PyCAMA report generated by tropl2-proc

tropl2-proc

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1 Short Introduction

1.1 The list of parameters

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

2 Definitions

The averages shown here are *unweighed* averages:

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

with N the number of observations in the dataset.

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

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

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

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

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

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

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

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

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

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

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

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

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

Table 1: Parameterlist and basic statistics for the analysis

Variable	mean $\pm\sigma$	Count	Mode	IQR	Median	Minimum	Maximum
qa value [1]	0.595 ± 0.421	18273503	0.995	0.840	0.490	0.0	1.000
sulfurdioxide total vertical column [DU]	$(2.876 \pm 111.483) \times 10^{-2}$	18273503	0.211	0.375	7.332×10^{-3}	-122	265
sulfurdioxide total vertical column precision [DU]	0.501 ± 0.822	18273503	9.715×10^{-2}	0.320	0.283	3.186×10^{-2}	145
sulfurdioxide slant column density corrected [DU]	$(1.385 \pm 32.190) \times 10^{-2}$	18273503	0.227	0.334	7.502×10^{-3}	-41.8	59.3
sulfurdioxide slant column density cobra [DU]	$(1.380 \pm 31.860) \times 10^{-2}$	18273503	0.227	0.334	7.502×10^{-3}	-41.8	23.1
sulfurdioxide slant column density cobra precision [DU]	0.265 ± 0.111	18273503	0.213	9.397×10^{-2}	0.230	7.912×10^{-2}	16.7
sulfurdioxide slant column density window1 [DU]	$(8.295 \pm 61.740) \times 10^{-2}$	18273503	7.500×10^{-2}	0.706	8.502×10^{-2}	-41.8	44.5
sulfurdioxide slant column density window1 precision [DU]	0.265 ± 0.111	18273503	0.213	9.397×10^{-2}	0.230	7.912×10^{-2}	16.7
sulfurdioxide slant column density corrected win1 [DU]	$(1.841 \pm 59.789) \times 10^{-2}$	18273503	-2.500×10^{-2}	0.672	7.723×10^{-3}	-41.8	44.6
background so2 slant column offset window1 [DU]	$(-6.454 \pm 15.234) \times 10^{-2}$	18273503	-0.140	0.215	-0.106	-1.12	3.37
sulfurdioxide slant column density window2 [DU]	0.569 ± 8.480	18273503	0.250	10.6	0.513	-822	939
sulfurdioxide slant column density window2 precision [DU]	7.69 ± 2.21	18273503	6.97	2.52	7.32	2.17	713
sulfurdioxide slant column density corrected win2 [DU]	-0.424 ± 8.340	18273503	-0.250	10.4	-0.404	-820	939
background so2 slant column offset window2 [DU]	-0.992 ± 2.031	18273503	0.250	2.59	-0.573	-14.1	6.84
sulfurdioxide slant column density window3 [DU]	-2.97 ± 23.14	18273503	-3.92	28.5	-3.38	-2.819×10^{3}	1.124×10^{3}
sulfurdioxide slant column density window3 precision [DU]	26.8 ± 13.0	18273503	21.5	10.0	23.3	9.61	798
sulfurdioxide slant column density corrected win3 [DU]	3.00 ± 22.30	18273503	1.68	27.3	2.93	-2.824×10^{3}	1.121×10^{3}
background so2 slant column offset window3 [DU]	5.98 ± 6.40	18273503	3.92	9.58	5.90	-25.0	35.3
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.20	18273503	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(3.591 \pm 7.407) \times 10^{-2}$	18273503	1.539×10^{-2}	2.323×10^{-2}	1.932×10^{-2}	6.158×10^{-4}	2.03
fitted radiance shift [nm]	$(-3.389 \pm 24.444) \times 10^{-4}$	18273503	-5.000×10^{-4}	1.599×10^{-3}	-3.966×10^{-4}	-5.971×10^{-2}	4.395×10^{-2}
fitted radiance squeeze [1]	$(-4.176 \pm 17.347) \times 10^{-5}$	18273503	-3.000×10^{-5}	2.083×10^{-4}	-3.684×10^{-5}	-1.490×10^{-2}	1.428×10^{-2}
fitted root mean square [1]	$(1.175 \pm 0.452) \times 10^{-3}$	18273503	9.750×10^{-4}	4.138×10^{-4}	1.053×10^{-3}	3.400×10^{-4}	4.249×10^{-2}
sulfurdioxide total air mass factor polluted [1]	1.00 ± 0.66	18273503	0.740	0.717	0.831	5.000×10^{-2}	3.37
sulfurdioxide total air mass factor polluted precision [1]	0.152 ± 0.157	18273503	3.500×10^{-2}	0.181	9.331×10^{-2}	2.500×10^{-3}	1.88
sulfurdioxide clear air mass factor polluted [1]	0.824 ± 0.559	18273503	0.580	0.405	0.689	2.776×10^{-2}	3.43
number of spectral points in retrieval [1]	73.4 ± 0.5	18273503	73.0	1.000	73.0	52.0	74.0

Table 2: Percentile ranges

Variable	1 %	5 %	10 %	15.9 %	25 %	75 %	84.1 %	90 %	95 %	99 %
qa value [1]	0.0	0.0	2.000×10^{-2}	6.000×10^{-2}	0.160	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	−2.53	−0.828	−0.482	−0.314	−0.177	0.198	0.344	0.528	0.918	2.90
sulfurdioxide total vertical column precision [DU]	6.840×10^{-2}	8.852×10^{-2}	0.109	0.134	0.175	0.494	0.689	0.987	1.59	3.96
sulfurdioxide slant column density corrected [DU]	−0.758	−0.441	−0.323	−0.244	−0.159	0.176	0.265	0.350	0.480	0.868
sulfurdioxide slant column density cobra [DU]	−0.758	−0.441	−0.323	−0.244	−0.159	0.176	0.265	0.350	0.480	0.868
sulfurdioxide slant column density cobra precision [DU]	0.138	0.163	0.176	0.186	0.198	0.292	0.352	0.407	0.480	0.672
sulfurdioxide slant column density window1 [DU]	−1.49	−0.876	−0.630	−0.458	−0.272	0.434	0.613	0.783	1.03	1.72
sulfurdioxide slant column density window1 precision [DU]	0.138	0.163	0.176	0.186	0.198	0.292	0.352	0.407	0.480	0.672
sulfurdioxide slant column density corrected win1 [DU]	−1.47	−0.883	−0.655	−0.497	−0.326	0.346	0.524	0.694	0.950	1.66
background so2 slant column offset window1 [DU]	−0.371	−0.258	−0.222	−0.197	−0.172	4.359×10^{-2}	0.108	0.157	0.214	0.310
sulfurdioxide slant column density window2 [DU]	−19.6	−13.0	−9.79	−7.42	−4.78	5.83	8.51	10.9	14.3	21.7
sulfurdioxide slant column density window2 precision [DU]	4.16	4.90	5.35	5.74	6.21	8.74	9.62	10.5	11.8	14.4
sulfurdioxide slant column density corrected win2 [DU]	−20.7	−13.9	−10.6	−8.27	−5.64	4.81	7.42	9.77	13.0	19.8
background so2 slant column offset window2 [DU]	−7.21	−4.90	−3.70	−2.89	−2.12	0.470	0.748	0.981	1.38	2.87
sulfurdioxide slant column density window3 [DU]	−61.0	−40.0	−30.8	−24.3	−17.3	11.2	18.9	26.0	35.6	54.6
sulfurdioxide slant column density window3 precision [DU]	13.5	15.4	16.7	17.8	19.4	29.4	34.1	39.6	50.8	82.3
sulfurdioxide slant column density corrected win3 [DU]	−53.9	−33.2	−24.0	−17.5	−10.6	16.7	23.9	30.4	39.5	58.1
background so2 slant column offset window3 [DU]	−7.01	−4.18	−2.56	−0.939	1.15	10.7	13.0	14.7	16.4	19.0
sulfurdioxide slant column cobra flag [1]	0.0	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
integrated so2 profile apriori [DU]	1.622×10^{-3}	3.640×10^{-3}	6.036×10^{-3}	8.385×10^{-3}	1.136×10^{-2}	3.459×10^{-2}	4.605×10^{-2}	6.220×10^{-2}	0.105	0.350
fitted radiance shift [nm]	-7.789×10^{-3}	-3.857×10^{-3}	-2.490×10^{-3}	-1.748×10^{-3}	-1.175×10^{-3}	4.236×10^{-4}	1.085×10^{-3}	1.932×10^{-3}	3.419×10^{-3}	7.513×10^{-3}
fitted radiance squeeze [1]	-4.967×10^{-4}	-3.249×10^{-4}	-2.517×10^{-4}	-1.998×10^{-4}	-1.438×10^{-4}	6.458×10^{-5}	1.151×10^{-4}	1.611×10^{-4}	2.260×10^{-4}	3.797×10^{-4}
fitted root mean square [1]	5.811×10^{-4}	7.058×10^{-4}	7.771×10^{-4}	8.315×10^{-4}	8.960×10^{-4}	1.310×10^{-3}	1.518×10^{-3}	1.747×10^{-3}	2.079×10^{-3}	2.834×10^{-3}
sulfurdioxide total air mass factor polluted [1]	7.802×10^{-2}	0.214	0.322	0.424	0.548	1.27	1.63	2.06	2.50	2.90
sulfurdioxide total air mass factor polluted precision [1]	9.685×10^{-3}	1.667×10^{-2}	2.411×10^{-2}	3.030×10^{-2}	3.937×10^{-2}	0.220	0.295	0.365	0.461	0.701
sulfurdioxide clear air mass factor polluted [1]	0.182	0.284	0.366	0.433	0.509	0.914	1.05	1.33	2.39	2.98
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]	0.723 ± 0.386	6200197	0.640	1.000	0.0	1.000	0.360	1.000
sulfurdioxide total vertical column [DU]	$(5.988 \pm 168.950) \times 10^{-2}$	6200197	0.579	1.569×10^{-2}	-122	265	-0.268	0.311
sulfurdioxide total vertical column precision [DU]	0.792 ± 1.182	6200197	0.579	0.412	4.999×10^{-2}	37.3	0.260	0.839
sulfurdioxide slant column density corrected [DU]	$(2.199 \pm 39.218) \times 10^{-2}$	6200197	0.397	1.214×10^{-2}	-41.8	37.7	-0.185	0.212
sulfurdioxide slant column density cobra [DU]	$(2.192 \pm 38.896) \times 10^{-2}$	6200197	0.397	1.214×10^{-2}	-41.8	16.5	-0.185	0.212
sulfurdioxide slant column density cobra precision [DU]	0.318 ± 0.137	6200197	0.147	0.281	9.344×10^{-2}	16.7	0.226	0.373
sulfurdioxide slant column density window1 [DU]	0.158 ± 0.716	6200197	0.792	0.160	-41.8	24.4	-0.238	0.554
sulfurdioxide slant column density window1 precision [DU]	0.318 ± 0.137	6200197	0.147	0.281	9.344×10^{-2}	16.7	0.226	0.373
sulfurdioxide slant column density corrected win1 [DU]	$(4.228 \pm 71.453) \times 10^{-2}$	6200197	0.785	2.365×10^{-2}	-41.8	24.3	-0.364	0.422
background so2 slant column offset window1 [DU]	-0.116 ± 0.121	6200197	0.105	-0.125	-0.877	2.11	-0.180	-7.449×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.02 ± 9.76	6200197	12.4	0.789	-579	939	-5.29	7.07
sulfurdioxide slant column density window2 precision [DU]	8.82 ± 2.28	6200197	2.82	8.49	2.48	322	7.25	10.1
sulfurdioxide slant column density corrected win2 [DU]	-0.365 ± 9.524	6200197	12.1	-0.341	-579	939	-6.40	5.69
background so2 slant column offset window2 [DU]	-1.39 ± 2.47	6200197	3.05	-0.503	-14.1	6.36	-2.71	0.349
sulfurdioxide slant column density window3 [DU]	-4.73 ± 26.31	6200197	33.2	-4.14	-207	172	-21.0	12.2
sulfurdioxide slant column density window3 precision [DU]	30.7 ± 13.1	6200197	10.5	27.4	9.78	228	23.3	33.7
sulfurdioxide slant column density corrected win3 [DU]	2.64 ± 25.81	6200197	32.6	2.93	-195	177	-13.4	19.1
background so2 slant column offset window3 [DU]	7.37 ± 5.25	6200197	7.92	6.39	-18.4	35.3	3.35	11.3
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.26	6200197	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(6.329 \pm 11.510) \times 10^{-2}$	6200197	4.008×10^{-2}	2.949×10^{-2}	1.271×10^{-3}	2.03	1.690×10^{-2}	5.697×10^{-2}
fitted radiance shift [nm]	$(-1.569 \pm 25.536) \times 10^{-4}$	6200197	1.688×10^{-3}	-1.808×10^{-4}	-4.392×10^{-2}	3.528×10^{-2}	-1.019×10^{-3}	6.691×10^{-4}
fitted radiance squeeze [1]	$(-2.194 \pm 1880.201) \times 10^{-7}$	6200197	2.174×10^{-4}	1.809×10^{-6}	-6.458×10^{-3}	1.006×10^{-2}	-1.073×10^{-4}	1.101×10^{-4}
fitted root mean square [1]	$(1.383 \pm 0.556) \times 10^{-3}$	6200197	6.034×10^{-4}	1.225×10^{-3}	3.483×10^{-4}	2.094×10^{-2}	1.011×10^{-3}	1.614×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.725 ± 0.389	6200197	0.521	0.713	5.000×10^{-2}	2.72	0.427	0.948
sulfurdioxide total air mass factor polluted precision [1]	$(9.016 \pm 11.714) \times 10^{-2}$	6200197	8.016×10^{-2}	4.922×10^{-2}	2.500×10^{-3}	1.88	3.004×10^{-2}	0.110
sulfurdioxide clear air mass factor polluted [1]	0.652 ± 0.281	6200197	0.452	0.671	2.776×10^{-2}	2.06	0.418	0.870
number of spectral points in retrieval [1]	73.5 ± 0.5	6200197	1.000	73.0	53.0	74.0	73.0	74.0

Table 4: Parameterlist and basic statistics for the analysis for observations in the southern hemisphere

Variable	mean $\pm\sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.530 ± 0.423	12073306	0.890	0.430	0.0	1.000	0.110	1.000
sulfurdioxide total vertical column [DU]	$(1.278 \pm 64.380) \times 10^{-2}$	12073306	0.306	4.990×10^{-3}	-33.0	125	-0.146	0.159
sulfurdioxide total vertical column precision [DU]	0.352 ± 0.491	12073306	0.246	0.237	3.186×10^{-2}	145	0.143	0.390
sulfurdioxide slant column density corrected [DU]	$(9.665 \pm 278.921) \times 10^{-3}$	12073306	0.308	5.627×10^{-3}	-9.74	59.3	-0.148	0.161
sulfurdioxide slant column density cobra [DU]	$(9.625 \pm 275.490) \times 10^{-3}$	12073306	0.308	5.627×10^{-3}	-9.74	23.1	-0.148	0.161
sulfurdioxide slant column density cobra precision [DU]	0.237 ± 0.083	12073306	6.236×10^{-2}	0.216	7.912×10^{-2}	10.7	0.191	0.253
sulfurdioxide slant column density window1 [DU]	$(4.440 \pm 55.609) \times 10^{-2}$	12073306	0.665	5.257×10^{-2}	-34.8	44.5	-0.287	0.378
sulfurdioxide slant column density window1 precision [DU]	0.237 ± 0.083	12073306	6.236×10^{-2}	0.216	7.912×10^{-2}	10.7	0.191	0.253
sulfurdioxide slant column density corrected win1 [DU]	$(6.146 \pm 527.657) \times 10^{-3}$	12073306	0.624	1.114×10^{-3}	-34.8	44.6	-0.310	0.314
background so2 slant column offset window1 [DU]	$(-3.826 \pm 16.000) \times 10^{-2}$	12073306	0.259	-6.919×10^{-2}	-1.12	3.37	-0.168	9.066×10^{-2}
sulfurdioxide slant column density window2 [DU]	0.337 ± 7.732	12073306	9.86	0.400	-822	872	-4.56	5.30
sulfurdioxide slant column density window2 precision [DU]	7.11 ± 1.94	12073306	2.05	6.84	2.17	713	5.90	7.95
sulfurdioxide slant column density corrected win2 [DU]	-0.454 ± 7.661	12073306	9.74	-0.430	-820	872	-5.31	4.43
background so2 slant column offset window2 [DU]	-0.790 ± 1.733	12073306	2.52	-0.612	-8.66	6.84	-1.97	0.551
sulfurdioxide slant column density window3 [DU]	-2.07 ± 21.28	12073306	26.5	-3.07	-2.819×10^{3}	1.124×10^{3}	-15.8	10.7
sulfurdioxide slant column density window3 precision [DU]	24.8 ± 12.4	12073306	7.76	21.5	9.61	798	18.3	26.0
sulfurdioxide slant column density corrected win3 [DU]	3.19 ± 20.26	12073306	25.1	2.94	-2.824×10^{3}	1.121×10^{3}	-9.44	15.7
background so2 slant column offset window3 [DU]	5.26 ± 6.81	12073306	11.0	5.55	-25.0	23.5	-0.551	10.5
sulfurdioxide slant column cobra flag [1]	1.99 ± 0.17	12073306	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.185 \pm 3.031) \times 10^{-2}$	12073306	1.804×10^{-2}	1.600×10^{-2}	6.158×10^{-4}	1.81	9.201×10^{-3}	2.724×10^{-2}
fitted radiance shift [nm]	$(-4.324 \pm 23.811) \times 10^{-4}$	12073306	1.511×10^{-3}	-4.974×10^{-4}	-5.971×10^{-2}	4.395×10^{-2}	-1.232×10^{-3}	2.789×10^{-4}
fitted radiance squeeze [1]	$(-6.310 \pm 16.139) \times 10^{-5}$	12073306	2.008×10^{-4}	-5.508×10^{-5}	-1.490×10^{-2}	1.428×10^{-2}	-1.594×10^{-4}	4.141×10^{-5}
fitted root mean square [1]	$(1.068 \pm 0.342) \times 10^{-3}$	12073306	3.143×10^{-4}	9.933×10^{-4}	3.400×10^{-4}	4.249×10^{-2}	8.614×10^{-4}	1.176×10^{-3}
sulfurdioxide total air mass factor polluted [1]	1.14 ± 0.72	12073306	0.928	0.922	5.000×10^{-2}	3.37	0.606	1.53
sulfurdioxide total air mass factor polluted precision [1]	0.184 ± 0.166	12073306	0.226	0.138	4.983×10^{-3}	1.76	4.730×10^{-2}	0.273
sulfurdioxide clear air mass factor polluted [1]	0.912 ± 0.640	12073306	0.429	0.697	0.131	3.43	0.535	0.964
number of spectral points in retrieval [1]	73.4 ± 0.5	12073306	1.000	73.0	52.0	74.0	73.0	74.0

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

Variable	mean $\pm\sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.637 ± 0.413	13082486	0.790	1.000	0.0	1.000	0.210	1.000
sulfurdioxide total vertical column [DU]	$(2.276 \pm 97.561) \times 10^{-2}$	13082486	0.396	7.802×10^{-3}	-79.8	265	-0.188	0.208
sulfurdioxide total vertical column precision [DU]	0.472 ± 0.718	13082486	0.276	0.289	4.626×10^{-2}	51.5	0.197	0.473
sulfurdioxide slant column density corrected [DU]	$(1.182 \pm 29.687) \times 10^{-2}$	13082486	0.324	6.937×10^{-3}	-9.74	37.7	-0.154	0.170
sulfurdioxide slant column density cobra [DU]	$(1.180 \pm 29.530) \times 10^{-2}$	13082486	0.324	6.937×10^{-3}	-9.74	22.0	-0.154	0.170
sulfurdioxide slant column density cobra precision [DU]	0.255 ± 0.104	13082486	7.979×10^{-2}	0.224	8.460×10^{-2}	16.7	0.195	0.275
sulfurdioxide slant column density window1 [DU]	0.117 ± 0.575	13082486	0.667	0.116	-34.8	30.0	-0.219	0.448
sulfurdioxide slant column density window1 precision [DU]	0.255 ± 0.104	13082486	7.979×10^{-2}	0.224	8.460×10^{-2}	16.7	0.195	0.275
sulfurdioxide slant column density corrected win1 [DU]	$(3.658 \pm 56.416) \times 10^{-2}$	13082486	0.647	2.668×10^{-2}	-34.8	29.9	-0.294	0.353
background so2 slant column offset window1 [DU]	$(-8.034 \pm 14.025) \times 10^{-2}$	13082486	0.190	-0.115	-1.12	2.11	-0.175	1.508×10^{-2}
sulfurdioxide slant column density window2 [DU]	0.375 ± 8.246	13082486	10.4	0.334	-822	939	-4.88	5.55
sulfurdioxide slant column density window2 precision [DU]	7.54 ± 2.04	13082486	2.37	7.23	2.17	322	6.16	8.53
sulfurdioxide slant column density corrected win2 [DU]	-0.334 ± 8.131	13082486	10.3	-0.306	-820	939	-5.47	4.83
background so2 slant column offset window2 [DU]	-0.710 ± 1.838	13082486	2.23	-0.325	-14.1	6.84	-1.70	0.534
sulfurdioxide slant column density window3 [DU]	$(4.522 \pm 2256.547) \times 10^{-2}$	13082486	28.2	-0.594	-495	320	-14.3	14.0
sulfurdioxide slant column density window3 precision [DU]	26.6 ± 12.6	13082486	9.38	23.2	9.61	228	19.5	28.9
sulfurdioxide slant column density corrected win3 [DU]	4.92 ± 21.71	13082486	27.2	4.46	-495	316	-8.86	18.4
background so2 slant column offset window3 [DU]	4.88 ± 5.75	13082486	8.44	4.94	-25.0	35.3	0.662	9.10
sulfurdioxide slant column cobra flag [1]	1.99 ± 0.15	13082486	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.877 \pm 4.305) \times 10^{-2}$	13082486	2.014×10^{-2}	1.969×10^{-2}	1.371×10^{-3}	1.81	1.253×10^{-2}	3.267×10^{-2}
fitted radiance shift [nm]	$(-2.964 \pm 24.256) \times 10^{-4}$	13082486	1.754×10^{-3}	-3.248×10^{-4}	-4.549×10^{-2}	4.365×10^{-2}	-1.200×10^{-3}	5.532×10^{-4}
fitted radiance squeeze [1]	$(-2.808 \pm 16.168) \times 10^{-5}$	13082486	1.927×10^{-4}	-2.448×10^{-5}	-1.475×10^{-2}	1.428×10^{-2}	-1.224×10^{-4}	7.031×10^{-5}
fitted root mean square [1]	$(1.125 \pm 0.421) \times 10^{-3}$	13082486	3.499×10^{-4}	1.017×10^{-3}	3.400×10^{-4}	4.249×10^{-2}	8.763×10^{-4}	1.226×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.874 ± 0.457	13082486	0.546	0.808	5.000×10^{-2}	2.71	0.559	1.10
sulfurdioxide total air mass factor polluted precision [1]	0.135 ± 0.130	13082486	0.156	8.158×10^{-2}	2.809×10^{-3}	1.76	4.051×10^{-2}	0.197
sulfurdioxide clear air mass factor polluted [1]	0.687 ± 0.242	13082486	0.326	0.666	5.618×10^{-2}	2.82	0.513	0.839
number of spectral points in retrieval [1]	73.5 ± 0.5	13082486	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]	0.476 ± 0.419	4641725	0.920	0.340	0.0	1.000	8.000×10^{-2}	1.000
sulfurdioxide total vertical column [DU]	$(3.816 \pm 126.189) \times 10^{-2}$	4641725	0.293	5.976×10^{-3}	-122	191	-0.136	0.157
sulfurdioxide total vertical column precision [DU]	0.524 ± 0.927	4641725	0.442	0.225	3.186×10^{-2}	145	0.104	0.547
sulfurdioxide slant column density corrected [DU]	$(1.804 \pm 37.305) \times 10^{-2}$	4641725	0.364	8.834×10^{-3}	-41.8	40.3	-0.172	0.192
sulfurdioxide slant column density cobra [DU]	$(1.796 \pm 36.822) \times 10^{-2}$	4641725	0.364	8.834×10^{-3}	-41.8	23.1	-0.172	0.192
sulfurdioxide slant column density cobra precision [DU]	0.288 ± 0.122	4641725	0.123	0.251	7.912×10^{-2}	10.7	0.209	0.332
sulfurdioxide slant column density window1 [DU]	$(-2.003 \pm 70.214) \times 10^{-2}$	4641725	0.809	-2.771×10^{-2}	-41.8	44.5	-0.436	0.374
sulfurdioxide slant column density window1 precision [DU]	0.288 ± 0.122	4641725	0.123	0.251	7.912×10^{-2}	10.7	0.209	0.332
sulfurdioxide slant column density corrected win1 [DU]	$(-3.559 \pm 66.847) \times 10^{-2}$	4641725	0.736	-5.378×10^{-2}	-41.8	44.6	-0.418	0.318
background so2 slant column offset window1 [DU]	$(-1.556 \pm 17.498) \times 10^{-2}$	4641725	0.289	-5.770×10^{-2}	-0.918	3.37	-0.157	0.132
sulfurdioxide slant column density window2 [DU]	1.08 ± 8.96	4641725	11.0	1.04	-795	872	-4.45	6.52
sulfurdioxide slant column density window2 precision [DU]	8.02 ± 2.52	4641725	2.92	7.56	2.37	409	6.31	9.23
sulfurdioxide slant column density corrected win2 [DU]	-0.669 ± 8.789	4641725	10.7	-0.686	-794	872	-6.05	4.69
background so2 slant column offset window2 [DU]	-1.75 ± 2.26	4641725	3.45	-1.61	-14.1	5.93	-3.26	0.182
sulfurdioxide slant column density window3 [DU]	-10.8 ± 22.6	4641725	26.7	-10.5	-2.819×10^{3}	1.124×10^{3}	-24.0	2.76
sulfurdioxide slant column density window3 precision [DU]	26.9 ± 13.6	4641725	11.2	23.3	9.95	798	18.7	30.0
sulfurdioxide slant column density corrected win3 [DU]	-1.77 ± 22.81	4641725	27.0	-0.796	-2.824×10^{3}	1.121×10^{3}	-14.8	12.3
background so2 slant column offset window3 [DU]	9.04 ± 7.09	4641725	11.7	10.7	-19.7	25.5	3.21	15.0
sulfurdioxide slant column cobra flag [1]	1.95 ± 0.30	4641725	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(4.766 \pm 10.609) \times 10^{-2}$	4641725	3.552×10^{-2}	1.640×10^{-2}	6.158×10^{-4}	2.03	5.740×10^{-3}	4.126×10^{-2}
fitted radiance shift [nm]	$(-4.715 \pm 24.217) \times 10^{-4}$	4641725	1.190×10^{-3}	-5.559×10^{-4}	-5.971×10^{-2}	4.395×10^{-2}	-1.131×10^{-3}	5.921×10^{-5}
fitted radiance squeeze [1]	$(-8.420 \pm 19.523) \times 10^{-5}$	4641725	2.438×10^{-4}	-8.606×10^{-5}	-1.490×10^{-2}	1.210×10^{-2}	-2.068×10^{-4}	3.698×10^{-5}
fitted root mean square [1]	$(1.298 \pm 0.491) \times 10^{-3}$	4641725	5.074×10^{-4}	1.183×10^{-3}	3.525×10^{-4}	3.250×10^{-2}	9.739×10^{-4}	1.481×10^{-3}
sulfurdioxide total air mass factor polluted [1]	1.39 ± 0.94	4641725	1.81	1.11	5.000×10^{-2}	3.37	0.545	2.35
sulfurdioxide total air mass factor polluted precision [1]	0.206 ± 0.208	4641725	0.274	0.145	2.500×10^{-3}	1.88	3.572×10^{-2}	0.309
sulfurdioxide clear air mass factor polluted [1]	1.23 ± 0.91	4641725	1.37	0.896	2.777×10^{-2}	3.43	0.518	1.89
number of spectral points in retrieval [1]	73.4 ± 0.5	4641725	1.000	73.0	52.0	74.0	73.0	74.0

3 Granule outlines

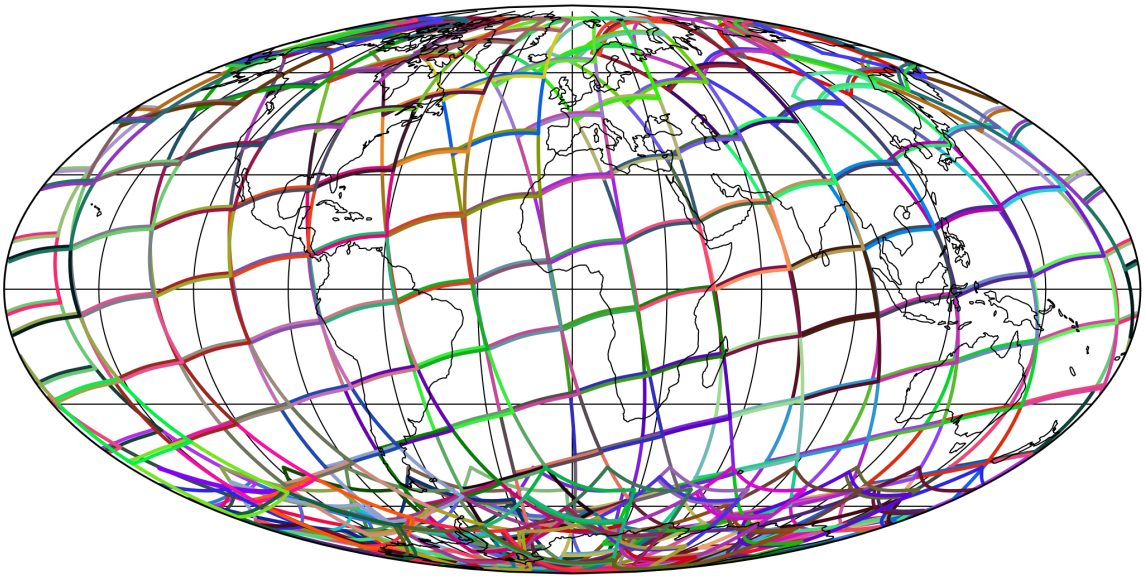

Figure 1: Outline of the granules.

4 Input data monitoring

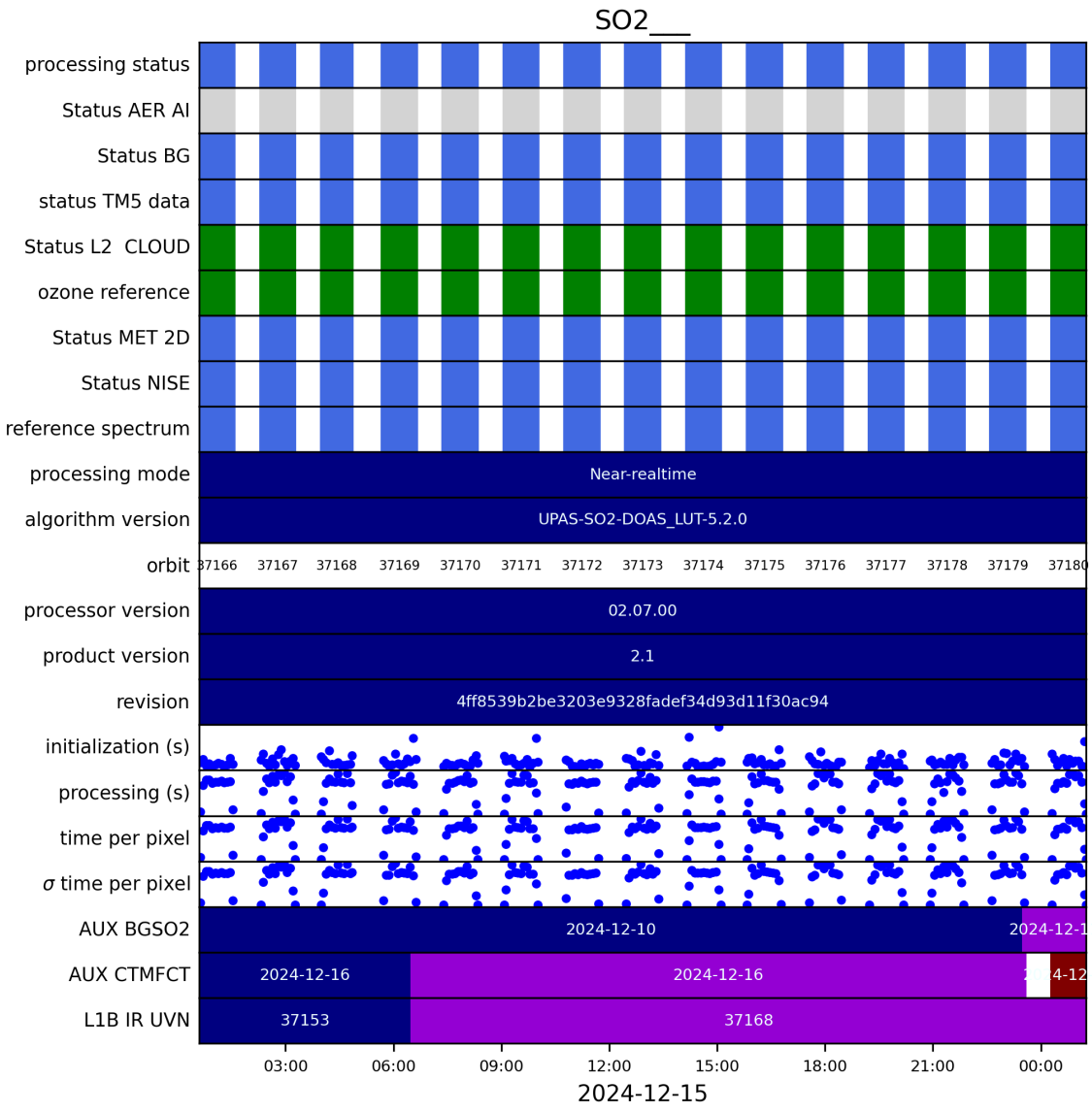

Figure 2: Input data per granule

5 Warnings and errors

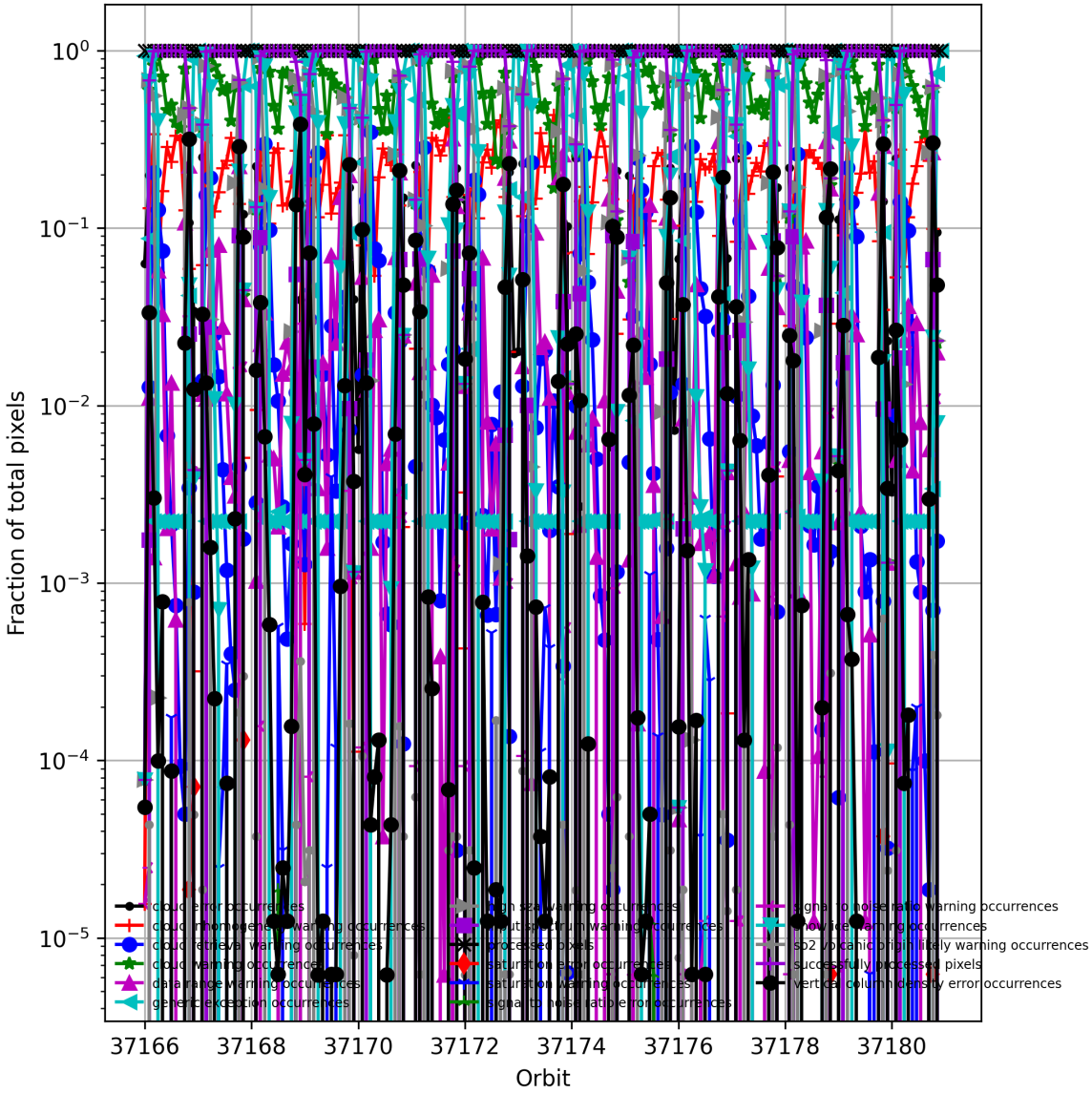

Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

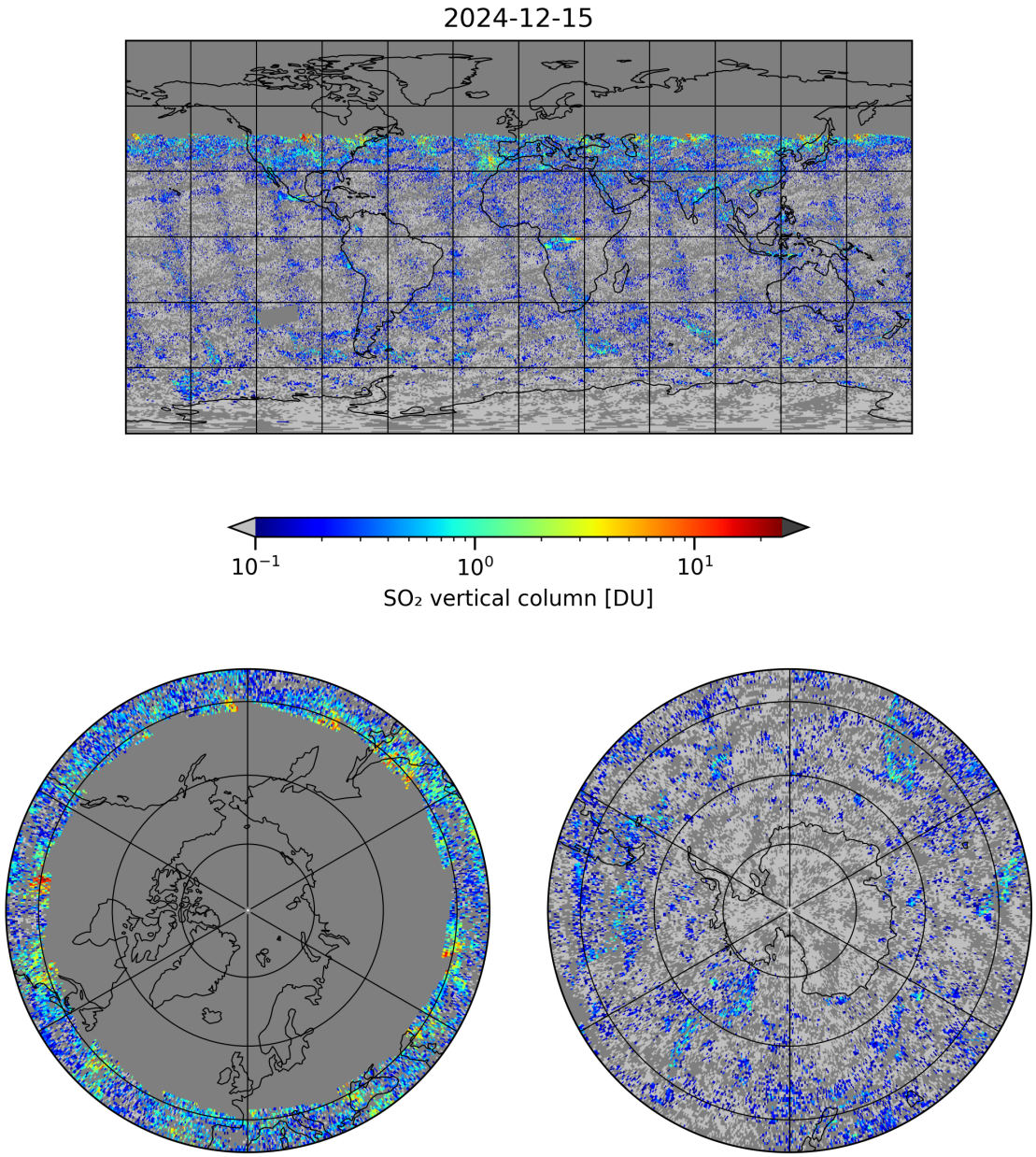

Figure 4: Map of "SO_2 vertical column" for 2024-12-15 to 2024-12-16

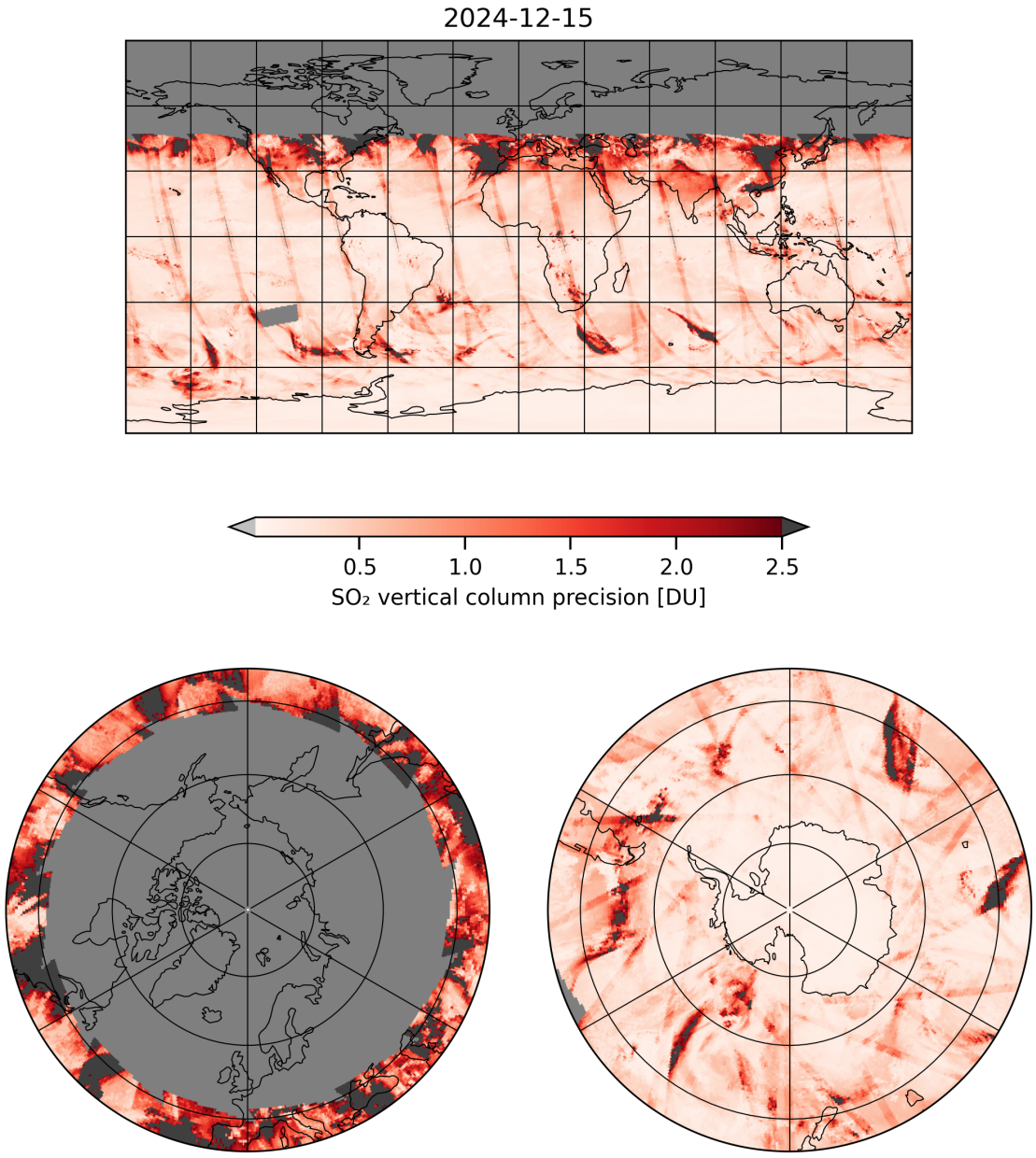

Figure 5: Map of "SO_2 vertical column precision" for 2024-12-15 to 2024-12-16

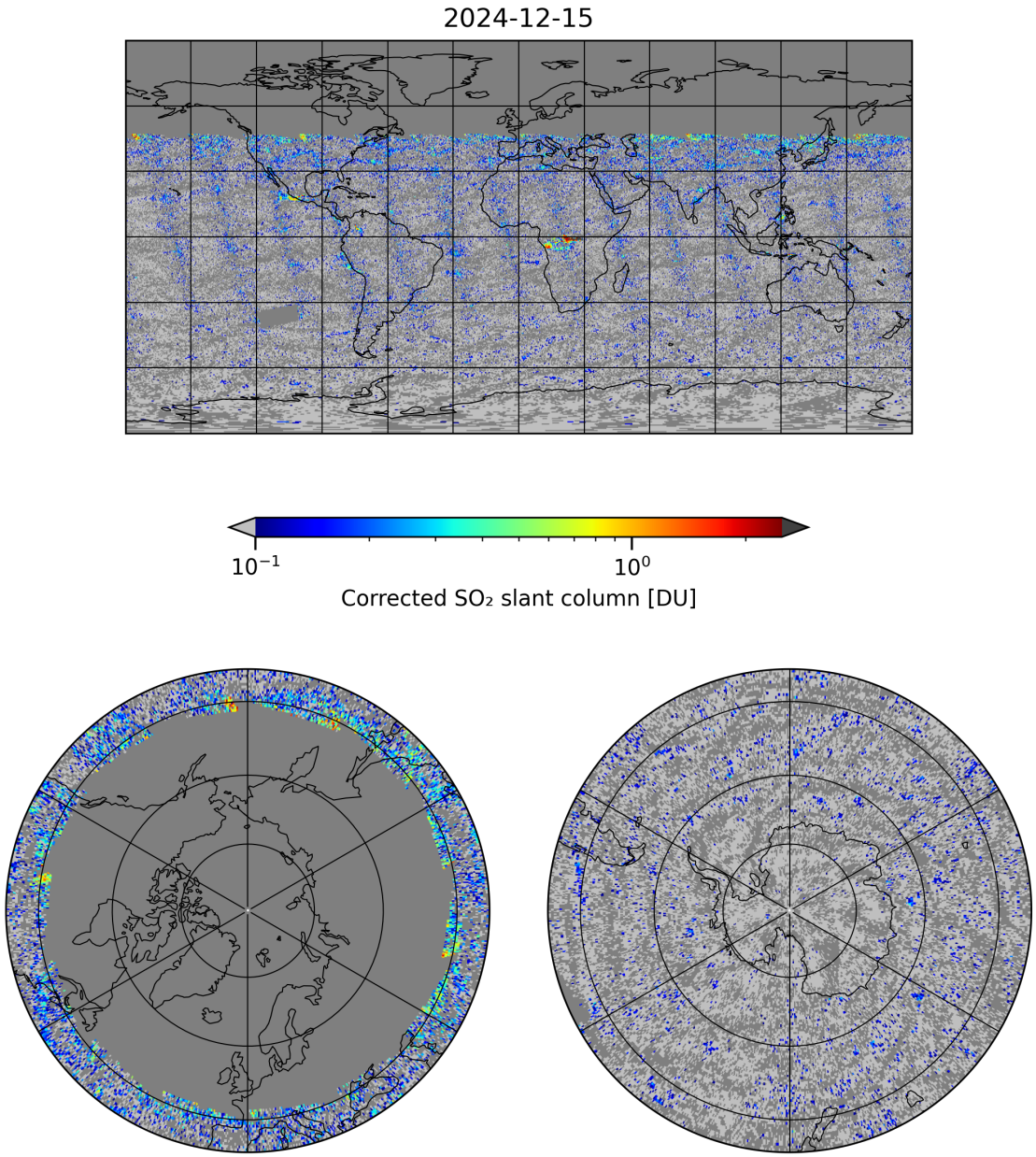

Figure 6: Map of "Corrected SO_2 slant column" for 2024-12-15 to 2024-12-16

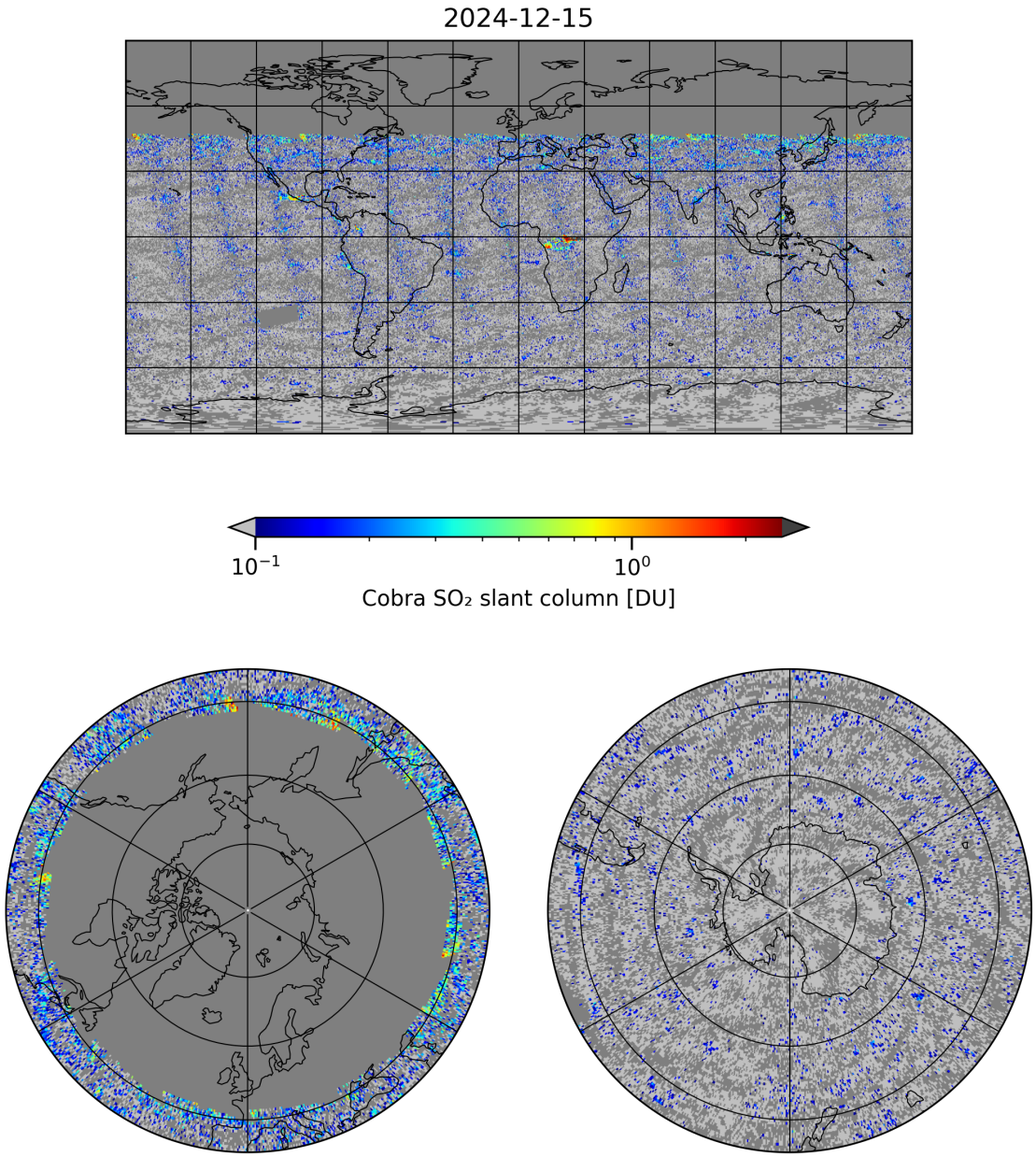

Figure 7: Map of "Cobra SO_2 slant column" for 2024-12-15 to 2024-12-16

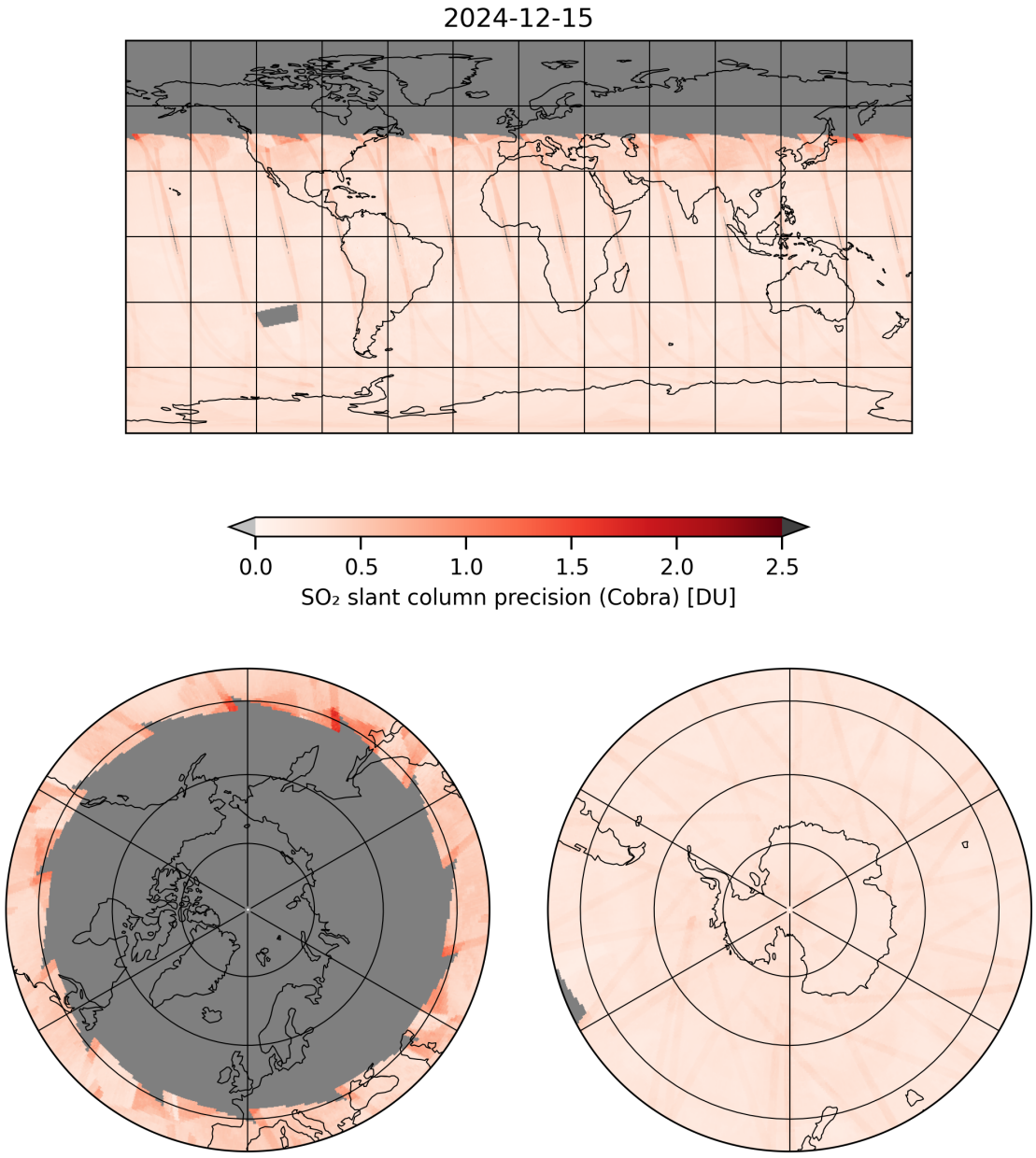

Figure 8: Map of "SO_2 slant column precision (Cobra)" for 2024-12-15 to 2024-12-16

