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]	0.641 ± 0.400	18545731	0.995	0.770	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(3.869 \pm 127.621) \times 10^{-2}$	18545731	0.263	0.464	1.166×10^{-2}	-67.6	1.043×10^{3}
sulfurdioxide total vertical column precision [DU]	0.512 ± 0.681	18545731	0.222	0.333	0.335	4.283×10^{-2}	227
sulfurdioxide slant column density corrected [DU]	$(2.651 \pm 54.647) \times 10^{-2}$	18545731	0.250	0.376	1.018×10^{-2}	-34.3	521
sulfurdioxide slant column density cobra [DU]	$(2.479 \pm 42.584) \times 10^{-2}$	18545731	0.250	0.376	1.018×10^{-2}	-34.3	54.3
sulfurdioxide slant column density cobra precision [DU]	0.300 ± 0.132	18545731	0.213	0.135	0.263	8.203×10^{-2}	34.1
sulfurdioxide slant column density window1 [DU]	0.187 ± 0.725	18545731	0.225	0.754	0.192	-66.4	72.6
sulfurdioxide slant column density window1 precision [DU]	0.300 ± 0.132	18545731	0.213	0.135	0.263	8.203×10^{-2}	34.1
sulfurdioxide slant column density corrected win1 [DU]	$(6.550 \pm 72.010) \times 10^{-2}$	18545731	2.500×10^{-2}	0.742	4.184×10^{-2}	-66.4	72.5
background so2 slant column offset window1 [DU]	-0.121 ± 0.153	18545731	-0.220	0.159	-0.152	-1.08	5.15
sulfurdioxide slant column density window2 [DU]	3.45 ± 9.13	18545731	3.25	11.6	3.32	-1.066×10^{3}	885
sulfurdioxide slant column density window2 precision [DU]	8.05 ± 2.22	18545731	7.43	2.50	7.73	2.27	814
sulfurdioxide slant column density corrected win2 [DU]	0.812 ± 8.763	18545731	0.750	11.0	0.827	-1.067×10^{3}	884
background so2 slant column offset window2 [DU]	-2.64 ± 3.08	18545731	-0.250	4.01	-1.62	-17.0	10.8
sulfurdioxide slant column density window3 [DU]	-15.9 ± 23.9	18545731	-17.4	30.0	-16.4	-2.750×10^{3}	1.322×10^{3}
sulfurdioxide slant column density window3 precision [DU]	28.0 ± 13.2	18545731	22.5	9.52	24.5	9.66	1.071×10^{3}
sulfurdioxide slant column density corrected win3 [DU]	-5.28 ± 23.14	18545731	-6.16	28.8	-5.19	-2.746×10^{3}	1.327×10^{3}
background so2 slant column offset window3 [DU]	10.6 ± 6.7	18545731	5.04	11.0	10.3	-24.0	44.8
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.21	18545731	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(2.904 \pm 7.124) \times 10^{-2}$	18545731	1.217×10^{-2}	1.603×10^{-2}	1.218×10^{-2}	1.310×10^{-4}	3.33
fitted radiance shift [nm]	$(-3.321 \pm 25.918) \times 10^{-4}$	18545731	-5.000×10^{-4}	1.734×10^{-3}	-3.146×10^{-4}	-4.807×10^{-2}	3.878×10^{-2}
fitted radiance squeeze [1]	$(-1.869 \pm 17.872) \times 10^{-5}$	18545731	-1.000×10^{-5}	2.046×10^{-4}	-1.321×10^{-5}	-1.198×10^{-2}	2.116×10^{-2}
fitted root mean square [1]	$(1.311 \pm 0.546) \times 10^{-3}$	18545731	9.750×10^{-4}	5.494×10^{-4}	1.157×10^{-3}	3.416×10^{-4}	9.307×10^{-2}
sulfurdioxide total air mass factor polluted [1]	0.867 ± 0.424	18545731	0.740	0.558	0.815	5.000×10^{-2}	2.84
sulfurdioxide total air mass factor polluted precision [1]	0.111 ± 0.123	18545731	3.500×10^{-2}	0.102	6.540×10^{-2}	3.083×10^{-3}	1.84
sulfurdioxide clear air mass factor polluted [1]	0.740 ± 0.299	18545731	0.620	0.402	0.708	5.744×10^{-2}	2.46
number of spectral points in retrieval [1]	73.4 ± 0.5	18545731	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	5.000×10^{-2}	0.120	0.230	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	−2.18	−0.861	−0.536	−0.364	−0.217	0.247	0.408	0.601	0.980	2.61
sulfurdioxide total vertical column precision [DU]	0.105	0.142	0.168	0.192	0.224	0.557	0.732	0.935	1.37	3.21
sulfurdioxide slant column density corrected [DU]	−0.862	−0.502	−0.365	−0.273	−0.176	0.200	0.303	0.405	0.566	1.10
sulfurdioxide slant column density cobra [DU]	−0.862	−0.502	−0.365	−0.273	−0.176	0.200	0.303	0.405	0.566	1.10
sulfurdioxide slant column density cobra precision [DU]	0.147	0.174	0.188	0.199	0.214	0.349	0.401	0.453	0.545	0.785
sulfurdioxide slant column density window1 [DU]	−1.72	−0.899	−0.593	−0.394	−0.189	0.565	0.760	0.946	1.23	2.05
sulfurdioxide slant column density window1 precision [DU]	0.147	0.174	0.188	0.199	0.214	0.349	0.401	0.453	0.545	0.785
sulfurdioxide slant column density corrected win1 [DU]	−1.65	−0.956	−0.691	−0.512	−0.323	0.419	0.624	0.825	1.14	2.09
background so2 slant column offset window1 [DU]	−0.380	−0.289	−0.264	−0.246	−0.220	-6.141×10^{-2}	-2.723×10^{-3}	6.372×10^{-2}	0.172	0.416
sulfurdioxide slant column density window2 [DU]	−17.8	−11.0	−7.72	−5.24	−2.43	9.20	12.2	14.8	18.4	26.0
sulfurdioxide slant column density window2 precision [DU]	4.36	5.21	5.72	6.13	6.62	9.11	9.95	10.8	12.0	14.7
sulfurdioxide slant column density corrected win2 [DU]	−20.4	−13.3	−9.94	−7.46	−4.70	6.35	9.10	11.6	14.9	22.0
background so2 slant column offset window2 [DU]	−11.2	−9.09	−7.40	−5.93	−4.35	−0.336	-2.651×10^{-2}	0.199	0.497	1.48
sulfurdioxide slant column density window3 [DU]	−74.2	−54.2	−45.0	−38.4	−31.0	−1.02	6.98	14.2	24.0	43.3
sulfurdioxide slant column density window3 precision [DU]	13.6	16.0	17.8	19.3	20.9	30.4	35.1	40.9	52.8	84.6
sulfurdioxide slant column density corrected win3 [DU]	−63.5	−43.3	−33.8	−27.0	−19.6	9.25	16.6	23.3	32.4	50.9
background so2 slant column offset window3 [DU]	−1.82	1.36	2.56	3.60	4.99	16.0	18.0	19.6	21.6	24.6
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]	5.362×10^{-4}	1.006×10^{-3}	1.653×10^{-3}	3.243×10^{-3}	6.233×10^{-3}	2.226×10^{-2}	3.358×10^{-2}	5.601×10^{-2}	0.116	0.336
fitted radiance shift [nm]	-8.236×10^{-3}	-4.170×10^{-3}	-2.743×10^{-3}	-1.920×10^{-3}	-1.223×10^{-3}	5.110×10^{-4}	1.190×10^{-3}	2.050×10^{-3}	3.558×10^{-3}	7.789×10^{-3}
fitted radiance squeeze [1]	-5.146×10^{-4}	-3.079×10^{-4}	-2.269×10^{-4}	-1.732×10^{-4}	-1.173×10^{-4}	8.732×10^{-5}	1.384×10^{-4}	1.856×10^{-4}	2.527×10^{-4}	4.107×10^{-4}
fitted root mean square [1]	6.158×10^{-4}	7.552×10^{-4}	8.306×10^{-4}	8.886×10^{-4}	9.602×10^{-4}	1.510×10^{-3}	1.749×10^{-3}	1.985×10^{-3}	2.336×10^{-3}	3.327×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.102	0.267	0.364	0.450	0.557	1.11	1.29	1.46	1.67	2.02
sulfurdioxide total air mass factor polluted precision [1]	1.137×10^{-2}	1.924×10^{-2}	2.513×10^{-2}	3.045×10^{-2}	3.832×10^{-2}	0.140	0.189	0.243	0.339	0.628
sulfurdioxide clear air mass factor polluted [1]	0.224	0.316	0.376	0.438	0.522	0.925	1.02	1.12	1.26	1.64
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]	0.608 ± 0.401	11597078	0.790	0.490	0.0	1.000	0.210	1.000
sulfurdioxide total vertical column [DU]	$(4.606 \pm 150.182) \times 10^{-2}$	11597078	0.462	1.091×10^{-2}	-67.6	1.043×10^{3}	-0.216	0.246
sulfurdioxide total vertical column precision [DU]	0.537 ± 0.766	11597078	0.352	0.334	4.283×10^{-2}	150	0.219	0.571
sulfurdioxide slant column density corrected [DU]	$(3.112 \pm 62.373) \times 10^{-2}$	11597078	0.375	9.588×10^{-3}	-9.66	521	-0.176	0.199
sulfurdioxide slant column density cobra [DU]	$(2.845 \pm 46.433) \times 10^{-2}$	11597078	0.375	9.588×10^{-3}	-9.66	54.3	-0.176	0.199
sulfurdioxide slant column density cobra precision [DU]	0.302 ± 0.139	11597078	0.144	0.260	8.203×10^{-2}	33.2	0.210	0.354
sulfurdioxide slant column density window1 [DU]	0.184 ± 0.759	11597078	0.754	0.191	-11.8	51.2	-0.190	0.563
sulfurdioxide slant column density window1 precision [DU]	0.302 ± 0.139	11597078	0.144	0.260	8.203×10^{-2}	33.2	0.210	0.354
sulfurdioxide slant column density corrected win1 [DU]	$(7.183 \pm 75.453) \times 10^{-2}$	11597078	0.741	4.235×10^{-2}	-11.2	51.3	-0.321	0.420
background so2 slant column offset window1 [DU]	-0.112 ± 0.171	11597078	0.172	-0.155	-0.850	5.15	-0.224	-5.113×10^{-2}
sulfurdioxide slant column density window2 [DU]	3.97 ± 8.86	11597078	11.4	3.83	-375	530	-1.79	9.59
sulfurdioxide slant column density window2 precision [DU]	7.71 ± 2.03	11597078	2.28	7.40	2.27	362	6.38	8.66
sulfurdioxide slant column density corrected win2 [DU]	0.681 ± 8.343	11597078	10.6	0.725	-385	521	-4.60	6.02
background so2 slant column offset window2 [DU]	-3.29 ± 3.50	11597078	5.57	-2.41	-17.0	10.8	-5.84	-0.270
sulfurdioxide slant column density window3 [DU]	-17.2 ± 22.7	11597078	28.4	-17.7	-2.750×10^{3}	1.322×10^{3}	-31.6	-3.19
sulfurdioxide slant column density window3 precision [DU]	26.3 ± 12.8	11597078	7.85	23.0	9.66	1.071×10^{3}	20.0	27.8
sulfurdioxide slant column density corrected win3 [DU]	-5.09 ± 21.77	11597078	27.1	-4.98	-2.746×10^{3}	1.327×10^{3}	-18.5	8.57
background so2 slant column offset window3 [DU]	12.1 ± 7.1	11597078	12.2	13.3	-23.0	44.8	5.53	17.7
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.20	11597078	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(3.640 \pm 8.584) \times 10^{-2}$	11597078	2.555×10^{-2}	1.255×10^{-2}	1.310×10^{-4}	3.33	3.418×10^{-3}	2.897×10^{-2}
fitted radiance shift [nm]	$(-1.944 \pm 24.849) \times 10^{-4}$	11597078	1.540×10^{-3}	-2.061×10^{-4}	-4.183×10^{-2}	3.878×10^{-2}	-9.882×10^{-4}	5.521×10^{-4}
fitted radiance squeeze [1]	$(-3.699 \pm 17.871) \times 10^{-5}$	11597078	2.026×10^{-4}	-2.598×10^{-5}	-9.854×10^{-3}	1.071×10^{-2}	-1.310×10^{-4}	7.159×10^{-5}
fitted root mean square [1]	$(1.318 \pm 0.583) \times 10^{-3}$	11597078	5.745×10^{-4}	1.143×10^{-3}	3.416×10^{-4}	2.169×10^{-2}	9.449×10^{-4}	1.519×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.878 ± 0.457	11597078	0.624	0.813	5.000×10^{-2}	2.84	0.534	1.16
sulfurdioxide total air mass factor polluted precision [1]	0.119 ± 0.142	11597078	0.108	6.617×10^{-2}	3.083×10^{-3}	1.84	3.683×10^{-2}	0.144
sulfurdioxide clear air mass factor polluted [1]	0.732 ± 0.338	11597078	0.475	0.684	5.744×10^{-2}	2.46	0.466	0.940
number of spectral points in retrieval [1]	73.5 ± 0.5	11597078	1.000	73.0	52.0	156	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]	0.696 ± 0.392	6948653	0.710	1.000	0.0	1.000	0.290	1.000
sulfurdioxide total vertical column [DU]	$(2.639 \pm 76.318) \times 10^{-2}$	6948653	0.466	1.295×10^{-2}	-50.2	264	-0.217	0.248
sulfurdioxide total vertical column precision [DU]	0.471 ± 0.508	6948653	0.306	0.336	5.077×10^{-2}	227	0.232	0.538
sulfurdioxide slant column density corrected [DU]	$(1.880 \pm 38.424) \times 10^{-2}$	6948653	0.378	1.115×10^{-2}	-34.3	261	-0.176	0.202
sulfurdioxide slant column density cobra [DU]	$(1.868 \pm 35.227) \times 10^{-2}$	6948653	0.378	1.115×10^{-2}	-34.3	49.8	-0.176	0.202
sulfurdioxide slant column density cobra precision [DU]	0.297 ± 0.118	6948653	0.121	0.266	8.341×10^{-2}	34.1	0.221	0.341
sulfurdioxide slant column density window1 [DU]	0.191 ± 0.664	6948653	0.754	0.194	-66.4	72.6	-0.186	0.568
sulfurdioxide slant column density window1 precision [DU]	0.297 ± 0.118	6948653	0.121	0.266	8.341×10^{-2}	34.1	0.221	0.341
sulfurdioxide slant column density corrected win1 [DU]	$(5.492 \pm 65.852) \times 10^{-2}$	6948653	0.744	4.096×10^{-2}	-66.4	72.5	-0.327	0.417
background so2 slant column offset window1 [DU]	-0.136 ± 0.116	6948653	0.140	-0.149	-1.08	2.84	-0.213	-7.329×10^{-2}
sulfurdioxide slant column density window2 [DU]	2.59 ± 9.50	6948653	11.9	2.44	-1.066×10^{3}	885	-3.47	8.48
sulfurdioxide slant column density window2 precision [DU]	8.62 ± 2.41	6948653	2.62	8.32	2.40	814	7.14	9.77
sulfurdioxide slant column density corrected win2 [DU]	1.03 ± 9.42	6948653	11.8	1.02	-1.067×10^{3}	884	-4.89	6.94
background so2 slant column offset window2 [DU]	-1.56 ± 1.75	6948653	2.08	-1.16	-12.1	10.5	-2.49	-0.407
sulfurdioxide slant column density window3 [DU]	-13.9 ± 25.6	6948653	32.6	-13.8	-1.528×10^{3}	635	-30.0	2.58
sulfurdioxide slant column density window3 precision [DU]	30.8 ± 13.4	6948653	10.3	27.4	10.3	458	23.3	33.6
sulfurdioxide slant column density corrected win3 [DU]	-5.59 ± 25.25	6948653	32.1	-5.62	-1.515×10^{3}	643	-21.5	10.6
background so2 slant column offset window3 [DU]	8.26 ± 5.26	6948653	7.52	7.26	-24.0	27.8	4.54	12.1
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.22	6948653	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(1.674 \pm 3.172) \times 10^{-2}$	6948653	9.195×10^{-3}	1.193×10^{-2}	7.710×10^{-4}	2.05	8.264×10^{-3}	1.746×10^{-2}
fitted radiance shift [nm]	$(-5.620 \pm 27.456) \times 10^{-4}$	6948653	2.053×10^{-3}	-5.459×10^{-4}	-4.807×10^{-2}	3.614×10^{-2}	-1.638×10^{-3}	4.151×10^{-4}
fitted radiance squeeze [1]	$(1.184 \pm 17.453) \times 10^{-5}$	6948653	2.075×10^{-4}	8.933×10^{-6}	-1.198×10^{-2}	2.116×10^{-2}	-9.387×10^{-5}	1.136×10^{-4}
fitted root mean square [1]	$(1.298 \pm 0.477) \times 10^{-3}$	6948653	5.086×10^{-4}	1.179×10^{-3}	3.513×10^{-4}	9.307×10^{-2}	9.873×10^{-4}	1.496×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.848 ± 0.362	6948653	0.468	0.818	5.000×10^{-2}	2.78	0.595	1.06
sulfurdioxide total air mass factor polluted precision [1]	$(9.784 \pm 8.169) \times 10^{-2}$	6948653	9.446×10^{-2}	6.400×10^{-2}	3.584×10^{-3}	1.25	4.017×10^{-2}	0.135
sulfurdioxide clear air mass factor polluted [1]	0.752 ± 0.216	6948653	0.309	0.731	8.861×10^{-2}	1.71	0.596	0.905
number of spectral points in retrieval [1]	73.4 ± 0.5	6948653	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]	0.669 ± 0.394	12524753	0.750	1.000	0.0	1.000	0.250	1.000
sulfurdioxide total vertical column [DU]	$(2.900 \pm 87.342) \times 10^{-2}$	12524753	0.448	1.071×10^{-2}	-67.6	264	-0.211	0.237
sulfurdioxide total vertical column precision [DU]	0.483 ± 0.610	12524753	0.311	0.318	5.157×10^{-2}	227	0.220	0.532
sulfurdioxide slant column density corrected [DU]	$(2.071 \pm 40.008) \times 10^{-2}$	12524753	0.367	9.326×10^{-3}	-34.3	261	-0.173	0.195
sulfurdioxide slant column density cobra [DU]	$(2.048 \pm 37.340) \times 10^{-2}$	12524753	0.367	9.326×10^{-3}	-34.3	32.4	-0.173	0.195
sulfurdioxide slant column density cobra precision [DU]	0.294 ± 0.128	12524753	0.136	0.252	8.203×10^{-2}	15.6	0.209	0.345
sulfurdioxide slant column density window1 [DU]	0.187 ± 0.690	12524753	0.742	0.196	-66.4	67.1	-0.180	0.562
sulfurdioxide slant column density window1 precision [DU]	0.294 ± 0.128	12524753	0.136	0.252	8.203×10^{-2}	15.6	0.209	0.345
sulfurdioxide slant column density corrected win1 [DU]	$(5.863 \pm 68.325) \times 10^{-2}$	12524753	0.731	3.996×10^{-2}	-66.4	67.4	-0.321	0.410
background so2 slant column offset window1 [DU]	-0.128 ± 0.144	12524753	0.156	-0.155	-1.08	4.23	-0.223	-6.646×10^{-2}
sulfurdioxide slant column density window2 [DU]	3.13 ± 9.07	12524753	11.5	2.96	-1.066×10^{3}	885	-2.71	8.80
sulfurdioxide slant column density window2 precision [DU]	8.03 ± 2.14	12524753	2.47	7.72	2.35	814	6.62	9.09
sulfurdioxide slant column density corrected win2 [DU]	0.817 ± 8.762	12524753	11.1	0.831	-1.067×10^{3}	884	-4.71	6.37
background so2 slant column offset window2 [DU]	-2.31 ± 2.95	12524753	3.31	-1.33	-17.0	10.8	-3.57	-0.262
sulfurdioxide slant column density window3 [DU]	-12.9 ± 24.0	12524753	30.6	-13.4	-1.326×10^{3}	635	-28.3	2.23
sulfurdioxide slant column density window3 precision [DU]	27.5 ± 11.7	12524753	8.89	24.4	9.66	359	21.1	30.0
sulfurdioxide slant column density corrected win3 [DU]	-2.99 ± 23.01	12524753	29.1	-3.15	-1.313×10^{3}	643	-17.5	11.5
background so2 slant column offset window3 [DU]	9.94 ± 6.63	12524753	10.5	8.95	-24.0	44.8	4.63	15.1
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.23	12524753	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(1.865 \pm 4.125) \times 10^{-2}$	12524753	1.173×10^{-2}	1.204×10^{-2}	1.392×10^{-4}	3.33	7.274×10^{-3}	1.900×10^{-2}
fitted radiance shift [nm]	$(-3.549 \pm 23.534) \times 10^{-4}$	12524753	1.731×10^{-3}	-3.174×10^{-4}	-4.807×10^{-2}	3.254×10^{-2}	-1.240×10^{-3}	4.912×10^{-4}
fitted radiance squeeze [1]	$(-1.031 \pm 17.529) \times 10^{-5}$	12524753	2.007×10^{-4}	-6.111×10^{-6}	-1.129×10^{-2}	2.116×10^{-2}	-1.077×10^{-4}	9.304×10^{-5}
fitted root mean square [1]	$(1.292 \pm 0.531) \times 10^{-3}$	12524753	5.701×10^{-4}	1.125×10^{-3}	3.416×10^{-4}	6.140×10^{-2}	9.418×10^{-4}	1.512×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.865 ± 0.386	12524753	0.509	0.842	5.000×10^{-2}	2.74	0.589	1.10
sulfurdioxide total air mass factor polluted precision [1]	0.104 ± 0.107	12524753	8.826×10^{-2}	6.400×10^{-2}	3.567×10^{-3}	1.60	4.120×10^{-2}	0.129
sulfurdioxide clear air mass factor polluted [1]	0.753 ± 0.270	12524753	0.371	0.738	7.002×10^{-2}	2.41	0.558	0.929
number of spectral points in retrieval [1]	73.4 ± 0.5	12524753	1.000	73.0	52.0	156	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]	0.630 ± 0.410	4200748	0.800	1.000	0.0	1.000	0.200	1.000
sulfurdioxide total vertical column [DU]	$(3.793 \pm 154.422) \times 10^{-2}$	4200748	0.485	1.159×10^{-2}	-47.3	951	-0.226	0.258
sulfurdioxide total vertical column precision [DU]	0.540 ± 0.735	4200748	0.350	0.363	4.283×10^{-2}	136	0.236	0.586
sulfurdioxide slant column density corrected [DU]	$(2.365 \pm 47.862) \times 10^{-2}$	4200748	0.378	1.002×10^{-2}	-23.3	114	-0.177	0.201
sulfurdioxide slant column density cobra [DU]	$(2.260 \pm 40.296) \times 10^{-2}$	4200748	0.378	1.002×10^{-2}	-23.3	53.1	-0.177	0.201
sulfurdioxide slant column density cobra precision [DU]	0.298 ± 0.128	4200748	0.117	0.268	8.999×10^{-2}	34.1	0.220	0.337
sulfurdioxide slant column density window1 [DU]	0.199 ± 0.701	4200748	0.744	0.200	-36.7	72.6	-0.173	0.571
sulfurdioxide slant column density window1 precision [DU]	0.298 ± 0.128	4200748	0.117	0.268	8.999×10^{-2}	34.1	0.220	0.337
sulfurdioxide slant column density corrected win1 [DU]	$(6.599 \pm 69.578) \times 10^{-2}$	4200748	0.733	4.319×10^{-2}	-36.7	72.5	-0.317	0.417
background so2 slant column offset window1 [DU]	-0.133 ± 0.147	4200748	0.143	-0.163	-0.556	2.05	-0.224	-8.148×10^{-2}
sulfurdioxide slant column density window2 [DU]	3.44 ± 9.20	4200748	11.7	3.39	-875	754	-2.46	9.28
sulfurdioxide slant column density window2 precision [DU]	8.20 ± 2.44	4200748	2.56	7.84	2.27	599	6.69	9.25
sulfurdioxide slant column density corrected win2 [DU]	0.784 ± 8.833	4200748	11.1	0.795	-875	754	-4.76	6.34
background so2 slant column offset window2 [DU]	-2.66 ± 3.02	4200748	4.16	-1.63	-15.9	10.8	-4.52	-0.355
sulfurdioxide slant column density window3 [DU]	-21.9 ± 23.0	4200748	28.5	-21.7	-452	409	-36.0	-7.53
sulfurdioxide slant column density window3 precision [DU]	30.0 ± 16.4	4200748	11.6	25.5	9.81	235	20.8	32.4
sulfurdioxide slant column density corrected win3 [DU]	-11.1 ± 23.3	4200748	28.9	-10.3	-445	417	-25.1	3.74
background so2 slant column offset window3 [DU]	10.9 ± 6.6	4200748	11.0	11.0	-24.0	44.5	5.25	16.3
sulfurdioxide slant column cobra flag [1]	1.99 ± 0.16	4200748	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(5.432 \pm 10.537) \times 10^{-2}$	4200748	4.727×10^{-2}	1.623×10^{-2}	1.319×10^{-4}	2.15	5.308×10^{-3}	5.257×10^{-2}
fitted radiance shift [nm]	$(-2.584 \pm 31.949) \times 10^{-4}$	4200748	1.773×10^{-3}	-2.868×10^{-4}	-4.538×10^{-2}	3.878×10^{-2}	-1.175×10^{-3}	5.976×10^{-4}
fitted radiance squeeze [1]	$(-2.607 \pm 17.637) \times 10^{-5}$	4200748	2.053×10^{-4}	-2.100×10^{-5}	-1.198×10^{-2}	1.389×10^{-2}	-1.254×10^{-4}	7.985×10^{-5}
fitted root mean square [1]	$(1.291 \pm 0.525) \times 10^{-3}$	4200748	4.562×10^{-4}	1.173×10^{-3}	3.480×10^{-4}	9.307×10^{-2}	9.823×10^{-4}	1.438×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.857 ± 0.485	4200748	0.619	0.718	5.000×10^{-2}	2.84	0.510	1.13
sulfurdioxide total air mass factor polluted precision [1]	0.125 ± 0.149	4200748	0.135	6.809×10^{-2}	3.385×10^{-3}	1.74	3.144×10^{-2}	0.166
sulfurdioxide clear air mass factor polluted [1]	0.709 ± 0.331	4200748	0.409	0.639	6.562×10^{-2}	2.46	0.470	0.879
number of spectral points in retrieval [1]	73.4 ± 0.5	4200748	1.000	73.0	52.0	74.0	73.0	74.0

