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]	0.600 ± 0.423	17081261	0.995	0.840	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(3.958 \pm 143.080) \times 10^{-2}$	17081261	0.235	0.421	8.132×10^{-3}	-121	542
sulfurdioxide total vertical column precision [DU]	0.578 ± 0.974	17081261	0.222	0.361	0.322	2.602×10^{-2}	124
sulfurdioxide slant column density corrected [DU]	$(1.811 \pm 45.515) \times 10^{-2}$	17081261	0.242	0.342	7.870×10^{-3}	-22.2	404
sulfurdioxide slant column density cobra [DU]	$(1.757 \pm 37.663) \times 10^{-2}$	17081261	0.242	0.342	7.870×10^{-3}	-22.2	60.8
sulfurdioxide slant column density cobra precision [DU]	0.271 ± 0.115	17081261	0.213	0.103	0.235	7.201×10^{-2}	30.8
sulfurdioxide slant column density window1 [DU]	$(7.814 \pm 65.683) \times 10^{-2}$	17081261	7.500×10^{-2}	0.709	7.694×10^{-2}	-46.1	115
sulfurdioxide slant column density window1 precision [DU]	0.271 ± 0.115	17081261	0.213	0.103	0.235	7.201×10^{-2}	30.8
sulfurdioxide slant column density corrected win1 [DU]	$(2.412 \pm 64.525) \times 10^{-2}$	17081261	-2.500×10^{-2}	0.688	1.017×10^{-2}	-46.1	115
background so2 slant column offset window1 [DU]	$(-5.403 \pm 13.432) \times 10^{-2}$	17081261	-0.140	0.168	-8.720×10^{-2}	-1.48	2.66
sulfurdioxide slant column density window2 [DU]	0.413 ± 8.588	17081261	0.250	10.8	0.336	-1.146×10^{3}	965
sulfurdioxide slant column density window2 precision [DU]	7.75 ± 2.22	17081261	6.97	2.57	7.39	2.14	656
sulfurdioxide slant column density corrected win2 [DU]	-0.497 ± 8.440	17081261	-0.750	10.6	-0.488	-1.148×10^{3}	965
background so2 slant column offset window2 [DU]	-0.910 ± 1.998	17081261	0.250	2.56	-0.525	-11.1	8.72
sulfurdioxide slant column density window3 [DU]	-1.72 ± 23.32	17081261	-3.92	28.8	-2.08	-1.714×10^{3}	2.113×10^{3}
sulfurdioxide slant column density window3 precision [DU]	27.0 ± 12.7	17081261	21.5	9.97	23.7	9.60	1.352×10^{3}
sulfurdioxide slant column density corrected win3 [DU]	4.12 ± 22.55	17081261	3.92	27.6	4.15	-1.722×10^{3}	2.112×10^{3}
background so2 slant column offset window3 [DU]	5.84 ± 6.59	17081261	2.80	9.84	5.52	-17.3	27.1
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.22	17081261	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(3.774 \pm 10.639) \times 10^{-2}$	17081261	1.664×10^{-2}	2.392×10^{-2}	1.697×10^{-2}	7.116×10^{-5}	5.00
fitted radiance shift [nm]	$(-4.190 \pm 24.629) \times 10^{-4}$	17081261	-5.000×10^{-4}	1.636×10^{-3}	-4.715×10^{-4}	-4.288×10^{-2}	3.909×10^{-2}
fitted radiance squeeze [1]	$(-3.987 \pm 17.222) \times 10^{-5}$	17081261	-3.000×10^{-5}	2.036×10^{-4}	-3.519×10^{-5}	-1.692×10^{-2}	1.737×10^{-2}
fitted root mean square [1]	$(1.193 \pm 0.468) \times 10^{-3}$	17081261	9.750×10^{-4}	4.332×10^{-4}	1.066×10^{-3}	2.441×10^{-4}	0.115
sulfurdioxide total air mass factor polluted [1]	0.933 ± 0.656	17081261	0.620	0.655	0.748	5.000×10^{-2}	3.43
sulfurdioxide total air mass factor polluted precision [1]	0.160 ± 0.203	17081261	3.500×10^{-2}	0.174	8.194×10^{-2}	2.500×10^{-3}	1.75
sulfurdioxide clear air mass factor polluted [1]	0.783 ± 0.558	17081261	0.620	0.395	0.644	2.733×10^{-2}	3.50
number of spectral points in retrieval [1]	73.4 ± 0.5	17081261	73.0	1.000	73.0	52.0	156

Table 2: Percentile ranges

Variable	1 %	5 %	10 %	15.9 %	25 %	75 %	84.1 %	90 %	95 %	99 %
qa value [1]	0.0	0.0	2.000×10^{-2}	6.000×10^{-2}	0.160	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	−3.01	−0.947	−0.546	−0.354	−0.198	0.223	0.390	0.603	1.06	3.56
sulfurdioxide total vertical column precision [DU]	6.236×10^{-2}	8.973×10^{-2}	0.121	0.149	0.194	0.555	0.786	1.13	1.89	4.93
sulfurdioxide slant column density corrected [DU]	−0.783	−0.453	−0.331	−0.249	−0.162	0.180	0.272	0.360	0.497	0.920
sulfurdioxide slant column density cobra [DU]	−0.783	−0.453	−0.331	−0.249	−0.162	0.180	0.272	0.360	0.497	0.920
sulfurdioxide slant column density cobra precision [DU]	0.141	0.164	0.177	0.187	0.200	0.304	0.362	0.416	0.487	0.706
sulfurdioxide slant column density window1 [DU]	−1.54	−0.891	−0.640	−0.466	−0.280	0.429	0.610	0.782	1.04	1.74
sulfurdioxide slant column density window1 precision [DU]	0.141	0.164	0.177	0.187	0.200	0.304	0.362	0.416	0.487	0.706
sulfurdioxide slant column density corrected win1 [DU]	−1.51	−0.903	−0.668	−0.506	−0.331	0.357	0.540	0.715	0.980	1.73
background so2 slant column offset window1 [DU]	−0.297	−0.232	−0.197	−0.168	−0.142	2.676×10^{-2}	8.397×10^{-2}	0.133	0.197	0.325
sulfurdioxide slant column density window2 [DU]	−20.0	−13.3	−10.1	−7.70	−5.03	5.73	8.47	10.9	14.4	22.0
sulfurdioxide slant column density window2 precision [DU]	4.20	4.94	5.39	5.78	6.26	8.83	9.71	10.6	11.8	14.4
sulfurdioxide slant column density corrected win2 [DU]	−21.1	−14.1	−10.9	−8.45	−5.79	4.80	7.46	9.85	13.1	20.1
background so2 slant column offset window2 [DU]	−6.99	−4.72	−3.47	−2.73	−2.05	0.509	0.809	1.06	1.43	2.88
sulfurdioxide slant column density window3 [DU]	−60.2	−39.1	−29.8	−23.3	−16.2	12.6	20.3	27.4	37.1	56.1
sulfurdioxide slant column density window3 precision [DU]	13.5	15.4	16.8	18.1	19.7	29.7	34.2	39.4	50.3	81.3
sulfurdioxide slant column density corrected win3 [DU]	−53.6	−32.7	−23.3	−16.7	−9.61	18.0	25.2	31.8	40.8	59.6
background so2 slant column offset window3 [DU]	−7.64	−4.70	−2.67	−0.993	0.973	10.8	13.1	14.9	16.8	19.4
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]	7.426×10^{-4}	2.642×10^{-3}	4.371×10^{-3}	6.347×10^{-3}	8.931×10^{-3}	3.285×10^{-2}	4.572×10^{-2}	6.243×10^{-2}	0.126	0.365
fitted radiance shift [nm]	-7.922×10^{-3}	-3.974×10^{-3}	-2.602×10^{-3}	-1.862×10^{-3}	-1.276×10^{-3}	3.597×10^{-4}	1.026×10^{-3}	1.884×10^{-3}	3.385×10^{-3}	7.463×10^{-3}
fitted radiance squeeze [1]	-4.974×10^{-4}	-3.203×10^{-4}	-2.457×10^{-4}	-1.942×10^{-4}	-1.392×10^{-4}	6.437×10^{-5}	1.143×10^{-4}	1.601×10^{-4}	2.251×10^{-4}	3.786×10^{-4}
fitted root mean square [1]	5.888×10^{-4}	7.106×10^{-4}	7.809×10^{-4}	8.361×10^{-4}	9.025×10^{-4}	1.336×10^{-3}	1.560×10^{-3}	1.795×10^{-3}	2.119×10^{-3}	2.889×10^{-3}
sulfurdioxide total air mass factor polluted [1]	6.007×10^{-2}	0.188	0.293	0.388	0.500	1.16	1.51	1.95	2.42	2.98
sulfurdioxide total air mass factor polluted precision [1]	8.922×10^{-3}	1.592×10^{-2}	2.224×10^{-2}	2.757×10^{-2}	3.435×10^{-2}	0.208	0.291	0.385	0.542	1.03
sulfurdioxide clear air mass factor polluted [1]	0.166	0.270	0.348	0.406	0.479	0.874	1.01	1.22	2.23	3.14
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]	0.718 ± 0.391	5910128	0.670	1.000	0.0	1.000	0.330	1.000
sulfurdioxide total vertical column [DU]	$(7.228 \pm 199.177) \times 10^{-2}$	5910128	0.628	1.740×10^{-2}	-121	542	-0.289	0.339
sulfurdioxide total vertical column precision [DU]	0.874 ± 1.363	5910128	0.606	0.441	5.170×10^{-2}	124	0.280	0.887
sulfurdioxide slant column density corrected [DU]	$(2.756 \pm 41.880) \times 10^{-2}$	5910128	0.400	1.254×10^{-2}	-11.9	45.2	-0.185	0.215
sulfurdioxide slant column density cobra [DU]	$(2.747 \pm 41.444) \times 10^{-2}$	5910128	0.400	1.254×10^{-2}	-11.9	15.0	-0.185	0.215
sulfurdioxide slant column density cobra precision [DU]	0.321 ± 0.140	5910128	0.154	0.281	9.361×10^{-2}	30.8	0.226	0.380
sulfurdioxide slant column density window1 [DU]	0.140 ± 0.734	5910128	0.796	0.138	-46.1	26.4	-0.260	0.535
sulfurdioxide slant column density window1 precision [DU]	0.321 ± 0.140	5910128	0.154	0.281	9.361×10^{-2}	30.8	0.226	0.380
sulfurdioxide slant column density corrected win1 [DU]	$(4.394 \pm 73.374) \times 10^{-2}$	5910128	0.791	1.992×10^{-2}	-46.1	26.3	-0.369	0.422
background so2 slant column offset window1 [DU]	$(-9.624 \pm 11.858) \times 10^{-2}$	5910128	0.103	-0.110	-0.726	2.66	-0.161	-5.775×10^{-2}
sulfurdioxide slant column density window2 [DU]	0.798 ± 9.742	5910128	12.4	0.540	-216	129	-5.54	6.84
sulfurdioxide slant column density window2 precision [DU]	8.81 ± 2.29	5910128	2.86	8.50	2.27	391	7.22	10.1
sulfurdioxide slant column density corrected win2 [DU]	-0.496 ± 9.498	5910128	12.1	-0.494	-220	126	-6.55	5.55
background so2 slant column offset window2 [DU]	-1.29 ± 2.45	5910128	3.10	-0.424	-11.1	8.20	-2.66	0.441
sulfurdioxide slant column density window3 [DU]	-3.49 ± 26.33	5910128	33.2	-2.92	-238	171	-19.7	13.4
sulfurdioxide slant column density window3 precision [DU]	30.3 ± 12.7	5910128	10.2	27.4	9.81	227	23.3	33.4
sulfurdioxide slant column density corrected win3 [DU]	3.53 ± 25.88	5910128	32.6	3.81	-224	184	-12.6	20.1
background so2 slant column offset window3 [DU]	7.02 ± 5.23	5910128	8.28	6.01	-8.52	27.1	2.88	11.2
sulfurdioxide slant column cobra flag [1]	1.96 ± 0.28	5910128	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(7.293 \pm 16.988) \times 10^{-2}$	5910128	4.395×10^{-2}	3.140×10^{-2}	5.675×10^{-4}	5.00	1.661×10^{-2}	6.056×10^{-2}
fitted radiance shift [nm]	$(-2.022 \pm 25.158) \times 10^{-4}$	5910128	1.674×10^{-3}	-2.328×10^{-4}	-3.994×10^{-2}	3.879×10^{-2}	-1.064×10^{-3}	6.102×10^{-4}
fitted radiance squeeze [1]	$(-3.552 \pm 186.291) \times 10^{-6}$	5910128	2.165×10^{-4}	-2.359×10^{-6}	-1.692×10^{-2}	4.233×10^{-3}	-1.108×10^{-4}	1.056×10^{-4}
fitted root mean square [1]	$(1.392 \pm 0.569) \times 10^{-3}$	5910128	6.389×10^{-4}	1.228×10^{-3}	3.661×10^{-4}	0.115	1.008×10^{-3}	1.647×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.673 ± 0.363	5910128	0.493	0.642	5.000×10^{-2}	2.80	0.399	0.892
sulfurdioxide total air mass factor polluted precision [1]	$(8.810 \pm 11.669) \times 10^{-2}$	5910128	7.561×10^{-2}	4.645×10^{-2}	2.500×10^{-3}	1.75	2.879×10^{-2}	0.104
sulfurdioxide clear air mass factor polluted [1]	0.620 ± 0.263	5910128	0.398	0.622	2.733×10^{-2}	1.98	0.413	0.812
number of spectral points in retrieval [1]	73.5 ± 0.5	5910128	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]	0.537 ± 0.426	11171133	0.900	0.450	0.0	1.000	0.1000	1.000
sulfurdioxide total vertical column [DU]	$(2.228 \pm 101.516) \times 10^{-2}$	11171133	0.343	5.525×10^{-3}	-42.6	423	-0.164	0.179
sulfurdioxide total vertical column precision [DU]	0.421 ± 0.629	11171133	0.290	0.269	2.602×10^{-2}	30.3	0.158	0.449
sulfurdioxide slant column density corrected [DU]	$(1.311 \pm 47.318) \times 10^{-2}$	11171133	0.316	5.913×10^{-3}	-22.2	404	-0.151	0.165
sulfurdioxide slant column density cobra [DU]	$(1.233 \pm 35.489) \times 10^{-2}$	11171133	0.316	5.913×10^{-3}	-22.2	60.8	-0.151	0.165
sulfurdioxide slant column density cobra precision [DU]	0.245 ± 0.089	11171133	7.275×10^{-2}	0.221	7.201×10^{-2}	17.7	0.193	0.265
sulfurdioxide slant column density window1 [DU]	$(4.532 \pm 60.932) \times 10^{-2}$	11171133	0.667	4.962×10^{-2}	-42.4	115	-0.289	0.378
sulfurdioxide slant column density window1 precision [DU]	0.245 ± 0.089	11171133	7.275×10^{-2}	0.221	7.201×10^{-2}	17.7	0.193	0.265
sulfurdioxide slant column density corrected win1 [DU]	$(1.363 \pm 59.285) \times 10^{-2}$	11171133	0.642	5.914×10^{-3}	-42.4	115	-0.314	0.328
background so2 slant column offset window1 [DU]	$(-3.169 \pm 13.677) \times 10^{-2}$	11171133	0.194	-6.035×10^{-2}	-1.48	1.72	-0.133	6.048×10^{-2}
sulfurdioxide slant column density window2 [DU]	0.209 ± 7.902	11171133	10.0	0.248	-1.146×10^{3}	965	-4.79	5.26
sulfurdioxide slant column density window2 precision [DU]	7.19 ± 1.97	11171133	2.11	6.92	2.14	656	5.95	8.06
sulfurdioxide slant column density corrected win2 [DU]	-0.497 ± 7.822	11171133	9.91	-0.486	-1.148×10^{3}	965	-5.45	4.46
background so2 slant column offset window2 [DU]	-0.707 ± 1.678	11171133	2.44	-0.578	-6.95	8.72	-1.89	0.556
sulfurdioxide slant column density window3 [DU]	-0.791 ± 21.505	11171133	26.9	-1.72	-1.714×10^{3}	2.113×10^{3}	-14.7	12.2
sulfurdioxide slant column density window3 precision [DU]	25.2 ± 12.4	11171133	7.97	21.9	9.60	1.352×10^{3}	18.6	26.6
sulfurdioxide slant column density corrected win3 [DU]	4.43 ± 20.57	11171133	25.5	4.29	-1.722×10^{3}	2.112×10^{3}	-8.33	17.1
background so2 slant column offset window3 [DU]	5.22 ± 7.13	11171133	11.2	5.18	-17.3	26.9	-0.619	10.6
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.18	11171133	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(1.912 \pm 3.223) \times 10^{-2}$	11171133	1.546×10^{-2}	1.308×10^{-2}	7.116×10^{-5}	1.39	6.795×10^{-3}	2.226×10^{-2}
fitted radiance shift [nm]	$(-5.337 \pm 24.266) \times 10^{-4}$	11171133	1.560×10^{-3}	-5.879×10^{-4}	-4.288×10^{-2}	3.909×10^{-2}	-1.362×10^{-3}	1.988×10^{-4}
fitted radiance squeeze [1]	$(-5.908 \pm 16.101) \times 10^{-5}$	11171133	1.952×10^{-4}	-5.080×10^{-5}	-1.630×10^{-2}	1.737×10^{-2}	-1.519×10^{-4}	4.328×10^{-5}
fitted root mean square [1]	$(1.088 \pm 0.363) \times 10^{-3}$	11171133	3.341×10^{-4}	1.007×10^{-3}	2.441×10^{-4}	5.315×10^{-2}	8.680×10^{-4}	1.202×10^{-3}
sulfurdioxide total air mass factor polluted [1]	1.07 ± 0.73	11171133	0.874	0.837	5.000×10^{-2}	3.43	0.547	1.42
sulfurdioxide total air mass factor polluted precision [1]	0.198 ± 0.227	11171133	0.223	0.127	4.358×10^{-3}	1.75	4.072×10^{-2}	0.264
sulfurdioxide clear air mass factor polluted [1]	0.870 ± 0.646	11171133	0.433	0.658	9.818×10^{-2}	3.50	0.498	0.932
number of spectral points in retrieval [1]	73.4 ± 0.5	11171133	1.000	73.0	52.0	156	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]	0.643 ± 0.415	12061966	0.790	1.000	0.0	1.000	0.210	1.000
sulfurdioxide total vertical column [DU]	$(2.407 \pm 105.130) \times 10^{-2}$	12061966	0.442	8.754×10^{-3}	-97.3	423	-0.210	0.232
sulfurdioxide total vertical column precision [DU]	0.537 ± 0.788	12061966	0.319	0.327	4.622×10^{-2}	124	0.216	0.535
sulfurdioxide slant column density corrected [DU]	$(1.260 \pm 32.375) \times 10^{-2}$	12061966	0.331	7.251×10^{-3}	-22.2	404	-0.157	0.174
sulfurdioxide slant column density cobra [DU]	$(1.255 \pm 30.146) \times 10^{-2}$	12061966	0.331	7.251×10^{-3}	-22.2	24.5	-0.157	0.174
sulfurdioxide slant column density cobra precision [DU]	0.260 ± 0.104	12061966	8.578×10^{-2}	0.229	8.240×10^{-2}	30.8	0.198	0.284
sulfurdioxide slant column density window1 [DU]	$(9.893 \pm 58.273) \times 10^{-2}$	12061966	0.674	9.979×10^{-2}	-46.1	115	-0.239	0.435
sulfurdioxide slant column density window1 precision [DU]	0.260 ± 0.104	12061966	8.578×10^{-2}	0.229	8.240×10^{-2}	30.8	0.198	0.284
sulfurdioxide slant column density corrected win1 [DU]	$(3.664 \pm 57.370) \times 10^{-2}$	12061966	0.659	2.789×10^{-2}	-46.1	115	-0.299	0.360
background so2 slant column offset window1 [DU]	$(-6.229 \pm 12.577) \times 10^{-2}$	12061966	0.161	-9.025×10^{-2}	-0.726	2.41	-0.144	1.709×10^{-2}
sulfurdioxide slant column density window2 [DU]	0.181 ± 8.309	12061966	10.5	0.135	-1.146×10^{3}	965	-5.12	5.41
sulfurdioxide slant column density window2 precision [DU]	7.58 ± 2.06	12061966	2.39	7.28	2.20	656	6.21	8.59
sulfurdioxide slant column density corrected win2 [DU]	-0.572 ± 8.201	12061966	10.4	-0.551	-1.148×10^{3}	965	-5.77	4.64
background so2 slant column offset window2 [DU]	-0.753 ± 1.865	12061966	2.37	-0.409	-11.1	8.66	-1.83	0.546
sulfurdioxide slant column density window3 [DU]	1.26 ± 22.68	12061966	28.5	0.604	-407	172	-13.2	15.3
sulfurdioxide slant column density window3 precision [DU]	26.7 ± 12.3	12061966	9.21	23.5	9.60	239	19.8	29.1
sulfurdioxide slant column density corrected win3 [DU]	5.98 ± 21.84	12061966	27.4	5.56	-408	173	-7.86	19.5
background so2 slant column offset window3 [DU]	4.72 ± 5.85	12061966	8.45	4.66	-17.3	27.1	0.560	9.01
sulfurdioxide slant column cobra flag [1]	1.99 ± 0.15	12061966	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.659 \pm 4.281) \times 10^{-2}$	12061966	1.944×10^{-2}	1.748×10^{-2}	1.387×10^{-3}	2.58	1.052×10^{-2}	2.995×10^{-2}
fitted radiance shift [nm]	$(-3.771 \pm 24.488) \times 10^{-4}$	12061966	1.779×10^{-3}	-4.045×10^{-4}	-4.268×10^{-2}	3.909×10^{-2}	-1.300×10^{-3}	4.782×10^{-4}
fitted radiance squeeze [1]	$(-3.200 \pm 16.307) \times 10^{-5}$	12061966	1.941×10^{-4}	-2.693×10^{-5}	-1.692×10^{-2}	1.344×10^{-2}	-1.261×10^{-4}	6.799×10^{-5}
fitted root mean square [1]	$(1.141 \pm 0.424) \times 10^{-3}$	12061966	3.675×10^{-4}	1.033×10^{-3}	3.395×10^{-4}	0.115	8.864×10^{-4}	1.254×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.811 ± 0.454	12061966	0.524	0.728	5.000×10^{-2}	2.73	0.503	1.03
sulfurdioxide total air mass factor polluted precision [1]	0.133 ± 0.140	12061966	0.153	7.166×10^{-2}	4.331×10^{-3}	1.30	3.507×10^{-2}	0.188
sulfurdioxide clear air mass factor polluted [1]	0.652 ± 0.237	12061966	0.321	0.621	6.742×10^{-2}	3.02	0.480	0.801
number of spectral points in retrieval [1]	73.5 ± 0.5	12061966	1.000	73.0	71.0	74.0	73.0	74.0

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

Variable	mean $\pm\sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.487 ± 0.423	4448995	0.920	0.370	0.0	1.000	8.000×10^{-2}	1.000
sulfurdioxide total vertical column [DU]	$(6.906 \pm 190.736) \times 10^{-2}$	4448995	0.335	6.185×10^{-3}	-110	542	-0.154	0.180
sulfurdioxide total vertical column precision [DU]	0.613 ± 1.171	4448995	0.474	0.279	2.602×10^{-2}	43.0	0.121	0.595
sulfurdioxide slant column density corrected [DU]	$(2.932 \pm 65.952) \times 10^{-2}$	4448995	0.369	8.689×10^{-3}	-6.70	238	-0.174	0.195
sulfurdioxide slant column density cobra [DU]	$(2.764 \pm 50.755) \times 10^{-2}$	4448995	0.369	8.689×10^{-3}	-6.70	60.8	-0.174	0.195
sulfurdioxide slant column density cobra precision [DU]	0.295 ± 0.132	4448995	0.142	0.256	7.201×10^{-2}	15.5	0.207	0.349
sulfurdioxide slant column density window1 [DU]	$(1.362 \pm 79.962) \times 10^{-2}$	4448995	0.796	-2.496×10^{-3}	-23.5	65.5	-0.402	0.394
sulfurdioxide slant column density window1 precision [DU]	0.295 ± 0.132	4448995	0.142	0.256	7.201×10^{-2}	15.5	0.207	0.349
sulfurdioxide slant column density corrected win1 [DU]	$(-1.638 \pm 78.370) \times 10^{-2}$	4448995	0.760	-4.855×10^{-2}	-23.5	65.4	-0.422	0.337
background so2 slant column offset window1 [DU]	$(-2.999 \pm 15.295) \times 10^{-2}$	4448995	0.197	-7.543×10^{-2}	-1.48	2.66	-0.135	6.272×10^{-2}
sulfurdioxide slant column density window2 [DU]	0.976 ± 9.133	4448995	11.3	0.880	-560	710	-4.72	6.54
sulfurdioxide slant column density window2 precision [DU]	8.11 ± 2.50	4448995	3.02	7.66	2.14	461	6.36	9.38
sulfurdioxide slant column density corrected win2 [DU]	-0.297 ± 8.933	4448995	11.0	-0.312	-560	710	-5.81	5.20
background so2 slant column offset window2 [DU]	-1.27 ± 2.19	4448995	3.00	-0.894	-11.1	8.72	-2.62	0.384
sulfurdioxide slant column density window3 [DU]	-9.12 ± 23.08	4448995	27.6	-8.78	-1.714×10^{3}	2.113×10^{3}	-22.7	4.89
sulfurdioxide slant column density window3 precision [DU]	27.2 ± 13.4	4448995	11.5	23.9	10.1	1.352×10^{3}	19.0	30.5
sulfurdioxide slant column density corrected win3 [DU]	-0.282 ± 23.408	4448995	28.0	0.790	-1.722×10^{3}	2.112×10^{3}	-13.7	14.3
background so2 slant column offset window3 [DU]	8.84 ± 7.48	4448995	12.7	10.5	-17.3	27.1	2.51	15.2
sulfurdioxide slant column cobra flag [1]	1.94 ± 0.32	4448995	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(5.698 \pm 16.674) \times 10^{-2}$	4448995	4.139×10^{-2}	1.252×10^{-2}	7.116×10^{-5}	4.95	3.866×10^{-3}	4.526×10^{-2}
fitted radiance shift [nm]	$(-5.414 \pm 24.240) \times 10^{-4}$	4448995	1.260×10^{-3}	-6.153×10^{-4}	-4.288×10^{-2}	3.520×10^{-2}	-1.230×10^{-3}	2.977×10^{-5}
fitted radiance squeeze [1]	$(-6.476 \pm 19.063) \times 10^{-5}$	4448995	2.239×10^{-4}	-6.407×10^{-5}	-1.337×10^{-2}	1.737×10^{-2}	-1.764×10^{-4}	4.745×10^{-5}
fitted root mean square [1]	$(1.314 \pm 0.530) \times 10^{-3}$	4448995	5.685×10^{-4}	1.178×10^{-3}	2.441×10^{-4}	2.929×10^{-2}	9.596×10^{-4}	1.528×10^{-3}
sulfurdioxide total air mass factor polluted [1]	1.30 ± 0.94	4448995	1.69	0.910	5.000×10^{-2}	3.43	0.519	2.21
sulfurdioxide total air mass factor polluted precision [1]	0.238 ± 0.306	4448995	0.252	0.130	2.500×10^{-3}	1.75	3.333×10^{-2}	0.285
sulfurdioxide clear air mass factor polluted [1]	1.17 ± 0.91	4448995	1.11	0.795	2.733×10^{-2}	3.50	0.507	1.61
number of spectral points in retrieval [1]	73.4 ± 0.5	4448995	1.000	73.0	52.0	156	73.0	74.0

3 Granule outlines

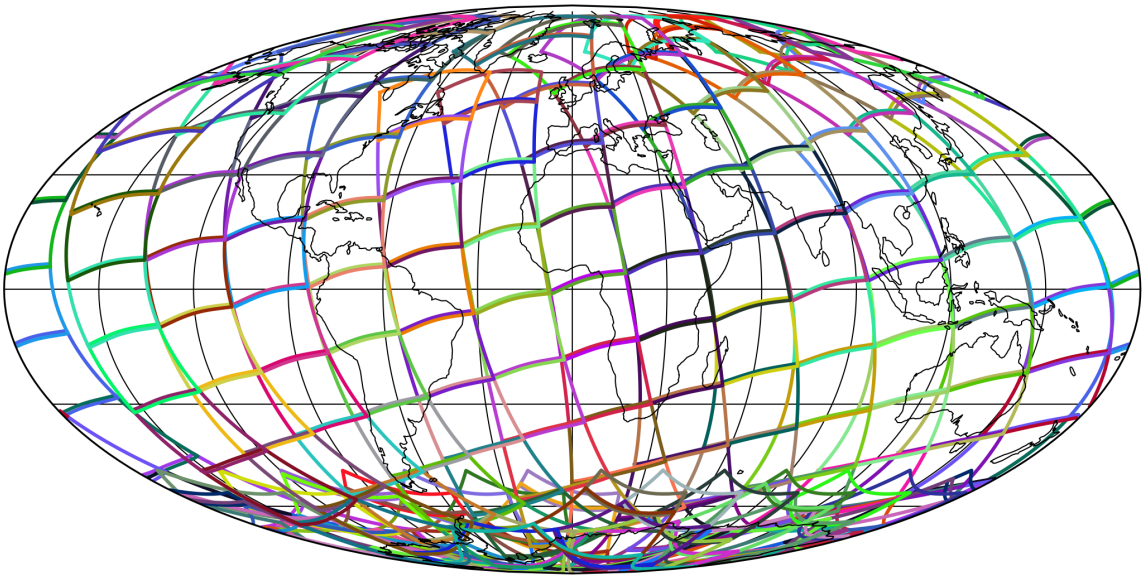


Figure 1: Outline of the granules.

4 Input data monitoring

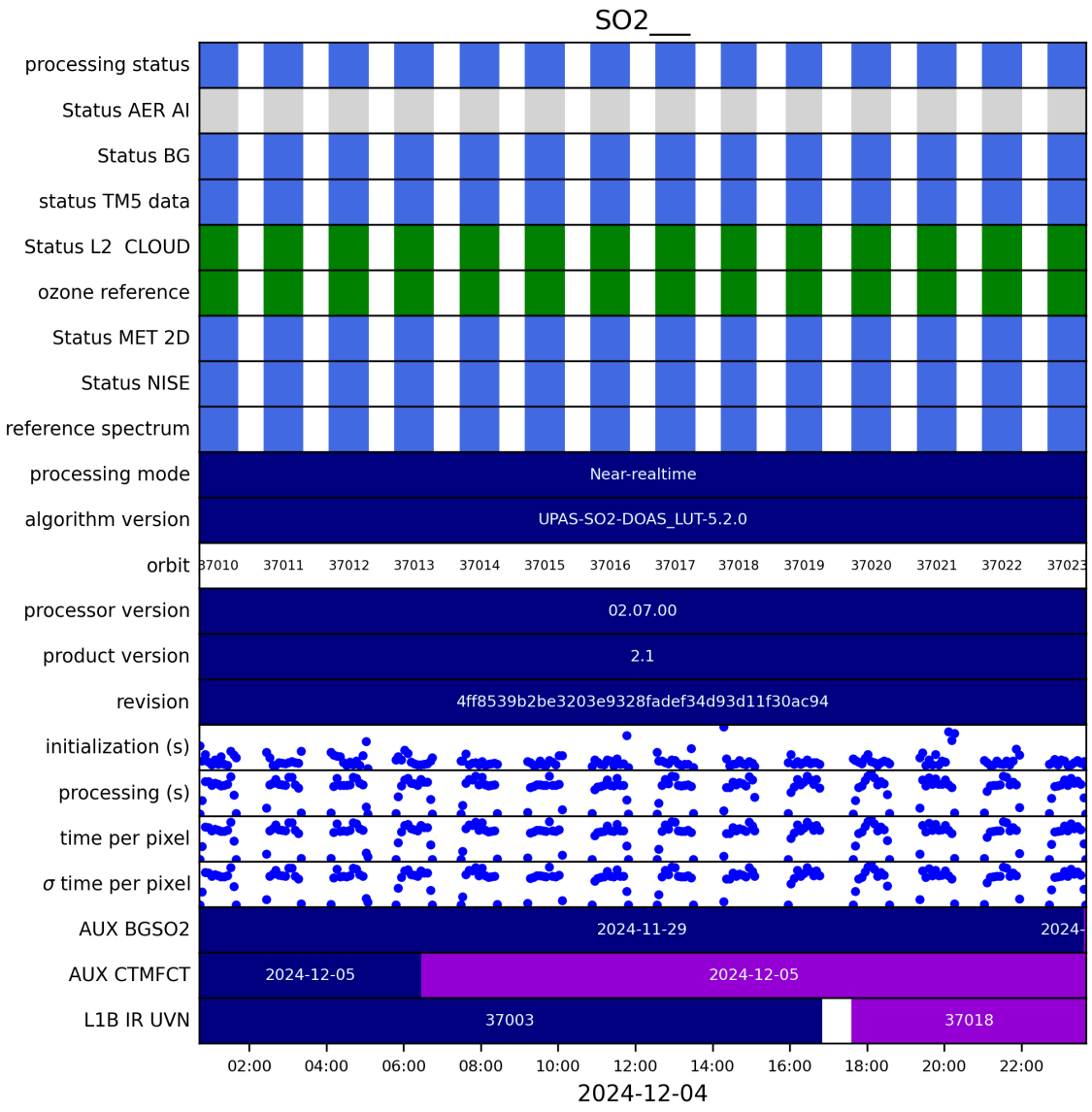


Figure 2: Input data per granule

5 Warnings and errors

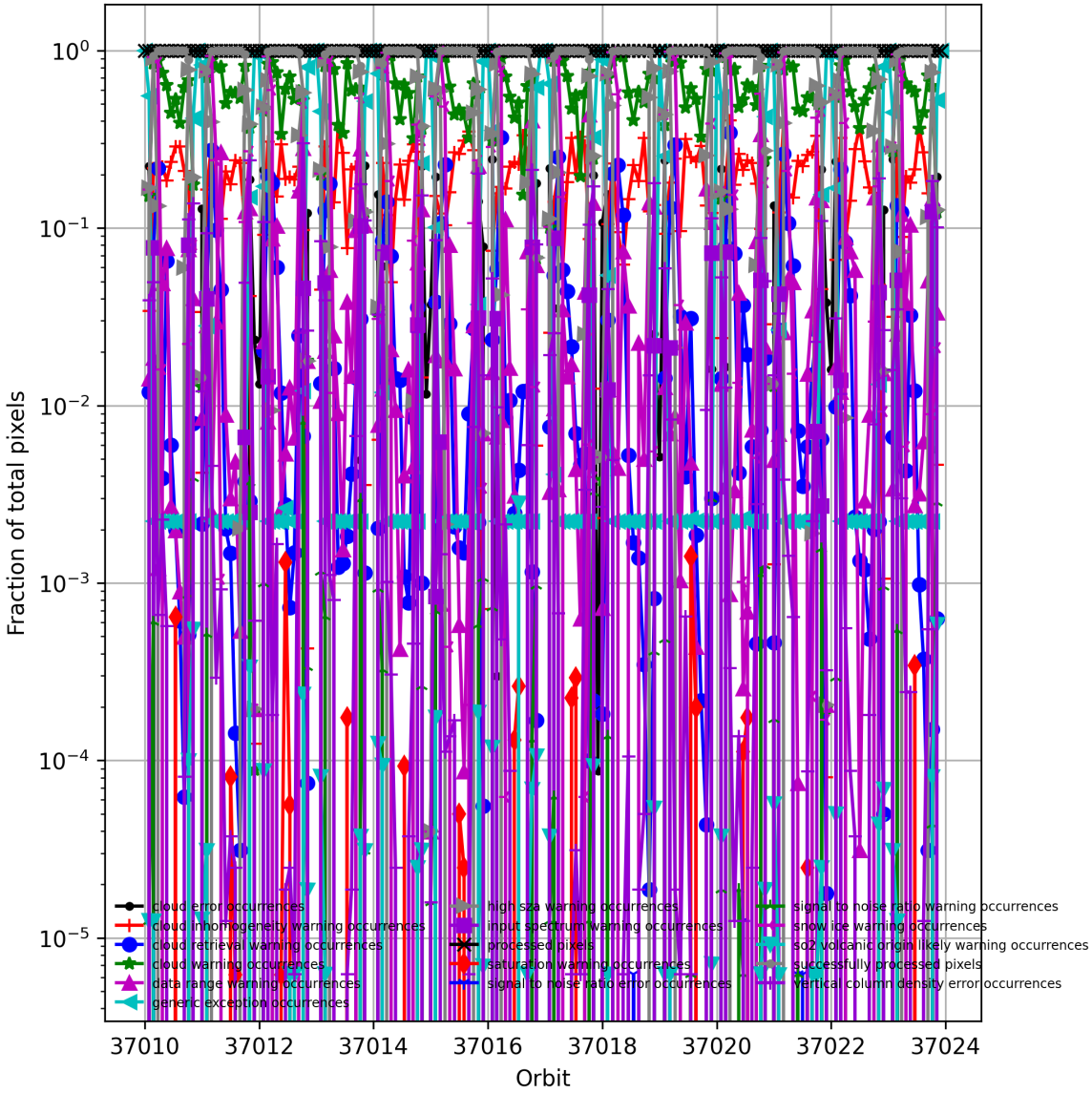


Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

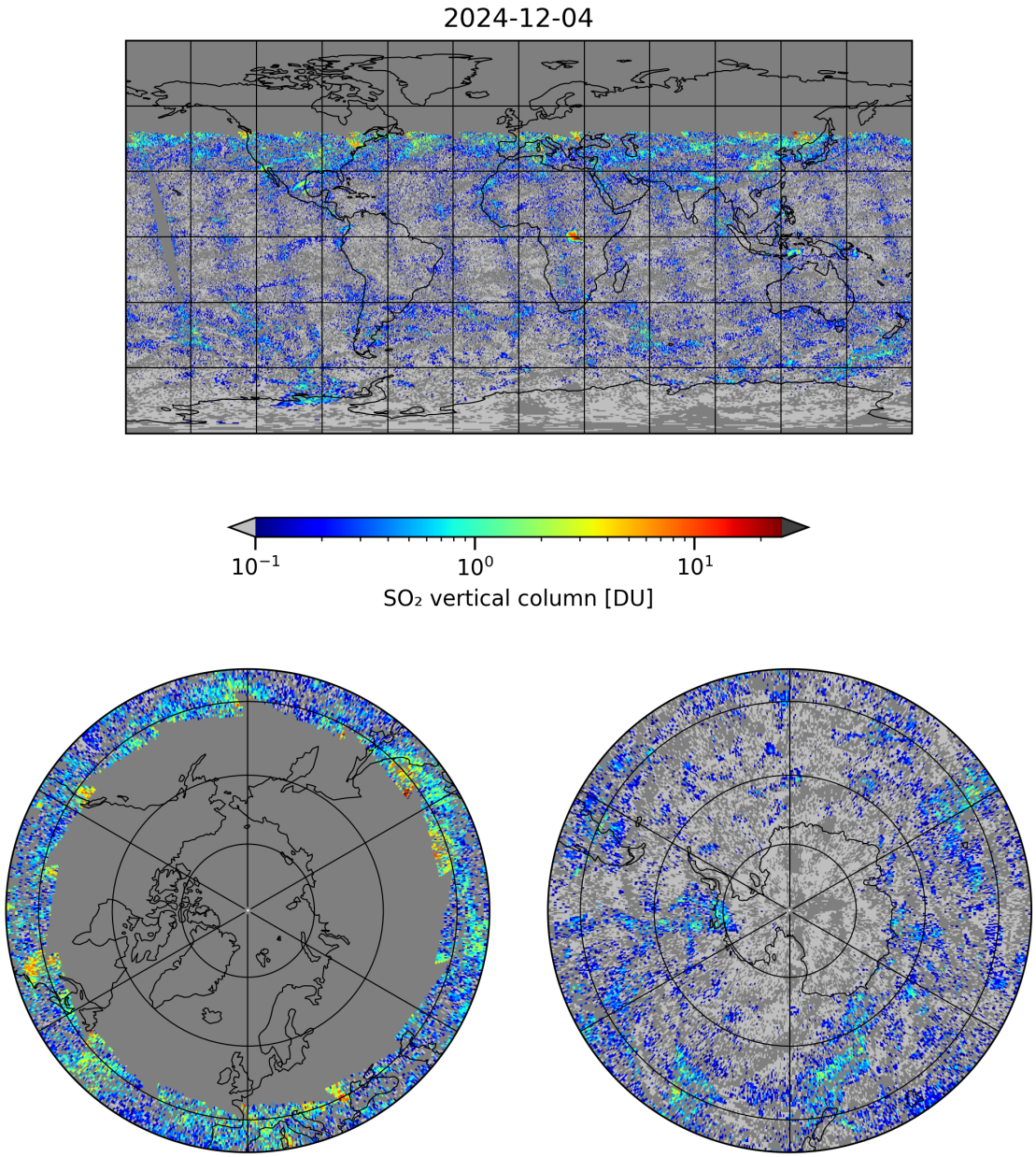


Figure 4: Map of "SO_2 vertical column" for 2024-12-04 to 2024-12-04

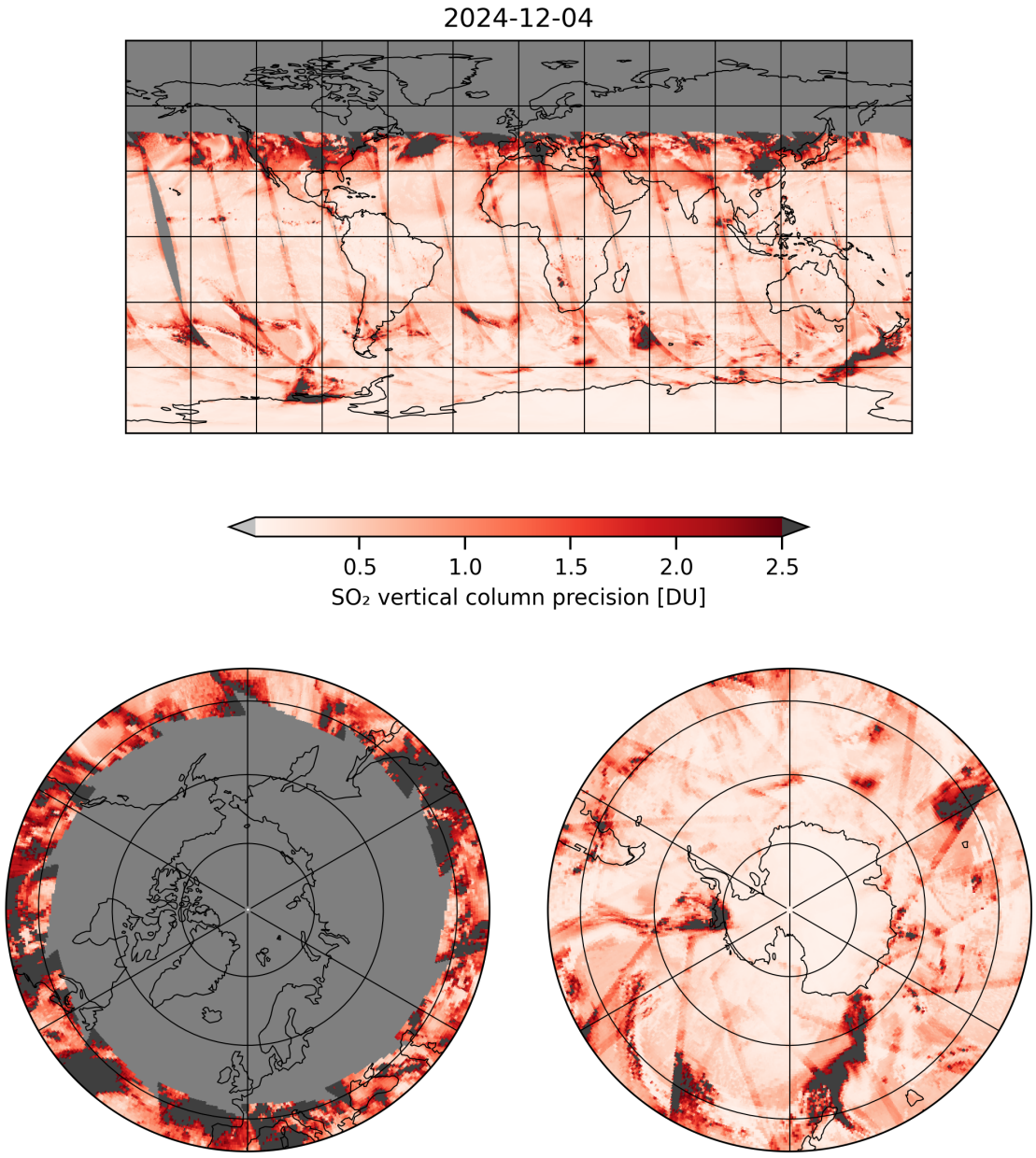


Figure 5: Map of "SO_2 vertical column precision" for 2024-12-04 to 2024-12-04

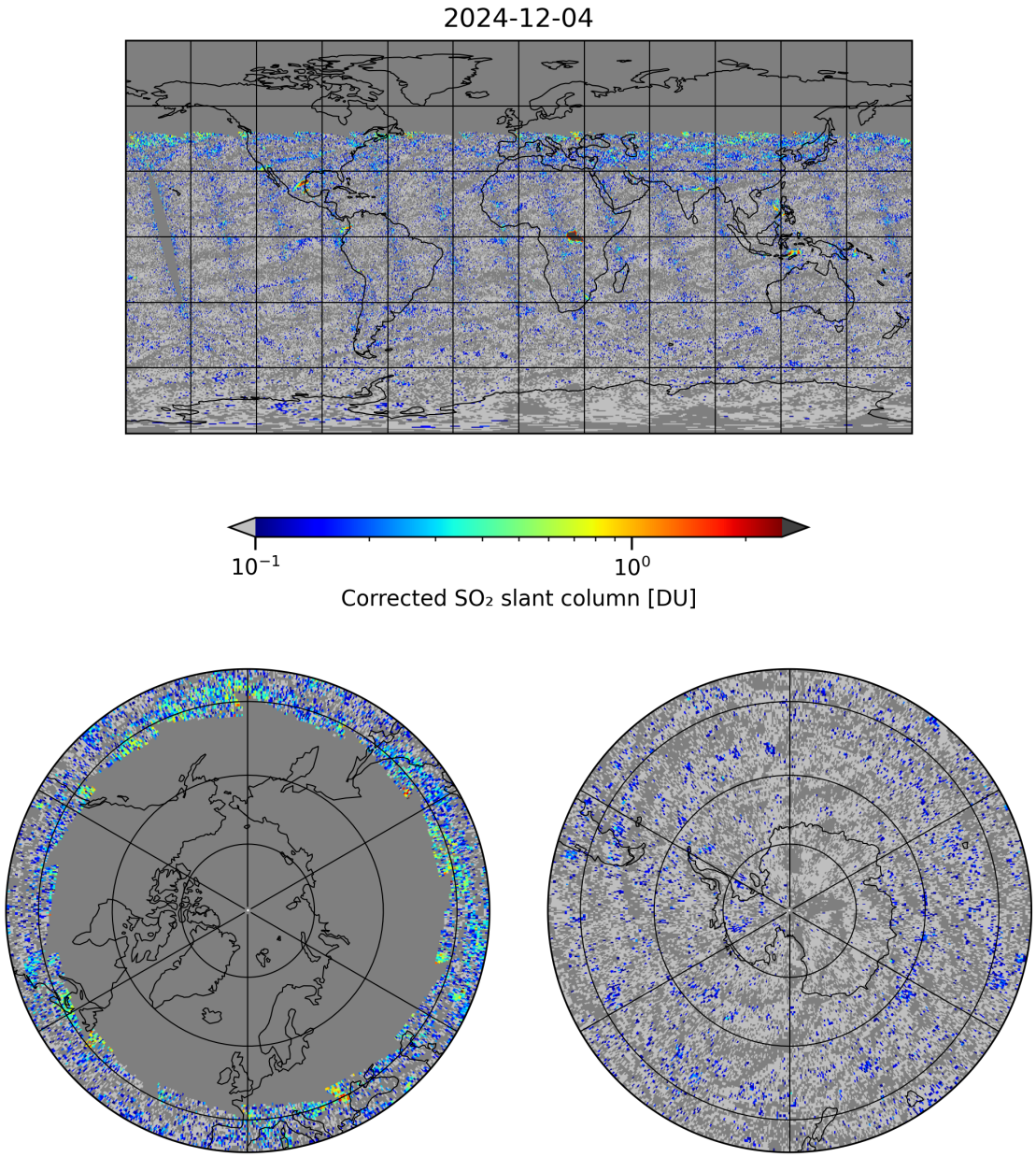


Figure 6: Map of “Corrected SO_2 slant column” for 2024-12-04 to 2024-12-04

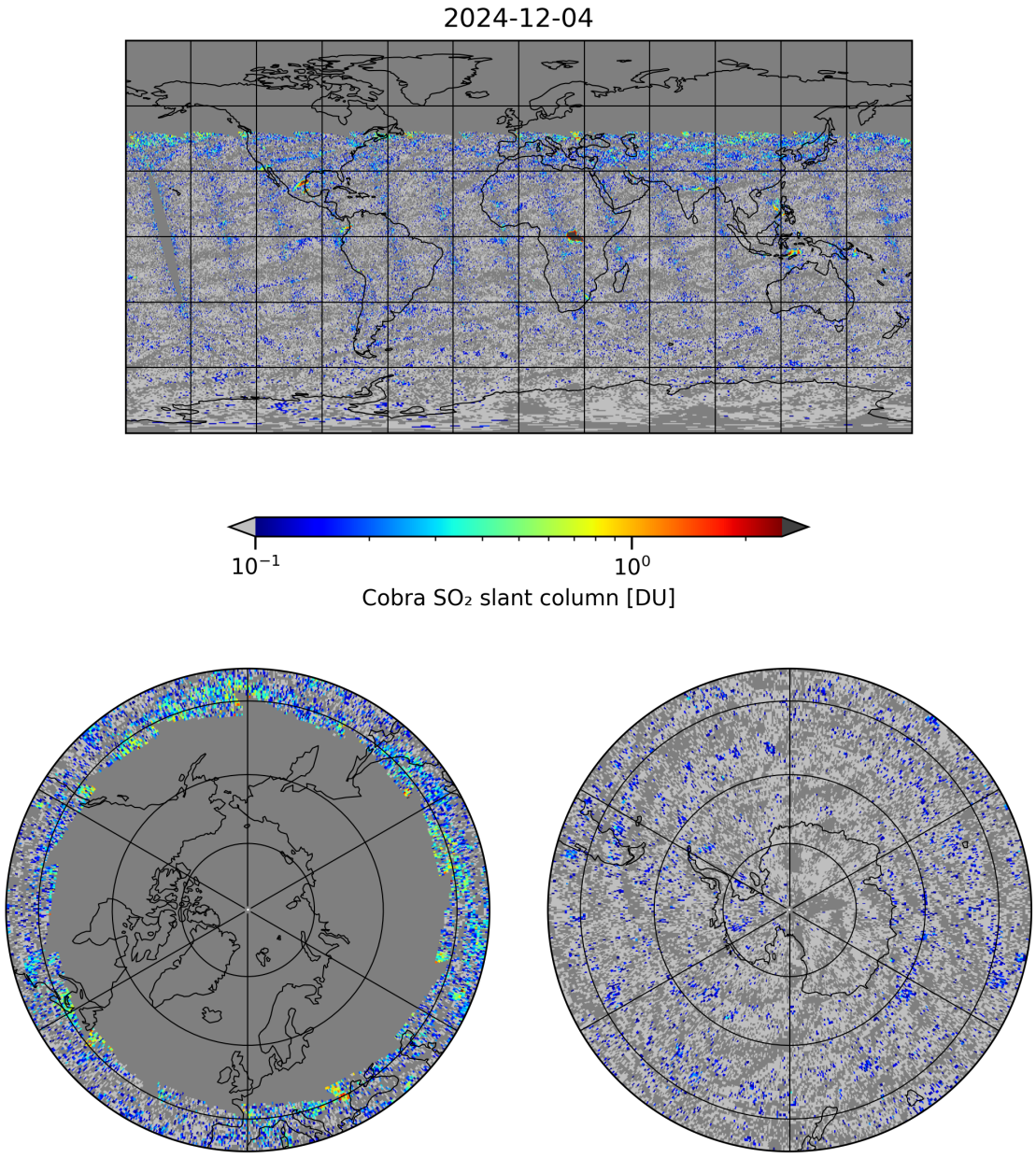


Figure 7: Map of "Cobra SO_2 slant column" for 2024-12-04 to 2024-12-04

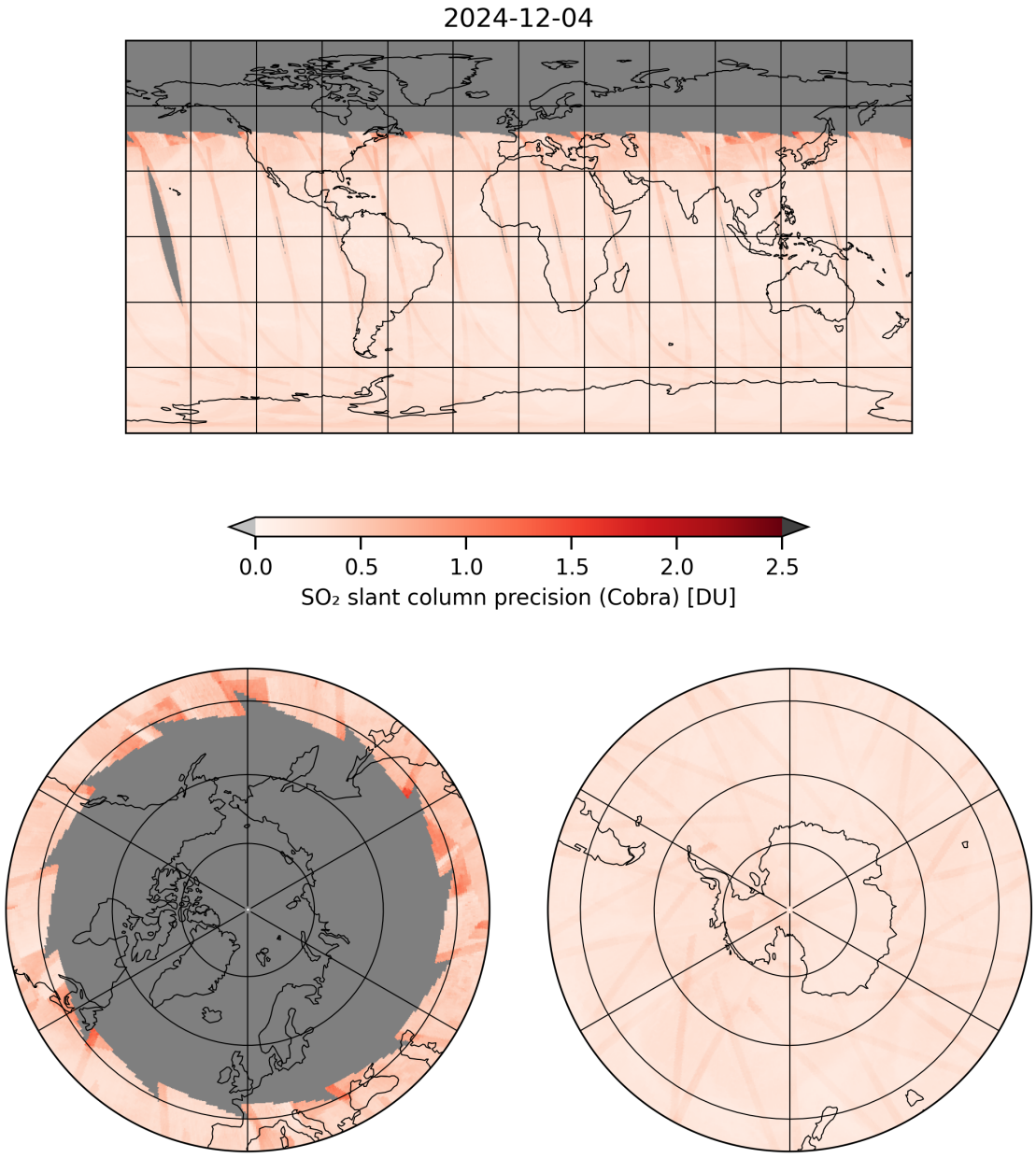


Figure 8: Map of "SO_2 slant column precision (Cobra)" for 2024-12-04 to 2024-12-04