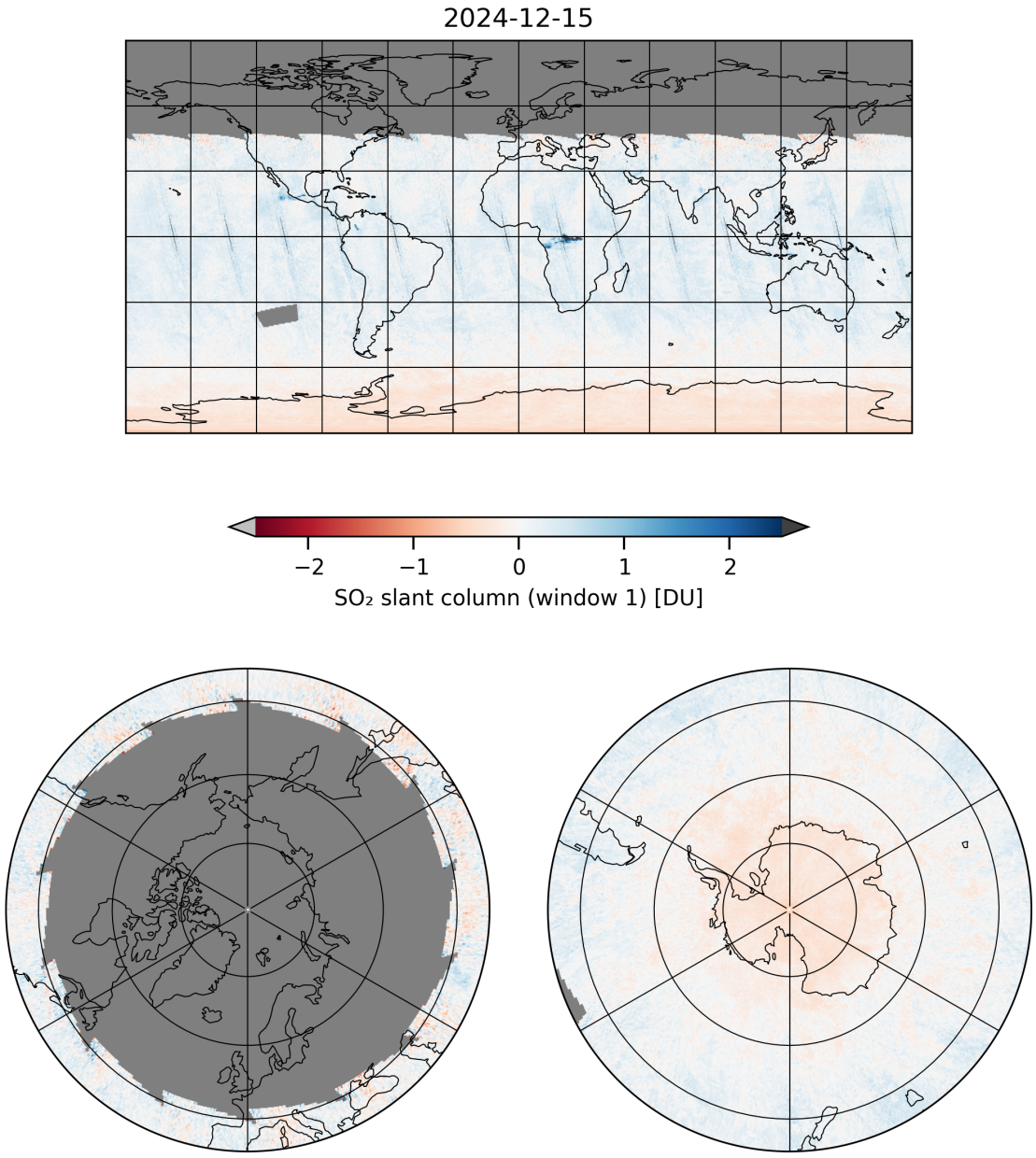

Figure 9: Map of "SO_2 slant column (window 1)" for 2024-12-15 to 2024-12-16

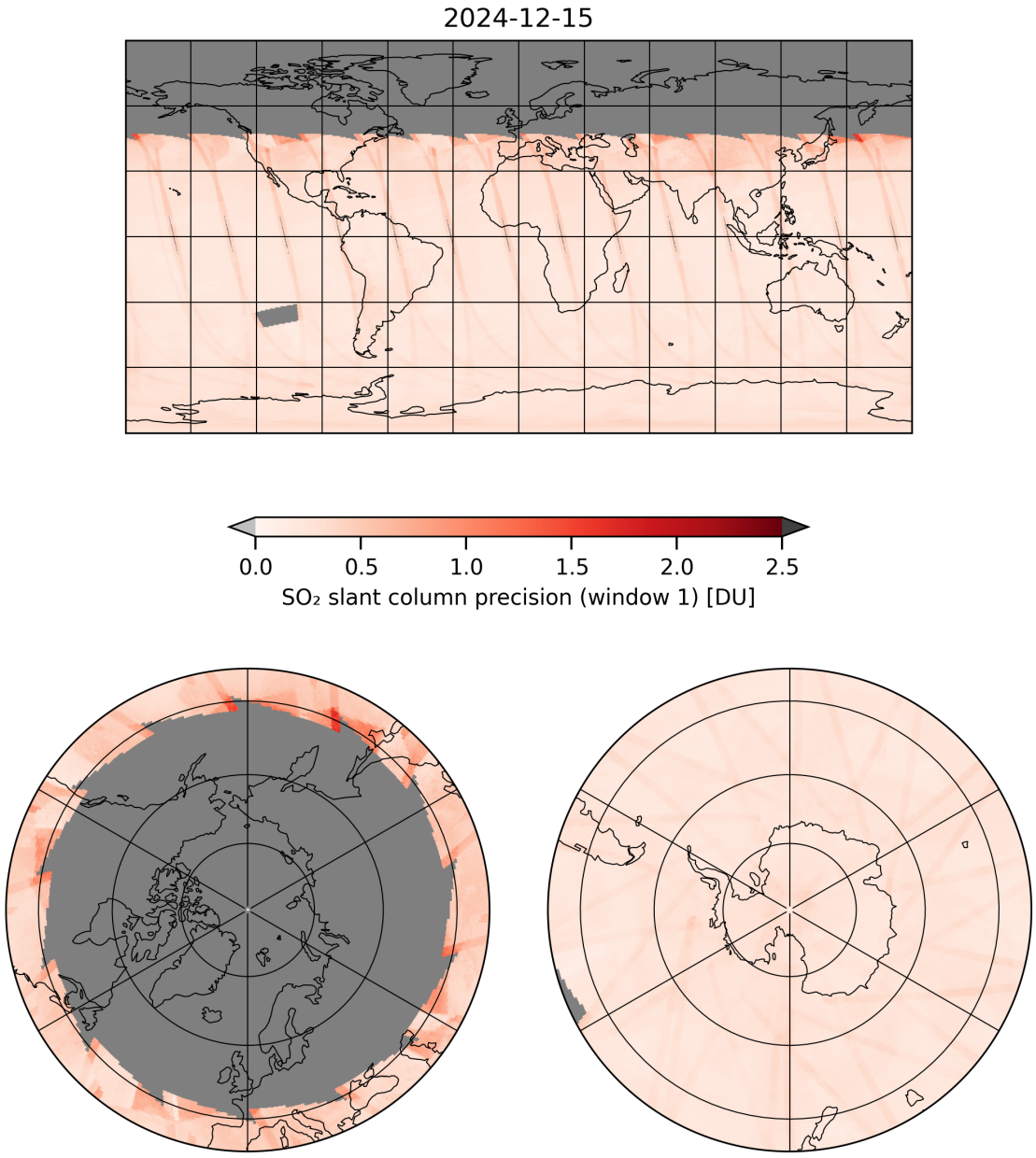

Figure 10: Map of "SO_2 slant column precision (window 1)" for 2024-12-15 to 2024-12-16

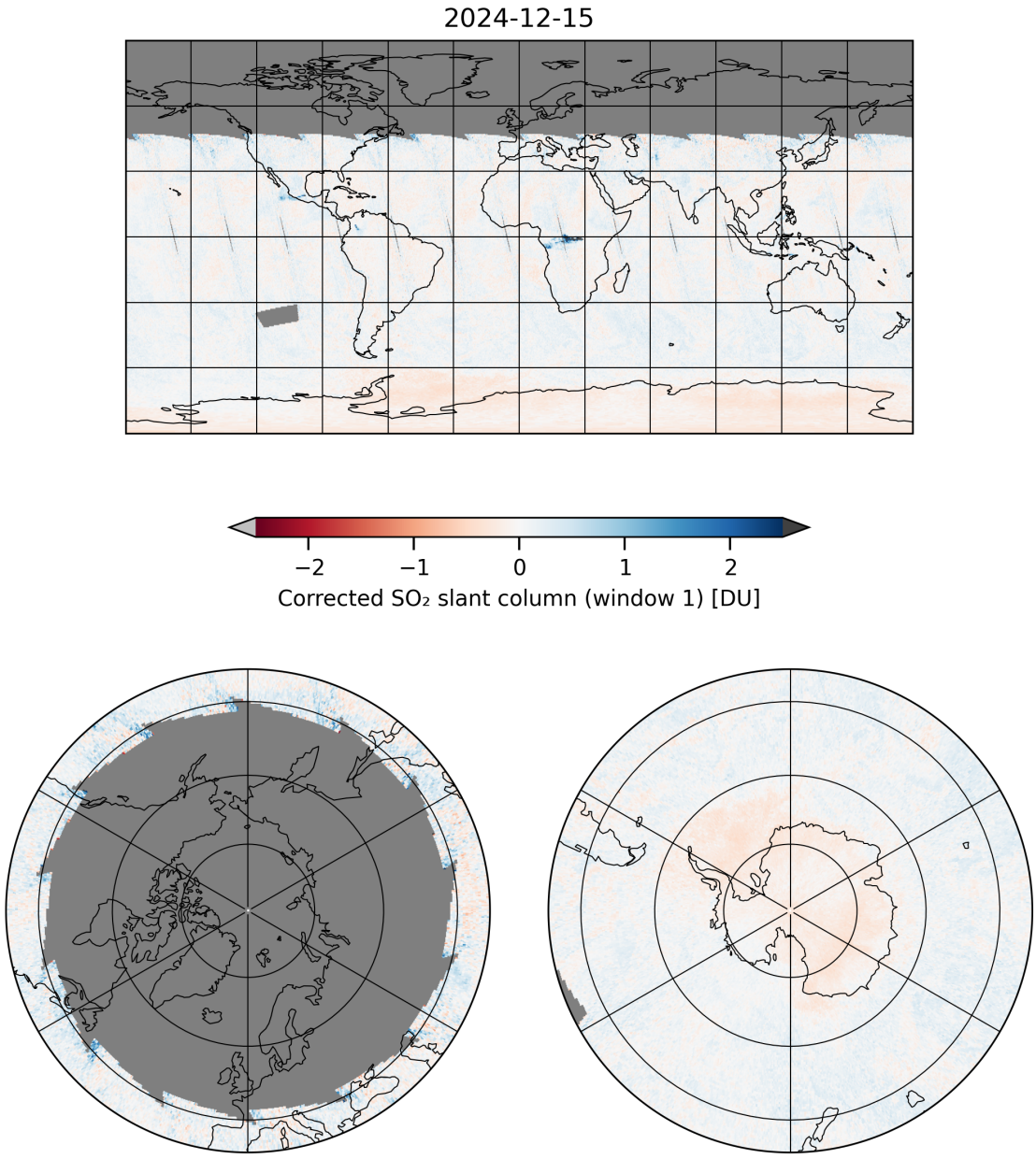

Figure 11: Map of "Corrected SO_2 slant column (window 1)" for 2024-12-15 to 2024-12-16

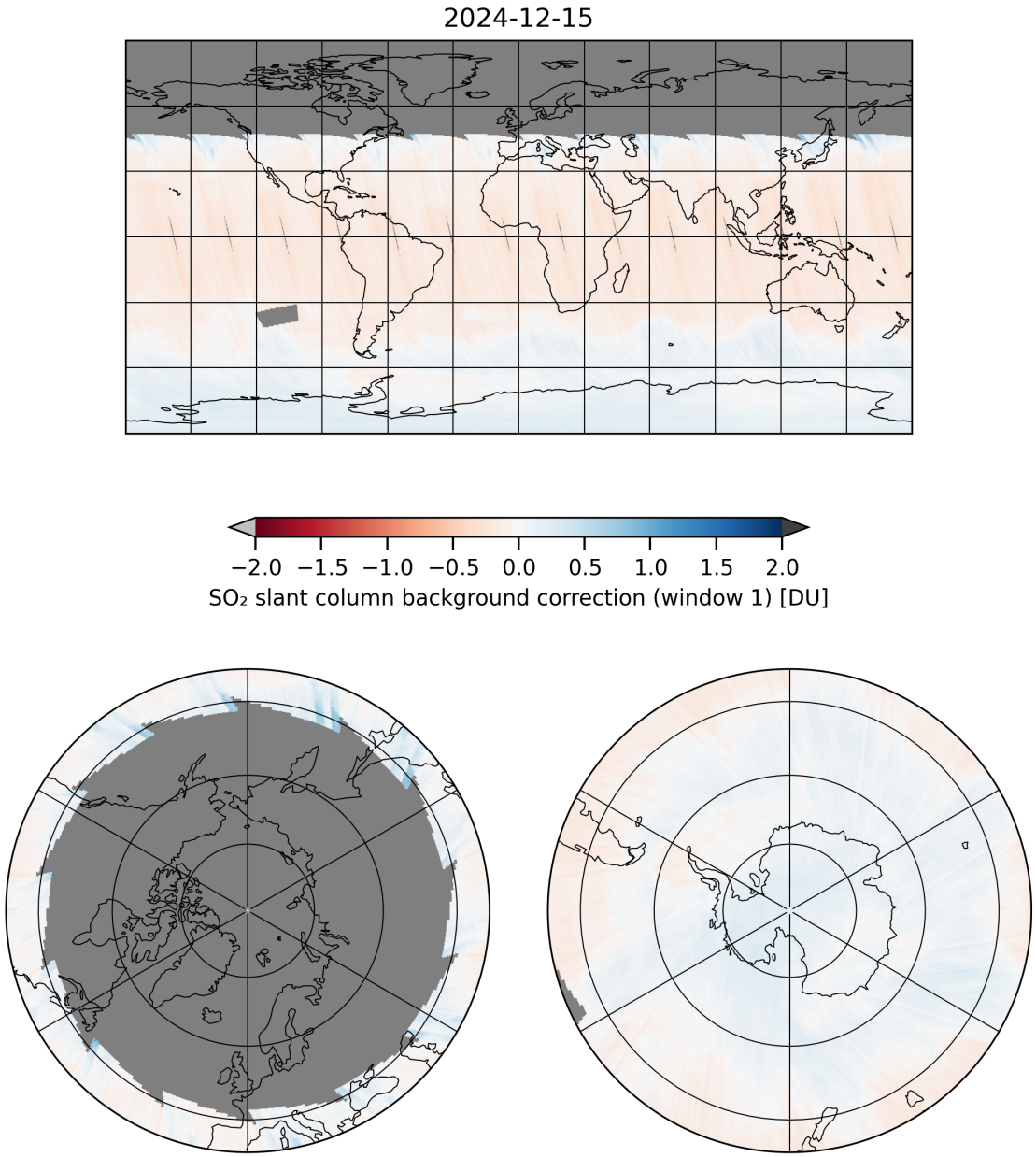

Figure 12: Map of "SO_2 slant column background correction (window 1)" for 2024-12-15 to 2024-12-16

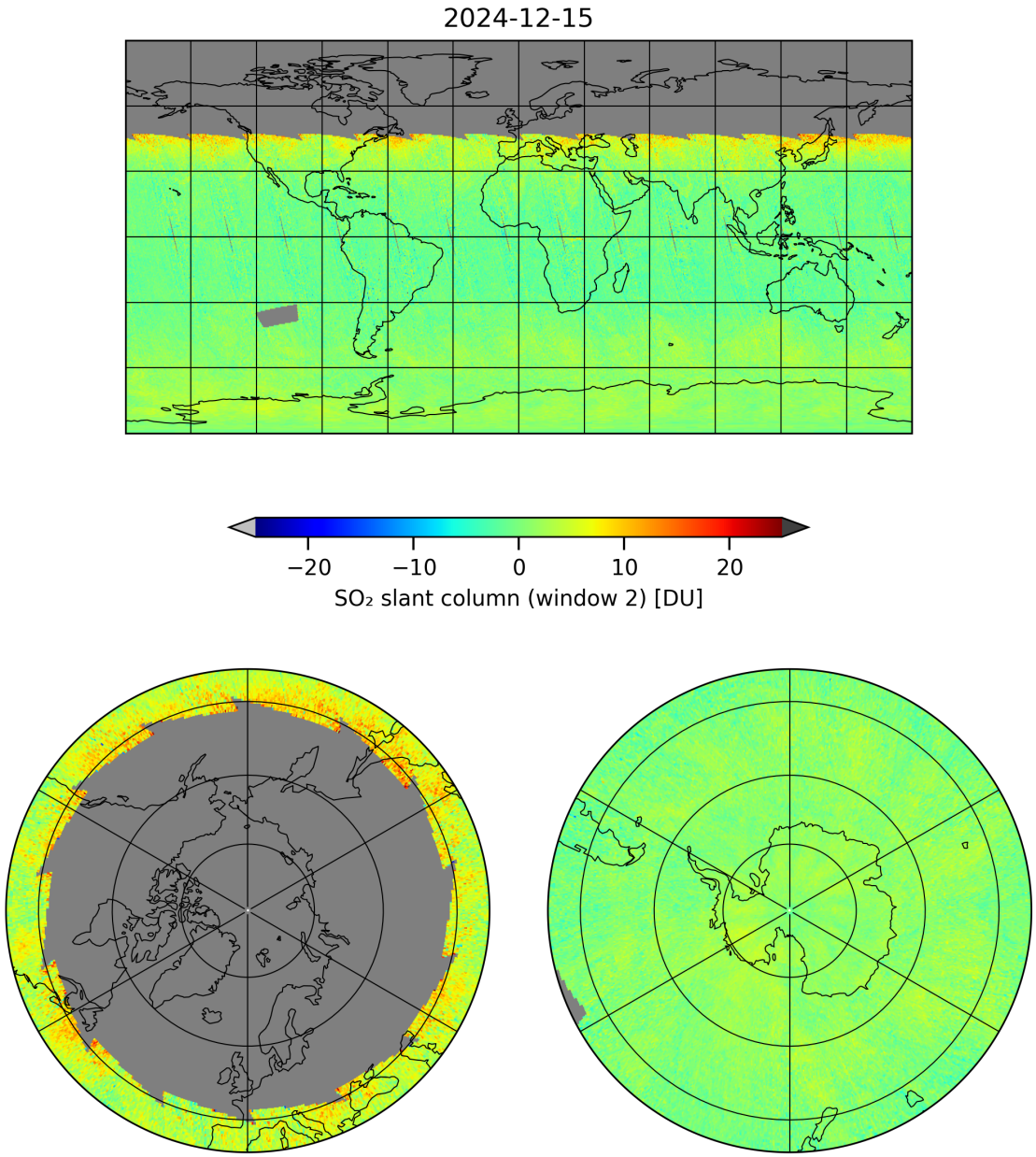

Figure 13: Map of "SO_2 slant column (window 2)" for 2024-12-15 to 2024-12-16

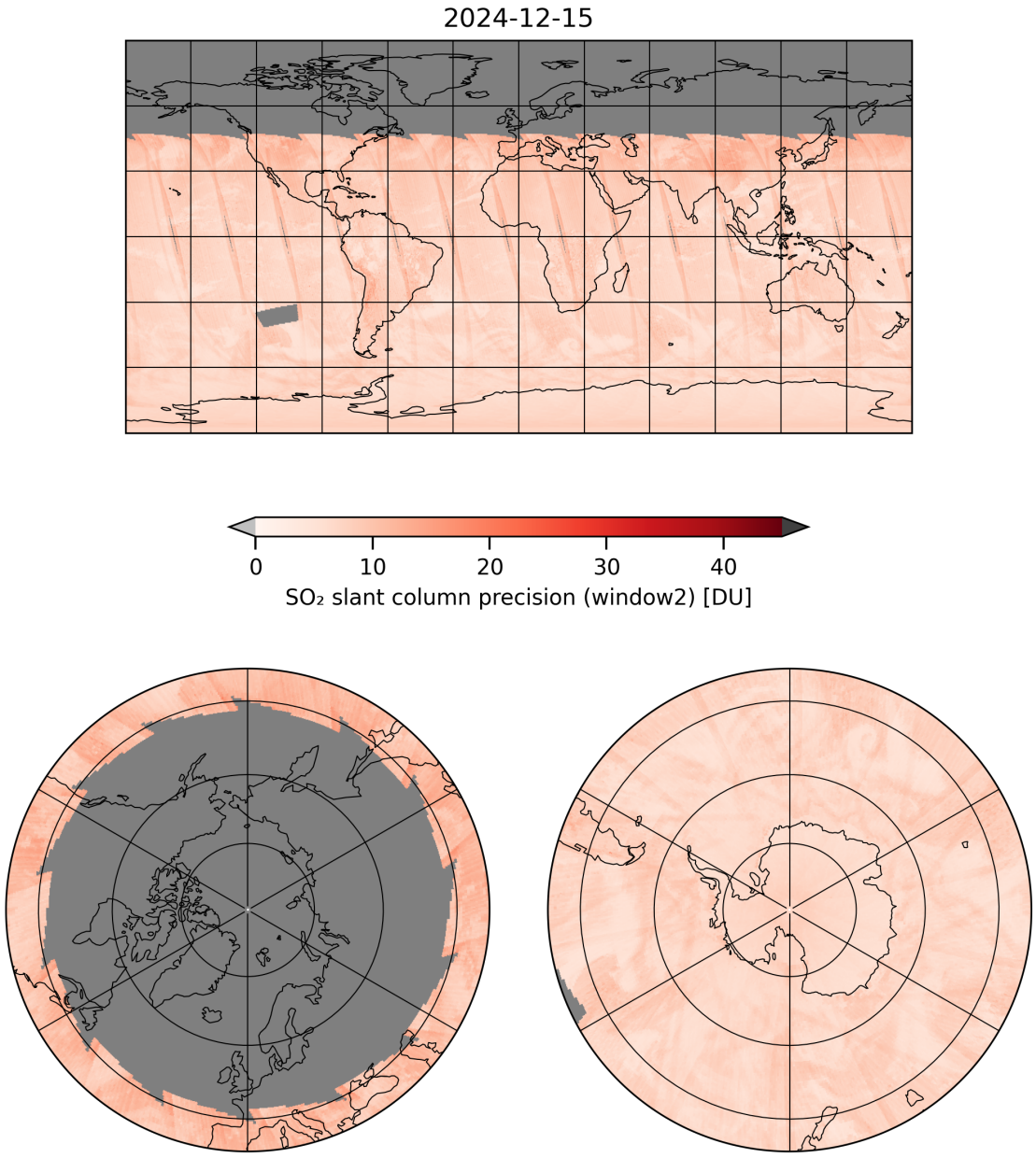

Figure 14: Map of "SO_2 slant column precision (window2)" for 2024-12-15 to 2024-12-16

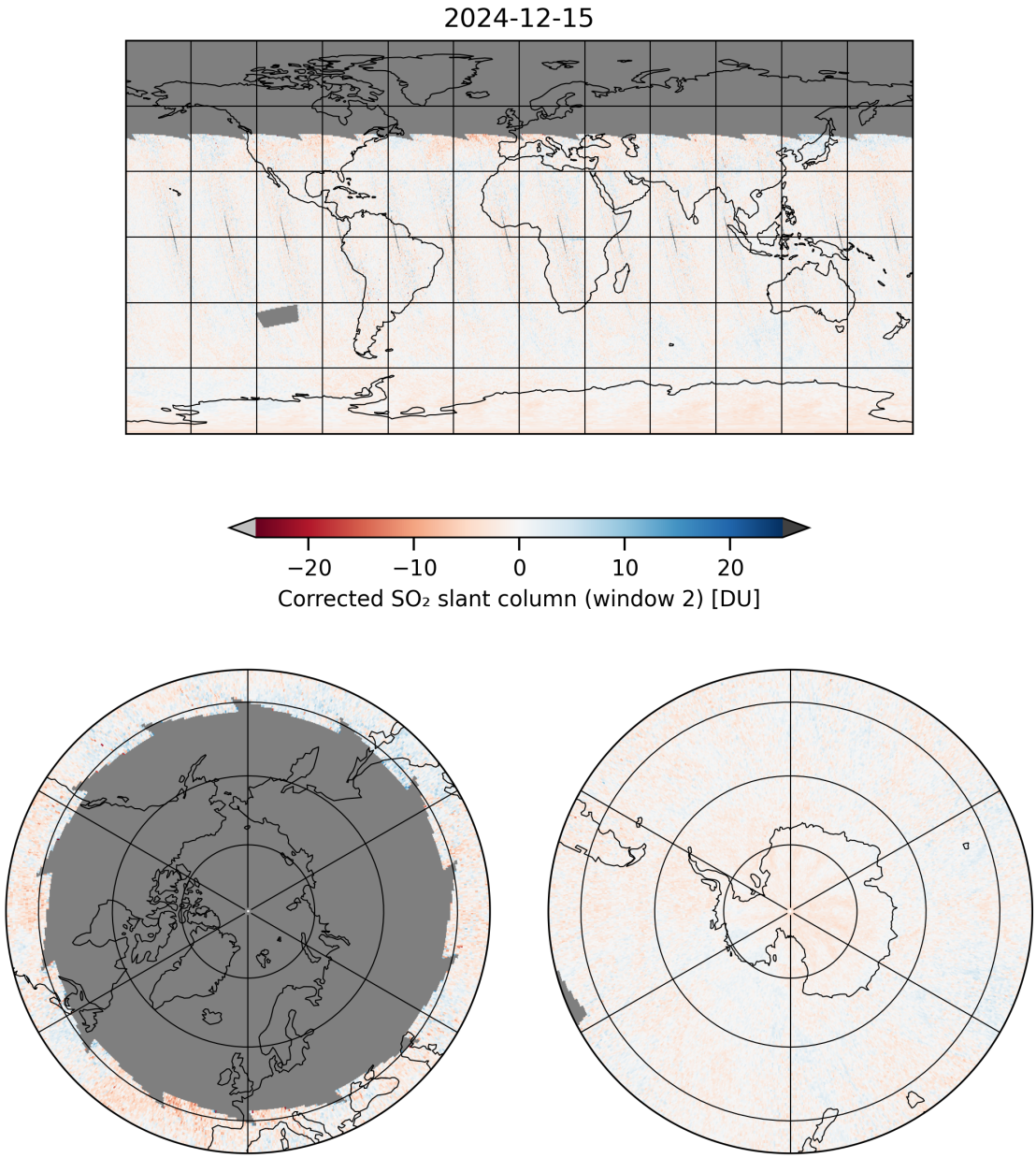

Figure 15: Map of "Corrected SO_2 slant column (window 2)" for 2024-12-15 to 2024-12-16

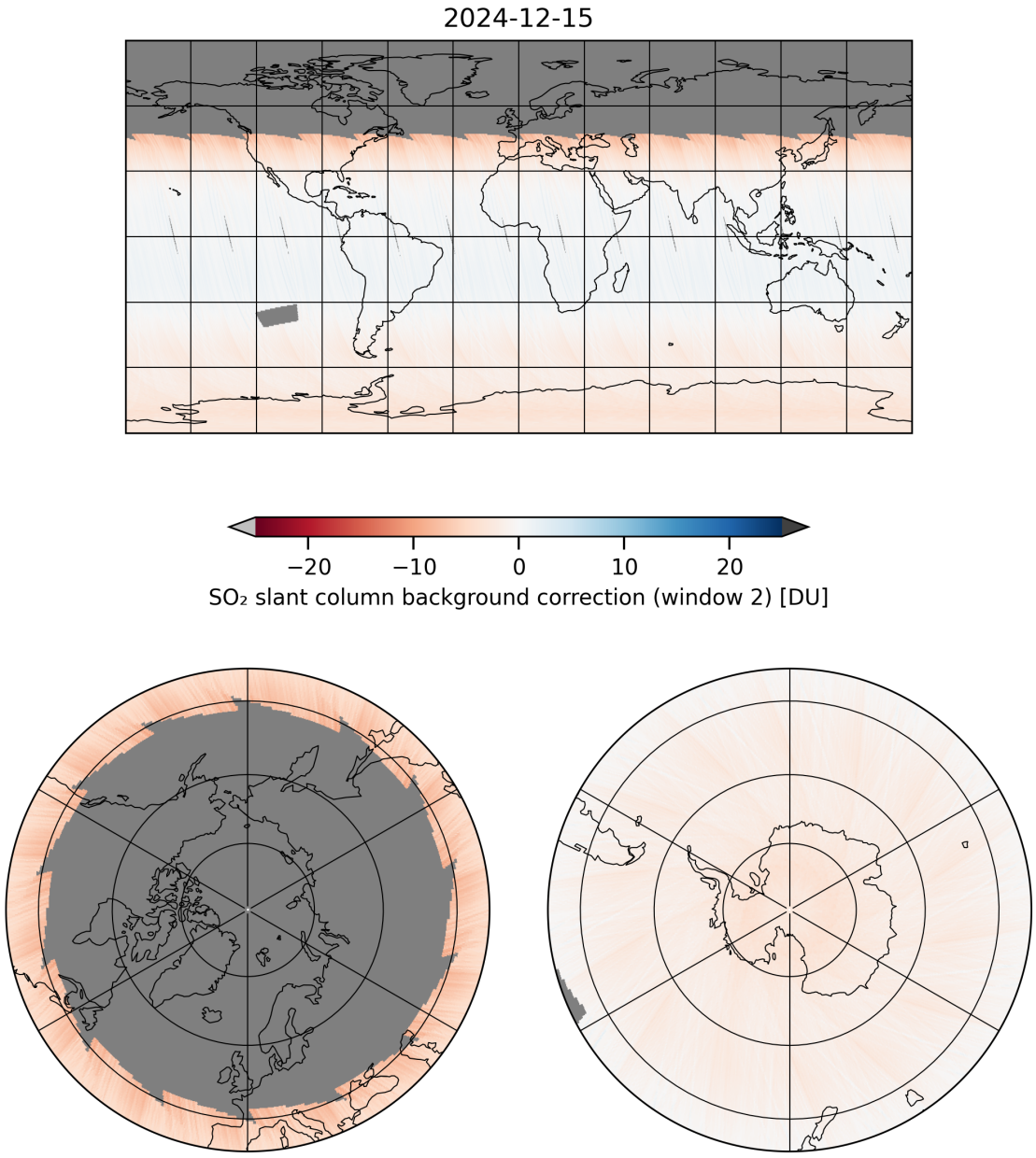

Figure 16: Map of "SO_2 slant column background correction (window 2)" for 2024-12-15 to 2024-12-16

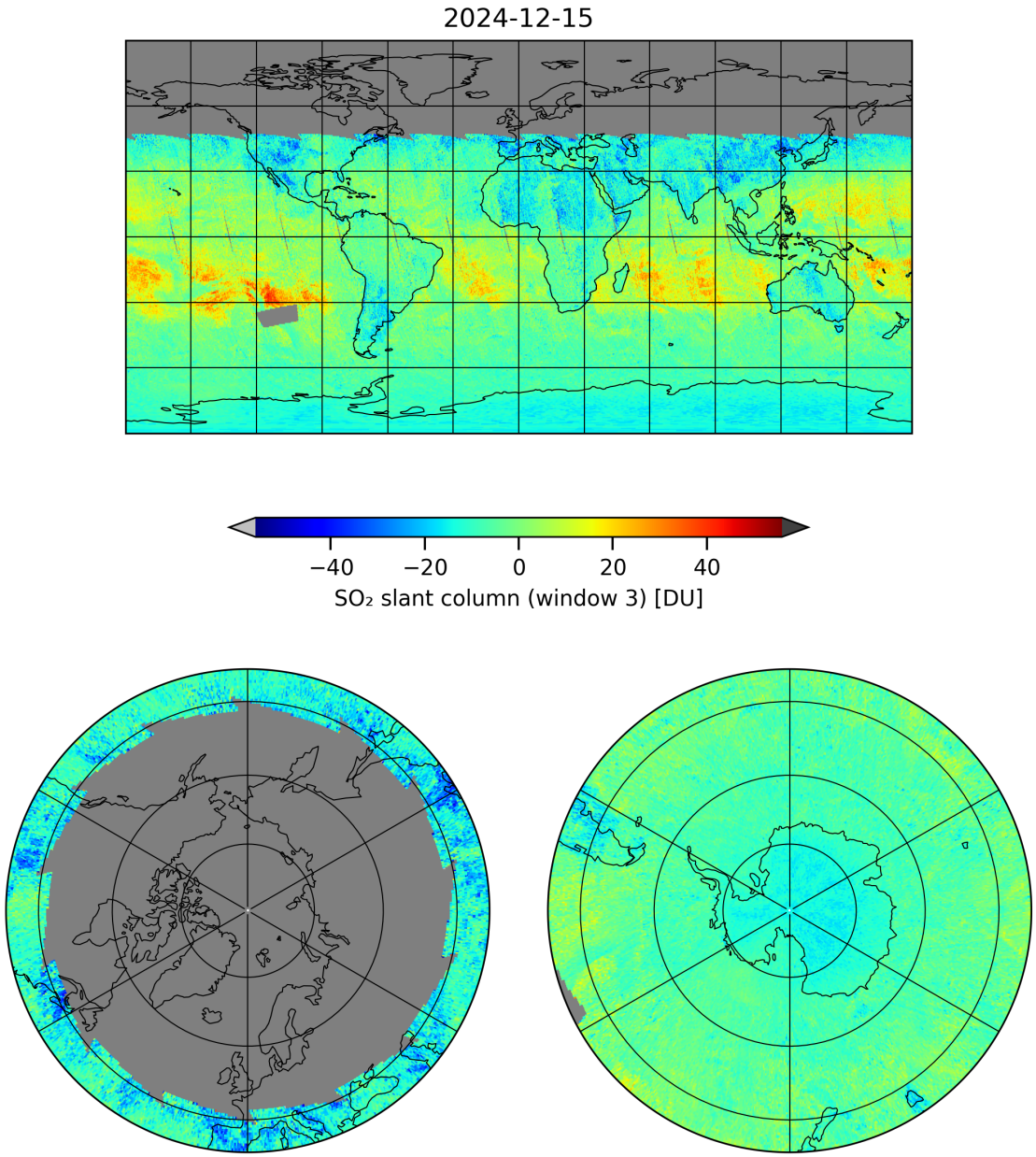

Figure 17: Map of "SO_2 slant column (window 3)" for 2024-12-15 to 2024-12-16

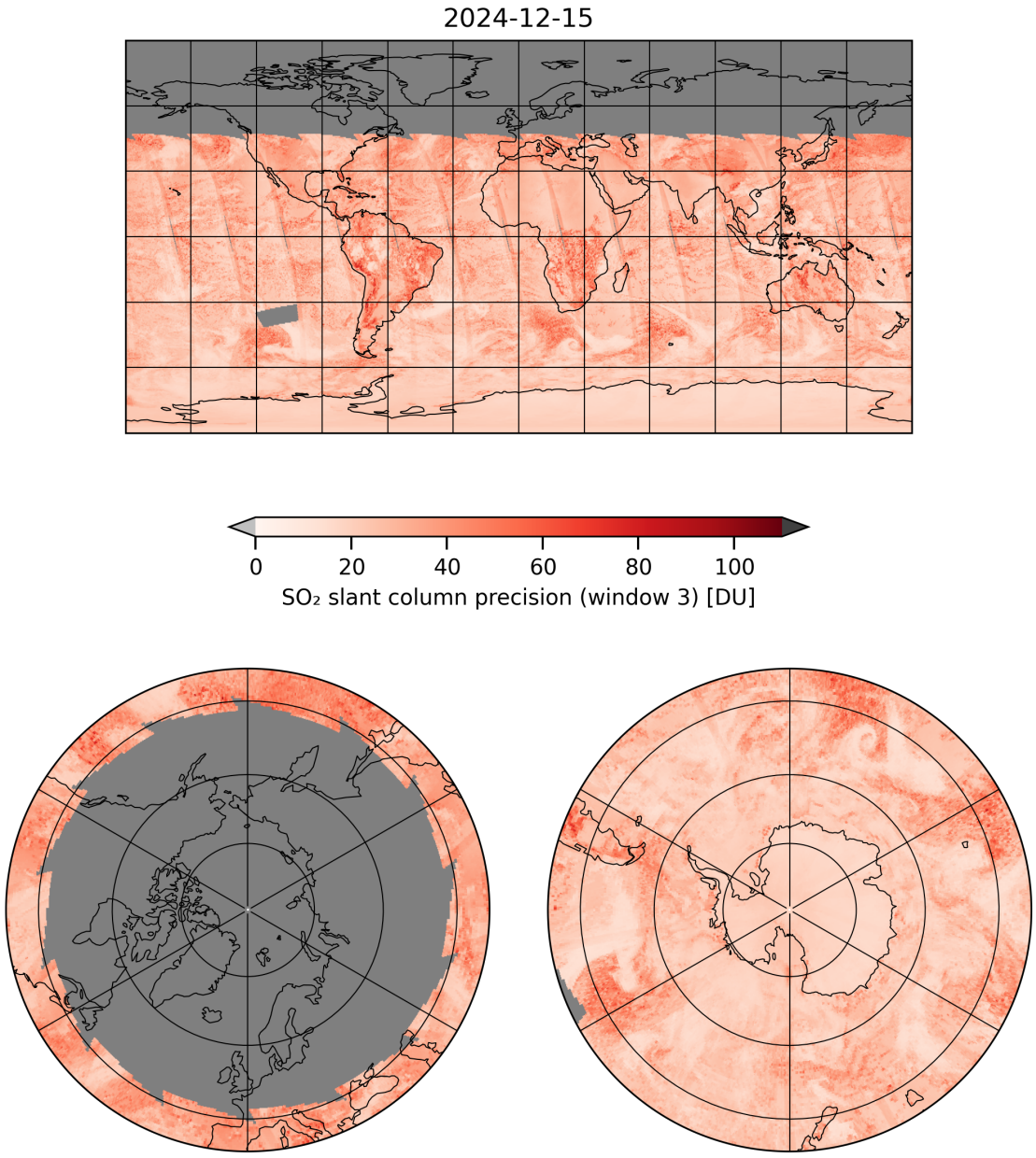

Figure 18: Map of "SO_2 slant column precision (window 3)" for 2024-12-15 to 2024-12-16

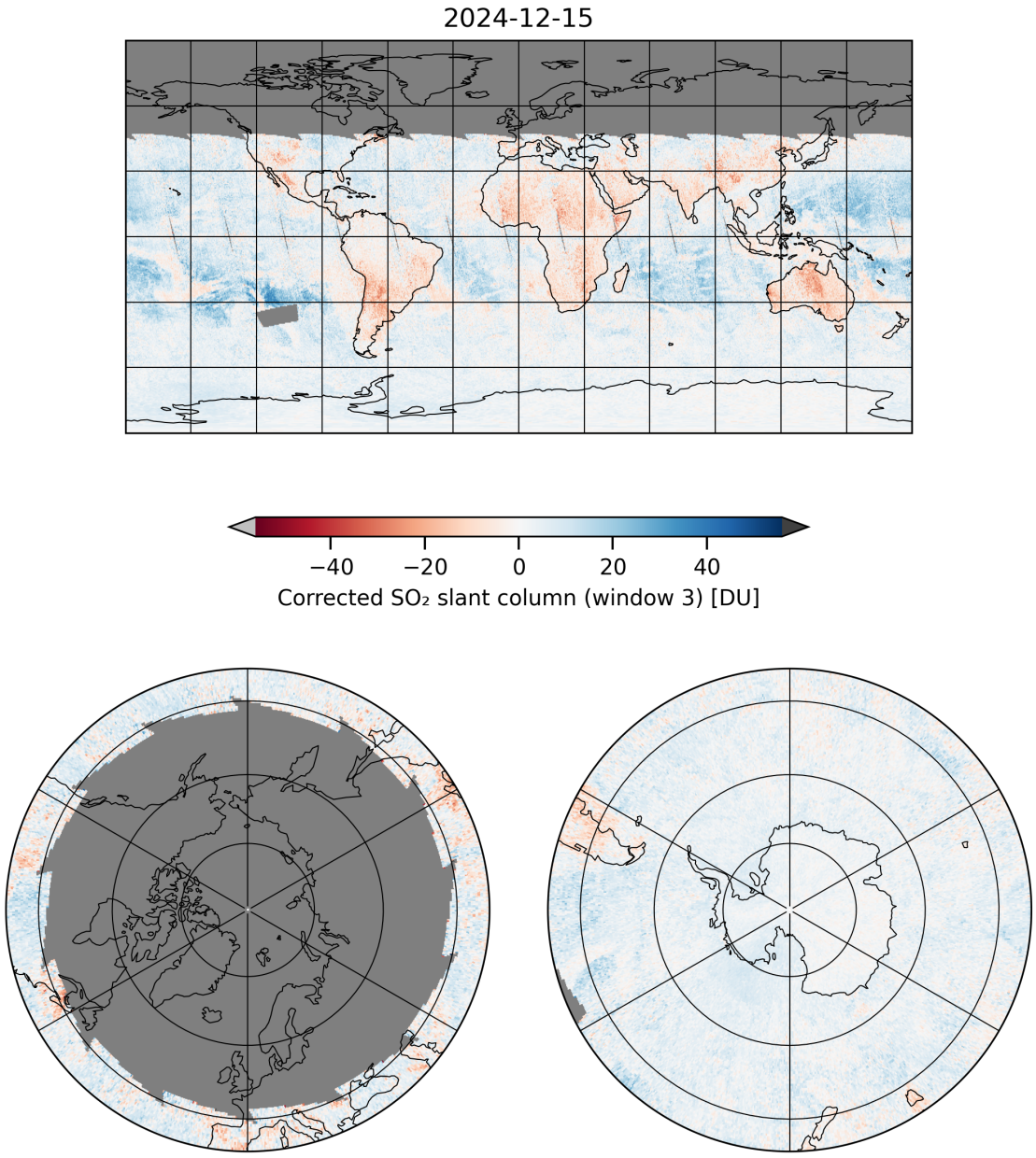

Figure 19: Map of "Corrected SO_2 slant column (window 3)" for 2024-12-15 to 2024-12-16

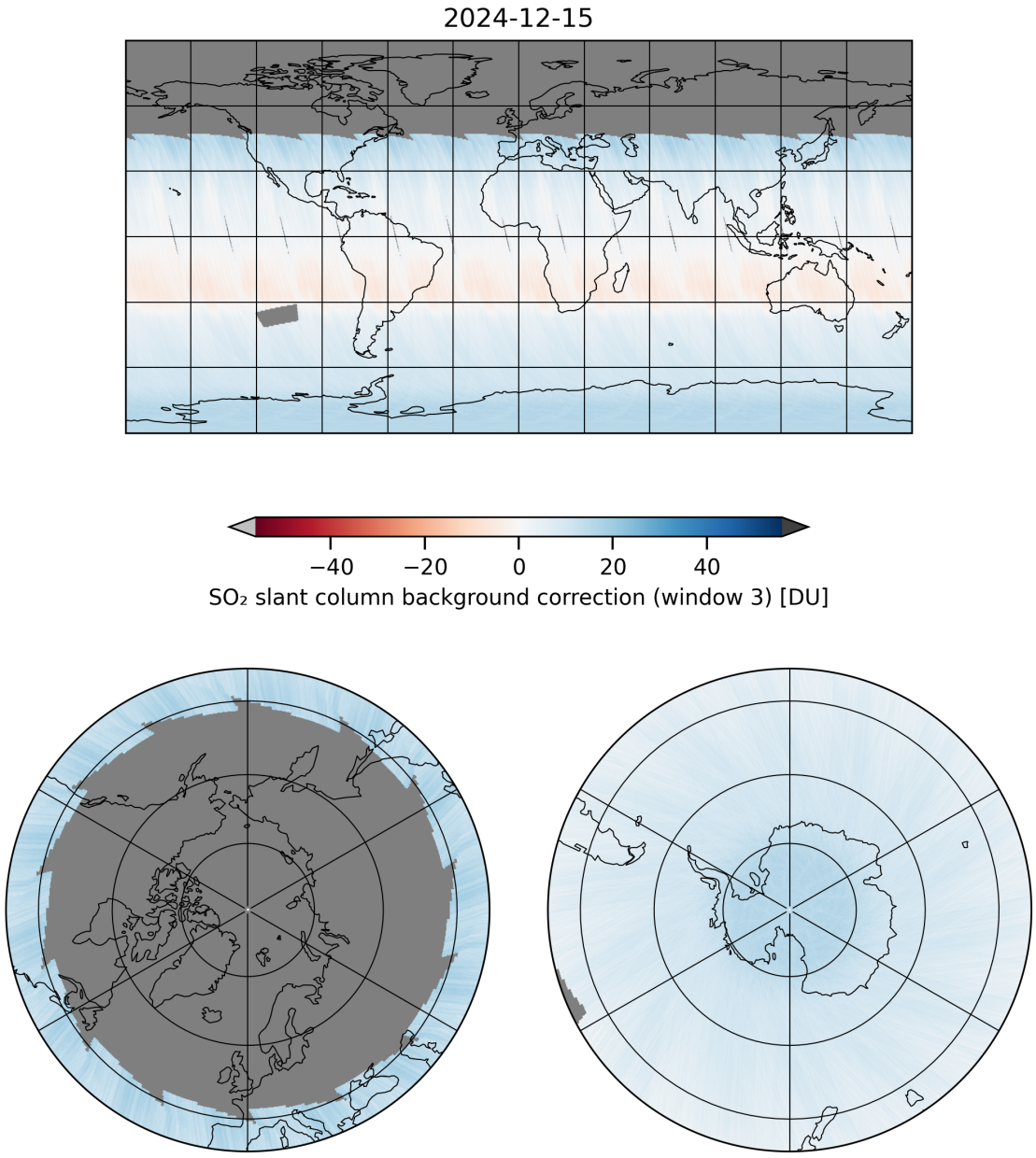

Figure 20: Map of "SO_2 slant column background correction (window 3)" for 2024-12-15 to 2024-12-16

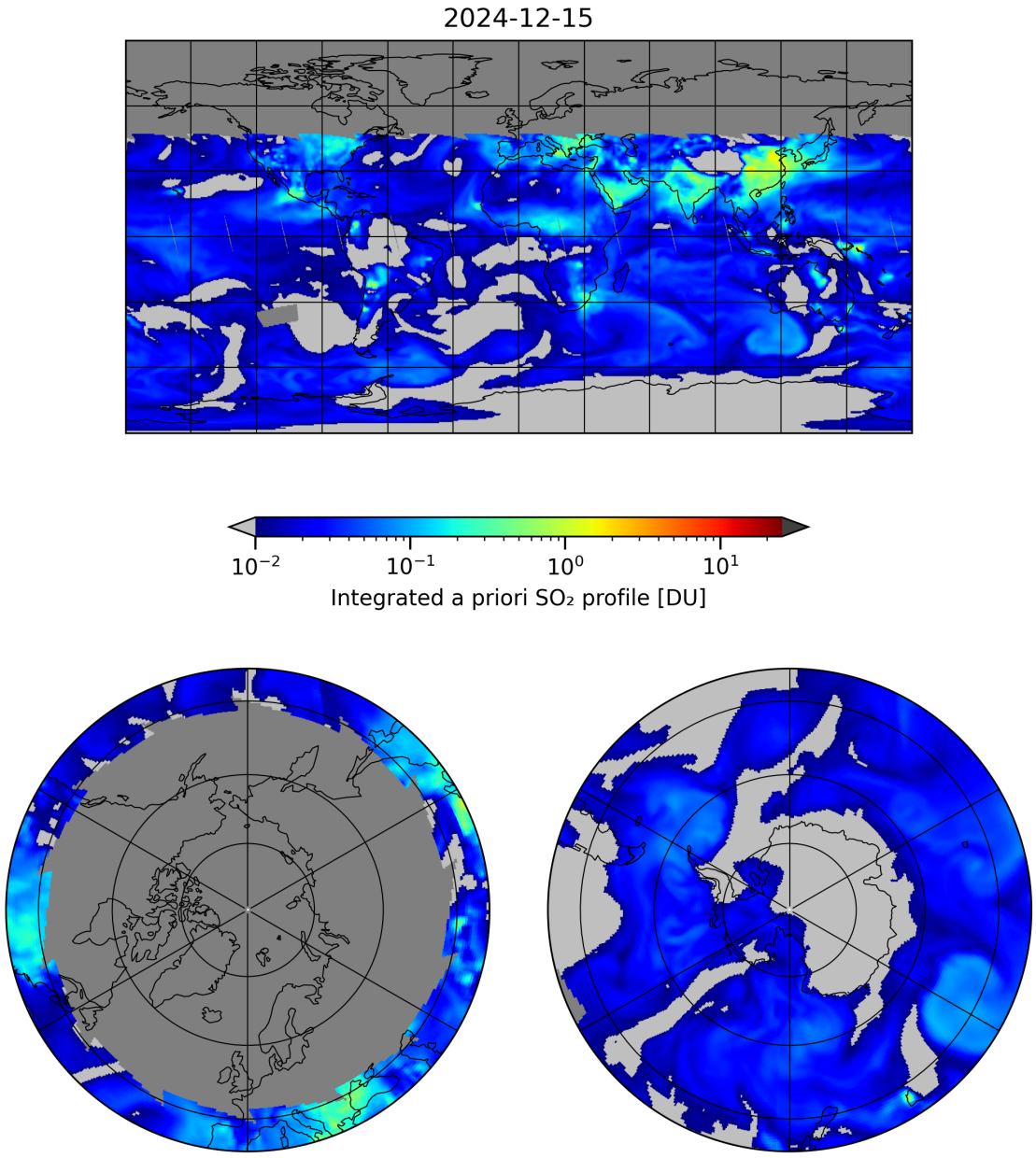

Figure 21: Map of “Integrated a priori SO_2 profile” for 2024-12-15 to 2024-12-16

