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]	0.594 ± 0.420	17174384	0.995	0.840	0.490	0.0	1.000
sulfurdioxide total vertical column [DU]	$(4.324 \pm 134.594) \times 10^{-2}$	17174384	0.223	0.404	8.854×10^{-3}	-120	623
sulfurdioxide total vertical column precision [DU]	0.550 ± 0.944	17174384	0.122	0.346	0.301	4.185×10^{-2}	47.1
sulfurdioxide slant column density corrected [DU]	$(1.902 \pm 39.389) \times 10^{-2}$	17174384	0.235	0.338	8.319×10^{-3}	-22.9	296
sulfurdioxide slant column density cobra [DU]	$(1.863 \pm 36.148) \times 10^{-2}$	17174384	0.235	0.338	8.319×10^{-3}	-22.9	67.8
sulfurdioxide slant column density cobra precision [DU]	0.270 ± 0.121	17174384	0.213	0.106	0.232	8.368×10^{-2}	28.4
sulfurdioxide slant column density window1 [DU]	0.126 ± 0.660	17174384	0.175	0.709	0.132	-27.9	127
sulfurdioxide slant column density window1 precision [DU]	0.270 ± 0.121	17174384	0.213	0.106	0.232	8.368×10^{-2}	28.4
sulfurdioxide slant column density corrected win1 [DU]	$(5.512 \pm 63.735) \times 10^{-2}$	17174384	2.500×10^{-2}	0.672	3.823×10^{-2}	-27.9	127
background so2 slant column offset window1 [DU]	$(-7.089 \pm 18.882) \times 10^{-2}$	17174384	-0.180	0.234	-0.131	-1.32	3.11
sulfurdioxide slant column density window2 [DU]	2.82 ± 8.50	17174384	2.75	10.6	2.71	-1.795×10^{3}	965
sulfurdioxide slant column density window2 precision [DU]	7.70 ± 2.23	17174384	6.97	2.55	7.34	2.16	445
sulfurdioxide slant column density corrected win2 [DU]	0.496 ± 8.347	17174384	0.750	10.5	0.497	-1.796×10^{3}	964
background so2 slant column offset window2 [DU]	-2.32 ± 2.06	17174384	-0.750	2.44	-1.80	-16.4	6.95
sulfurdioxide slant column density window3 [DU]	-18.2 ± 22.9	17174384	-19.6	28.2	-18.5	-304	379
sulfurdioxide slant column density window3 precision [DU]	26.7 ± 12.7	17174384	22.5	10.2	23.7	9.84	388
sulfurdioxide slant column density corrected win3 [DU]	-6.18 ± 22.22	17174384	-7.28	27.3	-6.24	-300	385
background so2 slant column offset window3 [DU]	12.0 ± 6.4	17174384	11.8	9.37	11.8	-28.4	48.9
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.21	17174384	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(3.947 \pm 12.393) \times 10^{-2}$	17174384	1.217×10^{-2}	2.401×10^{-2}	1.768×10^{-2}	3.450×10^{-4}	4.02
fitted radiance shift [nm]	$(-4.240 \pm 24.703) \times 10^{-4}$	17174384	-5.000×10^{-4}	1.702×10^{-3}	-4.772×10^{-4}	-4.176×10^{-2}	0.110
fitted radiance squeeze [1]	$(-6.364 \pm 18.505) \times 10^{-5}$	17174384	-3.000×10^{-5}	2.173×10^{-4}	-5.102×10^{-5}	-1.546×10^{-2}	4.571×10^{-2}
fitted root mean square [1]	$(1.203 \pm 0.496) \times 10^{-3}$	17174384	9.750×10^{-4}	4.620×10^{-4}	1.065×10^{-3}	2.610×10^{-4}	8.648×10^{-2}
sulfurdioxide total air mass factor polluted [1]	0.935 ± 0.611	17174384	0.620	0.701	0.782	5.000×10^{-2}	3.16
sulfurdioxide total air mass factor polluted precision [1]	0.156 ± 0.174	17174384	3.500×10^{-2}	0.180	8.729×10^{-2}	2.500×10^{-3}	1.74
sulfurdioxide clear air mass factor polluted [1]	0.793 ± 0.519	17174384	0.540	0.423	0.658	3.624×10^{-2}	3.24
number of spectral points in retrieval [1]	73.4 ± 0.5	17174384	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	3.000×10^{-2}	7.000×10^{-2}	0.160	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	−2.77	−0.894	−0.516	−0.335	−0.190	0.214	0.372	0.574	1.01	3.43
sulfurdioxide total vertical column precision [DU]	8.224×10^{-2}	0.103	0.123	0.146	0.187	0.533	0.745	1.07	1.76	4.50
sulfurdioxide slant column density corrected [DU]	−0.784	−0.450	−0.328	−0.246	−0.159	0.179	0.270	0.359	0.498	0.947
sulfurdioxide slant column density cobra [DU]	−0.784	−0.450	−0.328	−0.246	−0.159	0.179	0.270	0.359	0.498	0.947
sulfurdioxide slant column density cobra precision [DU]	0.137	0.160	0.173	0.184	0.197	0.303	0.364	0.421	0.500	0.723
sulfurdioxide slant column density window1 [DU]	−1.58	−0.875	−0.604	−0.422	−0.229	0.480	0.660	0.832	1.09	1.84
sulfurdioxide slant column density window1 precision [DU]	0.137	0.160	0.173	0.184	0.197	0.303	0.364	0.421	0.500	0.723
sulfurdioxide slant column density corrected win1 [DU]	−1.49	−0.862	−0.626	−0.465	−0.294	0.377	0.559	0.736	1.01	1.84
background so2 slant column offset window1 [DU]	−0.376	−0.278	−0.243	−0.219	−0.196	3.786×10^{-2}	0.140	0.207	0.284	0.441
sulfurdioxide slant column density window2 [DU]	−17.3	−10.7	−7.53	−5.18	−2.56	8.05	10.8	13.2	16.7	24.3
sulfurdioxide slant column density window2 precision [DU]	4.14	4.89	5.35	5.74	6.22	8.76	9.65	10.5	11.8	14.5
sulfurdioxide slant column density corrected win2 [DU]	−19.8	−13.0	−9.73	−7.36	−4.73	5.72	8.34	10.7	13.9	20.9
background so2 slant column offset window2 [DU]	−8.98	−6.38	−5.09	−4.20	−3.34	−0.899	−0.619	−0.413	−0.132	1.25
sulfurdioxide slant column density window3 [DU]	−75.5	−54.9	−45.8	−39.3	−32.3	−4.14	3.43	10.4	19.9	38.7
sulfurdioxide slant column density window3 precision [DU]	13.4	15.0	16.3	17.5	19.3	29.5	34.0	39.3	50.0	80.5
sulfurdioxide slant column density corrected win3 [DU]	−62.7	−42.3	−33.2	−26.7	−19.8	7.50	14.6	21.2	30.2	48.9
background so2 slant column offset window3 [DU]	−1.29	2.28	3.96	5.42	7.34	16.7	18.9	20.6	22.3	25.0
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]	1.299×10^{-3}	3.503×10^{-3}	5.279×10^{-3}	7.247×10^{-3}	9.878×10^{-3}	3.389×10^{-2}	4.636×10^{-2}	6.223×10^{-2}	0.111	0.386
fitted radiance shift [nm]	-7.865×10^{-3}	-3.992×10^{-3}	-2.641×10^{-3}	-1.909×10^{-3}	-1.321×10^{-3}	3.808×10^{-4}	1.079×10^{-3}	1.936×10^{-3}	3.400×10^{-3}	7.398×10^{-3}
fitted radiance squeeze [1]	-5.827×10^{-4}	-3.784×10^{-4}	-2.908×10^{-4}	-2.299×10^{-4}	-1.659×10^{-4}	5.138×10^{-5}	1.010×10^{-4}	1.459×10^{-4}	2.085×10^{-4}	3.543×10^{-4}
fitted root mean square [1]	5.800×10^{-4}	6.967×10^{-4}	7.691×10^{-4}	8.267×10^{-4}	8.955×10^{-4}	1.357×10^{-3}	1.593×10^{-3}	1.825×10^{-3}	2.164×10^{-3}	3.036×10^{-3}
sulfurdioxide total air mass factor polluted [1]	7.673×10^{-2}	0.197	0.298	0.386	0.498	1.20	1.56	1.94	2.29	2.58
sulfurdioxide total air mass factor polluted precision [1]	9.024×10^{-3}	1.634×10^{-2}	2.216×10^{-2}	2.784×10^{-2}	3.655×10^{-2}	0.217	0.299	0.383	0.508	0.823
sulfurdioxide clear air mass factor polluted [1]	0.174	0.274	0.348	0.407	0.480	0.902	1.05	1.39	2.14	2.66
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]	0.693 ± 0.399	5806376	0.730	1.000	0.0	1.000	0.270	1.000
sulfurdioxide total vertical column [DU]	$(9.433 \pm 209.778) \times 10^{-2}$	5806376	0.620	1.623×10^{-2}	-120	623	-0.285	0.336
sulfurdioxide total vertical column precision [DU]	0.886 ± 1.403	5806376	0.633	0.440	5.291×10^{-2}	47.1	0.271	0.904
sulfurdioxide slant column density corrected [DU]	$(3.076 \pm 47.984) \times 10^{-2}$	5806376	0.396	1.181×10^{-2}	-8.69	296	-0.183	0.213
sulfurdioxide slant column density cobra [DU]	$(3.015 \pm 43.721) \times 10^{-2}$	5806376	0.396	1.181×10^{-2}	-8.69	21.9	-0.183	0.213
sulfurdioxide slant column density cobra precision [DU]	0.320 ± 0.147	5806376	0.164	0.275	9.632×10^{-2}	7.80	0.222	0.386
sulfurdioxide slant column density window1 [DU]	0.203 ± 0.760	5806376	0.790	0.202	-9.86	23.7	-0.195	0.596
sulfurdioxide slant column density window1 precision [DU]	0.320 ± 0.147	5806376	0.164	0.275	9.632×10^{-2}	7.80	0.222	0.386
sulfurdioxide slant column density corrected win1 [DU]	$(7.917 \pm 75.814) \times 10^{-2}$	5806376	0.783	4.941×10^{-2}	-9.15	23.6	-0.335	0.448
background so2 slant column offset window1 [DU]	-0.124 ± 0.152	5806376	0.115	-0.147	-1.17	3.11	-0.201	-8.597×10^{-2}
sulfurdioxide slant column density window2 [DU]	3.35 ± 9.68	5806376	12.3	3.05	-111	304	-2.94	9.31
sulfurdioxide slant column density window2 precision [DU]	8.76 ± 2.33	5806376	2.89	8.44	2.20	256	7.15	10.0
sulfurdioxide slant column density corrected win2 [DU]	0.551 ± 9.414	5806376	12.0	0.533	-116	296	-5.46	6.53
background so2 slant column offset window2 [DU]	-2.80 ± 2.54	5806376	3.18	-1.85	-16.4	6.88	-4.18	-1.00
sulfurdioxide slant column density window3 [DU]	-20.4 ± 25.7	5806376	32.3	-19.9	-206	161	-36.2	-3.91
sulfurdioxide slant column density window3 precision [DU]	30.4 ± 12.9	5806376	10.0	27.4	10.4	210	23.2	33.2
sulfurdioxide slant column density corrected win3 [DU]	-6.51 ± 25.39	5806376	31.9	-6.33	-188	169	-22.3	9.62
background so2 slant column offset window3 [DU]	13.8 ± 5.5	5806376	8.12	13.1	-26.1	48.9	9.79	17.9
sulfurdioxide slant column cobra flag [1]	1.96 ± 0.27	5806376	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(7.695 \pm 20.447) \times 10^{-2}$	5806376	4.531×10^{-2}	2.813×10^{-2}	1.316×10^{-3}	4.02	1.575×10^{-2}	6.107×10^{-2}
fitted radiance shift [nm]	$(-2.543 \pm 26.116) \times 10^{-4}$	5806376	1.734×10^{-3}	-2.800×10^{-4}	-3.616×10^{-2}	3.632×10^{-2}	-1.135×10^{-3}	5.991×10^{-4}
fitted radiance squeeze [1]	$(-1.647 \pm 18.665) \times 10^{-5}$	5806376	2.133×10^{-4}	-1.173×10^{-5}	-1.200×10^{-2}	1.801×10^{-3}	-1.200×10^{-4}	9.335×10^{-5}
fitted root mean square [1]	$(1.391 \pm 0.602) \times 10^{-3}$	5806376	6.459×10^{-4}	1.210×10^{-3}	3.591×10^{-4}	2.456×10^{-2}	9.923×10^{-4}	1.638×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.678 ± 0.381	5806376	0.514	0.644	5.000×10^{-2}	2.85	0.386	0.901
sulfurdioxide total air mass factor polluted precision [1]	$(9.282 \pm 12.648) \times 10^{-2}$	5806376	8.009×10^{-2}	4.700×10^{-2}	2.500×10^{-3}	1.74	2.827×10^{-2}	0.108
sulfurdioxide clear air mass factor polluted [1]	0.621 ± 0.271	5806376	0.435	0.622	3.624×10^{-2}	2.02	0.396	0.831
number of spectral points in retrieval [1]	73.5 ± 0.5	5806376	1.000	73.0	52.0	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]	0.544 ± 0.421	11368008	0.880	0.460	0.0	1.000	0.120	1.000
sulfurdioxide total vertical column [DU]	$(1.714 \pm 69.792) \times 10^{-2}$	11368008	0.334	6.726×10^{-3}	-39.7	103	-0.159	0.175
sulfurdioxide total vertical column precision [DU]	0.378 ± 0.503	11368008	0.265	0.251	4.185×10^{-2}	40.0	0.156	0.421
sulfurdioxide slant column density corrected [DU]	$(1.302 \pm 34.159) \times 10^{-2}$	11368008	0.313	6.890×10^{-3}	-22.9	108	-0.149	0.164
sulfurdioxide slant column density cobra [DU]	$(1.275 \pm 31.570) \times 10^{-2}$	11368008	0.313	6.890×10^{-3}	-22.9	67.8	-0.149	0.164
sulfurdioxide slant column density cobra precision [DU]	0.244 ± 0.095	11368008	7.738×10^{-2}	0.218	8.368×10^{-2}	28.4	0.189	0.267
sulfurdioxide slant column density window1 [DU]	$(8.645 \pm 59.900) \times 10^{-2}$	11368008	0.671	0.101	-27.9	127	-0.244	0.428
sulfurdioxide slant column density window1 precision [DU]	0.244 ± 0.095	11368008	7.738×10^{-2}	0.218	8.368×10^{-2}	28.4	0.189	0.267
sulfurdioxide slant column density corrected win1 [DU]	$(4.283 \pm 56.540) \times 10^{-2}$	11368008	0.625	3.359×10^{-2}	-27.9	127	-0.277	0.348
background so2 slant column offset window1 [DU]	$(-4.362 \pm 19.981) \times 10^{-2}$	11368008	0.299	-0.107	-1.32	2.65	-0.194	0.104
sulfurdioxide slant column density window2 [DU]	2.55 ± 7.82	11368008	9.91	2.58	-1.795×10^{3}	965	-2.39	7.52
sulfurdioxide slant column density window2 precision [DU]	7.17 ± 1.97	11368008	2.10	6.90	2.16	445	5.93	8.03
sulfurdioxide slant column density corrected win2 [DU]	0.468 ± 7.745	11368008	9.79	0.482	-1.796×10^{3}	964	-4.42	5.37
background so2 slant column offset window2 [DU]	-2.08 ± 1.72	11368008	2.29	-1.78	-11.9	6.95	-3.13	-0.838
sulfurdioxide slant column density window3 [DU]	-17.1 ± 21.2	11368008	26.4	-17.9	-304	379	-30.7	-4.24
sulfurdioxide slant column density window3 precision [DU]	24.9 ± 12.2	11368008	8.50	21.9	9.84	388	18.1	26.6
sulfurdioxide slant column density corrected win3 [DU]	-6.01 ± 20.41	11368008	25.3	-6.20	-300	385	-18.7	6.58
background so2 slant column offset window3 [DU]	11.0 ± 6.7	11368008	10.3	10.9	-28.4	30.4	5.76	16.0
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.18	11368008	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.032 \pm 2.770) \times 10^{-2}$	11368008	1.847×10^{-2}	1.377×10^{-2}	3.450×10^{-4}	1.72	7.905×10^{-3}	2.638×10^{-2}
fitted radiance shift [nm]	$(-5.106 \pm 23.903) \times 10^{-4}$	11368008	1.647×10^{-3}	-5.775×10^{-4}	-4.176×10^{-2}	0.110	-1.389×10^{-3}	2.580×10^{-4}
fitted radiance squeeze [1]	$(-8.773 \pm 17.951) \times 10^{-5}$	11368008	2.169×10^{-4}	-7.083×10^{-5}	-1.546×10^{-2}	4.571×10^{-2}	-1.876×10^{-4}	2.924×10^{-5}
fitted root mean square [1]	$(1.107 \pm 0.399) \times 10^{-3}$	11368008	3.697×10^{-4}	1.010×10^{-3}	2.610×10^{-4}	8.648×10^{-2}	8.634×10^{-4}	1.233×10^{-3}
sulfurdioxide total air mass factor polluted [1]	1.07 ± 0.66	11368008	0.907	0.876	5.000×10^{-2}	3.16	0.559	1.47
sulfurdioxide total air mass factor polluted precision [1]	0.188 ± 0.186	11368008	0.225	0.129	3.877×10^{-3}	1.71	4.425×10^{-2}	0.269
sulfurdioxide clear air mass factor polluted [1]	0.881 ± 0.589	11368008	0.462	0.679	0.108	3.24	0.507	0.970
number of spectral points in retrieval [1]	73.4 ± 0.5	11368008	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]	0.639 ± 0.411	12038862	0.790	1.000	0.0	1.000	0.210	1.000
sulfurdioxide total vertical column [DU]	$(2.980 \pm 104.529) \times 10^{-2}$	12038862	0.419	8.588×10^{-3}	-71.2	623	-0.199	0.220
sulfurdioxide total vertical column precision [DU]	0.502 ± 0.737	12038862	0.303	0.304	4.957×10^{-2}	28.6	0.207	0.510
sulfurdioxide slant column density corrected [DU]	$(1.456 \pm 34.015) \times 10^{-2}$	12038862	0.320	7.149×10^{-3}	-18.6	296	-0.152	0.168
sulfurdioxide slant column density cobra [DU]	$(1.433 \pm 31.525) \times 10^{-2}$	12038862	0.320	7.149×10^{-3}	-18.6	18.0	-0.152	0.168
sulfurdioxide slant column density cobra precision [DU]	0.254 ± 0.109	12038862	8.358×10^{-2}	0.221	8.368×10^{-2}	21.2	0.191	0.274
sulfurdioxide slant column density window1 [DU]	0.159 ± 0.593	12038862	0.658	0.159	-27.9	50.3	-0.173	0.485
sulfurdioxide slant column density window1 precision [DU]	0.254 ± 0.109	12038862	8.358×10^{-2}	0.221	8.368×10^{-2}	21.2	0.191	0.274
sulfurdioxide slant column density corrected win1 [DU]	$(5.384 \pm 57.985) \times 10^{-2}$	12038862	0.637	4.098×10^{-2}	-27.9	50.5	-0.275	0.362
background so2 slant column offset window1 [DU]	-0.105 ± 0.154	12038862	0.182	-0.143	-1.17	3.11	-0.201	-1.838×10^{-2}
sulfurdioxide slant column density window2 [DU]	2.43 ± 8.21	12038862	10.3	2.35	-1.495×10^{3}	965	-2.80	7.53
sulfurdioxide slant column density window2 precision [DU]	7.52 ± 2.06	12038862	2.38	7.21	2.16	445	6.14	8.52
sulfurdioxide slant column density corrected win2 [DU]	0.411 ± 8.127	12038862	10.3	0.422	-1.496×10^{3}	964	-4.72	5.55
background so2 slant column offset window2 [DU]	-2.02 ± 1.84	12038862	1.99	-1.57	-16.4	6.95	-2.83	-0.837
sulfurdioxide slant column density window3 [DU]	-15.3 ± 22.4	12038862	28.0	-15.8	-304	161	-29.5	-1.44
sulfurdioxide slant column density window3 precision [DU]	26.7 ± 12.0	12038862	9.34	23.7	9.84	215	19.9	29.2
sulfurdioxide slant column density corrected win3 [DU]	-4.46 ± 21.73	12038862	27.2	-4.90	-300	169	-18.2	9.00
background so2 slant column offset window3 [DU]	10.8 ± 5.8	12038862	7.94	10.9	-28.4	48.9	6.85	14.8
sulfurdioxide slant column cobra flag [1]	1.99 ± 0.15	12038862	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.809 \pm 6.362) \times 10^{-2}$	12038862	2.064×10^{-2}	1.869×10^{-2}	1.386×10^{-3}	4.02	1.145×10^{-2}	3.209×10^{-2}
fitted radiance shift [nm]	$(-3.579 \pm 24.140) \times 10^{-4}$	12038862	1.808×10^{-3}	-3.775×10^{-4}	-4.176×10^{-2}	0.110	-1.282×10^{-3}	5.257×10^{-4}
fitted radiance squeeze [1]	$(-4.490 \pm 16.480) \times 10^{-5}$	12038862	1.937×10^{-4}	-3.718×10^{-5}	-1.546×10^{-2}	4.571×10^{-2}	-1.372×10^{-4}	5.650×10^{-5}
fitted root mean square [1]	$(1.126 \pm 0.444) \times 10^{-3}$	12038862	3.664×10^{-4}	1.011×10^{-3}	3.249×10^{-4}	4.847×10^{-2}	8.646×10^{-4}	1.231×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.820 ± 0.441	12038862	0.533	0.760	5.000×10^{-2}	2.65	0.507	1.04
sulfurdioxide total air mass factor polluted precision [1]	0.137 ± 0.146	12038862	0.155	7.454×10^{-2}	3.337×10^{-3}	1.71	3.801×10^{-2}	0.193
sulfurdioxide clear air mass factor polluted [1]	0.661 ± 0.235	12038862	0.339	0.635	7.165×10^{-2}	2.79	0.487	0.827
number of spectral points in retrieval [1]	73.4 ± 0.5	12038862	1.000	73.0	52.0	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]	0.480 ± 0.418	4586402	0.920	0.340	0.0	1.000	8.000×10^{-2}	1.000
sulfurdioxide total vertical column [DU]	$(6.532 \pm 171.096) \times 10^{-2}$	4586402	0.346	8.518×10^{-3}	-120	446	-0.159	0.187
sulfurdioxide total vertical column precision [DU]	0.611 ± 1.201	4586402	0.451	0.265	4.185×10^{-2}	47.1	0.130	0.581
sulfurdioxide slant column density corrected [DU]	$(2.811 \pm 49.260) \times 10^{-2}$	4586402	0.390	1.109×10^{-2}	-22.9	108	-0.182	0.208
sulfurdioxide slant column density cobra [DU]	$(2.740 \pm 44.943) \times 10^{-2}$	4586402	0.390	1.109×10^{-2}	-22.9	35.9	-0.182	0.208
sulfurdioxide slant column density cobra precision [DU]	0.309 ± 0.136	4586402	0.136	0.273	9.088×10^{-2}	12.9	0.221	0.357
sulfurdioxide slant column density window1 [DU]	$(3.238 \pm 79.078) \times 10^{-2}$	4586402	0.856	3.413×10^{-2}	-12.9	40.3	-0.403	0.453
sulfurdioxide slant column density window1 precision [DU]	0.309 ± 0.136	4586402	0.136	0.273	9.088×10^{-2}	12.9	0.221	0.357
sulfurdioxide slant column density corrected win1 [DU]	$(5.458 \pm 75.341) \times 10^{-2}$	4586402	0.772	2.787×10^{-2}	-13.1	40.3	-0.352	0.420
background so2 slant column offset window1 [DU]	$(2.220 \pm 23.754) \times 10^{-2}$	4586402	0.400	-5.101×10^{-2}	-1.32	2.65	-0.178	0.222
sulfurdioxide slant column density window2 [DU]	3.81 ± 9.03	4586402	11.2	3.74	-1.795×10^{3}	711	-1.82	9.34
sulfurdioxide slant column density window2 precision [DU]	8.11 ± 2.51	4586402	2.92	7.67	2.33	430	6.41	9.33
sulfurdioxide slant column density corrected win2 [DU]	0.732 ± 8.801	4586402	10.9	0.718	-1.796×10^{3}	710	-4.71	6.16
background so2 slant column offset window2 [DU]	-3.08 ± 2.30	4586402	3.40	-2.89	-16.3	6.95	-4.56	-1.16
sulfurdioxide slant column density window3 [DU]	-25.2 ± 22.3	4586402	26.7	-24.9	-284	379	-38.3	-11.6
sulfurdioxide slant column density window3 precision [DU]	26.5 ± 13.9	4586402	11.8	23.0	10.2	388	17.9	29.8
sulfurdioxide slant column density corrected win3 [DU]	-10.2 ± 22.7	4586402	27.1	-9.30	-272	385	-23.3	3.84
background so2 slant column offset window3 [DU]	15.0 ± 7.0	4586402	11.1	16.6	-28.4	48.7	9.48	20.6
sulfurdioxide slant column cobra flag [1]	1.95 ± 0.32	4586402	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(5.692 \pm 17.309) \times 10^{-2}$	4586402	3.719×10^{-2}	1.230×10^{-2}	3.450×10^{-4}	3.80	5.011×10^{-3}	4.220×10^{-2}
fitted radiance shift [nm]	$(-6.155 \pm 25.205) \times 10^{-4}$	4586402	1.360×10^{-3}	-7.170×10^{-4}	-4.151×10^{-2}	4.536×10^{-2}	-1.382×10^{-3}	-2.167×10^{-5}
fitted radiance squeeze [1]	$(-1.177 \pm 2.207) \times 10^{-4}$	4586402	2.801×10^{-4}	-1.100×10^{-4}	-1.424×10^{-2}	1.358×10^{-2}	-2.540×10^{-4}	2.610×10^{-5}
fitted root mean square [1]	$(1.394 \pm 0.553) \times 10^{-3}$	4586402	5.931×10^{-4}	1.260×10^{-3}	2.610×10^{-4}	5.202×10^{-2}	1.028×10^{-3}	1.621×10^{-3}
sulfurdioxide total air mass factor polluted [1]	1.27 ± 0.84	4586402	1.64	1.04	5.000×10^{-2}	3.16	0.501	2.14
sulfurdioxide total air mass factor polluted precision [1]	0.208 ± 0.225	4586402	0.263	0.133	2.500×10^{-3}	1.74	3.244×10^{-2}	0.296
sulfurdioxide clear air mass factor polluted [1]	1.17 ± 0.81	4586402	1.38	0.872	3.624×10^{-2}	3.24	0.476	1.85
number of spectral points in retrieval [1]	73.4 ± 0.5	4586402	1.000	73.0	52.0	74.0	73.0	74.0

3 Granule outlines

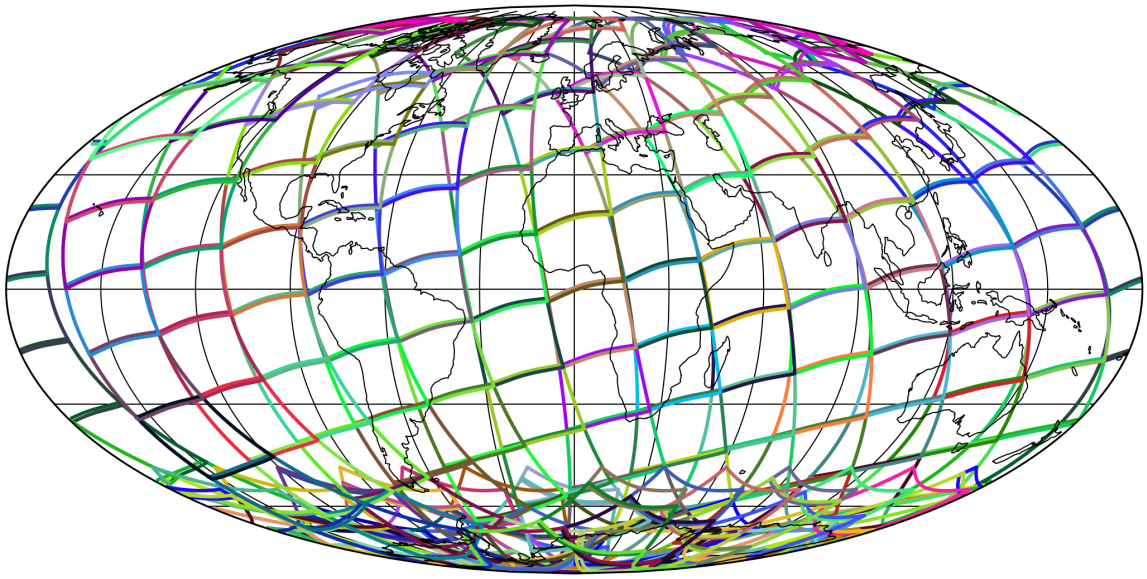

Figure 1: Outline of the granules.

4 Input data monitoring

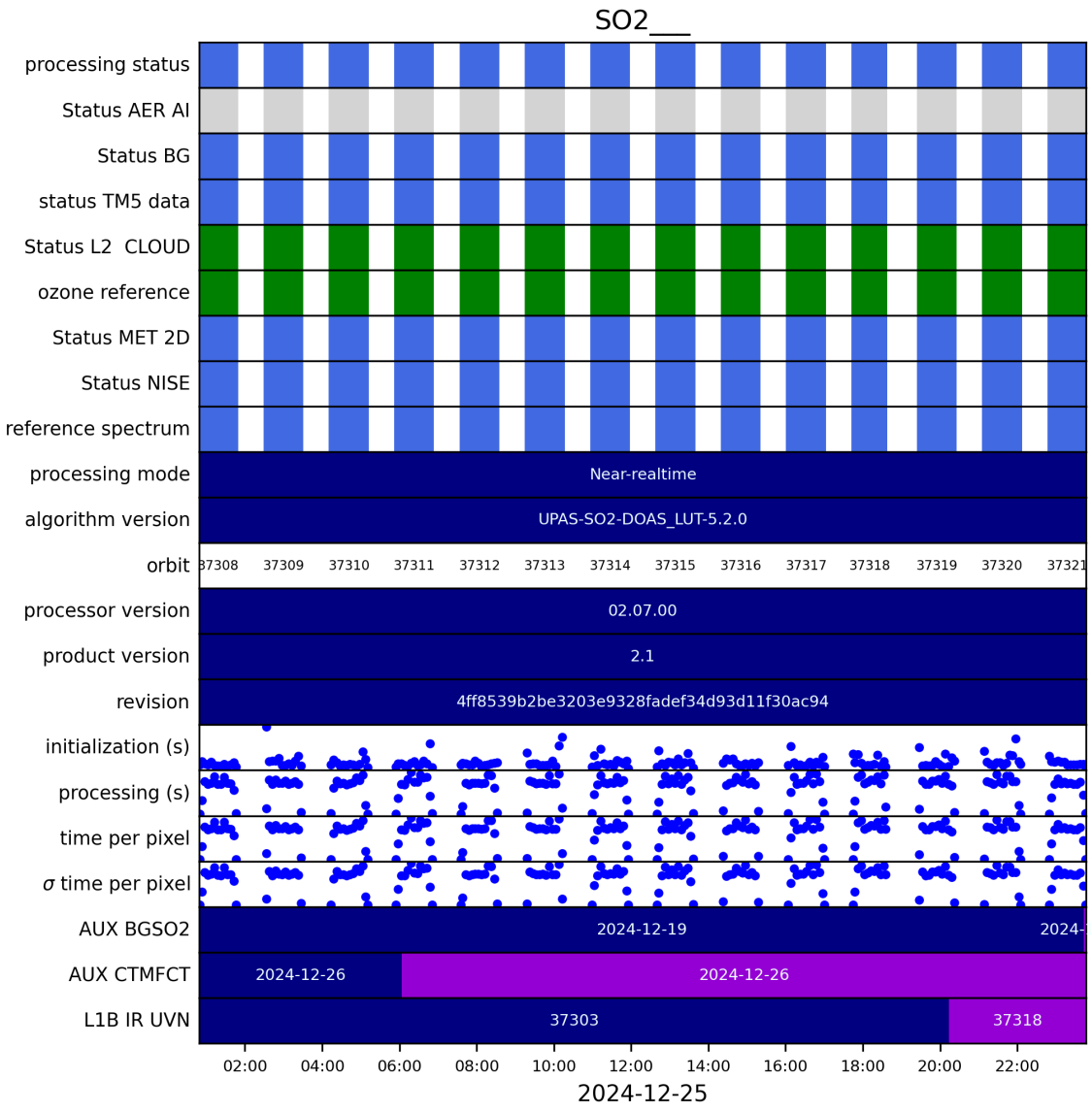

Figure 2: Input data per granule

5 Warnings and errors

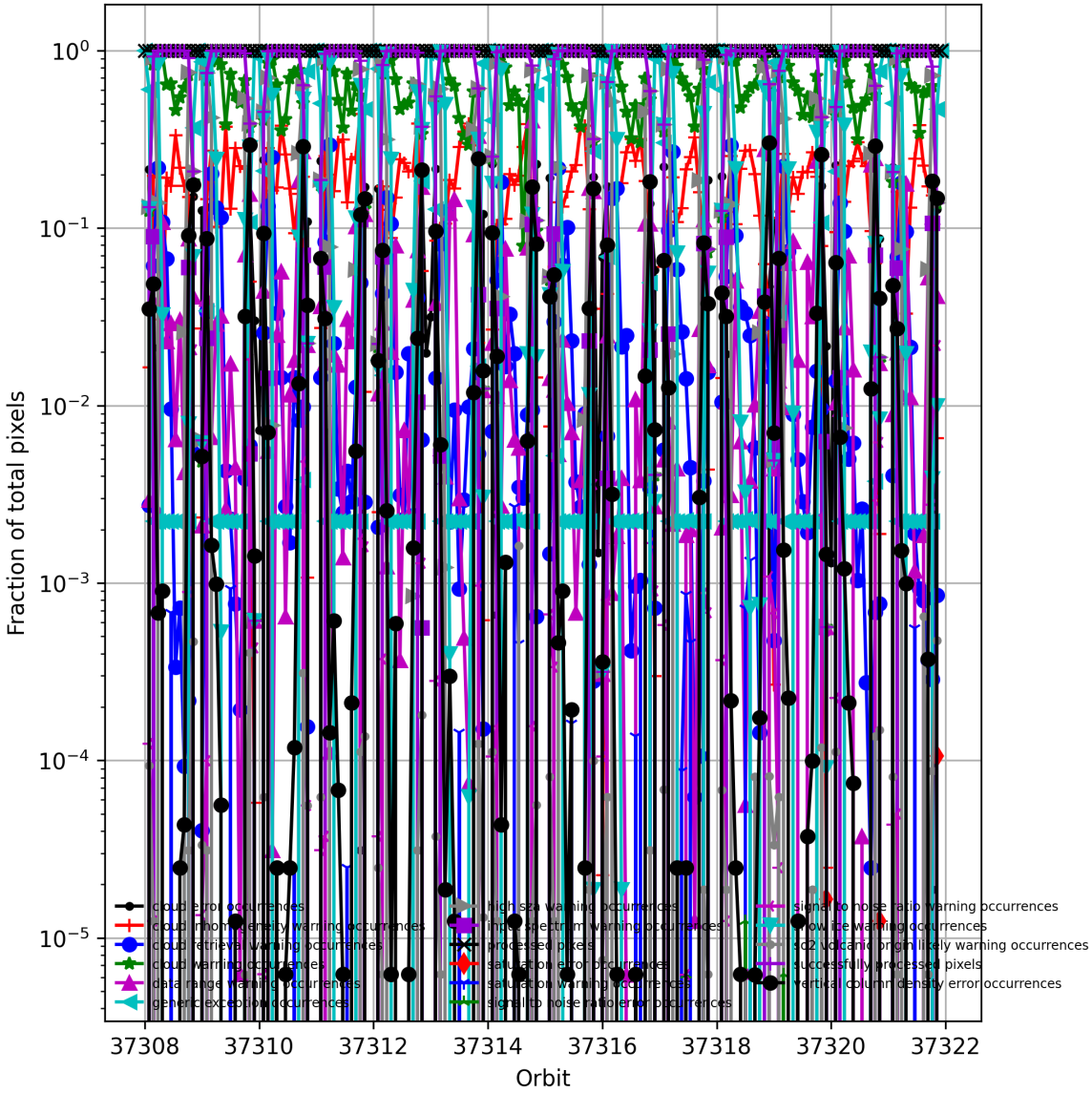

Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

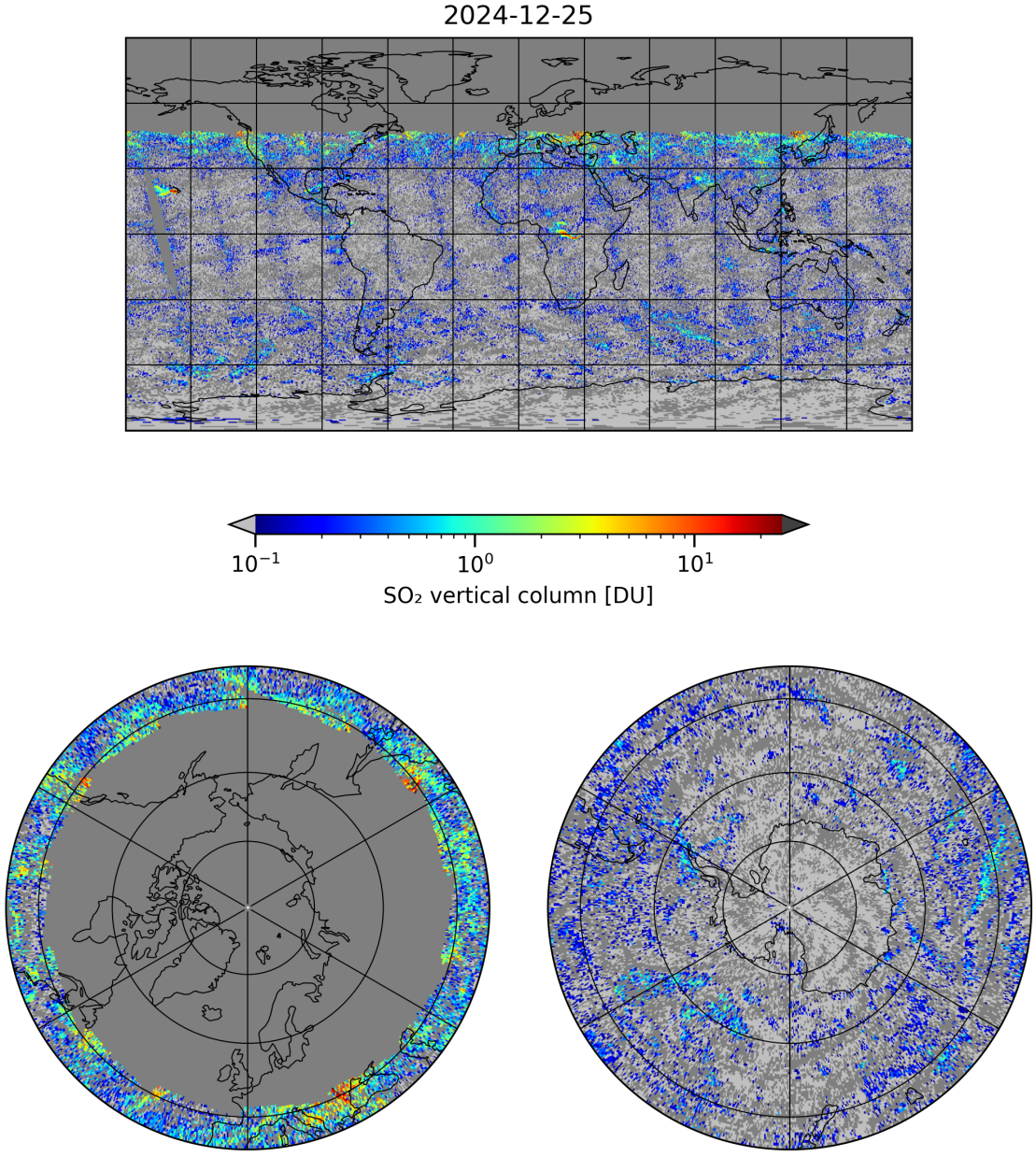

Figure 4: Map of "SO_2 vertical column" for 2024-12-25 to 2024-12-25

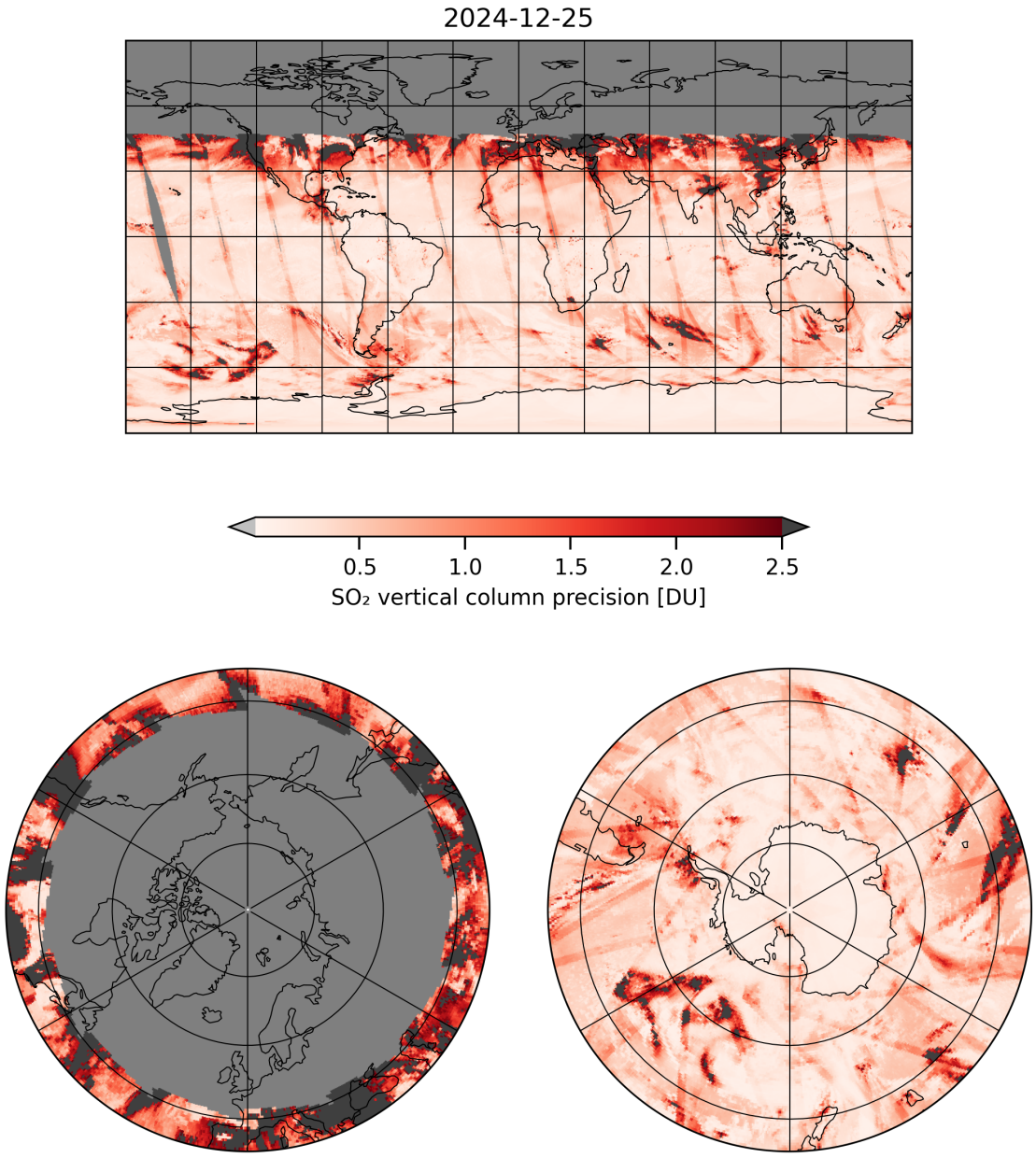

Figure 5: Map of "SO_2 vertical column precision" for 2024-12-25 to 2024-12-25

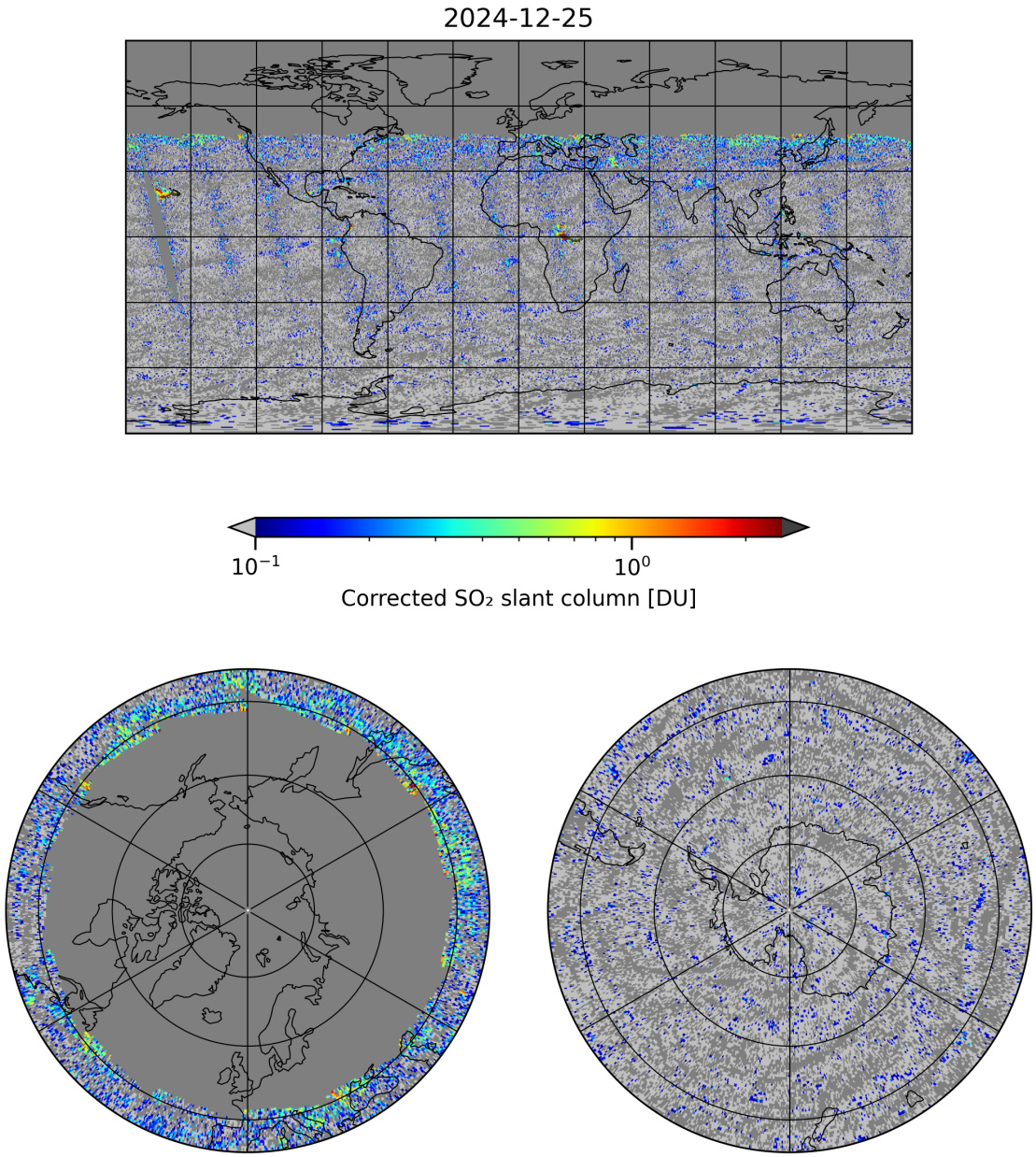

Figure 6: Map of “Corrected SO_2 slant column” for 2024-12-25 to 2024-12-25

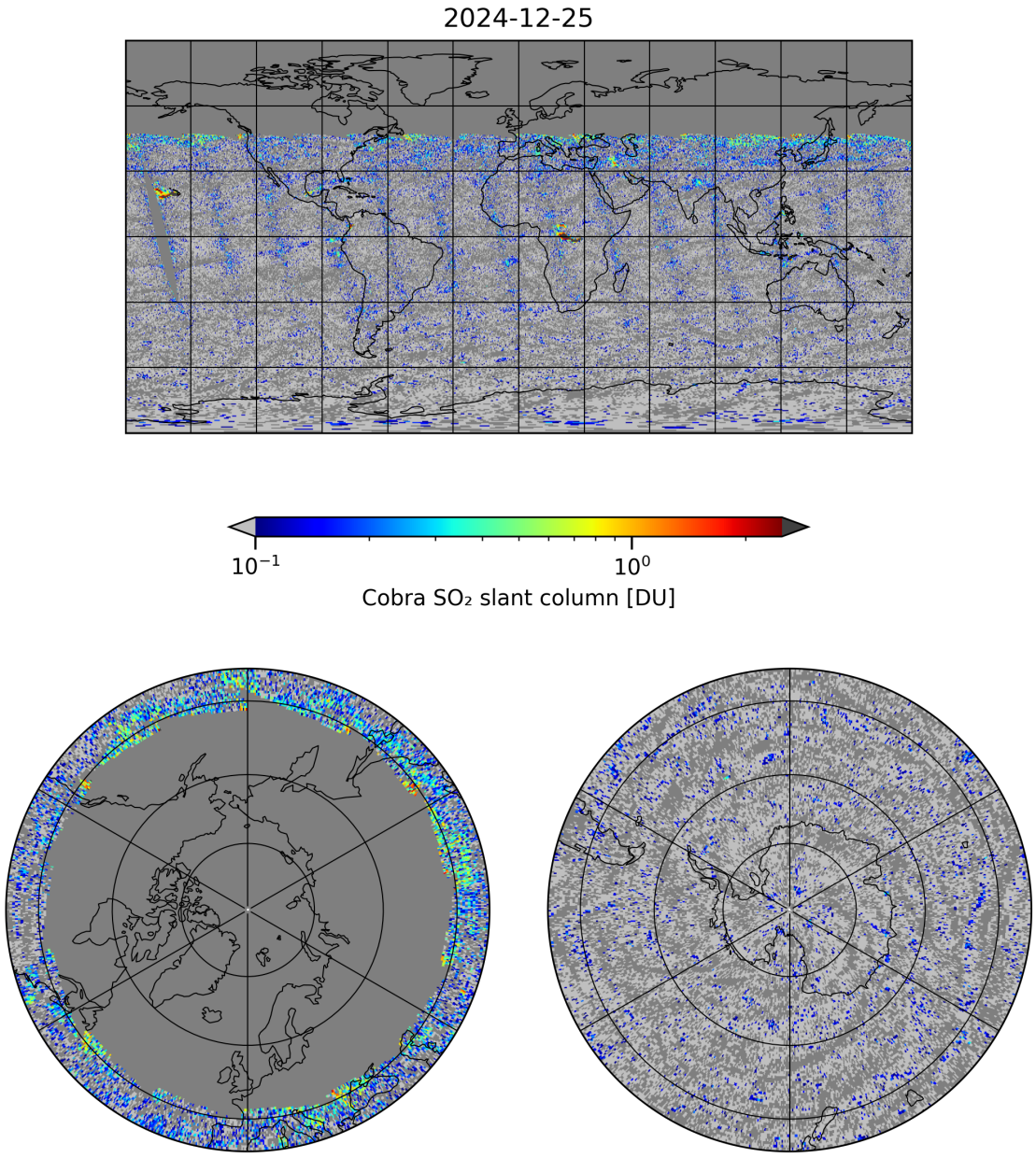

Figure 7: Map of “Cobra SO_2 slant column” for 2024-12-25 to 2024-12-25

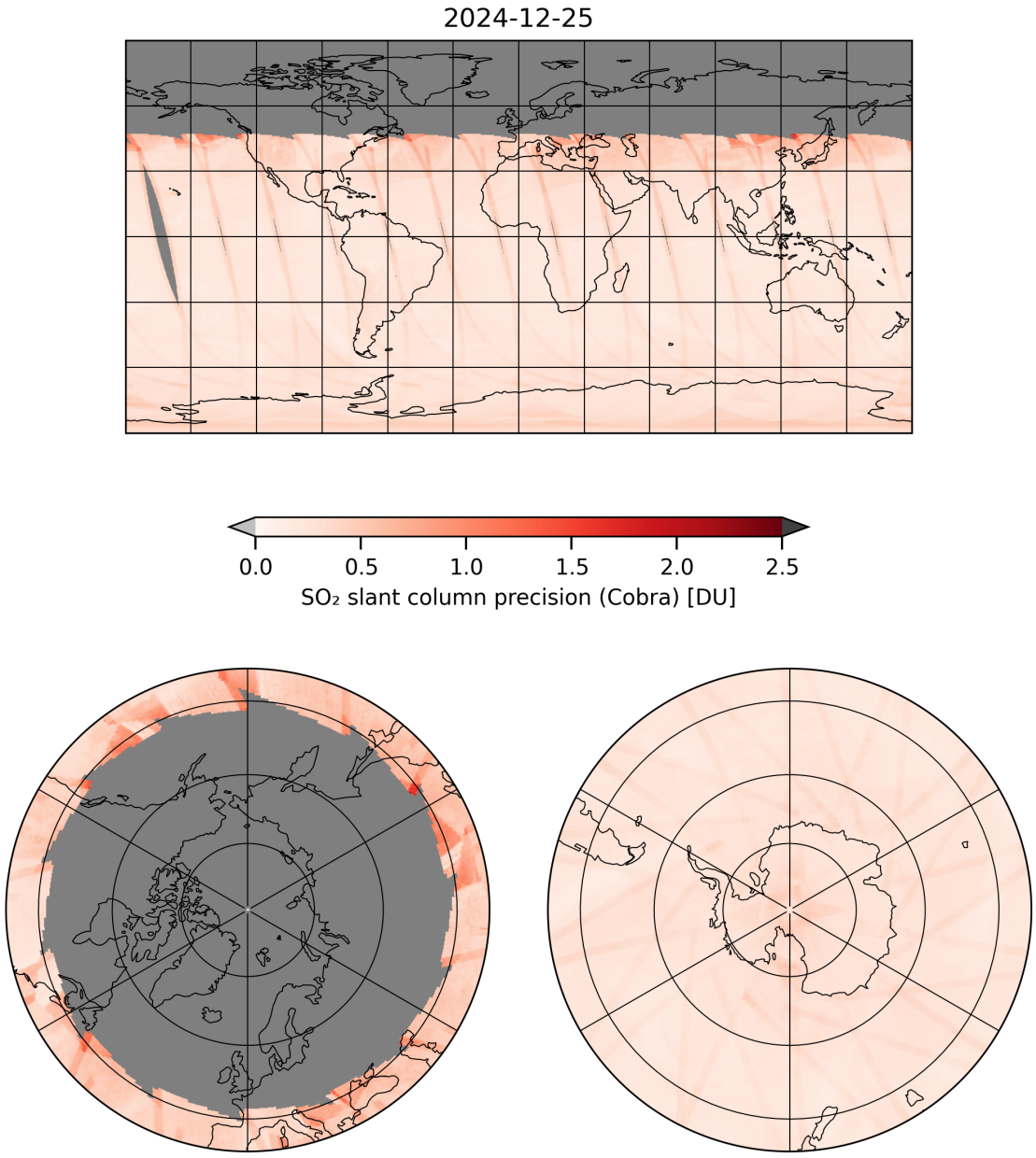

Figure 8: Map of "SO_2 slant column precision (Cobra)" for 2024-12-25 to 2024-12-25