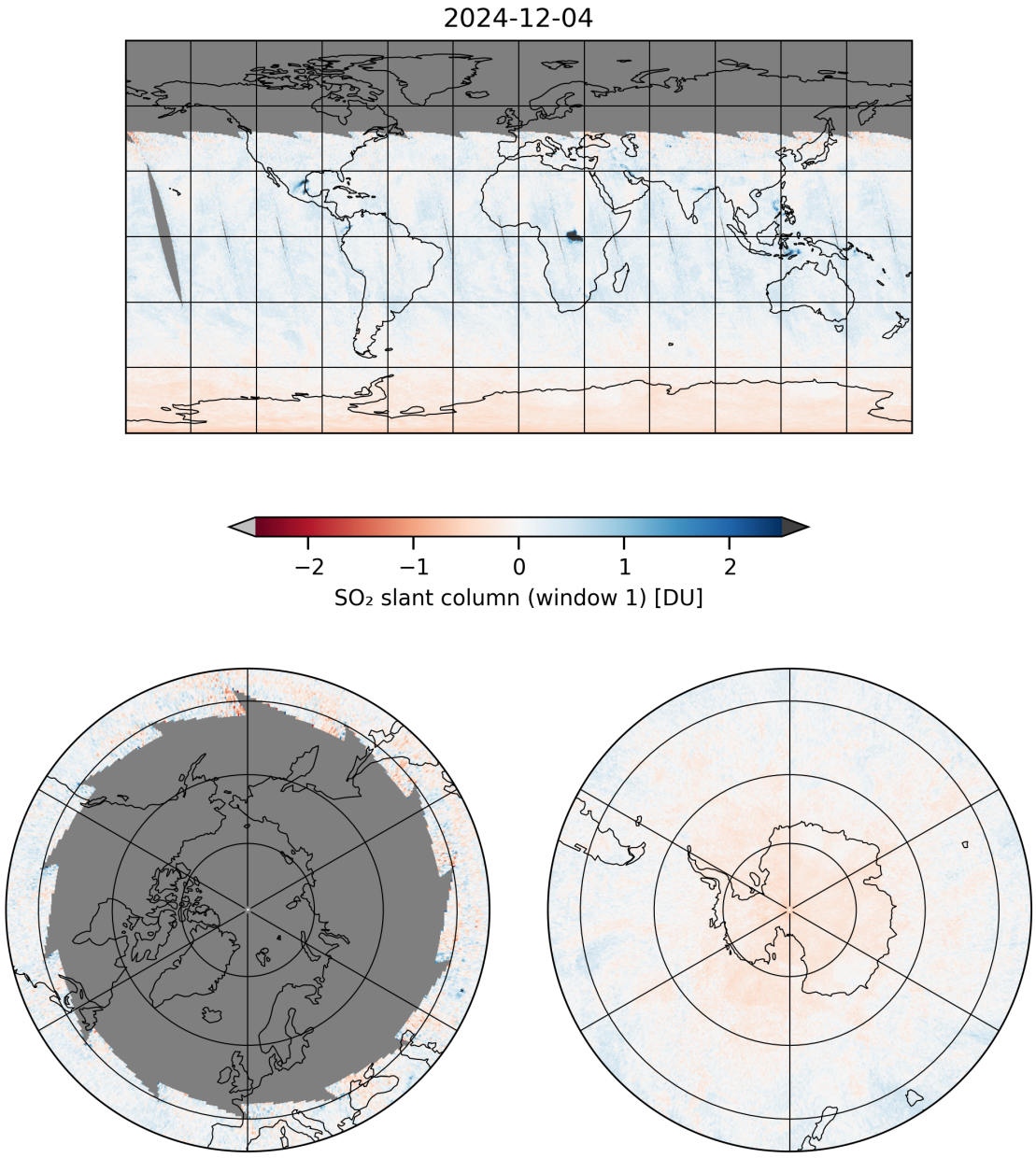


Figure 9: Map of "SO_2 slant column (window 1)" for 2024-12-04 to 2024-12-04

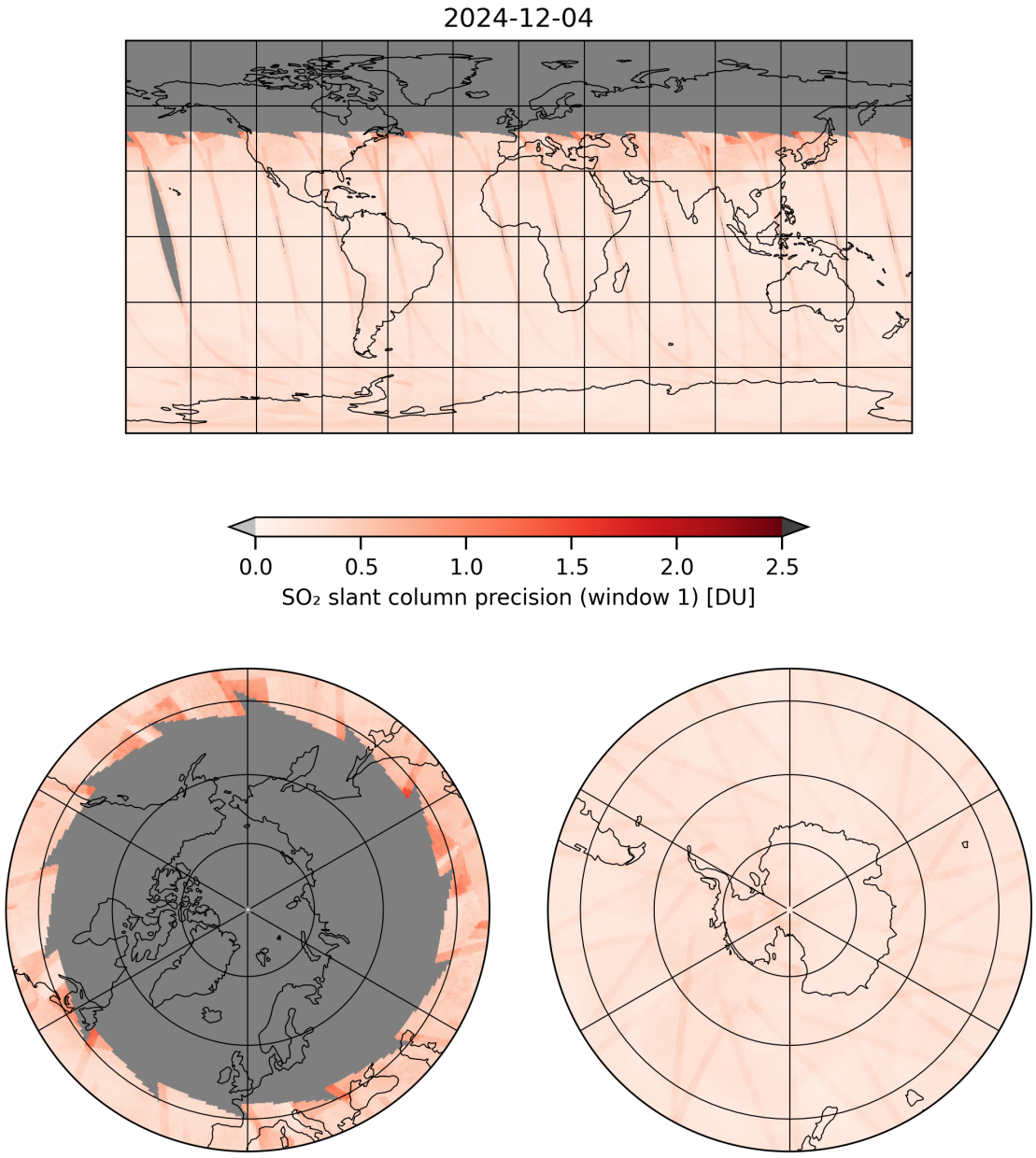


Figure 10: Map of "SO_2 slant column precision (window 1)" for 2024-12-04 to 2024-12-04

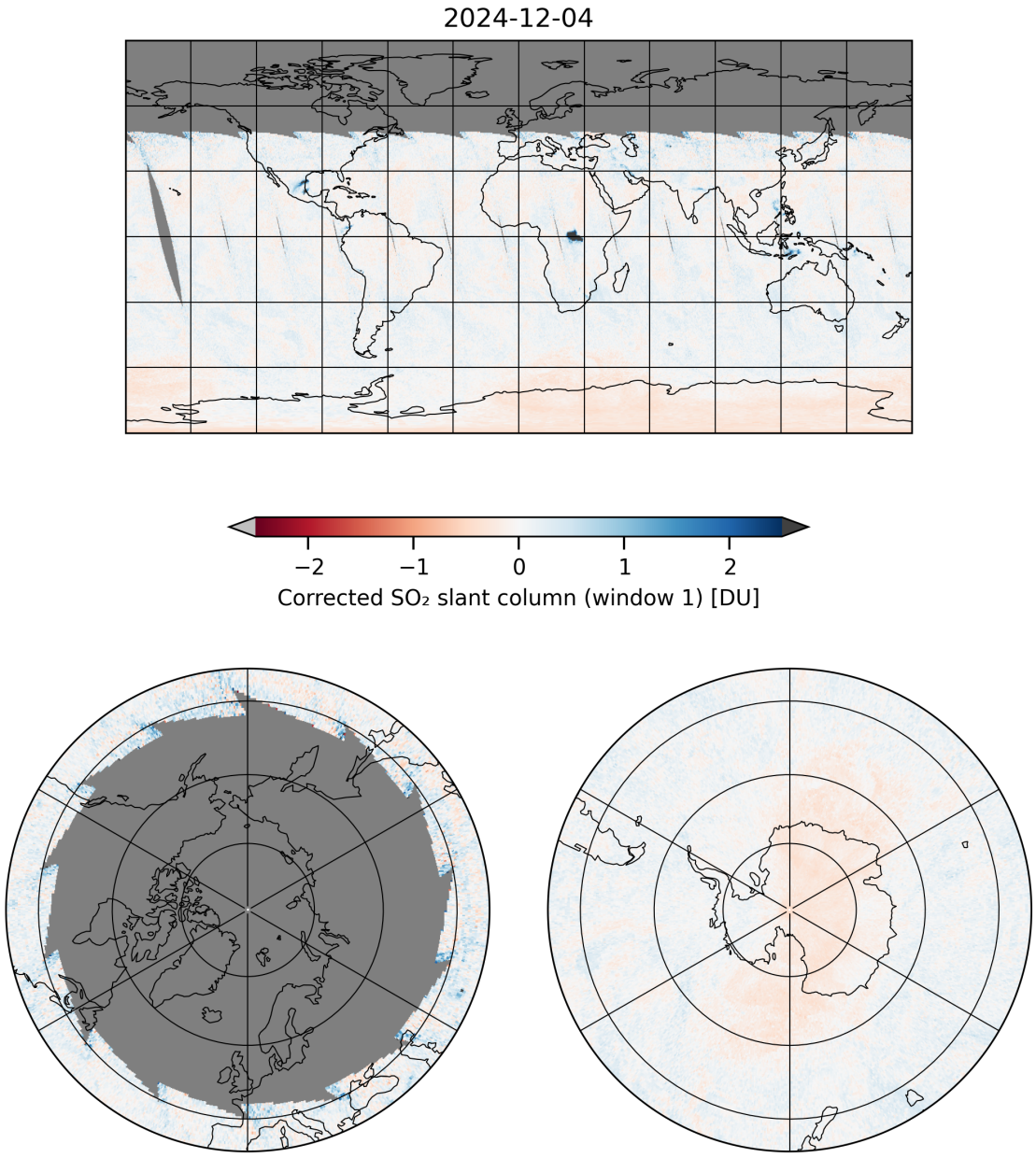


Figure 11: Map of “Corrected SO_2 slant column (window 1)” for 2024-12-04 to 2024-12-04

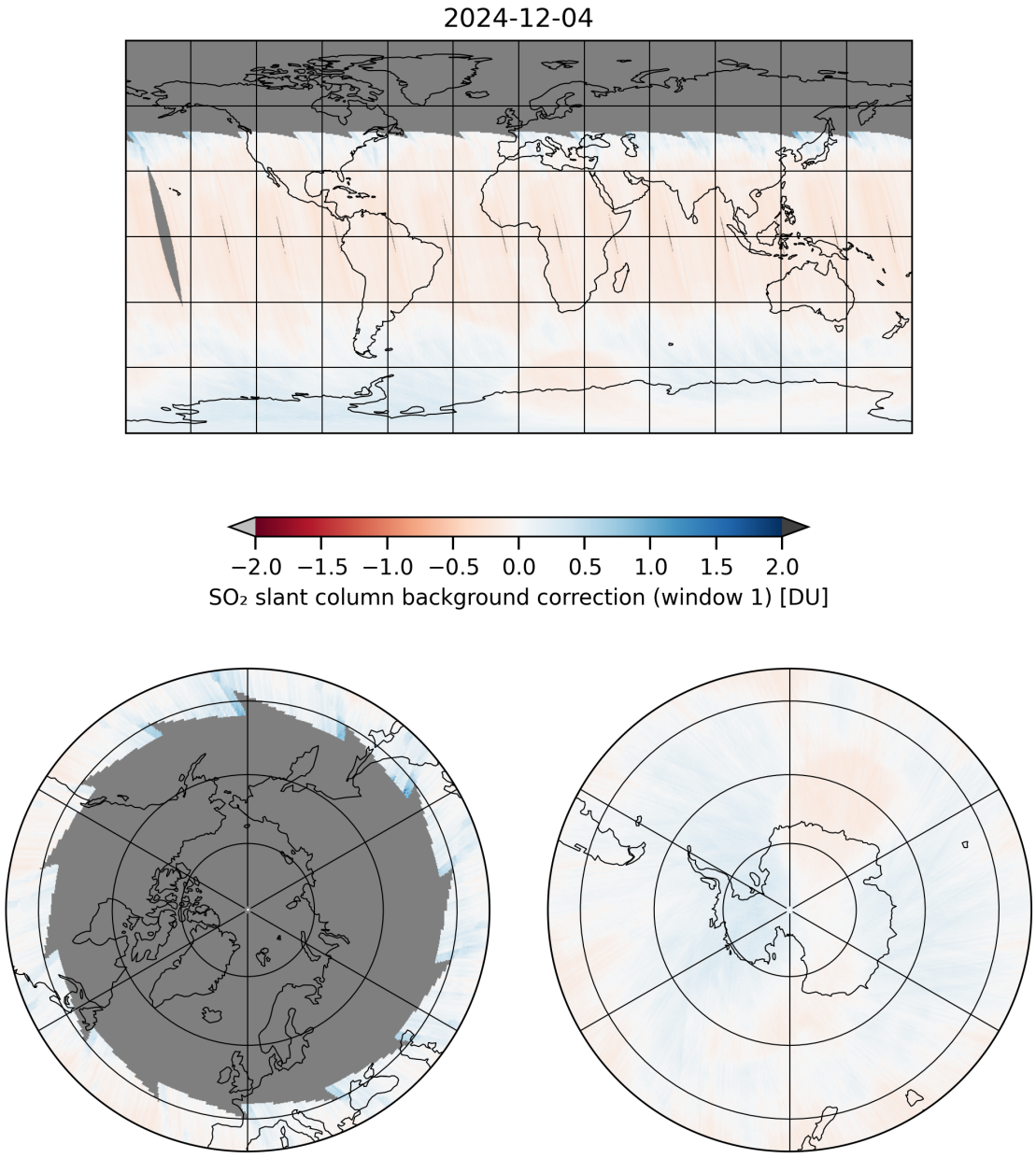


Figure 12: Map of "SO_2 slant column background correction (window 1)" for 2024-12-04 to 2024-12-04

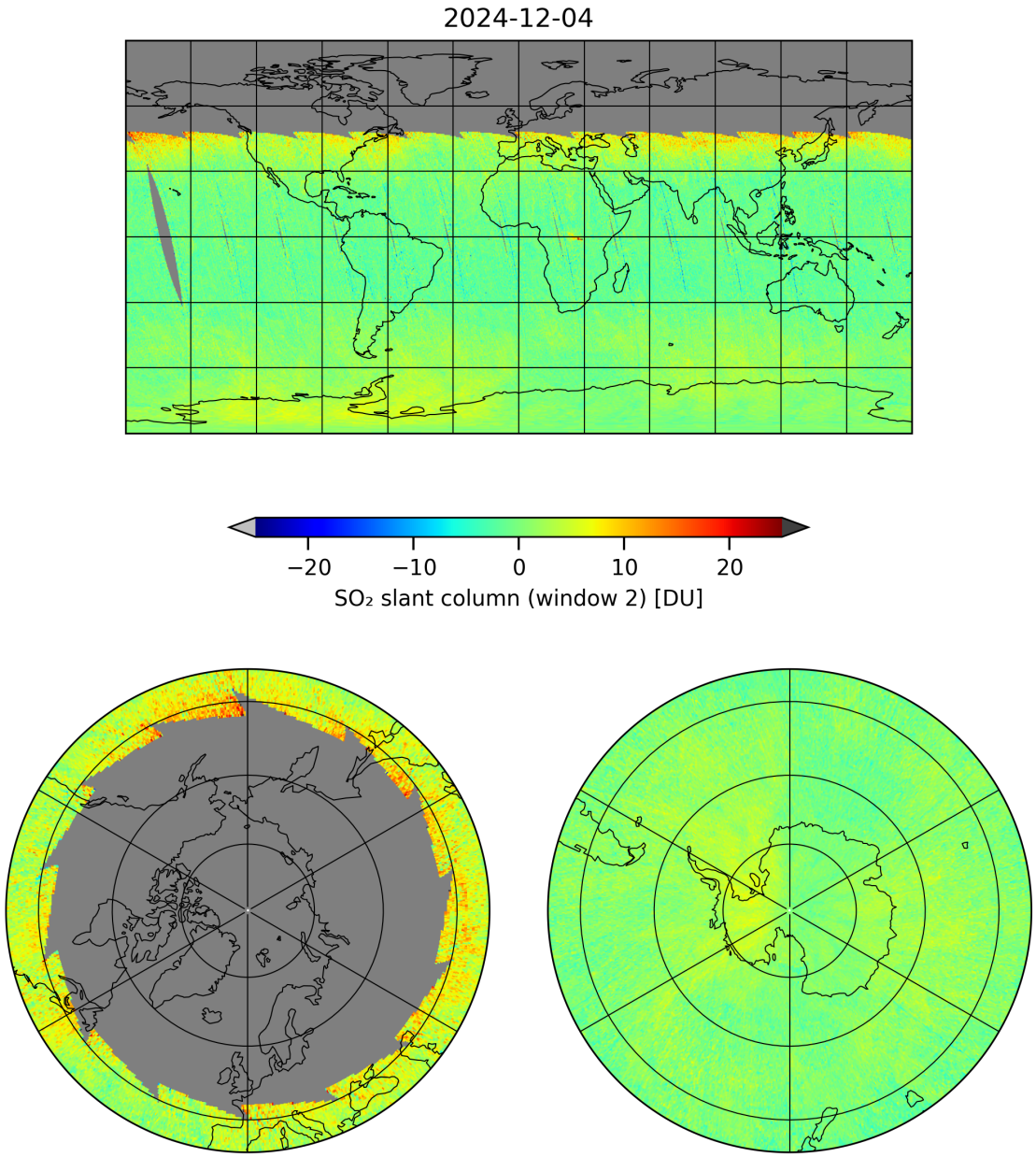


Figure 13: Map of "SO_2 slant column (window 2)" for 2024-12-04 to 2024-12-04

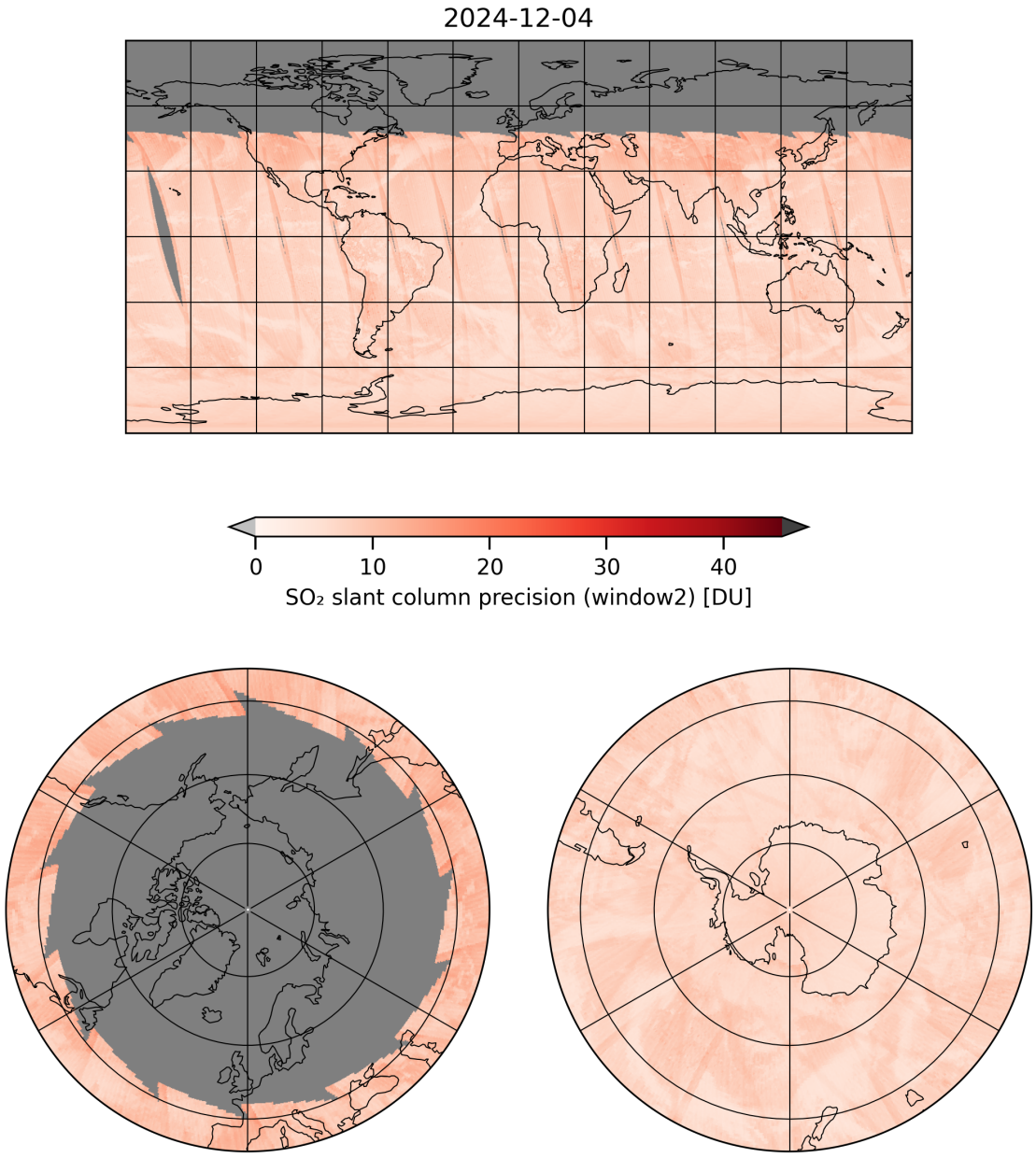


Figure 14: Map of "SO_2 slant column precision (window2)" for 2024-12-04 to 2024-12-04

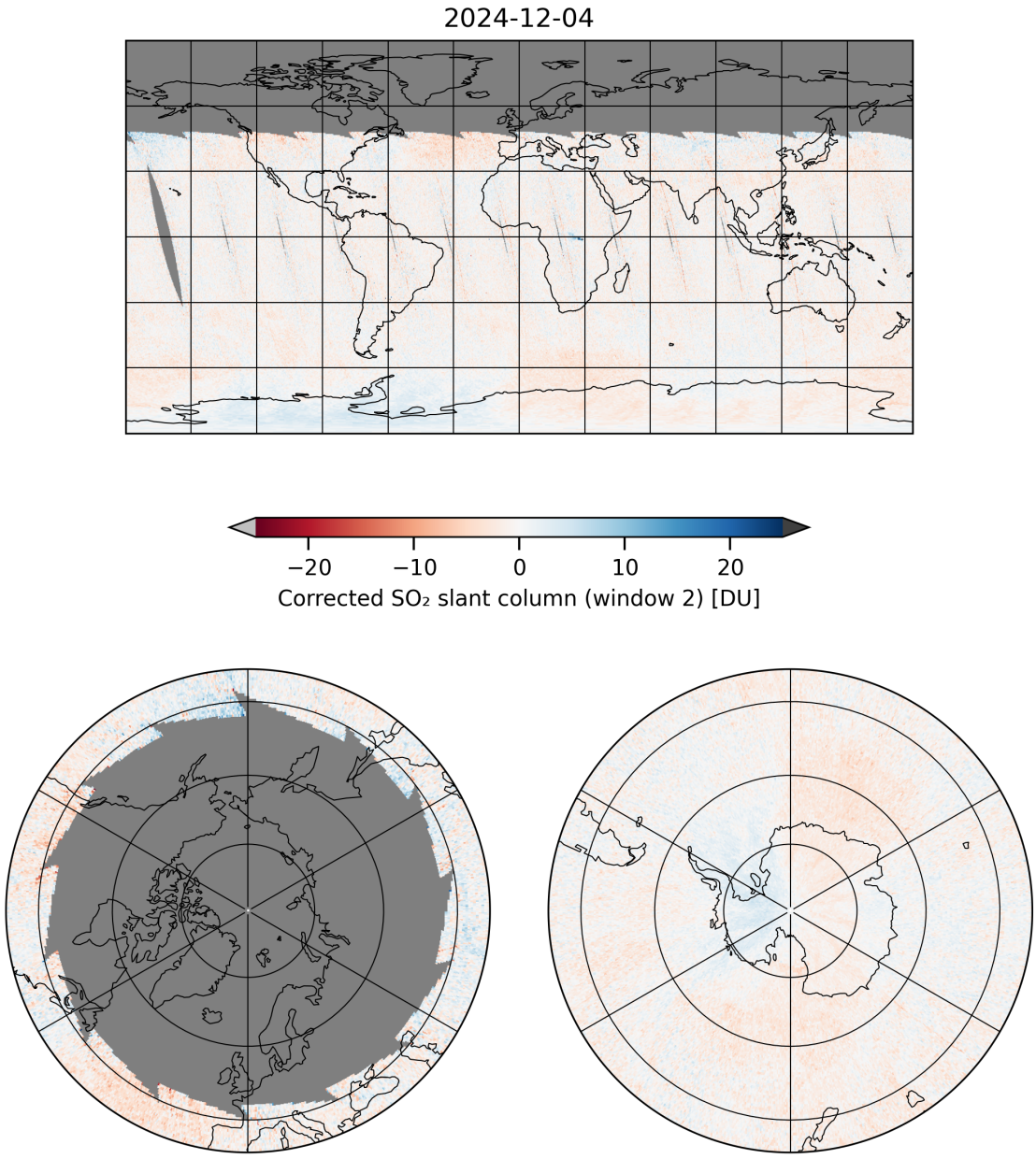


Figure 15: Map of "Corrected SO_2 slant column (window 2)" for 2024-12-04 to 2024-12-04

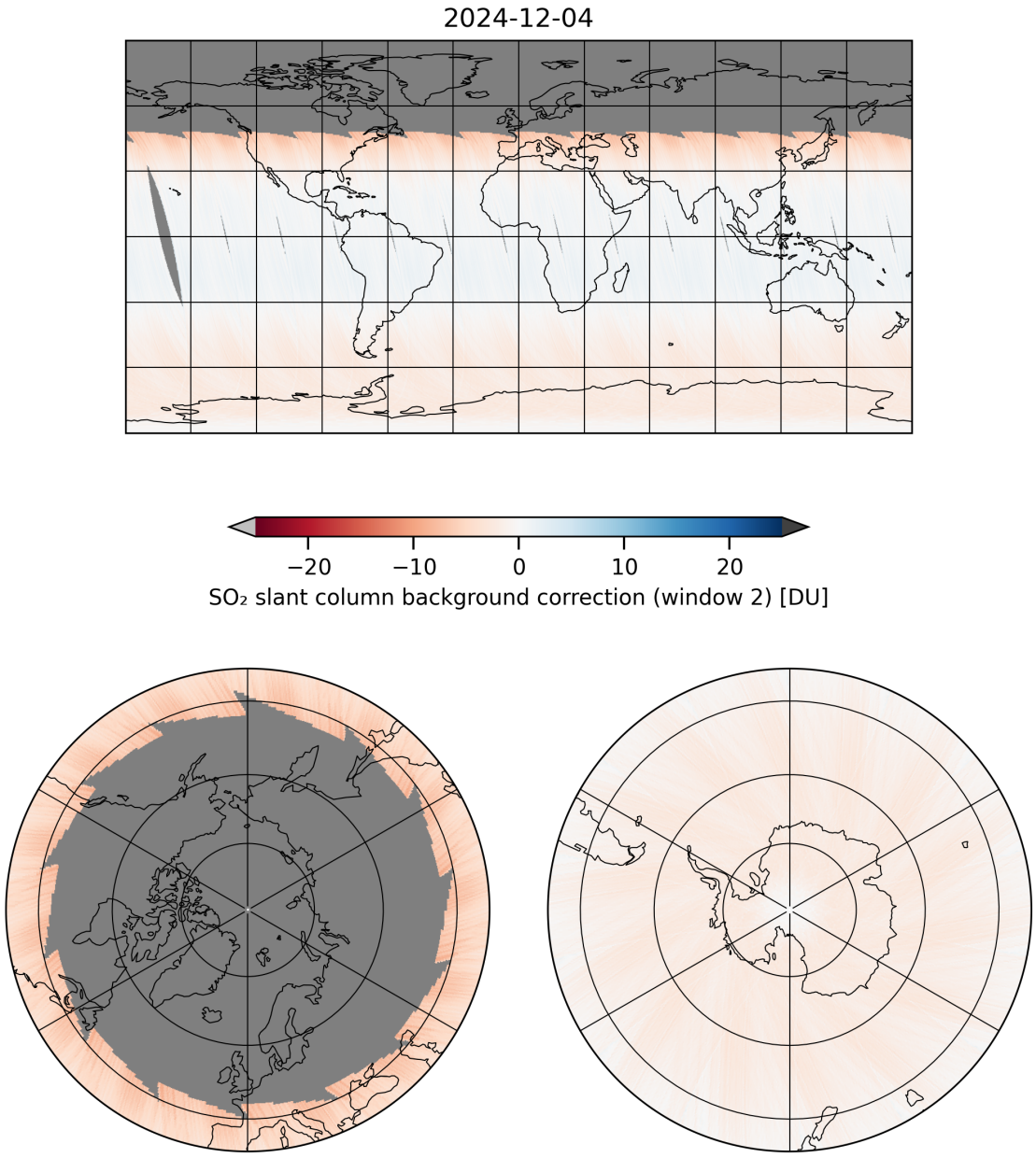


Figure 16: Map of "SO_2 slant column background correction (window 2)" for 2024-12-04 to 2024-12-04

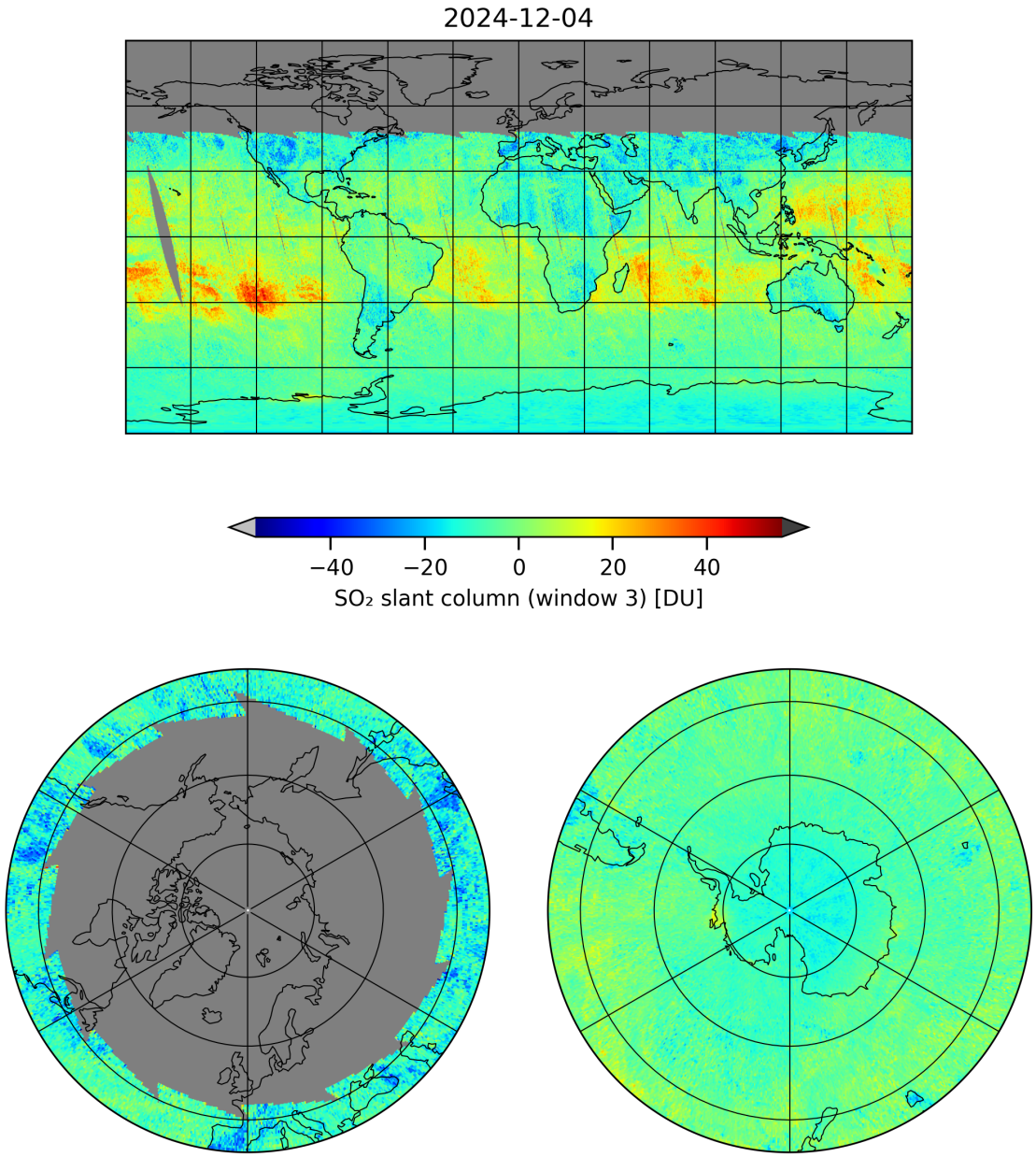


Figure 17: Map of "SO_2 slant column (window 3)" for 2024-12-04 to 2024-12-04

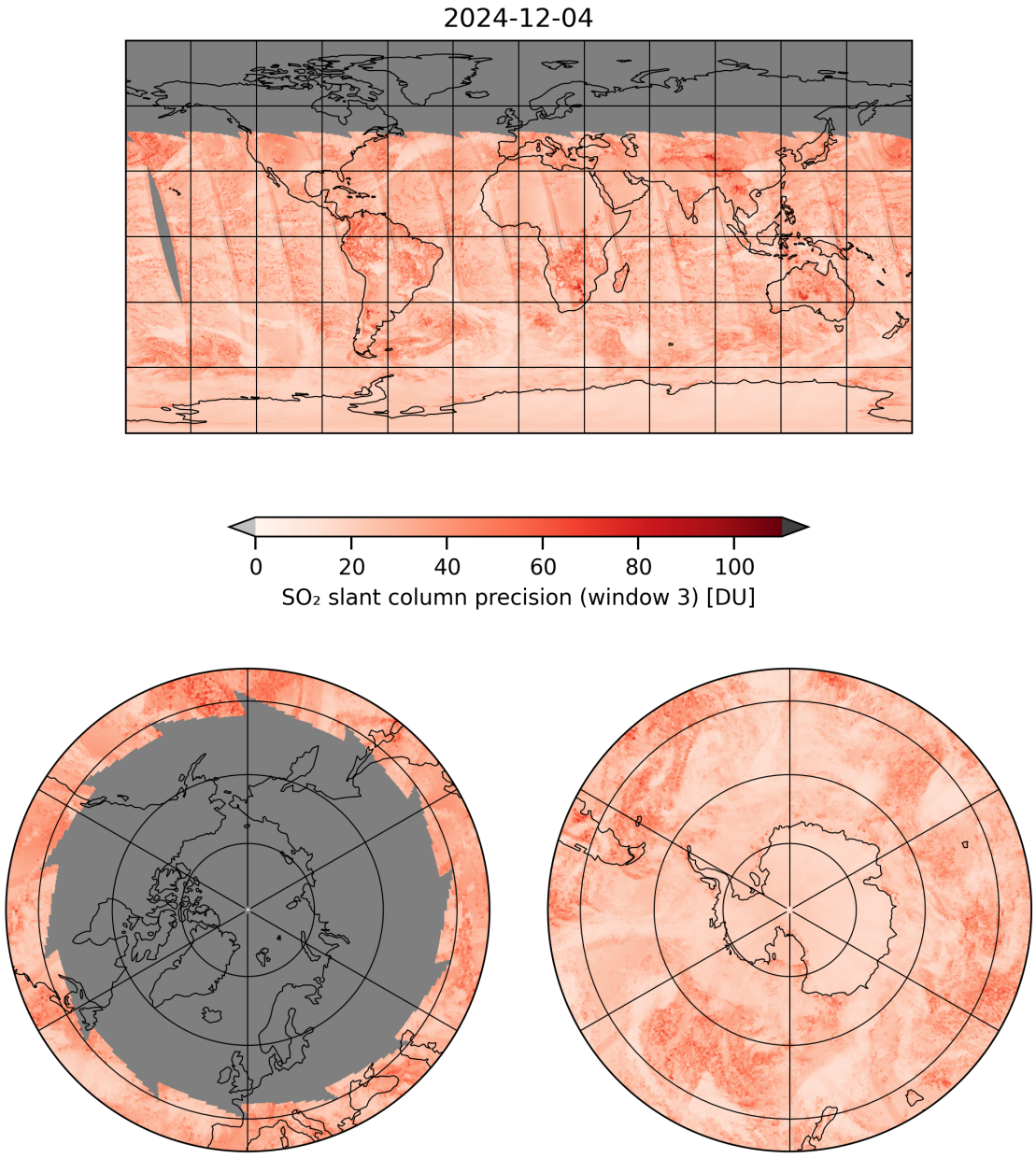


Figure 18: Map of "SO_2 slant column precision (window 3)" for 2024-12-04 to 2024-12-04

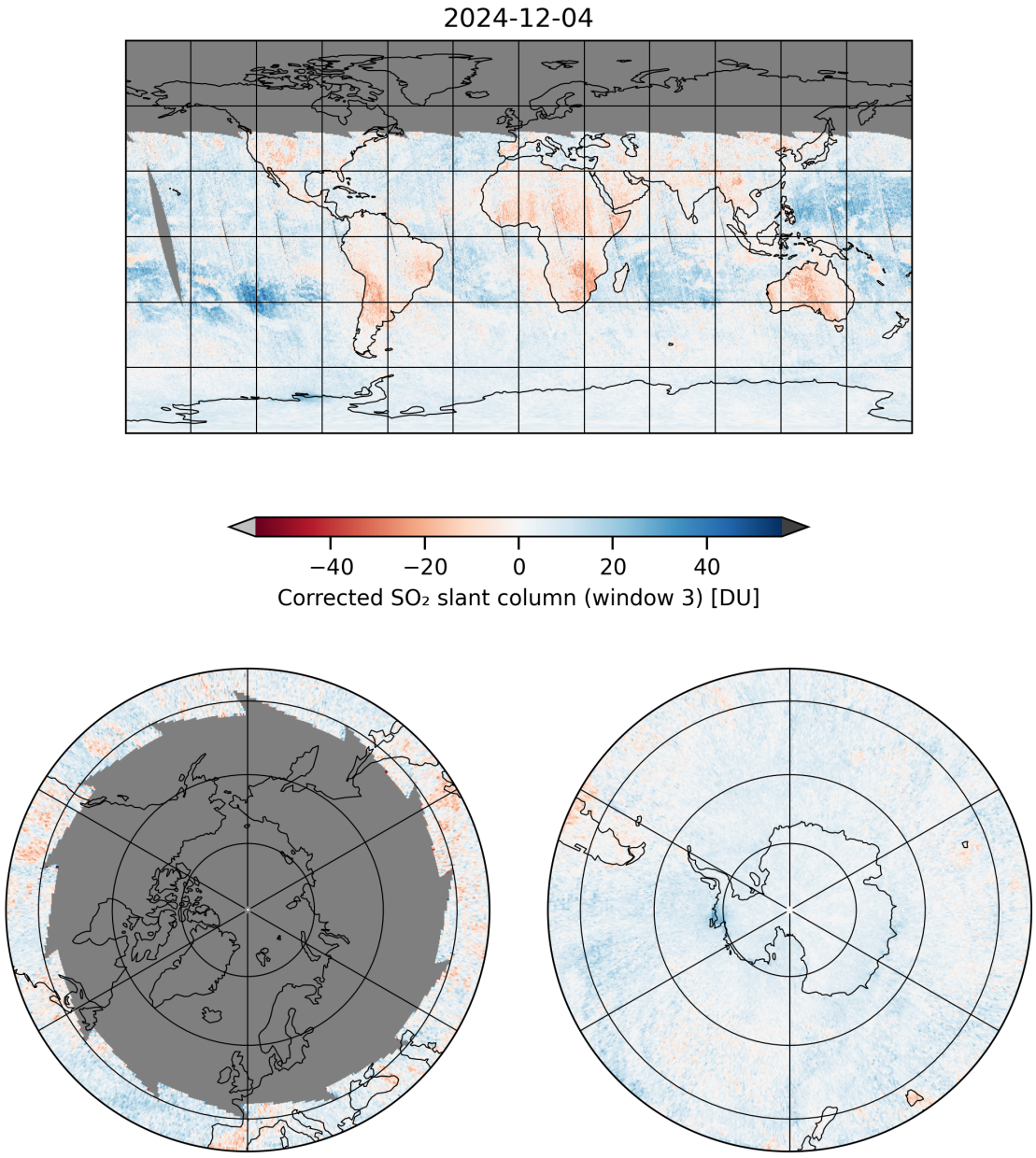


Figure 19: Map of "Corrected SO_2 slant column (window 3)" for 2024-12-04 to 2024-12-04

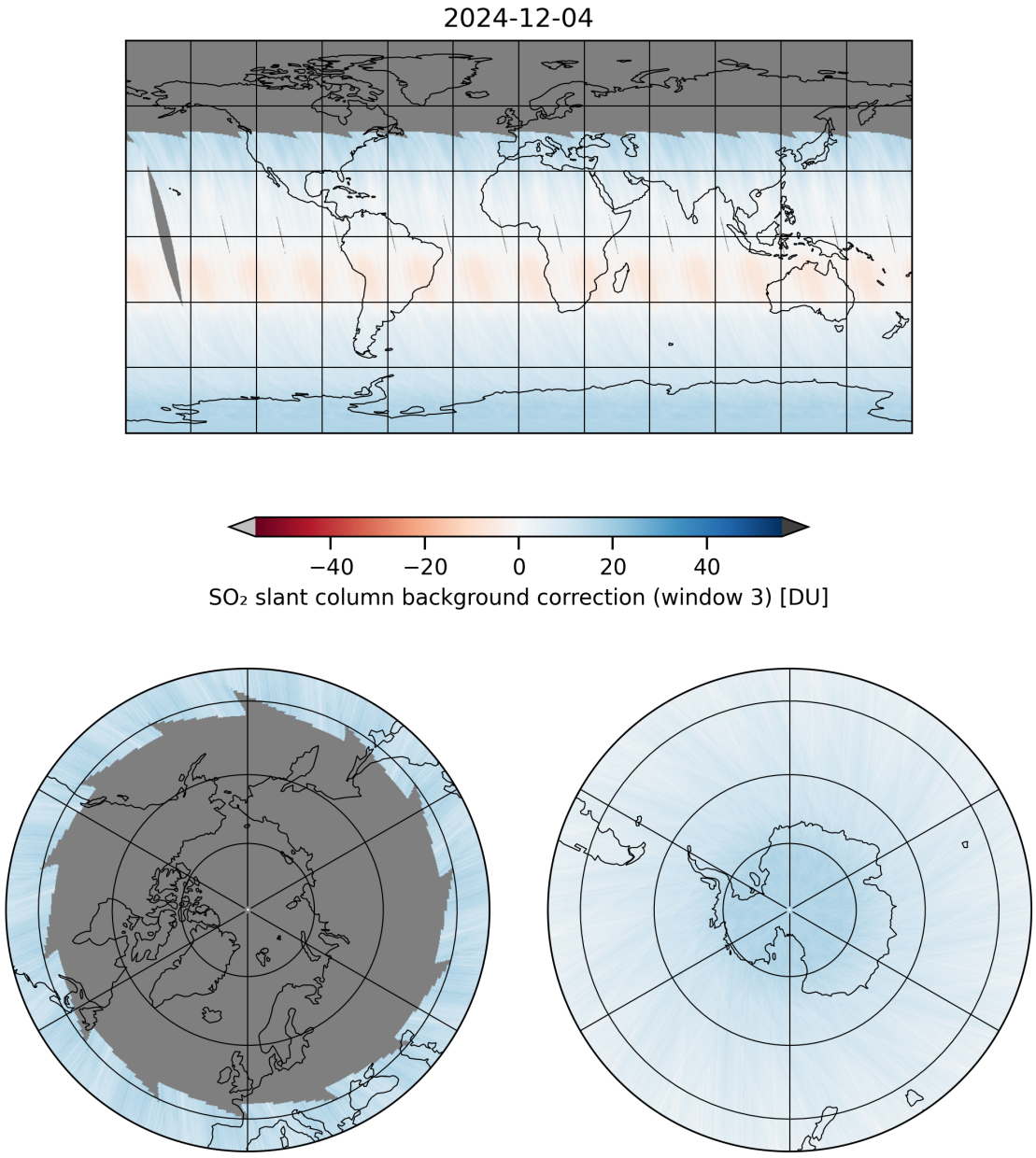


Figure 20: Map of "SO_2 slant column background correction (window 3)" for 2024-12-04 to 2024-12-04

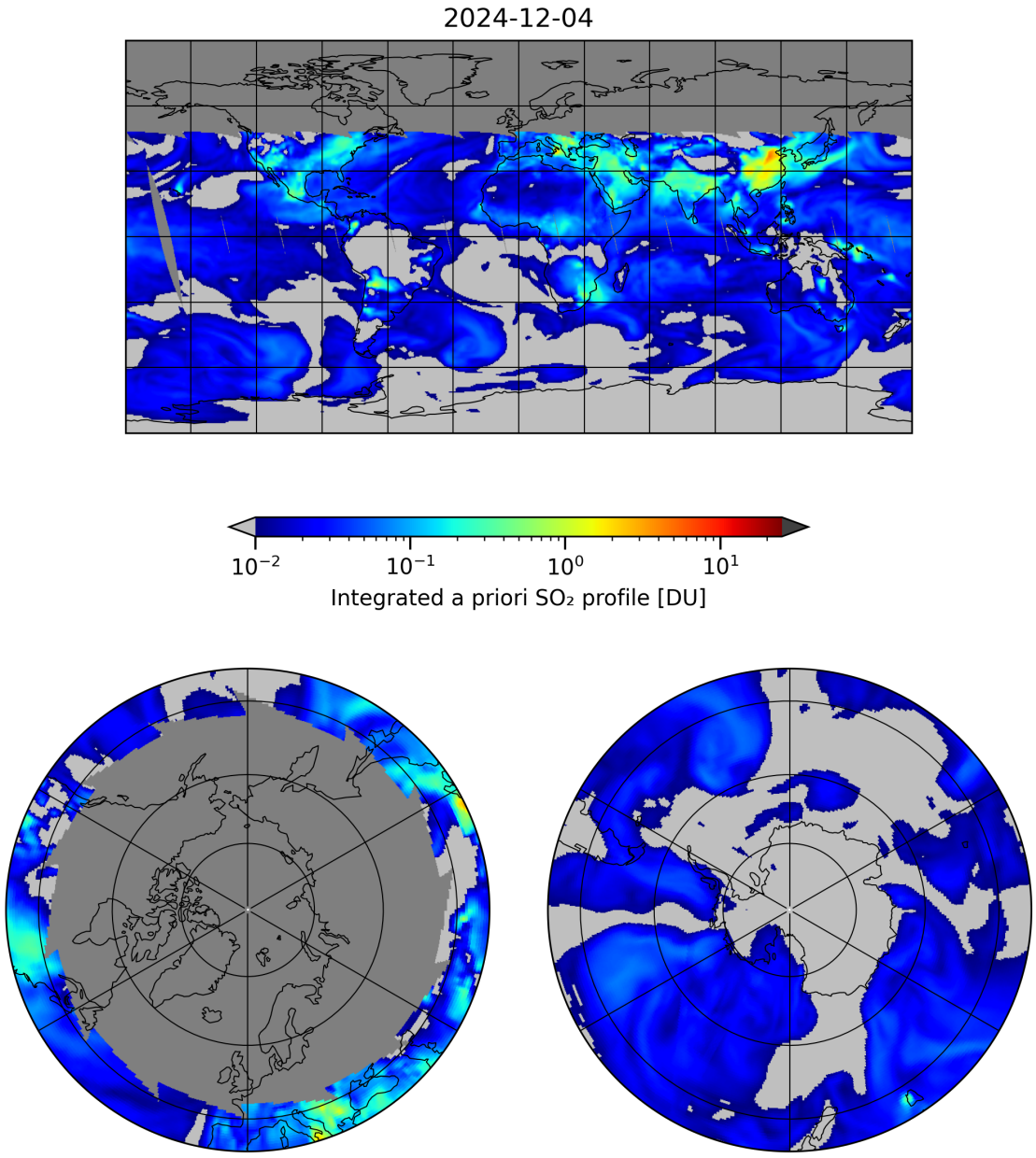


Figure 21: Map of “Integrated a priori SO_2 profile” for 2024-12-04 to 2024-12-04