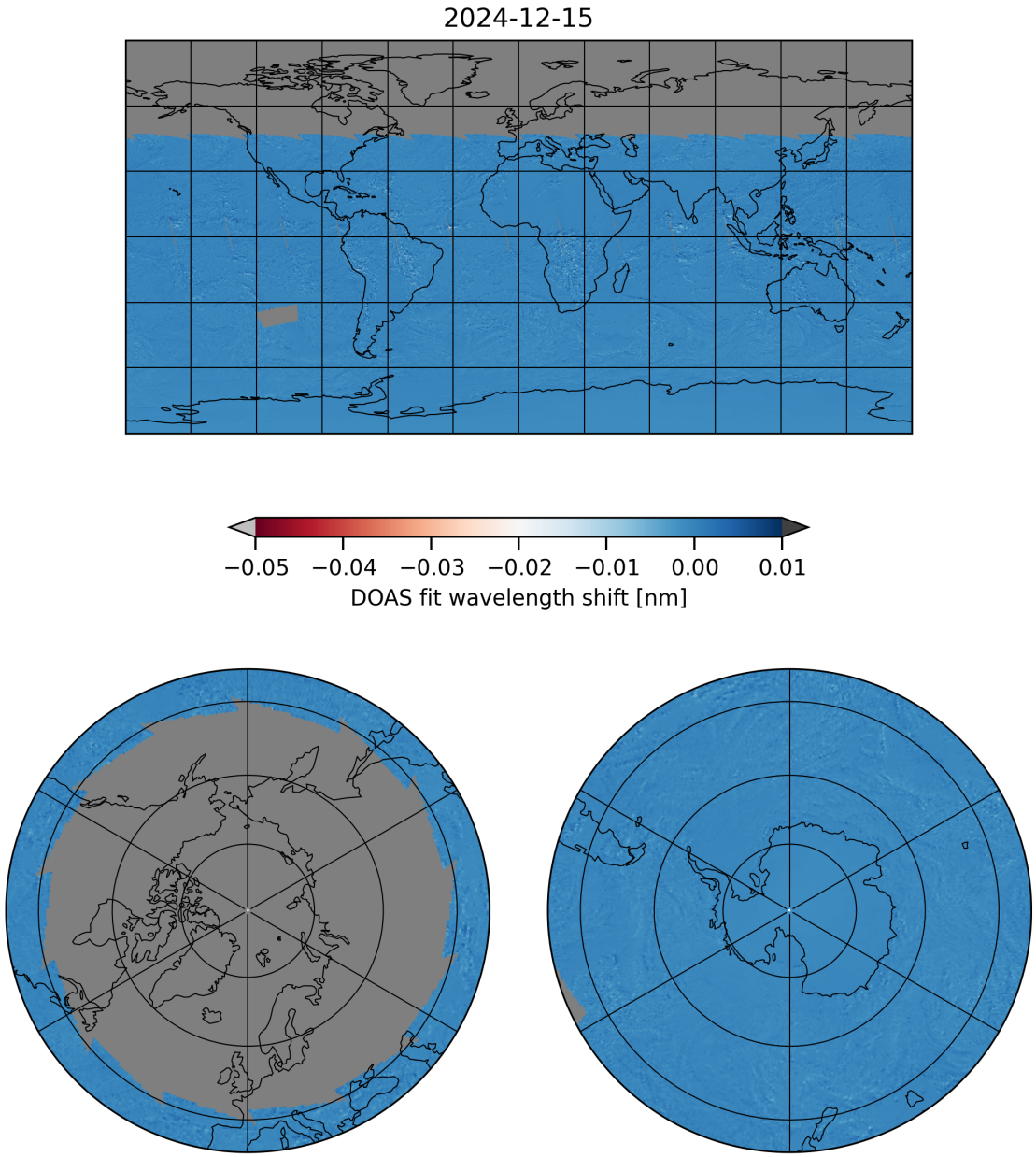

Figure 22: Map of “DOAS fit wavelength shift” for 2024-12-15 to 2024-12-16

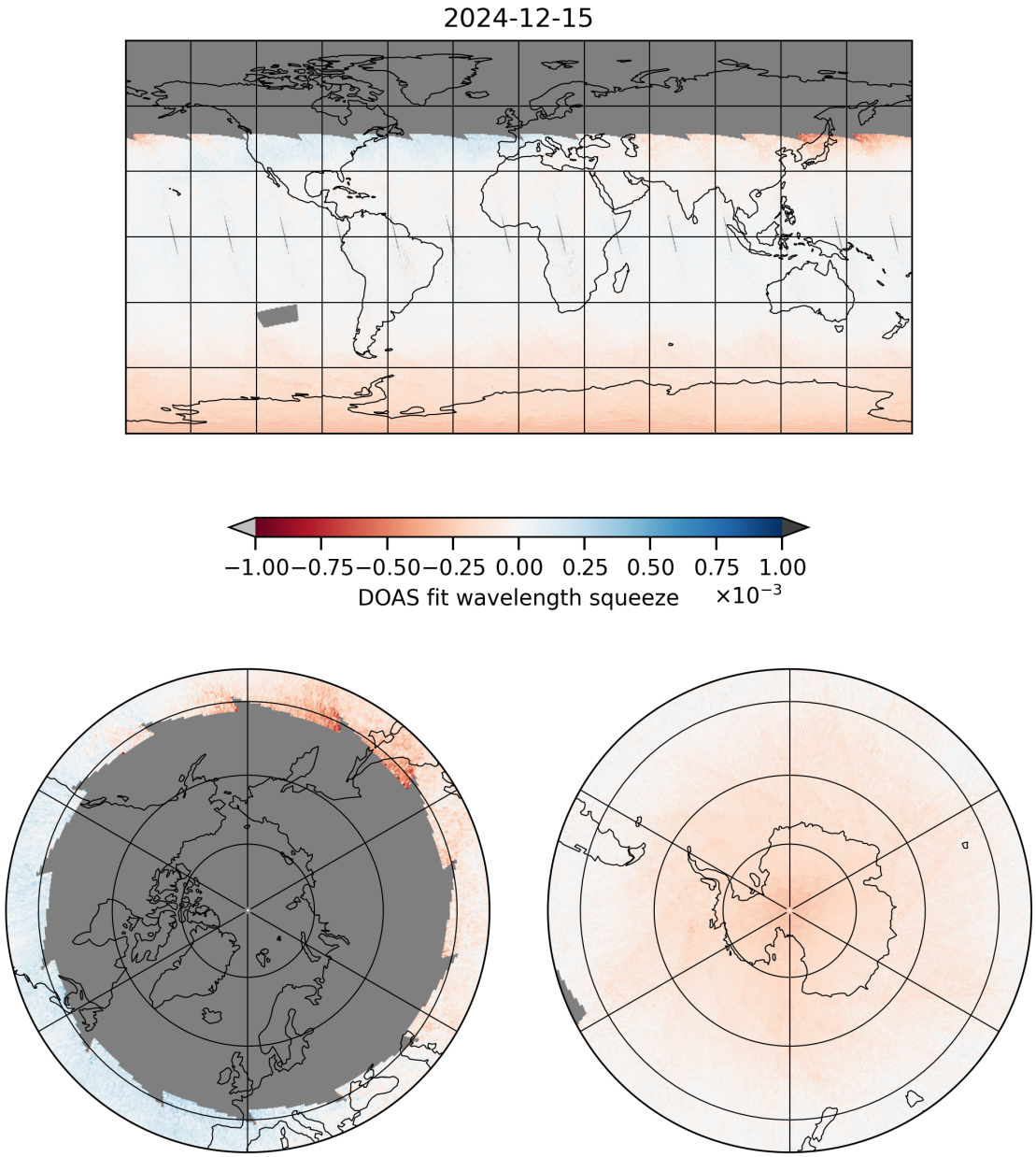

Figure 23: Map of “DOAS fit wavelength squeeze” for 2024-12-15 to 2024-12-16

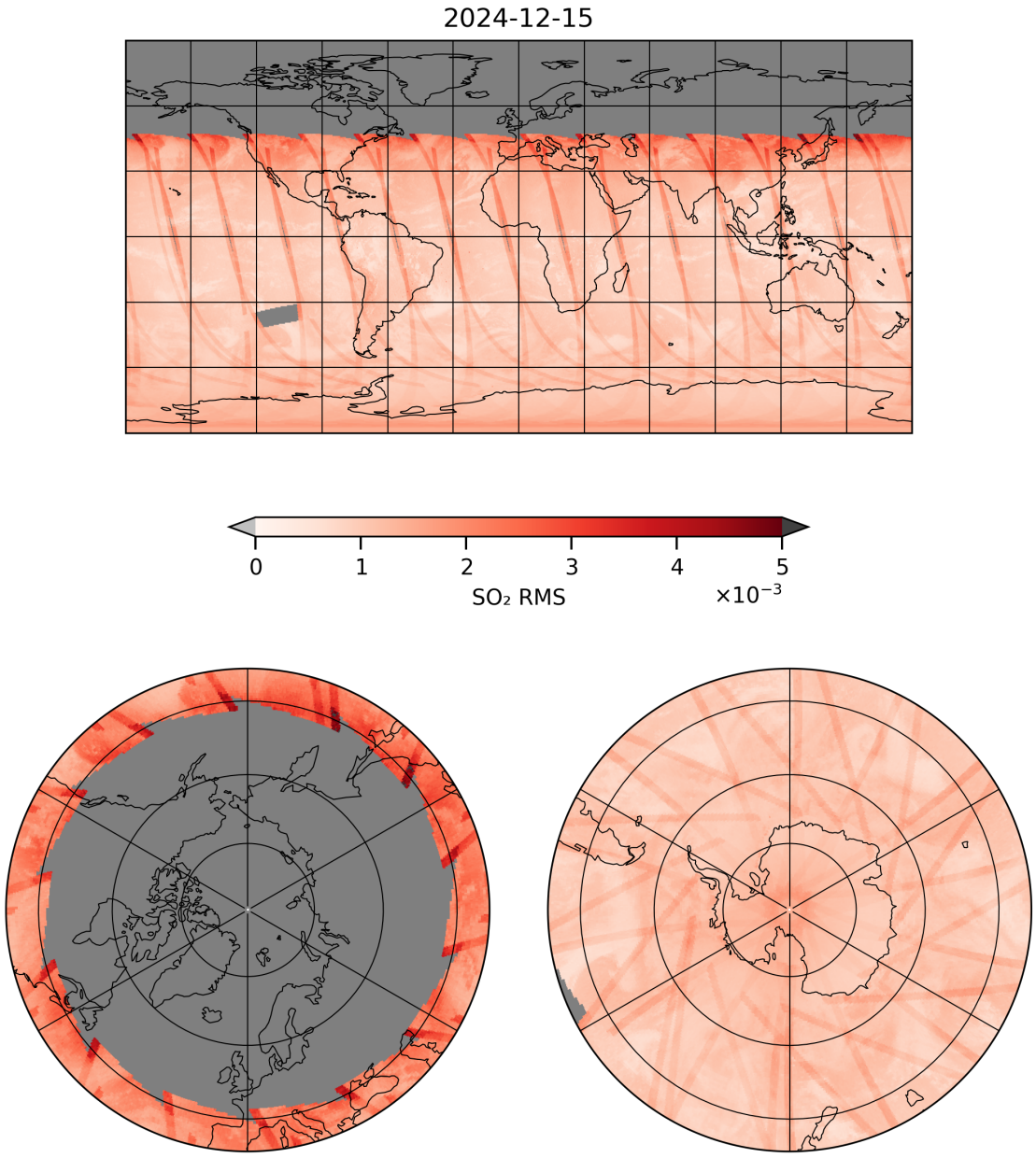

Figure 24: Map of "SO_2 RMS" for 2024-12-15 to 2024-12-16

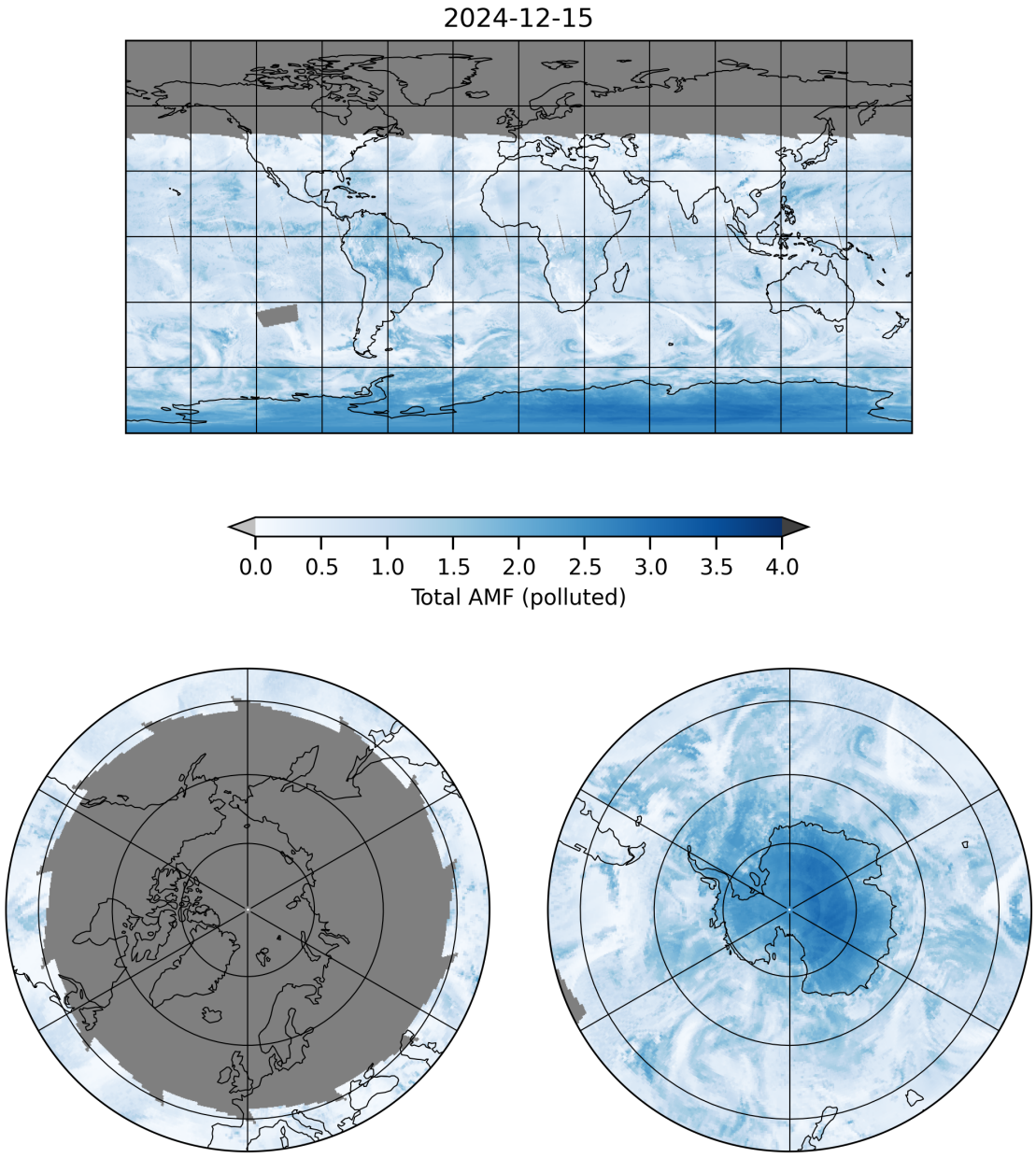

Figure 25: Map of “Total AMF (polluted)” for 2024-12-15 to 2024-12-16

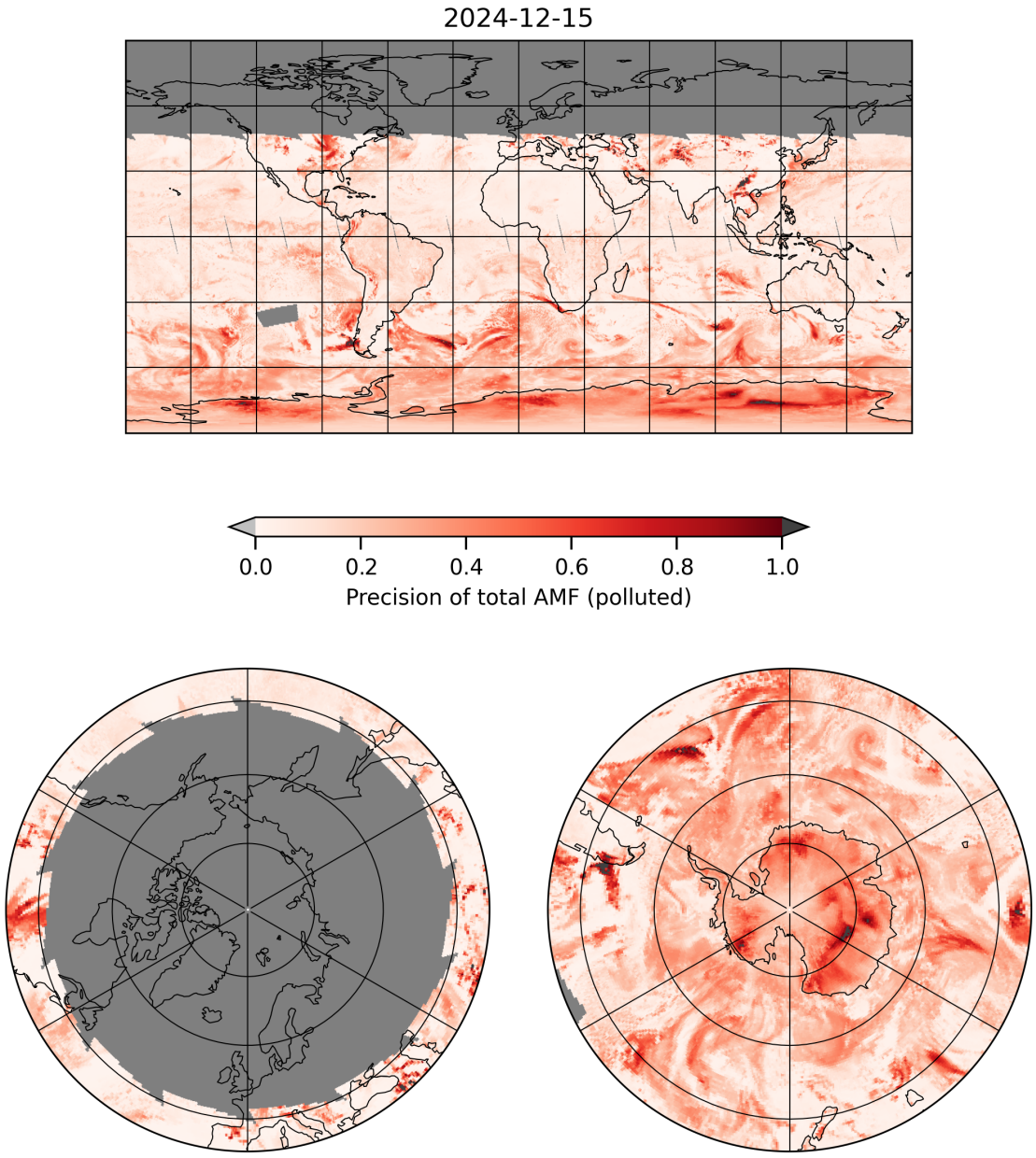

Figure 26: Map of “Precision of total AMF (polluted)” for 2024-12-15 to 2024-12-16

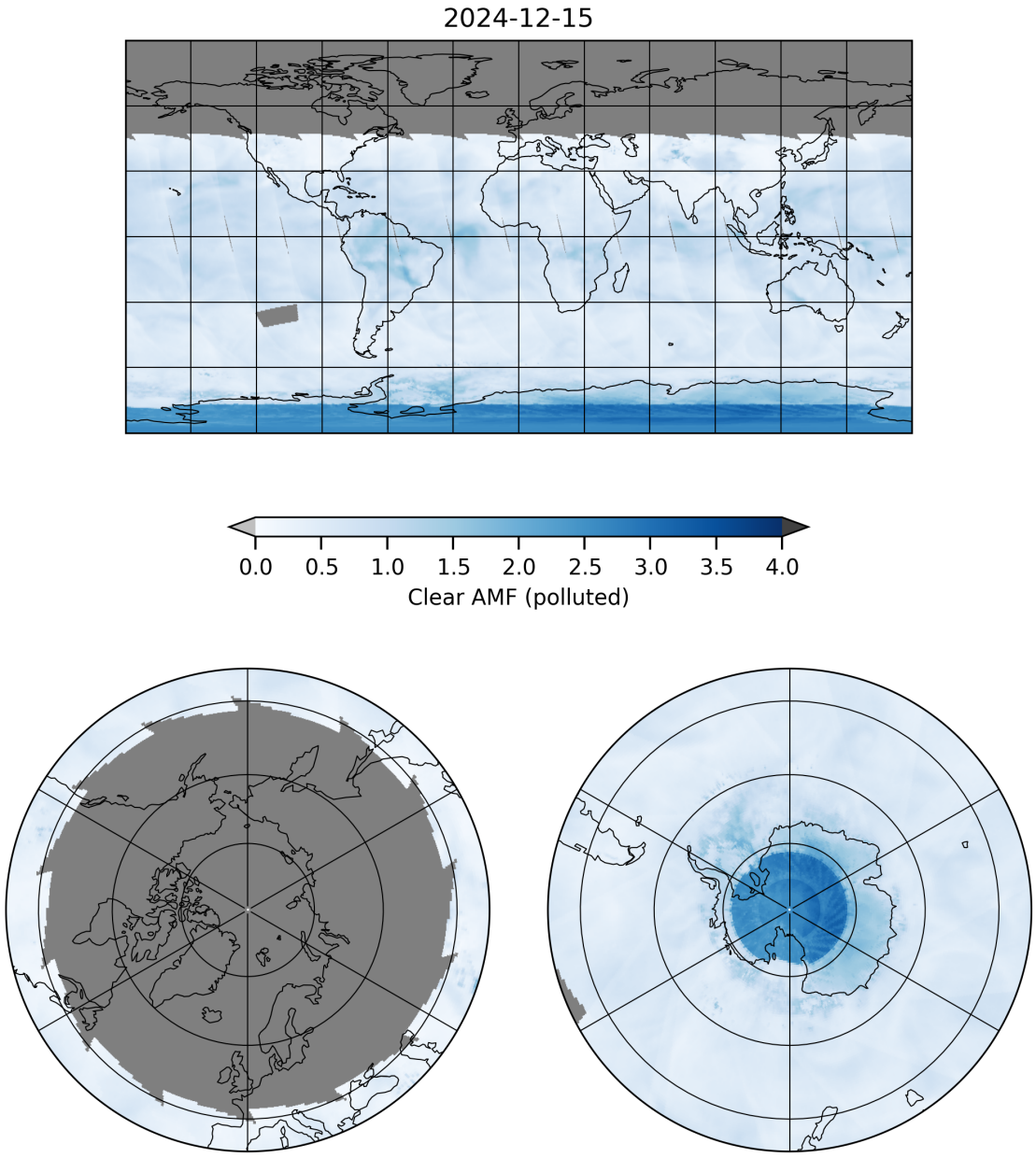

Figure 27: Map of “Clear AMF (polluted)” for 2024-12-15 to 2024-12-16

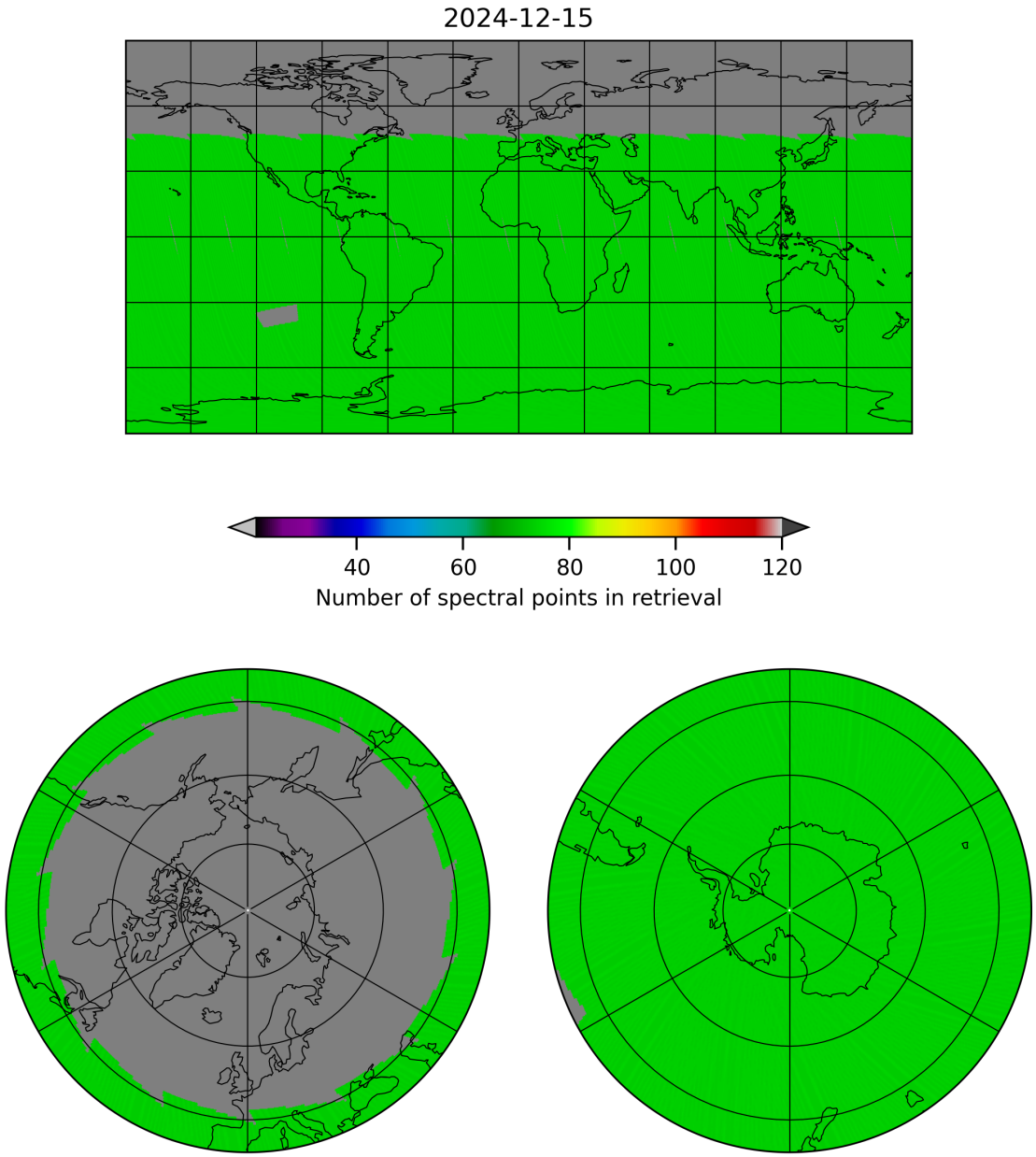

Figure 28: Map of “Number of spectral points in retrieval” for 2024-12-15 to 2024-12-16

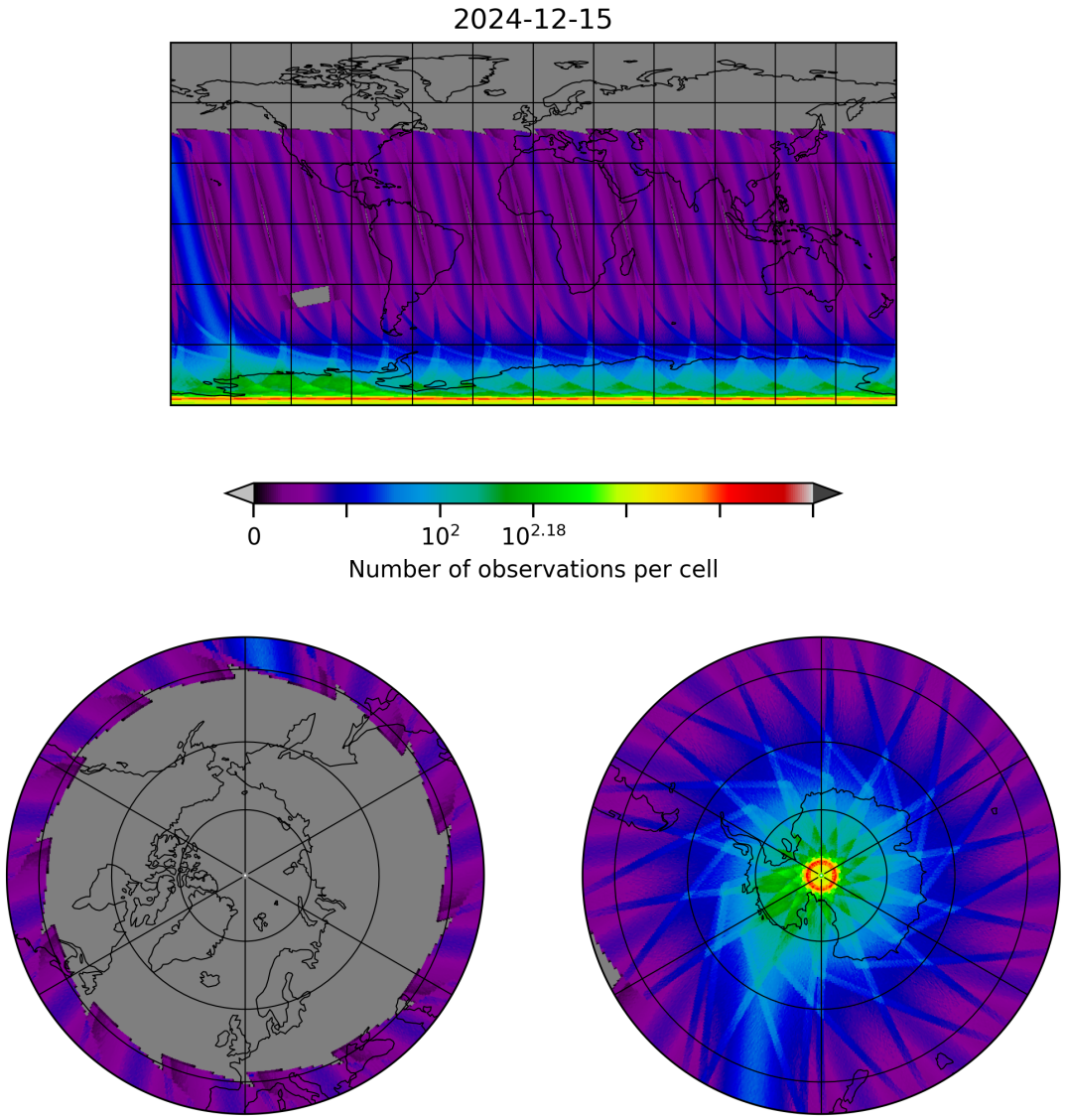

Figure 29: Map of the number of observations for 2024-12-15 to 2024-12-16

7 Zonal average

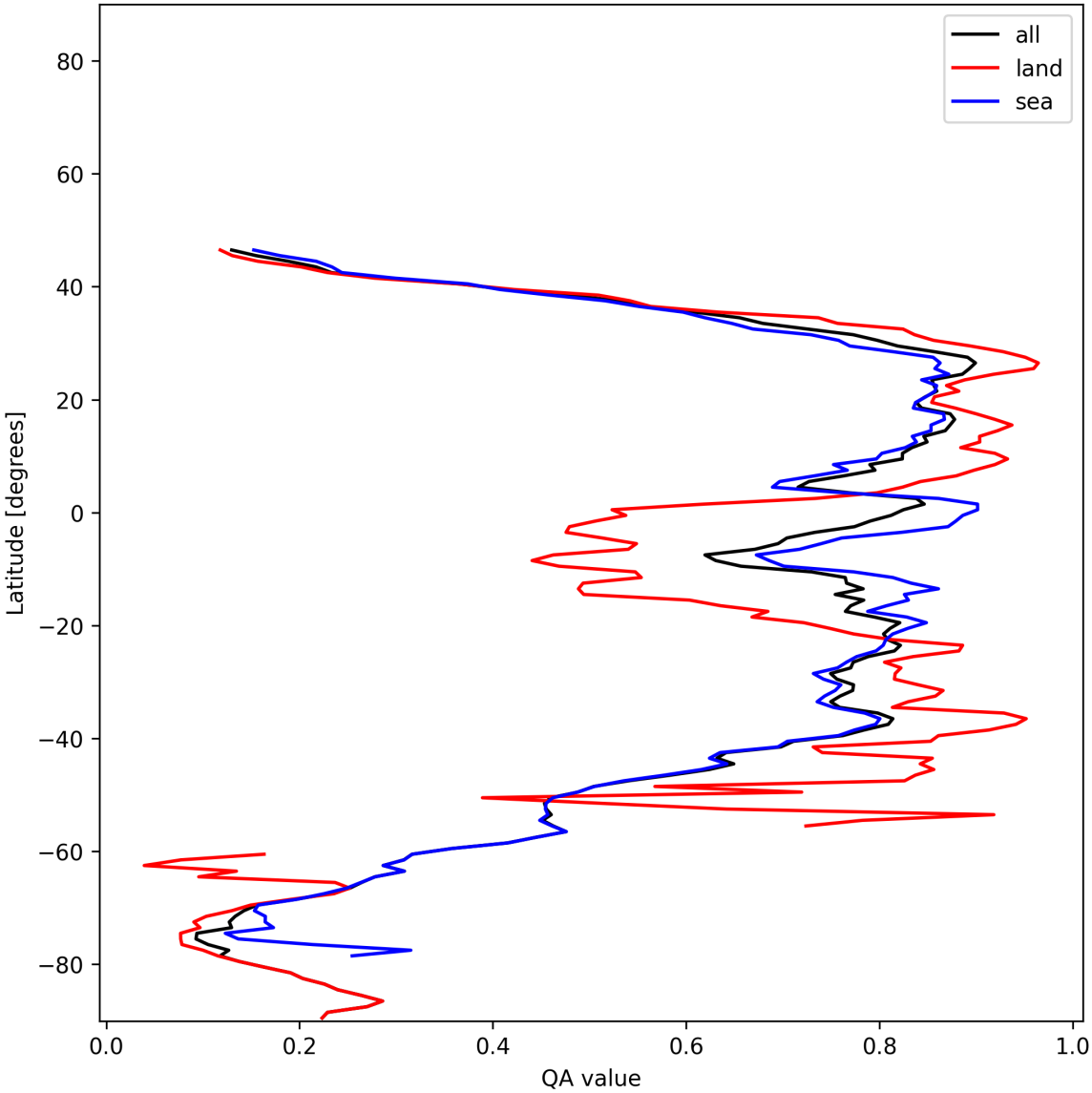

Figure 30: Zonal average of “QA value” for 2024-12-15 to 2024-12-16.

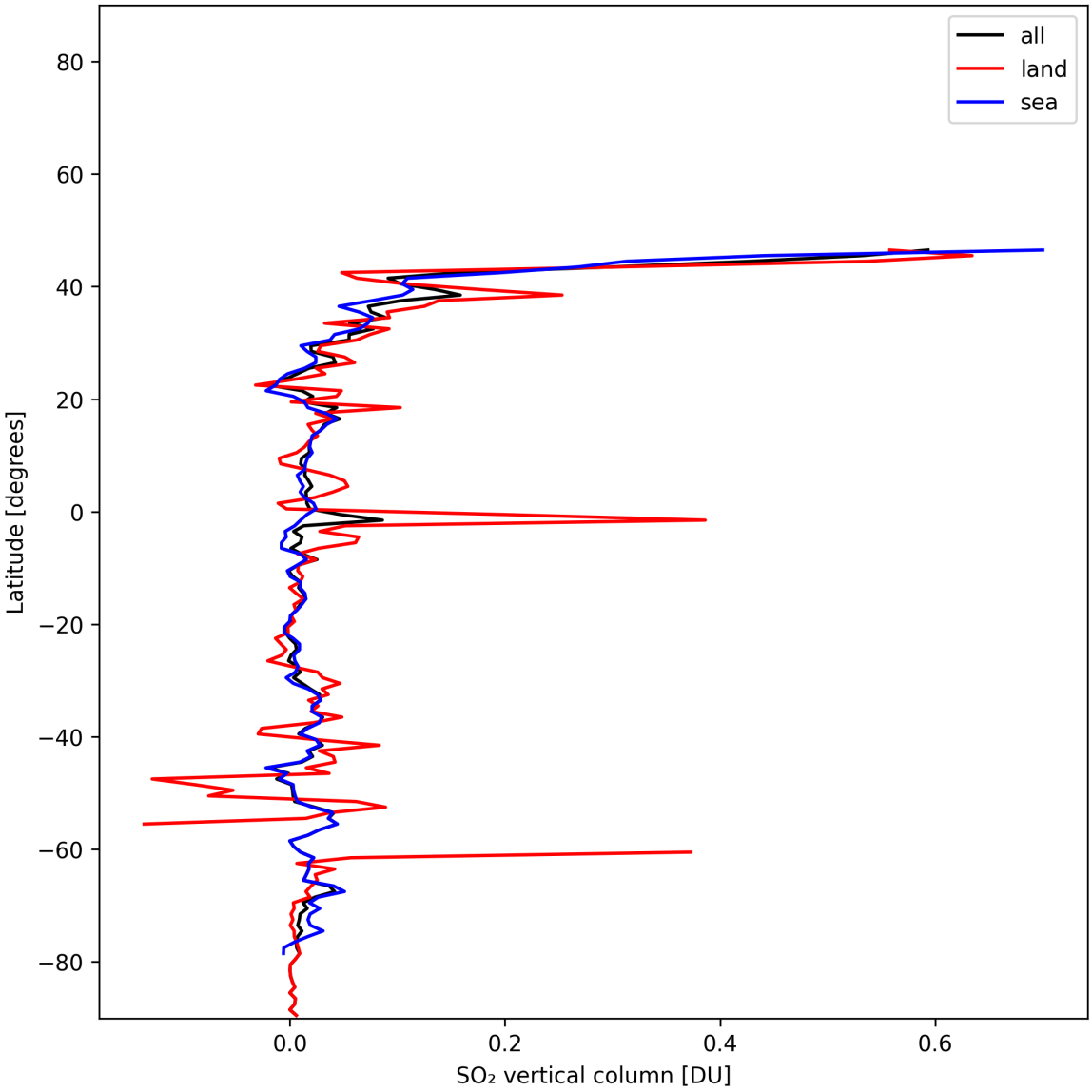

Figure 31: Zonal average of "SO_2 vertical column" for 2024-12-15 to 2024-12-16.

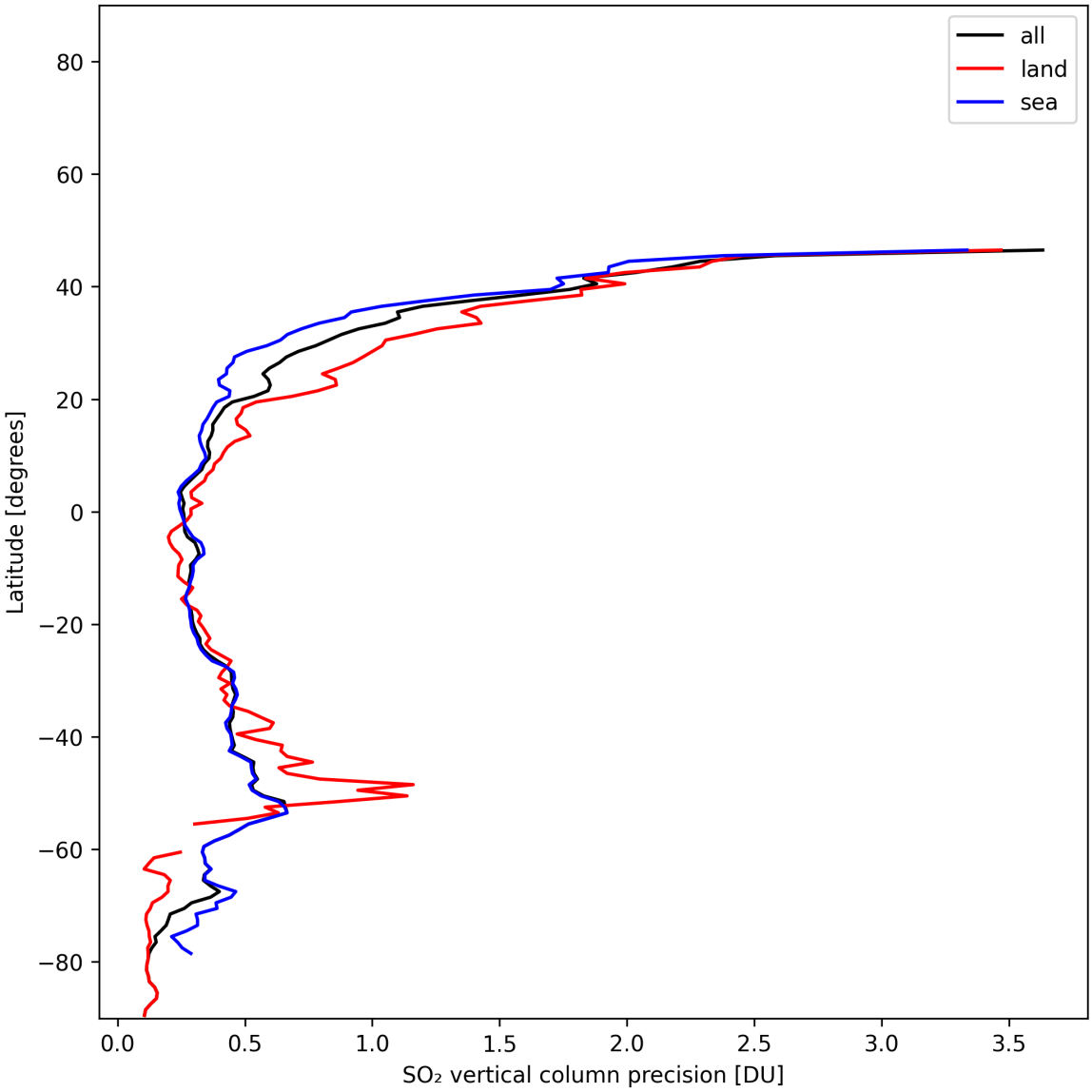

Figure 32: Zonal average of "SO_2 vertical column precision" for 2024-12-15 to 2024-12-16.

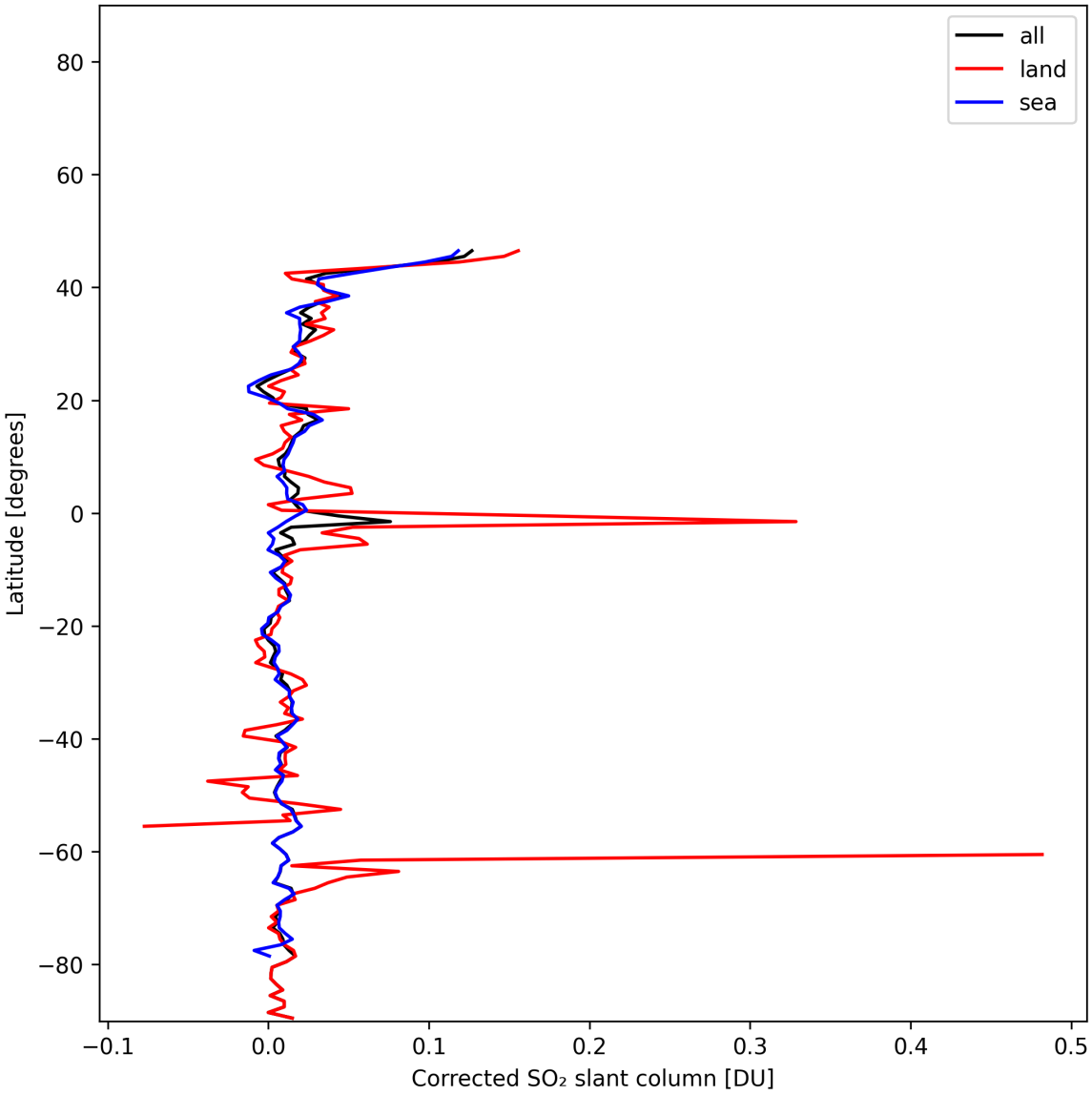

Figure 33: Zonal average of “Corrected SO_2 slant column” for 2024-12-15 to 2024-12-16.

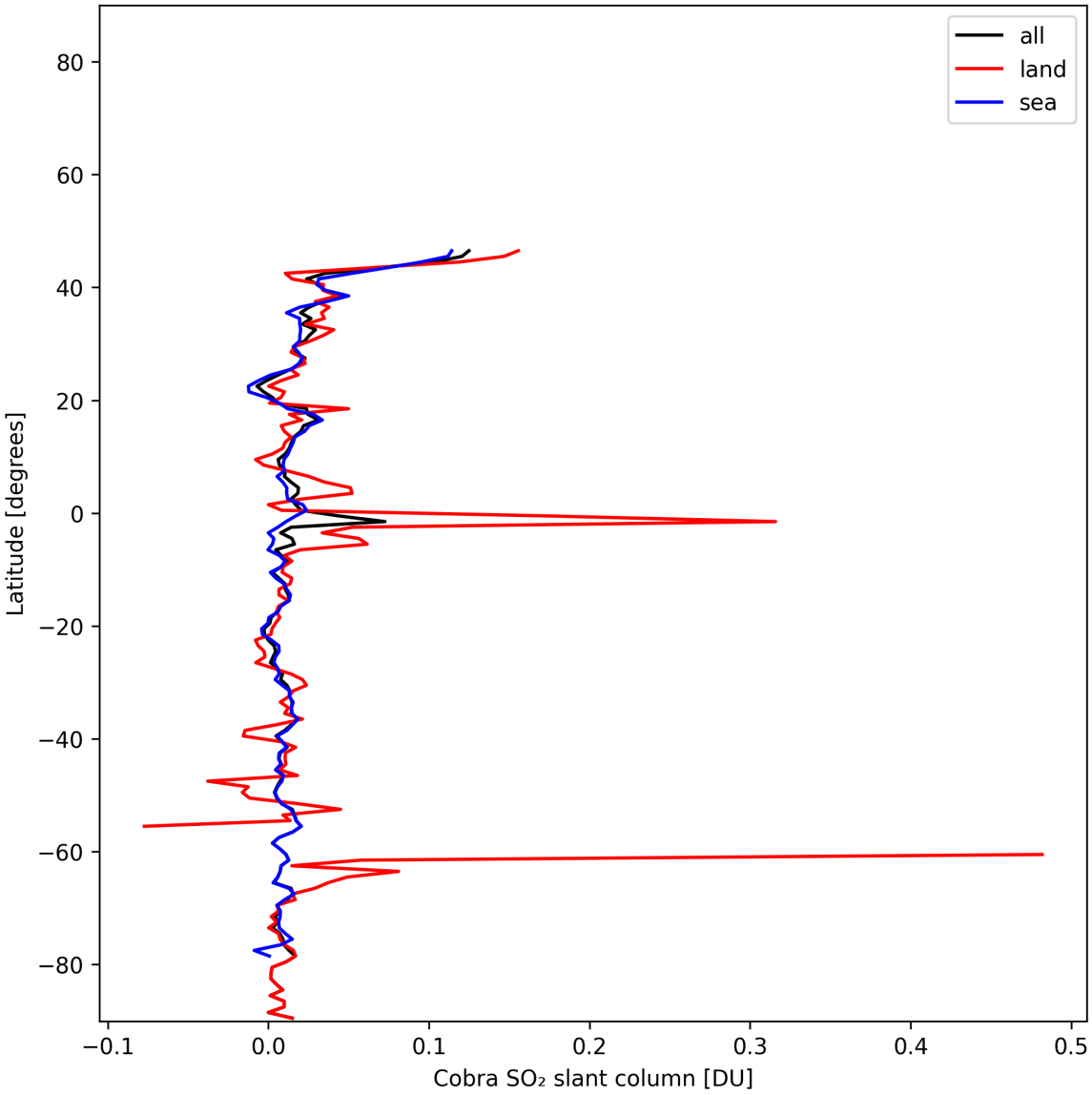

Figure 34: Zonal average of "Cobra SO_2 slant column" for 2024-12-15 to 2024-12-16.

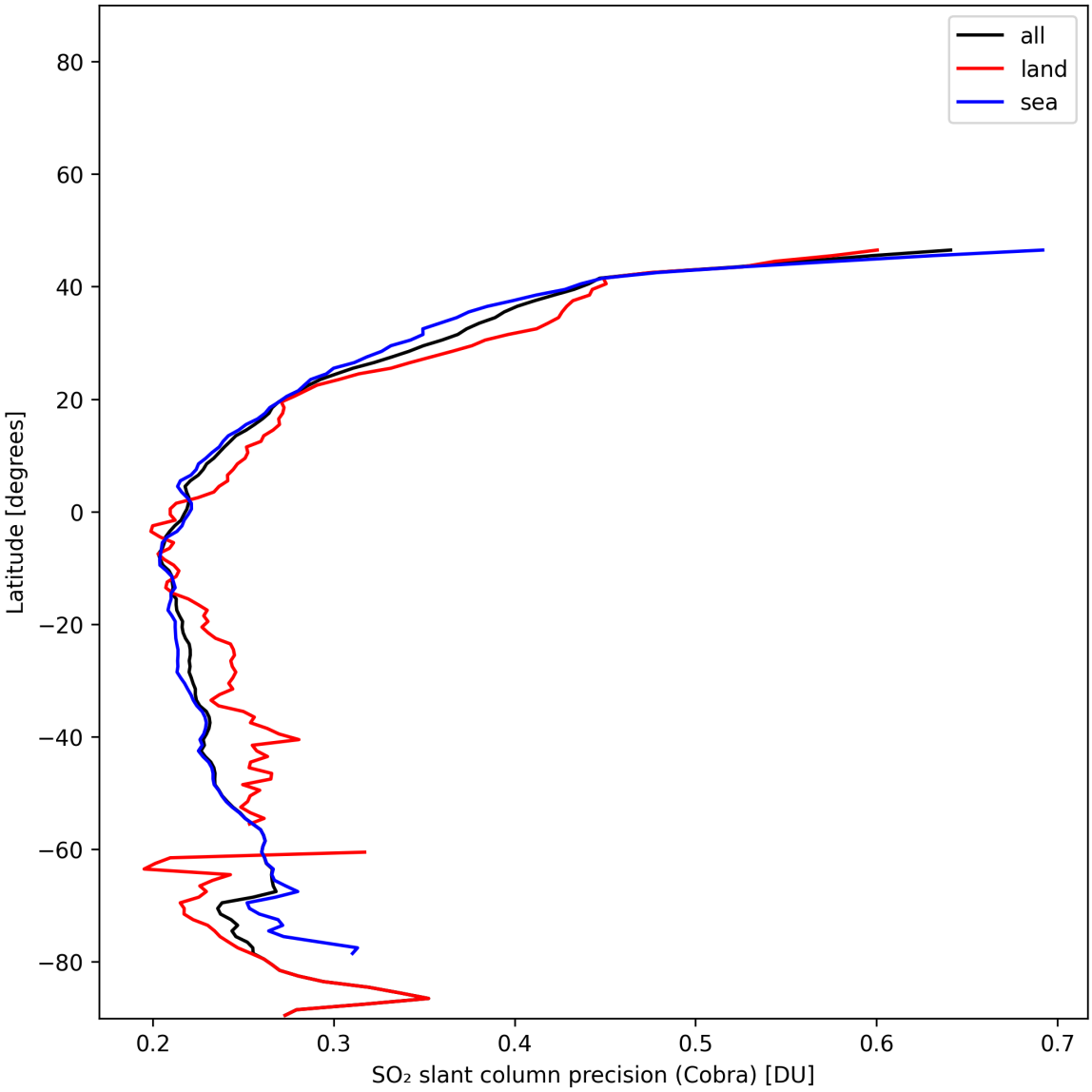

Figure 35: Zonal average of "SO_2 slant column precision (Cobra)" for 2024-12-15 to 2024-12-16.

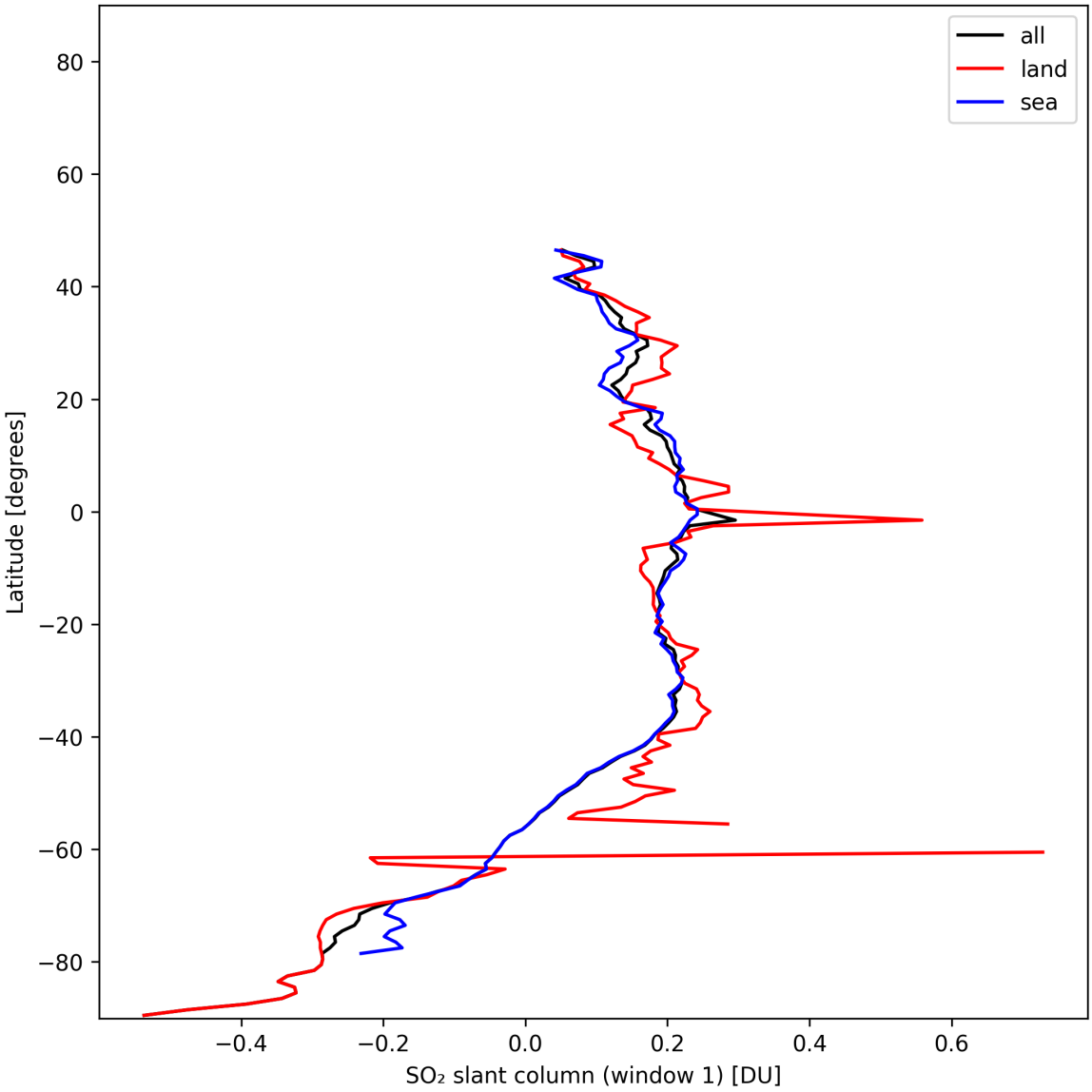

Figure 36: Zonal average of "SO_2 slant column (window 1)" for 2024-12-15 to 2024-12-16.