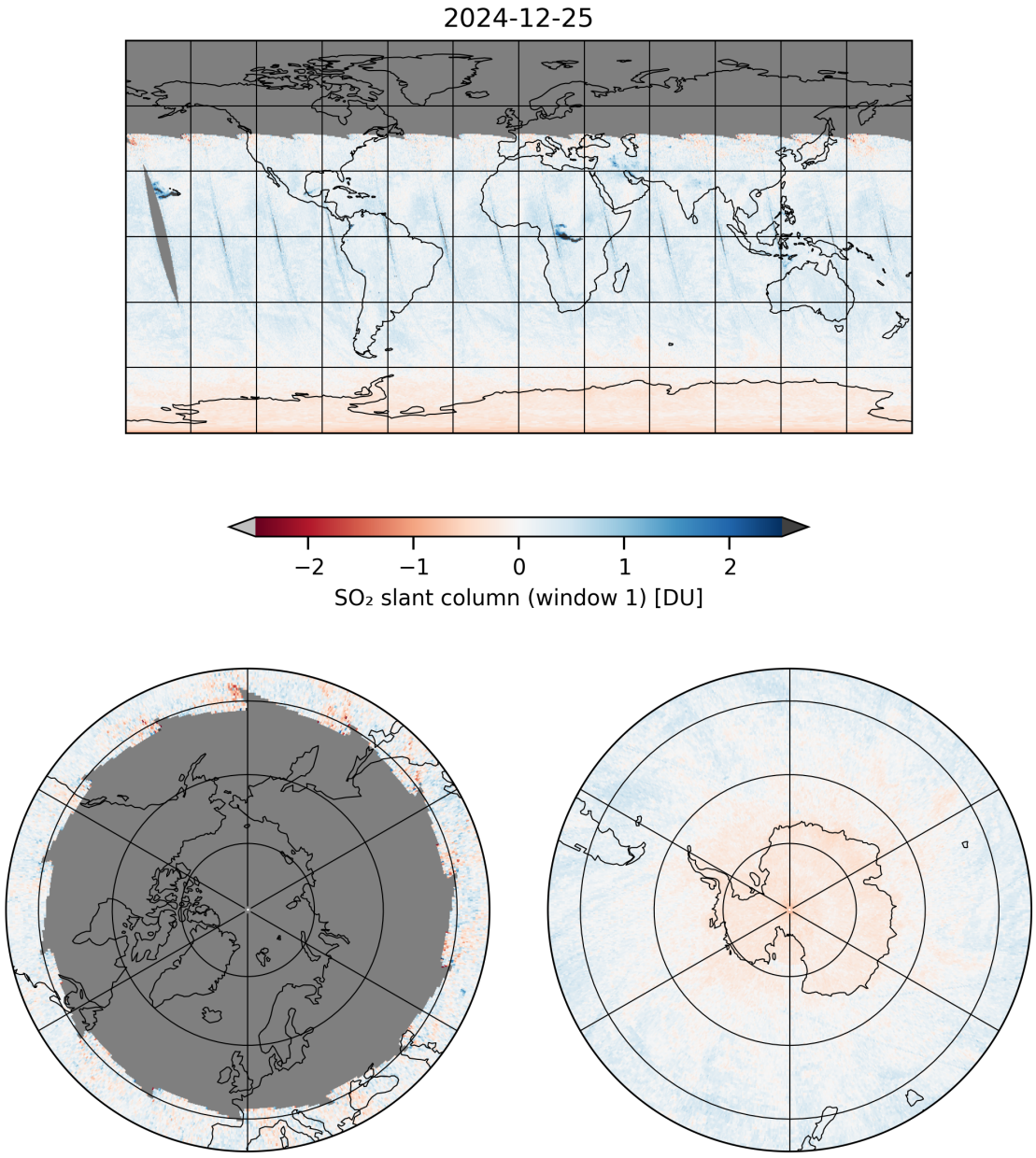

Figure 9: Map of "SO_2 slant column (window 1)" for 2024-12-25 to 2024-12-25

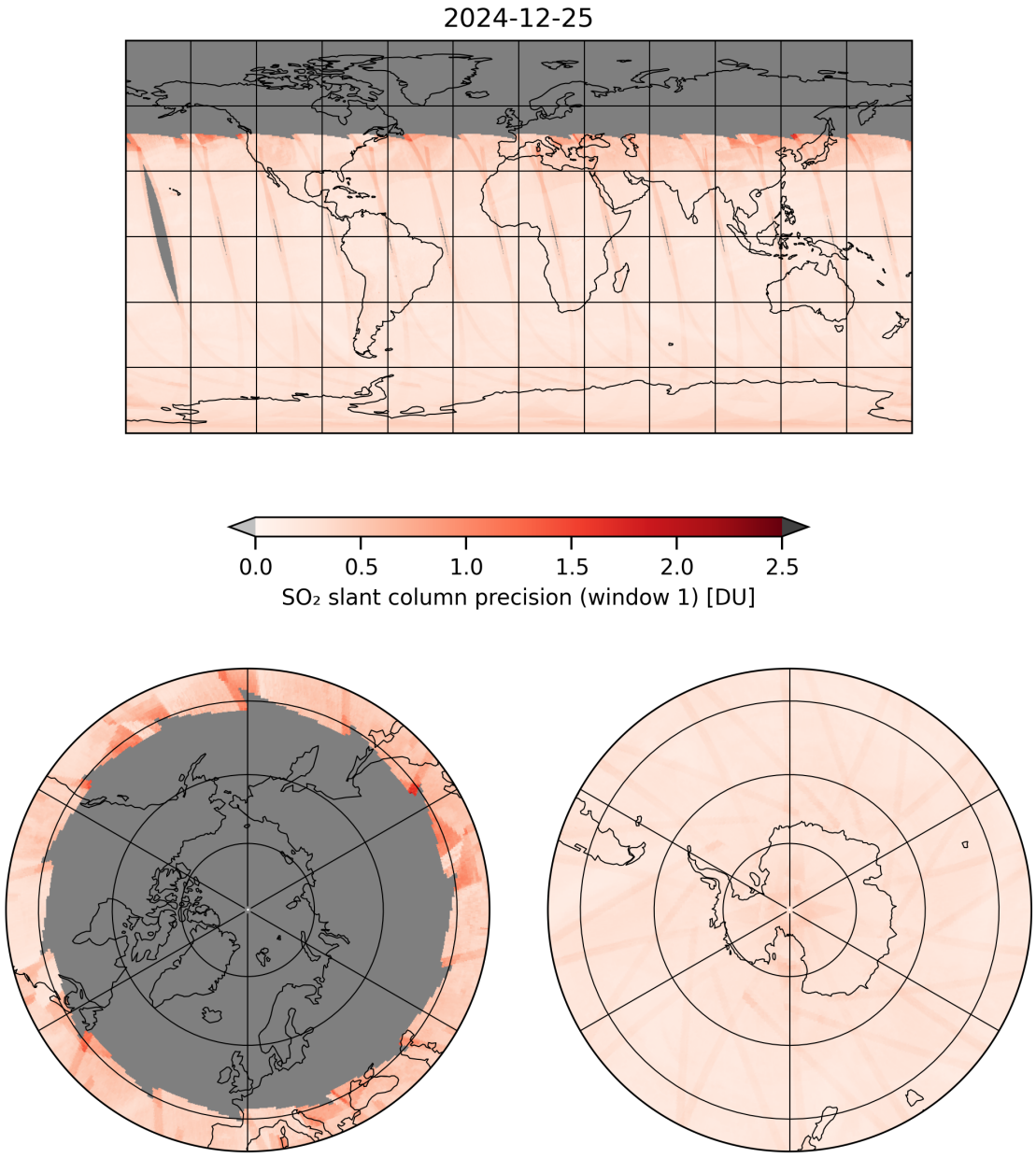

Figure 10: Map of "SO_2 slant column precision (window 1)" for 2024-12-25 to 2024-12-25

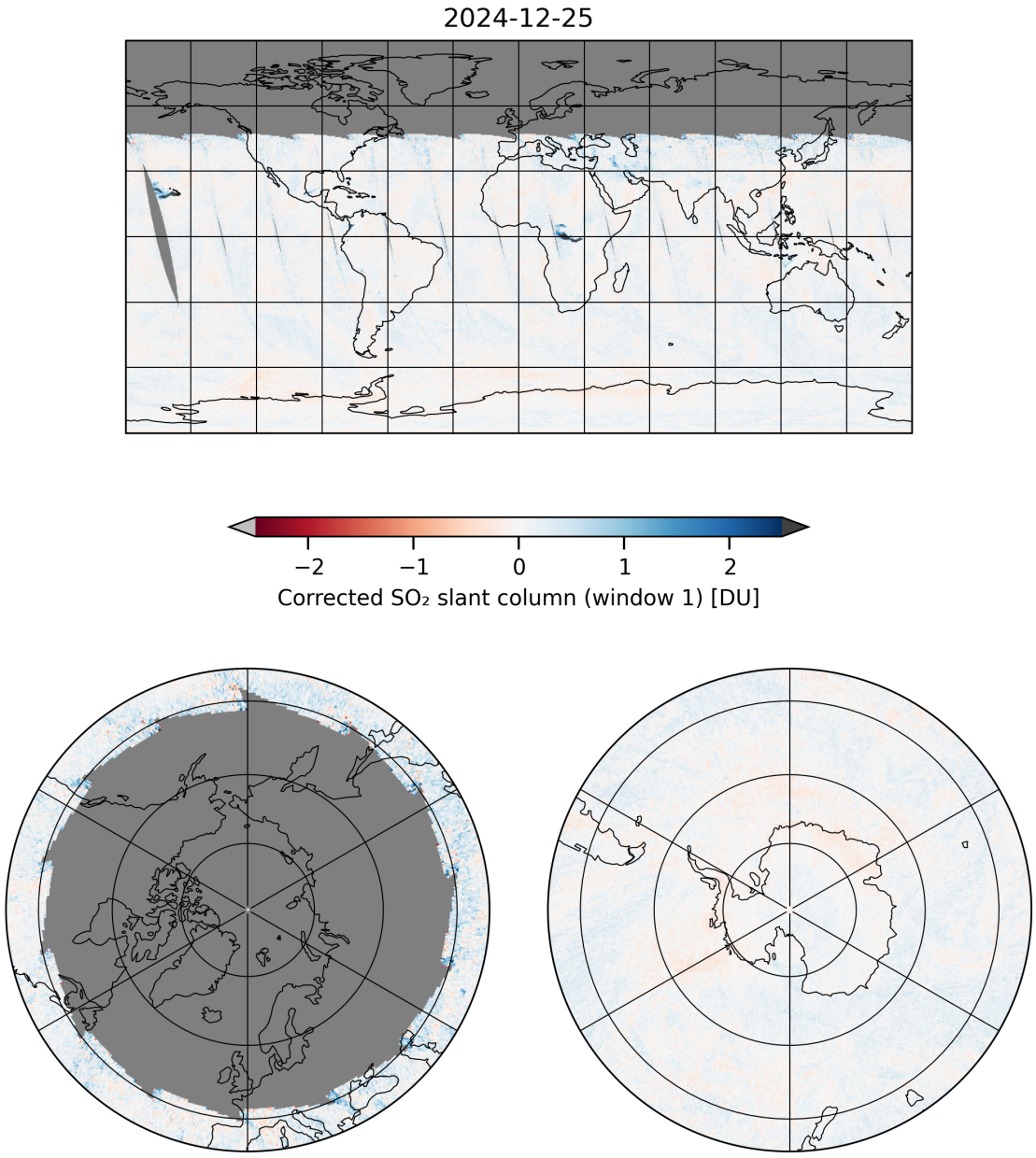

Figure 11: Map of “Corrected SO_2 slant column (window 1)” for 2024-12-25 to 2024-12-25

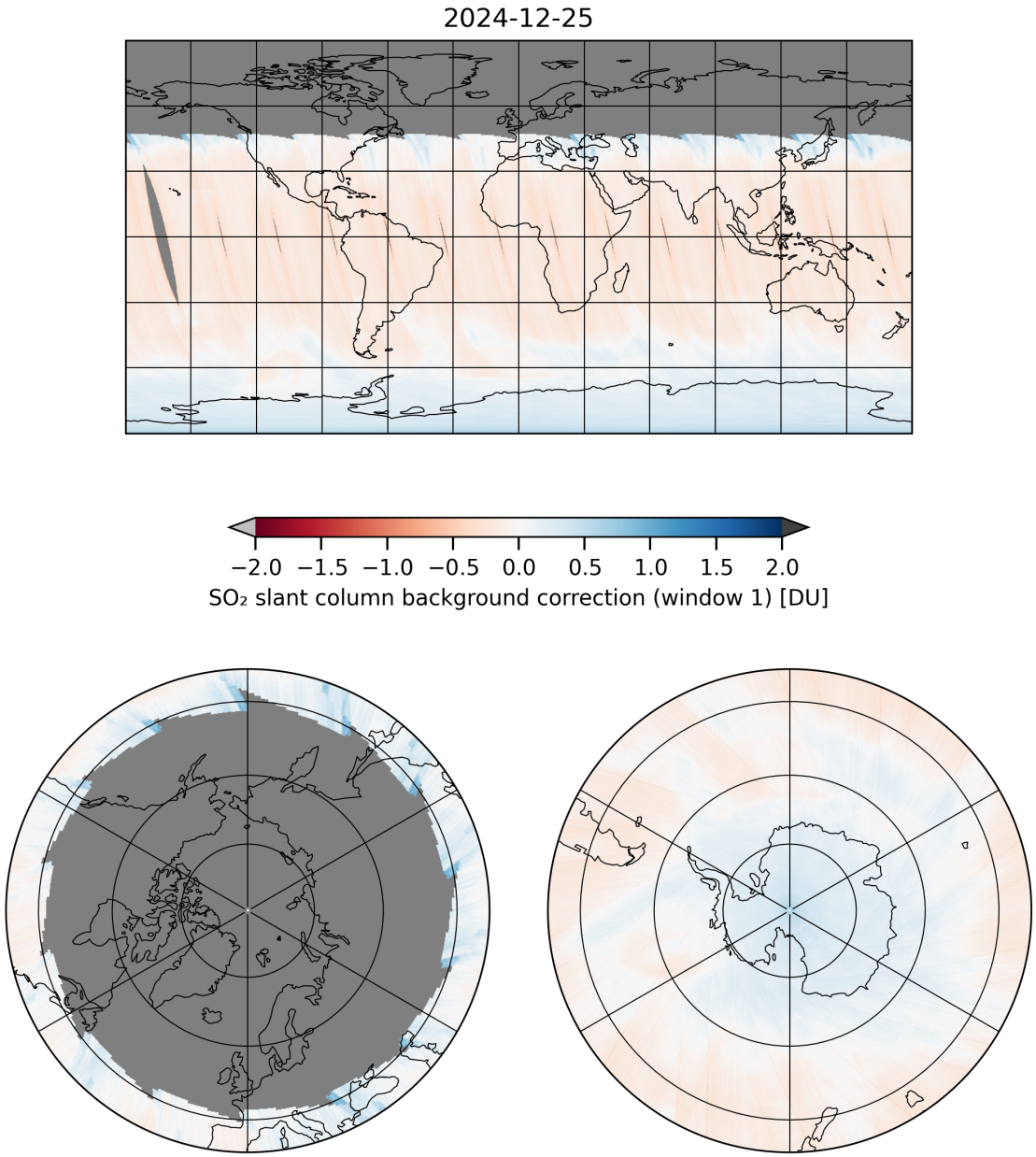

Figure 12: Map of "SO_2 slant column background correction (window 1)" for 2024-12-25 to 2024-12-25

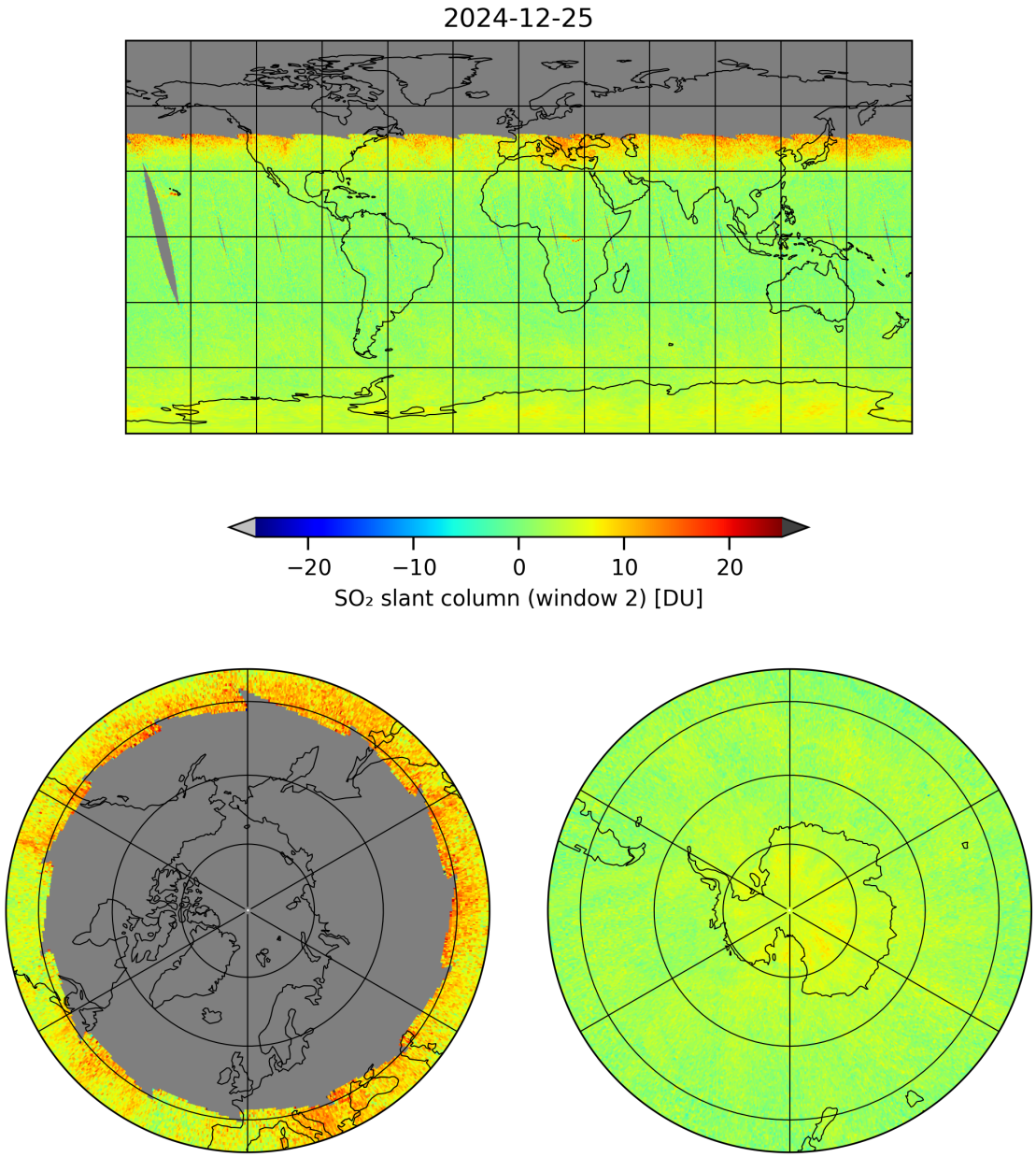

Figure 13: Map of "SO_2 slant column (window 2)" for 2024-12-25 to 2024-12-25

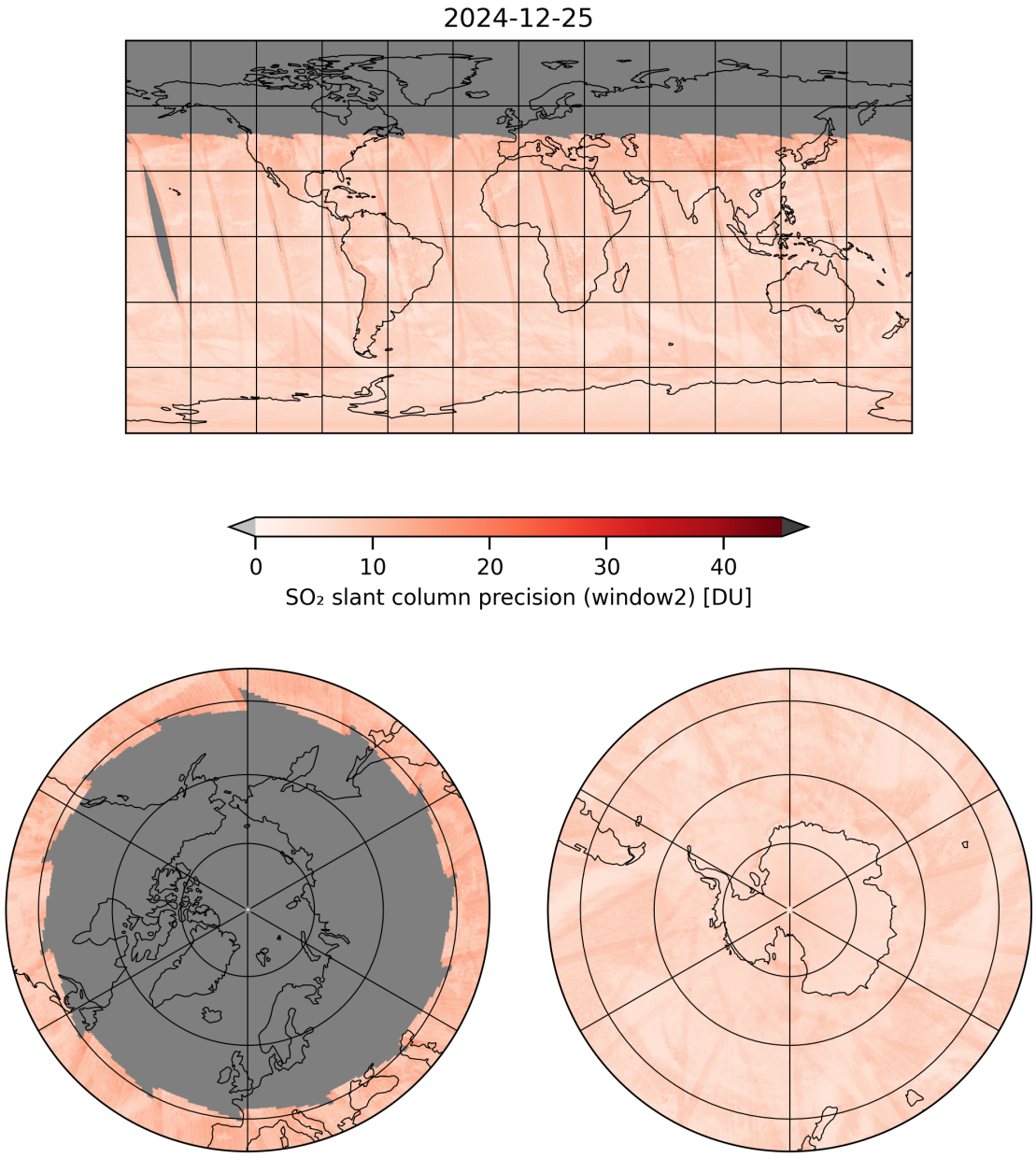

Figure 14: Map of "SO_2 slant column precision (window2)" for 2024-12-25 to 2024-12-25

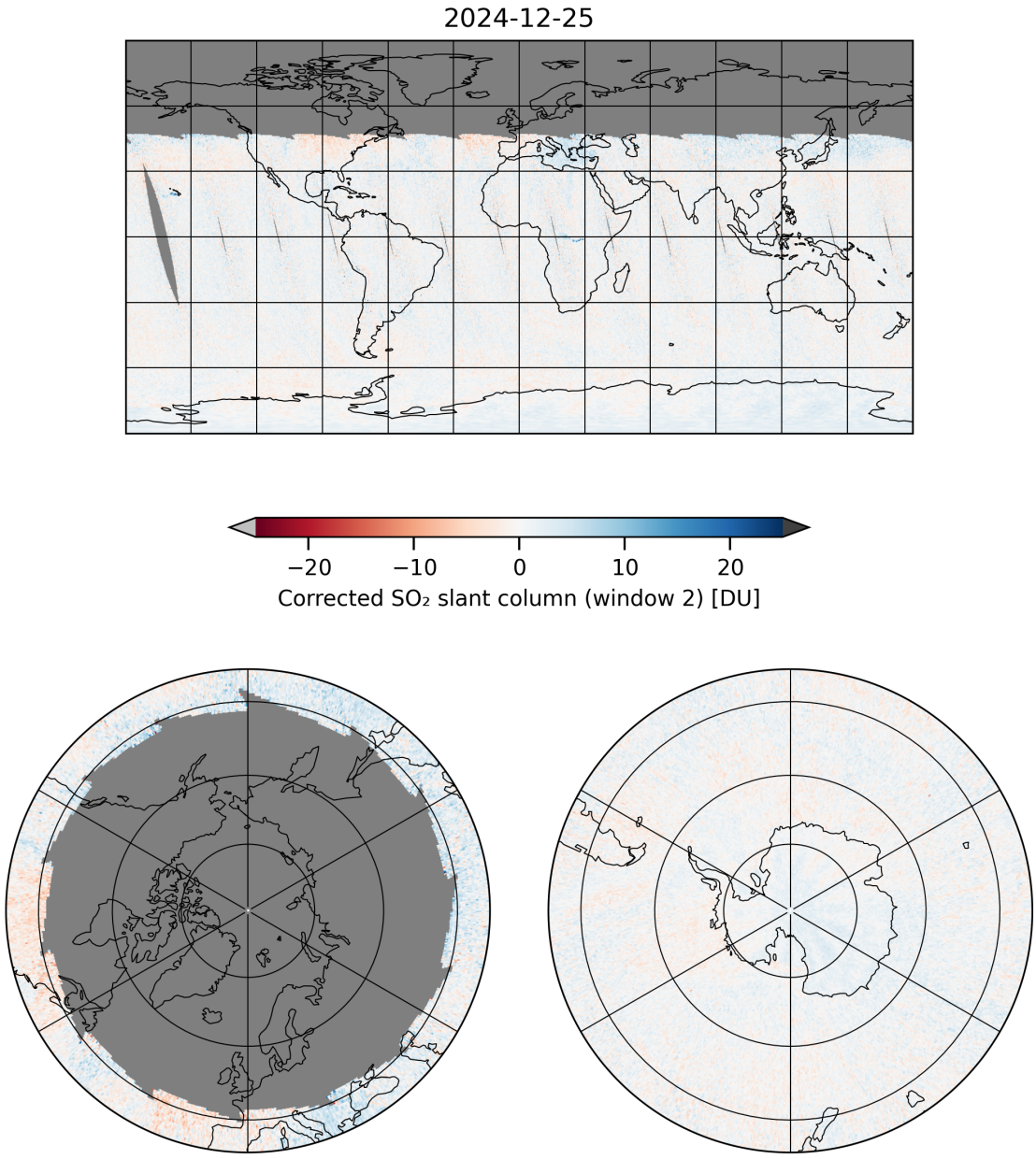

Figure 15: Map of "Corrected SO_2 slant column (window 2)" for 2024-12-25 to 2024-12-25

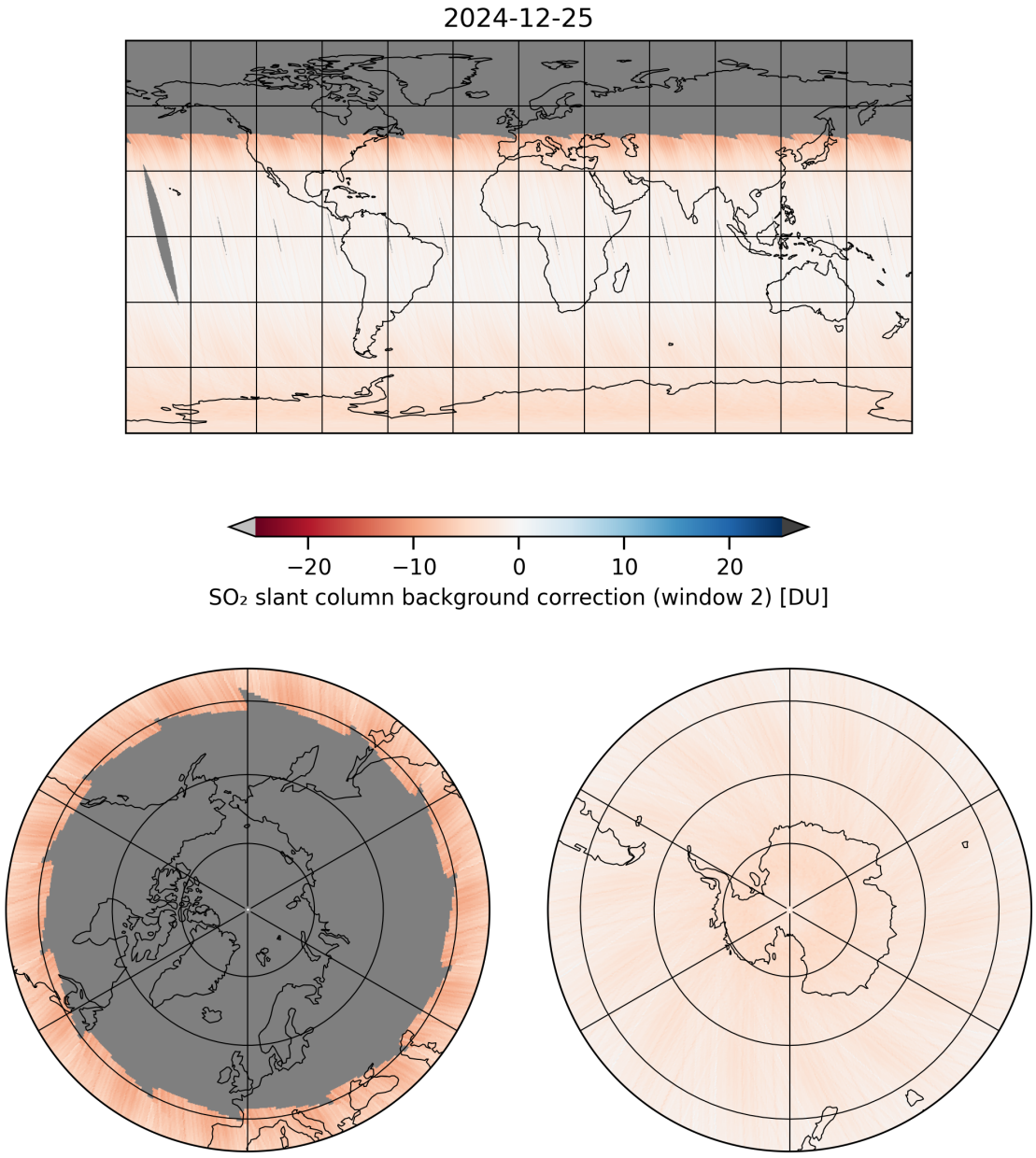

Figure 16: Map of "SO_2 slant column background correction (window 2)" for 2024-12-25 to 2024-12-25

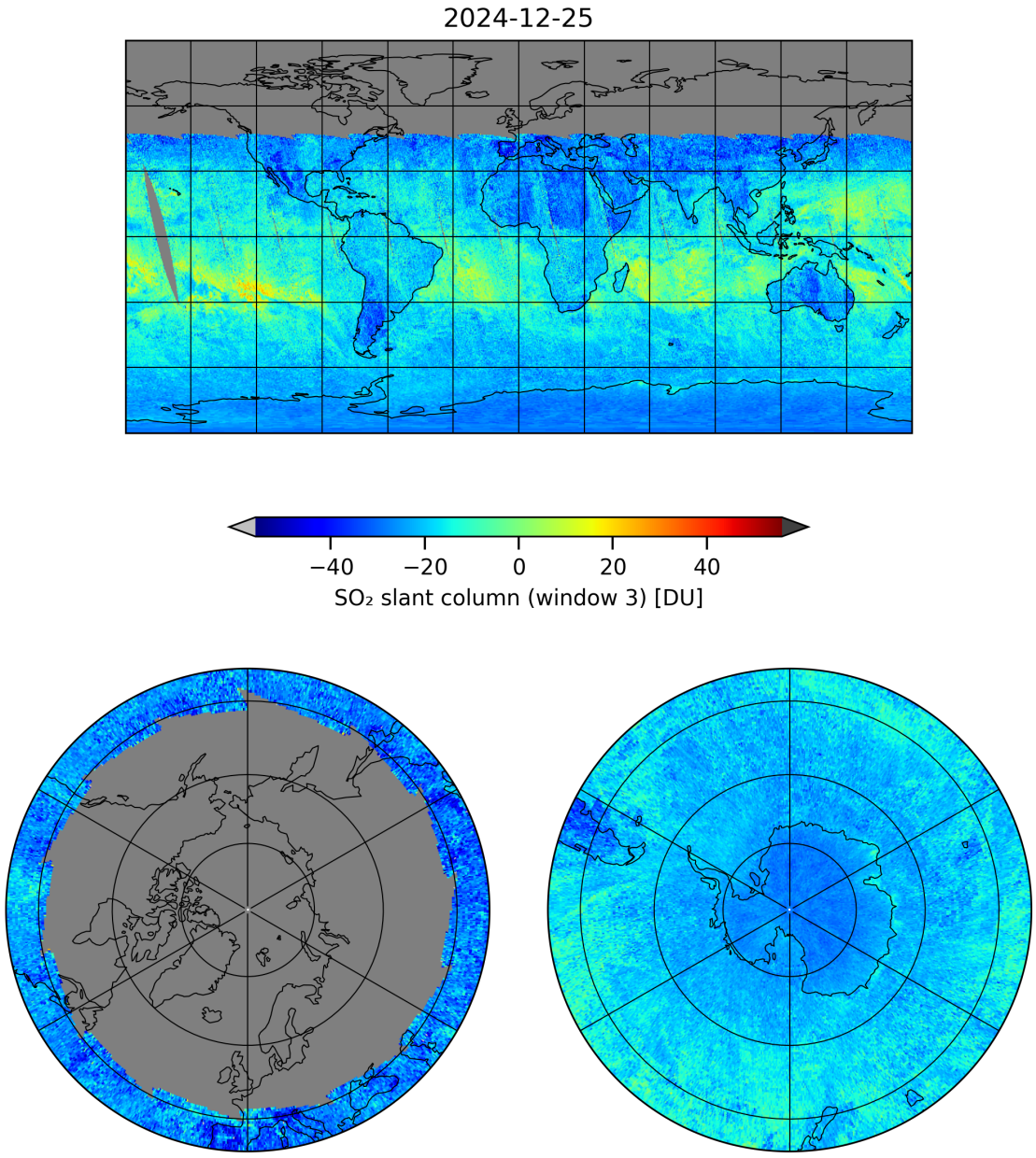

Figure 17: Map of "SO_2 slant column (window 3)" for 2024-12-25 to 2024-12-25

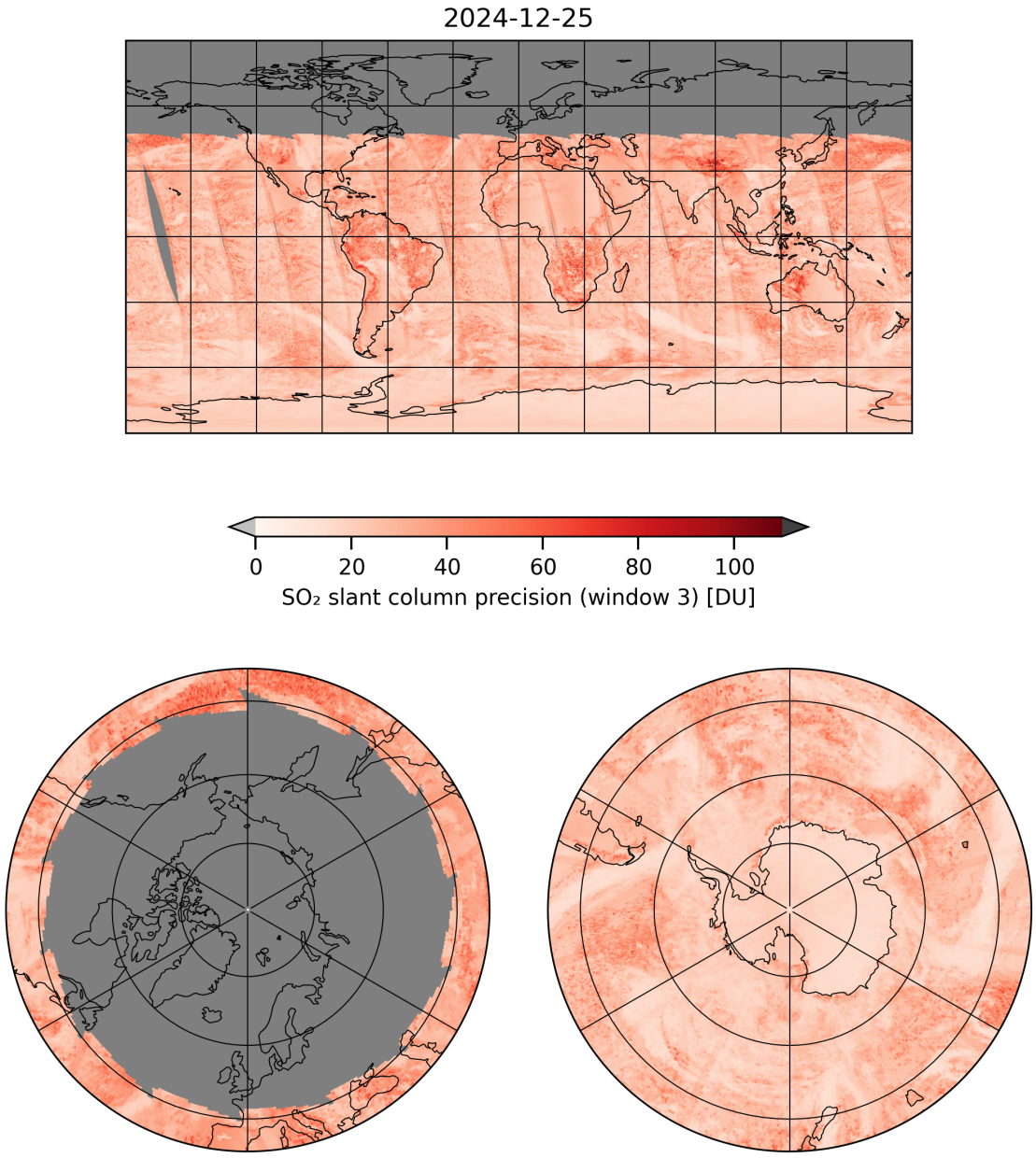

Figure 18: Map of "SO_2 slant column precision (window 3)" for 2024-12-25 to 2024-12-25

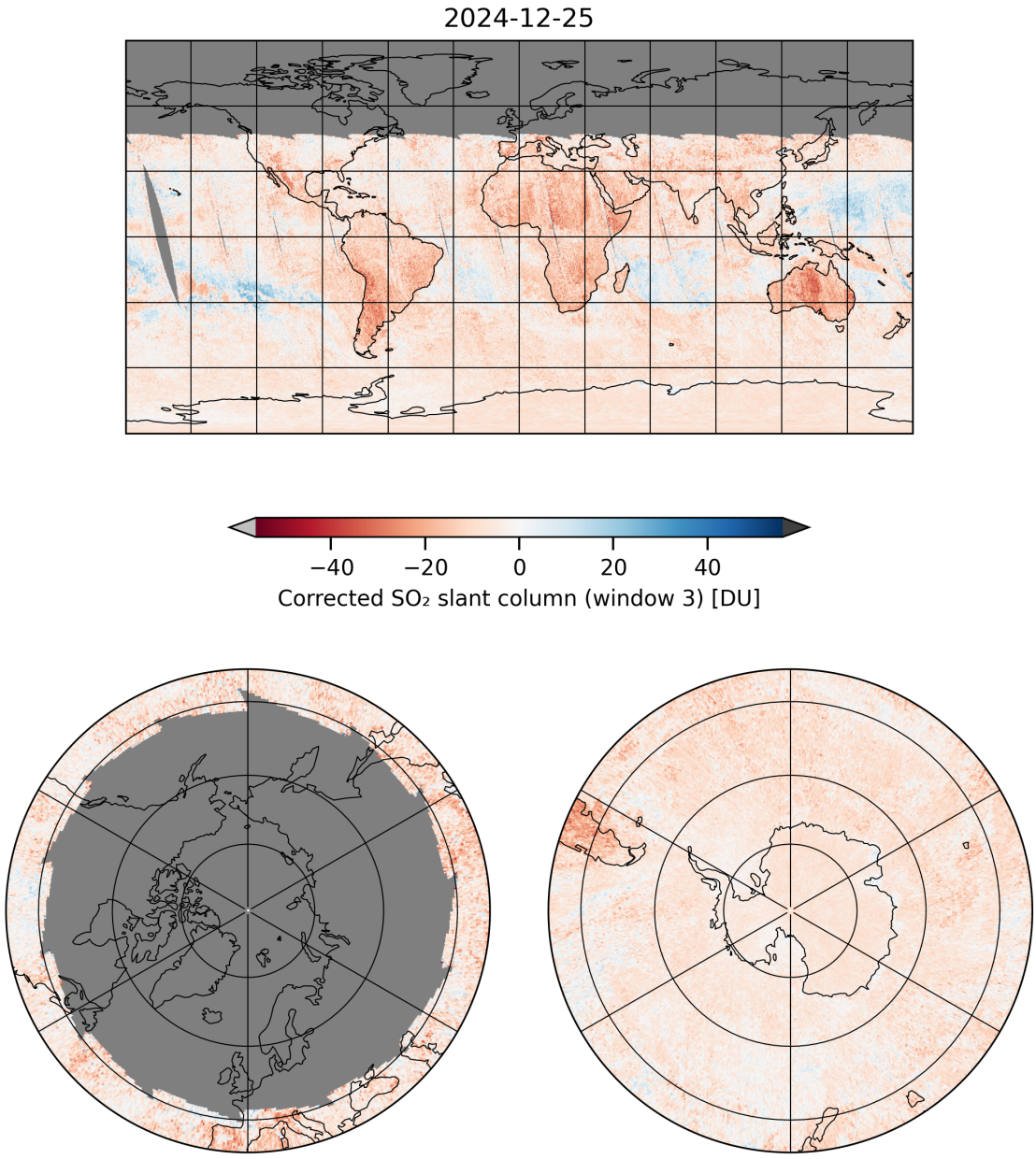

Figure 19: Map of "Corrected SO_2 slant column (window 3)" for 2024-12-25 to 2024-12-25

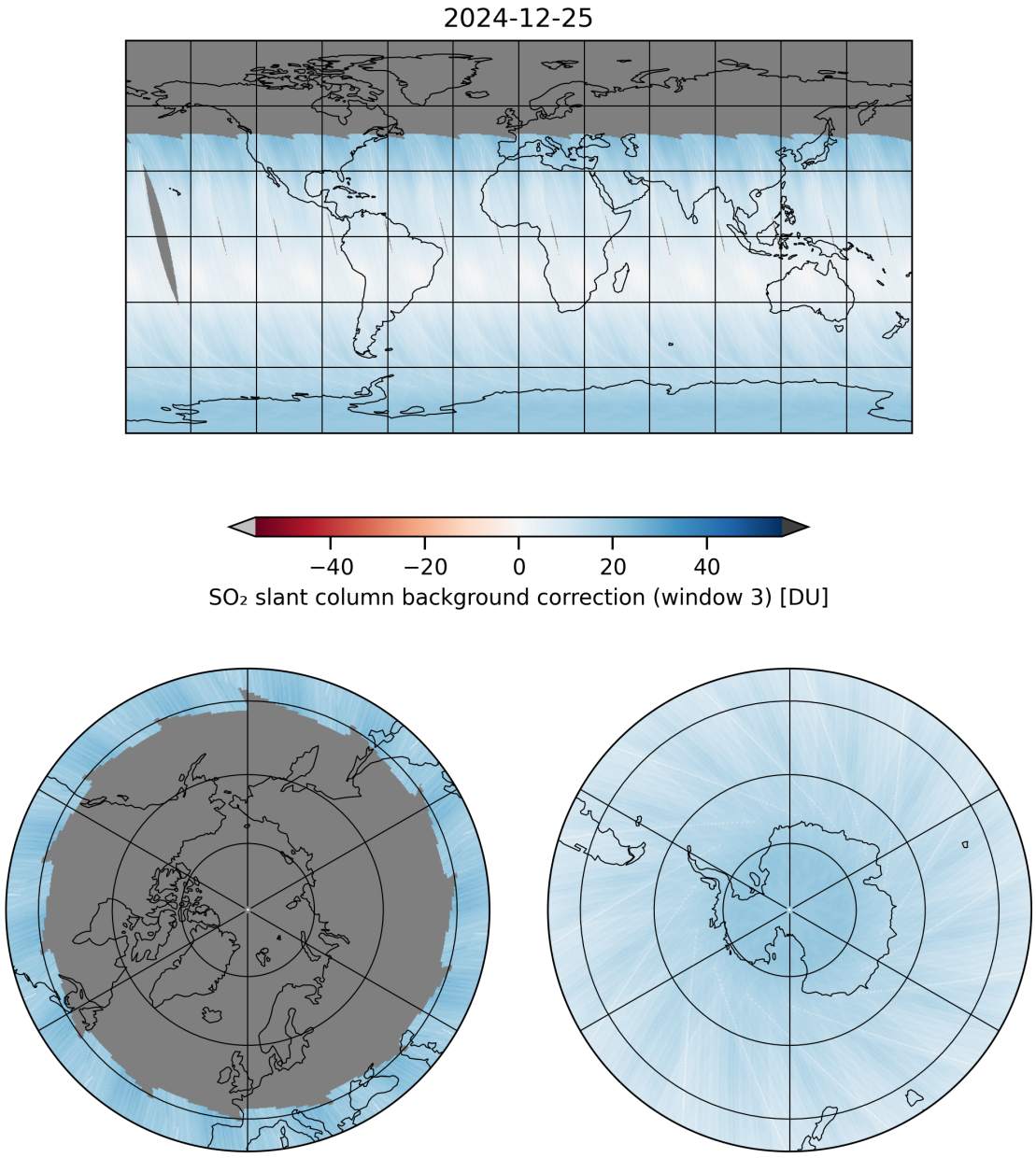

Figure 20: Map of "SO_2 slant column background correction (window 3)" for 2024-12-25 to 2024-12-25

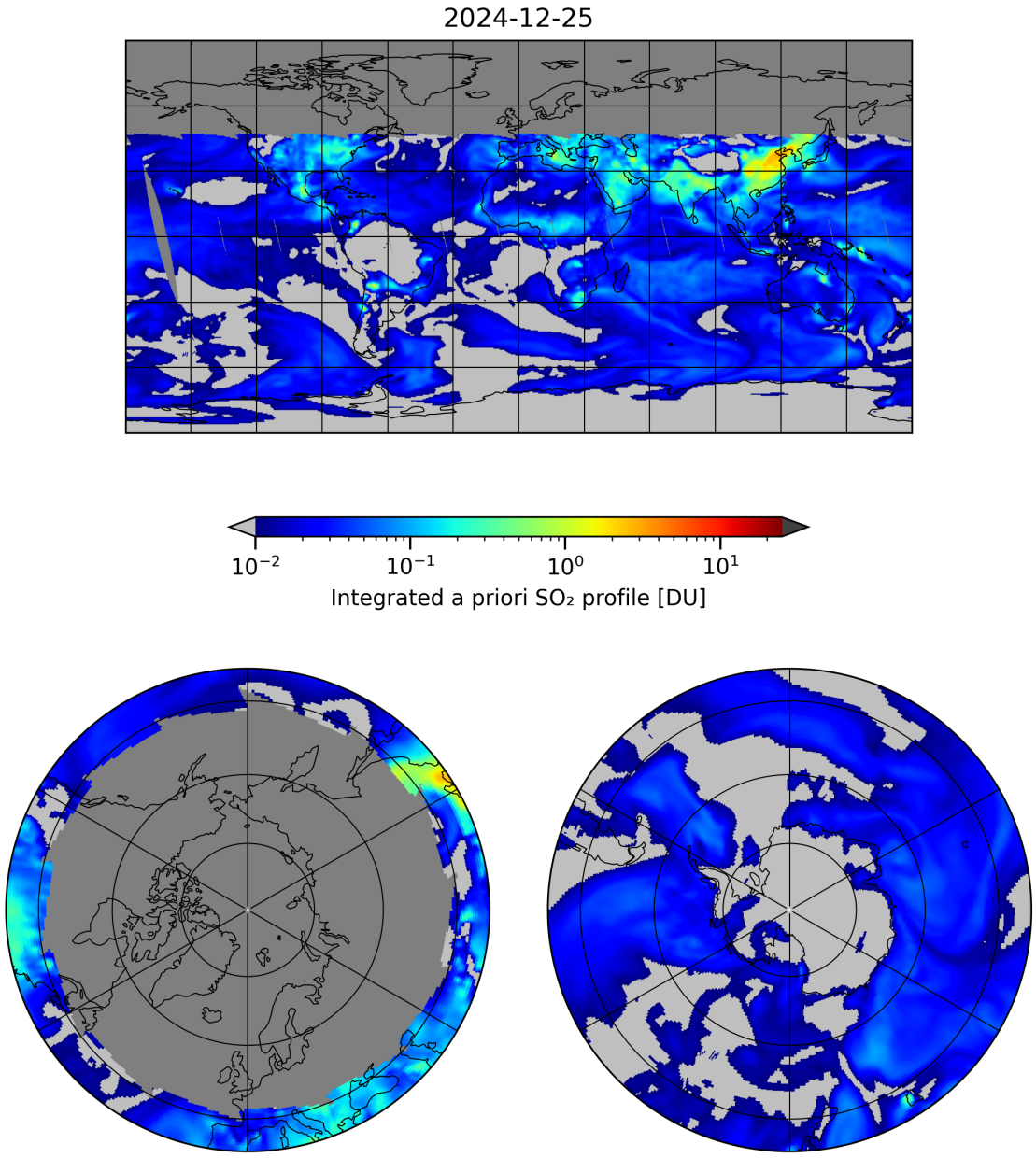

Figure 21: Map of “Integrated a priori SO_2 profile” for 2024-12-25 to 2024-12-25

