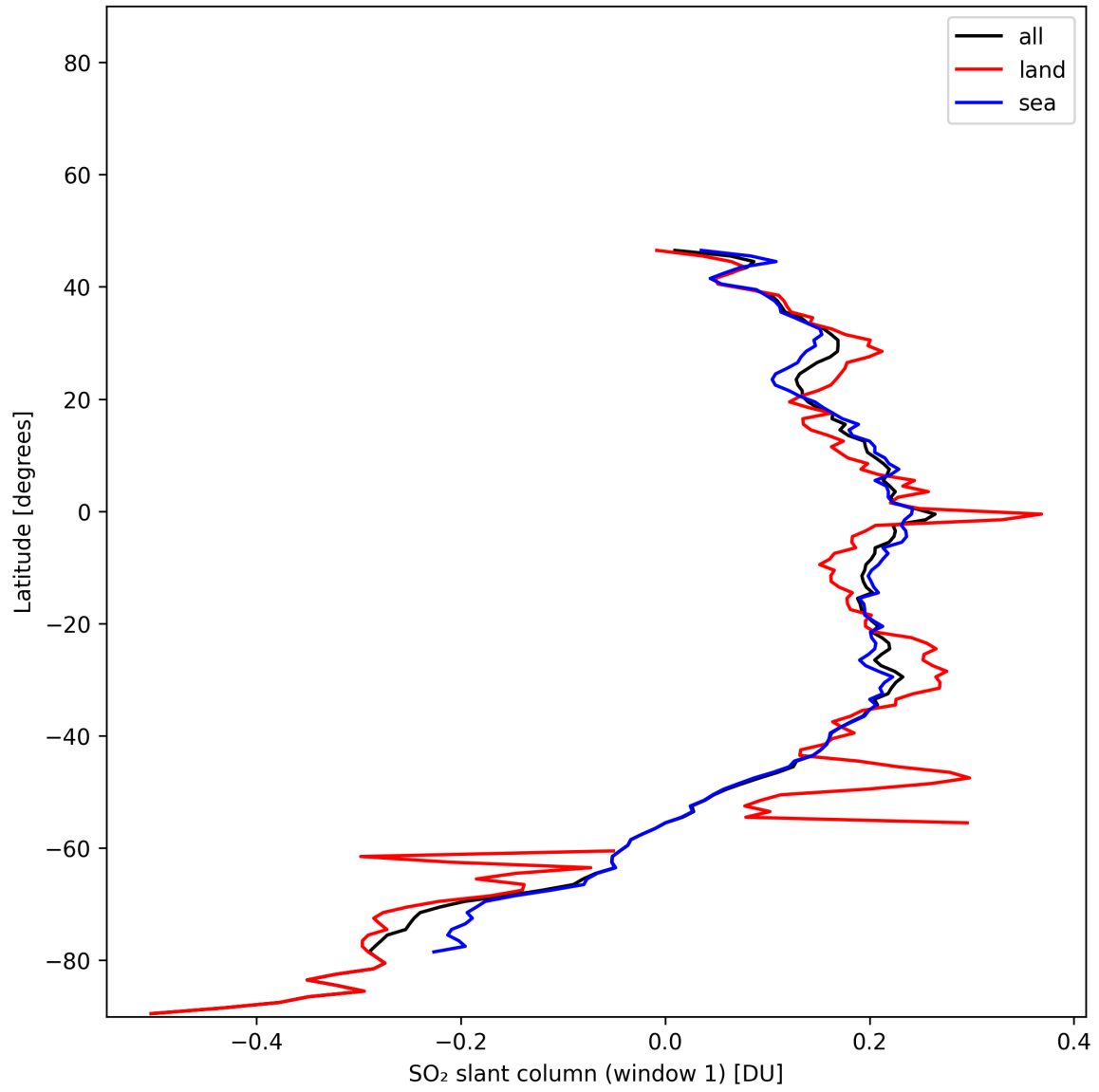


Figure 36: Zonal average of “SO₂ slant column (window 1)” for 2024-12-16 to 2024-12-17.

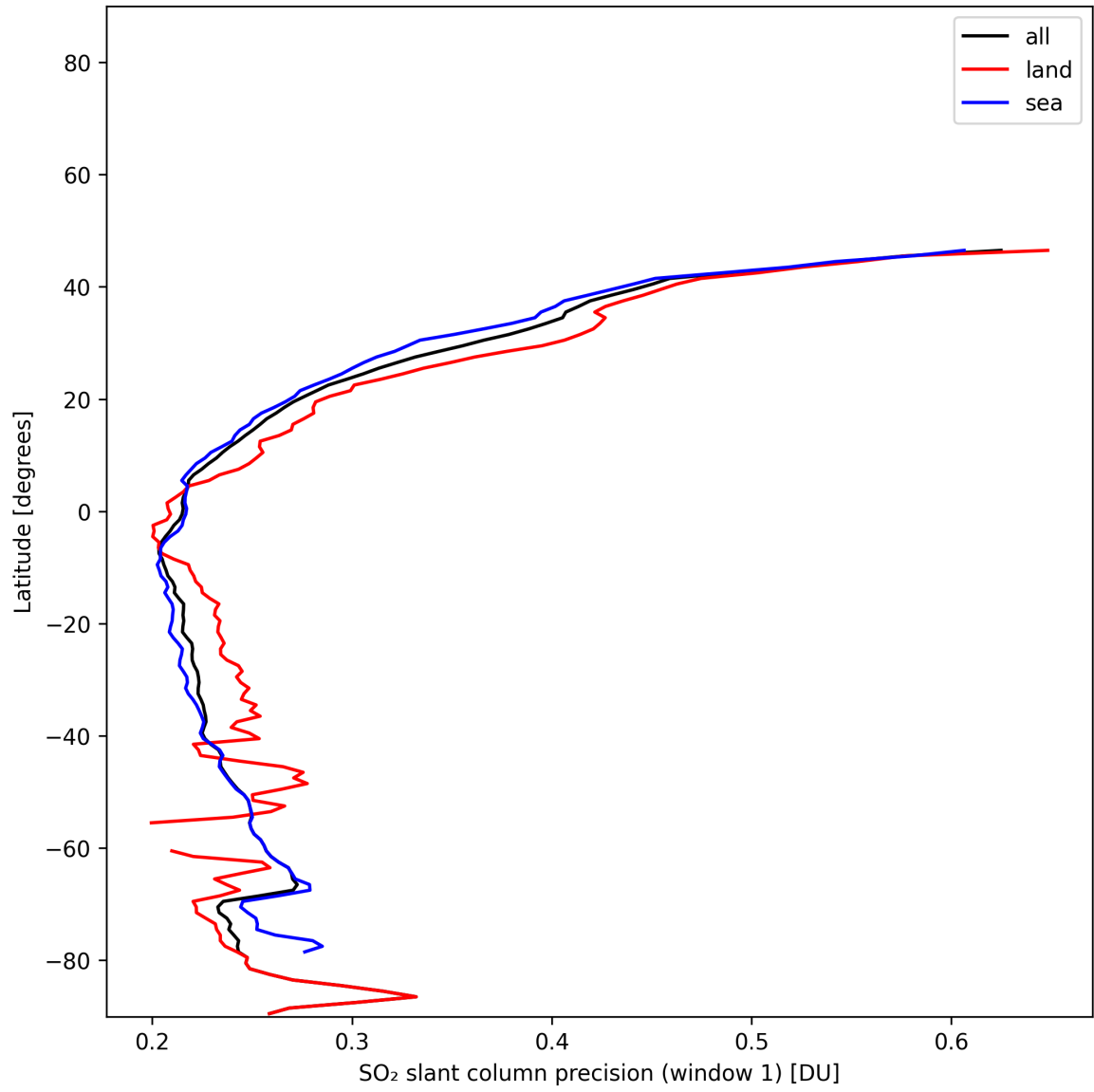


Figure 37: Zonal average of “SO₂ slant column precision (window 1)” for 2024-12-16 to 2024-12-17.

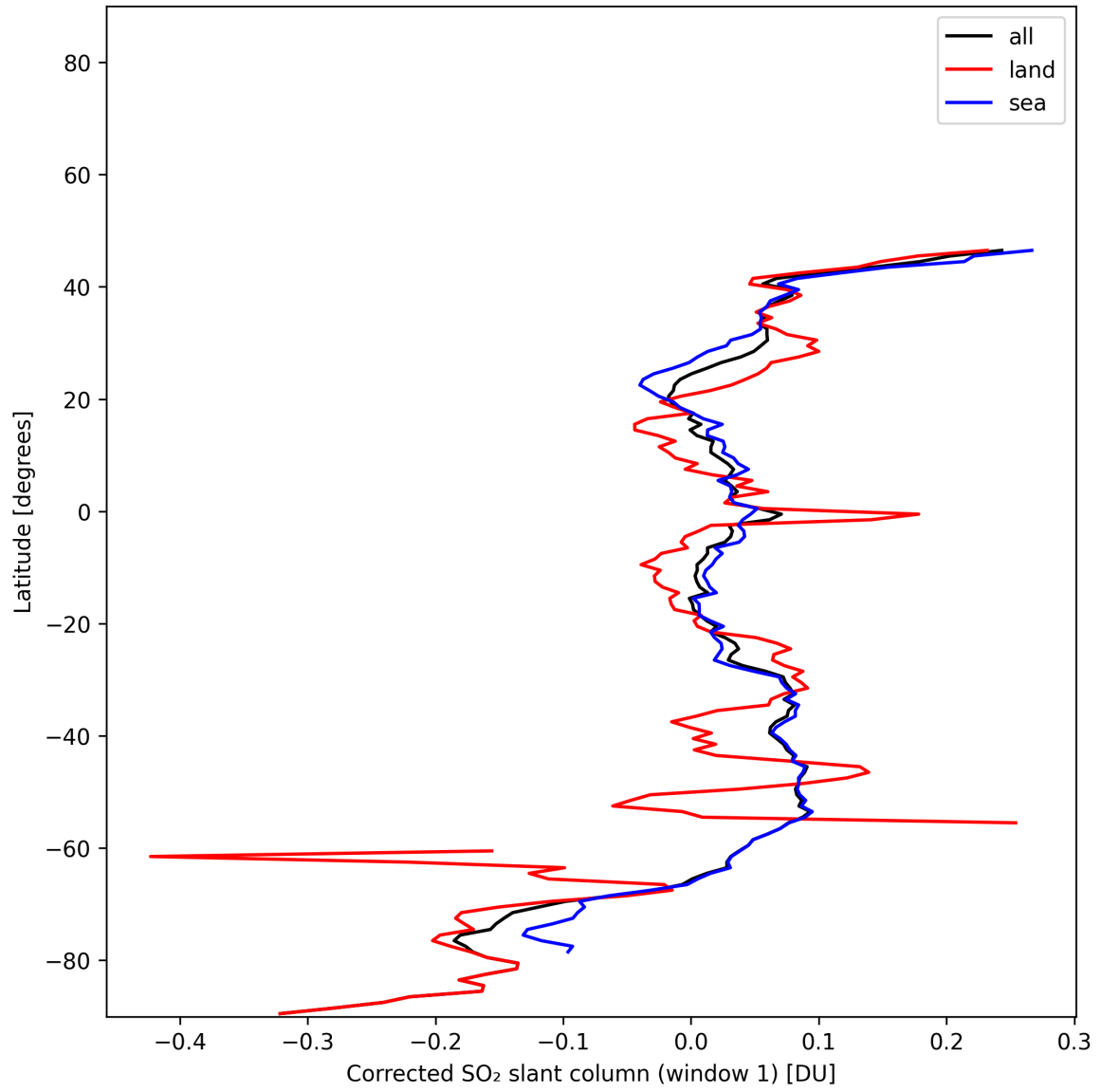


Figure 38: Zonal average of “Corrected SO₂ slant column (window 1)” for 2024-12-16 to 2024-12-17.

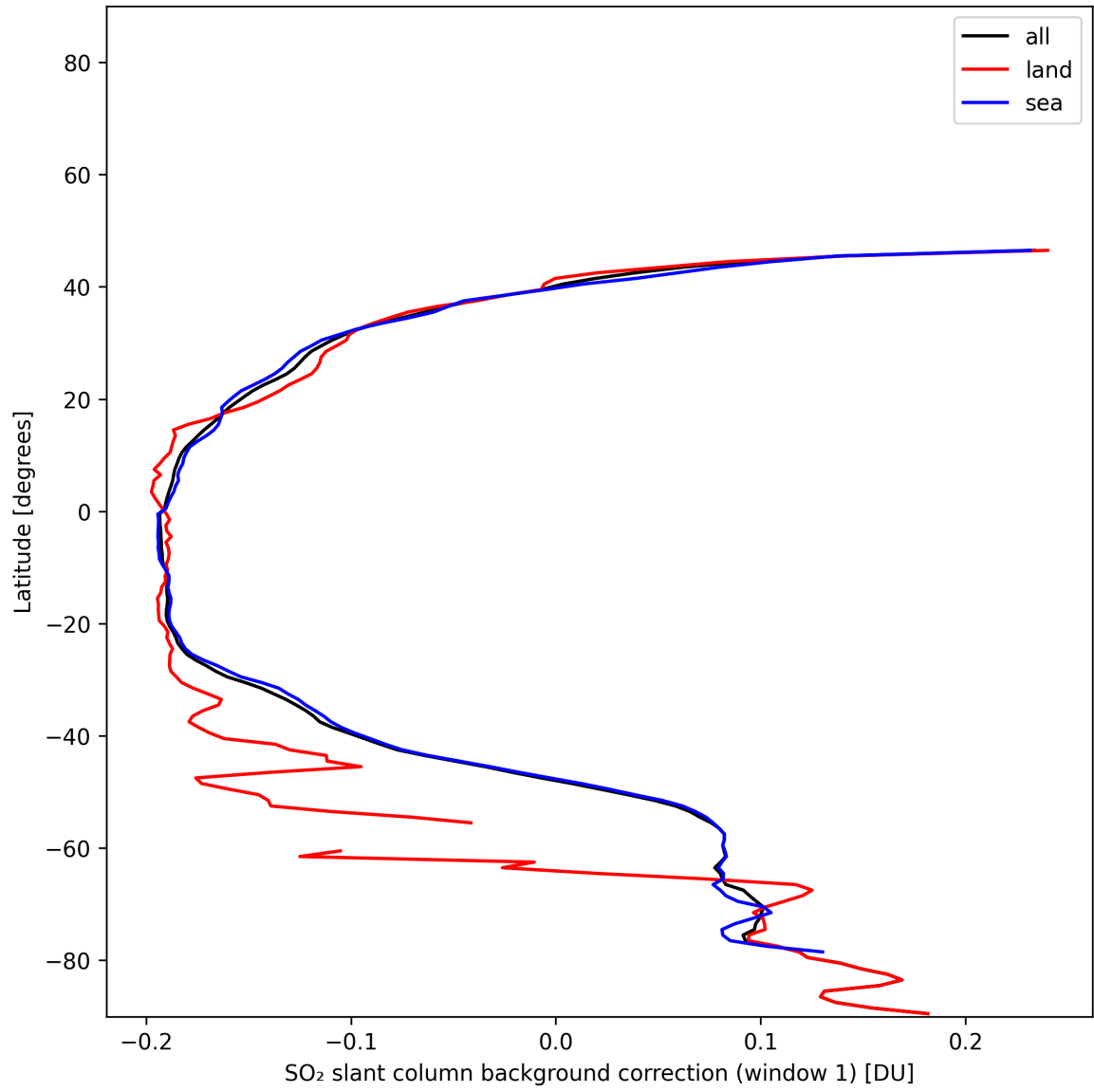


Figure 39: Zonal average of “SO₂ slant column background correction (window 1)” for 2024-12-16 to 2024-12-17.

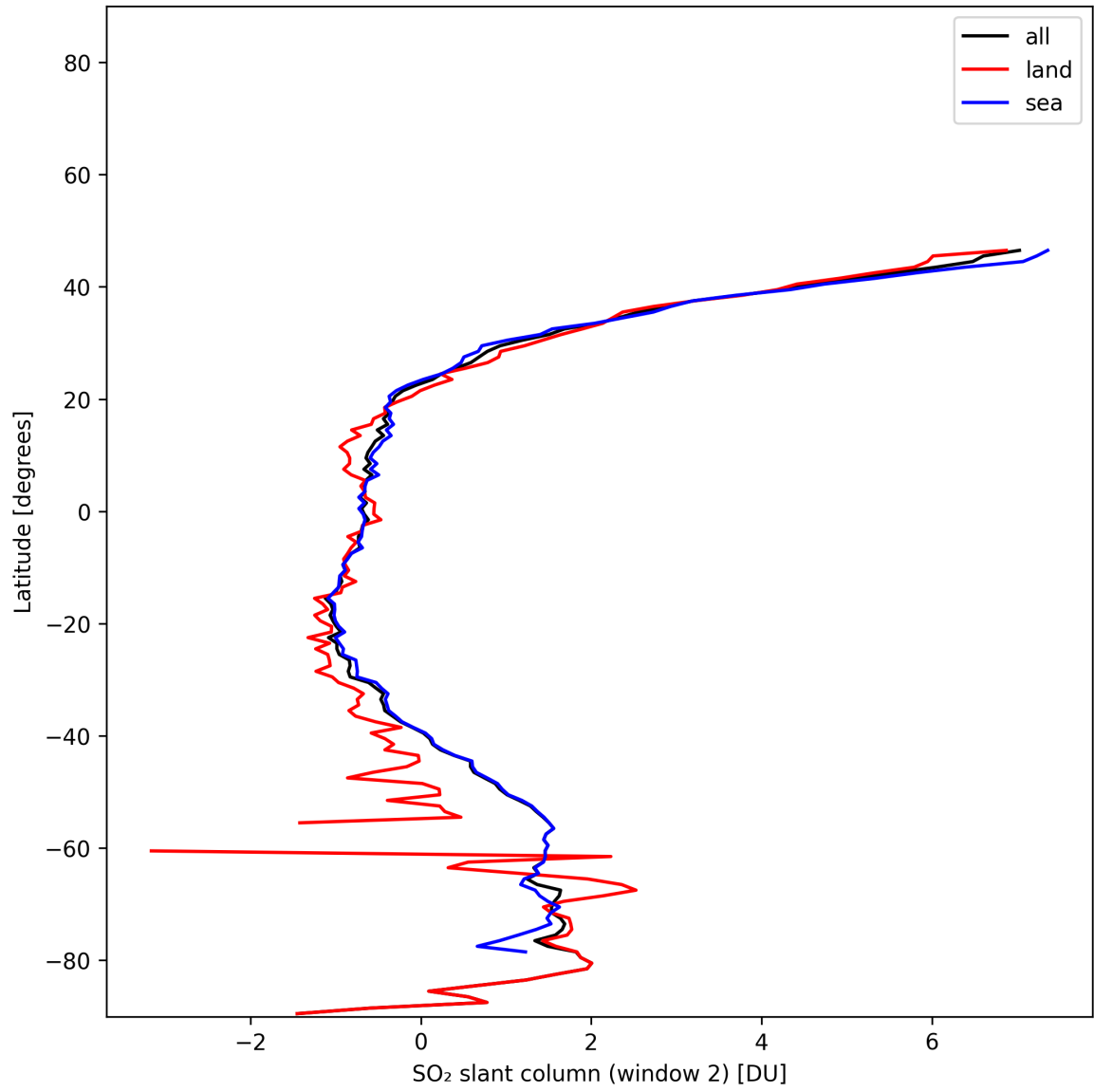


Figure 40: Zonal average of “SO₂ slant column (window 2)” for 2024-12-16 to 2024-12-17.

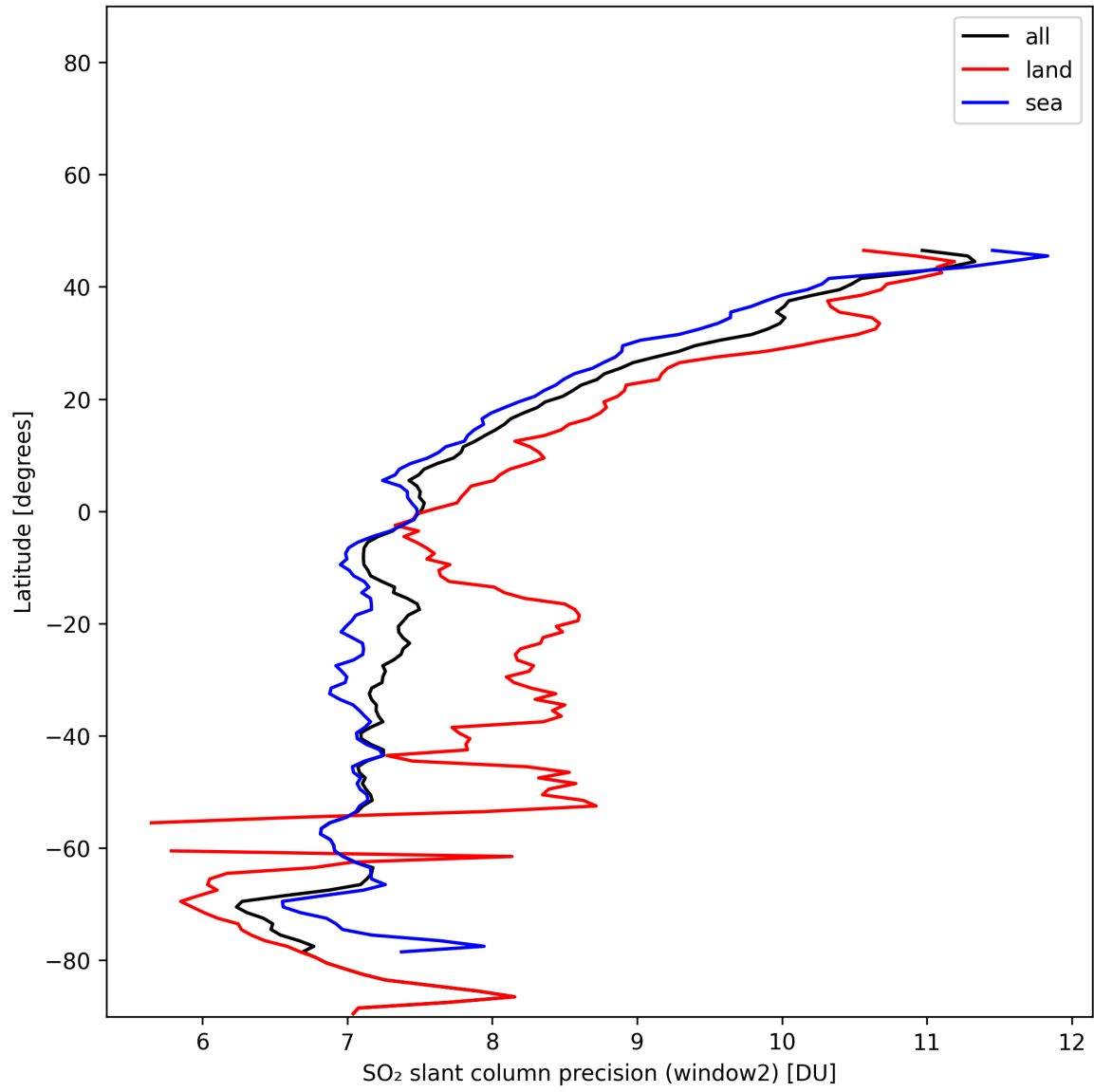


Figure 41: Zonal average of “SO₂ slant column precision (window2)” for 2024-12-16 to 2024-12-17.

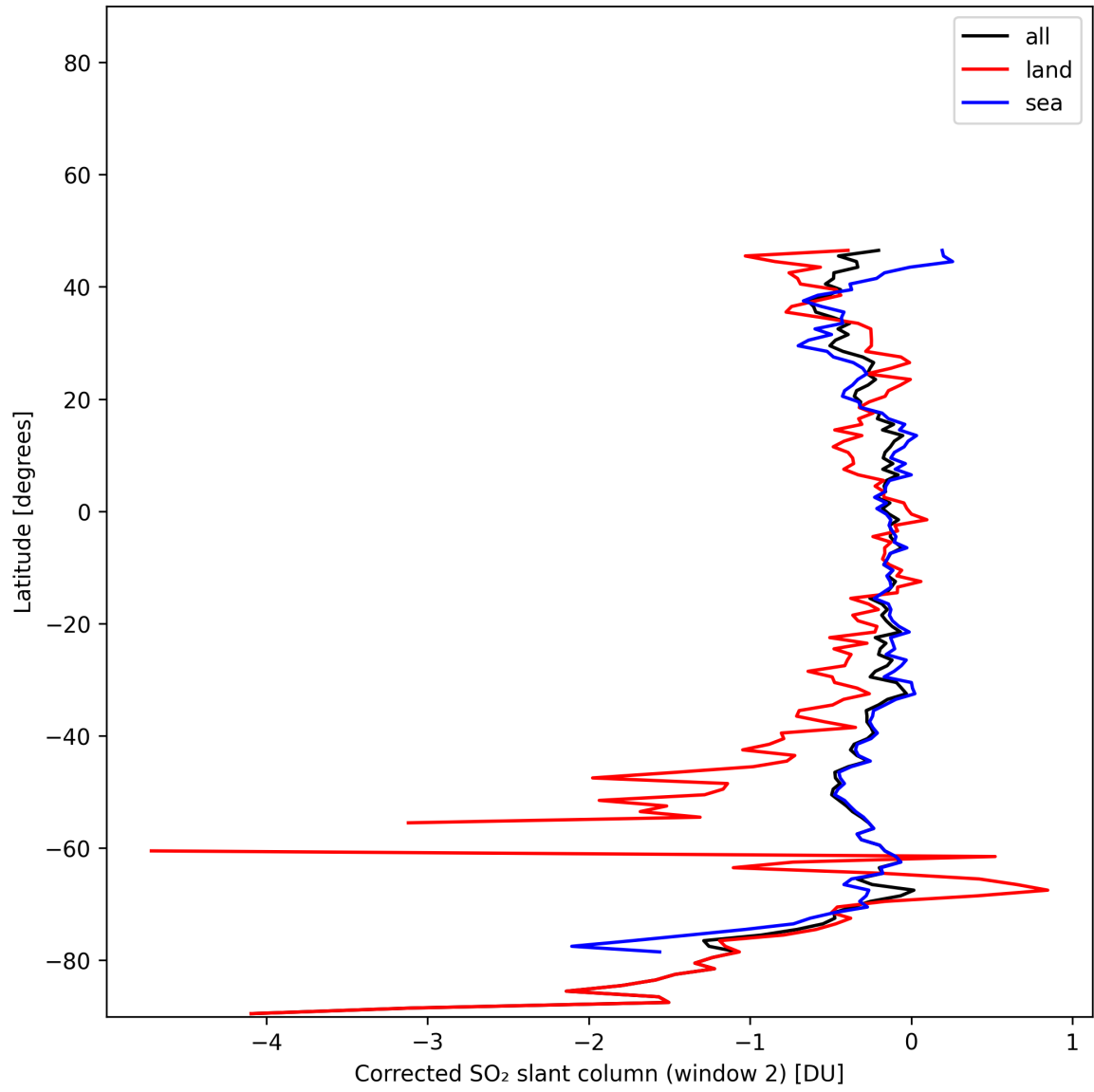


Figure 42: Zonal average of “Corrected SO₂ slant column (window 2)” for 2024-12-16 to 2024-12-17.

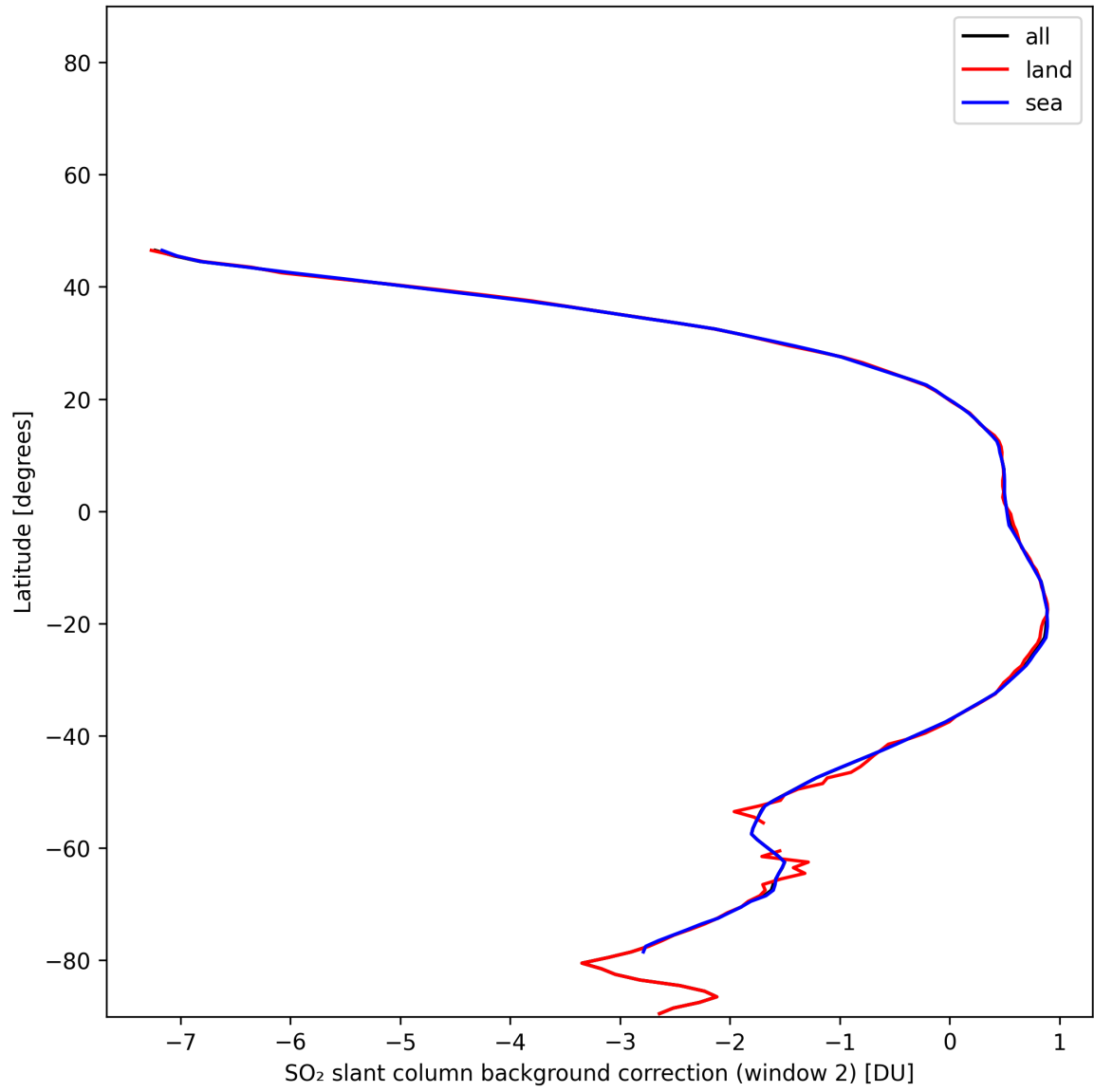


Figure 43: Zonal average of “SO₂ slant column background correction (window 2)” for 2024-12-16 to 2024-12-17.

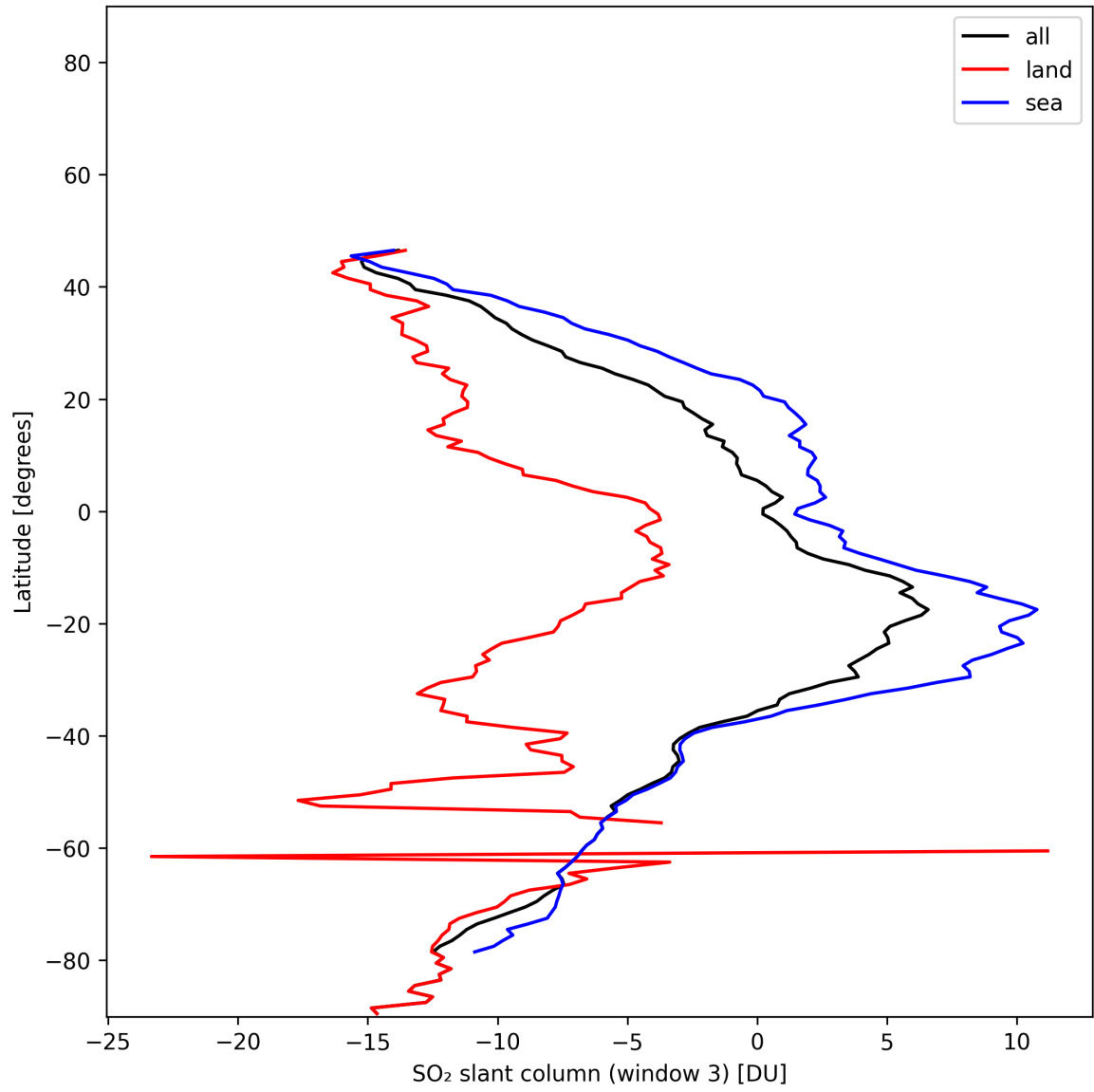


Figure 44: Zonal average of “SO₂ slant column (window 3)” for 2024-12-16 to 2024-12-17.

