PyCAMA report generated by tropl2-proc

tropl2-proc

2024-12-29 (02:19)

1 Short Introduction

1.1 The list of parameters

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

2 Definitions

The averages shown here are *unweighed* averages:

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

with N the number of observations in the dataset.

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

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

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

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

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

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

The median is a special case of a percentile. Instead of ½ in equation 3, other threshold values can be used. We report results for 1 %, 5 %, 10 %, 15.9 %, 25 %, 75 %, 84.1 %, 90 %, 95 % and 99 %. The inter quartile range is the difference between the 75 % and 25 % percentiles. Similarly the minimum and maximum values correspond to the 0 % and 100 % percentiles respectively.

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

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

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

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

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

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

Table 1: Parameterlist and basic statistics for the analysis

Variable	mean $\pm\sigma$	Count	Mode	IQR	Median	Minimum	Maximum
qa value [1]	0.612 ± 0.416	17184713	0.995	0.820	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(4.135 \pm 135.432) \times 10^{-2}$	17184713	0.223	0.406	8.870×10^{-3}	-136	531
sulfurdioxide total vertical column precision [DU]	0.551 ± 0.955	17184713	0.122	0.337	0.302	4.384×10^{-2}	42.9
sulfurdioxide slant column density corrected [DU]	$(1.640 \pm 33.570) \times 10^{-2}$	17184713	0.220	0.340	8.373×10^{-3}	-68.5	44.4
sulfurdioxide slant column density cobra [DU]	$(1.635 \pm 33.313) \times 10^{-2}$	17184713	0.220	0.340	8.373×10^{-3}	-68.5	37.8
sulfurdioxide slant column density cobra precision [DU]	0.272 ± 0.122	17184713	0.213	0.107	0.234	8.550×10^{-2}	20.3
sulfurdioxide slant column density window1 [DU]	0.116 ± 0.644	17184713	0.125	0.712	0.126	-206	73.7
sulfurdioxide slant column density window1 precision [DU]	0.272 ± 0.122	17184713	0.213	0.107	0.234	8.550×10^{-2}	20.3
sulfurdioxide slant column density corrected win1 [DU]	$(2.799 \pm 62.186) \times 10^{-2}$	17184713	-2.500×10^{-2}	0.675	1.381×10^{-2}	-206	73.7
background so2 slant column offset window1 [DU]	$(-8.831 \pm 18.884) \times 10^{-2}$	17184713	-0.220	0.238	-0.151	-1.37	5.29
sulfurdioxide slant column density window2 [DU]	2.07 ± 8.61	17184713	1.75	10.8	1.97	-788	843
sulfurdioxide slant column density window2 precision [DU]	7.75 ± 2.23	17184713	6.97	2.53	7.38	2.09	497
sulfurdioxide slant column density corrected win2 [DU]	-0.822 ± 8.398	17184713	-0.750	10.5	-0.805	-790	844
background so2 slant column offset window2 [DU]	-2.90 ± 2.03	17184713	-1.75	2.32	-2.34	-16.8	3.56
sulfurdioxide slant column density window3 [DU]	-11.4 ± 23.1	17184713	-12.9	28.5	-11.7	-515	489
sulfurdioxide slant column density window3 precision [DU]	26.3 ± 12.5	17184713	22.5	10.2	23.4	9.12	311
sulfurdioxide slant column density corrected win3 [DU]	5.18 ± 22.53	17184713	6.16	27.6	5.22	-506	497
background so2 slant column offset window3 [DU]	16.6 ± 6.2	17184713	15.1	8.99	16.4	-15.0	51.3
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.21	17184713	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(3.896 \pm 11.904) \times 10^{-2}$	17184713	2.276×10^{-2}	2.367×10^{-2}	1.823×10^{-2}	8.337×10^{-4}	3.76
fitted radiance shift [nm]	$(-3.963 \pm 23.939) \times 10^{-4}$	17184713	-5.000×10^{-4}	1.675×10^{-3}	-4.455×10^{-4}	-4.284×10^{-2}	4.329×10^{-2}
fitted radiance squeeze [1]	$(-6.494 \pm 18.666) \times 10^{-5}$	17184713	-3.000×10^{-5}	2.202×10^{-4}	-5.232×10^{-5}	-1.786×10^{-2}	1.431×10^{-2}
fitted root mean square [1]	$(1.209 \pm 0.500) \times 10^{-3}$	17184713	9.750×10^{-4}	4.636×10^{-4}	1.070×10^{-3}	3.336×10^{-4}	6.308×10^{-2}
sulfurdioxide total air mass factor polluted [1]	0.936 ± 0.609	17184713	0.780	0.689	0.781	5.000×10^{-2}	3.07
sulfurdioxide total air mass factor polluted precision [1]	0.154 ± 0.174	17184713	3.500×10^{-2}	0.177	8.431×10^{-2}	2.500×10^{-3}	1.75
sulfurdioxide clear air mass factor polluted [1]	0.794 ± 0.525	17184713	0.500	0.417	0.661	3.445×10^{-2}	3.13
number of spectral points in retrieval [1]	73.4 ± 0.5	17184713	73.0	1.000	73.0	70.0	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]	−2.80	−0.884	−0.513	−0.335	−0.191	0.216	0.372	0.571	1.00	3.41
sulfurdioxide total vertical column precision [DU]	8.026×10^{-2}	0.103	0.124	0.148	0.190	0.526	0.741	1.05	1.76	4.65
sulfurdioxide slant column density corrected [DU]	−0.790	−0.453	−0.330	−0.247	−0.160	0.180	0.271	0.361	0.501	0.937
sulfurdioxide slant column density cobra [DU]	−0.790	−0.453	−0.330	−0.247	−0.160	0.180	0.271	0.361	0.501	0.937
sulfurdioxide slant column density cobra precision [DU]	0.137	0.161	0.174	0.184	0.198	0.305	0.365	0.423	0.502	0.726
sulfurdioxide slant column density window1 [DU]	−1.60	−0.888	−0.615	−0.431	−0.237	0.475	0.655	0.826	1.08	1.81
sulfurdioxide slant column density window1 precision [DU]	0.137	0.161	0.174	0.184	0.198	0.305	0.365	0.423	0.502	0.726
sulfurdioxide slant column density corrected win1 [DU]	−1.52	−0.892	−0.655	−0.493	−0.320	0.355	0.537	0.715	0.990	1.79
background so2 slant column offset window1 [DU]	−0.389	−0.293	−0.261	−0.239	−0.217	2.051×10^{-2}	0.129	0.202	0.273	0.420
sulfurdioxide slant column density window2 [DU]	−18.4	−11.7	−8.43	−6.04	−3.38	7.38	10.1	12.6	16.1	24.0
sulfurdioxide slant column density window2 precision [DU]	4.18	4.93	5.39	5.78	6.26	8.79	9.68	10.6	11.9	14.6
sulfurdioxide slant column density corrected win2 [DU]	−21.4	−14.4	−11.1	−8.74	−6.08	4.45	7.08	9.45	12.7	19.7
background so2 slant column offset window2 [DU]	−9.46	−7.00	−5.71	−4.77	−3.83	−1.51	−1.25	−1.05	−0.758	0.687
sulfurdioxide slant column density window3 [DU]	−69.7	−48.6	−39.3	−32.8	−25.7	2.85	10.5	17.5	27.0	46.0
sulfurdioxide slant column density window3 precision [DU]	12.9	14.6	15.9	17.2	19.0	29.2	33.7	38.8	49.0	78.7
sulfurdioxide slant column density corrected win3 [DU]	−52.6	−31.7	−22.2	−15.6	−8.52	19.1	26.3	32.8	41.9	60.6
background so2 slant column offset window3 [DU]	3.43	6.71	8.46	10.0	12.1	21.1	23.4	25.0	26.7	29.2
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]	2.281×10^{-3}	4.182×10^{-3}	5.841×10^{-3}	7.313×10^{-3}	9.911×10^{-3}	3.358×10^{-2}	4.614×10^{-2}	6.486×10^{-2}	0.111	0.381
fitted radiance shift [nm]	-7.590×10^{-3}	-3.852×10^{-3}	-2.545×10^{-3}	-1.846×10^{-3}	-1.281×10^{-3}	3.937×10^{-4}	1.056×10^{-3}	1.883×10^{-3}	3.312×10^{-3}	7.204×10^{-3}
fitted radiance squeeze [1]	-5.846×10^{-4}	-3.827×10^{-4}	-2.949×10^{-4}	-2.336×10^{-4}	-1.688×10^{-4}	5.134×10^{-5}	1.014×10^{-4}	1.467×10^{-4}	2.098×10^{-4}	3.594×10^{-4}
fitted root mean square [1]	5.833×10^{-4}	6.999×10^{-4}	7.713×10^{-4}	8.287×10^{-4}	8.980×10^{-4}	1.362×10^{-3}	1.601×10^{-3}	1.839×10^{-3}	2.180×10^{-3}	3.060×10^{-3}
sulfurdioxide total air mass factor polluted [1]	7.160×10^{-2}	0.198	0.308	0.401	0.505	1.19	1.55	1.93	2.29	2.62
sulfurdioxide total air mass factor polluted precision [1]	8.791×10^{-3}	1.664×10^{-2}	2.276×10^{-2}	2.845×10^{-2}	3.705×10^{-2}	0.214	0.297	0.380	0.501	0.821
sulfurdioxide clear air mass factor polluted [1]	0.167	0.281	0.356	0.413	0.476	0.893	1.03	1.38	2.17	2.69
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]	0.711 ± 0.392	5823331	0.680	1.000	0.0	1.000	0.320	1.000
sulfurdioxide total vertical column [DU]	$(9.074 \pm 208.718) \times 10^{-2}$	5823331	0.590	1.607×10^{-2}	-136	531	-0.271	0.319
sulfurdioxide total vertical column precision [DU]	0.855 ± 1.393	5823331	0.590	0.410	5.311×10^{-2}	42.9	0.263	0.853
sulfurdioxide slant column density corrected [DU]	$(2.611 \pm 41.192) \times 10^{-2}$	5823331	0.398	1.227×10^{-2}	-9.39	44.4	-0.184	0.214
sulfurdioxide slant column density cobra [DU]	$(2.602 \pm 40.812) \times 10^{-2}$	5823331	0.398	1.227×10^{-2}	-9.39	12.0	-0.184	0.214
sulfurdioxide slant column density cobra precision [DU]	0.322 ± 0.149	5823331	0.164	0.276	9.158×10^{-2}	4.44	0.223	0.387
sulfurdioxide slant column density window1 [DU]	0.189 ± 0.741	5823331	0.794	0.193	-20.2	14.2	-0.205	0.588
sulfurdioxide slant column density window1 precision [DU]	0.322 ± 0.149	5823331	0.164	0.276	9.158×10^{-2}	4.44	0.223	0.387
sulfurdioxide slant column density corrected win1 [DU]	$(4.947 \pm 74.109) \times 10^{-2}$	5823331	0.787	2.457×10^{-2}	-20.2	14.1	-0.362	0.425
background so2 slant column offset window1 [DU]	-0.140 ± 0.150	5823331	0.121	-0.163	-1.12	5.29	-0.220	-9.936×10^{-2}
sulfurdioxide slant column density window2 [DU]	2.61 ± 9.81	5823331	12.4	2.30	-101	309	-3.76	8.62
sulfurdioxide slant column density window2 precision [DU]	8.77 ± 2.33	5823331	2.89	8.44	2.39	221	7.16	10.0
sulfurdioxide slant column density corrected win2 [DU]	-0.789 ± 9.481	5823331	12.0	-0.793	-108	309	-6.81	5.22
background so2 slant column offset window2 [DU]	-3.40 ± 2.53	5823331	3.10	-2.43	-16.8	3.38	-4.72	-1.62
sulfurdioxide slant column density window3 [DU]	-13.5 ± 25.9	5823331	32.6	-13.0	-212	198	-29.5	3.12
sulfurdioxide slant column density window3 precision [DU]	29.8 ± 12.2	5823331	9.96	27.1	9.52	311	22.9	32.8
sulfurdioxide slant column density corrected win3 [DU]	4.91 ± 25.63	5823331	32.3	5.20	-193	212	-11.0	21.3
background so2 slant column offset window3 [DU]	18.4 ± 5.2	5823331	7.94	17.5	-10.5	51.3	14.5	22.4
sulfurdioxide slant column cobra flag [1]	1.96 ± 0.27	5823331	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(7.457 \pm 19.621) \times 10^{-2}$	5823331	4.807×10^{-2}	2.642×10^{-2}	1.129×10^{-3}	3.76	1.523×10^{-2}	6.330×10^{-2}
fitted radiance shift [nm]	$(-2.027 \pm 24.464) \times 10^{-4}$	5823331	1.679×10^{-3}	-2.275×10^{-4}	-3.543×10^{-2}	4.329×10^{-2}	-1.066×10^{-3}	6.126×10^{-4}
fitted radiance squeeze [1]	$(-1.549 \pm 18.685) \times 10^{-5}$	5823331	2.143×10^{-4}	-1.180×10^{-5}	-1.022×10^{-2}	1.960×10^{-3}	-1.203×10^{-4}	9.400×10^{-5}
fitted root mean square [1]	$(1.398 \pm 0.609) \times 10^{-3}$	5823331	6.545×10^{-4}	1.208×10^{-3}	3.697×10^{-4}	2.843×10^{-2}	9.960×10^{-4}	1.651×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.708 ± 0.382	5823331	0.499	0.684	5.000×10^{-2}	2.86	0.423	0.922
sulfurdioxide total air mass factor polluted precision [1]	$(9.377 \pm 12.976) \times 10^{-2}$	5823331	8.290×10^{-2}	4.895×10^{-2}	2.500×10^{-3}	1.75	2.964×10^{-2}	0.113
sulfurdioxide clear air mass factor polluted [1]	0.635 ± 0.268	5823331	0.430	0.649	3.445×10^{-2}	2.11	0.414	0.844
number of spectral points in retrieval [1]	73.5 ± 0.5	5823331	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]	0.561 ± 0.419	11361382	0.860	0.490	0.0	1.000	0.140	1.000
sulfurdioxide total vertical column [DU]	$(1.604 \pm 73.454) \times 10^{-2}$	11361382	0.342	6.647×10^{-3}	-68.5	70.1	-0.162	0.179
sulfurdioxide total vertical column precision [DU]	0.395 ± 0.561	11361382	0.270	0.260	4.384×10^{-2}	28.8	0.159	0.429
sulfurdioxide slant column density corrected [DU]	$(1.143 \pm 28.880) \times 10^{-2}$	11361382	0.315	6.739×10^{-3}	-68.5	40.3	-0.150	0.165
sulfurdioxide slant column density cobra [DU]	$(1.140 \pm 28.707) \times 10^{-2}$	11361382	0.315	6.739×10^{-3}	-68.5	37.8	-0.150	0.165
sulfurdioxide slant column density cobra precision [DU]	0.246 ± 0.094	11361382	7.935×10^{-2}	0.220	8.550×10^{-2}	20.3	0.190	0.269
sulfurdioxide slant column density window1 [DU]	$(7.886 \pm 58.446) \times 10^{-2}$	11361382	0.674	9.609×10^{-2}	-206	73.7	-0.251	0.423
sulfurdioxide slant column density window1 precision [DU]	0.246 ± 0.094	11361382	7.935×10^{-2}	0.220	8.550×10^{-2}	20.3	0.190	0.269
sulfurdioxide slant column density corrected win1 [DU]	$(1.698 \pm 55.051) \times 10^{-2}$	11361382	0.628	9.351×10^{-3}	-206	73.7	-0.303	0.325
background so2 slant column offset window1 [DU]	$(-6.188 \pm 20.085) \times 10^{-2}$	11361382	0.308	-0.132	-1.37	2.14	-0.216	9.173×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.80 ± 7.92	11361382	10.1	1.83	-788	843	-3.21	6.85
sulfurdioxide slant column density window2 precision [DU]	7.22 ± 1.98	11361382	2.10	6.95	2.09	497	5.98	8.08
sulfurdioxide slant column density corrected win2 [DU]	-0.838 ± 7.785	11361382	9.87	-0.810	-790	844	-5.76	4.11
background so2 slant column offset window2 [DU]	-2.63 ± 1.65	11361382	2.16	-2.30	-12.8	3.56	-3.61	-1.45
sulfurdioxide slant column density window3 [DU]	-10.3 ± 21.5	11361382	26.8	-11.2	-515	489	-24.1	2.72
sulfurdioxide slant column density window3 precision [DU]	24.6 ± 12.2	11361382	8.63	21.6	9.12	296	17.8	26.4
sulfurdioxide slant column density corrected win3 [DU]	5.32 ± 20.76	11361382	25.6	5.24	-506	497	-7.47	18.1
background so2 slant column offset window3 [DU]	15.6 ± 6.5	11361382	10.0	15.5	-15.0	33.8	10.4	20.5
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.18	11361382	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.071 \pm 2.682) \times 10^{-2}$	11361382	1.851×10^{-2}	1.487×10^{-2}	8.337×10^{-4}	2.15	7.914×10^{-3}	2.642×10^{-2}
fitted radiance shift [nm]	$(-4.955 \pm 23.604) \times 10^{-4}$	11361382	1.625×10^{-3}	-5.569×10^{-4}	-4.284×10^{-2}	3.820×10^{-2}	-1.362×10^{-3}	2.629×10^{-4}
fitted radiance squeeze [1]	$(-9.028 \pm 18.141) \times 10^{-5}$	11361382	2.208×10^{-4}	-7.315×10^{-5}	-1.786×10^{-2}	1.431×10^{-2}	-1.922×10^{-4}	2.861×10^{-5}
fitted root mean square [1]	$(1.112 \pm 0.400) \times 10^{-3}$	11361382	3.771×10^{-4}	1.015×10^{-3}	3.336×10^{-4}	6.308×10^{-2}	8.644×10^{-4}	1.242×10^{-3}
sulfurdioxide total air mass factor polluted [1]	1.05 ± 0.67	11361382	0.895	0.849	5.000×10^{-2}	3.07	0.550	1.45
sulfurdioxide total air mass factor polluted precision [1]	0.186 ± 0.186	11361382	0.227	0.125	4.888×10^{-3}	1.56	4.257×10^{-2}	0.270
sulfurdioxide clear air mass factor polluted [1]	0.875 ± 0.600	11361382	0.453	0.667	0.124	3.13	0.495	0.948
number of spectral points in retrieval [1]	73.4 ± 0.5	11361382	1.000	73.0	70.0	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]	0.659 ± 0.405	12070827	0.760	1.000	0.0	1.000	0.240	1.000
sulfurdioxide total vertical column [DU]	$(2.677 \pm 101.385) \times 10^{-2}$	12070827	0.425	8.726×10^{-3}	-100	121	-0.202	0.223
sulfurdioxide total vertical column precision [DU]	0.501 ± 0.729	12070827	0.298	0.308	4.817×10^{-2}	33.0	0.212	0.511
sulfurdioxide slant column density corrected [DU]	$(1.276 \pm 30.187) \times 10^{-2}$	12070827	0.322	7.241×10^{-3}	-18.6	44.4	-0.153	0.169
sulfurdioxide slant column density cobra [DU]	$(1.273 \pm 30.036) \times 10^{-2}$	12070827	0.322	7.241×10^{-3}	-18.6	21.5	-0.153	0.169
sulfurdioxide slant column density cobra precision [DU]	0.255 ± 0.109	12070827	8.608×10^{-2}	0.223	8.550×10^{-2}	13.5	0.192	0.278
sulfurdioxide slant column density window1 [DU]	0.149 ± 0.583	12070827	0.660	0.152	-68.0	30.6	-0.181	0.479
sulfurdioxide slant column density window1 precision [DU]	0.255 ± 0.109	12070827	8.608×10^{-2}	0.223	8.550×10^{-2}	13.5	0.192	0.278
sulfurdioxide slant column density corrected win1 [DU]	$(2.616 \pm 57.126) \times 10^{-2}$	12070827	0.640	1.538×10^{-2}	-68.0	30.5	-0.302	0.338
background so2 slant column offset window1 [DU]	-0.123 ± 0.155	12070827	0.181	-0.164	-1.12	3.79	-0.222	-4.114×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.65 ± 8.33	12070827	10.5	1.58	-788	728	-3.65	6.83
sulfurdioxide slant column density window2 precision [DU]	7.56 ± 2.08	12070827	2.37	7.25	2.09	497	6.18	8.56
sulfurdioxide slant column density corrected win2 [DU]	-0.897 ± 8.184	12070827	10.4	-0.869	-790	726	-6.06	4.29
background so2 slant column offset window2 [DU]	-2.55 ± 1.77	12070827	1.80	-2.14	-16.7	3.56	-3.25	-1.45
sulfurdioxide slant column density window3 [DU]	-8.30 ± 22.63	12070827	28.4	-8.79	-475	489	-22.6	5.75
sulfurdioxide slant column density window3 precision [DU]	26.3 ± 12.0	12070827	9.34	23.4	9.12	311	19.5	28.9
sulfurdioxide slant column density corrected win3 [DU]	7.22 ± 21.94	12070827	27.5	6.86	-469	497	-6.66	20.9
background so2 slant column offset window3 [DU]	15.5 ± 5.6	12070827	7.62	15.6	-15.0	51.3	11.7	19.3
sulfurdioxide slant column cobra flag [1]	1.99 ± 0.15	12070827	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.748 \pm 4.144) \times 10^{-2}$	12070827	1.998×10^{-2}	1.900×10^{-2}	1.770×10^{-3}	2.84	1.144×10^{-2}	3.142×10^{-2}
fitted radiance shift [nm]	$(-3.215 \pm 23.631) \times 10^{-4}$	12070827	1.747×10^{-3}	-3.318×10^{-4}	-3.921×10^{-2}	4.329×10^{-2}	-1.216×10^{-3}	5.307×10^{-4}
fitted radiance squeeze [1]	$(-4.651 \pm 16.596) \times 10^{-5}$	12070827	1.961×10^{-4}	-3.858×10^{-5}	-1.316×10^{-2}	1.296×10^{-2}	-1.399×10^{-4}	5.617×10^{-5}
fitted root mean square [1]	$(1.131 \pm 0.446) \times 10^{-3}$	12070827	3.721×10^{-4}	1.017×10^{-3}	3.395×10^{-4}	4.805×10^{-2}	8.664×10^{-4}	1.238×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.813 ± 0.430	12070827	0.520	0.750	5.000×10^{-2}	2.58	0.507	1.03
sulfurdioxide total air mass factor polluted precision [1]	0.137 ± 0.146	12070827	0.153	7.355×10^{-2}	3.345×10^{-3}	1.45	3.766×10^{-2}	0.190
sulfurdioxide clear air mass factor polluted [1]	0.652 ± 0.226	12070827	0.335	0.628	5.082×10^{-2}	2.75	0.478	0.813
number of spectral points in retrieval [1]	73.5 ± 0.5	12070827	1.000	73.0	70.0	74.0	73.0	74.0

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

Variable	mean $\pm\sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.489 ± 0.419	4571366	0.910	0.390	0.0	1.000	9.000×10^{-2}	1.000
sulfurdioxide total vertical column [DU]	$(6.865 \pm 179.848) \times 10^{-2}$	4571366	0.338	8.405×10^{-3}	-136	531	-0.155	0.183
sulfurdioxide total vertical column precision [DU]	0.616 ± 1.243	4571366	0.416	0.257	4.384×10^{-2}	40.9	0.129	0.545
sulfurdioxide slant column density corrected [DU]	$(2.409 \pm 40.216) \times 10^{-2}$	4571366	0.390	1.112×10^{-2}	-68.5	36.3	-0.181	0.208
sulfurdioxide slant column density cobra [DU]	$(2.400 \pm 39.811) \times 10^{-2}$	4571366	0.390	1.112×10^{-2}	-68.5	20.0	-0.181	0.208
sulfurdioxide slant column density cobra precision [DU]	0.310 ± 0.138	4571366	0.133	0.272	8.672×10^{-2}	20.3	0.222	0.355
sulfurdioxide slant column density window1 [DU]	$(2.296 \pm 75.794) \times 10^{-2}$	4571366	0.860	2.924×10^{-2}	-68.5	73.7	-0.411	0.449
sulfurdioxide slant column density window1 precision [DU]	0.310 ± 0.138	4571366	0.133	0.272	8.672×10^{-2}	20.3	0.222	0.355
sulfurdioxide slant column density corrected win1 [DU]	$(2.906 \pm 71.989) \times 10^{-2}$	4571366	0.774	7.068×10^{-3}	-68.5	73.7	-0.374	0.400
background so2 slant column offset window1 [DU]	$(6.100 \pm 233.819) \times 10^{-3}$	4571366	0.406	-5.700×10^{-2}	-1.37	5.29	-0.195	0.211
sulfurdioxide slant column density window2 [DU]	3.11 ± 9.10	4571366	11.2	3.05	-503	843	-2.56	8.69
sulfurdioxide slant column density window2 precision [DU]	8.13 ± 2.48	4571366	2.85	7.69	2.38	449	6.45	9.30
sulfurdioxide slant column density corrected win2 [DU]	-0.631 ± 8.811	4571366	10.9	-0.637	-503	844	-6.07	4.81
background so2 slant column offset window2 [DU]	-3.74 ± 2.30	4571366	3.57	-3.57	-16.8	3.18	-5.31	-1.74
sulfurdioxide slant column density window3 [DU]	-18.9 ± 22.4	4571366	26.6	-18.5	-515	202	-31.9	-5.31
sulfurdioxide slant column density window3 precision [DU]	26.1 ± 13.4	4571366	12.0	22.9	9.82	296	17.6	29.6
sulfurdioxide slant column density corrected win3 [DU]	0.408 ± 22.919	4571366	27.3	1.45	-506	213	-12.6	14.6
background so2 slant column offset window3 [DU]	19.3 ± 6.9	4571366	11.0	21.0	-15.0	35.0	13.9	24.9
sulfurdioxide slant column cobra flag [1]	1.95 ± 0.32	4571366	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(5.704 \pm 17.923) \times 10^{-2}$	4571366	3.439×10^{-2}	1.361×10^{-2}	8.337×10^{-4}	3.76	5.923×10^{-3}	4.031×10^{-2}
fitted radiance shift [nm]	$(-6.103 \pm 23.947) \times 10^{-4}$	4571366	1.364×10^{-3}	-7.253×10^{-4}	-4.284×10^{-2}	3.820×10^{-2}	-1.379×10^{-3}	-1.500×10^{-5}
fitted radiance squeeze [1]	$(-1.184 \pm 2.230) \times 10^{-4}$	4571366	2.844×10^{-4}	-1.113×10^{-4}	-1.498×10^{-2}	1.431×10^{-2}	-2.574×10^{-4}	2.700×10^{-5}
fitted root mean square [1]	$(1.396 \pm 0.559) \times 10^{-3}$	4571366	6.000×10^{-4}	1.257×10^{-3}	3.336×10^{-4}	5.071×10^{-2}	1.024×10^{-3}	1.625×10^{-3}
sulfurdioxide total air mass factor polluted [1]	1.29 ± 0.84	4571366	1.61	1.07	5.000×10^{-2}	3.07	0.532	2.14
sulfurdioxide total air mass factor polluted precision [1]	0.205 ± 0.226	4571366	0.251	0.132	2.500×10^{-3}	1.75	3.649×10^{-2}	0.287
sulfurdioxide clear air mass factor polluted [1]	1.20 ± 0.82	4571366	1.43	0.914	3.445×10^{-2}	3.13	0.497	1.93
number of spectral points in retrieval [1]	73.4 ± 0.5	4571366	1.000	73.0	70.0	74.0	73.0	74.0

3 Granule outlines

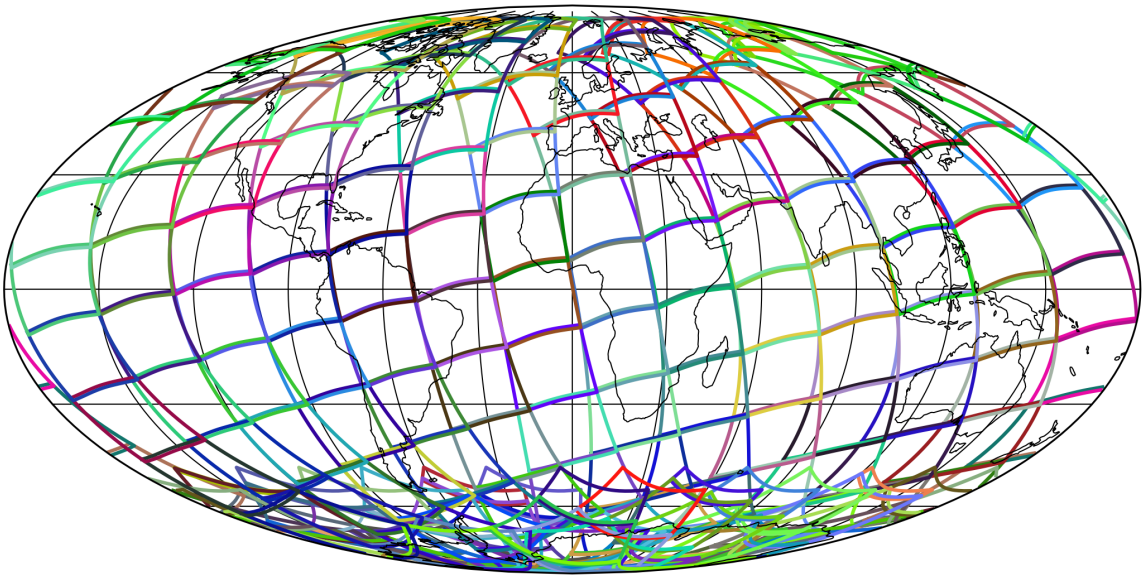

Figure 1: Outline of the granules.

4 Input data monitoring

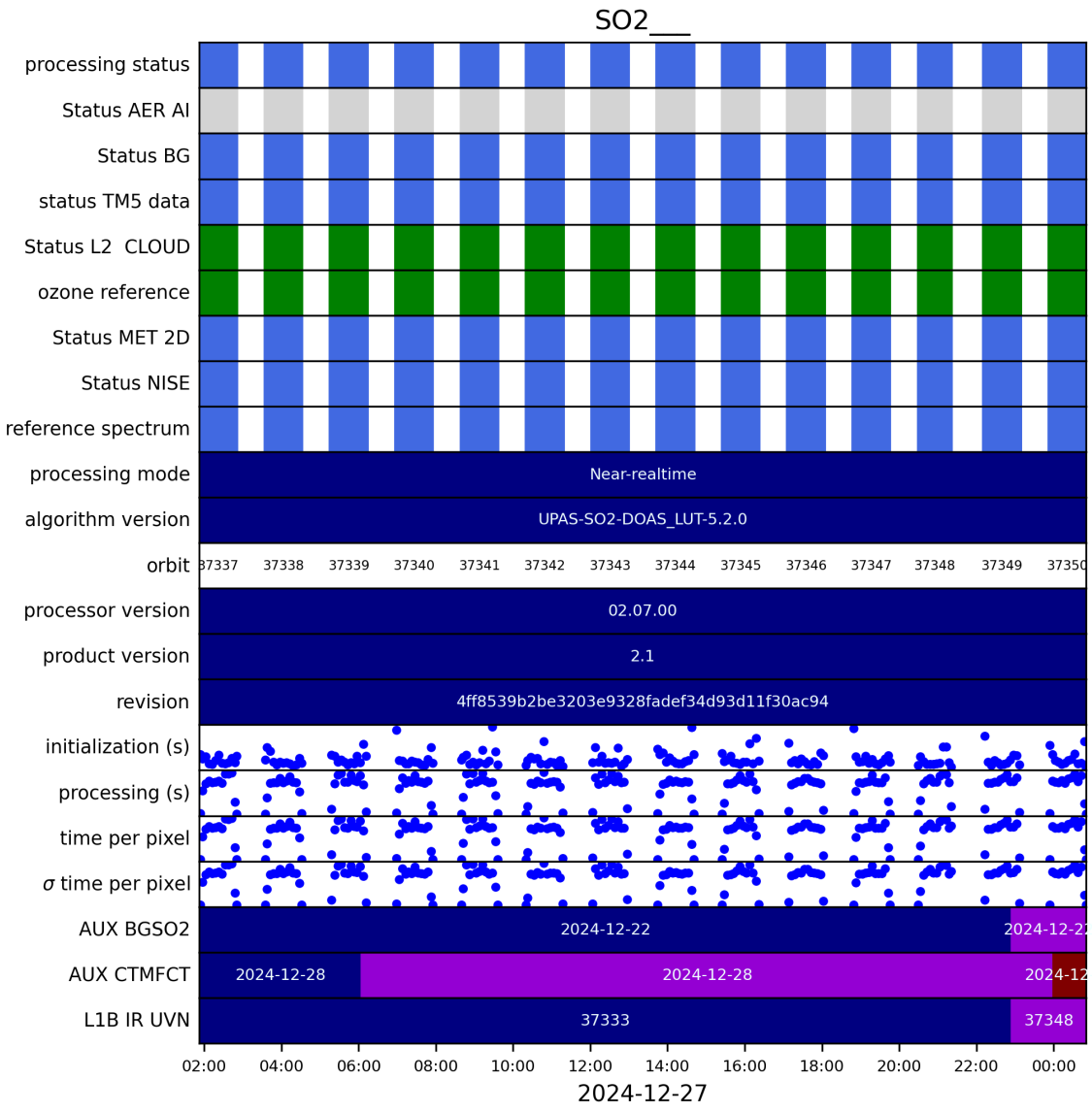

Figure 2: Input data per granule

5 Warnings and errors

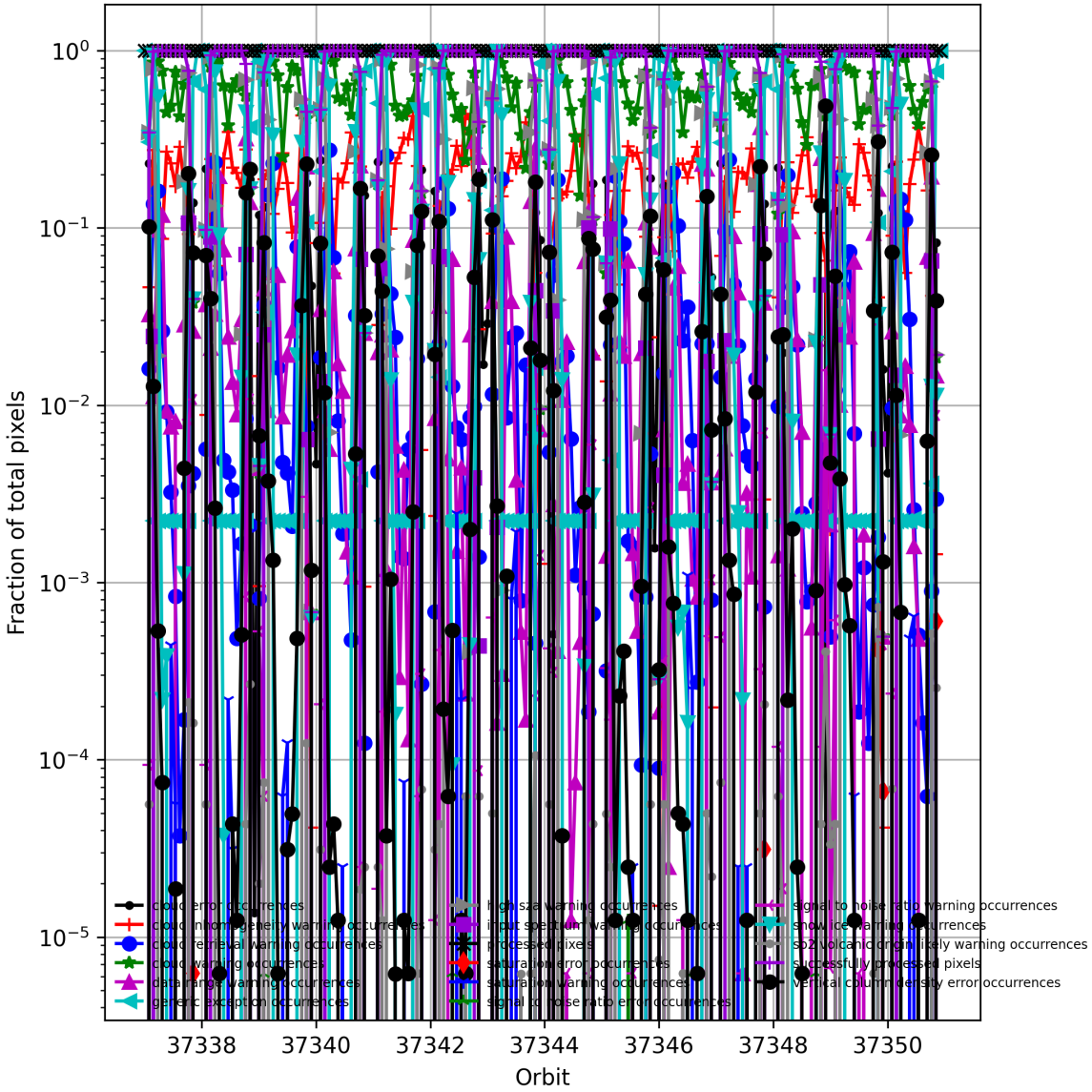

Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

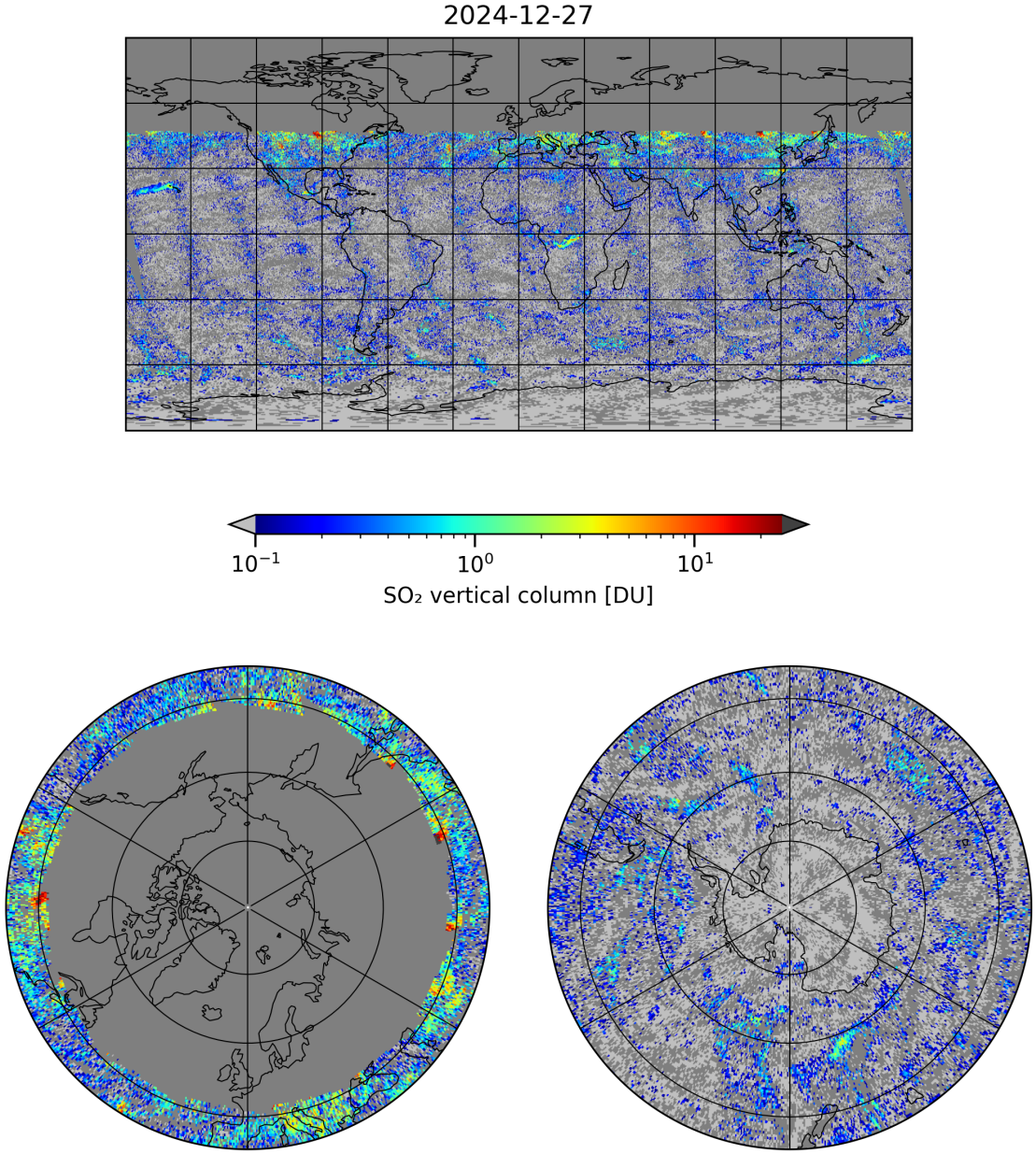

Figure 4: Map of "SO_2 vertical column" for 2024-12-27 to 2024-12-28

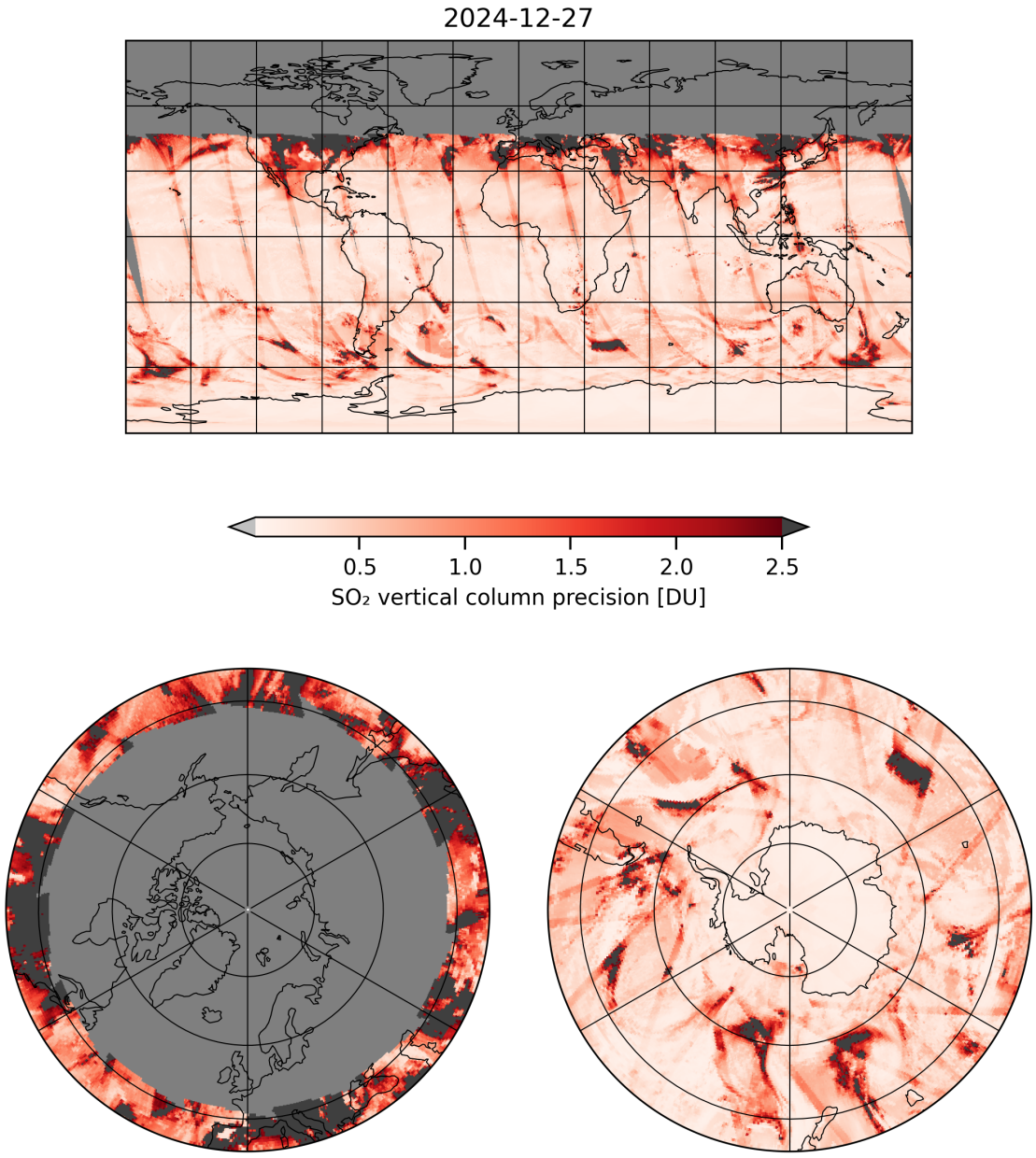

Figure 5: Map of "SO_2 vertical column precision" for 2024-12-27 to 2024-12-28

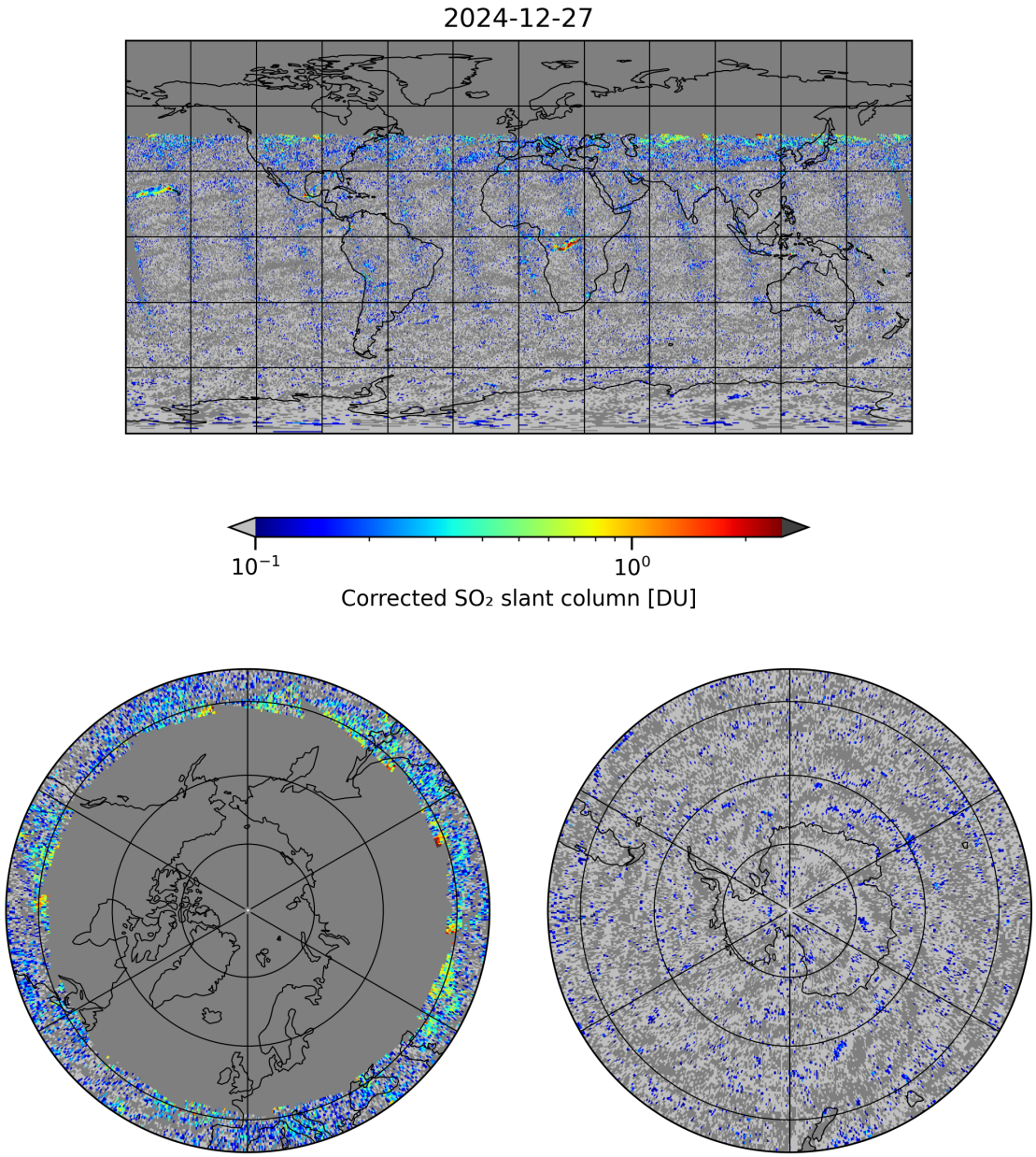

Figure 6: Map of "Corrected SO_2 slant column" for 2024-12-27 to 2024-12-28

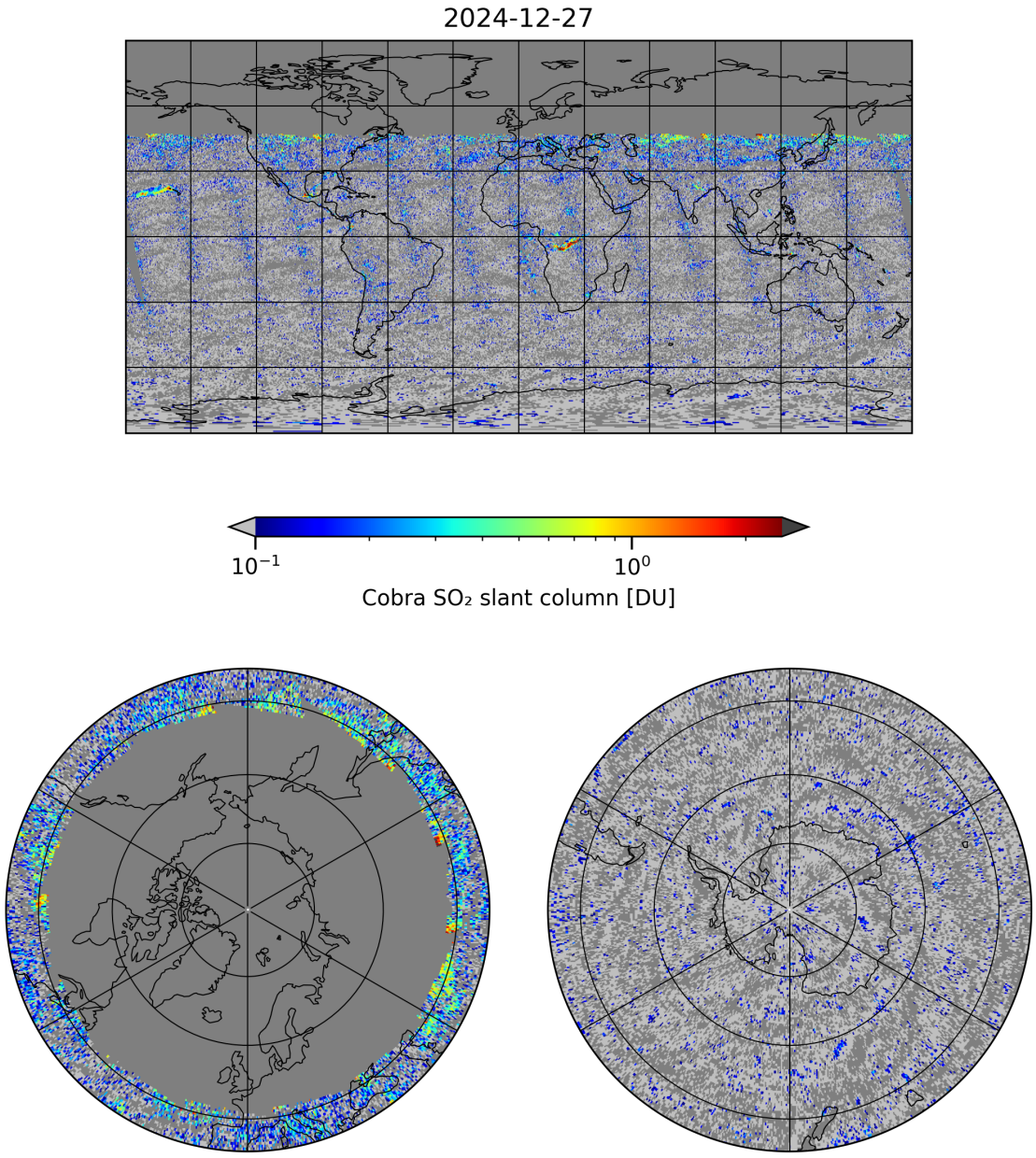

Figure 7: Map of "Cobra SO_2 slant column" for 2024-12-27 to 2024-12-28

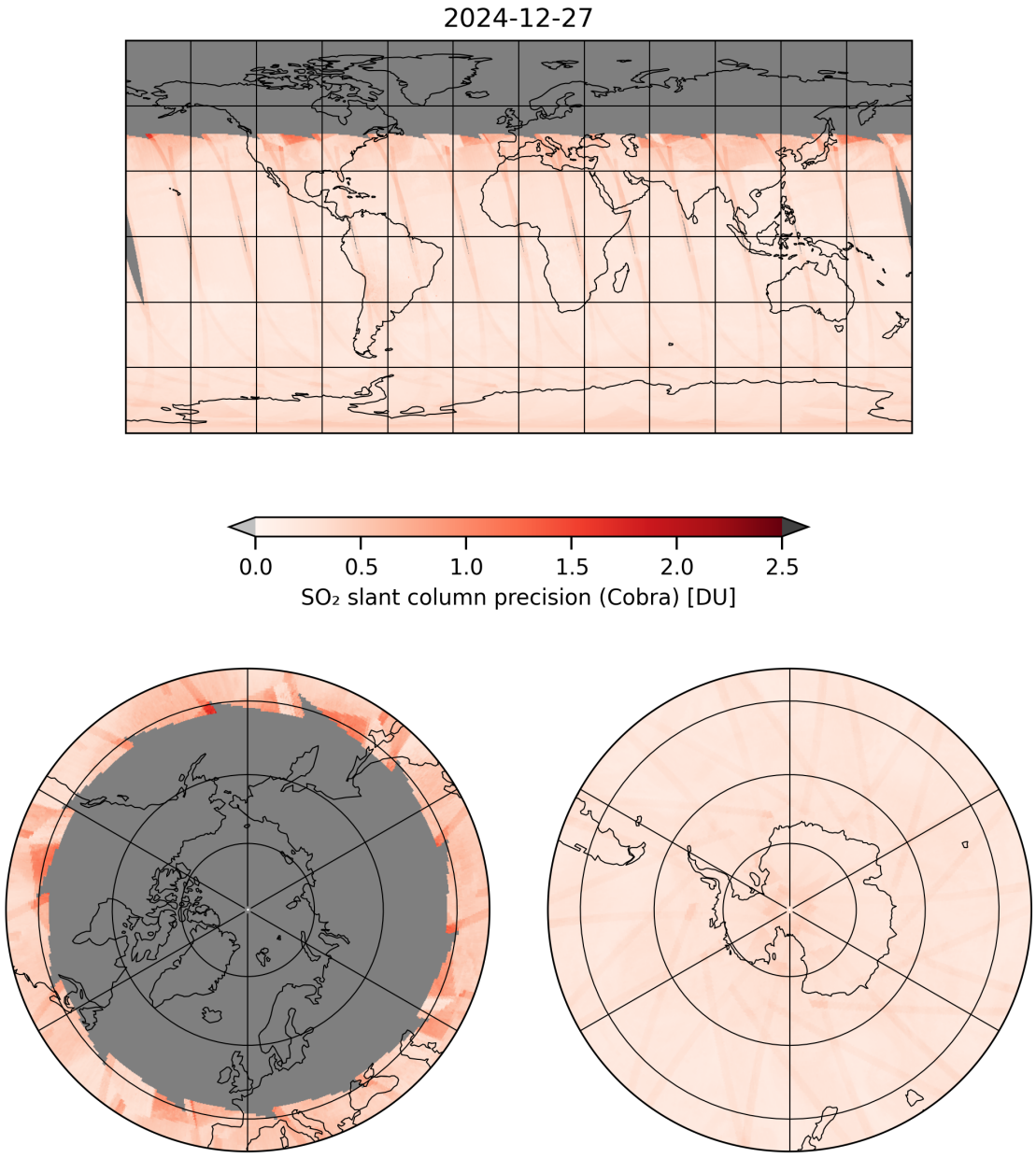

Figure 8: Map of "SO_2 slant column precision (Cobra)" for 2024-12-27 to 2024-12-28