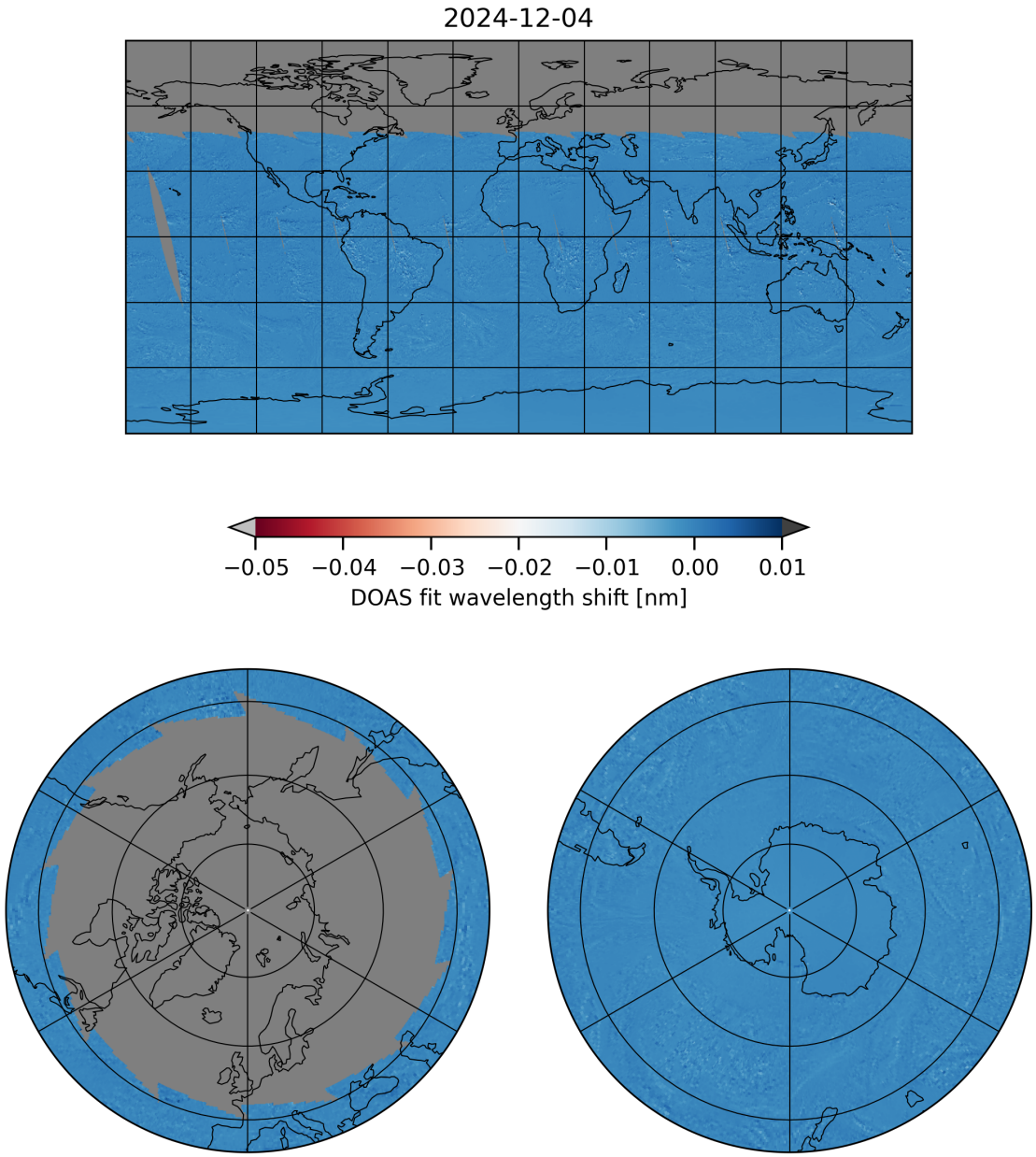


Figure 22: Map of “DOAS fit wavelength shift” for 2024-12-04 to 2024-12-04

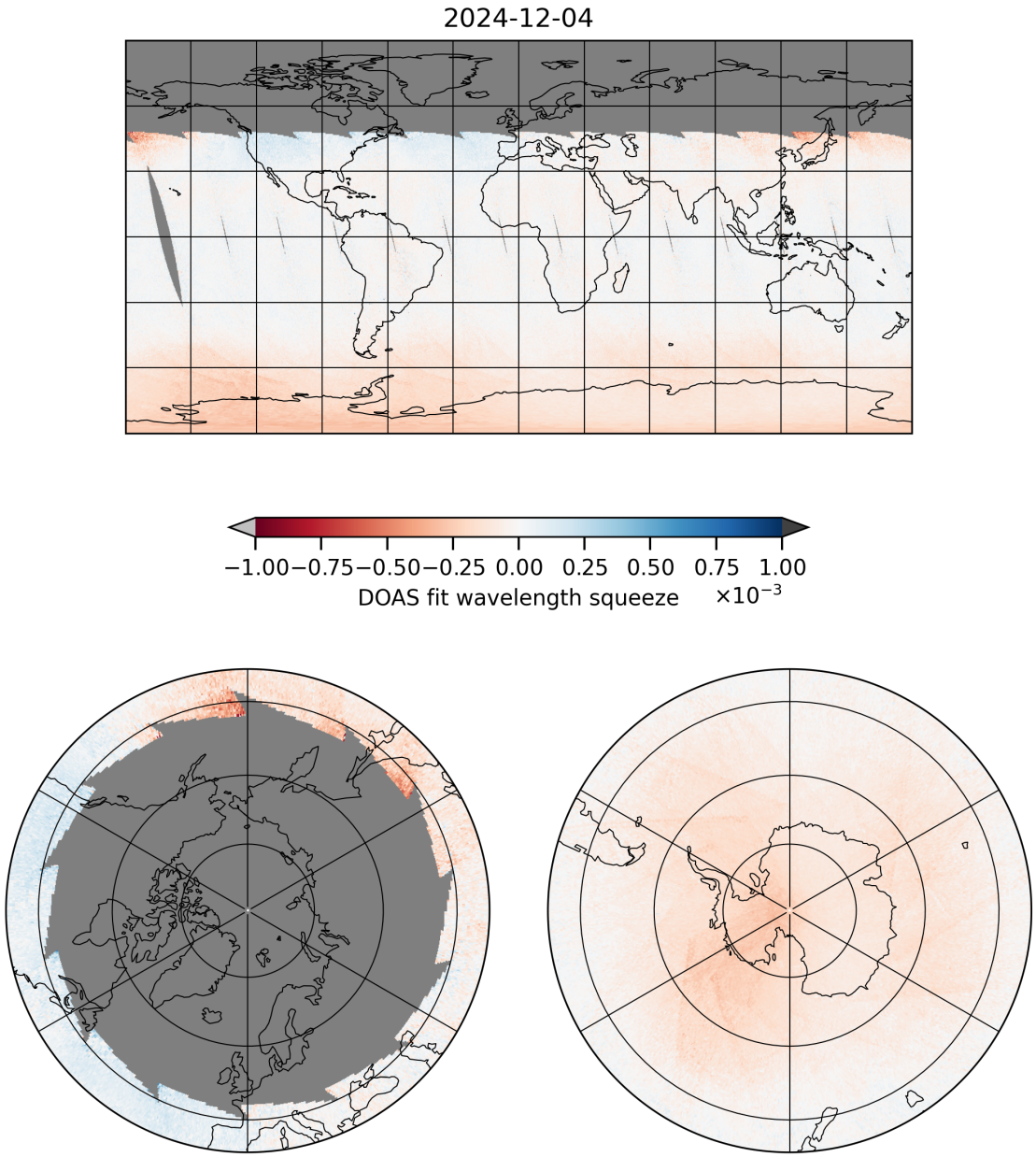


Figure 23: Map of “DOAS fit wavelength squeeze” for 2024-12-04 to 2024-12-04

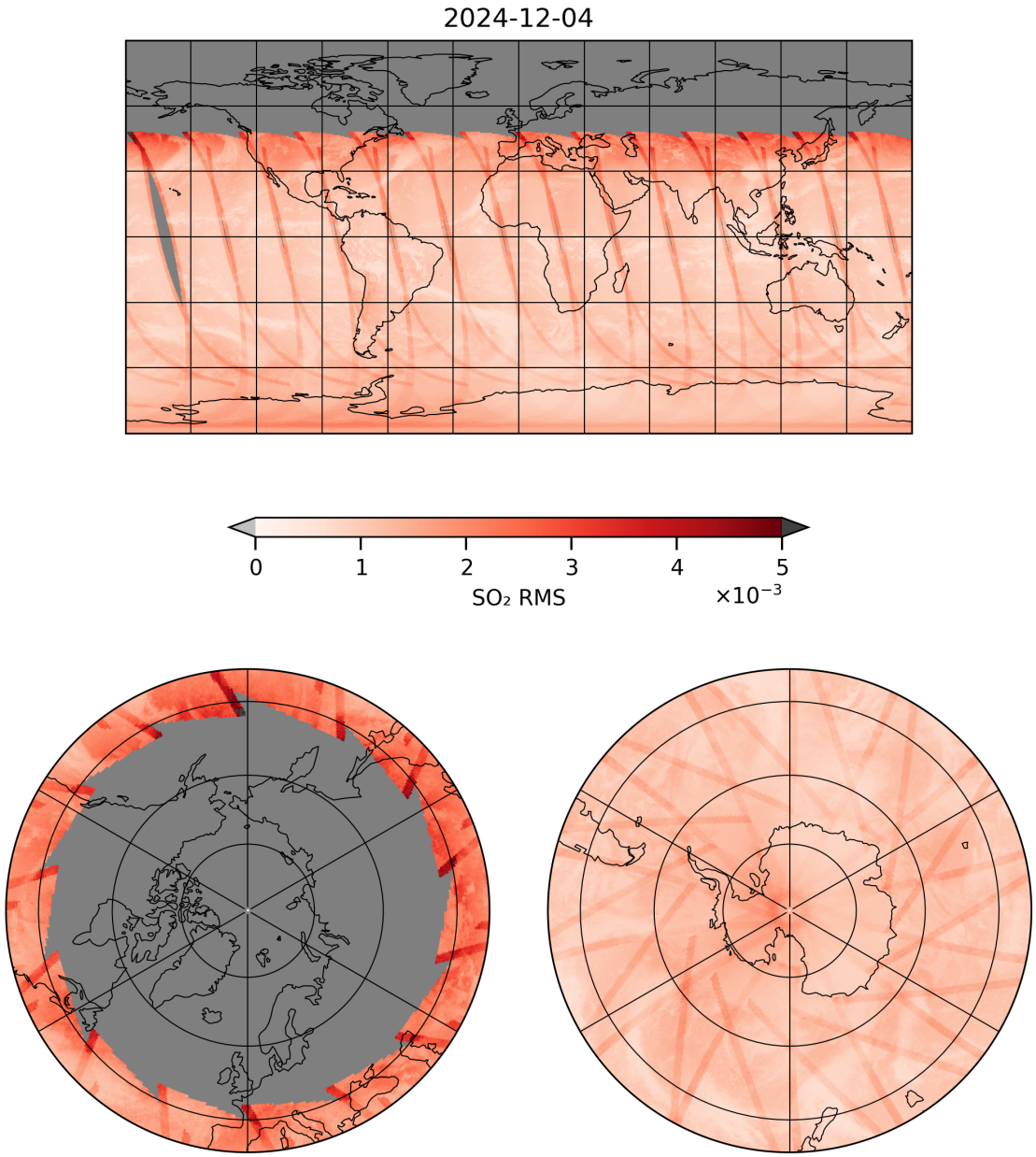


Figure 24: Map of "SO_2 RMS" for 2024-12-04 to 2024-12-04

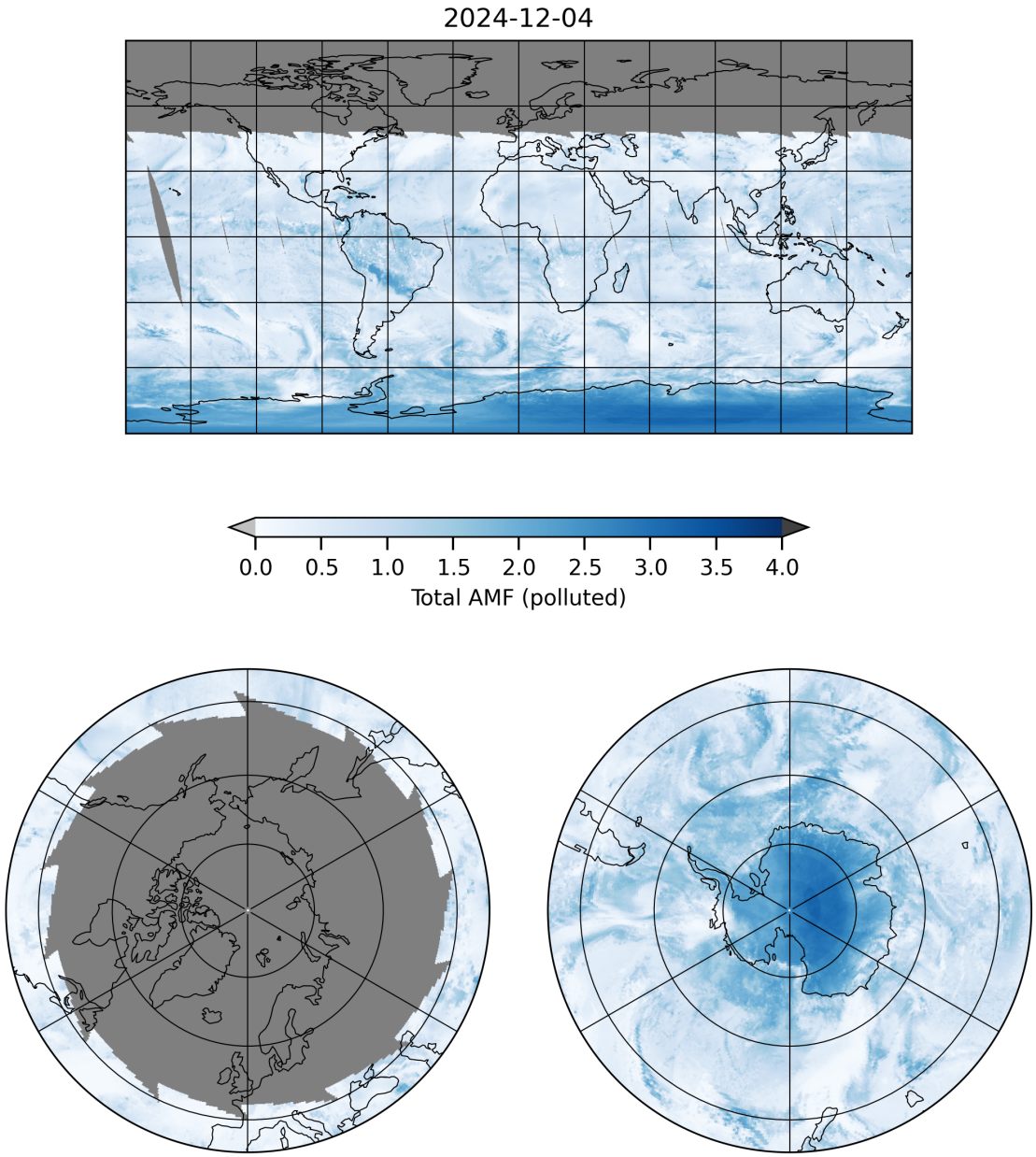


Figure 25: Map of “Total AMF (polluted)” for 2024-12-04 to 2024-12-04

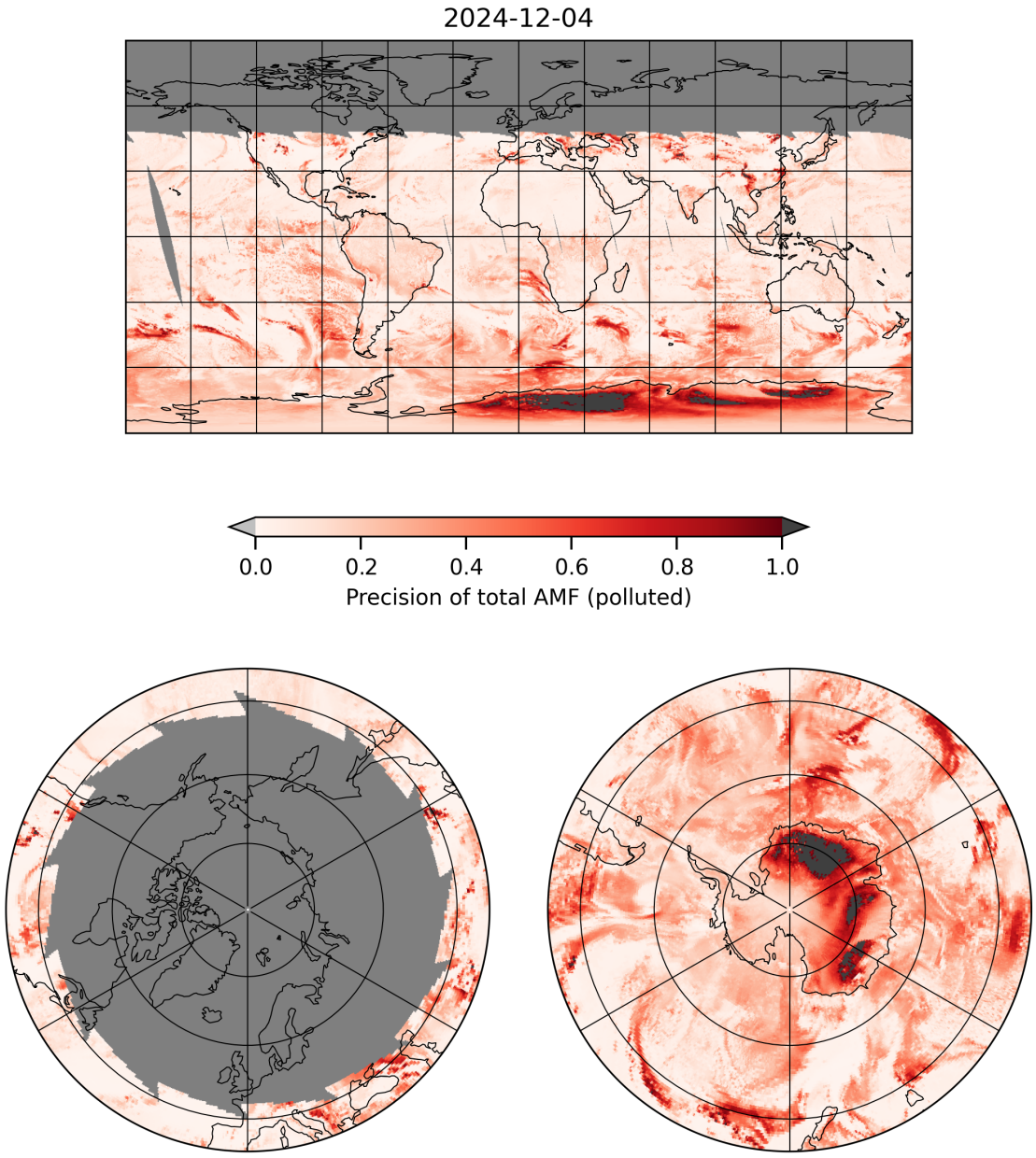


Figure 26: Map of “Precision of total AMF (polluted)” for 2024-12-04 to 2024-12-04

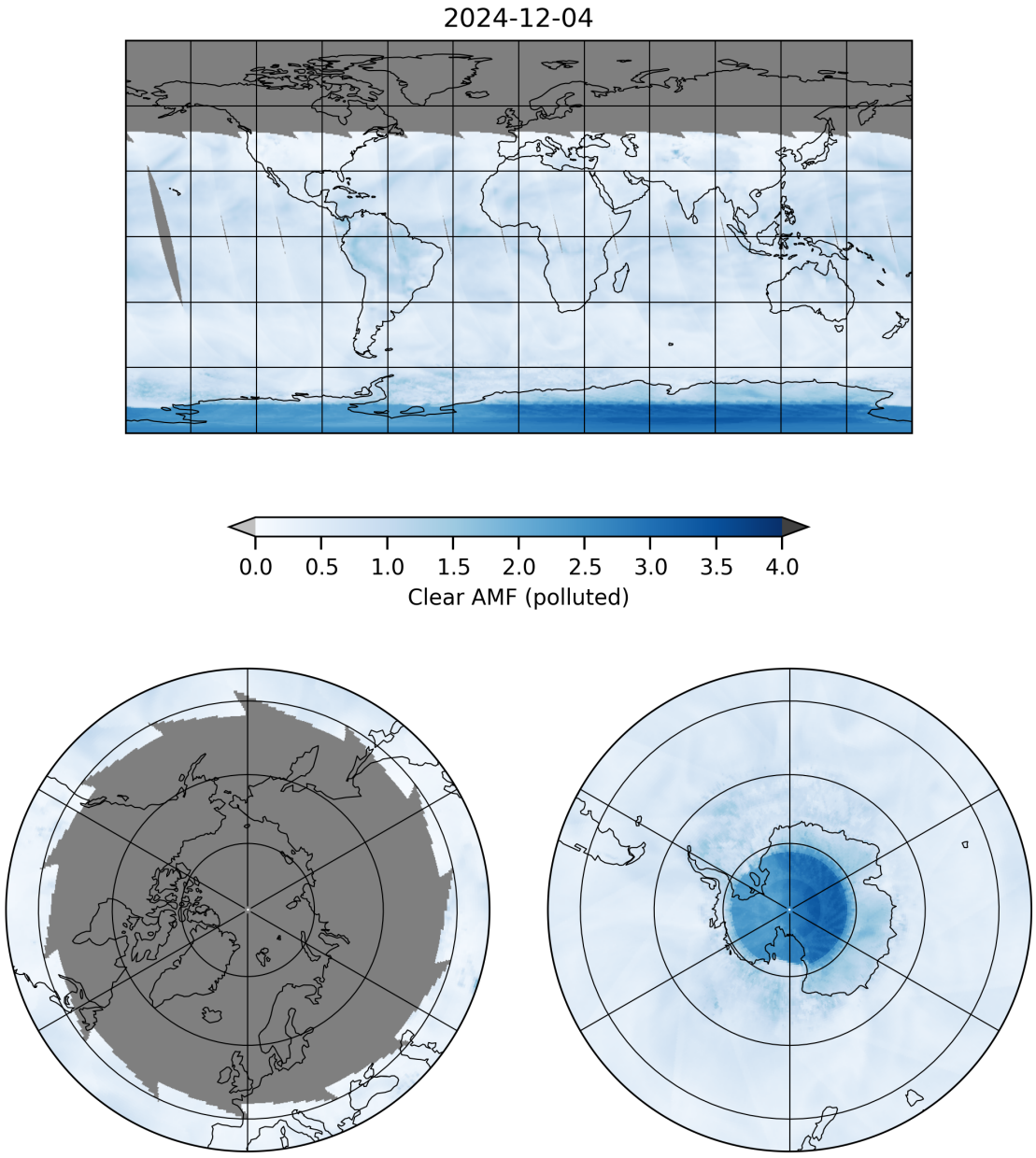


Figure 27: Map of “Clear AMF (polluted)” for 2024-12-04 to 2024-12-04

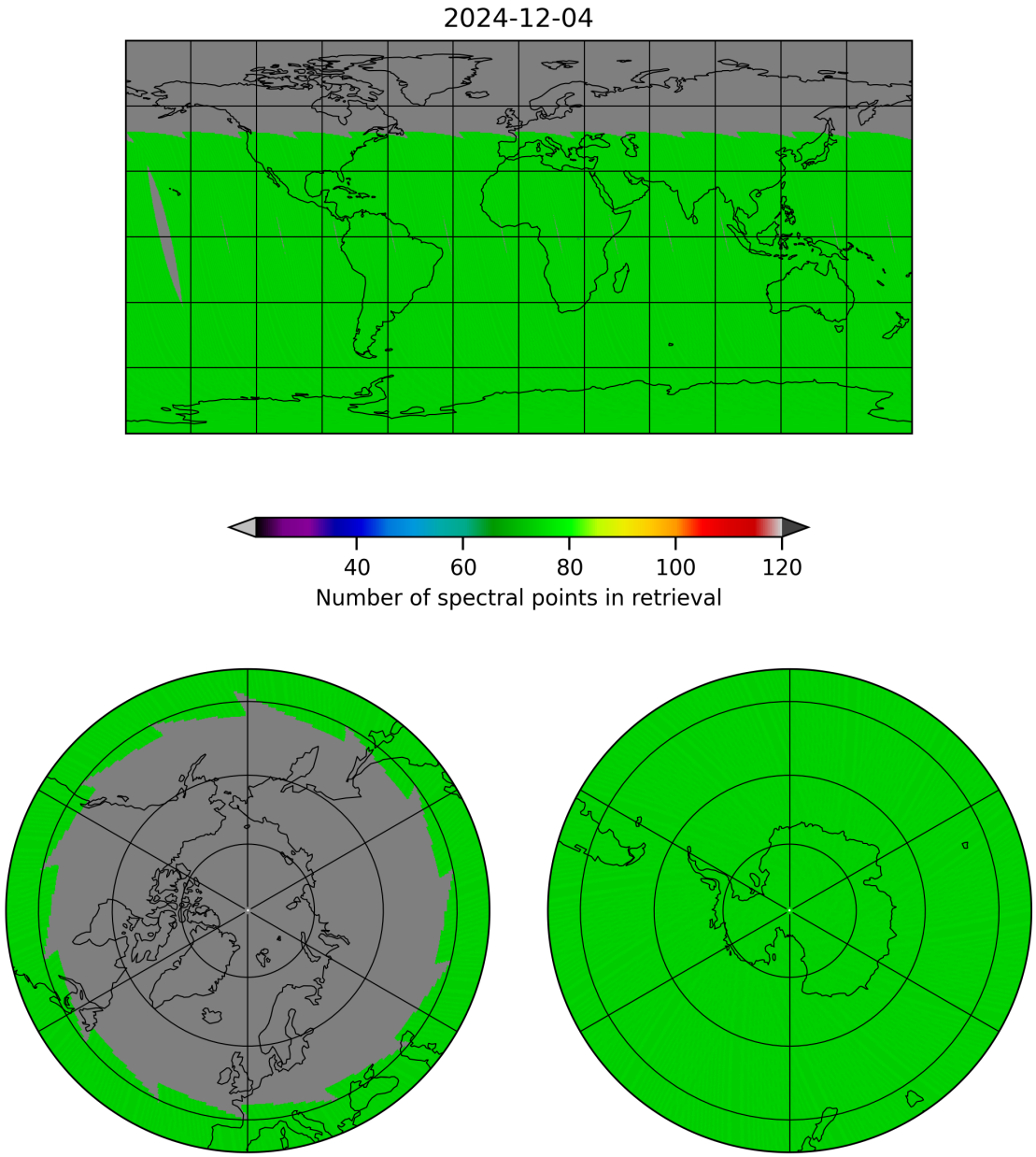


Figure 28: Map of “Number of spectral points in retrieval” for 2024-12-04 to 2024-12-04

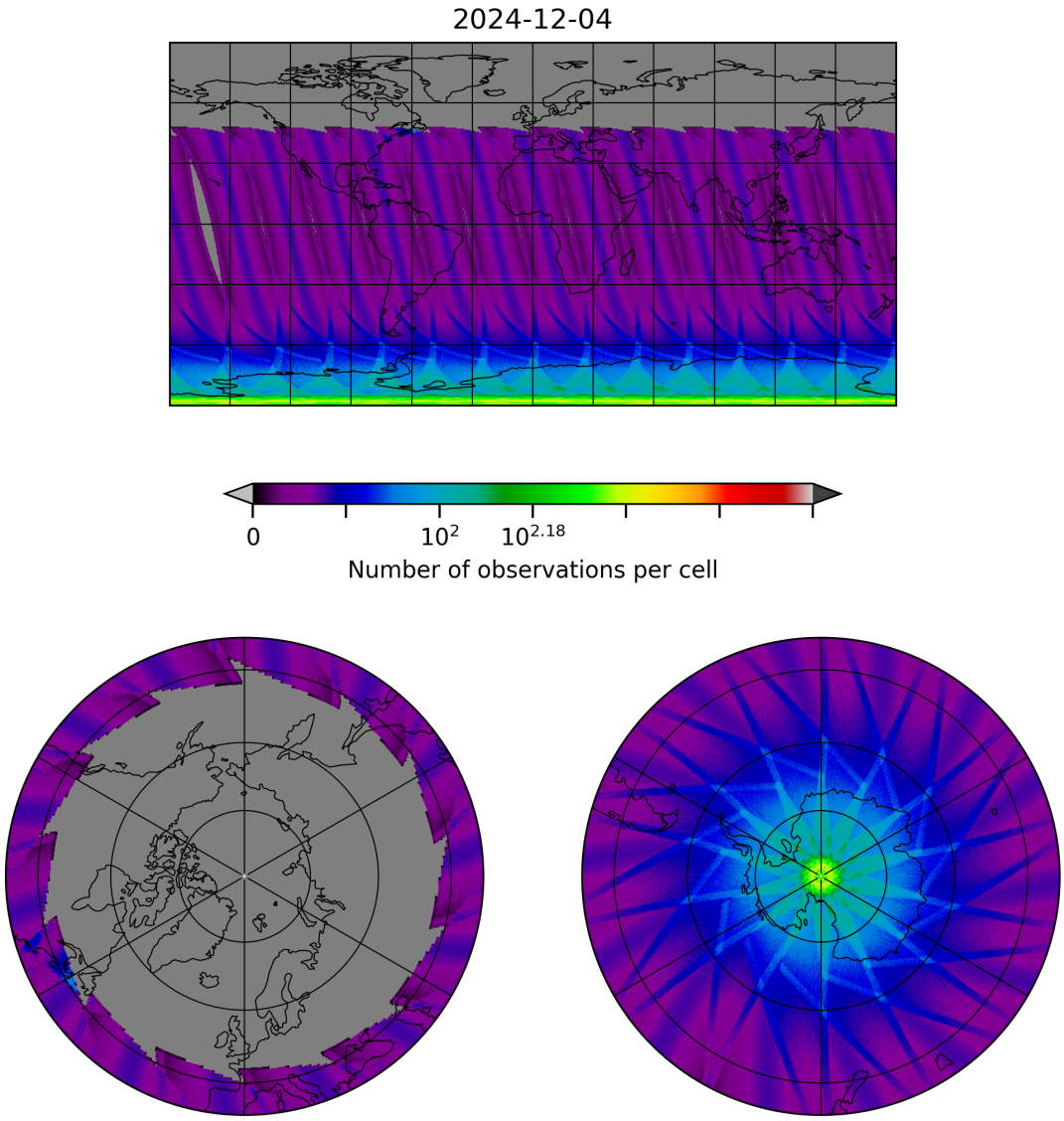


Figure 29: Map of the number of observations for 2024-12-04 to 2024-12-04

7 Zonal average

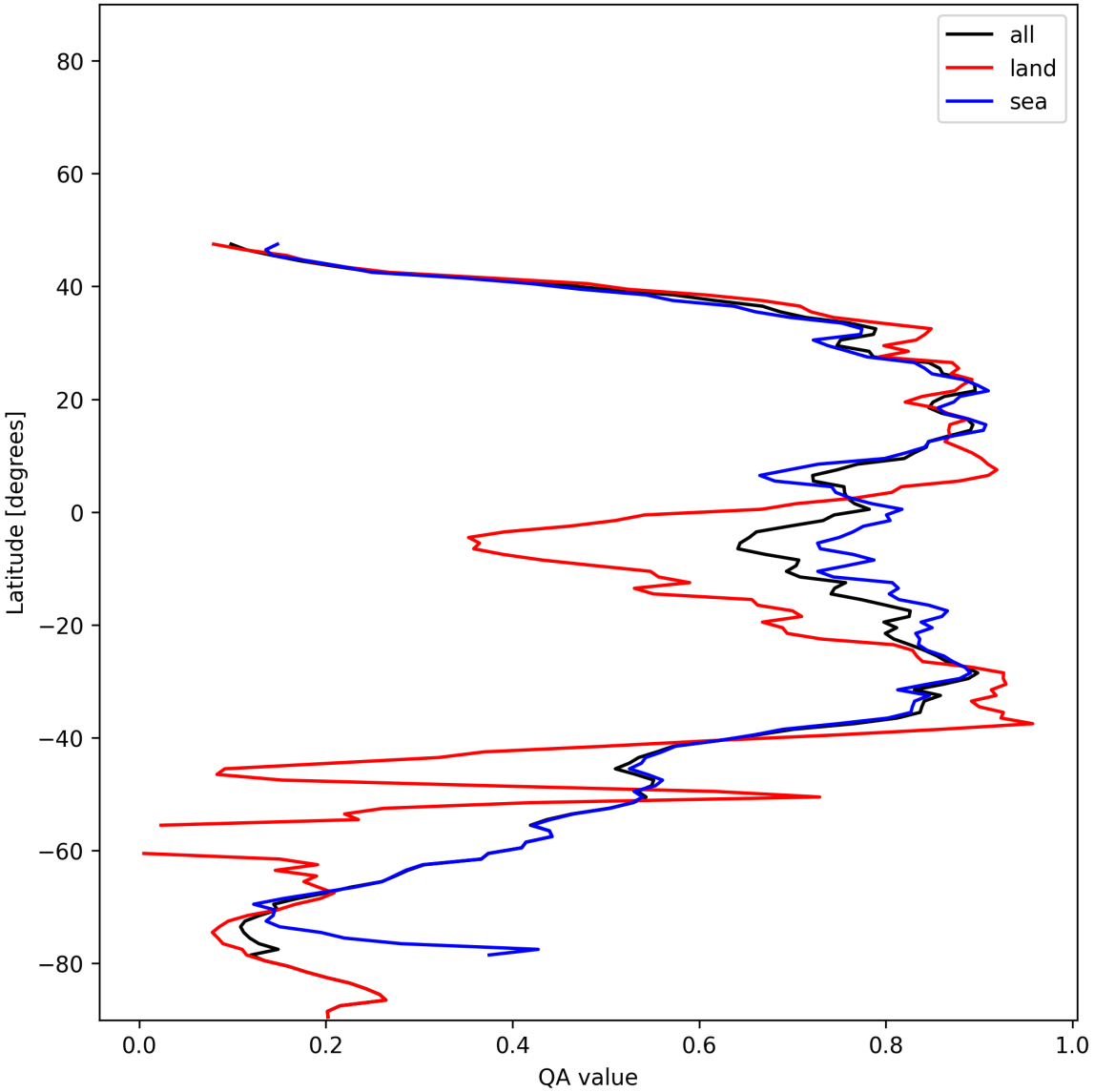


Figure 30: Zonal average of “QA value” for 2024-12-04 to 2024-12-04.

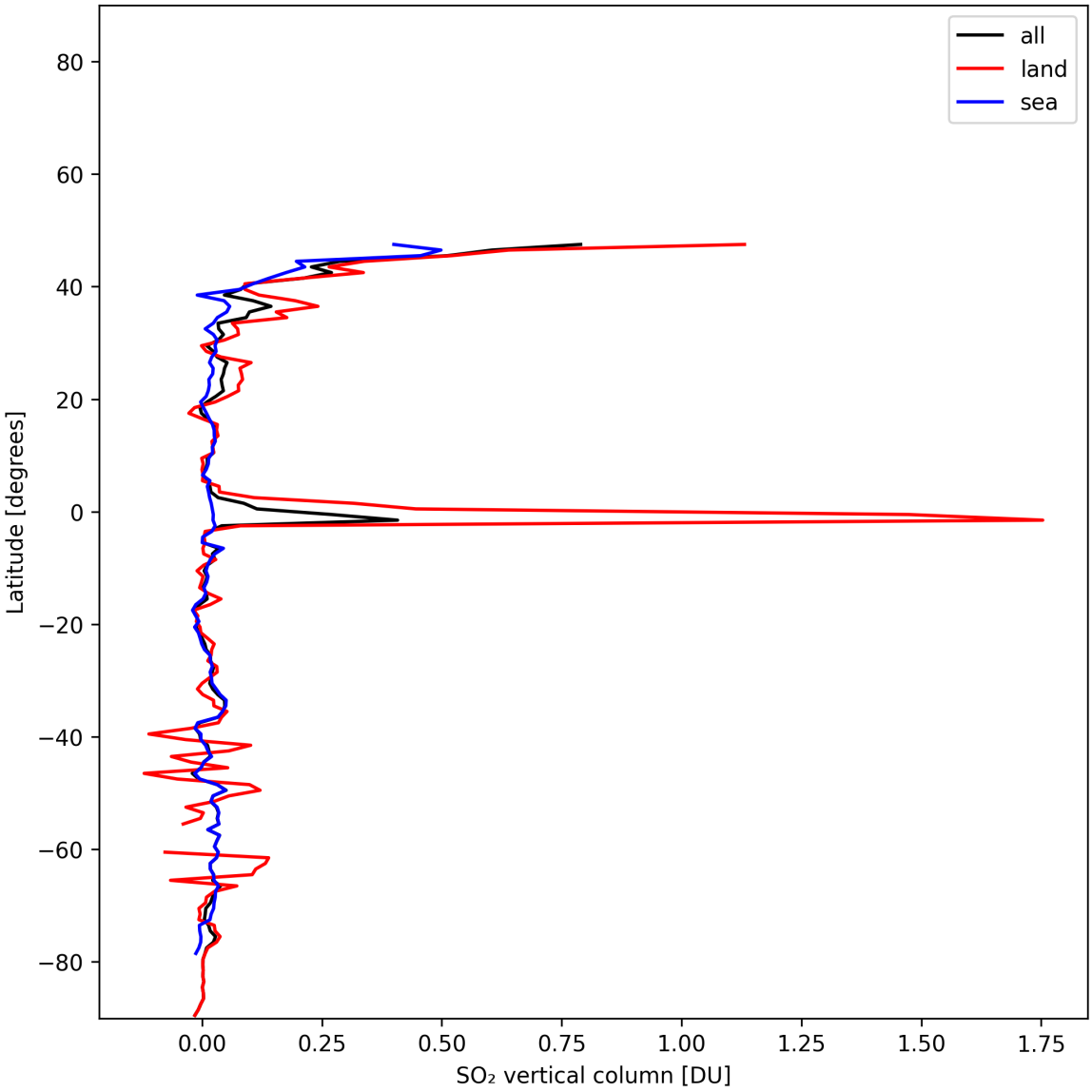


Figure 31: Zonal average of "SO_2 vertical column" for 2024-12-04 to 2024-12-04.

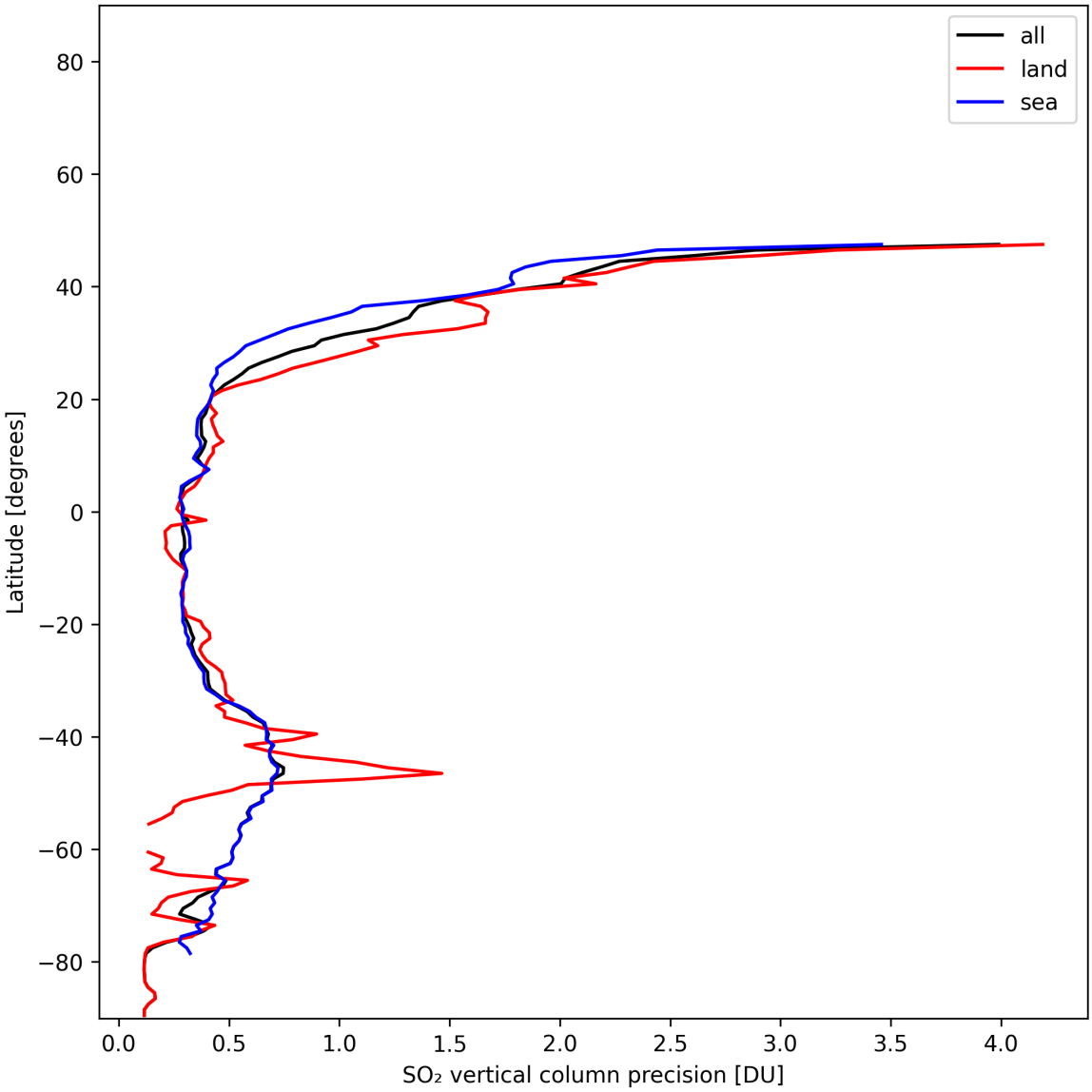


Figure 32: Zonal average of "SO_2 vertical column precision" for 2024-12-04 to 2024-12-04.

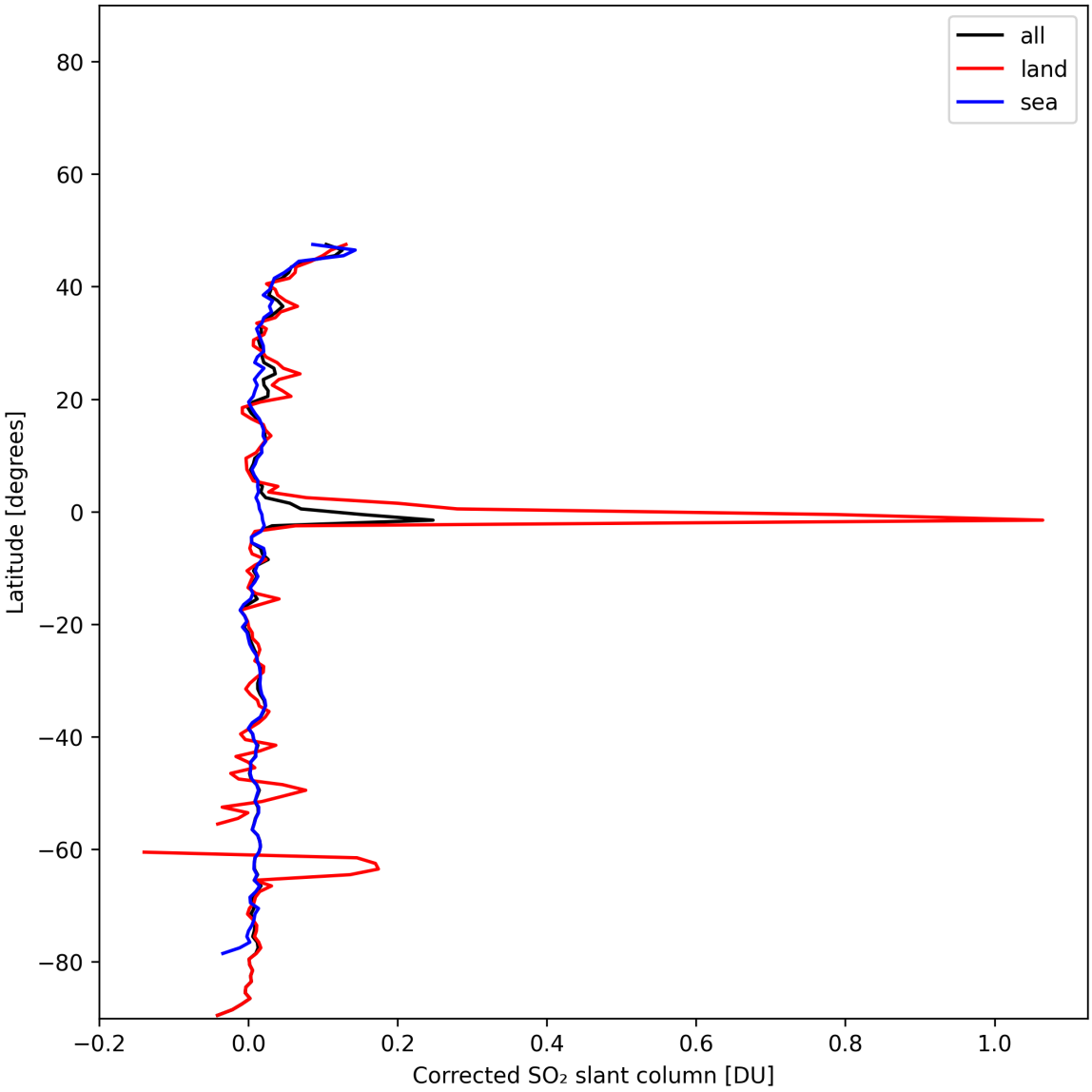


Figure 33: Zonal average of “Corrected SO_2 slant column” for 2024-12-04 to 2024-12-04.

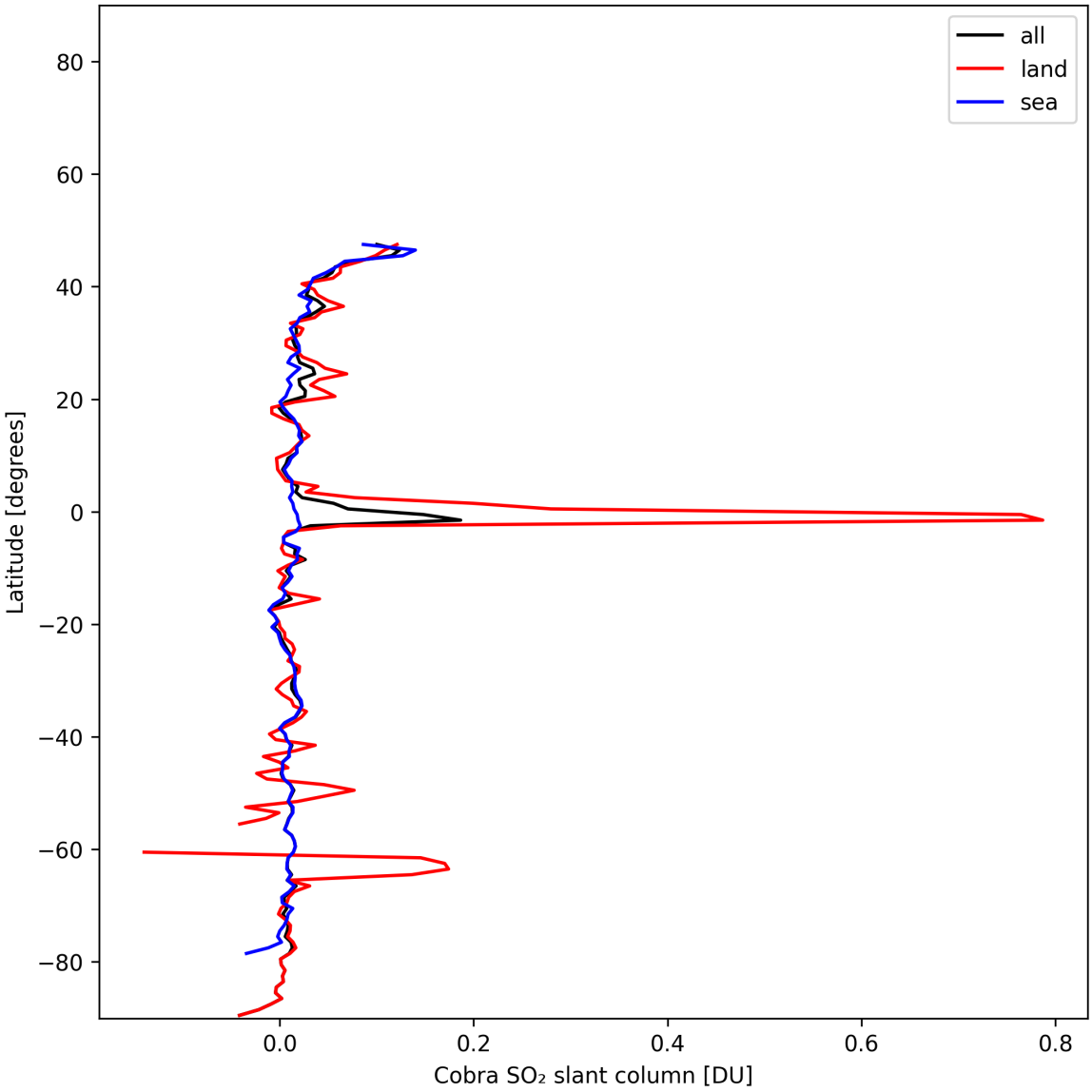


Figure 34: Zonal average of "Cobra SO_2 slant column" for 2024-12-04 to 2024-12-04.

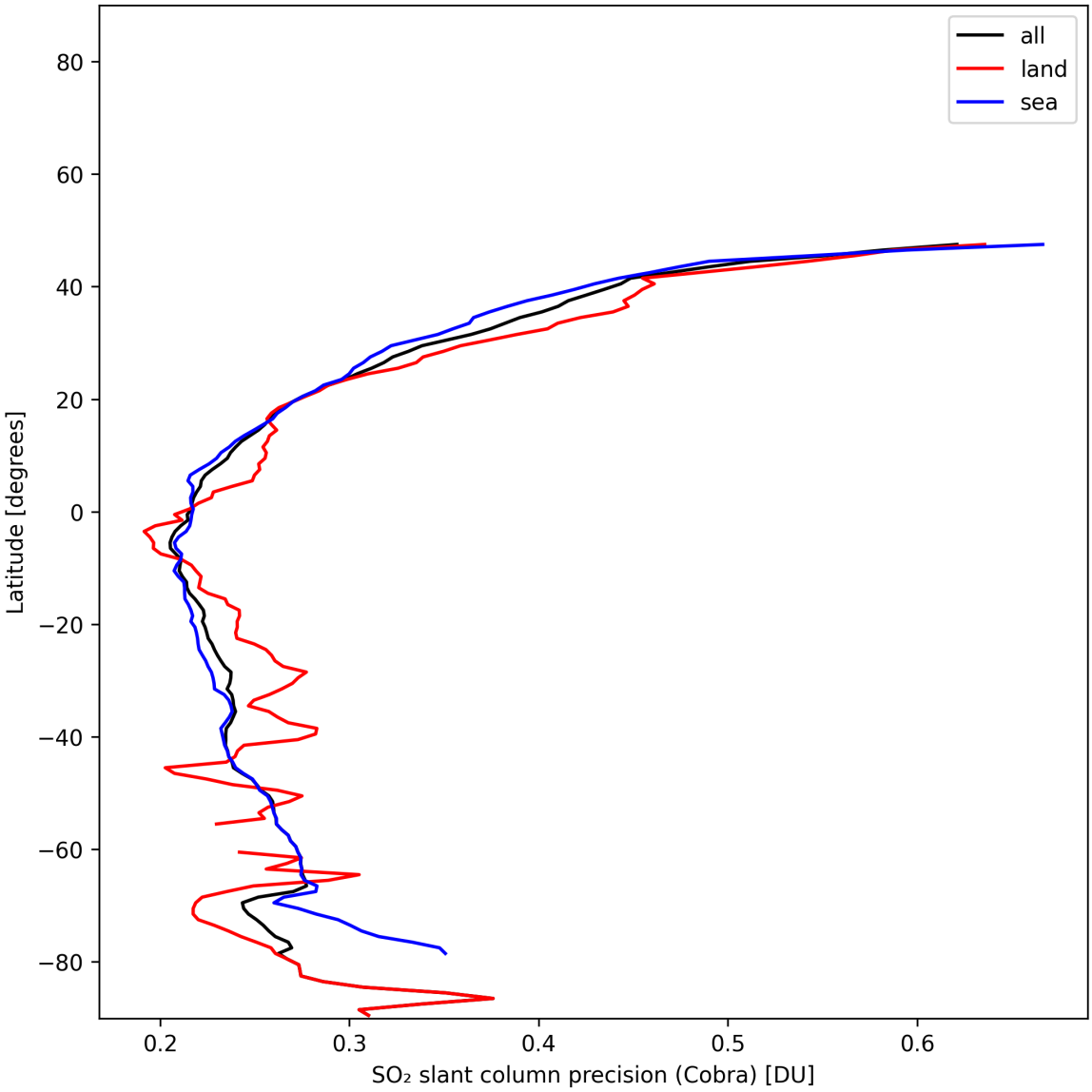


Figure 35: Zonal average of "SO_2 slant column precision (Cobra)" for 2024-12-04 to 2024-12-04.

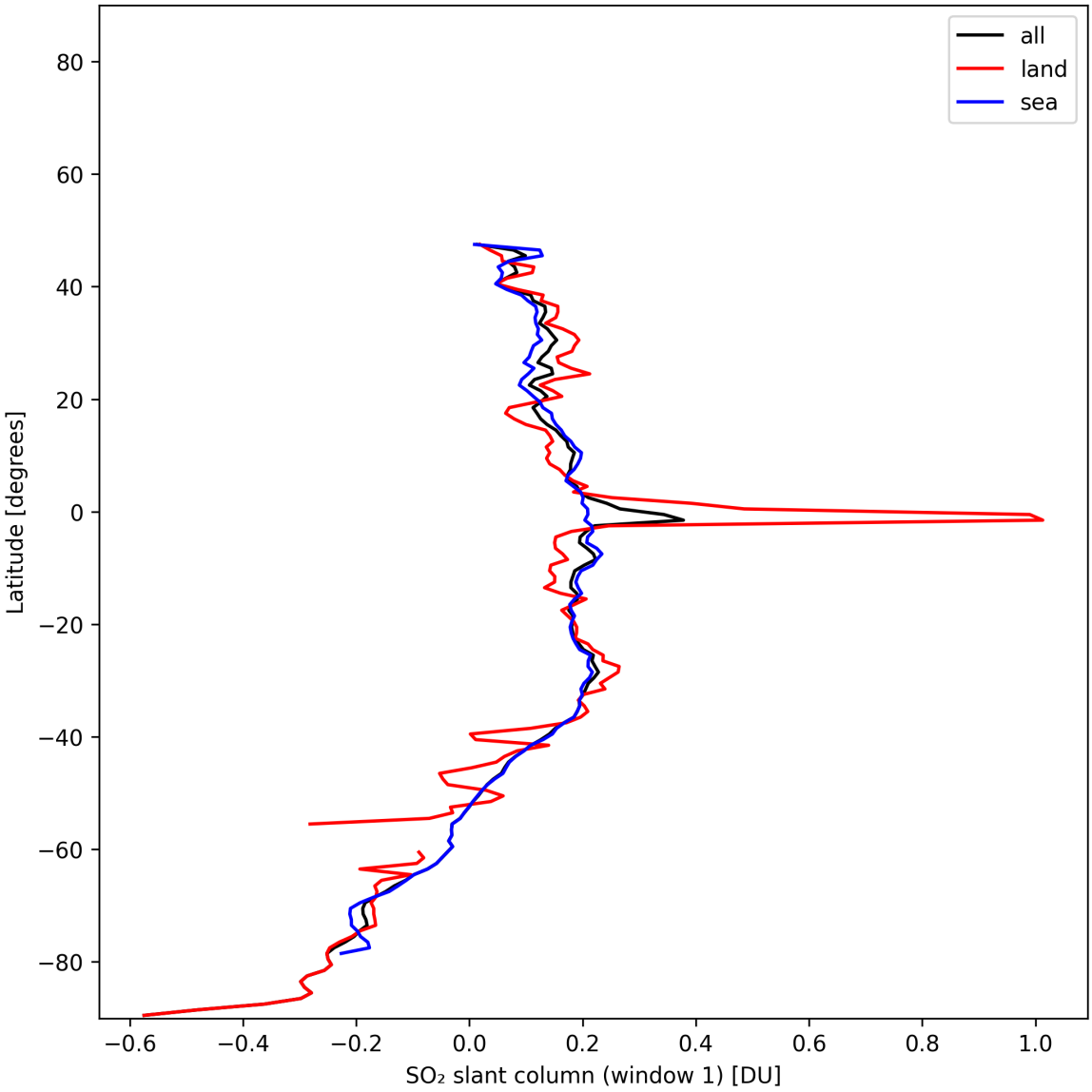


Figure 36: Zonal average of "SO_2 slant column (window 1)" for 2024-12-04 to 2024-12-04.

