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]	0.607 ± 0.417	16686868	0.995	0.820	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(3.652 \pm 125.147) \times 10^{-2}$	16686868	0.223	0.399	8.435×10^{-3}	-110	576
sulfurdioxide total vertical column precision [DU]	0.540 ± 0.901	16686868	0.122	0.339	0.299	4.005×10^{-2}	43.7
sulfurdioxide slant column density corrected [DU]	$(1.592 \pm 36.779) \times 10^{-2}$	16686868	0.235	0.340	8.062×10^{-3}	-7.27	439
sulfurdioxide slant column density cobra [DU]	$(1.582 \pm 33.468) \times 10^{-2}$	16686868	0.235	0.340	8.062×10^{-3}	-7.27	67.8
sulfurdioxide slant column density cobra precision [DU]	0.272 ± 0.121	16686868	0.213	0.108	0.233	8.076×10^{-2}	19.1
sulfurdioxide slant column density window1 [DU]	$(9.319 \pm 64.343) \times 10^{-2}$	16686868	0.125	0.714	0.101	-60.7	111
sulfurdioxide slant column density window1 precision [DU]	0.272 ± 0.121	16686868	0.213	0.108	0.233	8.076×10^{-2}	19.1
sulfurdioxide slant column density corrected win1 [DU]	$(-4.777 \pm 6211.995) \times 10^{-4}$	16686868	-2.500×10^{-2}	0.678	-1.637×10^{-2}	-60.7	111
background so2 slant column offset window1 [DU]	$(-9.367 \pm 18.891) \times 10^{-2}$	16686868	-0.220	0.234	-0.158	-1.49	3.48
sulfurdioxide slant column density window2 [DU]	0.108 ± 8.557	16686868	-0.250	10.7	1.754×10^{-3}	-1.235×10^{3}	692
sulfurdioxide slant column density window2 precision [DU]	7.76 ± 2.19	16686868	6.97	2.51	7.39	2.29	469
sulfurdioxide slant column density corrected win2 [DU]	-2.19 ± 8.36	16686868	-2.25	10.5	-2.18	-1.236×10^{3}	691
background so2 slant column offset window2 [DU]	-2.30 ± 2.18	16686868	-0.750	2.38	-1.70	-16.5	7.43
sulfurdioxide slant column density window3 [DU]	0.406 ± 23.213	16686868	-0.560	28.7	0.116	-256	494
sulfurdioxide slant column density window3 precision [DU]	26.8 ± 12.6	16686868	21.5	9.85	23.5	9.74	356
sulfurdioxide slant column density corrected win3 [DU]	13.7 ± 22.4	16686868	12.9	27.6	13.7	-251	501
background so2 slant column offset window3 [DU]	13.3 ± 6.1	16686868	11.8	8.73	13.2	-20.3	38.8
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.21	16686868	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(3.974 \pm 10.558) \times 10^{-2}$	16686868	1.800×10^{-2}	2.386×10^{-2}	1.861×10^{-2}	6.877×10^{-4}	2.87
fitted radiance shift [nm]	$(-2.623 \pm 24.562) \times 10^{-4}$	16686868	-5.000×10^{-4}	1.668×10^{-3}	-3.156×10^{-4}	-4.703×10^{-2}	8.156×10^{-2}
fitted radiance squeeze [1]	$(-6.241 \pm 18.812) \times 10^{-5}$	16686868	-3.000×10^{-5}	2.214×10^{-4}	-5.091×10^{-5}	-1.543×10^{-2}	1.477×10^{-2}
fitted root mean square [1]	$(1.207 \pm 0.496) \times 10^{-3}$	16686868	9.250×10^{-4}	4.639×10^{-4}	1.065×10^{-3}	3.357×10^{-4}	5.651×10^{-2}
sulfurdioxide total air mass factor polluted [1]	0.949 ± 0.615	16686868	0.700	0.719	0.782	5.000×10^{-2}	3.12
sulfurdioxide total air mass factor polluted precision [1]	0.155 ± 0.169	16686868	2.500×10^{-2}	0.181	8.774×10^{-2}	2.500×10^{-3}	1.63
sulfurdioxide clear air mass factor polluted [1]	0.804 ± 0.539	16686868	0.500	0.422	0.661	3.419×10^{-2}	3.32
number of spectral points in retrieval [1]	73.4 ± 0.5	16686868	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}	8.000×10^{-2}	0.180	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	−2.74	−0.881	−0.510	−0.331	−0.188	0.211	0.366	0.564	0.991	3.26
sulfurdioxide total vertical column precision [DU]	8.076×10^{-2}	0.103	0.123	0.145	0.183	0.522	0.737	1.06	1.74	4.40
sulfurdioxide slant column density corrected [DU]	−0.791	−0.454	−0.330	−0.248	−0.161	0.179	0.271	0.360	0.499	0.930
sulfurdioxide slant column density cobra [DU]	−0.791	−0.454	−0.330	−0.248	−0.161	0.179	0.271	0.360	0.499	0.930
sulfurdioxide slant column density cobra precision [DU]	0.139	0.163	0.175	0.185	0.198	0.306	0.365	0.422	0.503	0.728
sulfurdioxide slant column density window1 [DU]	−1.61	−0.908	−0.638	−0.455	−0.262	0.452	0.633	0.804	1.06	1.79
sulfurdioxide slant column density window1 precision [DU]	0.139	0.163	0.175	0.185	0.198	0.306	0.365	0.422	0.503	0.728
sulfurdioxide slant column density corrected win1 [DU]	−1.54	−0.918	−0.683	−0.523	−0.351	0.327	0.510	0.689	0.964	1.76
background so2 slant column offset window1 [DU]	−0.381	−0.297	−0.268	−0.244	−0.222	1.230×10^{-2}	0.128	0.201	0.269	0.421
sulfurdioxide slant column density window2 [DU]	−20.1	−13.5	−10.4	−7.99	−5.33	5.40	8.13	10.6	14.1	21.8
sulfurdioxide slant column density window2 precision [DU]	4.25	4.99	5.44	5.82	6.29	8.81	9.69	10.6	11.8	14.5
sulfurdioxide slant column density corrected win2 [DU]	−22.6	−15.7	−12.5	−10.1	−7.44	3.07	5.70	8.07	11.3	18.3
background so2 slant column offset window2 [DU]	−9.28	−6.78	−5.33	−4.30	−3.24	−0.867	−0.597	−0.370	1.649×10^{-2}	1.62
sulfurdioxide slant column density window3 [DU]	−58.2	−36.9	−27.6	−21.1	−13.9	14.7	22.4	29.4	38.9	57.6
sulfurdioxide slant column density window3 precision [DU]	14.1	15.8	17.0	18.1	19.6	29.5	34.0	39.1	49.9	80.6
sulfurdioxide slant column density corrected win3 [DU]	−43.5	−22.9	−13.6	−7.03	1.547×10^{-2}	27.6	34.7	41.3	50.3	68.6
background so2 slant column offset window3 [DU]	0.450	3.46	5.18	6.81	9.13	17.9	20.0	21.5	22.9	25.3
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]	1.606×10^{-3}	3.839×10^{-3}	5.939×10^{-3}	8.087×10^{-3}	1.075×10^{-2}	3.461×10^{-2}	4.848×10^{-2}	6.563×10^{-2}	0.118	0.414
fitted radiance shift [nm]	-7.658×10^{-3}	-3.759×10^{-3}	-2.420×10^{-3}	-1.711×10^{-3}	-1.145×10^{-3}	5.222×10^{-4}	1.185×10^{-3}	2.031×10^{-3}	3.506×10^{-3}	7.598×10^{-3}
fitted radiance squeeze [1]	-5.841×10^{-4}	-3.809×10^{-4}	-2.930×10^{-4}	-2.319×10^{-4}	-1.675×10^{-4}	5.389×10^{-5}	1.049×10^{-4}	1.513×10^{-4}	2.167×10^{-4}	3.733×10^{-4}
fitted root mean square [1]	5.884×10^{-4}	7.085×10^{-4}	7.786×10^{-4}	8.330×10^{-4}	8.984×10^{-4}	1.362×10^{-3}	1.599×10^{-3}	1.831×10^{-3}	2.167×10^{-3}	3.055×10^{-3}
sulfurdioxide total air mass factor polluted [1]	7.702×10^{-2}	0.207	0.315	0.405	0.510	1.23	1.58	1.95	2.31	2.63
sulfurdioxide total air mass factor polluted precision [1]	9.802×10^{-3}	1.720×10^{-2}	2.287×10^{-2}	2.779×10^{-2}	3.580×10^{-2}	0.217	0.303	0.387	0.504	0.763
sulfurdioxide clear air mass factor polluted [1]	0.170	0.286	0.359	0.414	0.479	0.901	1.06	1.51	2.21	2.69
number of spectral points in retrieval [1]	73.0	73.0	73.0	73.0	73.0	74.0	74.0	74.0	74.0	74.0

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

Variable	mean $\pm\sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.717 ± 0.387	5510807	0.650	1.000	0.0	1.000	0.350	1.000
sulfurdioxide total vertical column [DU]	$(7.618 \pm 190.726) \times 10^{-2}$	5510807	0.627	1.480×10^{-2}	-110	576	-0.291	0.336
sulfurdioxide total vertical column precision [DU]	0.861 ± 1.288	5510807	0.618	0.450	4.909×10^{-2}	43.7	0.280	0.898
sulfurdioxide slant column density corrected [DU]	$(2.359 \pm 40.882) \times 10^{-2}$	5510807	0.400	1.076×10^{-2}	-6.72	42.4	-0.187	0.213
sulfurdioxide slant column density cobra [DU]	$(2.354 \pm 40.635) \times 10^{-2}$	5510807	0.400	1.076×10^{-2}	-6.72	42.4	-0.187	0.213
sulfurdioxide slant column density cobra precision [DU]	0.324 ± 0.149	5510807	0.165	0.278	9.454×10^{-2}	9.66	0.224	0.389
sulfurdioxide slant column density window1 [DU]	0.175 ± 0.743	5510807	0.798	0.177	-10.8	16.2	-0.223	0.574
sulfurdioxide slant column density window1 precision [DU]	0.324 ± 0.149	5510807	0.165	0.278	9.454×10^{-2}	9.66	0.224	0.389
sulfurdioxide slant column density corrected win1 [DU]	$(2.722 \pm 74.321) \times 10^{-2}$	5510807	0.793	1.094×10^{-3}	-10.7	16.1	-0.387	0.405
background so2 slant column offset window1 [DU]	-0.148 ± 0.143	5510807	0.129	-0.168	-1.02	2.02	-0.230	-0.101
sulfurdioxide slant column density window2 [DU]	0.644 ± 9.798	5510807	12.4	0.341	-366	94.0	-5.74	6.68
sulfurdioxide slant column density window2 precision [DU]	8.82 ± 2.30	5510807	2.89	8.50	2.36	114	7.21	10.1
sulfurdioxide slant column density corrected win2 [DU]	-2.26 ± 9.50	5510807	12.1	-2.26	-364	87.2	-8.31	3.78
background so2 slant column offset window2 [DU]	-2.90 ± 2.74	5510807	3.38	-1.85	-16.5	7.43	-4.39	-1.02
sulfurdioxide slant column density window3 [DU]	-2.58 ± 26.15	5510807	33.0	-1.91	-207	161	-18.7	14.3
sulfurdioxide slant column density window3 precision [DU]	30.3 ± 12.4	5510807	10.1	27.3	10.3	238	23.3	33.4
sulfurdioxide slant column density corrected win3 [DU]	12.8 ± 25.7	5510807	32.4	13.2	-186	178	-3.21	29.2
background so2 slant column offset window3 [DU]	15.3 ± 5.2	5510807	8.11	14.3	-14.6	38.8	11.3	19.5
sulfurdioxide slant column cobra flag [1]	1.96 ± 0.27	5510807	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(7.614 \pm 17.252) \times 10^{-2}$	5510807	4.987×10^{-2}	2.865×10^{-2}	1.006×10^{-3}	2.87	1.614×10^{-2}	6.601×10^{-2}
fitted radiance shift [nm]	$(-6.097 \pm 251.381) \times 10^{-5}$	5510807	1.659×10^{-3}	-8.232×10^{-5}	-3.592×10^{-2}	3.877×10^{-2}	-9.109×10^{-4}	7.487×10^{-4}
fitted radiance squeeze [1]	$(-4.596 \pm 189.184) \times 10^{-6}$	5510807	2.163×10^{-4}	-2.722×10^{-6}	-1.198×10^{-2}	1.993×10^{-3}	-1.113×10^{-4}	1.050×10^{-4}
fitted root mean square [1]	$(1.404 \pm 0.604) \times 10^{-3}$	5510807	6.586×10^{-4}	1.220×10^{-3}	3.667×10^{-4}	2.430×10^{-2}	1.000×10^{-3}	1.659×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.674 ± 0.379	5510807	0.475	0.623	5.000×10^{-2}	2.98	0.398	0.873
sulfurdioxide total air mass factor polluted precision [1]	$(8.840 \pm 12.097) \times 10^{-2}$	5510807	7.699×10^{-2}	4.405×10^{-2}	2.500×10^{-3}	1.63	2.692×10^{-2}	0.104
sulfurdioxide clear air mass factor polluted [1]	0.615 ± 0.265	5510807	0.395	0.603	3.419×10^{-2}	2.13	0.408	0.803
number of spectral points in retrieval [1]	73.5 ± 0.5	5510807	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]	0.553 ± 0.420	11176061	0.870	0.470	0.0	1.000	0.130	1.000
sulfurdioxide total vertical column [DU]	$(1.696 \pm 73.730) \times 10^{-2}$	11176061	0.329	6.678×10^{-3}	-44.1	378	-0.156	0.173
sulfurdioxide total vertical column precision [DU]	0.382 ± 0.565	11176061	0.255	0.247	4.005×10^{-2}	31.0	0.155	0.410
sulfurdioxide slant column density corrected [DU]	$(1.214 \pm 34.572) \times 10^{-2}$	11176061	0.316	6.988×10^{-3}	-7.27	439	-0.150	0.166
sulfurdioxide slant column density cobra [DU]	$(1.202 \pm 29.289) \times 10^{-2}$	11176061	0.316	6.988×10^{-3}	-7.27	67.8	-0.150	0.166
sulfurdioxide slant column density cobra precision [DU]	0.246 ± 0.095	11176061	7.939×10^{-2}	0.219	8.076×10^{-2}	19.1	0.191	0.270
sulfurdioxide slant column density window1 [DU]	$(5.292 \pm 58.376) \times 10^{-2}$	11176061	0.676	6.958×10^{-2}	-60.7	111	-0.278	0.398
sulfurdioxide slant column density window1 precision [DU]	0.246 ± 0.095	11176061	7.939×10^{-2}	0.219	8.076×10^{-2}	19.1	0.191	0.270
sulfurdioxide slant column density corrected win1 [DU]	$(-1.414 \pm 55.067) \times 10^{-2}$	11176061	0.631	-2.323×10^{-2}	-60.7	111	-0.336	0.294
background so2 slant column offset window1 [DU]	$(-6.706 \pm 20.246) \times 10^{-2}$	11176061	0.311	-0.145	-1.49	3.48	-0.220	9.095×10^{-2}
sulfurdioxide slant column density window2 [DU]	-0.156 ± 7.860	11176061	10.0	-0.134	-1.235×10^{3}	692	-5.16	4.87
sulfurdioxide slant column density window2 precision [DU]	7.24 ± 1.94	11176061	2.08	6.97	2.29	469	6.02	8.10
sulfurdioxide slant column density corrected win2 [DU]	-2.15 ± 7.75	11176061	9.85	-2.15	-1.236×10^{3}	691	-7.08	2.77
background so2 slant column offset window2 [DU]	-2.00 ± 1.77	11176061	2.18	-1.63	-11.4	7.19	-2.97	-0.791
sulfurdioxide slant column density window3 [DU]	1.88 ± 21.47	11176061	26.9	0.934	-256	494	-12.0	14.9
sulfurdioxide slant column density window3 precision [DU]	25.2 ± 12.3	11176061	7.82	21.8	9.74	356	18.6	26.5
sulfurdioxide slant column density corrected win3 [DU]	14.2 ± 20.5	11176061	25.6	14.0	-251	501	1.32	26.9
background so2 slant column offset window3 [DU]	12.3 ± 6.2	11176061	9.83	12.5	-20.3	29.1	7.25	17.1
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.18	11176061	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.179 \pm 3.150) \times 10^{-2}$	11176061	1.789×10^{-2}	1.546×10^{-2}	6.877×10^{-4}	1.62	8.967×10^{-3}	2.686×10^{-2}
fitted radiance shift [nm]	$(-3.615 \pm 24.212) \times 10^{-4}$	11176061	1.617×10^{-3}	-4.310×10^{-4}	-4.703×10^{-2}	8.156×10^{-2}	-1.228×10^{-3}	3.884×10^{-4}
fitted radiance squeeze [1]	$(-9.092 \pm 18.092) \times 10^{-5}$	11176061	2.203×10^{-4}	-7.442×10^{-5}	-1.543×10^{-2}	1.477×10^{-2}	-1.927×10^{-4}	2.760×10^{-5}
fitted root mean square [1]	$(1.110 \pm 0.398) \times 10^{-3}$	11176061	3.685×10^{-4}	1.009×10^{-3}	3.357×10^{-4}	5.651×10^{-2}	8.665×10^{-4}	1.235×10^{-3}
sulfurdioxide total air mass factor polluted [1]	1.08 ± 0.66	11176061	0.903	0.900	5.000×10^{-2}	3.12	0.581	1.48
sulfurdioxide total air mass factor polluted precision [1]	0.187 ± 0.179	11176061	0.228	0.129	4.330×10^{-3}	1.50	4.531×10^{-2}	0.273
sulfurdioxide clear air mass factor polluted [1]	0.898 ± 0.610	11176061	0.474	0.685	0.101	3.32	0.504	0.979
number of spectral points in retrieval [1]	73.4 ± 0.5	11176061	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]	0.651 ± 0.408	11553816	0.780	1.000	0.0	1.000	0.220	1.000
sulfurdioxide total vertical column [DU]	$(2.711 \pm 103.045) \times 10^{-2}$	11553816	0.416	7.965×10^{-3}	-87.5	126	-0.198	0.218
sulfurdioxide total vertical column precision [DU]	0.513 ± 0.763	11553816	0.305	0.303	4.668×10^{-2}	31.0	0.203	0.508
sulfurdioxide slant column density corrected [DU]	$(1.196 \pm 29.916) \times 10^{-2}$	11553816	0.321	6.747×10^{-3}	-6.72	42.4	-0.153	0.168
sulfurdioxide slant column density cobra [DU]	$(1.195 \pm 29.868) \times 10^{-2}$	11553816	0.321	6.747×10^{-3}	-6.72	42.4	-0.153	0.168
sulfurdioxide slant column density cobra precision [DU]	0.255 ± 0.109	11553816	8.235×10^{-2}	0.221	8.076×10^{-2}	19.1	0.192	0.275
sulfurdioxide slant column density window1 [DU]	0.125 ± 0.586	11553816	0.663	0.127	-60.7	111	-0.207	0.456
sulfurdioxide slant column density window1 precision [DU]	0.255 ± 0.109	11553816	8.235×10^{-2}	0.221	8.076×10^{-2}	19.1	0.192	0.275
sulfurdioxide slant column density corrected win1 [DU]	$(-3.829 \pm 573.359) \times 10^{-3}$	11553816	0.642	-1.572×10^{-2}	-60.7	111	-0.334	0.309
background so2 slant column offset window1 [DU]	-0.129 ± 0.153	11553816	0.171	-0.170	-1.43	1.89	-0.226	-5.420×10^{-2}
sulfurdioxide slant column density window2 [DU]	-0.283 ± 8.270	11553816	10.4	-0.370	-1.235×10^{3}	692	-5.57	4.87
sulfurdioxide slant column density window2 precision [DU]	7.56 ± 2.03	11553816	2.32	7.24	2.29	401	6.21	8.52
sulfurdioxide slant column density corrected win2 [DU]	-2.21 ± 8.14	11553816	10.3	-2.20	-1.236×10^{3}	691	-7.37	2.96
background so2 slant column offset window2 [DU]	-1.92 ± 1.92	11553816	1.81	-1.48	-16.5	7.43	-2.60	-0.798
sulfurdioxide slant column density window3 [DU]	3.51 ± 22.69	11553816	28.5	3.00	-227	249	-10.9	17.6
sulfurdioxide slant column density window3 precision [DU]	26.4 ± 11.8	11553816	8.92	23.3	9.74	238	19.8	28.7
sulfurdioxide slant column density corrected win3 [DU]	15.7 ± 21.8	11553816	27.4	15.4	-222	252	1.91	29.3
background so2 slant column offset window3 [DU]	12.2 ± 5.5	11553816	7.42	12.3	-20.3	38.8	8.57	16.0
sulfurdioxide slant column cobra flag [1]	1.99 ± 0.15	11553816	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.901 \pm 5.721) \times 10^{-2}$	11553816	1.940×10^{-2}	1.878×10^{-2}	2.285×10^{-3}	2.79	1.199×10^{-2}	3.139×10^{-2}
fitted radiance shift [nm]	$(-2.040 \pm 23.732) \times 10^{-4}$	11553816	1.748×10^{-3}	-2.235×10^{-4}	-4.703×10^{-2}	4.025×10^{-2}	-1.106×10^{-3}	6.423×10^{-4}
fitted radiance squeeze [1]	$(-4.388 \pm 16.772) \times 10^{-5}$	11553816	1.975×10^{-4}	-3.730×10^{-5}	-1.198×10^{-2}	1.477×10^{-2}	-1.389×10^{-4}	5.862×10^{-5}
fitted root mean square [1]	$(1.129 \pm 0.448) \times 10^{-3}$	11553816	3.585×10^{-4}	1.009×10^{-3}	3.357×10^{-4}	4.644×10^{-2}	8.687×10^{-4}	1.227×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.825 ± 0.443	11553816	0.551	0.753	5.000×10^{-2}	2.60	0.507	1.06
sulfurdioxide total air mass factor polluted precision [1]	0.139 ± 0.149	11553816	0.157	7.488×10^{-2}	3.119×10^{-3}	1.43	3.656×10^{-2}	0.193
sulfurdioxide clear air mass factor polluted [1]	0.654 ± 0.234	11553816	0.333	0.631	6.824×10^{-2}	2.65	0.475	0.808
number of spectral points in retrieval [1]	73.4 ± 0.5	11553816	1.000	73.0	70.0	74.0	73.0	74.0

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

Variable	mean $\pm\sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.495 ± 0.417	4578500	0.900	0.410	0.0	1.000	0.1000	1.000
sulfurdioxide total vertical column [DU]	$(5.026 \pm 148.057) \times 10^{-2}$	4578500	0.340	8.534×10^{-3}	-110	576	-0.156	0.183
sulfurdioxide total vertical column precision [DU]	0.546 ± 1.037	4578500	0.395	0.261	4.005×10^{-2}	43.7	0.132	0.527
sulfurdioxide slant column density corrected [DU]	$(2.369 \pm 44.764) \times 10^{-2}$	4578500	0.391	1.111×10^{-2}	-7.27	396	-0.182	0.209
sulfurdioxide slant column density cobra [DU]	$(2.350 \pm 40.126) \times 10^{-2}$	4578500	0.391	1.111×10^{-2}	-7.27	67.8	-0.182	0.209
sulfurdioxide slant column density cobra precision [DU]	0.310 ± 0.135	4578500	0.133	0.276	8.386×10^{-2}	15.4	0.223	0.356
sulfurdioxide slant column density window1 [DU]	$(5.406 \pm 750.922) \times 10^{-3}$	4578500	0.853	1.039×10^{-2}	-15.5	33.7	-0.426	0.427
sulfurdioxide slant column density window1 precision [DU]	0.310 ± 0.135	4578500	0.133	0.276	8.386×10^{-2}	15.4	0.223	0.356
sulfurdioxide slant column density corrected win1 [DU]	$(3.424 \pm 713.237) \times 10^{-3}$	4578500	0.774	-2.041×10^{-2}	-15.9	33.7	-0.401	0.373
background so2 slant column offset window1 [DU]	$(-1.983 \pm 236.743) \times 10^{-3}$	4578500	0.416	-8.046×10^{-2}	-1.49	3.48	-0.205	0.210
sulfurdioxide slant column density window2 [DU]	1.03 ± 9.03	4578500	11.3	0.987	-504	603	-4.64	6.62
sulfurdioxide slant column density window2 precision [DU]	8.18 ± 2.43	4578500	2.88	7.77	2.30	469	6.51	9.40
sulfurdioxide slant column density corrected win2 [DU]	-2.14 ± 8.78	4578500	10.9	-2.13	-504	600	-7.59	3.31
background so2 slant column offset window2 [DU]	-3.17 ± 2.44	4578500	3.63	-2.96	-16.0	7.43	-4.79	-1.15
sulfurdioxide slant column density window3 [DU]	-6.78 ± 22.59	4578500	27.0	-6.45	-241	494	-20.0	6.94
sulfurdioxide slant column density window3 precision [DU]	27.4 ± 14.0	4578500	11.5	23.7	10.4	356	19.0	30.4
sulfurdioxide slant column density corrected win3 [DU]	9.18 ± 22.83	4578500	27.3	10.1	-242	501	-4.00	23.3
background so2 slant column offset window3 [DU]	16.0 ± 6.5	4578500	10.3	17.8	-20.3	33.5	11.0	21.3
sulfurdioxide slant column cobra flag [1]	1.95 ± 0.31	4578500	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(5.556 \pm 14.379) \times 10^{-2}$	4578500	4.122×10^{-2}	1.627×10^{-2}	6.877×10^{-4}	2.86	5.657×10^{-3}	4.687×10^{-2}
fitted radiance shift [nm]	$(-4.254 \pm 25.653) \times 10^{-4}$	4578500	1.387×10^{-3}	-5.390×10^{-4}	-4.483×10^{-2}	8.156×10^{-2}	-1.204×10^{-3}	1.830×10^{-4}
fitted radiance squeeze [1]	$(-1.139 \pm 2.231) \times 10^{-4}$	4578500	2.846×10^{-4}	-1.066×10^{-4}	-1.543×10^{-2}	1.393×10^{-2}	-2.530×10^{-4}	3.155×10^{-5}
fitted root mean square [1]	$(1.386 \pm 0.537) \times 10^{-3}$	4578500	5.871×10^{-4}	1.261×10^{-3}	3.409×10^{-4}	5.651×10^{-2}	1.028×10^{-3}	1.615×10^{-3}
sulfurdioxide total air mass factor polluted [1]	1.29 ± 0.83	4578500	1.60	1.07	5.000×10^{-2}	3.12	0.543	2.14
sulfurdioxide total air mass factor polluted precision [1]	0.199 ± 0.206	4578500	0.255	0.133	2.500×10^{-3}	1.63	3.444×10^{-2}	0.289
sulfurdioxide clear air mass factor polluted [1]	1.21 ± 0.82	4578500	1.48	0.884	3.419×10^{-2}	3.32	0.525	2.00
number of spectral points in retrieval [1]	73.4 ± 0.5	4578500	1.000	73.0	52.0	74.0	73.0	74.0

3 Granule outlines

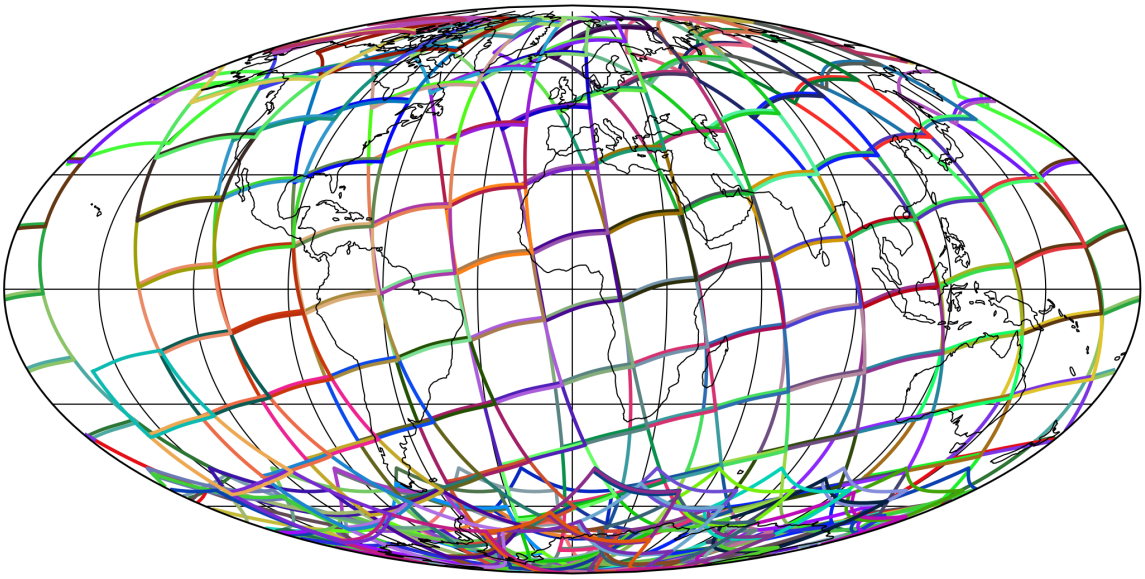

Figure 1: Outline of the granules.

4 Input data monitoring

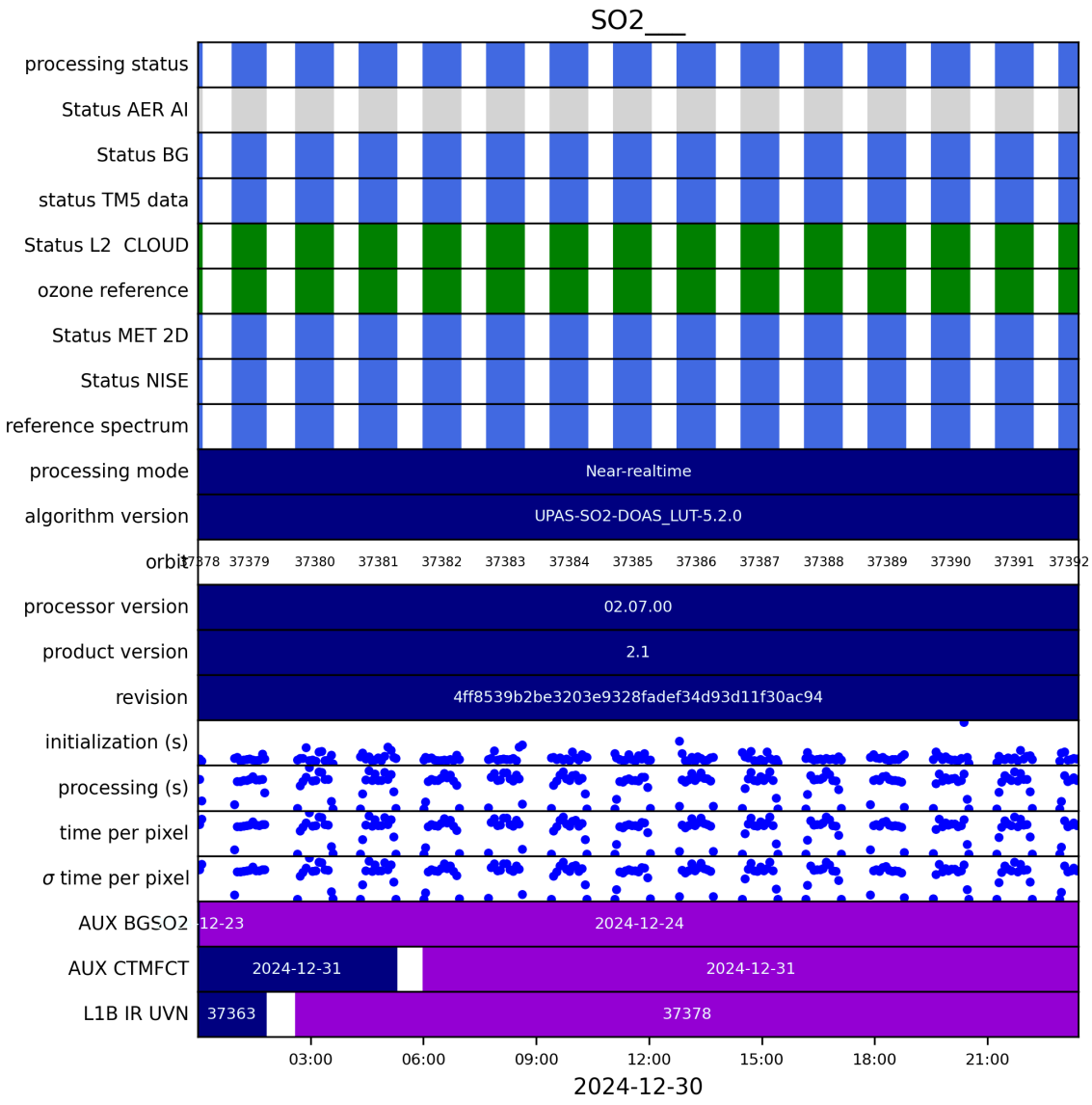

Figure 2: Input data per granule

5 Warnings and errors

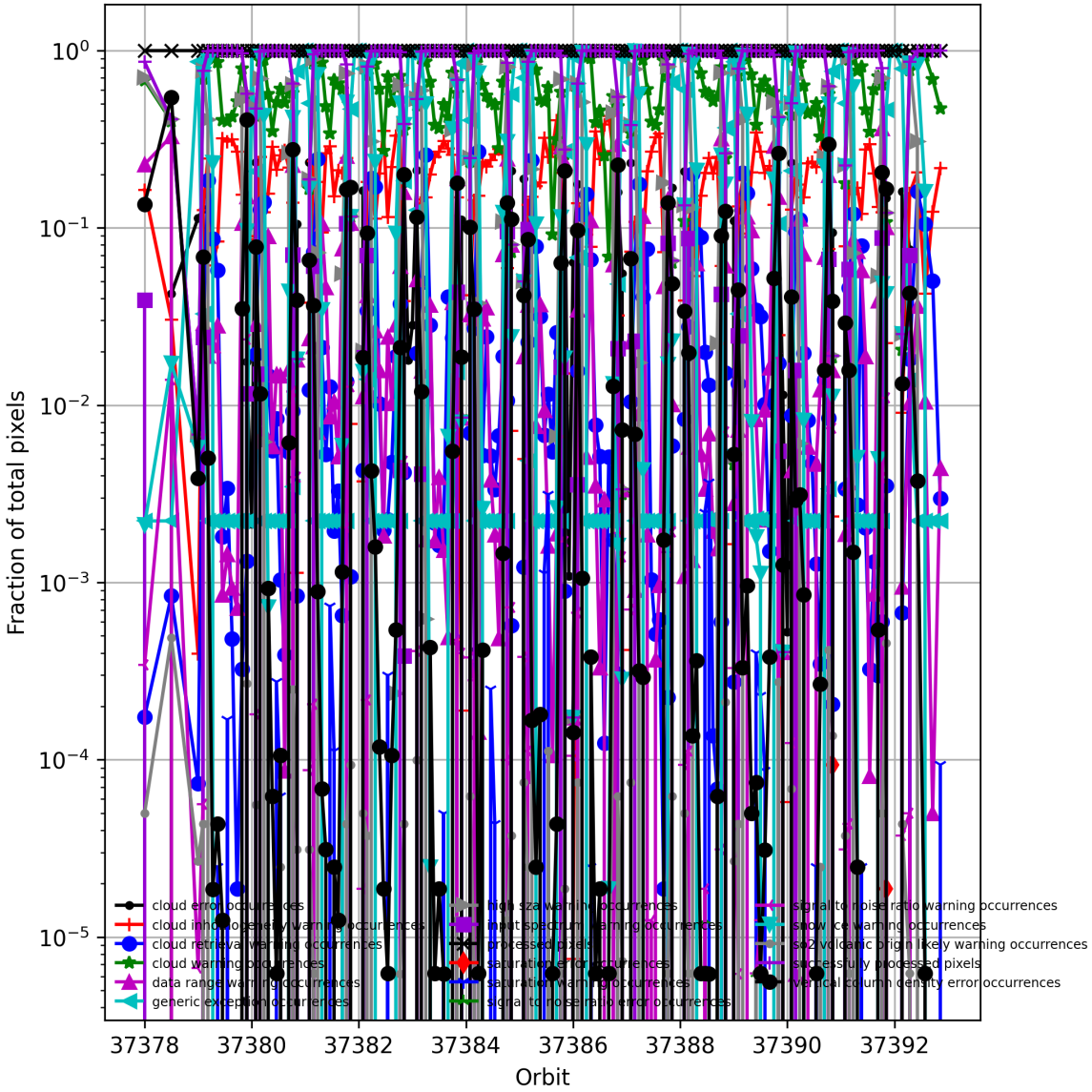

Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

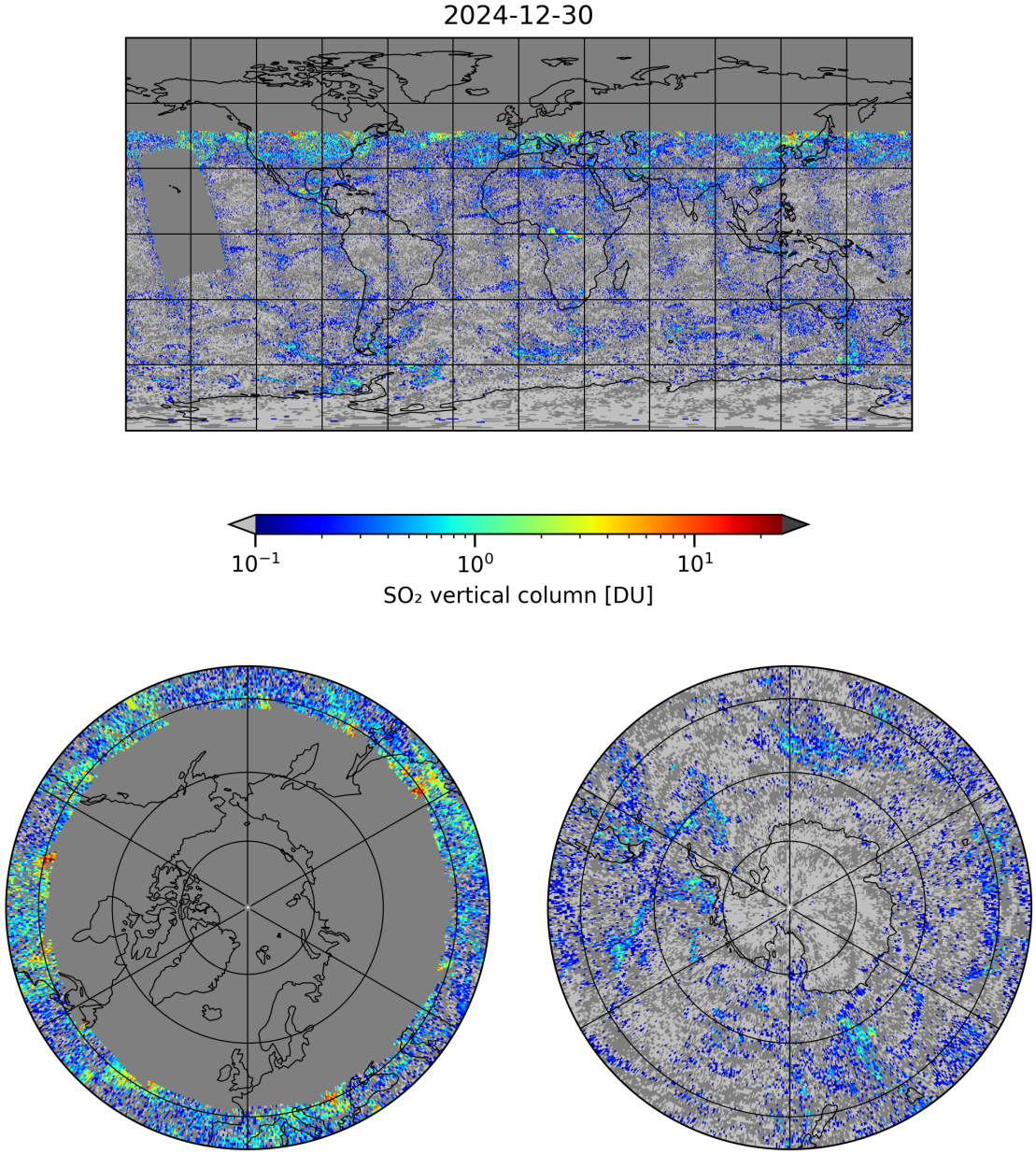

Figure 4: Map of "SO_2 vertical column" for 2024-12-30 to 2024-12-30

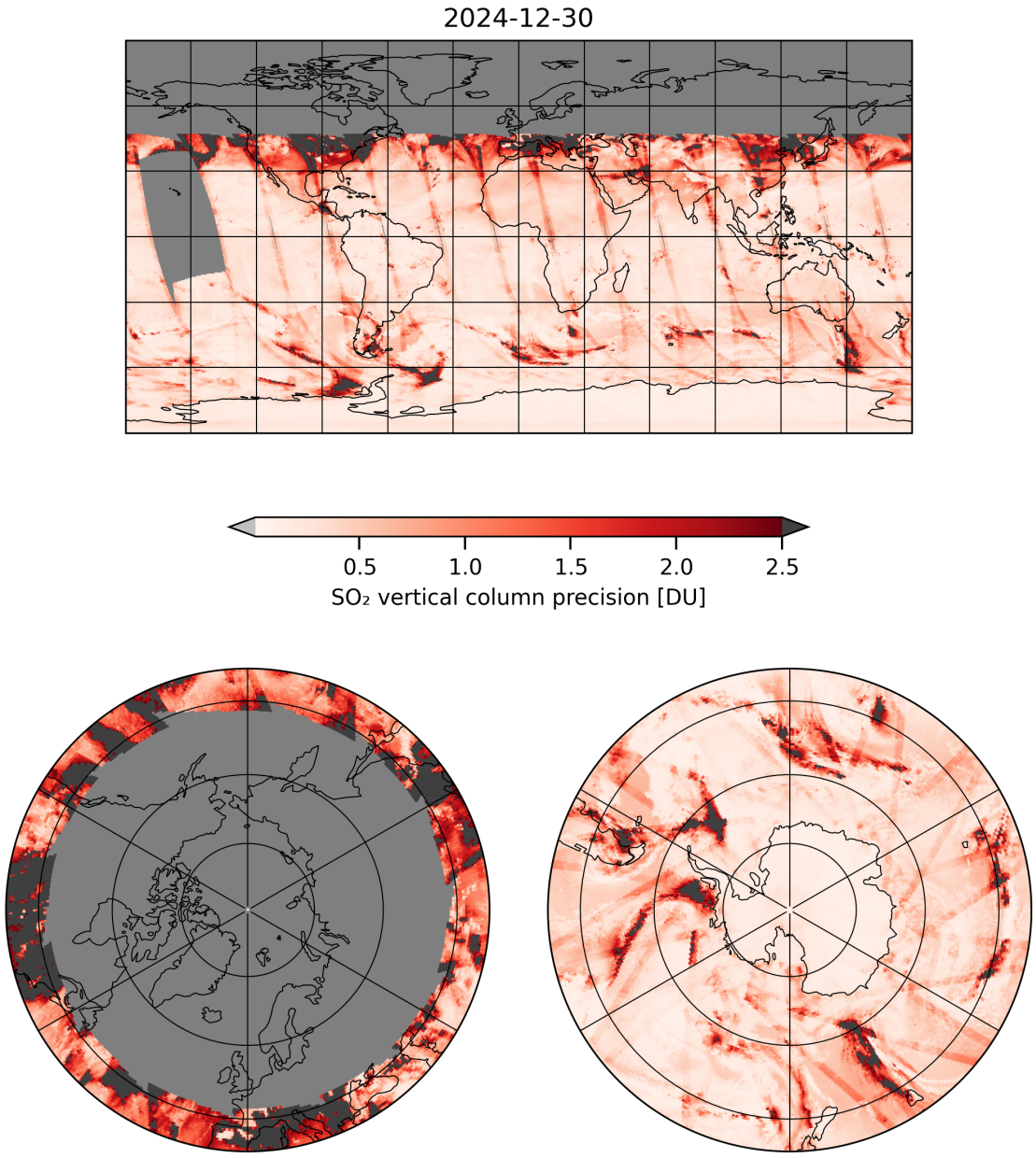

Figure 5: Map of "SO_2 vertical column precision" for 2024-12-30 to 2024-12-30

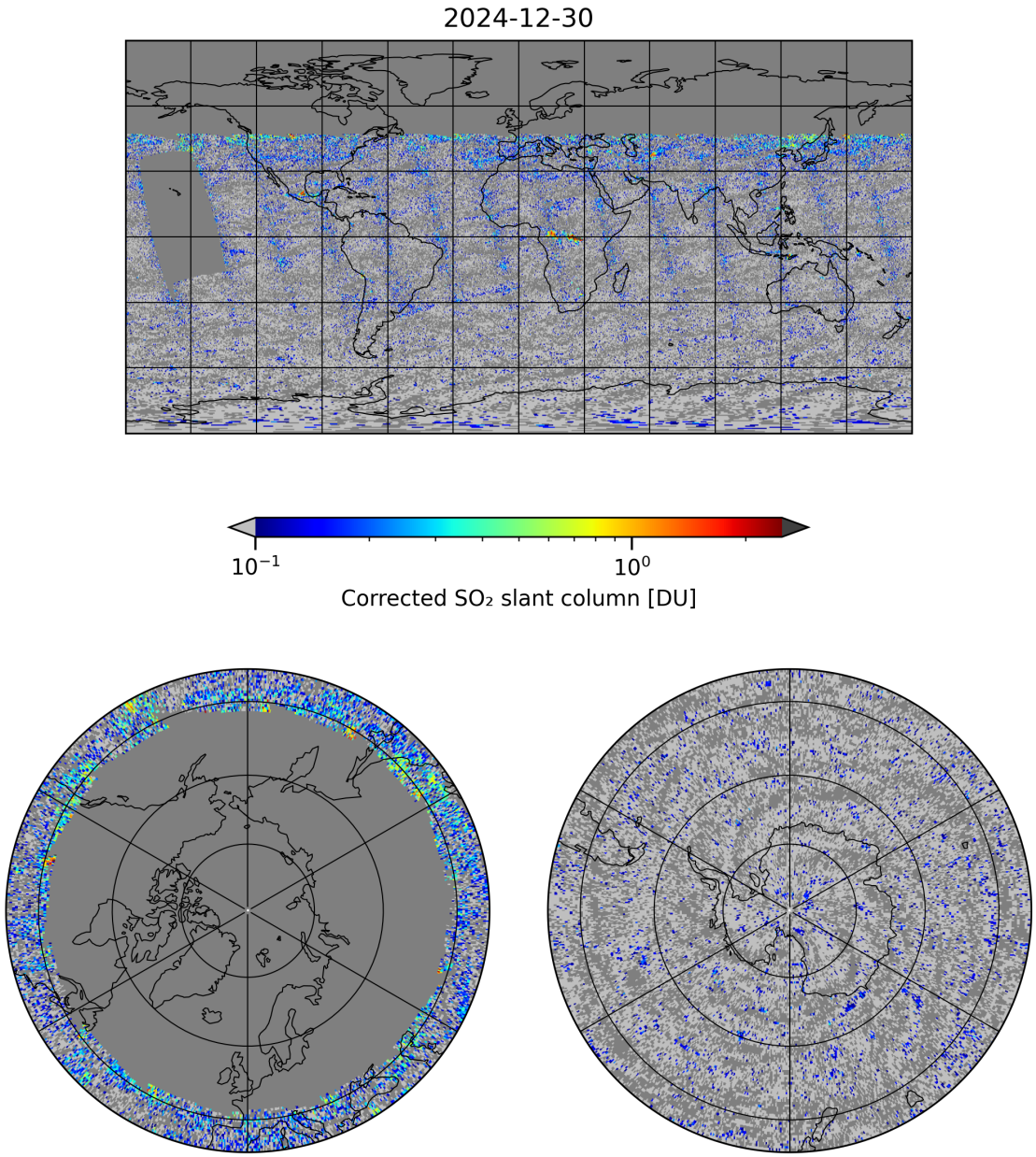

Figure 6: Map of “Corrected SO_2 slant column” for 2024-12-30 to 2024-12-30

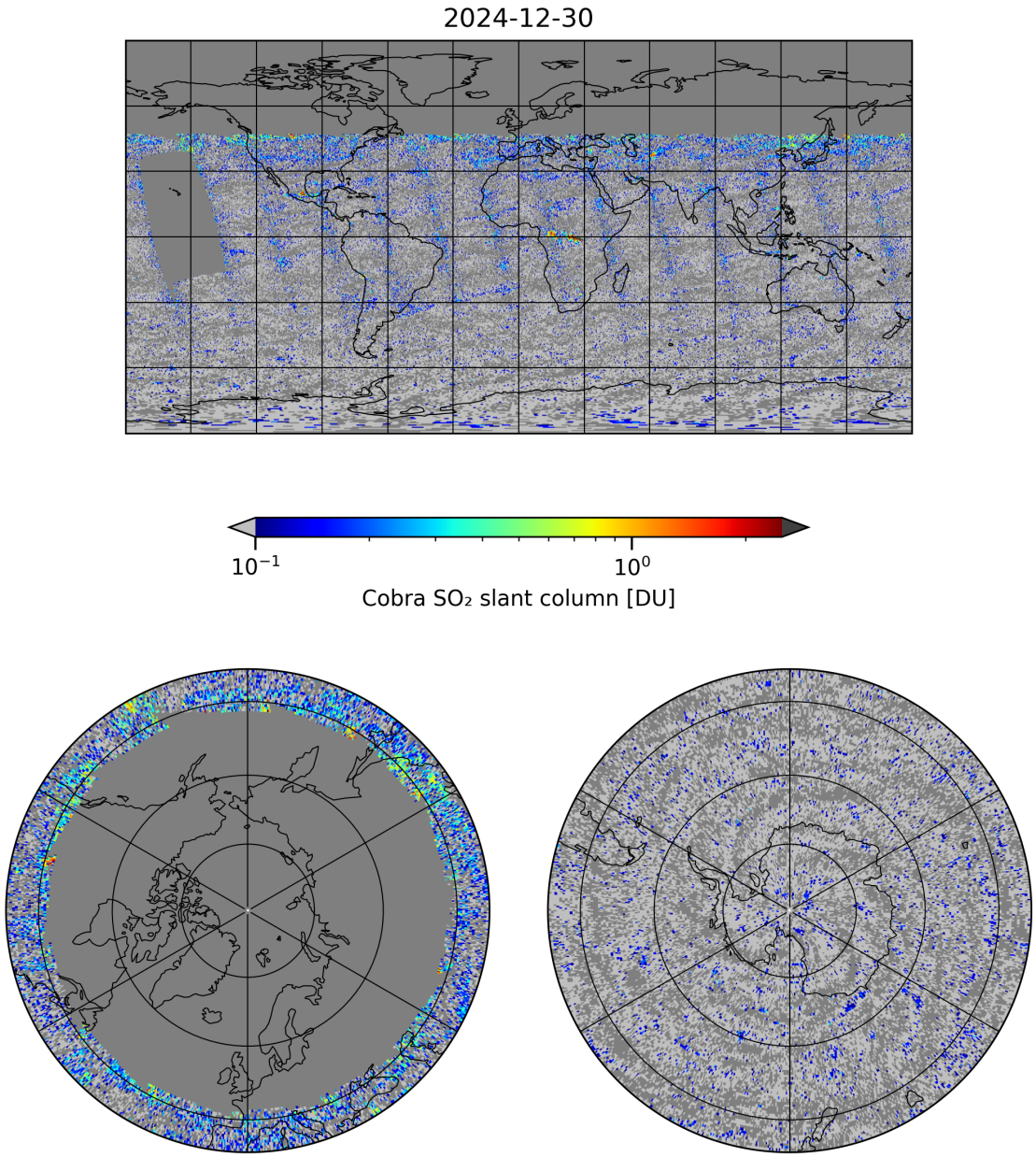

Figure 7: Map of “Cobra SO_2 slant column” for 2024-12-30 to 2024-12-30

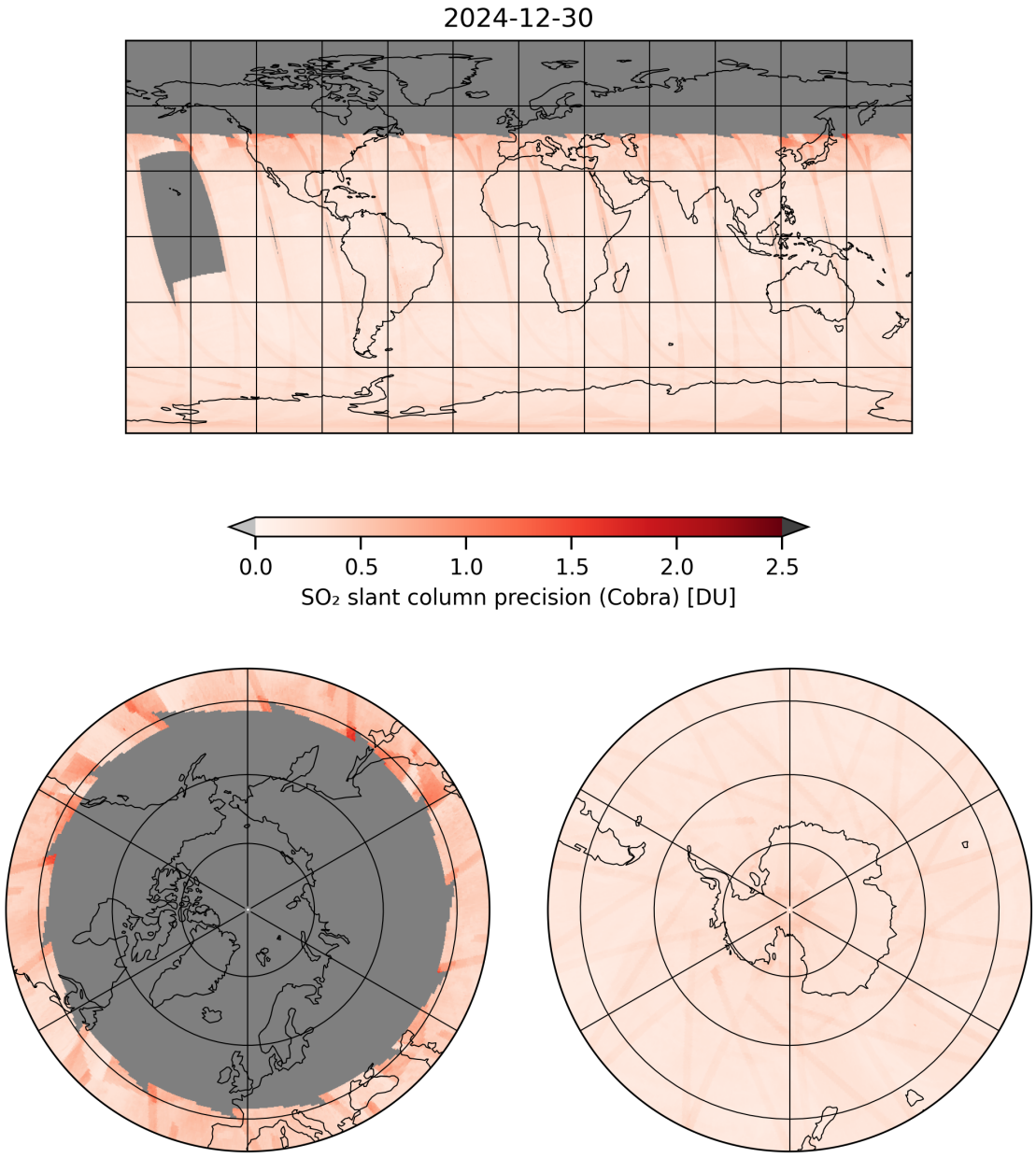

Figure 8: Map of "SO_2 slant column precision (Cobra)" for 2024-12-30 to 2024-12-30