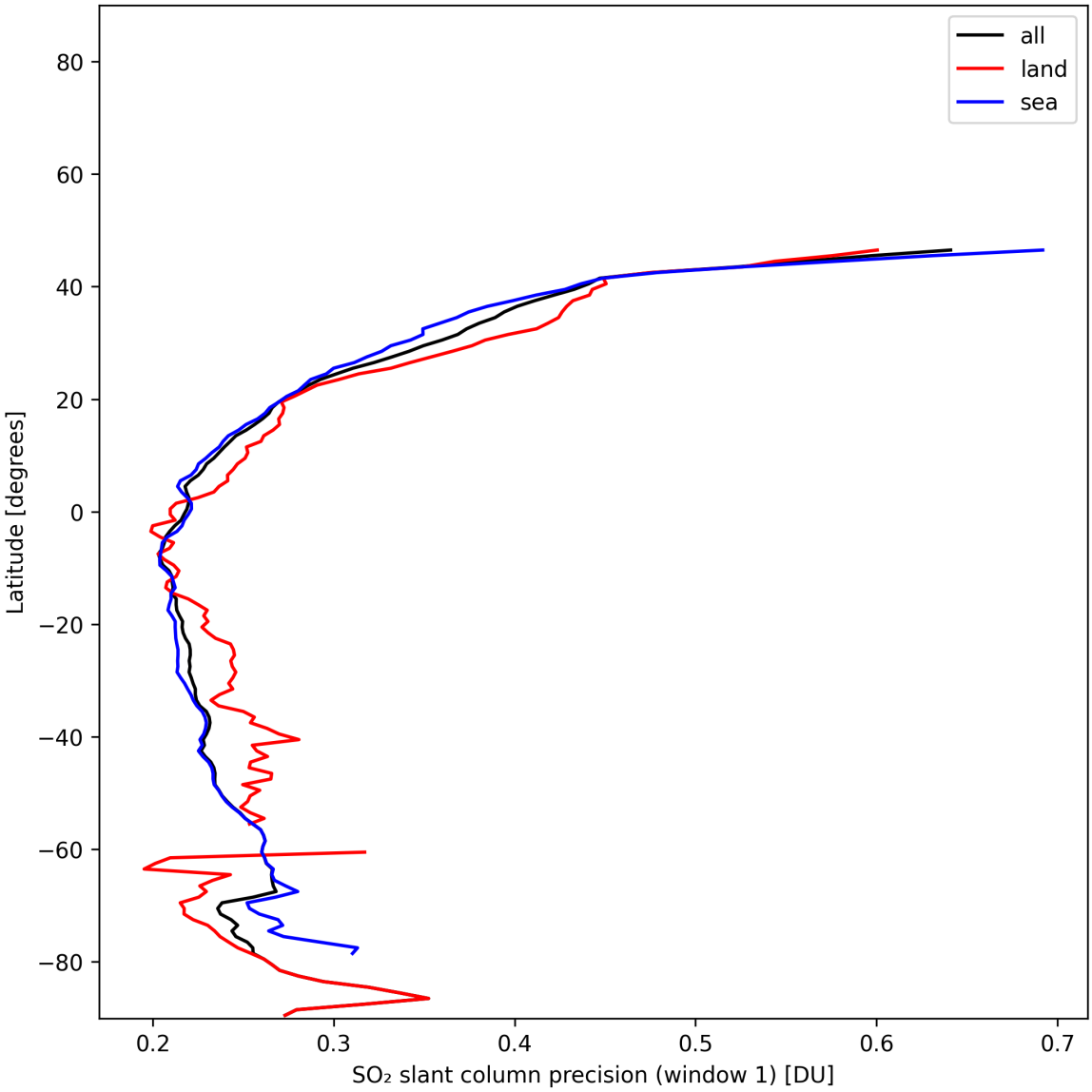

Figure 37: Zonal average of "SO_2 slant column precision (window 1)" for 2024-12-15 to 2024-12-16.

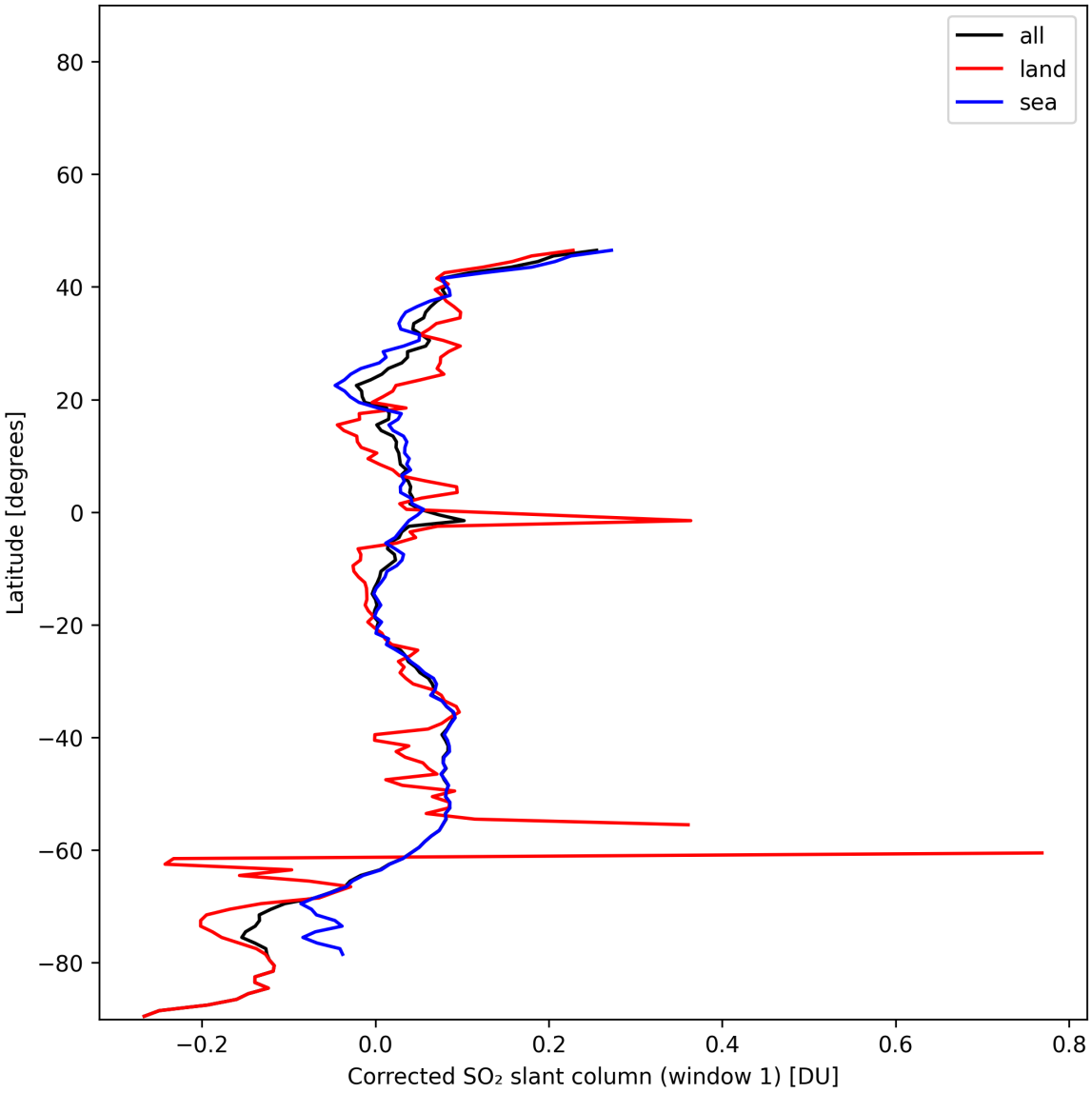

Figure 38: Zonal average of "Corrected SO_2 slant column (window 1)" for 2024-12-15 to 2024-12-16.

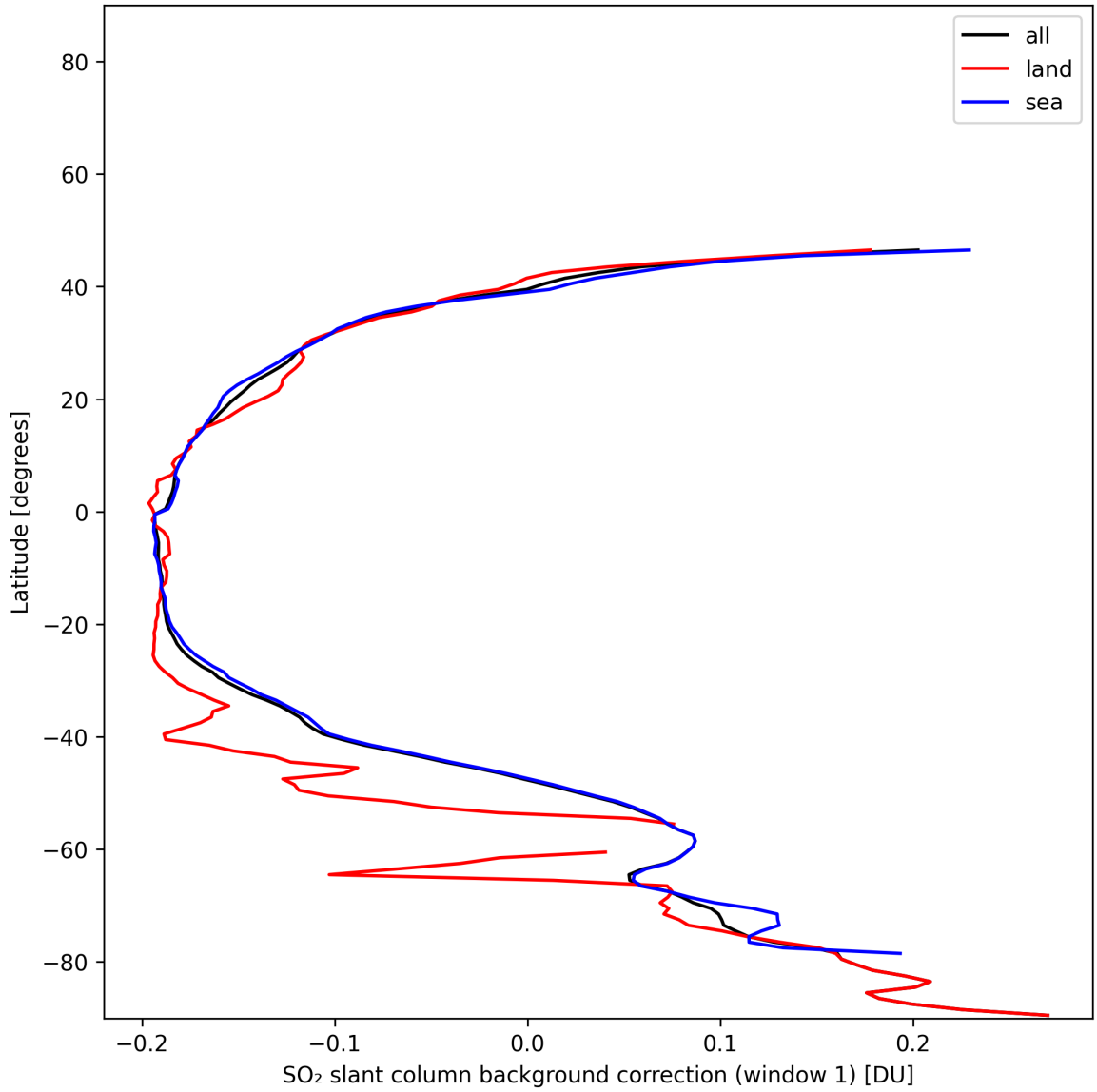

Figure 39: Zonal average of "SO_2 slant column background correction (window 1)" for 2024-12-15 to 2024-12-16.

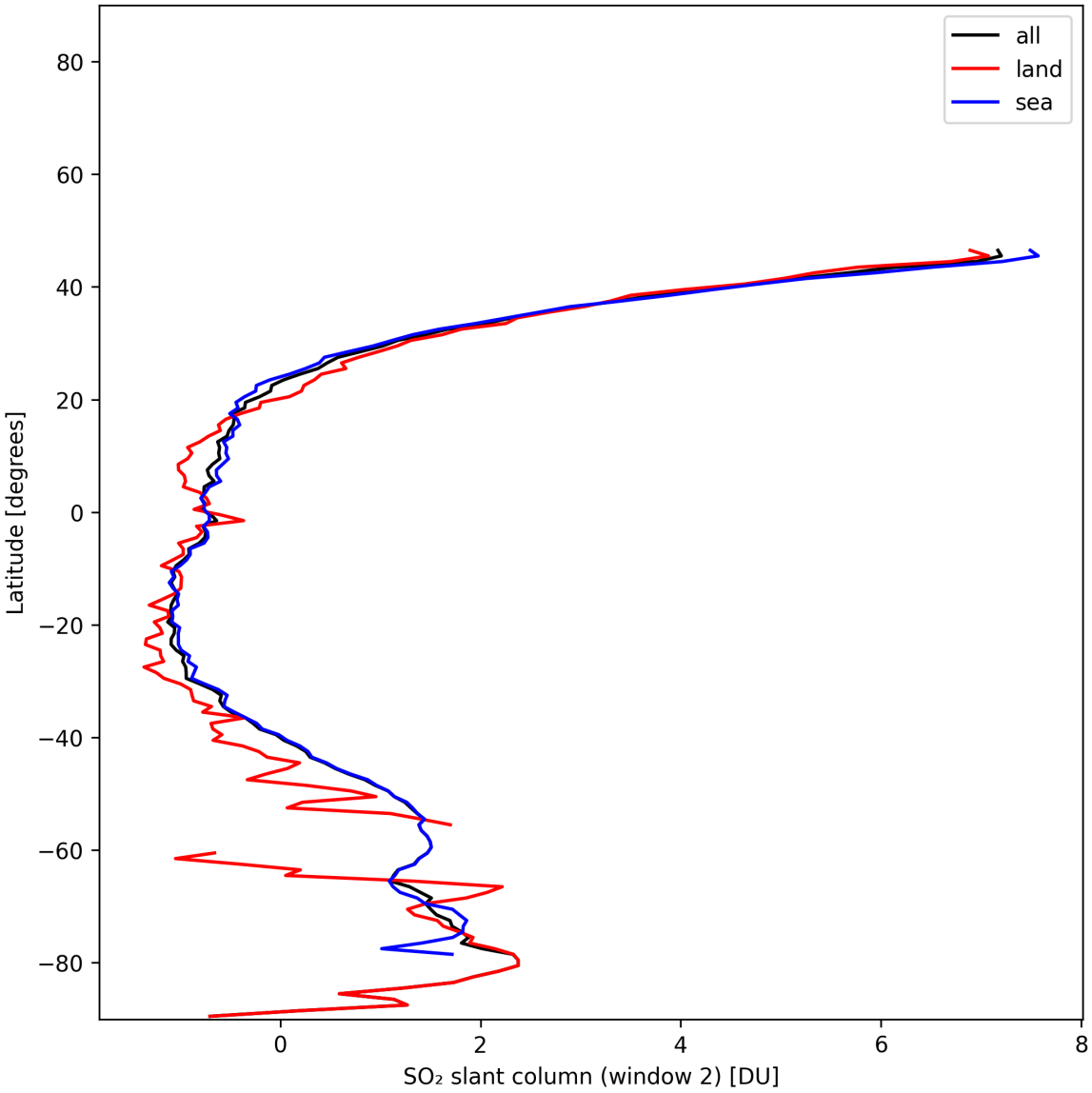

Figure 40: Zonal average of "SO_2 slant column (window 2)" for 2024-12-15 to 2024-12-16.

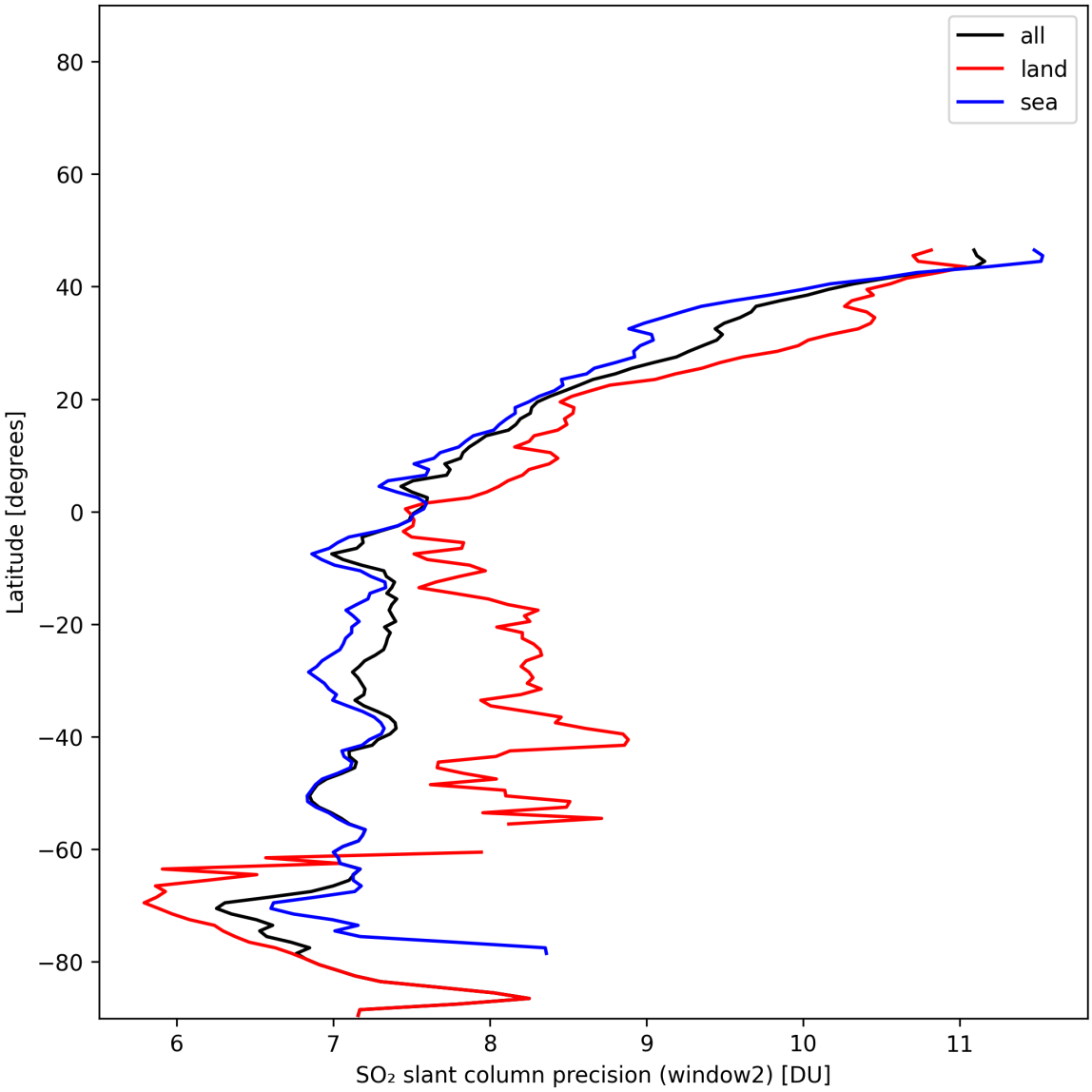

Figure 41: Zonal average of "SO_2 slant column precision (window2)" for 2024-12-15 to 2024-12-16.

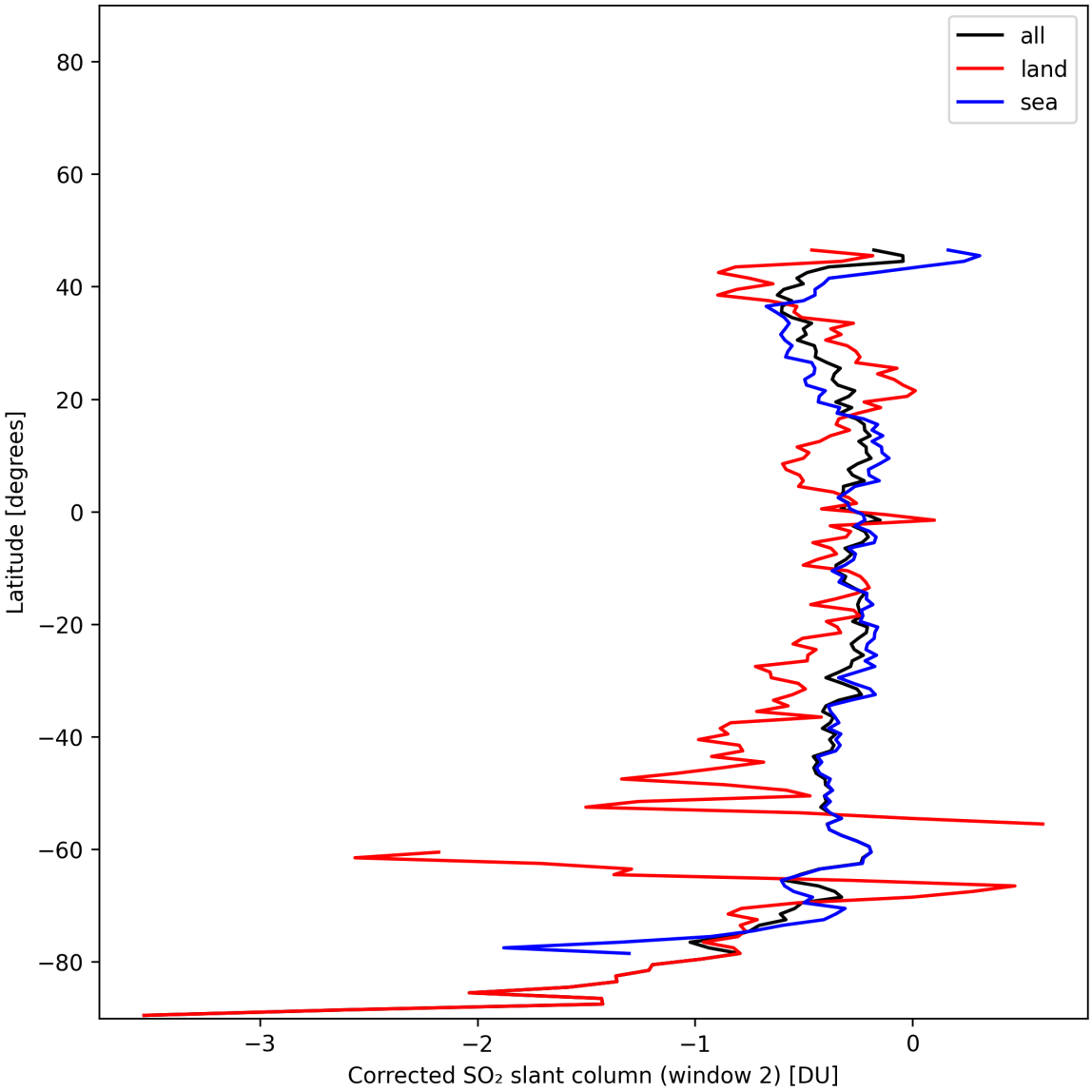

Figure 42: Zonal average of "Corrected SO_2 slant column (window 2)" for 2024-12-15 to 2024-12-16.

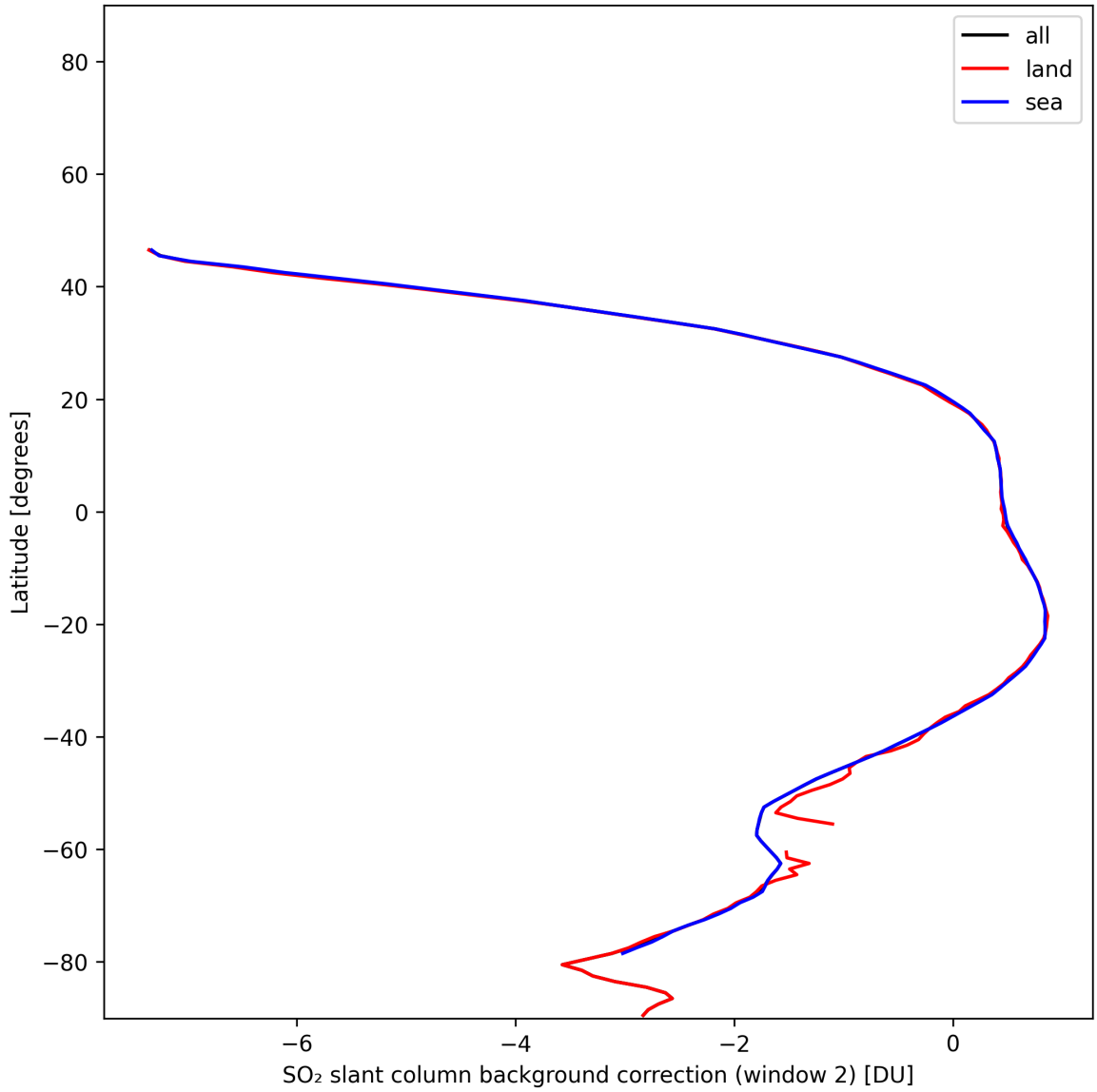

Figure 43: Zonal average of "SO_2 slant column background correction (window 2)" for 2024-12-15 to 2024-12-16.

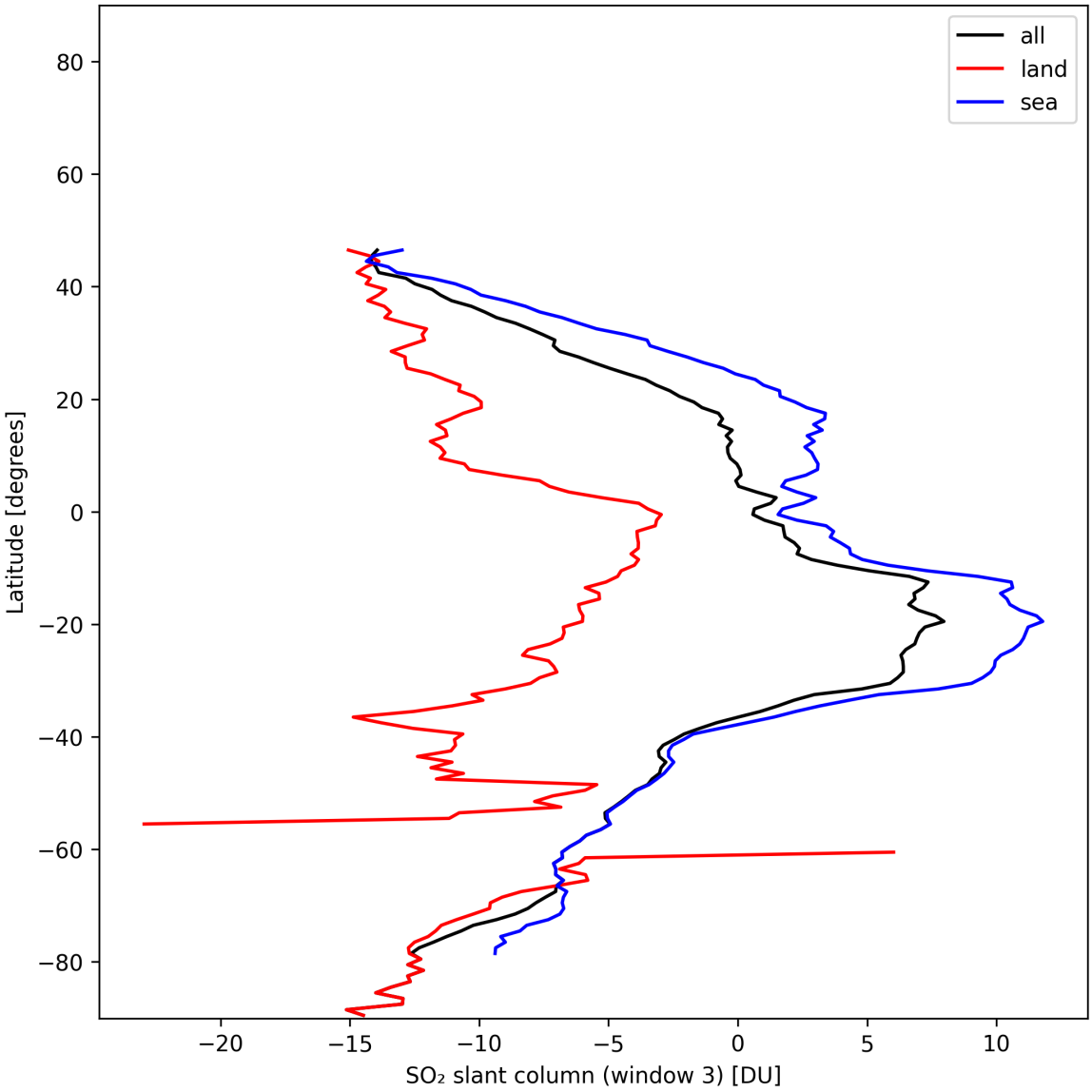

Figure 44: Zonal average of "SO_2 slant column (window 3)" for 2024-12-15 to 2024-12-16.

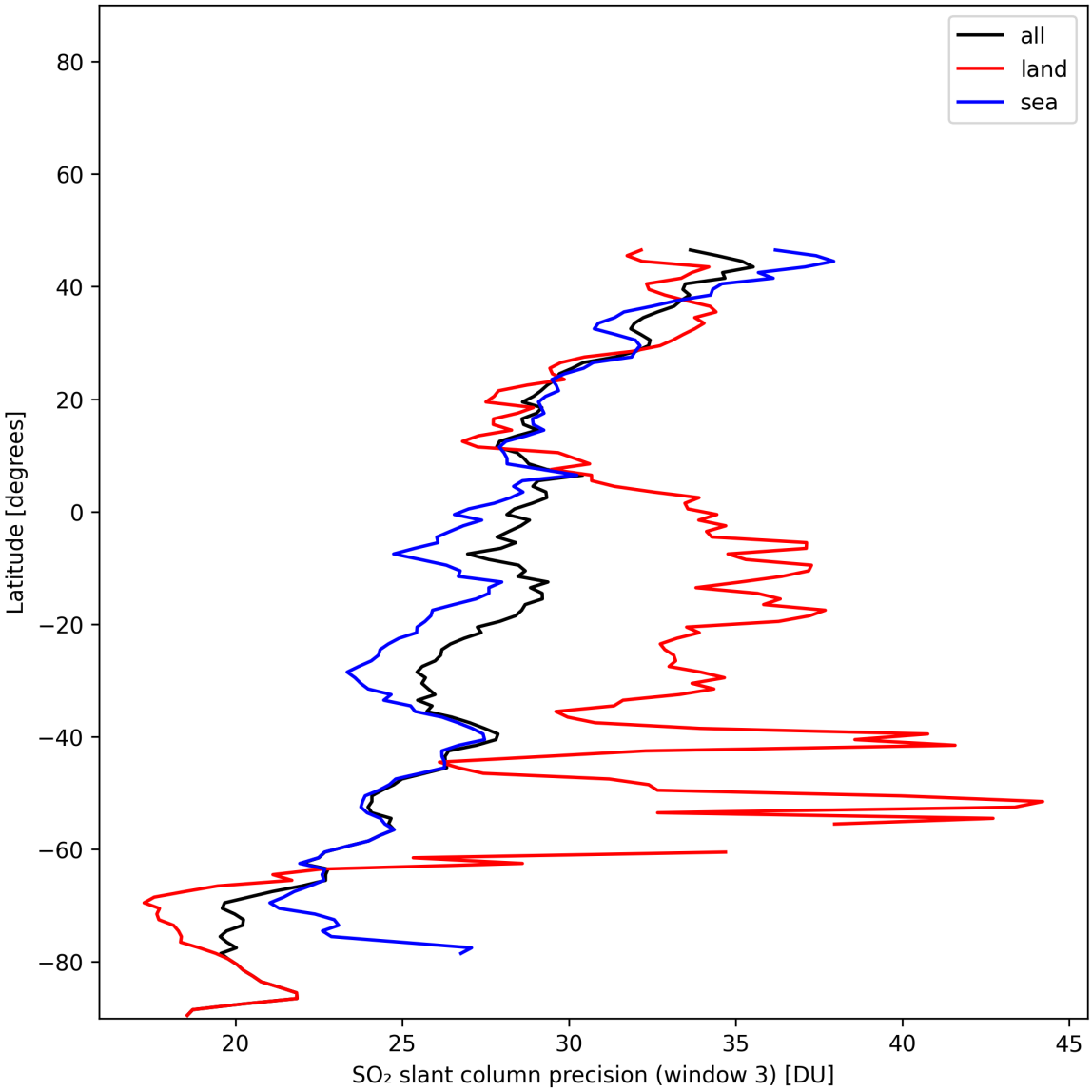

Figure 45: Zonal average of "SO_2 slant column precision (window 3)" for 2024-12-15 to 2024-12-16.

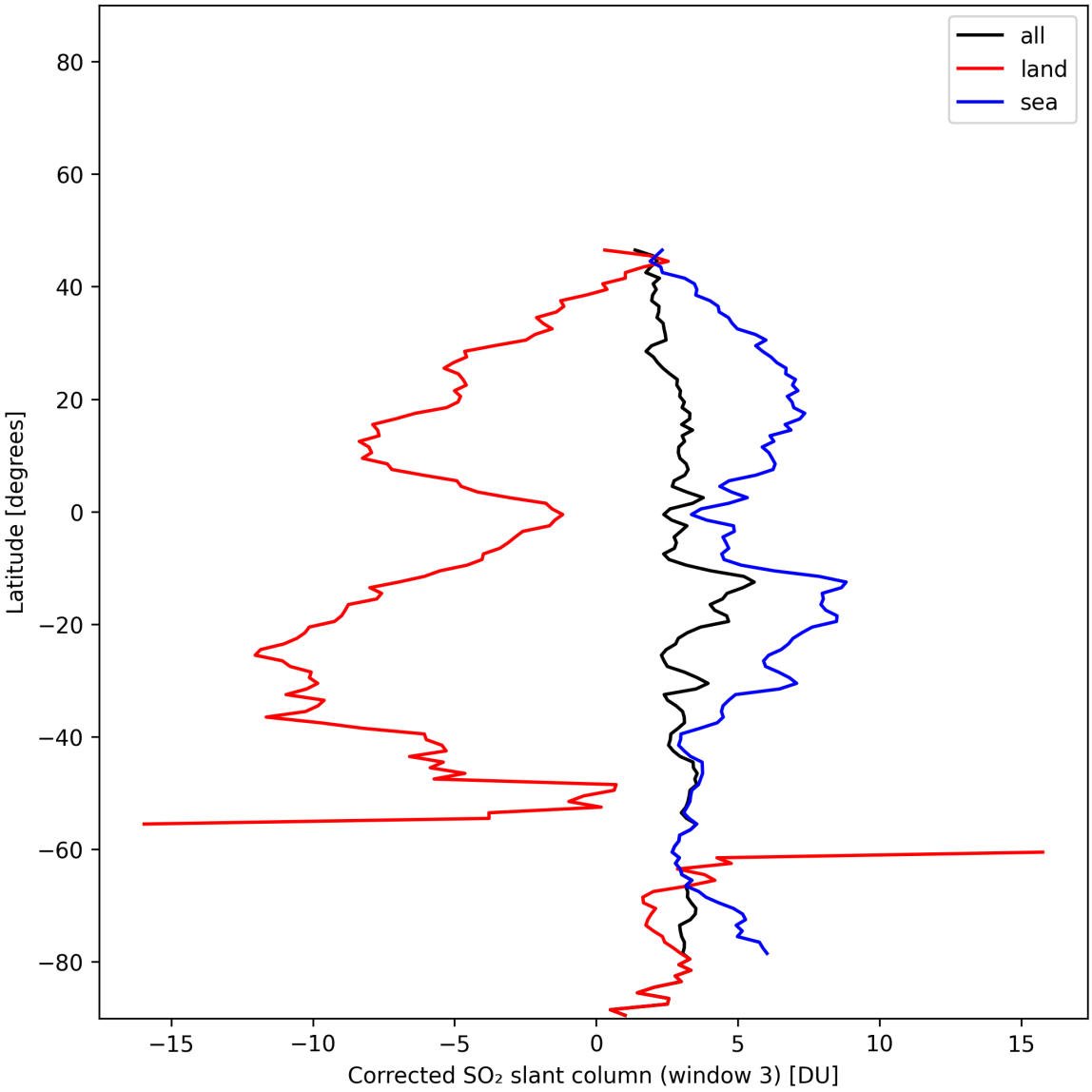

Figure 46: Zonal average of "Corrected SO_2 slant column (window 3)" for 2024-12-15 to 2024-12-16.

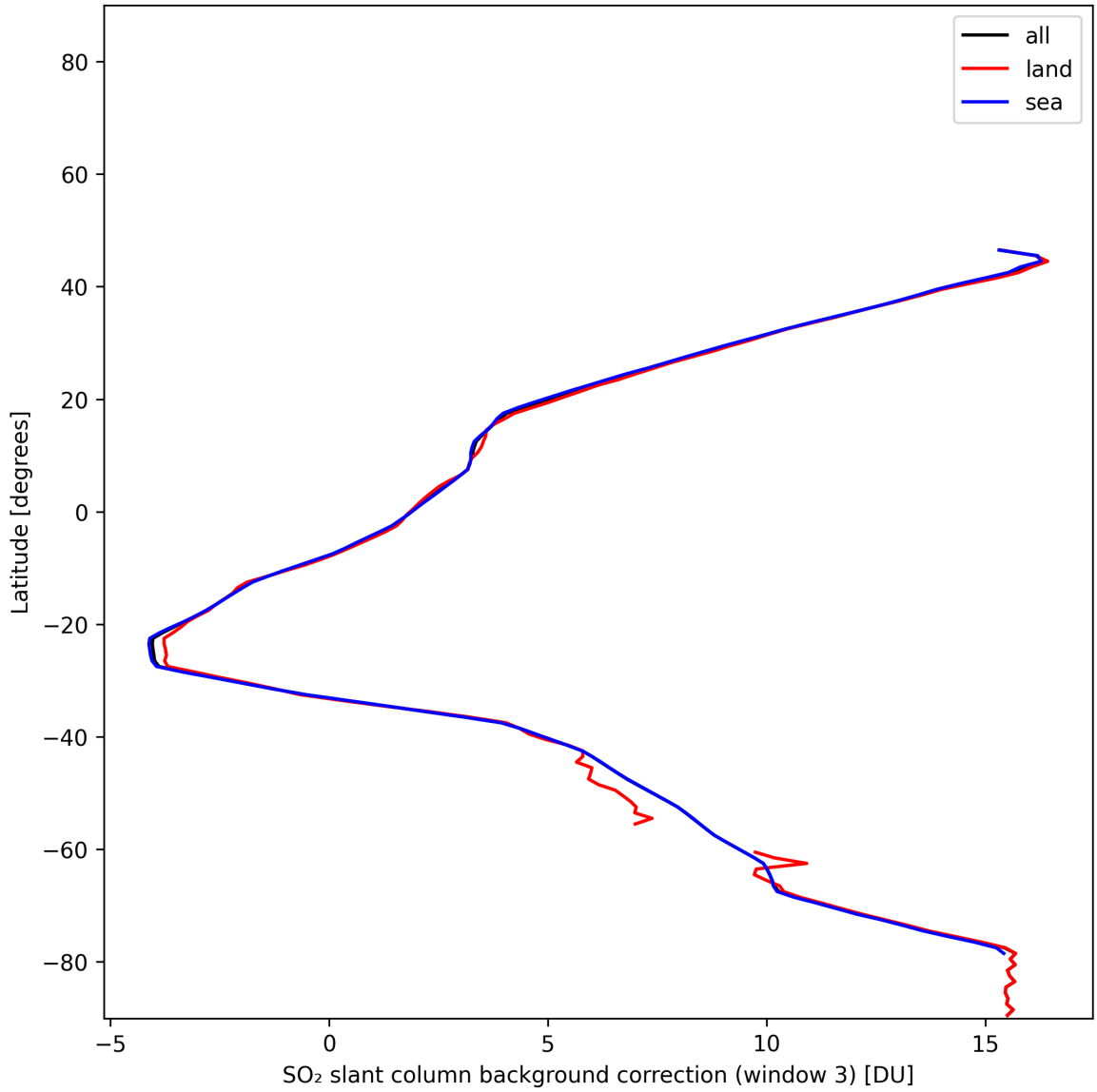

Figure 47: Zonal average of "SO_2 slant column background correction (window 3)" for 2024-12-15 to 2024-12-16.

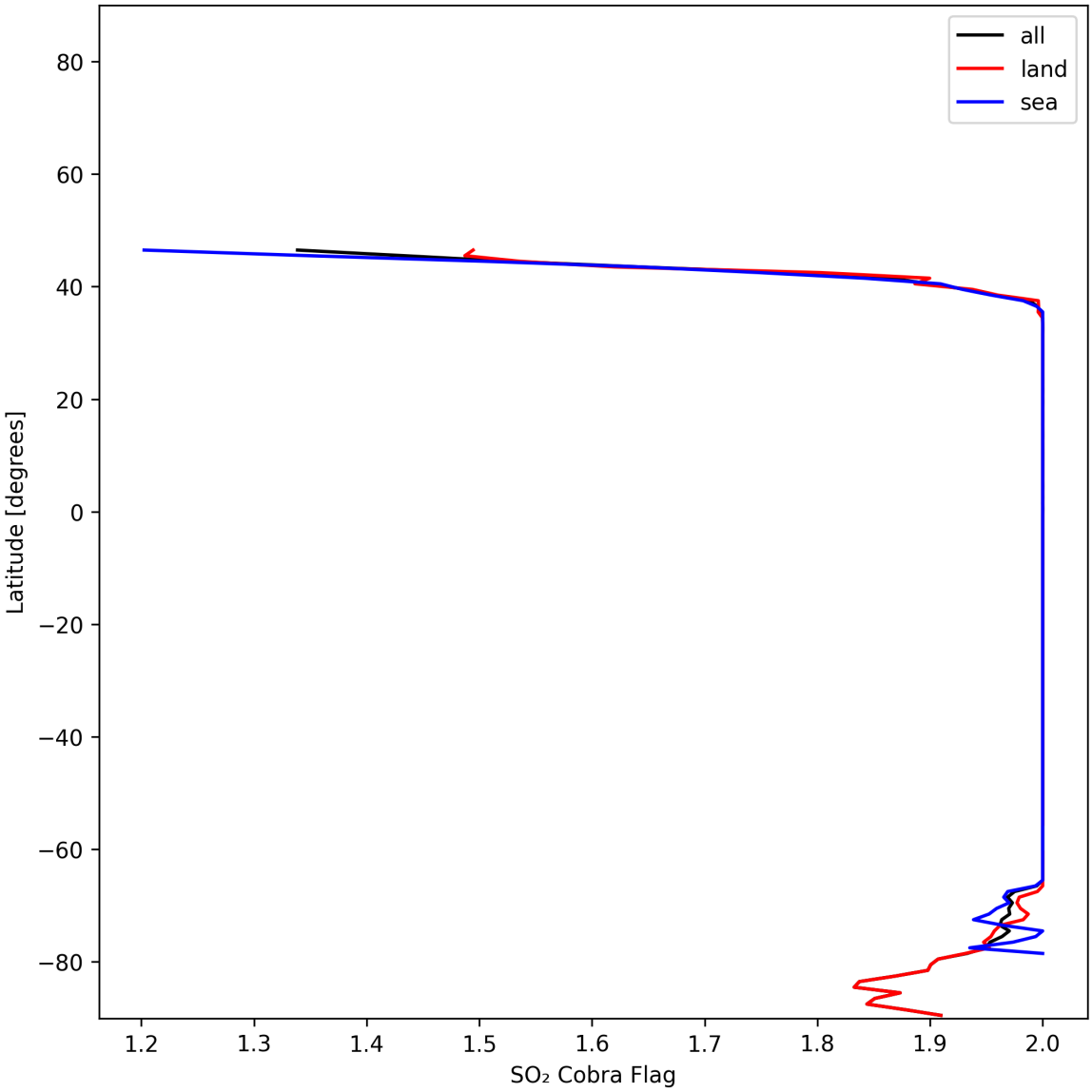

Figure 48: Zonal average of "SO_2 Cobra Flag" for 2024-12-15 to 2024-12-16.

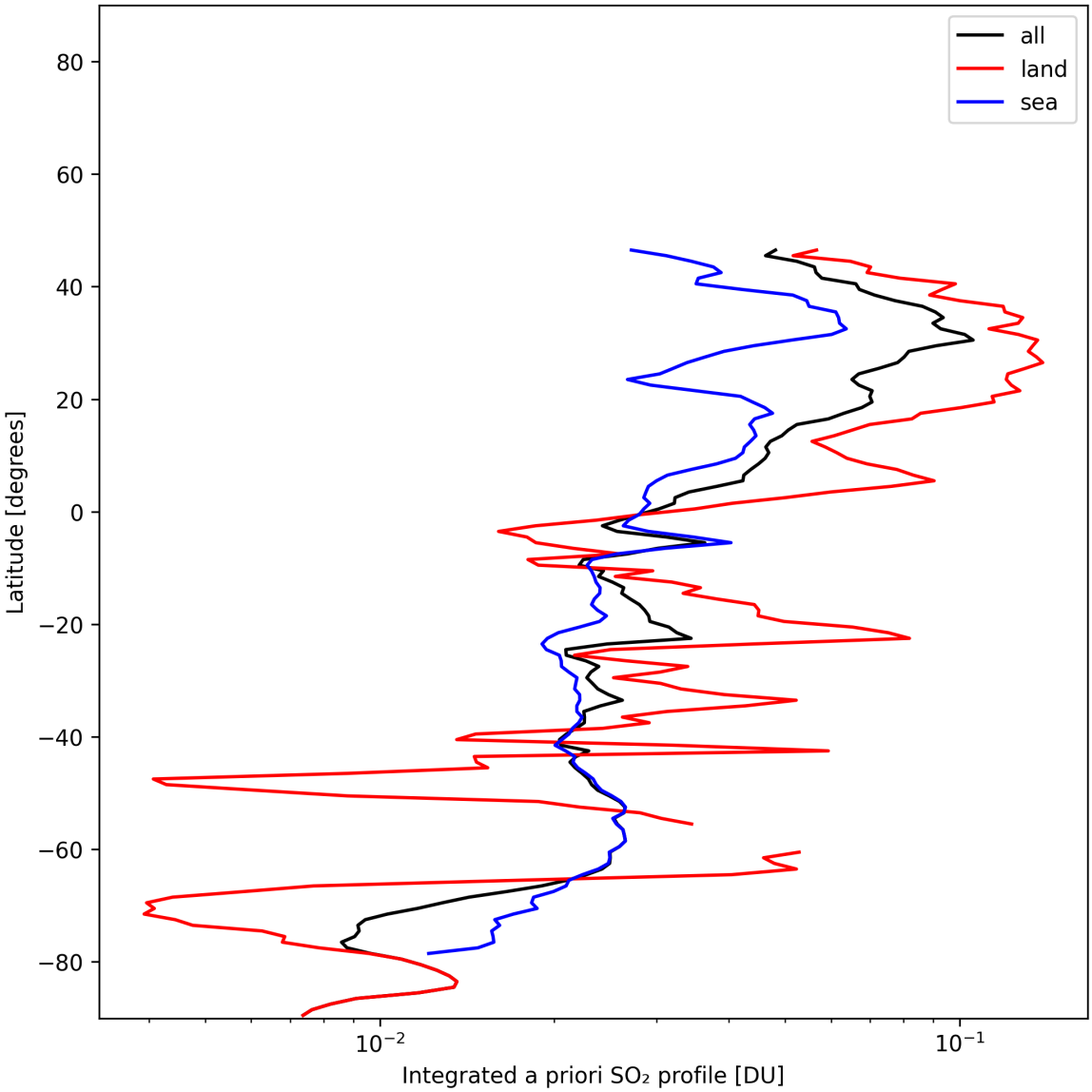

Figure 49: Zonal average of "Integrated a priori SO_2 profile" for 2024-12-15 to 2024-12-16.

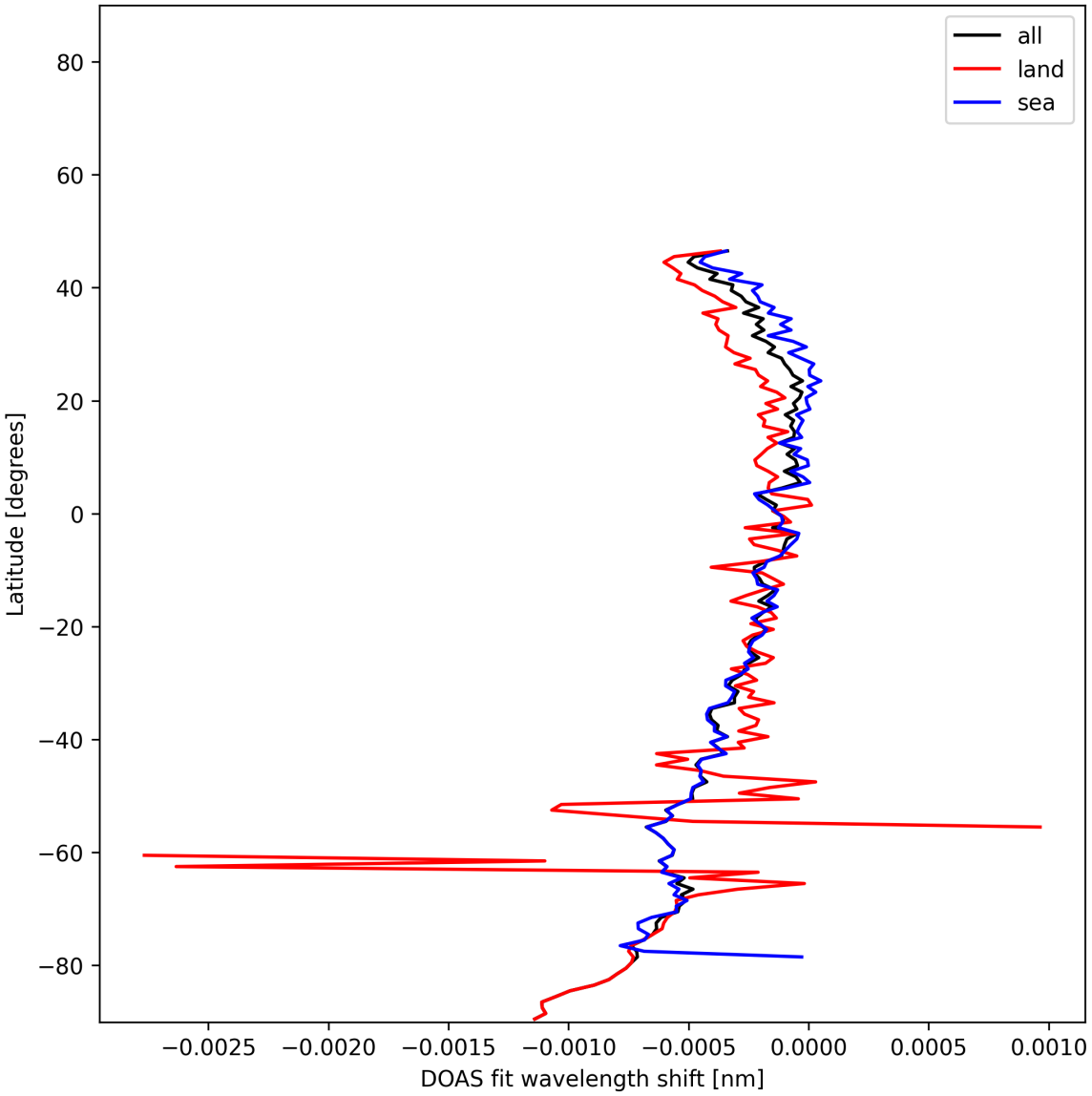

Figure 50: Zonal average of “DOAS fit wavelength shift” for 2024-12-15 to 2024-12-16.

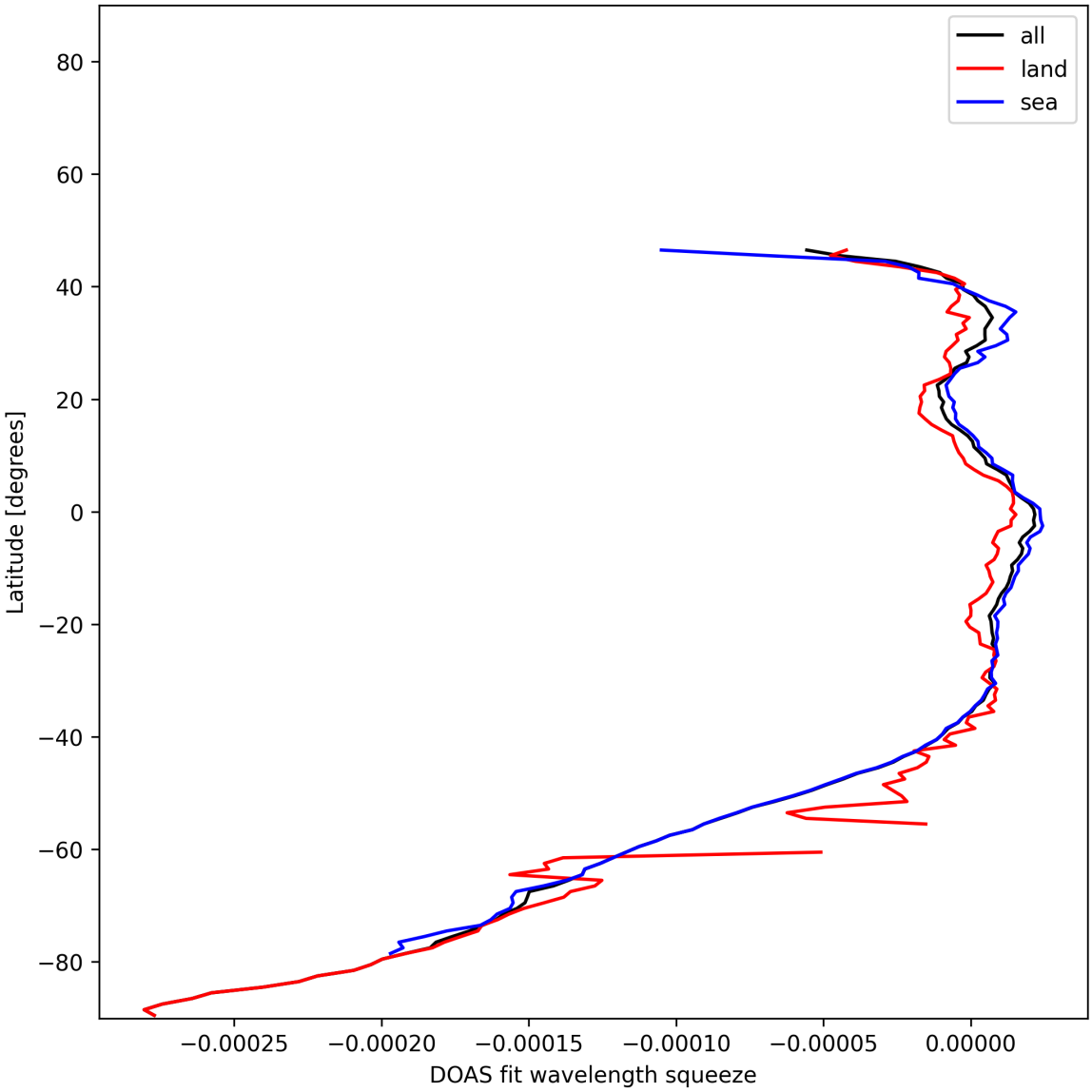

Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2024-12-15 to 2024-12-16.

