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]	0.593 ± 0.418	17166951	0.995	0.830	0.490	0.0	1.000
sulfurdioxide total vertical column [DU]	$(3.483 \pm 128.761) \times 10^{-2}$	17166951	0.199	0.386	8.125×10^{-3}	-154	312
sulfurdioxide total vertical column precision [DU]	0.531 ± 0.943	17166951	0.122	0.326	0.290	3.802×10^{-2}	55.1
sulfurdioxide slant column density corrected [DU]	$(1.516 \pm 33.244) \times 10^{-2}$	17166951	0.242	0.336	7.995×10^{-3}	-9.96	63.9
sulfurdioxide slant column density cobra [DU]	$(1.506 \pm 32.544) \times 10^{-2}$	17166951	0.242	0.336	7.995×10^{-3}	-9.96	46.5
sulfurdioxide slant column density cobra precision [DU]	0.268 ± 0.116	17166951	0.213	0.100	0.232	7.619×10^{-2}	16.4
sulfurdioxide slant column density window1 [DU]	0.104 ± 0.633	17166951	0.125	0.708	0.111	-35.5	98.5
sulfurdioxide slant column density window1 precision [DU]	0.268 ± 0.116	17166951	0.213	0.100	0.232	7.619×10^{-2}	16.4
sulfurdioxide slant column density corrected win1 [DU]	$(3.778 \pm 61.084) \times 10^{-2}$	17166951	2.500×10^{-2}	0.674	2.633×10^{-2}	-35.5	98.6
background so2 slant column offset window1 [DU]	$(-6.624 \pm 17.584) \times 10^{-2}$	17166951	-0.180	0.222	-0.121	-1.33	5.30
sulfurdioxide slant column density window2 [DU]	2.63 ± 8.47	17166951	2.25	10.6	2.53	-1.036×10^{3}	1.950×10^{3}
sulfurdioxide slant column density window2 precision [DU]	7.68 ± 2.20	17166951	6.97	2.55	7.31	2.30	477
sulfurdioxide slant column density corrected win2 [DU]	1.64 ± 8.33	17166951	1.75	10.4	1.63	-1.035×10^{3}	1.950×10^{3}
background so2 slant column offset window2 [DU]	-0.990 ± 2.089	17166951	0.250	2.38	-0.550	-15.0	13.5
sulfurdioxide slant column density window3 [DU]	-13.2 ± 22.9	17166951	-14.0	28.3	-13.5	-422	665
sulfurdioxide slant column density window3 precision [DU]	26.4 ± 12.6	17166951	22.5	10.3	23.4	8.86	252
sulfurdioxide slant column density corrected win3 [DU]	-7.07 ± 22.25	17166951	-8.40	27.3	-7.15	-421	662
background so2 slant column offset window3 [DU]	6.12 ± 6.25	17166951	2.80	9.44	6.02	-17.1	30.6
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.21	17166951	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(3.892 \pm 10.042) \times 10^{-2}$	17166951	2.661×10^{-2}	2.380×10^{-2}	1.916×10^{-2}	2.284×10^{-4}	2.74
fitted radiance shift [nm]	$(-3.813 \pm 24.347) \times 10^{-4}$	17166951	-5.000×10^{-4}	1.672×10^{-3}	-4.349×10^{-4}	-4.927×10^{-2}	3.842×10^{-2}
fitted radiance squeeze [1]	$(-6.118 \pm 18.053) \times 10^{-5}$	17166951	-3.000×10^{-5}	2.148×10^{-4}	-5.146×10^{-5}	-1.422×10^{-2}	2.226×10^{-2}
fitted root mean square [1]	$(1.192 \pm 0.479) \times 10^{-3}$	17166951	9.750×10^{-4}	4.430×10^{-4}	1.062×10^{-3}	3.257×10^{-4}	5.543×10^{-2}
sulfurdioxide total air mass factor polluted [1]	0.974 ± 0.638	17166951	0.500	0.732	0.813	5.000×10^{-2}	3.05
sulfurdioxide total air mass factor polluted precision [1]	0.155 ± 0.159	17166951	2.500×10^{-2}	0.184	9.713×10^{-2}	2.500×10^{-3}	1.63
sulfurdioxide clear air mass factor polluted [1]	0.808 ± 0.542	17166951	0.580	0.431	0.666	3.368×10^{-2}	3.07
number of spectral points in retrieval [1]	73.4 ± 0.5	17166951	73.0	1.000	73.0	53.0	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}	7.000×10^{-2}	0.170	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	−2.73	−0.851	−0.494	−0.321	−0.182	0.204	0.355	0.547	0.958	3.21
sulfurdioxide total vertical column precision [DU]	7.774×10^{-2}	9.786×10^{-2}	0.115	0.137	0.177	0.503	0.700	1.01	1.73	4.50
sulfurdioxide slant column density corrected [DU]	−0.775	−0.447	−0.326	−0.245	−0.159	0.177	0.267	0.355	0.490	0.902
sulfurdioxide slant column density cobra [DU]	−0.775	−0.447	−0.326	−0.245	−0.159	0.177	0.267	0.355	0.490	0.902
sulfurdioxide slant column density cobra precision [DU]	0.135	0.160	0.173	0.184	0.197	0.297	0.360	0.416	0.490	0.683
sulfurdioxide slant column density window1 [DU]	−1.56	−0.881	−0.619	−0.440	−0.249	0.459	0.639	0.809	1.07	1.77
sulfurdioxide slant column density window1 precision [DU]	0.135	0.160	0.173	0.184	0.197	0.297	0.360	0.416	0.490	0.683
sulfurdioxide slant column density corrected win1 [DU]	−1.49	−0.876	−0.641	−0.480	−0.308	0.366	0.547	0.720	0.984	1.73
background so2 slant column offset window1 [DU]	−0.365	−0.271	−0.235	−0.208	−0.183	3.905×10^{-2}	0.131	0.195	0.266	0.386
sulfurdioxide slant column density window2 [DU]	−17.4	−10.9	−7.72	−5.37	−2.75	7.87	10.6	13.0	16.5	24.0
sulfurdioxide slant column density window2 precision [DU]	4.15	4.89	5.34	5.72	6.20	8.74	9.63	10.5	11.8	14.4
sulfurdioxide slant column density corrected win2 [DU]	−18.6	−11.8	−8.57	−6.21	−3.59	6.85	9.48	11.8	15.1	22.1
background so2 slant column offset window2 [DU]	−7.72	−4.88	−3.49	−2.73	−2.01	0.363	0.632	0.854	1.18	2.92
sulfurdioxide slant column density window3 [DU]	−70.5	−50.0	−40.9	−34.4	−27.4	0.896	8.46	15.4	24.9	43.9
sulfurdioxide slant column density window3 precision [DU]	13.2	14.8	16.0	17.2	19.0	29.2	33.7	38.9	49.6	79.8
sulfurdioxide slant column density corrected win3 [DU]	−63.4	−43.2	−34.1	−27.7	−20.7	6.62	13.7	20.3	29.4	48.3
background so2 slant column offset window3 [DU]	−6.68	−3.85	−2.01	−0.546	1.44	10.9	13.1	14.6	16.2	18.9
sulfurdioxide slant column cobra flag [1]	0.0	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
integrated so2 profile apriori [DU]	7.633×10^{-4}	2.785×10^{-3}	4.869×10^{-3}	7.421×10^{-3}	1.058×10^{-2}	3.438×10^{-2}	4.638×10^{-2}	6.312×10^{-2}	0.110	0.481
fitted radiance shift [nm]	-7.731×10^{-3}	-3.906×10^{-3}	-2.563×10^{-3}	-1.833×10^{-3}	-1.261×10^{-3}	4.115×10^{-4}	1.089×10^{-3}	1.939×10^{-3}	3.399×10^{-3}	7.350×10^{-3}
fitted radiance squeeze [1]	-5.537×10^{-4}	-3.639×10^{-4}	-2.822×10^{-4}	-2.249×10^{-4}	-1.639×10^{-4}	5.092×10^{-5}	1.008×10^{-4}	1.460×10^{-4}	2.094×10^{-4}	3.580×10^{-4}
fitted root mean square [1]	5.764×10^{-4}	6.988×10^{-4}	7.706×10^{-4}	8.275×10^{-4}	8.959×10^{-4}	1.339×10^{-3}	1.566×10^{-3}	1.794×10^{-3}	2.122×10^{-3}	2.966×10^{-3}
sulfurdioxide total air mass factor polluted [1]	8.252×10^{-2}	0.208	0.316	0.407	0.514	1.25	1.62	2.03	2.43	2.67
sulfurdioxide total air mass factor polluted precision [1]	8.672×10^{-3}	1.686×10^{-2}	2.318×10^{-2}	2.891×10^{-2}	3.848×10^{-2}	0.222	0.300	0.377	0.480	0.712
sulfurdioxide clear air mass factor polluted [1]	0.156	0.282	0.359	0.418	0.487	0.918	1.08	1.34	2.31	2.80
number of spectral points in retrieval [1]	73.0	73.0	73.0	73.0	73.0	74.0	74.0	74.0	74.0	74.0

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

Variable	mean $\pm\sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.706 ± 0.393	5797470	0.690	1.000	0.0	1.000	0.310	1.000
sulfurdioxide total vertical column [DU]	$(7.475 \pm 203.626) \times 10^{-2}$	5797470	0.587	1.474×10^{-2}	-154	312	-0.271	0.316
sulfurdioxide total vertical column precision [DU]	0.870 ± 1.424	5797470	0.594	0.418	5.562×10^{-2}	55.1	0.258	0.851
sulfurdioxide slant column density corrected [DU]	$(2.334 \pm 40.093) \times 10^{-2}$	5797470	0.397	1.134×10^{-2}	-9.96	38.4	-0.185	0.212
sulfurdioxide slant column density cobra [DU]	$(2.325 \pm 39.697) \times 10^{-2}$	5797470	0.397	1.134×10^{-2}	-9.96	10.2	-0.185	0.212
sulfurdioxide slant column density cobra precision [DU]	0.320 ± 0.143	5797470	0.160	0.277	8.525×10^{-2}	5.50	0.224	0.384
sulfurdioxide slant column density window1 [DU]	0.176 ± 0.735	5797470	0.795	0.180	-10.6	22.0	-0.219	0.576
sulfurdioxide slant column density window1 precision [DU]	0.320 ± 0.143	5797470	0.160	0.277	8.525×10^{-2}	5.50	0.224	0.384
sulfurdioxide slant column density corrected win1 [DU]	$(5.687 \pm 73.166) \times 10^{-2}$	5797470	0.788	3.473×10^{-2}	-9.96	21.9	-0.353	0.435
background so2 slant column offset window1 [DU]	-0.119 ± 0.141	5797470	0.114	-0.137	-1.33	5.30	-0.190	-7.691×10^{-2}
sulfurdioxide slant column density window2 [DU]	3.12 ± 9.70	5797470	12.3	2.82	-91.7	83.4	-3.21	9.11
sulfurdioxide slant column density window2 precision [DU]	8.79 ± 2.32	5797470	2.87	8.48	2.42	159	7.19	10.1
sulfurdioxide slant column density corrected win2 [DU]	1.64 ± 9.45	5797470	12.0	1.61	-94.4	83.2	-4.40	7.63
background so2 slant column offset window2 [DU]	-1.48 ± 2.58	5797470	3.07	-0.595	-15.0	13.5	-2.82	0.250
sulfurdioxide slant column density window3 [DU]	-15.2 ± 26.0	5797470	32.8	-14.7	-217	156	-31.3	1.42
sulfurdioxide slant column density window3 precision [DU]	30.2 ± 12.9	5797470	9.96	27.3	10.2	231	23.1	33.1
sulfurdioxide slant column density corrected win3 [DU]	-7.31 ± 25.58	5797470	32.3	-7.15	-201	172	-23.3	8.98
background so2 slant column offset window3 [DU]	7.92 ± 5.40	5797470	8.65	7.15	-13.5	30.6	3.53	12.2
sulfurdioxide slant column cobra flag [1]	1.96 ± 0.26	5797470	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(7.571 \pm 16.356) \times 10^{-2}$	5797470	4.642×10^{-2}	2.941×10^{-2}	2.199×10^{-3}	2.74	1.741×10^{-2}	6.382×10^{-2}
fitted radiance shift [nm]	$(-1.994 \pm 25.799) \times 10^{-4}$	5797470	1.681×10^{-3}	-2.168×10^{-4}	-3.973×10^{-2}	3.842×10^{-2}	-1.059×10^{-3}	6.223×10^{-4}
fitted radiance squeeze [1]	$(-1.699 \pm 18.944) \times 10^{-5}$	5797470	2.163×10^{-4}	-1.240×10^{-5}	-2.888×10^{-3}	1.054×10^{-2}	-1.220×10^{-4}	9.430×10^{-5}
fitted root mean square [1]	$(1.394 \pm 0.594) \times 10^{-3}$	5797470	6.441×10^{-4}	1.220×10^{-3}	3.605×10^{-4}	2.166×10^{-2}	1.001×10^{-3}	1.645×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.714 ± 0.394	5797470	0.540	0.681	5.000×10^{-2}	2.82	0.414	0.954
sulfurdioxide total air mass factor polluted precision [1]	$(9.350 \pm 11.372) \times 10^{-2}$	5797470	8.937×10^{-2}	5.166×10^{-2}	2.500×10^{-3}	1.61	2.934×10^{-2}	0.119
sulfurdioxide clear air mass factor polluted [1]	0.642 ± 0.285	5797470	0.456	0.637	3.368×10^{-2}	2.11	0.412	0.867
number of spectral points in retrieval [1]	73.5 ± 0.5	5797470	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]	0.536 ± 0.419	11369481	0.880	0.430	0.0	1.000	0.120	1.000
sulfurdioxide total vertical column [DU]	$(1.448 \pm 62.276) \times 10^{-2}$	11369481	0.319	6.183×10^{-3}	-28.9	52.4	-0.152	0.167
sulfurdioxide total vertical column precision [DU]	0.359 ± 0.468	11369481	0.260	0.243	3.802×10^{-2}	33.6	0.147	0.407
sulfurdioxide slant column density corrected [DU]	$(1.099 \pm 29.130) \times 10^{-2}$	11369481	0.311	6.640×10^{-3}	-6.99	63.9	-0.148	0.163
sulfurdioxide slant column density cobra [DU]	$(1.089 \pm 28.198) \times 10^{-2}$	11369481	0.311	6.640×10^{-3}	-6.99	46.5	-0.148	0.163
sulfurdioxide slant column density cobra precision [DU]	0.241 ± 0.088	11369481	7.041×10^{-2}	0.218	7.619×10^{-2}	16.4	0.190	0.260
sulfurdioxide slant column density window1 [DU]	$(6.728 \pm 57.049) \times 10^{-2}$	11369481	0.668	8.040×10^{-2}	-35.5	98.5	-0.262	0.406
sulfurdioxide slant column density window1 precision [DU]	0.241 ± 0.088	11369481	7.041×10^{-2}	0.218	7.619×10^{-2}	16.4	0.190	0.260
sulfurdioxide slant column density corrected win1 [DU]	$(2.805 \pm 53.865) \times 10^{-2}$	11369481	0.627	2.284×10^{-2}	-35.5	98.6	-0.289	0.337
background so2 slant column offset window1 [DU]	$(-3.923 \pm 18.540) \times 10^{-2}$	11369481	0.280	-9.391×10^{-2}	-1.27	2.57	-0.180	0.101
sulfurdioxide slant column density window2 [DU]	2.38 ± 7.76	11369481	9.90	2.41	-1.036×10^{3}	1.950×10^{3}	-2.55	7.35
sulfurdioxide slant column density window2 precision [DU]	7.12 ± 1.90	11369481	2.06	6.85	2.30	477	5.91	7.97
sulfurdioxide slant column density corrected win2 [DU]	1.64 ± 7.69	11369481	9.76	1.64	-1.035×10^{3}	1.950×10^{3}	-3.24	6.52
background so2 slant column offset window2 [DU]	-0.737 ± 1.734	11369481	2.23	-0.527	-11.8	13.5	-1.81	0.425
sulfurdioxide slant column density window3 [DU]	-12.2 ± 21.1	11369481	26.5	-13.0	-422	665	-25.8	0.657
sulfurdioxide slant column density window3 precision [DU]	24.5 ± 12.0	11369481	8.45	21.5	8.86	252	17.7	26.2
sulfurdioxide slant column density corrected win3 [DU]	-6.95 ± 20.34	11369481	25.2	-7.16	-421	662	-19.6	5.60
background so2 slant column offset window3 [DU]	5.20 ± 6.45	11369481	10.3	5.31	-17.1	24.4	-0.164	10.2
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.17	11369481	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.016 \pm 2.328) \times 10^{-2}$	11369481	1.920×10^{-2}	1.506×10^{-2}	2.284×10^{-4}	1.77	7.975×10^{-3}	2.717×10^{-2}
fitted radiance shift [nm]	$(-4.741 \pm 23.518) \times 10^{-4}$	11369481	1.617×10^{-3}	-5.456×10^{-4}	-4.927×10^{-2}	3.692×10^{-2}	-1.333×10^{-3}	2.839×10^{-4}
fitted radiance squeeze [1]	$(-8.372 \pm 17.148) \times 10^{-5}$	11369481	2.113×10^{-4}	-7.061×10^{-5}	-1.422×10^{-2}	2.226×10^{-2}	-1.828×10^{-4}	2.848×10^{-5}
fitted root mean square [1]	$(1.089 \pm 0.368) \times 10^{-3}$	11369481	3.464×10^{-4}	1.005×10^{-3}	3.257×10^{-4}	5.543×10^{-2}	8.622×10^{-4}	1.209×10^{-3}
sulfurdioxide total air mass factor polluted [1]	1.11 ± 0.70	11369481	0.948	0.900	5.000×10^{-2}	3.05	0.569	1.52
sulfurdioxide total air mass factor polluted precision [1]	0.187 ± 0.170	11369481	0.228	0.138	4.943×10^{-3}	1.63	4.623×10^{-2}	0.274
sulfurdioxide clear air mass factor polluted [1]	0.893 ± 0.618	11369481	0.456	0.677	0.112	3.07	0.513	0.968
number of spectral points in retrieval [1]	73.4 ± 0.5	11369481	1.000	73.0	53.0	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]	0.635 ± 0.410	12068824	0.790	1.000	0.0	1.000	0.210	1.000
sulfurdioxide total vertical column [DU]	$(2.123 \pm 93.459) \times 10^{-2}$	12068824	0.399	7.614×10^{-3}	-153	132	-0.190	0.209
sulfurdioxide total vertical column precision [DU]	0.461 ± 0.675	12068824	0.280	0.295	4.171×10^{-2}	42.9	0.198	0.477
sulfurdioxide slant column density corrected [DU]	$(1.136 \pm 29.185) \times 10^{-2}$	12068824	0.319	6.670×10^{-3}	-9.07	38.4	-0.152	0.167
sulfurdioxide slant column density cobra [DU]	$(1.134 \pm 29.026) \times 10^{-2}$	12068824	0.319	6.670×10^{-3}	-9.07	24.5	-0.152	0.167
sulfurdioxide slant column density cobra precision [DU]	0.251 ± 0.102	12068824	7.930×10^{-2}	0.222	7.619×10^{-2}	10.5	0.192	0.271
sulfurdioxide slant column density window1 [DU]	0.136 ± 0.573	12068824	0.658	0.137	-35.5	62.7	-0.194	0.464
sulfurdioxide slant column density window1 precision [DU]	0.251 ± 0.102	12068824	7.930×10^{-2}	0.222	7.619×10^{-2}	10.5	0.192	0.271
sulfurdioxide slant column density corrected win1 [DU]	$(4.010 \pm 56.037) \times 10^{-2}$	12068824	0.641	3.127×10^{-2}	-35.5	63.0	-0.287	0.354
background so2 slant column offset window1 [DU]	$(-9.563 \pm 14.639) \times 10^{-2}$	12068824	0.178	-0.132	-1.09	5.06	-0.186	-8.876×10^{-3}
sulfurdioxide slant column density window2 [DU]	2.26 ± 8.18	12068824	10.3	2.18	-968	1.950×10^{3}	-2.96	7.38
sulfurdioxide slant column density window2 precision [DU]	7.50 ± 2.03	12068824	2.38	7.19	2.30	411	6.13	8.50
sulfurdioxide slant column density corrected win2 [DU]	1.47 ± 8.09	12068824	10.3	1.47	-968	1.950×10^{3}	-3.66	6.59
background so2 slant column offset window2 [DU]	-0.791 ± 1.946	12068824	2.09	-0.397	-15.0	13.5	-1.68	0.403
sulfurdioxide slant column density window3 [DU]	-10.2 ± 22.4	12068824	28.1	-10.8	-255	665	-24.4	3.61
sulfurdioxide slant column density window3 precision [DU]	26.4 ± 12.2	12068824	9.44	23.4	8.86	203	19.4	28.9
sulfurdioxide slant column density corrected win3 [DU]	-5.14 ± 21.67	12068824	27.2	-5.60	-260	662	-18.9	8.28
background so2 slant column offset window3 [DU]	5.09 ± 5.63	12068824	8.01	5.04	-17.1	30.6	1.05	9.06
sulfurdioxide slant column cobra flag [1]	1.99 ± 0.15	12068824	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.726 \pm 3.363) \times 10^{-2}$	12068824	2.006×10^{-2}	1.971×10^{-2}	1.577×10^{-3}	1.37	1.203×10^{-2}	3.210×10^{-2}
fitted radiance shift [nm]	$(-3.047 \pm 24.205) \times 10^{-4}$	12068824	1.788×10^{-3}	-3.260×10^{-4}	-4.280×10^{-2}	3.842×10^{-2}	-1.224×10^{-3}	5.640×10^{-4}
fitted radiance squeeze [1]	$(-4.390 \pm 16.172) \times 10^{-5}$	12068824	1.933×10^{-4}	-3.805×10^{-5}	-1.144×10^{-2}	1.281×10^{-2}	-1.373×10^{-4}	5.604×10^{-5}
fitted root mean square [1]	$(1.116 \pm 0.422) \times 10^{-3}$	12068824	3.546×10^{-4}	1.011×10^{-3}	3.350×10^{-4}	2.903×10^{-2}	8.665×10^{-4}	1.221×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.862 ± 0.464	12068824	0.565	0.792	5.000×10^{-2}	2.79	0.528	1.09
sulfurdioxide total air mass factor polluted precision [1]	0.140 ± 0.136	12068824	0.164	8.635×10^{-2}	2.578×10^{-3}	1.63	4.027×10^{-2}	0.204
sulfurdioxide clear air mass factor polluted [1]	0.675 ± 0.245	12068824	0.340	0.641	3.970×10^{-2}	2.83	0.494	0.835
number of spectral points in retrieval [1]	73.4 ± 0.5	12068824	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]	0.483 ± 0.417	4561141	0.920	0.360	0.0	1.000	8.000×10^{-2}	1.000
sulfurdioxide total vertical column [DU]	$(6.016 \pm 174.281) \times 10^{-2}$	4561141	0.329	8.314×10^{-3}	-154	312	-0.150	0.178
sulfurdioxide total vertical column precision [DU]	0.641 ± 1.280	4561141	0.456	0.245	3.802×10^{-2}	55.1	0.119	0.575
sulfurdioxide slant column density corrected [DU]	$(2.305 \pm 41.077) \times 10^{-2}$	4561141	0.384	1.125×10^{-2}	-9.96	63.9	-0.179	0.205
sulfurdioxide slant column density cobra [DU]	$(2.278 \pm 39.365) \times 10^{-2}$	4561141	0.384	1.125×10^{-2}	-9.96	46.5	-0.179	0.205
sulfurdioxide slant column density cobra precision [DU]	0.305 ± 0.135	4561141	0.130	0.266	8.821×10^{-2}	16.4	0.220	0.350
sulfurdioxide slant column density window1 [DU]	$(1.248 \pm 75.031) \times 10^{-2}$	4561141	0.849	1.421×10^{-2}	-18.8	98.5	-0.419	0.430
sulfurdioxide slant column density window1 precision [DU]	0.305 ± 0.135	4561141	0.130	0.266	8.821×10^{-2}	16.4	0.220	0.350
sulfurdioxide slant column density corrected win1 [DU]	$(2.781 \pm 71.350) \times 10^{-2}$	4561141	0.769	9.154×10^{-3}	-19.0	98.6	-0.371	0.398
background so2 slant column offset window1 [DU]	$(1.532 \pm 21.862) \times 10^{-2}$	4561141	0.370	-4.125×10^{-2}	-1.33	5.30	-0.167	0.204
sulfurdioxide slant column density window2 [DU]	3.55 ± 8.98	4561141	11.1	3.49	-834	1.054×10^{3}	-2.08	9.07
sulfurdioxide slant column density window2 precision [DU]	8.06 ± 2.47	4561141	2.91	7.61	2.34	477	6.36	9.28
sulfurdioxide slant column density corrected win2 [DU]	2.08 ± 8.77	4561141	10.8	2.08	-833	1.054×10^{3}	-3.33	7.51
background so2 slant column offset window2 [DU]	-1.46 ± 2.28	4561141	3.00	-1.17	-13.1	13.5	-2.79	0.213
sulfurdioxide slant column density window3 [DU]	-20.4 ± 22.4	4561141	26.7	-20.2	-422	475	-33.6	-6.87
sulfurdioxide slant column density window3 precision [DU]	26.1 ± 13.5	4561141	11.8	22.8	10.0	252	17.7	29.5
sulfurdioxide slant column density corrected win3 [DU]	-11.6 ± 22.7	4561141	27.1	-10.8	-421	469	-24.7	2.41
background so2 slant column offset window3 [DU]	8.80 ± 6.91	4561141	11.5	10.8	-16.5	27.2	2.98	14.4
sulfurdioxide slant column cobra flag [1]	1.95 ± 0.30	4561141	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(5.954 \pm 16.074) \times 10^{-2}$	4561141	3.838×10^{-2}	1.519×10^{-2}	2.284×10^{-4}	2.74	4.226×10^{-3}	4.261×10^{-2}
fitted radiance shift [nm]	$(-5.895 \pm 23.993) \times 10^{-4}$	4561141	1.310×10^{-3}	-6.818×10^{-4}	-4.927×10^{-2}	3.692×10^{-2}	-1.309×10^{-3}	1.210×10^{-7}
fitted radiance squeeze [1]	$(-1.112 \pm 2.134) \times 10^{-4}$	4561141	2.712×10^{-4}	-1.068×10^{-4}	-1.422×10^{-2}	2.226×10^{-2}	-2.450×10^{-4}	2.619×10^{-5}
fitted root mean square [1]	$(1.374 \pm 0.542) \times 10^{-3}$	4561141	5.575×10^{-4}	1.241×10^{-3}	3.257×10^{-4}	5.543×10^{-2}	1.022×10^{-3}	1.580×10^{-3}
sulfurdioxide total air mass factor polluted [1]	1.31 ± 0.88	4561141	1.75	1.06	5.000×10^{-2}	3.05	0.501	2.25
sulfurdioxide total air mass factor polluted precision [1]	0.199 ± 0.204	4561141	0.257	0.137	2.500×10^{-3}	1.59	3.365×10^{-2}	0.290
sulfurdioxide clear air mass factor polluted [1]	1.19 ± 0.86	4561141	1.32	0.902	3.368×10^{-2}	3.07	0.482	1.80
number of spectral points in retrieval [1]	73.4 ± 0.5	4561141	1.000	73.0	53.0	74.0	73.0	74.0

3 Granule outlines

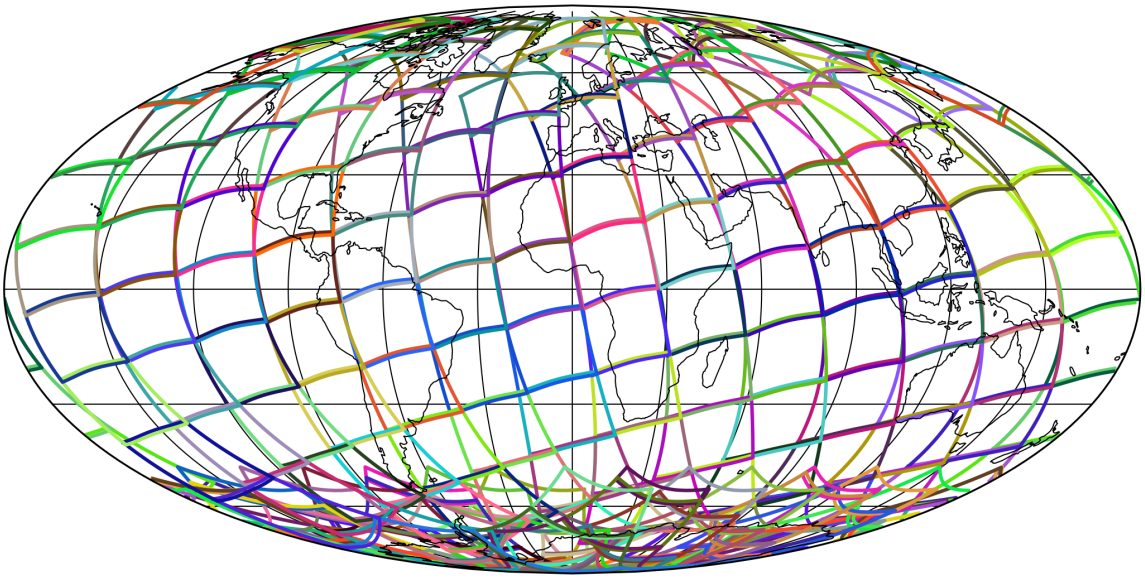

Figure 1: Outline of the granules.

4 Input data monitoring

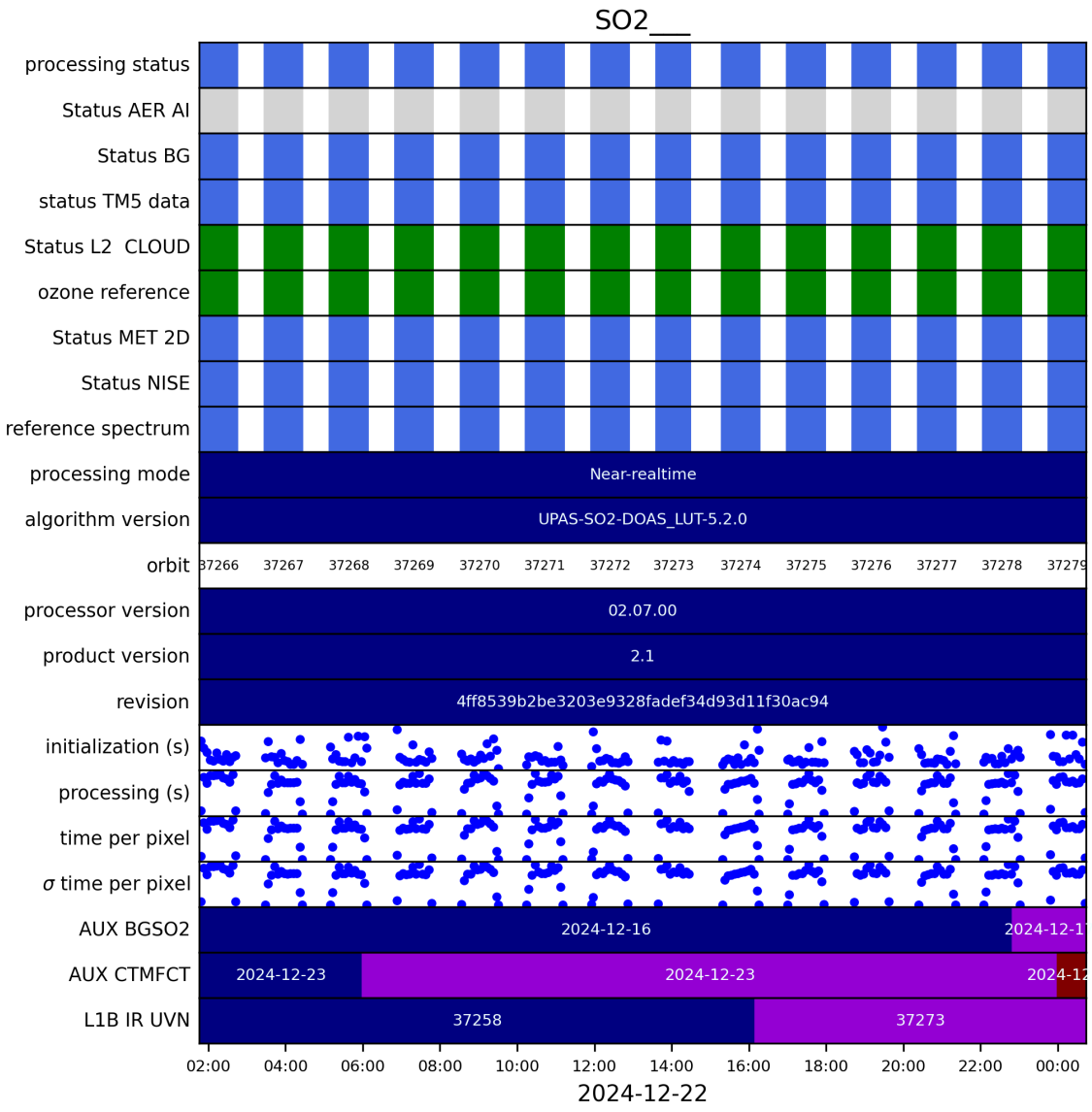

Figure 2: Input data per granule

5 Warnings and errors

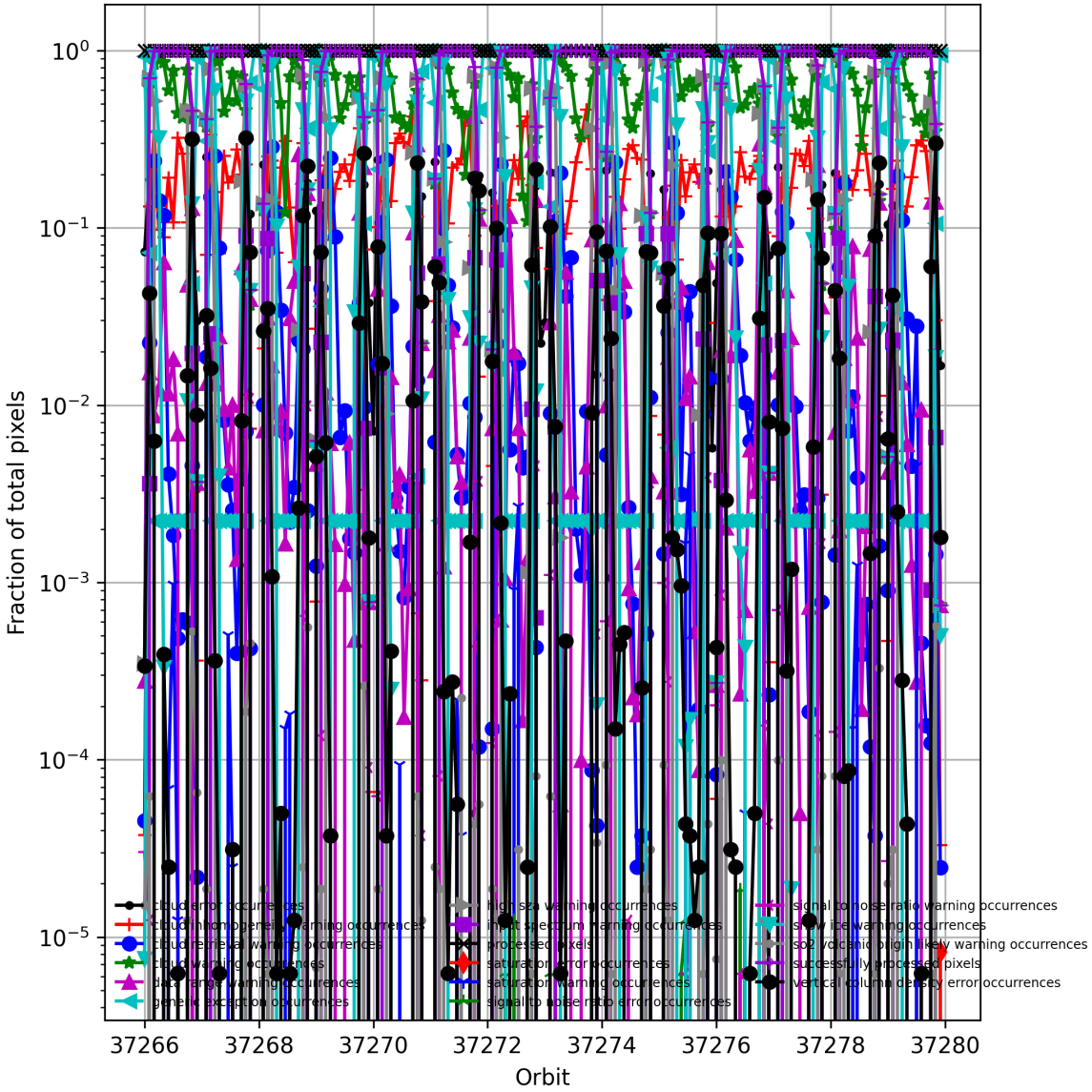

Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

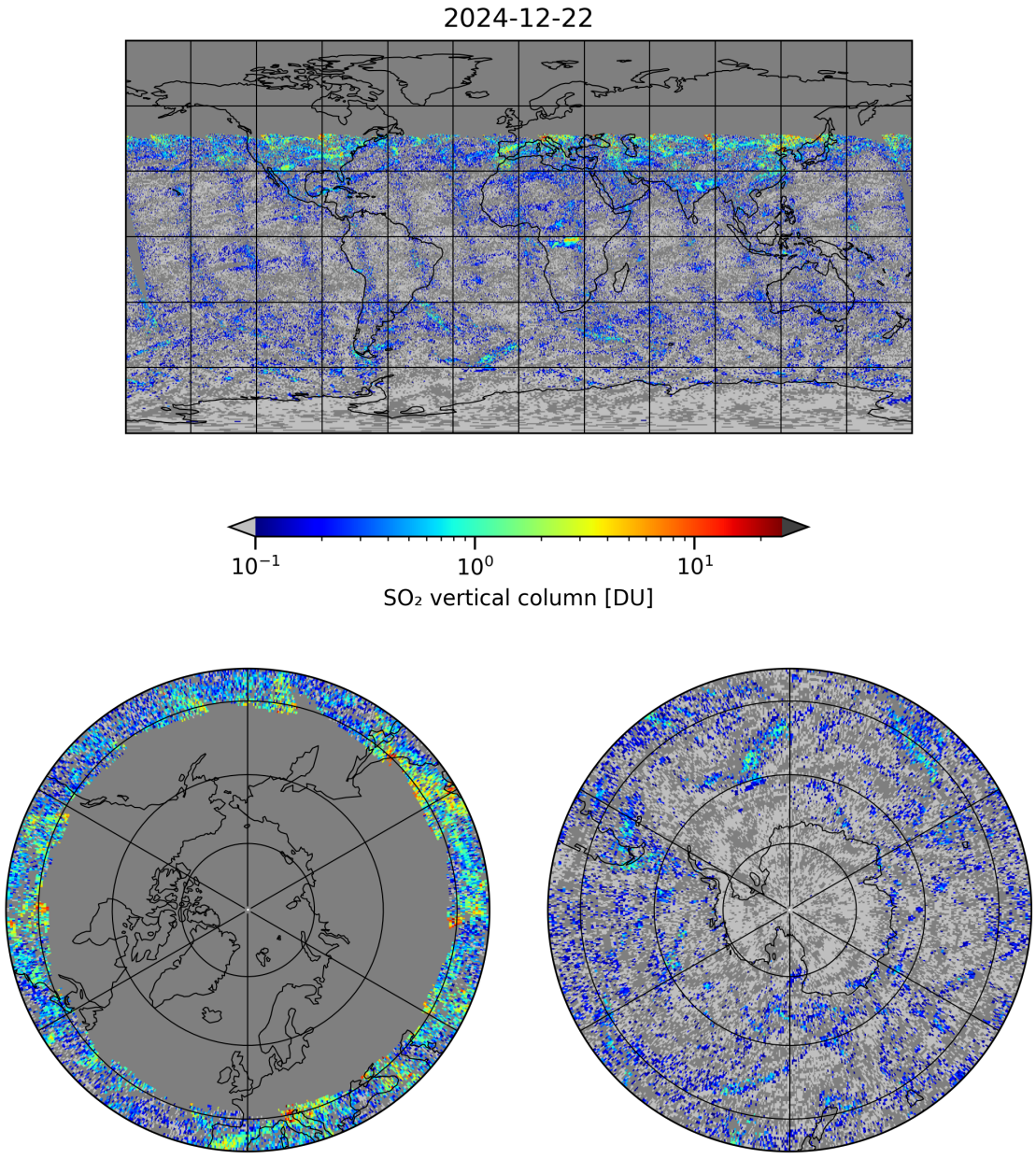

Figure 4: Map of "SO_2 vertical column" for 2024-12-22 to 2024-12-23

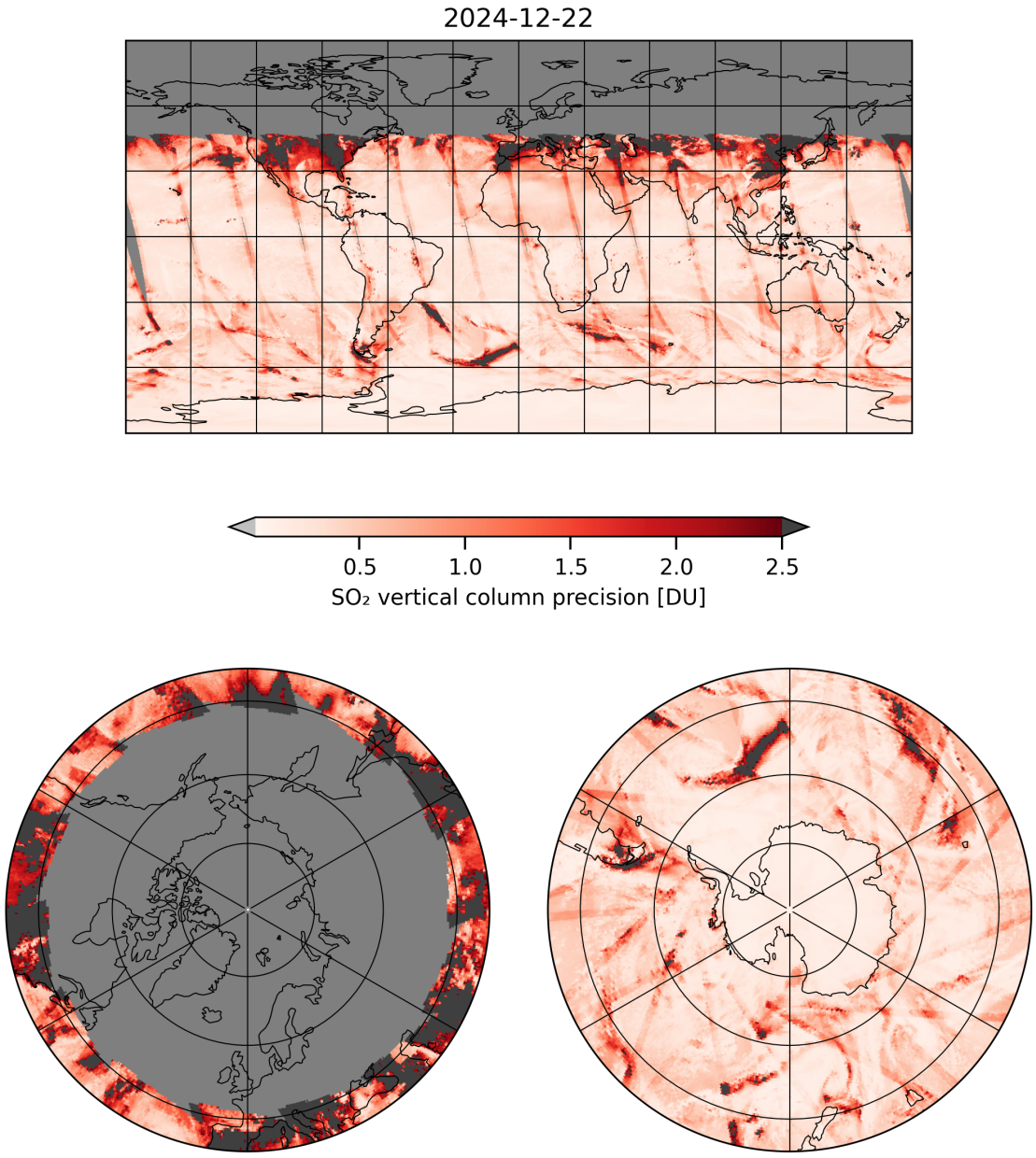

Figure 5: Map of "SO_2 vertical column precision" for 2024-12-22 to 2024-12-23

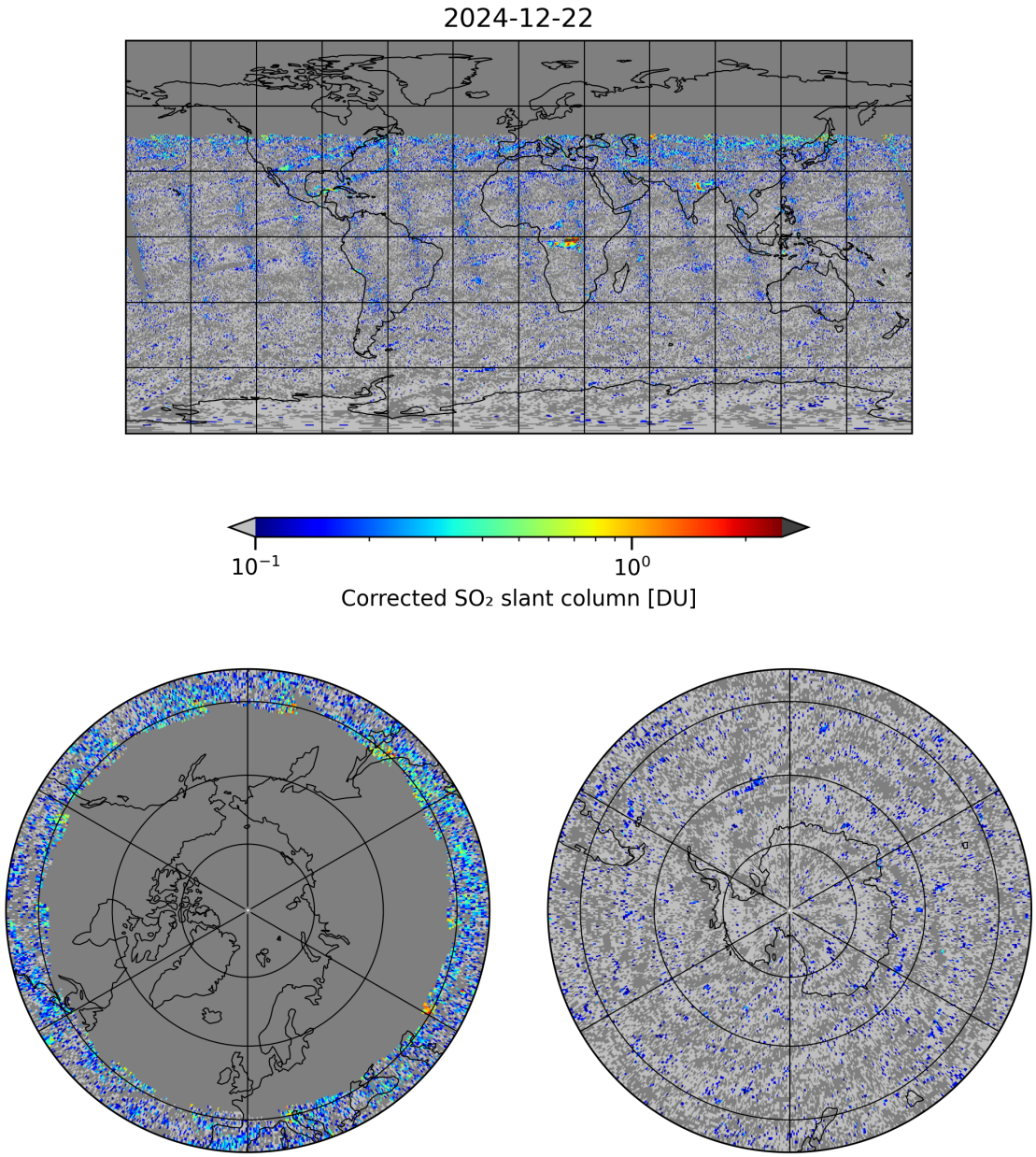

Figure 6: Map of "Corrected SO_2 slant column" for 2024-12-22 to 2024-12-23

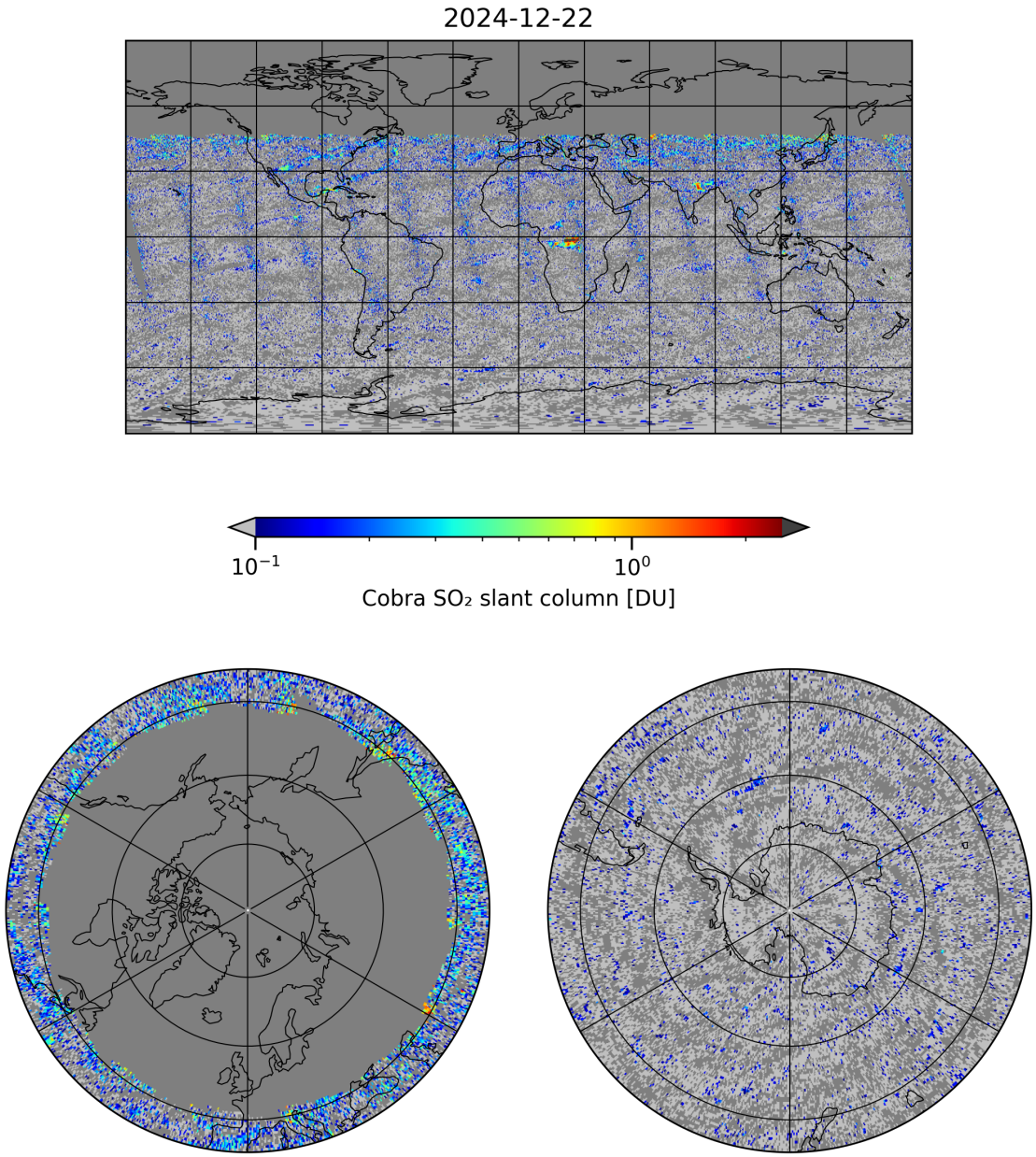

Figure 7: Map of "Cobra SO_2 slant column" for 2024-12-22 to 2024-12-23

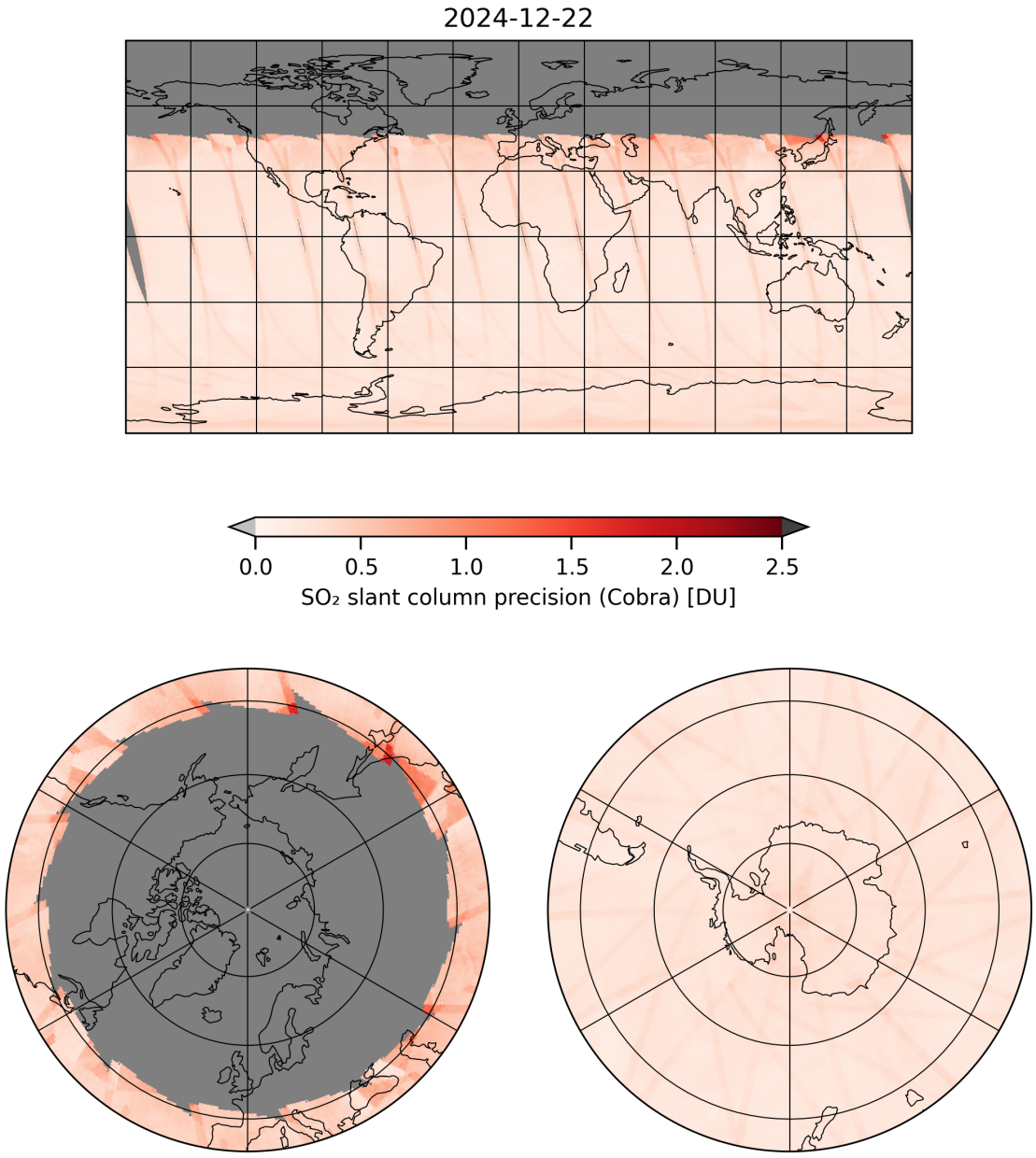

Figure 8: Map of "SO_2 slant column precision (Cobra)" for 2024-12-22 to 2024-12-23