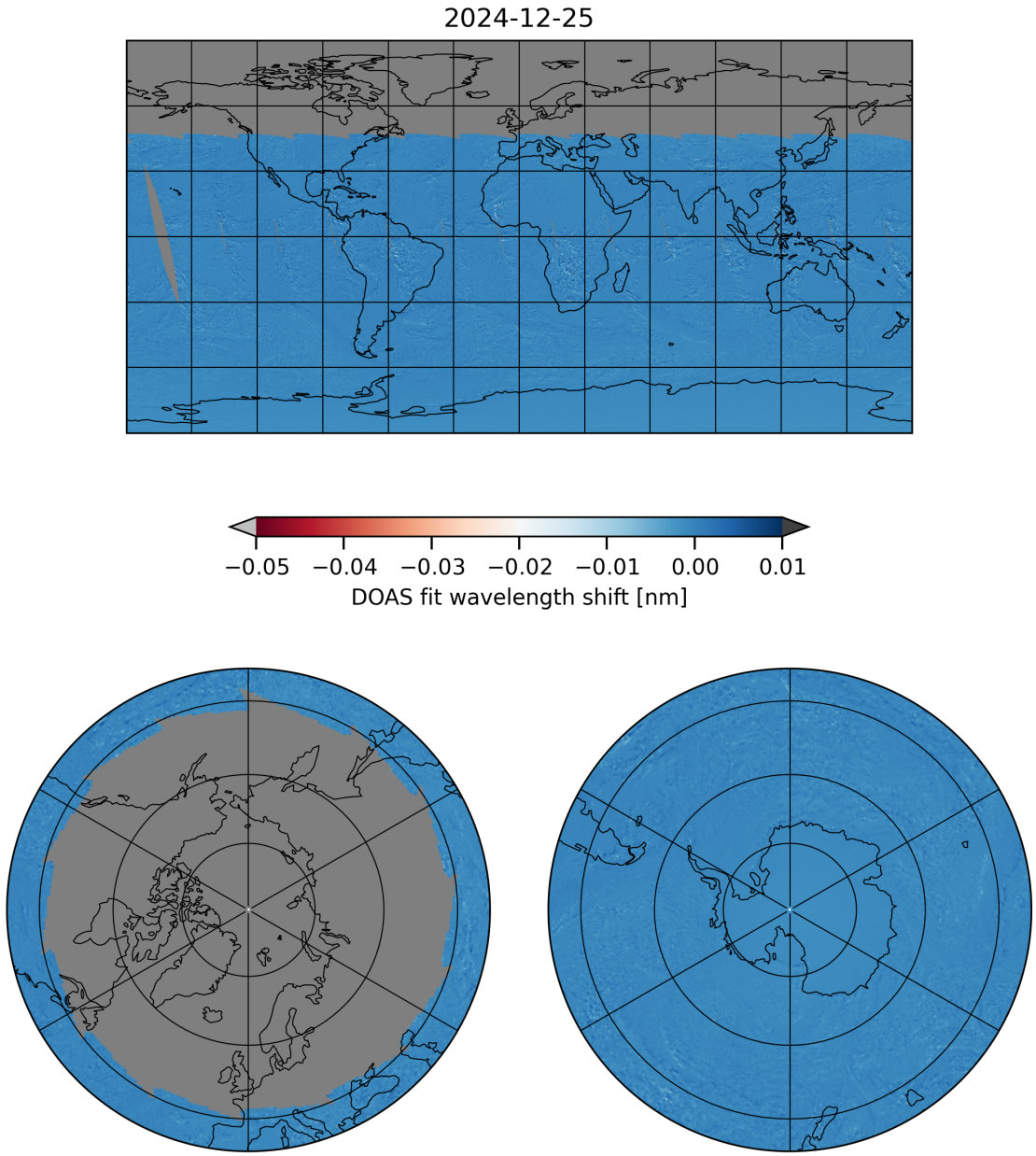

Figure 22: Map of “DOAS fit wavelength shift” for 2024-12-25 to 2024-12-25

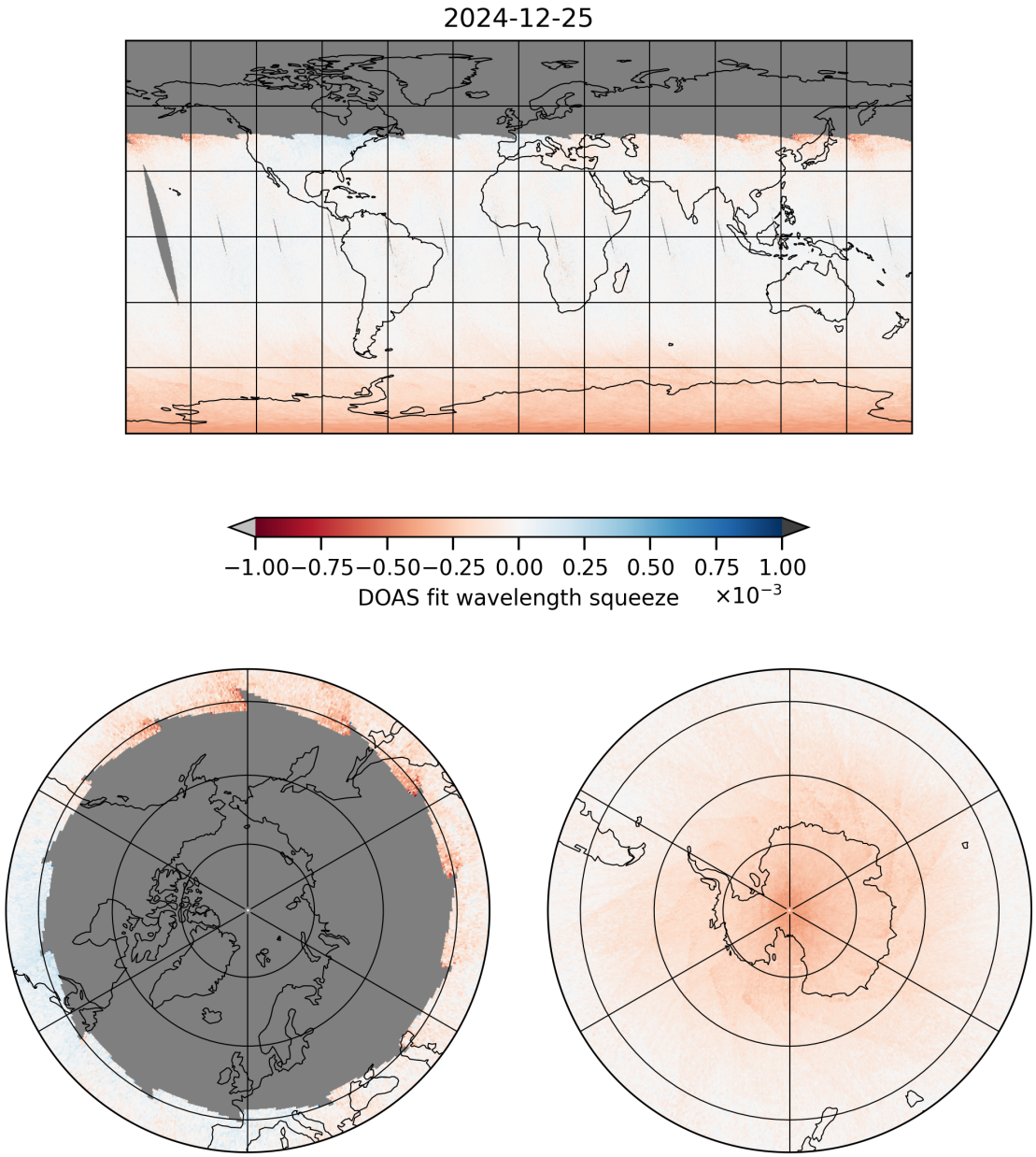

Figure 23: Map of “DOAS fit wavelength squeeze” for 2024-12-25 to 2024-12-25

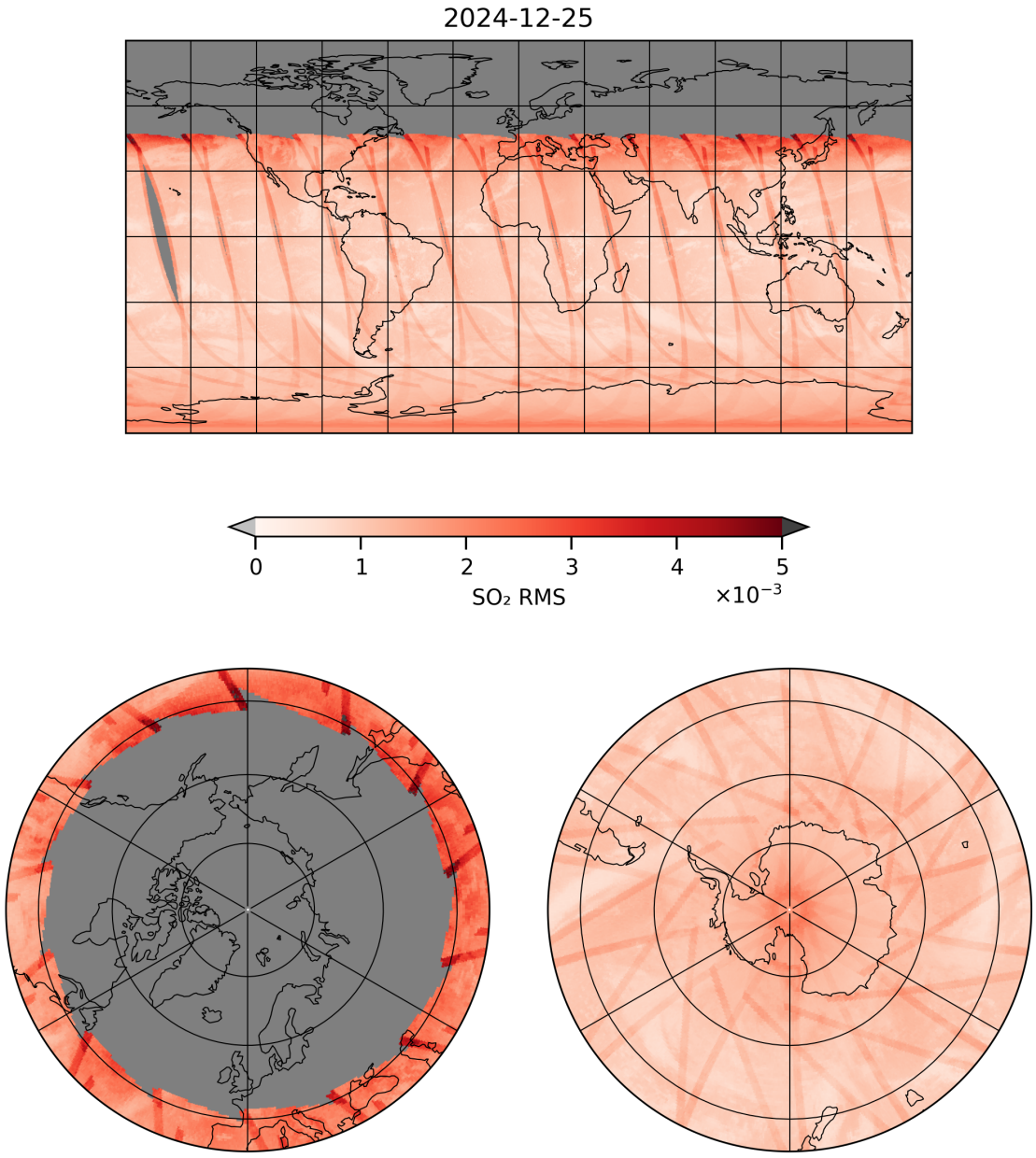

Figure 24: Map of "SO_2 RMS" for 2024-12-25 to 2024-12-25

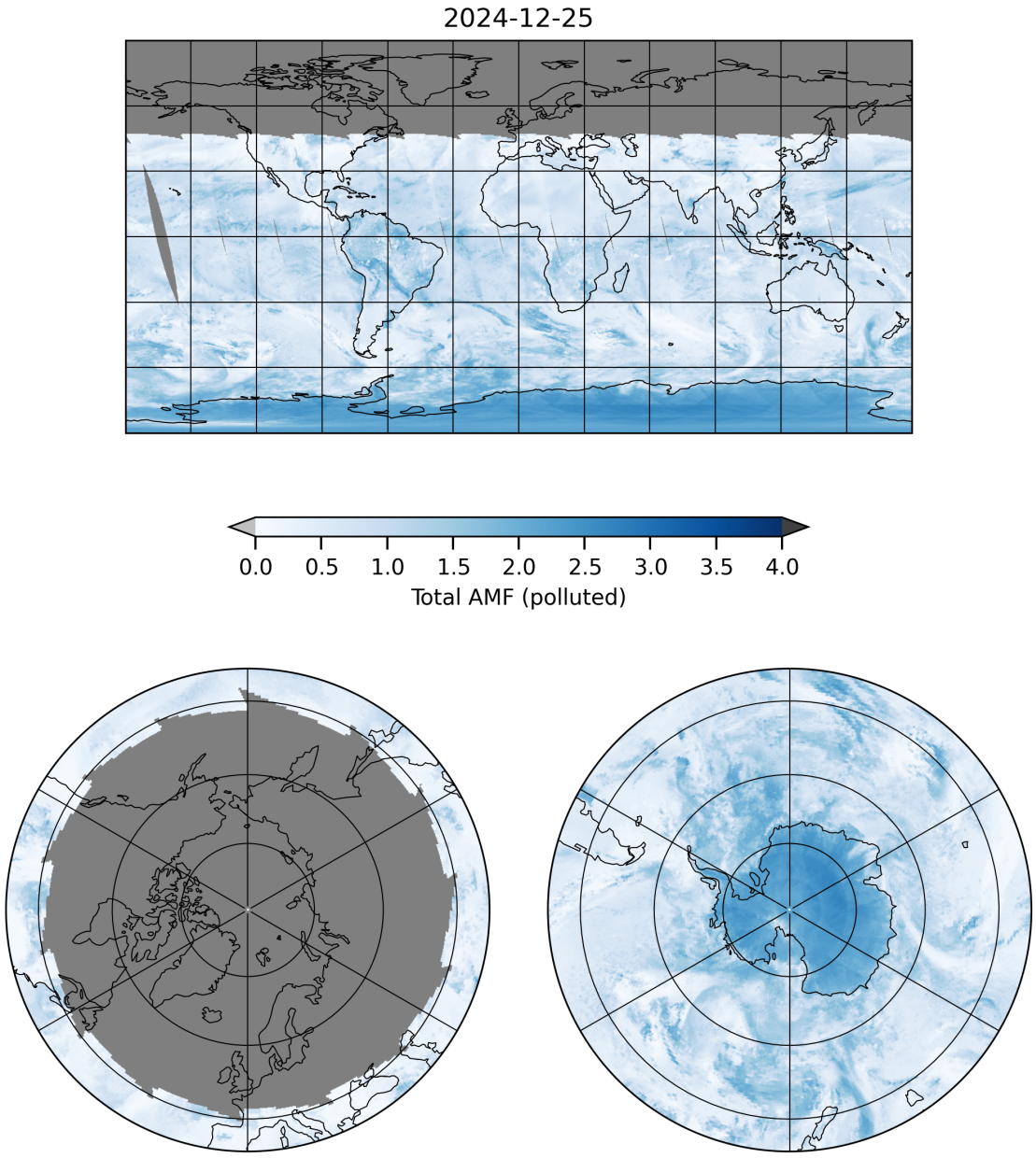

Figure 25: Map of “Total AMF (polluted)” for 2024-12-25 to 2024-12-25

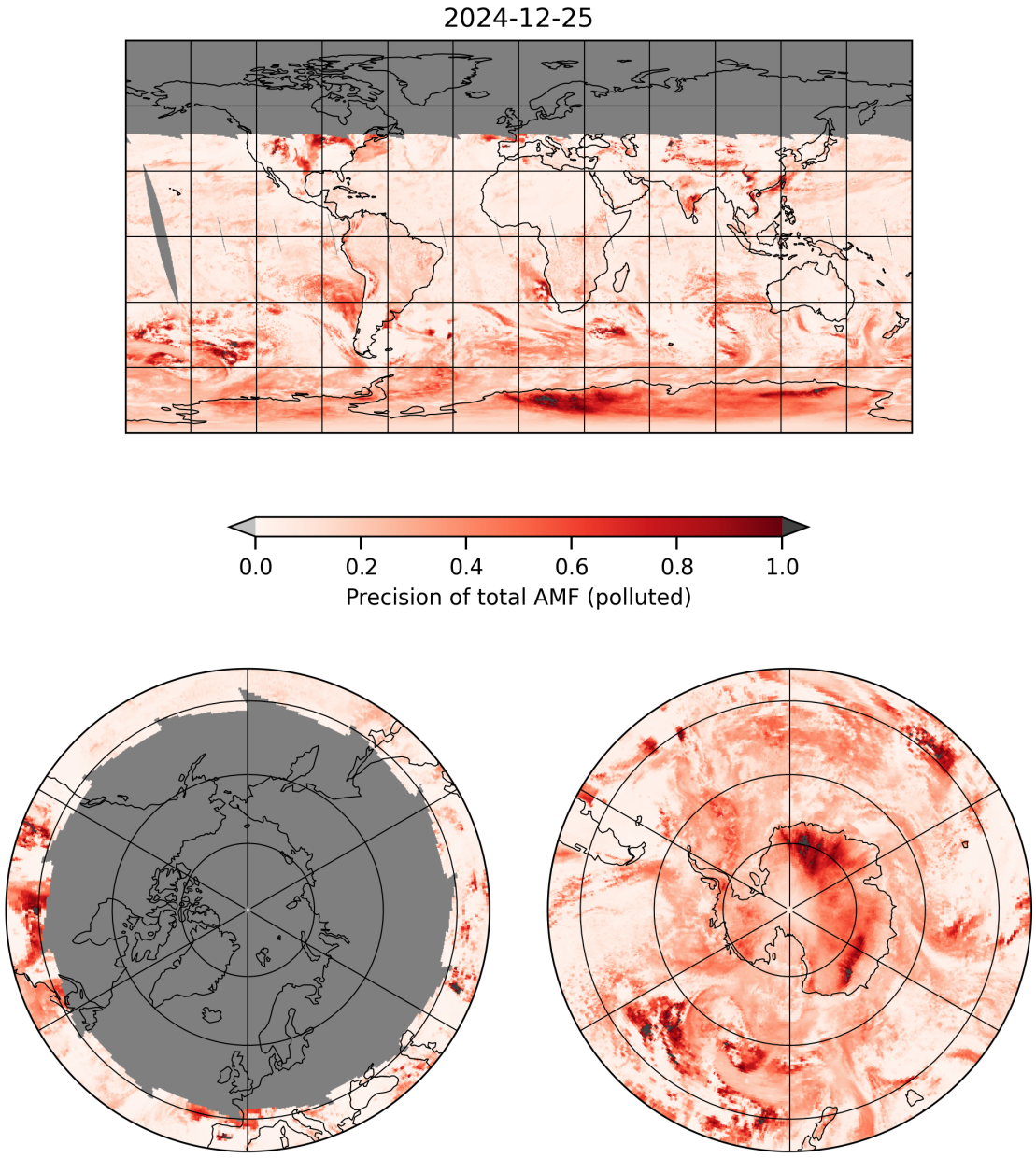

Figure 26: Map of “Precision of total AMF (polluted)” for 2024-12-25 to 2024-12-25

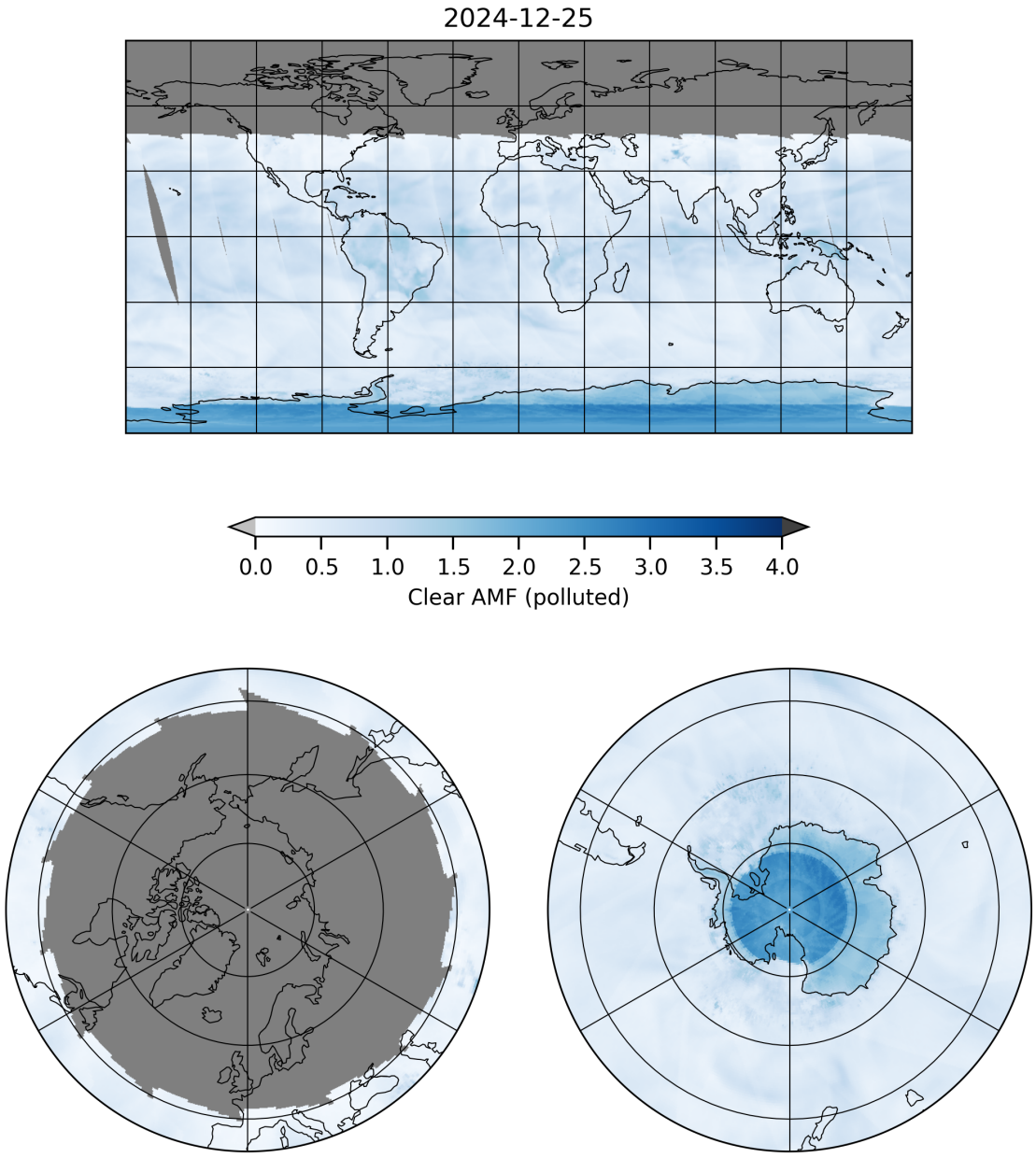

Figure 27: Map of “Clear AMF (polluted)” for 2024-12-25 to 2024-12-25

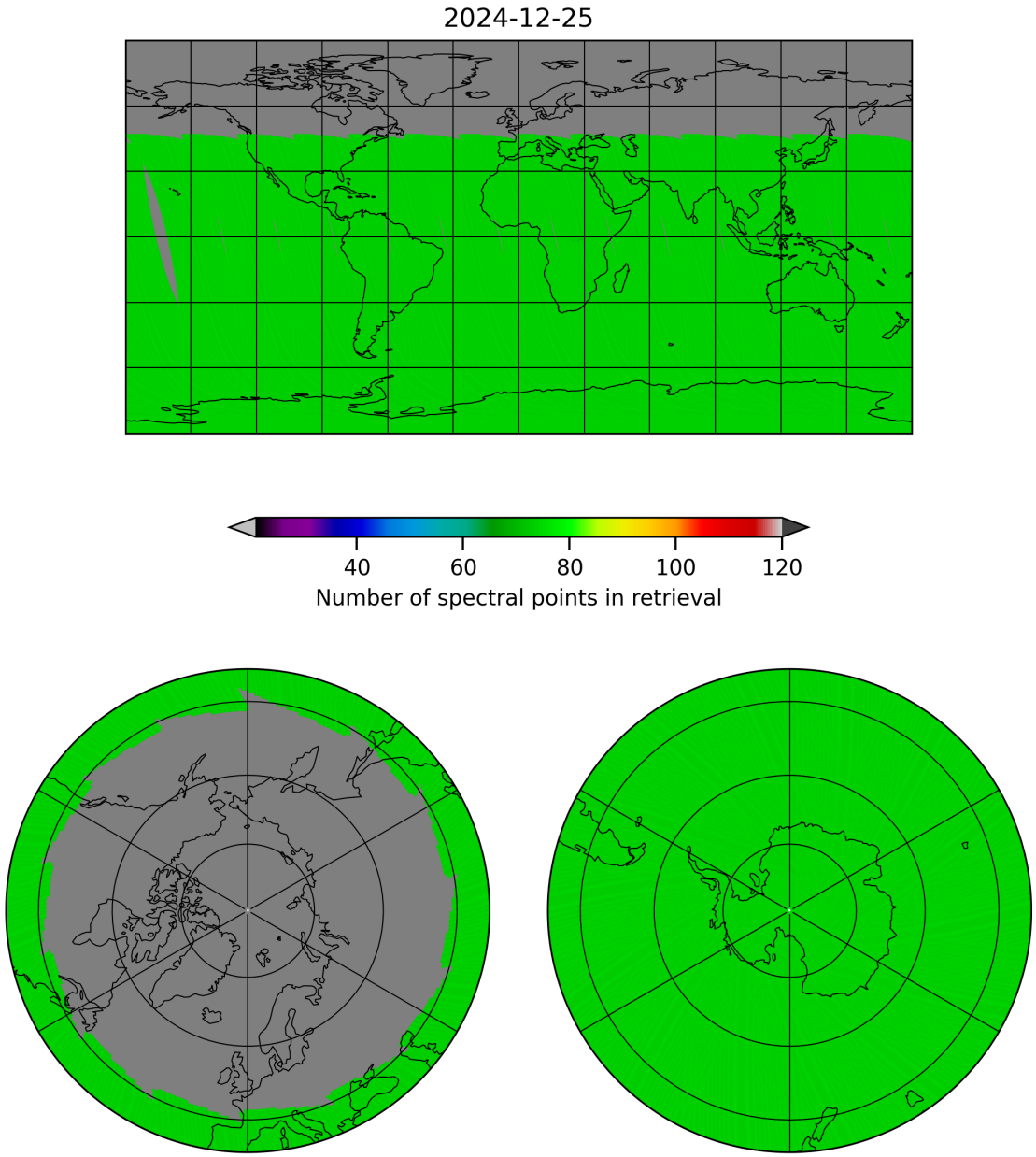

Figure 28: Map of “Number of spectral points in retrieval” for 2024-12-25 to 2024-12-25

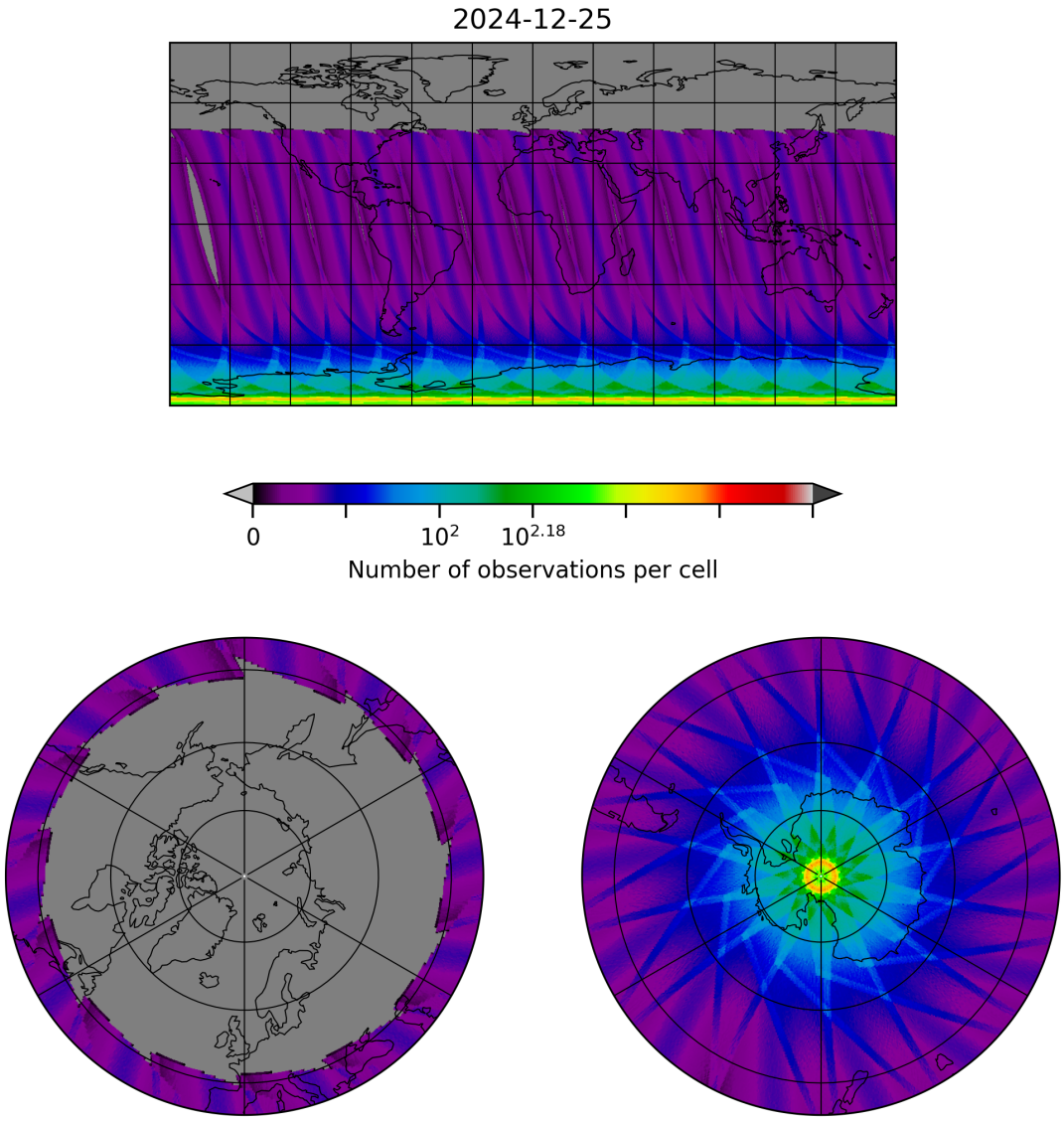

Figure 29: Map of the number of observations for 2024-12-25 to 2024-12-25

7 Zonal average

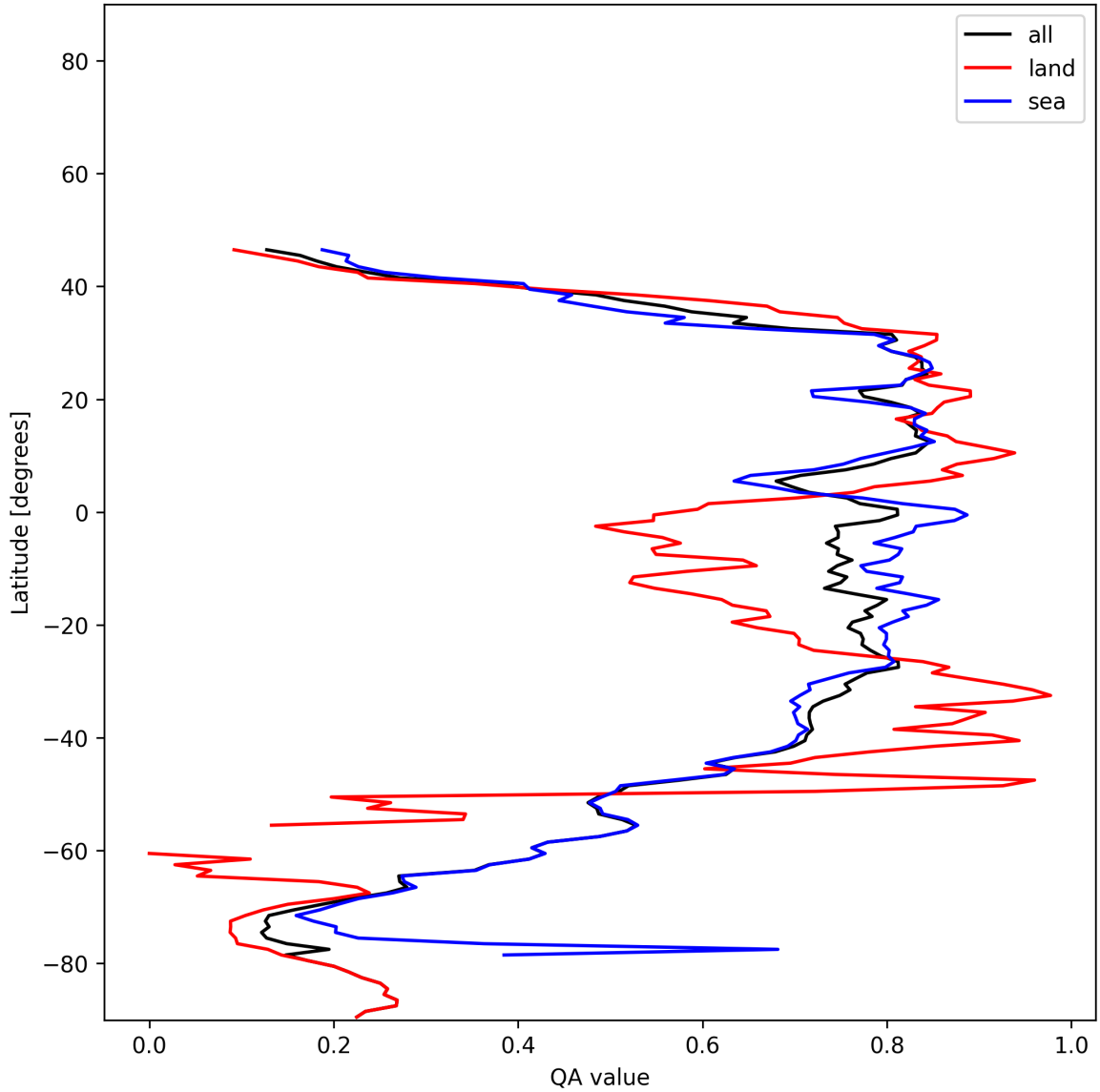

Figure 30: Zonal average of “QA value” for 2024-12-25 to 2024-12-25.

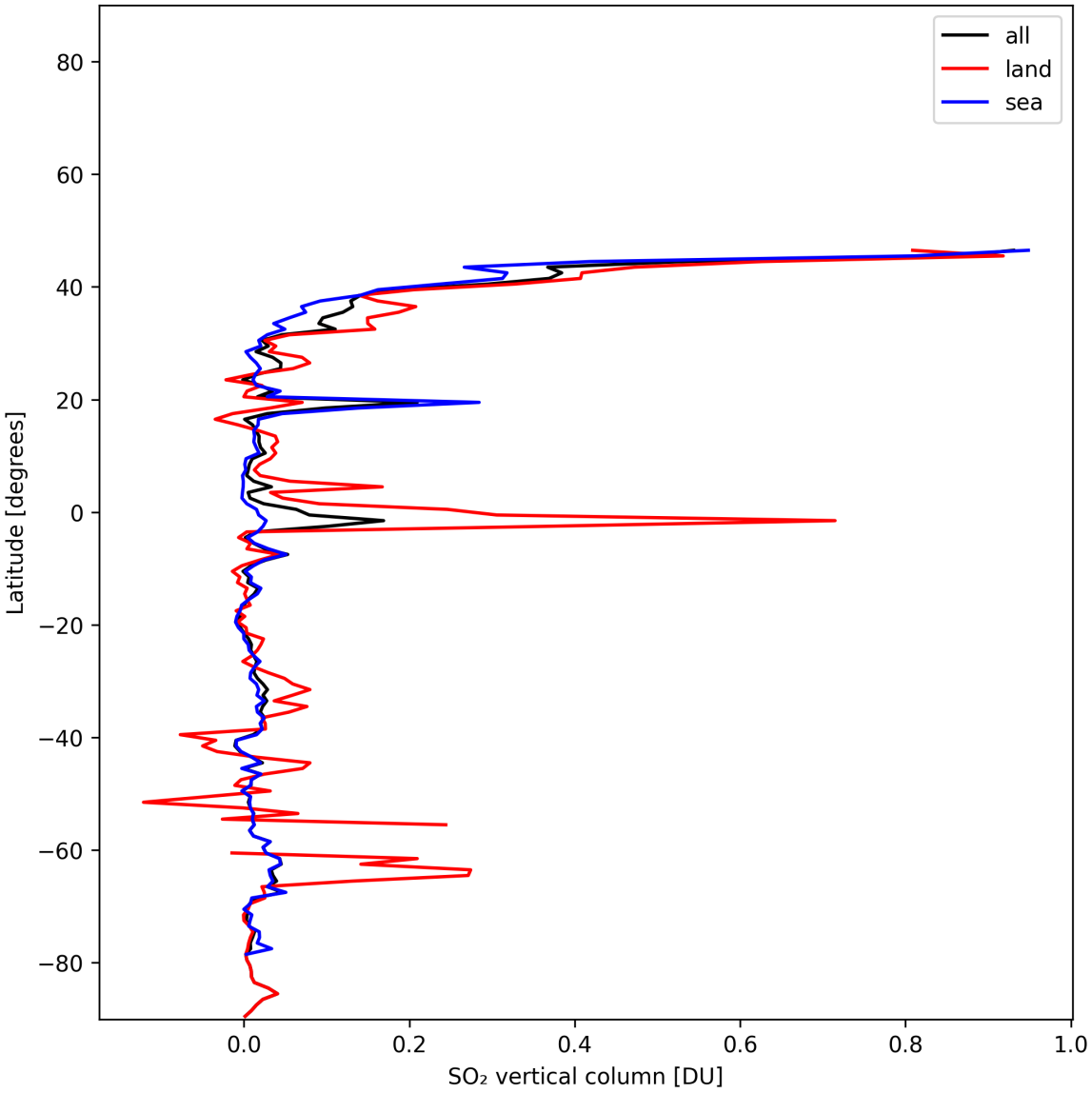

Figure 31: Zonal average of "SO_2 vertical column" for 2024-12-25 to 2024-12-25.

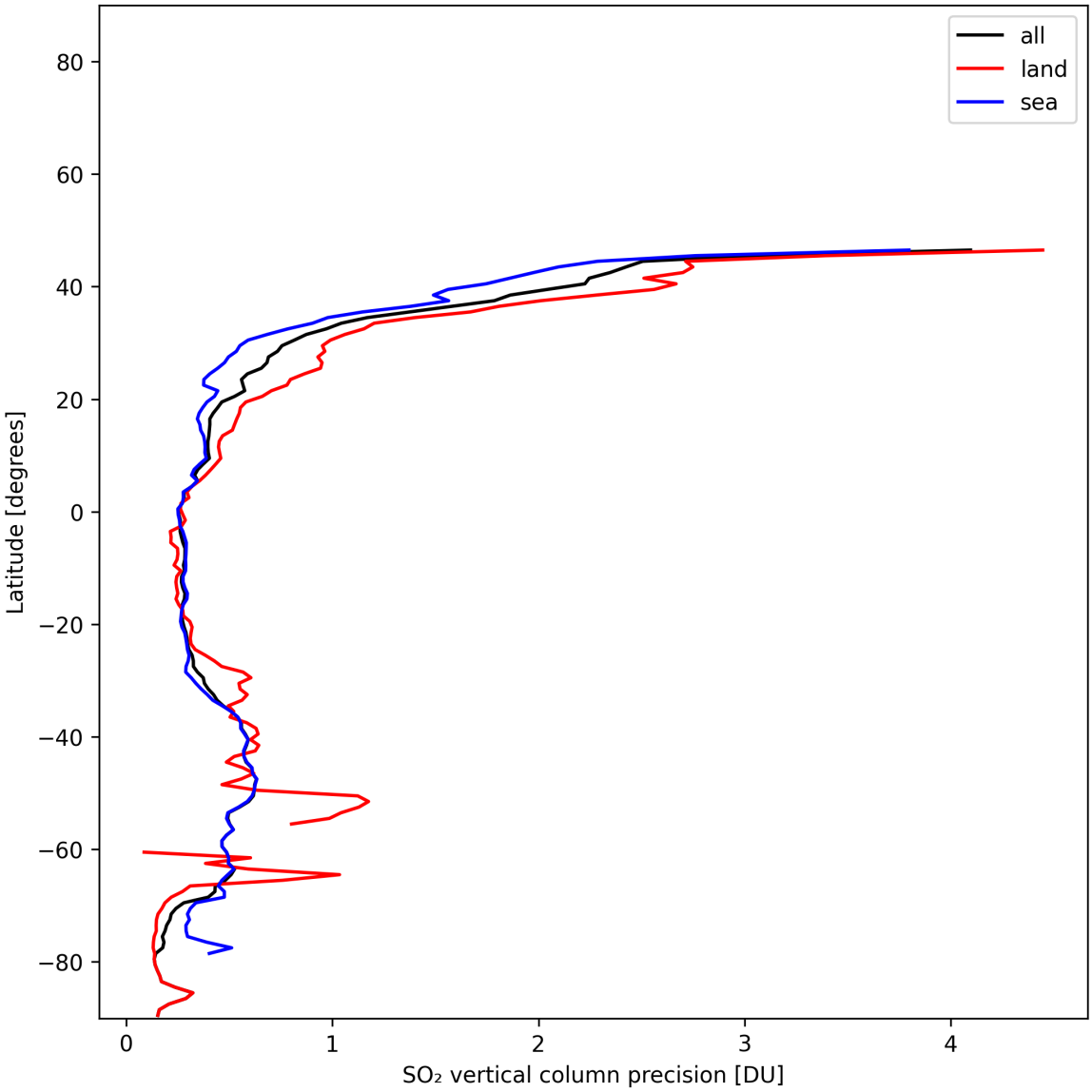

Figure 32: Zonal average of "SO_2 vertical column precision" for 2024-12-25 to 2024-12-25.

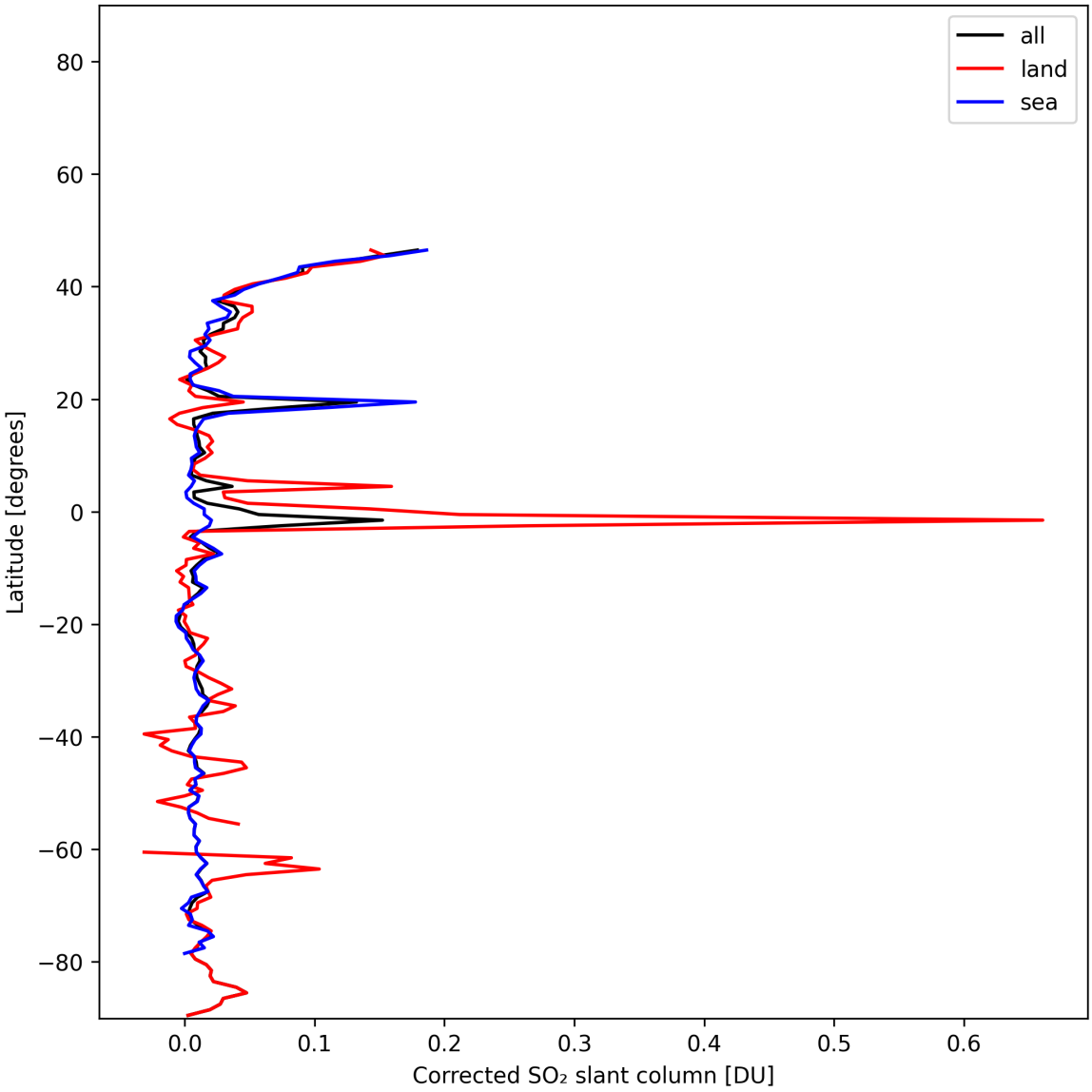

Figure 33: Zonal average of “Corrected SO_2 slant column” for 2024-12-25 to 2024-12-25.

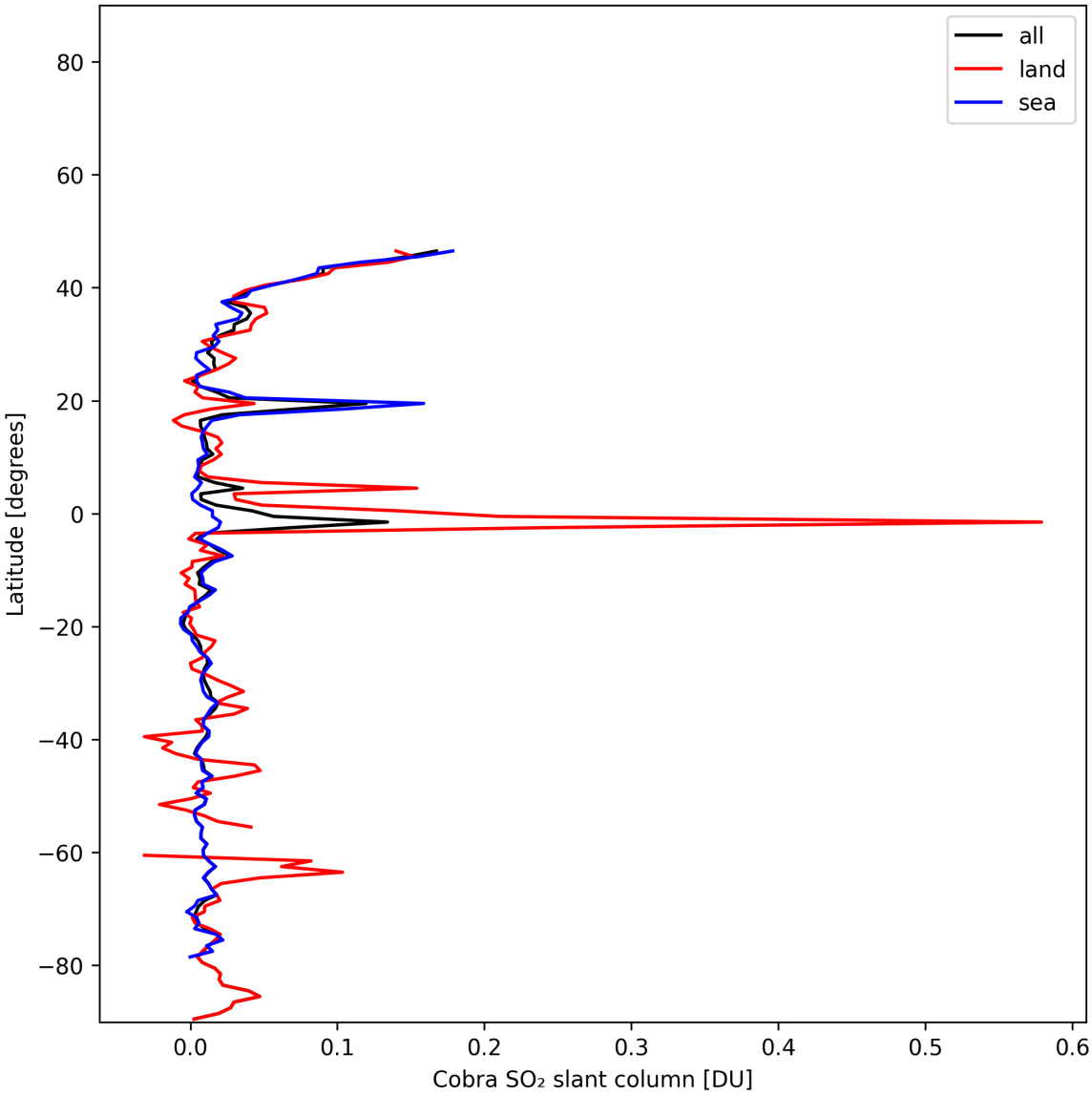

Figure 34: Zonal average of "Cobra SO_2 slant column" for 2024-12-25 to 2024-12-25.

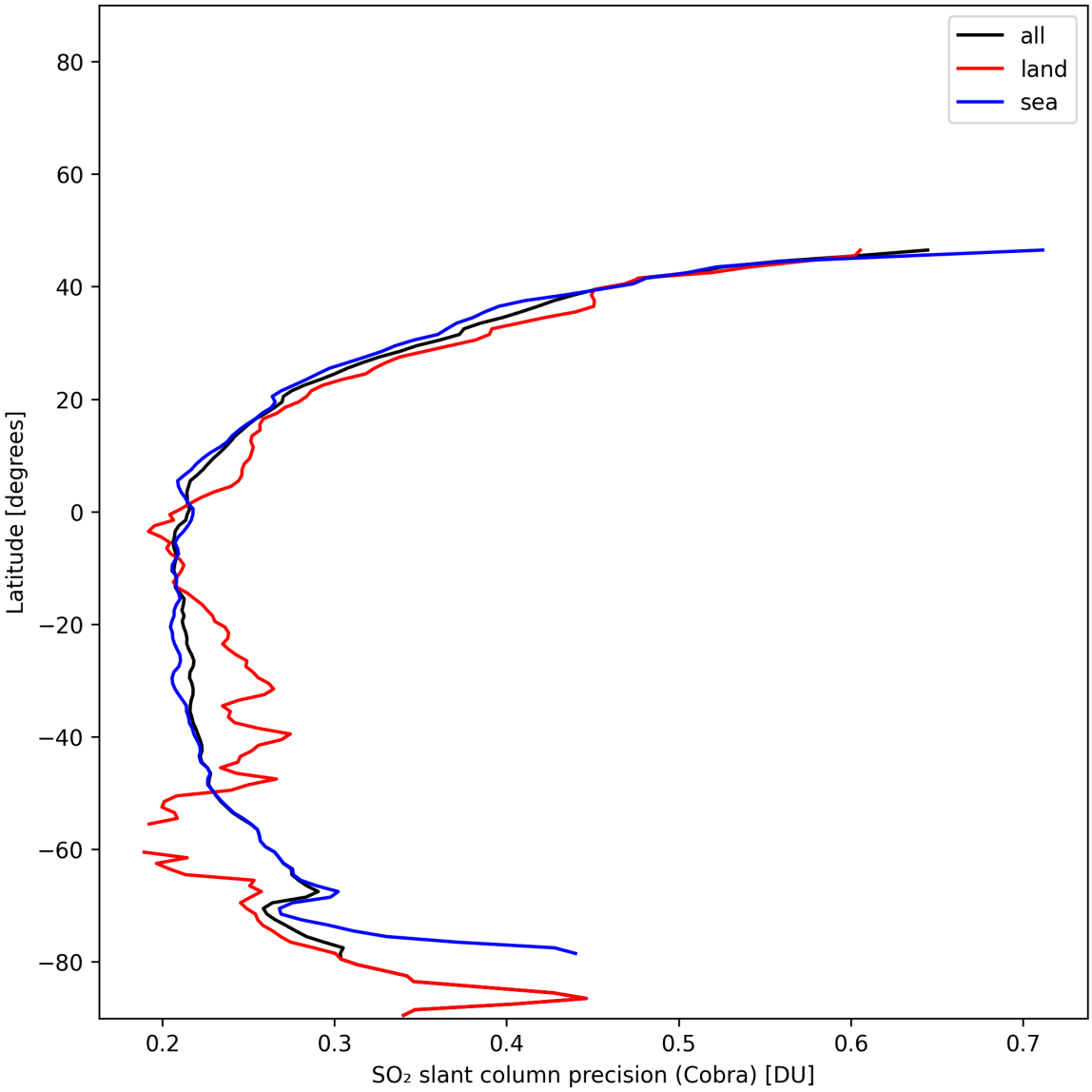

Figure 35: Zonal average of "SO_2 slant column precision (Cobra)" for 2024-12-25 to 2024-12-25.

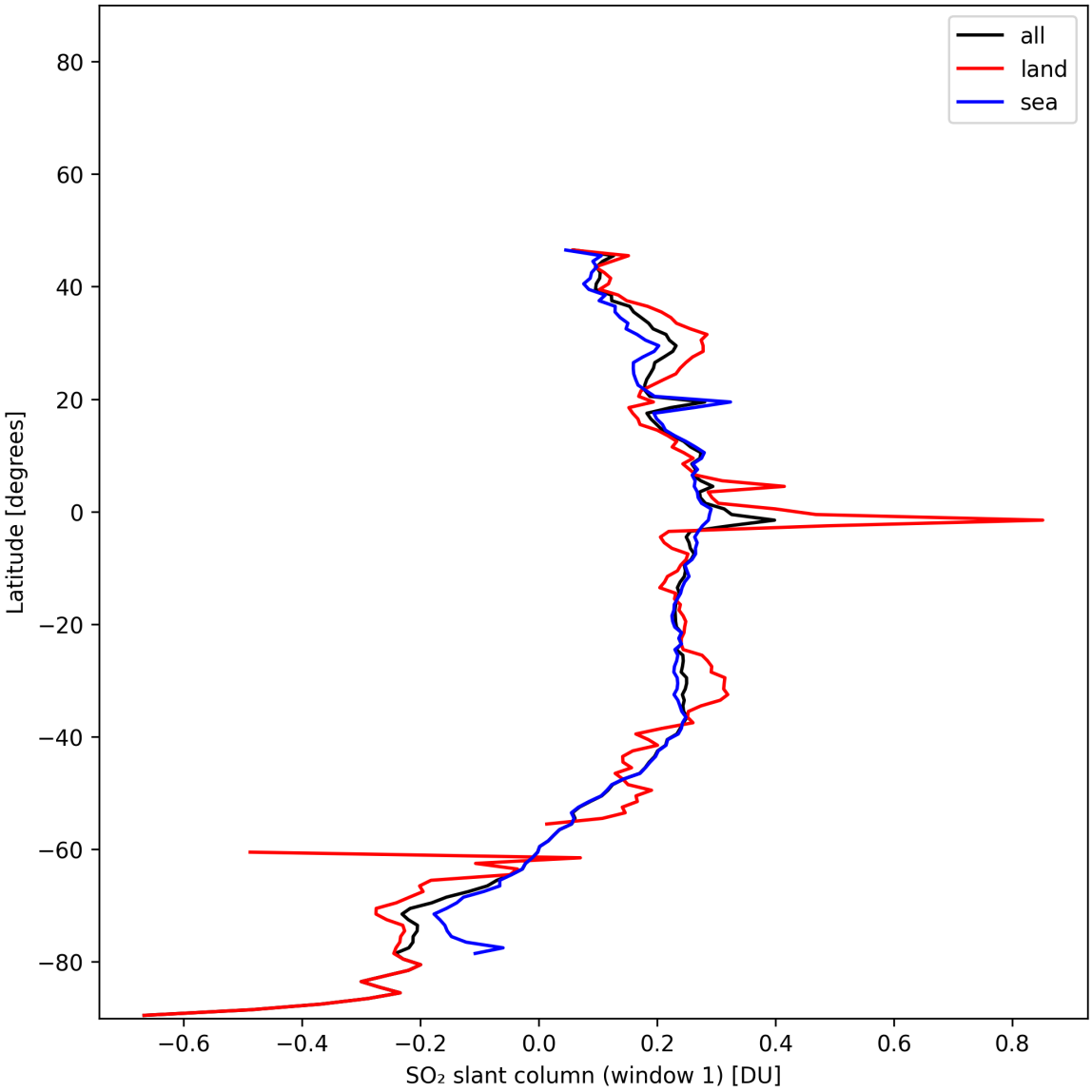

Figure 36: Zonal average of "SO_2 slant column (window 1)" for 2024-12-25 to 2024-12-25.