3 Granule outlines

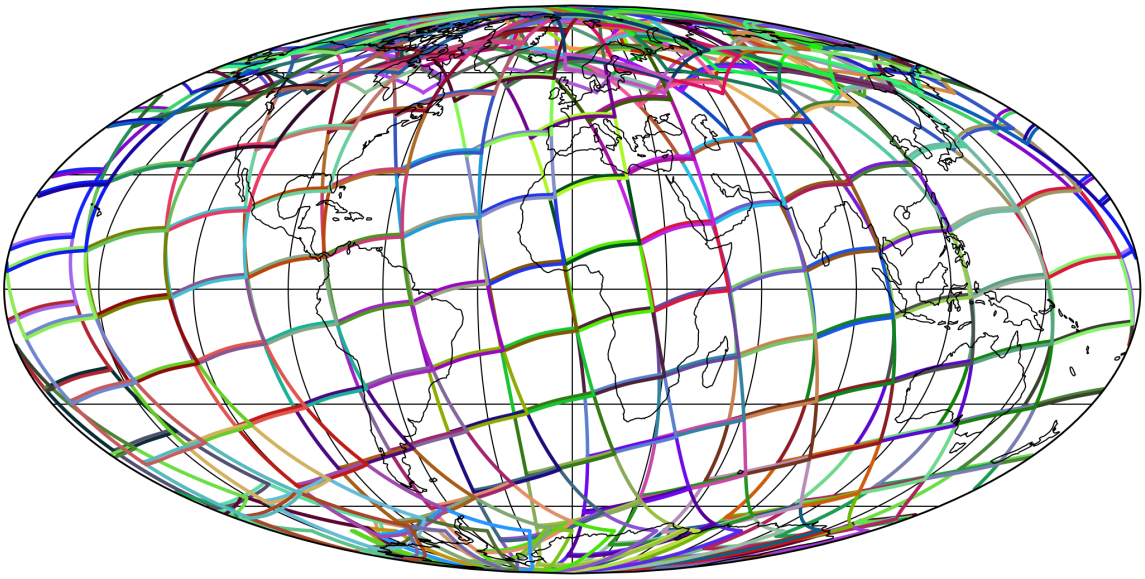

Figure 1: Outline of the granules.