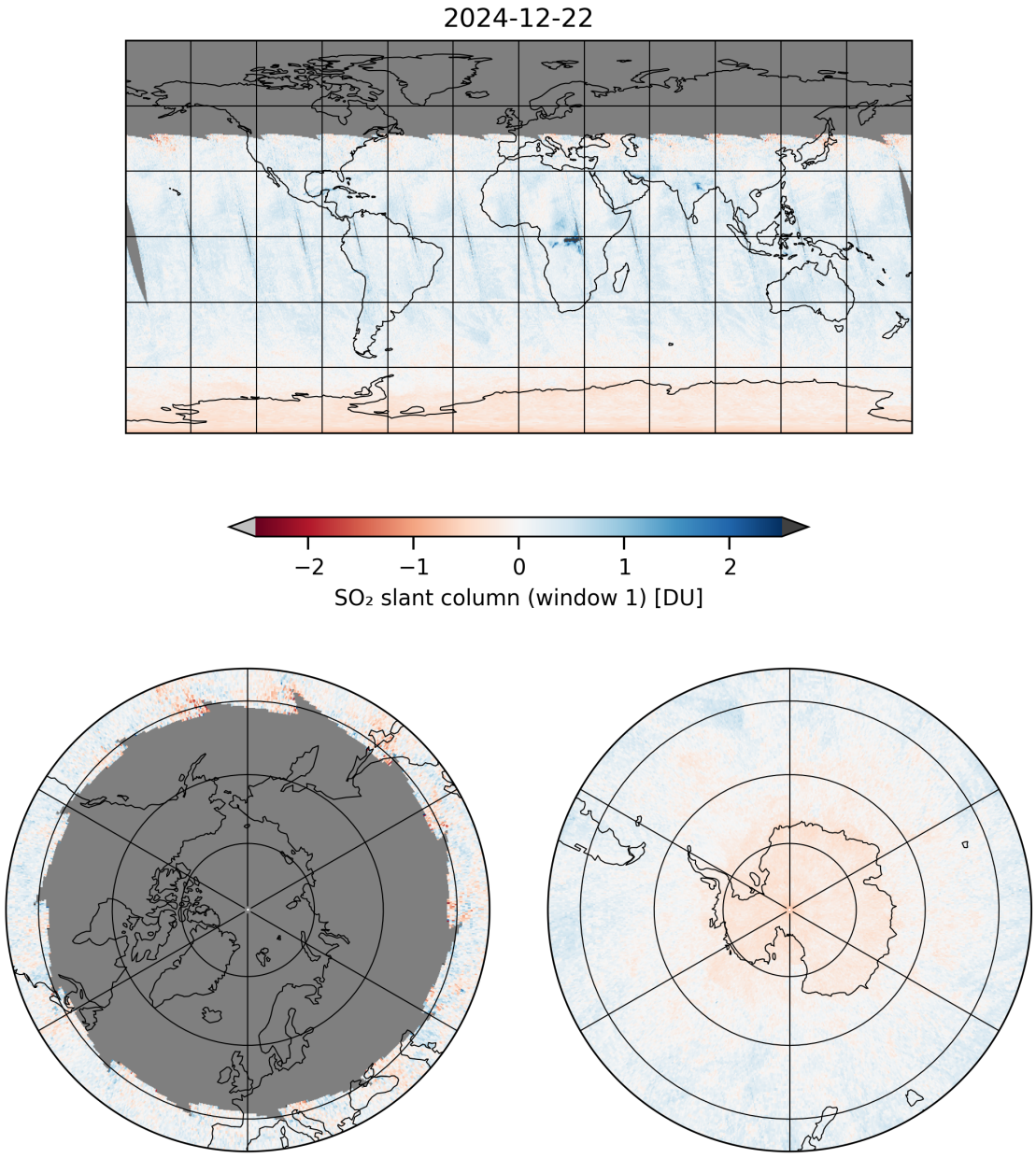

Figure 9: Map of "SO_2 slant column (window 1)" for 2024-12-22 to 2024-12-23

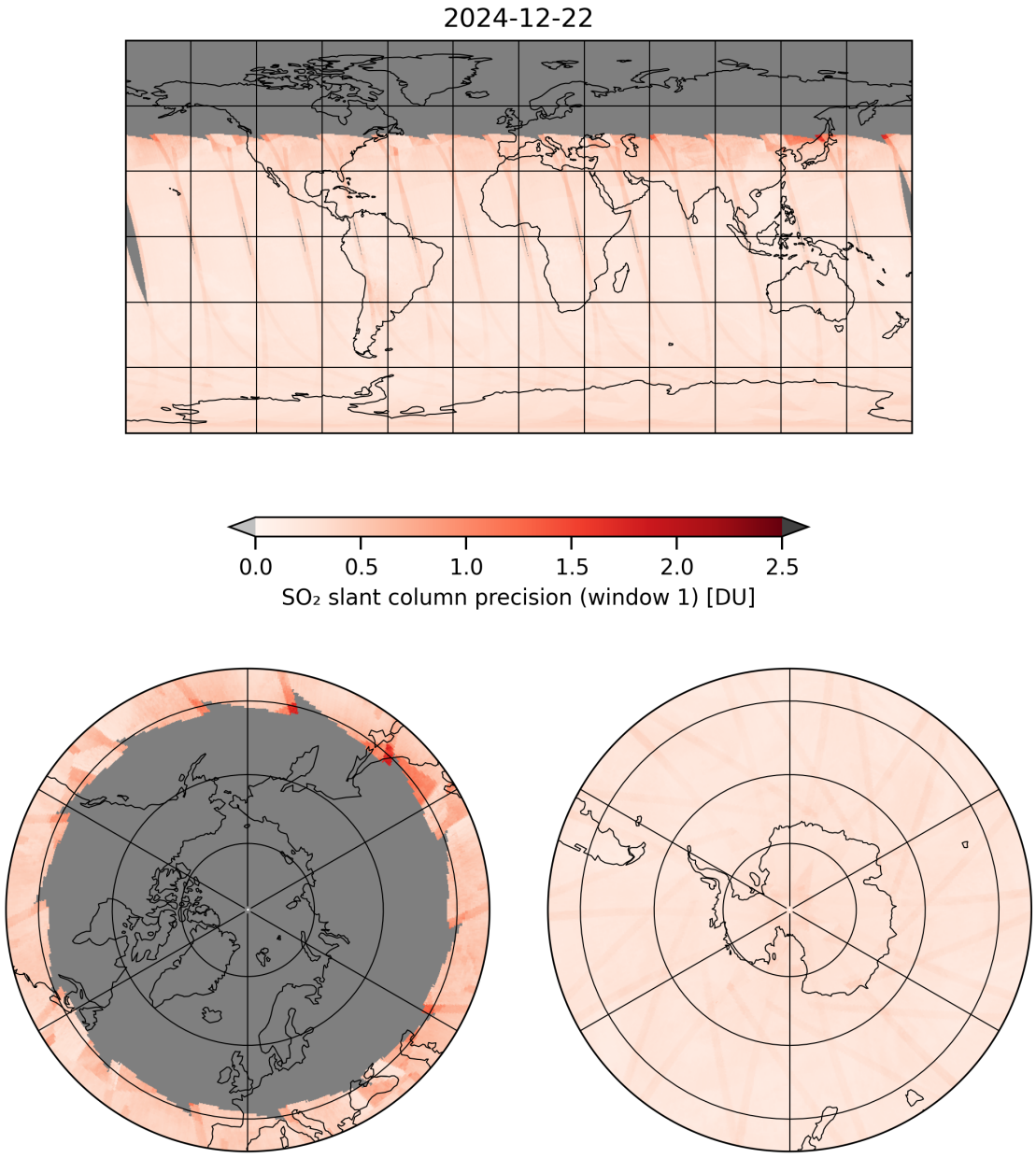

Figure 10: Map of "SO_2 slant column precision (window 1)" for 2024-12-22 to 2024-12-23

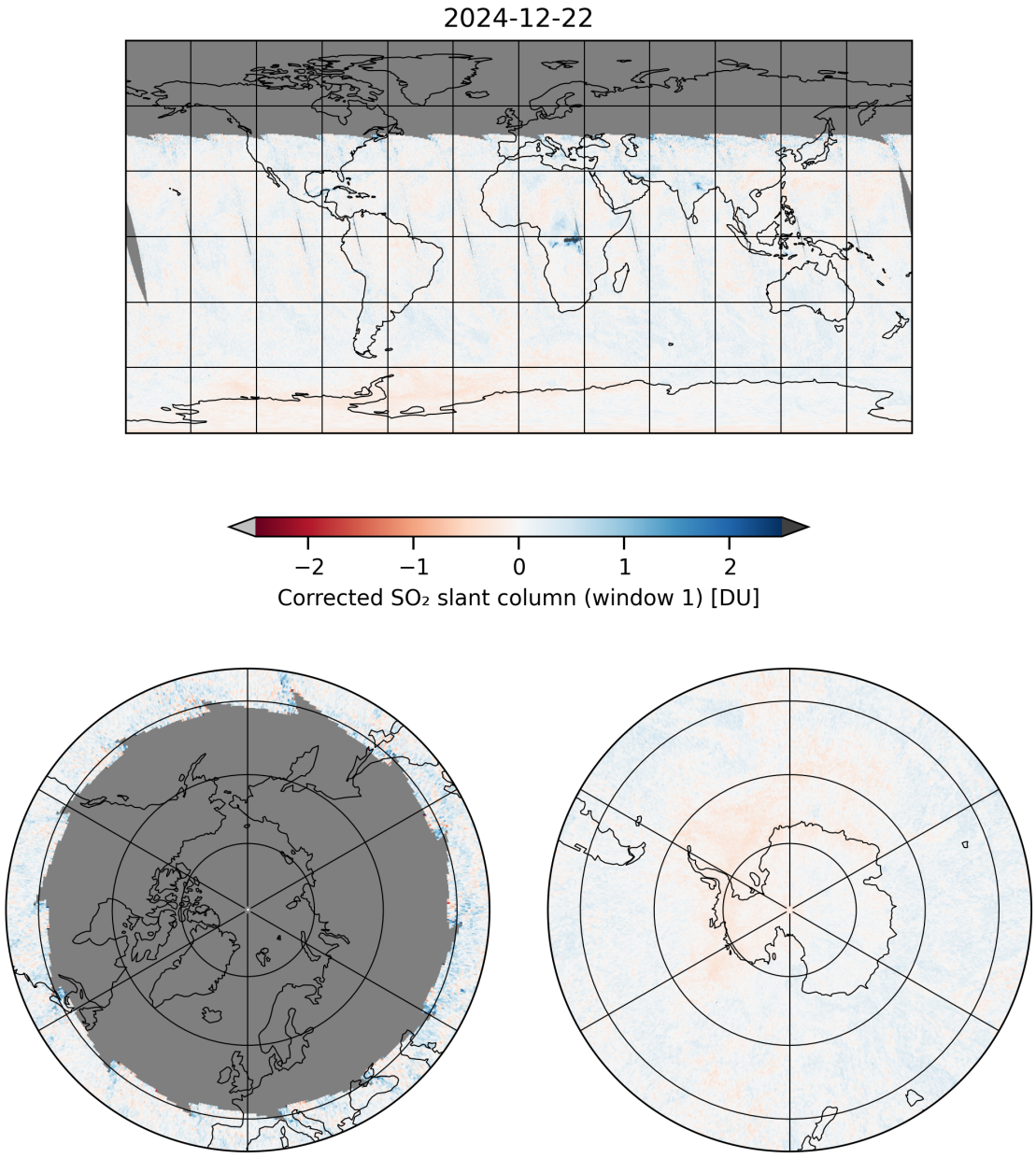

Figure 11: Map of "Corrected SO_2 slant column (window 1)" for 2024-12-22 to 2024-12-23

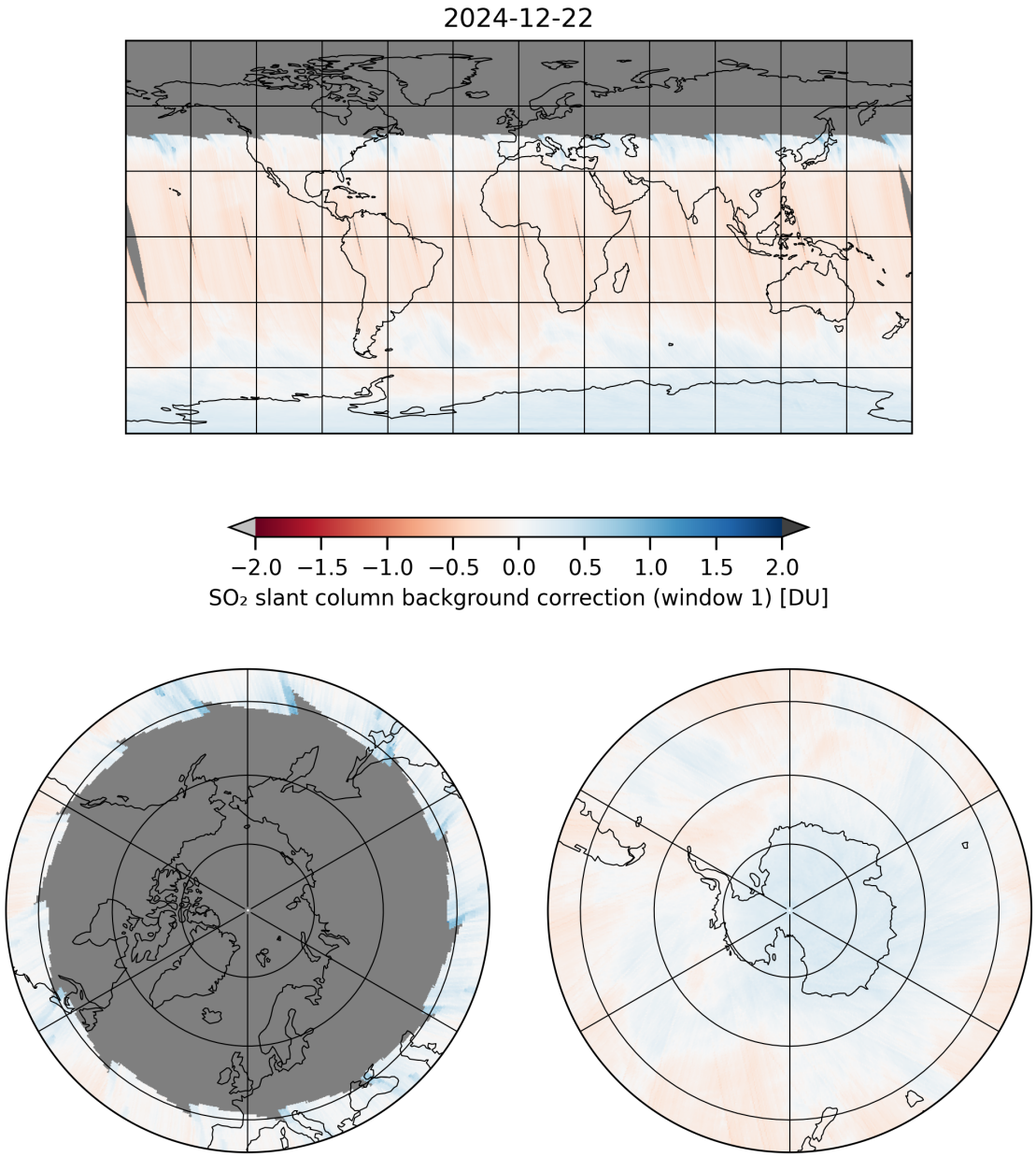

Figure 12: Map of "SO_2 slant column background correction (window 1)" for 2024-12-22 to 2024-12-23

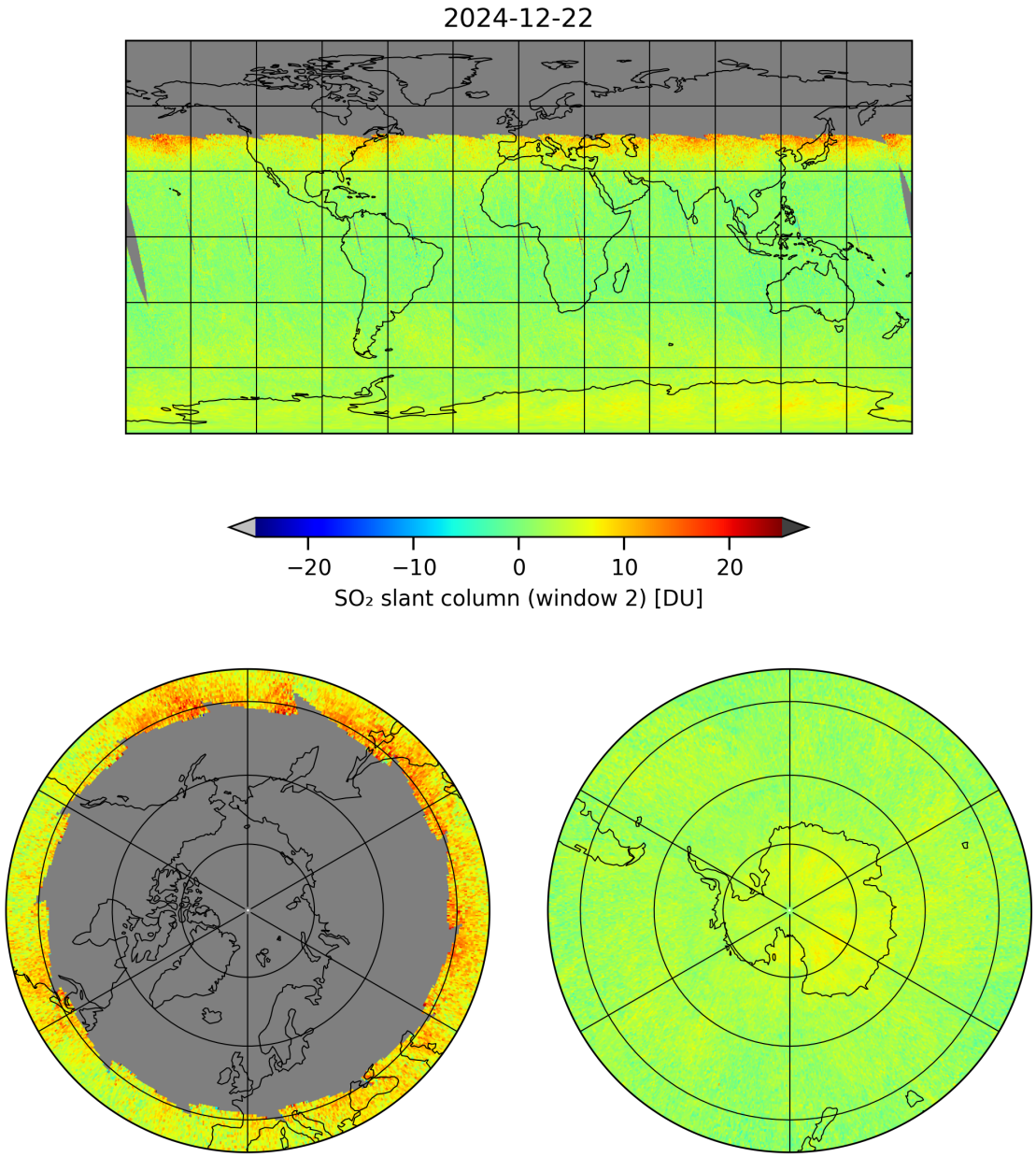

Figure 13: Map of "SO_2 slant column (window 2)" for 2024-12-22 to 2024-12-23

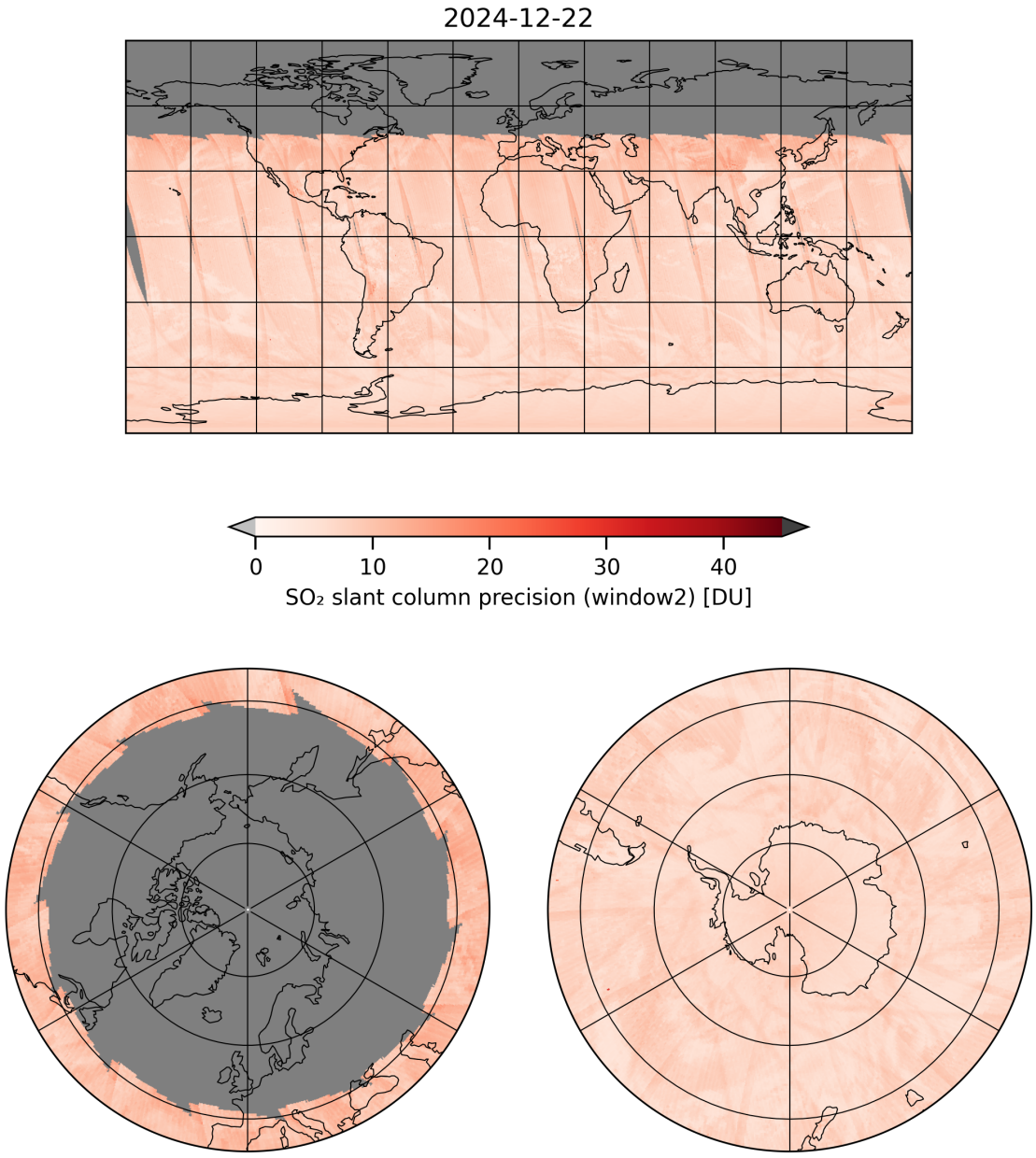

Figure 14: Map of "SO_2 slant column precision (window2)" for 2024-12-22 to 2024-12-23

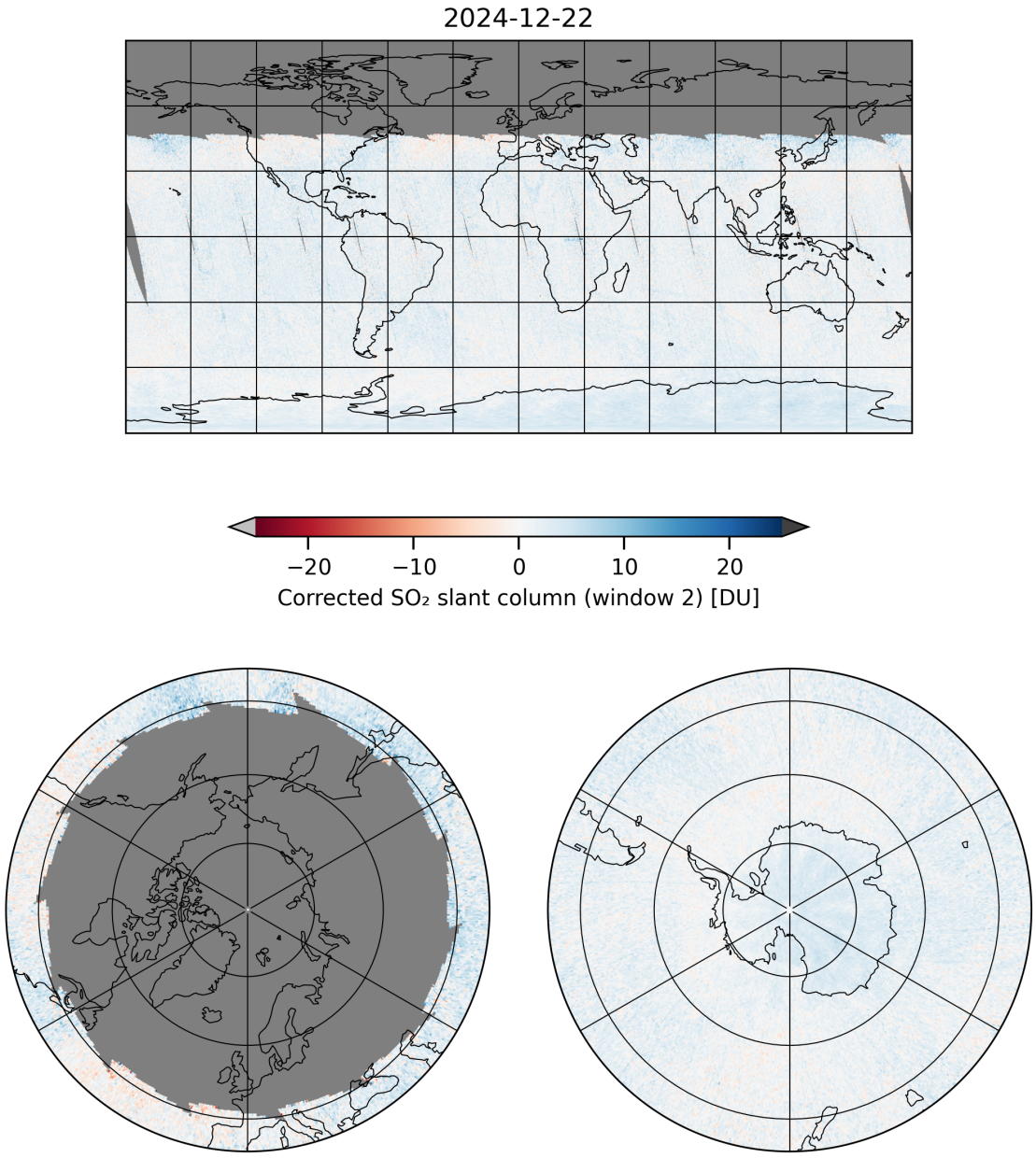

Figure 15: Map of "Corrected SO_2 slant column (window 2)" for 2024-12-22 to 2024-12-23

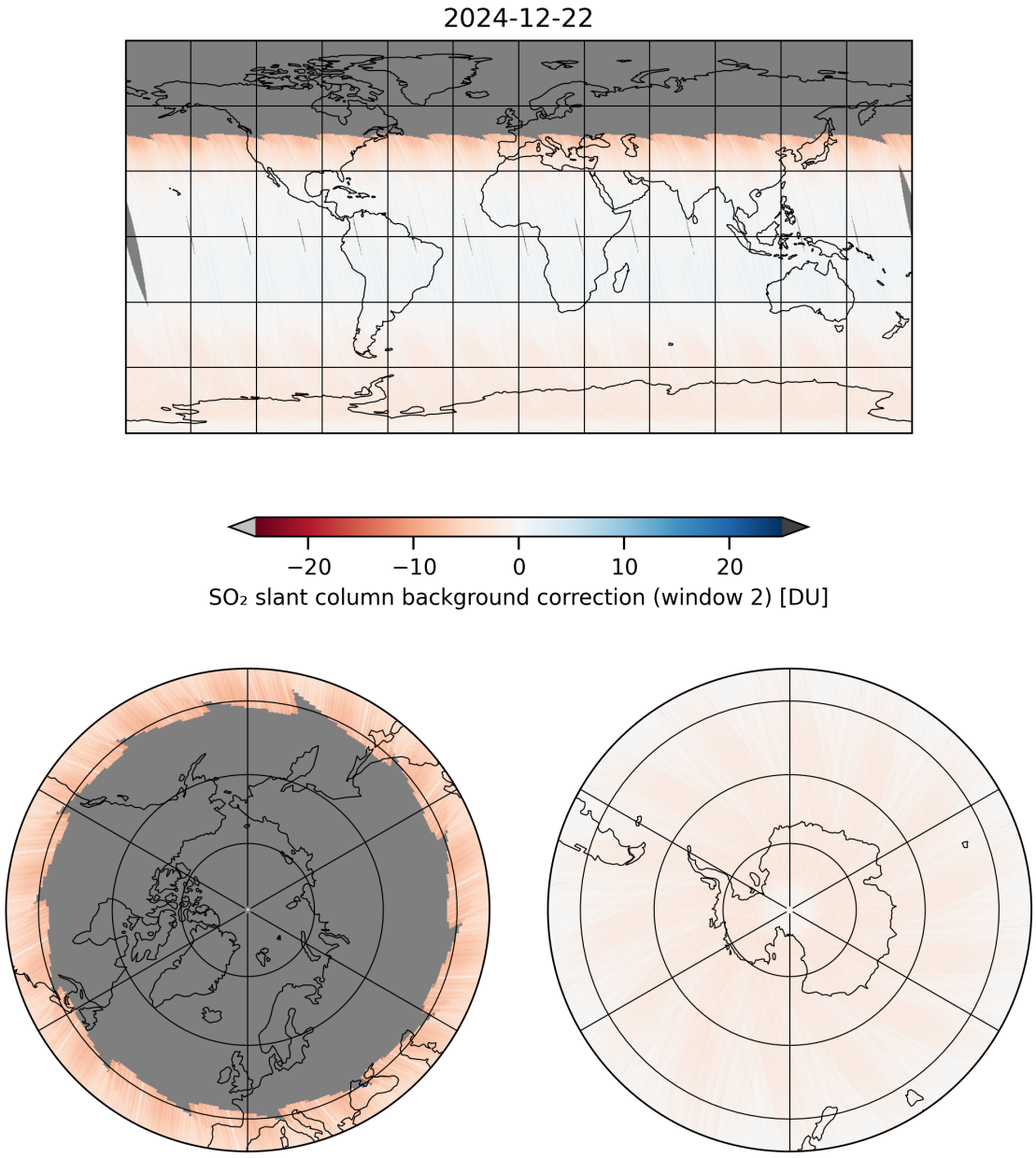

Figure 16: Map of "SO_2 slant column background correction (window 2)" for 2024-12-22 to 2024-12-23

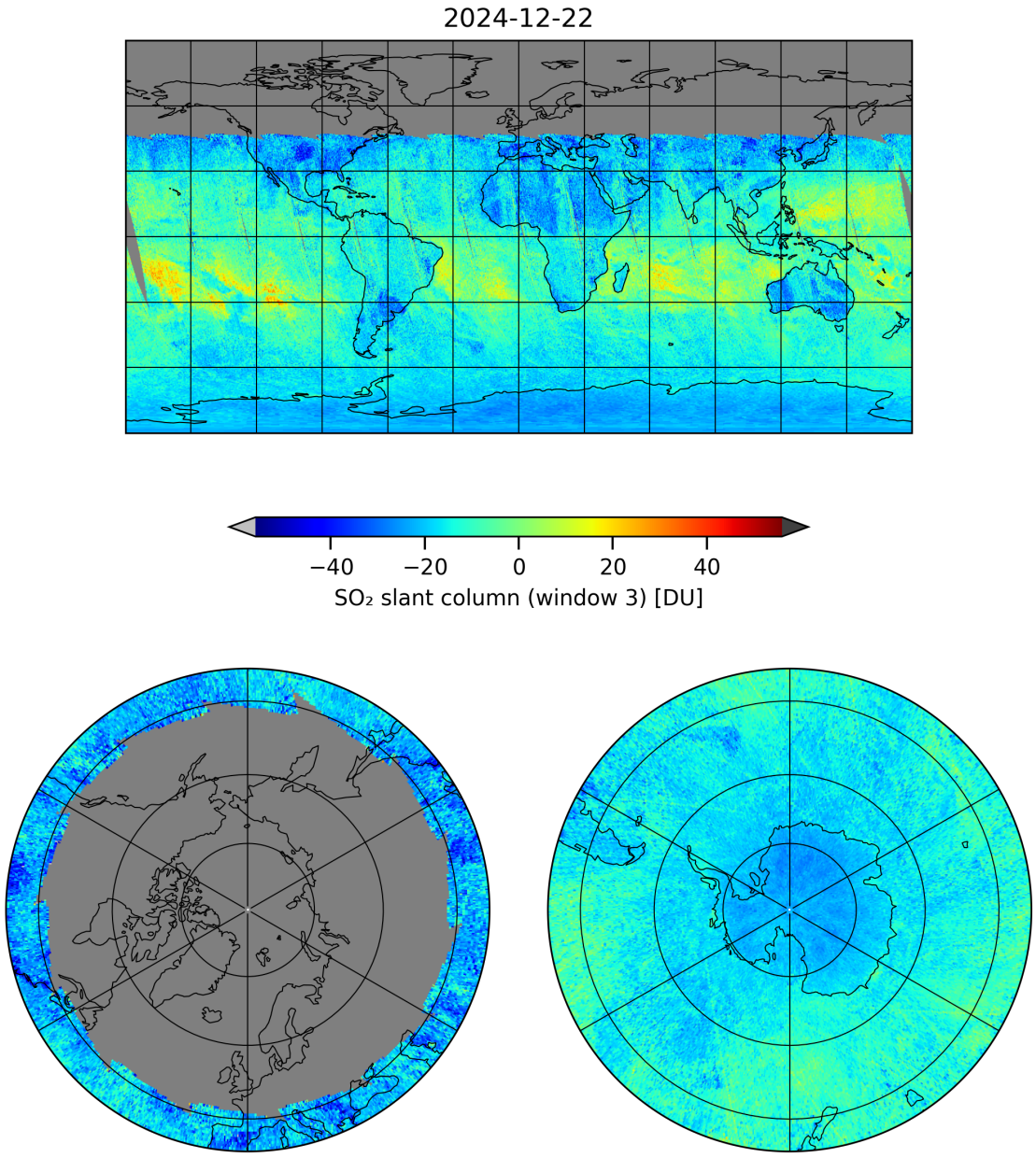

Figure 17: Map of "SO_2 slant column (window 3)" for 2024-12-22 to 2024-12-23

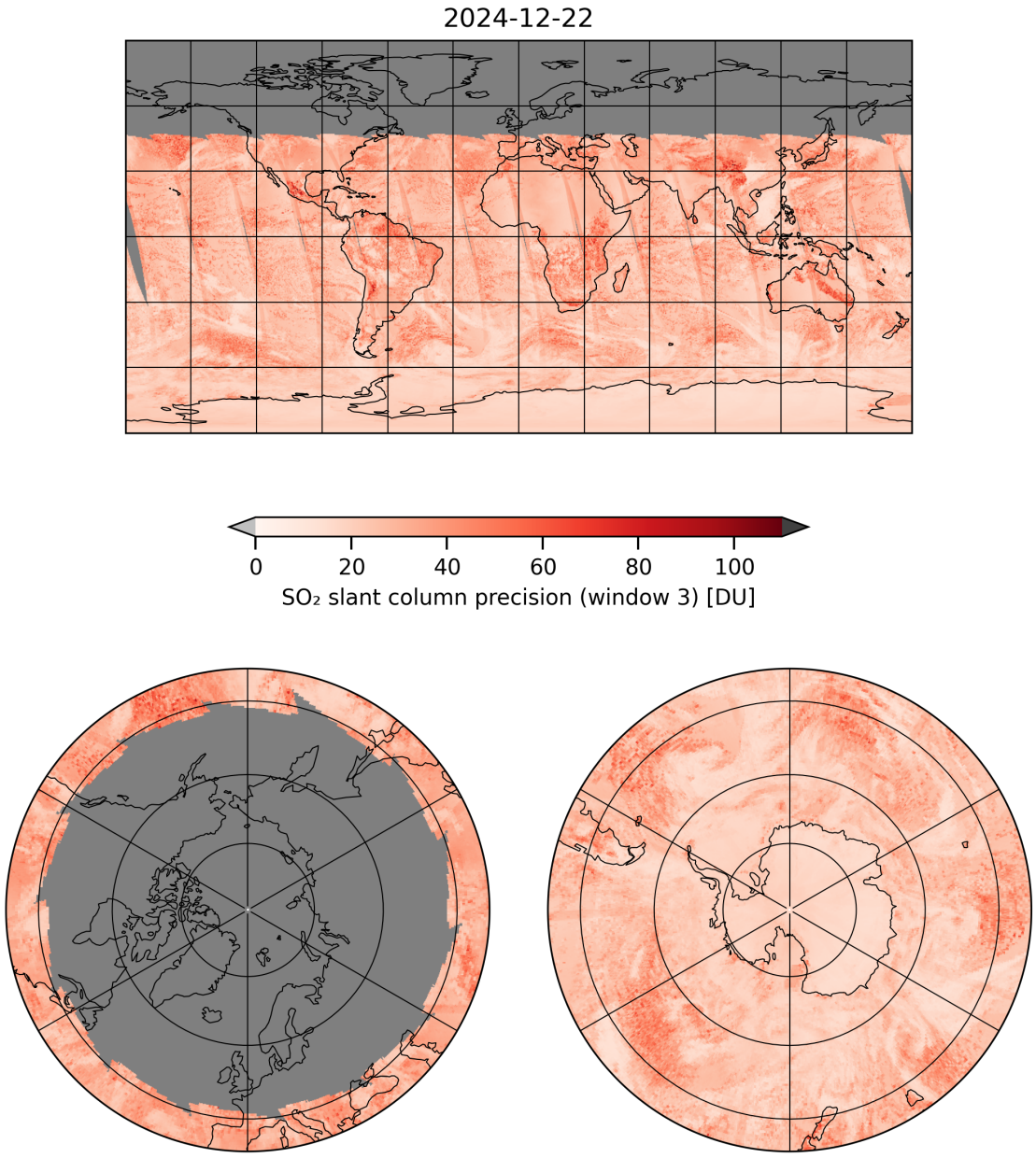

Figure 18: Map of "SO_2 slant column precision (window 3)" for 2024-12-22 to 2024-12-23

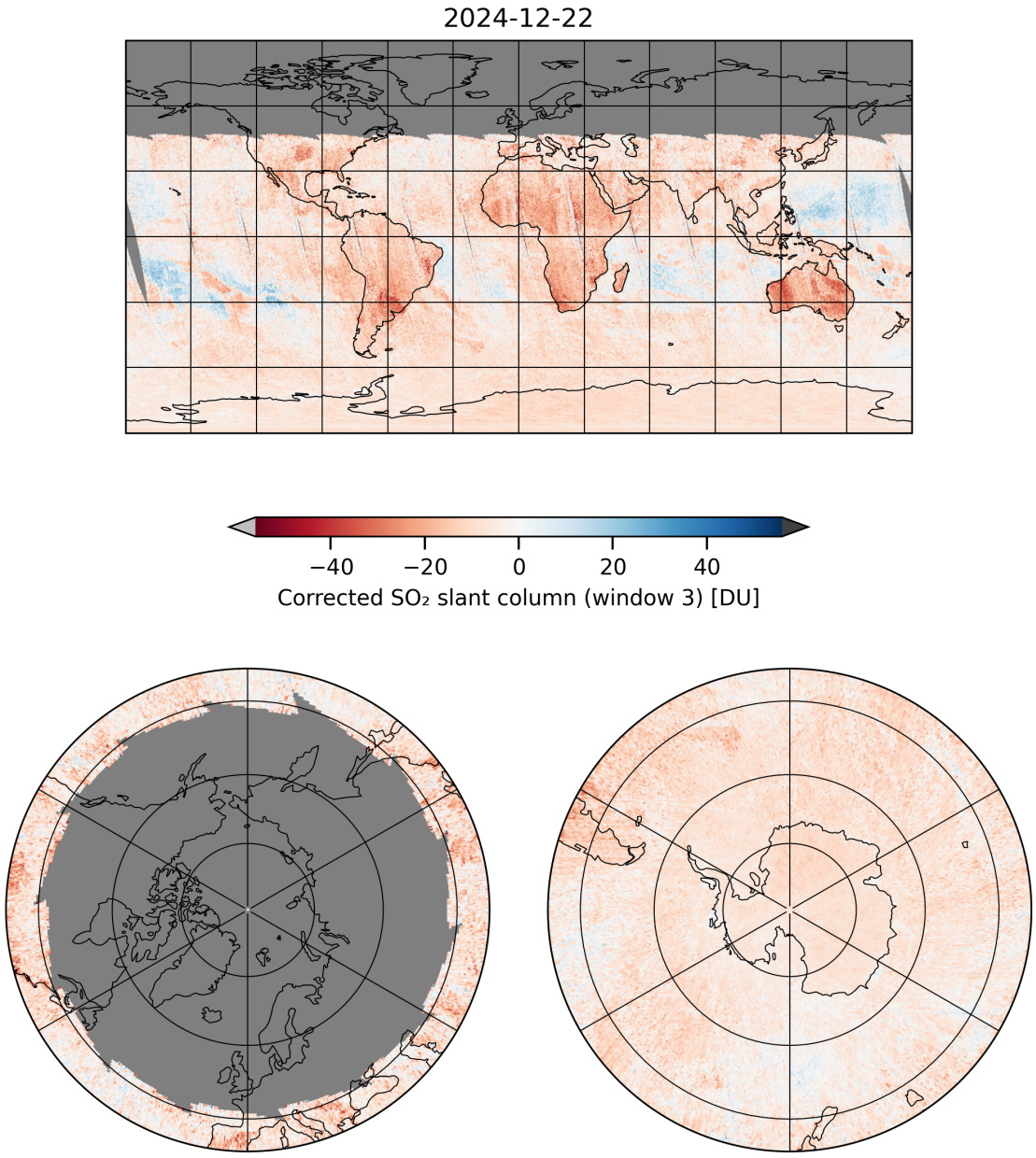

Figure 19: Map of "Corrected SO_2 slant column (window 3)" for 2024-12-22 to 2024-12-23

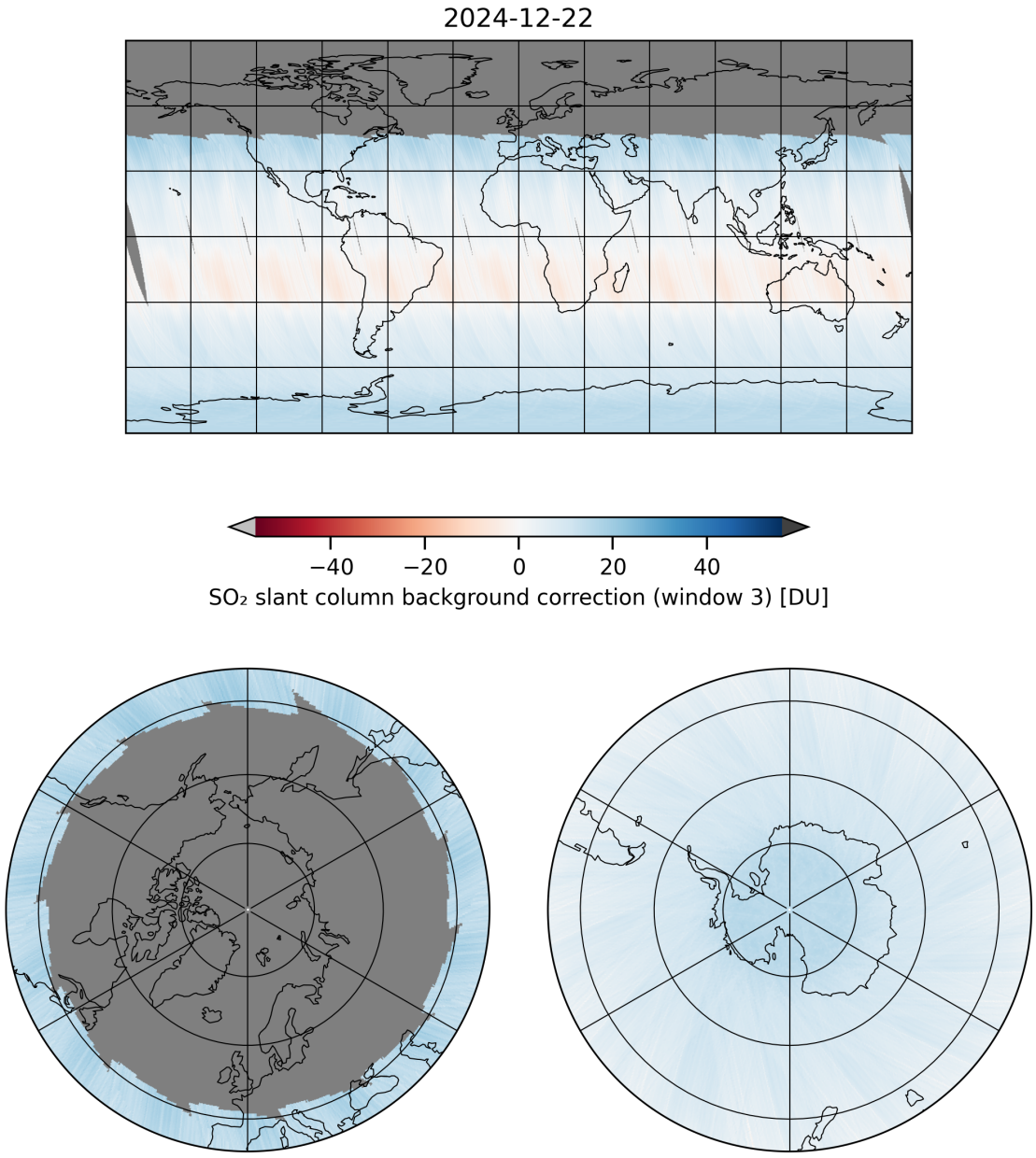

Figure 20: Map of "SO_2 slant column background correction (window 3)" for 2024-12-22 to 2024-12-23

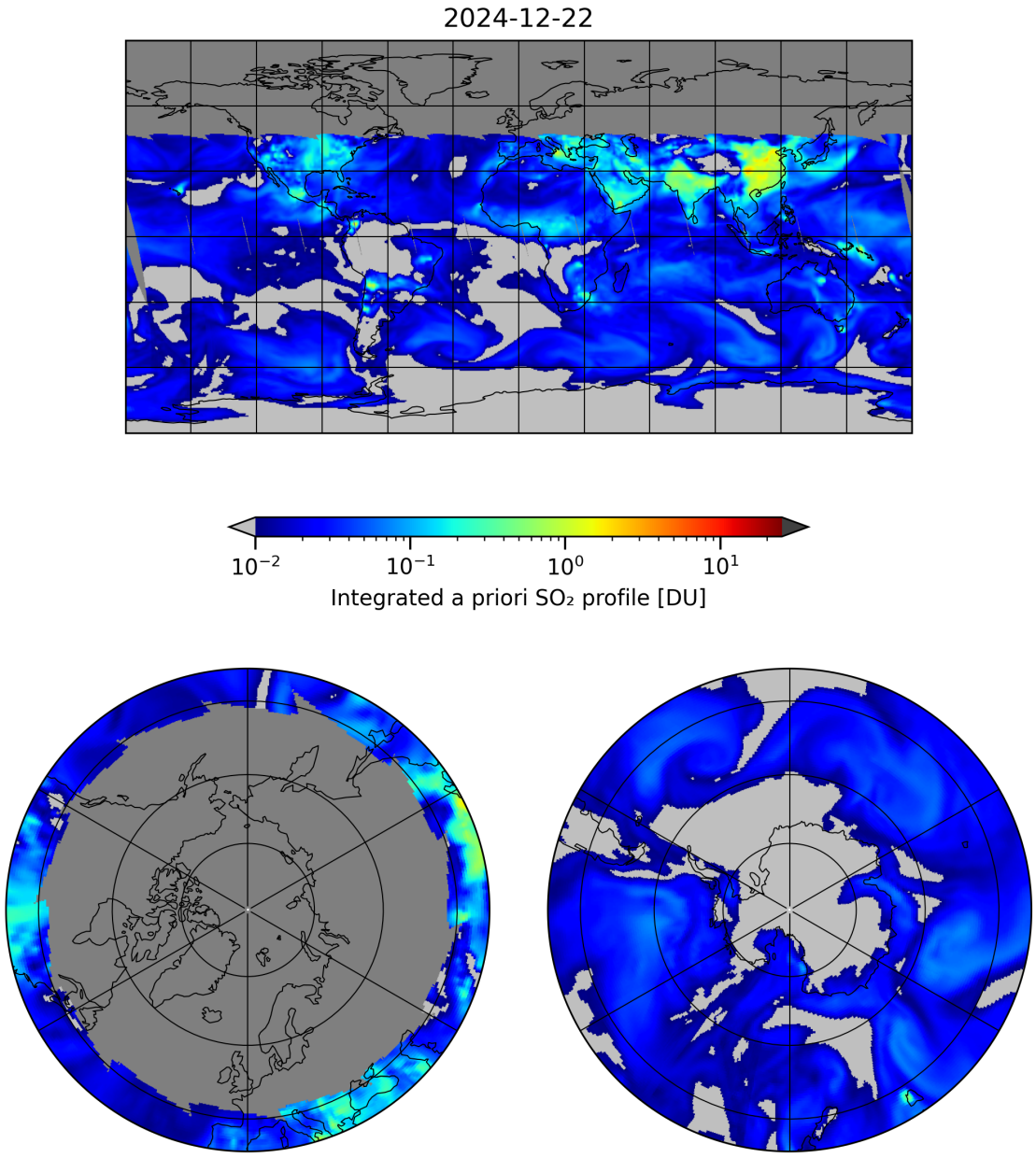

Figure 21: Map of “Integrated a priori SO_2 profile” for 2024-12-22 to 2024-12-23