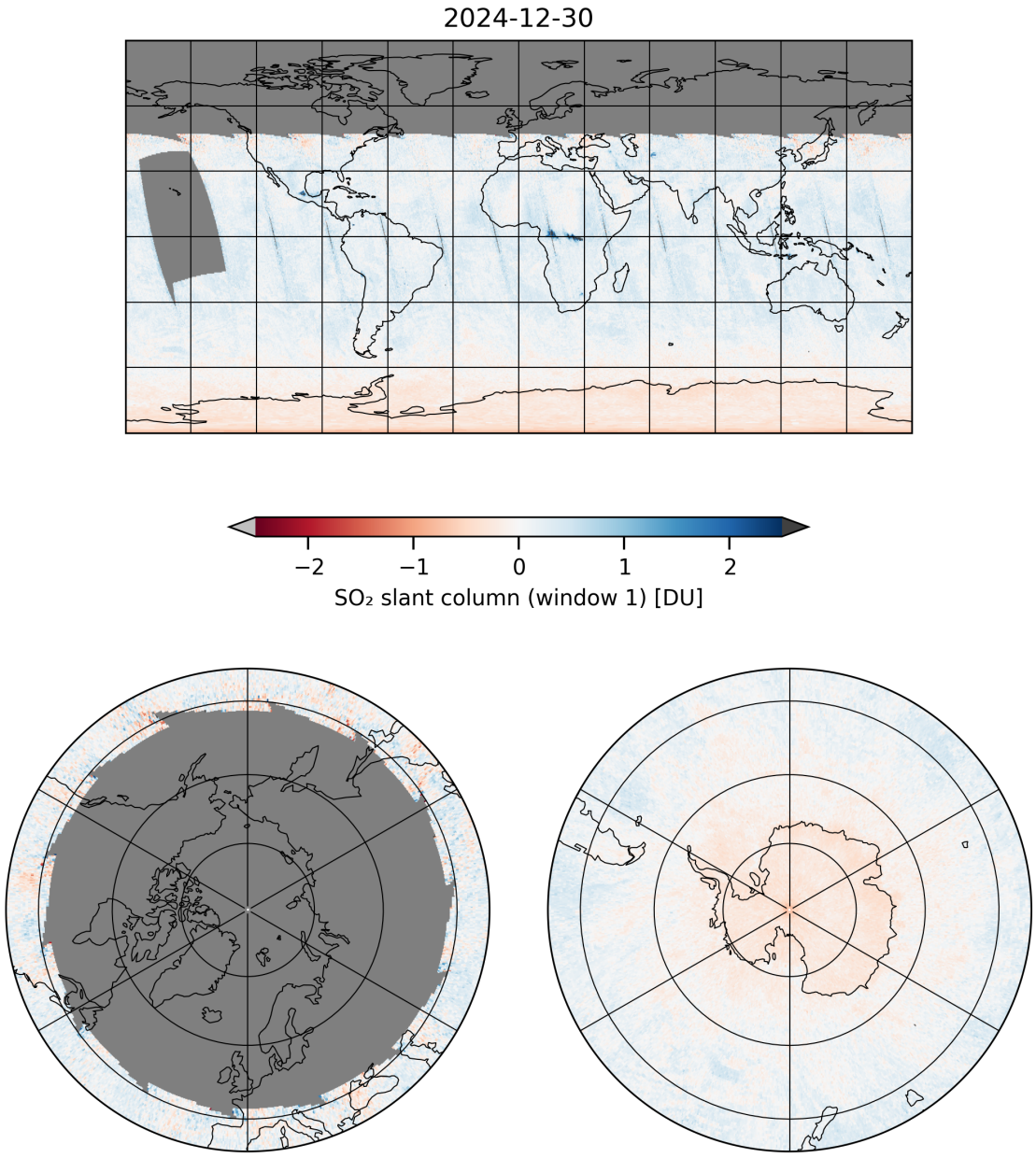

Figure 9: Map of "SO_2 slant column (window 1)" for 2024-12-30 to 2024-12-30

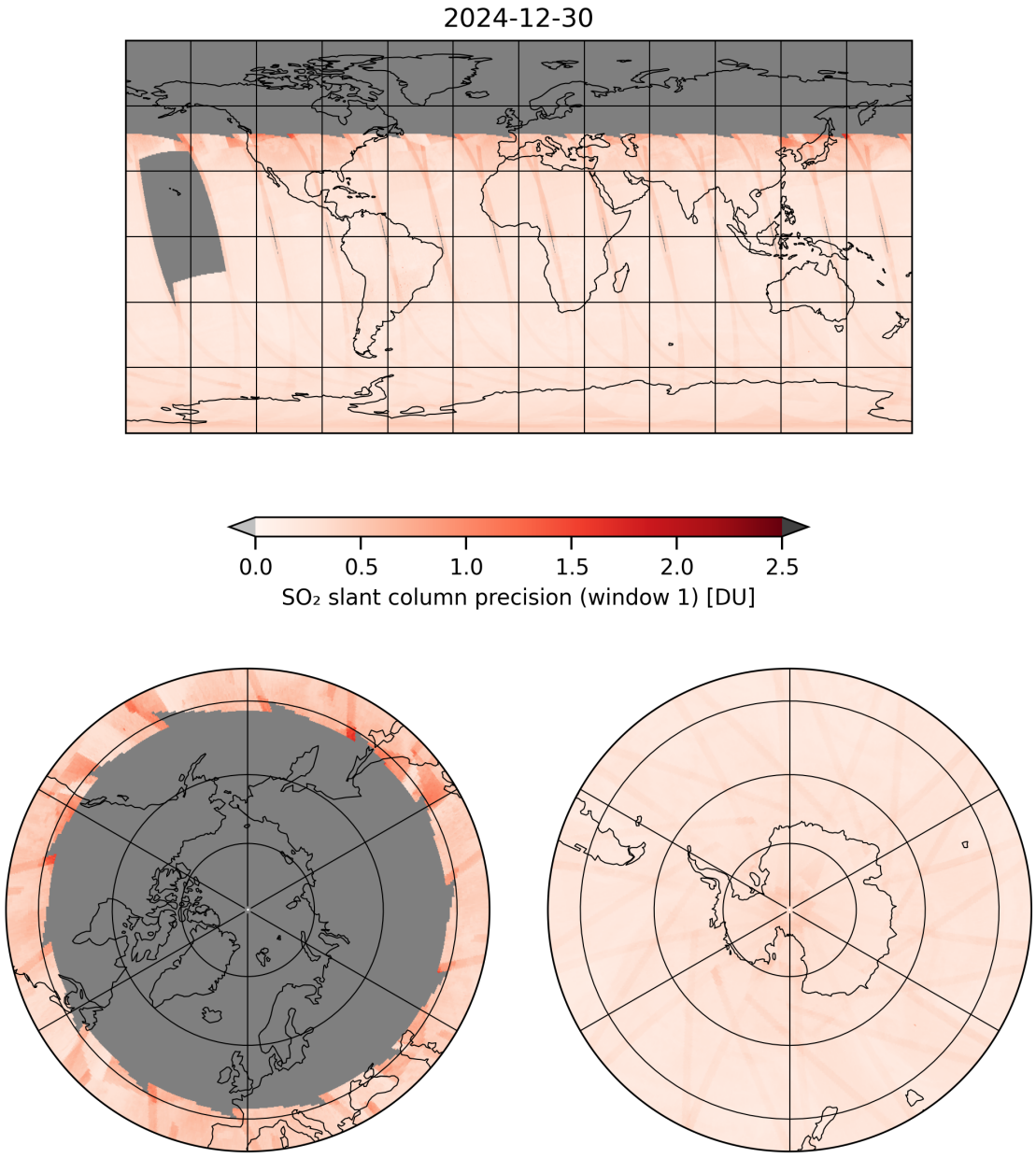

Figure 10: Map of "SO_2 slant column precision (window 1)" for 2024-12-30 to 2024-12-30

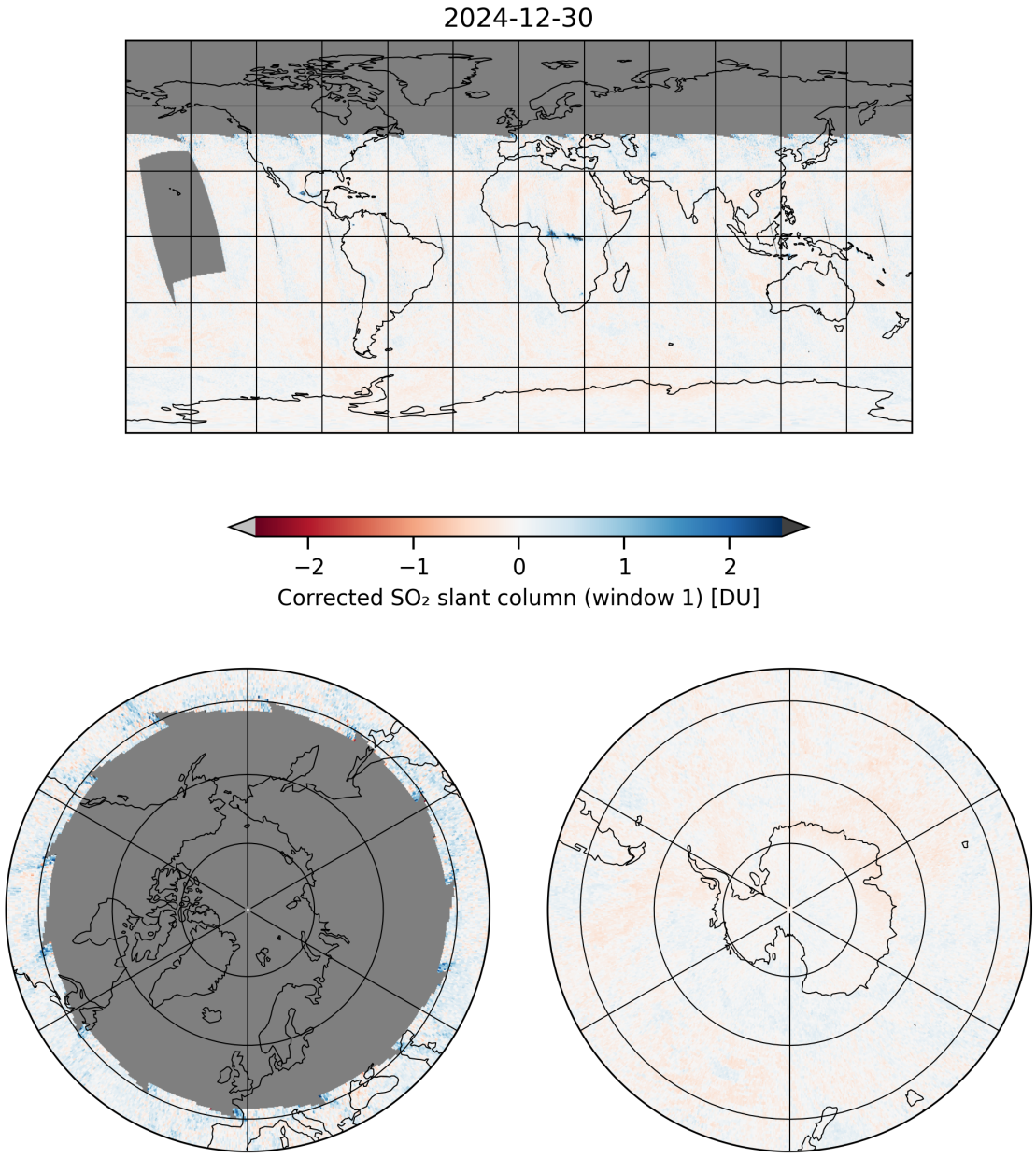

Figure 11: Map of “Corrected SO_2 slant column (window 1)” for 2024-12-30 to 2024-12-30

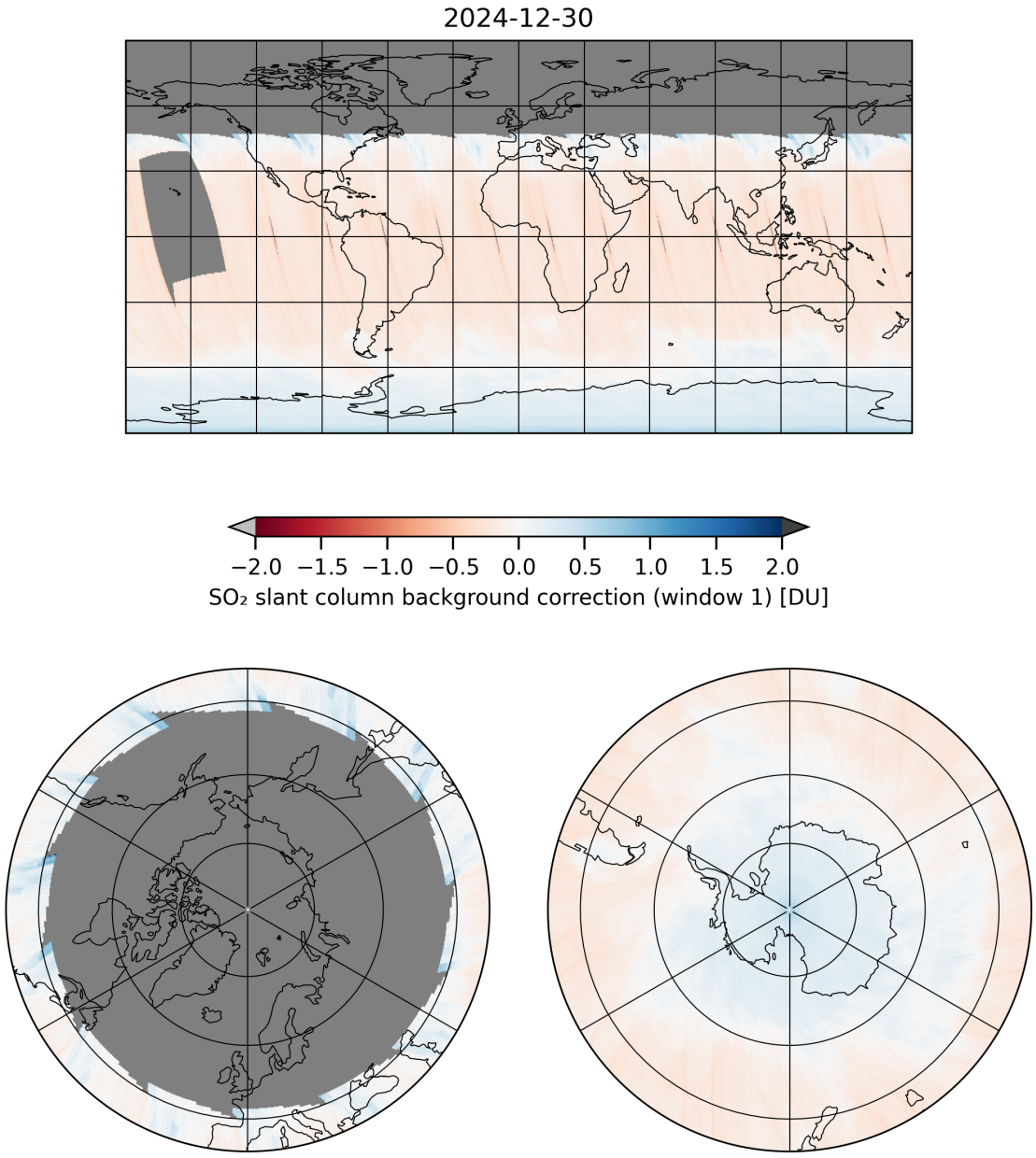

Figure 12: Map of "SO_2 slant column background correction (window 1)" for 2024-12-30 to 2024-12-30

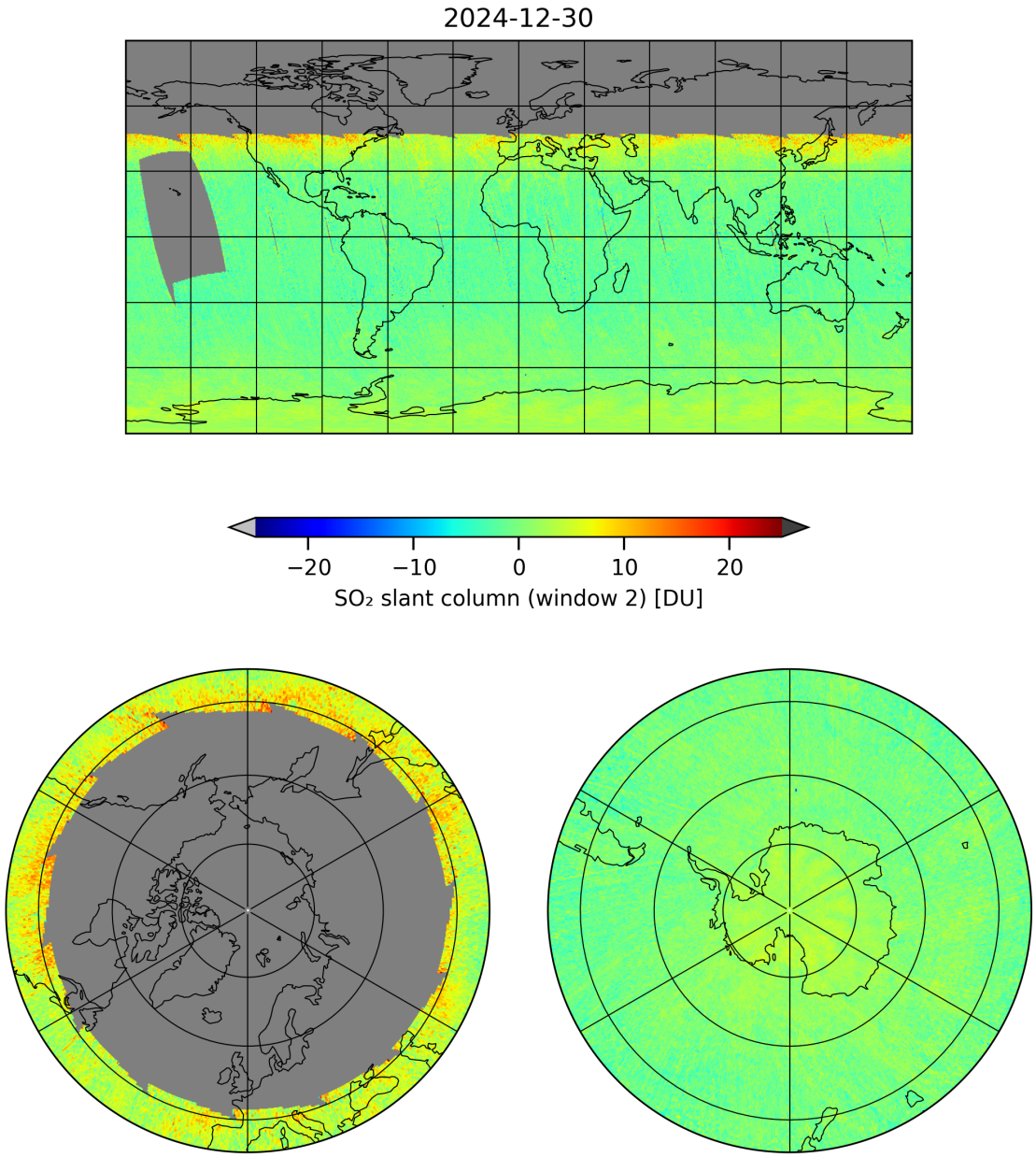

Figure 13: Map of "SO_2 slant column (window 2)" for 2024-12-30 to 2024-12-30

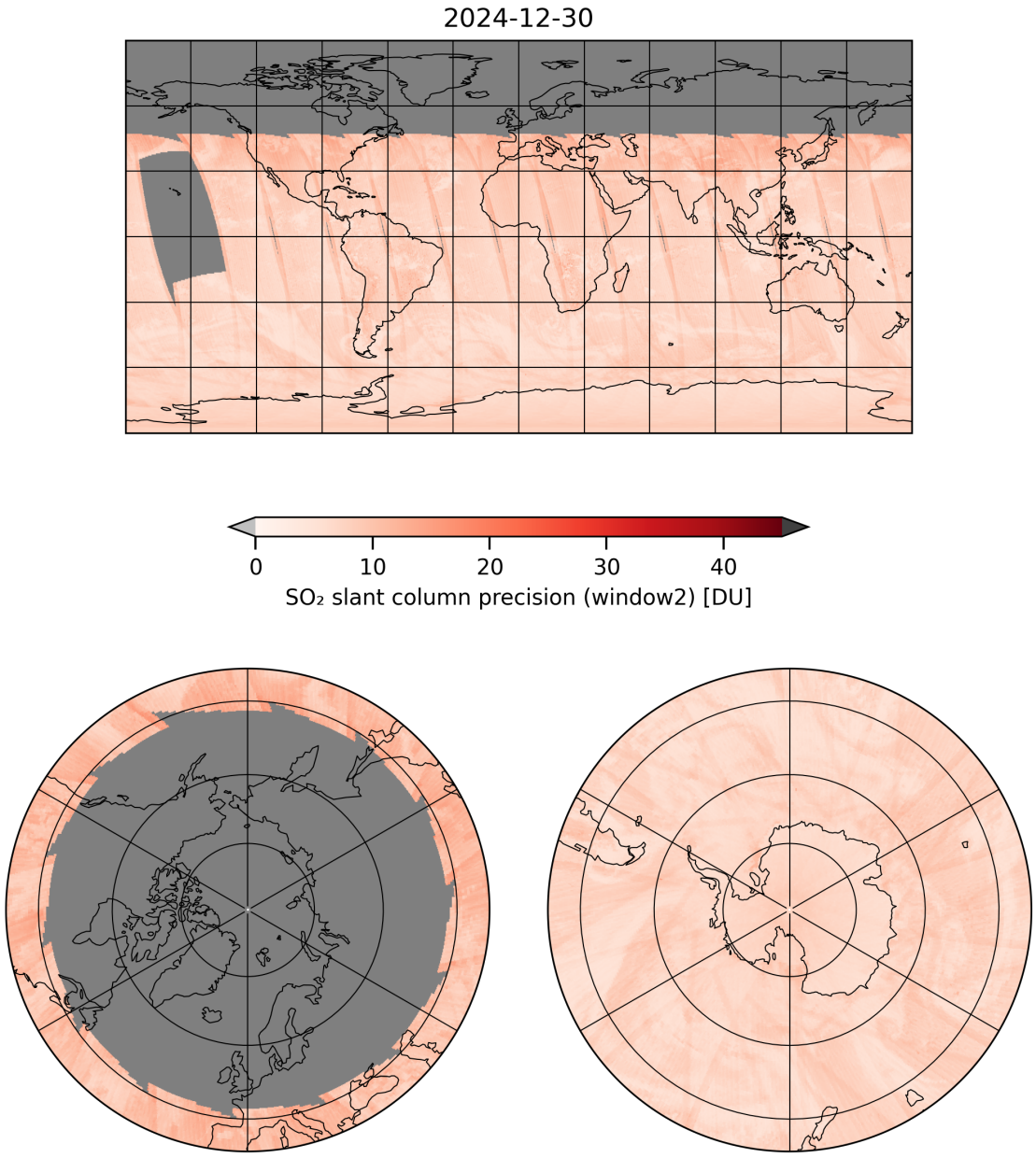

Figure 14: Map of "SO_2 slant column precision (window2)" for 2024-12-30 to 2024-12-30

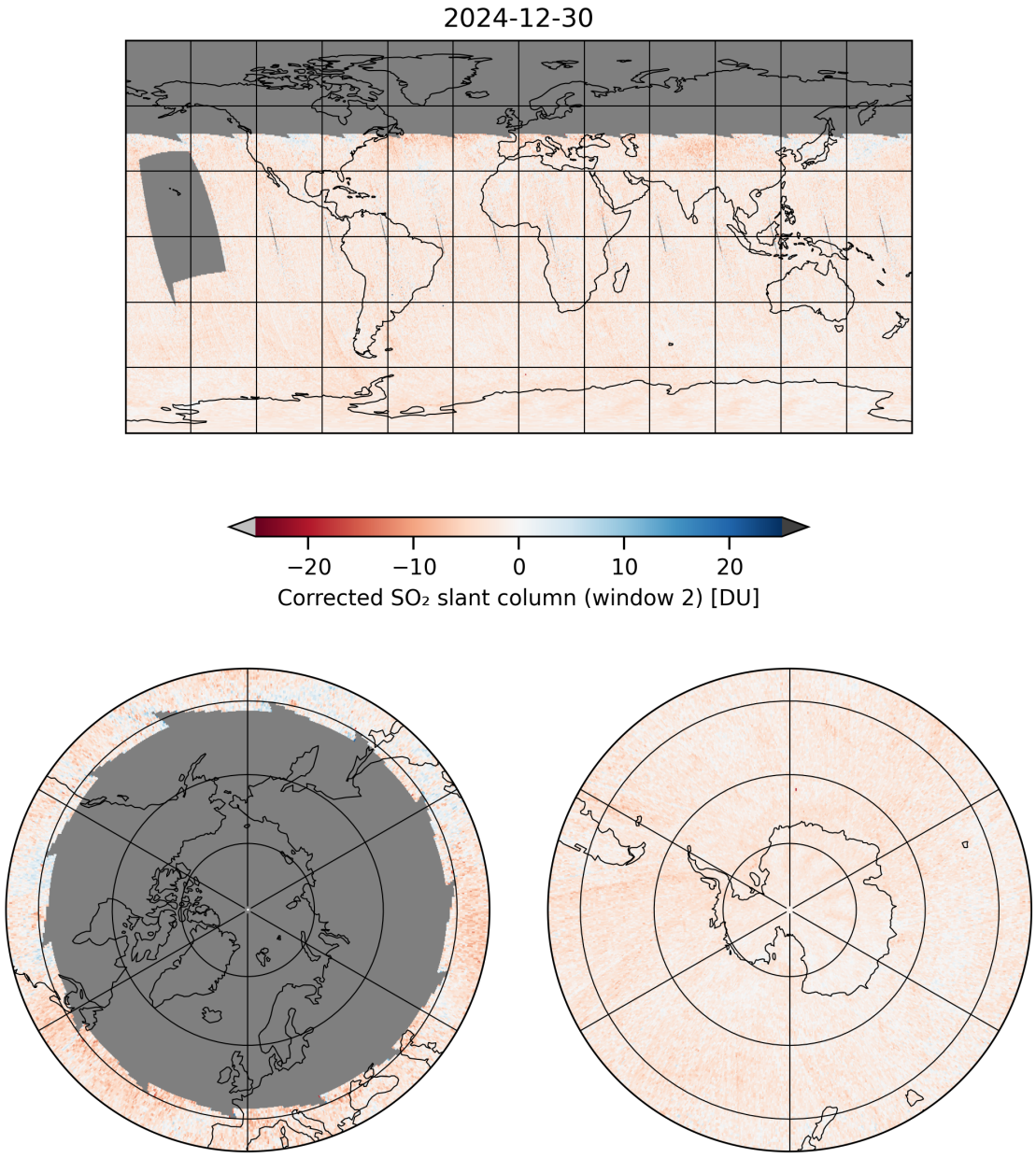

Figure 15: Map of “Corrected SO_2 slant column (window 2)” for 2024-12-30 to 2024-12-30

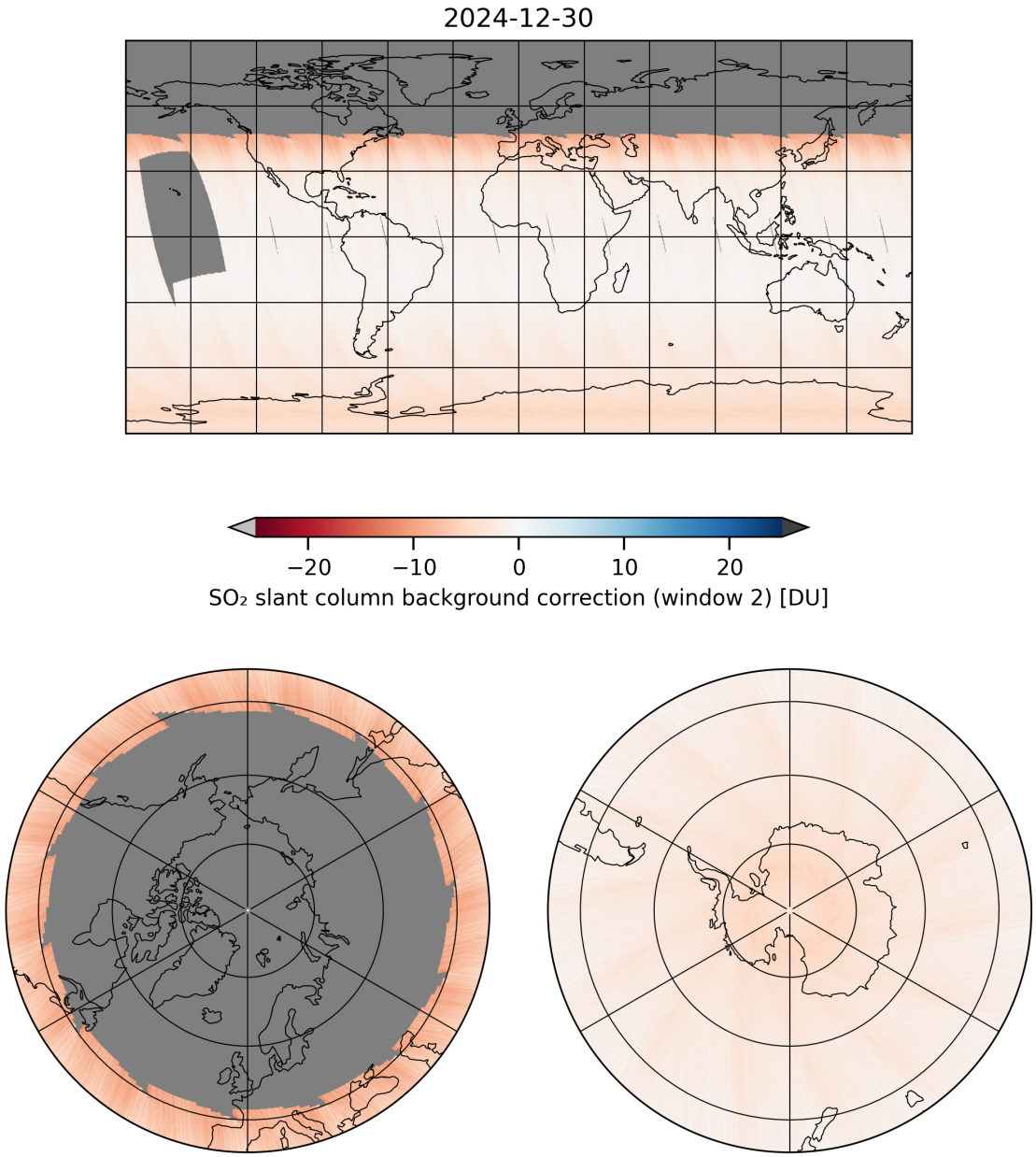

Figure 16: Map of "SO_2 slant column background correction (window 2)" for 2024-12-30 to 2024-12-30

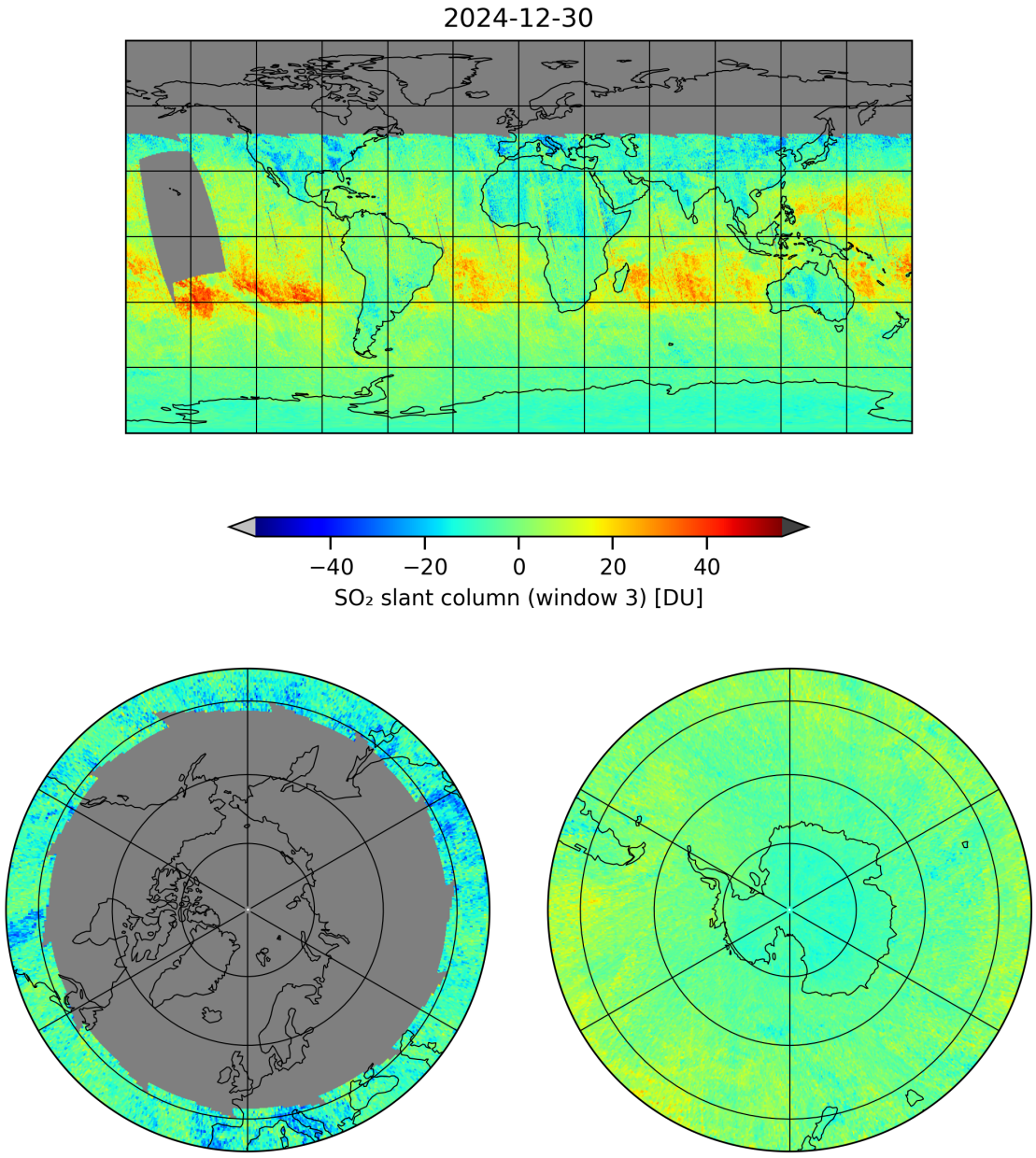

Figure 17: Map of "SO_2 slant column (window 3)" for 2024-12-30 to 2024-12-30

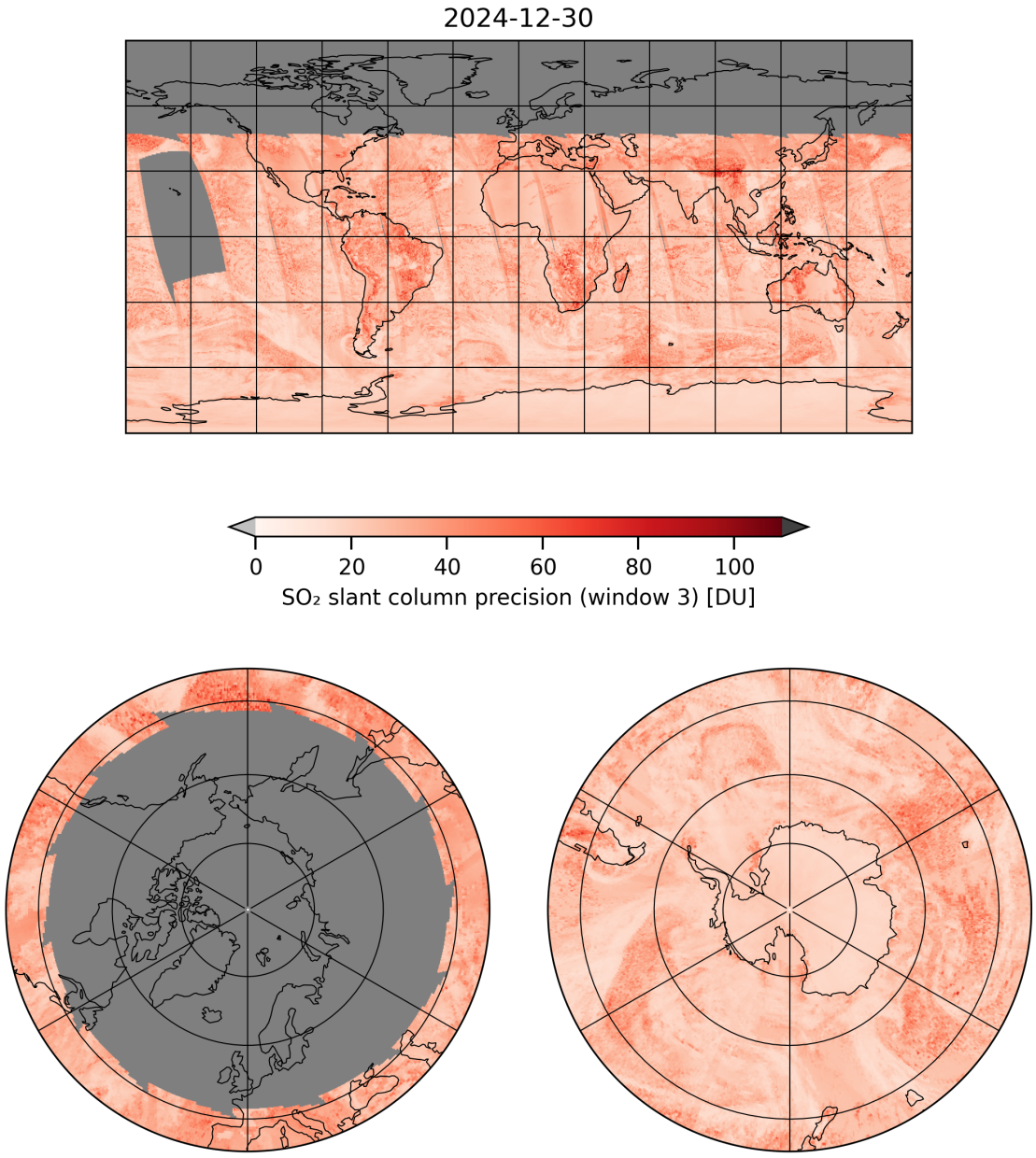

Figure 18: Map of "SO_2 slant column precision (window 3)" for 2024-12-30 to 2024-12-30

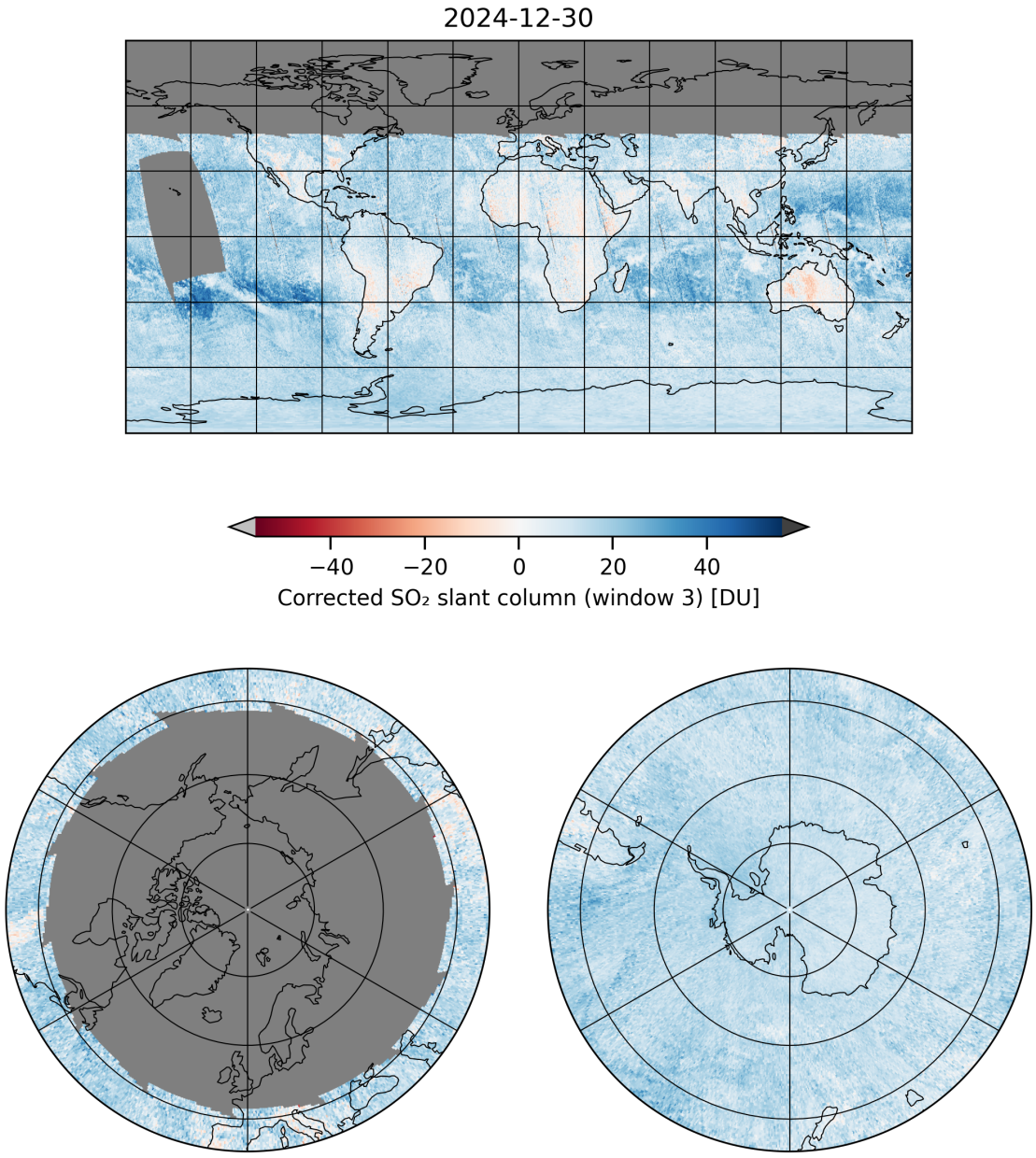

Figure 19: Map of "Corrected SO_2 slant column (window 3)" for 2024-12-30 to 2024-12-30

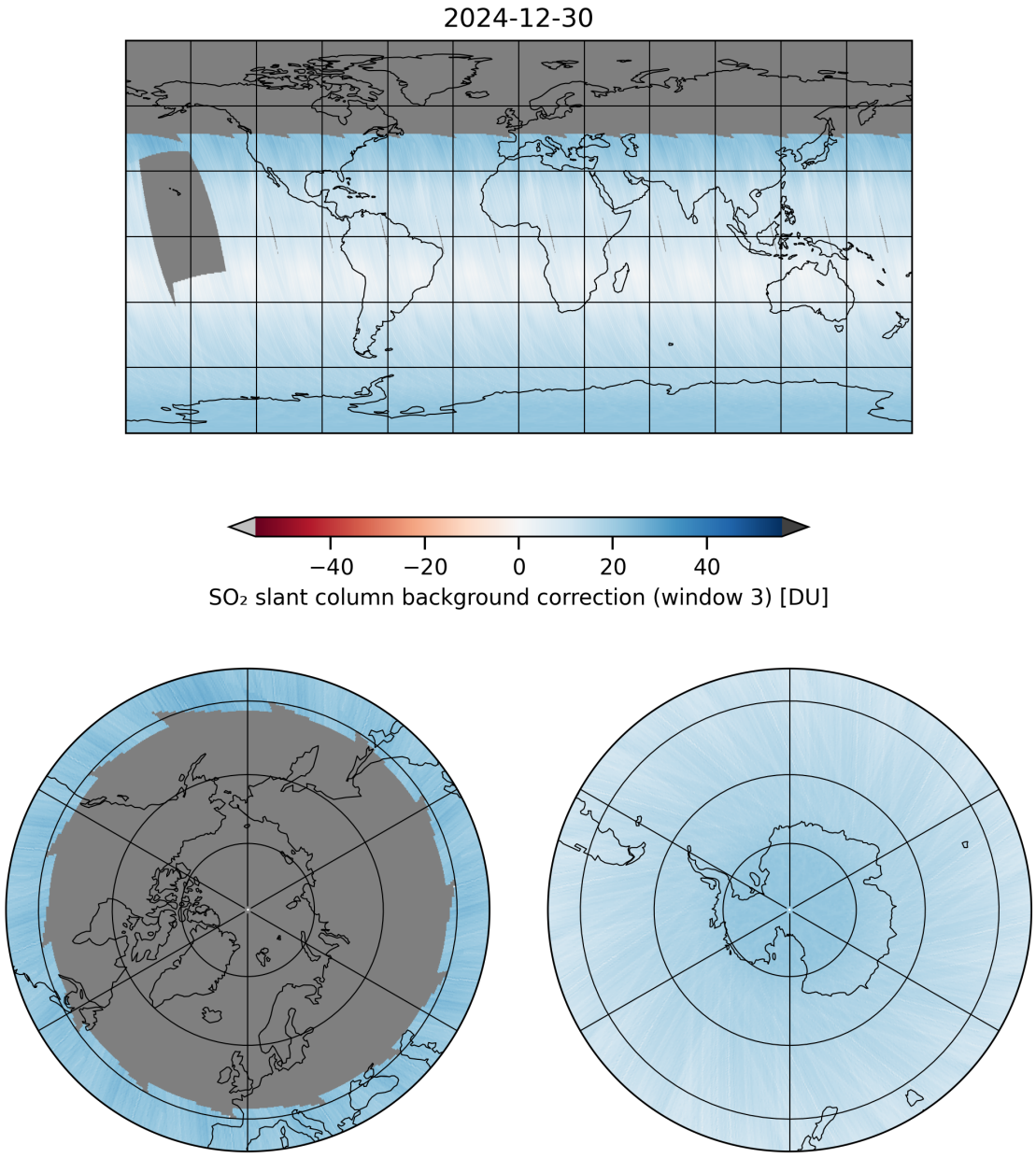

Figure 20: Map of "SO_2 slant column background correction (window 3)" for 2024-12-30 to 2024-12-30

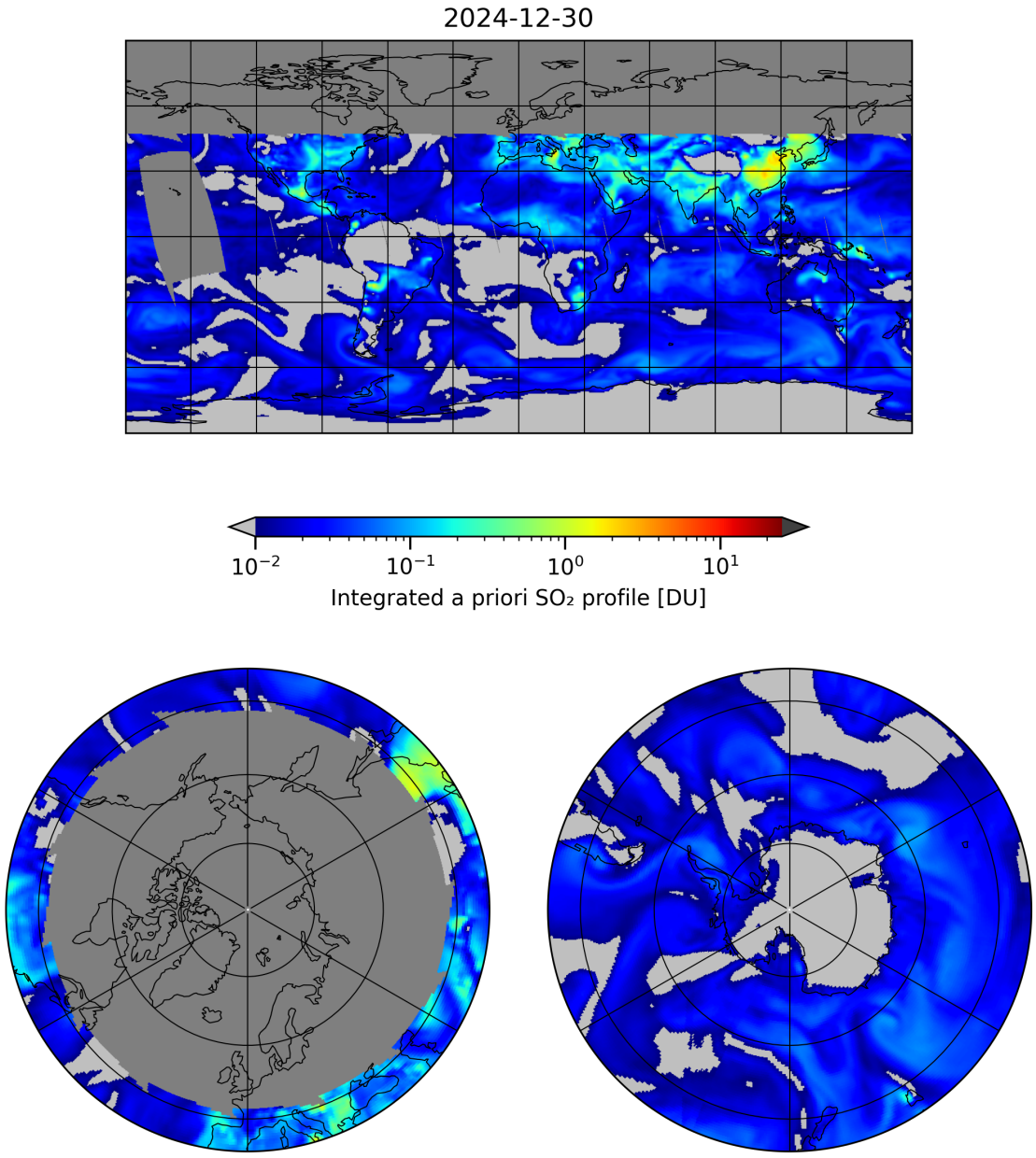

Figure 21: Map of “Integrated a priori SO_2 profile” for 2024-12-30 to 2024-12-30

