

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]	0.610 ± 0.417	17197507	0.995	0.820	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(3.891 \pm 130.436) \times 10^{-2}$	17197507	0.223	0.408	8.860×10^{-3}	-102	263
sulfurdioxide total vertical column precision [DU]	0.552 ± 0.922	17197507	0.122	0.338	0.302	3.812×10^{-2}	172
sulfurdioxide slant column density corrected [DU]	$(1.619 \pm 33.814) \times 10^{-2}$	17197507	0.227	0.339	8.315×10^{-3}	-23.9	225
sulfurdioxide slant column density cobra [DU]	$(1.615 \pm 33.073) \times 10^{-2}$	17197507	0.227	0.339	8.315×10^{-3}	-23.9	46.4
sulfurdioxide slant column density cobra precision [DU]	0.271 ± 0.121	17197507	0.213	0.104	0.233	8.237×10^{-2}	20.8
sulfurdioxide slant column density window1 [DU]	0.107 ± 0.641	17197507	0.125	0.711	0.116	-83.0	86.5
sulfurdioxide slant column density window1 precision [DU]	0.271 ± 0.121	17197507	0.213	0.104	0.233	8.237×10^{-2}	20.8
sulfurdioxide slant column density corrected win1 [DU]	$(1.118 \pm 61.897) \times 10^{-2}$	17197507	-2.500×10^{-2}	0.674	-4.281×10^{-3}	-83.0	86.4
background so2 slant column offset window1 [DU]	$(-9.630 \pm 18.803) \times 10^{-2}$	17197507	-0.220	0.239	-0.160	-1.07	2.04
sulfurdioxide slant column density window2 [DU]	1.63 ± 8.61	17197507	1.75	10.7	1.53	-1.166×10^3	1.291×10^3
sulfurdioxide slant column density window2 precision [DU]	7.75 ± 2.25	17197507	6.97	2.54	7.37	2.10	537
sulfurdioxide slant column density corrected win2 [DU]	-1.23 ± 8.39	17197507	-1.25	10.5	-1.21	-1.167×10^3	1.290×10^3
background so2 slant column offset window2 [DU]	-2.86 ± 2.06	17197507	-1.75	2.34	-2.30	-16.1	5.49
sulfurdioxide slant column density window3 [DU]	-7.43 ± 23.28	17197507	-9.52	28.6	-7.75	-4.779×10^3	3.658×10^3
sulfurdioxide slant column density window3 precision [DU]	26.3 ± 12.7	17197507	22.5	10.2	23.3	8.78	1.830×10^3
sulfurdioxide slant column density corrected win3 [DU]	9.72 ± 22.59	17197507	9.52	27.7	9.73	-4.773×10^3	3.664×10^3
background so2 slant column offset window3 [DU]	17.1 ± 6.1	17197507	15.1	8.86	17.0	-16.4	51.9
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.22	17197507	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(3.694 \pm 9.017) \times 10^{-2}$	17197507	1.946×10^{-2}	2.323×10^{-2}	1.793×10^{-2}	7.626×10^{-4}	2.49
fitted radiance shift [nm]	$(-3.169 \pm 24.354) \times 10^{-4}$	17197507	-5.000×10^{-4}	1.669×10^{-3}	-3.712×10^{-4}	-4.072×10^{-2}	4.961×10^{-2}
fitted radiance squeeze [1]	$(-6.402 \pm 18.651) \times 10^{-5}$	17197507	-3.000×10^{-5}	2.200×10^{-4}	-5.195×10^{-5}	-1.573×10^{-2}	1.639×10^{-2}
fitted root mean square [1]	$(1.205 \pm 0.498) \times 10^{-3}$	17197507	9.750×10^{-4}	4.607×10^{-4}	1.065×10^{-3}	3.302×10^{-4}	0.108
sulfurdioxide total air mass factor polluted [1]	0.934 ± 0.613	17197507	0.620	0.688	0.774	5.000×10^{-2}	3.14
sulfurdioxide total air mass factor polluted precision [1]	0.152 ± 0.172	17197507	3.500×10^{-2}	0.175	8.140×10^{-2}	2.794×10^{-3}	1.63
sulfurdioxide clear air mass factor polluted [1]	0.799 ± 0.528	17197507	0.500	0.411	0.661	4.342×10^{-2}	3.16
number of spectral points in retrieval [1]	73.4 ± 0.5	17197507	73.0	1.000	73.0	71.0	74.0

Table 2: Percentile ranges

Variable	1 %	5 %	10 %	15.9 %	25 %	75 %	84.1 %	90 %	95 %	99 %
qa value [1]	0.0	0.0	3.000×10^{-2}	8.000×10^{-2}	0.180	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	-2.83	-0.894	-0.518	-0.338	-0.192	0.217	0.374	0.573	1.01	3.39
sulfurdioxide total vertical column precision [DU]	8.035×10^{-2}	0.103	0.123	0.148	0.191	0.528	0.741	1.08	1.80	4.65
sulfurdioxide slant column density corrected [DU]	-0.790	-0.452	-0.329	-0.247	-0.160	0.179	0.271	0.360	0.499	0.939
sulfurdioxide slant column density cobra [DU]	-0.790	-0.452	-0.329	-0.247	-0.160	0.179	0.271	0.360	0.499	0.939
sulfurdioxide slant column density cobra precision [DU]	0.138	0.161	0.174	0.185	0.198	0.302	0.364	0.420	0.500	0.727
sulfurdioxide slant column density window1 [DU]	-1.60	-0.891	-0.622	-0.439	-0.246	0.465	0.645	0.816	1.07	1.81
sulfurdioxide slant column density window1 precision [DU]	0.138	0.161	0.174	0.185	0.198	0.302	0.364	0.420	0.500	0.727
sulfurdioxide slant column density corrected win1 [DU]	-1.53	-0.904	-0.669	-0.509	-0.338	0.336	0.519	0.697	0.974	1.78
background so2 slant column offset window1 [DU]	-0.390	-0.300	-0.271	-0.248	-0.225	1.354×10^{-2}	0.121	0.196	0.264	0.413
sulfurdioxide slant column density window2 [DU]	-18.7	-12.1	-8.86	-6.48	-3.81	6.93	9.66	12.2	15.6	23.4
sulfurdioxide slant column density window2 precision [DU]	4.17	4.93	5.39	5.78	6.26	8.80	9.69	10.6	11.9	14.6
sulfurdioxide slant column density corrected win2 [DU]	-21.7	-14.8	-11.5	-9.13	-6.48	4.03	6.65	9.01	12.2	19.2
background so2 slant column offset window2 [DU]	-9.48	-7.06	-5.72	-4.77	-3.81	-1.47	-1.20	-0.975	-0.628	0.640
sulfurdioxide slant column density window3 [DU]	-65.8	-44.8	-35.4	-28.9	-21.8	6.85	14.6	21.6	31.2	50.2
sulfurdioxide slant column density window3 precision [DU]	12.9	14.5	15.8	17.1	18.9	29.1	33.6	38.9	49.5	79.8
sulfurdioxide slant column density corrected win3 [DU]	-47.9	-27.1	-17.7	-11.1	-4.03	23.7	30.8	37.4	46.5	65.2
background so2 slant column offset window3 [DU]	4.13	7.17	8.95	10.6	12.8	21.7	23.9	25.5	27.0	29.6
sulfurdioxide slant column cobra flag [1]	0.0	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
integrated so2 profile apriori [DU]	2.111×10^{-3}	4.194×10^{-3}	5.860×10^{-3}	7.450×10^{-3}	9.959×10^{-3}	3.319×10^{-2}	4.683×10^{-2}	6.243×10^{-2}	0.107	0.390
fitted radiance shift [nm]	-7.657×10^{-3}	-3.825×10^{-3}	-2.486×10^{-3}	-1.774×10^{-3}	-1.202×10^{-3}	4.678×10^{-4}	1.146×10^{-3}	1.999×10^{-3}	3.464×10^{-3}	7.452×10^{-3}
fitted radiance squeeze [1]	-5.821×10^{-4}	-3.806×10^{-4}	-2.933×10^{-4}	-2.324×10^{-4}	-1.682×10^{-4}	5.181×10^{-5}	1.021×10^{-4}	1.477×10^{-4}	2.115×10^{-4}	3.629×10^{-4}
fitted root mean square [1]	5.787×10^{-4}	7.005×10^{-4}	7.723×10^{-4}	8.287×10^{-4}	8.964×10^{-4}	1.357×10^{-3}	1.600×10^{-3}	1.834×10^{-3}	2.167×10^{-3}	3.080×10^{-3}
sulfurdioxide total air mass factor polluted [1]	7.414×10^{-2}	0.188	0.300	0.399	0.506	1.19	1.56	1.93	2.30	2.64
sulfurdioxide total air mass factor polluted precision [1]	8.832×10^{-3}	1.614×10^{-2}	2.233×10^{-2}	2.784×10^{-2}	3.553×10^{-2}	0.210	0.293	0.374	0.498	0.818
sulfurdioxide clear air mass factor polluted [1]	0.167	0.285	0.363	0.416	0.481	0.891	1.03	1.42	2.19	2.68
number of spectral points in retrieval [1]	73.0	73.0	73.0	73.0	73.0	74.0	74.0	74.0	74.0	74.0

Table 3: Parameterlist and basic statistics for the analysis for observations in the northern hemisphere

Variable	mean $\pm \sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.709 ± 0.391	5841208	0.680	1.000	0.0	1.000	0.320	1.000
sulfurdioxide total vertical column [DU]	$(8.152 \pm 199.453) \times 10^{-2}$	5841208	0.599	1.575×10^{-2}	-102	263	-0.276	0.322
sulfurdioxide total vertical column precision [DU]	0.853 ± 1.325	5841208	0.576	0.420	5.410×10^{-2}	42.8	0.269	0.845
sulfurdioxide slant column density corrected [DU]	$(2.377 \pm 40.568) \times 10^{-2}$	5841208	0.395	1.163×10^{-2}	-7.59	37.3	-0.184	0.211
sulfurdioxide slant column density cobra [DU]	$(2.372 \pm 40.327) \times 10^{-2}$	5841208	0.395	1.163×10^{-2}	-7.59	20.0	-0.184	0.211
sulfurdioxide slant column density cobra precision [DU]	0.321 ± 0.148	5841208	0.162	0.272	9.028×10^{-2}	10.0	0.221	0.384
sulfurdioxide slant column density window1 [DU]	0.182 ± 0.737	5841208	0.787	0.186	-83.0	10.0	-0.210	0.577
sulfurdioxide slant column density window1 precision [DU]	0.321 ± 0.148	5841208	0.162	0.272	9.028×10^{-2}	10.0	0.221	0.384
sulfurdioxide slant column density corrected win1 [DU]	$(3.570 \pm 73.786) \times 10^{-2}$	5841208	0.781	1.084×10^{-2}	-83.0	10.7	-0.373	0.408
background so2 slant column offset window1 [DU]	-0.146 ± 0.148	5841208	0.123	-0.169	-1.07	2.04	-0.228	-0.105
sulfurdioxide slant column density window2 [DU]	2.16 ± 9.77	5841208	12.4	1.85	-252	356	-4.20	8.16
sulfurdioxide slant column density window2 precision [DU]	8.77 ± 2.35	5841208	2.90	8.44	2.36	537	7.15	10.1
sulfurdioxide slant column density corrected win2 [DU]	-1.22 ± 9.44	5841208	12.0	-1.22	-260	355	-7.23	4.78
background so2 slant column offset window2 [DU]	-3.38 ± 2.57	5841208	3.16	-2.41	-16.1	5.49	-4.74	-1.58
sulfurdioxide slant column density window3 [DU]	-9.65 ± 25.97	5841208	32.7	-9.09	-212	174	-25.7	7.06
sulfurdioxide slant column density window3 precision [DU]	30.0 ± 12.7	5841208	10.1	27.1	9.73	217	22.9	33.0
sulfurdioxide slant column density corrected win3 [DU]	9.31 ± 25.58	5841208	32.3	9.58	-190	187	-6.64	25.6
background so2 slant column offset window3 [DU]	19.0 ± 5.1	5841208	7.91	18.0	-10.8	51.9	15.0	22.9
sulfurdioxide slant column cobra flag [1]	1.96 ± 0.28	5841208	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(6.850 \pm 14.482) \times 10^{-2}$	5841208	4.425×10^{-2}	2.579×10^{-2}	1.135×10^{-3}	2.49	1.541×10^{-2}	5.967×10^{-2}
fitted radiance shift [nm]	$(-1.206 \pm 25.823) \times 10^{-4}$	5841208	1.751×10^{-3}	-1.514×10^{-4}	-3.588×10^{-2}	3.474×10^{-2}	-1.015×10^{-3}	7.361×10^{-4}
fitted radiance squeeze [1]	$(-1.237 \pm 18.709) \times 10^{-5}$	5841208	2.140×10^{-4}	-9.096×10^{-6}	-1.303×10^{-2}	1.763×10^{-3}	-1.172×10^{-4}	9.681×10^{-5}
fitted root mean square [1]	$(1.394 \pm 0.609) \times 10^{-3}$	5841208	6.575×10^{-4}	1.203×10^{-3}	3.602×10^{-4}	0.108	9.903×10^{-4}	1.648×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.692 ± 0.373	5841208	0.480	0.658	5.000×10^{-2}	2.93	0.420	0.901
sulfurdioxide total air mass factor polluted precision [1]	$(8.992 \pm 11.459) \times 10^{-2}$	5841208	8.176×10^{-2}	4.776×10^{-2}	2.794×10^{-3}	1.60	2.910×10^{-2}	0.111
sulfurdioxide clear air mass factor polluted [1]	0.629 ± 0.261	5841208	0.408	0.637	4.342×10^{-2}	2.07	0.423	0.831
number of spectral points in retrieval [1]	73.5 ± 0.5	5841208	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]	0.560 ± 0.421	11356299	0.870	0.490	0.0	1.000	0.130	1.000
sulfurdioxide total vertical column [DU]	$(1.699 \pm 72.724) \times 10^{-2}$	11356299	0.341	6.787×10^{-3}	-93.5	207	-0.162	0.179
sulfurdioxide total vertical column precision [DU]	0.397 ± 0.561	11356299	0.271	0.259	3.812×10^{-2}	172	0.159	0.429
sulfurdioxide slant column density corrected [DU]	$(1.229 \pm 29.741) \times 10^{-2}$	11356299	0.316	6.918×10^{-3}	-23.9	225	-0.150	0.166
sulfurdioxide slant column density cobra [DU]	$(1.225 \pm 28.627) \times 10^{-2}$	11356299	0.316	6.918×10^{-3}	-23.9	46.4	-0.150	0.166
sulfurdioxide slant column density cobra precision [DU]	0.245 ± 0.094	11356299	7.674×10^{-2}	0.220	8.237×10^{-2}	20.8	0.190	0.267
sulfurdioxide slant column density window1 [DU]	$(6.911 \pm 58.150) \times 10^{-2}$	11356299	0.674	8.502×10^{-2}	-74.4	86.5	-0.262	0.412
sulfurdioxide slant column density window1 precision [DU]	0.245 ± 0.094	11356299	7.674×10^{-2}	0.220	8.237×10^{-2}	20.8	0.190	0.267
sulfurdioxide slant column density corrected win1 [DU]	$(-1.426 \pm 547.423) \times 10^{-3}$	11356299	0.629	-1.065×10^{-2}	-74.4	86.4	-0.323	0.306
background so2 slant column offset window1 [DU]	$(-7.053 \pm 20.067) \times 10^{-2}$	11356299	0.308	-0.145	-1.07	1.66	-0.224	8.381×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.36 ± 7.93	11356299	10.0	1.40	-1.166×10^3	1.291×10^3	-3.64	6.40
sulfurdioxide slant column density window2 precision [DU]	7.22 ± 2.00	11356299	2.11	6.94	2.10	483	5.98	8.08
sulfurdioxide slant column density corrected win2 [DU]	-1.23 ± 7.80	11356299	9.85	-1.20	-1.167×10^3	1.290×10^3	-6.14	3.70
background so2 slant column offset window2 [DU]	-2.59 ± 1.67	11356299	2.17	-2.24	-10.9	4.57	-3.57	-1.40
sulfurdioxide slant column density window3 [DU]	-6.29 ± 21.68	11356299	26.9	-7.19	-4.779×10^3	3.658×10^3	-20.2	6.76
sulfurdioxide slant column density window3 precision [DU]	24.4 ± 12.3	11356299	8.53	21.4	8.78	1.830×10^3	17.6	26.2
sulfurdioxide slant column density corrected win3 [DU]	9.93 ± 20.89	11356299	25.7	9.79	-4.773×10^3	3.664×10^3	-2.93	22.8
background so2 slant column offset window3 [DU]	16.2 ± 6.4	11356299	10.0	16.2	-16.4	33.8	11.0	21.1
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.18	11356299	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.070 \pm 2.737) \times 10^{-2}$	11356299	1.790×10^{-2}	1.446×10^{-2}	7.626×10^{-4}	2.09	8.154×10^{-3}	2.605×10^{-2}
fitted radiance shift [nm]	$(-4.179 \pm 23.499) \times 10^{-4}$	11356299	1.588×10^{-3}	-4.792×10^{-4}	-4.072×10^{-2}	4.961×10^{-2}	-1.270×10^{-3}	3.184×10^{-4}
fitted radiance squeeze [1]	$(-9.058 \pm 18.055) \times 10^{-5}$	11356299	2.201×10^{-4}	-7.403×10^{-5}	-1.573×10^{-2}	1.639×10^{-2}	-1.924×10^{-4}	2.769×10^{-5}
fitted root mean square [1]	$(1.108 \pm 0.397) \times 10^{-3}$	11356299	3.706×10^{-4}	1.011×10^{-3}	3.302×10^{-4}	8.865×10^{-2}	8.638×10^{-4}	1.234×10^{-3}
sulfurdioxide total air mass factor polluted [1]	1.06 ± 0.67	11356299	0.902	0.856	5.000×10^{-2}	3.14	0.556	1.46
sulfurdioxide total air mass factor polluted precision [1]	0.183 ± 0.187	11356299	0.225	0.122	4.928×10^{-3}	1.63	4.128×10^{-2}	0.266
sulfurdioxide clear air mass factor polluted [1]	0.886 ± 0.605	11356299	0.451	0.676	0.134	3.16	0.500	0.951
number of spectral points in retrieval [1]	73.4 ± 0.5	11356299	1.000	73.0	71.0	74.0	73.0	74.0

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

Variable	mean $\pm \sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.655 ± 0.407	12108680	0.770	1.000	0.0	1.000	0.230	1.000
sulfurdioxide total vertical column [DU]	$(2.833 \pm 112.349) \times 10^{-2}$	12108680	0.428	8.746×10^{-3}	-102	248	-0.203	0.225
sulfurdioxide total vertical column precision [DU]	0.516 ± 0.790	12108680	0.302	0.310	4.571×10^{-2}	42.8	0.213	0.515
sulfurdioxide slant column density corrected [DU]	$(1.250 \pm 30.086) \times 10^{-2}$	12108680	0.322	7.193×10^{-3}	-23.9	121	-0.153	0.169
sulfurdioxide slant column density cobra [DU]	$(1.249 \pm 29.841) \times 10^{-2}$	12108680	0.322	7.193×10^{-3}	-23.9	21.0	-0.153	0.169
sulfurdioxide slant column density cobra precision [DU]	0.255 ± 0.108	12108680	8.277×10^{-2}	0.222	8.237×10^{-2}	12.2	0.192	0.275
sulfurdioxide slant column density window1 [DU]	0.139 ± 0.583	12108680	0.659	0.142	-83.0	75.2	-0.191	0.468
sulfurdioxide slant column density window1 precision [DU]	0.255 ± 0.108	12108680	8.277×10^{-2}	0.222	8.237×10^{-2}	12.2	0.192	0.275
sulfurdioxide slant column density corrected win1 [DU]	$(8.849 \pm 571.211) \times 10^{-3}$	12108680	0.639	-3.226×10^{-3}	-83.0	75.3	-0.320	0.319
background so2 slant column offset window1 [DU]	-0.130 ± 0.154	12108680	0.179	-0.173	-1.07	1.96	-0.229	-5.063×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.23 ± 8.32	12108680	10.5	1.15	-1.154×10^3	675	-4.07	6.40
sulfurdioxide slant column density window2 precision [DU]	7.57 ± 2.10	12108680	2.39	7.23	2.10	400	6.17	8.56
sulfurdioxide slant column density corrected win2 [DU]	-1.27 ± 8.16	12108680	10.3	-1.25	-1.156×10^3	672	-6.43	3.91
background so2 slant column offset window2 [DU]	-2.50 ± 1.79	12108680	1.79	-2.09	-16.1	5.49	-3.19	-1.40
sulfurdioxide slant column density window3 [DU]	-4.35 ± 22.75	12108680	28.5	-4.88	-434	199	-18.7	9.75
sulfurdioxide slant column density window3 precision [DU]	26.2 ± 12.2	12108680	9.43	23.2	8.78	198	19.4	28.8
sulfurdioxide slant column density corrected win3 [DU]	11.7 ± 22.0	12108680	27.6	11.3	-423	211	-2.21	25.4
background so2 slant column offset window3 [DU]	16.1 ± 5.5	12108680	7.58	16.1	-16.4	51.9	12.3	19.9
sulfurdioxide slant column cobra flag [1]	1.99 ± 0.14	12108680	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.791 \pm 4.514) \times 10^{-2}$	12108680	1.971×10^{-2}	1.844×10^{-2}	1.907×10^{-3}	2.09	1.126×10^{-2}	3.096×10^{-2}
fitted radiance shift [nm]	$(-2.502 \pm 24.078) \times 10^{-4}$	12108680	1.758×10^{-3}	-2.655×10^{-4}	-3.588×10^{-2}	3.483×10^{-2}	-1.156×10^{-3}	6.019×10^{-4}
fitted radiance squeeze [1]	$(-4.609 \pm 16.593) \times 10^{-5}$	12108680	1.960×10^{-4}	-3.870×10^{-5}	-1.324×10^{-2}	1.345×10^{-2}	-1.399×10^{-4}	5.612×10^{-5}
fitted root mean square [1]	$(1.129 \pm 0.447) \times 10^{-3}$	12108680	3.651×10^{-4}	1.011×10^{-3}	3.302×10^{-4}	0.108	8.649×10^{-4}	1.230×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.810 ± 0.436	12108680	0.514	0.741	5.000×10^{-2}	2.52	0.508	1.02
sulfurdioxide total air mass factor polluted precision [1]	0.134 ± 0.146	12108680	0.149	7.052×10^{-2}	3.013×10^{-3}	1.54	3.617×10^{-2}	0.186
sulfurdioxide clear air mass factor polluted [1]	0.652 ± 0.226	12108680	0.333	0.630	5.846×10^{-2}	2.71	0.480	0.813
number of spectral points in retrieval [1]	73.4 ± 0.5	12108680	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]	0.493 ± 0.420	4545356	0.910	0.400	0.0	1.000	9.000×10^{-2}	1.000
sulfurdioxide total vertical column [DU]	$(5.740 \pm 152.524) \times 10^{-2}$	4545356	0.336	8.387×10^{-3}	-93.5	263	-0.154	0.182
sulfurdioxide total vertical column precision [DU]	0.582 ± 1.084	4545356	0.406	0.255	3.812×10^{-2}	172	0.128	0.534
sulfurdioxide slant column density corrected [DU]	$(2.446 \pm 41.359) \times 10^{-2}$	4545356	0.389	1.118×10^{-2}	-12.9	225	-0.181	0.208
sulfurdioxide slant column density cobra [DU]	$(2.434 \pm 39.549) \times 10^{-2}$	4545356	0.389	1.118×10^{-2}	-12.9	46.4	-0.181	0.208
sulfurdioxide slant column density cobra precision [DU]	0.309 ± 0.138	4545356	0.128	0.269	8.975×10^{-2}	20.8	0.222	0.350
sulfurdioxide slant column density window1 [DU]	$(1.626 \pm 75.716) \times 10^{-2}$	4545356	0.859	2.044×10^{-2}	-74.4	86.5	-0.418	0.441
sulfurdioxide slant column density window1 precision [DU]	0.309 ± 0.138	4545356	0.128	0.269	8.975×10^{-2}	20.8	0.222	0.350
sulfurdioxide slant column density corrected win1 [DU]	$(1.457 \pm 71.912) \times 10^{-2}$	4545356	0.777	-9.112×10^{-3}	-74.4	86.4	-0.391	0.386
background so2 slant column offset window1 [DU]	$(-1.685 \pm 234.423) \times 10^{-3}$	4545356	0.412	-6.323×10^{-2}	-1.07	2.04	-0.204	0.208
sulfurdioxide slant column density window2 [DU]	2.64 ± 9.14	4545356	11.2	2.60	-1.166×10^3	1.291×10^3	-3.02	8.22
sulfurdioxide slant column density window2 precision [DU]	8.13 ± 2.51	4545356	2.83	7.71	2.33	483	6.48	9.30
sulfurdioxide slant column density corrected win2 [DU]	-1.11 ± 8.86	4545356	10.9	-1.10	-1.167×10^3	1.290×10^3	-6.54	4.33
background so2 slant column offset window2 [DU]	-3.75 ± 2.33	4545356	3.62	-3.59	-14.6	3.56	-5.34	-1.73
sulfurdioxide slant column density window3 [DU]	-14.9 ± 22.6	4545356	26.8	-14.6	-4.779×10^3	571	-28.1	-1.31
sulfurdioxide slant column density window3 precision [DU]	26.1 ± 13.5	4545356	11.8	23.0	9.56	1.830×10^3	17.6	29.4
sulfurdioxide slant column density corrected win3 [DU]	5.02 ± 23.07	4545356	27.5	6.05	-4.773×10^3	574	-8.14	19.3
background so2 slant column offset window3 [DU]	20.0 ± 6.7	4545356	10.8	21.7	-10.4	51.8	14.7	25.5
sulfurdioxide slant column cobra flag [1]	1.94 ± 0.33	4545356	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(5.083 \pm 13.117) \times 10^{-2}$	4545356	3.355×10^{-2}	1.414×10^{-2}	7.626×10^{-4}	2.49	6.272×10^{-3}	3.982×10^{-2}
fitted radiance shift [nm]	$(-5.131 \pm 24.305) \times 10^{-4}$	4545356	1.344×10^{-3}	-6.292×10^{-4}	-4.072×10^{-2}	4.961×10^{-2}	-1.274×10^{-3}	6.979×10^{-5}
fitted radiance squeeze [1]	$(-1.166 \pm 2.240) \times 10^{-4}$	4545356	2.854×10^{-4}	-1.102×10^{-4}	-1.573×10^{-2}	1.639×10^{-2}	-2.562×10^{-4}	2.924×10^{-5}
fitted root mean square [1]	$(1.392 \pm 0.556) \times 10^{-3}$	4545356	5.851×10^{-4}	1.255×10^{-3}	3.362×10^{-4}	8.865×10^{-2}	1.028×10^{-3}	1.613×10^{-3}
sulfurdioxide total air mass factor polluted [1]	1.29 ± 0.84	4545356	1.61	1.08	5.000×10^{-2}	3.14	0.538	2.15
sulfurdioxide total air mass factor polluted precision [1]	0.204 ± 0.221	4545356	0.255	0.132	2.794×10^{-3}	1.63	3.494×10^{-2}	0.290
sulfurdioxide clear air mass factor polluted [1]	1.21 ± 0.82	4545356	1.45	0.926	4.342×10^{-2}	3.16	0.513	1.97
number of spectral points in retrieval [1]	73.4 ± 0.5	4545356	1.000	73.0	71.0	74.0	73.0	74.0

3 Granule outlines

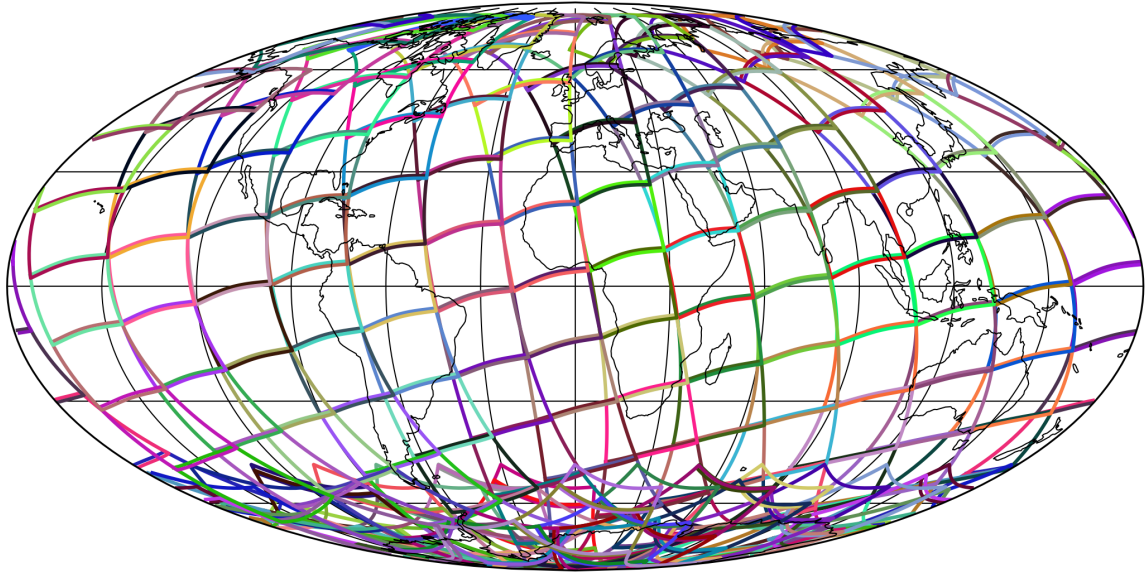


Figure 1: Outline of the granules.

4 Input data monitoring

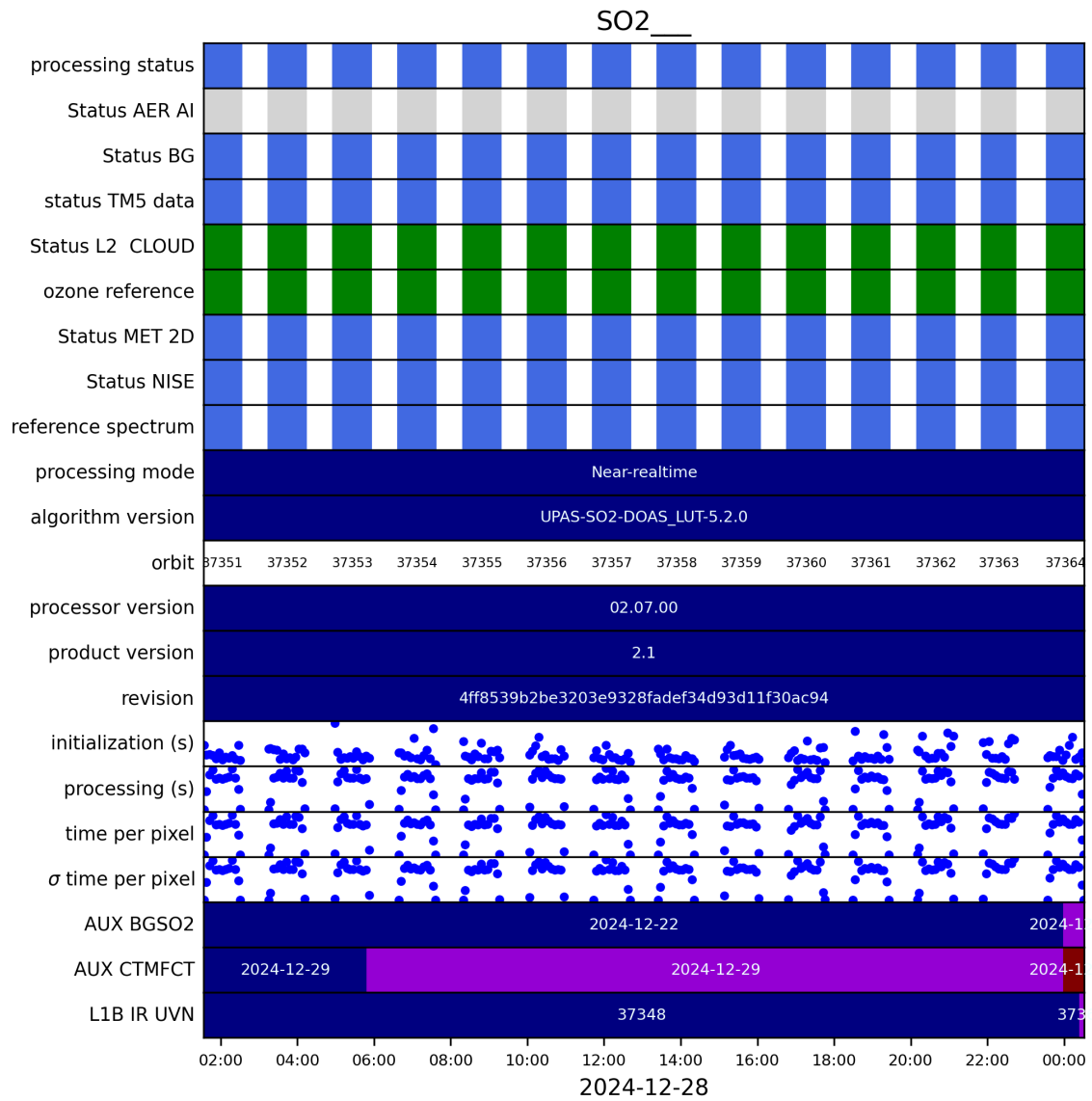


Figure 2: Input data per granule

5 Warnings and errors

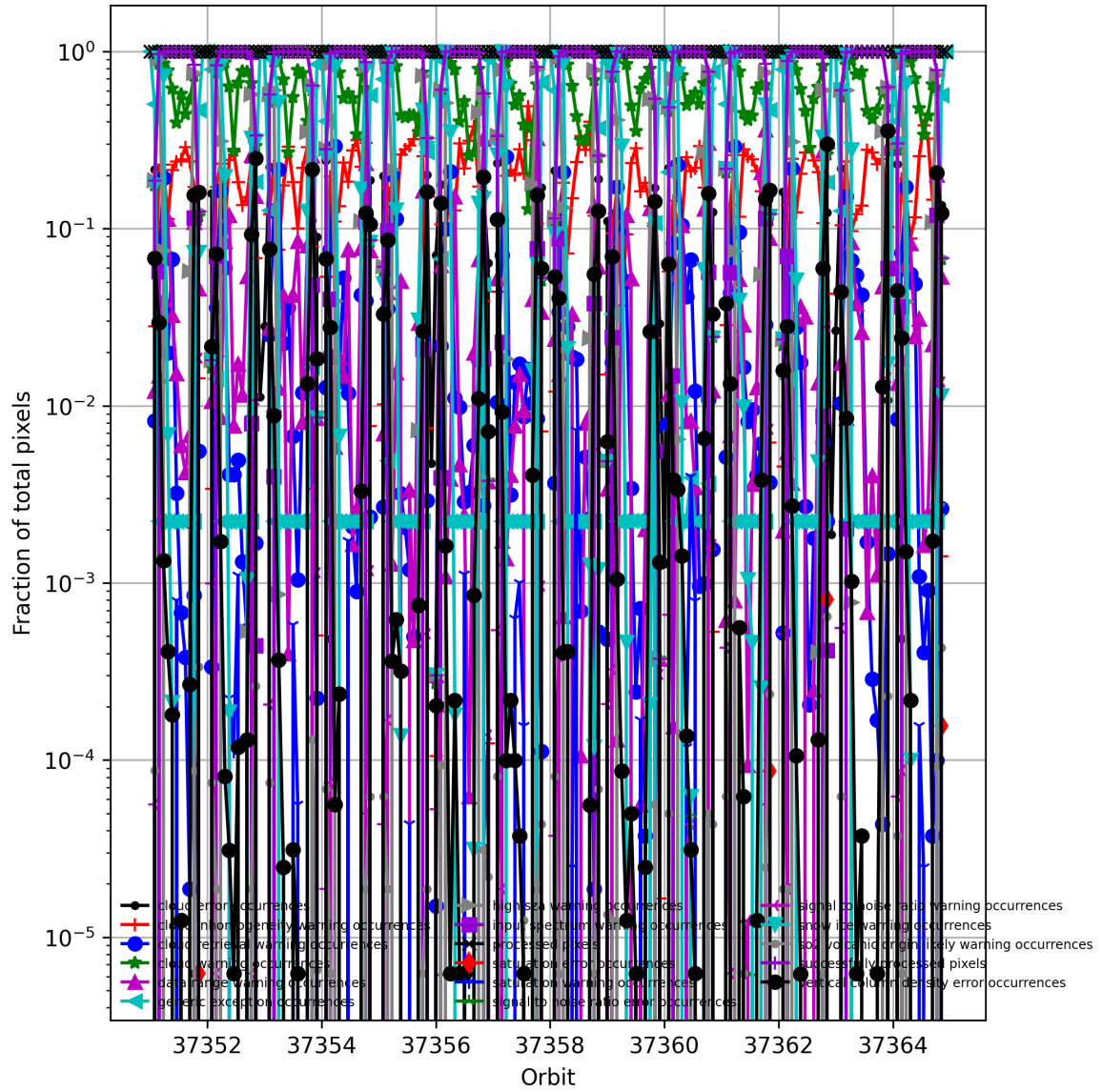


Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

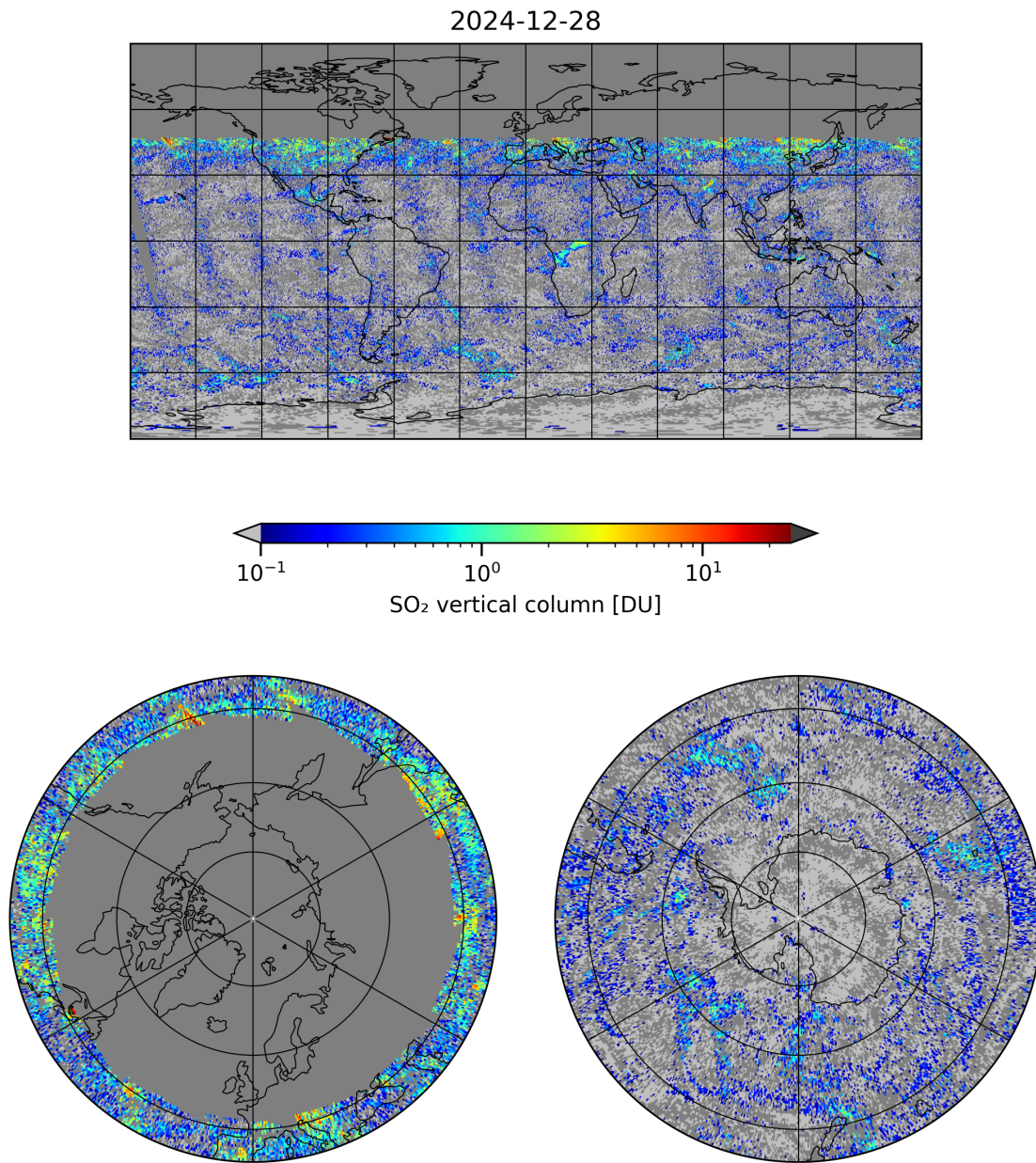


Figure 4: Map of “SO₂ vertical column” for 2024-12-28 to 2024-12-29

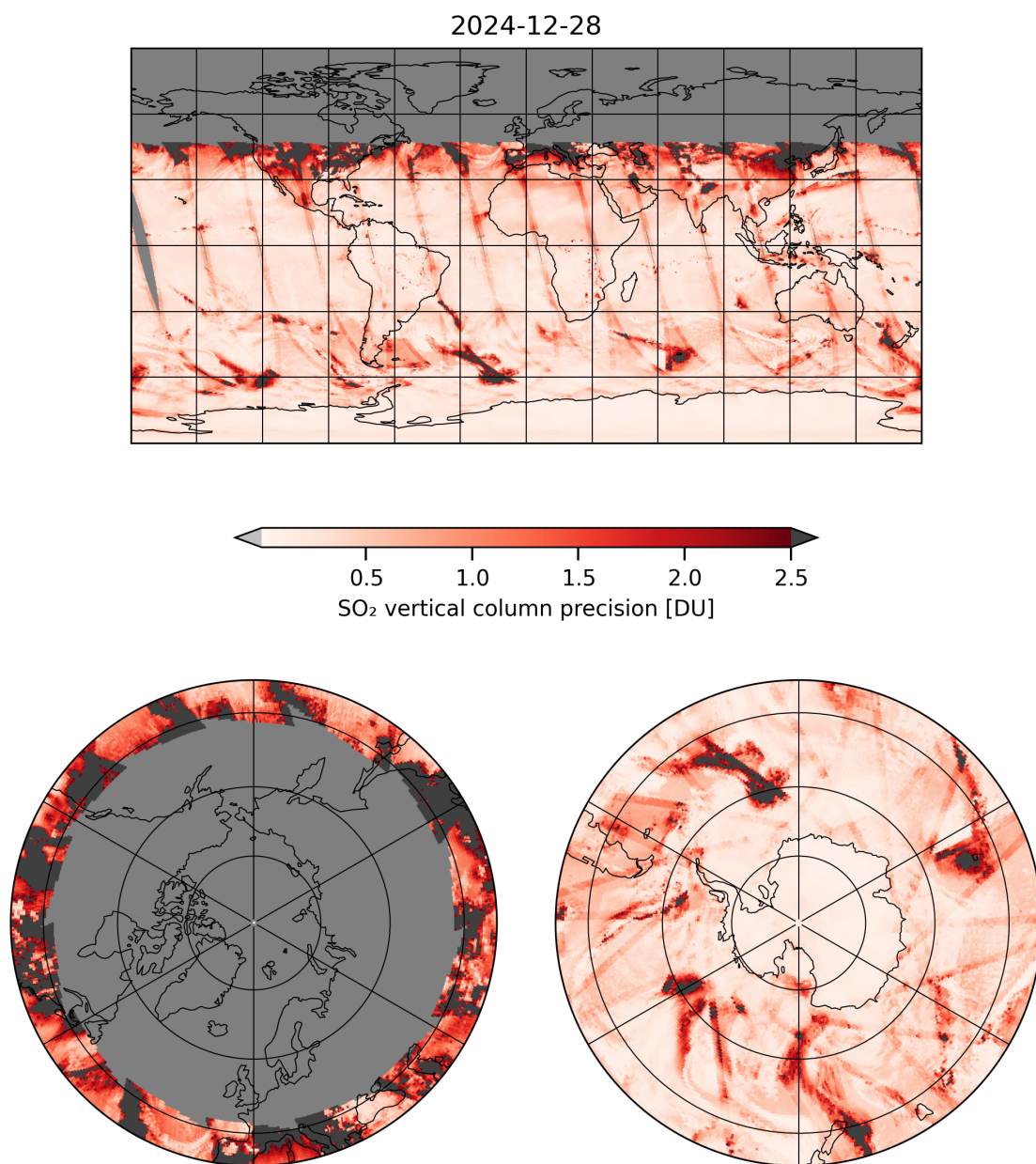


Figure 5: Map of “SO₂ vertical column precision” for 2024-12-28 to 2024-12-29

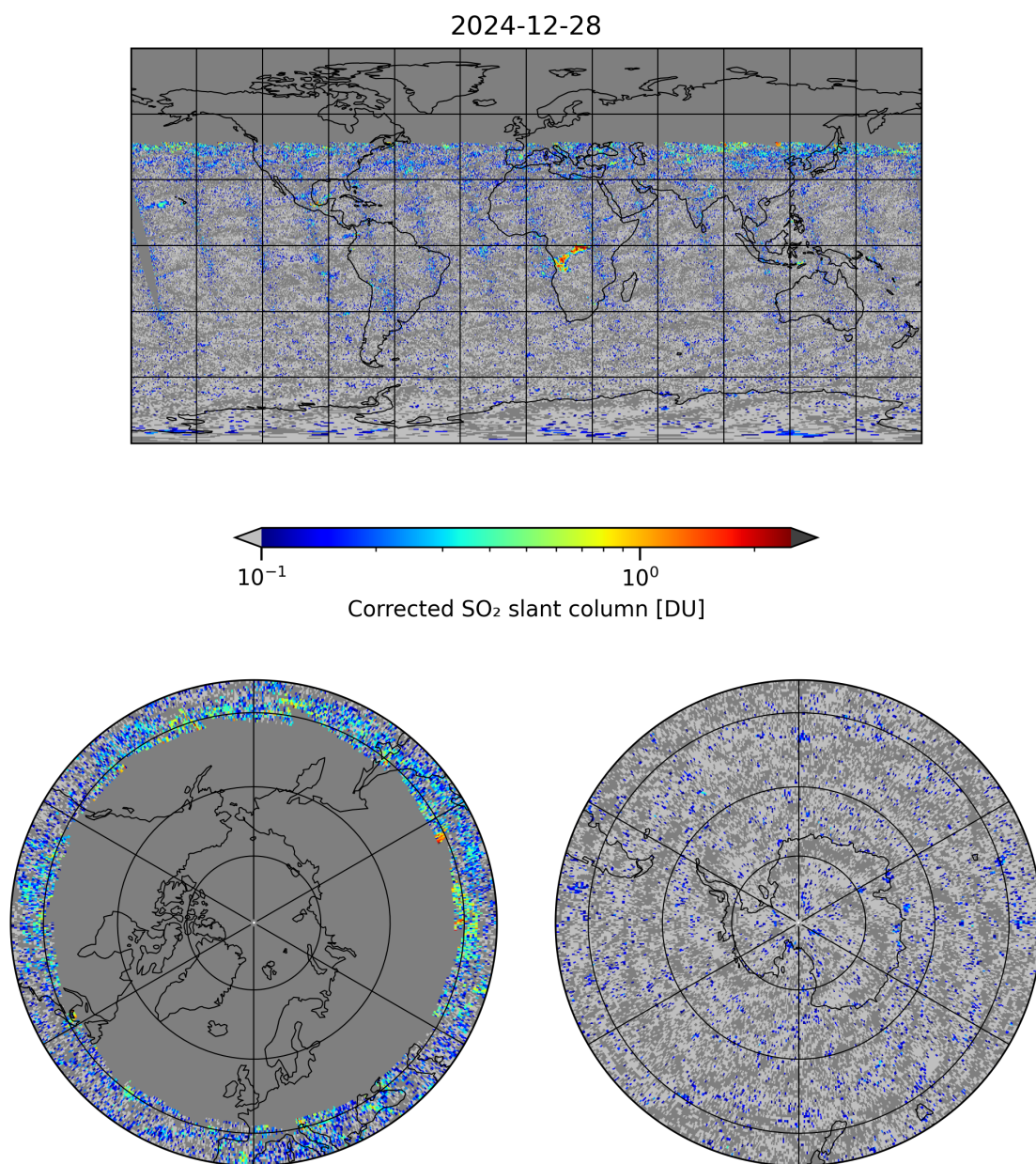


Figure 6: Map of “Corrected SO₂ slant column” for 2024-12-28 to 2024-12-29

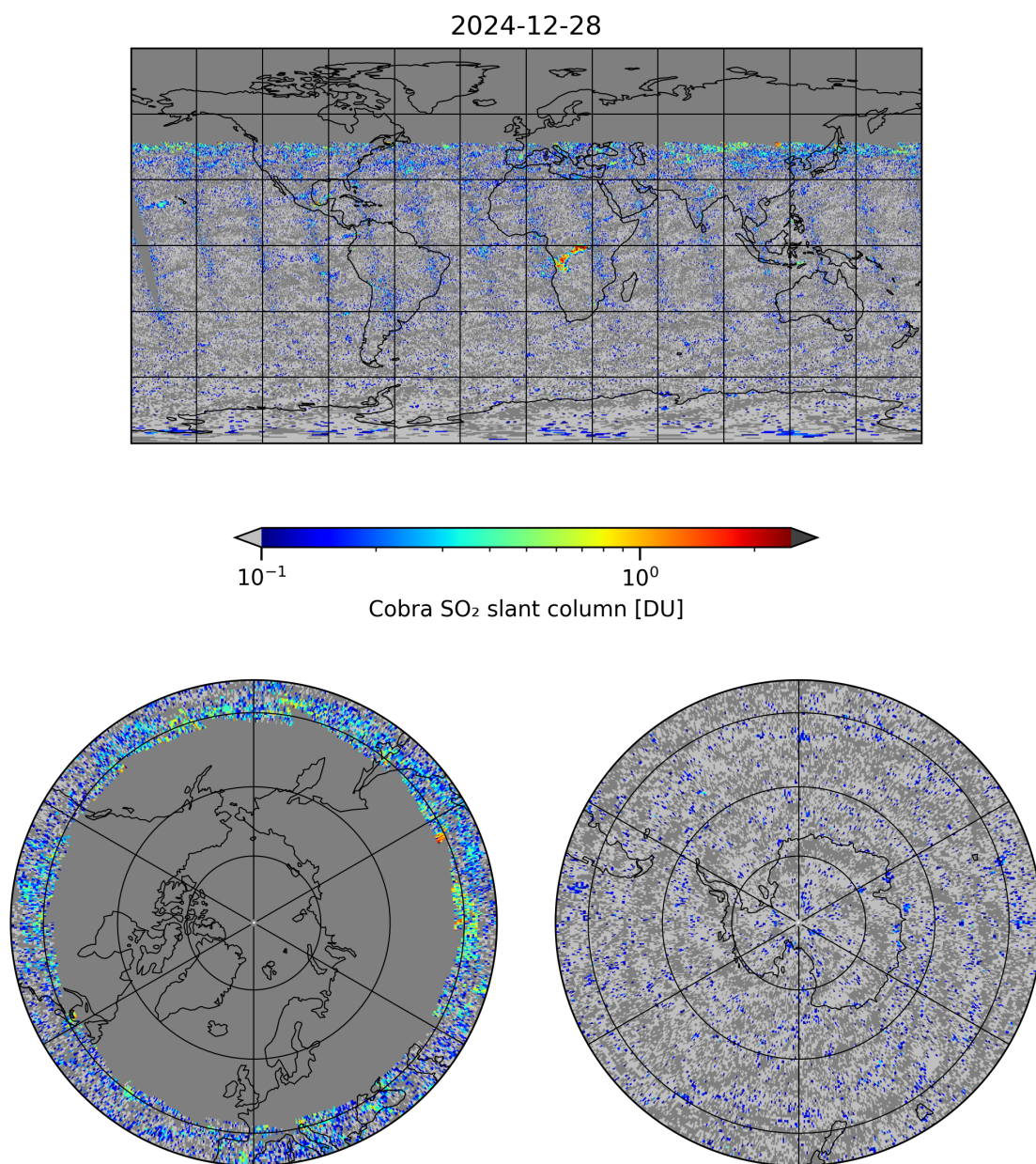


Figure 7: Map of “Cobra SO₂ slant column” for 2024-12-28 to 2024-12-29

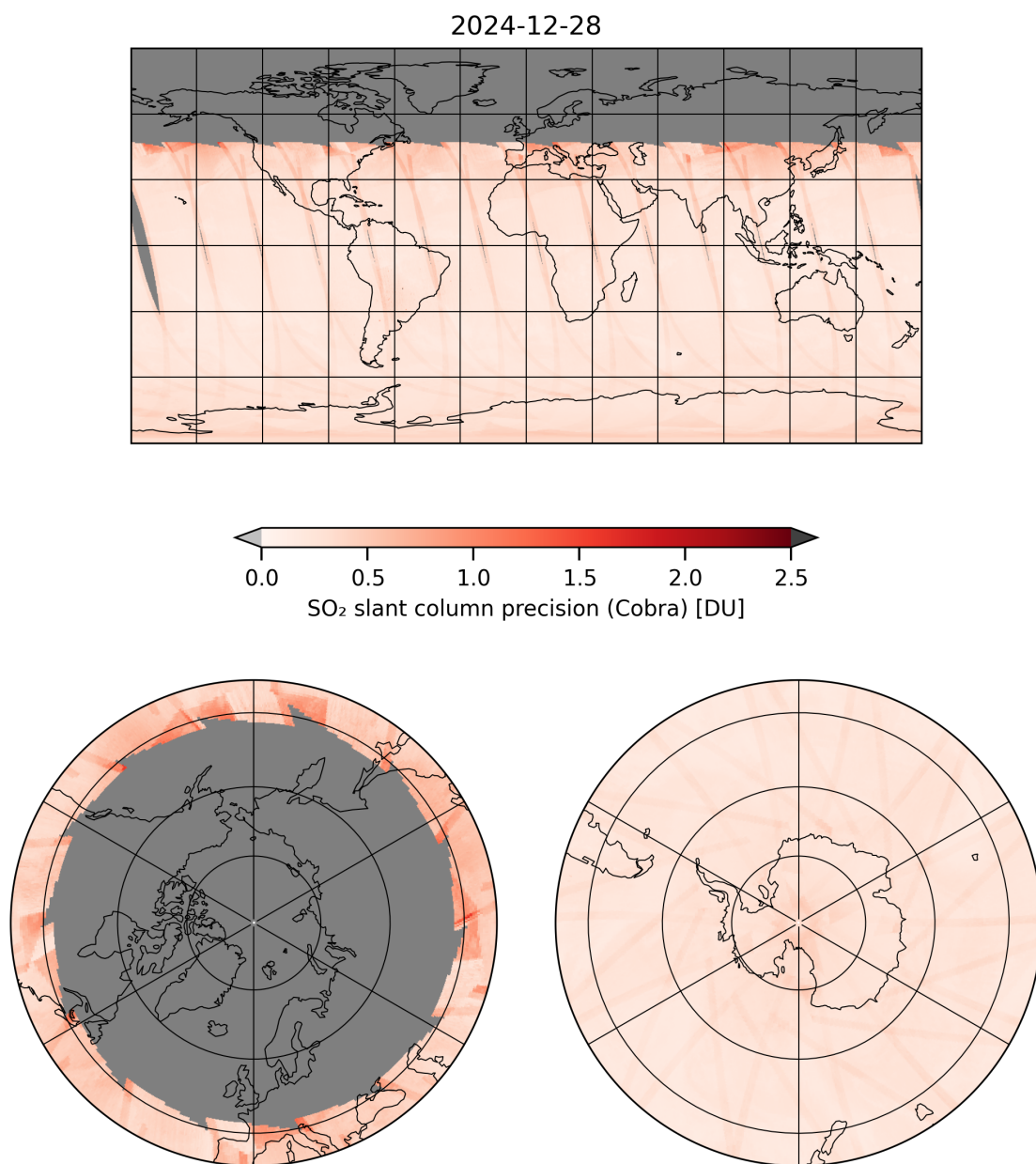


Figure 8: Map of “SO₂ slant column precision (Cobra)” for 2024-12-28 to 2024-12-29