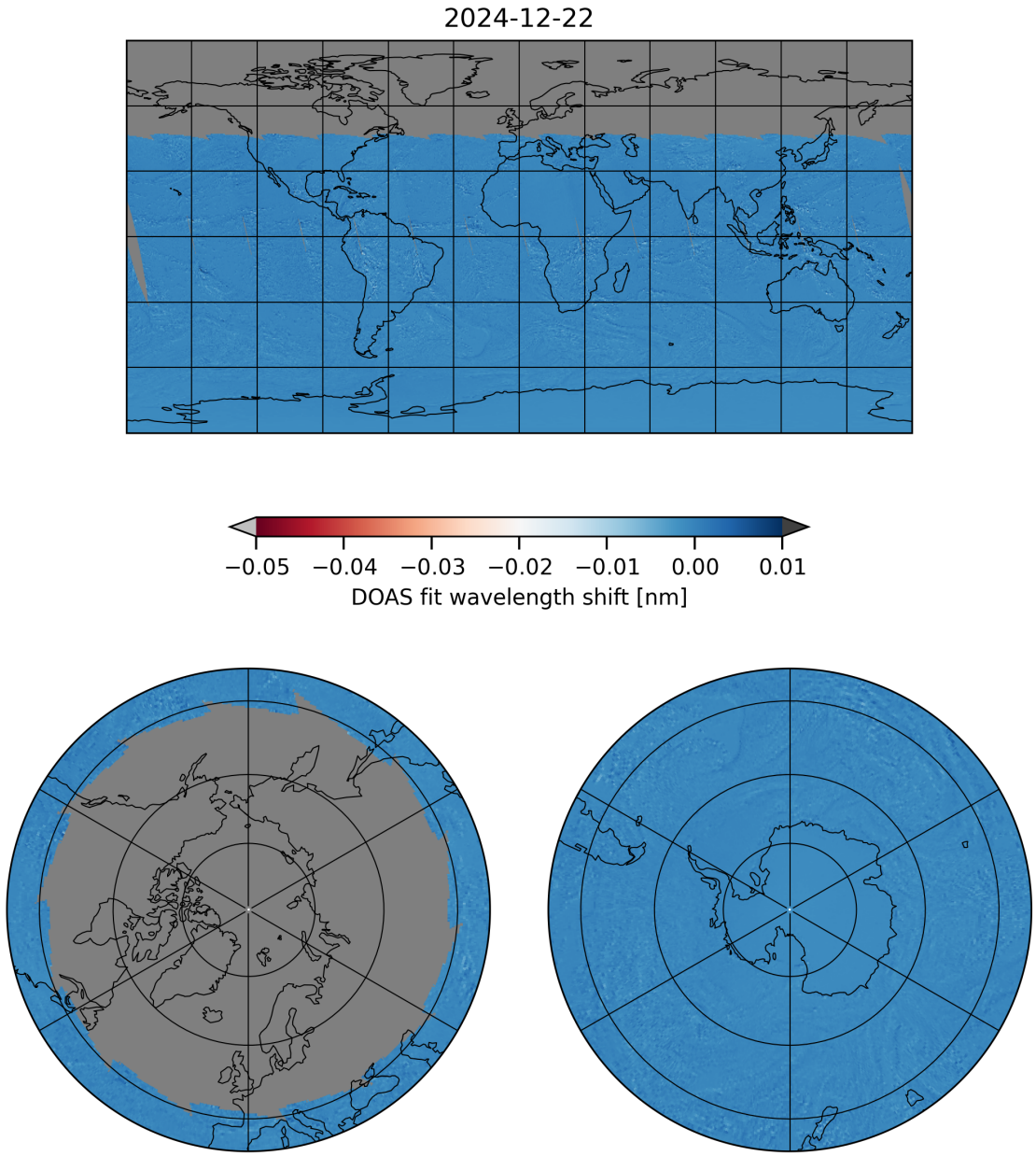

Figure 22: Map of “DOAS fit wavelength shift” for 2024-12-22 to 2024-12-23

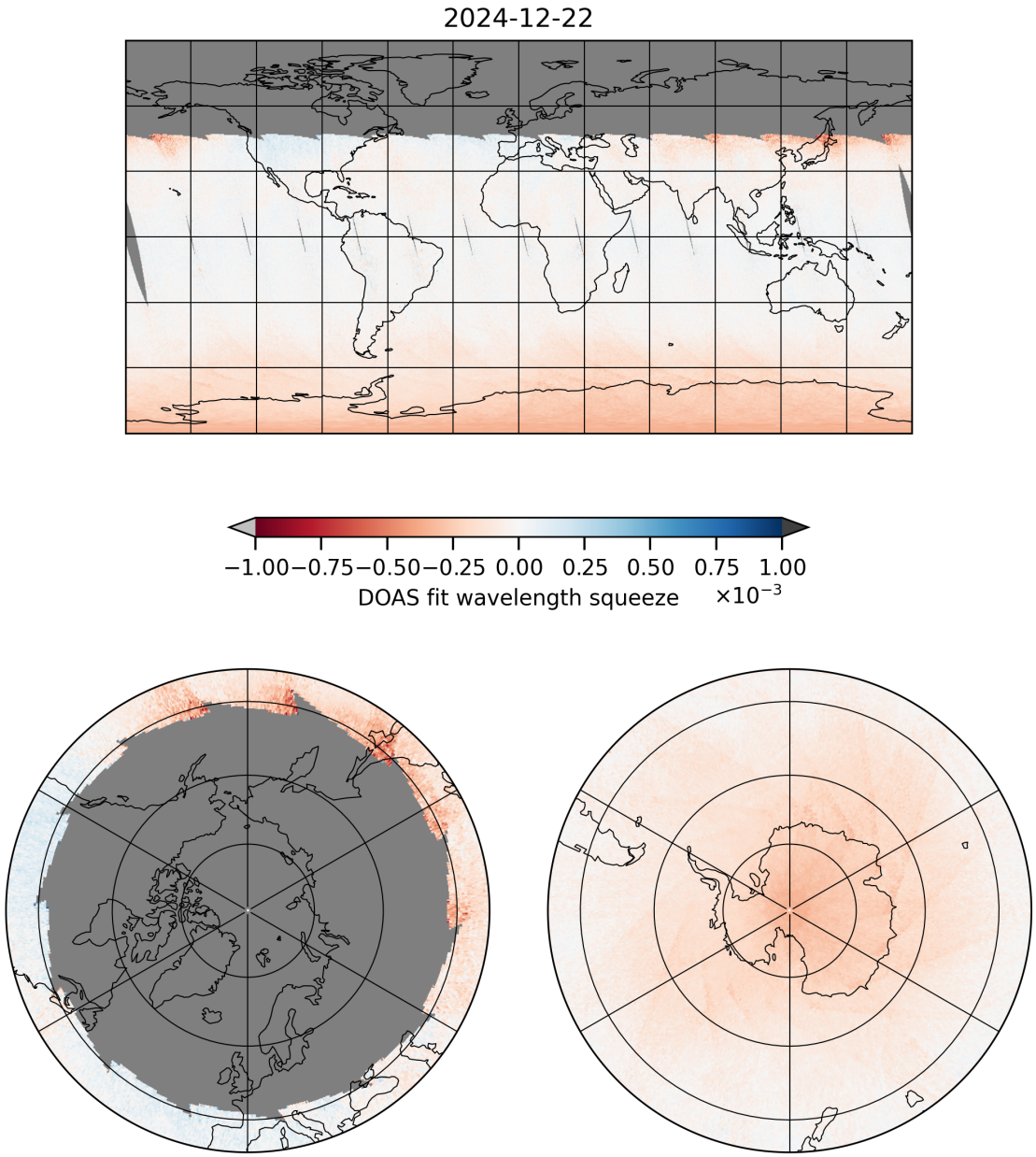

Figure 23: Map of “DOAS fit wavelength squeeze” for 2024-12-22 to 2024-12-23

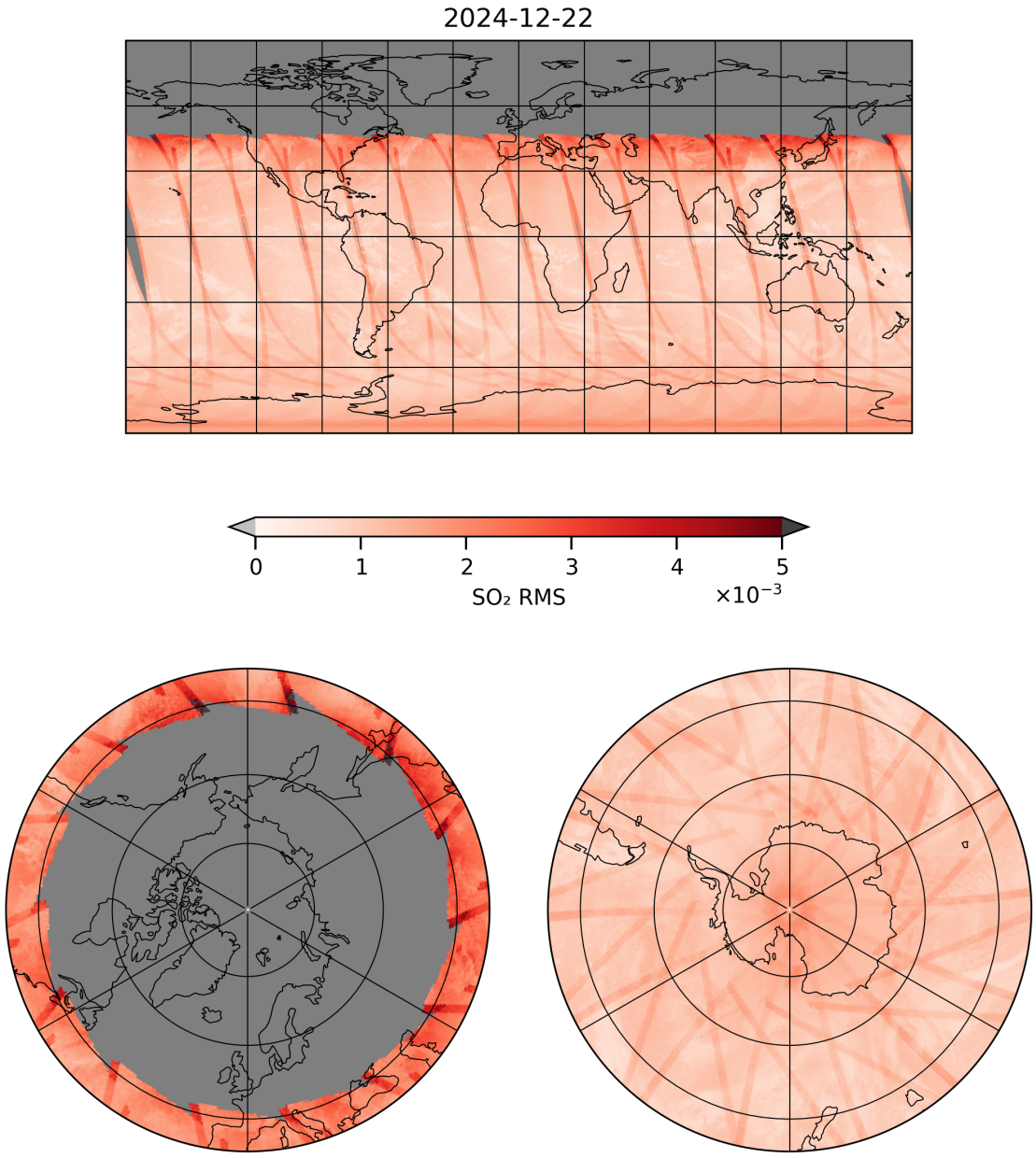

Figure 24: Map of "SO_2 RMS" for 2024-12-22 to 2024-12-23

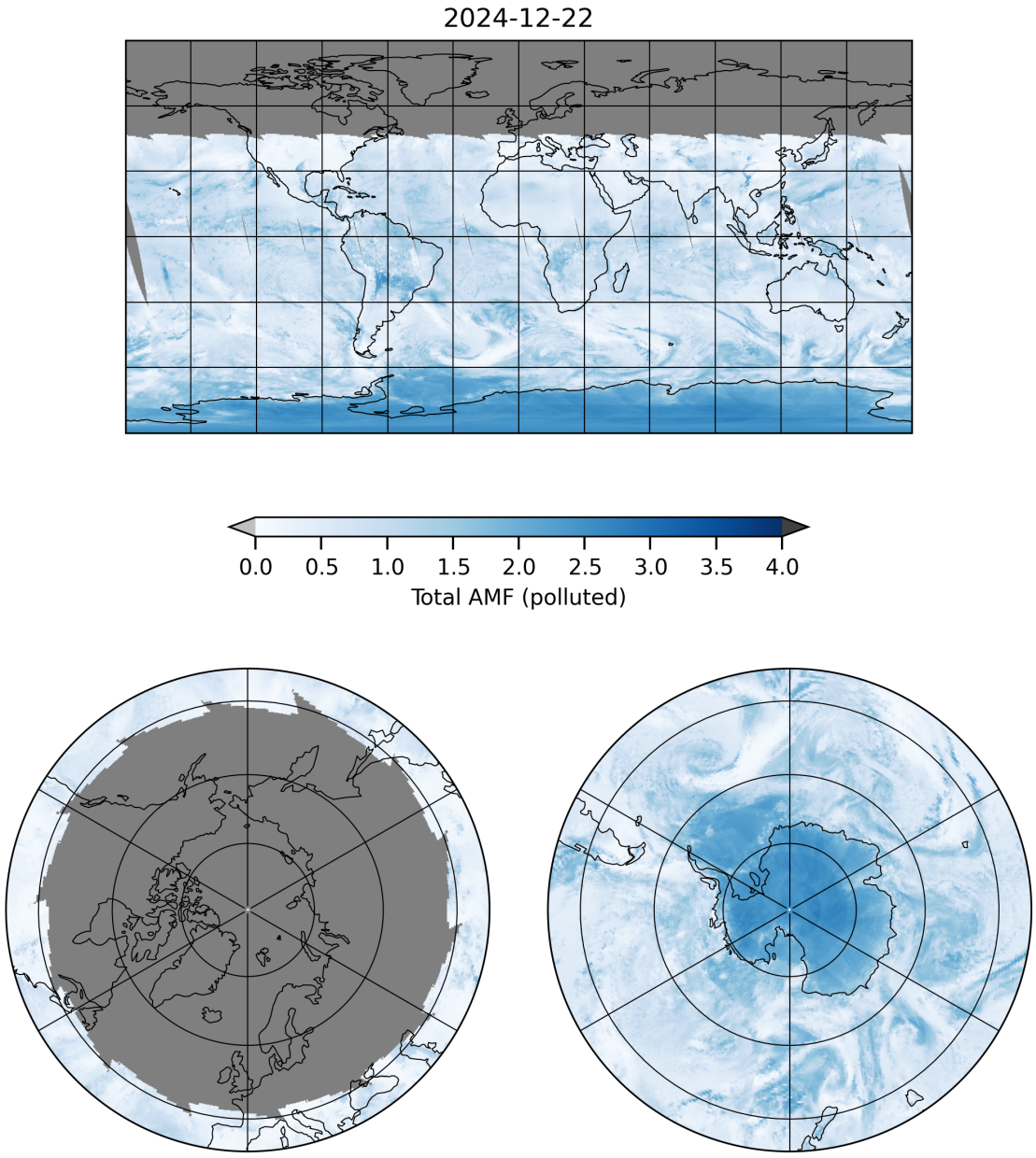

Figure 25: Map of “Total AMF (polluted)” for 2024-12-22 to 2024-12-23

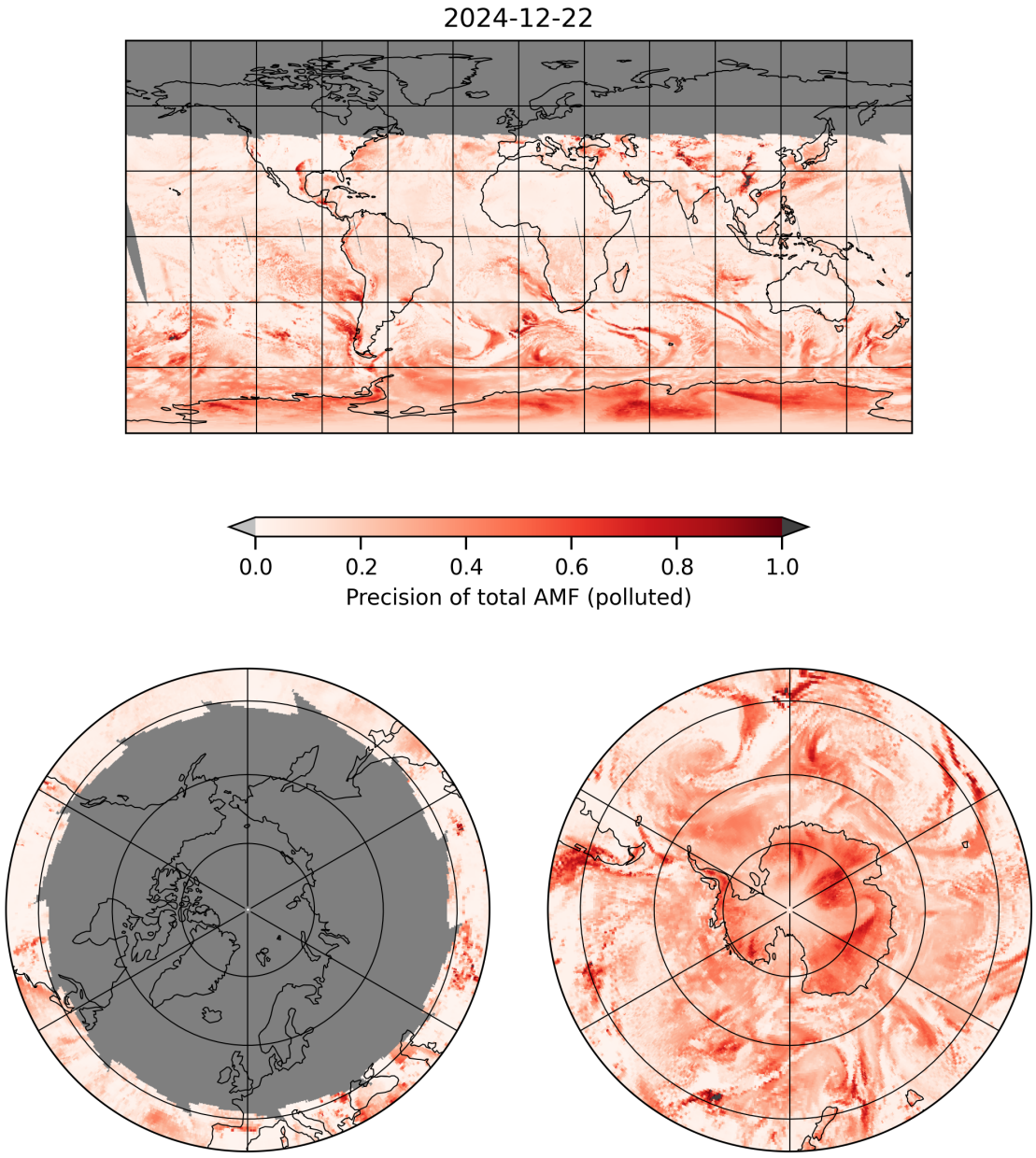

Figure 26: Map of “Precision of total AMF (polluted)” for 2024-12-22 to 2024-12-23

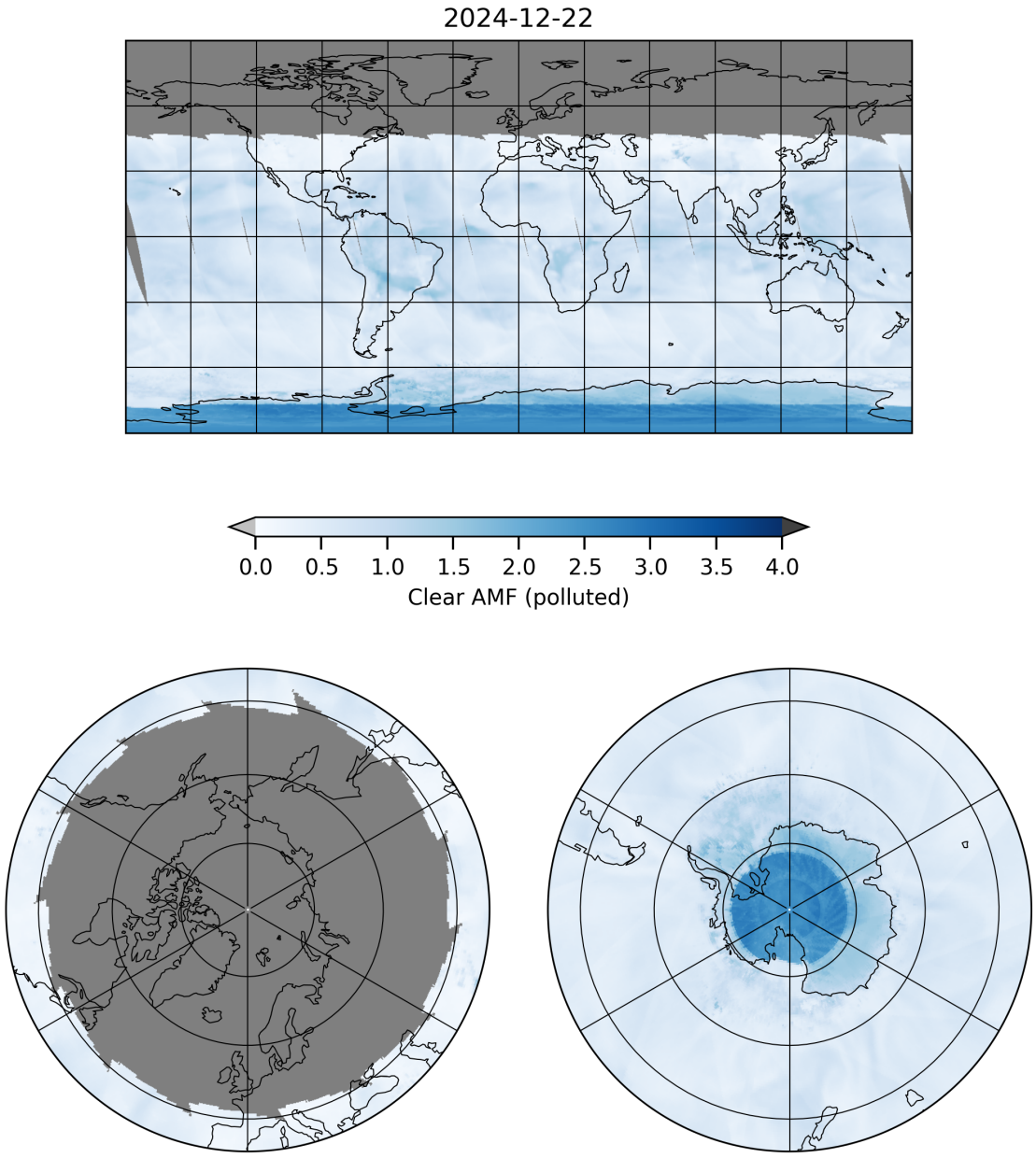

Figure 27: Map of “Clear AMF (polluted)” for 2024-12-22 to 2024-12-23

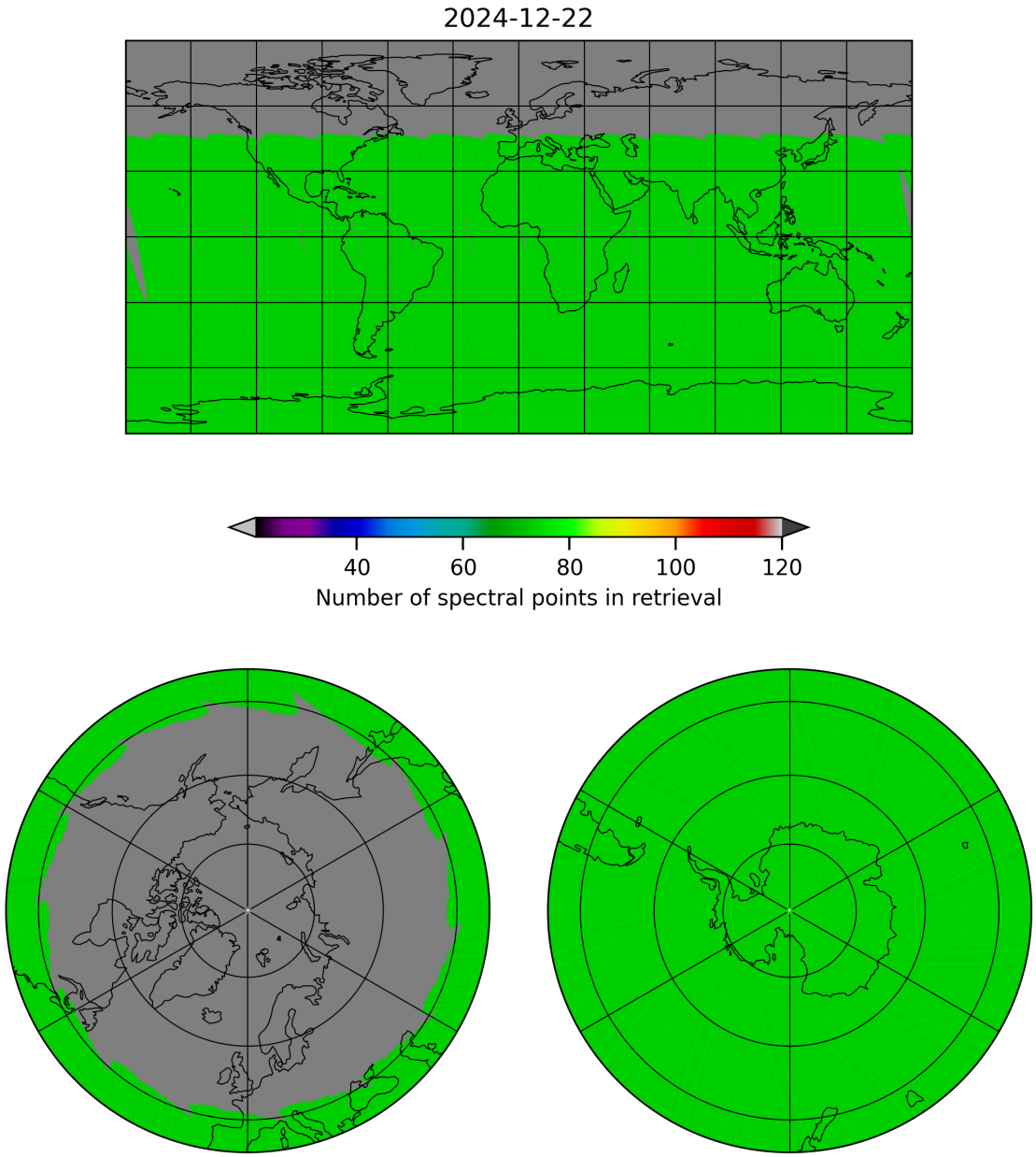

Figure 28: Map of “Number of spectral points in retrieval” for 2024-12-22 to 2024-12-23

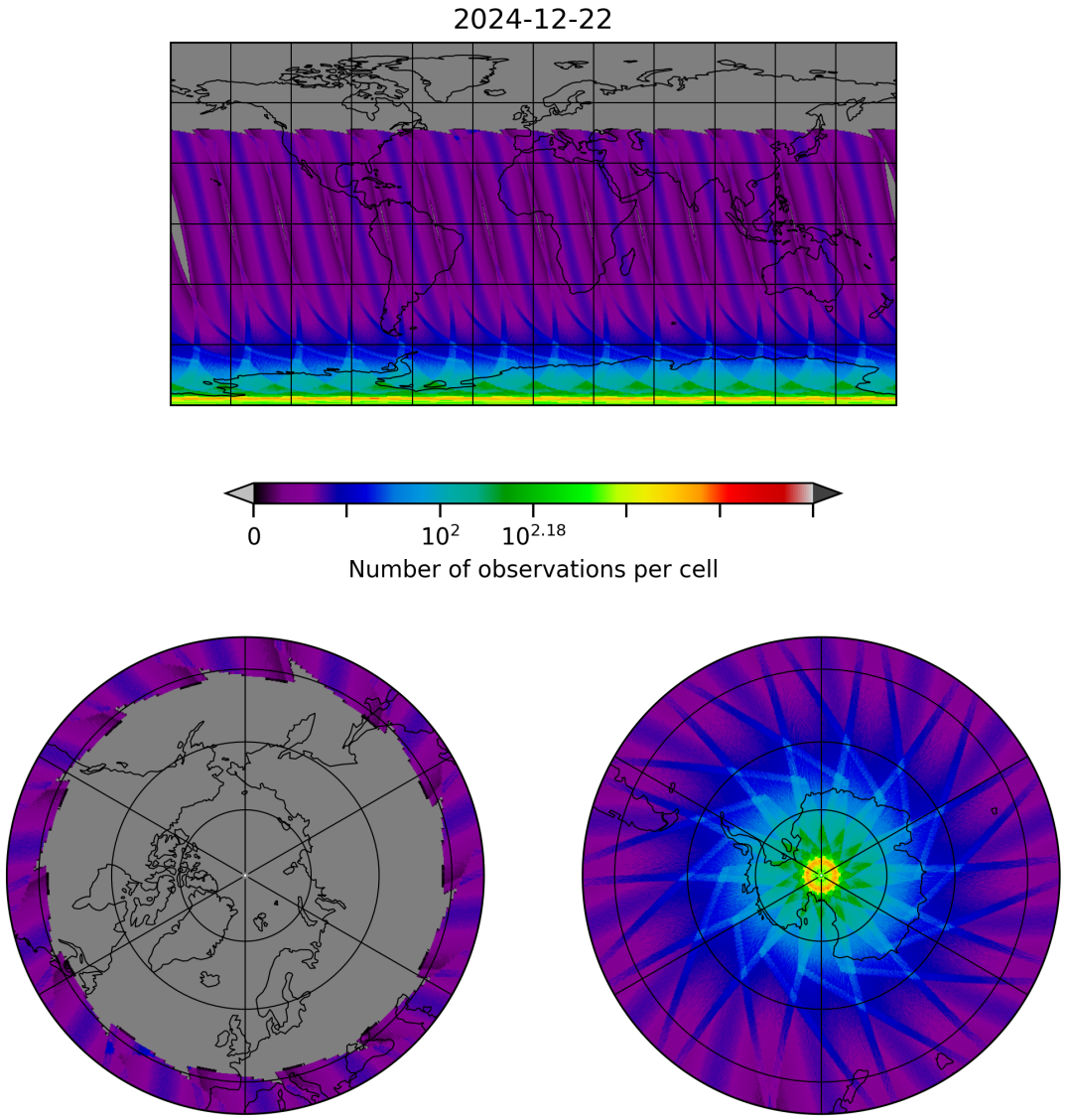

Figure 29: Map of the number of observations for 2024-12-22 to 2024-12-23

7 Zonal average

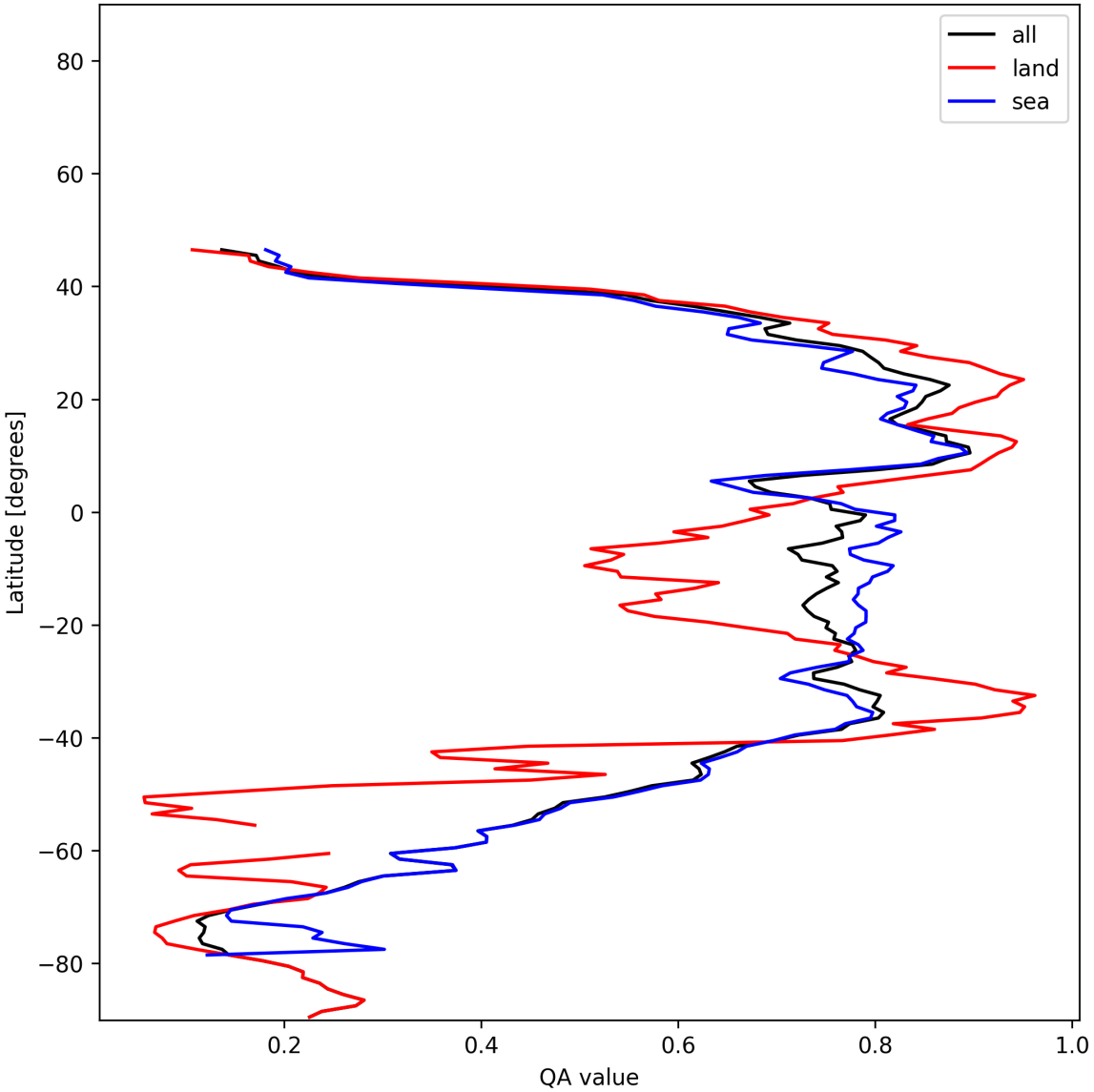

Figure 30: Zonal average of “QA value” for 2024-12-22 to 2024-12-23.

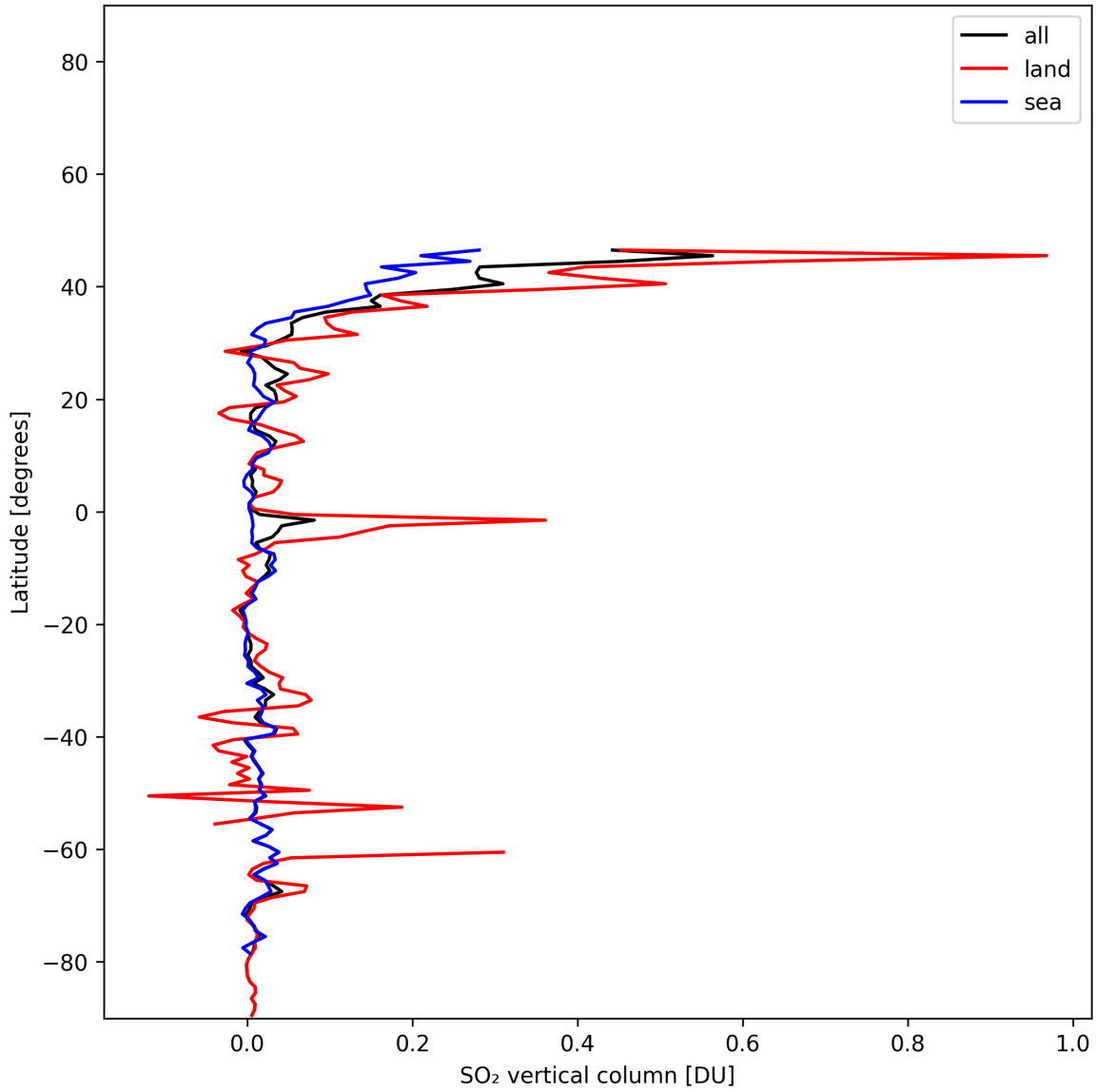

Figure 31: Zonal average of "SO_2 vertical column" for 2024-12-22 to 2024-12-23.

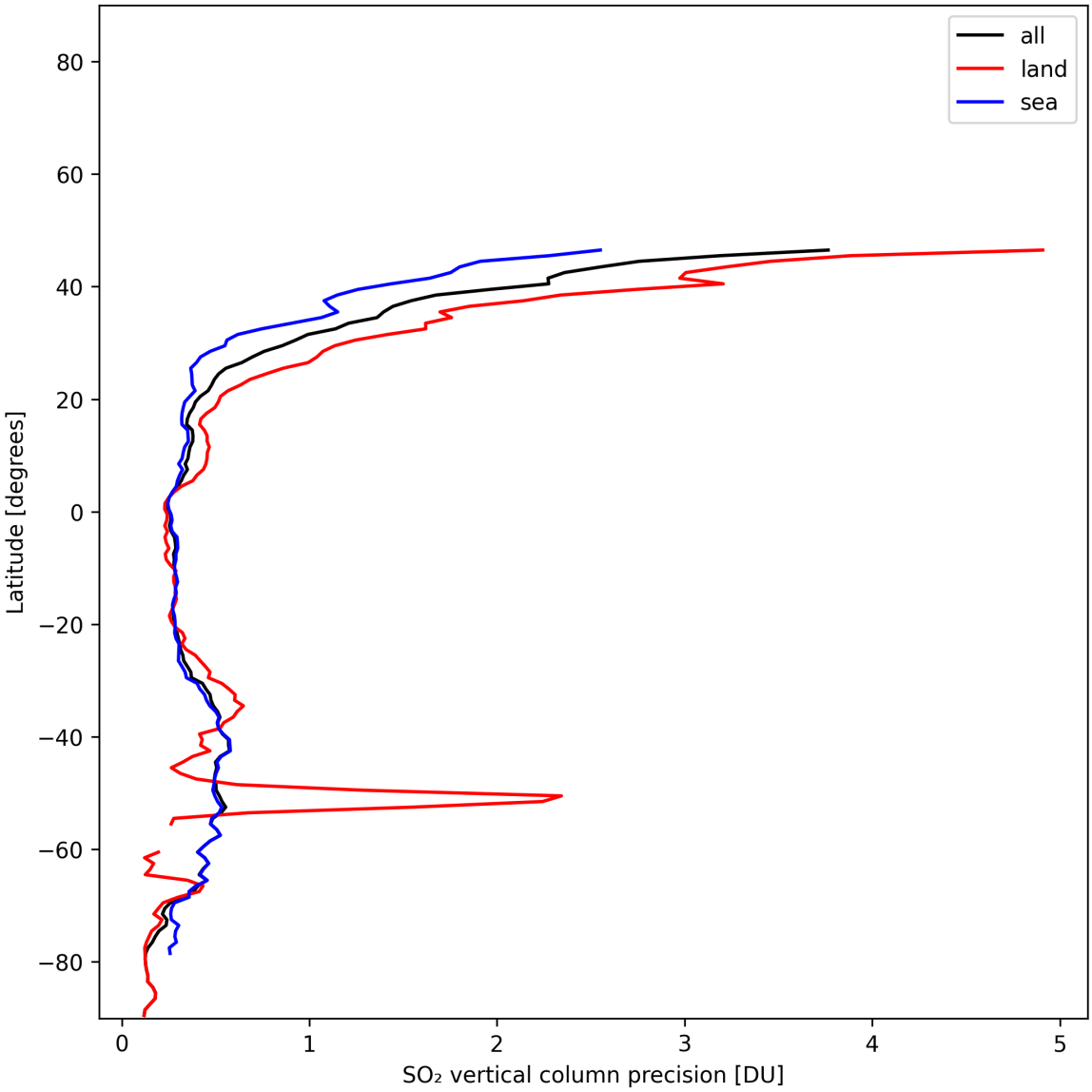

Figure 32: Zonal average of "SO_2 vertical column precision" for 2024-12-22 to 2024-12-23.

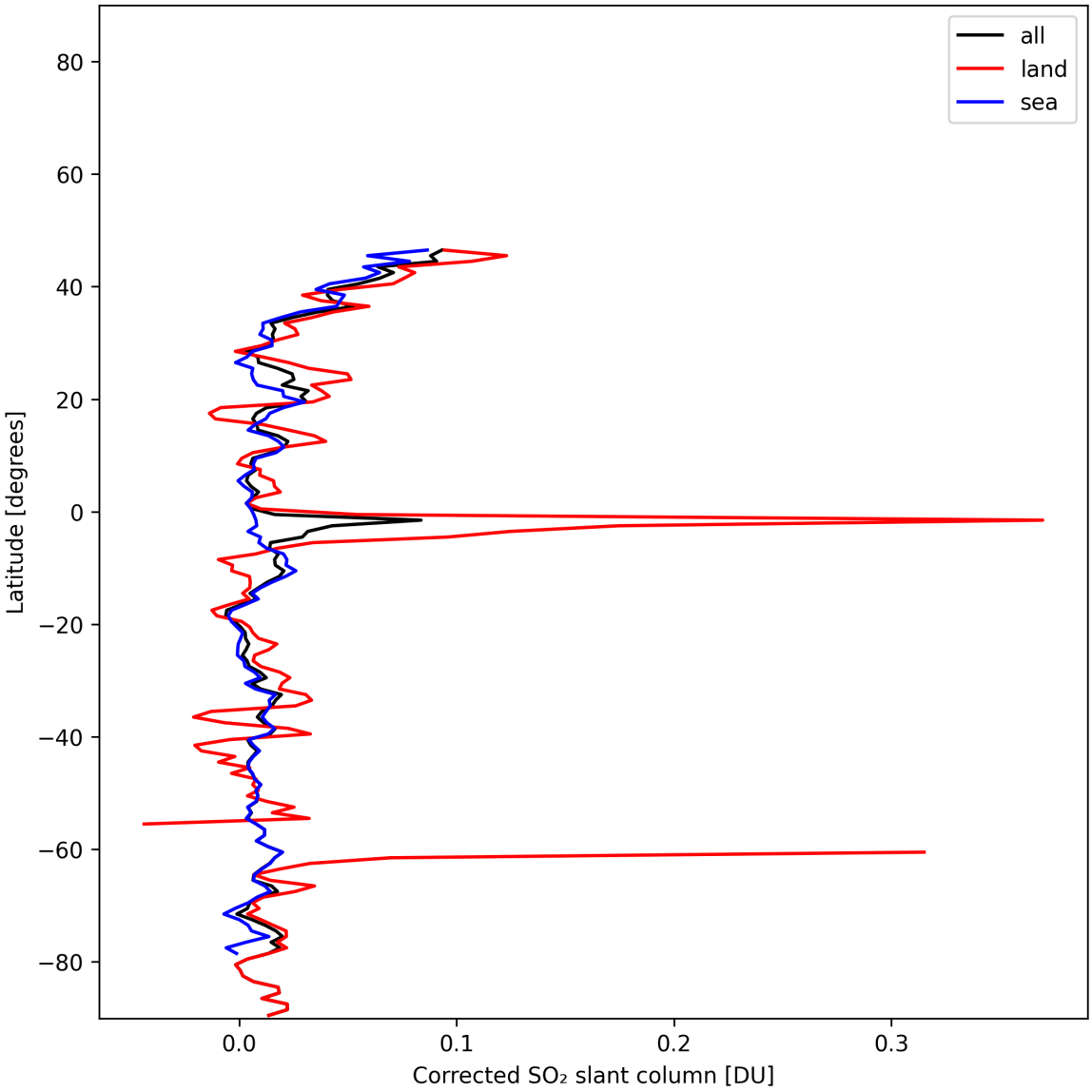

Figure 33: Zonal average of “Corrected SO_2 slant column” for 2024-12-22 to 2024-12-23.

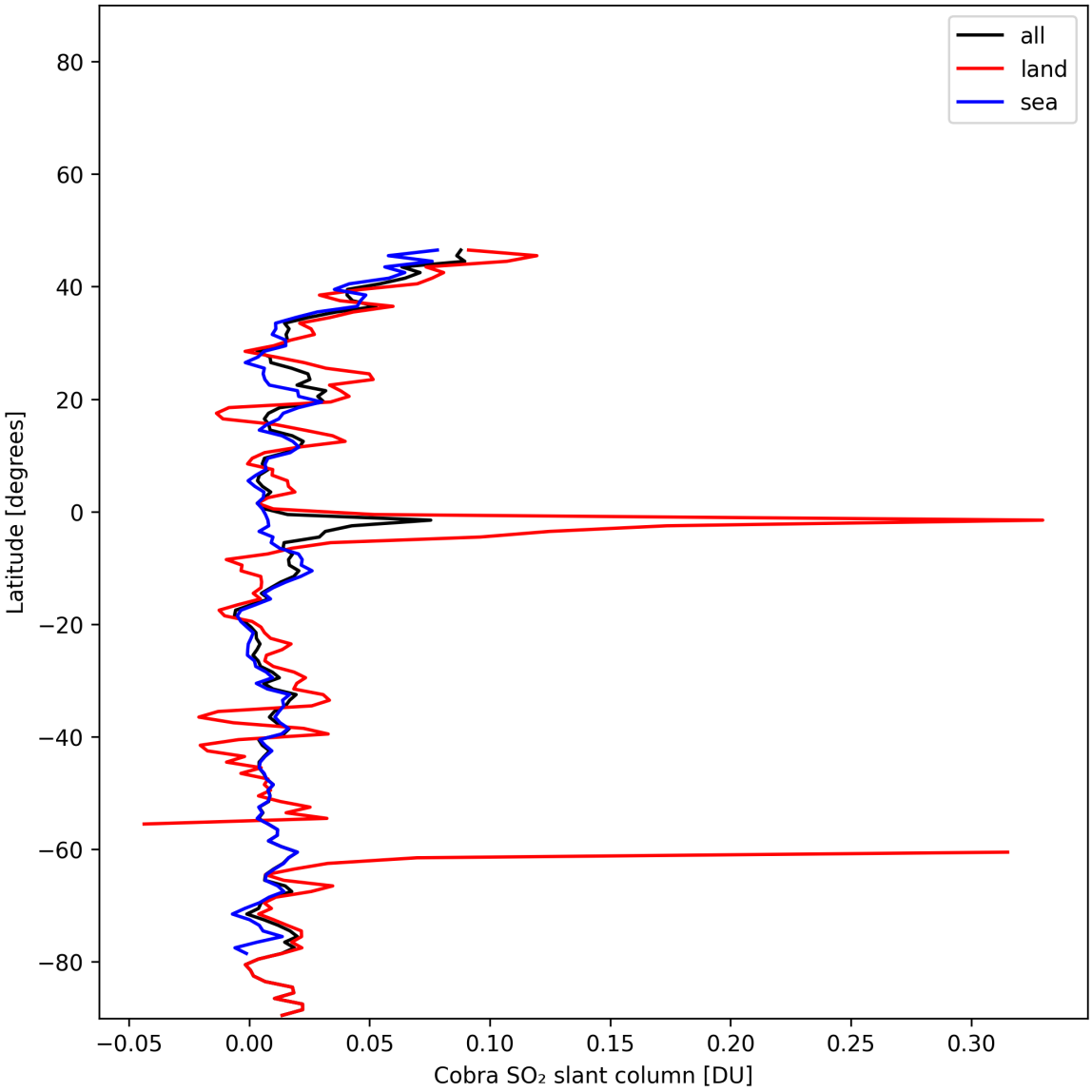

Figure 34: Zonal average of "Cobra SO_2 slant column" for 2024-12-22 to 2024-12-23.

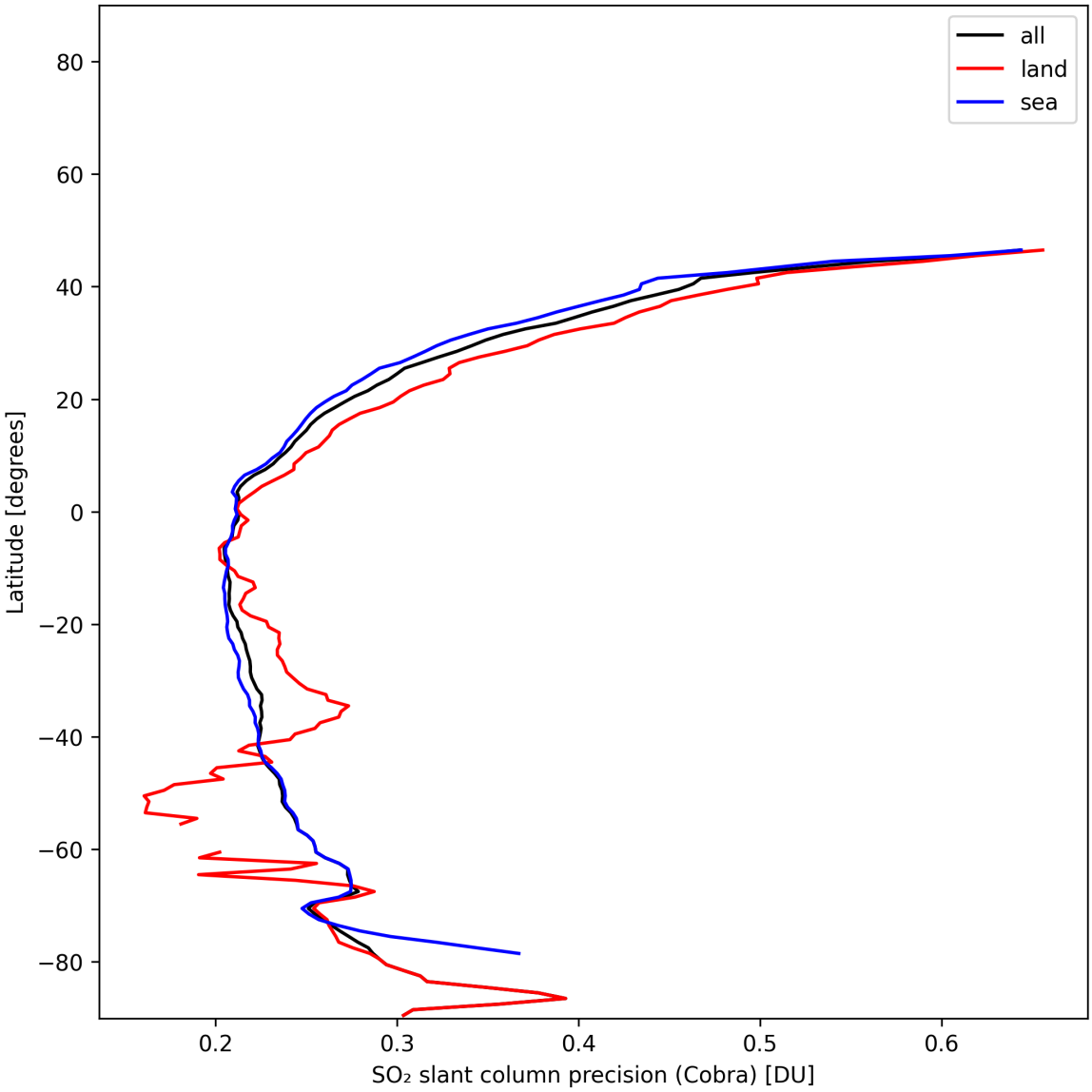

Figure 35: Zonal average of "SO_2 slant column precision (Cobra)" for 2024-12-22 to 2024-12-23.

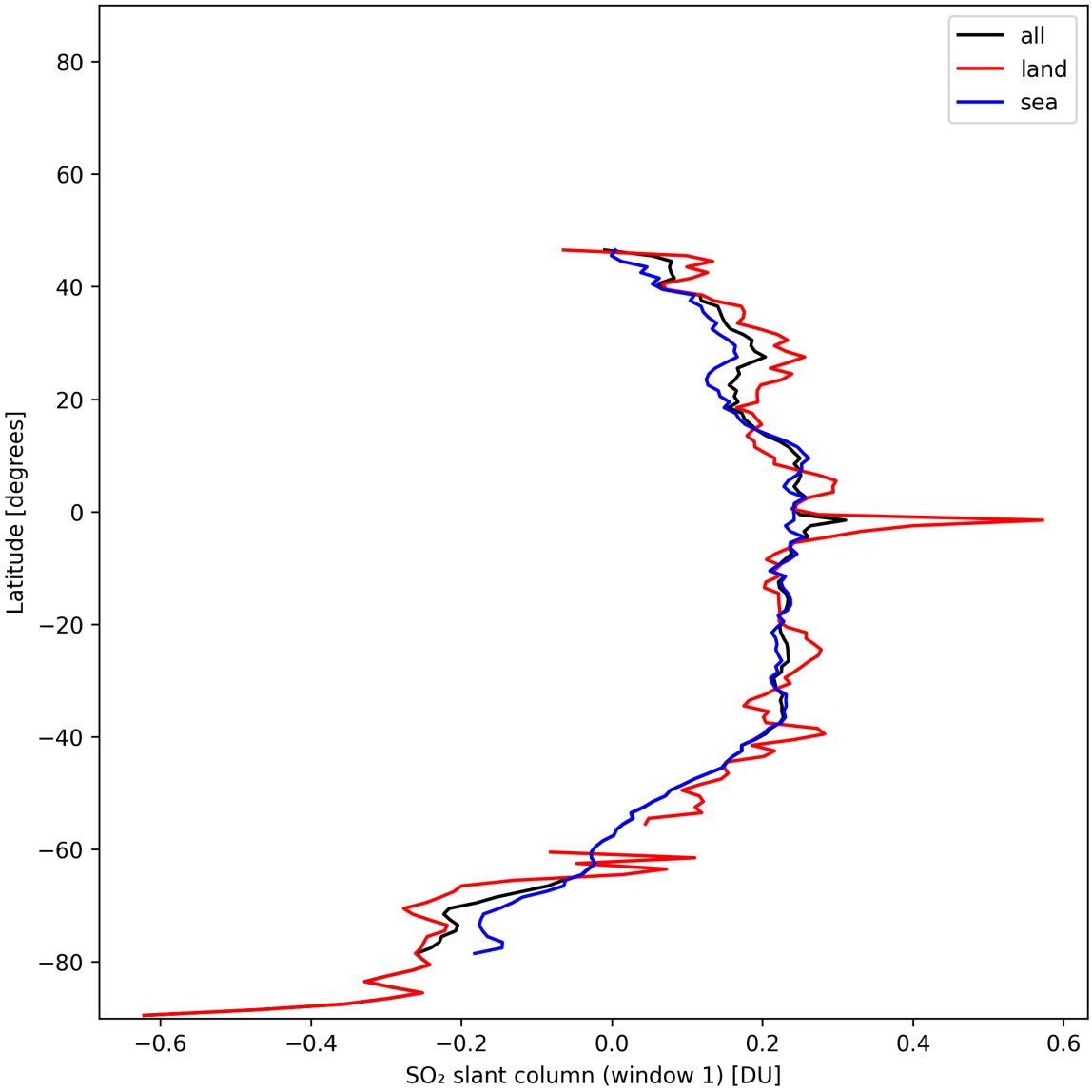

Figure 36: Zonal average of "SO_2 slant column (window 1)" for 2024-12-22 to 2024-12-23.