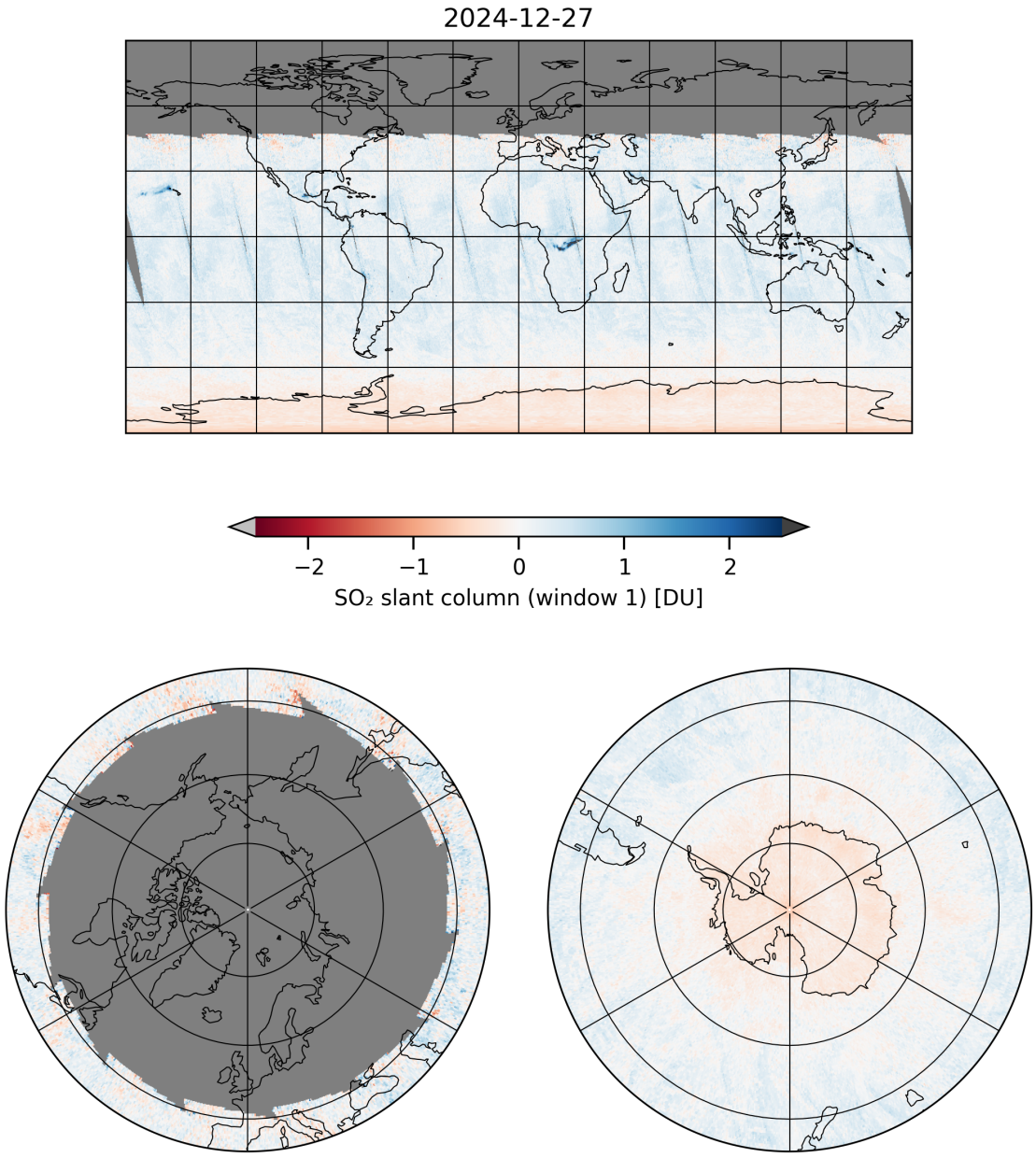

Figure 9: Map of "SO_2 slant column (window 1)" for 2024-12-27 to 2024-12-28

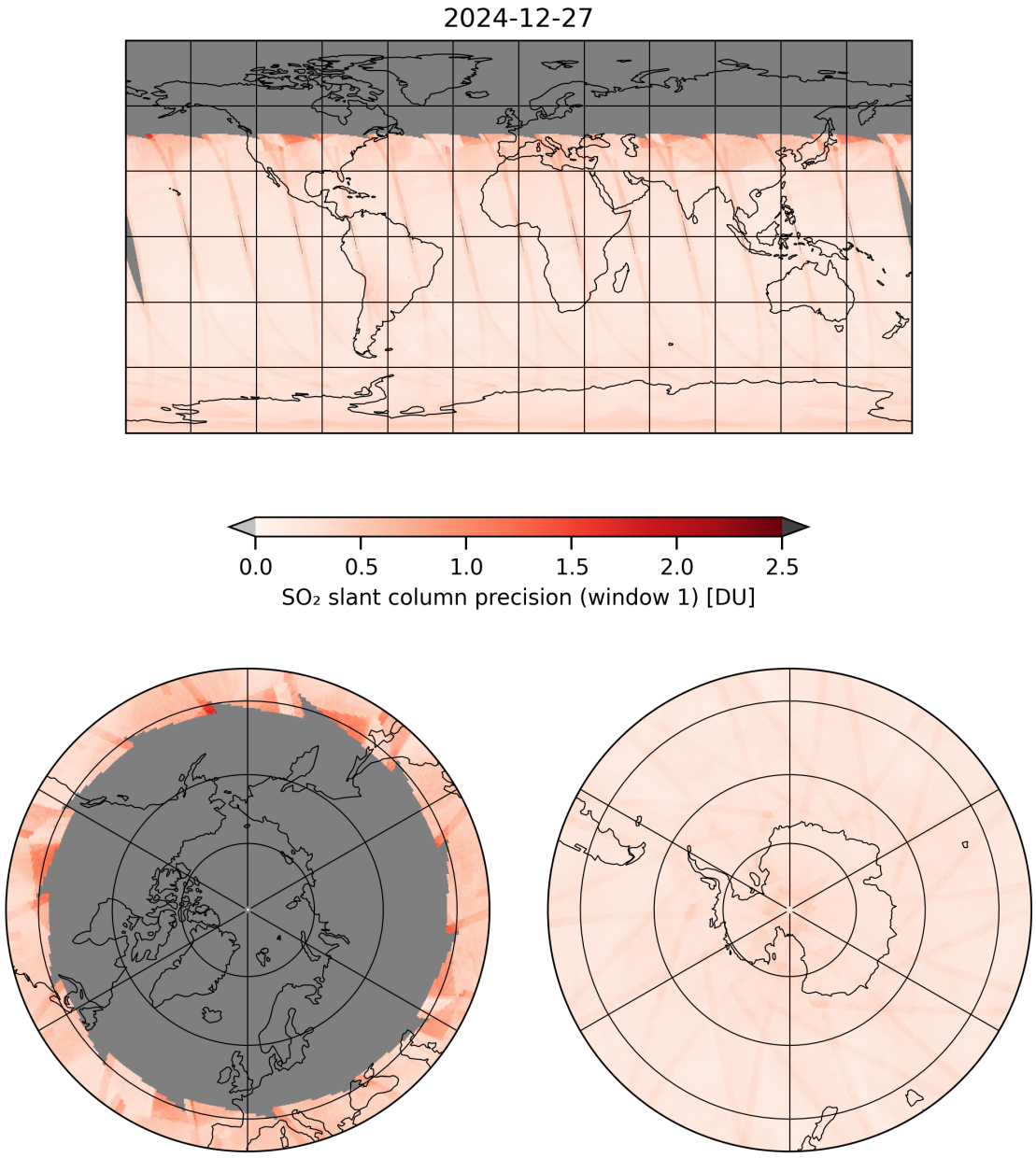

Figure 10: Map of "SO_2 slant column precision (window 1)" for 2024-12-27 to 2024-12-28

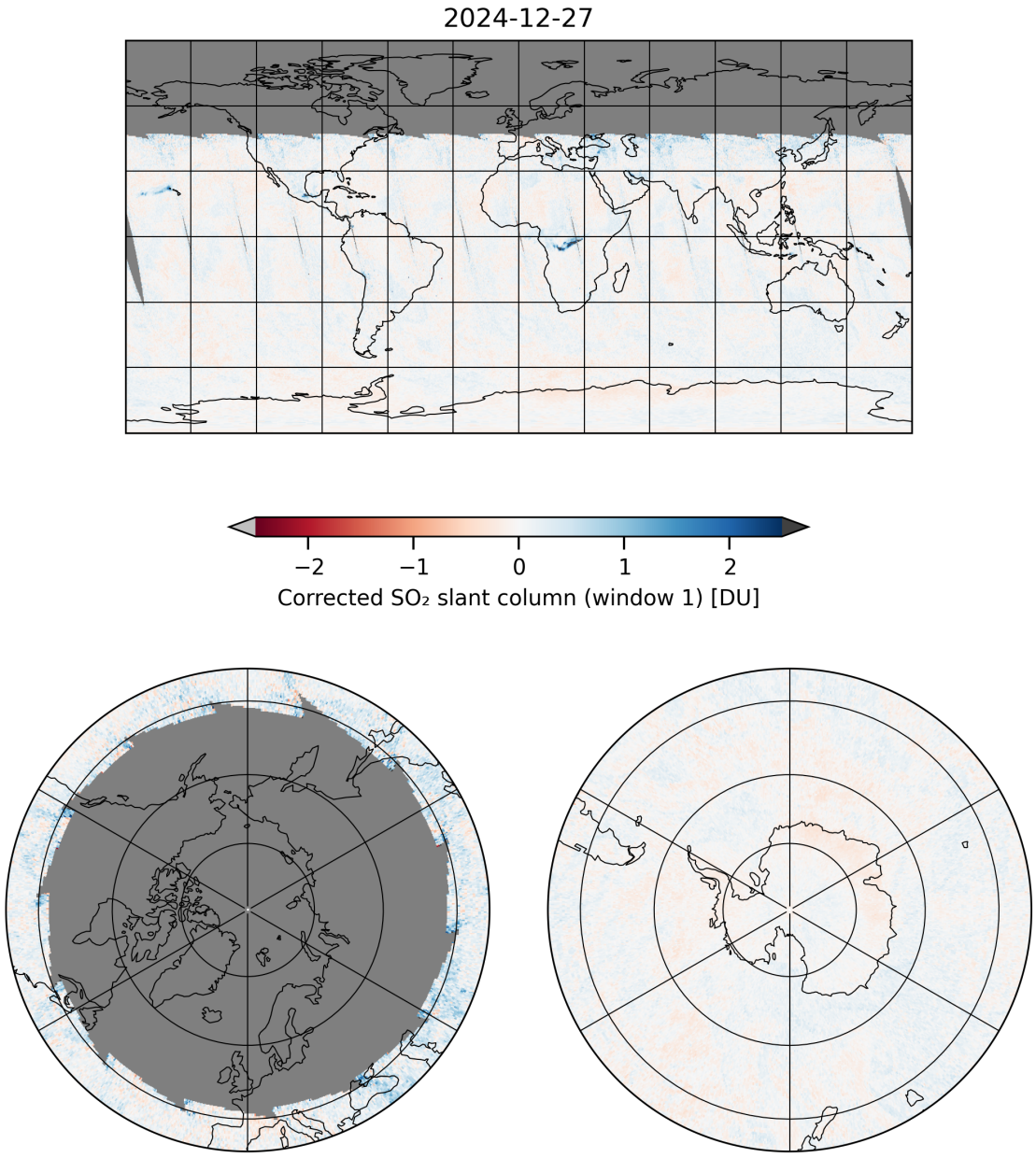

Figure 11: Map of "Corrected SO_2 slant column (window 1)" for 2024-12-27 to 2024-12-28

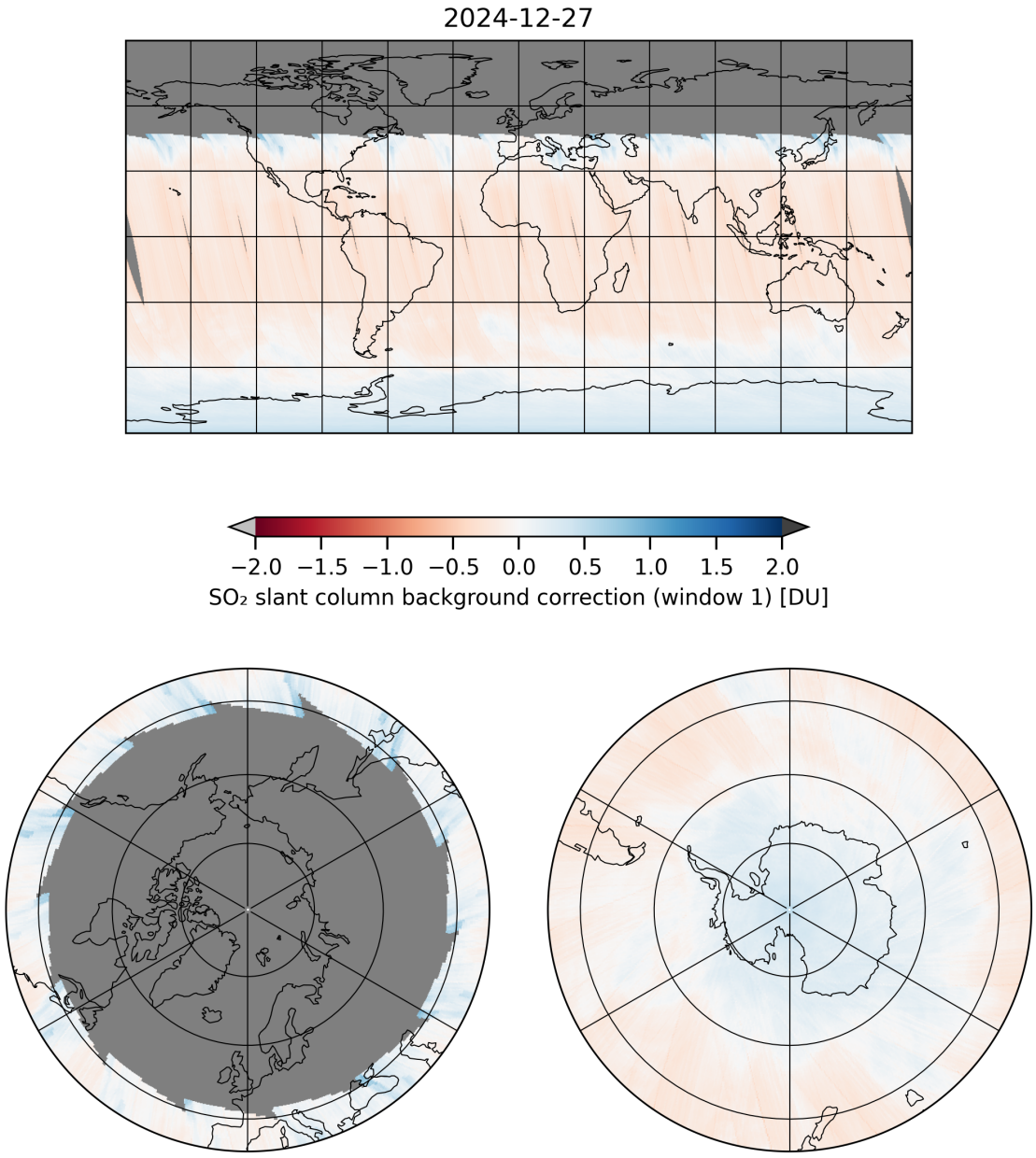

Figure 12: Map of "SO_2 slant column background correction (window 1)" for 2024-12-27 to 2024-12-28

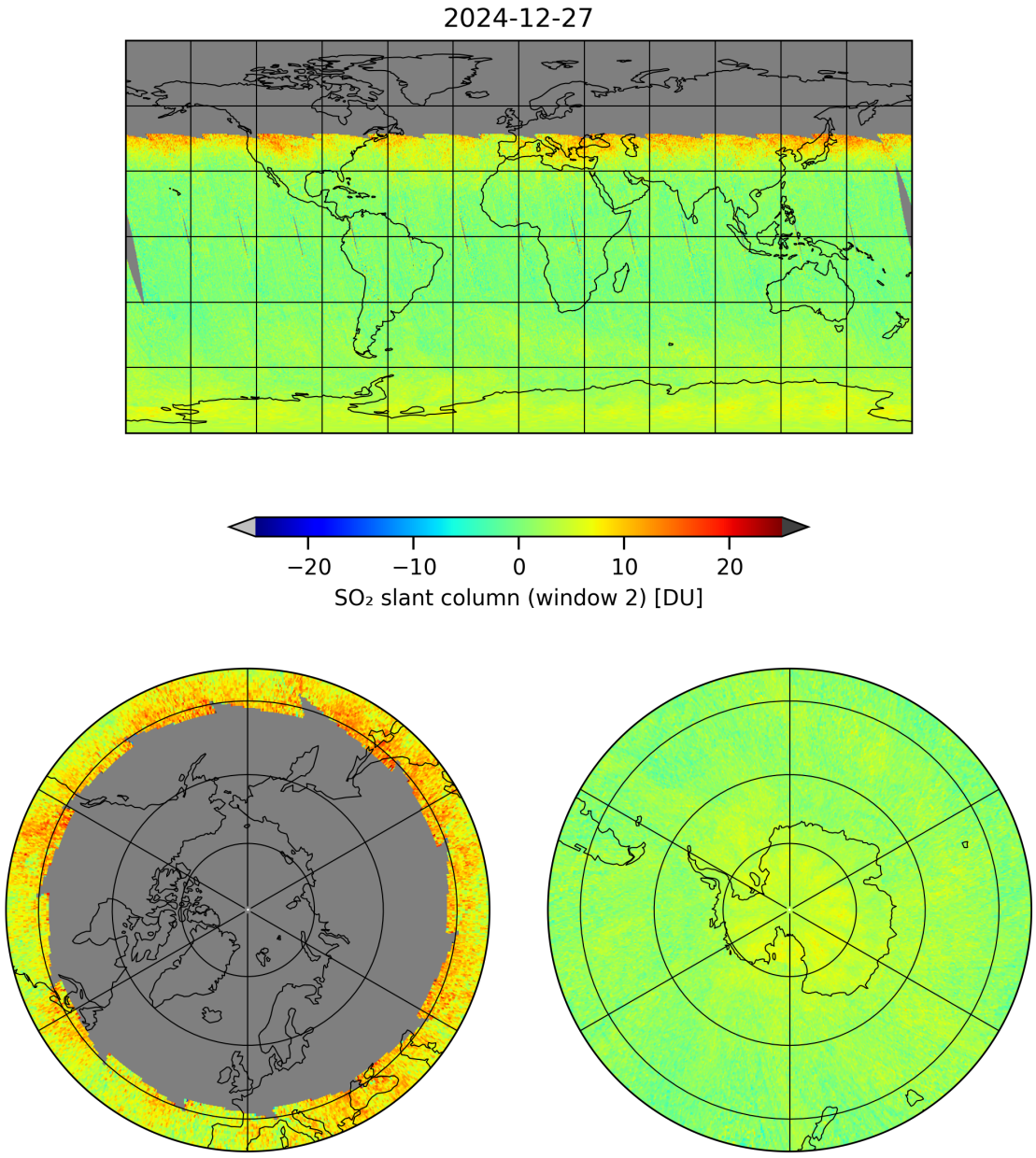

Figure 13: Map of "SO_2 slant column (window 2)" for 2024-12-27 to 2024-12-28

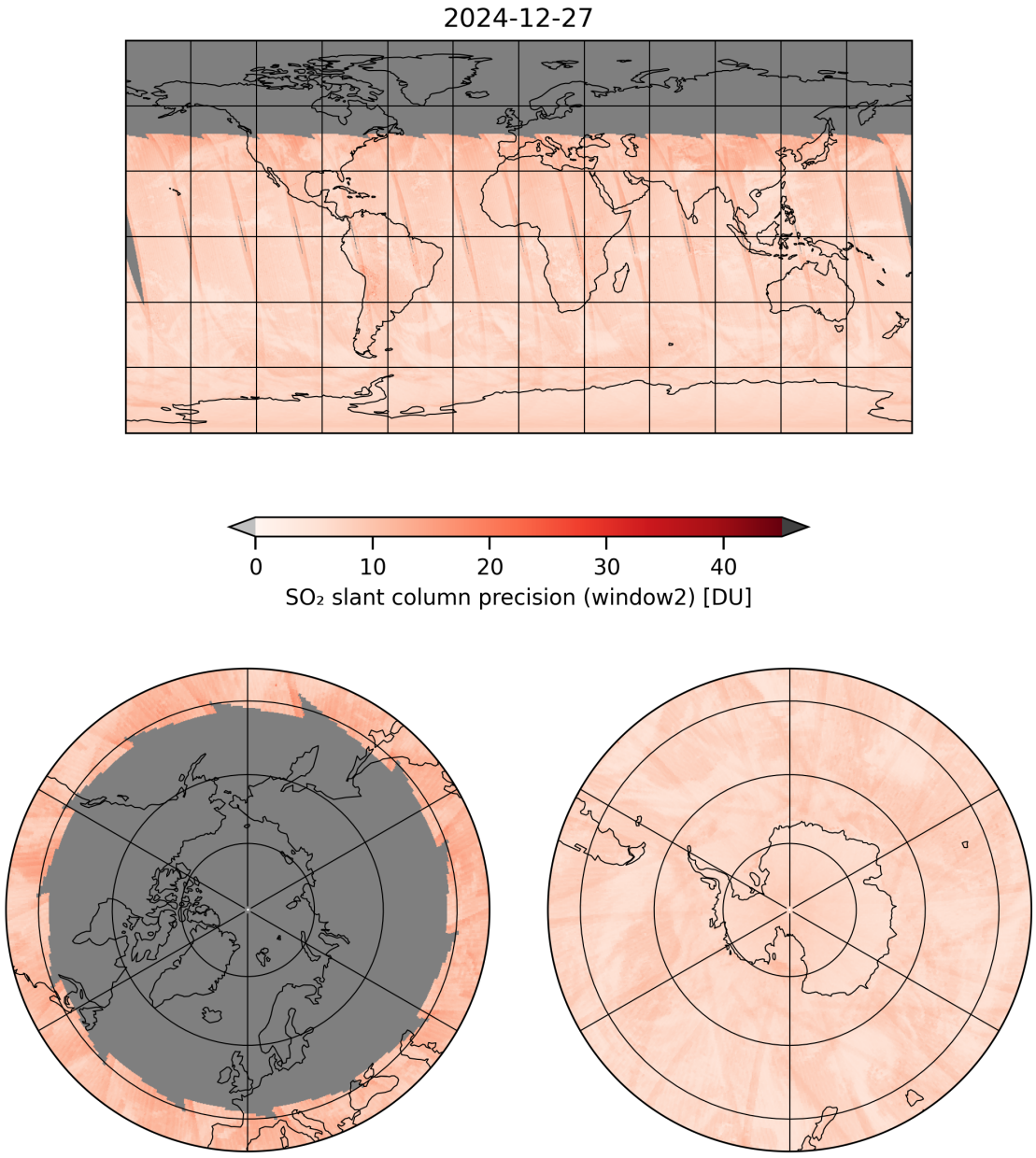

Figure 14: Map of "SO_2 slant column precision (window2)" for 2024-12-27 to 2024-12-28

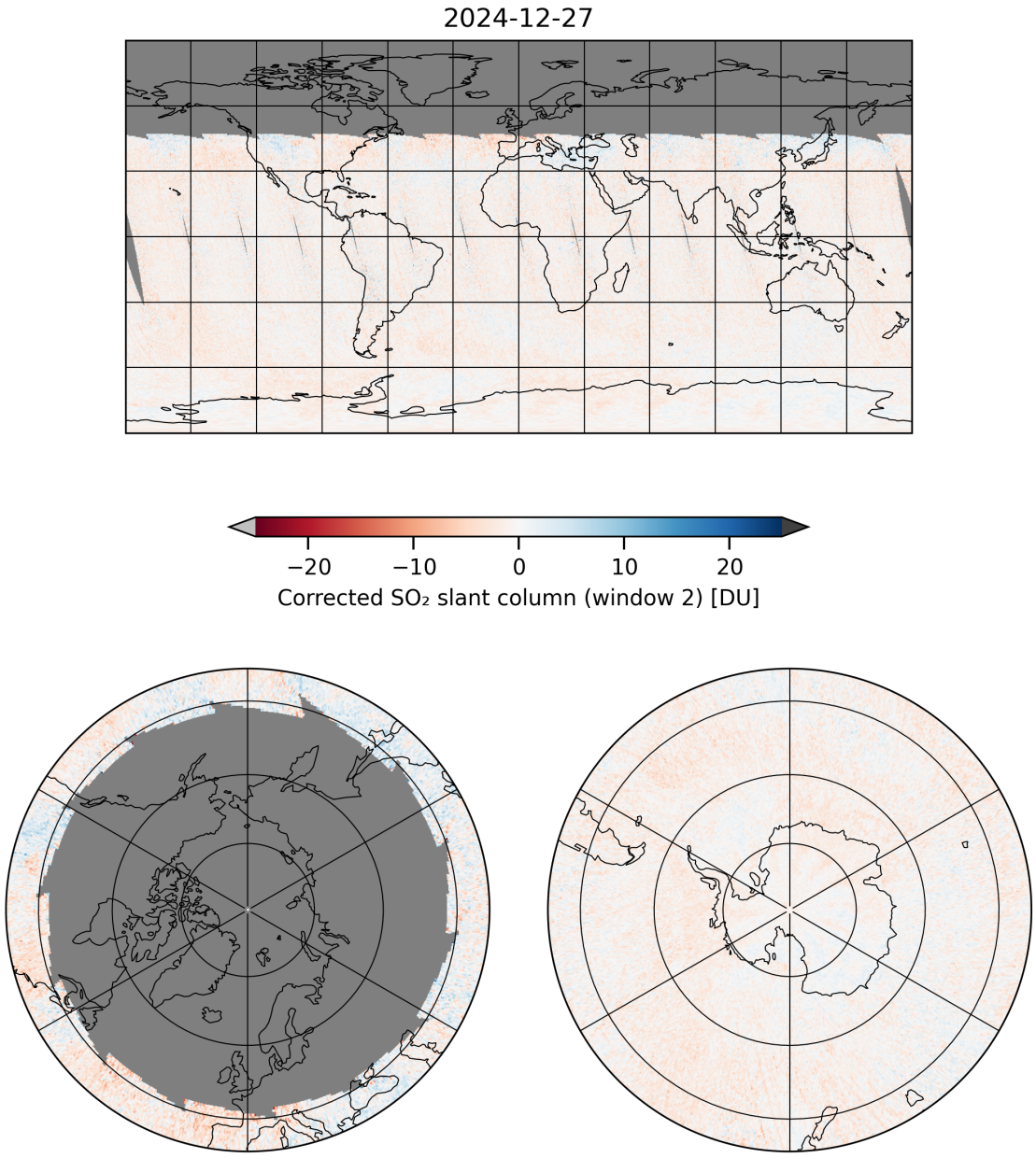

Figure 15: Map of "Corrected SO_2 slant column (window 2)" for 2024-12-27 to 2024-12-28

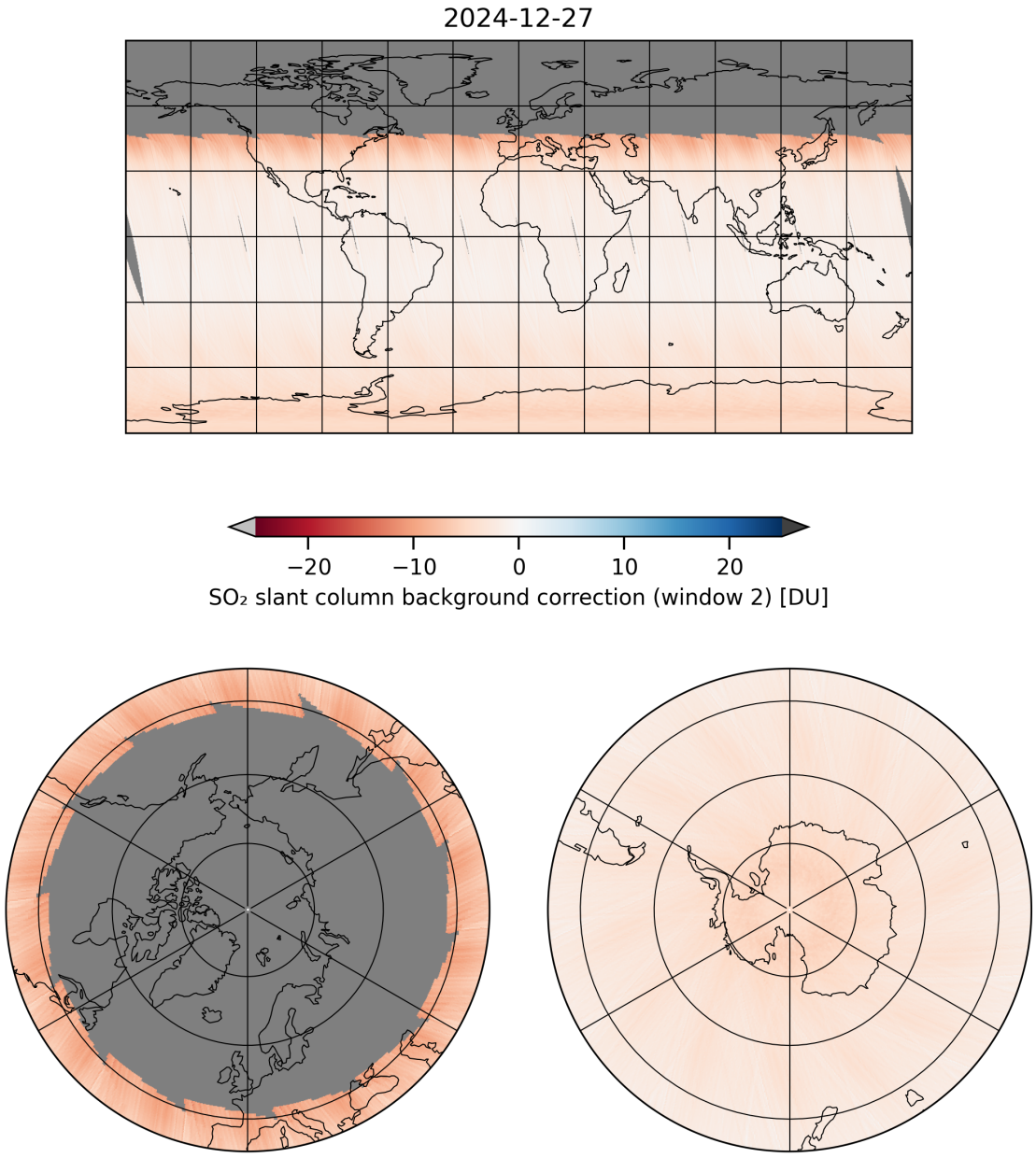

Figure 16: Map of "SO_2 slant column background correction (window 2)" for 2024-12-27 to 2024-12-28

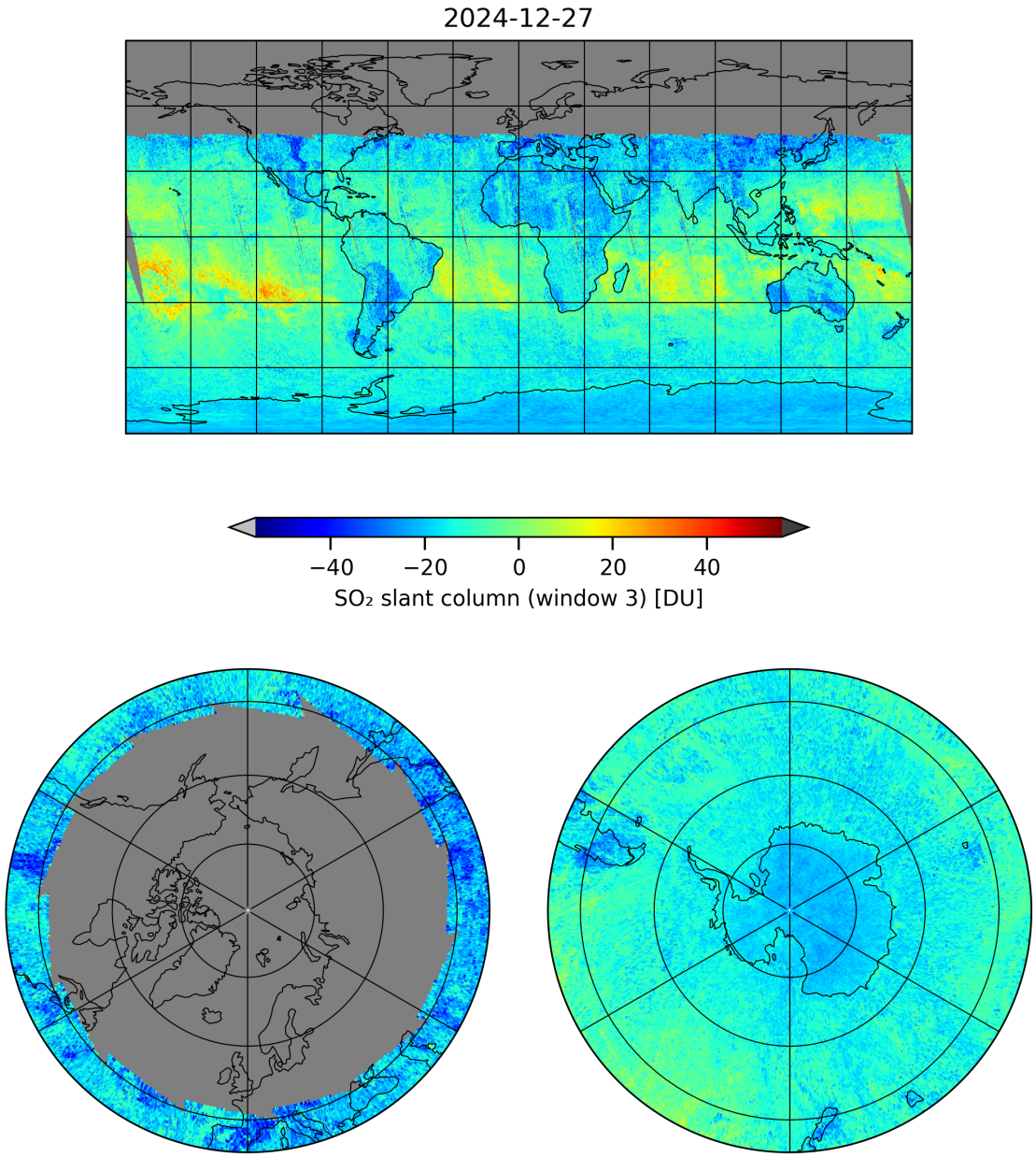

Figure 17: Map of "SO_2 slant column (window 3)" for 2024-12-27 to 2024-12-28

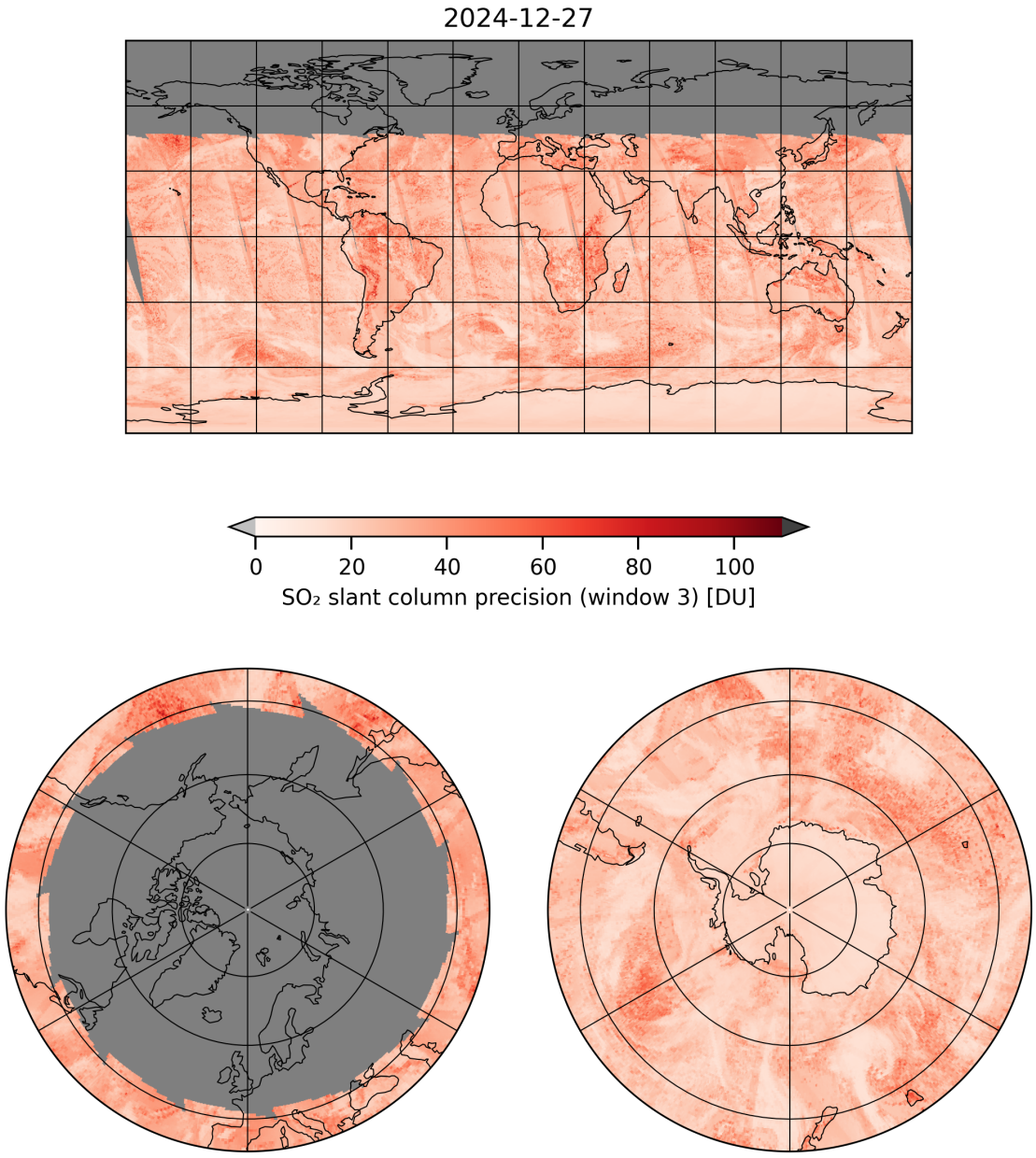

Figure 18: Map of "SO_2 slant column precision (window 3)" for 2024-12-27 to 2024-12-28

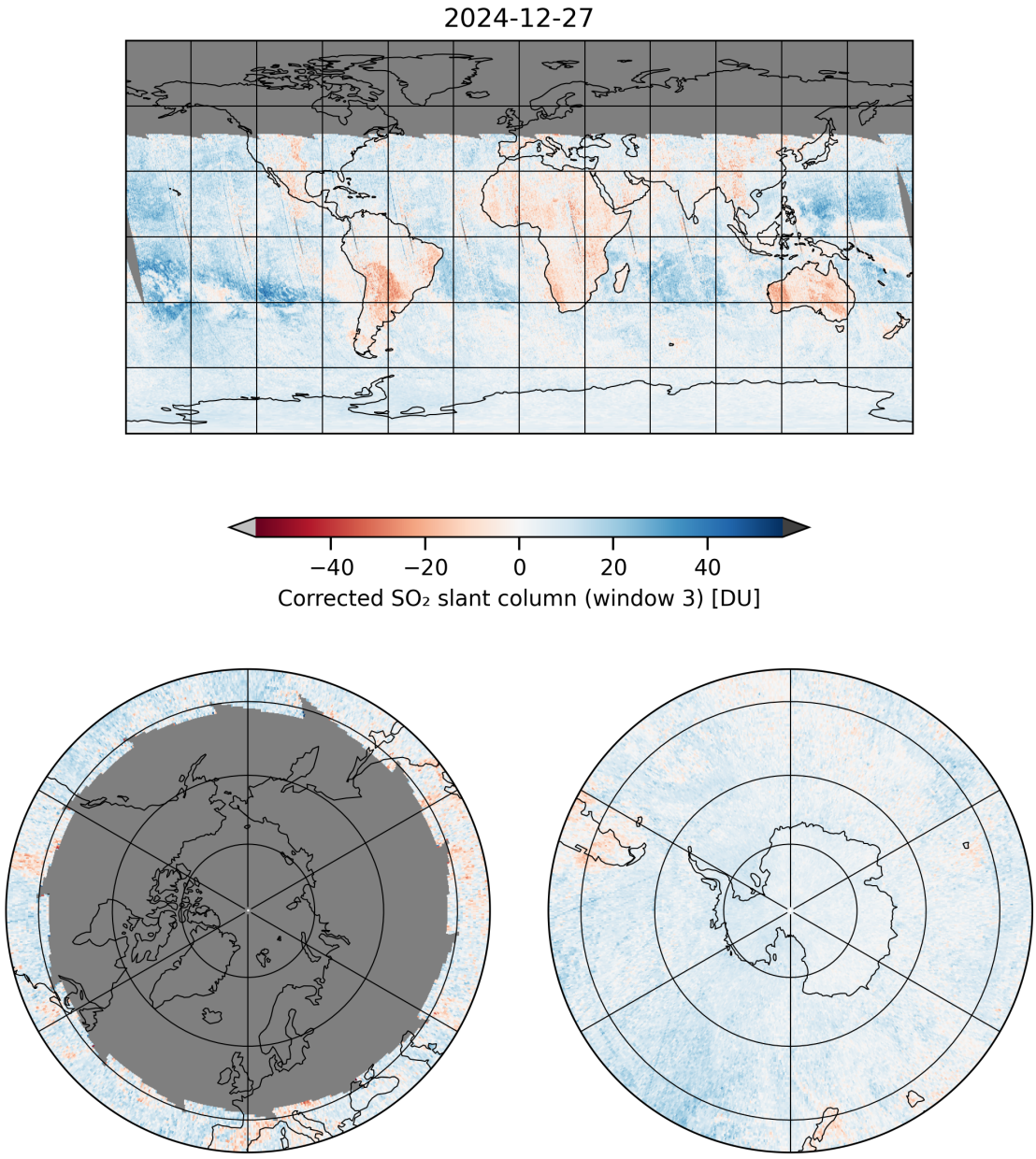

Figure 19: Map of "Corrected SO_2 slant column (window 3)" for 2024-12-27 to 2024-12-28

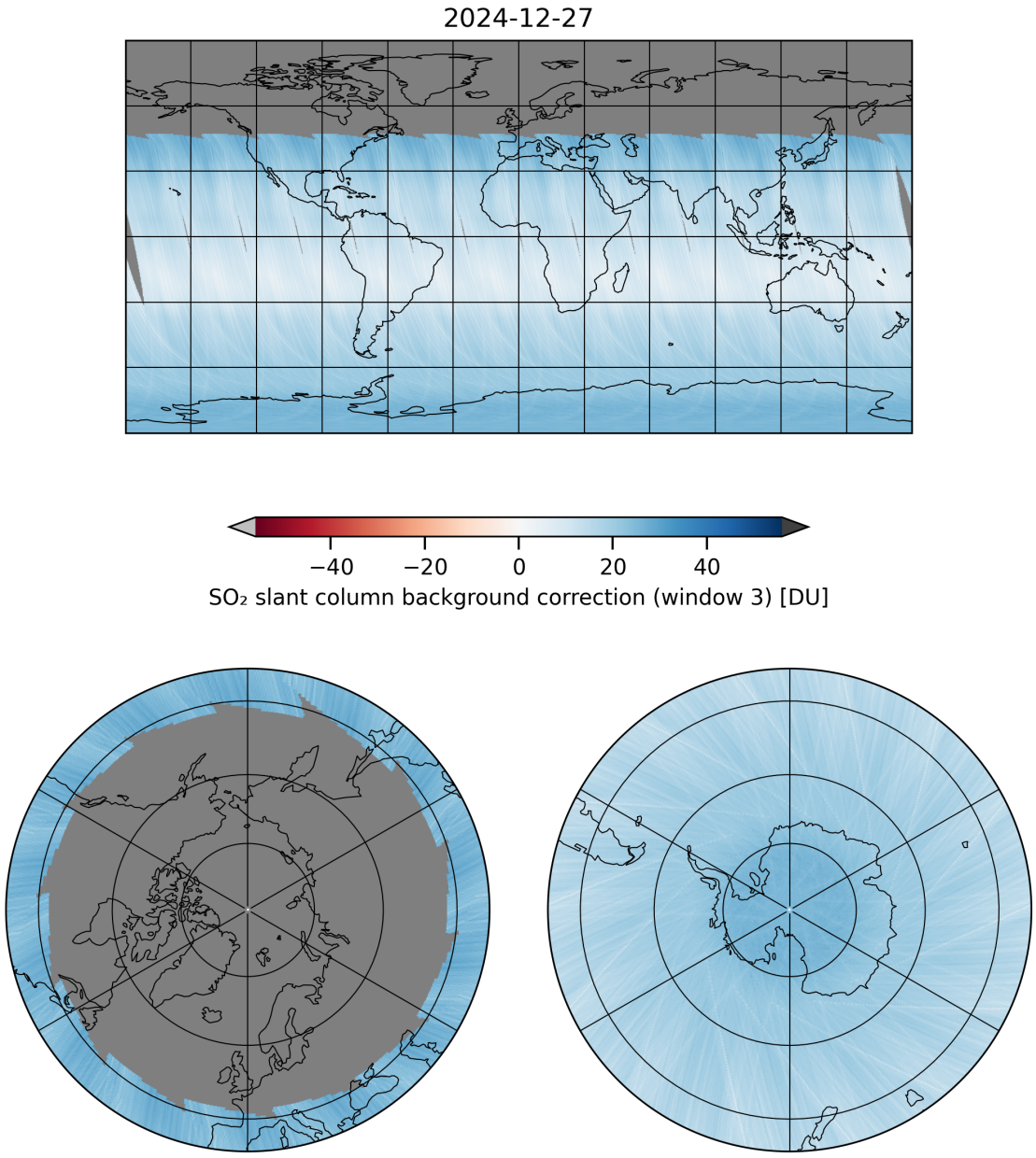

Figure 20: Map of "SO_2 slant column background correction (window 3)" for 2024-12-27 to 2024-12-28

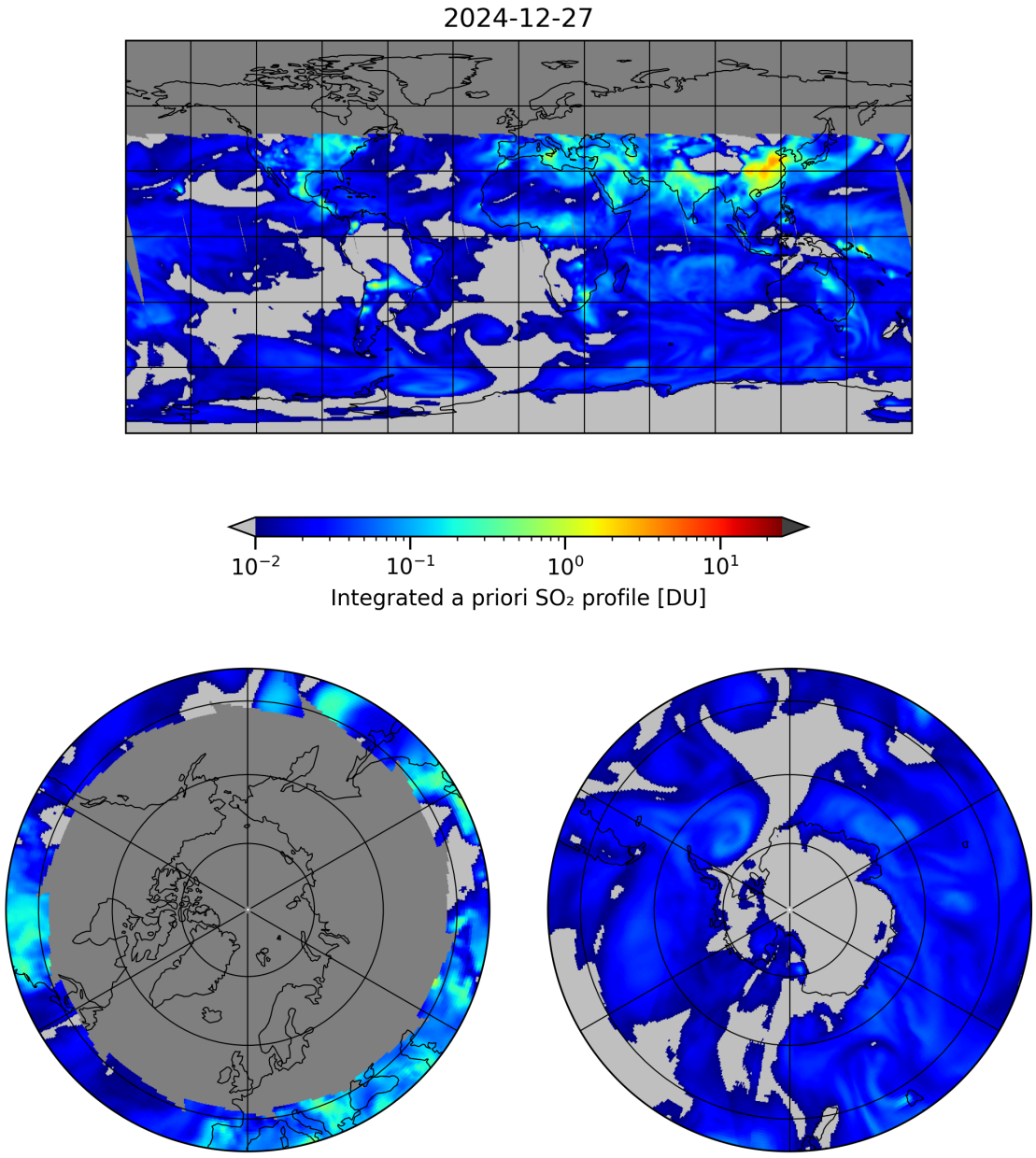

Figure 21: Map of “Integrated a priori SO_2 profile” for 2024-12-27 to 2024-12-28