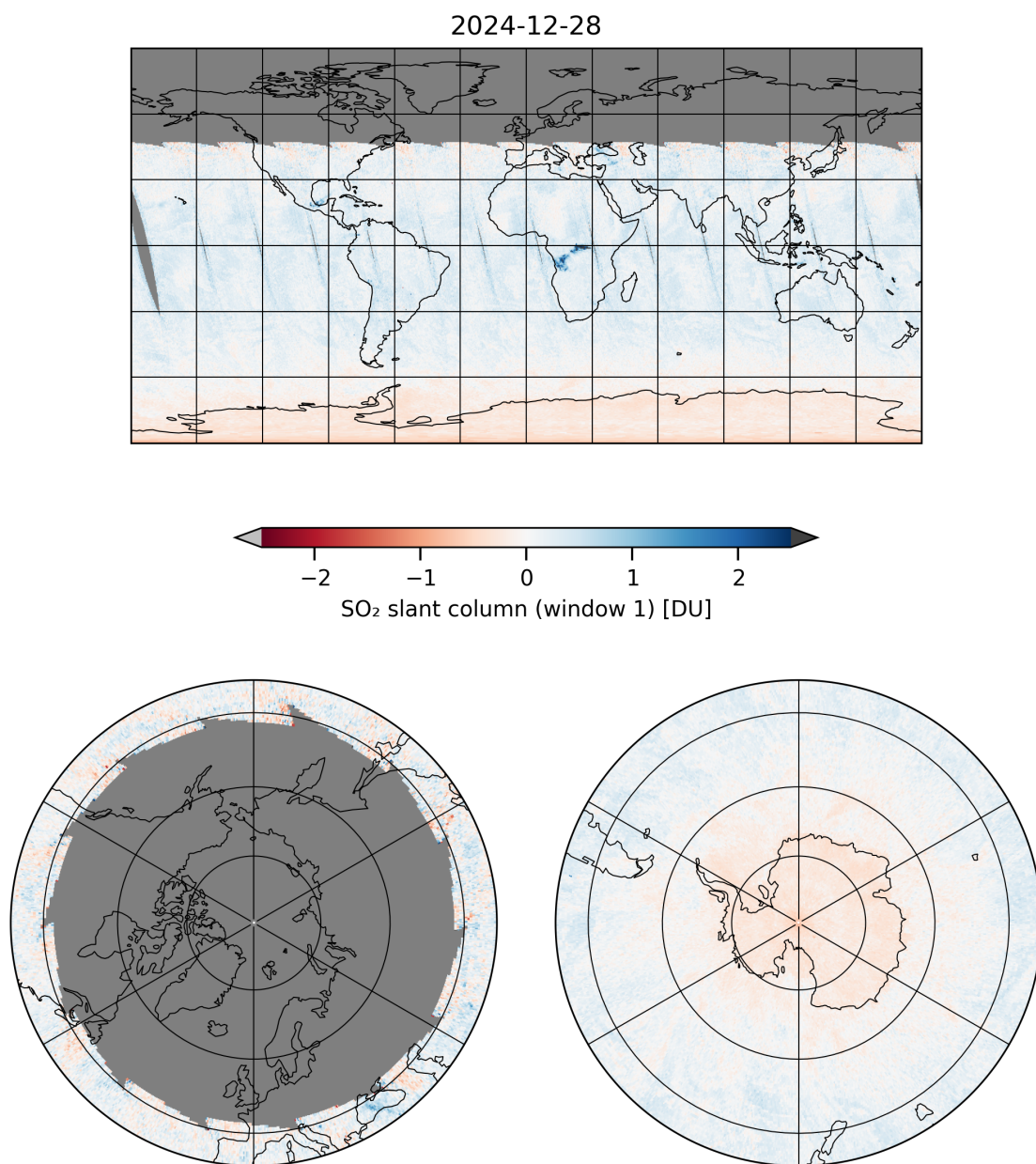


Figure 9: Map of “SO₂ slant column (window 1)” for 2024-12-28 to 2024-12-29

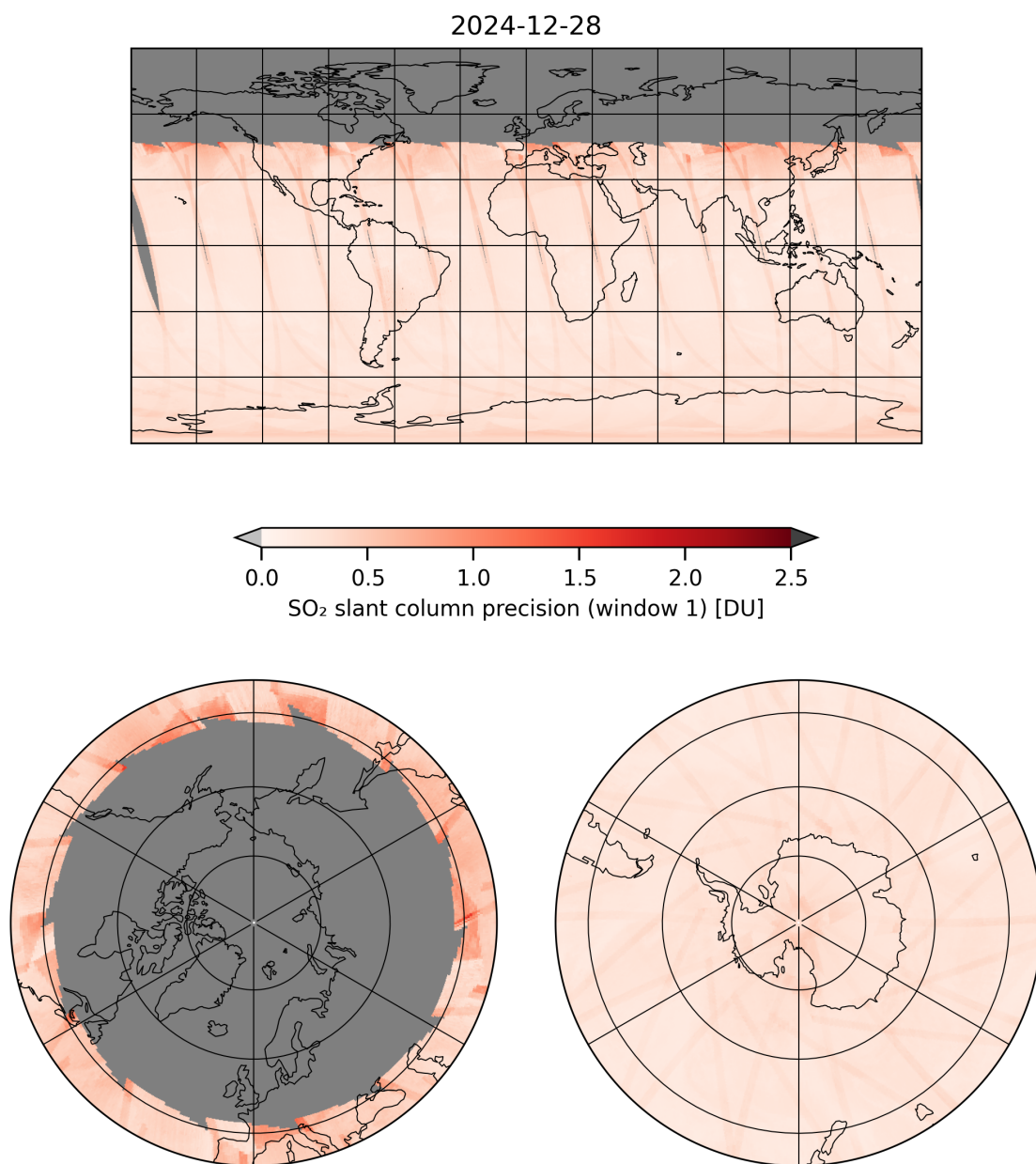


Figure 10: Map of “SO₂ slant column precision (window 1)” for 2024-12-28 to 2024-12-29

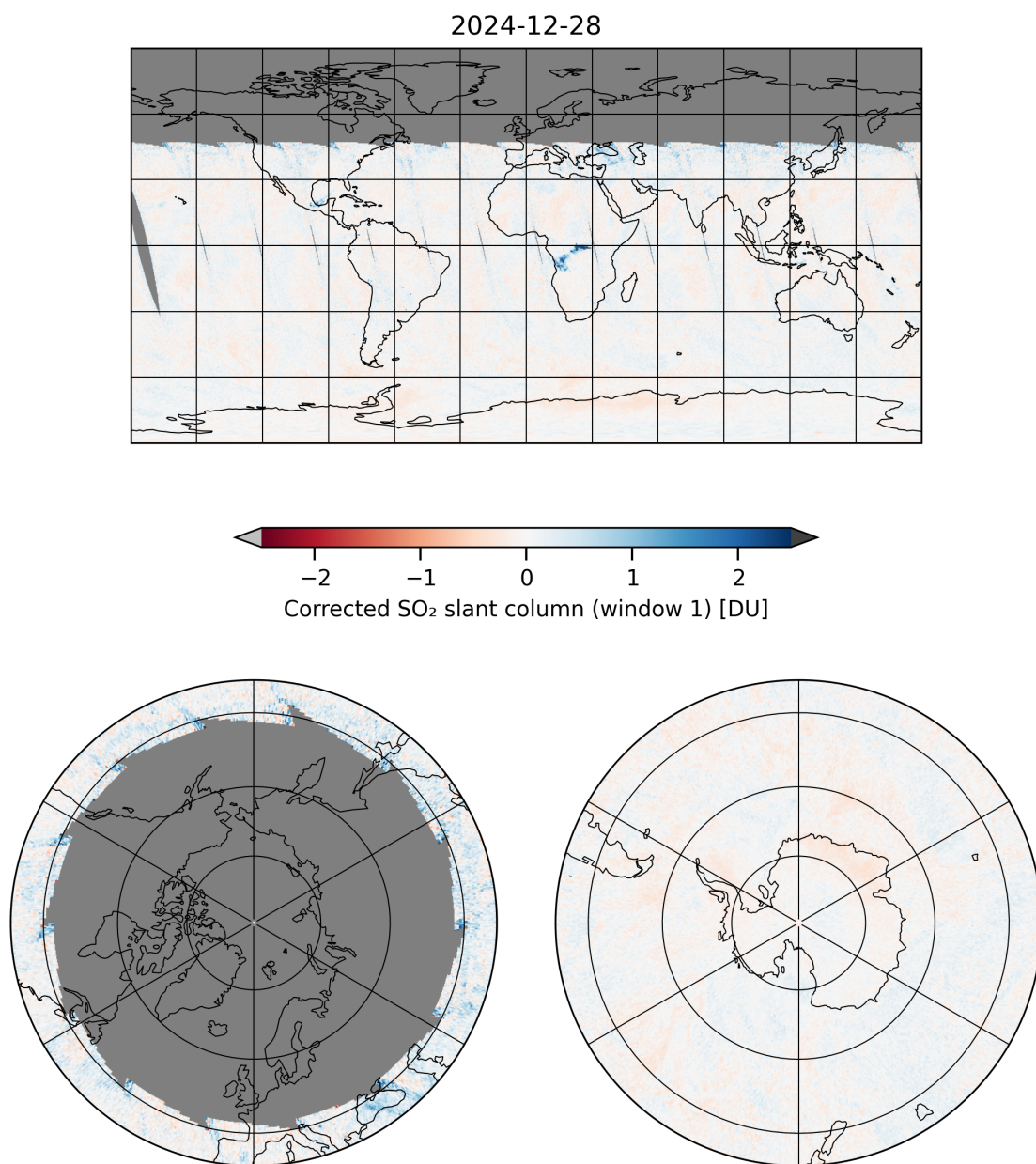


Figure 11: Map of “Corrected SO₂ slant column (window 1)” for 2024-12-28 to 2024-12-29

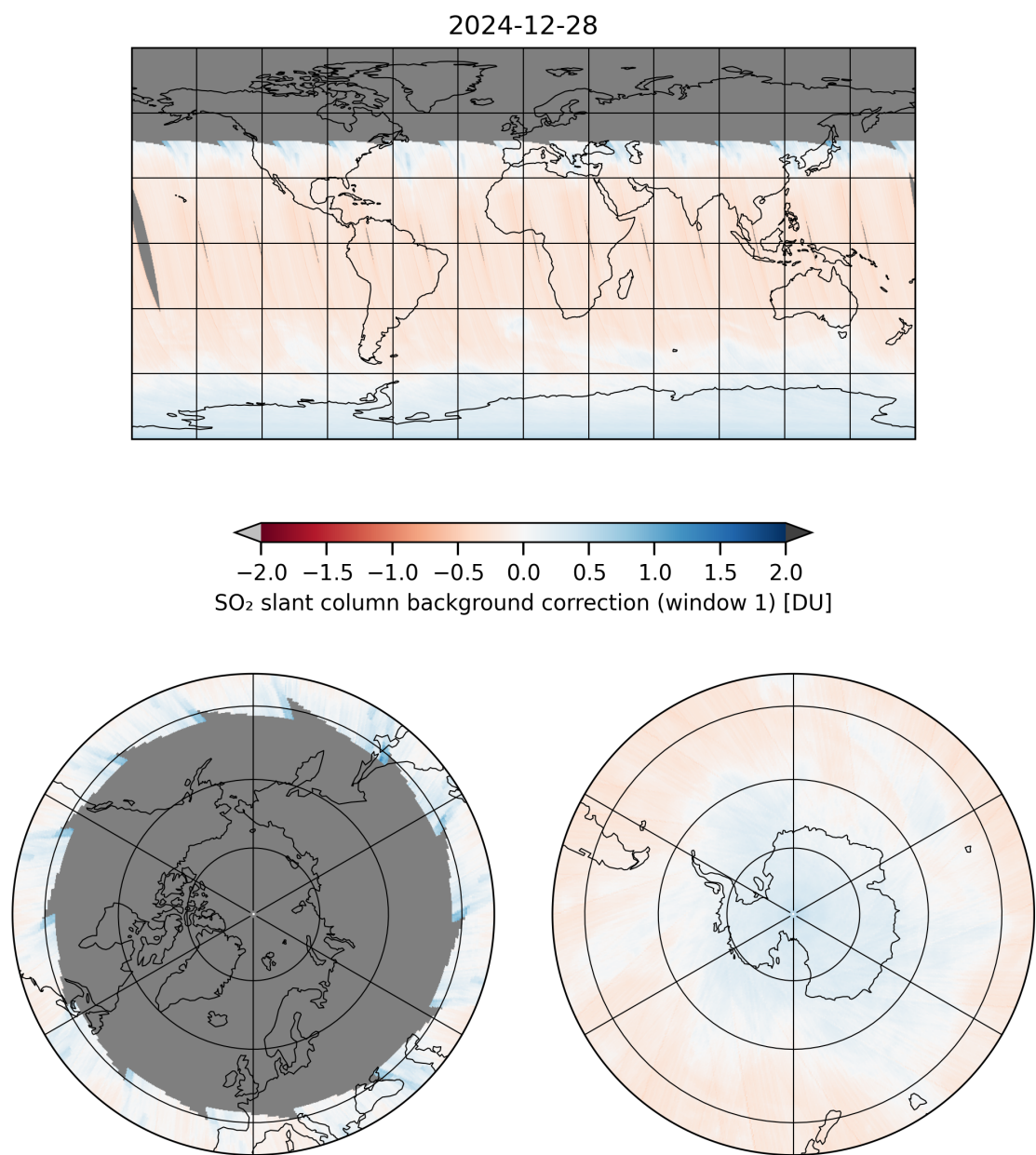


Figure 12: Map of “SO₂ slant column background correction (window 1)” for 2024-12-28 to 2024-12-29

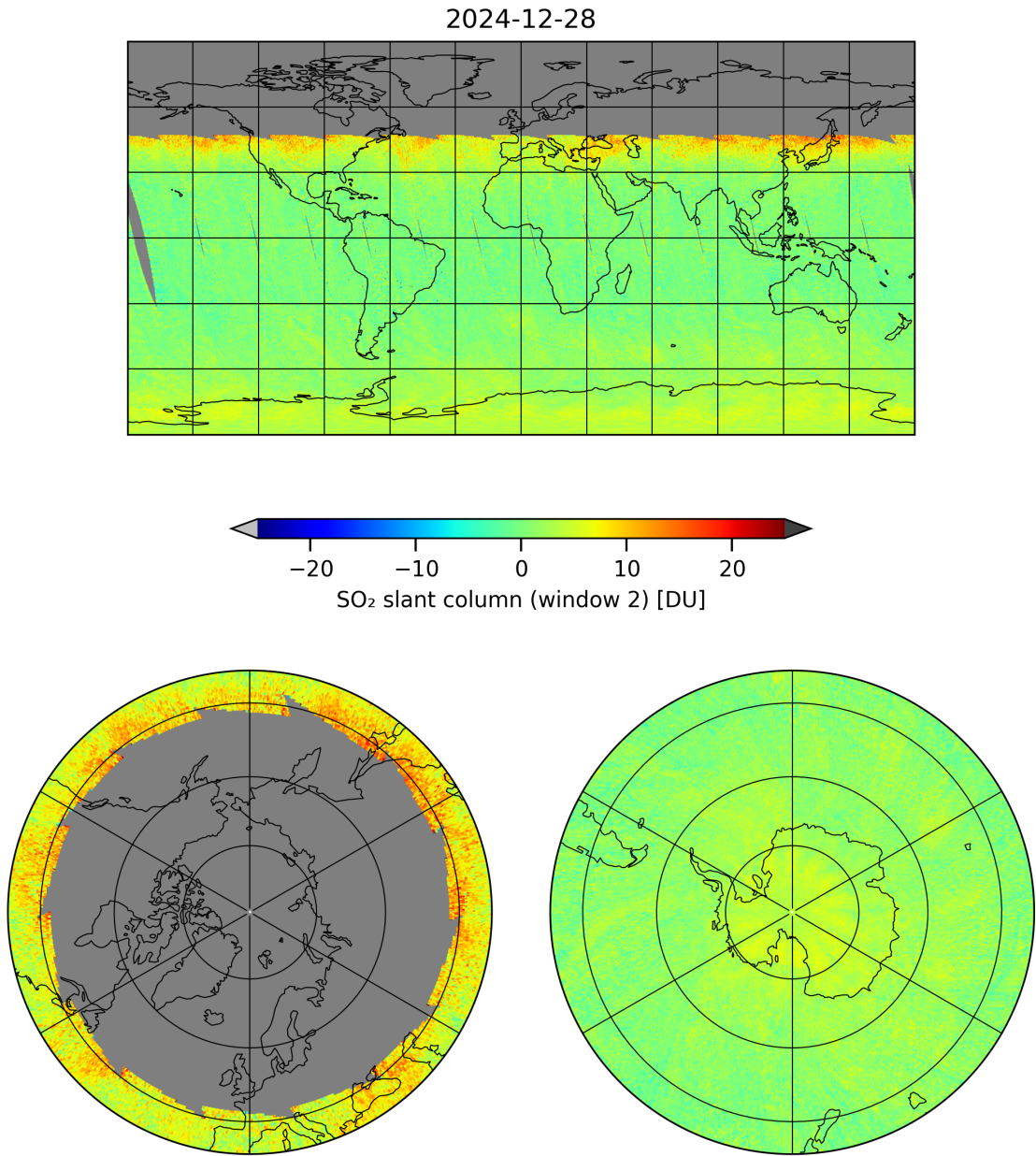


Figure 13: Map of “SO₂ slant column (window 2)” for 2024-12-28 to 2024-12-29

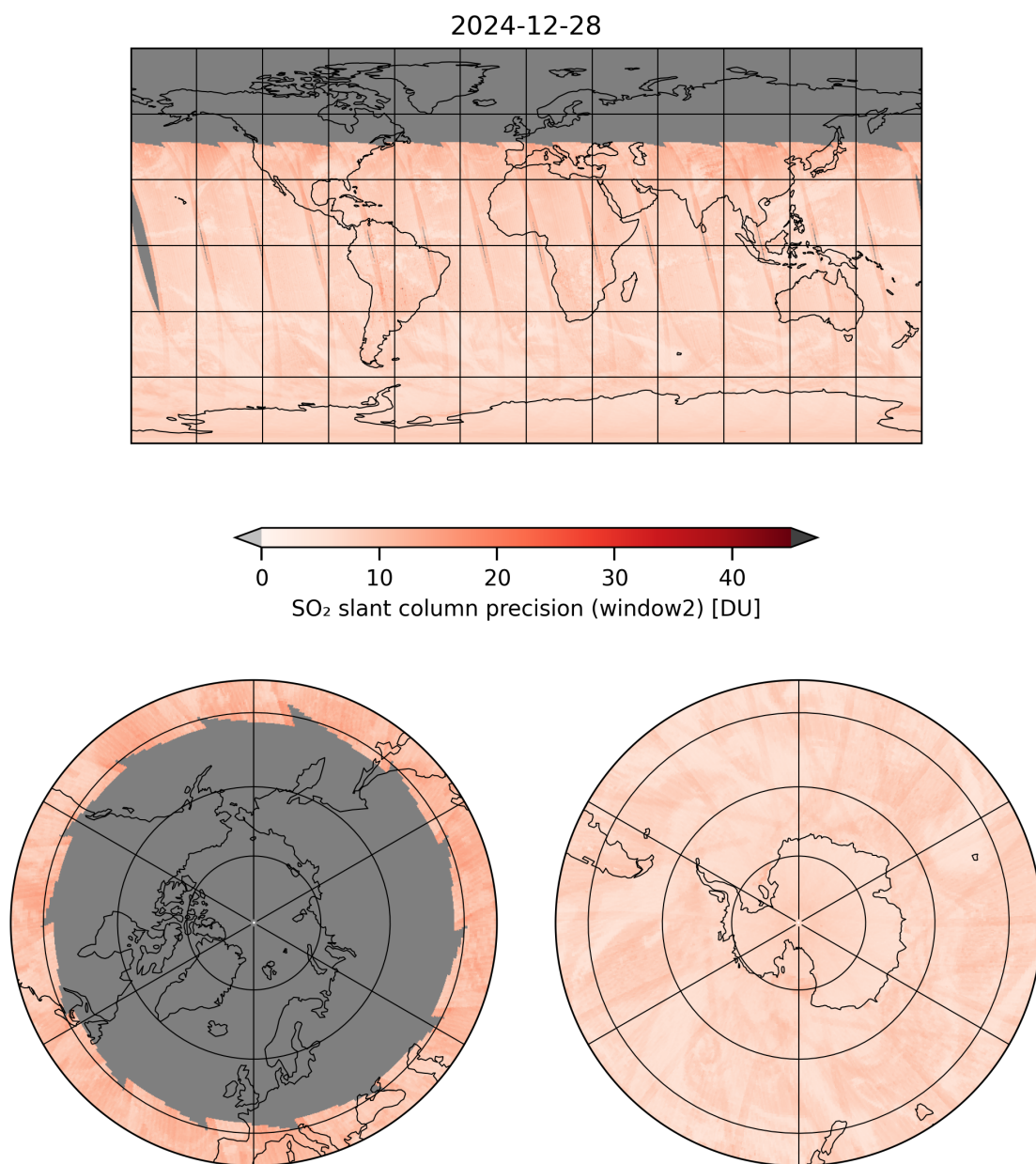


Figure 14: Map of “SO₂ slant column precision (window2)” for 2024-12-28 to 2024-12-29

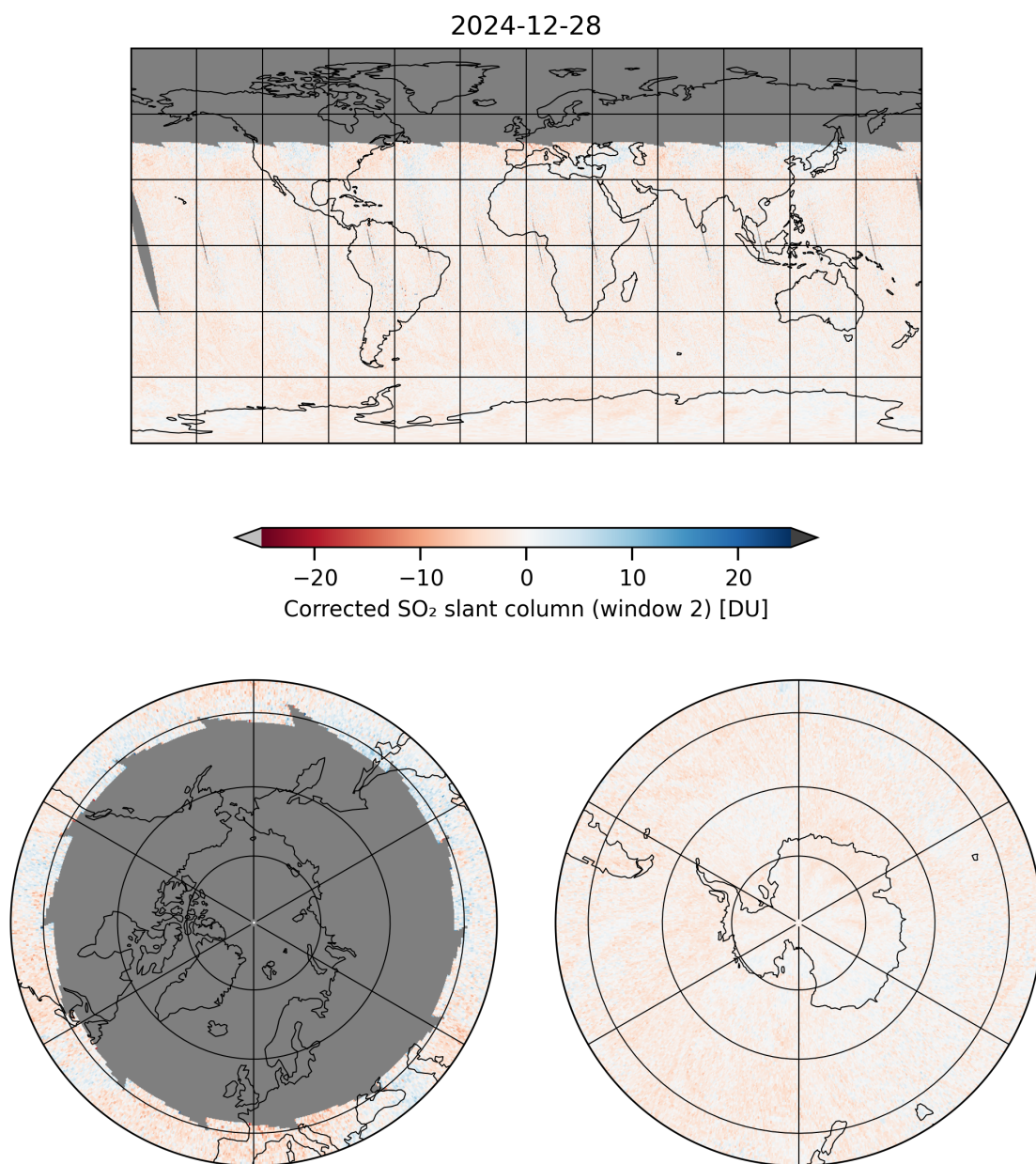


Figure 15: Map of “Corrected SO₂ slant column (window 2)” for 2024-12-28 to 2024-12-29

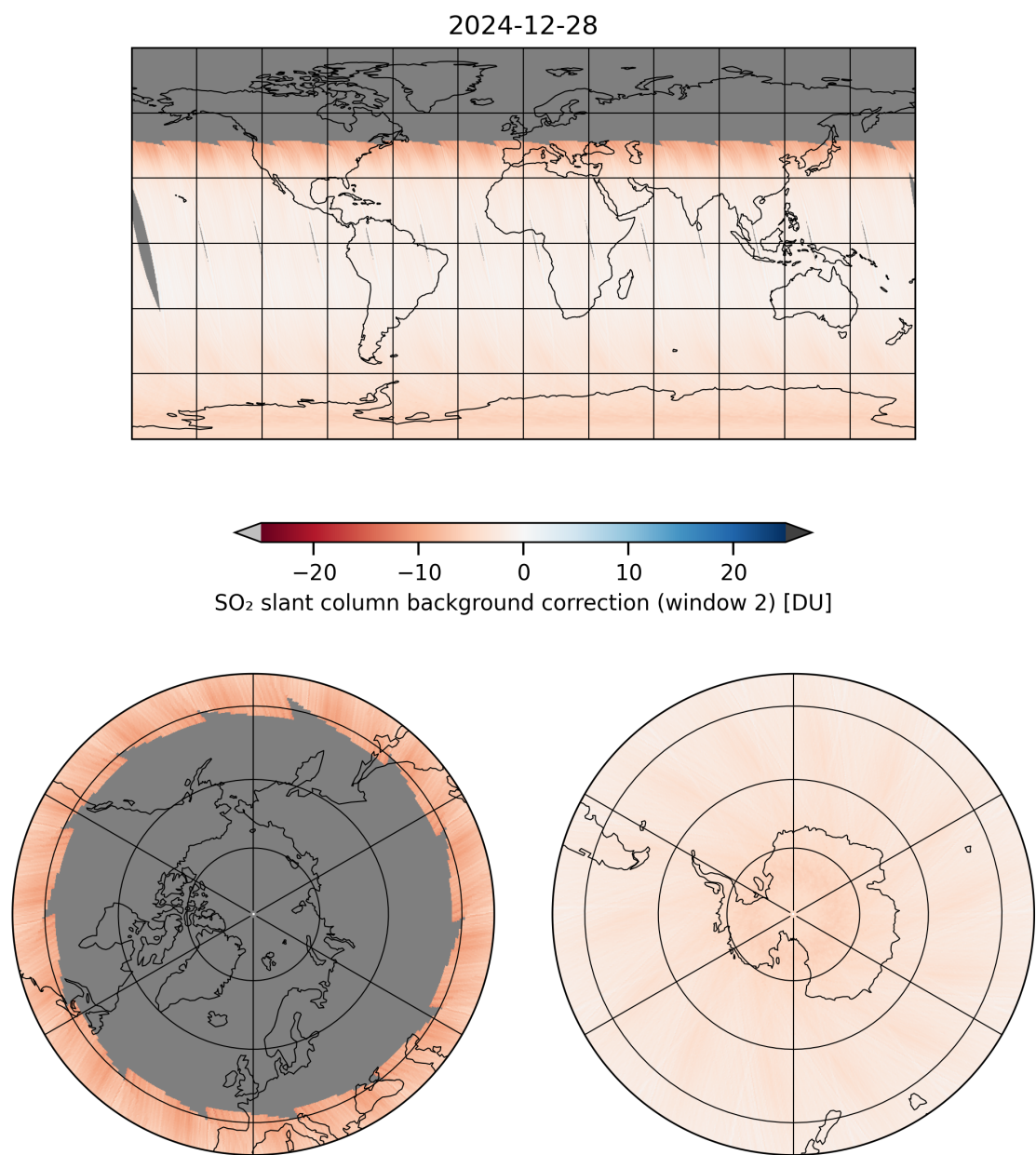


Figure 16: Map of “SO₂ slant column background correction (window 2)” for 2024-12-28 to 2024-12-29

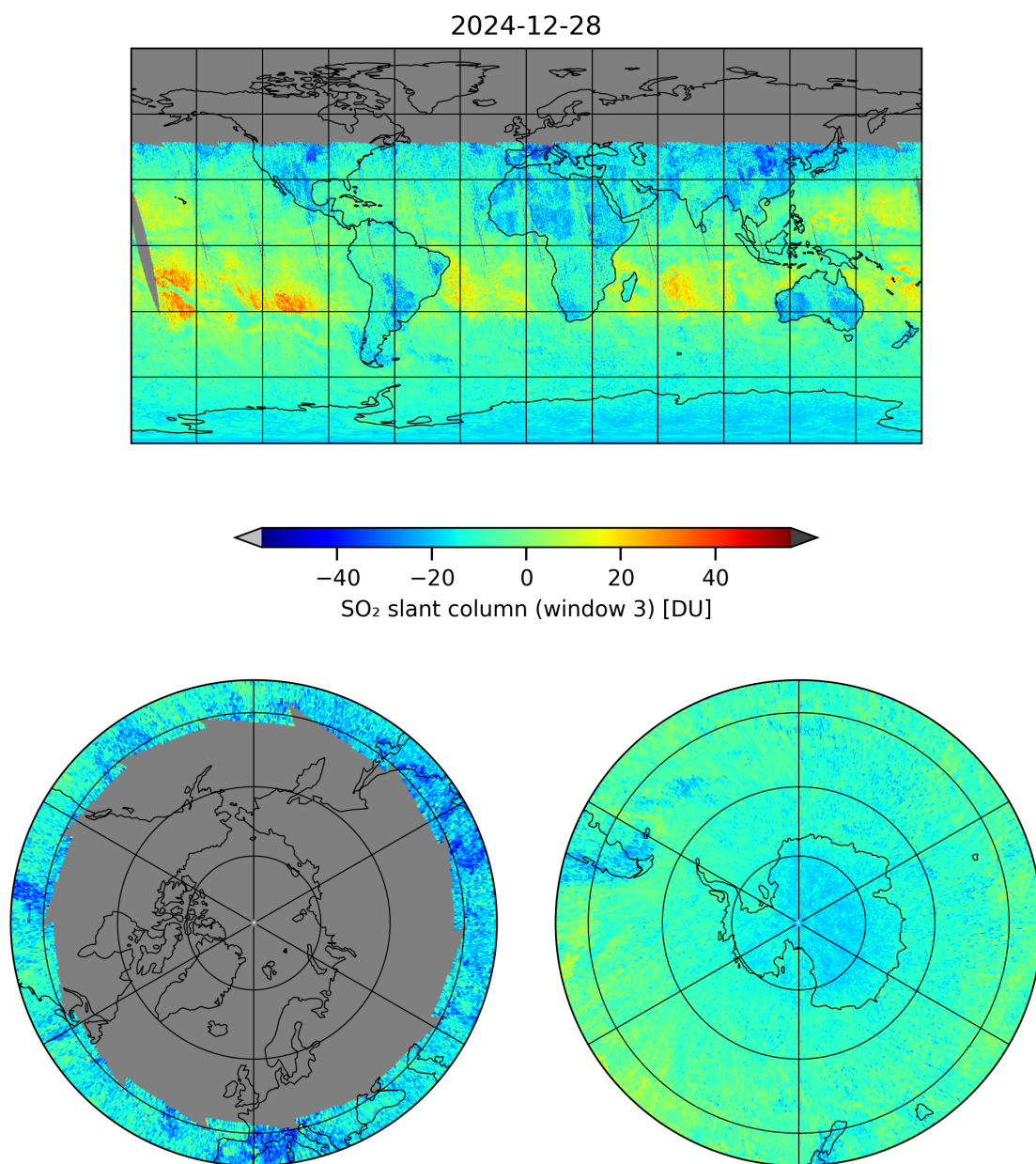


Figure 17: Map of “SO₂ slant column (window 3)” for 2024-12-28 to 2024-12-29

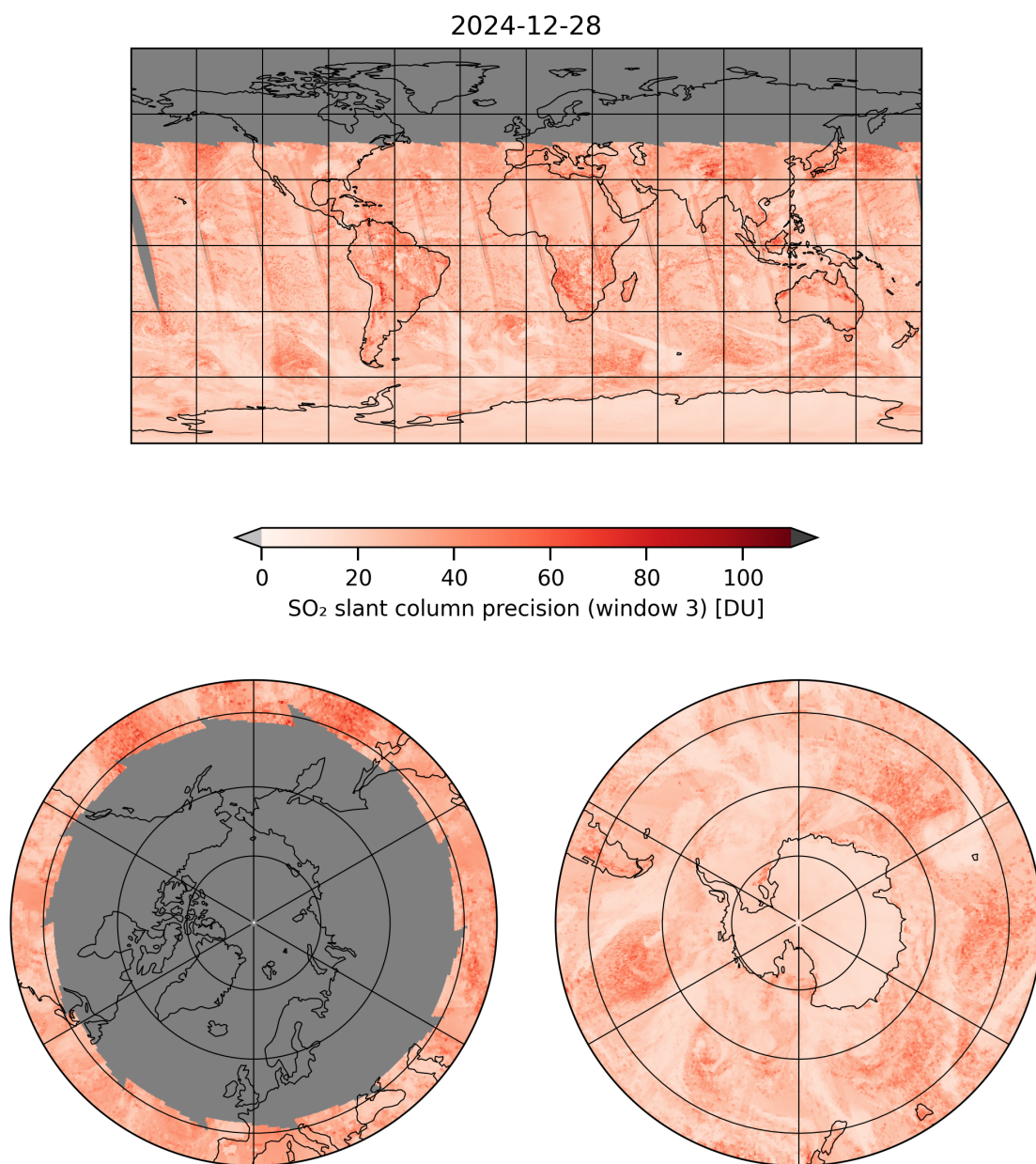


Figure 18: Map of “SO₂ slant column precision (window 3)” for 2024-12-28 to 2024-12-29

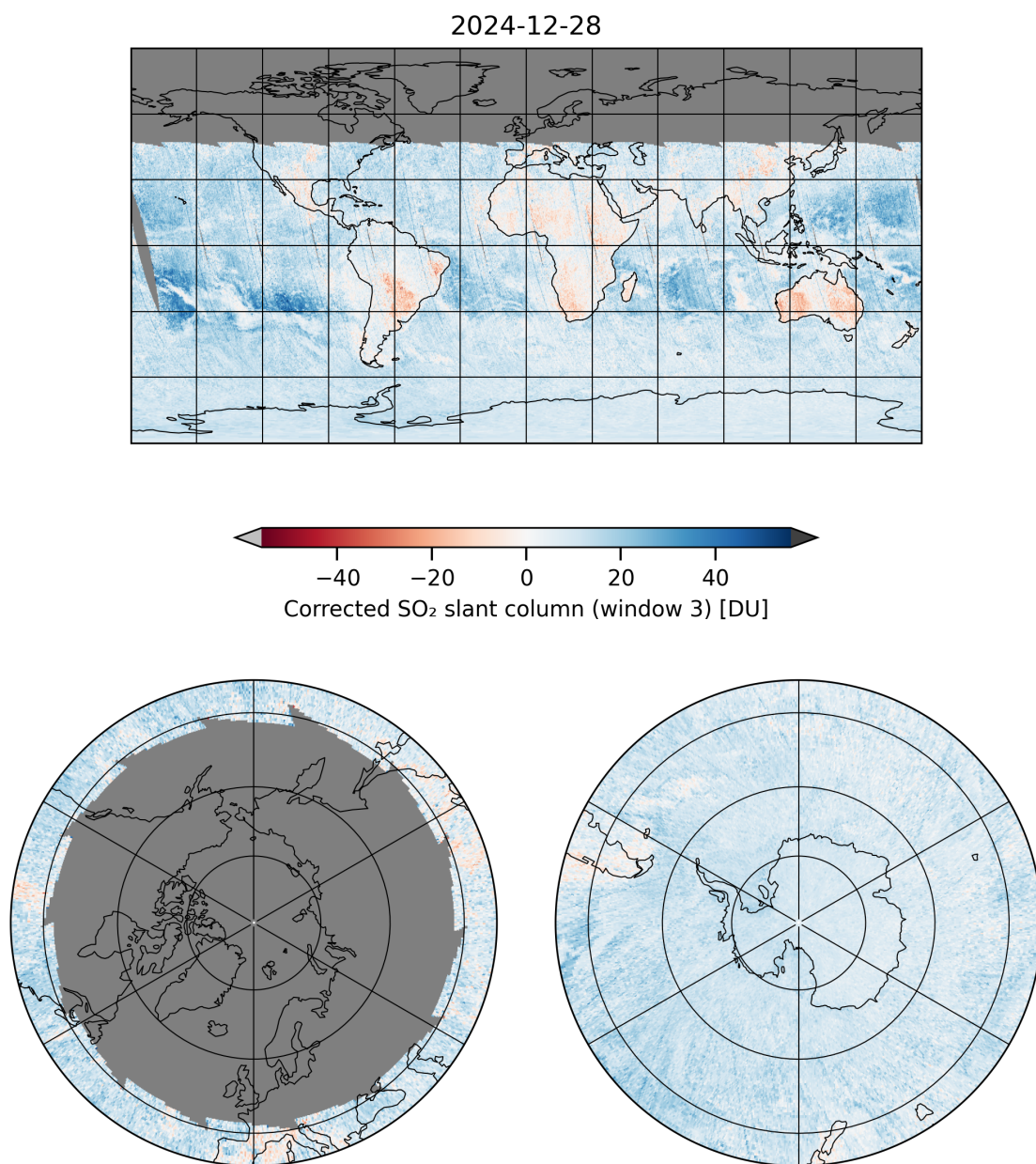


Figure 19: Map of “Corrected SO₂ slant column (window 3)” for 2024-12-28 to 2024-12-29

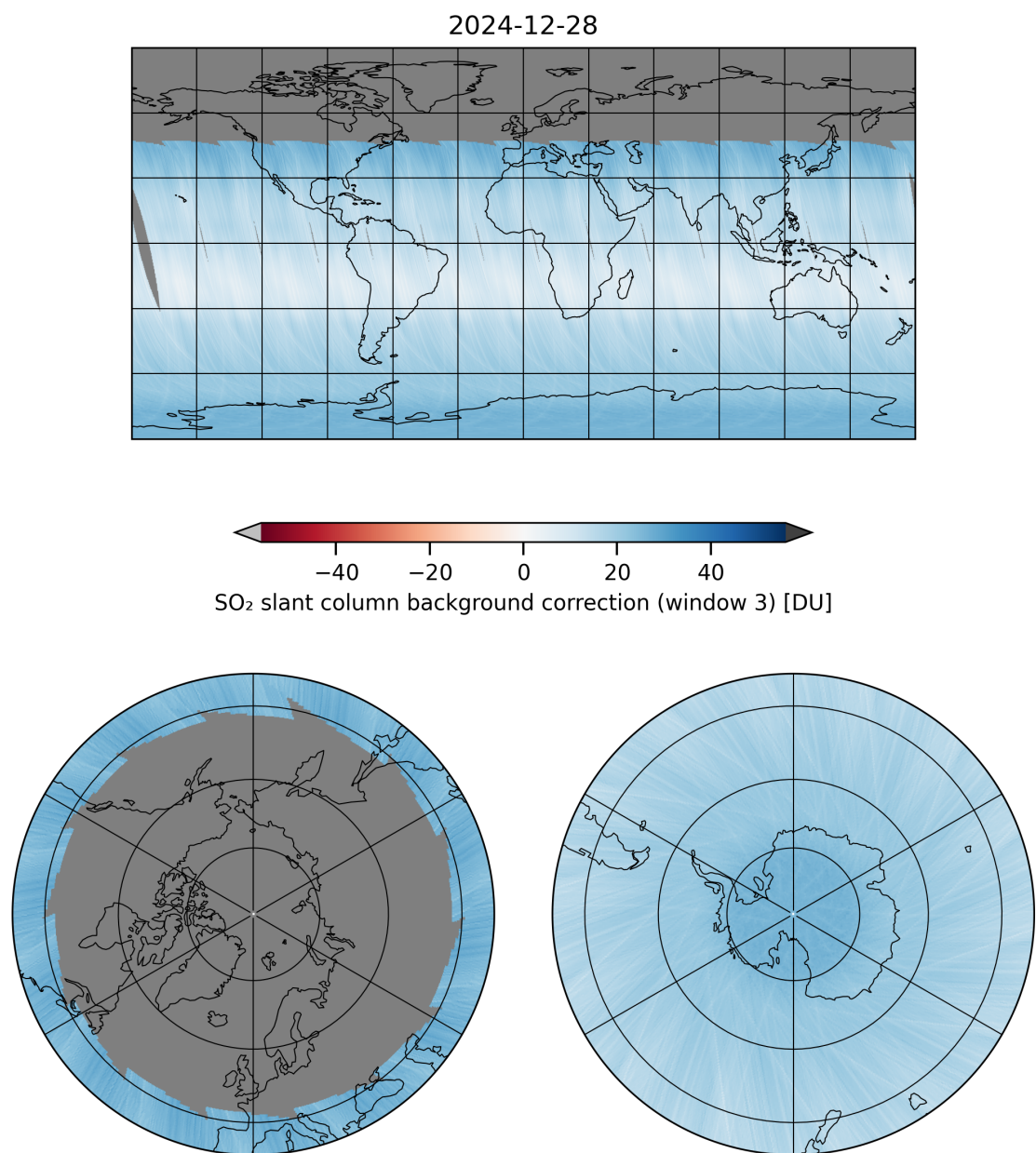


Figure 20: Map of “SO₂ slant column background correction (window 3)” for 2024-12-28 to 2024-12-29