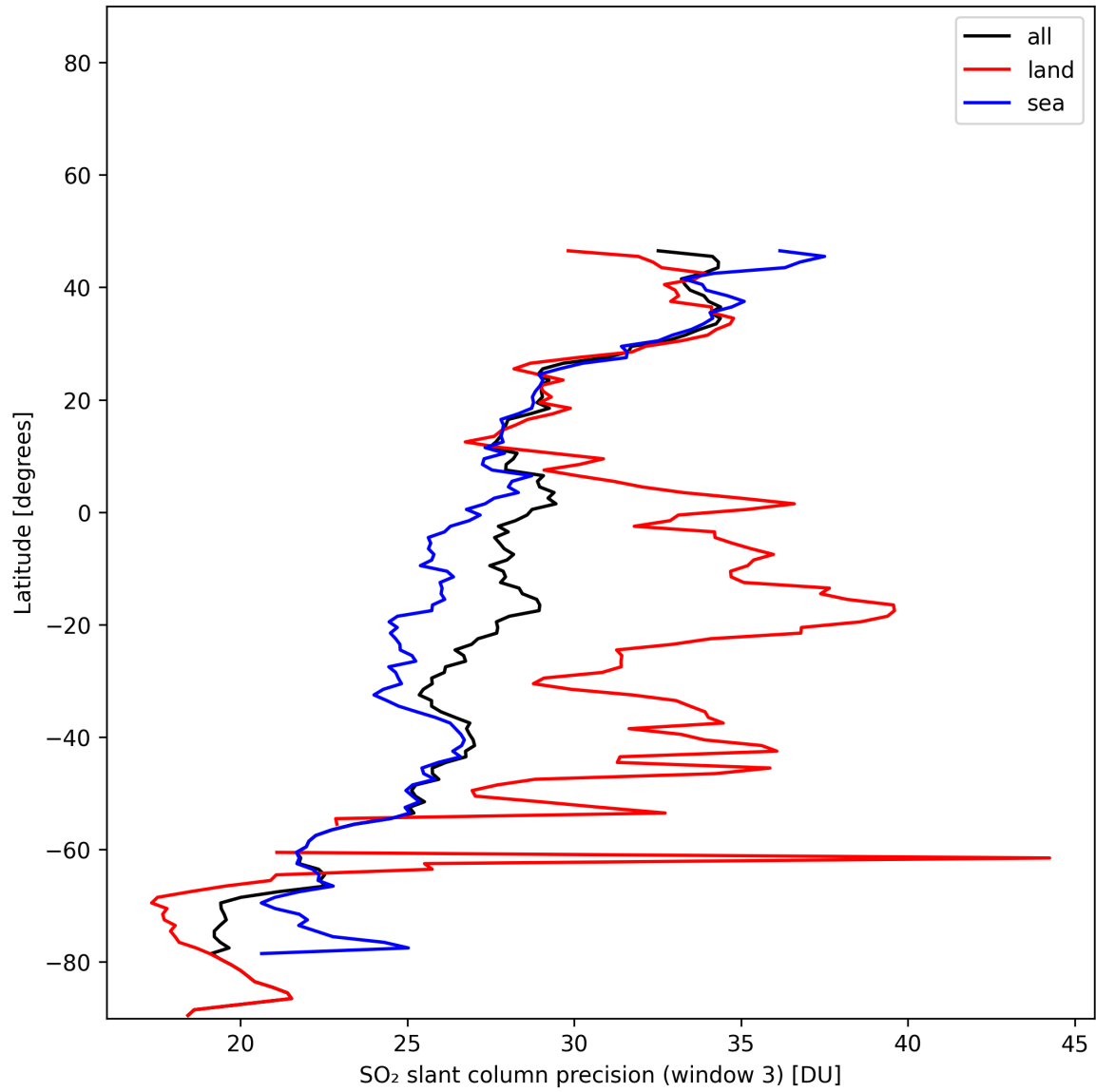


Figure 45: Zonal average of “SO₂ slant column precision (window 3)” for 2024-12-16 to 2024-12-17.

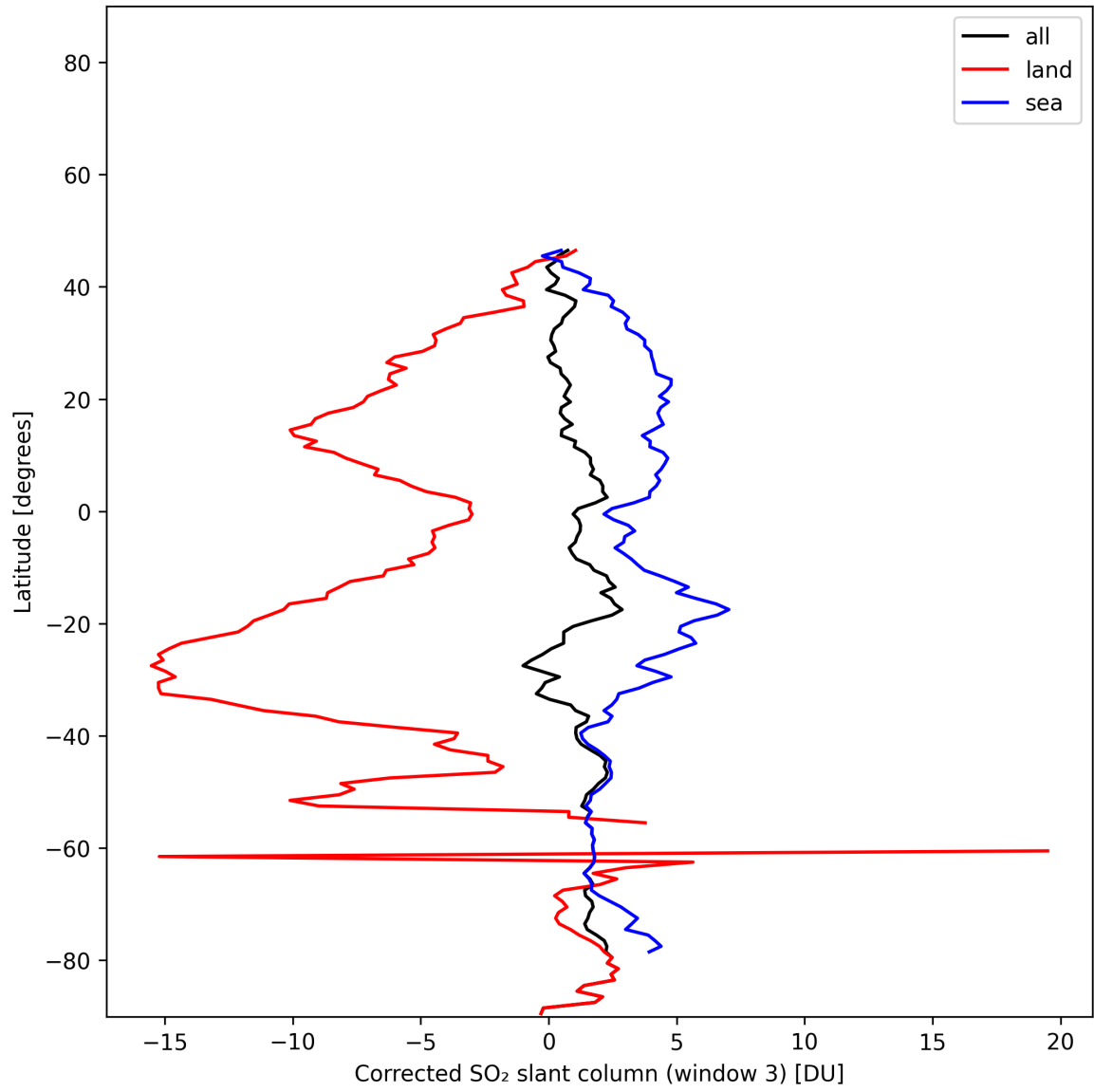


Figure 46: Zonal average of “Corrected SO₂ slant column (window 3)” for 2024-12-16 to 2024-12-17.

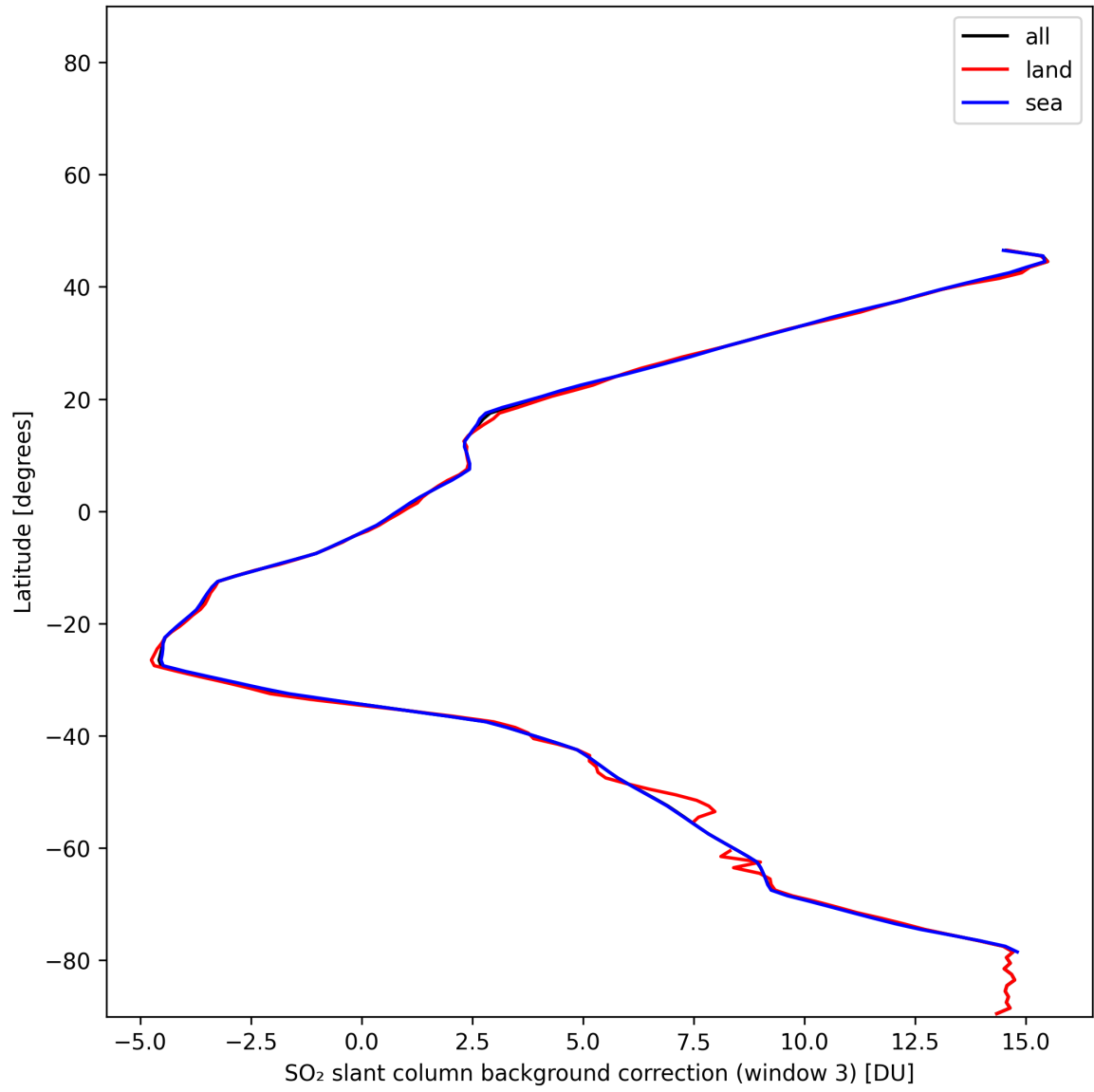


Figure 47: Zonal average of “SO₂ slant column background correction (window 3)” for 2024-12-16 to 2024-12-17.

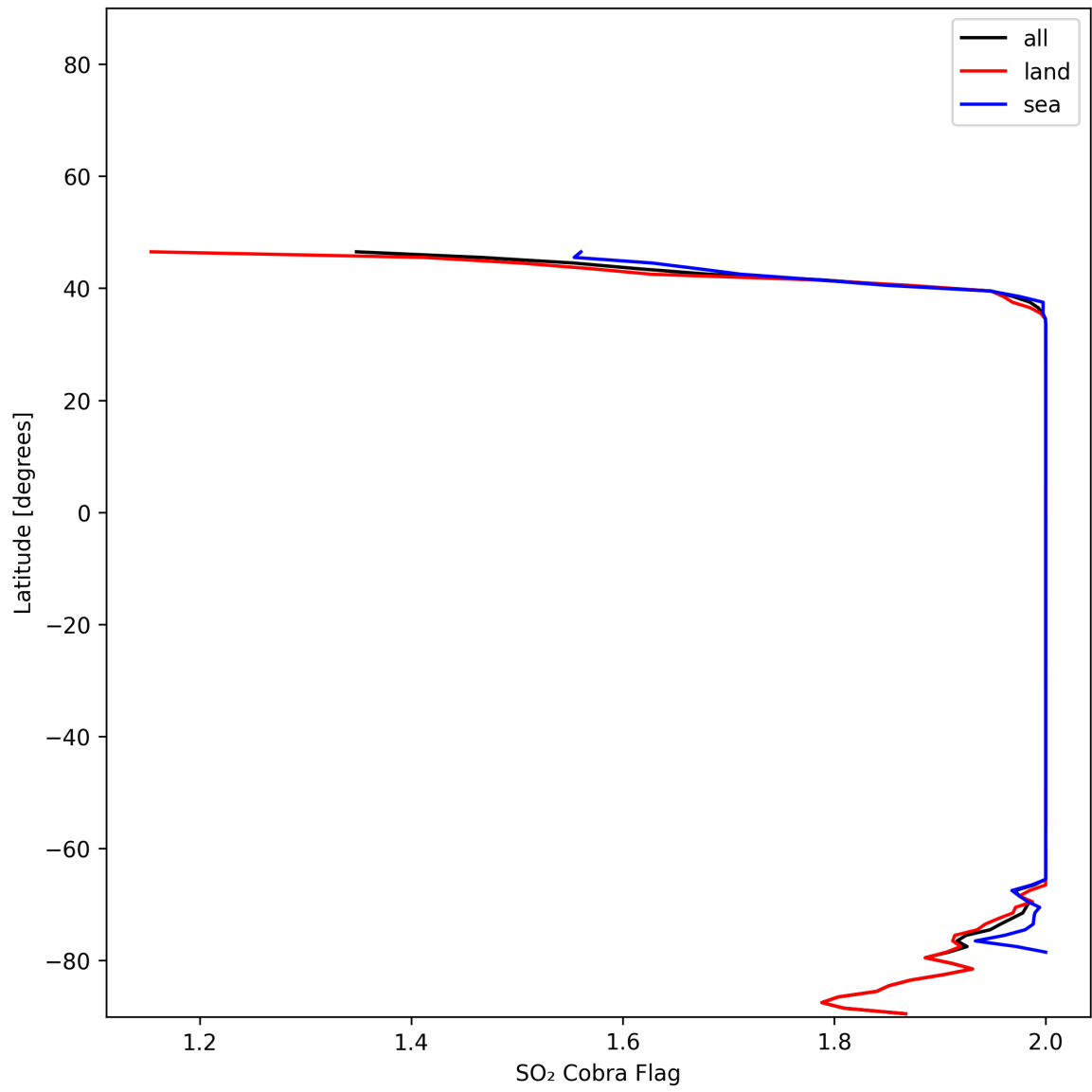


Figure 48: Zonal average of "SO₂ Cobra Flag" for 2024-12-16 to 2024-12-17.

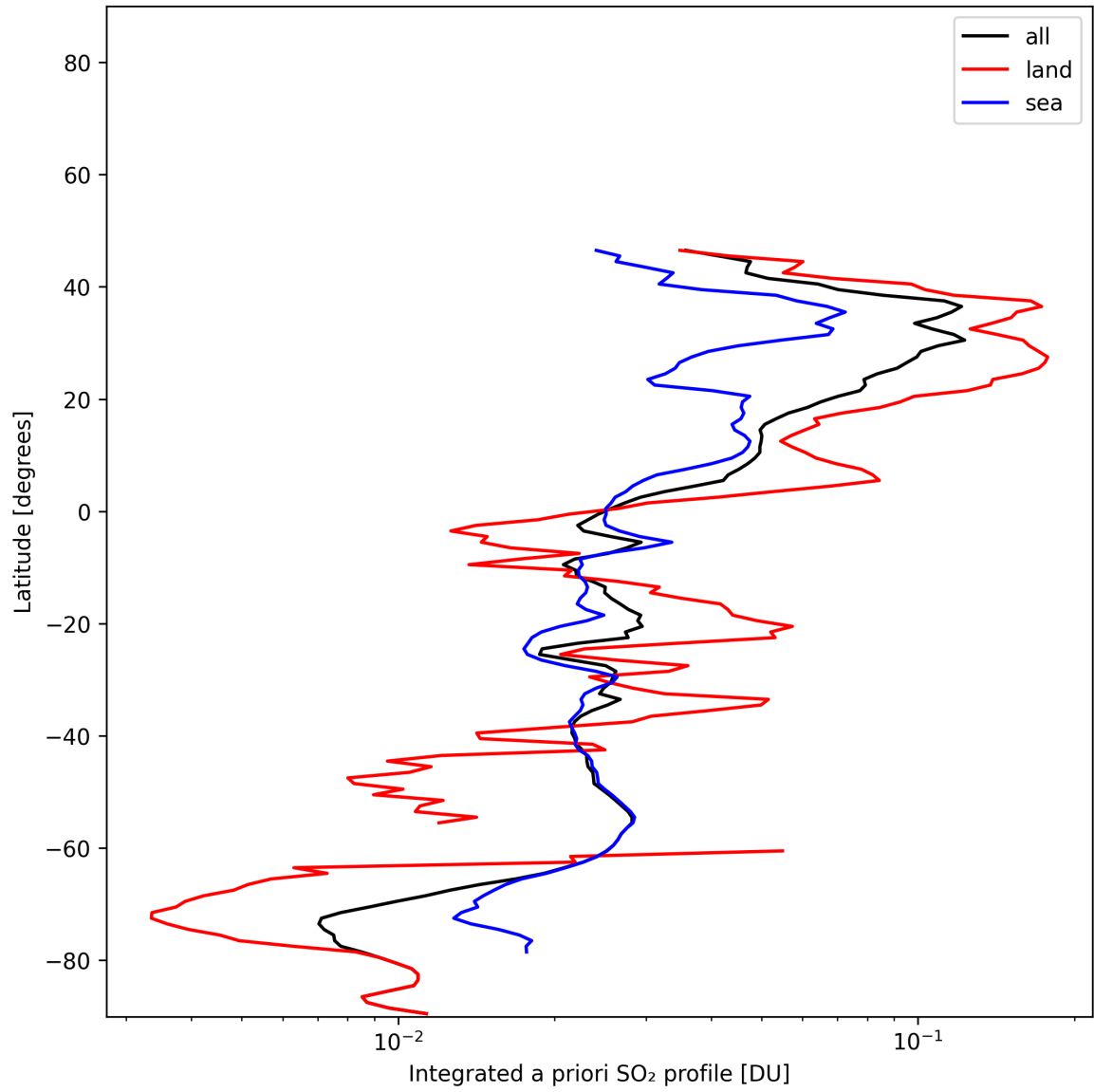


Figure 49: Zonal average of “Integrated a priori SO₂ profile” for 2024-12-16 to 2024-12-17.

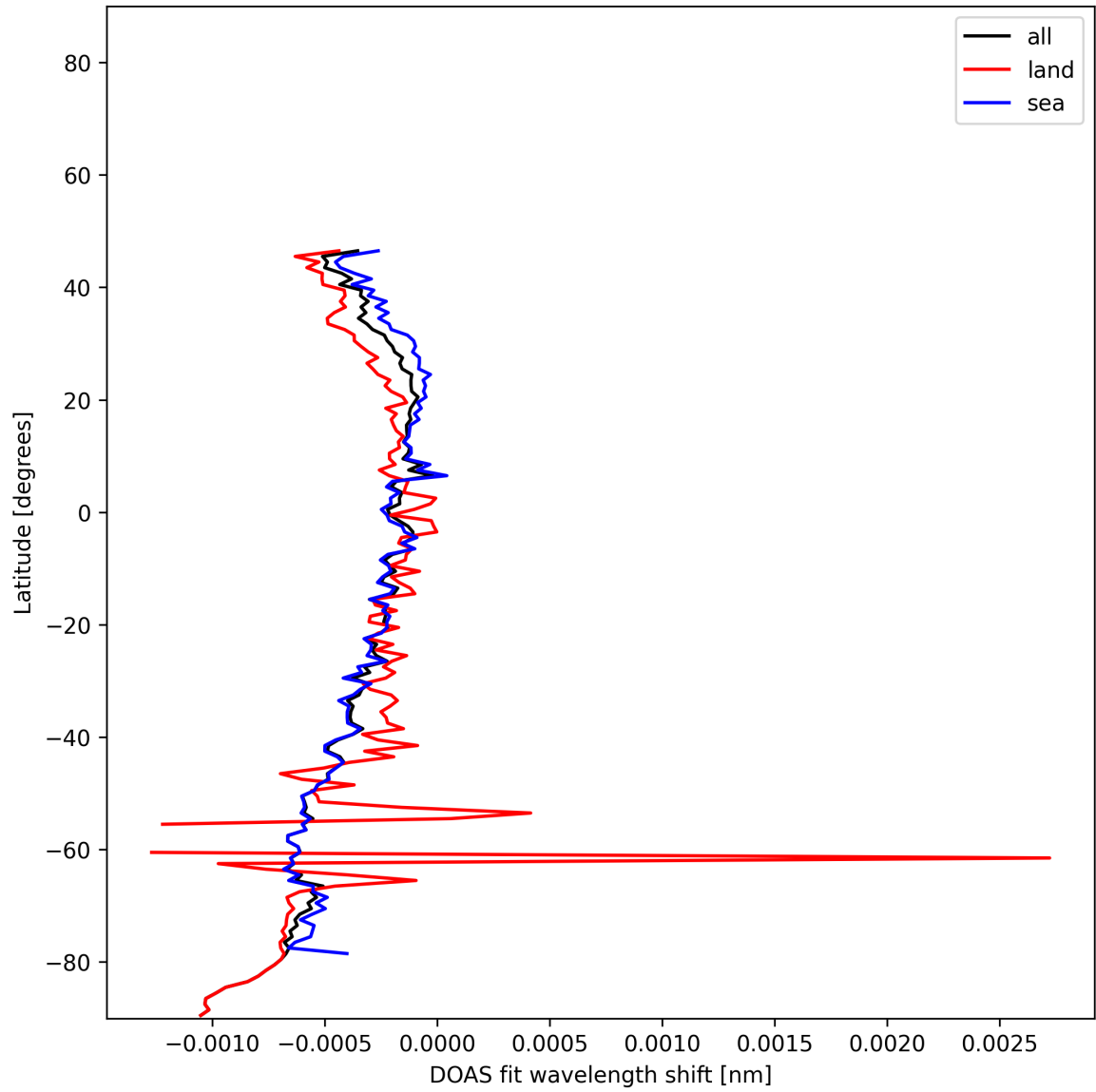


Figure 50: Zonal average of “DOAS fit wavelength shift” for 2024-12-16 to 2024-12-17.

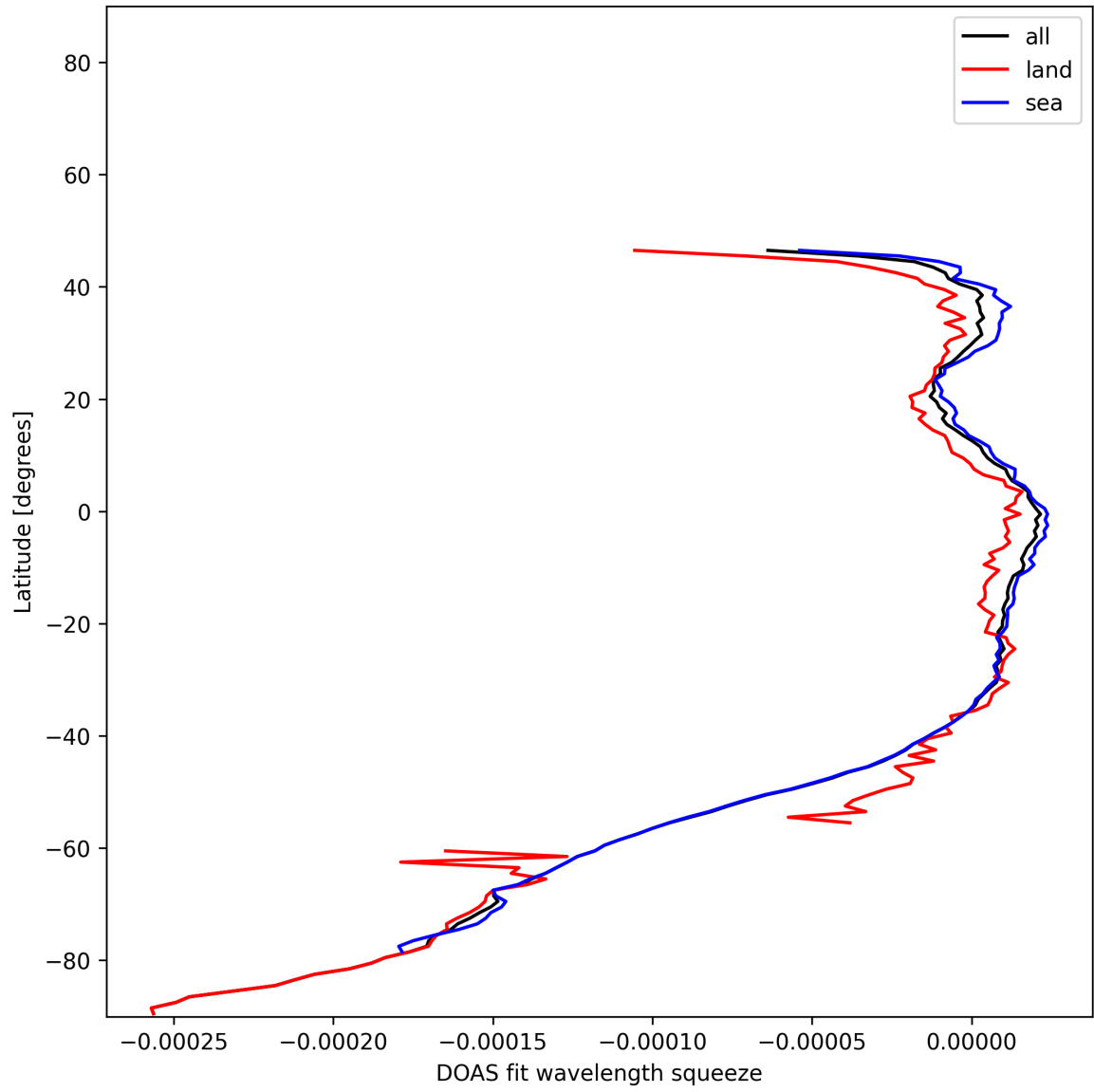


Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2024-12-16 to 2024-12-17.

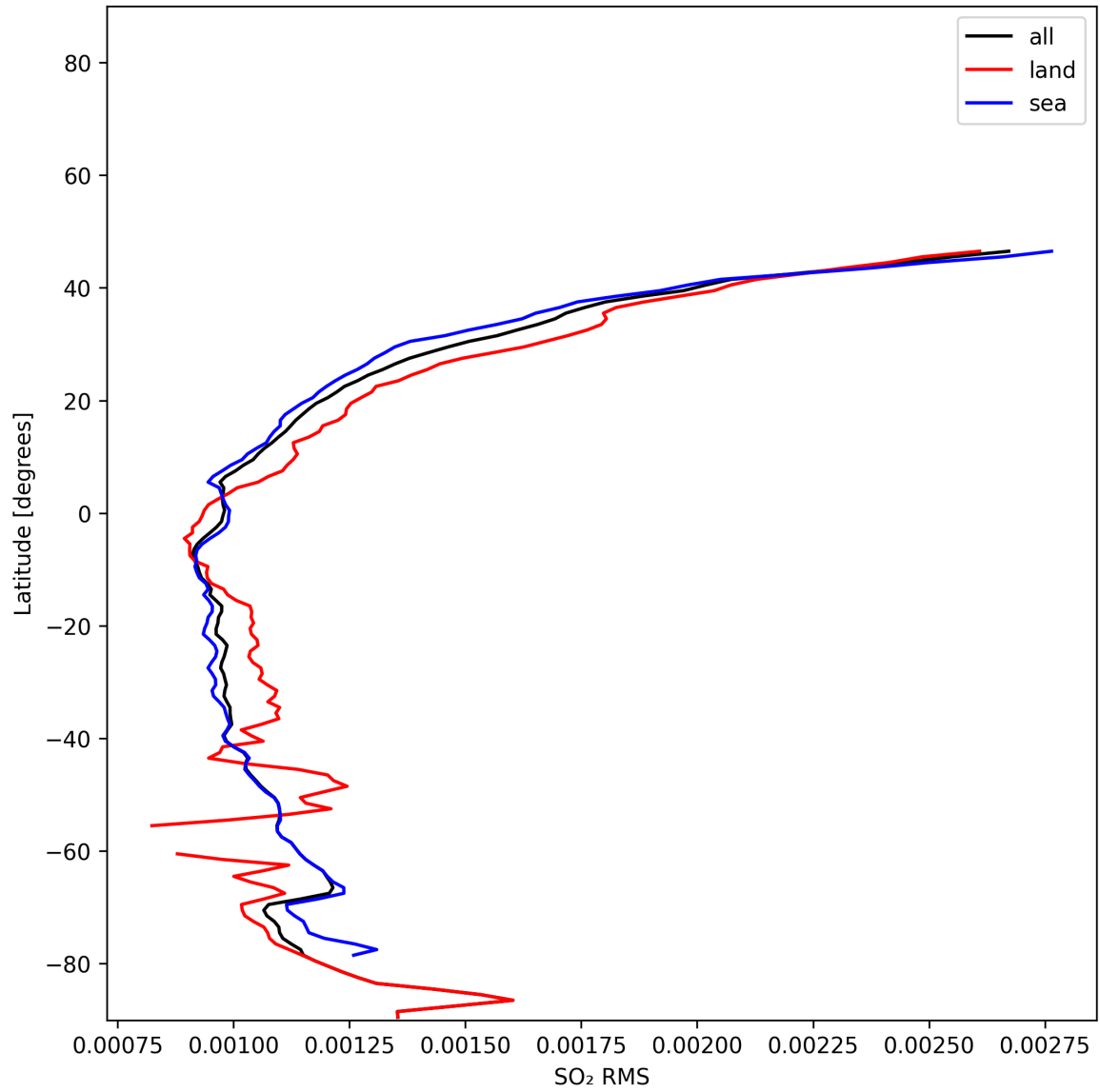


Figure 52: Zonal average of “SO₂ RMS” for 2024-12-16 to 2024-12-17.

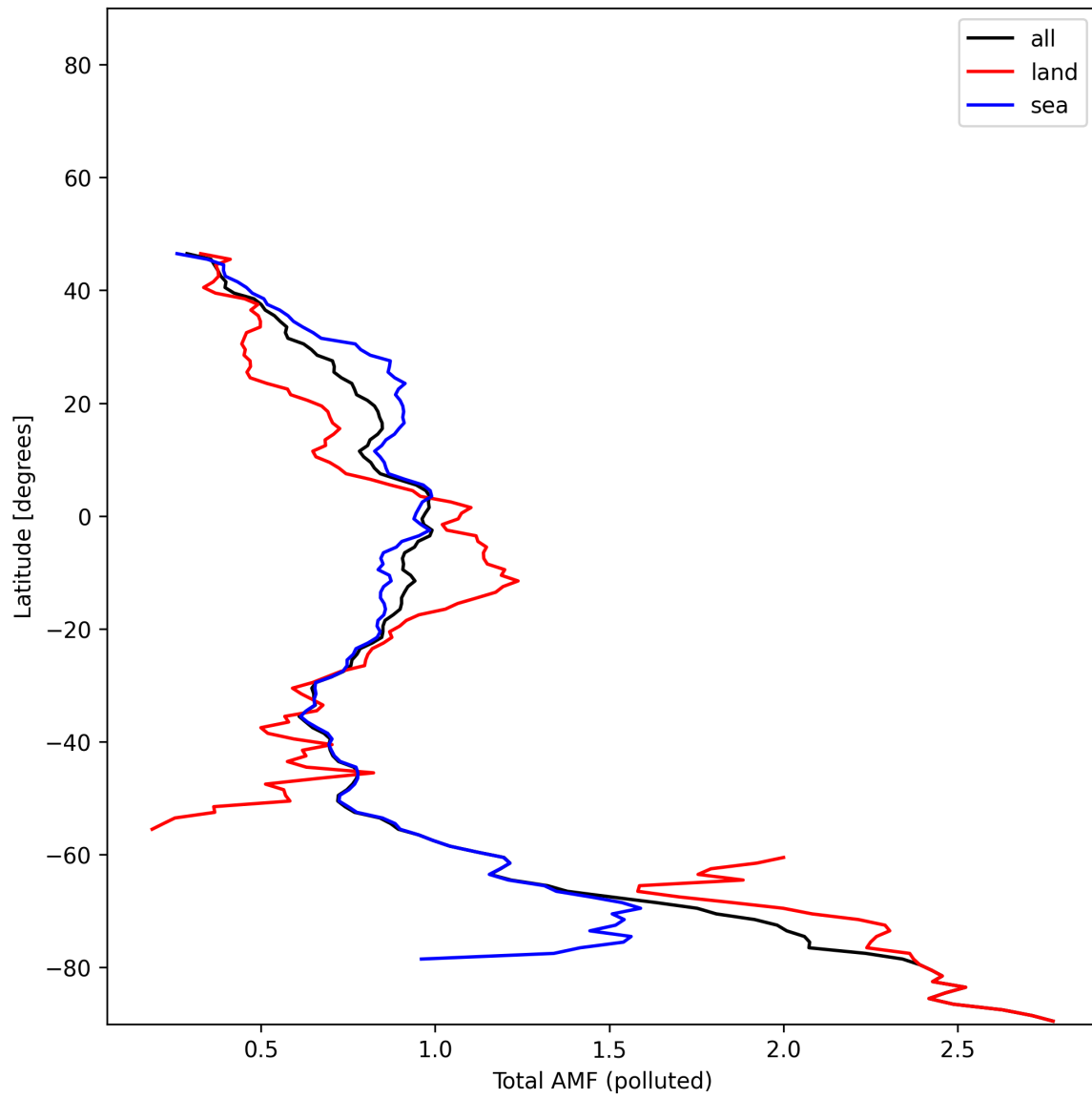


Figure 53: Zonal average of “Total AMF (polluted)” for 2024-12-16 to 2024-12-17.