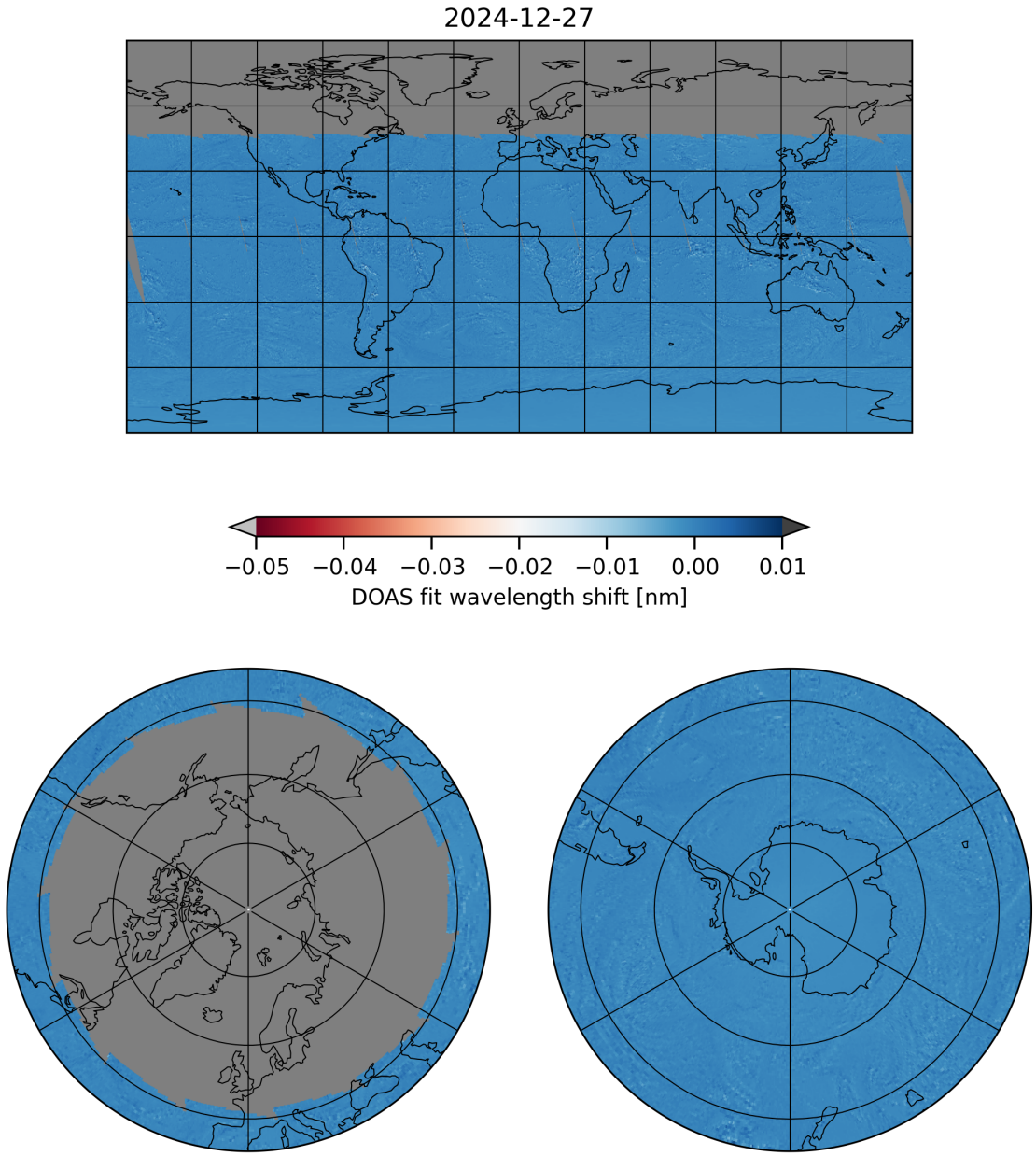

Figure 22: Map of “DOAS fit wavelength shift” for 2024-12-27 to 2024-12-28

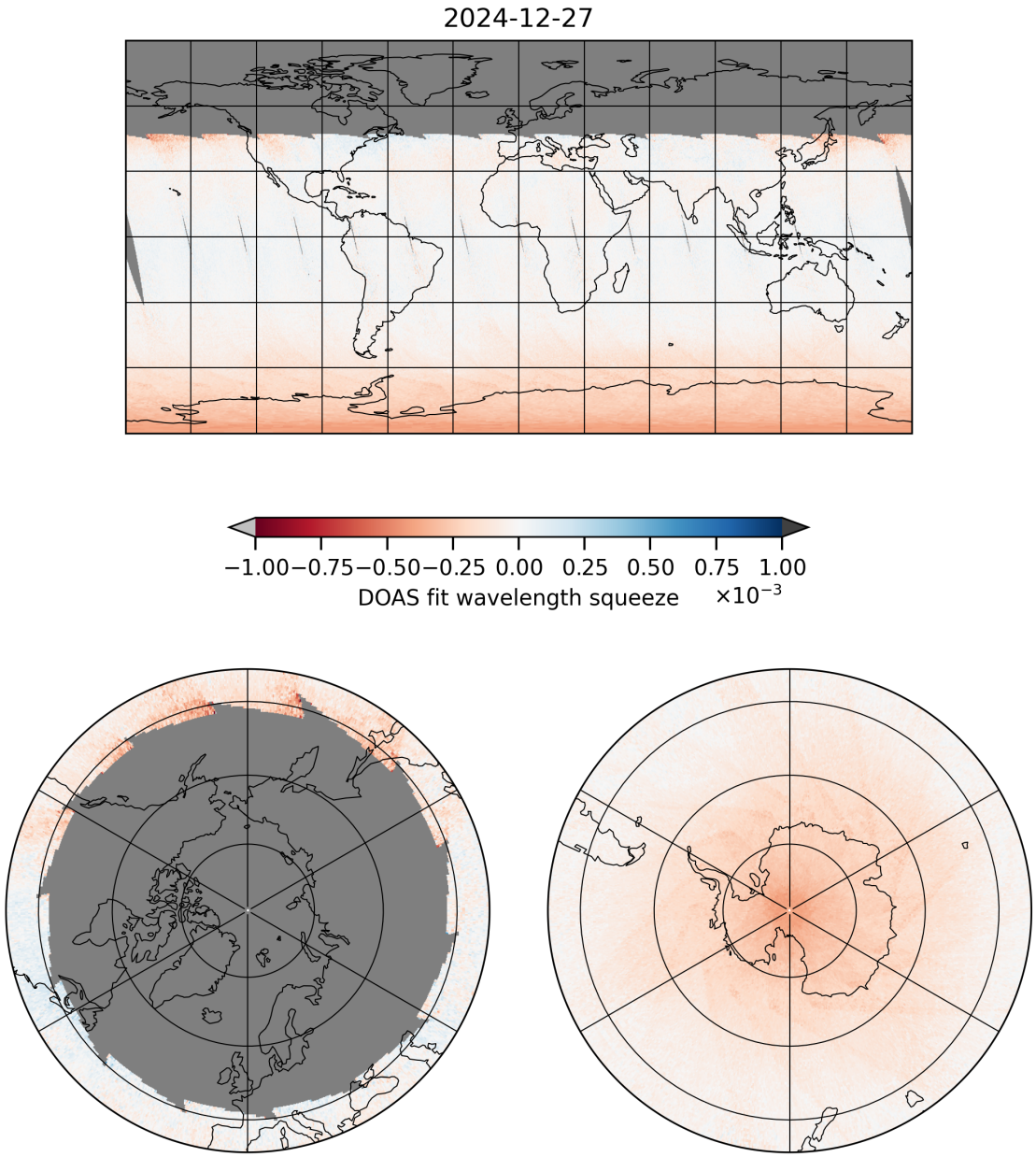

Figure 23: Map of “DOAS fit wavelength squeeze” for 2024-12-27 to 2024-12-28

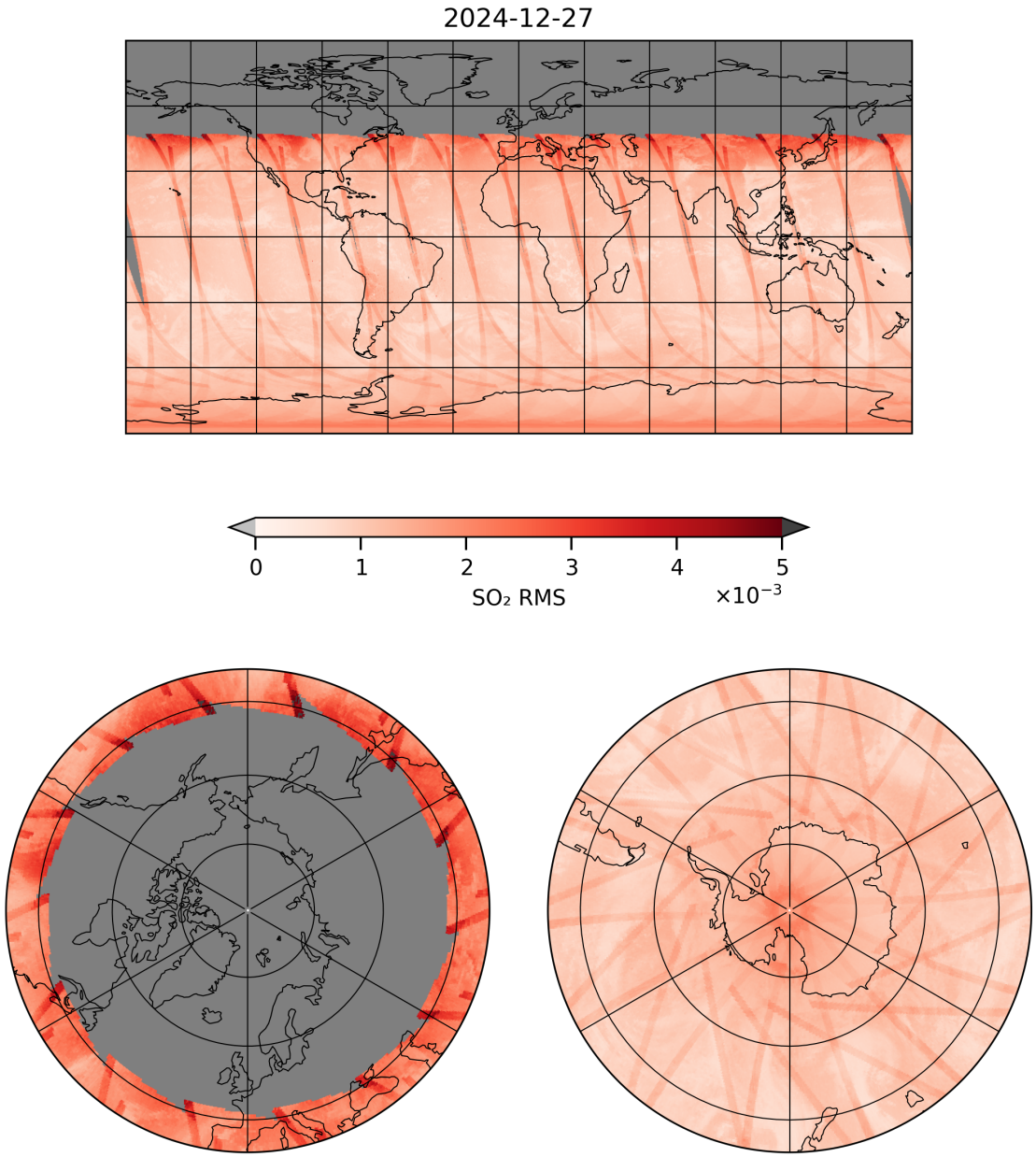

Figure 24: Map of "SO_2 RMS" for 2024-12-27 to 2024-12-28

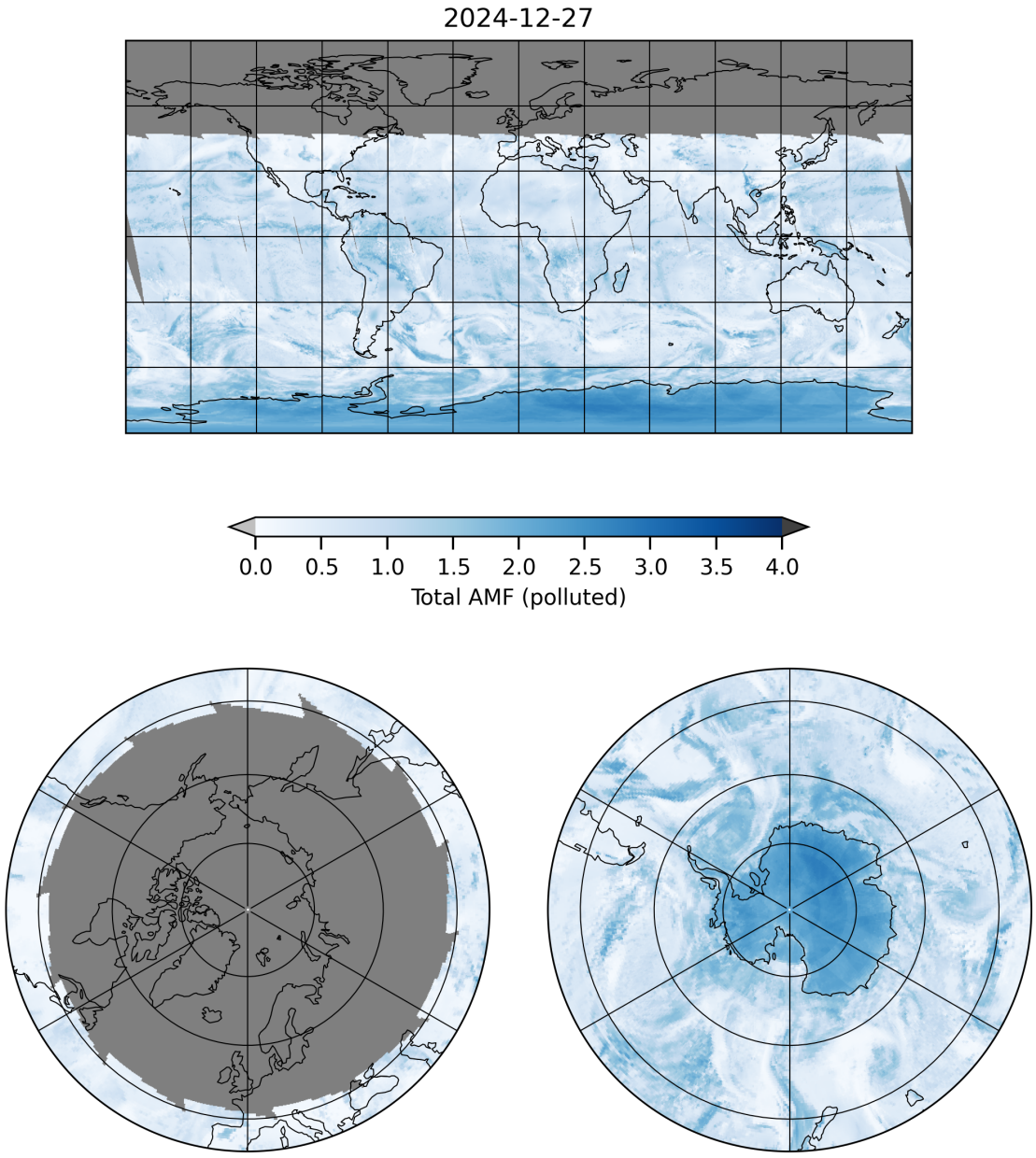

Figure 25: Map of “Total AMF (polluted)” for 2024-12-27 to 2024-12-28

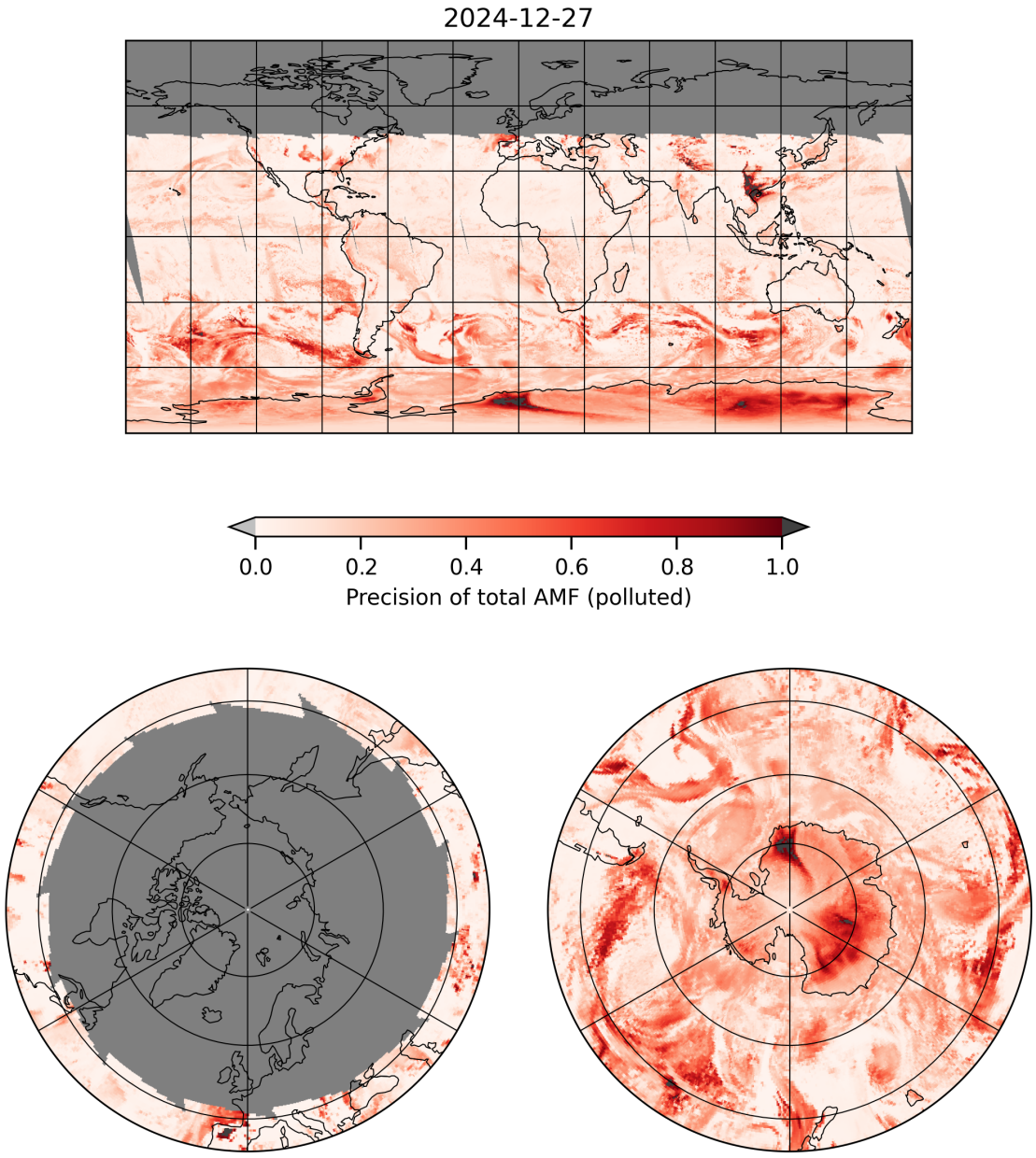

Figure 26: Map of “Precision of total AMF (polluted)” for 2024-12-27 to 2024-12-28

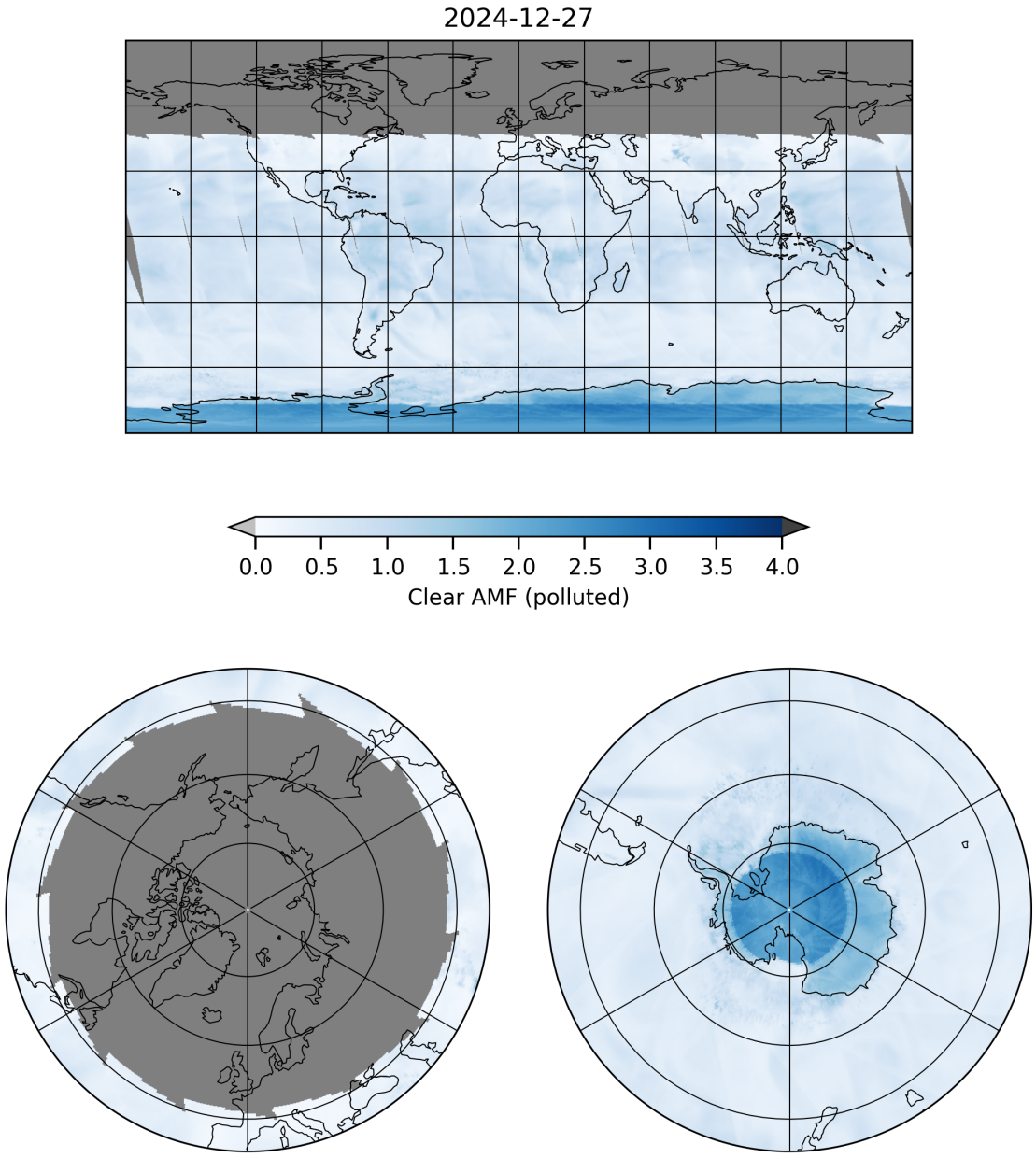

Figure 27: Map of “Clear AMF (polluted)” for 2024-12-27 to 2024-12-28

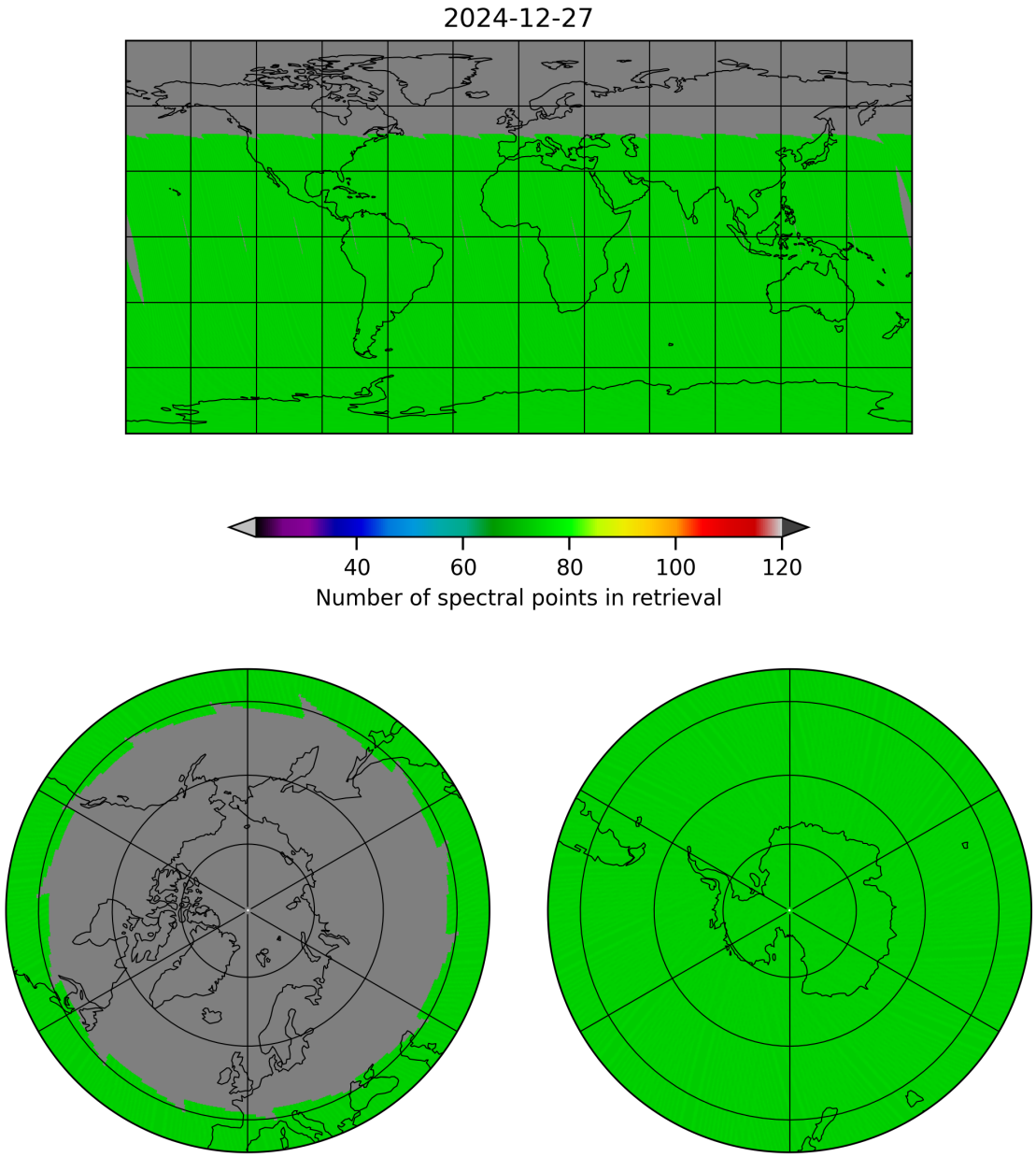

Figure 28: Map of “Number of spectral points in retrieval” for 2024-12-27 to 2024-12-28

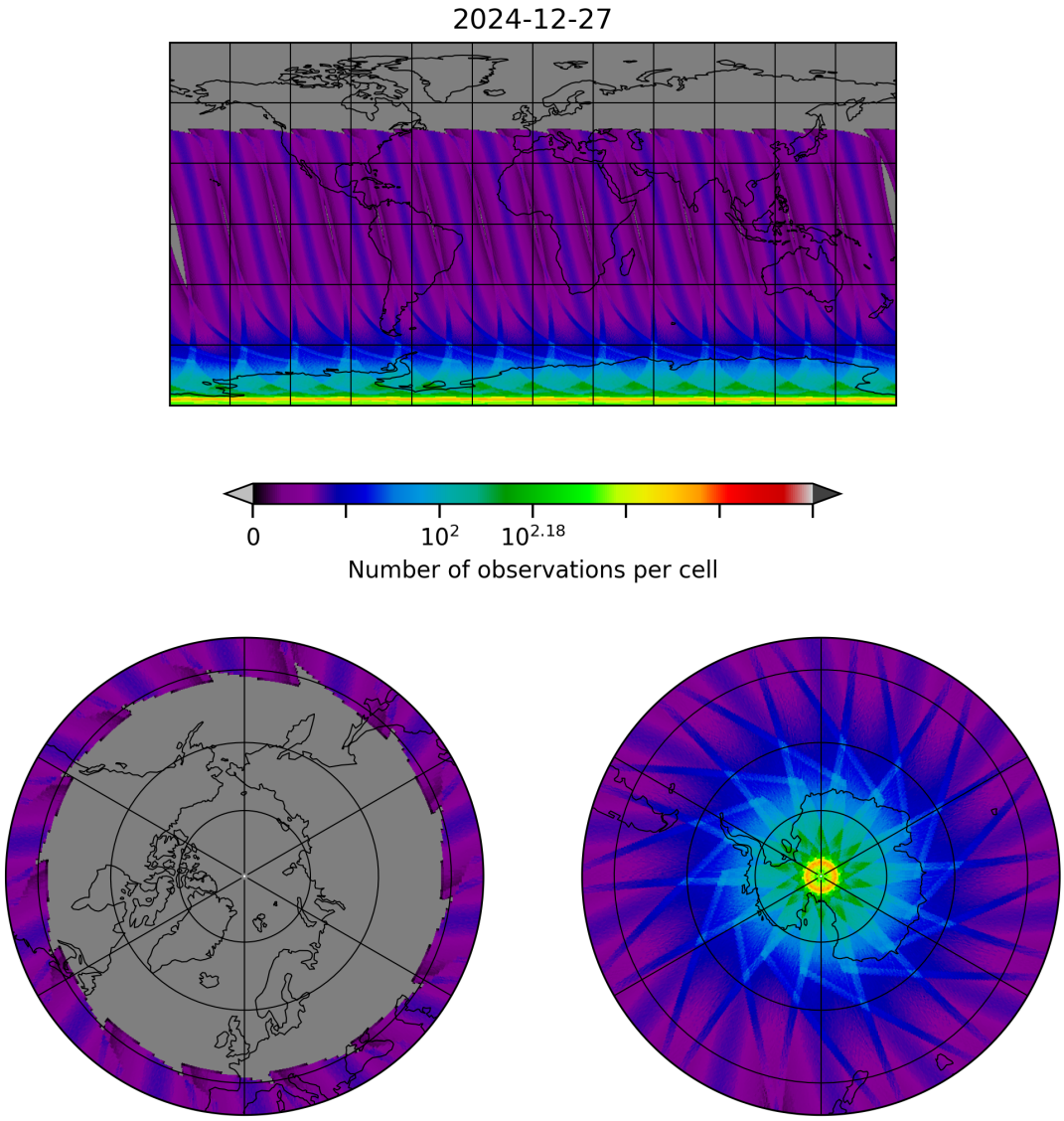

Figure 29: Map of the number of observations for 2024-12-27 to 2024-12-28

7 Zonal average

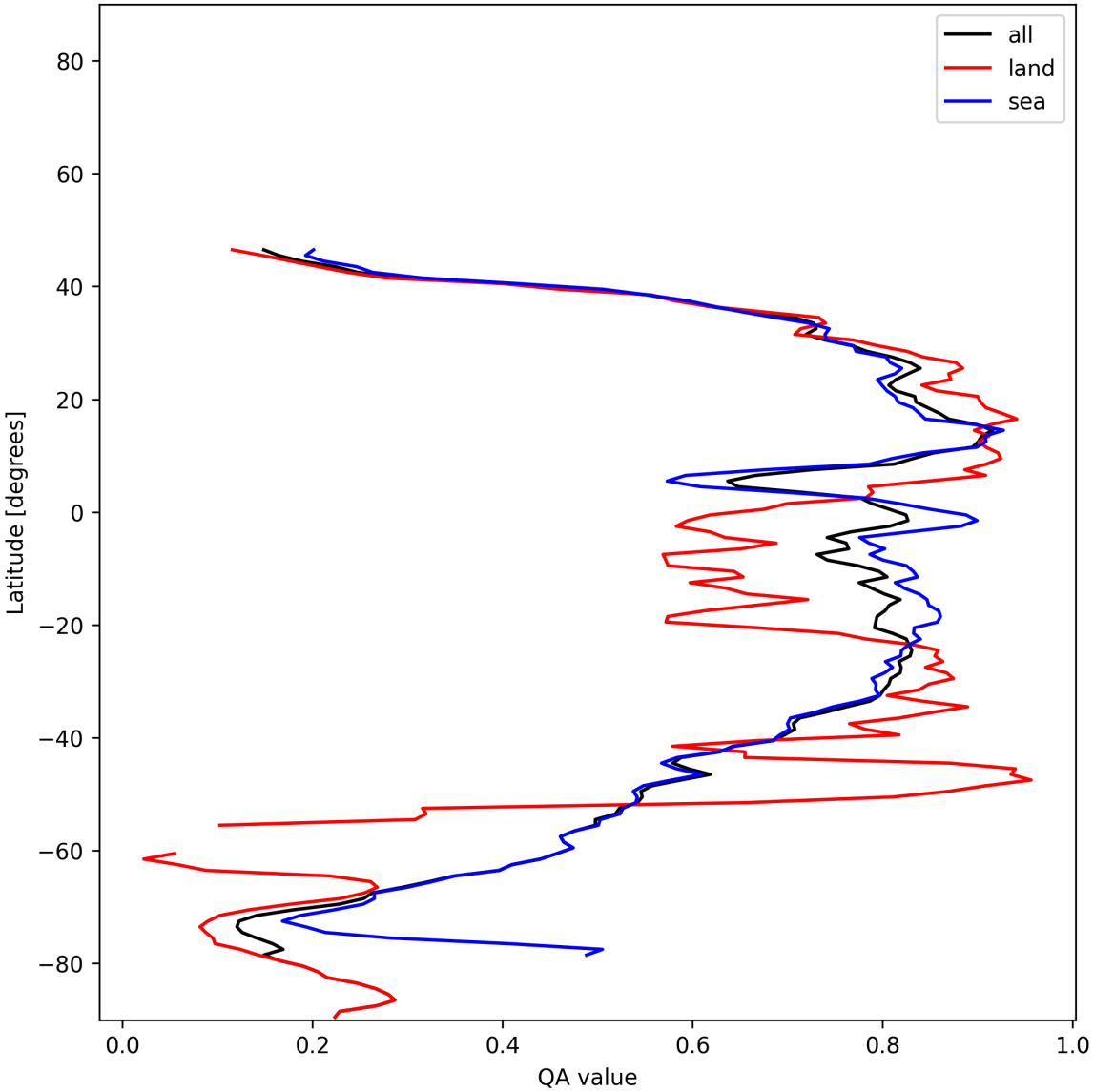

Figure 30: Zonal average of “QA value” for 2024-12-27 to 2024-12-28.

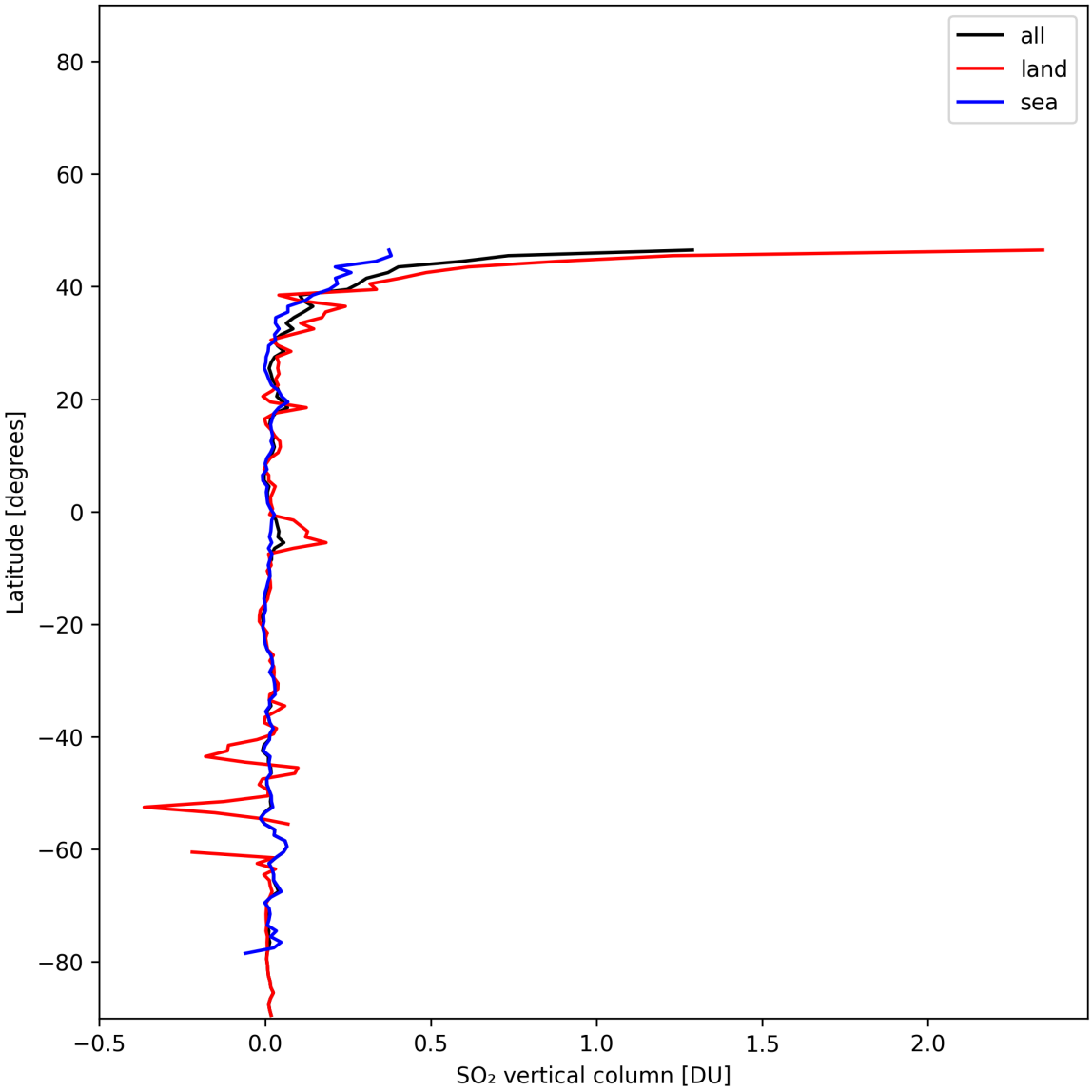

Figure 31: Zonal average of "SO_2 vertical column" for 2024-12-27 to 2024-12-28.

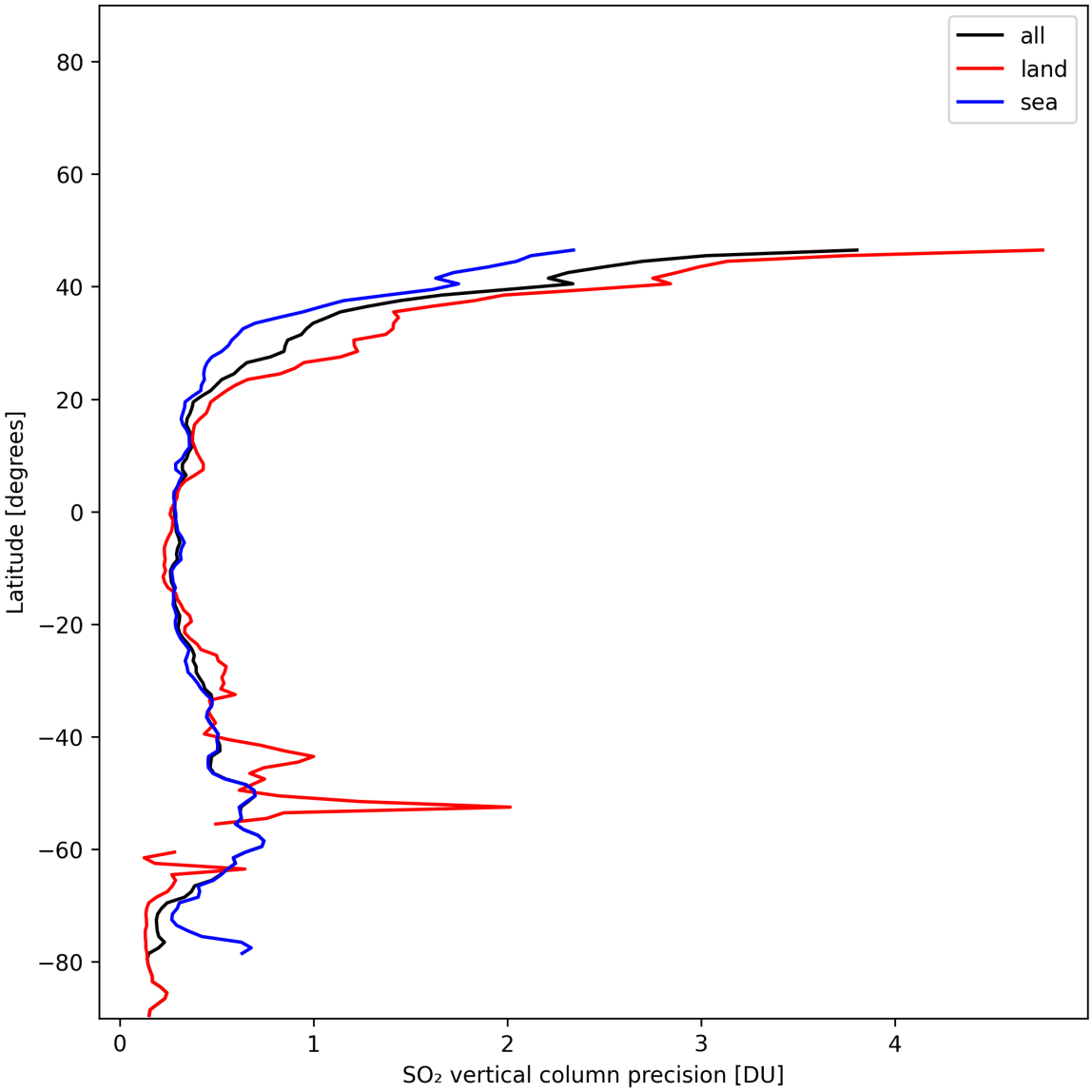

Figure 32: Zonal average of "SO_2 vertical column precision" for 2024-12-27 to 2024-12-28.

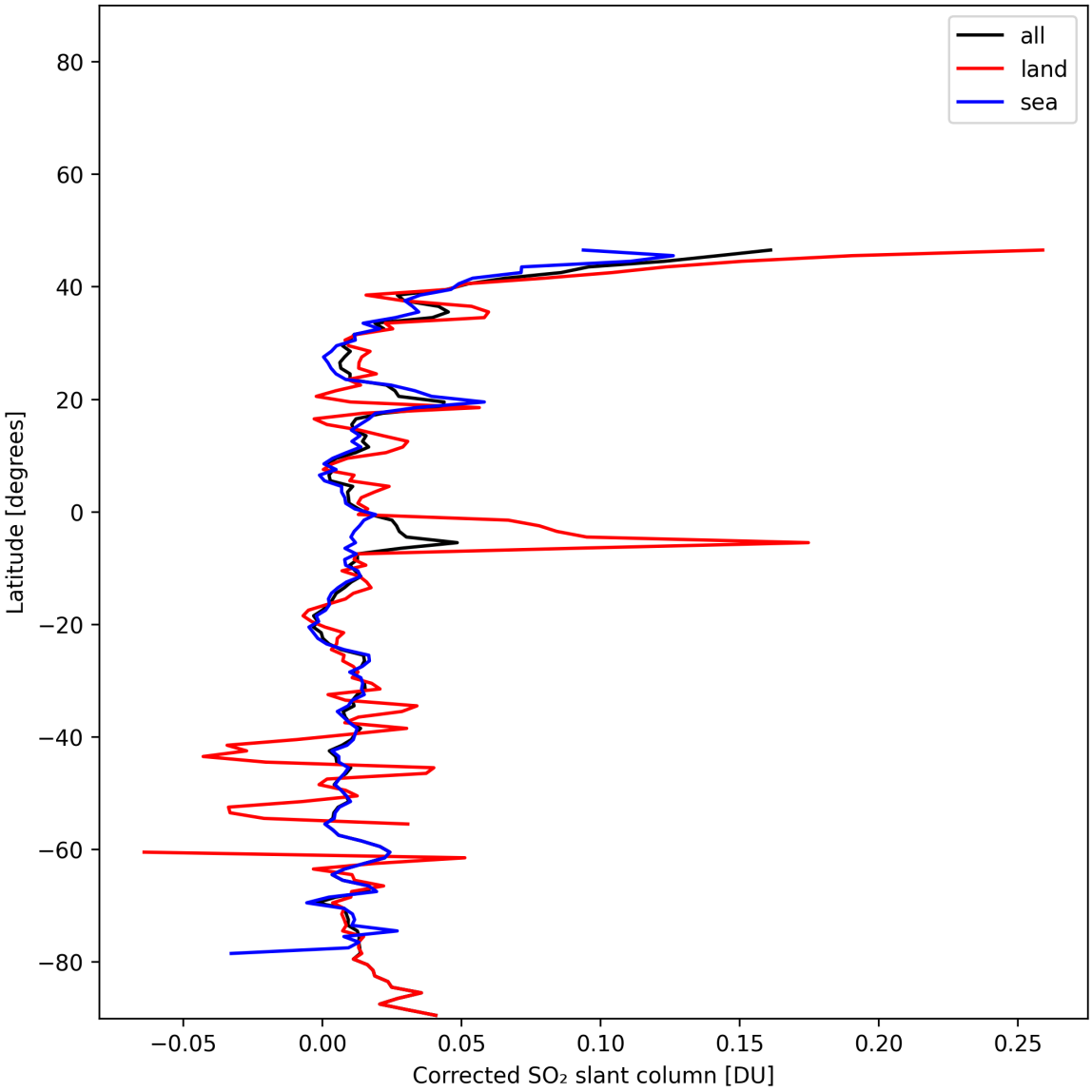

Figure 33: Zonal average of “Corrected SO_2 slant column” for 2024-12-27 to 2024-12-28.

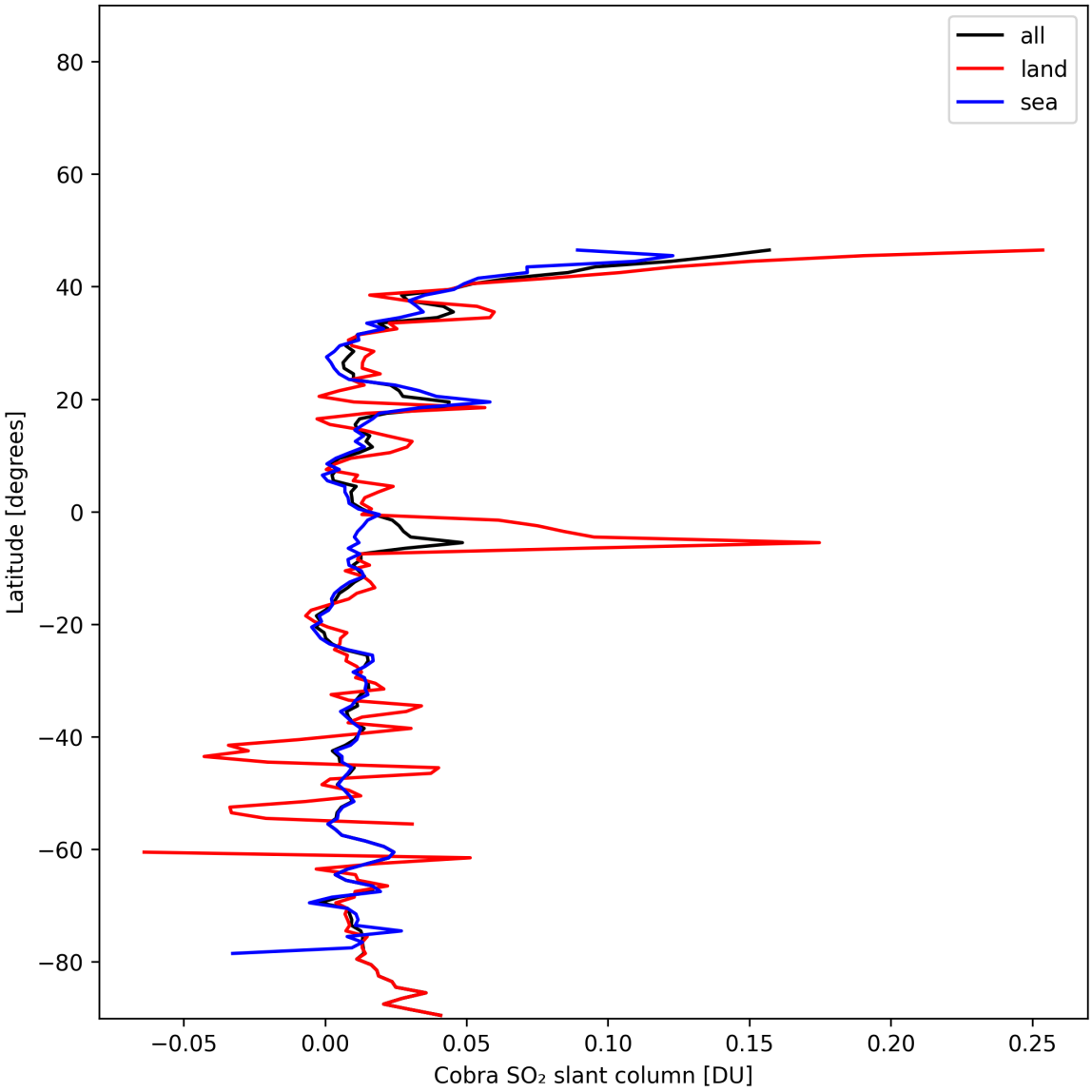

Figure 34: Zonal average of "Cobra SO_2 slant column" for 2024-12-27 to 2024-12-28.

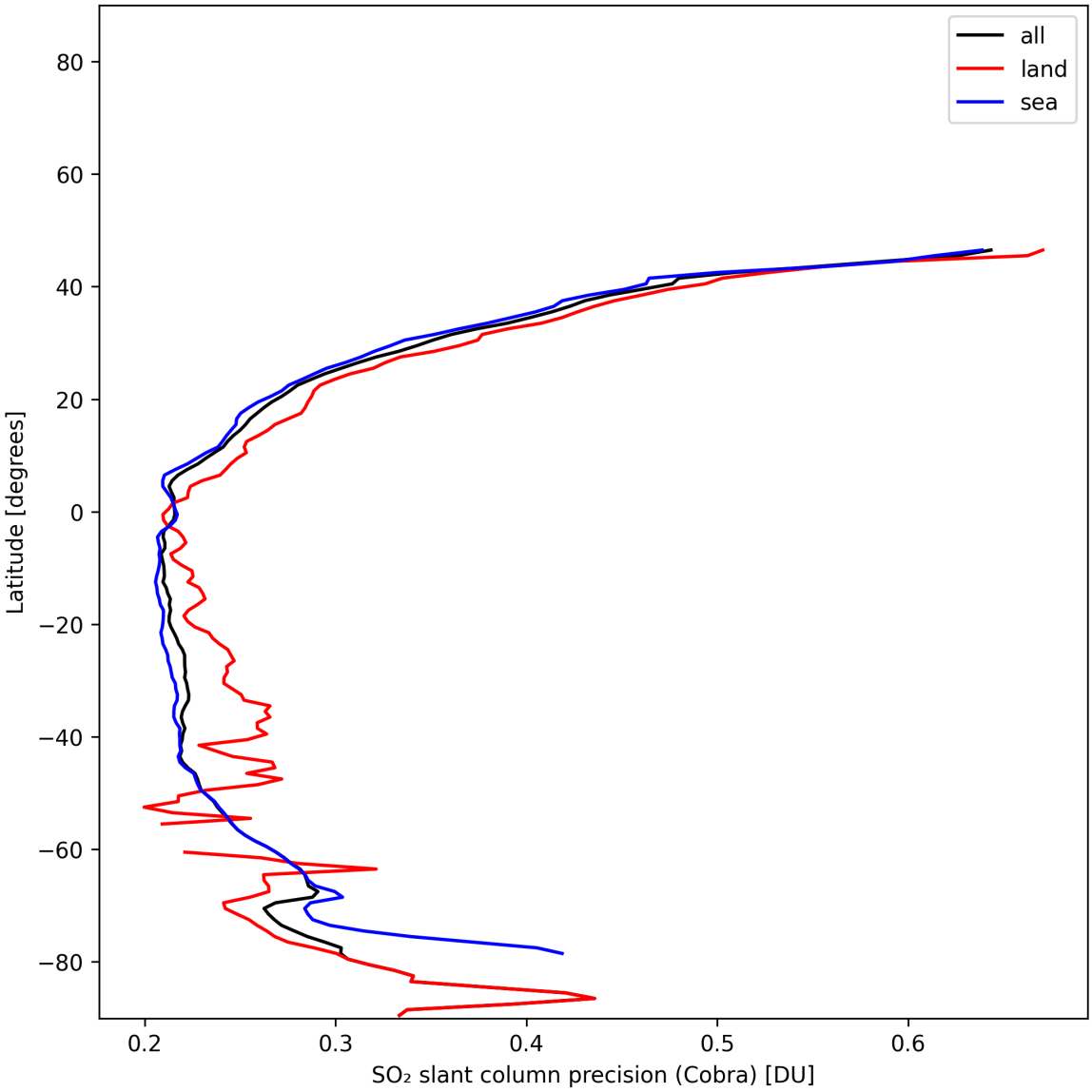

Figure 35: Zonal average of "SO_2 slant column precision (Cobra)" for 2024-12-27 to 2024-12-28.

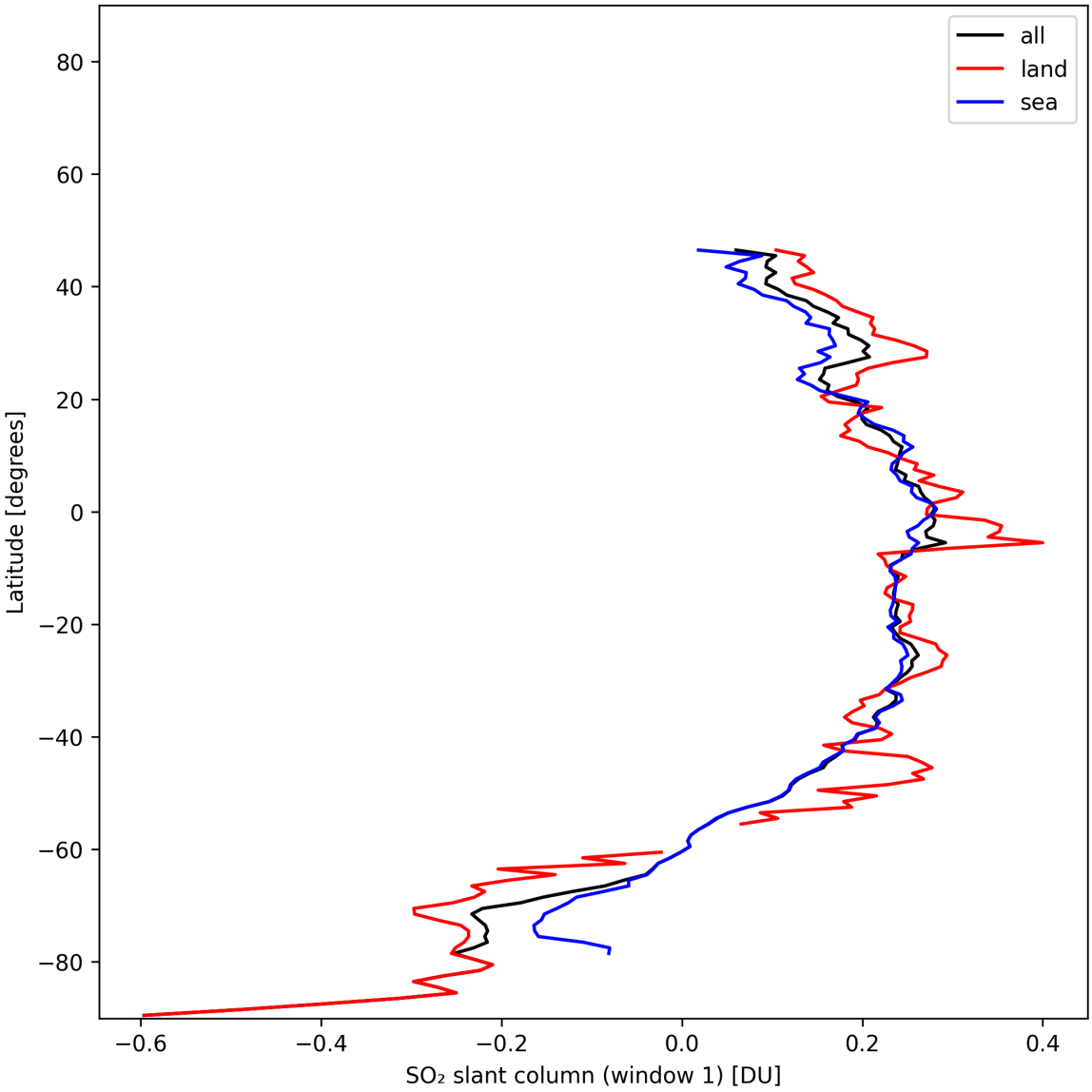

Figure 36: Zonal average of "SO_2 slant column (window 1)" for 2024-12-27 to 2024-12-28.