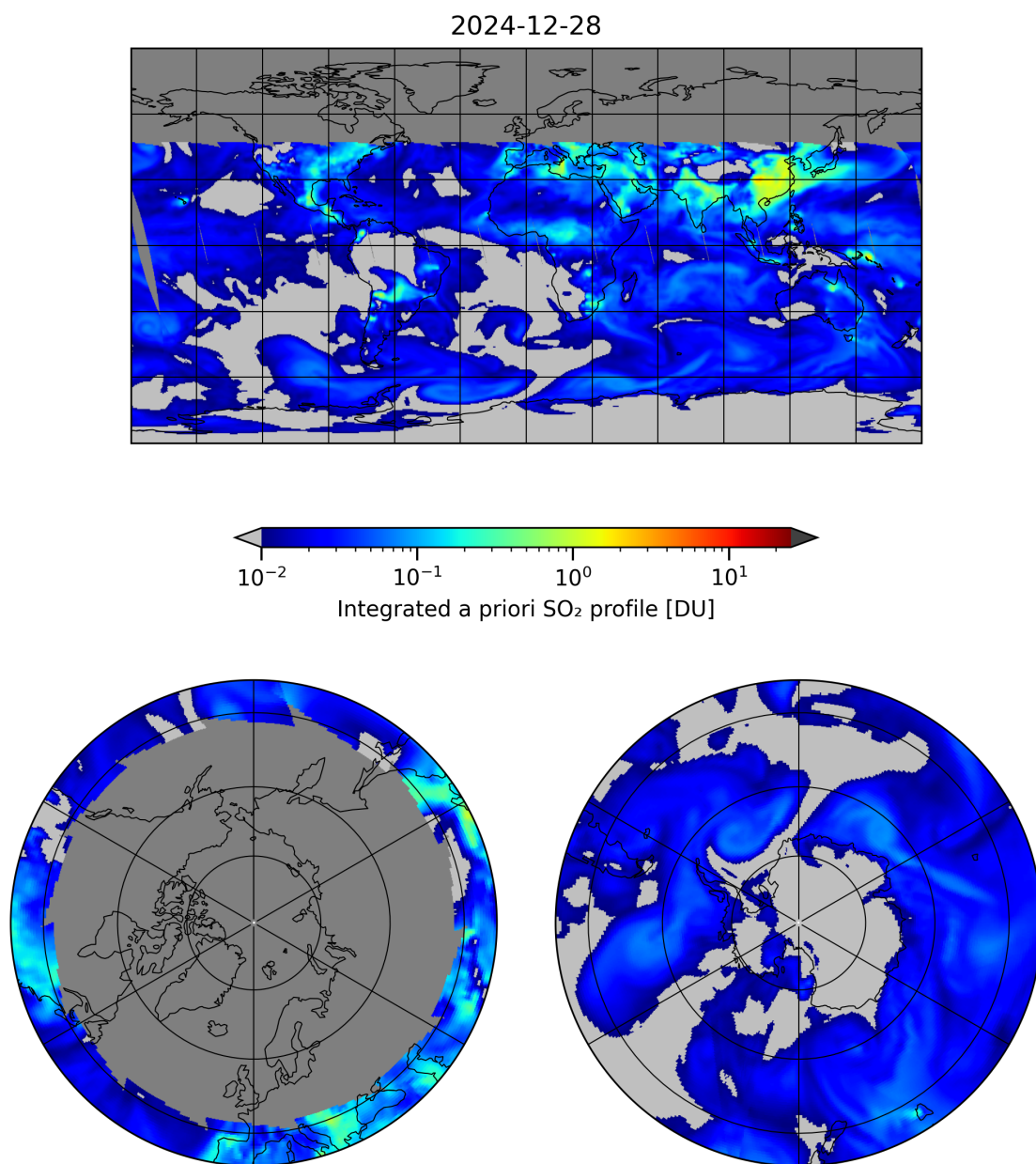


Figure 21: Map of “Integrated a priori SO₂ profile” for 2024-12-28 to 2024-12-29

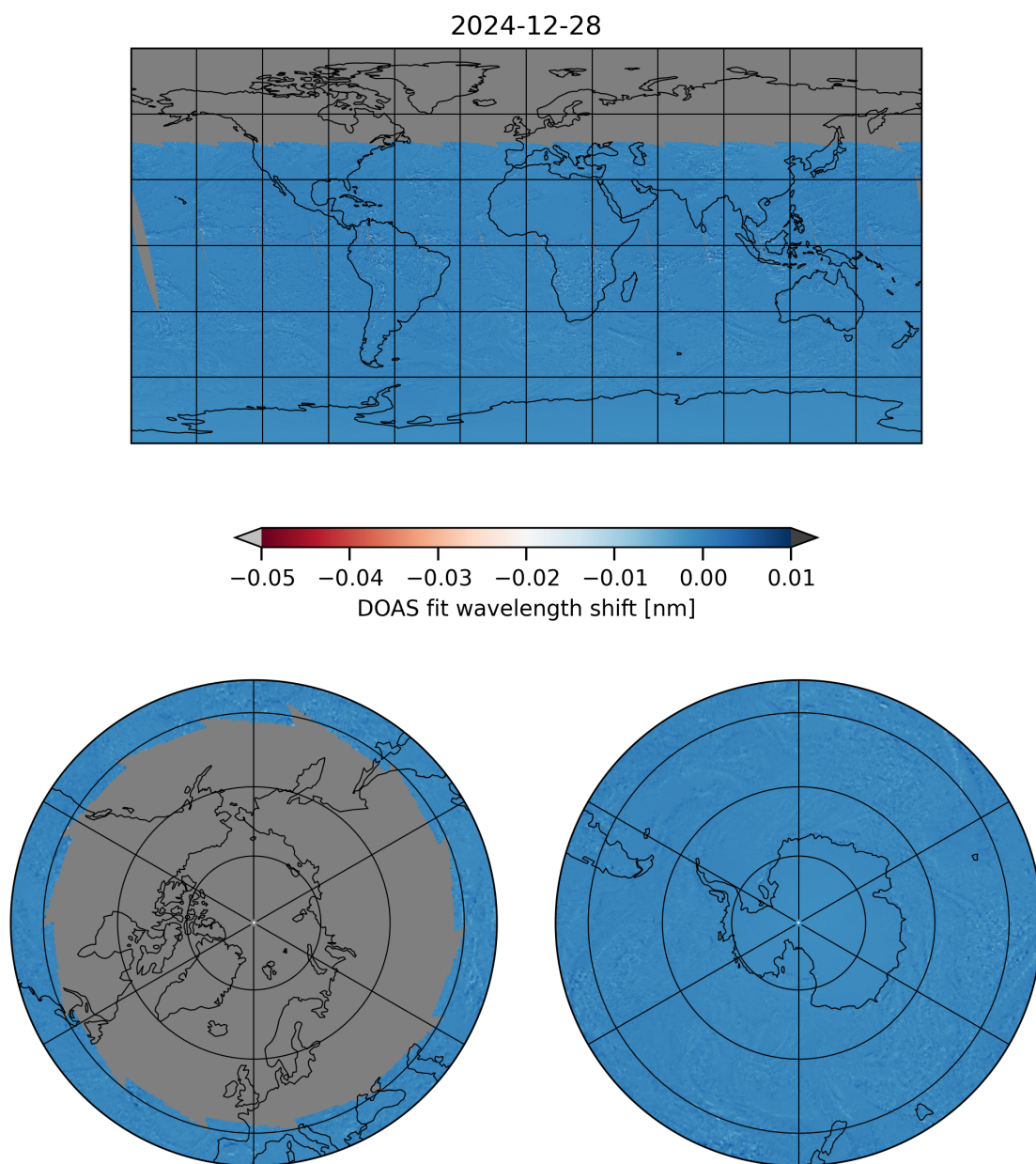


Figure 22: Map of “DOAS fit wavelength shift” for 2024-12-28 to 2024-12-29

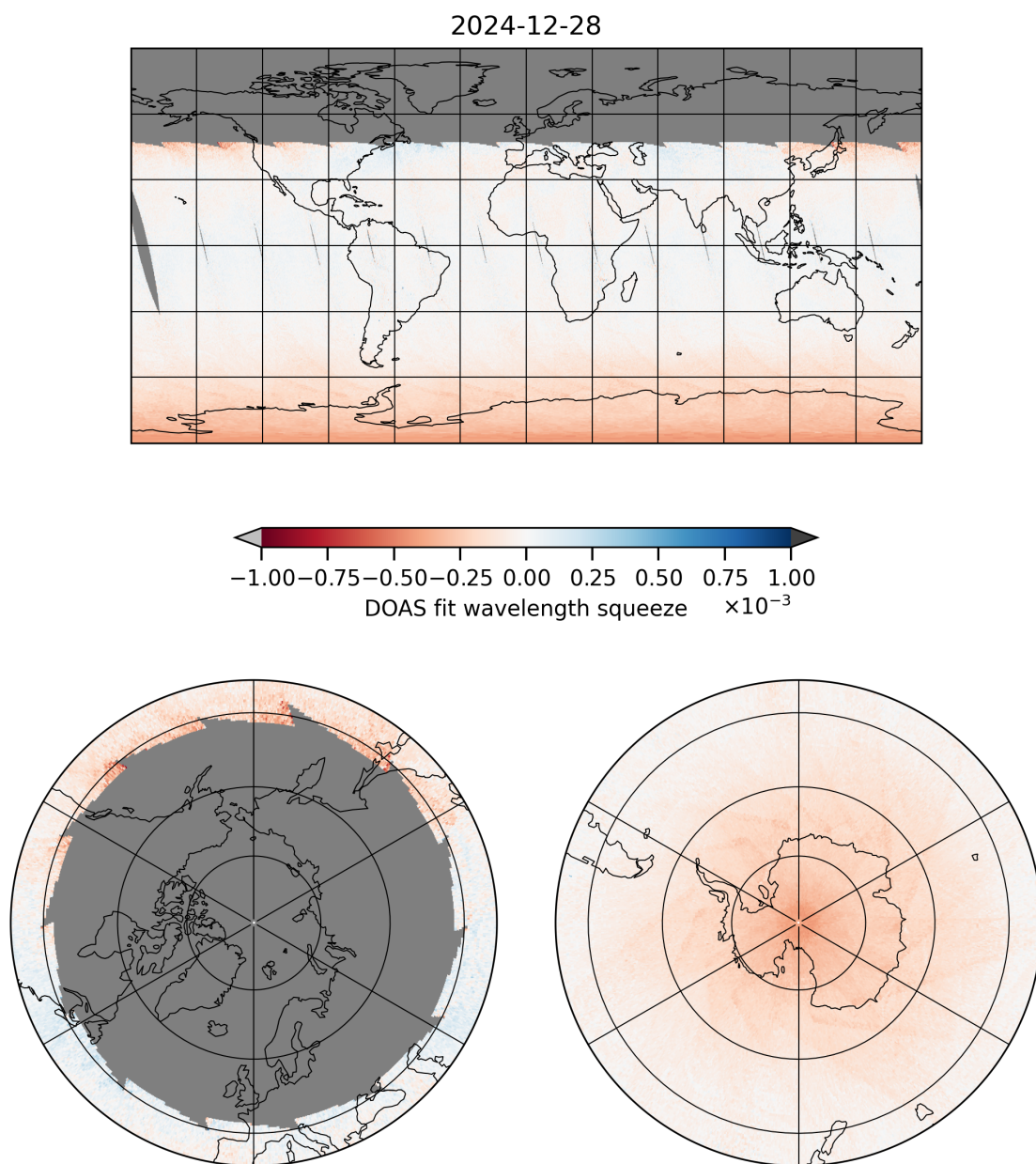


Figure 23: Map of “DOAS fit wavelength squeeze” for 2024-12-28 to 2024-12-29

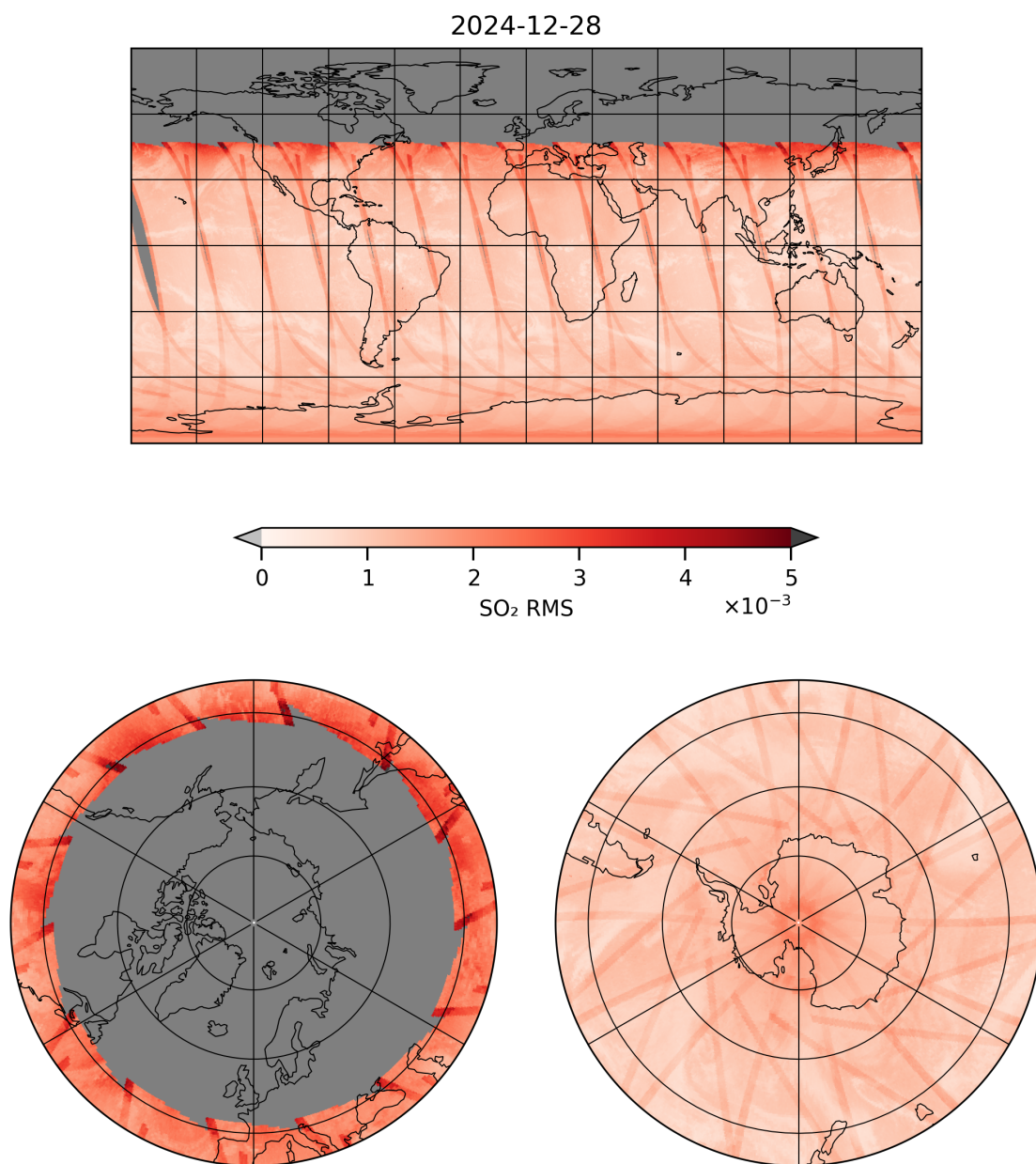


Figure 24: Map of “SO₂ RMS” for 2024-12-28 to 2024-12-29

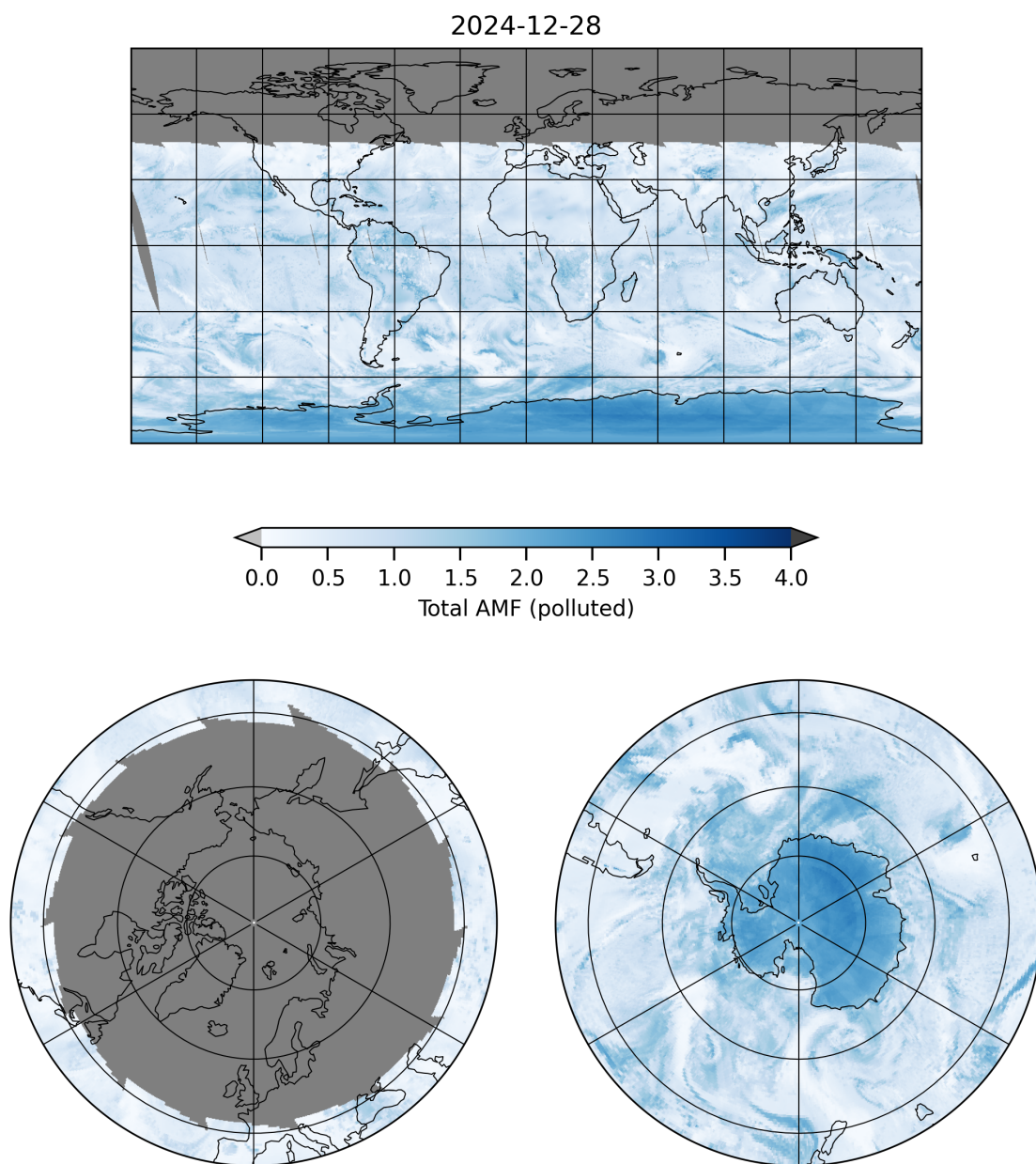


Figure 25: Map of “Total AMF (polluted)” for 2024-12-28 to 2024-12-29

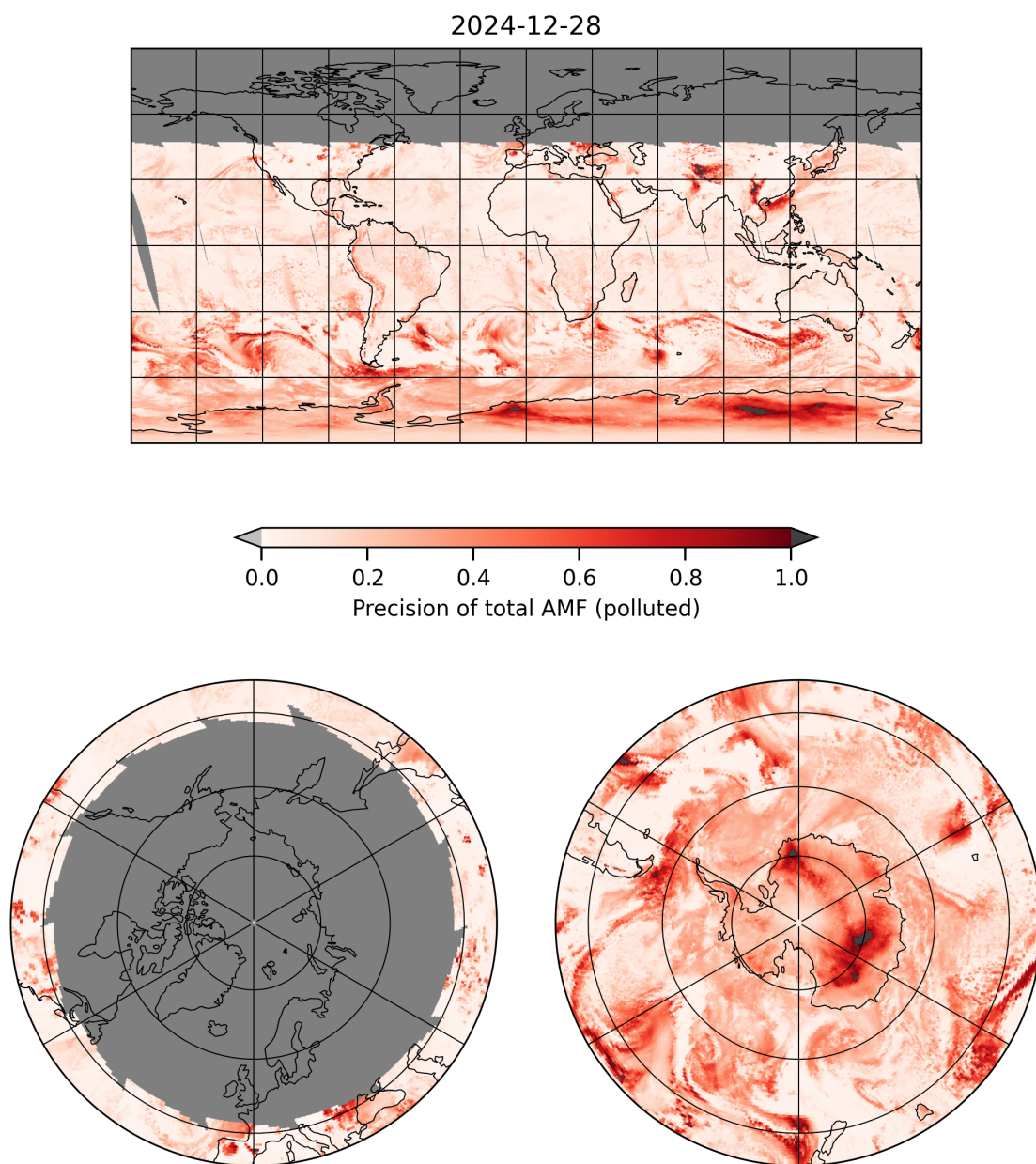


Figure 26: Map of “Precision of total AMF (polluted)” for 2024-12-28 to 2024-12-29

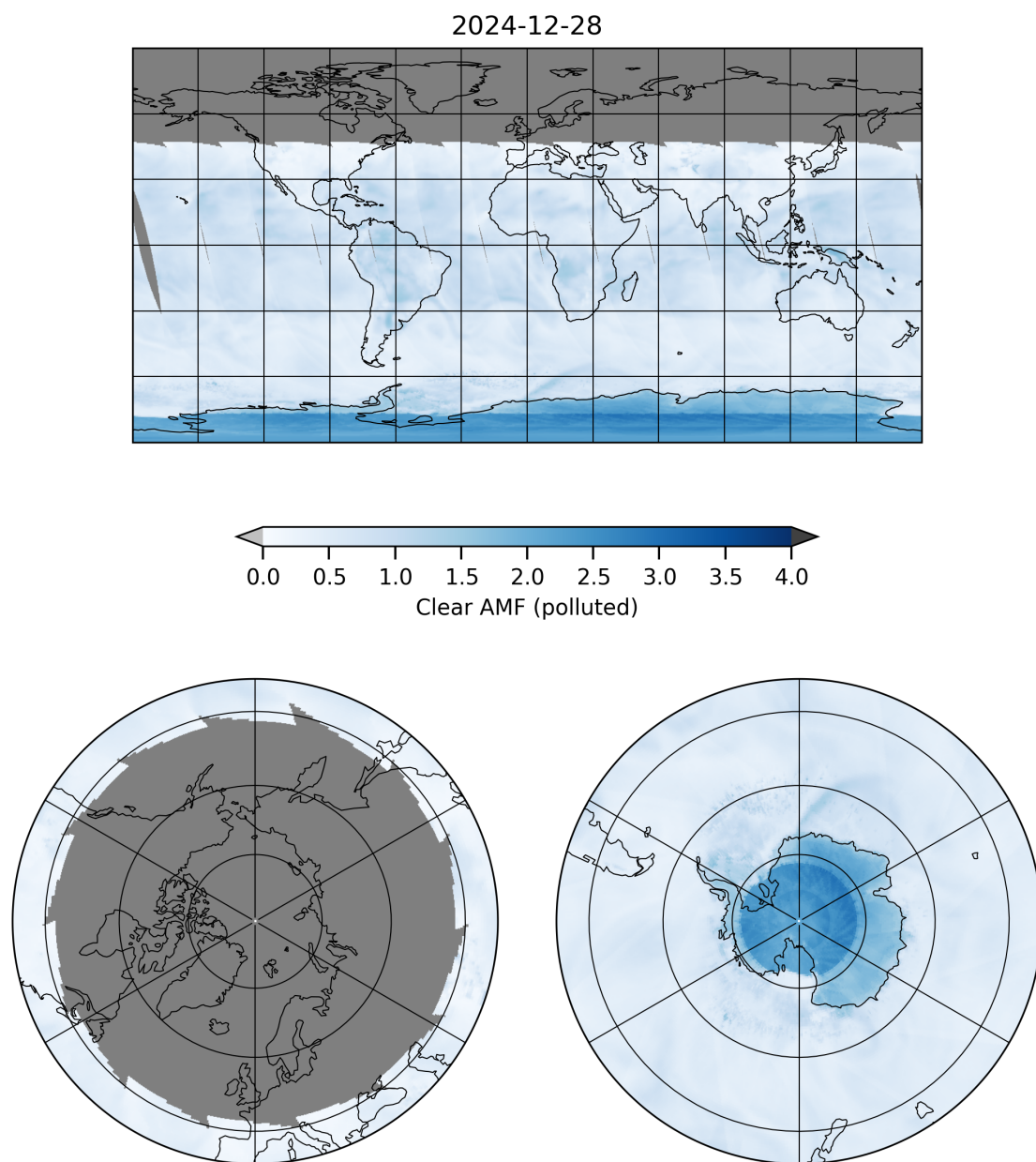


Figure 27: Map of “Clear AMF (polluted)” for 2024-12-28 to 2024-12-29

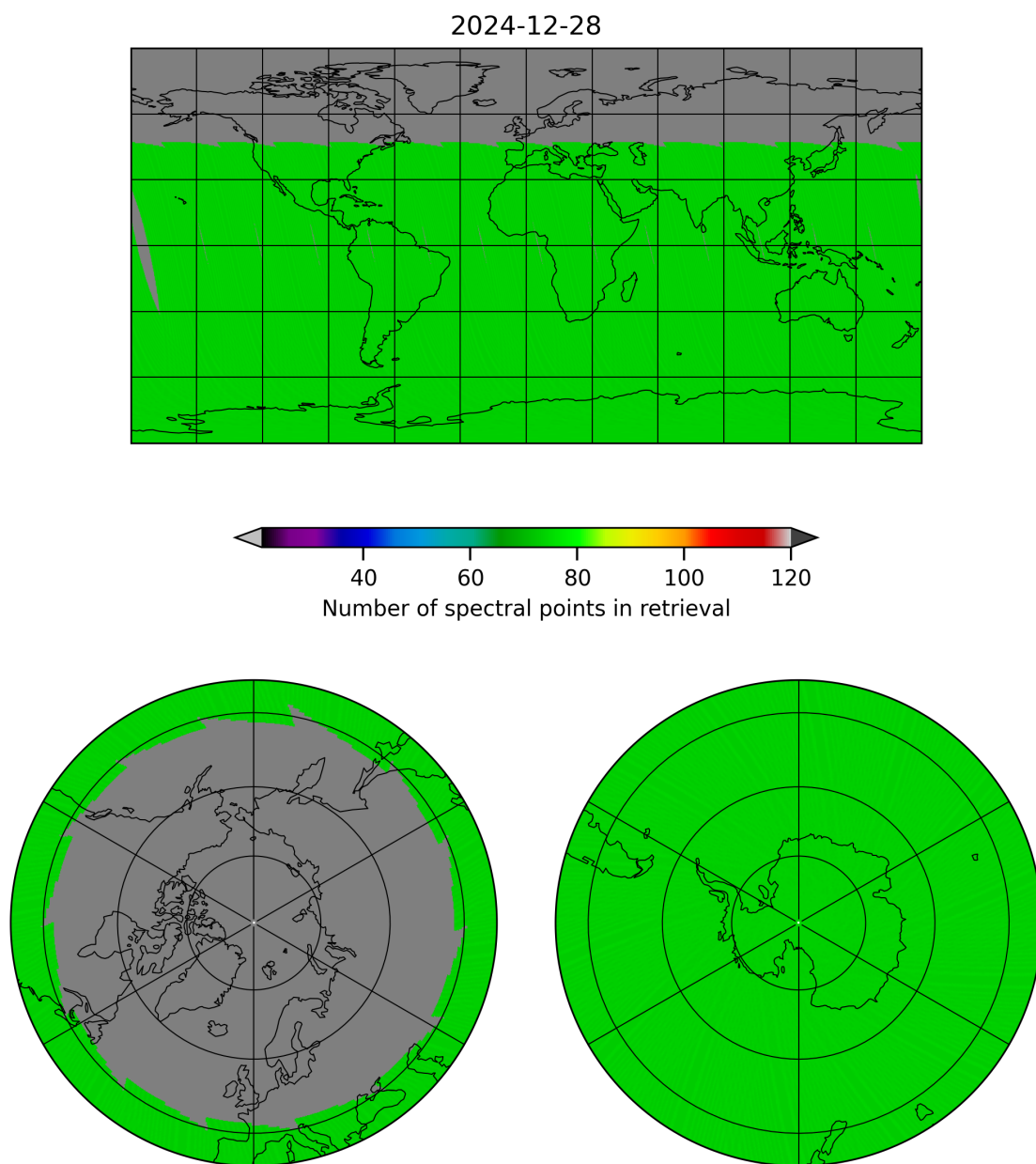


Figure 28: Map of “Number of spectral points in retrieval” for 2024-12-28 to 2024-12-29

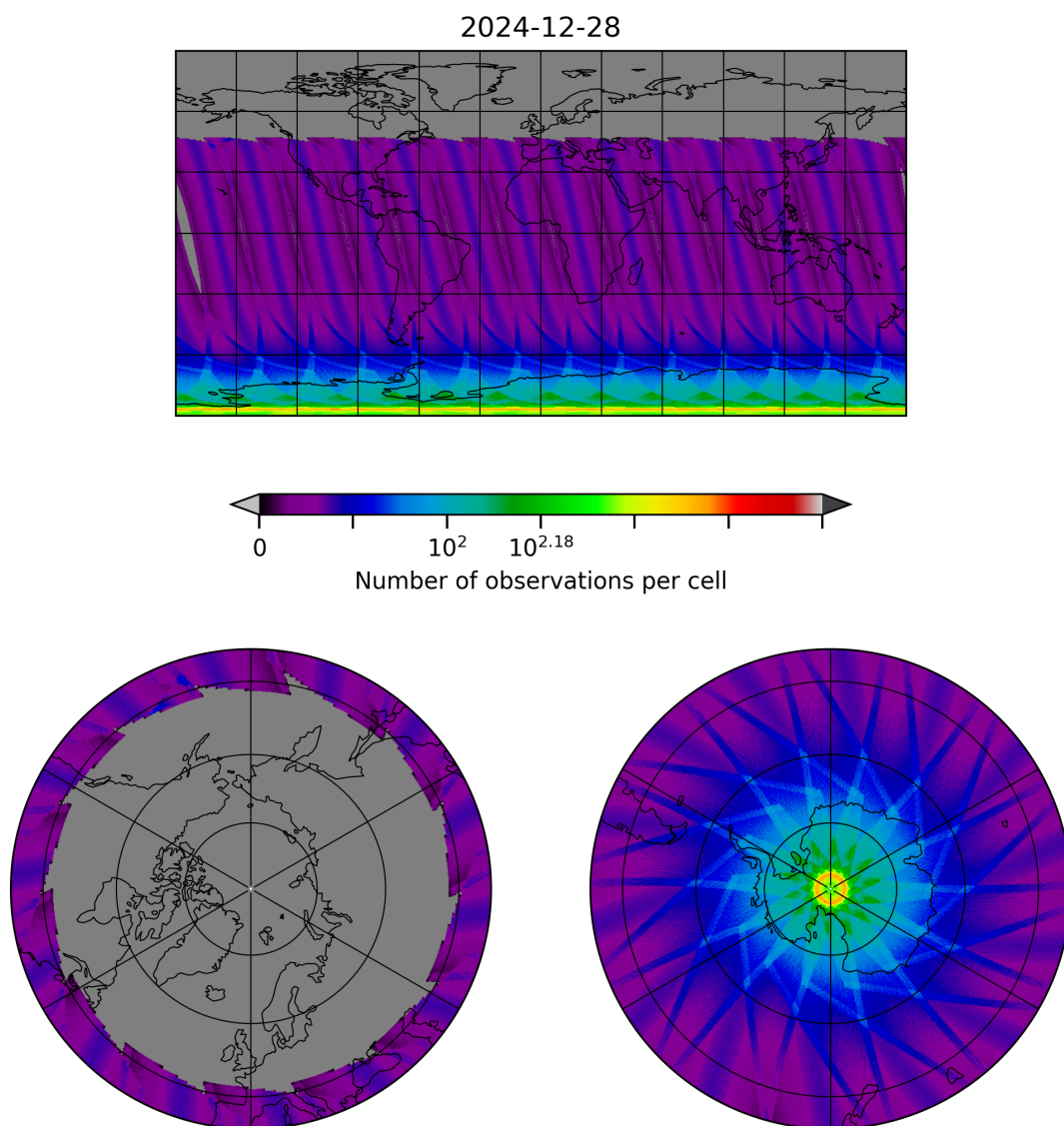


Figure 29: Map of the number of observations for 2024-12-28 to 2024-12-29

7 Zonal average

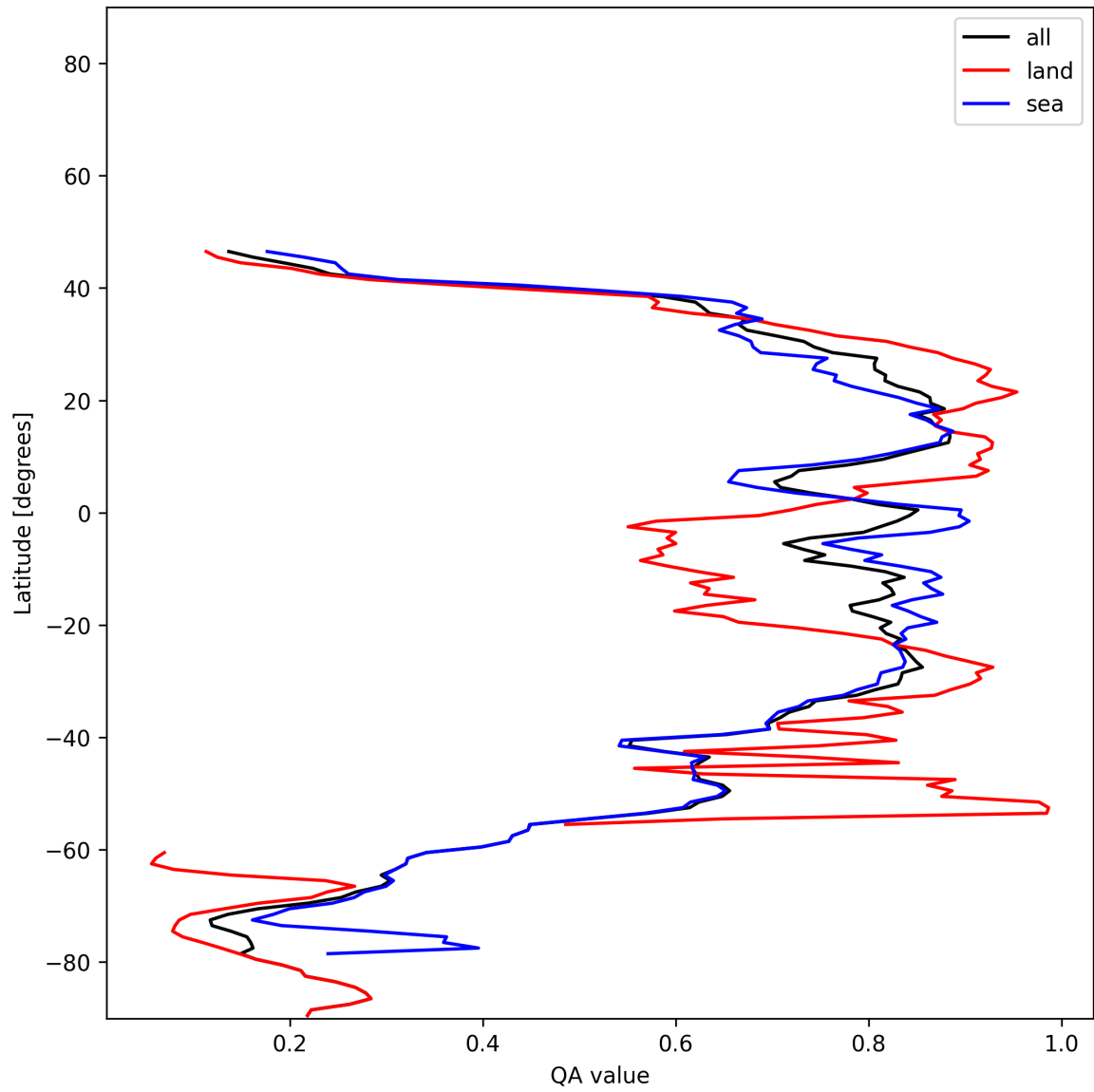


Figure 30: Zonal average of “QA value” for 2024-12-28 to 2024-12-29.

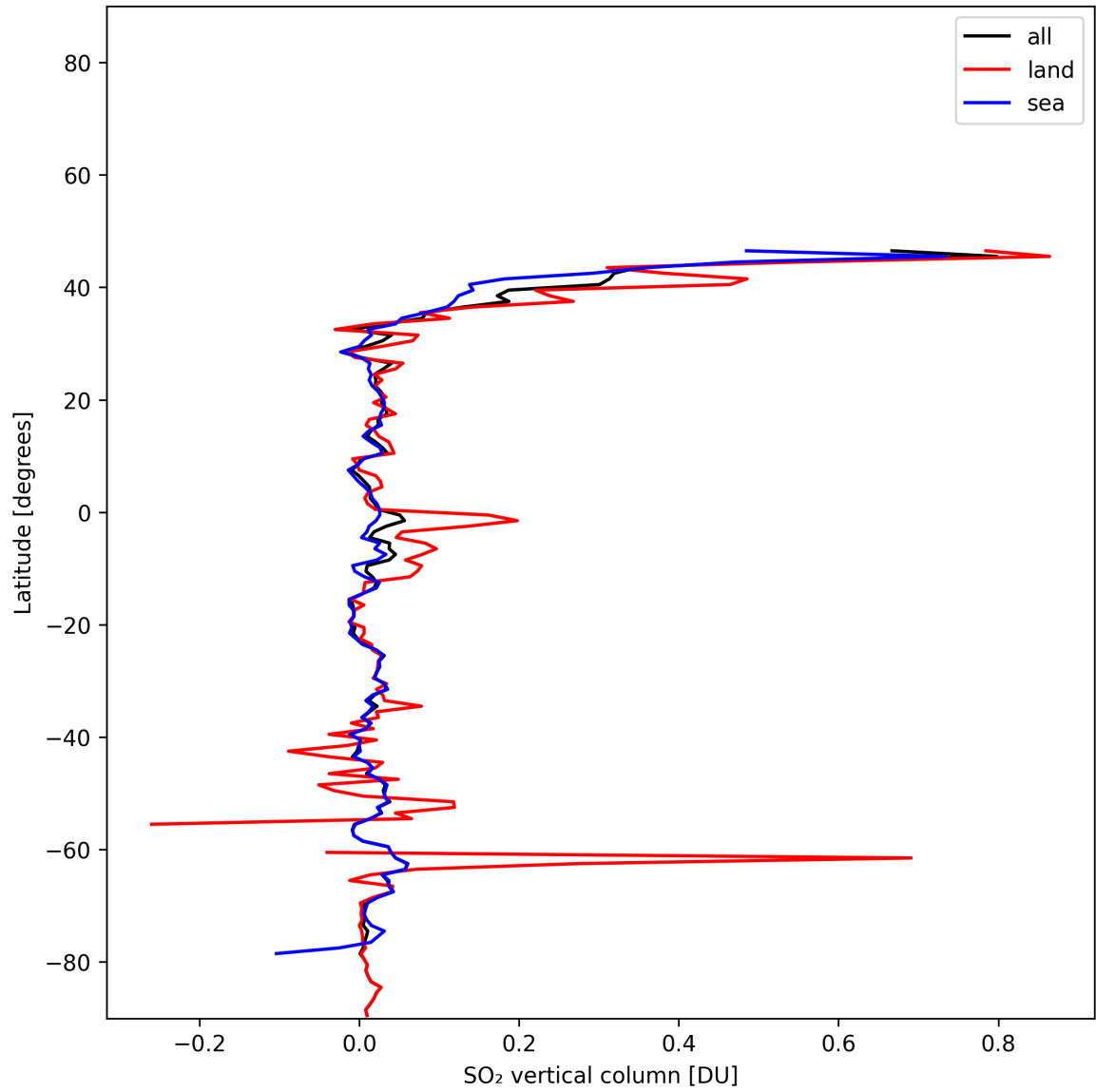


Figure 31: Zonal average of “SO₂ vertical column” for 2024-12-28 to 2024-12-29.

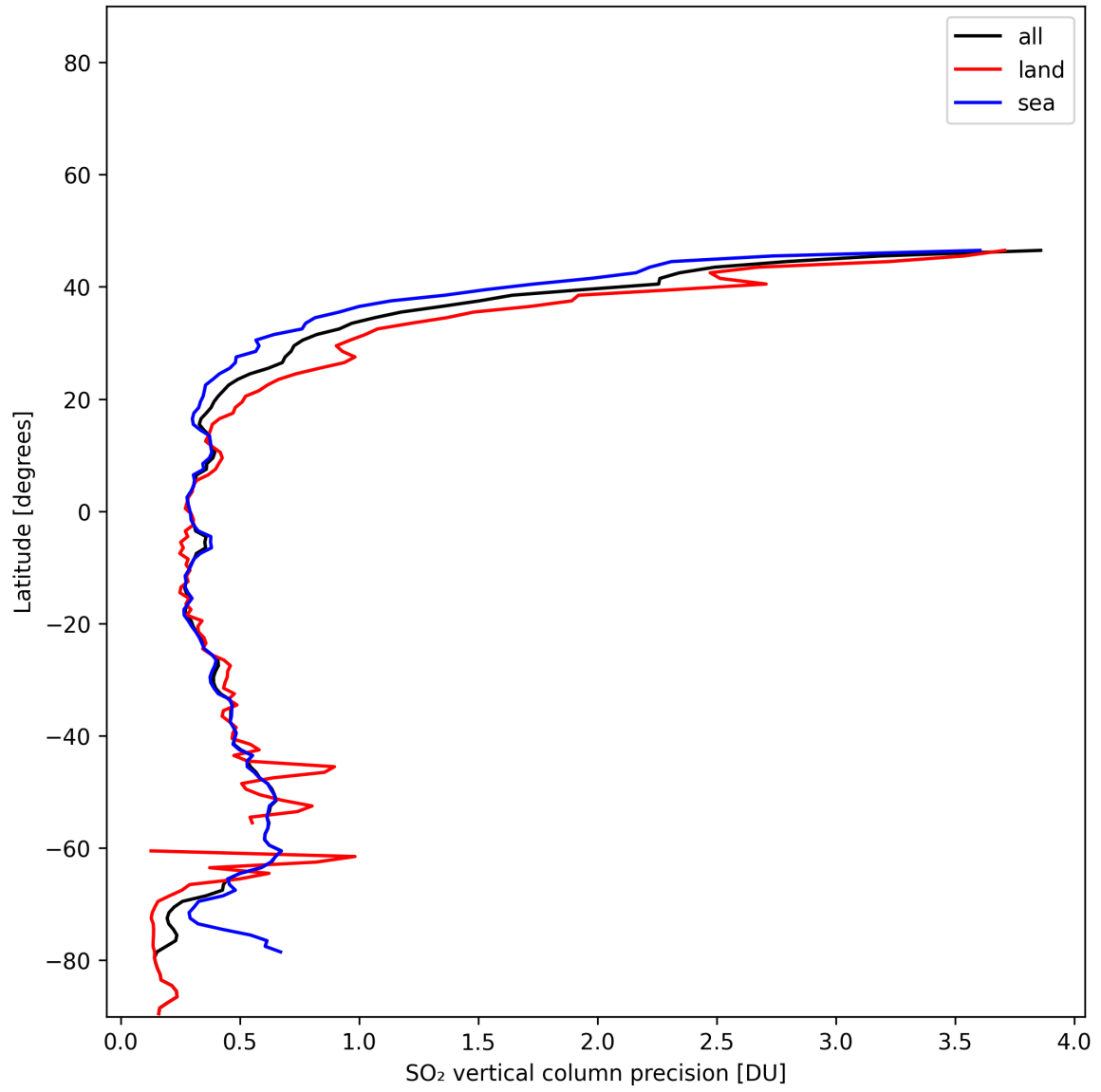


Figure 32: Zonal average of “SO₂ vertical column precision” for 2024-12-28 to 2024-12-29.

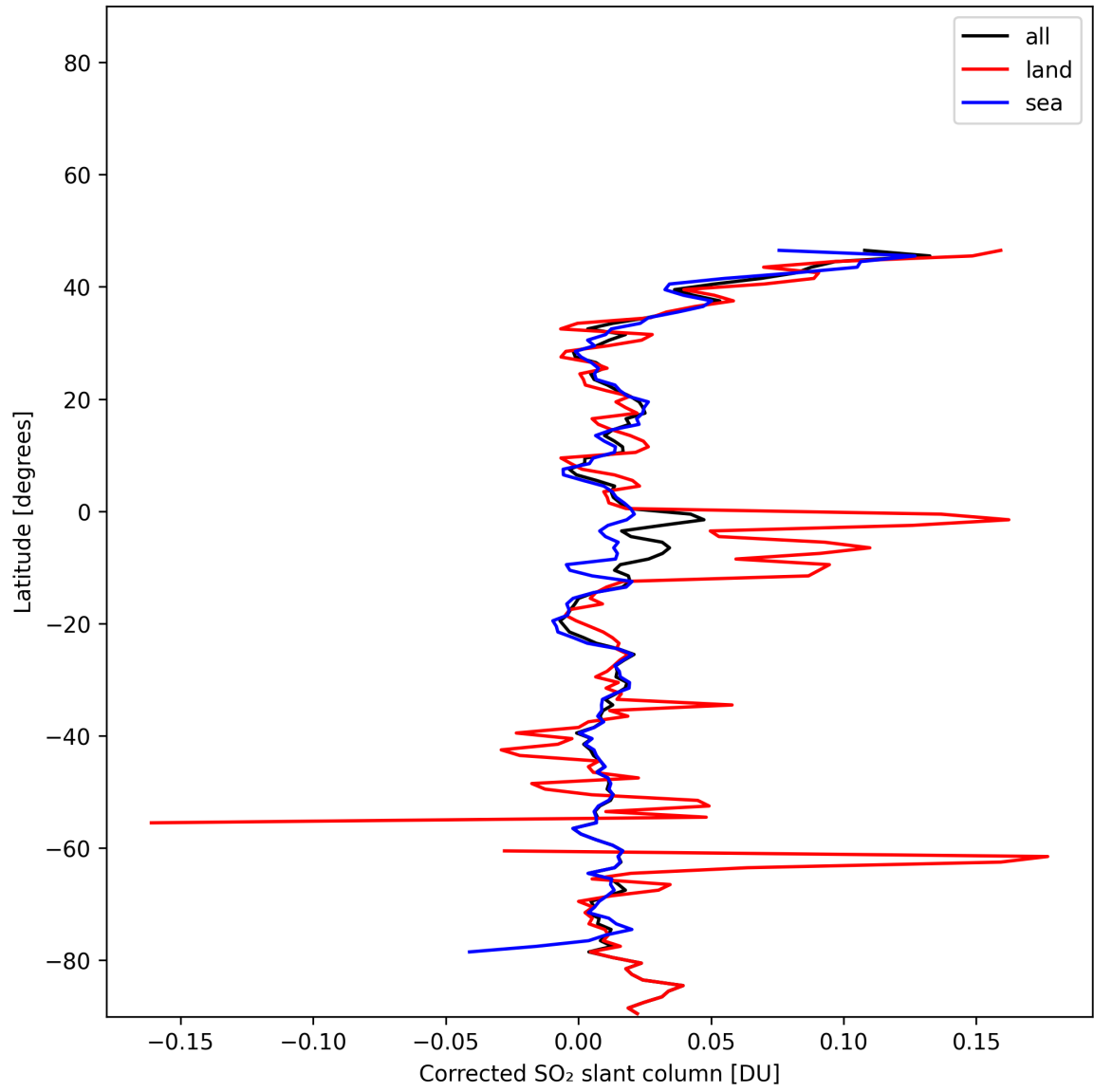


Figure 33: Zonal average of “Corrected SO₂ slant column” for 2024-12-28 to 2024-12-29.

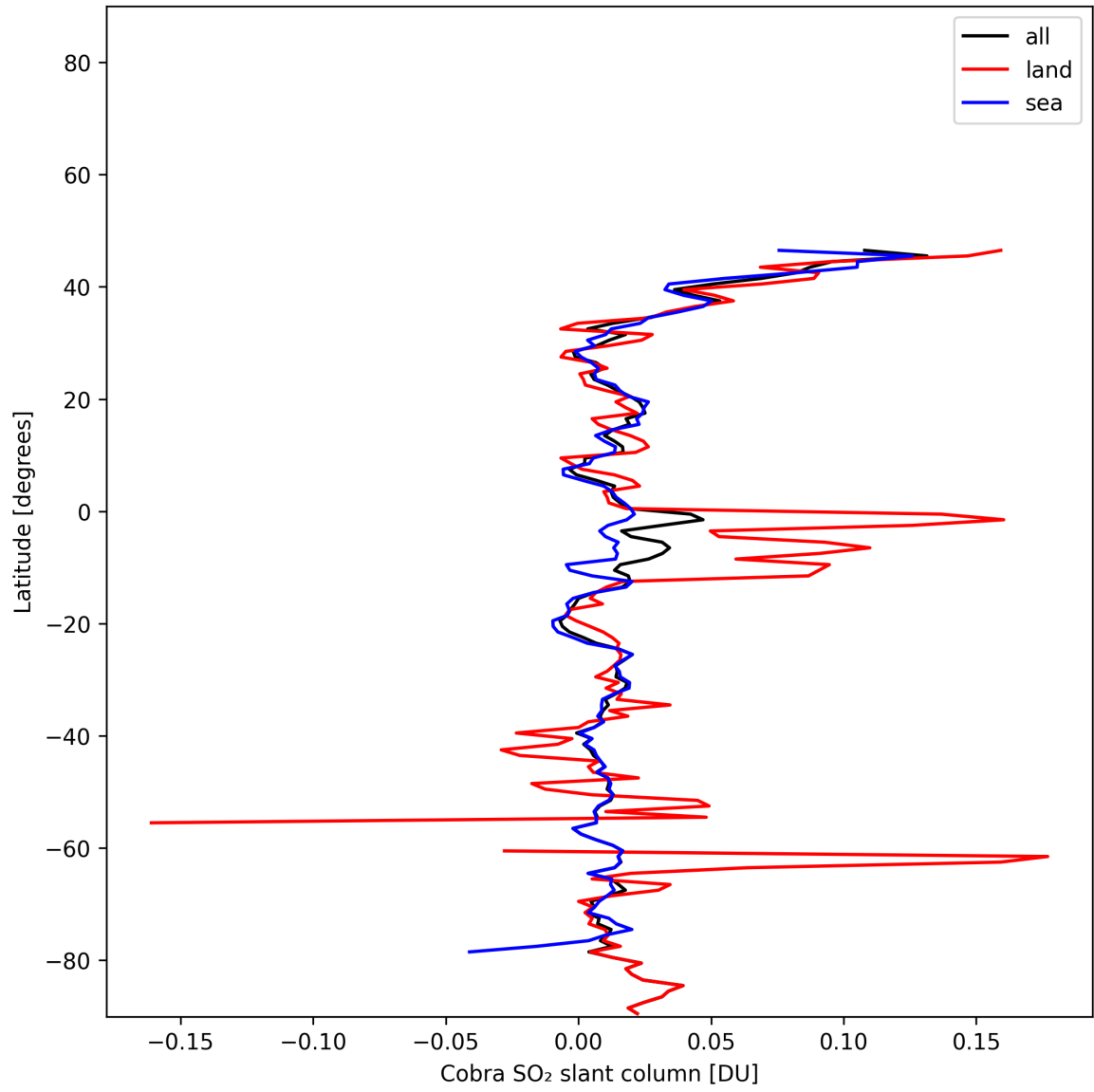


Figure 34: Zonal average of “Cobra SO₂ slant column” for 2024-12-28 to 2024-12-29.

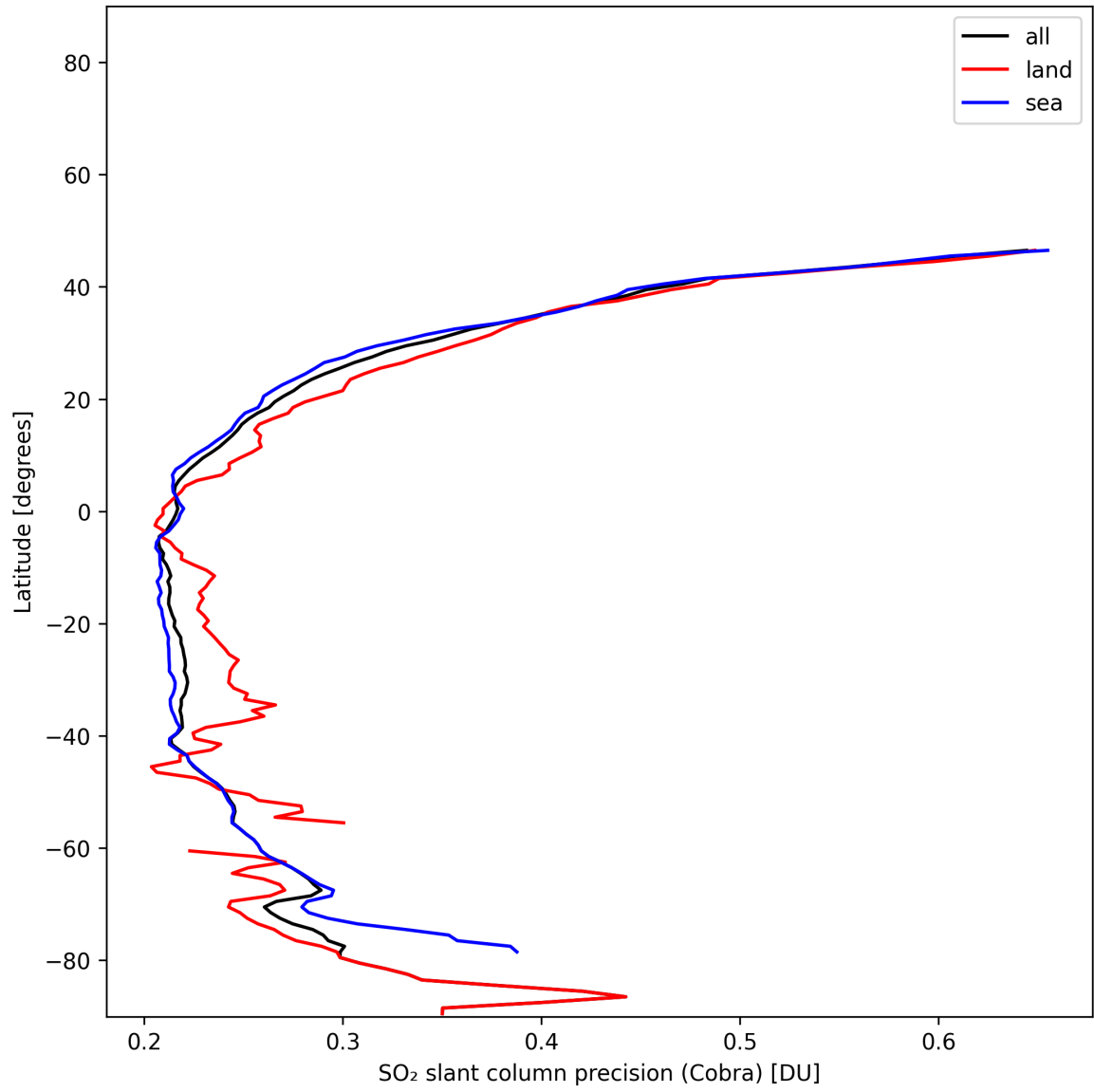


Figure 35: Zonal average of “SO₂ slant column precision (Cobra)” for 2024-12-28 to 2024-12-29.

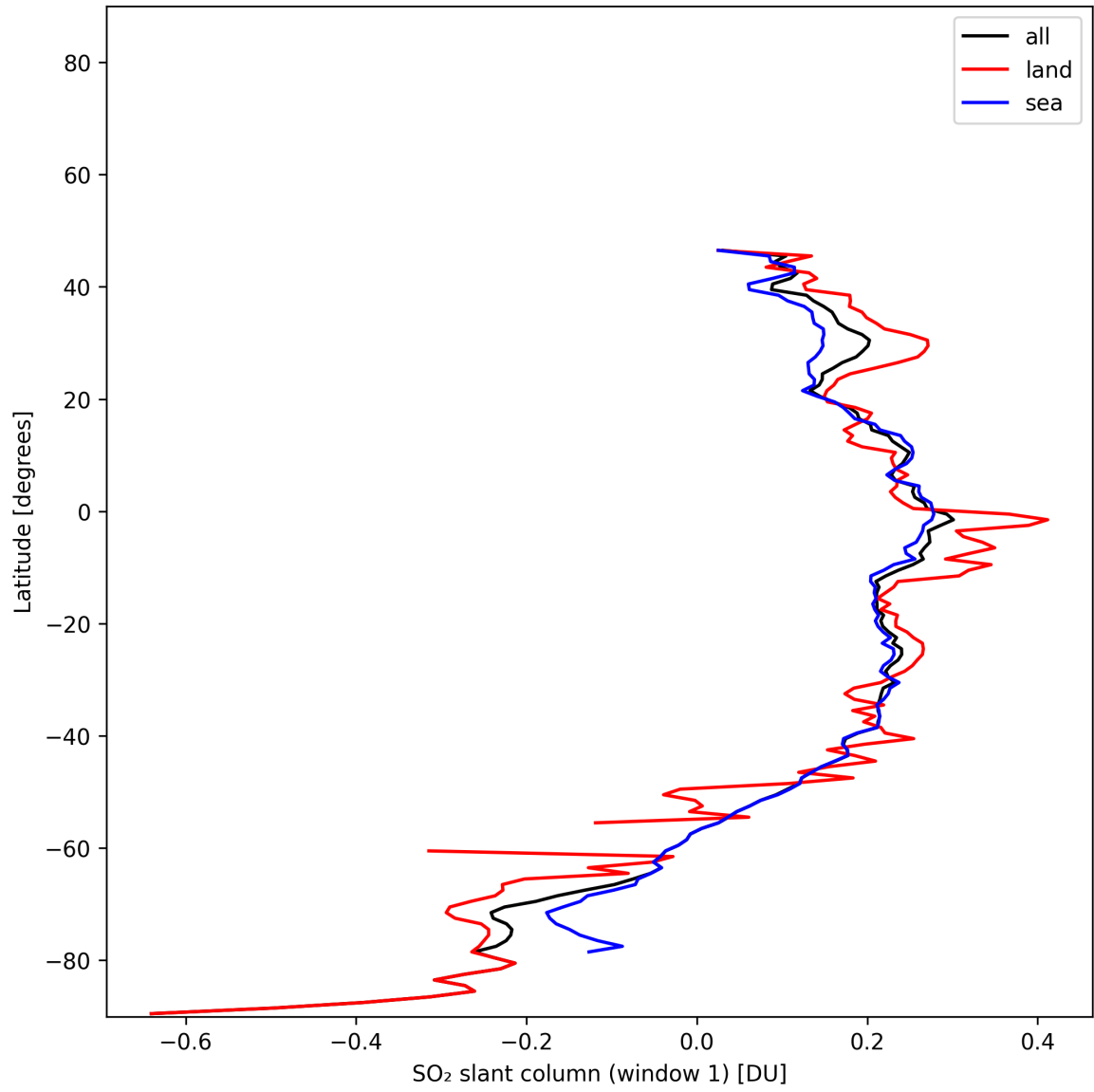


Figure 36: Zonal average of “SO₂ slant column (window 1)” for 2024-12-28 to 2024-12-29.