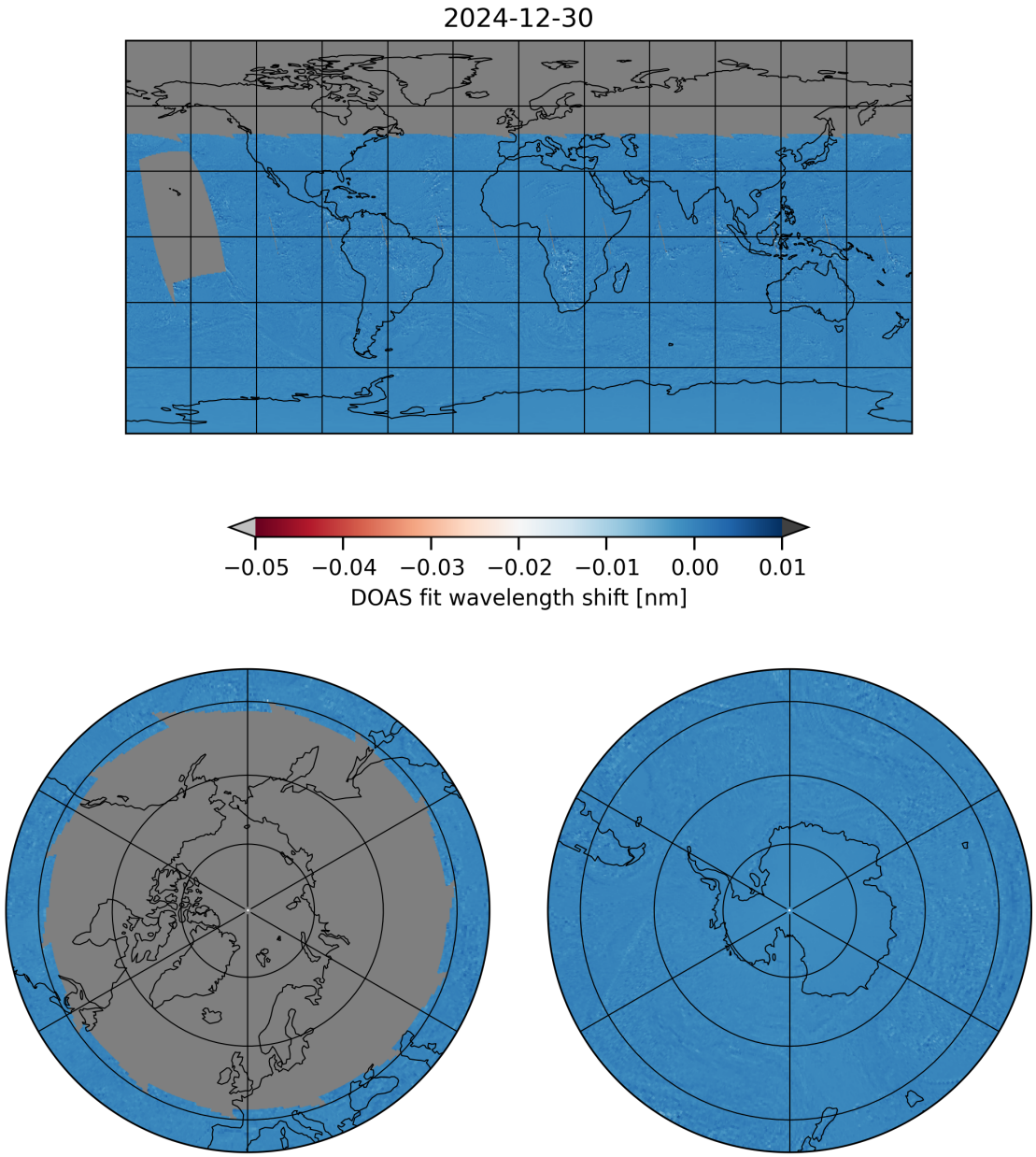

Figure 22: Map of “DOAS fit wavelength shift” for 2024-12-30 to 2024-12-30

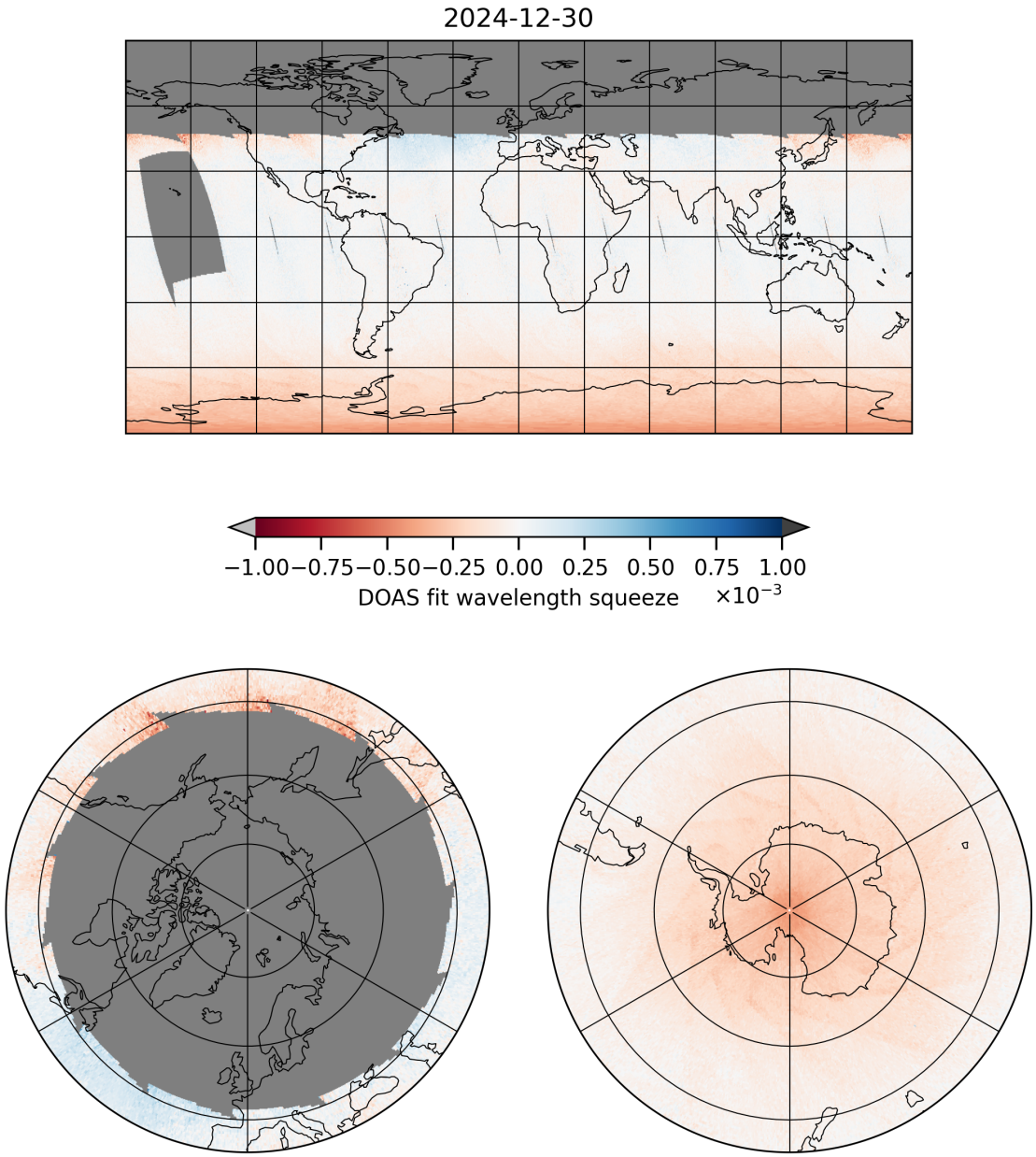

Figure 23: Map of “DOAS fit wavelength squeeze” for 2024-12-30 to 2024-12-30

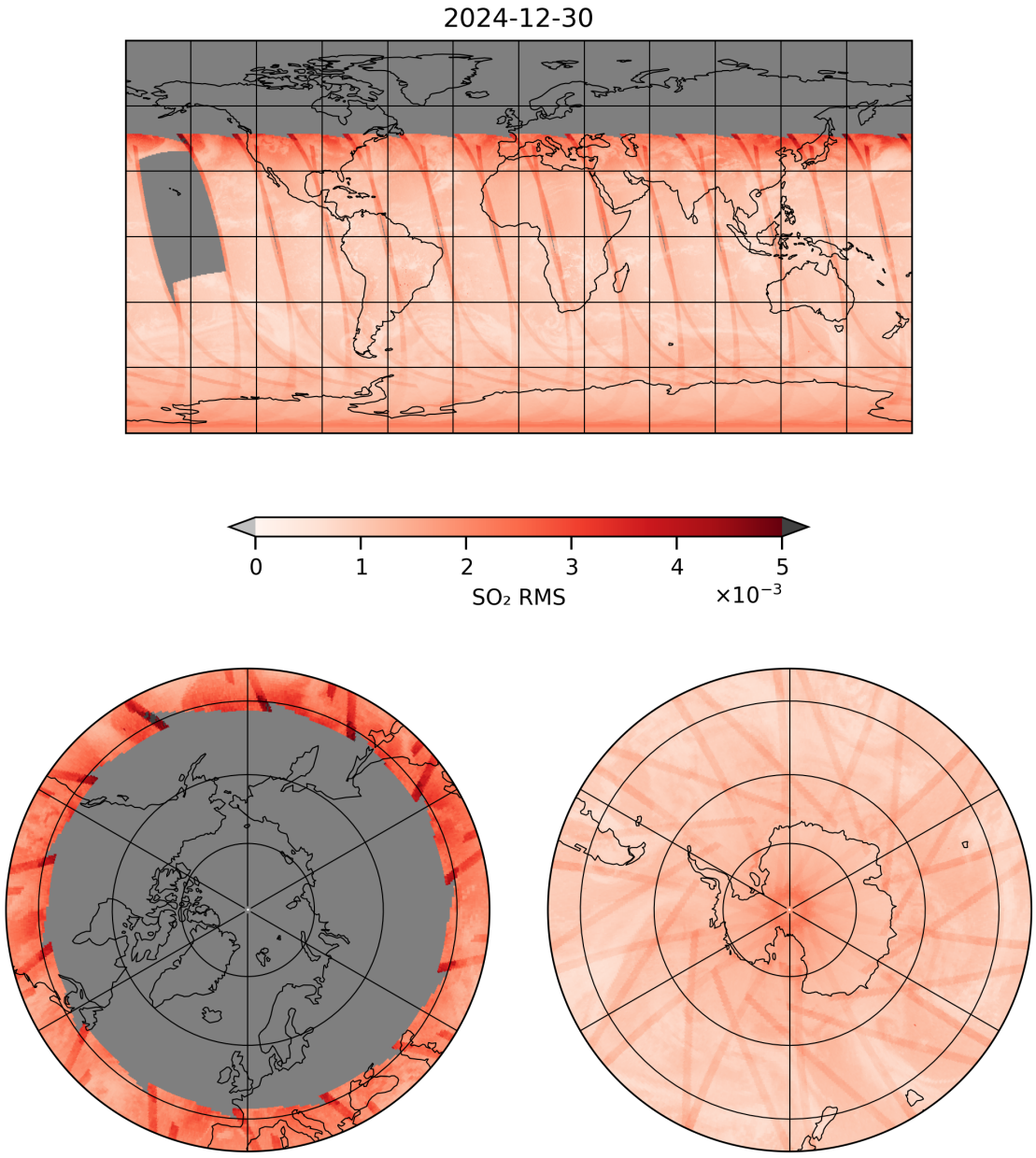

Figure 24: Map of "SO_2 RMS" for 2024-12-30 to 2024-12-30

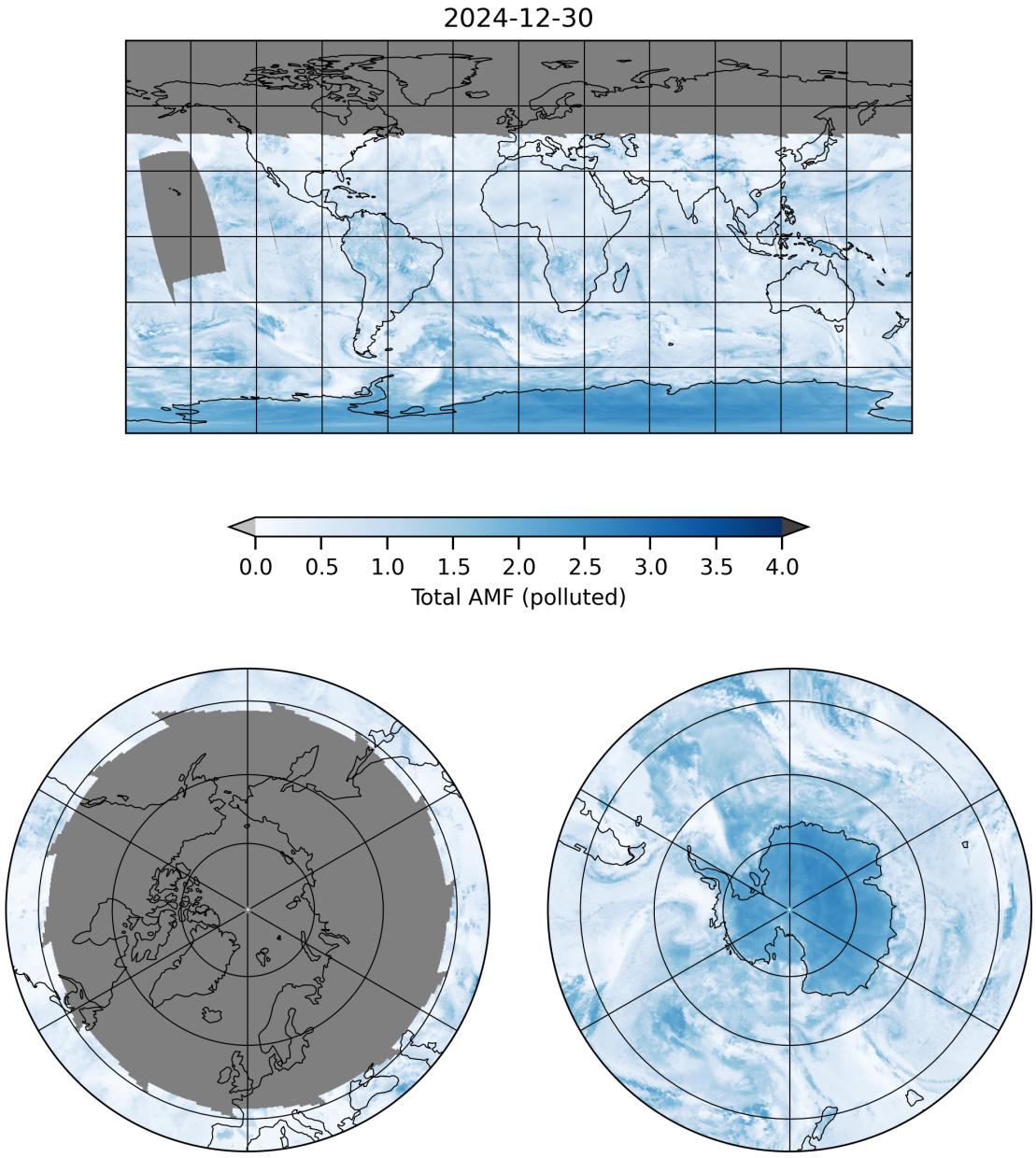

Figure 25: Map of “Total AMF (polluted)” for 2024-12-30 to 2024-12-30

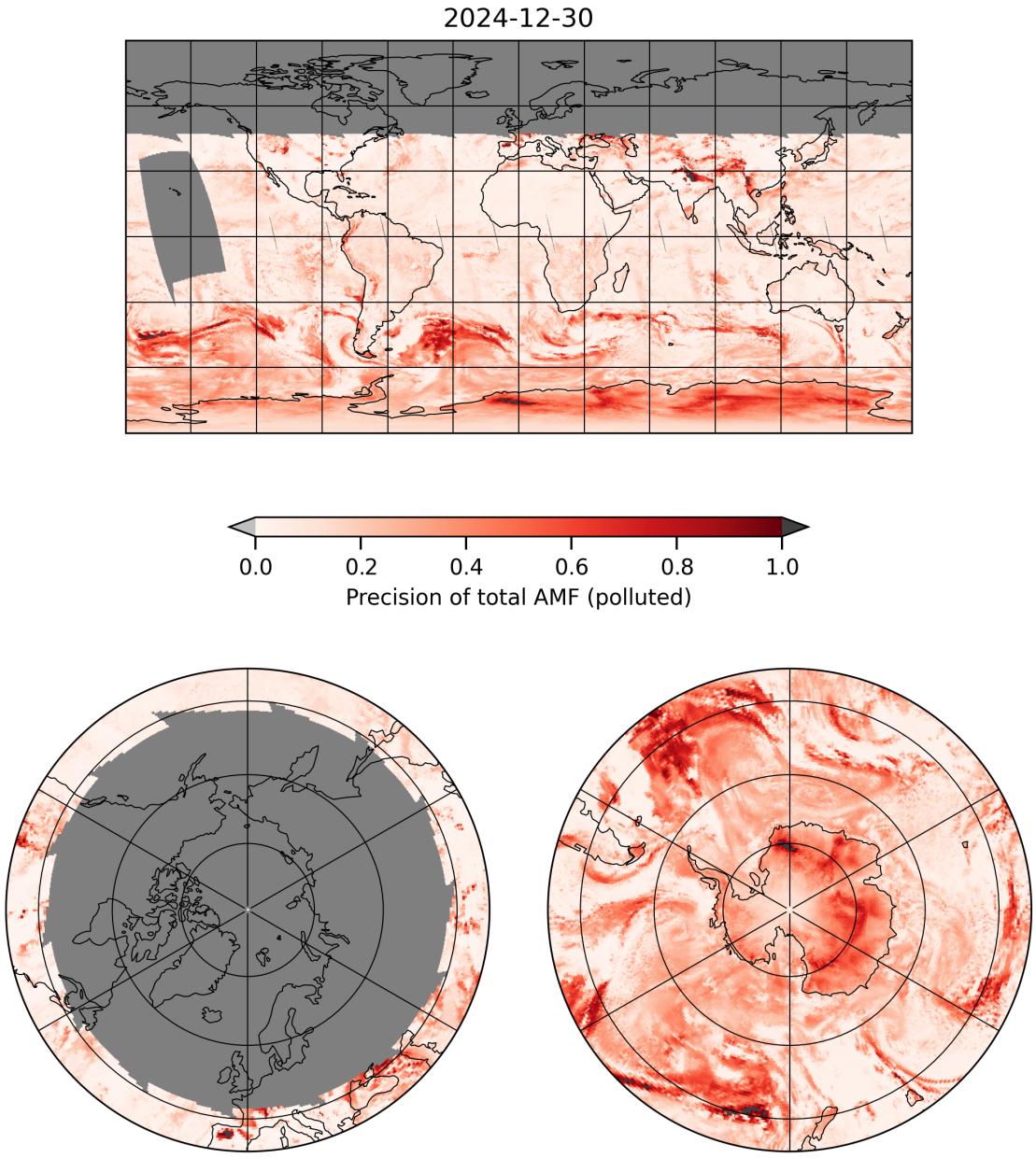

Figure 26: Map of “Precision of total AMF (polluted)” for 2024-12-30 to 2024-12-30

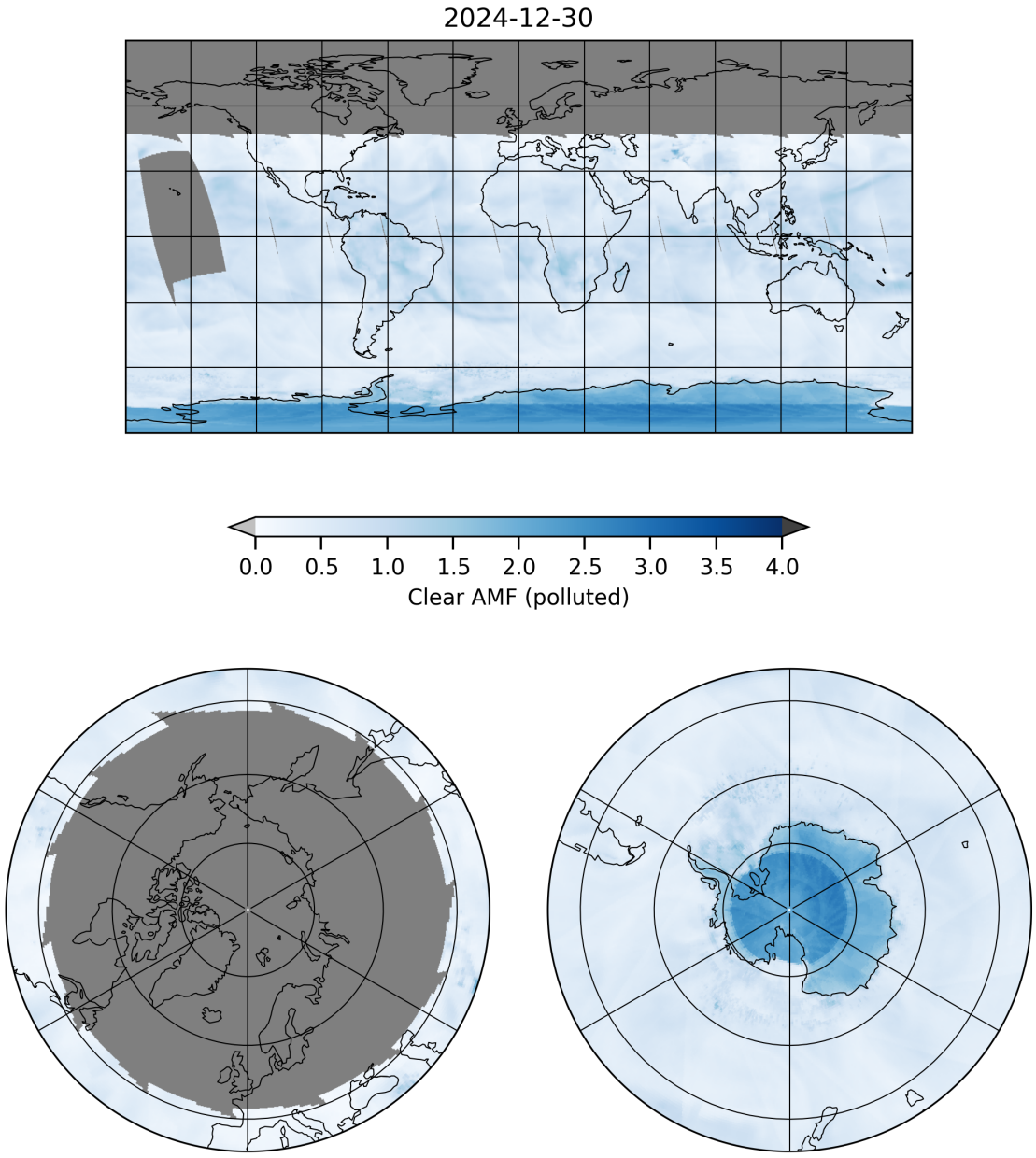

Figure 27: Map of “Clear AMF (polluted)” for 2024-12-30 to 2024-12-30

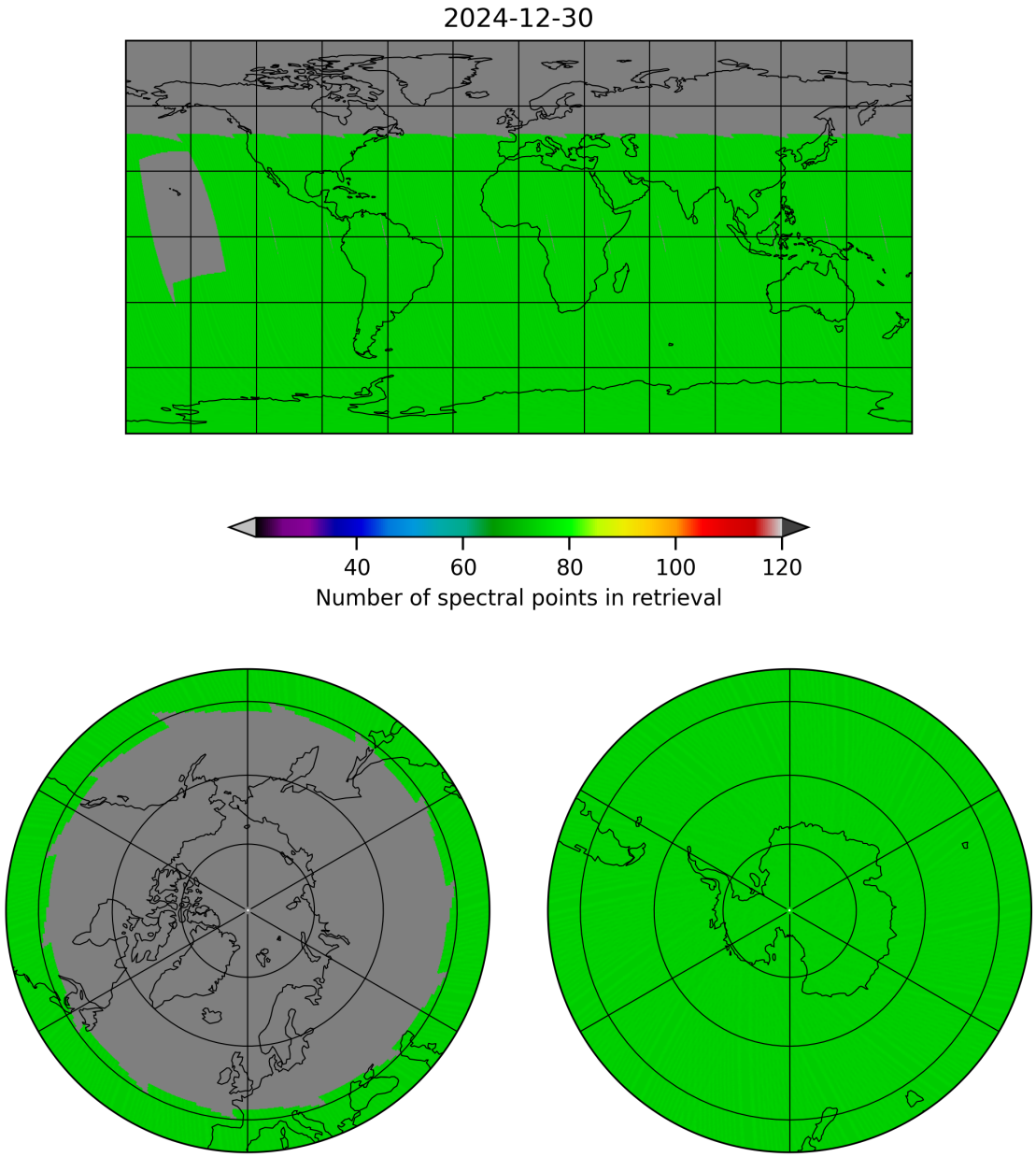

Figure 28: Map of “Number of spectral points in retrieval” for 2024-12-30 to 2024-12-30

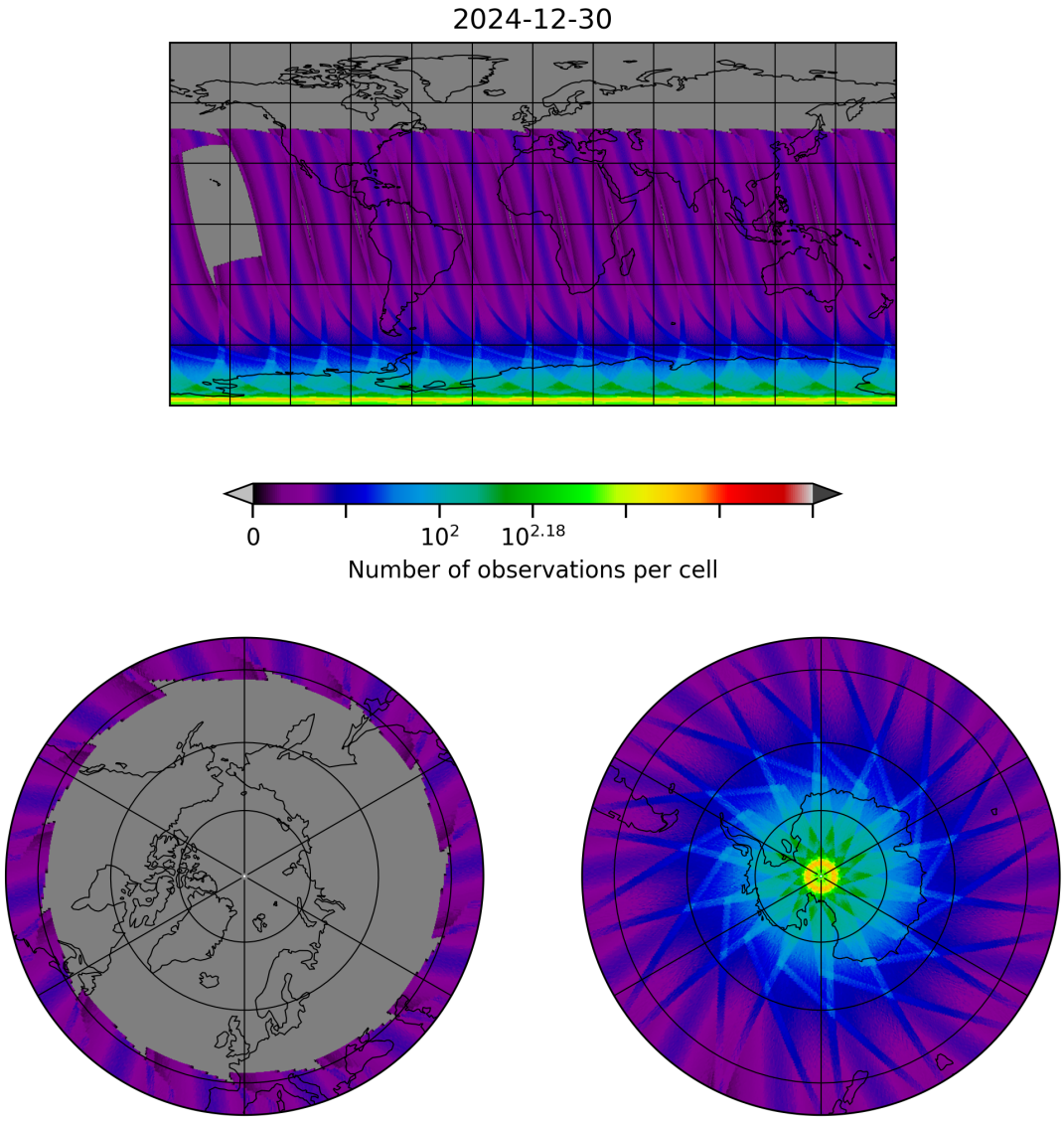

Figure 29: Map of the number of observations for 2024-12-30 to 2024-12-30

7 Zonal average

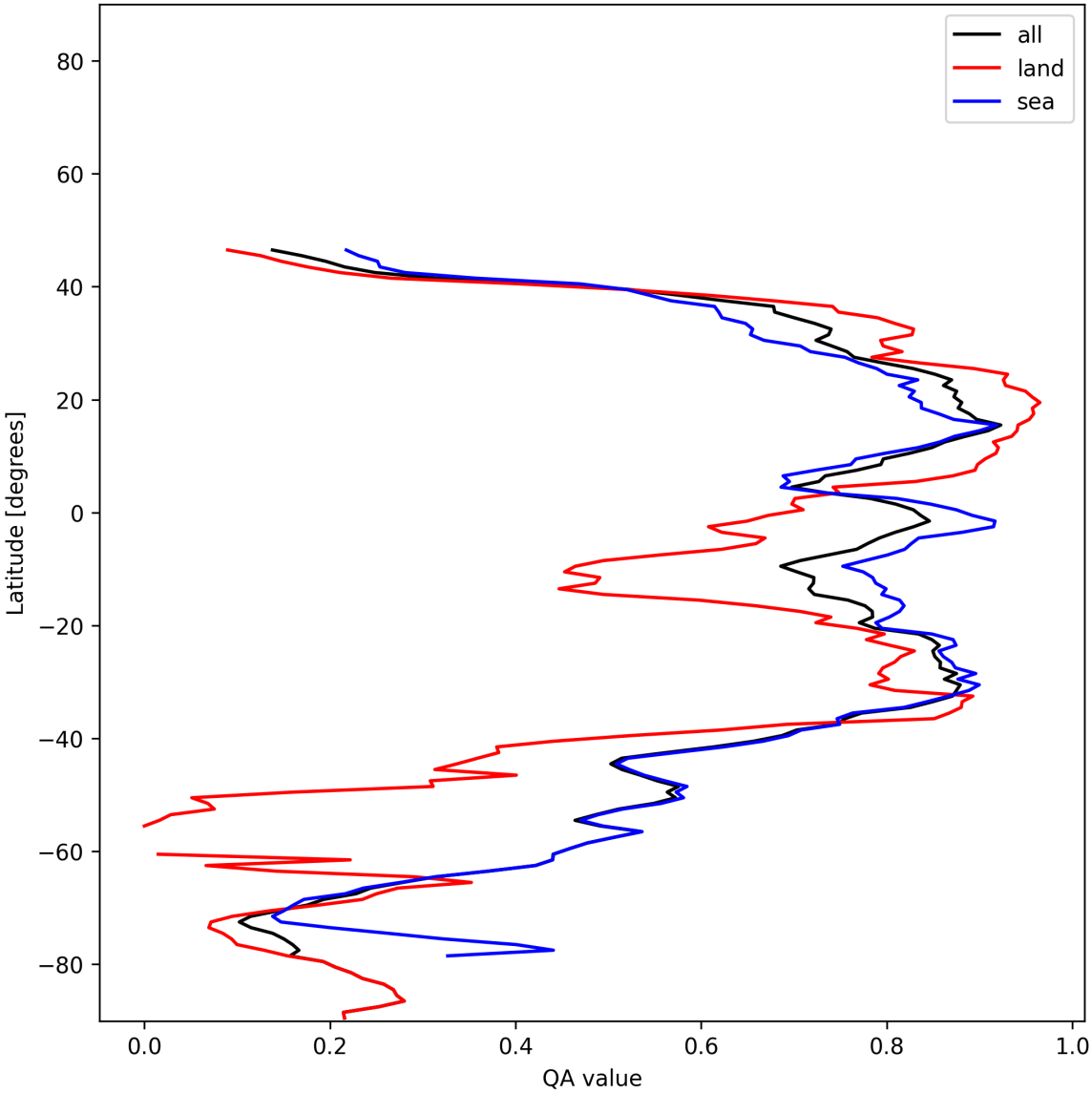

Figure 30: Zonal average of “QA value” for 2024-12-30 to 2024-12-30.

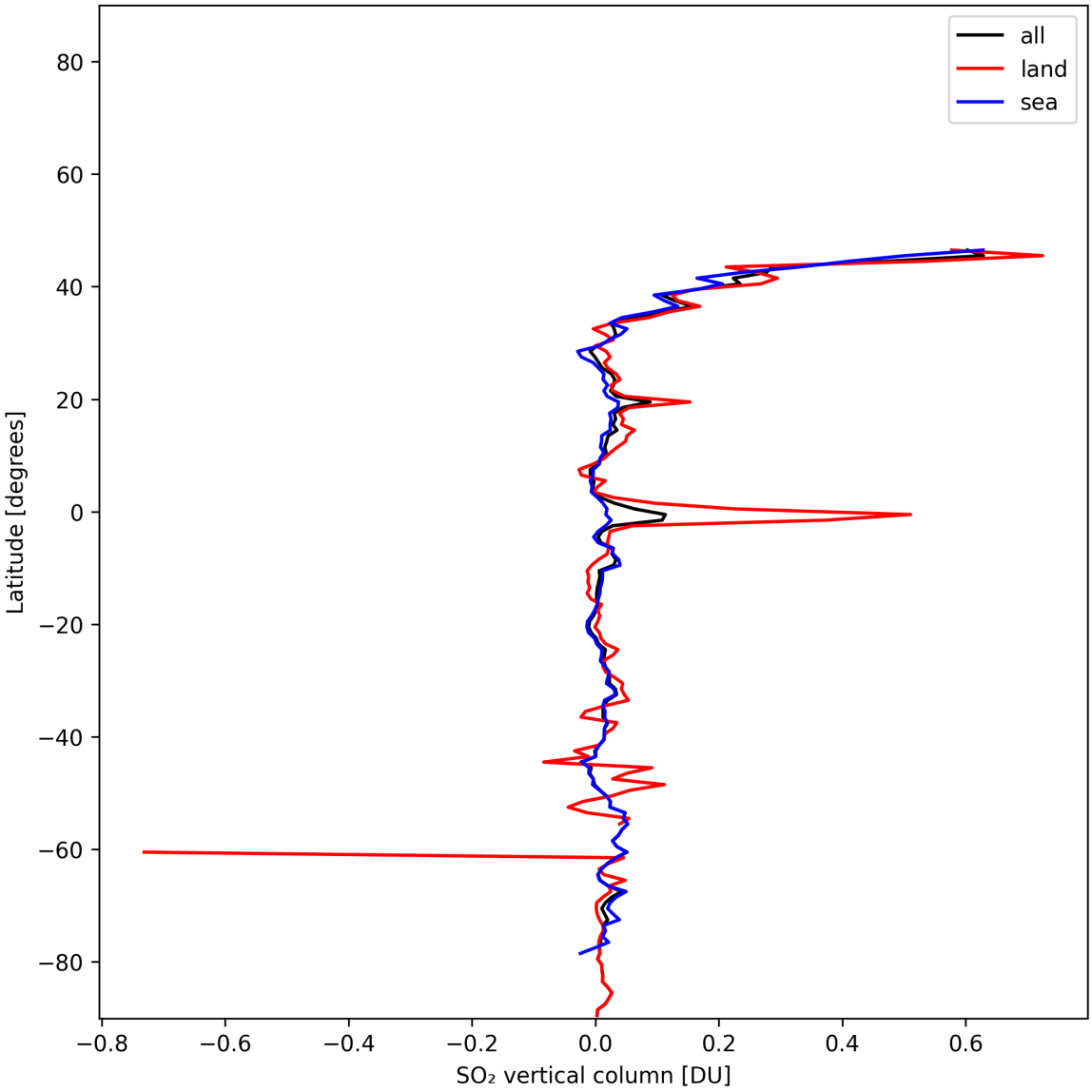

Figure 31: Zonal average of "SO_2 vertical column" for 2024-12-30 to 2024-12-30.

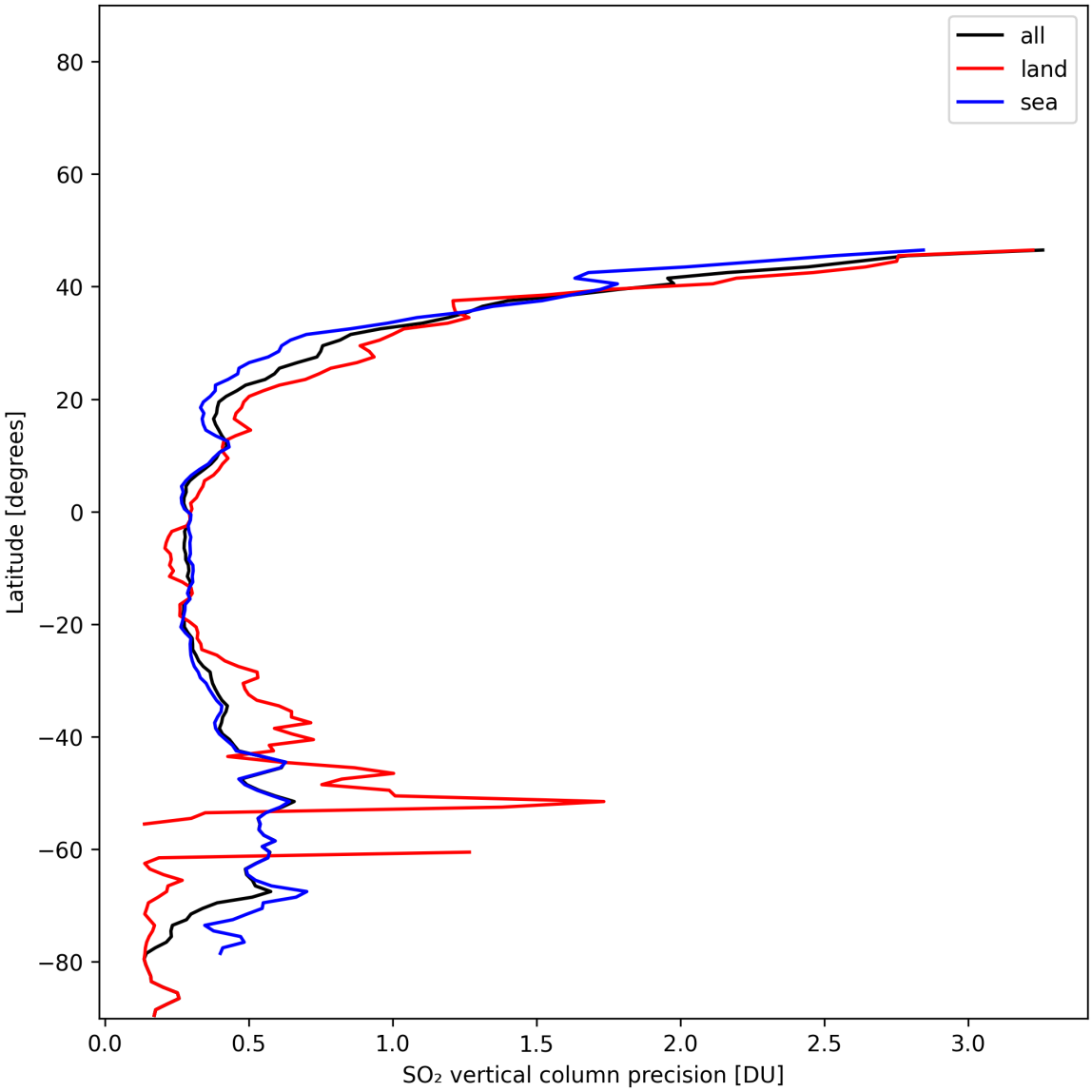

Figure 32: Zonal average of "SO_2 vertical column precision" for 2024-12-30 to 2024-12-30.

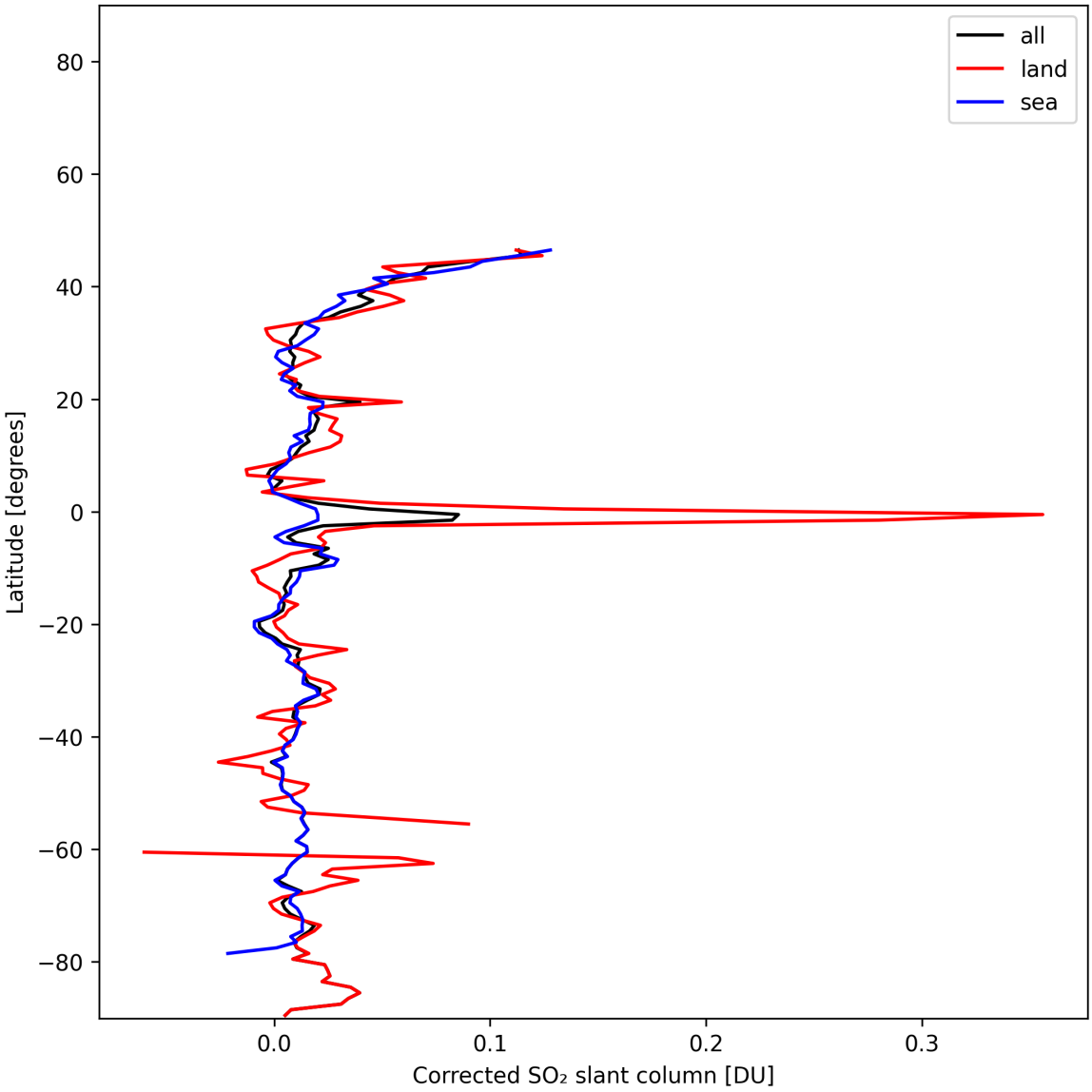

Figure 33: Zonal average of “Corrected SO_2 slant column” for 2024-12-30 to 2024-12-30.

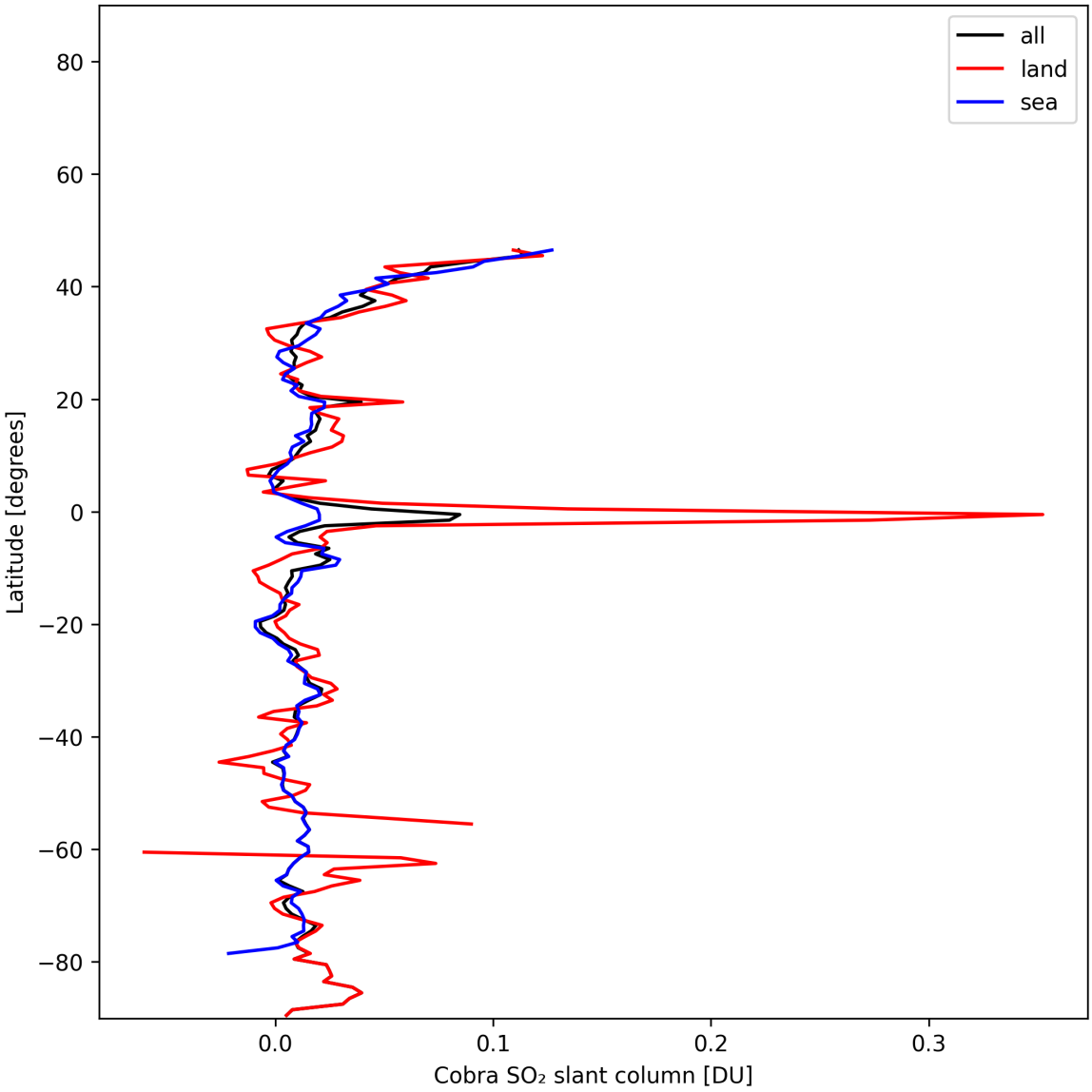

Figure 34: Zonal average of "Cobra SO_2 slant column" for 2024-12-30 to 2024-12-30.

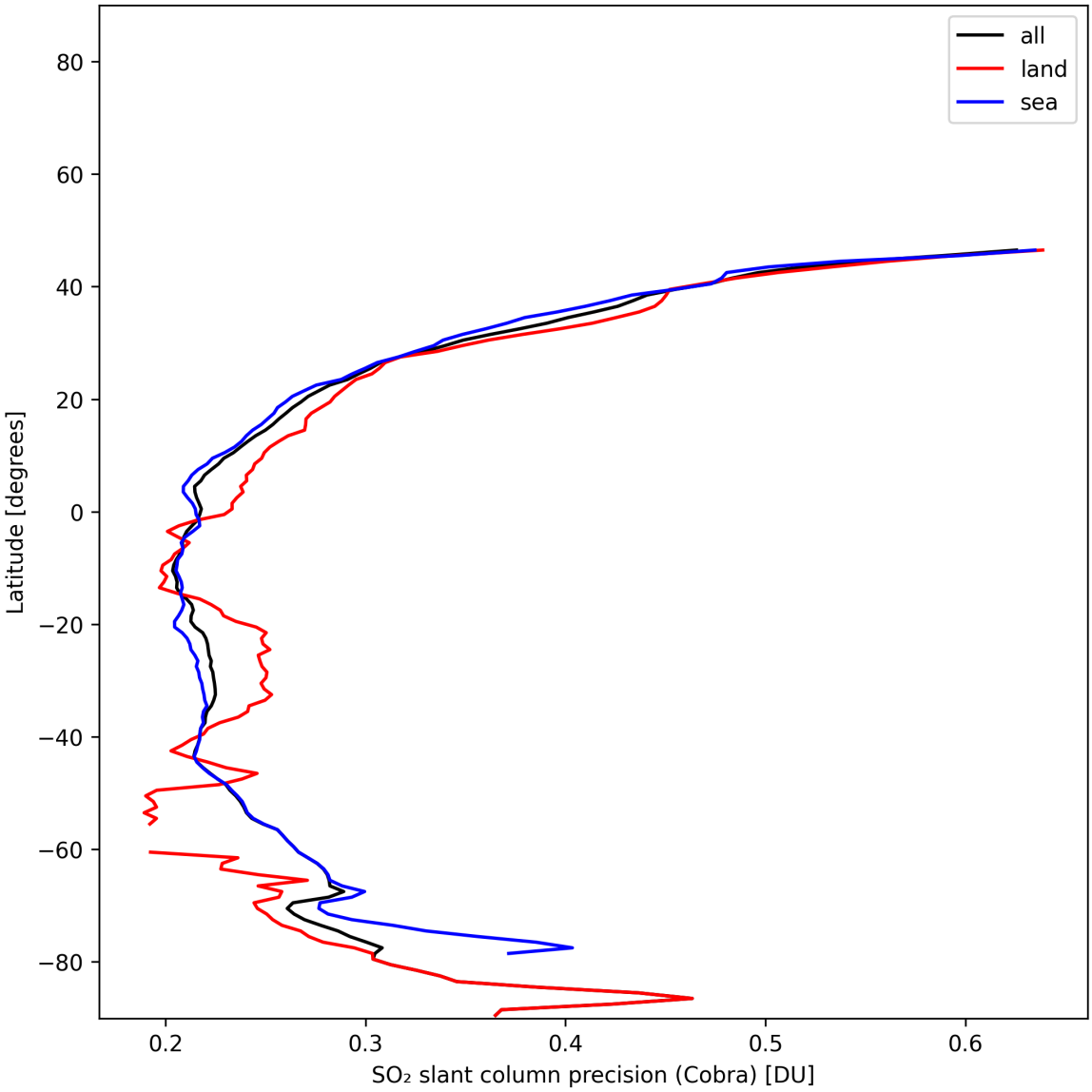

Figure 35: Zonal average of "SO_2 slant column precision (Cobra)" for 2024-12-30 to 2024-12-30.

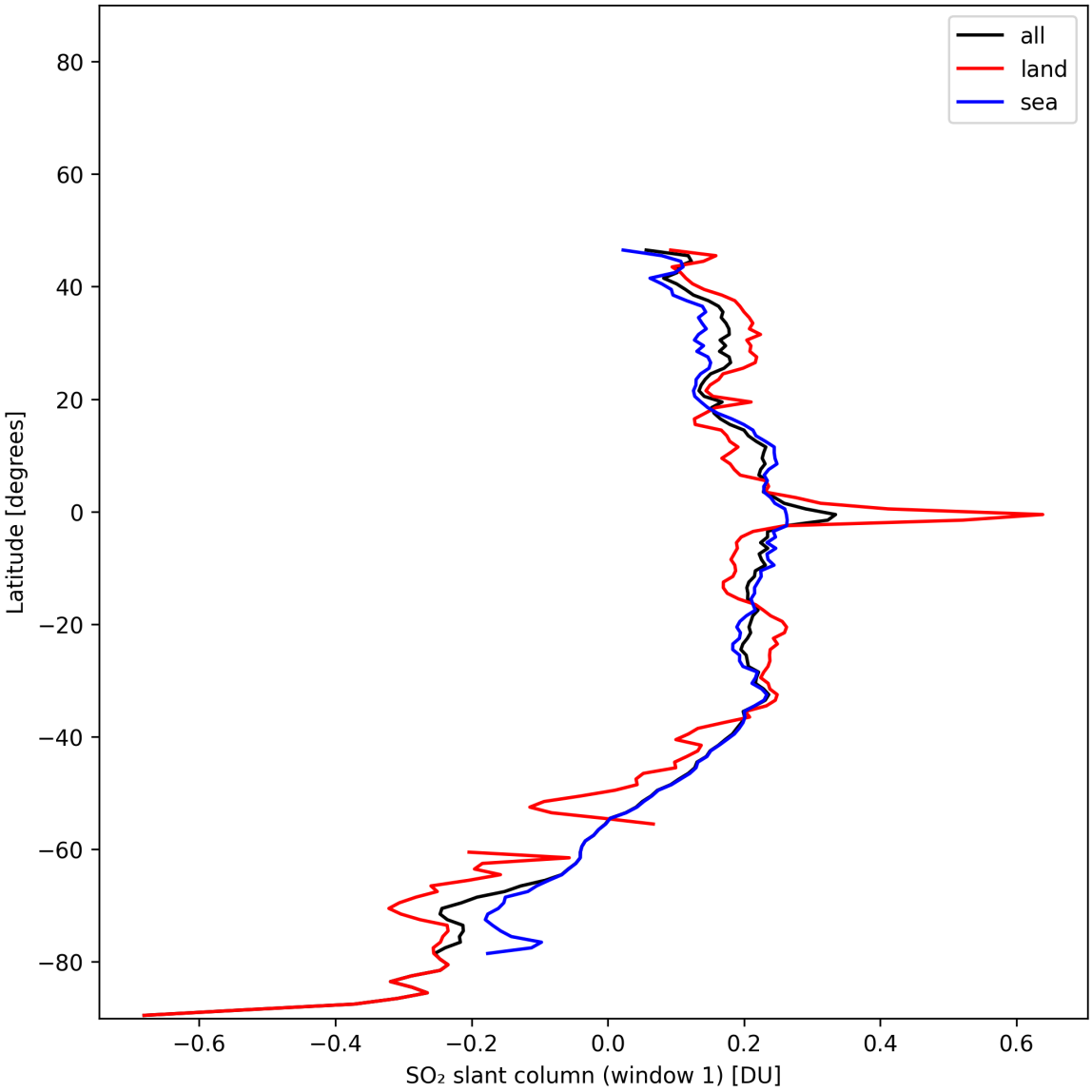

Figure 36: Zonal average of "SO_2 slant column (window 1)" for 2024-12-30 to 2024-12-30.