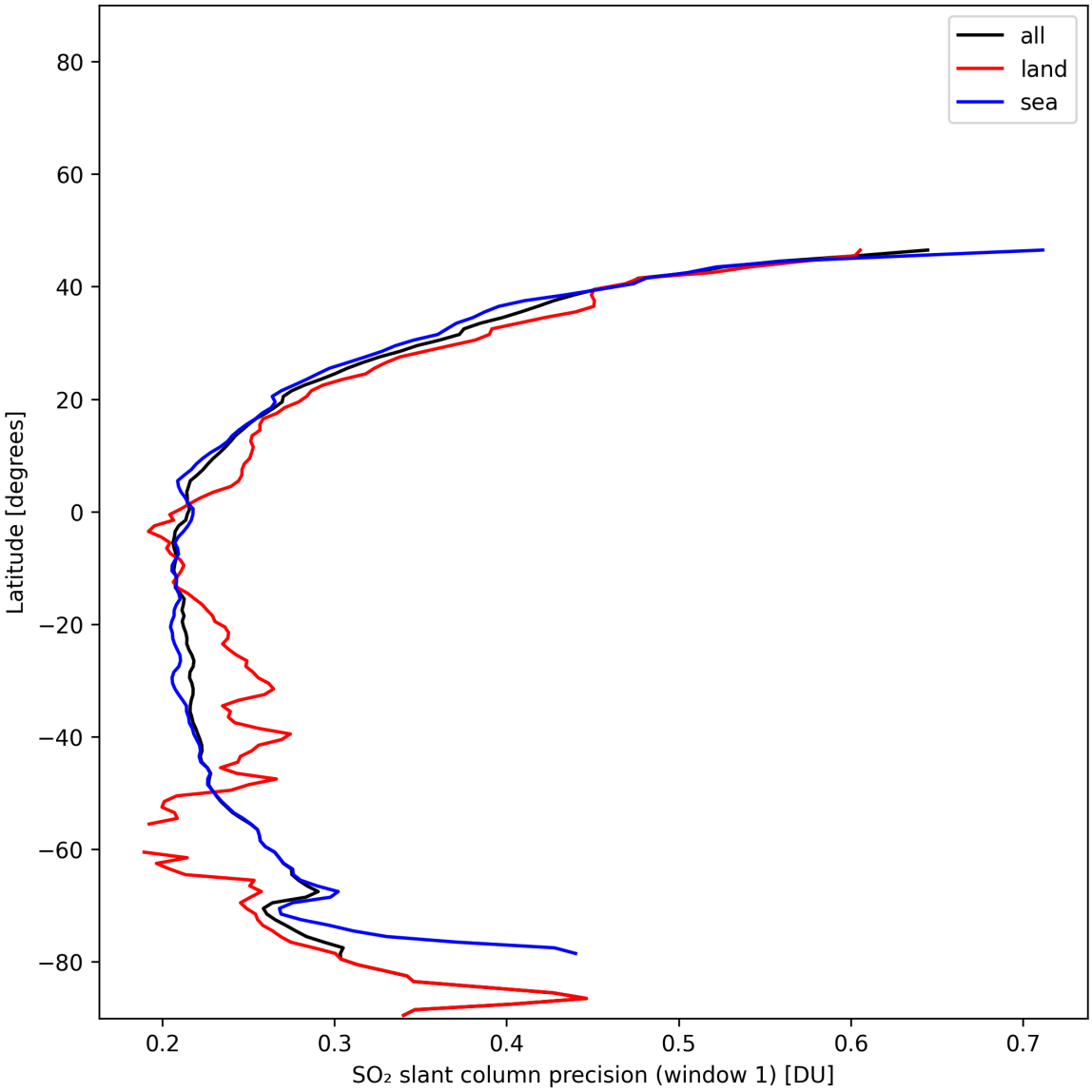

Figure 37: Zonal average of "SO_2 slant column precision (window 1)" for 2024-12-25 to 2024-12-25.

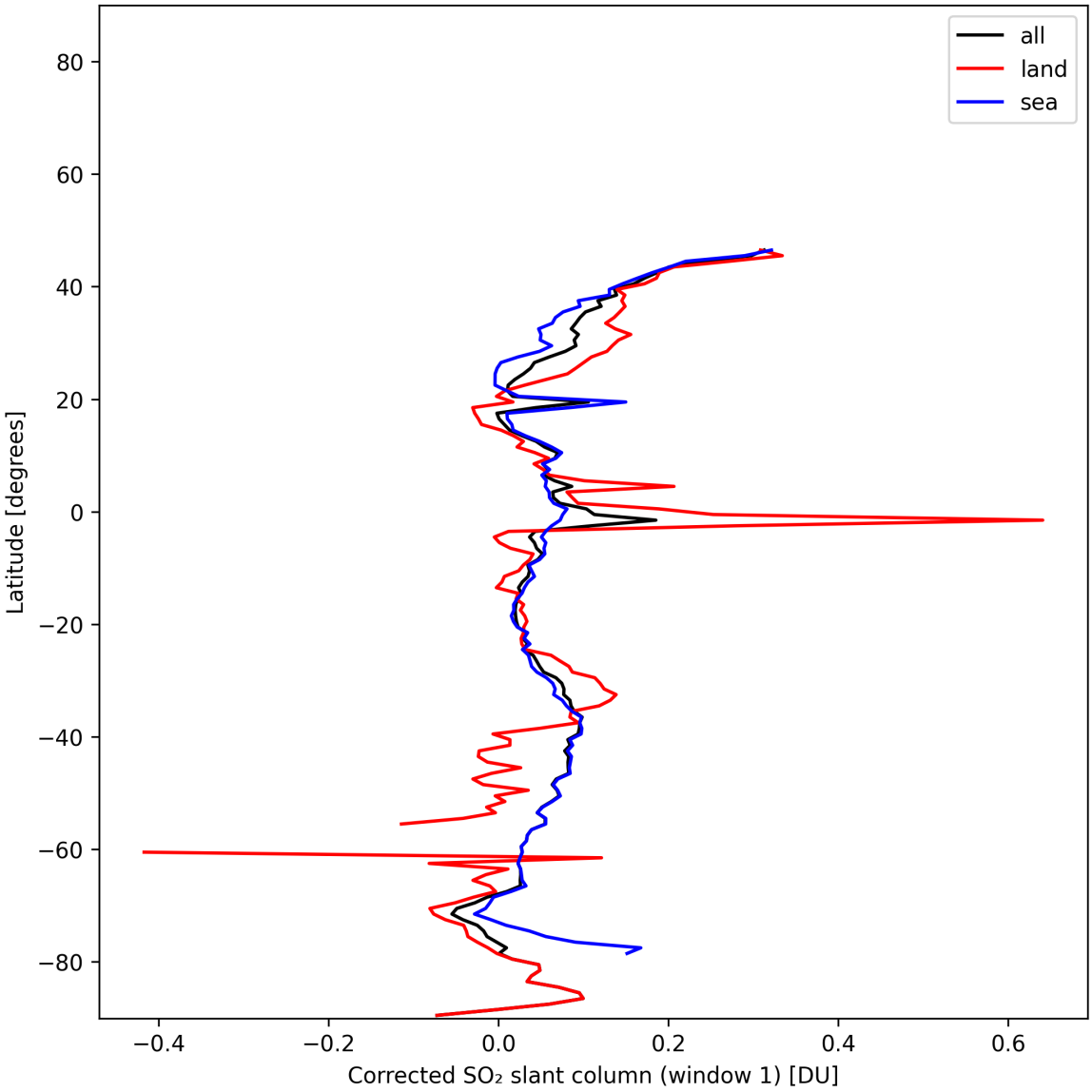

Figure 38: Zonal average of "Corrected SO_2 slant column (window 1)" for 2024-12-25 to 2024-12-25.

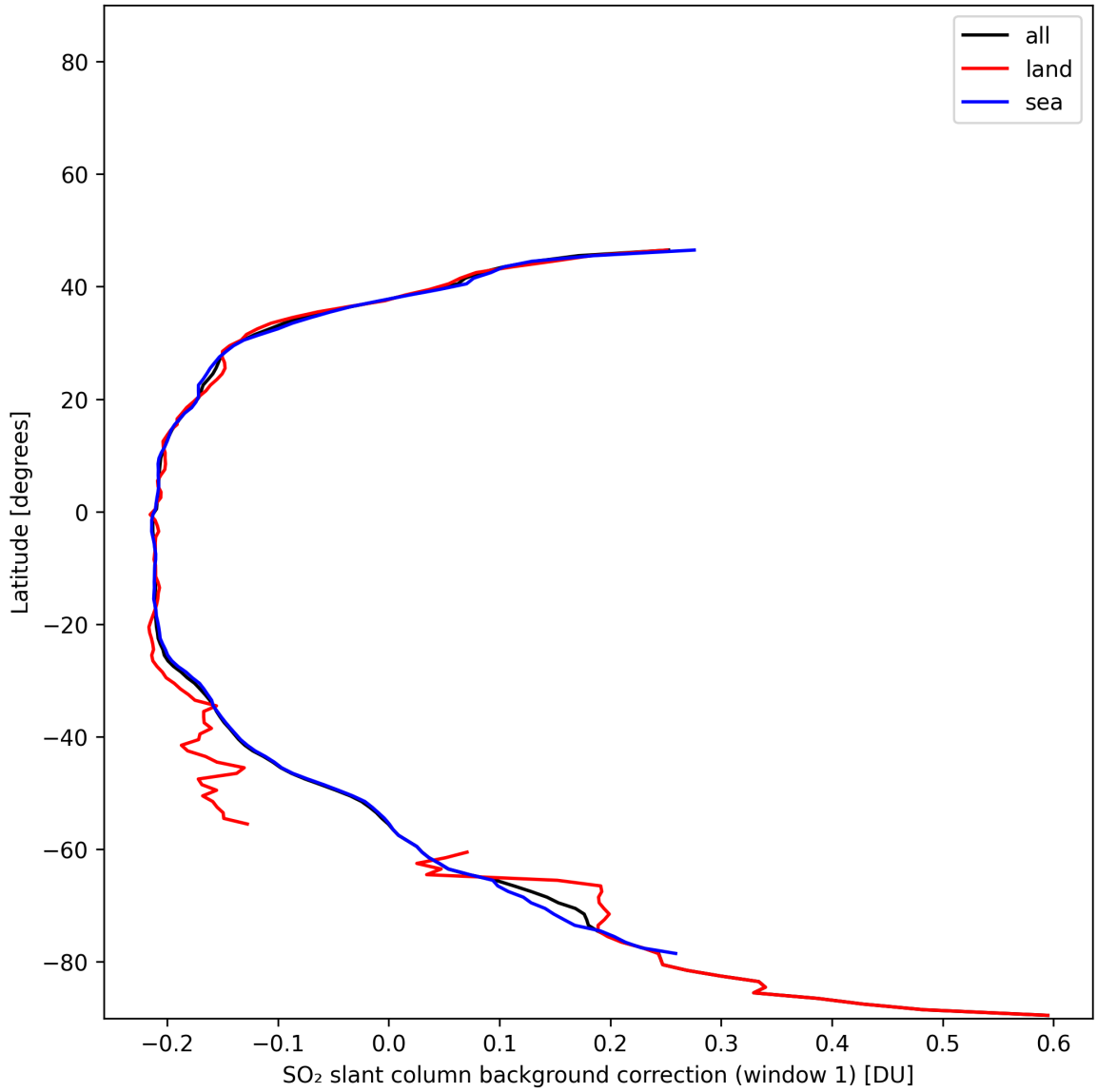

Figure 39: Zonal average of "SO_2 slant column background correction (window 1)" for 2024-12-25 to 2024-12-25.

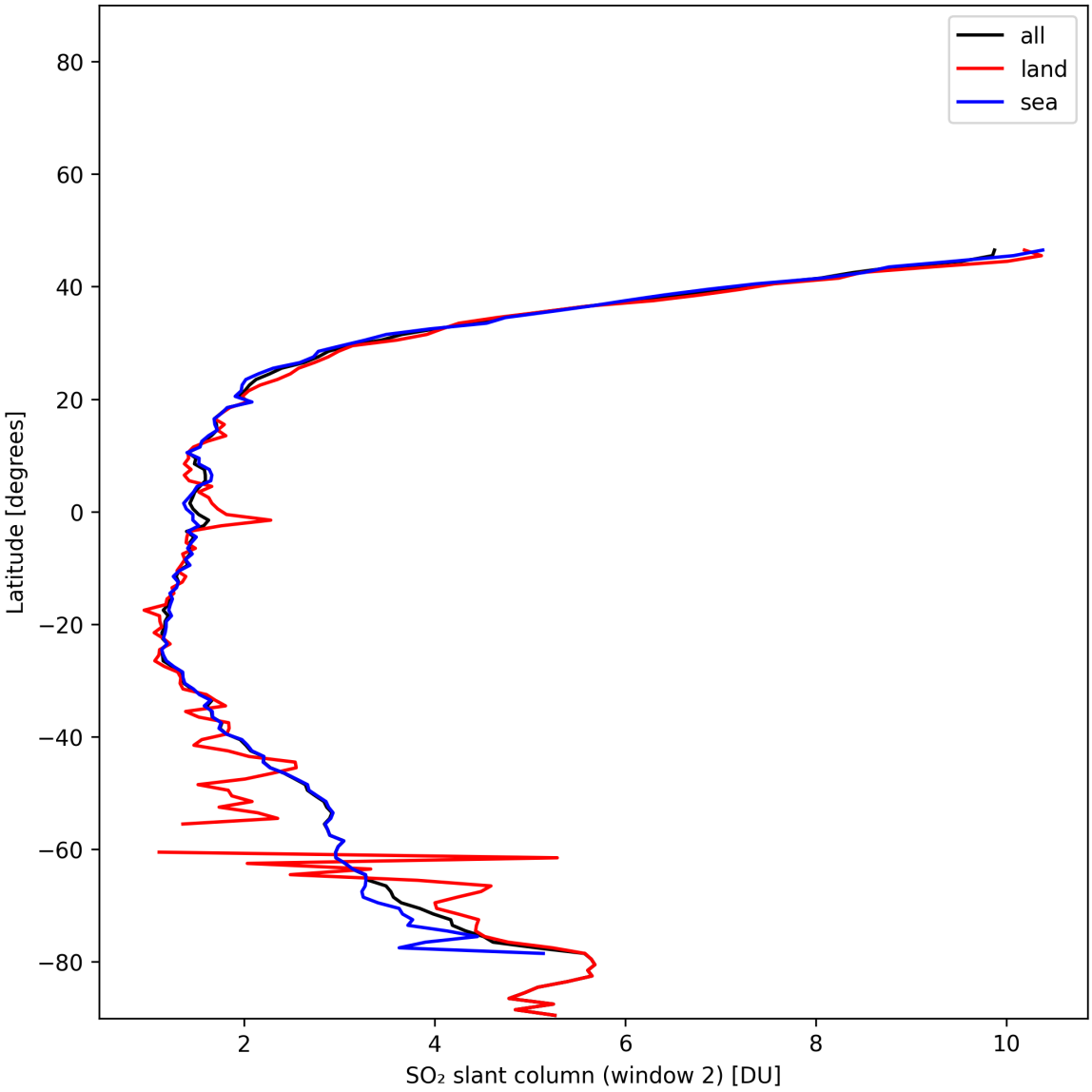

Figure 40: Zonal average of "SO_2 slant column (window 2)" for 2024-12-25 to 2024-12-25.

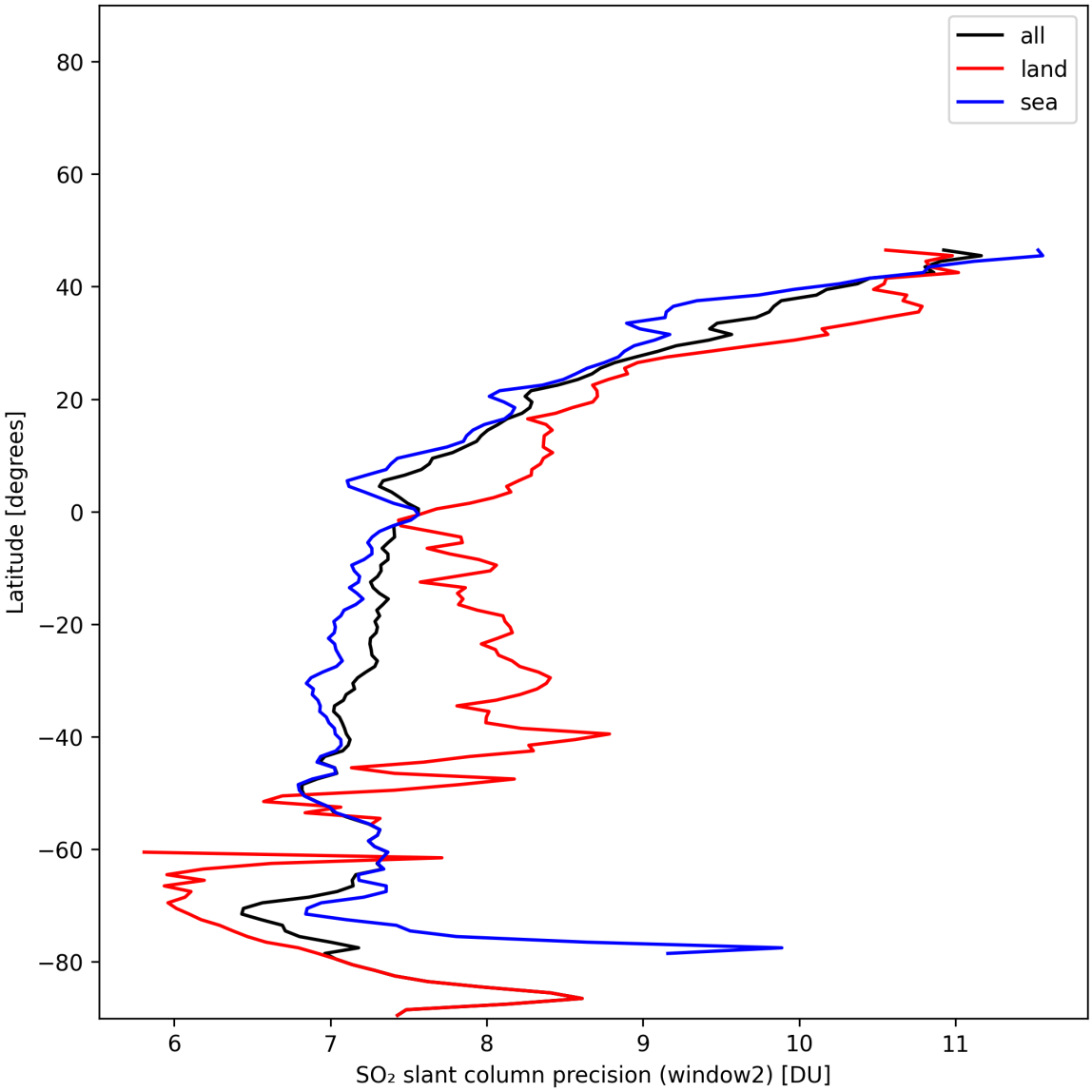

Figure 41: Zonal average of "SO_2 slant column precision (window2)" for 2024-12-25 to 2024-12-25.

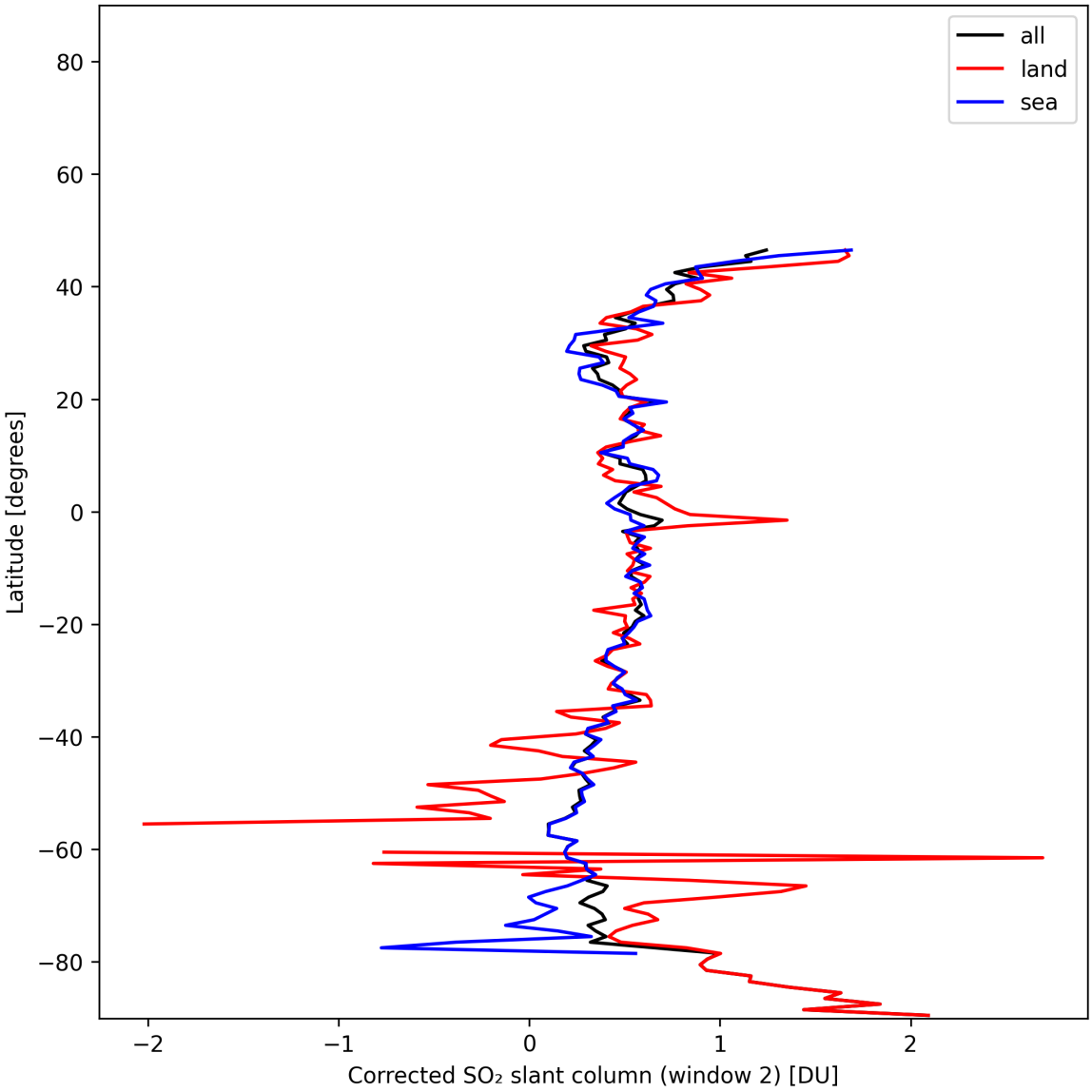

Figure 42: Zonal average of "Corrected SO_2 slant column (window 2)" for 2024-12-25 to 2024-12-25.

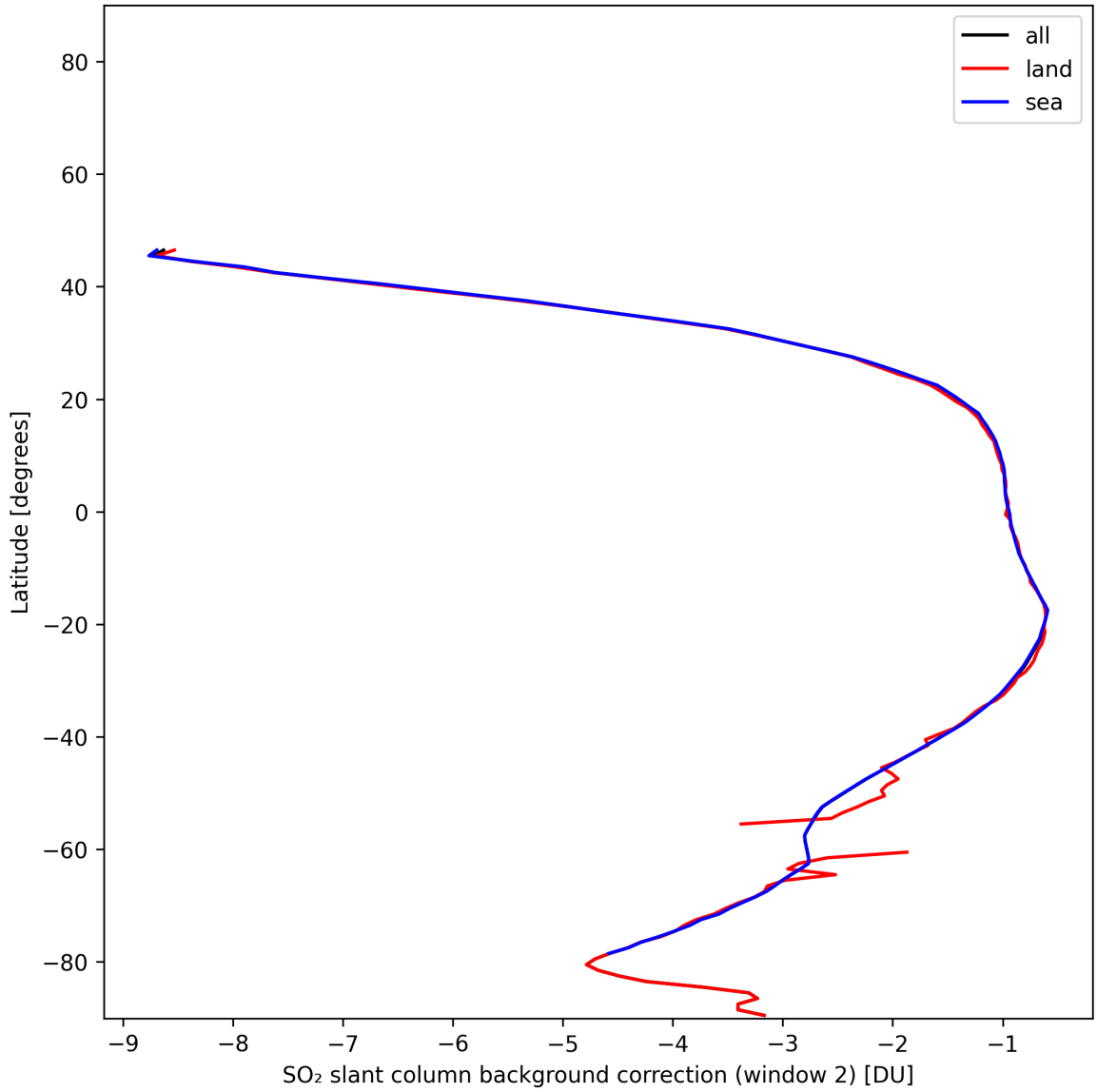

Figure 43: Zonal average of "SO_2 slant column background correction (window 2)" for 2024-12-25 to 2024-12-25.

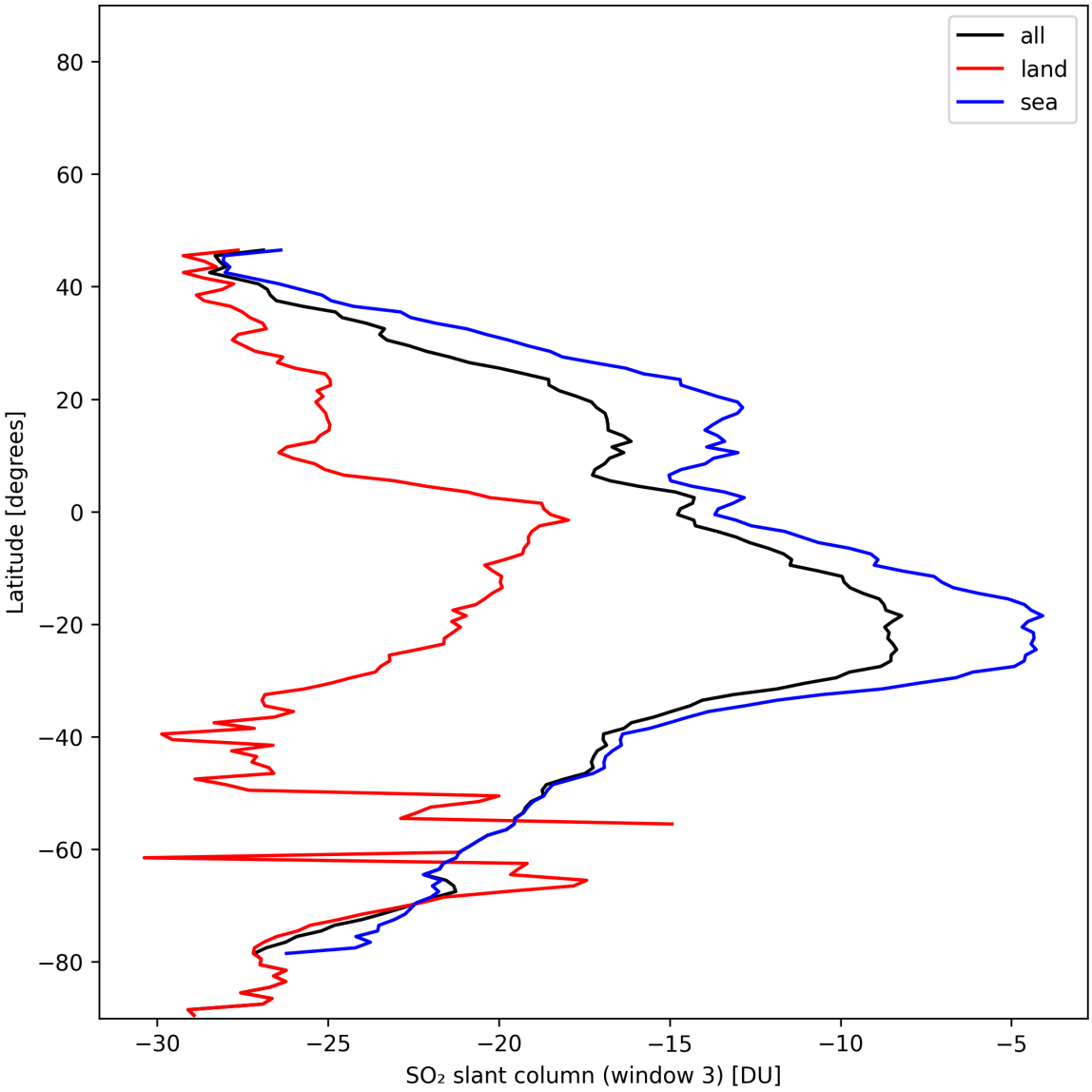

Figure 44: Zonal average of "SO_2 slant column (window 3)" for 2024-12-25 to 2024-12-25.

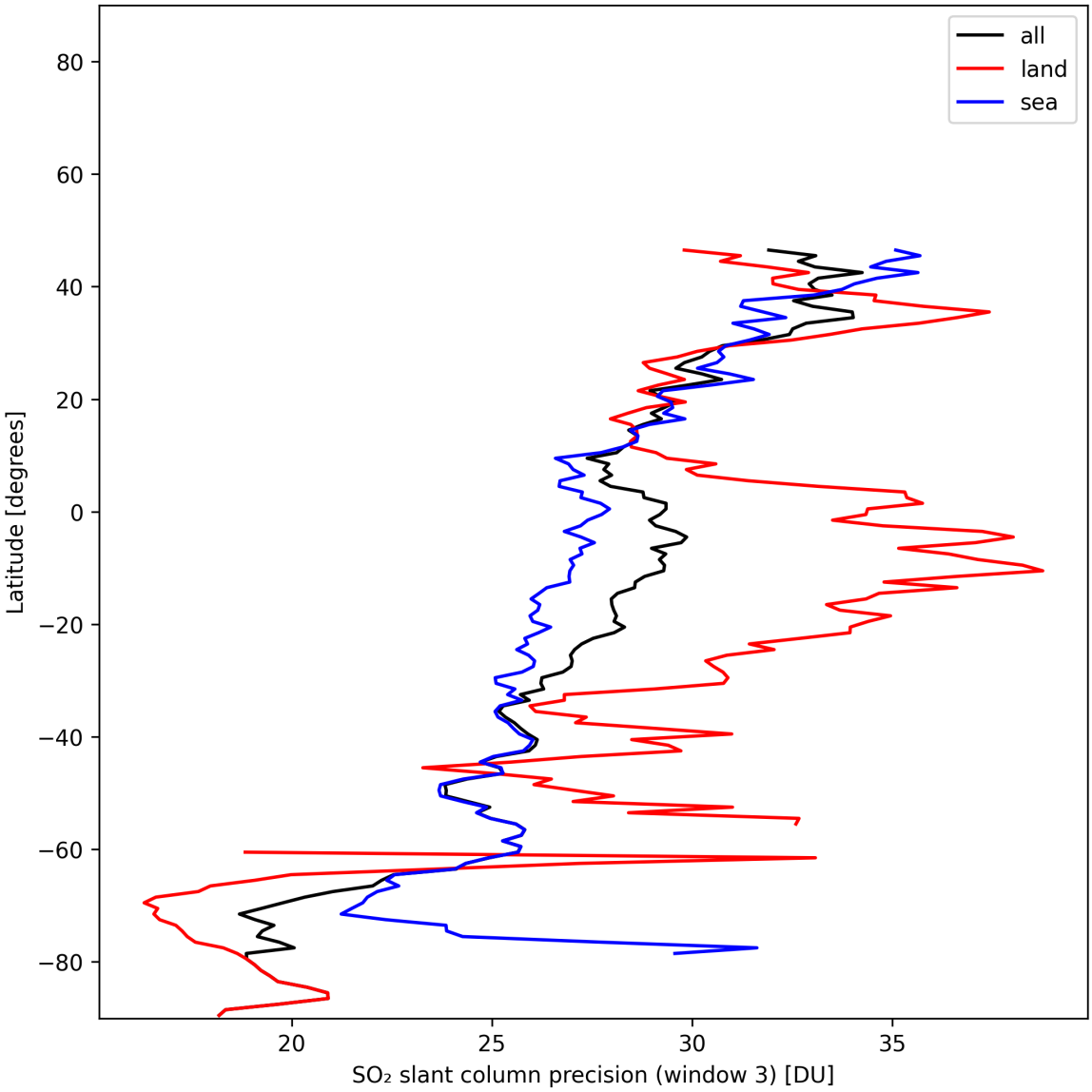

Figure 45: Zonal average of "SO_2 slant column precision (window 3)" for 2024-12-25 to 2024-12-25.

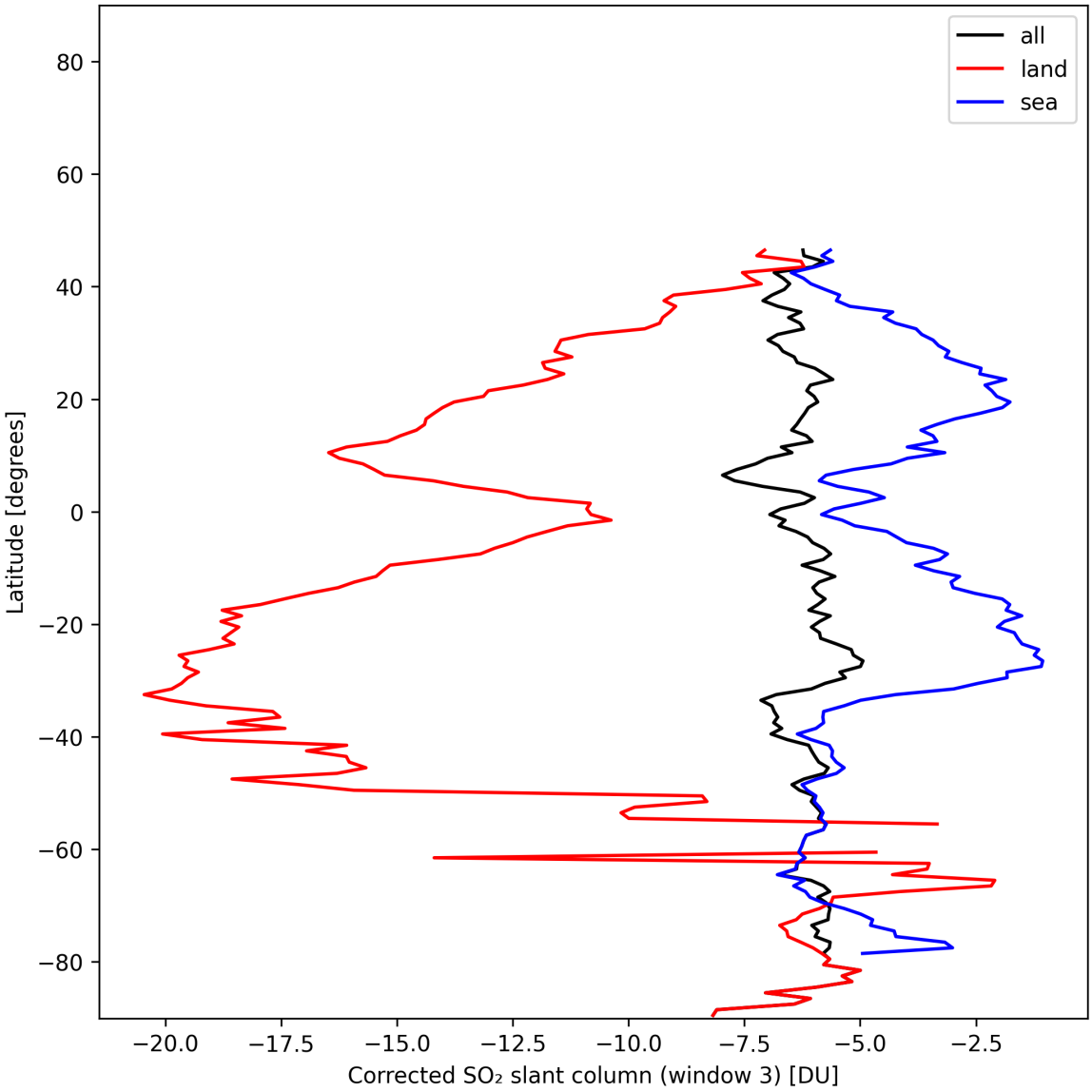

Figure 46: Zonal average of "Corrected SO_2 slant column (window 3)" for 2024-12-25 to 2024-12-25.

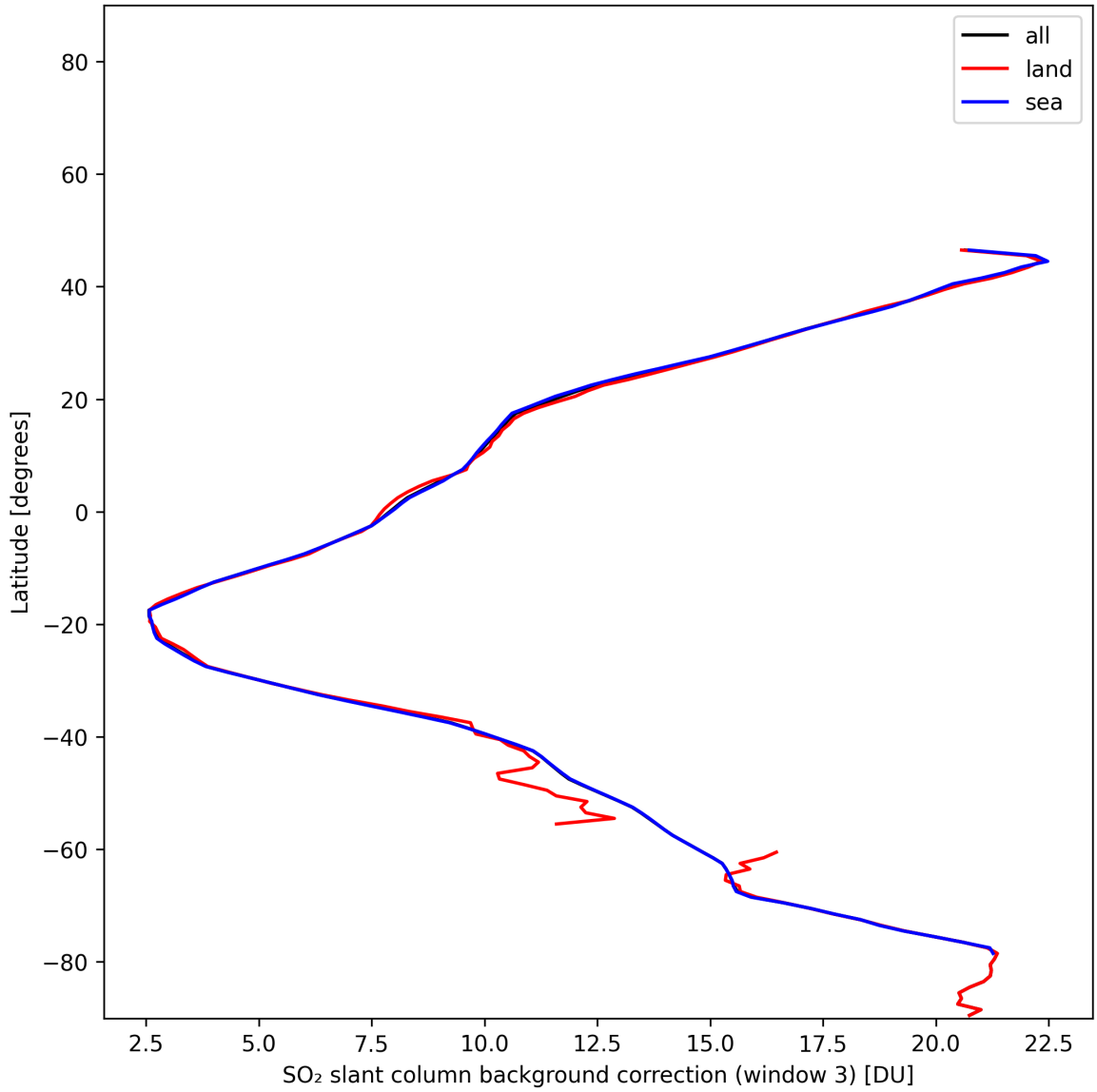

Figure 47: Zonal average of "SO_2 slant column background correction (window 3)" for 2024-12-25 to 2024-12-25.

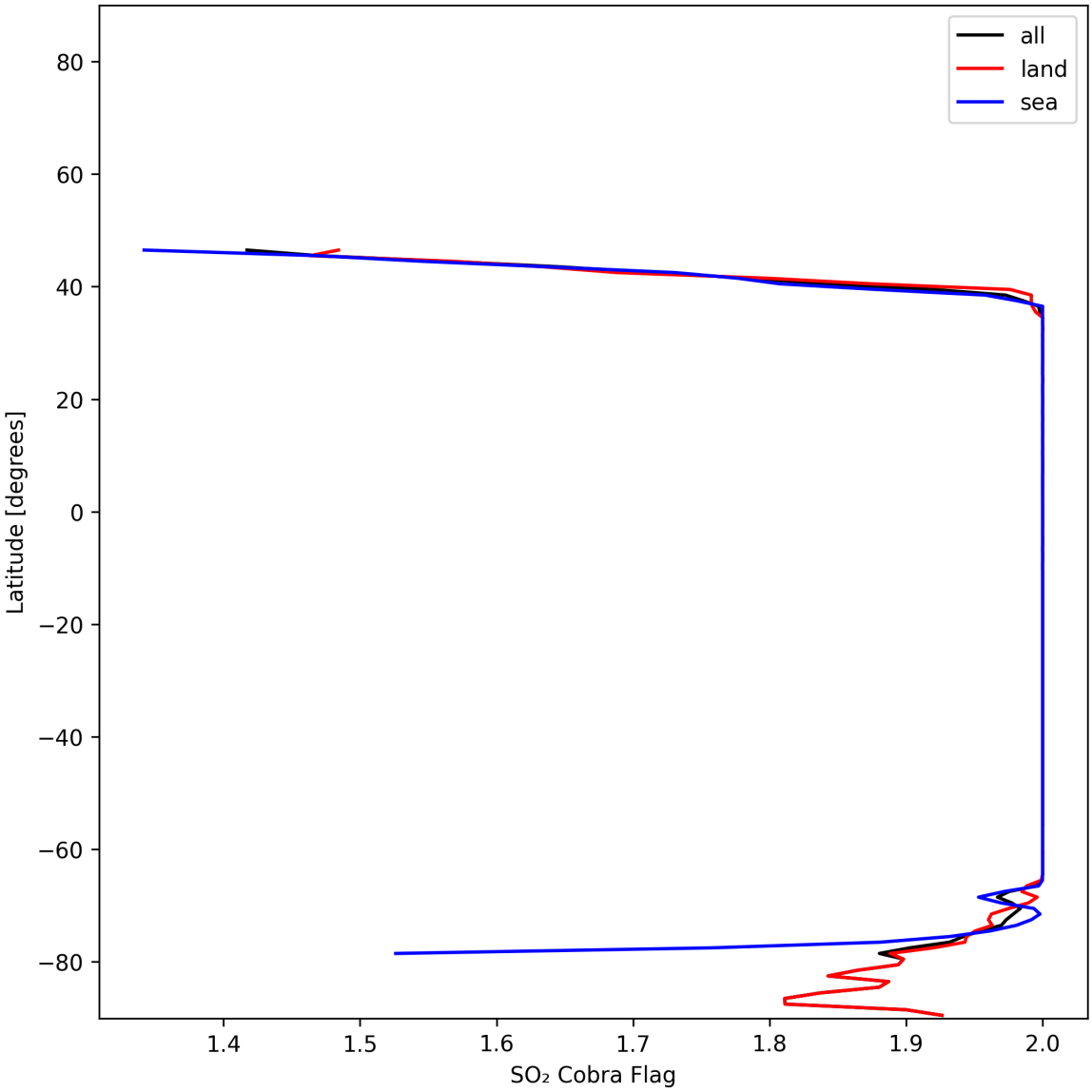

Figure 48: Zonal average of "SO_2 Cobra Flag" for 2024-12-25 to 2024-12-25.

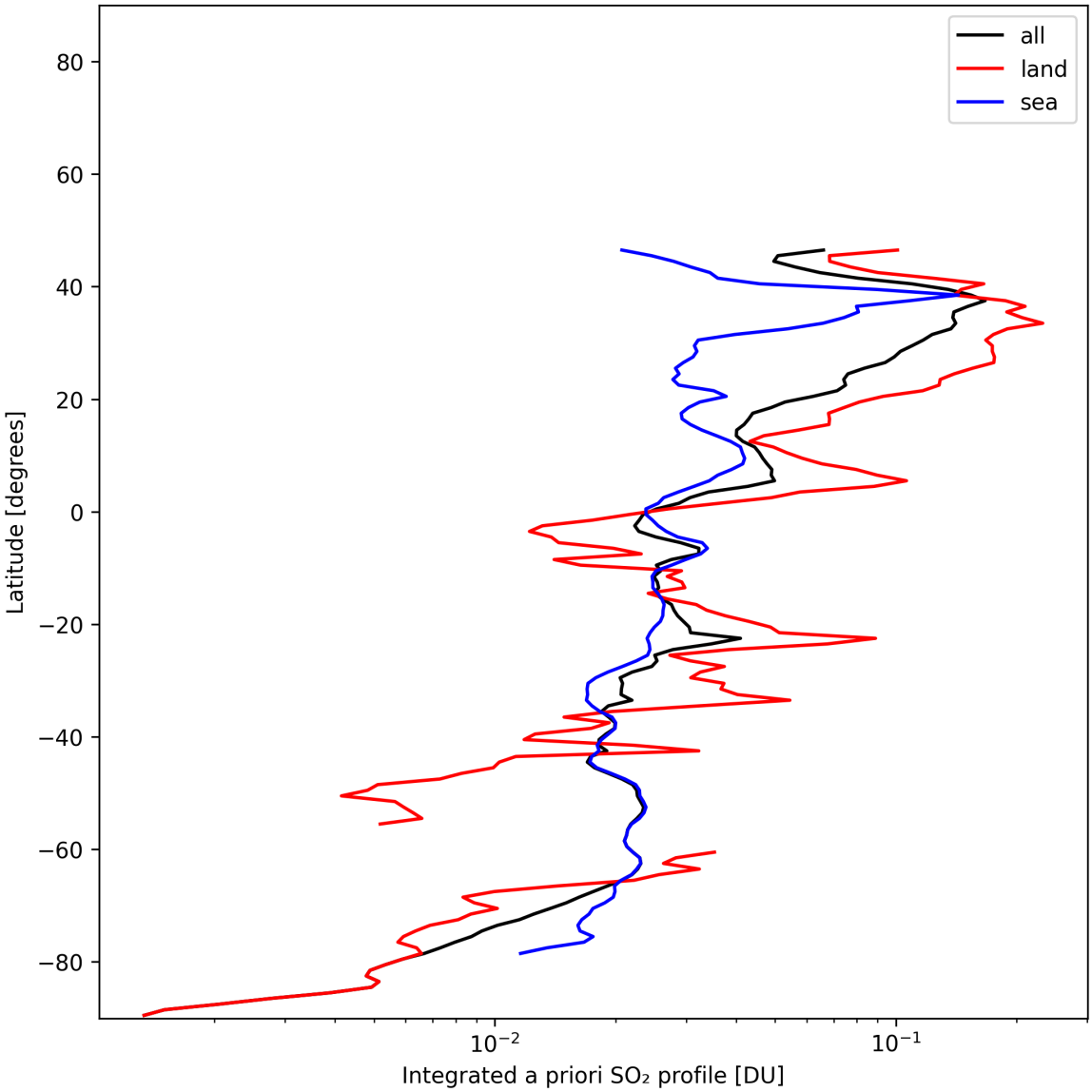

Figure 49: Zonal average of “Integrated a priori SO_2 profile” for 2024-12-25 to 2024-12-25.

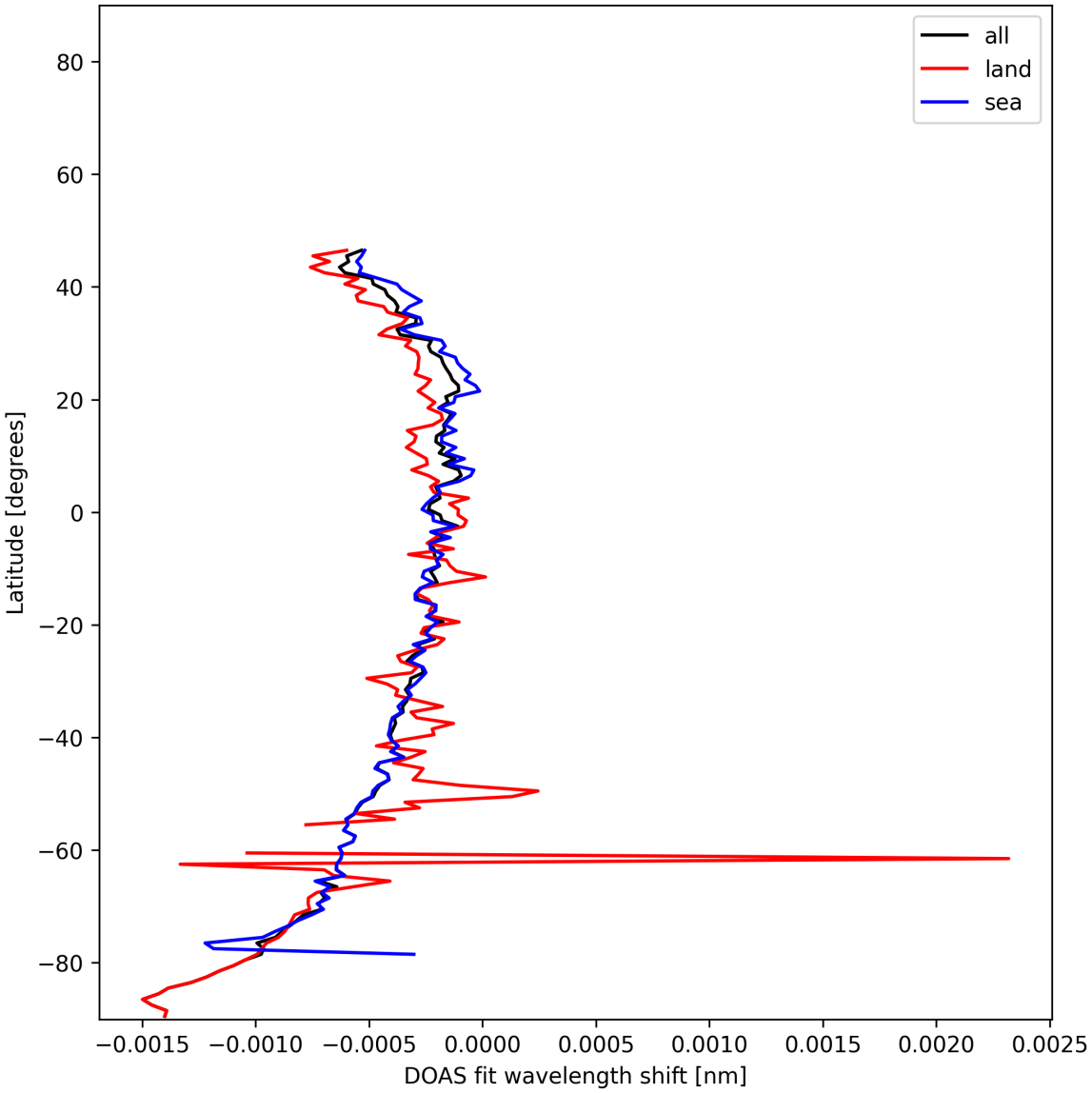

Figure 50: Zonal average of “DOAS fit wavelength shift” for 2024-12-25 to 2024-12-25.

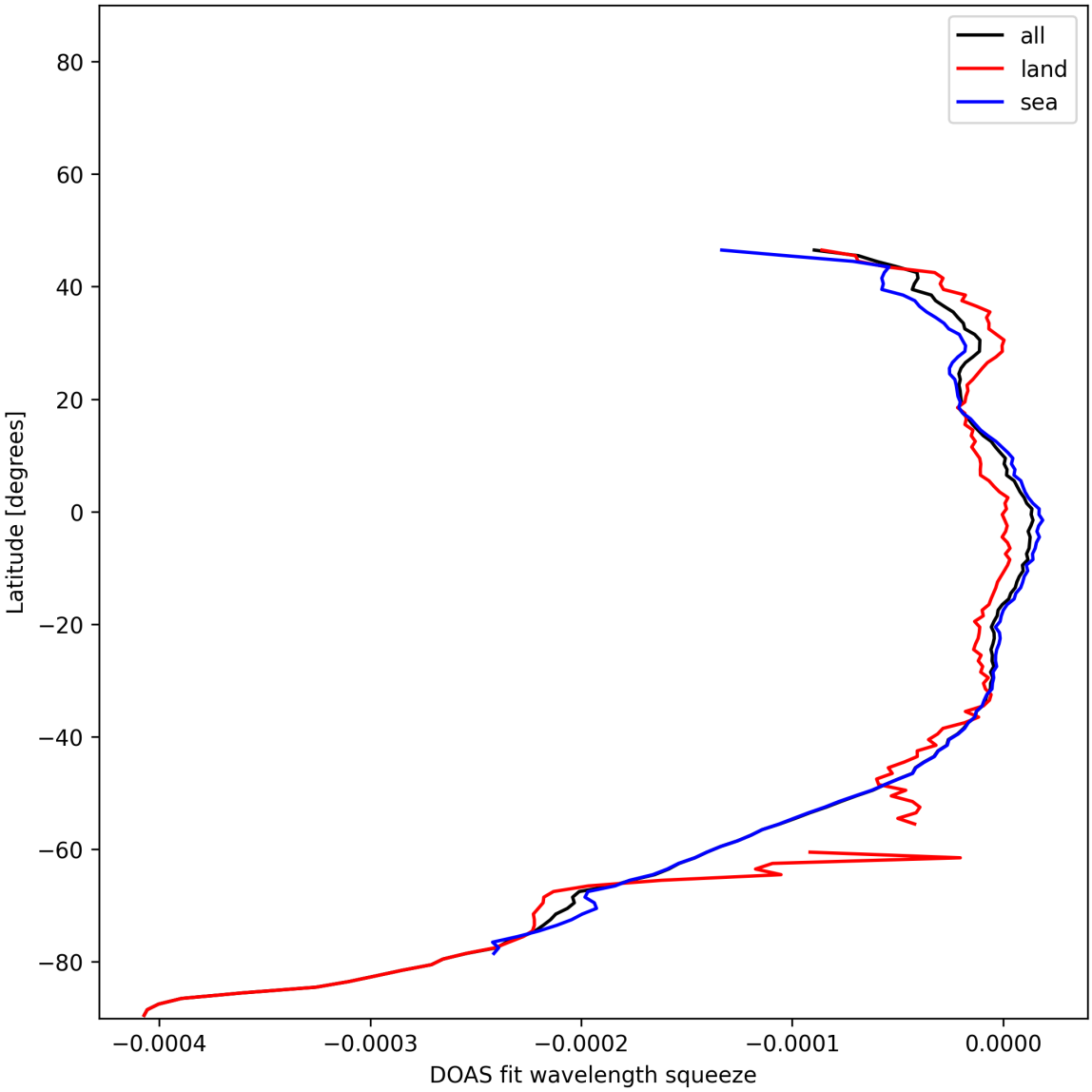

Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2024-12-25 to 2024-12-25.