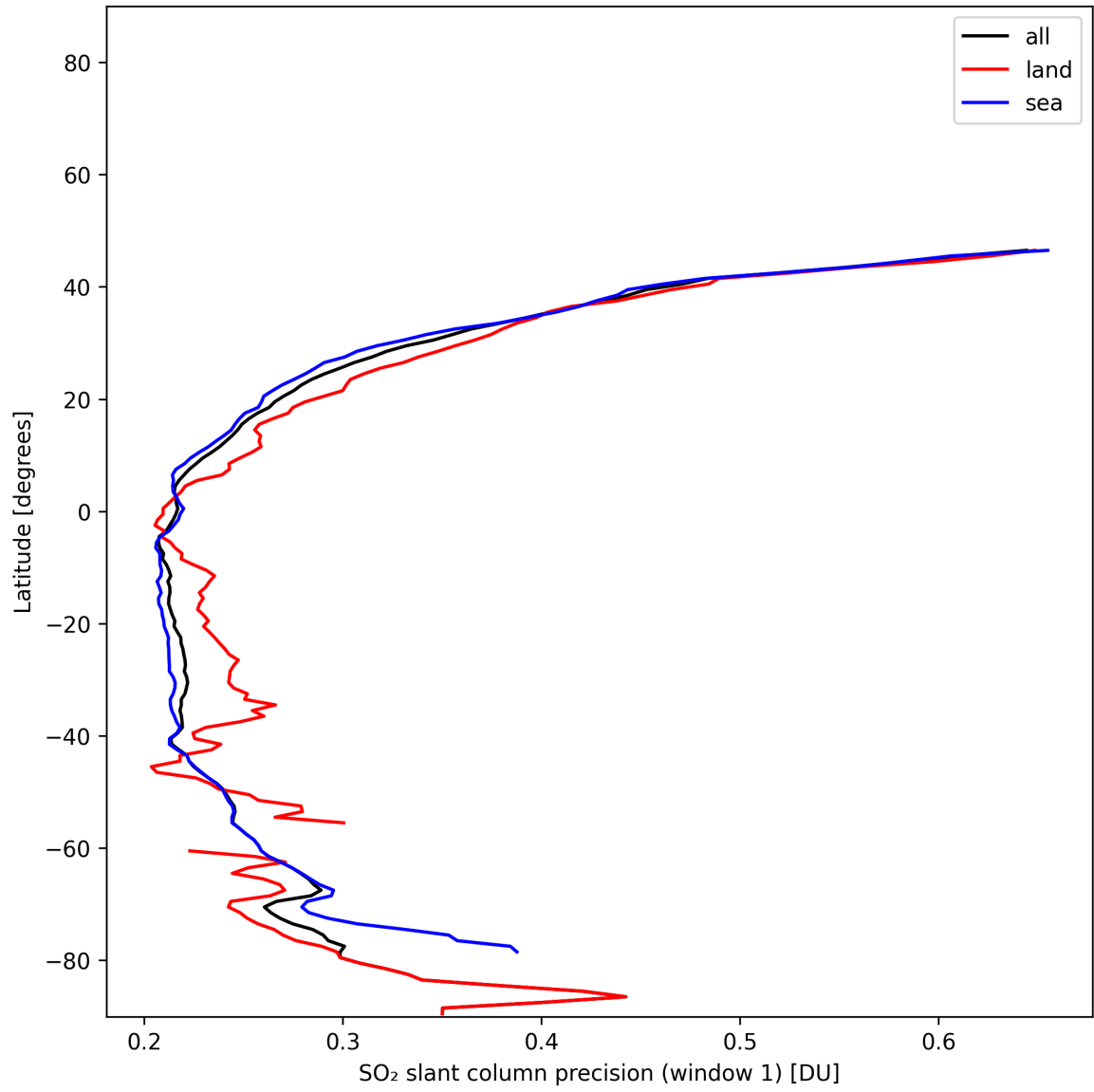


Figure 37: Zonal average of “SO₂ slant column precision (window 1)” for 2024-12-28 to 2024-12-29.

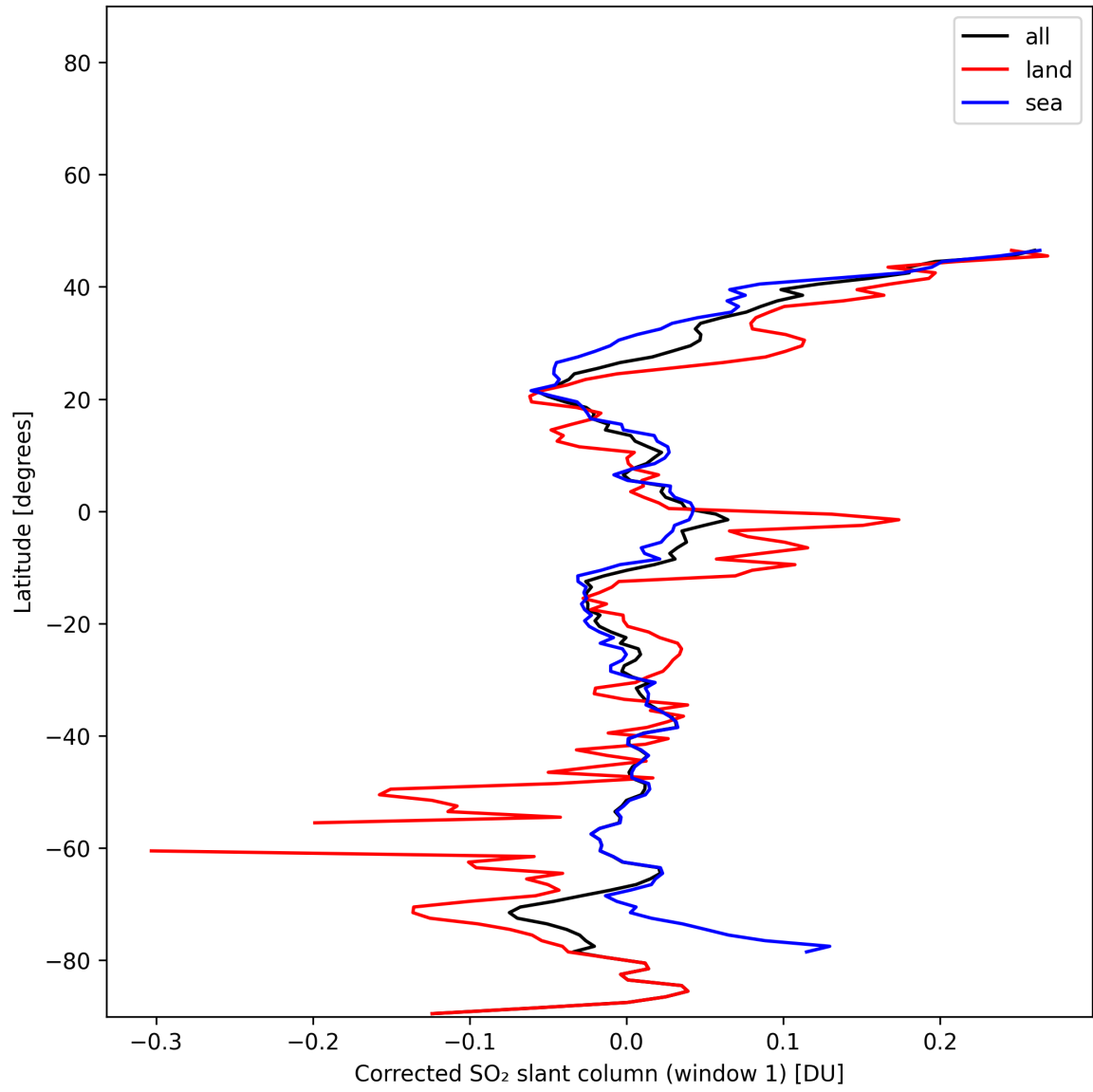


Figure 38: Zonal average of “Corrected SO₂ slant column (window 1)” for 2024-12-28 to 2024-12-29.

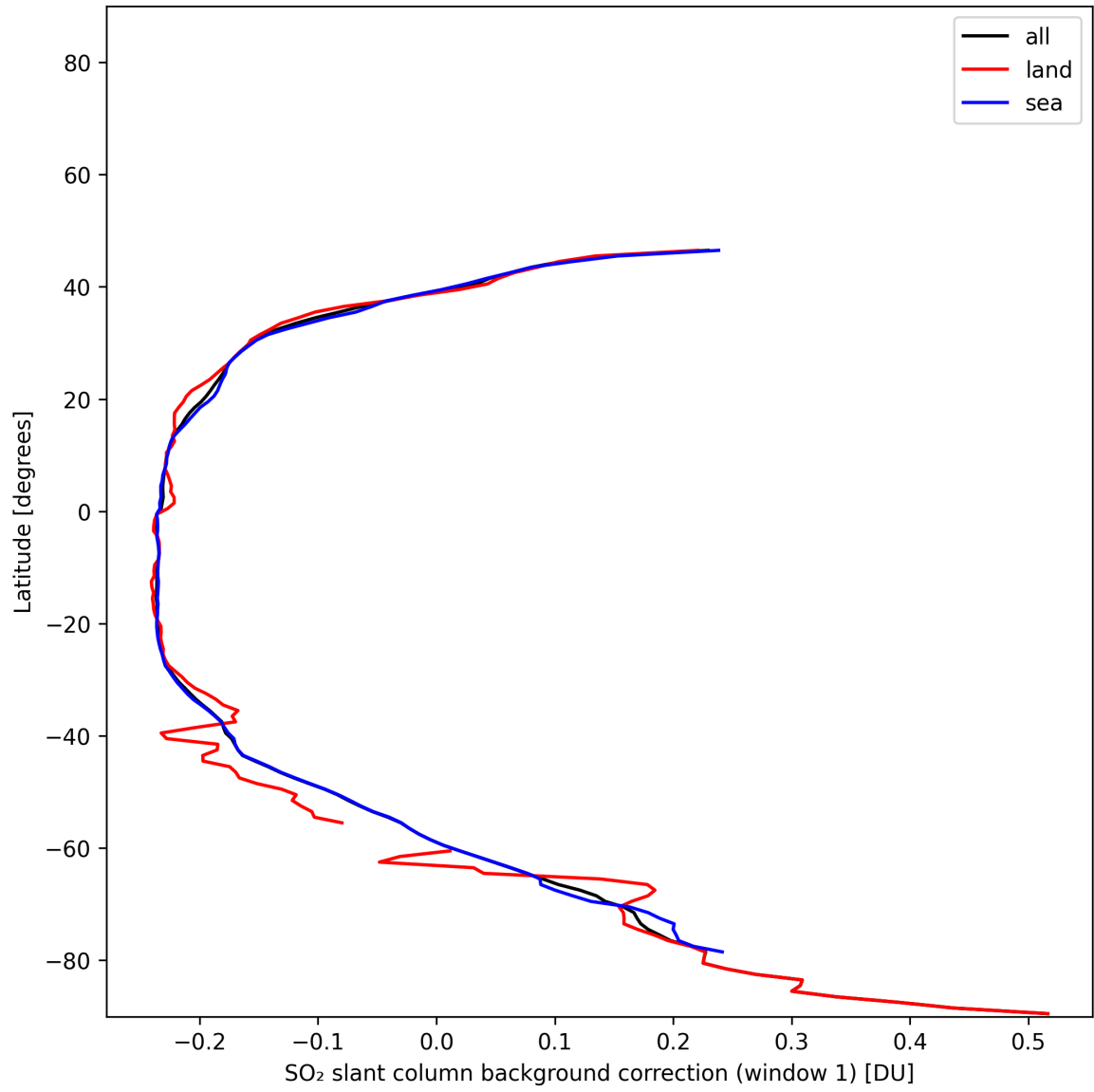


Figure 39: Zonal average of “SO₂ slant column background correction (window 1)” for 2024-12-28 to 2024-12-29.

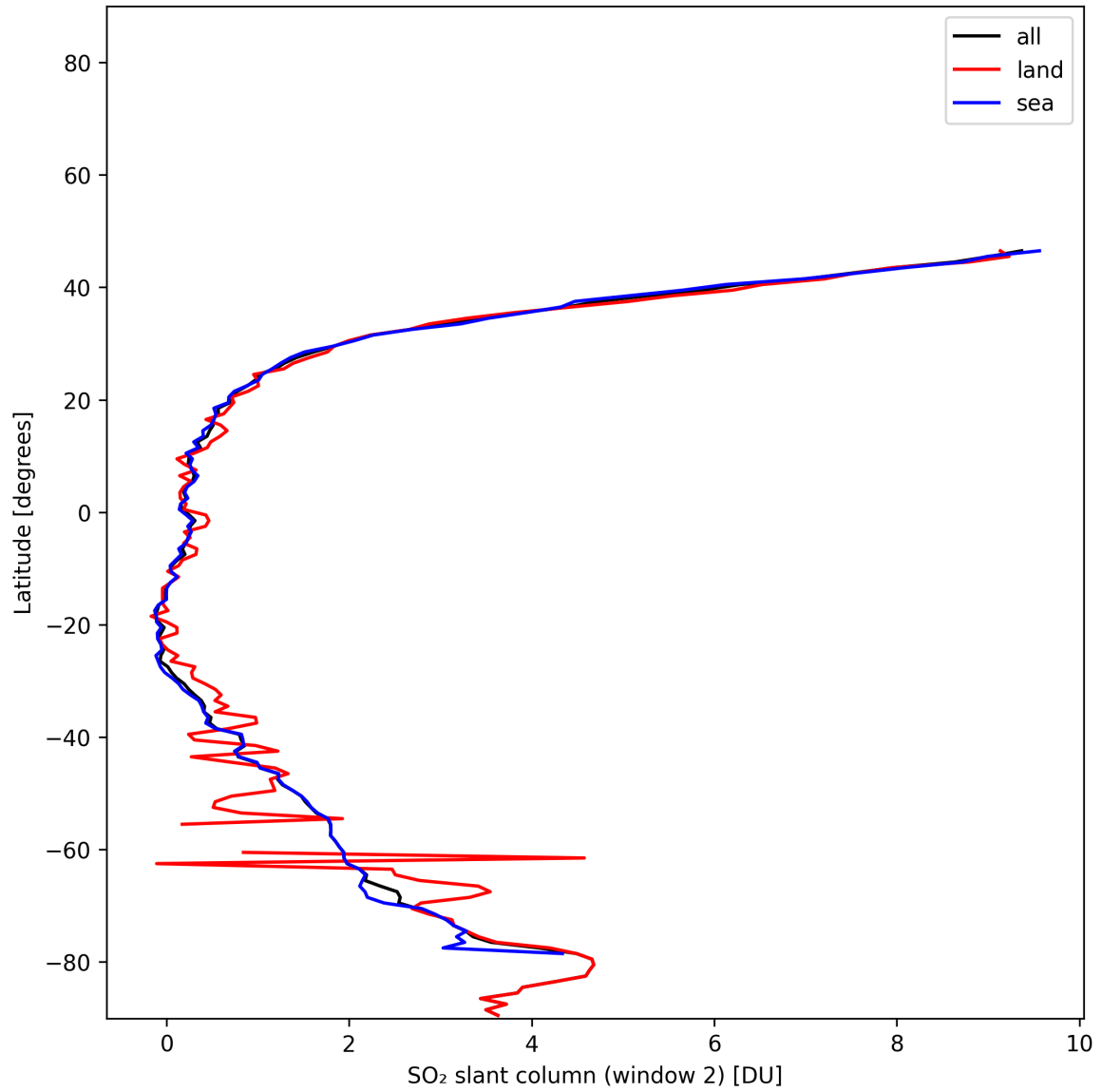


Figure 40: Zonal average of “SO₂ slant column (window 2)” for 2024-12-28 to 2024-12-29.

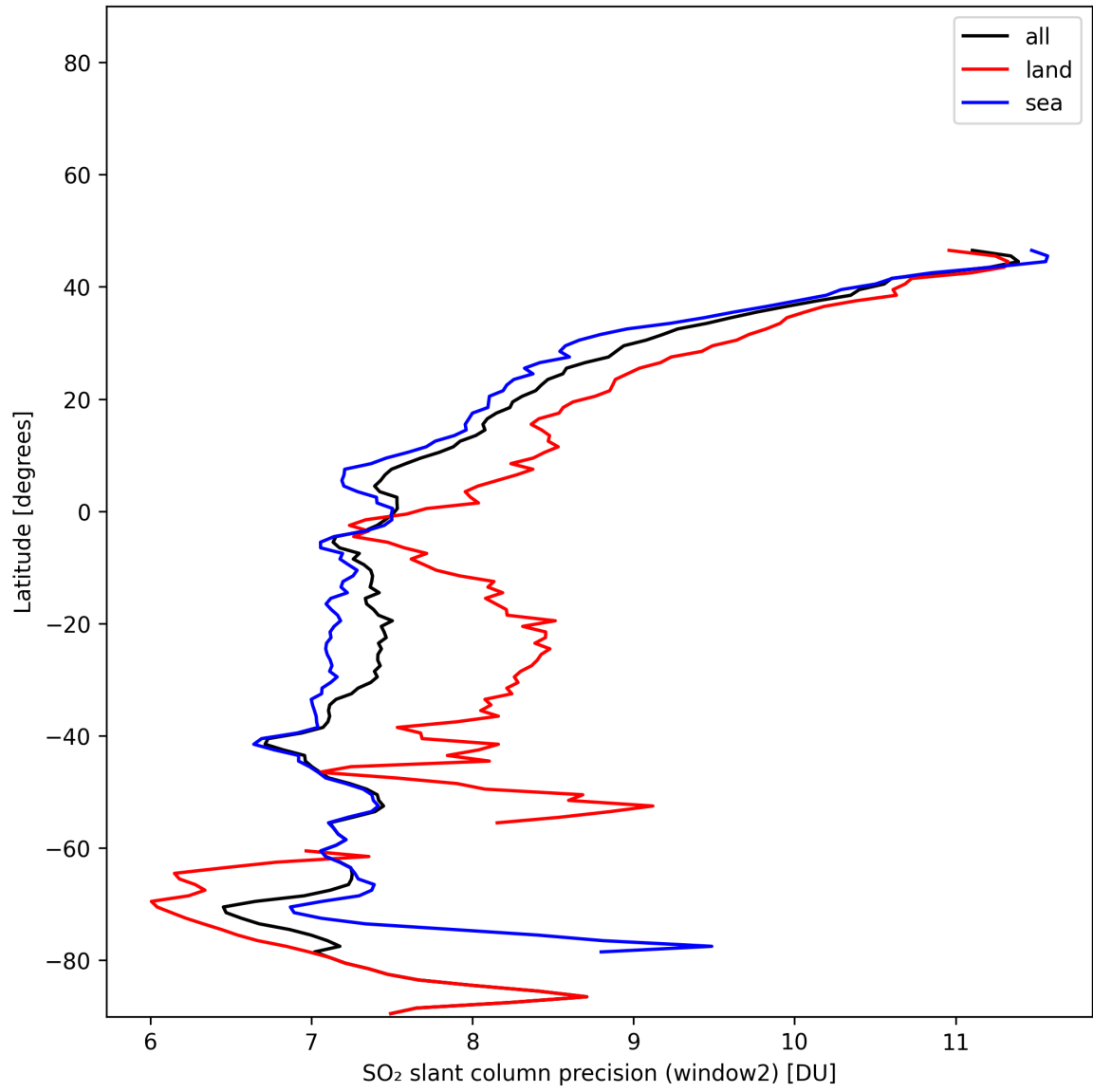


Figure 41: Zonal average of “SO₂ slant column precision (window2)” for 2024-12-28 to 2024-12-29.

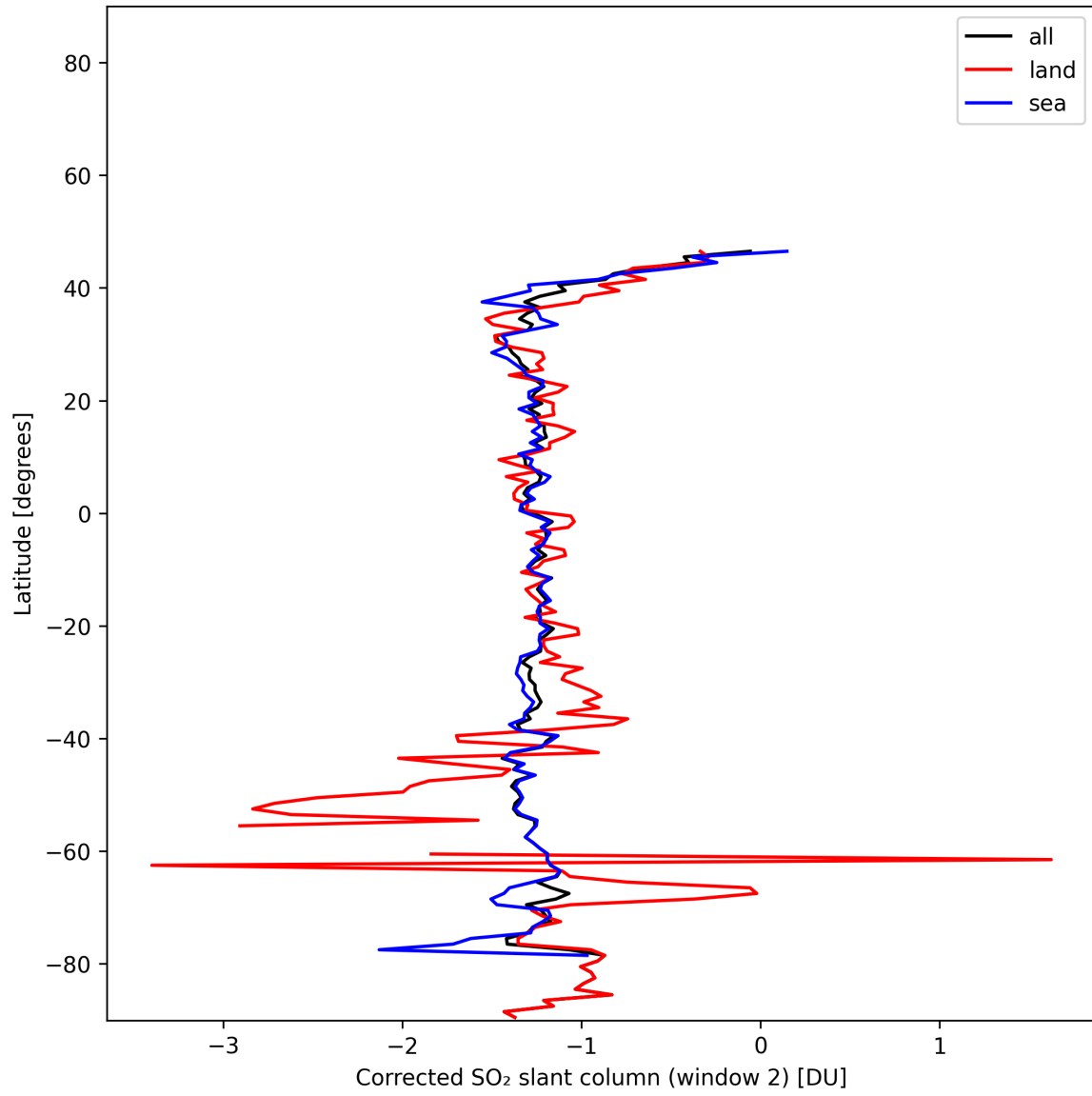


Figure 42: Zonal average of “Corrected SO₂ slant column (window 2)” for 2024-12-28 to 2024-12-29.

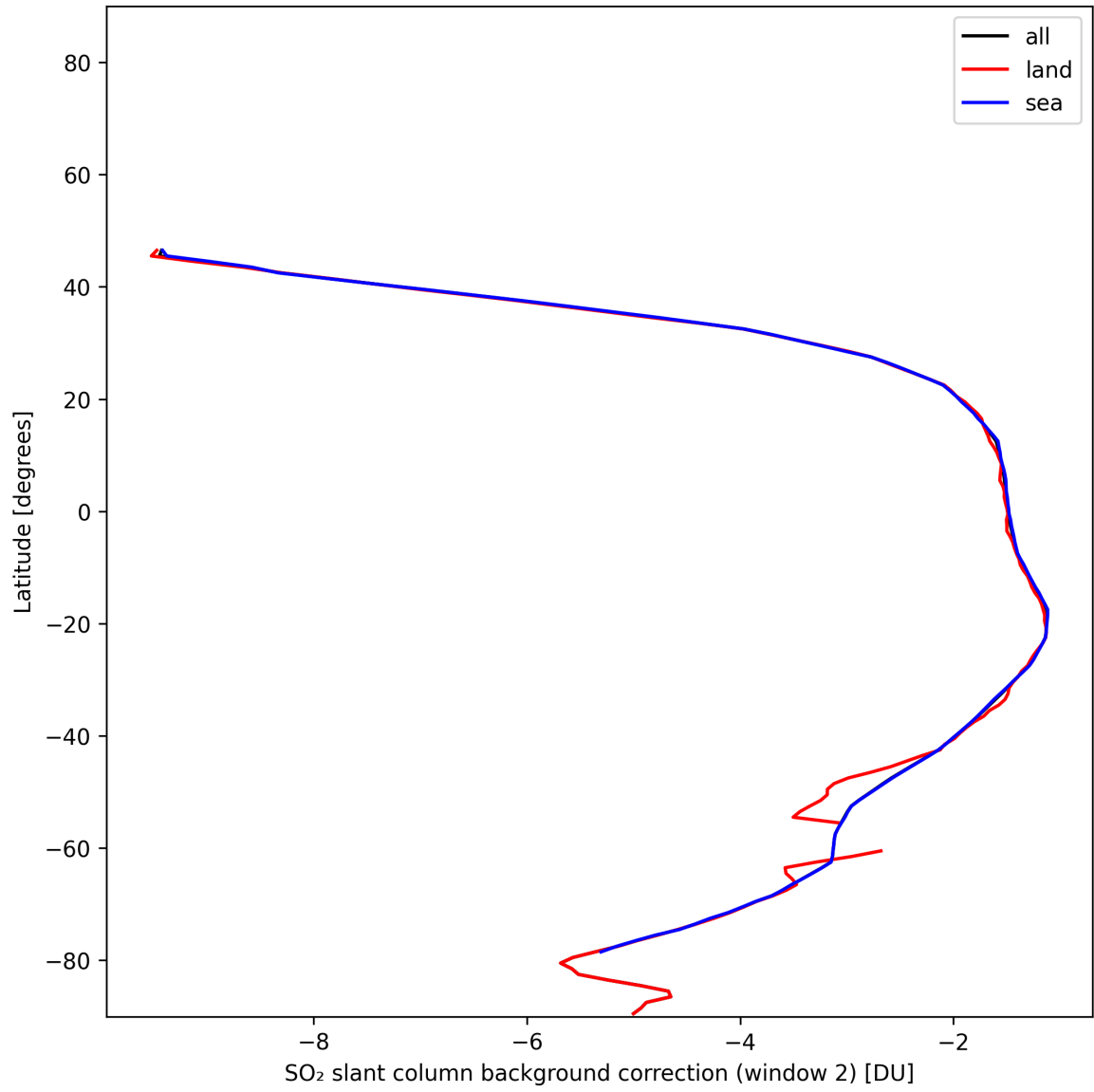


Figure 43: Zonal average of “SO₂ slant column background correction (window 2)” for 2024-12-28 to 2024-12-29.

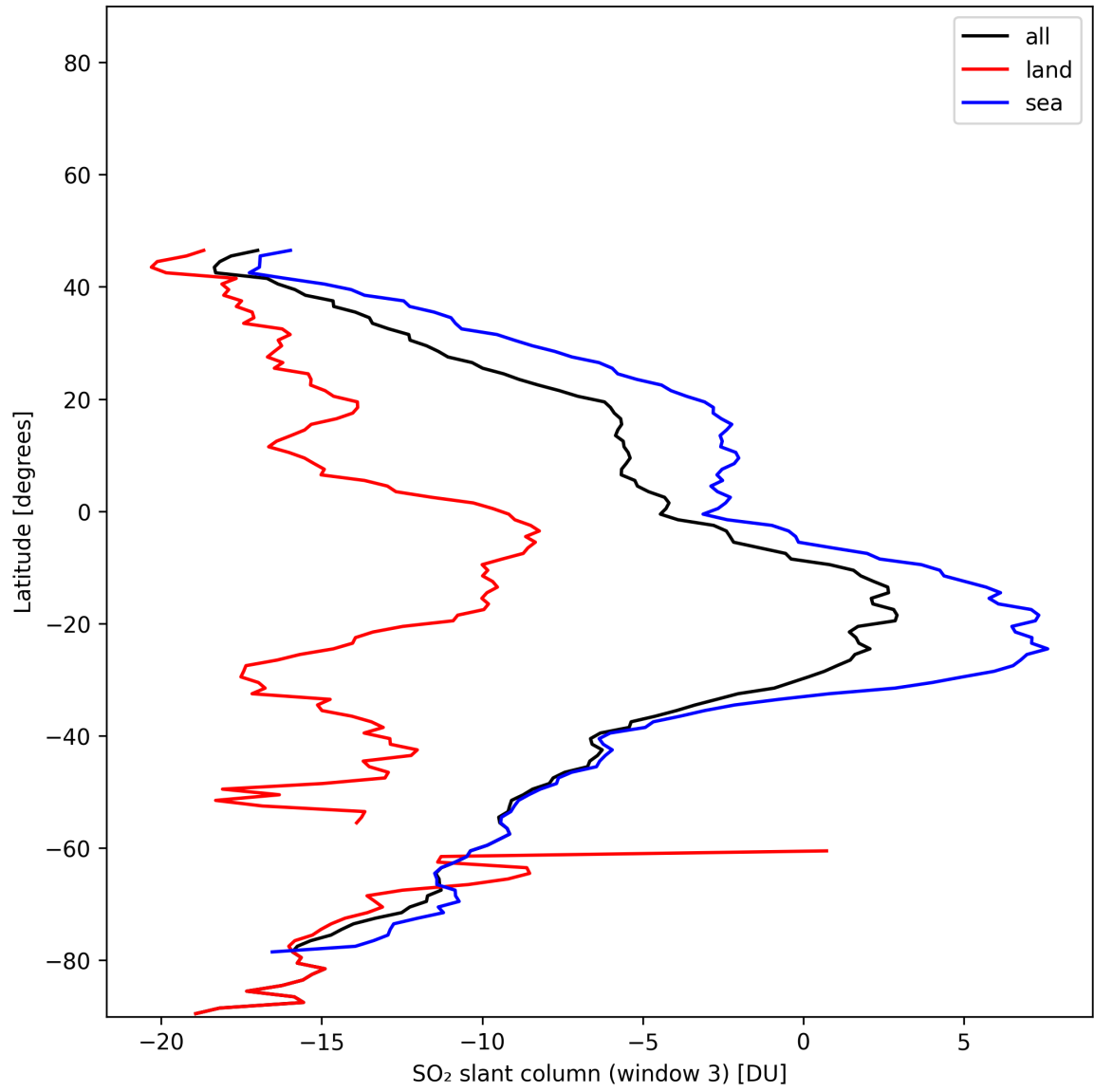


Figure 44: Zonal average of “SO₂ slant column (window 3)” for 2024-12-28 to 2024-12-29.

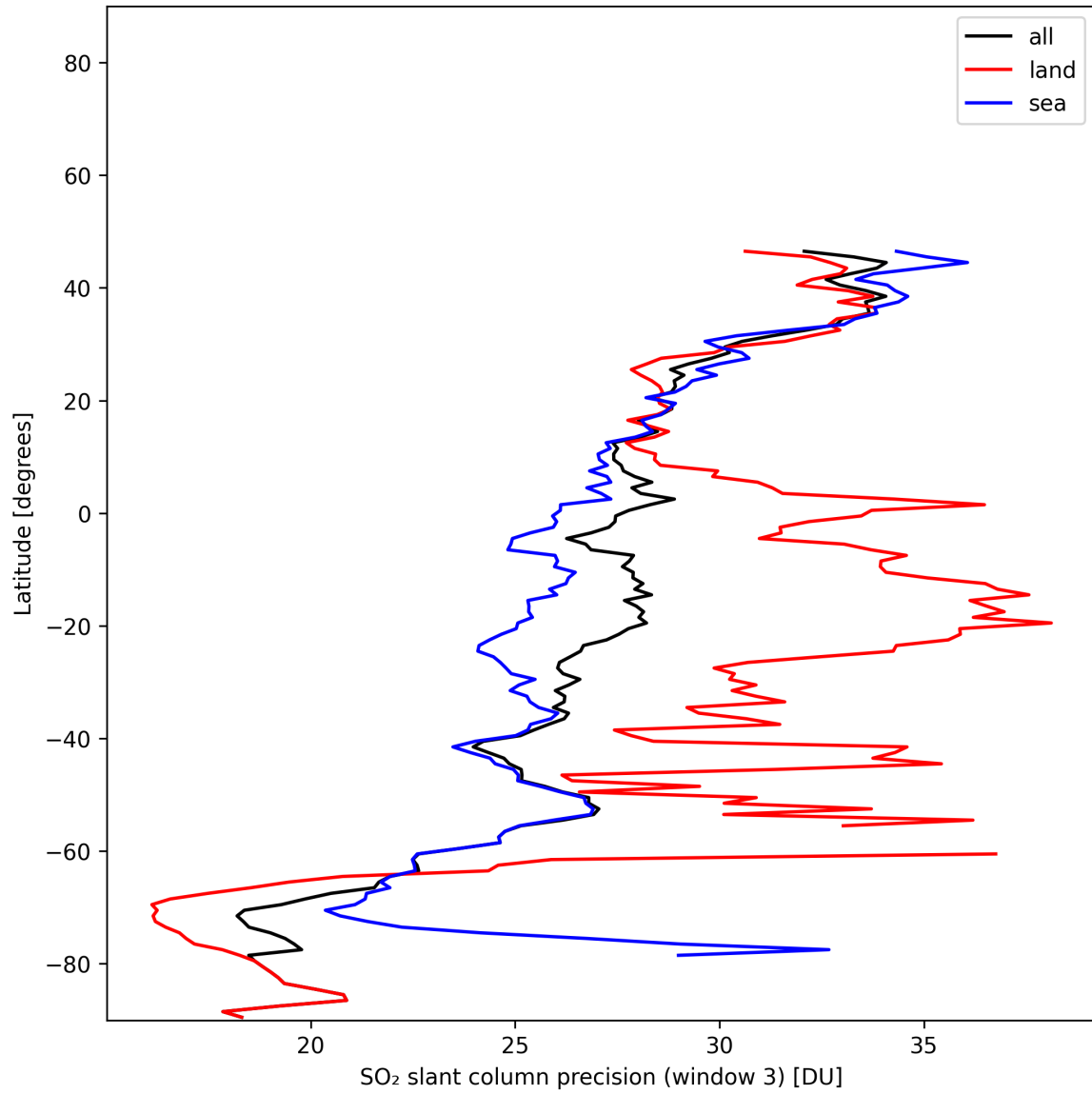


Figure 45: Zonal average of “SO₂ slant column precision (window 3)” for 2024-12-28 to 2024-12-29.

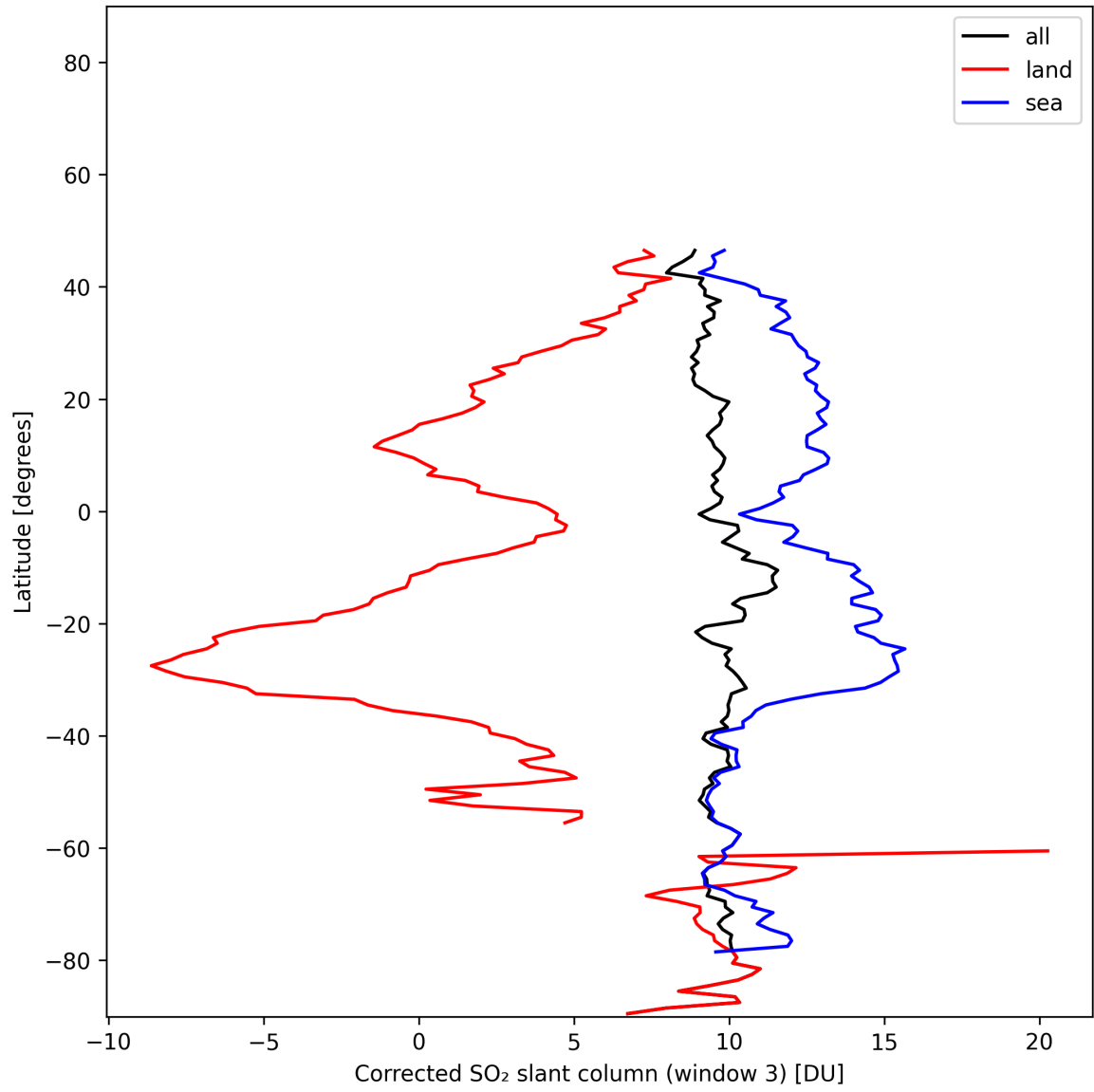


Figure 46: Zonal average of “Corrected SO₂ slant column (window 3)” for 2024-12-28 to 2024-12-29.

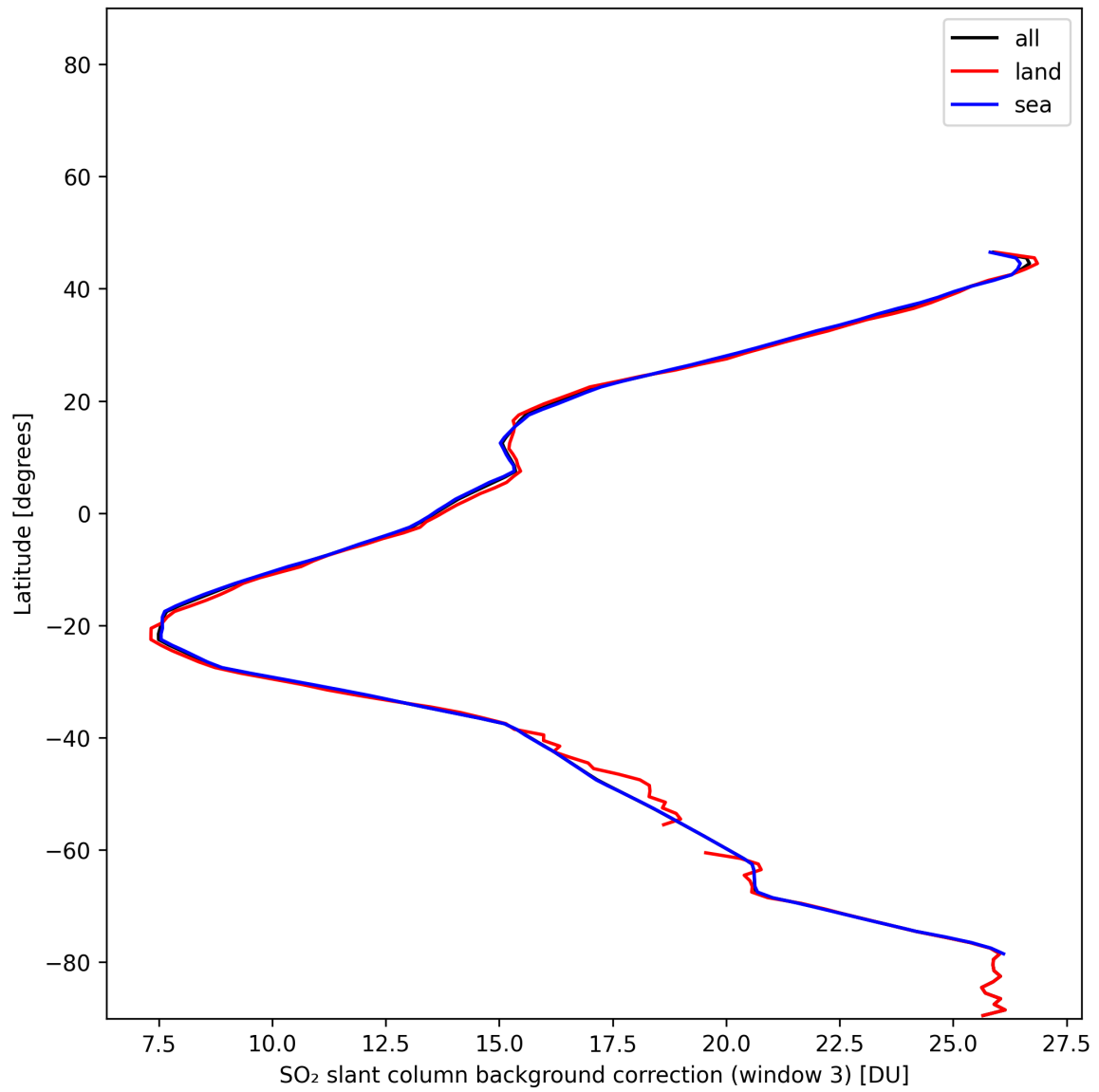


Figure 47: Zonal average of “SO₂ slant column background correction (window 3)” for 2024-12-28 to 2024-12-29.

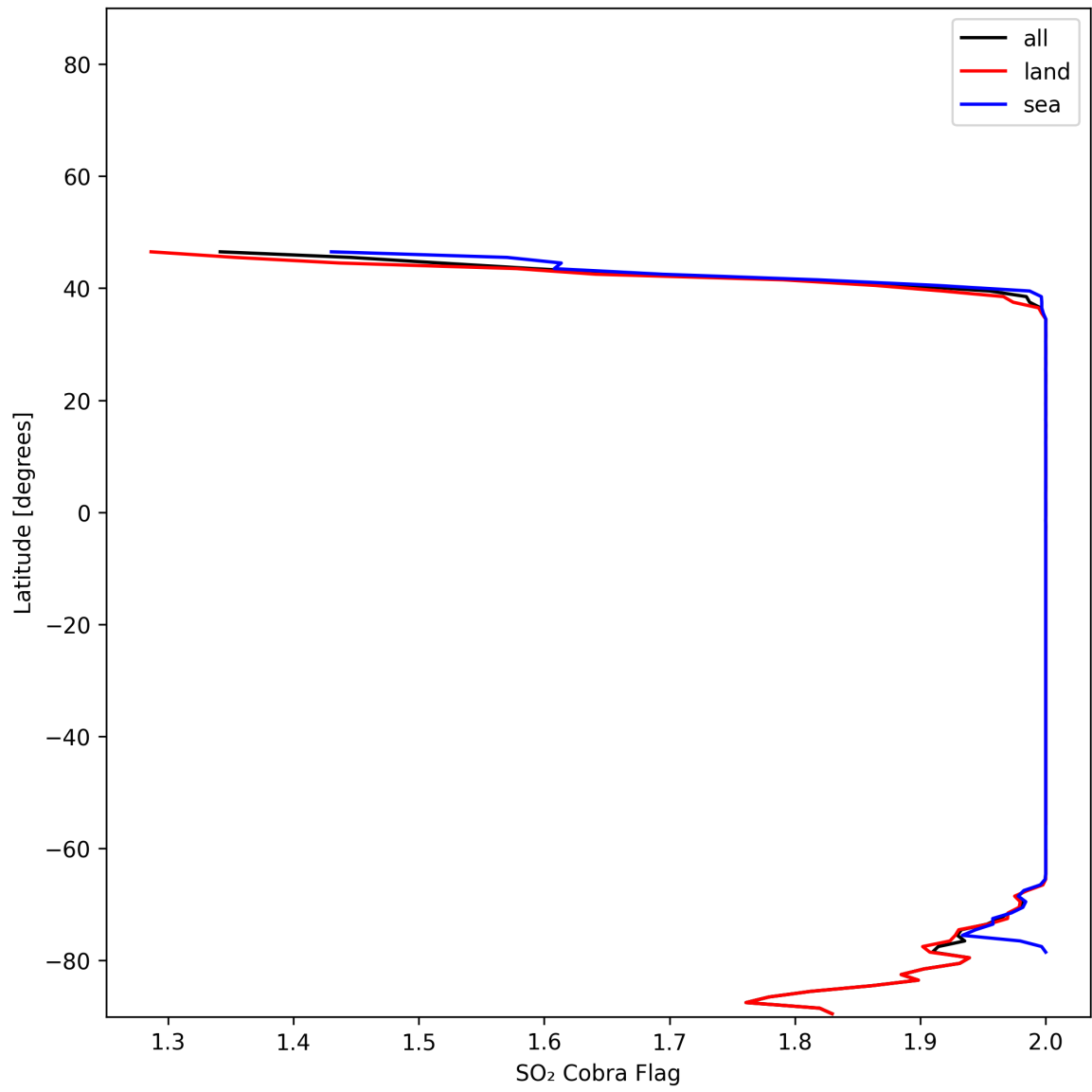


Figure 48: Zonal average of "SO₂ Cobra Flag" for 2024-12-28 to 2024-12-29.

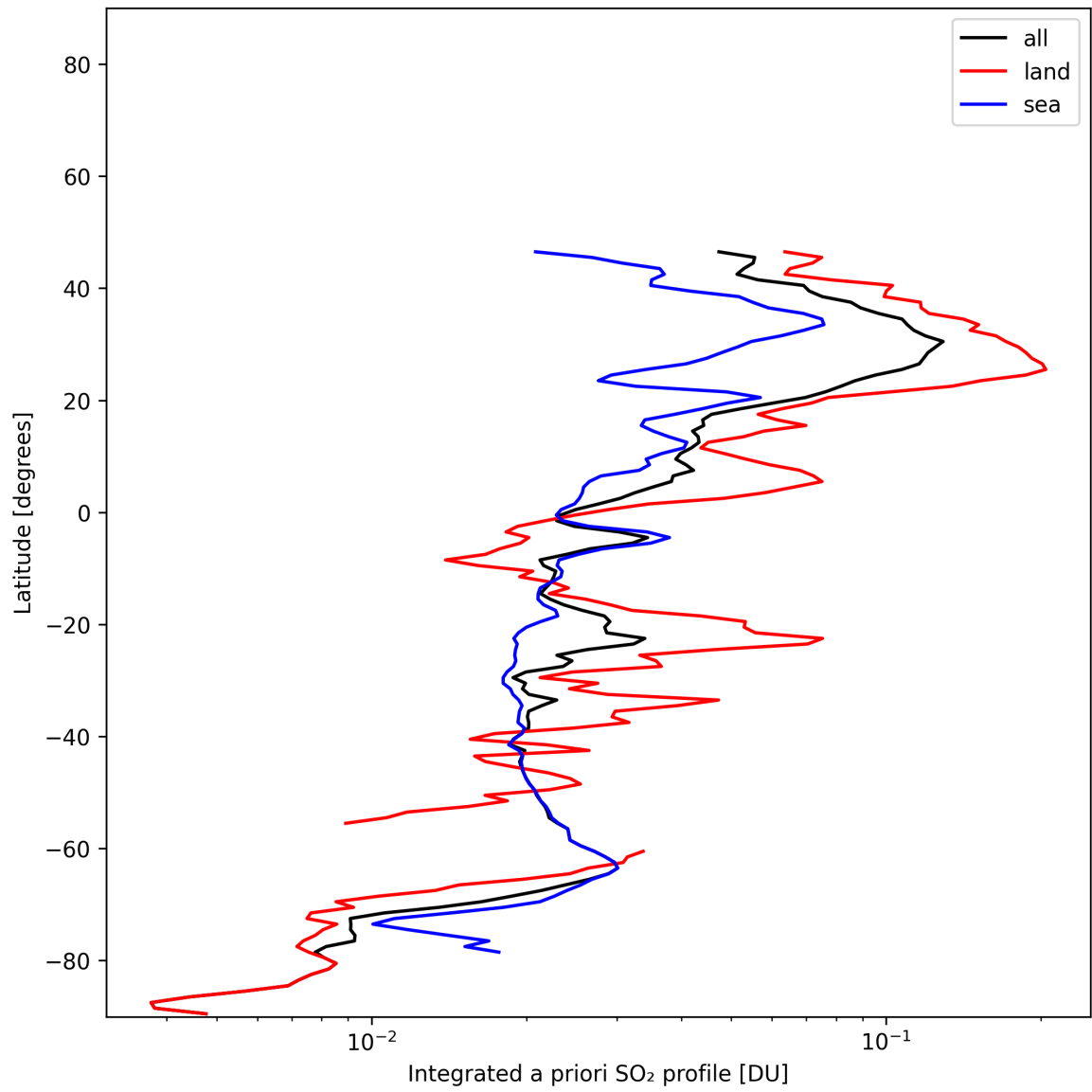


Figure 49: Zonal average of “Integrated a priori SO₂ profile” for 2024-12-28 to 2024-12-29.

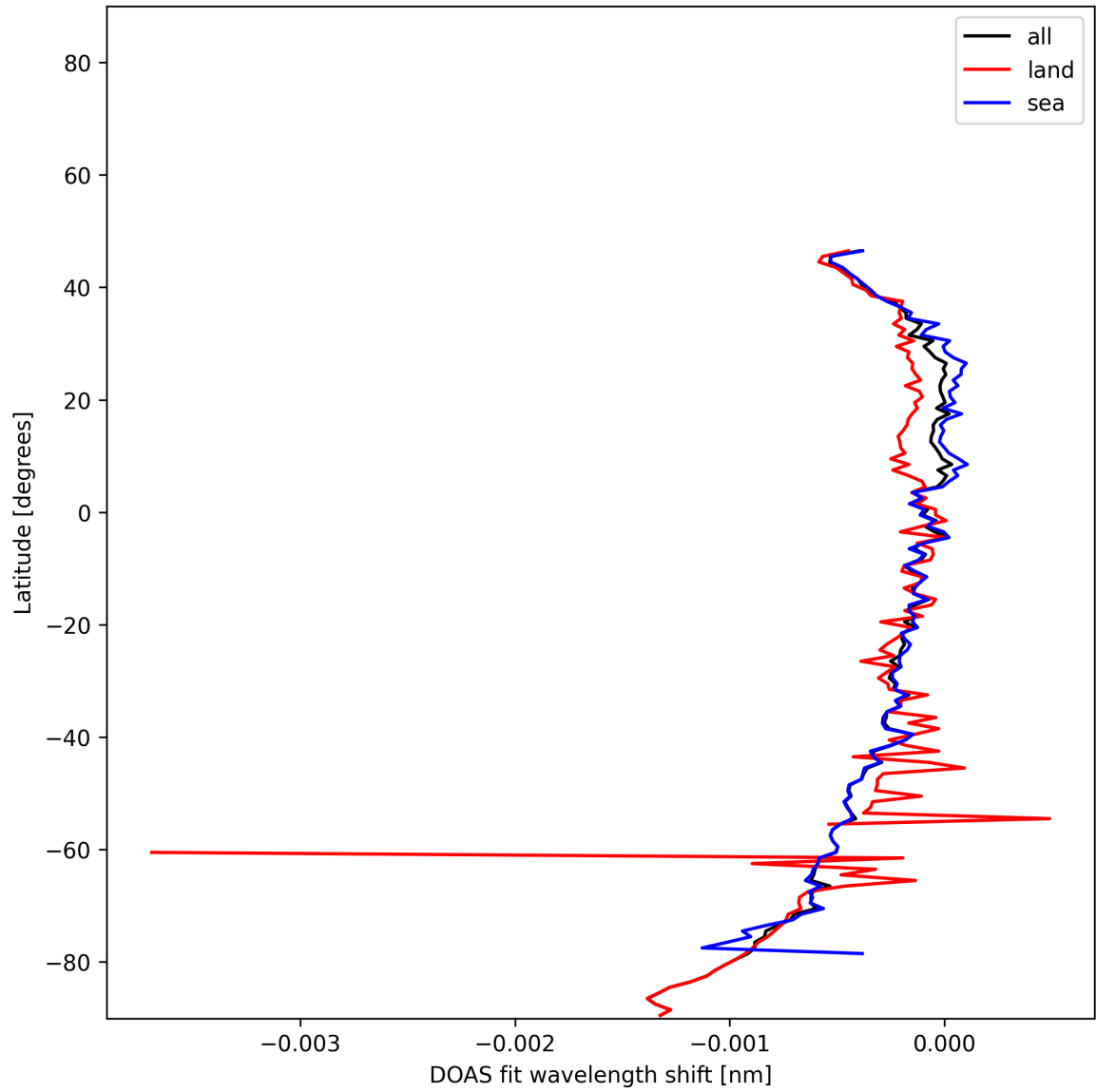


Figure 50: Zonal average of "DOAS fit wavelength shift" for 2024-12-28 to 2024-12-29.

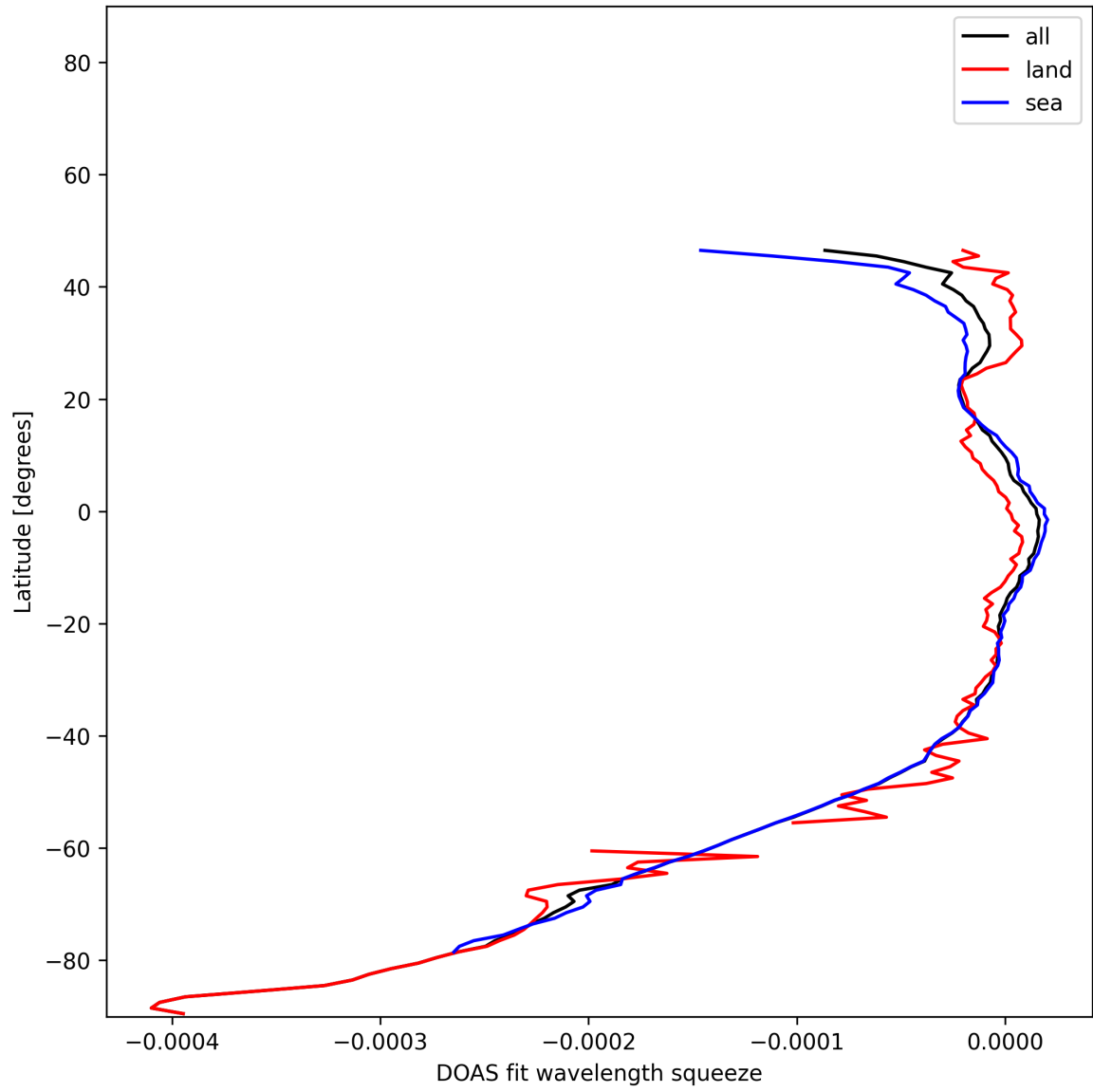


Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2024-12-28 to 2024-12-29.