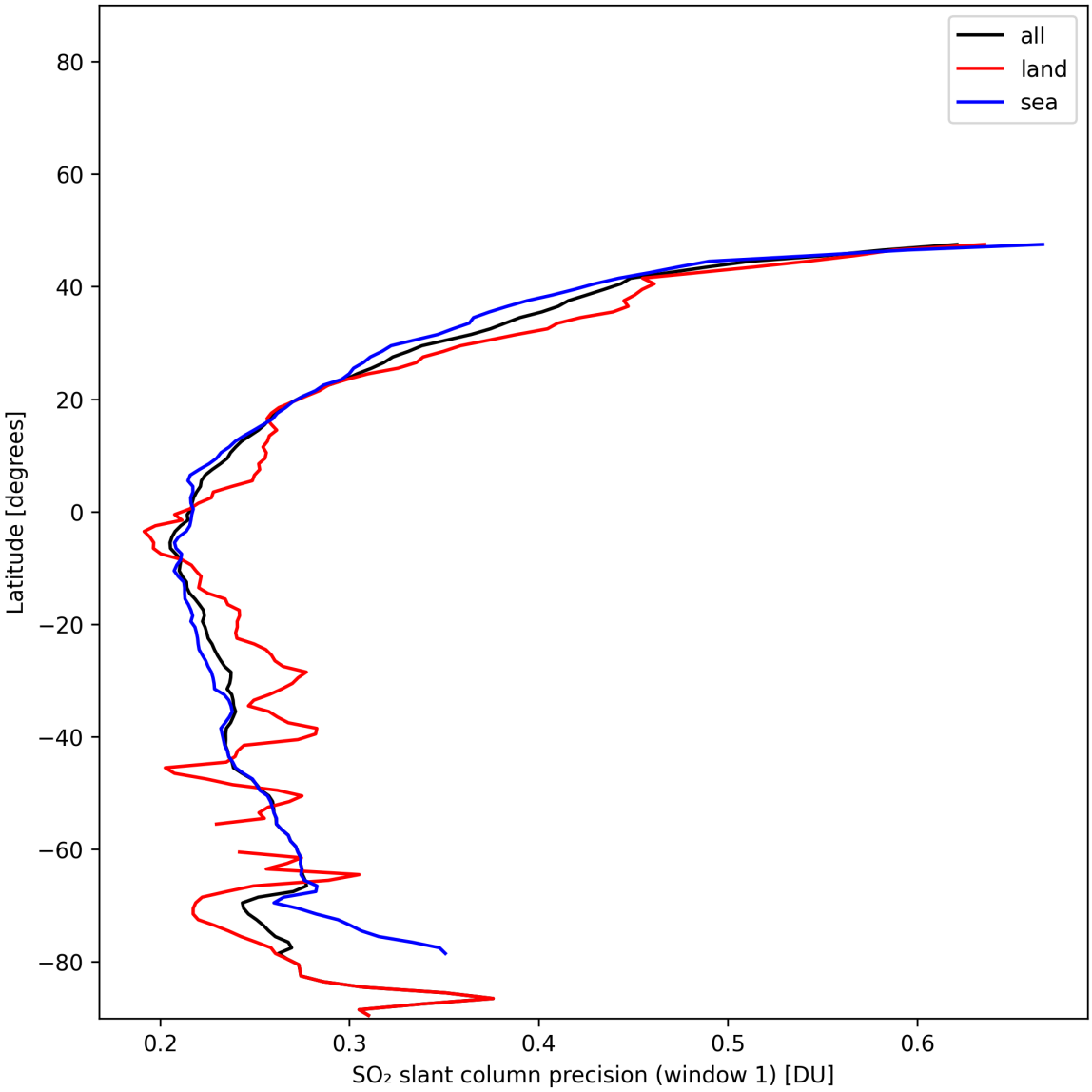


Figure 37: Zonal average of "SO_2 slant column precision (window 1)" for 2024-12-04 to 2024-12-04.

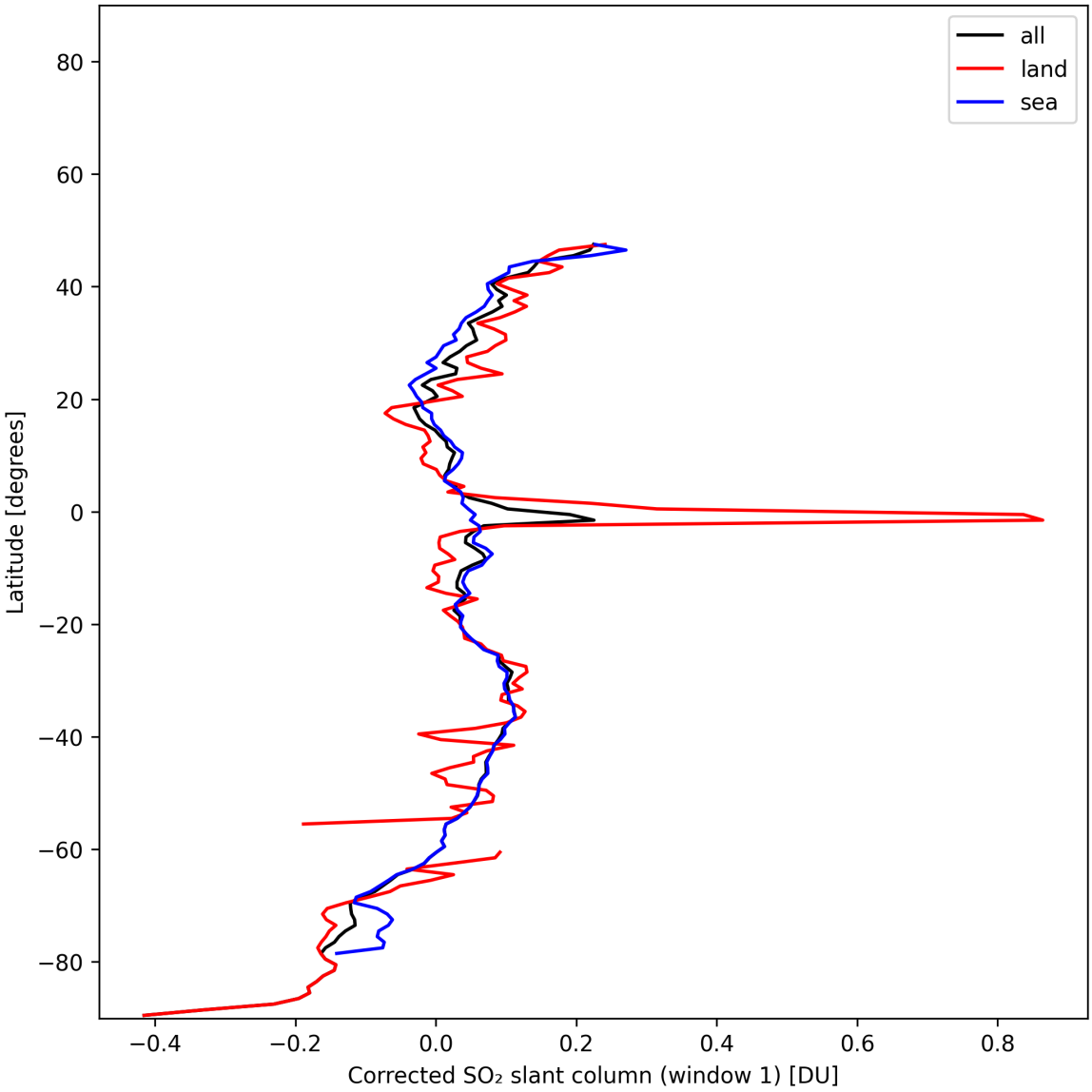


Figure 38: Zonal average of "Corrected SO_2 slant column (window 1)" for 2024-12-04 to 2024-12-04.

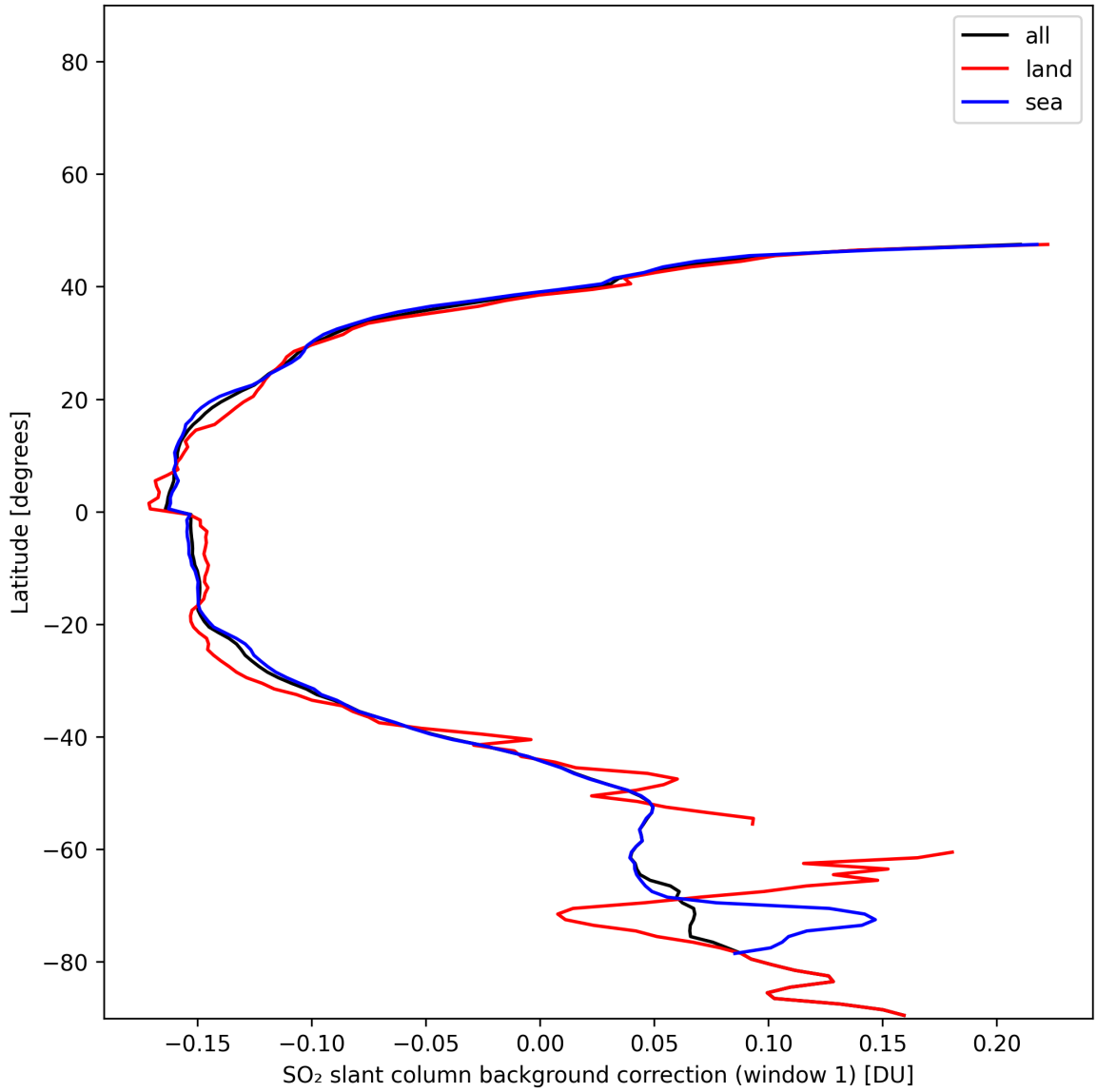


Figure 39: Zonal average of "SO_2 slant column background correction (window 1)" for 2024-12-04 to 2024-12-04.

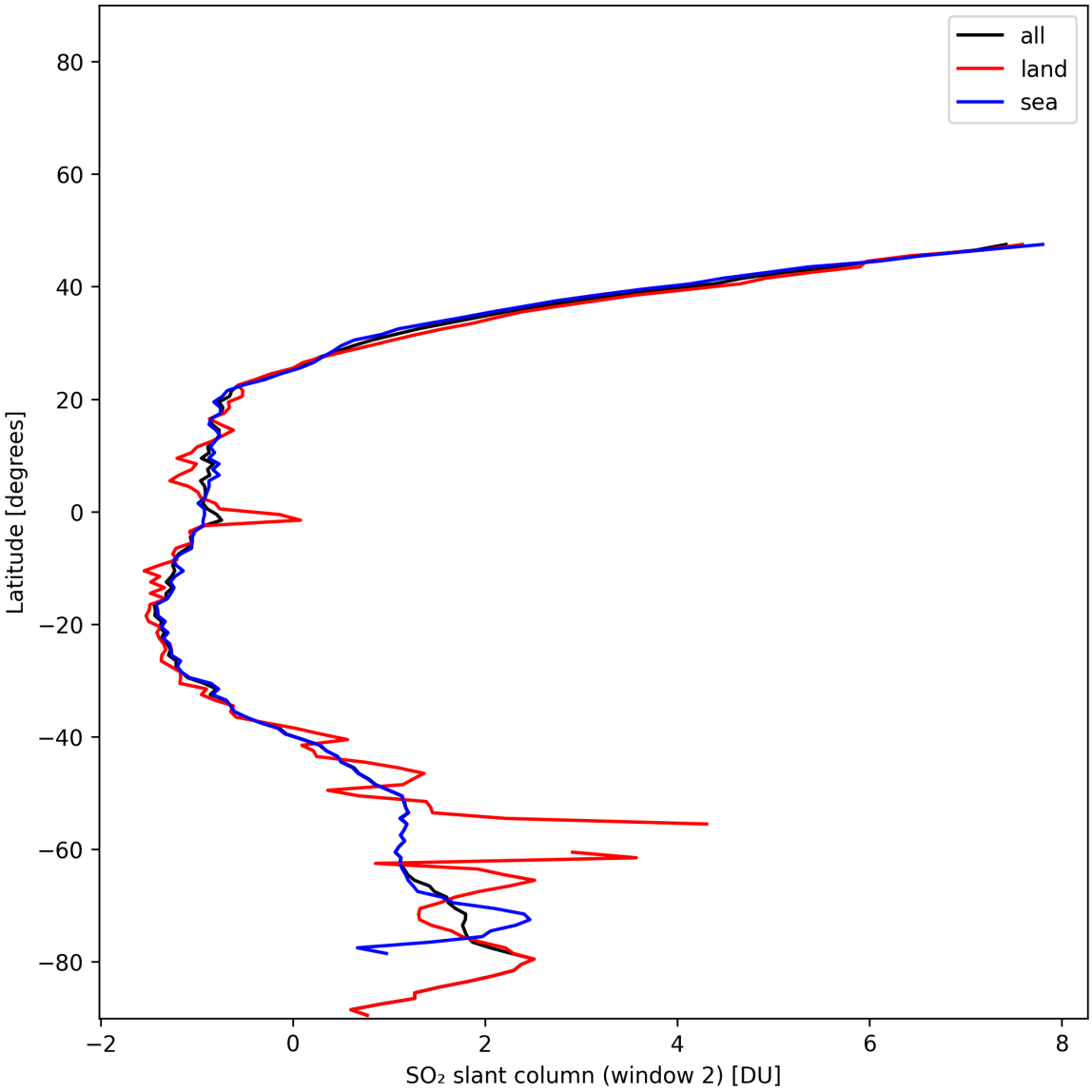


Figure 40: Zonal average of "SO_2 slant column (window 2)" for 2024-12-04 to 2024-12-04.

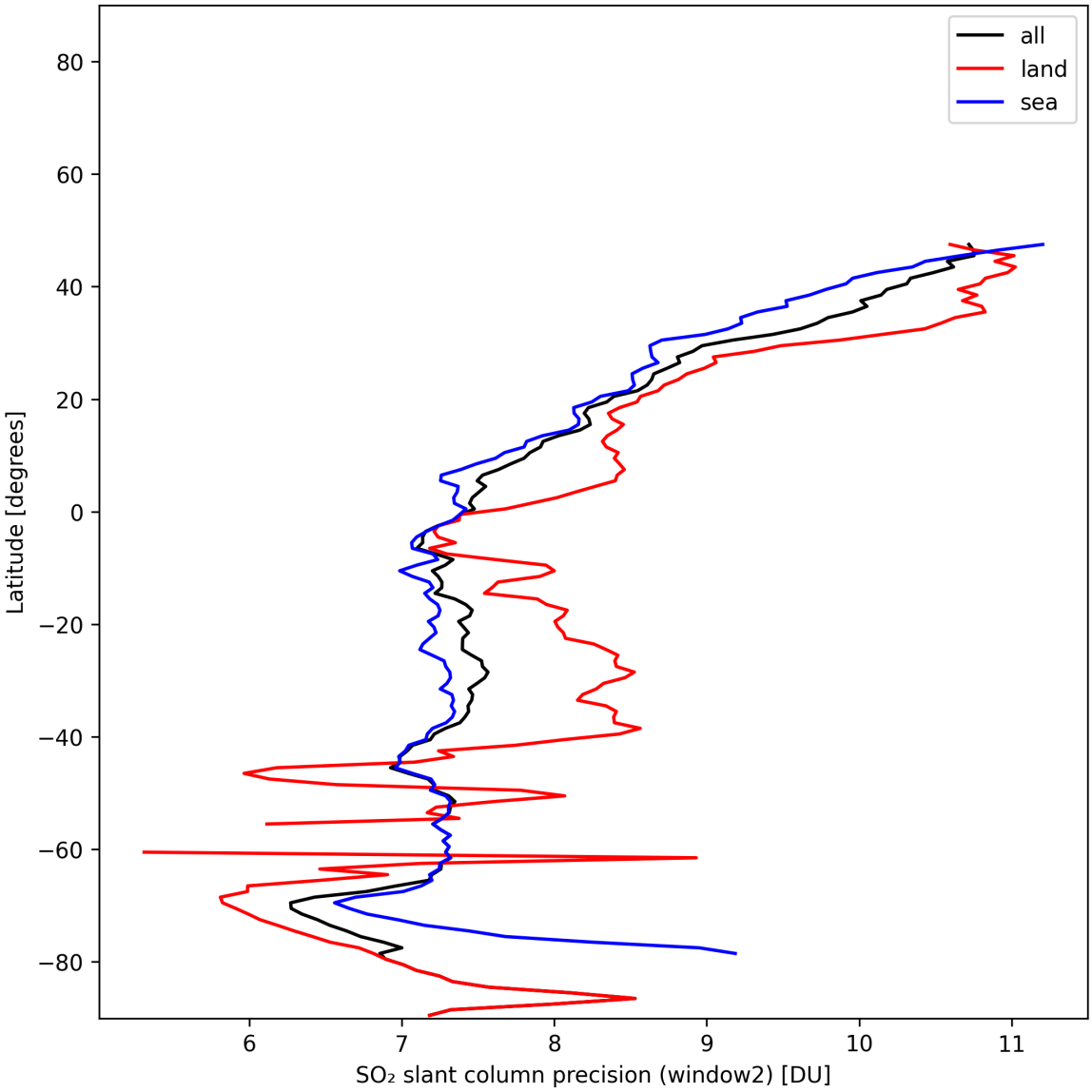


Figure 41: Zonal average of "SO_2 slant column precision (window2)" for 2024-12-04 to 2024-12-04.

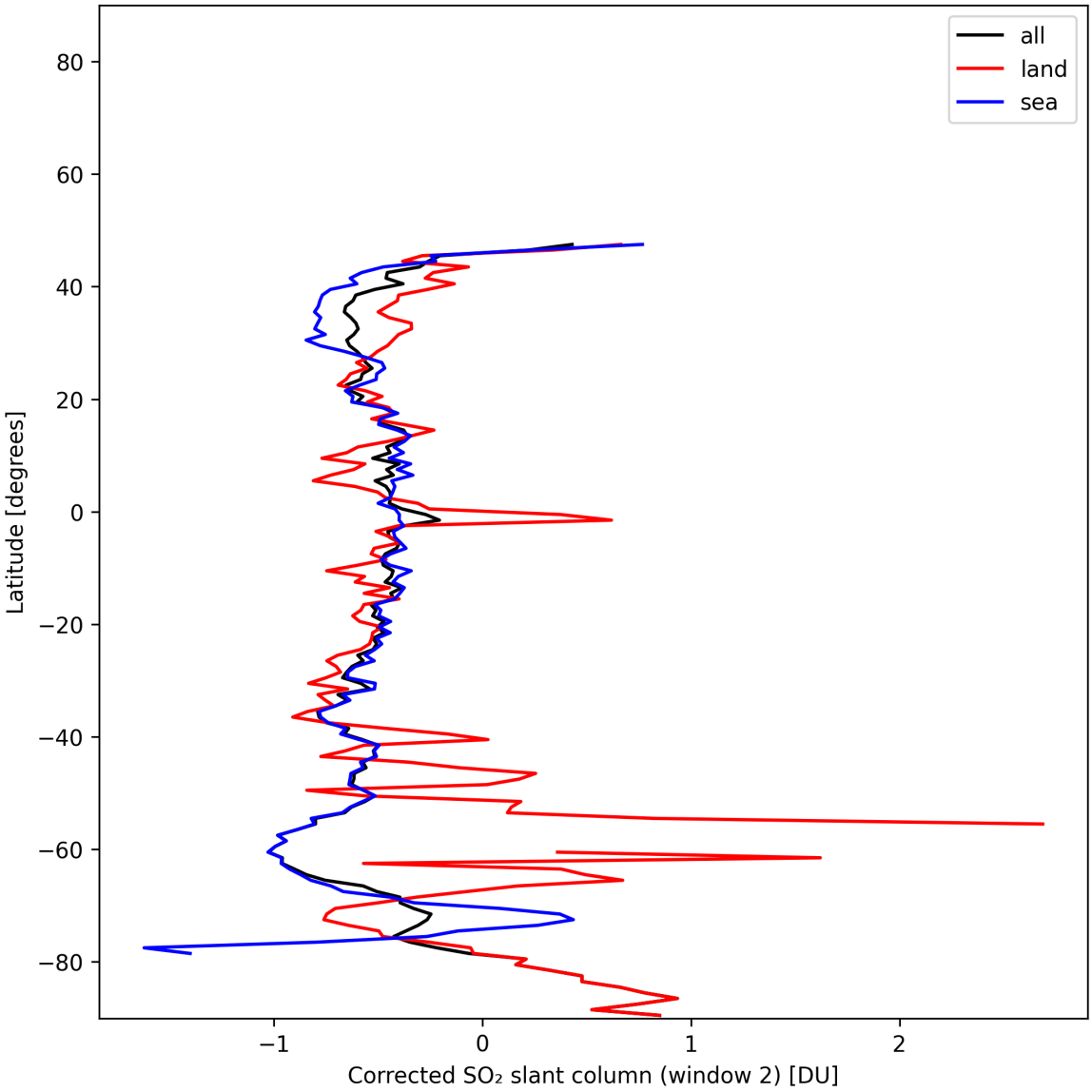


Figure 42: Zonal average of "Corrected SO_2 slant column (window 2)" for 2024-12-04 to 2024-12-04.

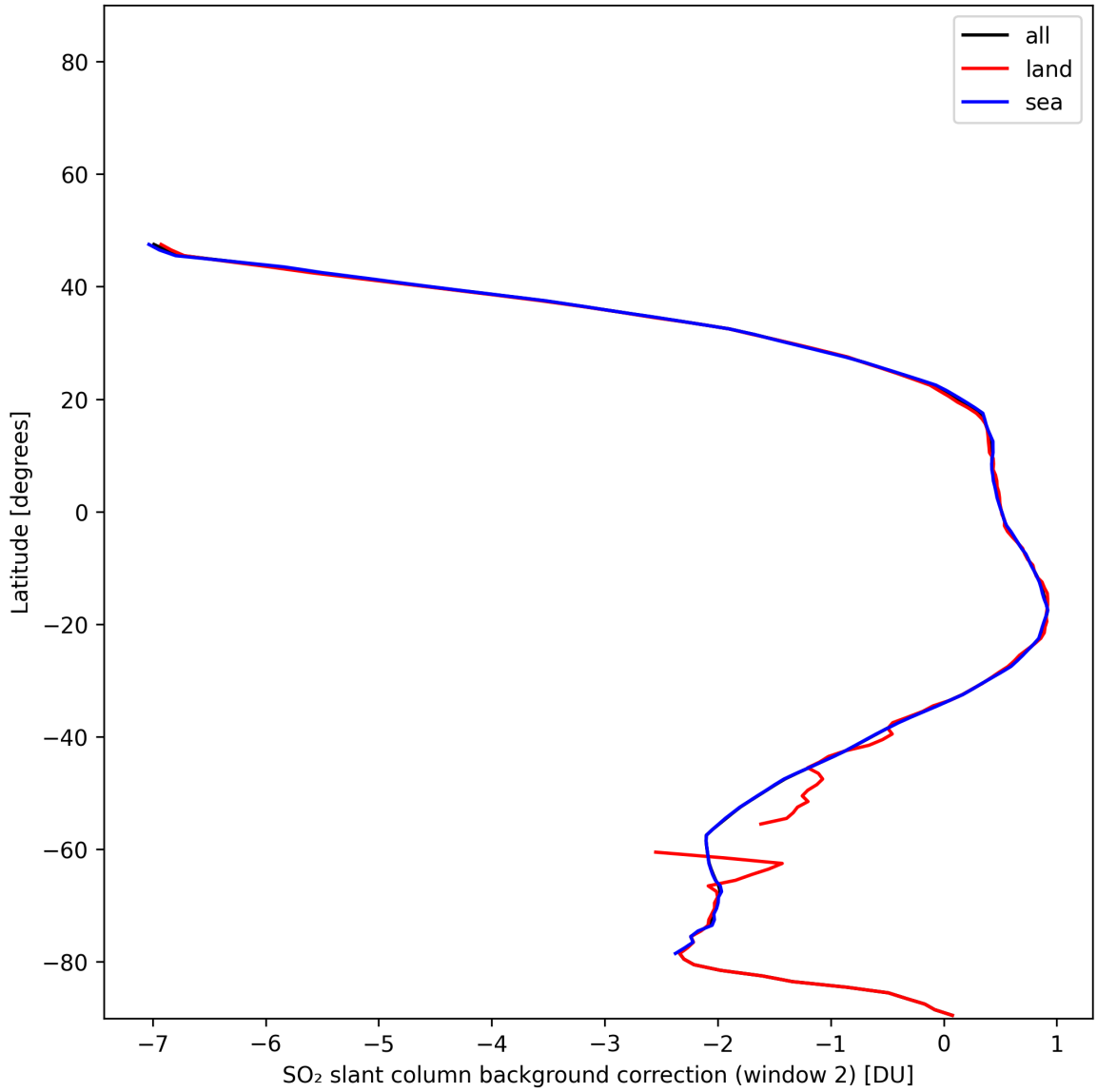


Figure 43: Zonal average of "SO_2 slant column background correction (window 2)" for 2024-12-04 to 2024-12-04.

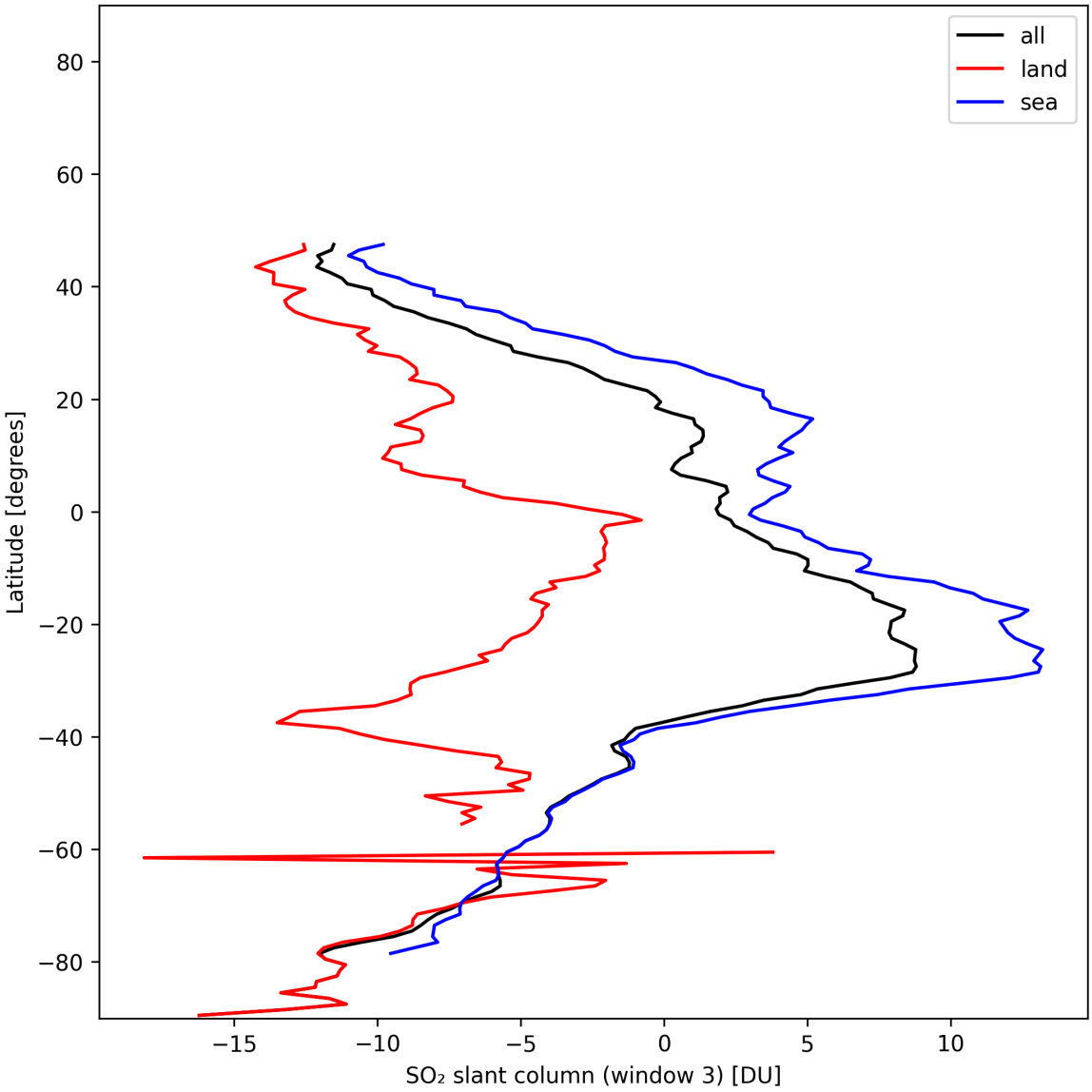


Figure 44: Zonal average of "SO_2 slant column (window 3)" for 2024-12-04 to 2024-12-04.

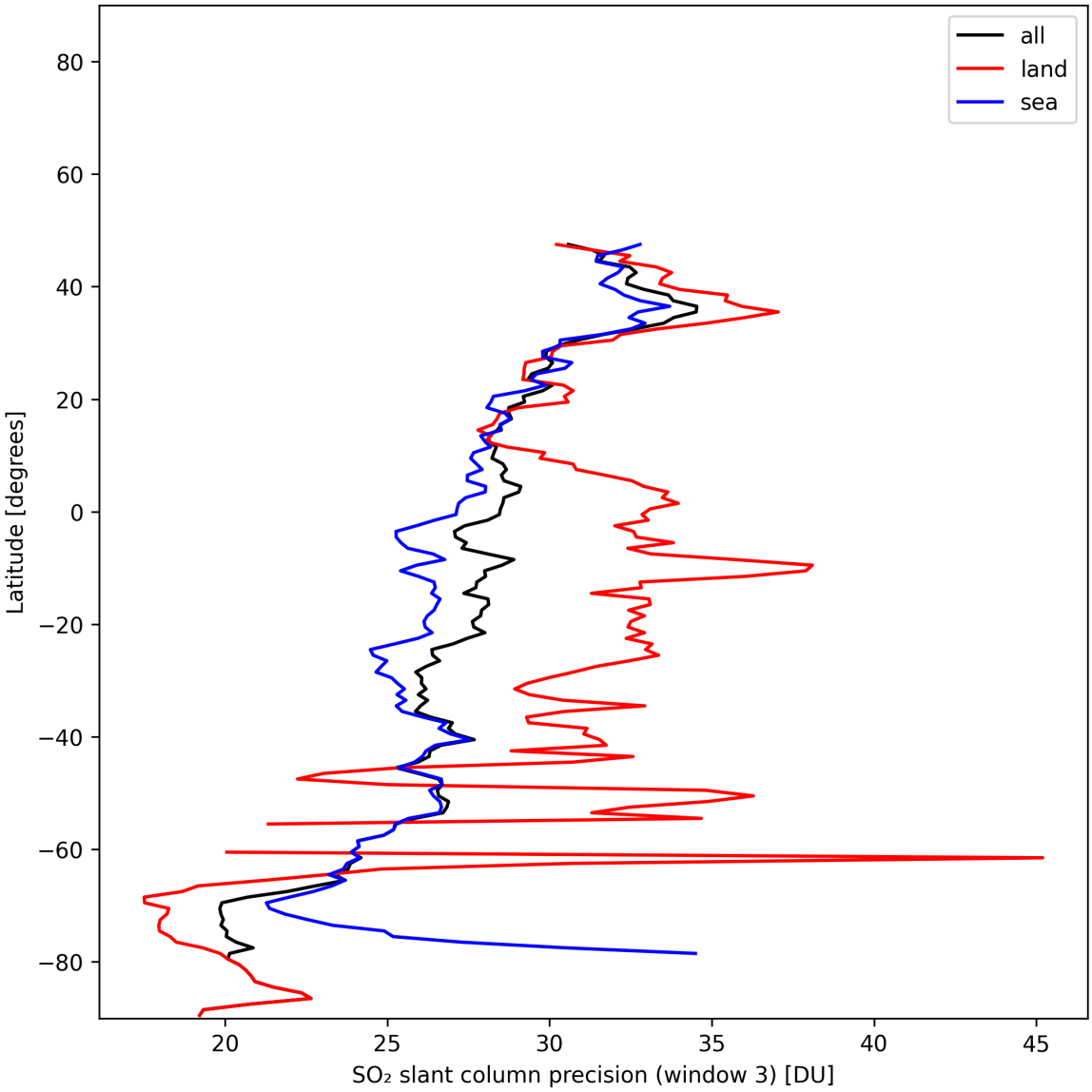


Figure 45: Zonal average of "SO_2 slant column precision (window 3)" for 2024-12-04 to 2024-12-04.

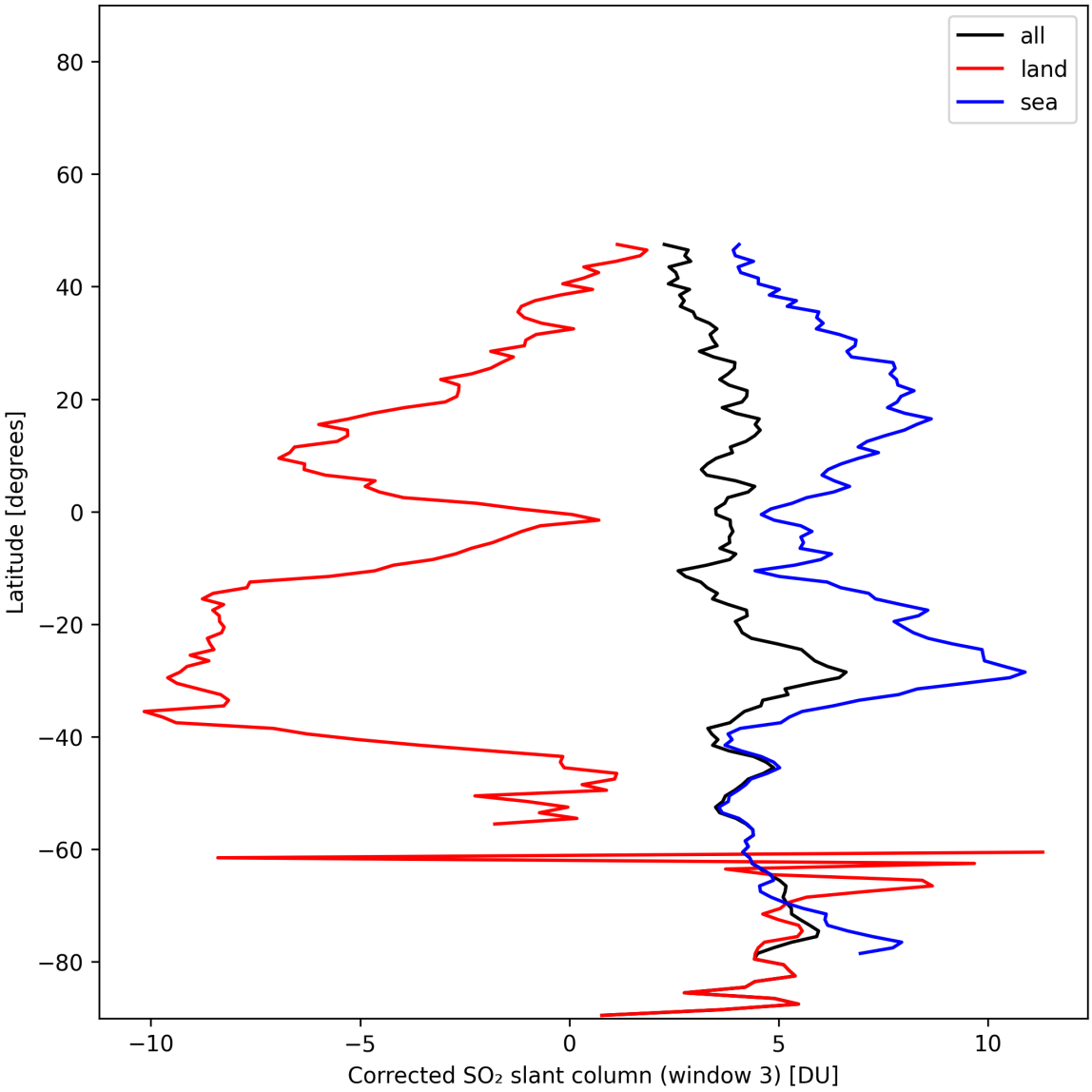


Figure 46: Zonal average of "Corrected SO_2 slant column (window 3)" for 2024-12-04 to 2024-12-04.

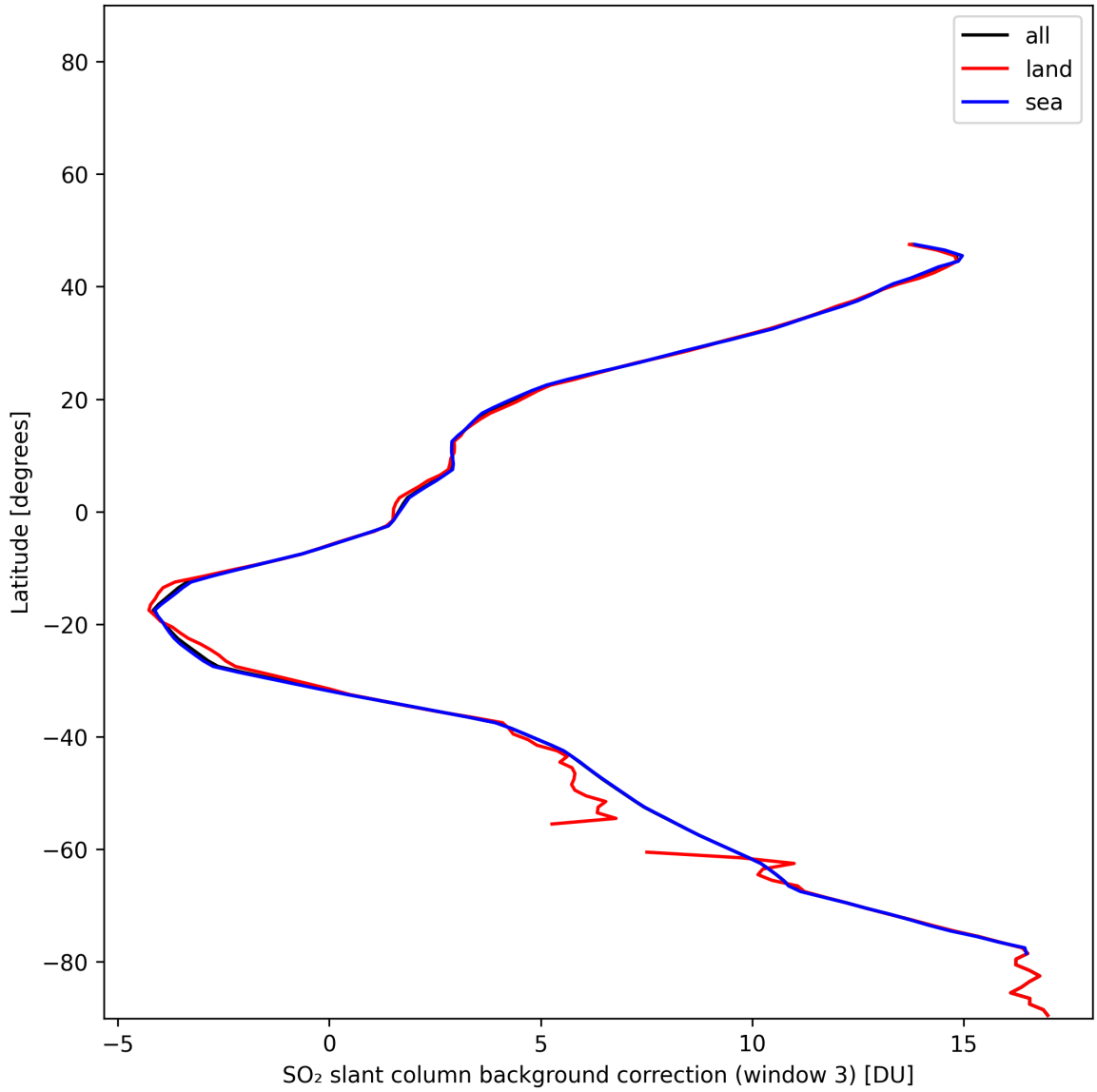


Figure 47: Zonal average of "SO_2 slant column background correction (window 3)" for 2024-12-04 to 2024-12-04.

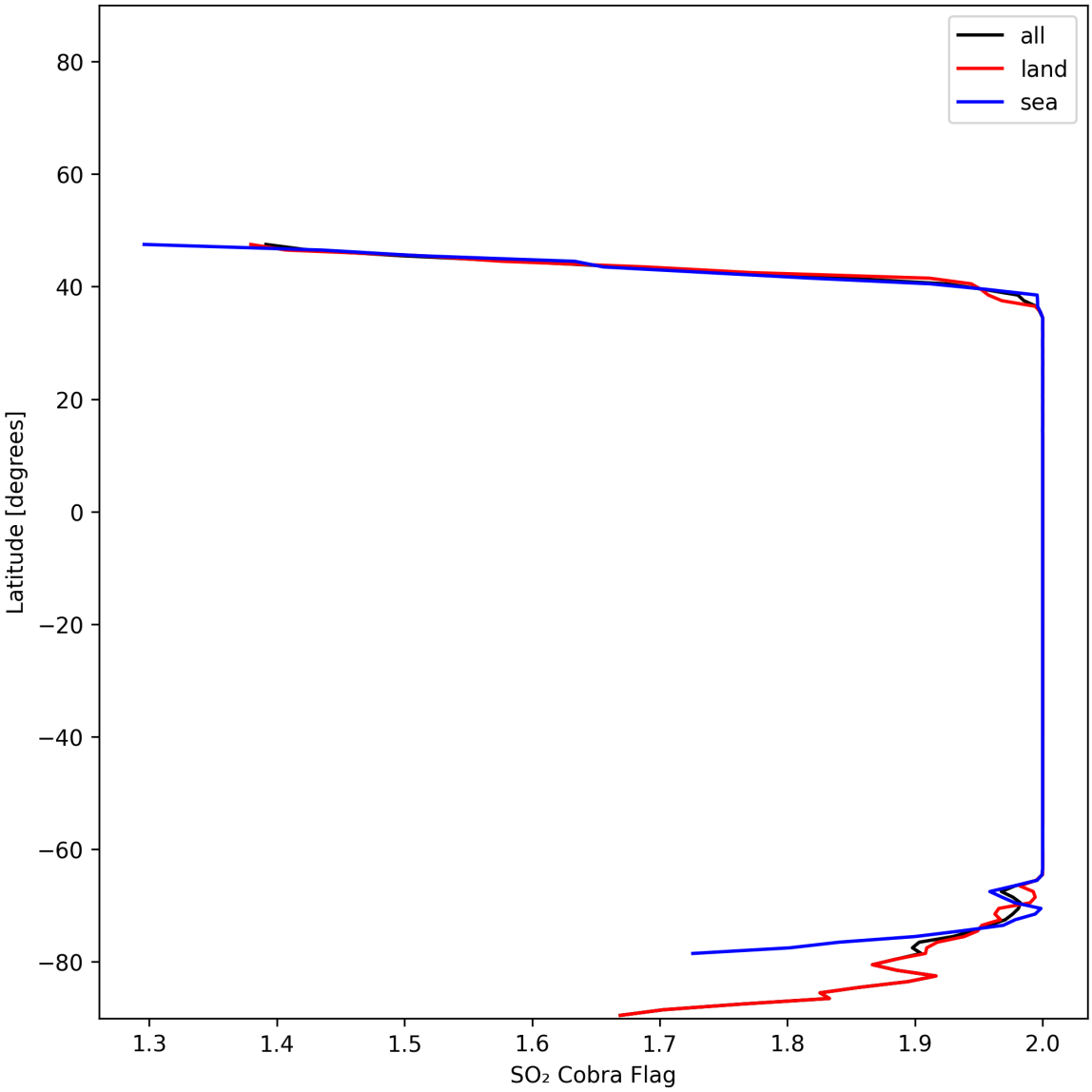


Figure 48: Zonal average of "SO_2 Cobra Flag" for 2024-12-04 to 2024-12-04.

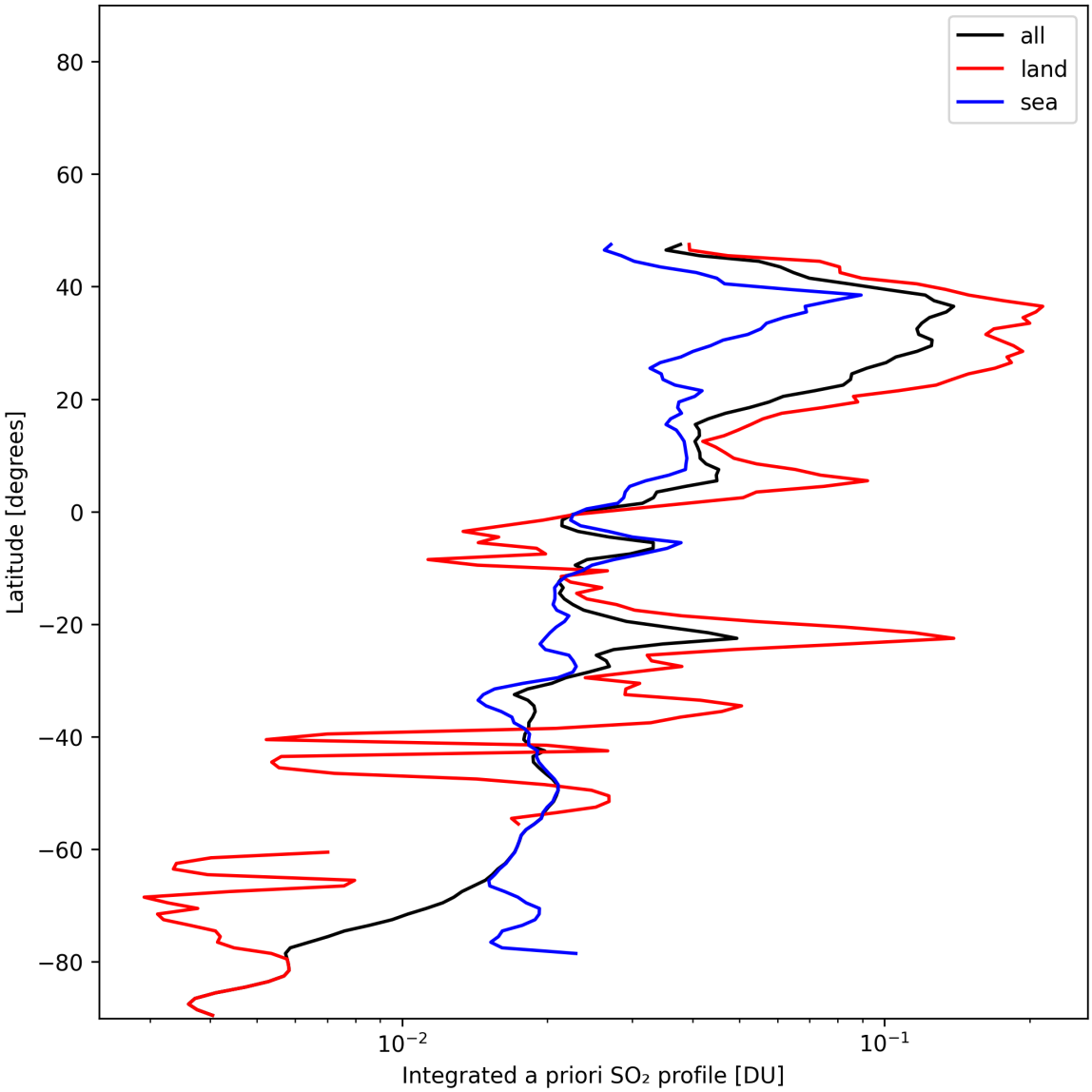


Figure 49: Zonal average of “Integrated a priori SO_2 profile” for 2024-12-04 to 2024-12-04.

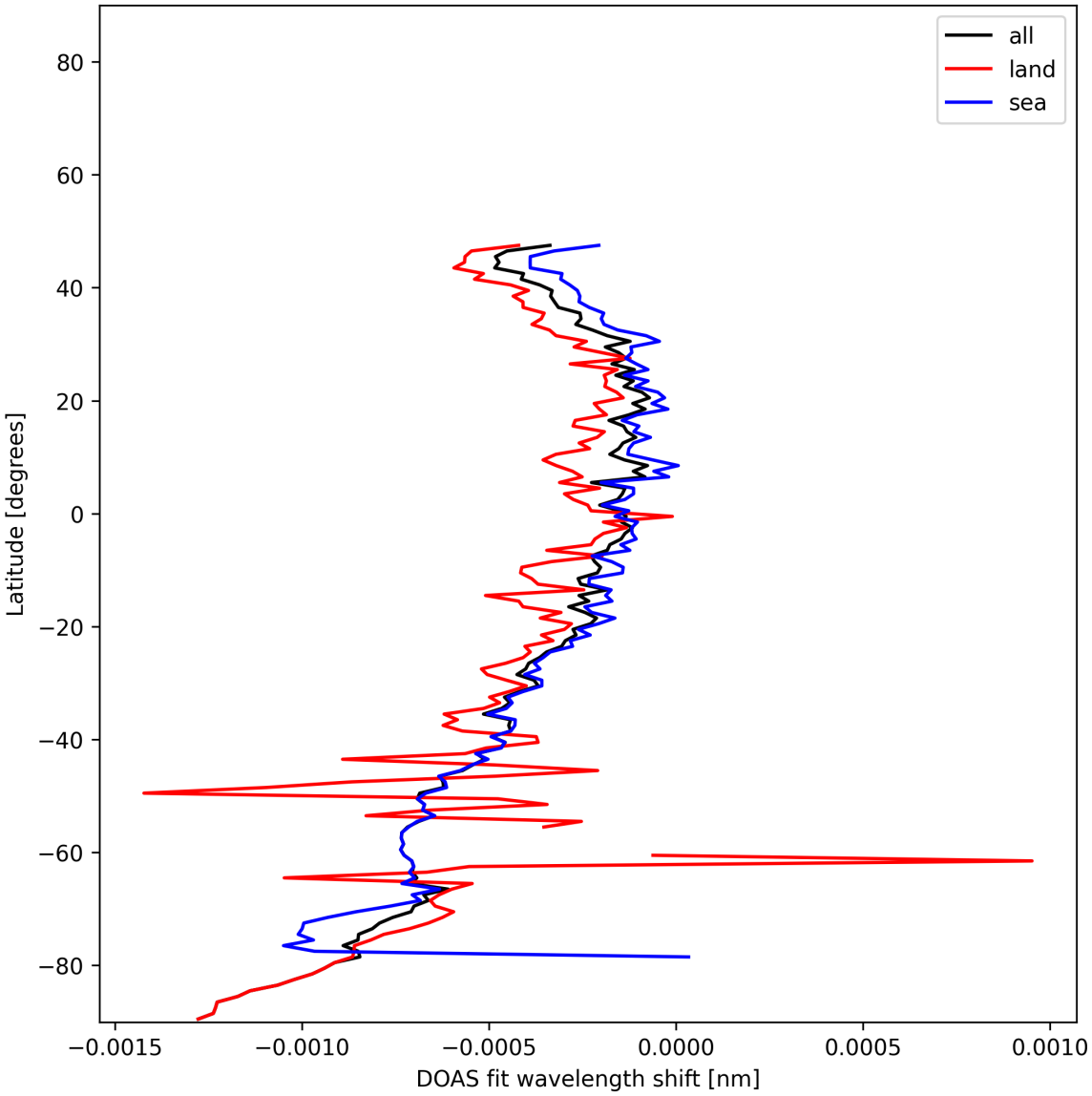


Figure 50: Zonal average of “DOAS fit wavelength shift” for 2024-12-04 to 2024-12-04.

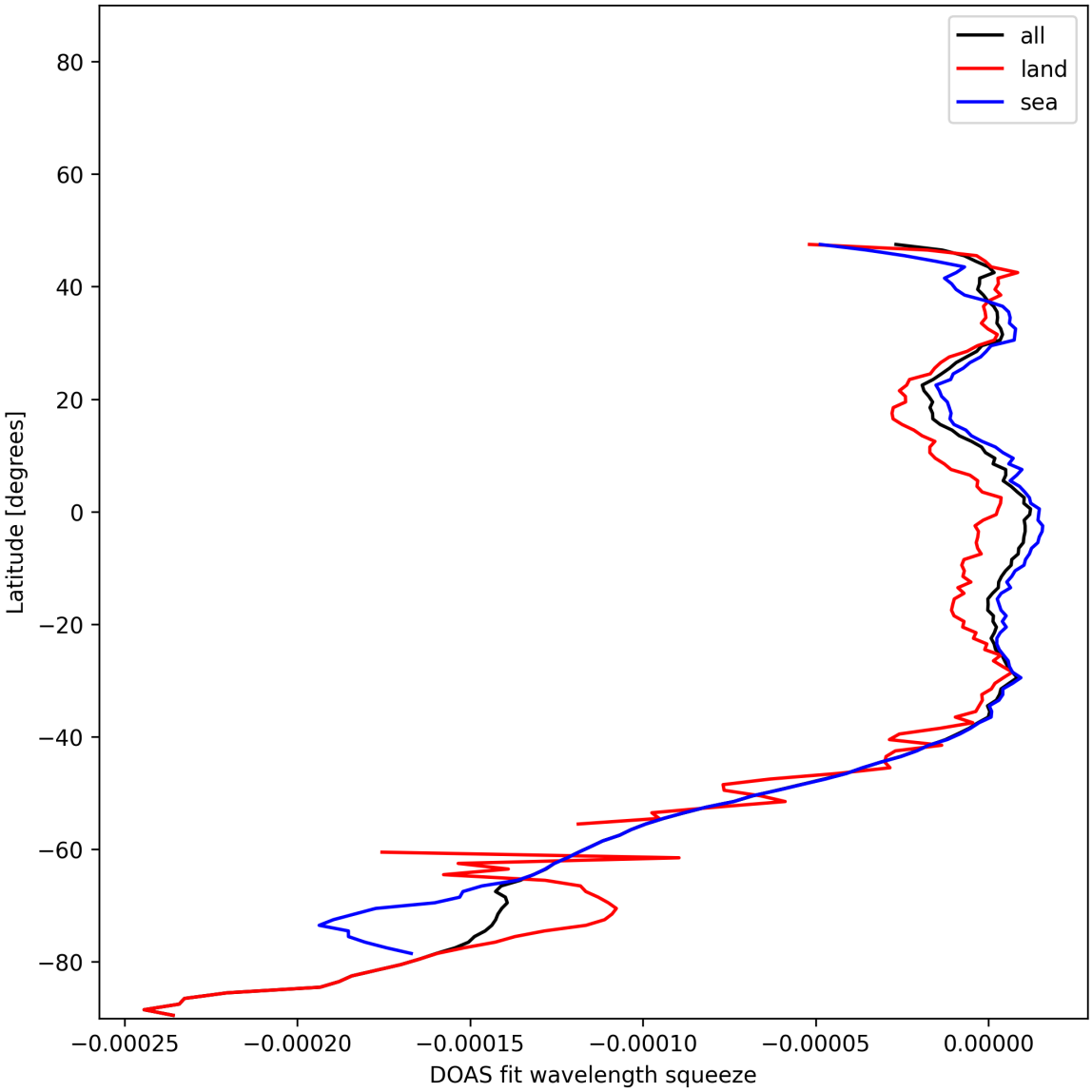


Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2024-12-04 to 2024-12-04.