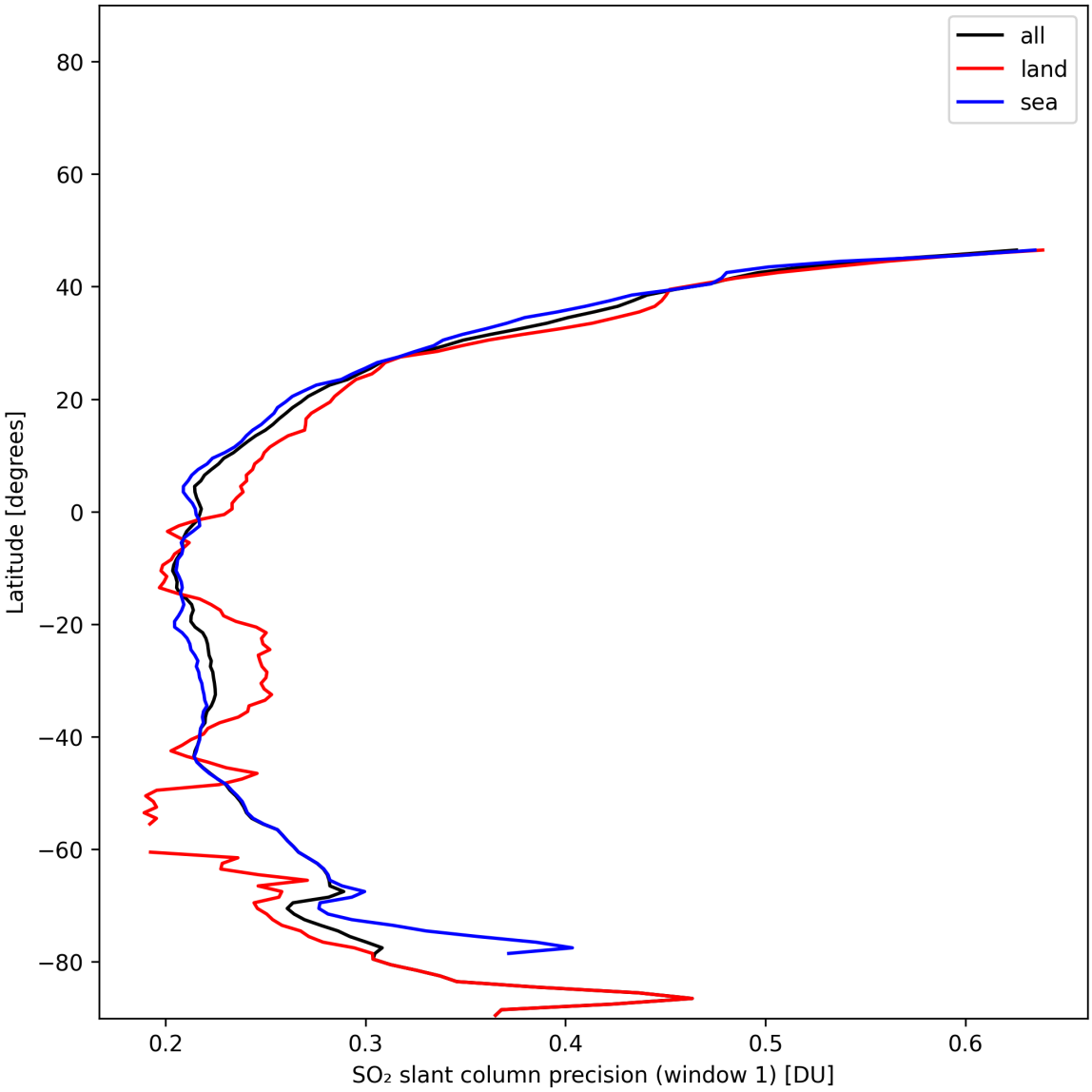

Figure 37: Zonal average of "SO_2 slant column precision (window 1)" for 2024-12-30 to 2024-12-30.

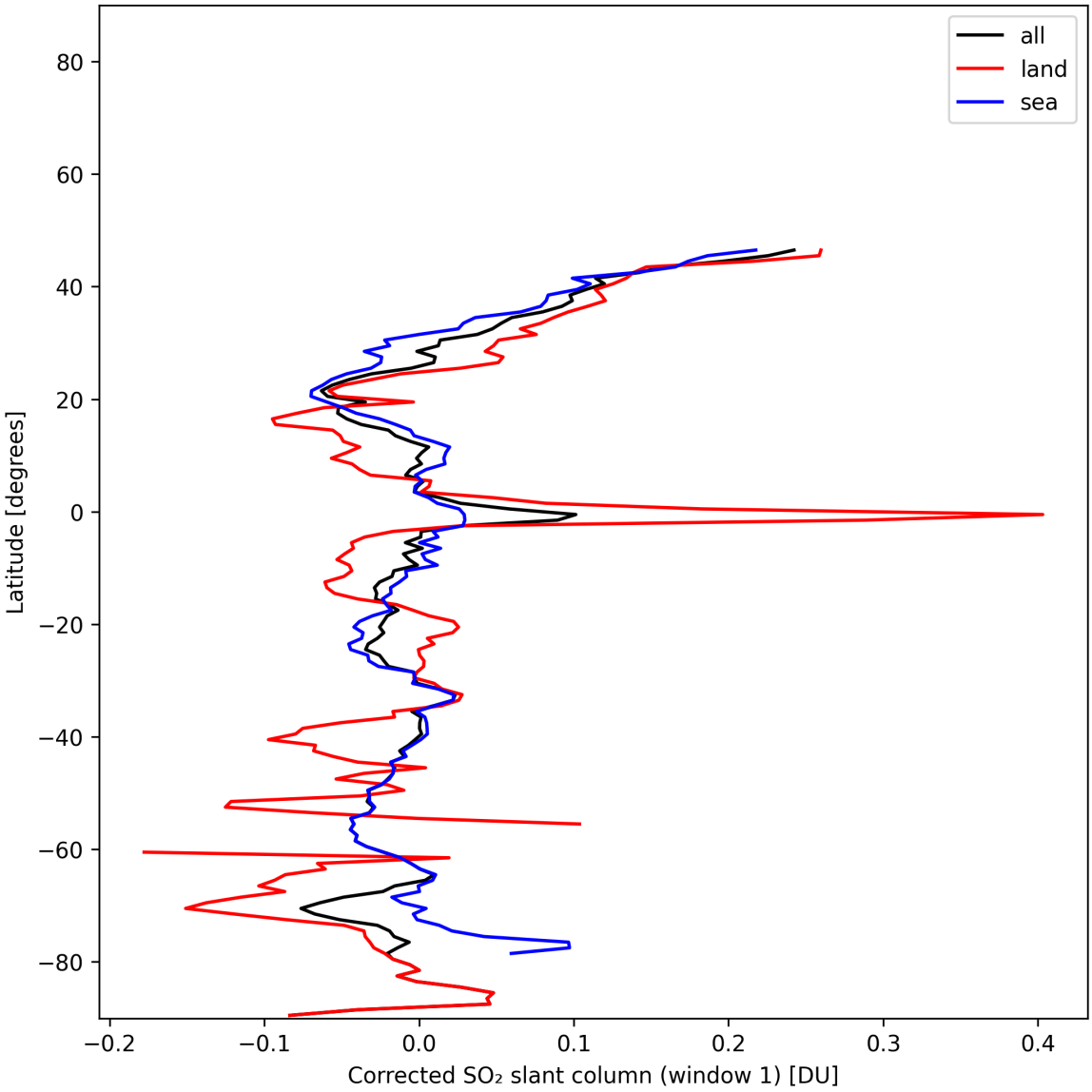

Figure 38: Zonal average of "Corrected SO_2 slant column (window 1)" for 2024-12-30 to 2024-12-30.

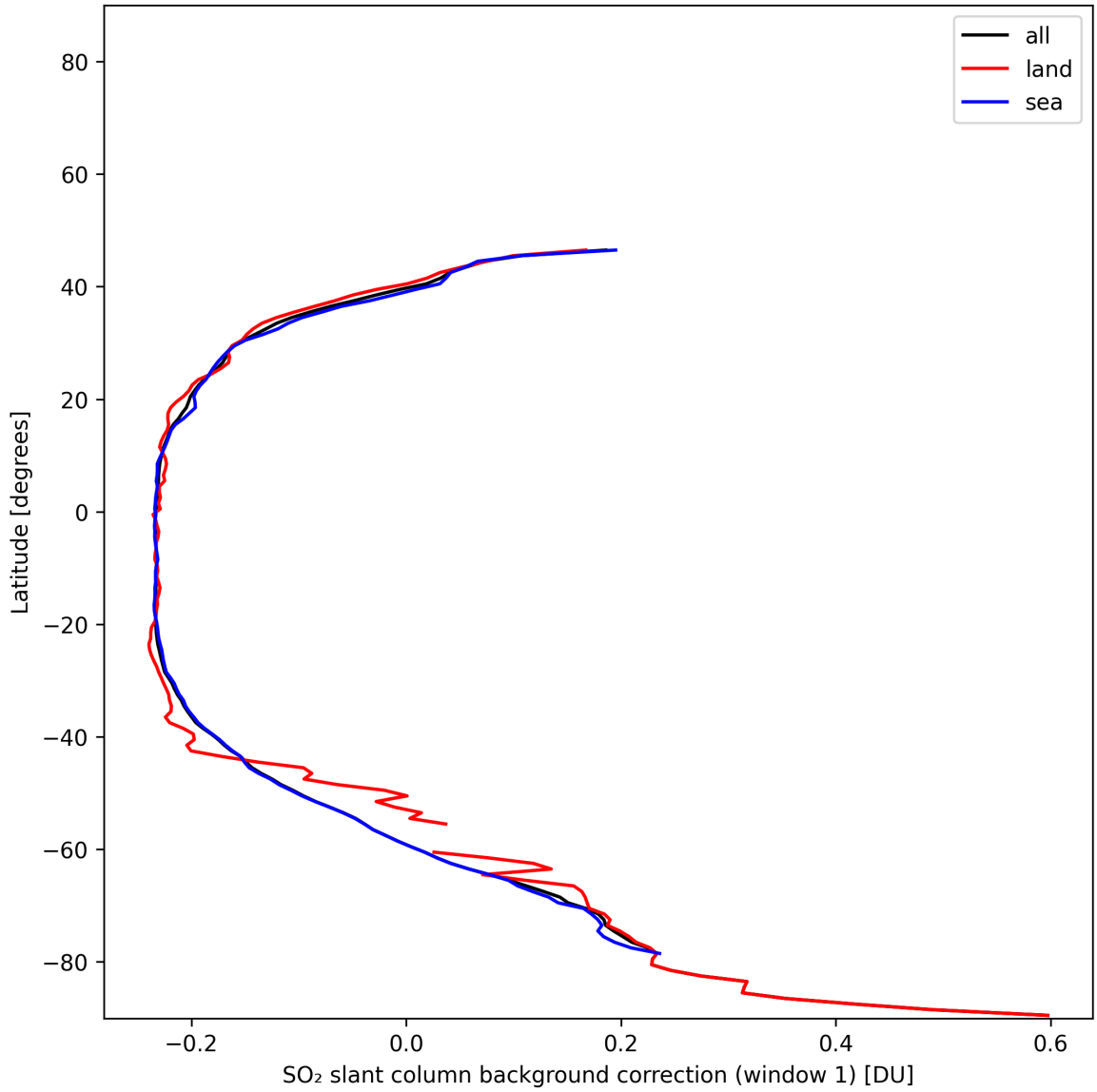

Figure 39: Zonal average of "SO_2 slant column background correction (window 1)" for 2024-12-30 to 2024-12-30.

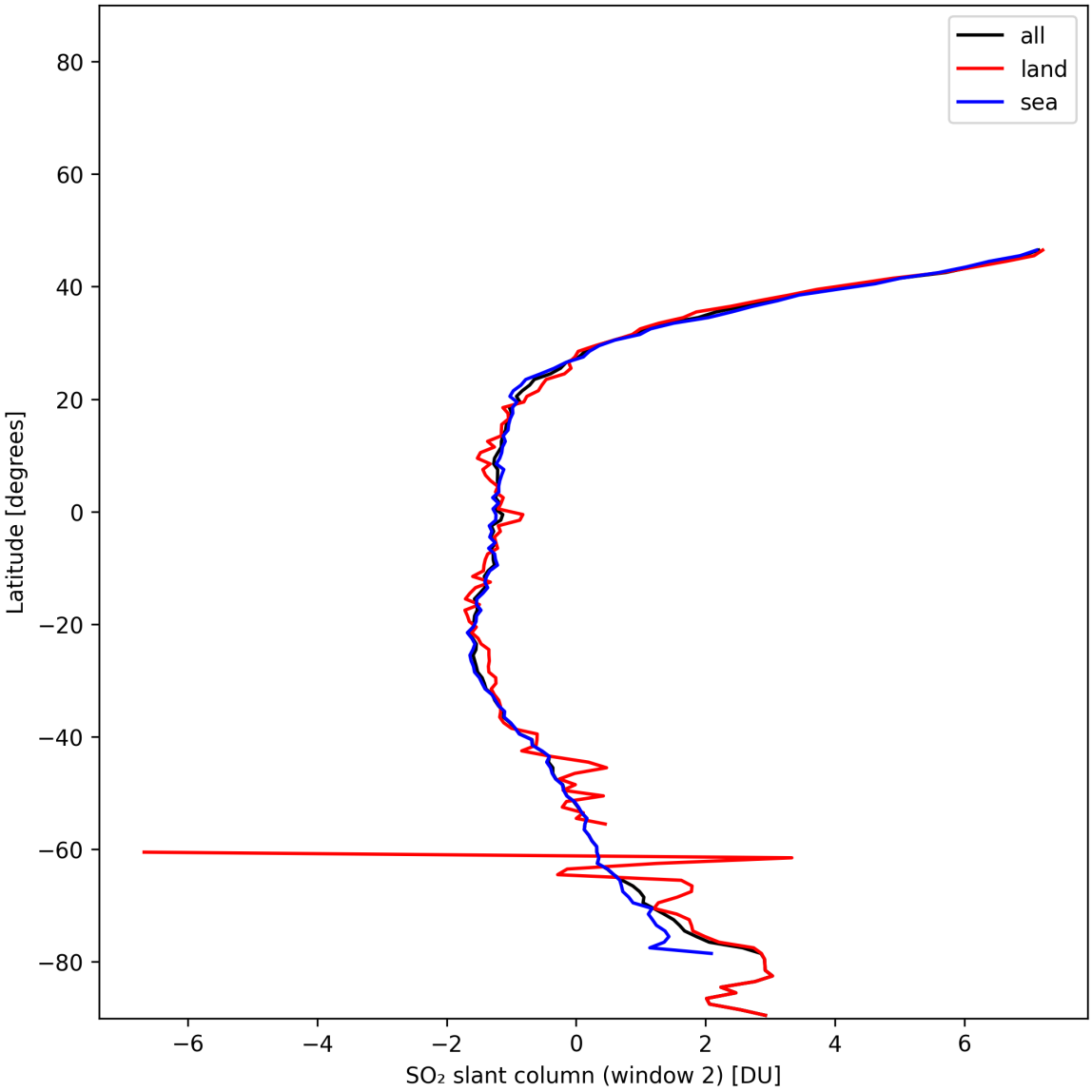

Figure 40: Zonal average of "SO_2 slant column (window 2)" for 2024-12-30 to 2024-12-30.

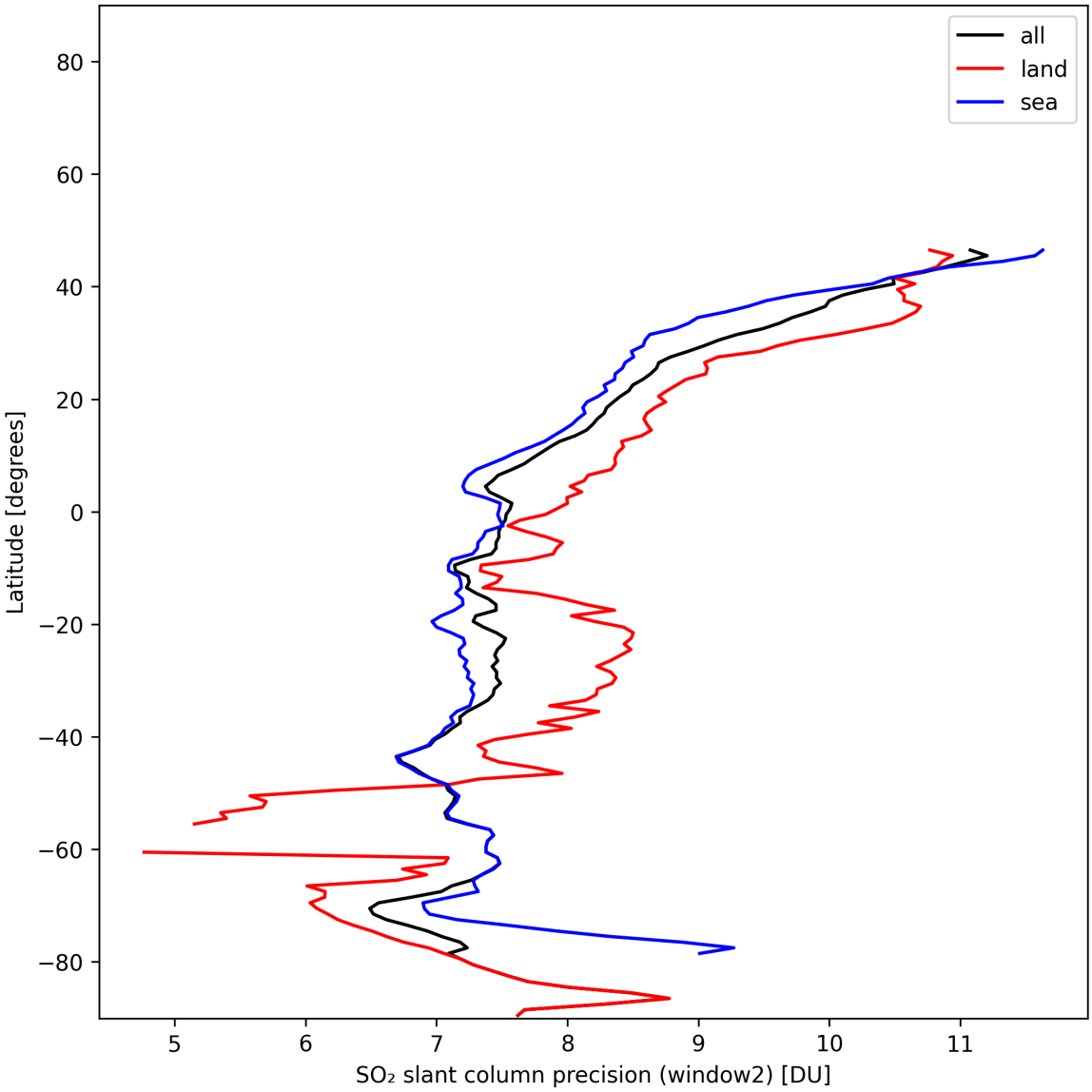

Figure 41: Zonal average of "SO_2 slant column precision (window2)" for 2024-12-30 to 2024-12-30.

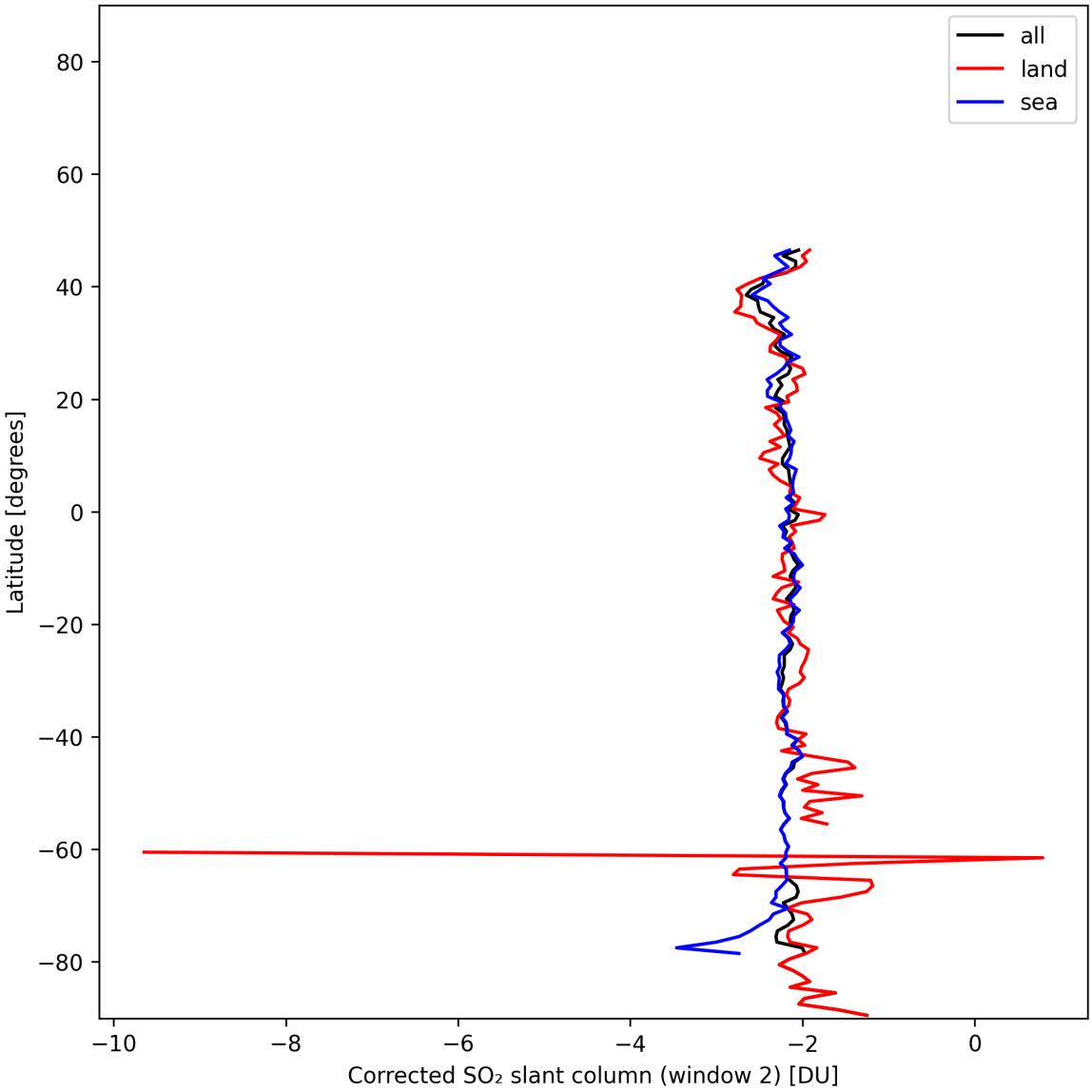

Figure 42: Zonal average of "Corrected SO_2 slant column (window 2)" for 2024-12-30 to 2024-12-30.

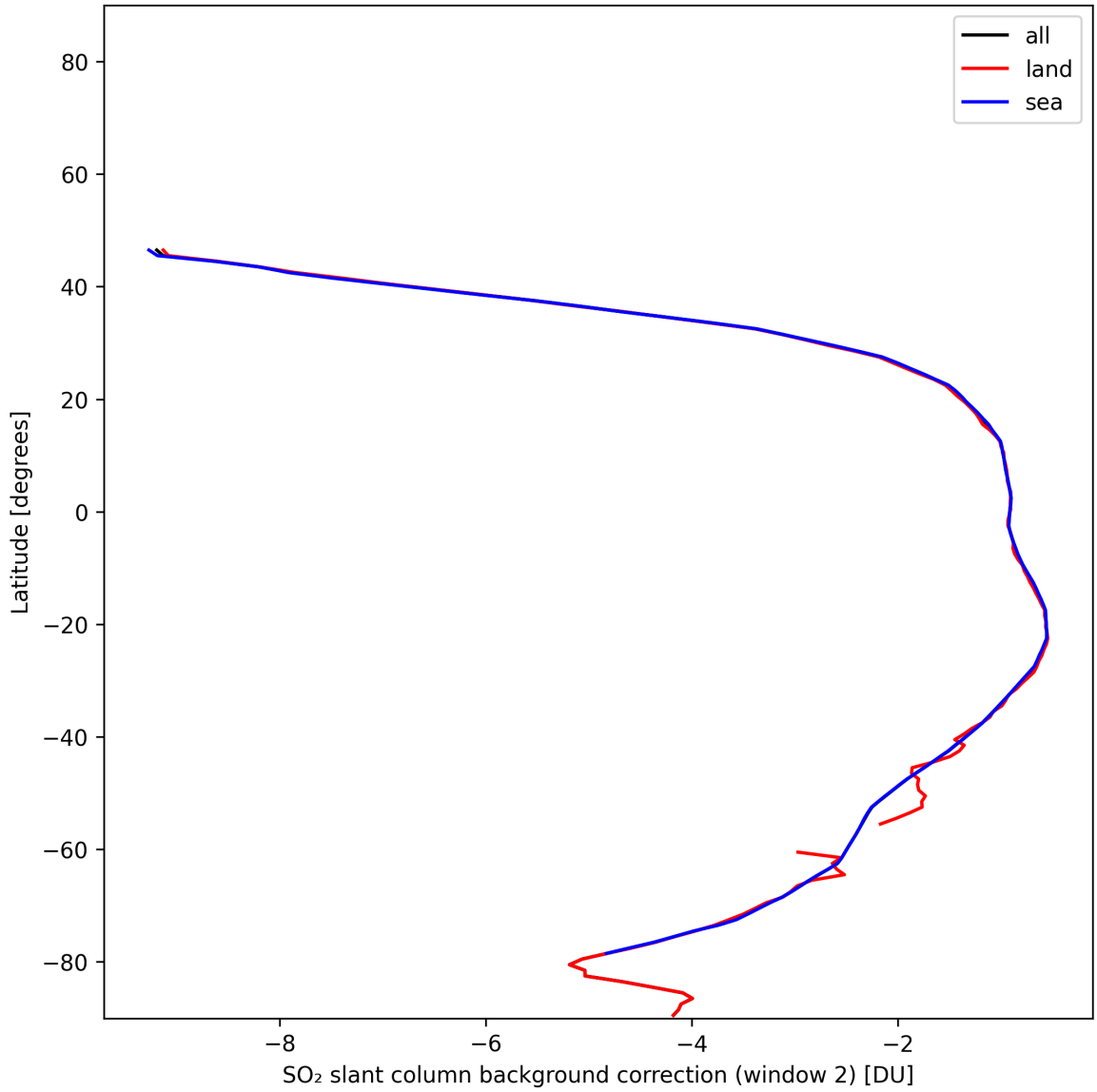

Figure 43: Zonal average of "SO_2 slant column background correction (window 2)" for 2024-12-30 to 2024-12-30.

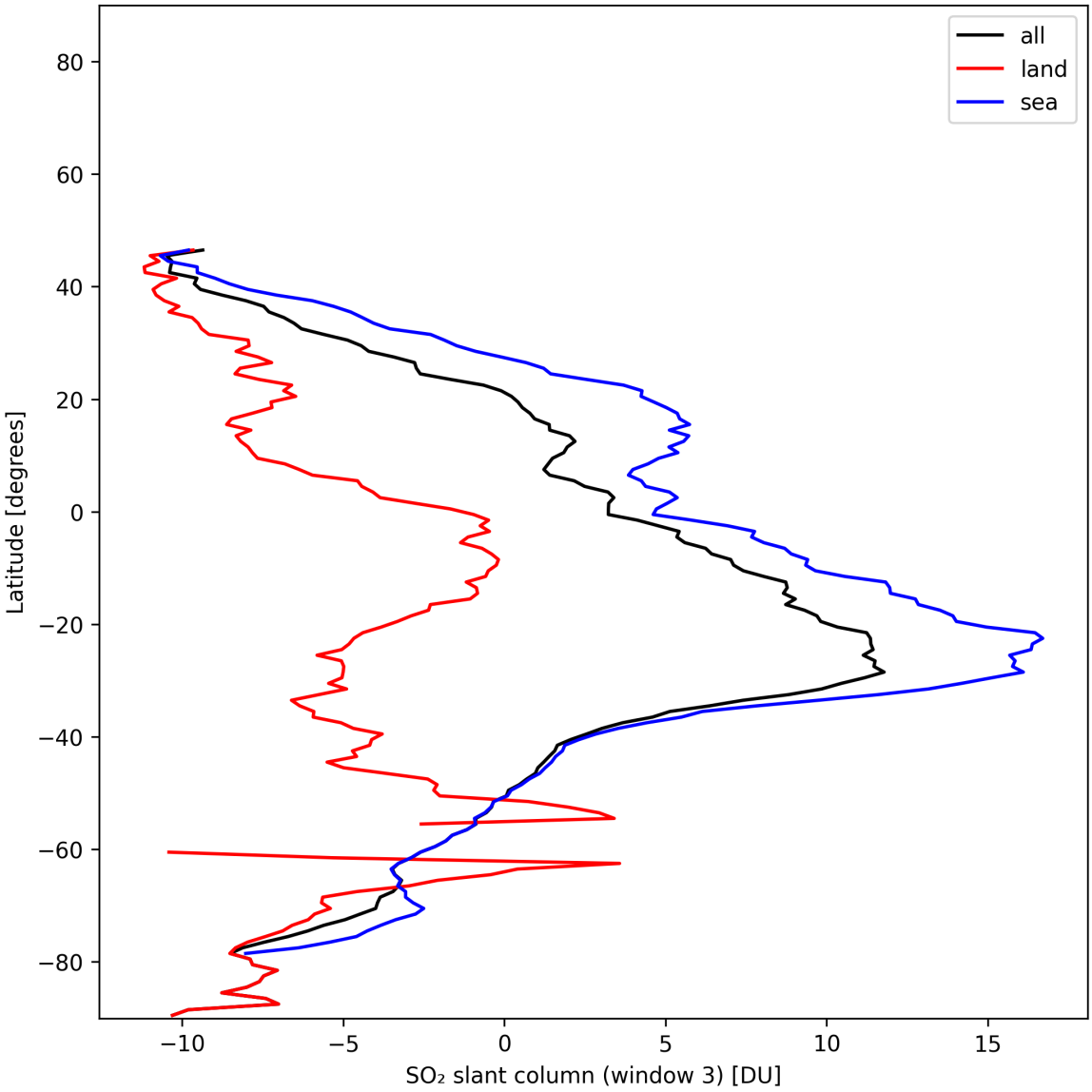

Figure 44: Zonal average of "SO_2 slant column (window 3)" for 2024-12-30 to 2024-12-30.

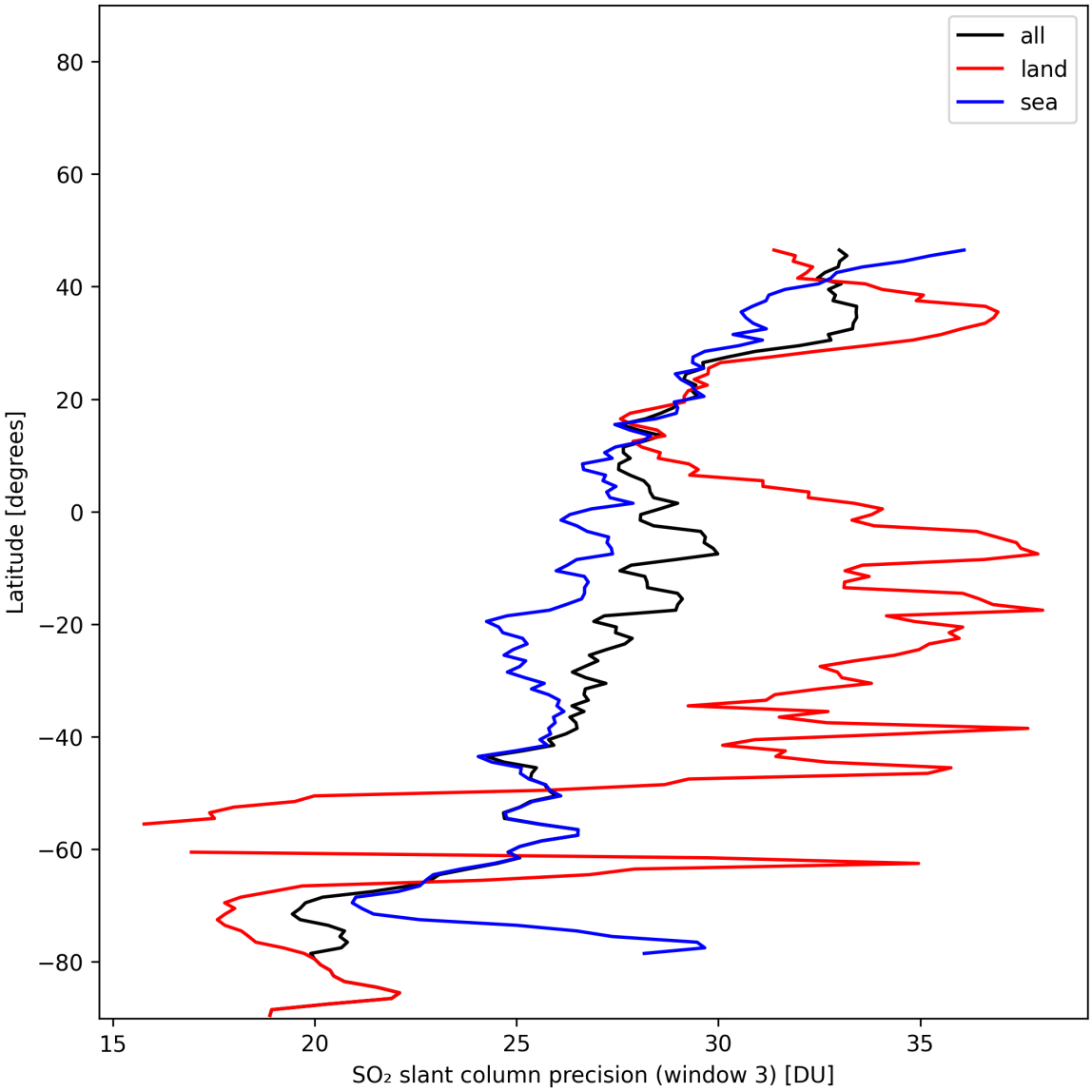

Figure 45: Zonal average of "SO_2 slant column precision (window 3)" for 2024-12-30 to 2024-12-30.

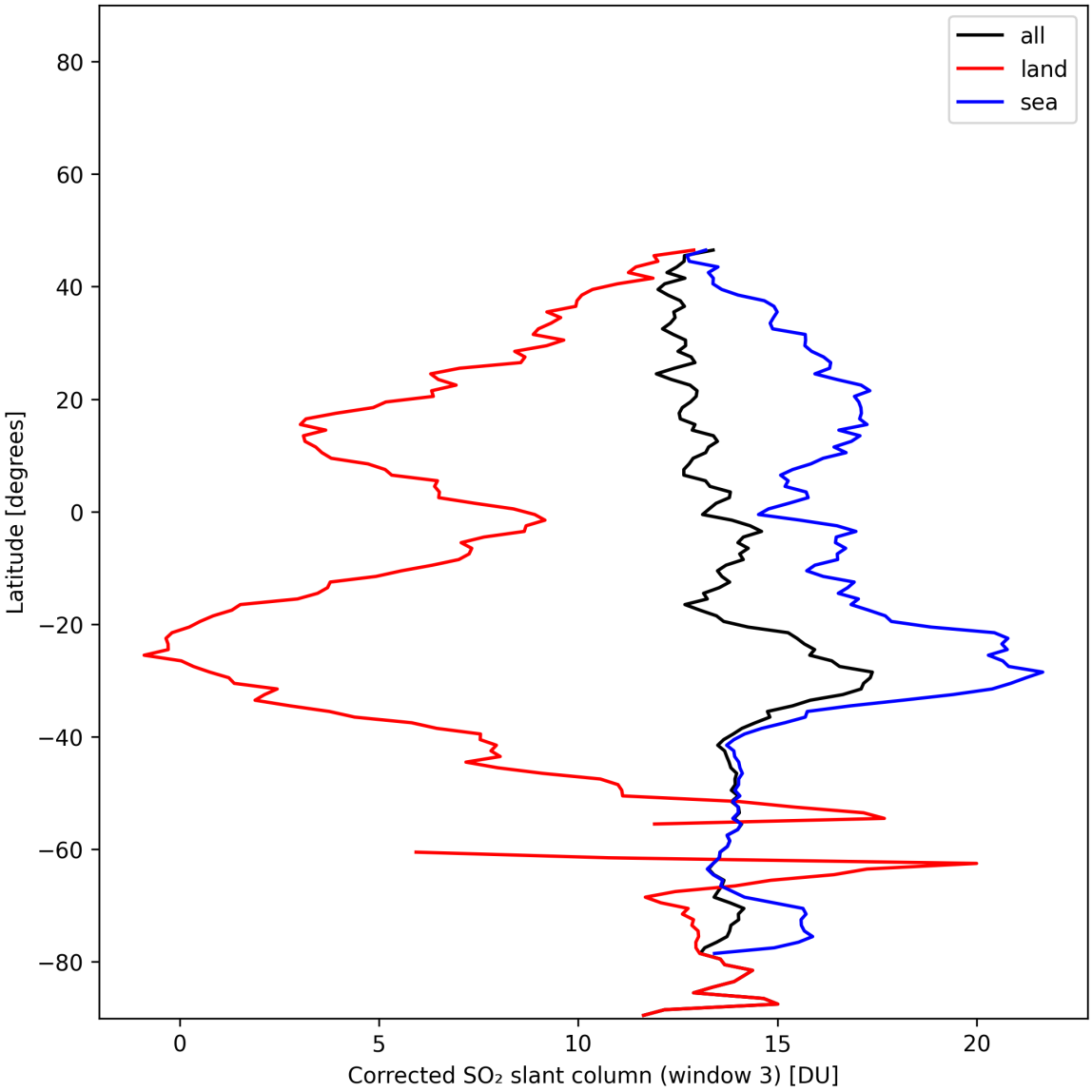

Figure 46: Zonal average of "Corrected SO_2 slant column (window 3)" for 2024-12-30 to 2024-12-30.

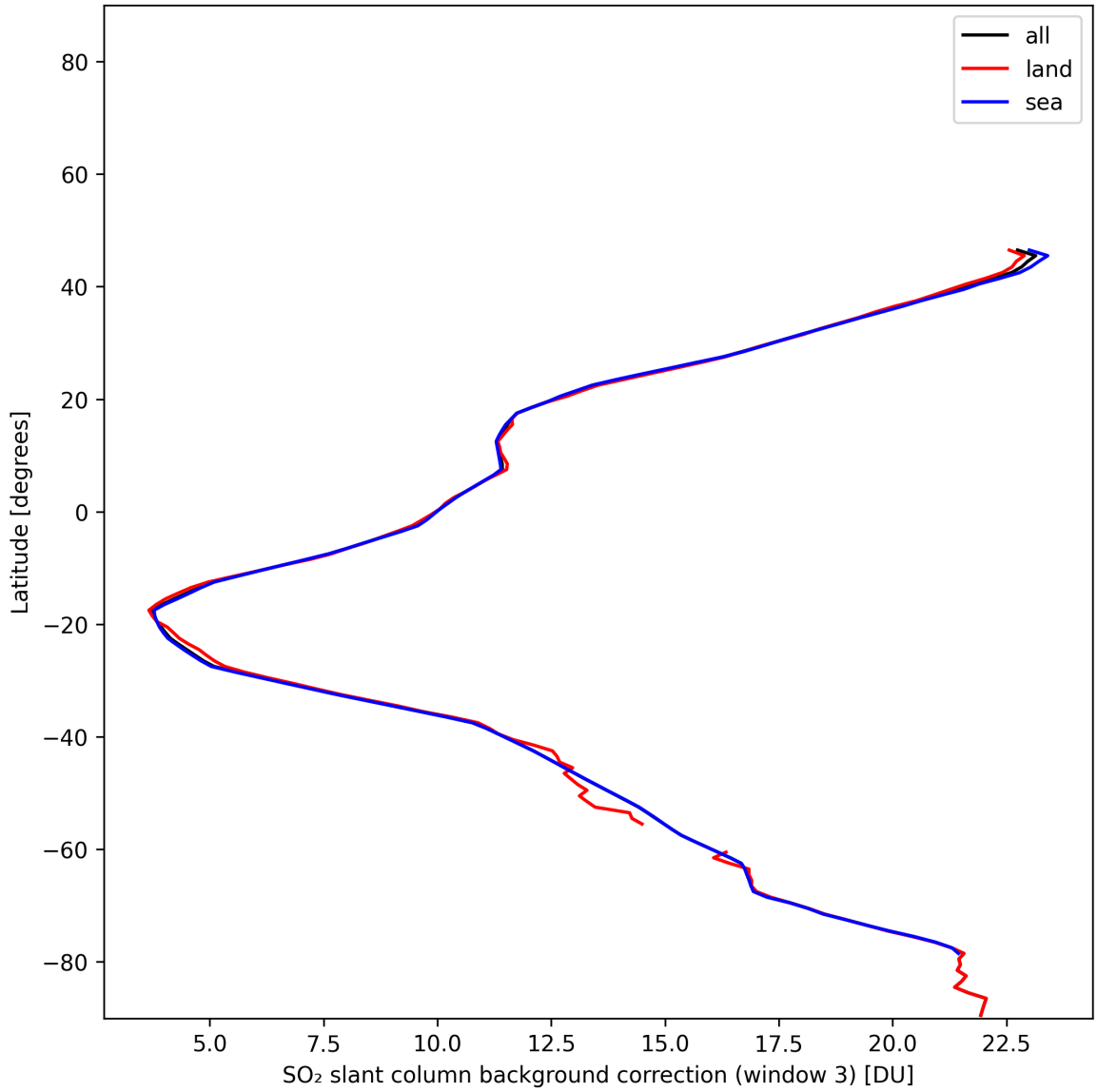

Figure 47: Zonal average of "SO_2 slant column background correction (window 3)" for 2024-12-30 to 2024-12-30.

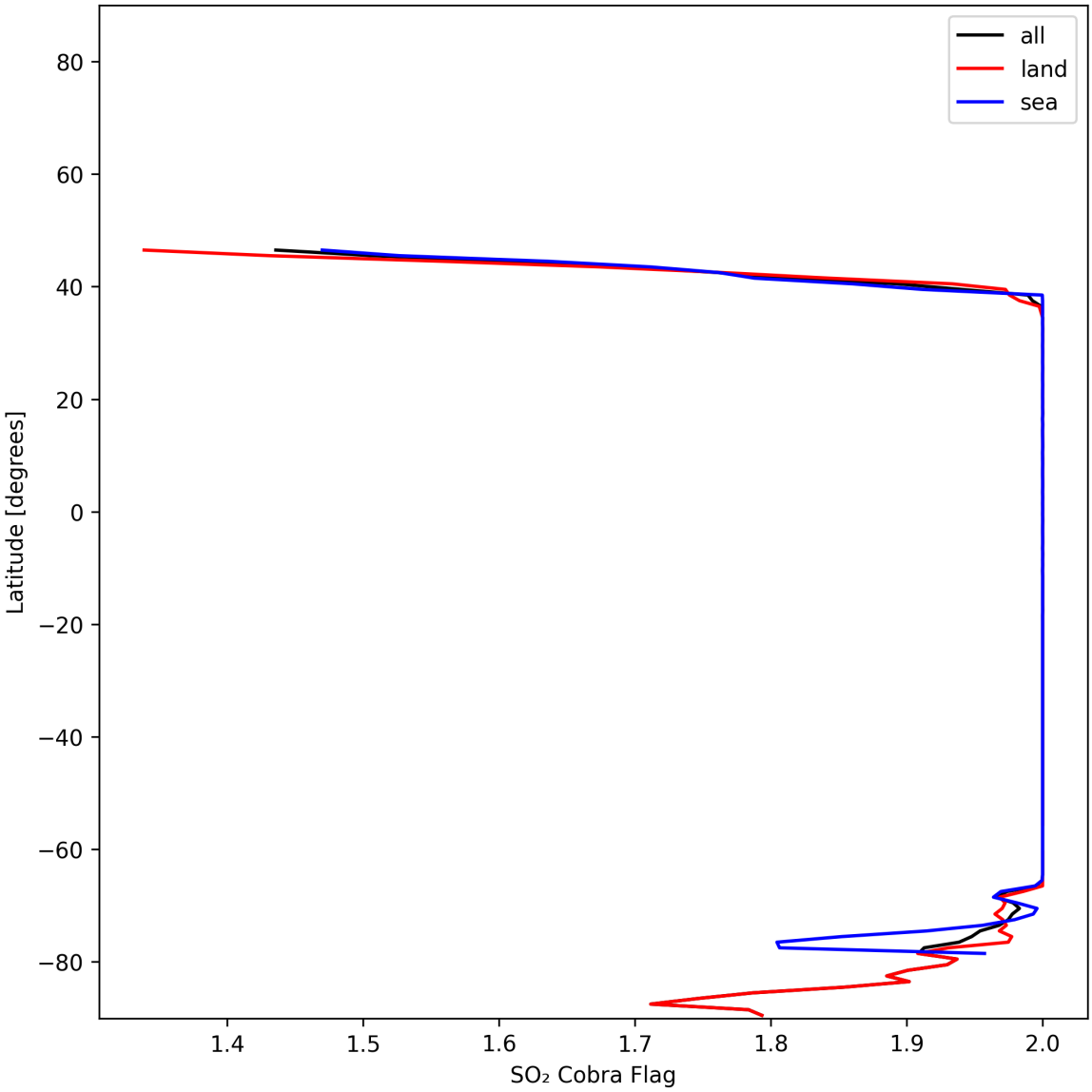

Figure 48: Zonal average of "SO_2 Cobra Flag" for 2024-12-30 to 2024-12-30.

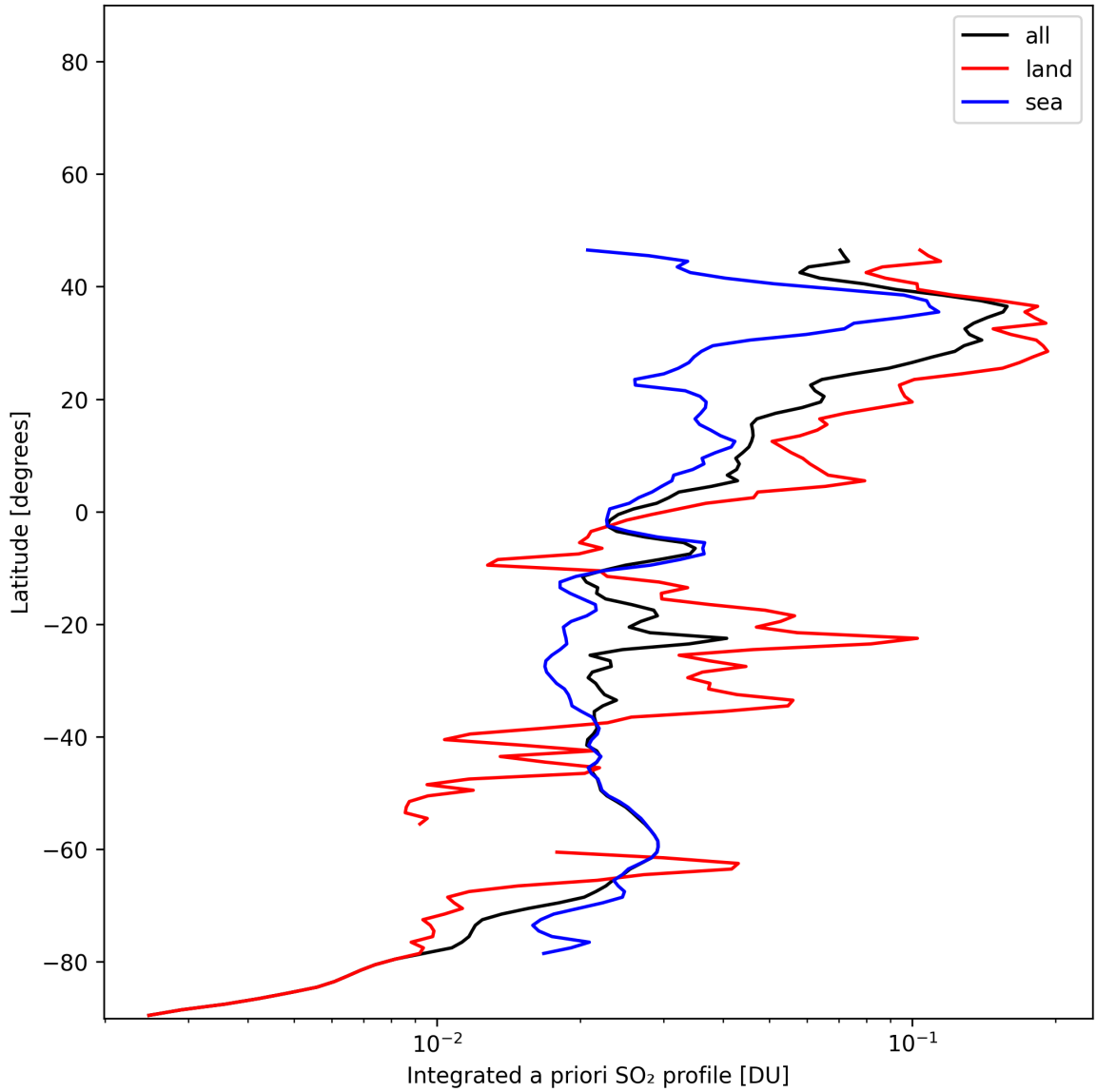

Figure 49: Zonal average of “Integrated a priori SO_2 profile” for 2024-12-30 to 2024-12-30.

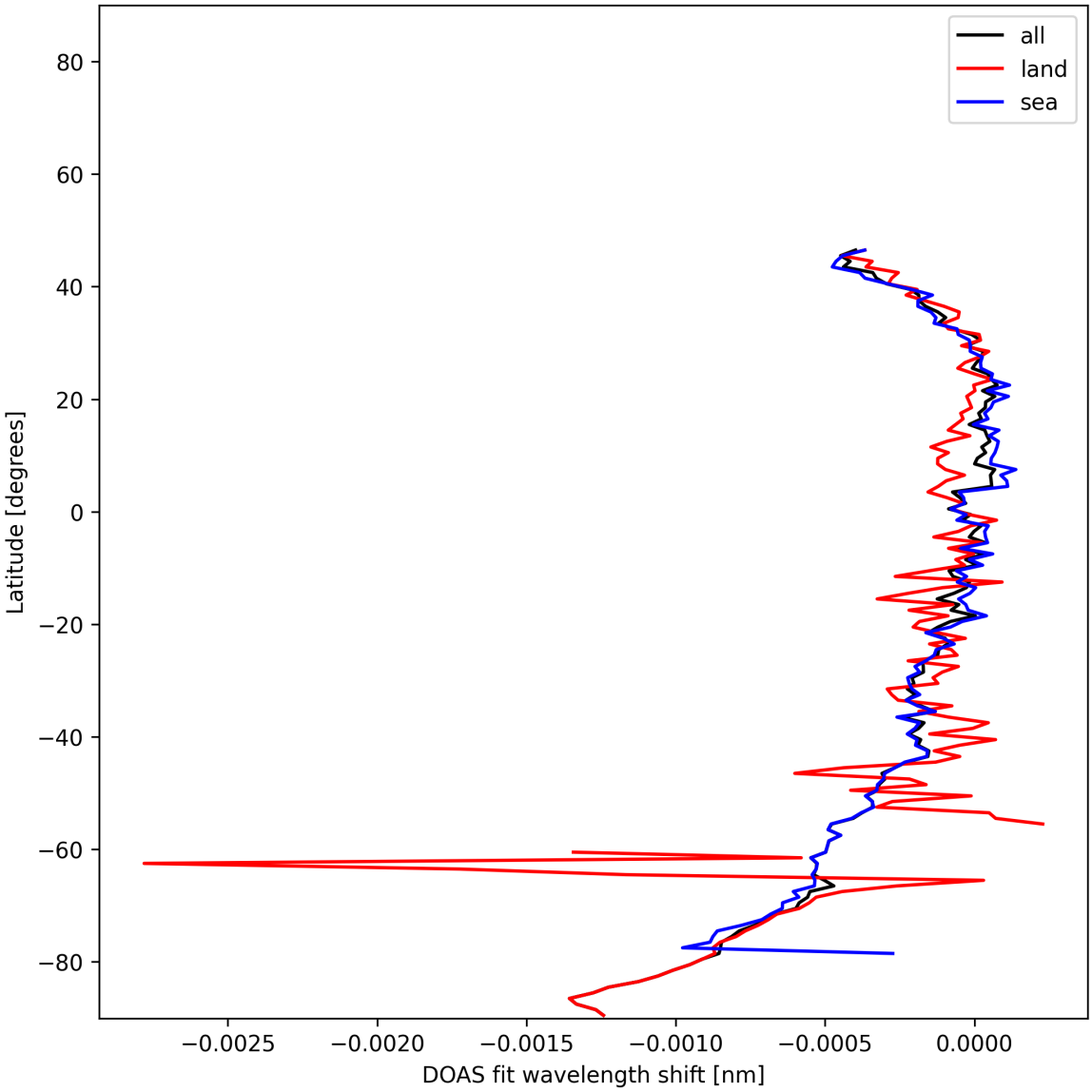

Figure 50: Zonal average of “DOAS fit wavelength shift” for 2024-12-30 to 2024-12-30.

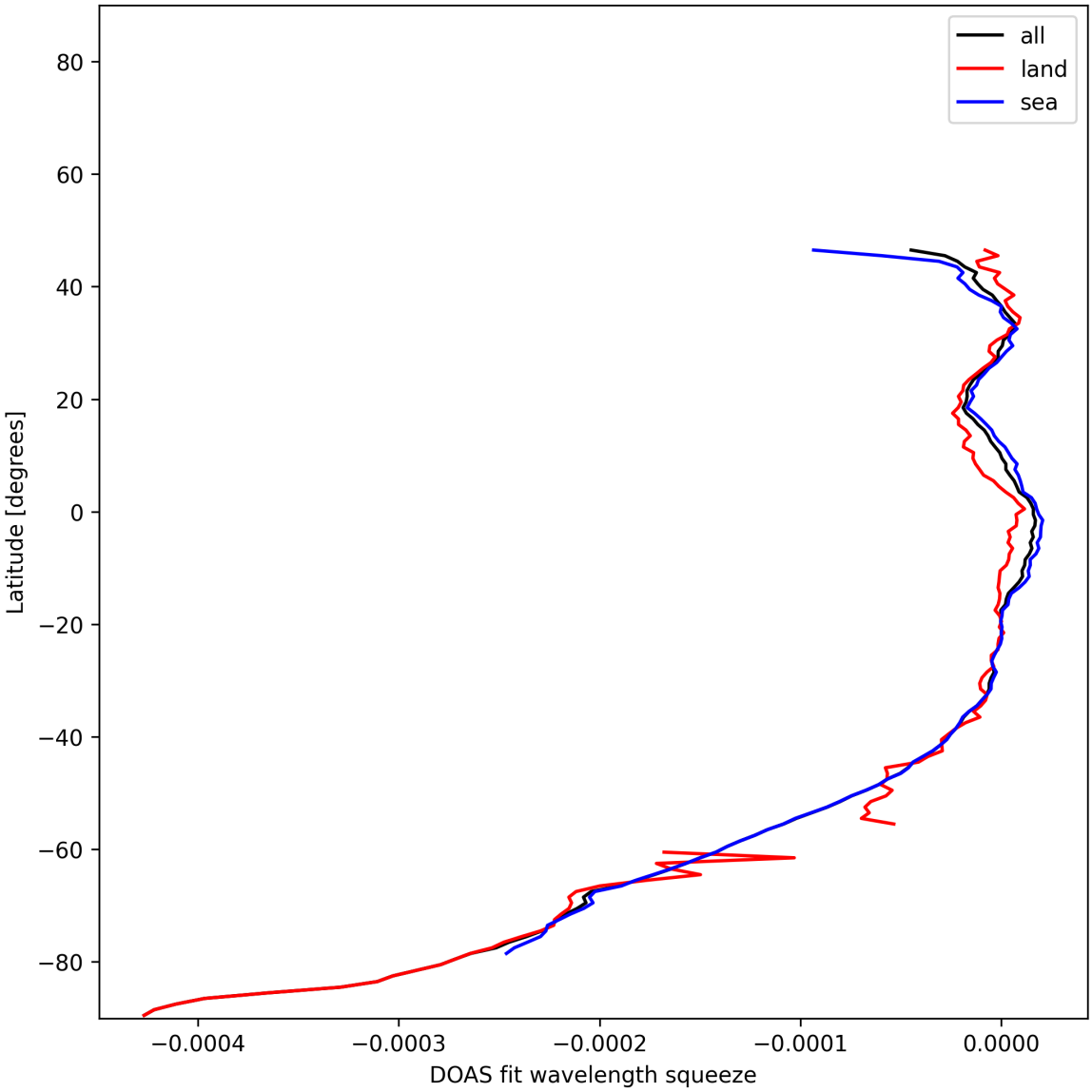

Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2024-12-30 to 2024-12-30.