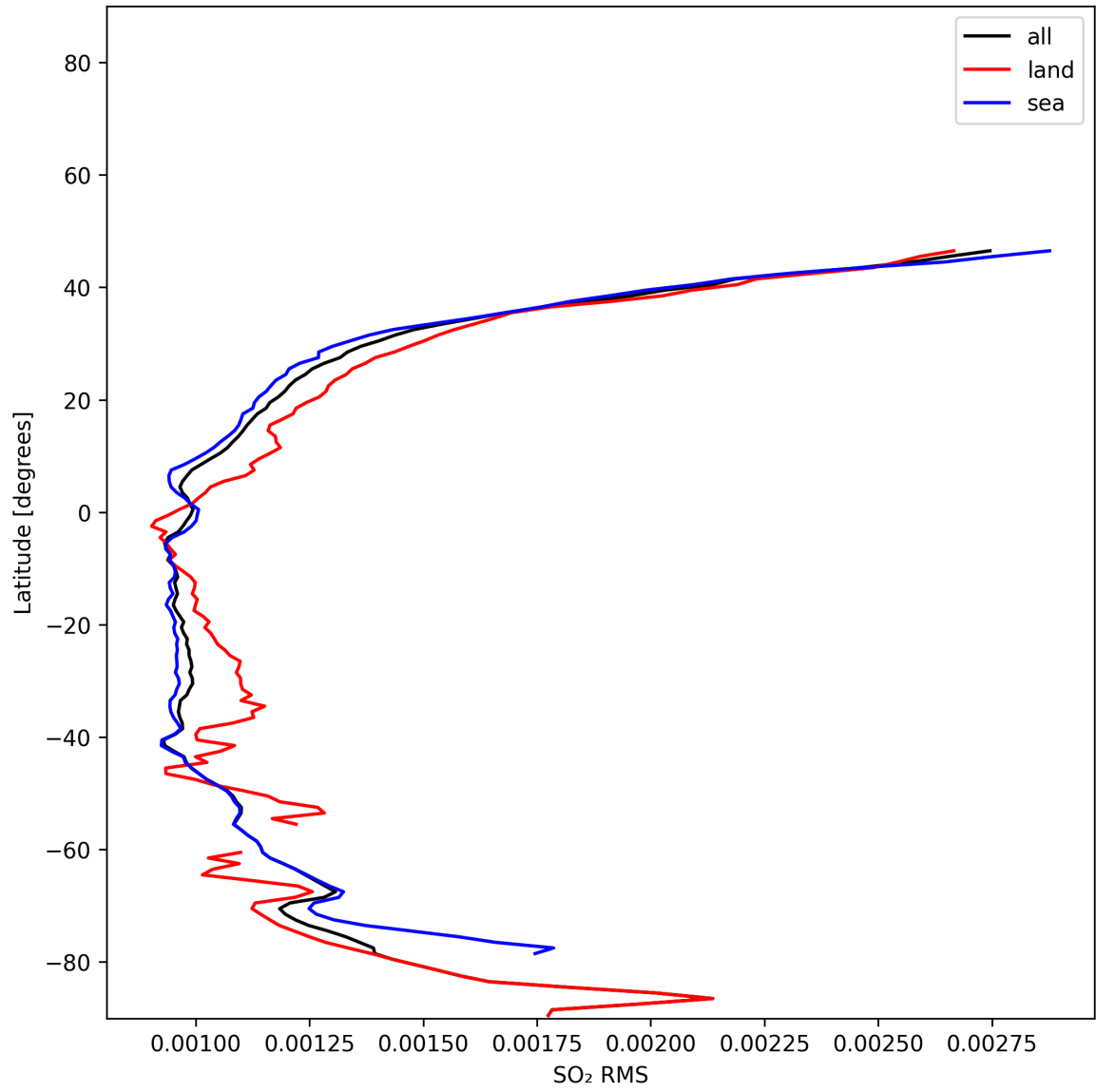


Figure 52: Zonal average of “SO₂ RMS” for 2024-12-28 to 2024-12-29.

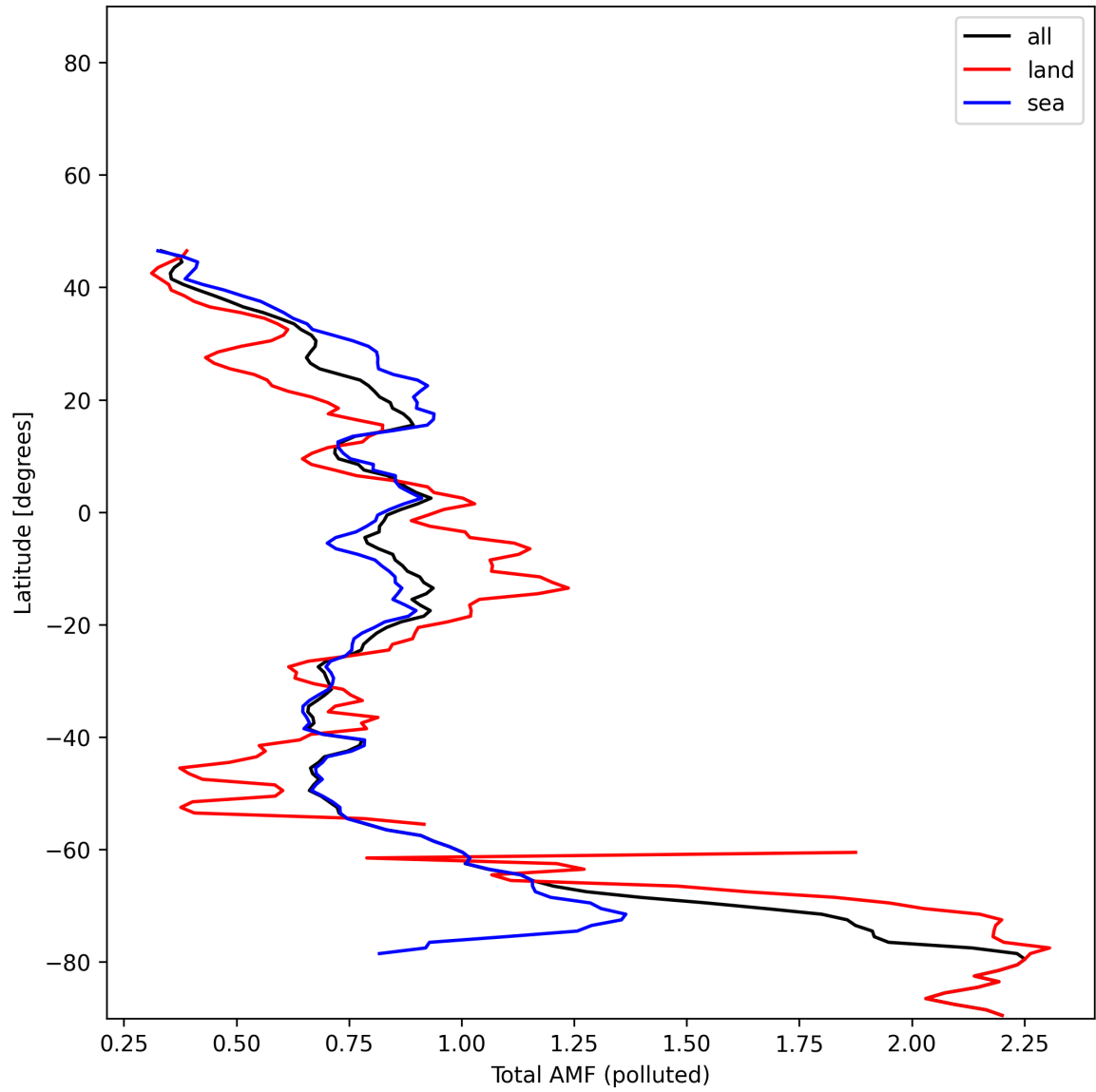


Figure 53: Zonal average of “Total AMF (polluted)” for 2024-12-28 to 2024-12-29.

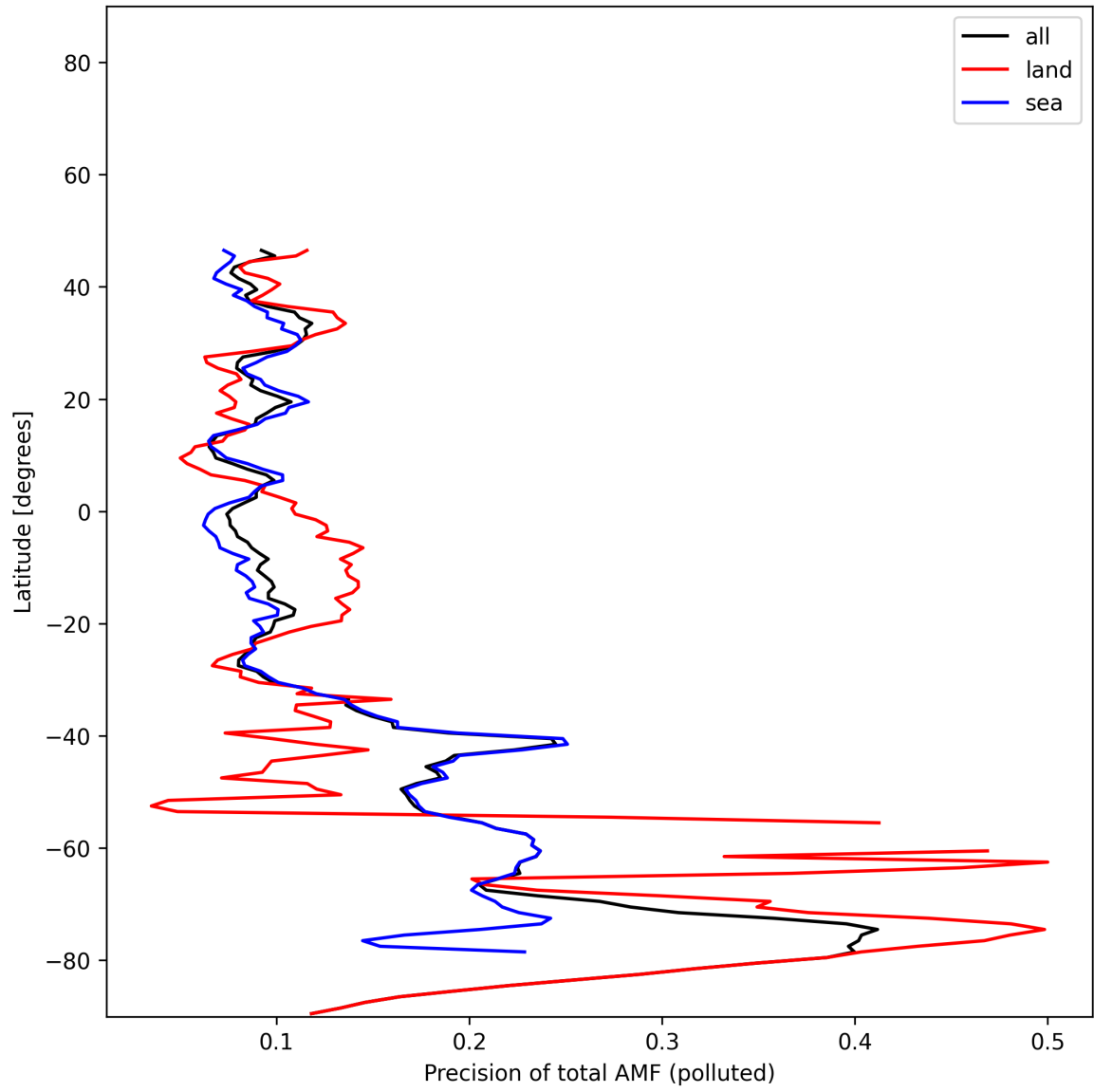


Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2024-12-28 to 2024-12-29.

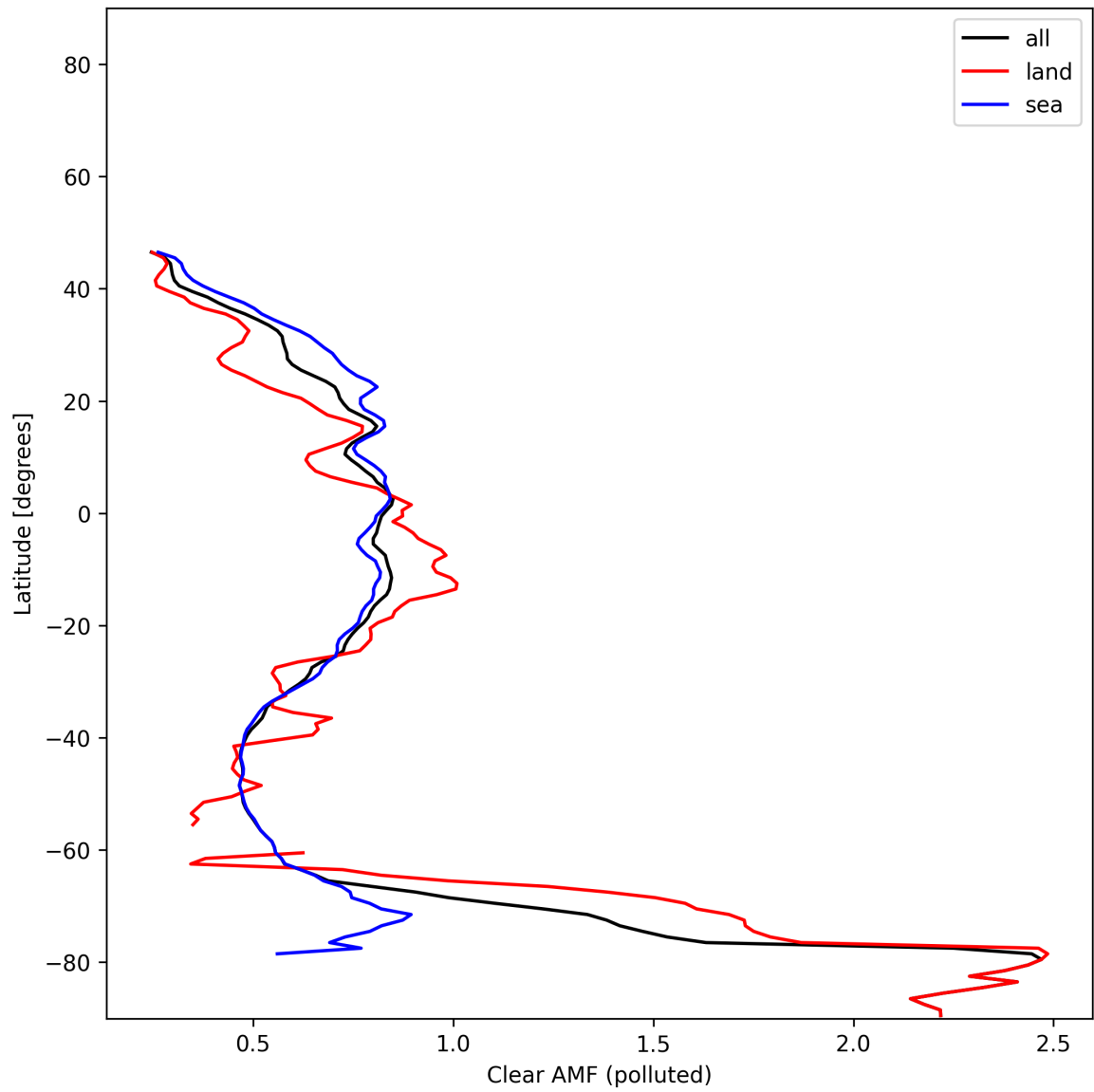


Figure 55: Zonal average of “Clear AMF (polluted)” for 2024-12-28 to 2024-12-29.

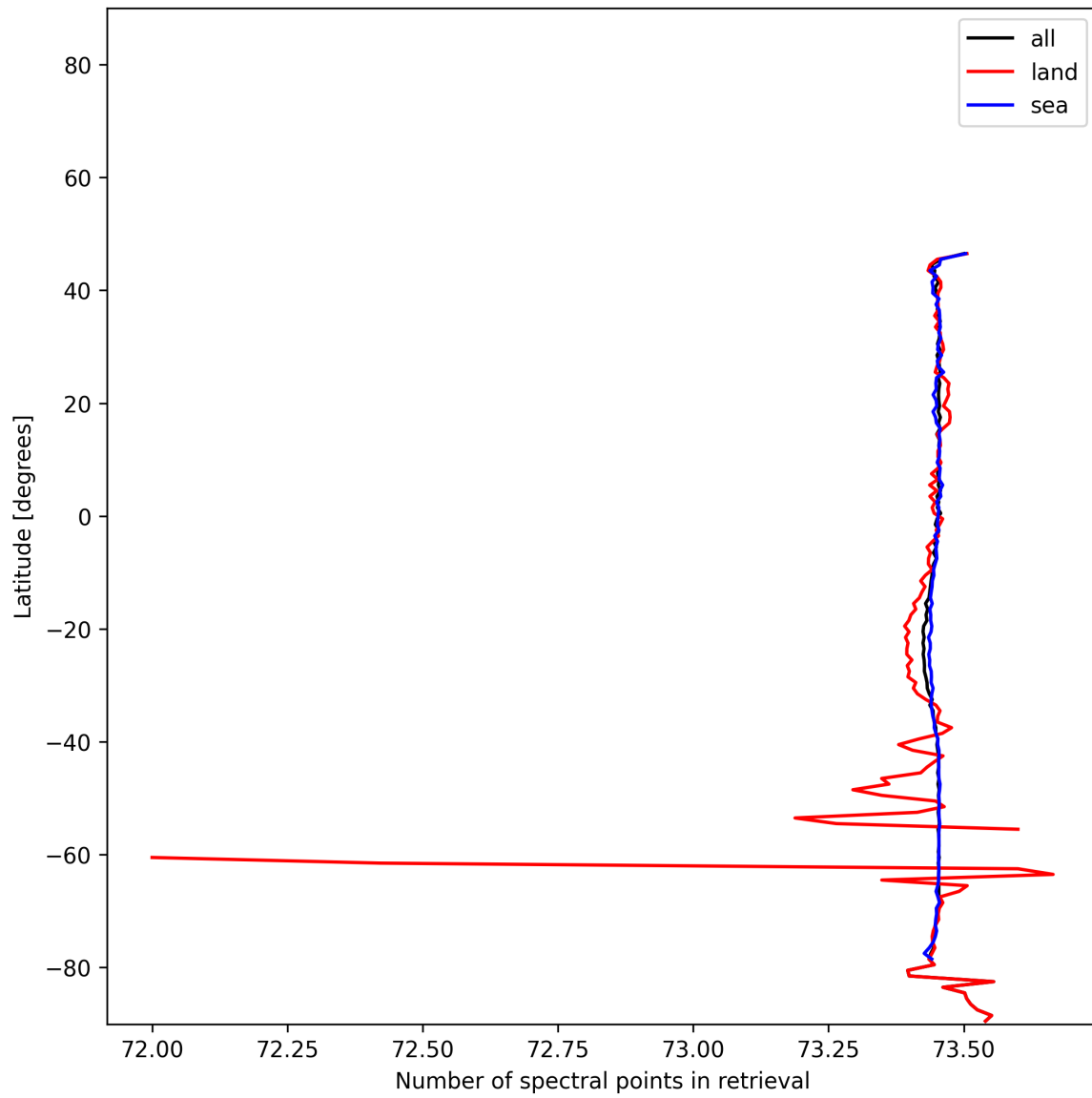


Figure 56: Zonal average of “Number of spectral points in retrieval” for 2024-12-28 to 2024-12-29.

8 Histograms

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

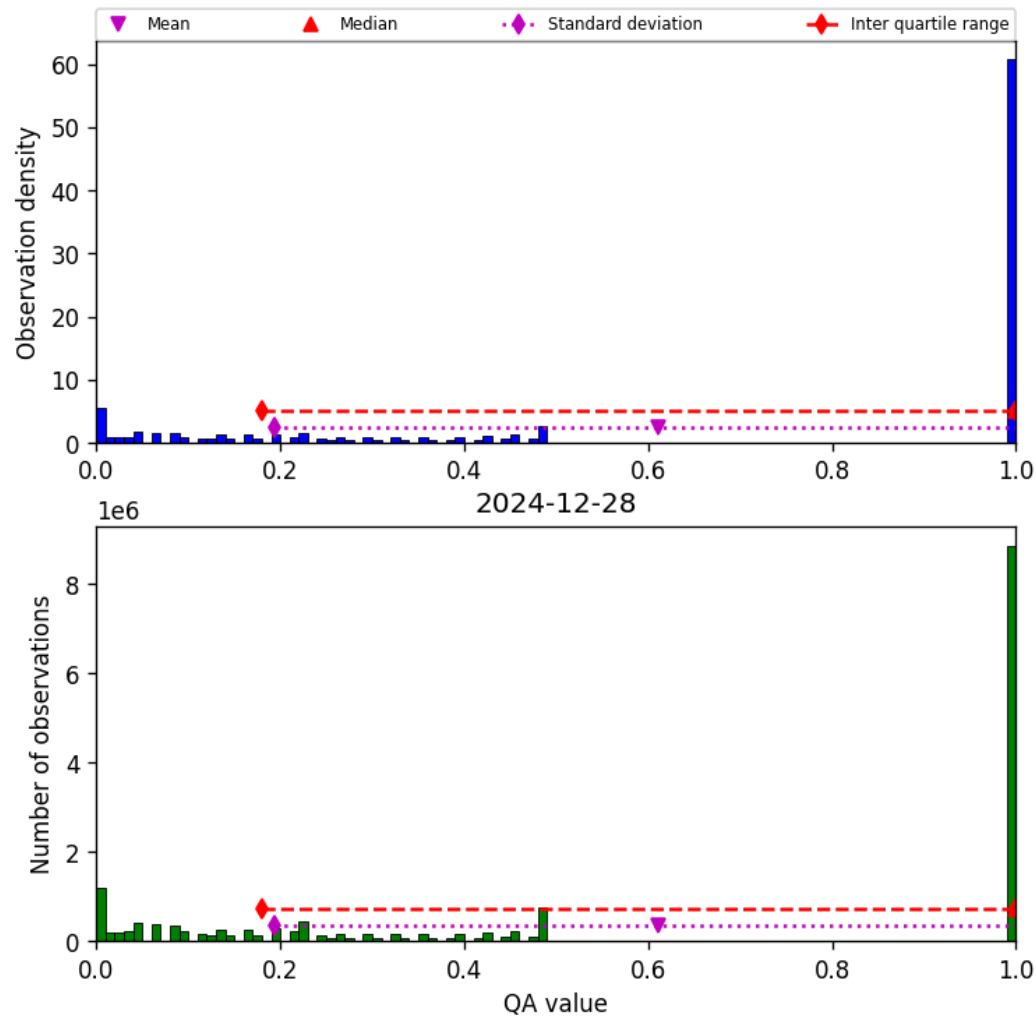


Figure 57: Histogram of “QA value” for 2024-12-28 to 2024-12-29

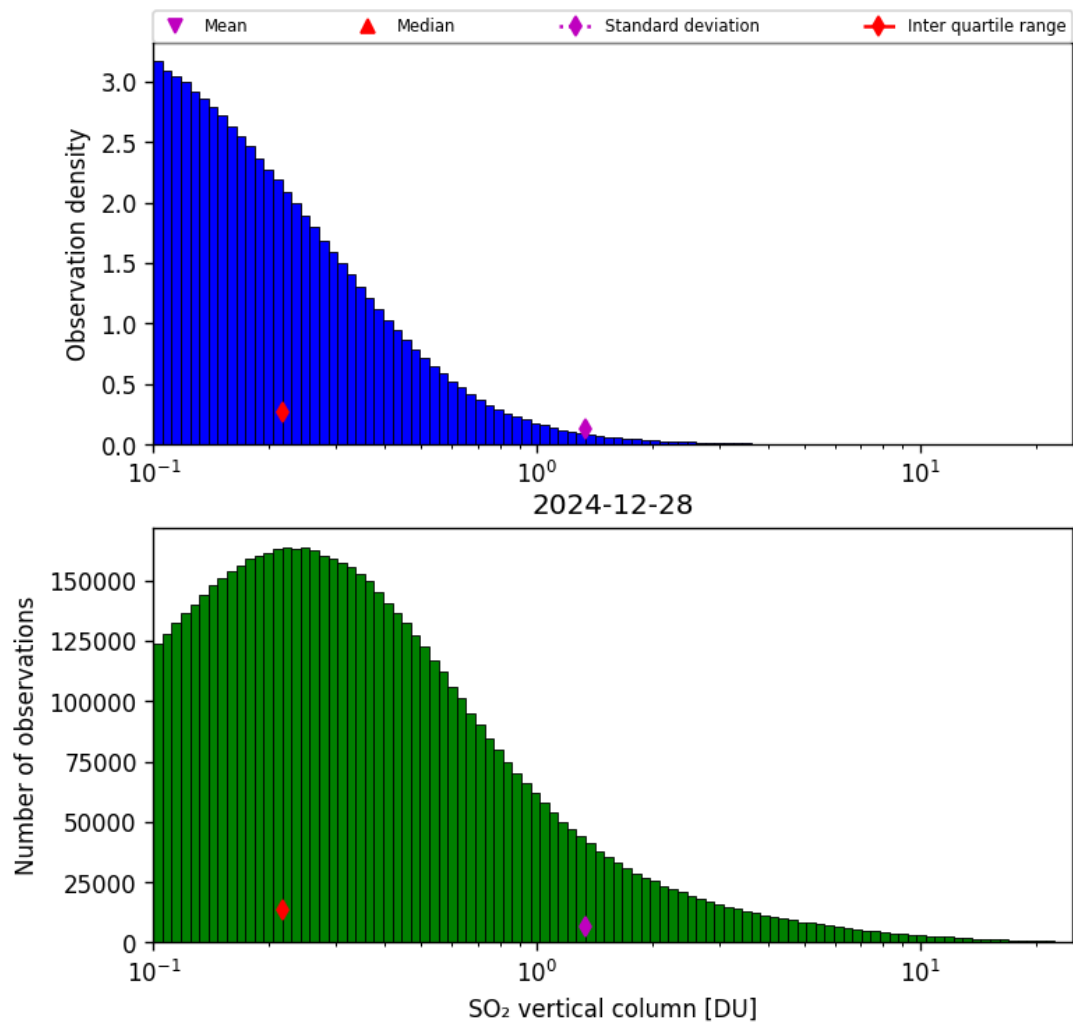


Figure 58: Histogram of “SO₂ vertical column” for 2024-12-28 to 2024-12-29

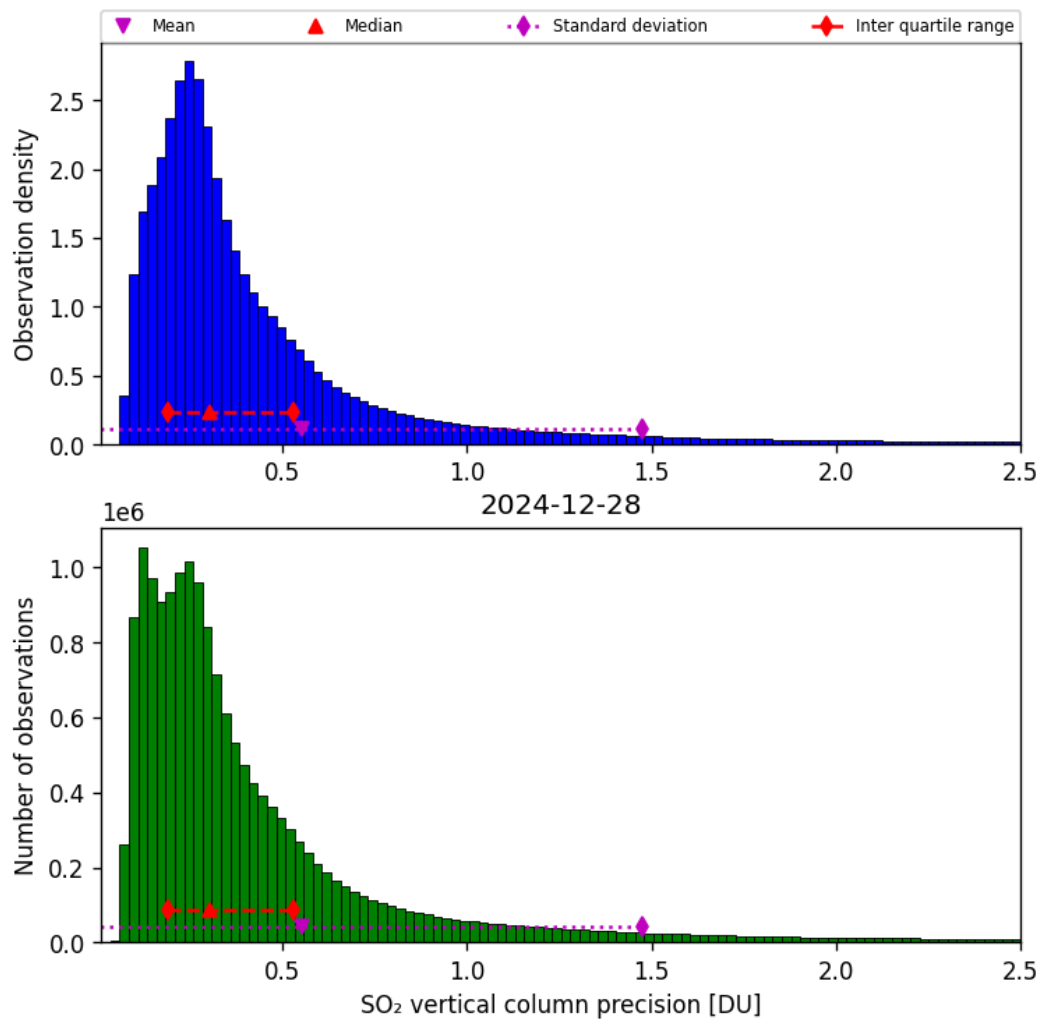


Figure 59: Histogram of “SO₂ vertical column precision” for 2024-12-28 to 2024-12-29

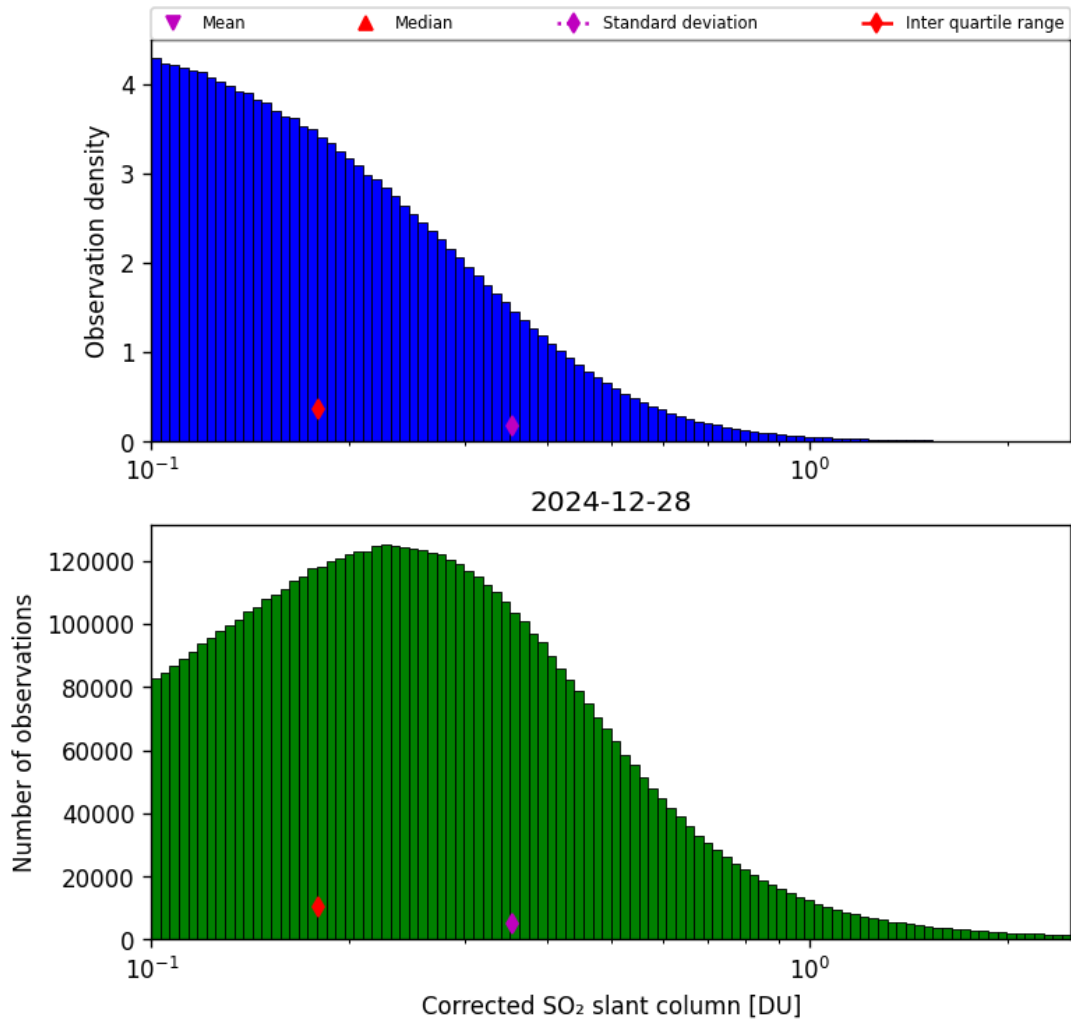


Figure 60: Histogram of “Corrected SO₂ slant column” for 2024-12-28 to 2024-12-29

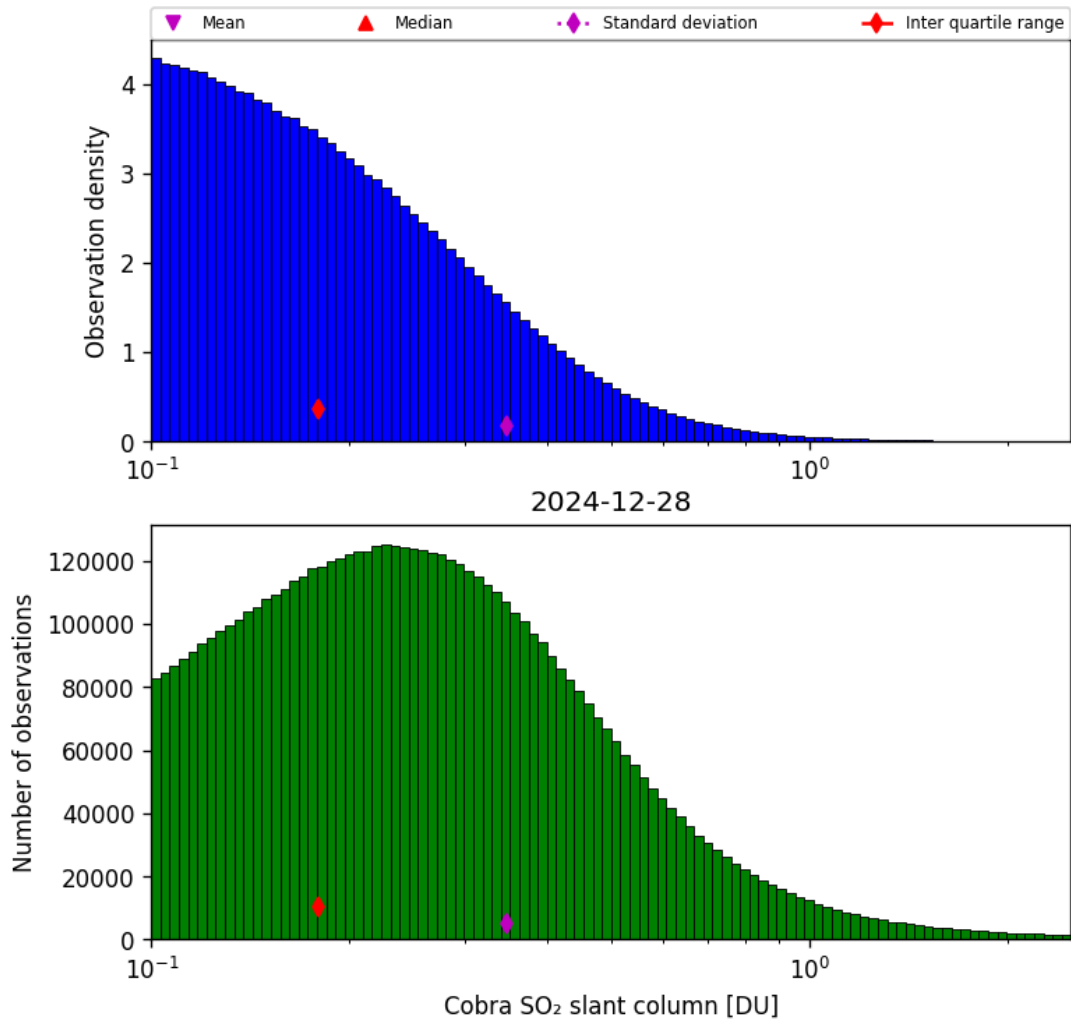


Figure 61: Histogram of “Cobra SO₂ slant column” for 2024-12-28 to 2024-12-29

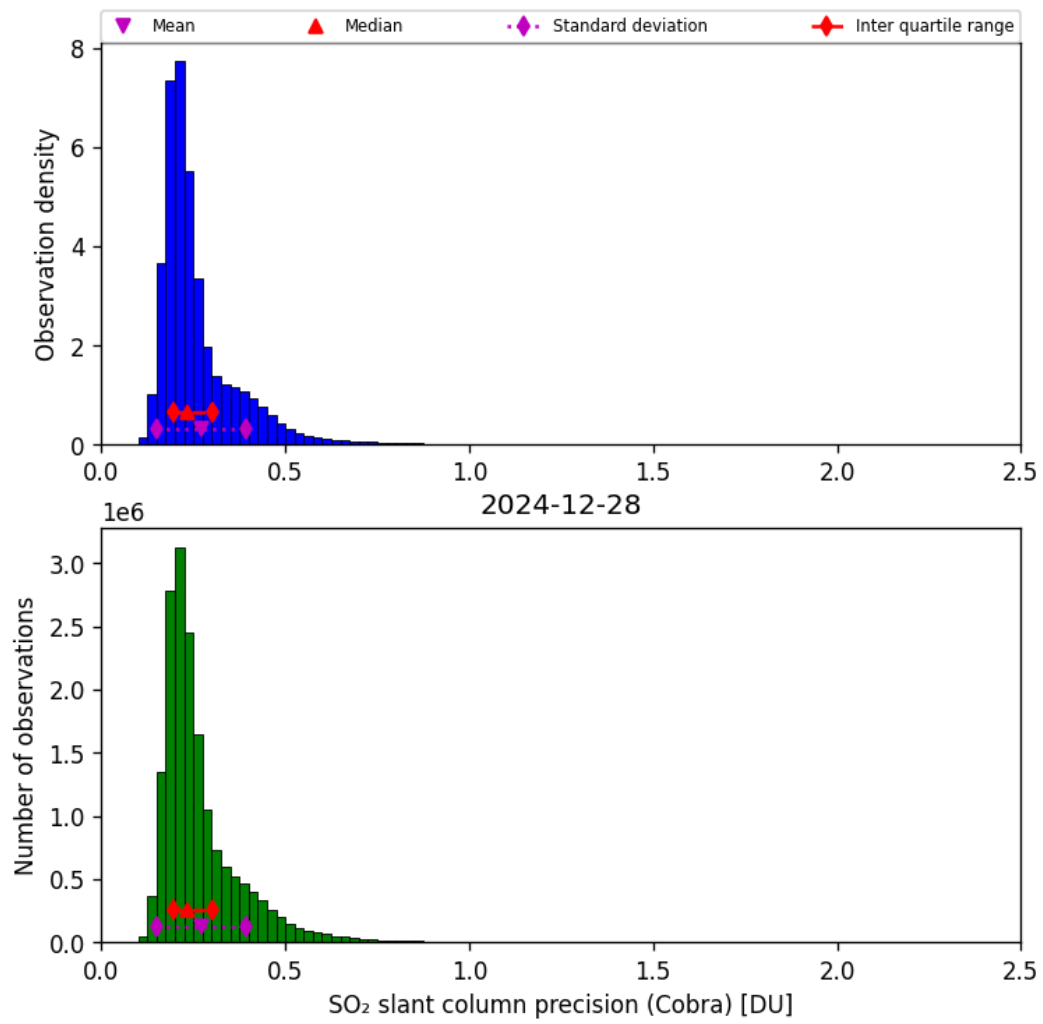


Figure 62: Histogram of “SO₂ slant column precision (Cobra)” for 2024-12-28 to 2024-12-29

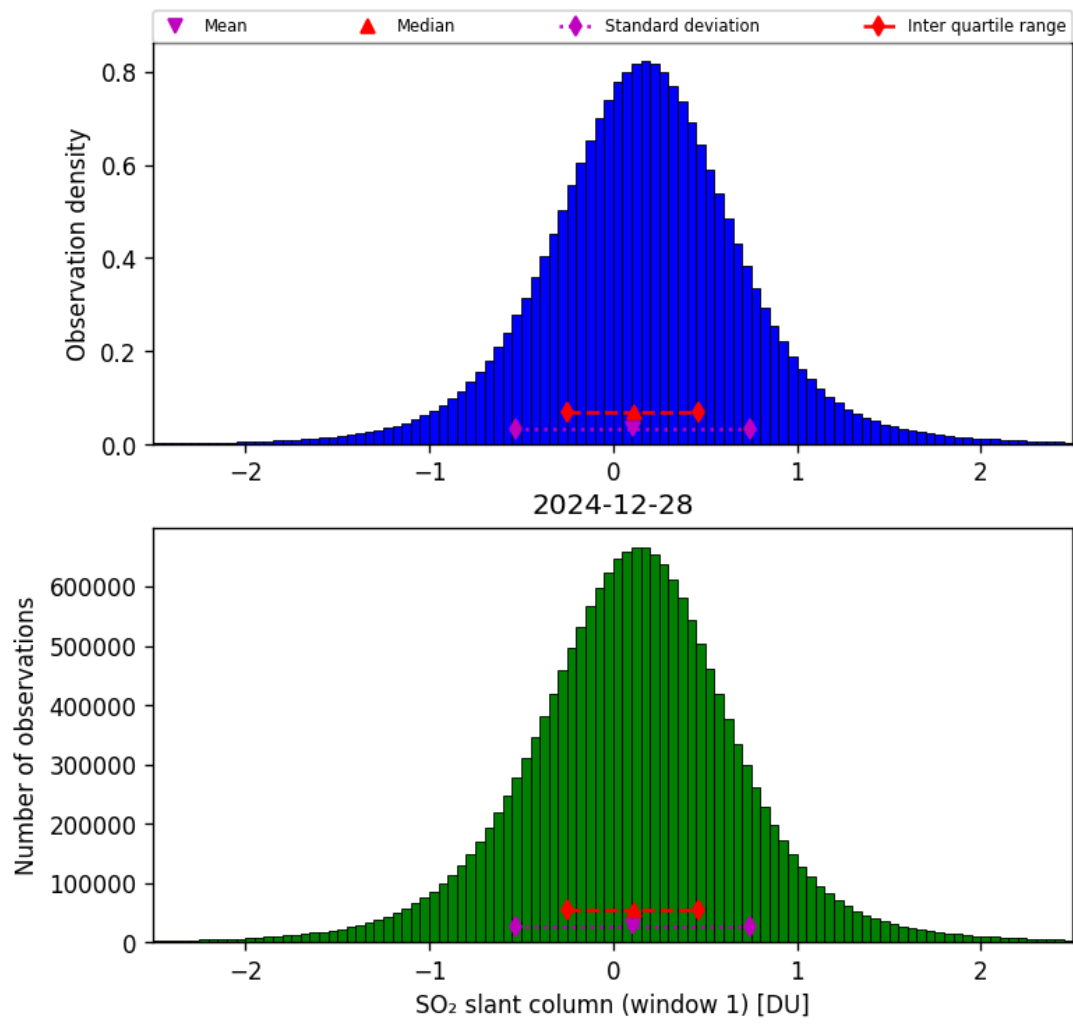


Figure 63: Histogram of “SO₂ slant column (window 1)” for 2024-12-28 to 2024-12-29

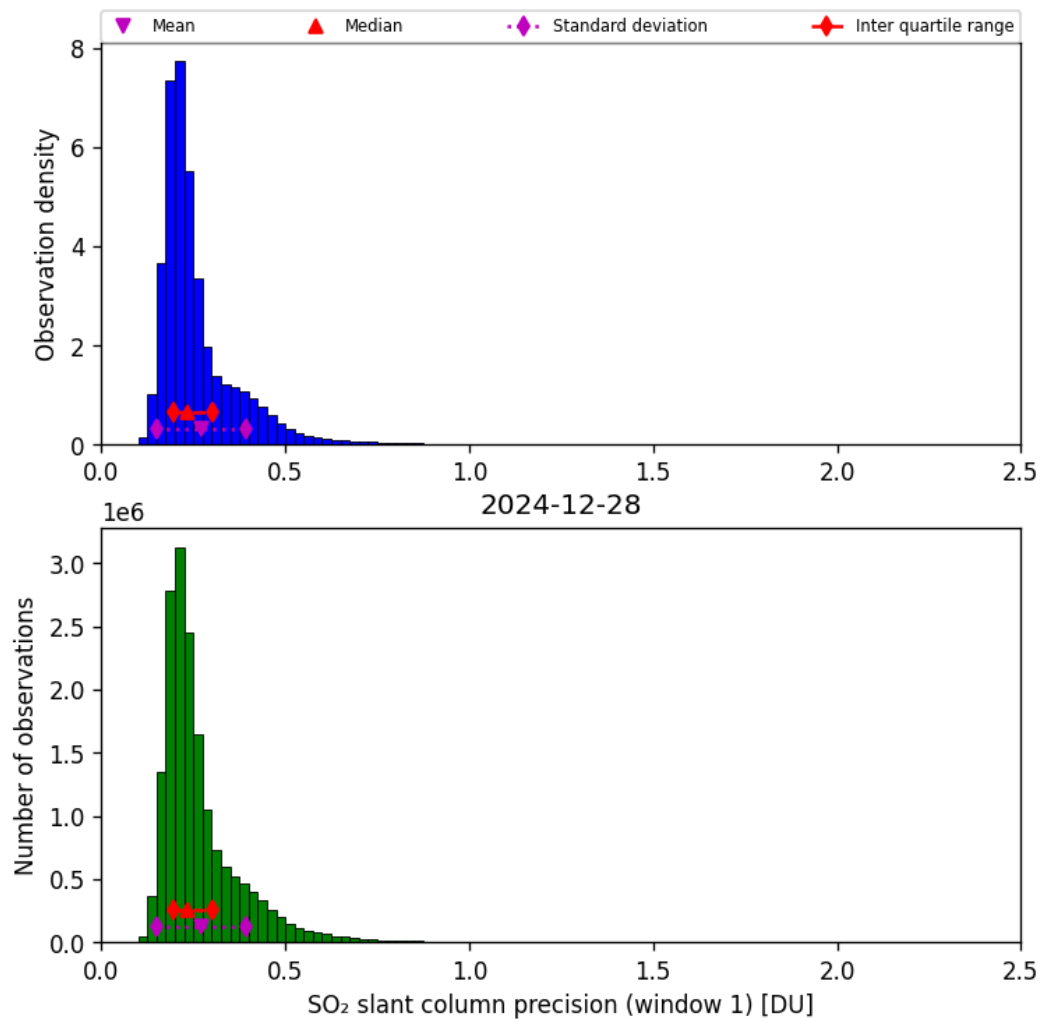


Figure 64: Histogram of “SO₂ slant column precision (window 1)” for 2024-12-28 to 2024-12-29

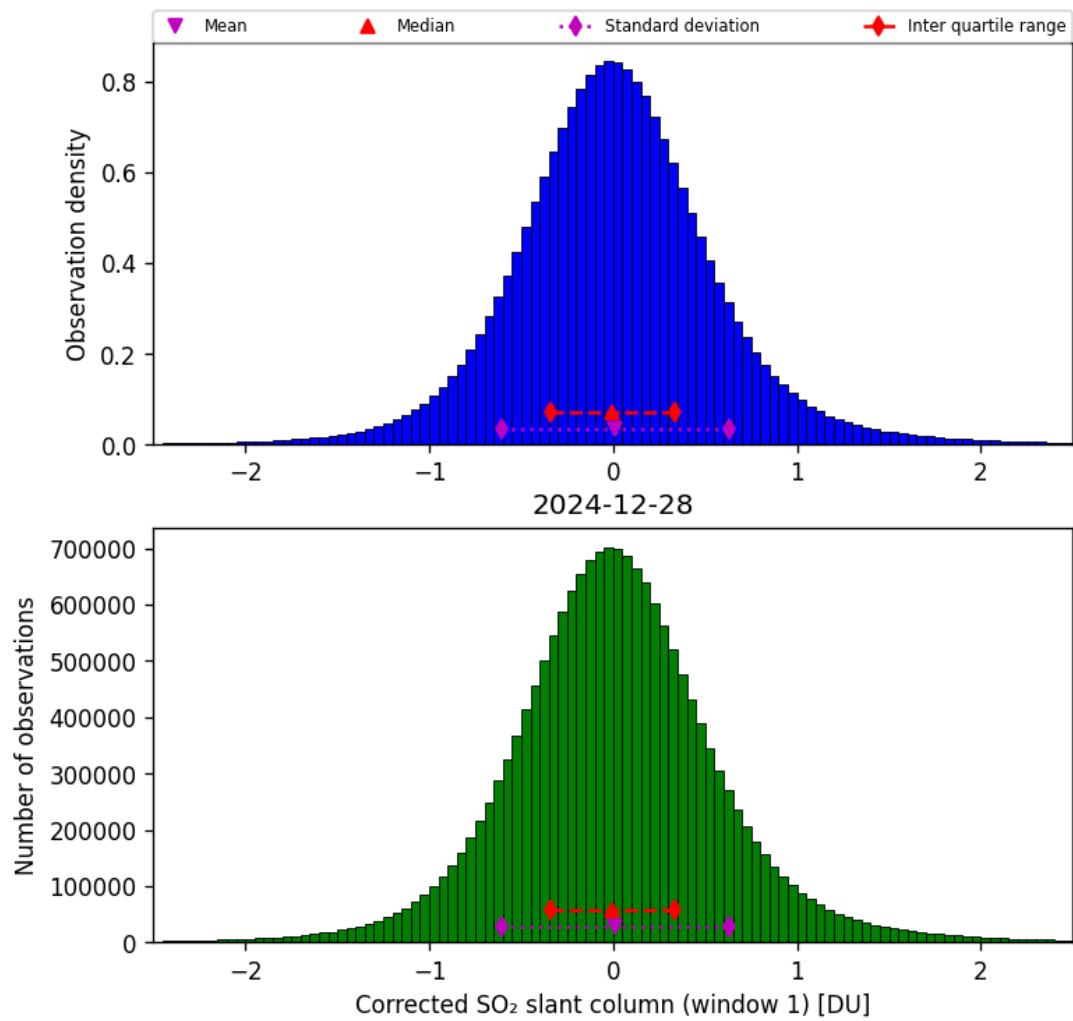


Figure 65: Histogram of “Corrected SO₂ slant column (window 1)” for 2024-12-28 to 2024-12-29

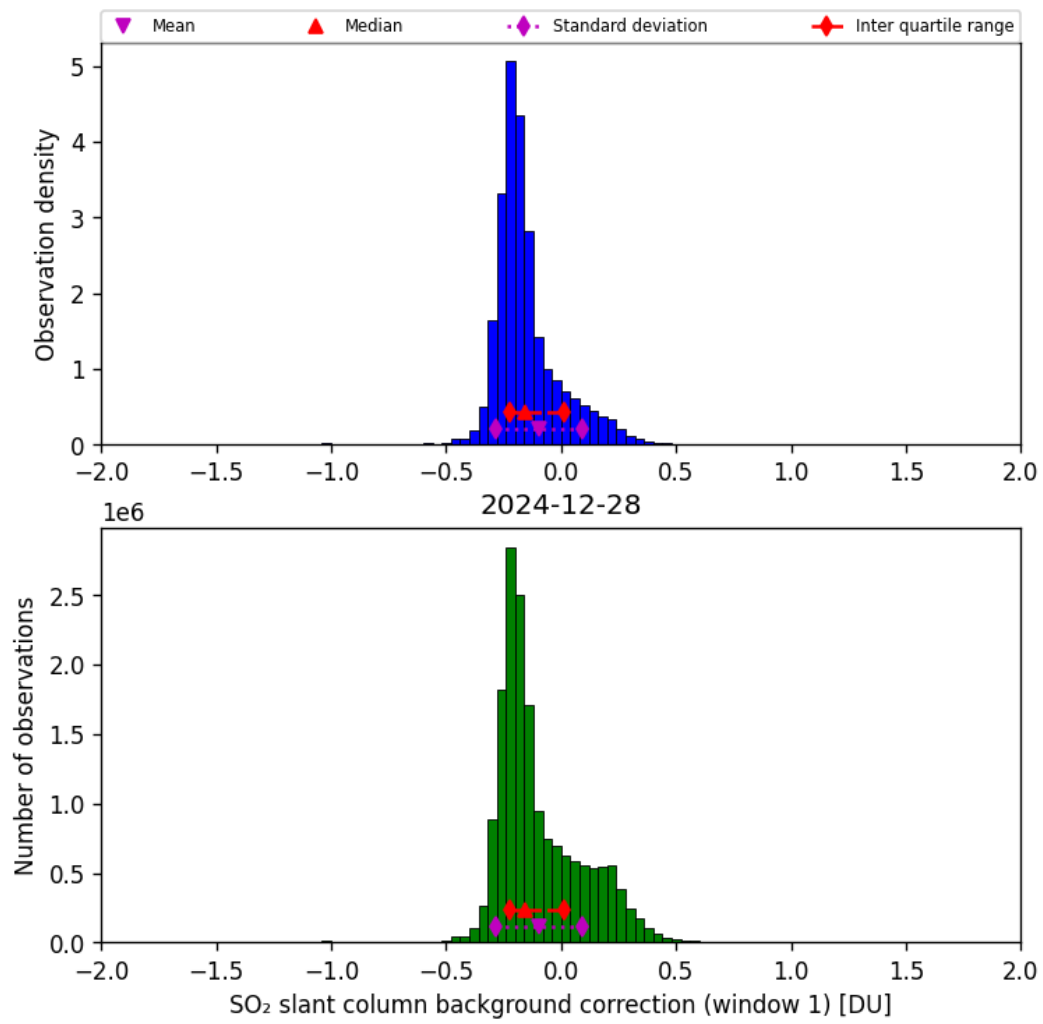


Figure 66: Histogram of “SO₂ slant column background correction (window 1)” for 2024-12-28 to 2024-12-29