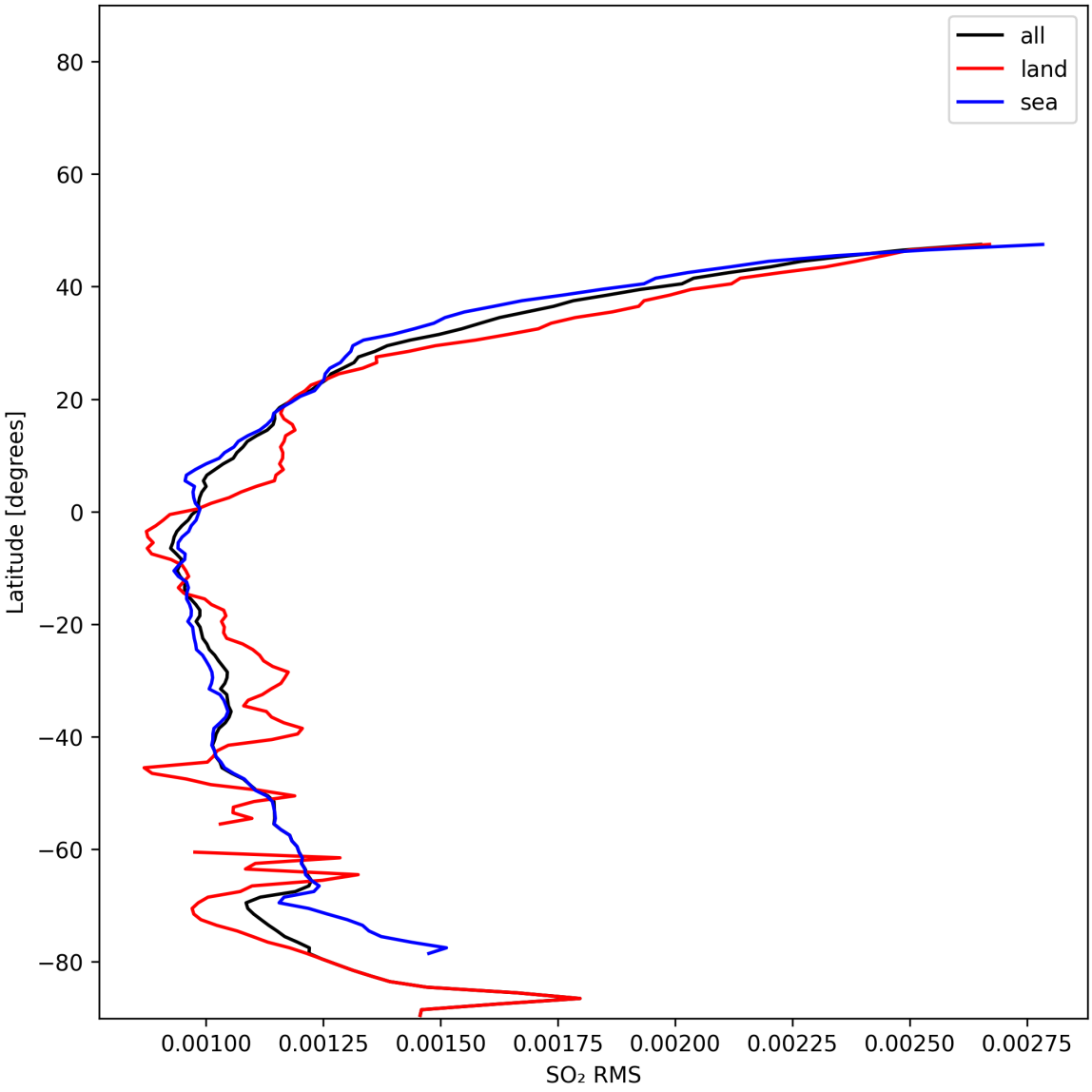


Figure 52: Zonal average of "SO_2 RMS" for 2024-12-04 to 2024-12-04.

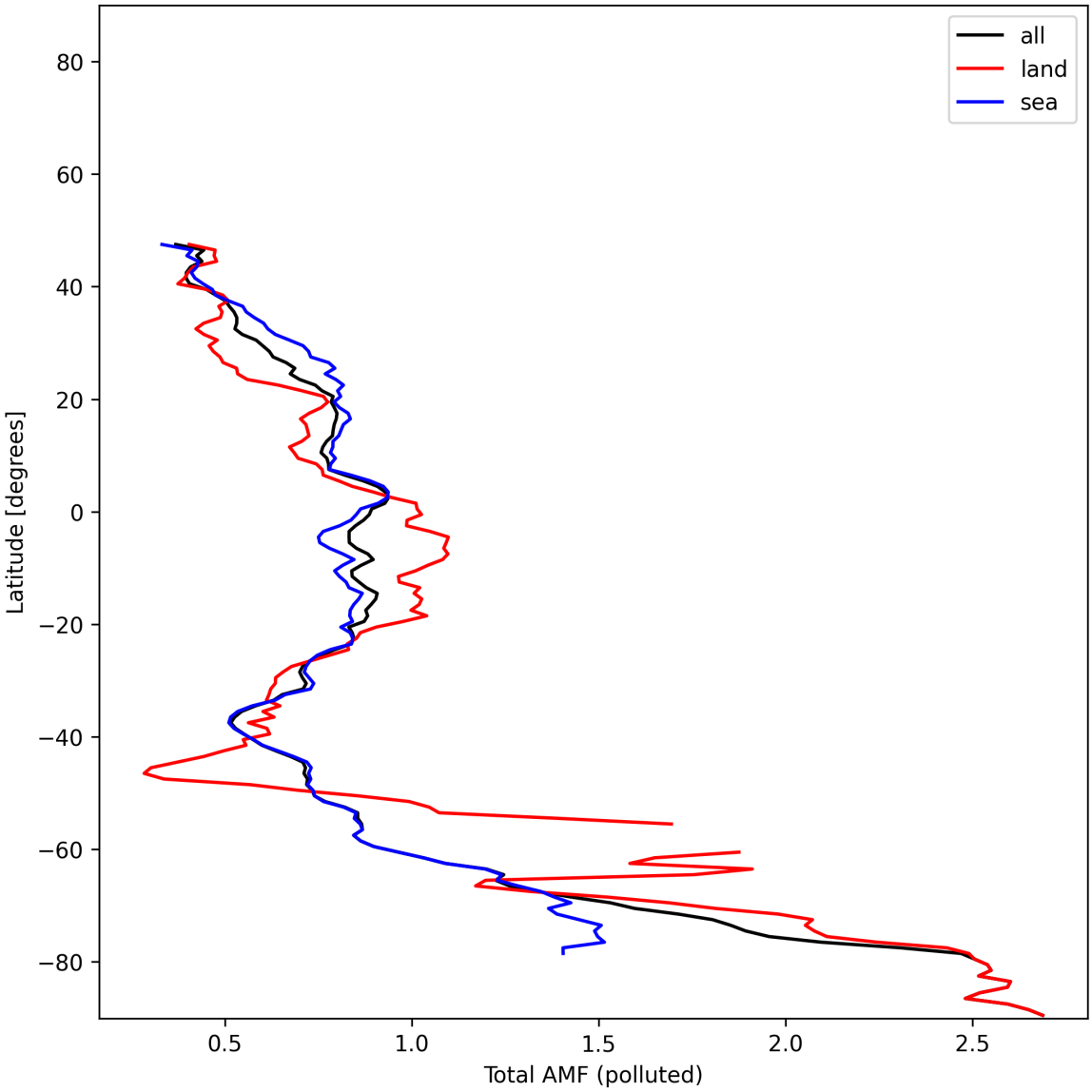


Figure 53: Zonal average of “Total AMF (polluted)” for 2024-12-04 to 2024-12-04.

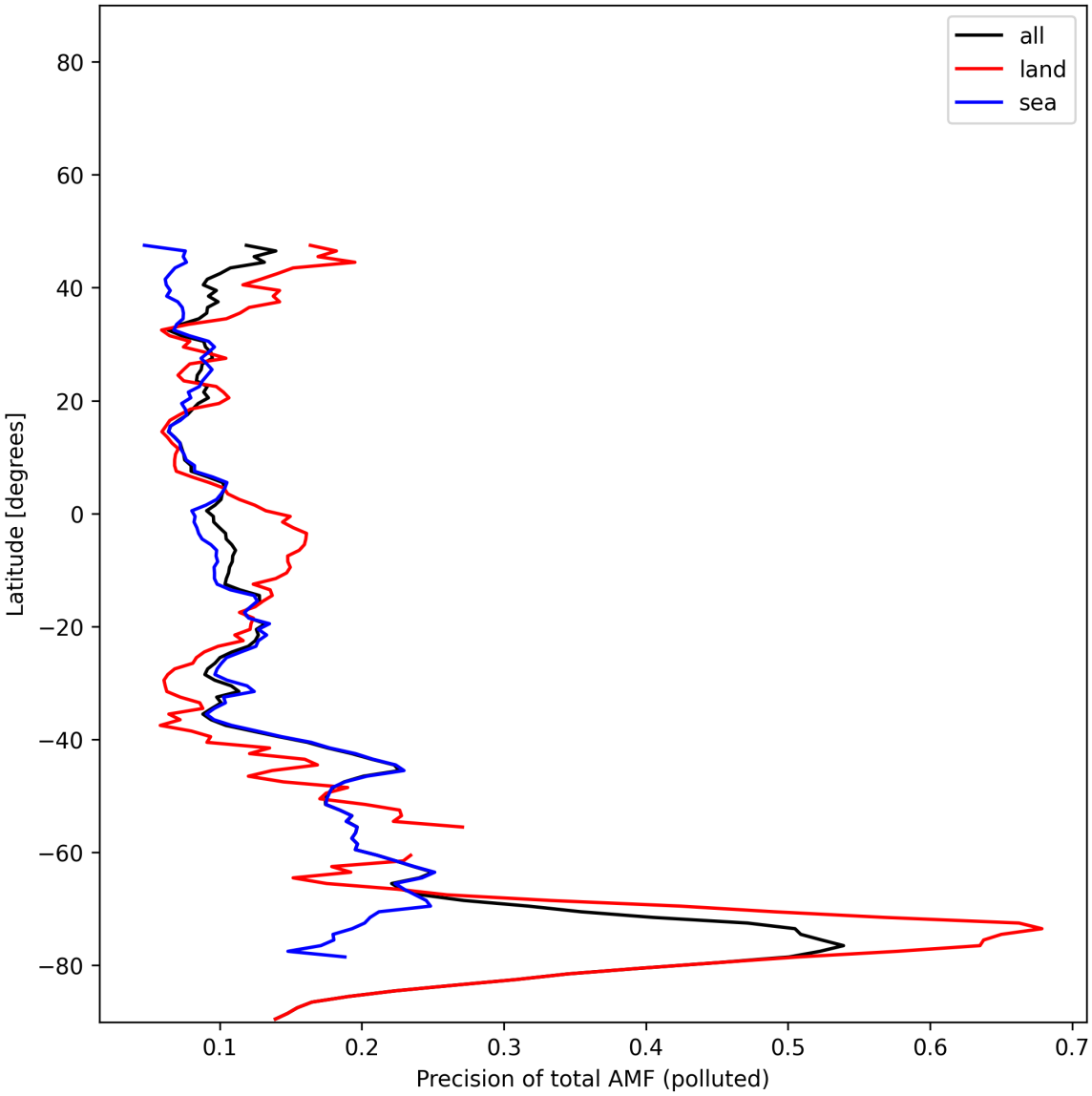


Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2024-12-04 to 2024-12-04.

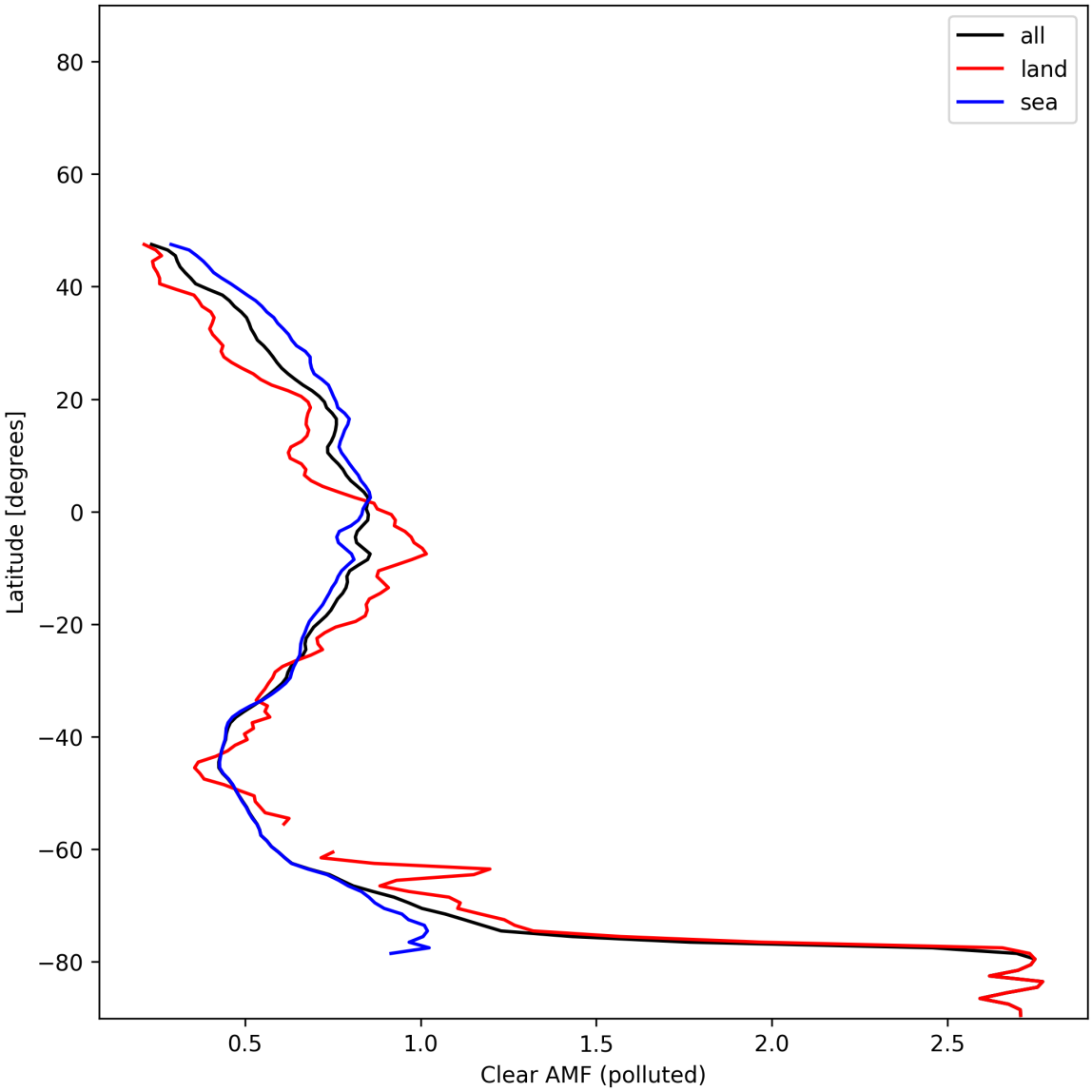


Figure 55: Zonal average of “Clear AMF (polluted)” for 2024-12-04 to 2024-12-04.

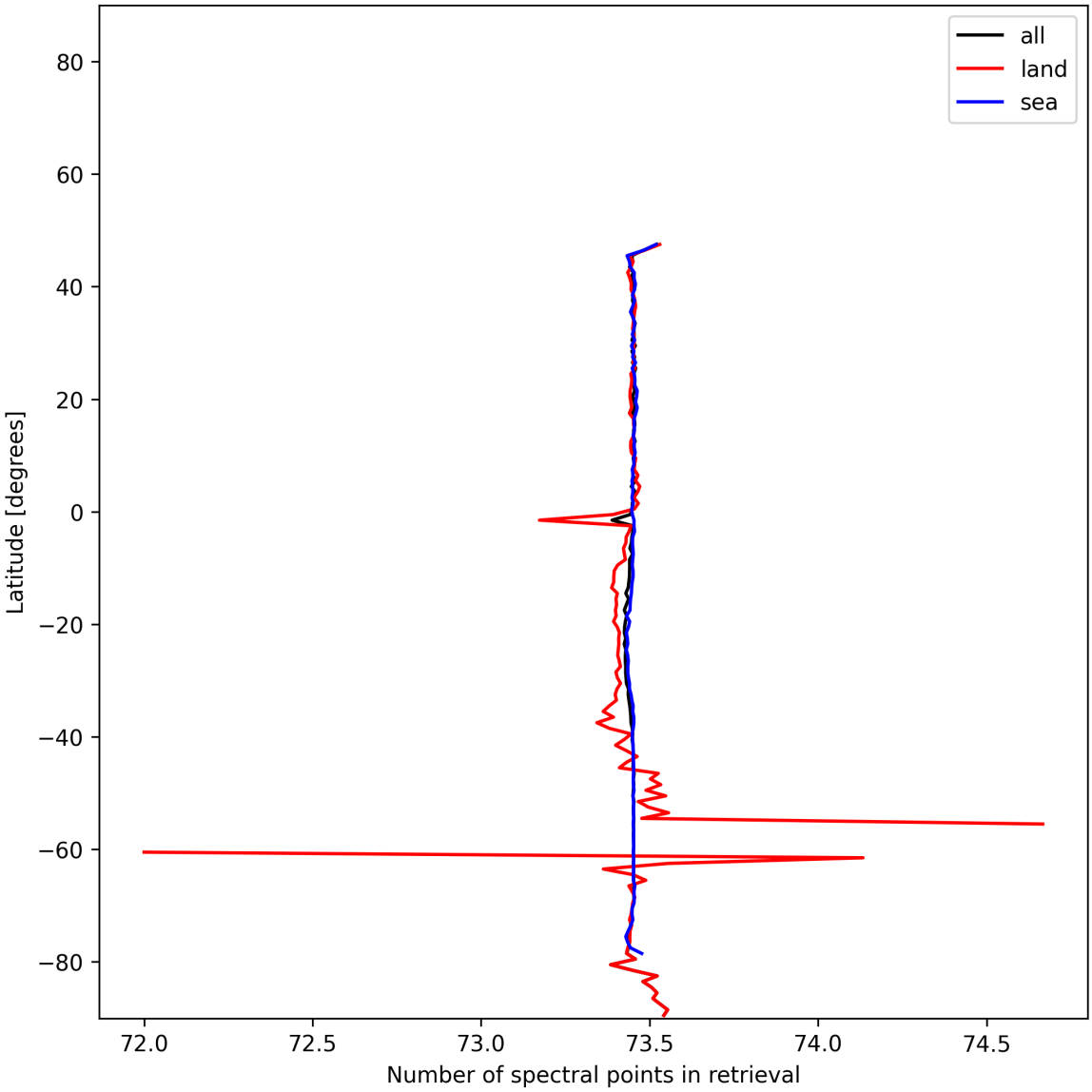


Figure 56: Zonal average of “Number of spectral points in retrieval” for 2024-12-04 to 2024-12-04.

8 Histograms

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

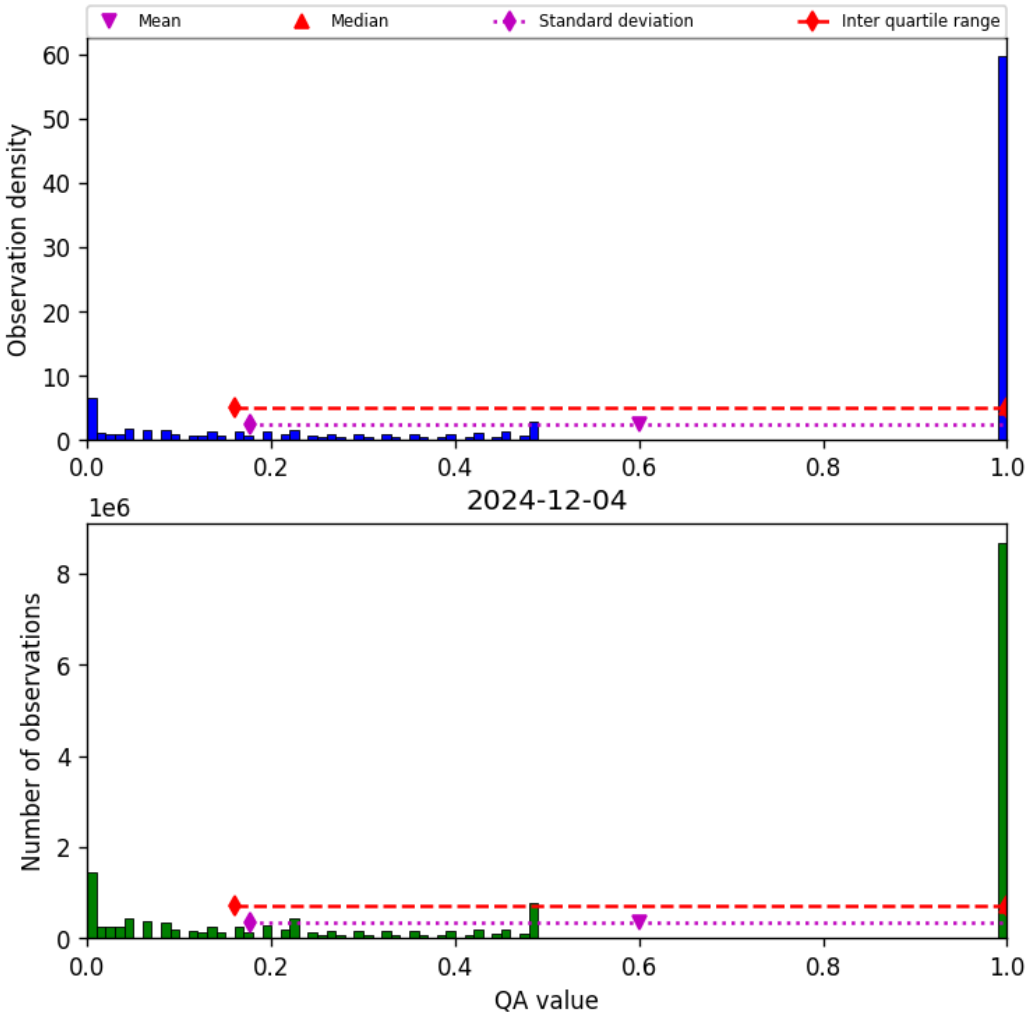


Figure 57: Histogram of “QA value” for 2024-12-04 to 2024-12-04

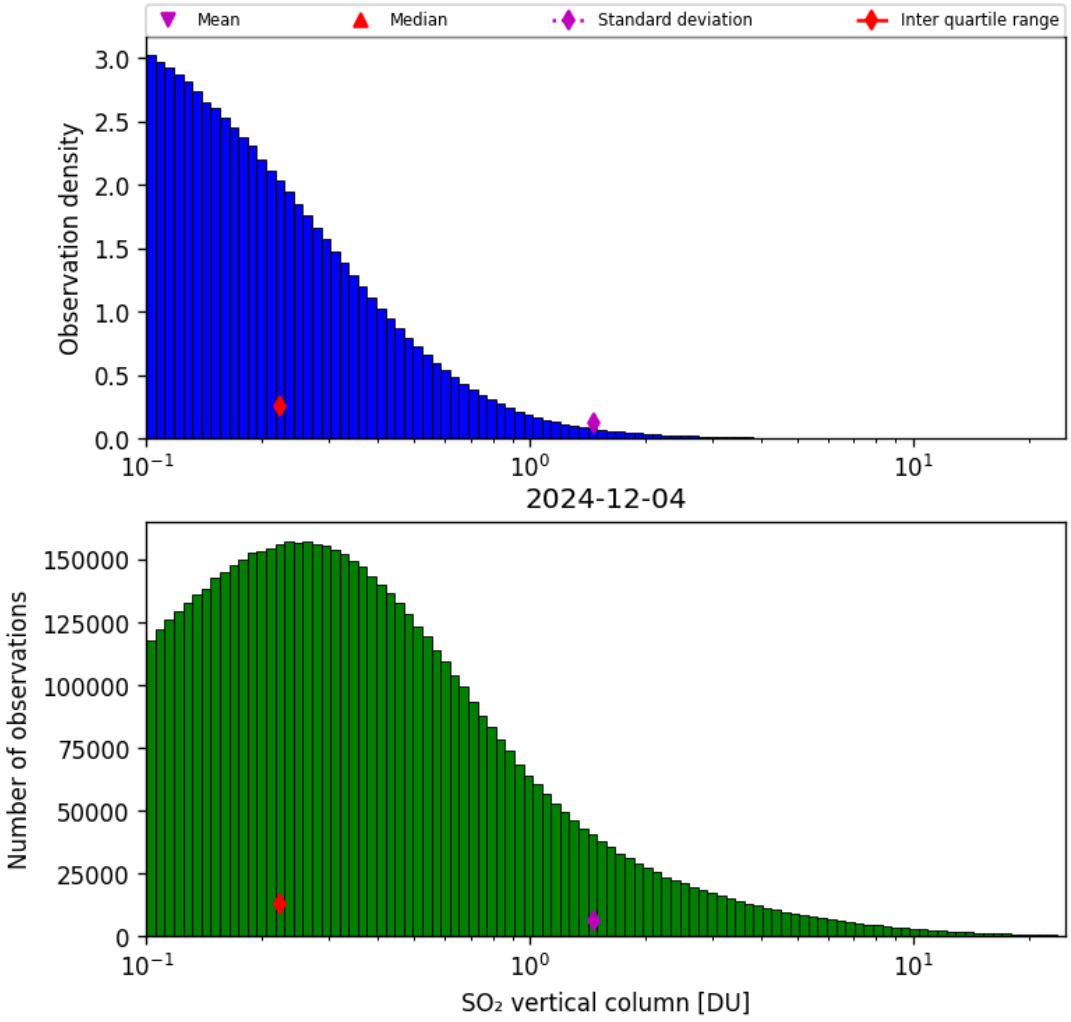


Figure 58: Histogram of "SO_2 vertical column" for 2024-12-04 to 2024-12-04

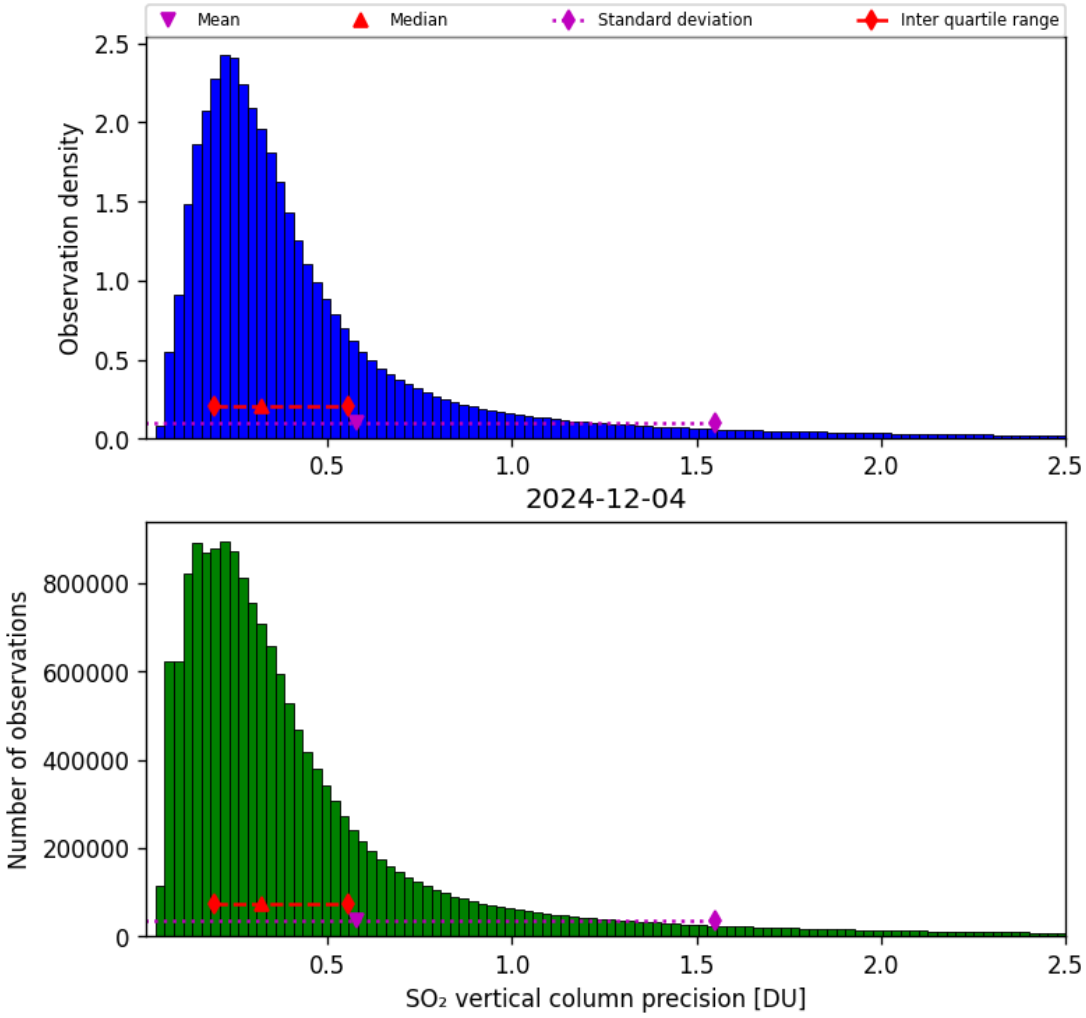


Figure 59: Histogram of "SO_2 vertical column precision" for 2024-12-04 to 2024-12-04

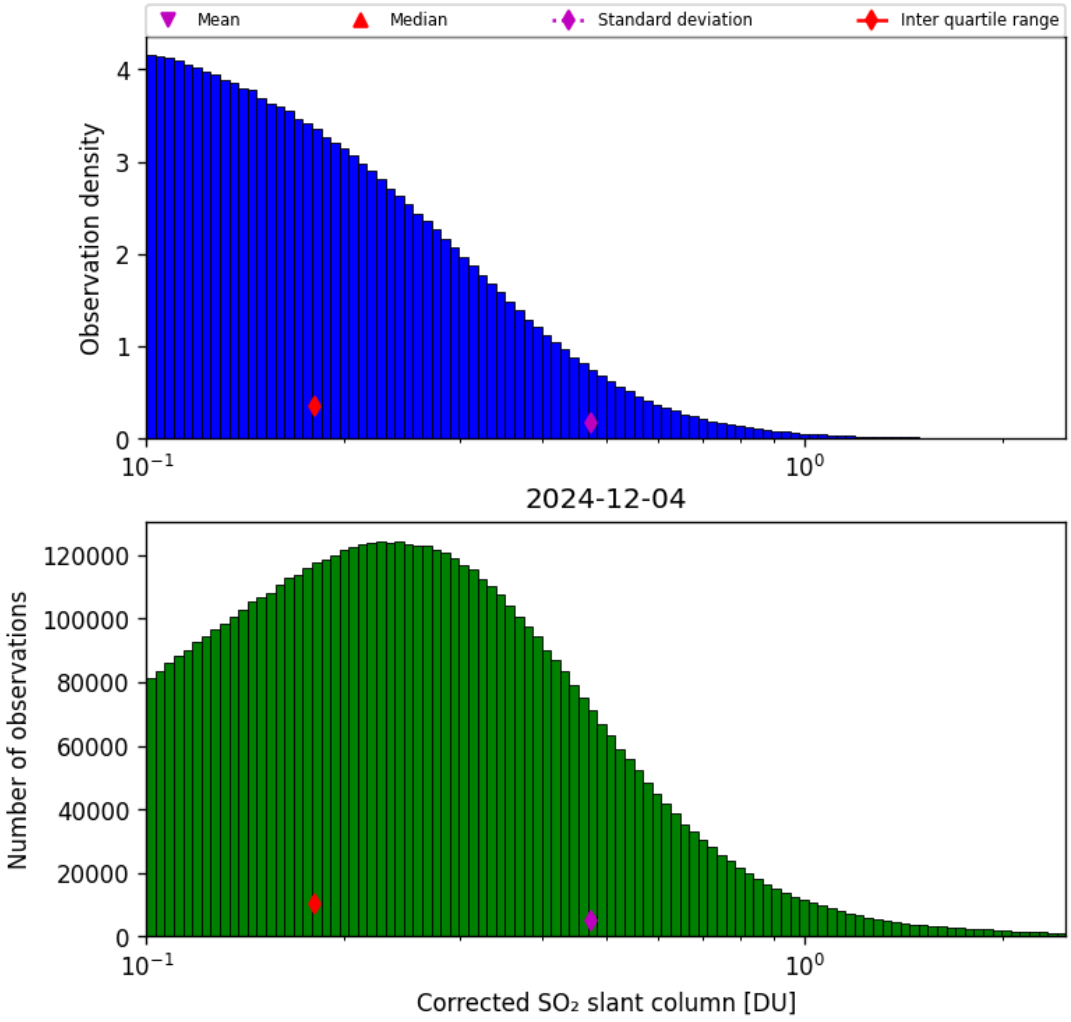


Figure 60: Histogram of "Corrected SO_2 slant column" for 2024-12-04 to 2024-12-04

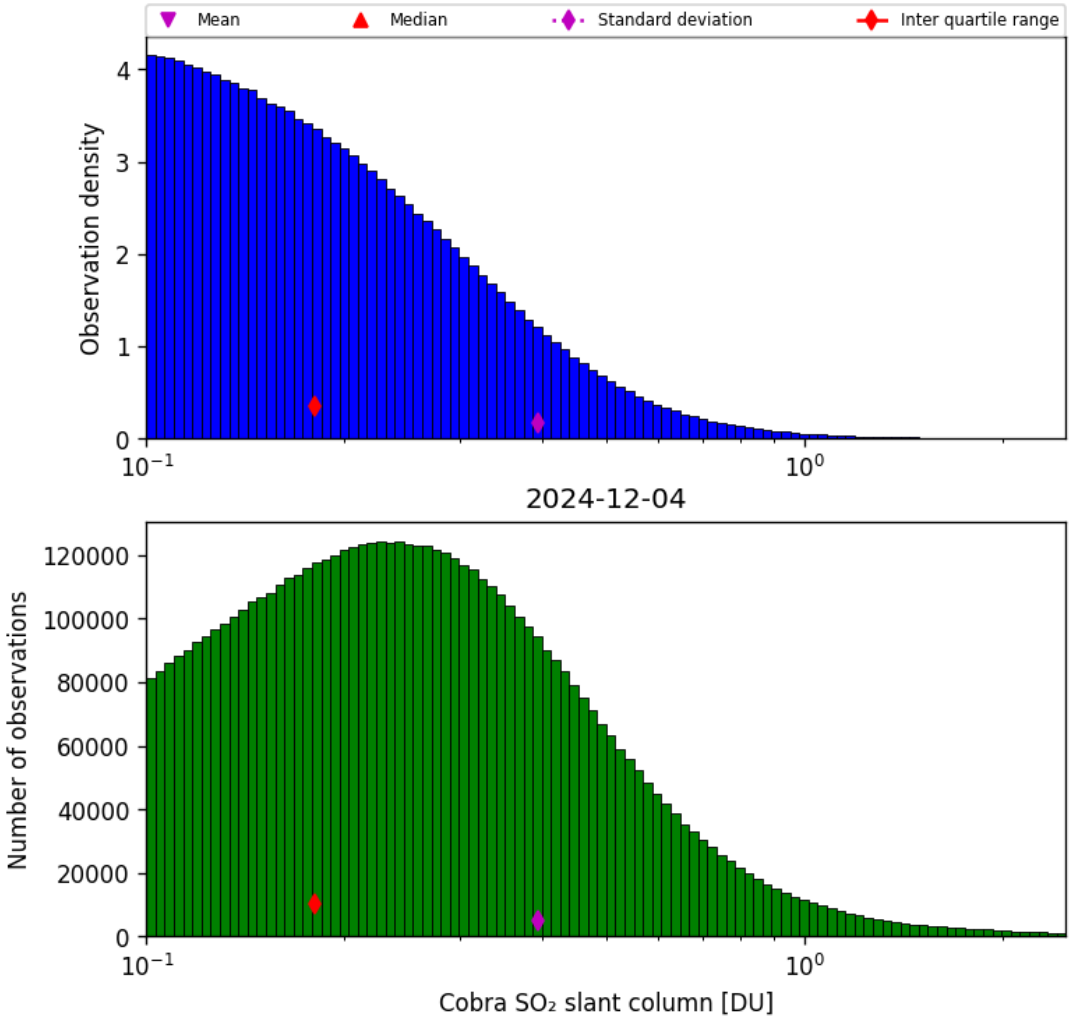


Figure 61: Histogram of “Cobra SO_2 slant column” for 2024-12-04 to 2024-12-04

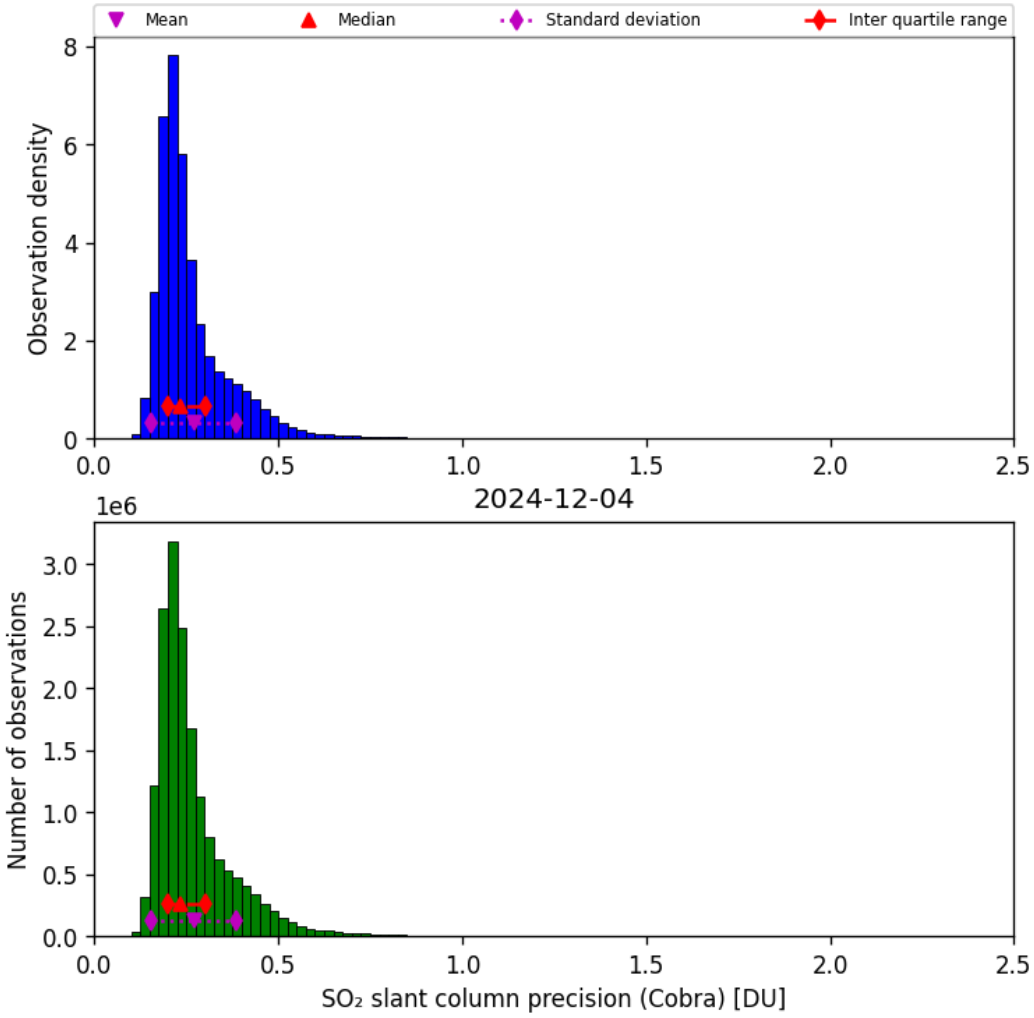


Figure 62: Histogram of "SO_2 slant column precision (Cobra)" for 2024-12-04 to 2024-12-04

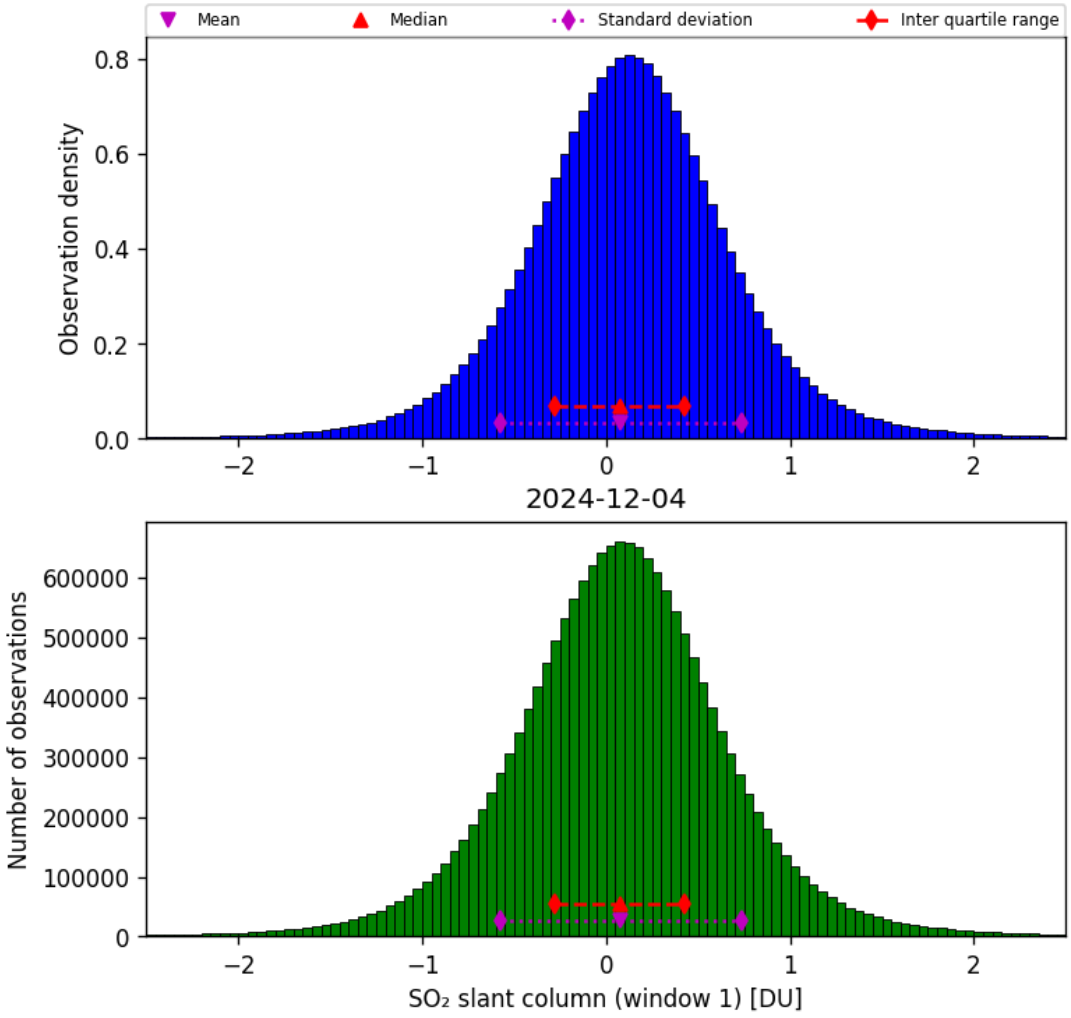


Figure 63: Histogram of "SO_2 slant column (window 1)" for 2024-12-04 to 2024-12-04

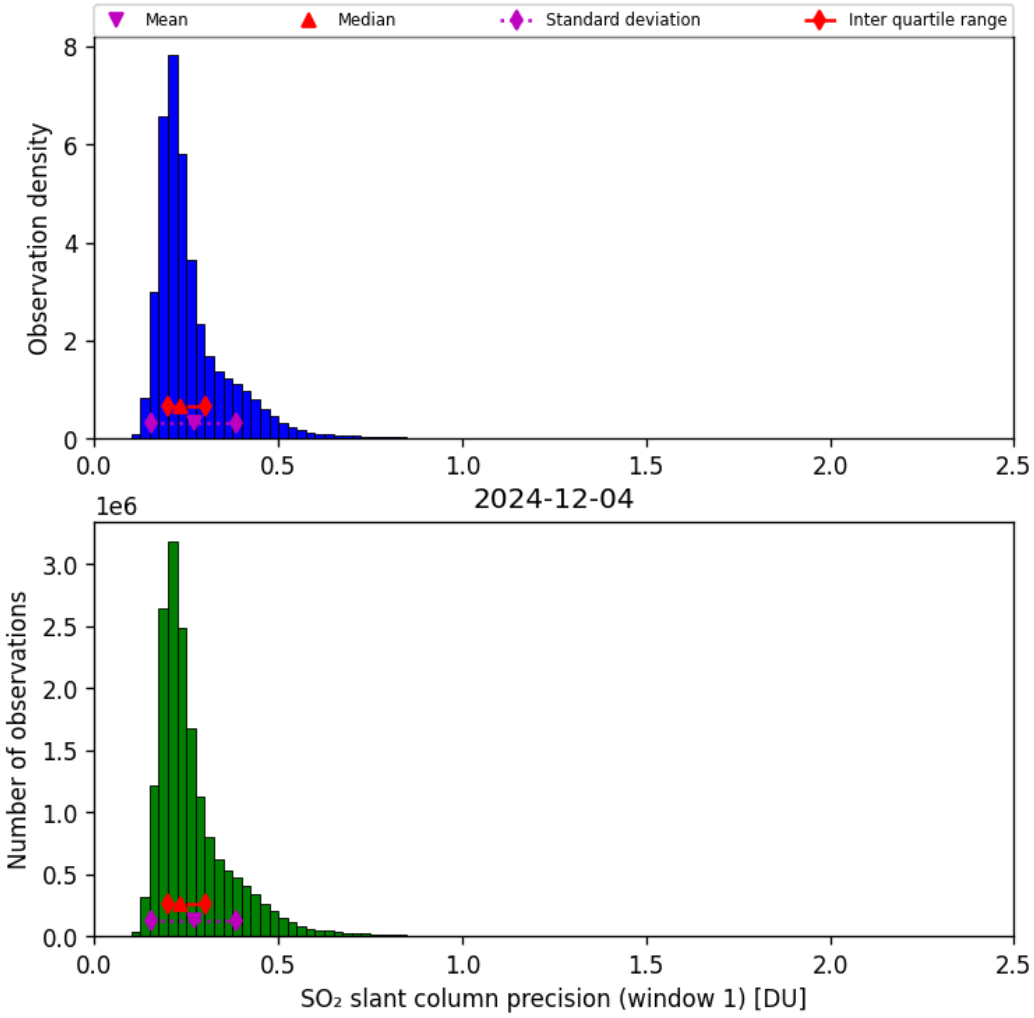


Figure 64: Histogram of "SO_2 slant column precision (window 1)" for 2024-12-04 to 2024-12-04

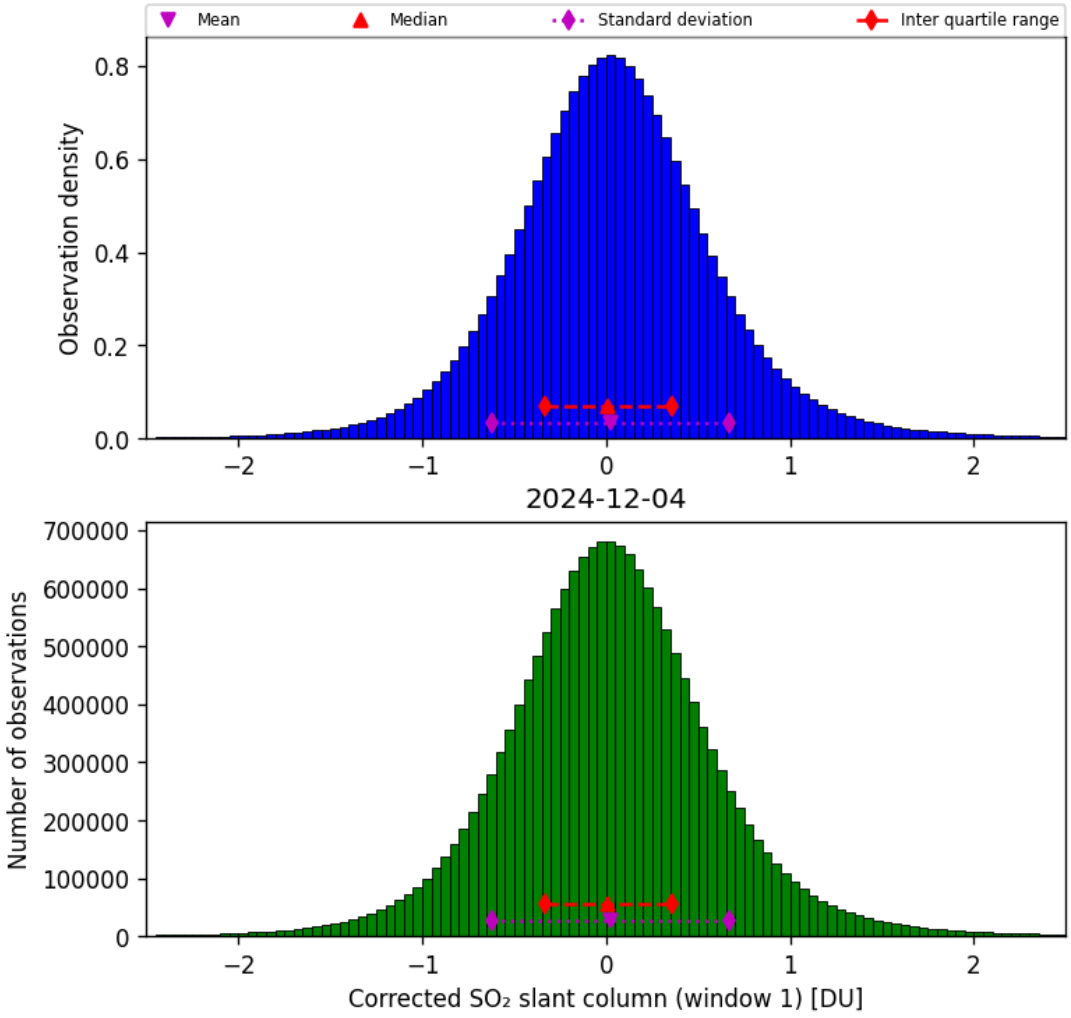


Figure 65: Histogram of "Corrected SO_2 slant column (window 1)" for 2024-12-04 to 2024-12-04

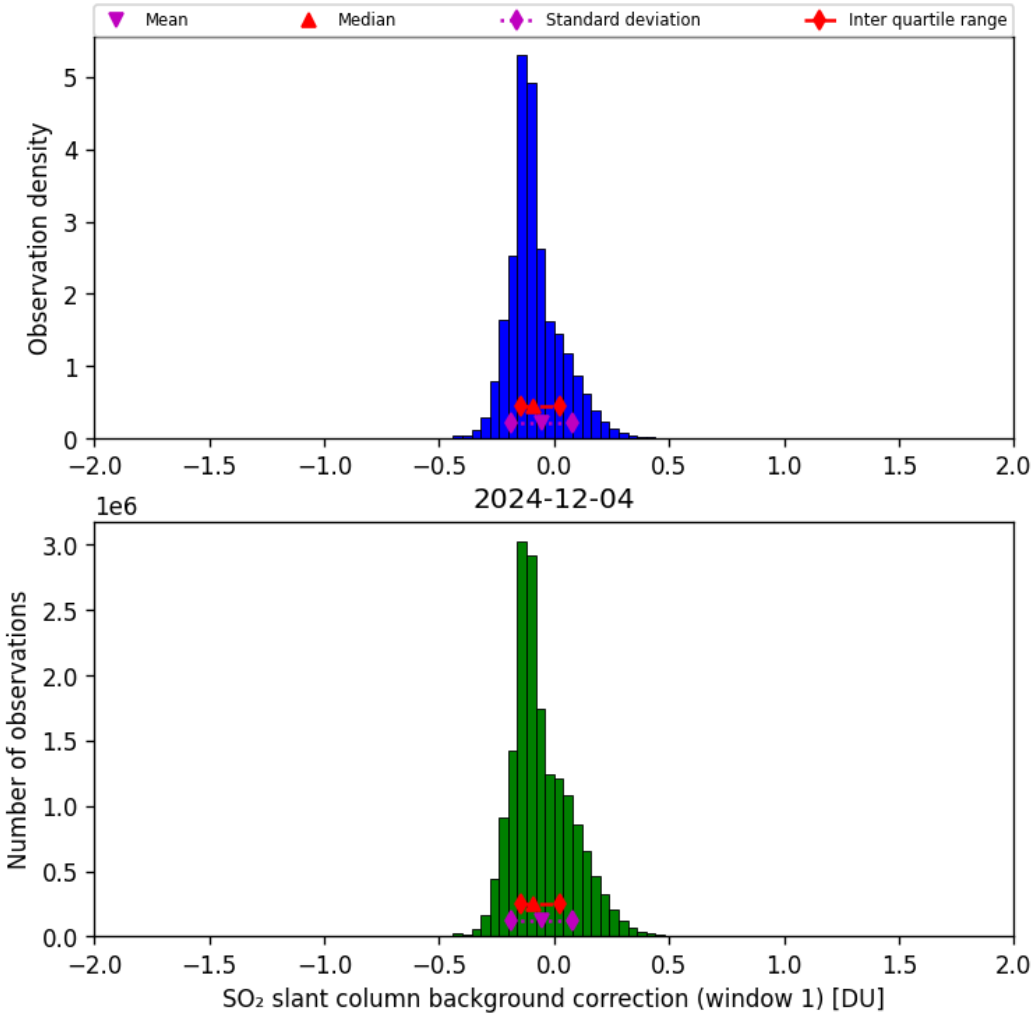


Figure 66: Histogram of "SO_2 slant column background correction (window 1)" for 2024-12-04 to 2024-12-04