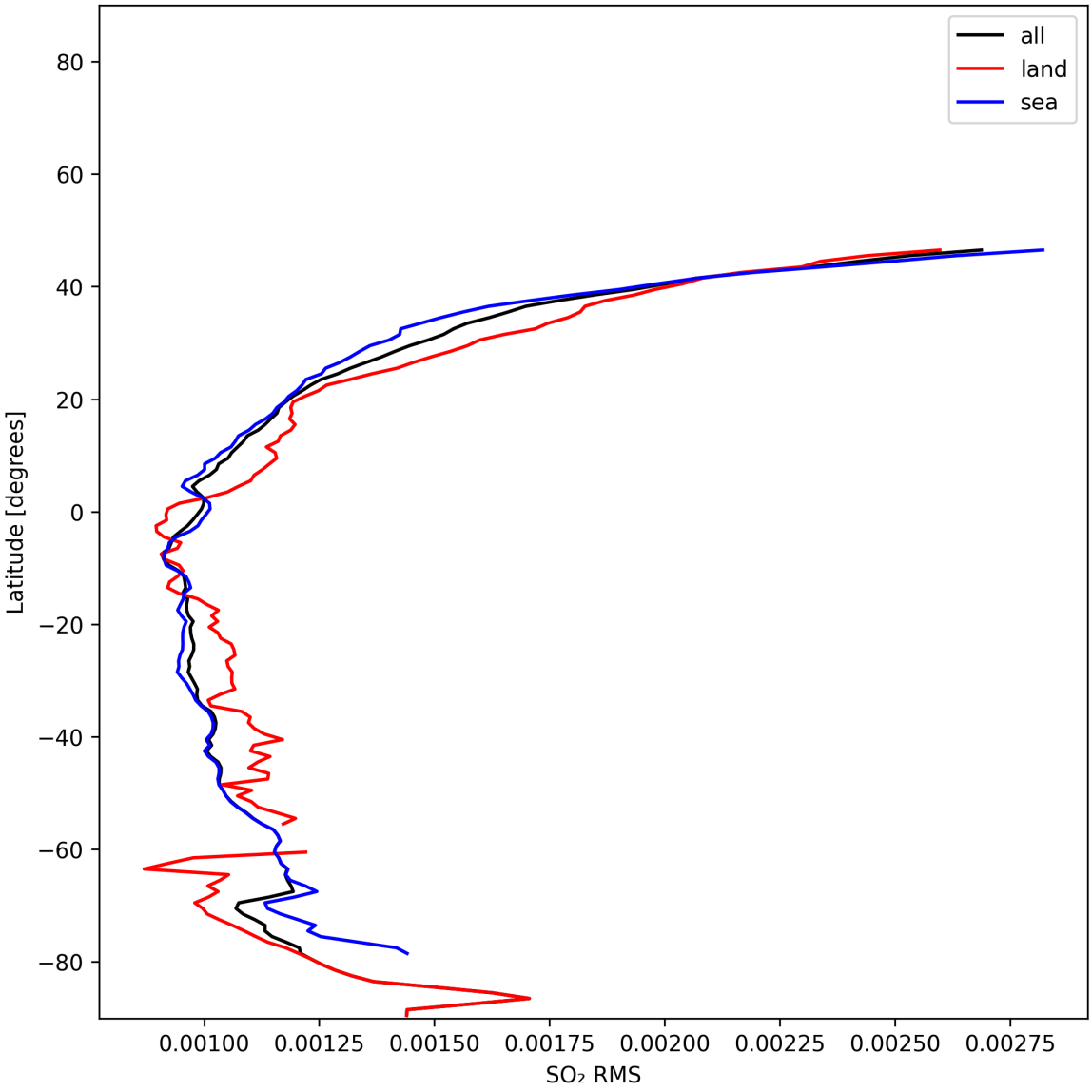

Figure 52: Zonal average of "SO_2 RMS" for 2024-12-15 to 2024-12-16.

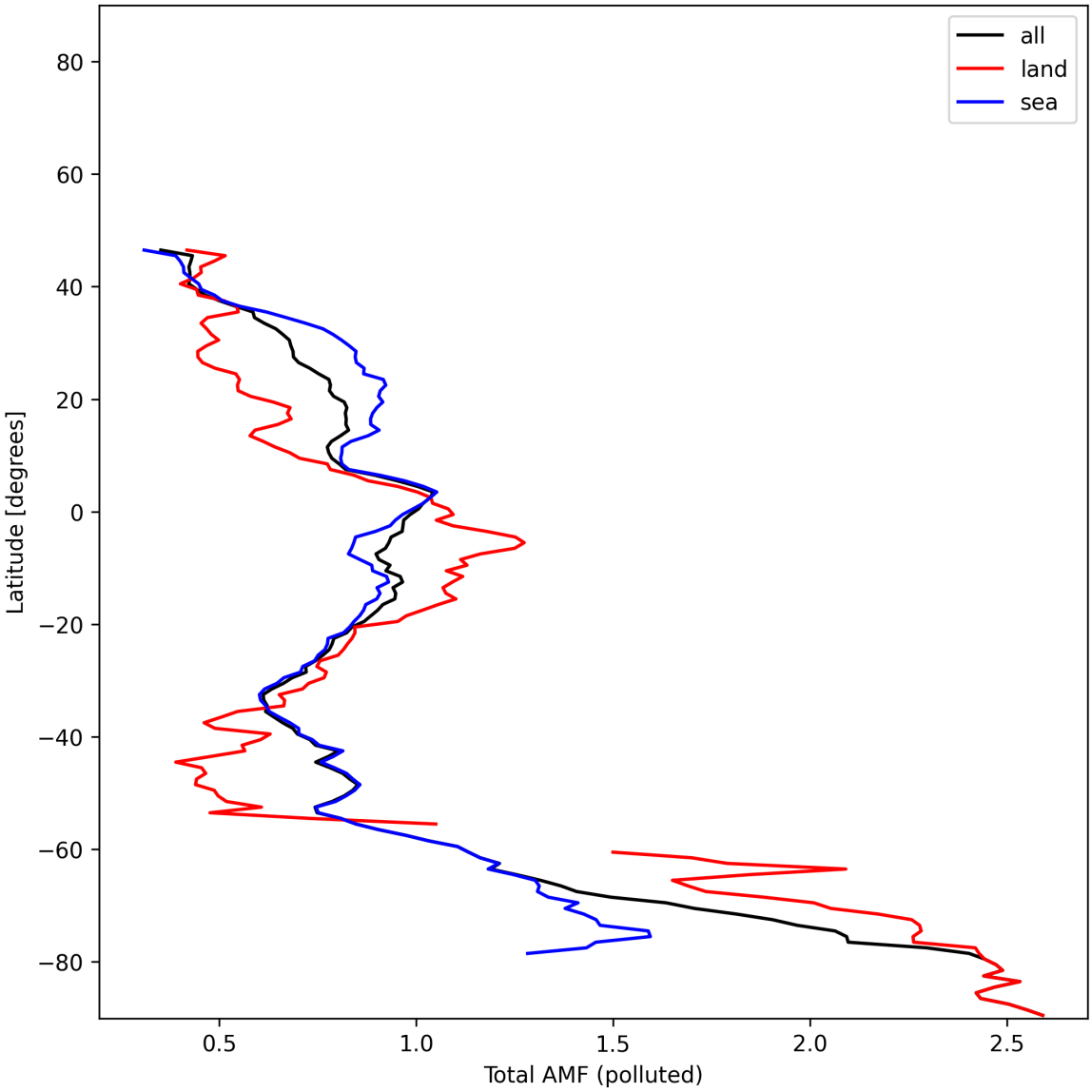

Figure 53: Zonal average of “Total AMF (polluted)” for 2024-12-15 to 2024-12-16.

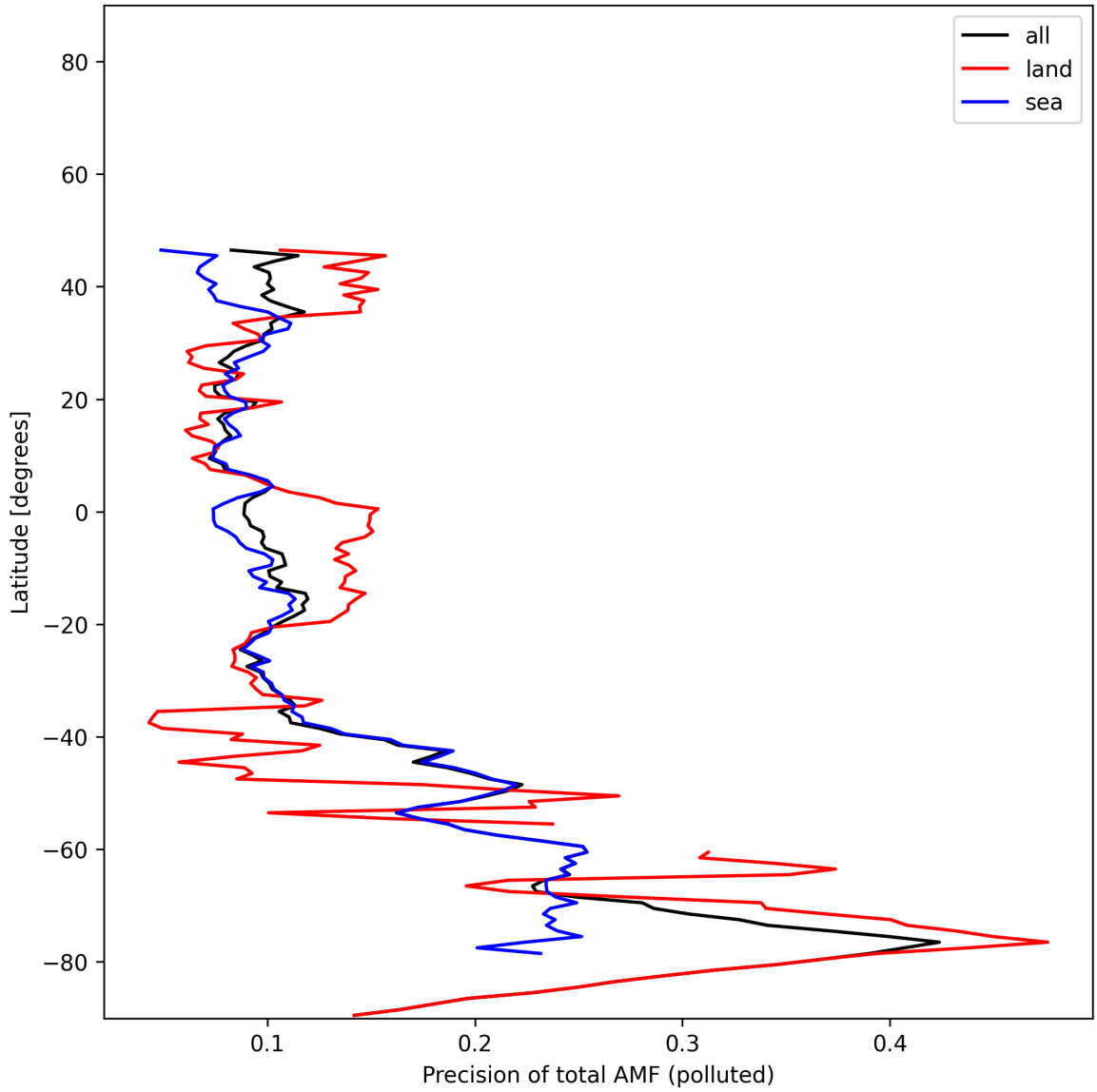

Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2024-12-15 to 2024-12-16.

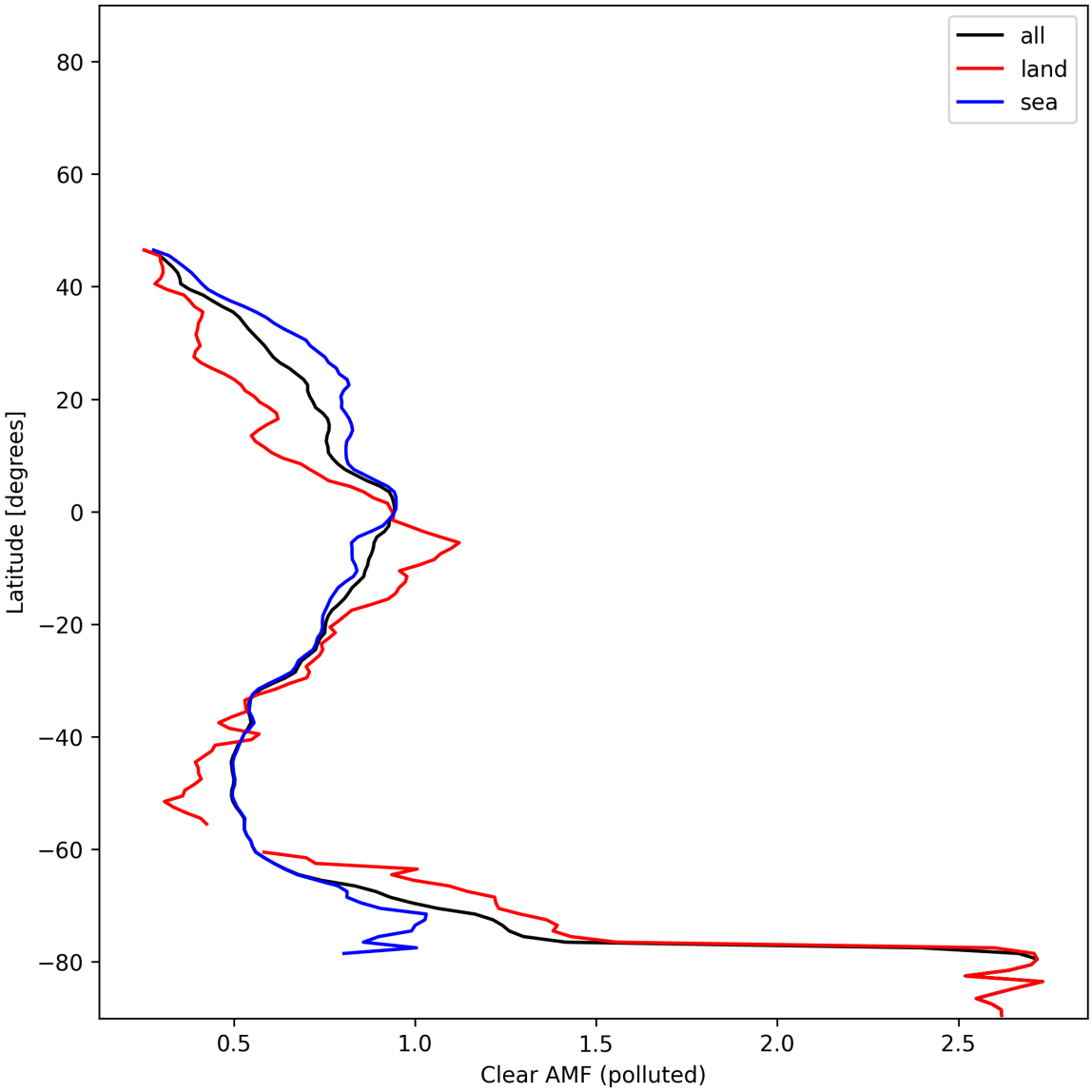

Figure 55: Zonal average of “Clear AMF (polluted)” for 2024-12-15 to 2024-12-16.

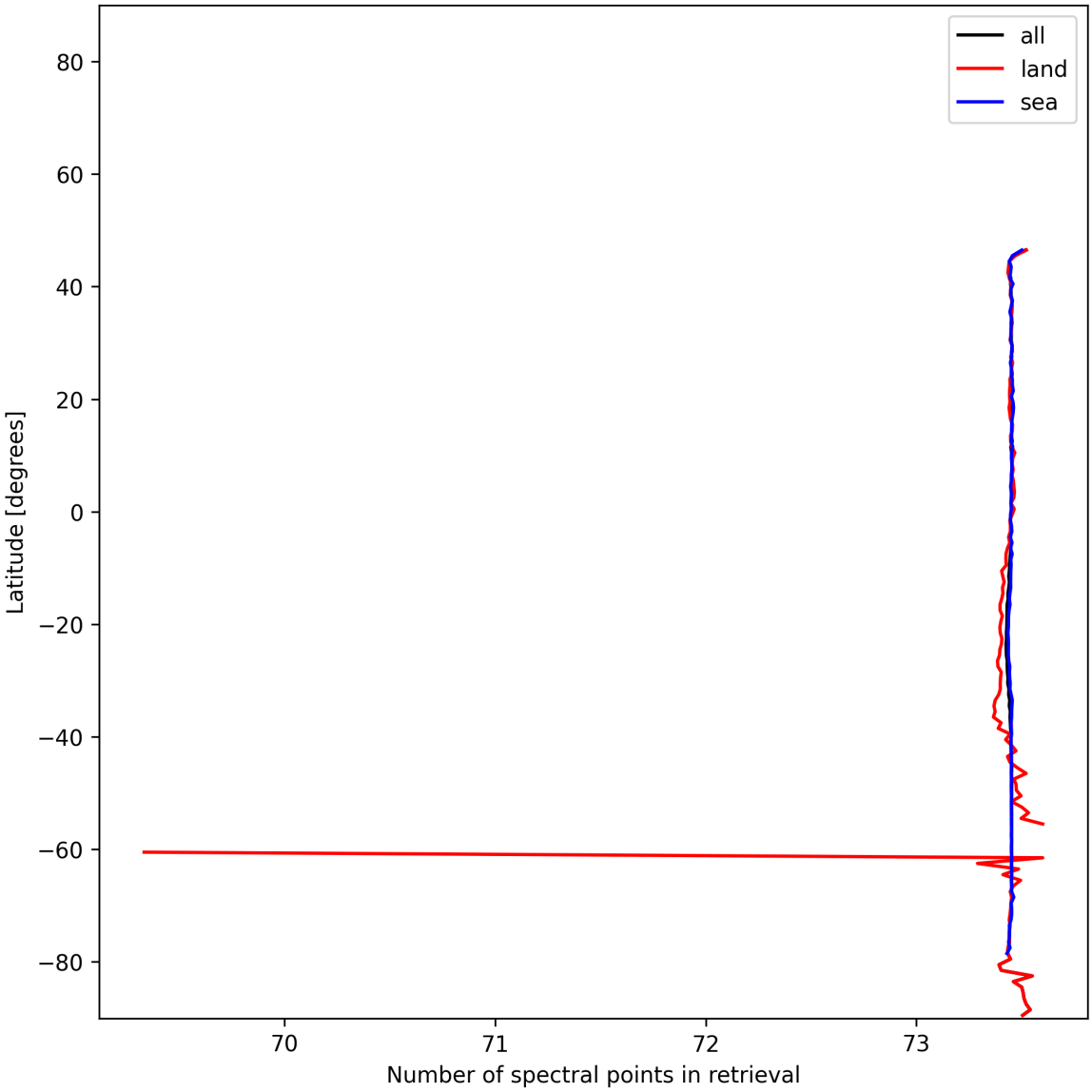

Figure 56: Zonal average of “Number of spectral points in retrieval” for 2024-12-15 to 2024-12-16.

8 Histograms

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

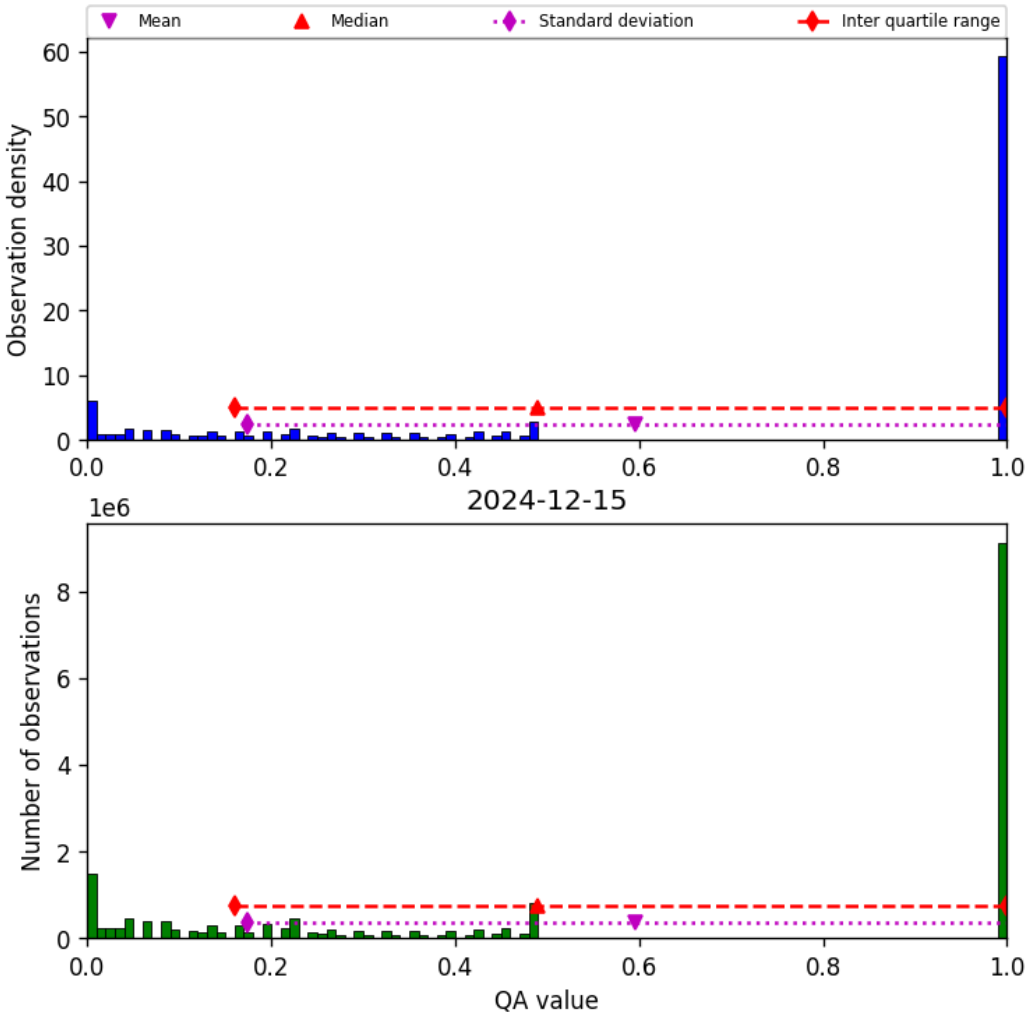

Figure 57: Histogram of “QA value” for 2024-12-15 to 2024-12-16

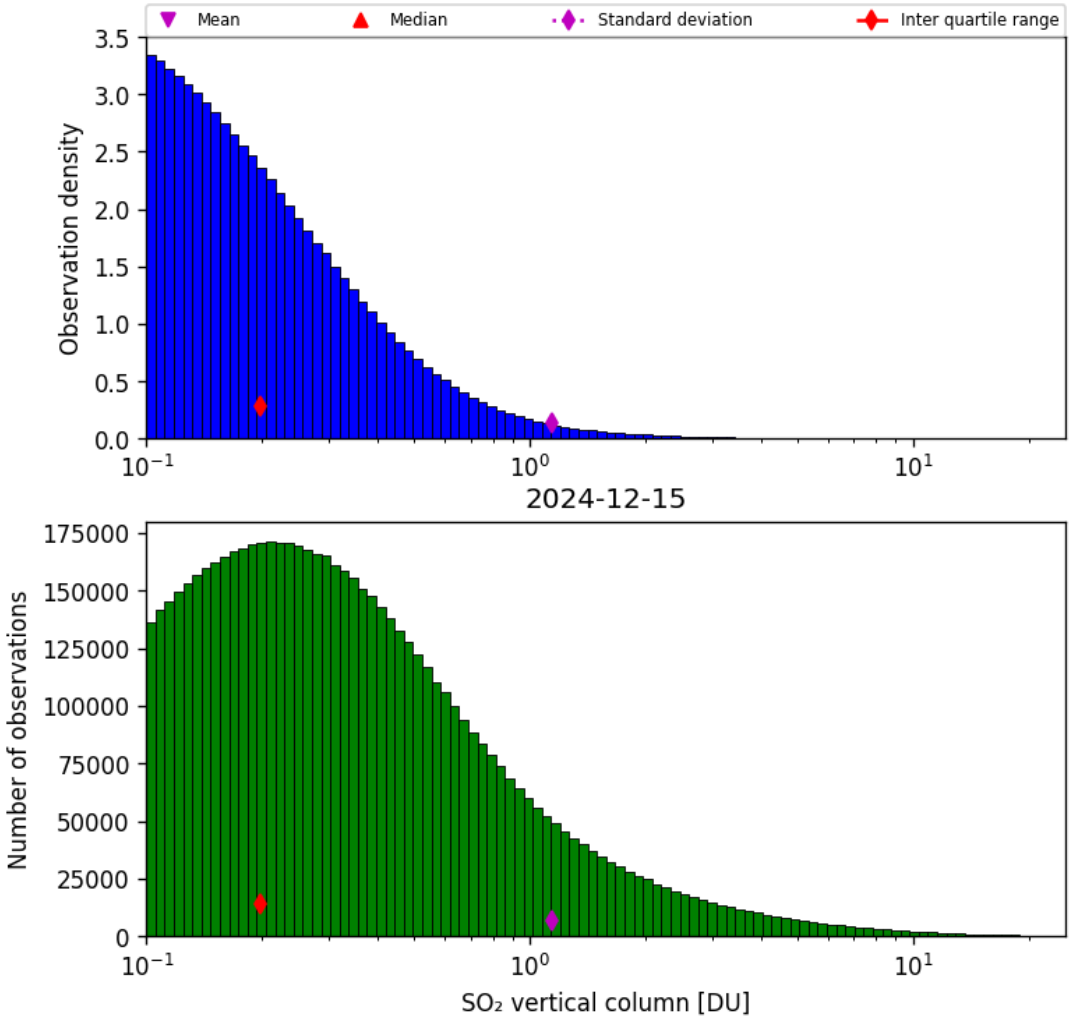

Figure 58: Histogram of "SO_2 vertical column" for 2024-12-15 to 2024-12-16

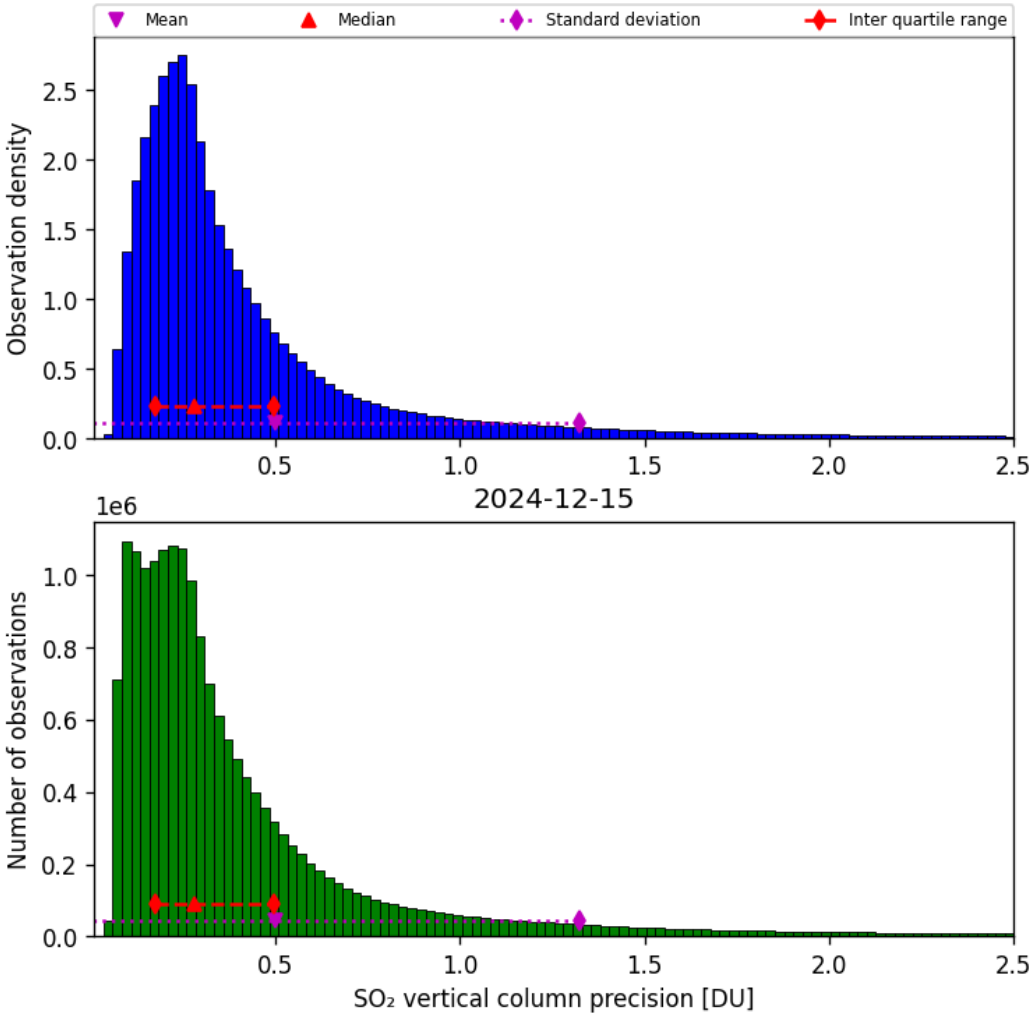

Figure 59: Histogram of "SO_2 vertical column precision" for 2024-12-15 to 2024-12-16

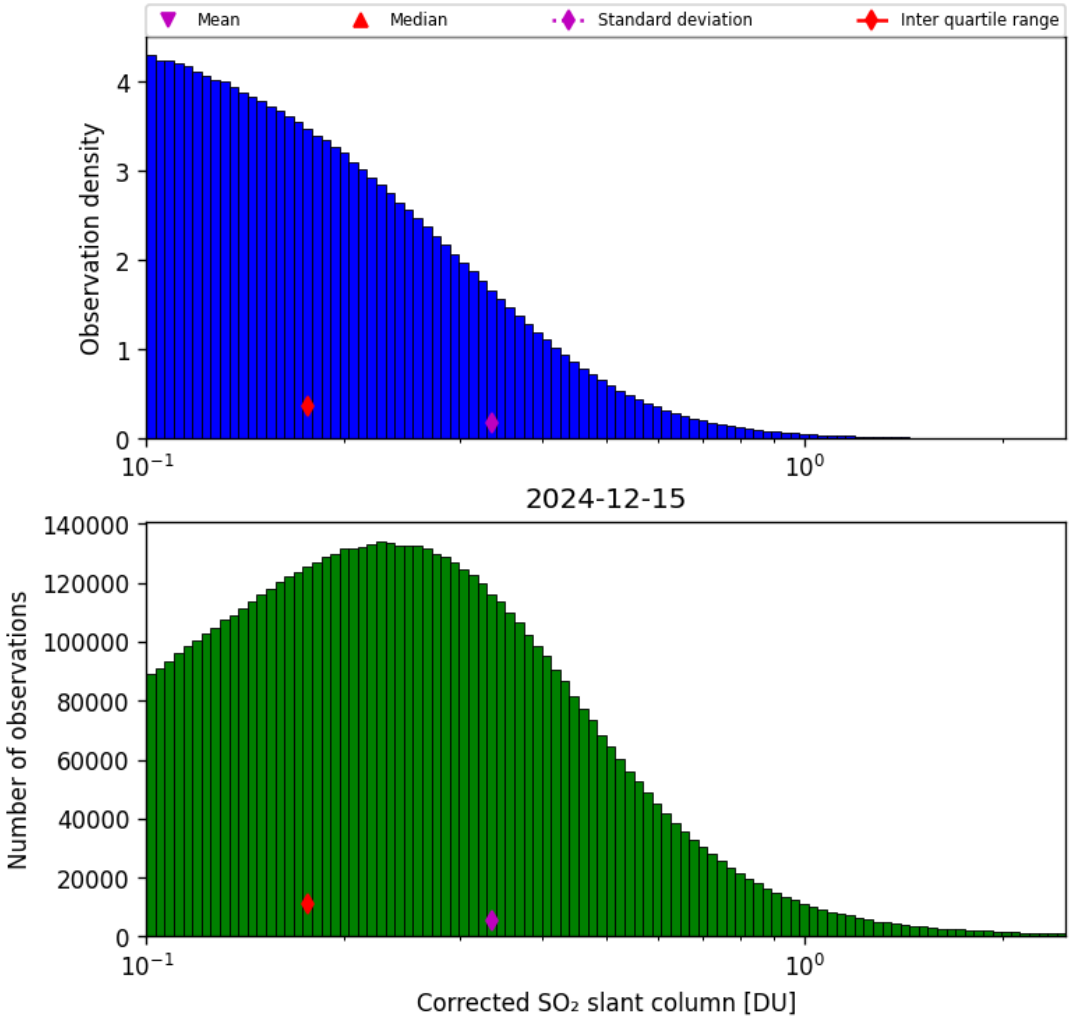

Figure 60: Histogram of "Corrected SO_2 slant column" for 2024-12-15 to 2024-12-16

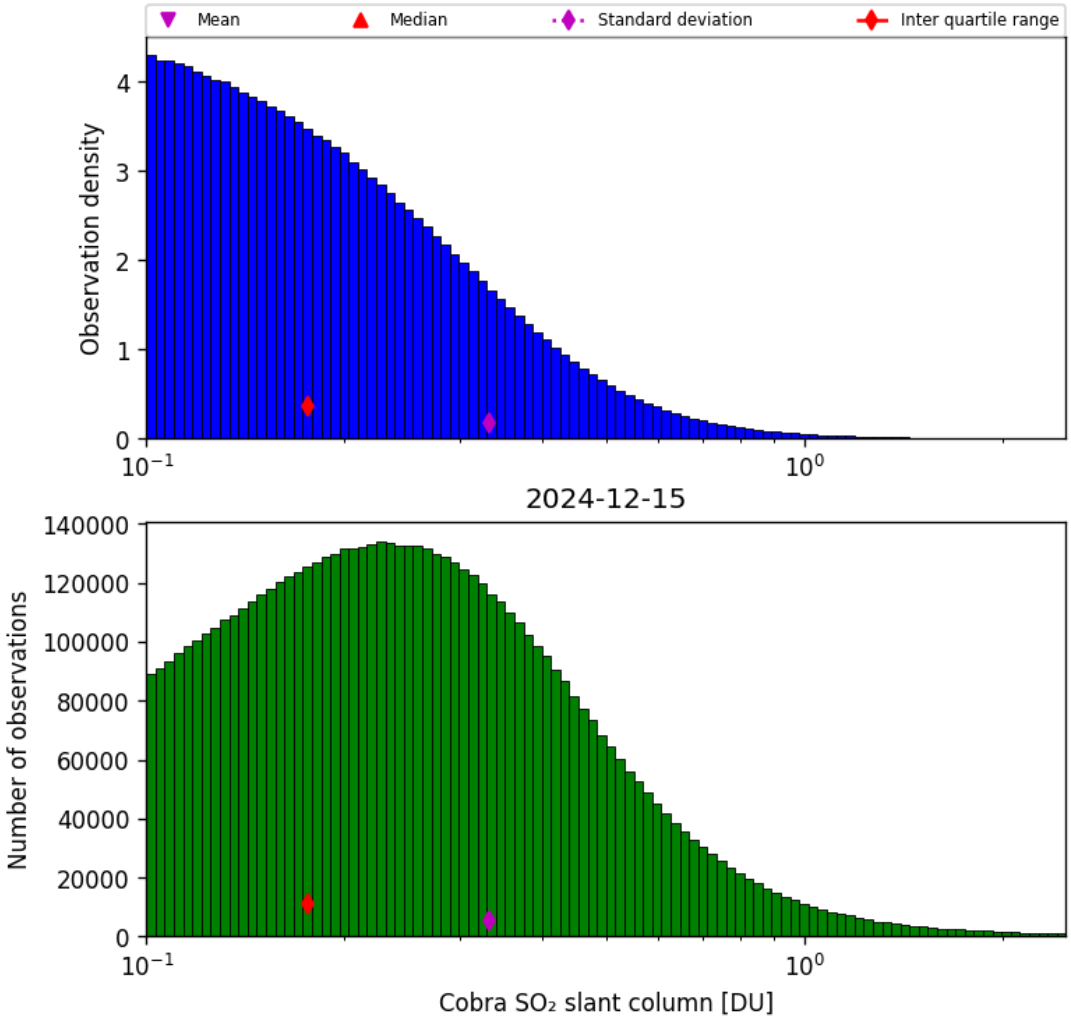

Figure 61: Histogram of "Cobra SO_2 slant column" for 2024-12-15 to 2024-12-16

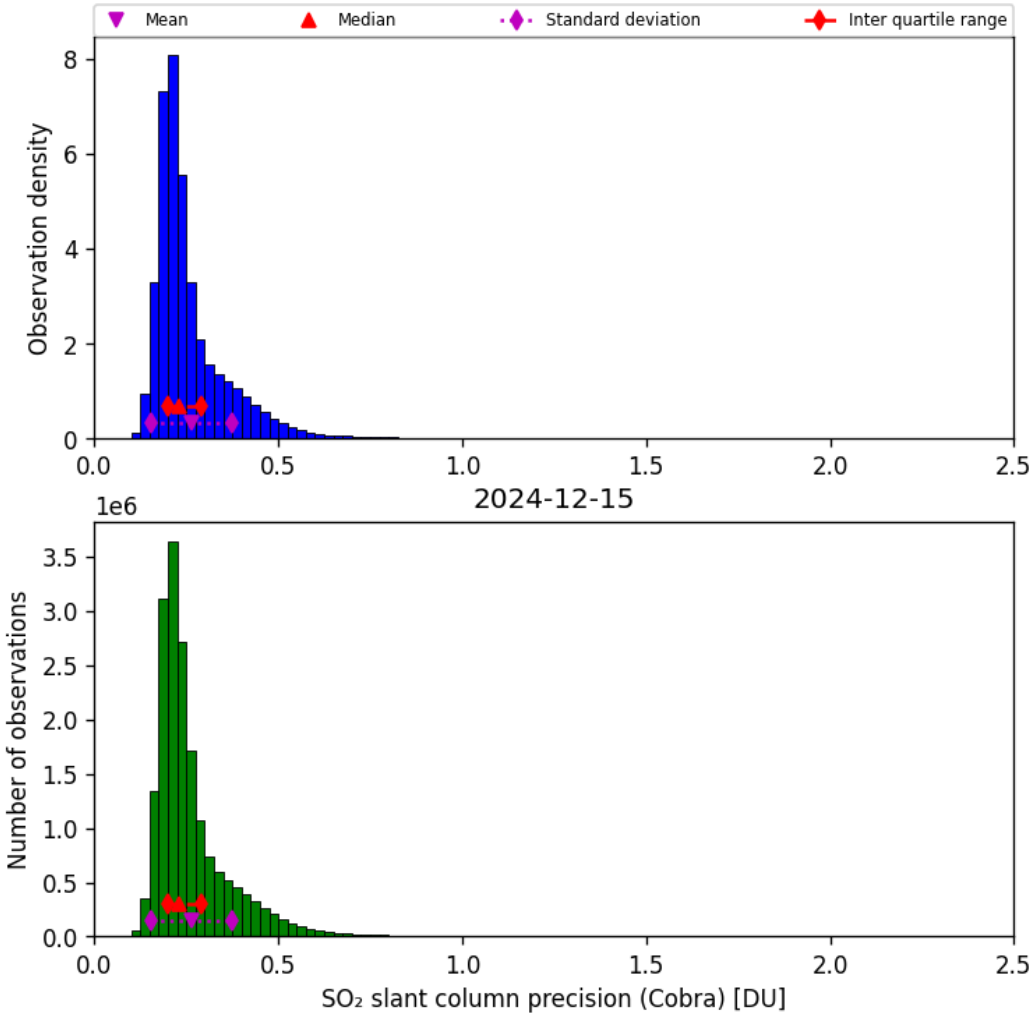

Figure 62: Histogram of "SO_2 slant column precision (Cobra)" for 2024-12-15 to 2024-12-16

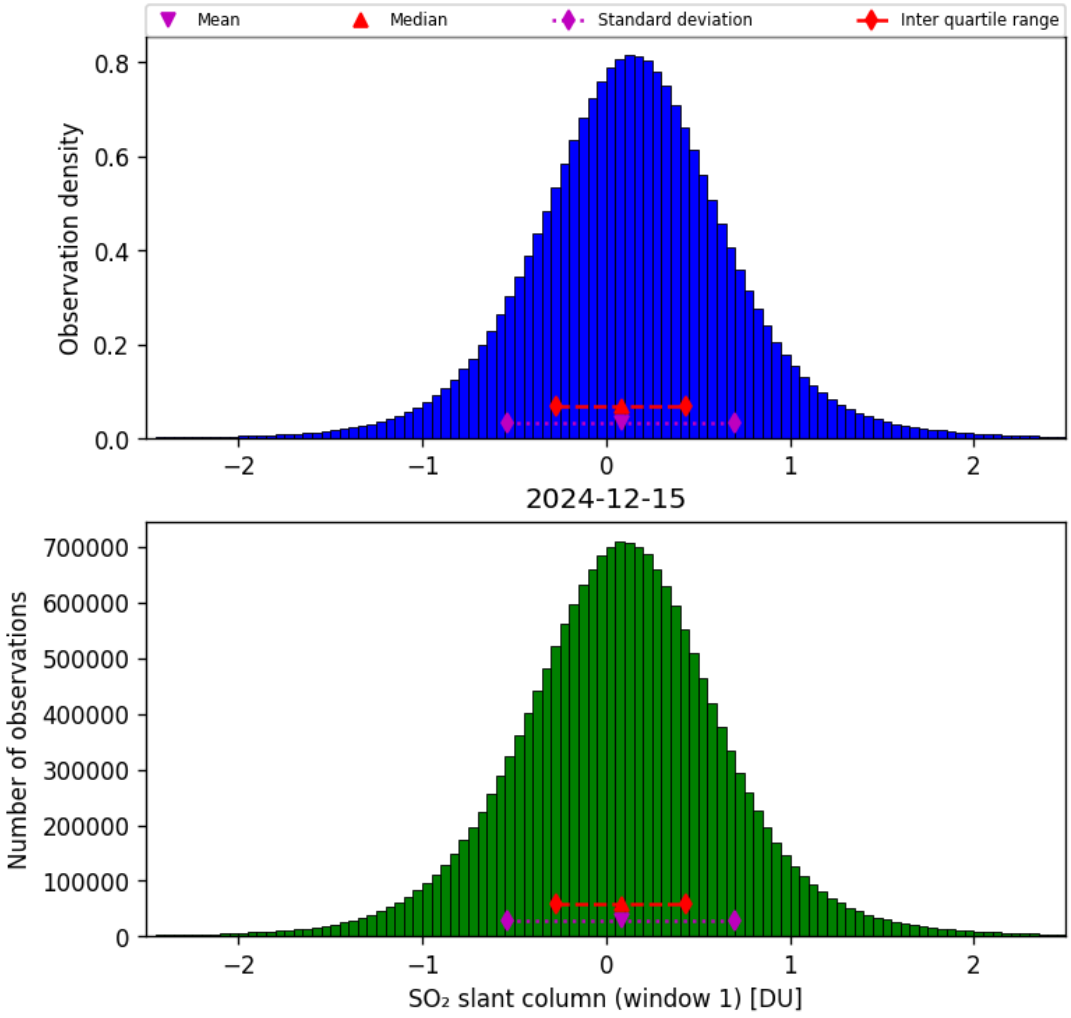

Figure 63: Histogram of "SO_2 slant column (window 1)" for 2024-12-15 to 2024-12-16

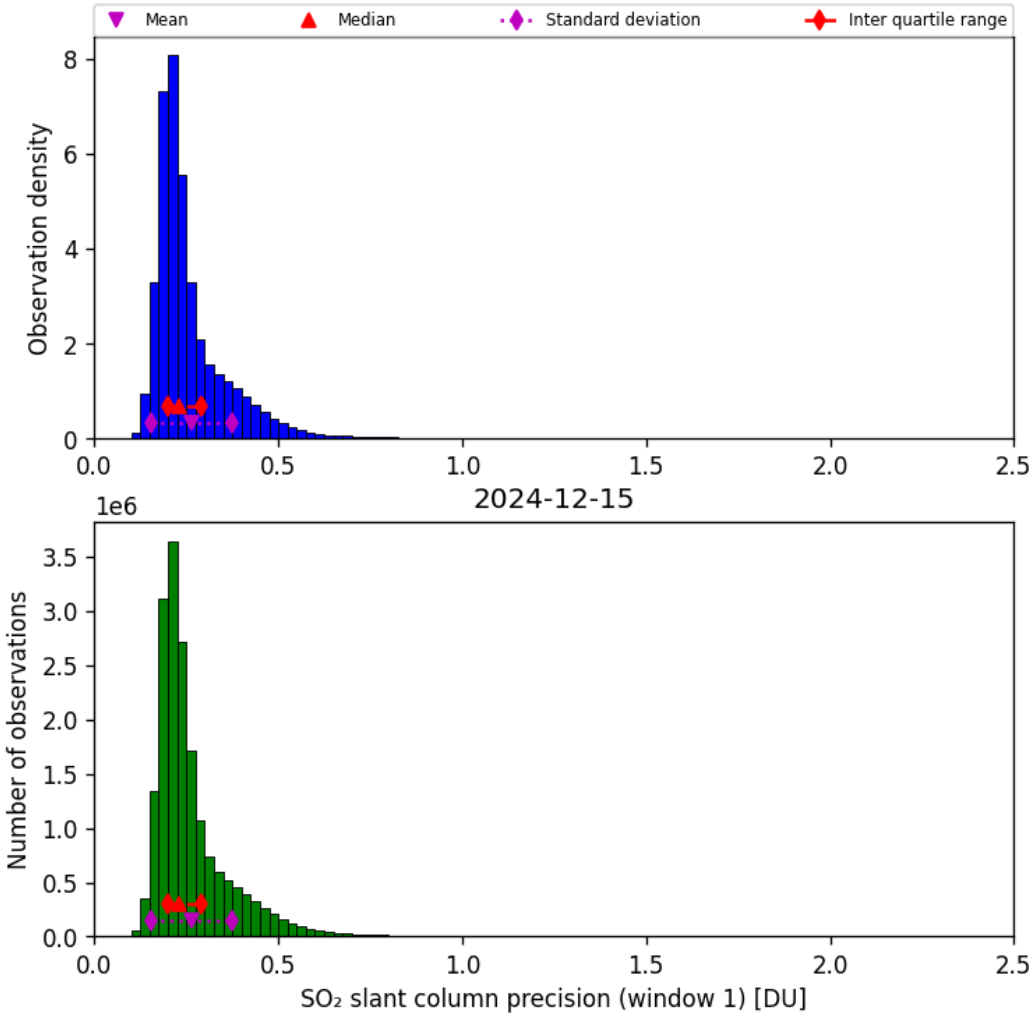

Figure 64: Histogram of "SO_2 slant column precision (window 1)" for 2024-12-15 to 2024-12-16

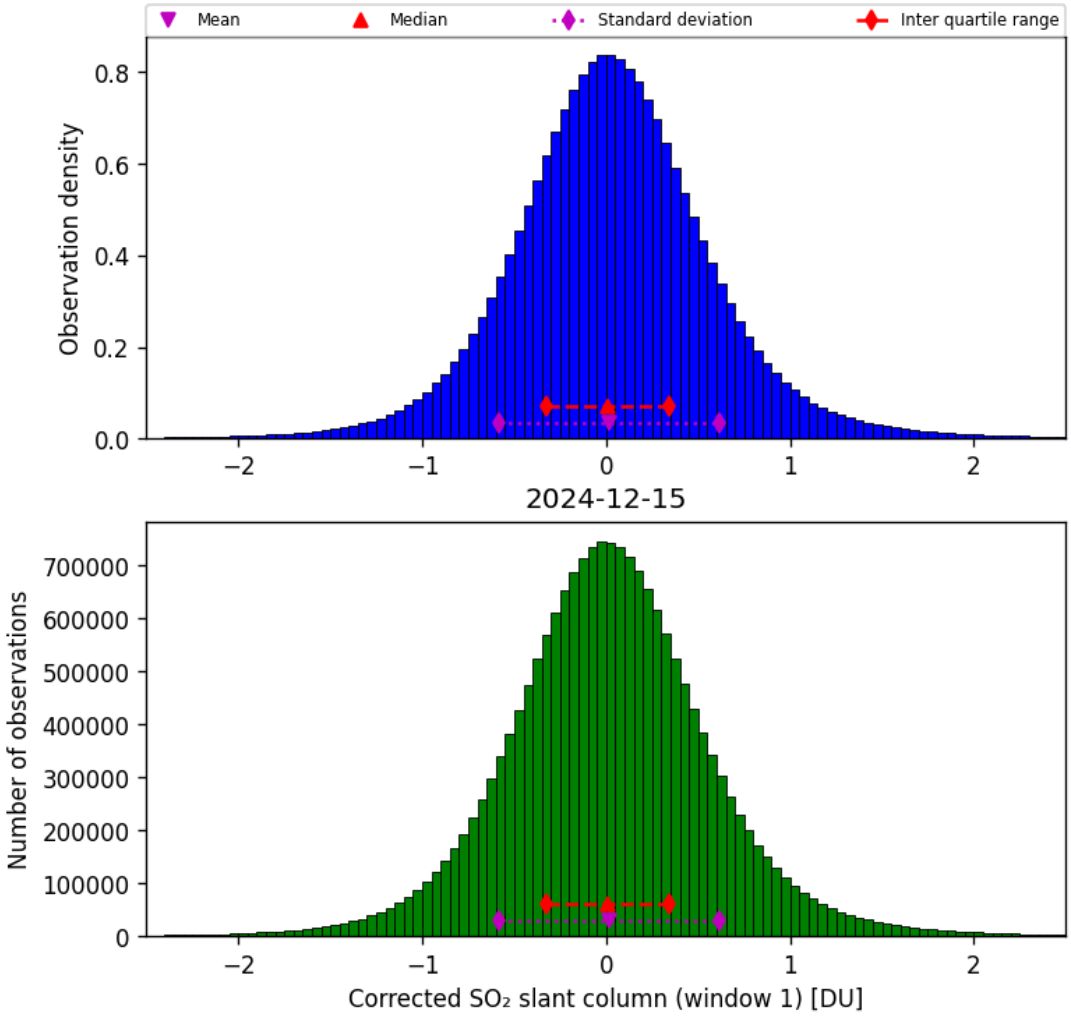

Figure 65: Histogram of "Corrected SO_2 slant column (window 1)" for 2024-12-15 to 2024-12-16

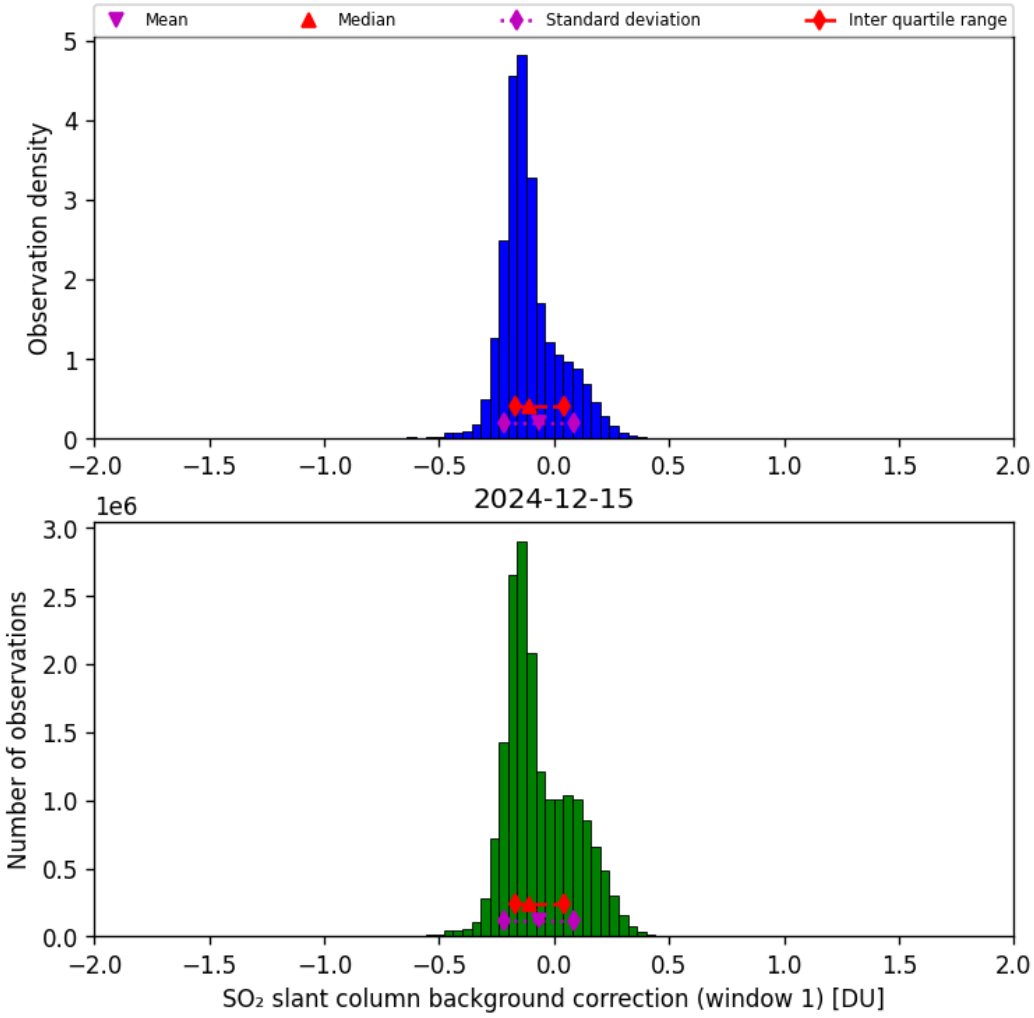

Figure 66: Histogram of "SO_2 slant column background correction (window 1)" for 2024-12-15 to 2024-12-16