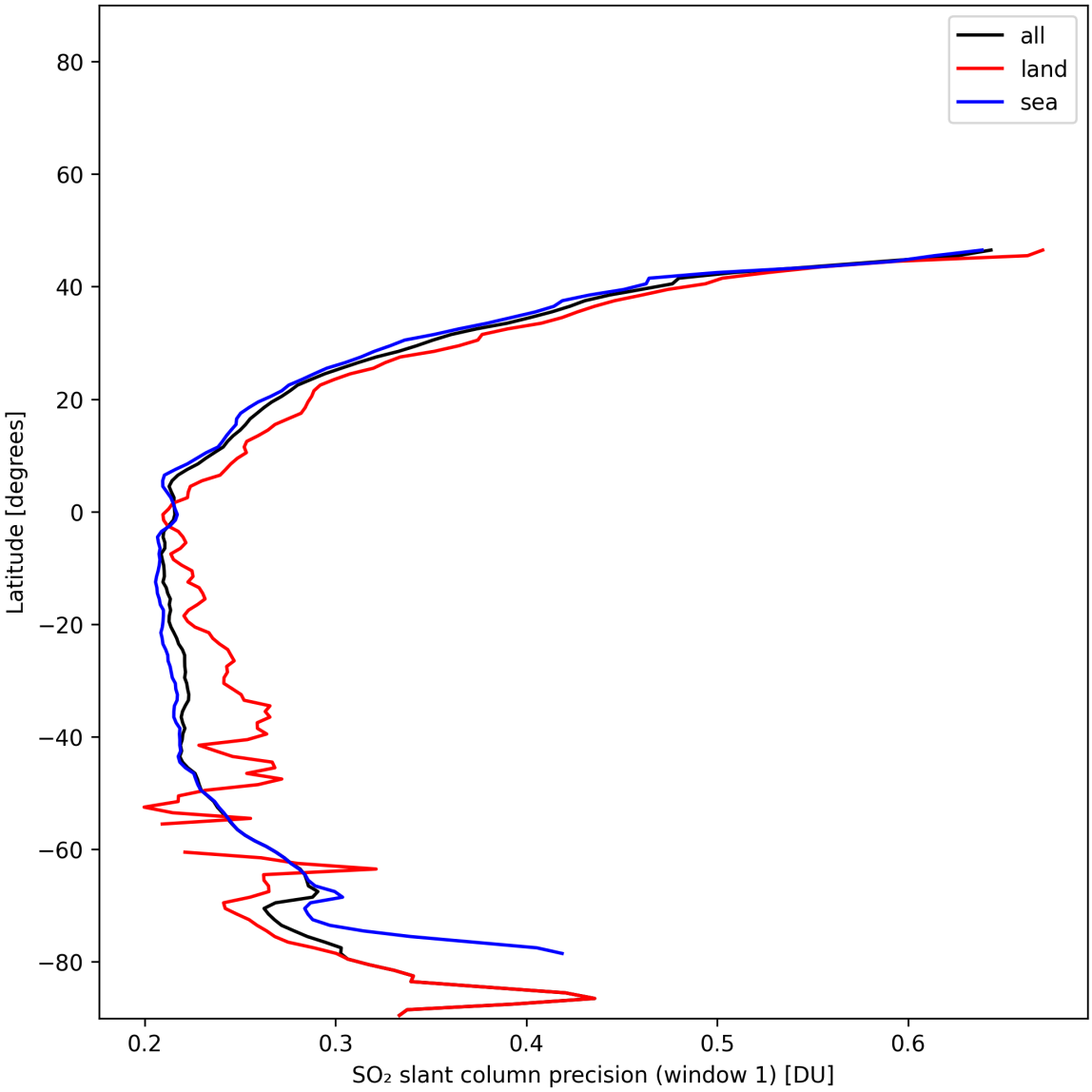

Figure 37: Zonal average of "SO_2 slant column precision (window 1)" for 2024-12-27 to 2024-12-28.

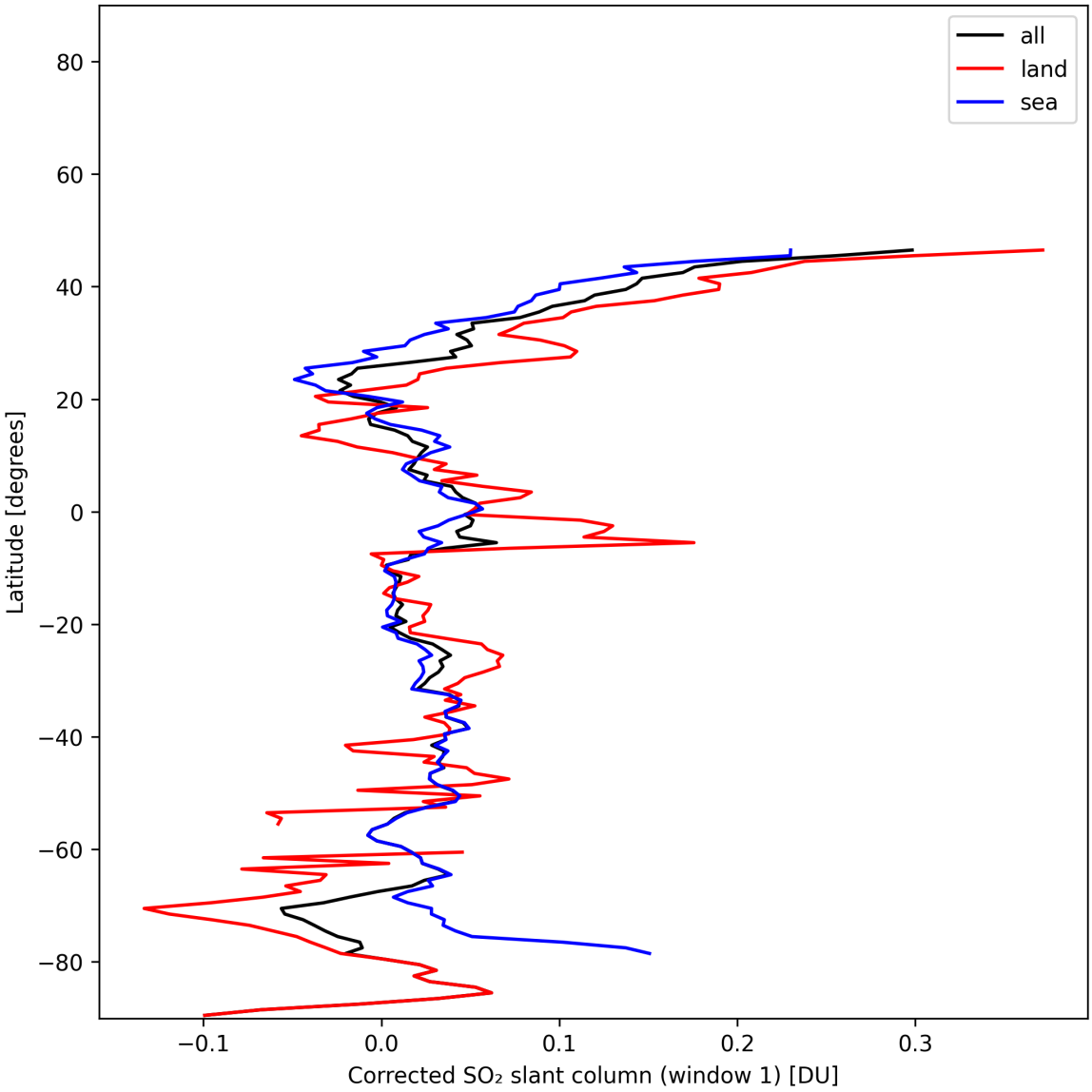

Figure 38: Zonal average of "Corrected SO_2 slant column (window 1)" for 2024-12-27 to 2024-12-28.

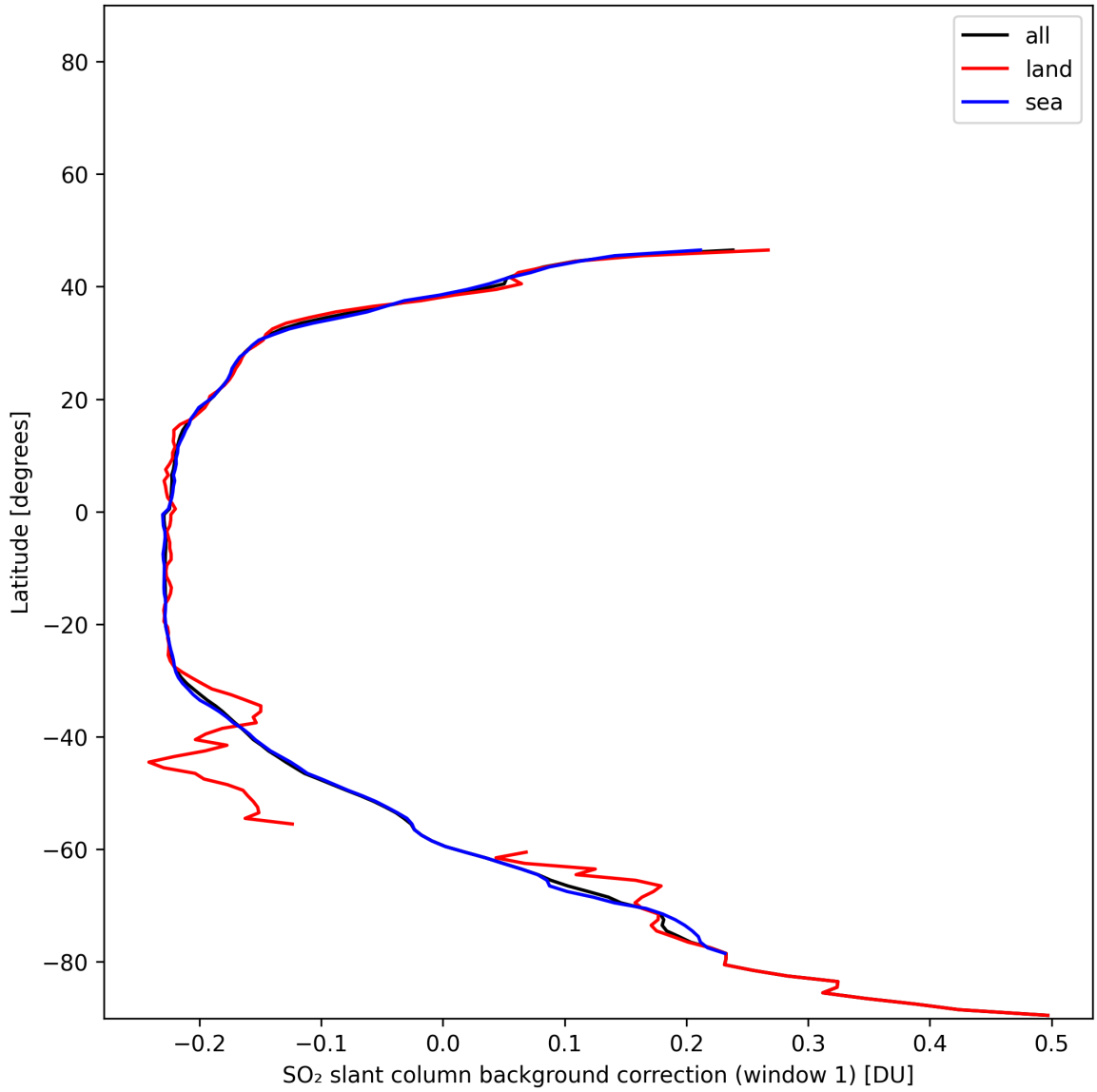

Figure 39: Zonal average of "SO_2 slant column background correction (window 1)" for 2024-12-27 to 2024-12-28.

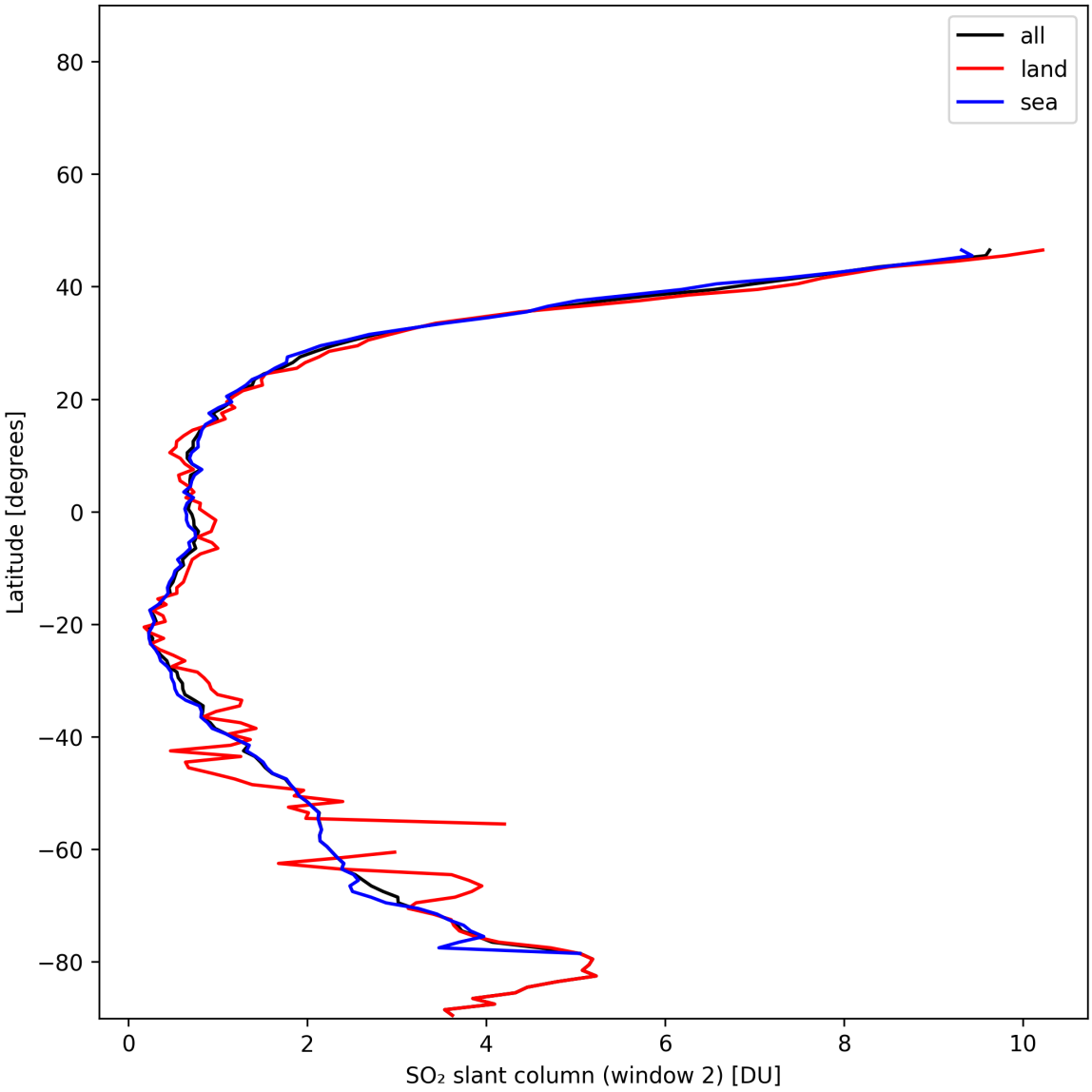

Figure 40: Zonal average of "SO_2 slant column (window 2)" for 2024-12-27 to 2024-12-28.

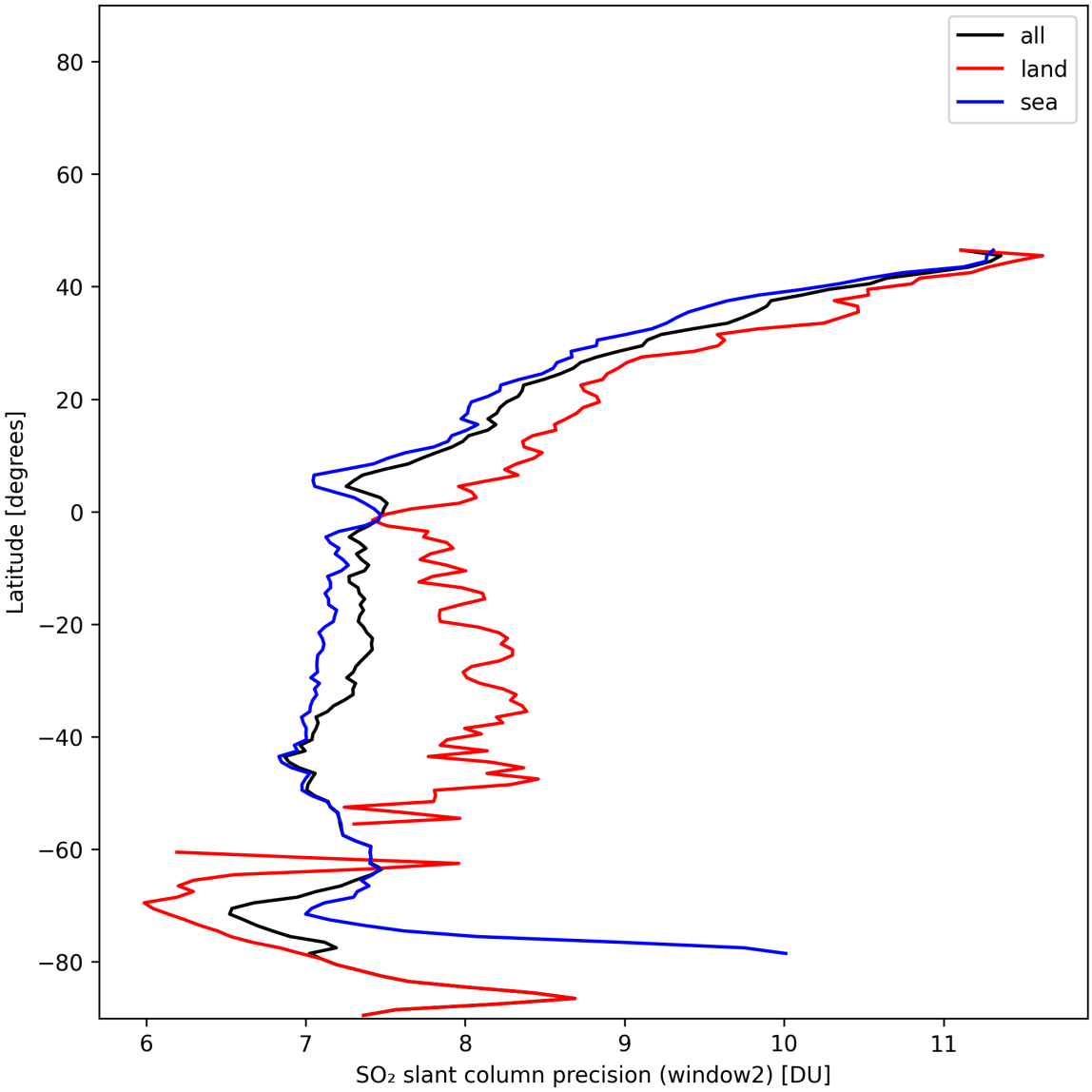

Figure 41: Zonal average of "SO_2 slant column precision (window2)" for 2024-12-27 to 2024-12-28.

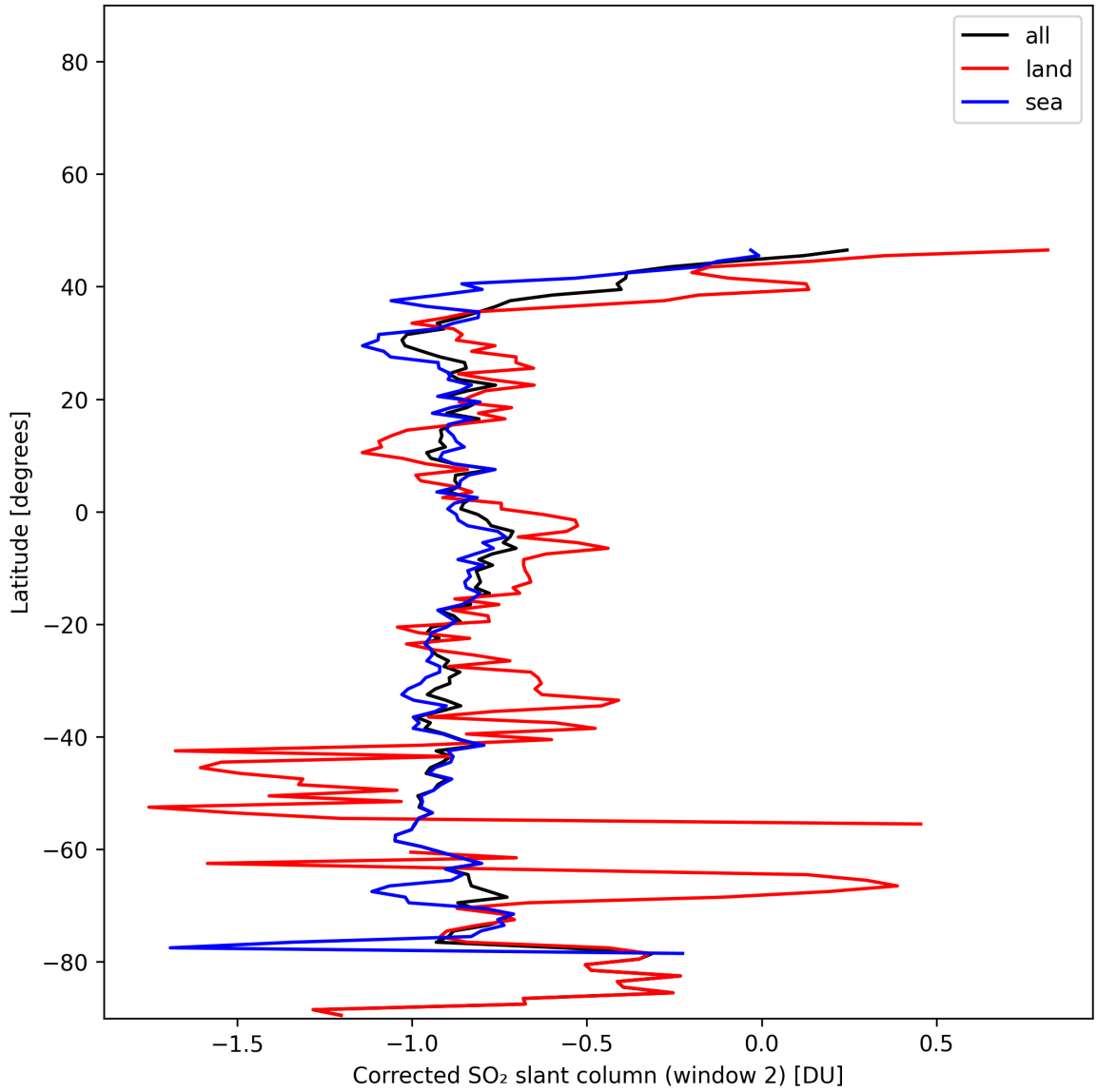

Figure 42: Zonal average of "Corrected SO_2 slant column (window 2)" for 2024-12-27 to 2024-12-28.

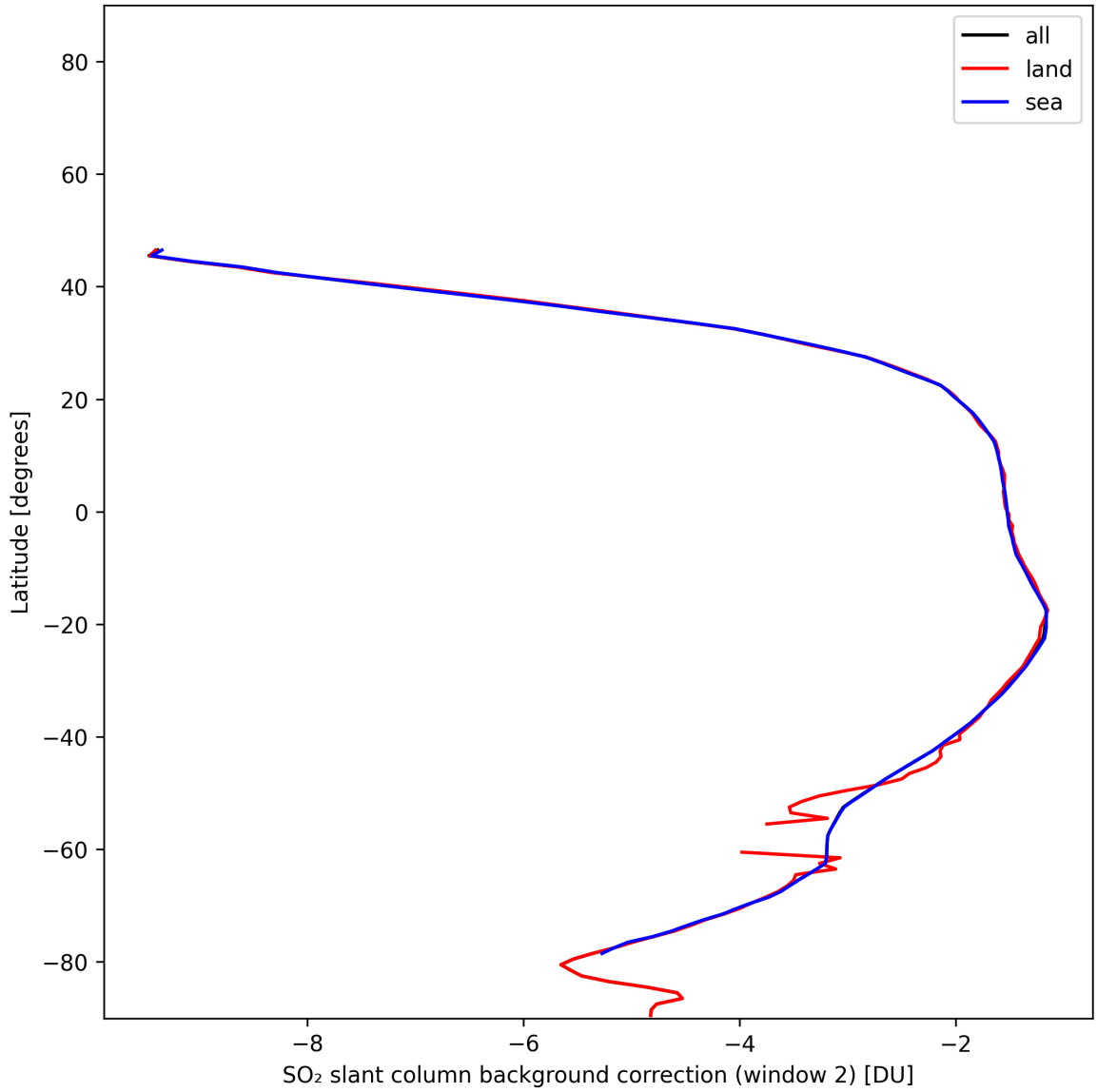

Figure 43: Zonal average of "SO_2 slant column background correction (window 2)" for 2024-12-27 to 2024-12-28.

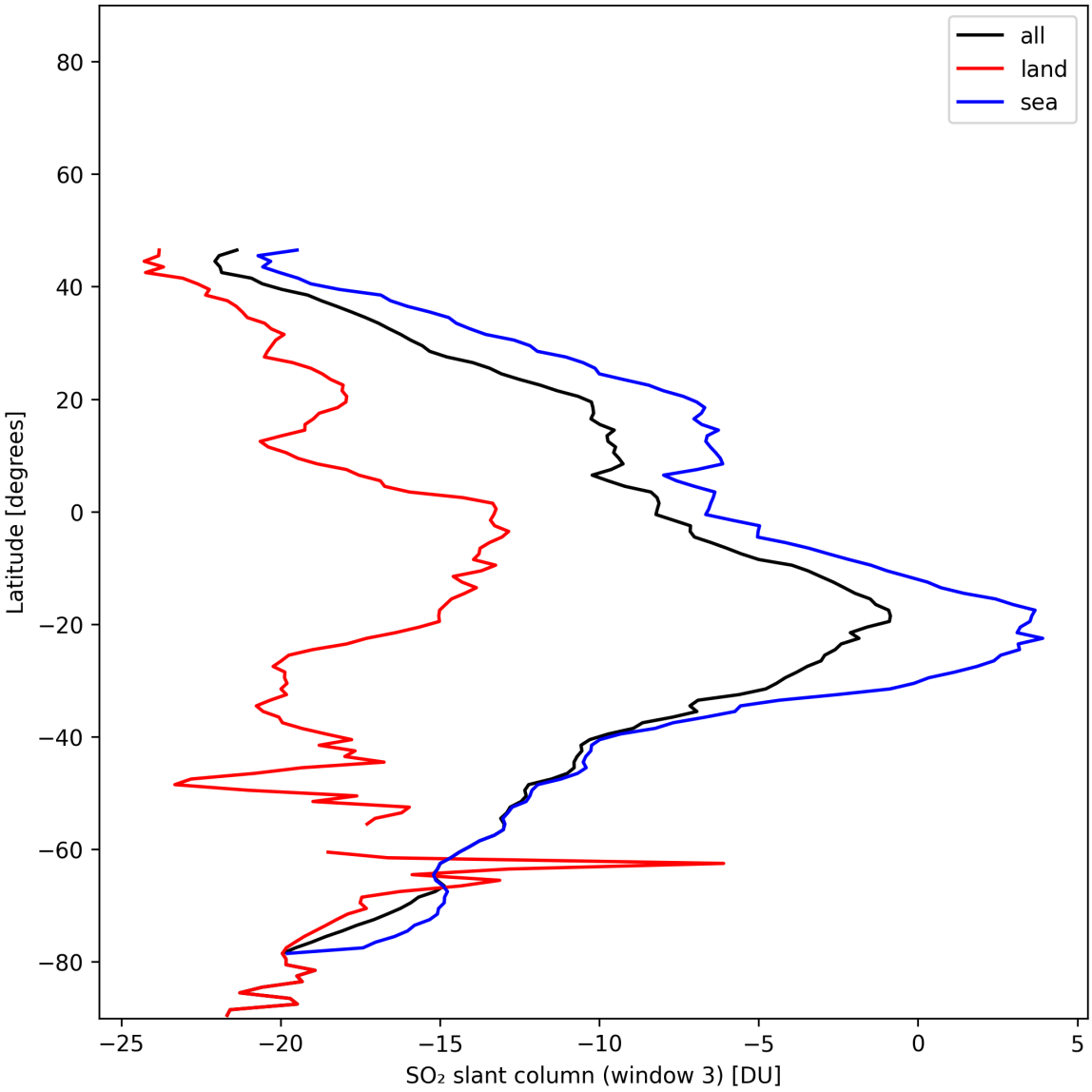

Figure 44: Zonal average of "SO_2 slant column (window 3)" for 2024-12-27 to 2024-12-28.

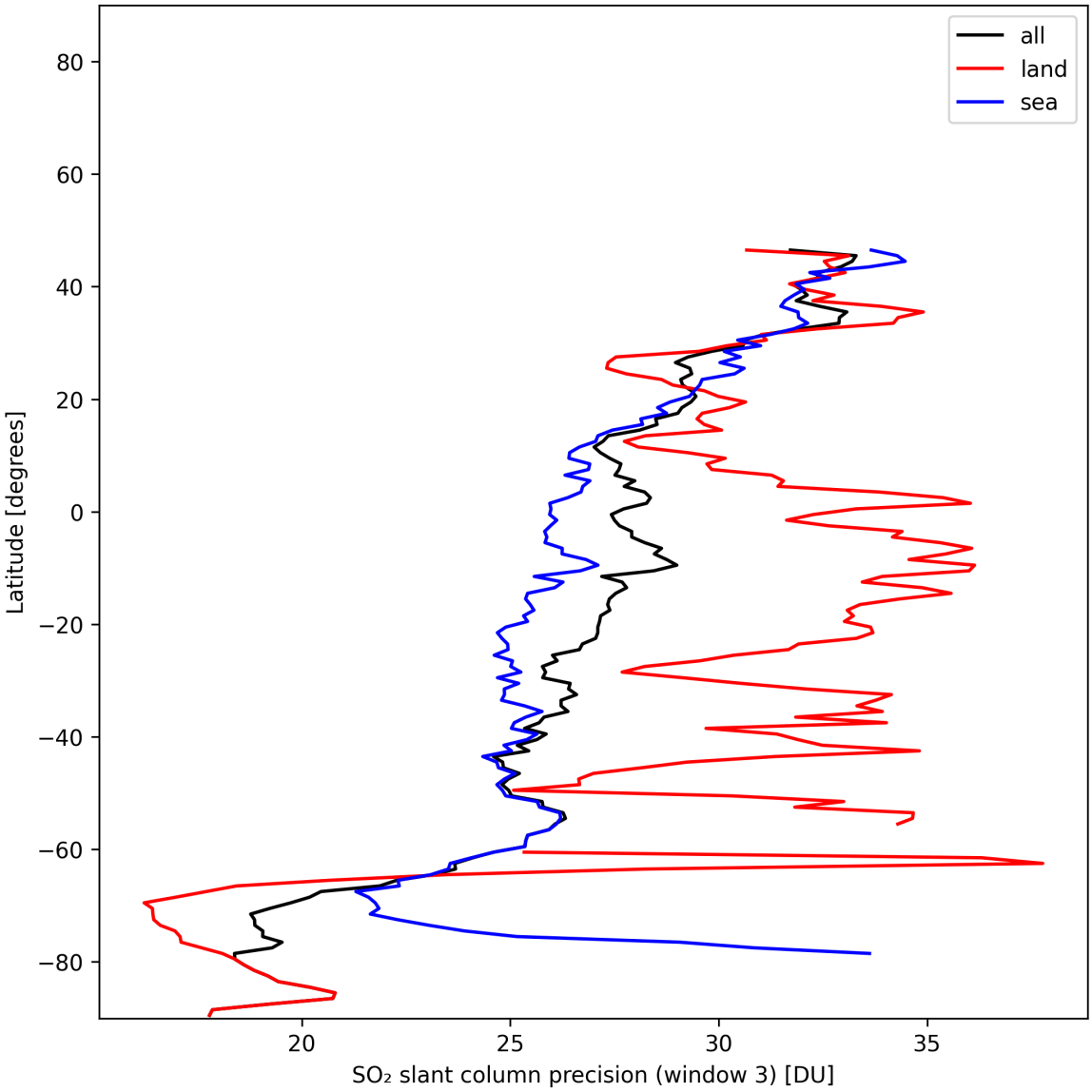

Figure 45: Zonal average of "SO_2 slant column precision (window 3)" for 2024-12-27 to 2024-12-28.

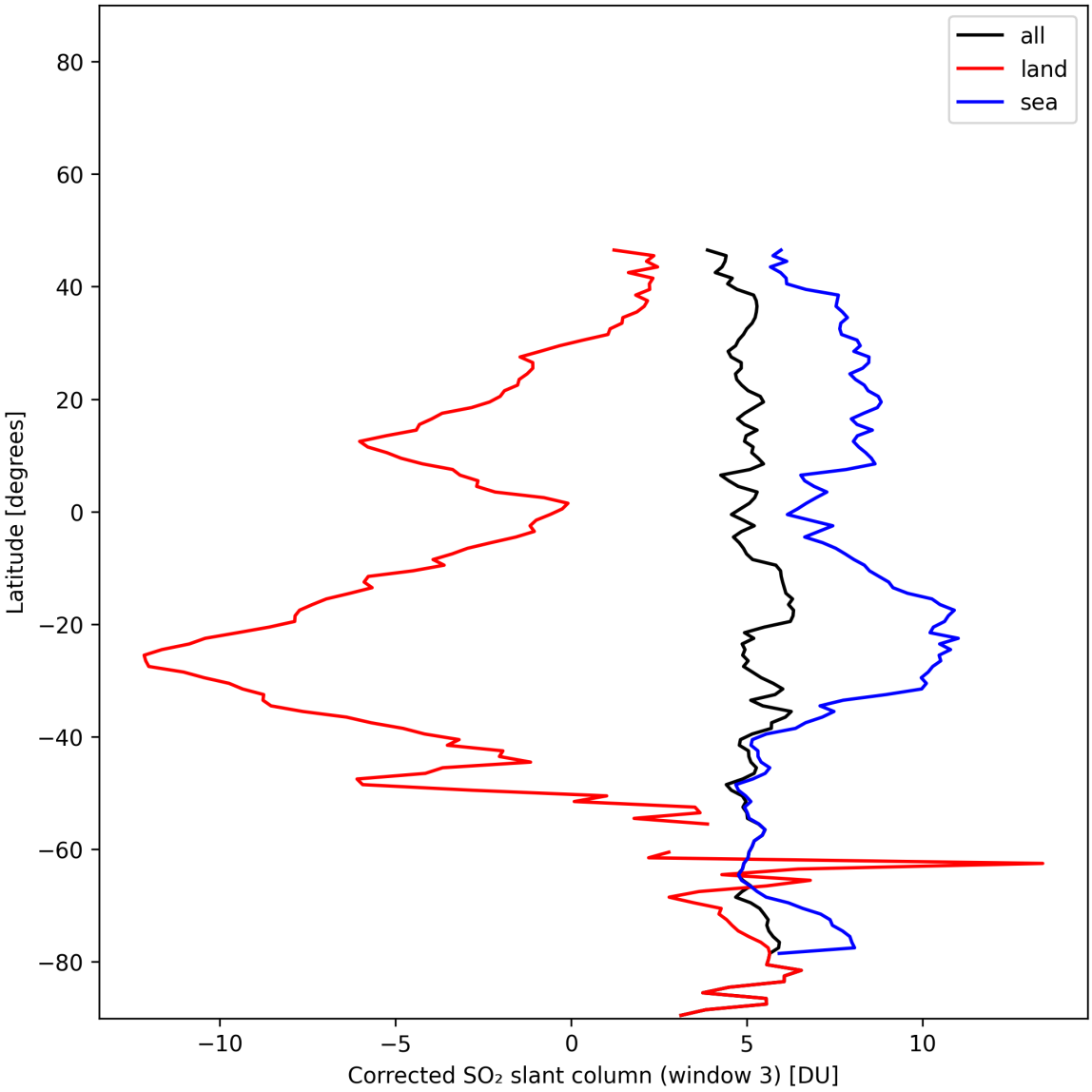

Figure 46: Zonal average of "Corrected SO_2 slant column (window 3)" for 2024-12-27 to 2024-12-28.

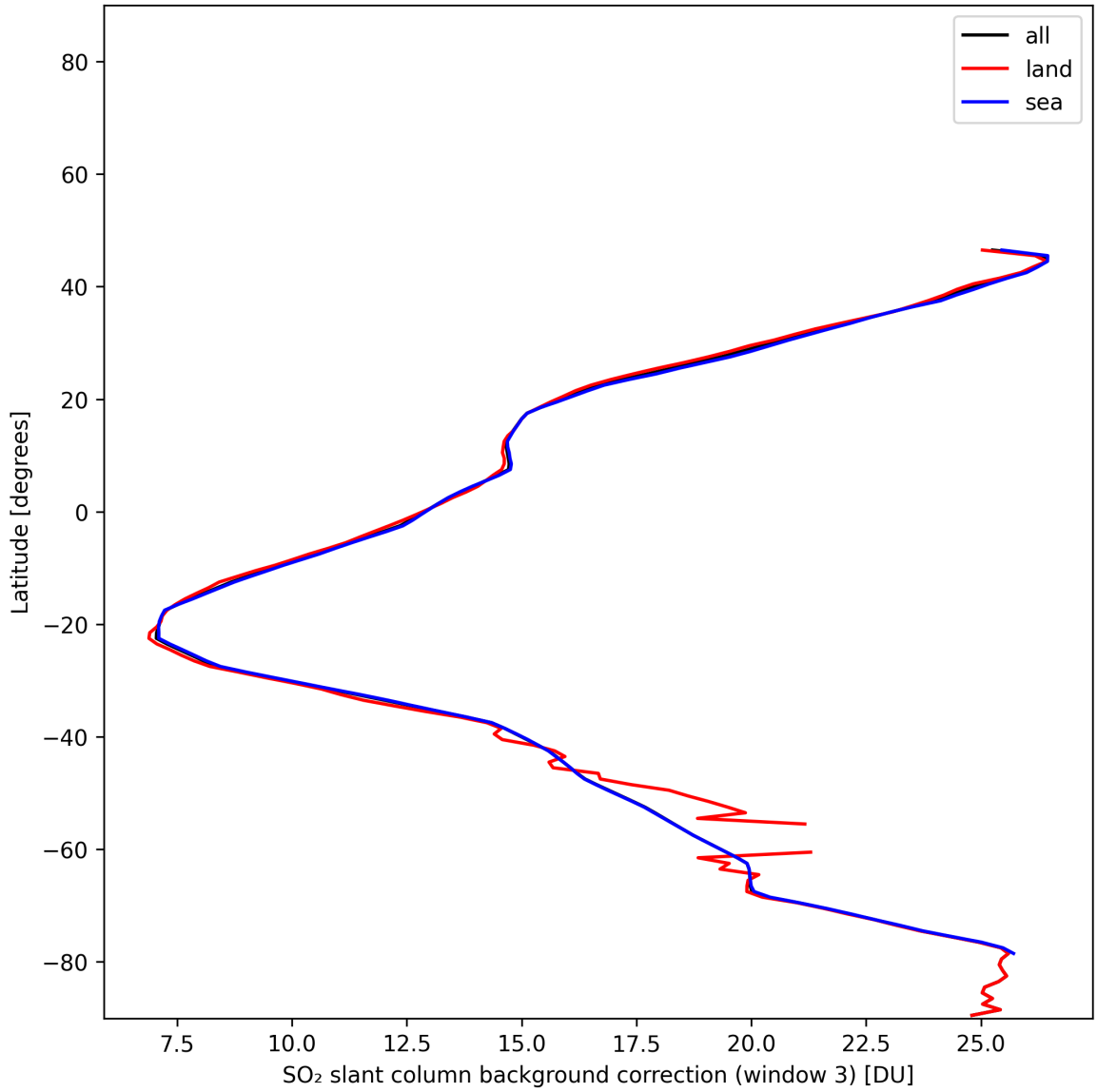

Figure 47: Zonal average of "SO_2 slant column background correction (window 3)" for 2024-12-27 to 2024-12-28.

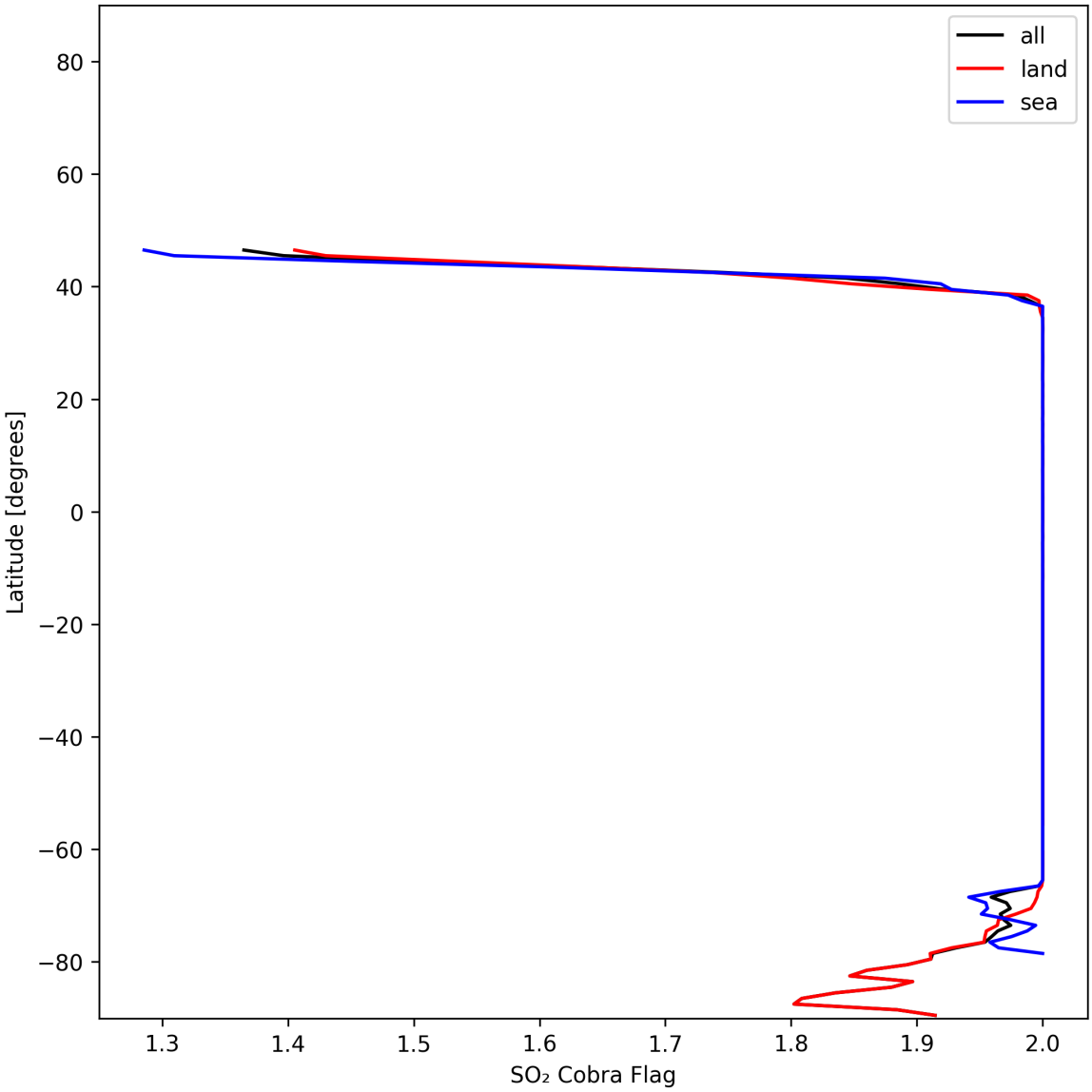

Figure 48: Zonal average of "SO_2 Cobra Flag" for 2024-12-27 to 2024-12-28.

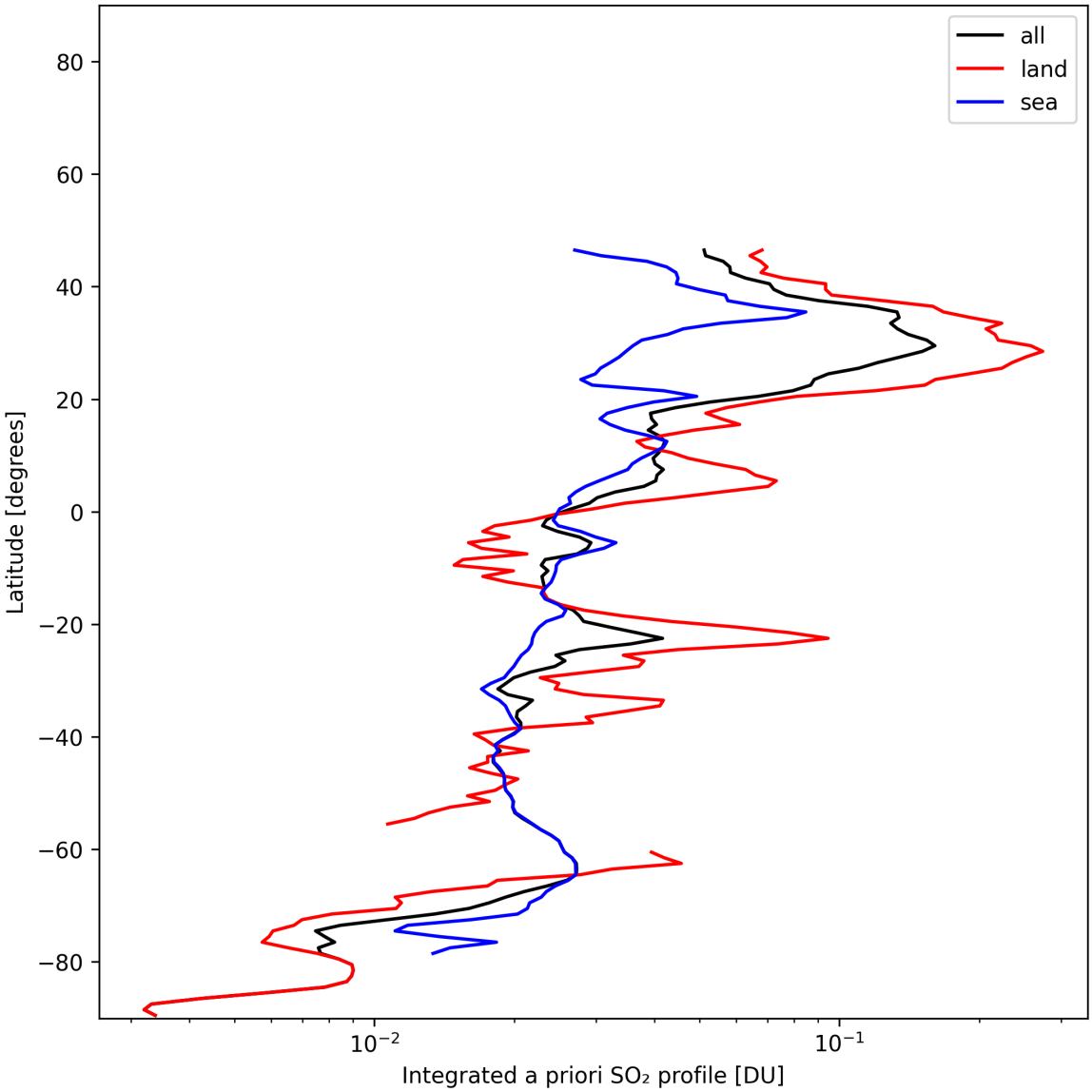

Figure 49: Zonal average of “Integrated a priori SO_2 profile” for 2024-12-27 to 2024-12-28.

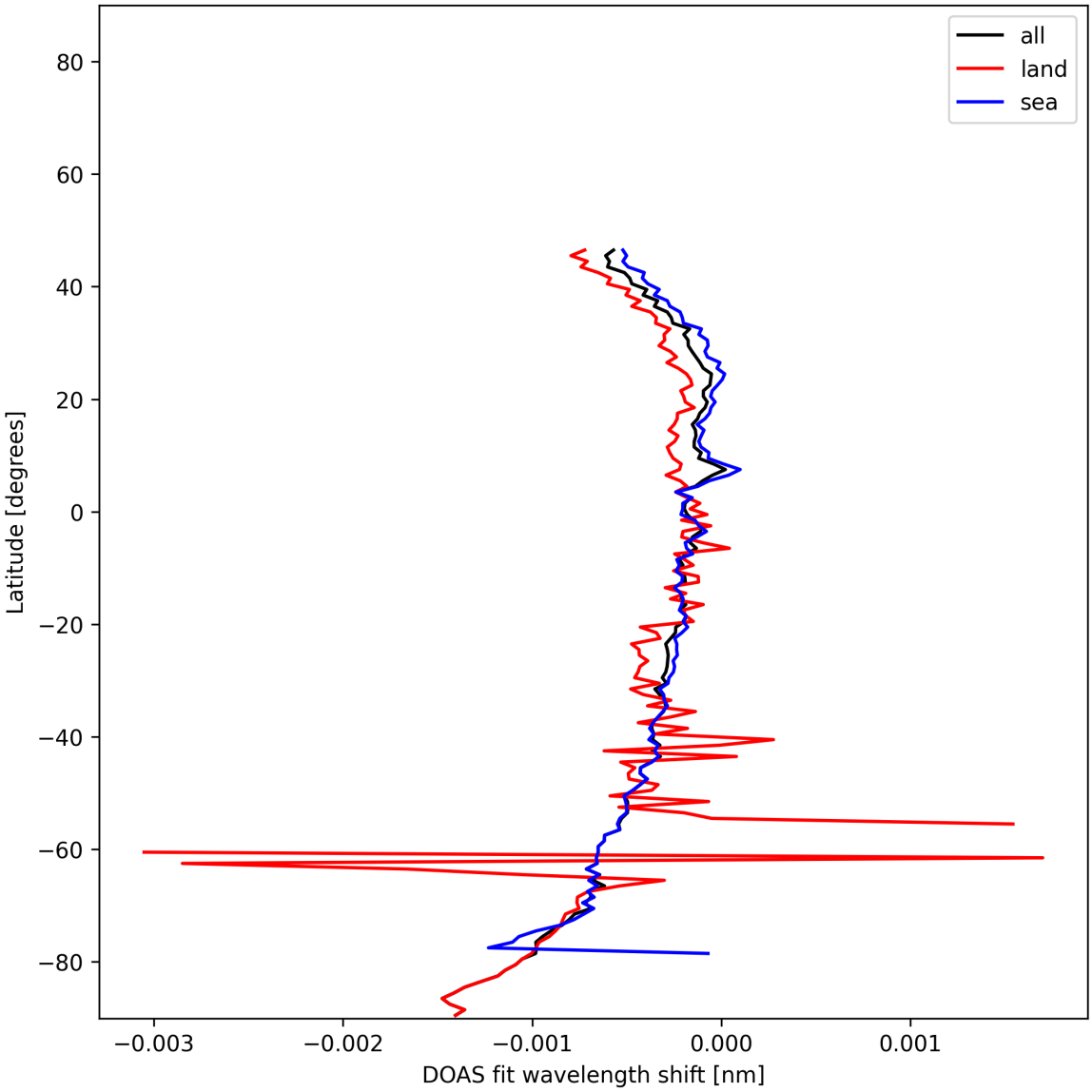

Figure 50: Zonal average of “DOAS fit wavelength shift” for 2024-12-27 to 2024-12-28.

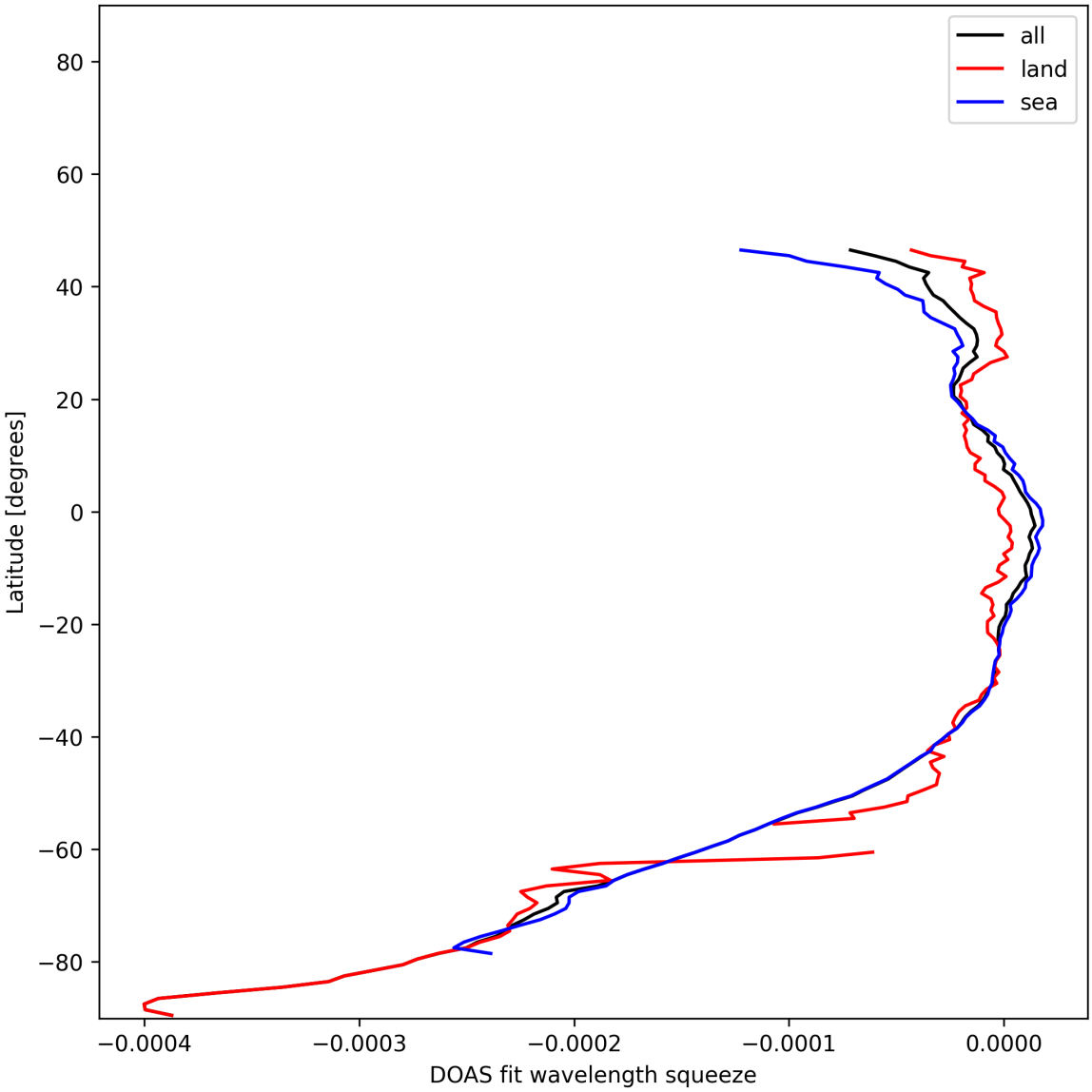

Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2024-12-27 to 2024-12-28.