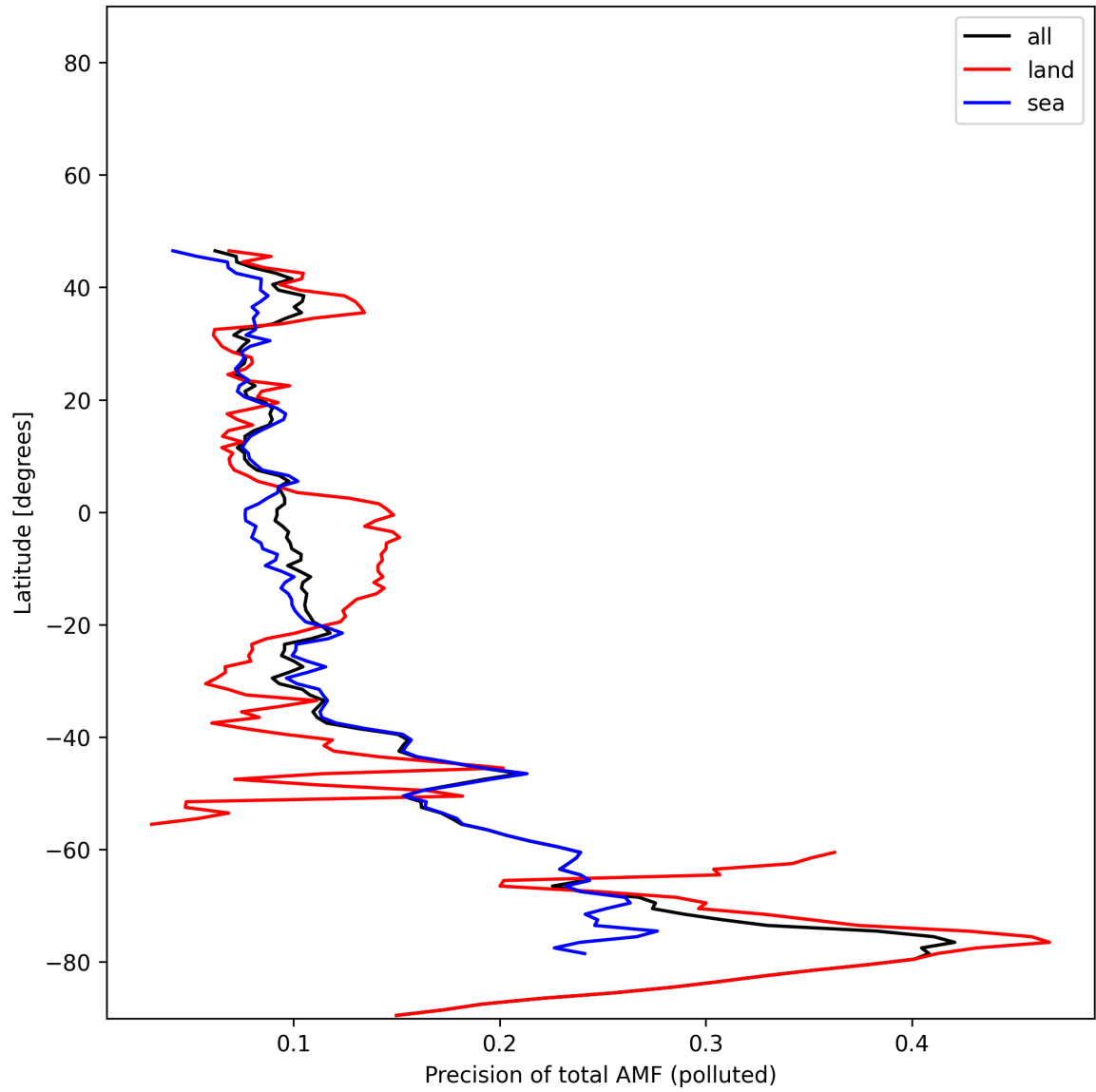


Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2024-12-16 to 2024-12-17.

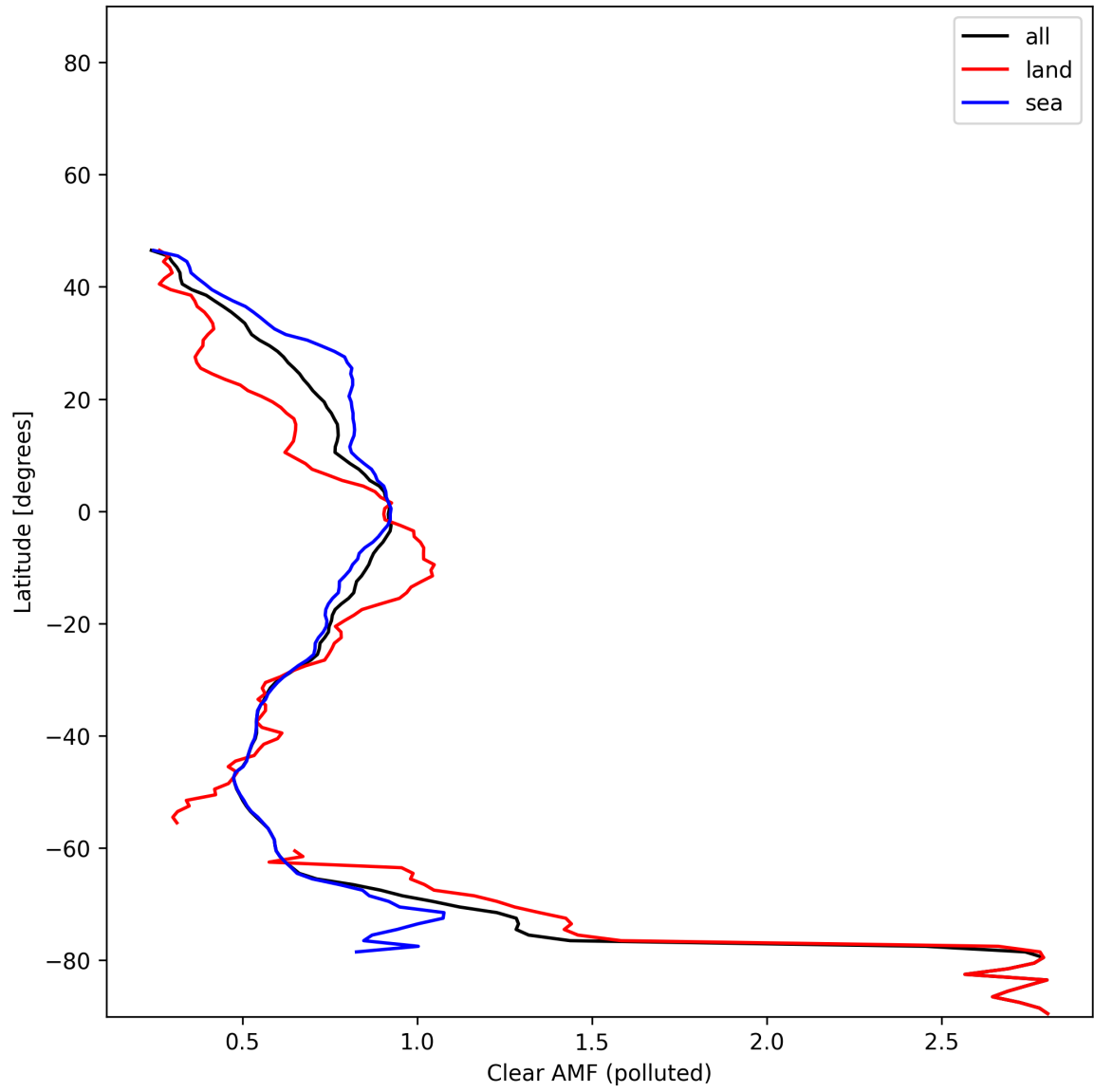


Figure 55: Zonal average of “Clear AMF (polluted)” for 2024-12-16 to 2024-12-17.

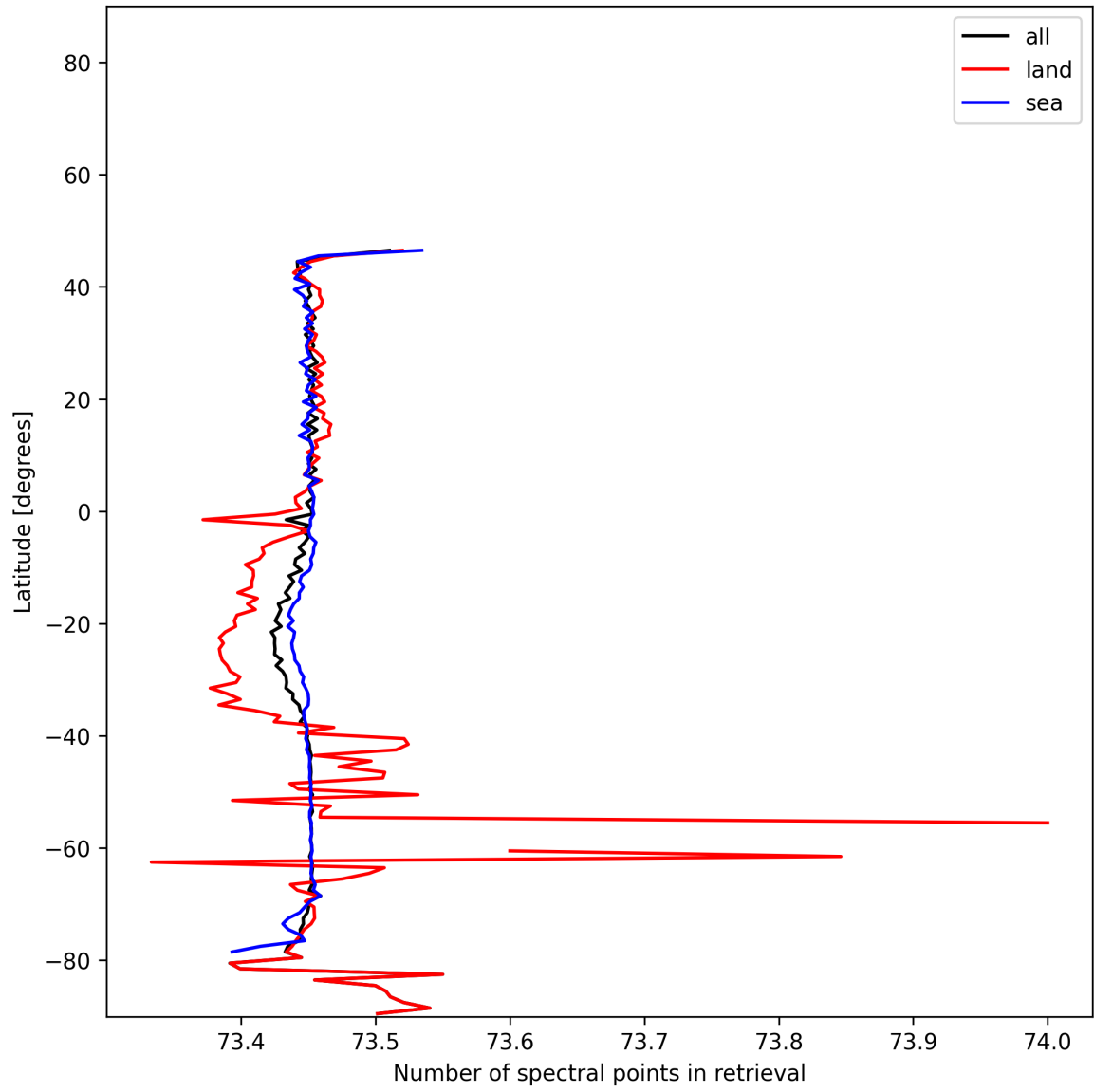


Figure 56: Zonal average of “Number of spectral points in retrieval” for 2024-12-16 to 2024-12-17.

8 Histograms

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

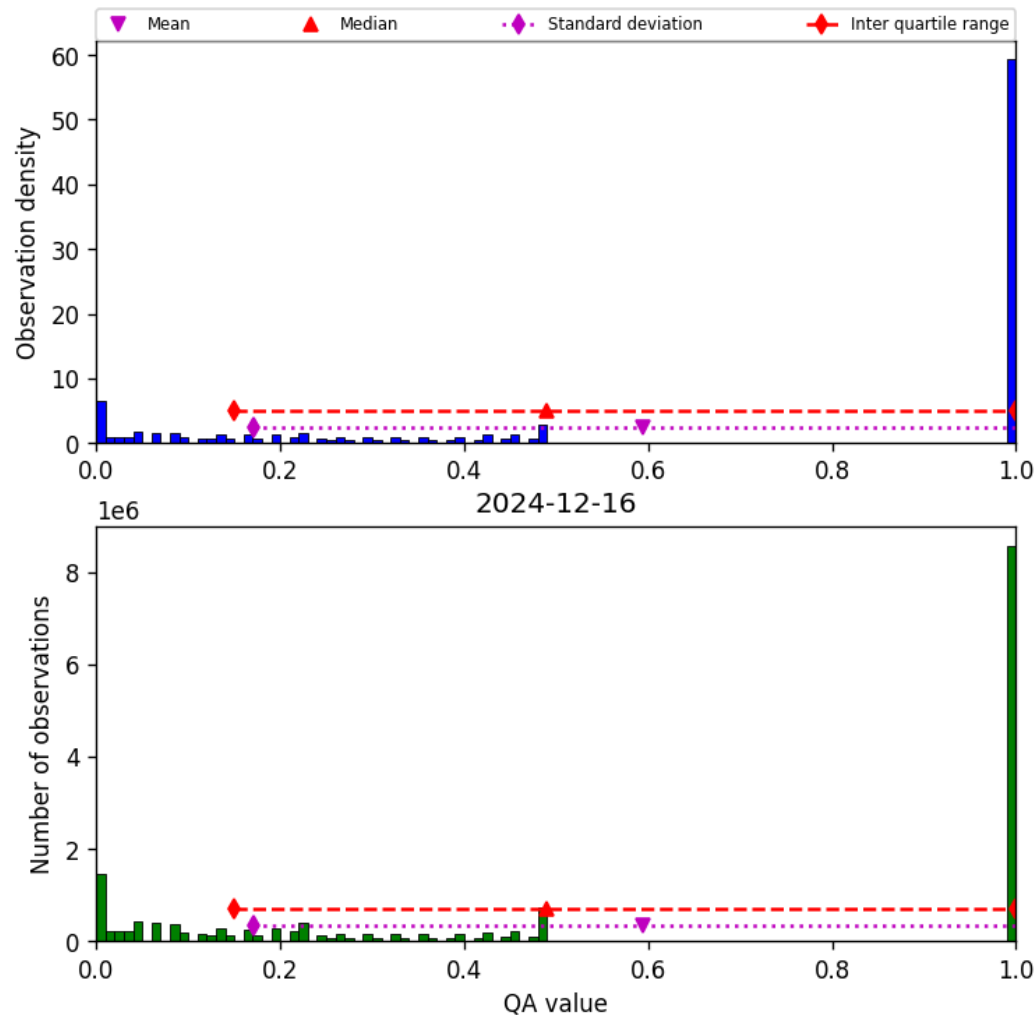


Figure 57: Histogram of “QA value” for 2024-12-16 to 2024-12-17

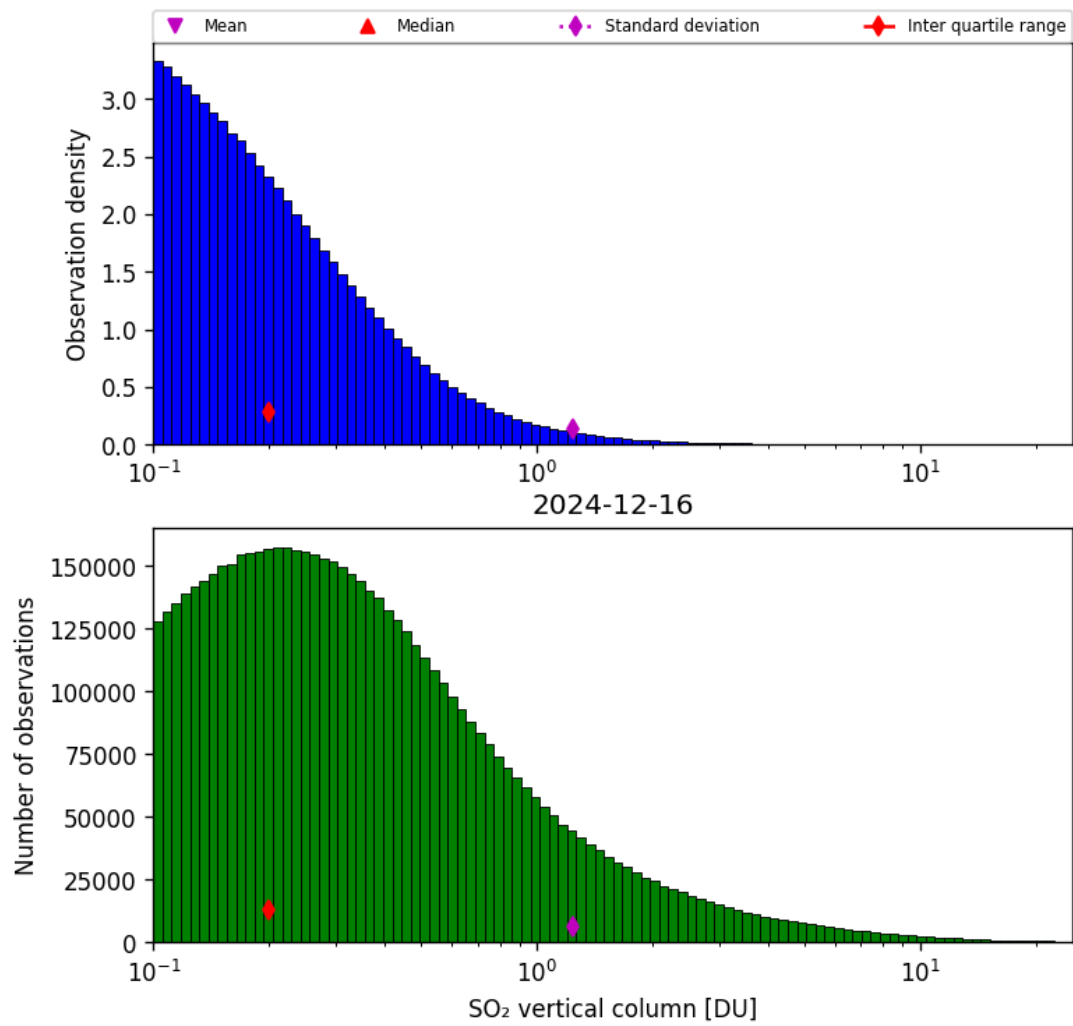


Figure 58: Histogram of “SO₂ vertical column” for 2024-12-16 to 2024-12-17

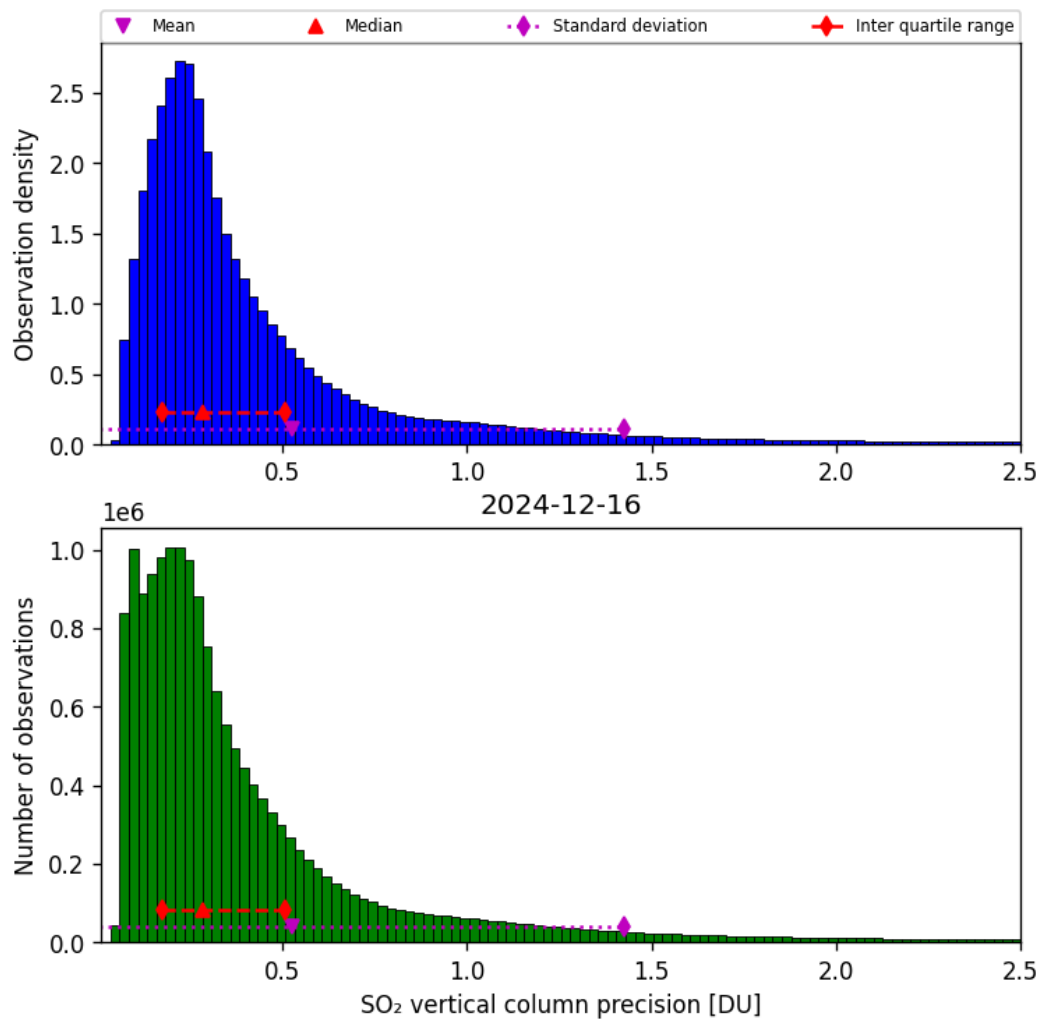


Figure 59: Histogram of “SO₂ vertical column precision” for 2024-12-16 to 2024-12-17

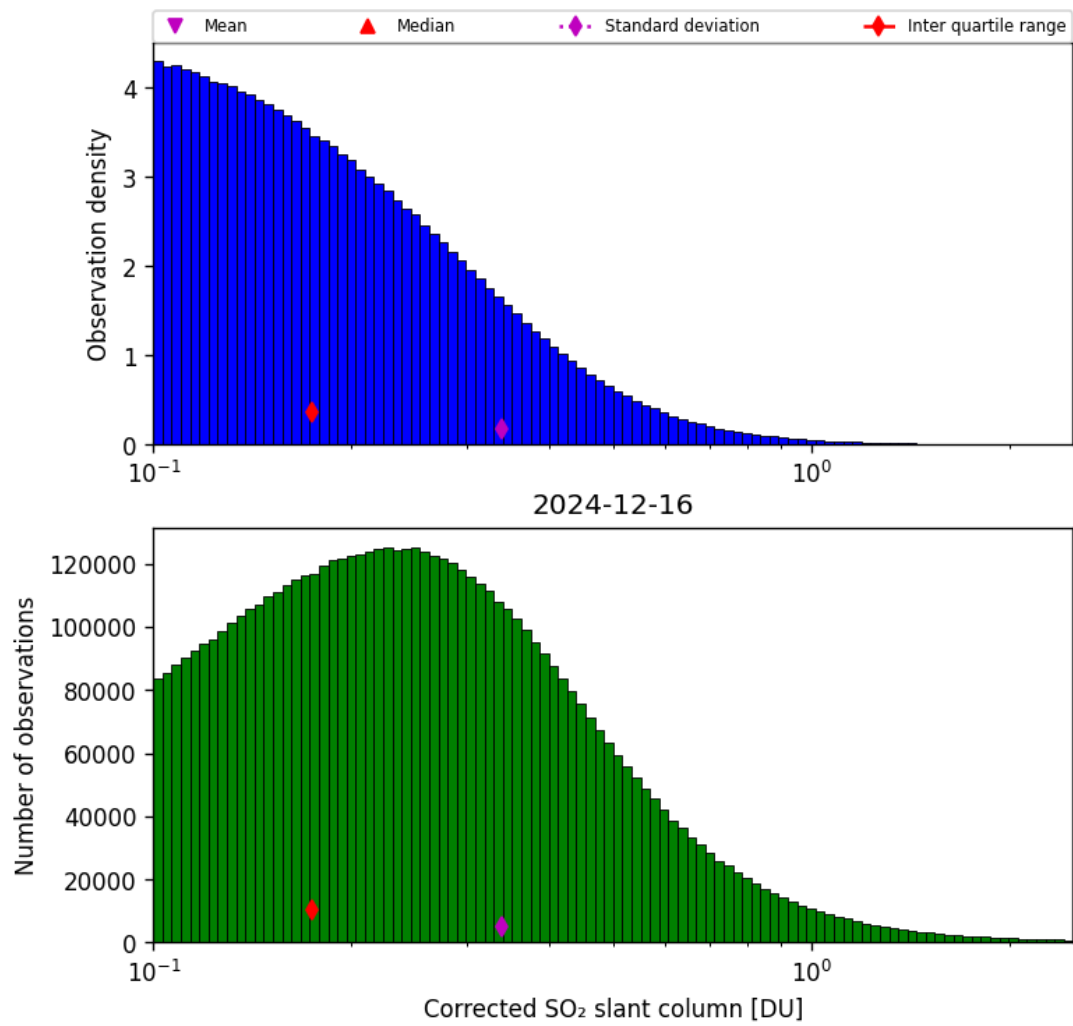


Figure 60: Histogram of “Corrected SO₂ slant column” for 2024-12-16 to 2024-12-17

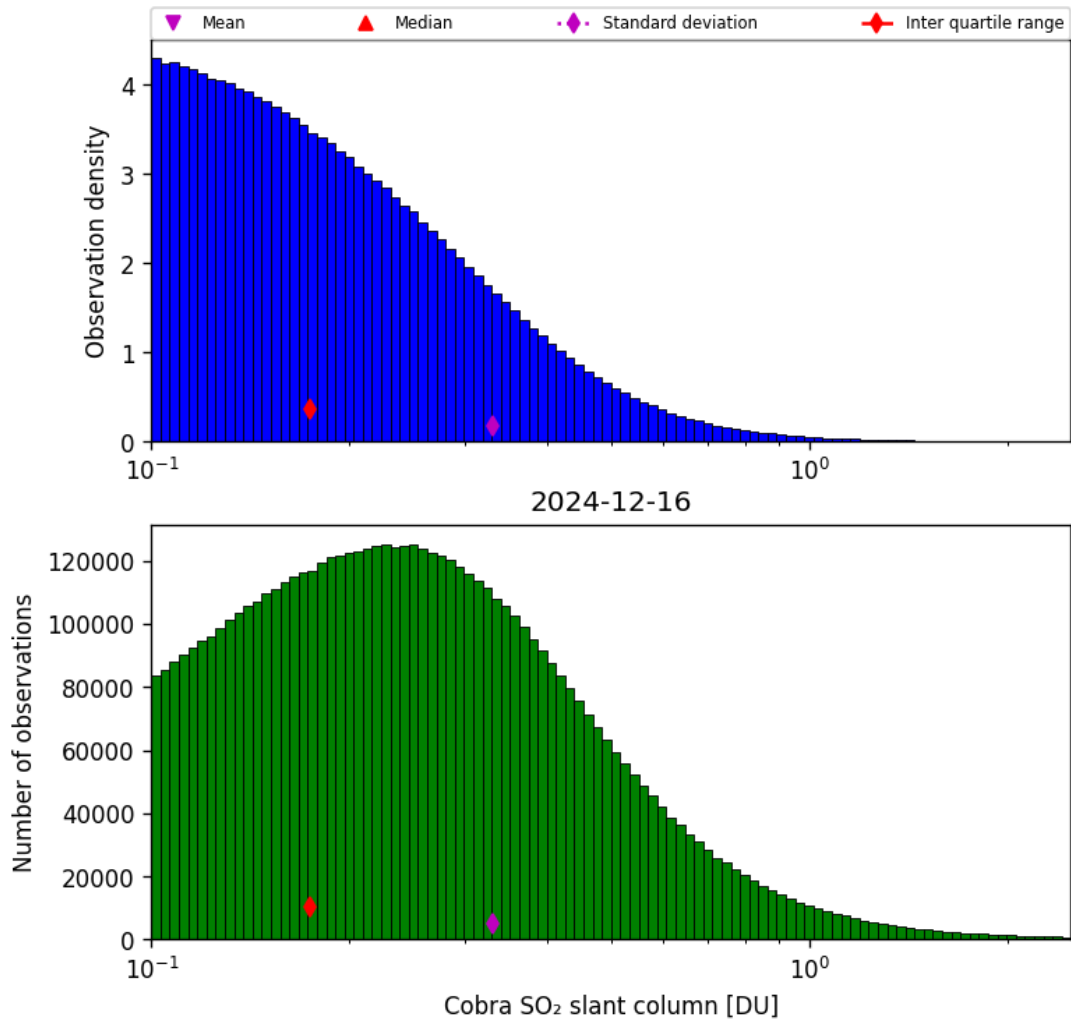


Figure 61: Histogram of “Cobra SO₂ slant column” for 2024-12-16 to 2024-12-17

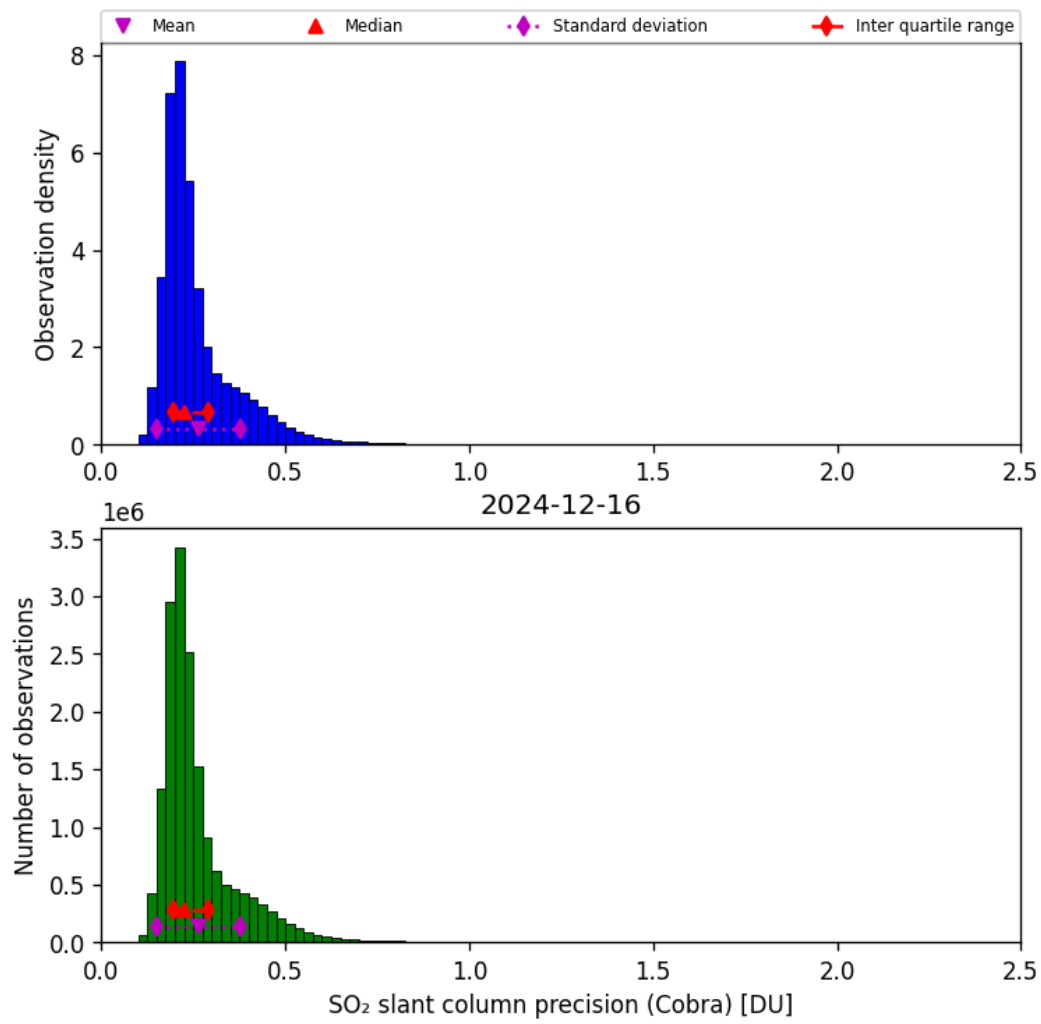


Figure 62: Histogram of “SO₂ slant column precision (Cobra)” for 2024-12-16 to 2024-12-17

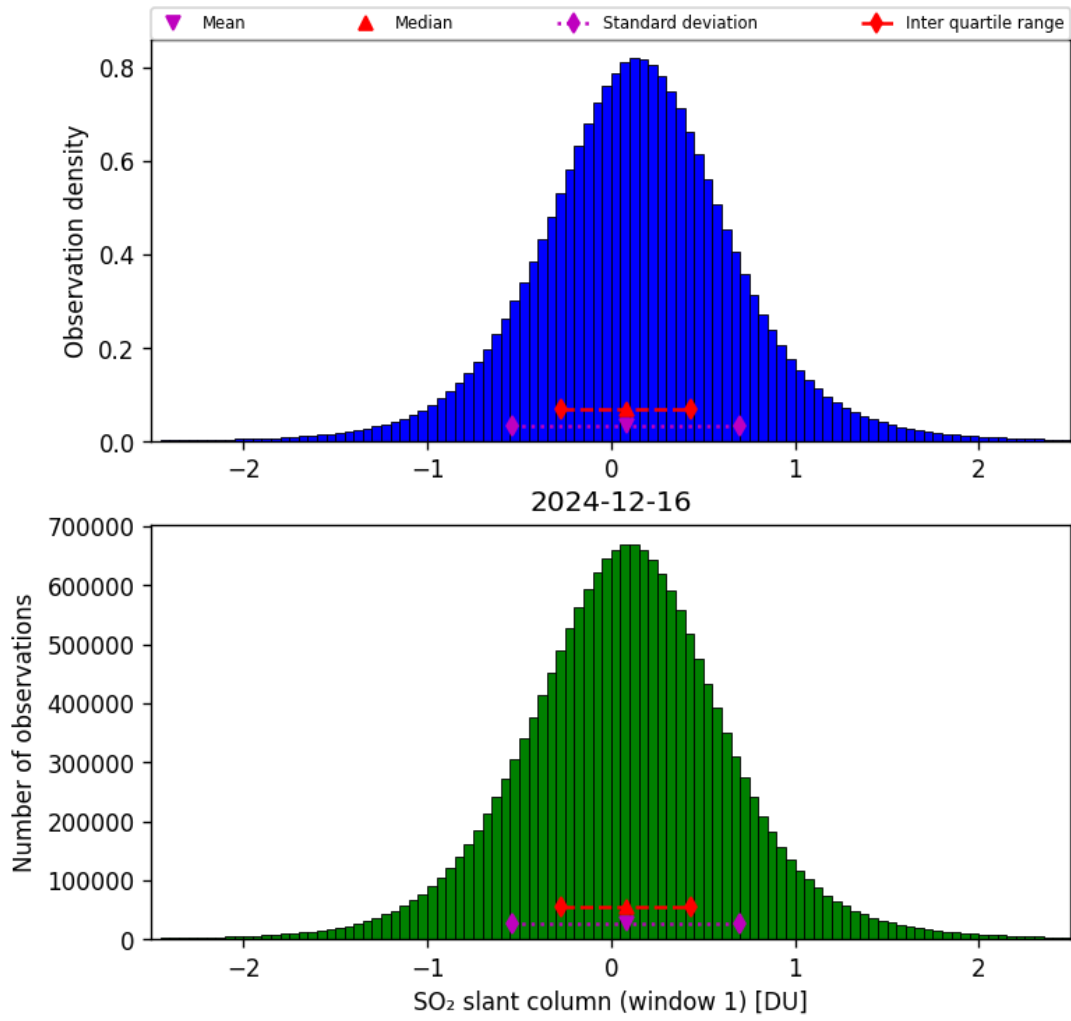


Figure 63: Histogram of “SO₂ slant column (window 1)” for 2024-12-16 to 2024-12-17