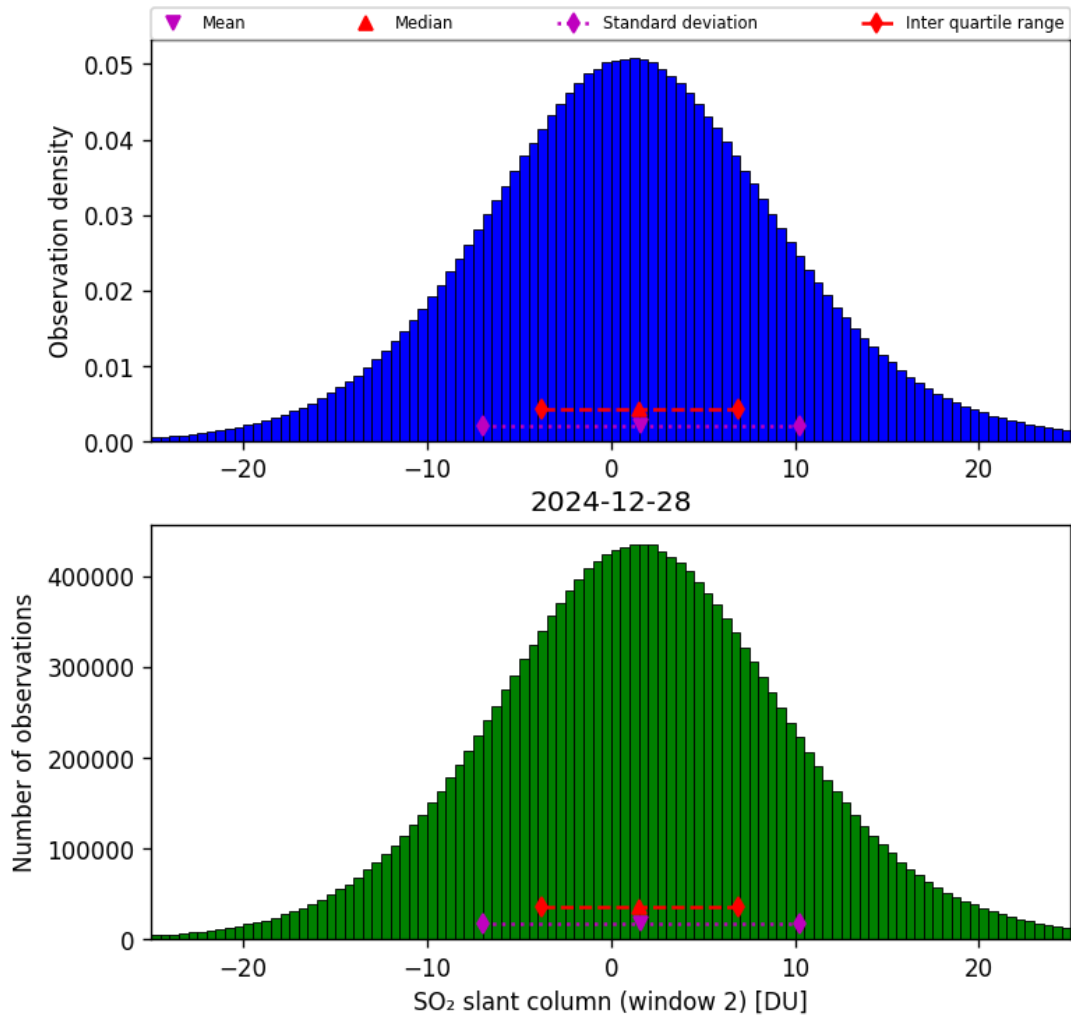


Figure 67: Histogram of “SO₂ slant column (window 2)” for 2024-12-28 to 2024-12-29

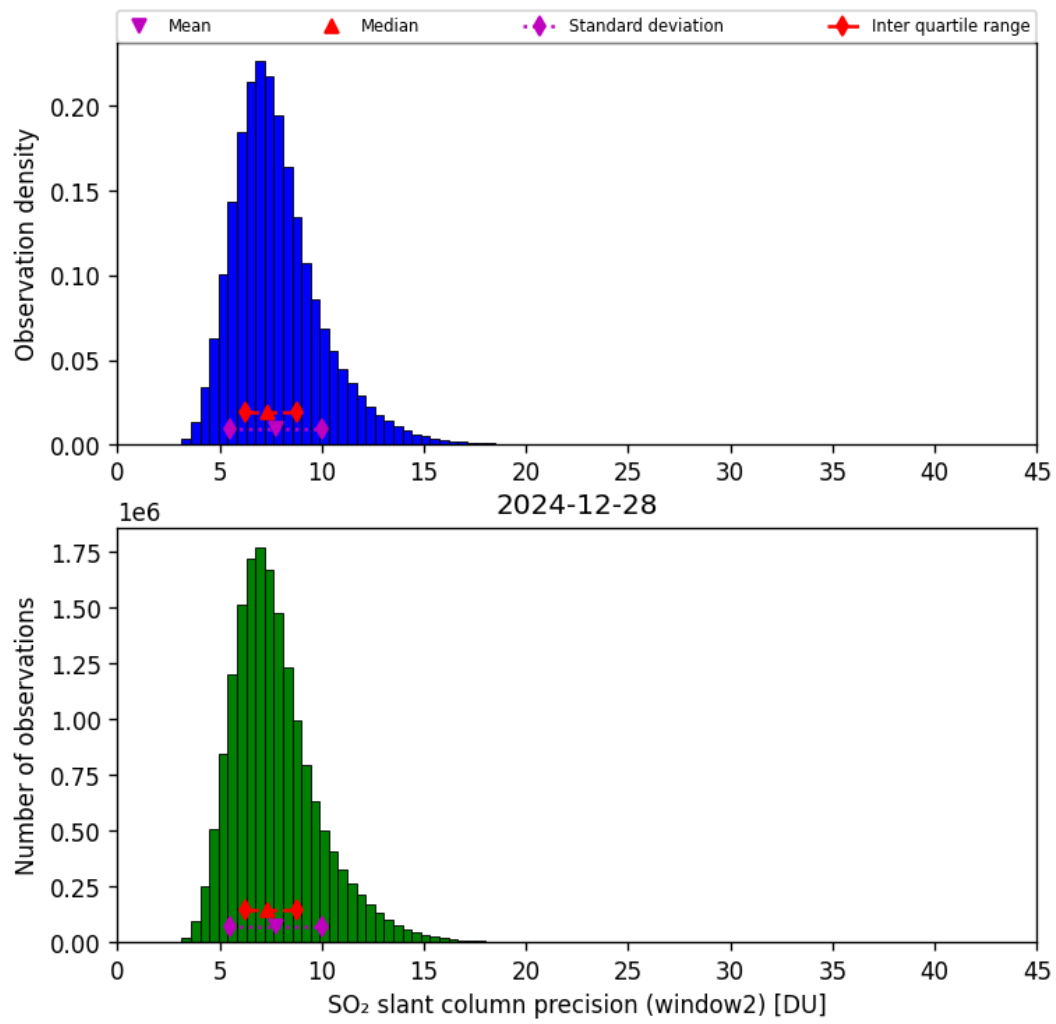


Figure 68: Histogram of “SO₂ slant column precision (window2)” for 2024-12-28 to 2024-12-29

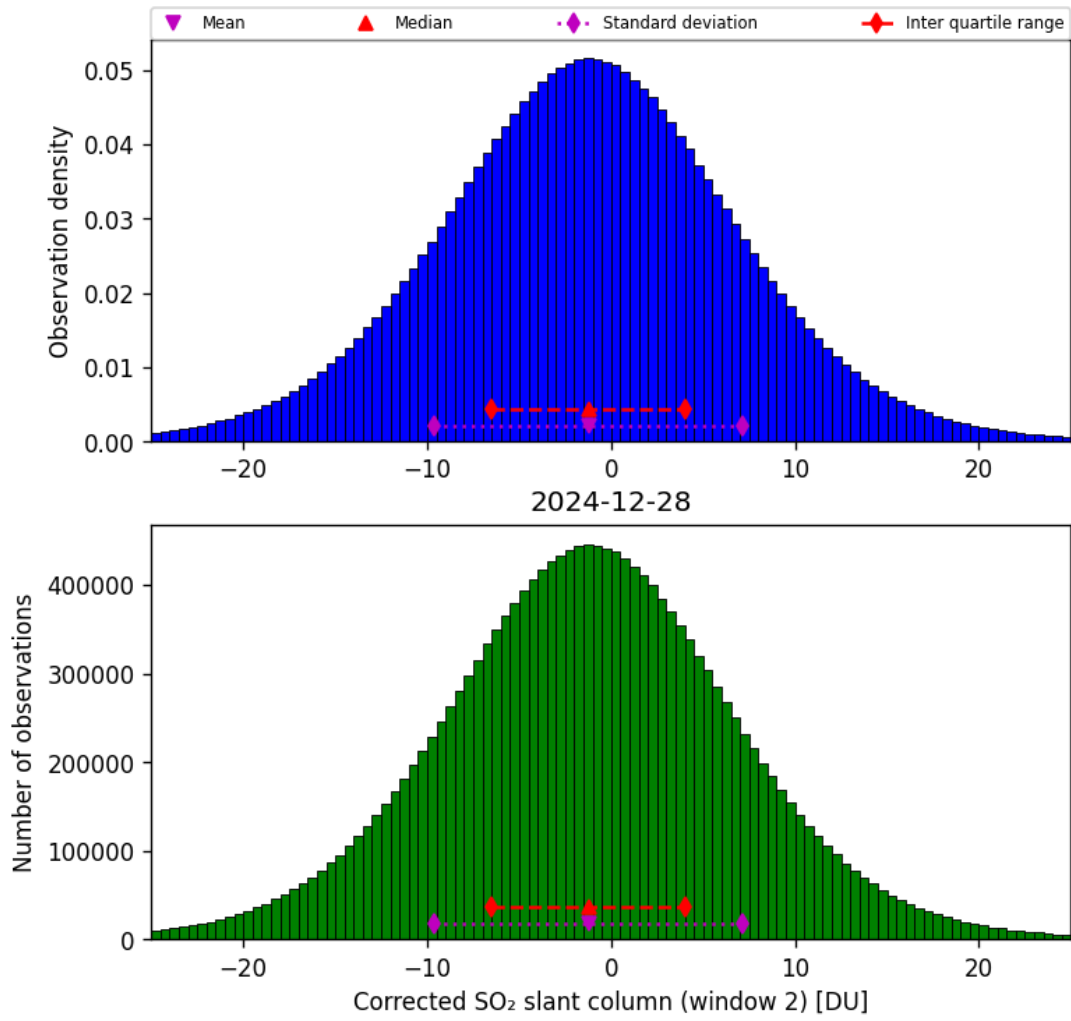


Figure 69: Histogram of “Corrected SO₂ slant column (window 2)” for 2024-12-28 to 2024-12-29

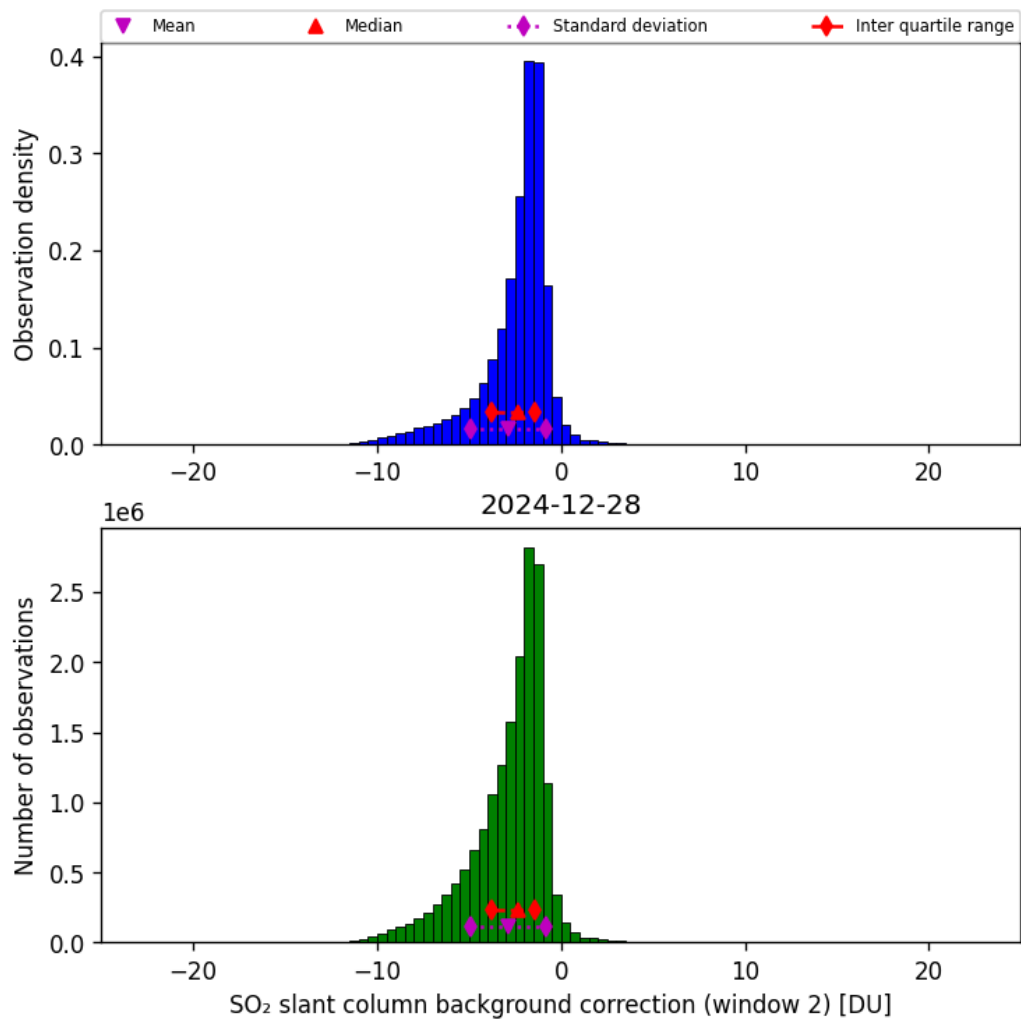


Figure 70: Histogram of “SO₂ slant column background correction (window 2)” for 2024-12-28 to 2024-12-29

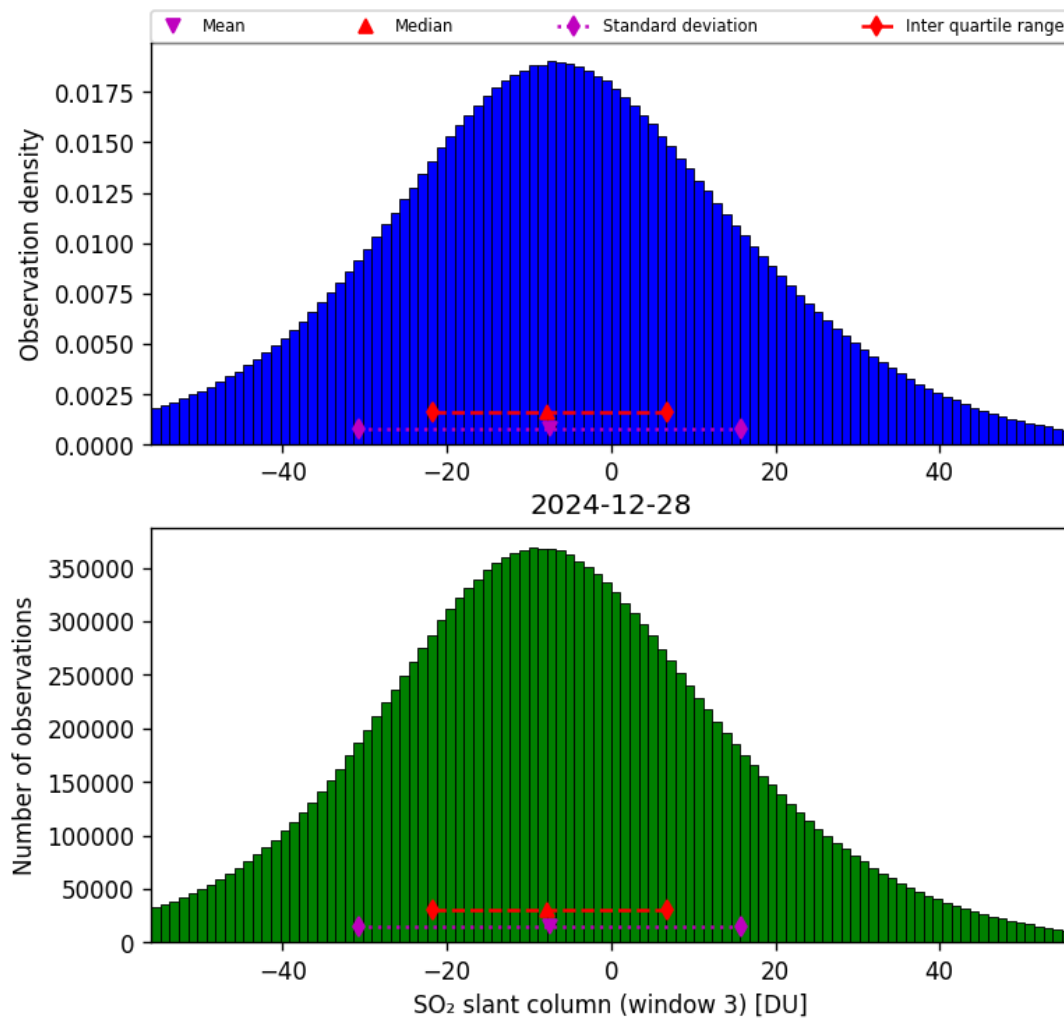


Figure 71: Histogram of “SO₂ slant column (window 3)” for 2024-12-28 to 2024-12-29

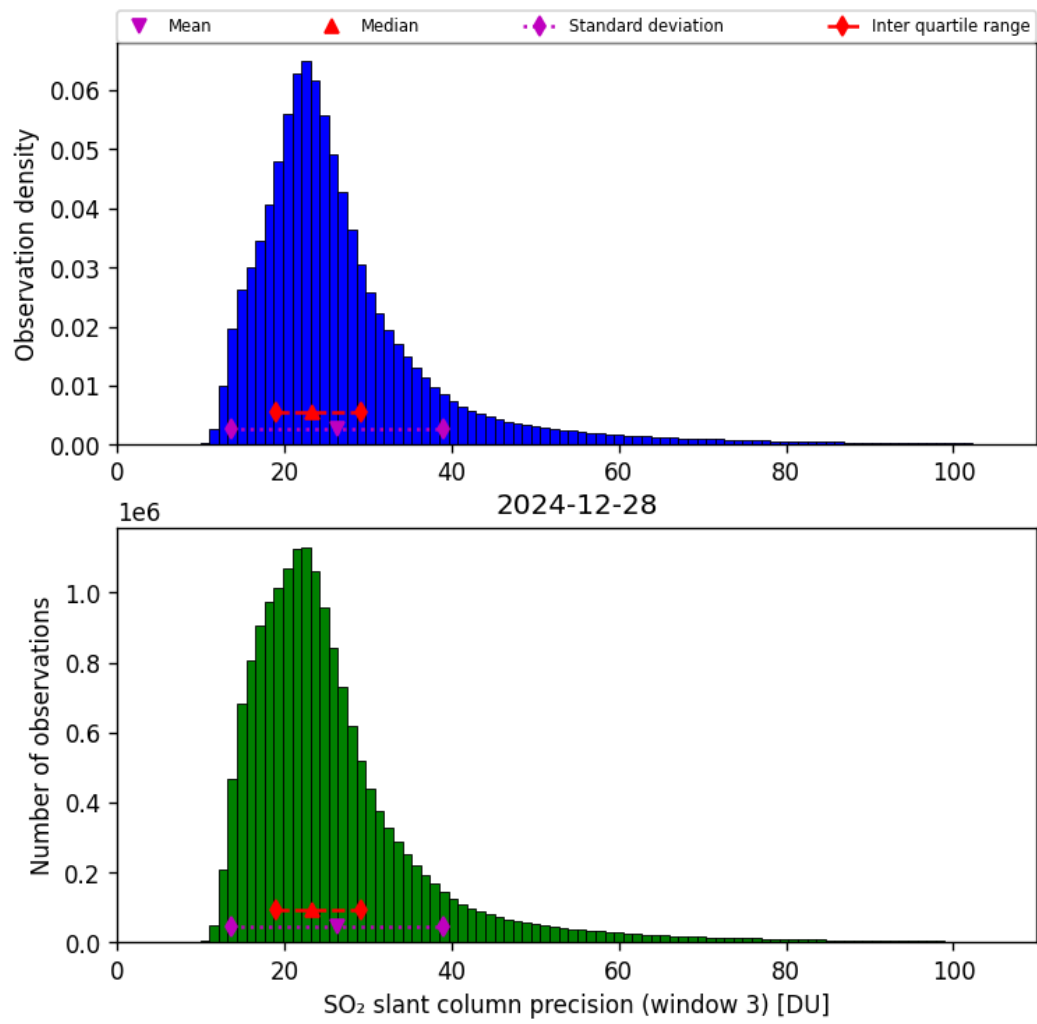


Figure 72: Histogram of “SO₂ slant column precision (window 3)” for 2024-12-28 to 2024-12-29

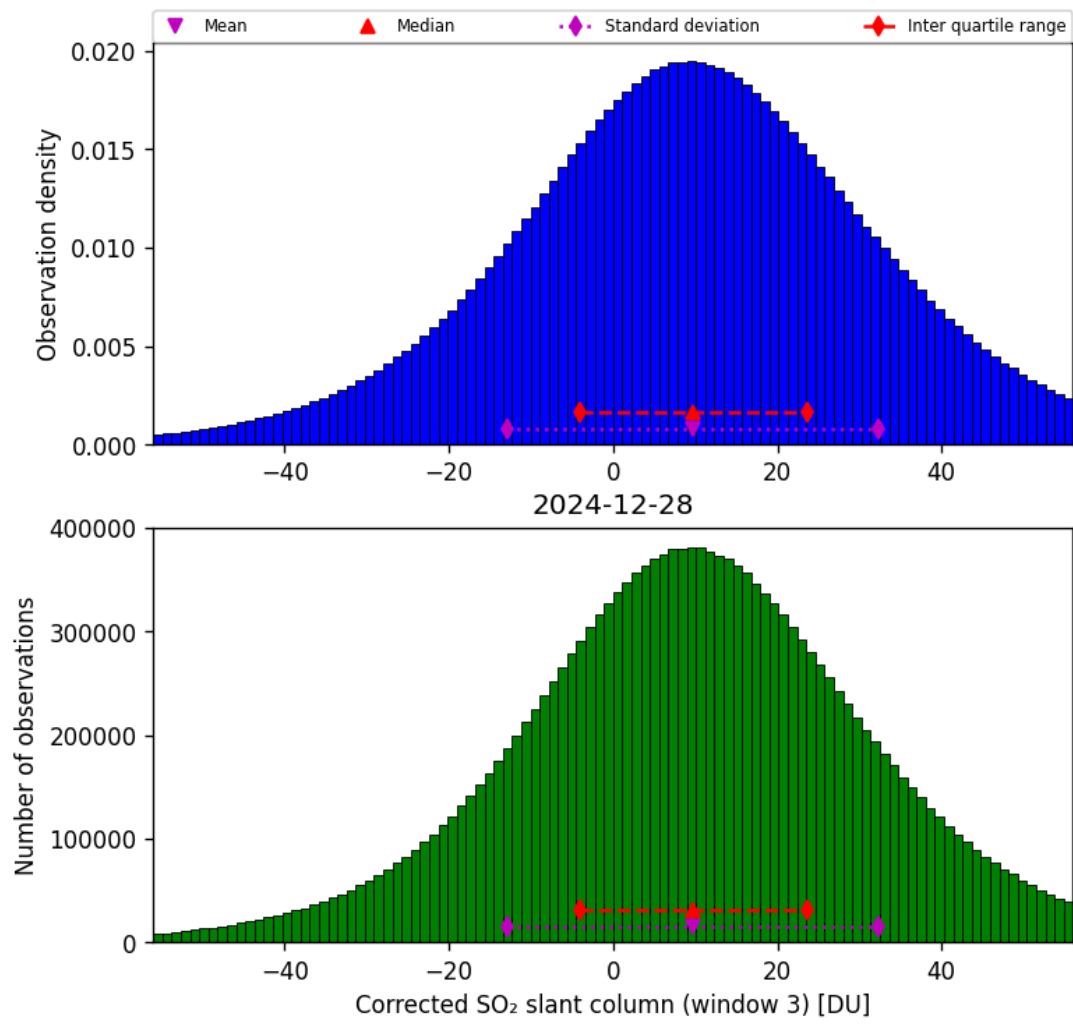


Figure 73: Histogram of “Corrected SO₂ slant column (window 3)” for 2024-12-28 to 2024-12-29

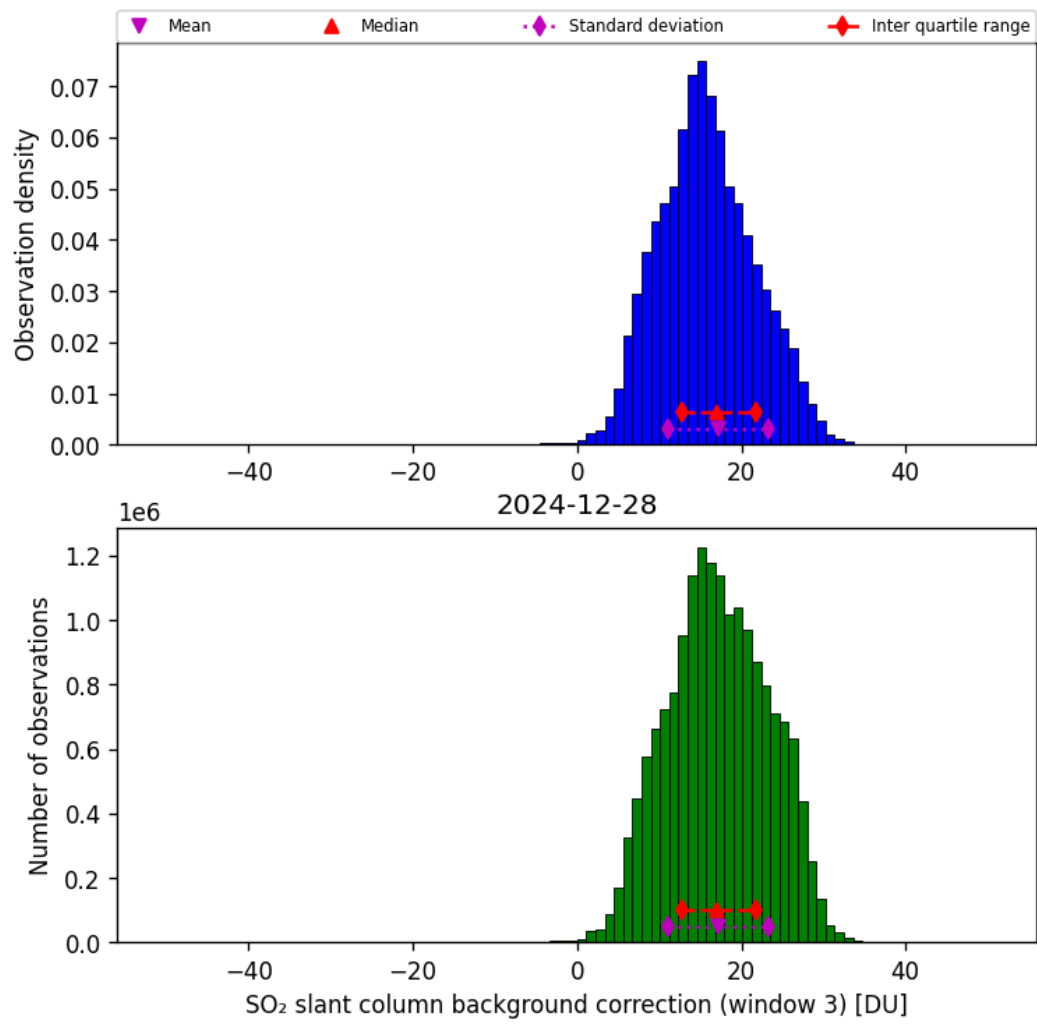


Figure 74: Histogram of “SO₂ slant column background correction (window 3)” for 2024-12-28 to 2024-12-29

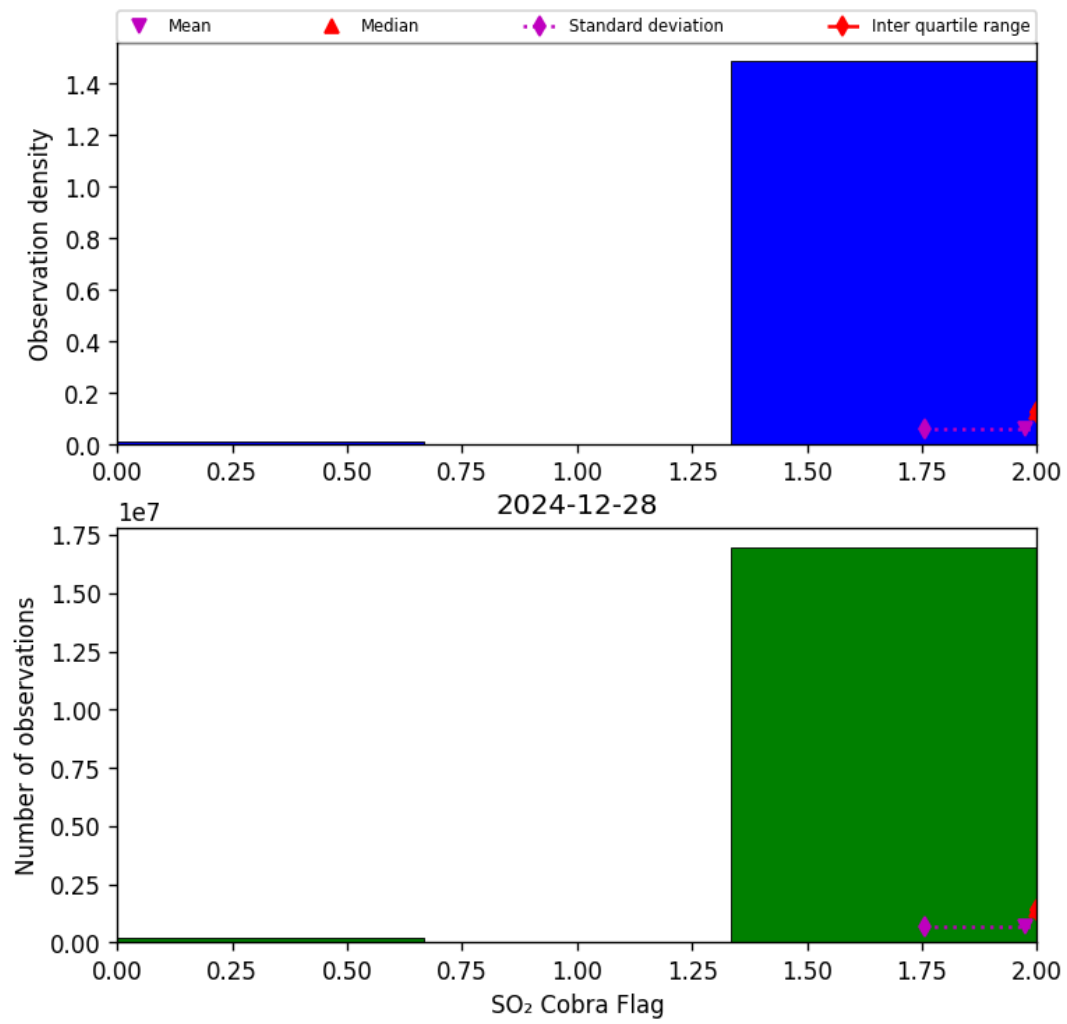


Figure 75: Histogram of “SO₂ Cobra Flag” for 2024-12-28 to 2024-12-29

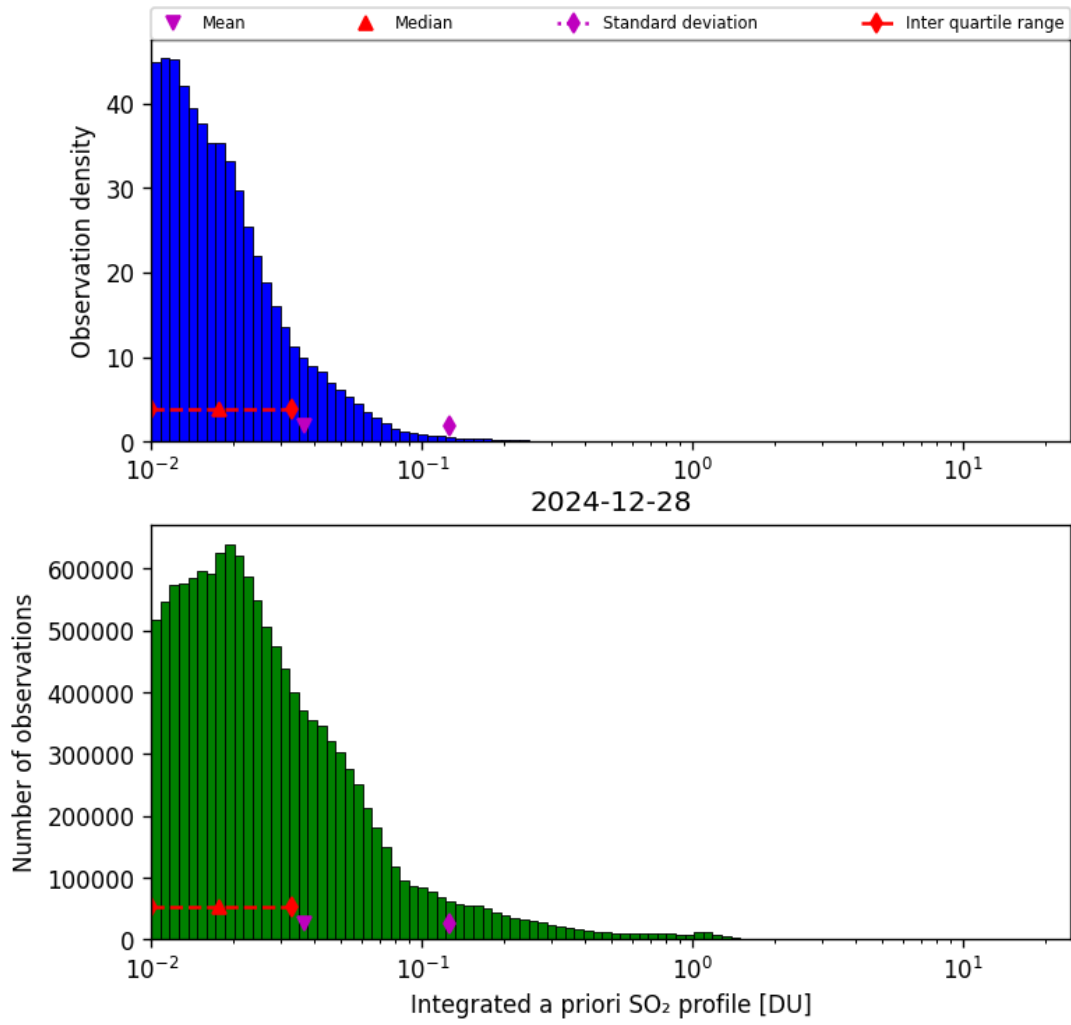


Figure 76: Histogram of “Integrated a priori SO₂ profile” for 2024-12-28 to 2024-12-29

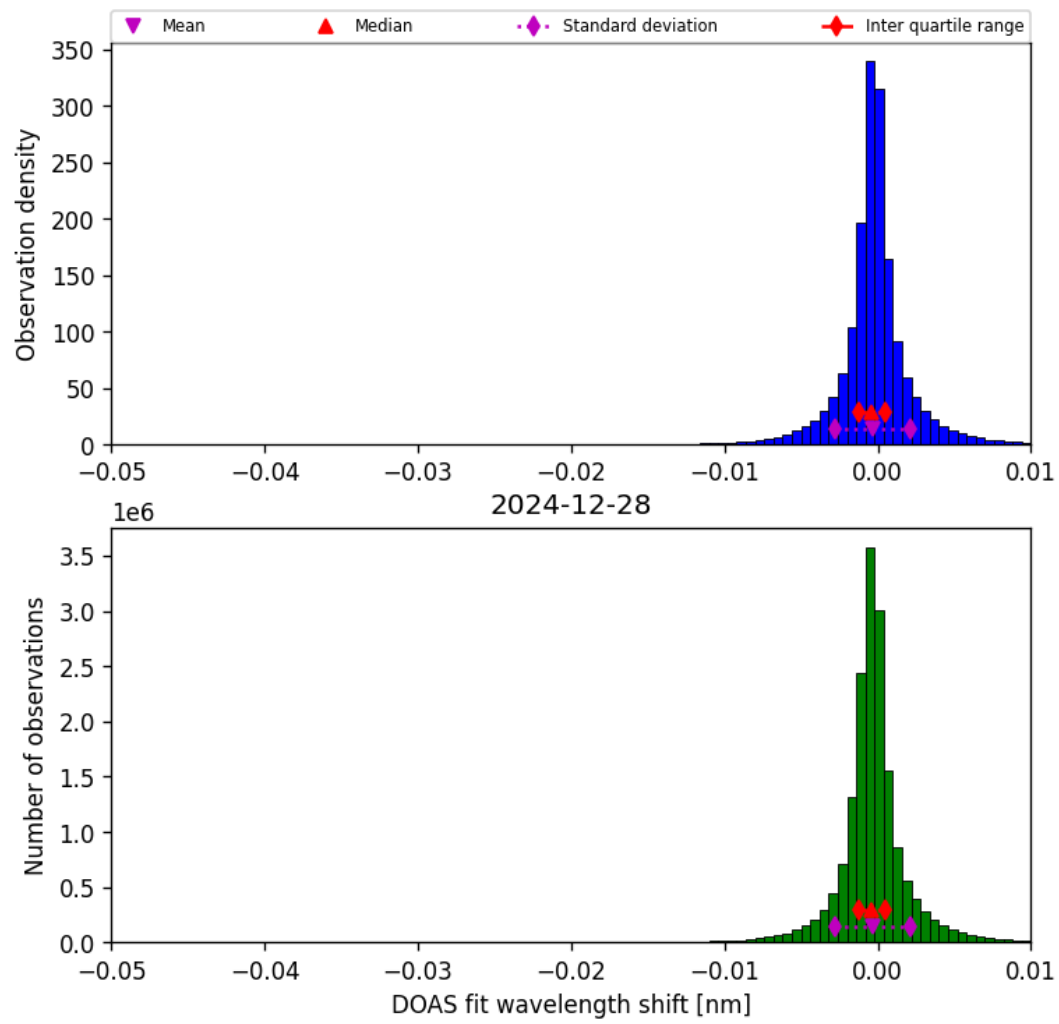


Figure 77: Histogram of “DOAS fit wavelength shift” for 2024-12-28 to 2024-12-29

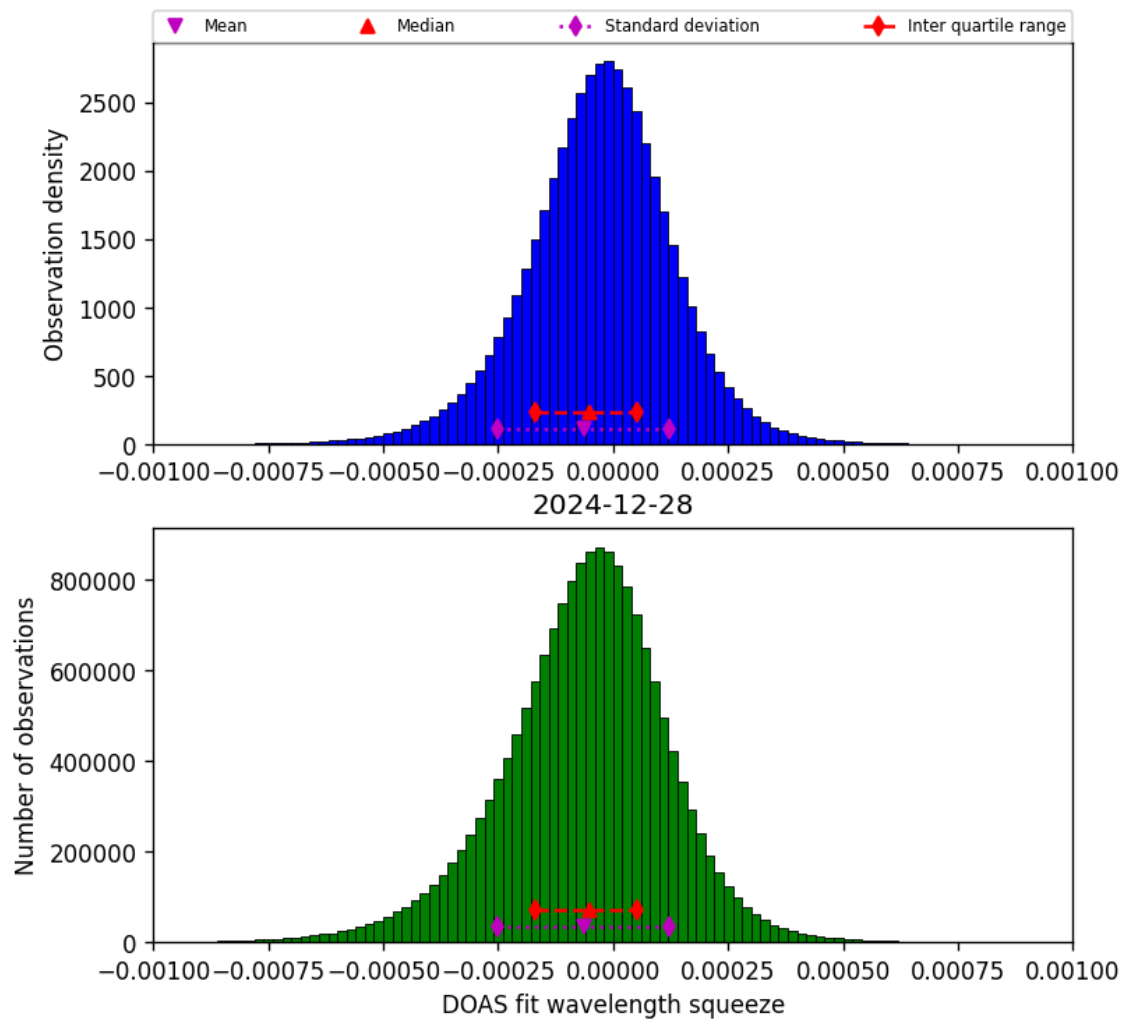


Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2024-12-28 to 2024-12-29

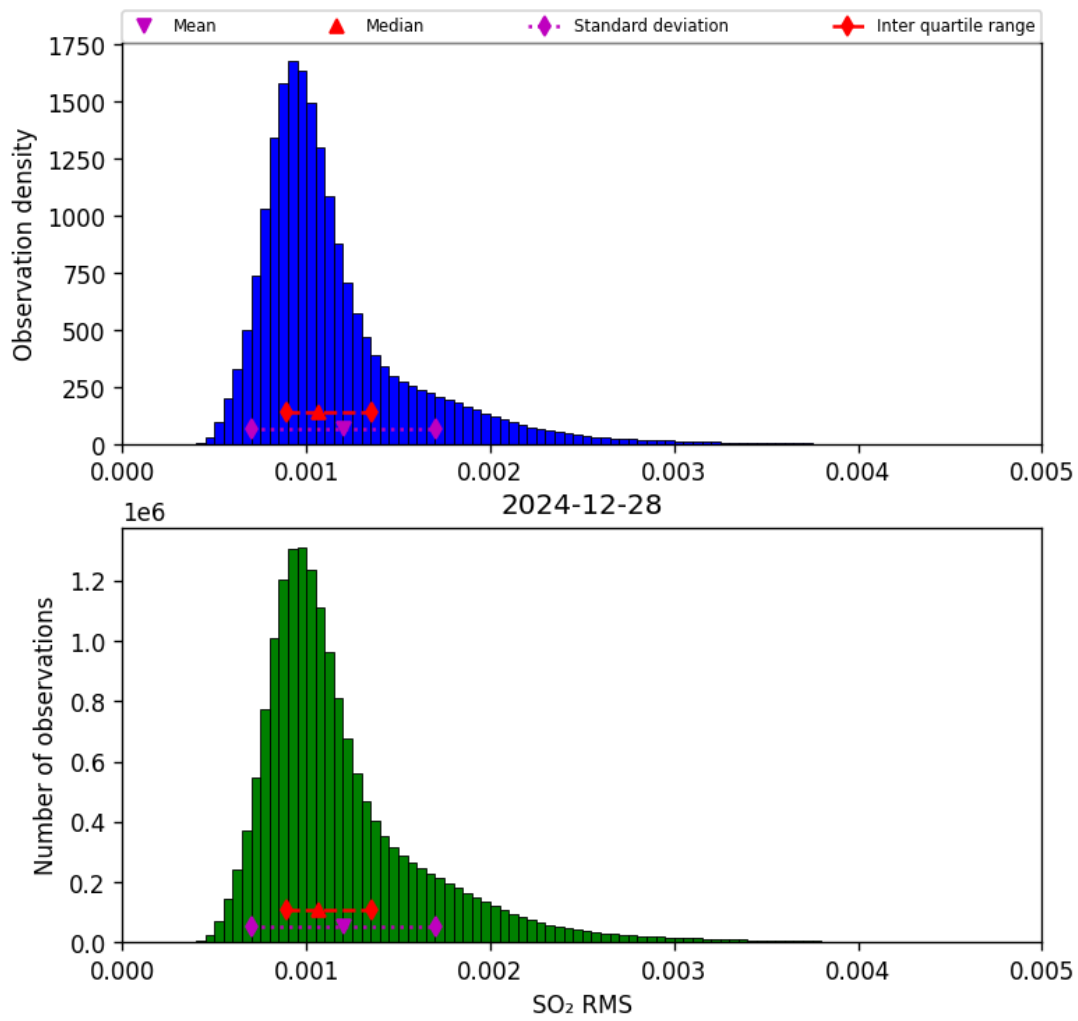


Figure 79: Histogram of “SO₂ RMS” for 2024-12-28 to 2024-12-29

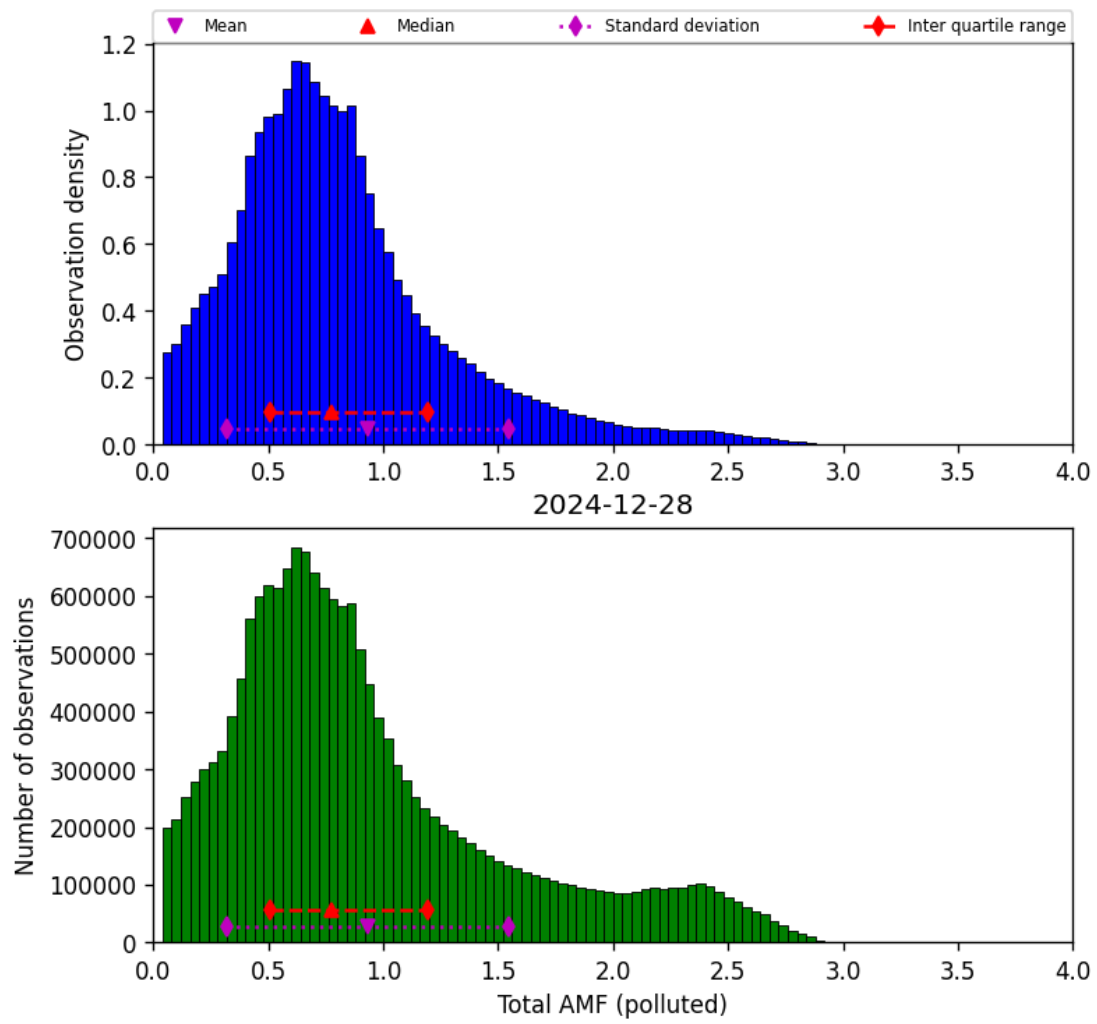


Figure 80: Histogram of “Total AMF (polluted)” for 2024-12-28 to 2024-12-29

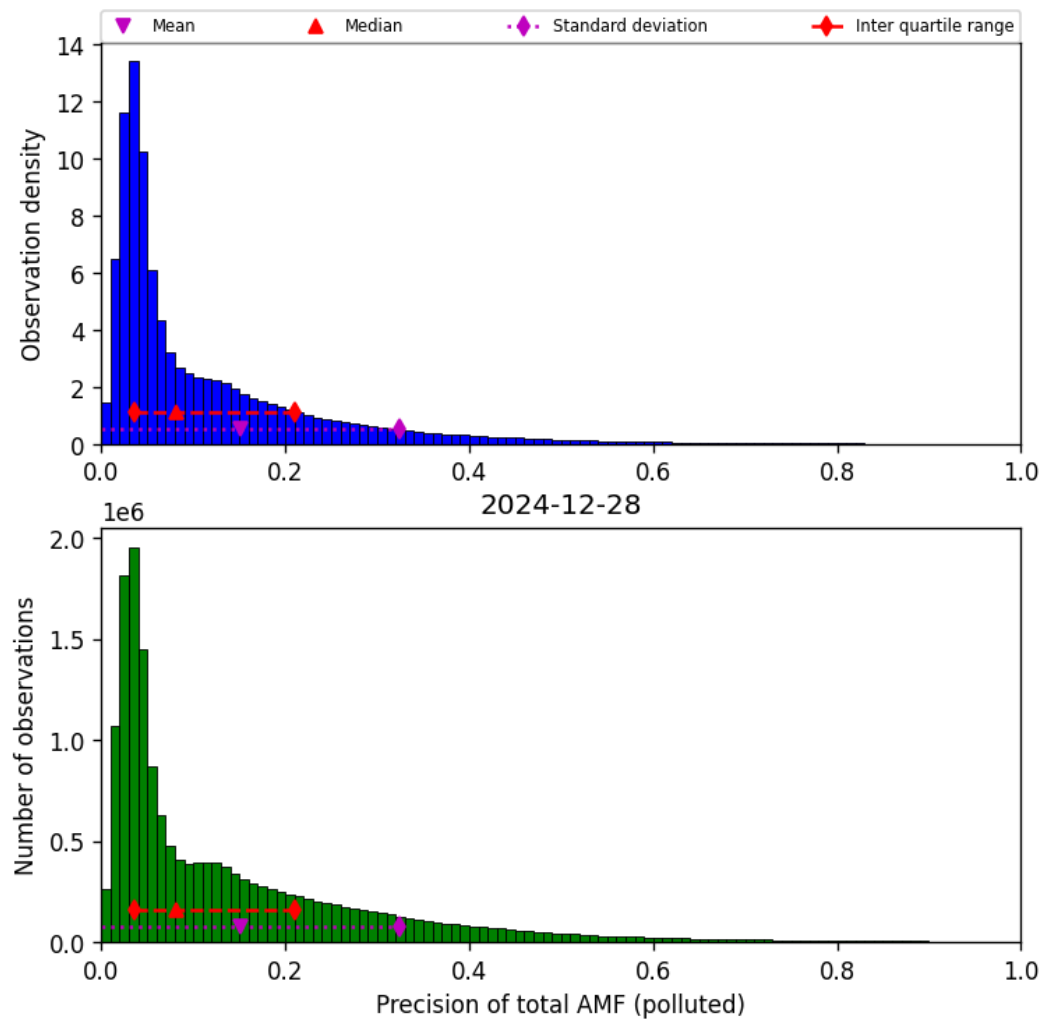


Figure 81: Histogram of “Precision of total AMF (polluted)” for 2024-12-28 to 2024-12-29

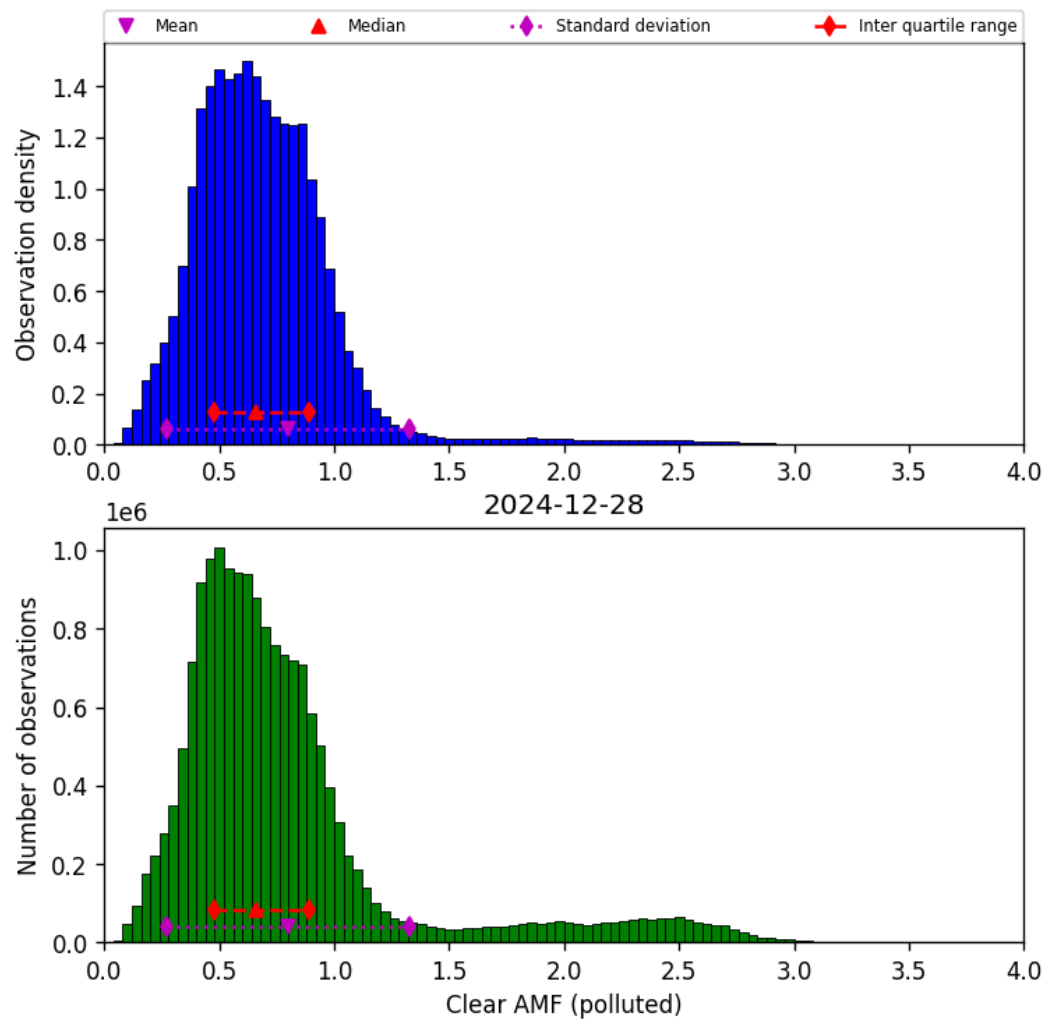


Figure 82: Histogram of "Clear AMF (polluted)" for 2024-12-28 to 2024-12-29

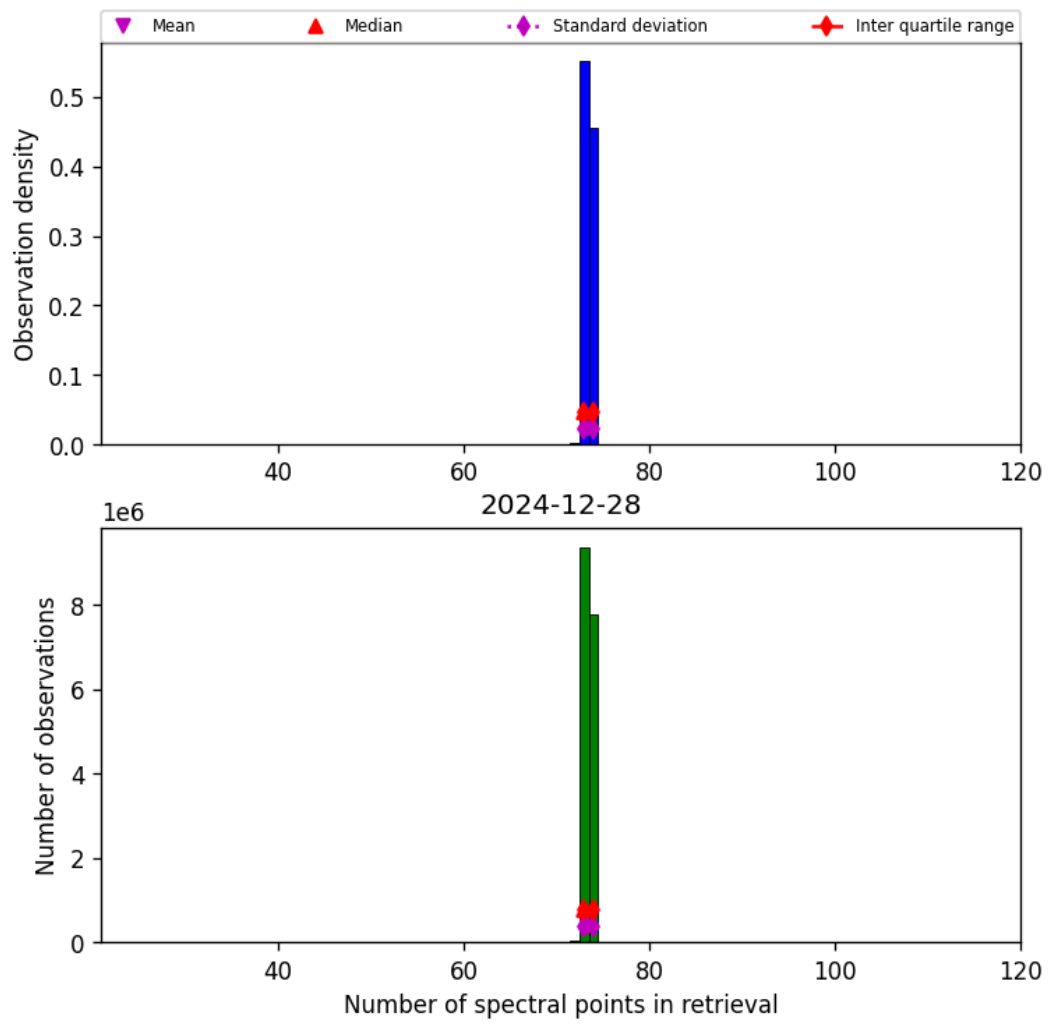


Figure 83: Histogram of “Number of spectral points in retrieval” for 2024-12-28 to 2024-12-29

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.