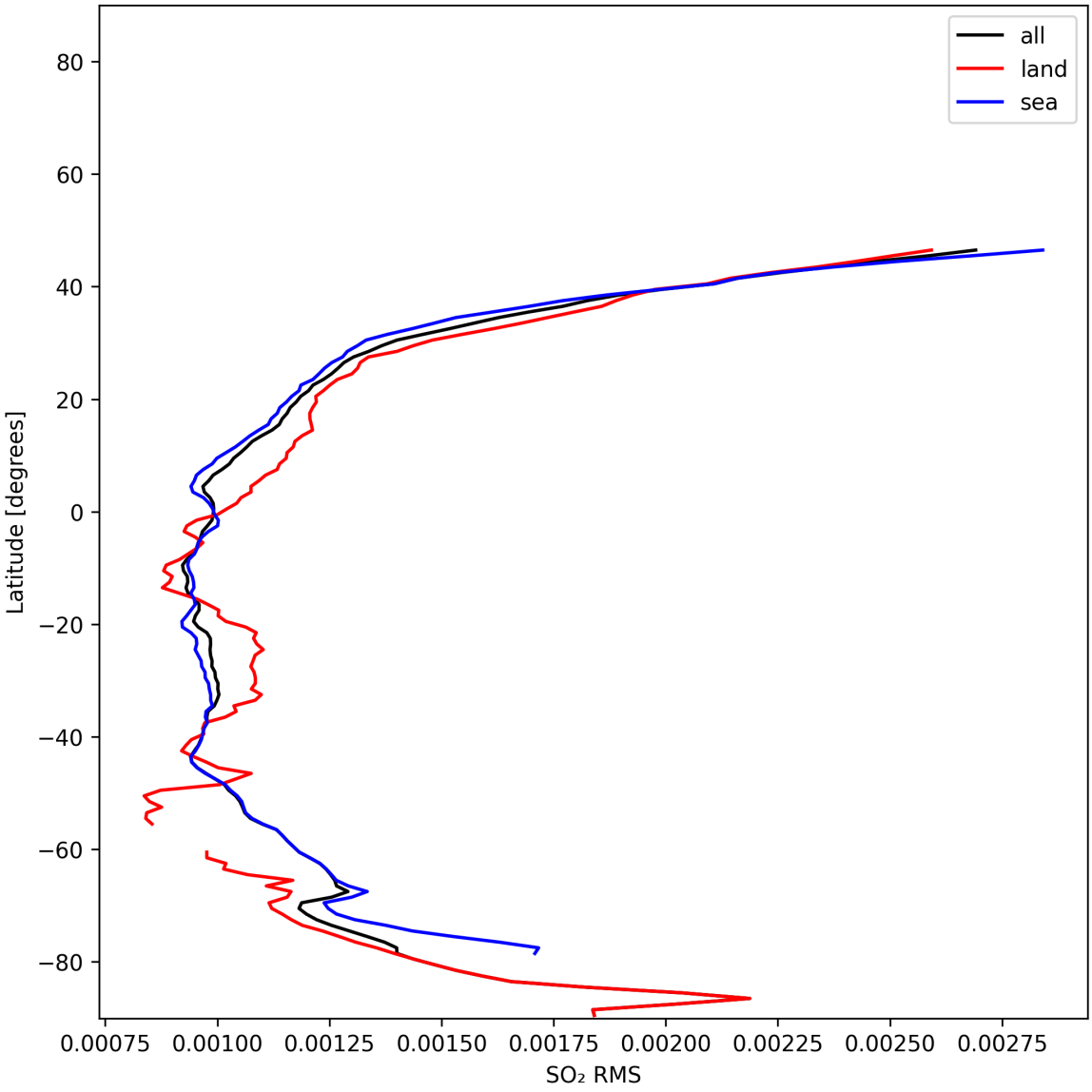

Figure 52: Zonal average of "SO_2 RMS" for 2024-12-30 to 2024-12-30.

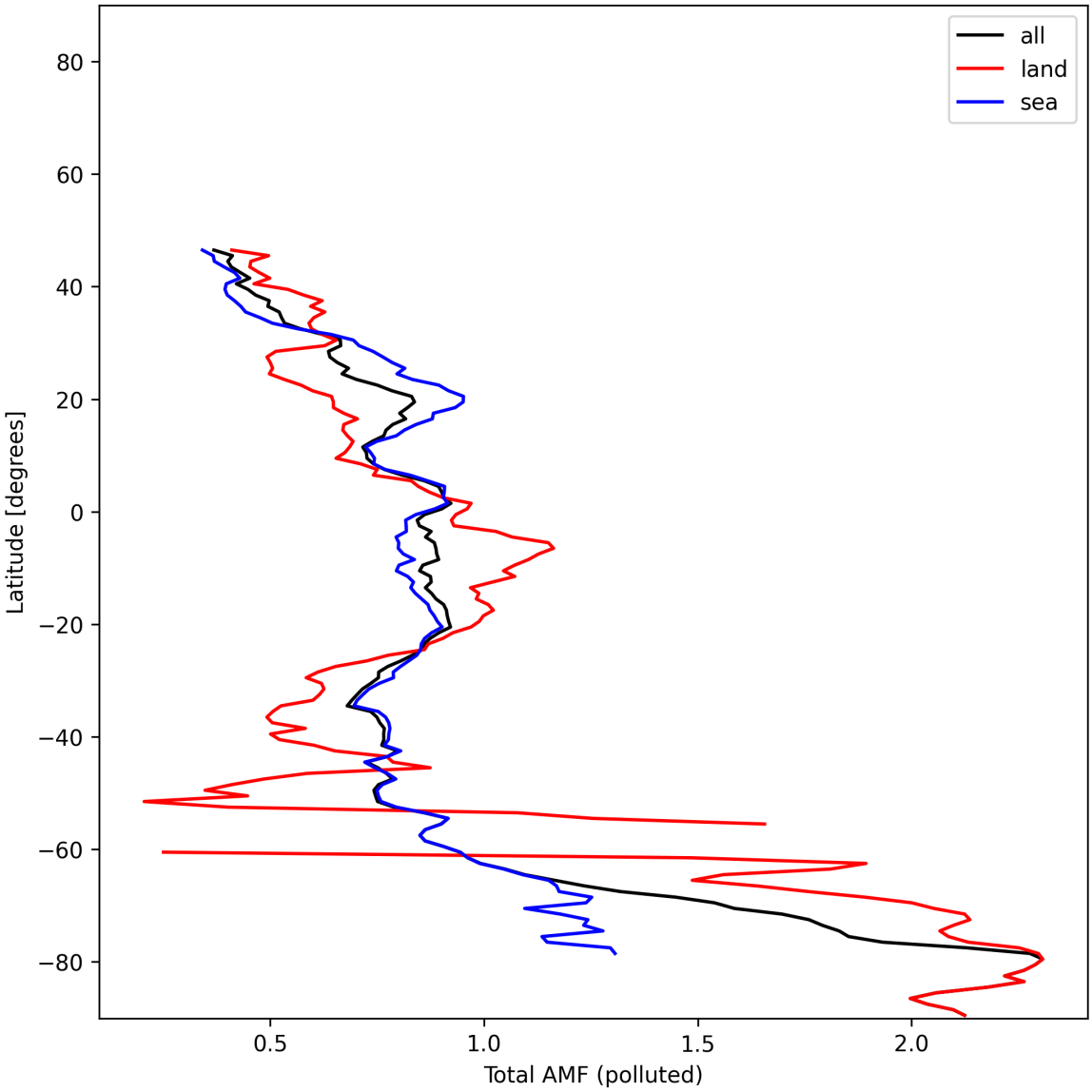

Figure 53: Zonal average of “Total AMF (polluted)” for 2024-12-30 to 2024-12-30.

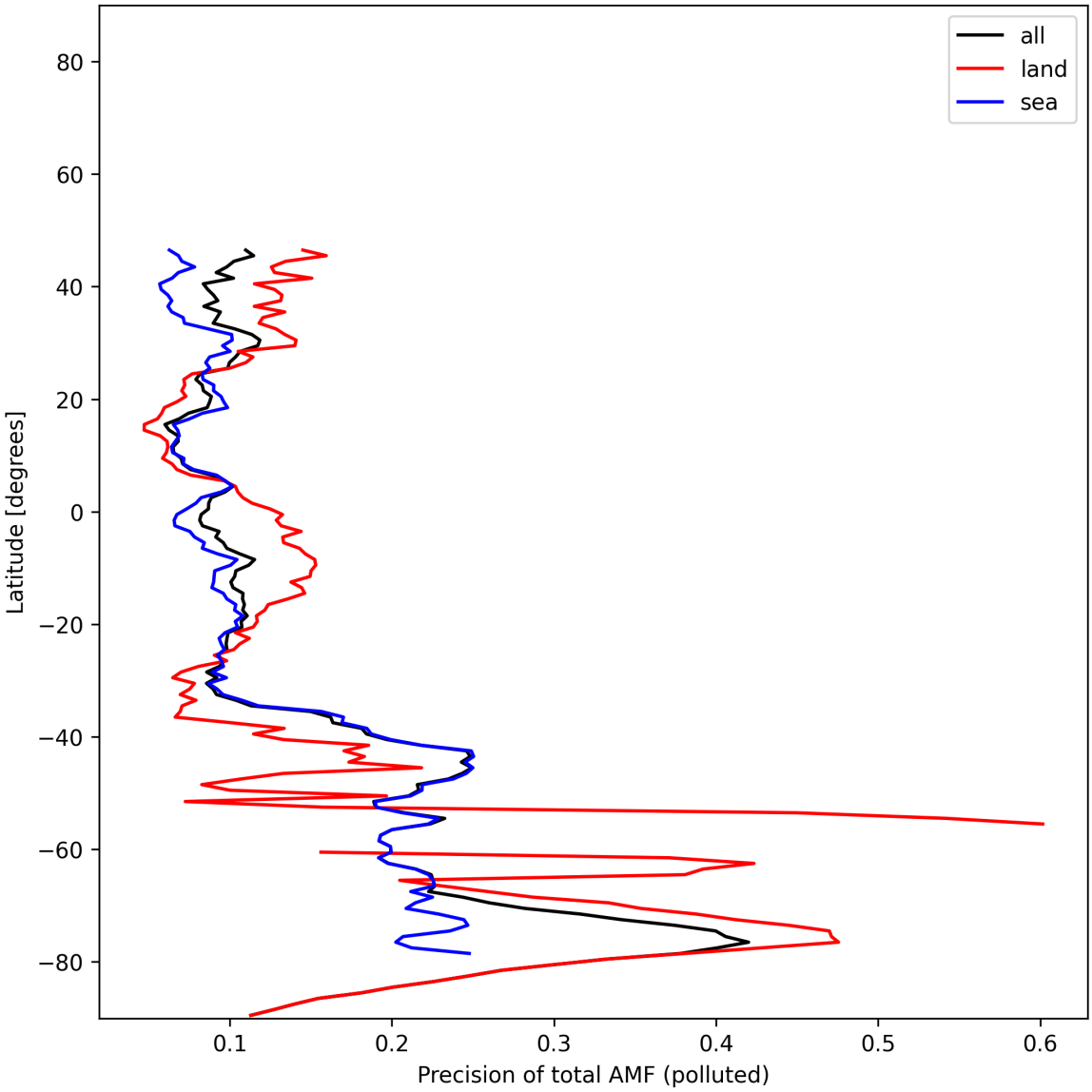

Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2024-12-30 to 2024-12-30.

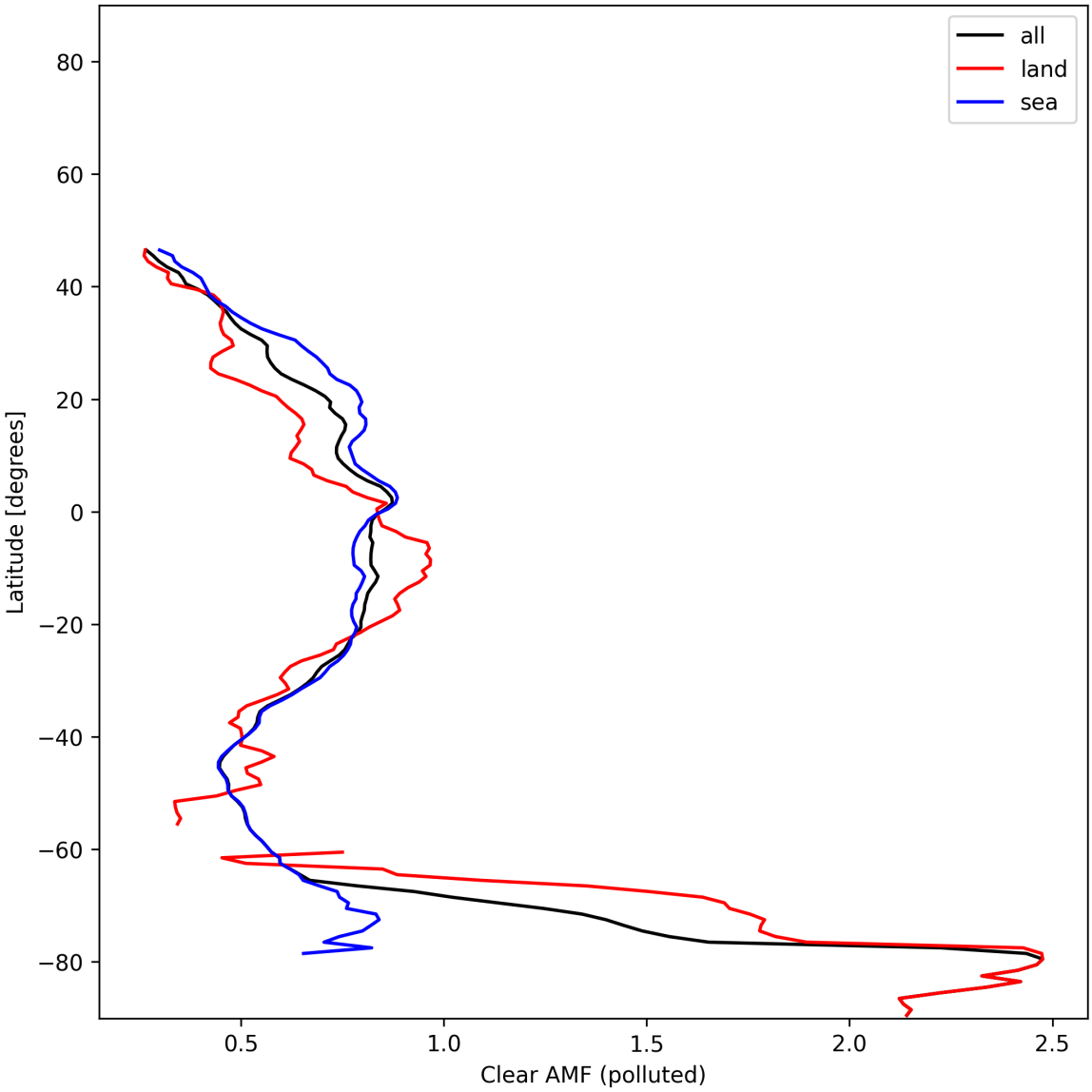

Figure 55: Zonal average of “Clear AMF (polluted)” for 2024-12-30 to 2024-12-30.

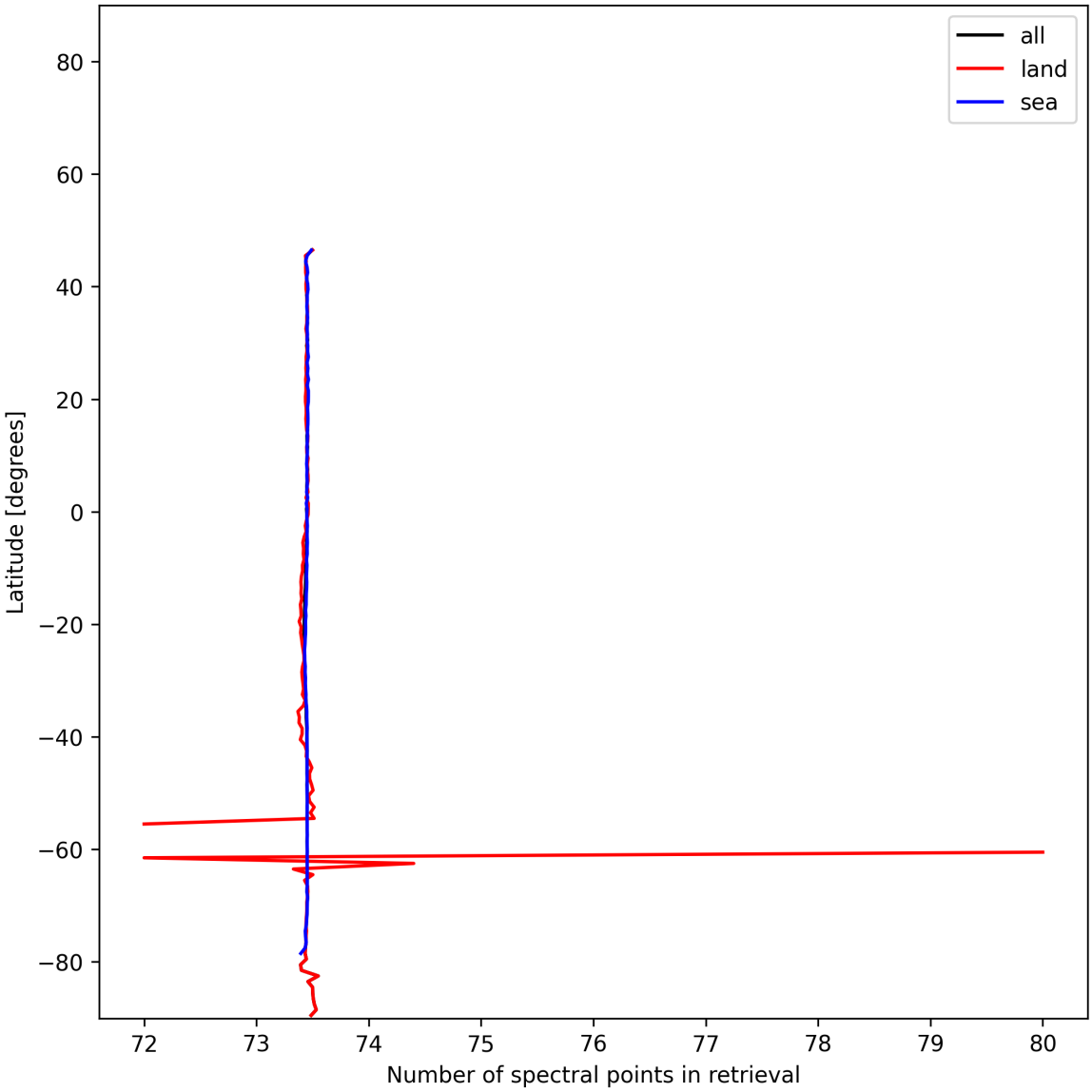

Figure 56: Zonal average of “Number of spectral points in retrieval” for 2024-12-30 to 2024-12-30.

8 Histograms

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

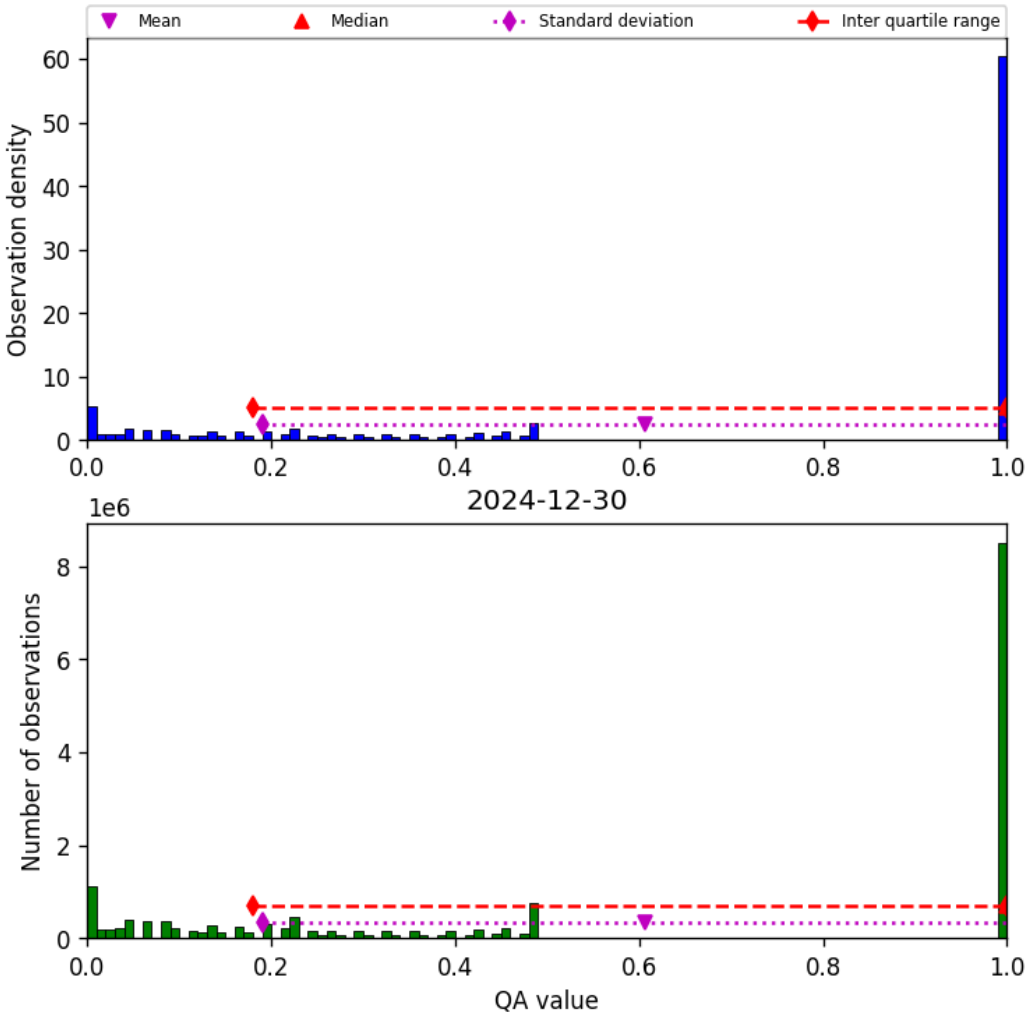

Figure 57: Histogram of “QA value” for 2024-12-30 to 2024-12-30

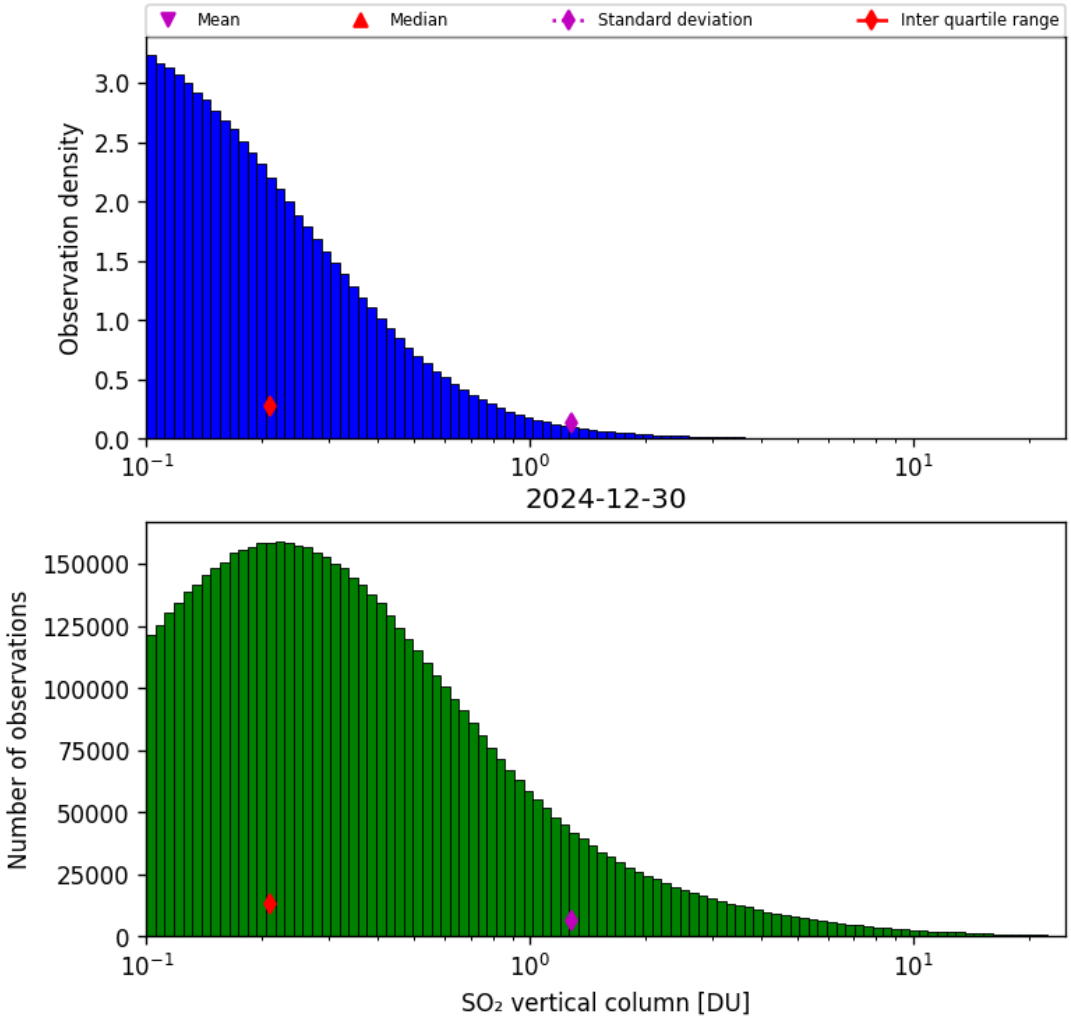

Figure 58: Histogram of "SO_2 vertical column" for 2024-12-30 to 2024-12-30

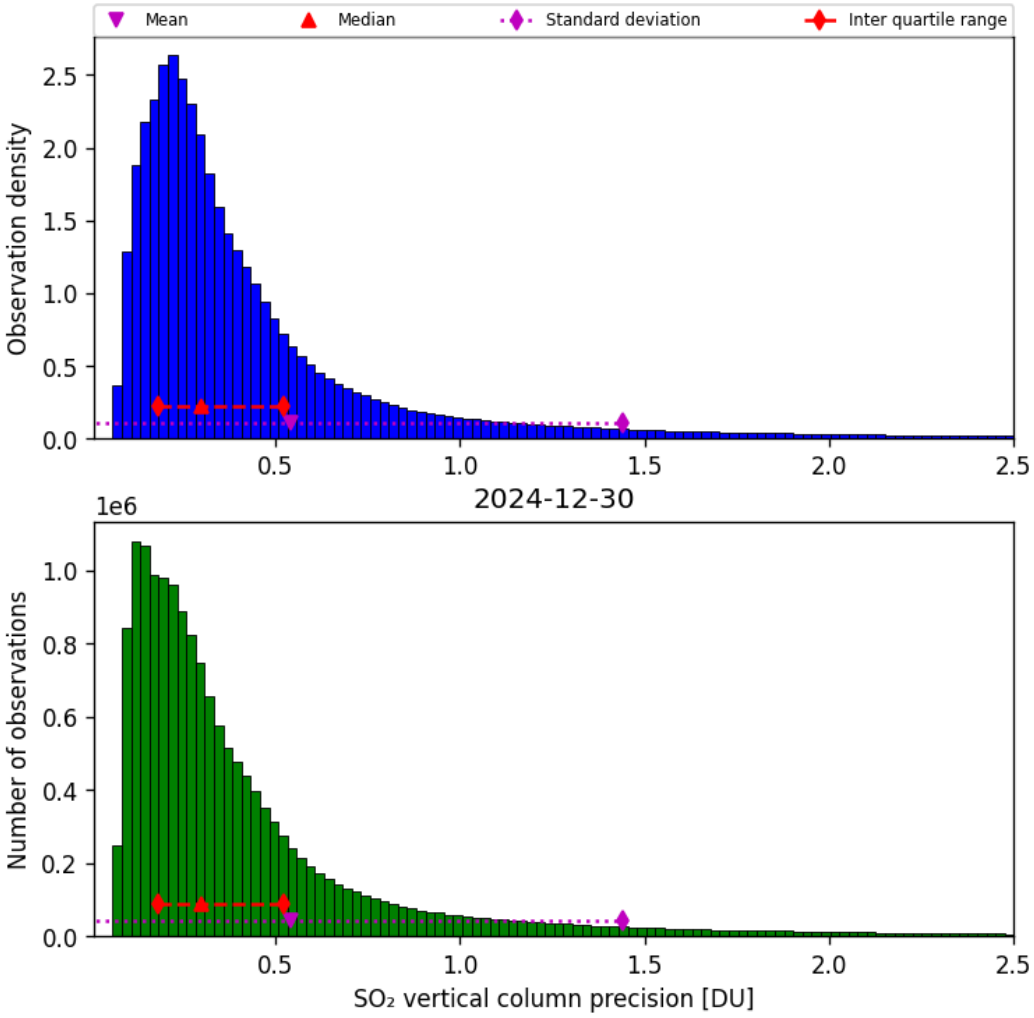

Figure 59: Histogram of "SO_2 vertical column precision" for 2024-12-30 to 2024-12-30

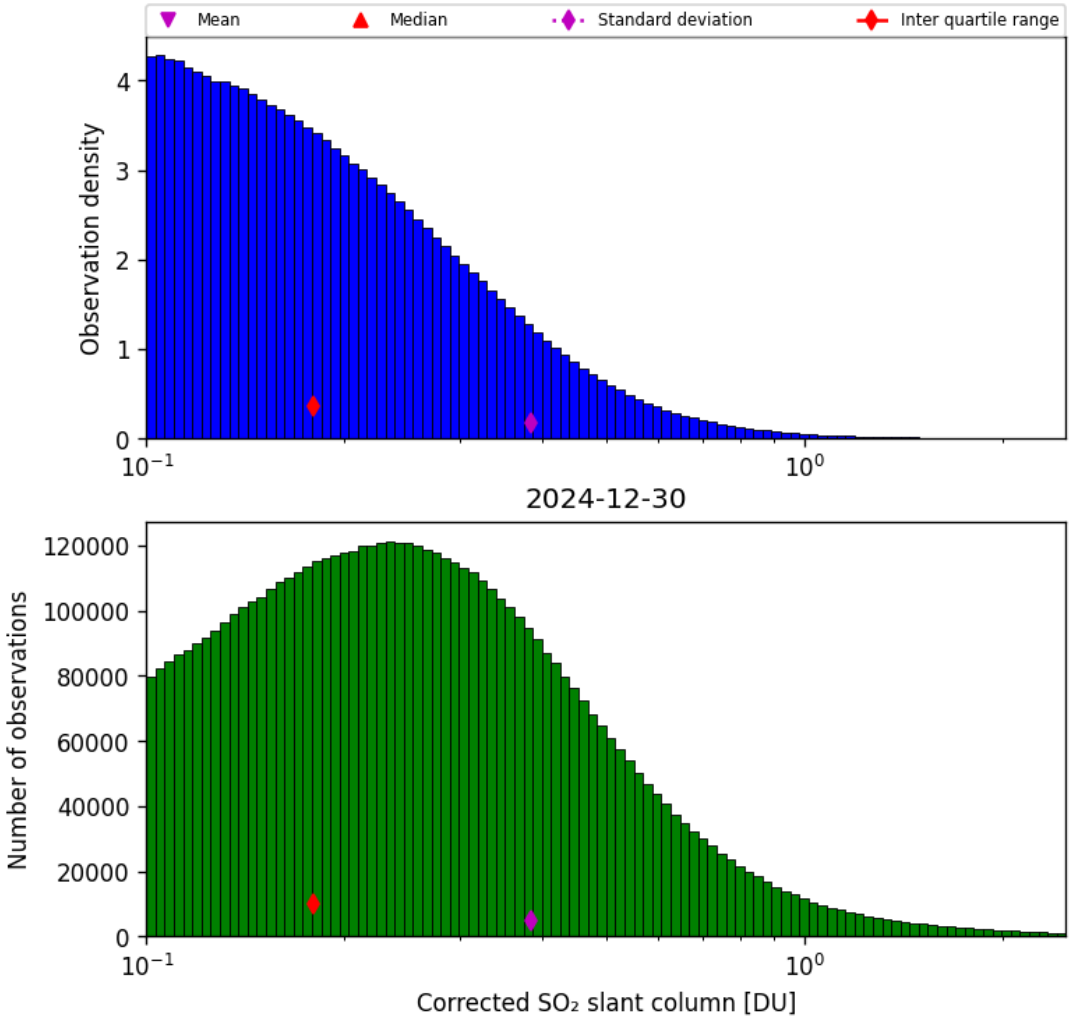

Figure 60: Histogram of "Corrected SO_2 slant column" for 2024-12-30 to 2024-12-30

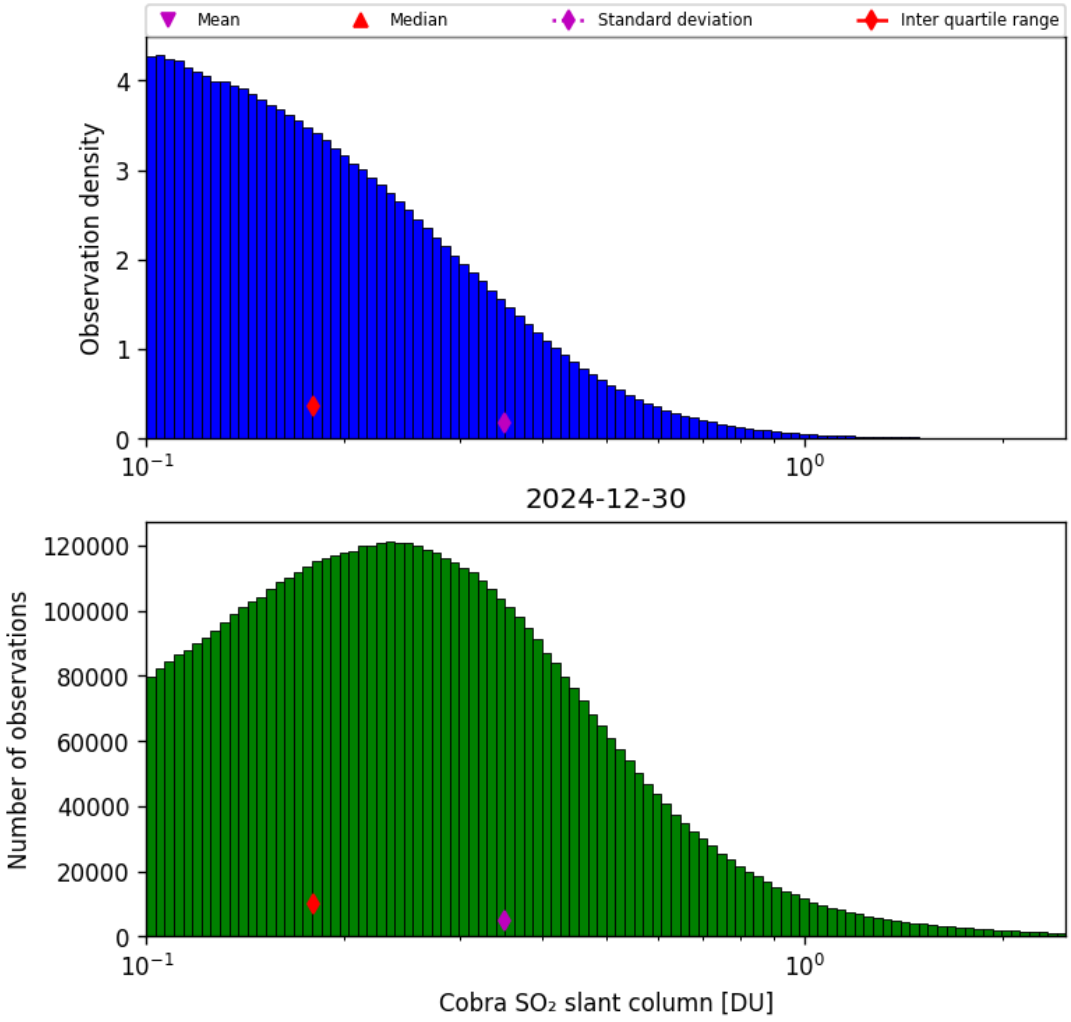

Figure 61: Histogram of "Cobra SO_2 slant column" for 2024-12-30 to 2024-12-30

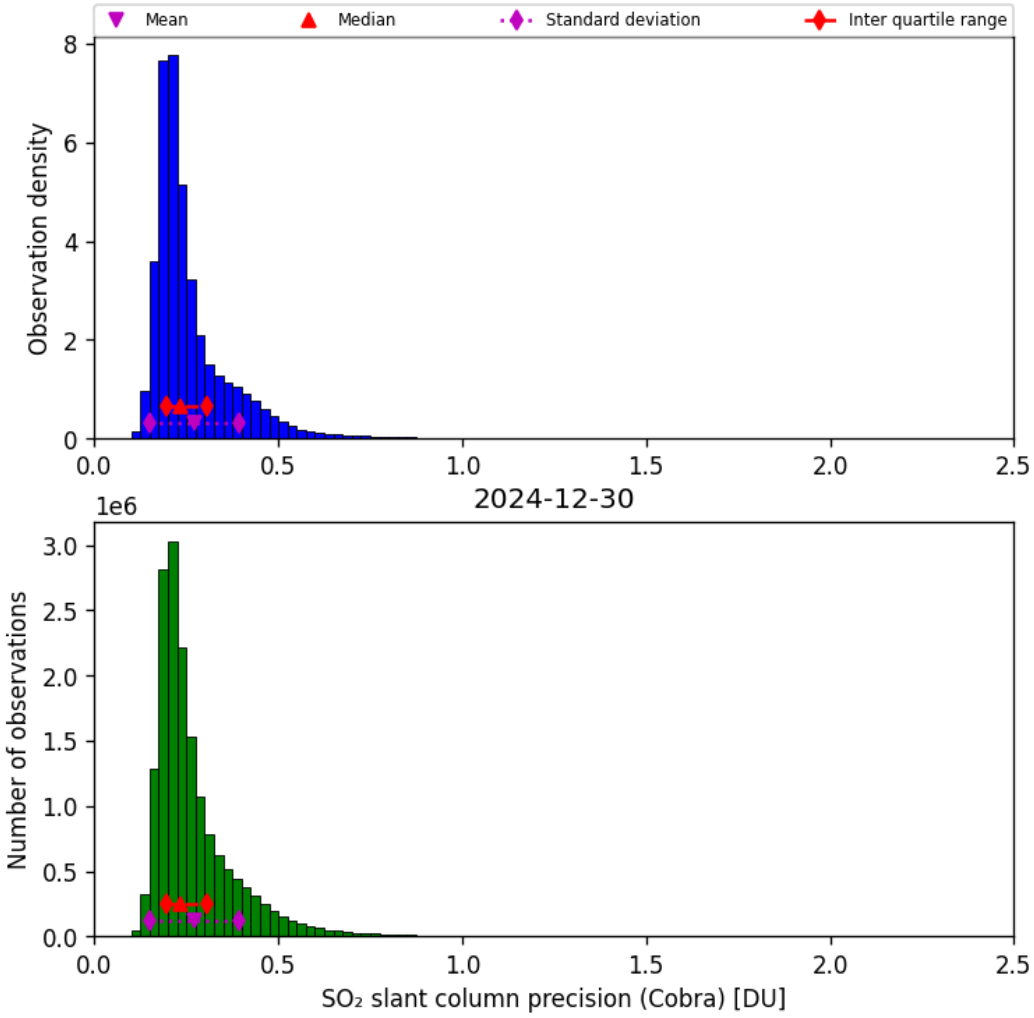

Figure 62: Histogram of "SO_2 slant column precision (Cobra)" for 2024-12-30 to 2024-12-30

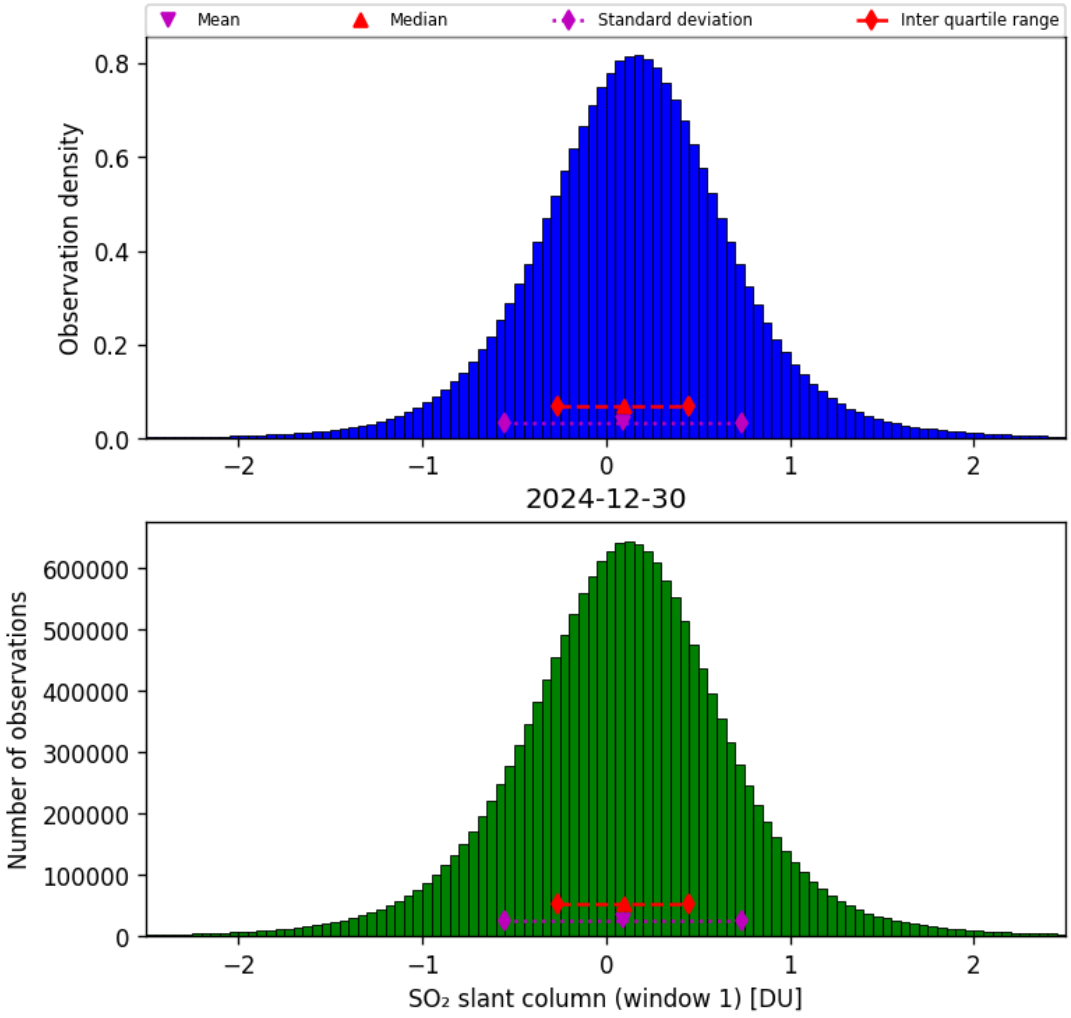

Figure 63: Histogram of "SO_2 slant column (window 1)" for 2024-12-30 to 2024-12-30

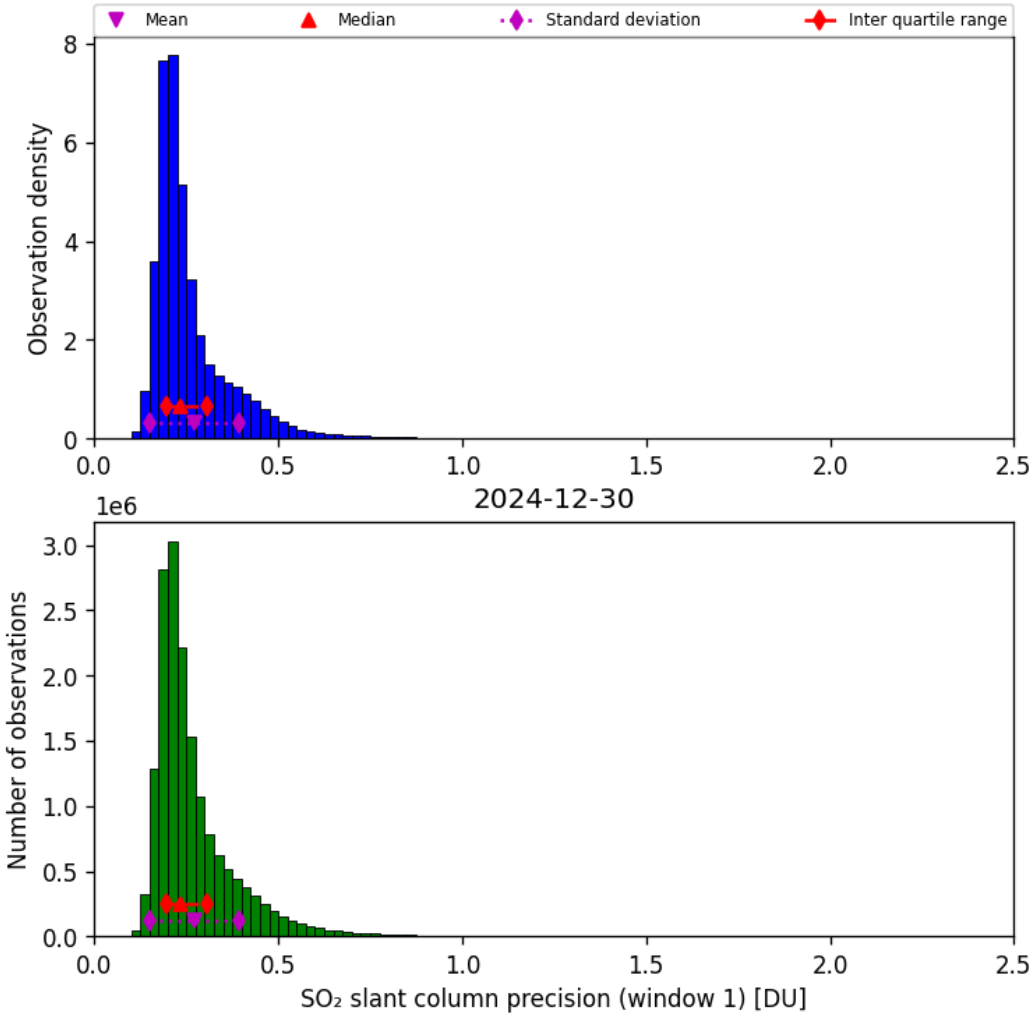

Figure 64: Histogram of "SO_2 slant column precision (window 1)" for 2024-12-30 to 2024-12-30

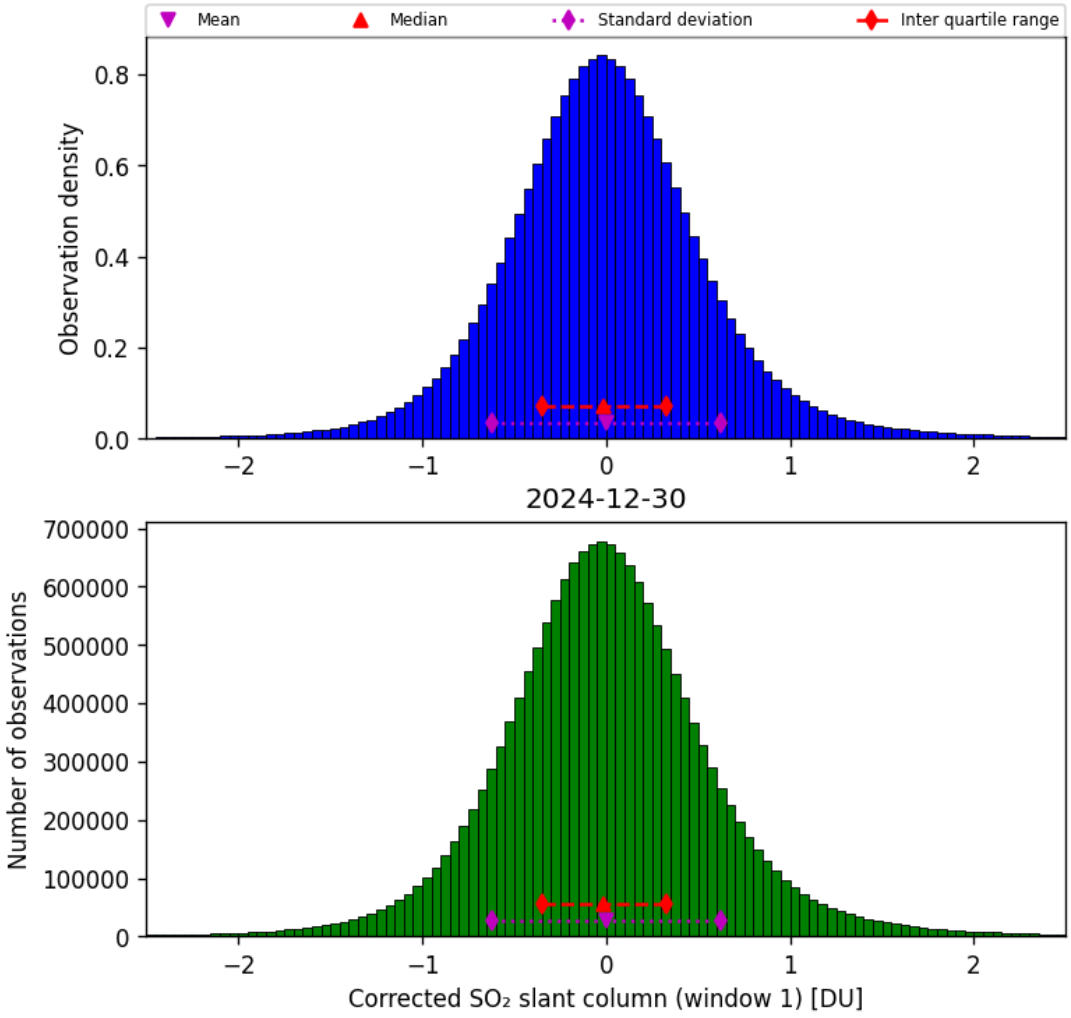

Figure 65: Histogram of "Corrected SO_2 slant column (window 1)" for 2024-12-30 to 2024-12-30

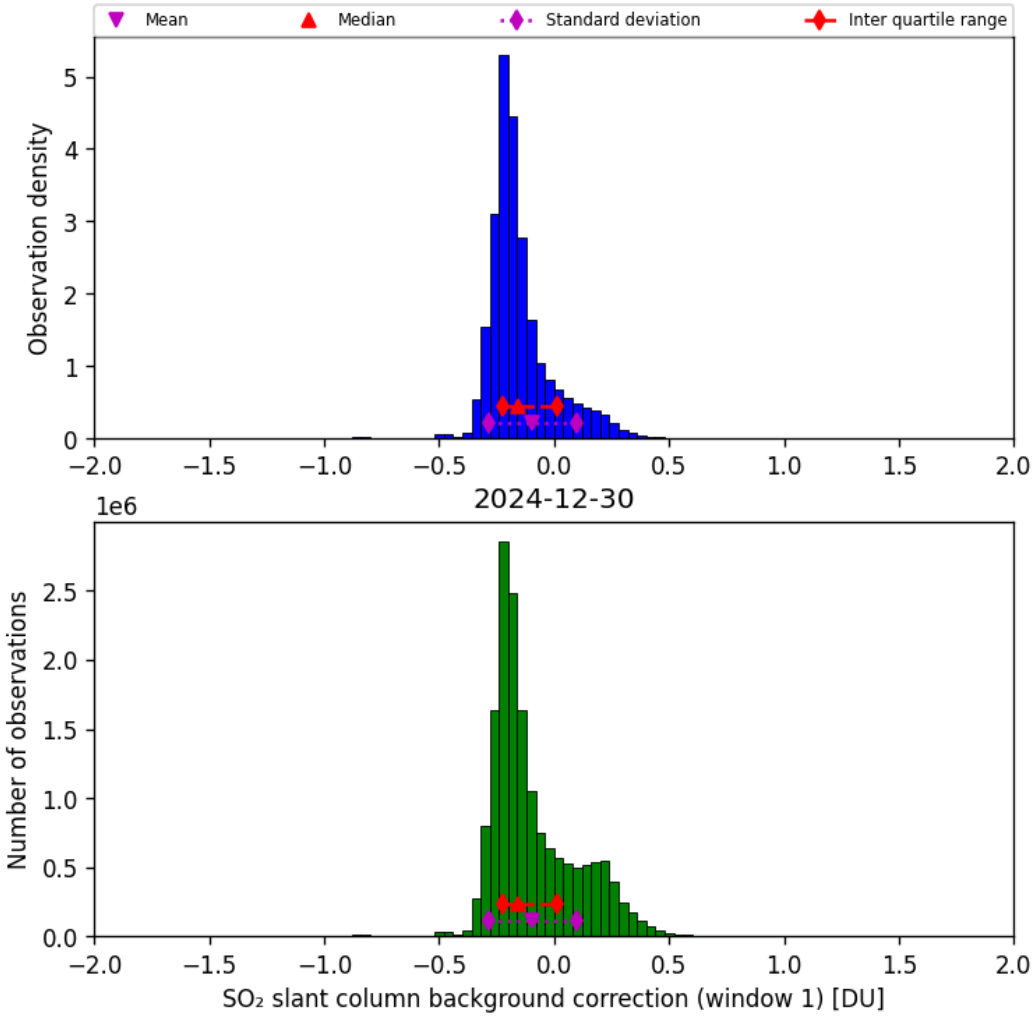

Figure 66: Histogram of "SO_2 slant column background correction (window 1)" for 2024-12-30 to 2024-12-30