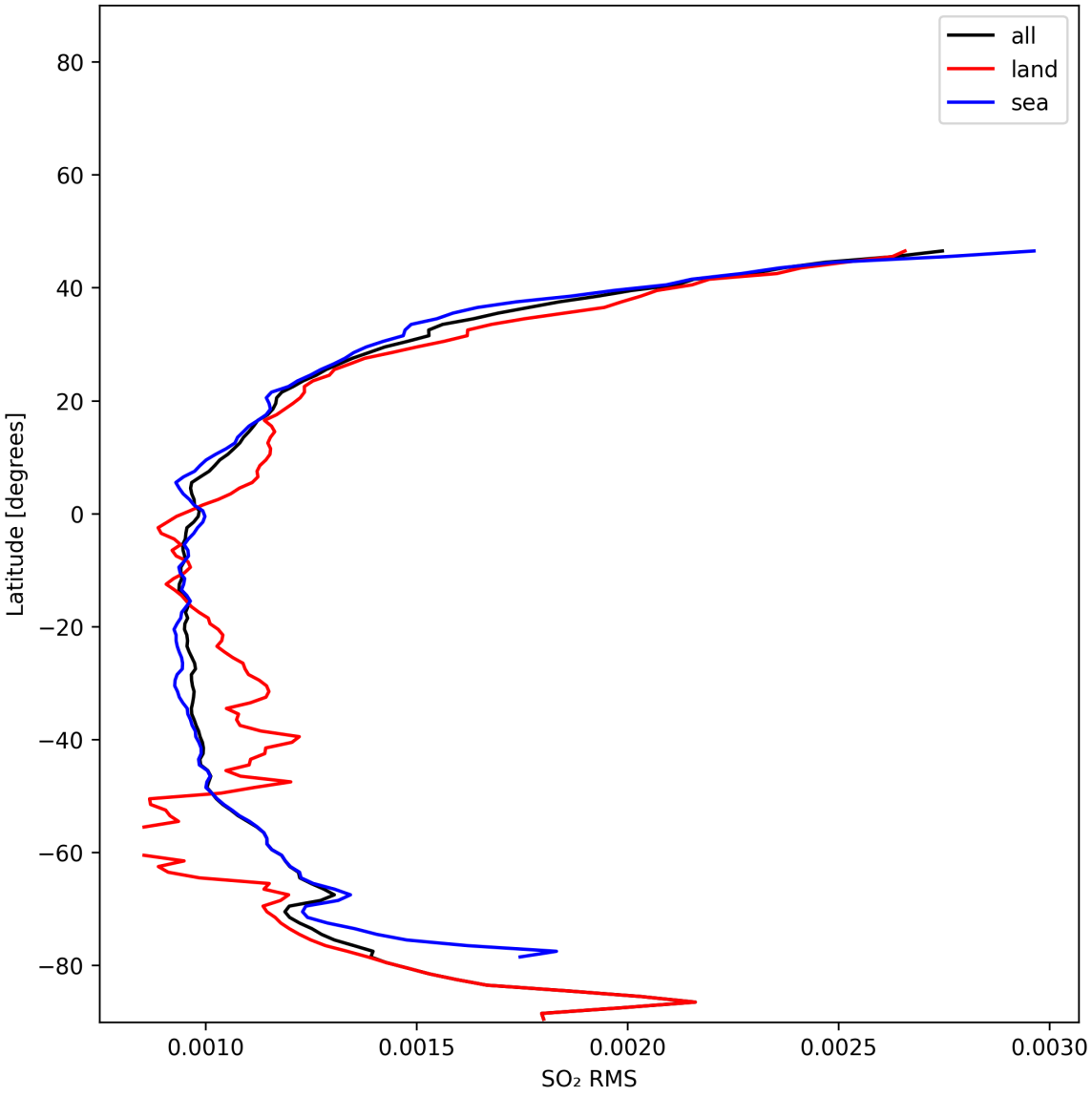

Figure 52: Zonal average of "SO_2 RMS" for 2024-12-25 to 2024-12-25.

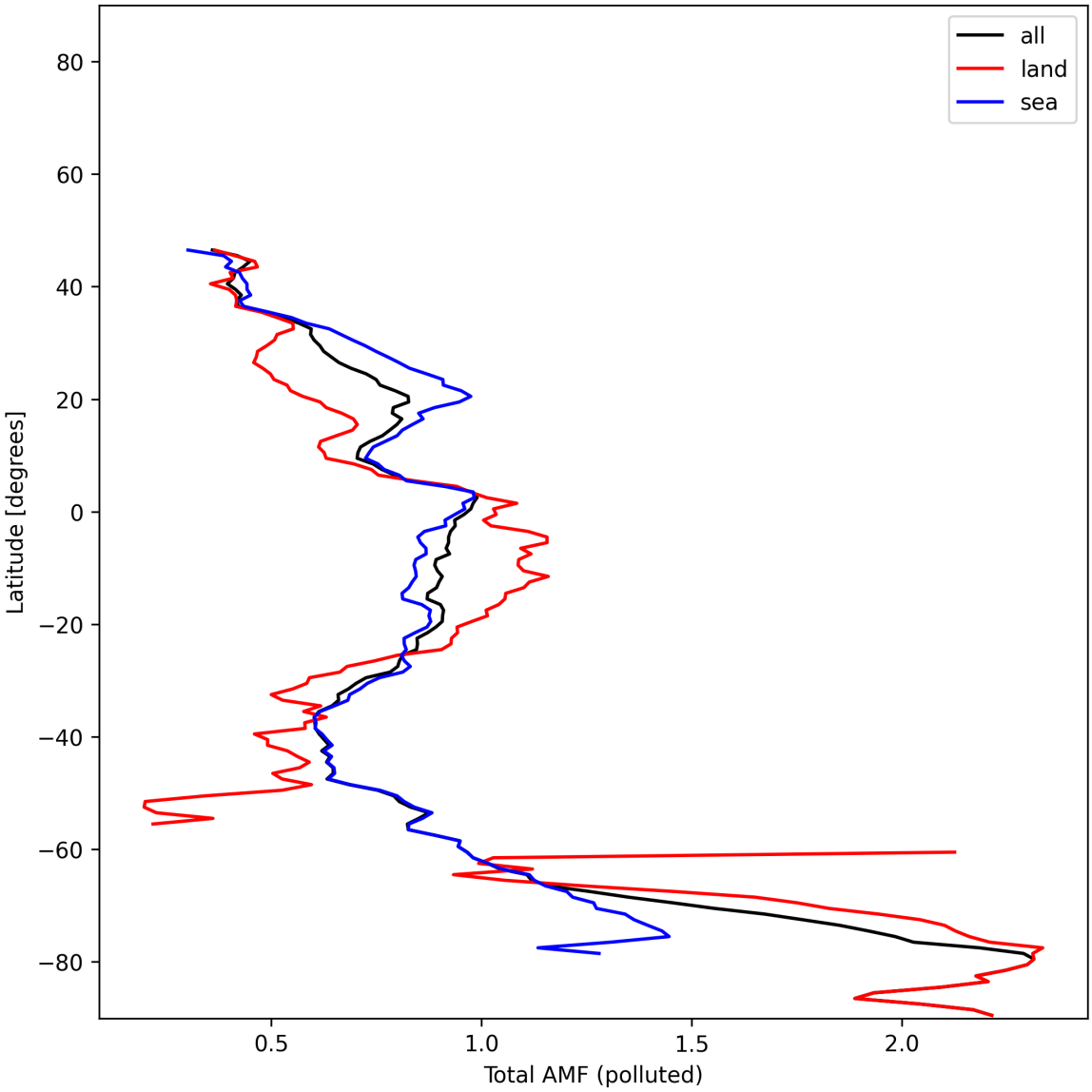

Figure 53: Zonal average of “Total AMF (polluted)” for 2024-12-25 to 2024-12-25.

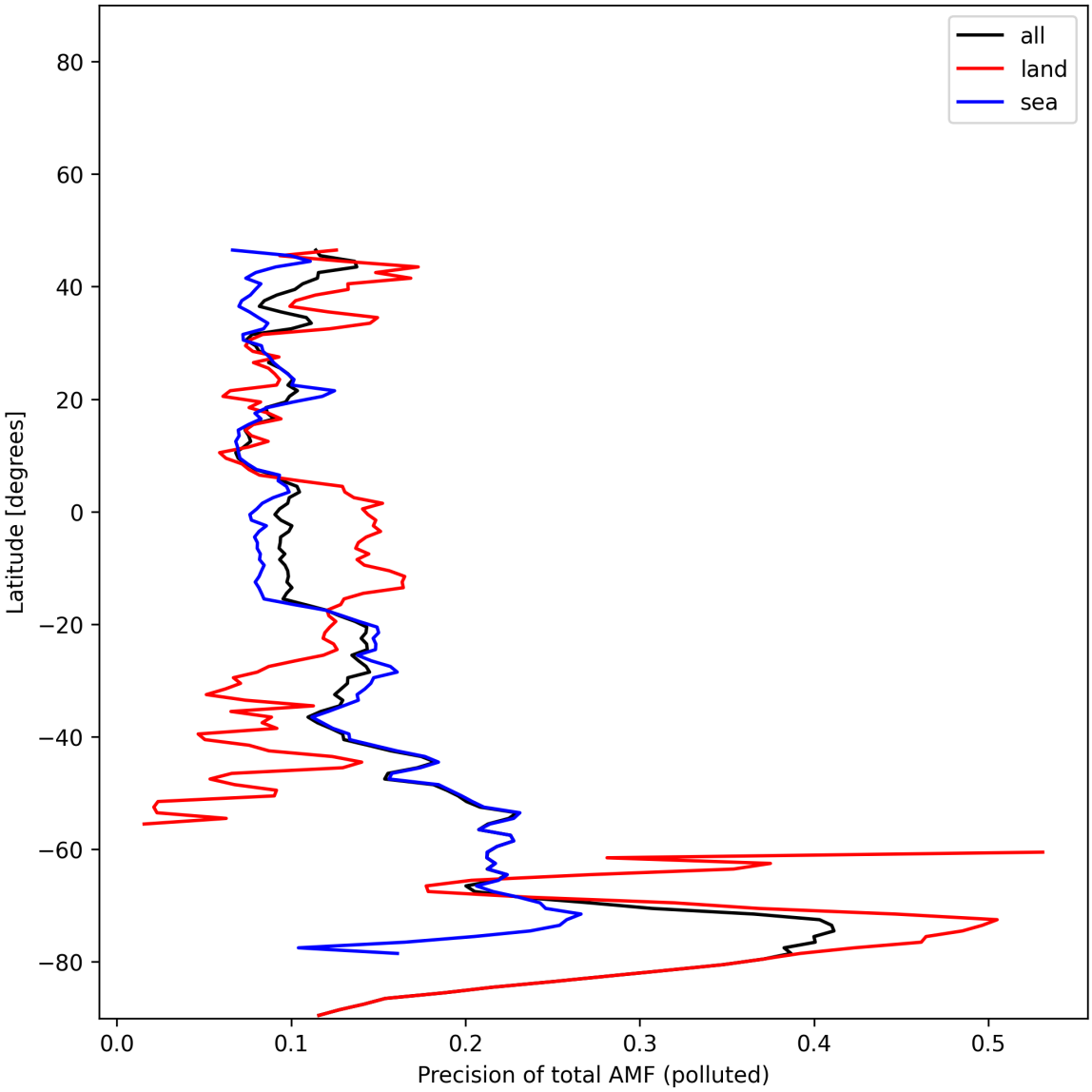

Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2024-12-25 to 2024-12-25.

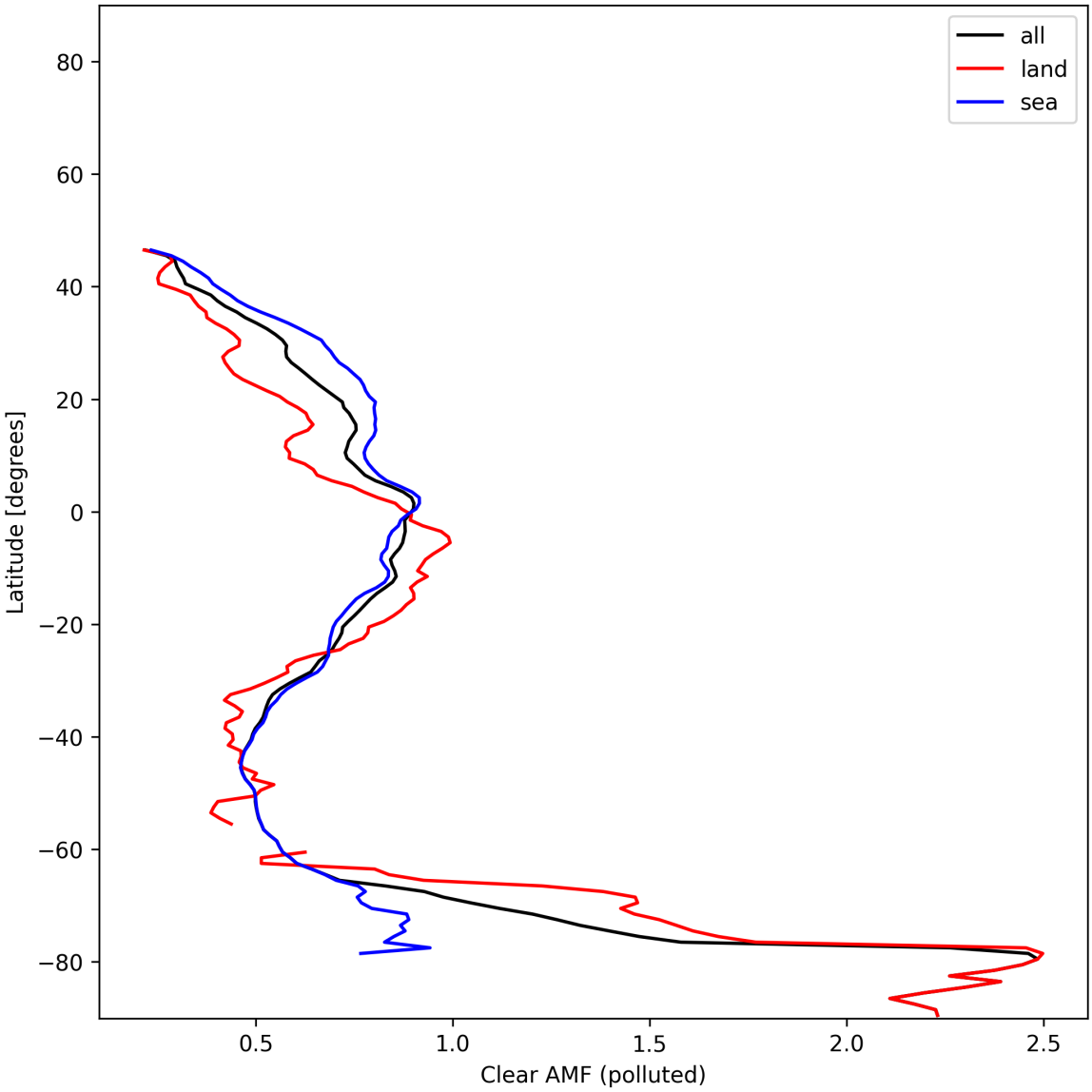

Figure 55: Zonal average of “Clear AMF (polluted)” for 2024-12-25 to 2024-12-25.

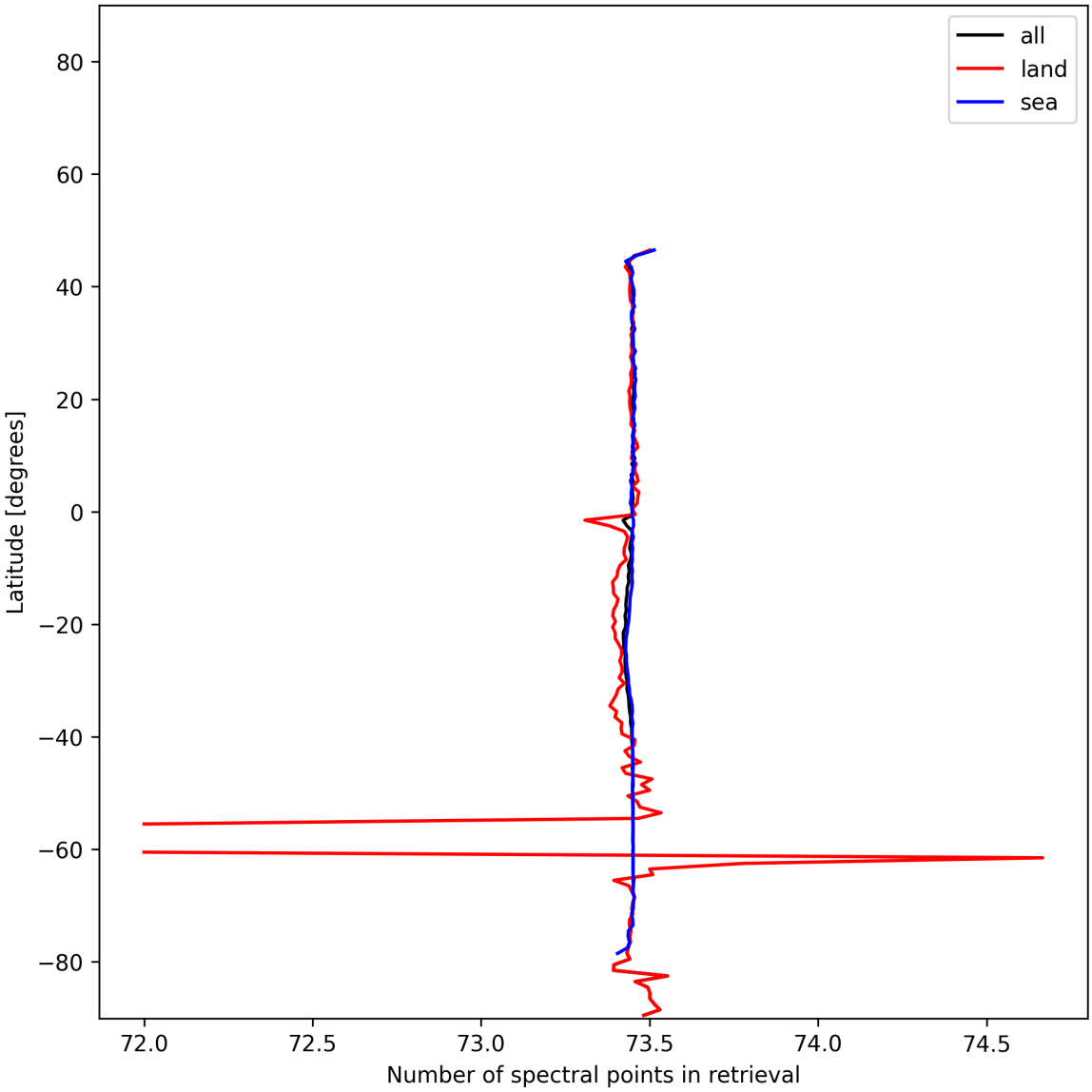

Figure 56: Zonal average of “Number of spectral points in retrieval” for 2024-12-25 to 2024-12-25.

8 Histograms

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

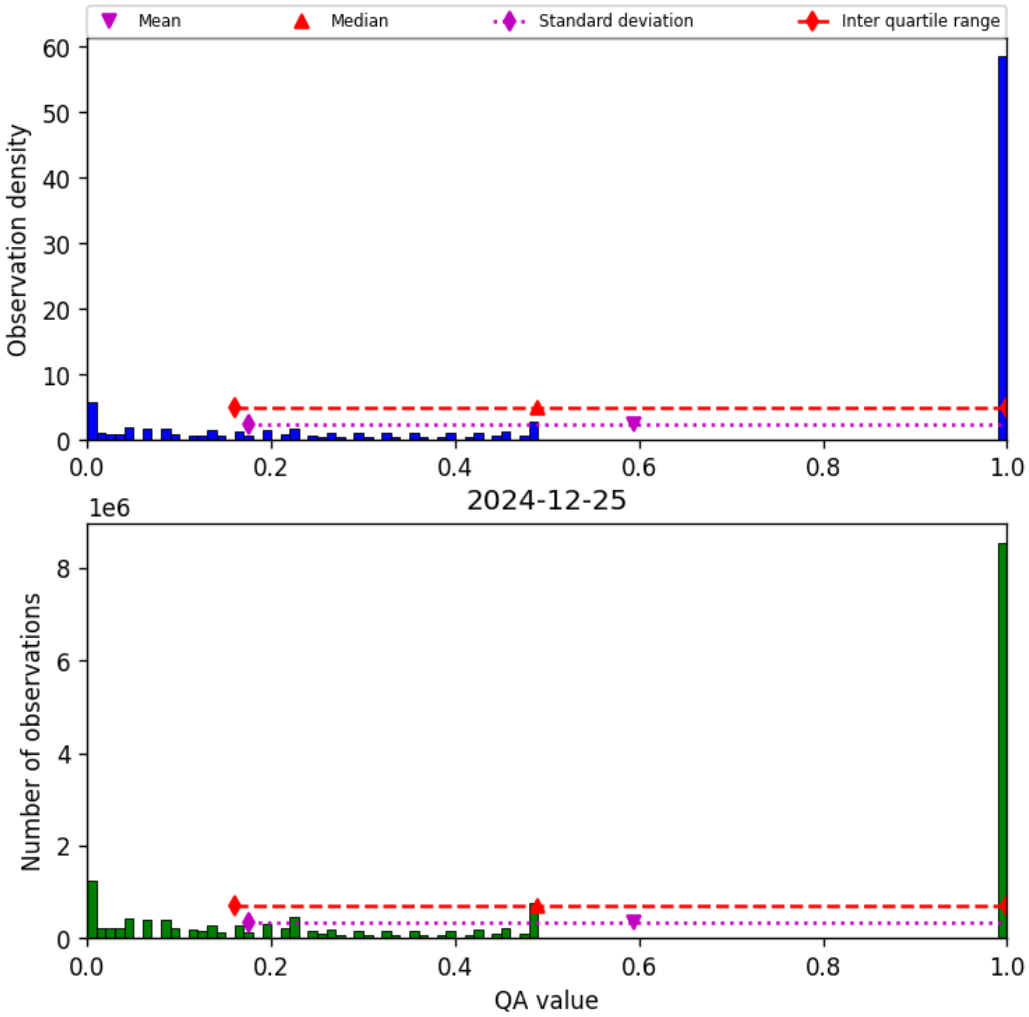

Figure 57: Histogram of “QA value” for 2024-12-25 to 2024-12-25

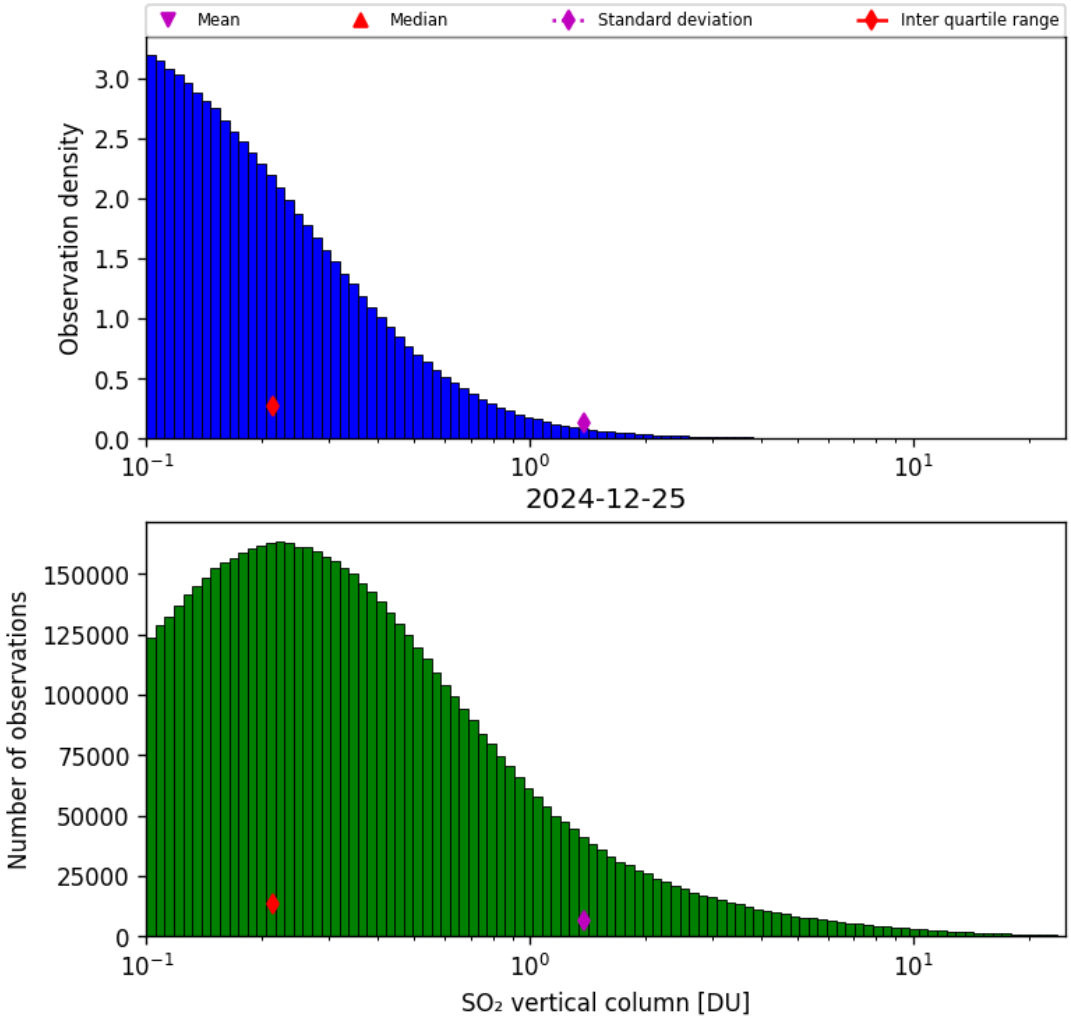

Figure 58: Histogram of "SO_2 vertical column" for 2024-12-25 to 2024-12-25

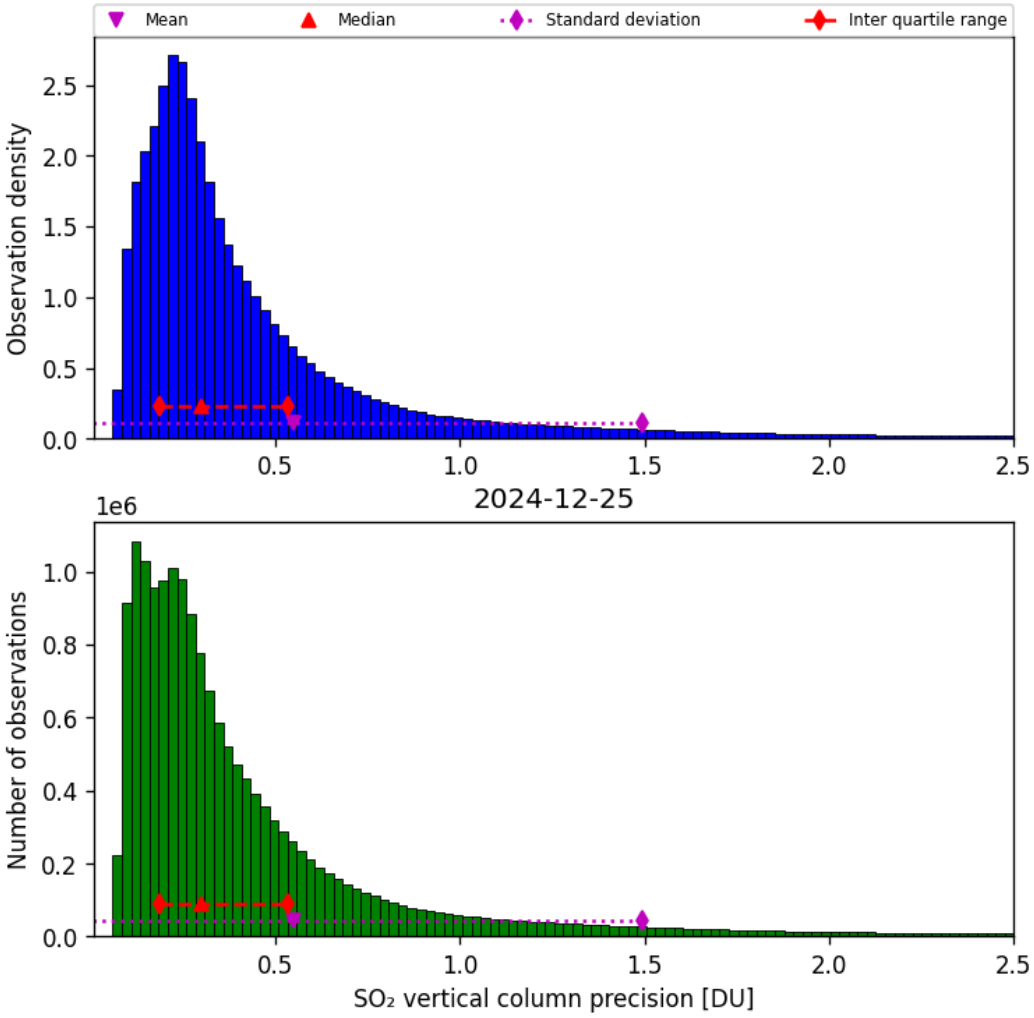

Figure 59: Histogram of "SO_2 vertical column precision" for 2024-12-25 to 2024-12-25

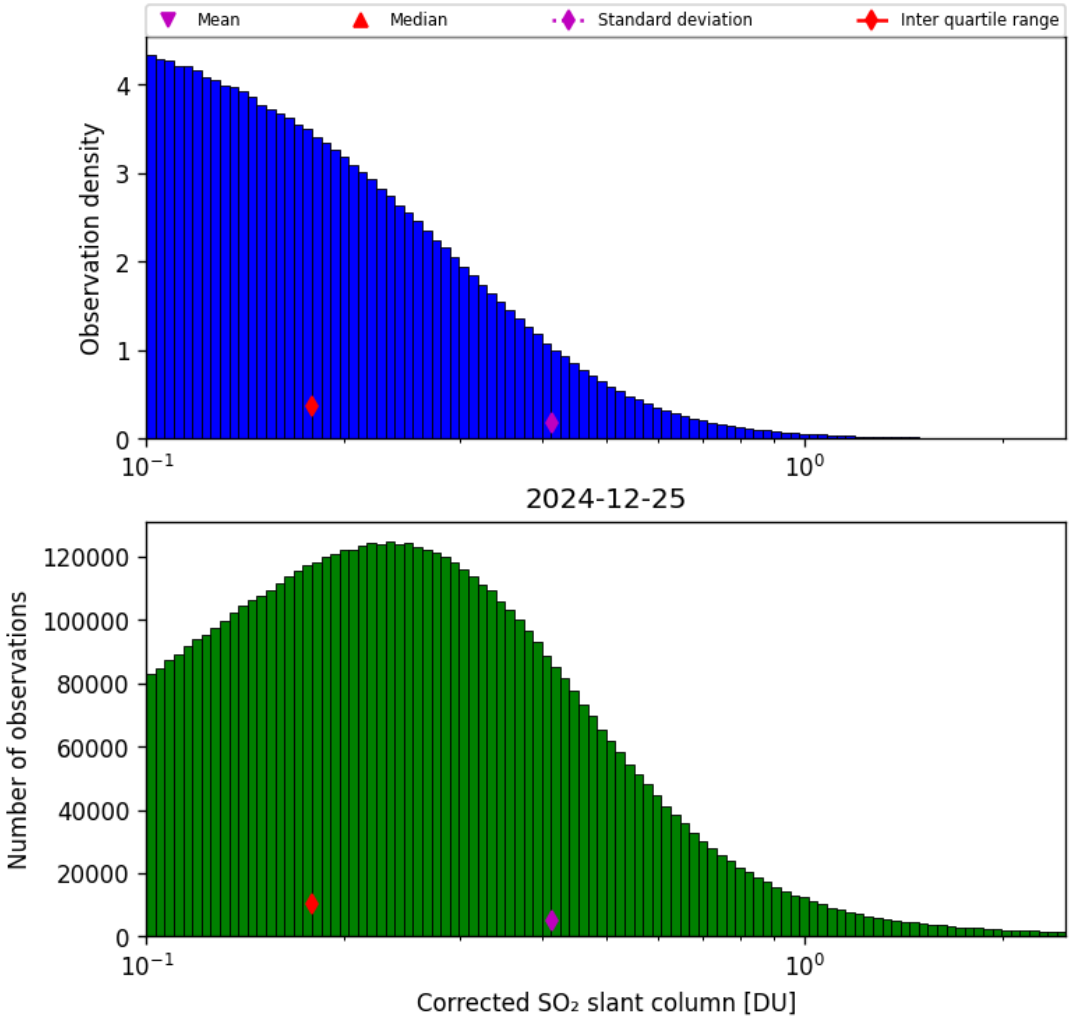

Figure 60: Histogram of "Corrected SO_2 slant column" for 2024-12-25 to 2024-12-25

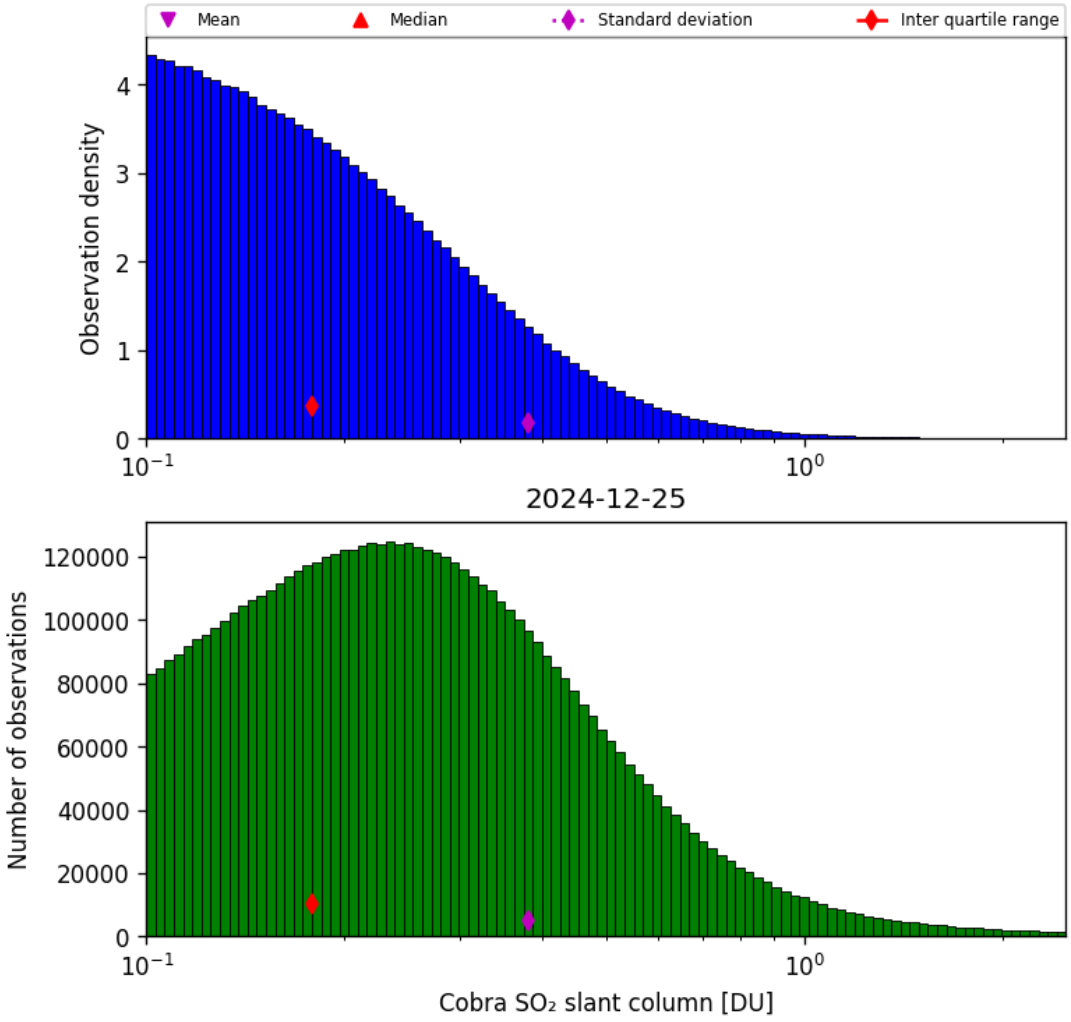

Figure 61: Histogram of "Cobra SO_2 slant column" for 2024-12-25 to 2024-12-25

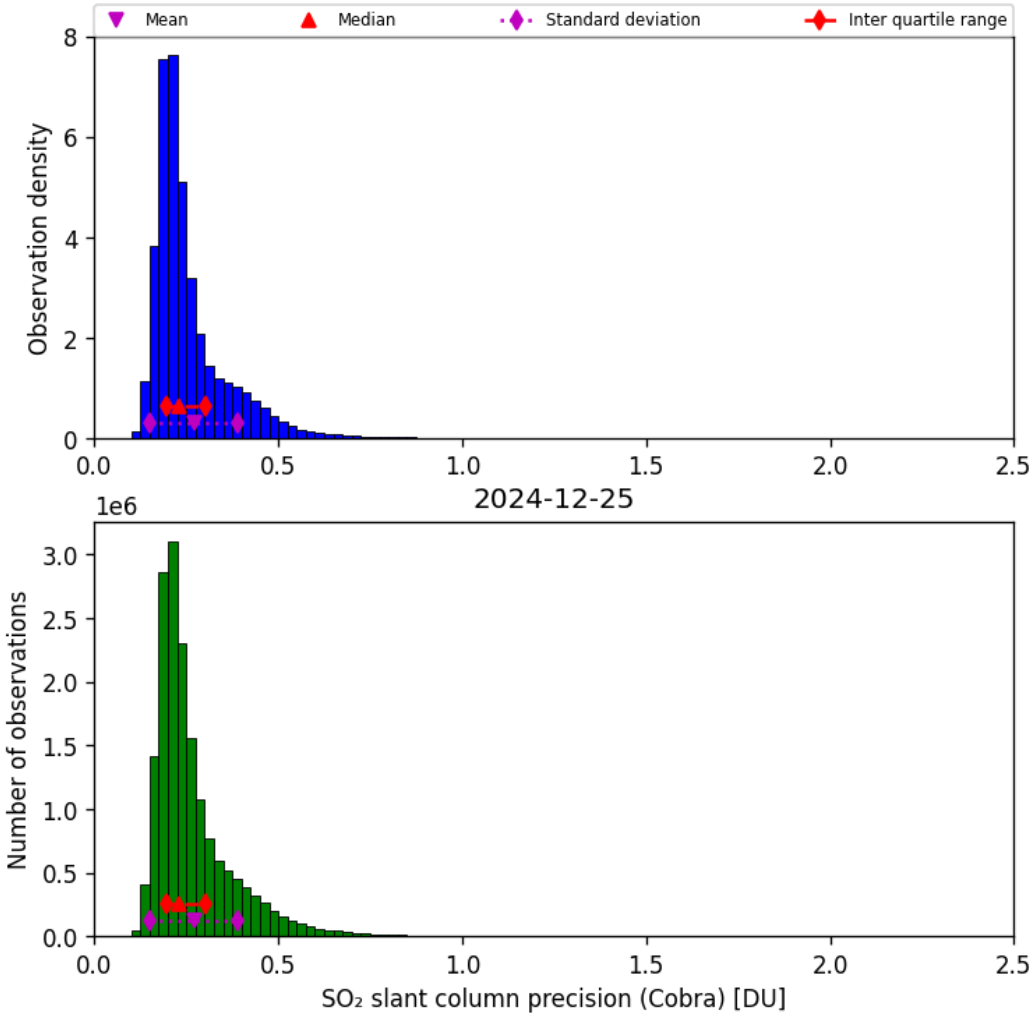

Figure 62: Histogram of "SO_2 slant column precision (Cobra)" for 2024-12-25 to 2024-12-25

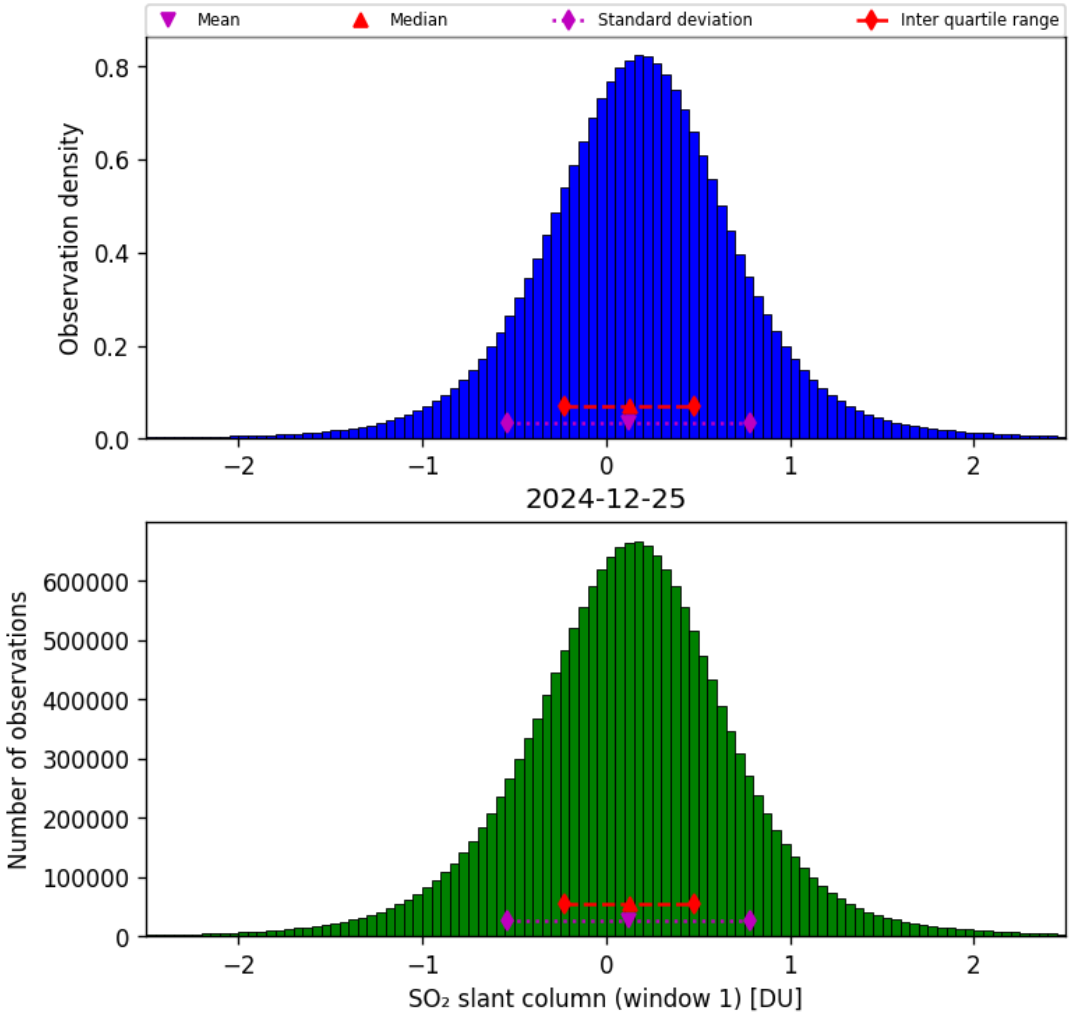

Figure 63: Histogram of "SO_2 slant column (window 1)" for 2024-12-25 to 2024-12-25

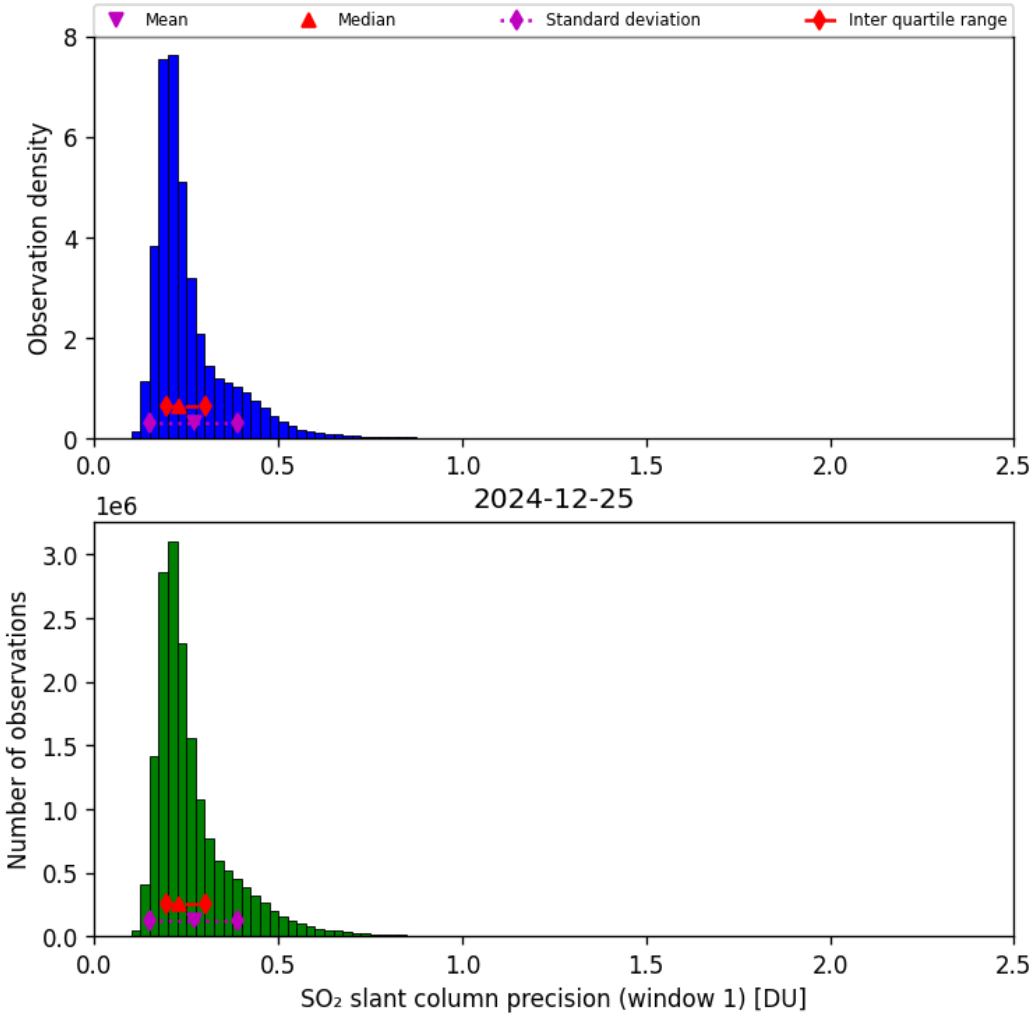

Figure 64: Histogram of "SO_2 slant column precision (window 1)" for 2024-12-25 to 2024-12-25

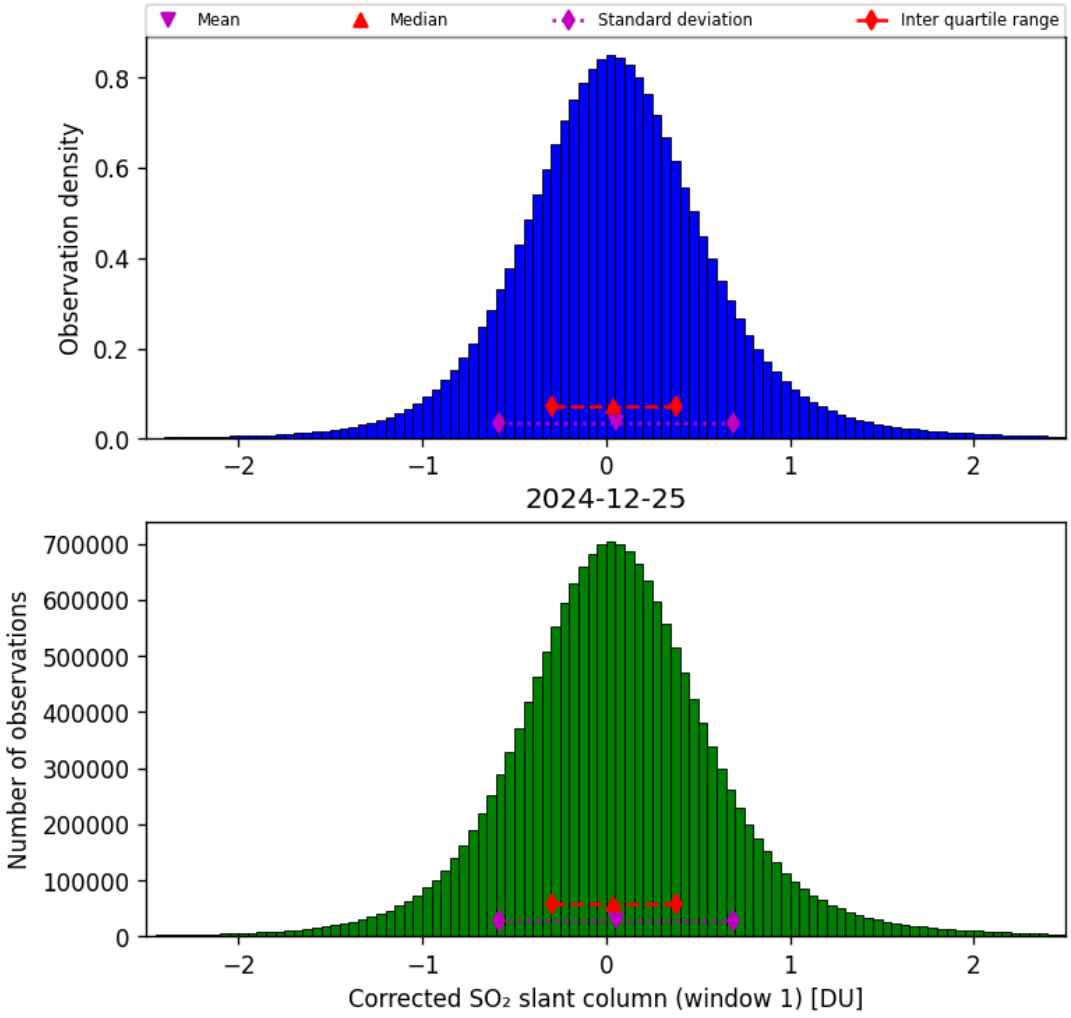

Figure 65: Histogram of "Corrected SO_2 slant column (window 1)" for 2024-12-25 to 2024-12-25

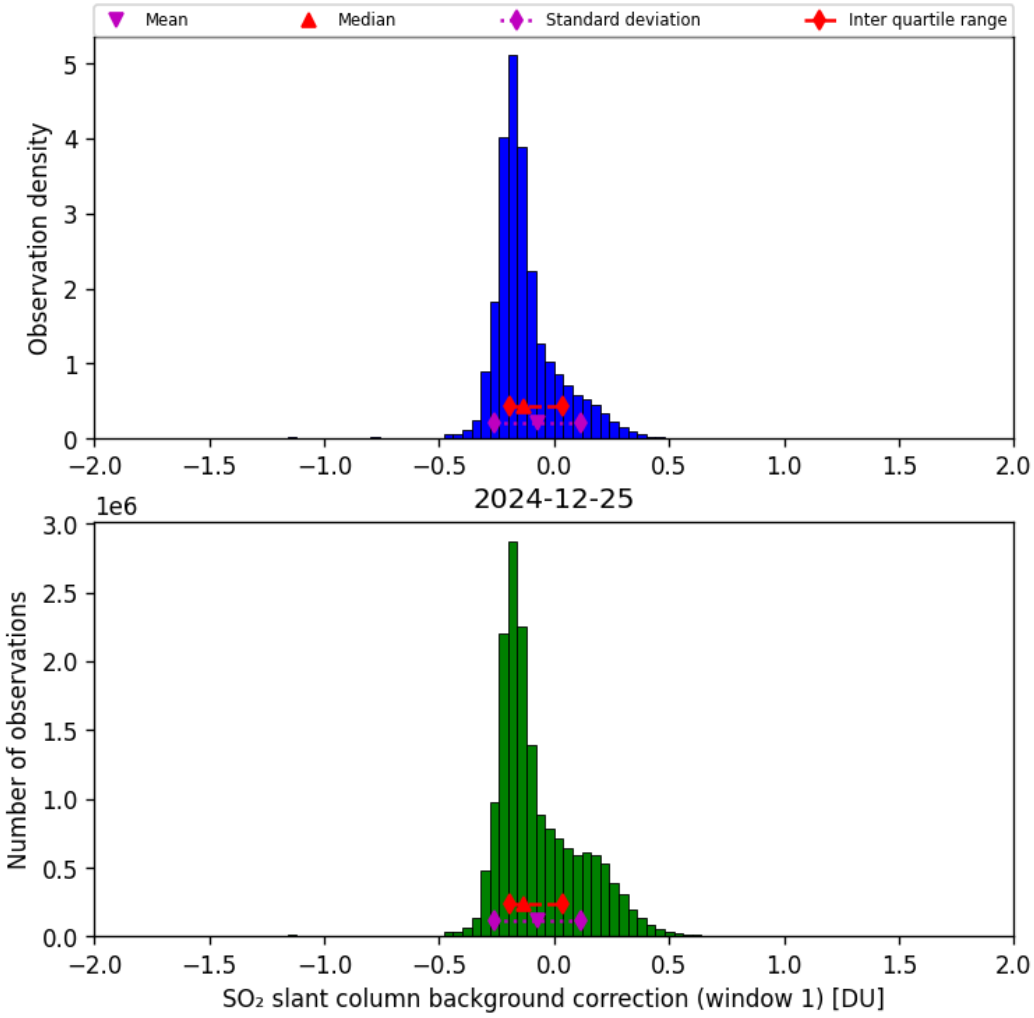

Figure 66: Histogram of "SO_2 slant column background correction (window 1)" for 2024-12-25 to 2024-12-25