4 Input data monitoring

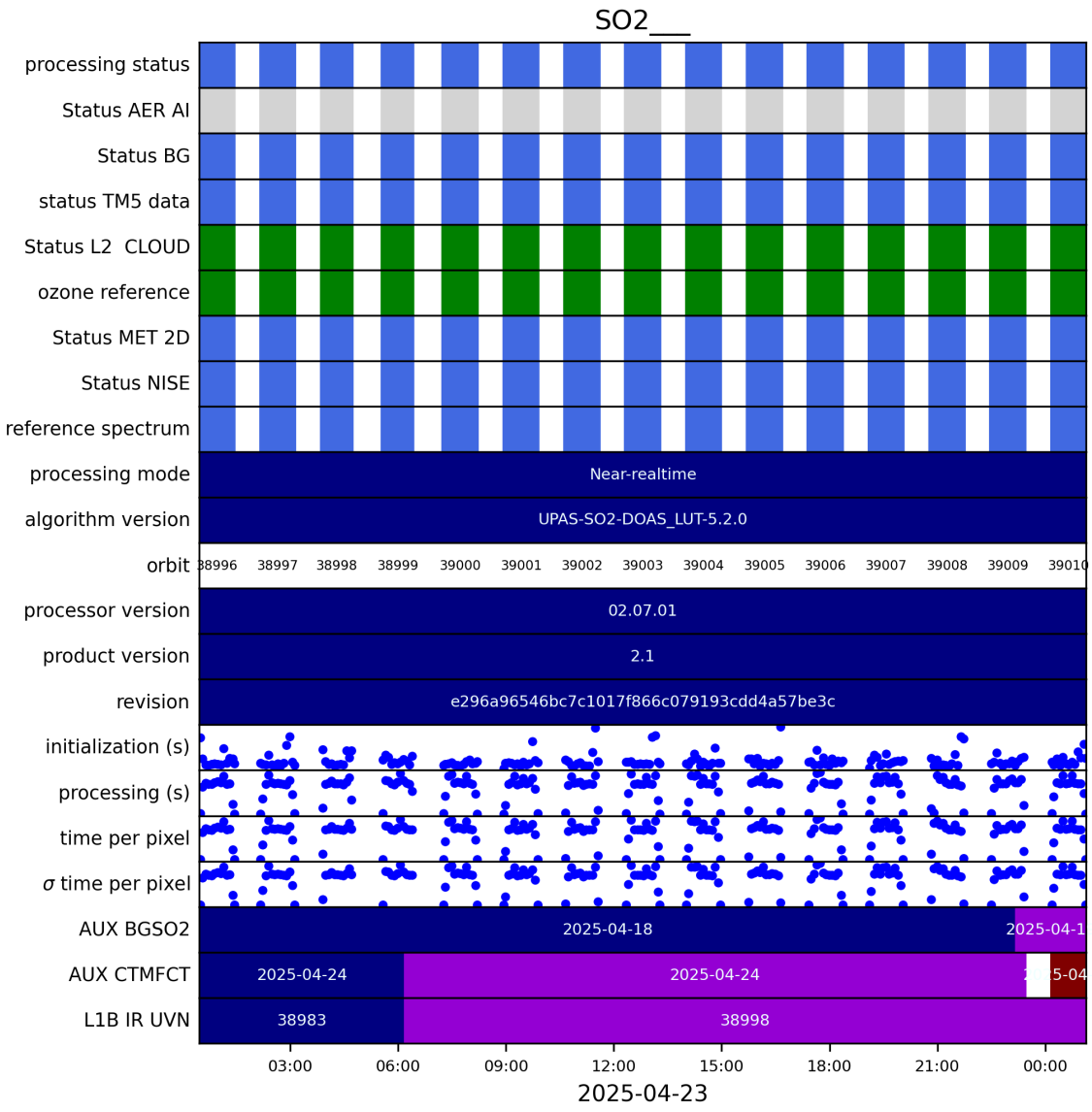

Figure 2: Input data per granule

5 Warnings and errors

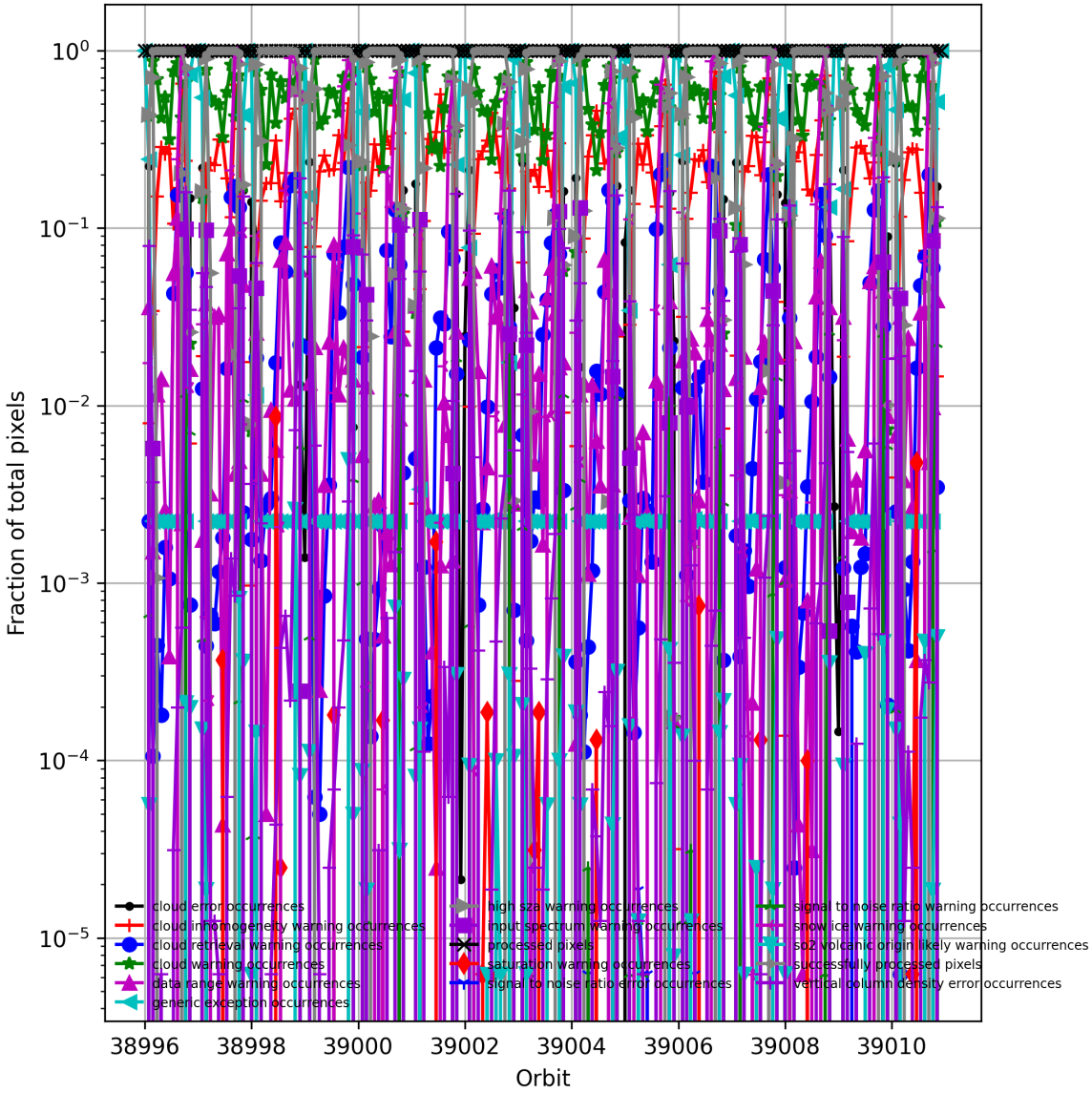

Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

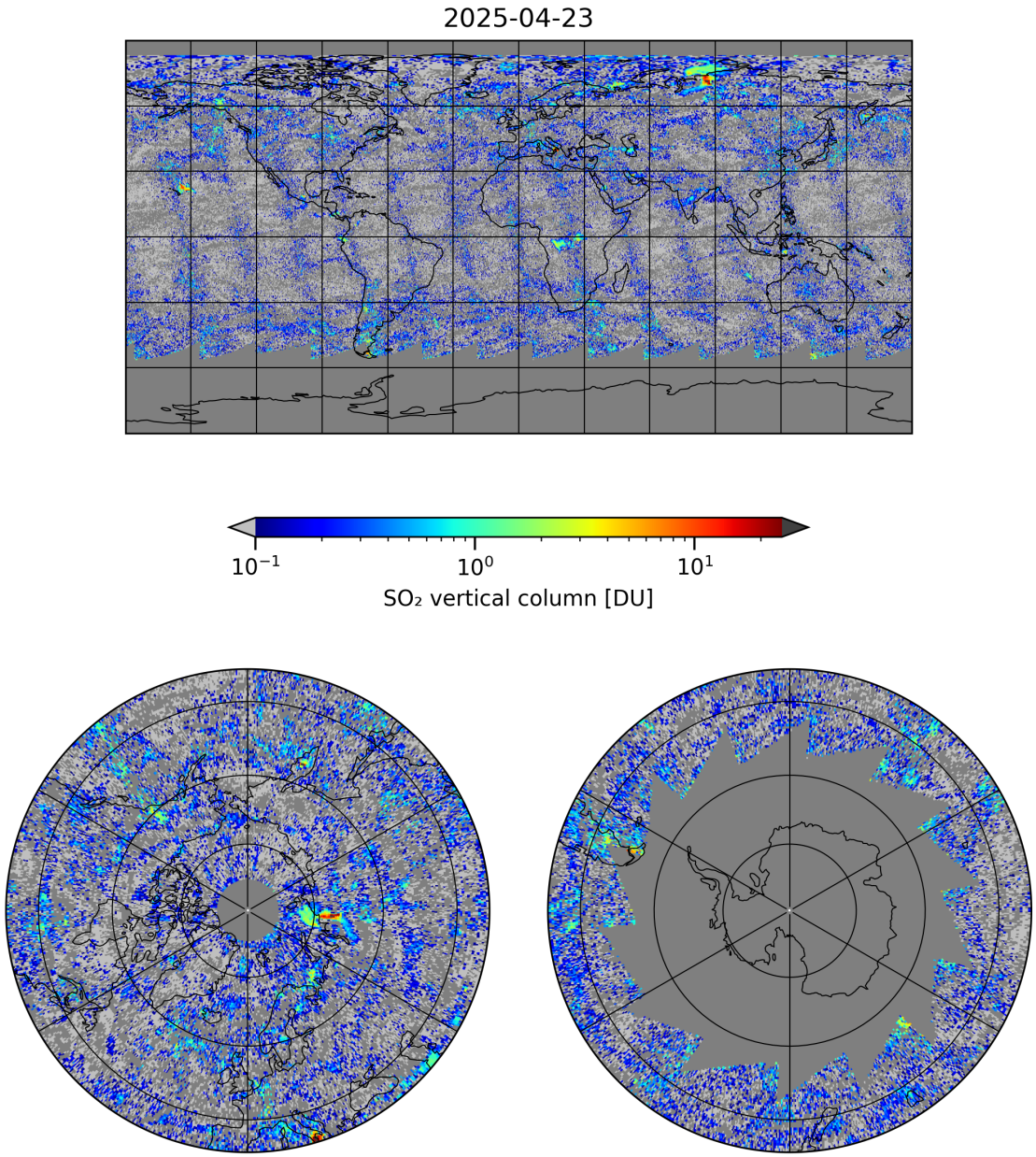

Figure 4: Map of "SO_2 vertical column" for 2025-04-23 to 2025-04-24

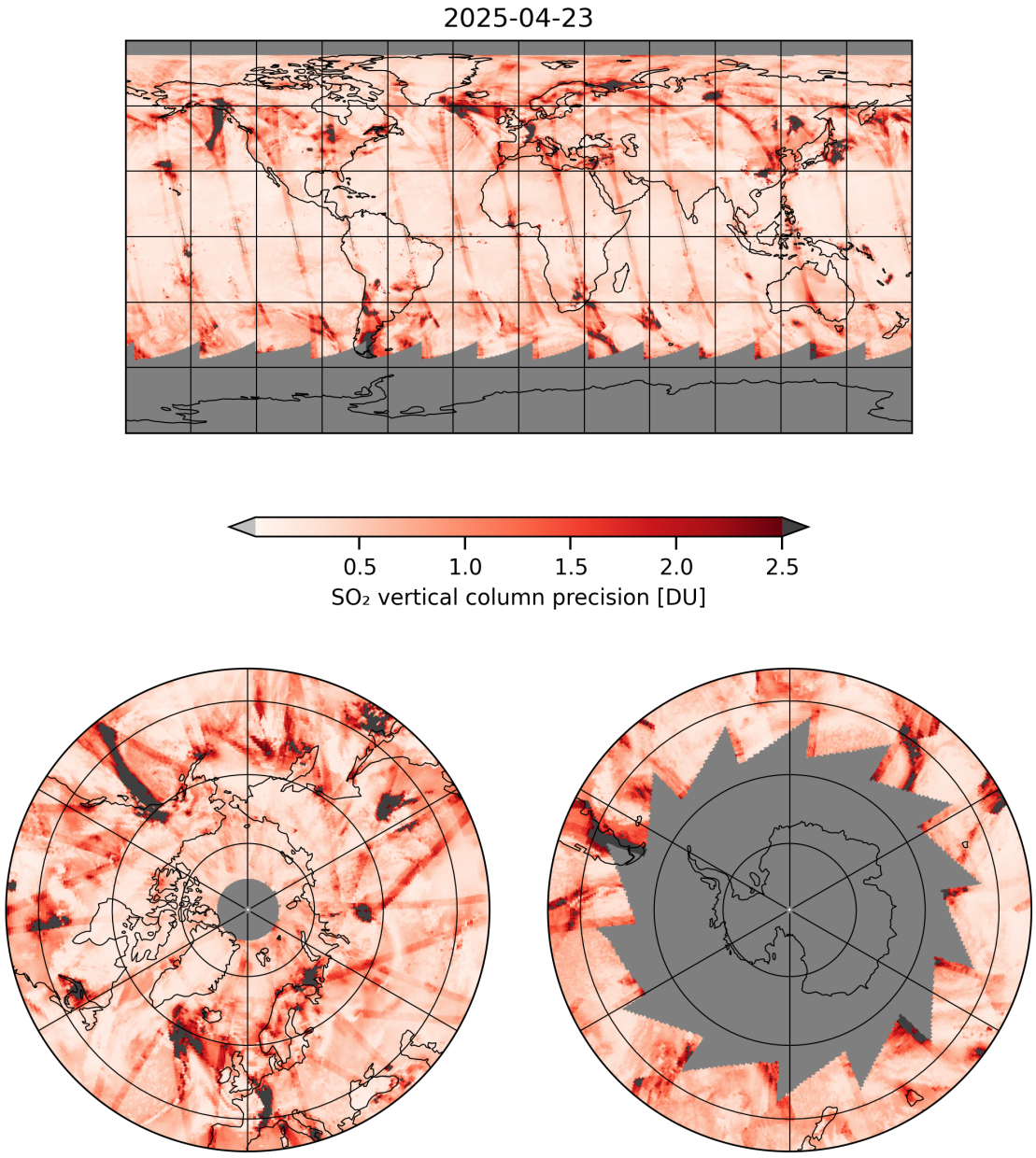

Figure 5: Map of "SO_2 vertical column precision" for 2025-04-23 to 2025-04-24

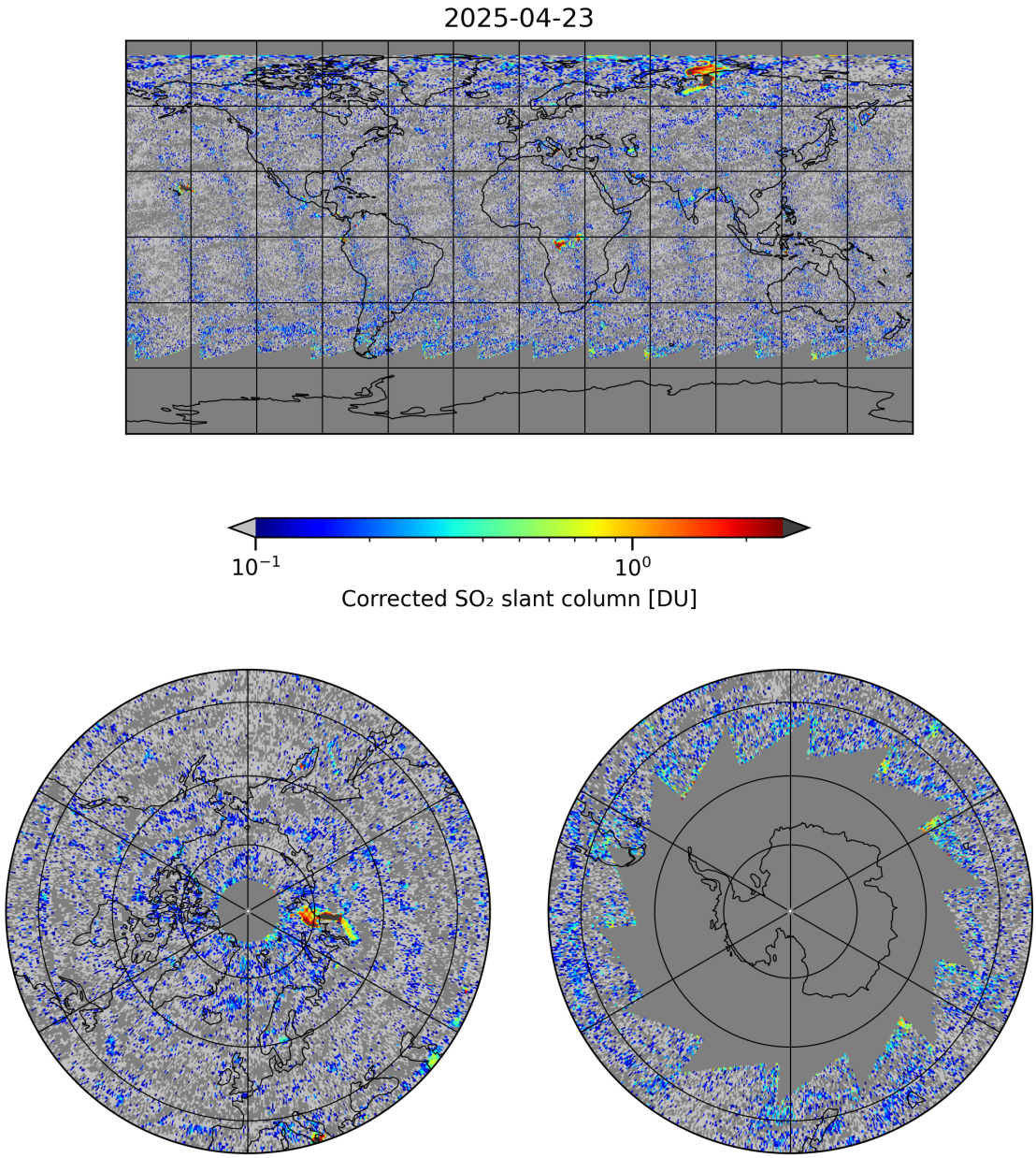

Figure 6: Map of "Corrected SO_2 slant column" for 2025-04-23 to 2025-04-24

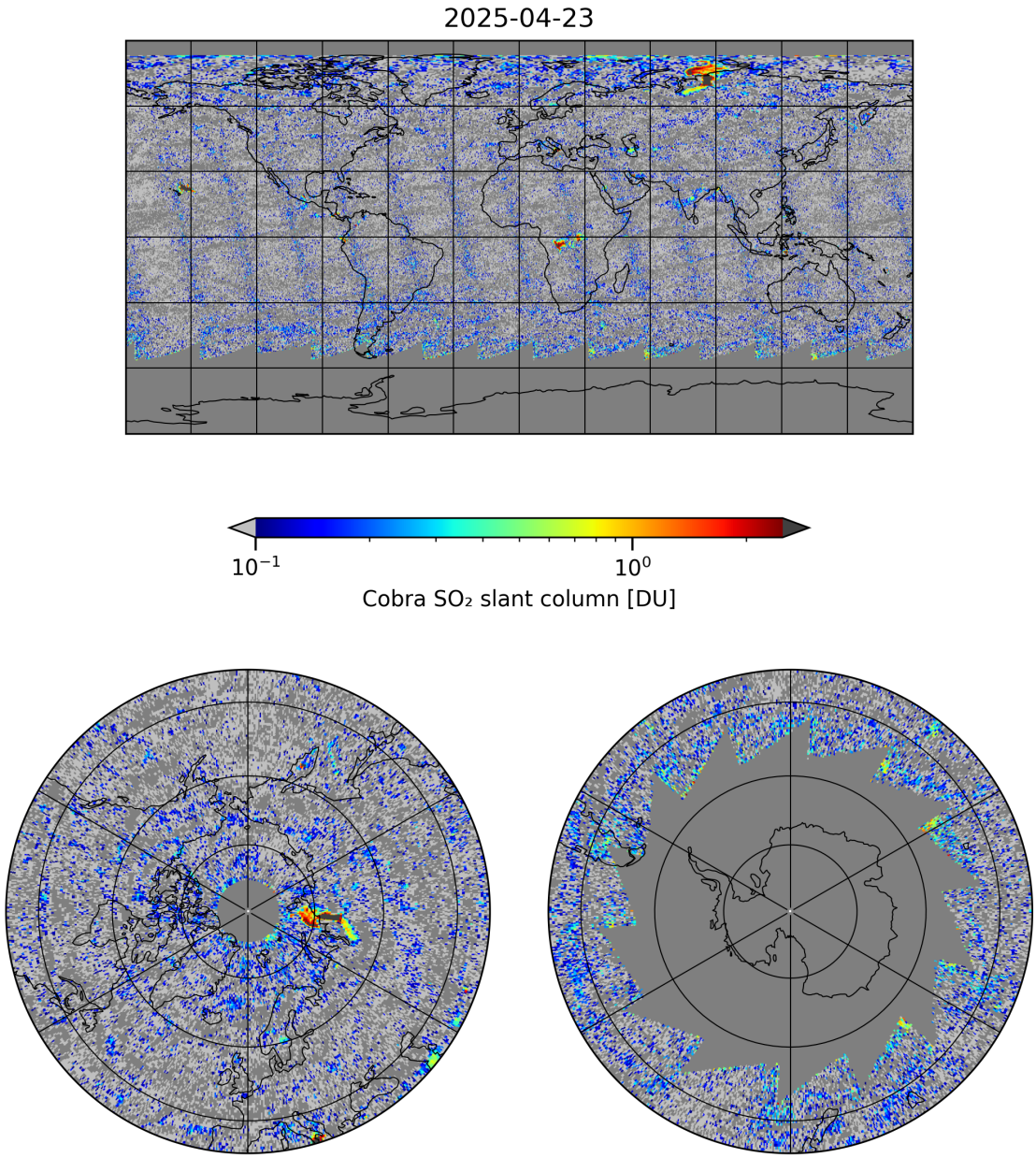

Figure 7: Map of "Cobra SO_2 slant column" for 2025-04-23 to 2025-04-24

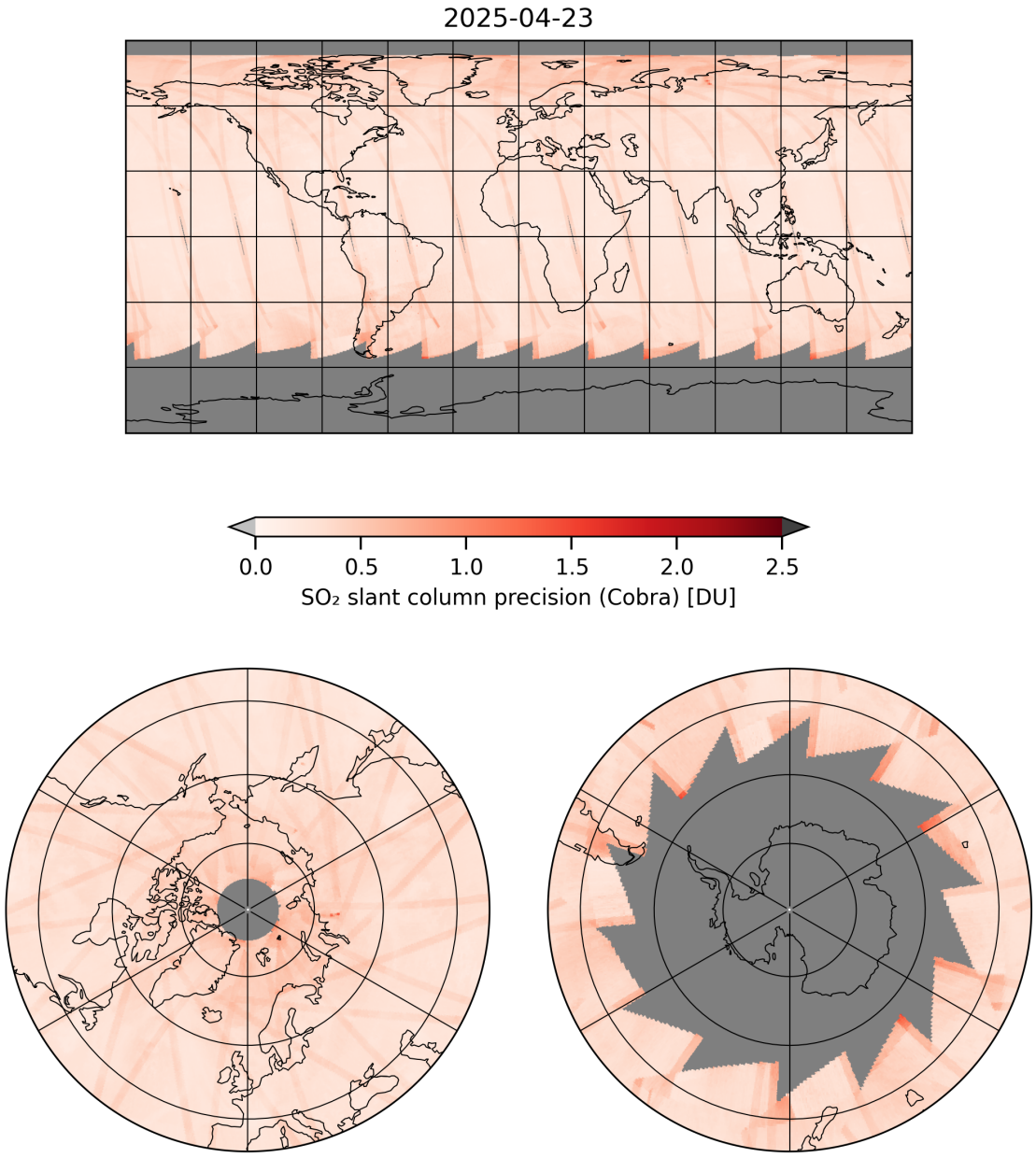

Figure 8: Map of "SO_2 slant column precision (Cobra)" for 2025-04-23 to 2025-04-24