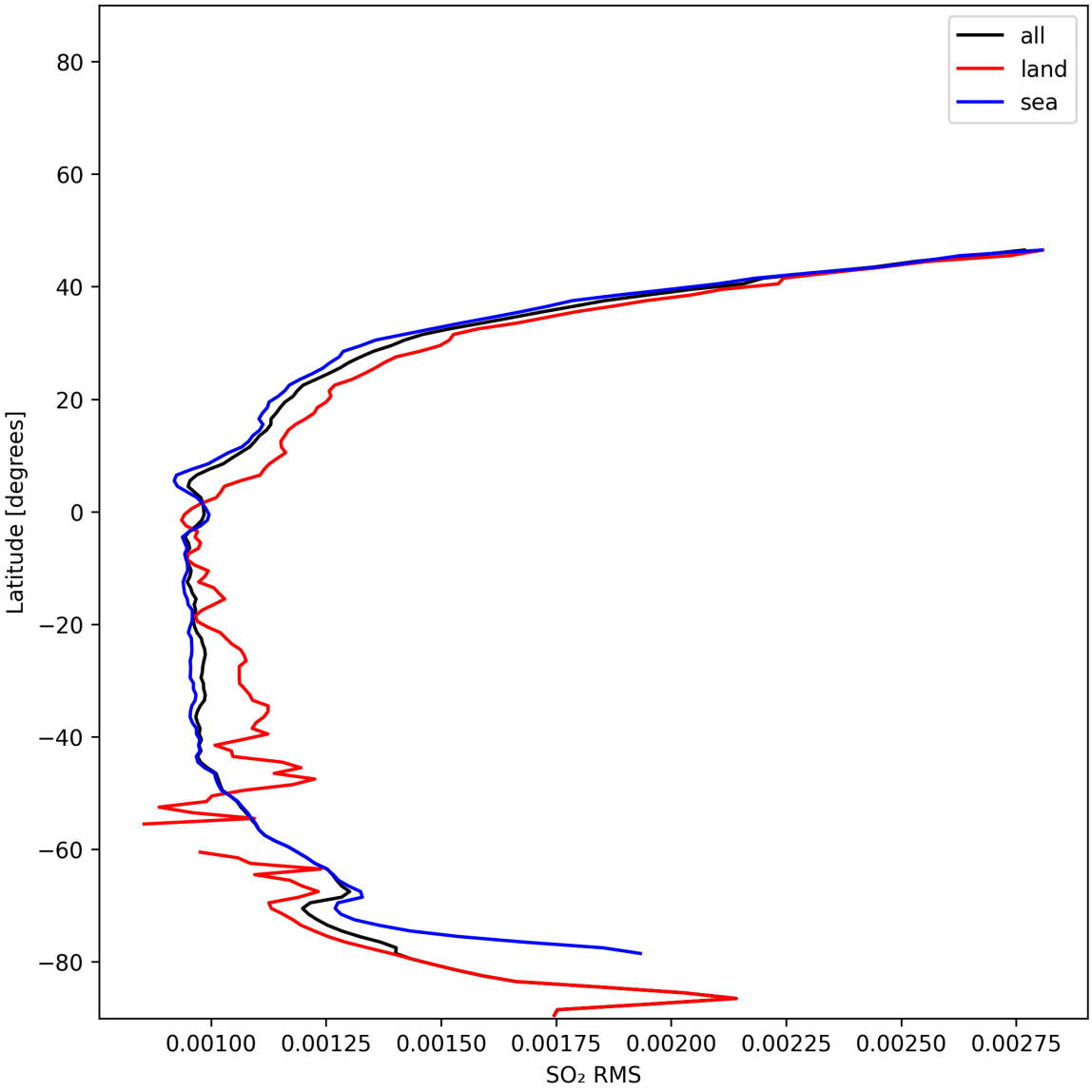

Figure 52: Zonal average of "SO_2 RMS" for 2024-12-27 to 2024-12-28.

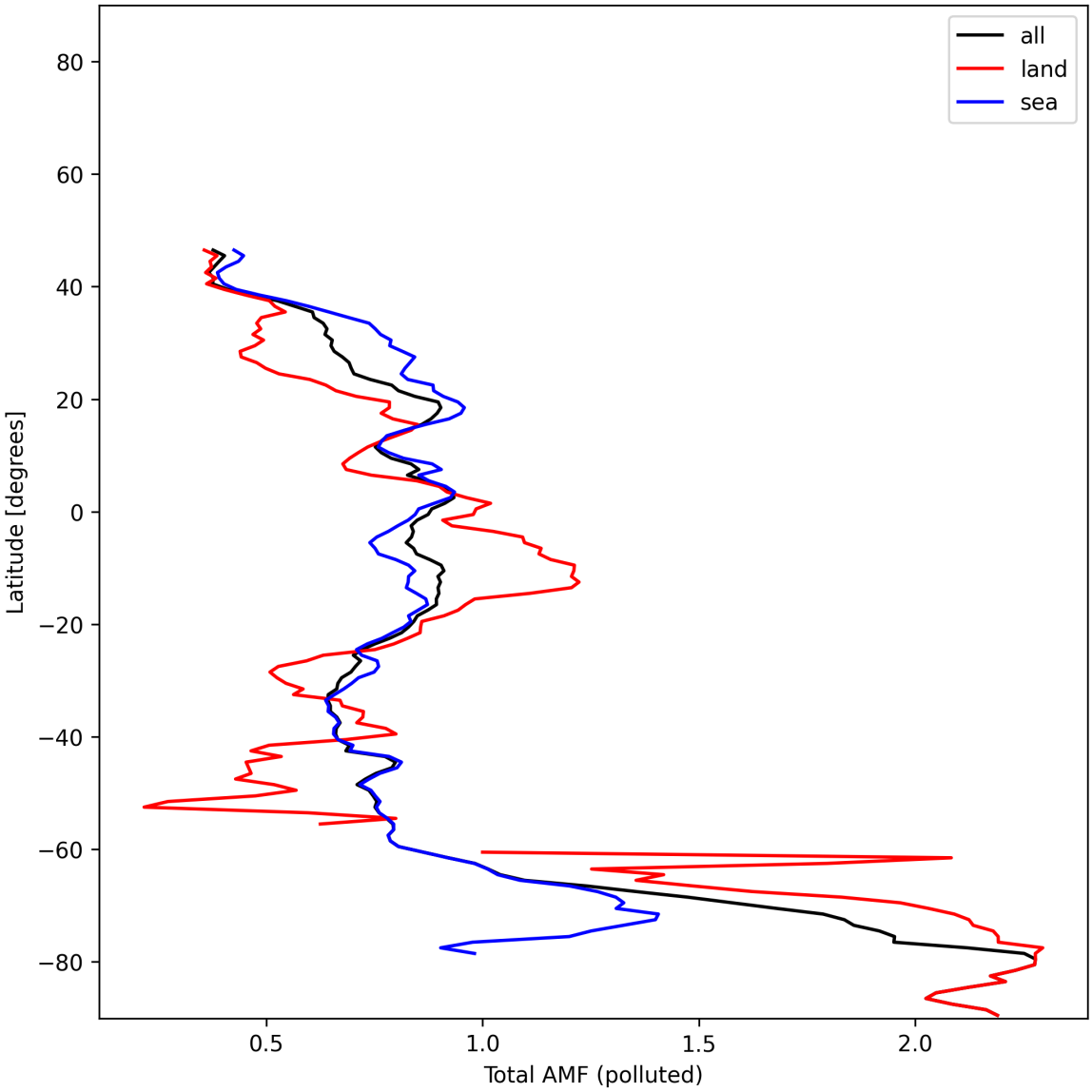

Figure 53: Zonal average of “Total AMF (polluted)” for 2024-12-27 to 2024-12-28.

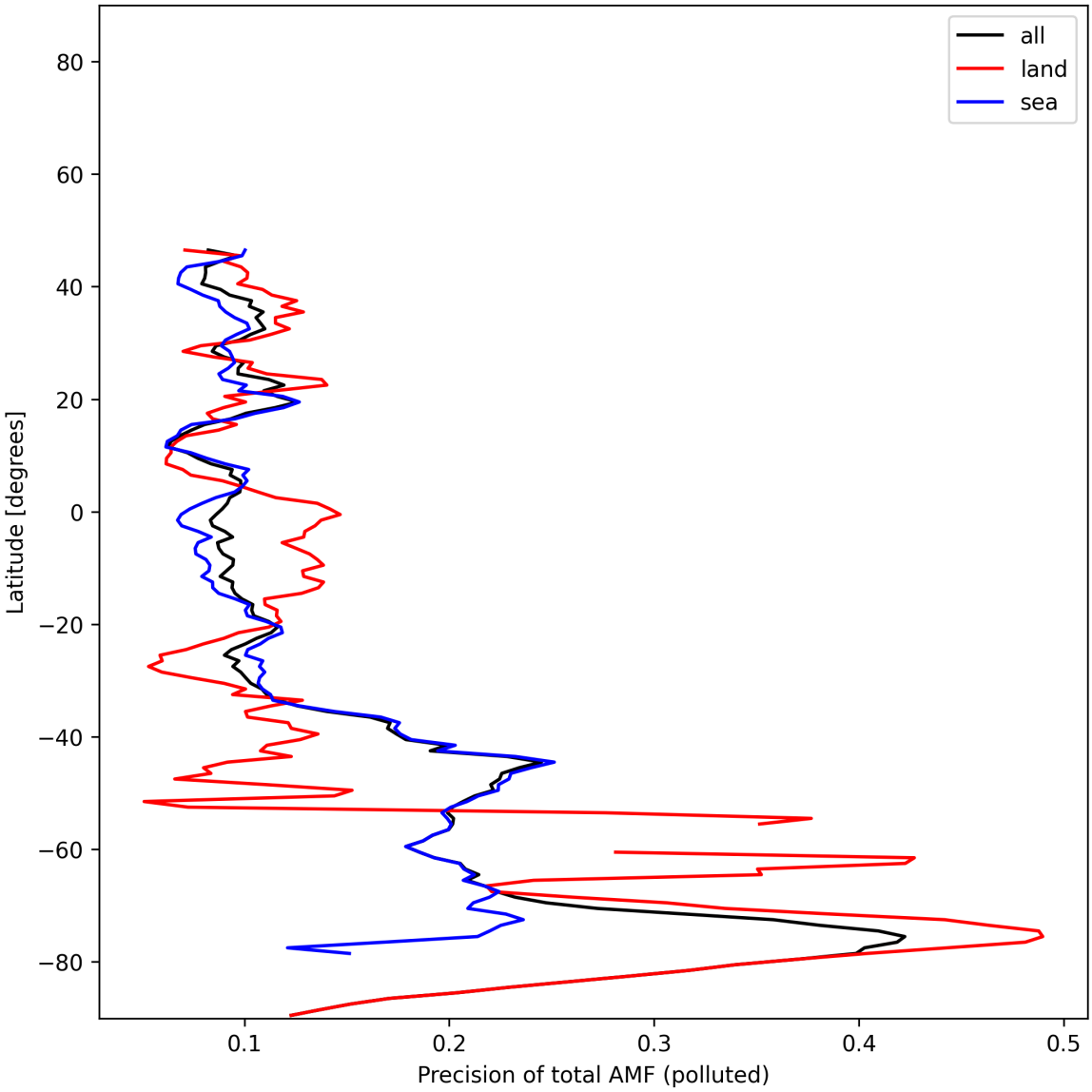

Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2024-12-27 to 2024-12-28.

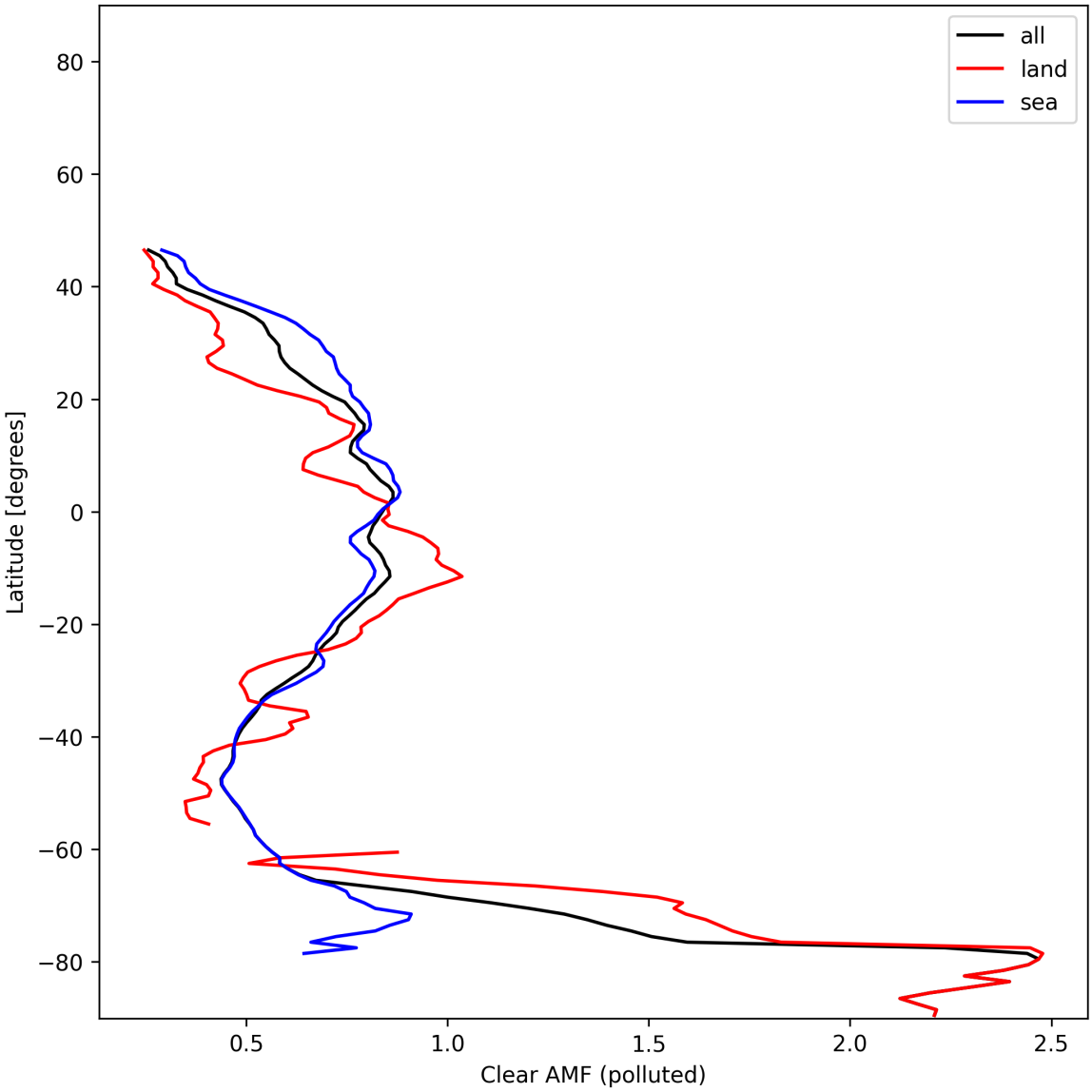

Figure 55: Zonal average of “Clear AMF (polluted)” for 2024-12-27 to 2024-12-28.

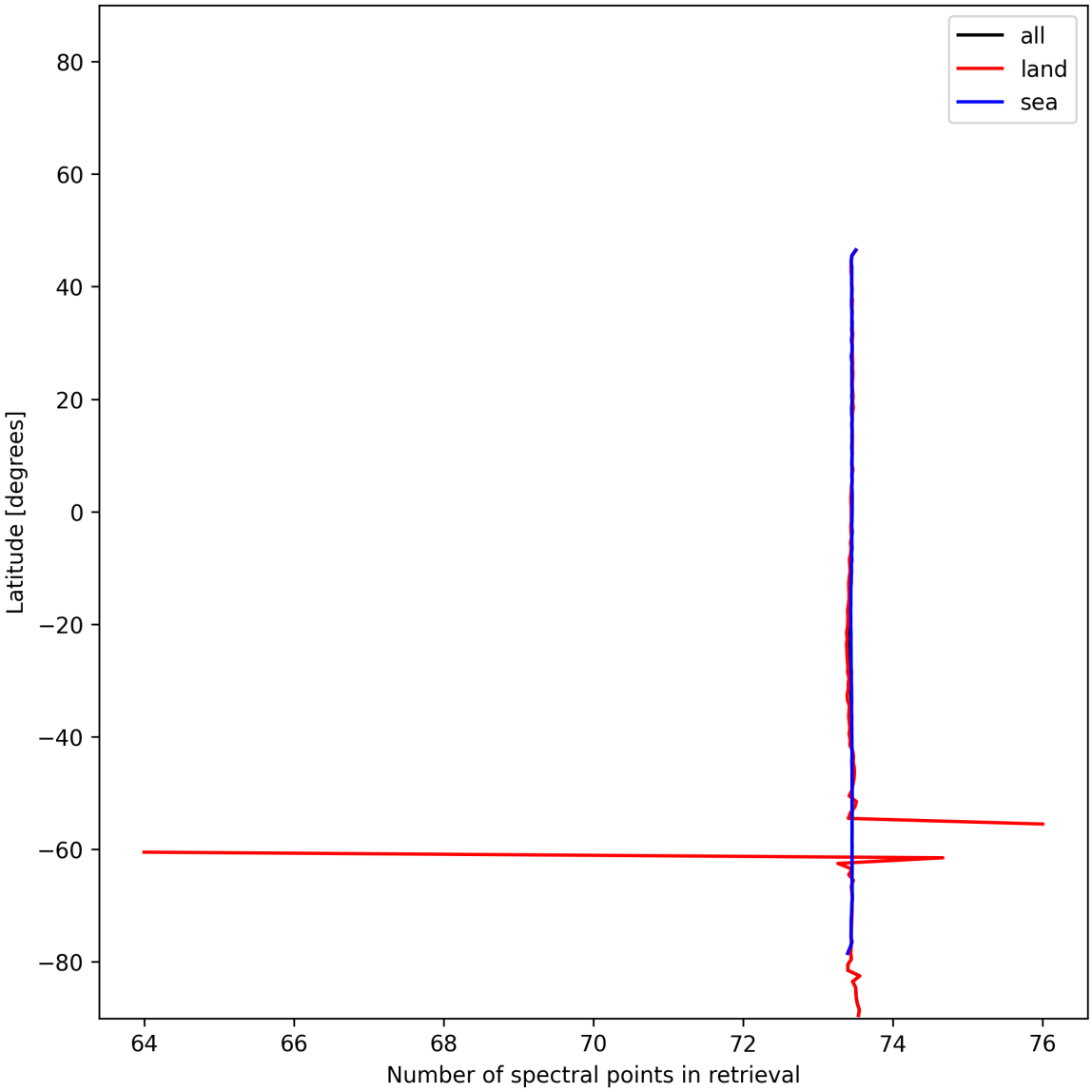

Figure 56: Zonal average of “Number of spectral points in retrieval” for 2024-12-27 to 2024-12-28.

8 Histograms

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

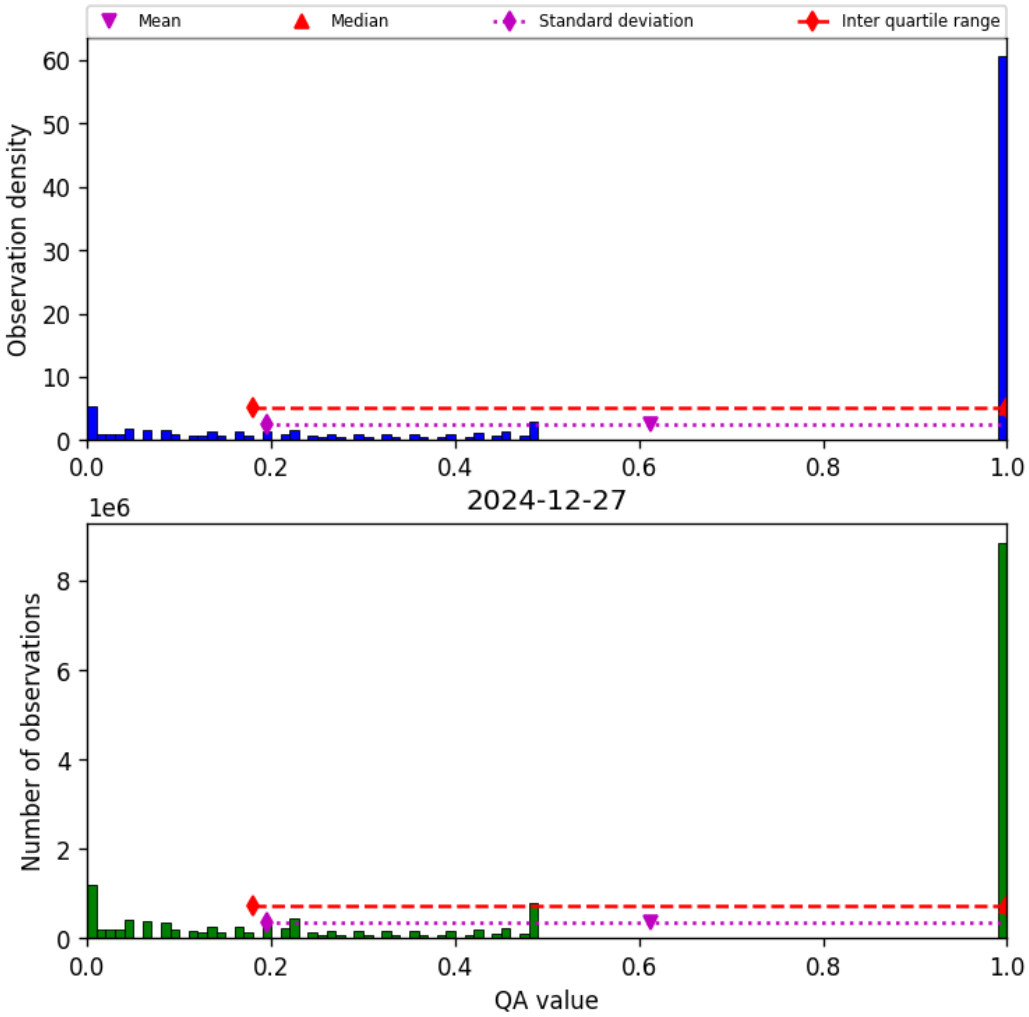

Figure 57: Histogram of “QA value” for 2024-12-27 to 2024-12-28

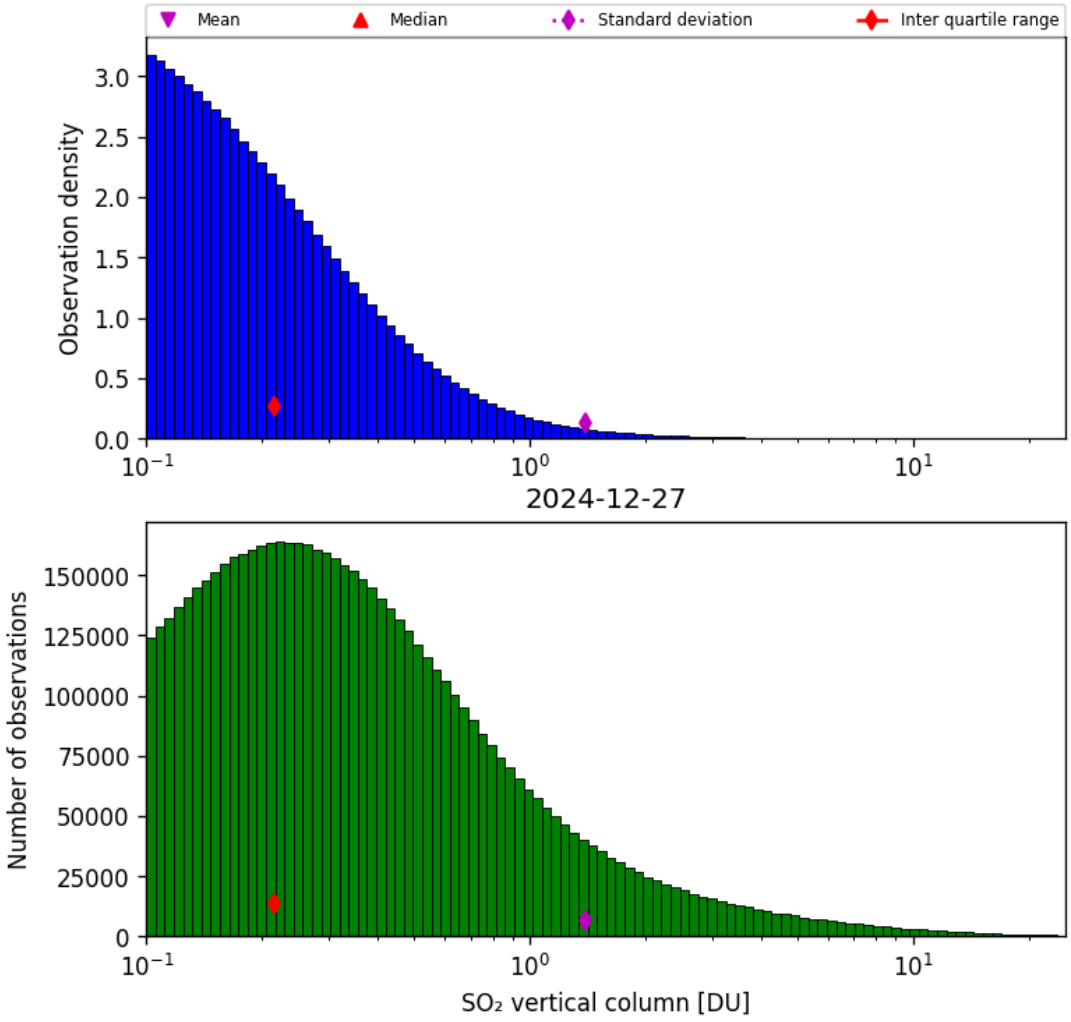

Figure 58: Histogram of "SO_2 vertical column" for 2024-12-27 to 2024-12-28

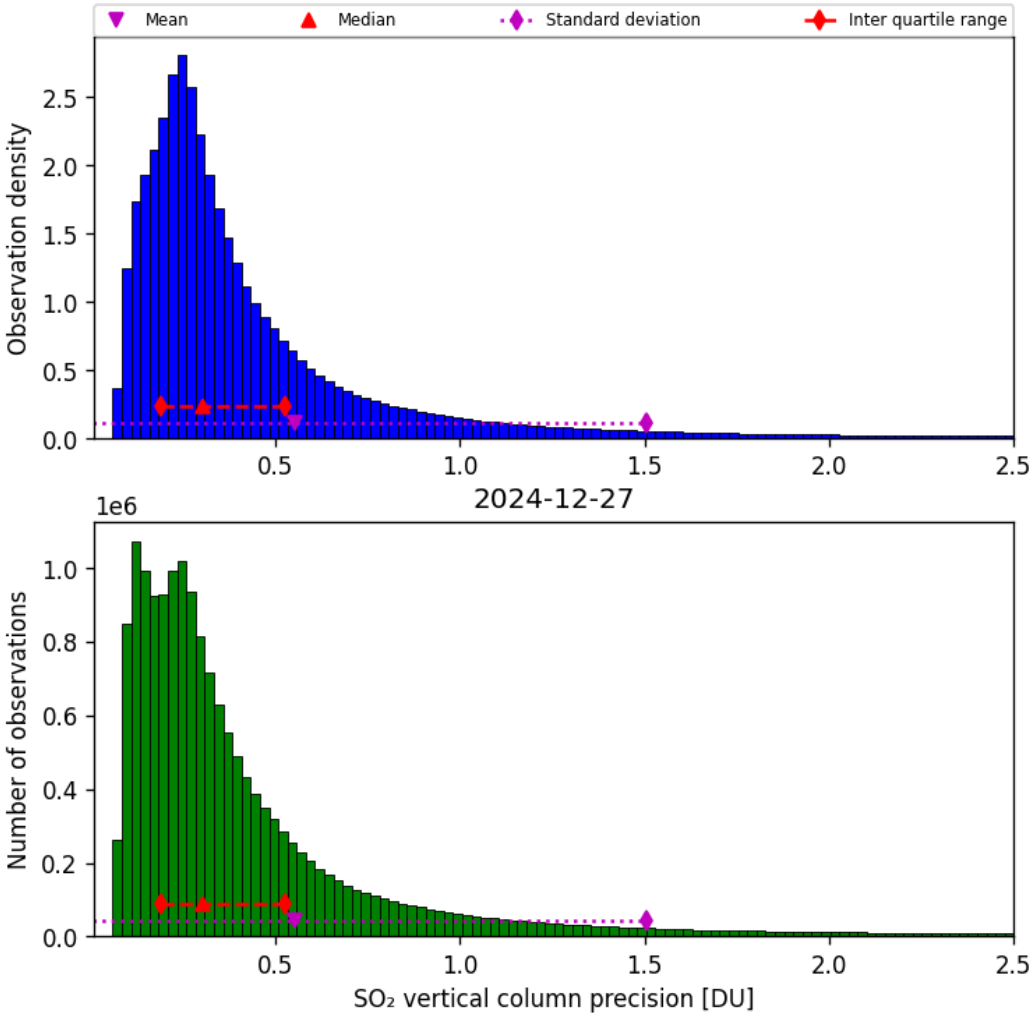

Figure 59: Histogram of "SO_2 vertical column precision" for 2024-12-27 to 2024-12-28

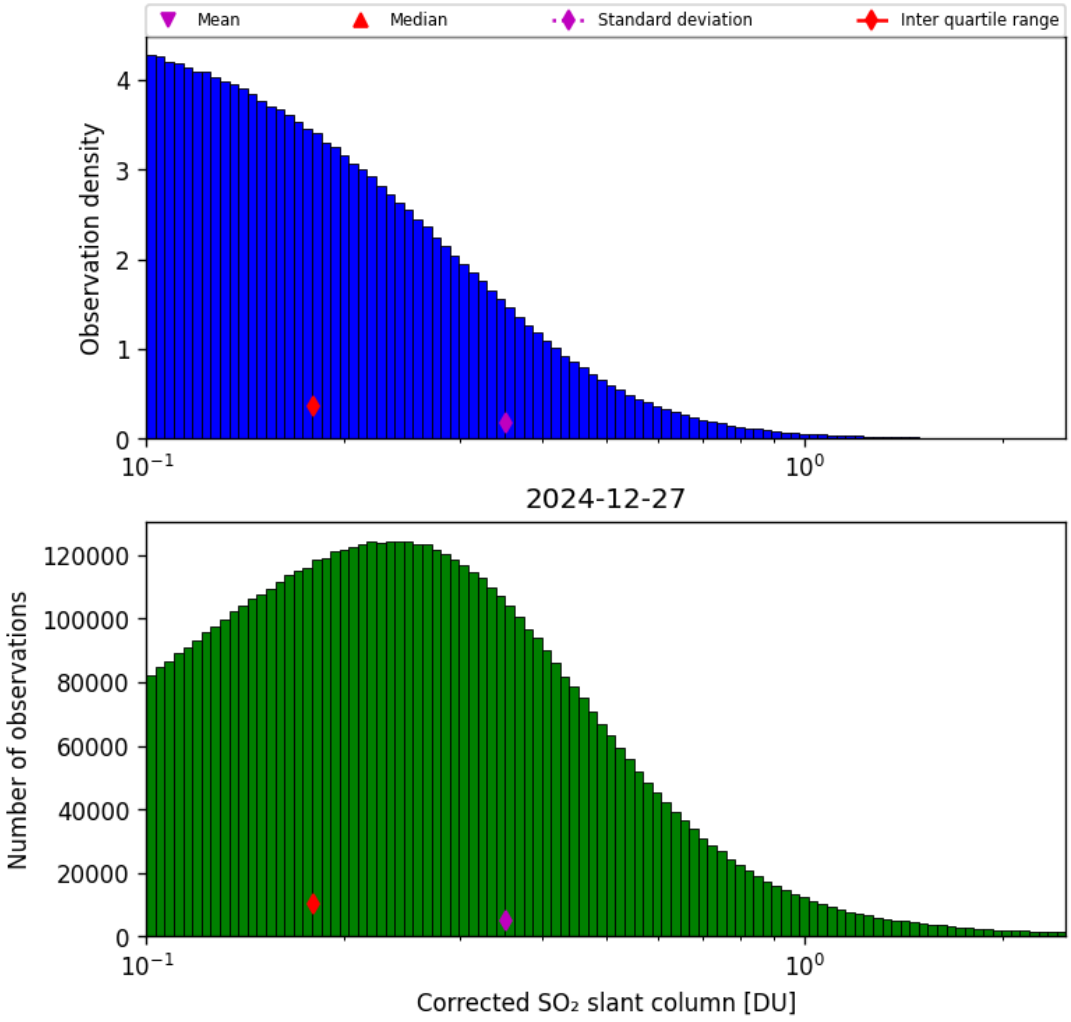

Figure 60: Histogram of "Corrected SO_2 slant column" for 2024-12-27 to 2024-12-28

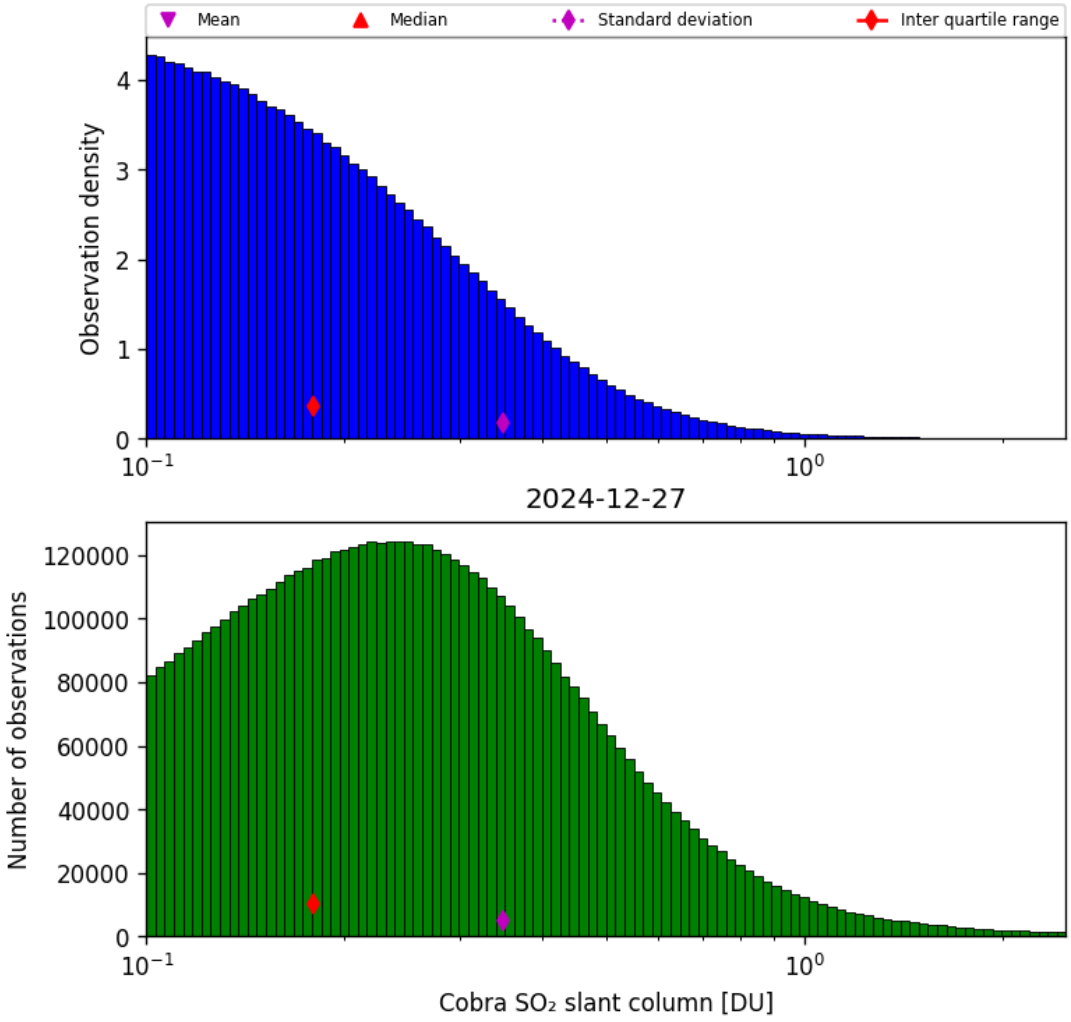

Figure 61: Histogram of "Cobra SO_2 slant column" for 2024-12-27 to 2024-12-28

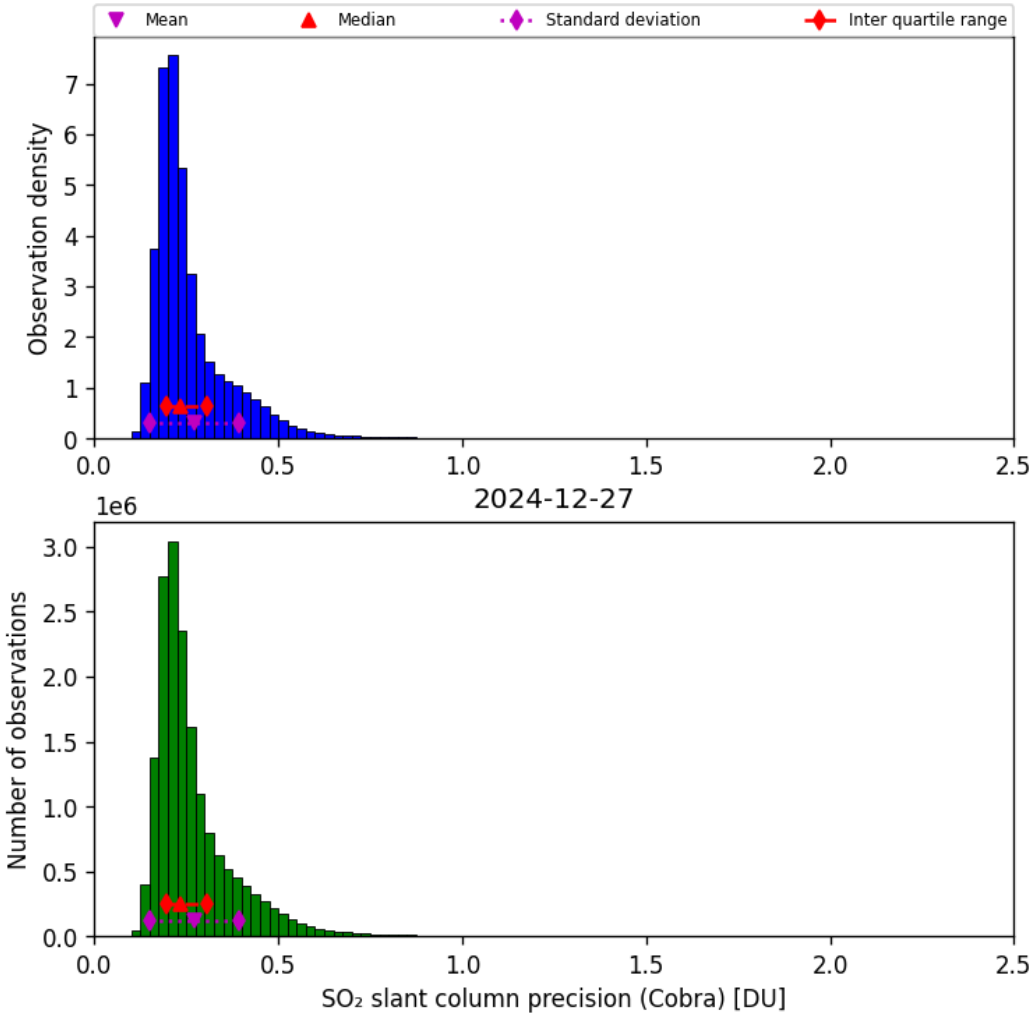

Figure 62: Histogram of "SO_2 slant column precision (Cobra)" for 2024-12-27 to 2024-12-28

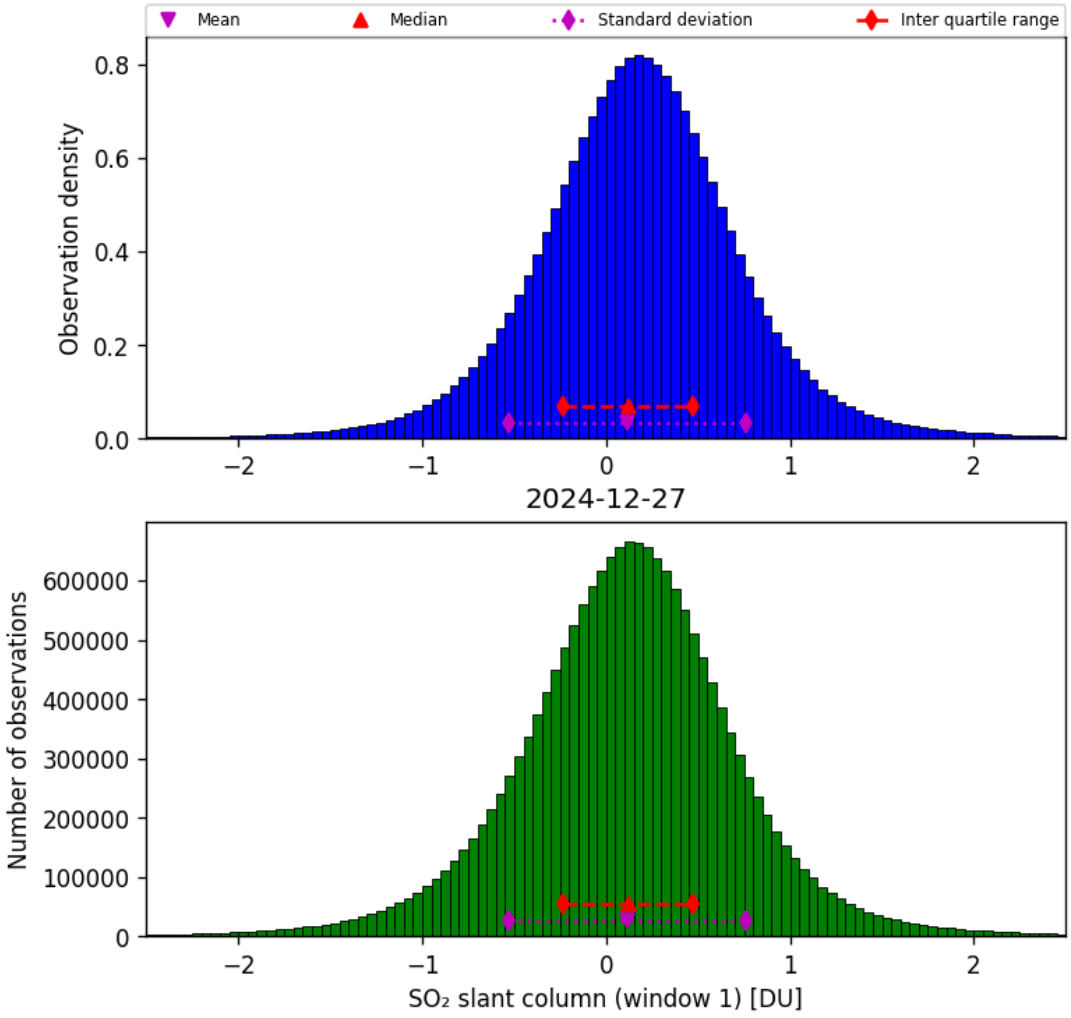

Figure 63: Histogram of "SO_2 slant column (window 1)" for 2024-12-27 to 2024-12-28

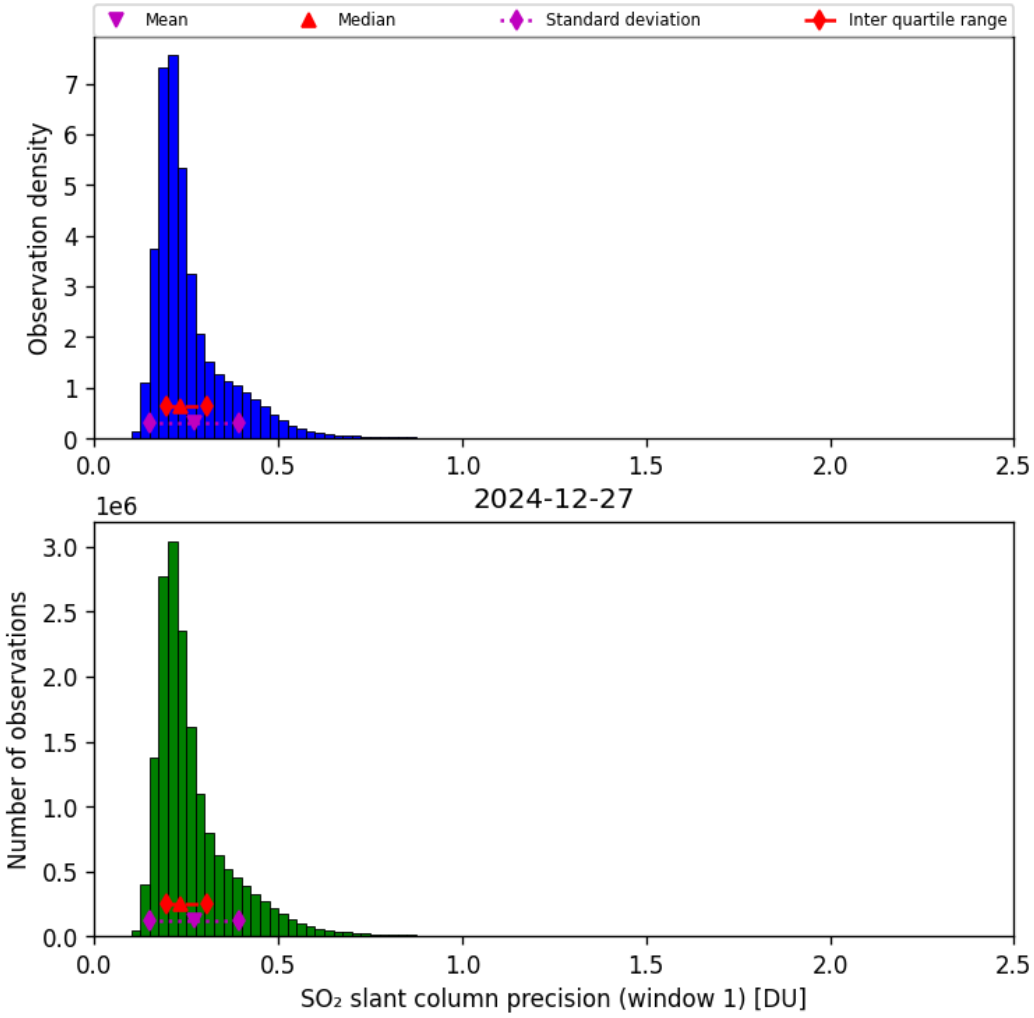

Figure 64: Histogram of "SO_2 slant column precision (window 1)" for 2024-12-27 to 2024-12-28

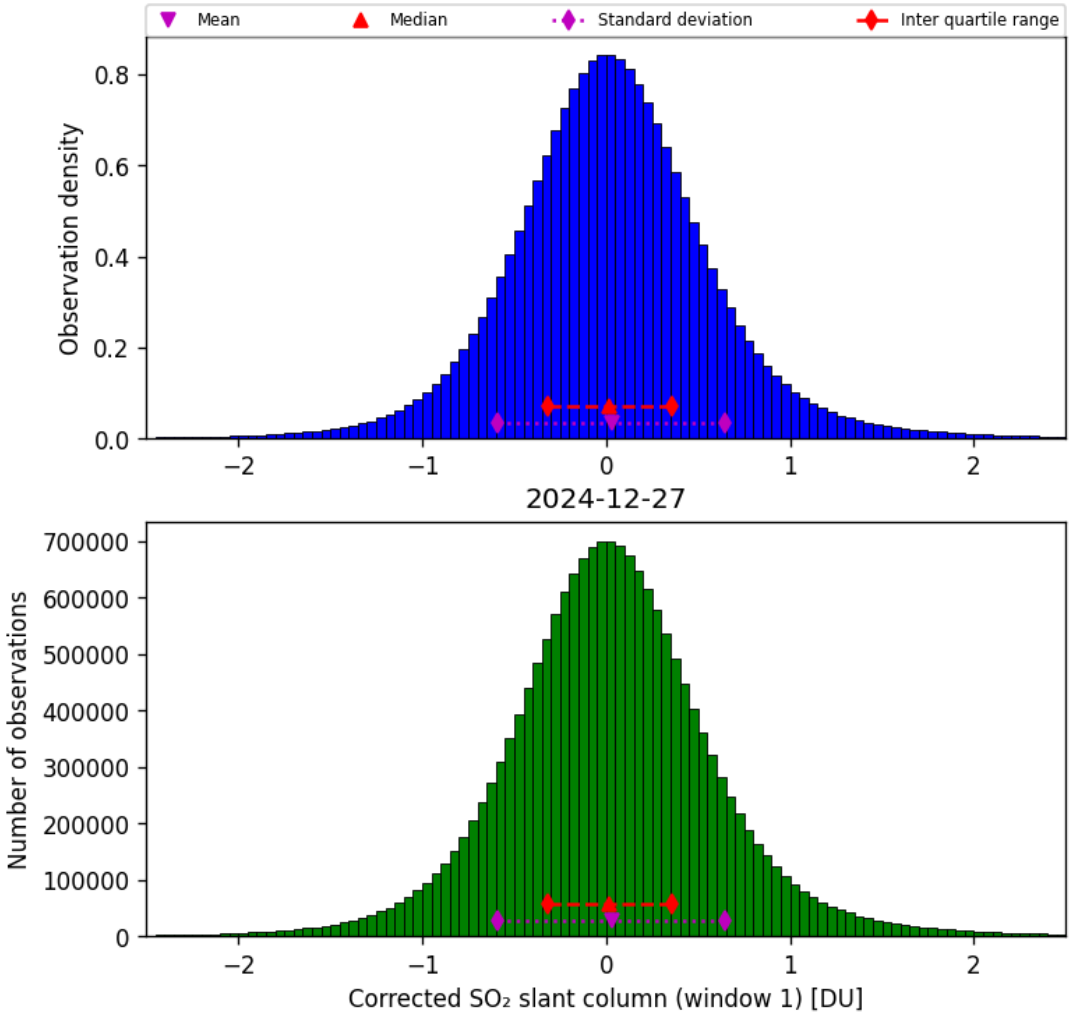

Figure 65: Histogram of "Corrected SO_2 slant column (window 1)" for 2024-12-27 to 2024-12-28

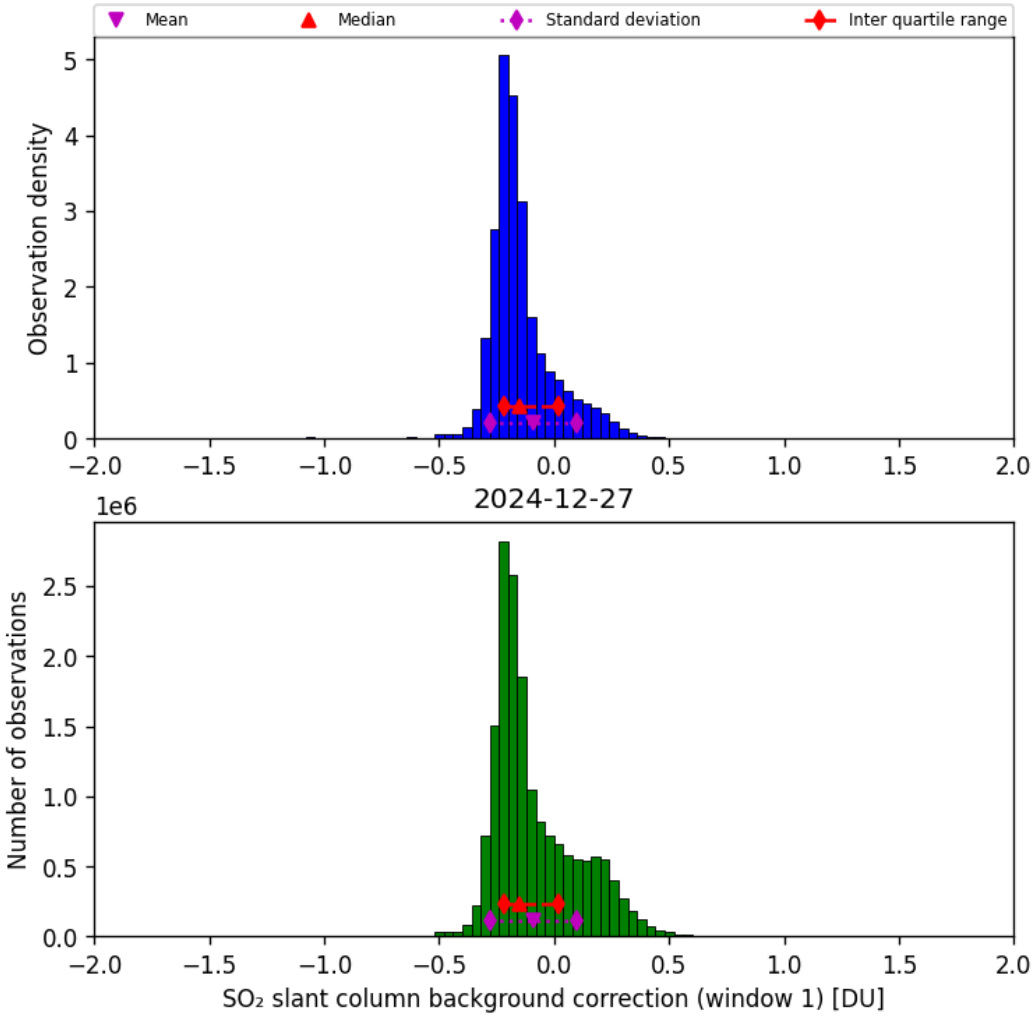

Figure 66: Histogram of "SO_2 slant column background correction (window 1)" for 2024-12-27 to 2024-12-28