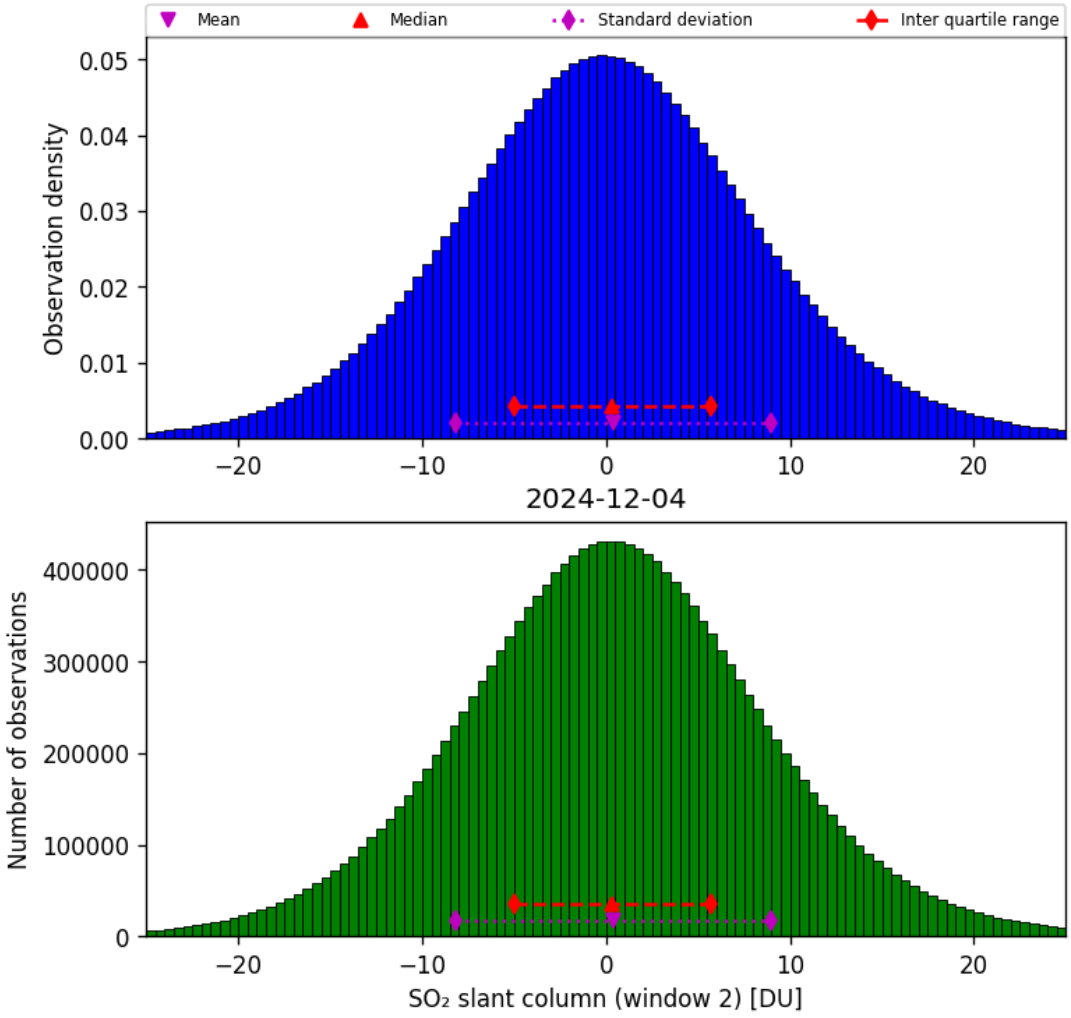


Figure 67: Histogram of "SO_2 slant column (window 2)" for 2024-12-04 to 2024-12-04

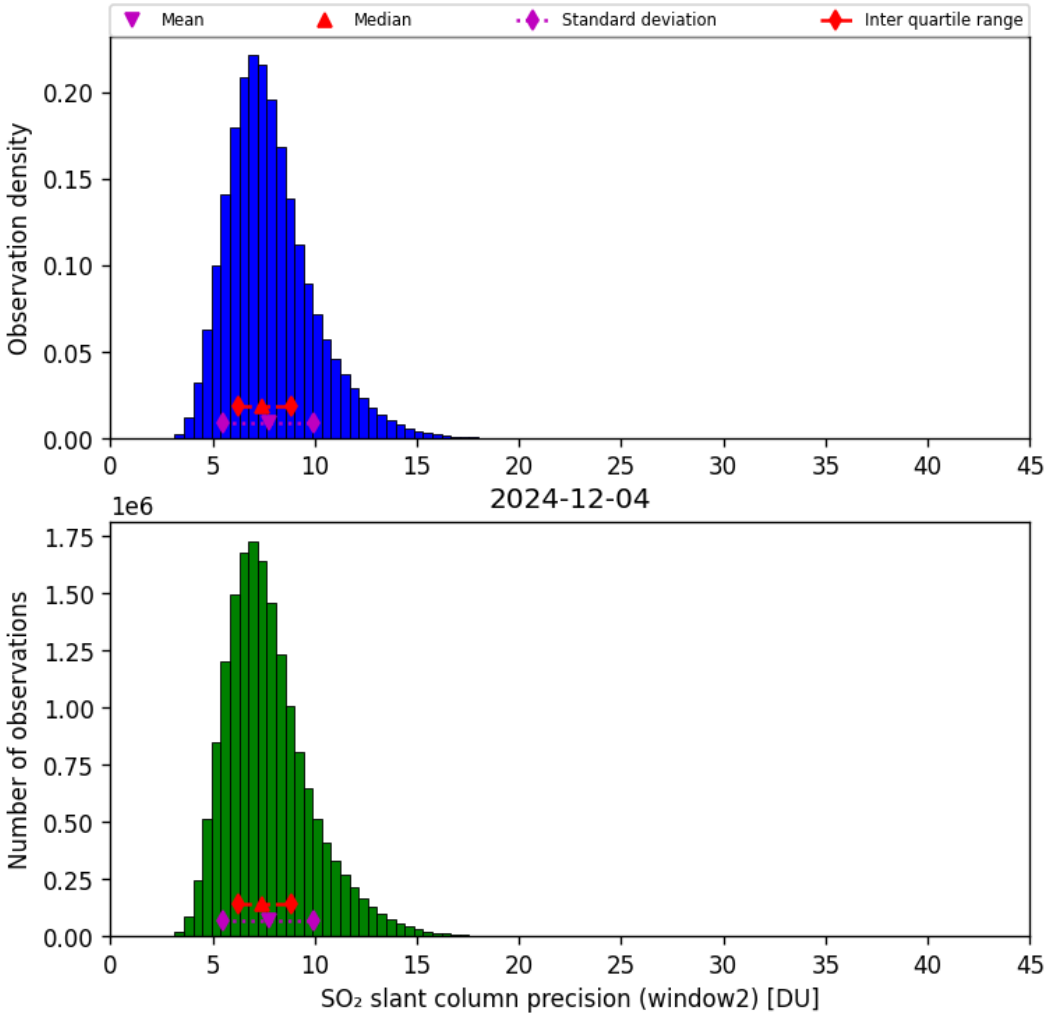


Figure 68: Histogram of "SO_2 slant column precision (window2)" for 2024-12-04 to 2024-12-04

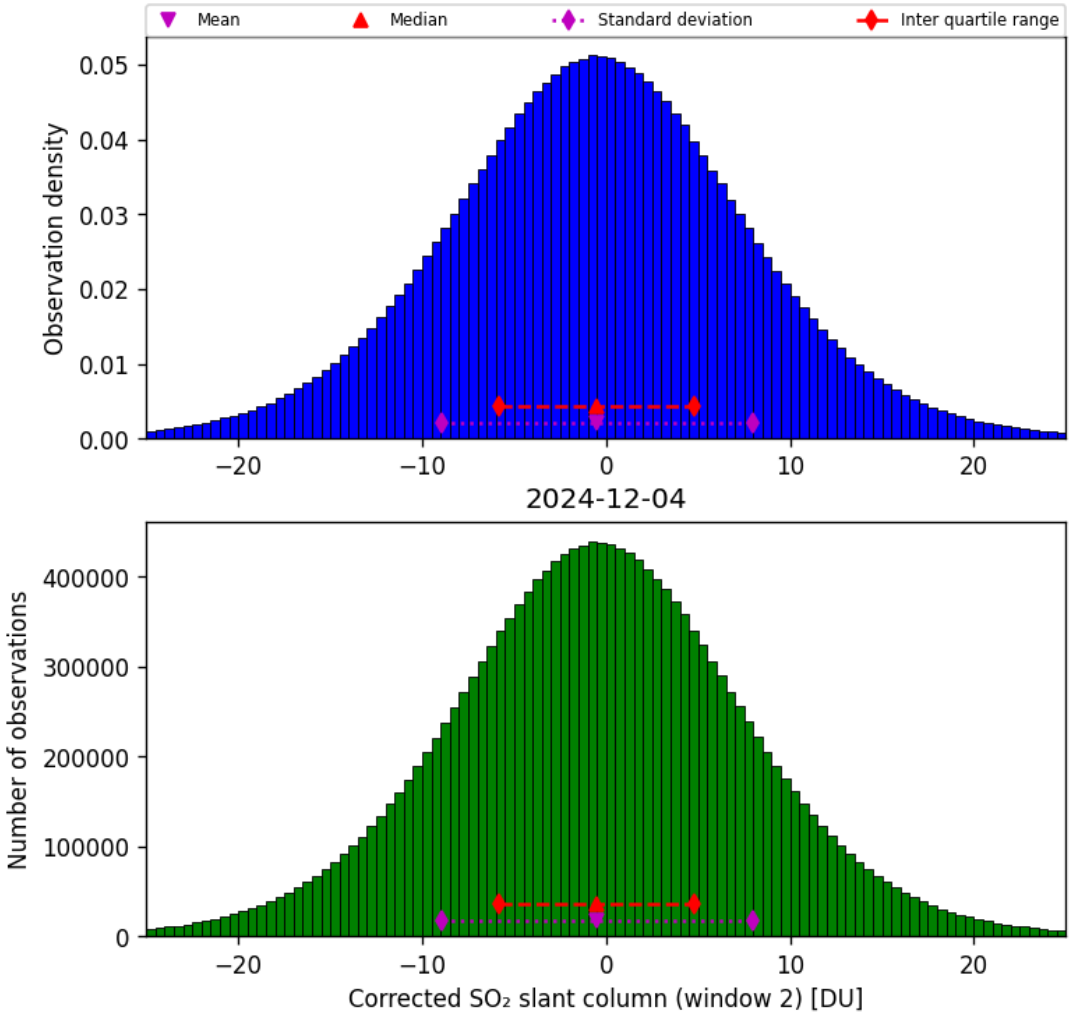


Figure 69: Histogram of "Corrected SO_2 slant column (window 2)" for 2024-12-04 to 2024-12-04

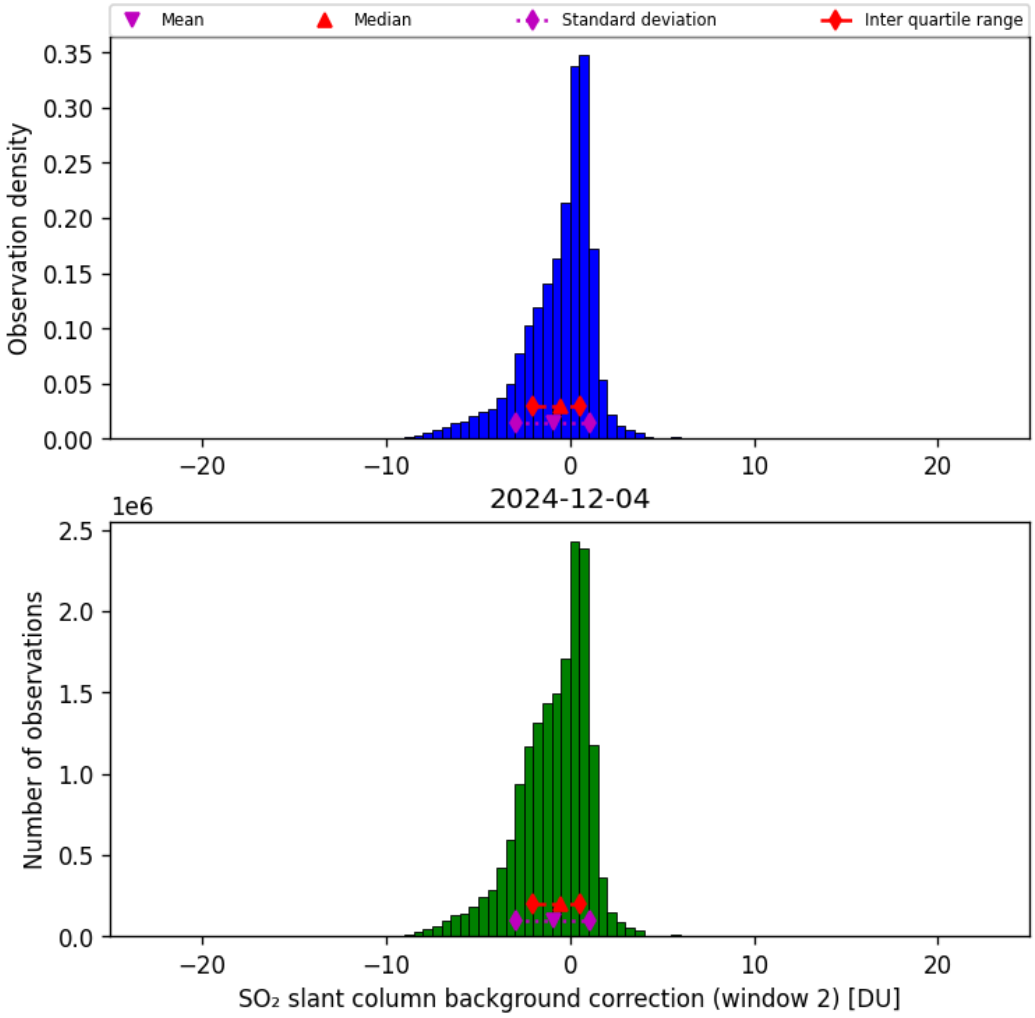


Figure 70: Histogram of "SO_2 slant column background correction (window 2)" for 2024-12-04 to 2024-12-04

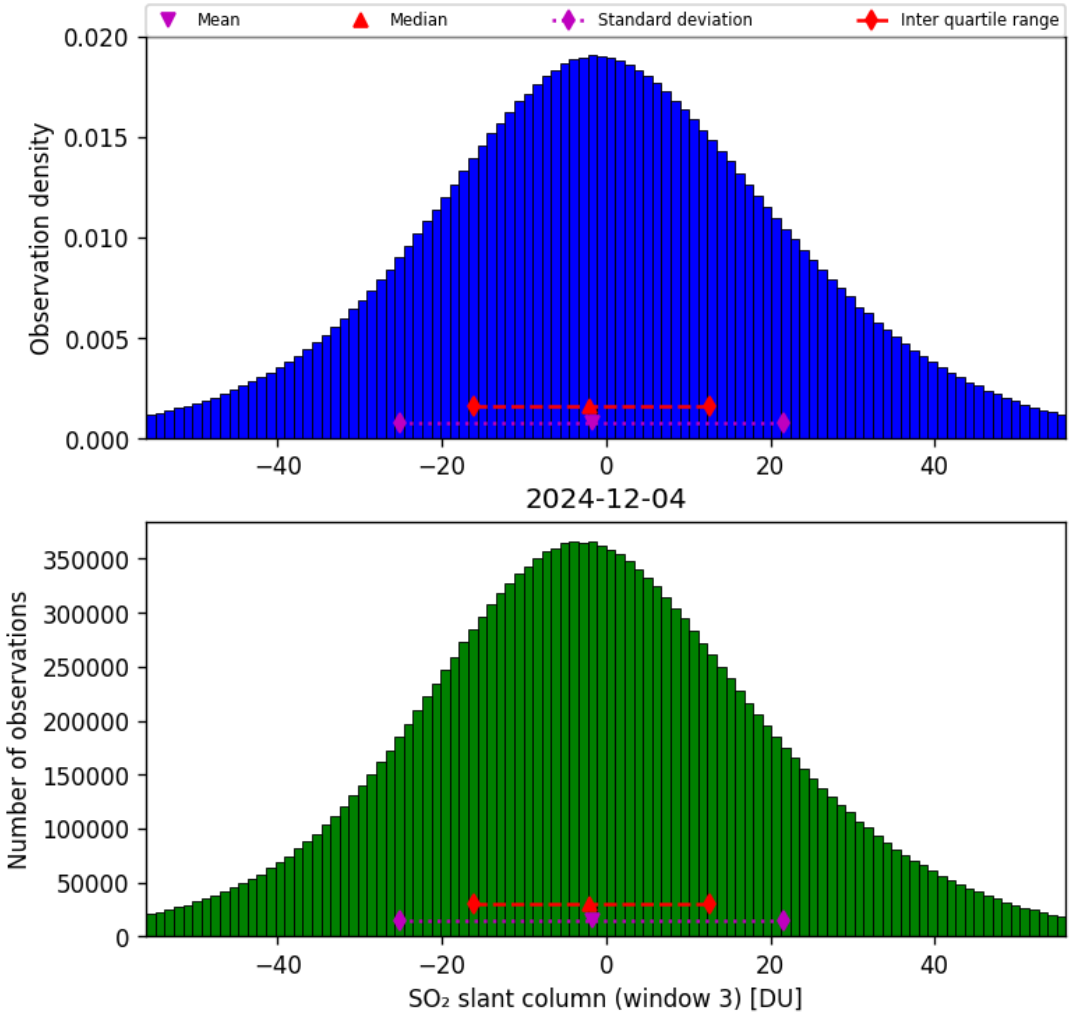


Figure 71: Histogram of "SO_2 slant column (window 3)" for 2024-12-04 to 2024-12-04

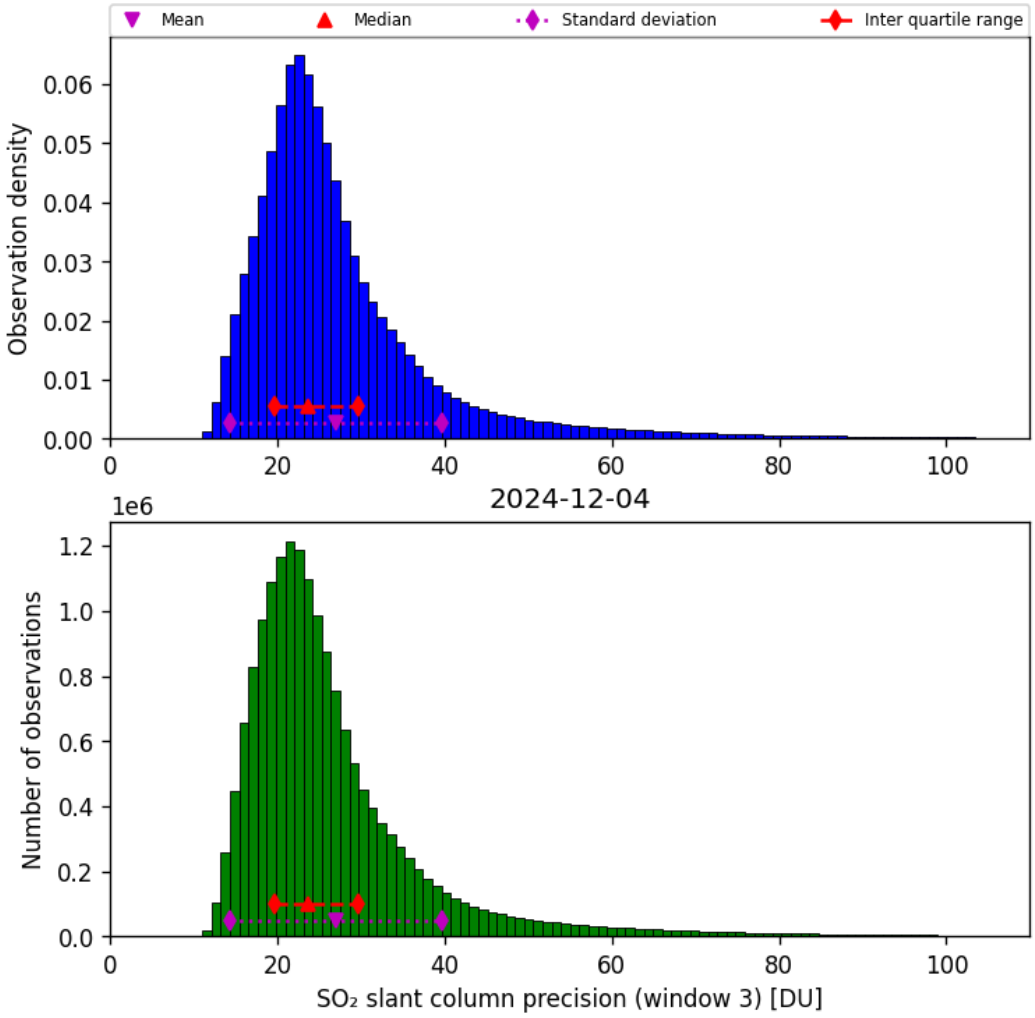


Figure 72: Histogram of "SO_2 slant column precision (window 3)" for 2024-12-04 to 2024-12-04

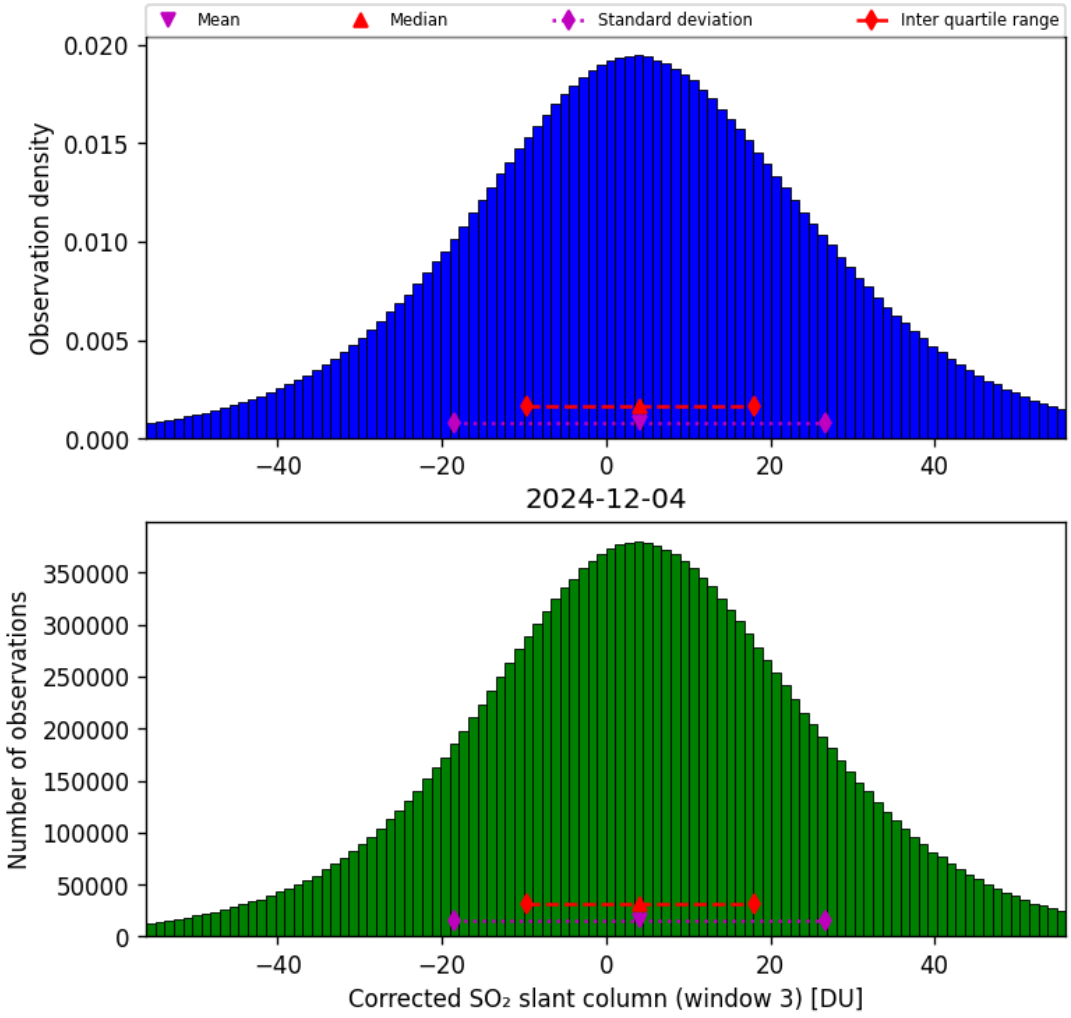


Figure 73: Histogram of "Corrected SO_2 slant column (window 3)" for 2024-12-04 to 2024-12-04

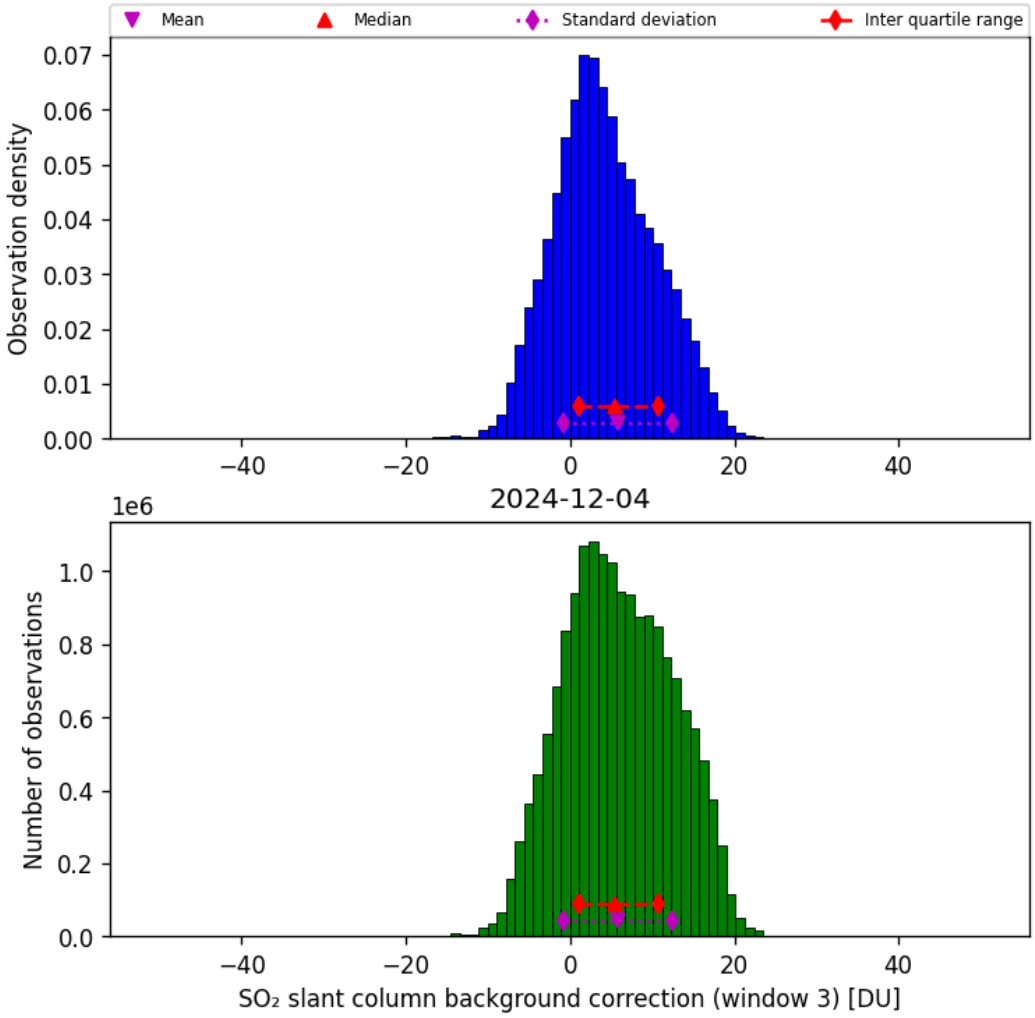


Figure 74: Histogram of "SO_2 slant column background correction (window 3)" for 2024-12-04 to 2024-12-04

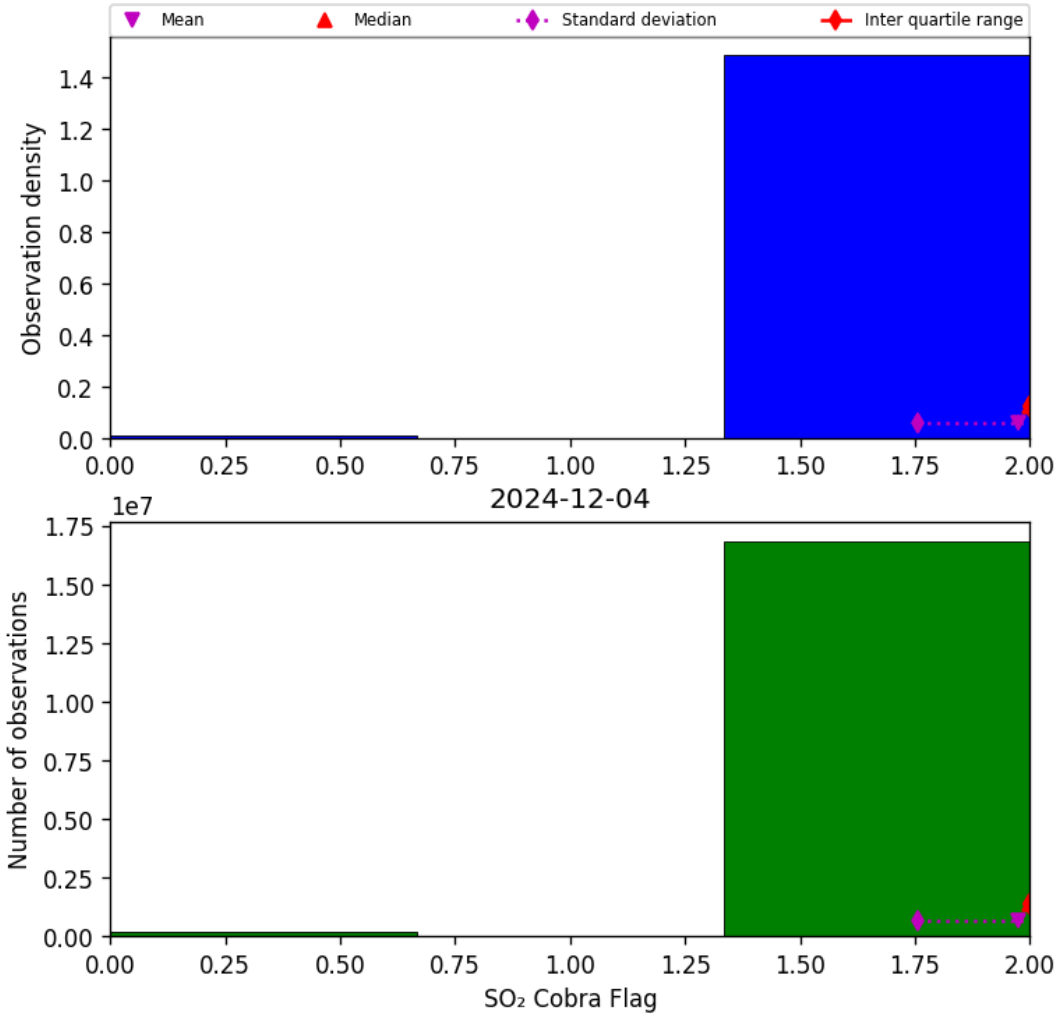


Figure 75: Histogram of "SO_2 Cobra Flag" for 2024-12-04 to 2024-12-04

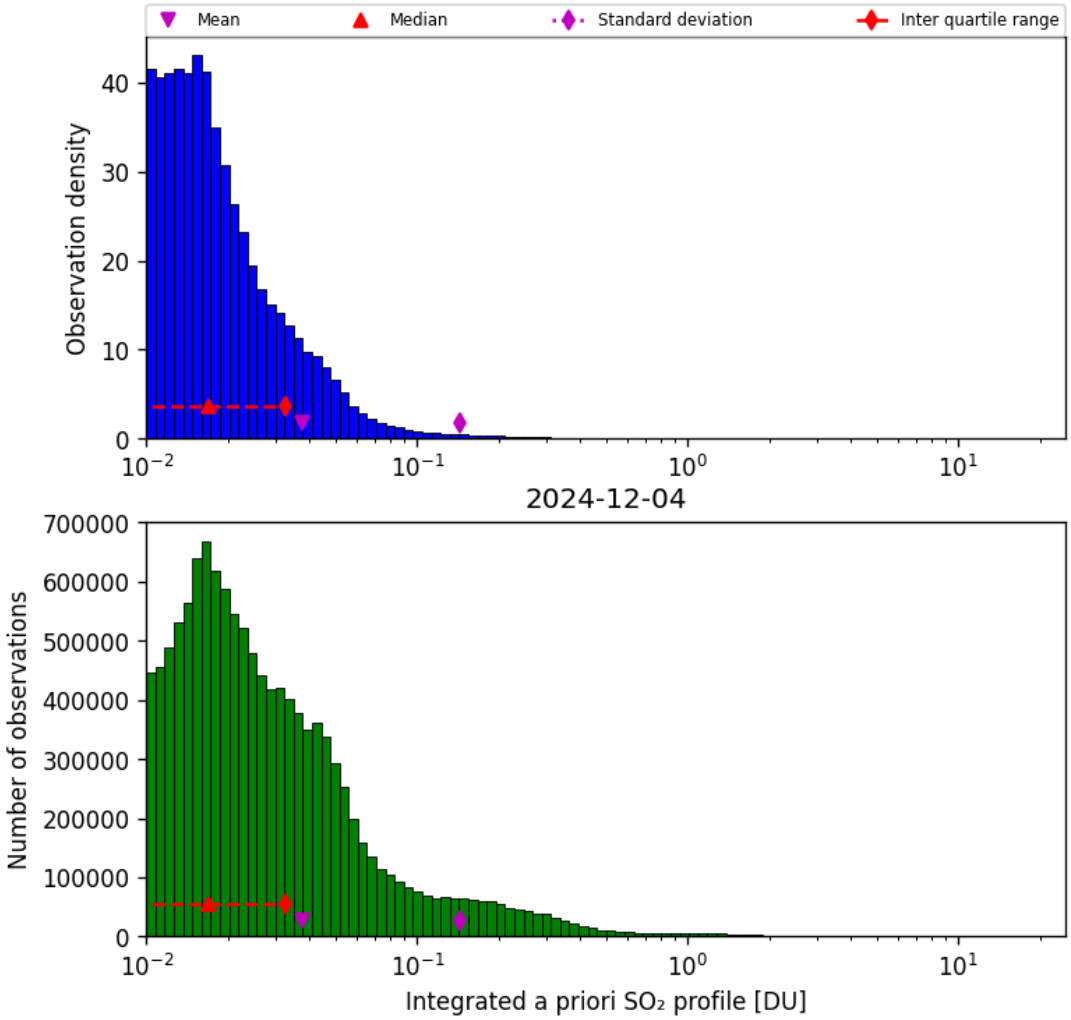


Figure 76: Histogram of “Integrated a priori SO_2 profile” for 2024-12-04 to 2024-12-04

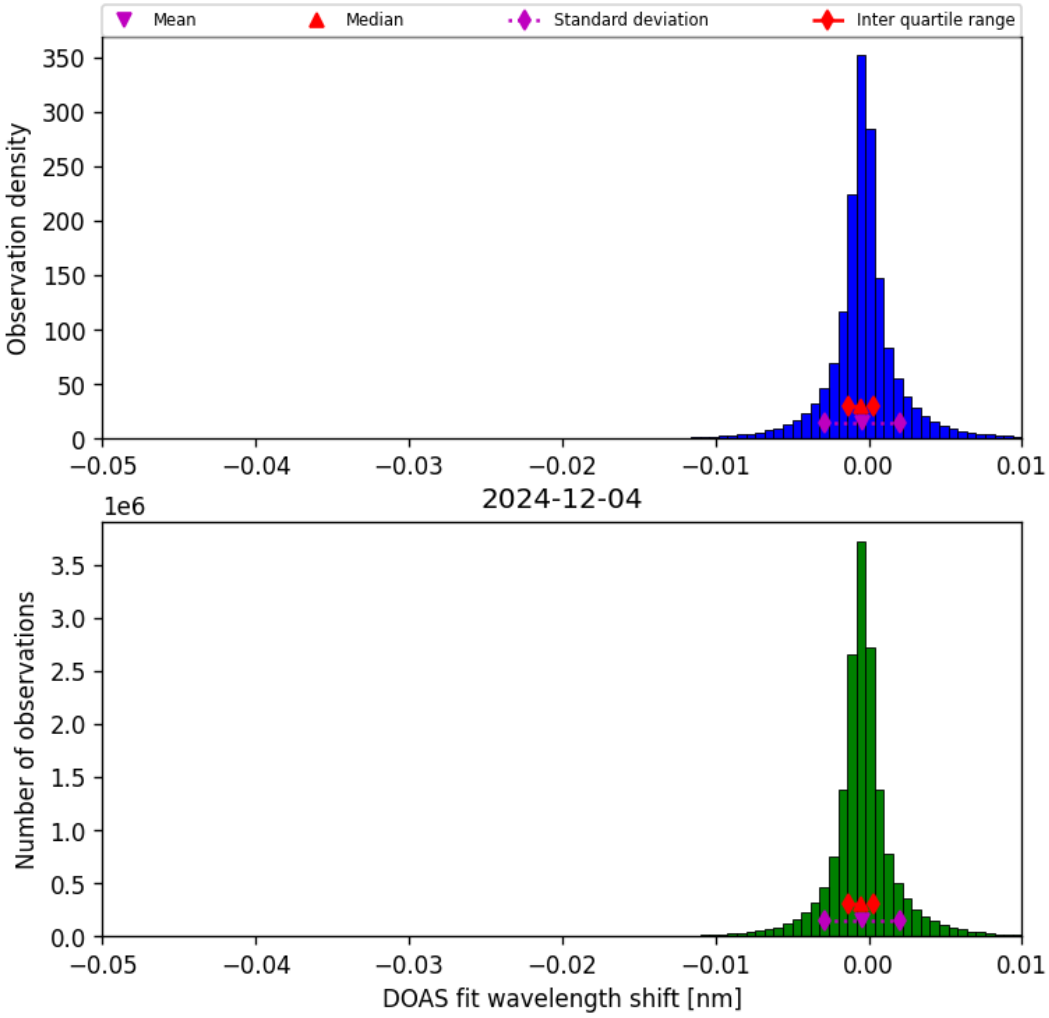


Figure 77: Histogram of “DOAS fit wavelength shift” for 2024-12-04 to 2024-12-04

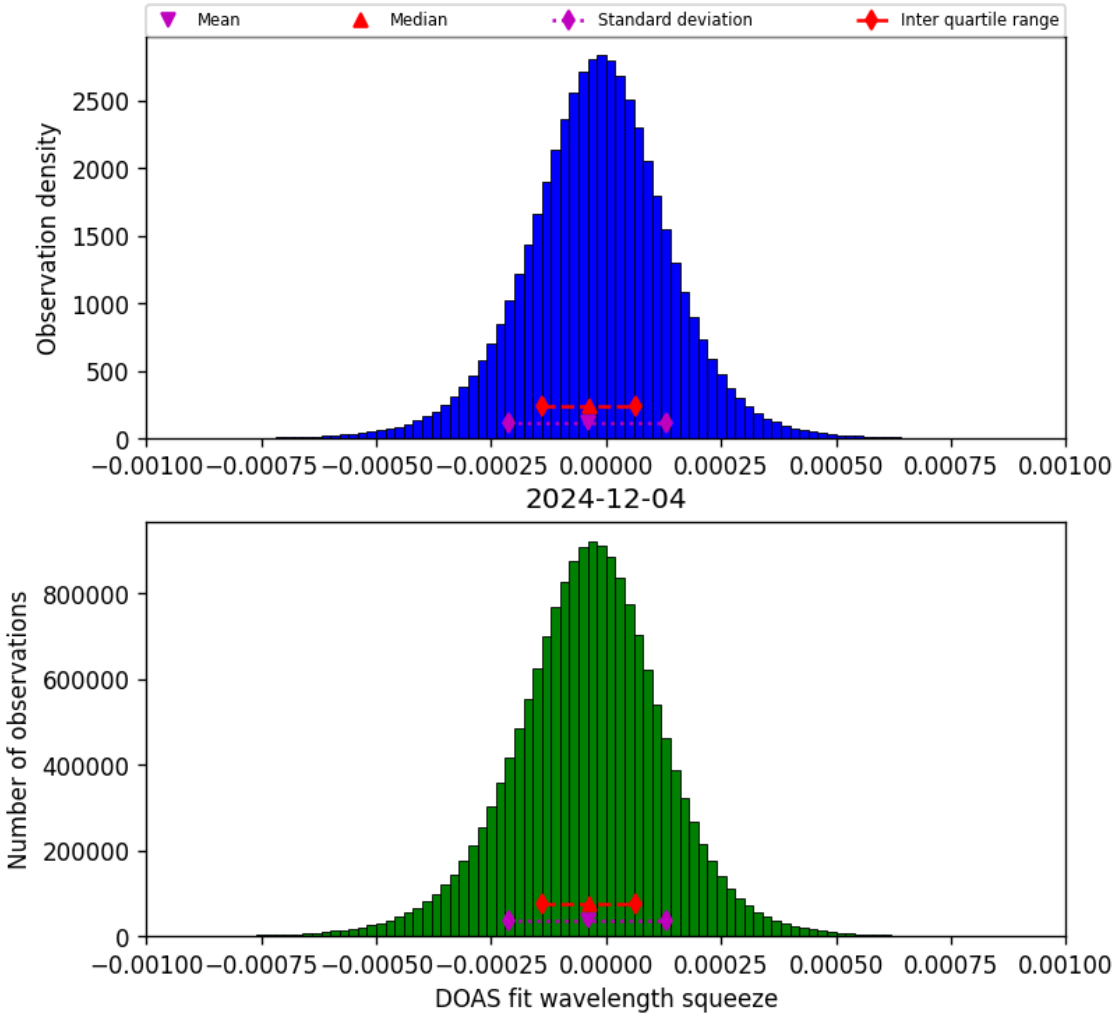


Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2024-12-04 to 2024-12-04

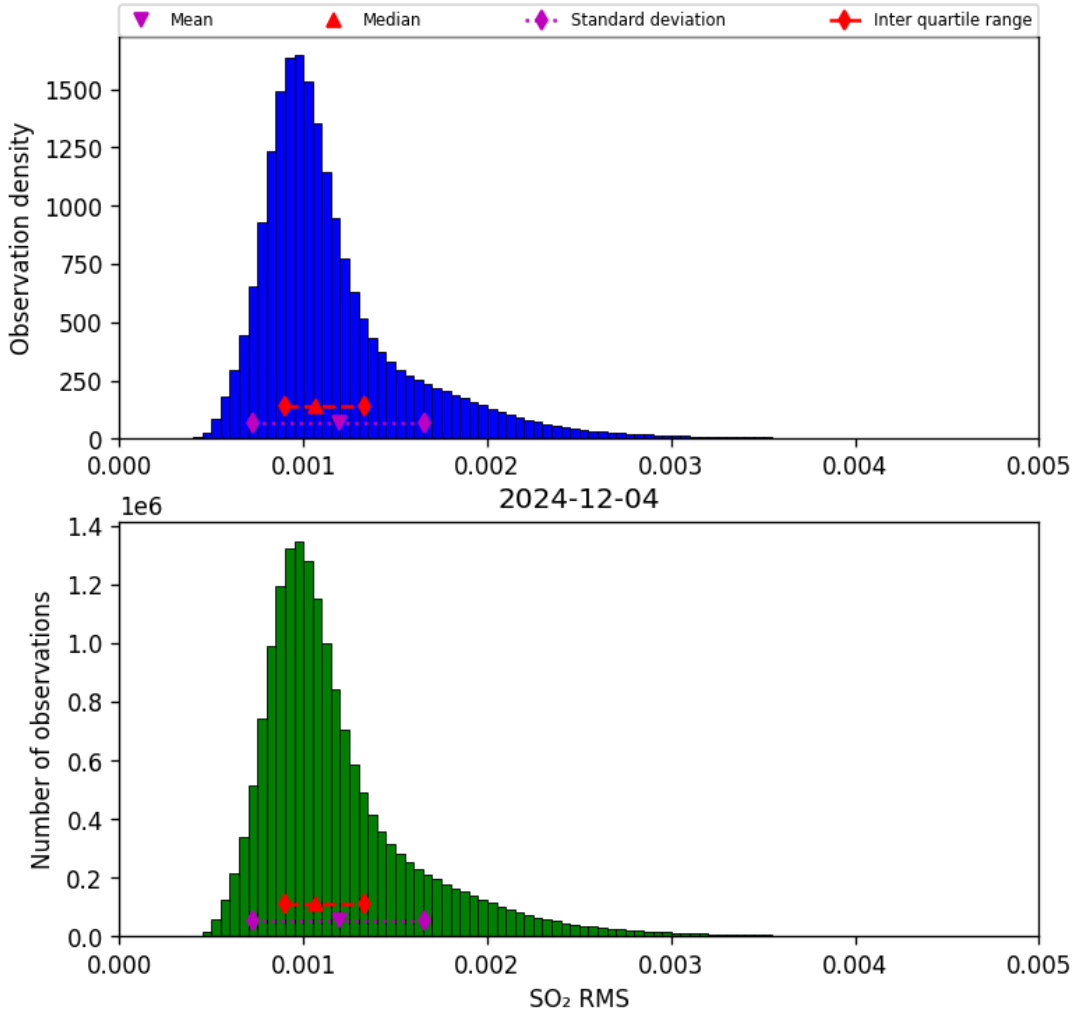


Figure 79: Histogram of "SO_2 RMS" for 2024-12-04 to 2024-12-04

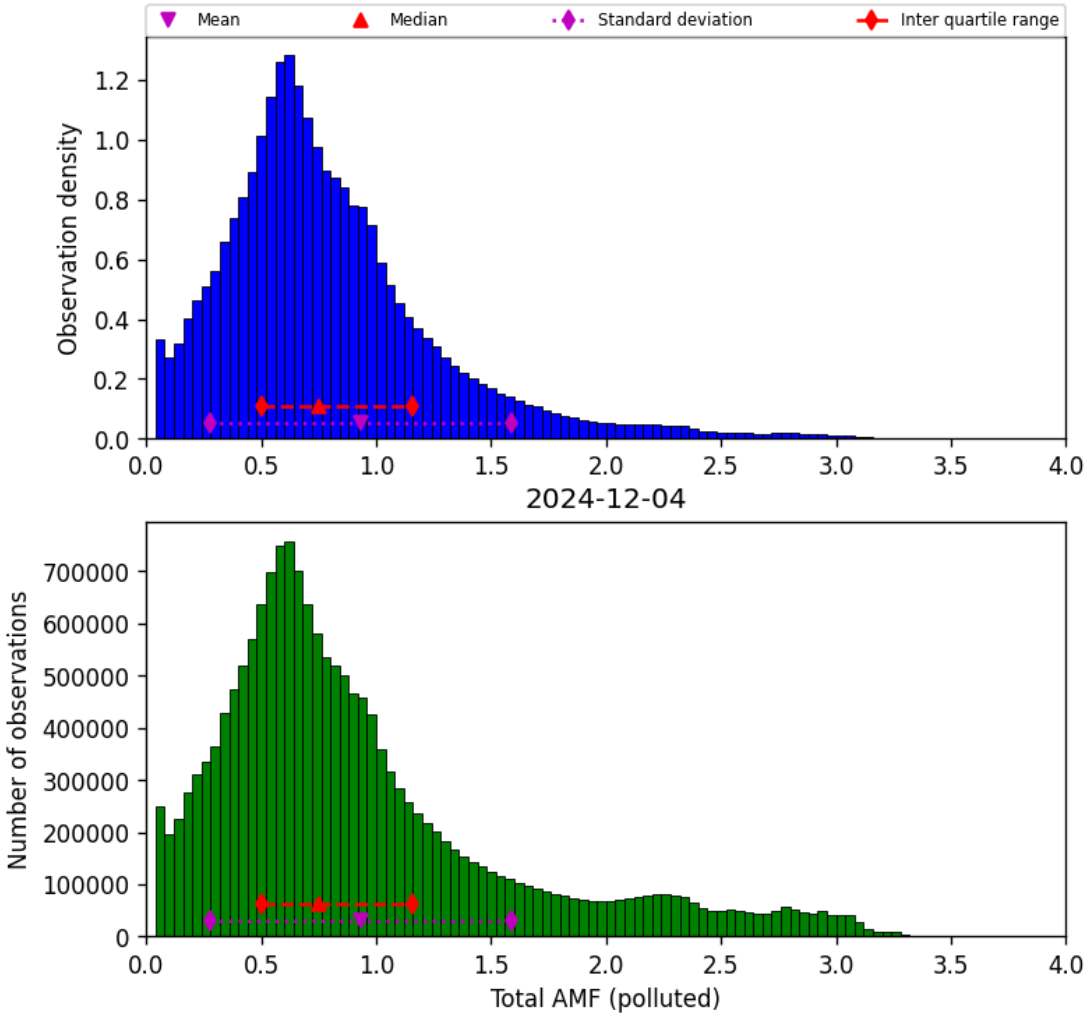


Figure 80: Histogram of “Total AMF (polluted)” for 2024-12-04 to 2024-12-04

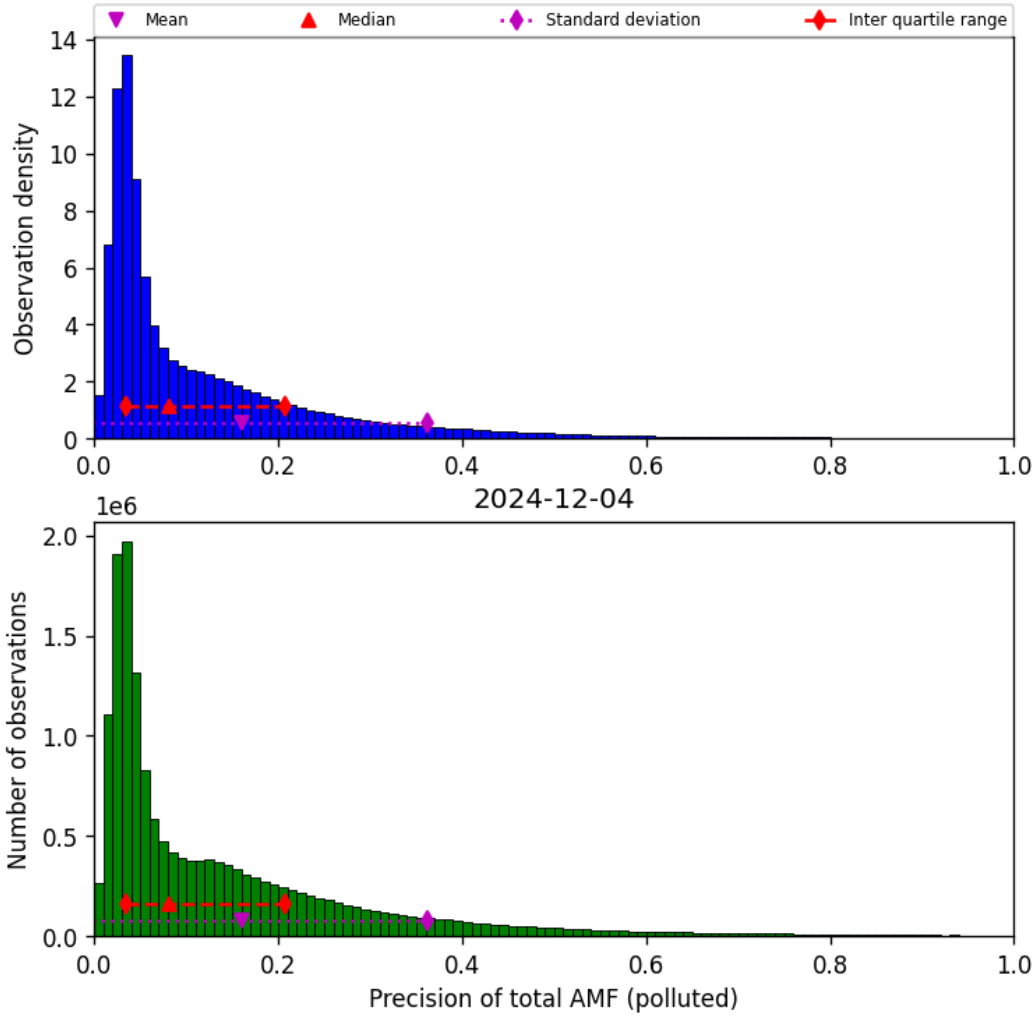


Figure 81: Histogram of “Precision of total AMF (polluted)” for 2024-12-04 to 2024-12-04

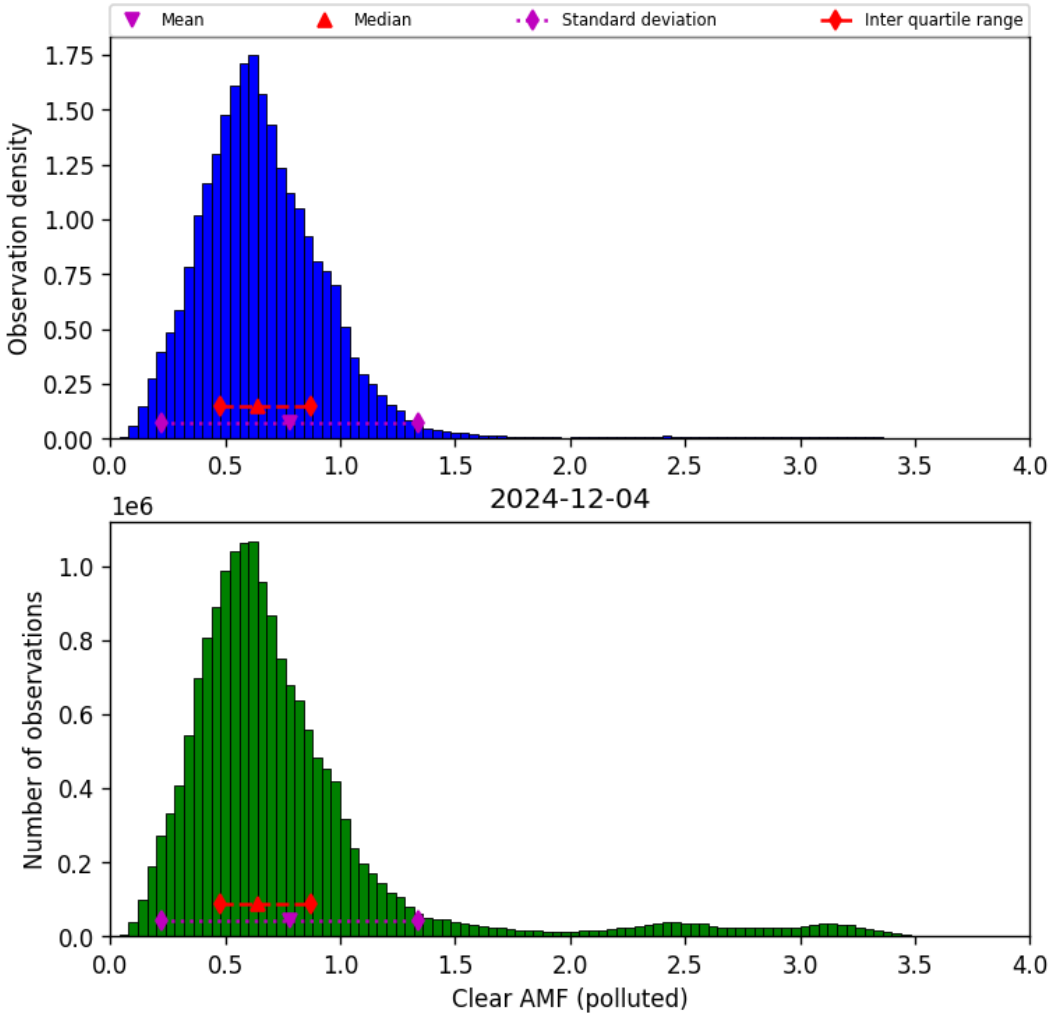


Figure 82: Histogram of “Clear AMF (polluted)” for 2024-12-04 to 2024-12-04

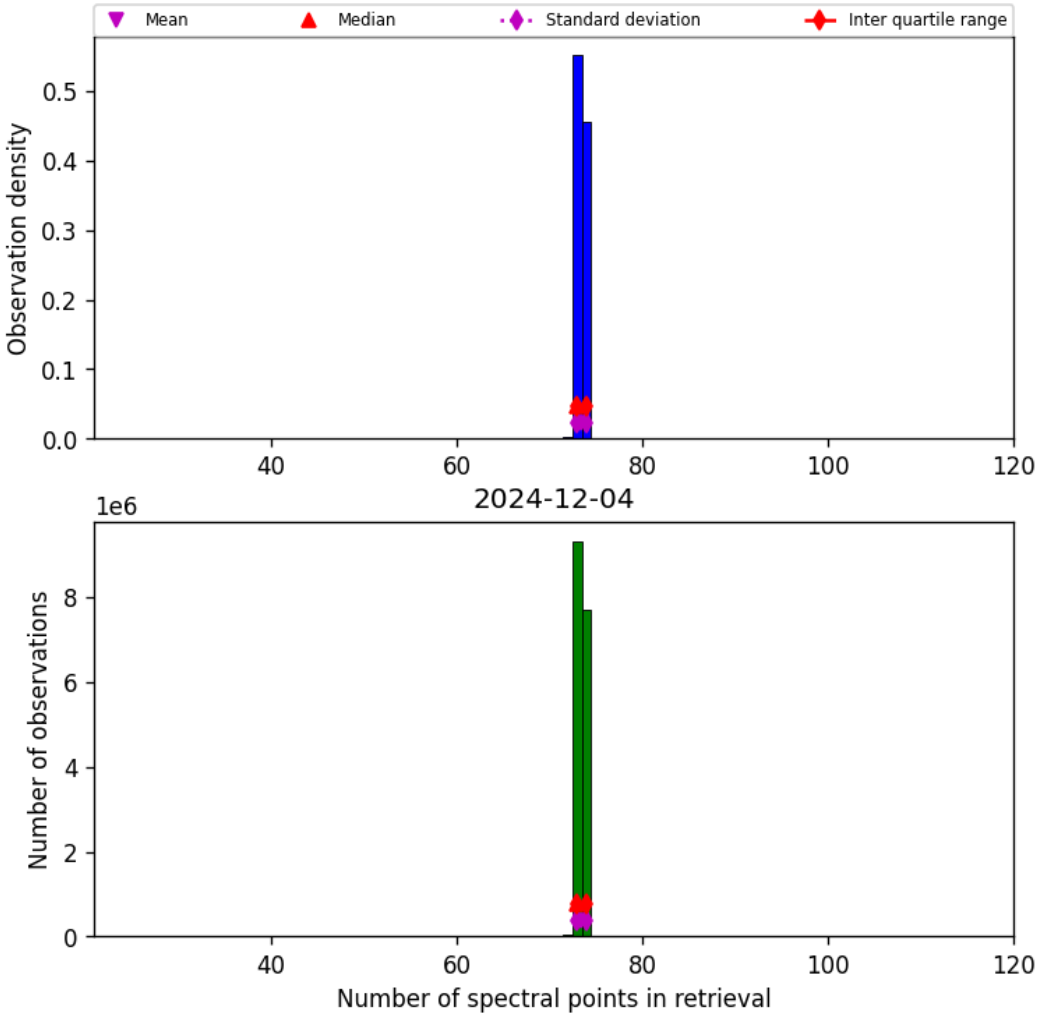


Figure 83: Histogram of “Number of spectral points in retrieval” for 2024-12-04 to 2024-12-04

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.