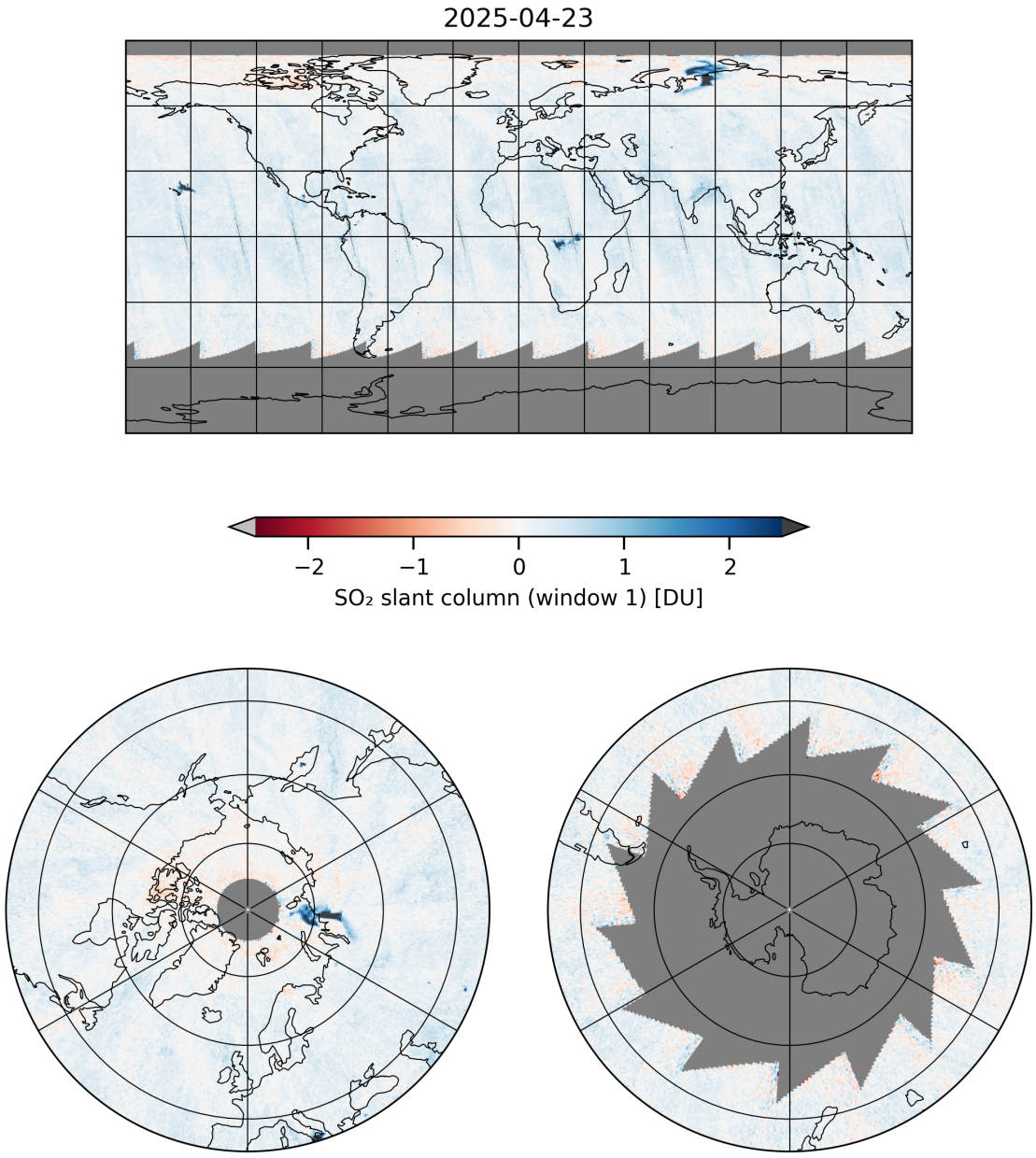

Figure 9: Map of "SO_2 slant column (window 1)" for 2025-04-23 to 2025-04-24

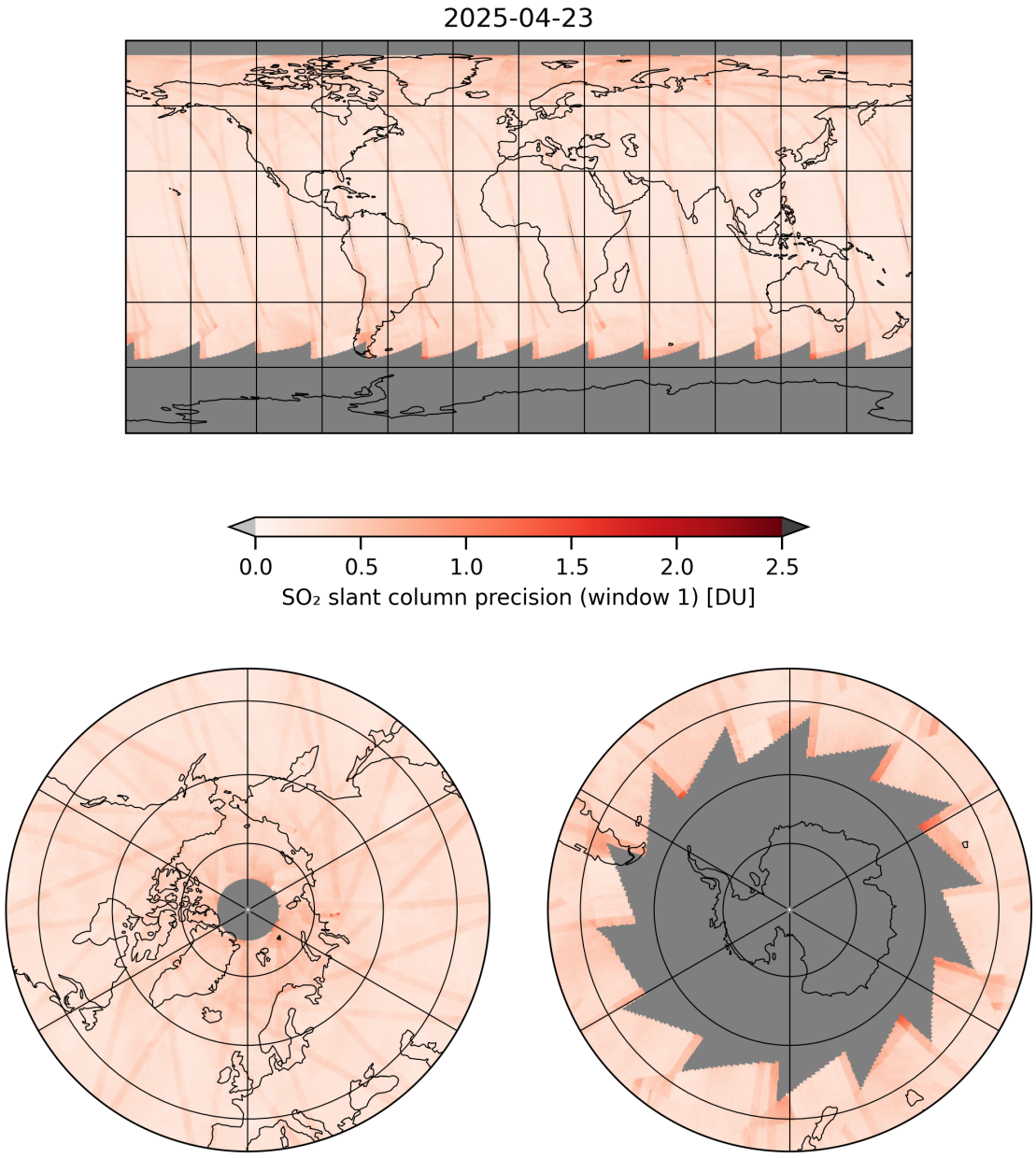

Figure 10: Map of "SO_2 slant column precision (window 1)" for 2025-04-23 to 2025-04-24

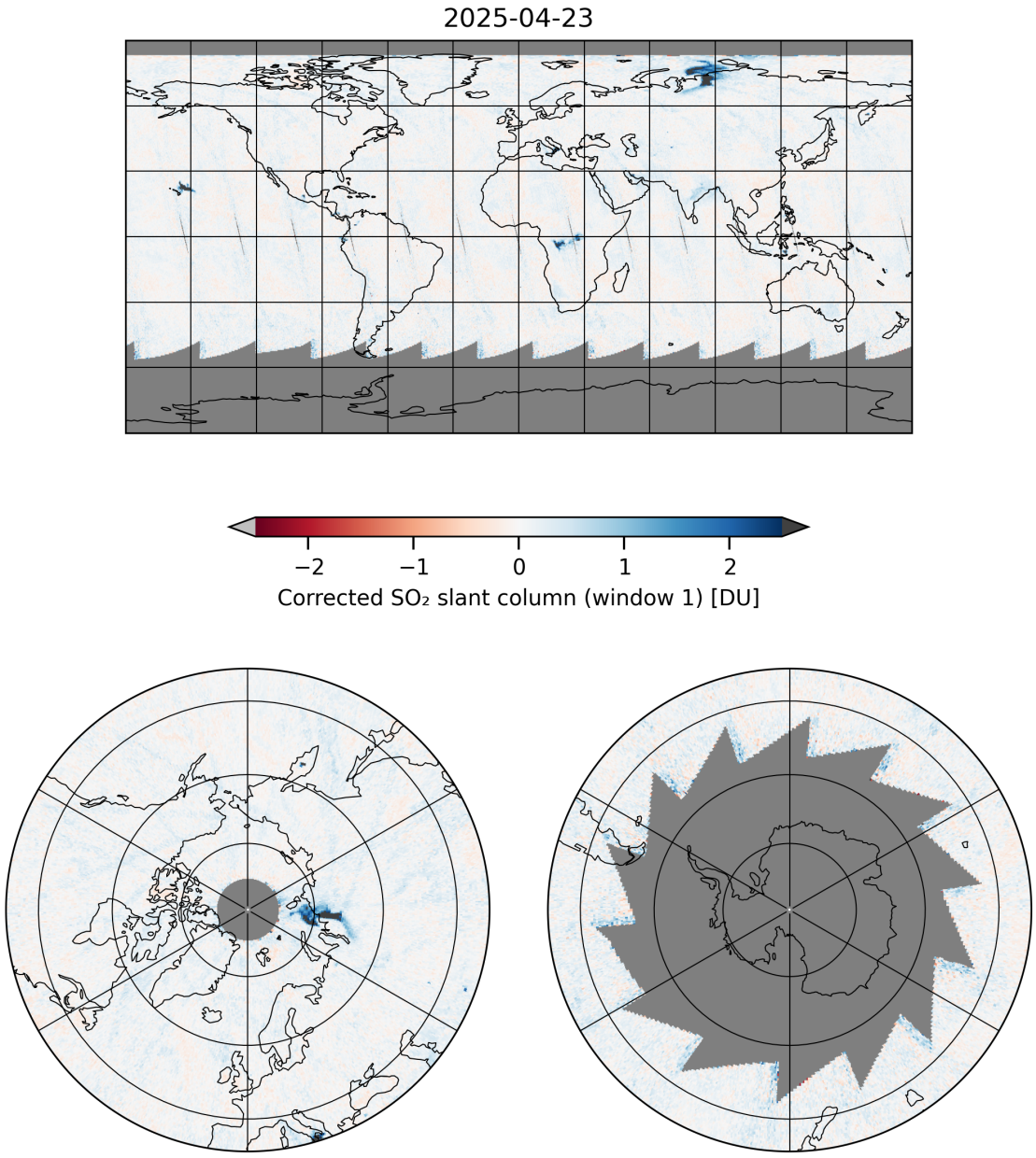

Figure 11: Map of “Corrected SO_2 slant column (window 1)” for 2025-04-23 to 2025-04-24

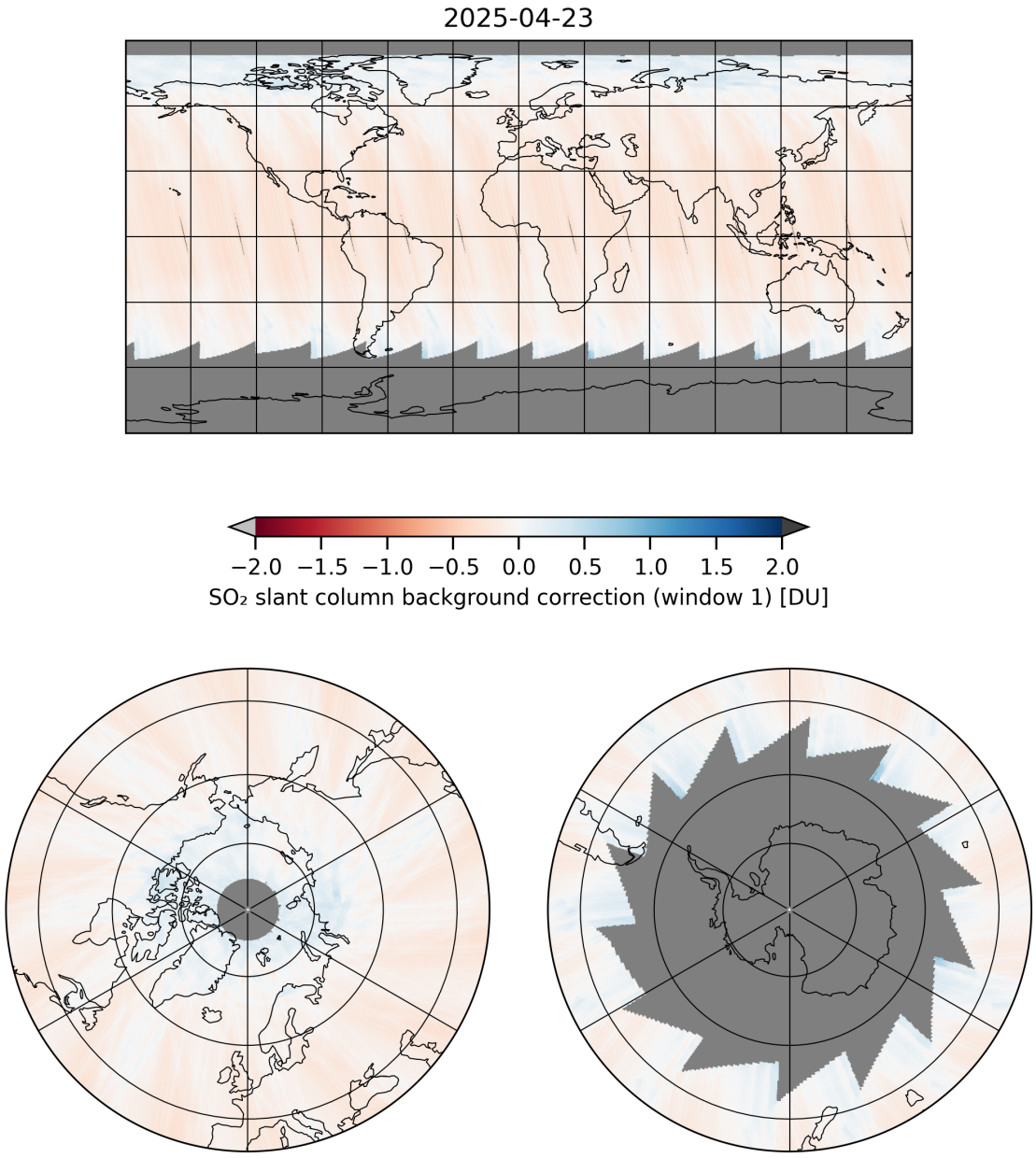

Figure 12: Map of "SO_2 slant column background correction (window 1)" for 2025-04-23 to 2025-04-24