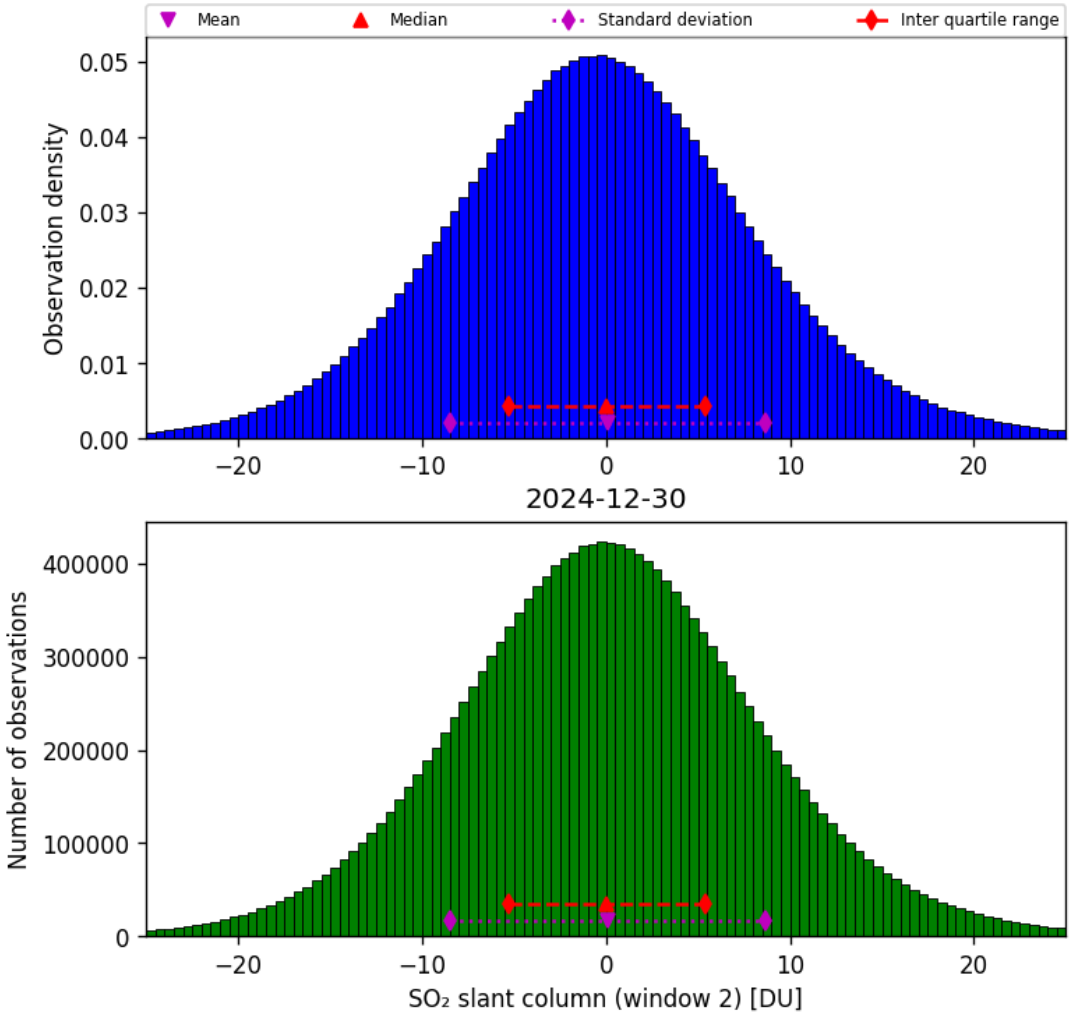

Figure 67: Histogram of "SO_2 slant column (window 2)" for 2024-12-30 to 2024-12-30

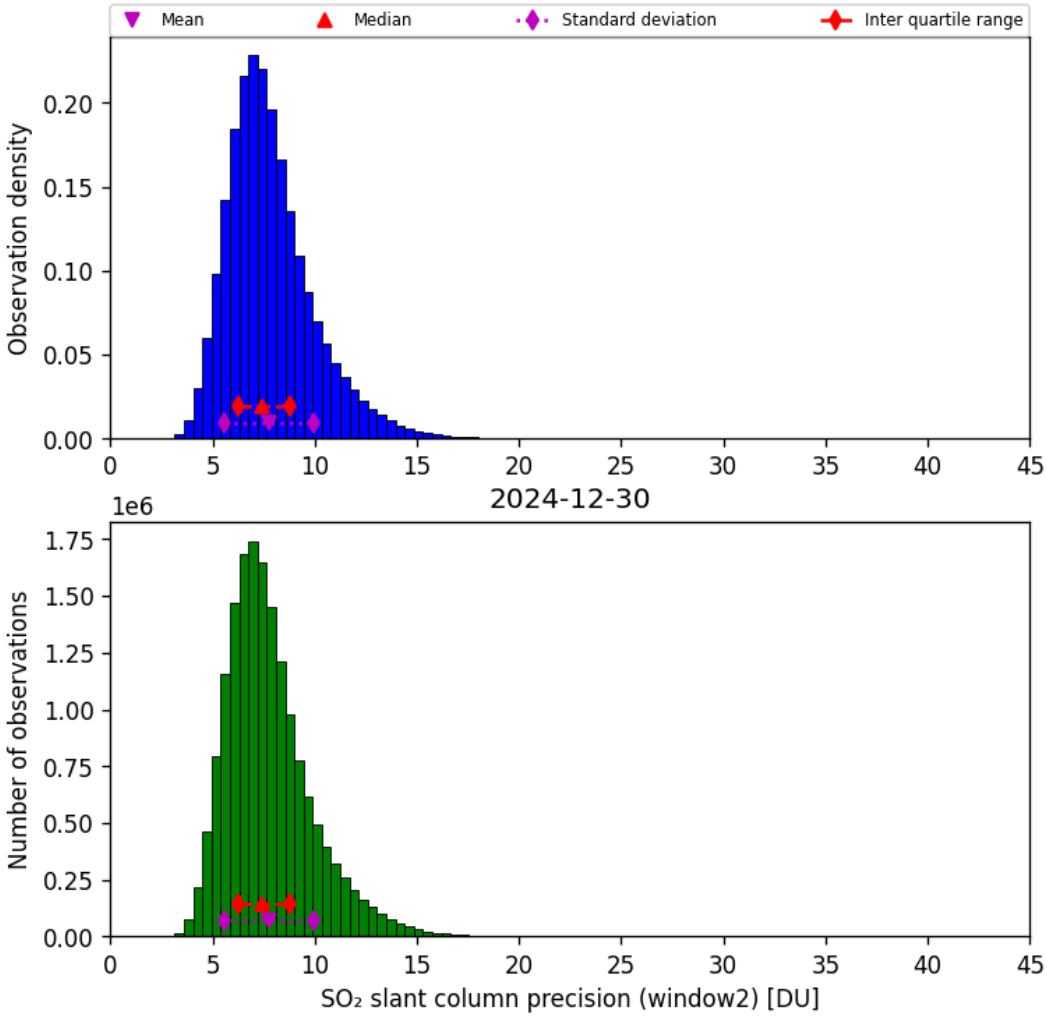

Figure 68: Histogram of "SO_2 slant column precision (window2)" for 2024-12-30 to 2024-12-30

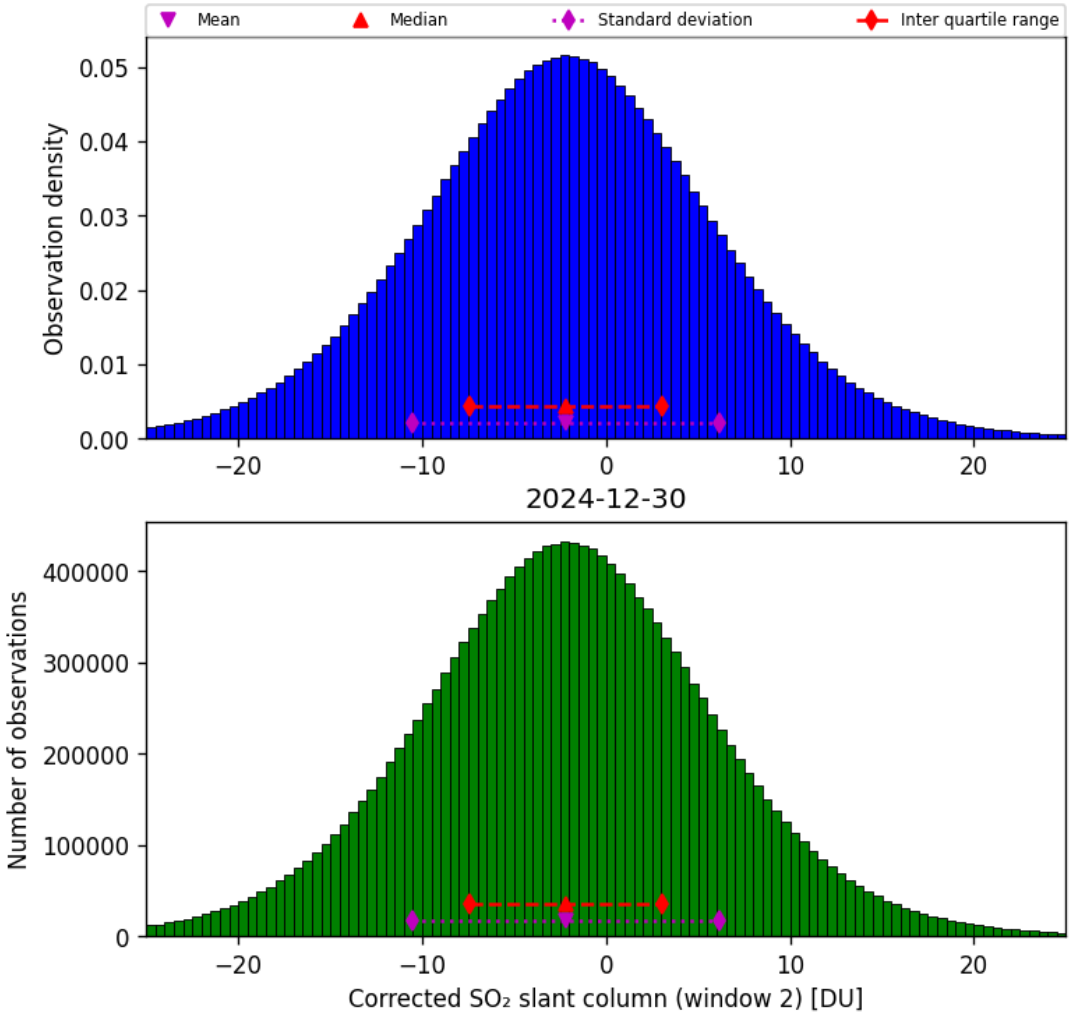

Figure 69: Histogram of "Corrected SO_2 slant column (window 2)" for 2024-12-30 to 2024-12-30

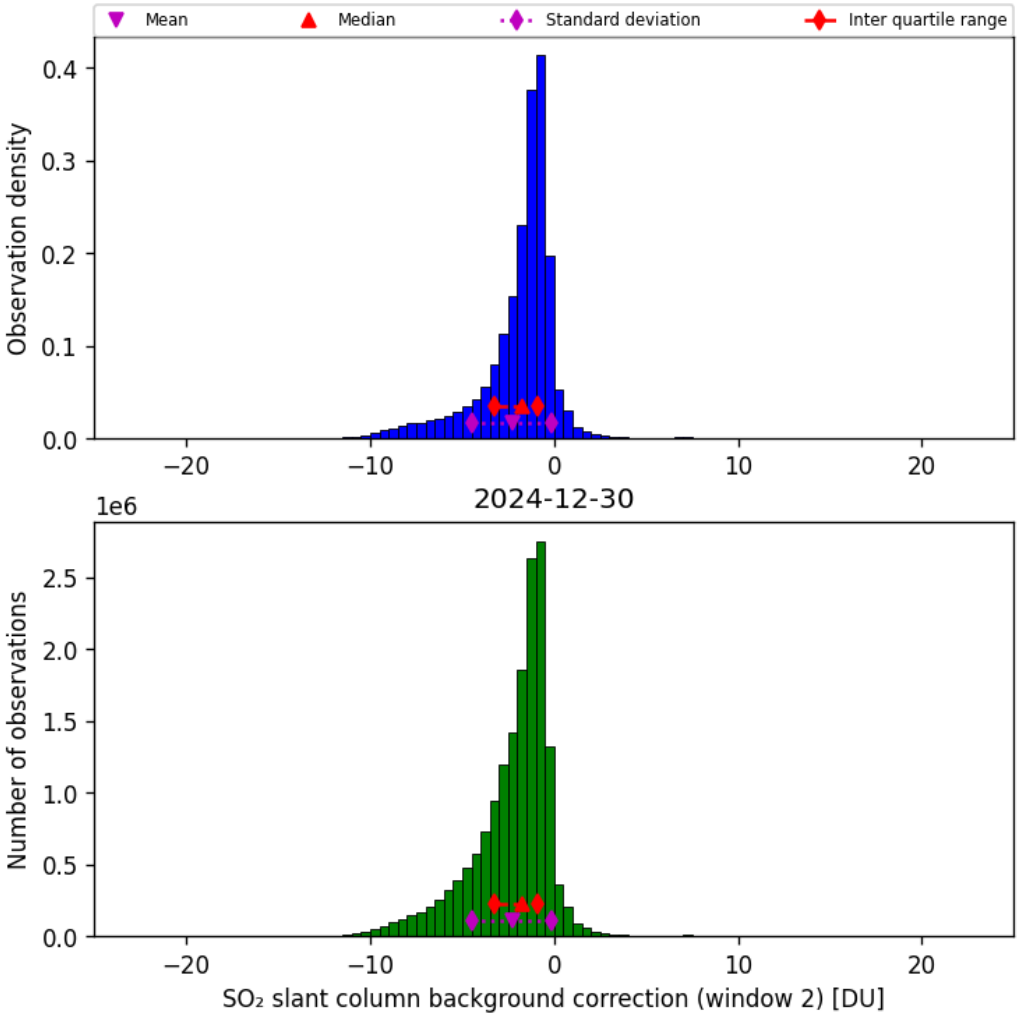

Figure 70: Histogram of "SO_2 slant column background correction (window 2)" for 2024-12-30 to 2024-12-30

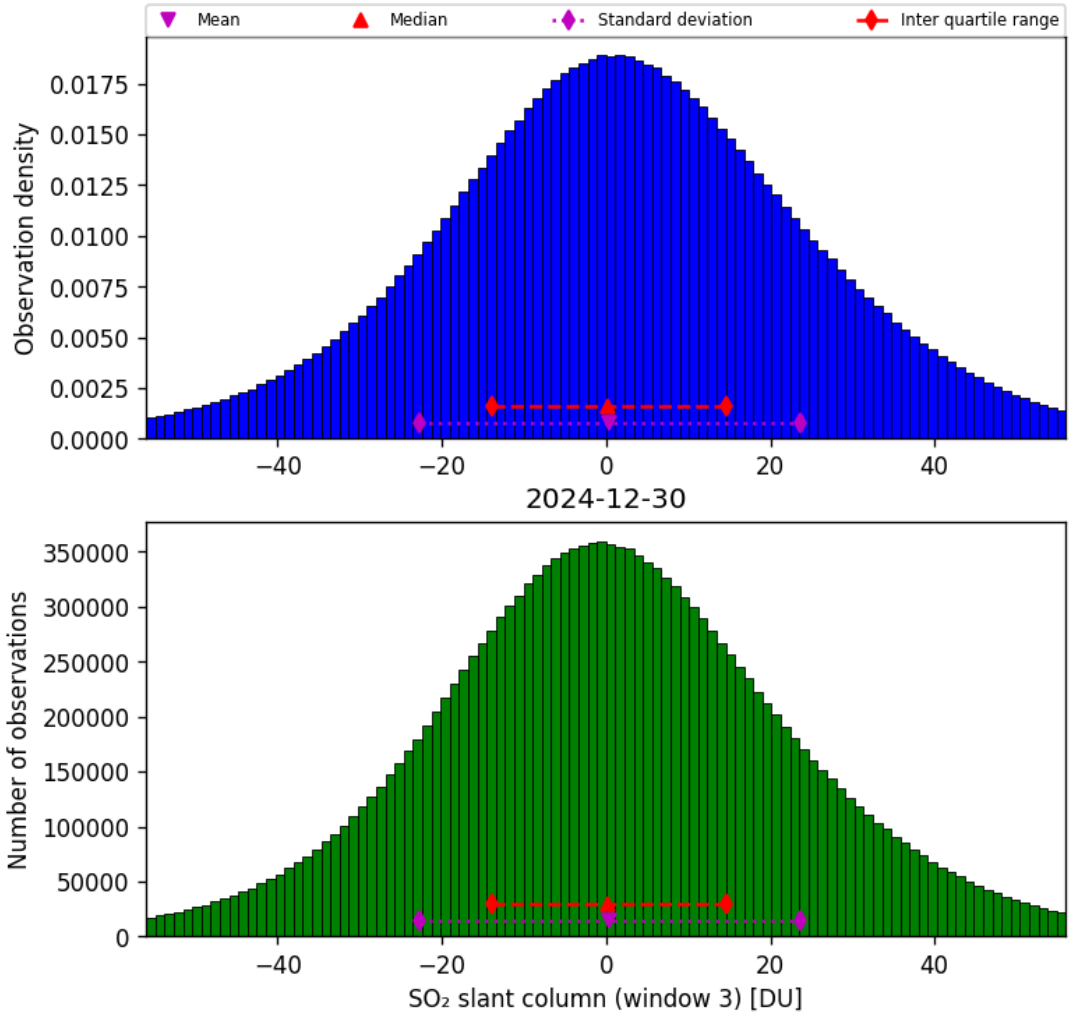

Figure 71: Histogram of "SO_2 slant column (window 3)" for 2024-12-30 to 2024-12-30

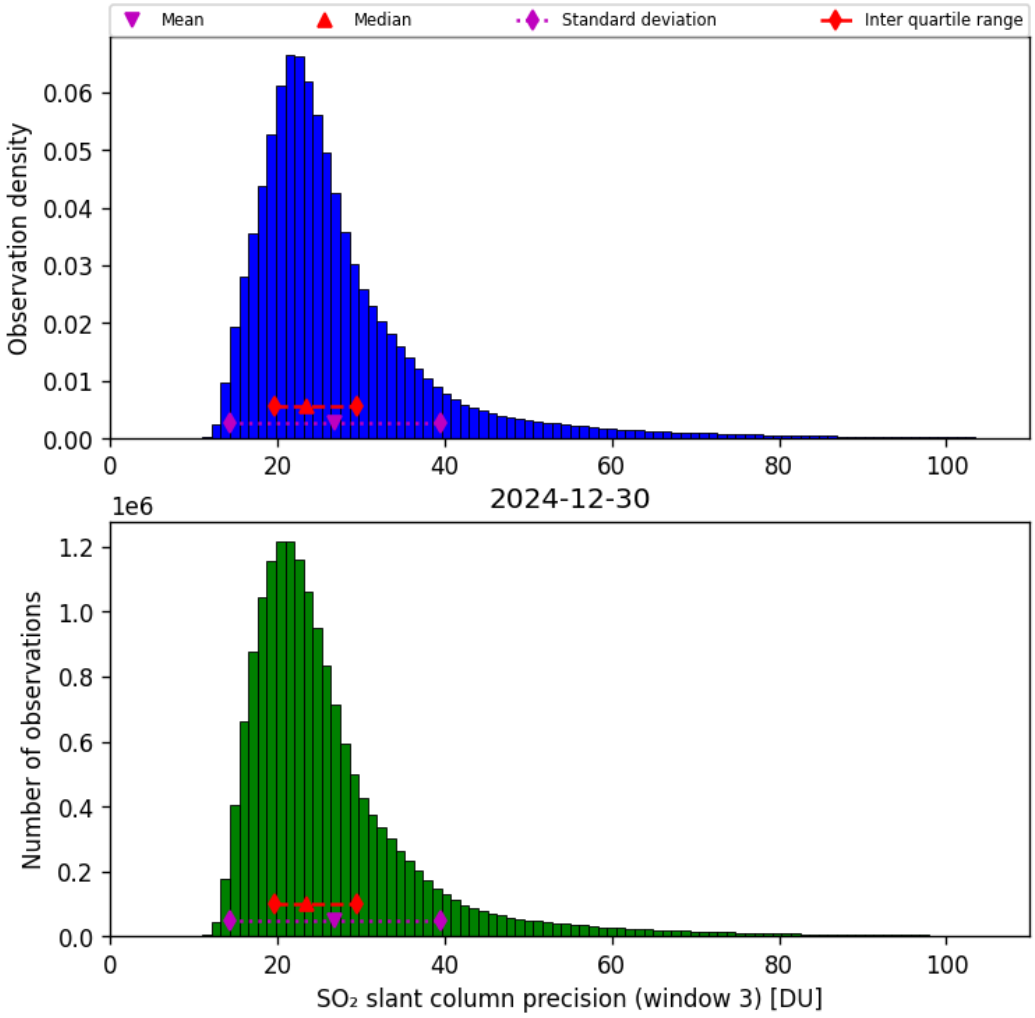

Figure 72: Histogram of "SO_2 slant column precision (window 3)" for 2024-12-30 to 2024-12-30

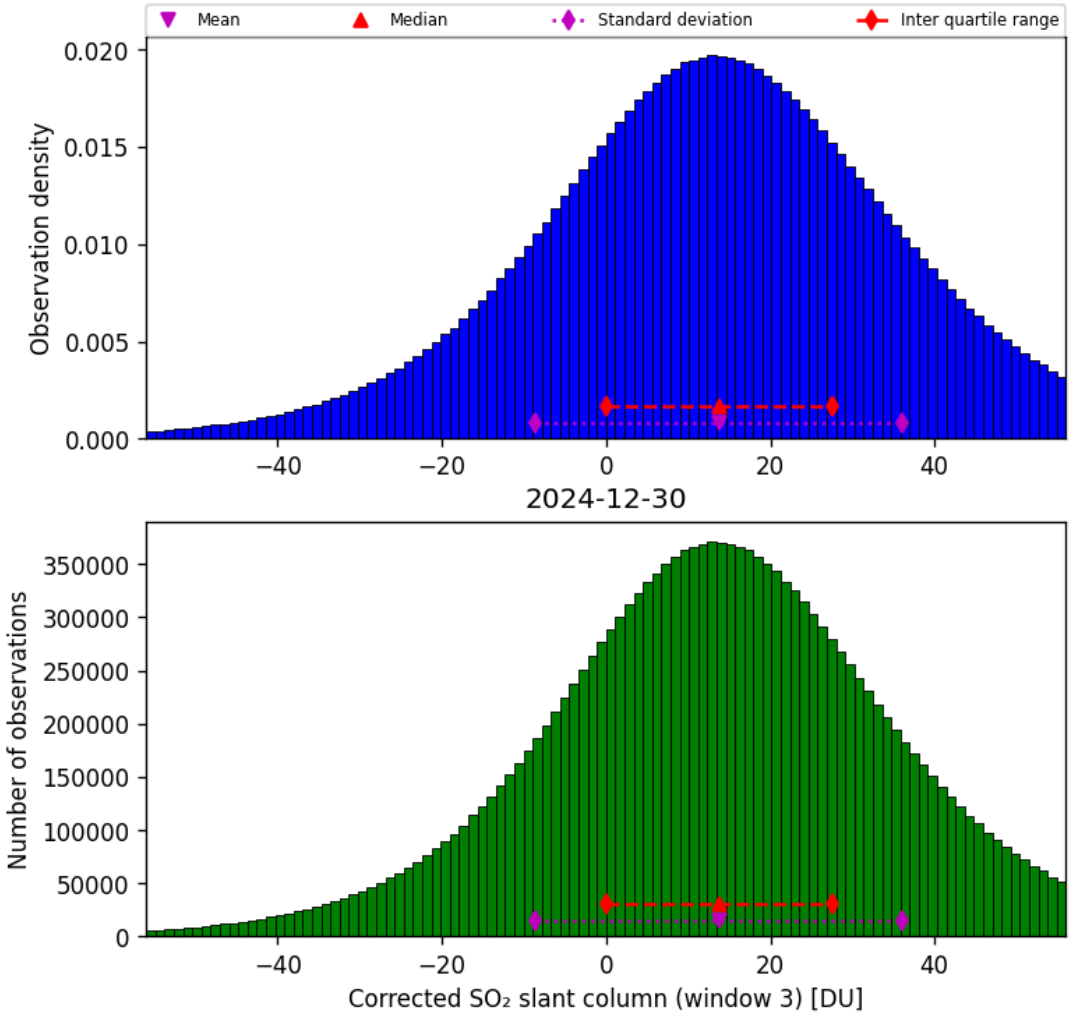

Figure 73: Histogram of "Corrected SO_2 slant column (window 3)" for 2024-12-30 to 2024-12-30

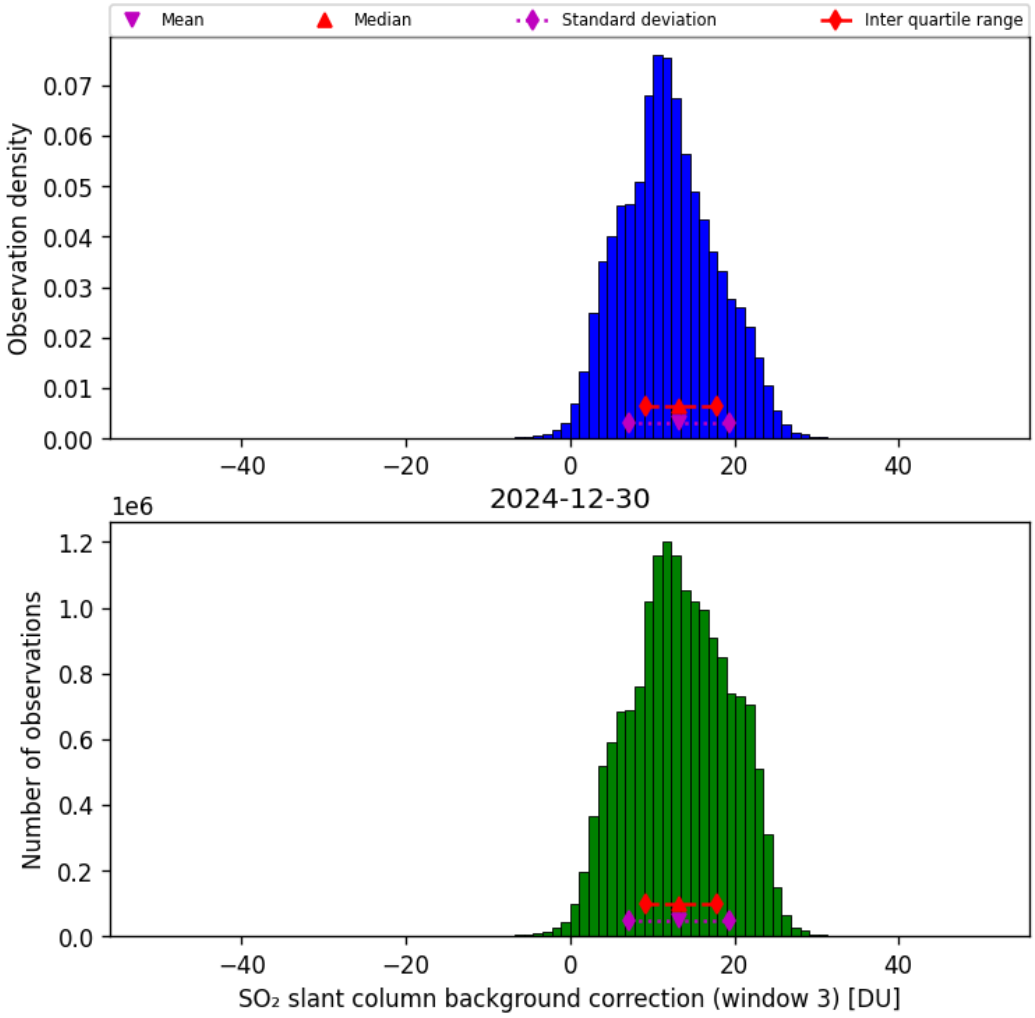

Figure 74: Histogram of "SO_2 slant column background correction (window 3)" for 2024-12-30 to 2024-12-30

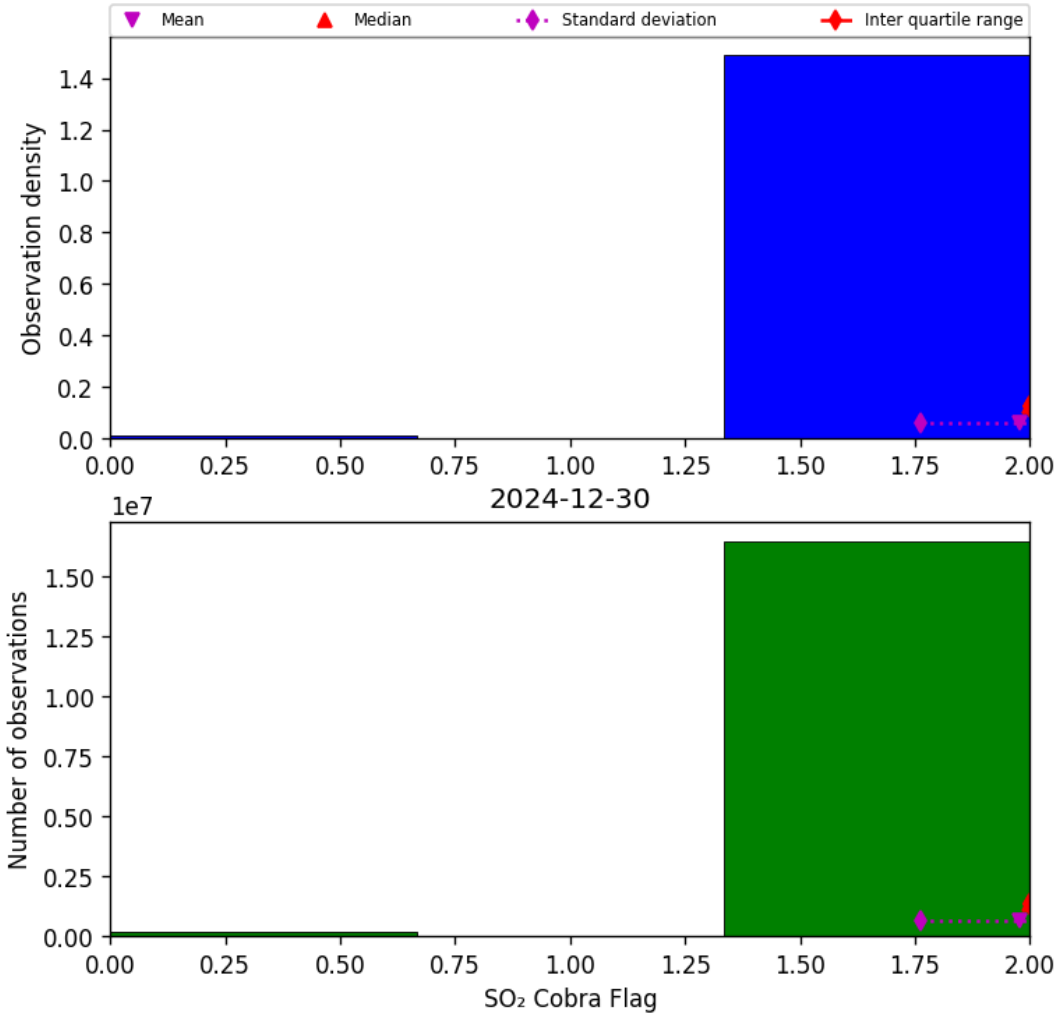

Figure 75: Histogram of "SO_2 Cobra Flag" for 2024-12-30 to 2024-12-30

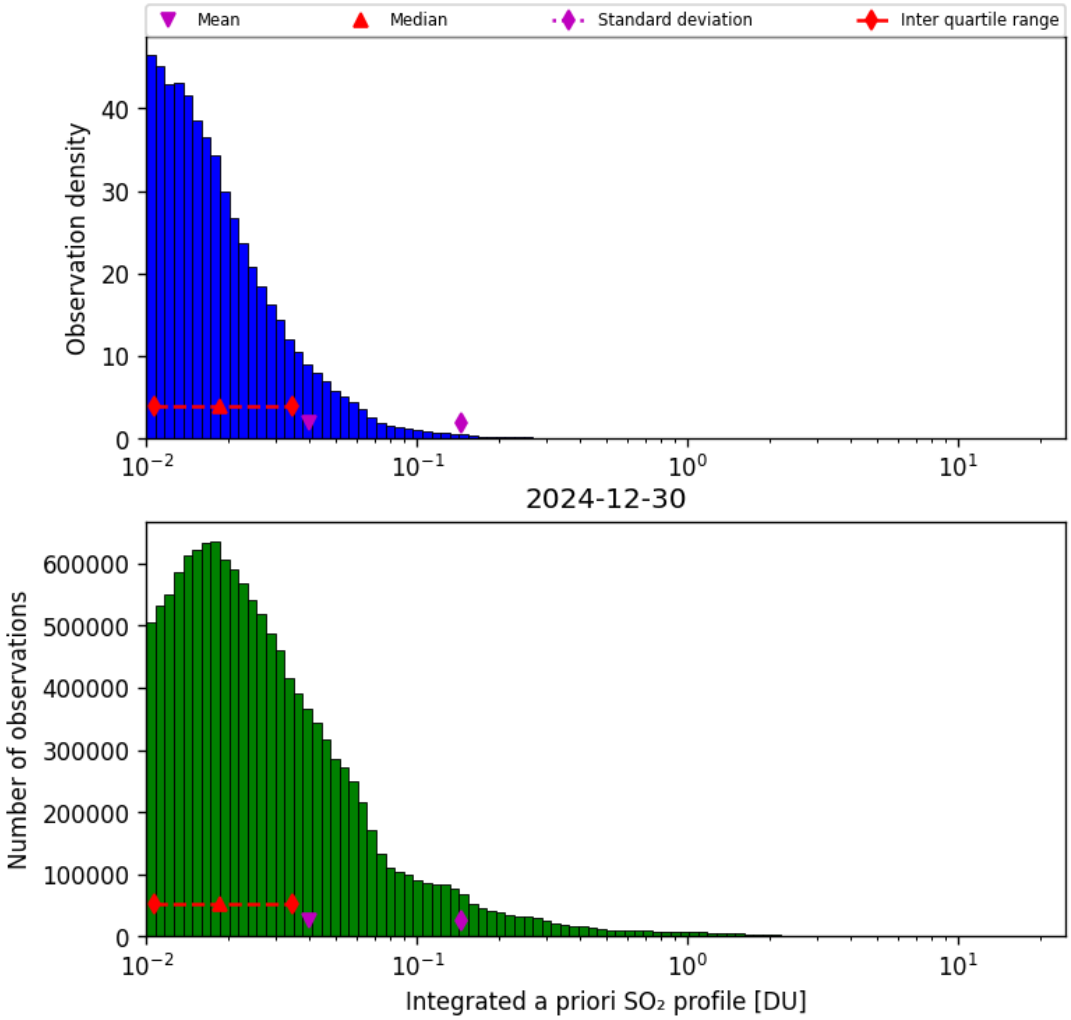

Figure 76: Histogram of "Integrated a priori SO_2 profile" for 2024-12-30 to 2024-12-30

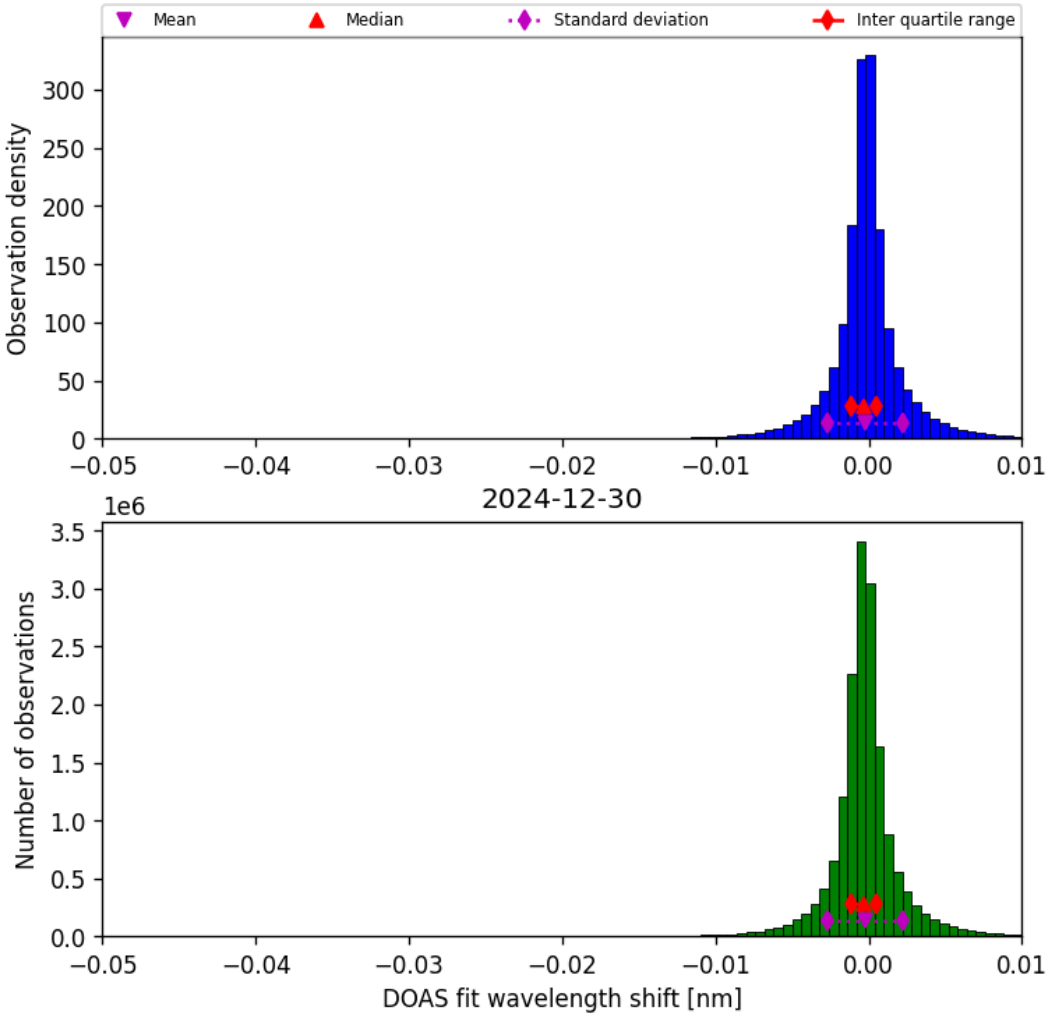

Figure 77: Histogram of “DOAS fit wavelength shift” for 2024-12-30 to 2024-12-30

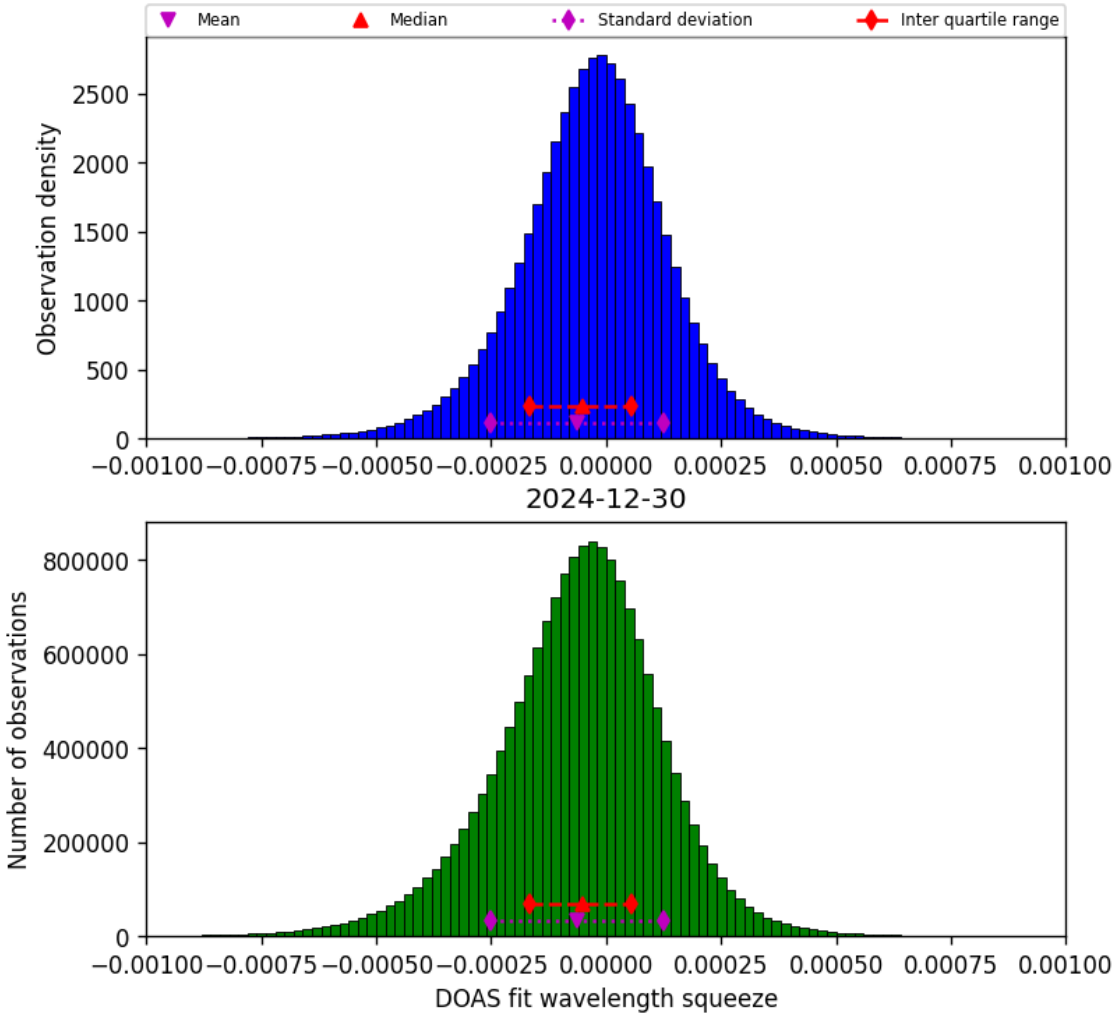

Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2024-12-30 to 2024-12-30

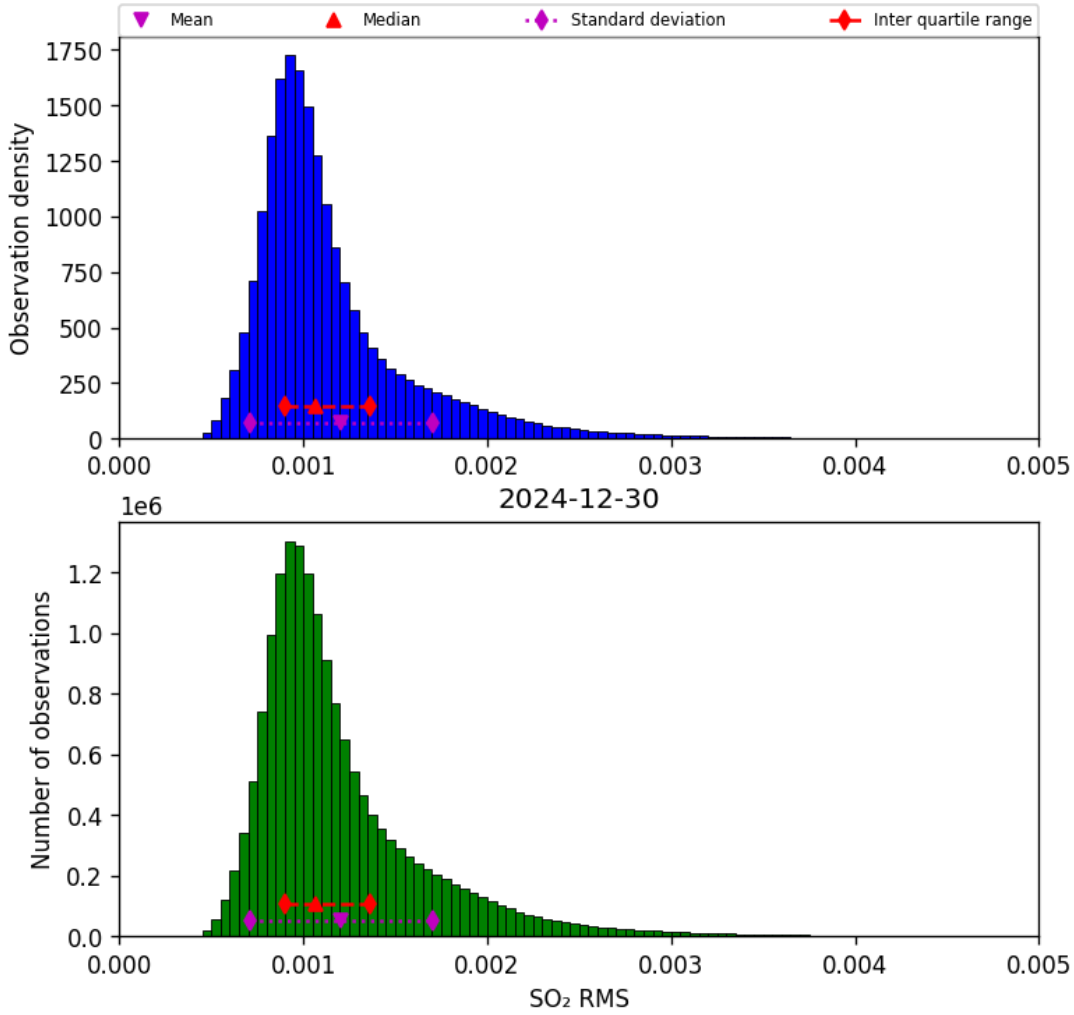

Figure 79: Histogram of "SO_2 RMS" for 2024-12-30 to 2024-12-30

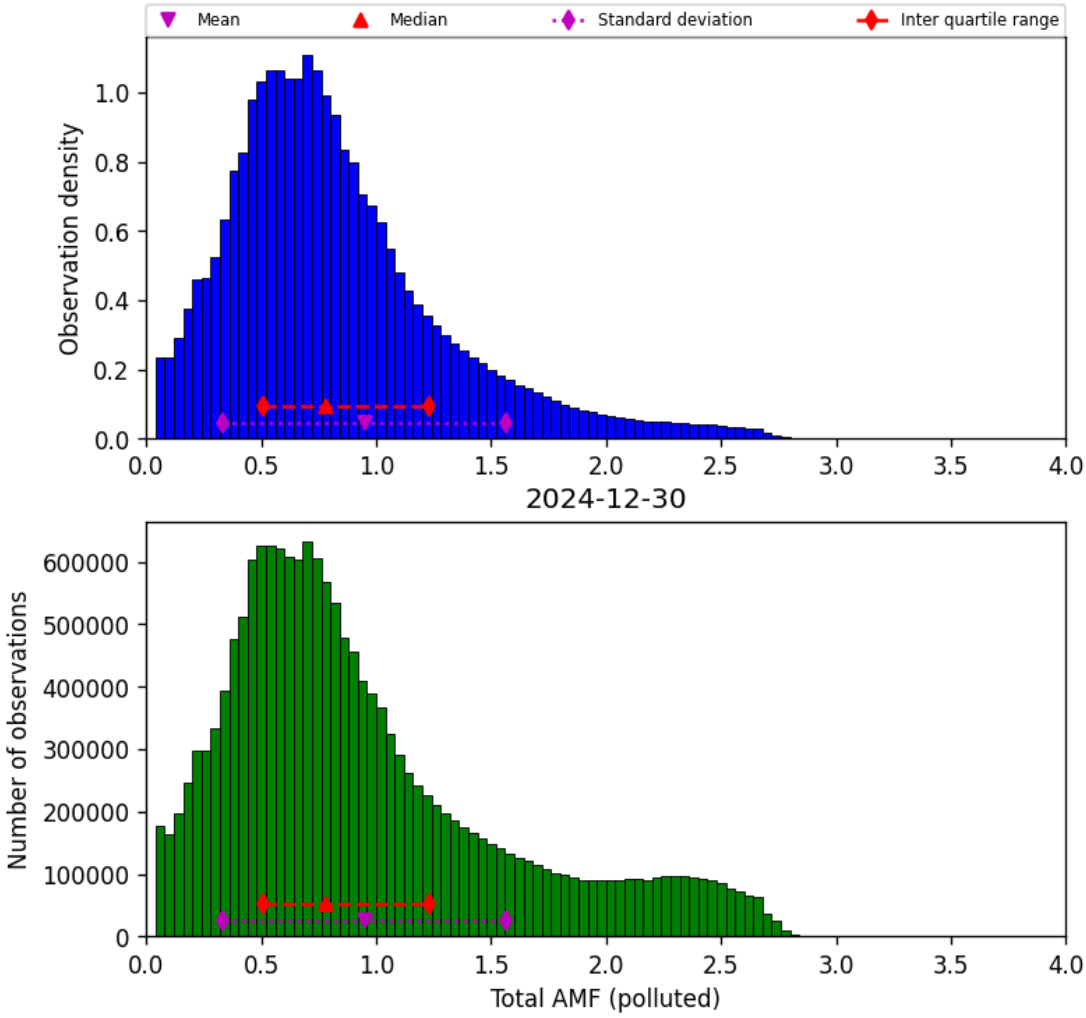

Figure 80: Histogram of “Total AMF (polluted)” for 2024-12-30 to 2024-12-30

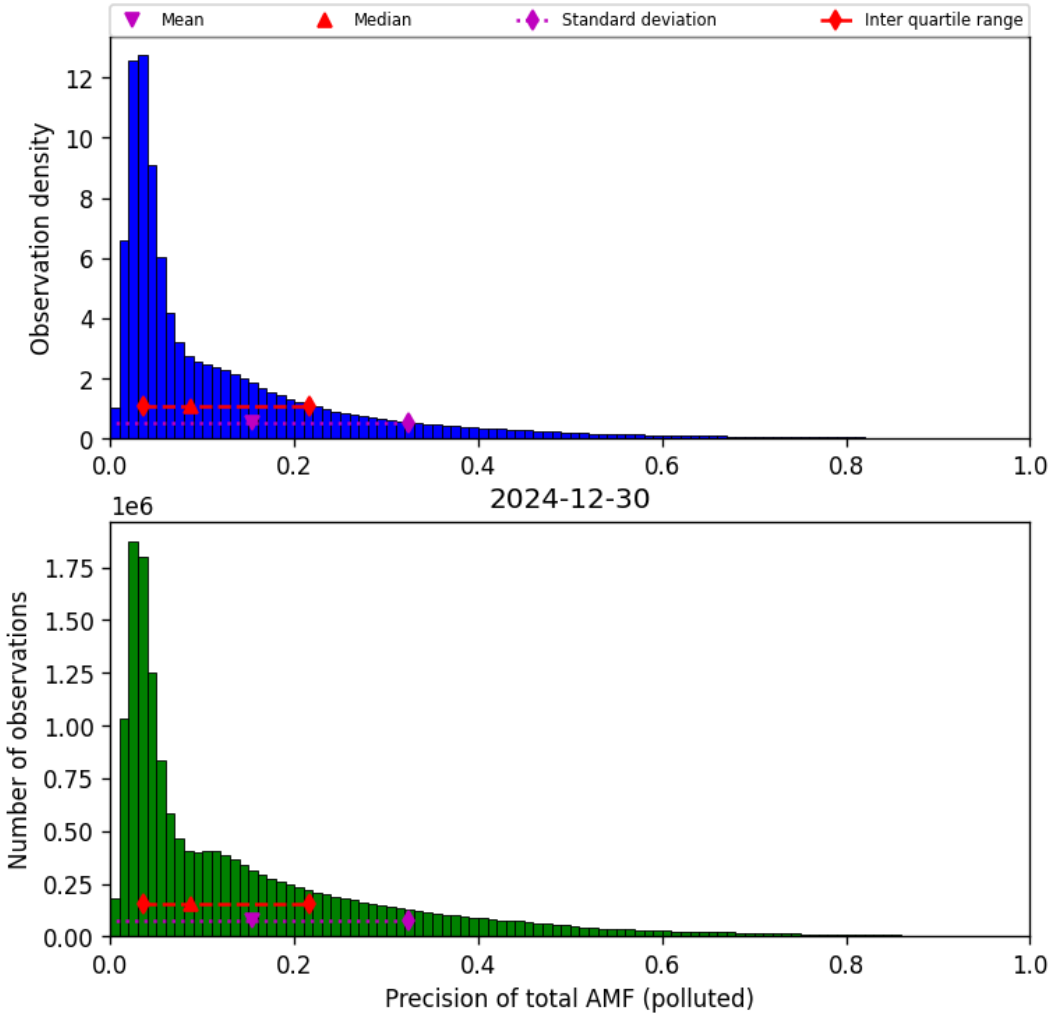

Figure 81: Histogram of “Precision of total AMF (polluted)” for 2024-12-30 to 2024-12-30

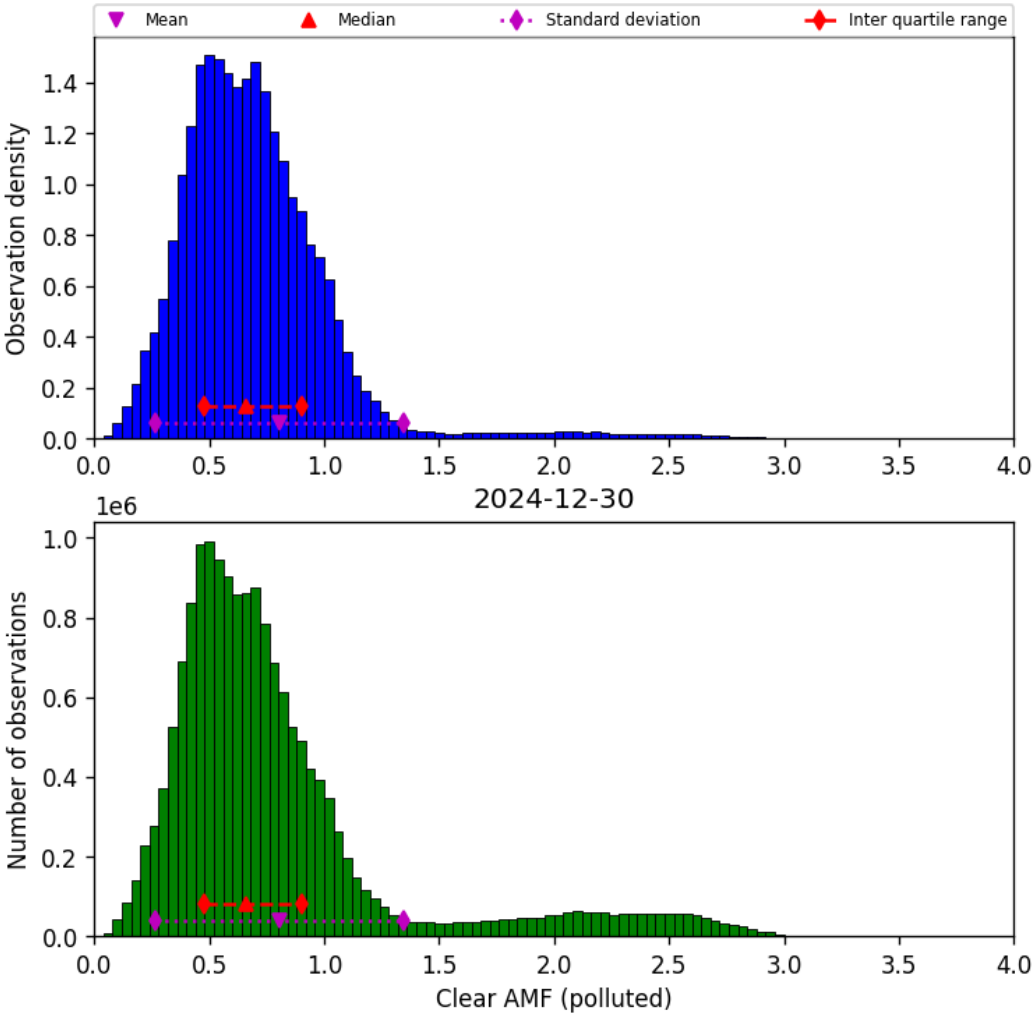

Figure 82: Histogram of “Clear AMF (polluted)” for 2024-12-30 to 2024-12-30

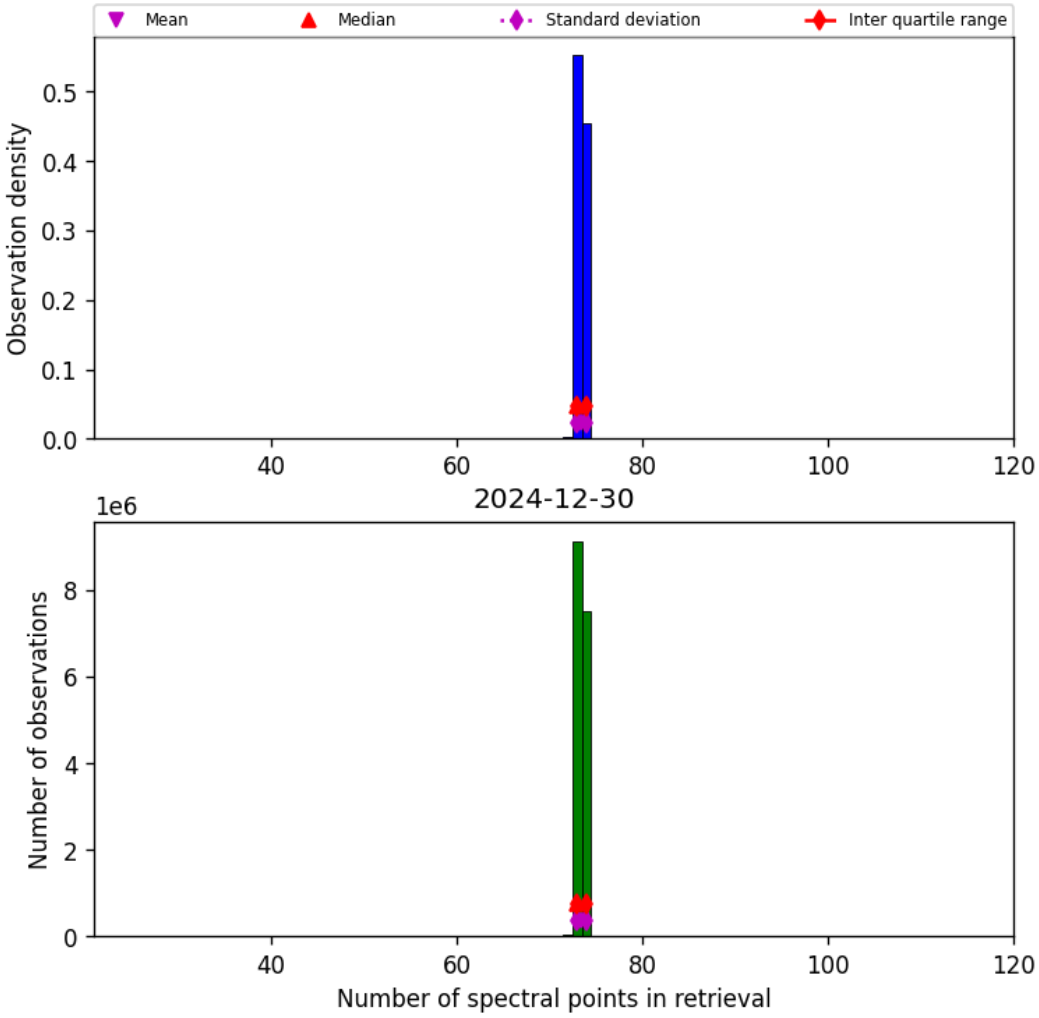

Figure 83: Histogram of “Number of spectral points in retrieval” for 2024-12-30 to 2024-12-30

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.