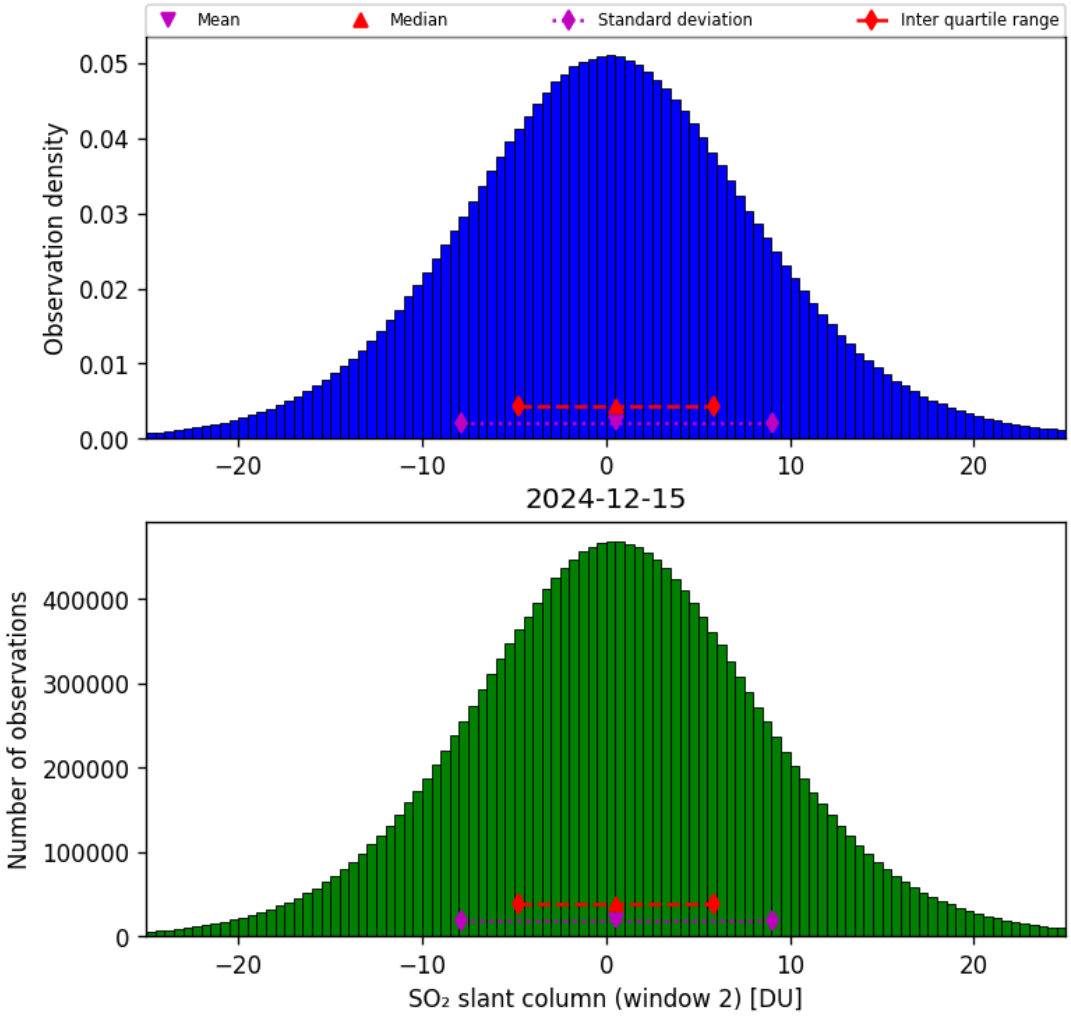

Figure 67: Histogram of "SO_2 slant column (window 2)" for 2024-12-15 to 2024-12-16

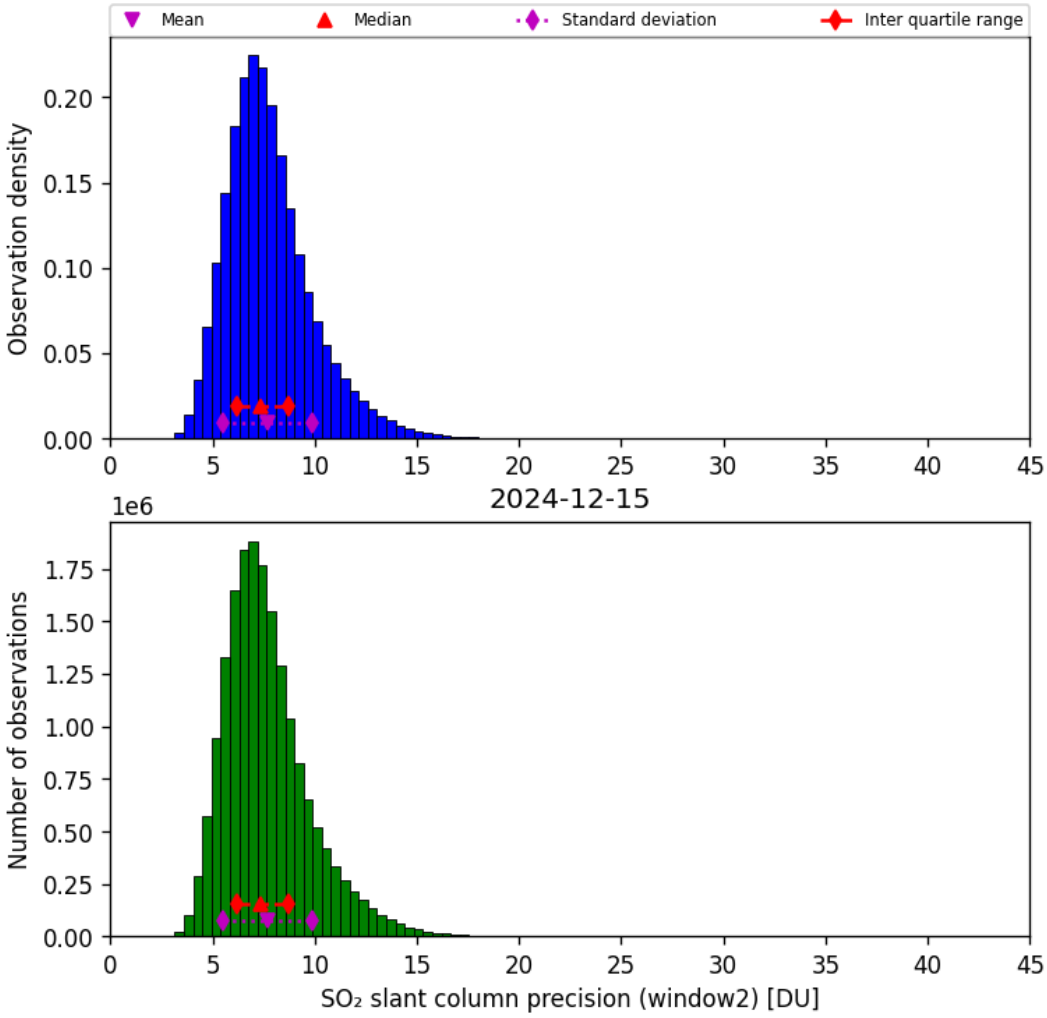

Figure 68: Histogram of "SO_2 slant column precision (window2)" for 2024-12-15 to 2024-12-16

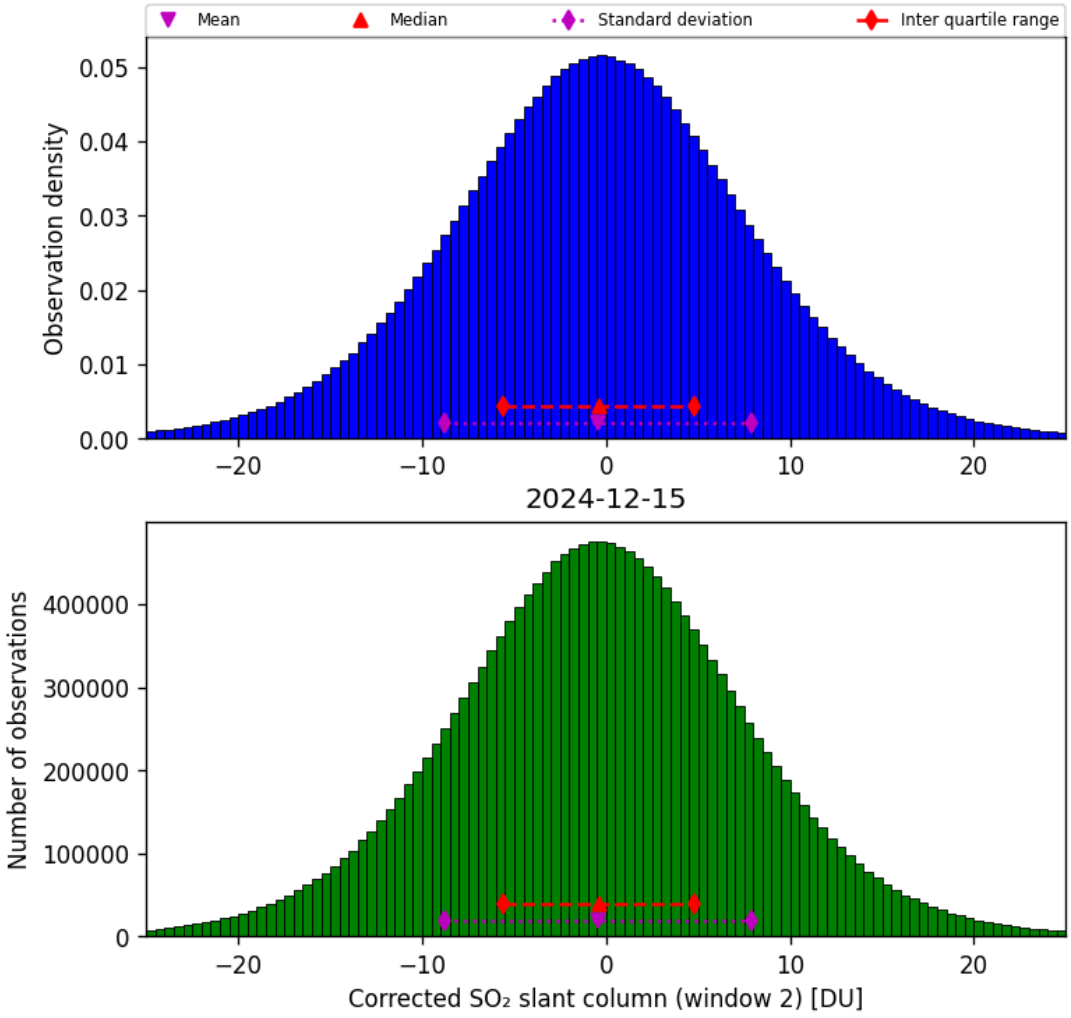

Figure 69: Histogram of "Corrected SO_2 slant column (window 2)" for 2024-12-15 to 2024-12-16

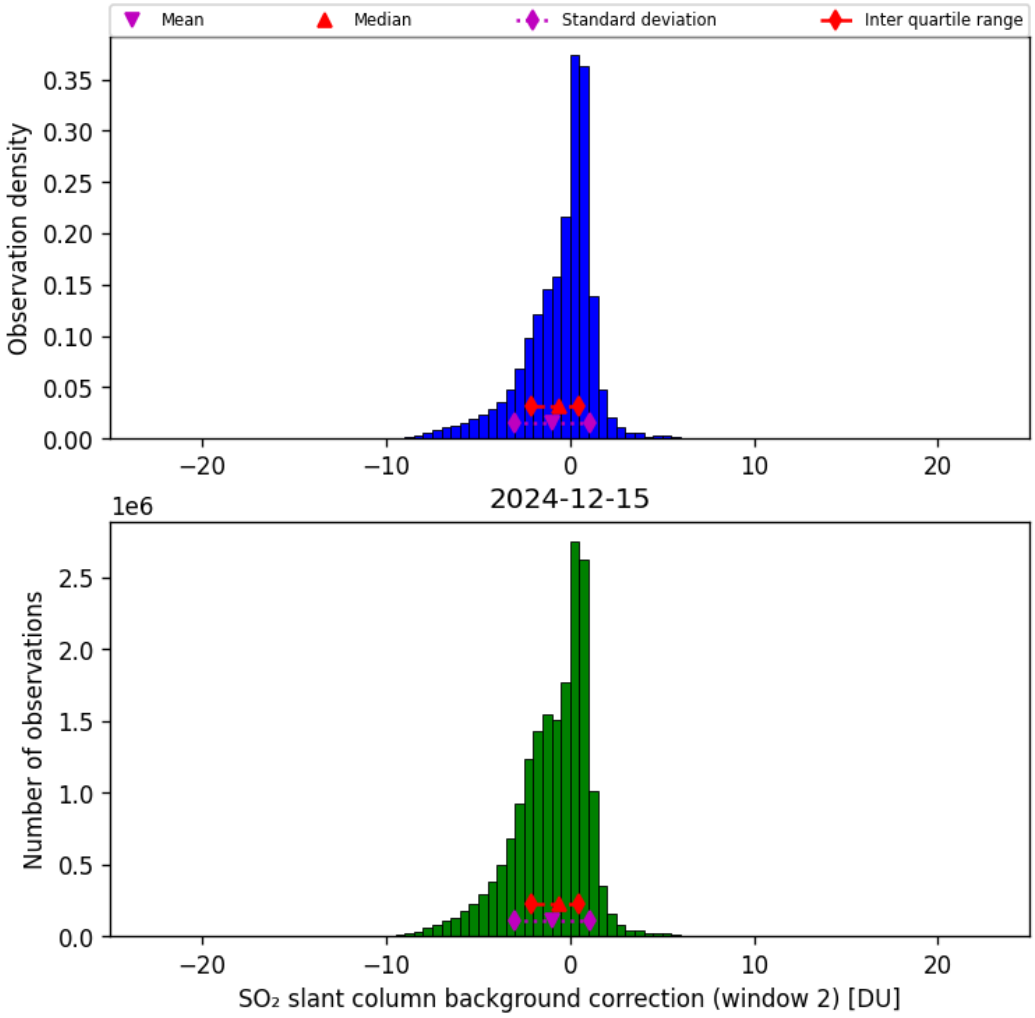

Figure 70: Histogram of "SO_2 slant column background correction (window 2)" for 2024-12-15 to 2024-12-16

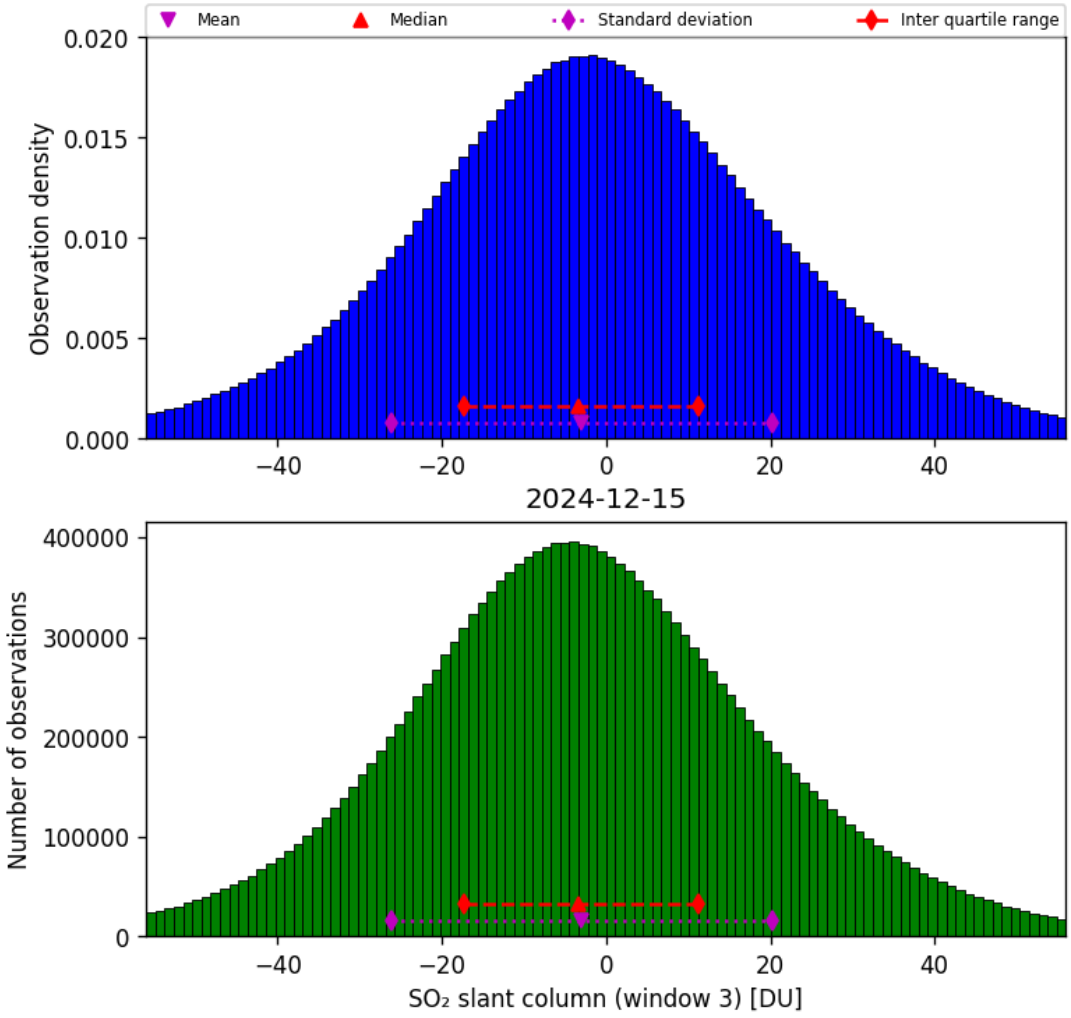

Figure 71: Histogram of "SO_2 slant column (window 3)" for 2024-12-15 to 2024-12-16

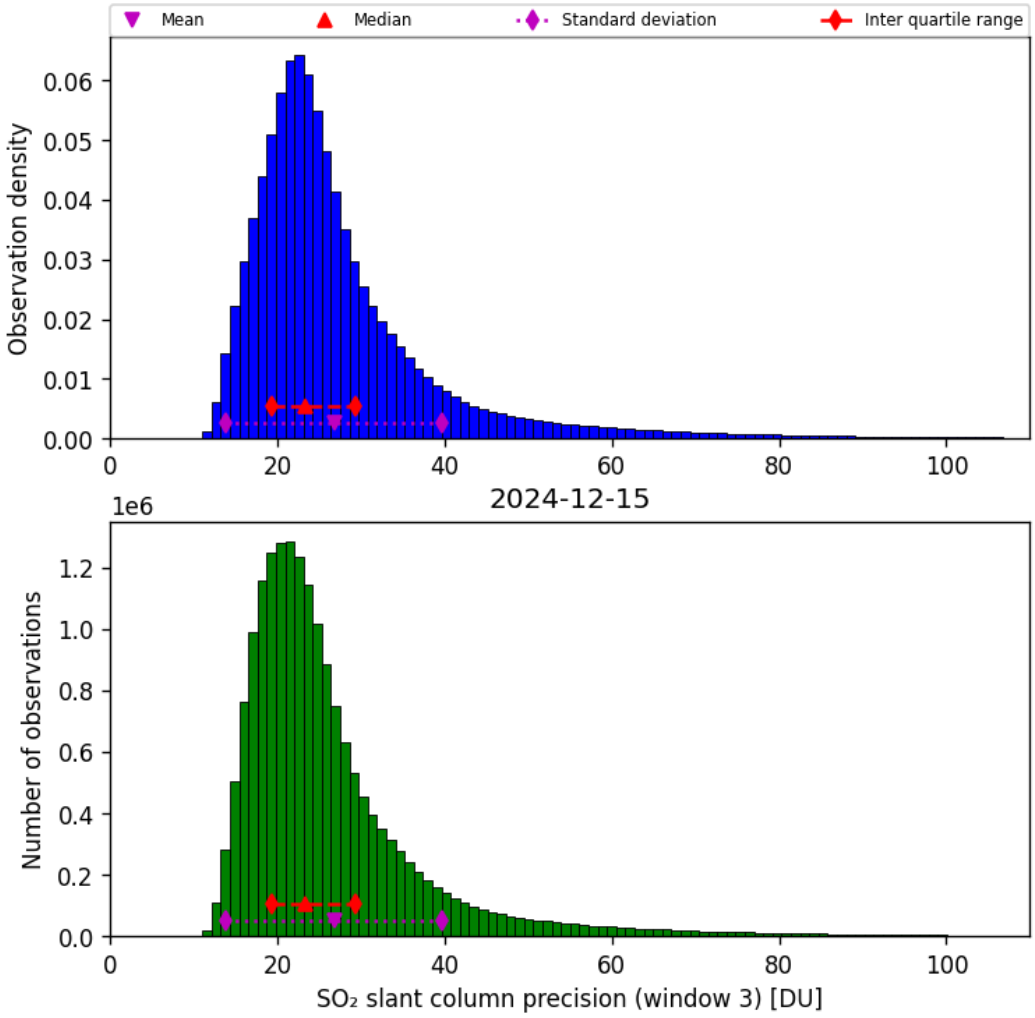

Figure 72: Histogram of "SO_2 slant column precision (window 3)" for 2024-12-15 to 2024-12-16

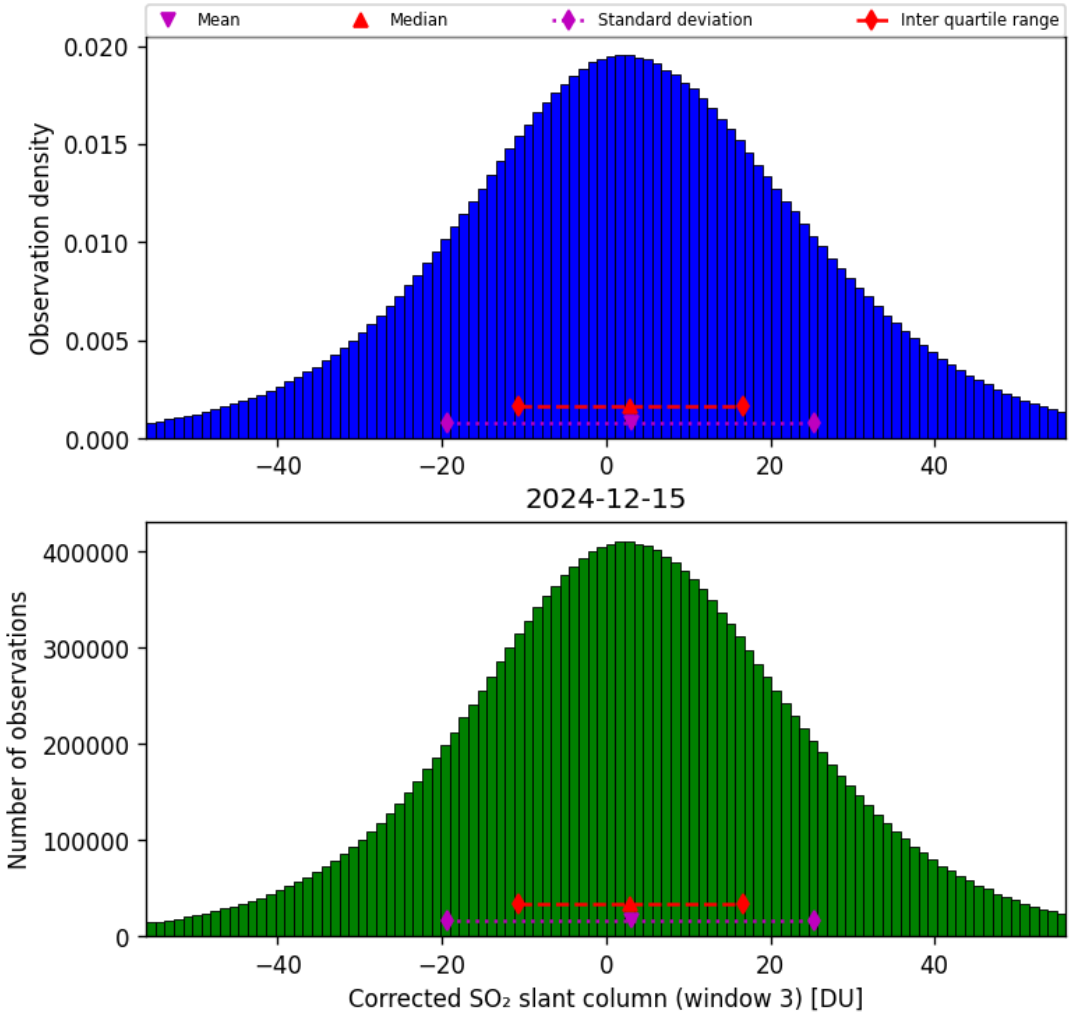

Figure 73: Histogram of "Corrected SO_2 slant column (window 3)" for 2024-12-15 to 2024-12-16

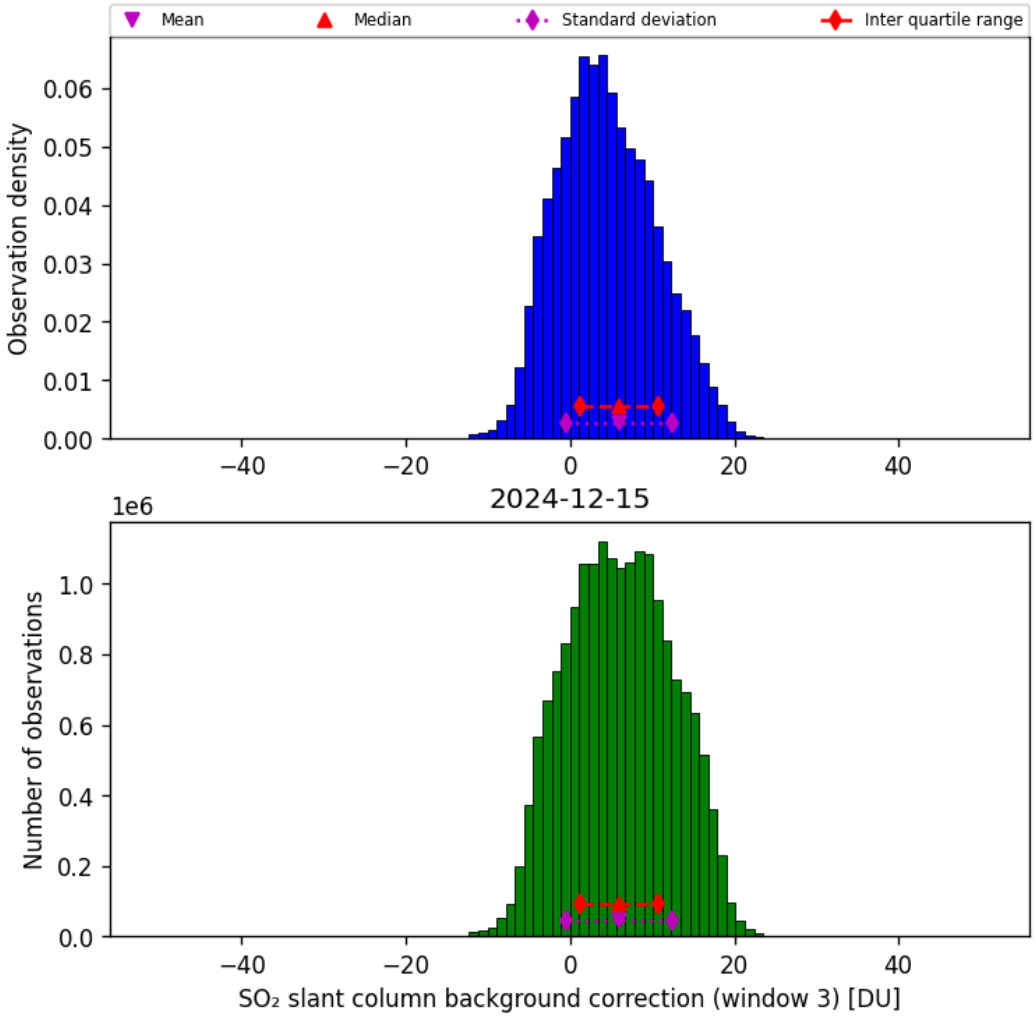

Figure 74: Histogram of "SO_2 slant column background correction (window 3)" for 2024-12-15 to 2024-12-16

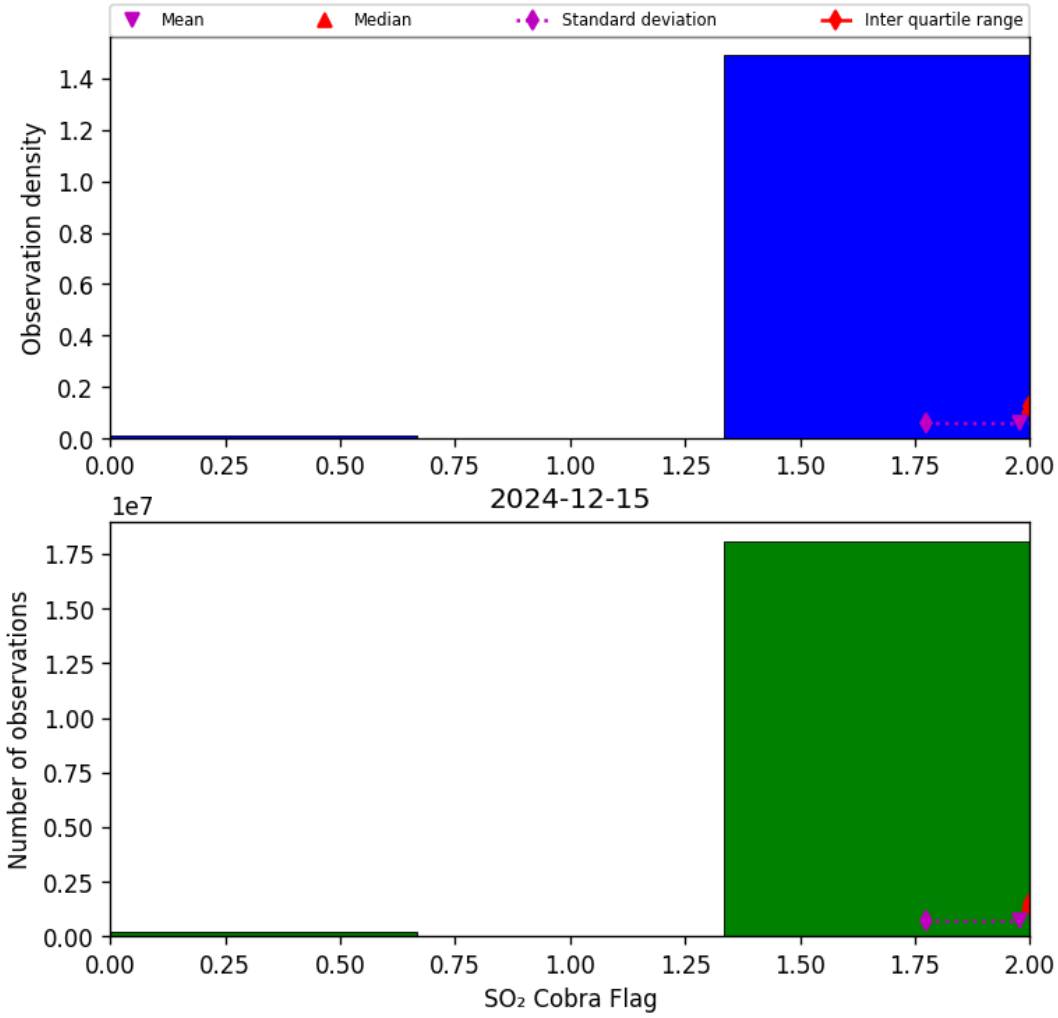

Figure 75: Histogram of "SO_2 Cobra Flag" for 2024-12-15 to 2024-12-16

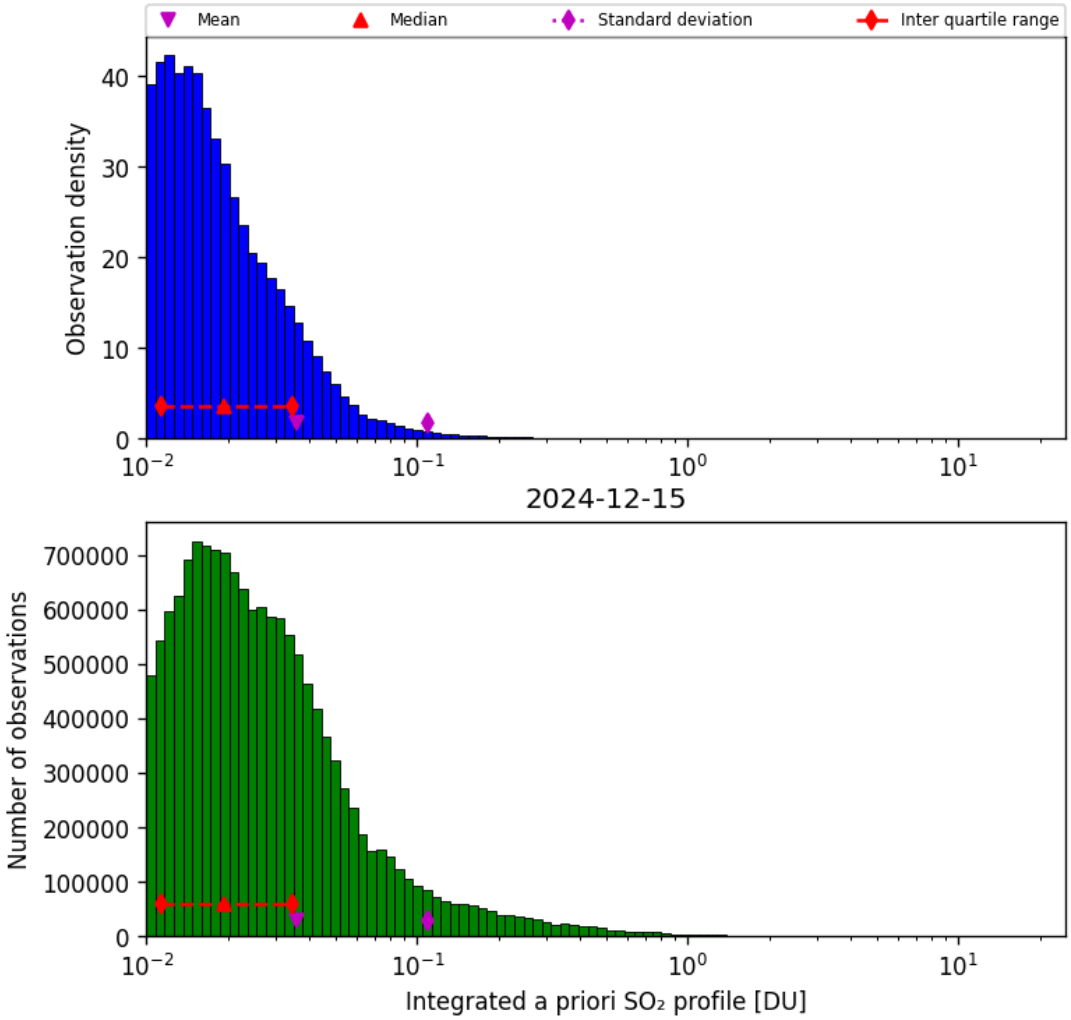

Figure 76: Histogram of "Integrated a priori SO_2 profile" for 2024-12-15 to 2024-12-16

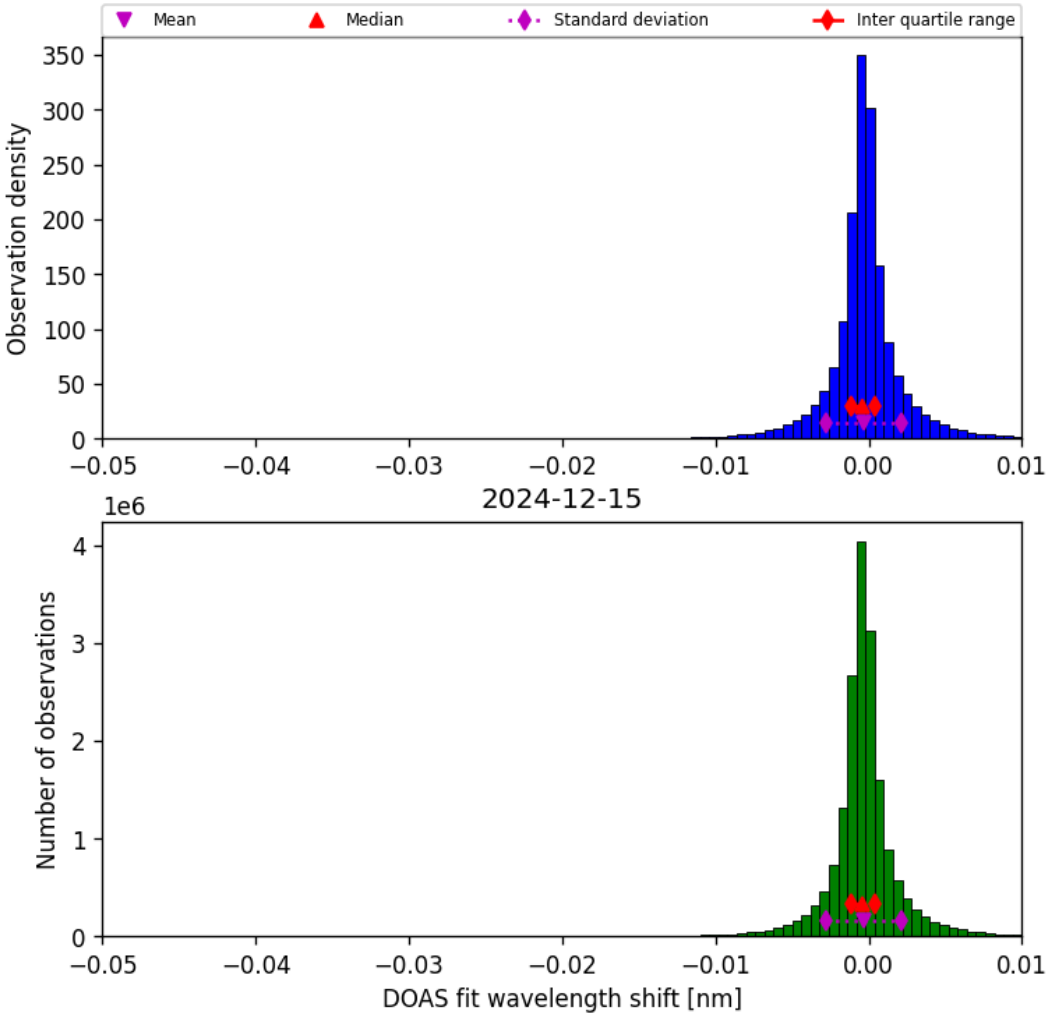

Figure 77: Histogram of “DOAS fit wavelength shift” for 2024-12-15 to 2024-12-16

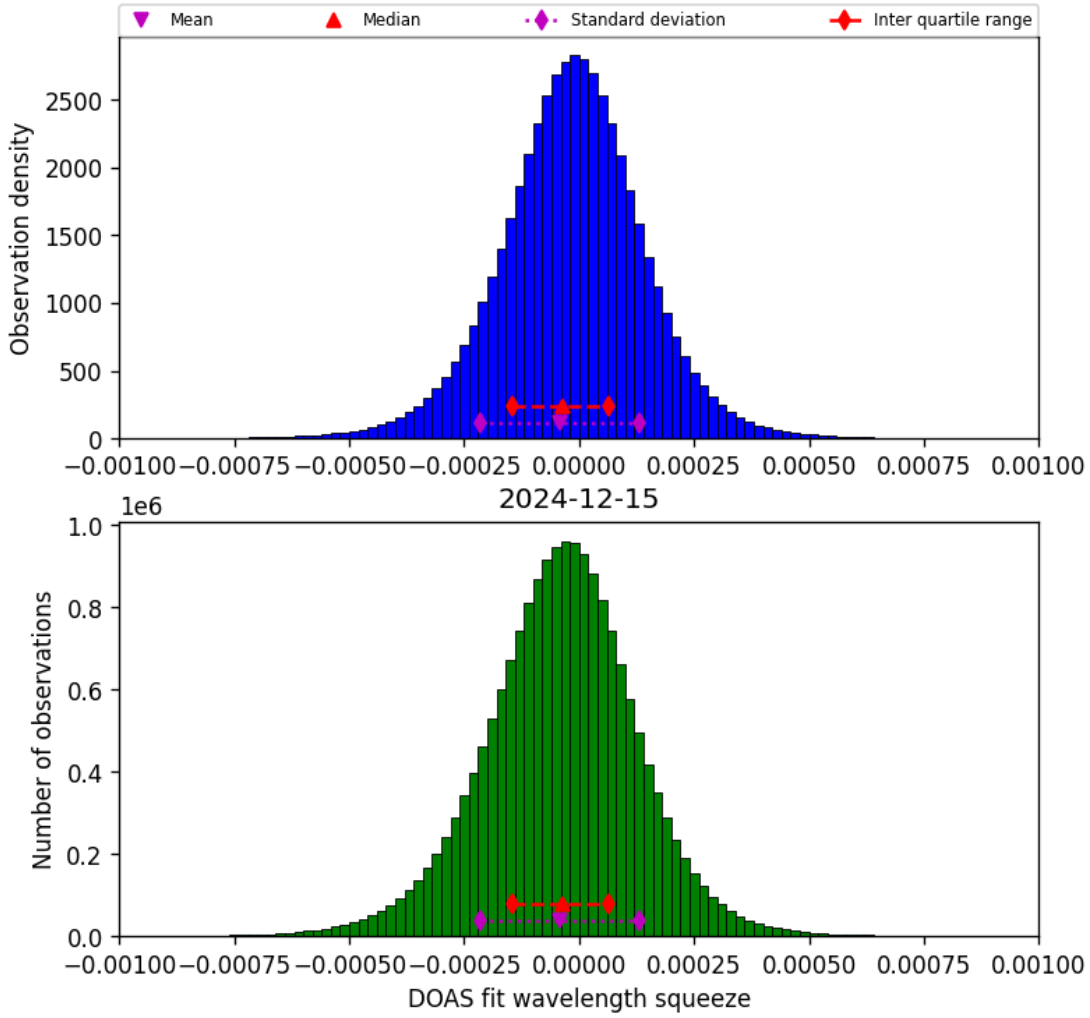

Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2024-12-15 to 2024-12-16

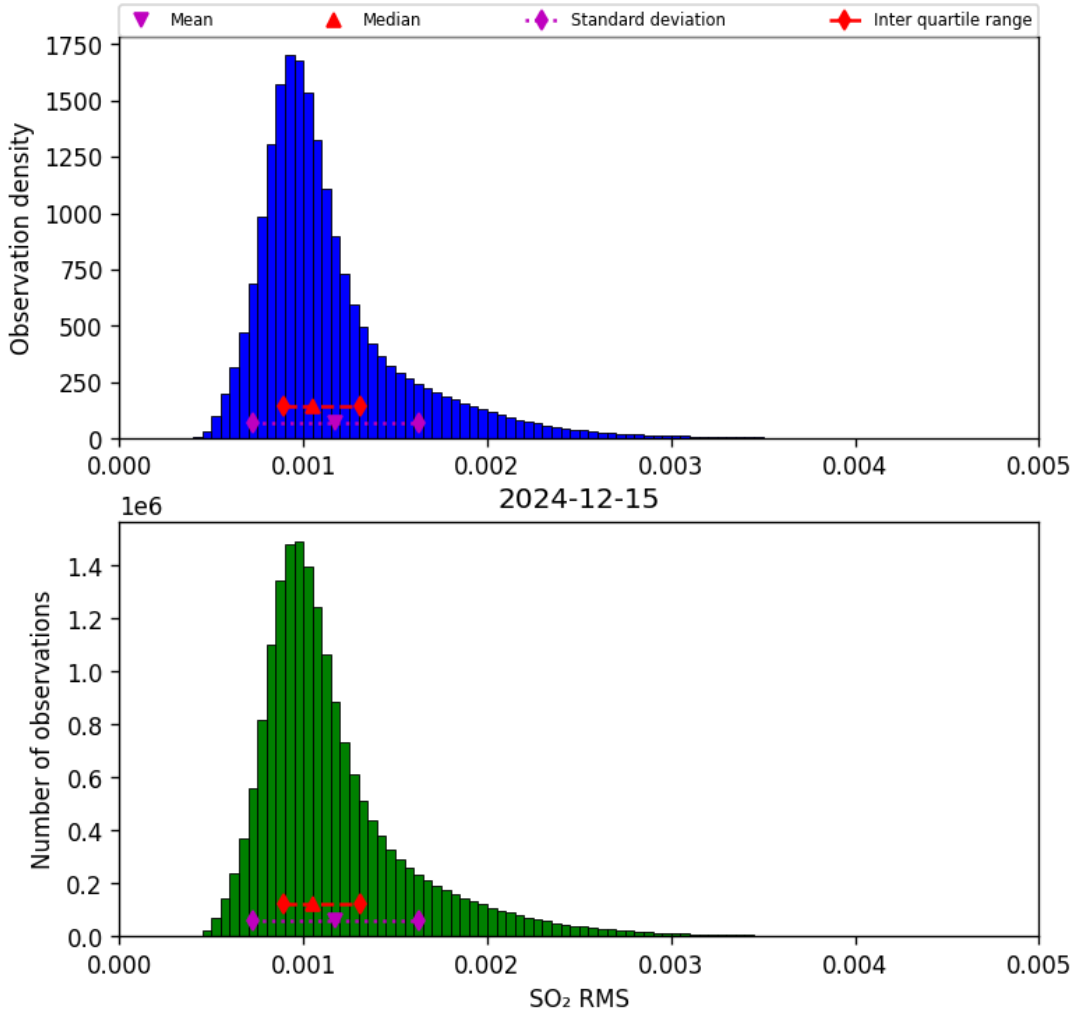

Figure 79: Histogram of "SO_2 RMS" for 2024-12-15 to 2024-12-16

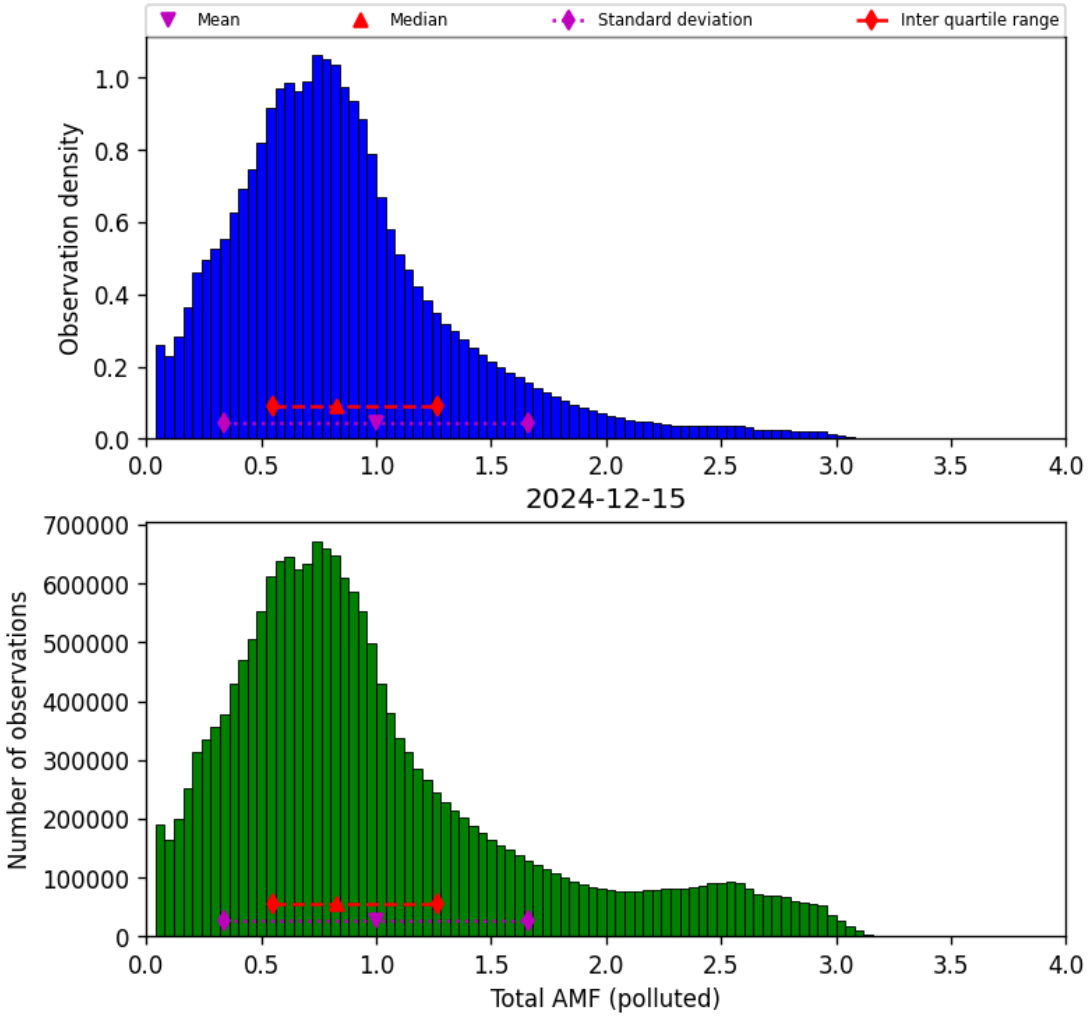

Figure 80: Histogram of “Total AMF (polluted)” for 2024-12-15 to 2024-12-16

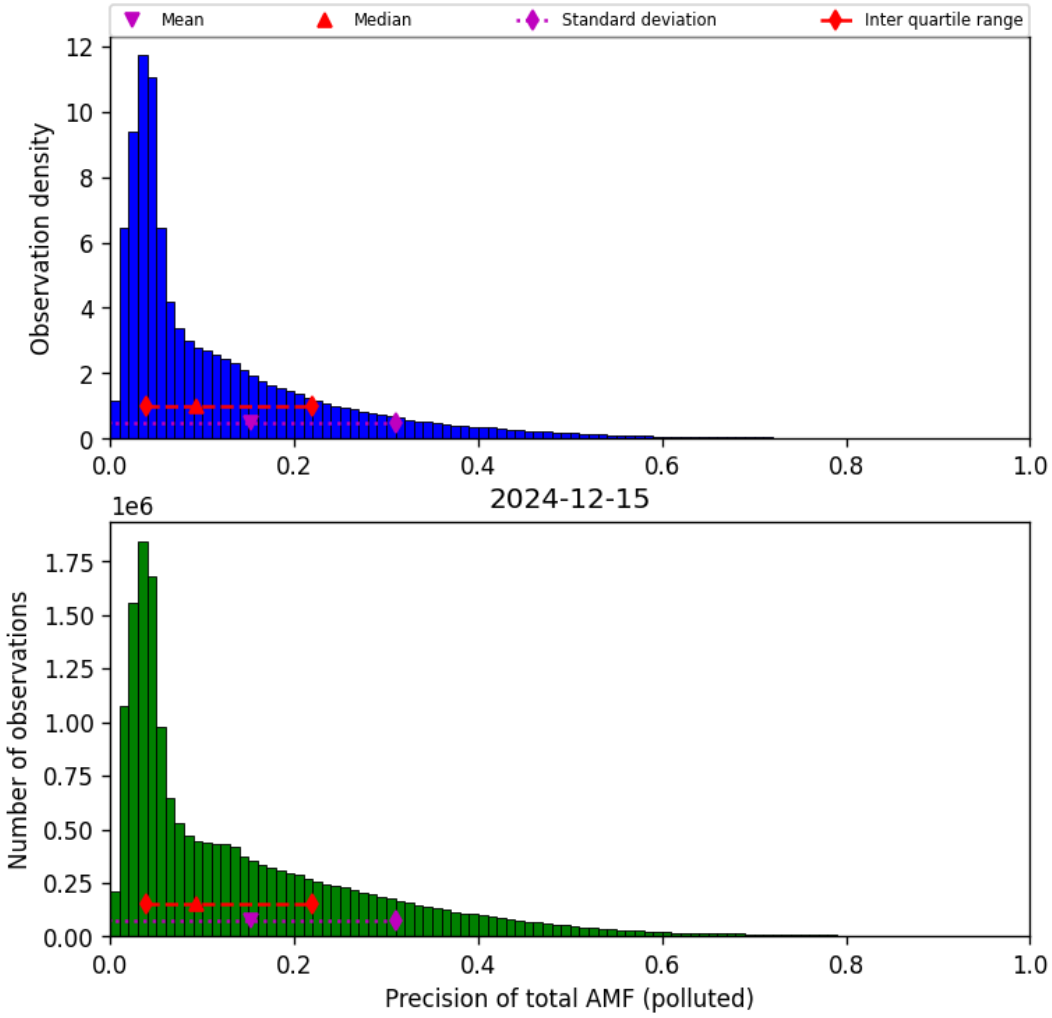

Figure 81: Histogram of “Precision of total AMF (polluted)” for 2024-12-15 to 2024-12-16

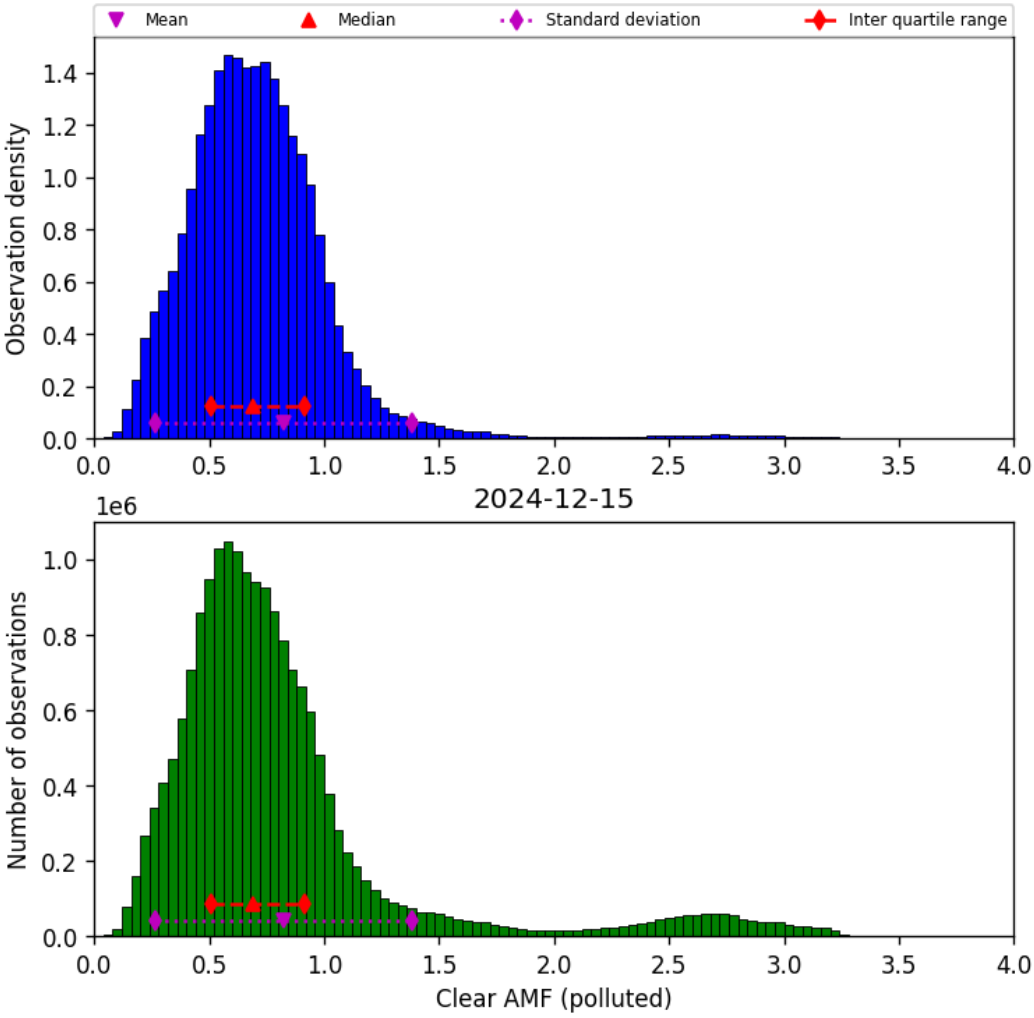

Figure 82: Histogram of “Clear AMF (polluted)” for 2024-12-15 to 2024-12-16

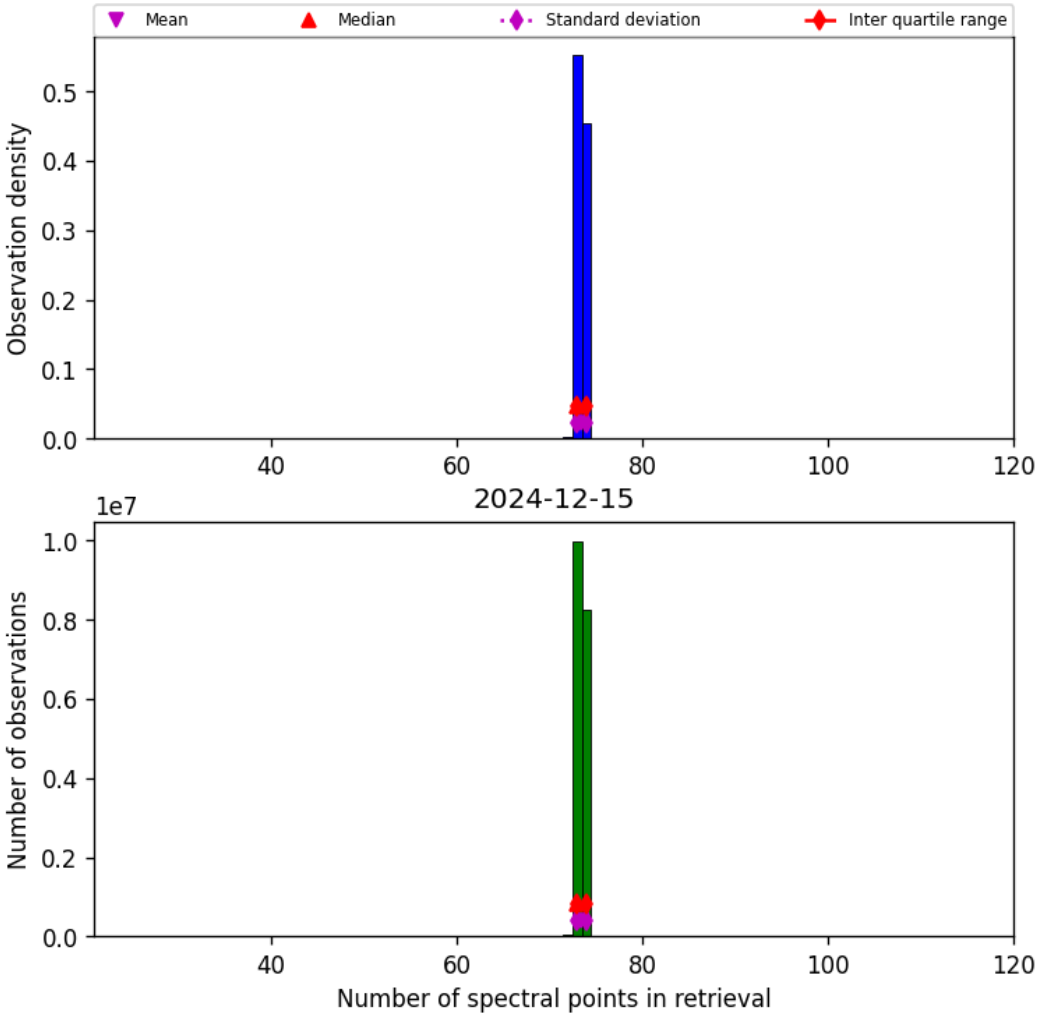

Figure 83: Histogram of “Number of spectral points in retrieval” for 2024-12-15 to 2024-12-16

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.