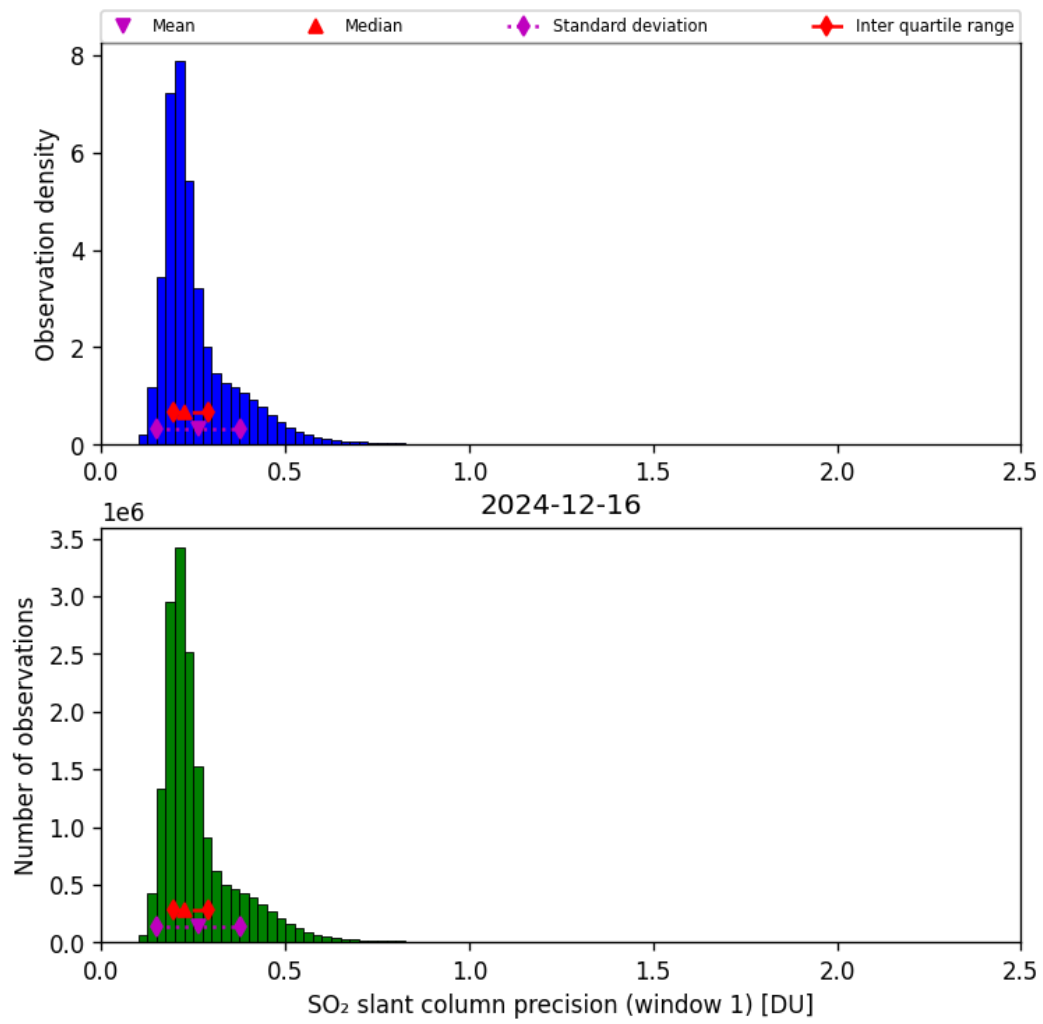


Figure 64: Histogram of “SO₂ slant column precision (window 1)” for 2024-12-16 to 2024-12-17

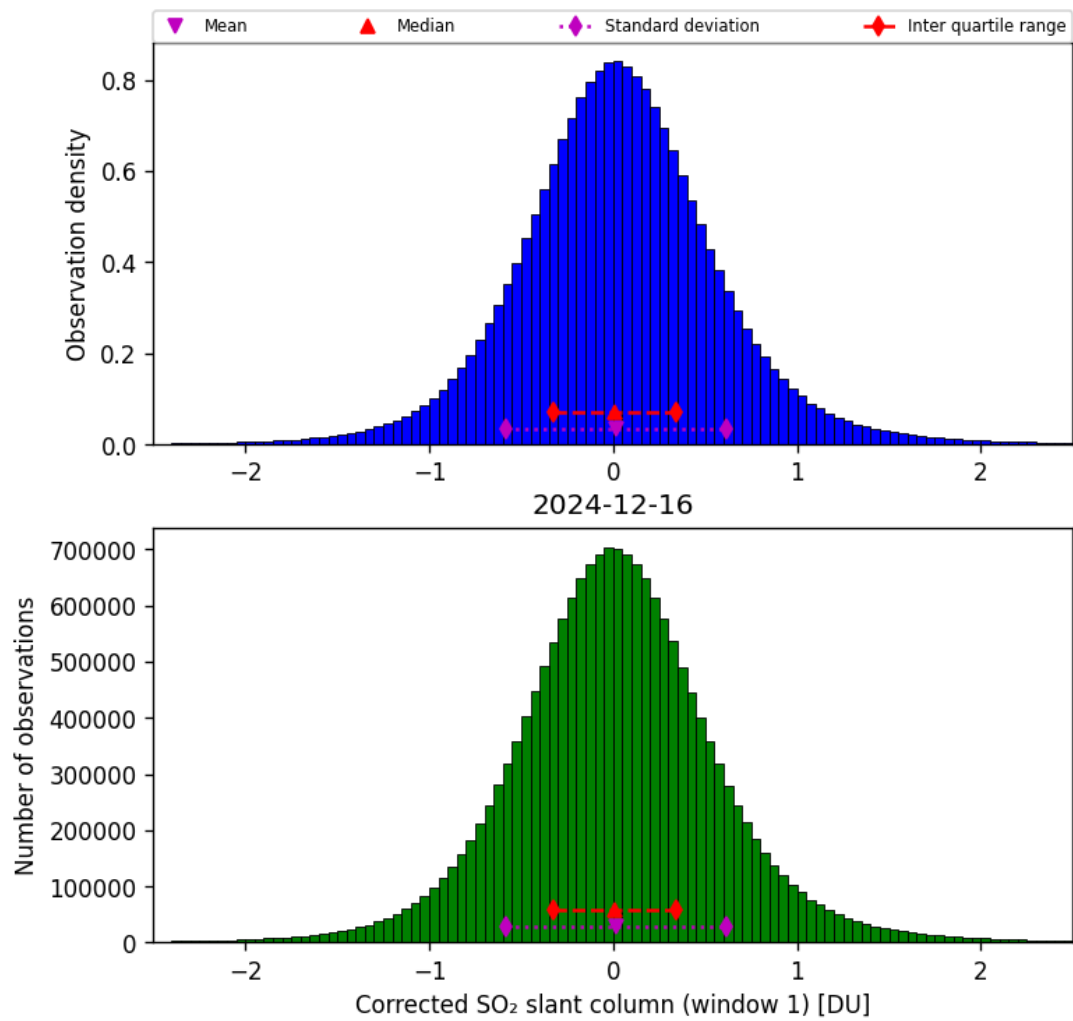


Figure 65: Histogram of “Corrected SO₂ slant column (window 1)” for 2024-12-16 to 2024-12-17

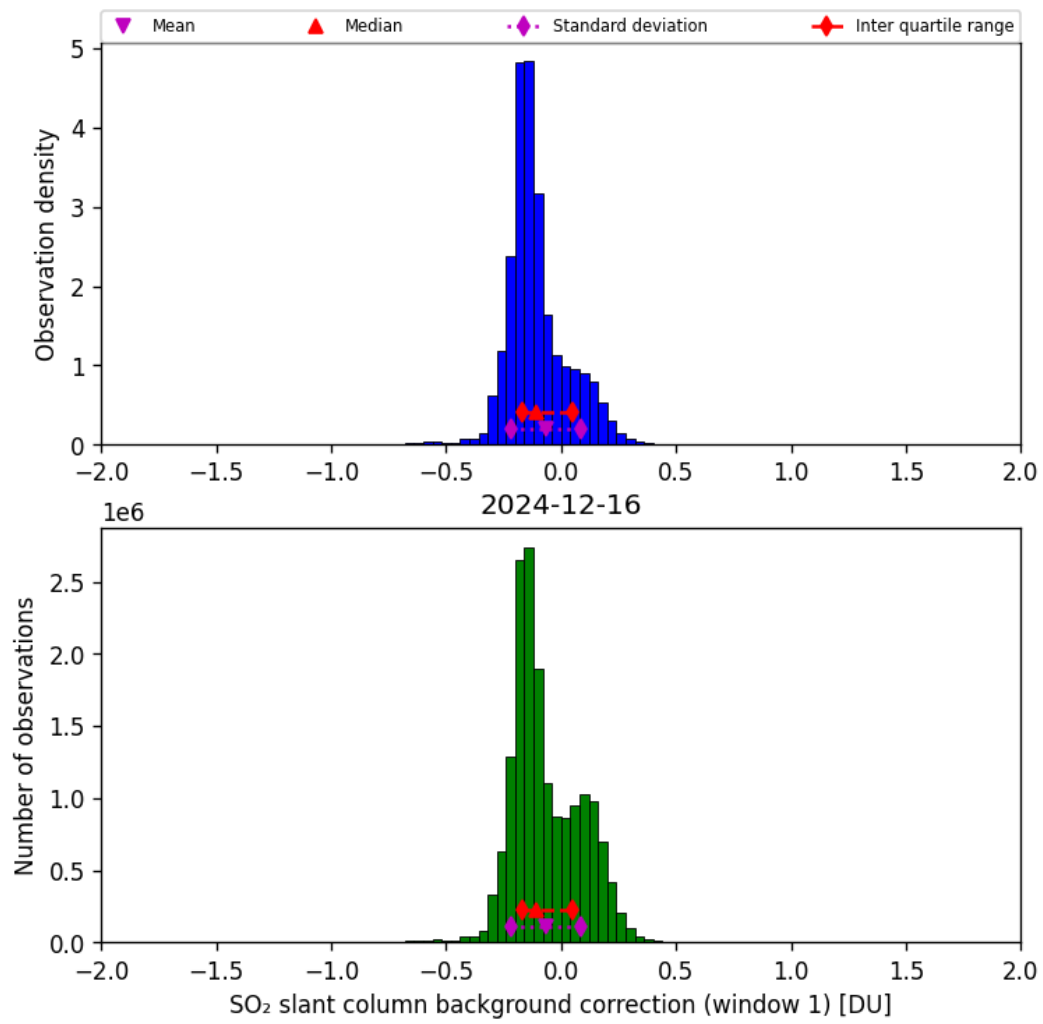


Figure 66: Histogram of “SO₂ slant column background correction (window 1)” for 2024-12-16 to 2024-12-17

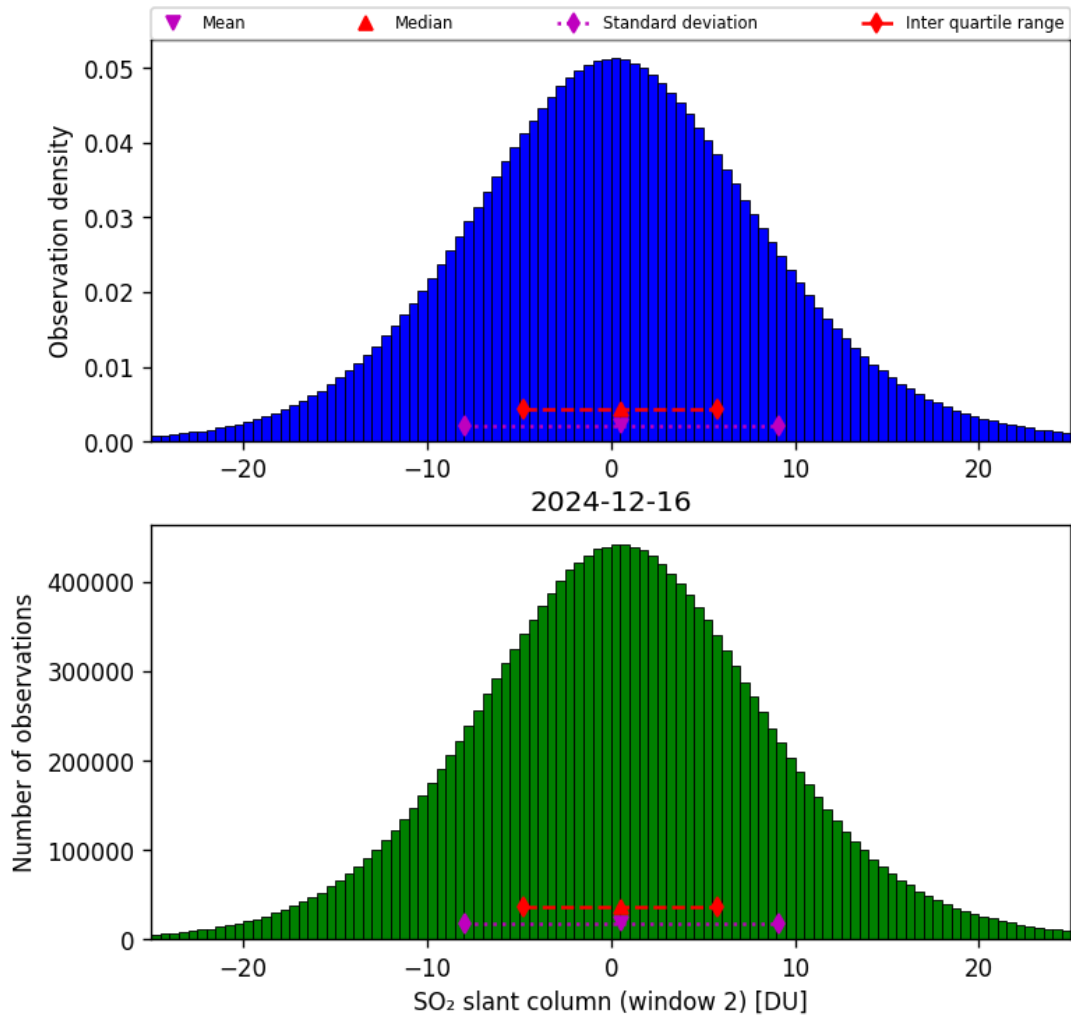


Figure 67: Histogram of “SO₂ slant column (window 2)” for 2024-12-16 to 2024-12-17

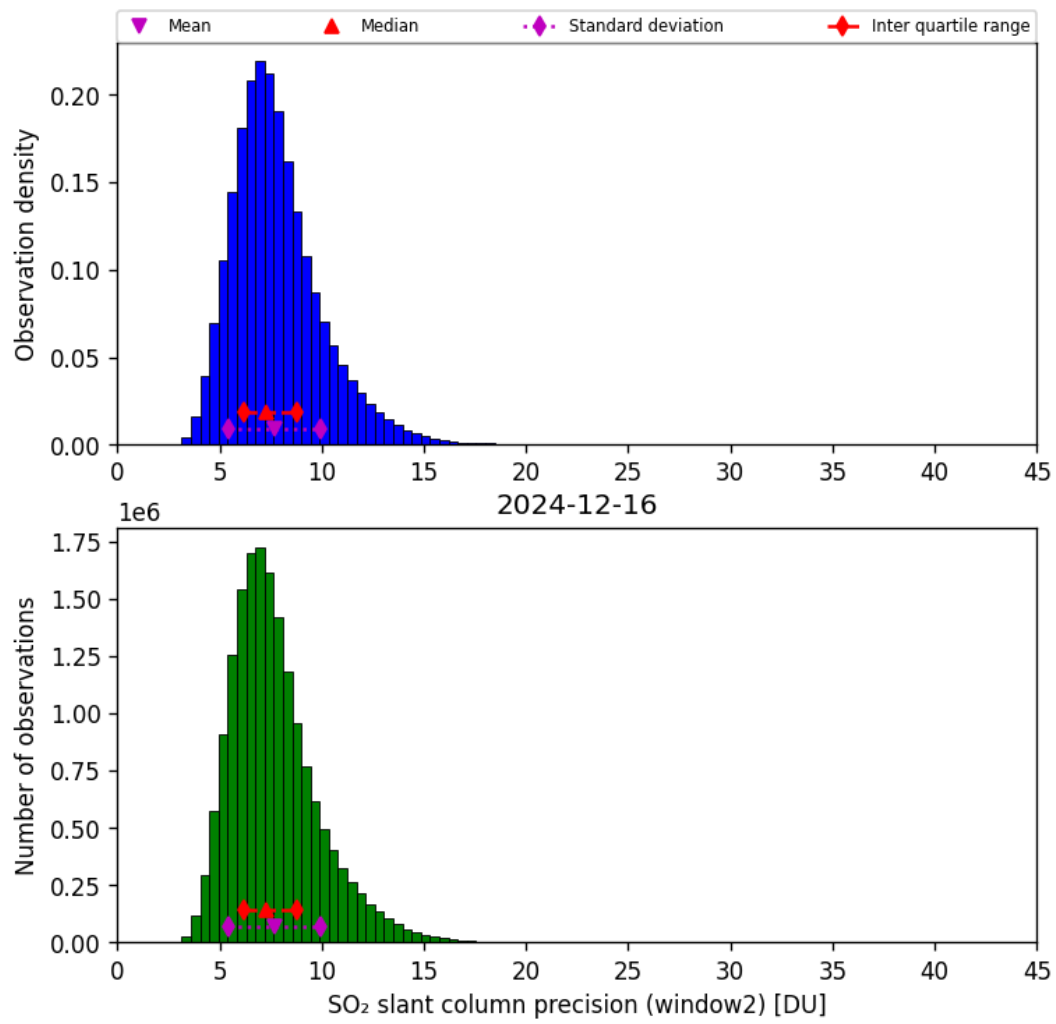


Figure 68: Histogram of “SO₂ slant column precision (window2)” for 2024-12-16 to 2024-12-17

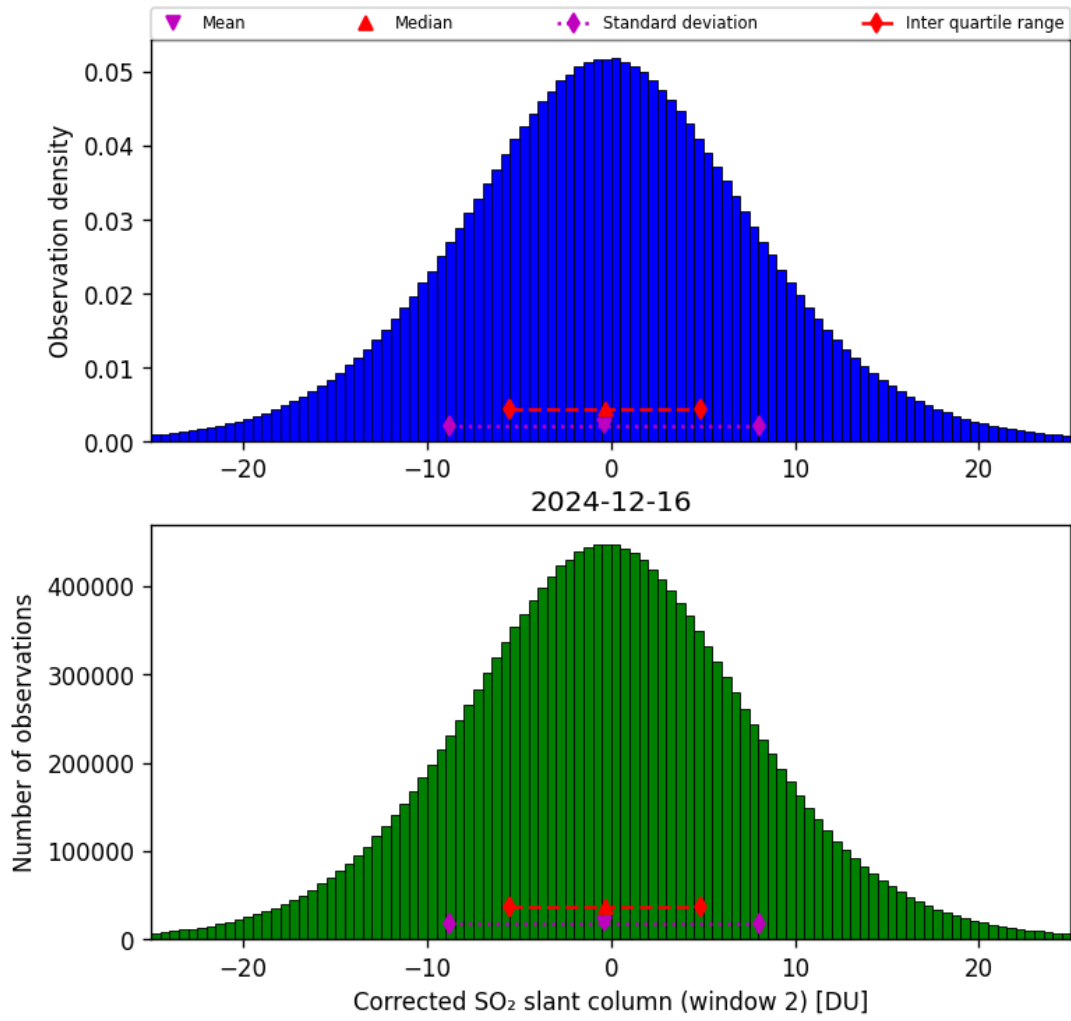


Figure 69: Histogram of “Corrected SO₂ slant column (window 2)” for 2024-12-16 to 2024-12-17

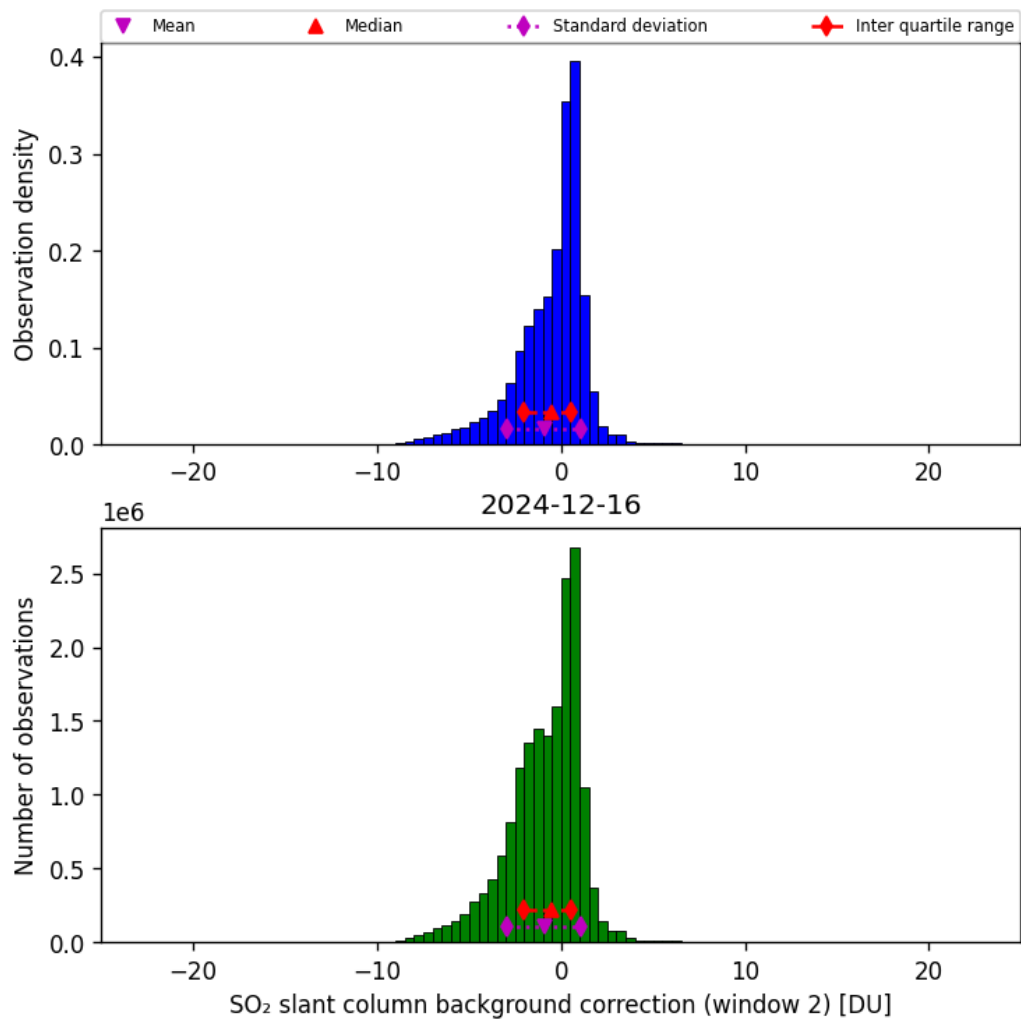


Figure 70: Histogram of “SO₂ slant column background correction (window 2)” for 2024-12-16 to 2024-12-17

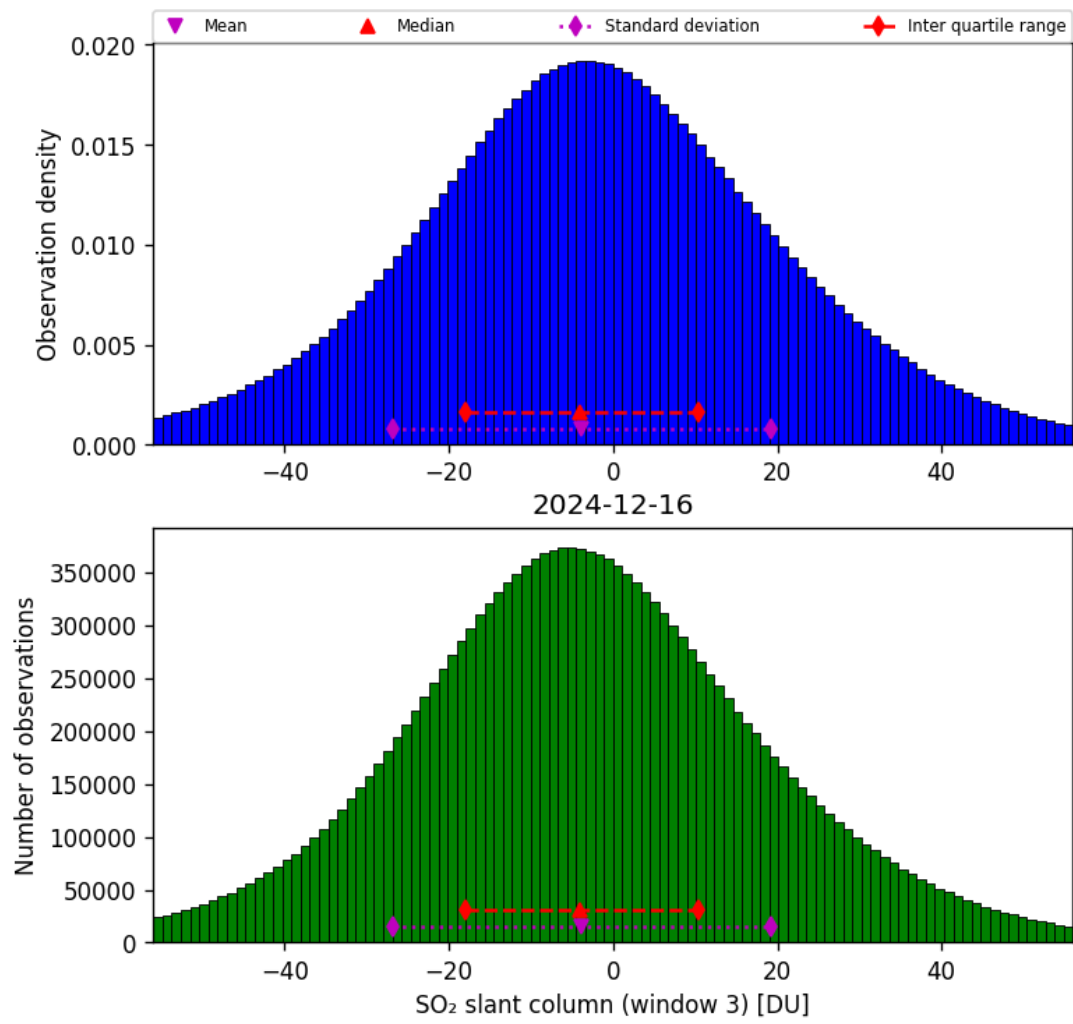


Figure 71: Histogram of “SO₂ slant column (window 3)” for 2024-12-16 to 2024-12-17

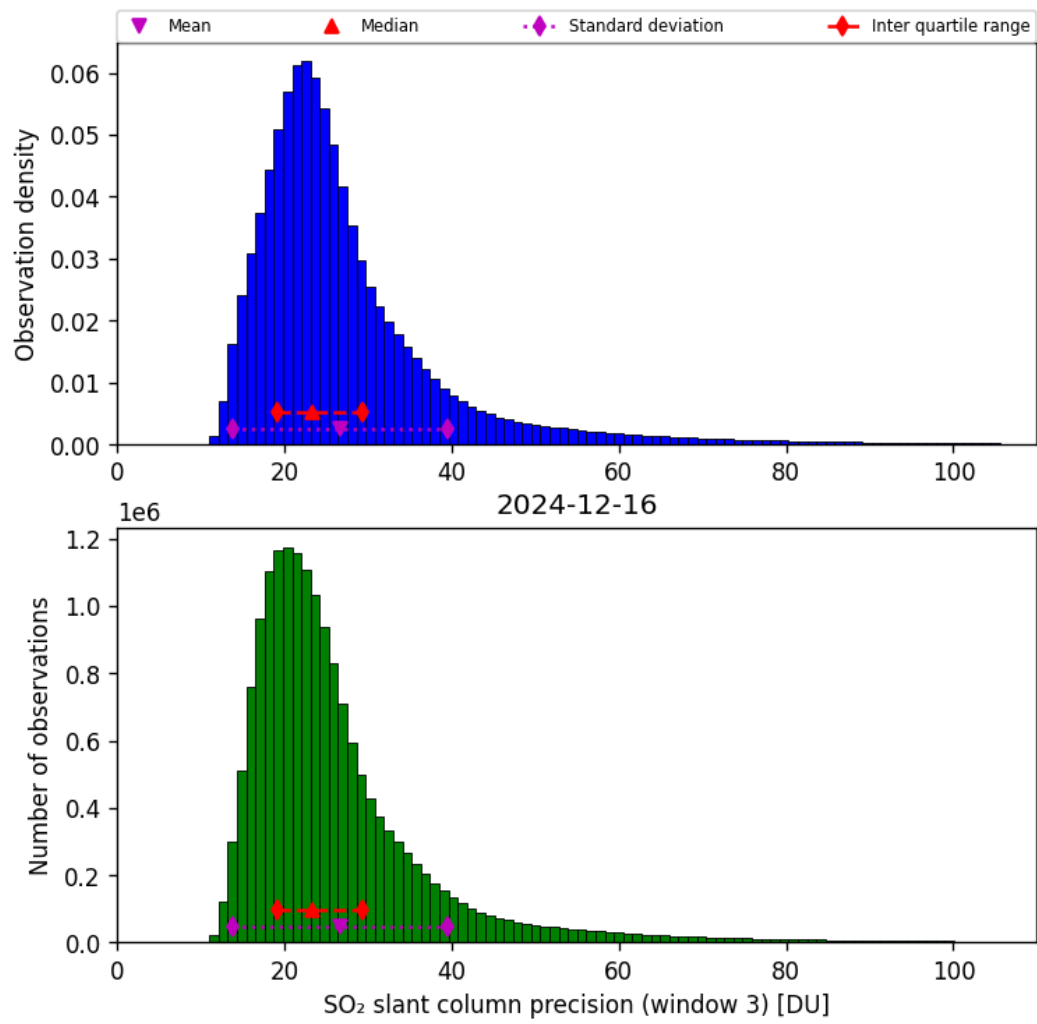


Figure 72: Histogram of “SO₂ slant column precision (window 3)” for 2024-12-16 to 2024-12-17

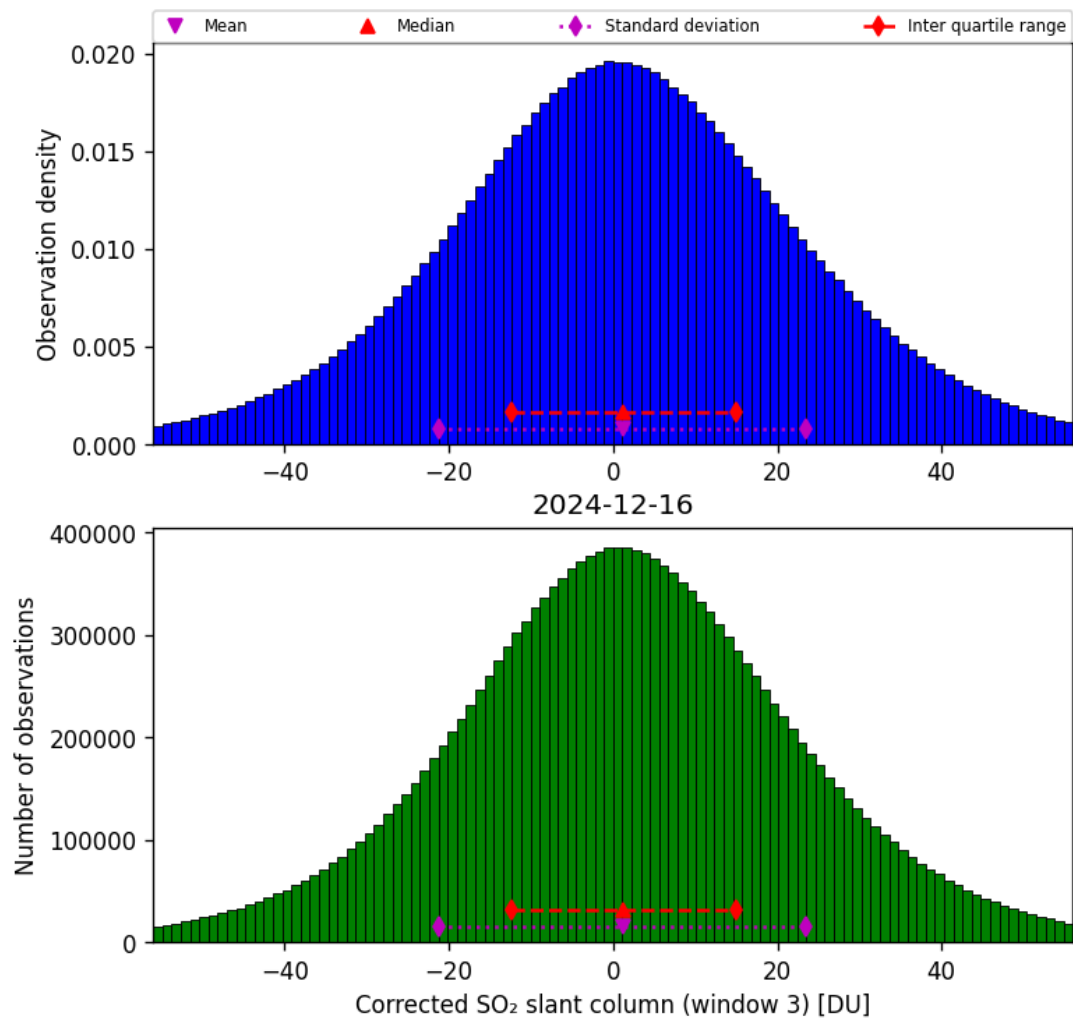


Figure 73: Histogram of “Corrected SO₂ slant column (window 3)” for 2024-12-16 to 2024-12-17