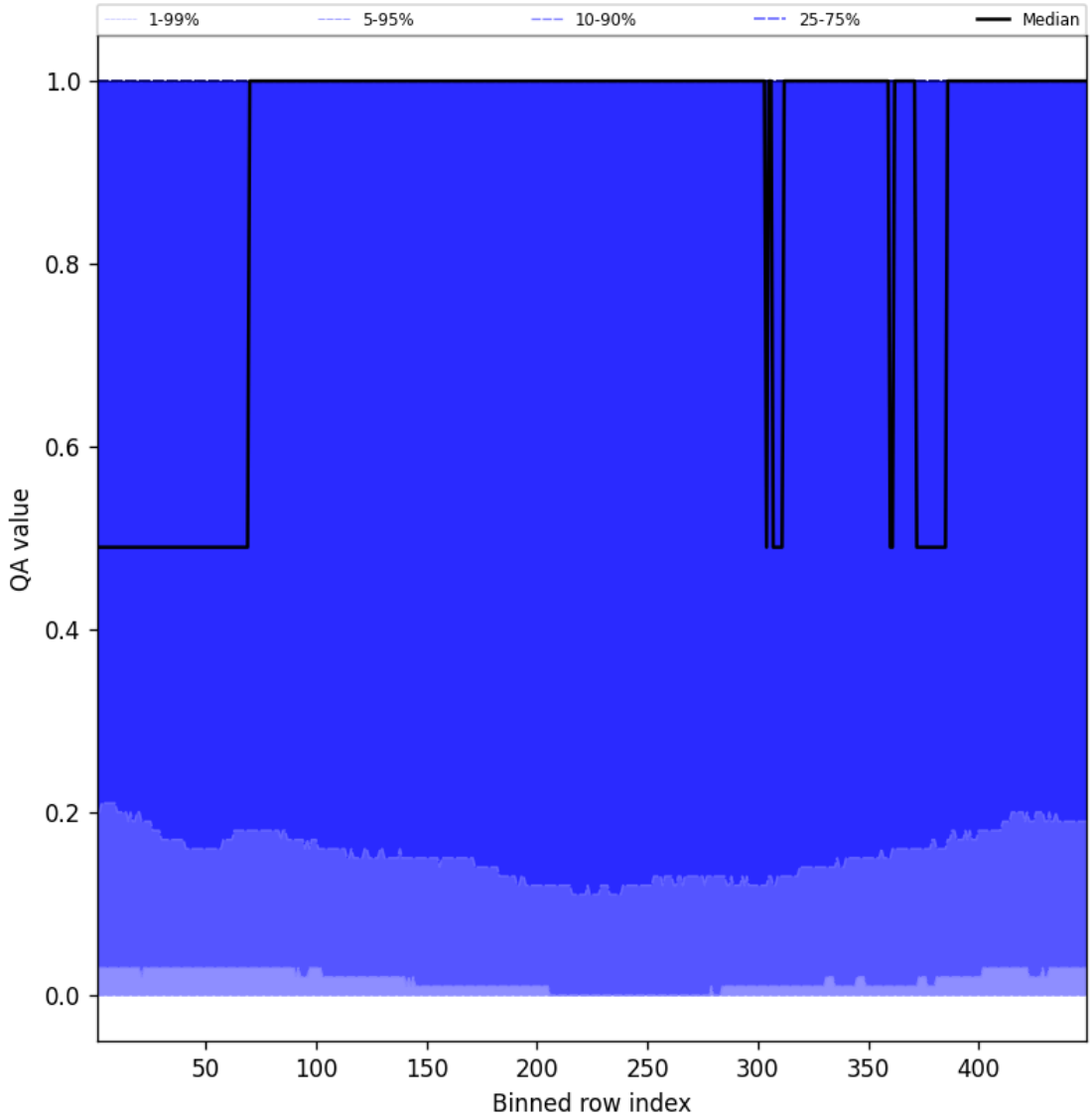


Figure 84: Along track statistics of “QA value” for 2024-12-04 to 2024-12-04

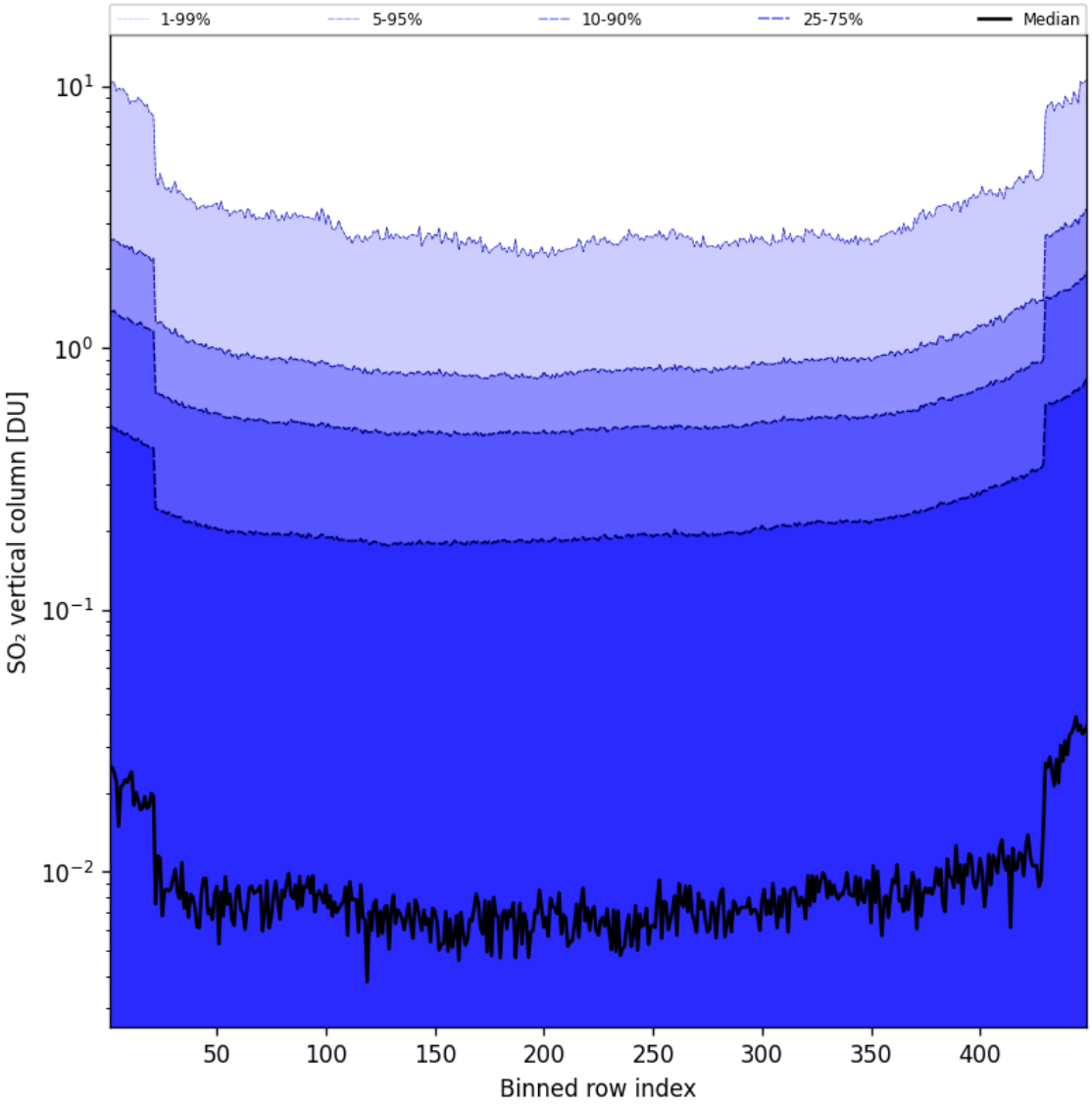


Figure 85: Along track statistics of "SO_2 vertical column" for 2024-12-04 to 2024-12-04

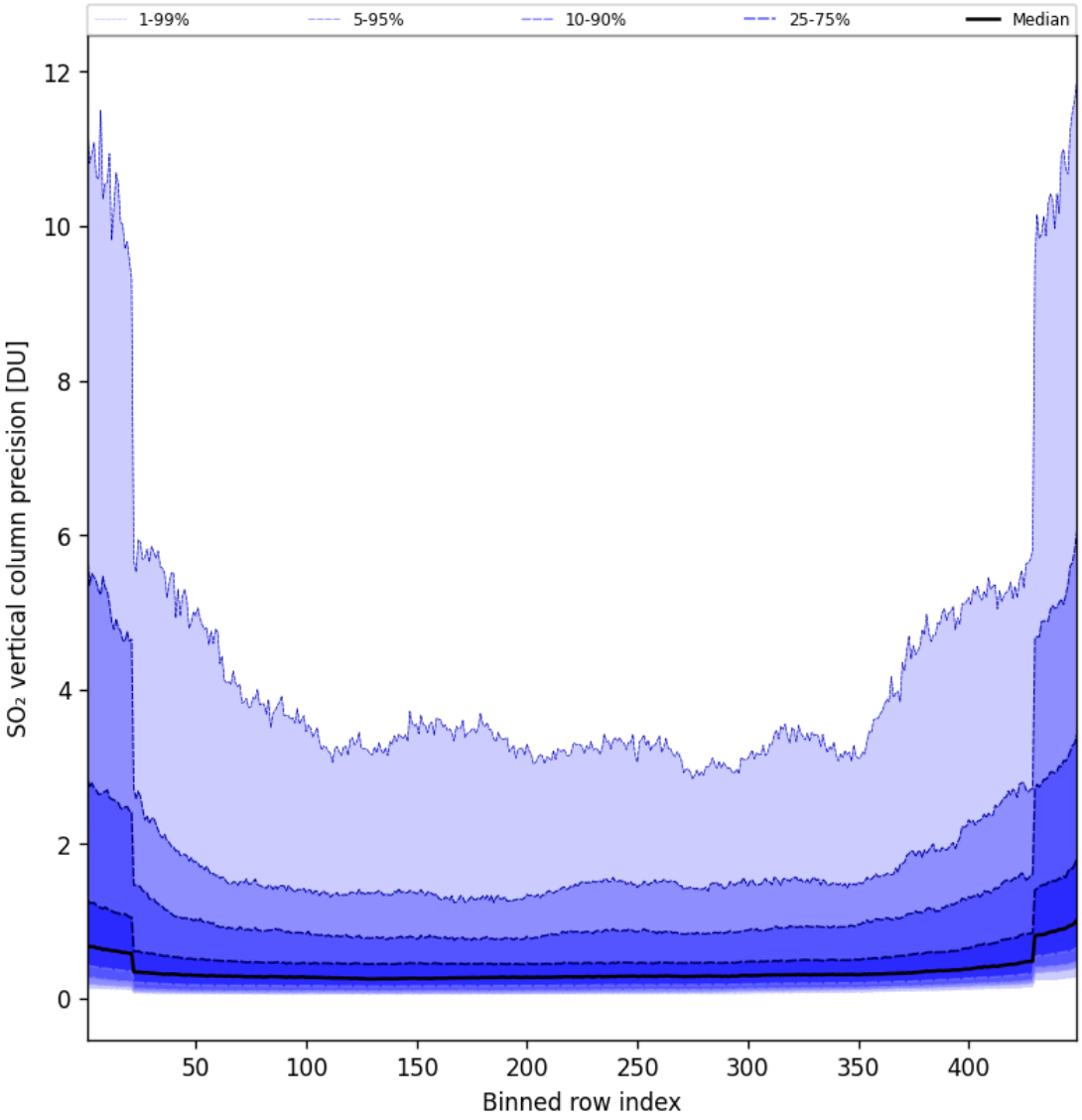


Figure 86: Along track statistics of "SO_2 vertical column precision" for 2024-12-04 to 2024-12-04

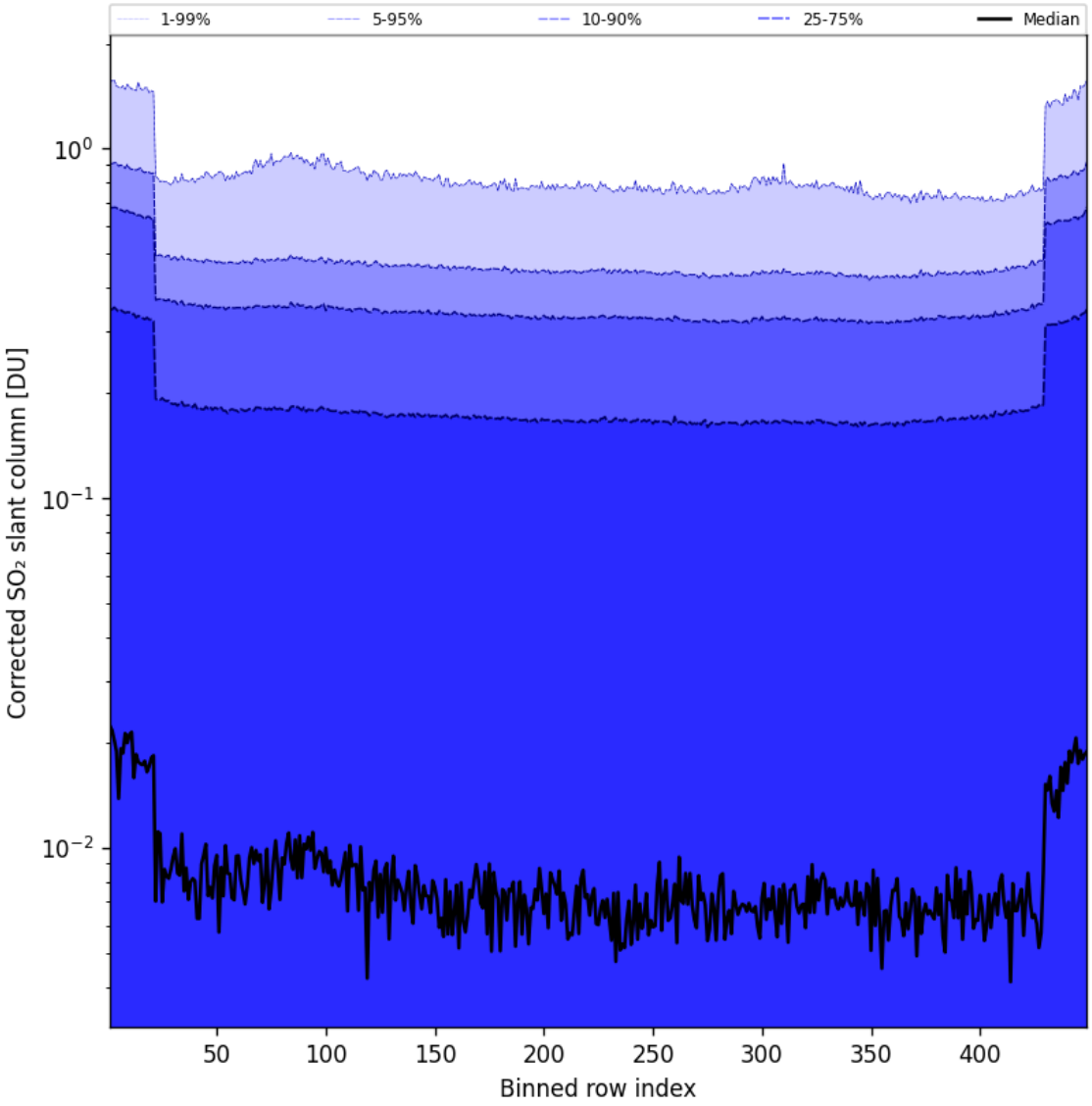


Figure 87: Along track statistics of "Corrected SO_2 slant column" for 2024-12-04 to 2024-12-04

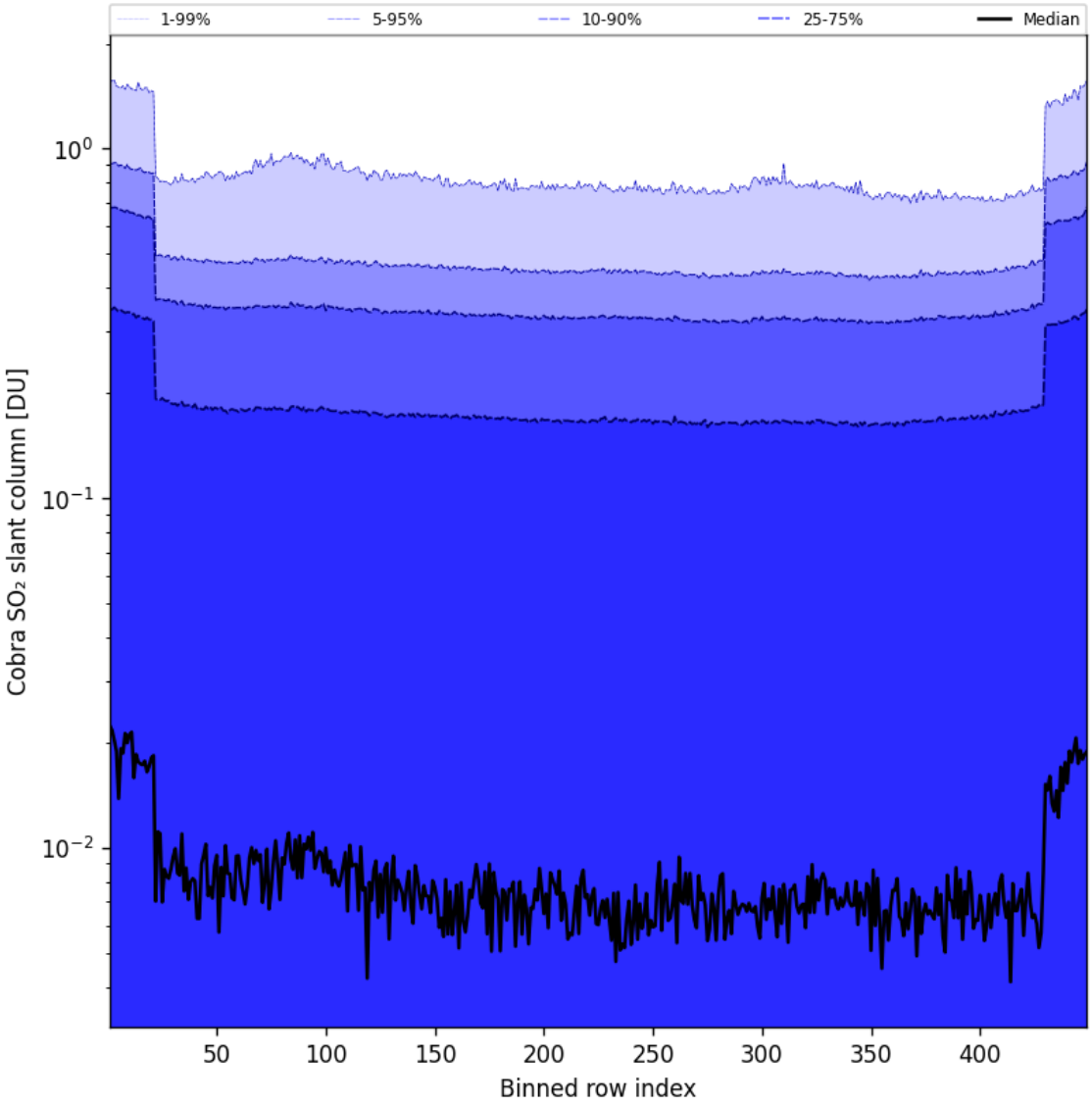


Figure 88: Along track statistics of "Cobra SO_2 slant column" for 2024-12-04 to 2024-12-04

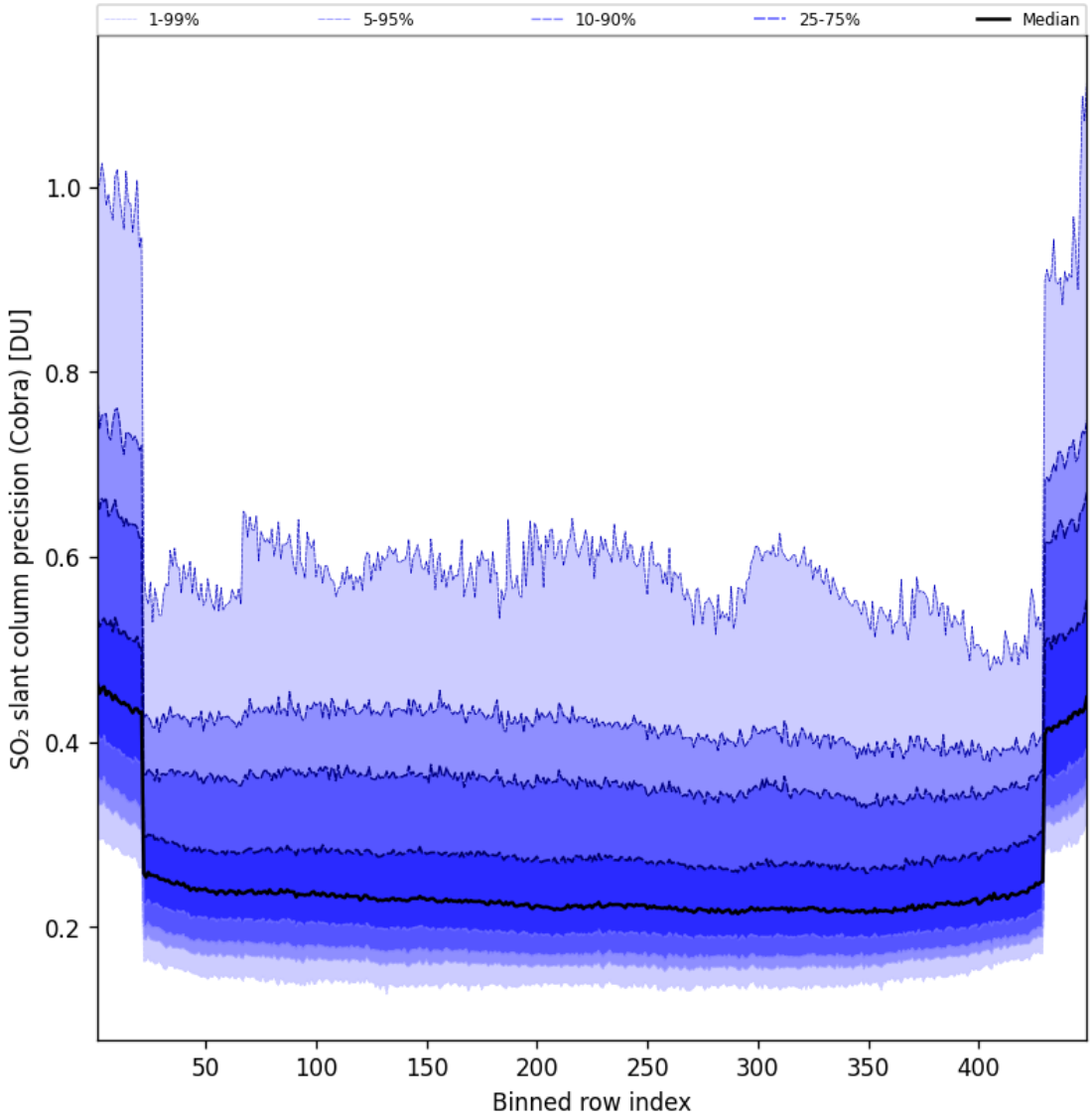


Figure 89: Along track statistics of "SO_2 slant column precision (Cobra)" for 2024-12-04 to 2024-12-04

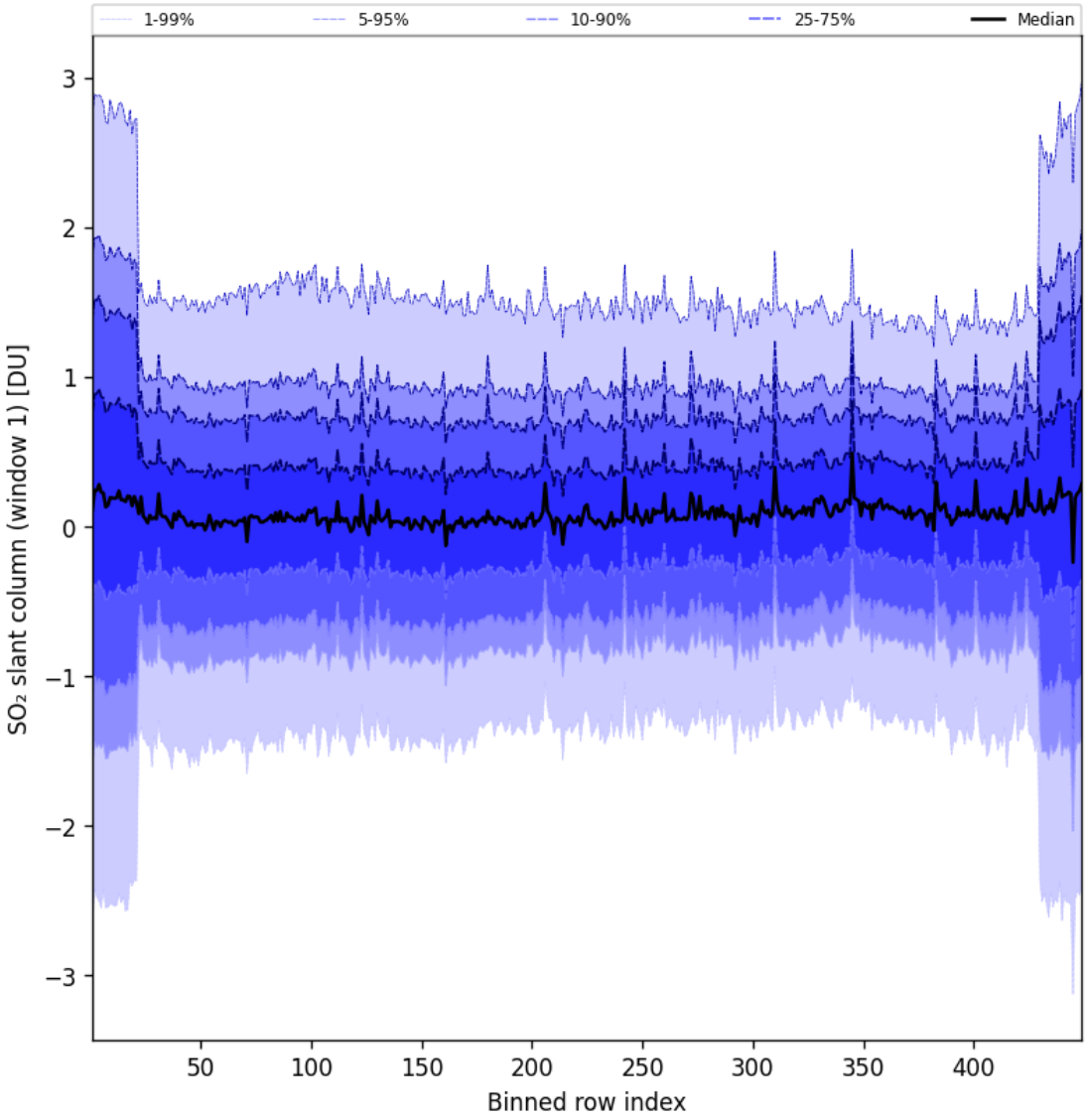


Figure 90: Along track statistics of "SO_2 slant column (window 1)" for 2024-12-04 to 2024-12-04

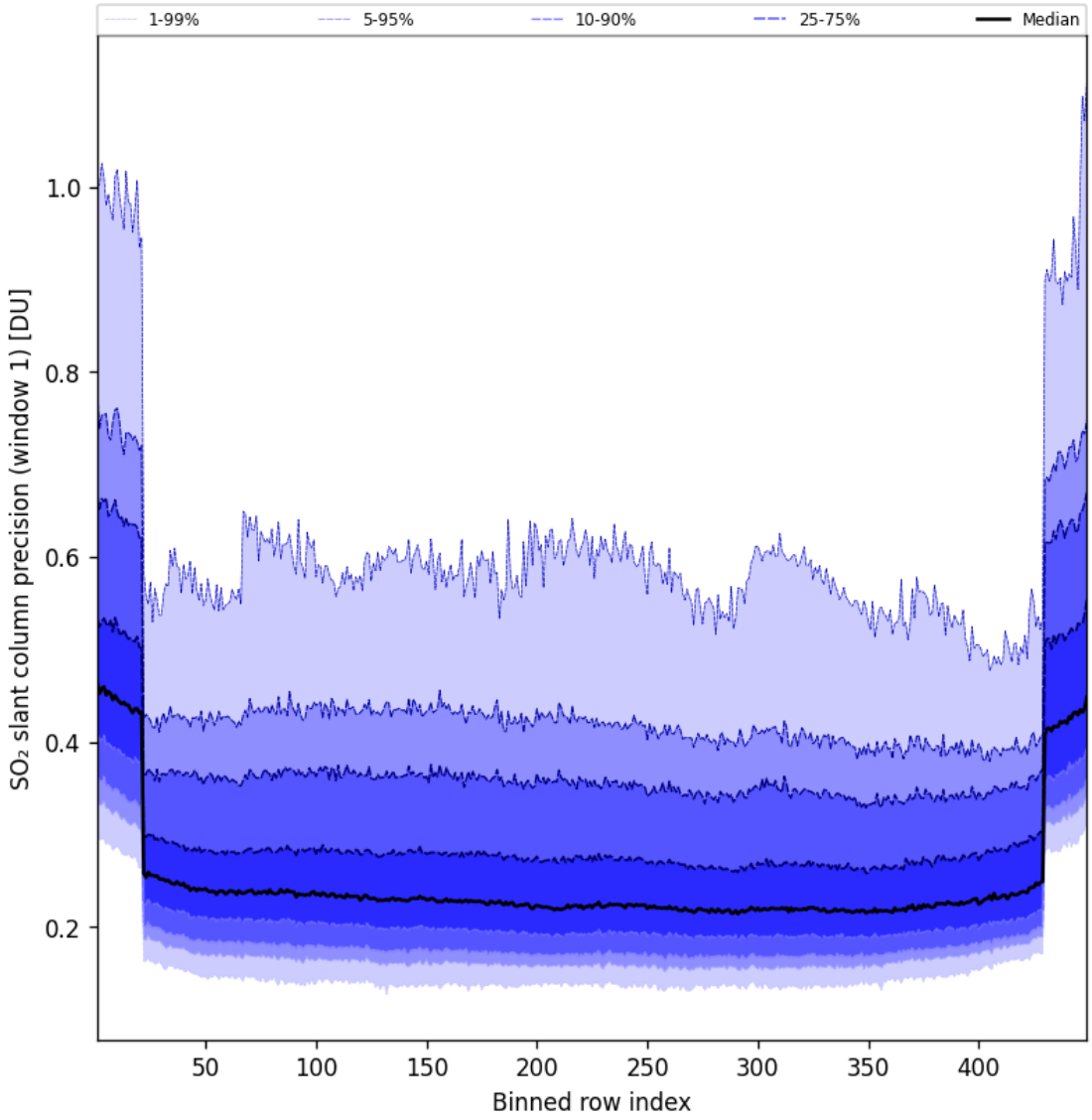


Figure 91: Along track statistics of "SO_2 slant column precision (window 1)" for 2024-12-04 to 2024-12-04

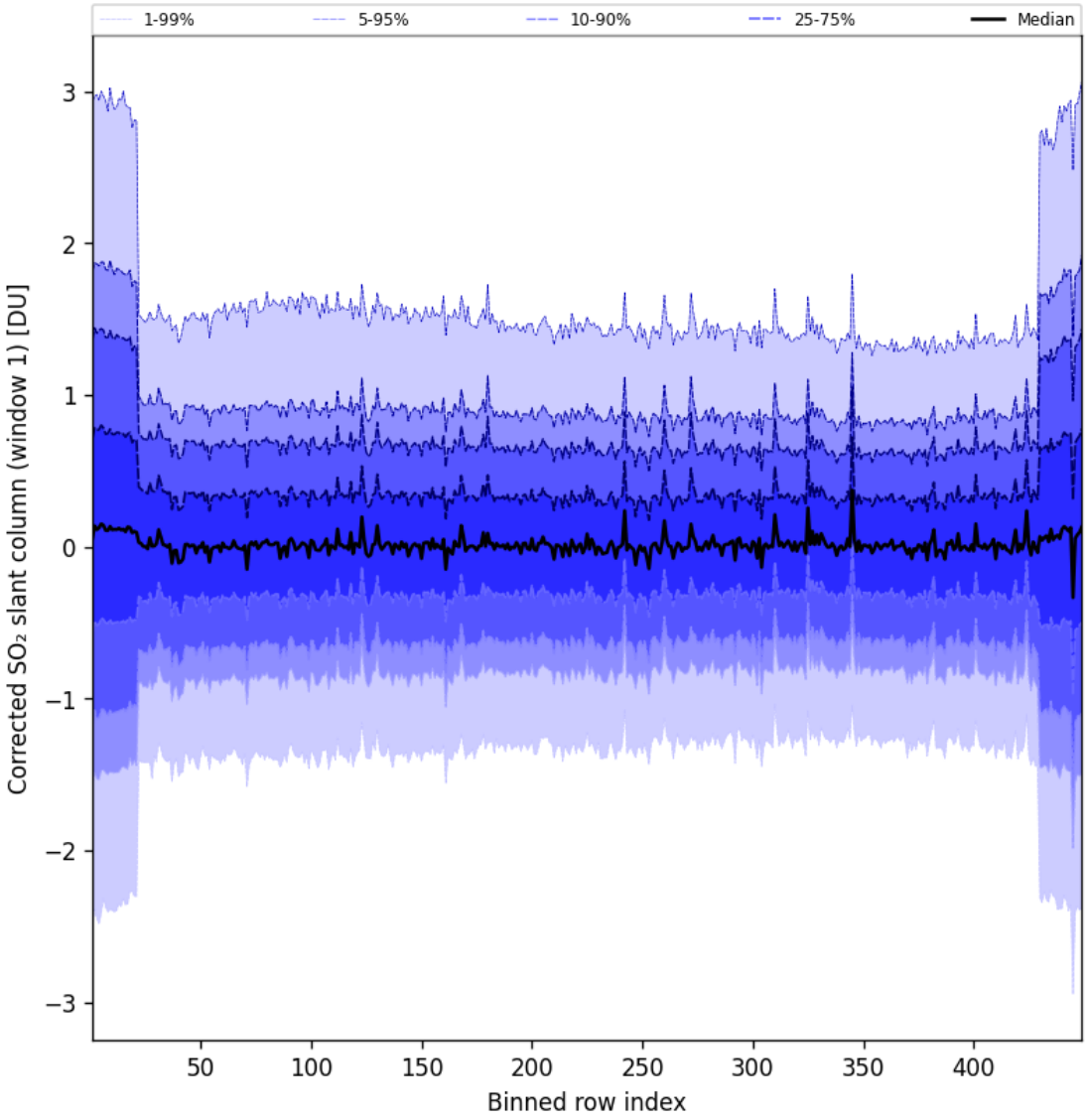


Figure 92: Along track statistics of “Corrected SO_2 slant column (window 1)” for 2024-12-04 to 2024-12-04

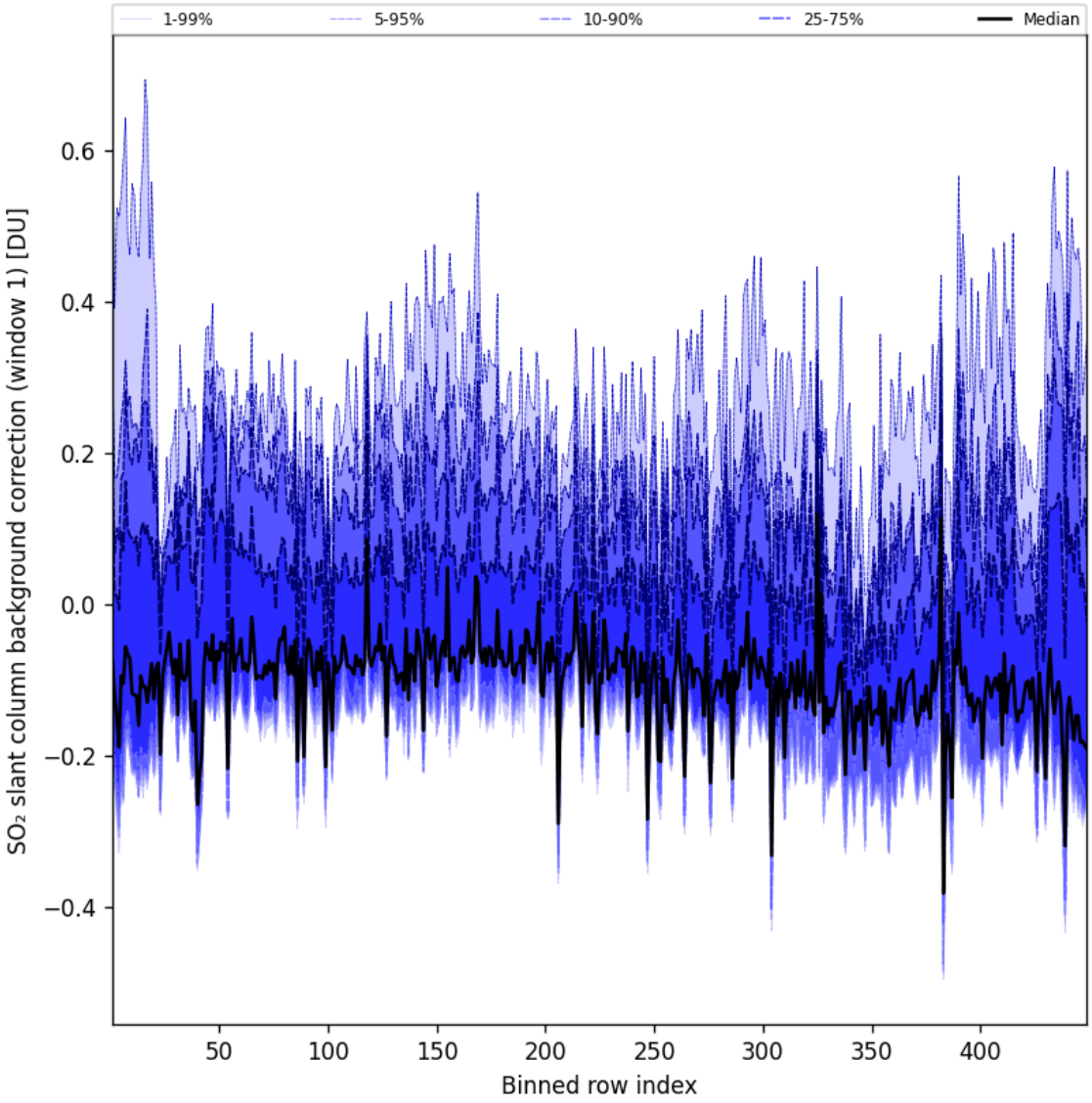


Figure 93: Along track statistics of "SO_2 slant column background correction (window 1)" for 2024-12-04 to 2024-12-04

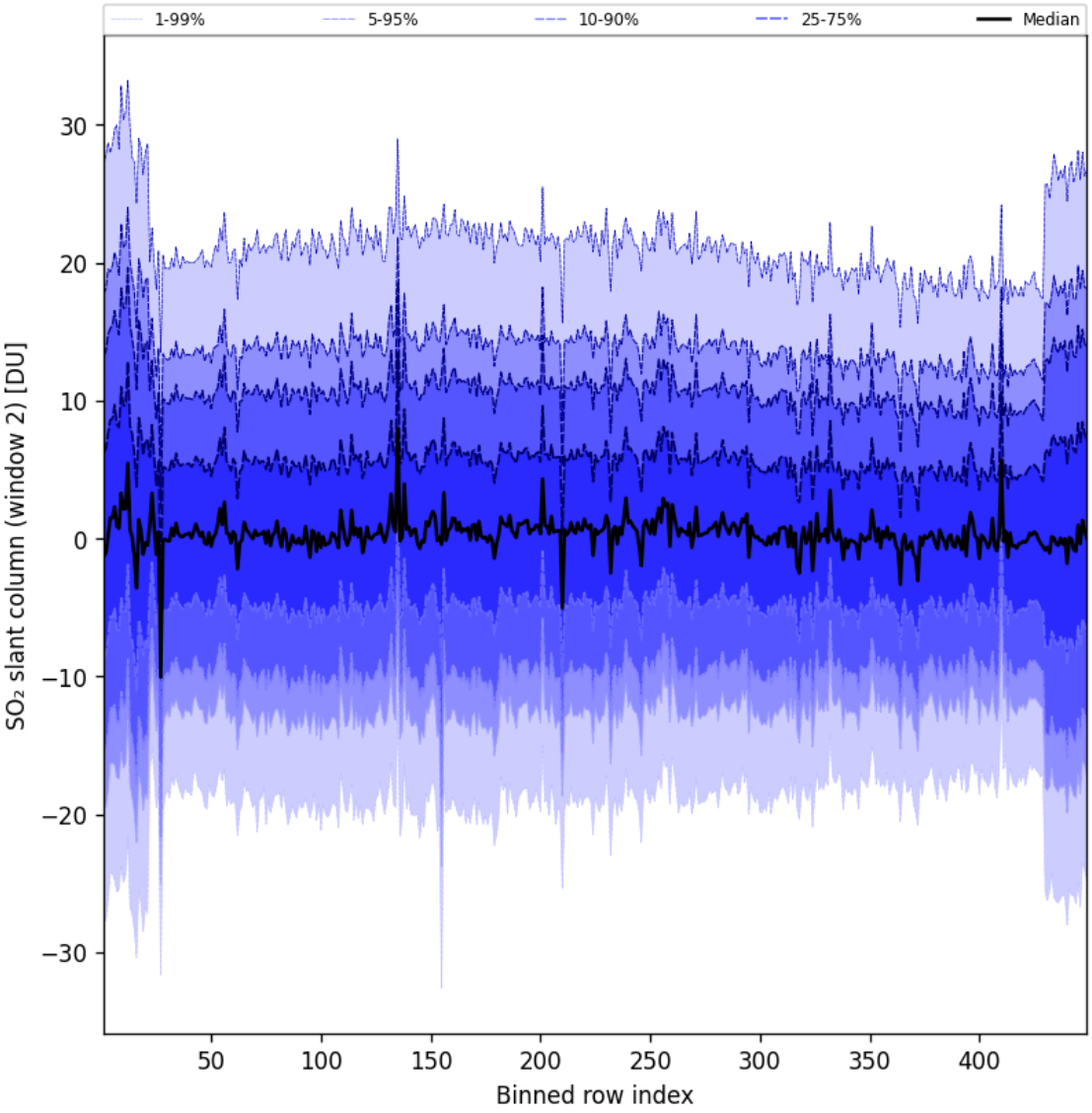


Figure 94: Along track statistics of "SO_2 slant column (window 2)" for 2024-12-04 to 2024-12-04

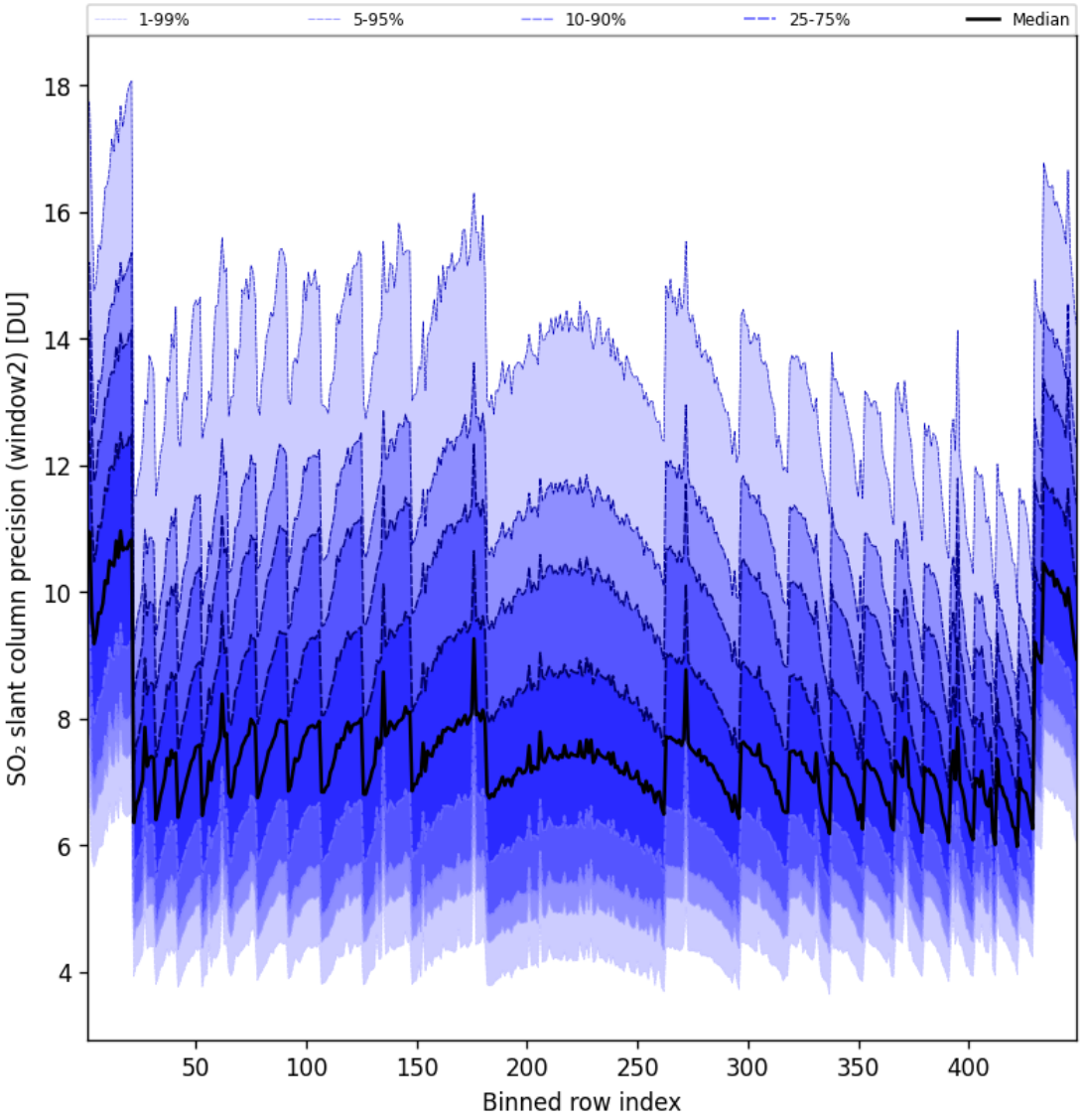


Figure 95: Along track statistics of "SO_2 slant column precision (window2)" for 2024-12-04 to 2024-12-04

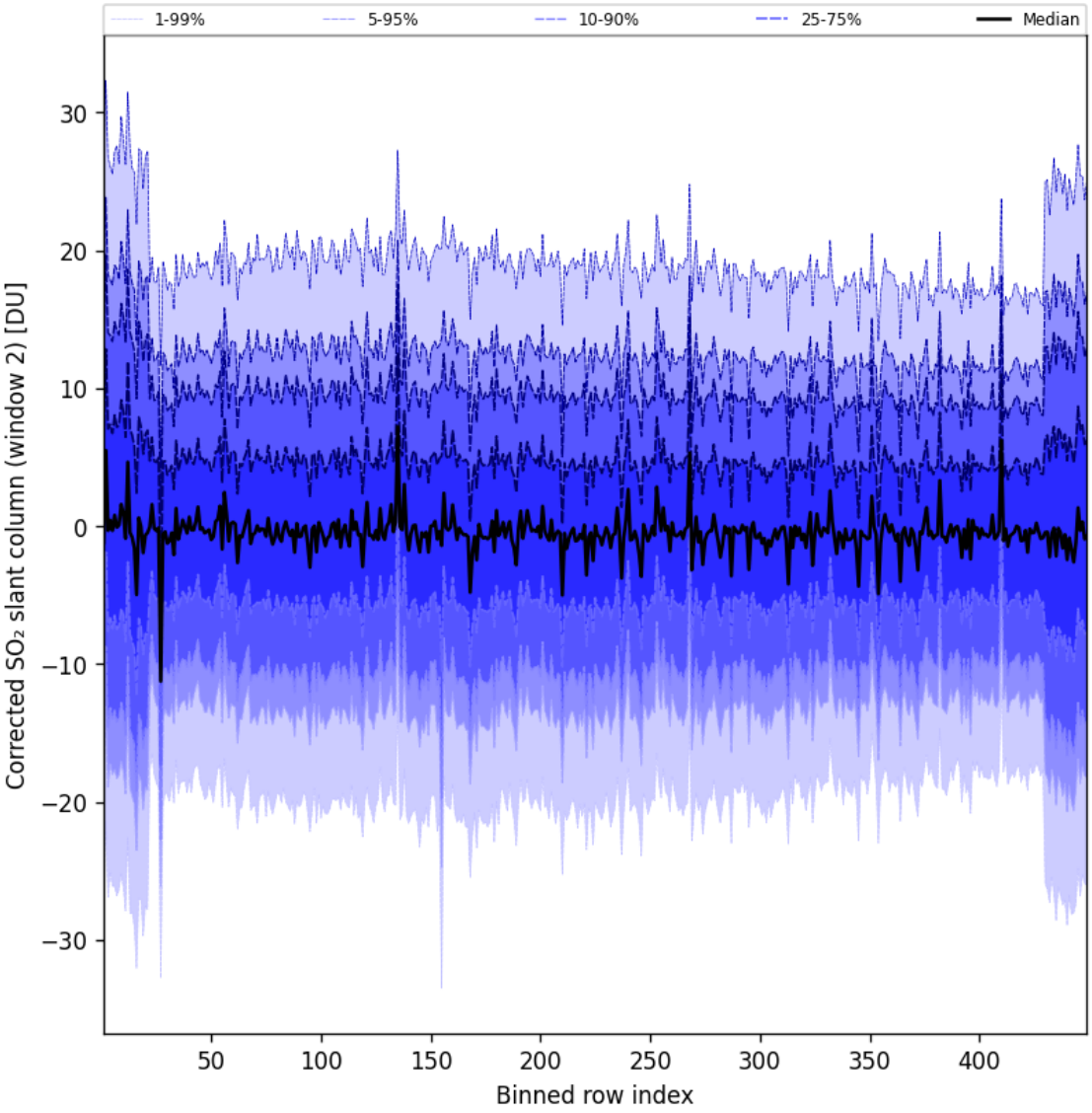


Figure 96: Along track statistics of “Corrected SO_2 slant column (window 2)” for 2024-12-04 to 2024-12-04