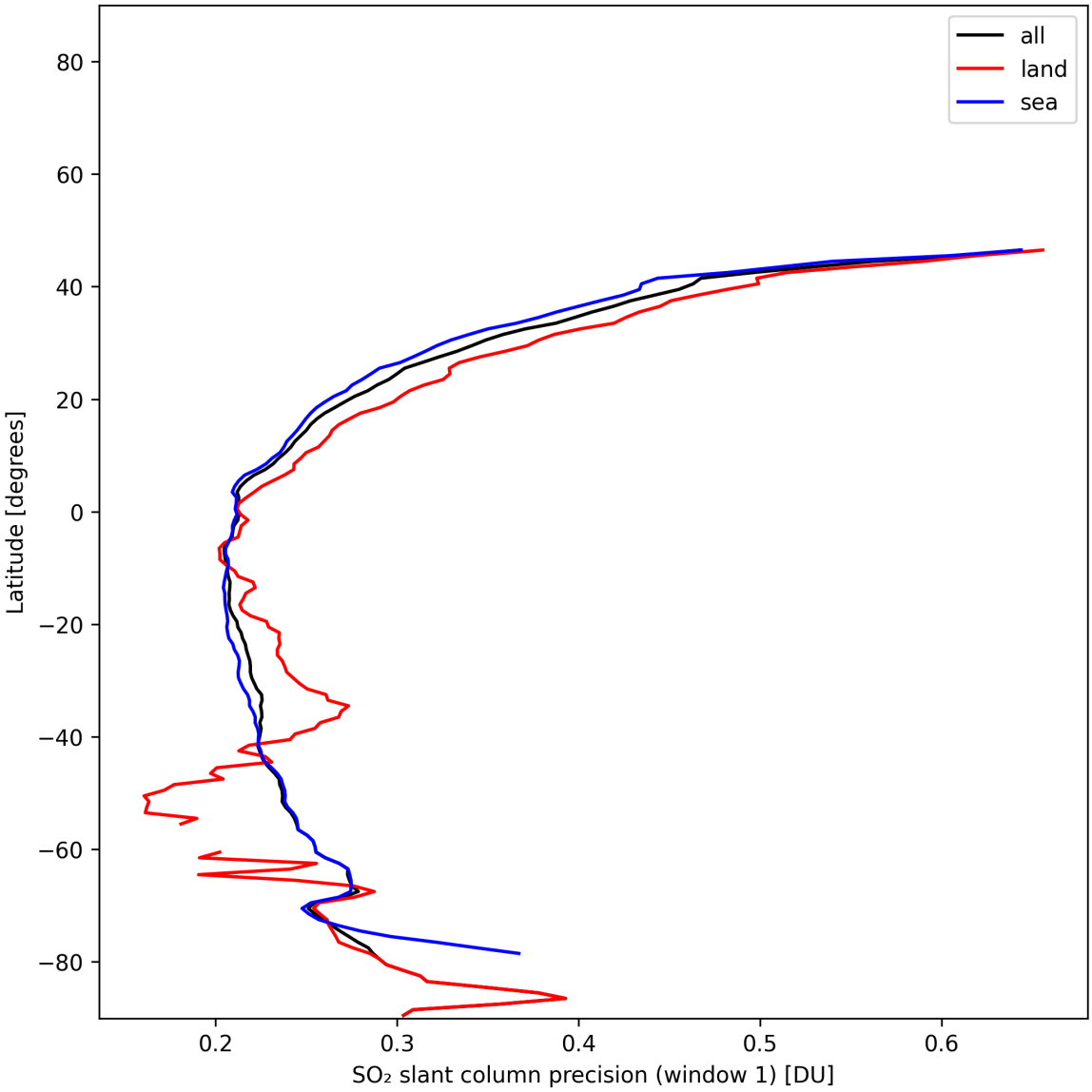

Figure 37: Zonal average of "SO_2 slant column precision (window 1)" for 2024-12-22 to 2024-12-23.

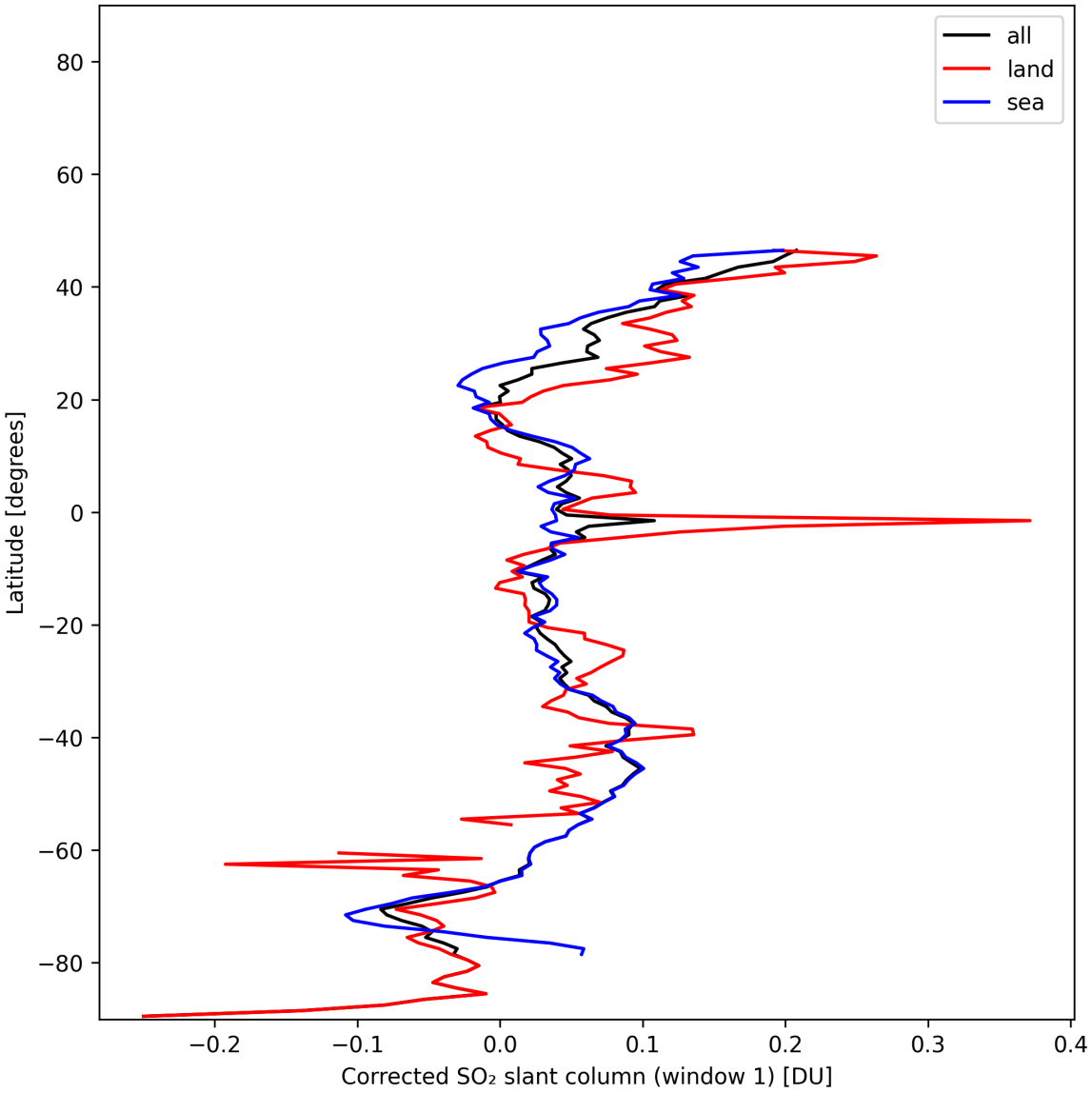

Figure 38: Zonal average of "Corrected SO_2 slant column (window 1)" for 2024-12-22 to 2024-12-23.

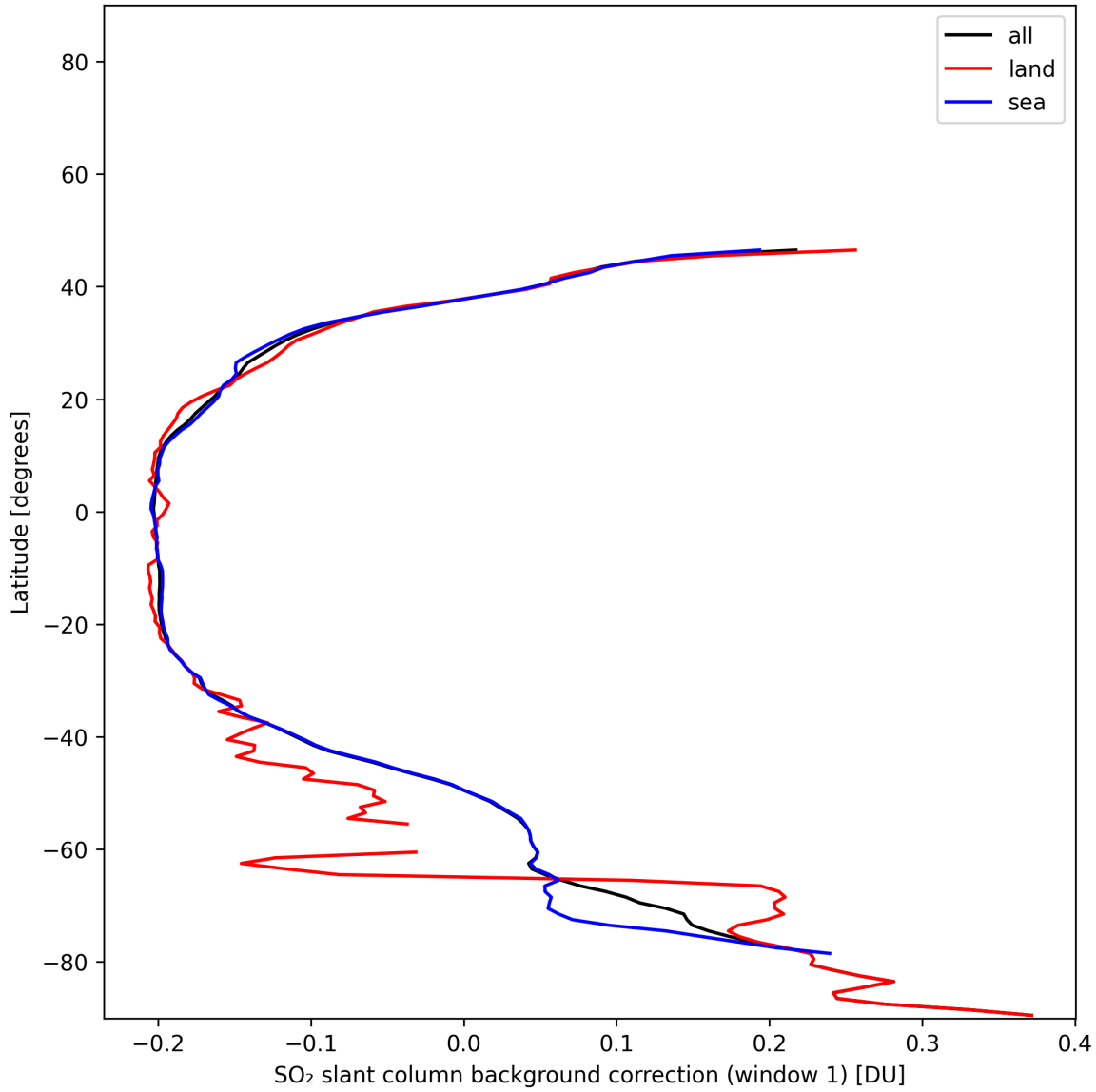

Figure 39: Zonal average of "SO_2 slant column background correction (window 1)" for 2024-12-22 to 2024-12-23.

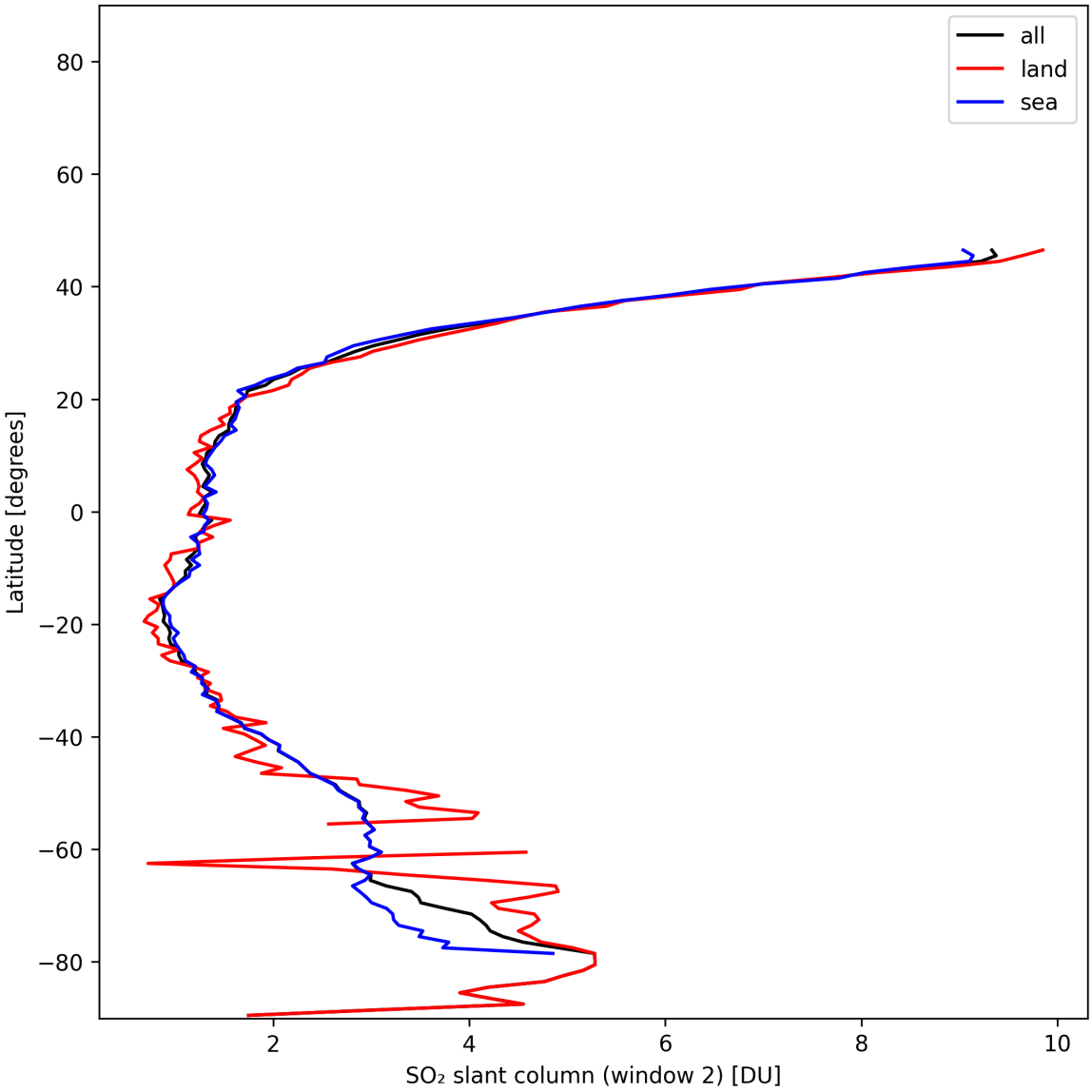

Figure 40: Zonal average of "SO_2 slant column (window 2)" for 2024-12-22 to 2024-12-23.

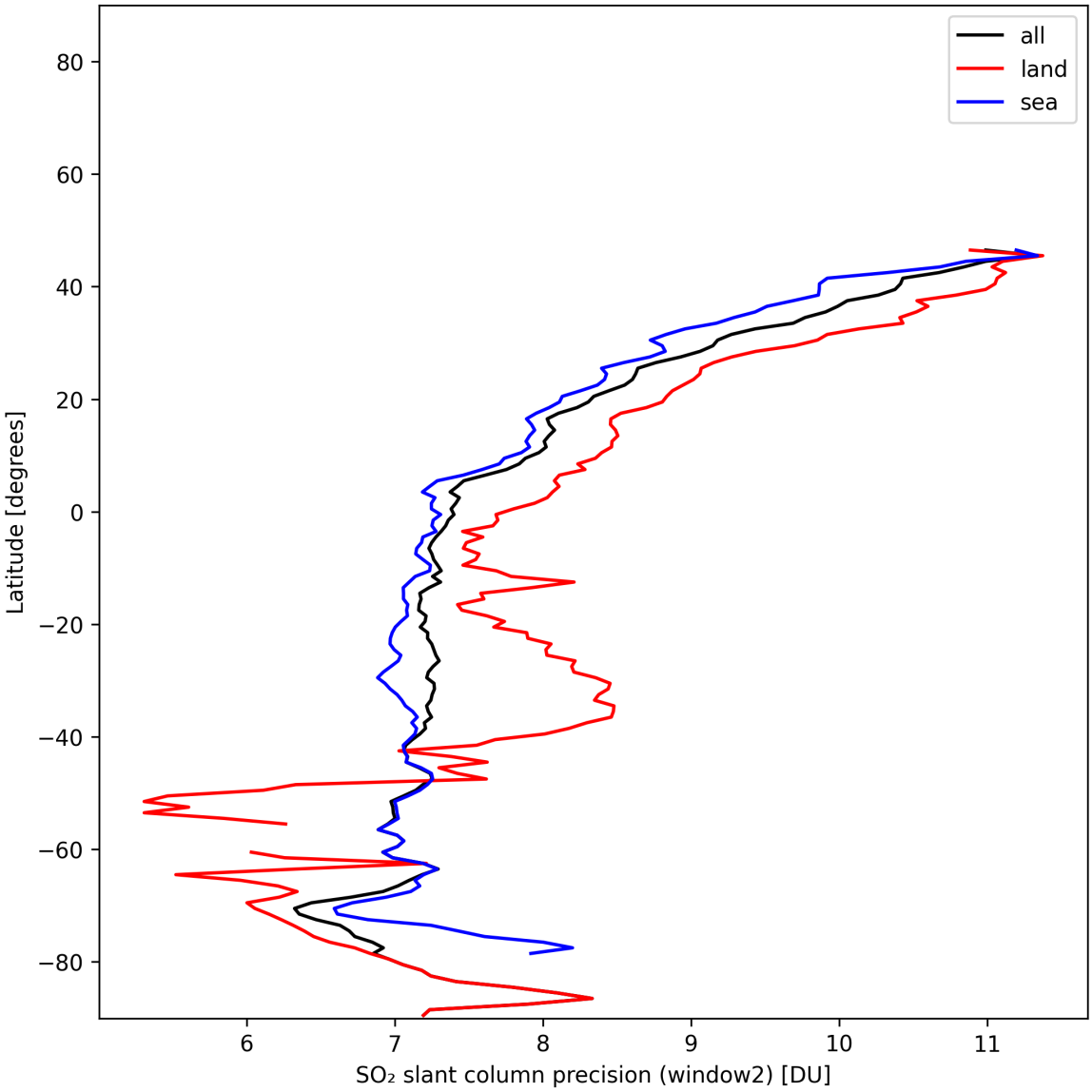

Figure 41: Zonal average of "SO_2 slant column precision (window2)" for 2024-12-22 to 2024-12-23.

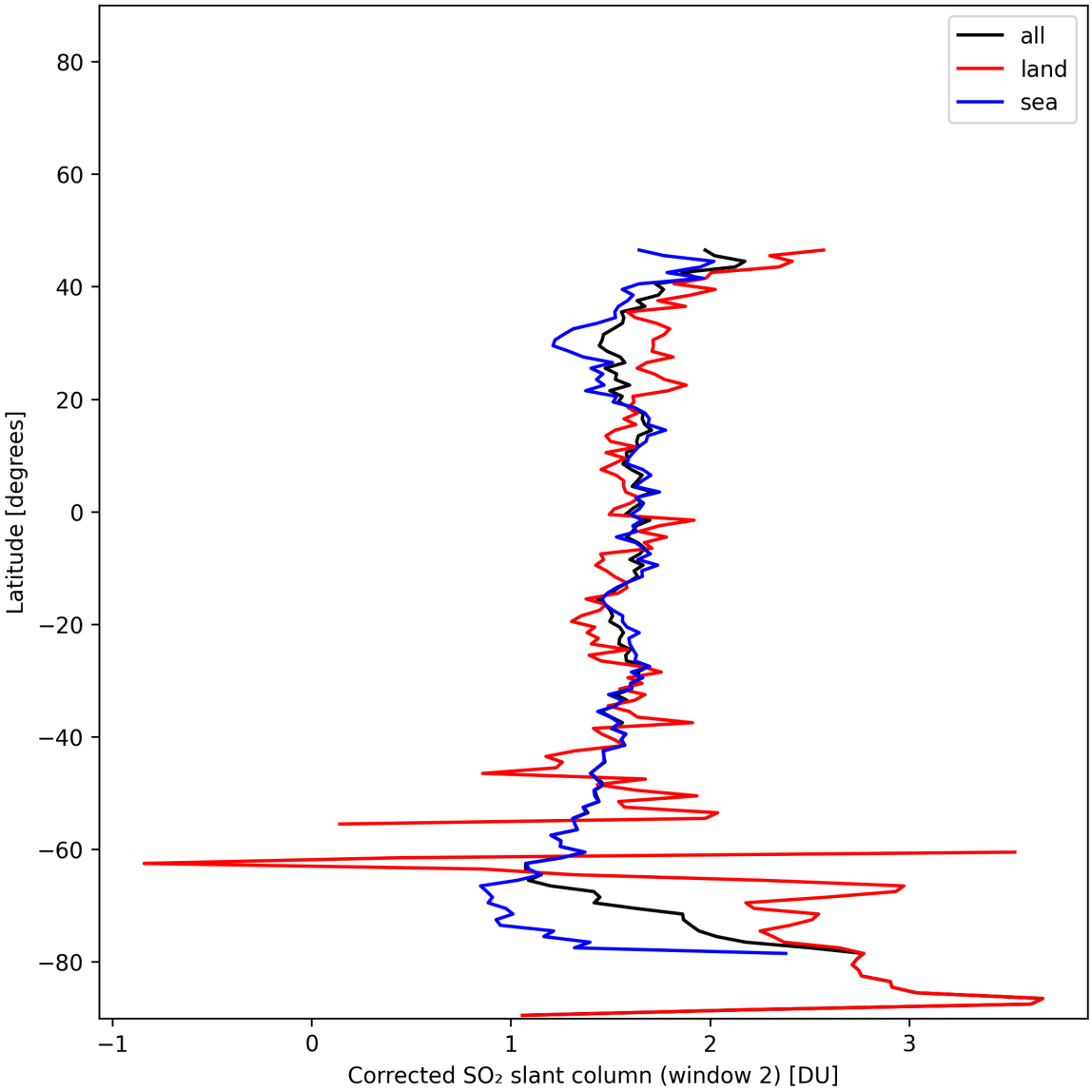

Figure 42: Zonal average of "Corrected SO_2 slant column (window 2)" for 2024-12-22 to 2024-12-23.

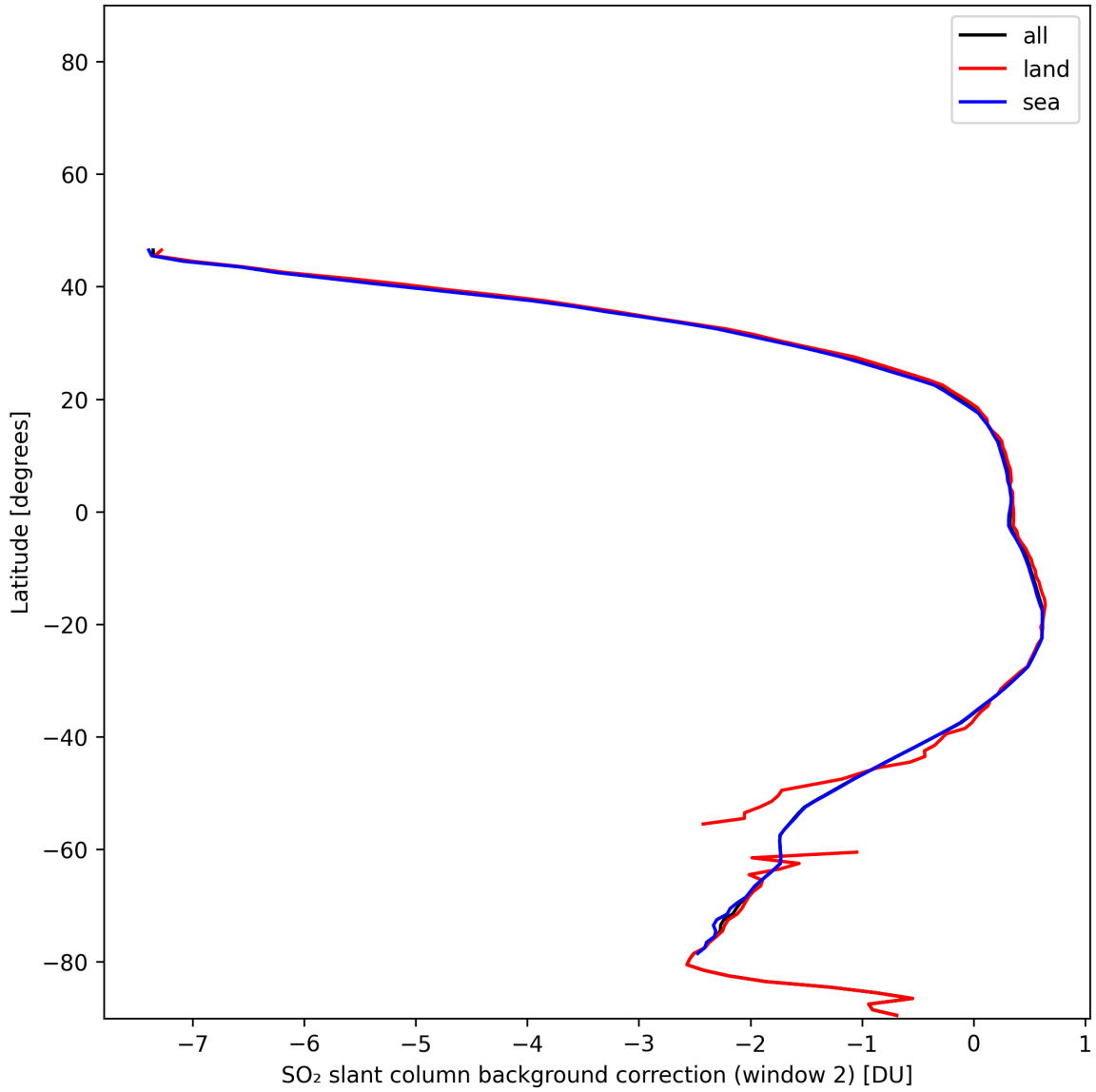

Figure 43: Zonal average of "SO_2 slant column background correction (window 2)" for 2024-12-22 to 2024-12-23.

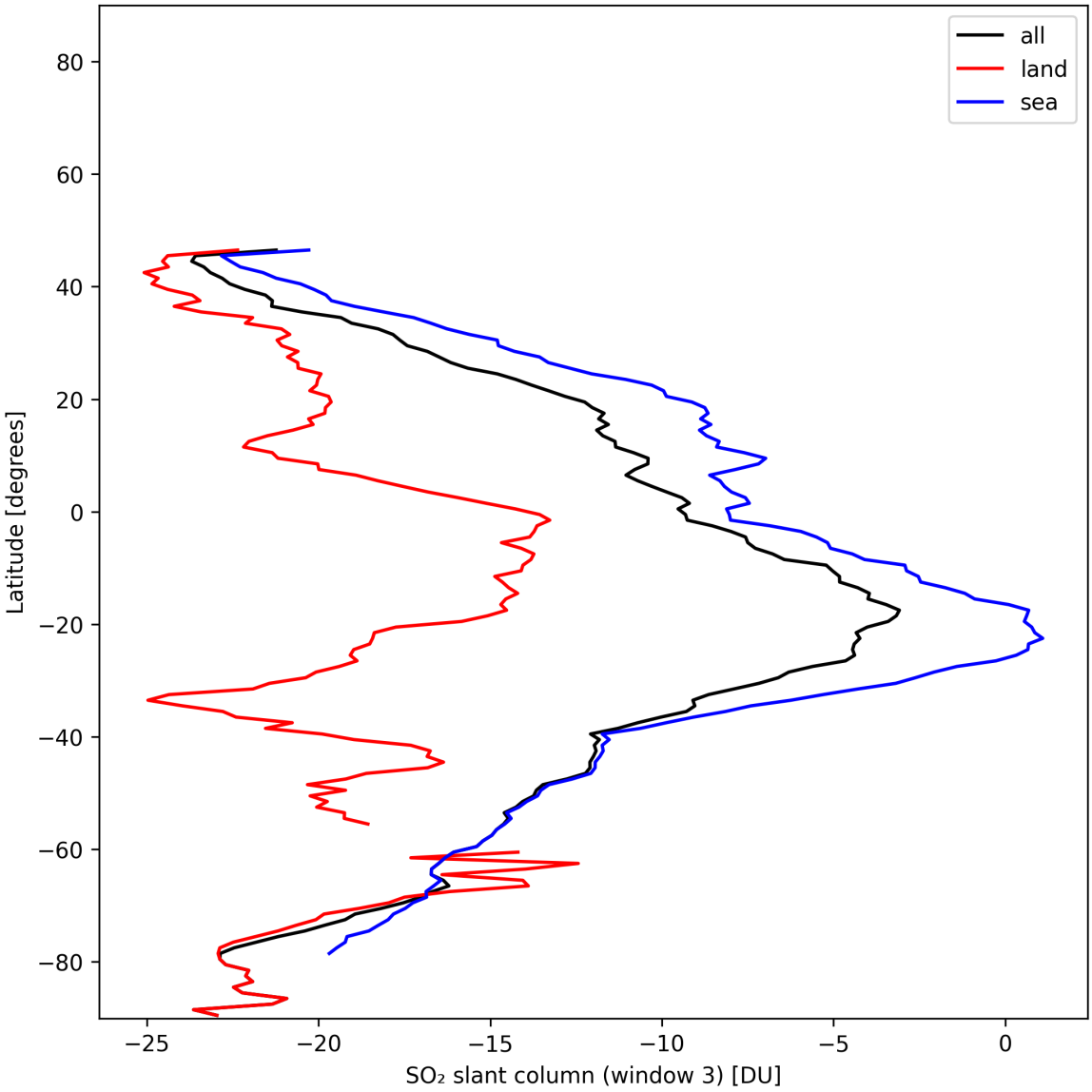

Figure 44: Zonal average of "SO_2 slant column (window 3)" for 2024-12-22 to 2024-12-23.

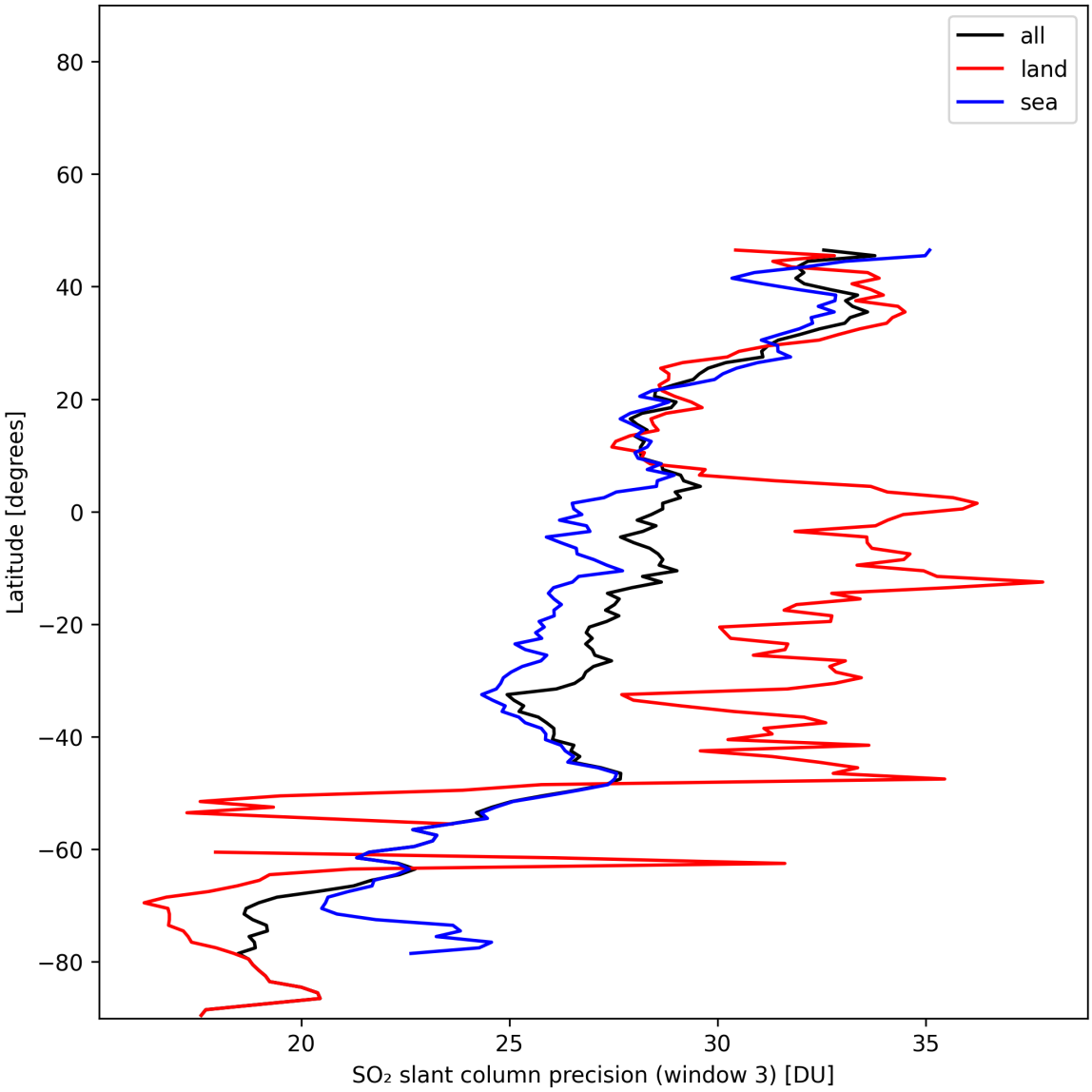

Figure 45: Zonal average of "SO_2 slant column precision (window 3)" for 2024-12-22 to 2024-12-23.

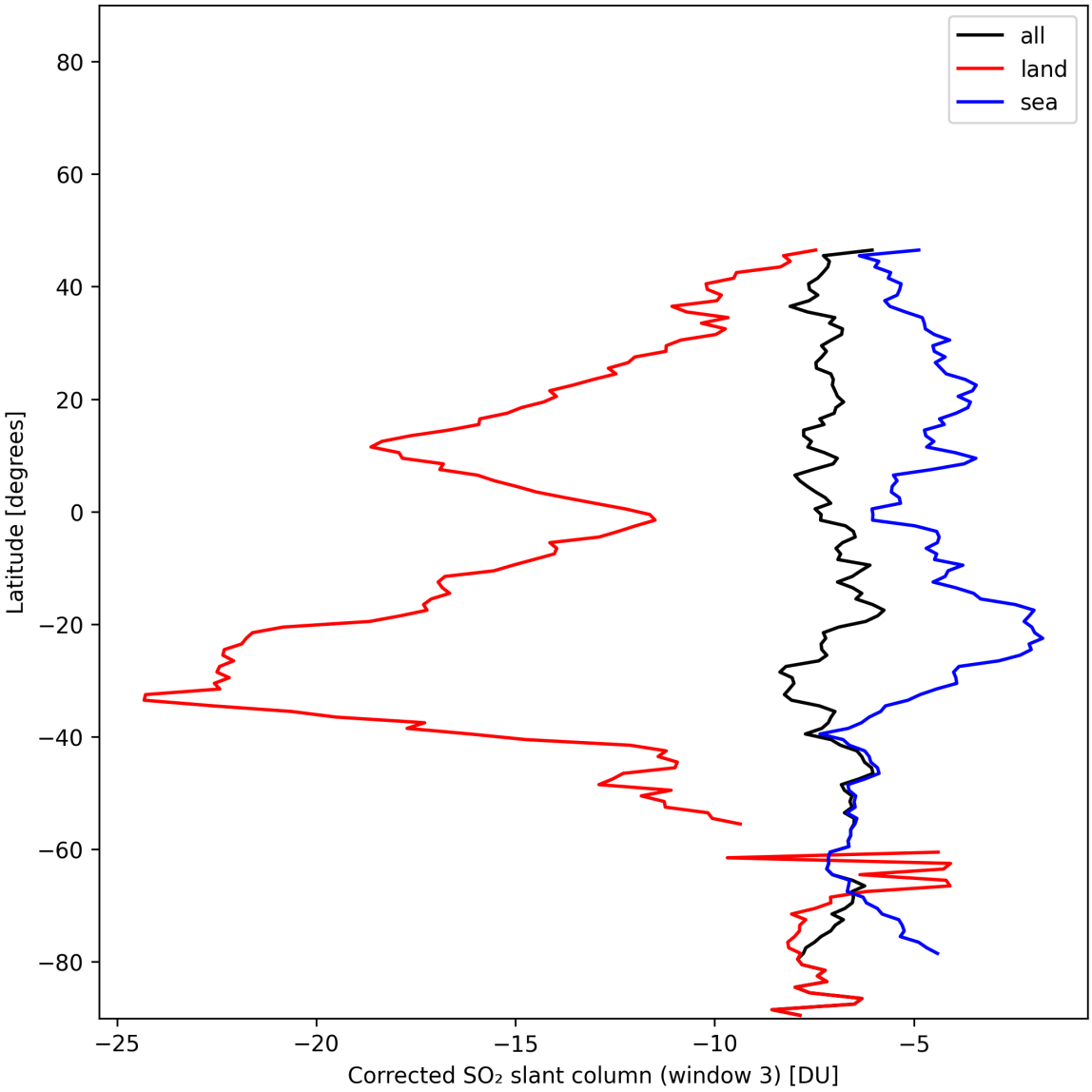

Figure 46: Zonal average of "Corrected SO_2 slant column (window 3)" for 2024-12-22 to 2024-12-23.

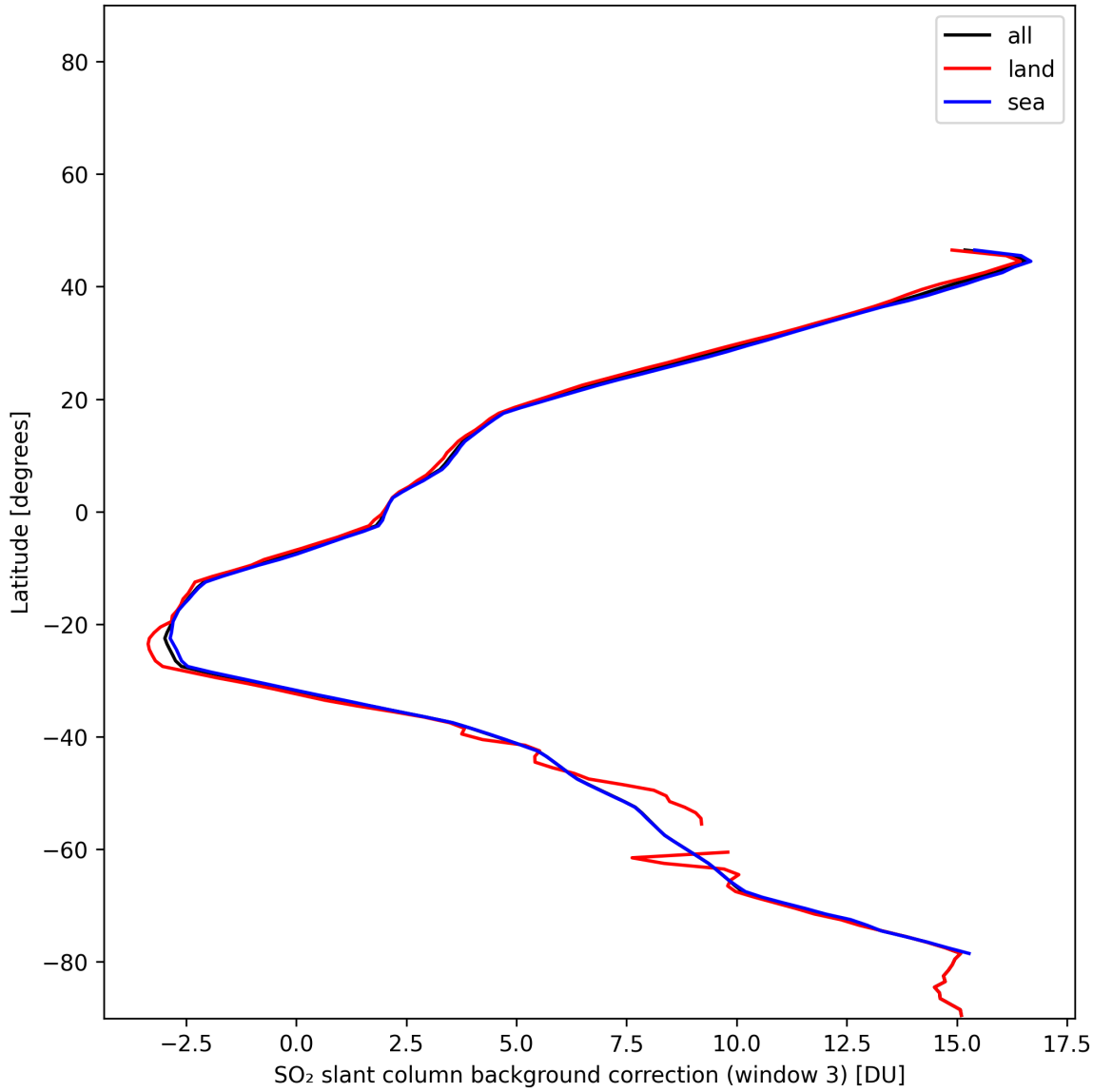

Figure 47: Zonal average of "SO_2 slant column background correction (window 3)" for 2024-12-22 to 2024-12-23.

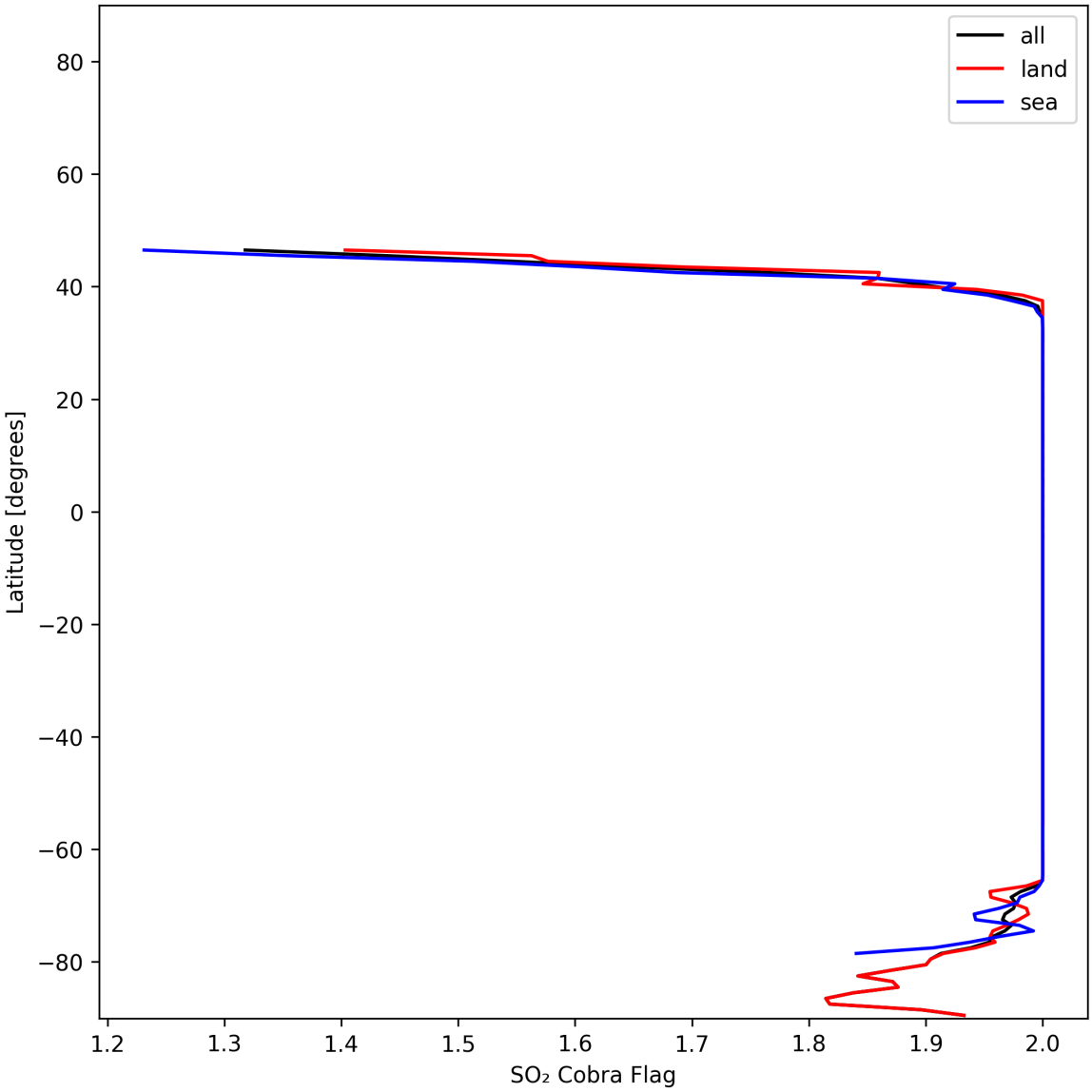

Figure 48: Zonal average of "SO_2 Cobra Flag" for 2024-12-22 to 2024-12-23.

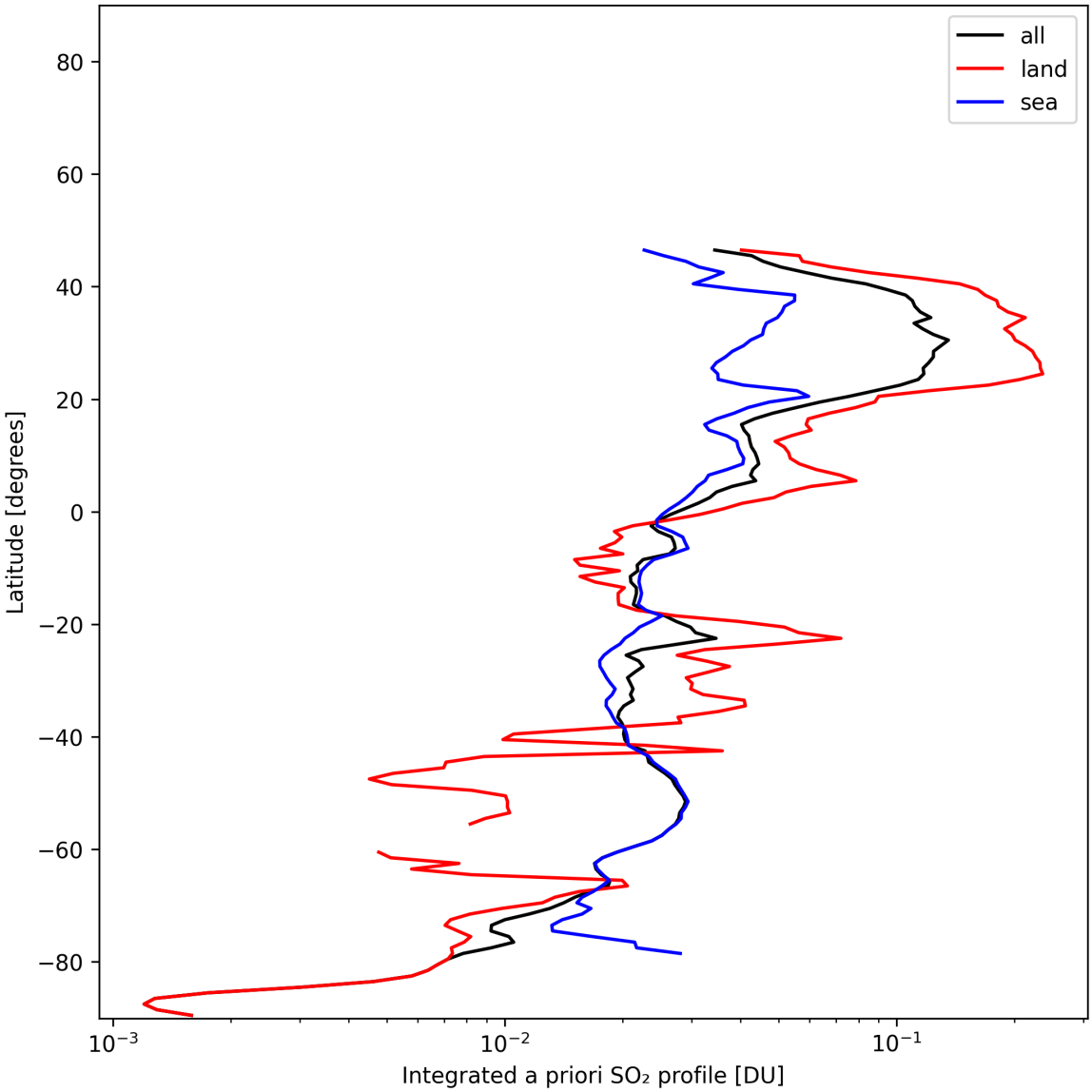

Figure 49: Zonal average of “Integrated a priori SO_2 profile” for 2024-12-22 to 2024-12-23.

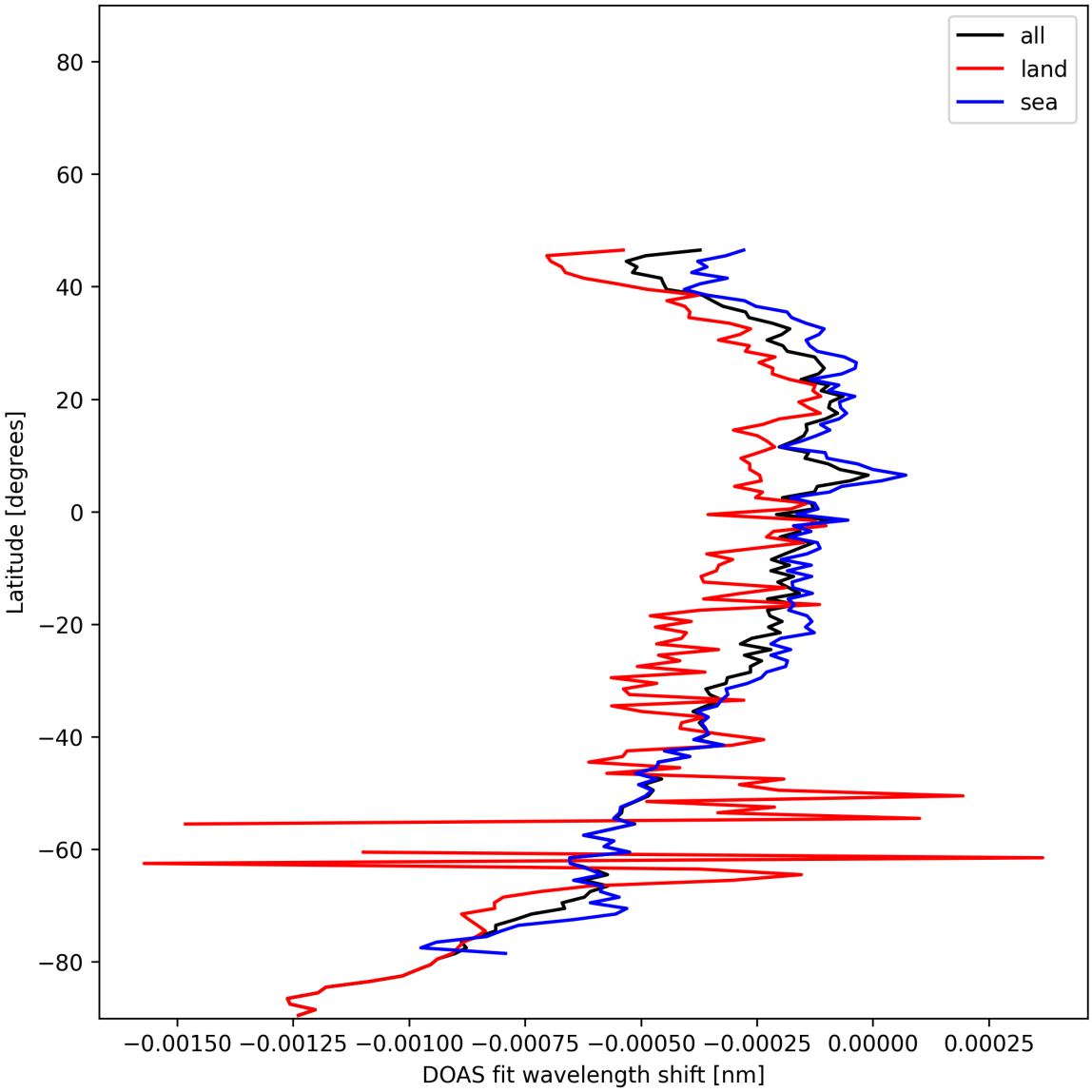

Figure 50: Zonal average of “DOAS fit wavelength shift” for 2024-12-22 to 2024-12-23.

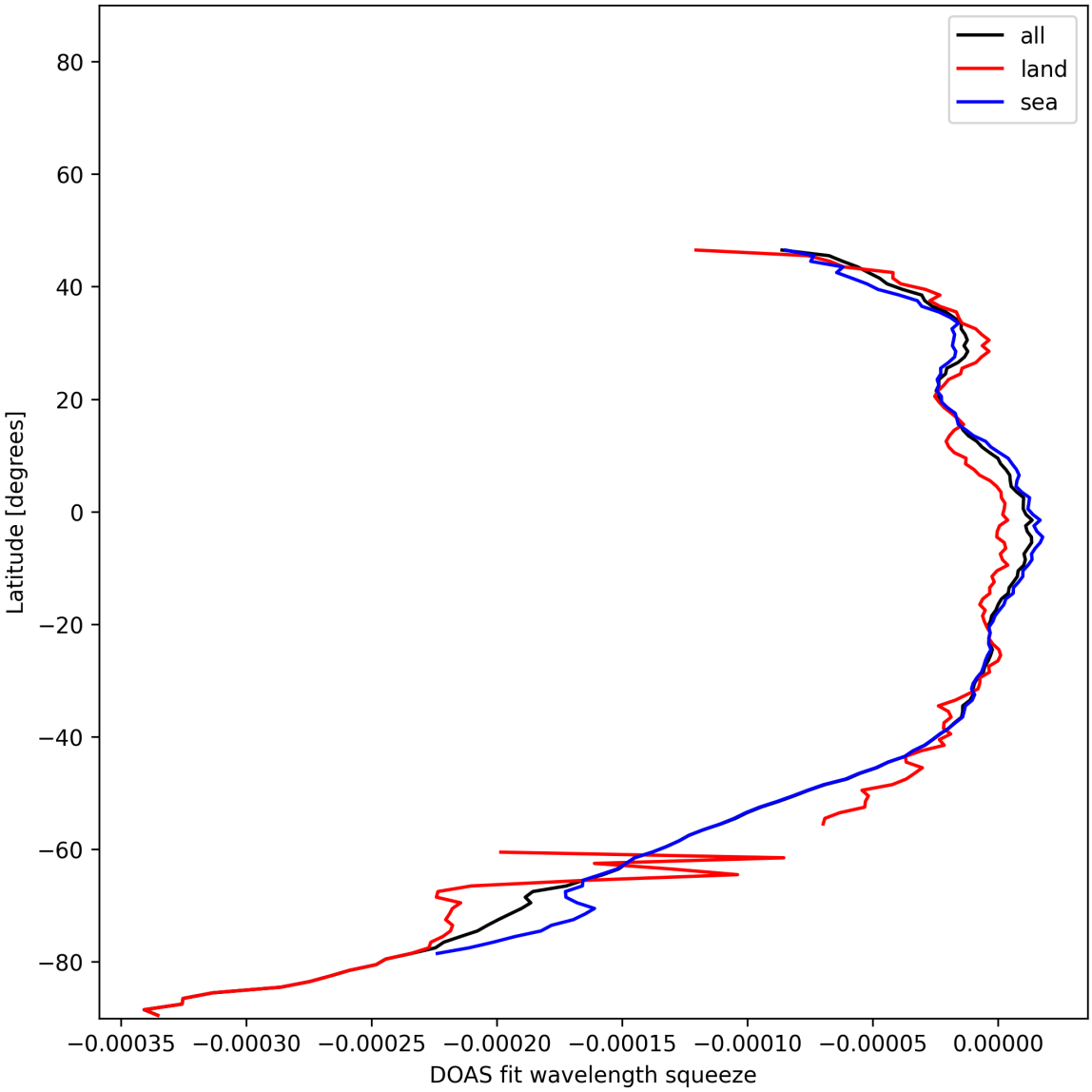

Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2024-12-22 to 2024-12-23.