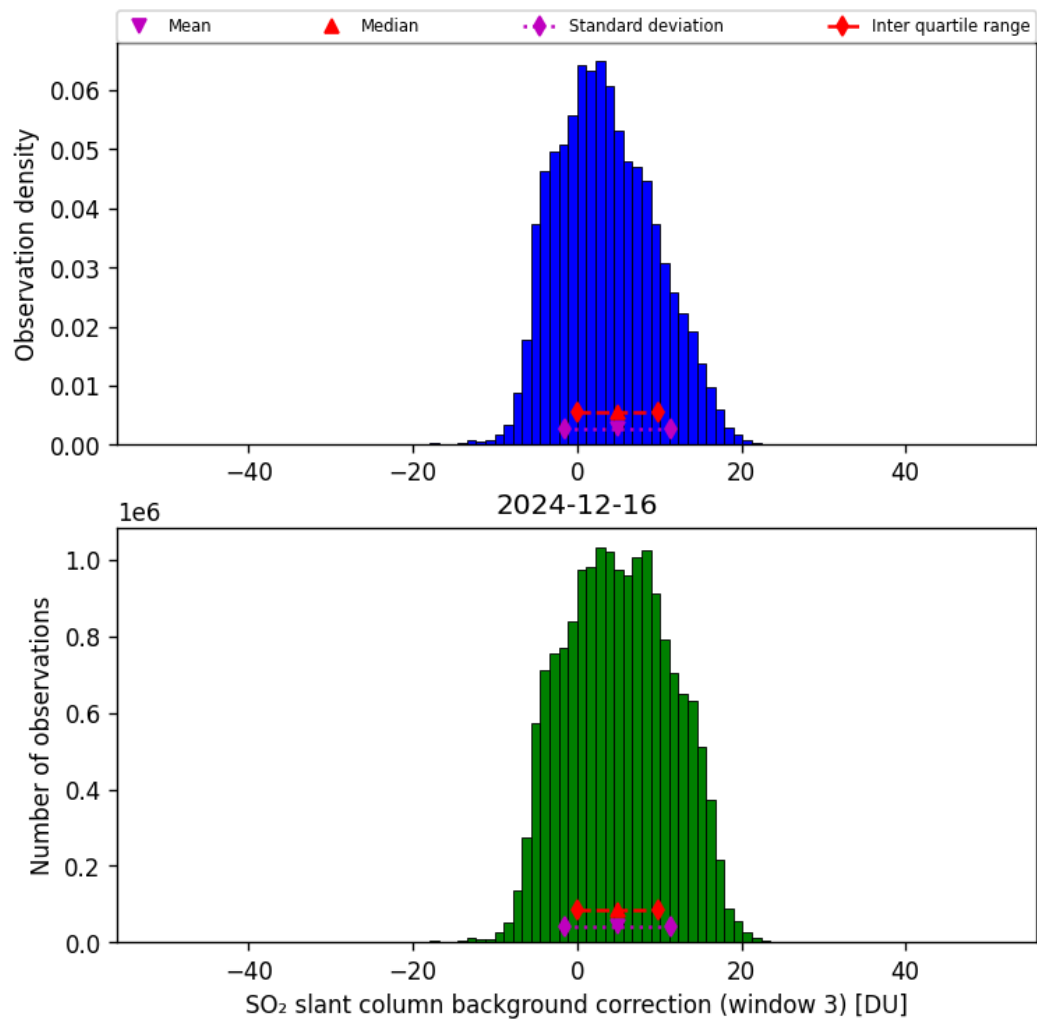


Figure 74: Histogram of “SO₂ slant column background correction (window 3)” for 2024-12-16 to 2024-12-17

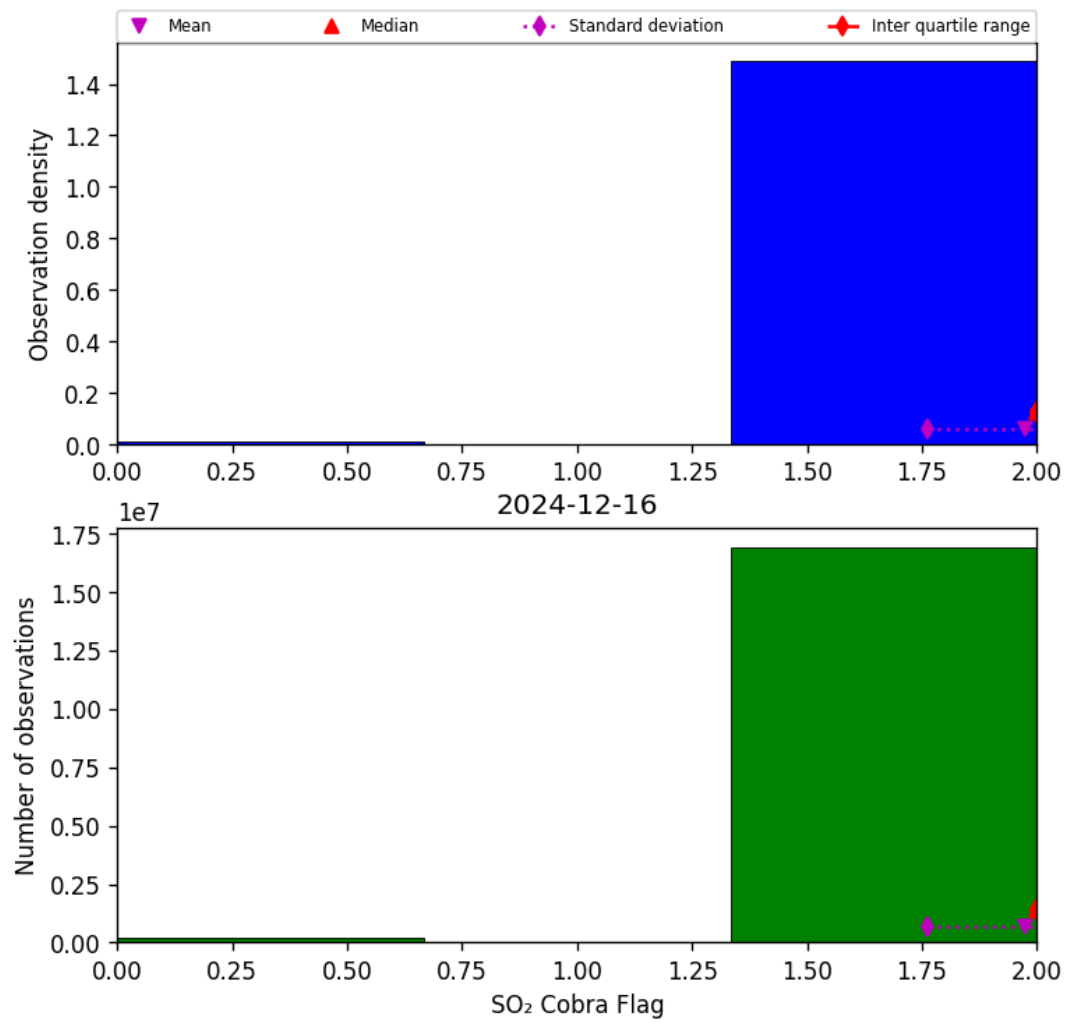


Figure 75: Histogram of “SO₂ Cobra Flag” for 2024-12-16 to 2024-12-17

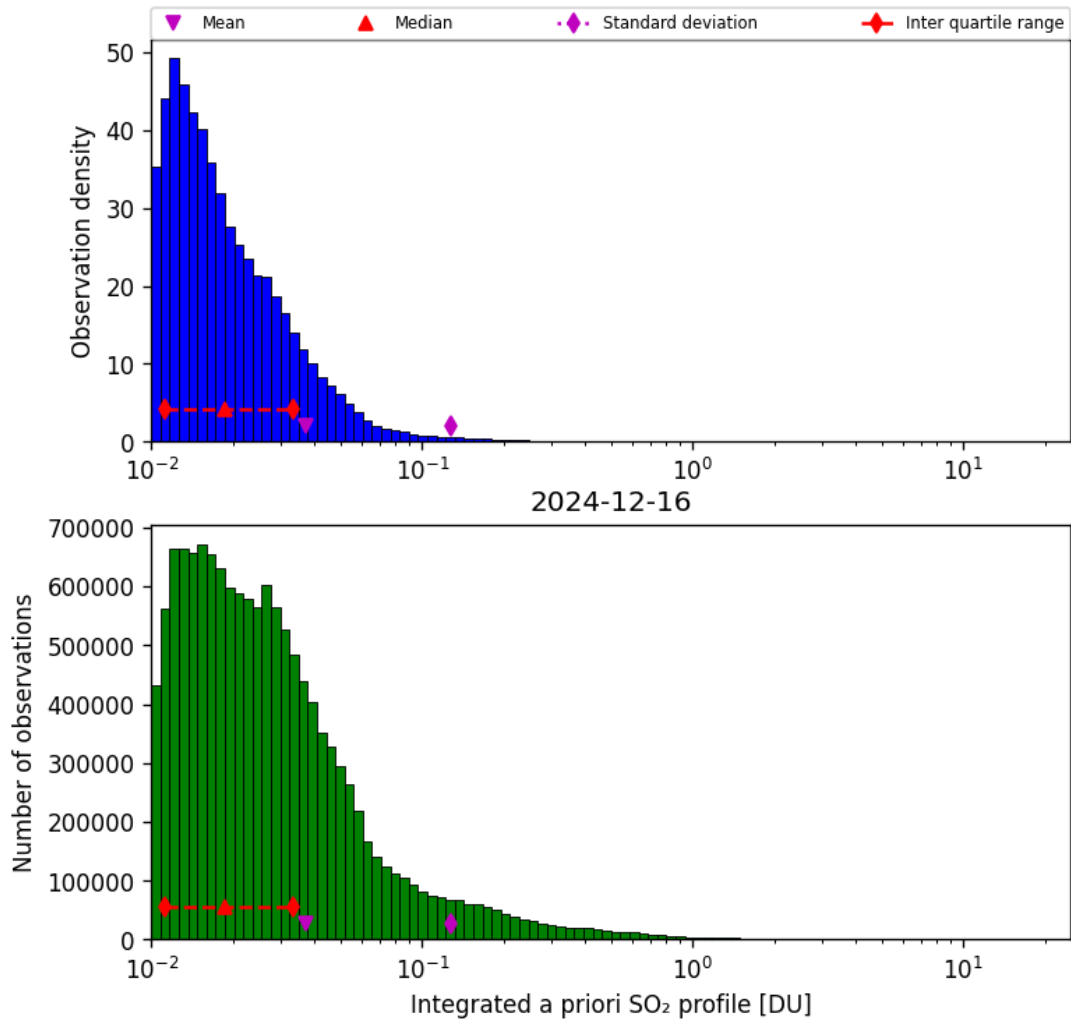


Figure 76: Histogram of “Integrated a priori SO₂ profile” for 2024-12-16 to 2024-12-17

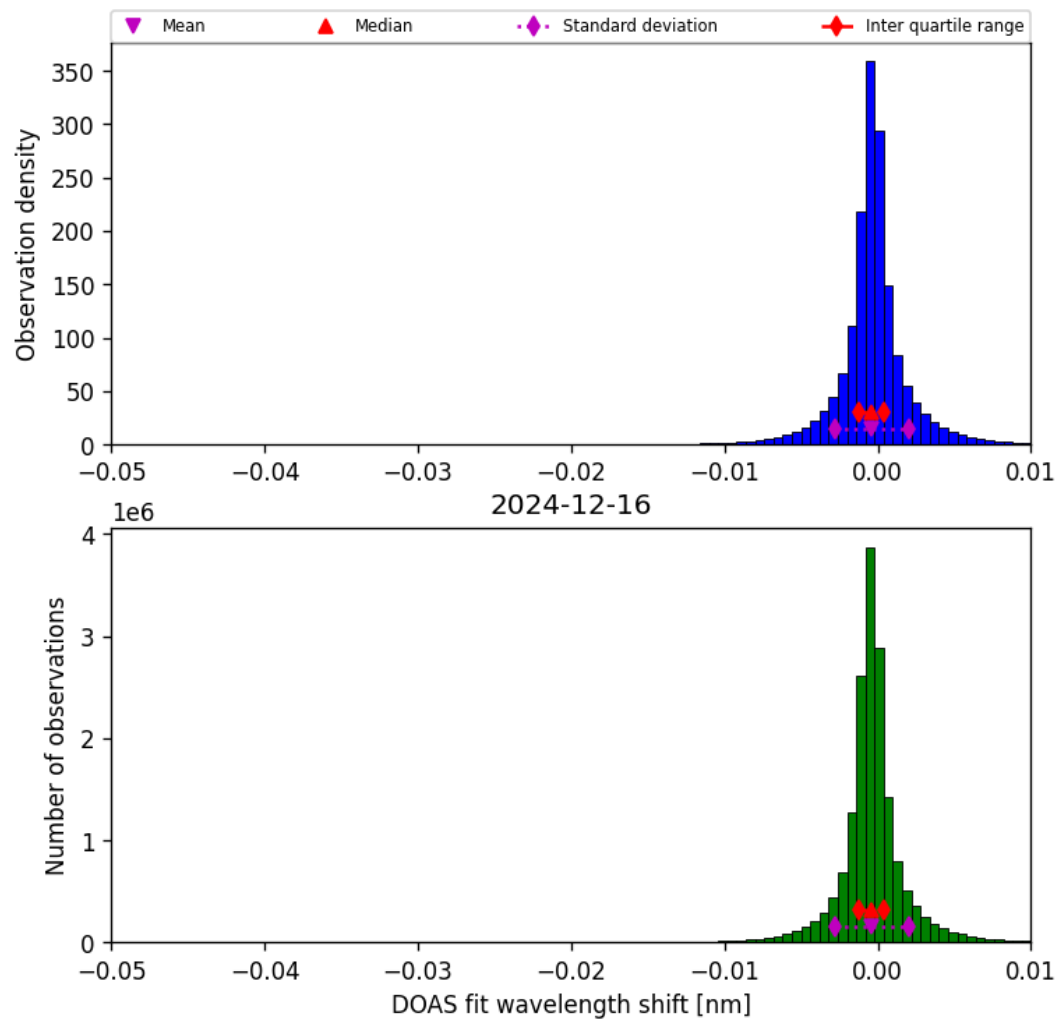


Figure 77: Histogram of “DOAS fit wavelength shift” for 2024-12-16 to 2024-12-17

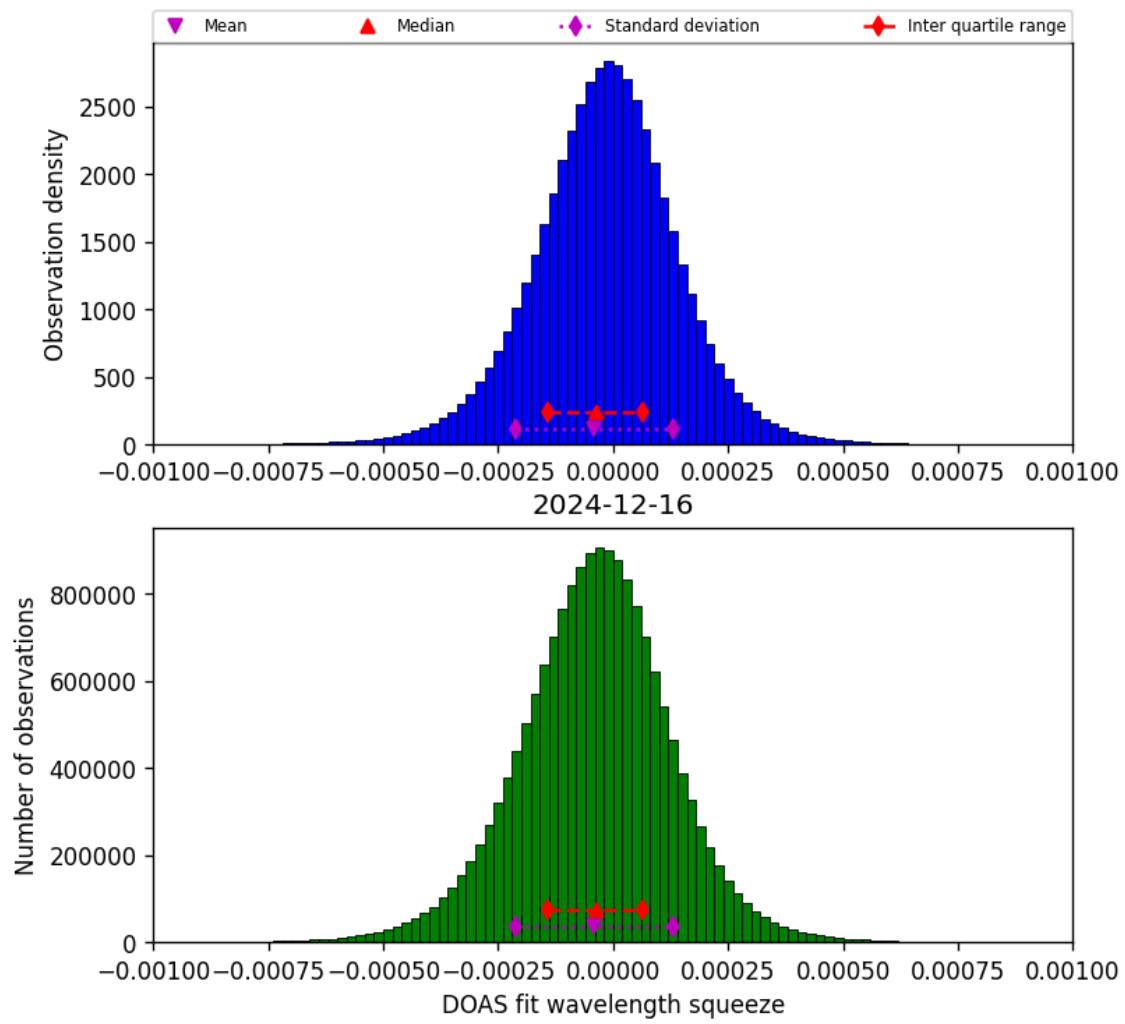


Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2024-12-16 to 2024-12-17

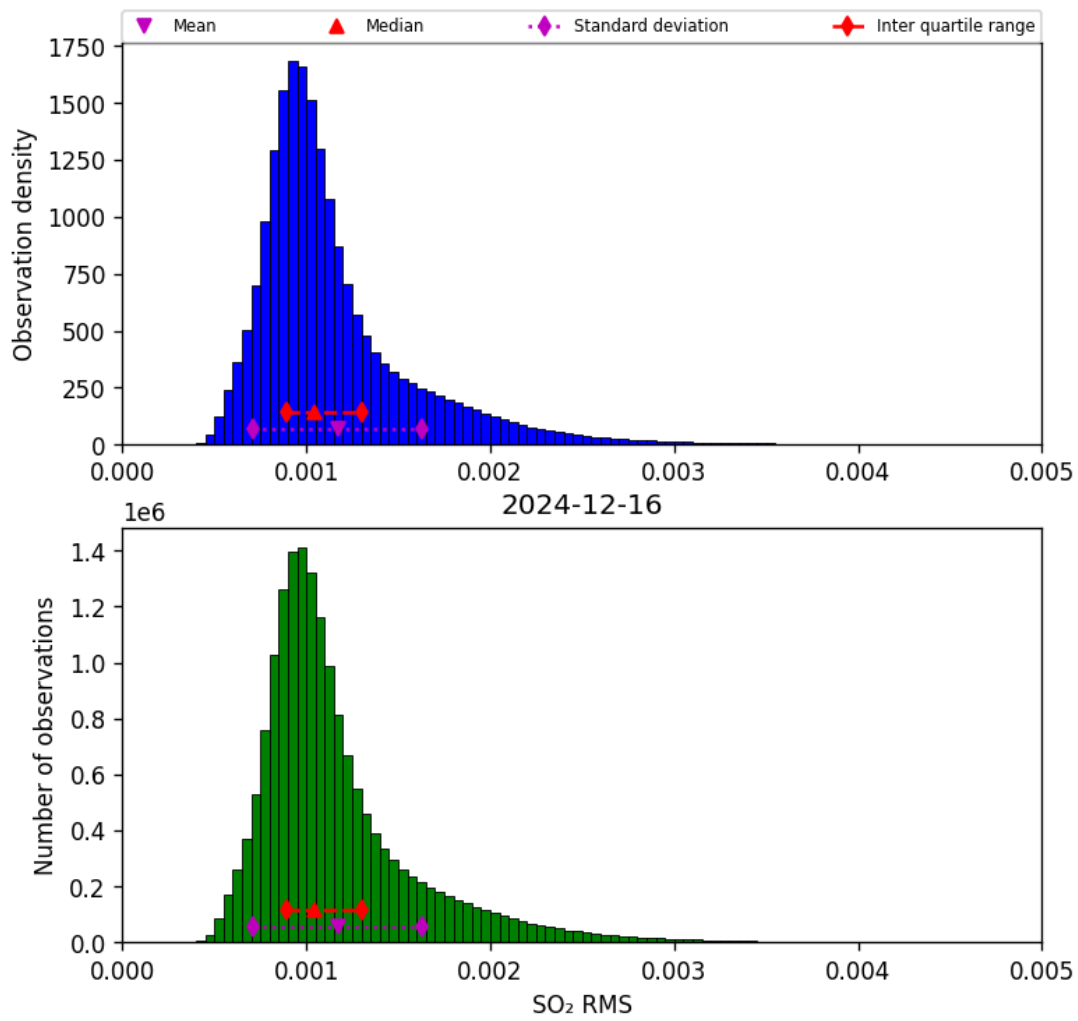


Figure 79: Histogram of “SO₂ RMS” for 2024-12-16 to 2024-12-17

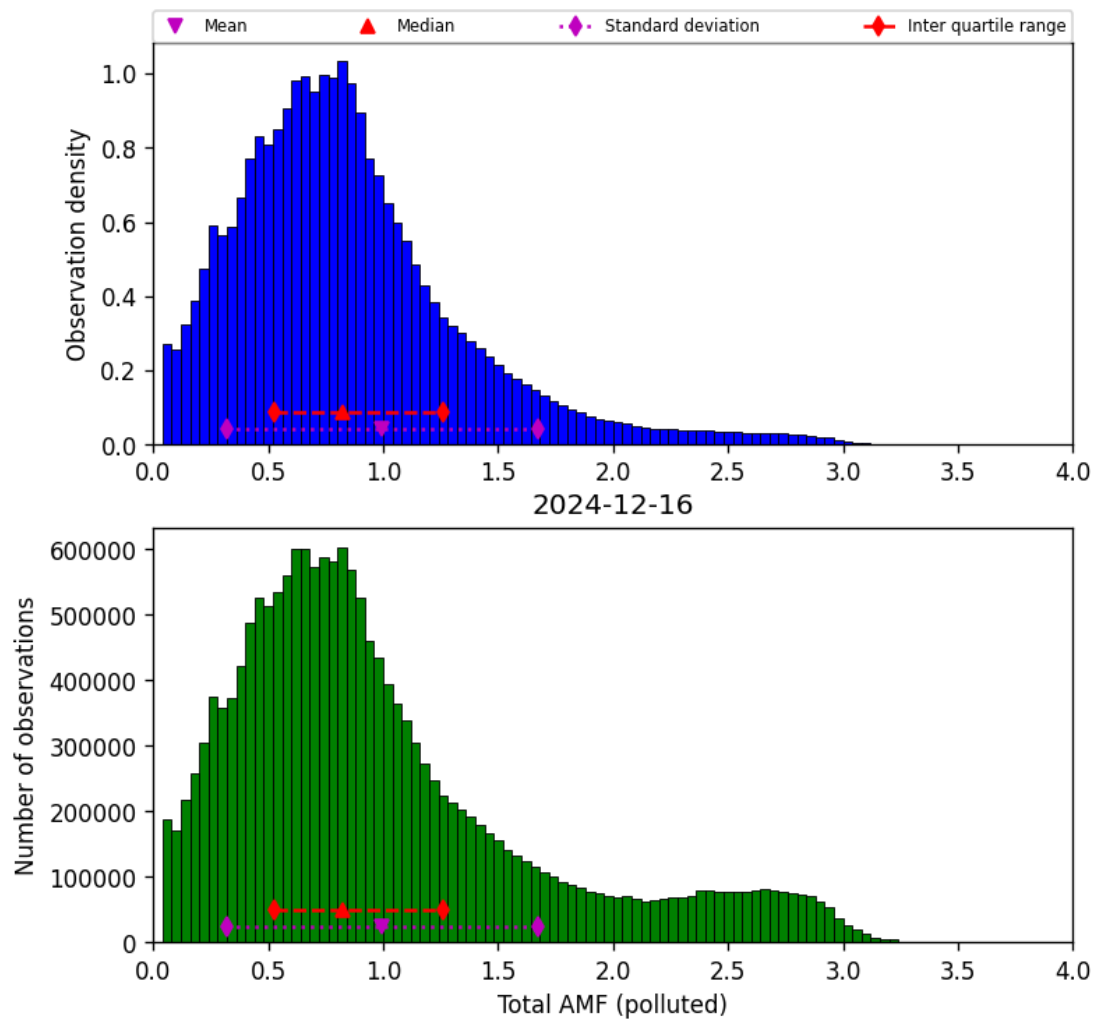


Figure 80: Histogram of “Total AMF (polluted)” for 2024-12-16 to 2024-12-17

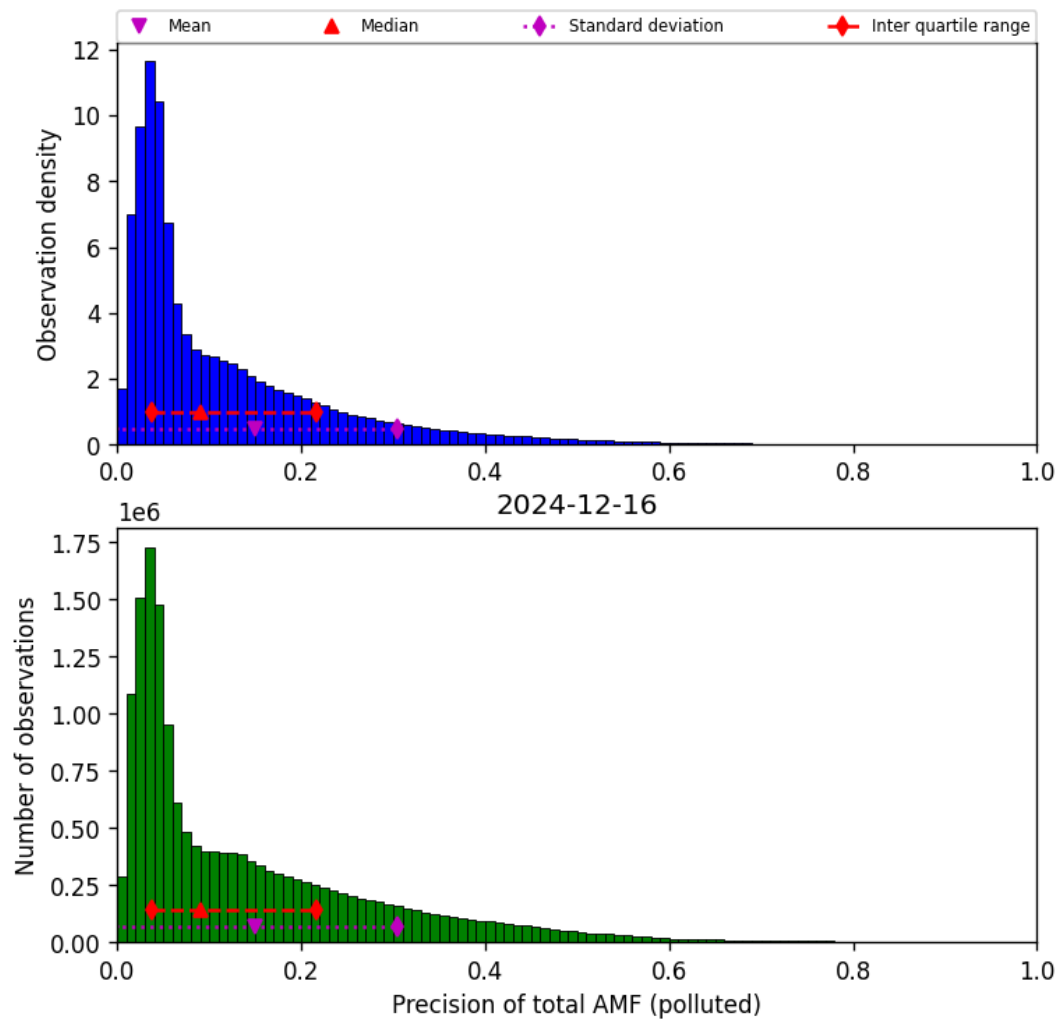


Figure 81: Histogram of “Precision of total AMF (polluted)” for 2024-12-16 to 2024-12-17

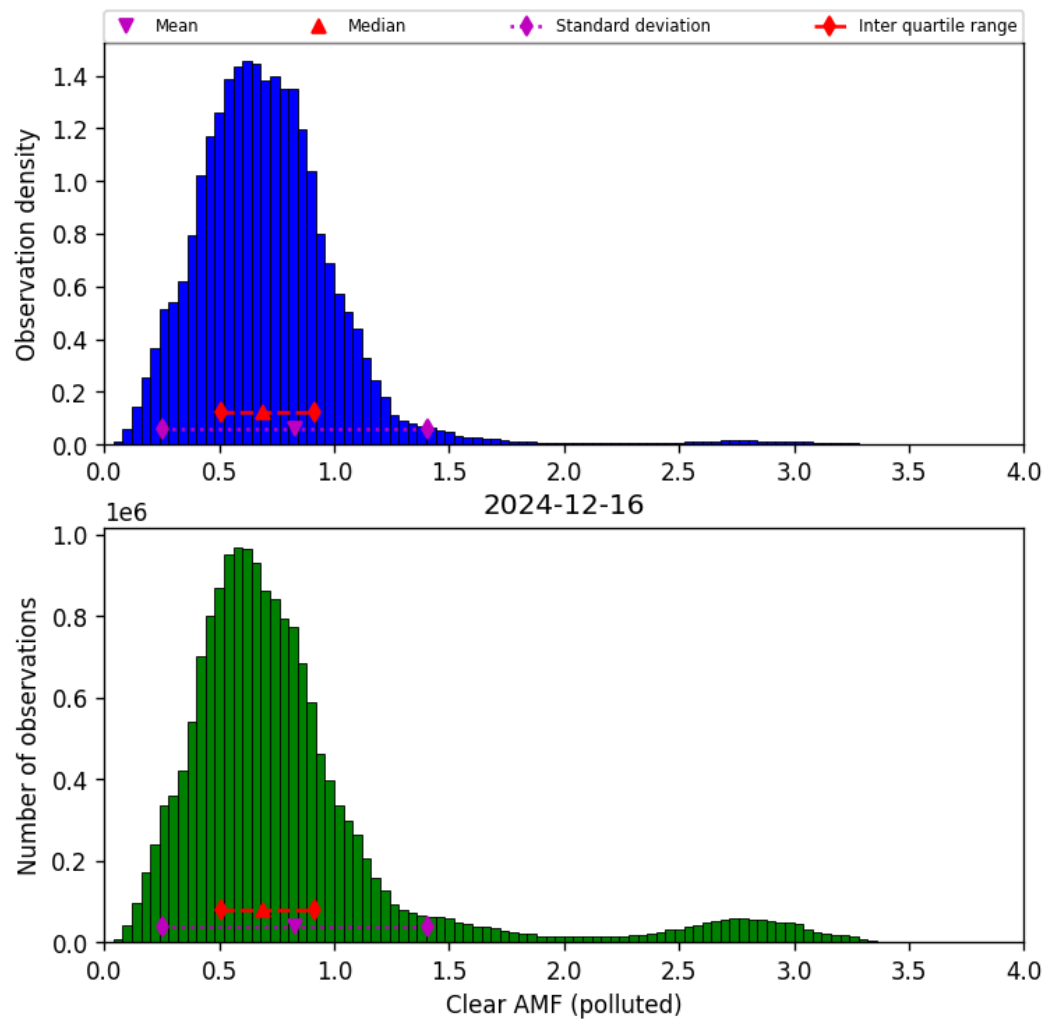


Figure 82: Histogram of “Clear AMF (polluted)” for 2024-12-16 to 2024-12-17

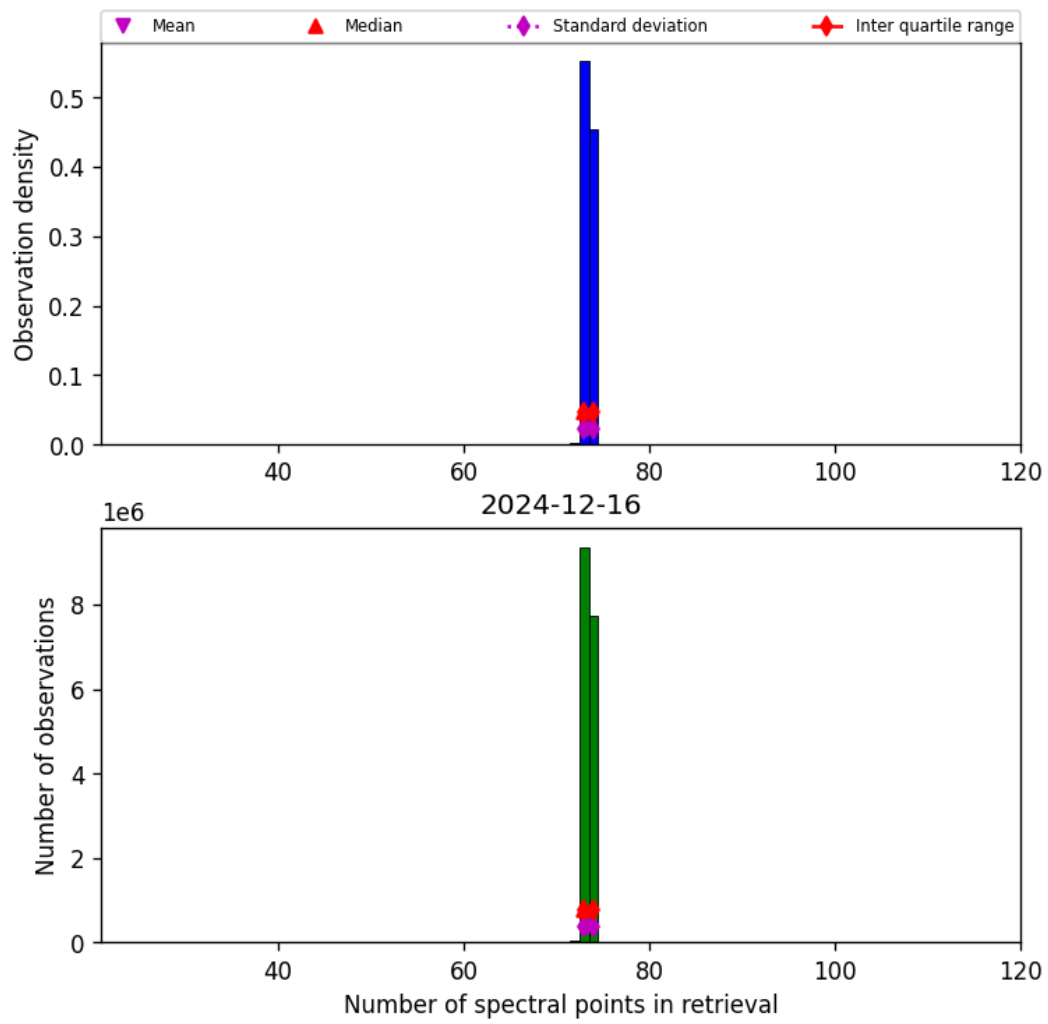


Figure 83: Histogram of “Number of spectral points in retrieval” for 2024-12-16 to 2024-12-17

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.