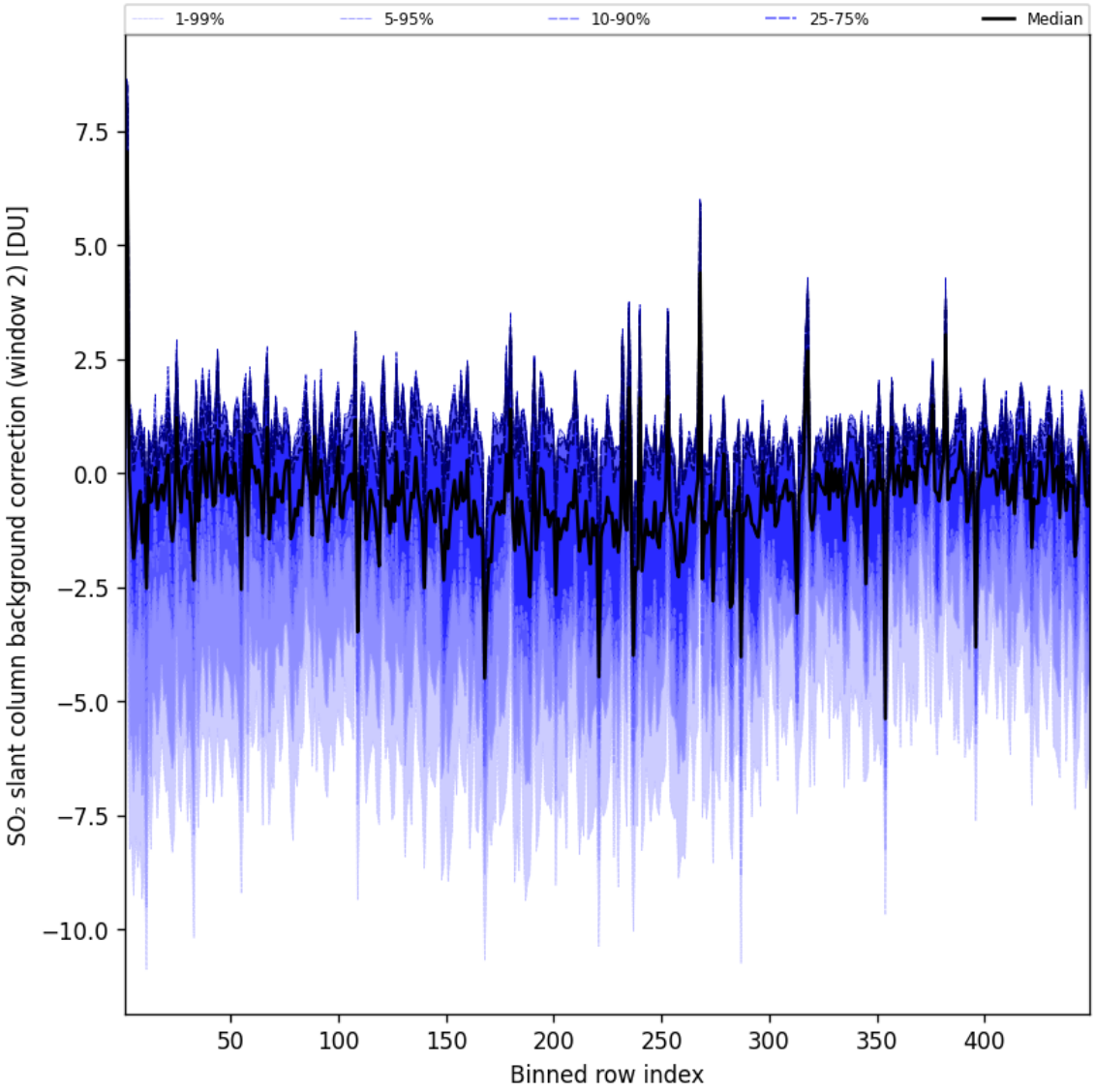


Figure 97: Along track statistics of "SO_2 slant column background correction (window 2)" for 2024-12-04 to 2024-12-04

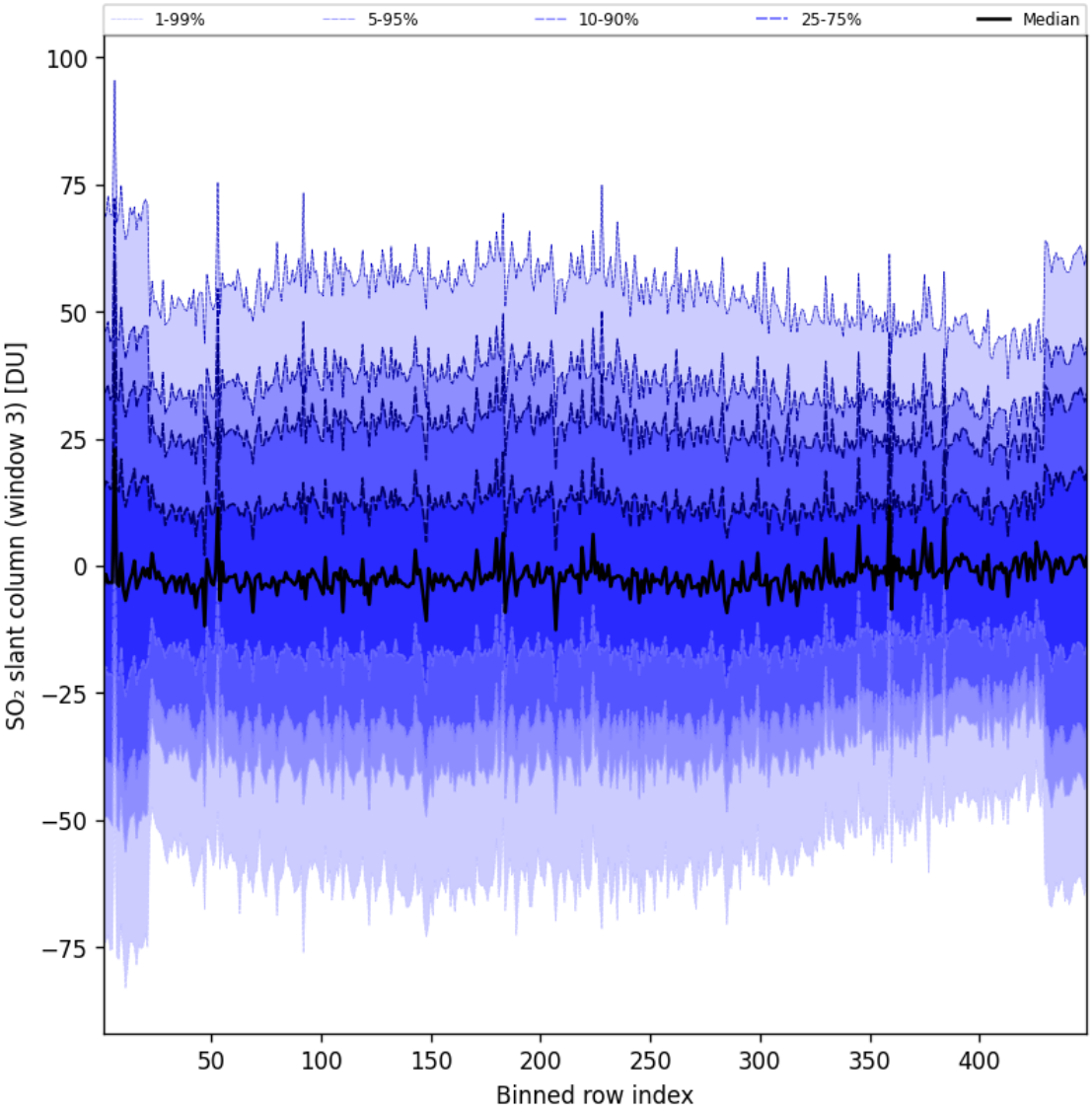


Figure 98: Along track statistics of "SO_2 slant column (window 3)" for 2024-12-04 to 2024-12-04

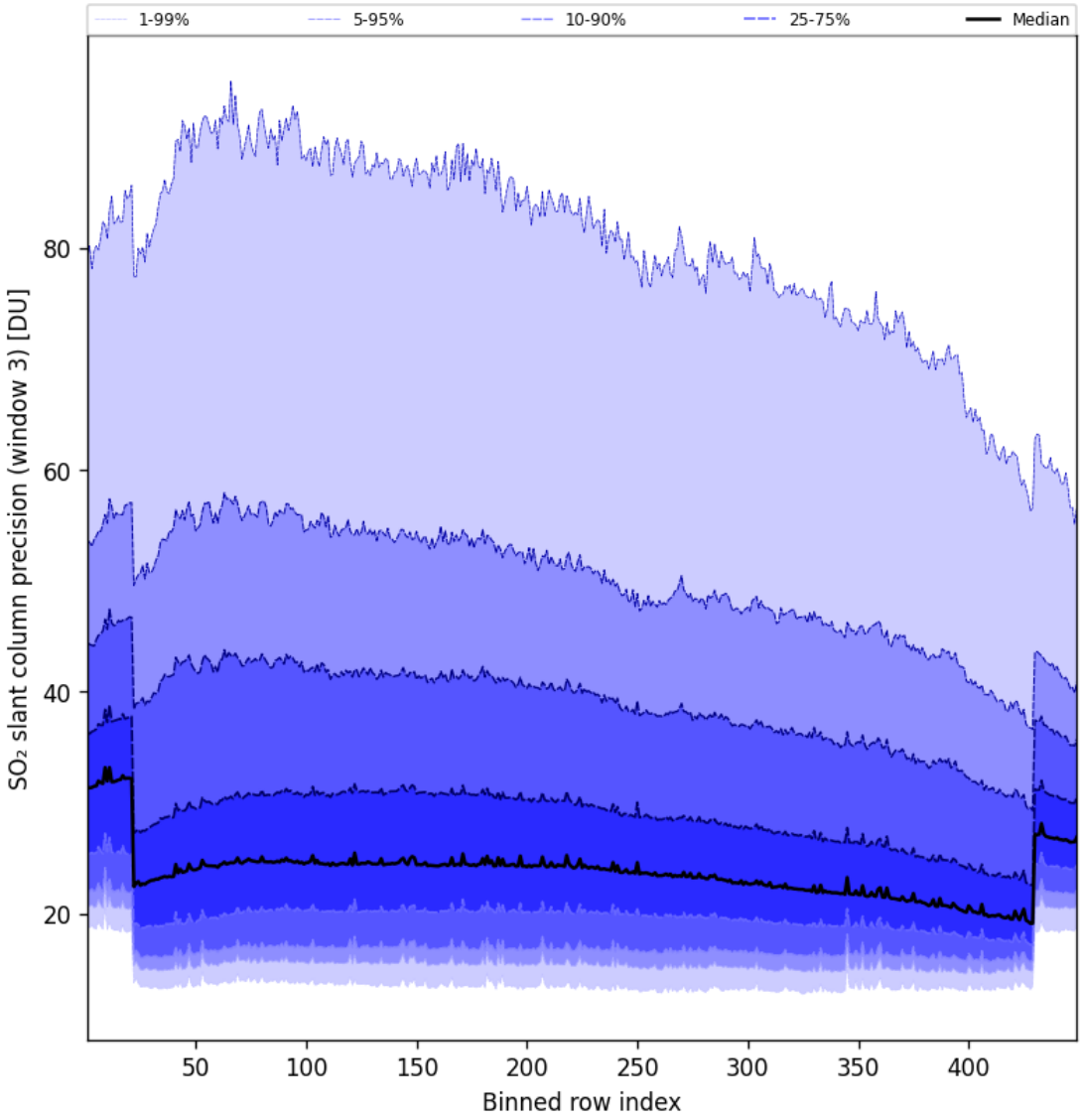


Figure 99: Along track statistics of "SO_2 slant column precision (window 3)" for 2024-12-04 to 2024-12-04

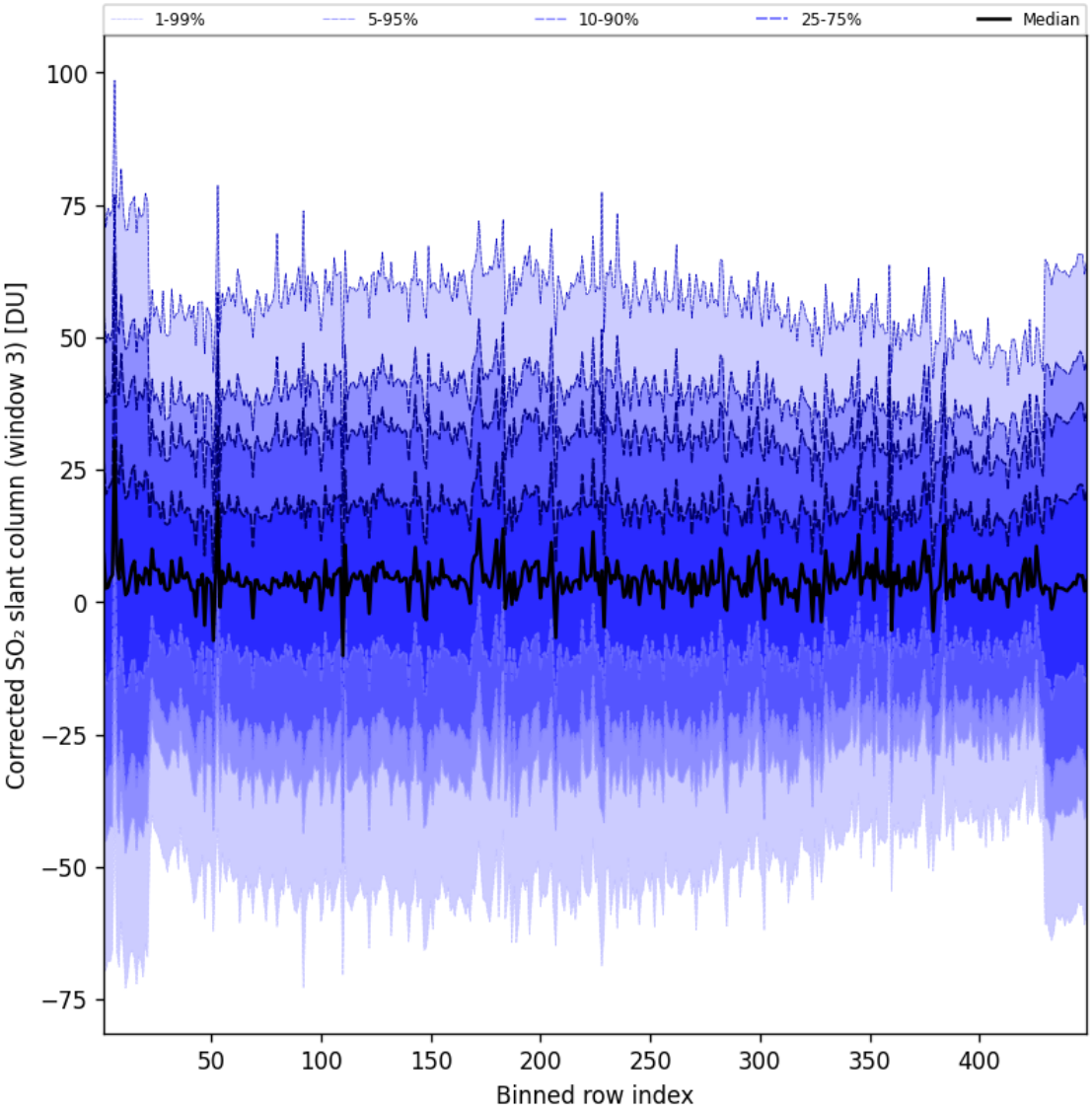


Figure 100: Along track statistics of “Corrected SO_2 slant column (window 3)” for 2024-12-04 to 2024-12-04

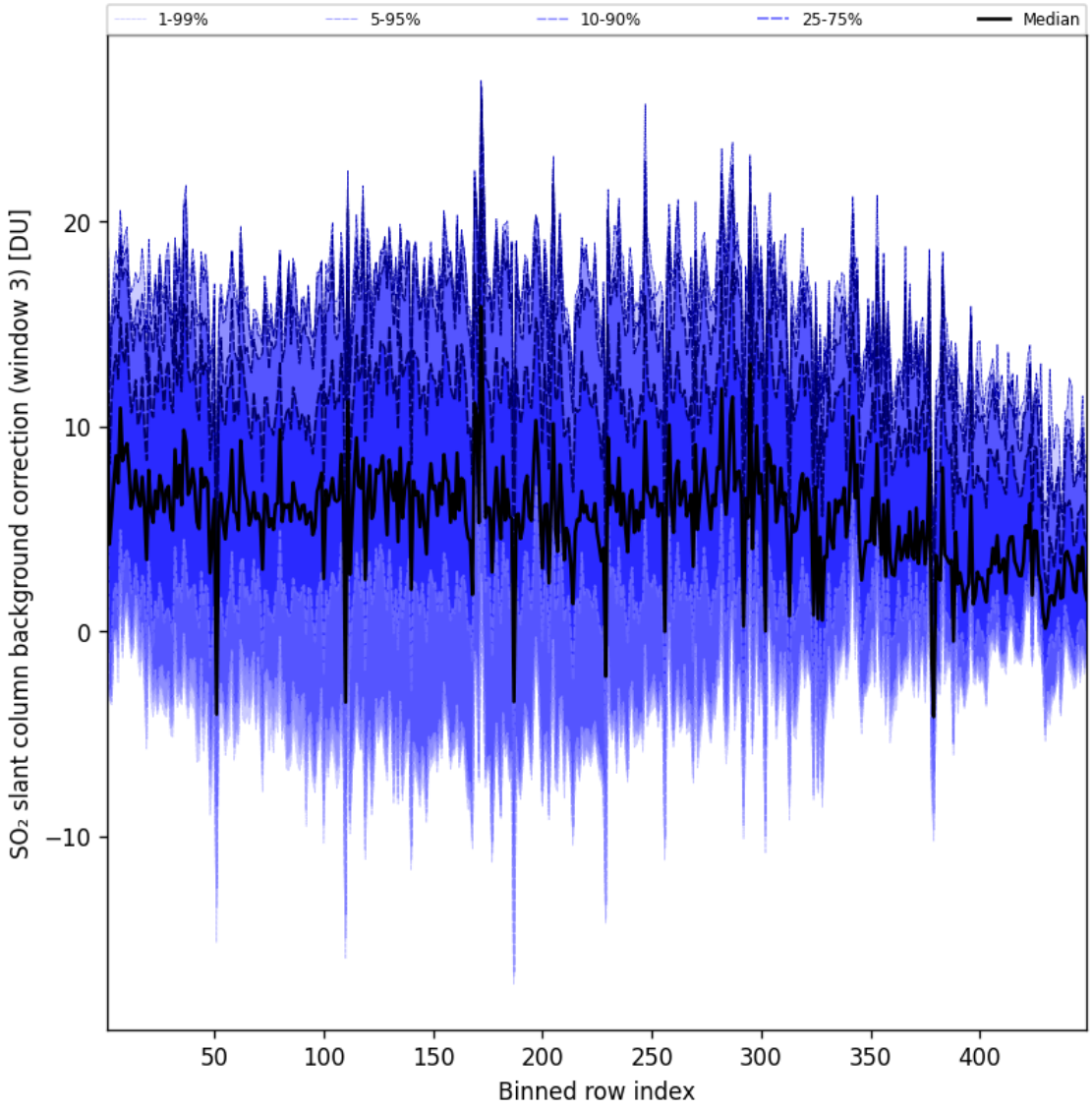
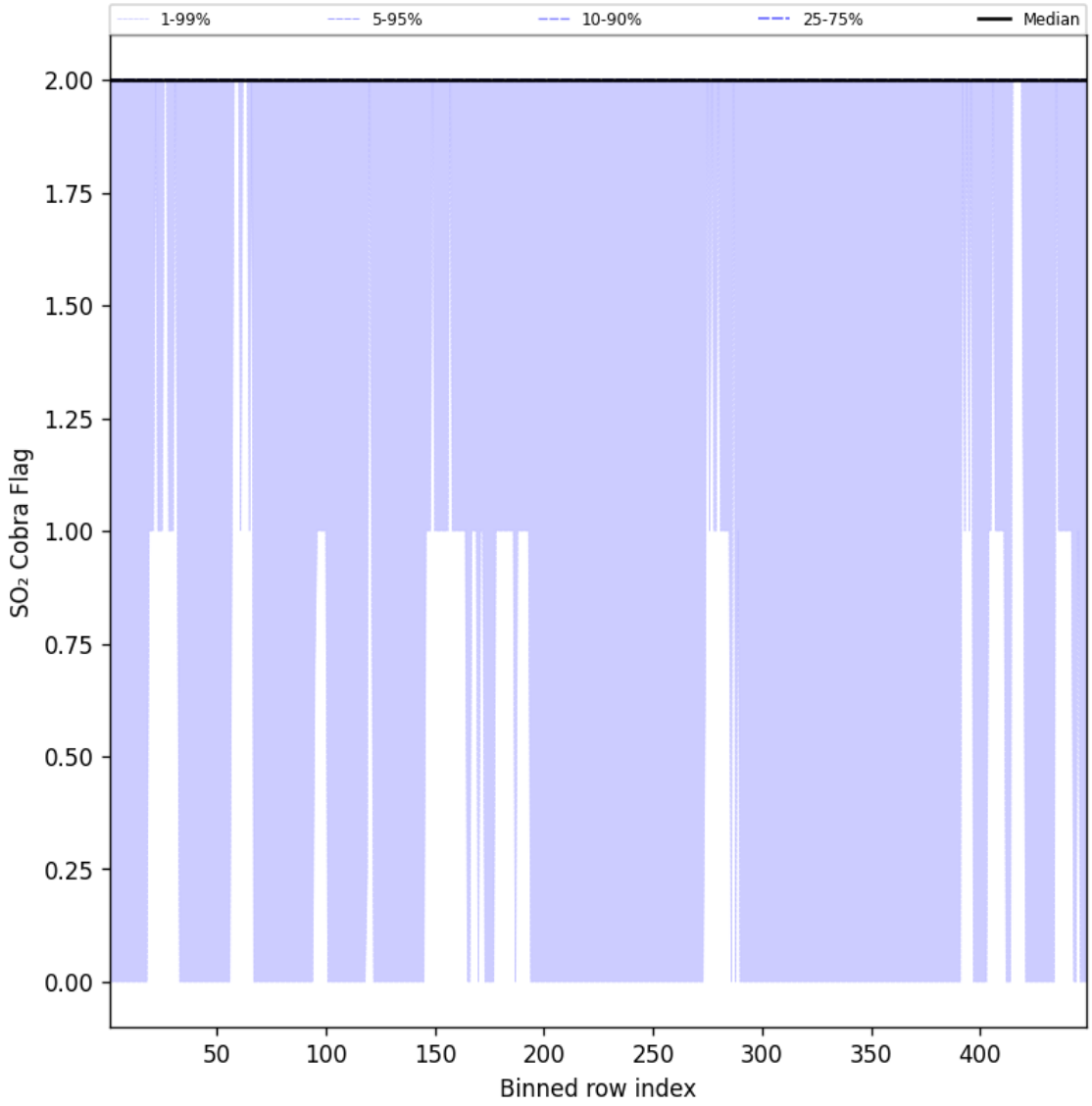


Figure 101: Along track statistics of "SO_2 slant column background correction (window 3)" for 2024-12-04 to 2024-12-04



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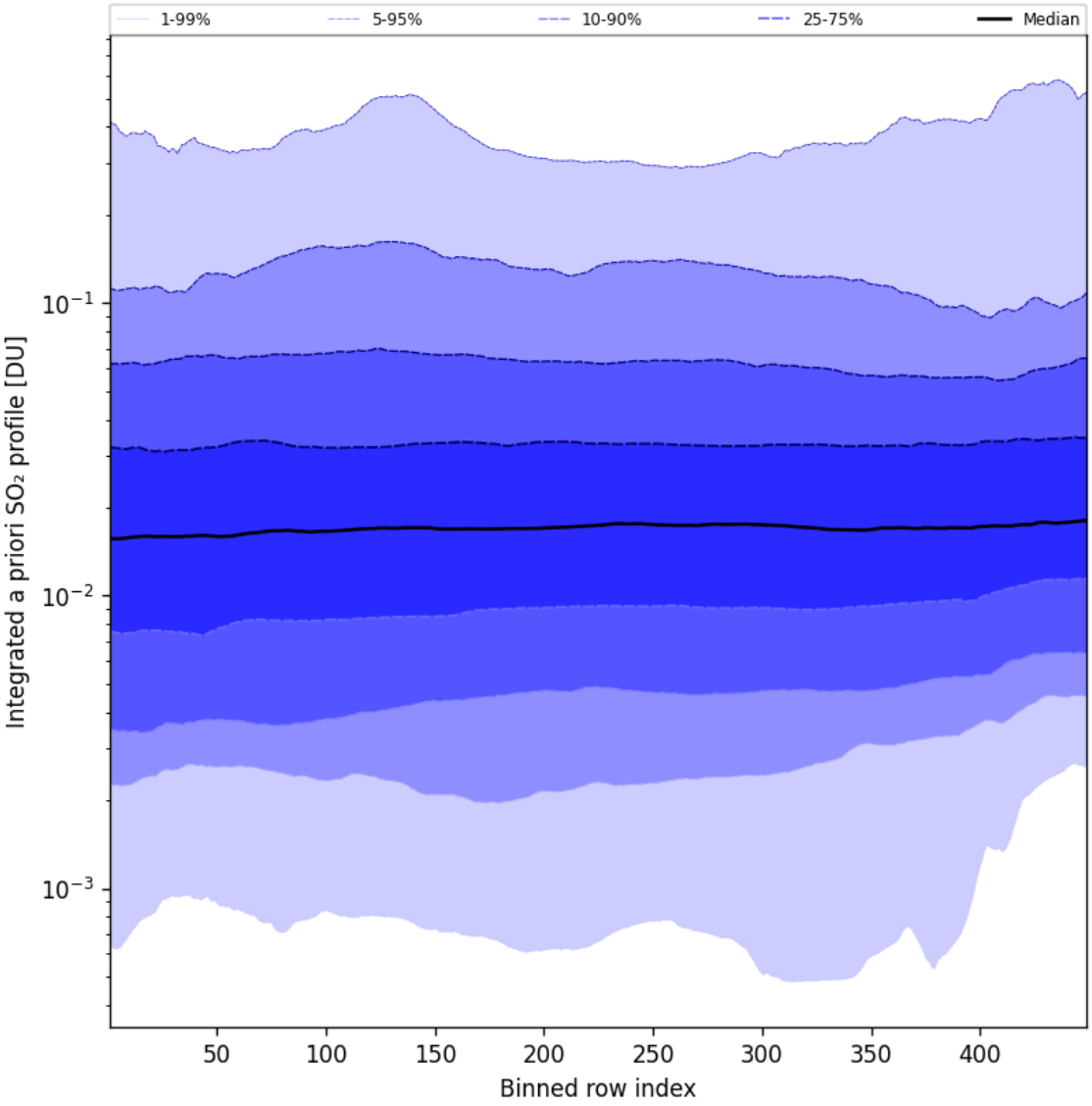
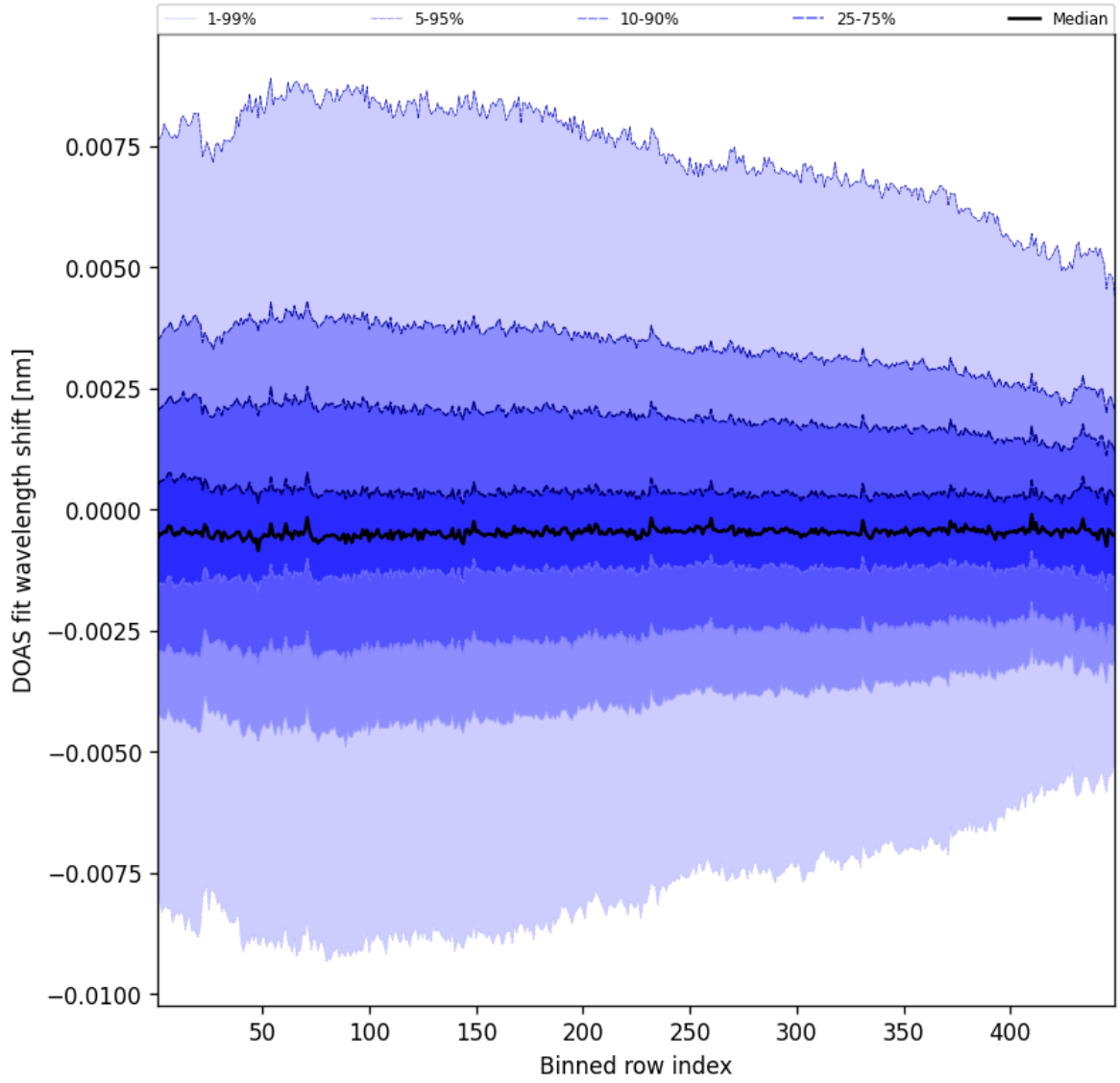


Figure 103: Along track statistics of “Integrated a priori SO_2 profile” for 2024-12-04 to 2024-12-04



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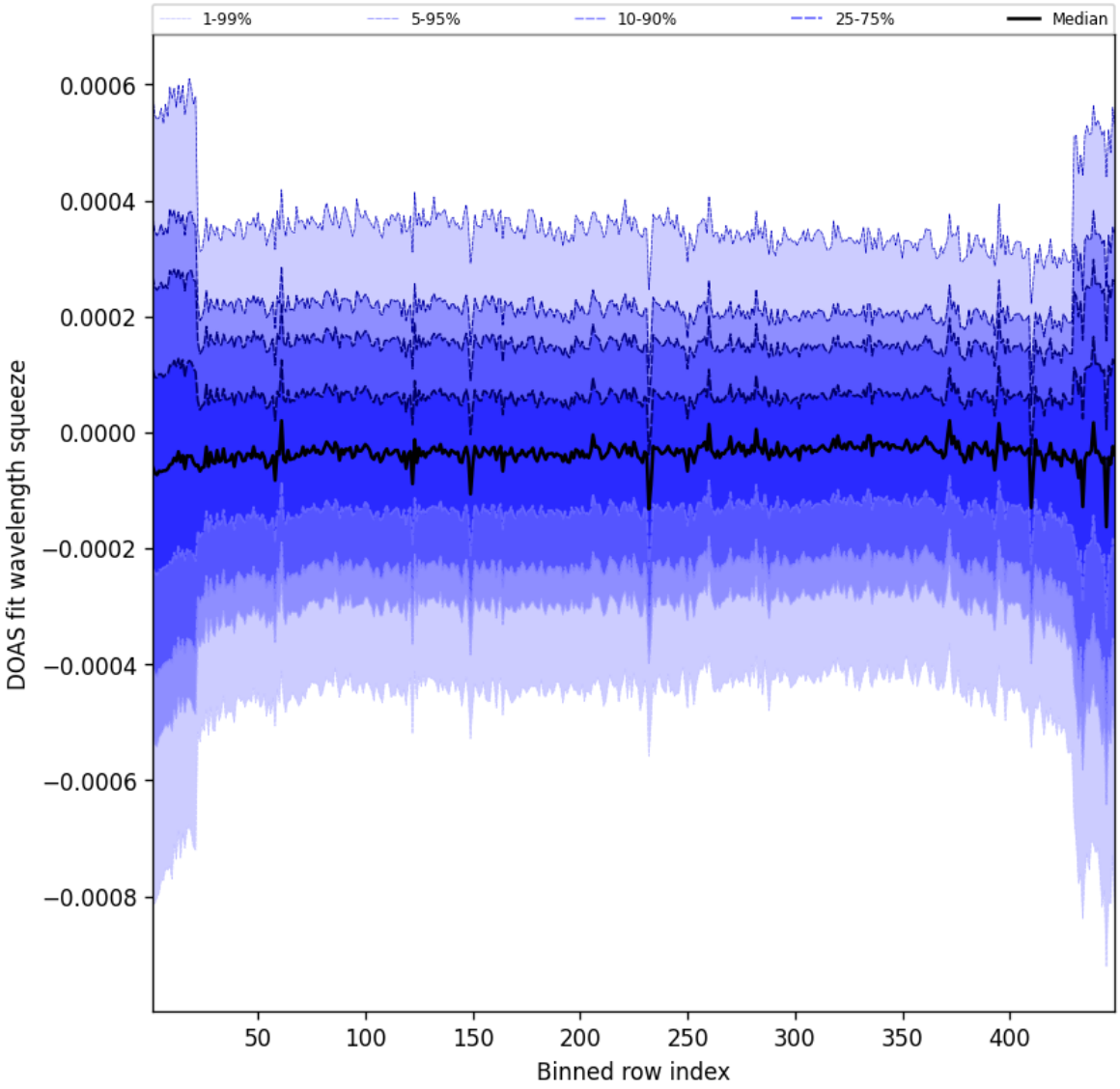

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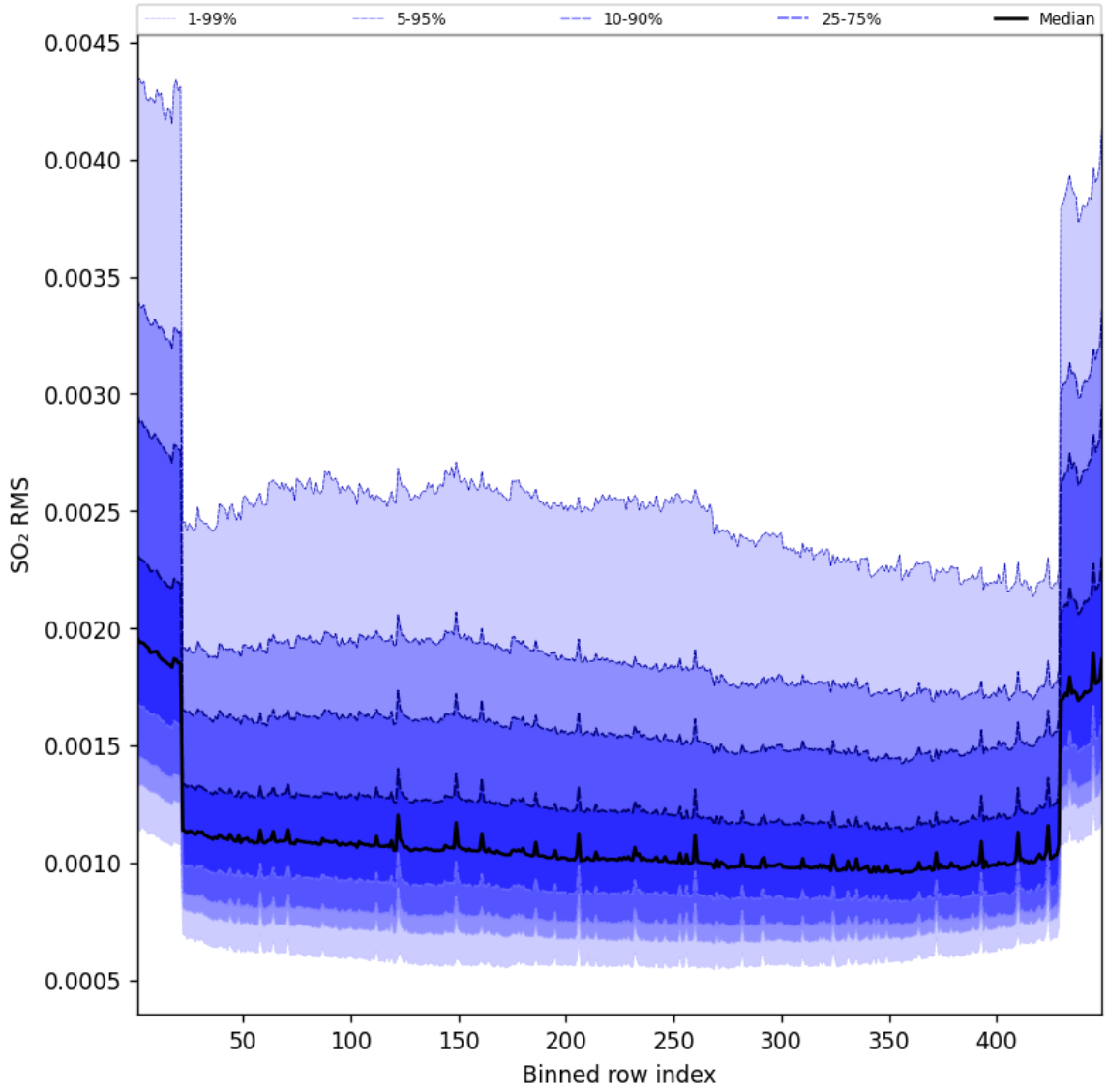

Figure 106: Along track statistics of "SO_2 RMS" for 2024-12-04 to 2024-12-04

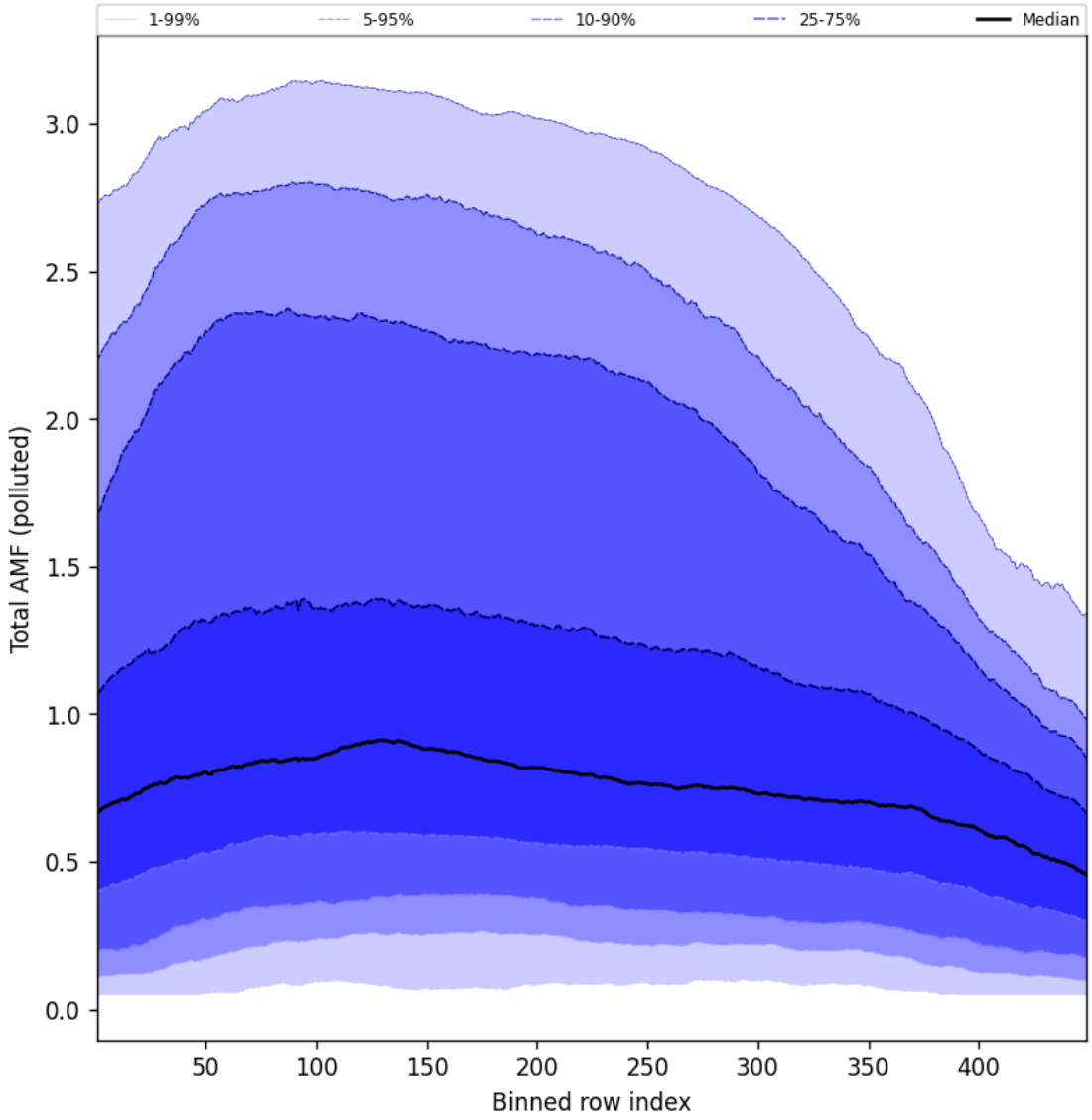

Figure 107: Along track statistics of “Total AMF (polluted)” for 2024-12-04 to 2024-12-04

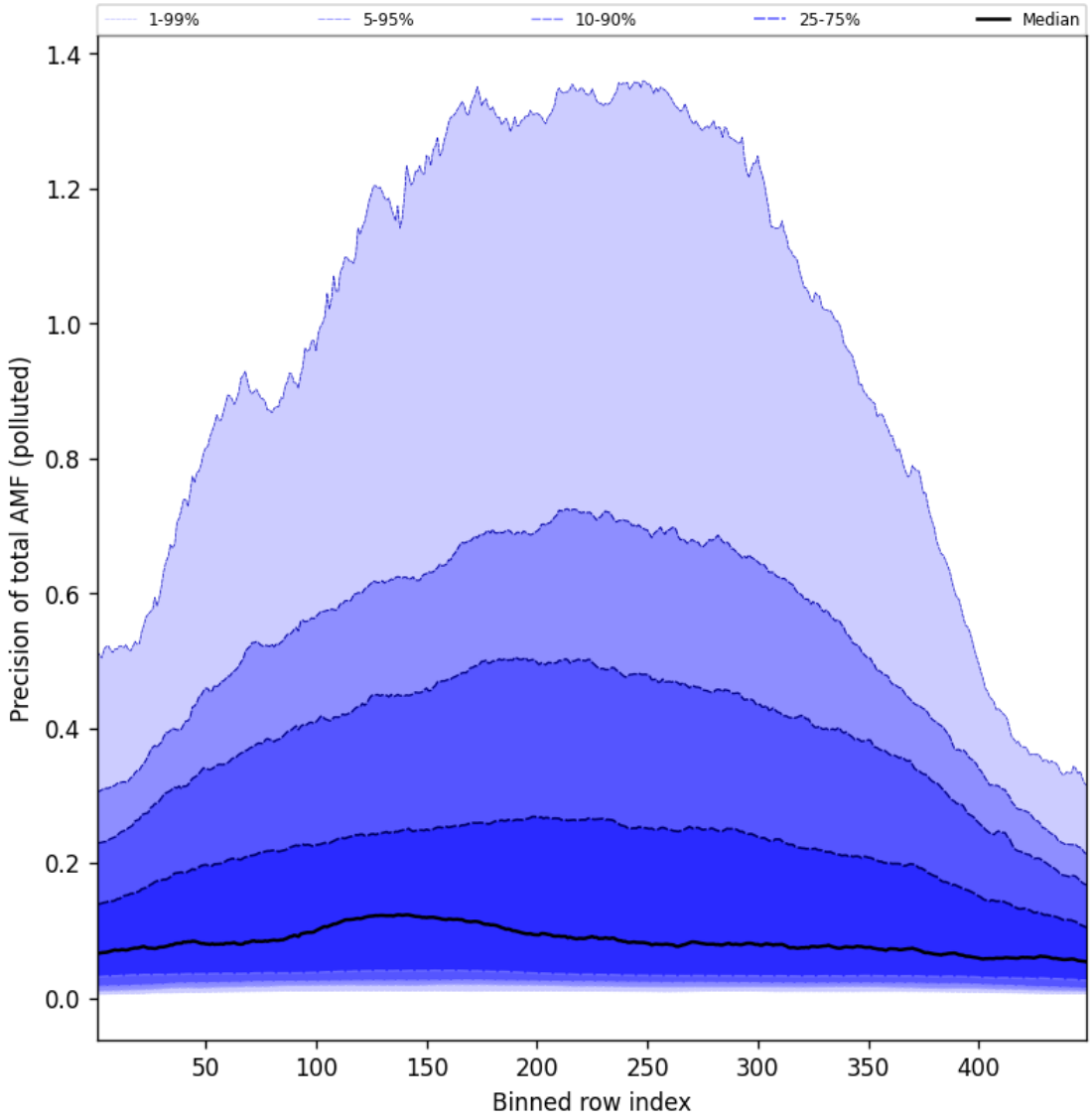

Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2024-12-04 to 2024-12-04

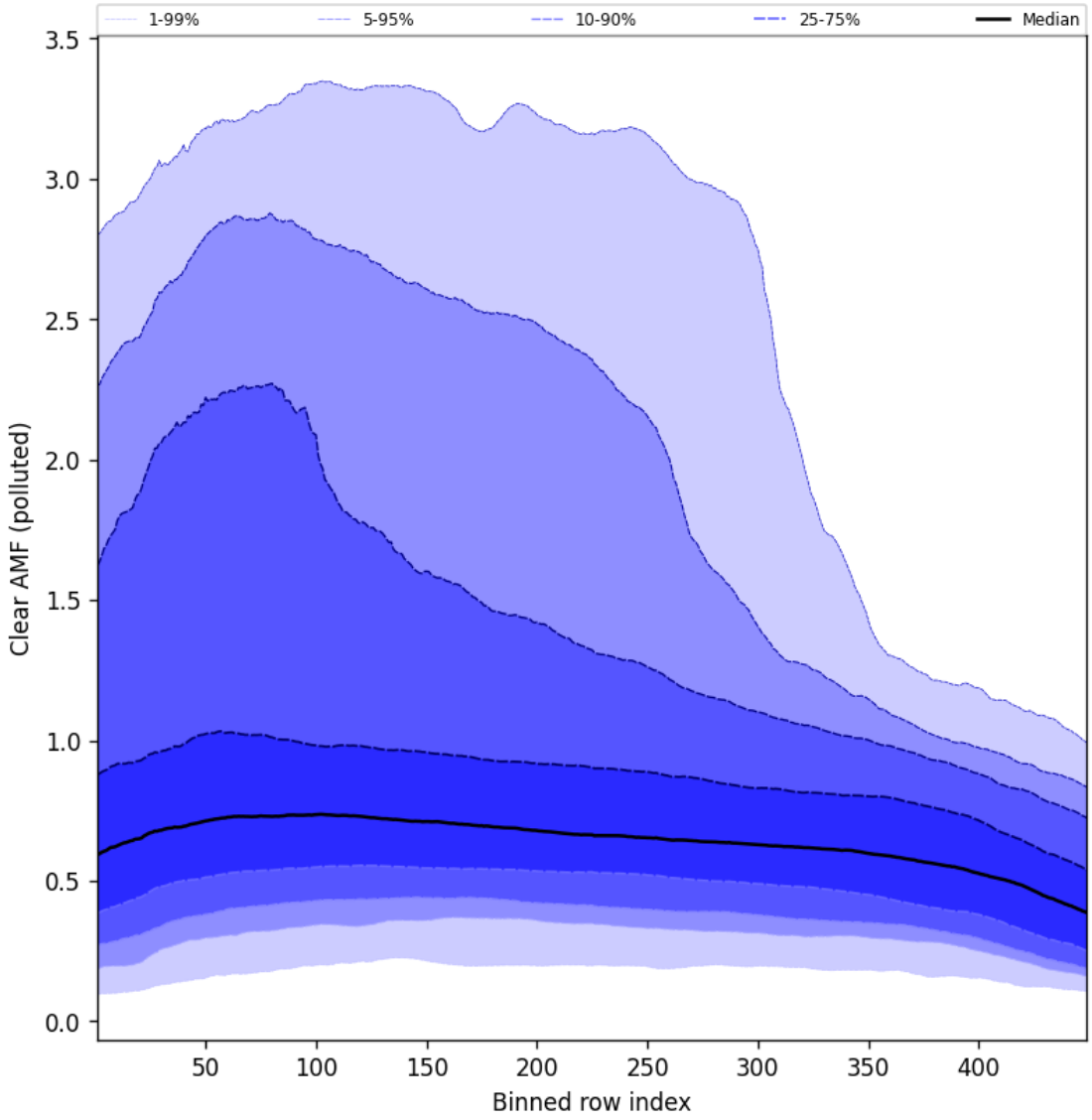

Figure 109: Along track statistics of “Clear AMF (polluted)” for 2024-12-04 to 2024-12-04

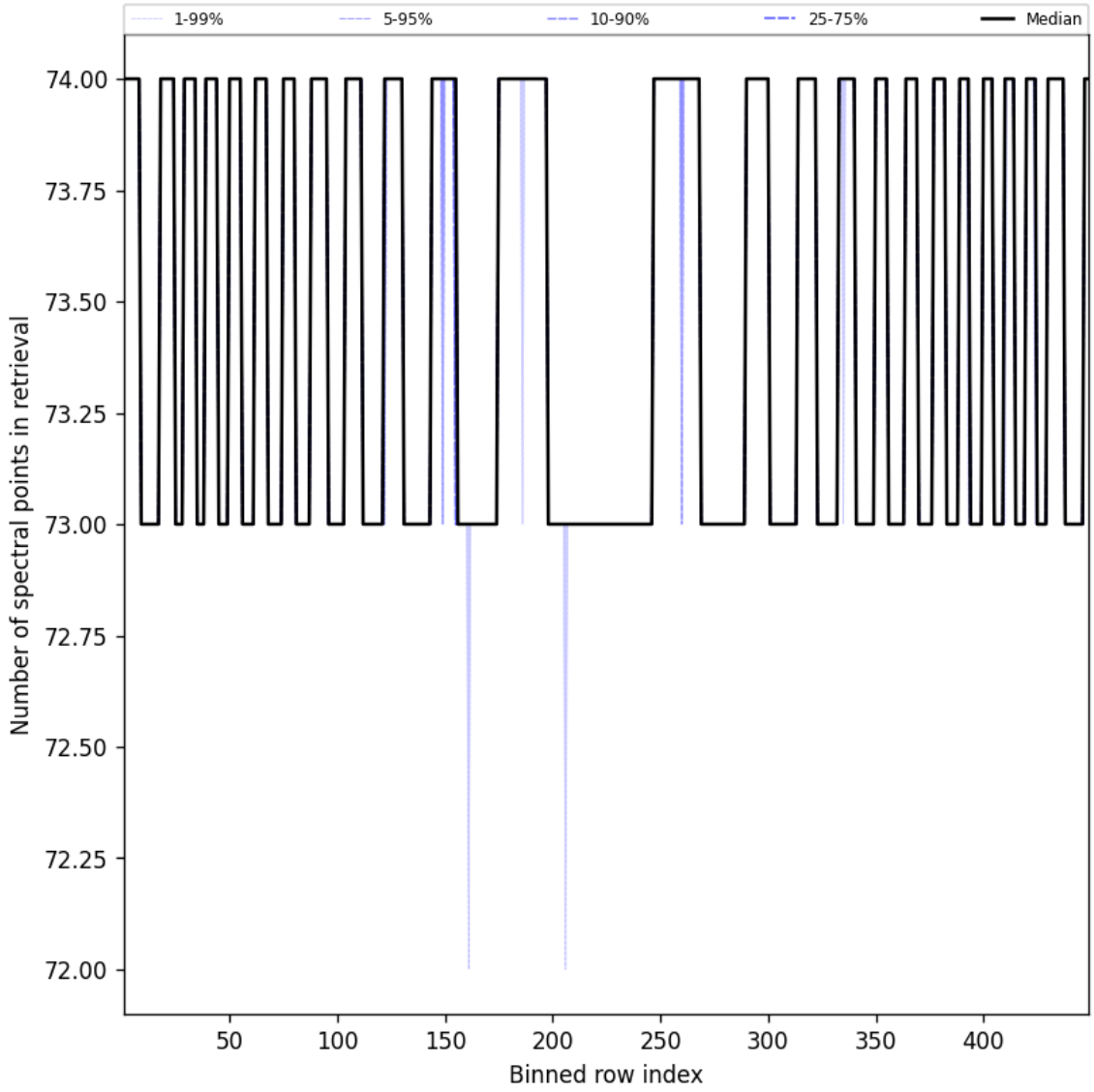

Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2024-12-04 to 2024-12-04

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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