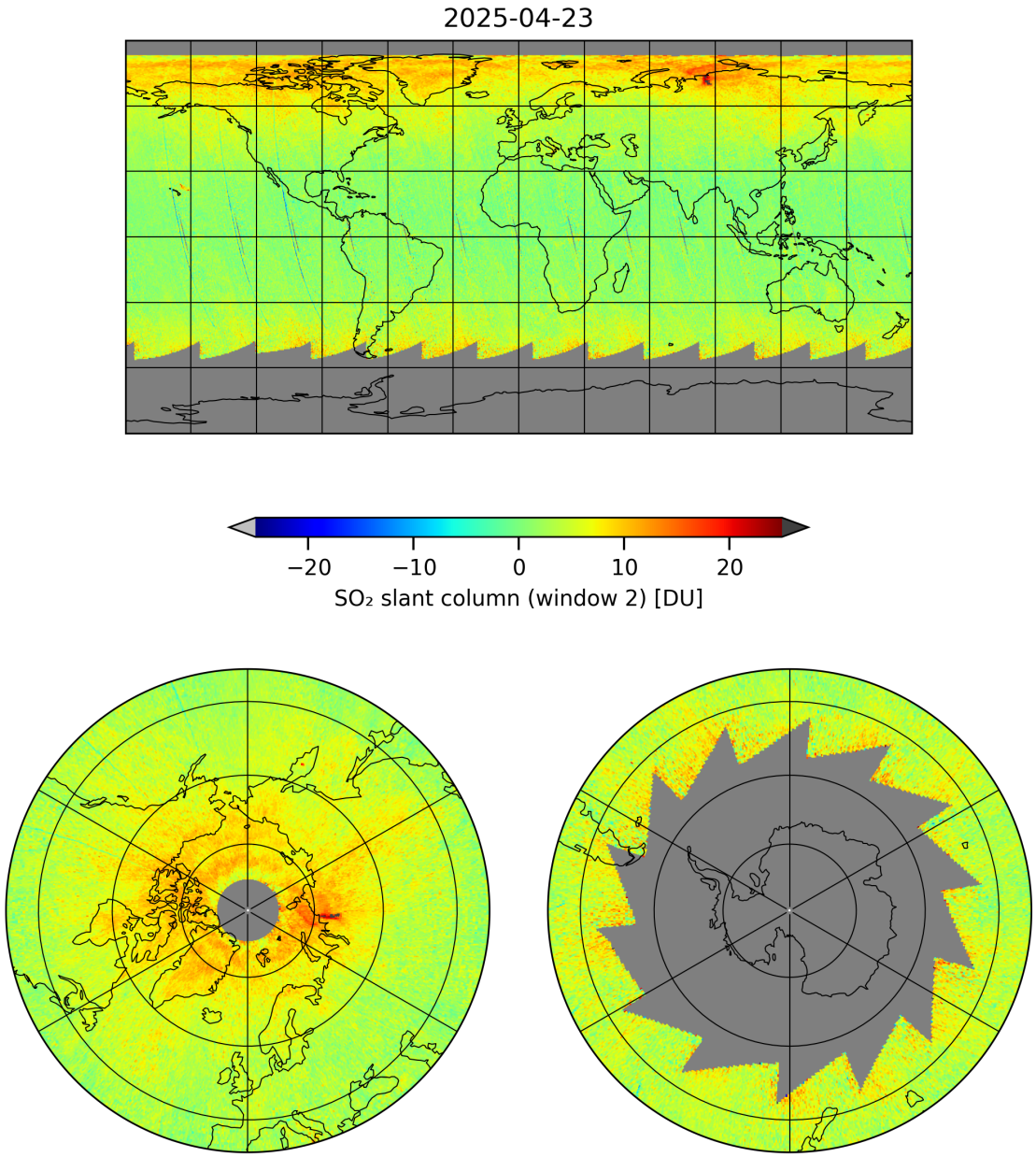

Figure 13: Map of "SO_2 slant column (window 2)" for 2025-04-23 to 2025-04-24

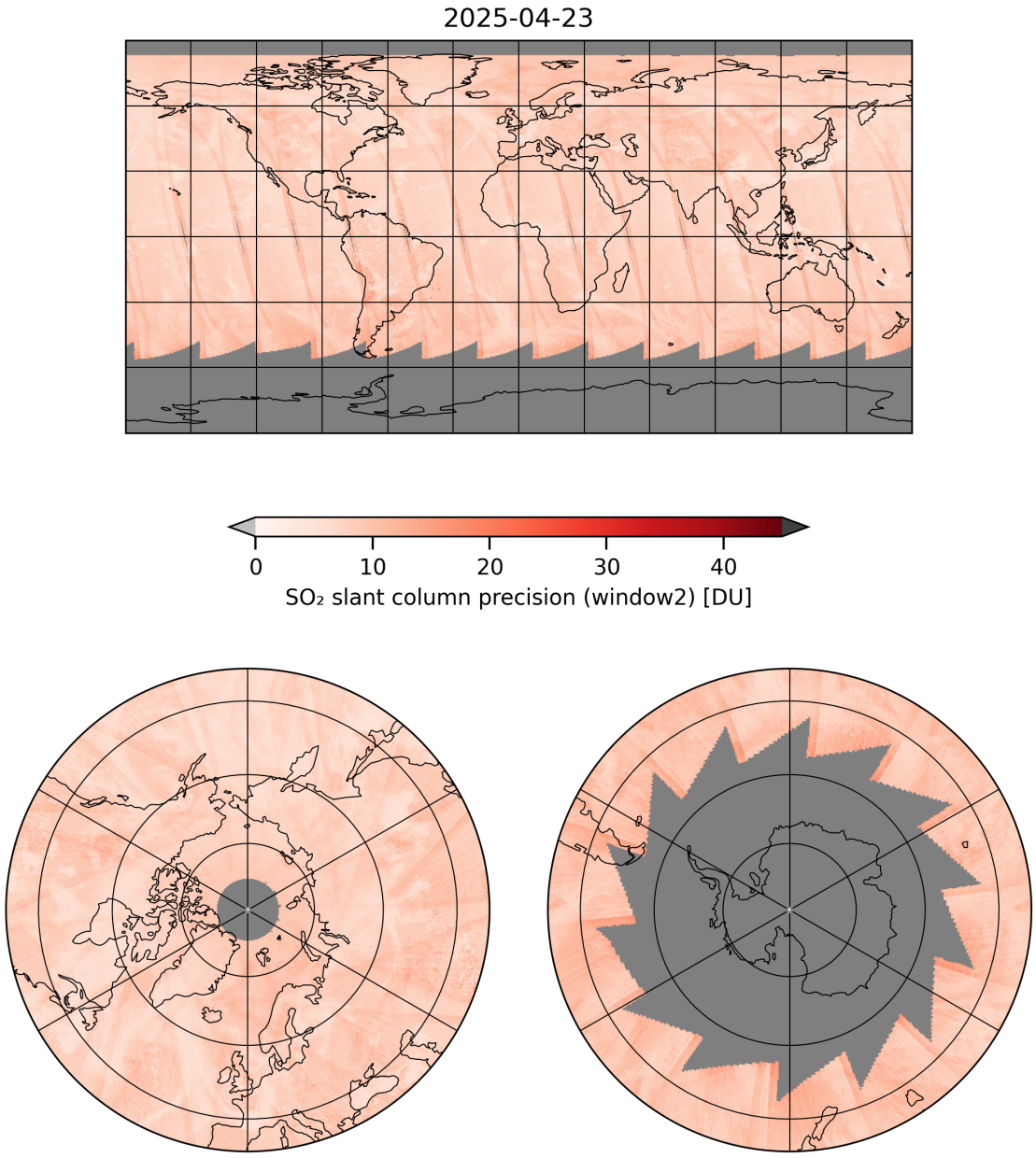

Figure 14: Map of "SO_2 slant column precision (window2)" for 2025-04-23 to 2025-04-24

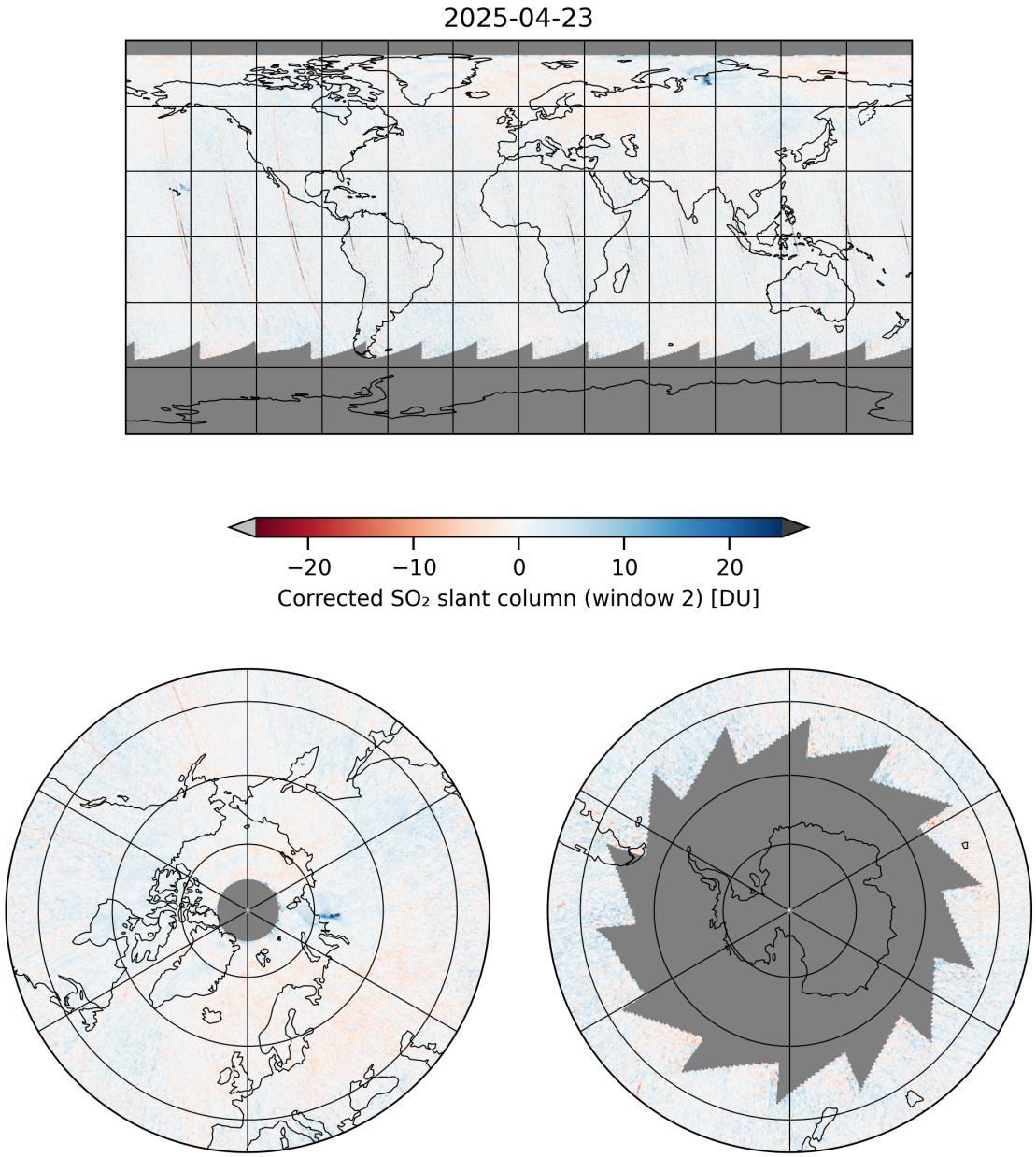

Figure 15: Map of “Corrected SO_2 slant column (window 2)” for 2025-04-23 to 2025-04-24

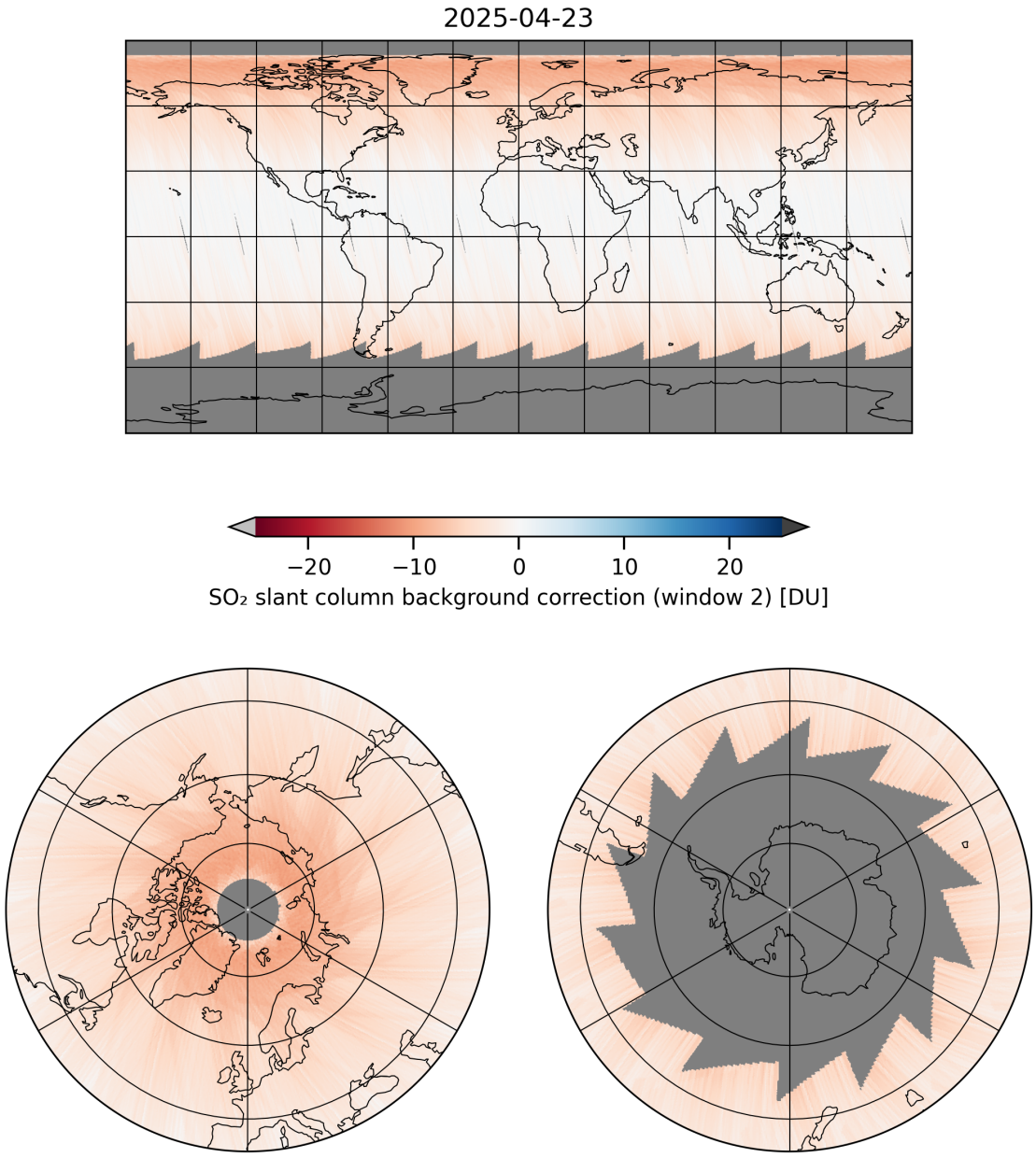

Figure 16: Map of "SO_2 slant column background correction (window 2)" for 2025-04-23 to 2025-04-24

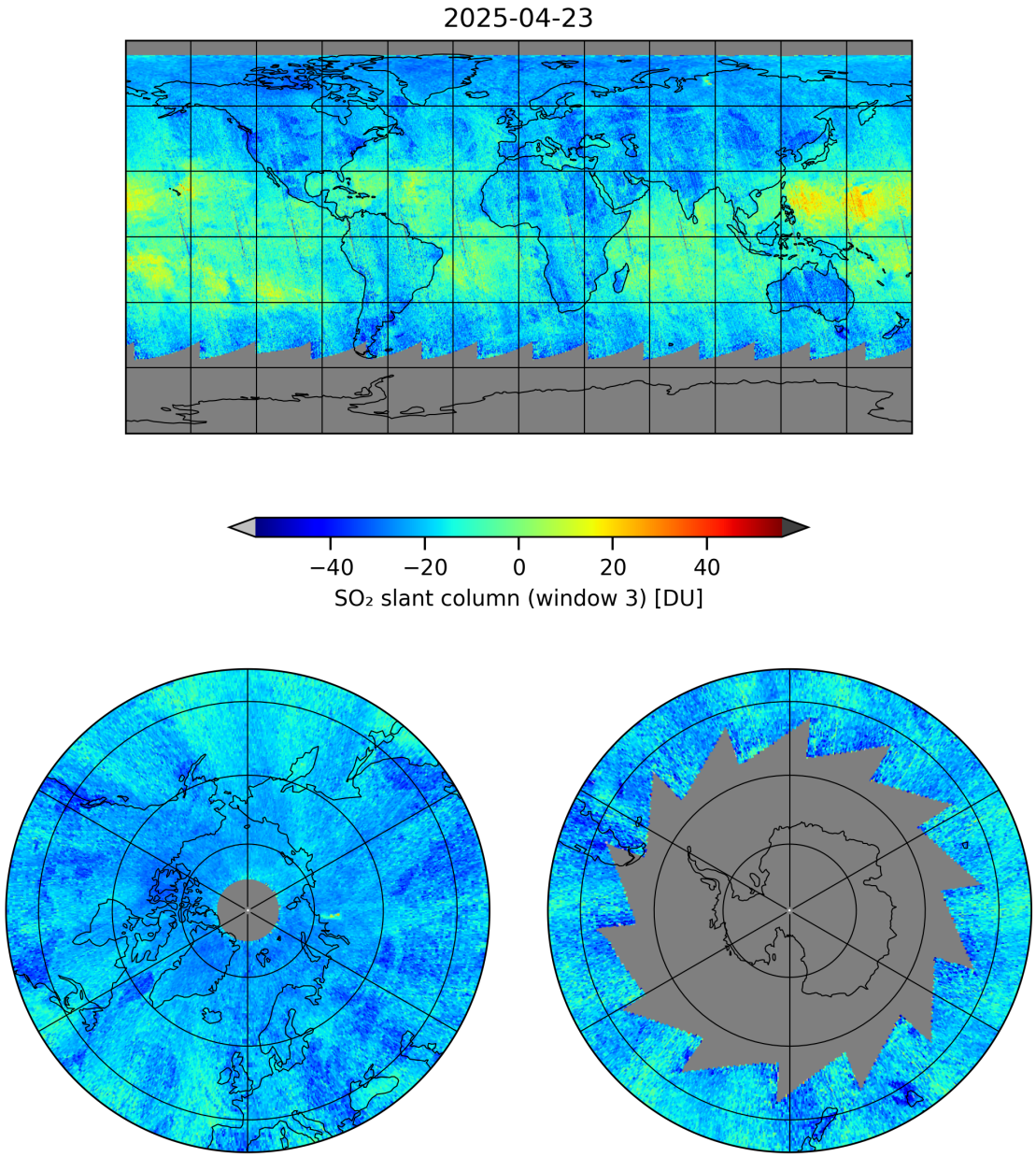

Figure 17: Map of "SO_2 slant column (window 3)" for 2025-04-23 to 2025-04-24

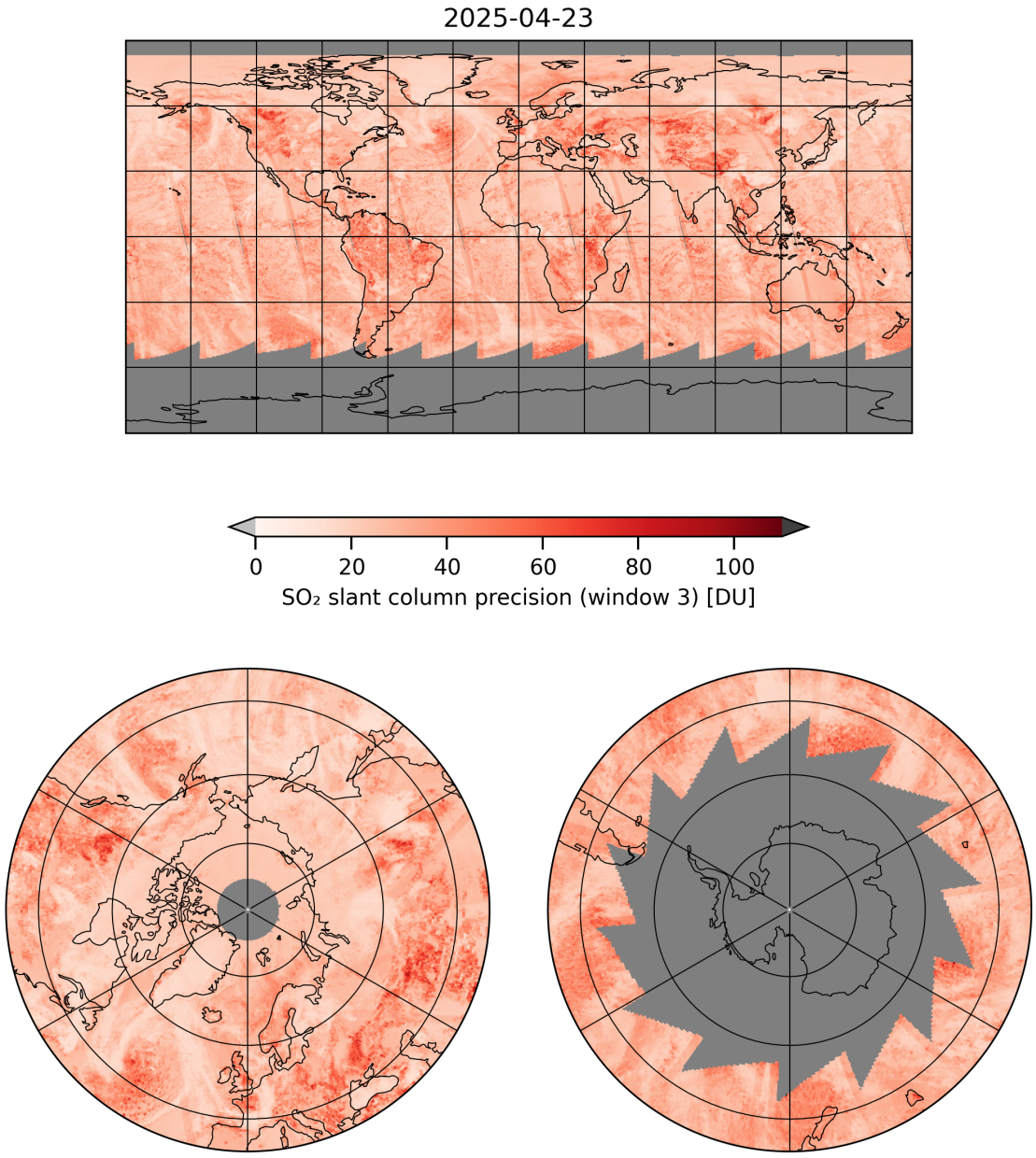

Figure 18: Map of "SO_2 slant column precision (window 3)" for 2025-04-23 to 2025-04-24