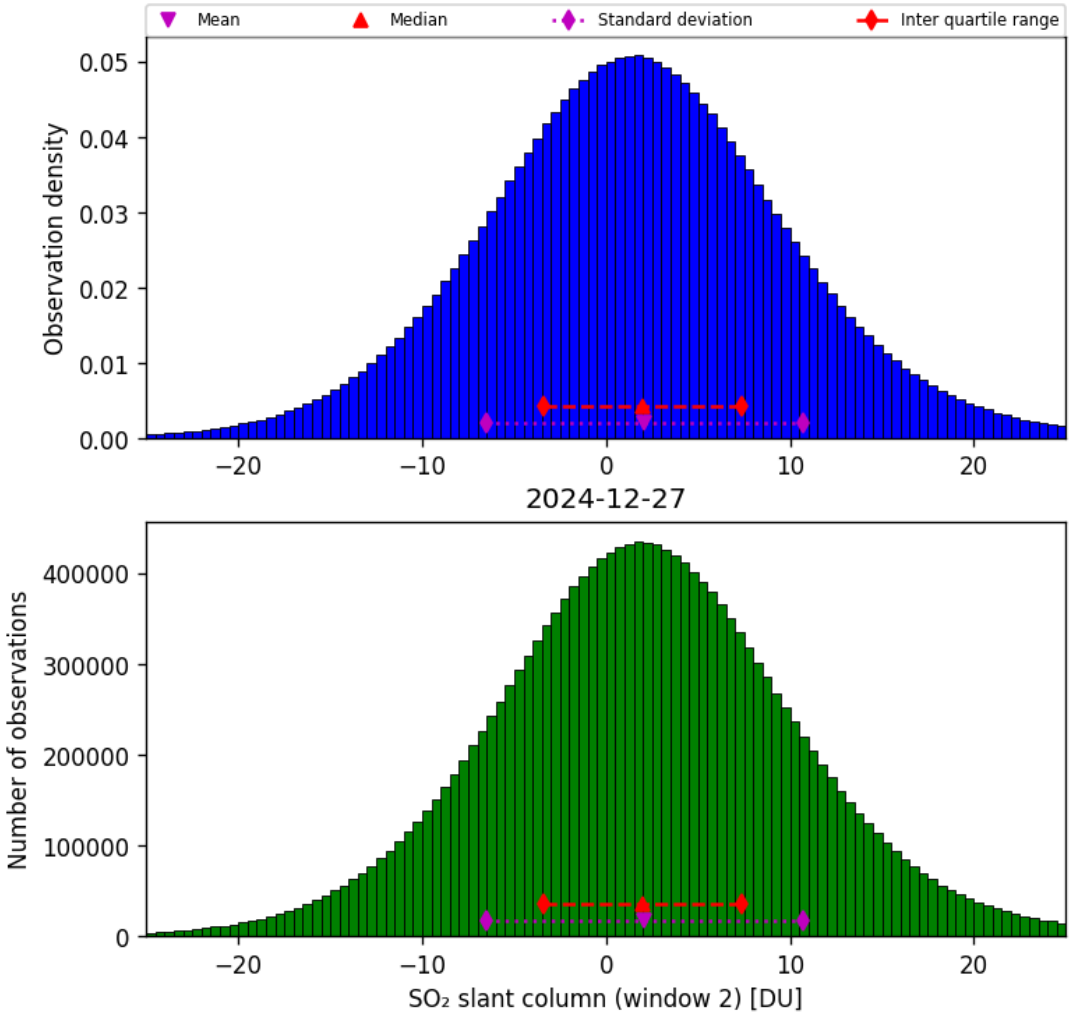

Figure 67: Histogram of "SO_2 slant column (window 2)" for 2024-12-27 to 2024-12-28

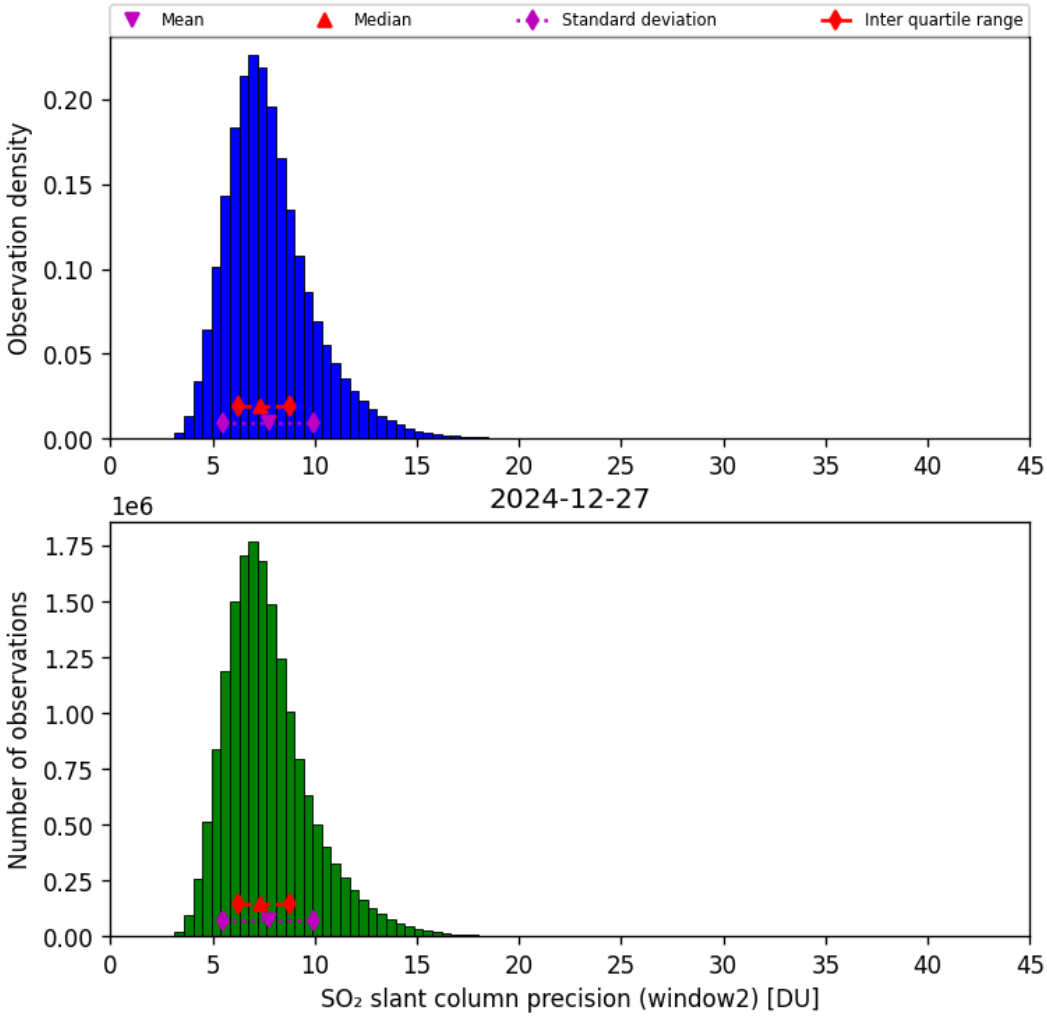

Figure 68: Histogram of "SO_2 slant column precision (window2)" for 2024-12-27 to 2024-12-28

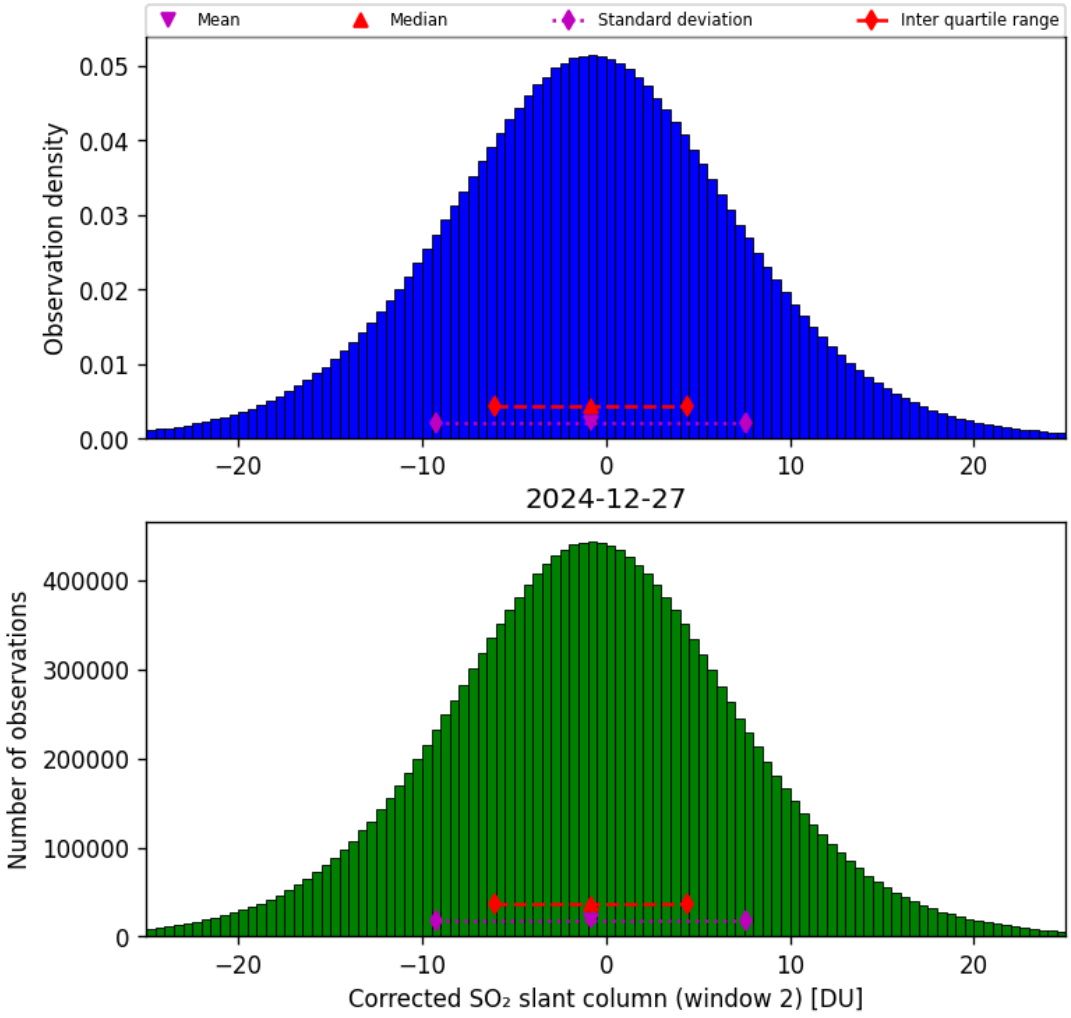

Figure 69: Histogram of "Corrected SO_2 slant column (window 2)" for 2024-12-27 to 2024-12-28

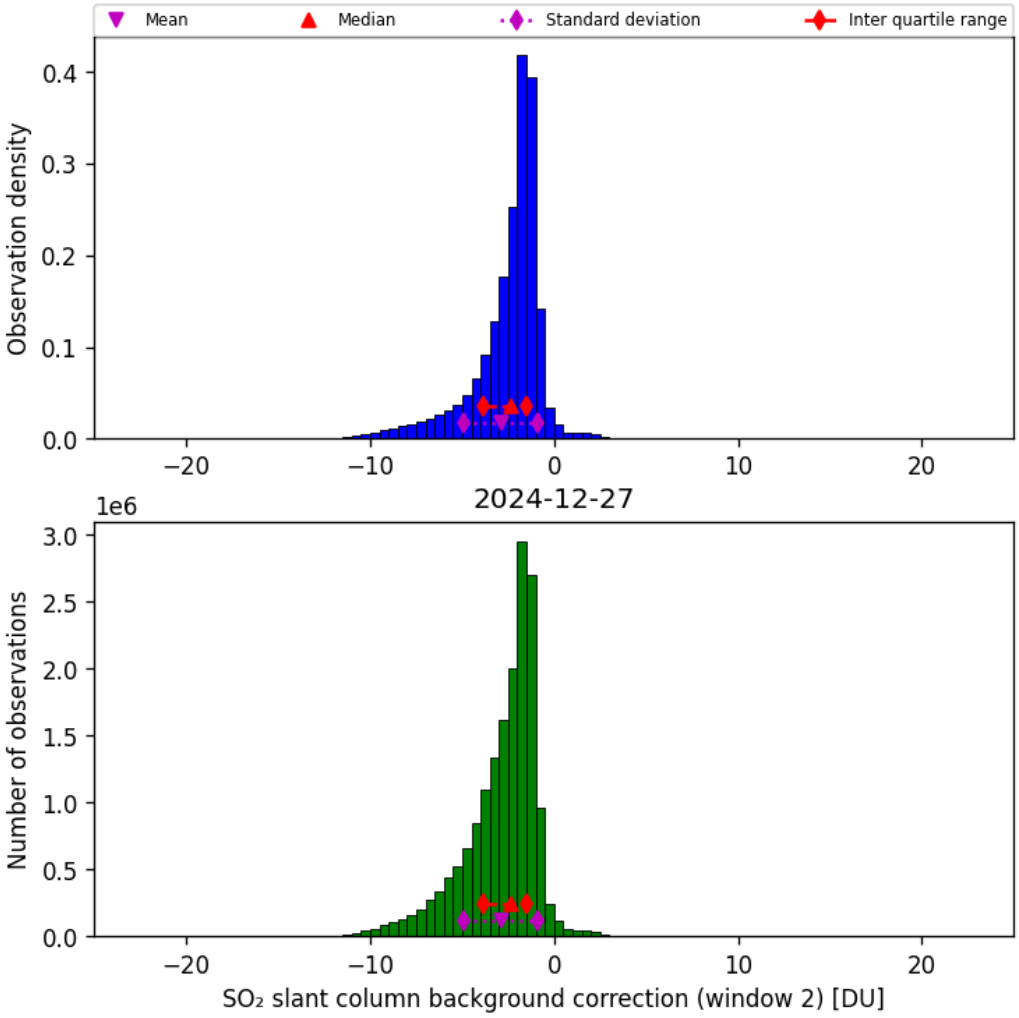

Figure 70: Histogram of "SO_2 slant column background correction (window 2)" for 2024-12-27 to 2024-12-28

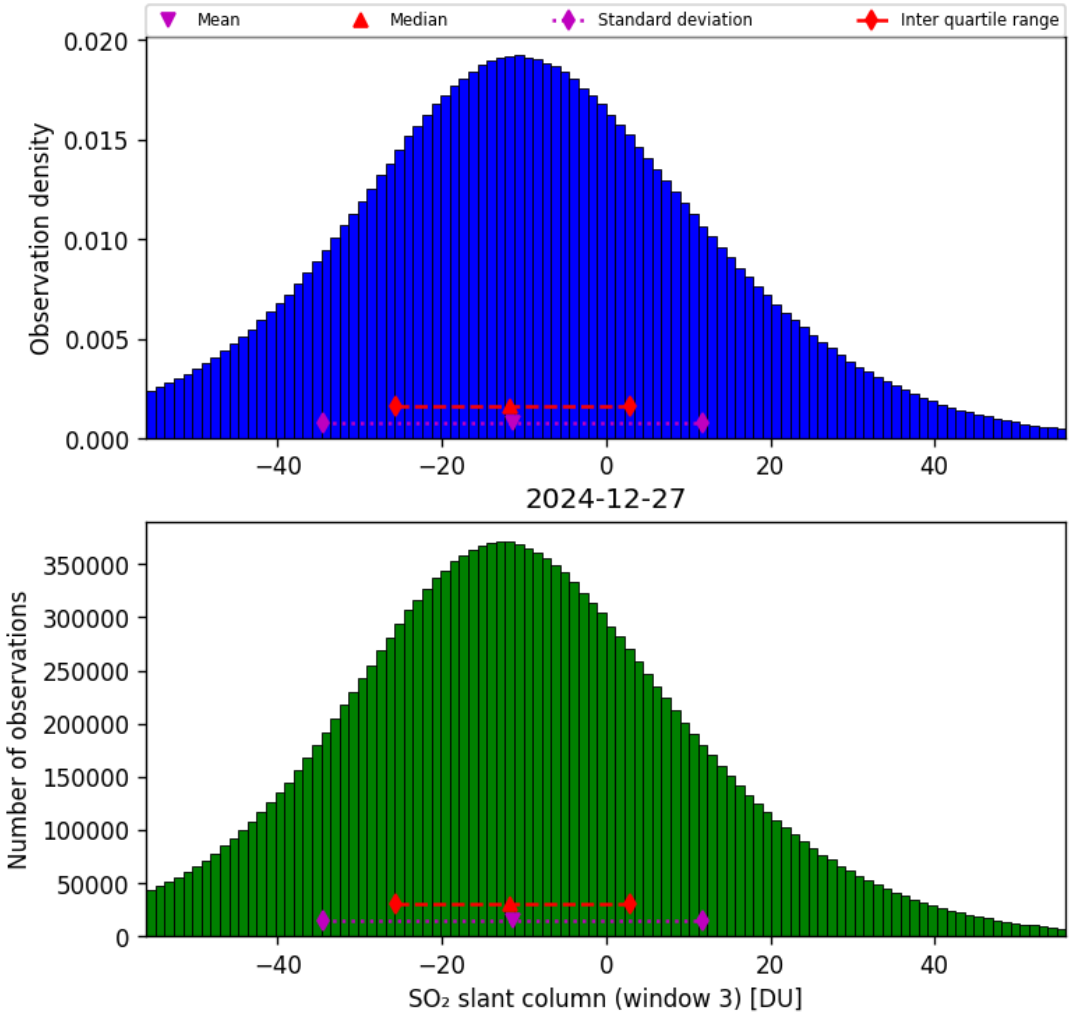

Figure 71: Histogram of "SO_2 slant column (window 3)" for 2024-12-27 to 2024-12-28

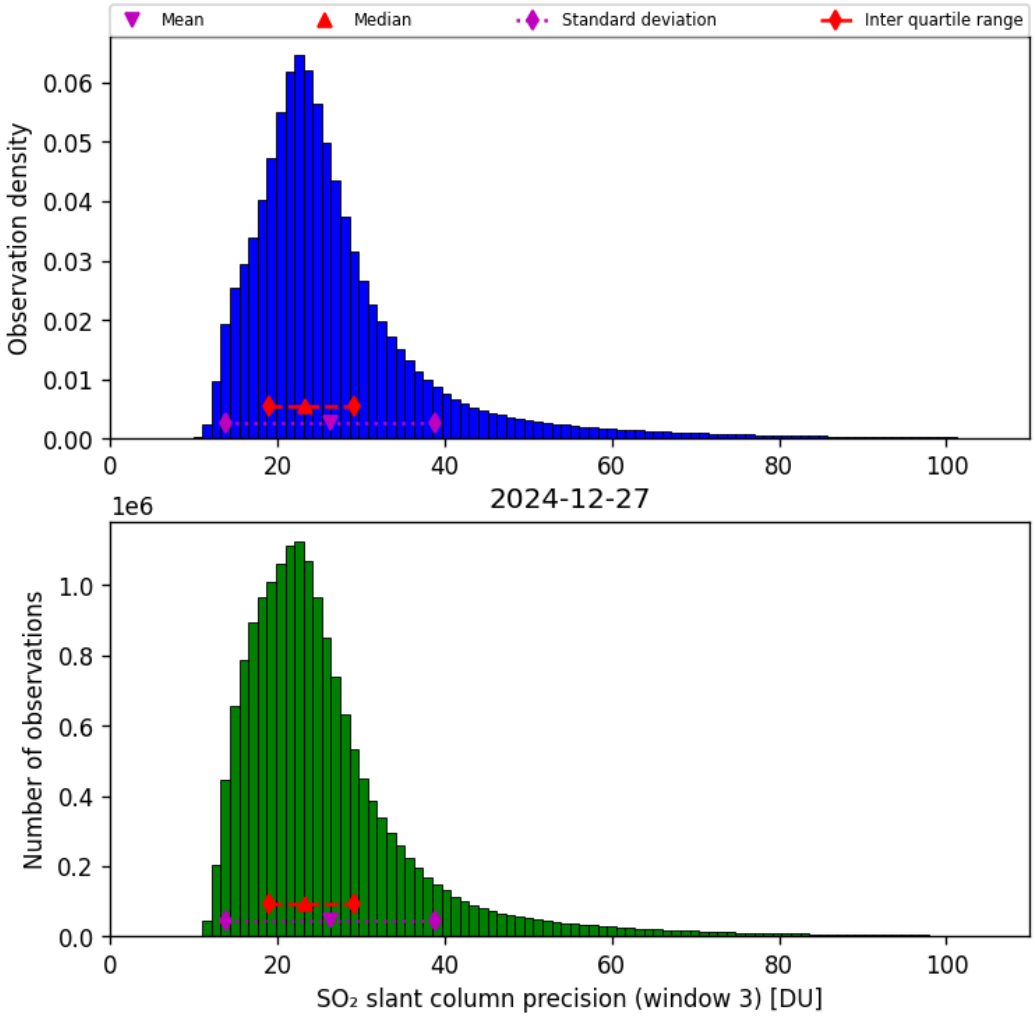

Figure 72: Histogram of "SO_2 slant column precision (window 3)" for 2024-12-27 to 2024-12-28

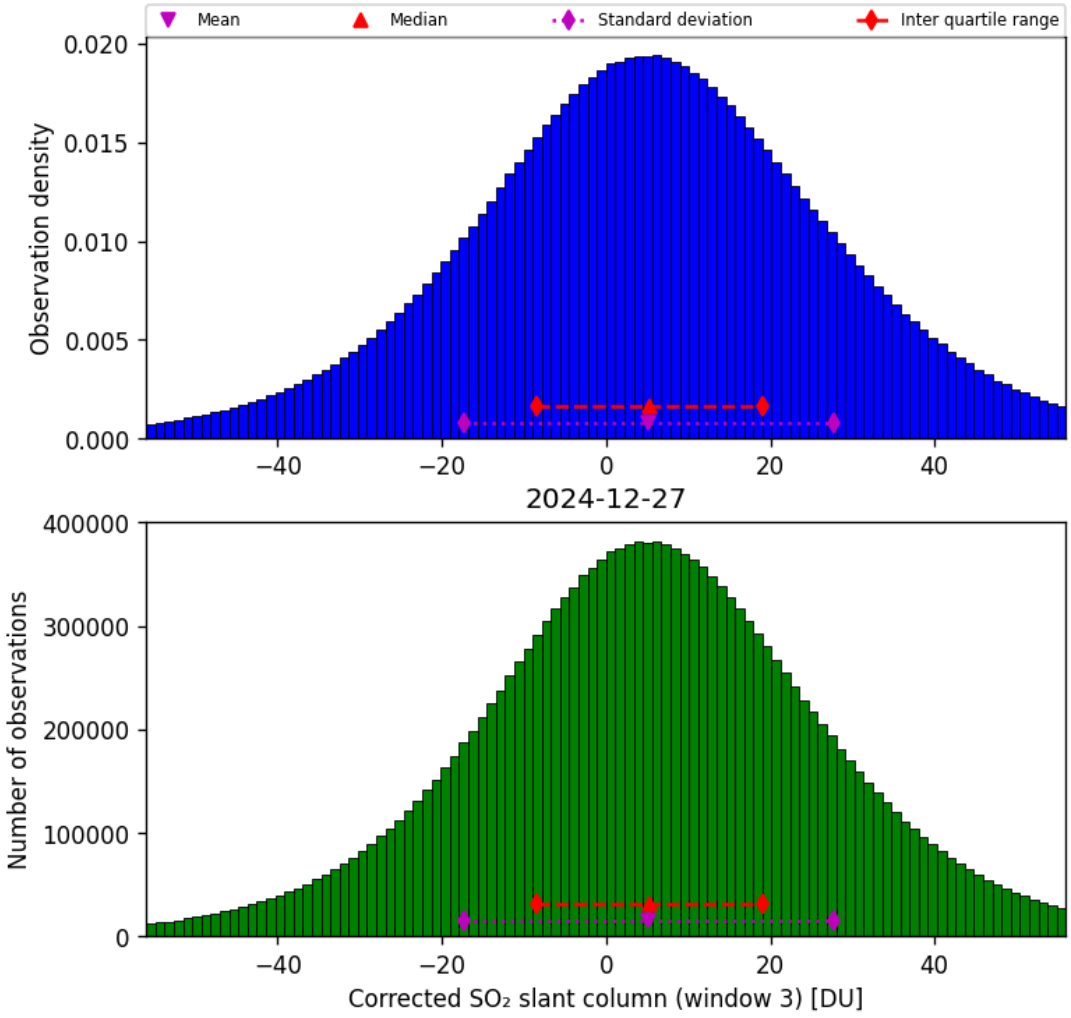

Figure 73: Histogram of "Corrected SO_2 slant column (window 3)" for 2024-12-27 to 2024-12-28

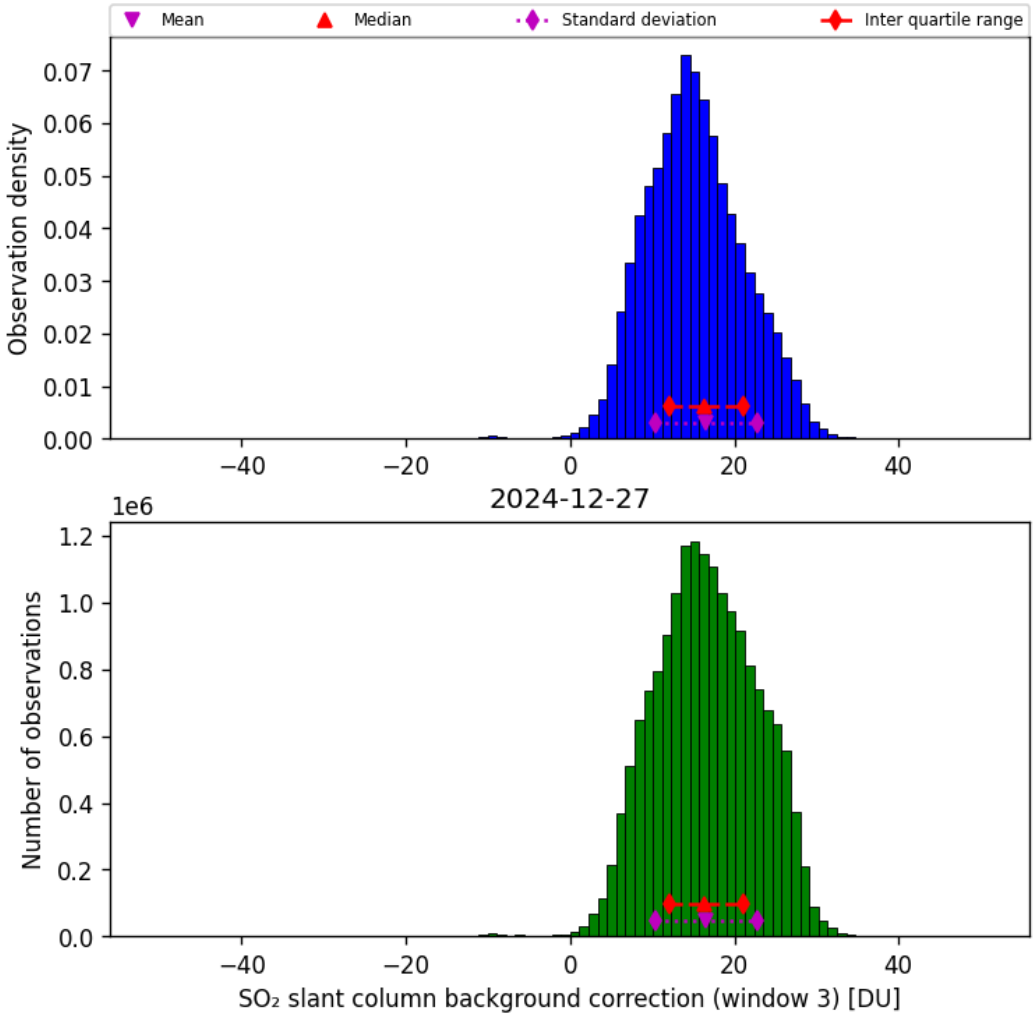

Figure 74: Histogram of "SO_2 slant column background correction (window 3)" for 2024-12-27 to 2024-12-28

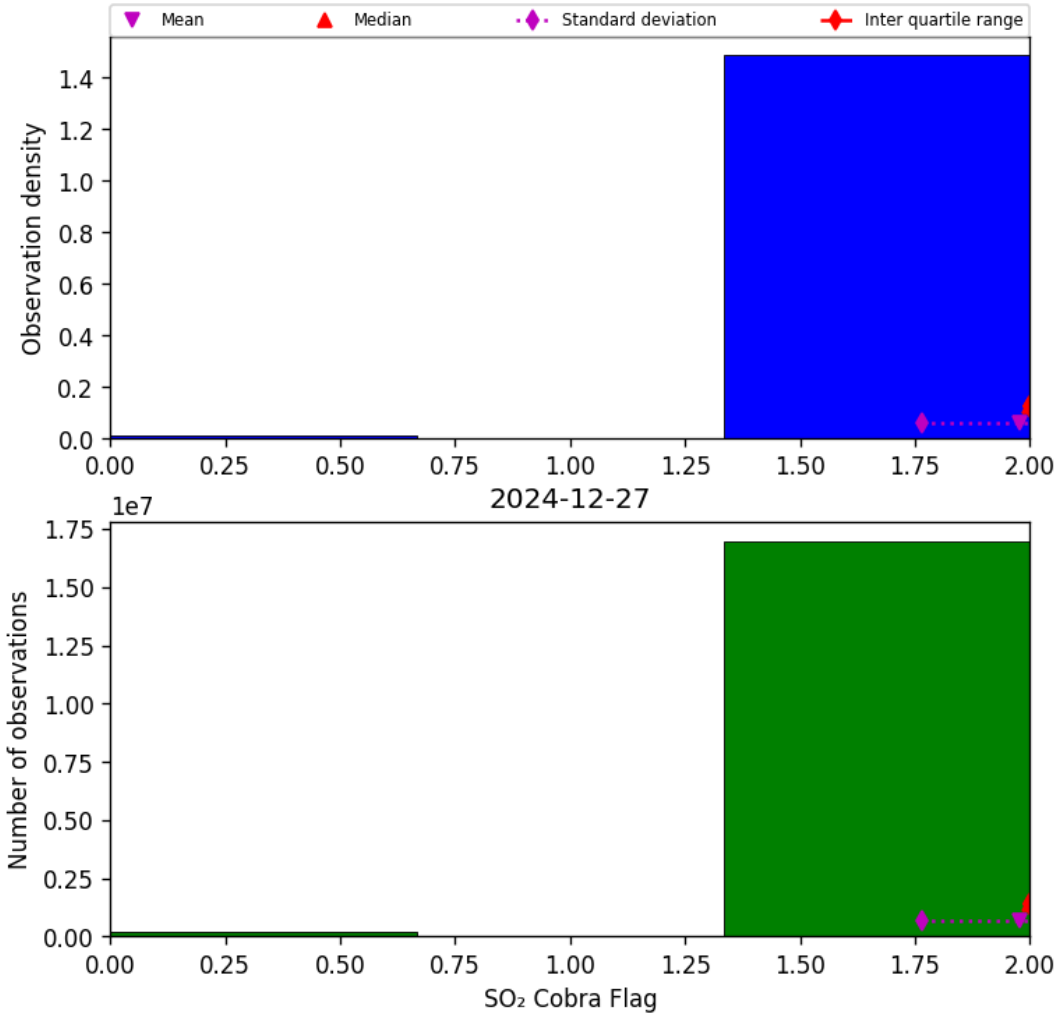

Figure 75: Histogram of "SO_2 Cobra Flag" for 2024-12-27 to 2024-12-28

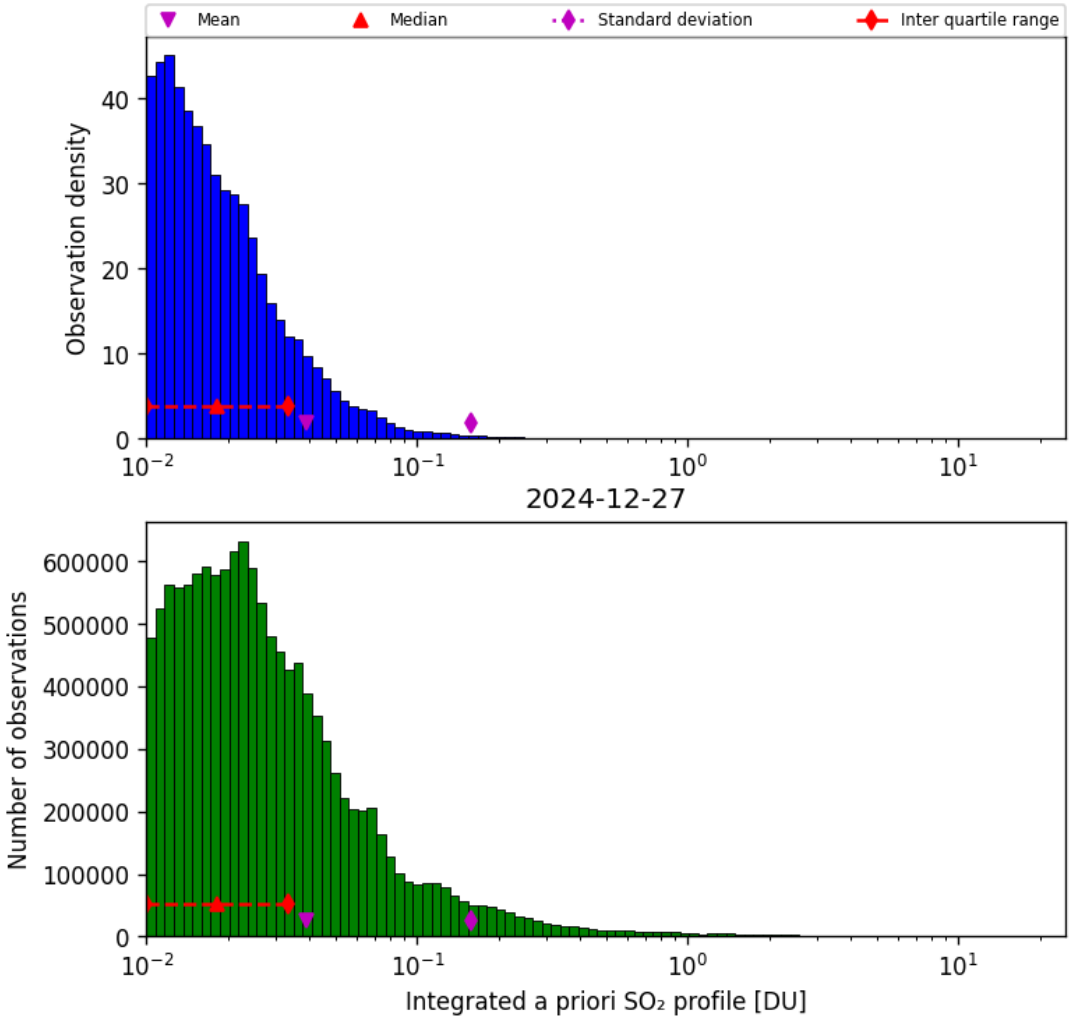

Figure 76: Histogram of "Integrated a priori SO_2 profile" for 2024-12-27 to 2024-12-28

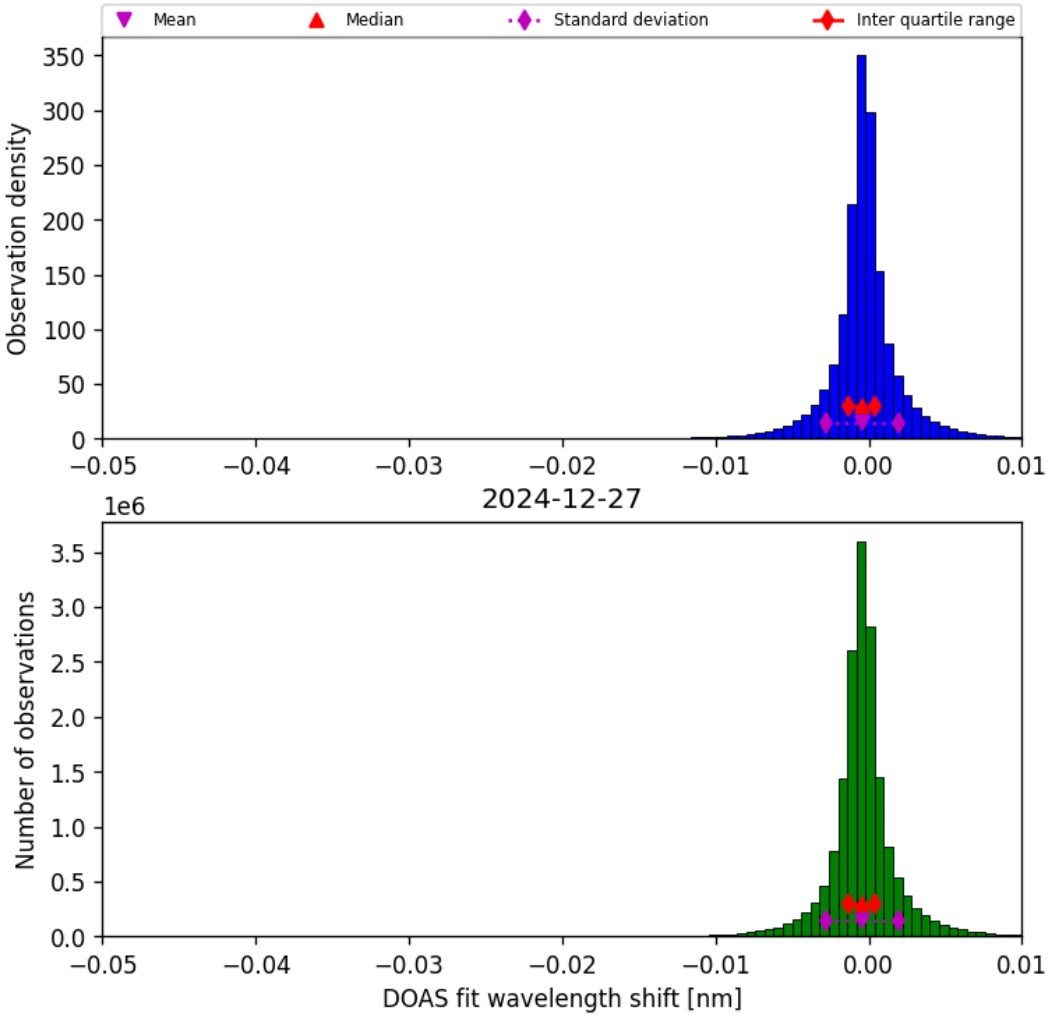

Figure 77: Histogram of “DOAS fit wavelength shift” for 2024-12-27 to 2024-12-28

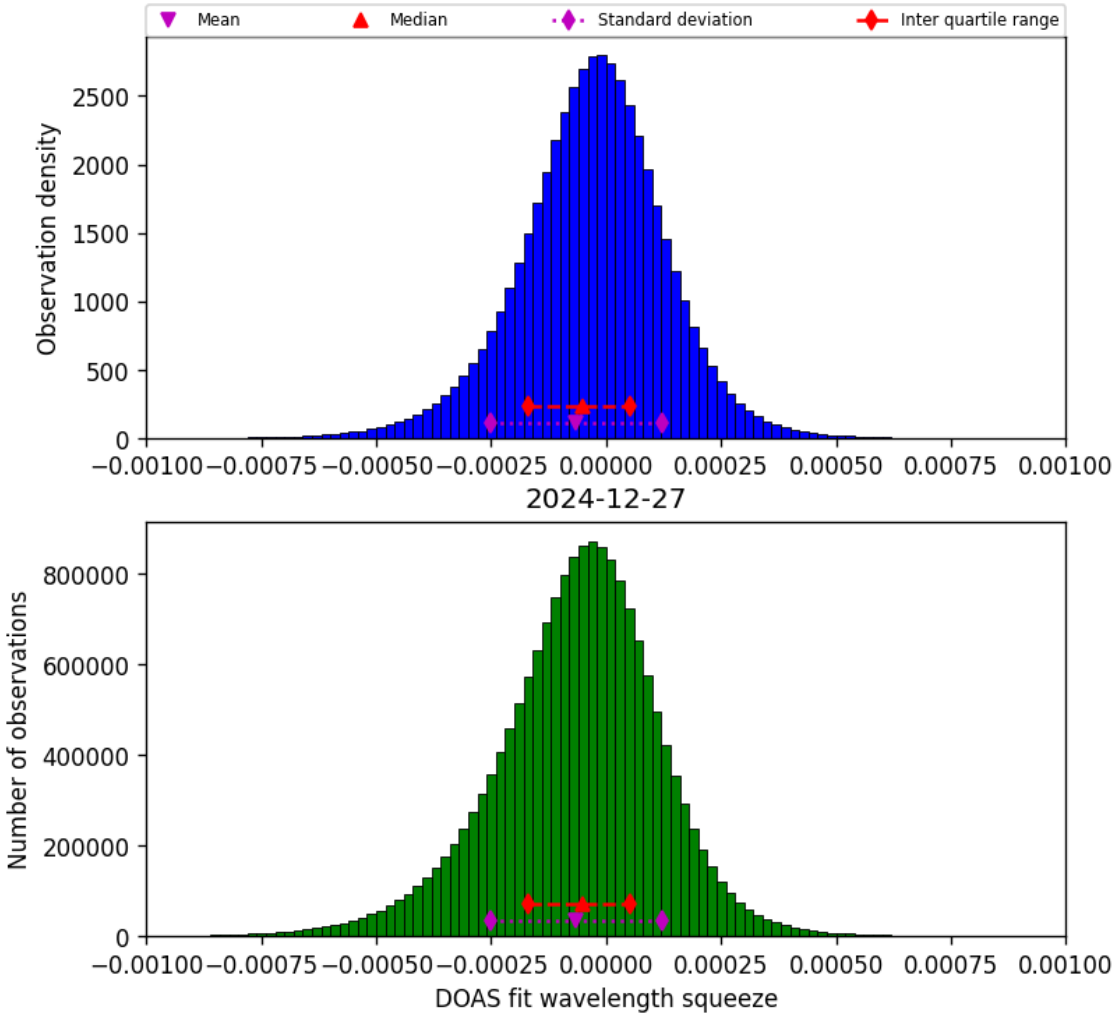

Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2024-12-27 to 2024-12-28

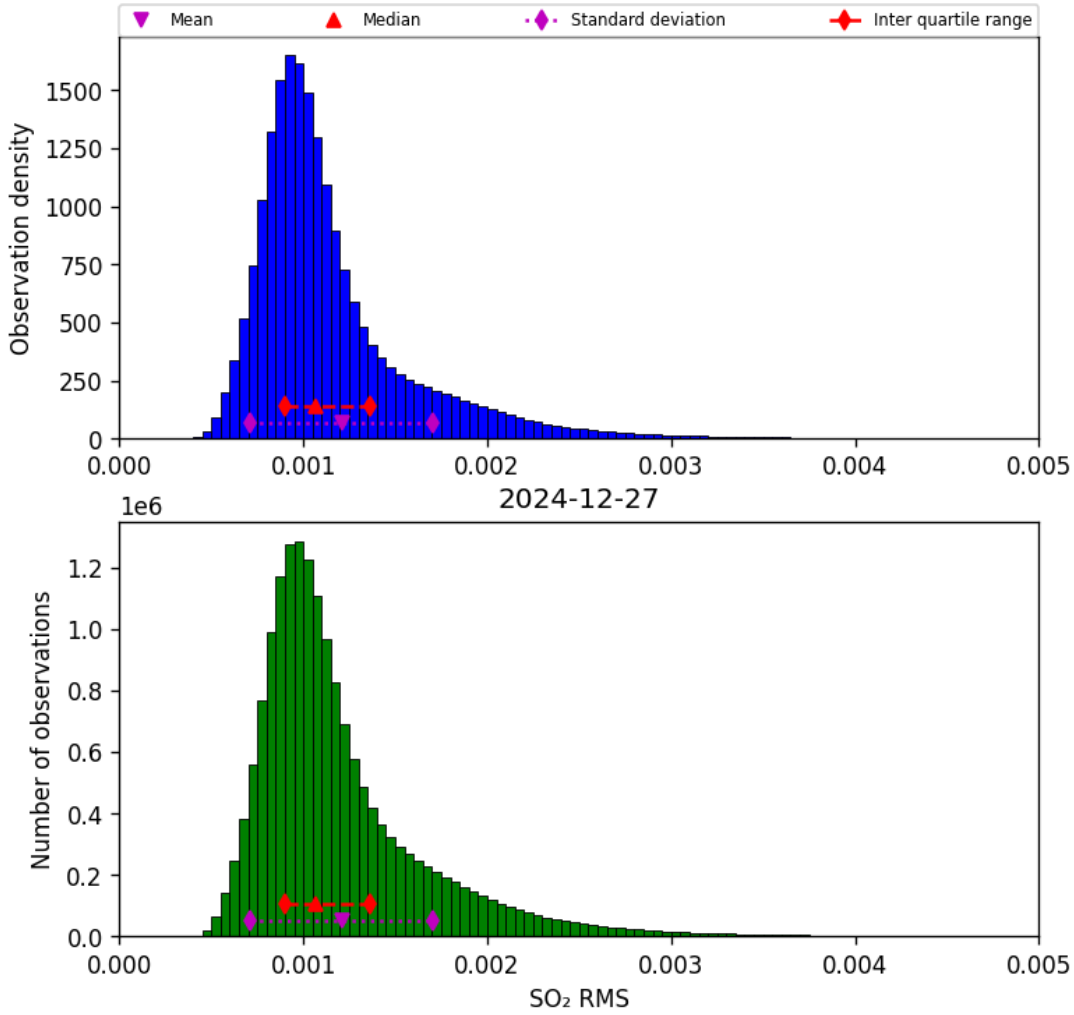

Figure 79: Histogram of "SO_2 RMS" for 2024-12-27 to 2024-12-28

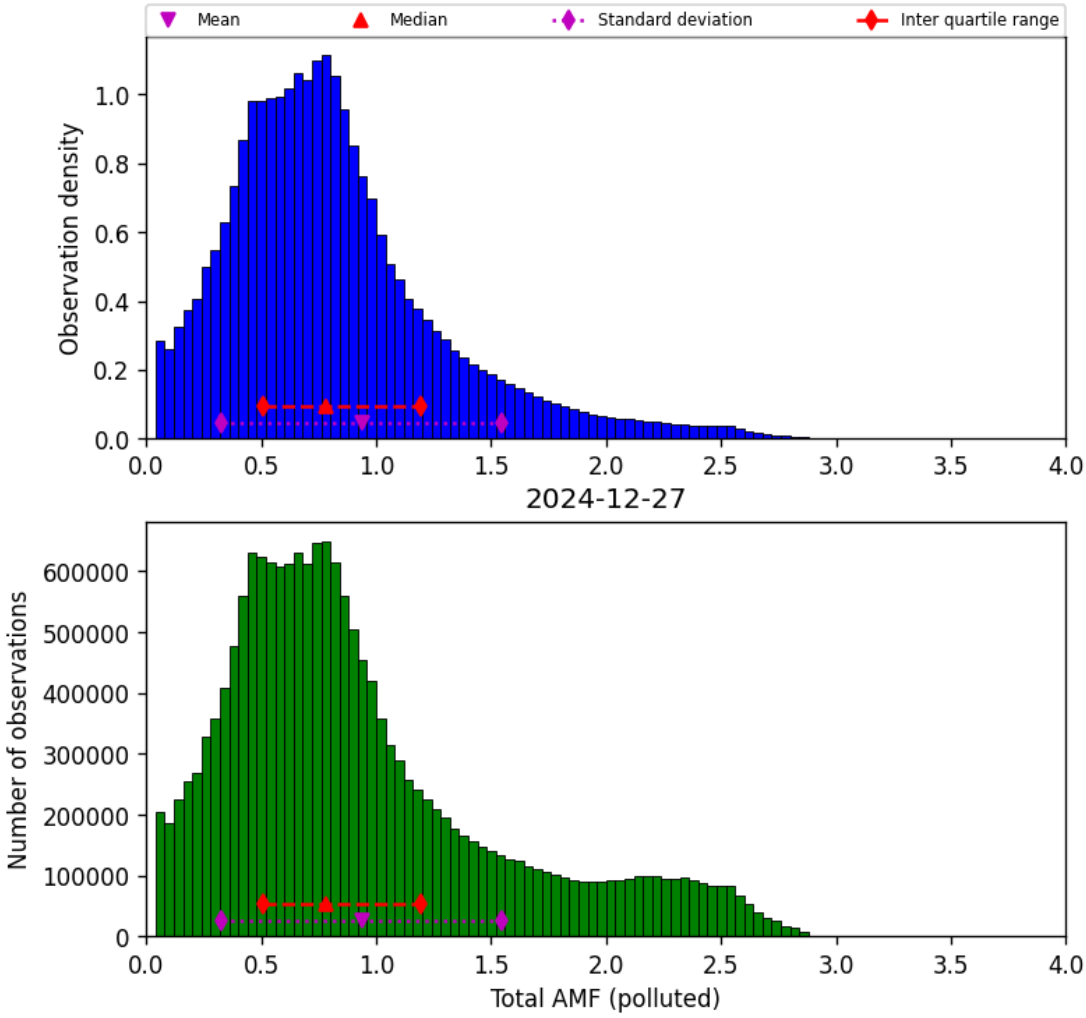

Figure 80: Histogram of “Total AMF (polluted)” for 2024-12-27 to 2024-12-28

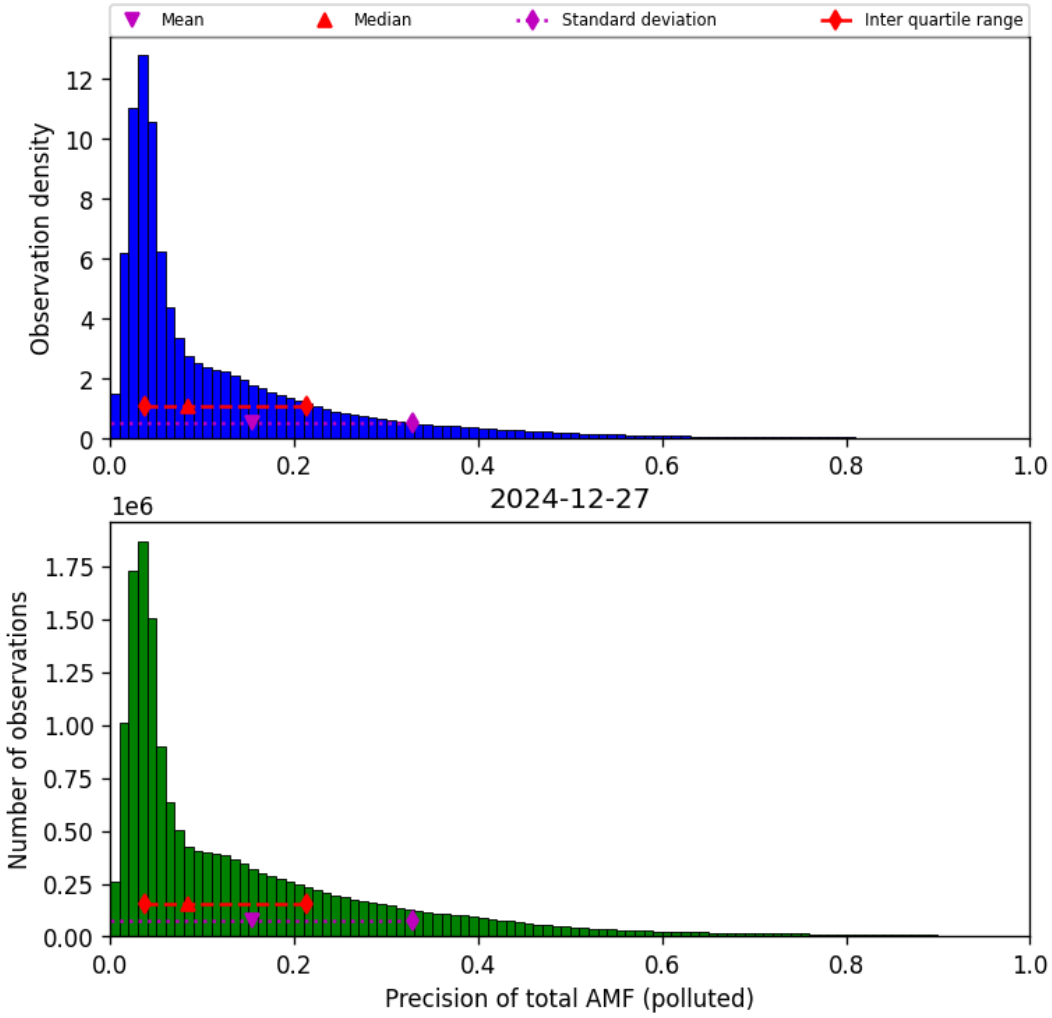

Figure 81: Histogram of “Precision of total AMF (polluted)” for 2024-12-27 to 2024-12-28

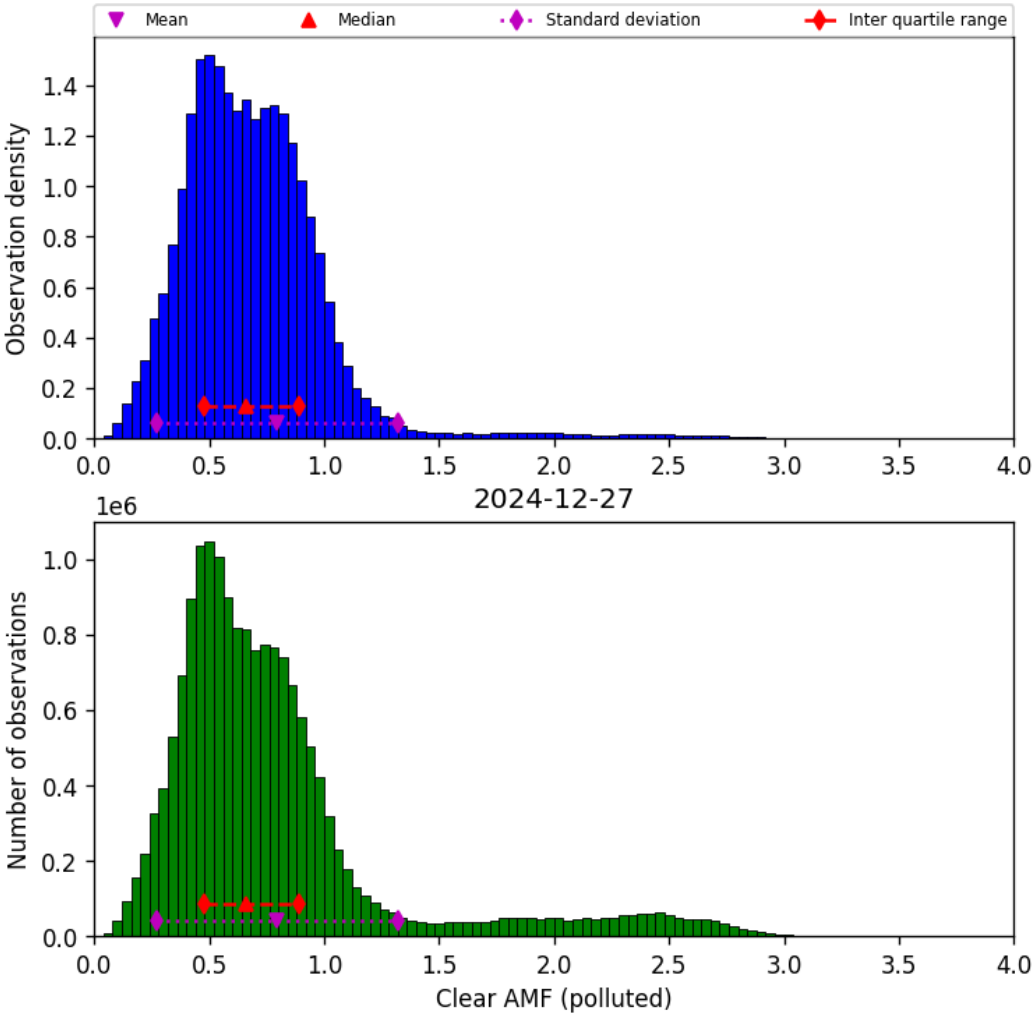

Figure 82: Histogram of “Clear AMF (polluted)” for 2024-12-27 to 2024-12-28

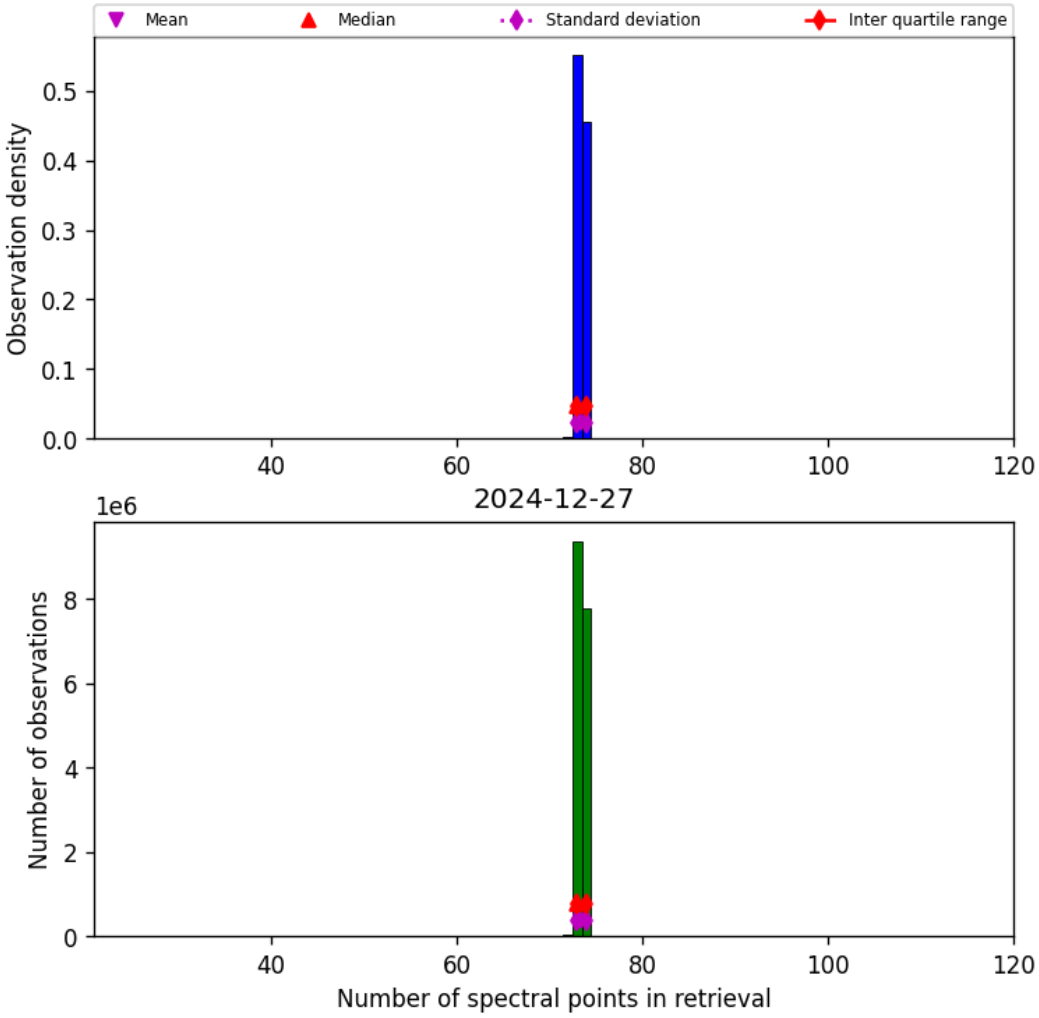

Figure 83: Histogram of “Number of spectral points in retrieval” for 2024-12-27 to 2024-12-28

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.