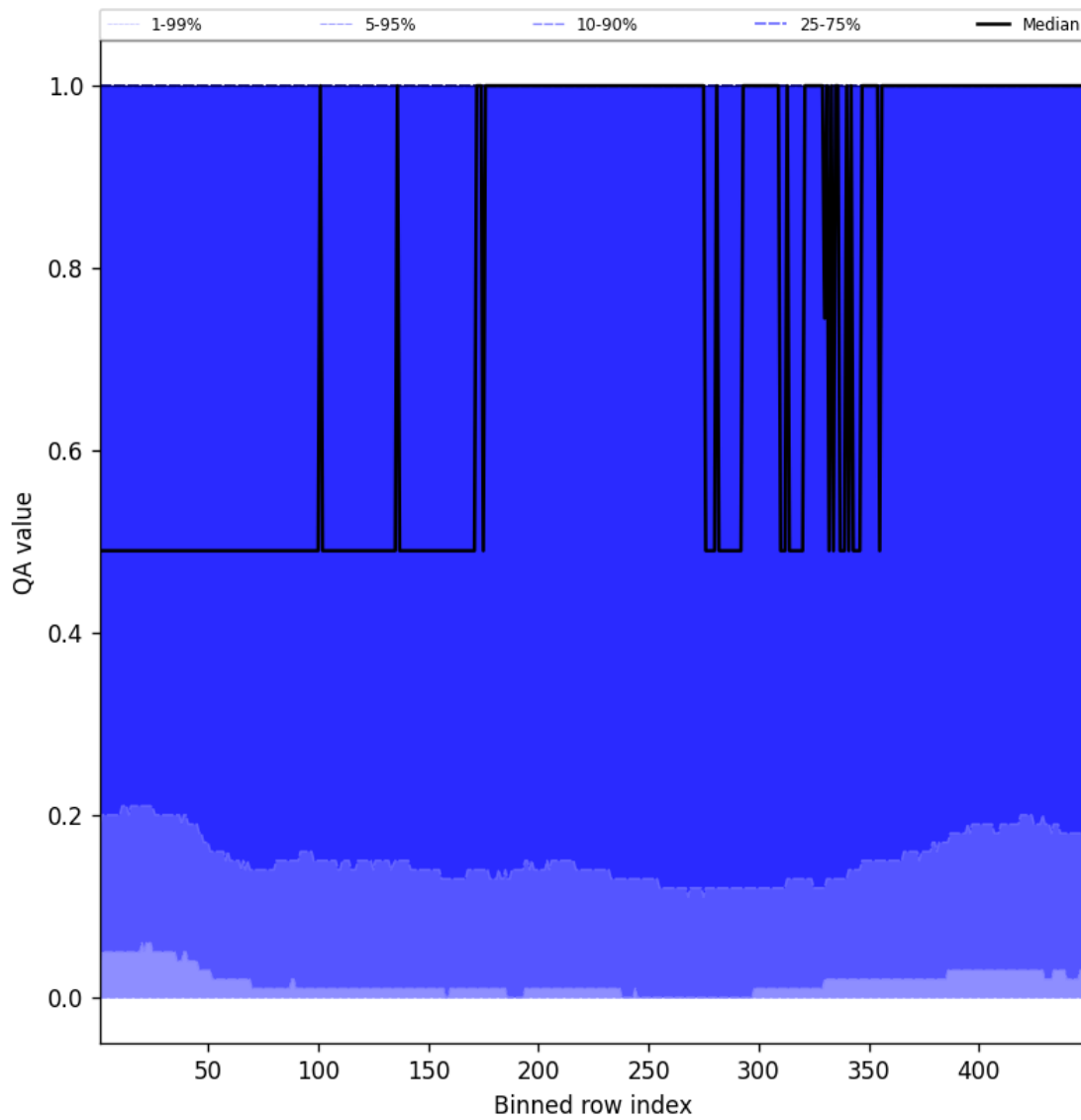


Figure 84: Along track statistics of “QA value” for 2024-12-16 to 2024-12-17

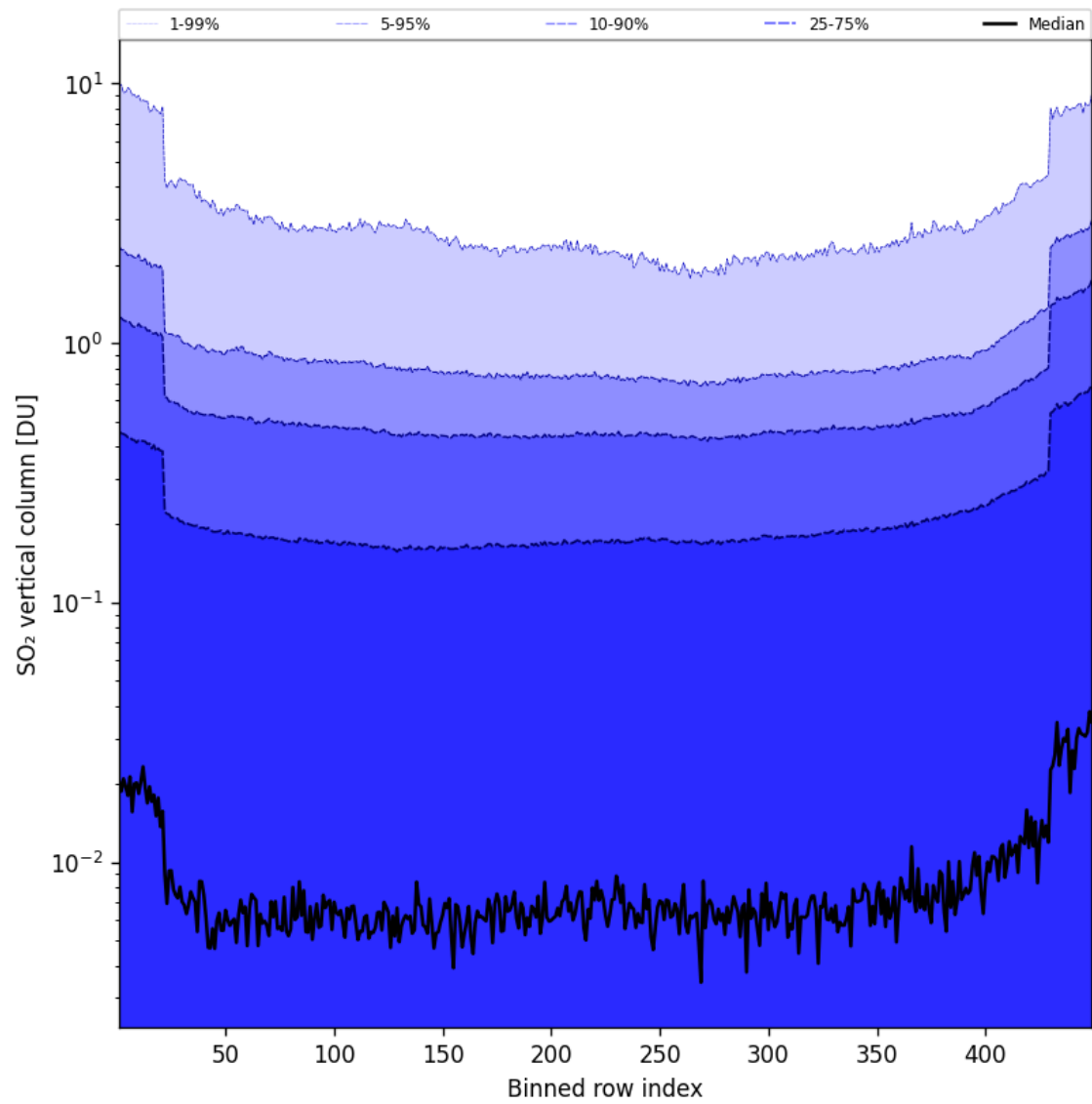


Figure 85: Along track statistics of “SO₂ vertical column” for 2024-12-16 to 2024-12-17

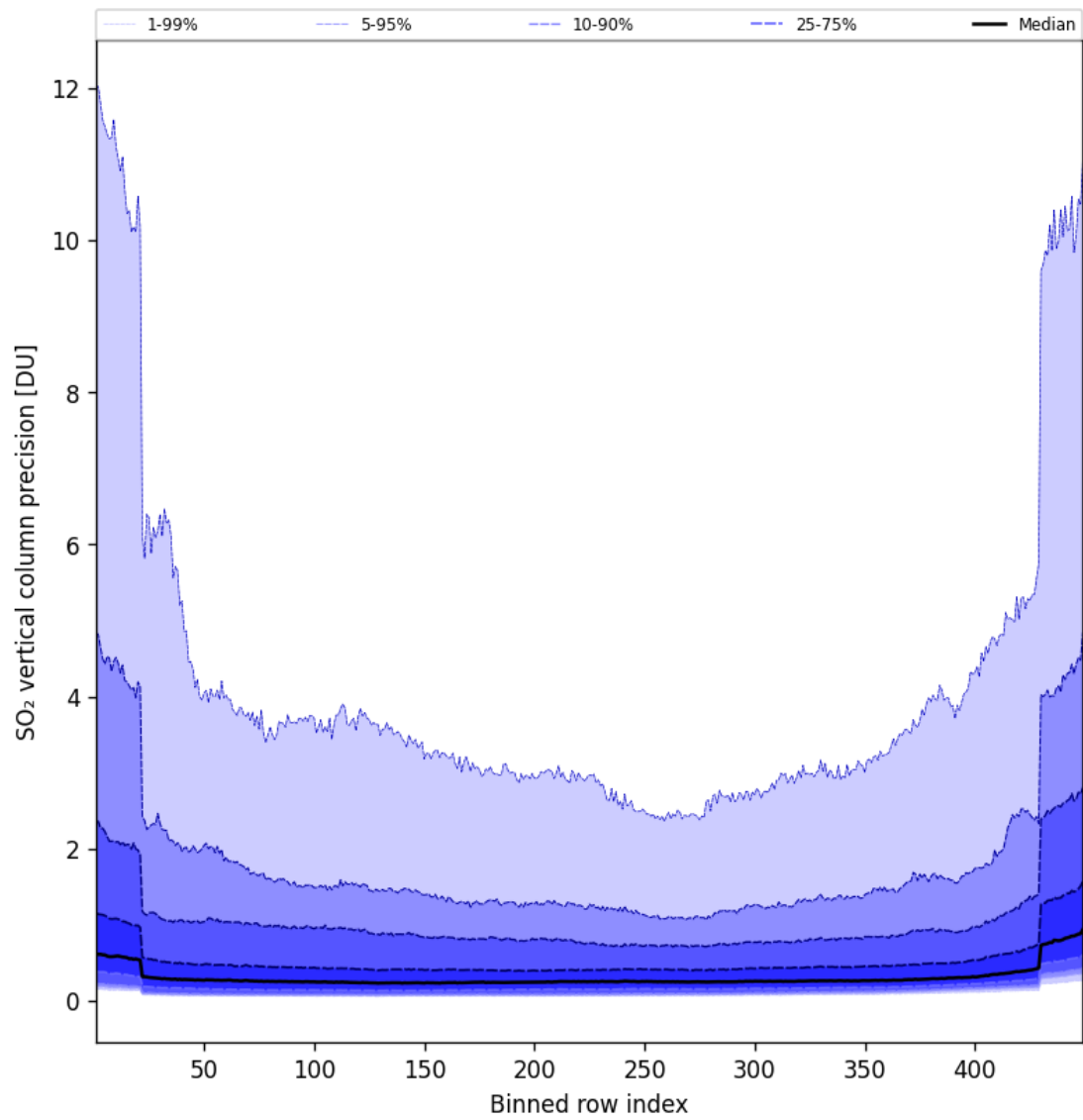


Figure 86: Along track statistics of “SO₂ vertical column precision” for 2024-12-16 to 2024-12-17

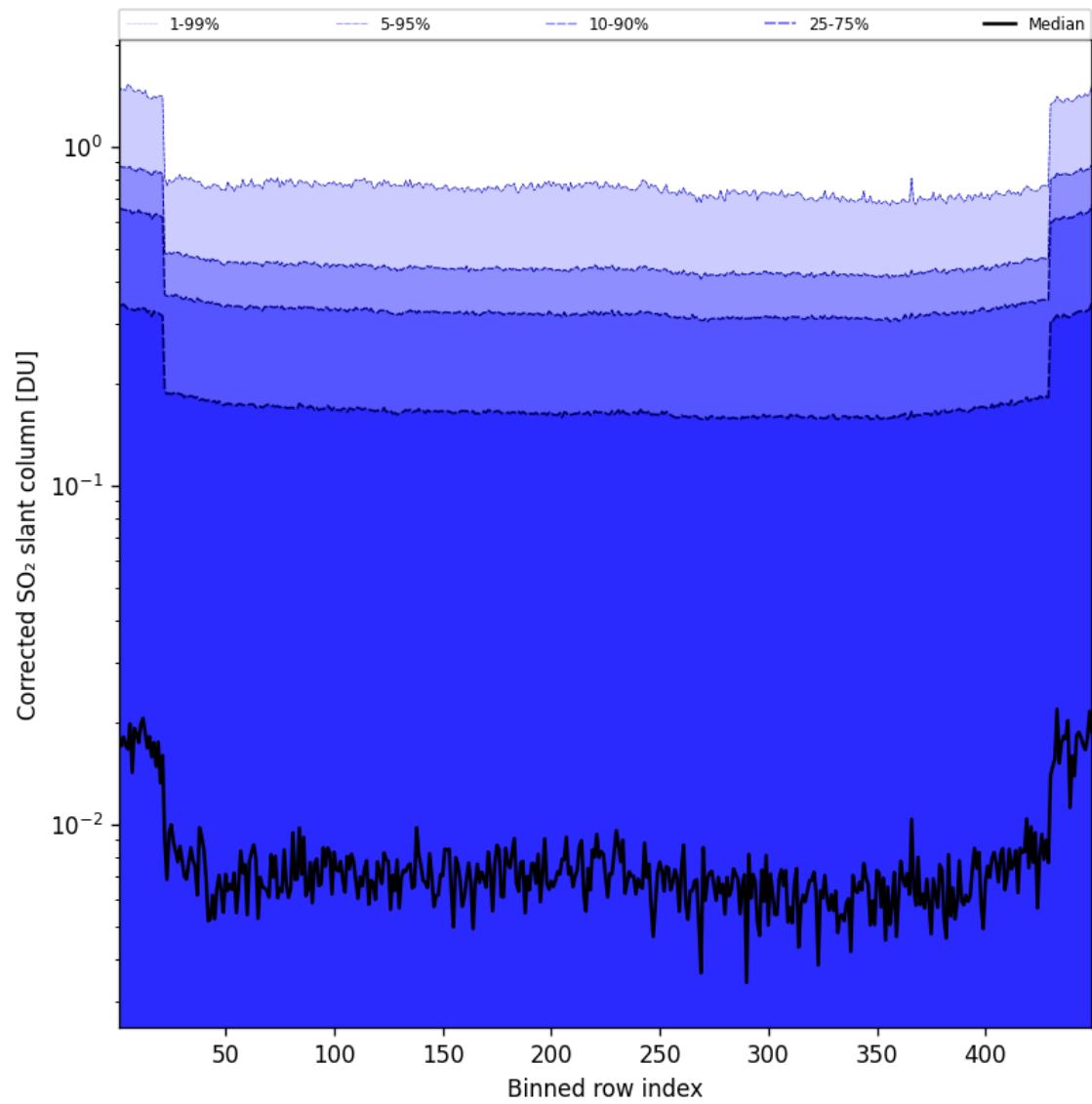


Figure 87: Along track statistics of "Corrected SO₂ slant column" for 2024-12-16 to 2024-12-17

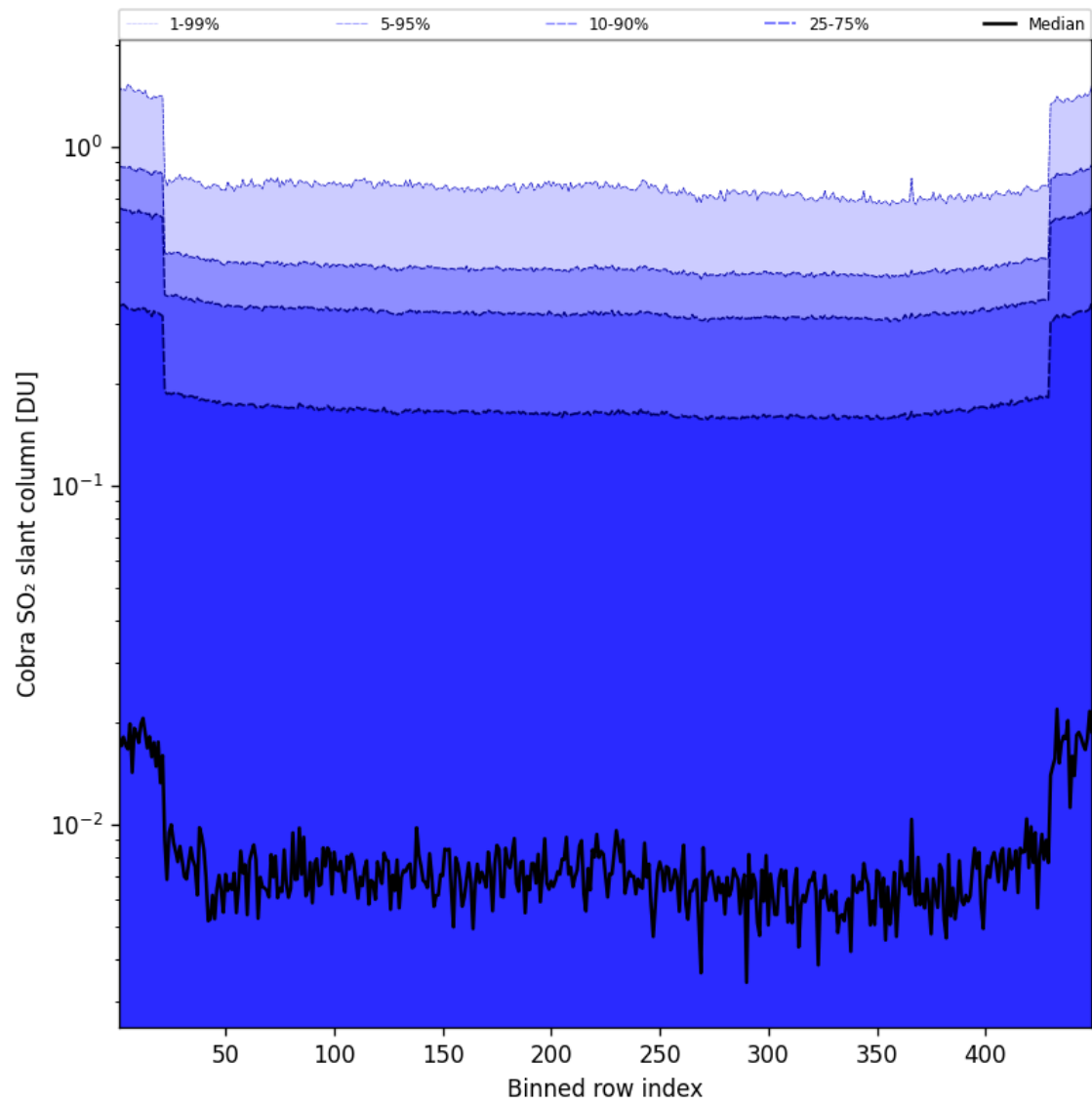


Figure 88: Along track statistics of “Cobra SO₂ slant column” for 2024-12-16 to 2024-12-17

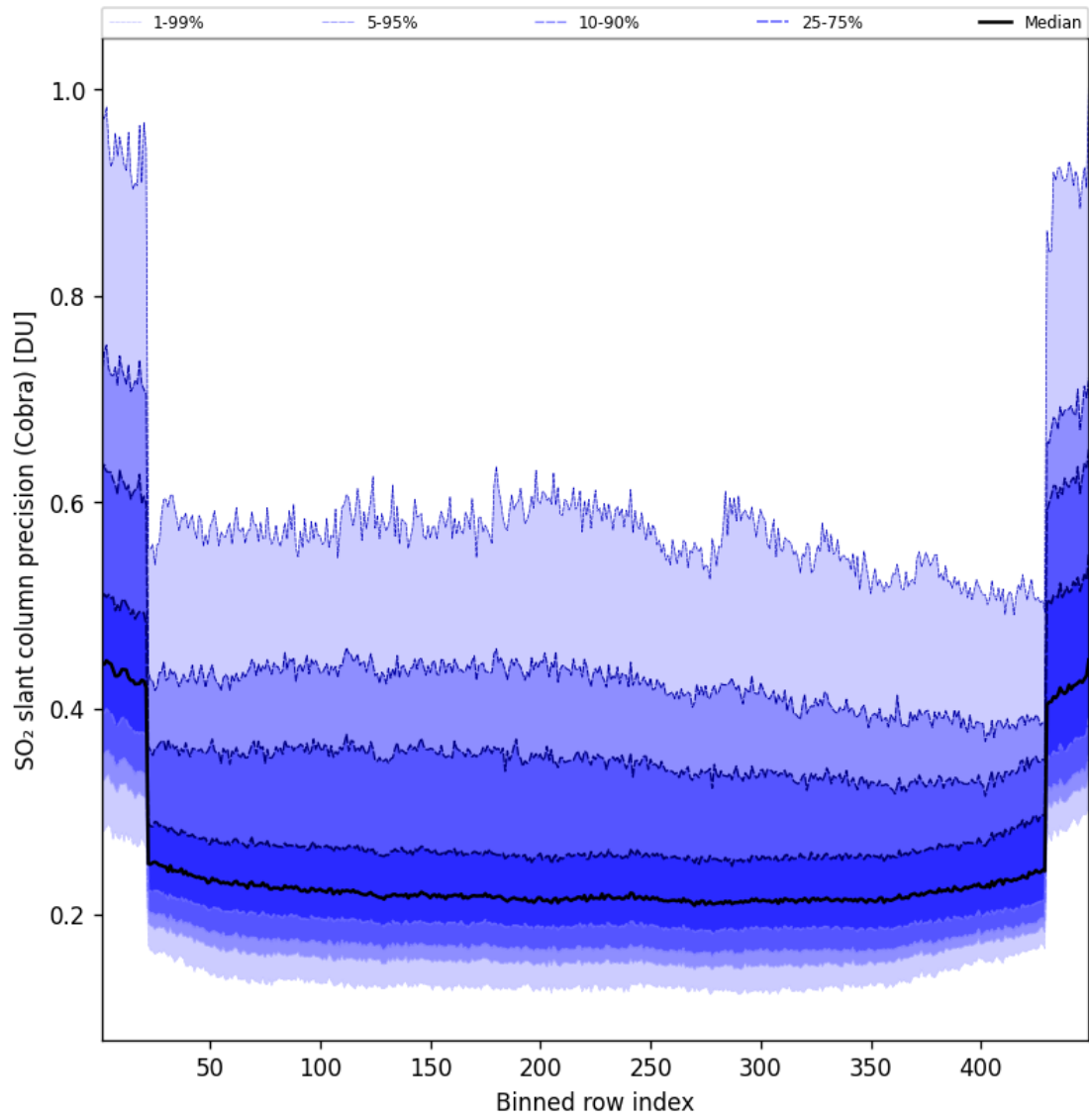


Figure 89: Along track statistics of “SO₂ slant column precision (Cobra)” for 2024-12-16 to 2024-12-17

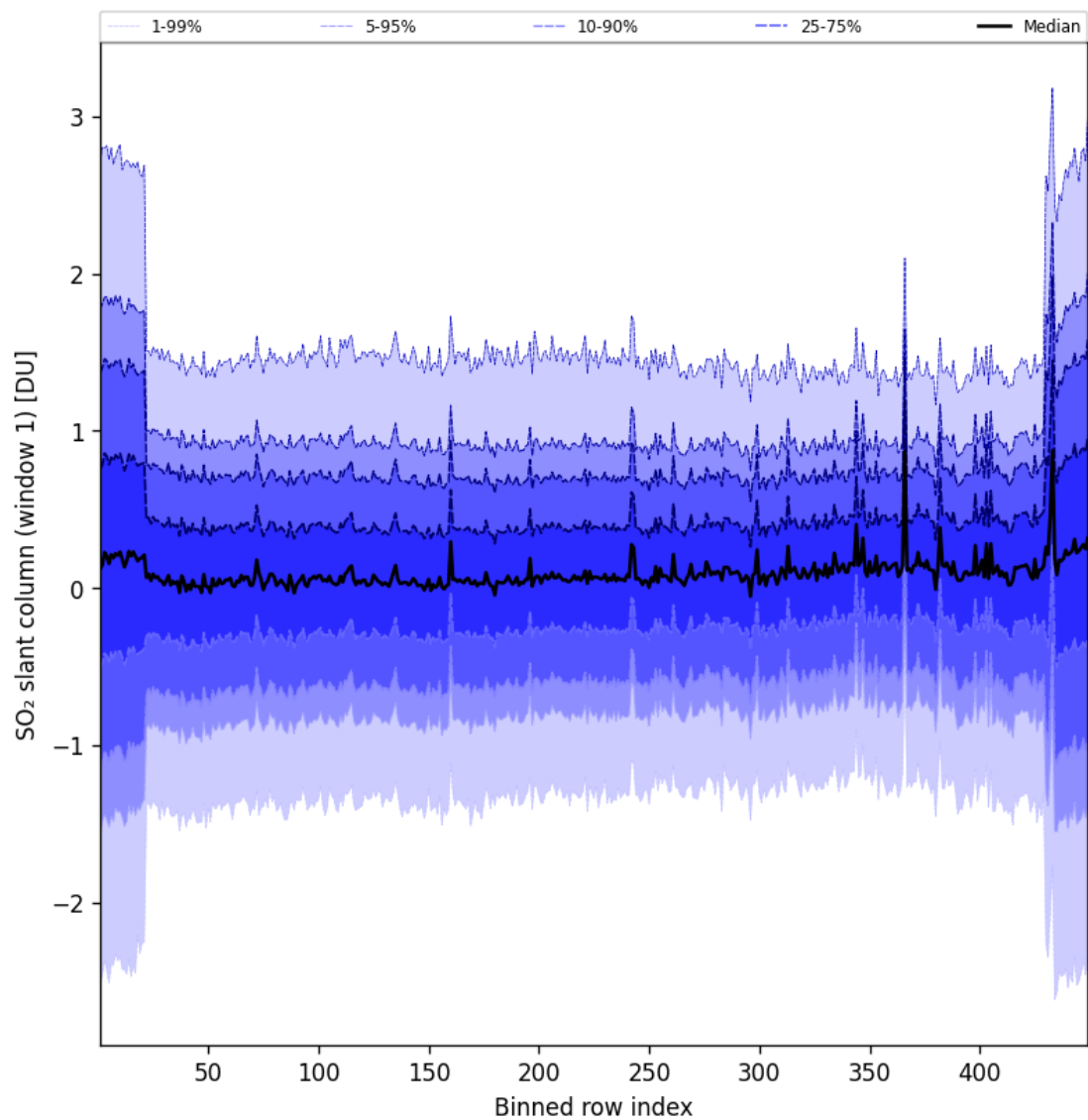


Figure 90: Along track statistics of “SO₂ slant column (window 1)” for 2024-12-16 to 2024-12-17

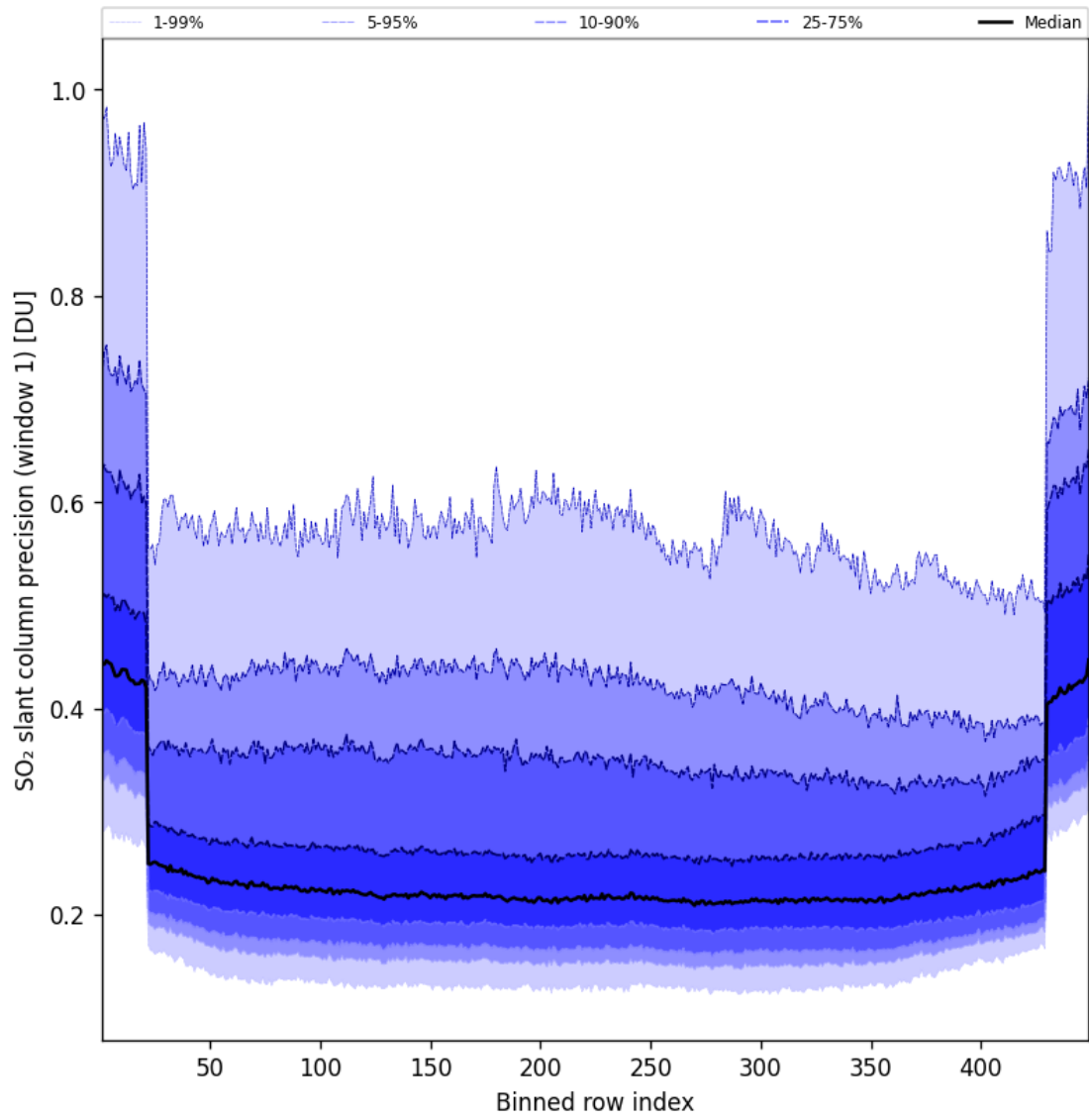


Figure 91: Along track statistics of “SO₂ slant column precision (window 1)” for 2024-12-16 to 2024-12-17

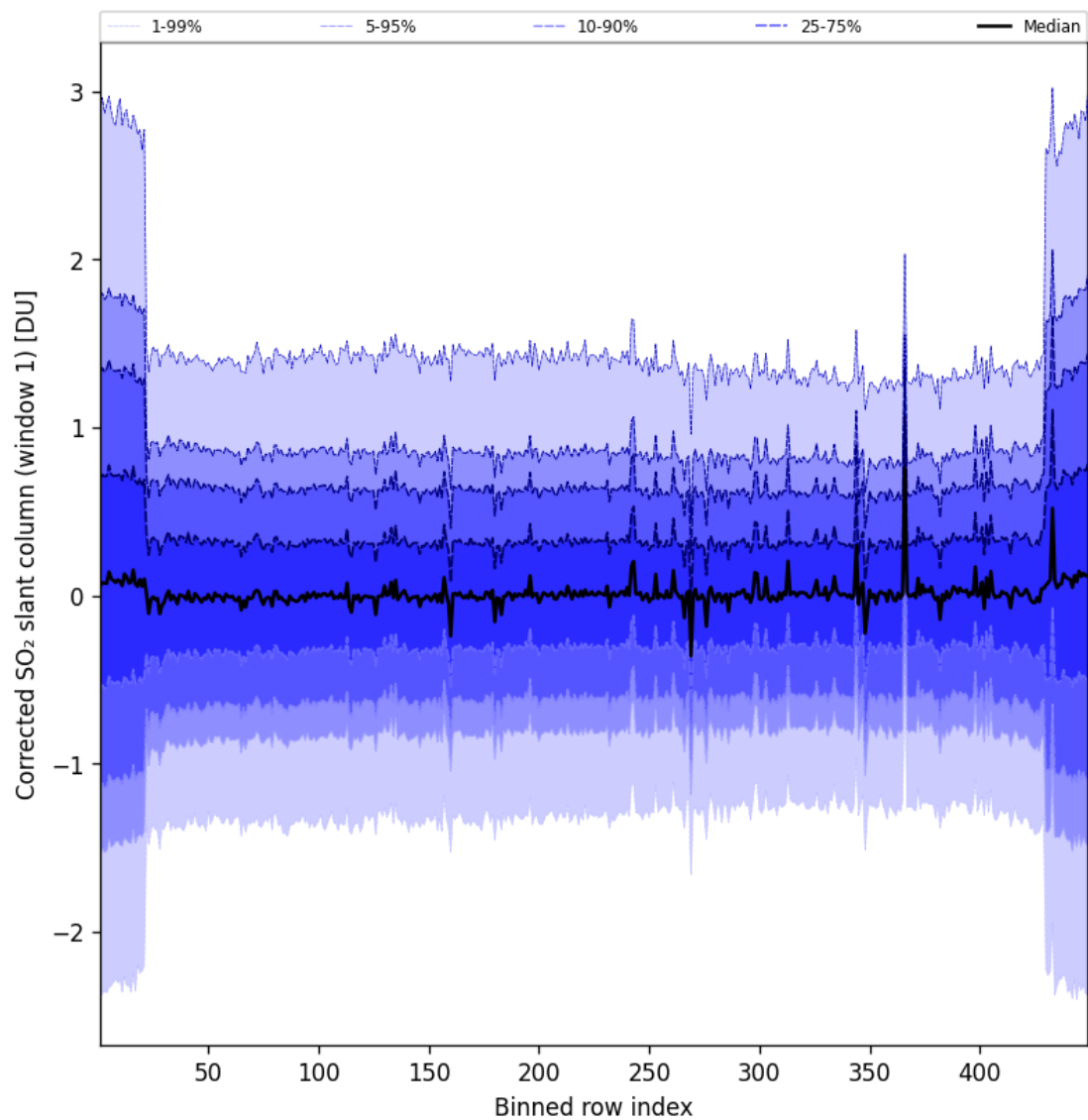


Figure 92: Along track statistics of “Corrected SO₂ slant column (window 1)” for 2024-12-16 to 2024-12-17