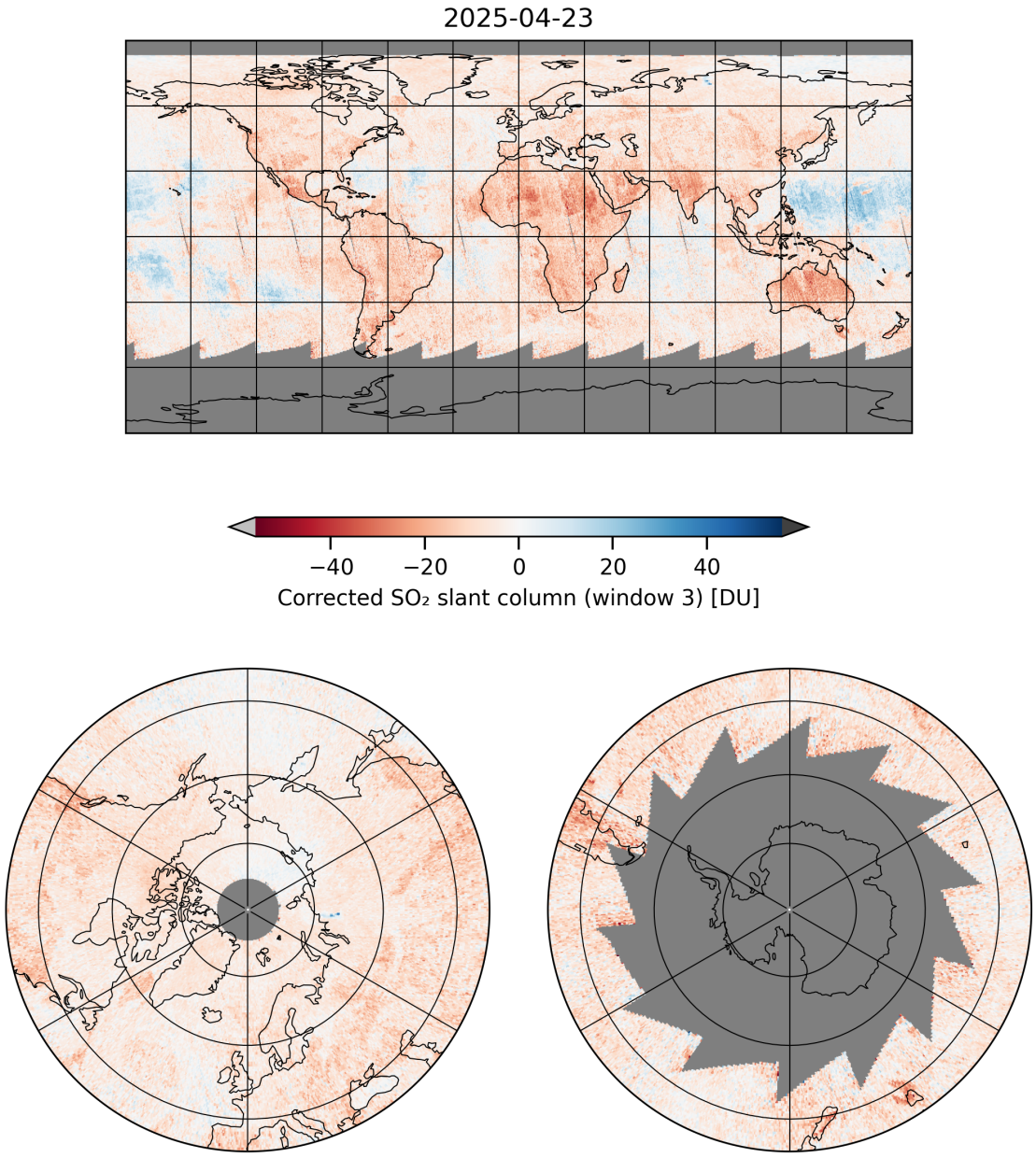

Figure 19: Map of "Corrected SO_2 slant column (window 3)" for 2025-04-23 to 2025-04-24

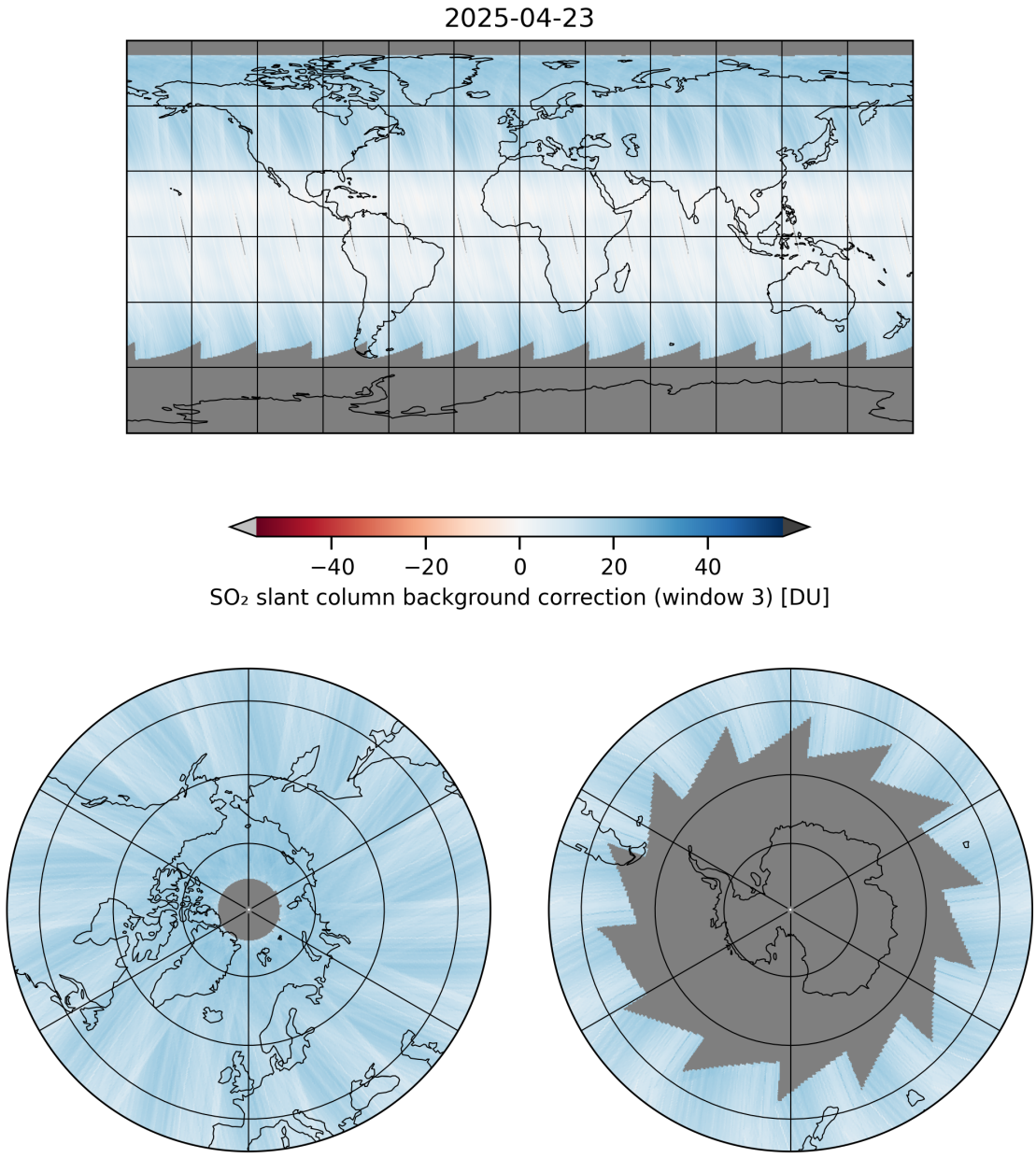

Figure 20: Map of "SO_2 slant column background correction (window 3)" for 2025-04-23 to 2025-04-24

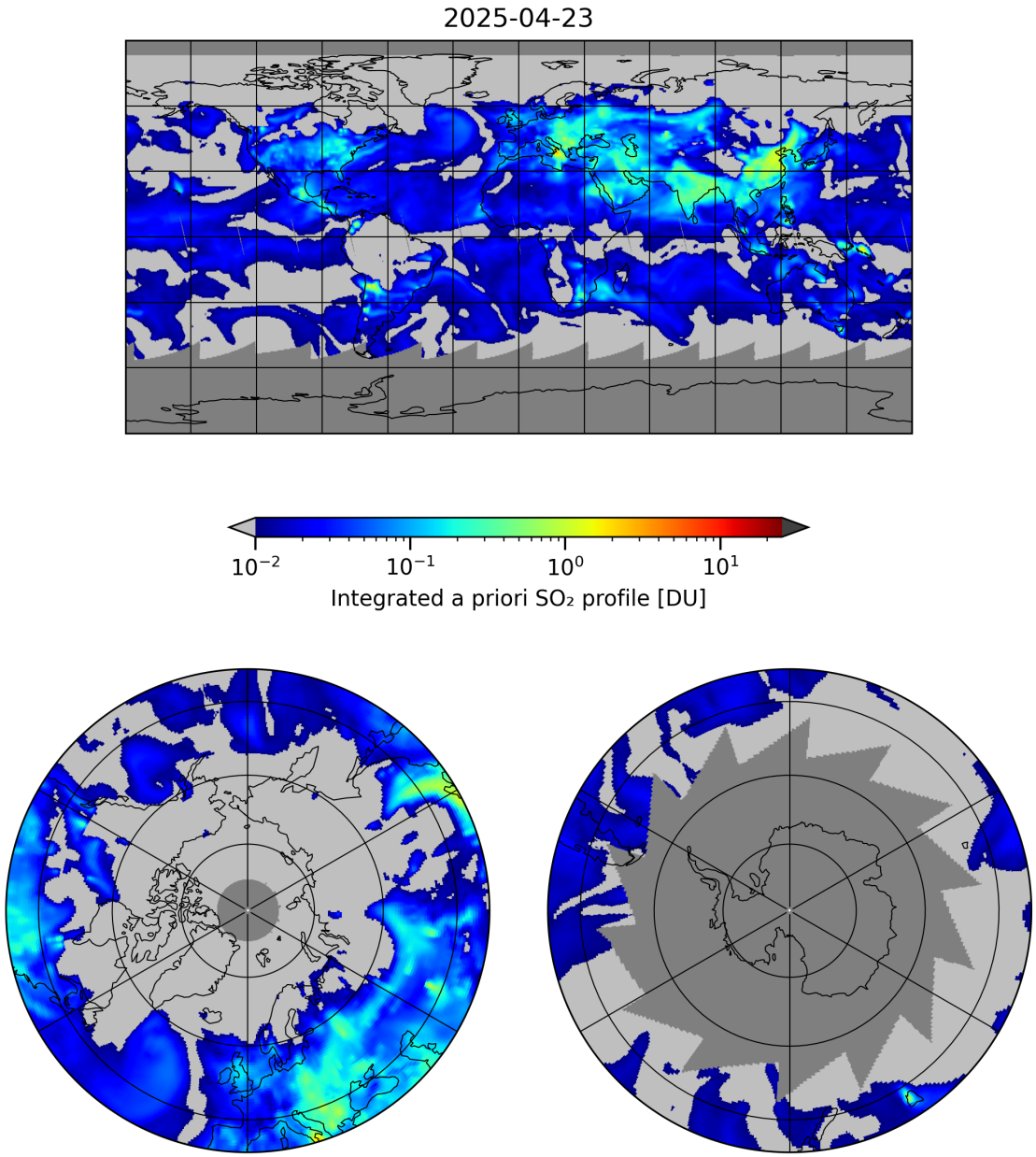

Figure 21: Map of “Integrated a priori SO_2 profile” for 2025-04-23 to 2025-04-24