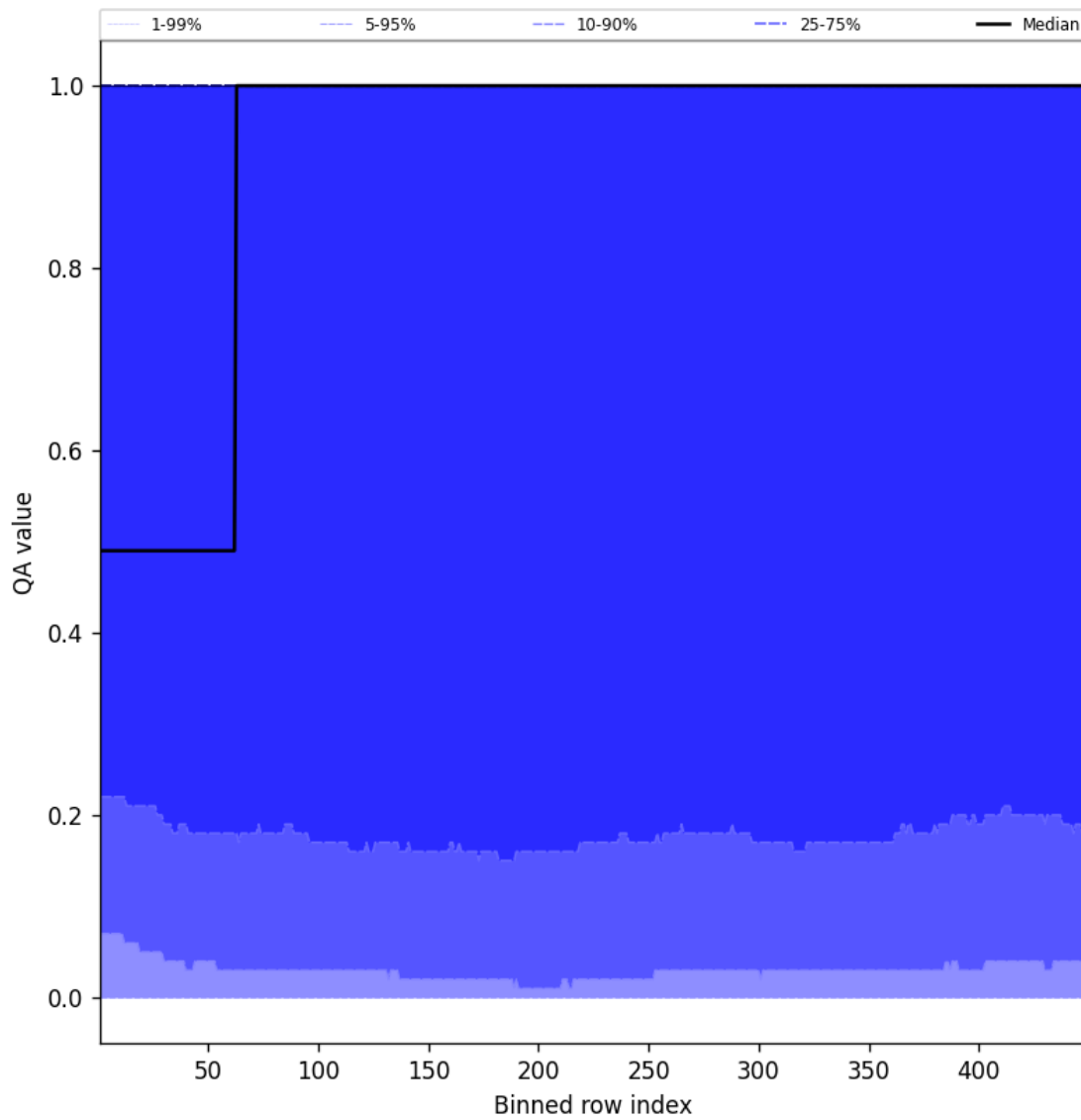


Figure 84: Along track statistics of “QA value” for 2024-12-28 to 2024-12-29

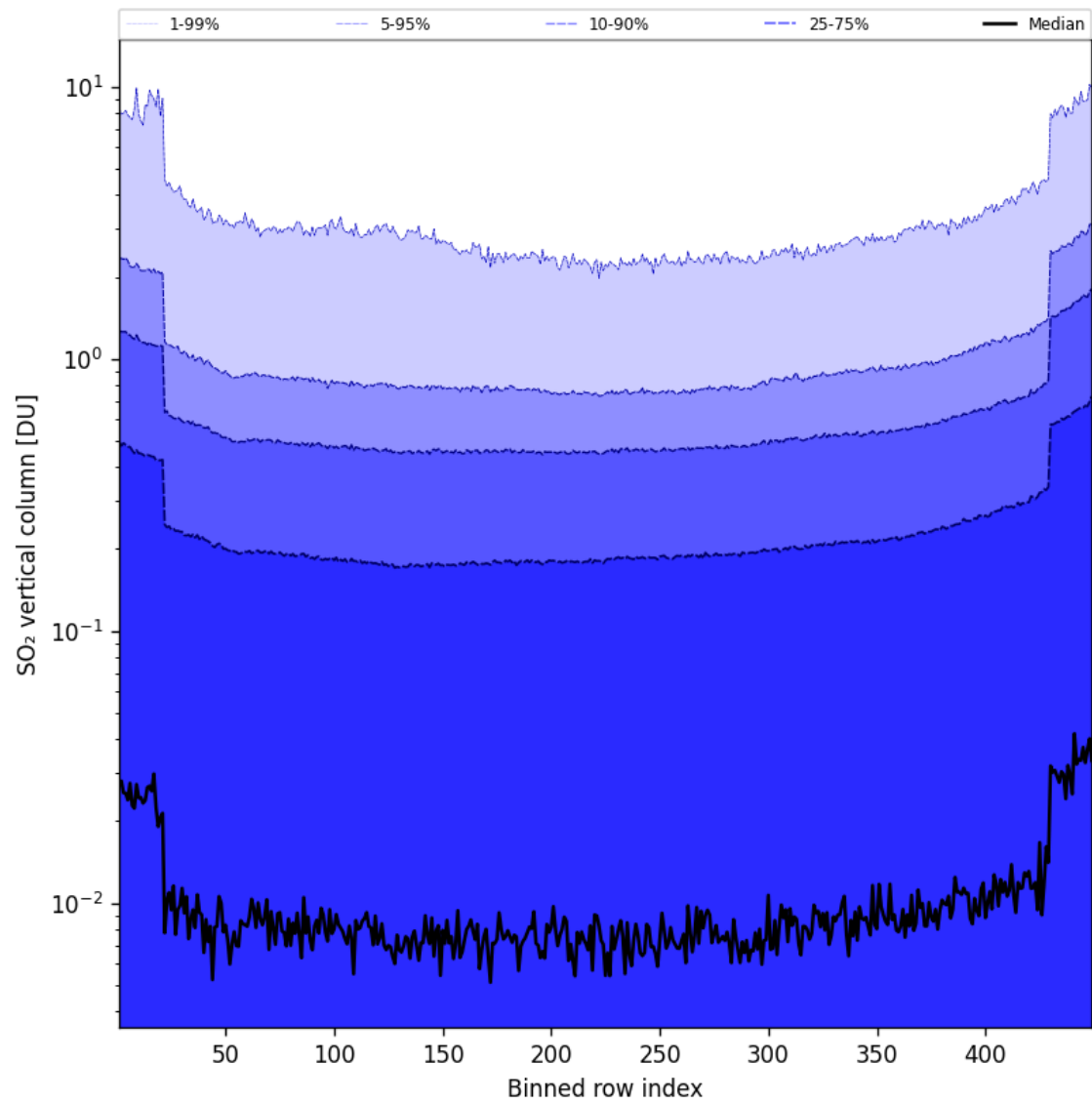


Figure 85: Along track statistics of “SO₂ vertical column” for 2024-12-28 to 2024-12-29

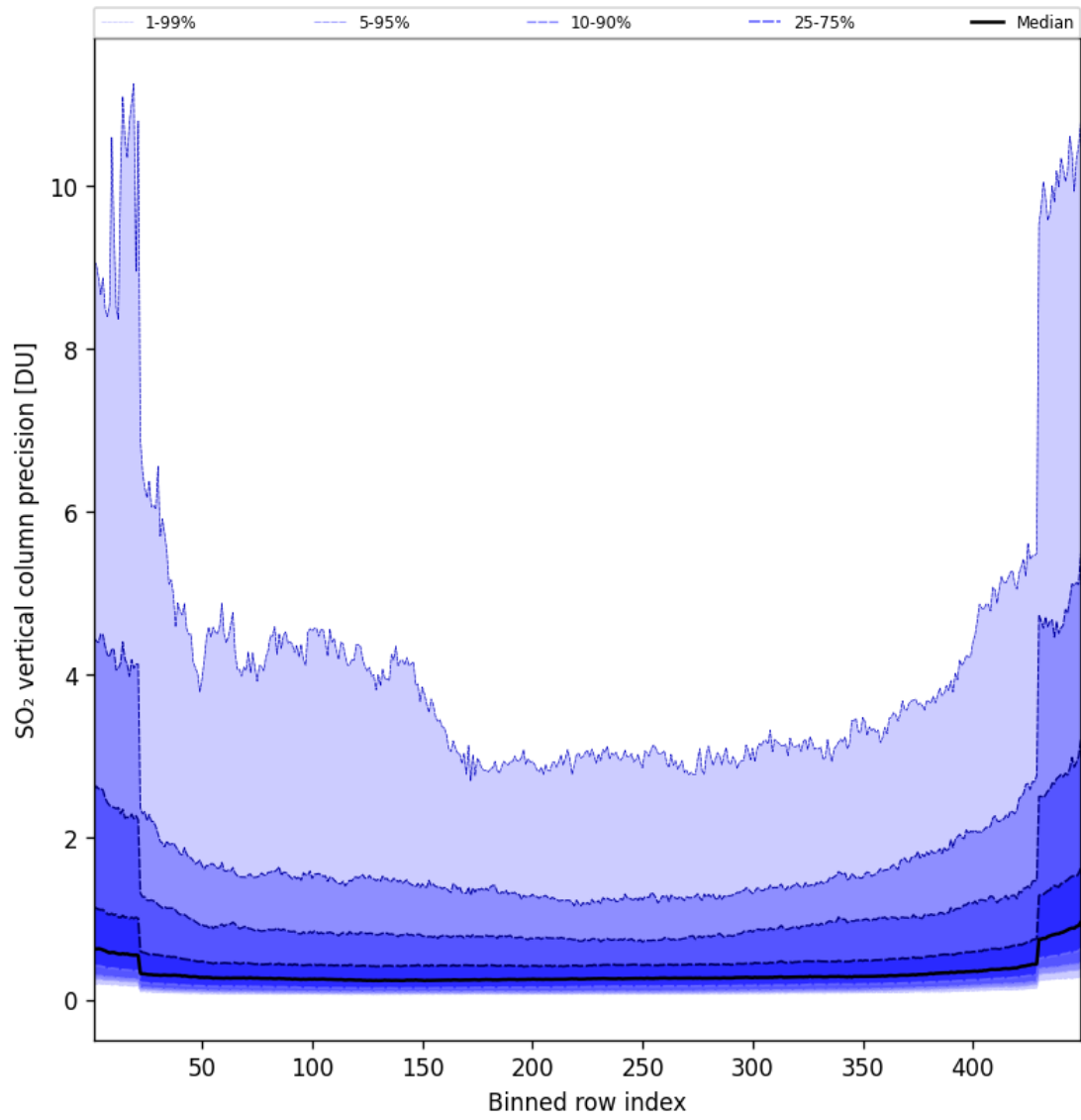


Figure 86: Along track statistics of “SO₂ vertical column precision” for 2024-12-28 to 2024-12-29

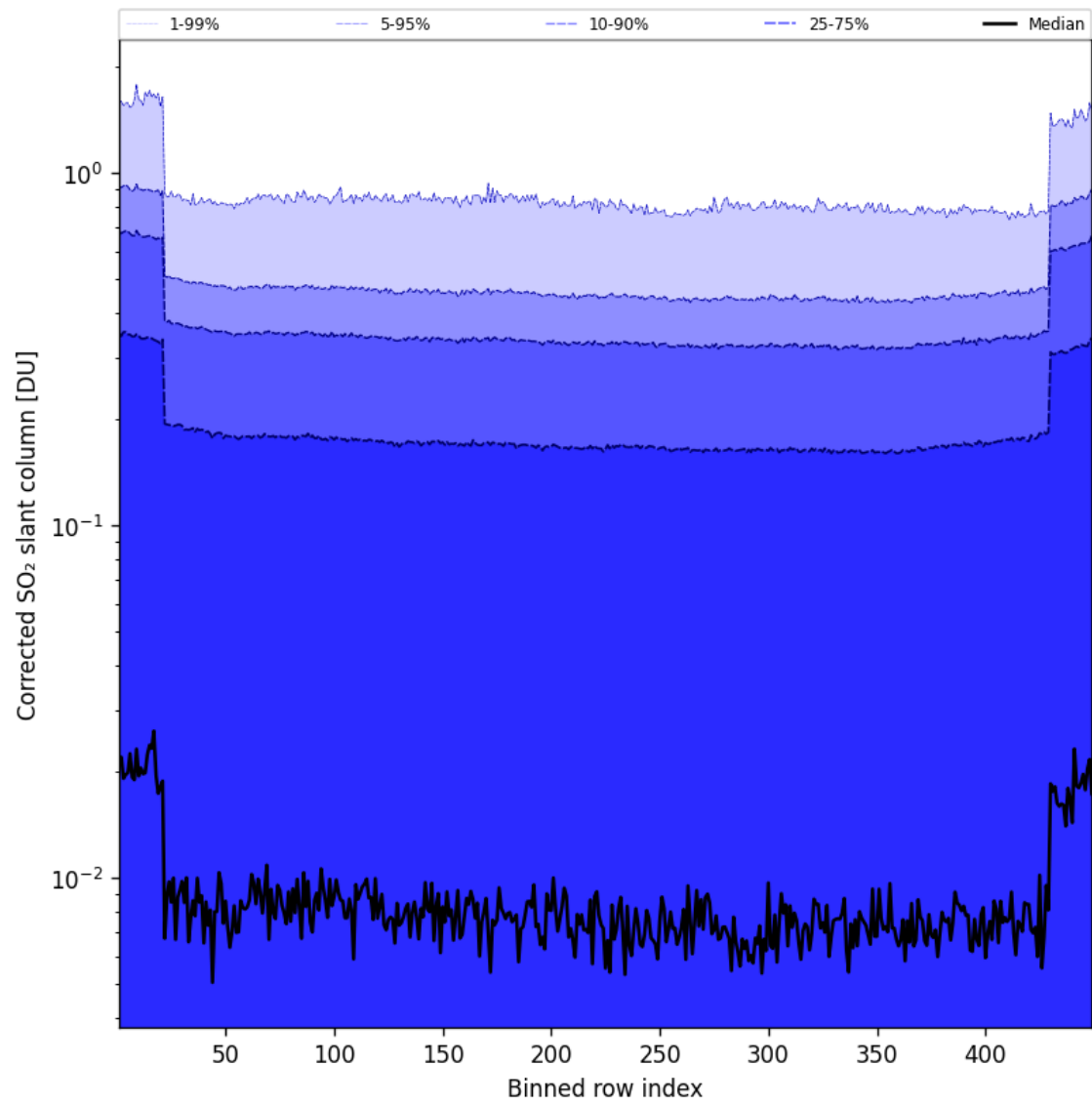


Figure 87: Along track statistics of “Corrected SO₂ slant column” for 2024-12-28 to 2024-12-29

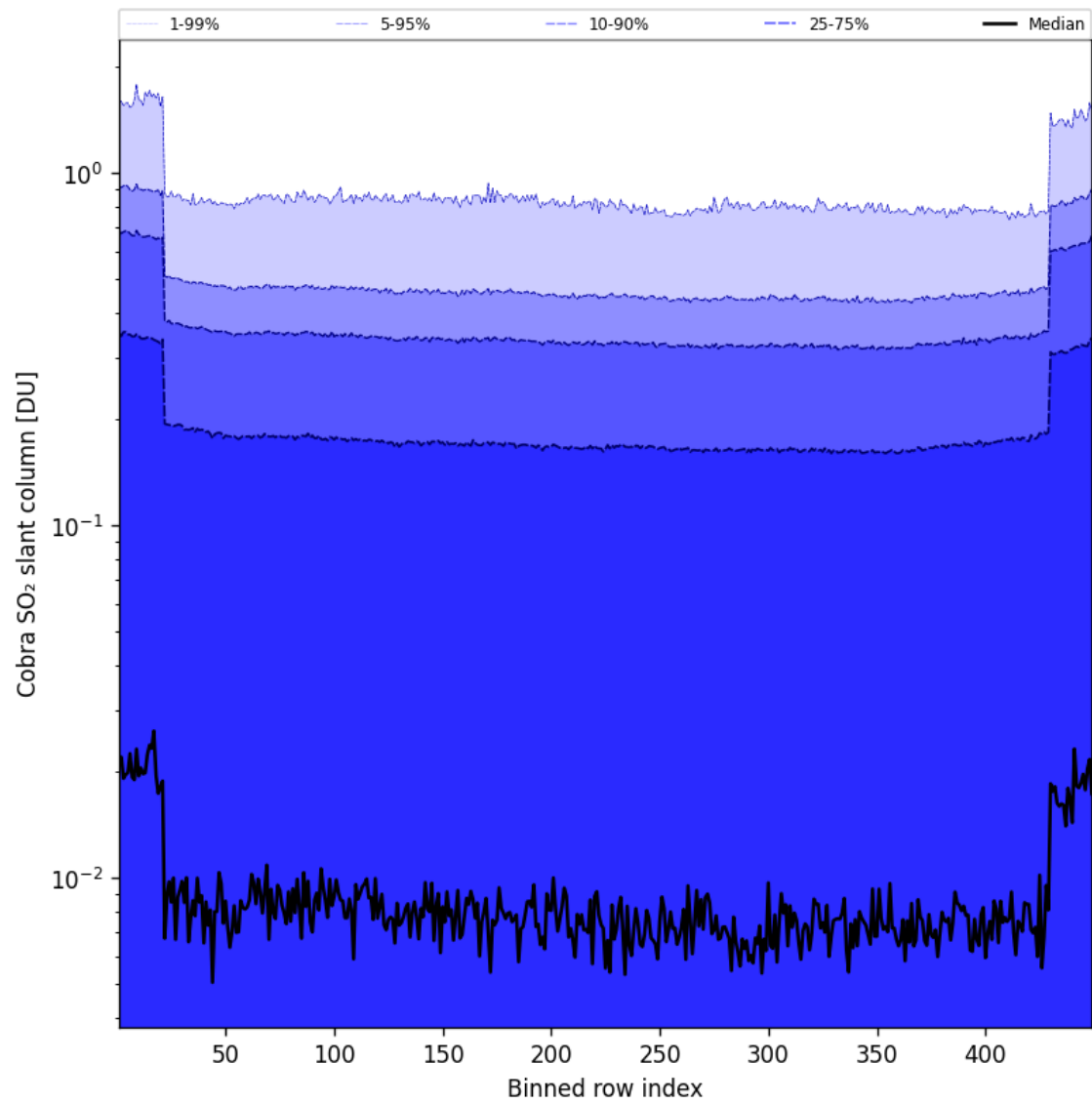


Figure 88: Along track statistics of "Cobra SO₂ slant column" for 2024-12-28 to 2024-12-29

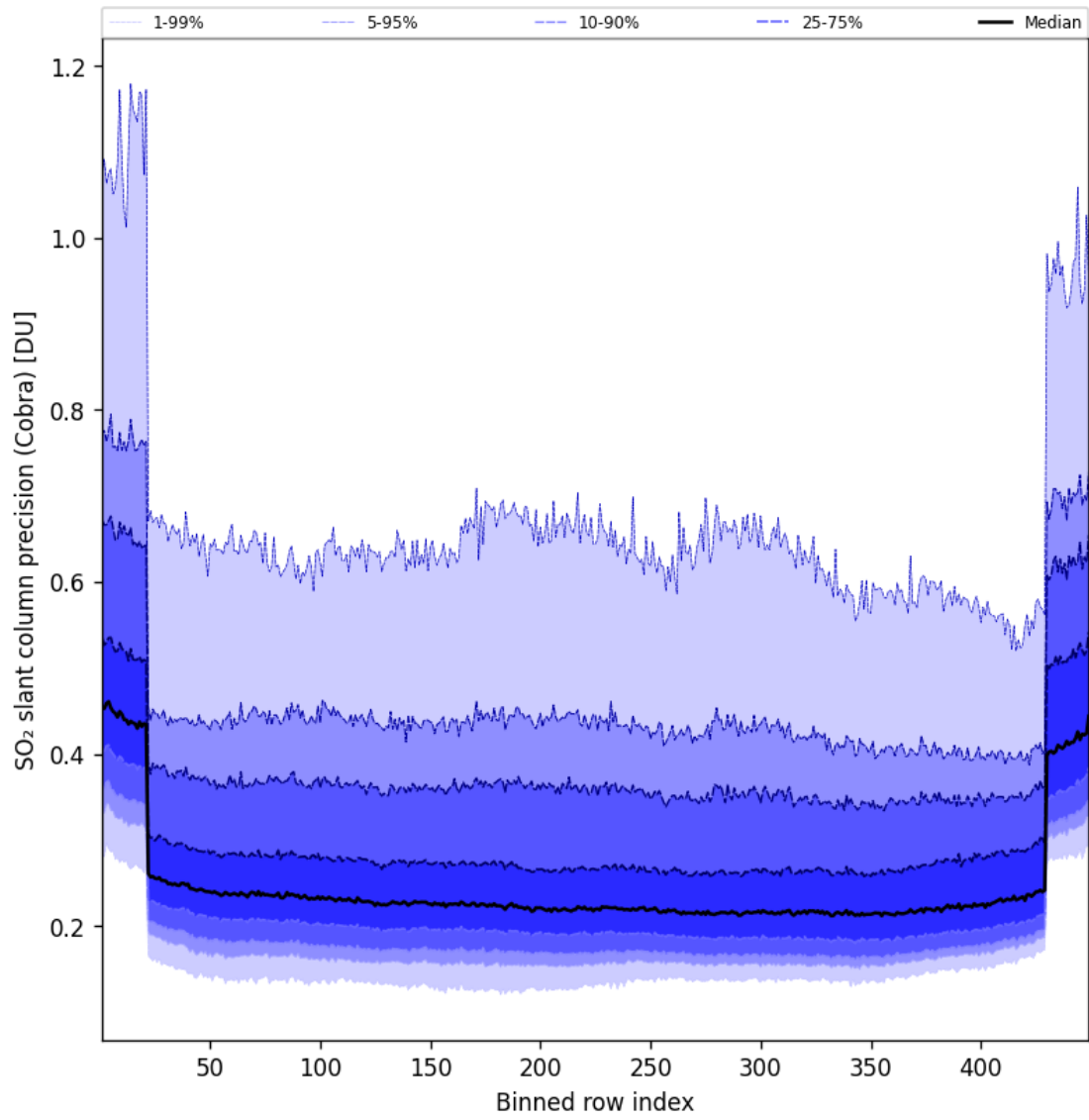


Figure 89: Along track statistics of “SO₂ slant column precision (Cobra)” for 2024-12-28 to 2024-12-29

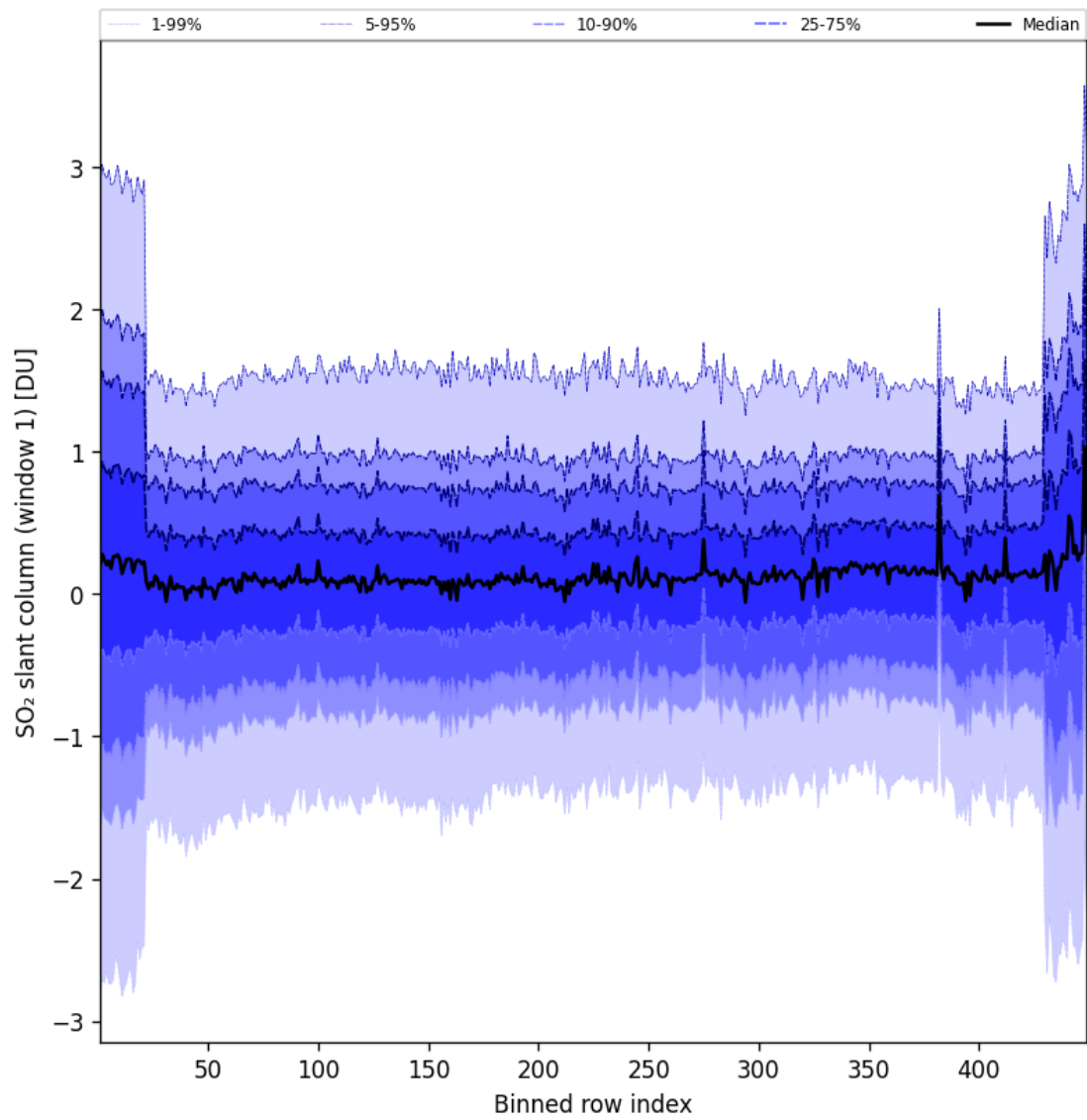


Figure 90: Along track statistics of “SO₂ slant column (window 1)” for 2024-12-28 to 2024-12-29

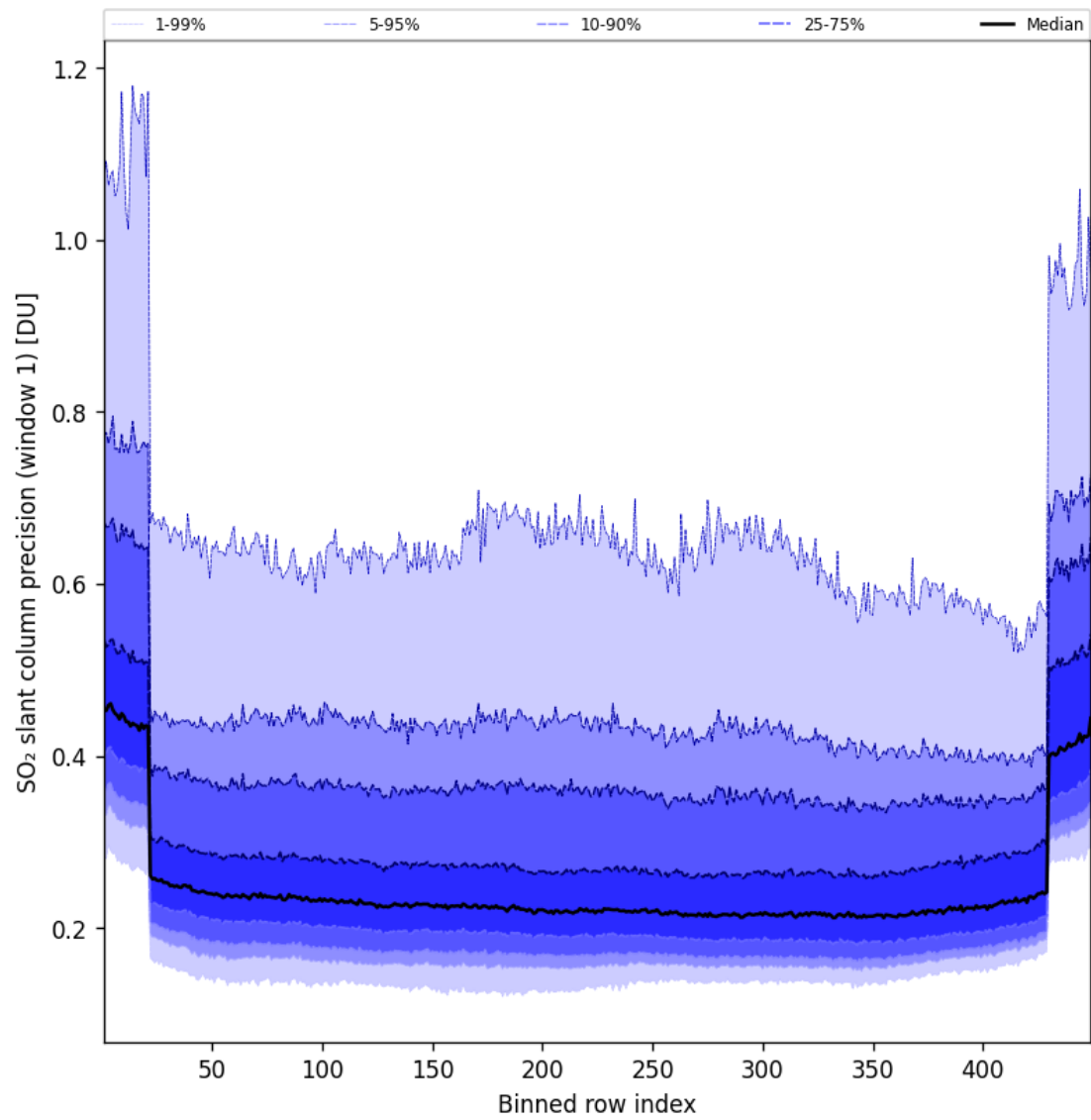


Figure 91: Along track statistics of “SO₂ slant column precision (window 1)” for 2024-12-28 to 2024-12-29

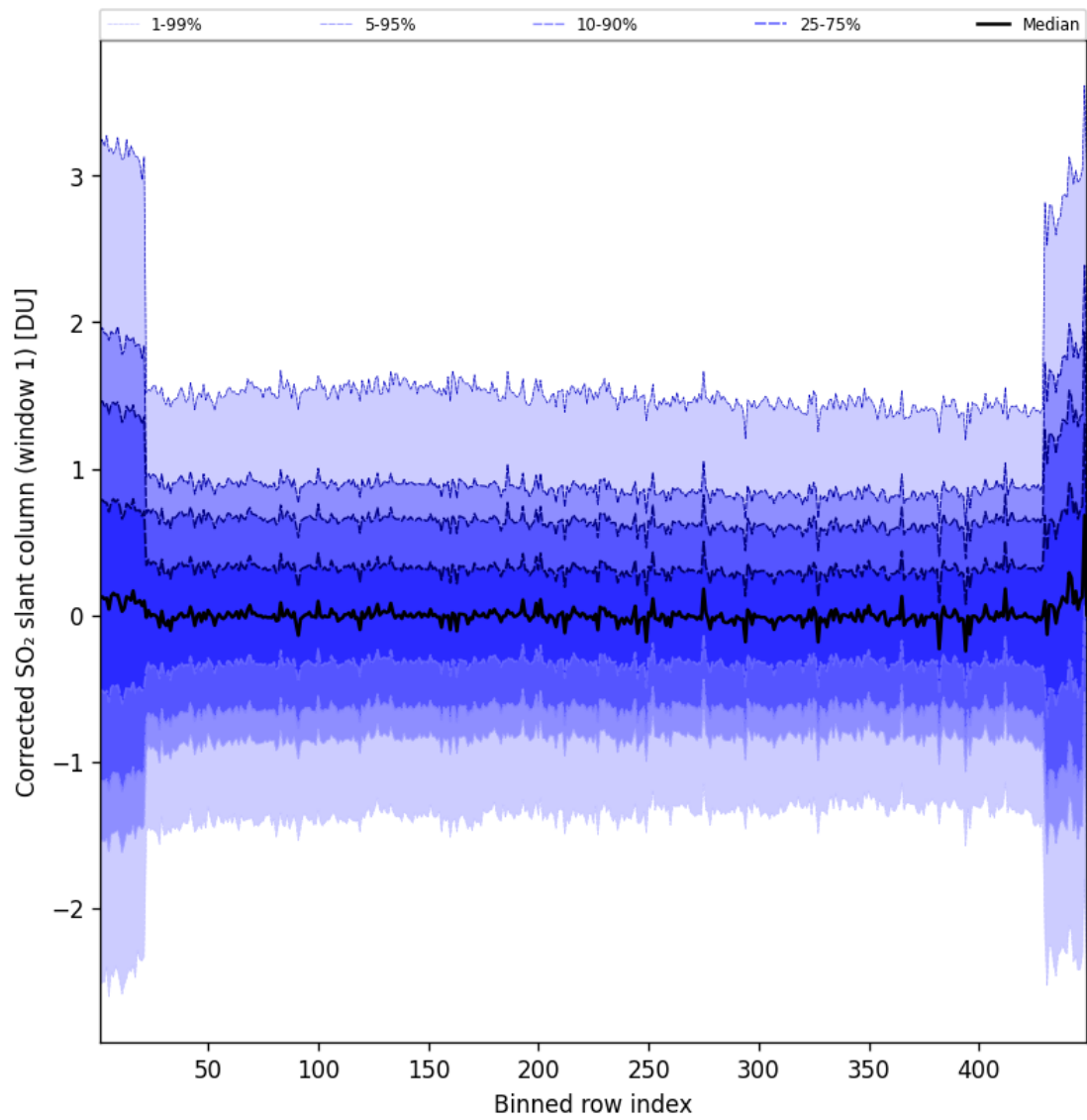


Figure 92: Along track statistics of “Corrected SO₂ slant column (window 1)” for 2024-12-28 to 2024-12-29

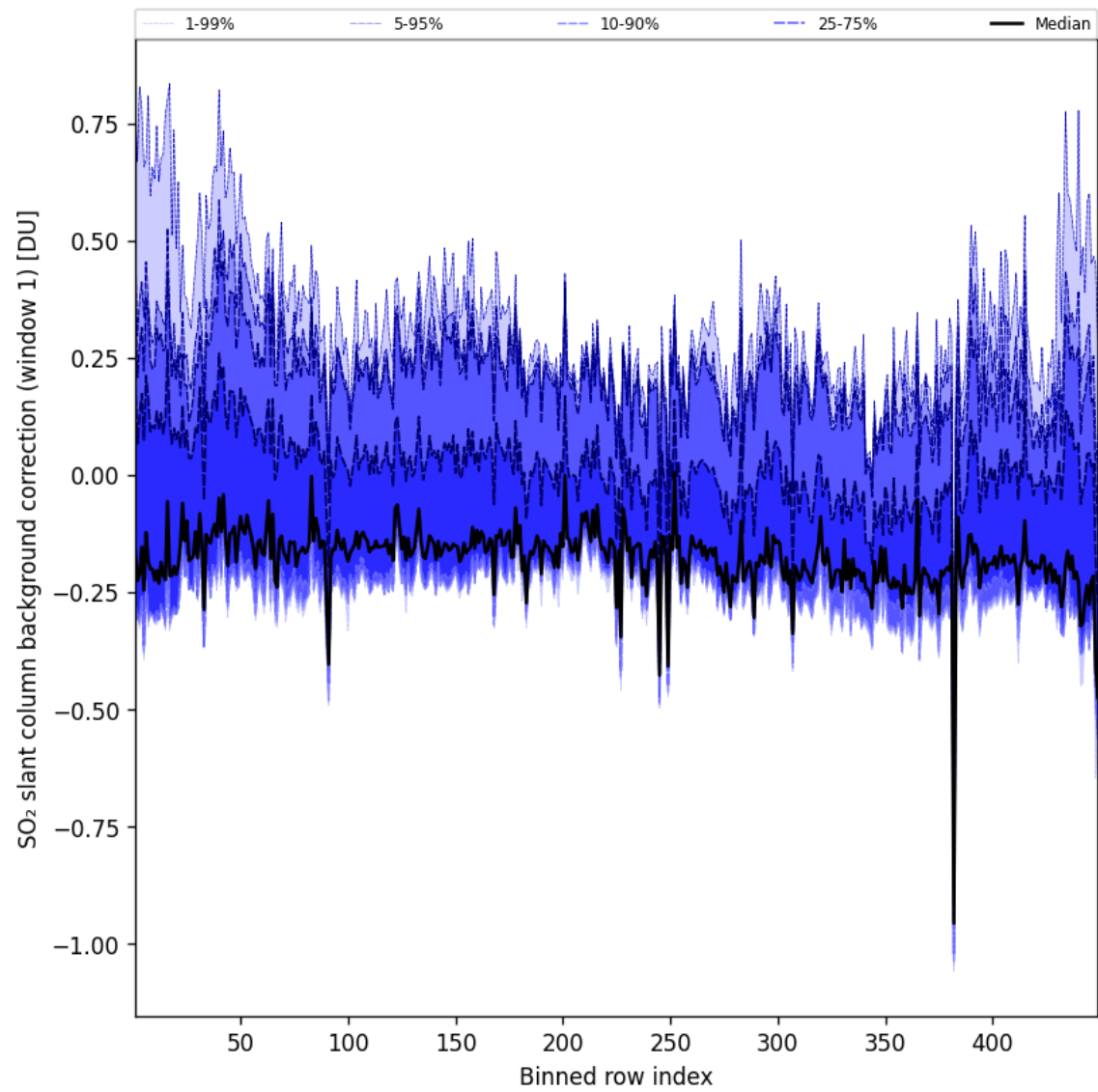


Figure 93: Along track statistics of “SO₂ slant column background correction (window 1)” for 2024-12-28 to 2024-12-29

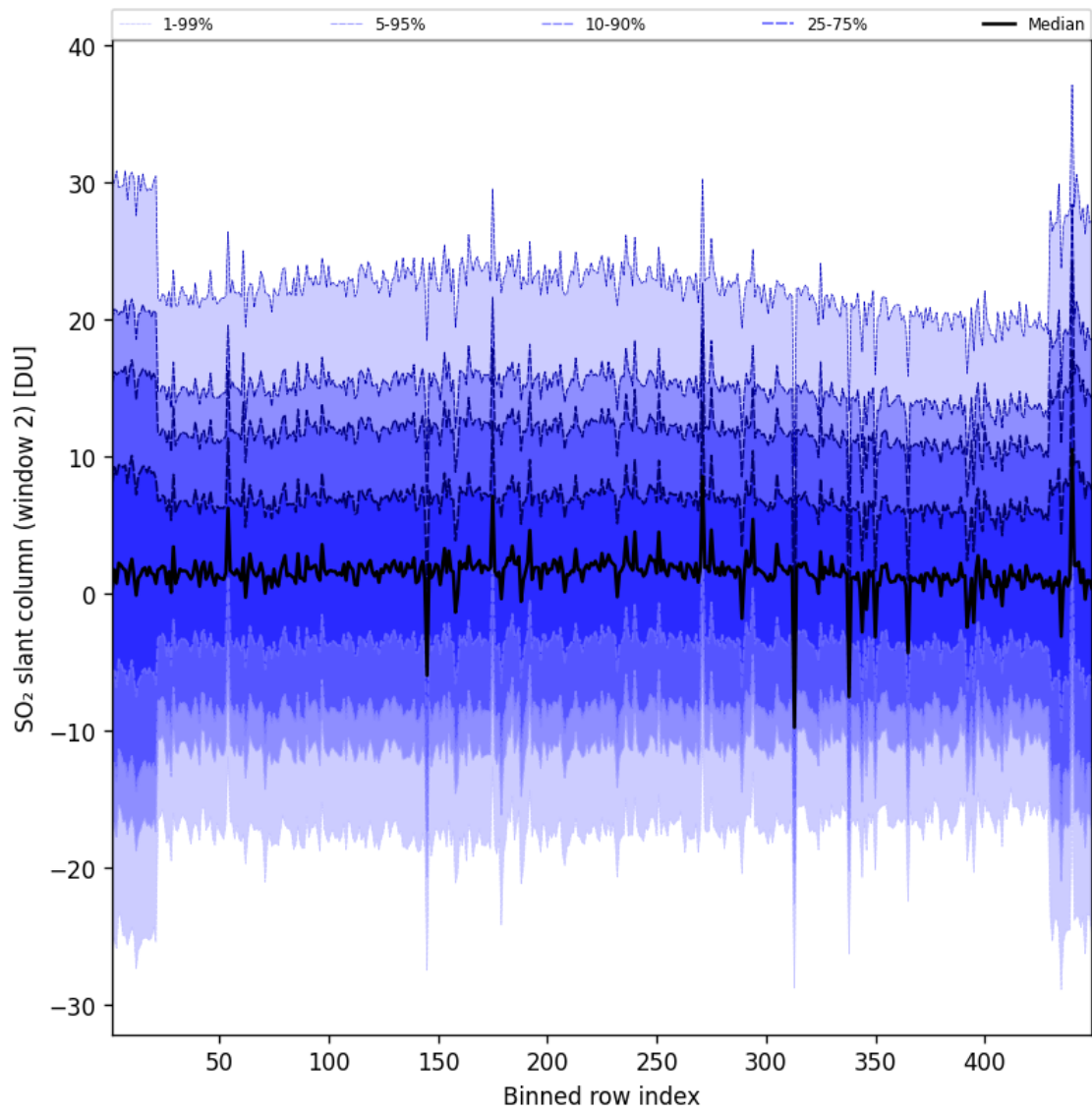


Figure 94: Along track statistics of “SO₂ slant column (window 2)” for 2024-12-28 to 2024-12-29

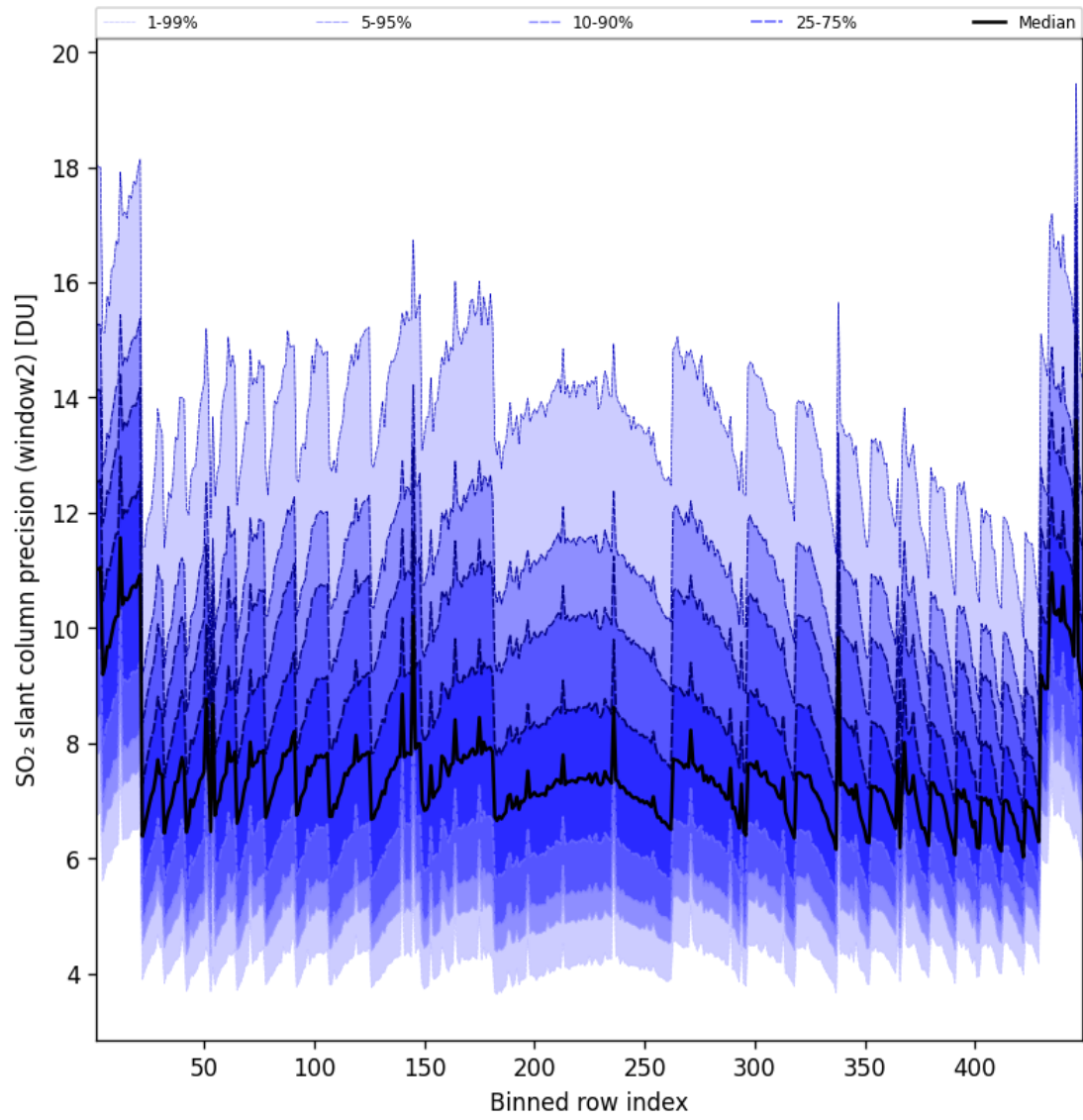


Figure 95: Along track statistics of “SO₂ slant column precision (window2)” for 2024-12-28 to 2024-12-29

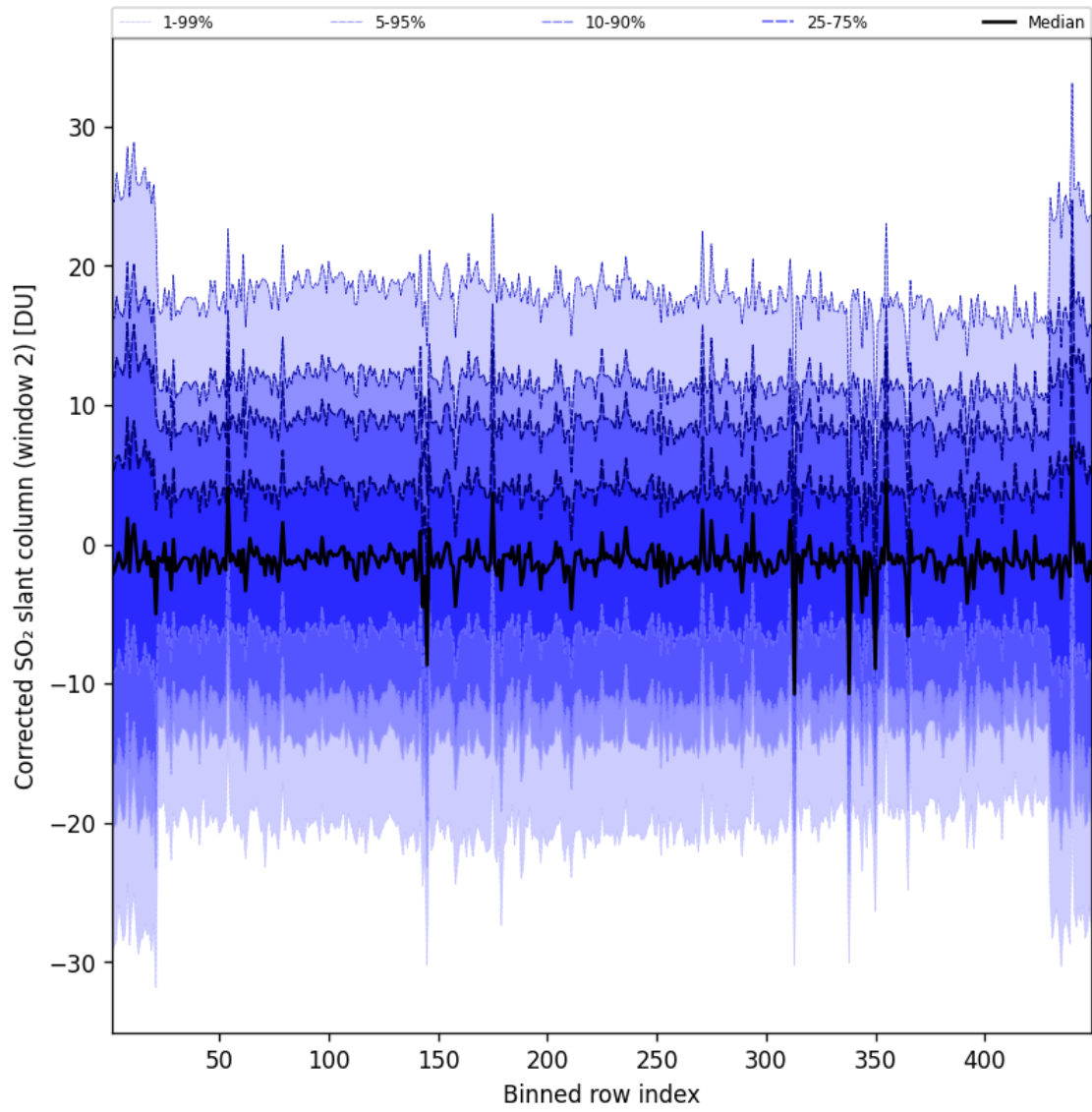


Figure 96: Along track statistics of “Corrected SO₂ slant column (window 2)” for 2024-12-28 to 2024-12-29