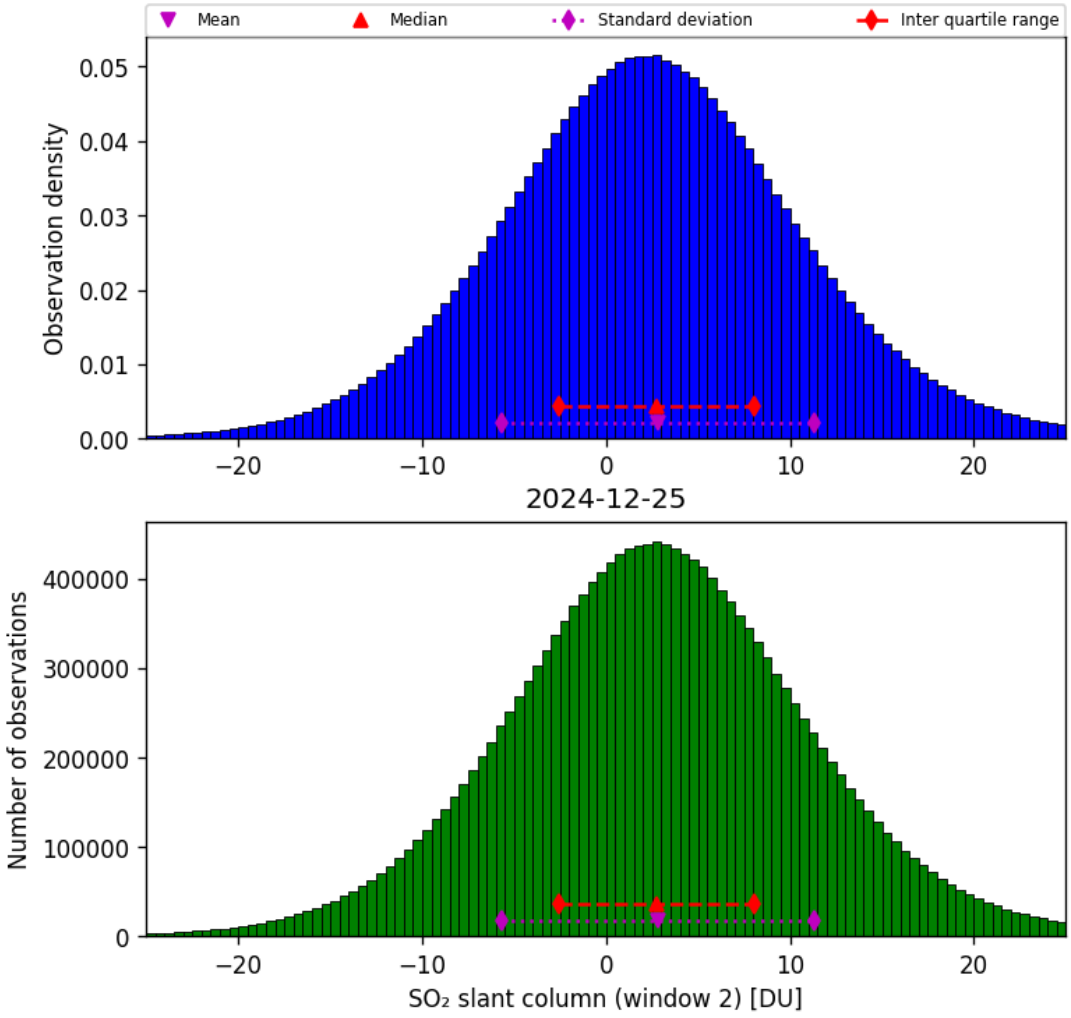

Figure 67: Histogram of "SO_2 slant column (window 2)" for 2024-12-25 to 2024-12-25

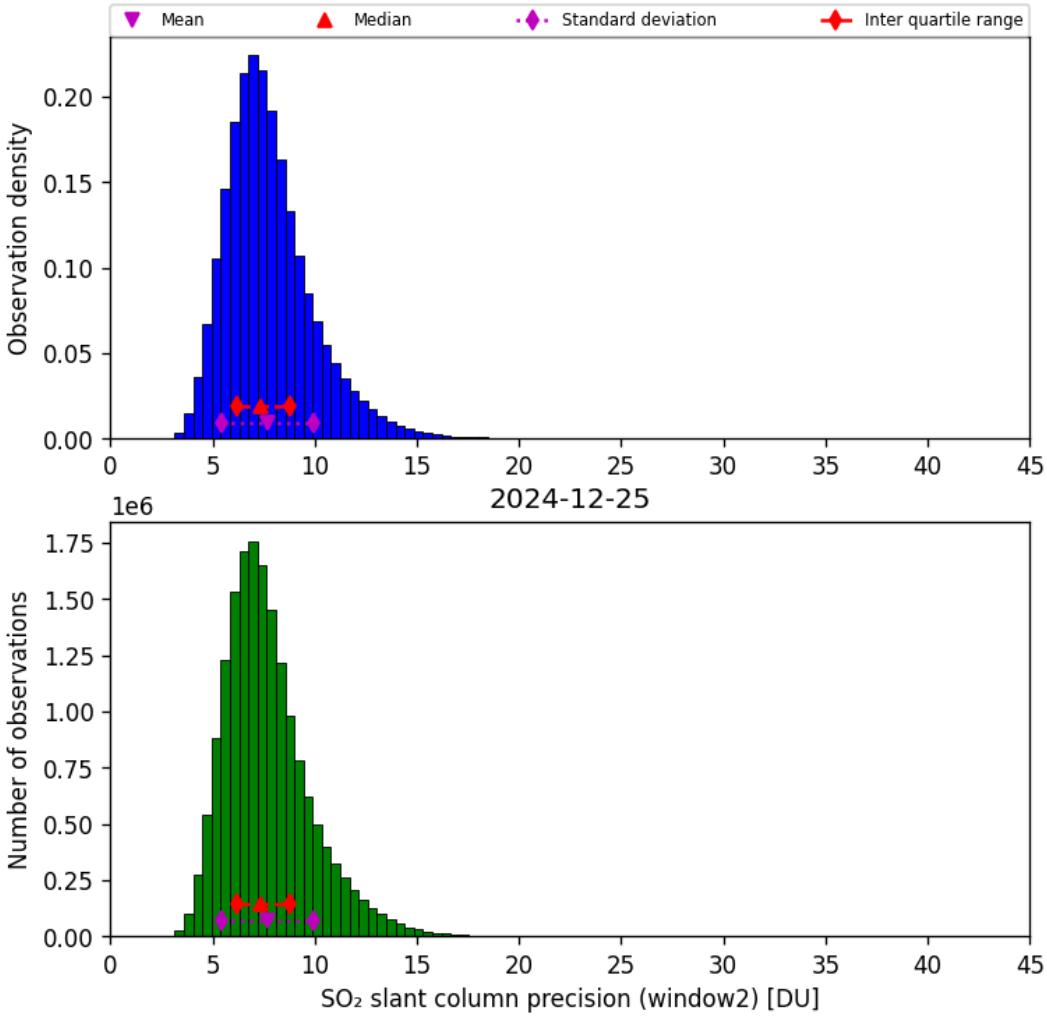

Figure 68: Histogram of "SO_2 slant column precision (window2)" for 2024-12-25 to 2024-12-25

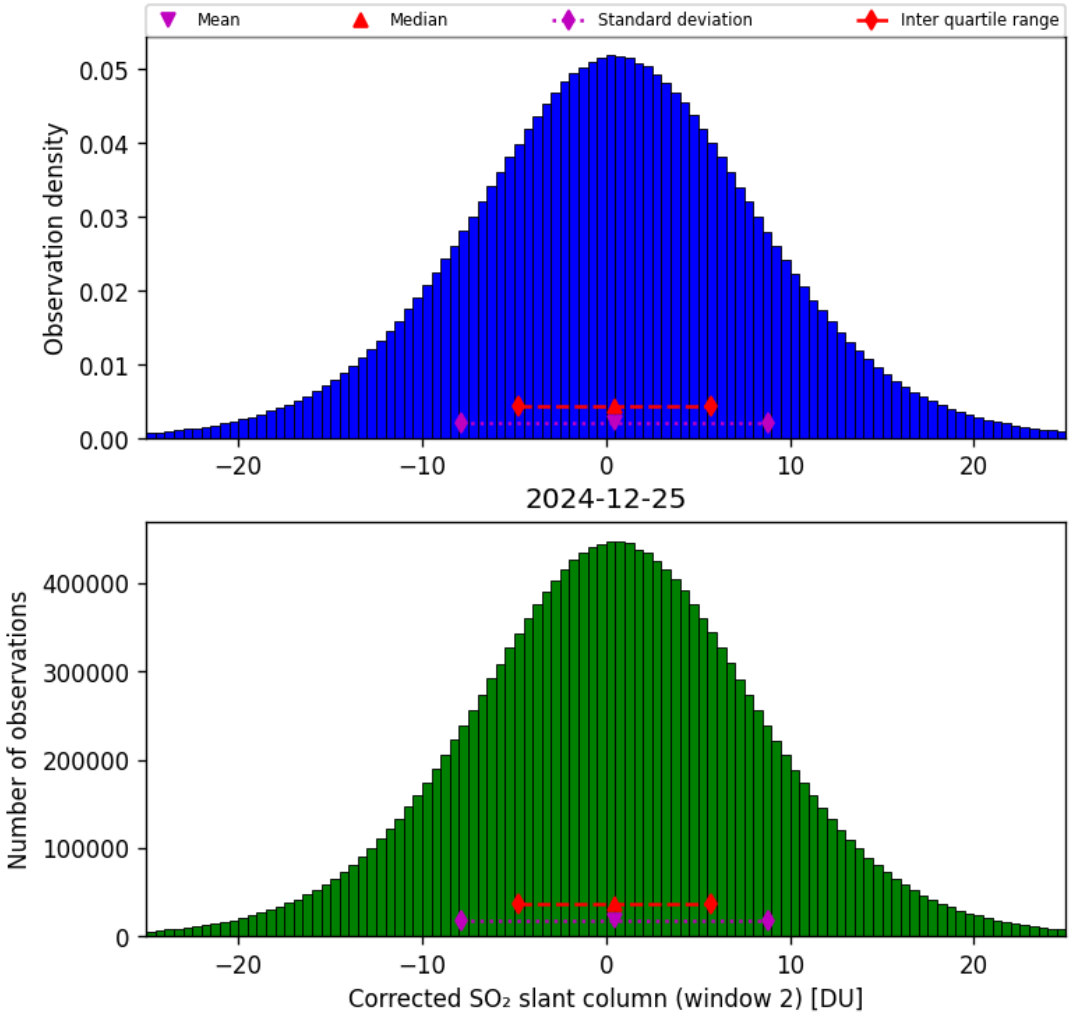

Figure 69: Histogram of "Corrected SO_2 slant column (window 2)" for 2024-12-25 to 2024-12-25

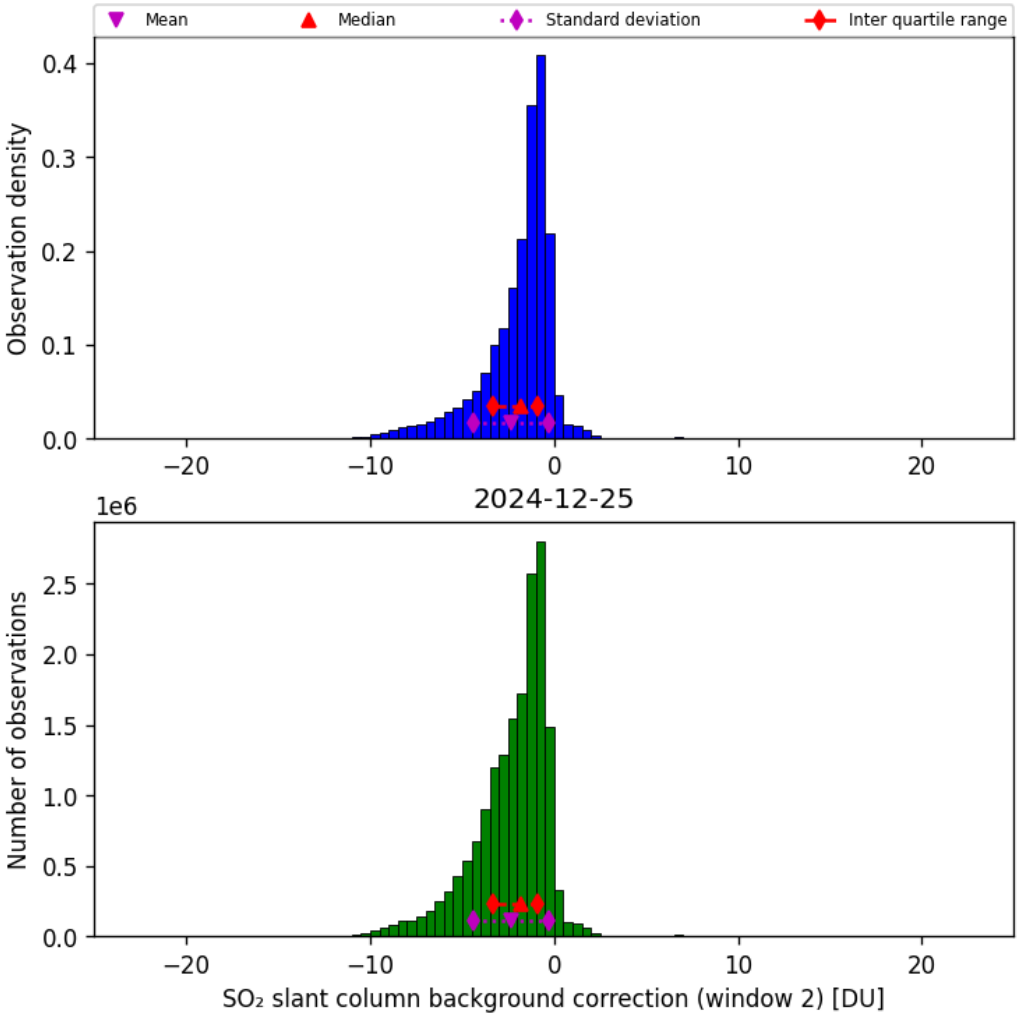

Figure 70: Histogram of "SO_2 slant column background correction (window 2)" for 2024-12-25 to 2024-12-25

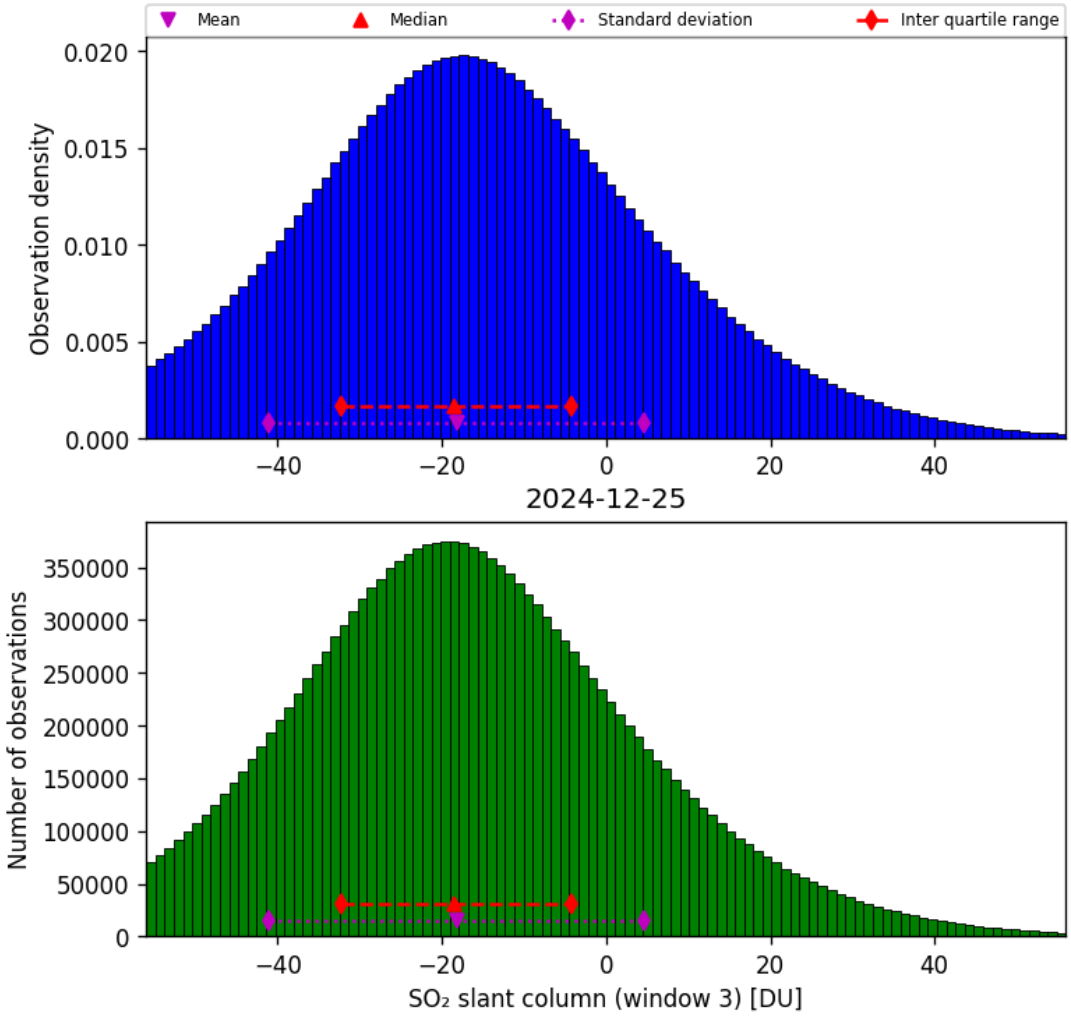

Figure 71: Histogram of "SO_2 slant column (window 3)" for 2024-12-25 to 2024-12-25

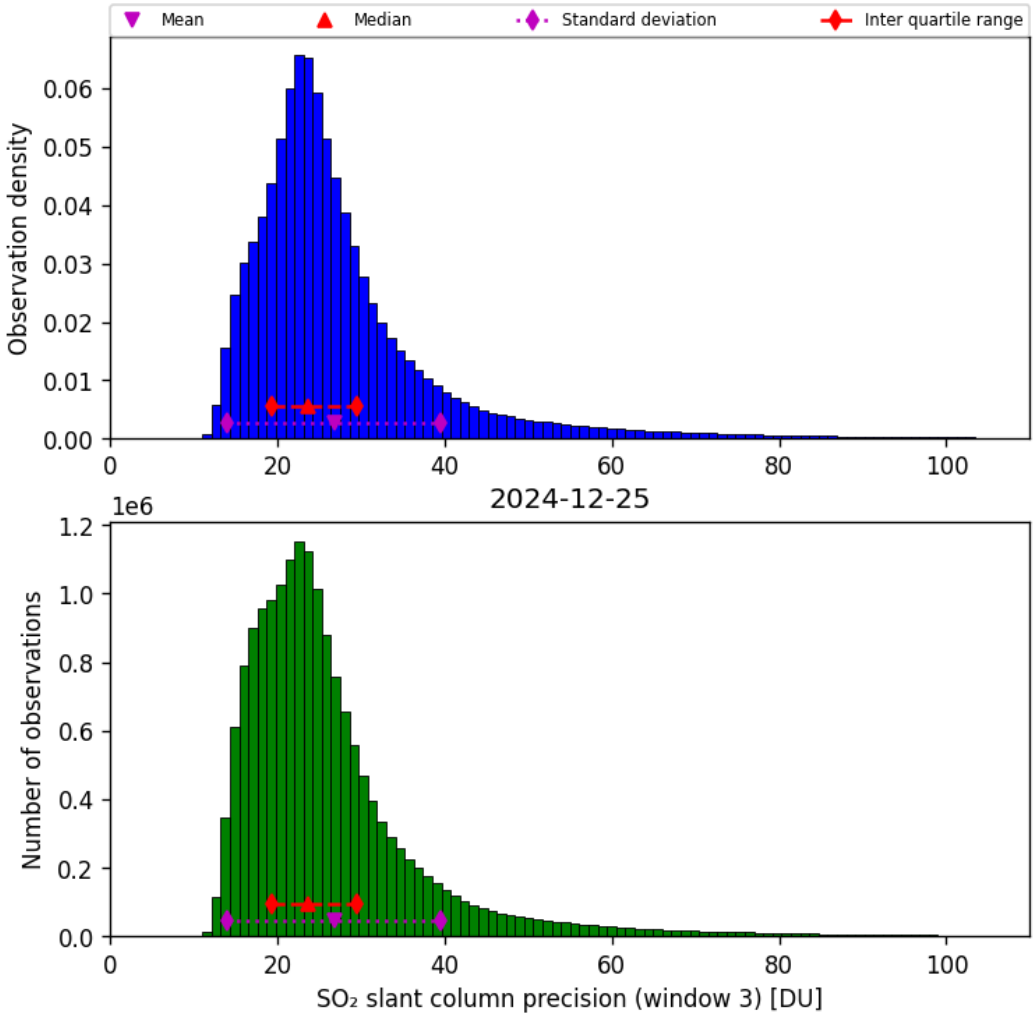

Figure 72: Histogram of "SO_2 slant column precision (window 3)" for 2024-12-25 to 2024-12-25

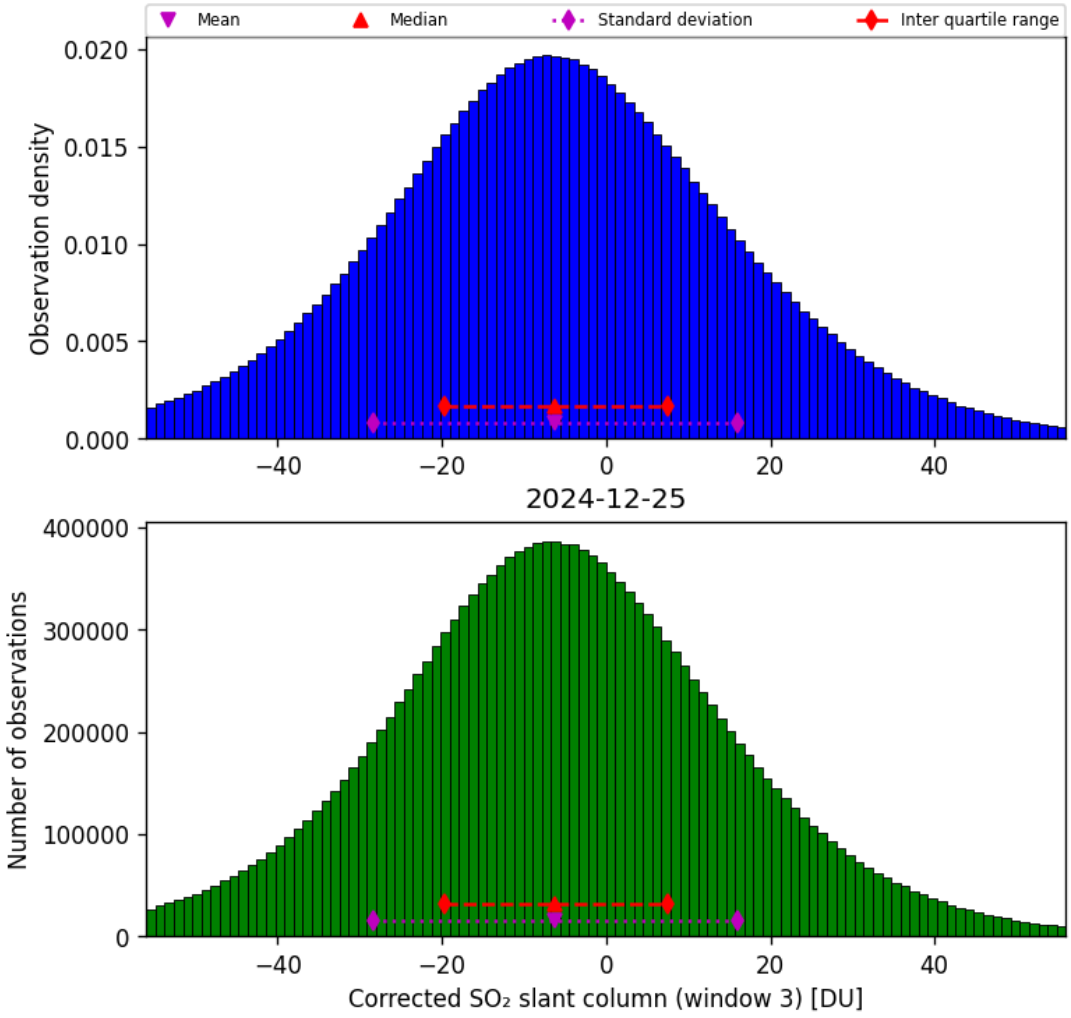

Figure 73: Histogram of "Corrected SO_2 slant column (window 3)" for 2024-12-25 to 2024-12-25

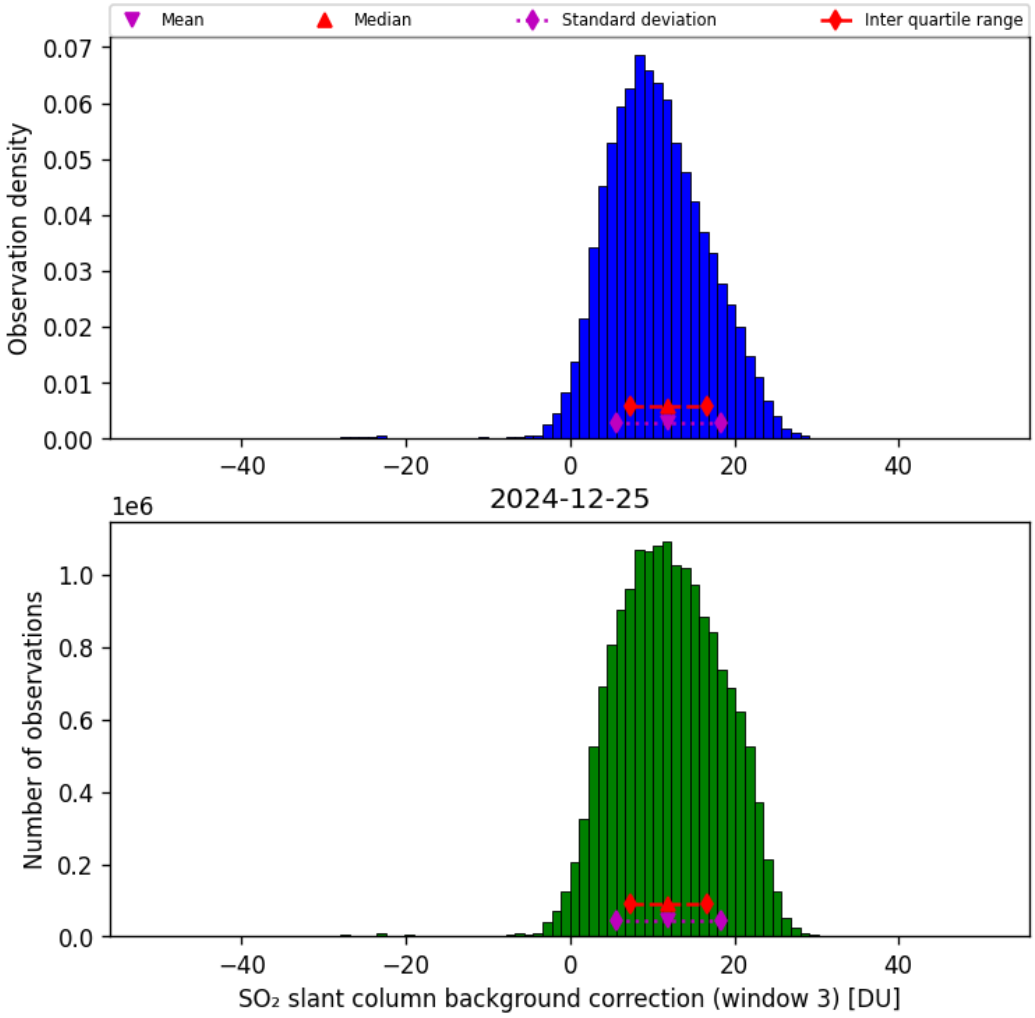

Figure 74: Histogram of "SO_2 slant column background correction (window 3)" for 2024-12-25 to 2024-12-25

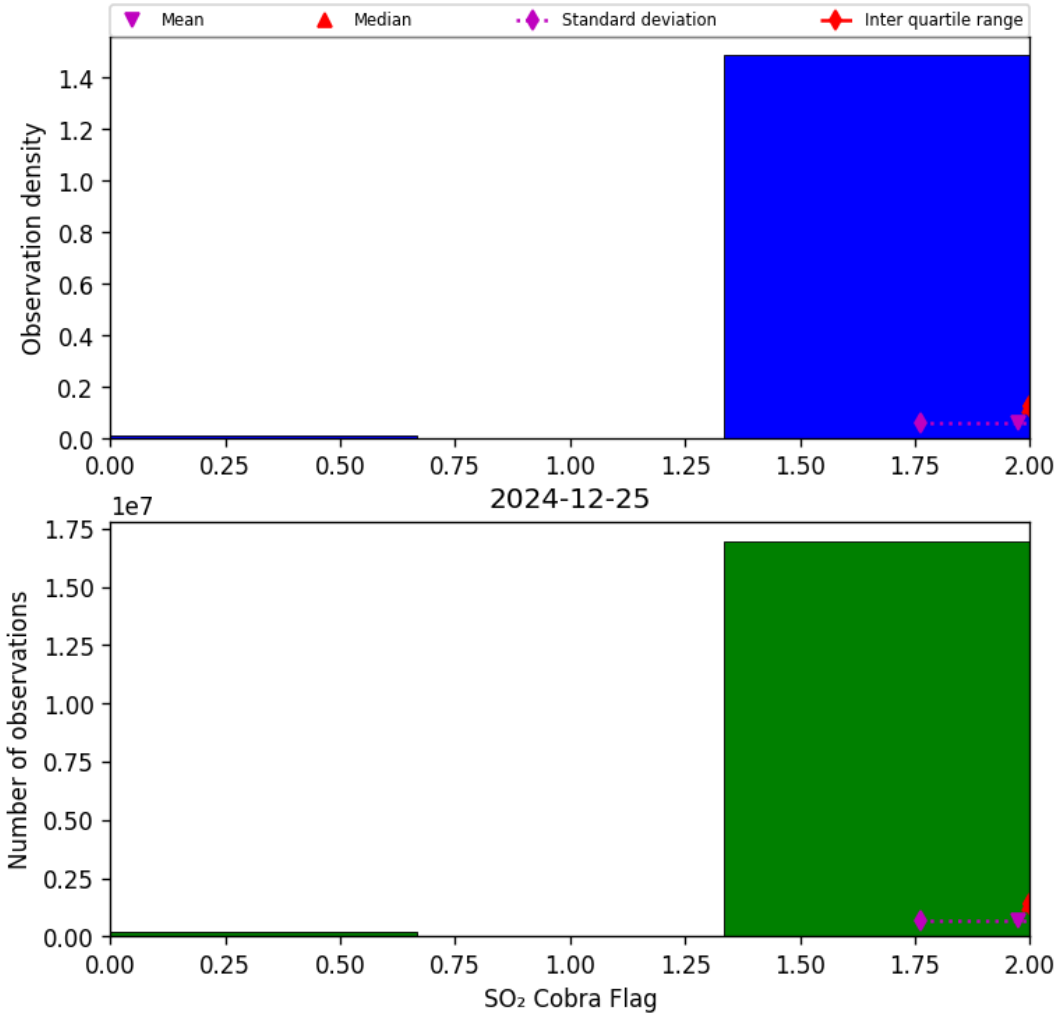

Figure 75: Histogram of "SO_2 Cobra Flag" for 2024-12-25 to 2024-12-25

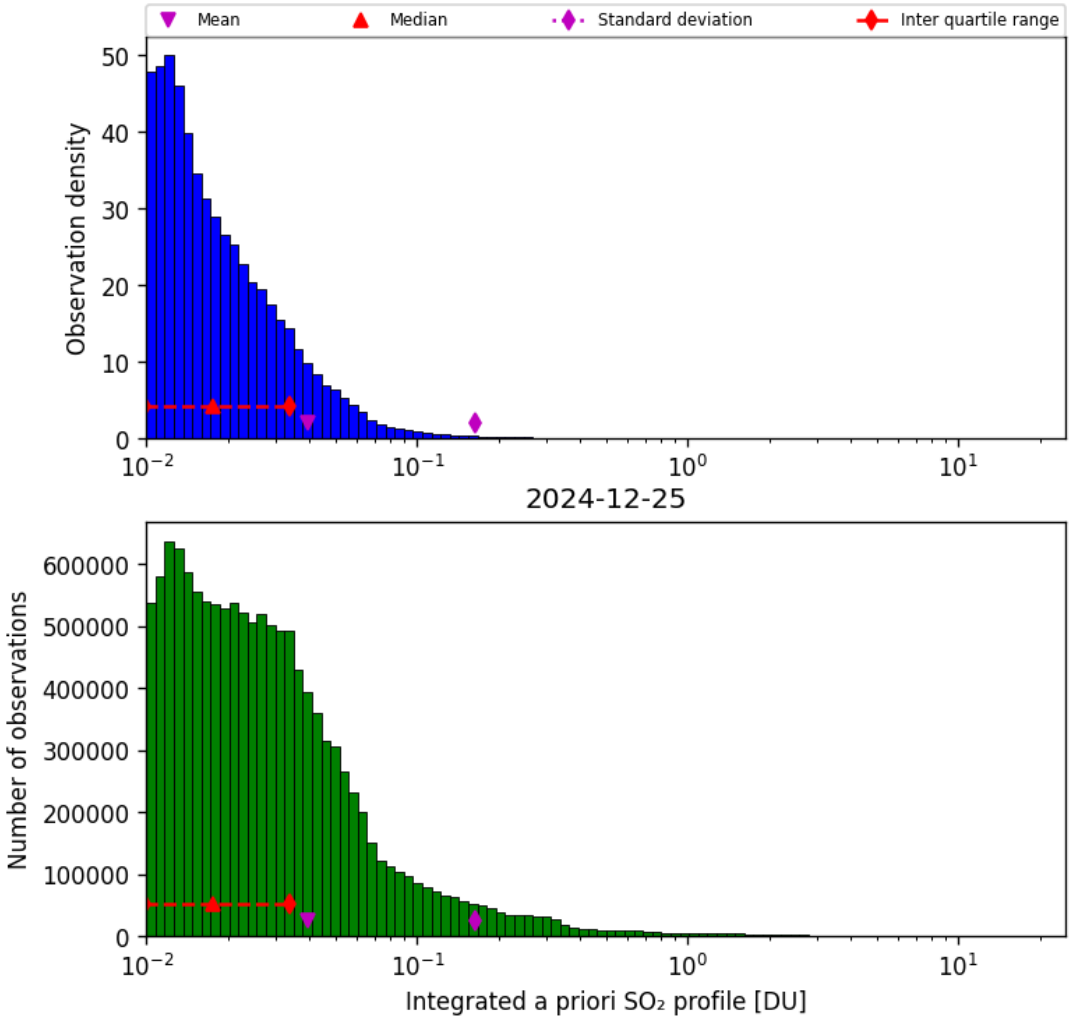

Figure 76: Histogram of “Integrated a priori SO_2 profile” for 2024-12-25 to 2024-12-25

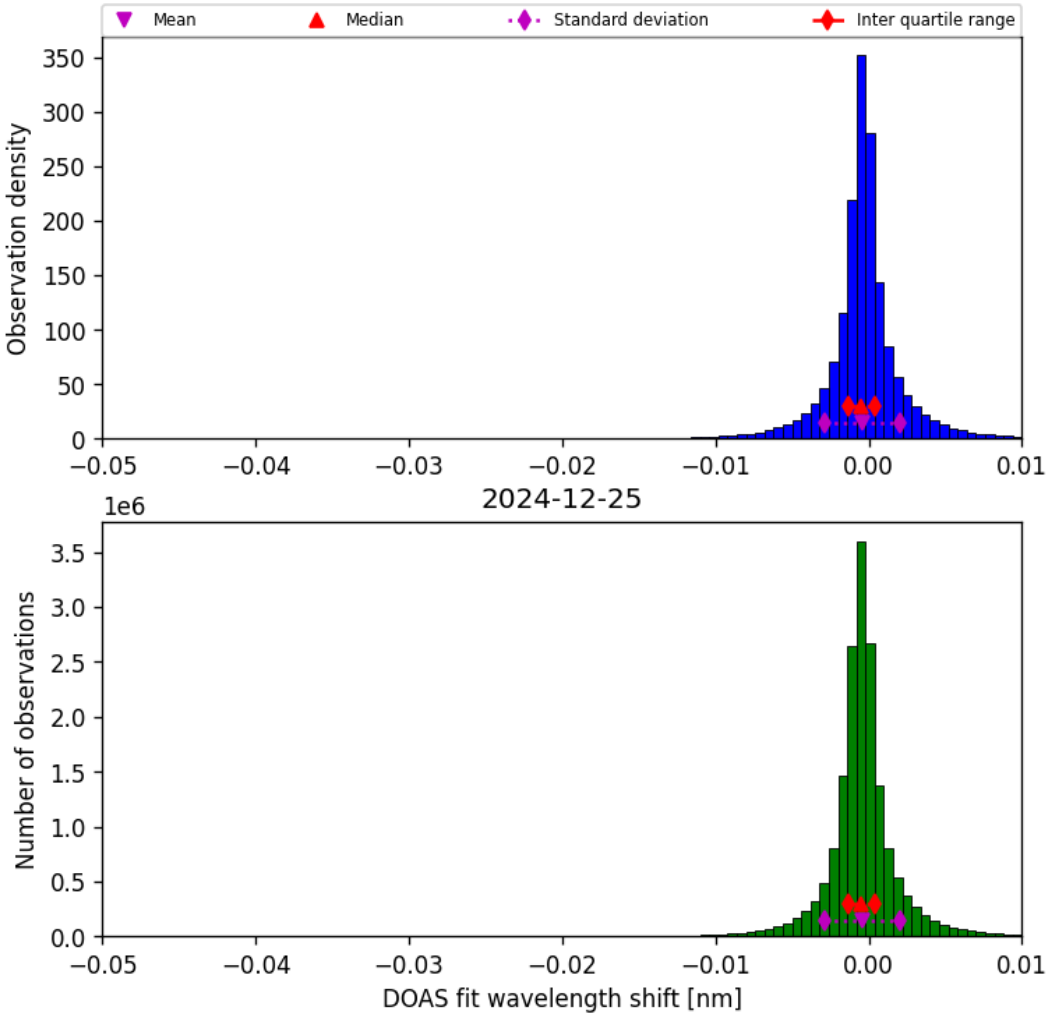

Figure 77: Histogram of “DOAS fit wavelength shift” for 2024-12-25 to 2024-12-25

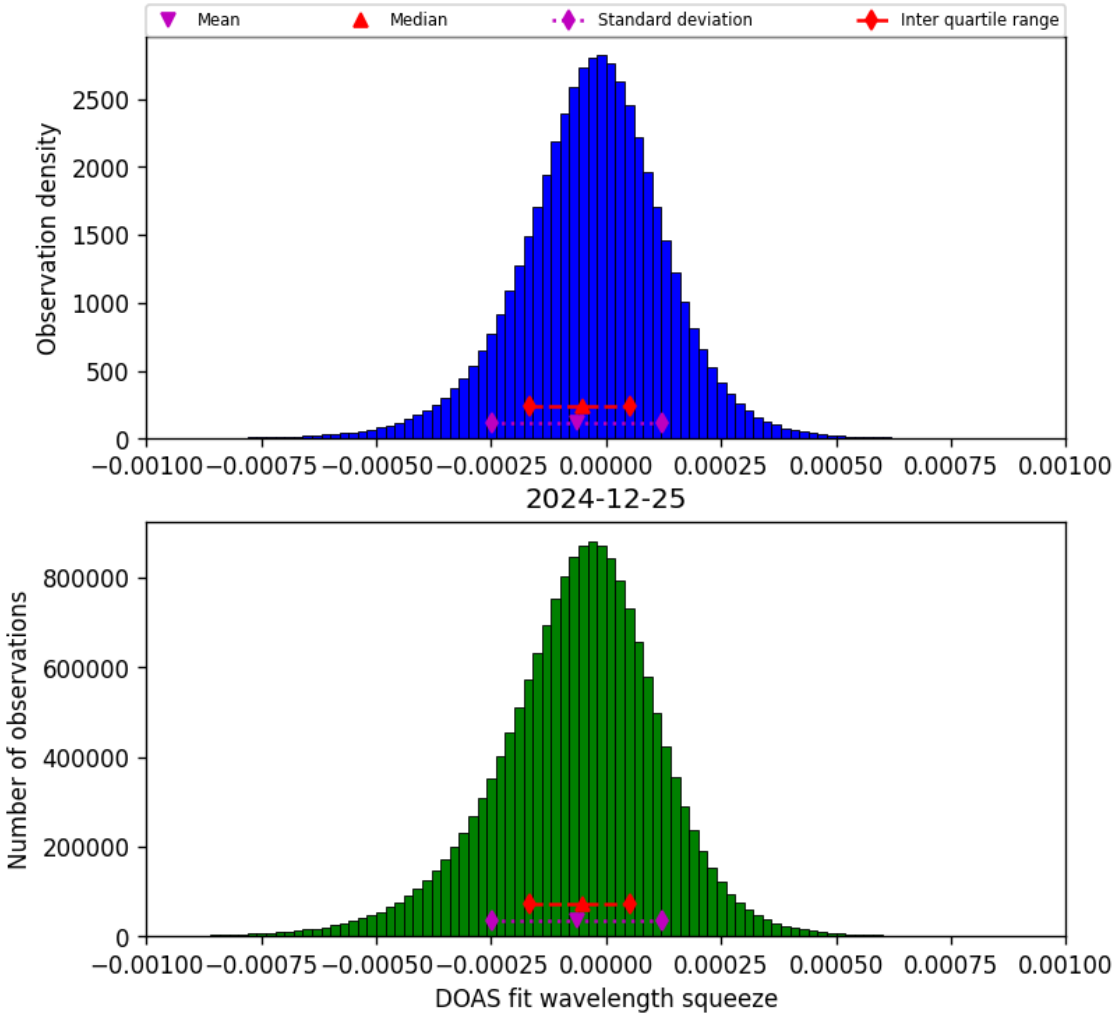

Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2024-12-25 to 2024-12-25

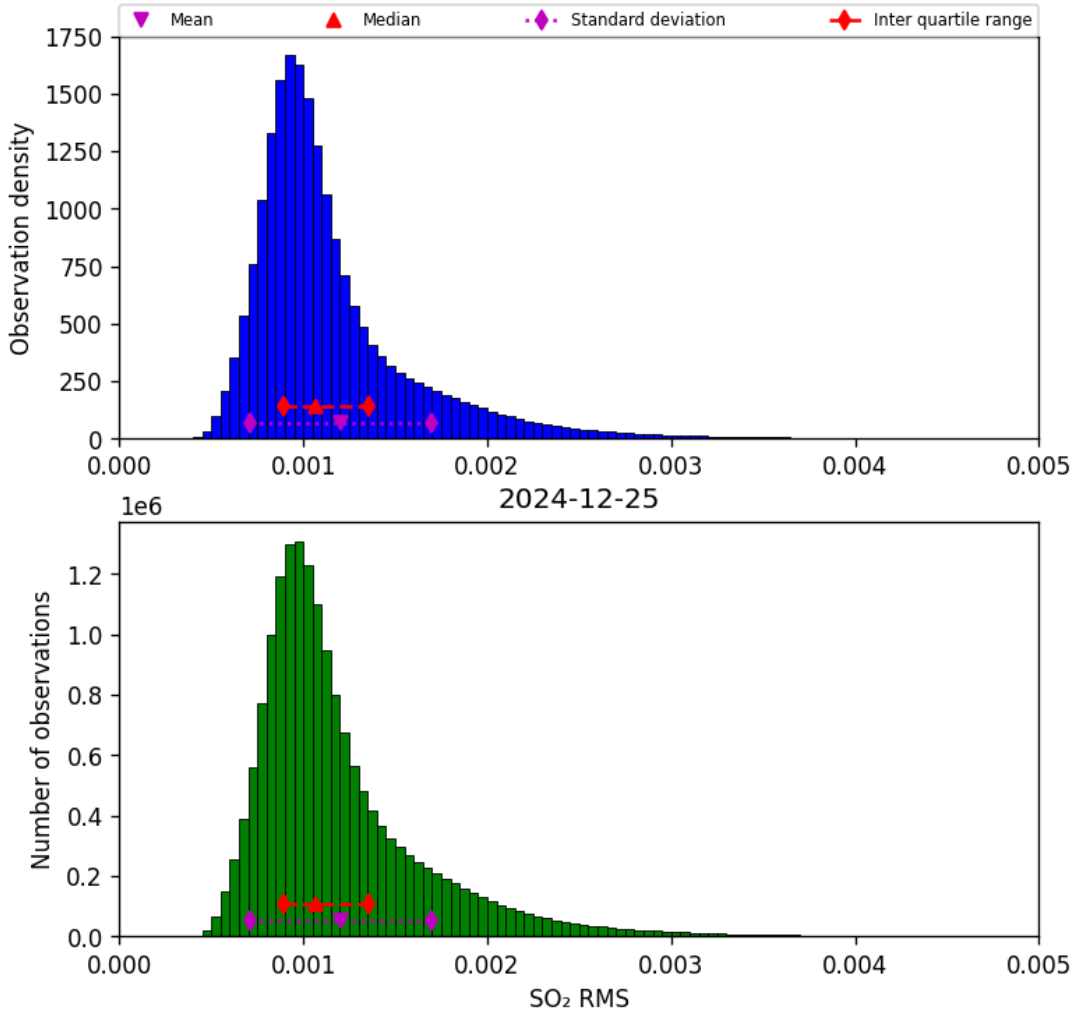

Figure 79: Histogram of "SO_2 RMS" for 2024-12-25 to 2024-12-25

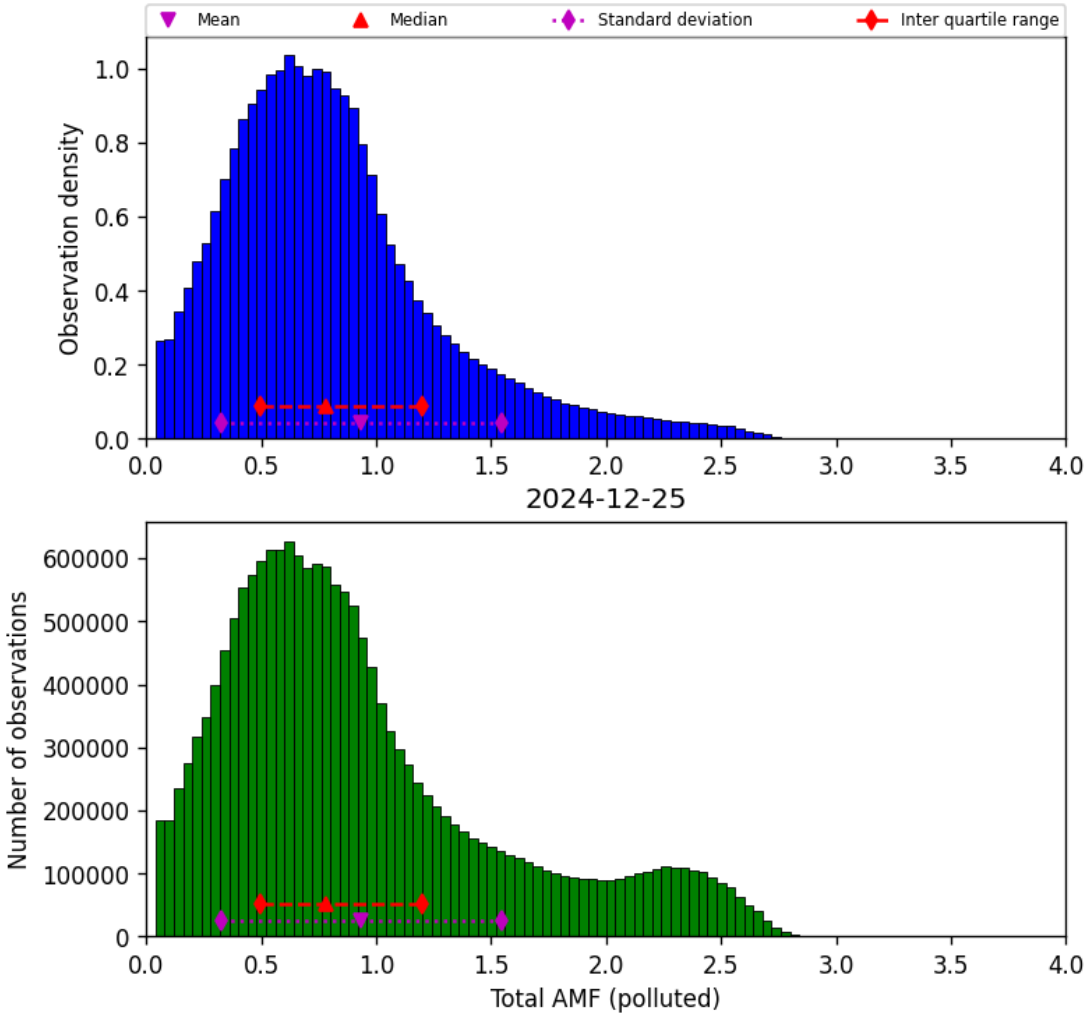

Figure 80: Histogram of “Total AMF (polluted)” for 2024-12-25 to 2024-12-25

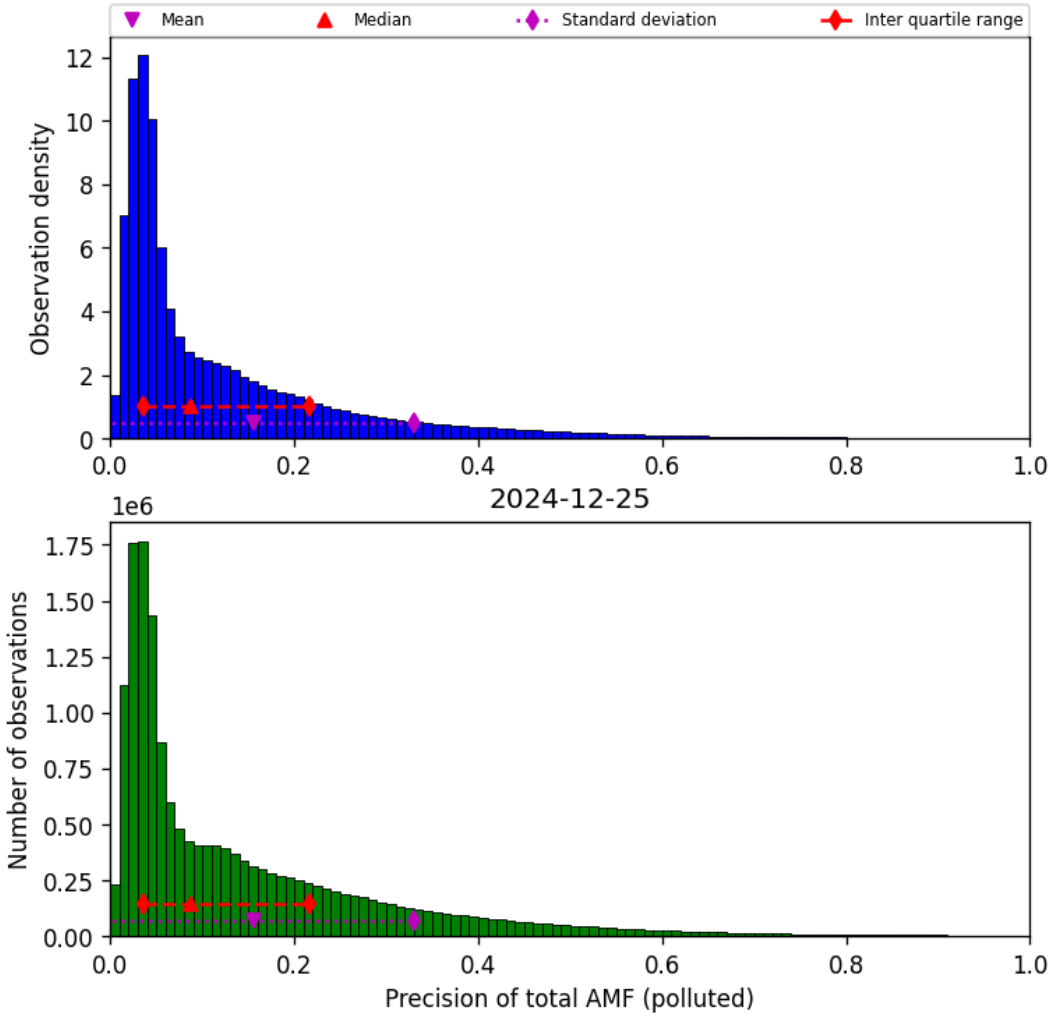

Figure 81: Histogram of “Precision of total AMF (polluted)” for 2024-12-25 to 2024-12-25

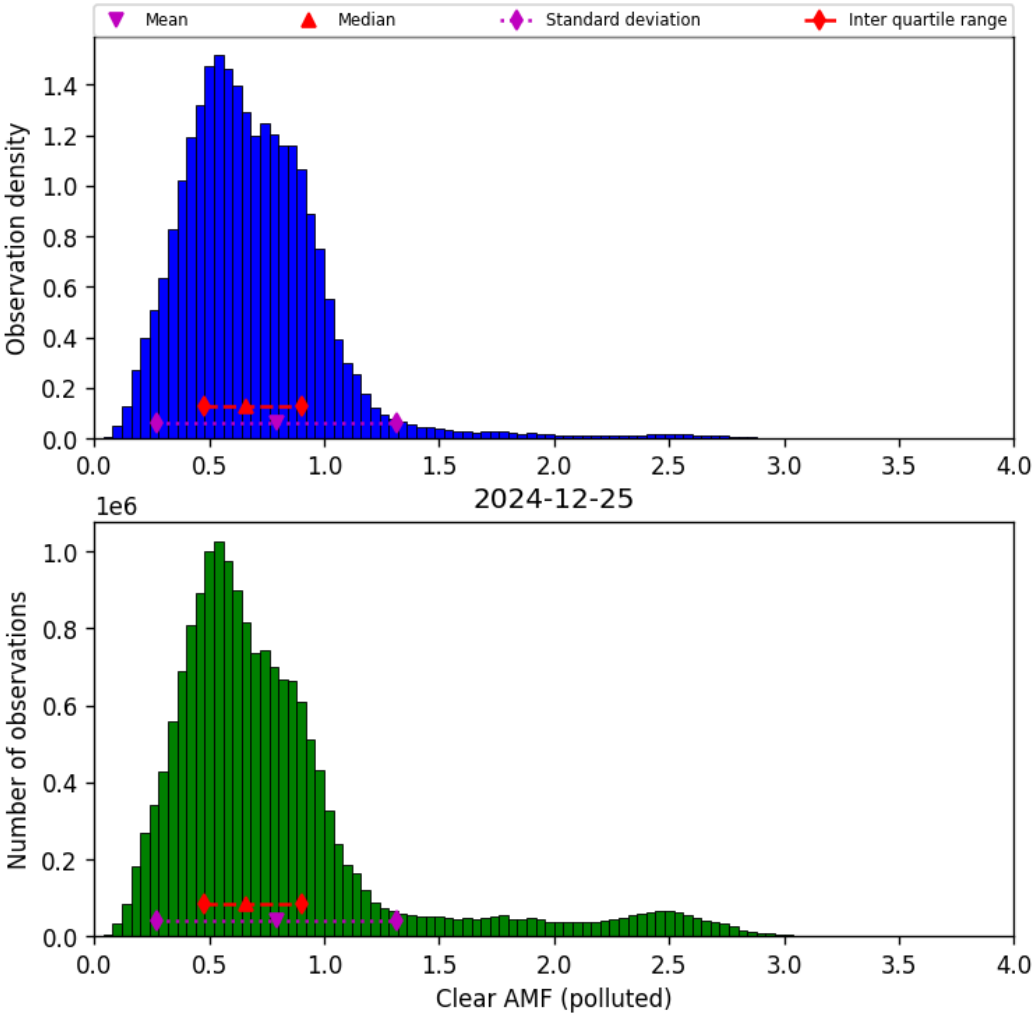

Figure 82: Histogram of “Clear AMF (polluted)” for 2024-12-25 to 2024-12-25

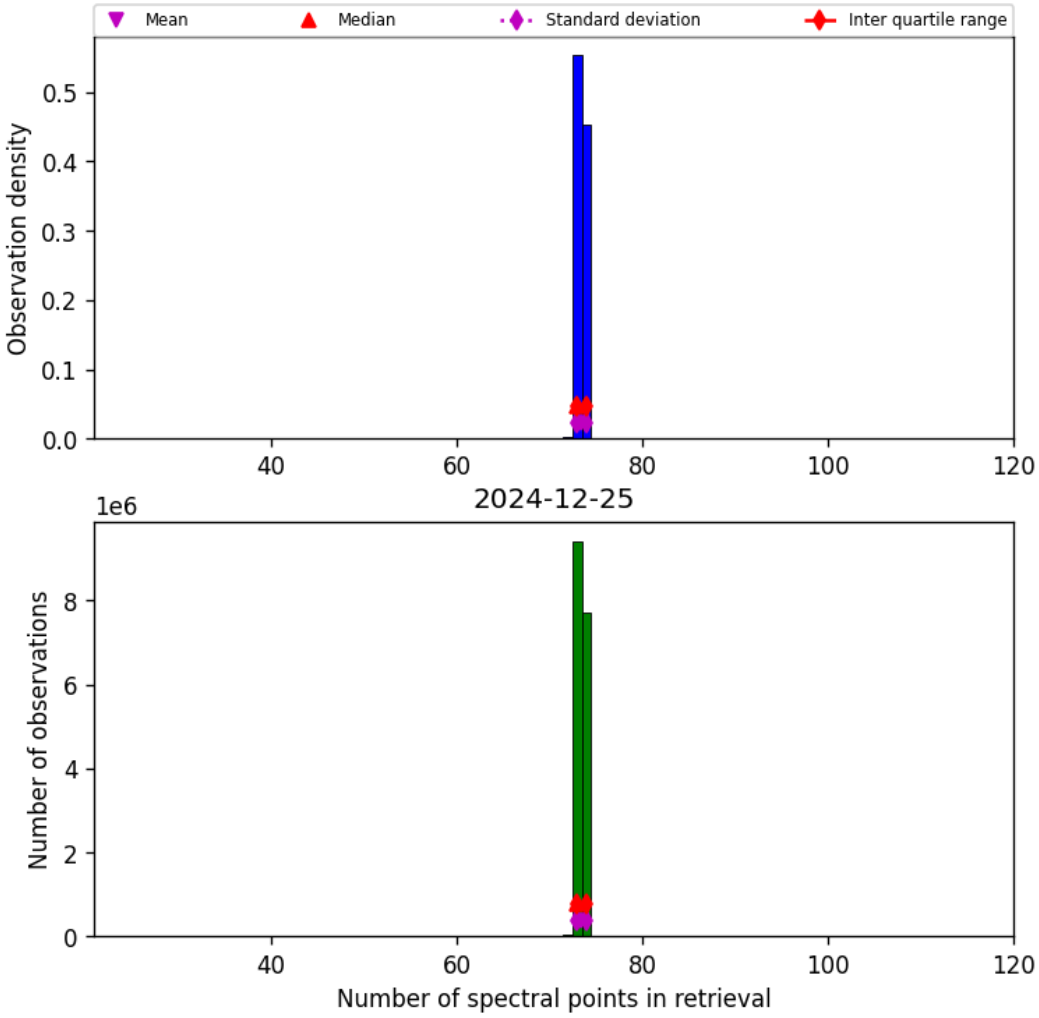

Figure 83: Histogram of “Number of spectral points in retrieval” for 2024-12-25 to 2024-12-25

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.