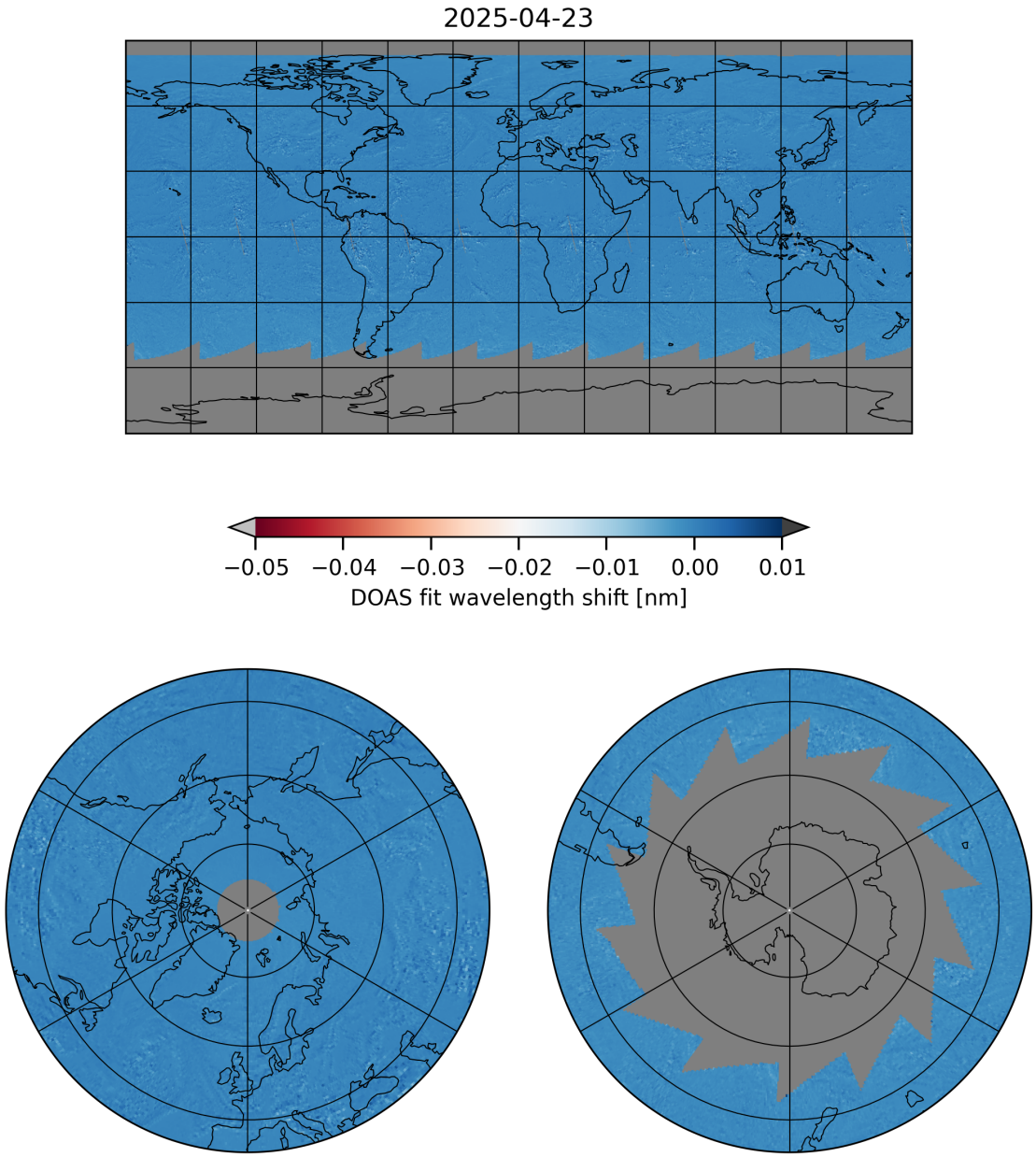

Figure 22: Map of “DOAS fit wavelength shift” for 2025-04-23 to 2025-04-24

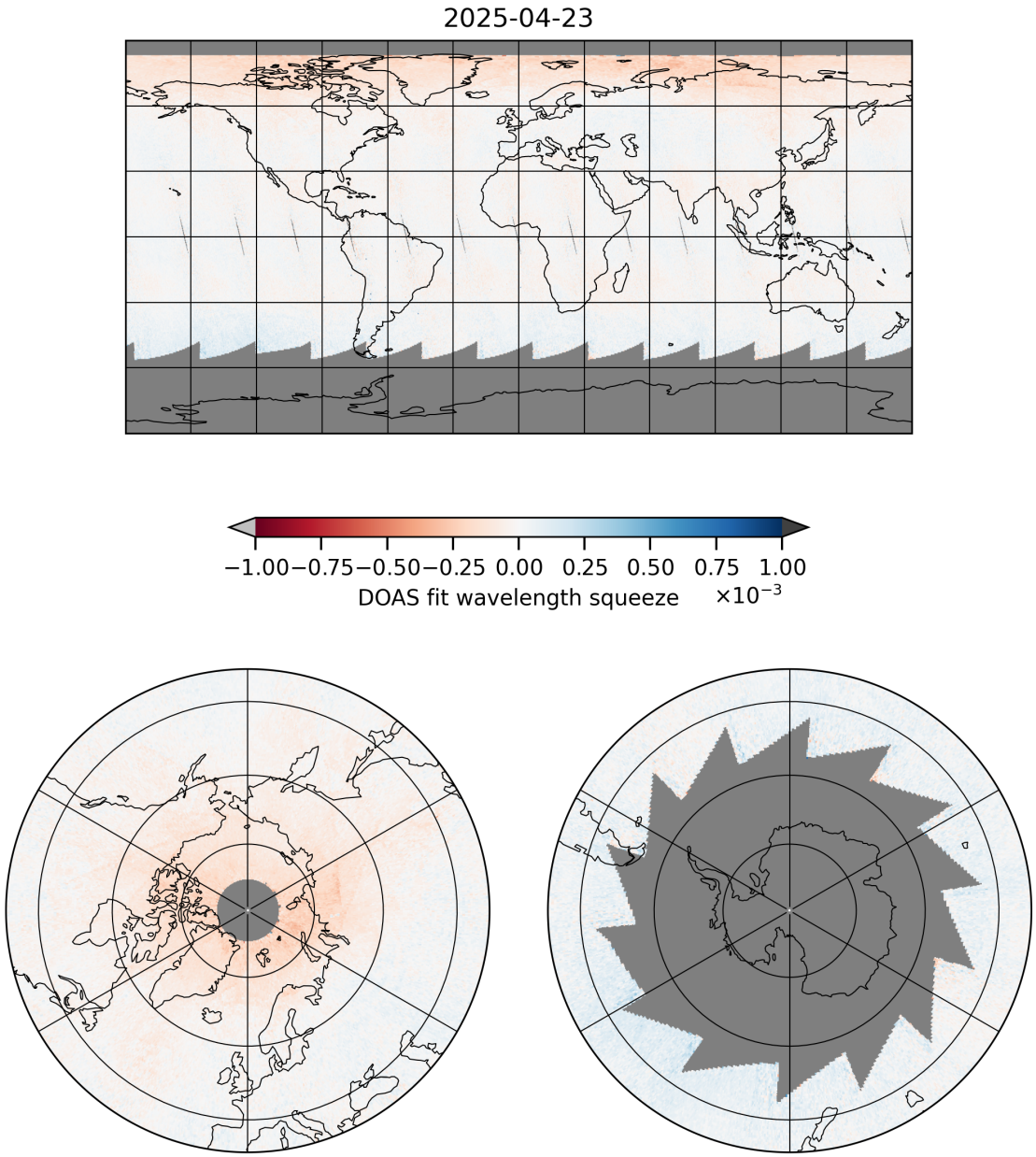

Figure 23: Map of “DOAS fit wavelength squeeze” for 2025-04-23 to 2025-04-24

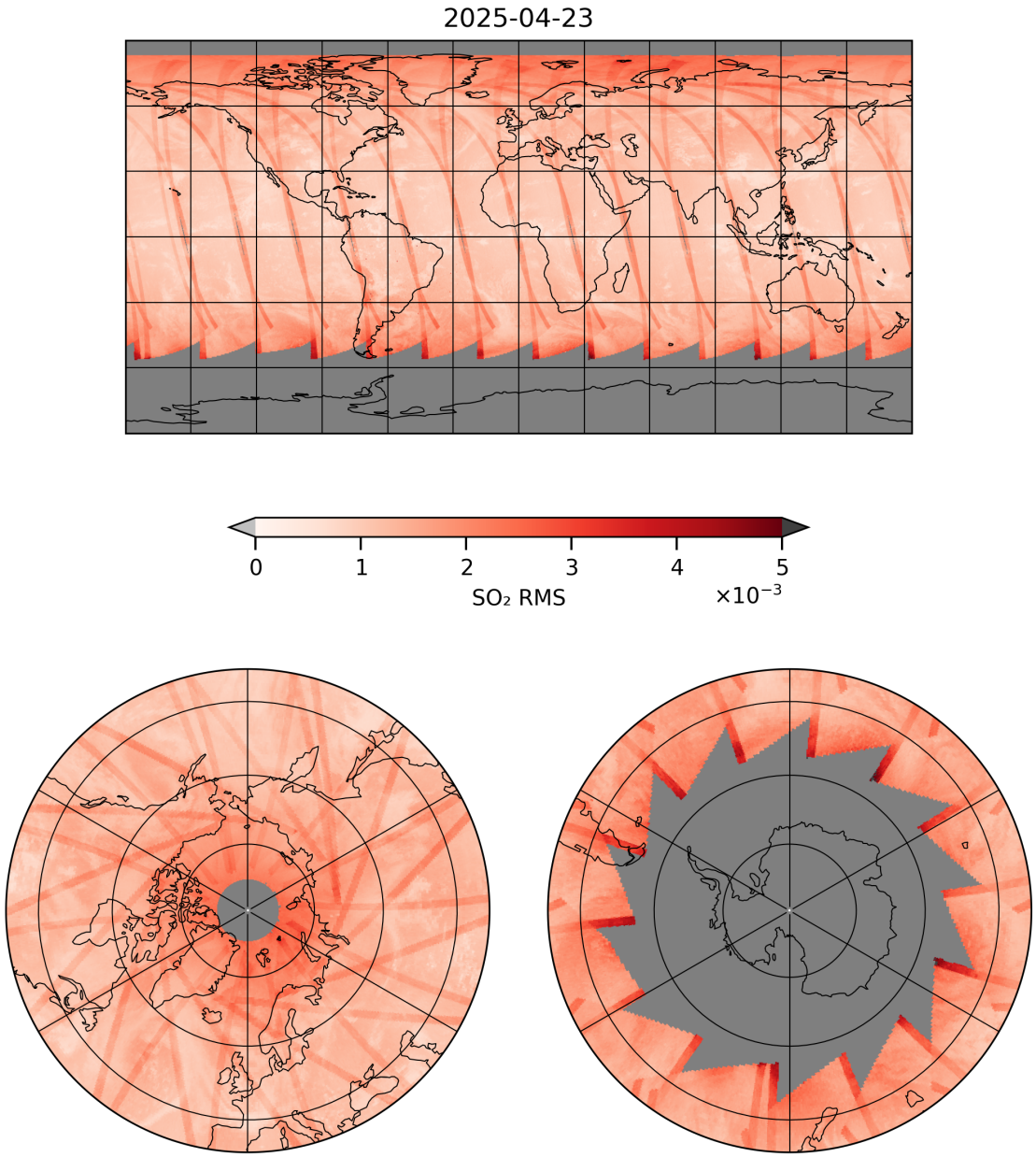

Figure 24: Map of "SO_2 RMS" for 2025-04-23 to 2025-04-24

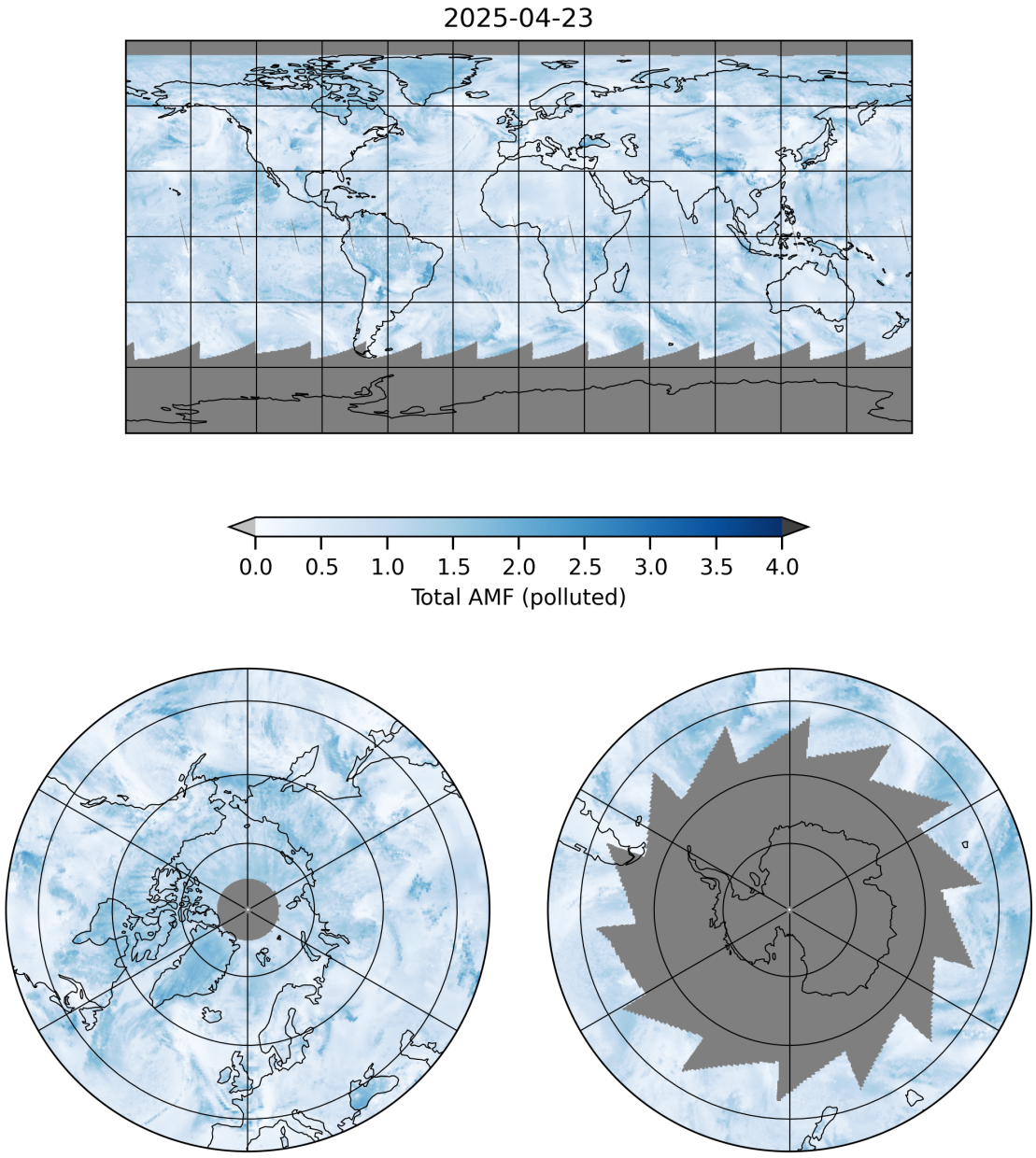

Figure 25: Map of “Total AMF (polluted)” for 2025-04-23 to 2025-04-24

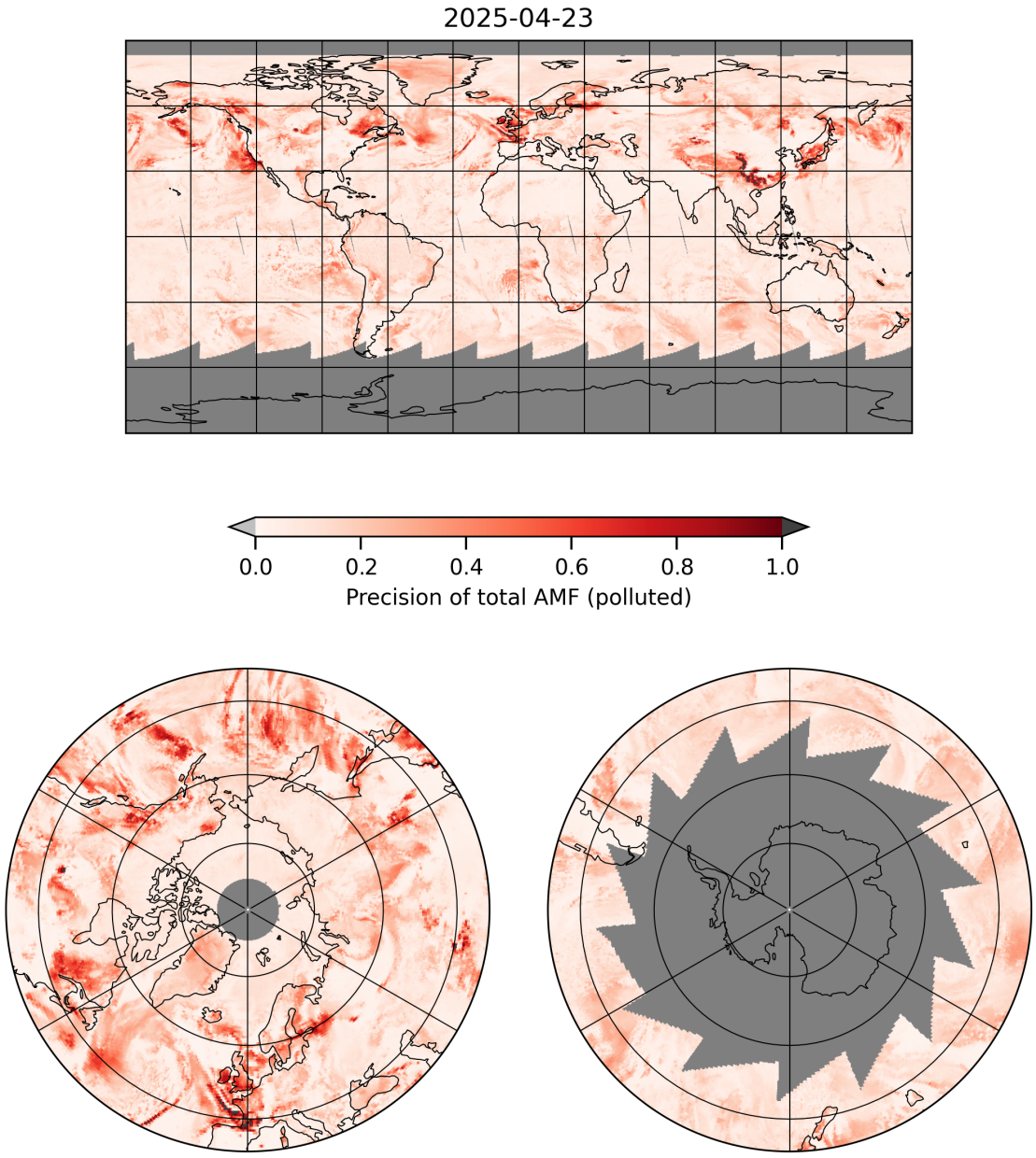

Figure 26: Map of “Precision of total AMF (polluted)” for 2025-04-23 to 2025-04-24