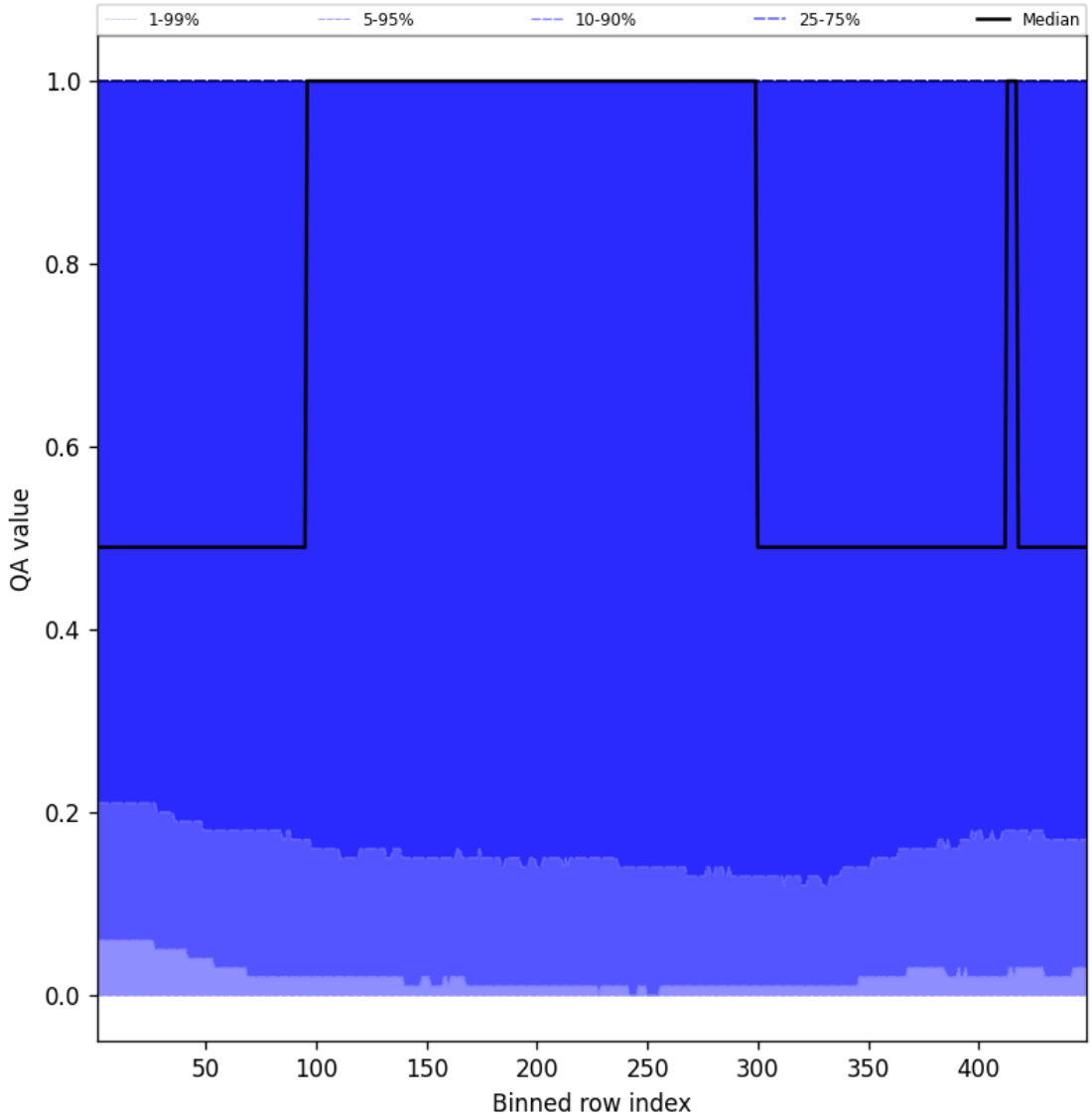

Figure 84: Along track statistics of “QA value” for 2024-12-15 to 2024-12-16

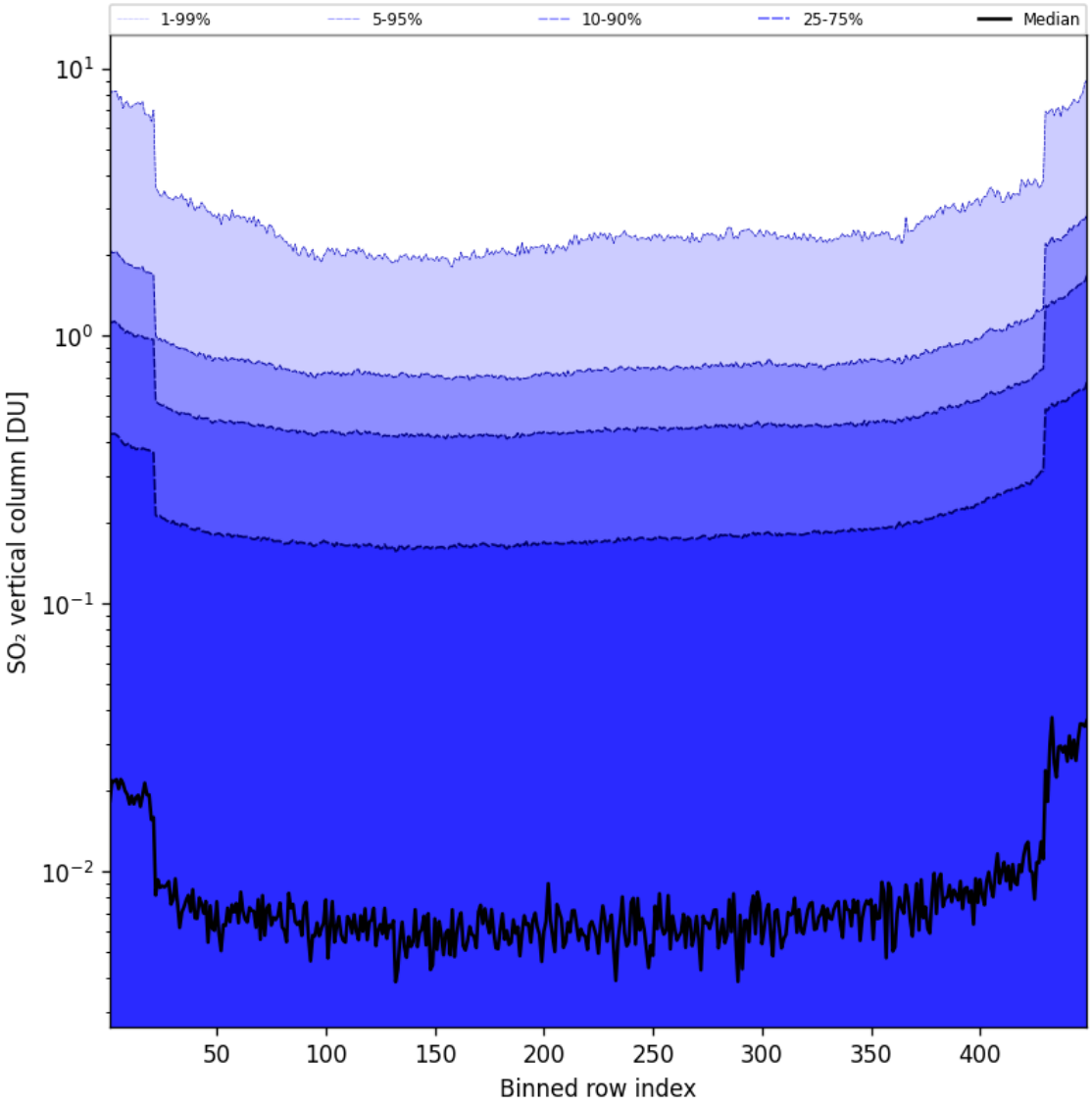

Figure 85: Along track statistics of "SO_2 vertical column" for 2024-12-15 to 2024-12-16

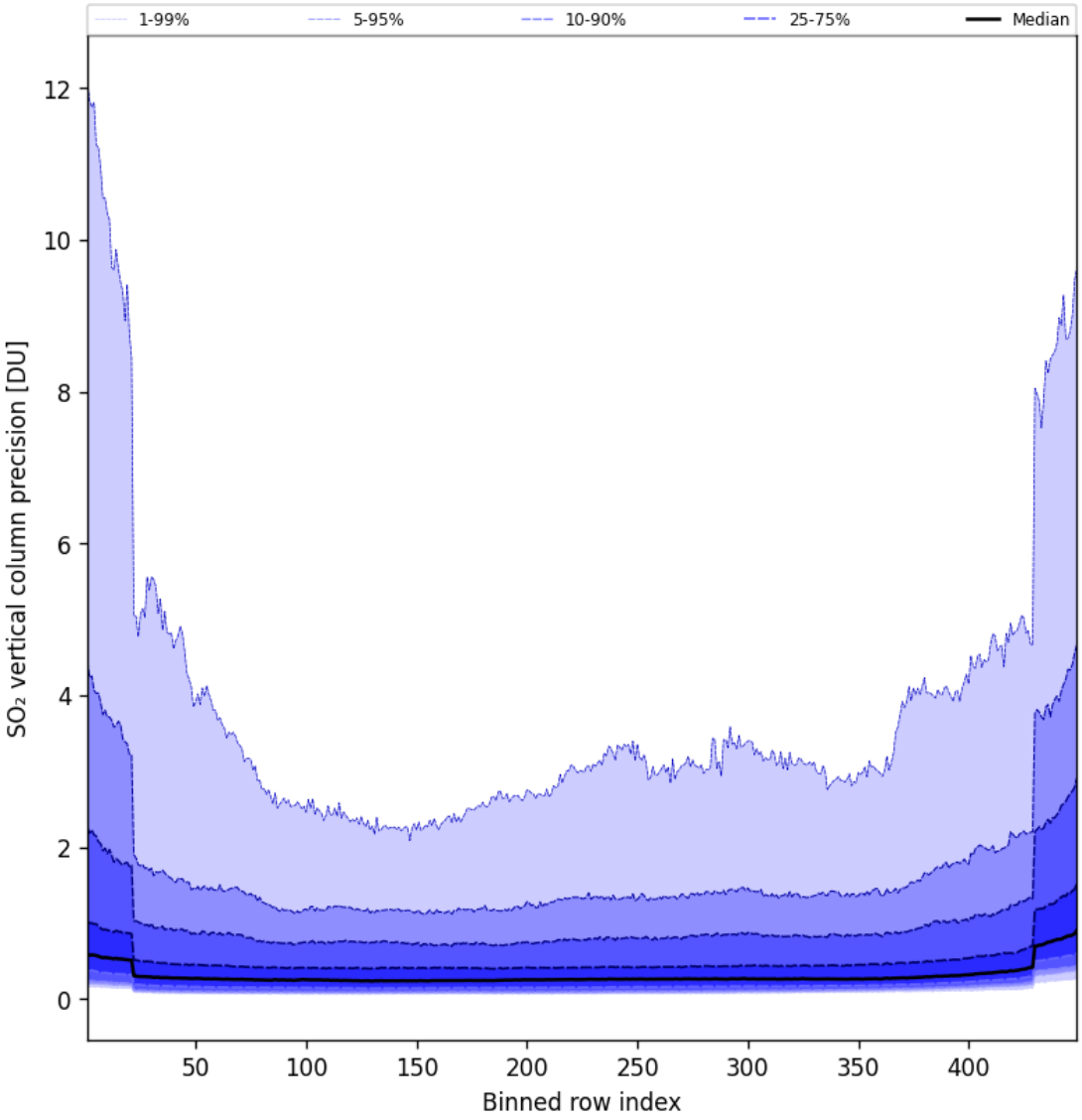

Figure 86: Along track statistics of "SO_2 vertical column precision" for 2024-12-15 to 2024-12-16

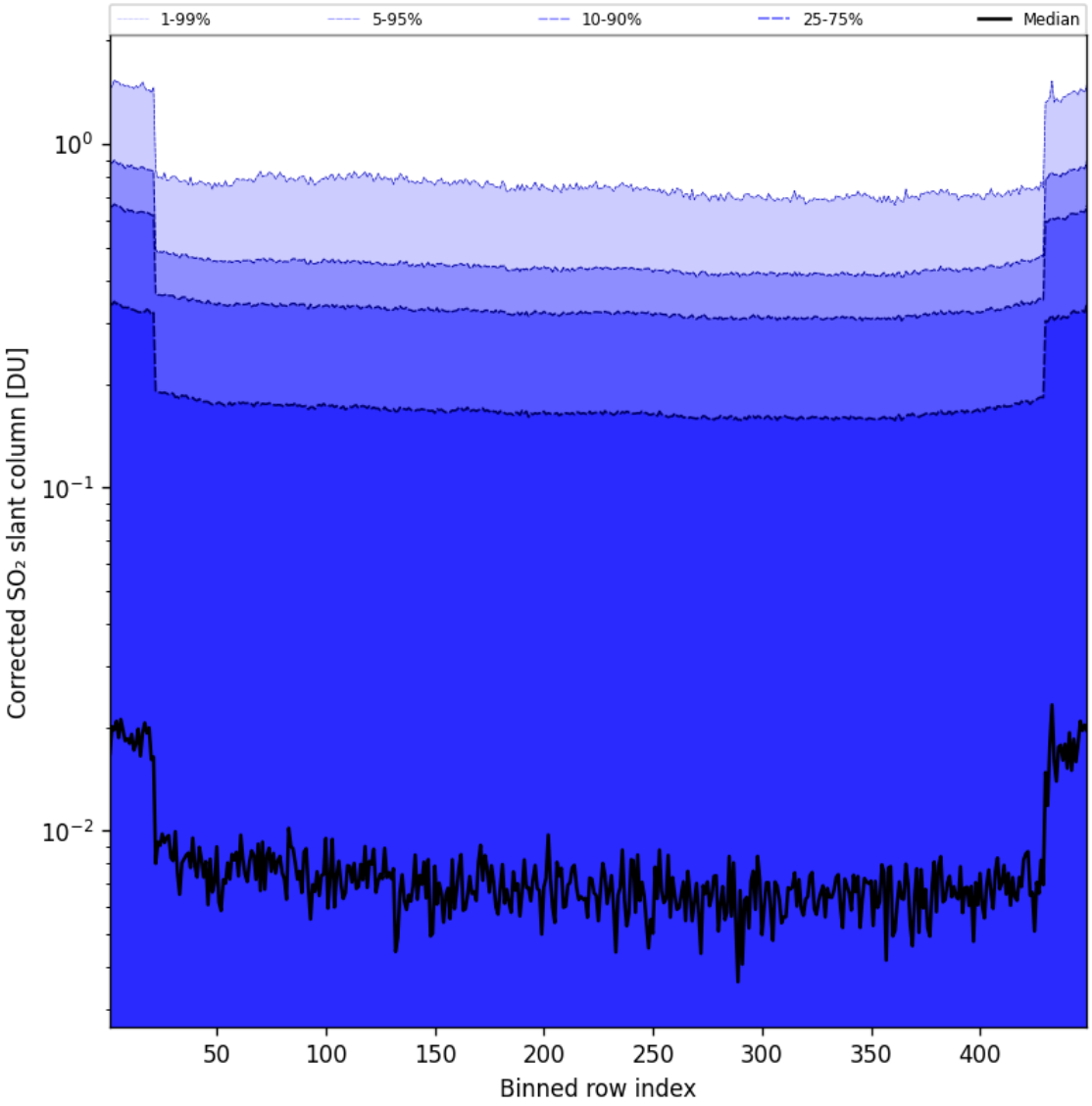

Figure 87: Along track statistics of "Corrected SO_2 slant column" for 2024-12-15 to 2024-12-16

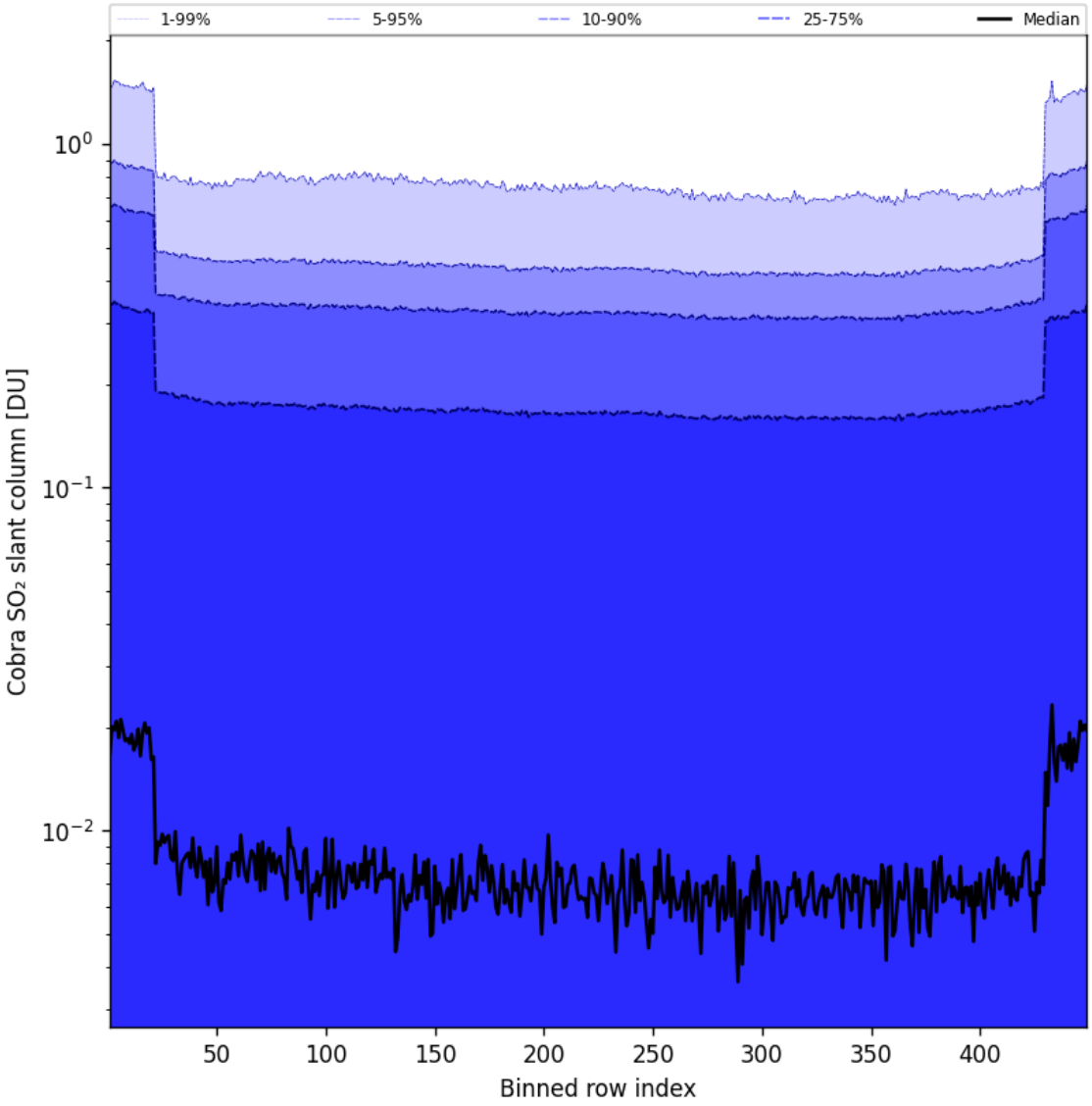

Figure 88: Along track statistics of “Cobra SO_2 slant column” for 2024-12-15 to 2024-12-16

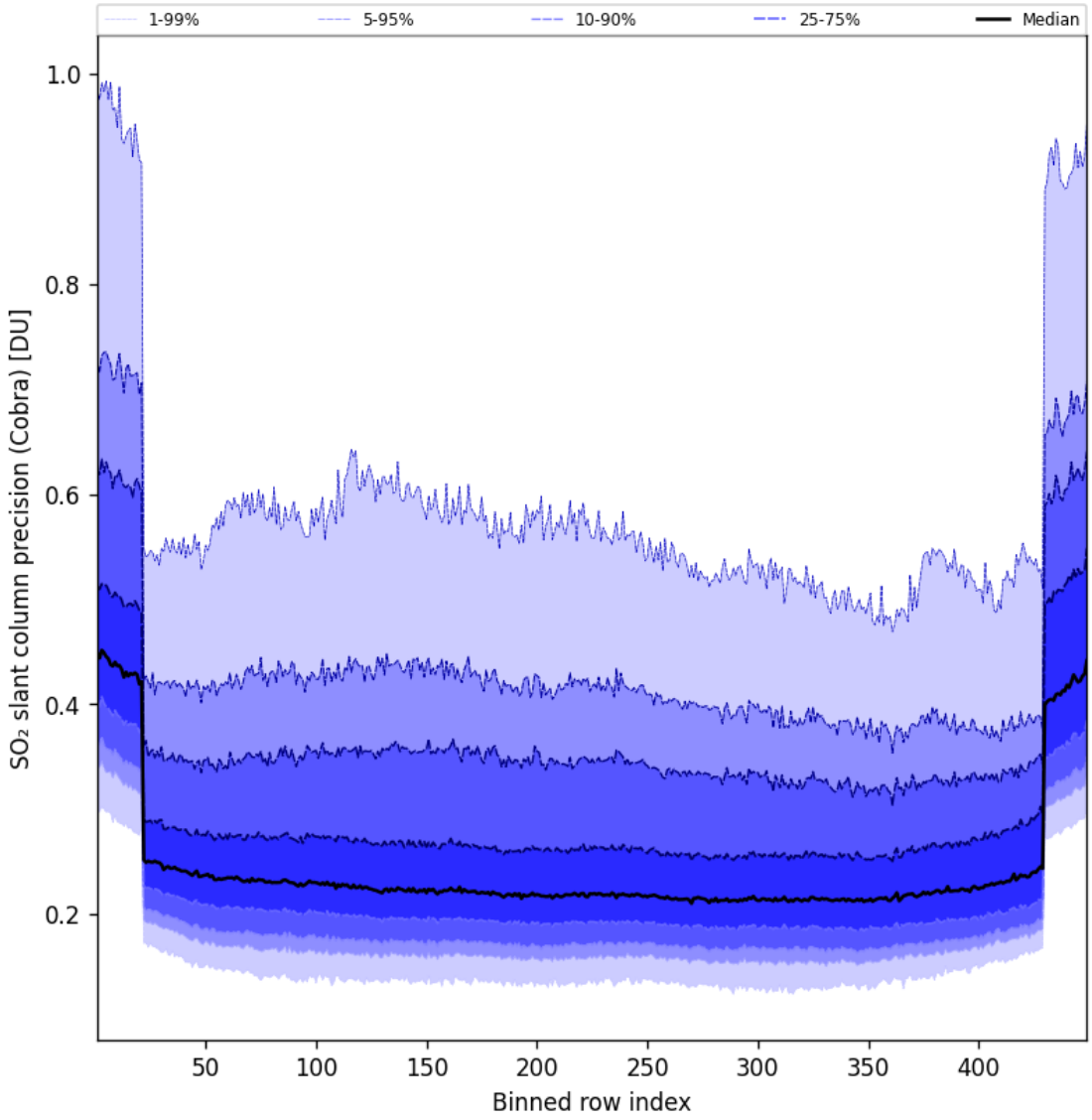

Figure 89: Along track statistics of "SO_2 slant column precision (Cobra)" for 2024-12-15 to 2024-12-16

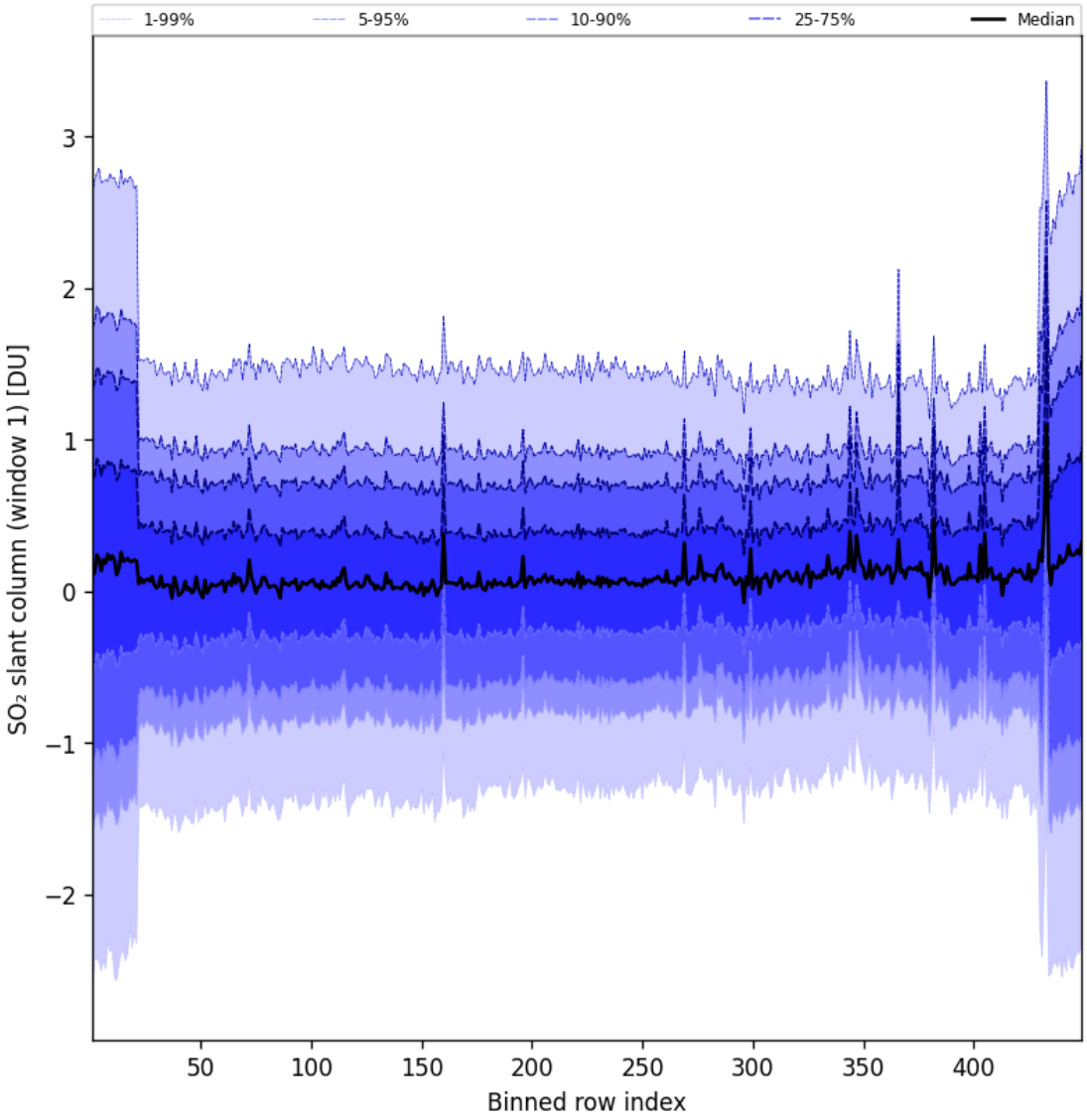

Figure 90: Along track statistics of "SO_2 slant column (window 1)" for 2024-12-15 to 2024-12-16

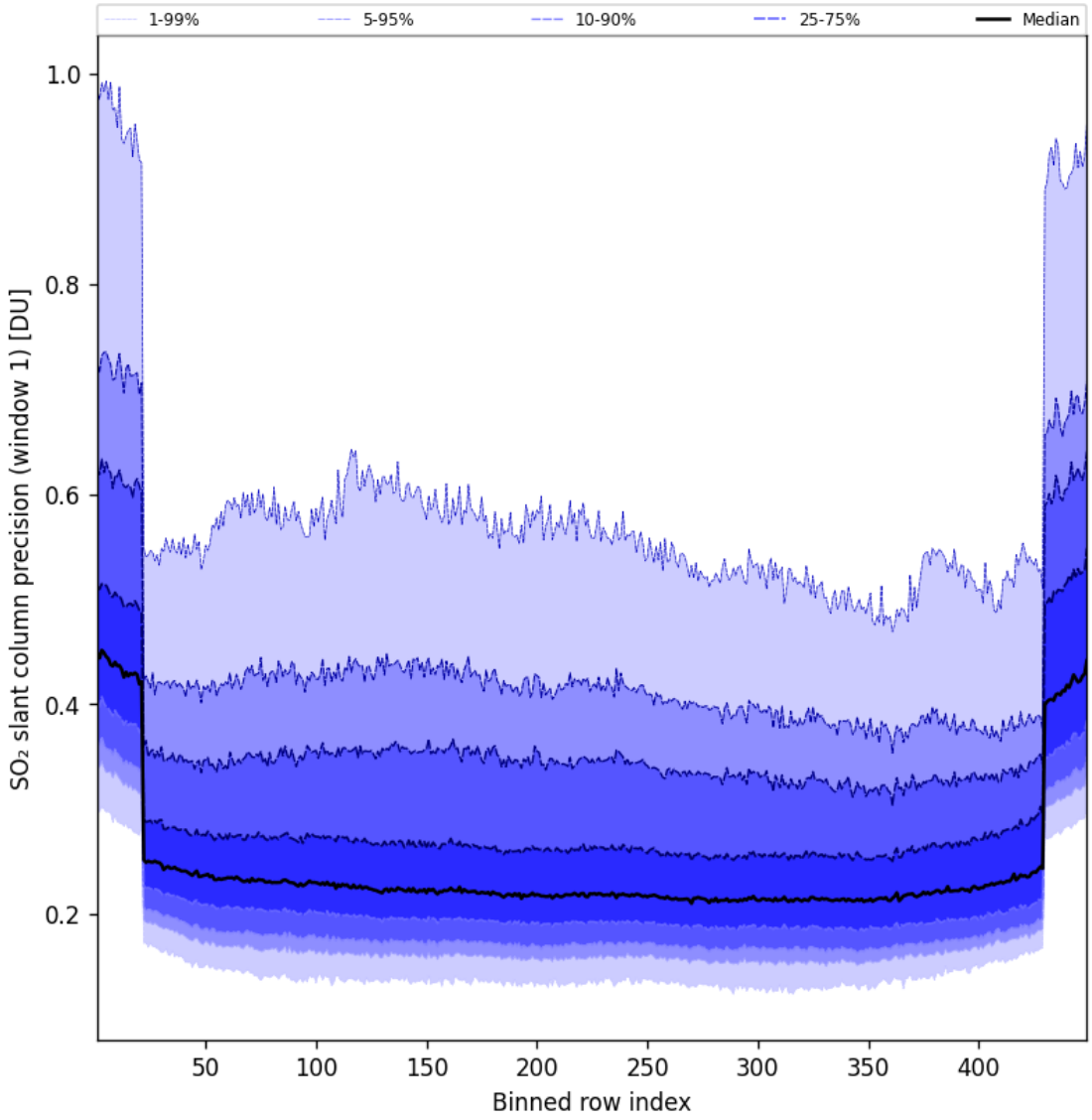

Figure 91: Along track statistics of "SO_2 slant column precision (window 1)" for 2024-12-15 to 2024-12-16

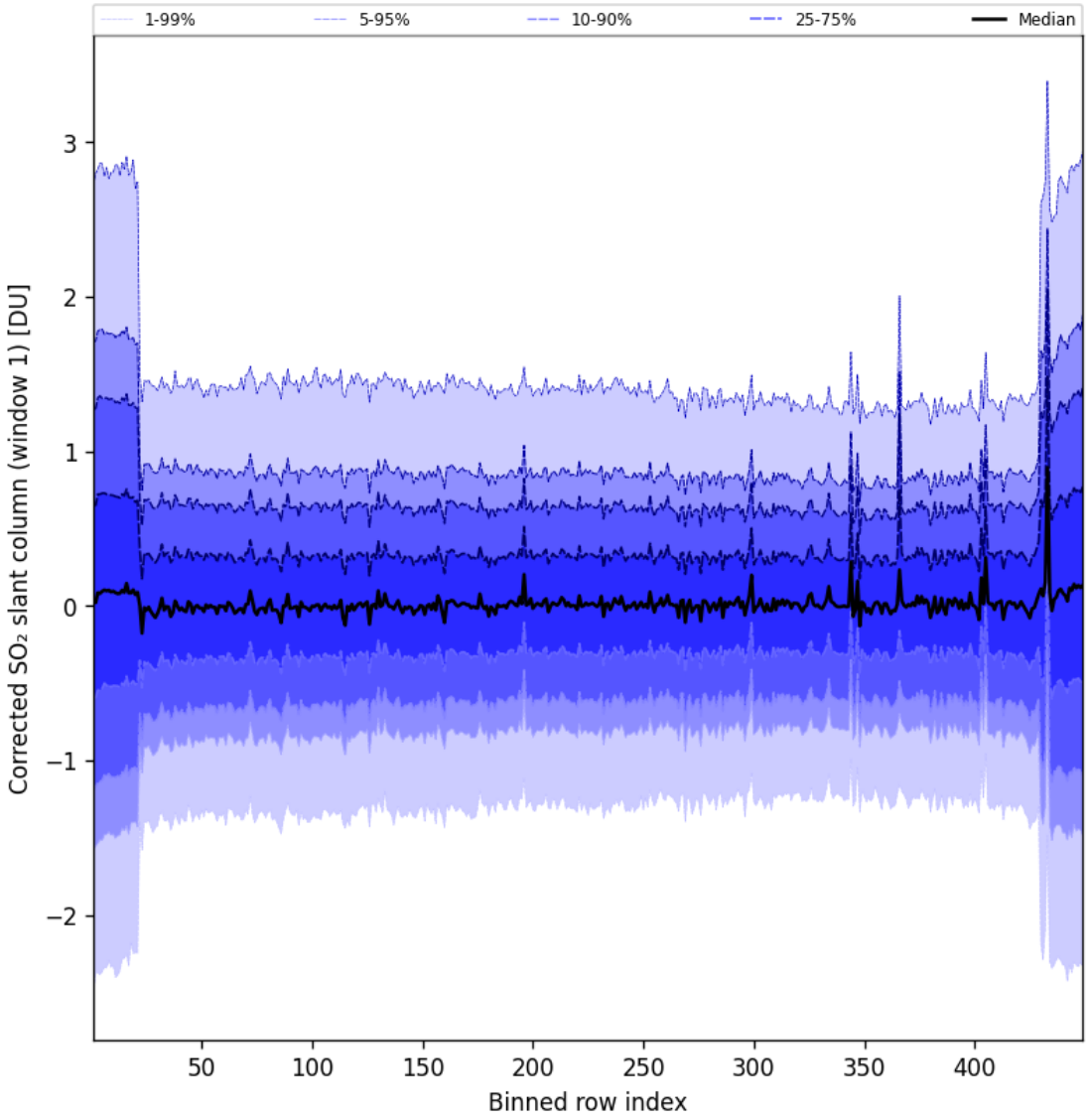

Figure 92: Along track statistics of "Corrected SO_2 slant column (window 1)" for 2024-12-15 to 2024-12-16

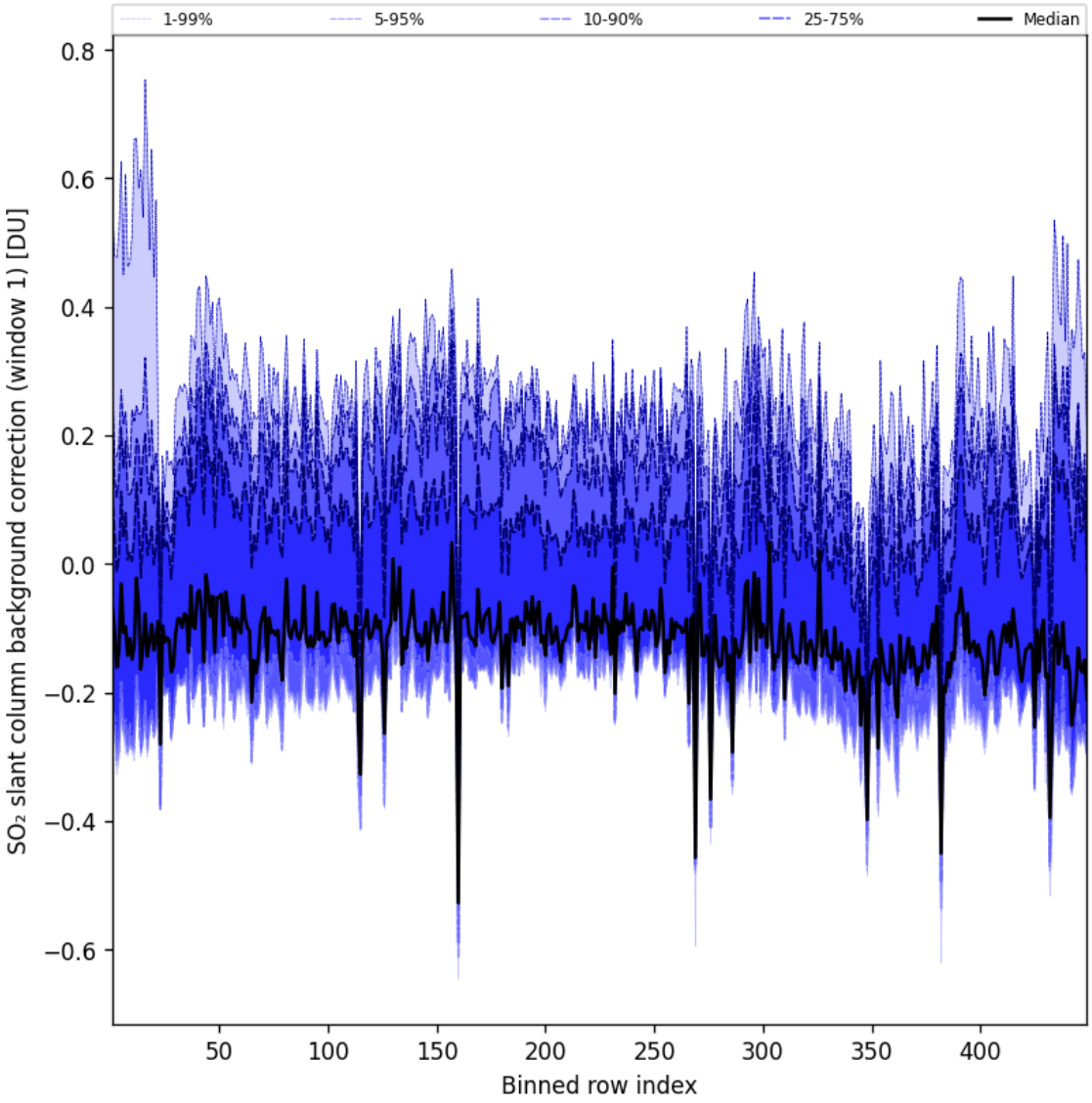

Figure 93: Along track statistics of "SO_2 slant column background correction (window 1)" for 2024-12-15 to 2024-12-16

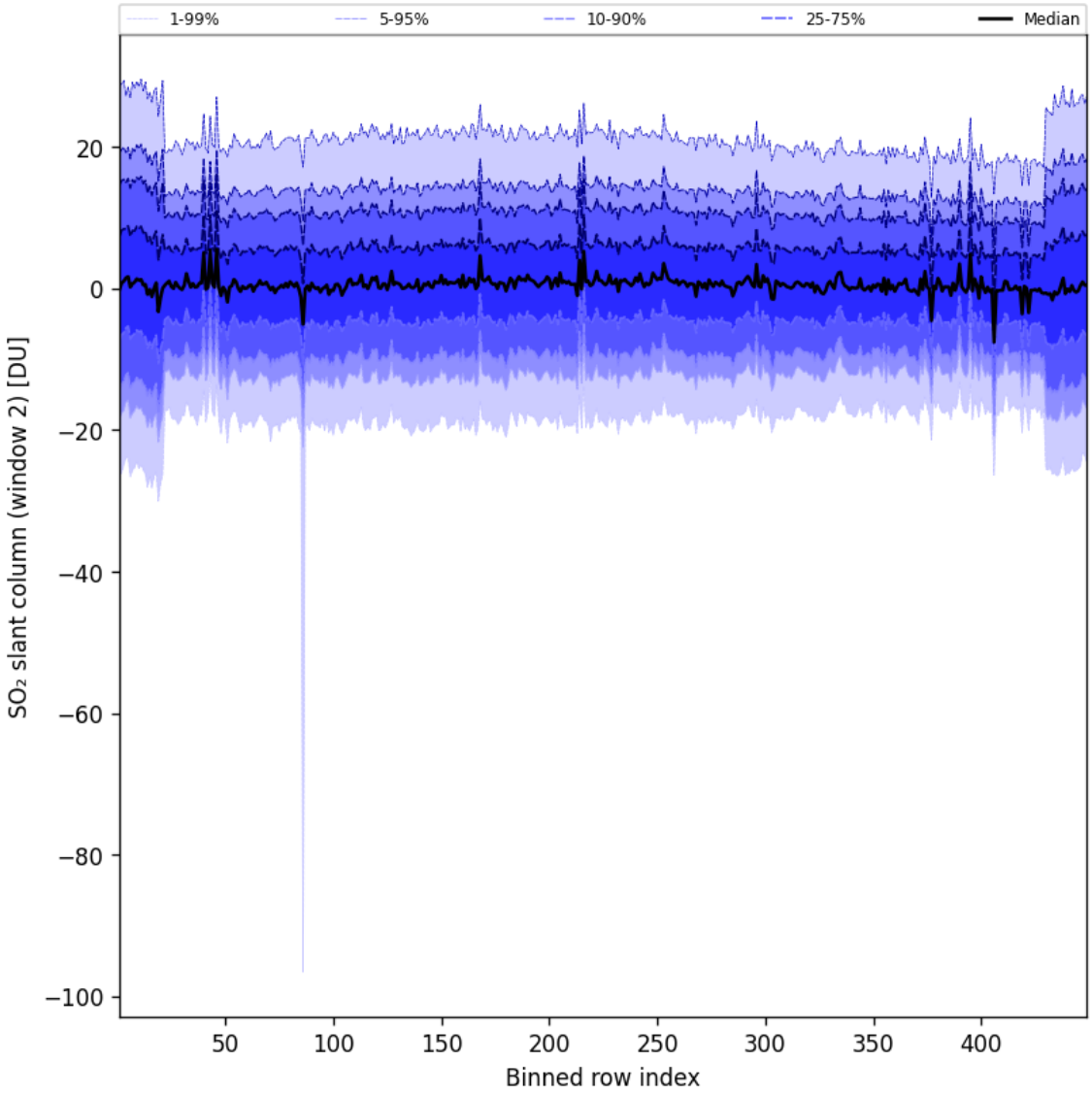

Figure 94: Along track statistics of "SO_2 slant column (window 2)" for 2024-12-15 to 2024-12-16

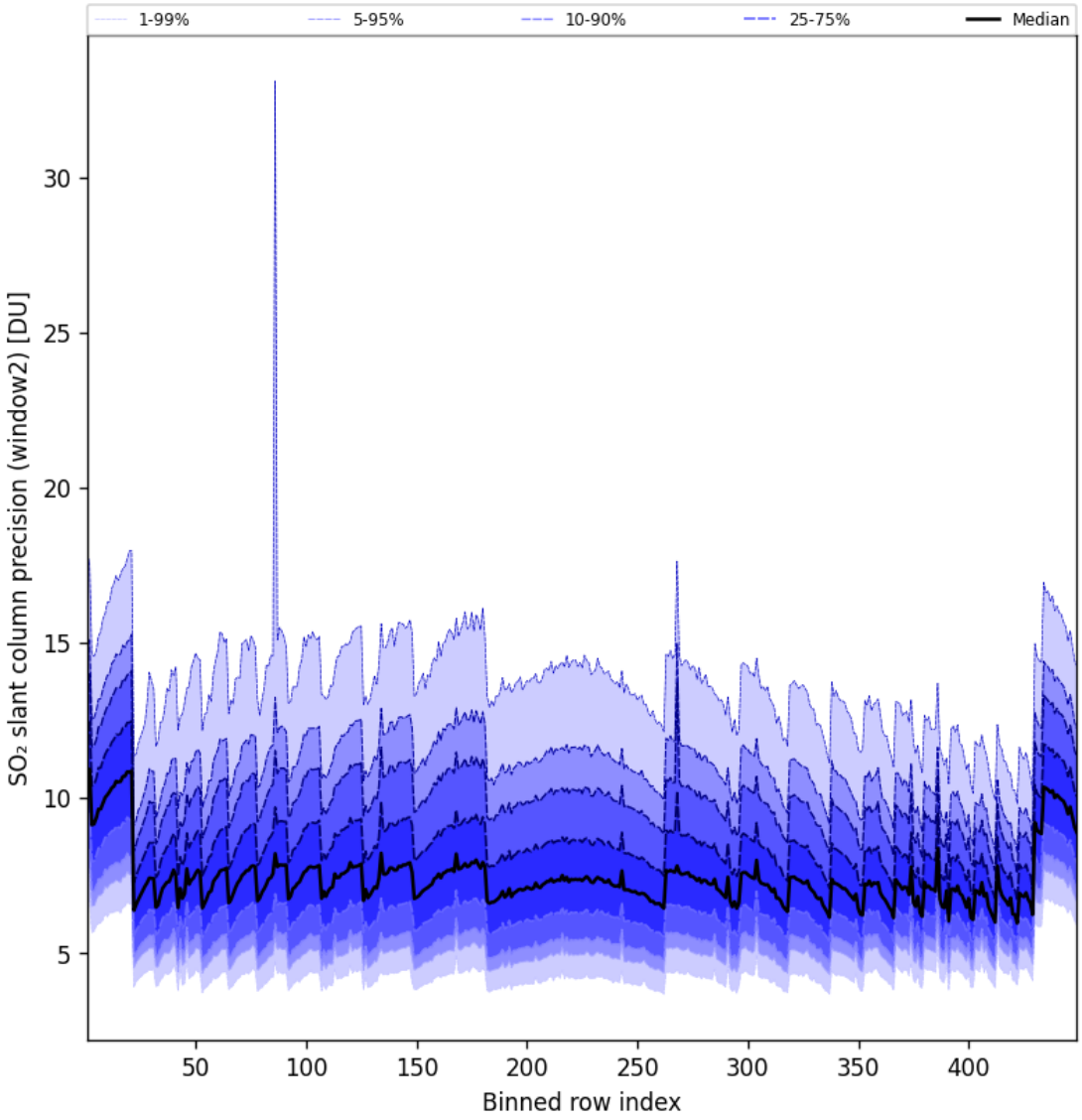

Figure 95: Along track statistics of "SO_2 slant column precision (window2)" for 2024-12-15 to 2024-12-16

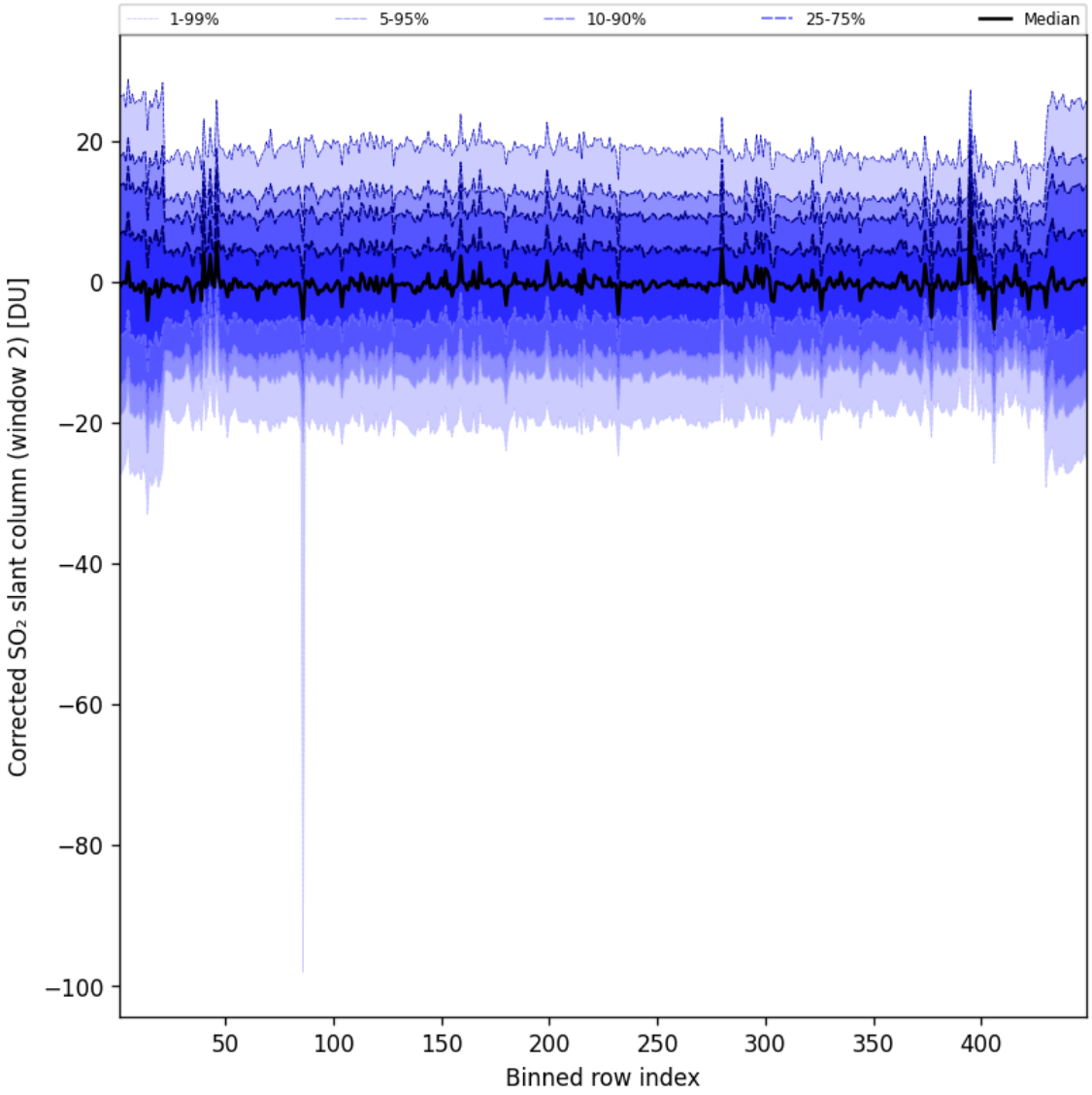

Figure 96: Along track statistics of "Corrected SO_2 slant column (window 2)" for 2024-12-15 to 2024-12-16