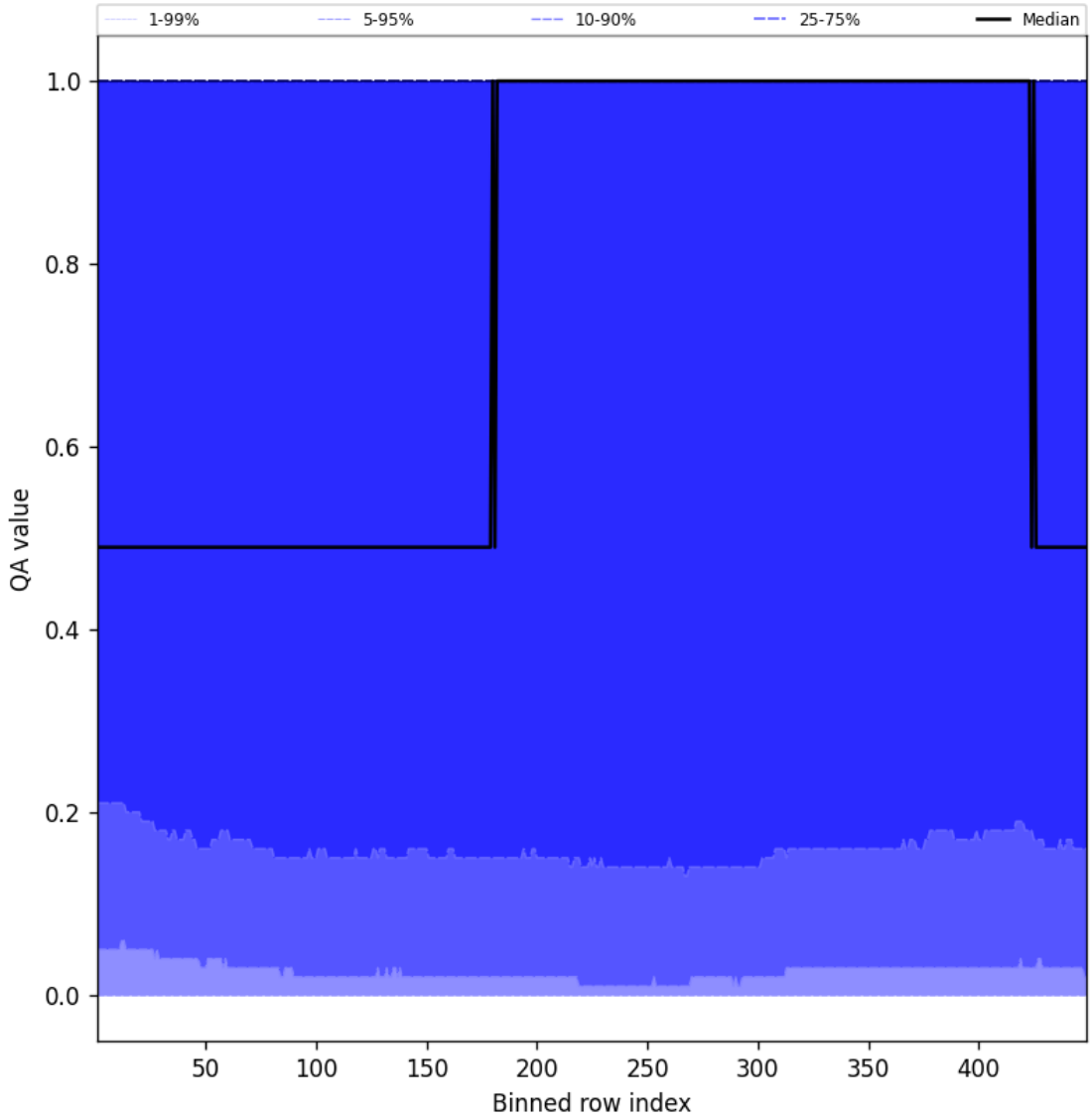

Figure 84: Along track statistics of “QA value” for 2024-12-25 to 2024-12-25

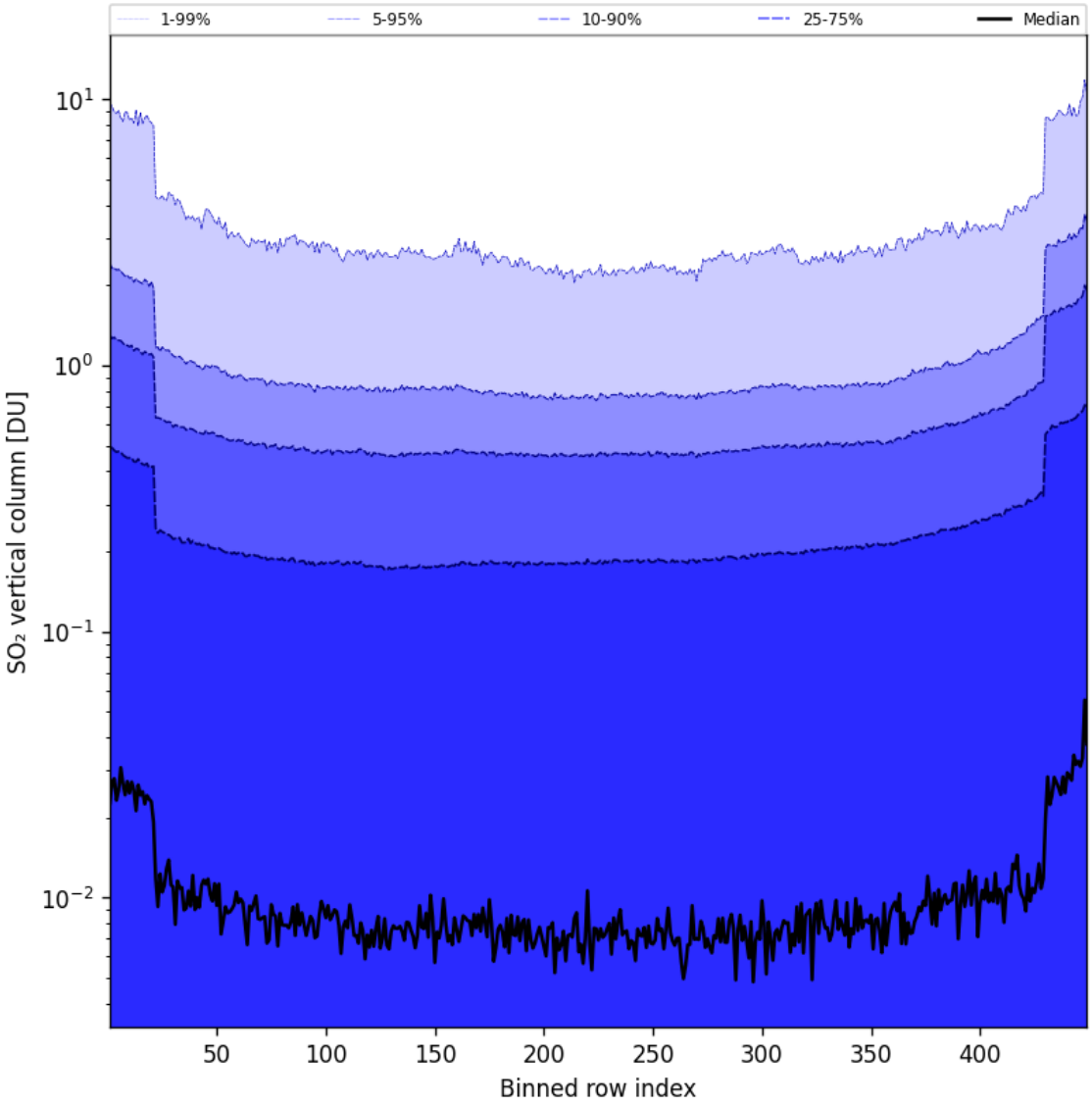

Figure 85: Along track statistics of "SO_2 vertical column" for 2024-12-25 to 2024-12-25

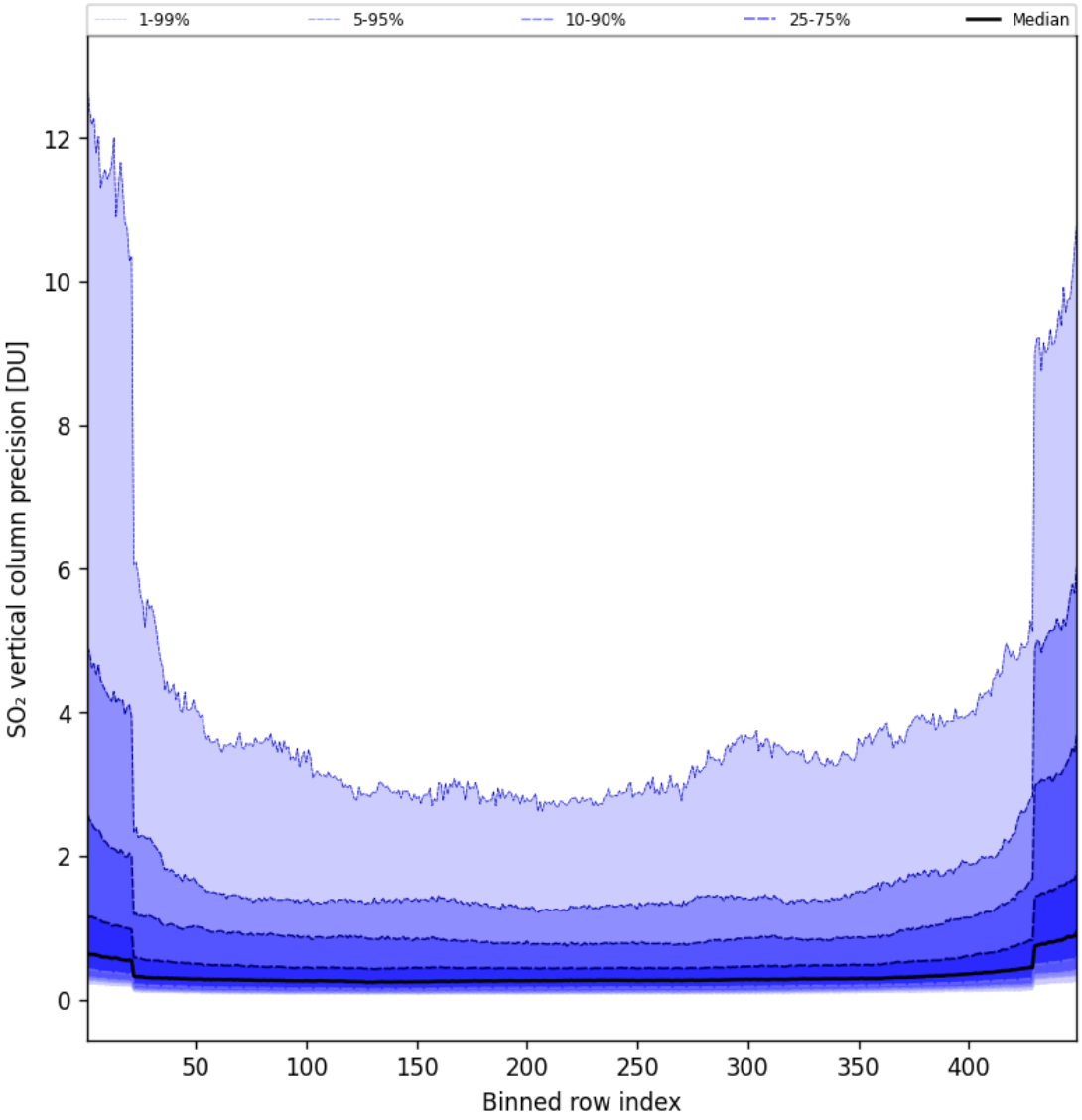

Figure 86: Along track statistics of "SO_2 vertical column precision" for 2024-12-25 to 2024-12-25

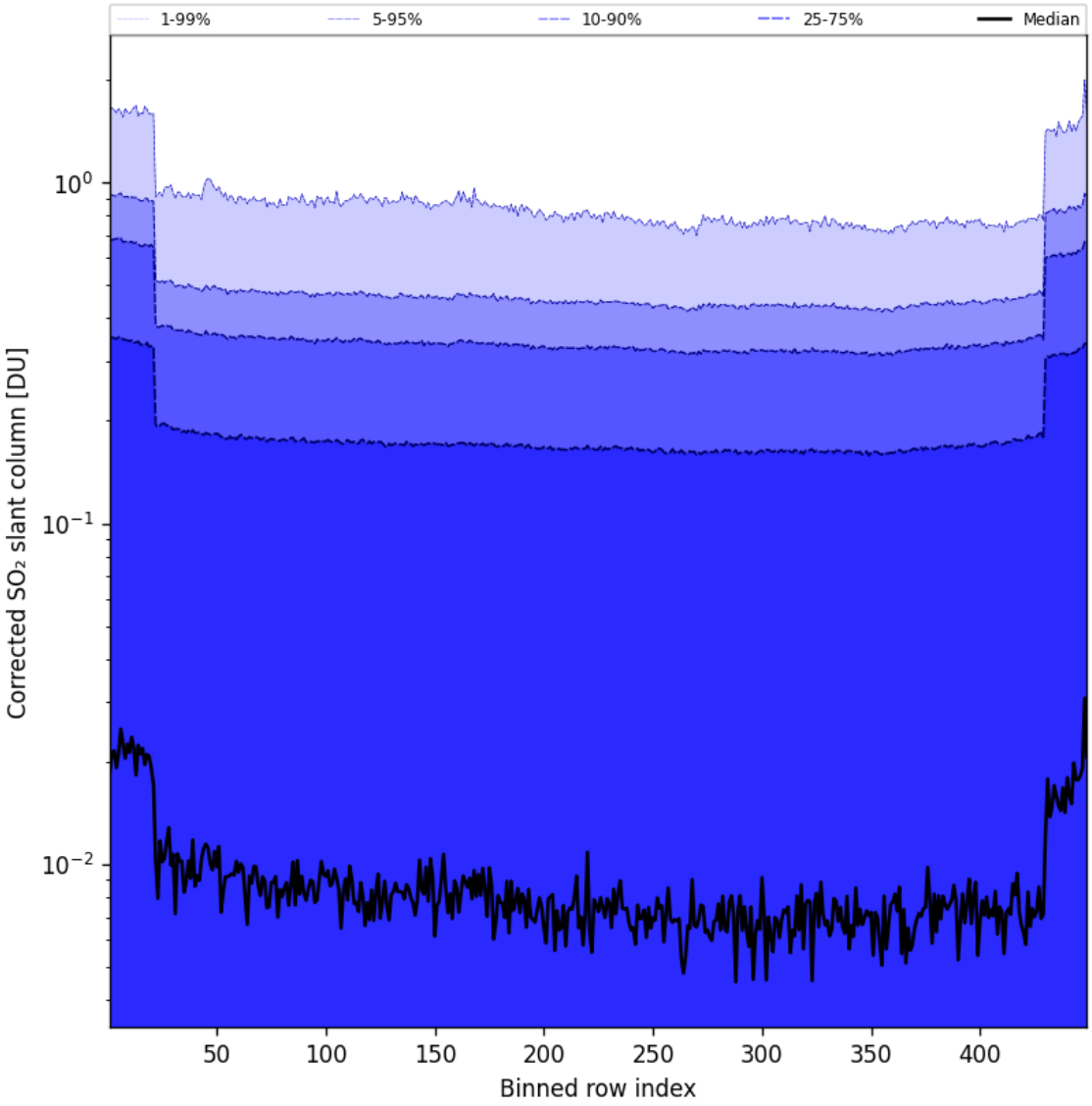

Figure 87: Along track statistics of "Corrected SO_2 slant column" for 2024-12-25 to 2024-12-25

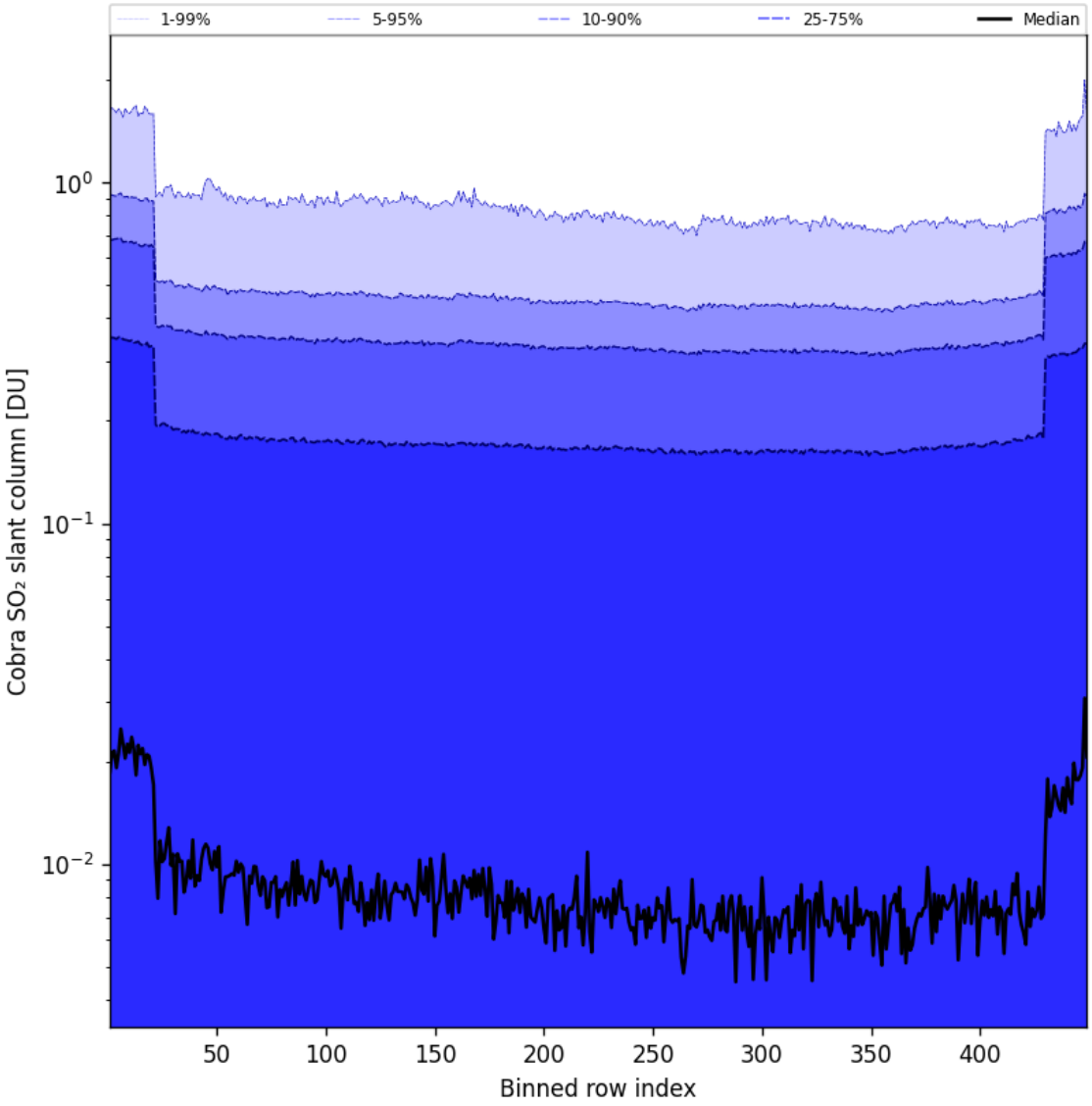

Figure 88: Along track statistics of "Cobra SO_2 slant column" for 2024-12-25 to 2024-12-25

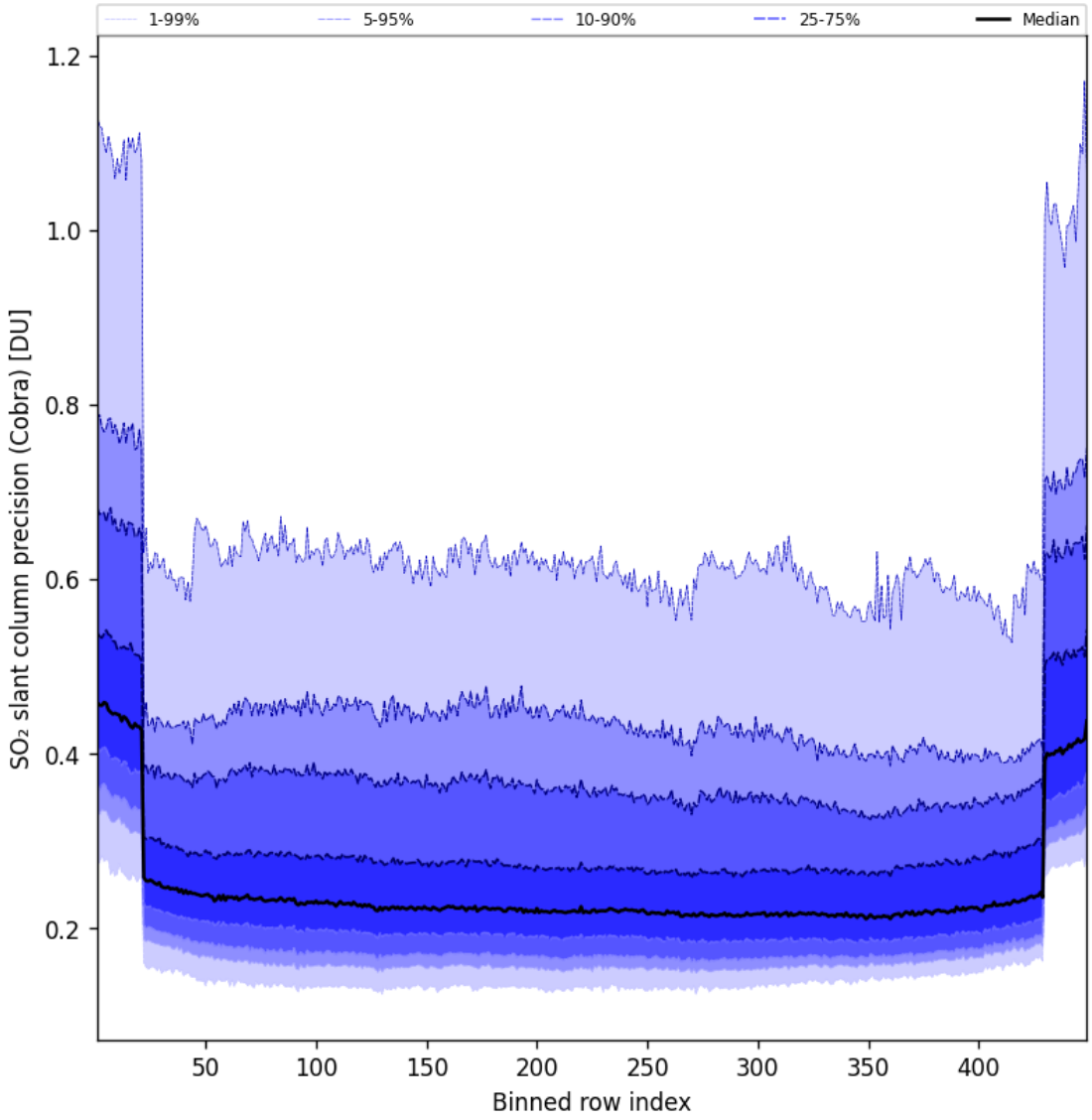

Figure 89: Along track statistics of "SO_2 slant column precision (Cobra)" for 2024-12-25 to 2024-12-25

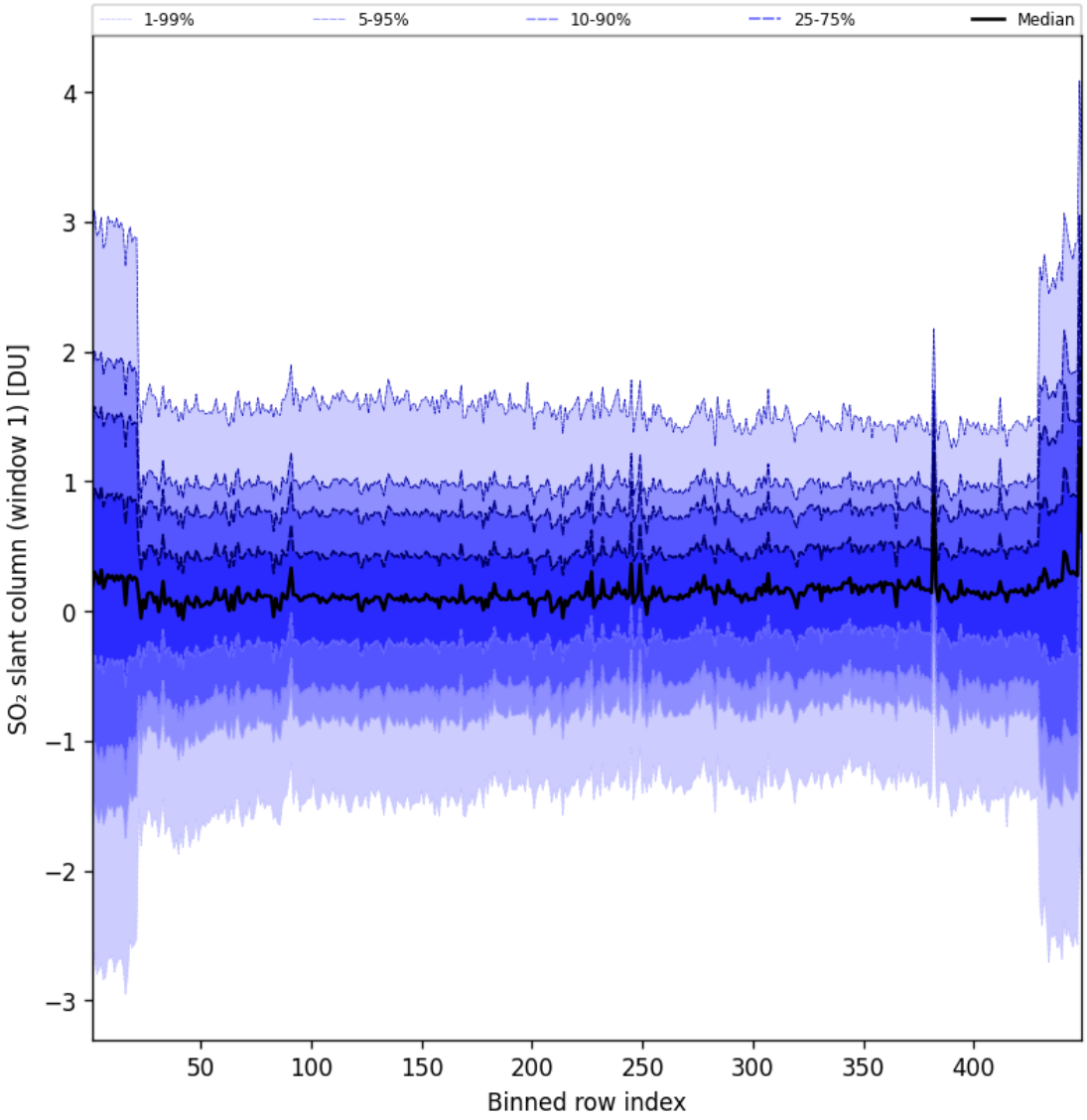

Figure 90: Along track statistics of "SO_2 slant column (window 1)" for 2024-12-25 to 2024-12-25

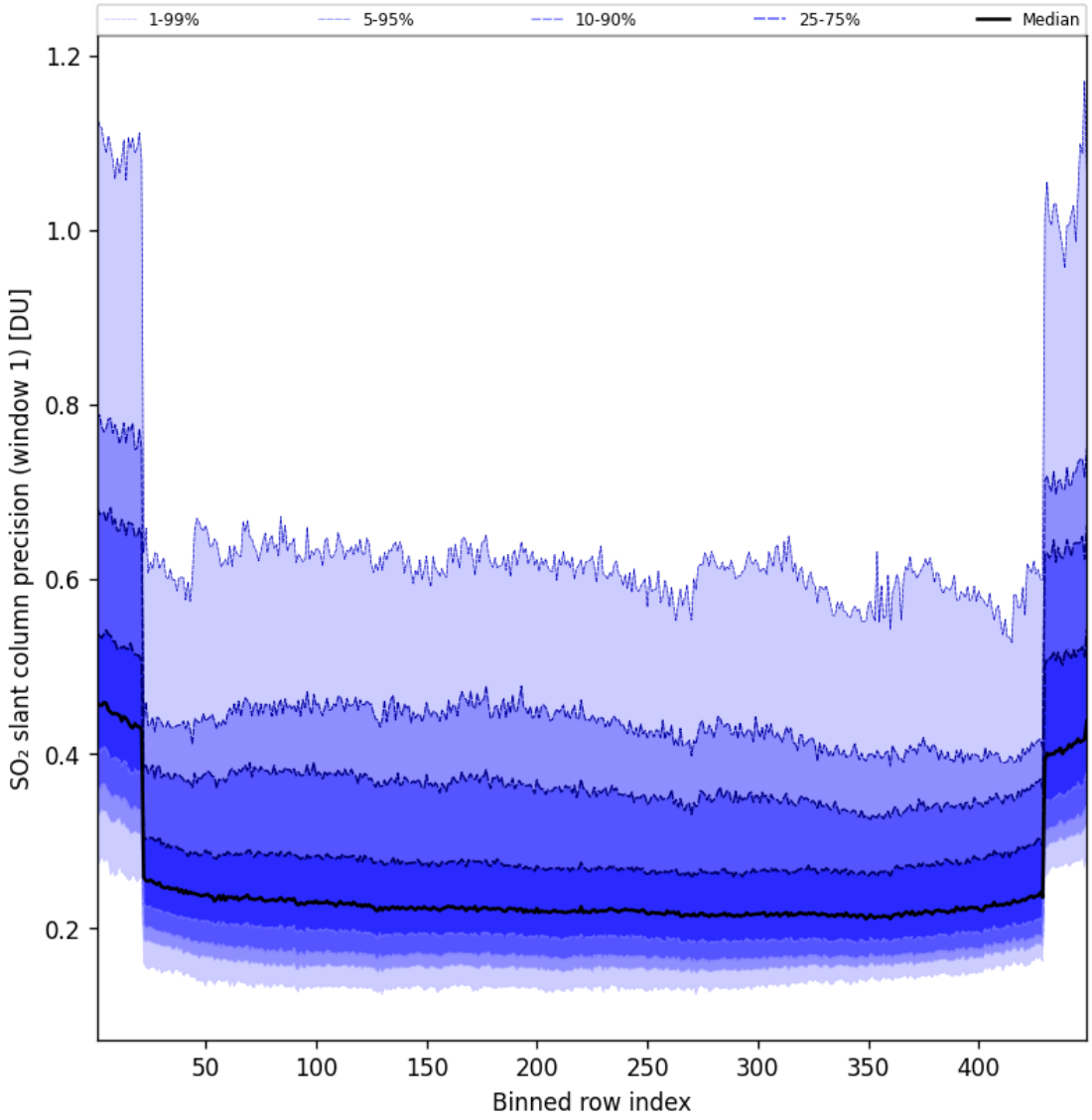

Figure 91: Along track statistics of "SO_2 slant column precision (window 1)" for 2024-12-25 to 2024-12-25

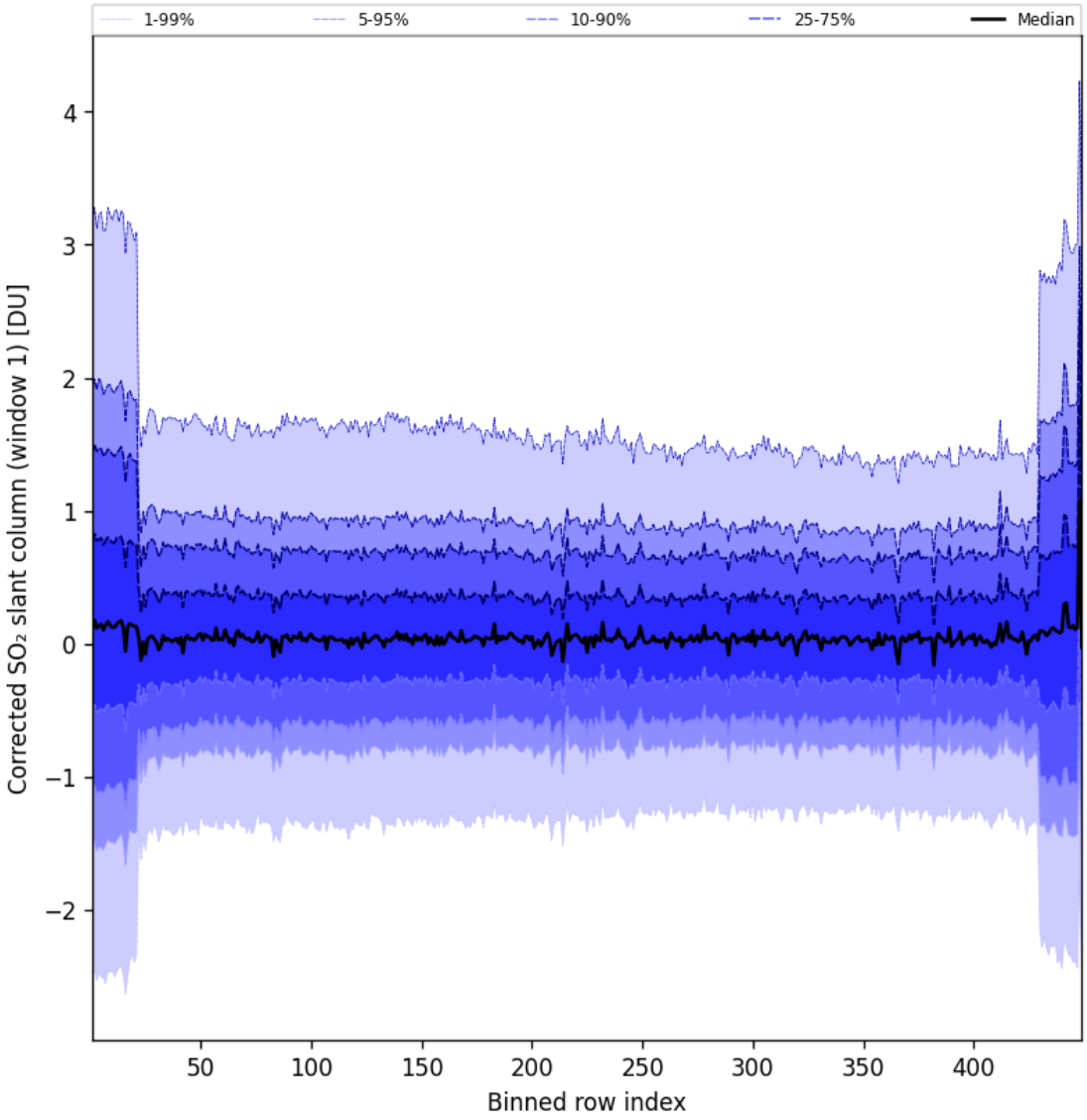

Figure 92: Along track statistics of "Corrected SO_2 slant column (window 1)" for 2024-12-25 to 2024-12-25

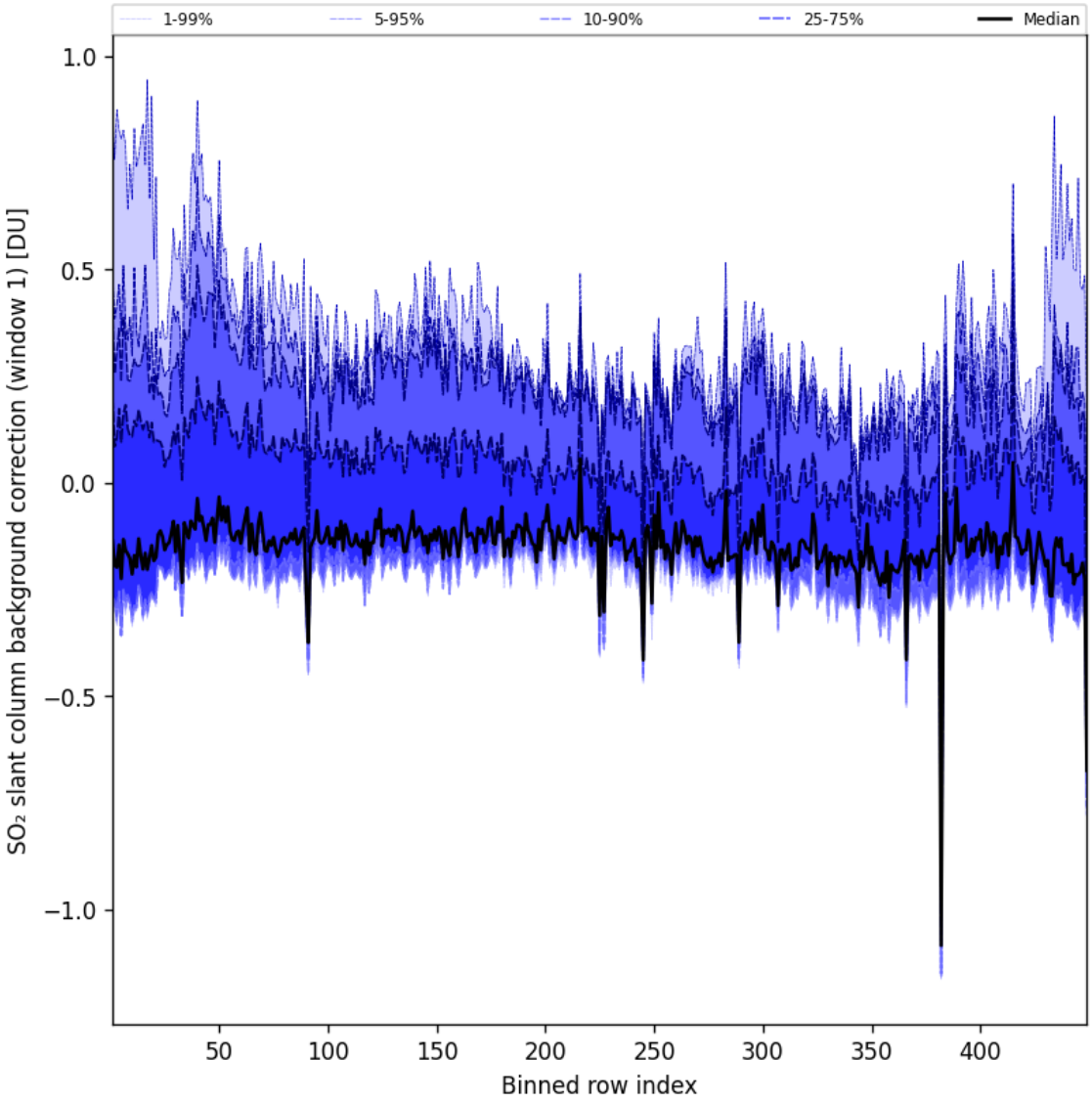

Figure 93: Along track statistics of "SO_2 slant column background correction (window 1)" for 2024-12-25 to 2024-12-25

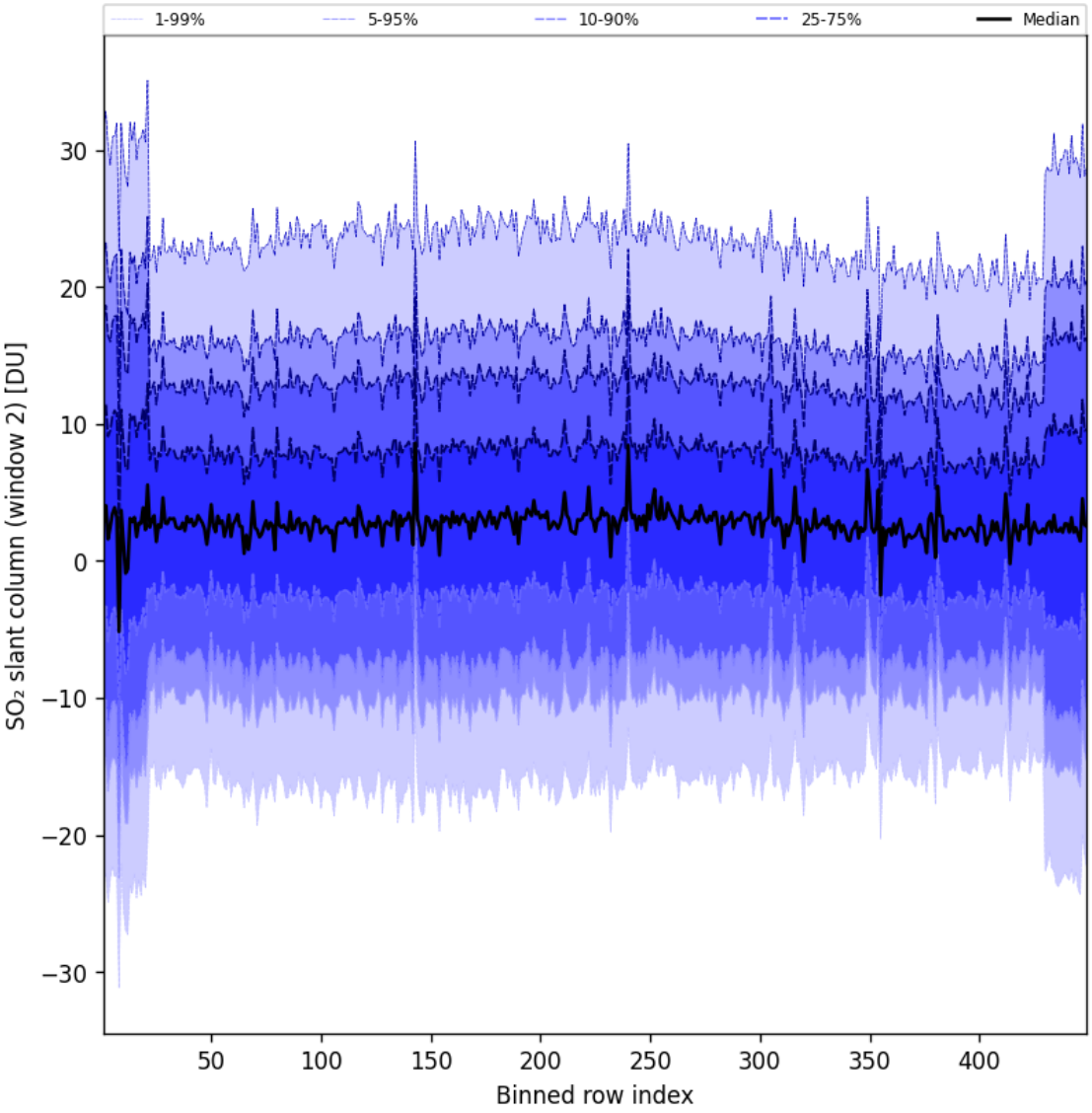

Figure 94: Along track statistics of "SO_2 slant column (window 2)" for 2024-12-25 to 2024-12-25

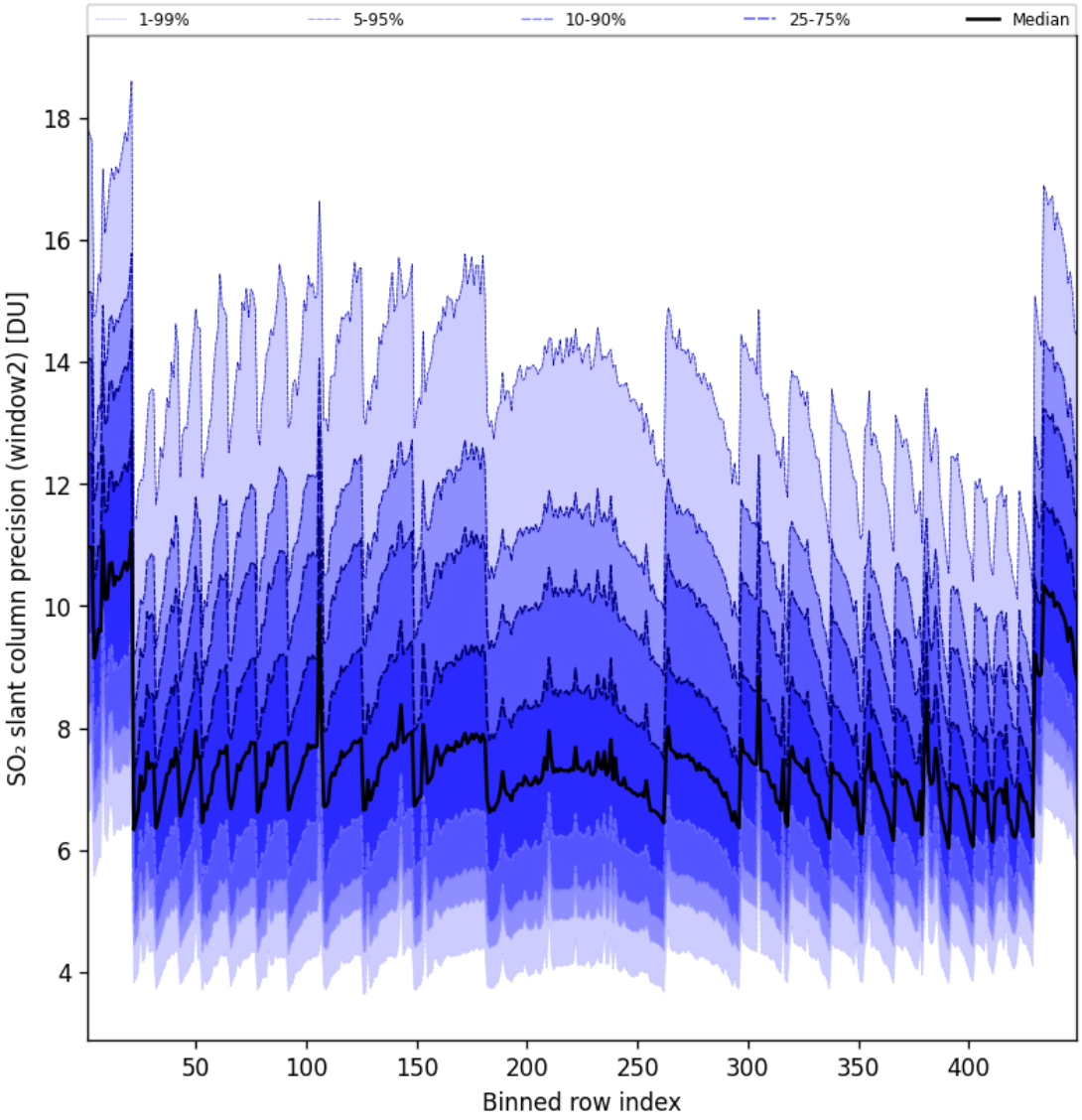

Figure 95: Along track statistics of "SO_2 slant column precision (window2)" for 2024-12-25 to 2024-12-25

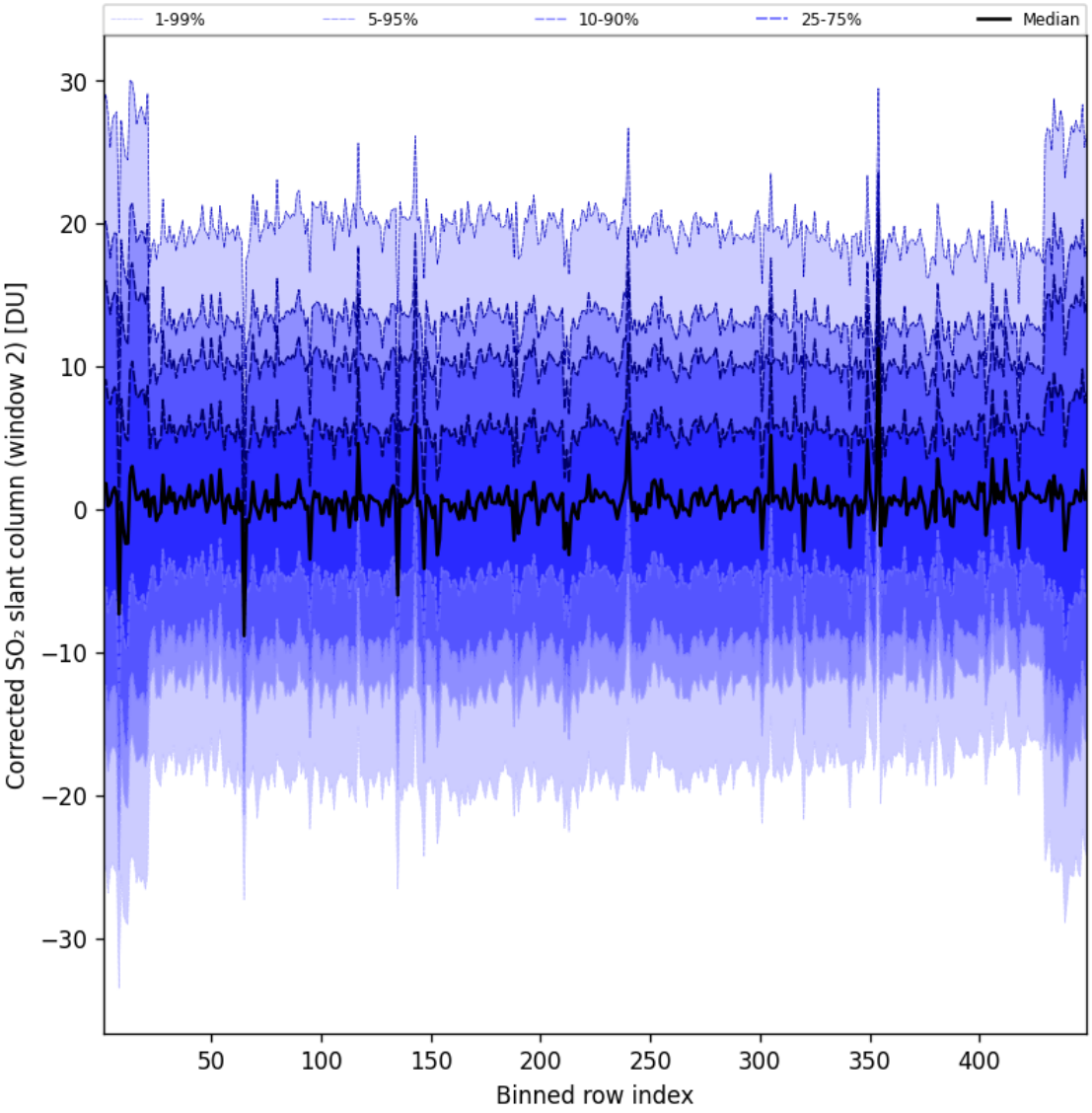

Figure 96: Along track statistics of “Corrected SO_2 slant column (window 2)” for 2024-12-25 to 2024-12-25