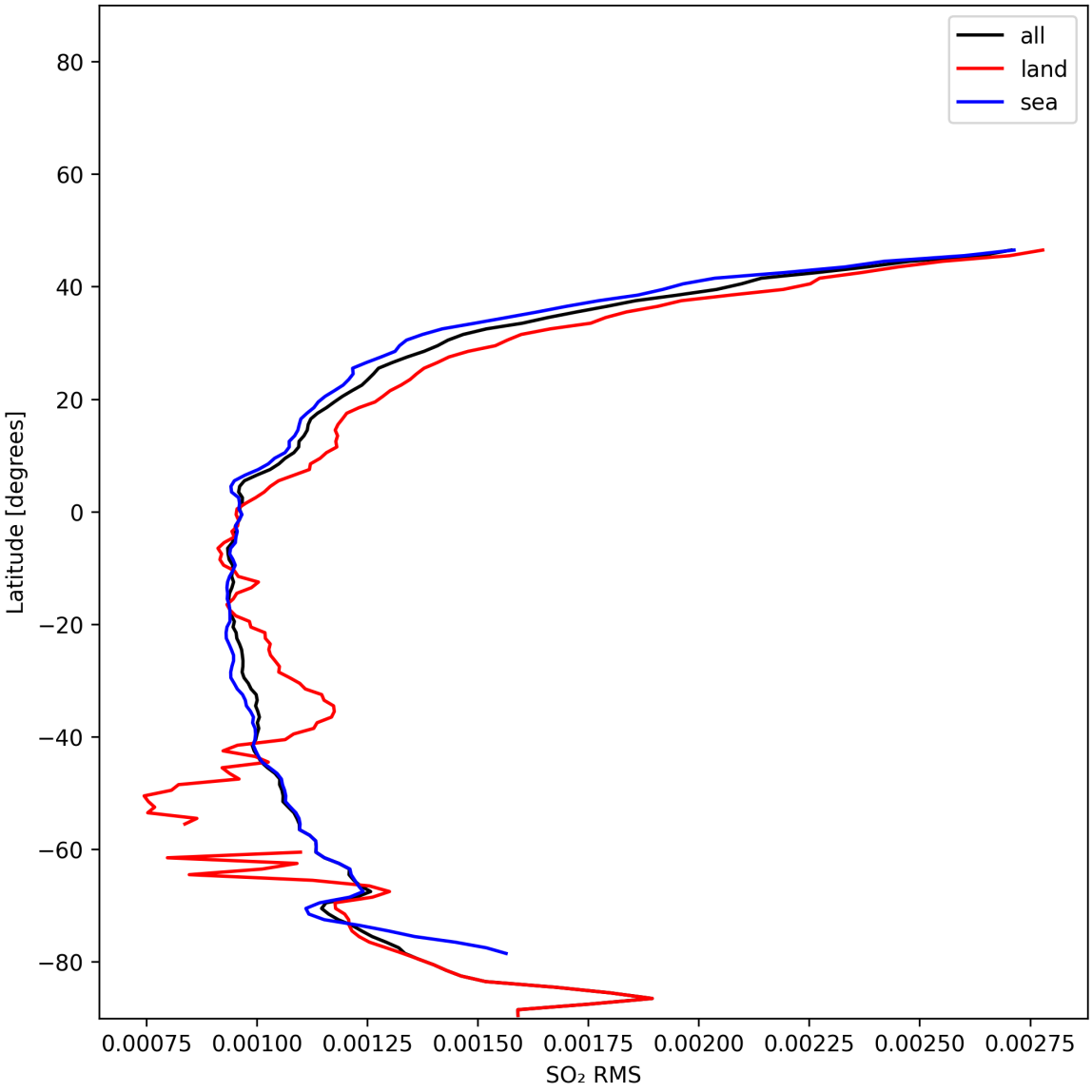

Figure 52: Zonal average of "SO_2 RMS" for 2024-12-22 to 2024-12-23.

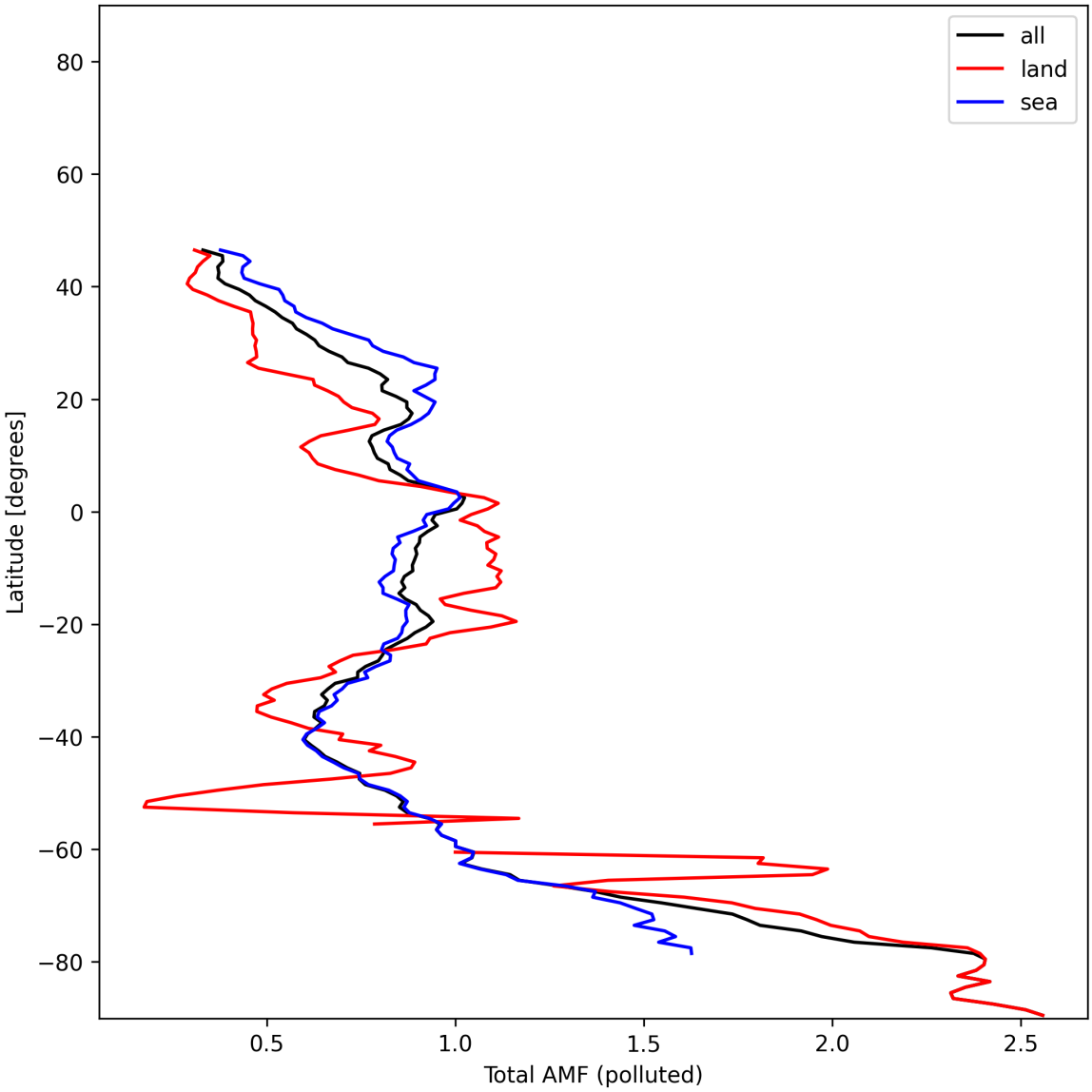

Figure 53: Zonal average of “Total AMF (polluted)” for 2024-12-22 to 2024-12-23.

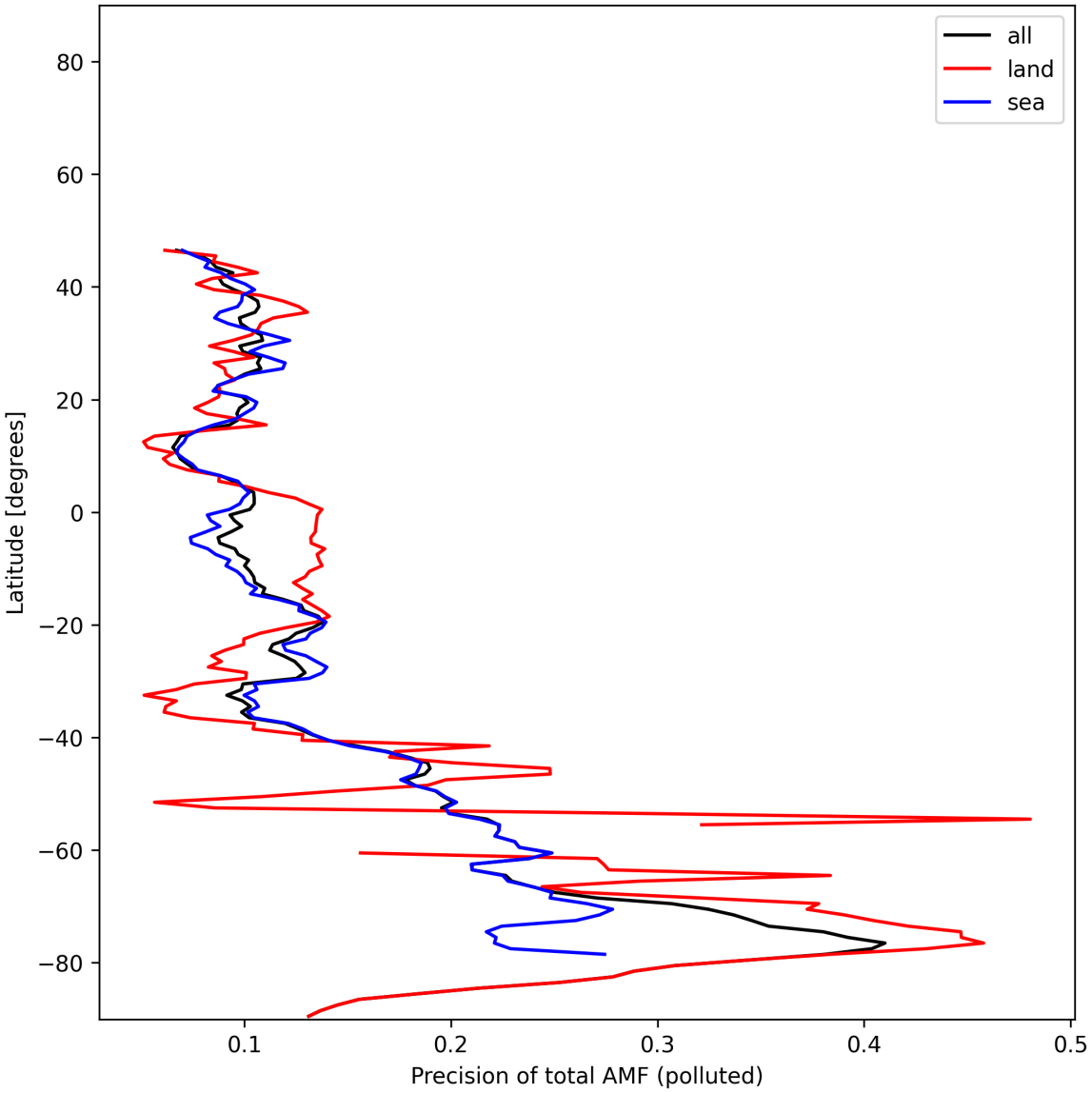

Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2024-12-22 to 2024-12-23.

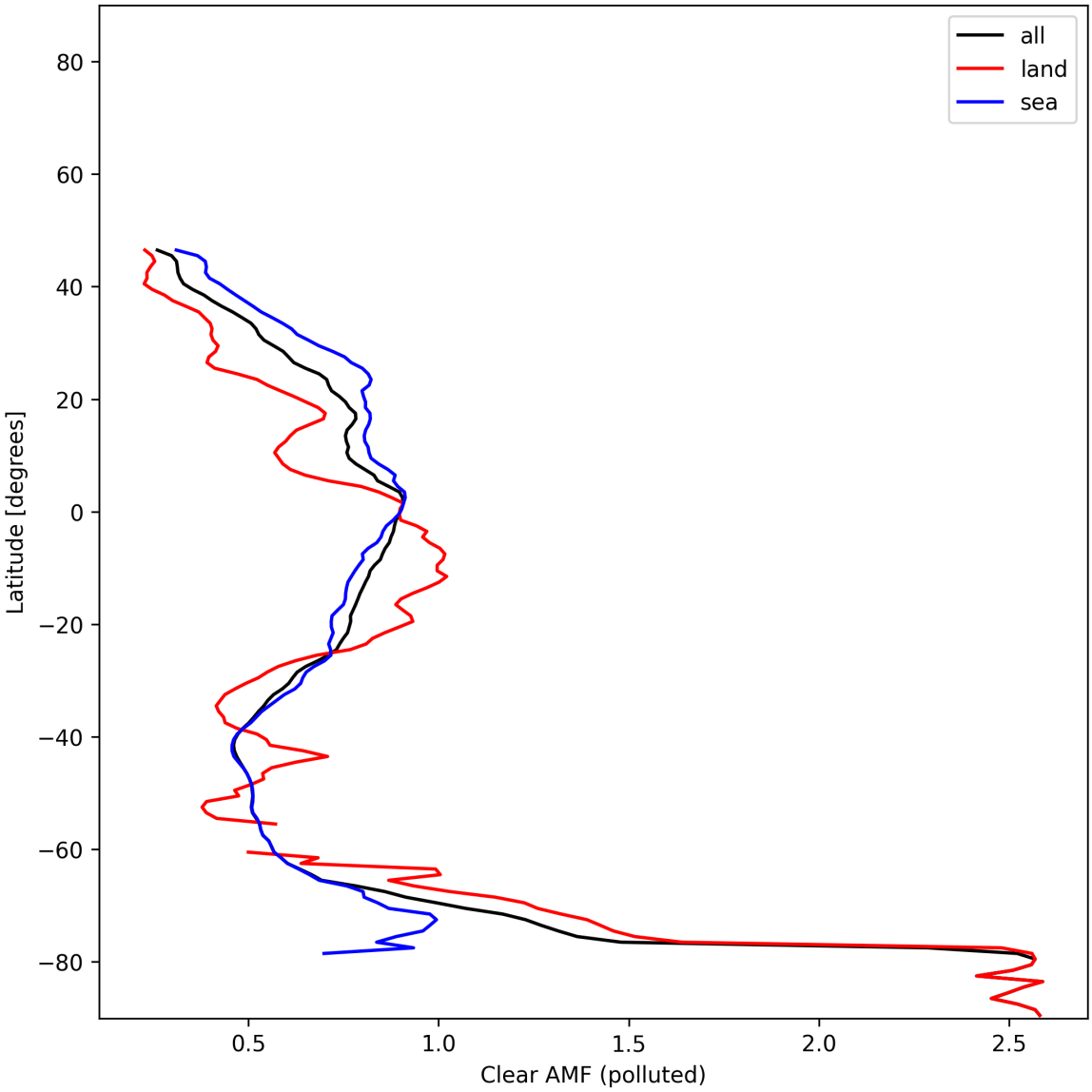

Figure 55: Zonal average of “Clear AMF (polluted)” for 2024-12-22 to 2024-12-23.

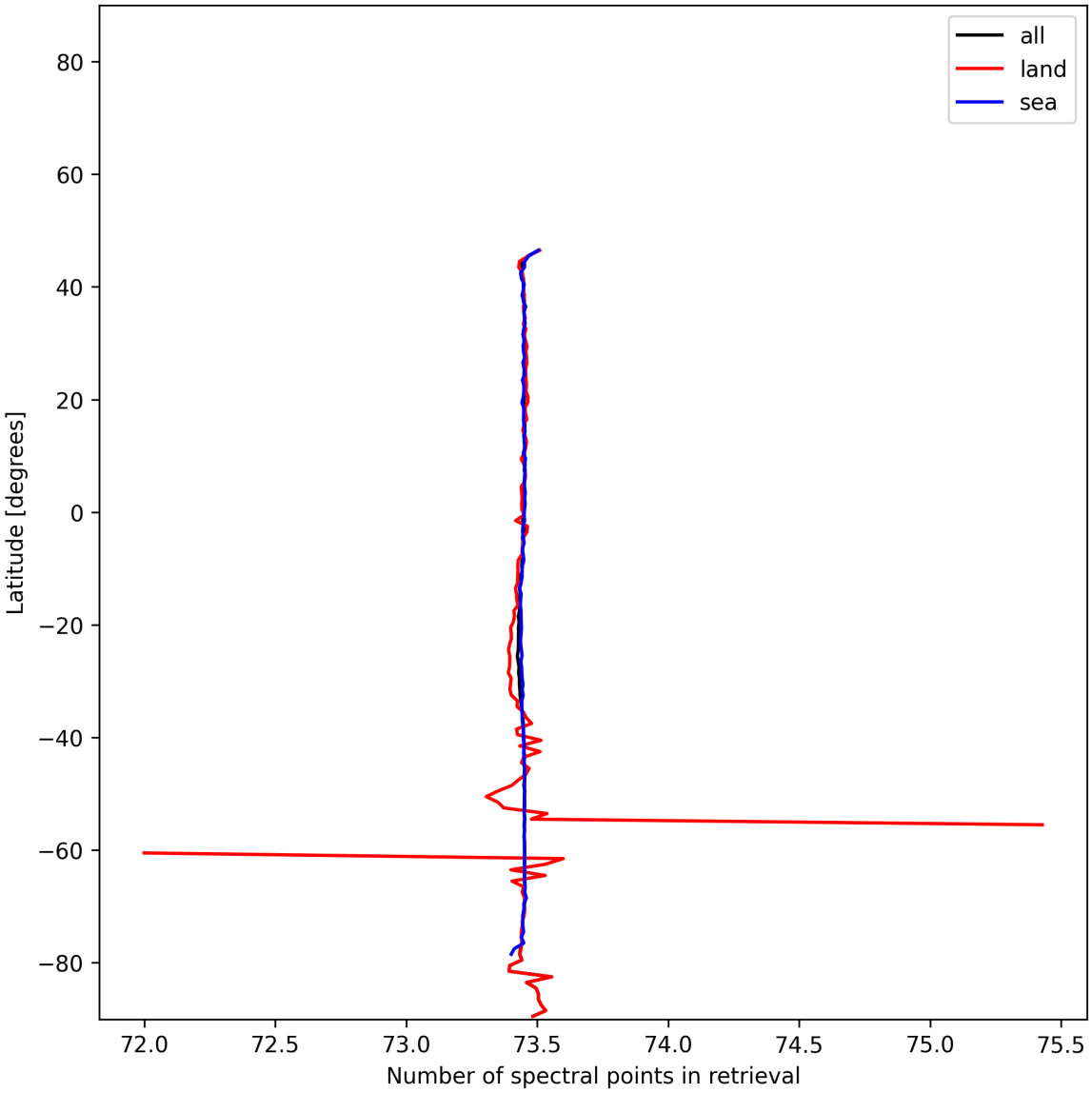

Figure 56: Zonal average of “Number of spectral points in retrieval” for 2024-12-22 to 2024-12-23.

8 Histograms

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

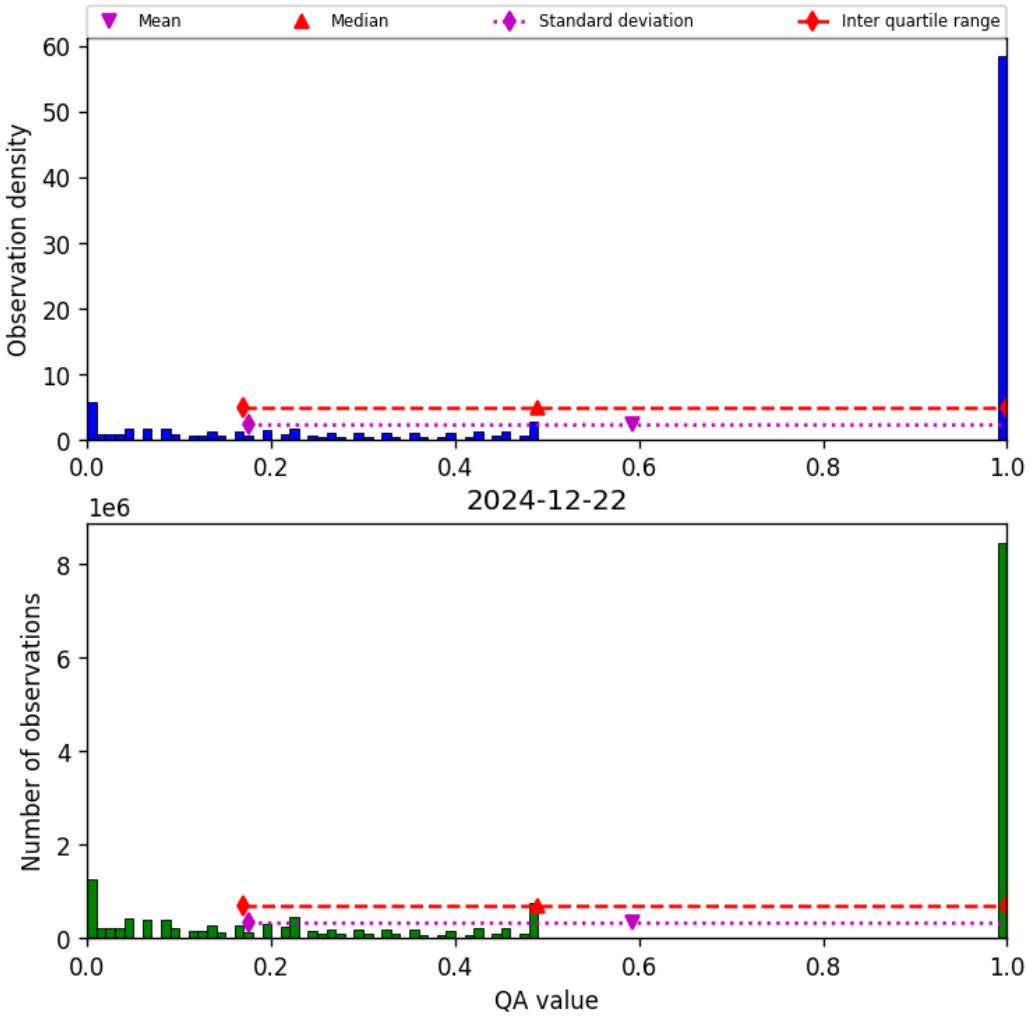

Figure 57: Histogram of “QA value” for 2024-12-22 to 2024-12-23

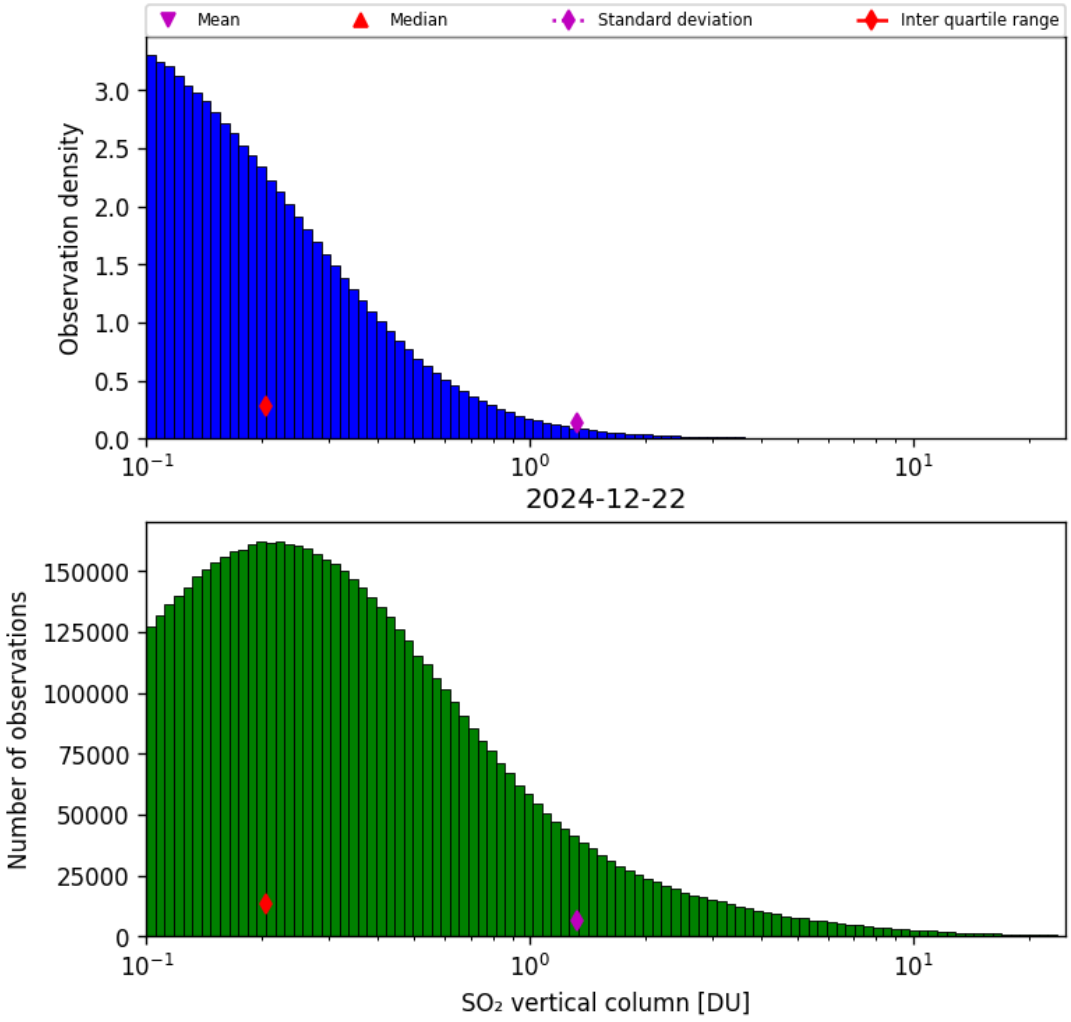

Figure 58: Histogram of "SO_2 vertical column" for 2024-12-22 to 2024-12-23

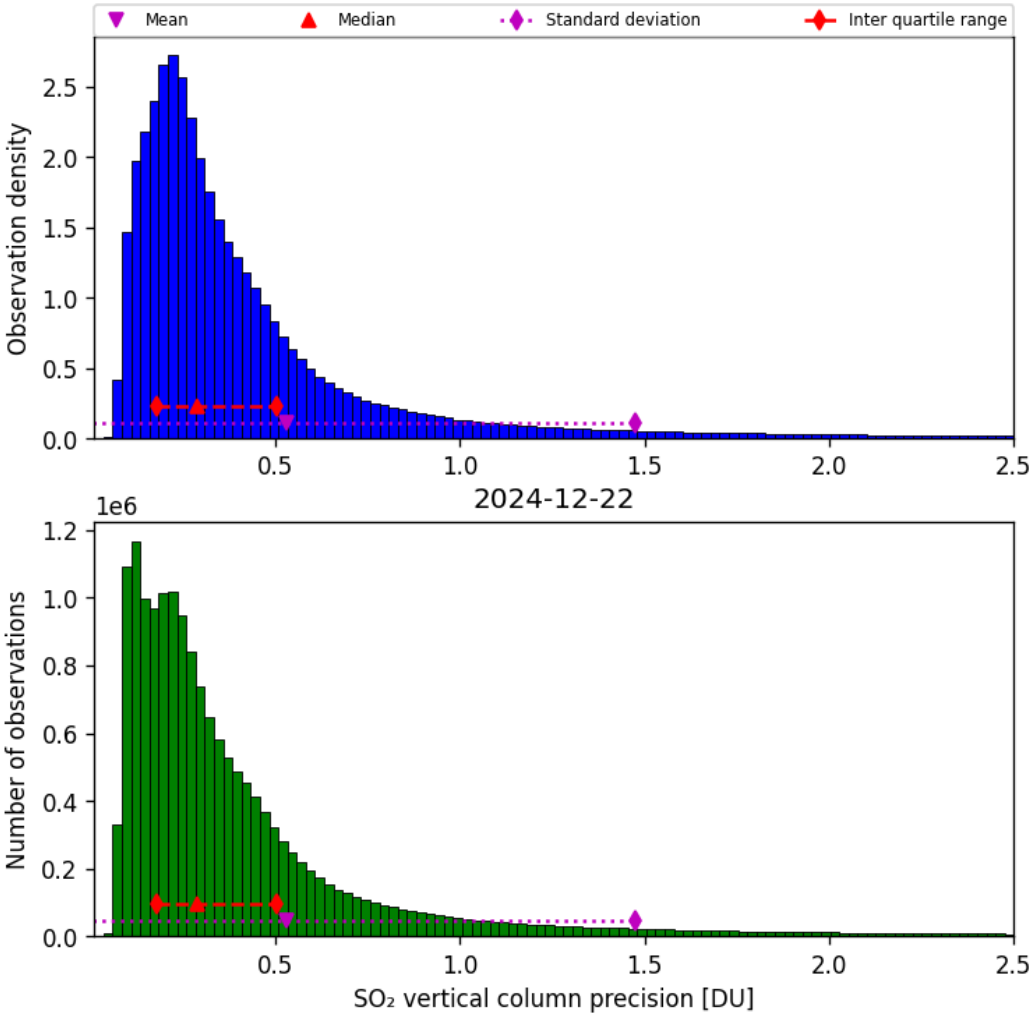

Figure 59: Histogram of "SO_2 vertical column precision" for 2024-12-22 to 2024-12-23

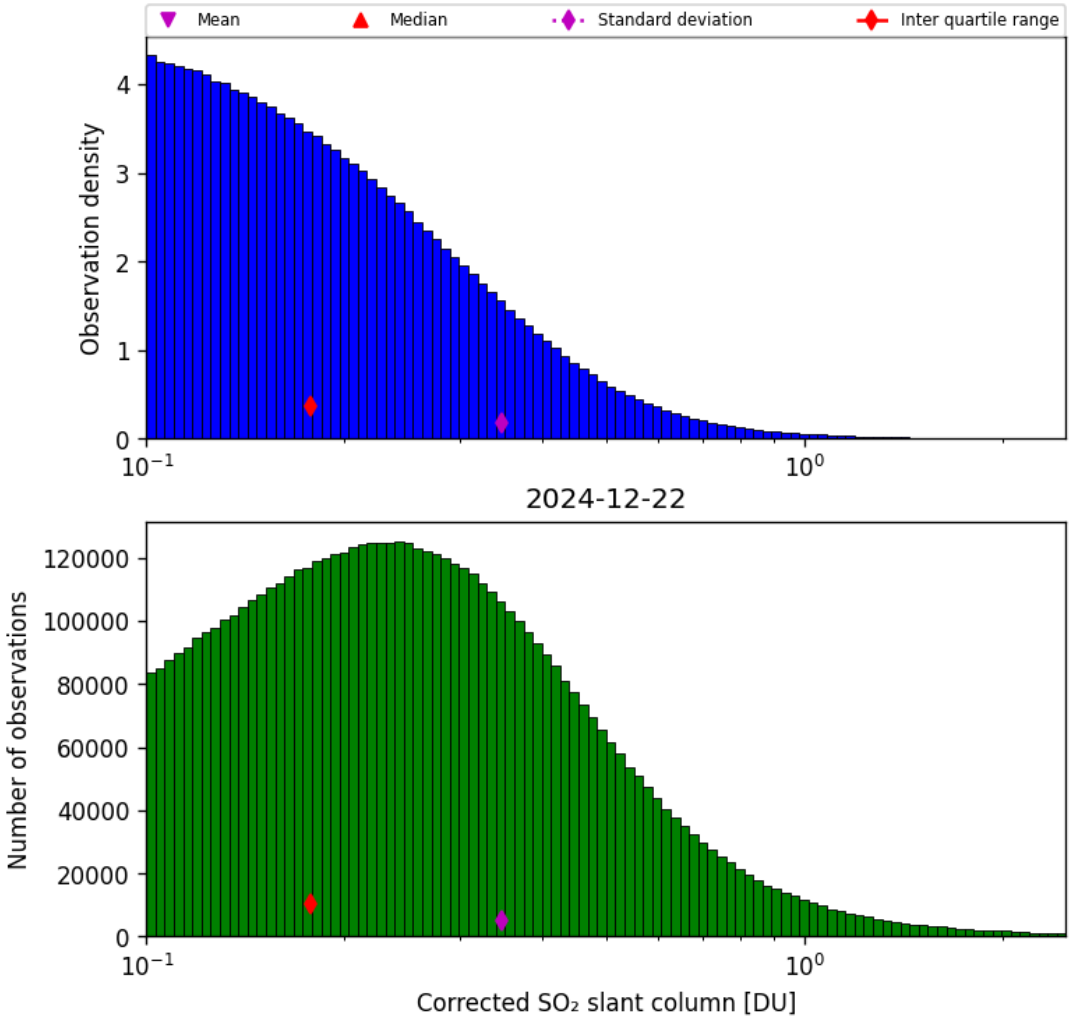

Figure 60: Histogram of "Corrected SO_2 slant column" for 2024-12-22 to 2024-12-23

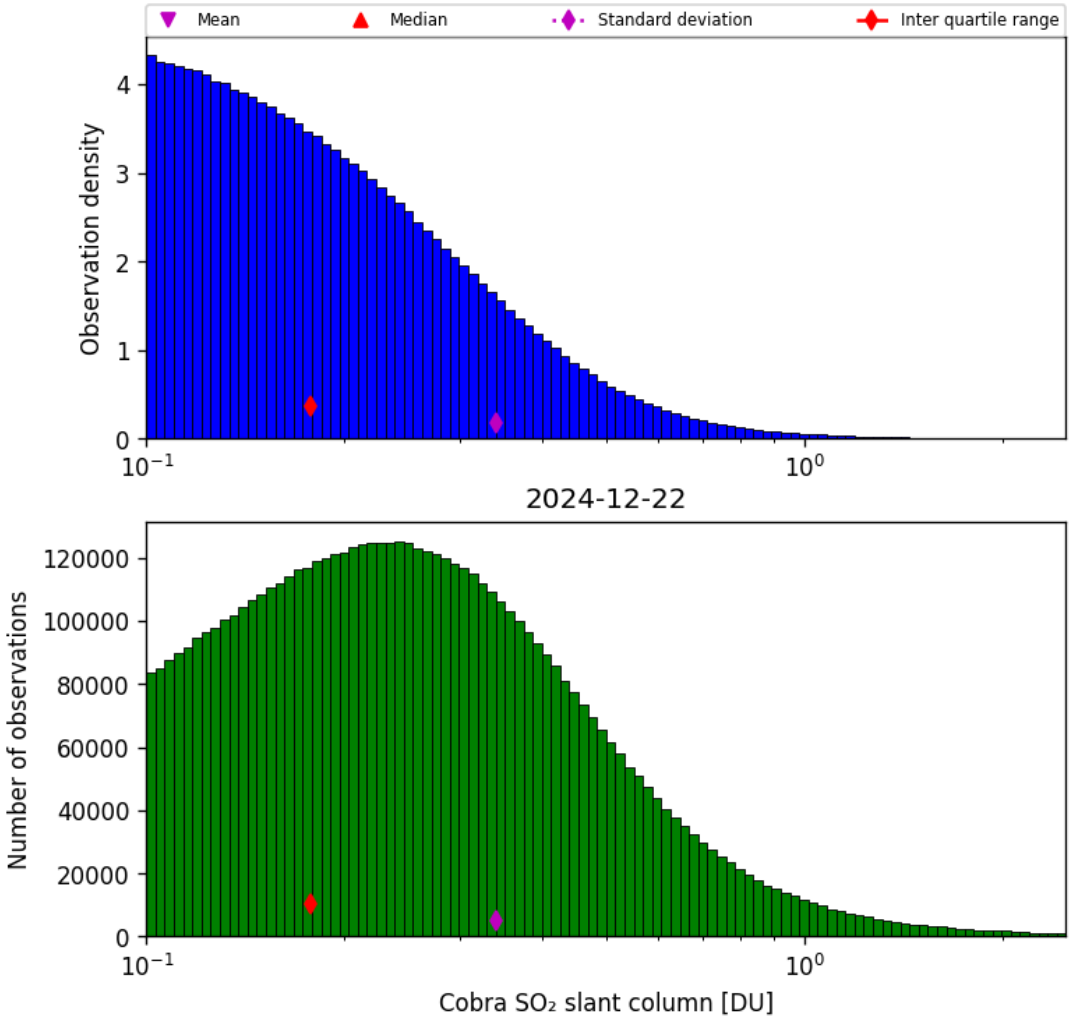

Figure 61: Histogram of "Cobra SO_2 slant column" for 2024-12-22 to 2024-12-23

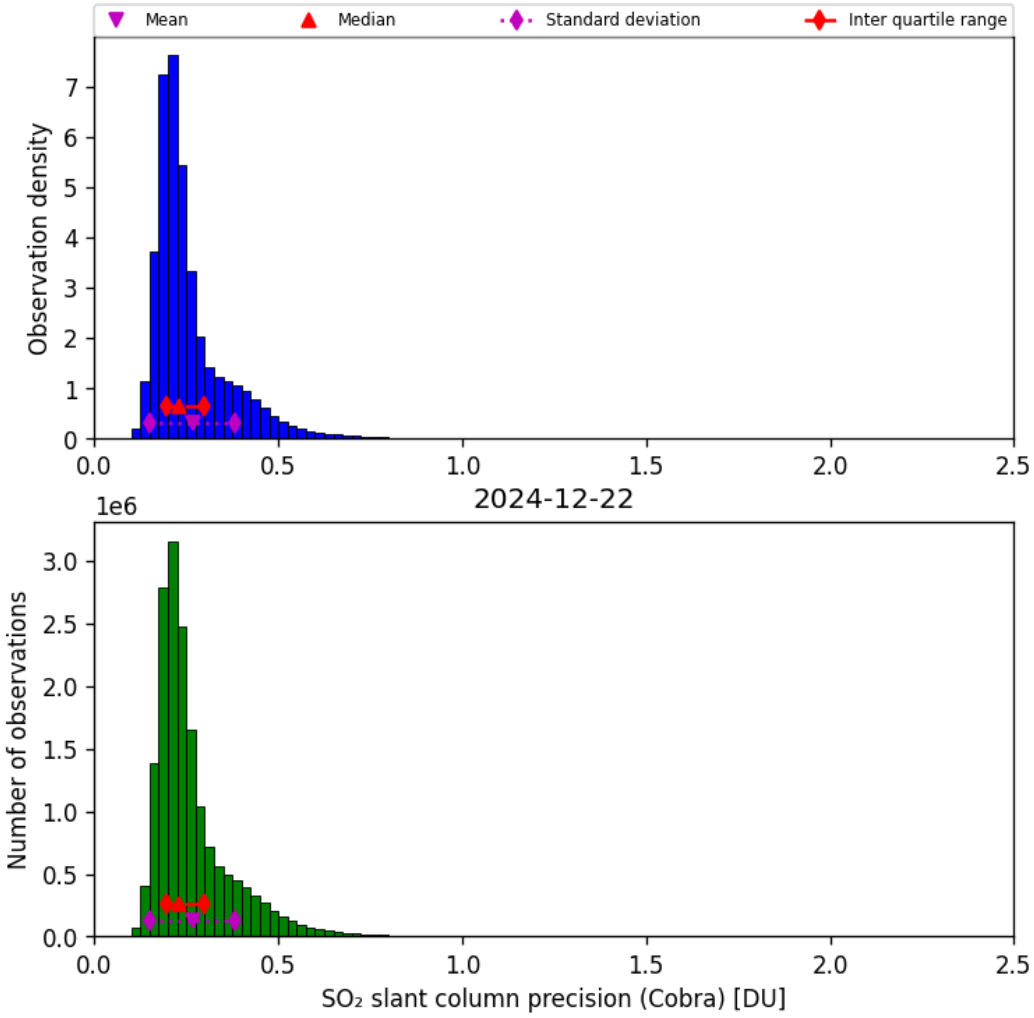

Figure 62: Histogram of "SO_2 slant column precision (Cobra)" for 2024-12-22 to 2024-12-23

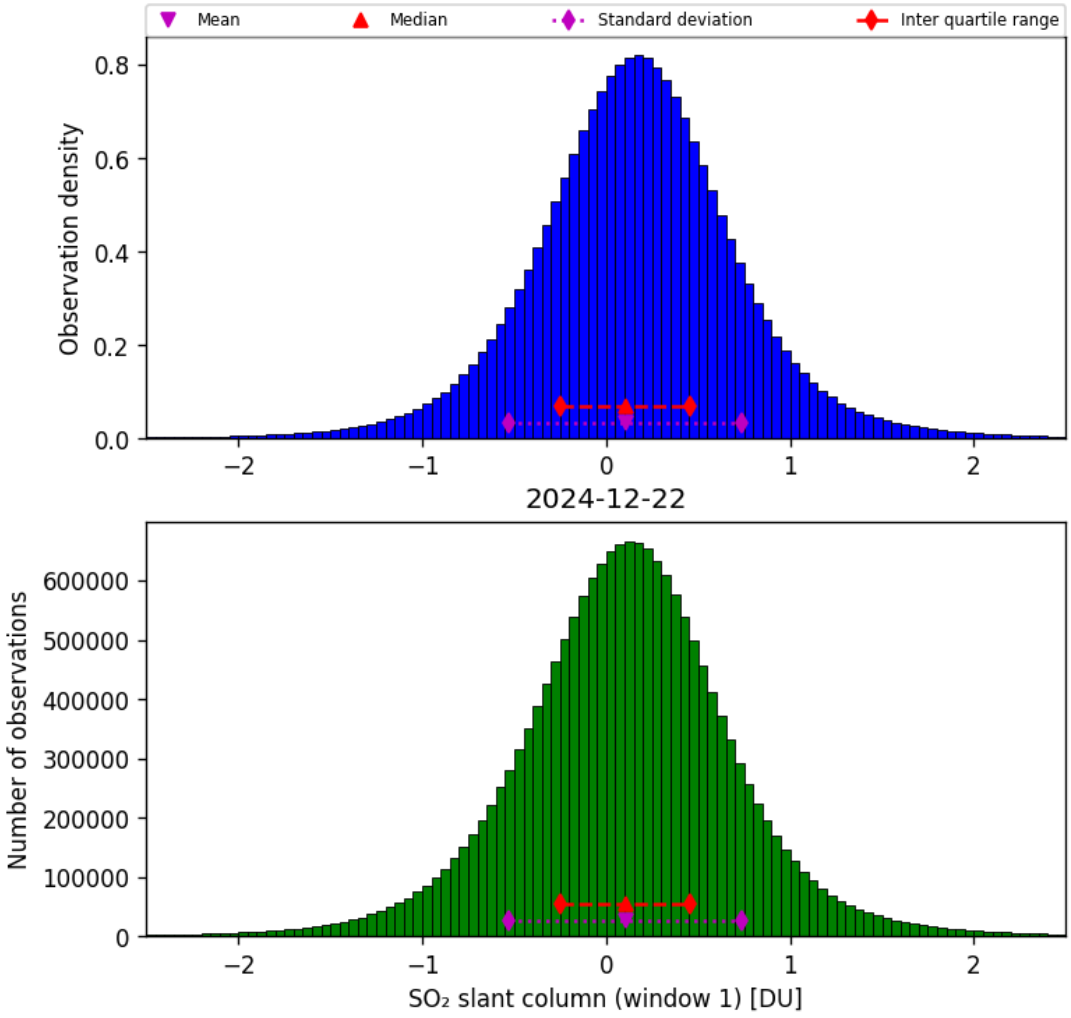

Figure 63: Histogram of "SO_2 slant column (window 1)" for 2024-12-22 to 2024-12-23

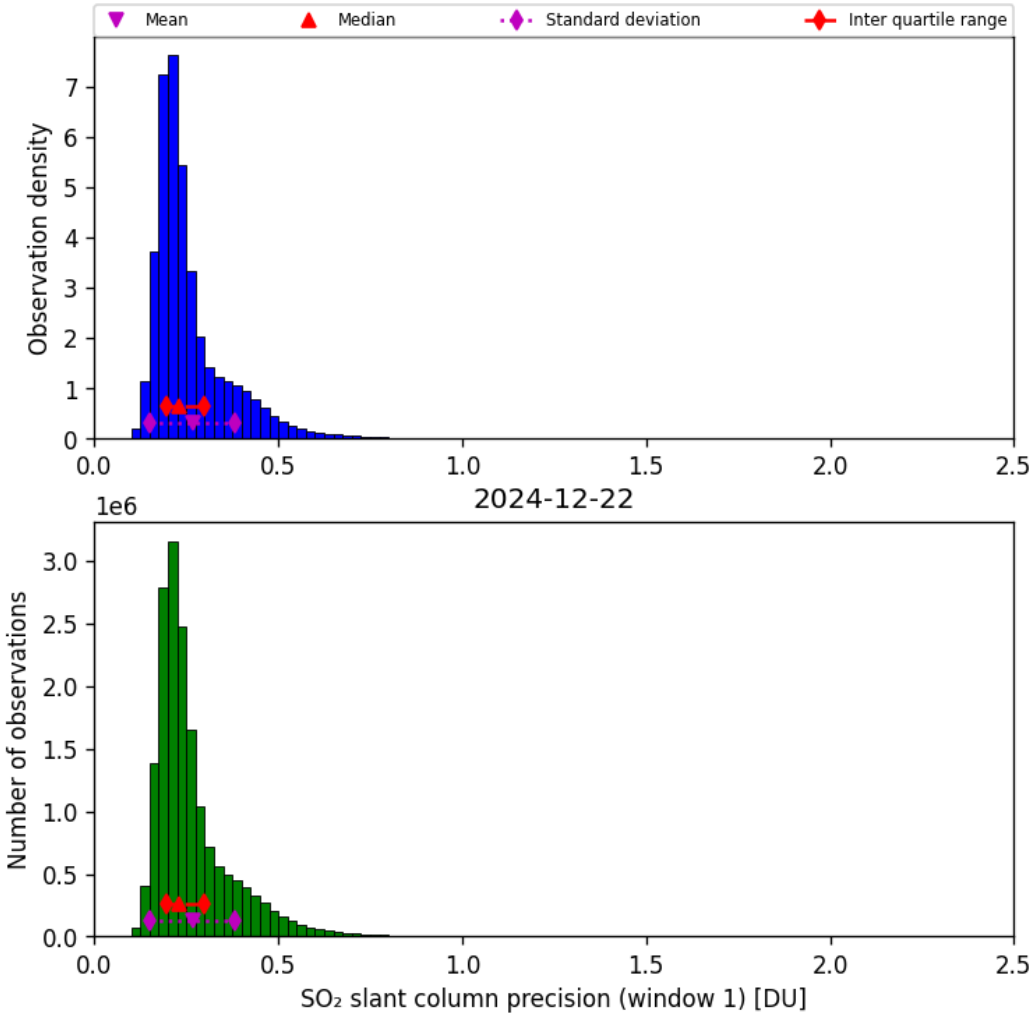

Figure 64: Histogram of "SO_2 slant column precision (window 1)" for 2024-12-22 to 2024-12-23

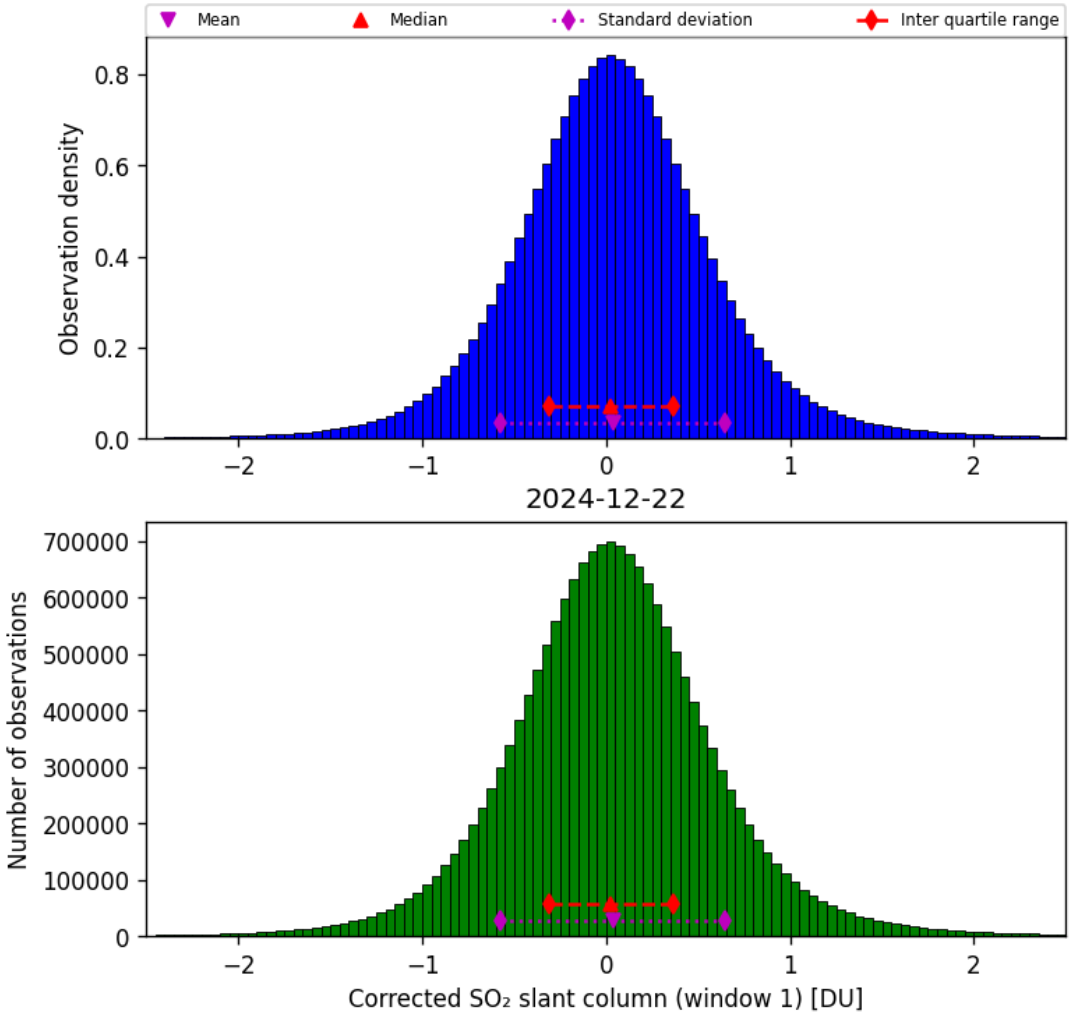

Figure 65: Histogram of "Corrected SO_2 slant column (window 1)" for 2024-12-22 to 2024-12-23

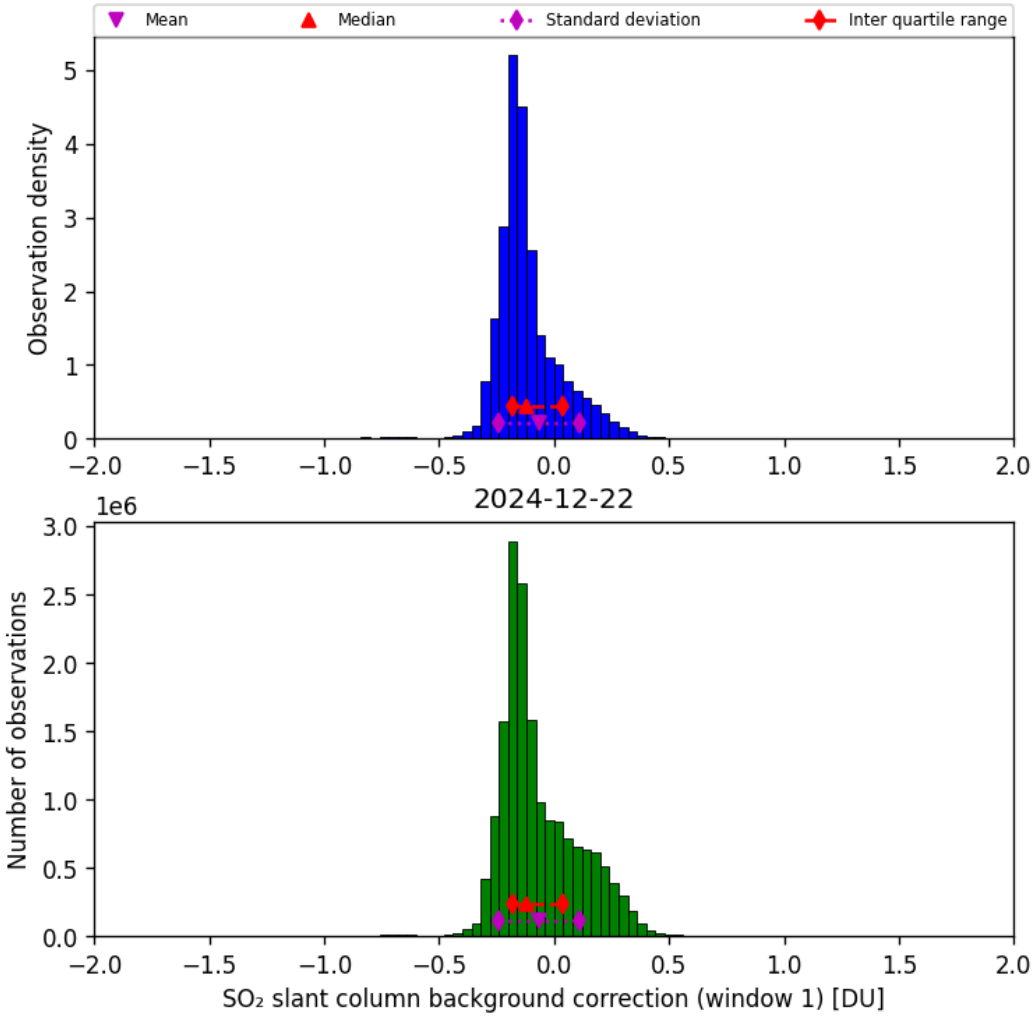

Figure 66: Histogram of "SO_2 slant column background correction (window 1)" for 2024-12-22 to 2024-12-23