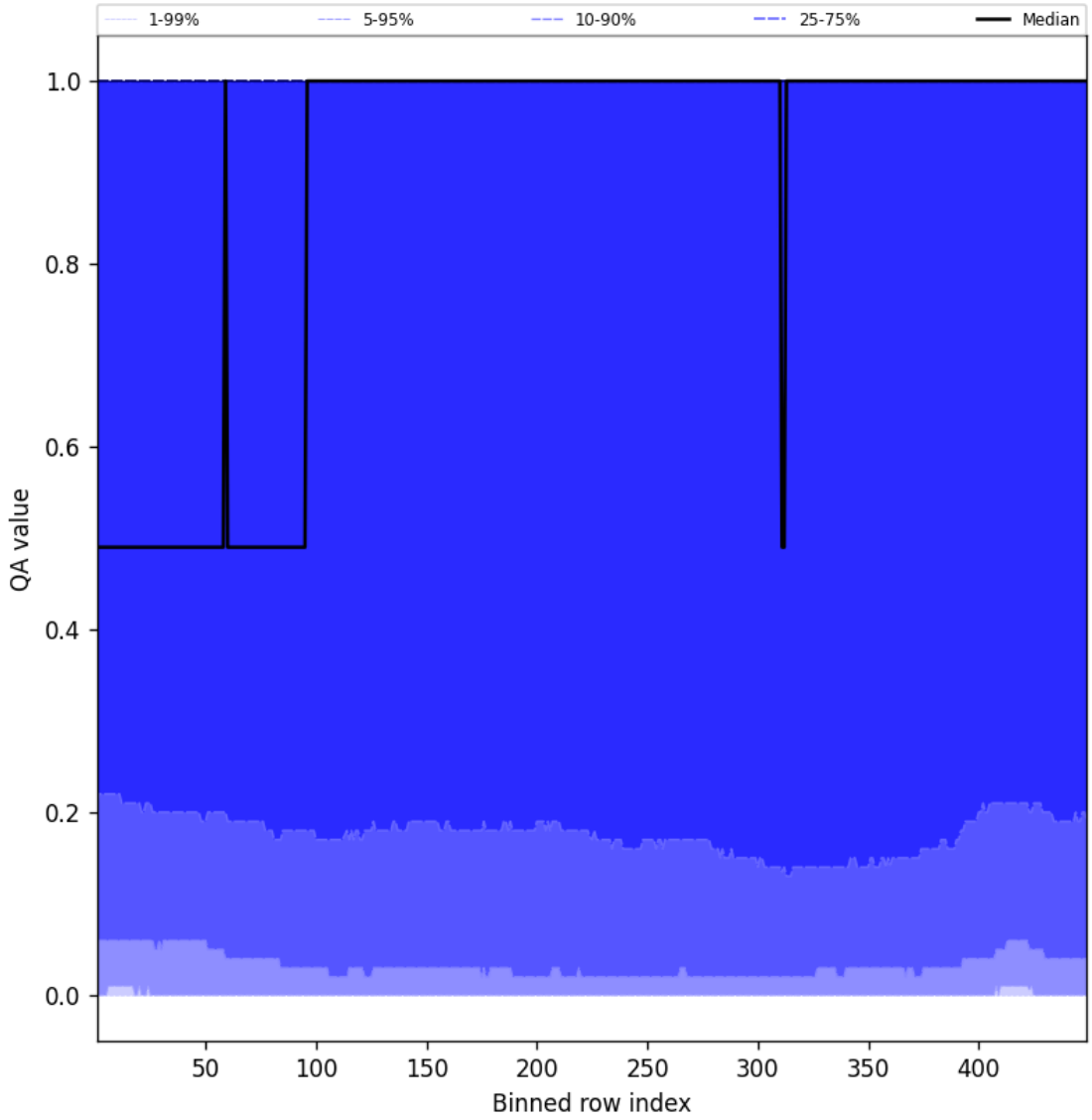

Figure 84: Along track statistics of “QA value” for 2024-12-30 to 2024-12-30

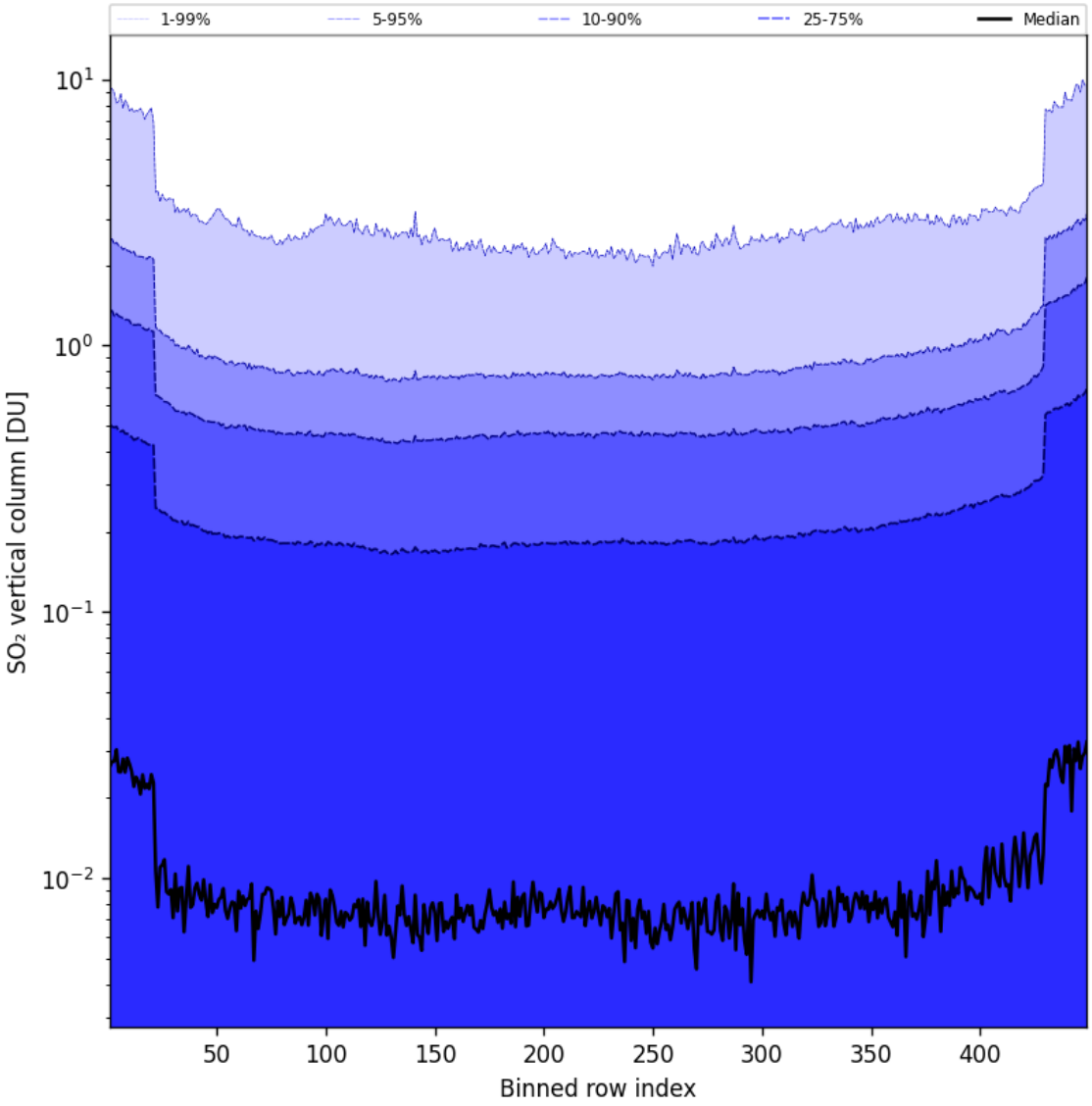

Figure 85: Along track statistics of "SO_2 vertical column" for 2024-12-30 to 2024-12-30

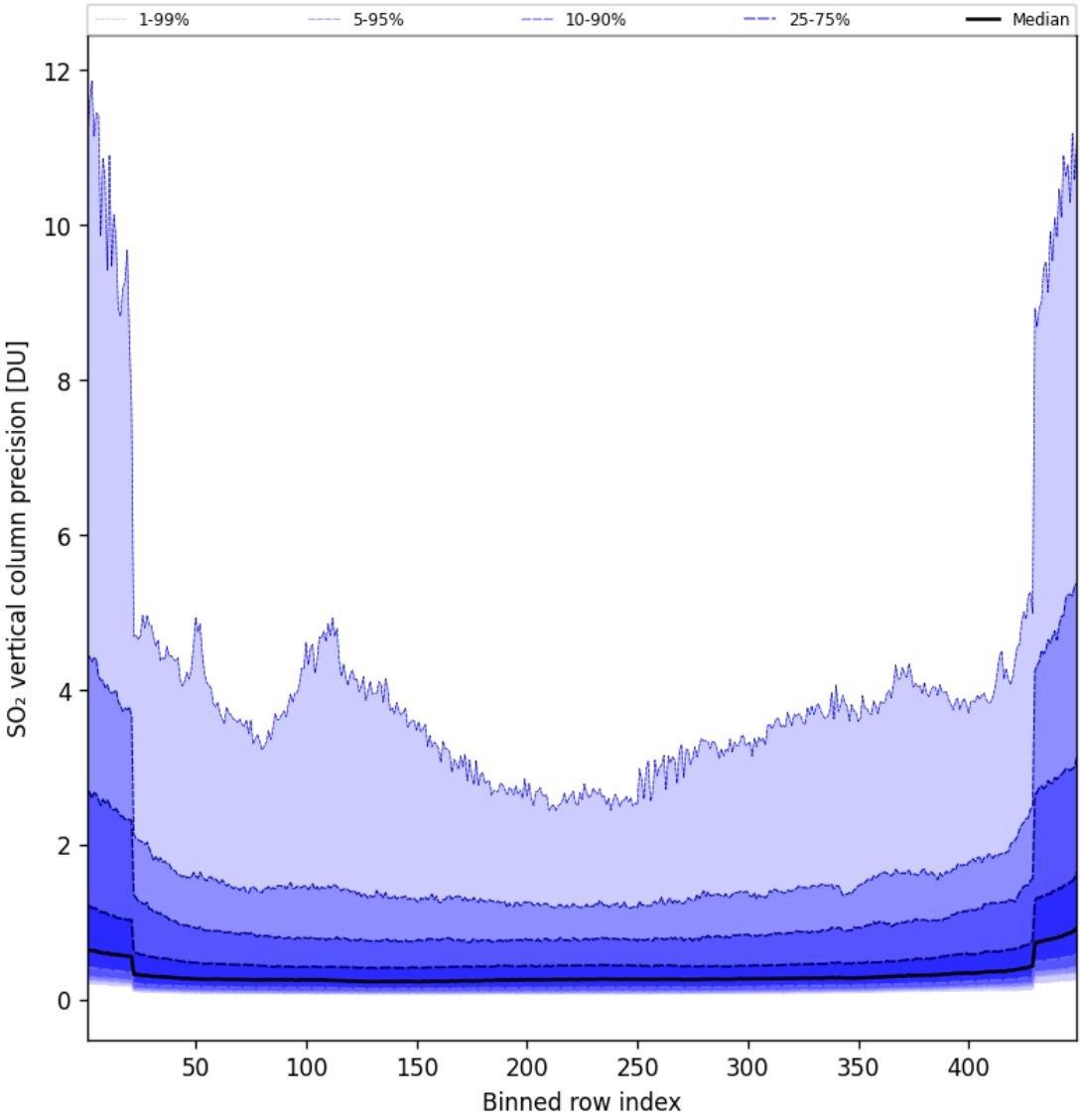

Figure 86: Along track statistics of "SO_2 vertical column precision" for 2024-12-30 to 2024-12-30

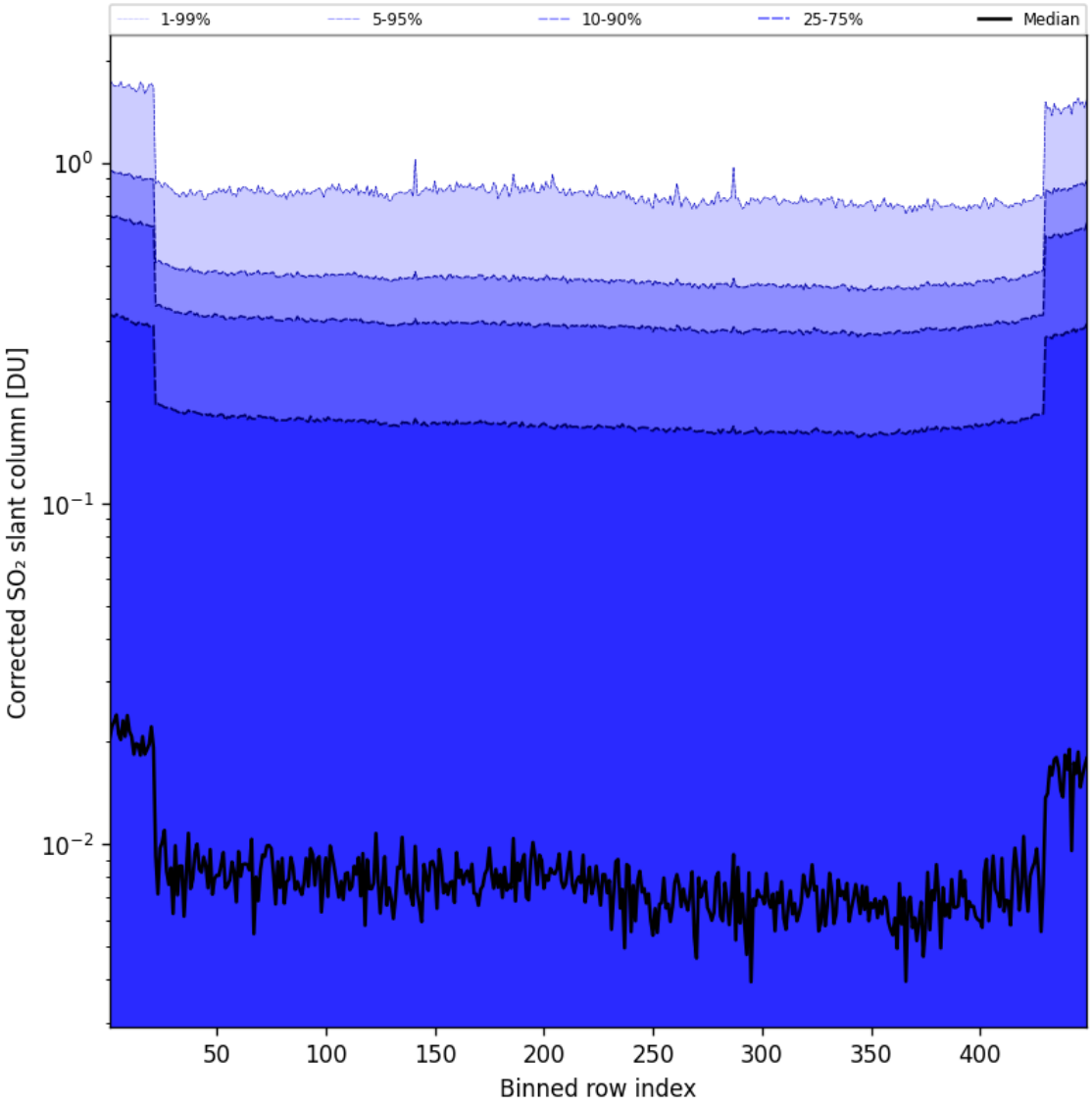

Figure 87: Along track statistics of "Corrected SO_2 slant column" for 2024-12-30 to 2024-12-30

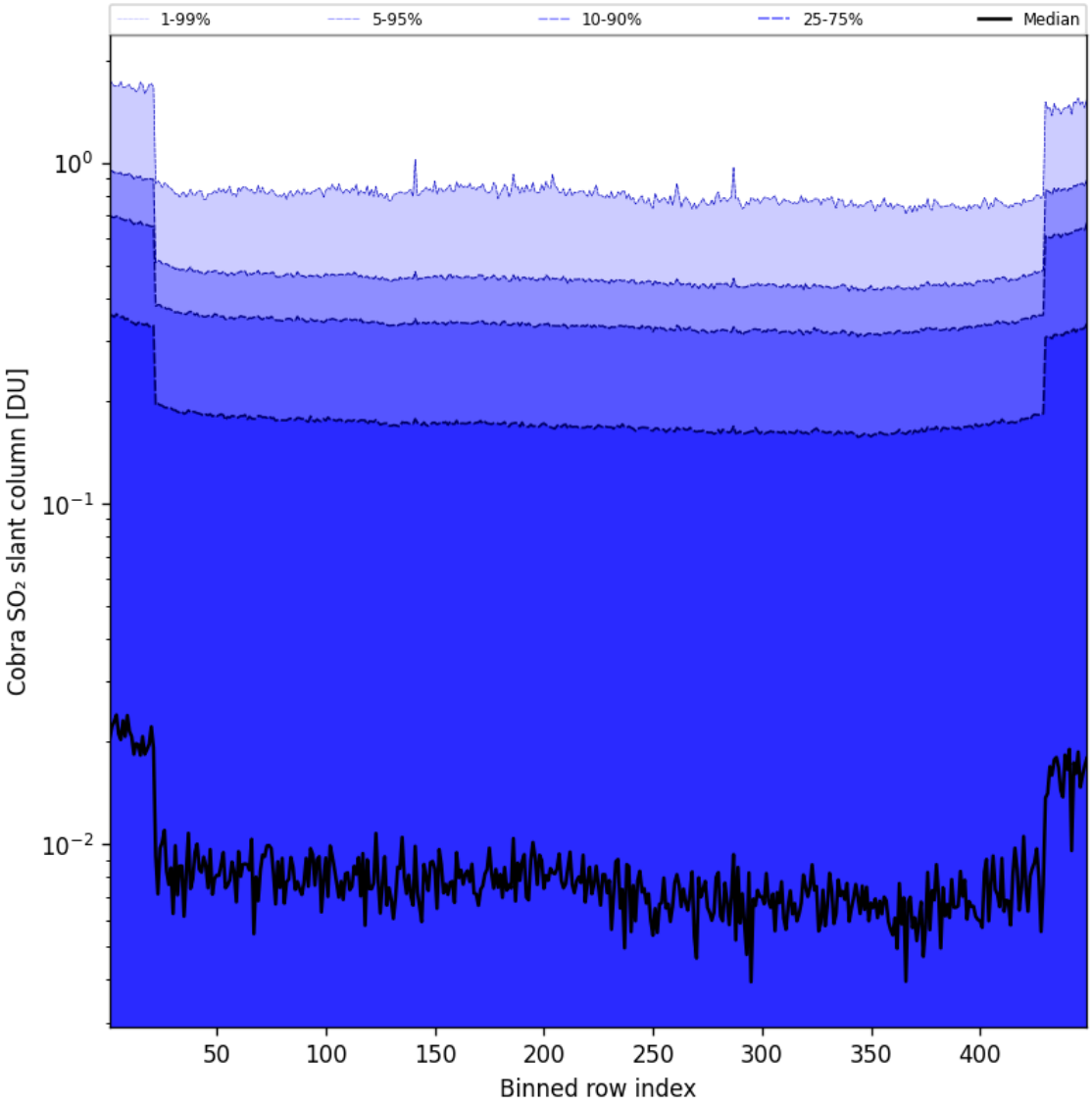

Figure 88: Along track statistics of "Cobra SO_2 slant column" for 2024-12-30 to 2024-12-30

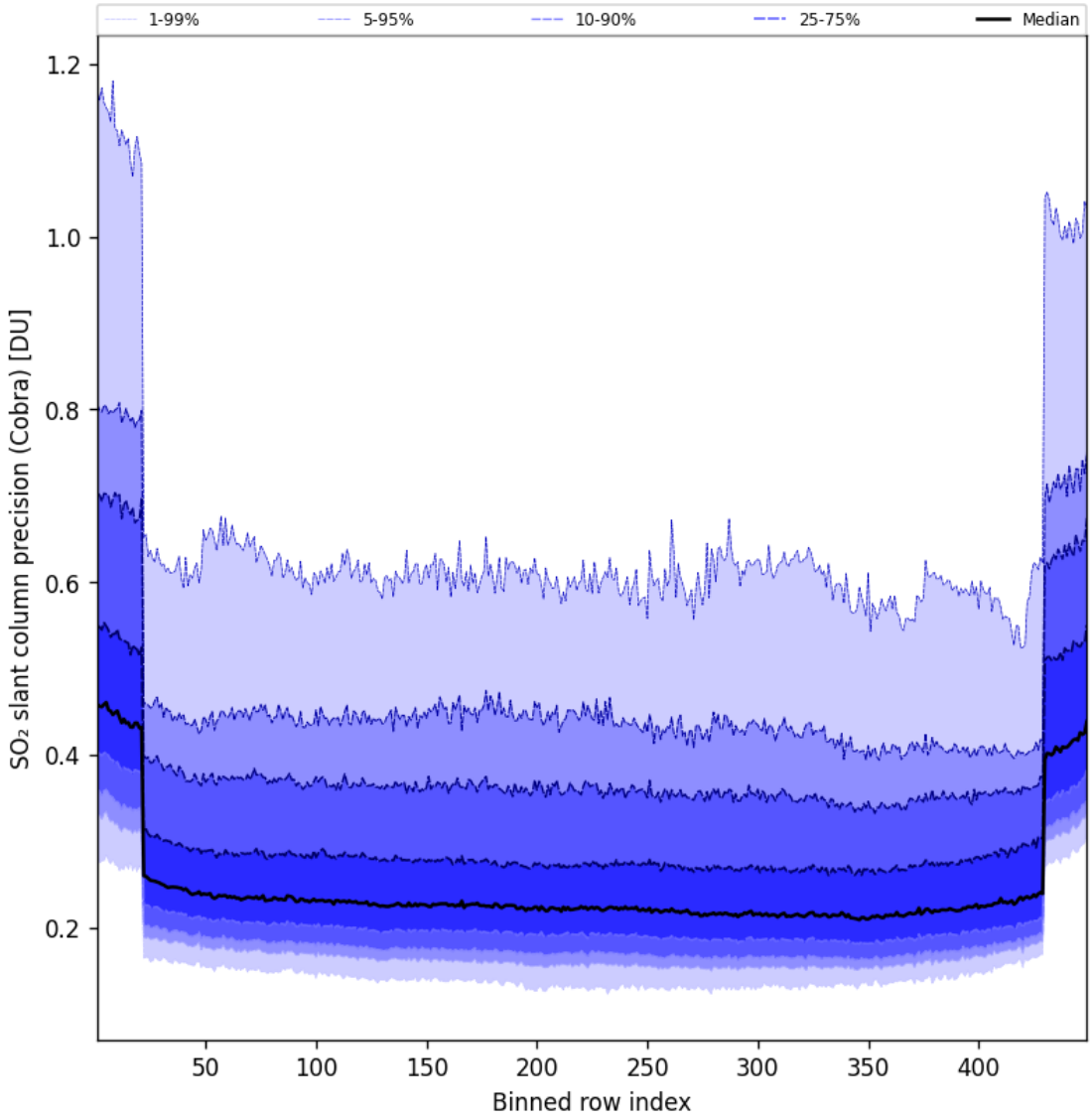

Figure 89: Along track statistics of "SO_2 slant column precision (Cobra)" for 2024-12-30 to 2024-12-30

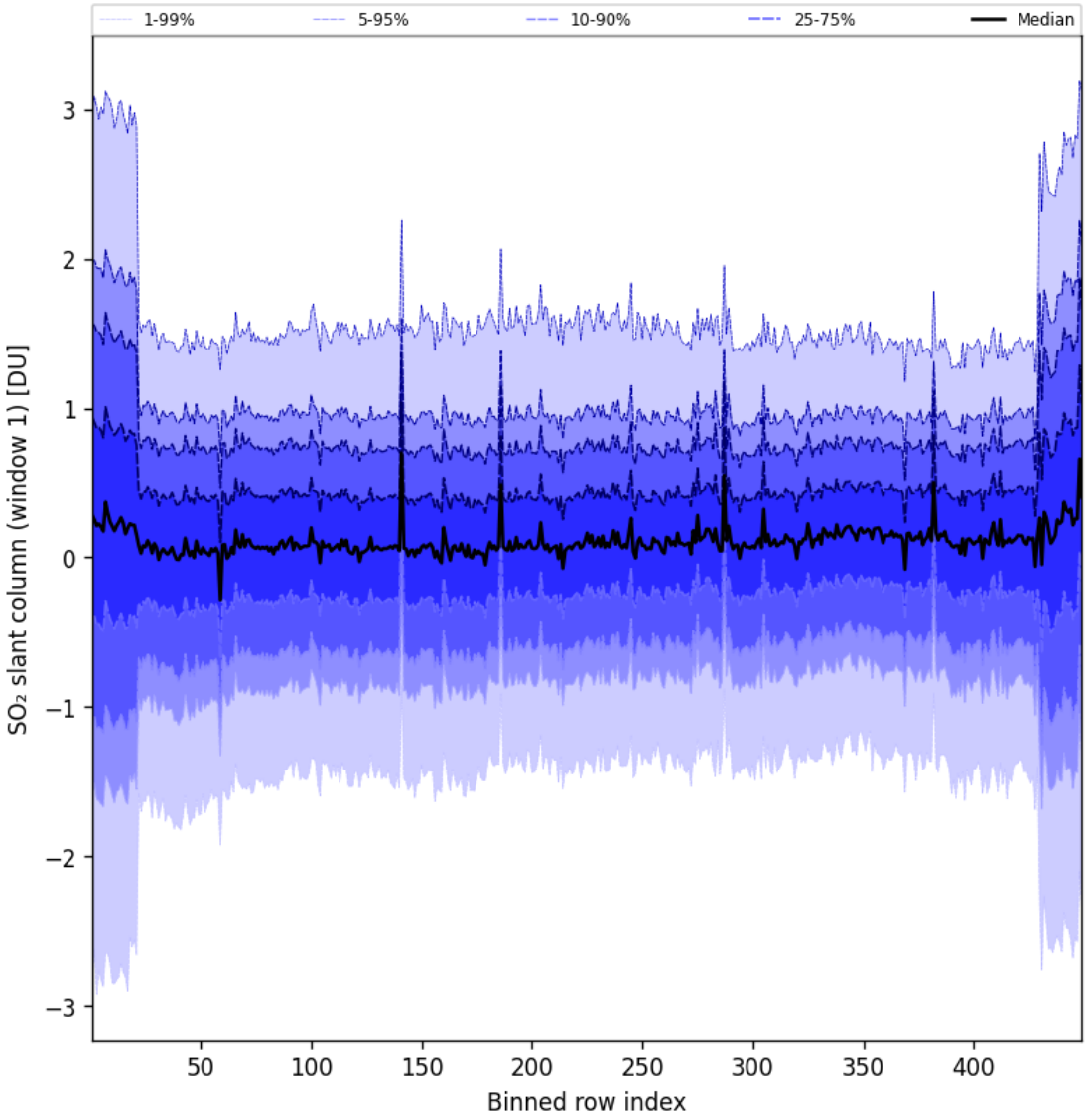

Figure 90: Along track statistics of "SO_2 slant column (window 1)" for 2024-12-30 to 2024-12-30

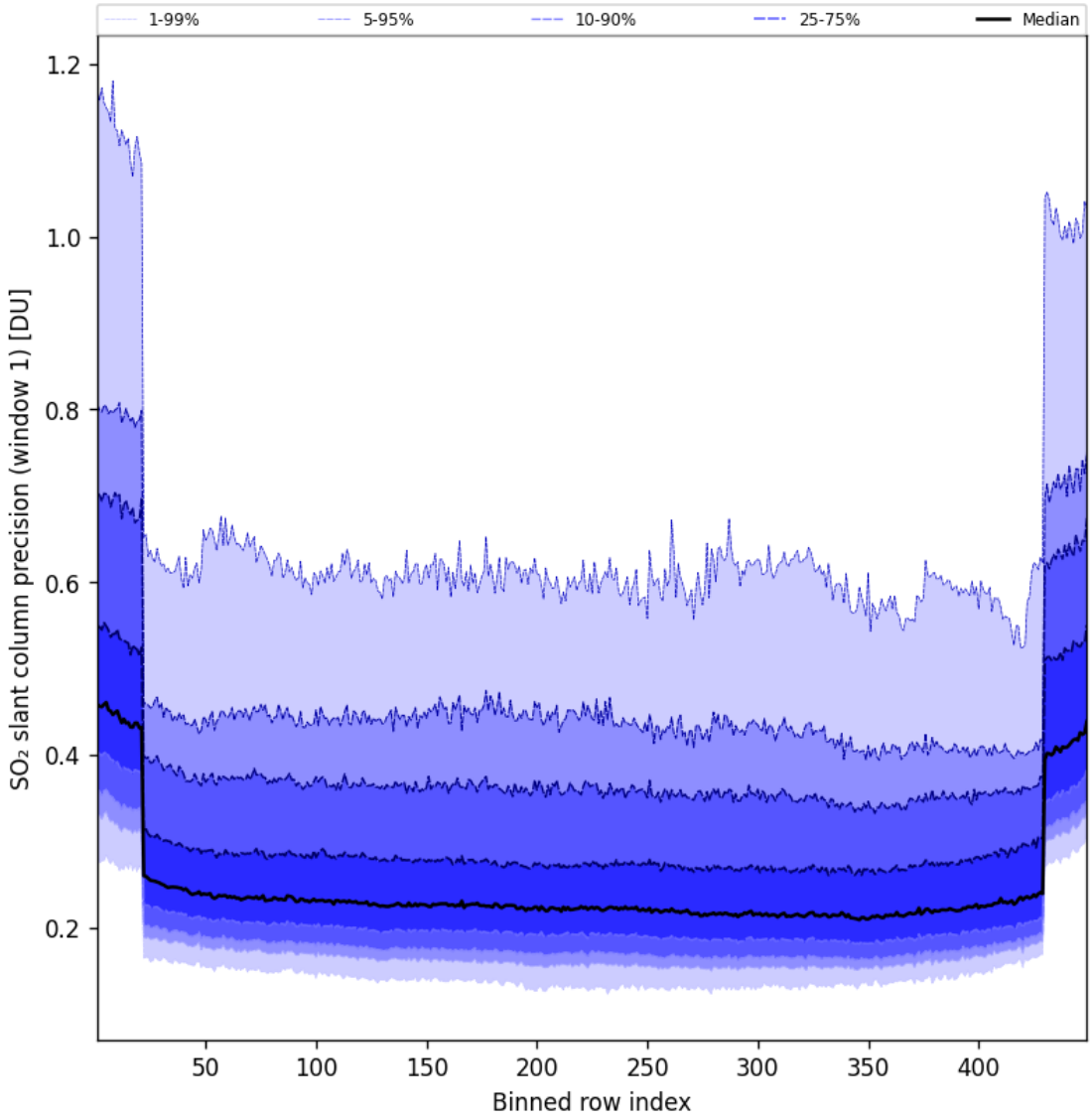

Figure 91: Along track statistics of "SO_2 slant column precision (window 1)" for 2024-12-30 to 2024-12-30

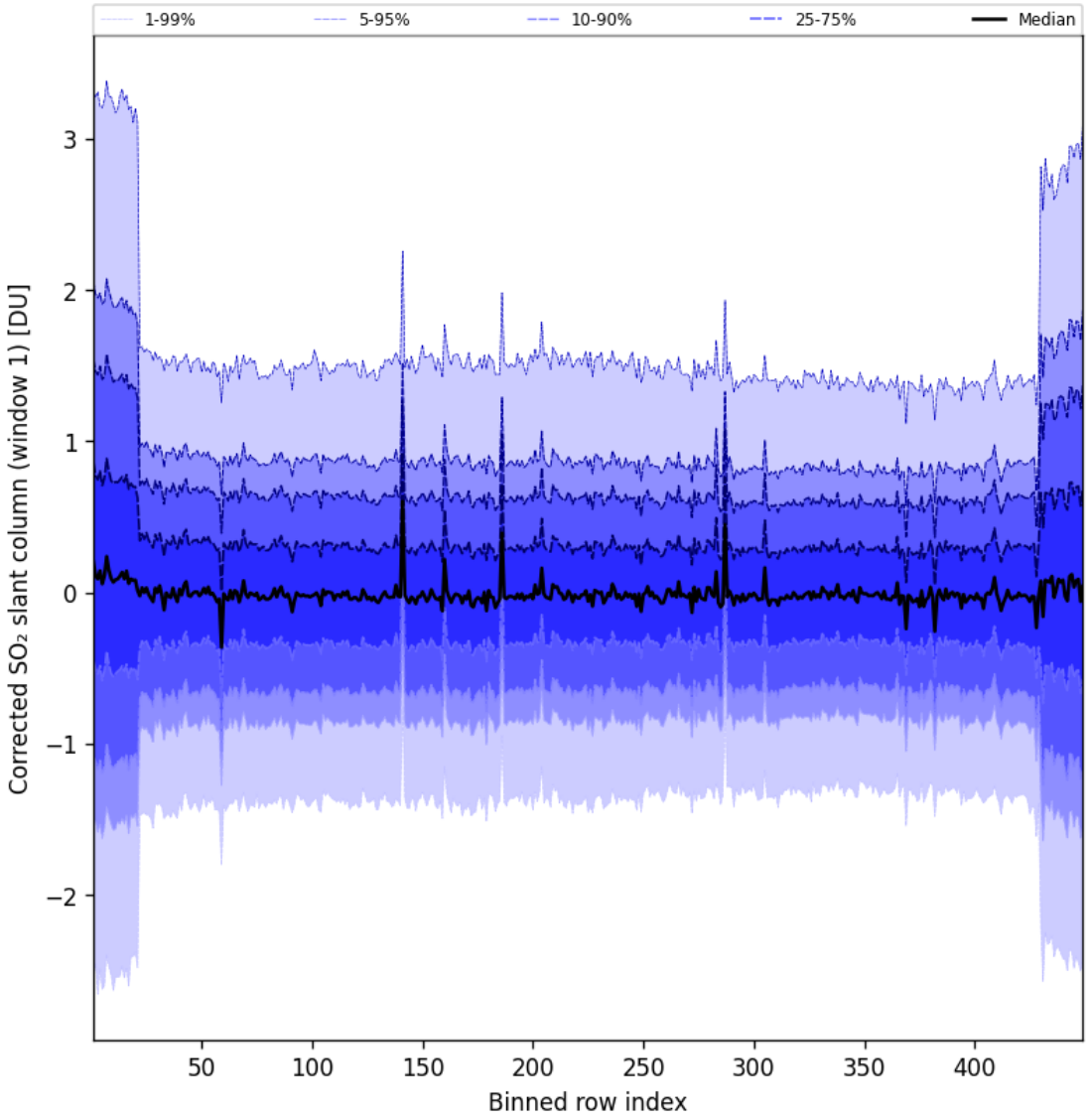

Figure 92: Along track statistics of "Corrected SO_2 slant column (window 1)" for 2024-12-30 to 2024-12-30

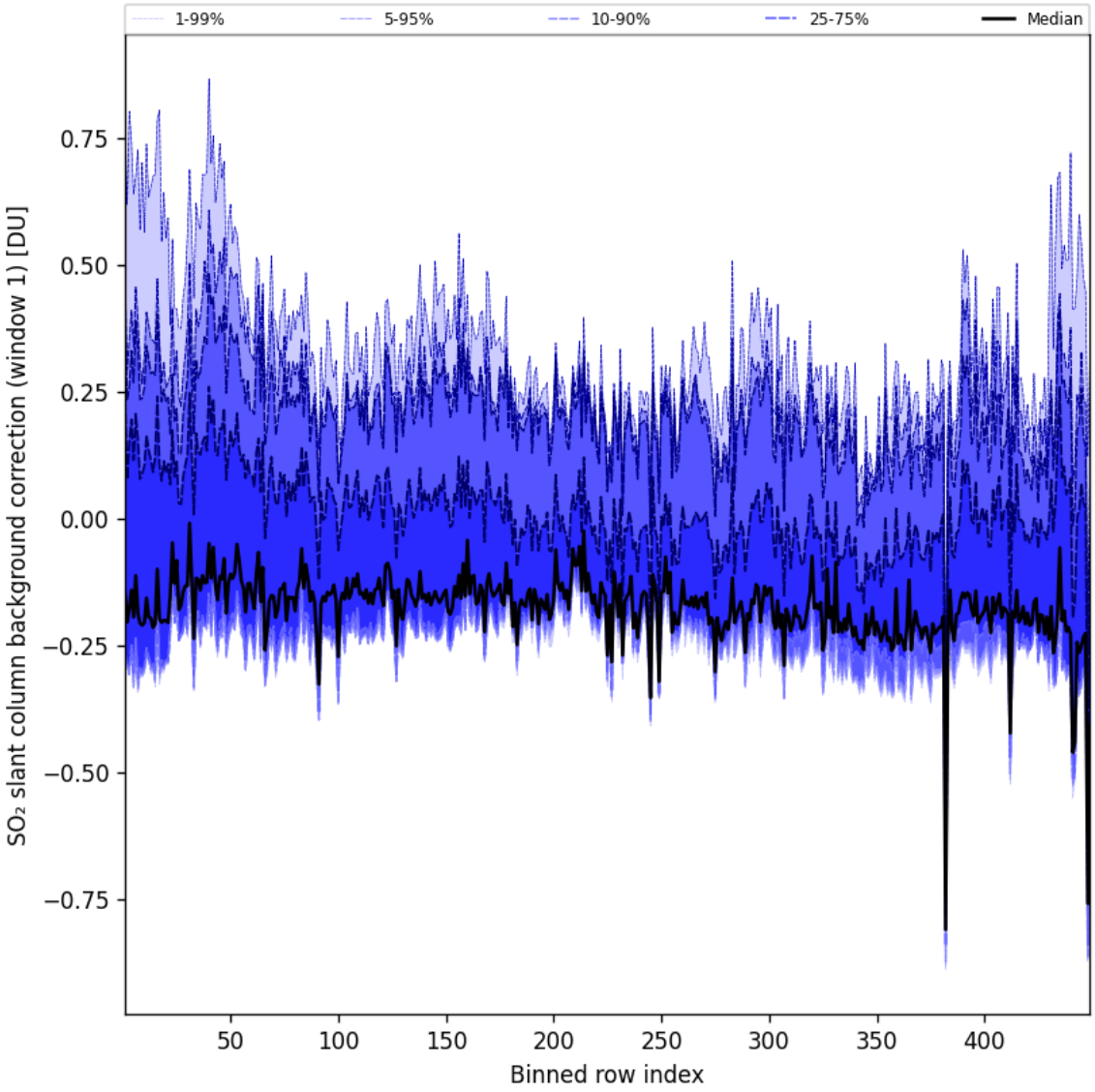

Figure 93: Along track statistics of "SO_2 slant column background correction (window 1)" for 2024-12-30 to 2024-12-30

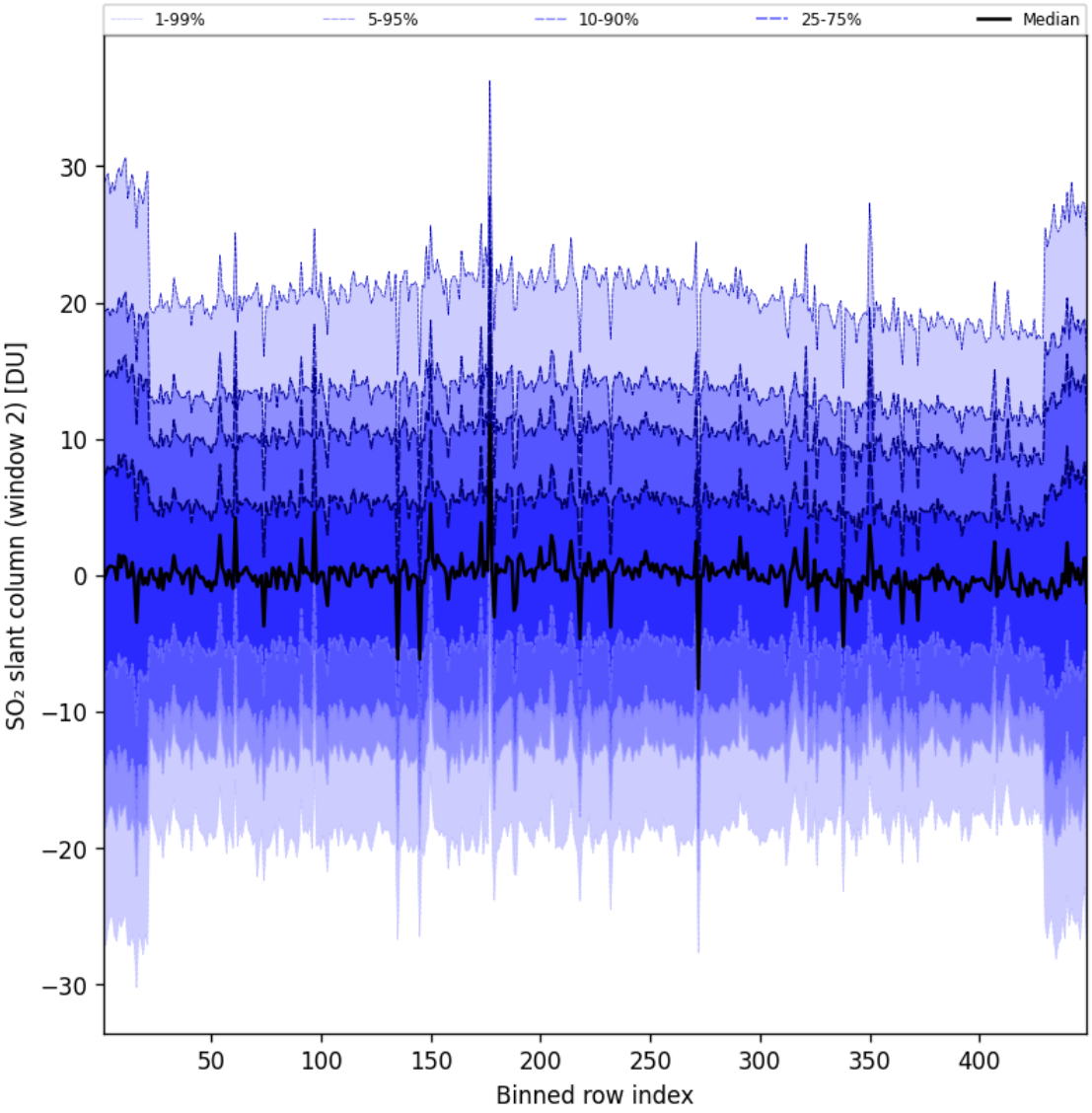

Figure 94: Along track statistics of "SO_2 slant column (window 2)" for 2024-12-30 to 2024-12-30

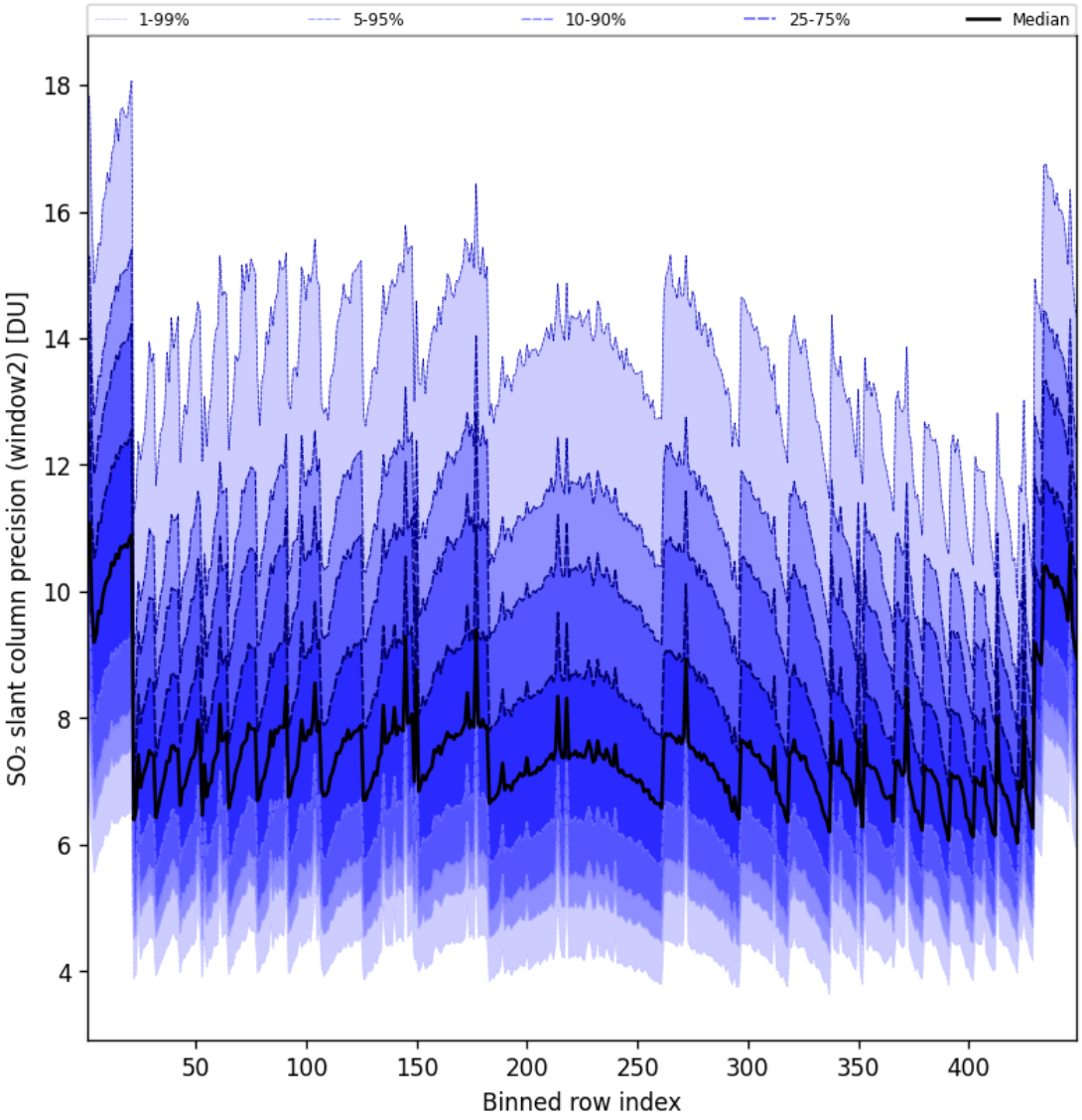

Figure 95: Along track statistics of "SO_2 slant column precision (window2)" for 2024-12-30 to 2024-12-30

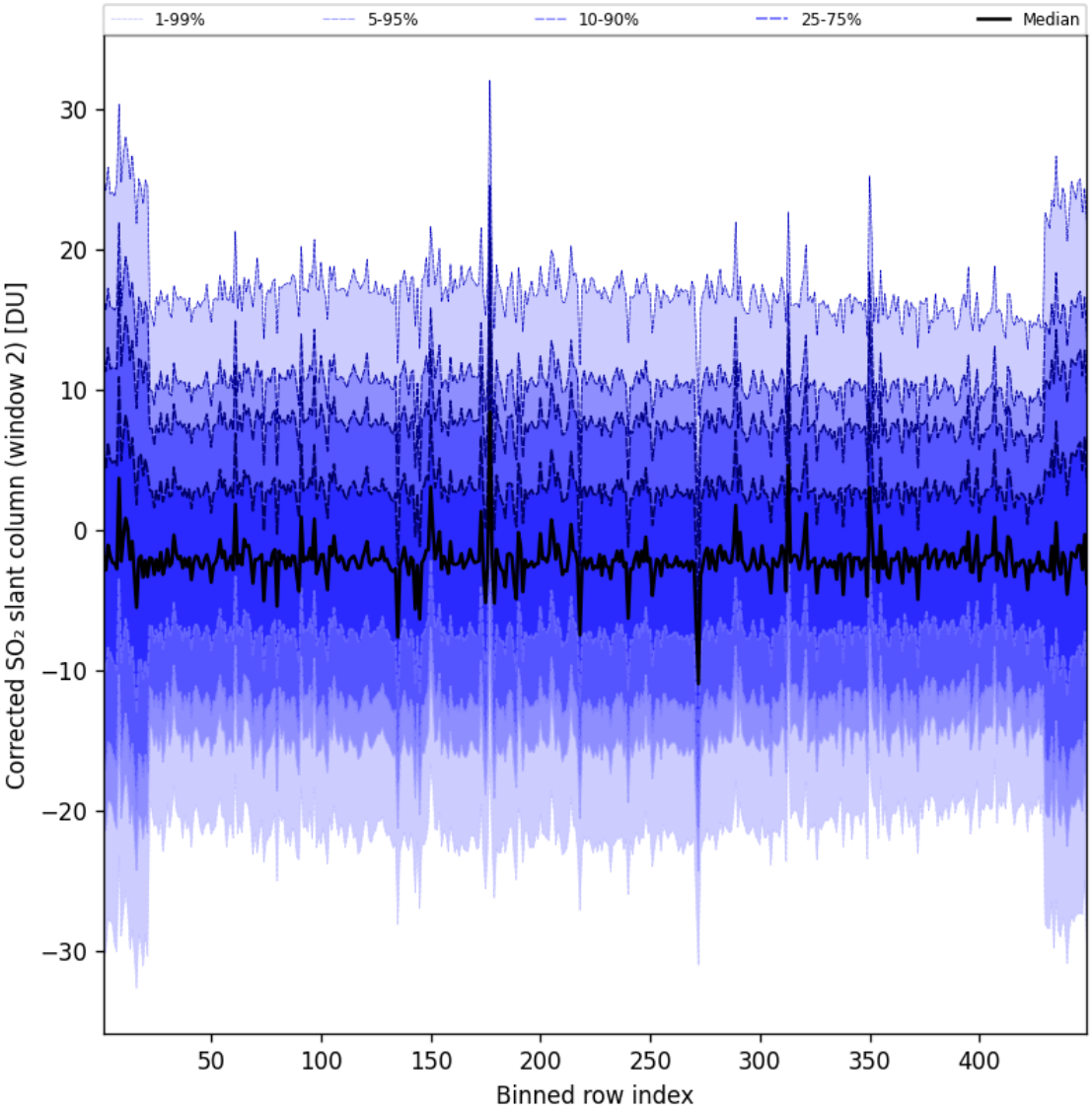

Figure 96: Along track statistics of “Corrected SO_2 slant column (window 2)” for 2024-12-30 to 2024-12-30