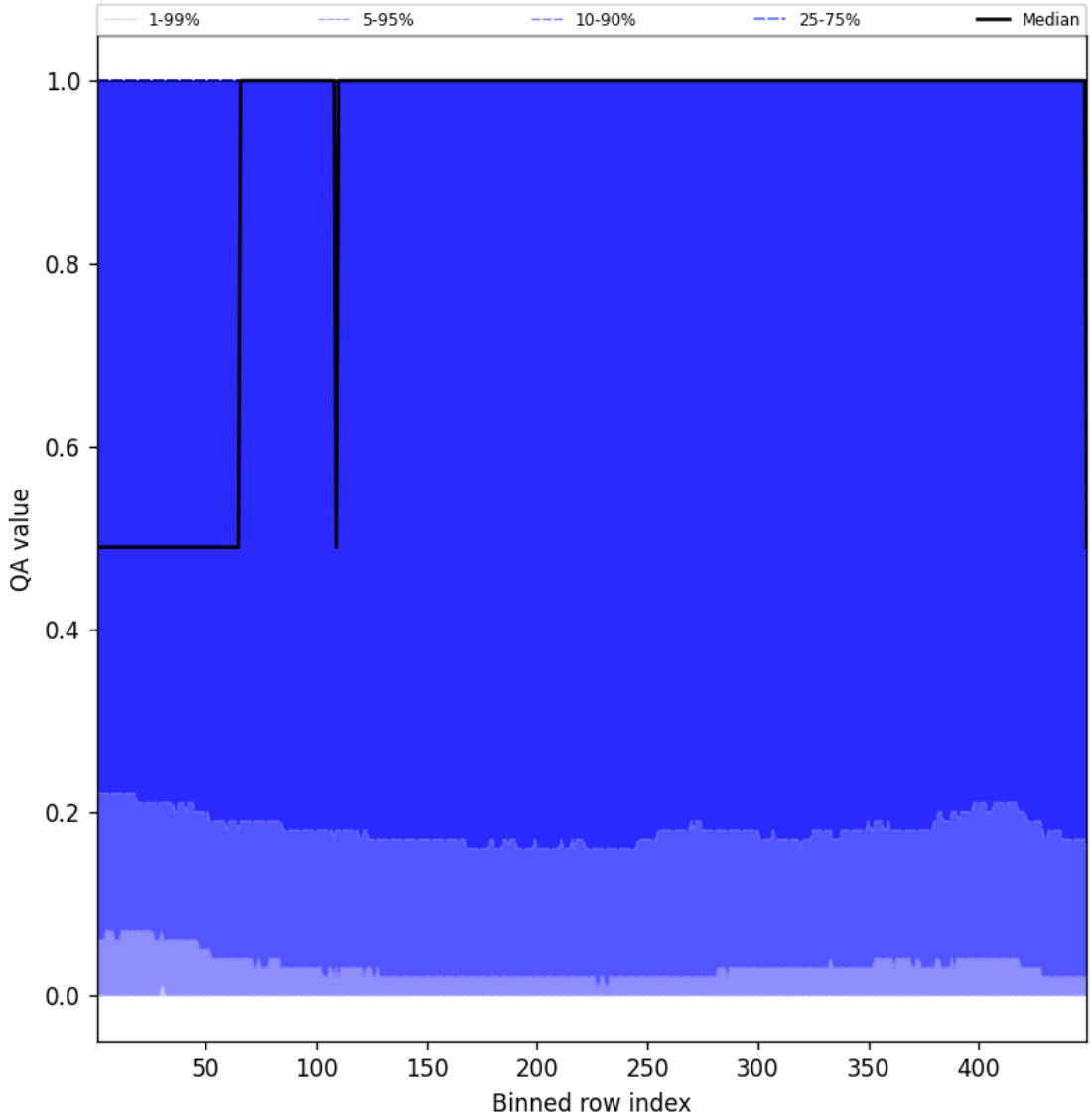

Figure 84: Along track statistics of “QA value” for 2024-12-27 to 2024-12-28

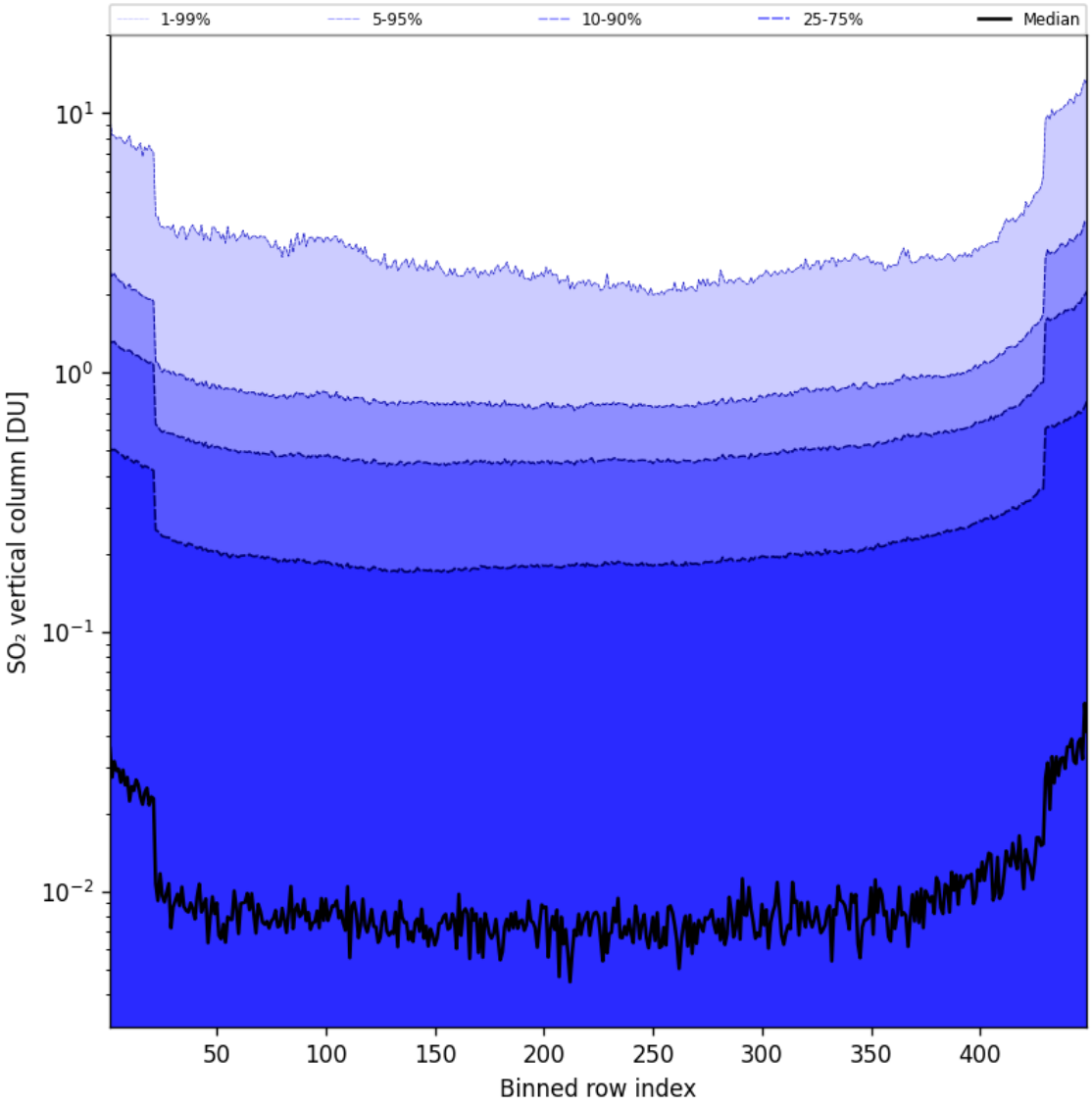

Figure 85: Along track statistics of "SO_2 vertical column" for 2024-12-27 to 2024-12-28

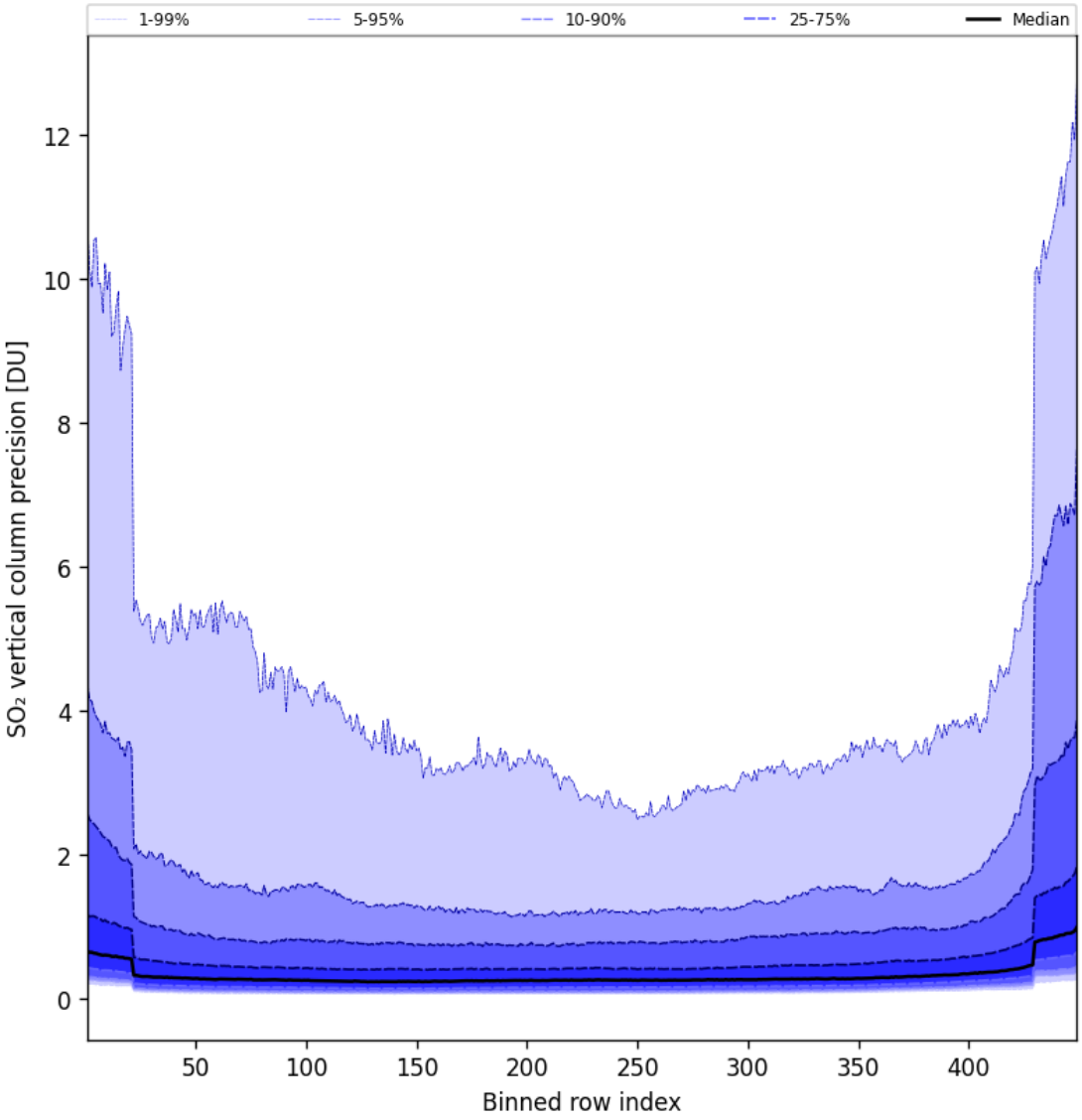

Figure 86: Along track statistics of "SO_2 vertical column precision" for 2024-12-27 to 2024-12-28

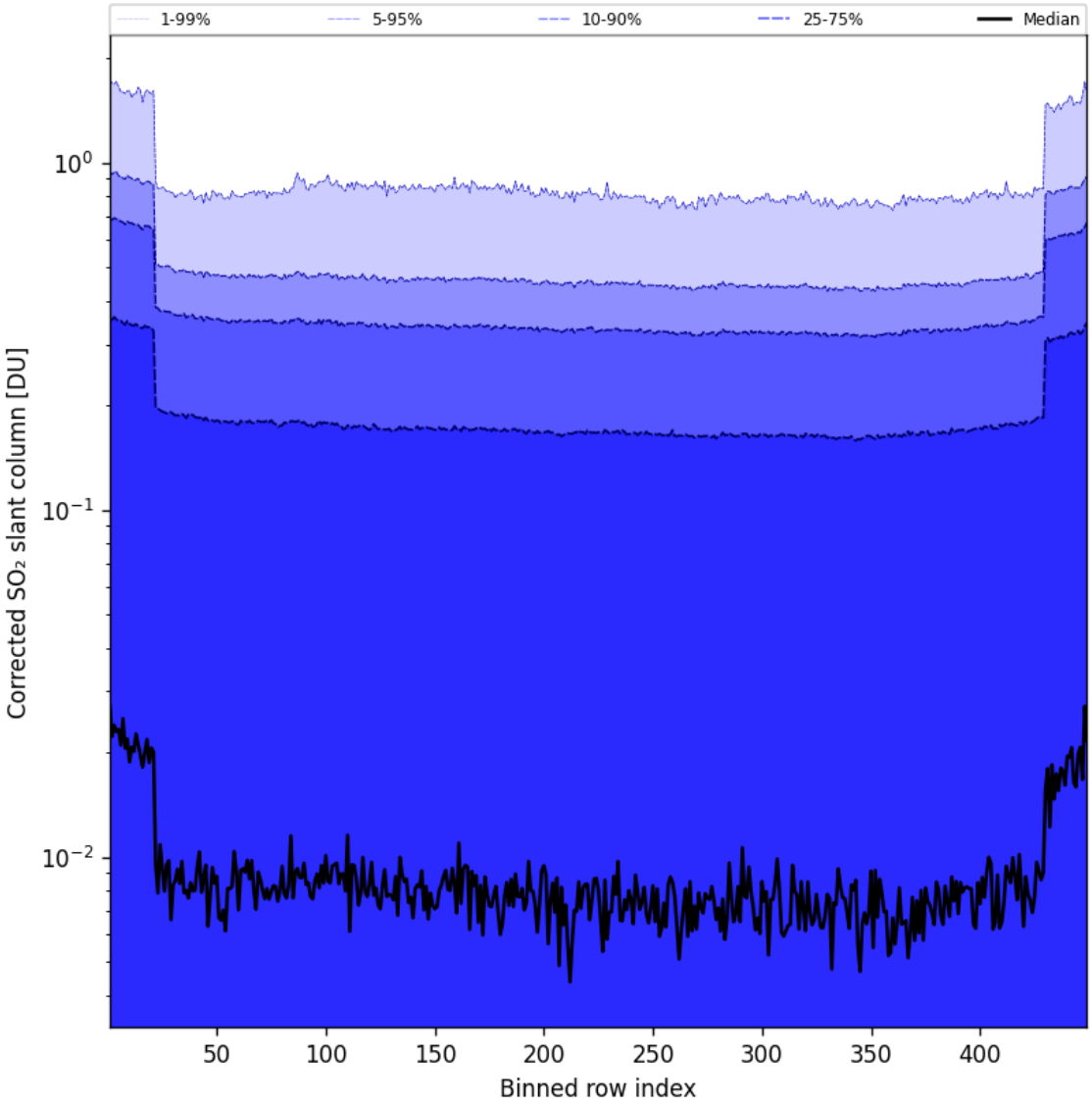

Figure 87: Along track statistics of "Corrected SO_2 slant column" for 2024-12-27 to 2024-12-28

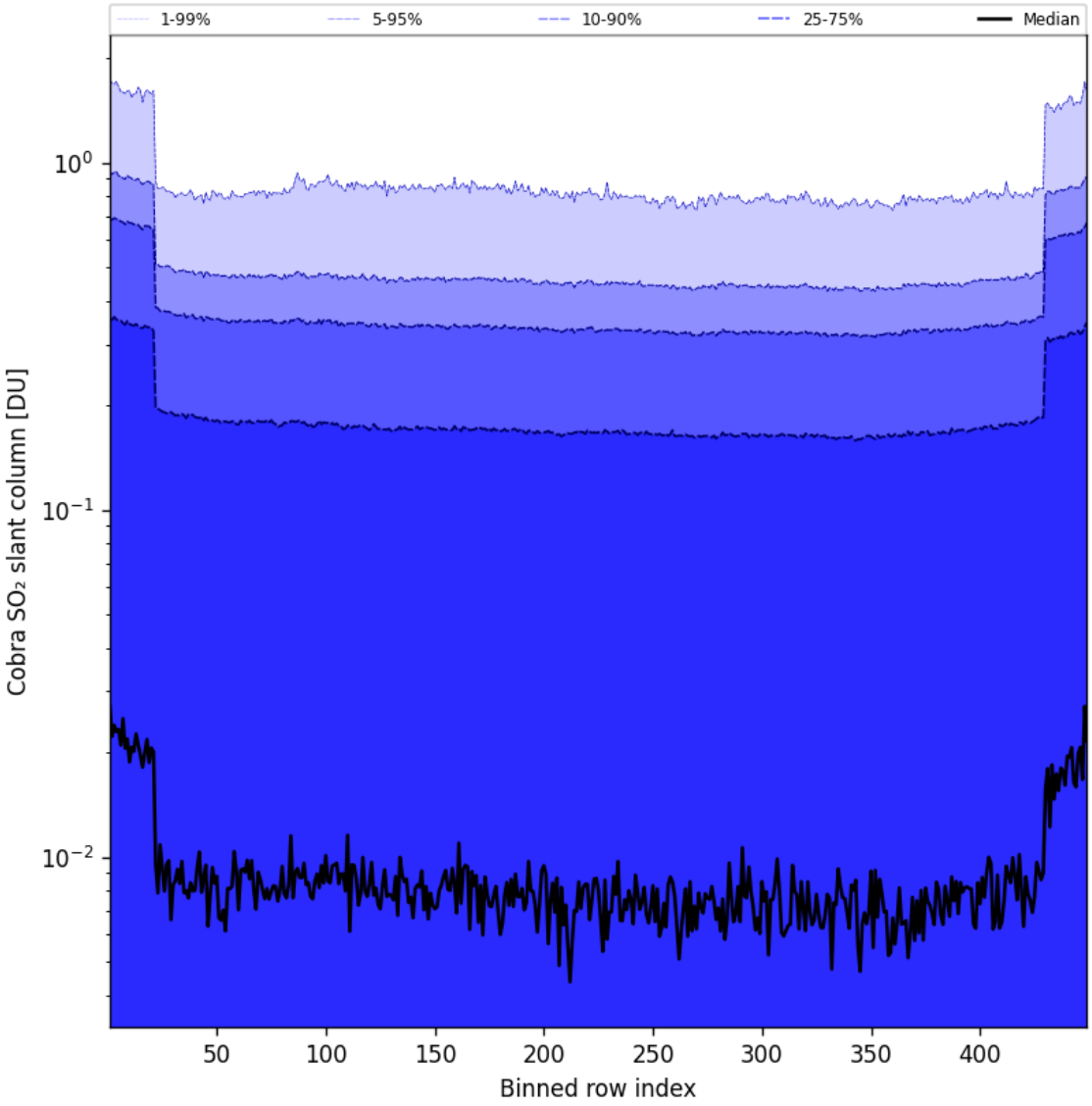

Figure 88: Along track statistics of "Cobra SO_2 slant column" for 2024-12-27 to 2024-12-28

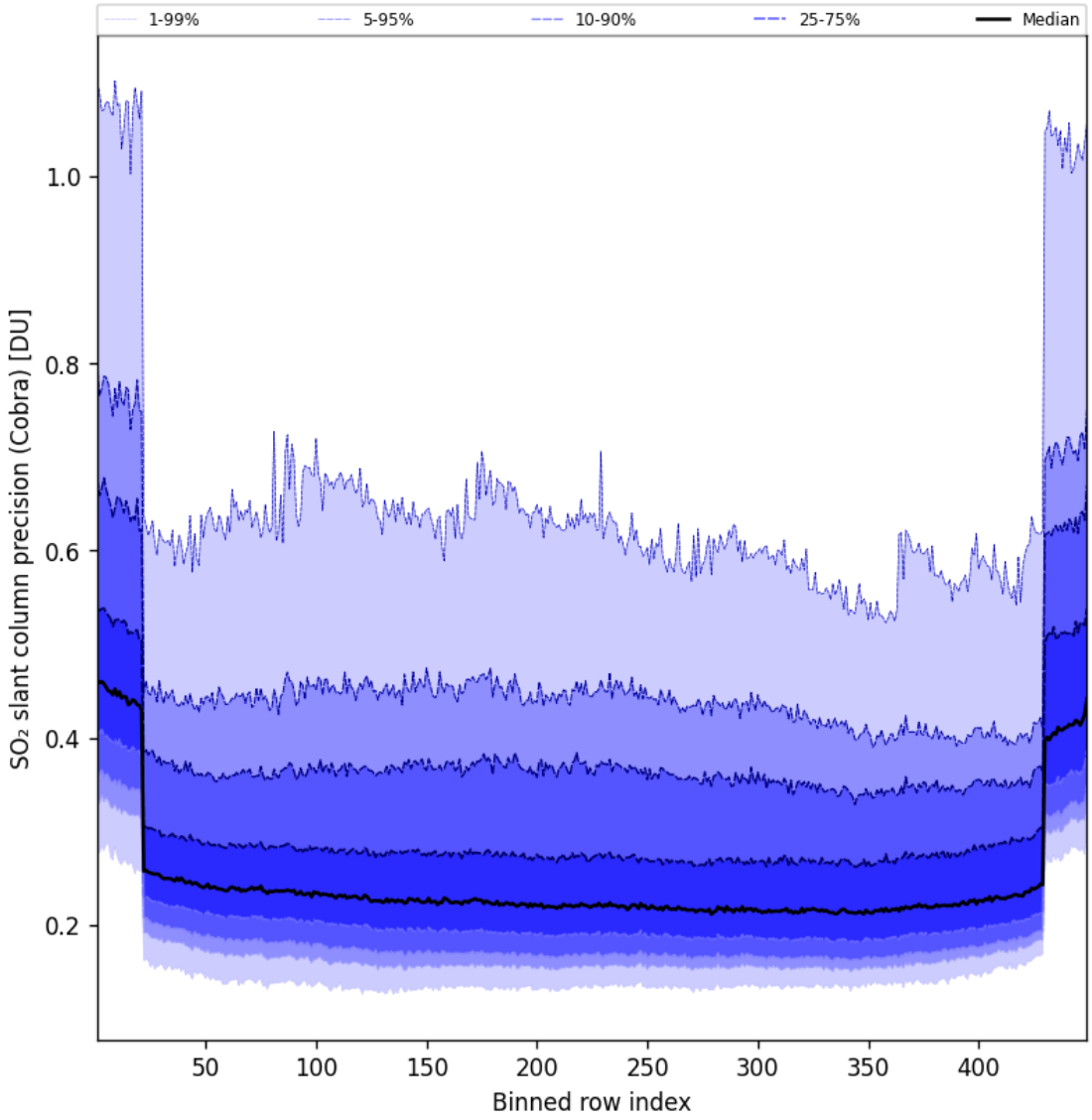

Figure 89: Along track statistics of "SO_2 slant column precision (Cobra)" for 2024-12-27 to 2024-12-28

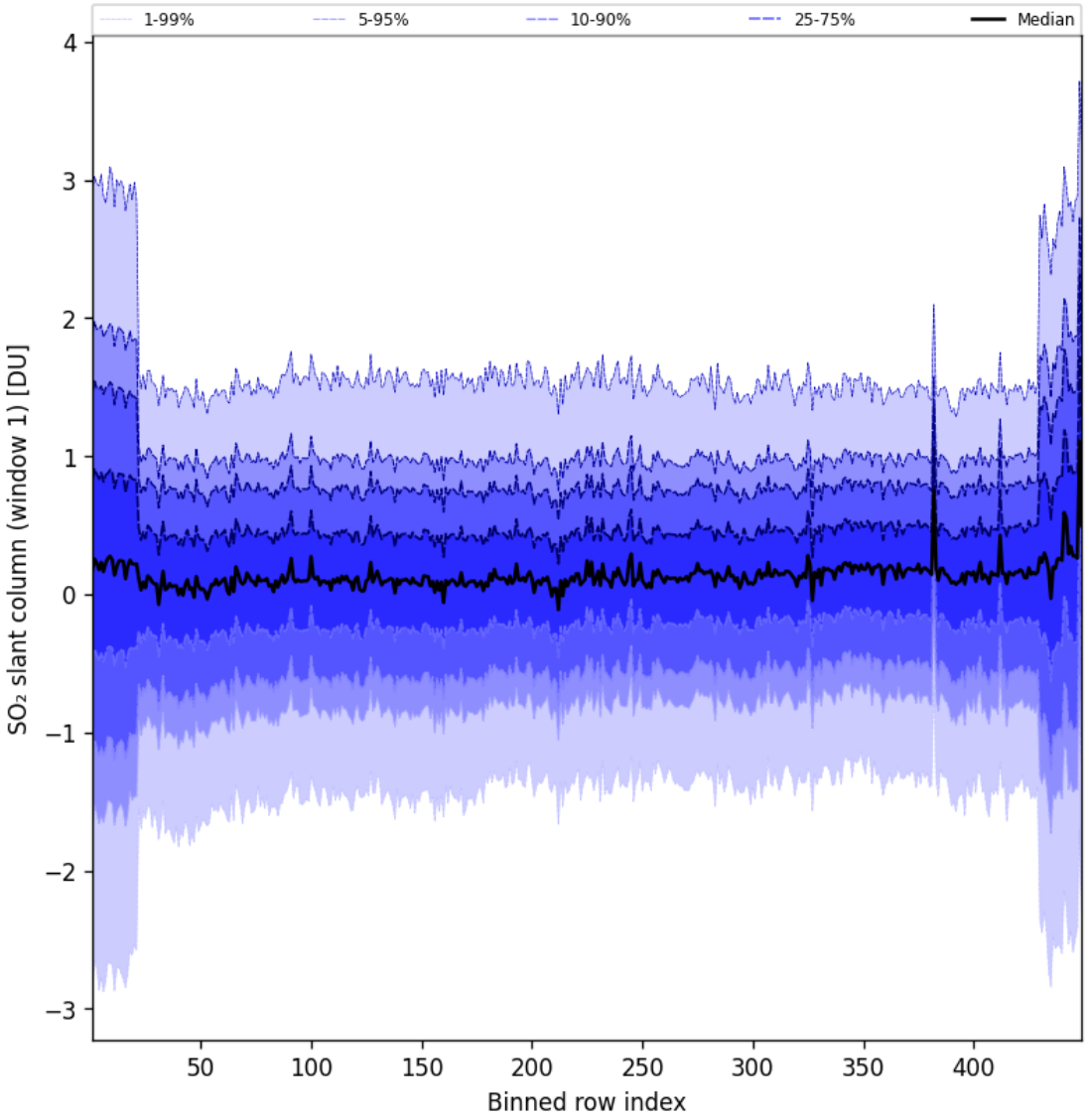

Figure 90: Along track statistics of "SO_2 slant column (window 1)" for 2024-12-27 to 2024-12-28

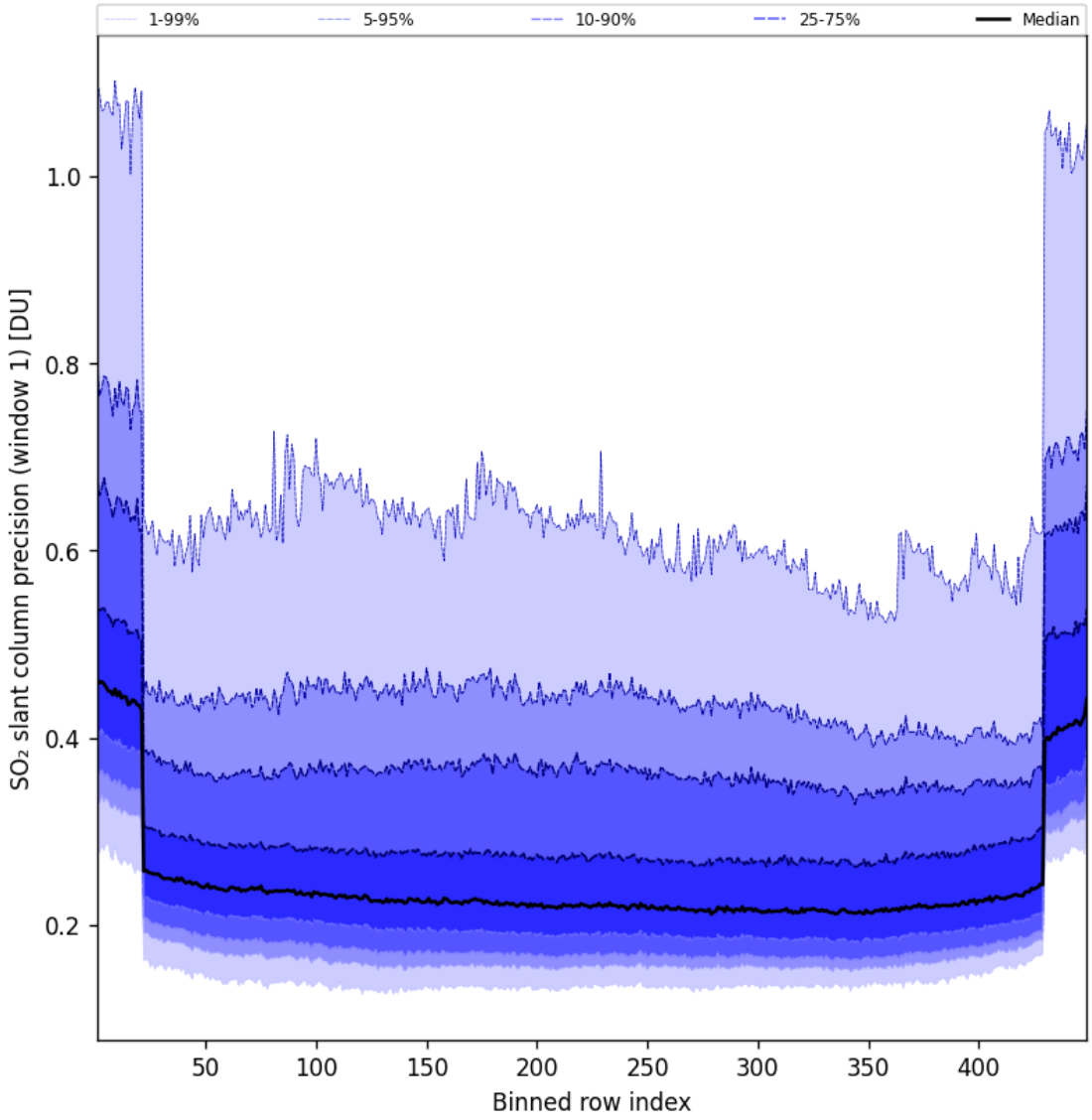

Figure 91: Along track statistics of "SO_2 slant column precision (window 1)" for 2024-12-27 to 2024-12-28

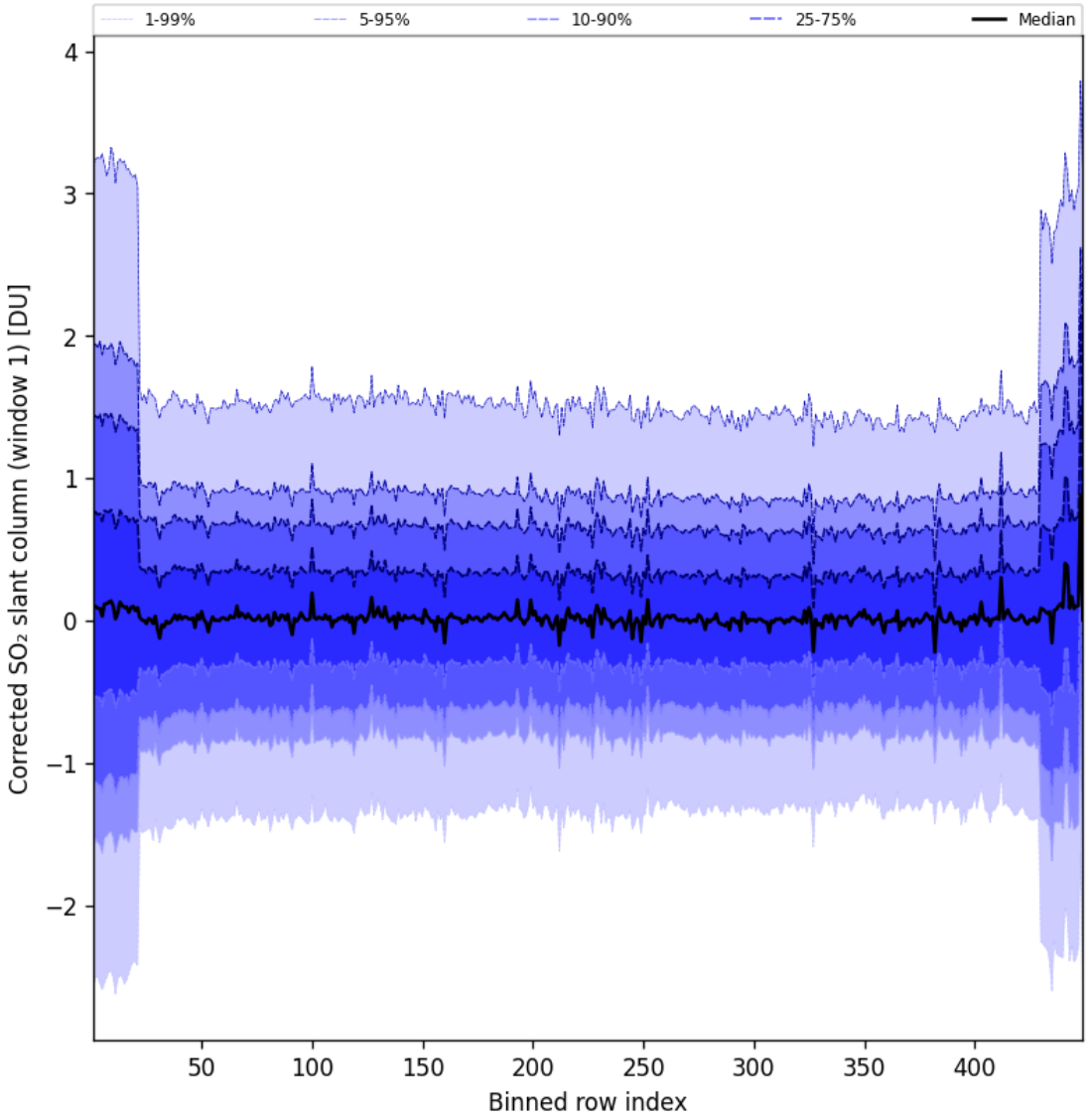

Figure 92: Along track statistics of "Corrected SO_2 slant column (window 1)" for 2024-12-27 to 2024-12-28

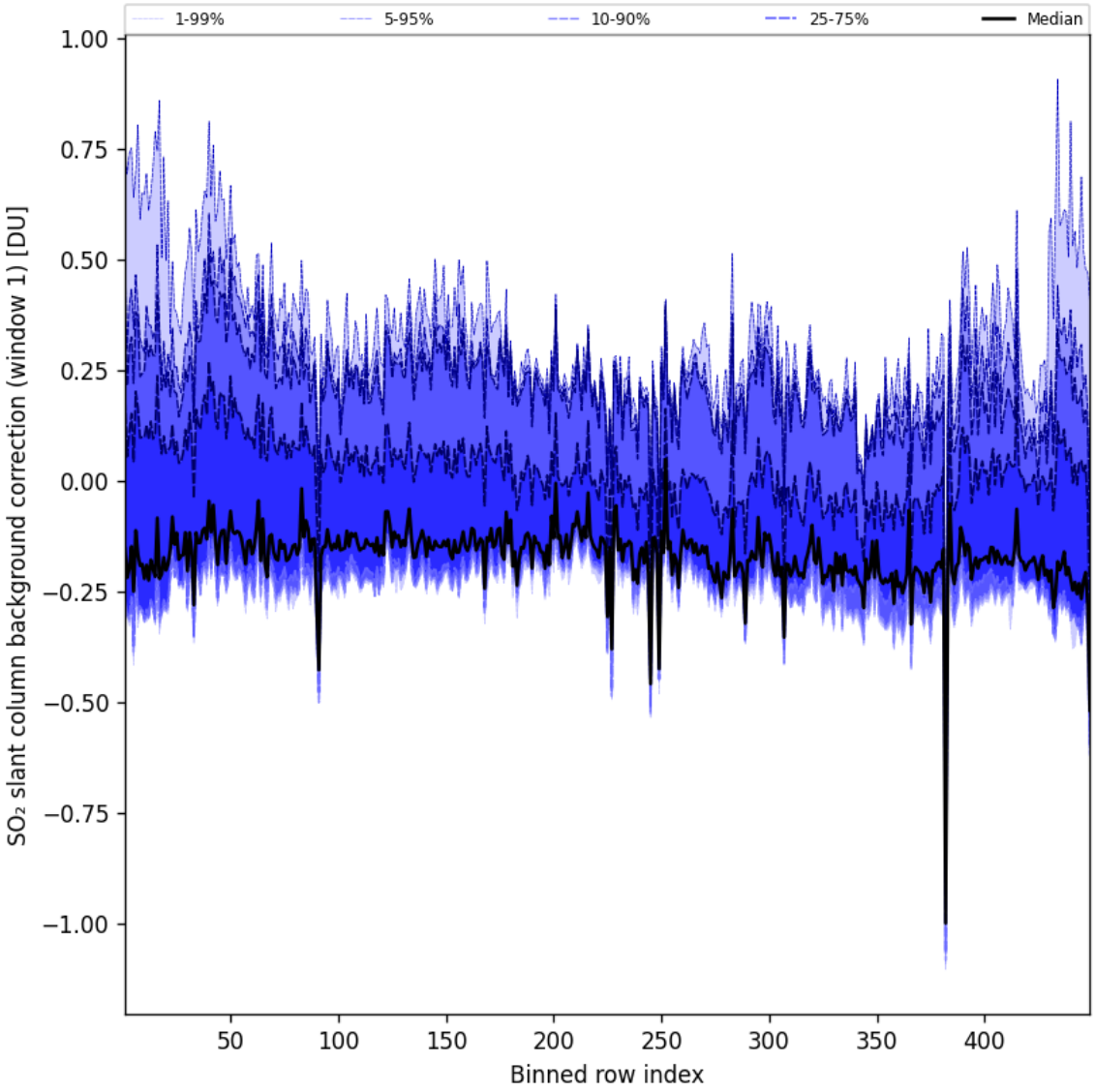

Figure 93: Along track statistics of "SO_2 slant column background correction (window 1)" for 2024-12-27 to 2024-12-28

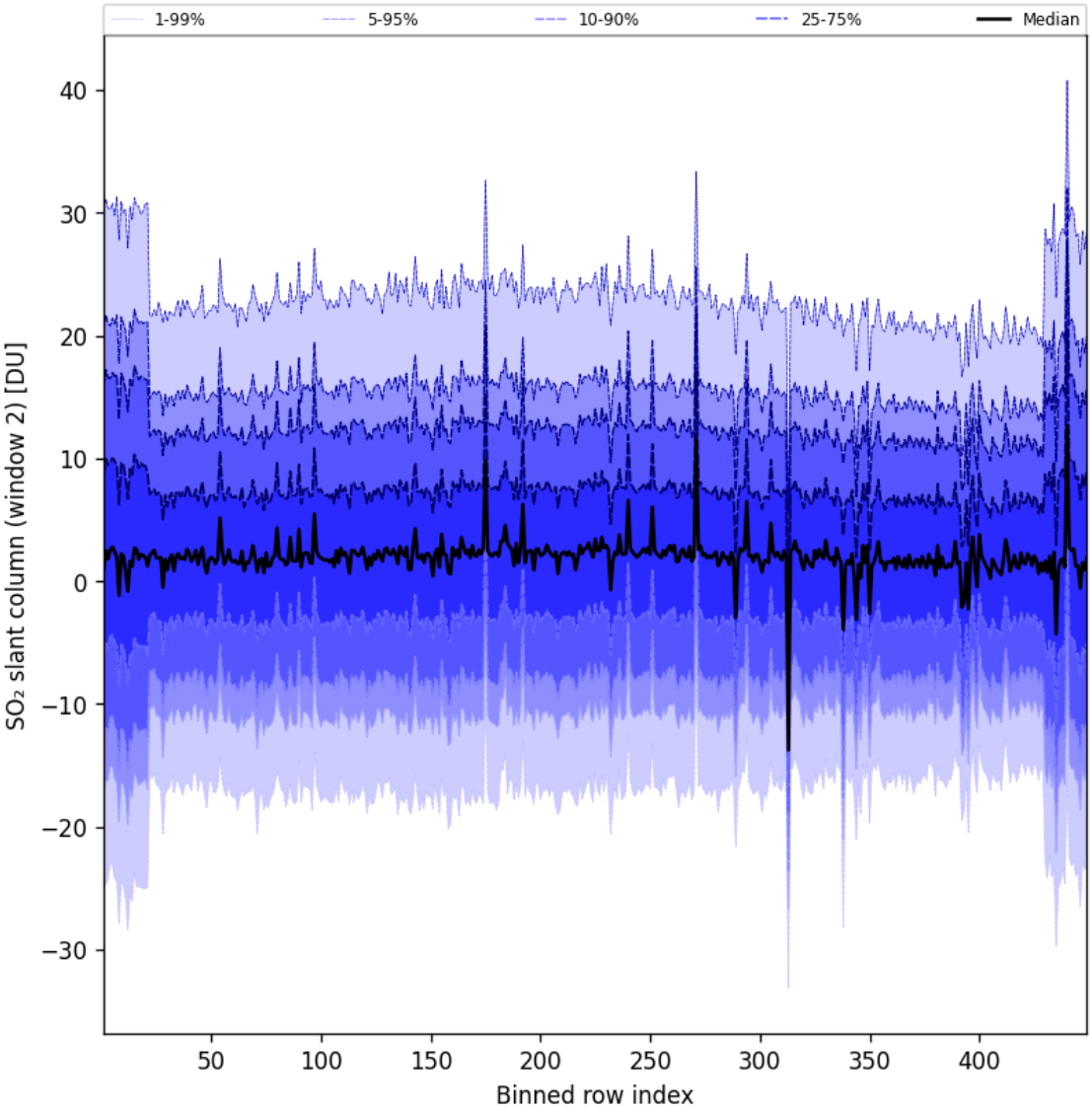

Figure 94: Along track statistics of "SO_2 slant column (window 2)" for 2024-12-27 to 2024-12-28

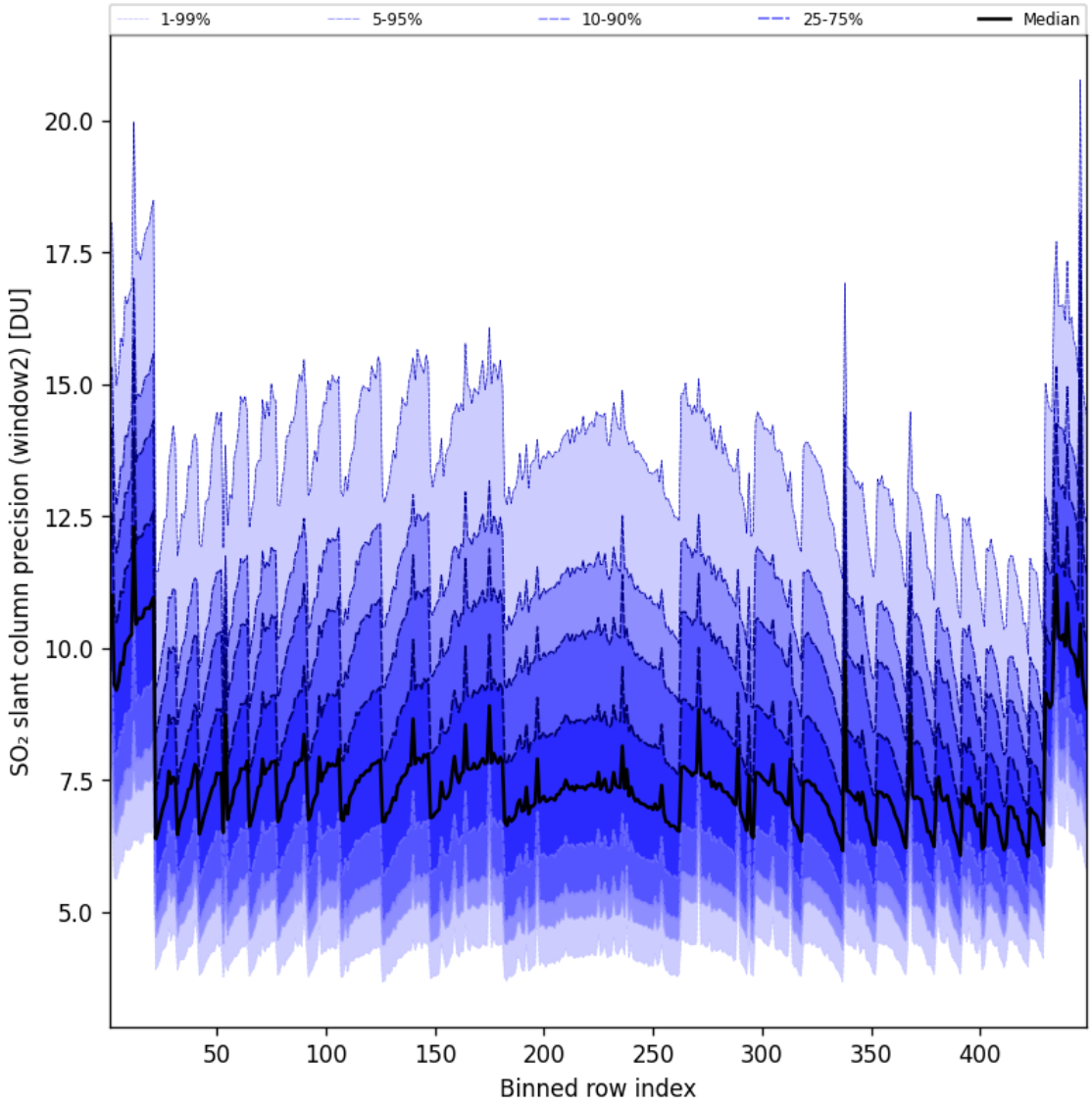

Figure 95: Along track statistics of "SO_2 slant column precision (window2)" for 2024-12-27 to 2024-12-28

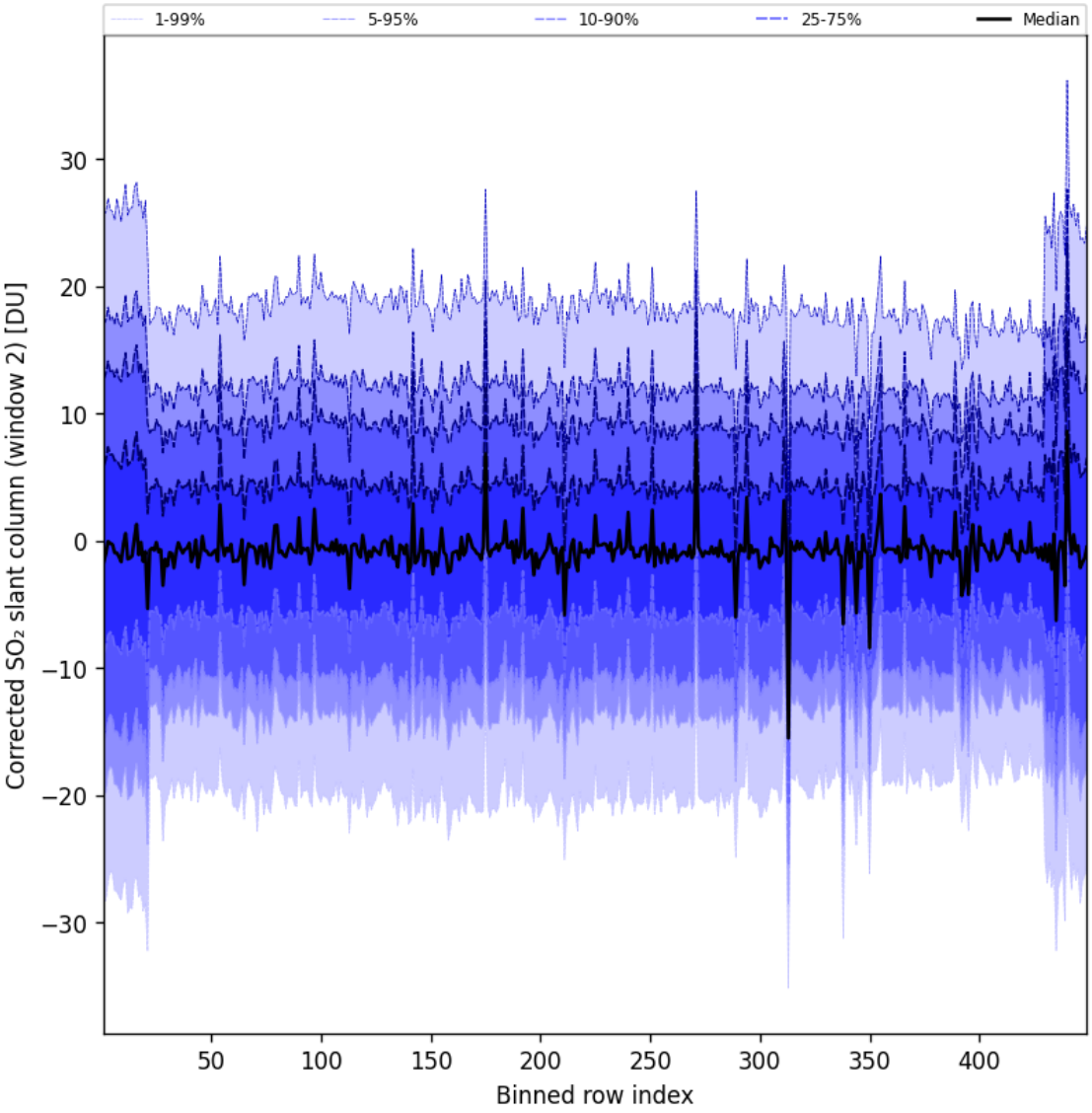

Figure 96: Along track statistics of "Corrected SO_2 slant column (window 2)" for 2024-12-27 to 2024-12-28