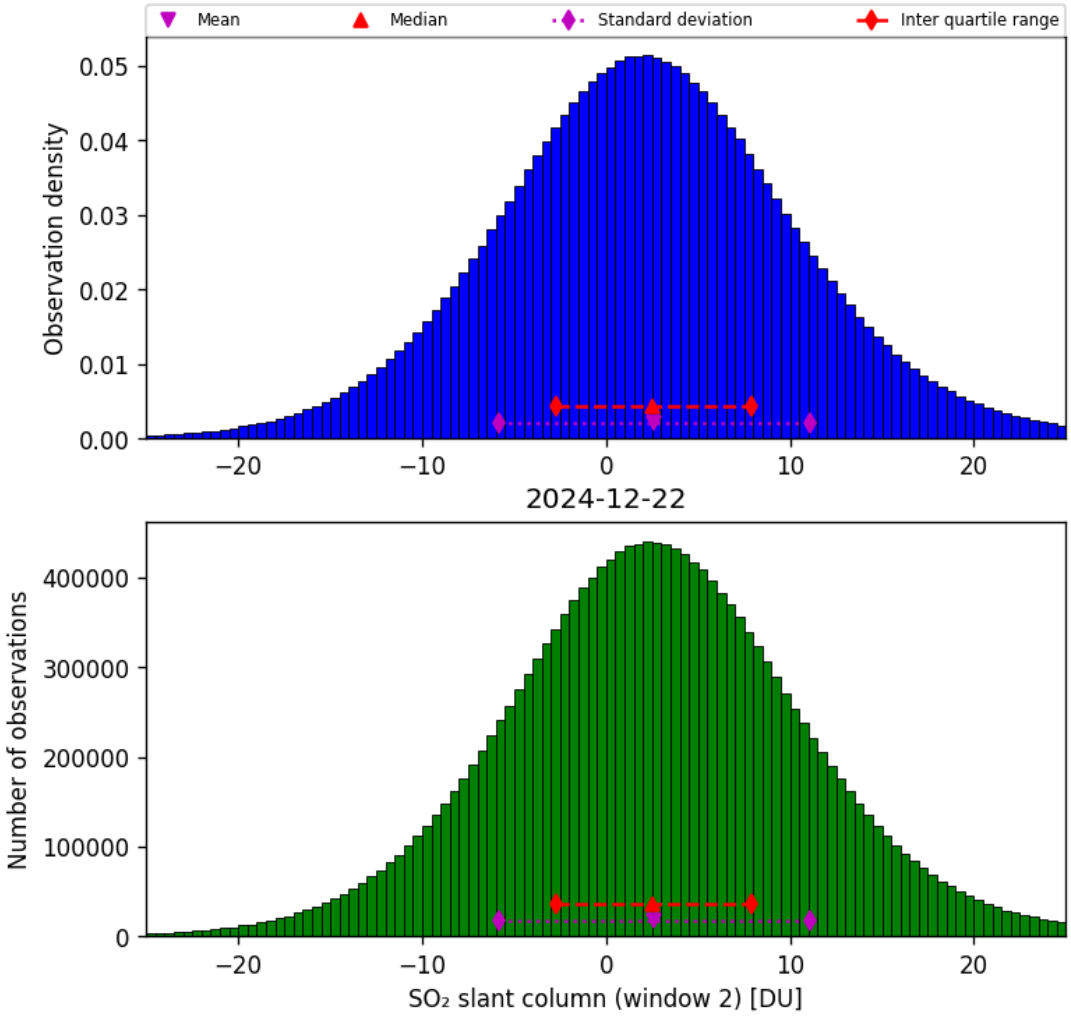

Figure 67: Histogram of "SO_2 slant column (window 2)" for 2024-12-22 to 2024-12-23

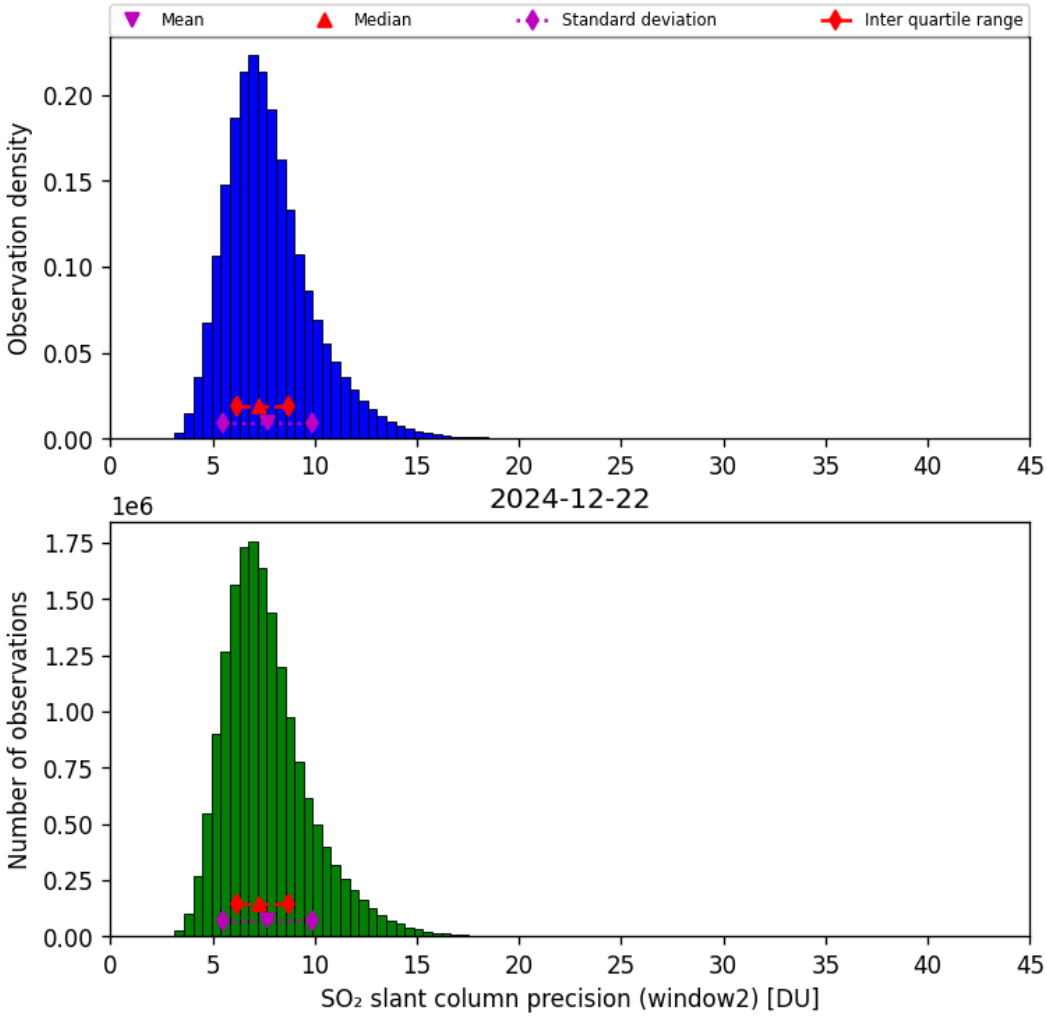

Figure 68: Histogram of "SO_2 slant column precision (window2)" for 2024-12-22 to 2024-12-23

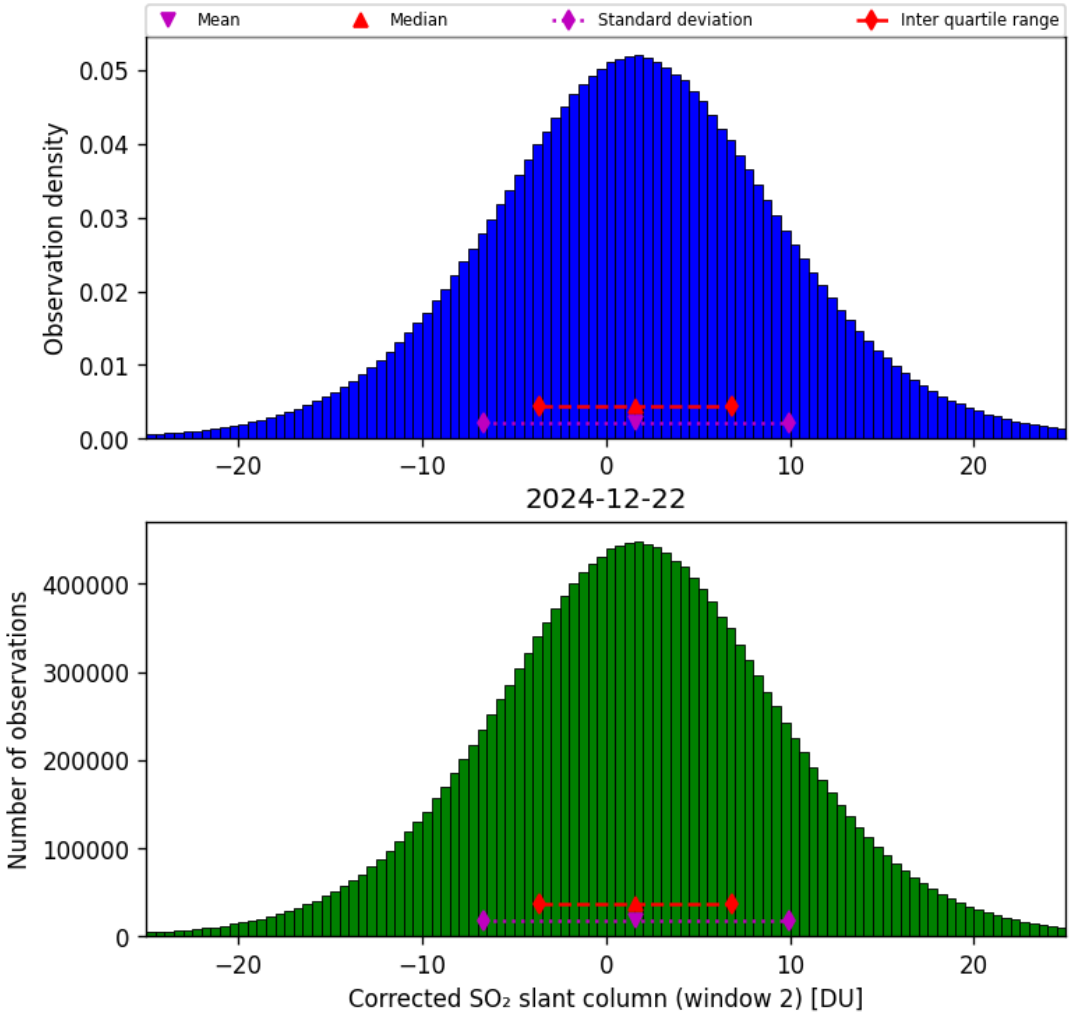

Figure 69: Histogram of "Corrected SO_2 slant column (window 2)" for 2024-12-22 to 2024-12-23

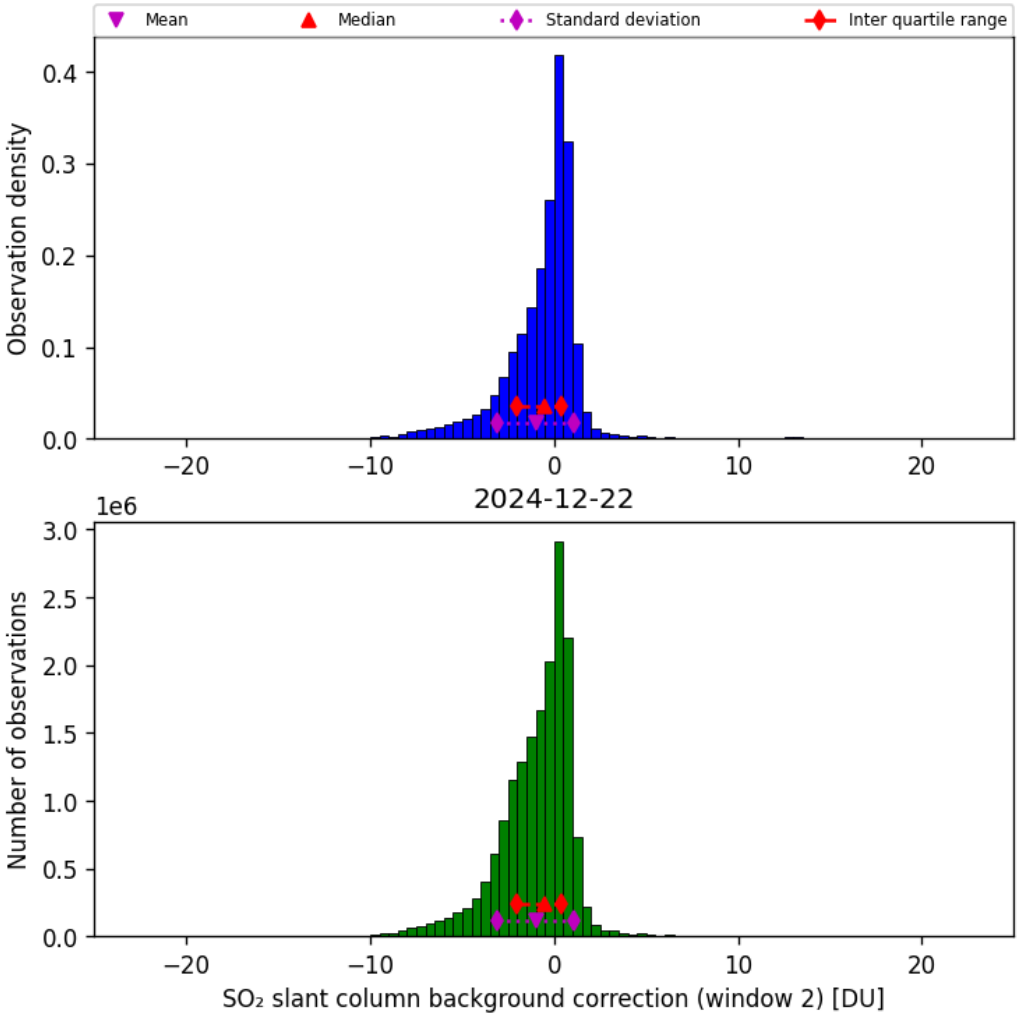

Figure 70: Histogram of "SO_2 slant column background correction (window 2)" for 2024-12-22 to 2024-12-23

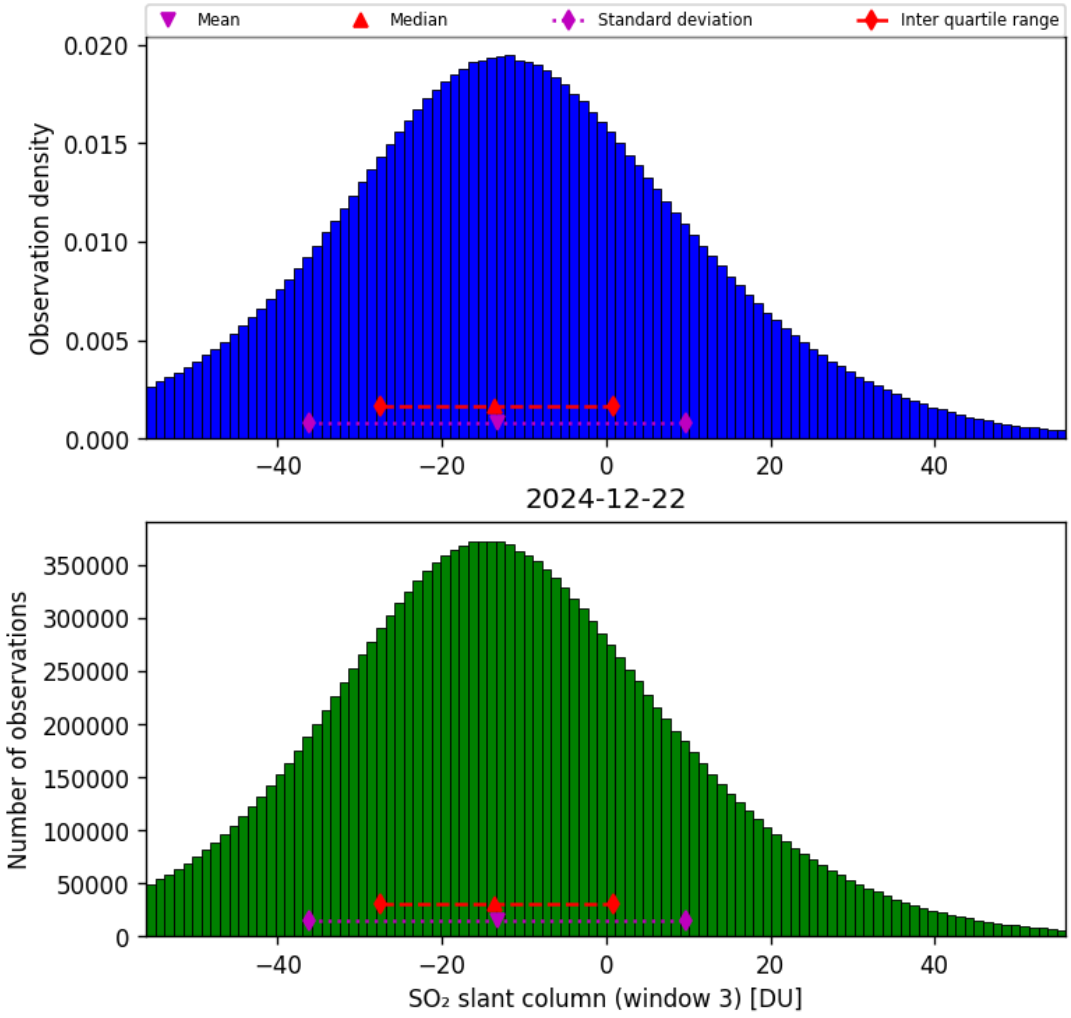

Figure 71: Histogram of "SO_2 slant column (window 3)" for 2024-12-22 to 2024-12-23

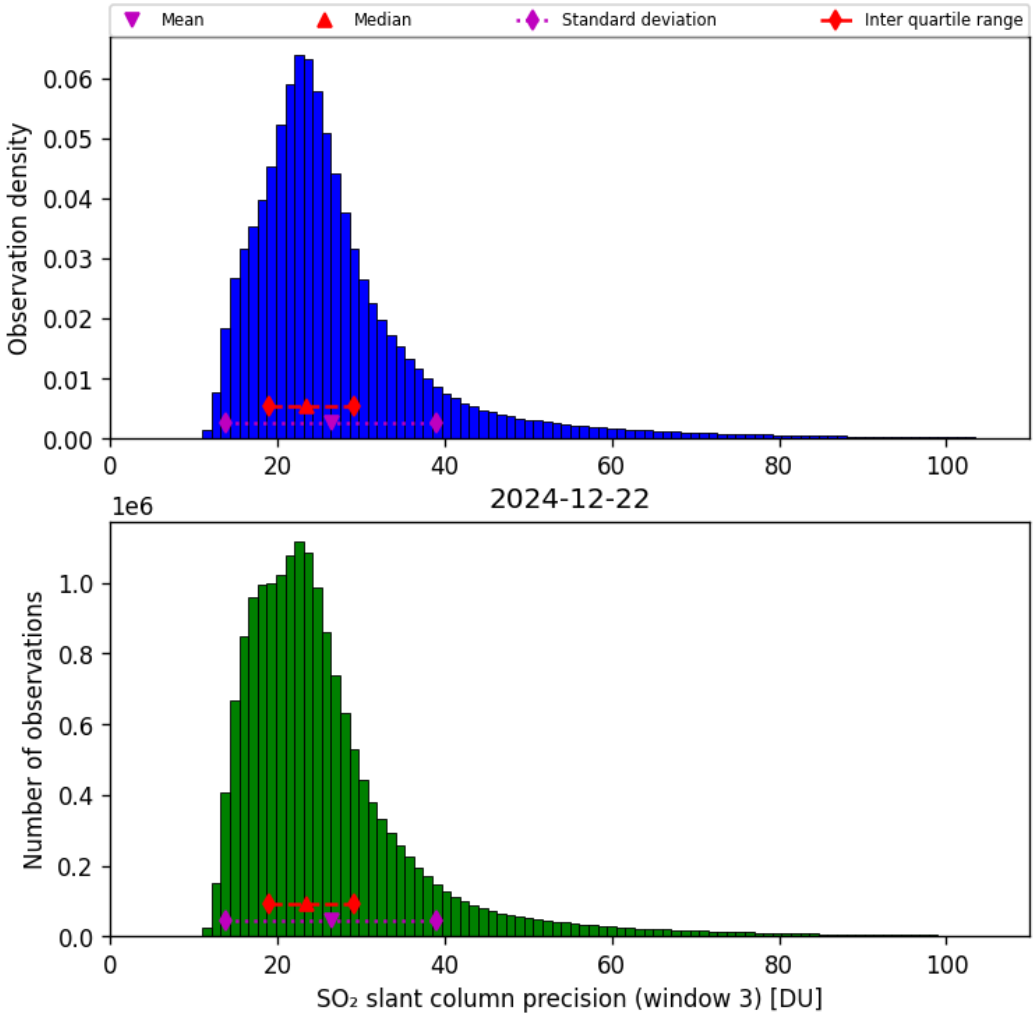

Figure 72: Histogram of "SO_2 slant column precision (window 3)" for 2024-12-22 to 2024-12-23

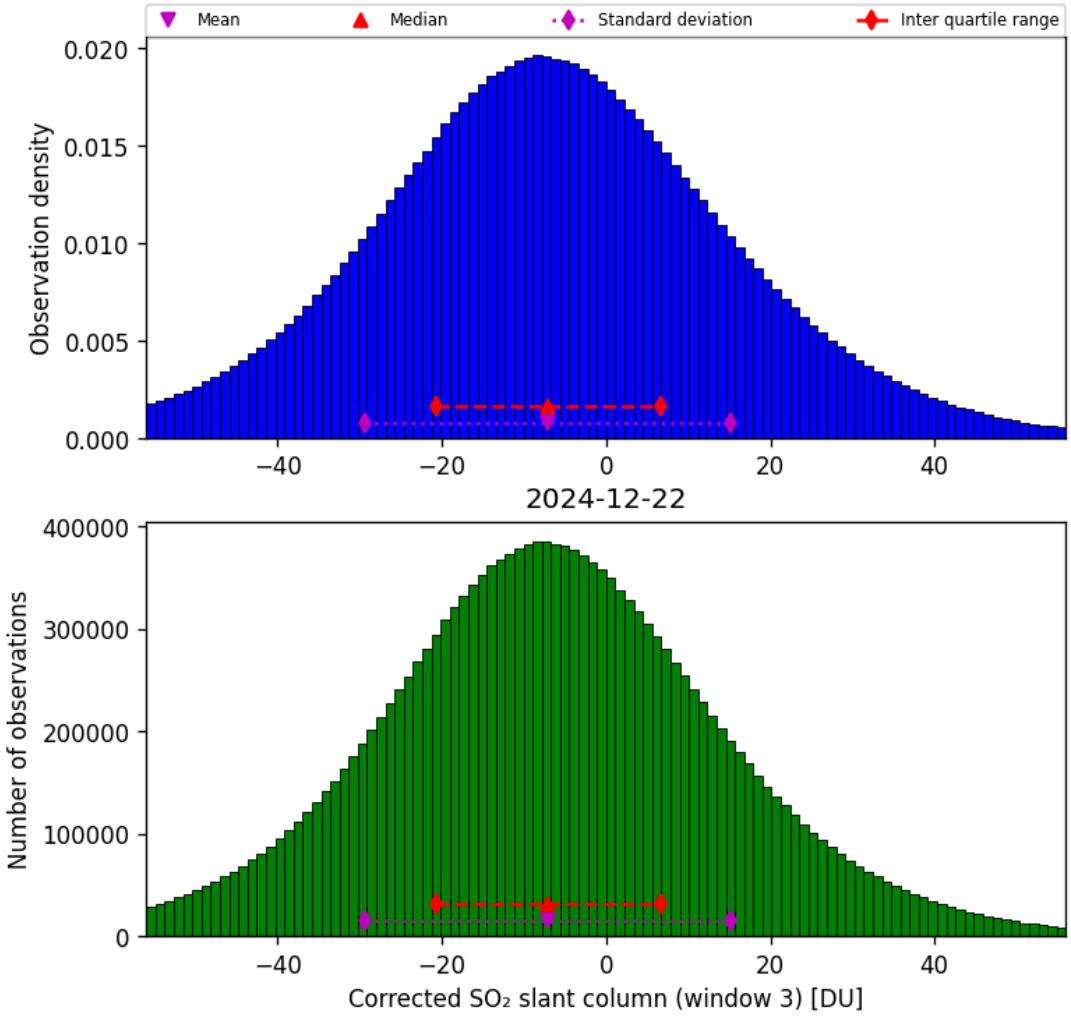

Figure 73: Histogram of "Corrected SO_2 slant column (window 3)" for 2024-12-22 to 2024-12-23

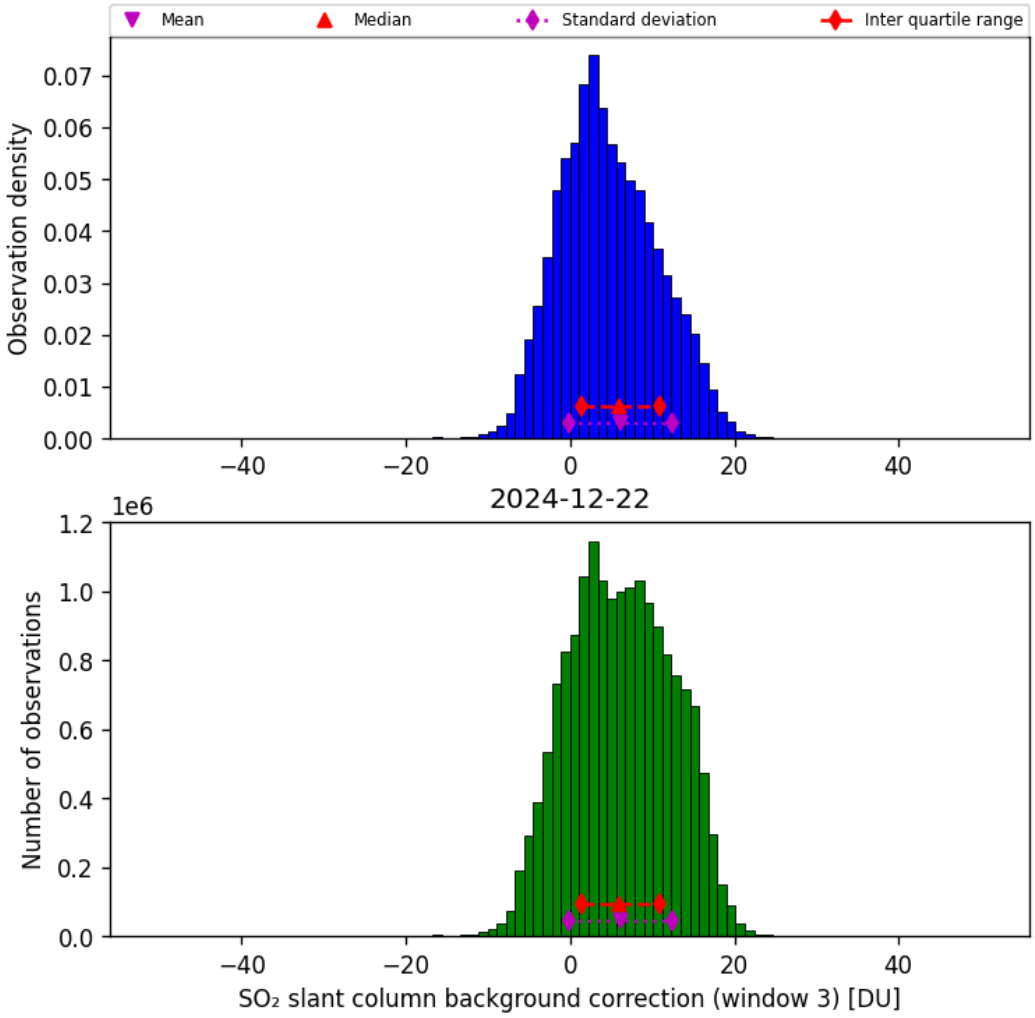

Figure 74: Histogram of "SO_2 slant column background correction (window 3)" for 2024-12-22 to 2024-12-23

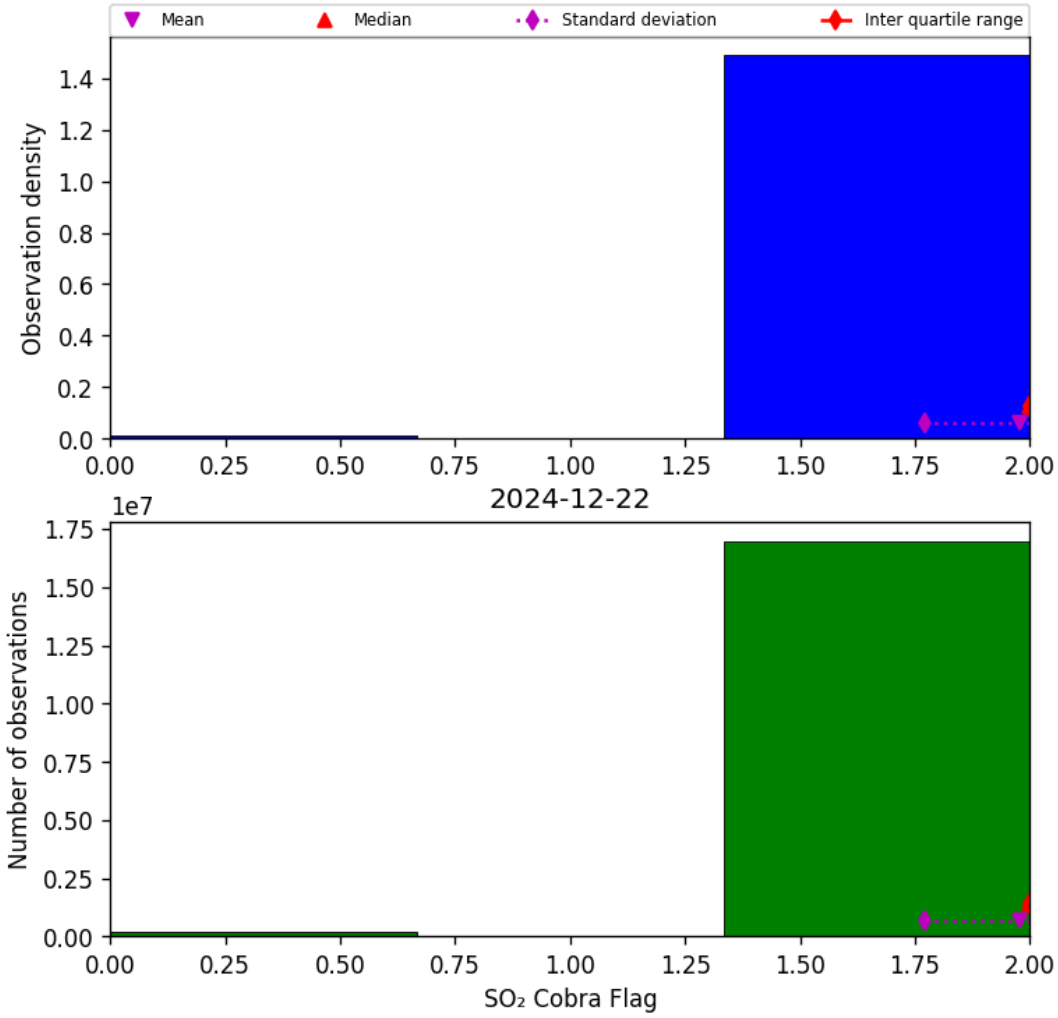

Figure 75: Histogram of "SO_2 Cobra Flag" for 2024-12-22 to 2024-12-23

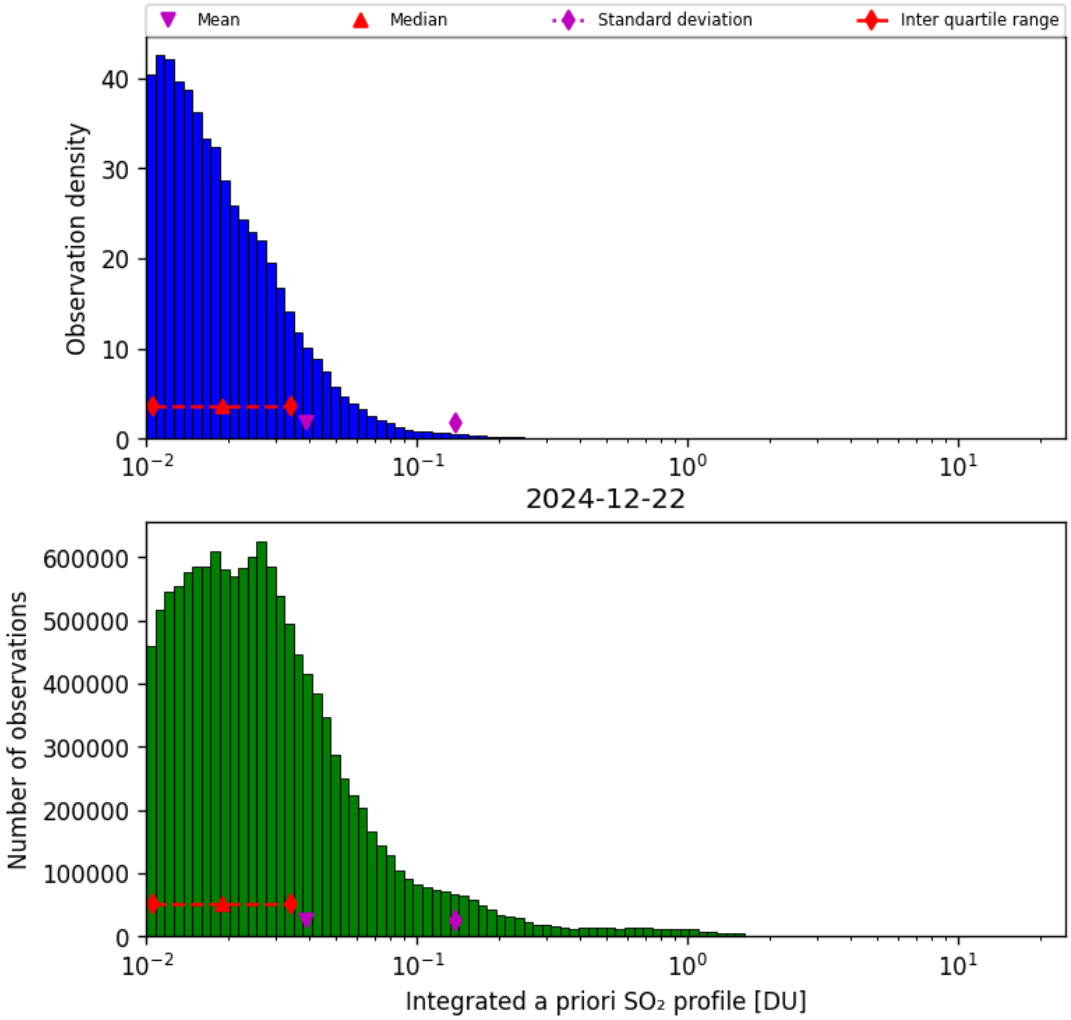

Figure 76: Histogram of "Integrated a priori SO_2 profile" for 2024-12-22 to 2024-12-23

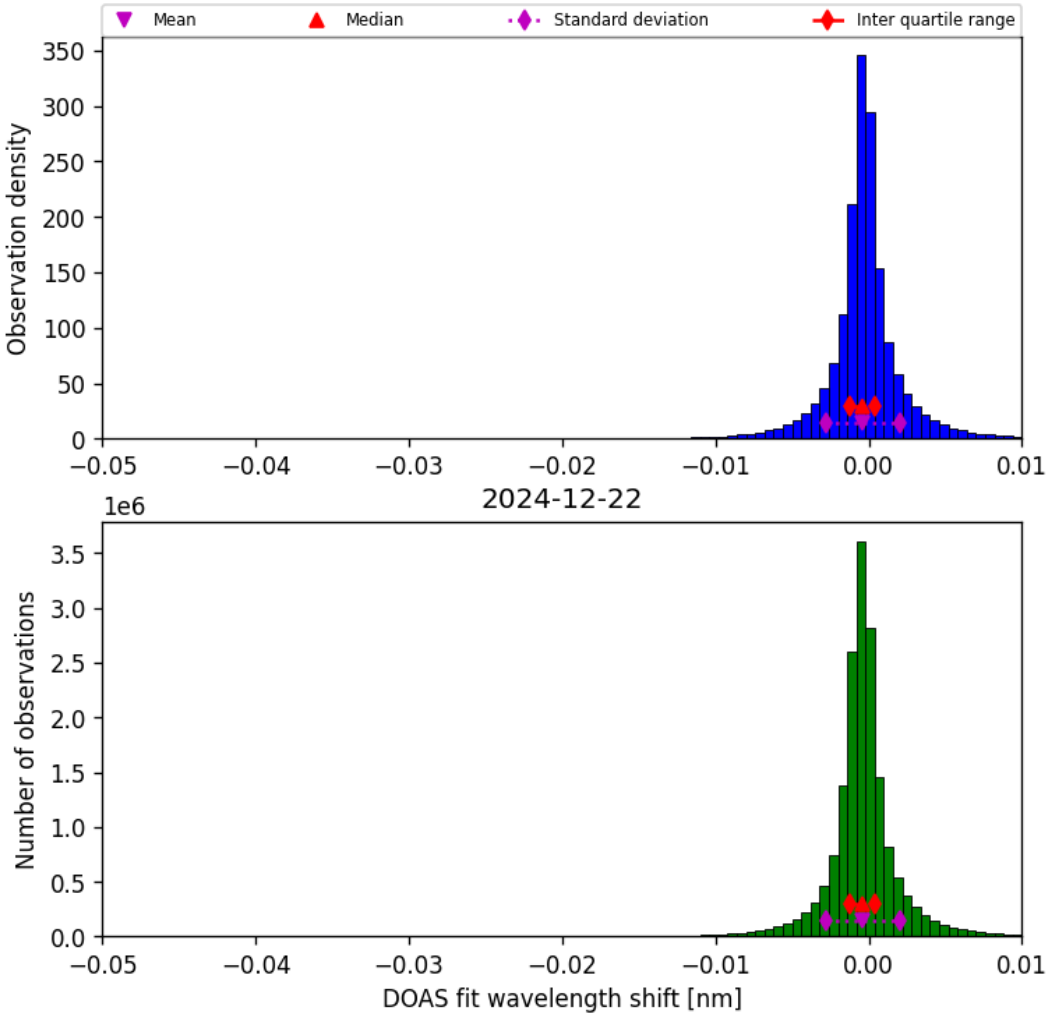

Figure 77: Histogram of “DOAS fit wavelength shift” for 2024-12-22 to 2024-12-23

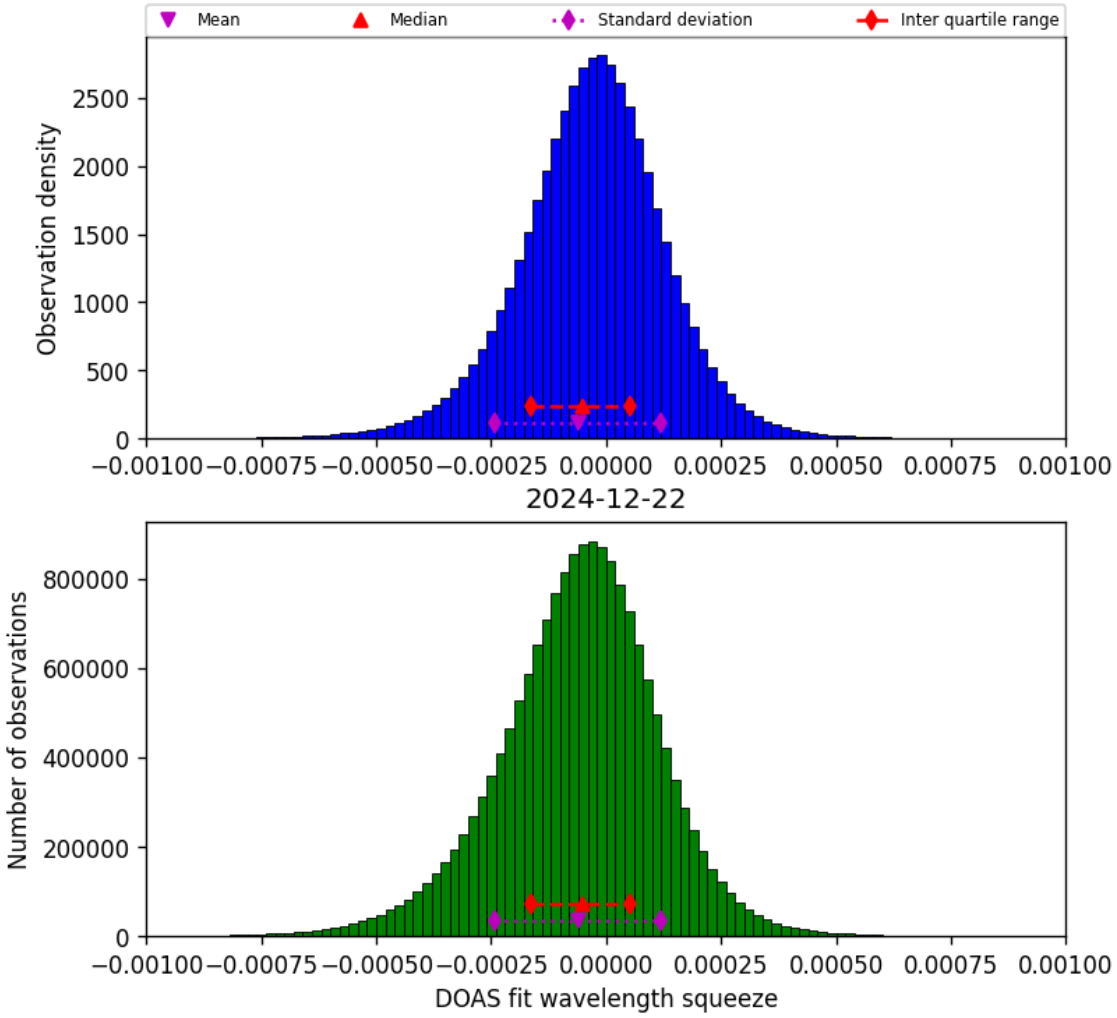

Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2024-12-22 to 2024-12-23

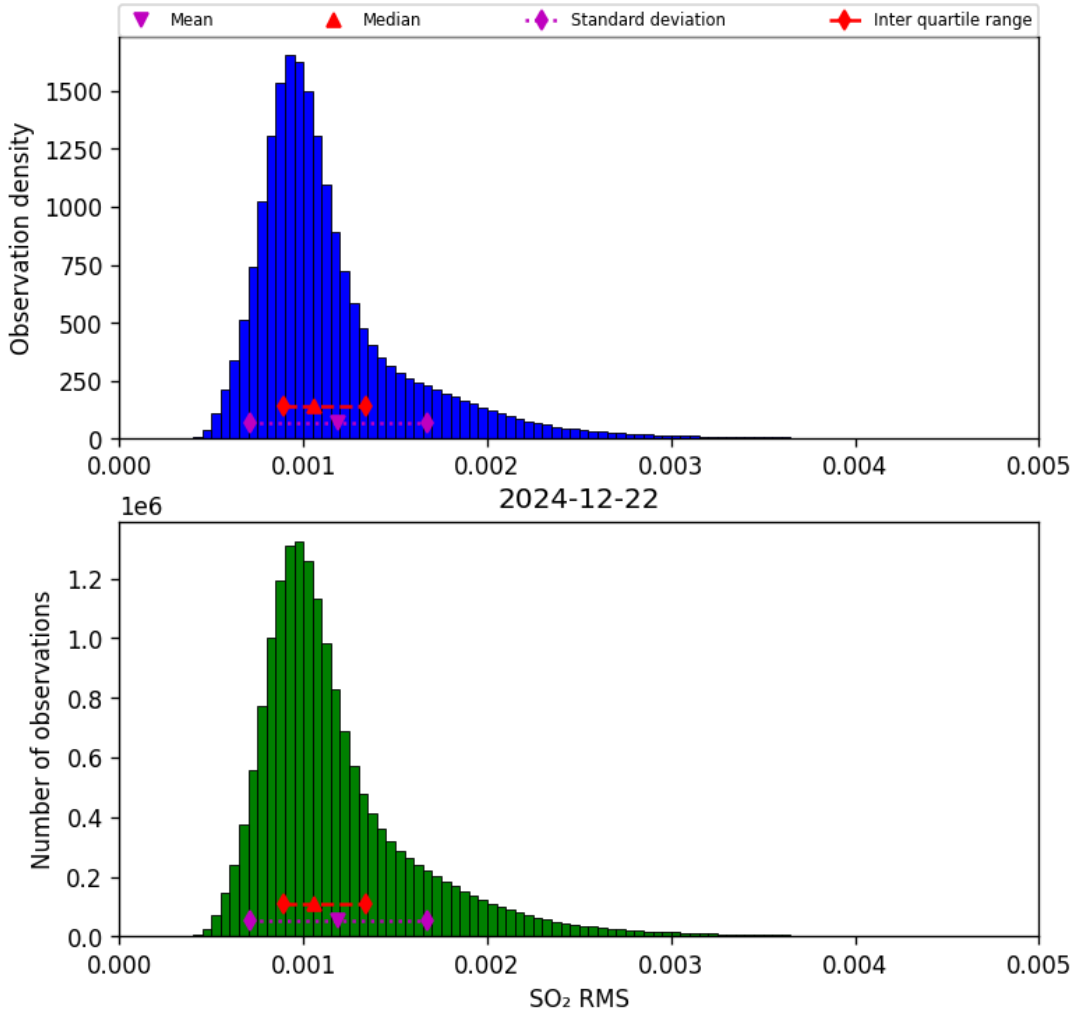

Figure 79: Histogram of "SO_2 RMS" for 2024-12-22 to 2024-12-23

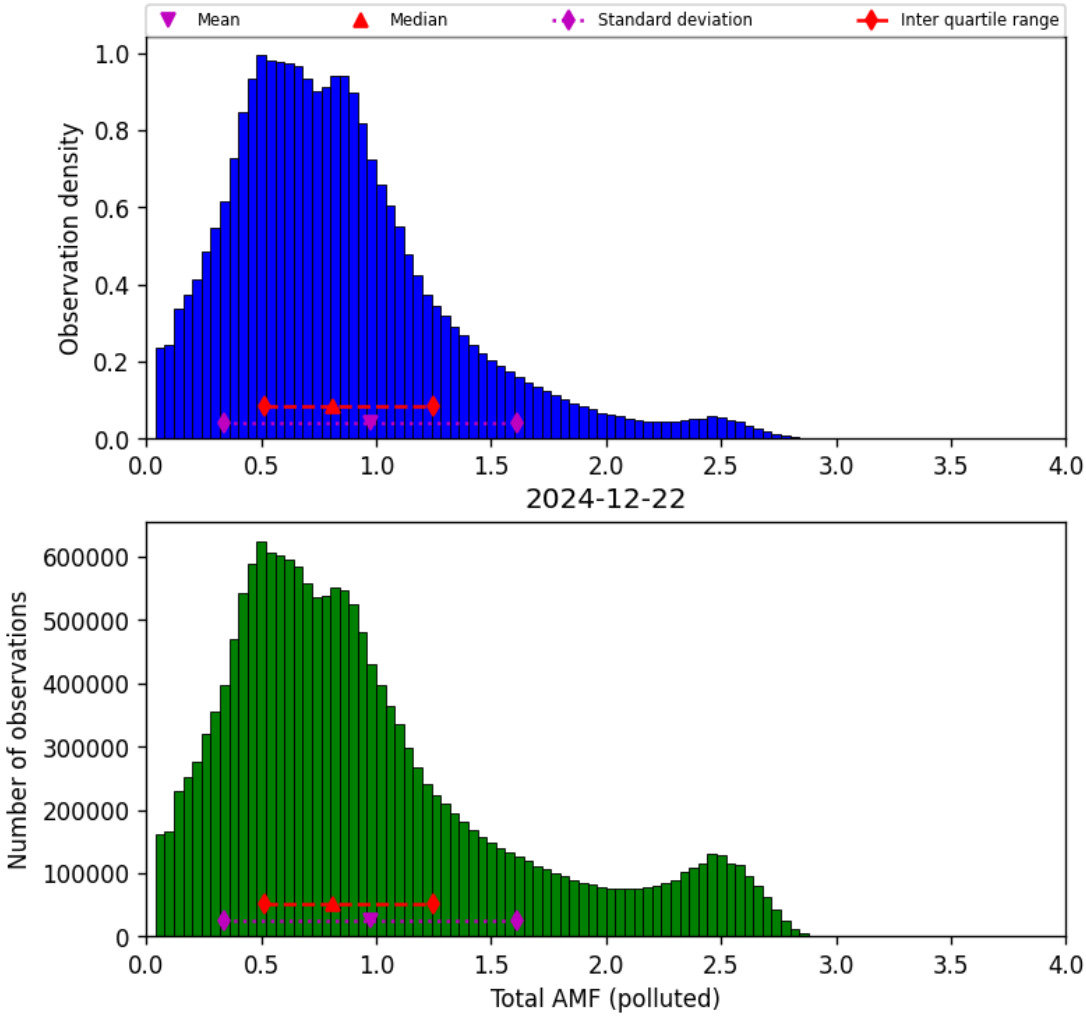

Figure 80: Histogram of “Total AMF (polluted)” for 2024-12-22 to 2024-12-23

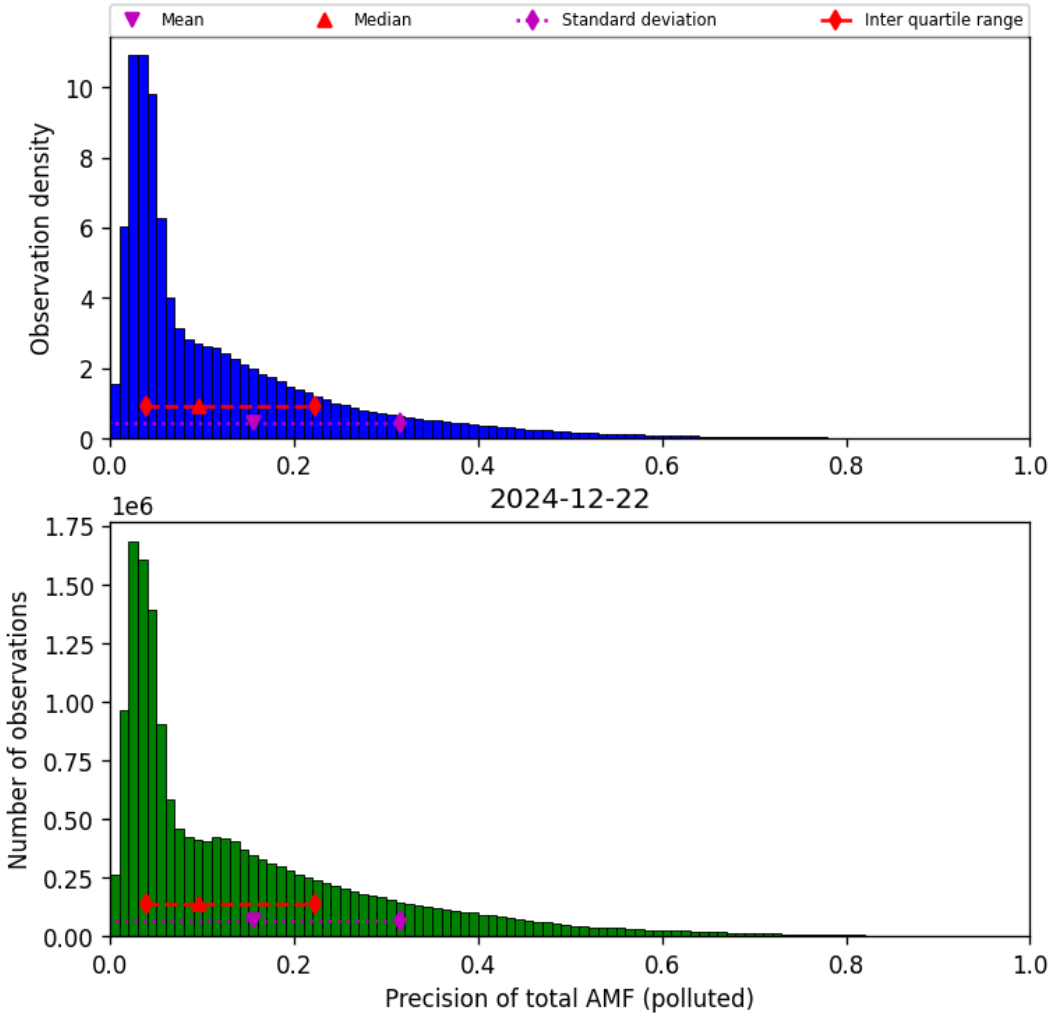

Figure 81: Histogram of “Precision of total AMF (polluted)” for 2024-12-22 to 2024-12-23

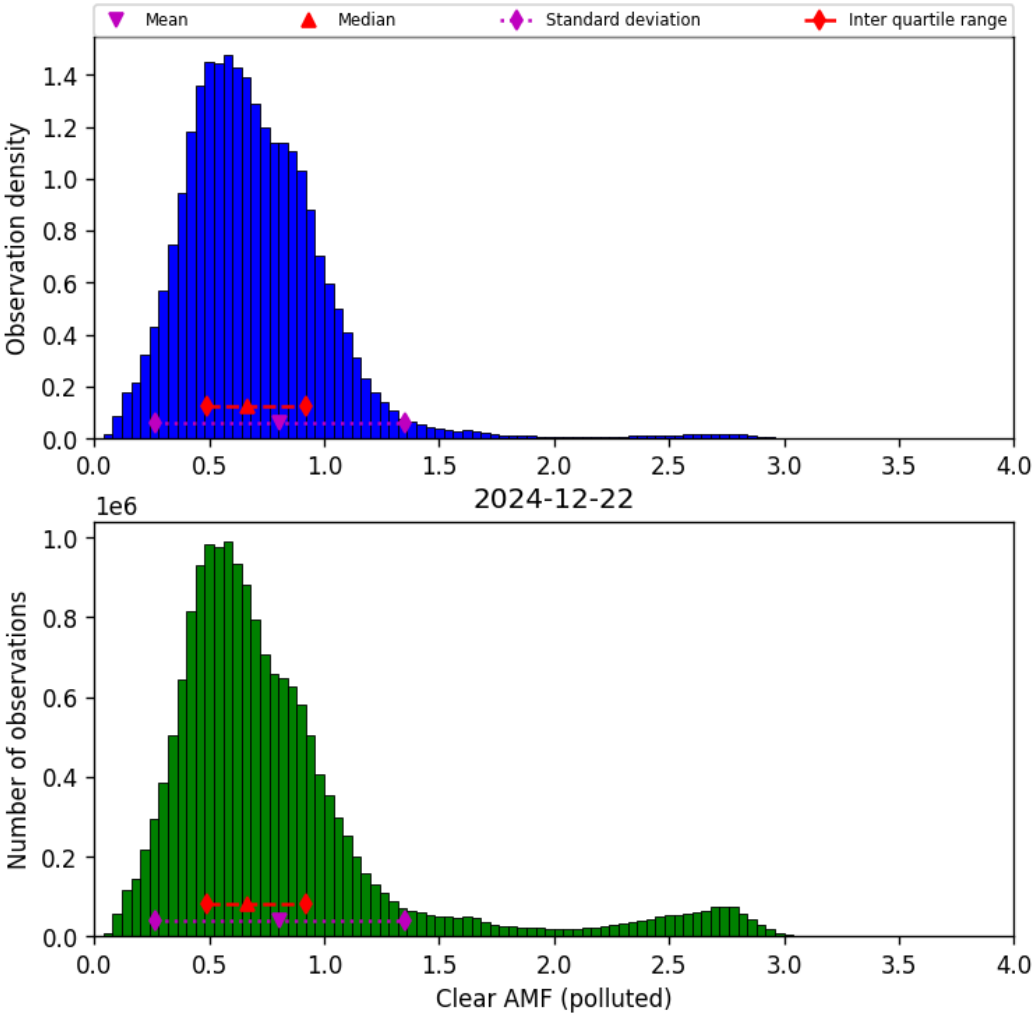

Figure 82: Histogram of “Clear AMF (polluted)” for 2024-12-22 to 2024-12-23

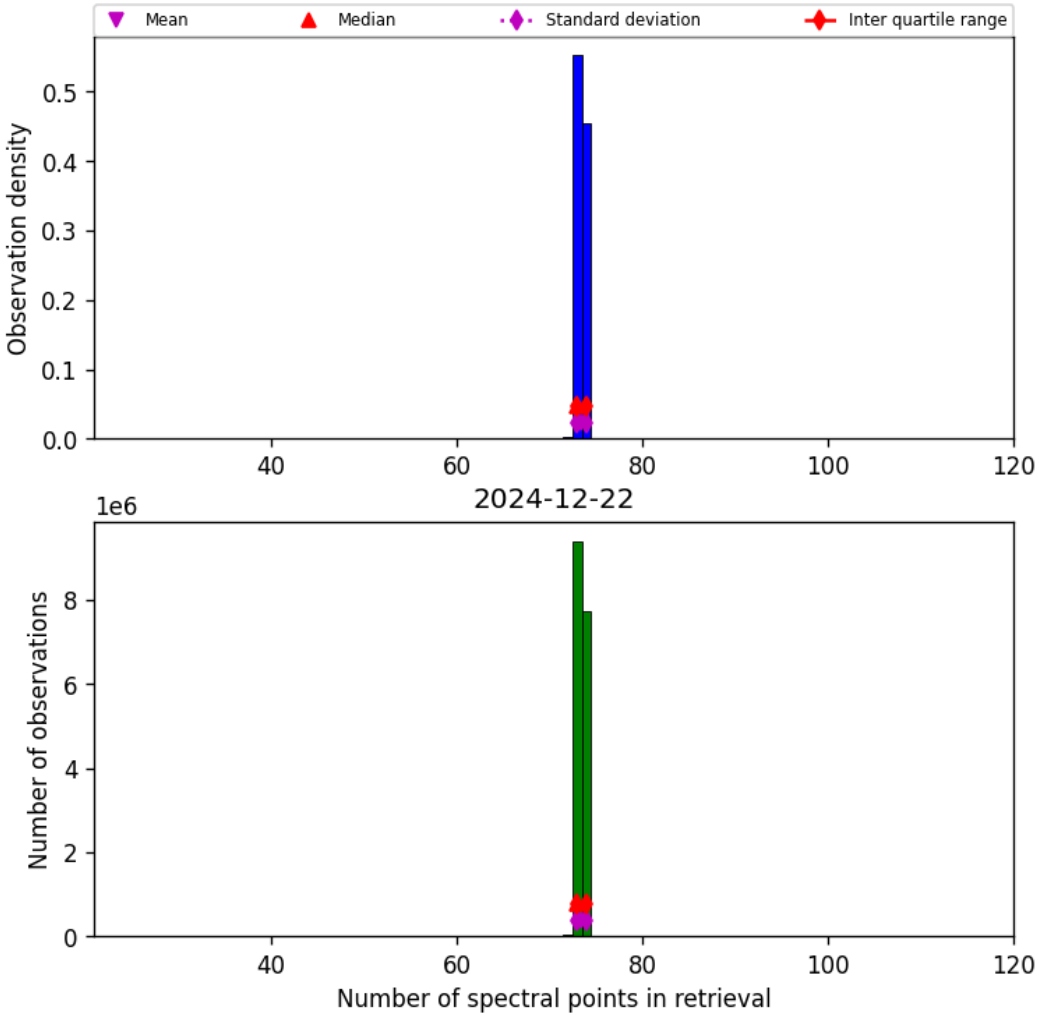

Figure 83: Histogram of “Number of spectral points in retrieval” for 2024-12-22 to 2024-12-23

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.