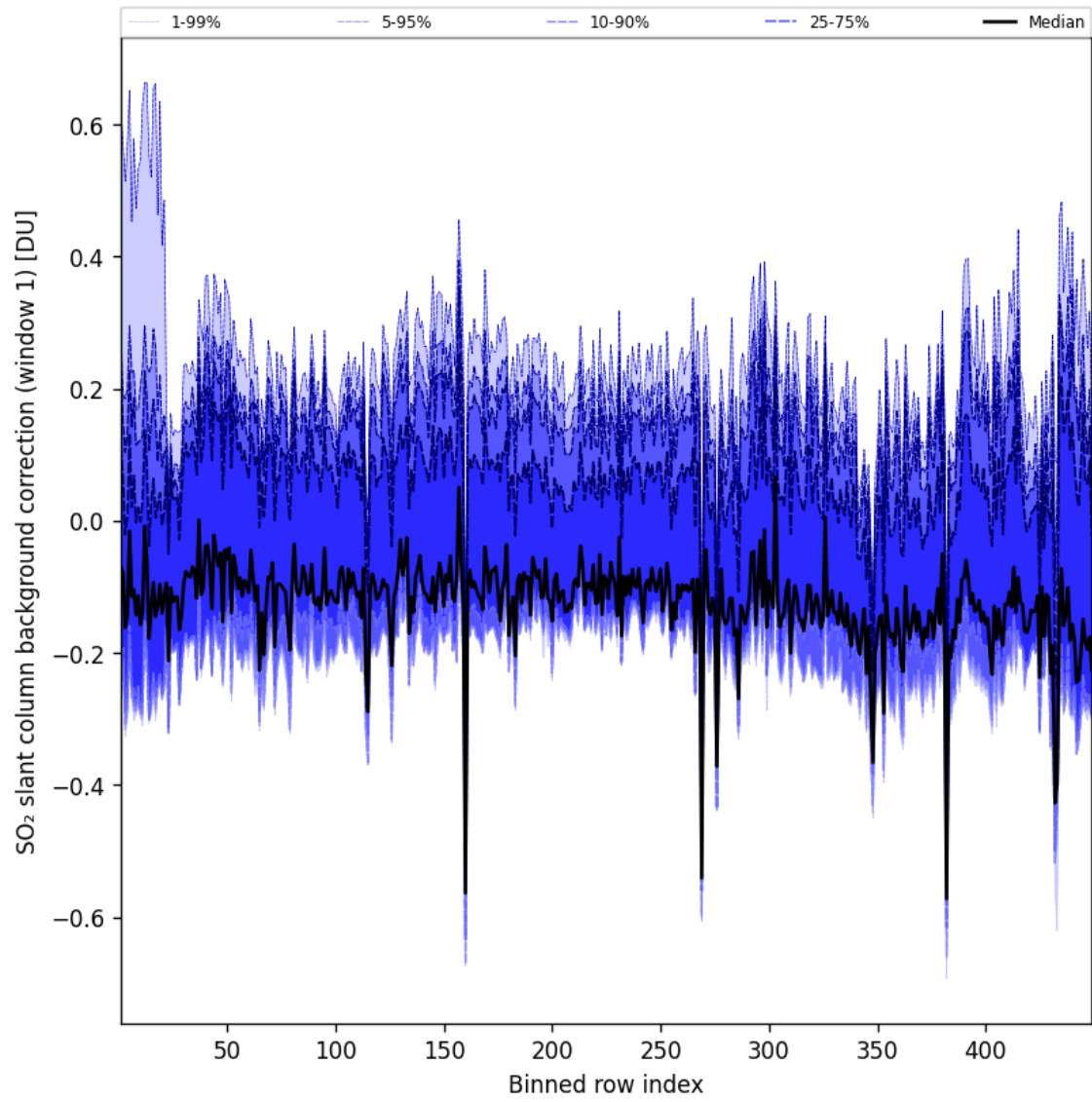


Figure 93: Along track statistics of “SO₂ slant column background correction (window 1)” for 2024-12-16 to 2024-12-17

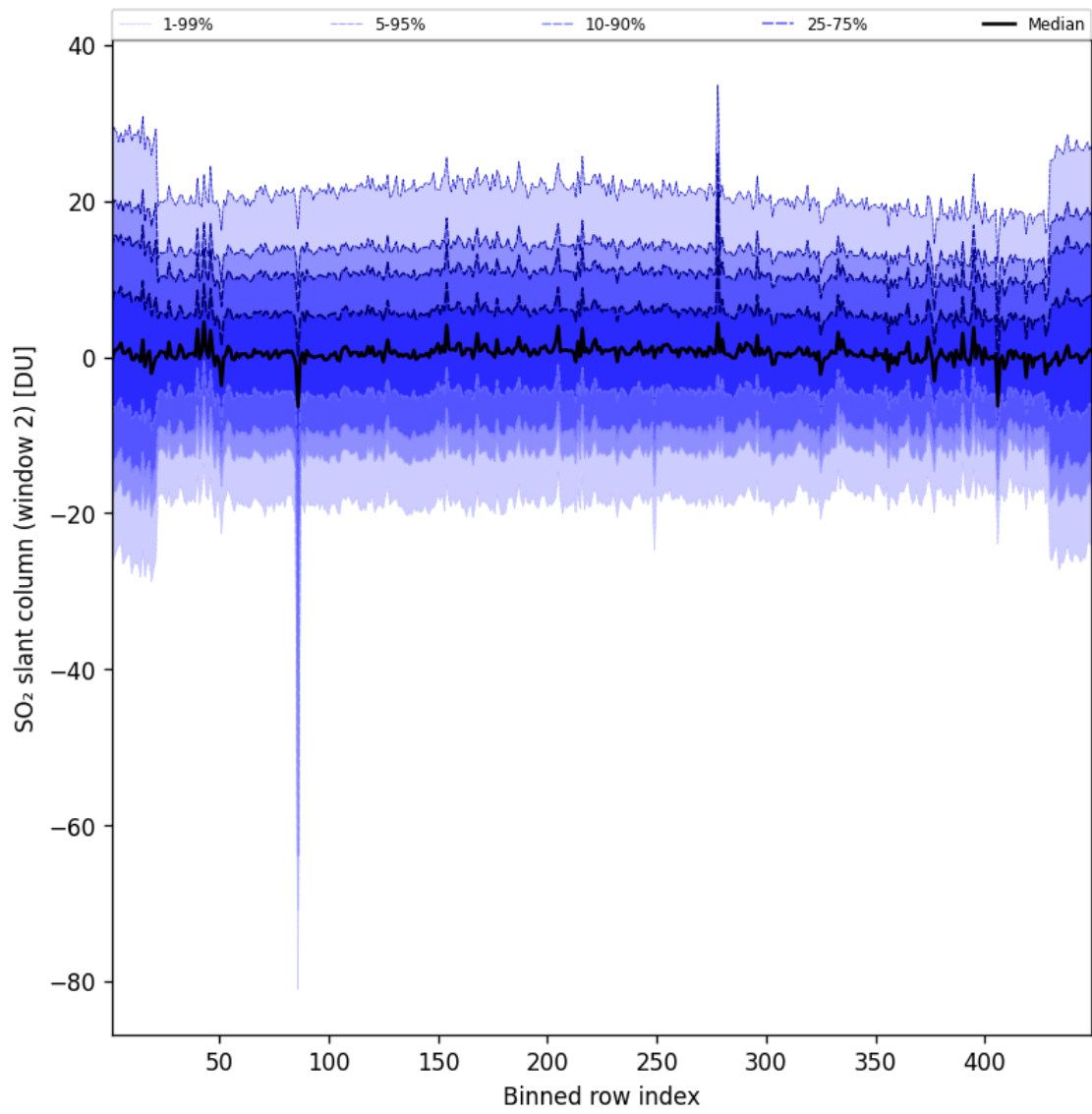


Figure 94: Along track statistics of “SO₂ slant column (window 2)” for 2024-12-16 to 2024-12-17

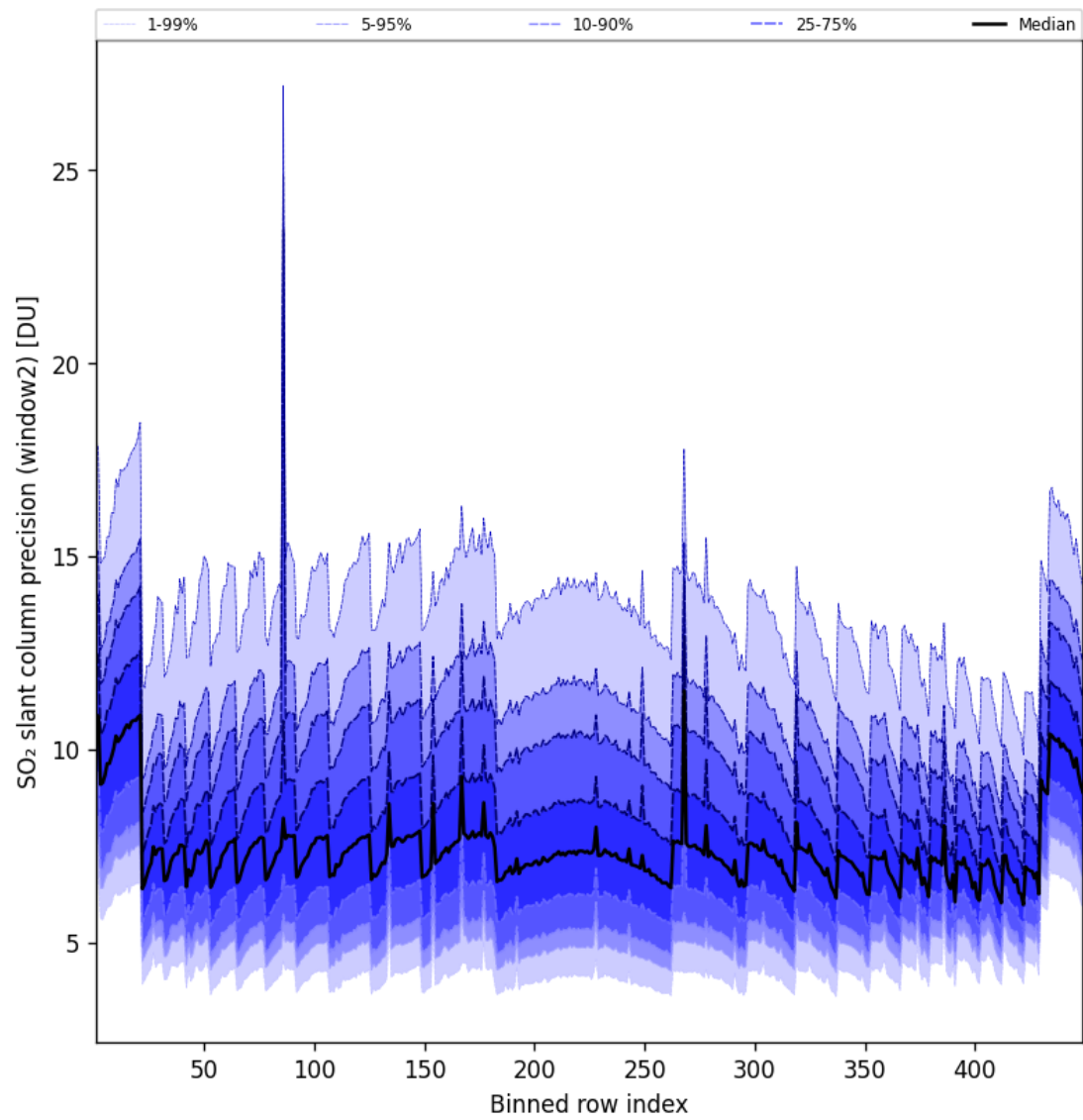


Figure 95: Along track statistics of “SO₂ slant column precision (window2)” for 2024-12-16 to 2024-12-17

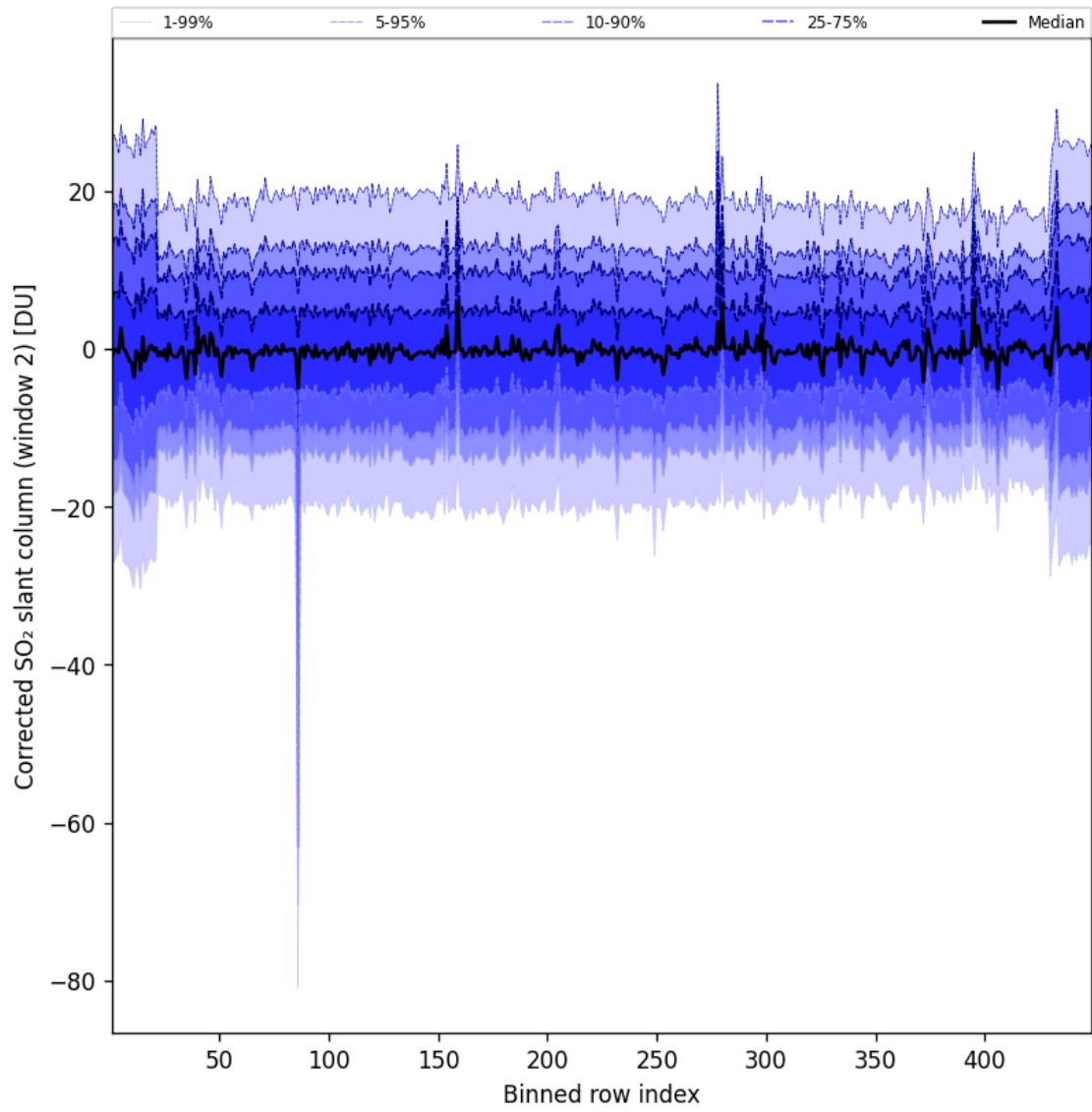


Figure 96: Along track statistics of “Corrected SO₂ slant column (window 2)” for 2024-12-16 to 2024-12-17

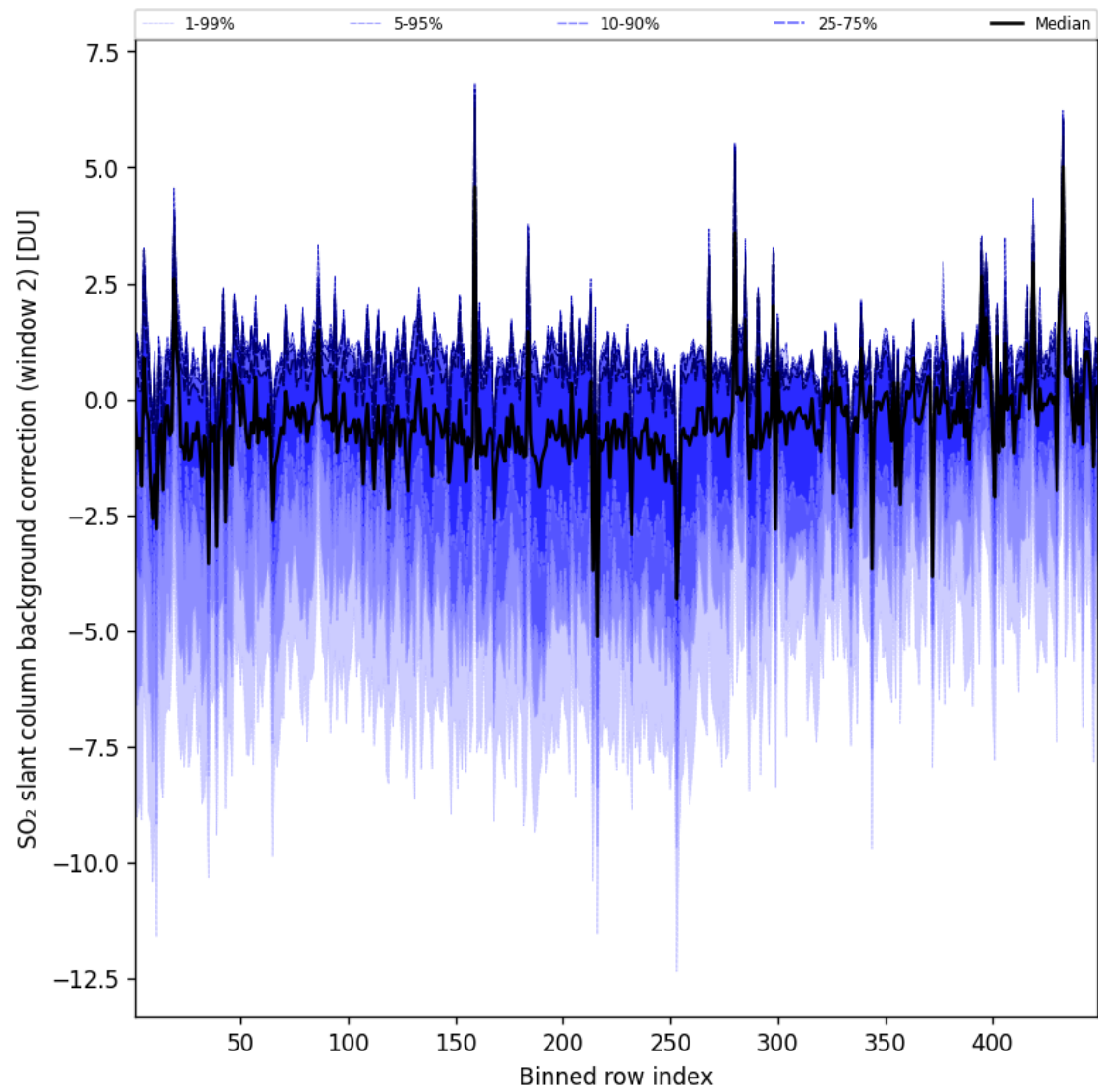


Figure 97: Along track statistics of “SO₂ slant column background correction (window 2)” for 2024-12-16 to 2024-12-17

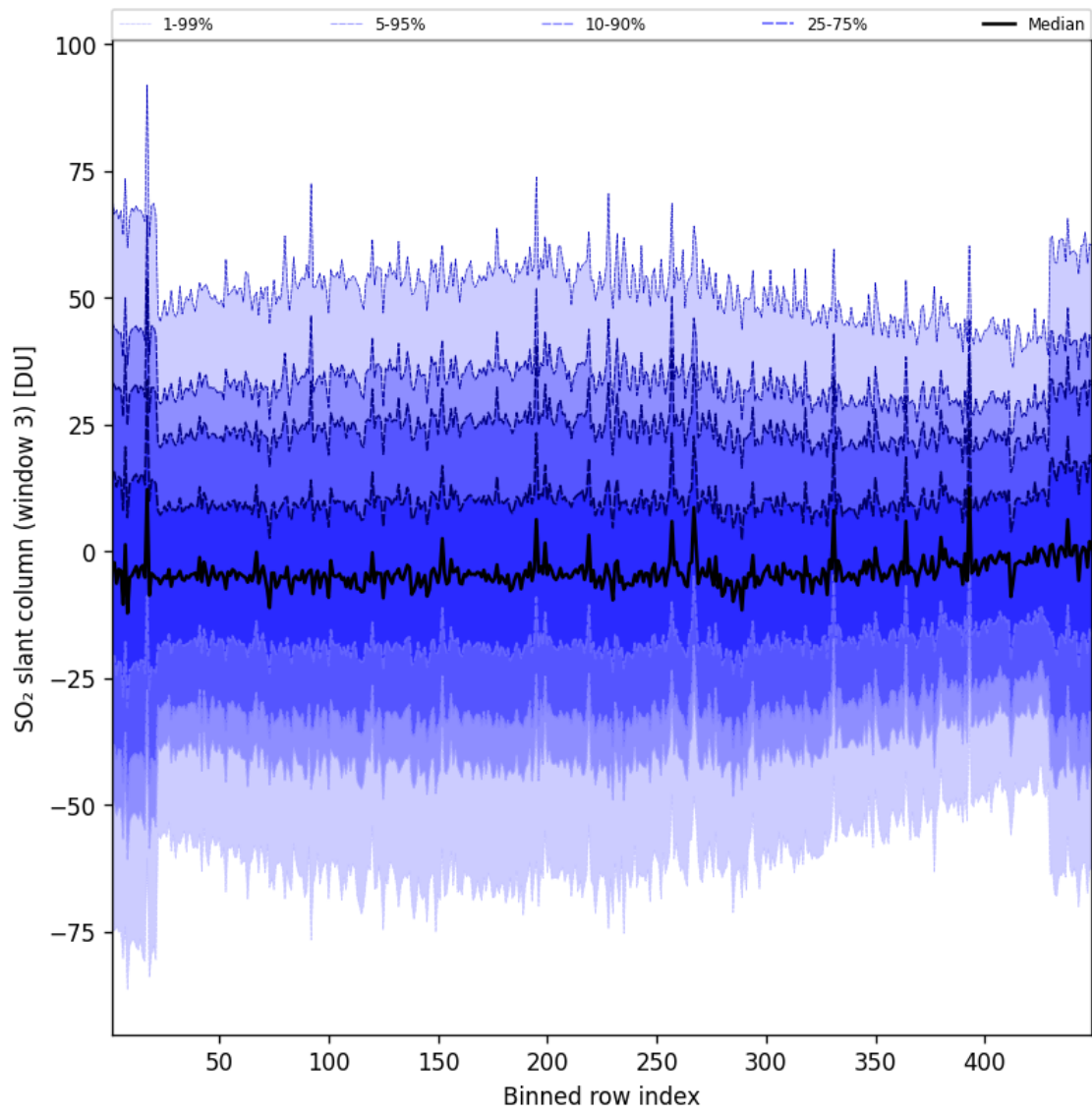


Figure 98: Along track statistics of “SO₂ slant column (window 3)” for 2024-12-16 to 2024-12-17

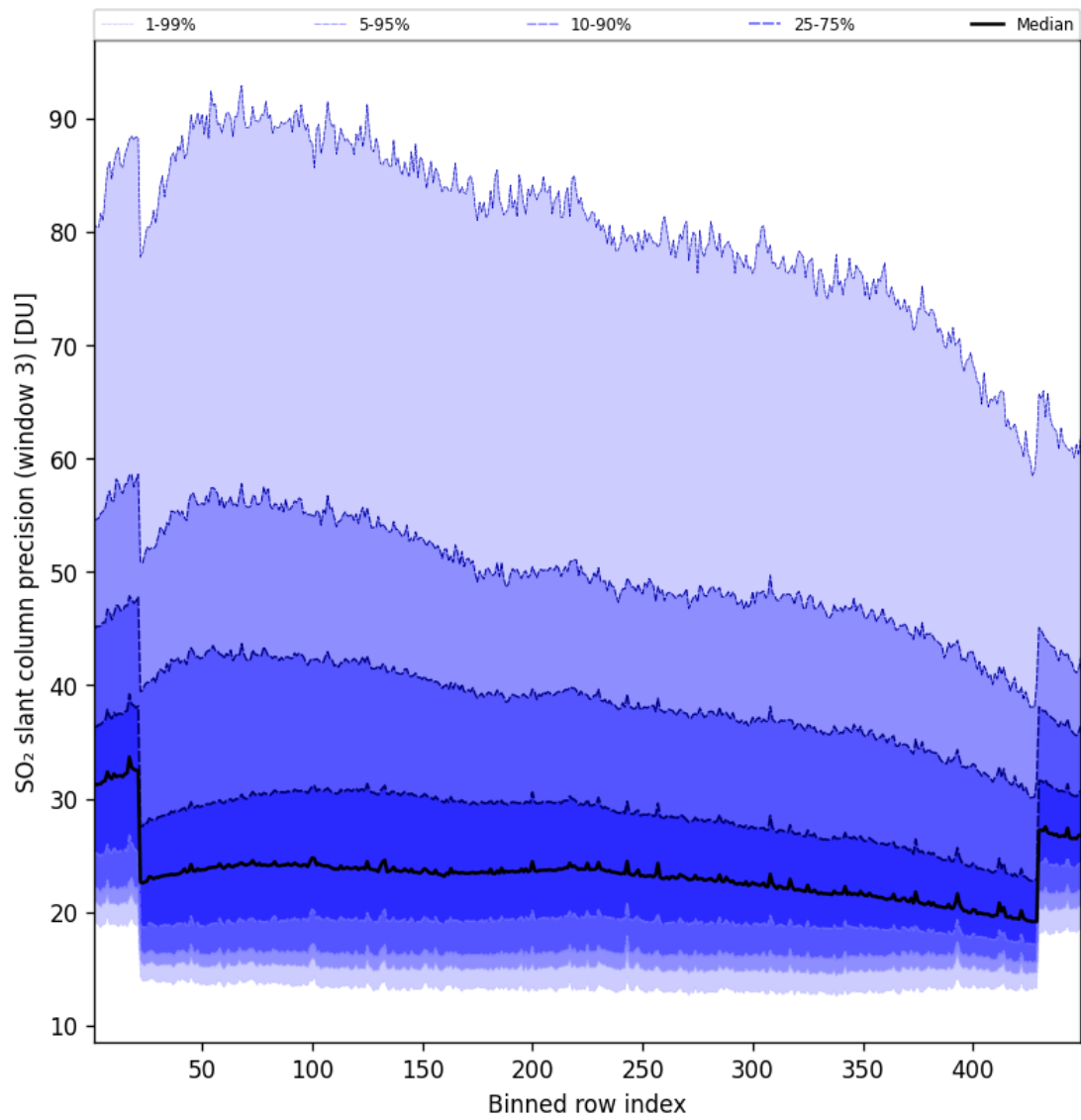


Figure 99: Along track statistics of “SO₂ slant column precision (window 3)” for 2024-12-16 to 2024-12-17

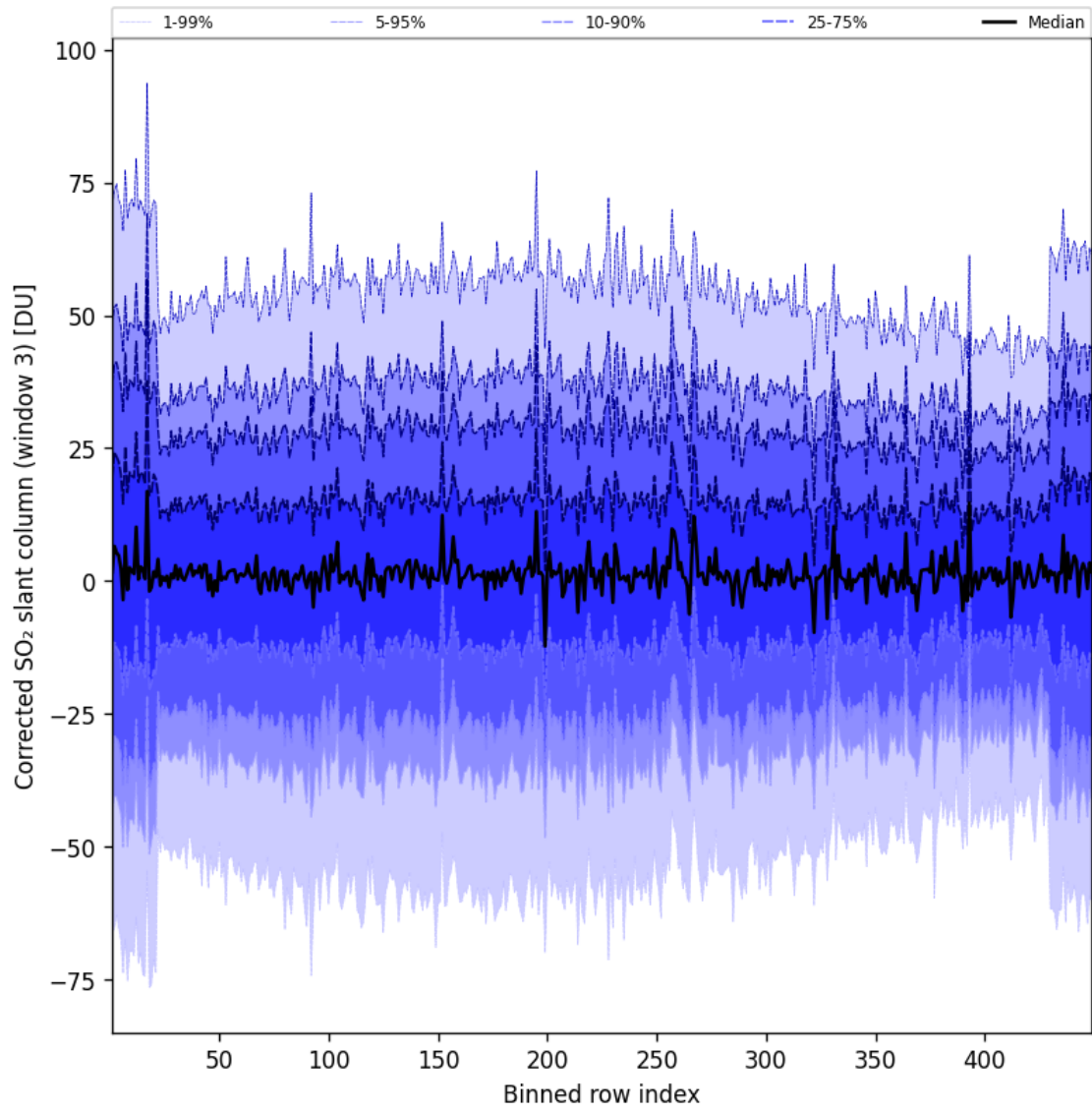


Figure 100: Along track statistics of "Corrected SO₂ slant column (window 3)" for 2024-12-16 to 2024-12-17

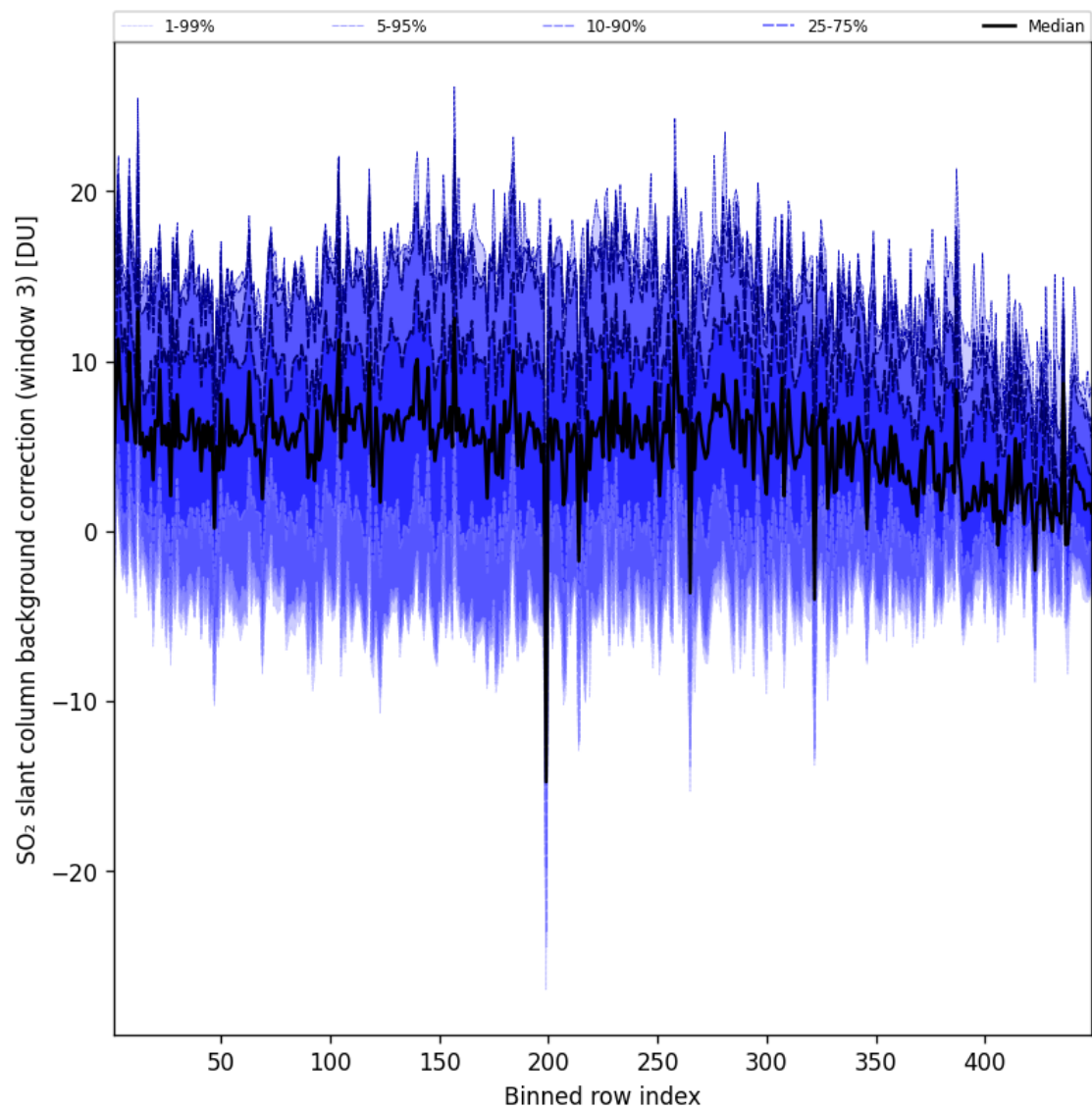


Figure 101: Along track statistics of “SO₂ slant column background correction (window 3)” for 2024-12-16 to 2024-12-17