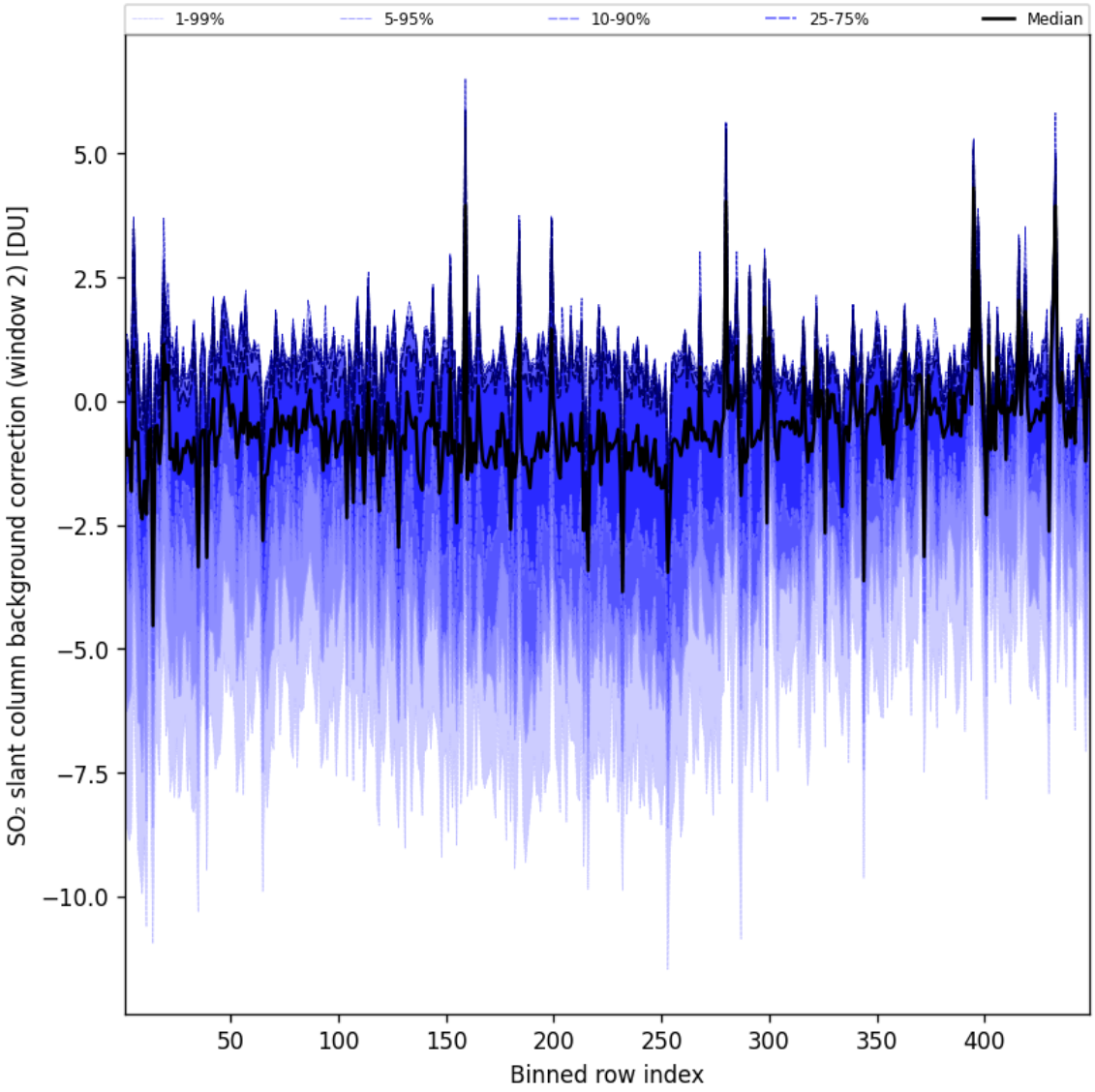

Figure 97: Along track statistics of "SO_2 slant column background correction (window 2)" for 2024-12-15 to 2024-12-16

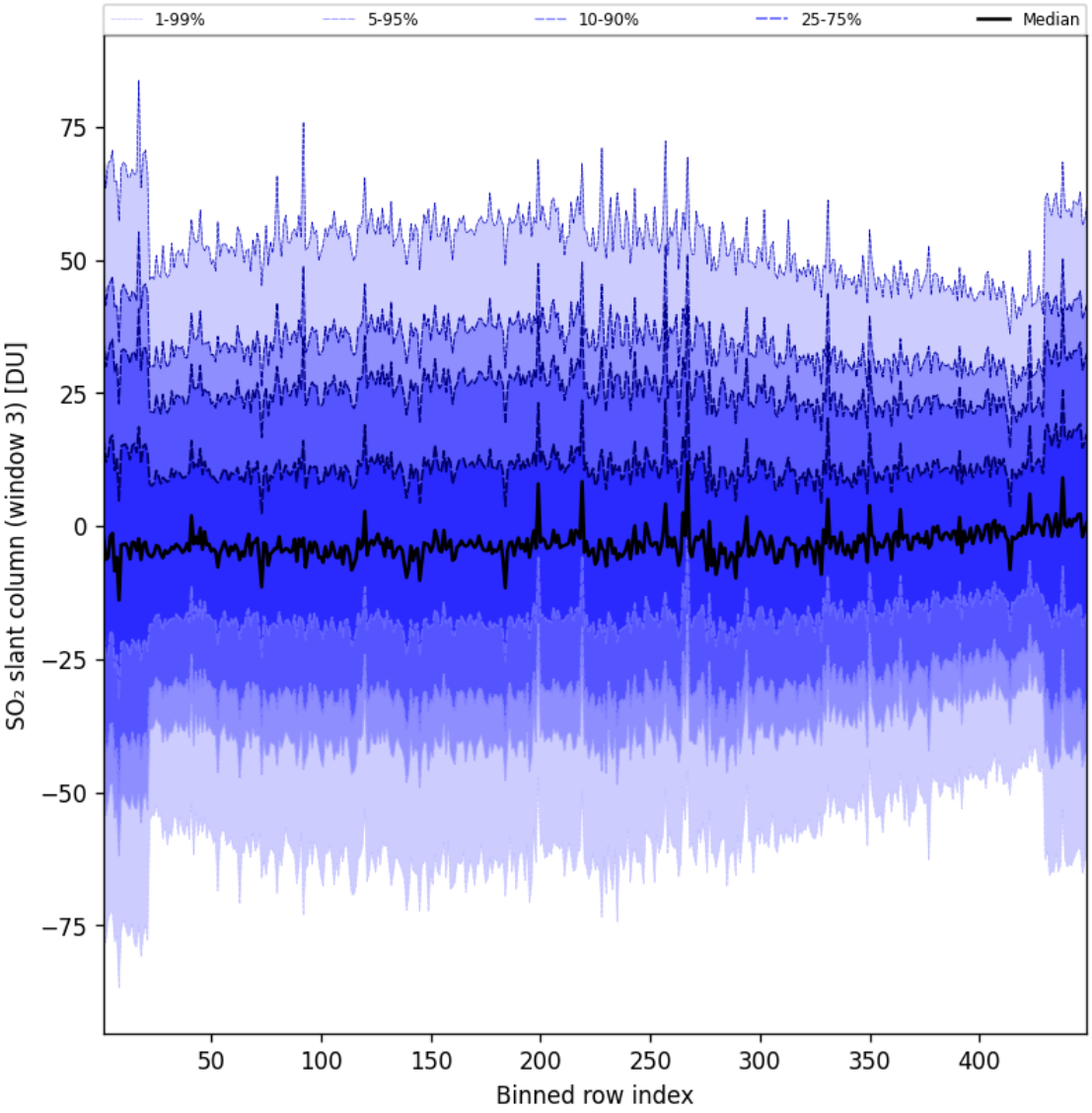

Figure 98: Along track statistics of "SO_2 slant column (window 3)" for 2024-12-15 to 2024-12-16

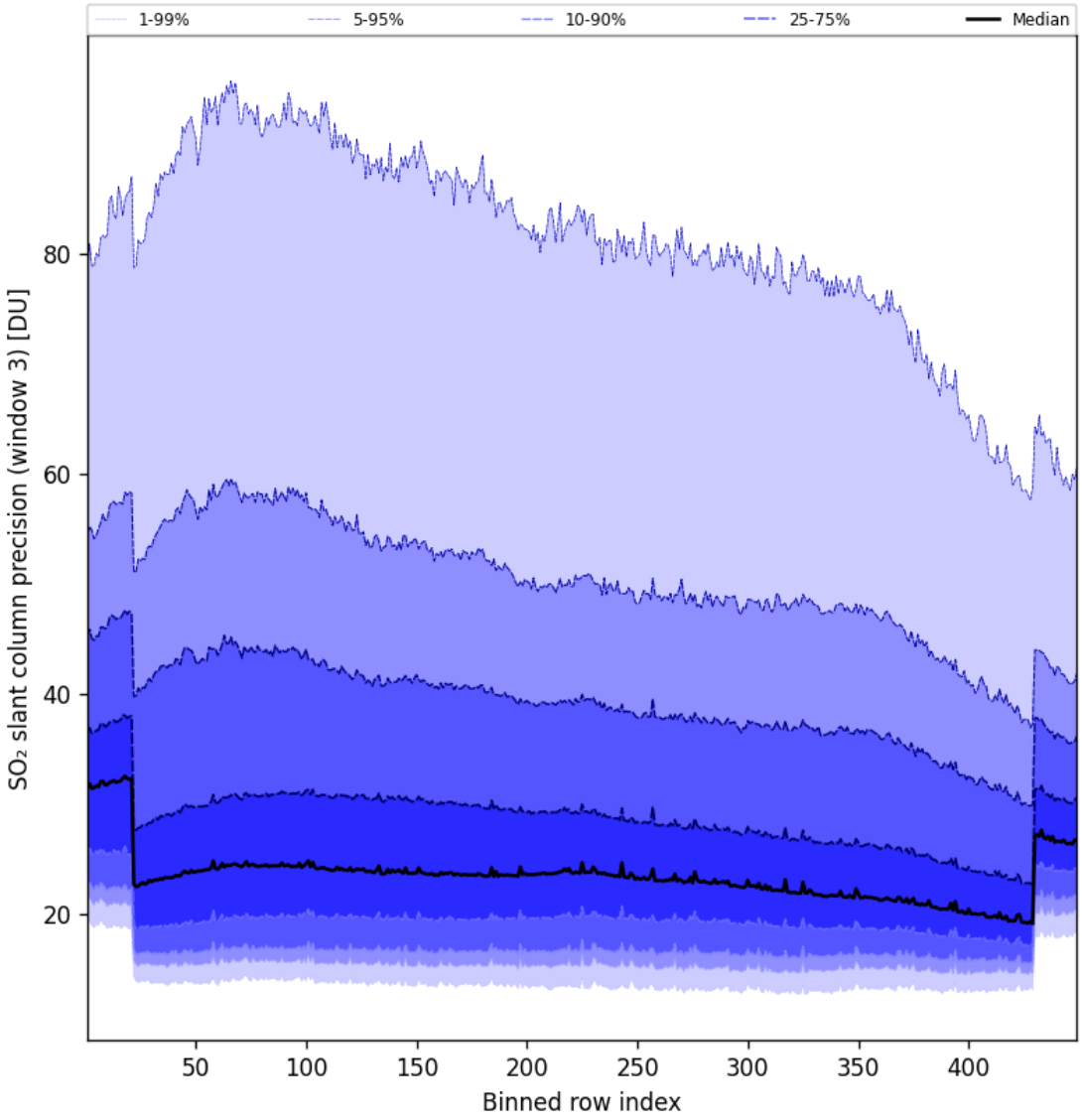

Figure 99: Along track statistics of "SO_2 slant column precision (window 3)" for 2024-12-15 to 2024-12-16

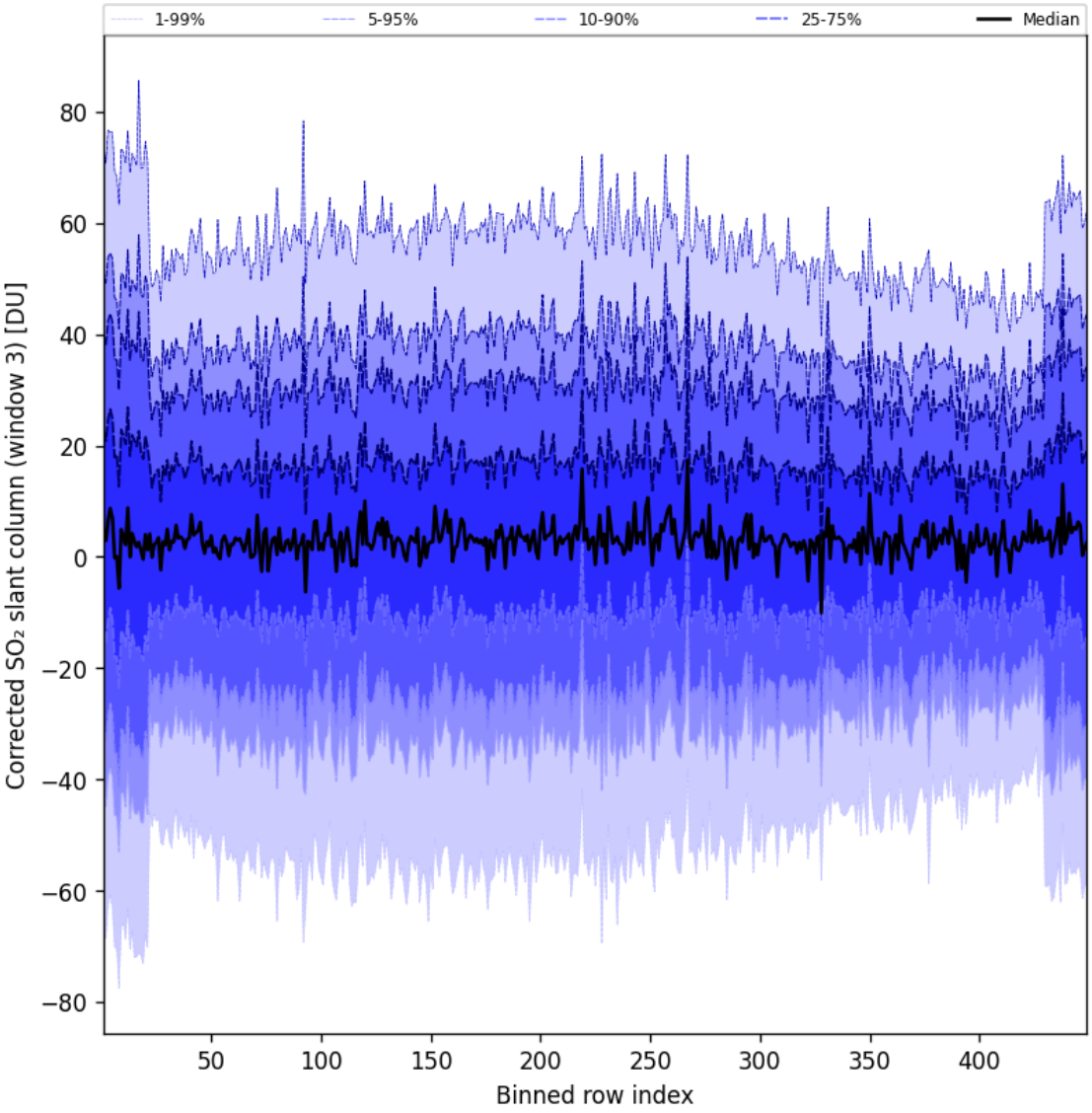

Figure 100: Along track statistics of “Corrected SO_2 slant column (window 3)” for 2024-12-15 to 2024-12-16

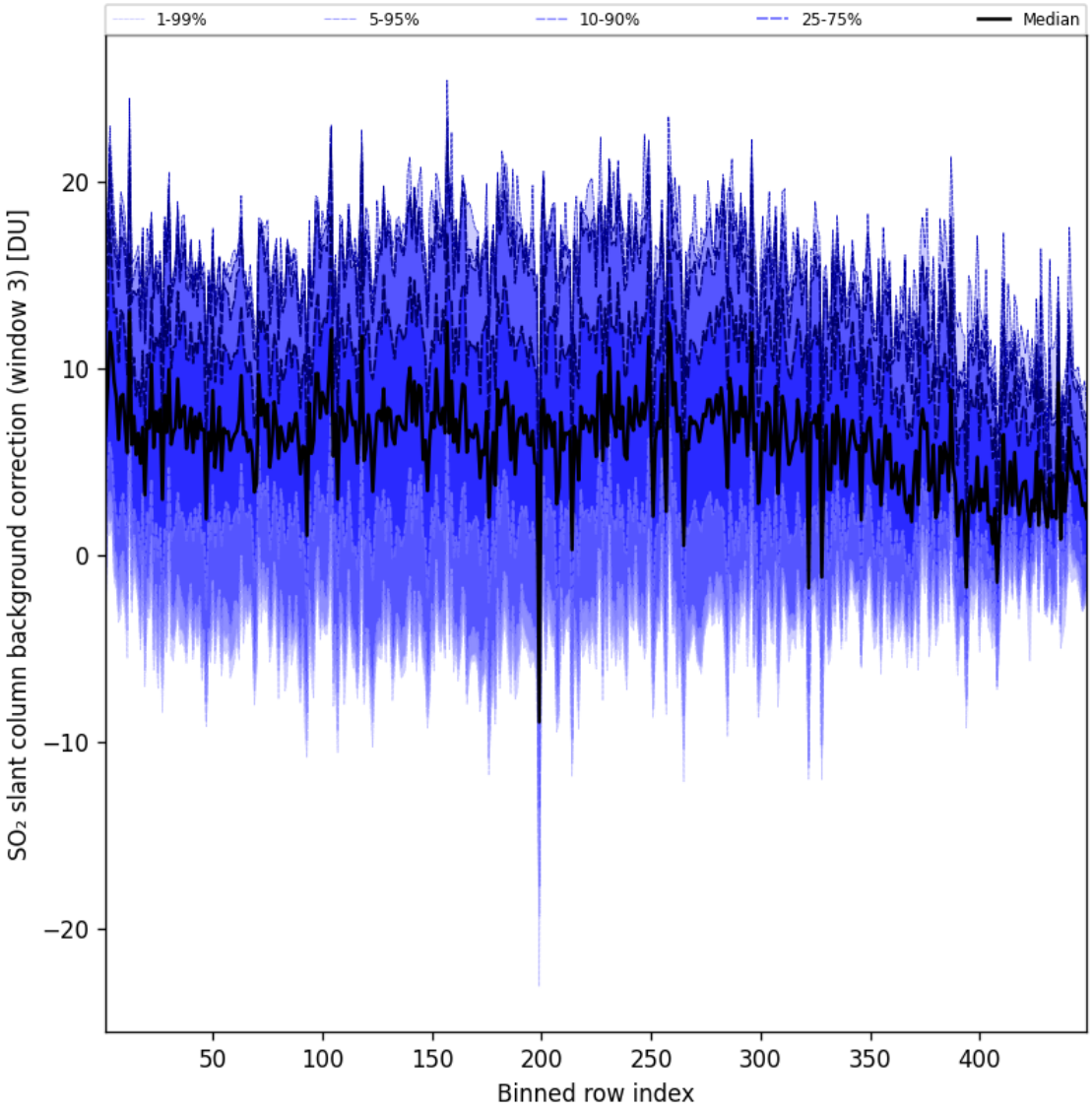

Figure 101: Along track statistics of "SO_2 slant column background correction (window 3)" for 2024-12-15 to 2024-12-16

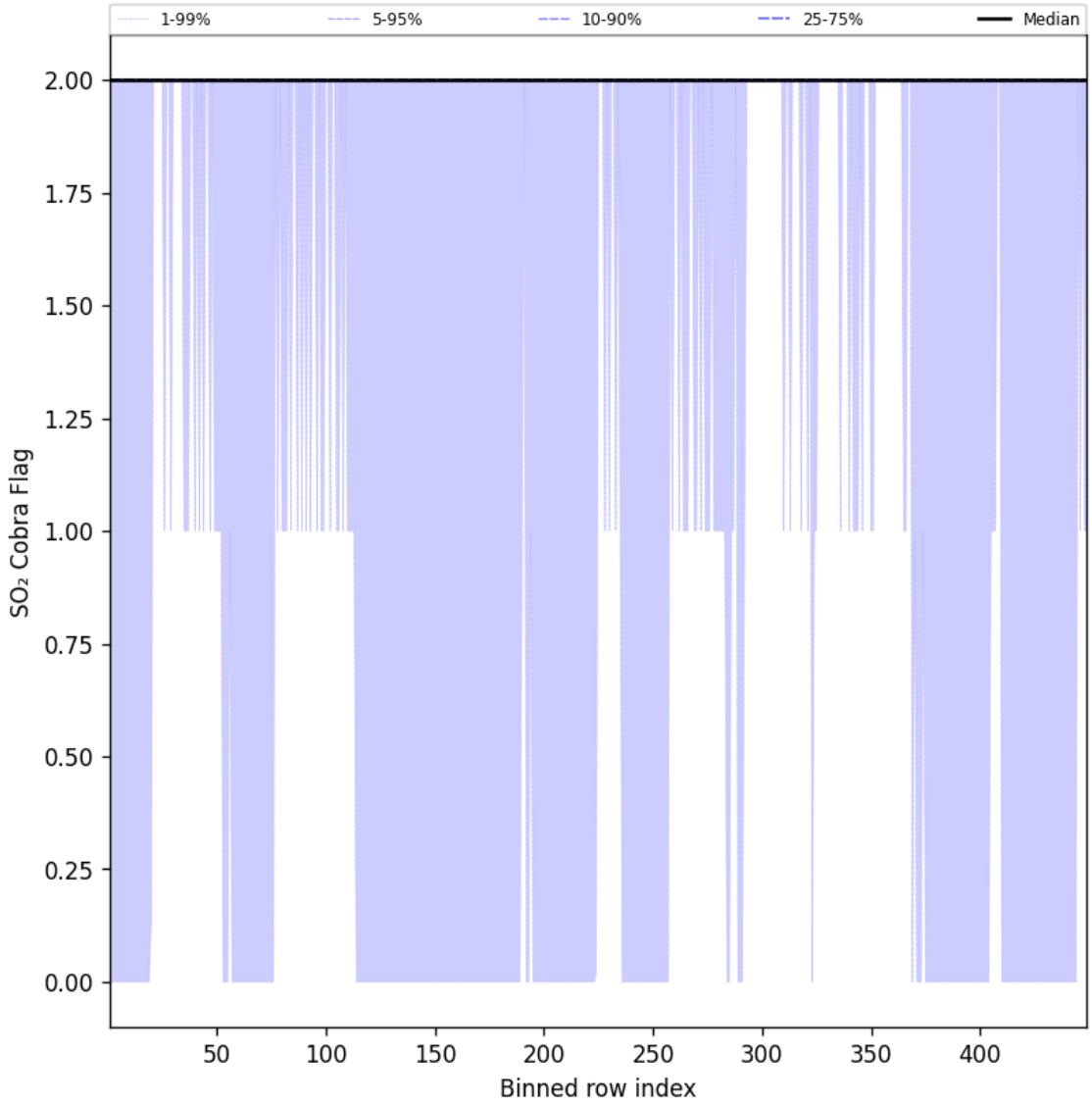

Figure 102: Along track statistics of "SO_2 Cobra Flag" for 2024-12-15 to 2024-12-16

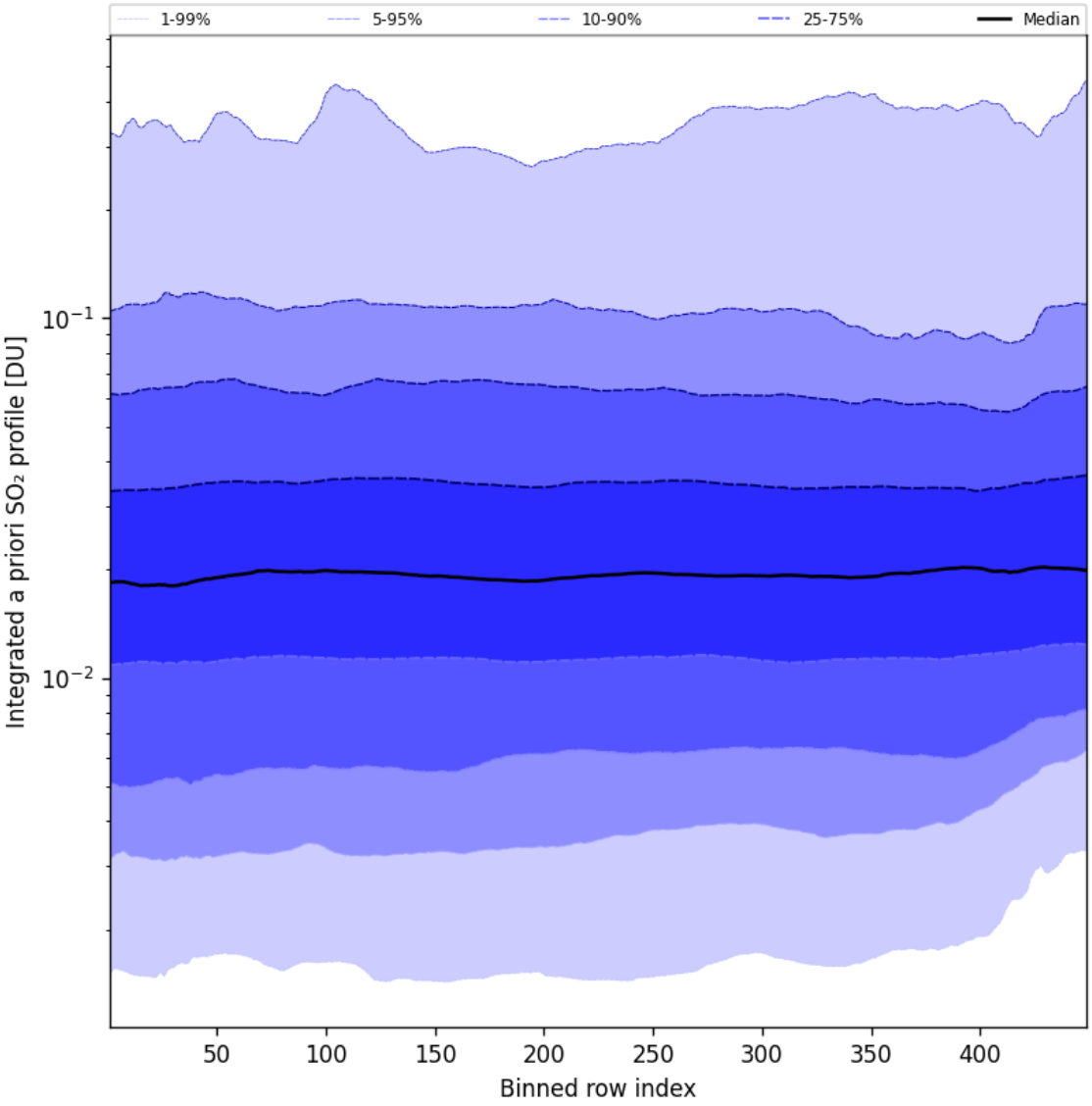

Figure 103: Along track statistics of “Integrated a priori SO_2 profile” for 2024-12-15 to 2024-12-16

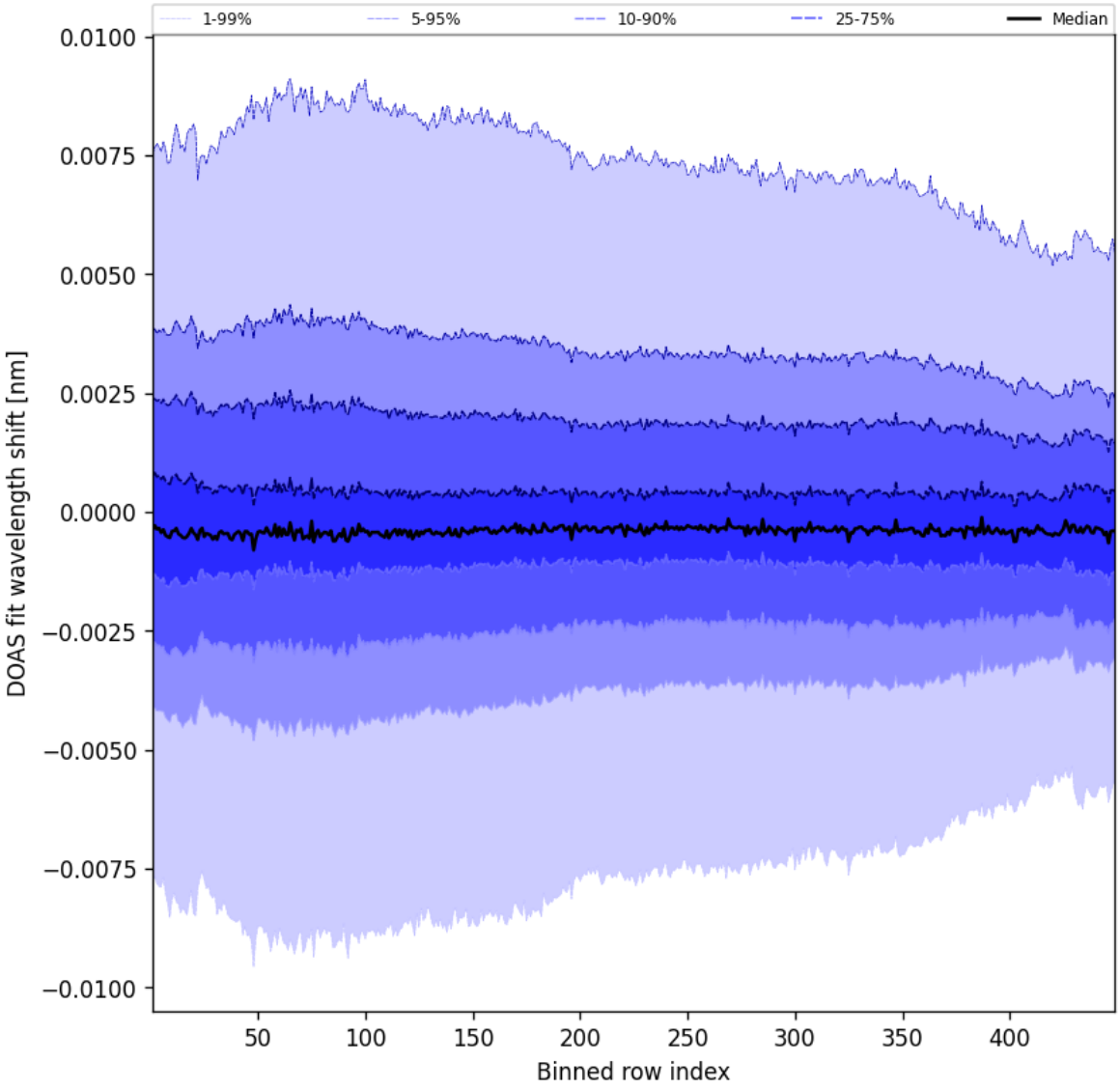

Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2024-12-15 to 2024-12-16

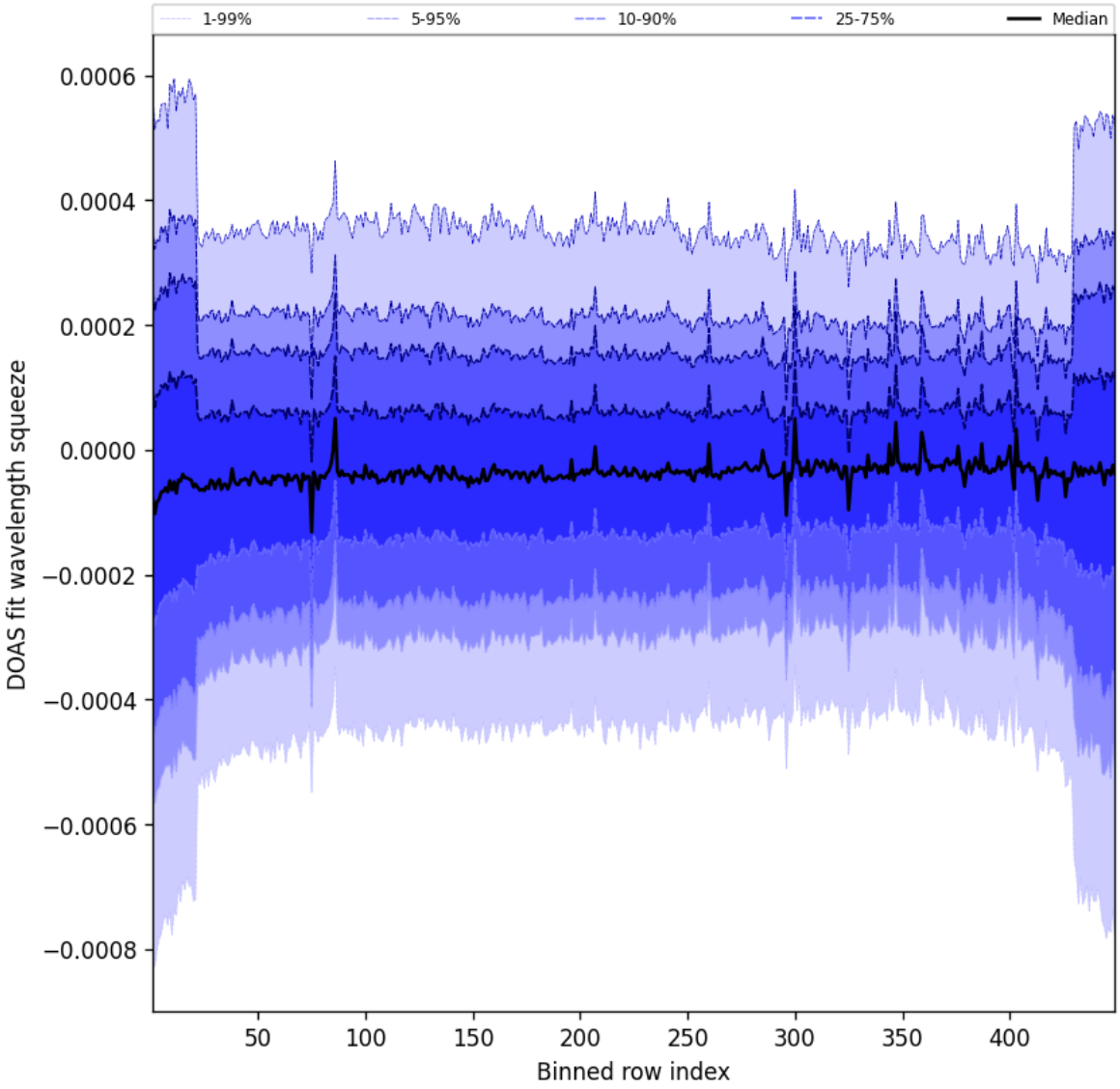

Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2024-12-15 to 2024-12-16

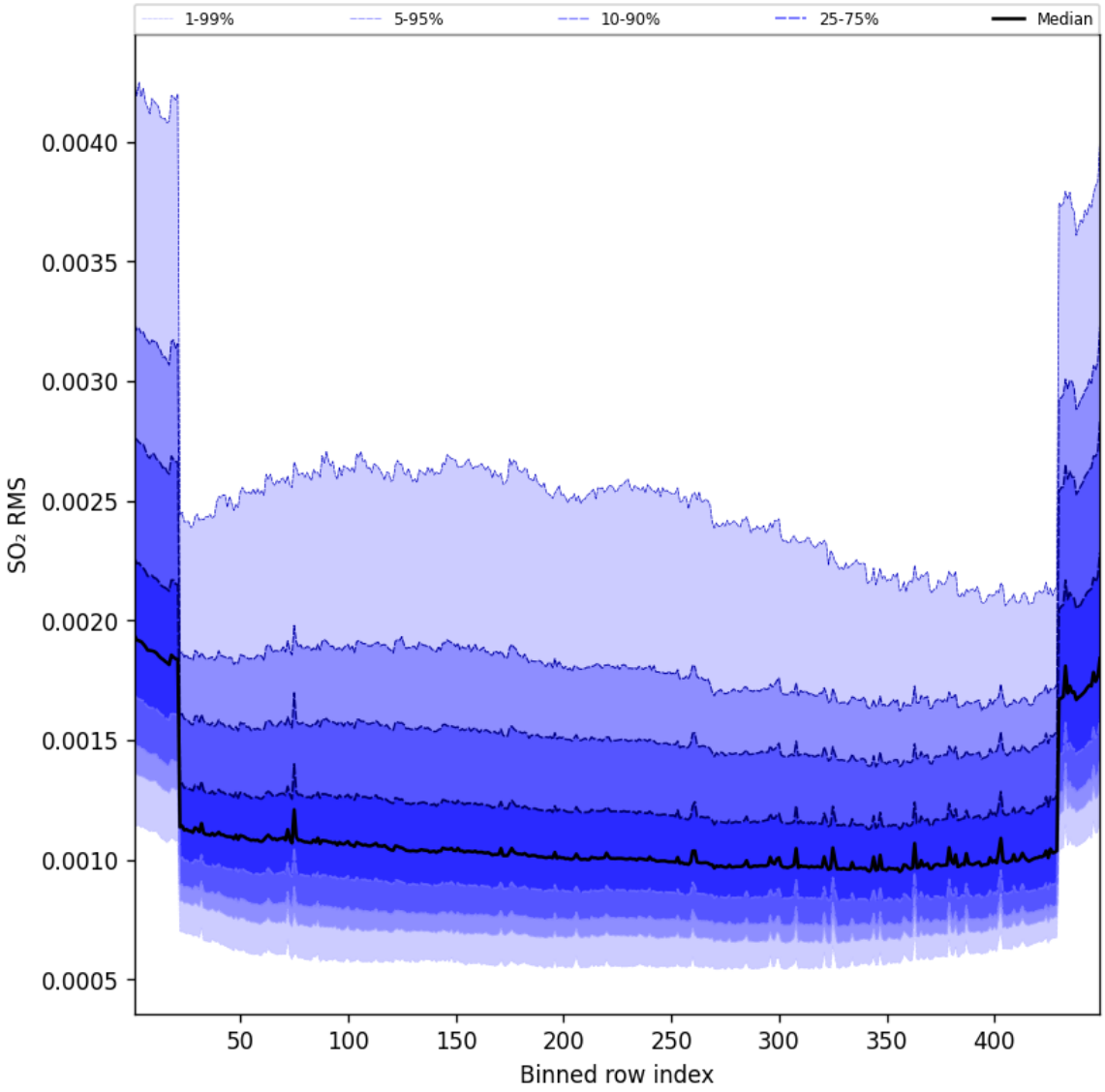

Figure 106: Along track statistics of "SO_2 RMS" for 2024-12-15 to 2024-12-16

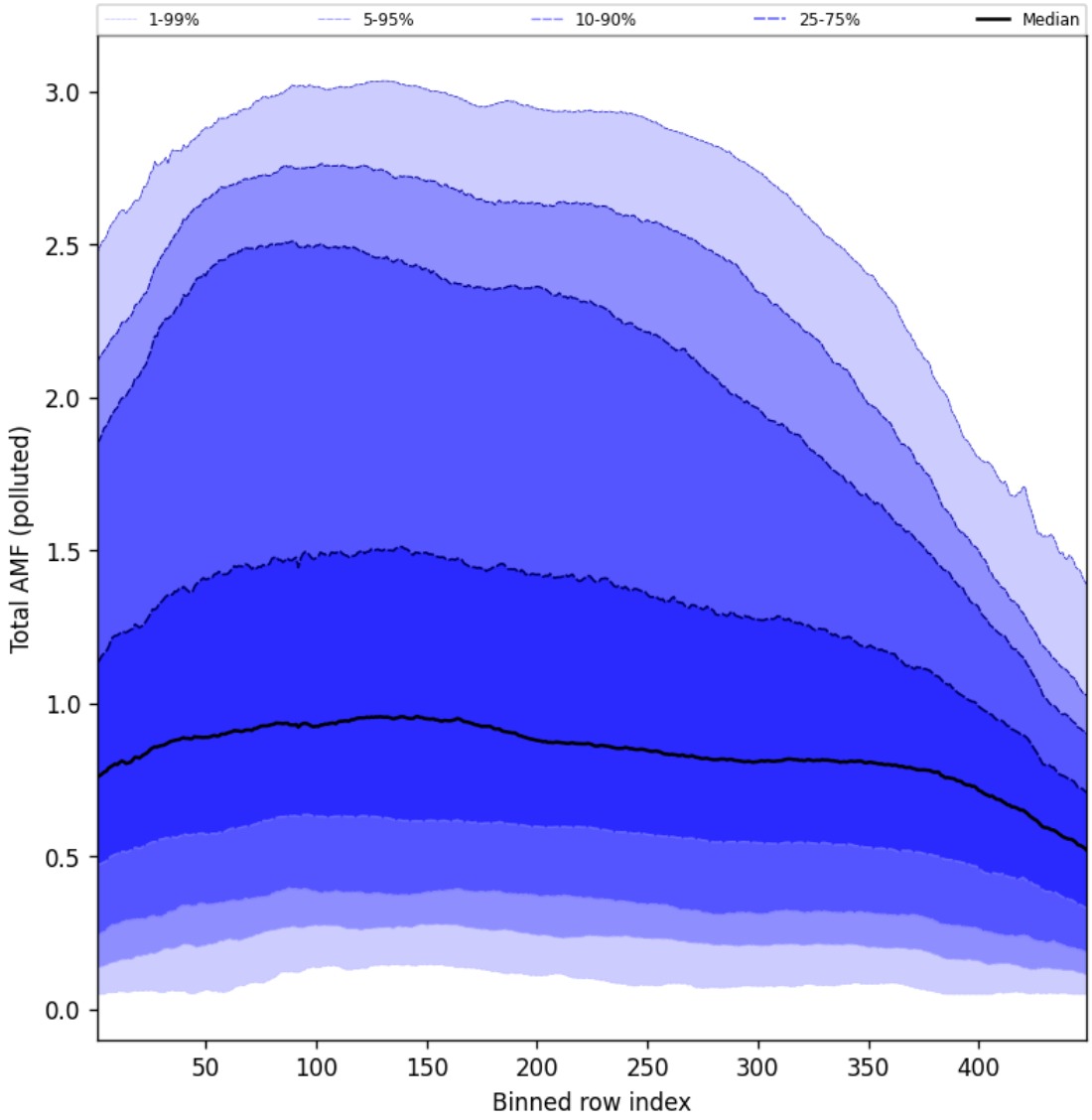

Figure 107: Along track statistics of “Total AMF (polluted)” for 2024-12-15 to 2024-12-16

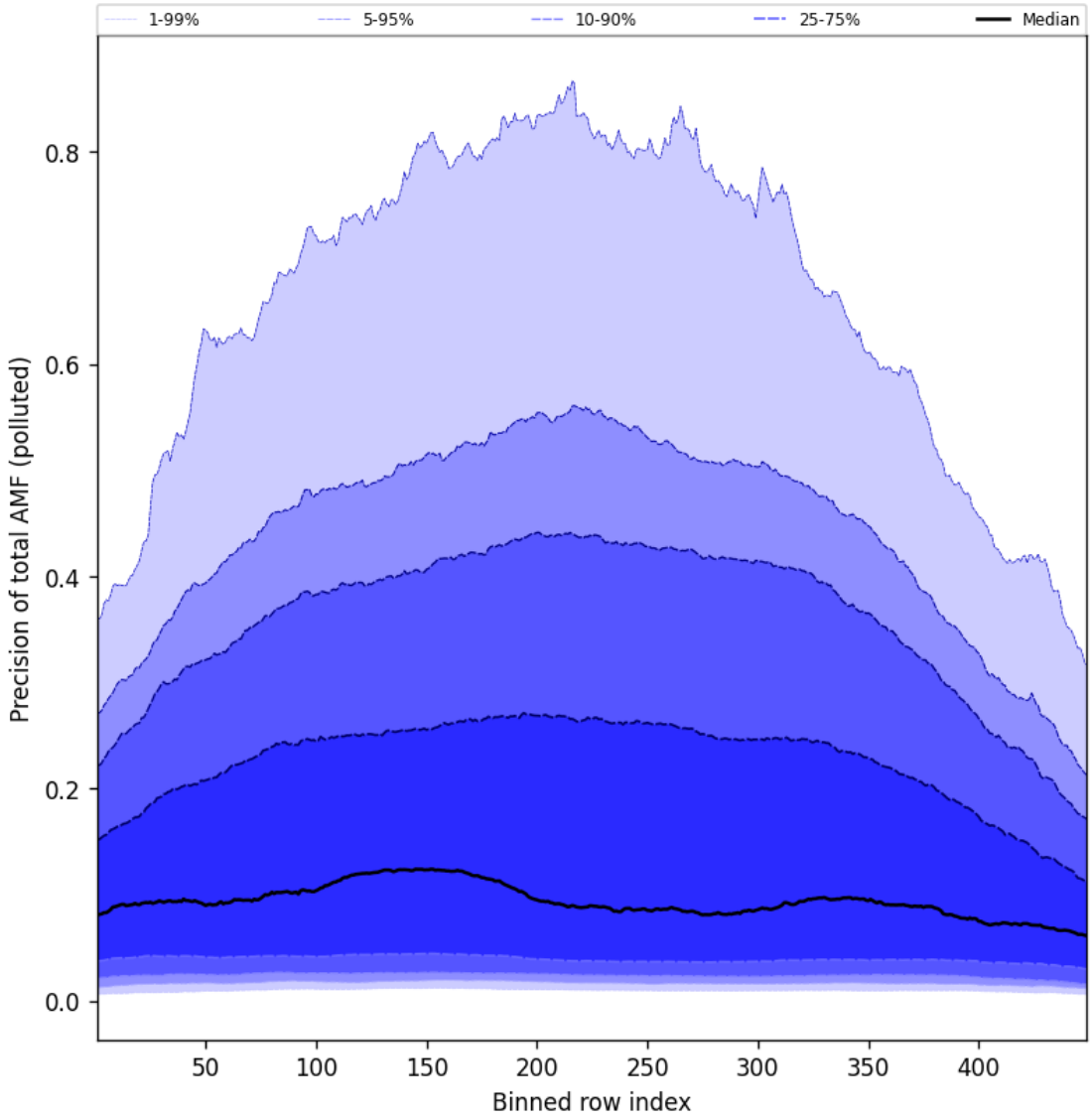

Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2024-12-15 to 2024-12-16

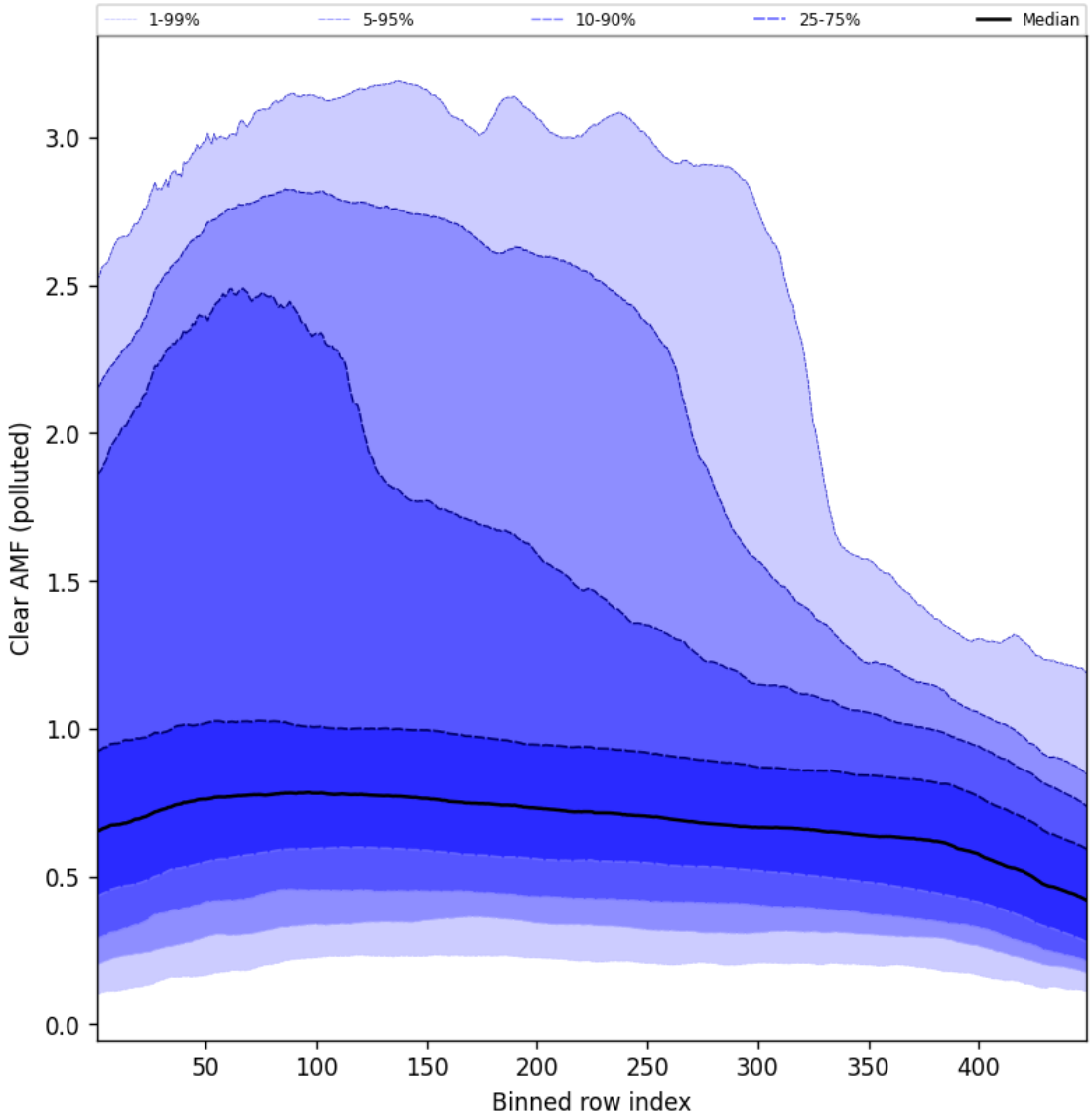

Figure 109: Along track statistics of “Clear AMF (polluted)” for 2024-12-15 to 2024-12-16

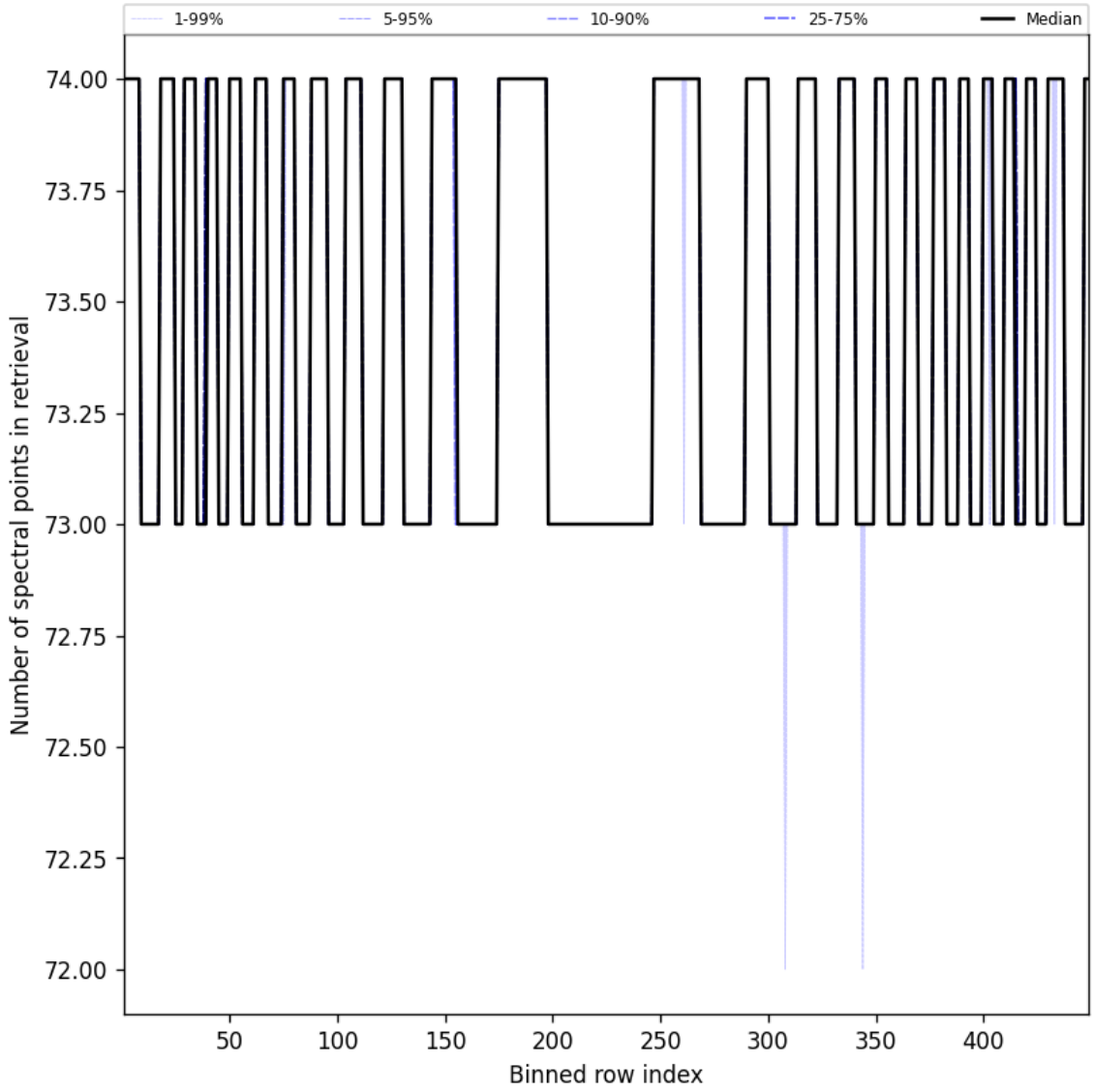

Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2024-12-15 to 2024-12-16

10 Coincidence density

To investigate the relation between parameters scatter density plots are produced. These include some 'hidden' parameters, latitude and the solar- and viewing geometries, in addition to all configured parameters. All combinations of pairs of parameters are included *once*, in one direction alone.

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11 Copyright information of 'PyCAMA'

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