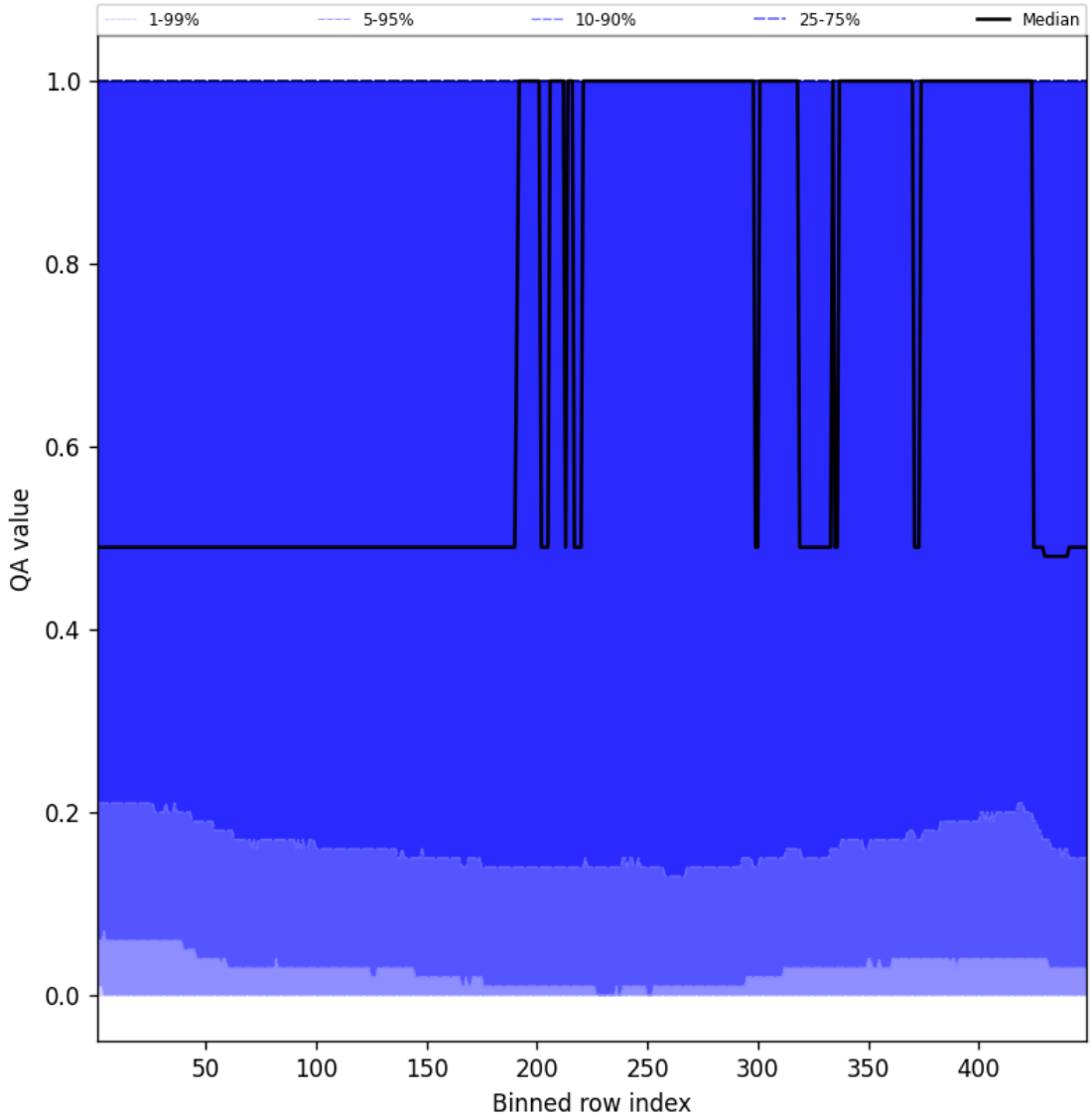

Figure 84: Along track statistics of “QA value” for 2024-12-22 to 2024-12-23

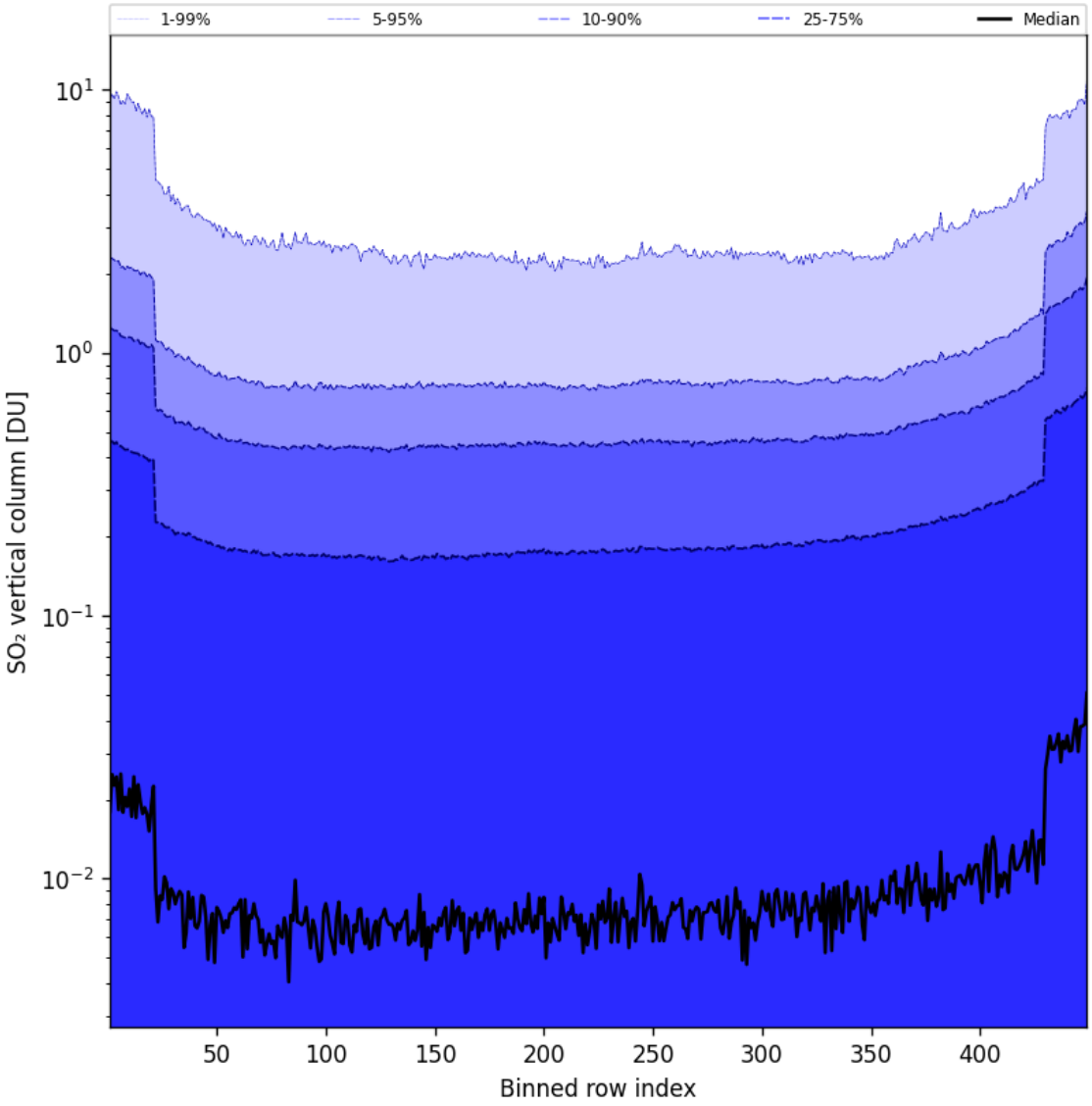

Figure 85: Along track statistics of "SO_2 vertical column" for 2024-12-22 to 2024-12-23

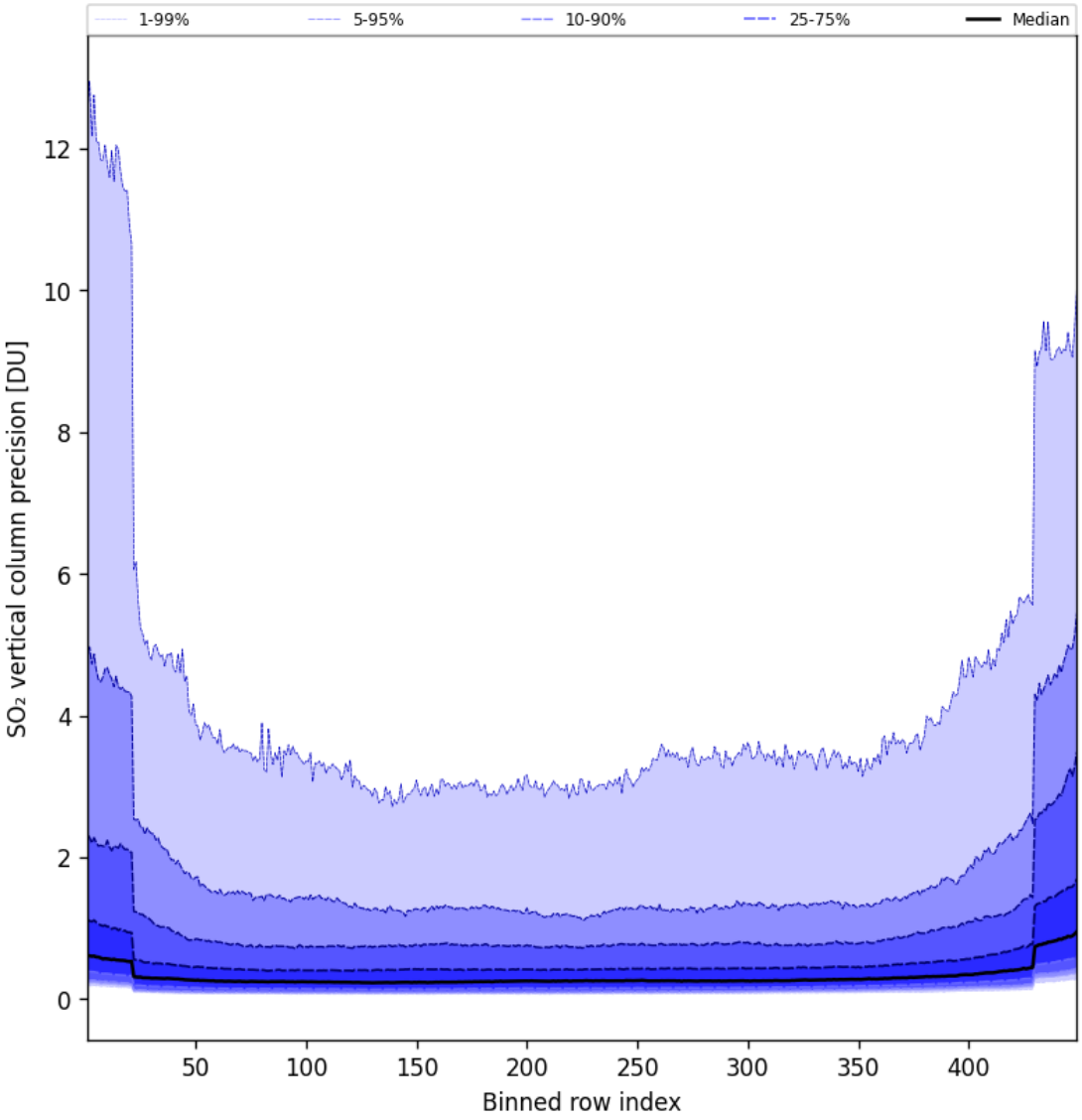

Figure 86: Along track statistics of "SO_2 vertical column precision" for 2024-12-22 to 2024-12-23

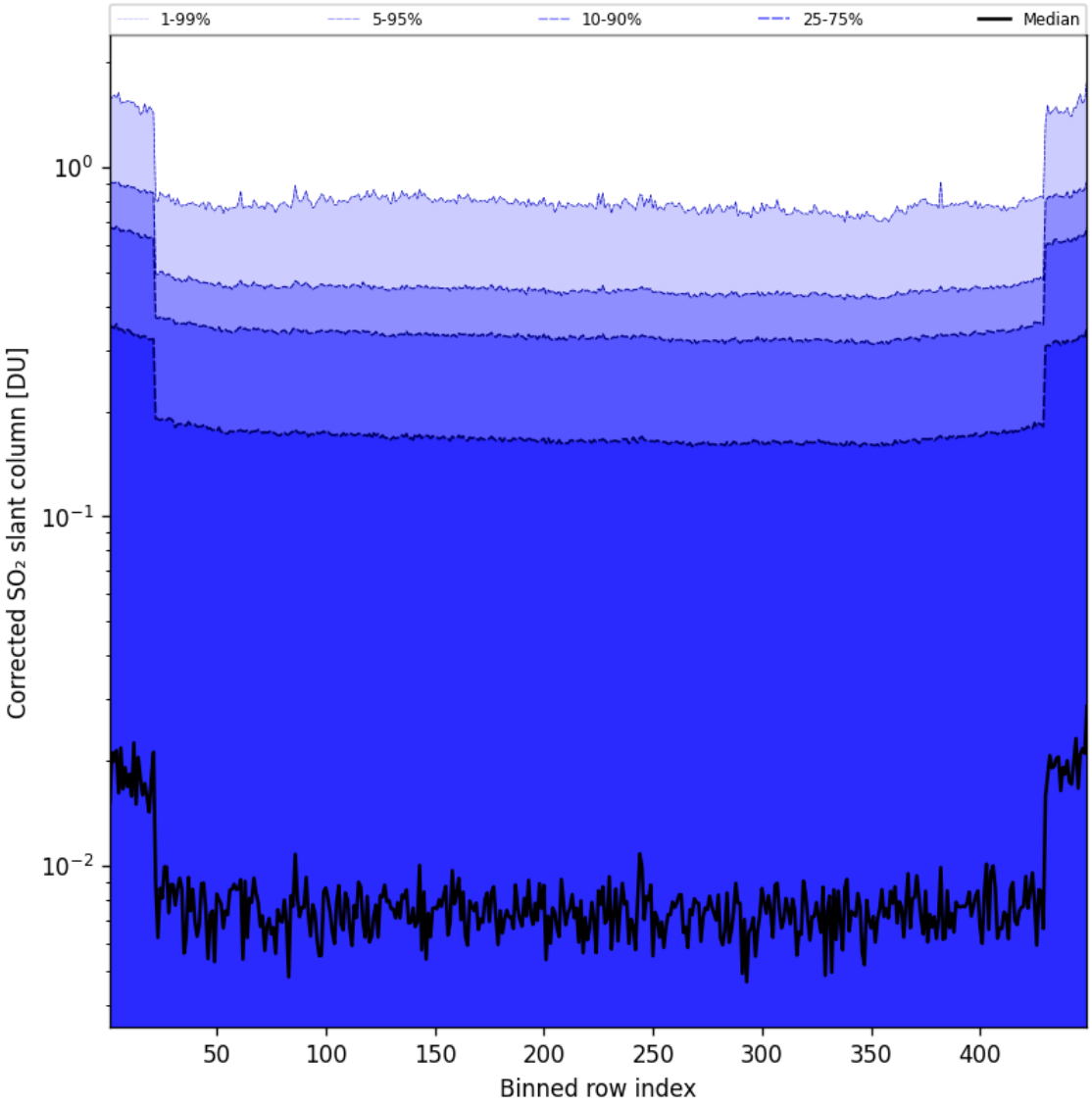

Figure 87: Along track statistics of "Corrected SO_2 slant column" for 2024-12-22 to 2024-12-23

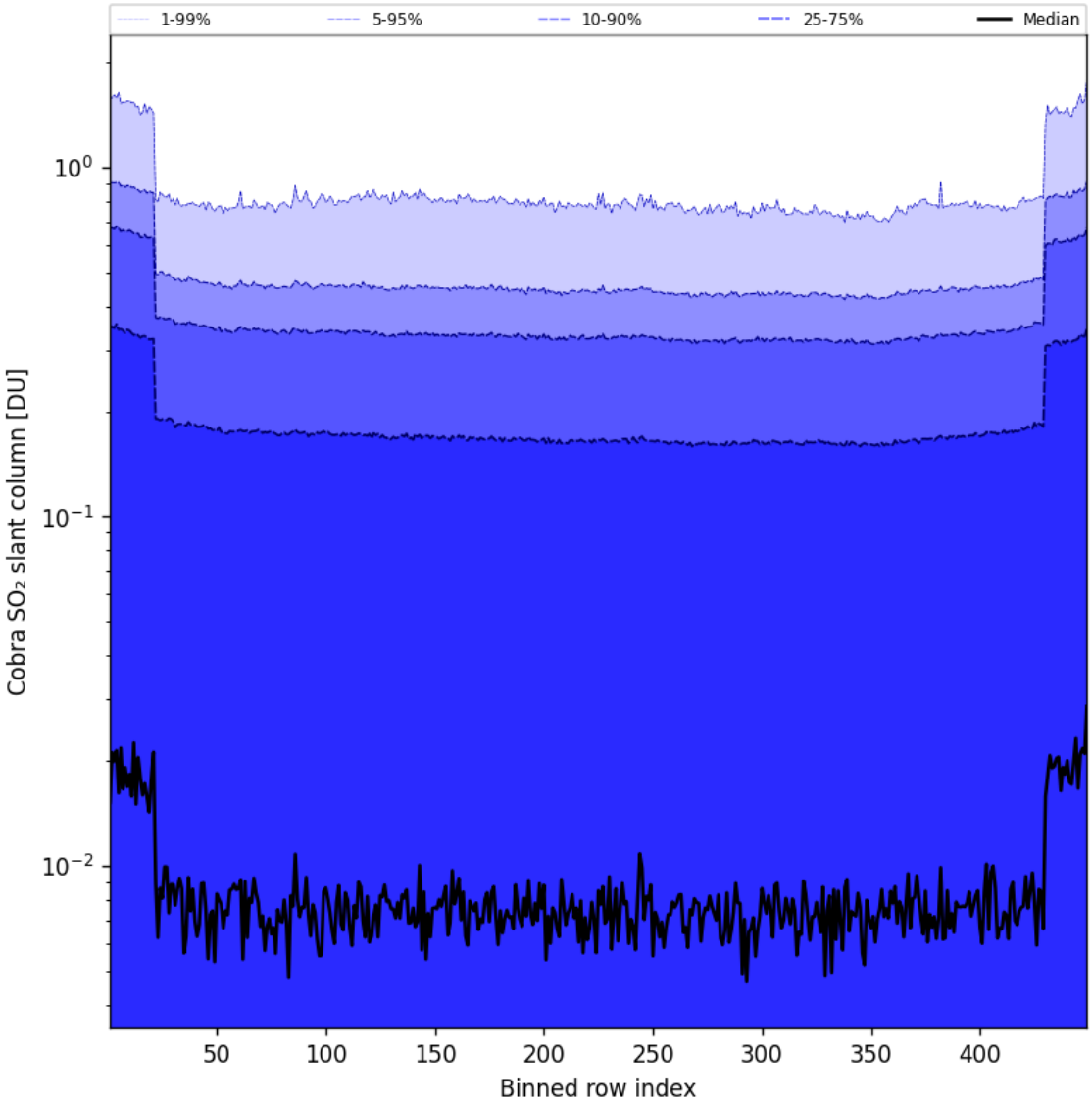

Figure 88: Along track statistics of "Cobra SO_2 slant column" for 2024-12-22 to 2024-12-23

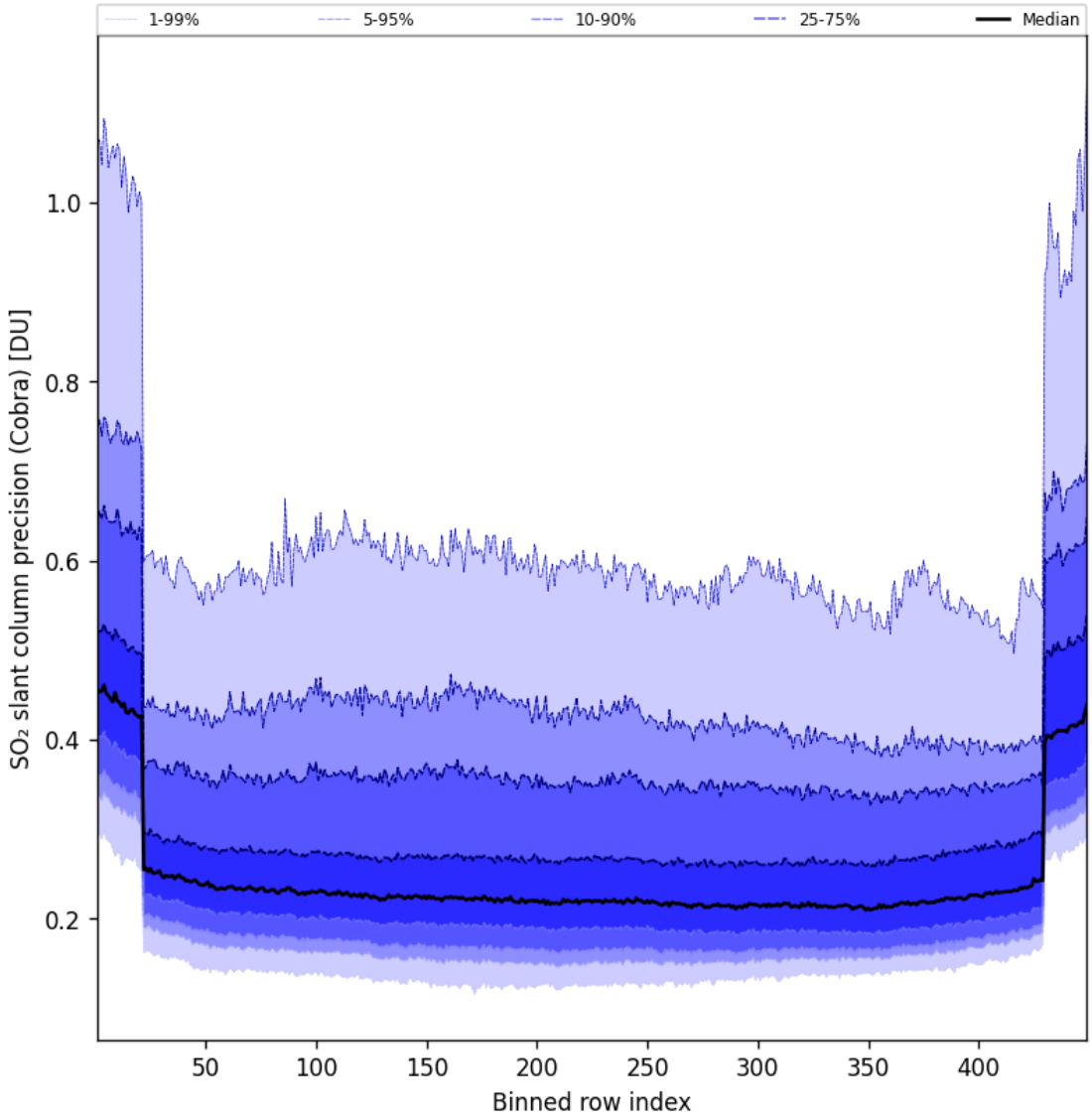

Figure 89: Along track statistics of "SO_2 slant column precision (Cobra)" for 2024-12-22 to 2024-12-23

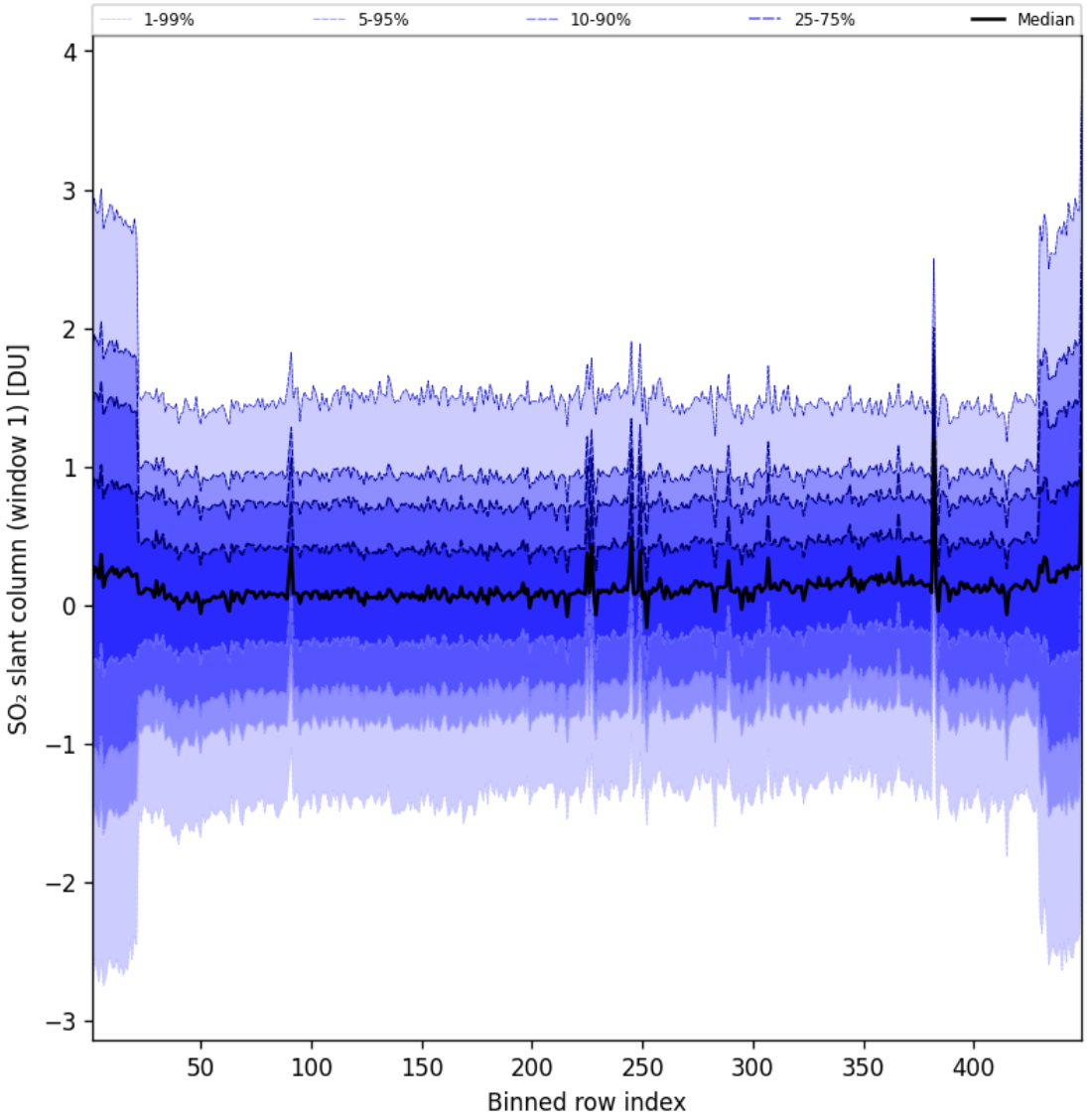

Figure 90: Along track statistics of "SO_2 slant column (window 1)" for 2024-12-22 to 2024-12-23

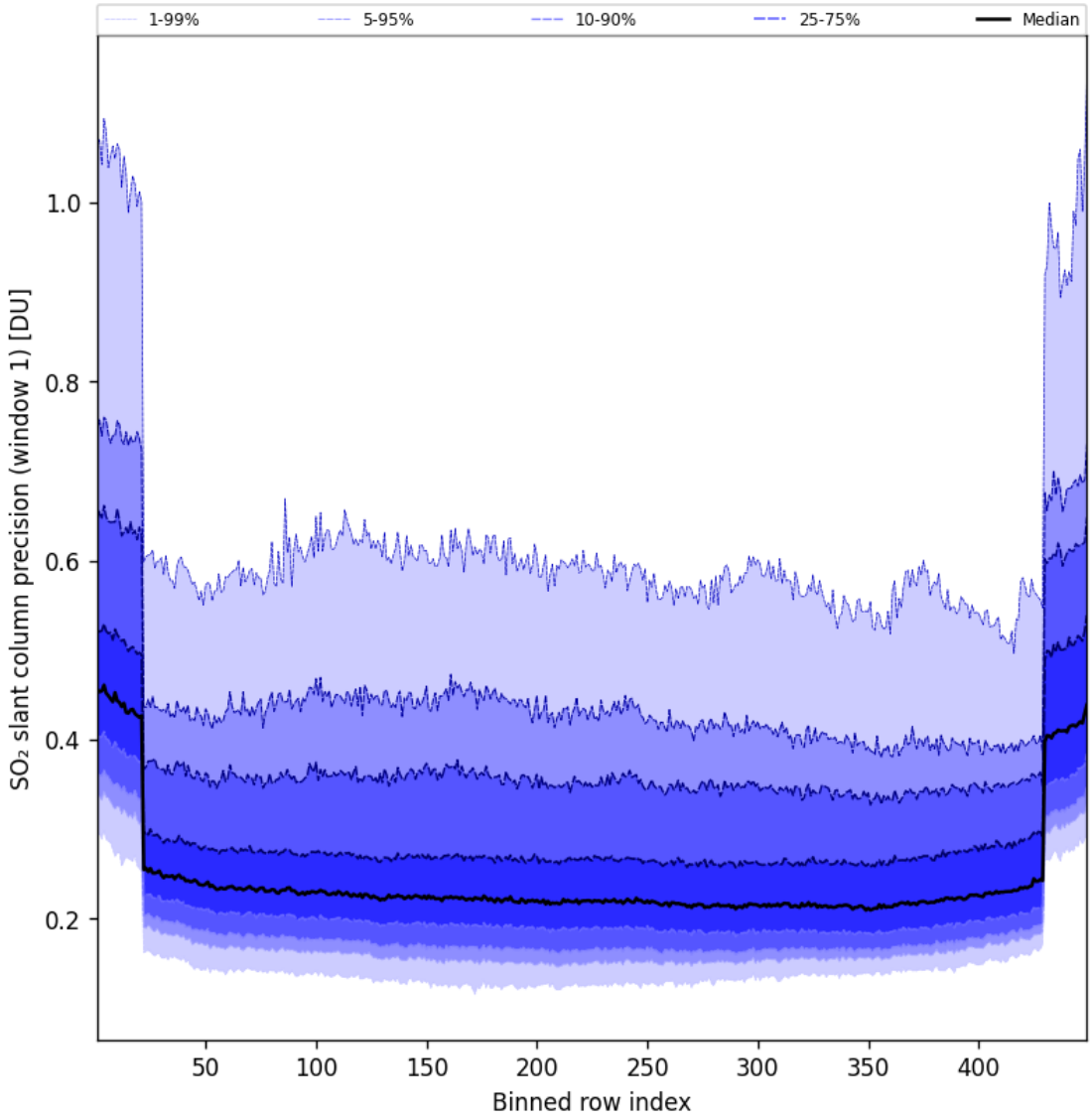

Figure 91: Along track statistics of "SO_2 slant column precision (window 1)" for 2024-12-22 to 2024-12-23

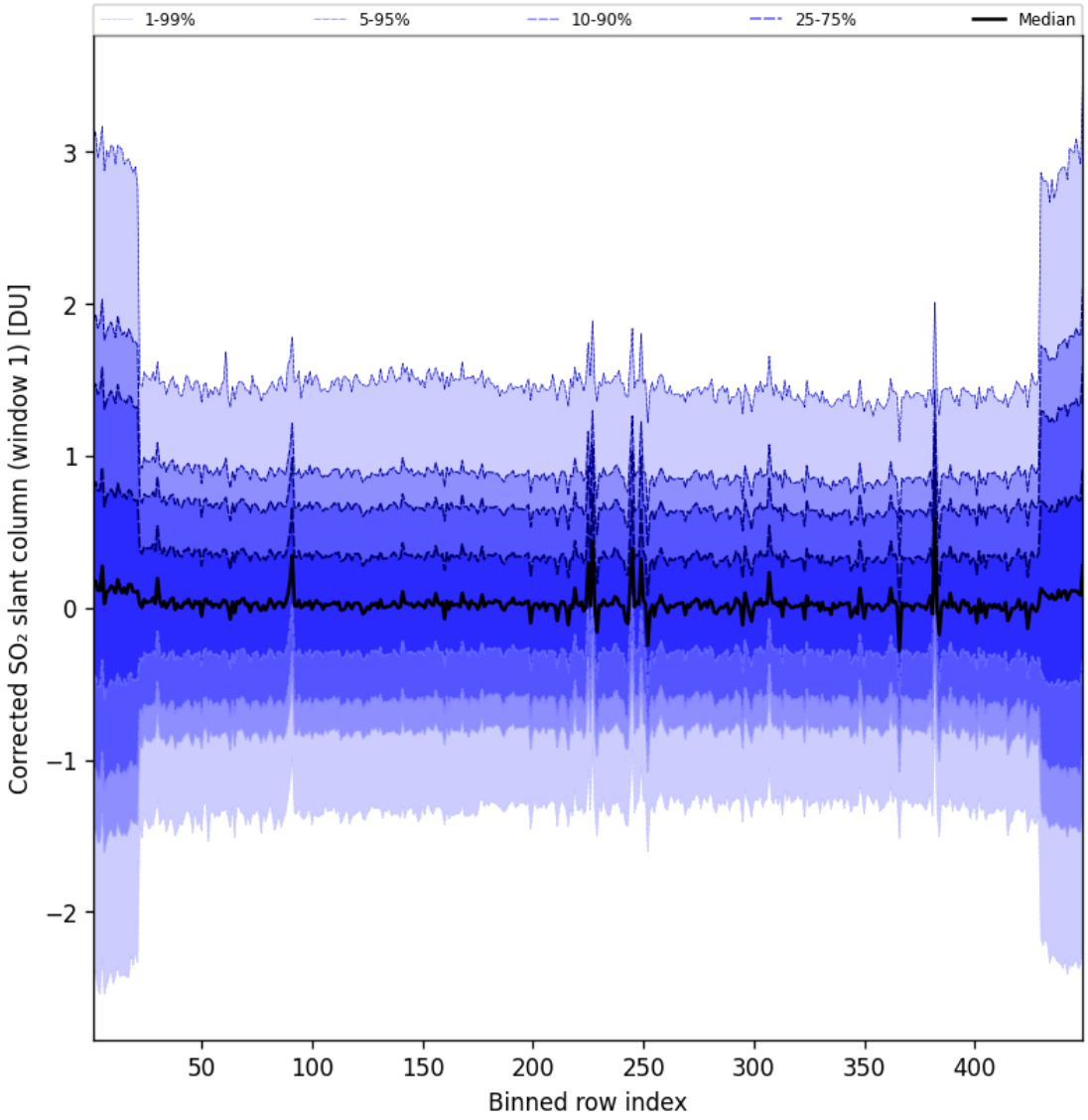

Figure 92: Along track statistics of “Corrected SO_2 slant column (window 1)” for 2024-12-22 to 2024-12-23

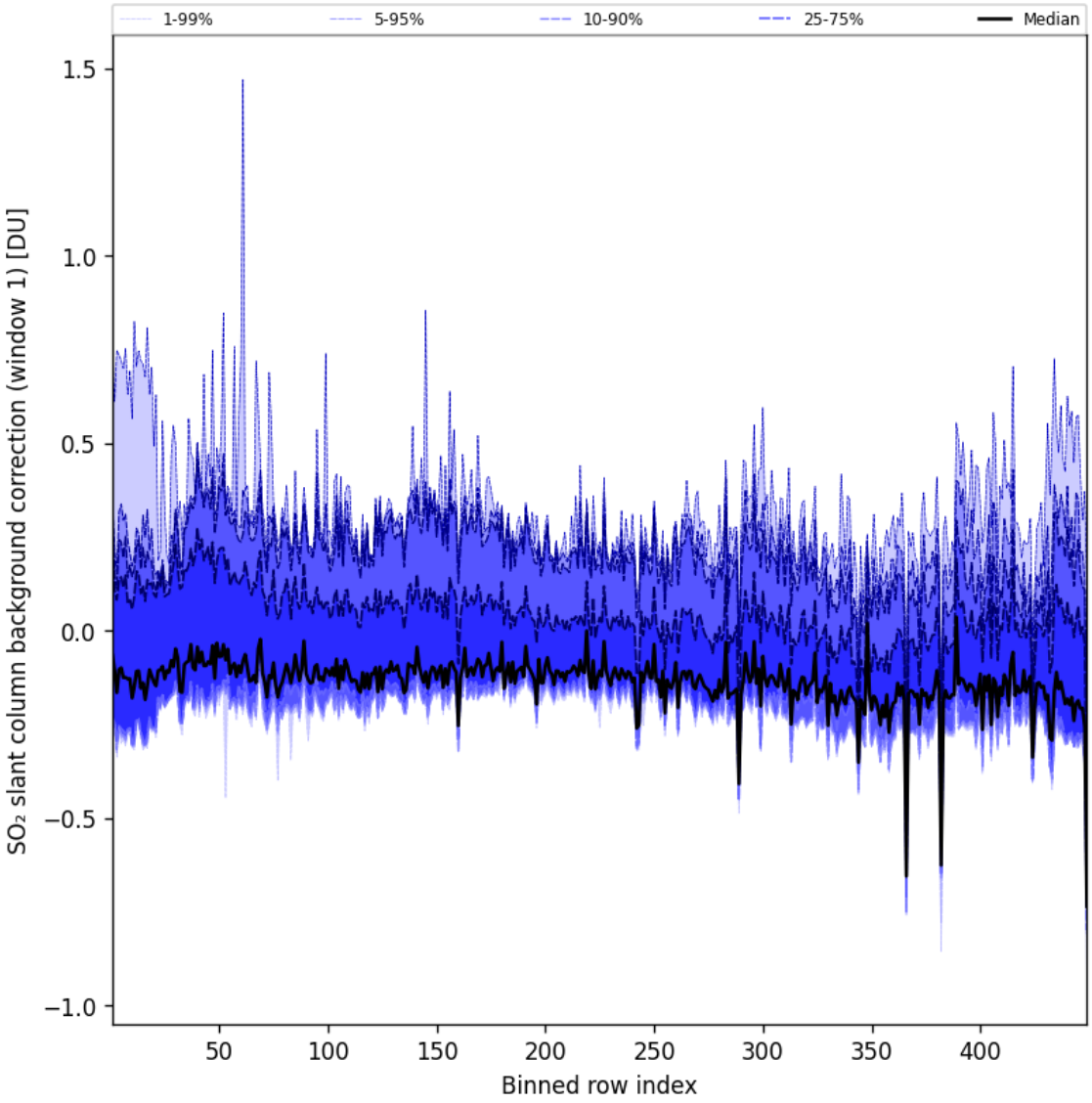

Figure 93: Along track statistics of "SO_2 slant column background correction (window 1)" for 2024-12-22 to 2024-12-23

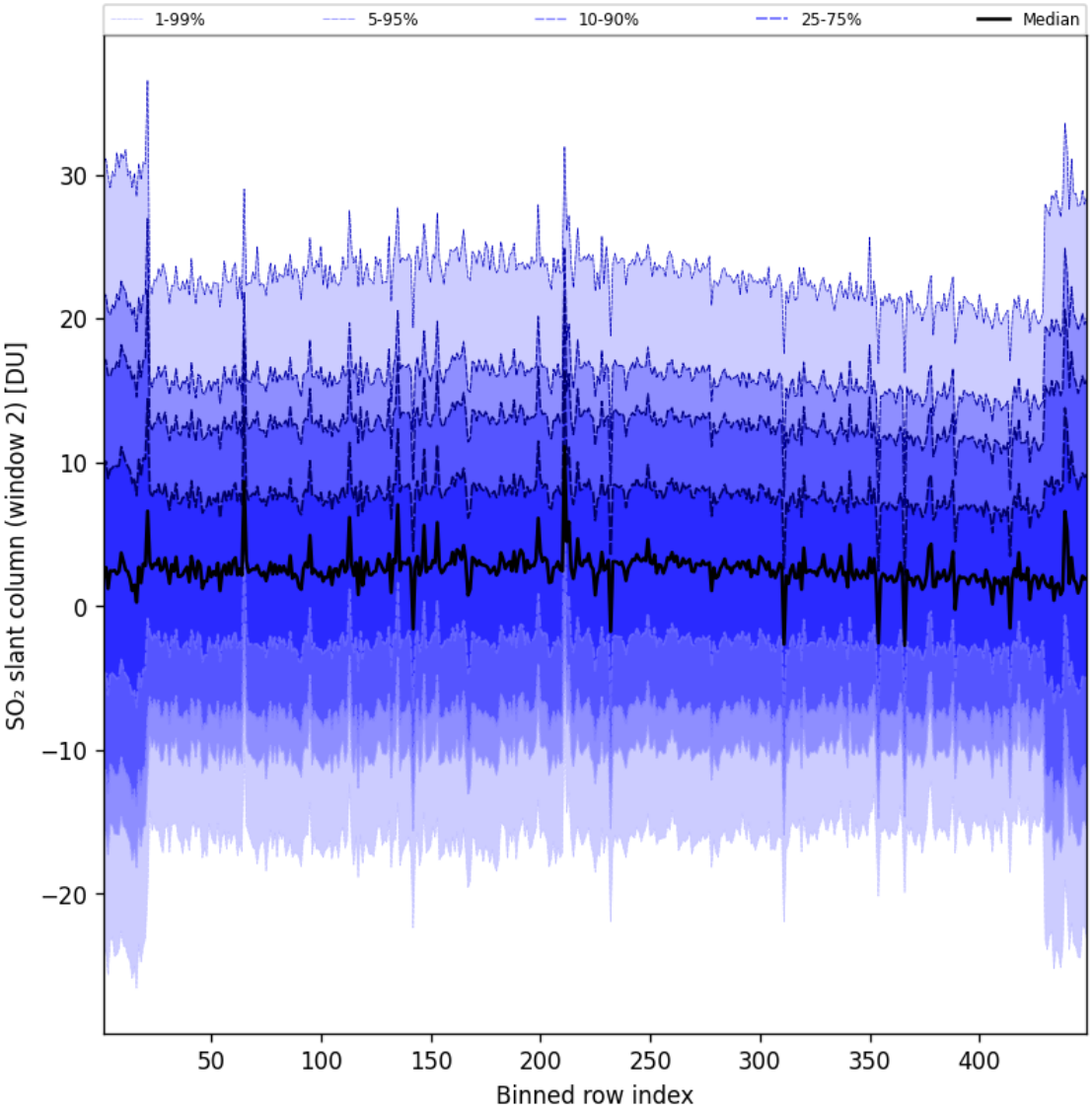

Figure 94: Along track statistics of "SO_2 slant column (window 2)" for 2024-12-22 to 2024-12-23

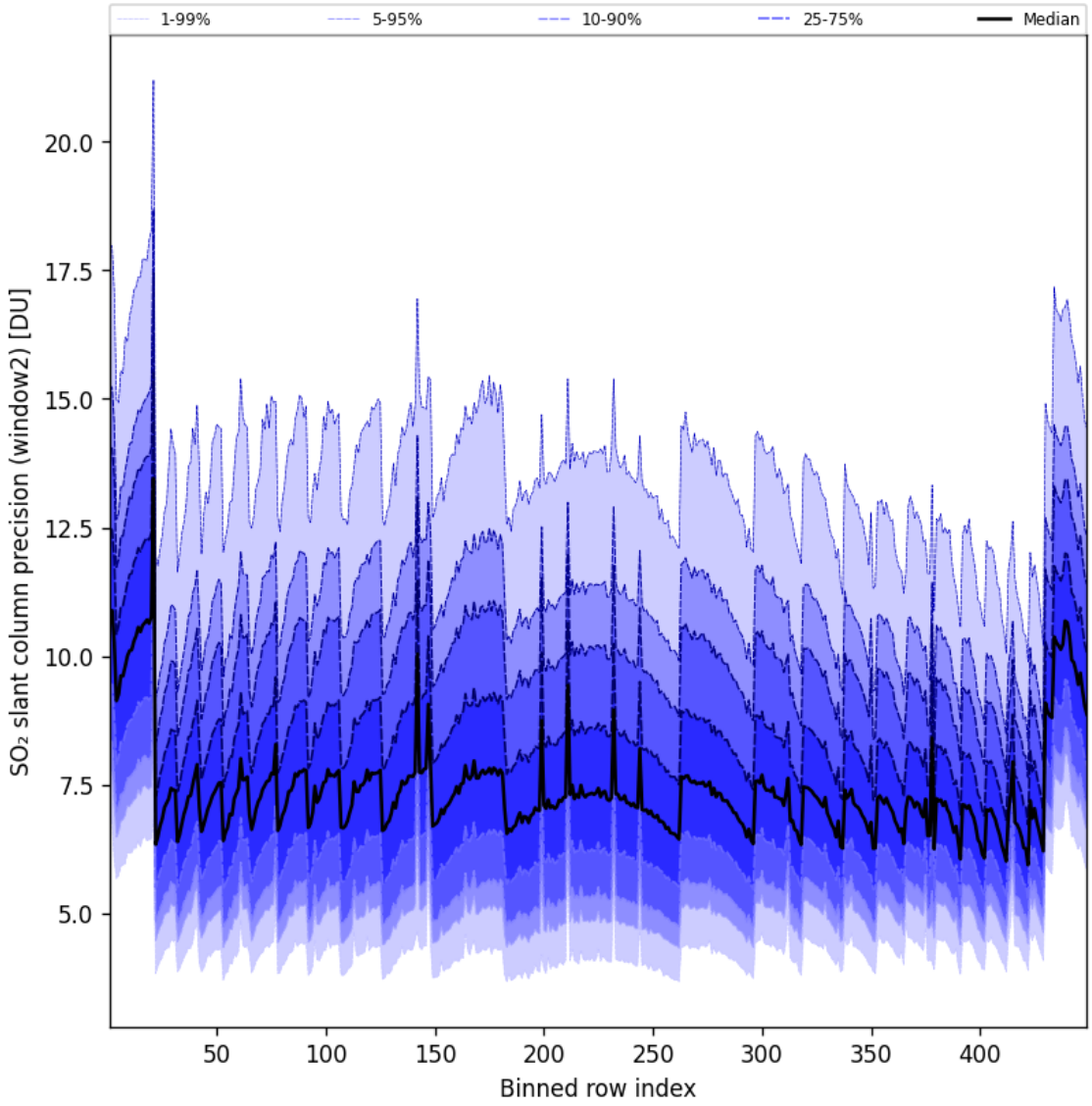

Figure 95: Along track statistics of "SO_2 slant column precision (window2)" for 2024-12-22 to 2024-12-23

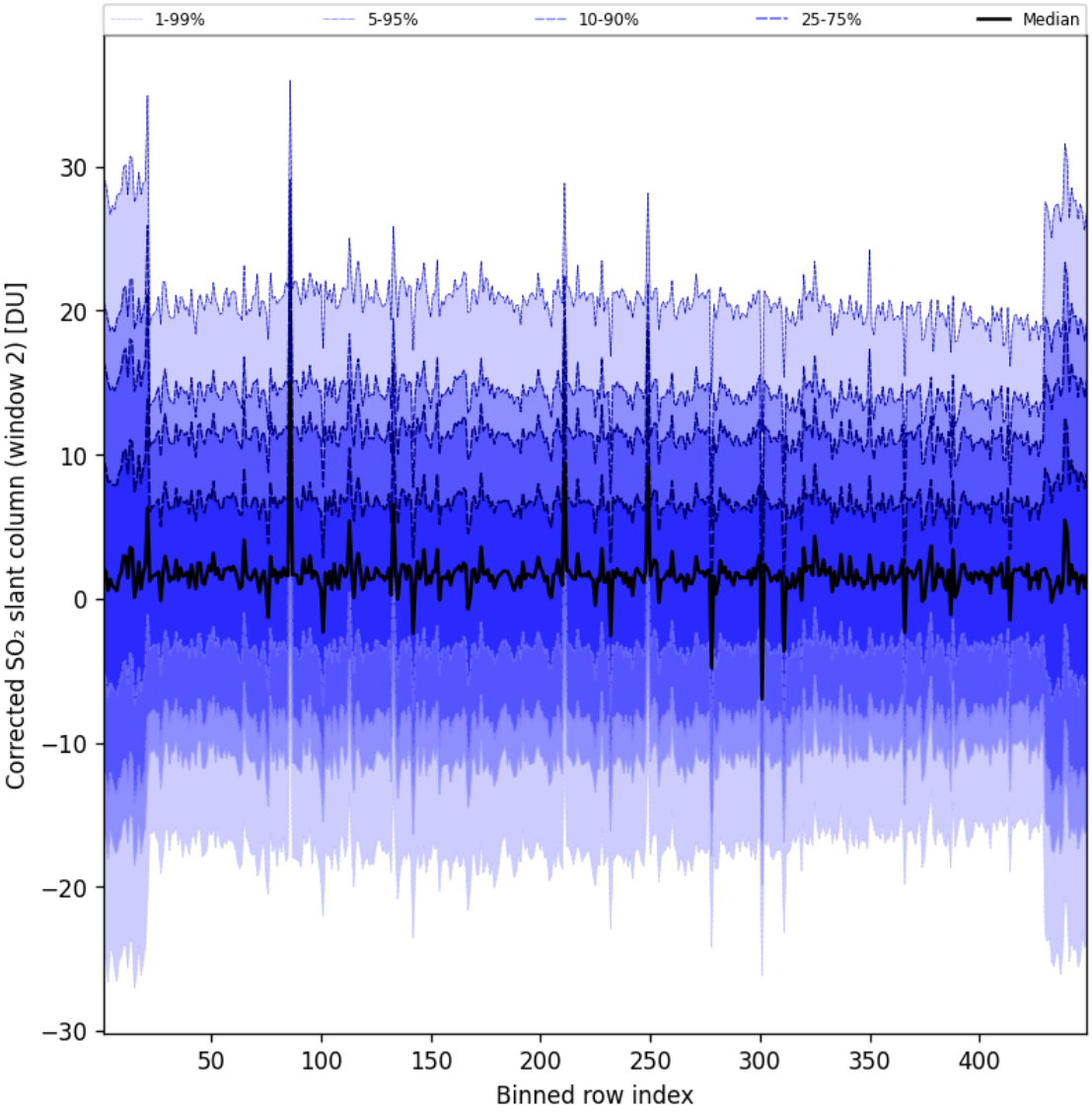

Figure 96: Along track statistics of "Corrected SO_2 slant column (window 2)" for 2024-12-22 to 2024-12-23