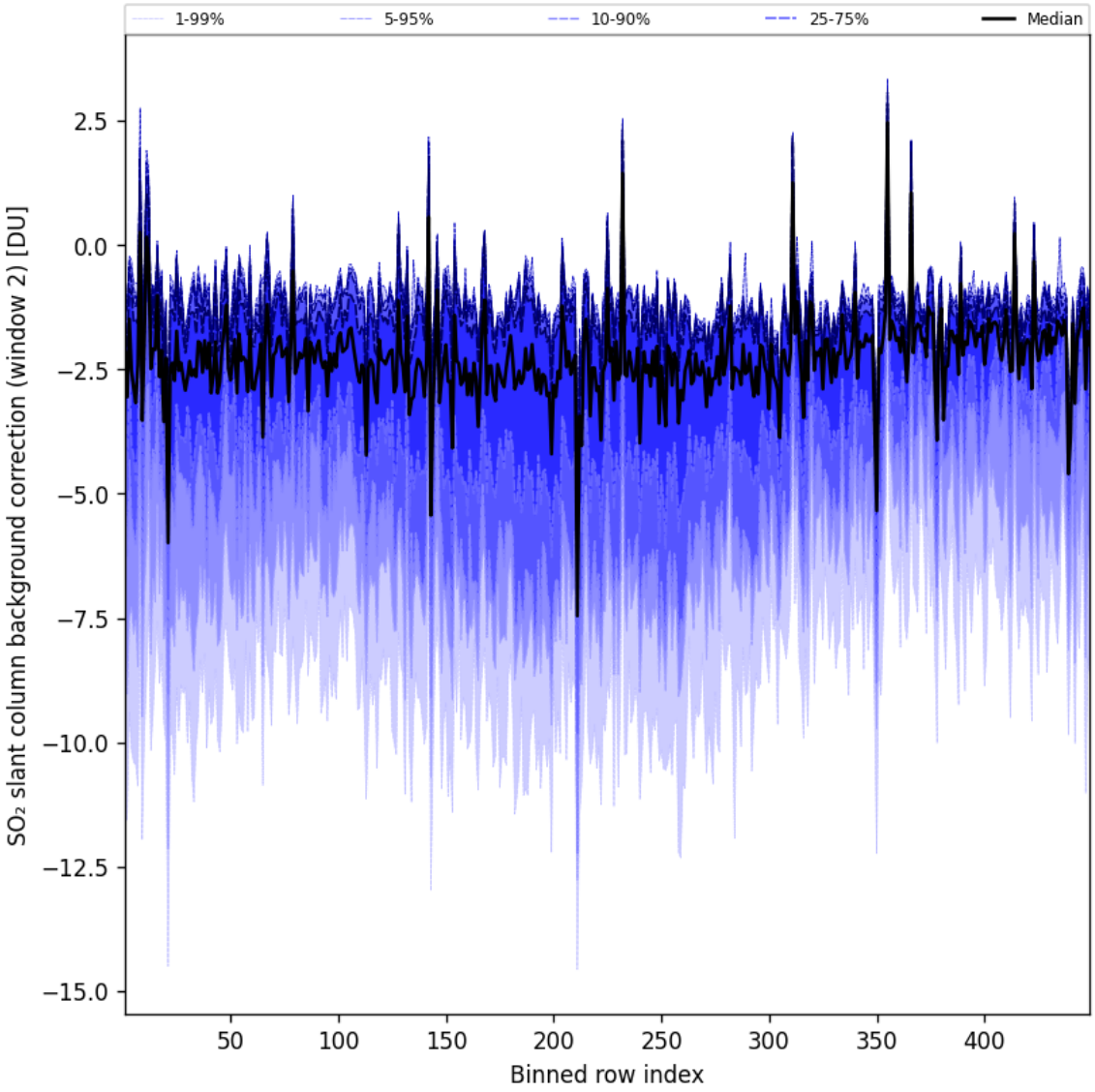

Figure 97: Along track statistics of "SO_2 slant column background correction (window 2)" for 2024-12-27 to 2024-12-28

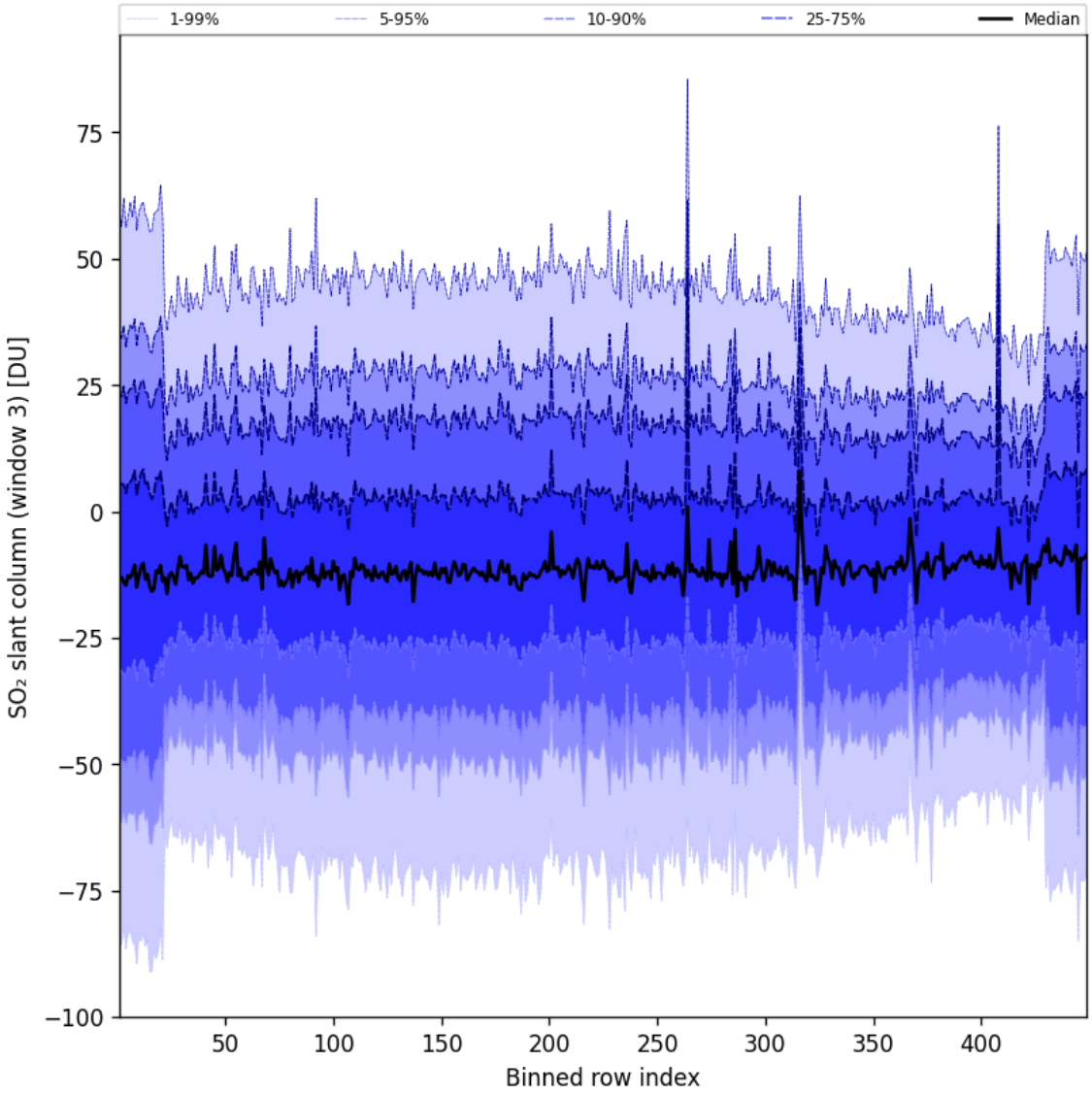

Figure 98: Along track statistics of "SO_2 slant column (window 3)" for 2024-12-27 to 2024-12-28

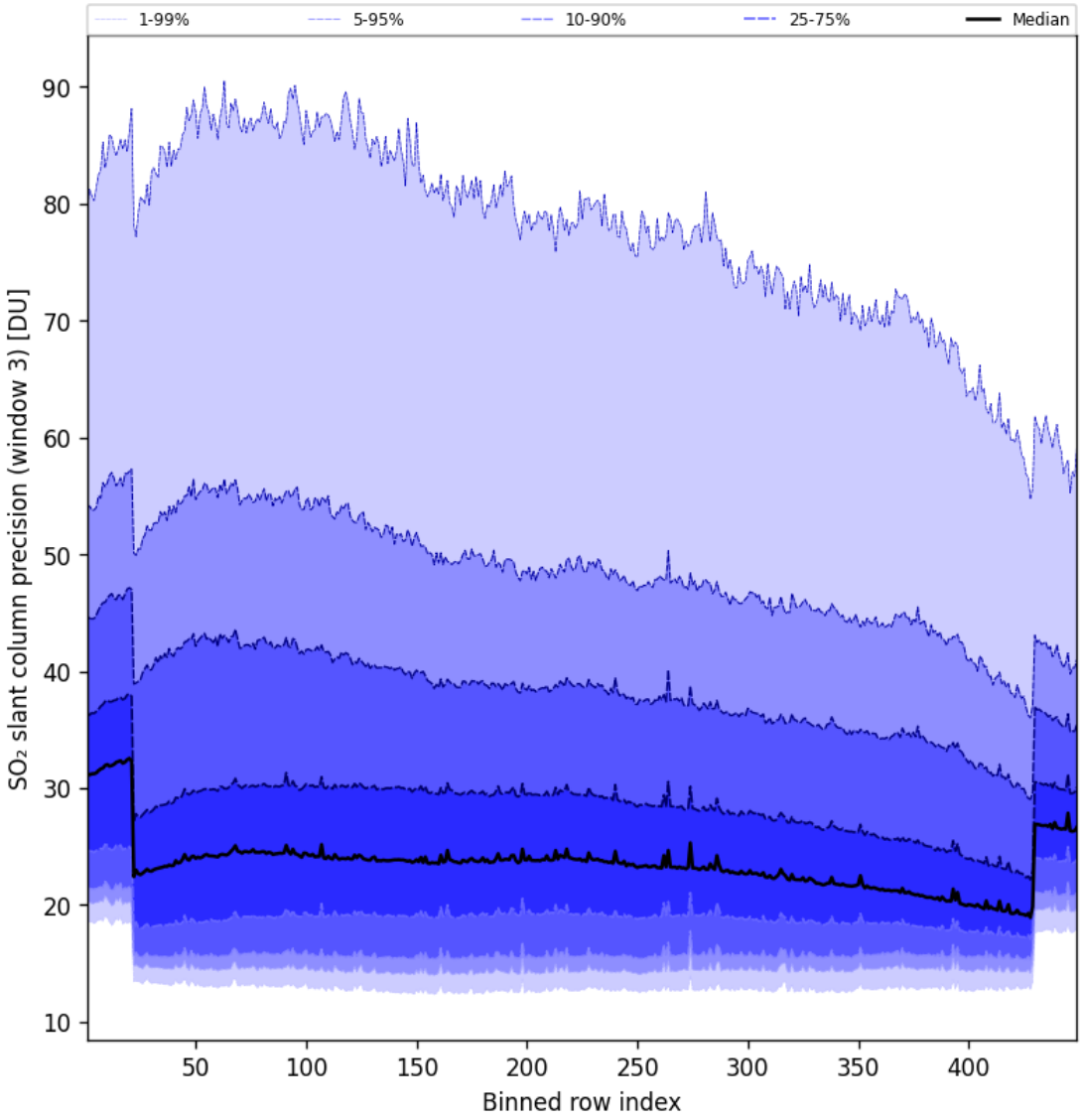

Figure 99: Along track statistics of "SO_2 slant column precision (window 3)" for 2024-12-27 to 2024-12-28

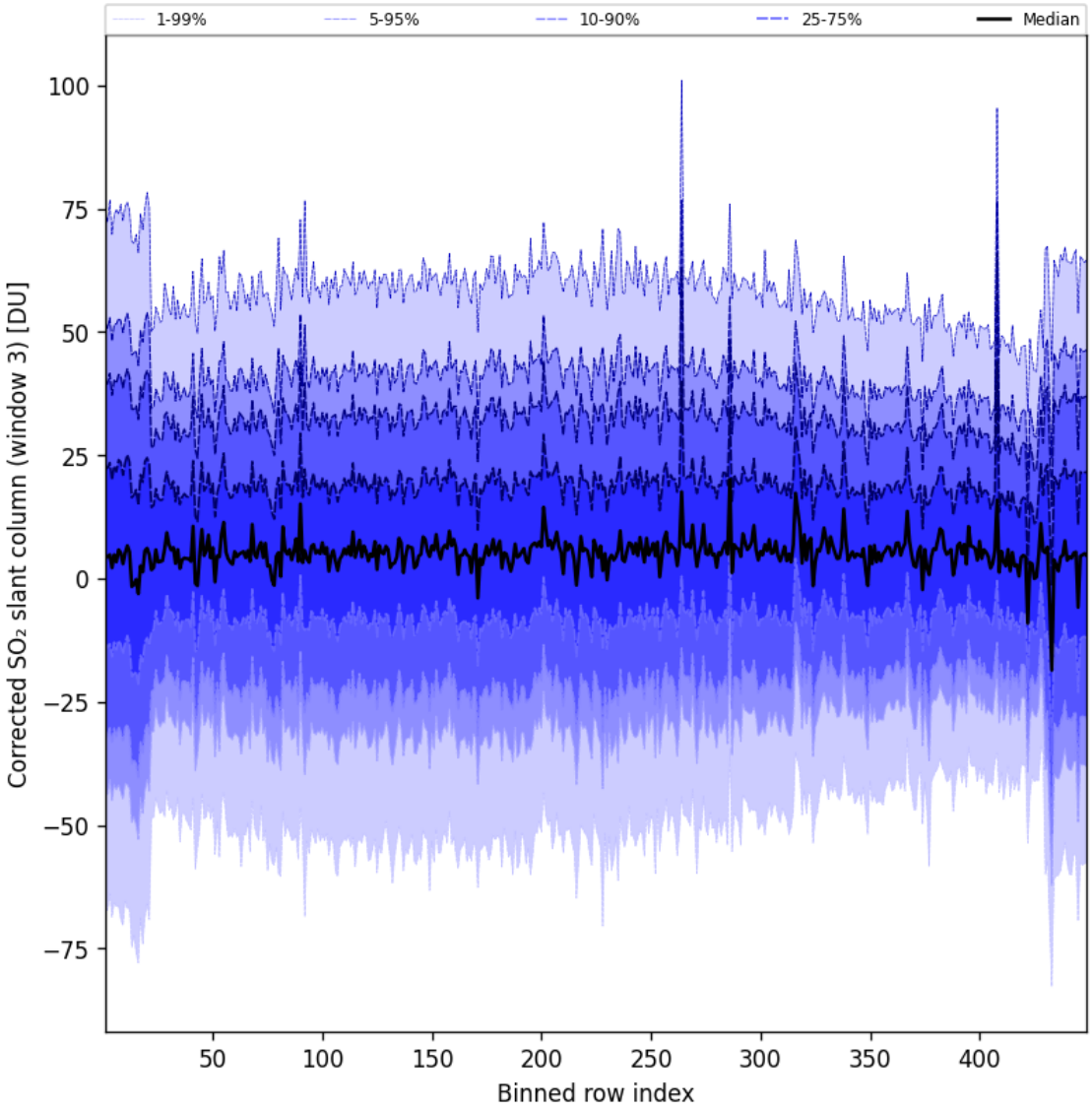

Figure 100: Along track statistics of "Corrected SO_2 slant column (window 3)" for 2024-12-27 to 2024-12-28

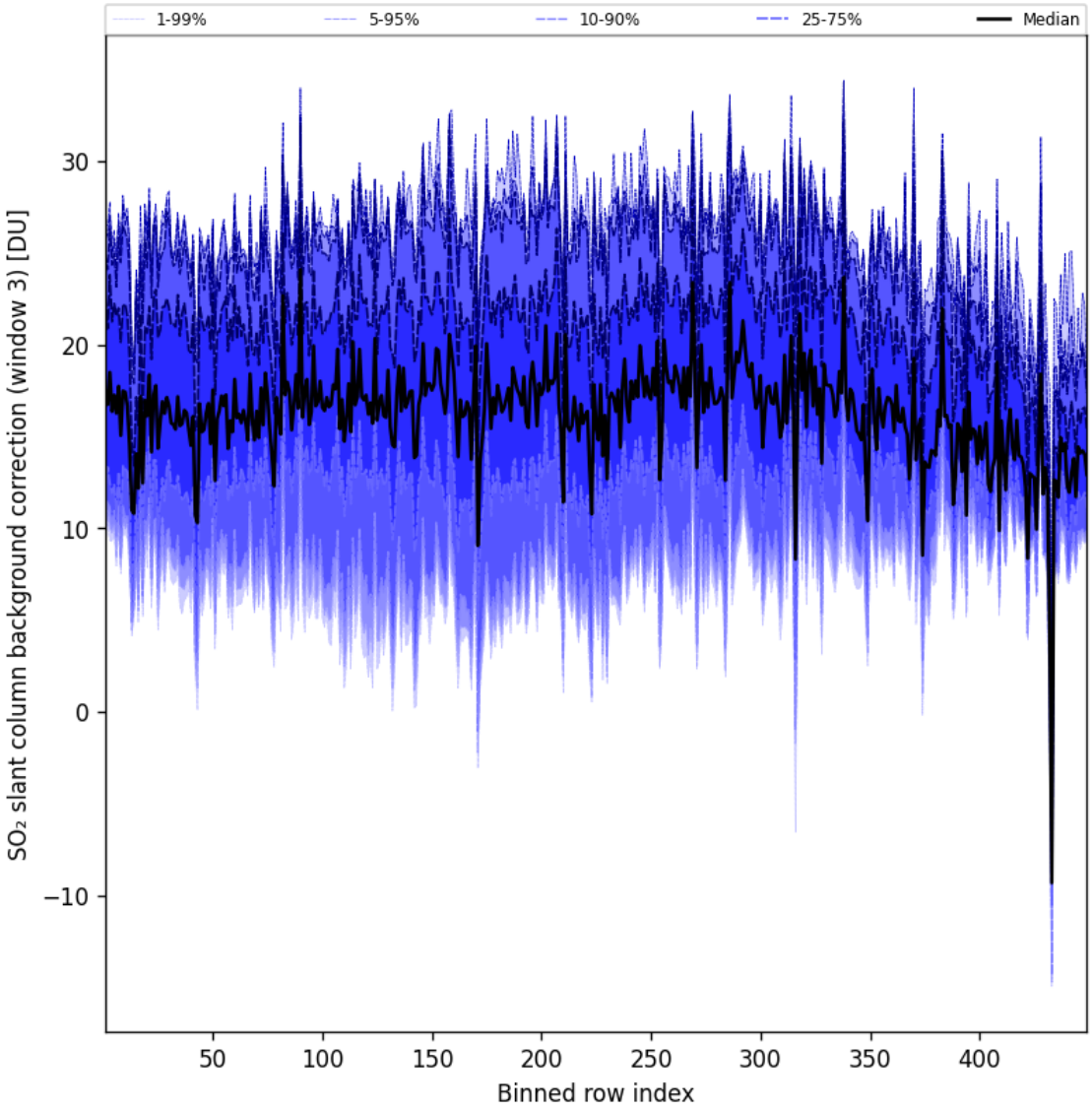

Figure 101: Along track statistics of "SO_2 slant column background correction (window 3)" for 2024-12-27 to 2024-12-28

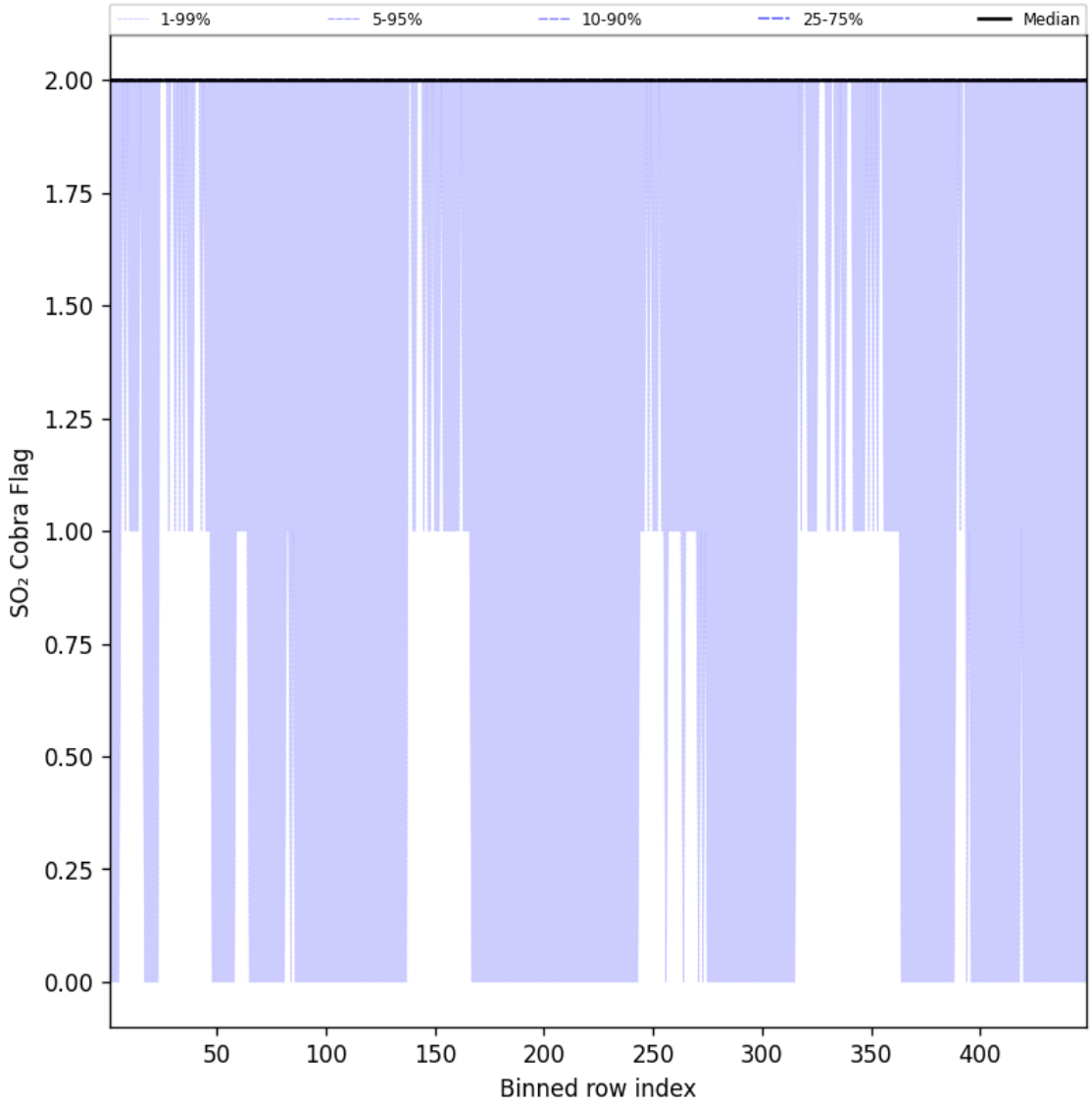

Figure 102: Along track statistics of "SO_2 Cobra Flag" for 2024-12-27 to 2024-12-28

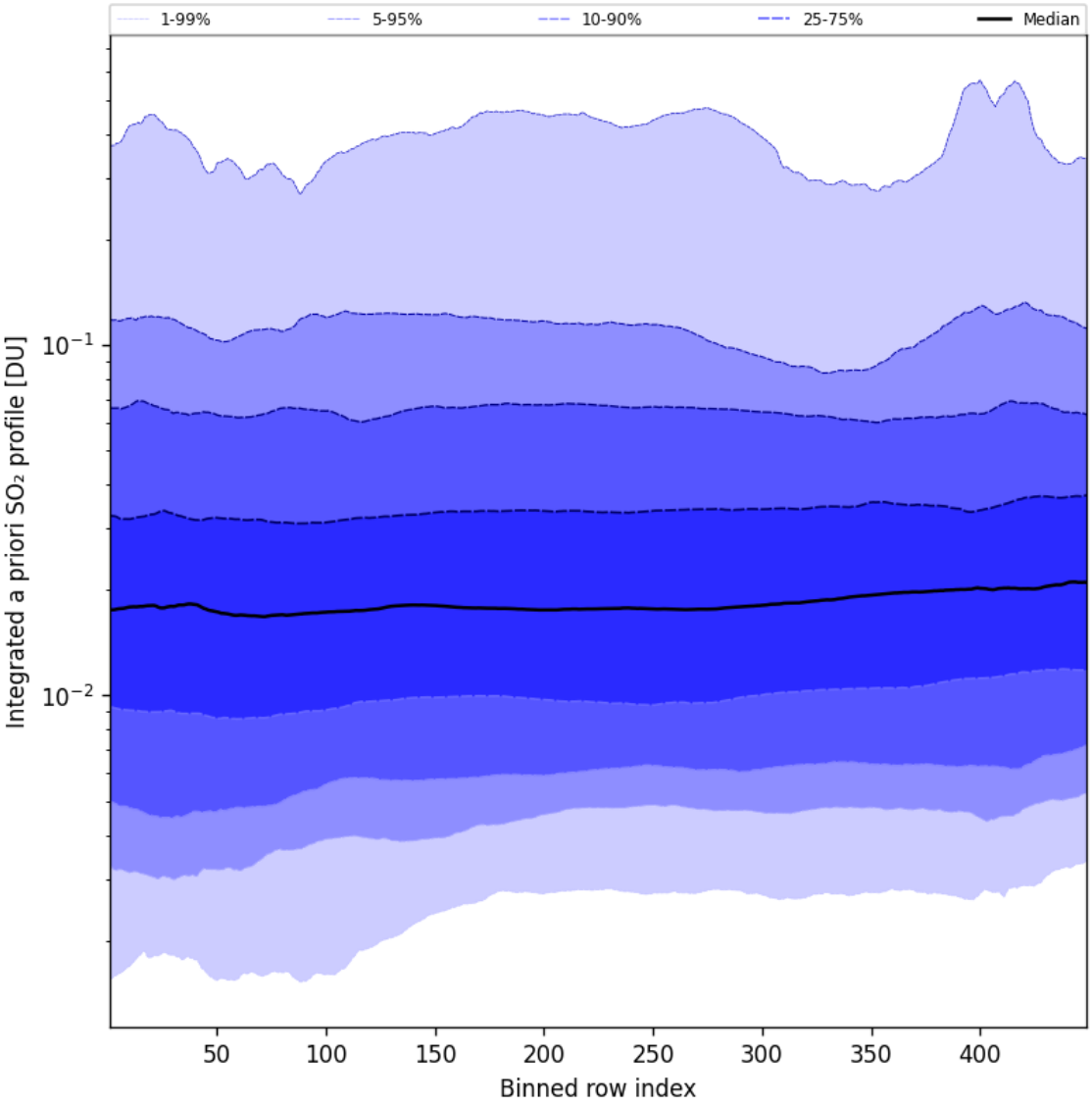

Figure 103: Along track statistics of “Integrated a priori SO_2 profile” for 2024-12-27 to 2024-12-28

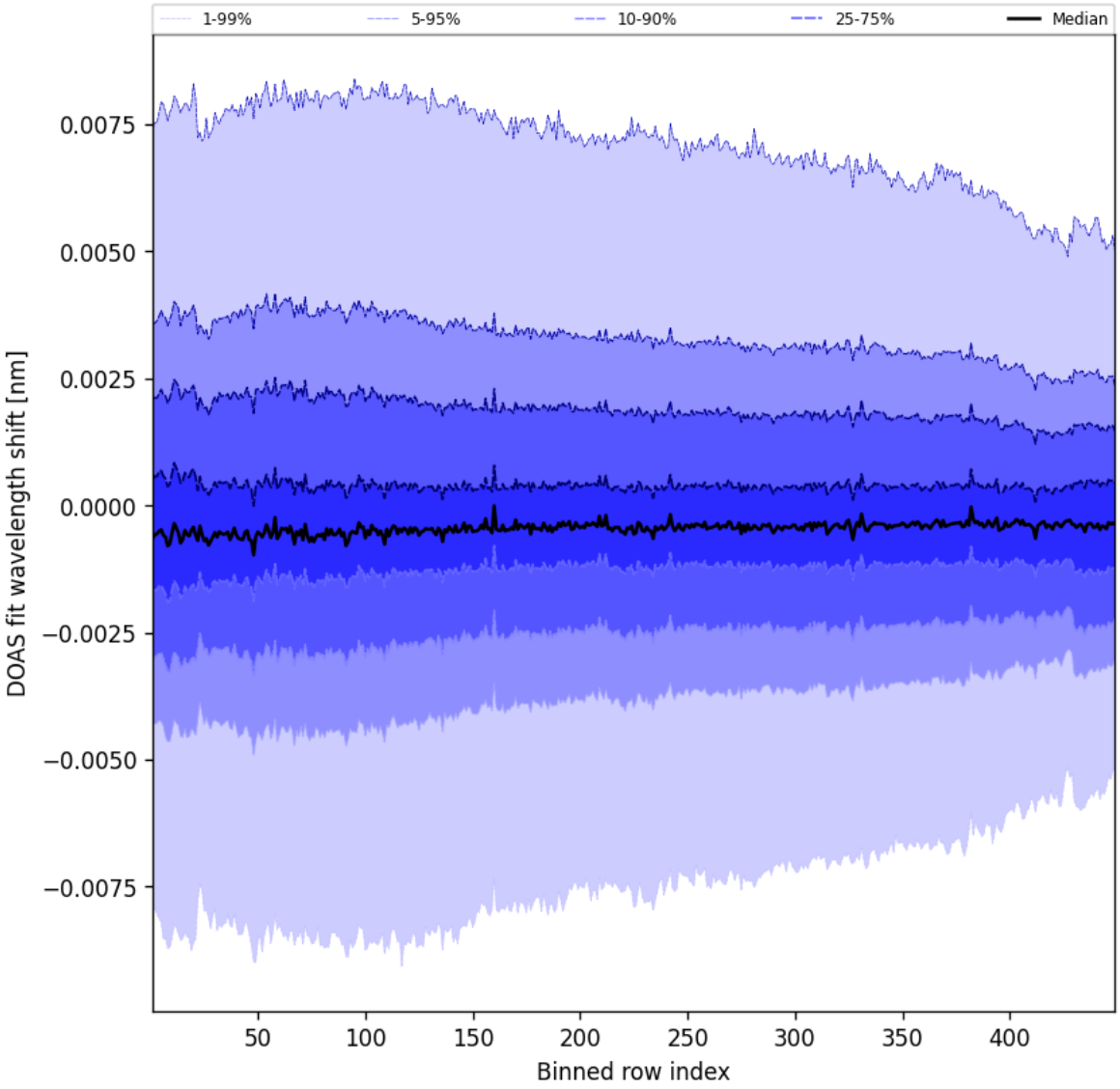

Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2024-12-27 to 2024-12-28

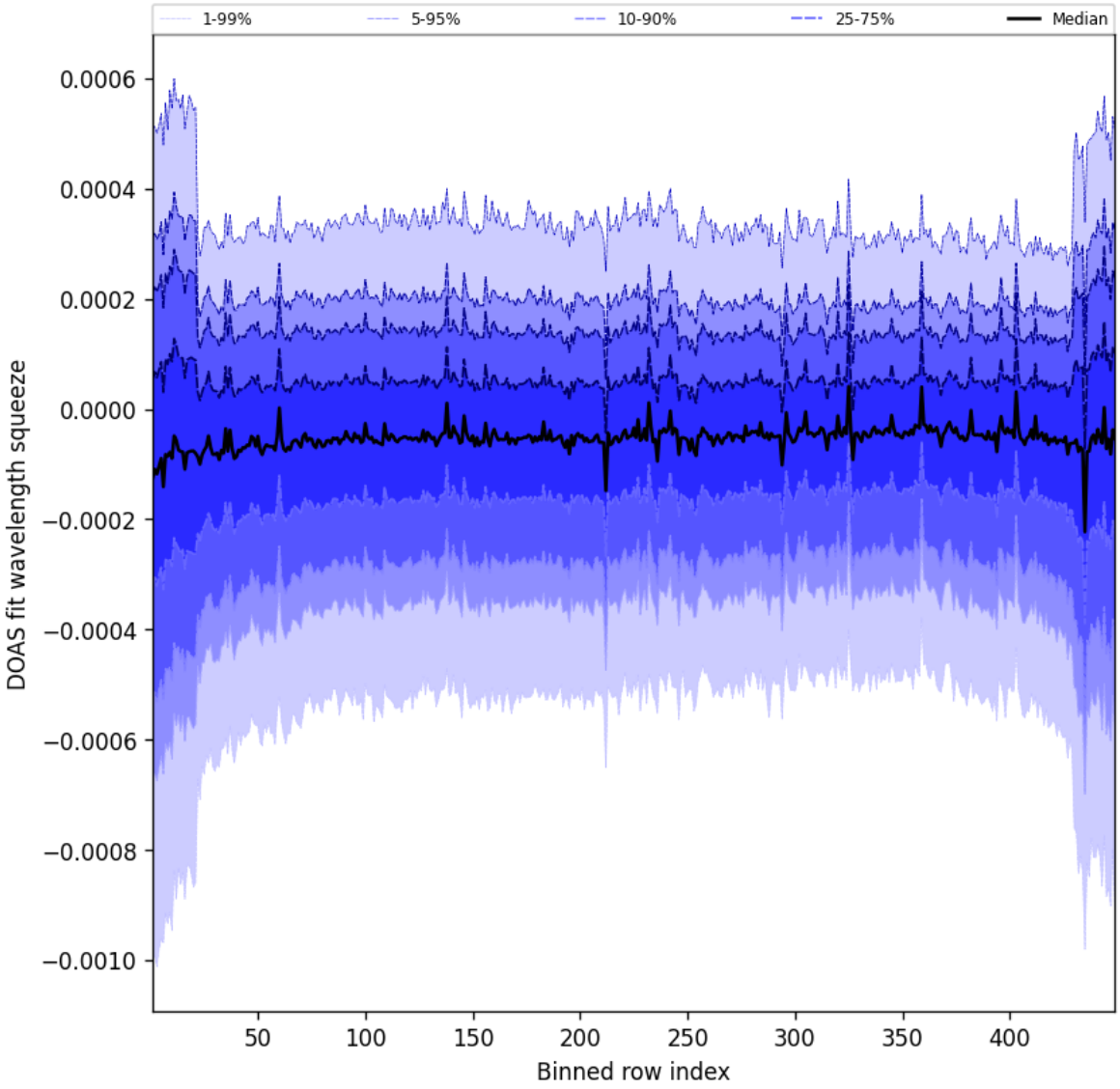

Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2024-12-27 to 2024-12-28

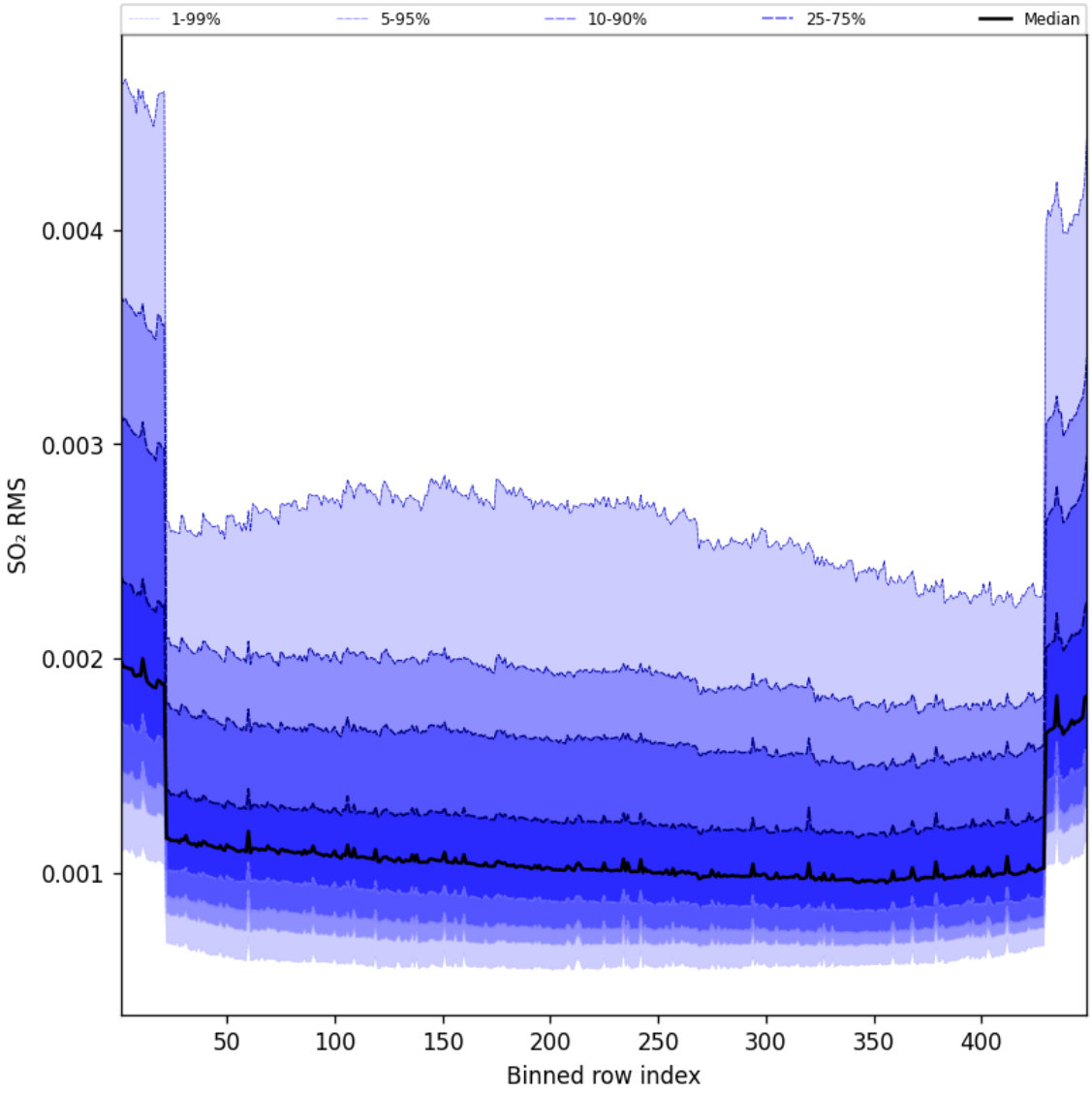

Figure 106: Along track statistics of "SO_2 RMS" for 2024-12-27 to 2024-12-28

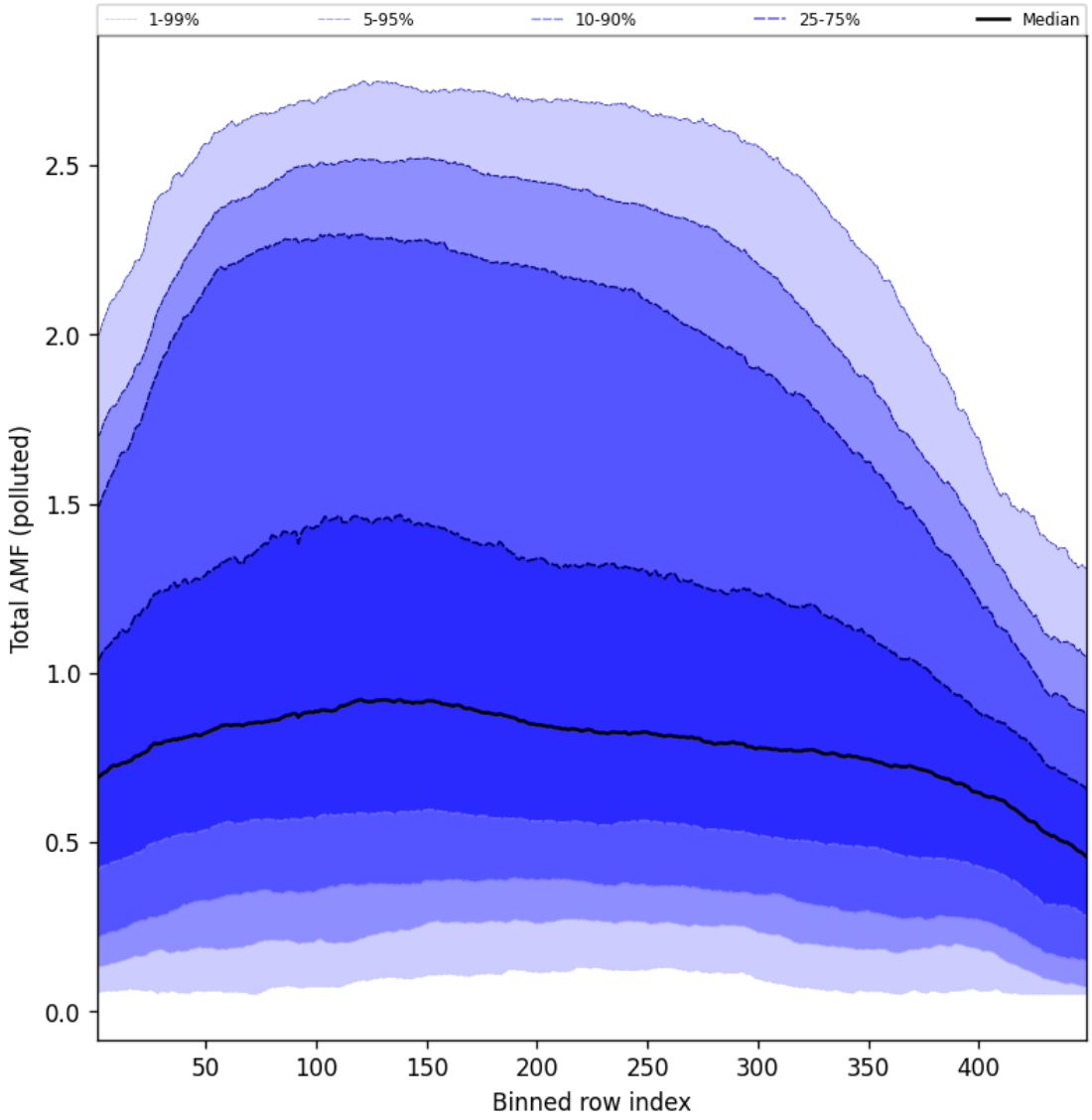

Figure 107: Along track statistics of “Total AMF (polluted)” for 2024-12-27 to 2024-12-28

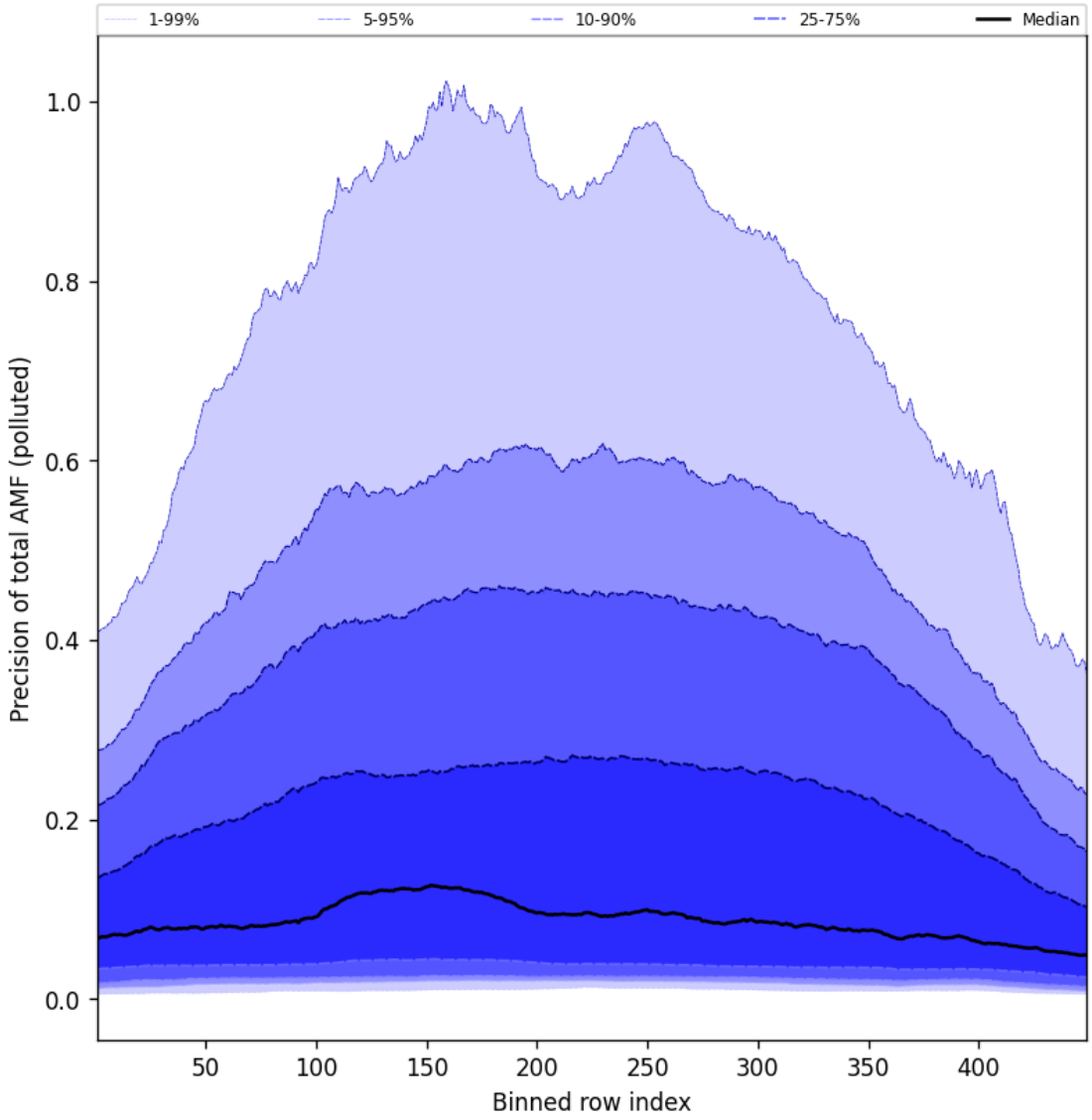

Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2024-12-27 to 2024-12-28

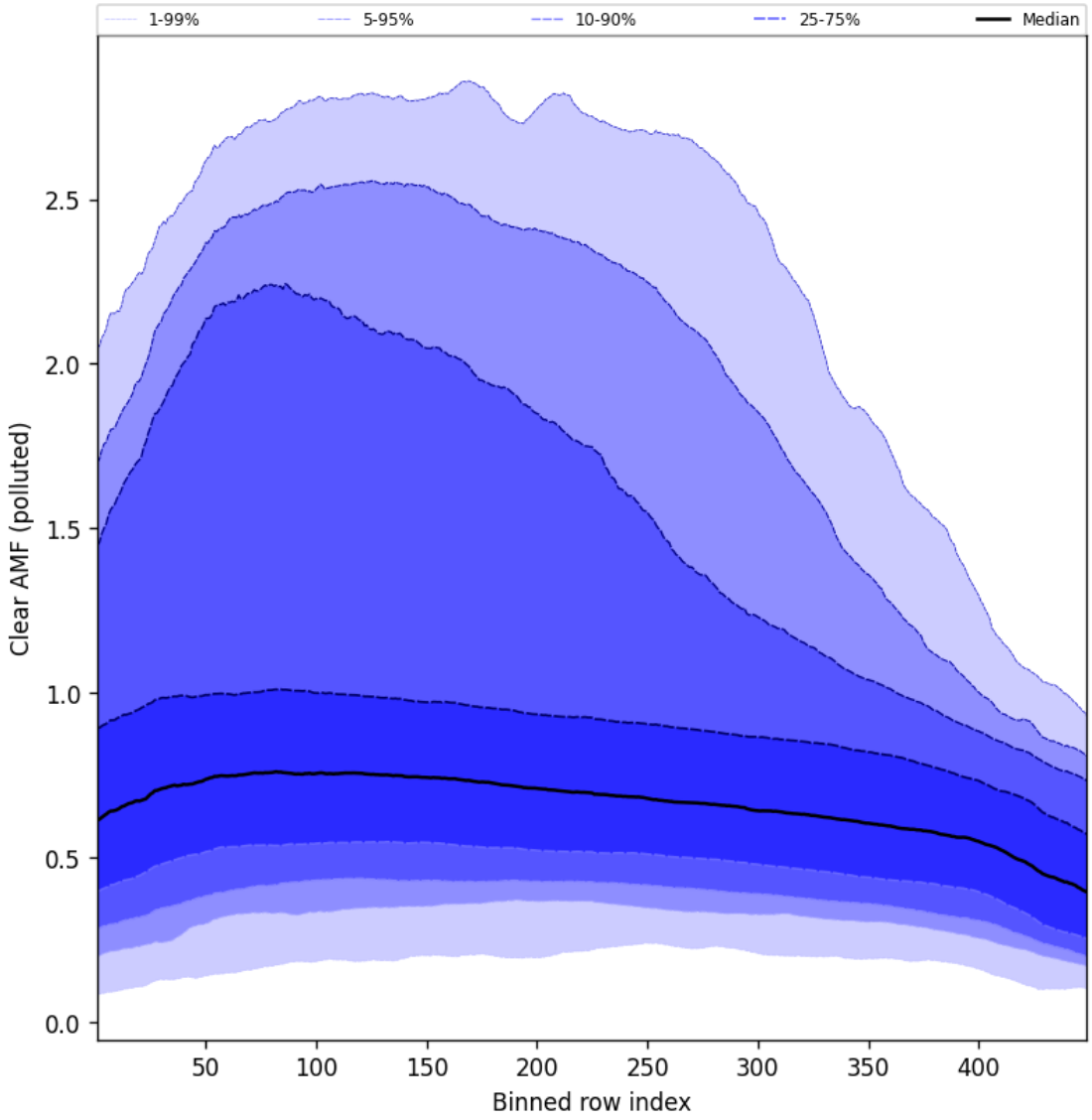

Figure 109: Along track statistics of “Clear AMF (polluted)” for 2024-12-27 to 2024-12-28

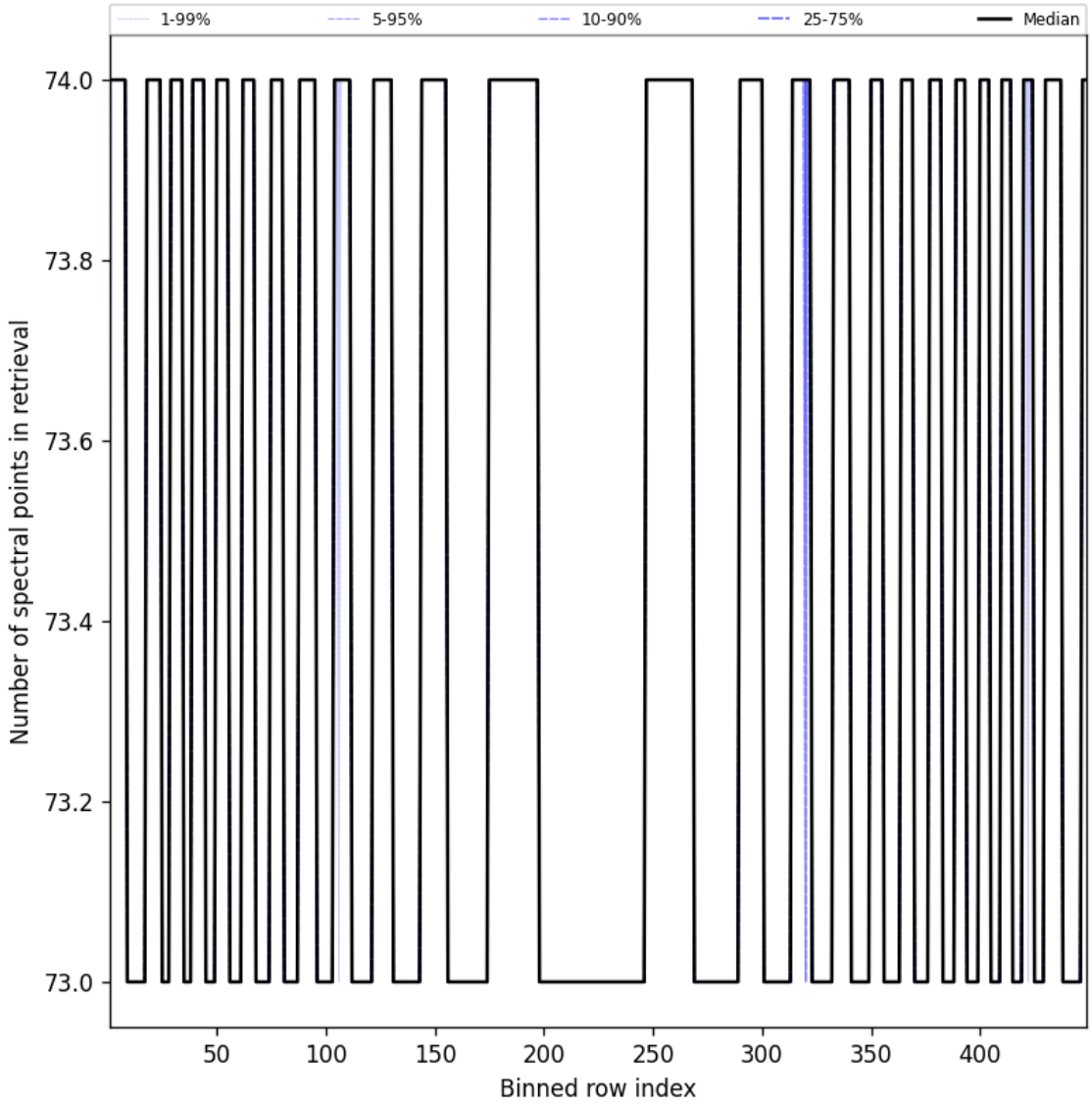

Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2024-12-27 to 2024-12-28

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.

Contents

List of Figures

List of Tables

11 Copyright information of 'PyCAMA'

Maarten Sneep (maarten.sneep@knmi.nl).