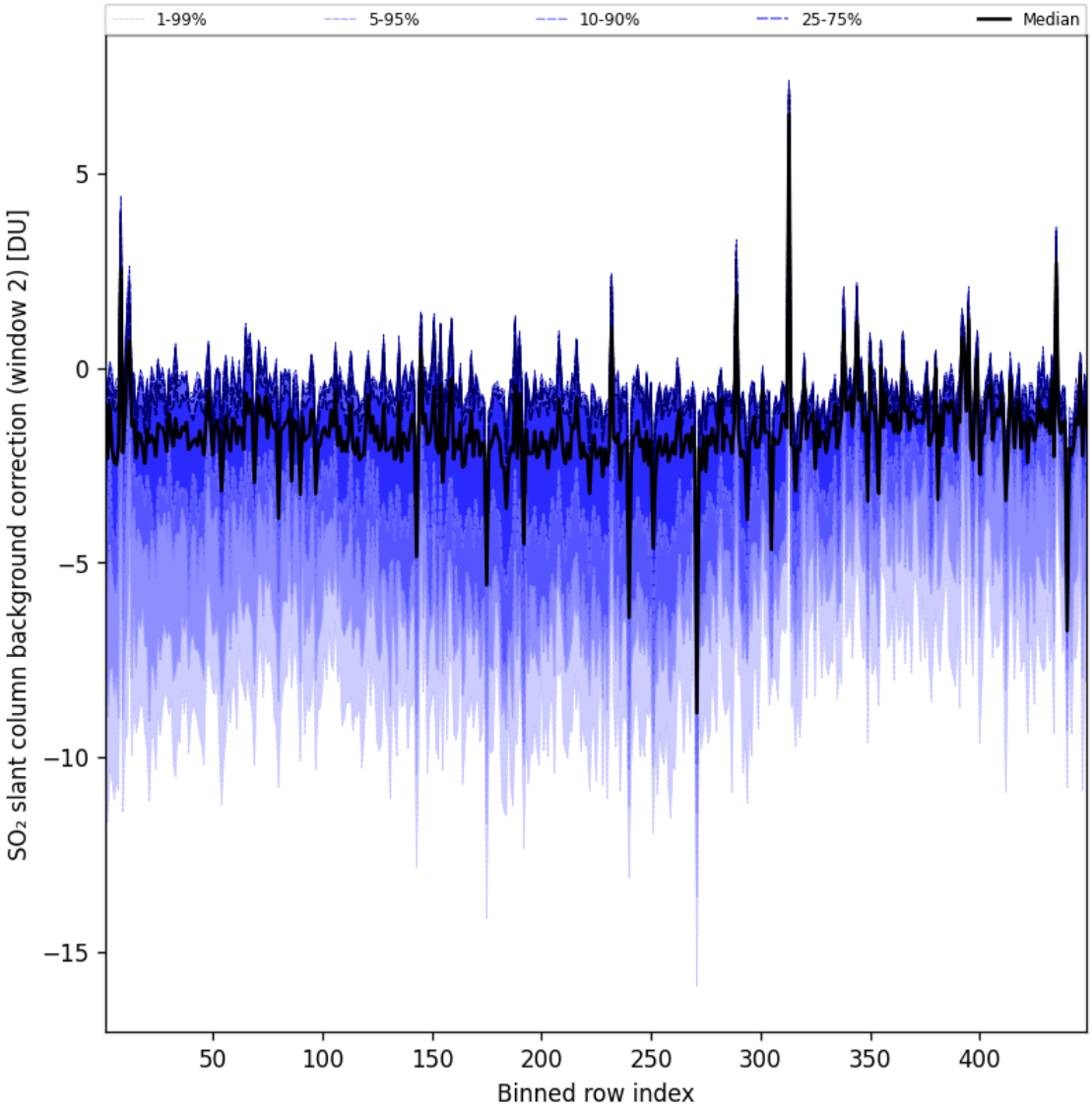

Figure 97: Along track statistics of "SO_2 slant column background correction (window 2)" for 2024-12-30 to 2024-12-30

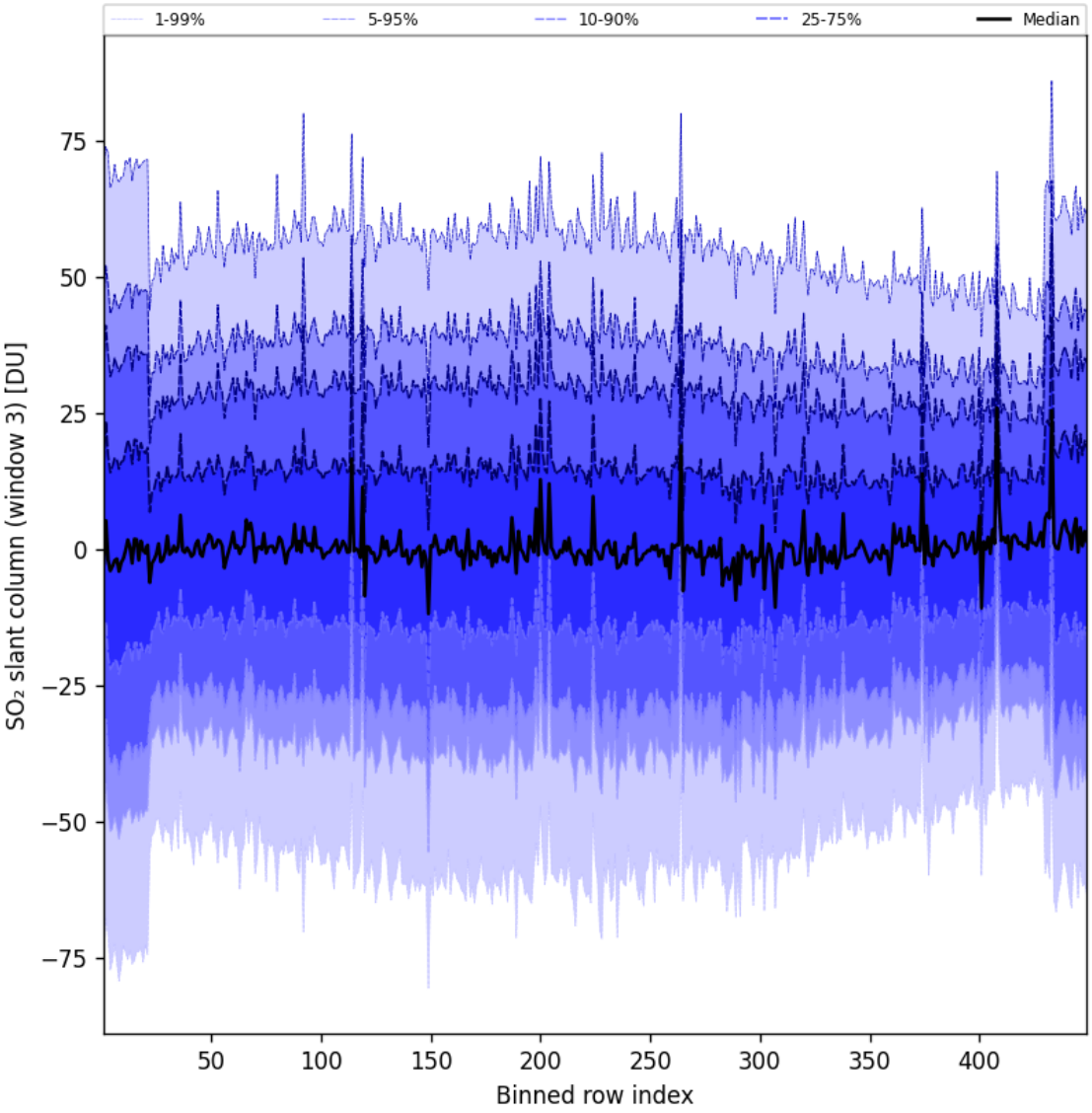

Figure 98: Along track statistics of "SO_2 slant column (window 3)" for 2024-12-30 to 2024-12-30

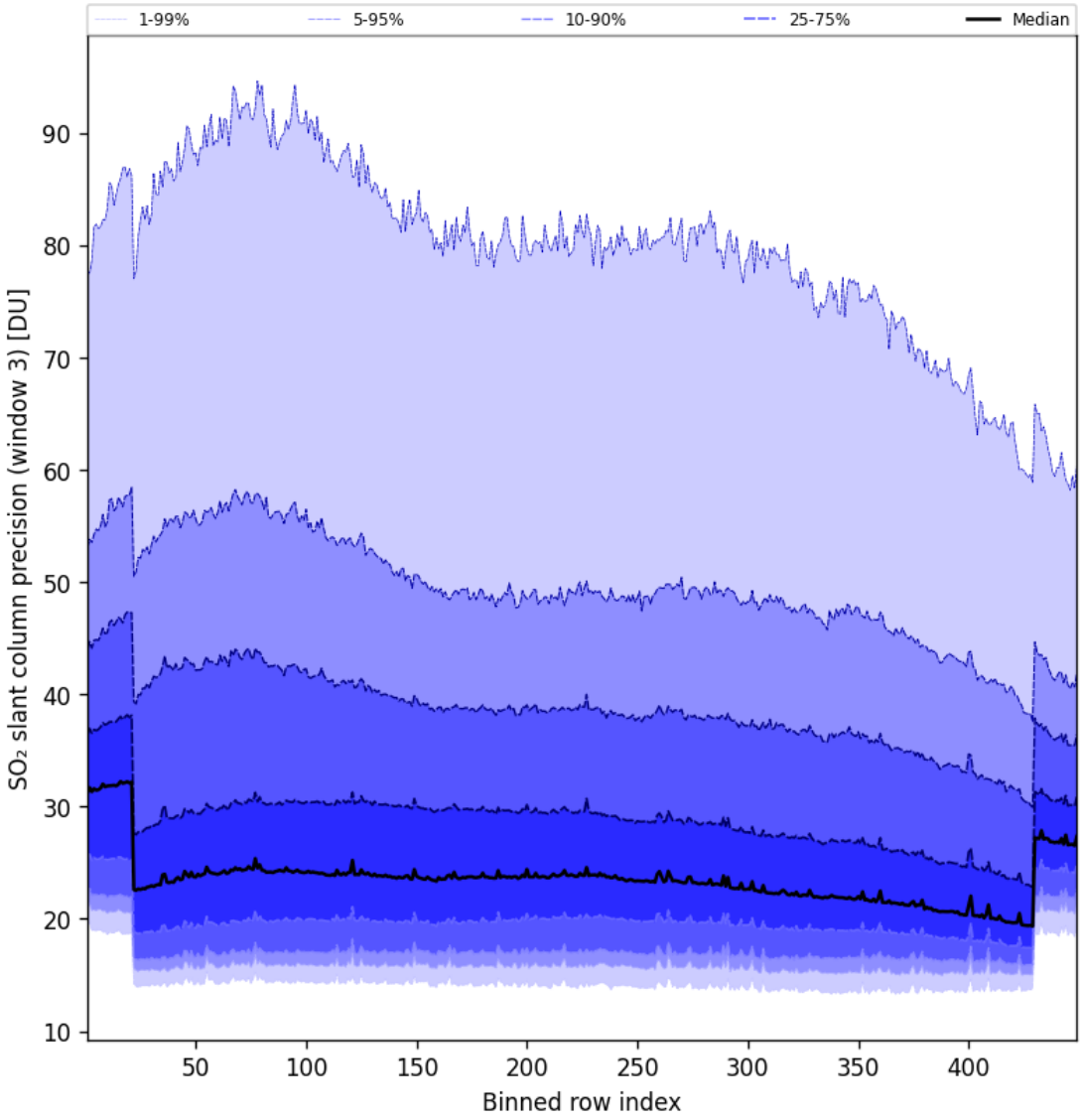

Figure 99: Along track statistics of "SO_2 slant column precision (window 3)" for 2024-12-30 to 2024-12-30

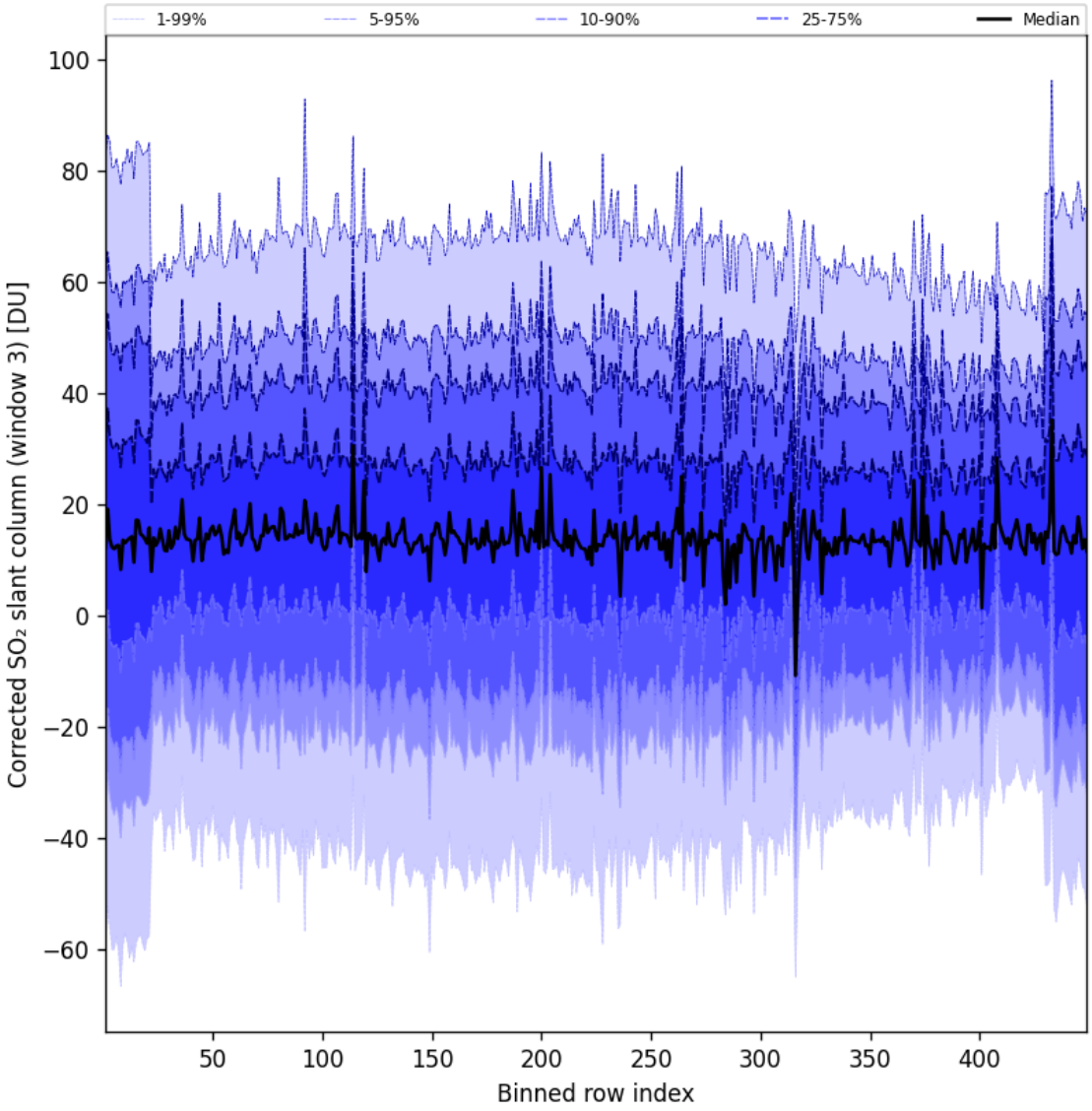

Figure 100: Along track statistics of “Corrected SO_2 slant column (window 3)” for 2024-12-30 to 2024-12-30

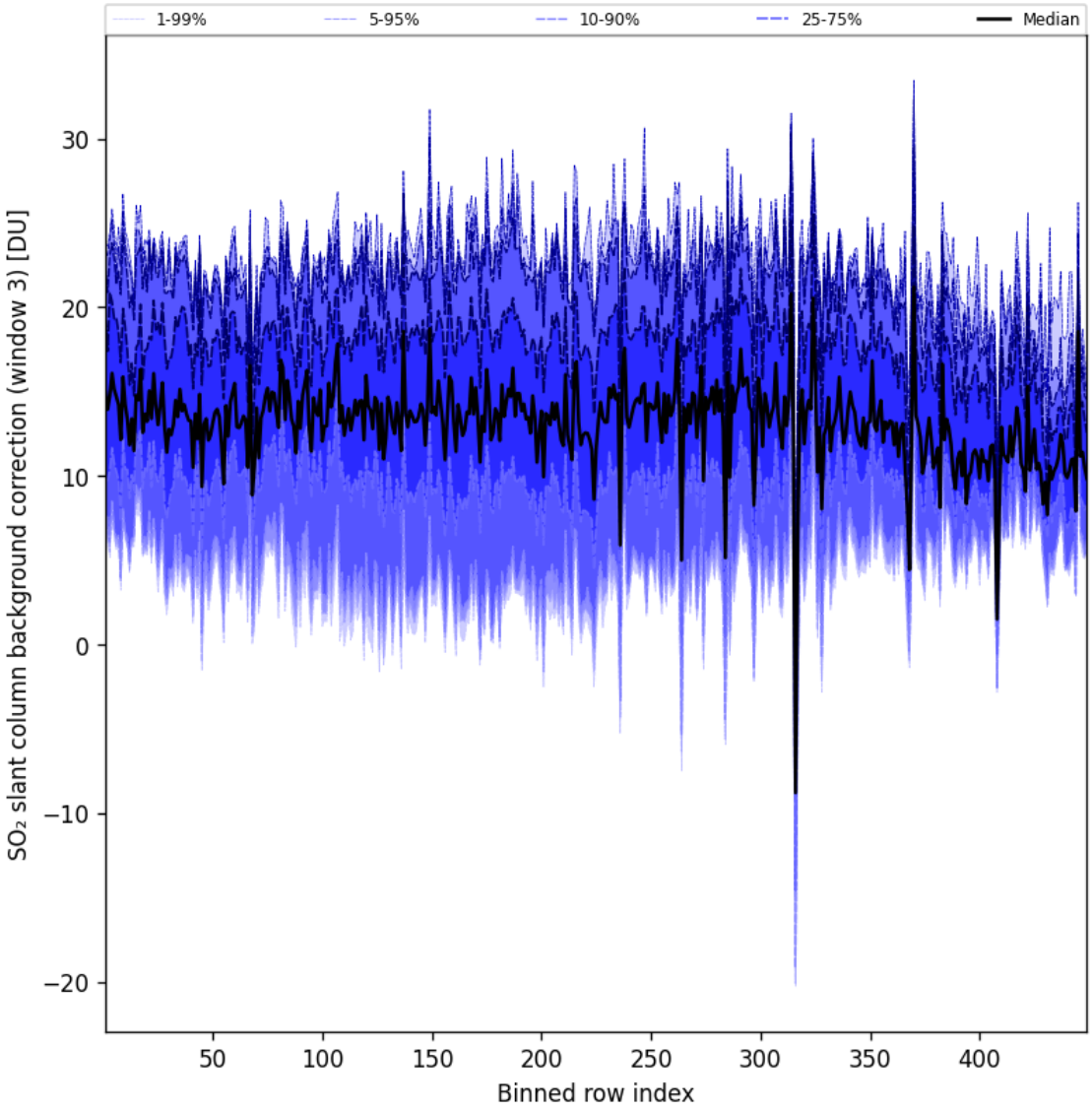

Figure 101: Along track statistics of "SO_2 slant column background correction (window 3)" for 2024-12-30 to 2024-12-30

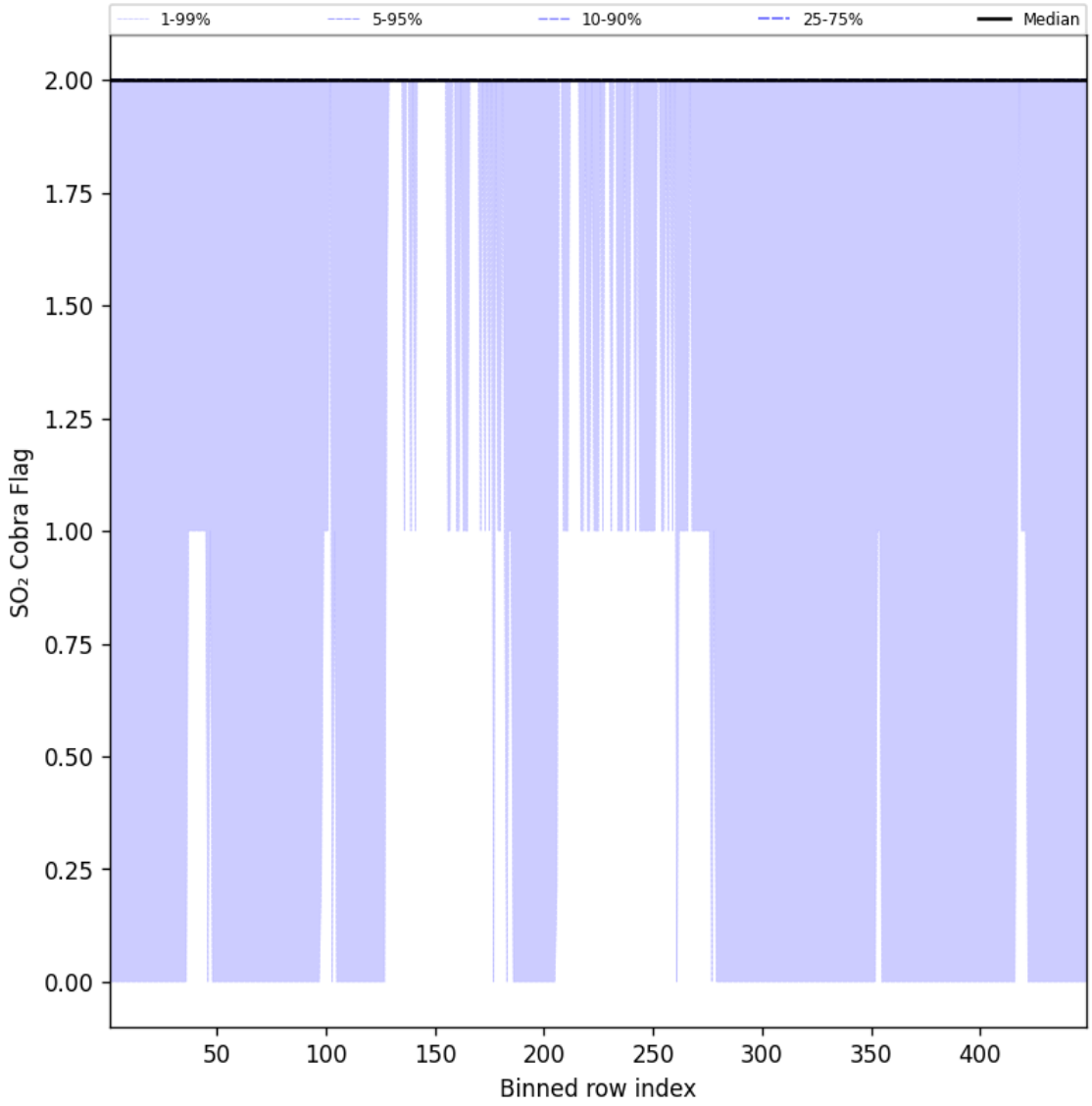

Figure 102: Along track statistics of "SO_2 Cobra Flag" for 2024-12-30 to 2024-12-30

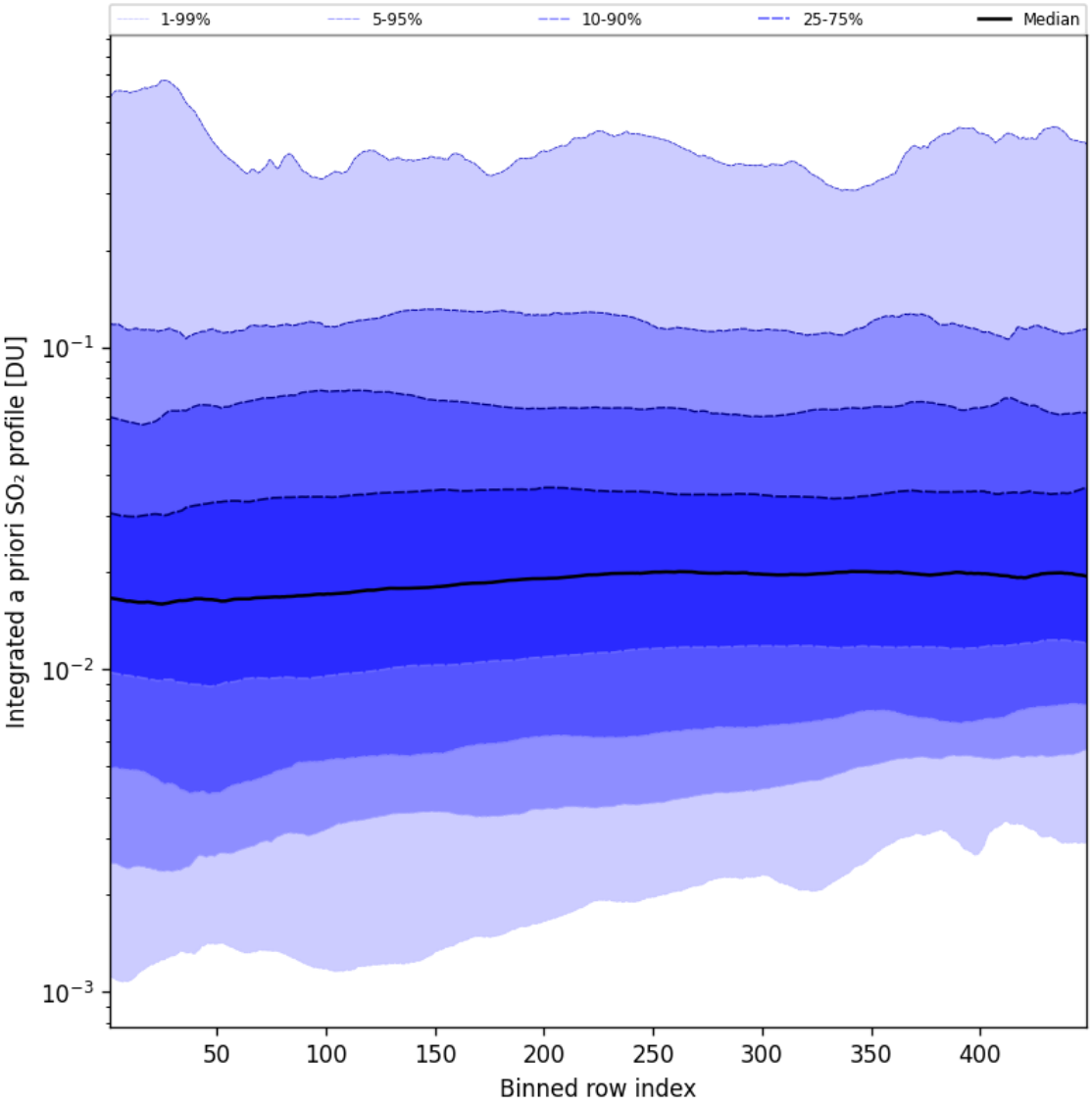

Figure 103: Along track statistics of “Integrated a priori SO_2 profile” for 2024-12-30 to 2024-12-30

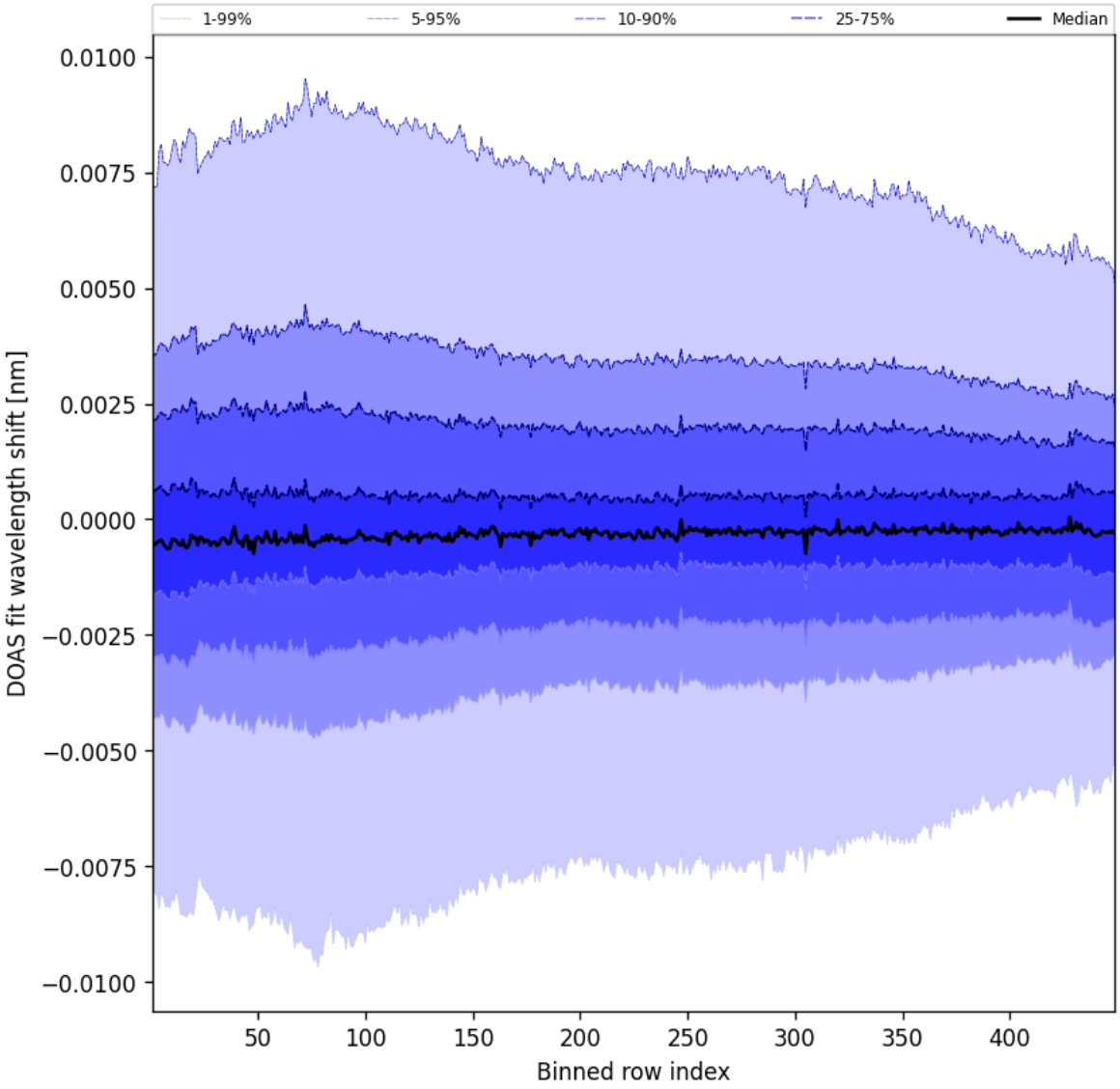

Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2024-12-30 to 2024-12-30

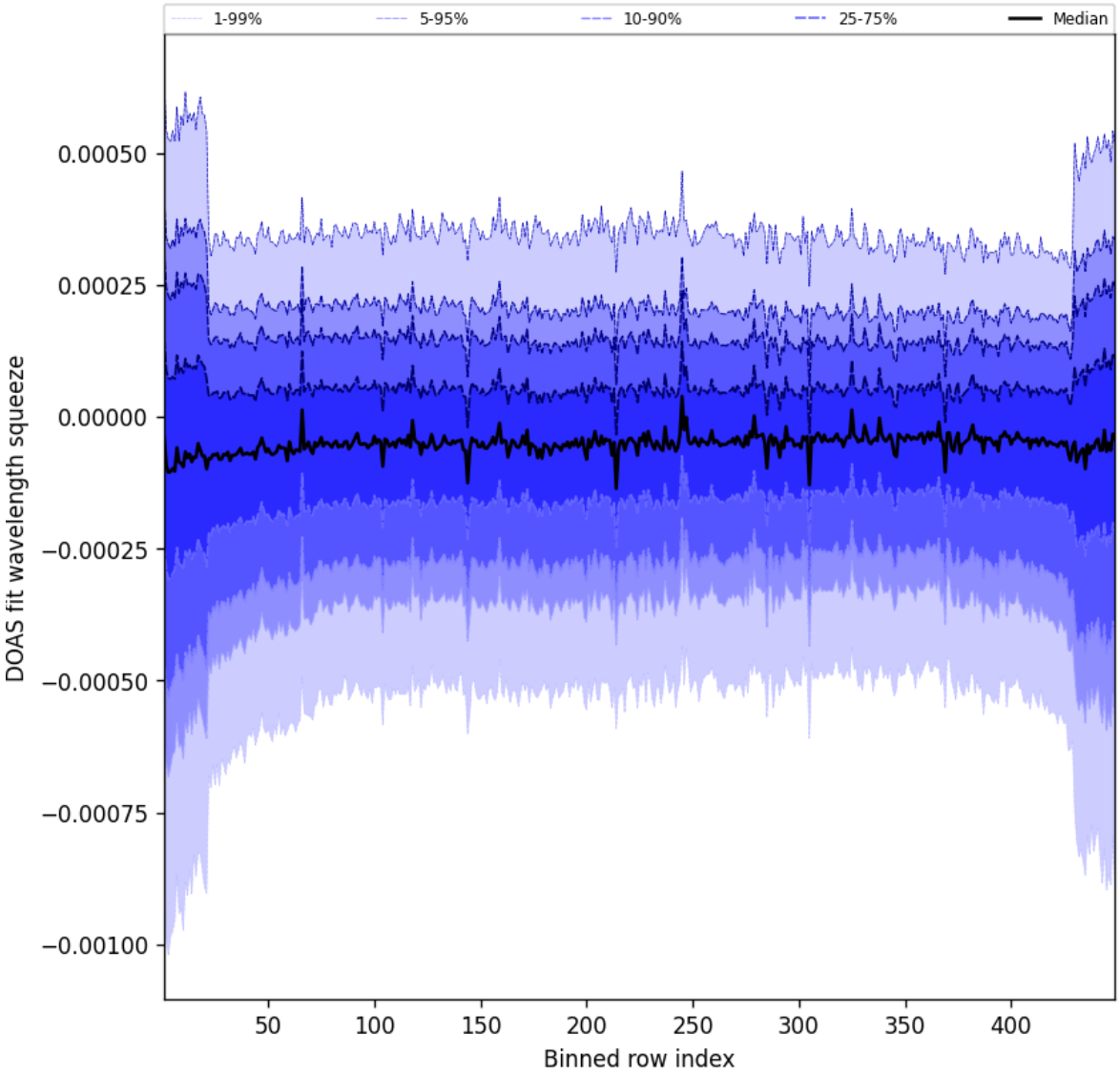

Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2024-12-30 to 2024-12-30

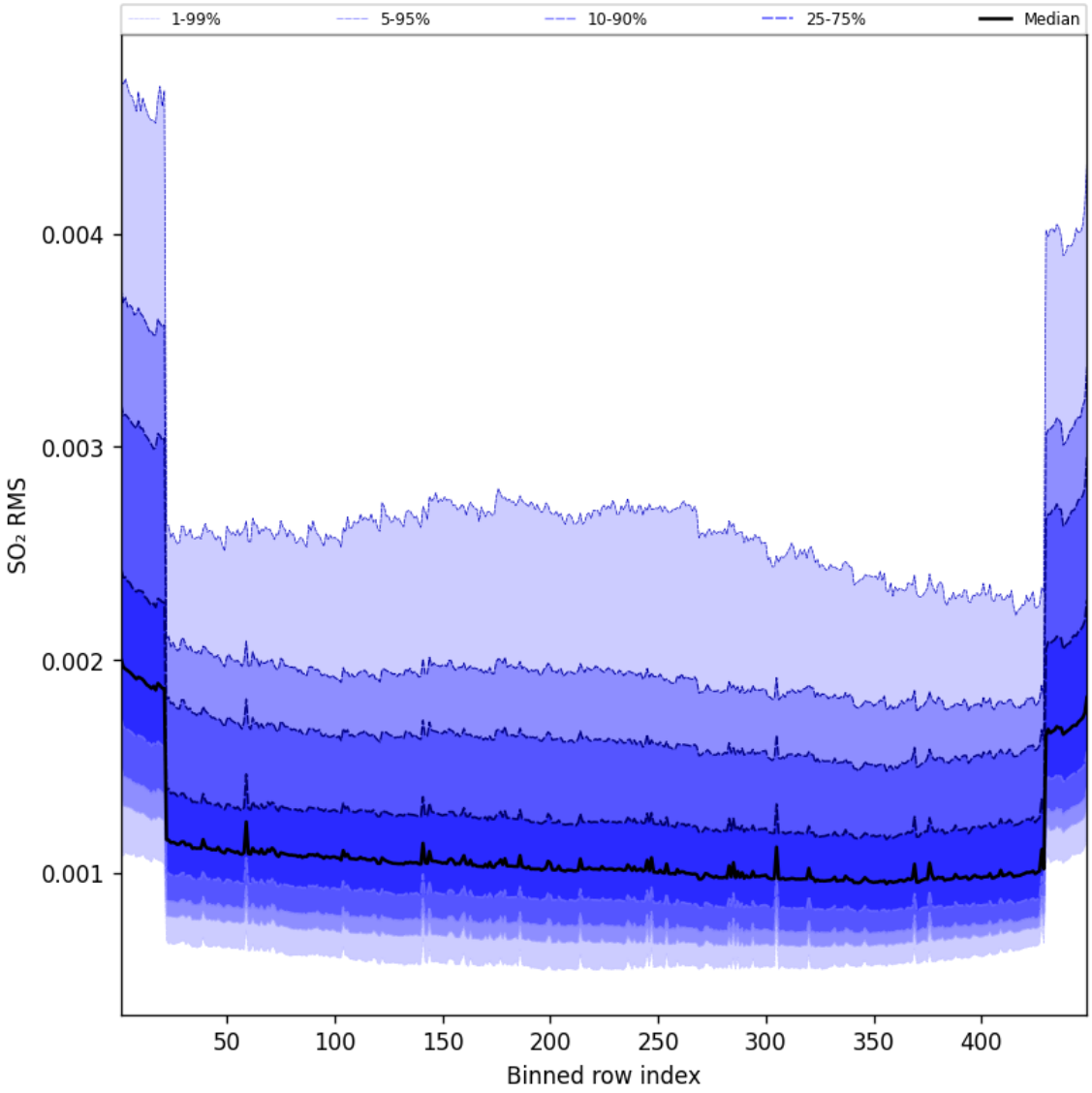

Figure 106: Along track statistics of "SO_2 RMS" for 2024-12-30 to 2024-12-30

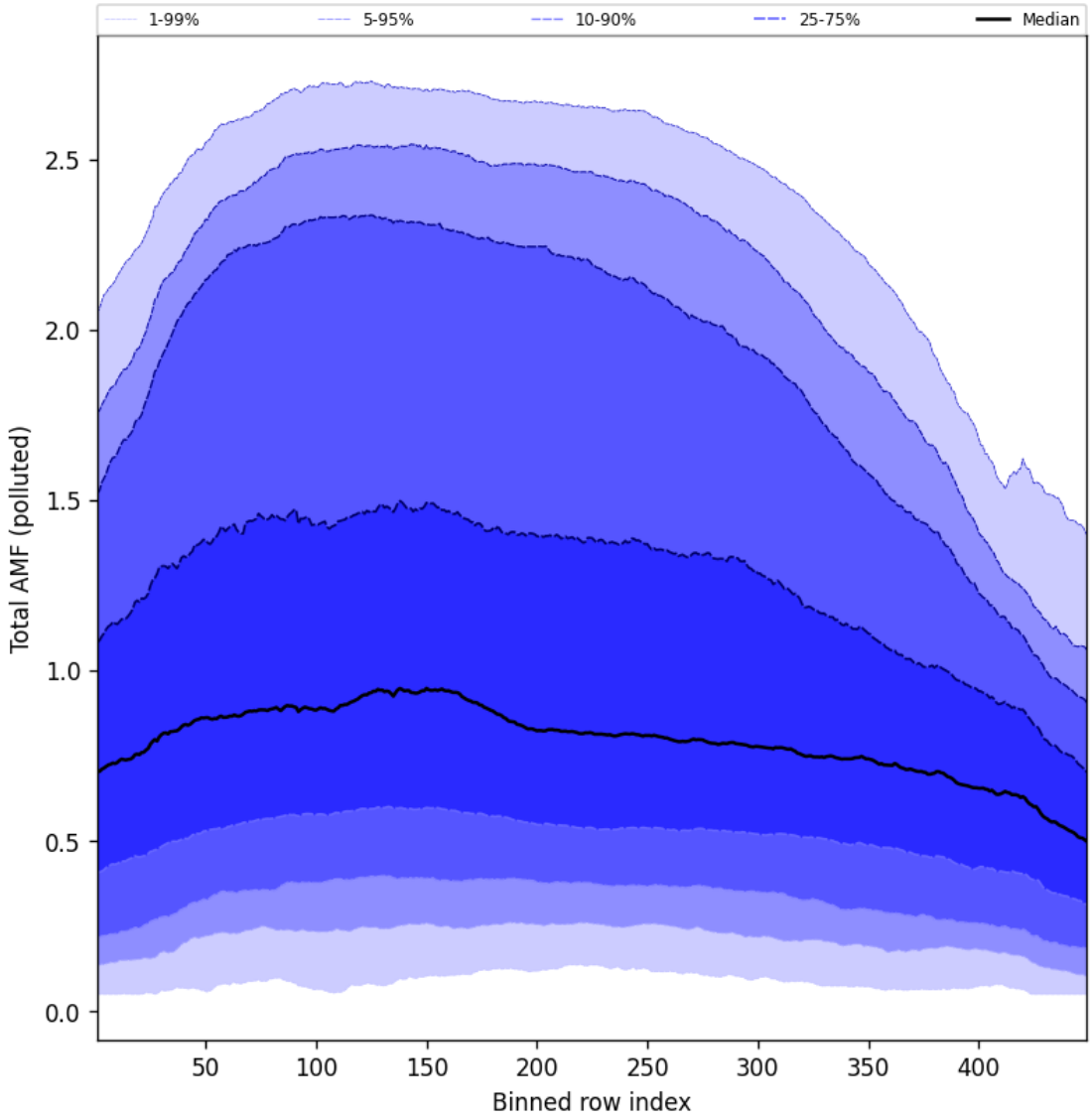

Figure 107: Along track statistics of “Total AMF (polluted)” for 2024-12-30 to 2024-12-30

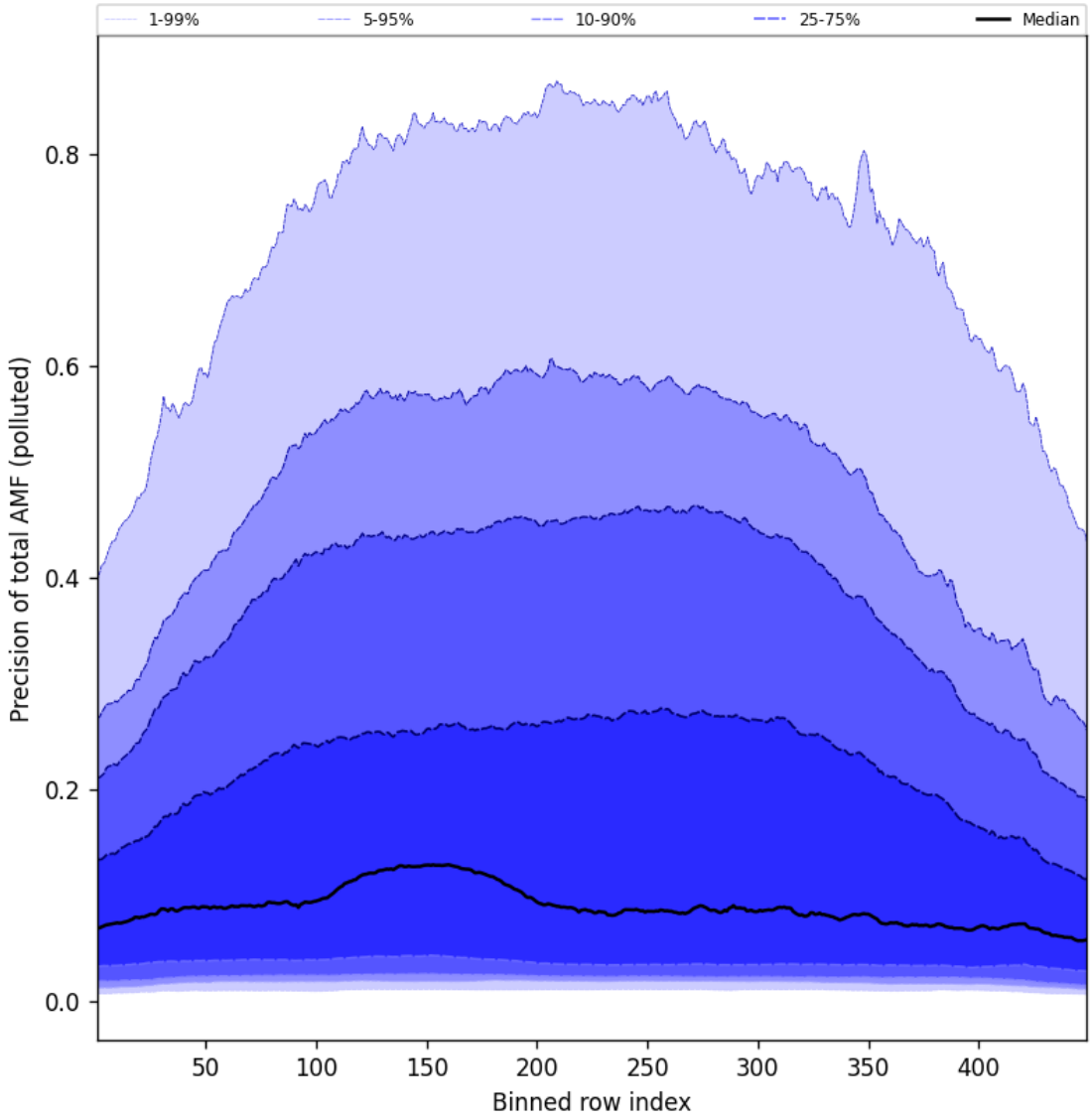

Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2024-12-30 to 2024-12-30

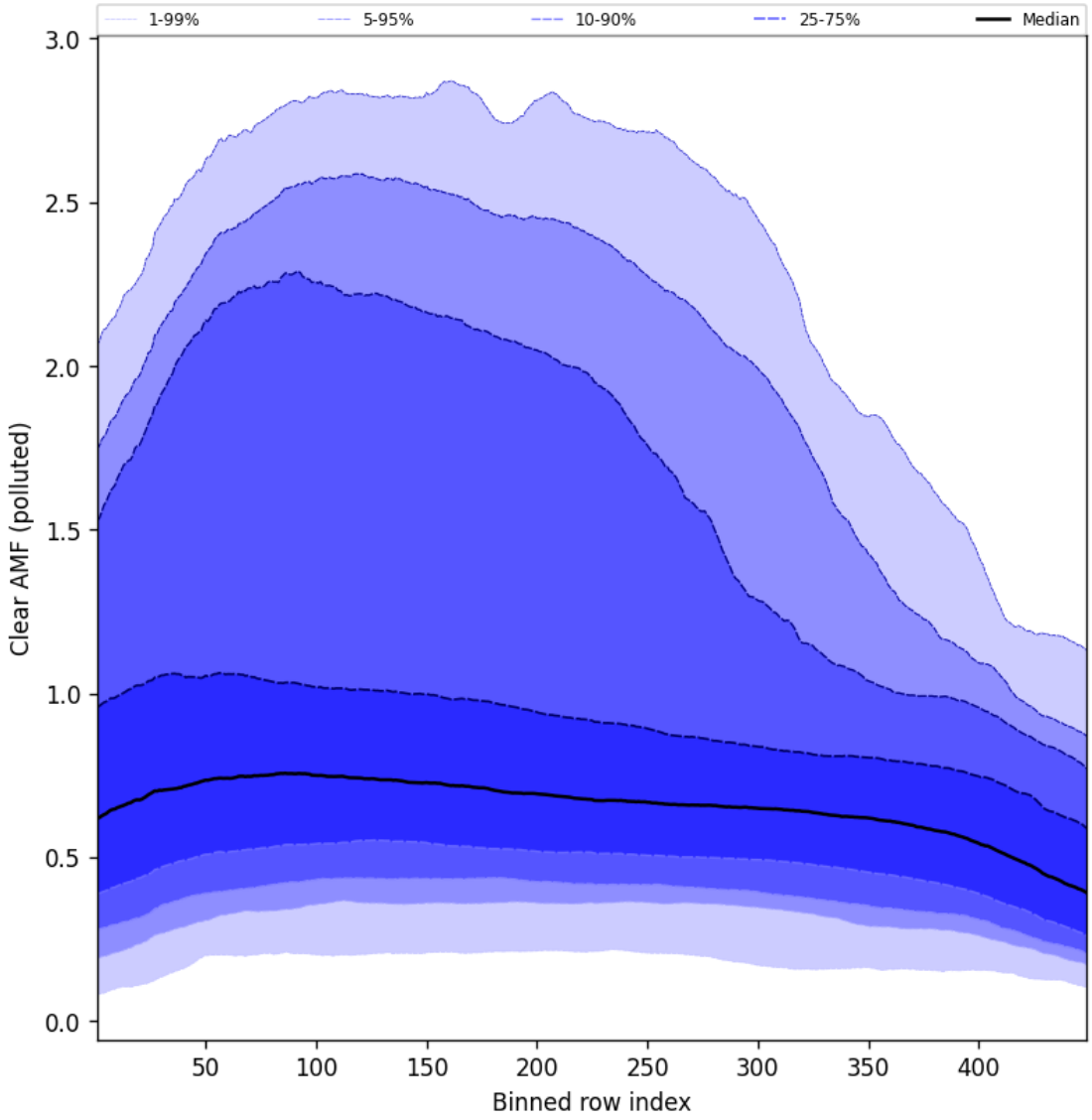

Figure 109: Along track statistics of “Clear AMF (polluted)” for 2024-12-30 to 2024-12-30

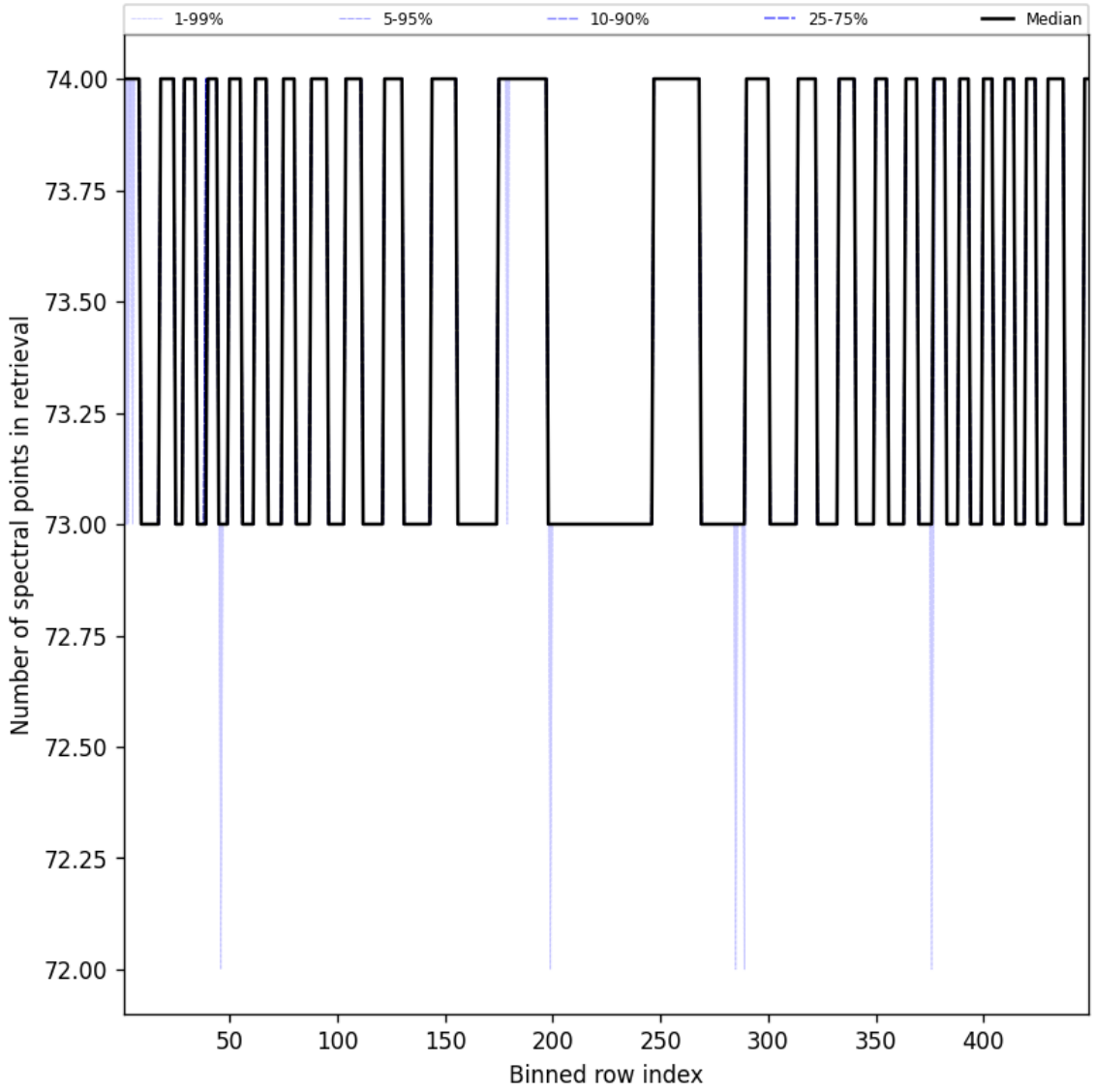

Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2024-12-30 to 2024-12-30

10 Coincidence density

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

Contents

List of Figures

List of Tables

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