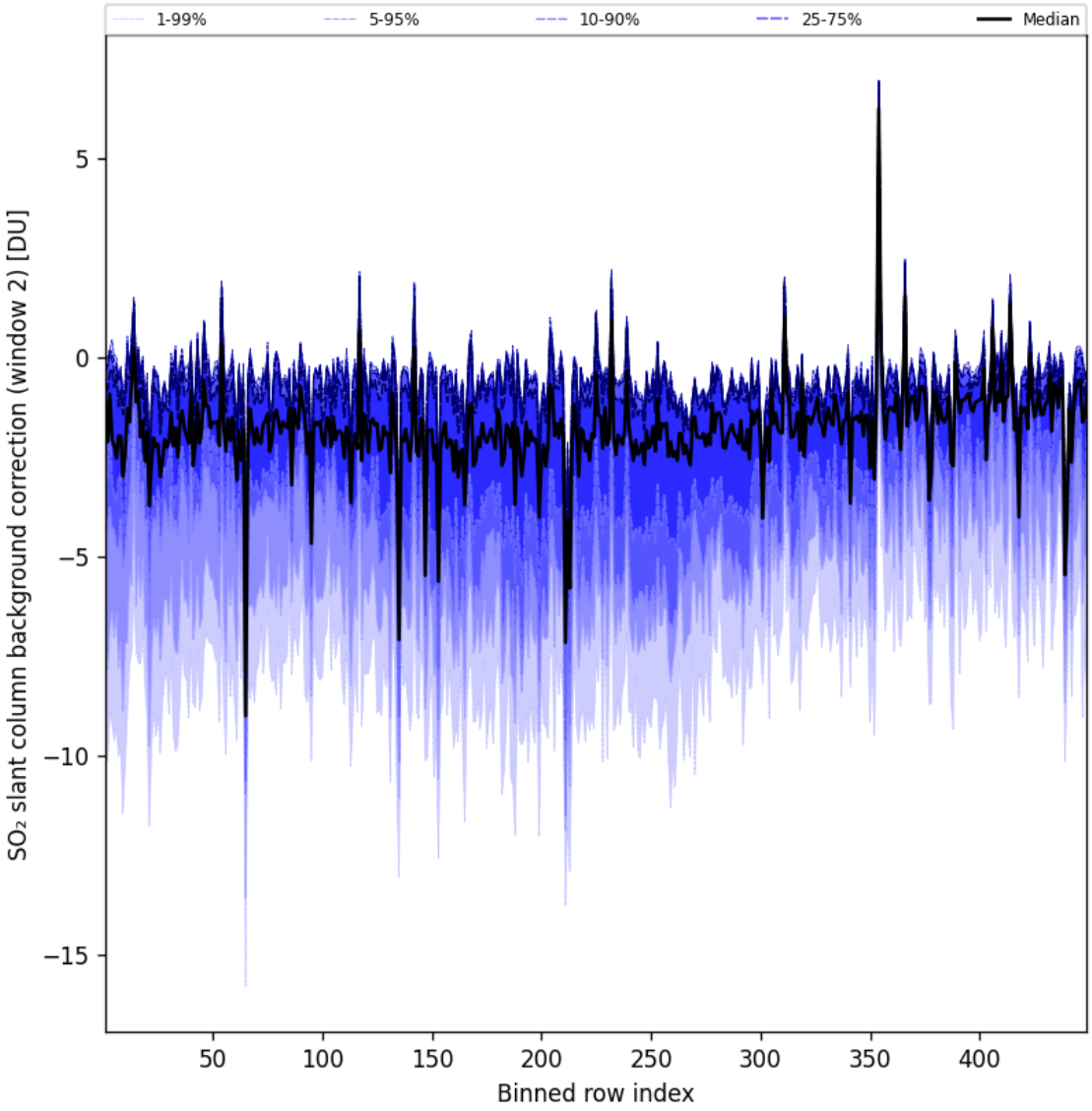

Figure 97: Along track statistics of "SO_2 slant column background correction (window 2)" for 2024-12-25 to 2024-12-25

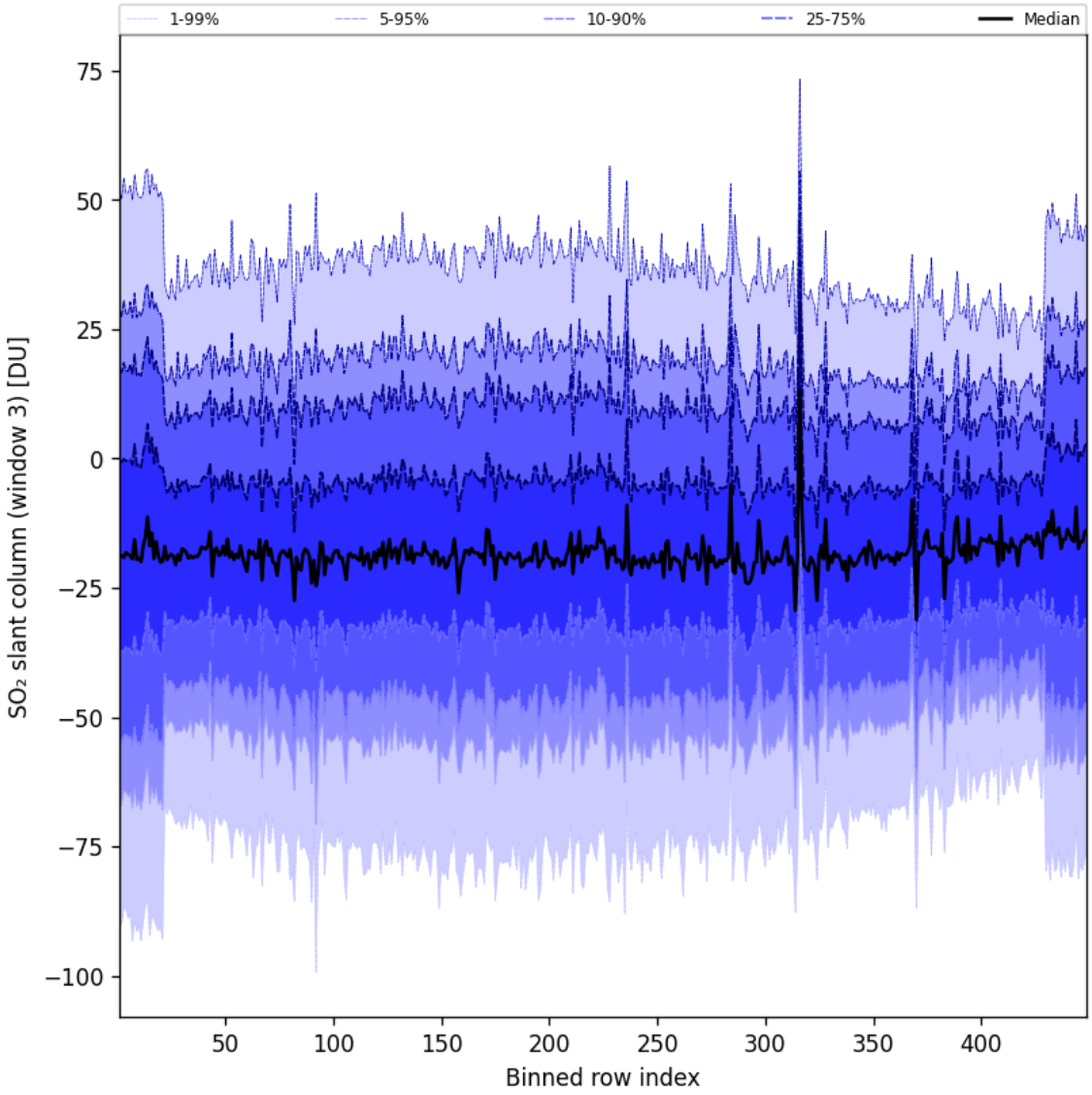

Figure 98: Along track statistics of "SO_2 slant column (window 3)" for 2024-12-25 to 2024-12-25

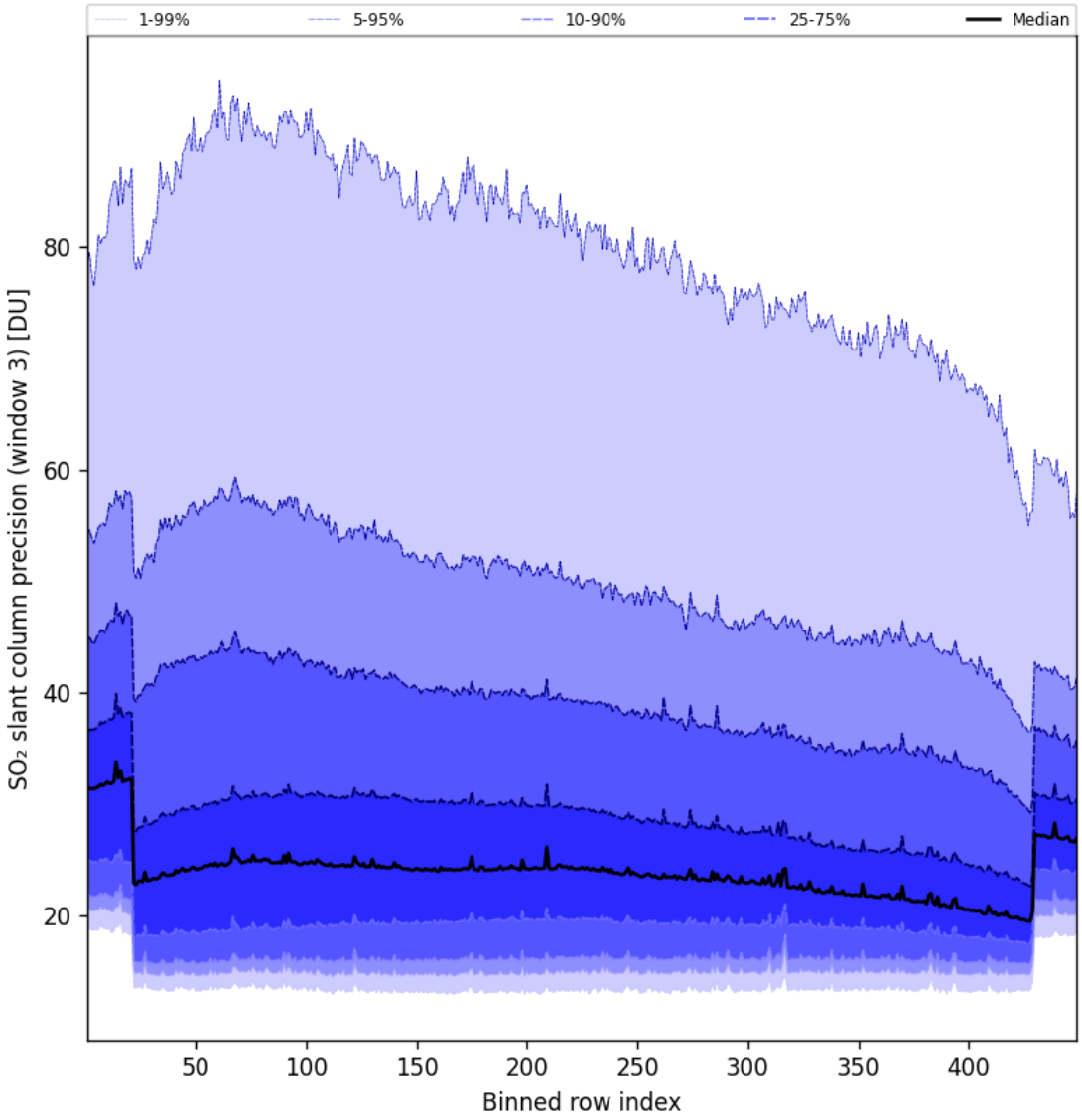

Figure 99: Along track statistics of "SO_2 slant column precision (window 3)" for 2024-12-25 to 2024-12-25

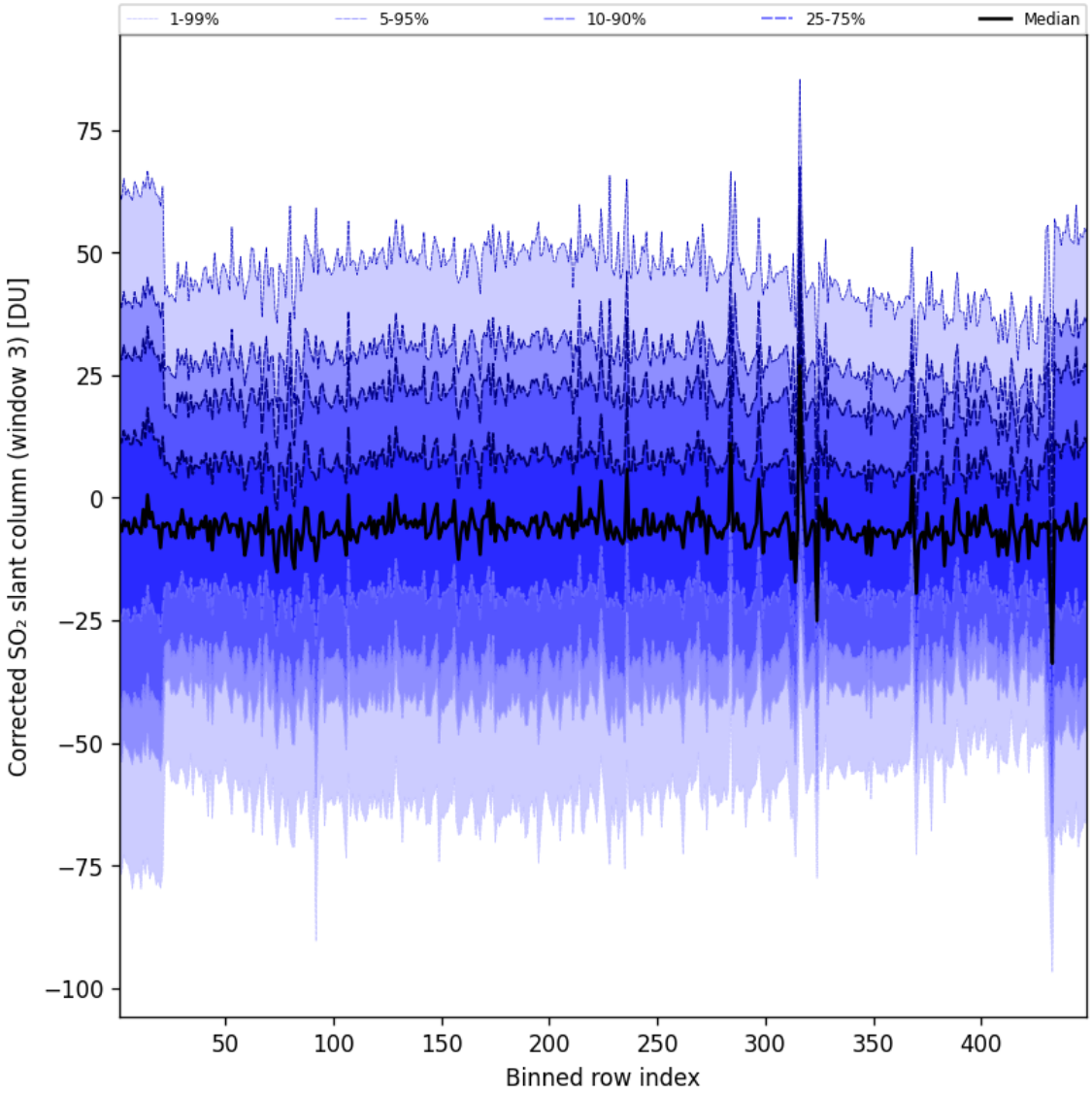

Figure 100: Along track statistics of “Corrected SO_2 slant column (window 3)” for 2024-12-25 to 2024-12-25

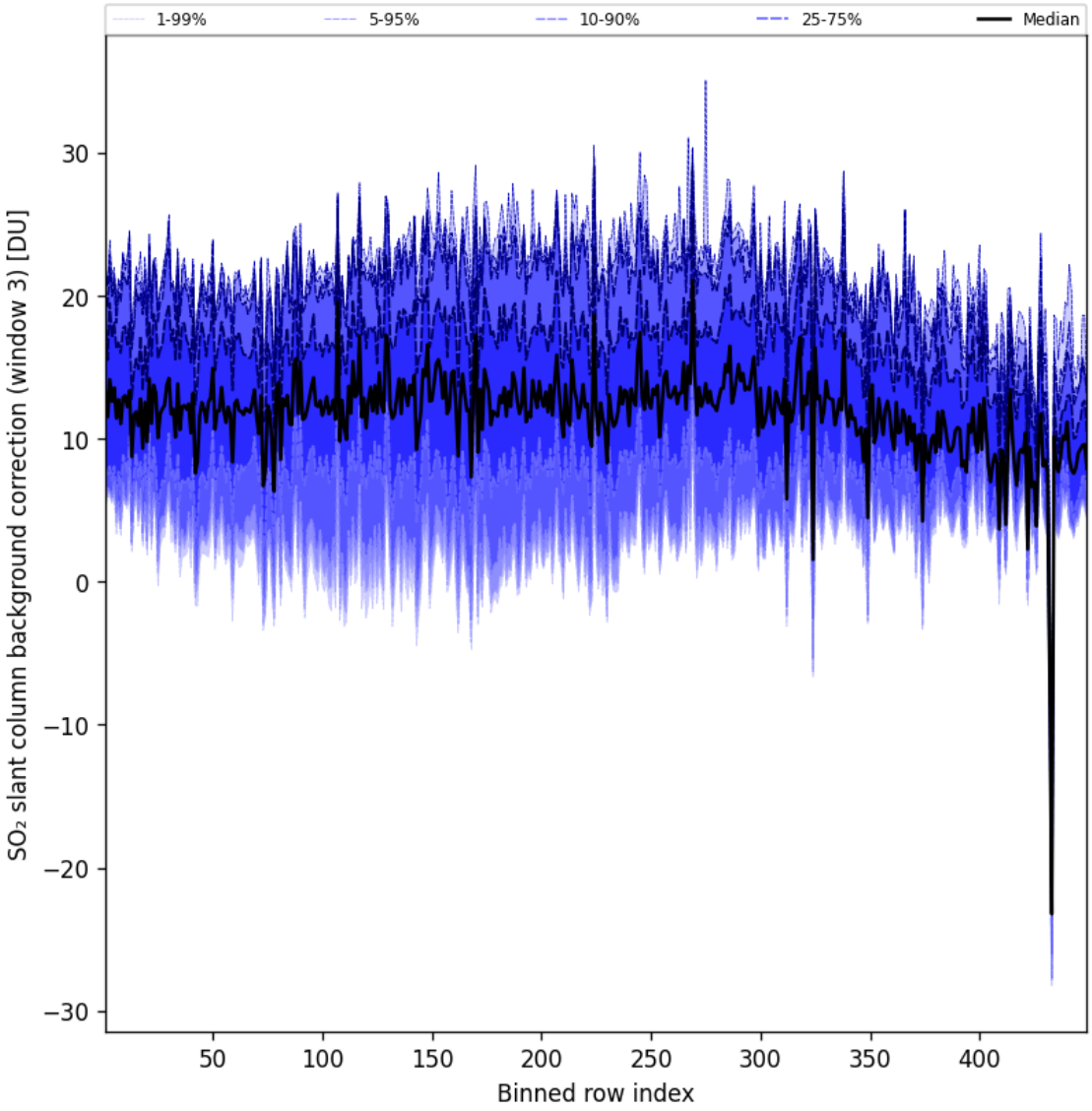

Figure 101: Along track statistics of "SO_2 slant column background correction (window 3)" for 2024-12-25 to 2024-12-25

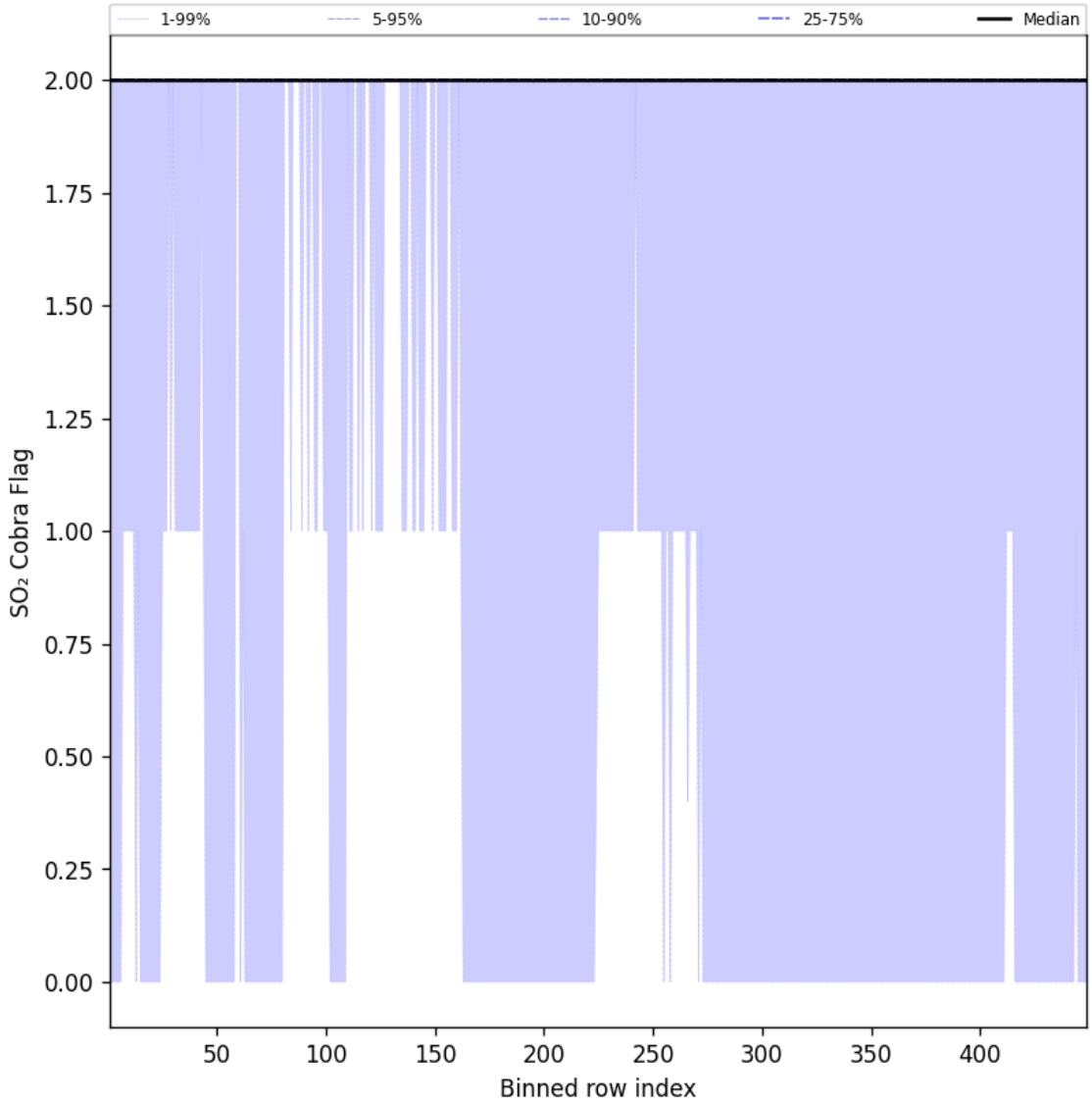

Figure 102: Along track statistics of "SO_2 Cobra Flag" for 2024-12-25 to 2024-12-25

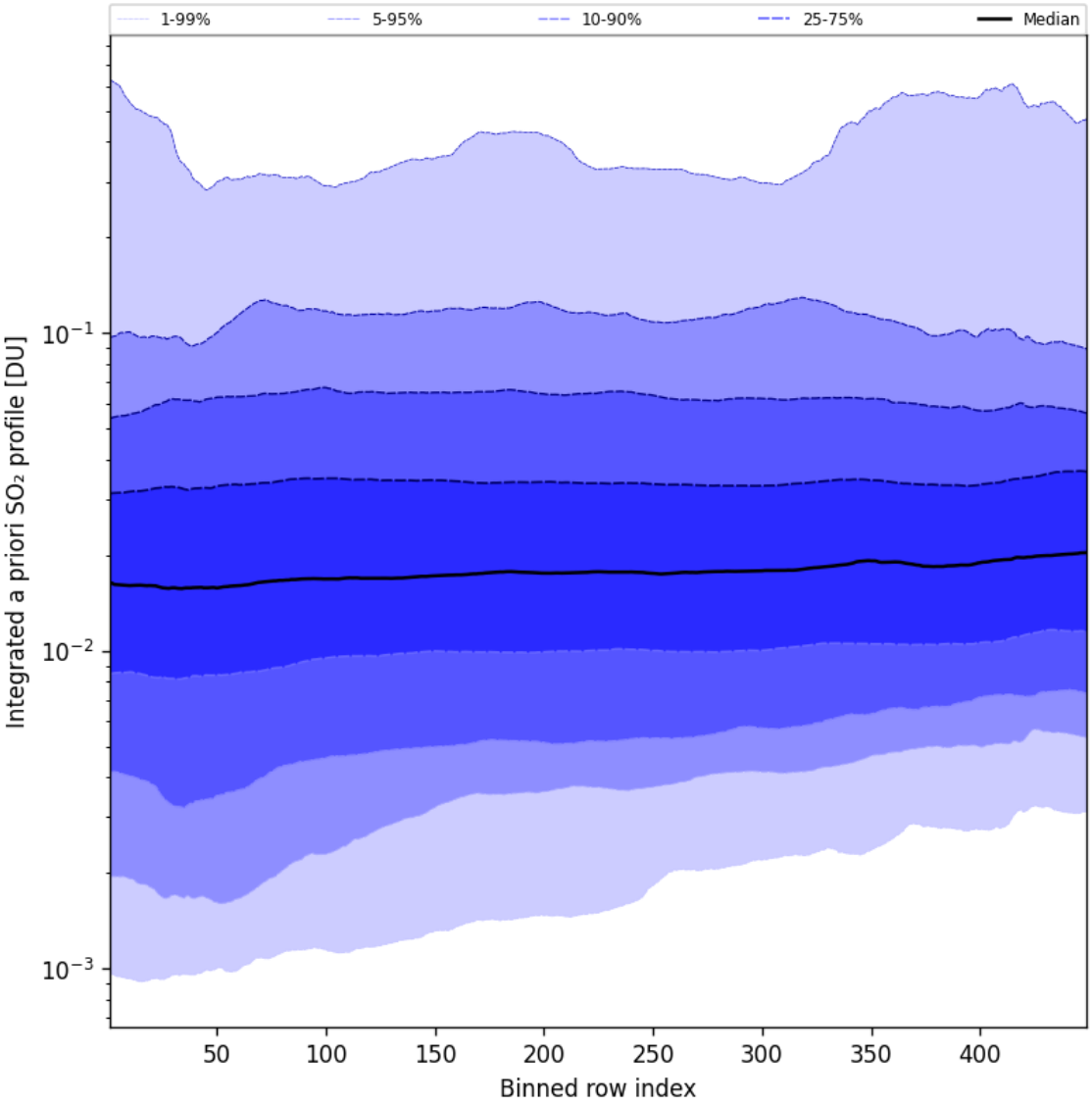

Figure 103: Along track statistics of “Integrated a priori SO_2 profile” for 2024-12-25 to 2024-12-25

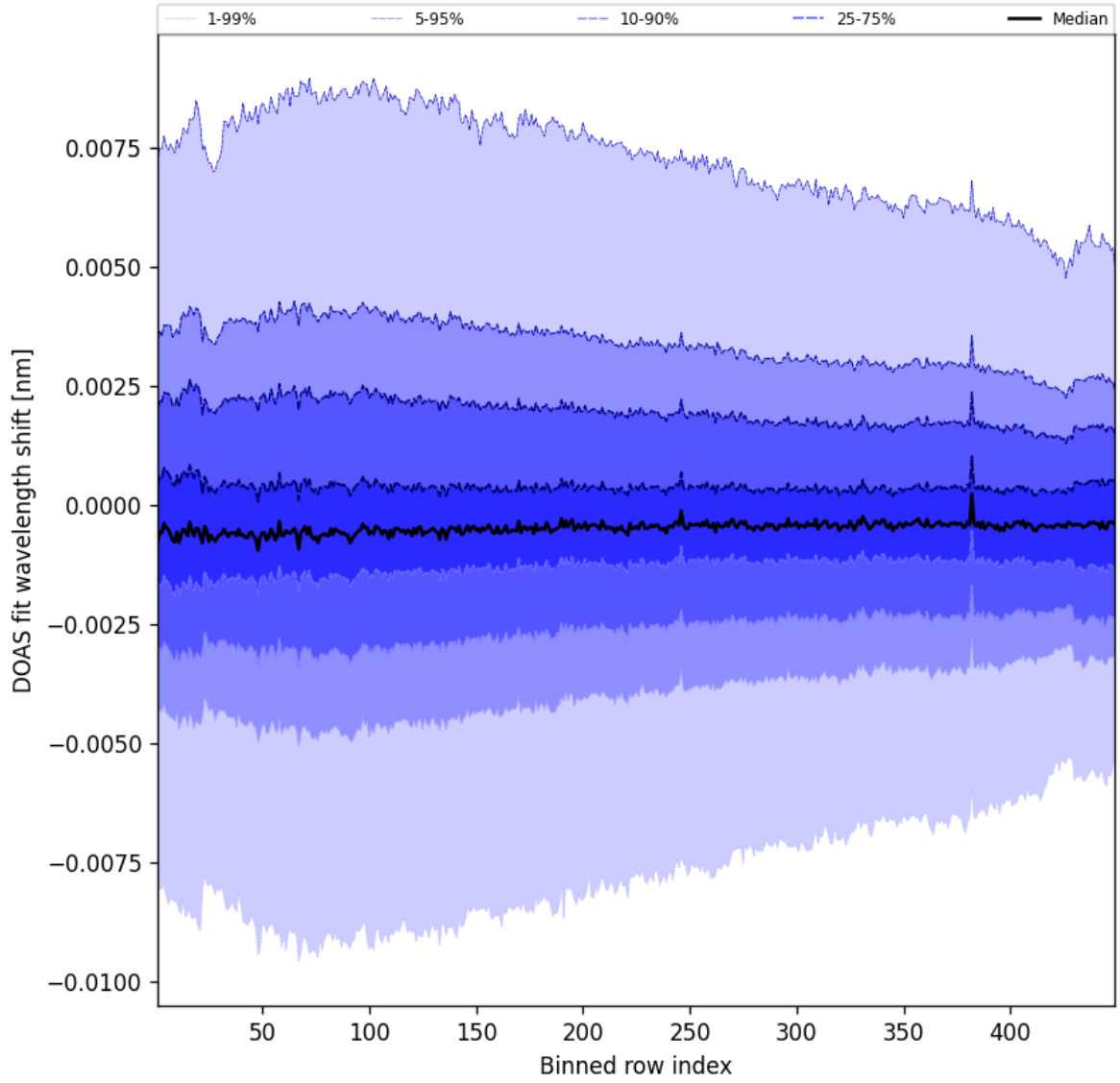

Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2024-12-25 to 2024-12-25

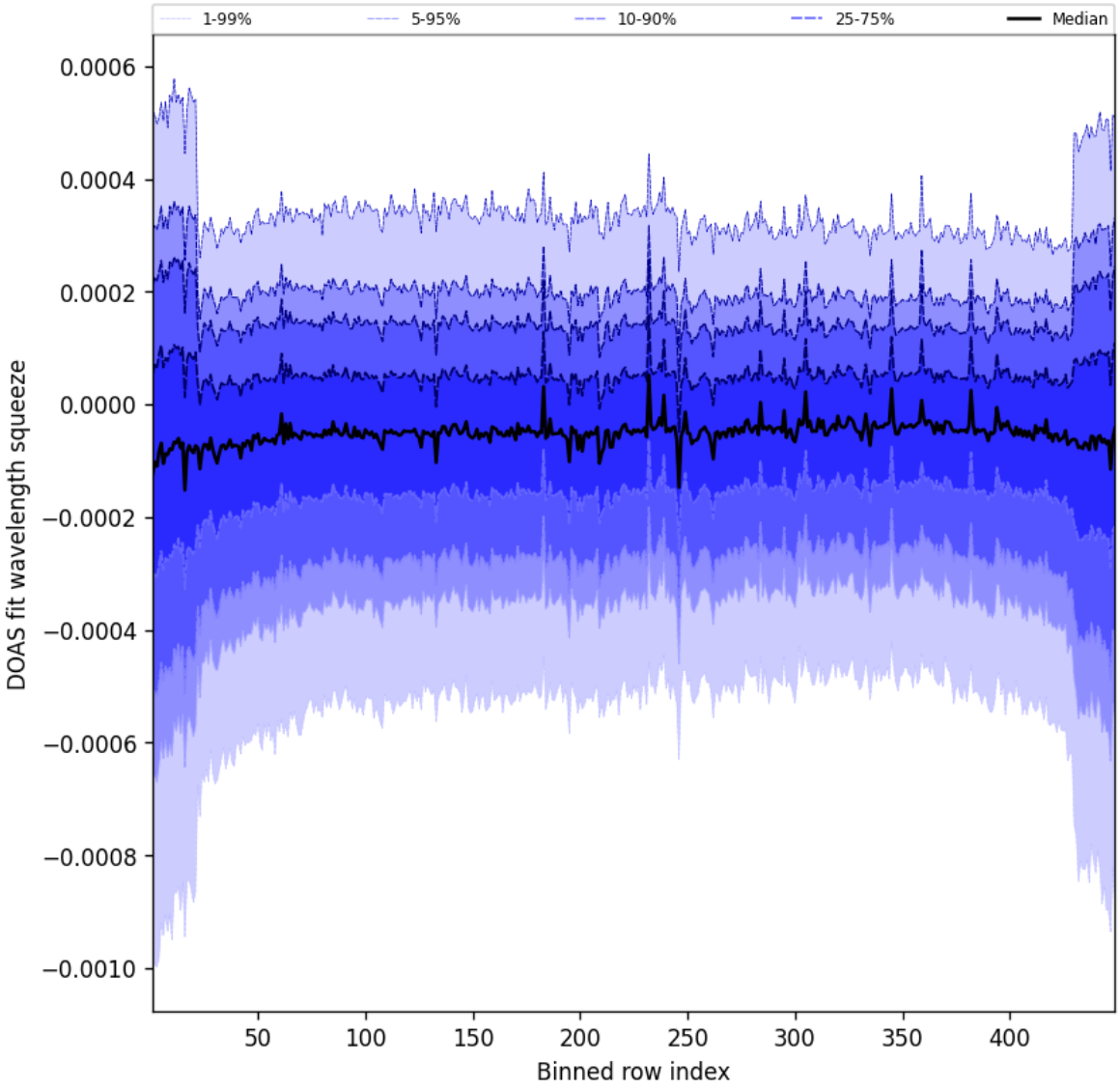

Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2024-12-25 to 2024-12-25

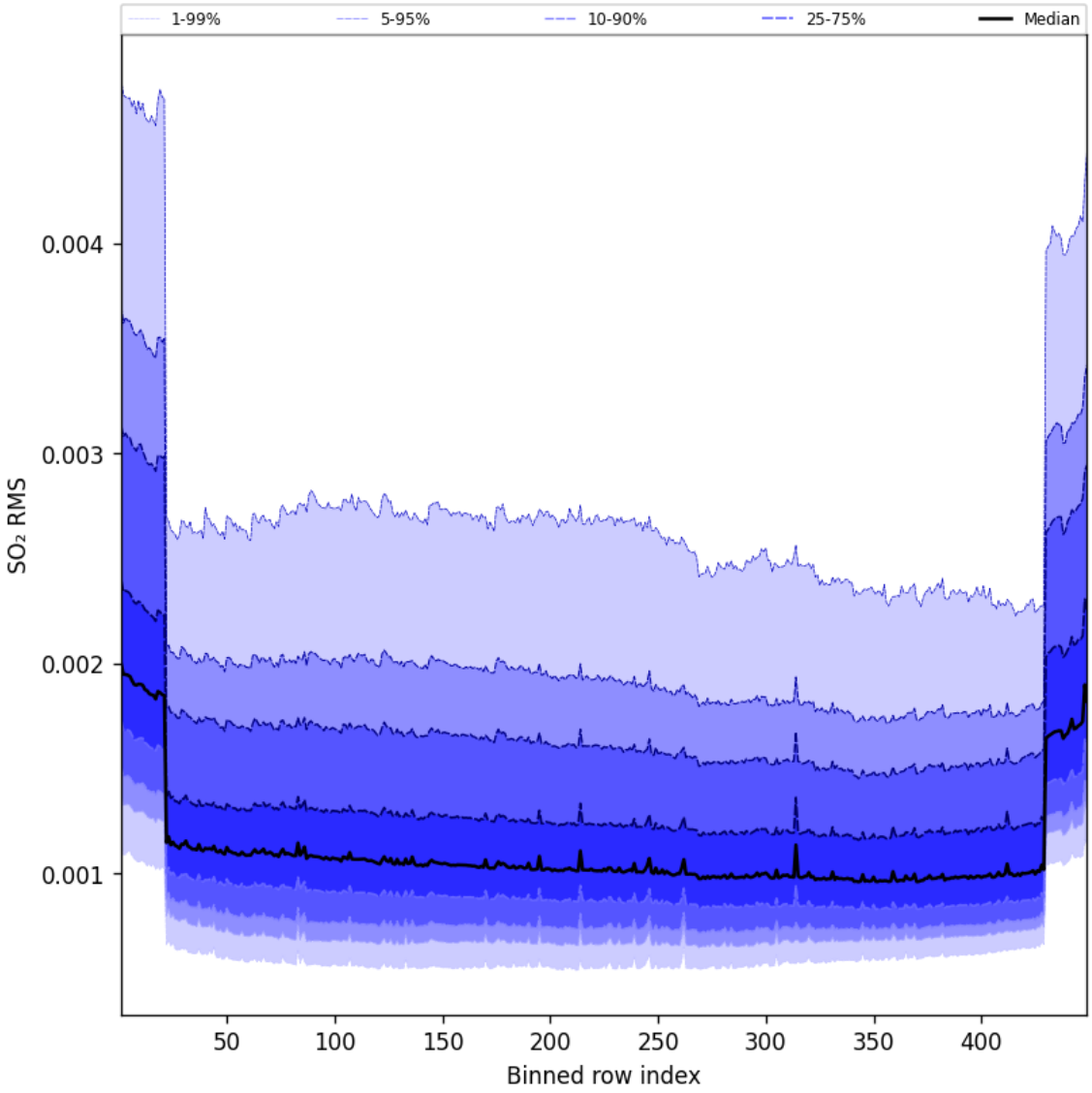

Figure 106: Along track statistics of "SO_2 RMS" for 2024-12-25 to 2024-12-25

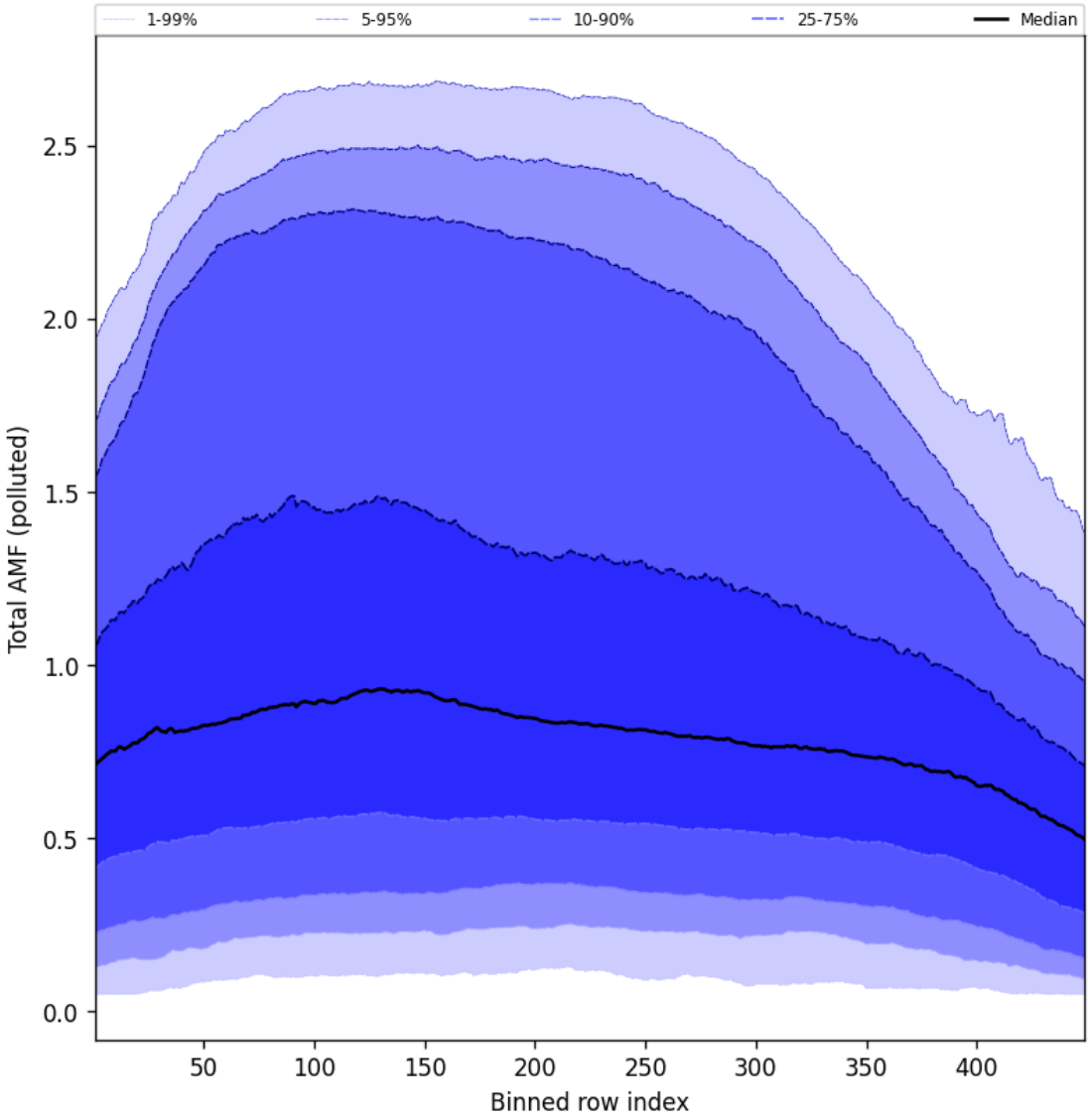

Figure 107: Along track statistics of “Total AMF (polluted)” for 2024-12-25 to 2024-12-25

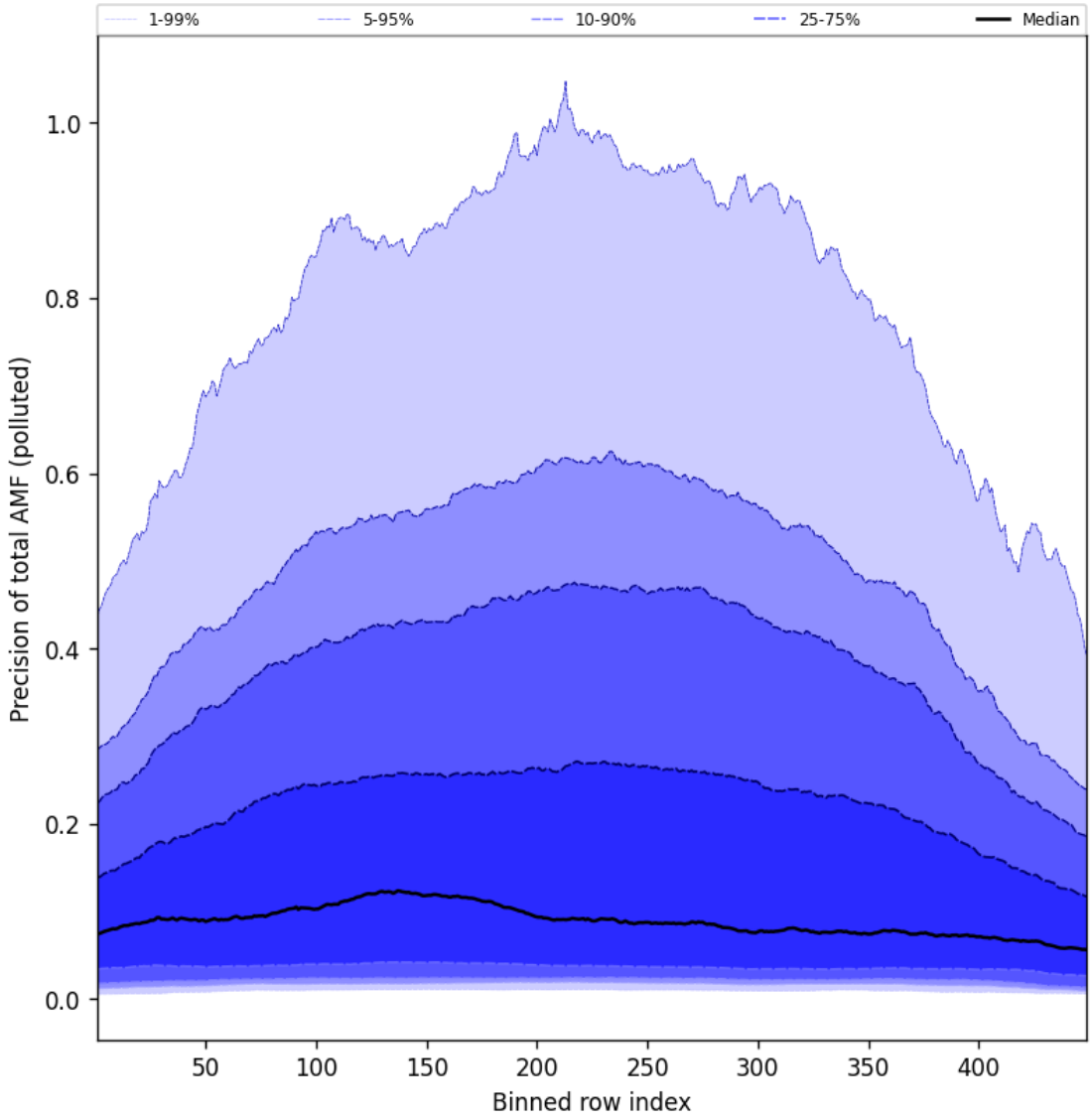

Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2024-12-25 to 2024-12-25

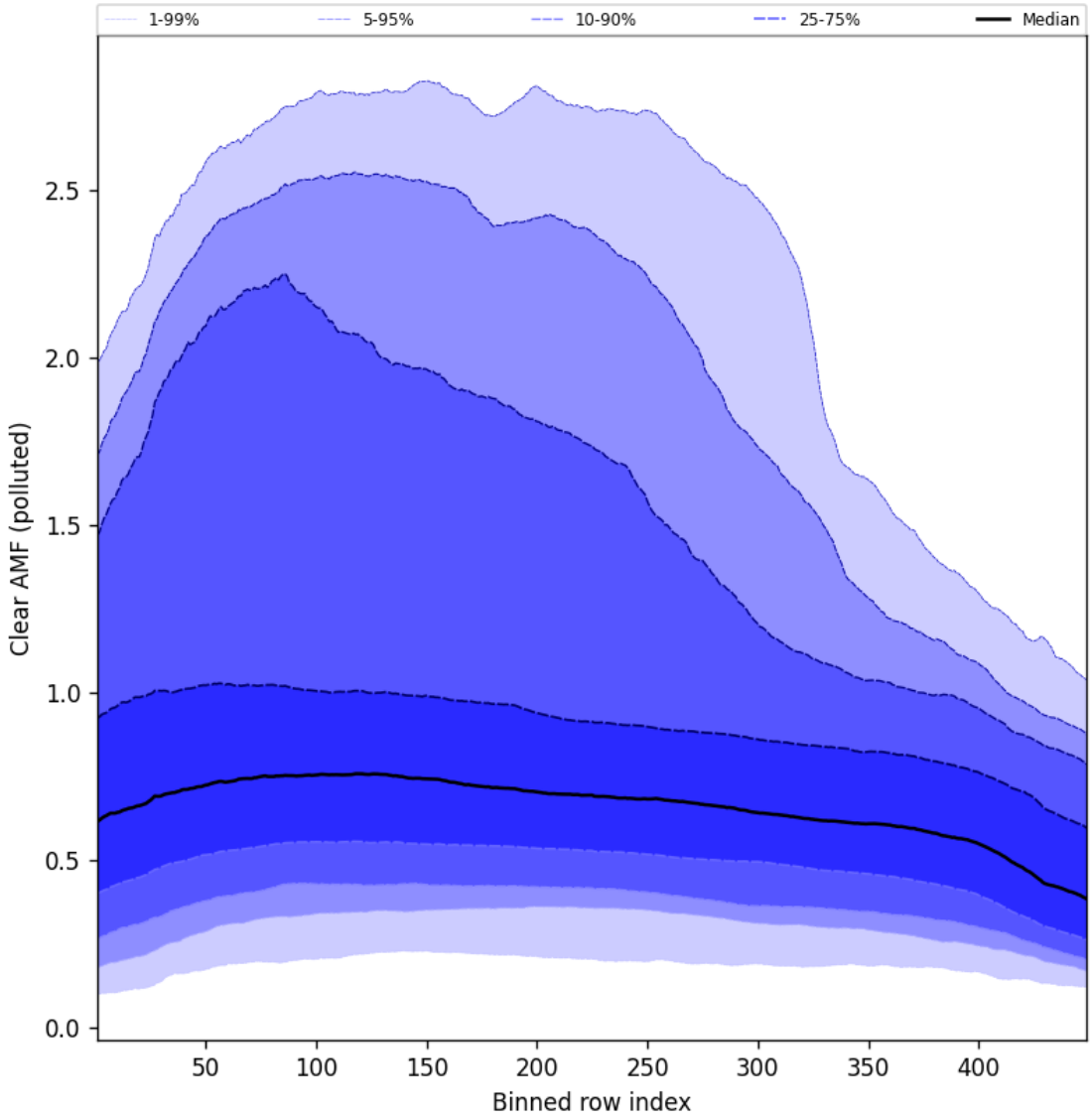

Figure 109: Along track statistics of “Clear AMF (polluted)” for 2024-12-25 to 2024-12-25

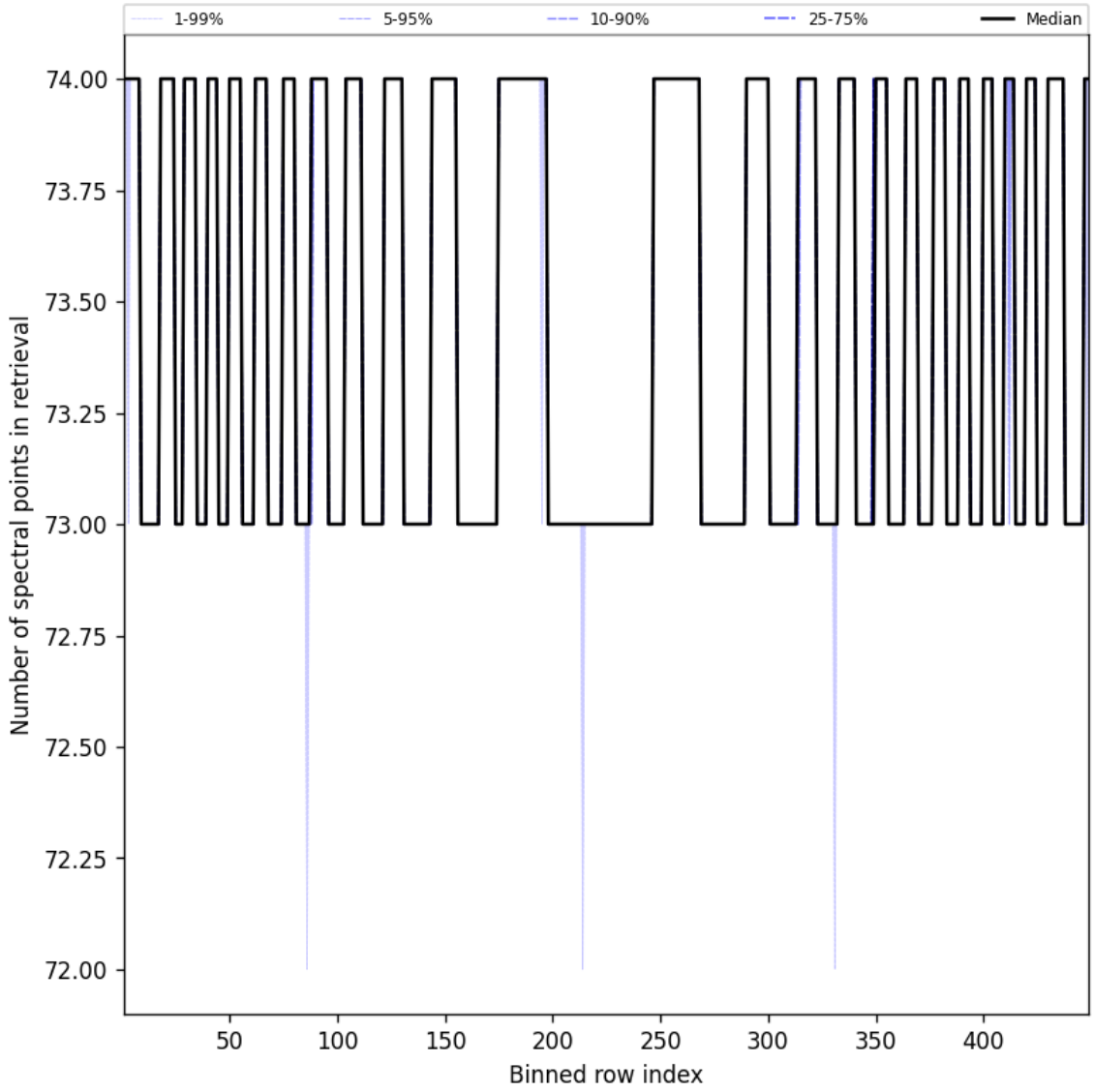

Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2024-12-25 to 2024-12-25

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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