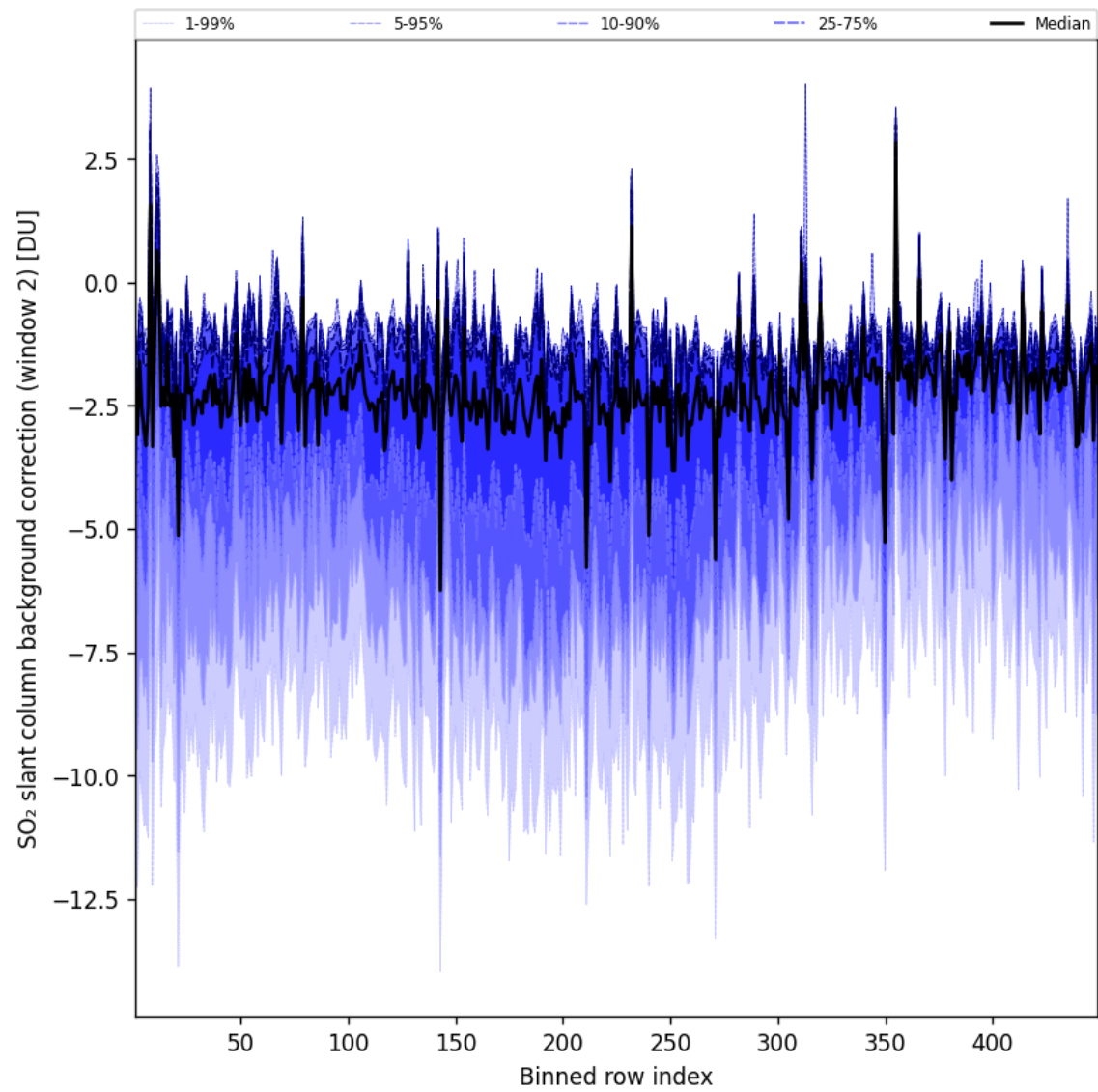


Figure 97: Along track statistics of “SO₂ slant column background correction (window 2)” for 2024-12-28 to 2024-12-29

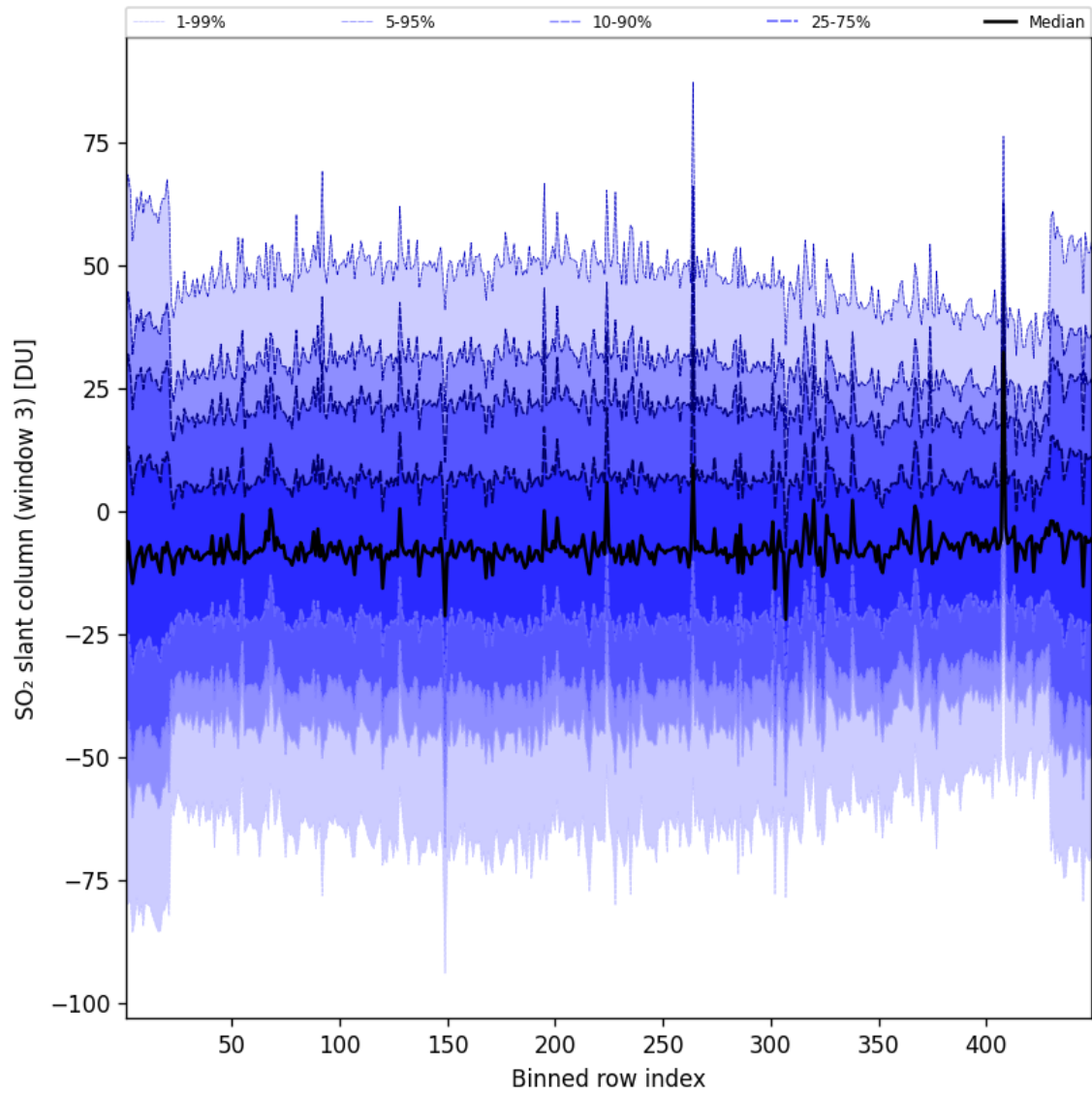


Figure 98: Along track statistics of “SO₂ slant column (window 3)” for 2024-12-28 to 2024-12-29

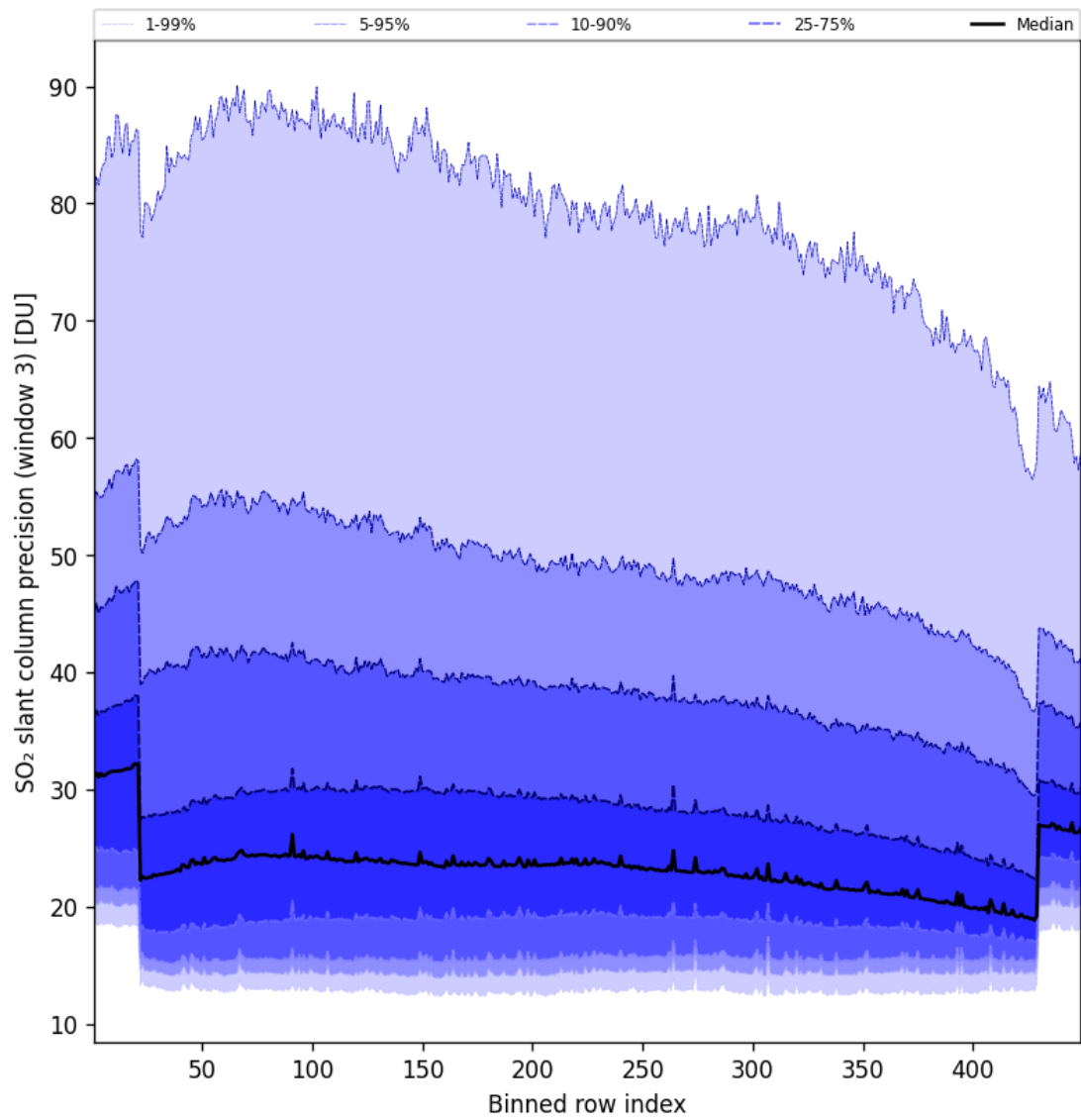


Figure 99: Along track statistics of “SO₂ slant column precision (window 3)” for 2024-12-28 to 2024-12-29

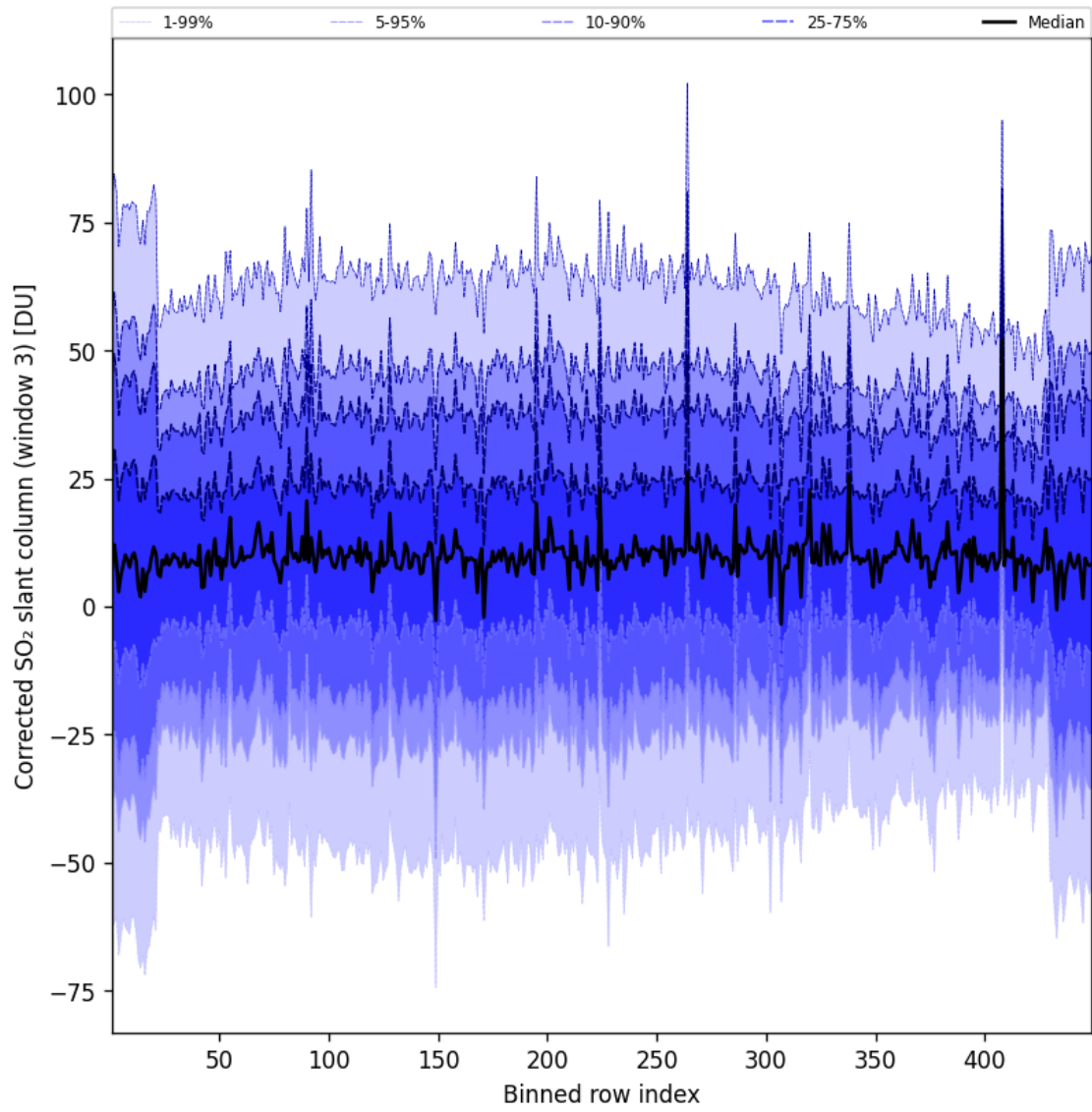


Figure 100: Along track statistics of “Corrected SO₂ slant column (window 3)” for 2024-12-28 to 2024-12-29

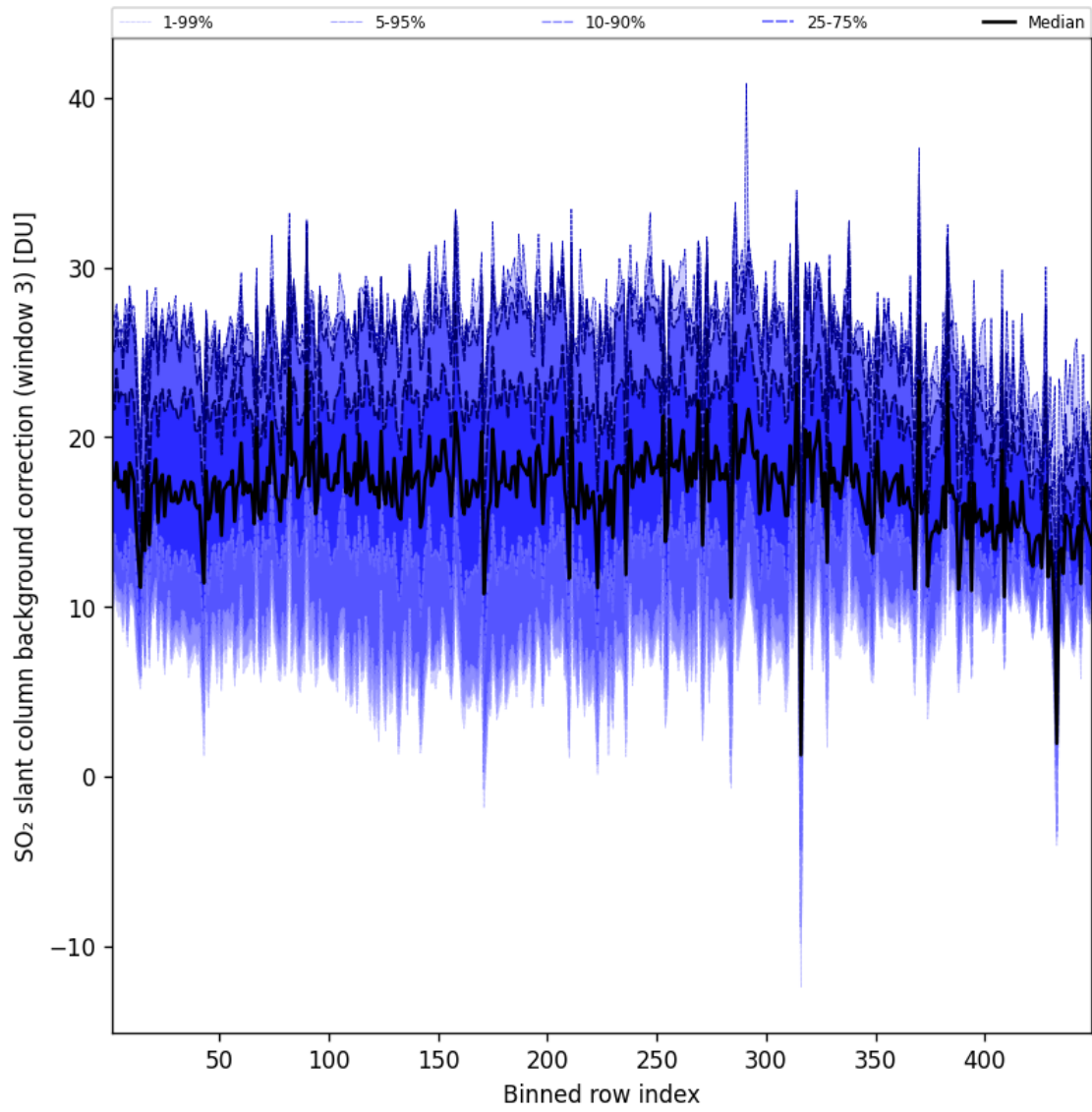


Figure 101: Along track statistics of “SO₂ slant column background correction (window 3)” for 2024-12-28 to 2024-12-29

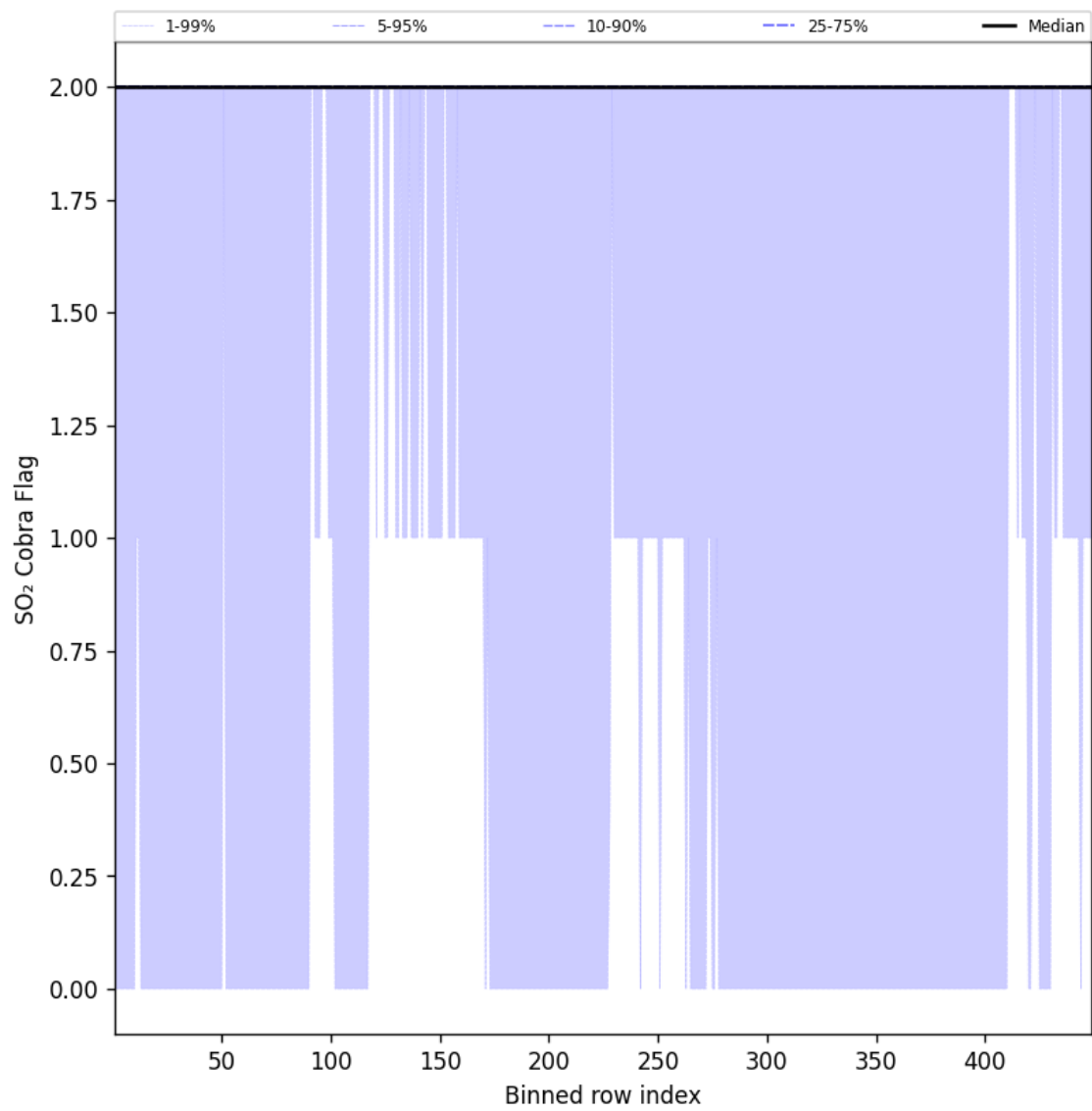


Figure 102: Along track statistics of “SO₂ Cobra Flag” for 2024-12-28 to 2024-12-29

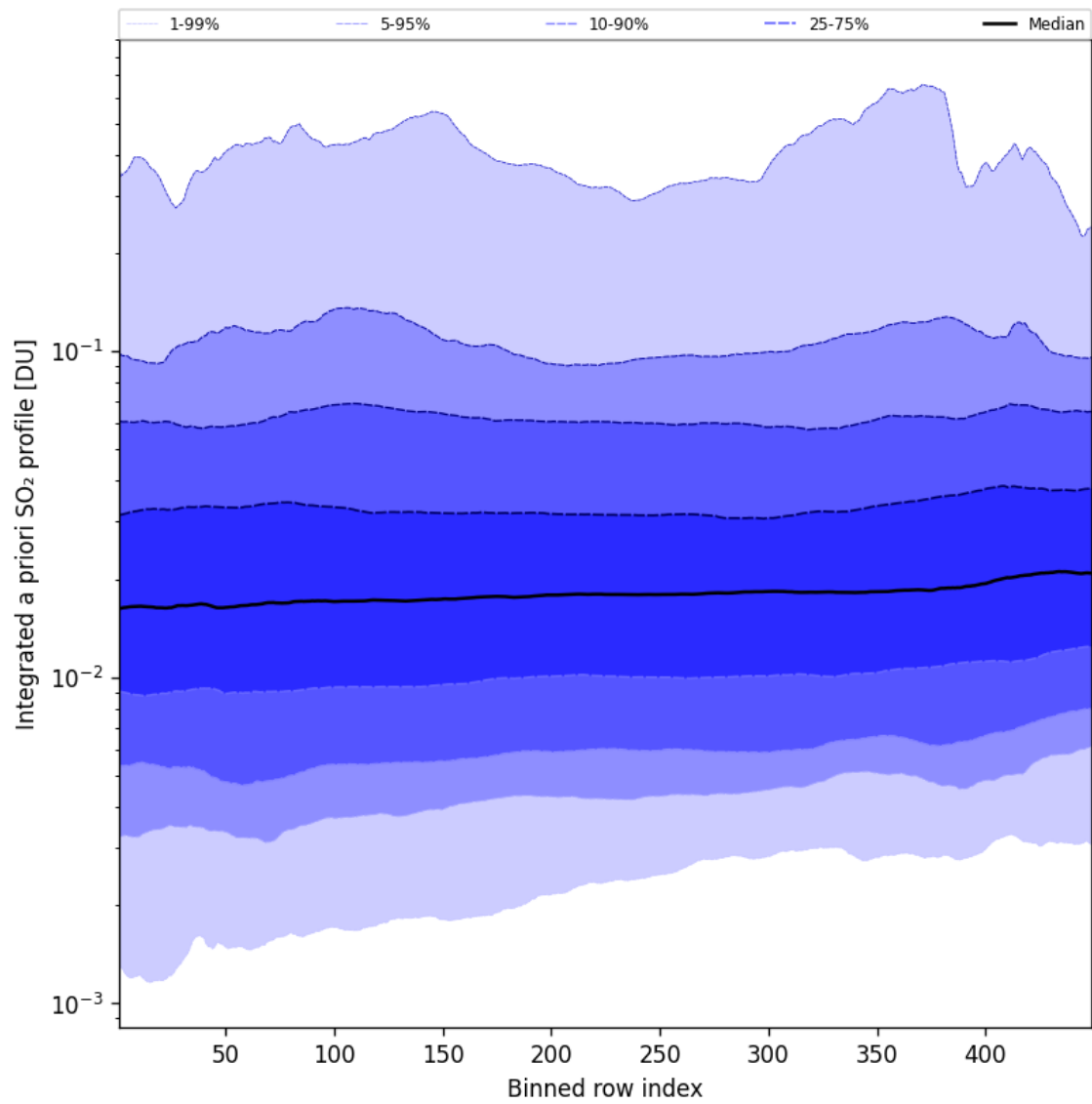


Figure 103: Along track statistics of “Integrated a priori SO₂ profile” for 2024-12-28 to 2024-12-29

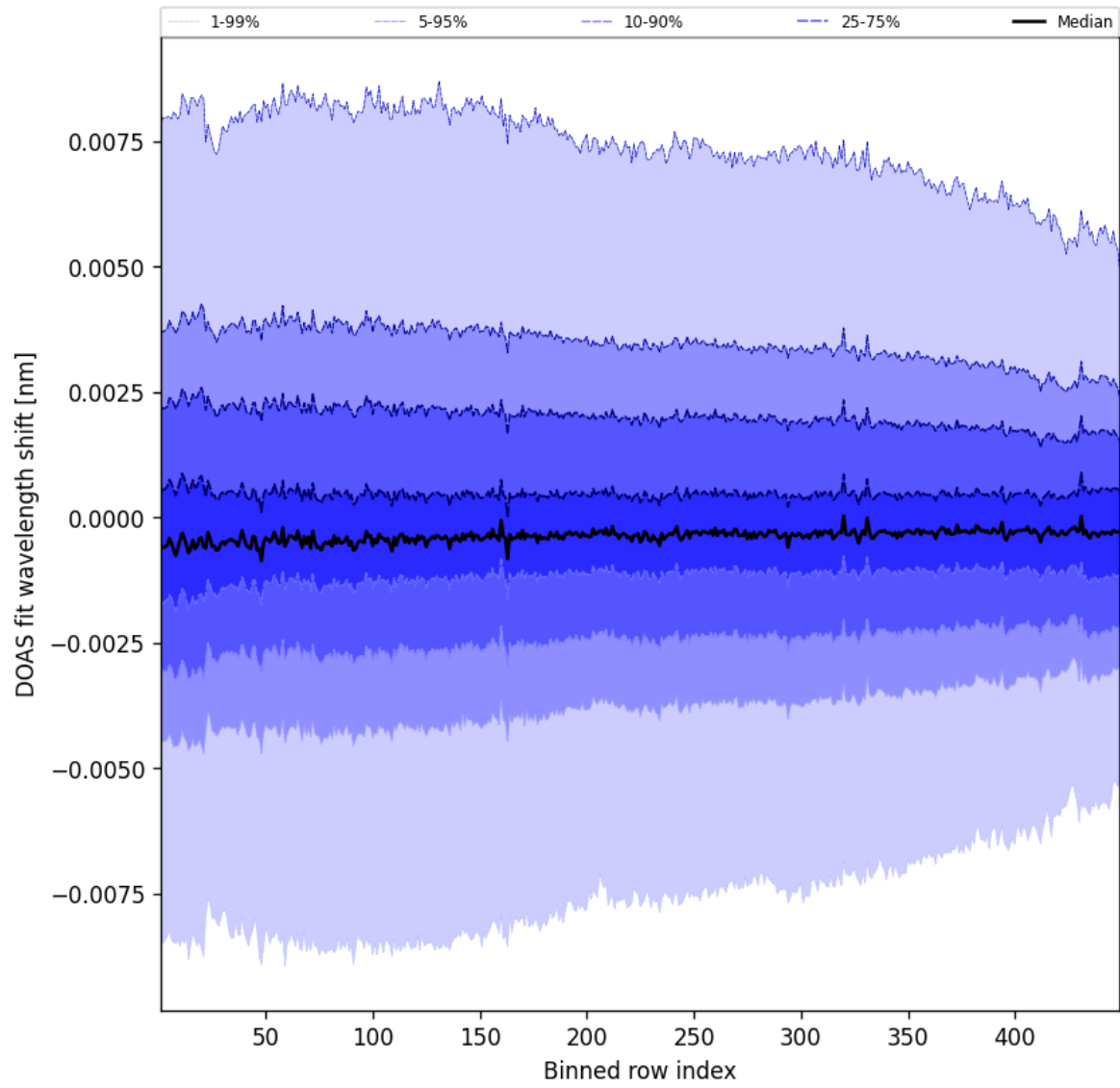


Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2024-12-28 to 2024-12-29

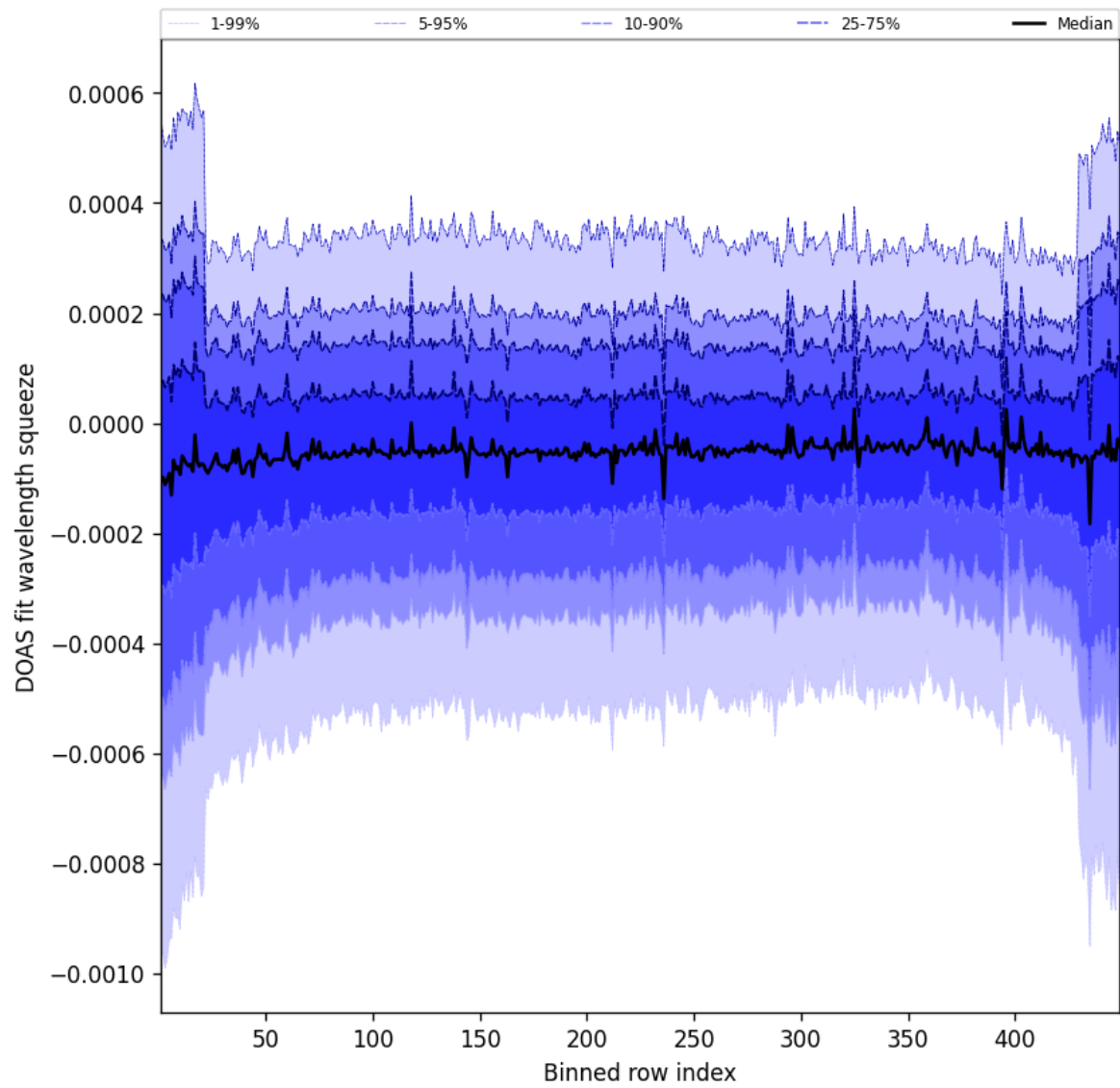


Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2024-12-28 to 2024-12-29

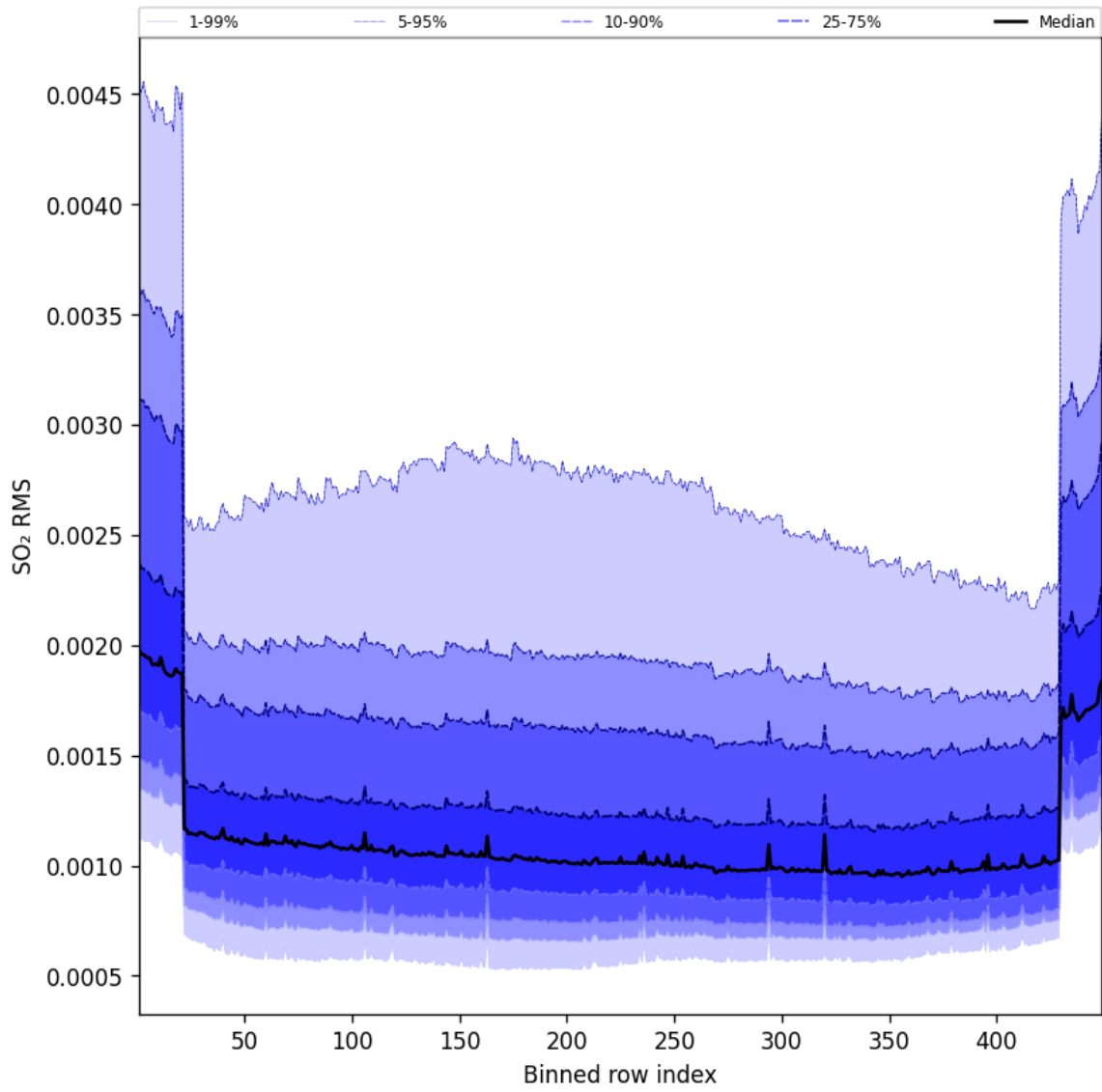


Figure 106: Along track statistics of “SO₂ RMS” for 2024-12-28 to 2024-12-29

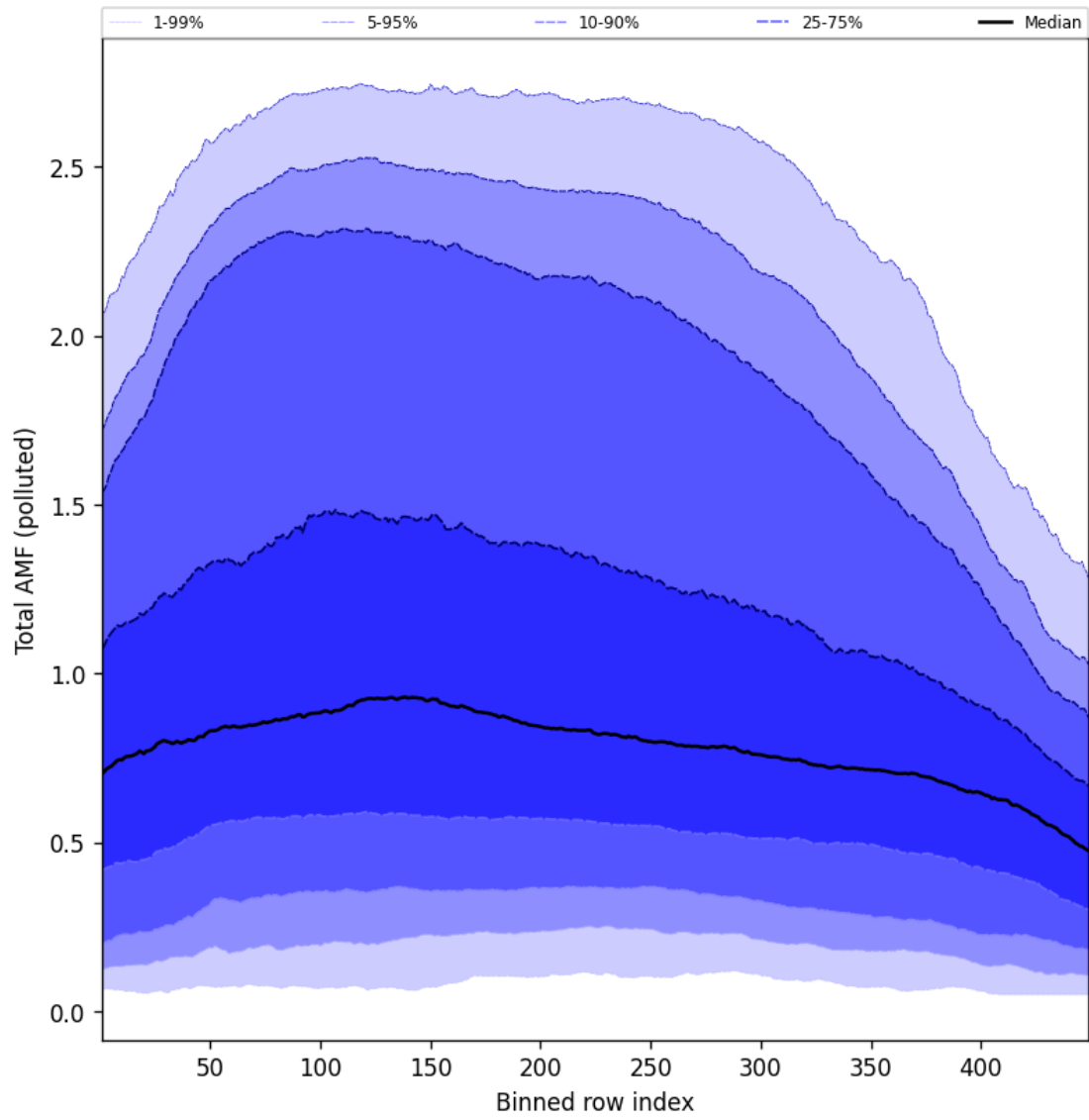


Figure 107: Along track statistics of “Total AMF (polluted)” for 2024-12-28 to 2024-12-29

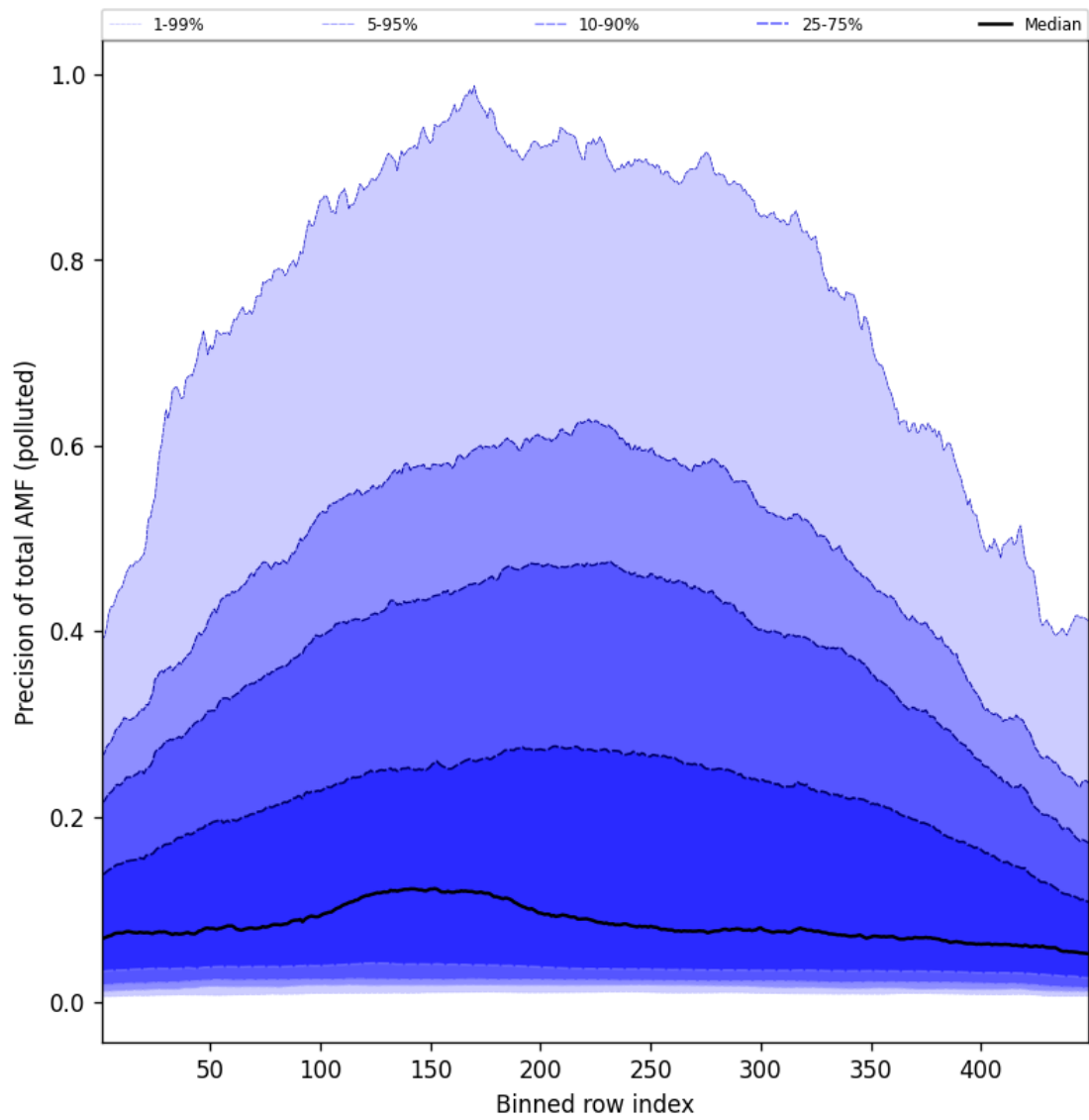


Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2024-12-28 to 2024-12-29

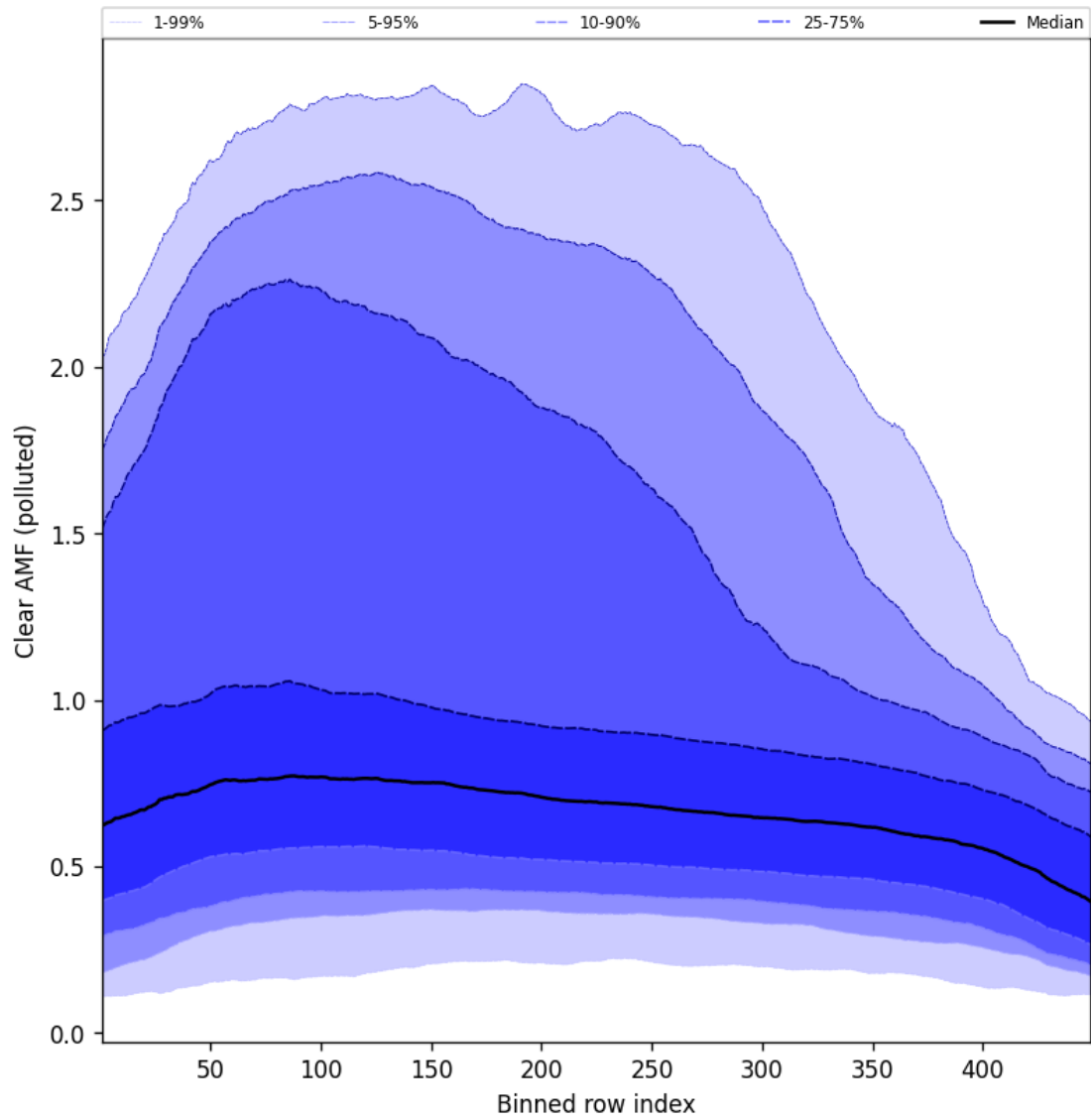


Figure 109: Along track statistics of “Clear AMF (polluted)” for 2024-12-28 to 2024-12-29

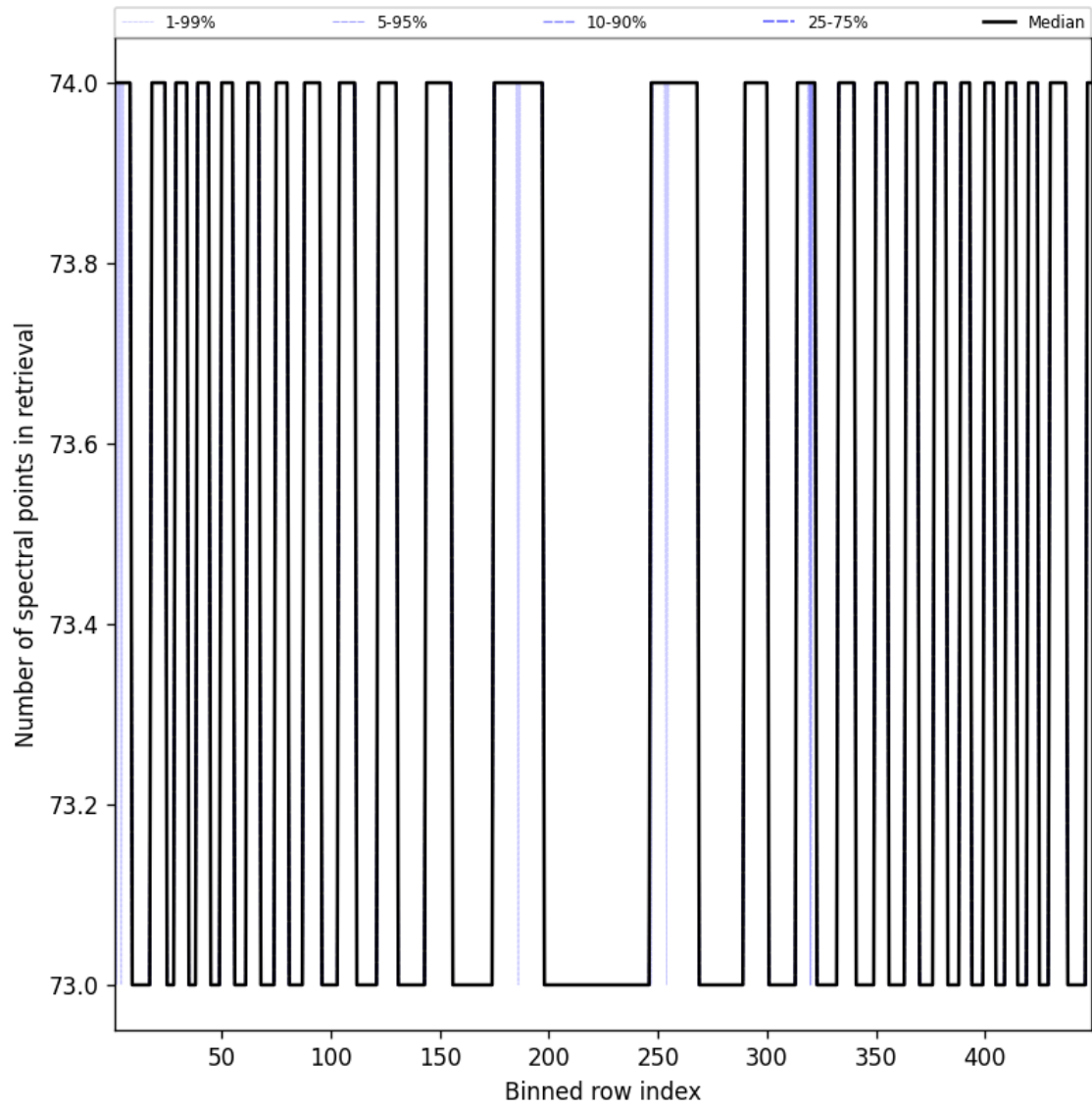


Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2024-12-28 to 2024-12-29

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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