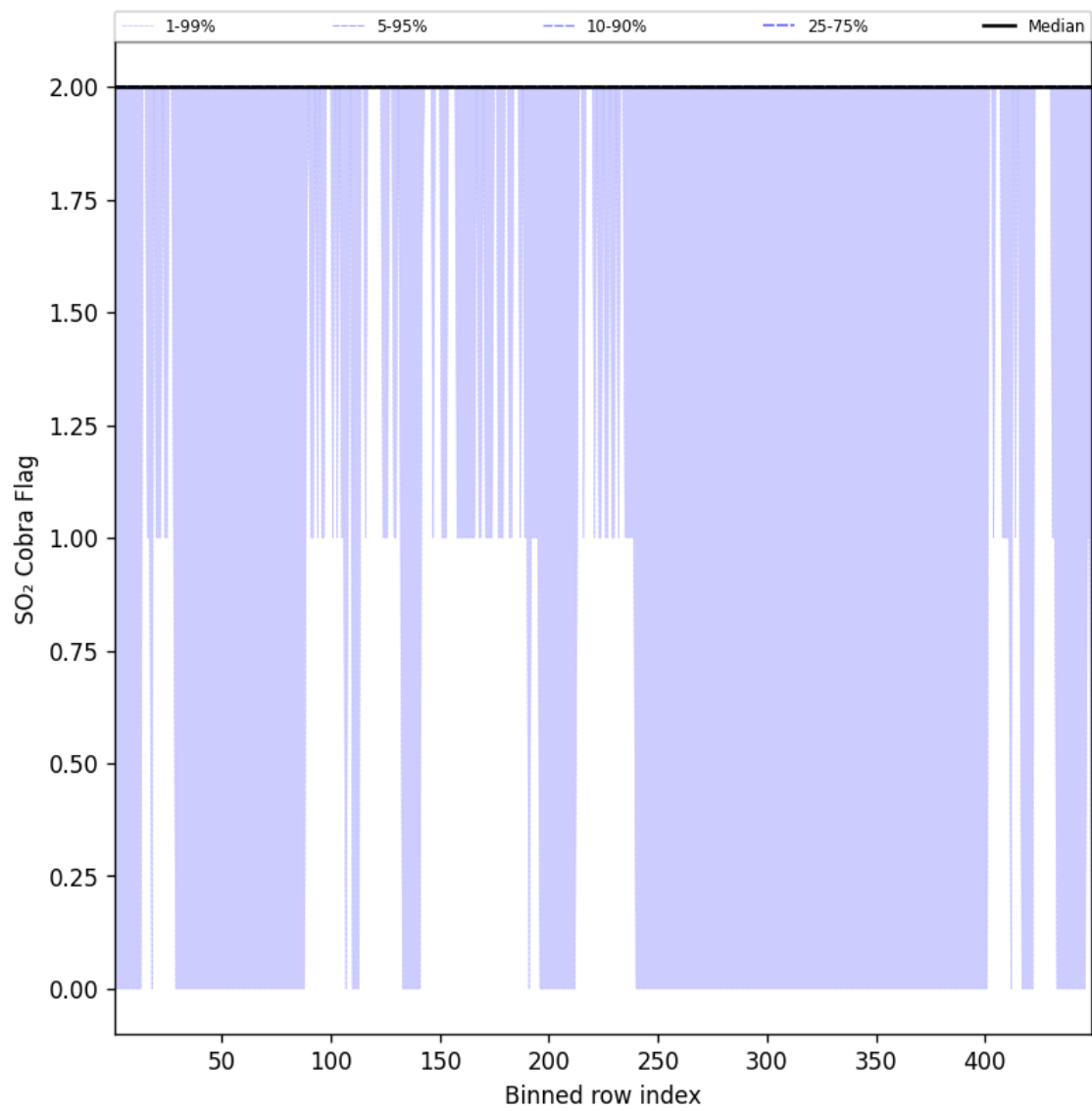


Figure 102: Along track statistics of “SO₂ Cobra Flag” for 2024-12-16 to 2024-12-17

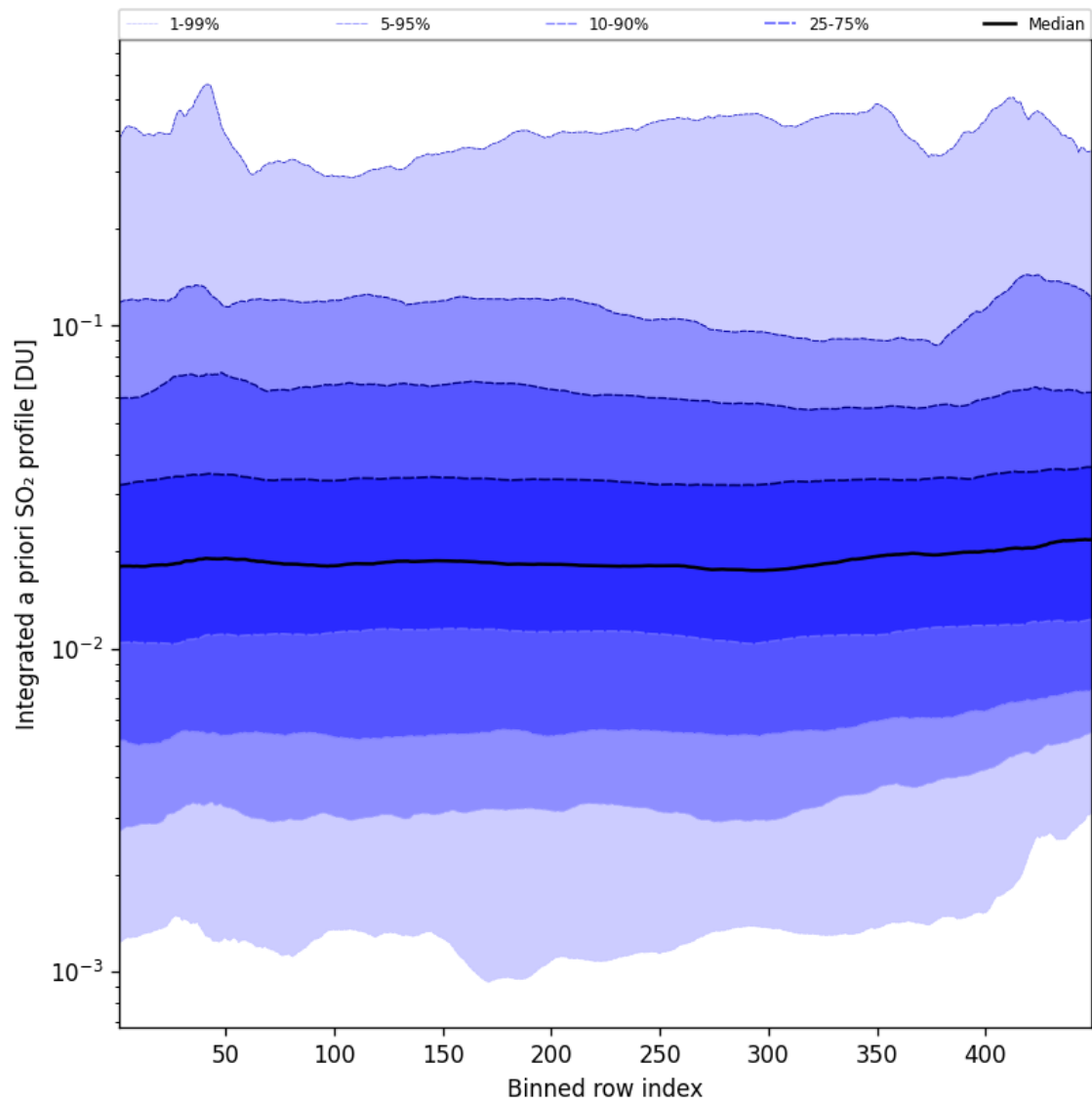


Figure 103: Along track statistics of “Integrated a priori SO₂ profile” for 2024-12-16 to 2024-12-17

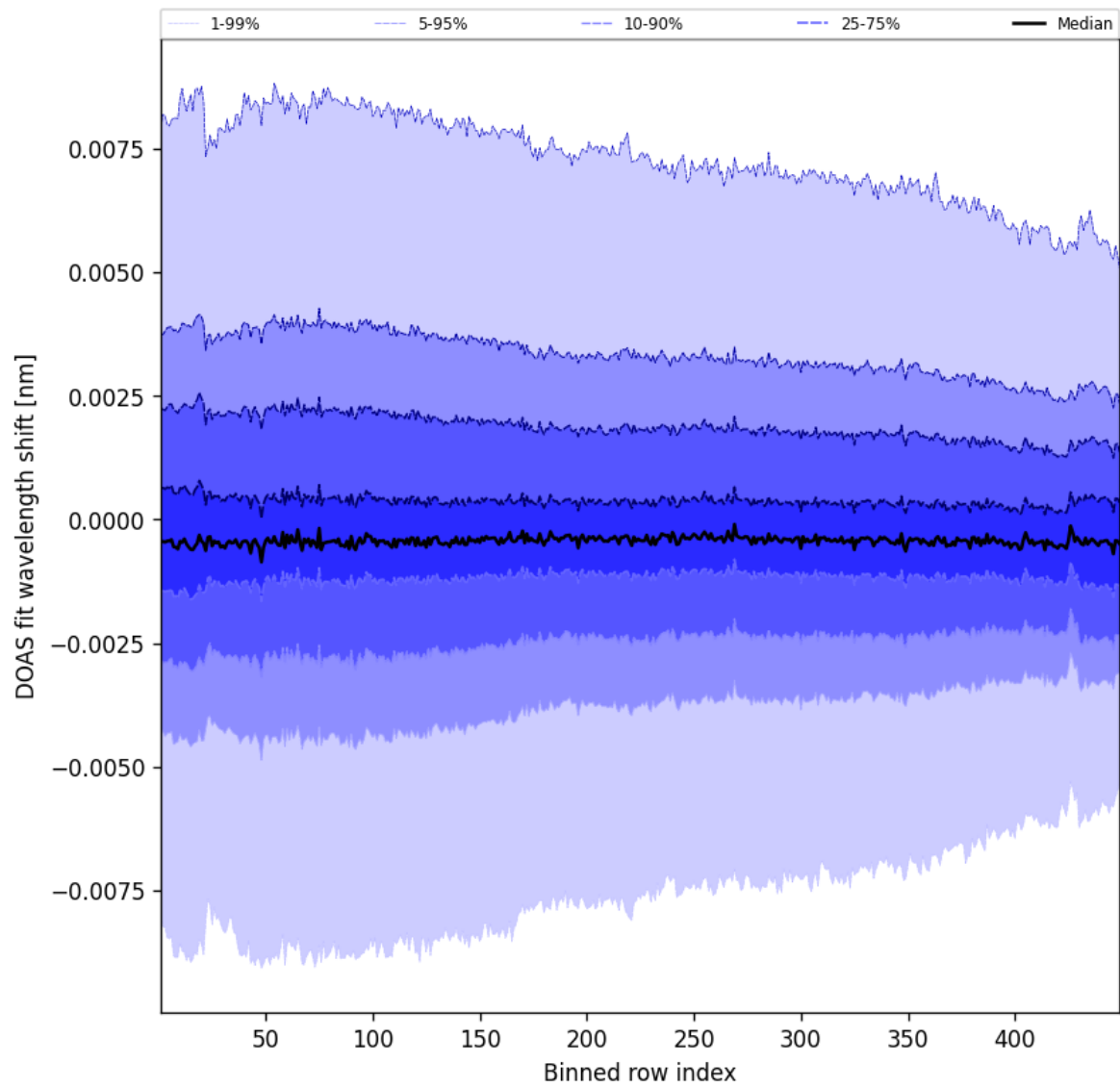


Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2024-12-16 to 2024-12-17

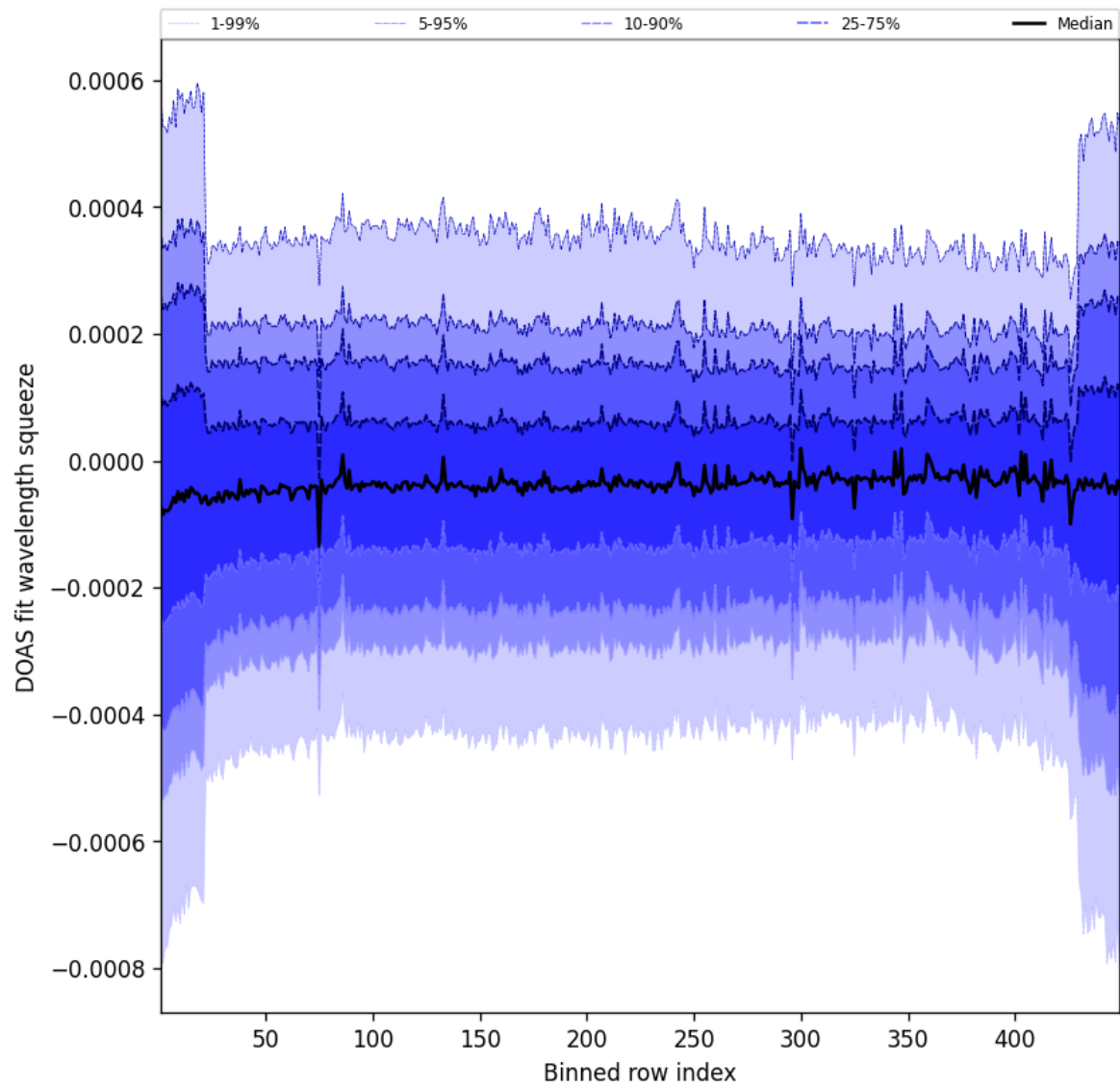


Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2024-12-16 to 2024-12-17

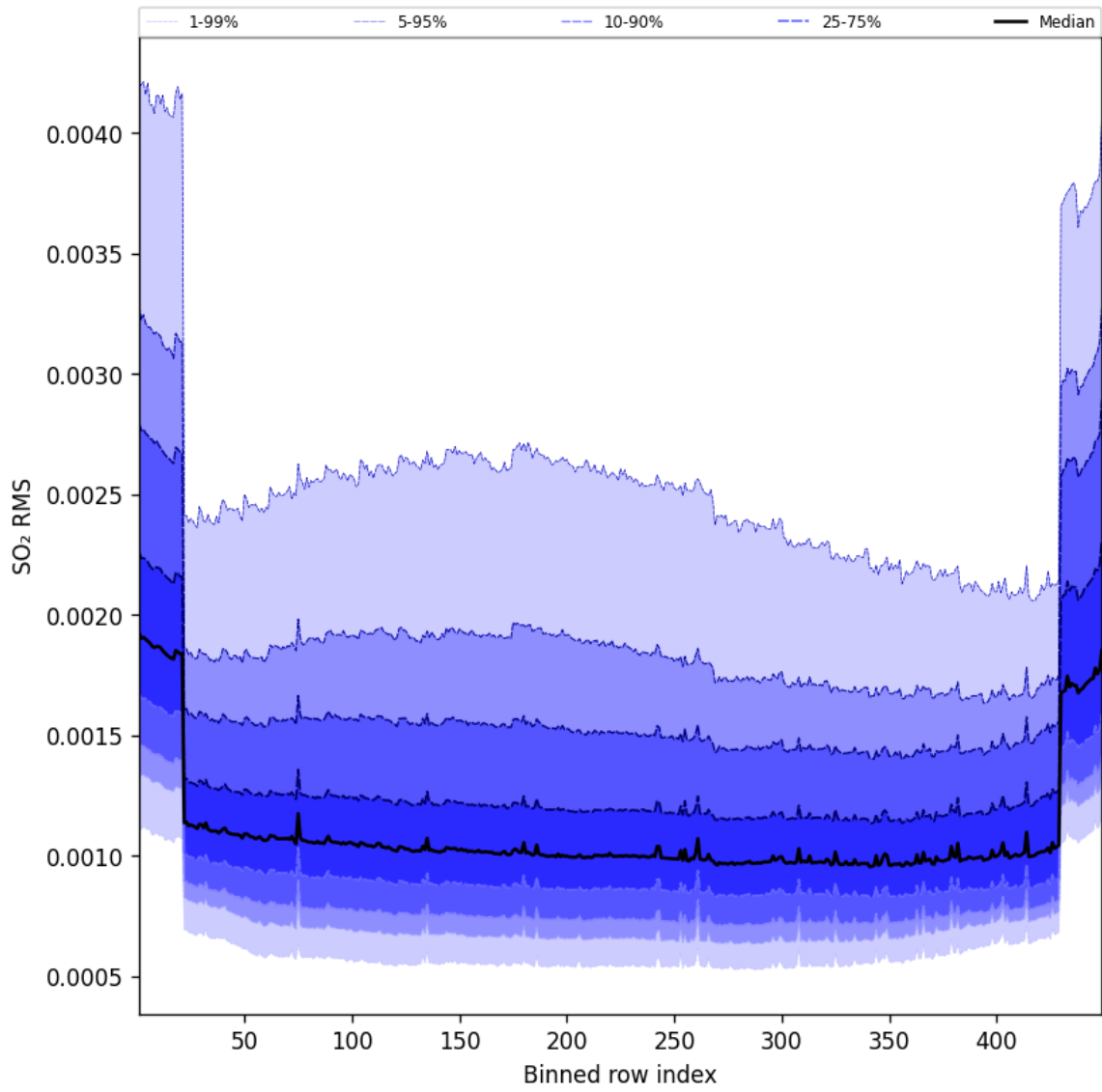


Figure 106: Along track statistics of “SO₂ RMS” for 2024-12-16 to 2024-12-17

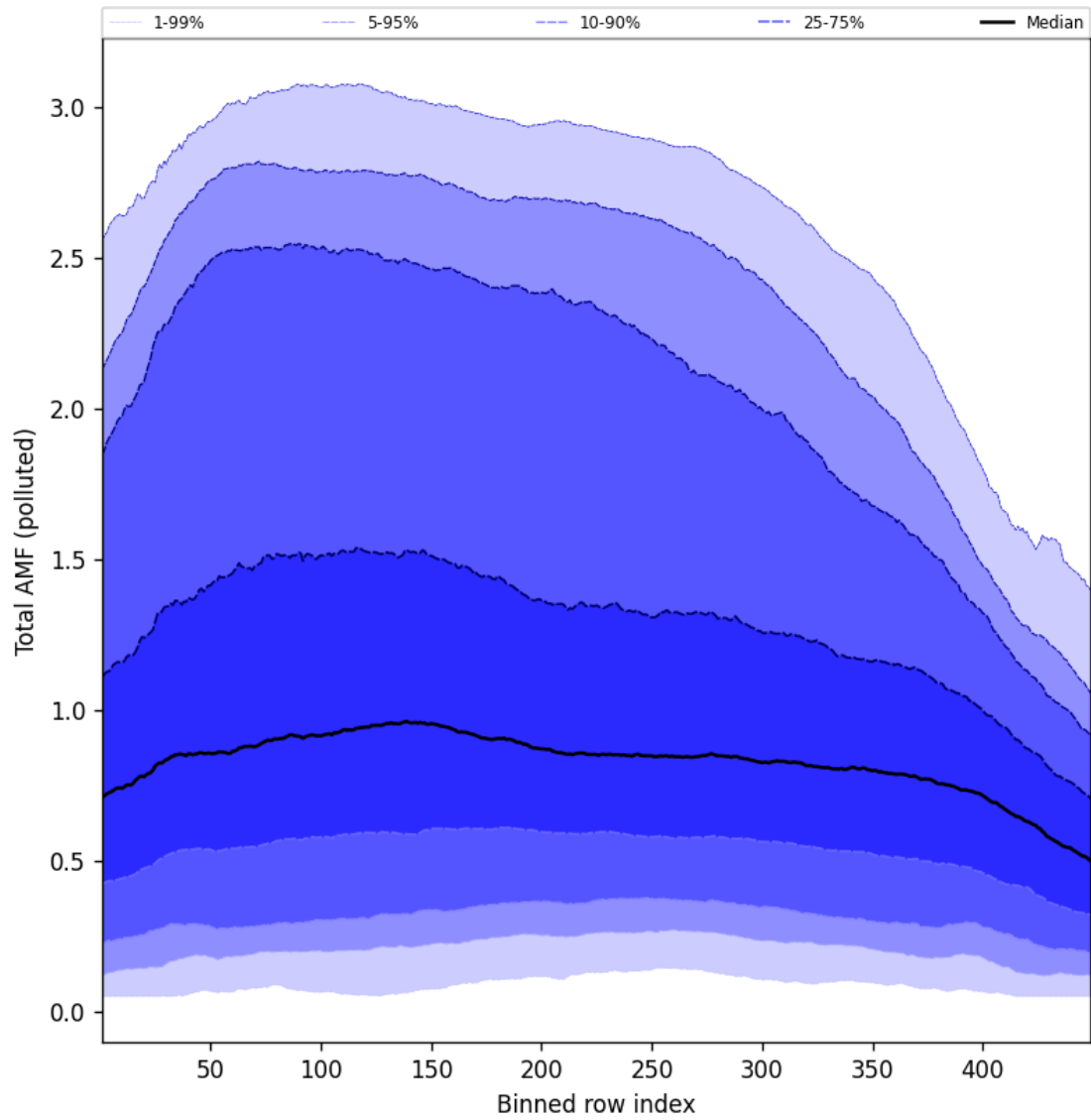


Figure 107: Along track statistics of “Total AMF (polluted)” for 2024-12-16 to 2024-12-17

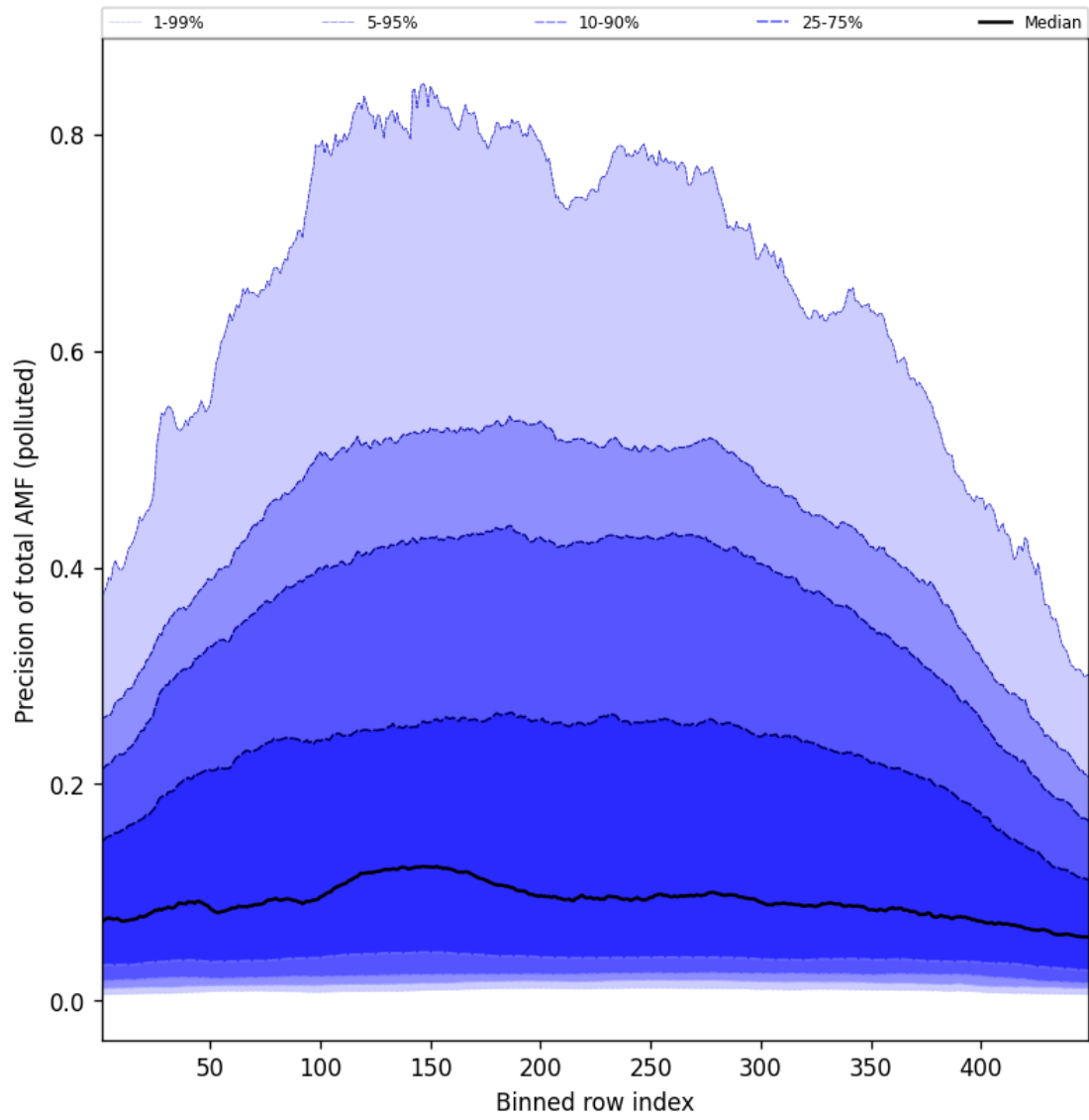


Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2024-12-16 to 2024-12-17

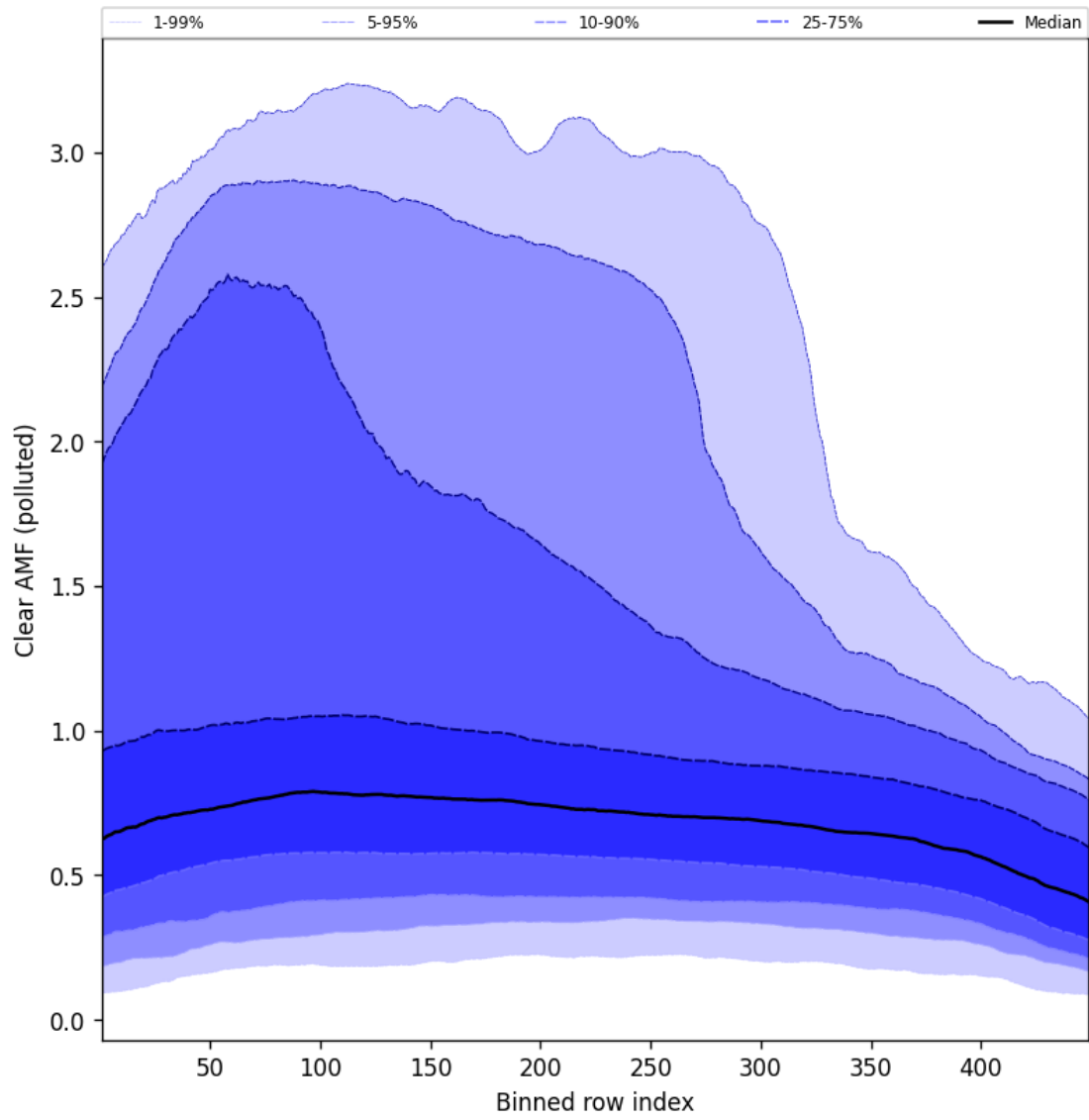


Figure 109: Along track statistics of “Clear AMF (polluted)” for 2024-12-16 to 2024-12-17

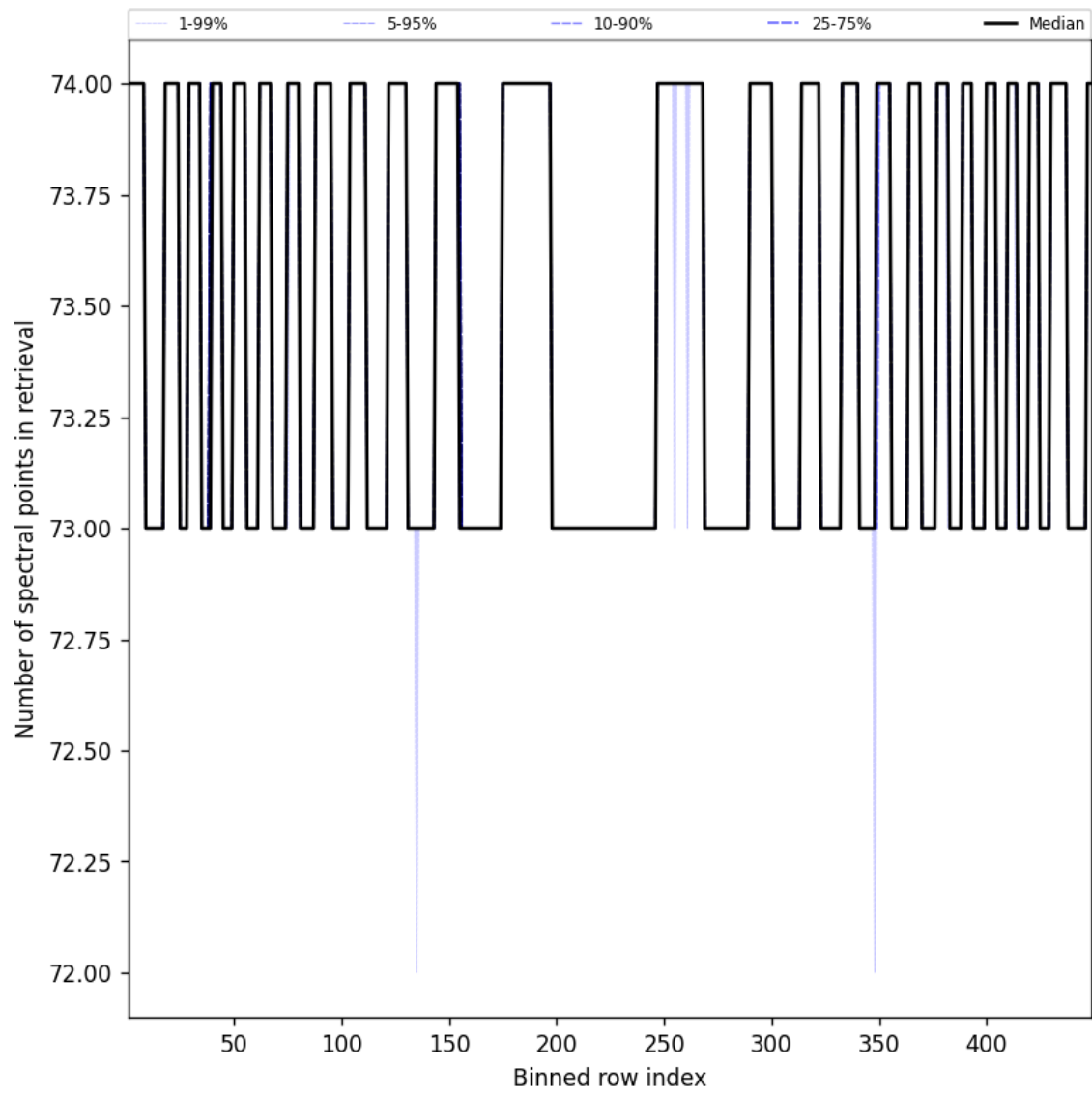


Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2024-12-16 to 2024-12-17

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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