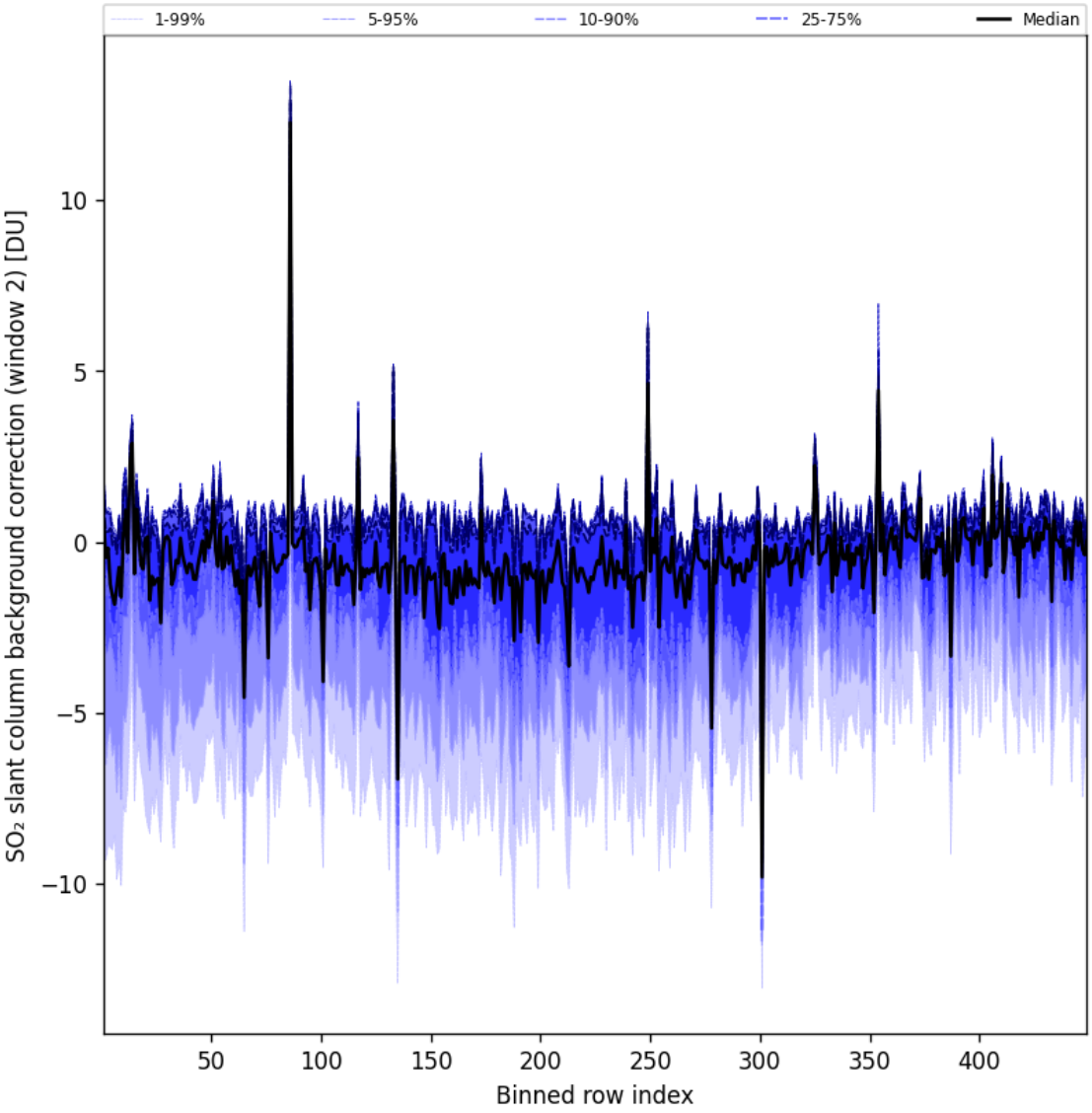

Figure 97: Along track statistics of "SO_2 slant column background correction (window 2)" for 2024-12-22 to 2024-12-23

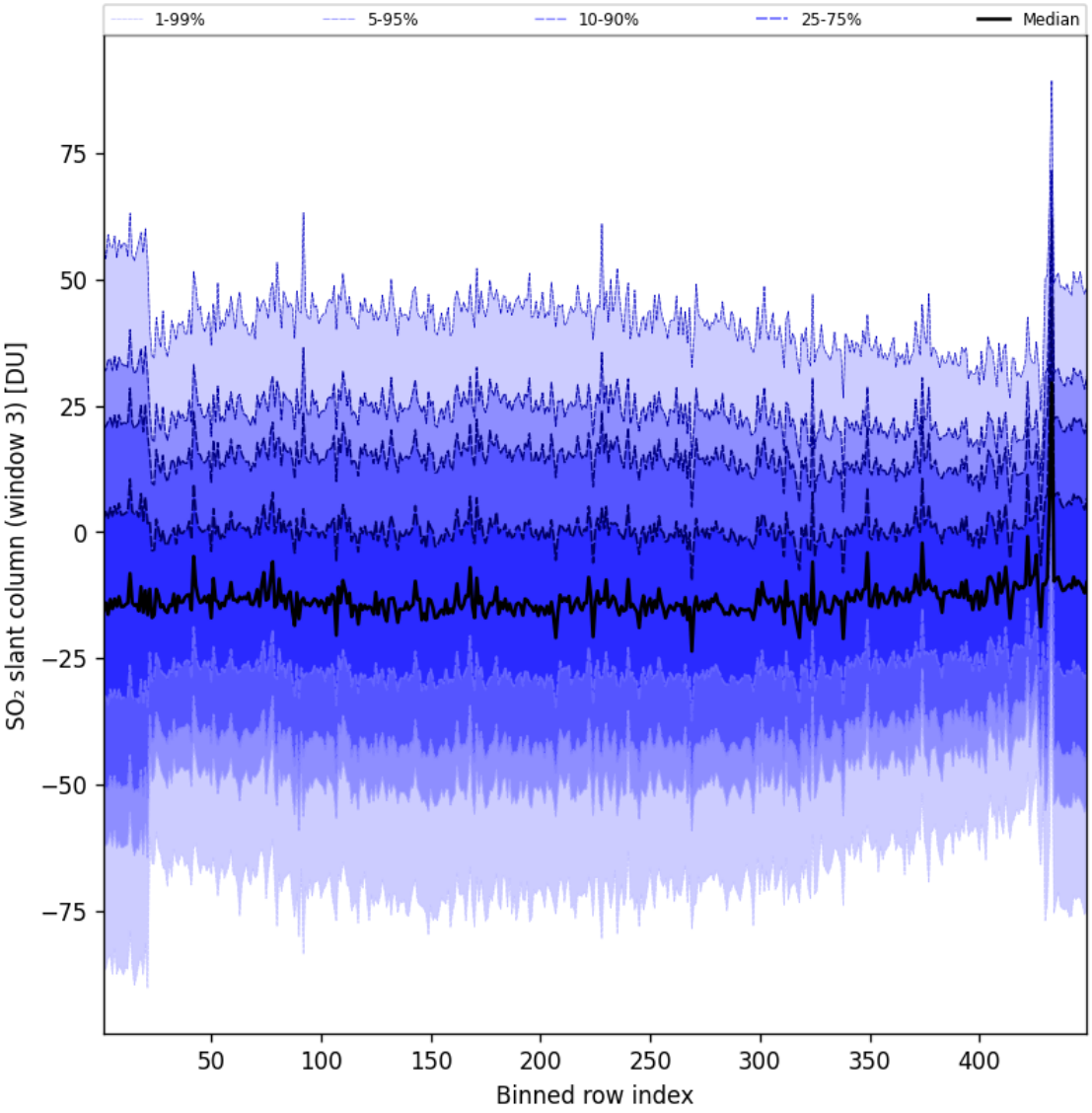

Figure 98: Along track statistics of "SO_2 slant column (window 3)" for 2024-12-22 to 2024-12-23

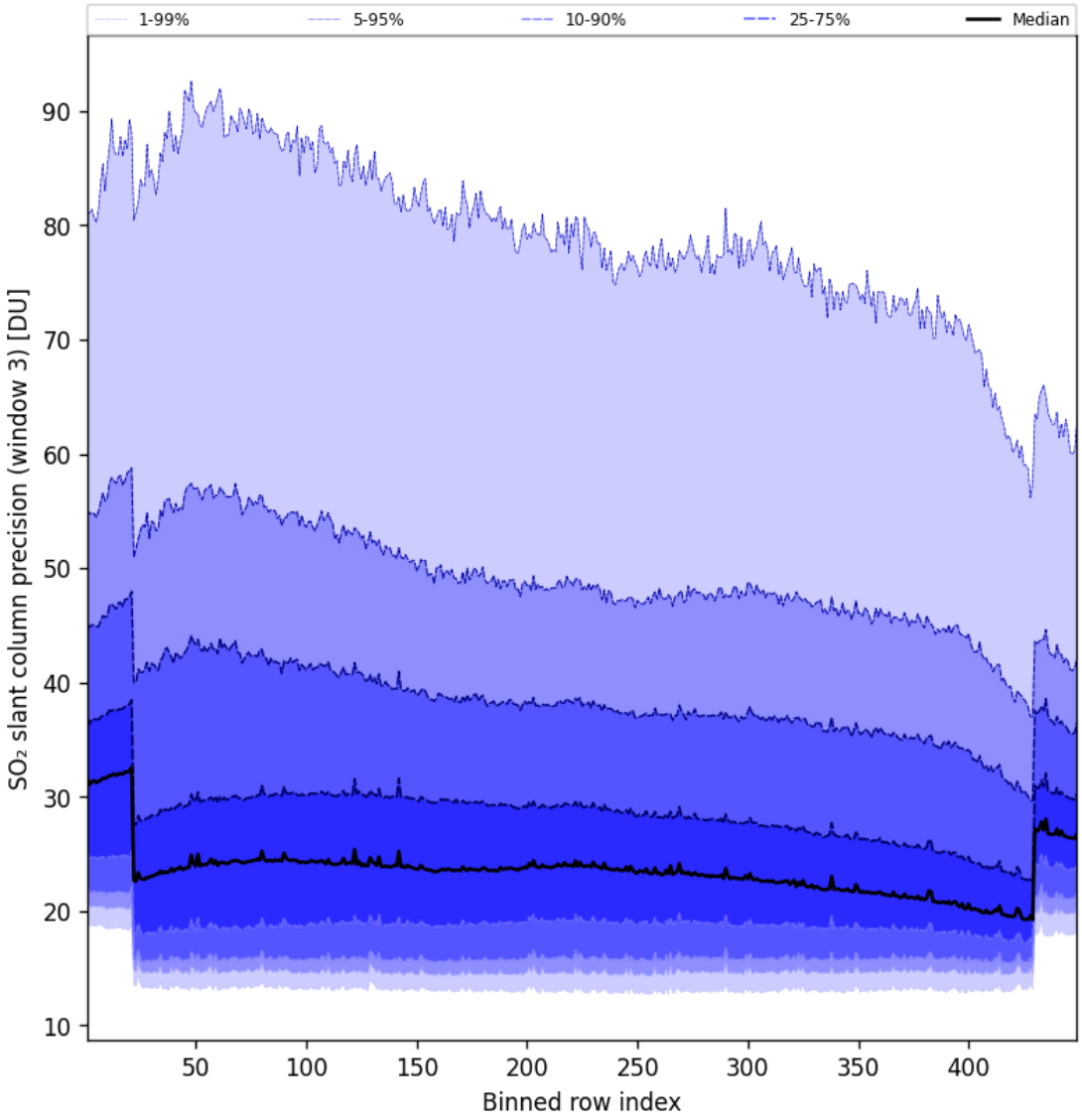

Figure 99: Along track statistics of "SO_2 slant column precision (window 3)" for 2024-12-22 to 2024-12-23

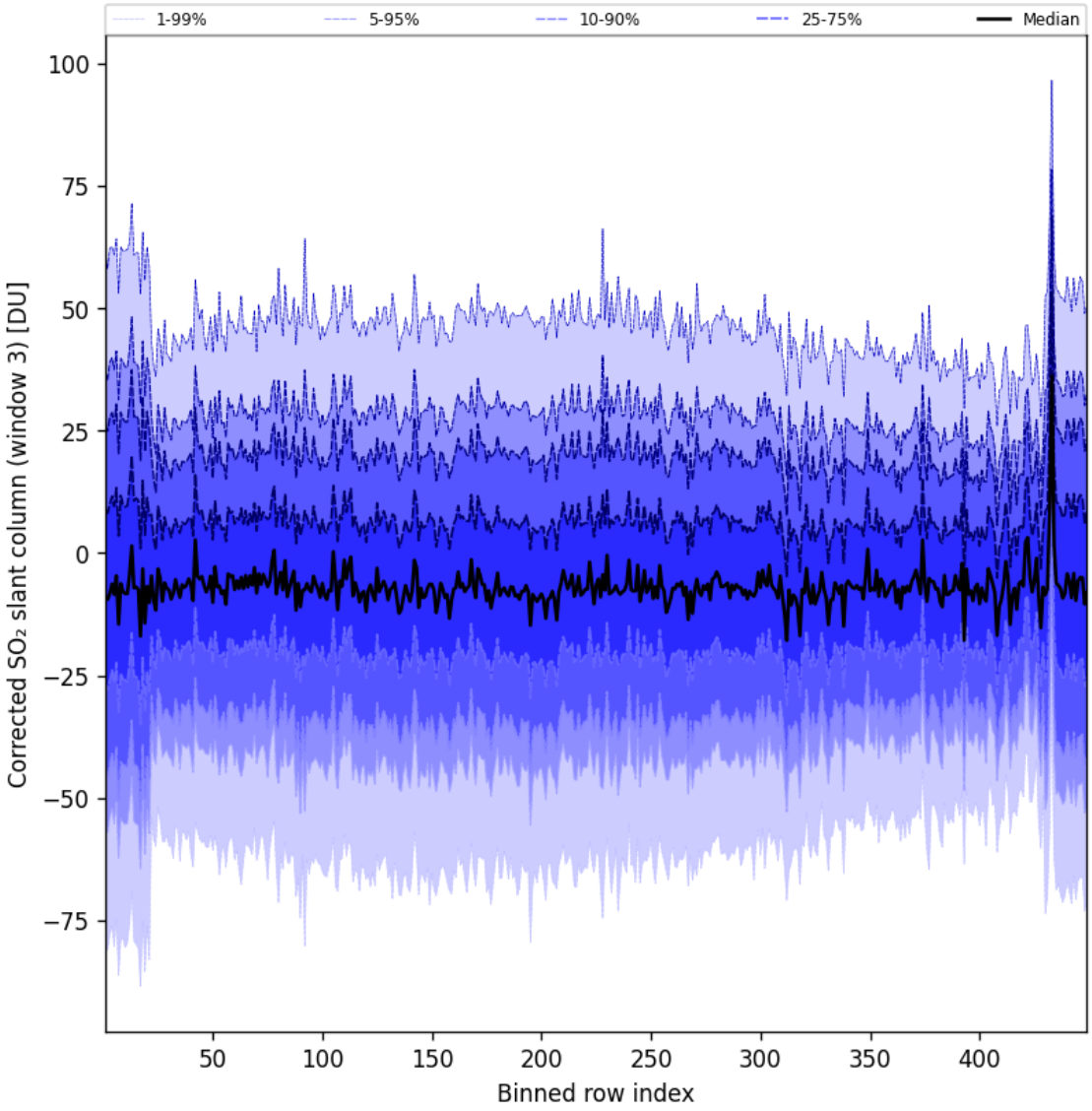

Figure 100: Along track statistics of “Corrected SO_2 slant column (window 3)” for 2024-12-22 to 2024-12-23

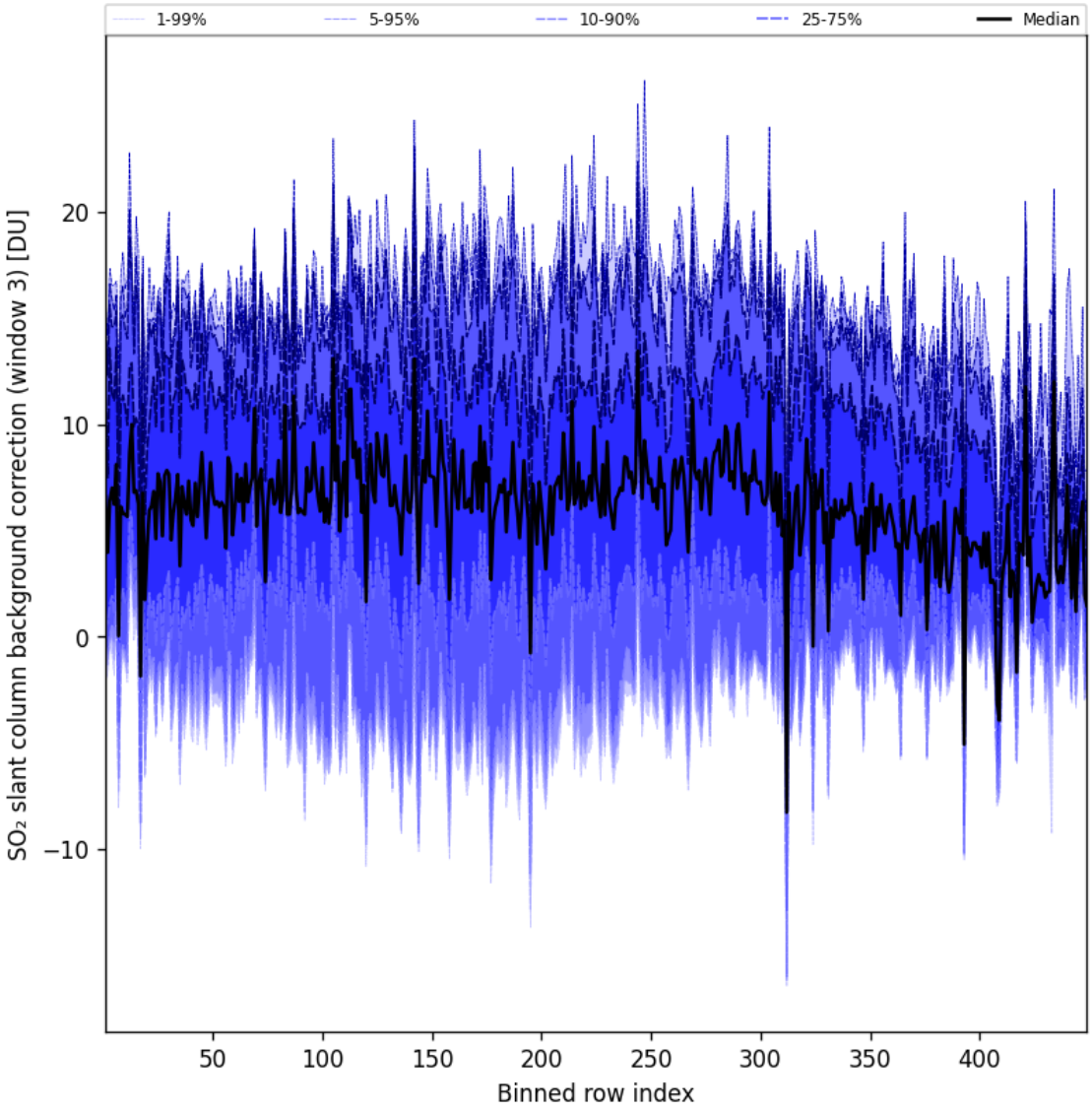

Figure 101: Along track statistics of "SO_2 slant column background correction (window 3)" for 2024-12-22 to 2024-12-23

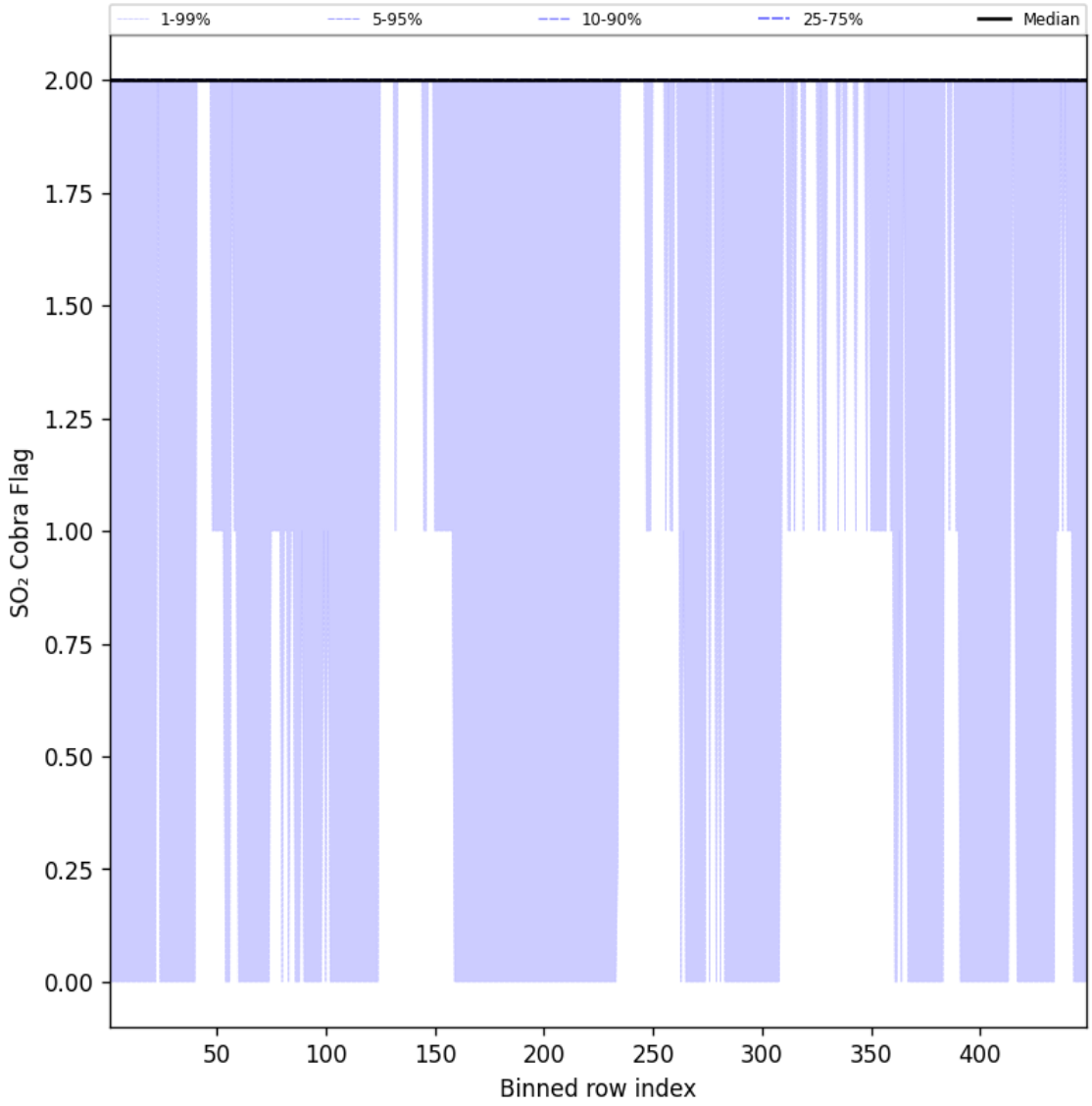

Figure 102: Along track statistics of "SO_2 Cobra Flag" for 2024-12-22 to 2024-12-23

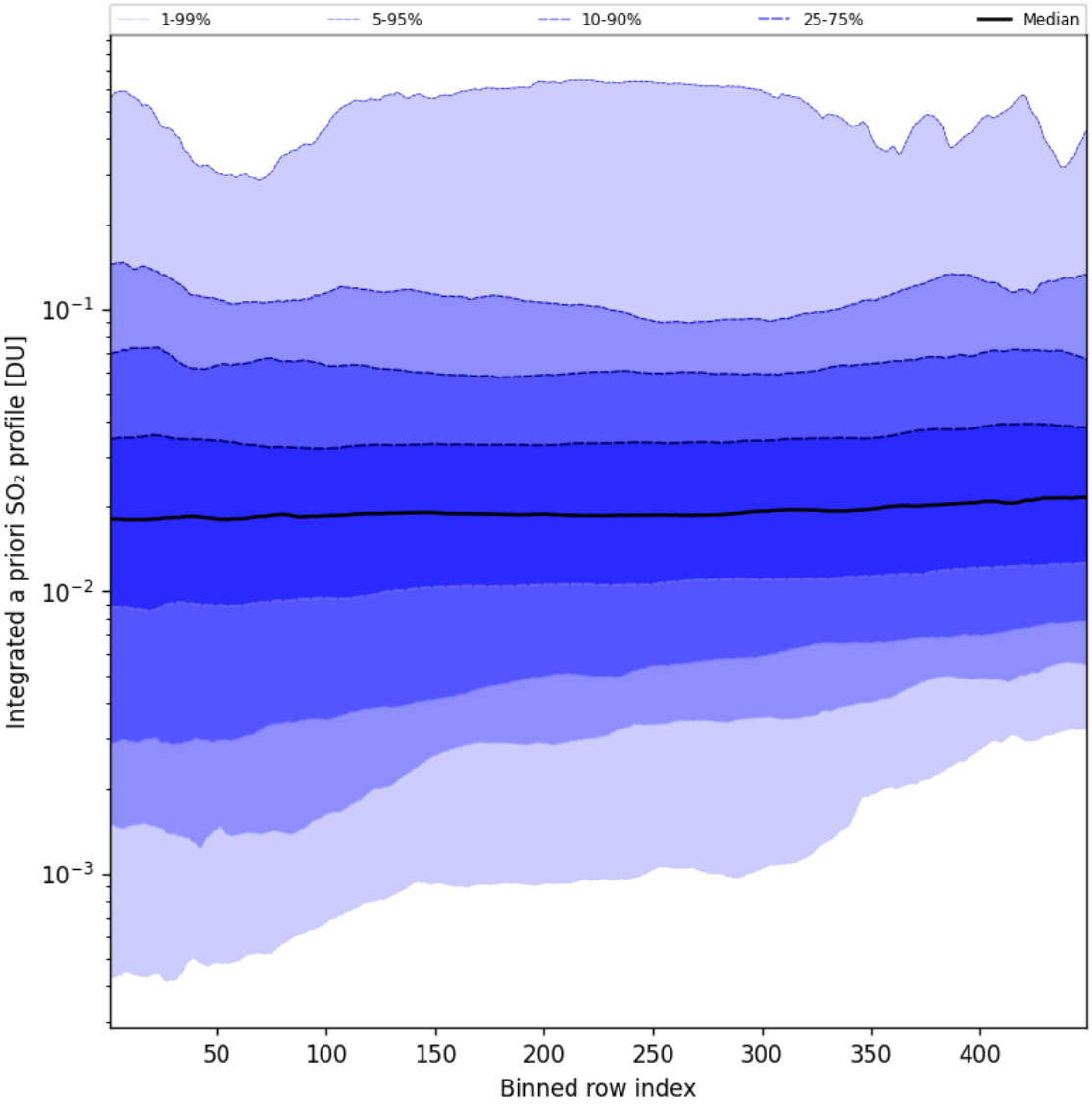

Figure 103: Along track statistics of “Integrated a priori SO_2 profile” for 2024-12-22 to 2024-12-23

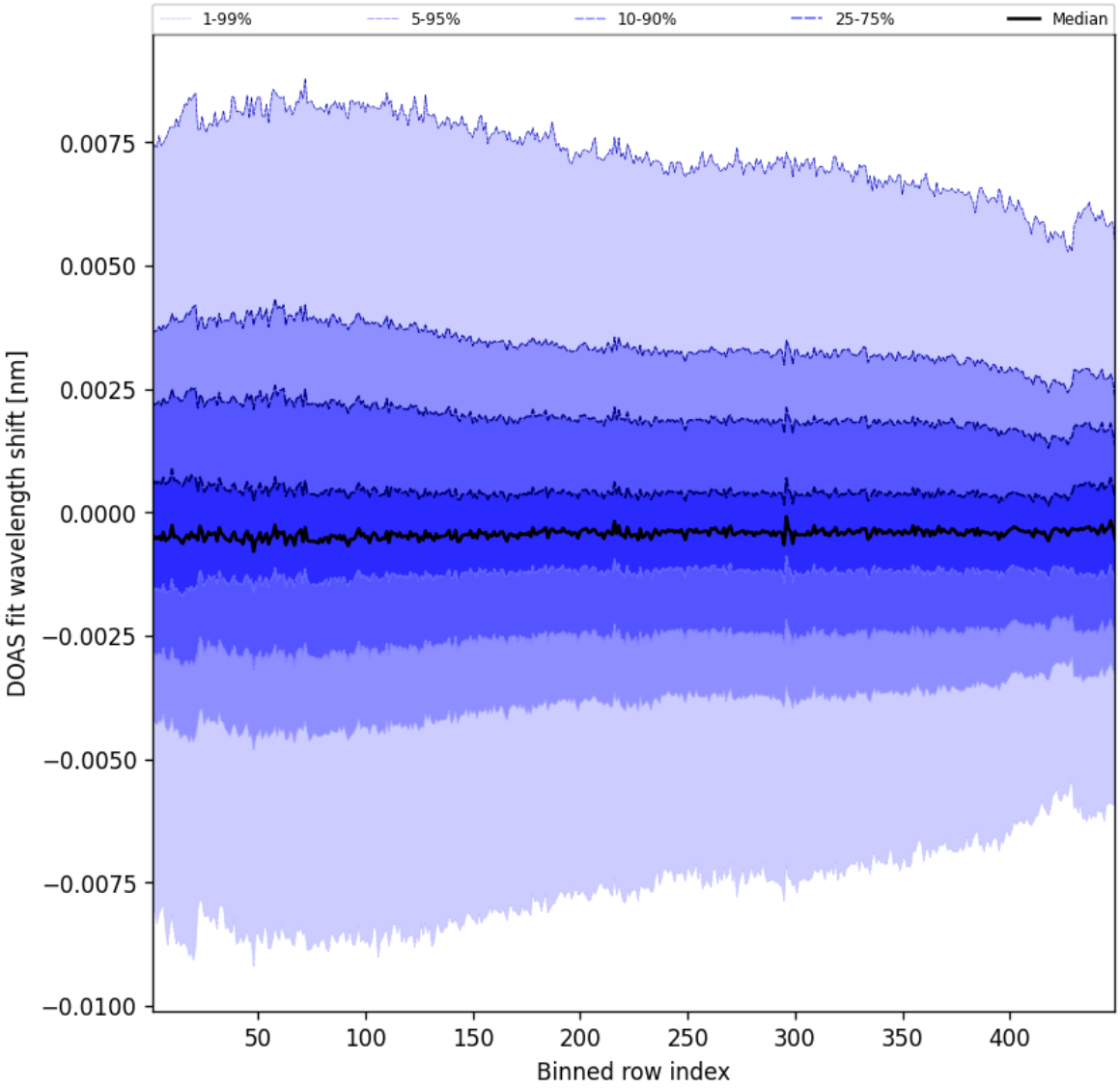

Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2024-12-22 to 2024-12-23

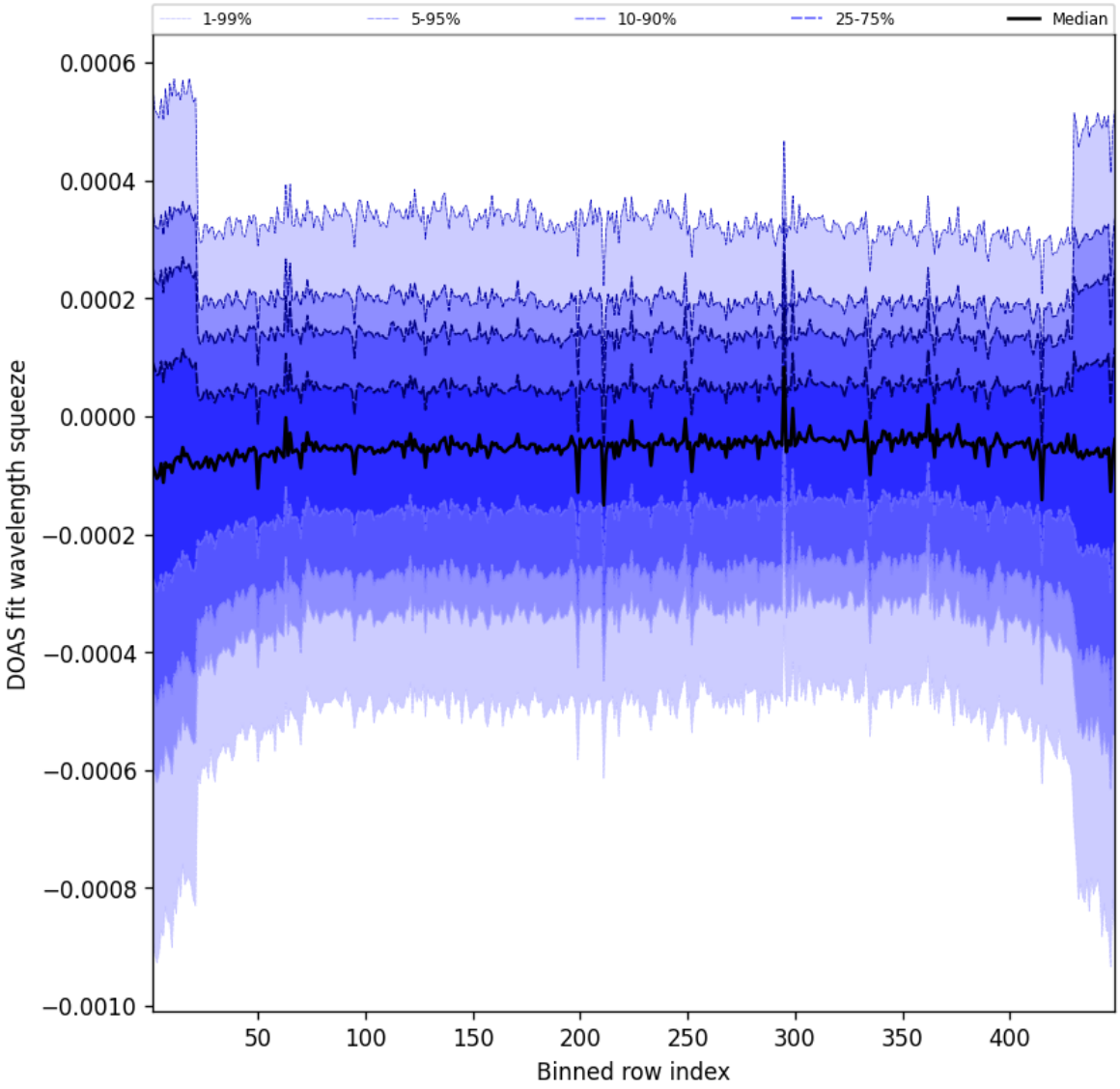

Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2024-12-22 to 2024-12-23

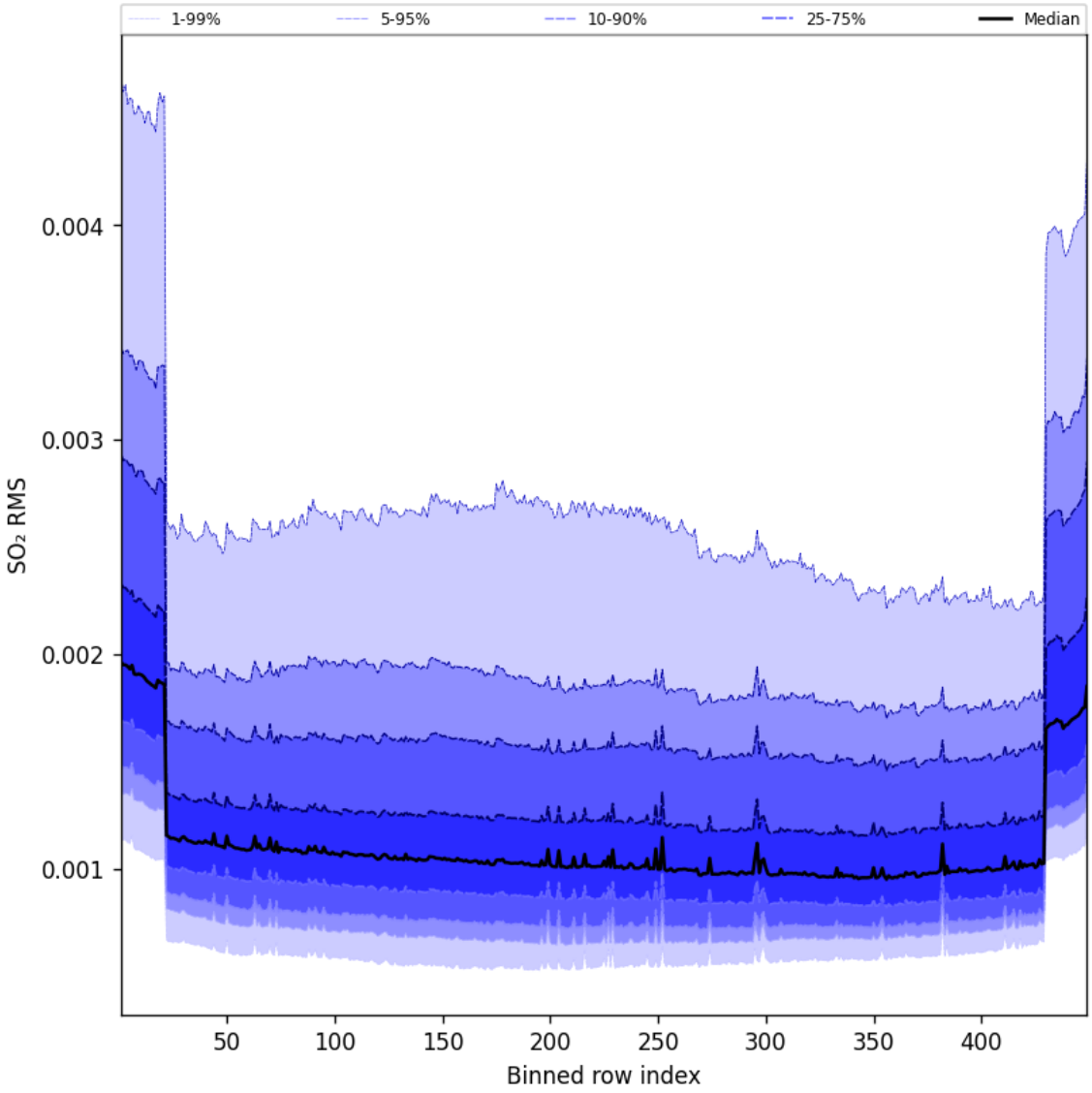

Figure 106: Along track statistics of "SO_2 RMS" for 2024-12-22 to 2024-12-23

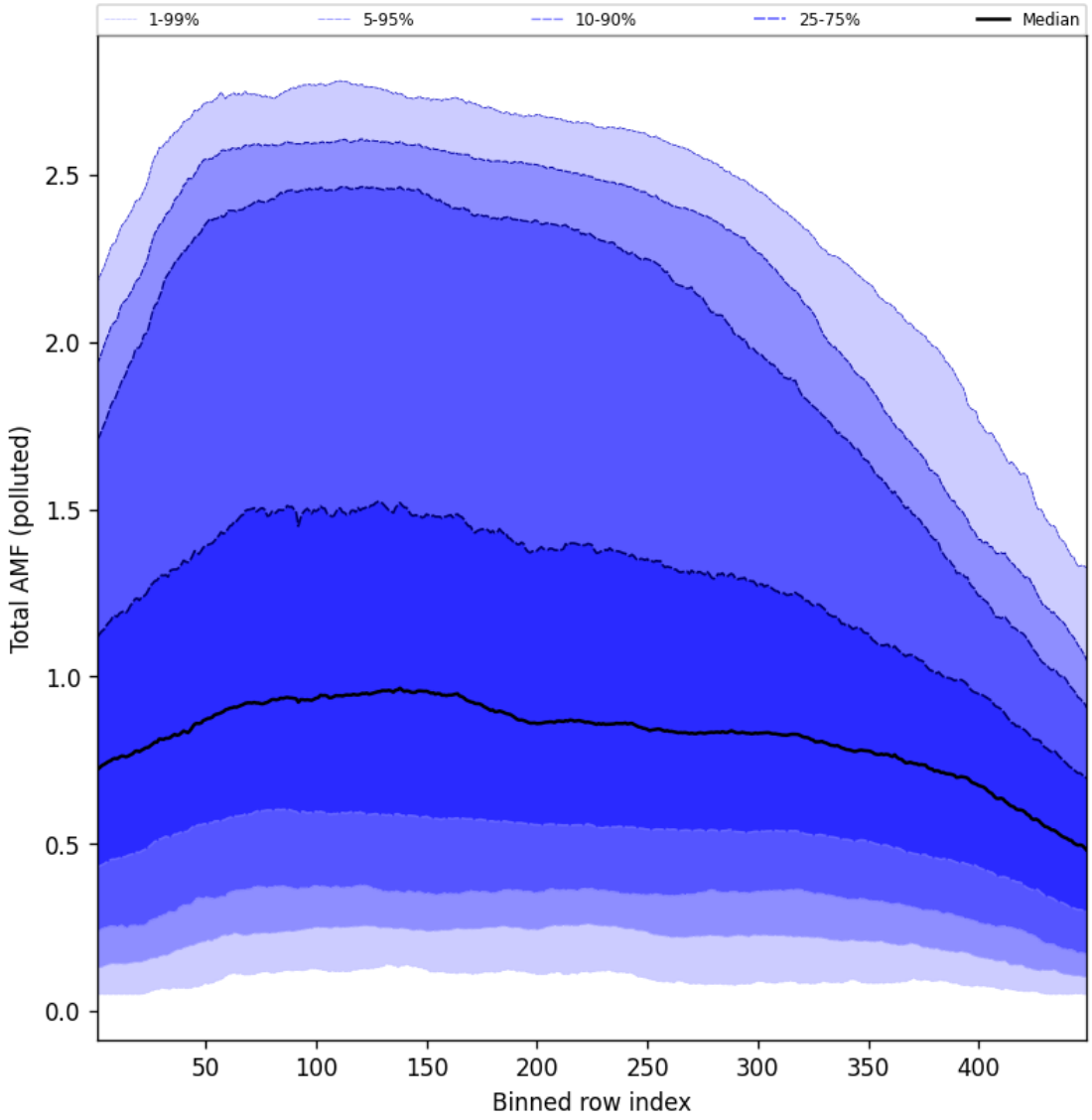

Figure 107: Along track statistics of “Total AMF (polluted)” for 2024-12-22 to 2024-12-23

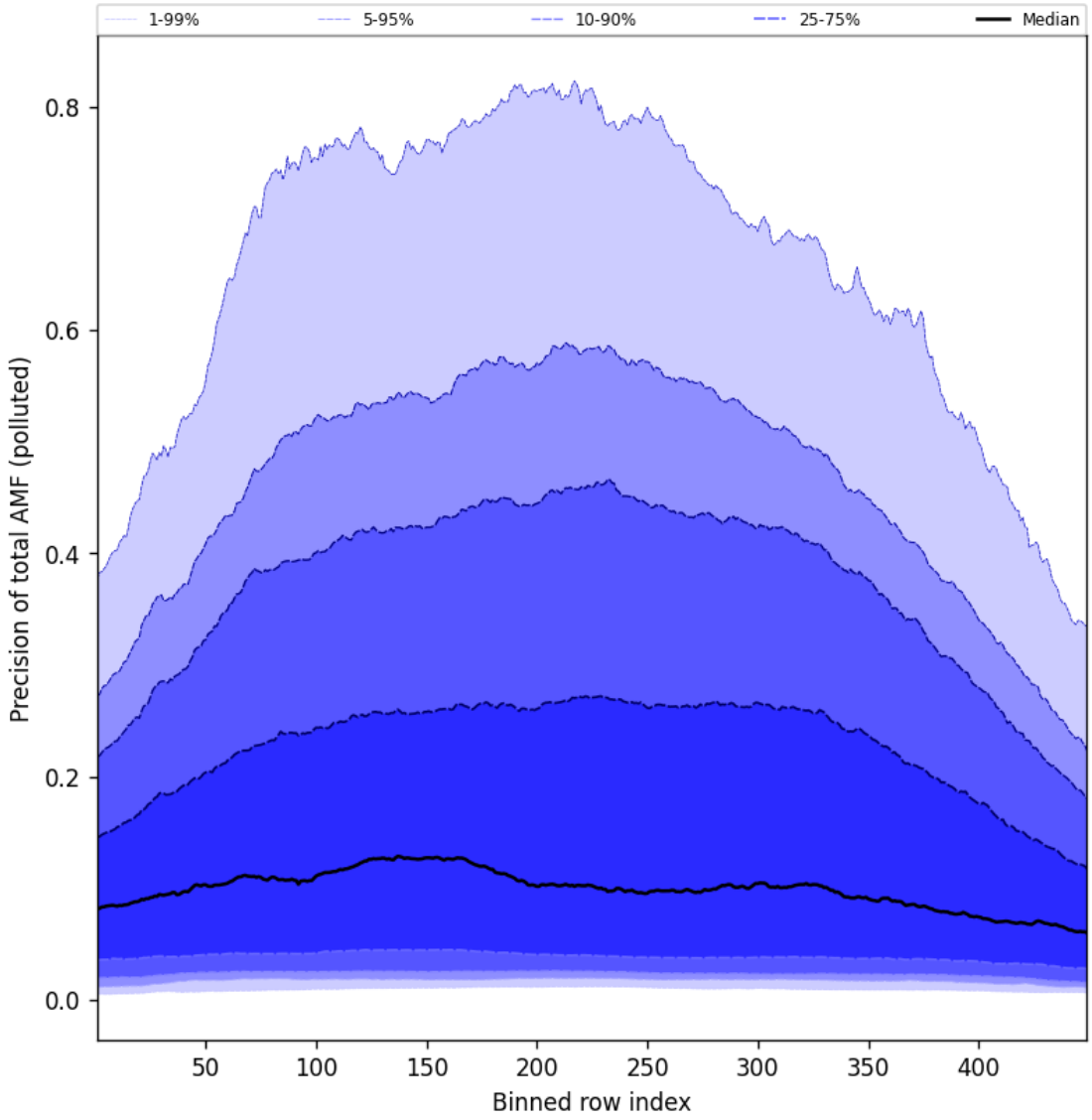

Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2024-12-22 to 2024-12-23

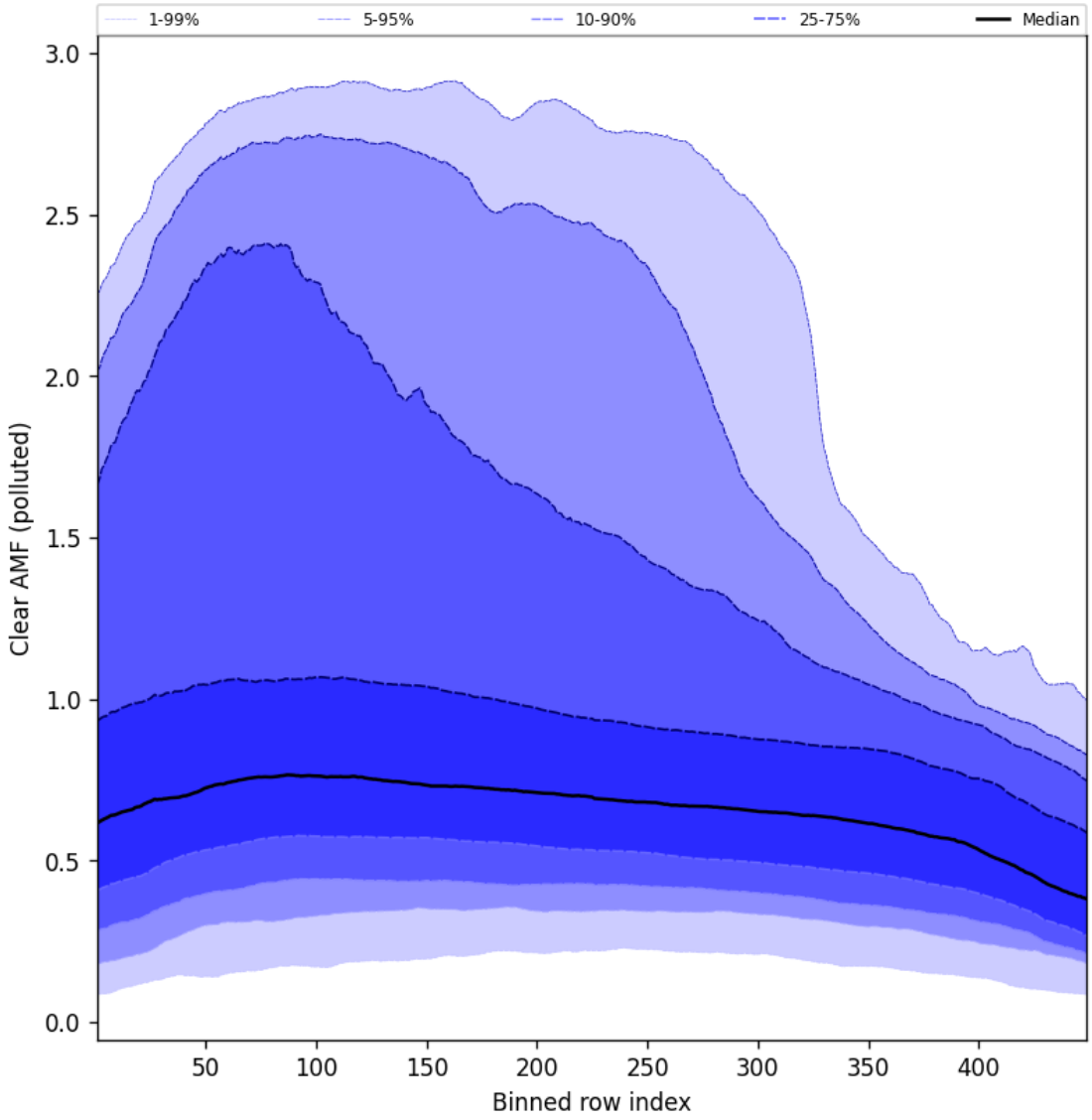

Figure 109: Along track statistics of “Clear AMF (polluted)” for 2024-12-22 to 2024-12-23

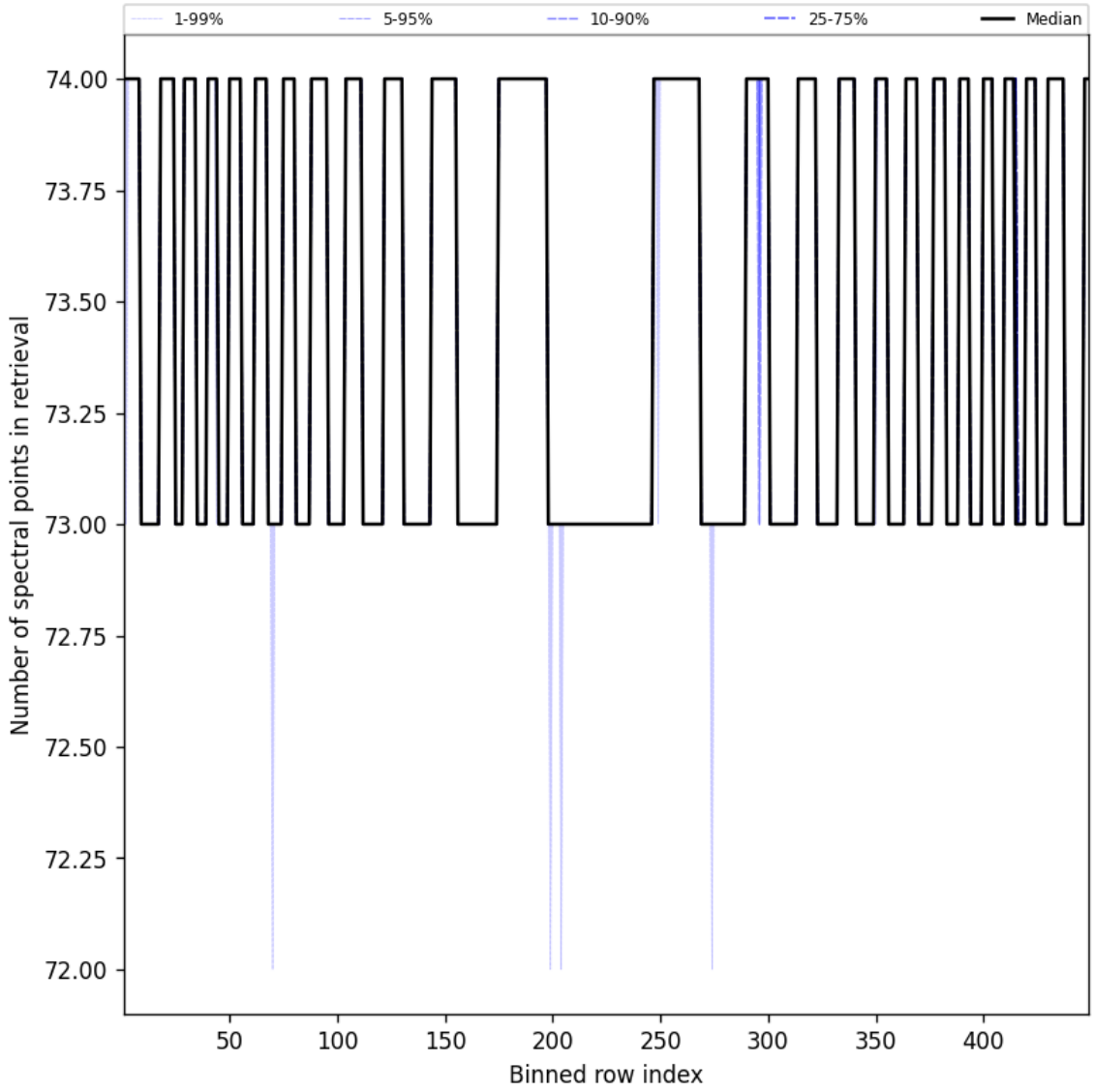

Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2024-12-22 to 2024-12-23

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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