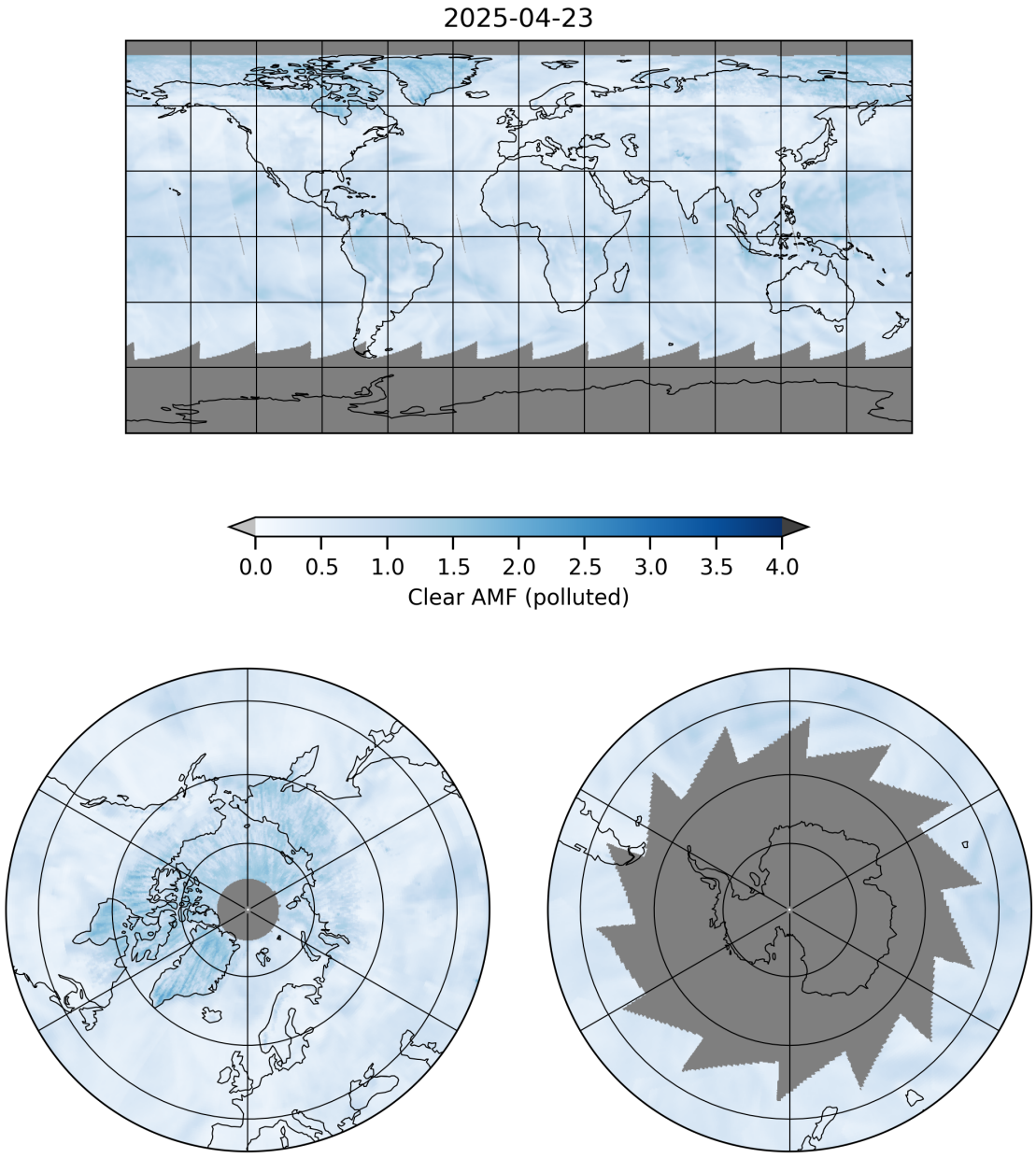

Figure 27: Map of “Clear AMF (polluted)” for 2025-04-23 to 2025-04-24

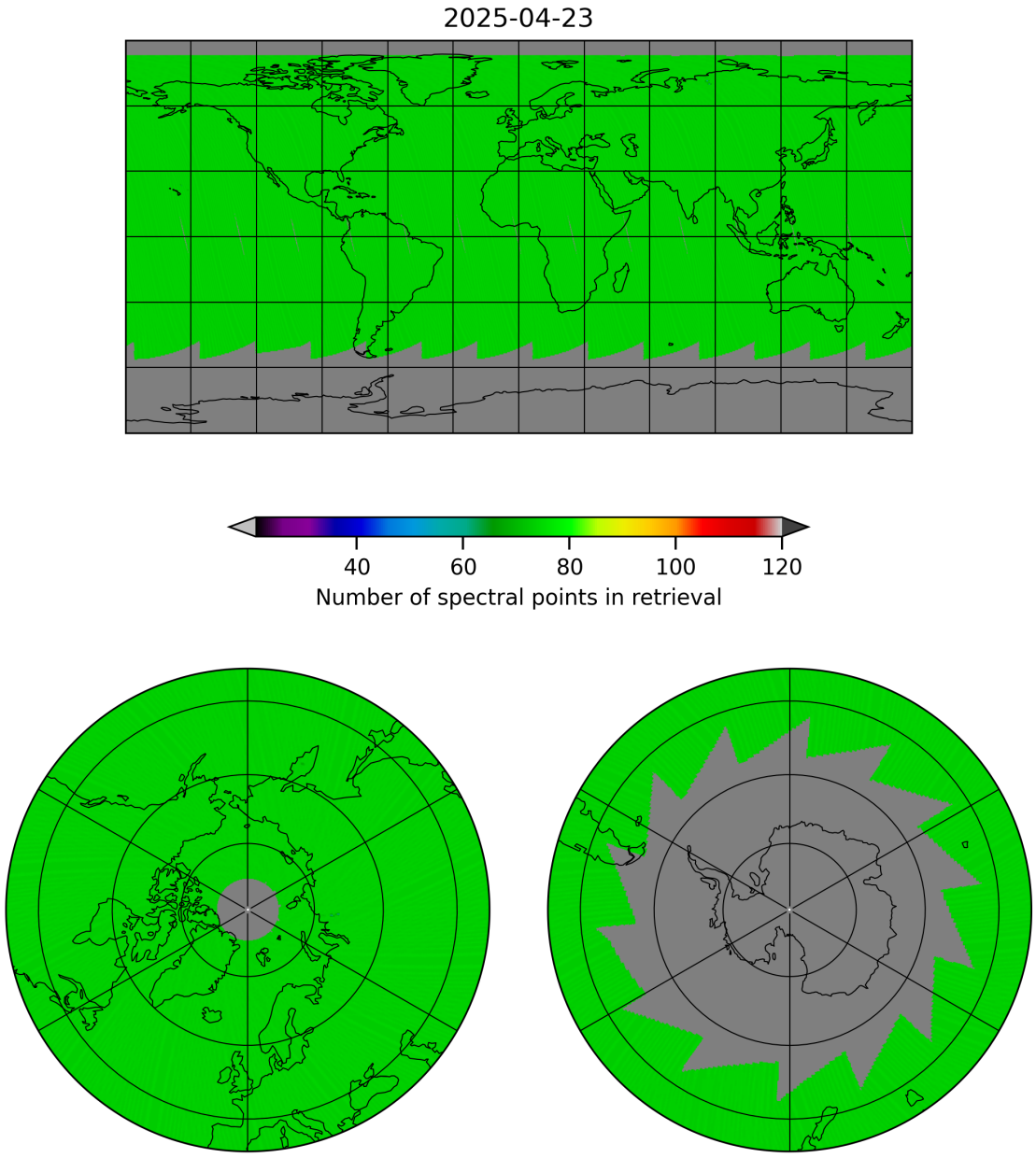

Figure 28: Map of “Number of spectral points in retrieval” for 2025-04-23 to 2025-04-24

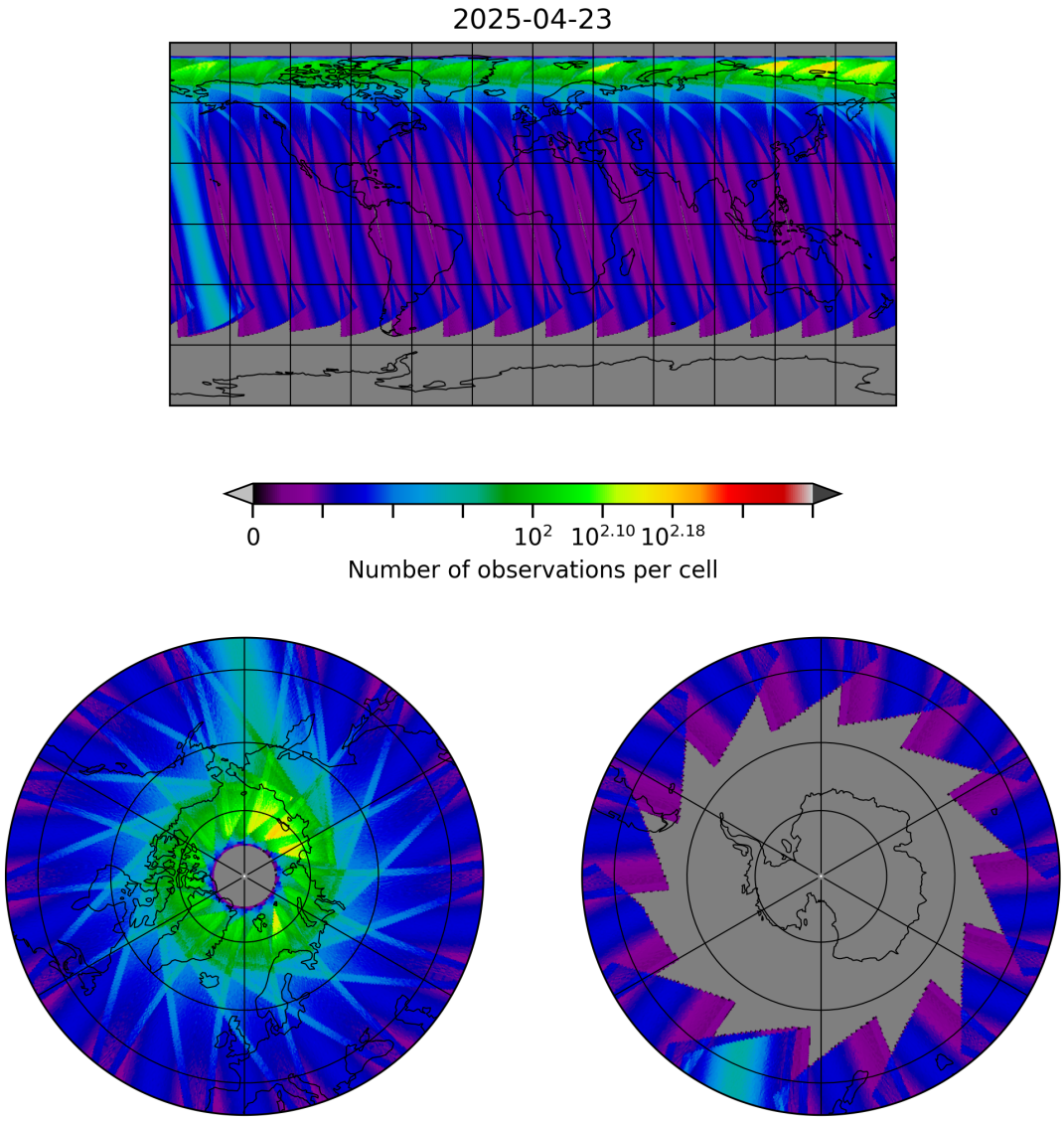

Figure 29: Map of the number of observations for 2025-04-23 to 2025-04-24

7 Zonal average

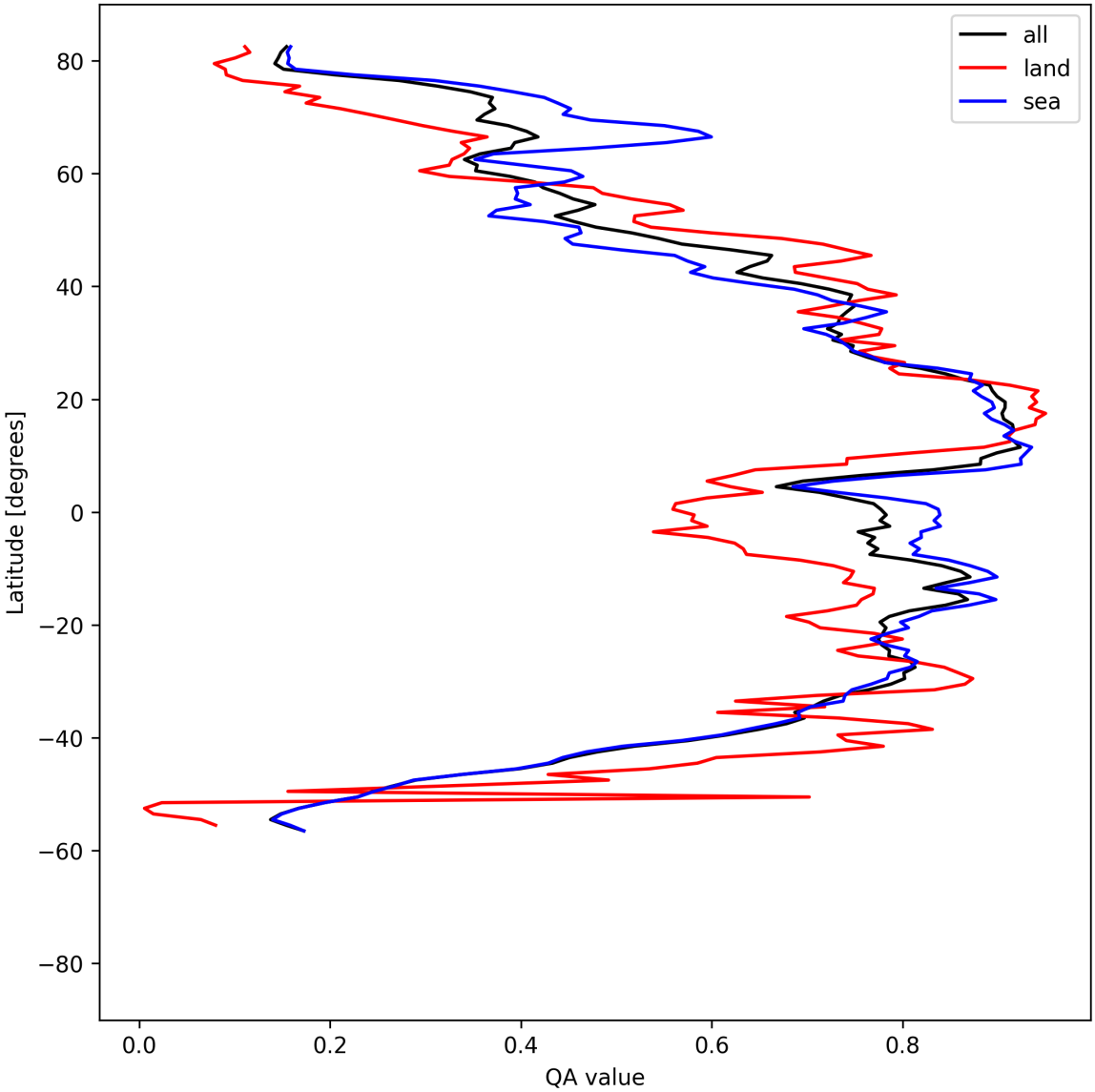

Figure 30: Zonal average of “QA value” for 2025-04-23 to 2025-04-24.

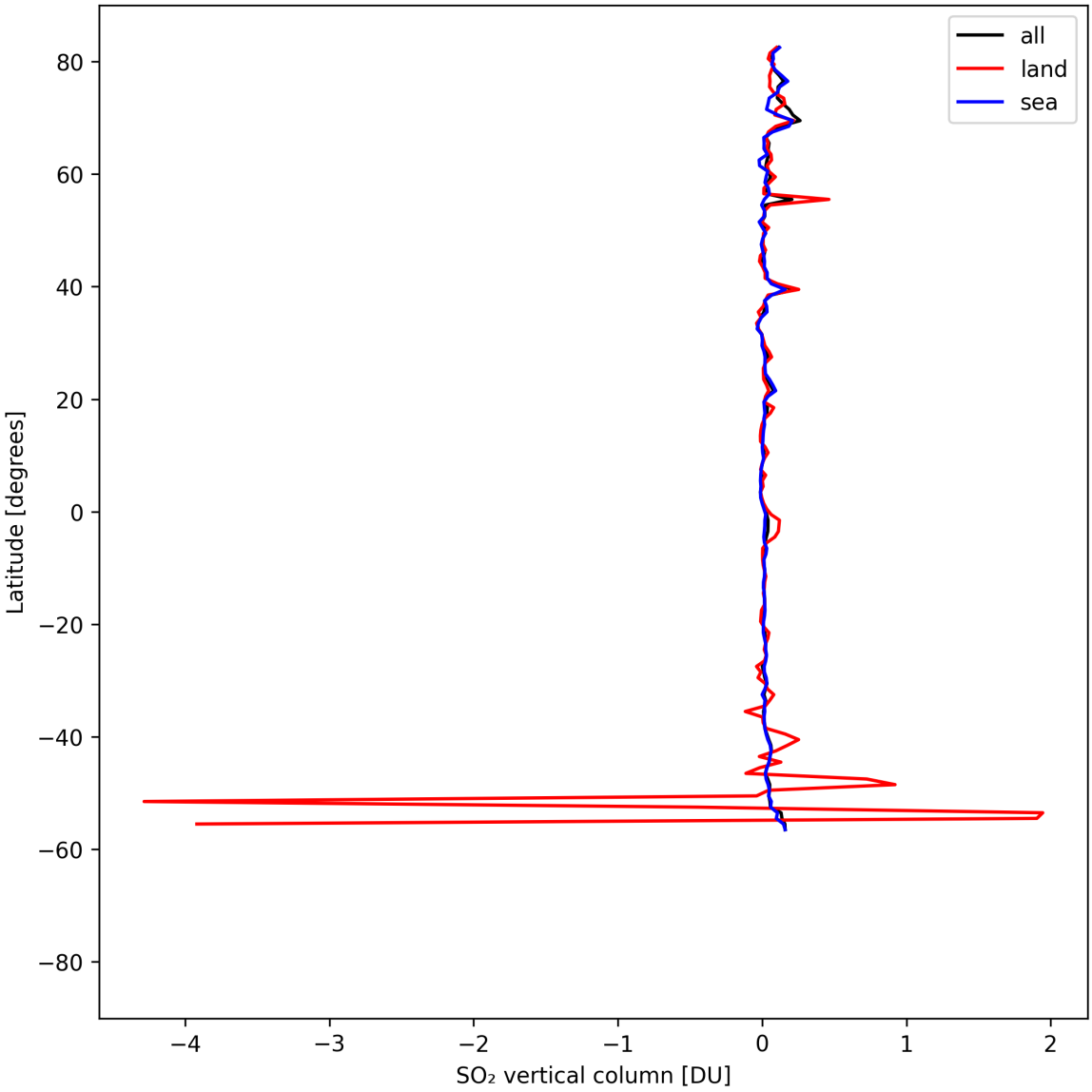

Figure 31: Zonal average of "SO_2 vertical column" for 2025-04-23 to 2025-04-24.

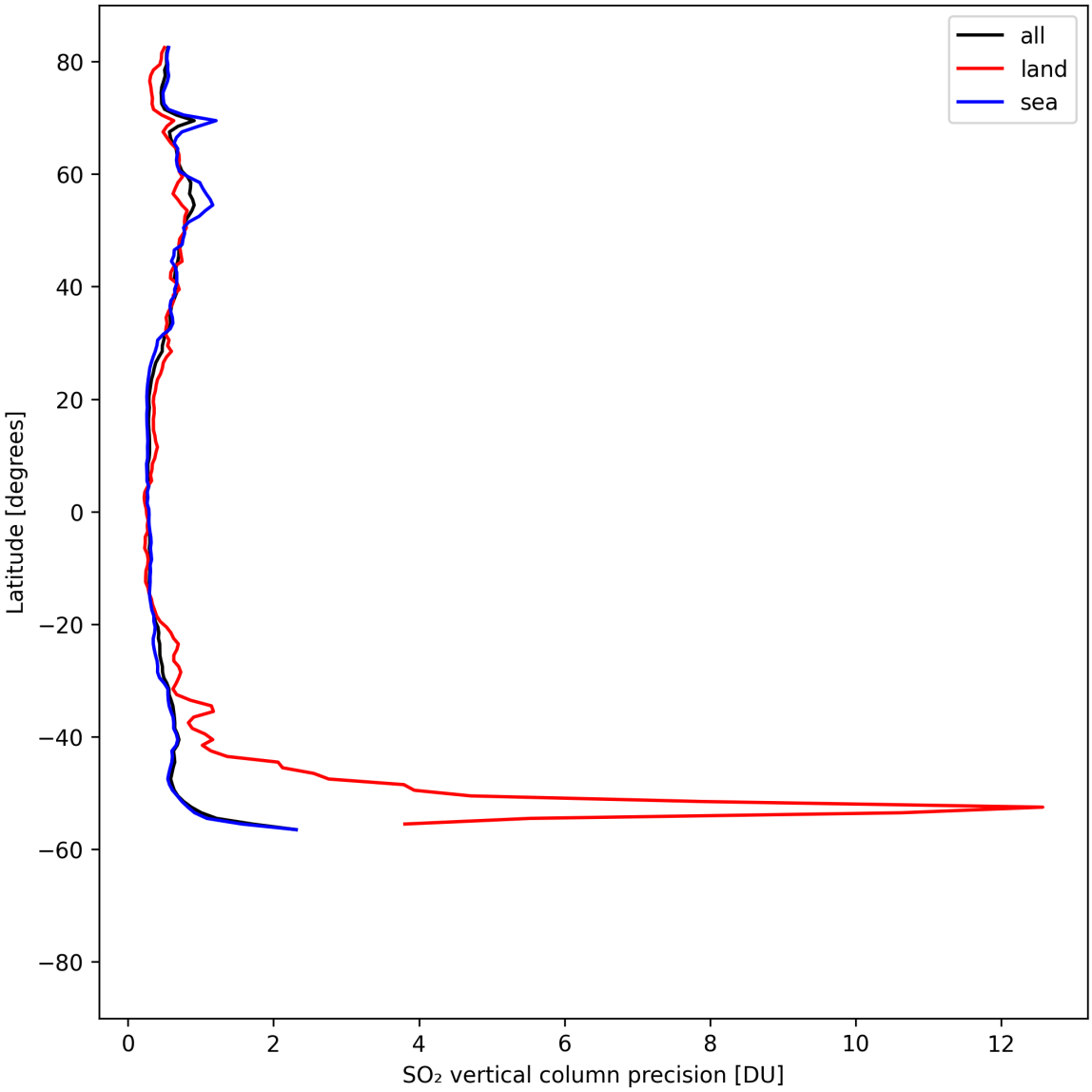

Figure 32: Zonal average of "SO_2 vertical column precision" for 2025-04-23 to 2025-04-24.

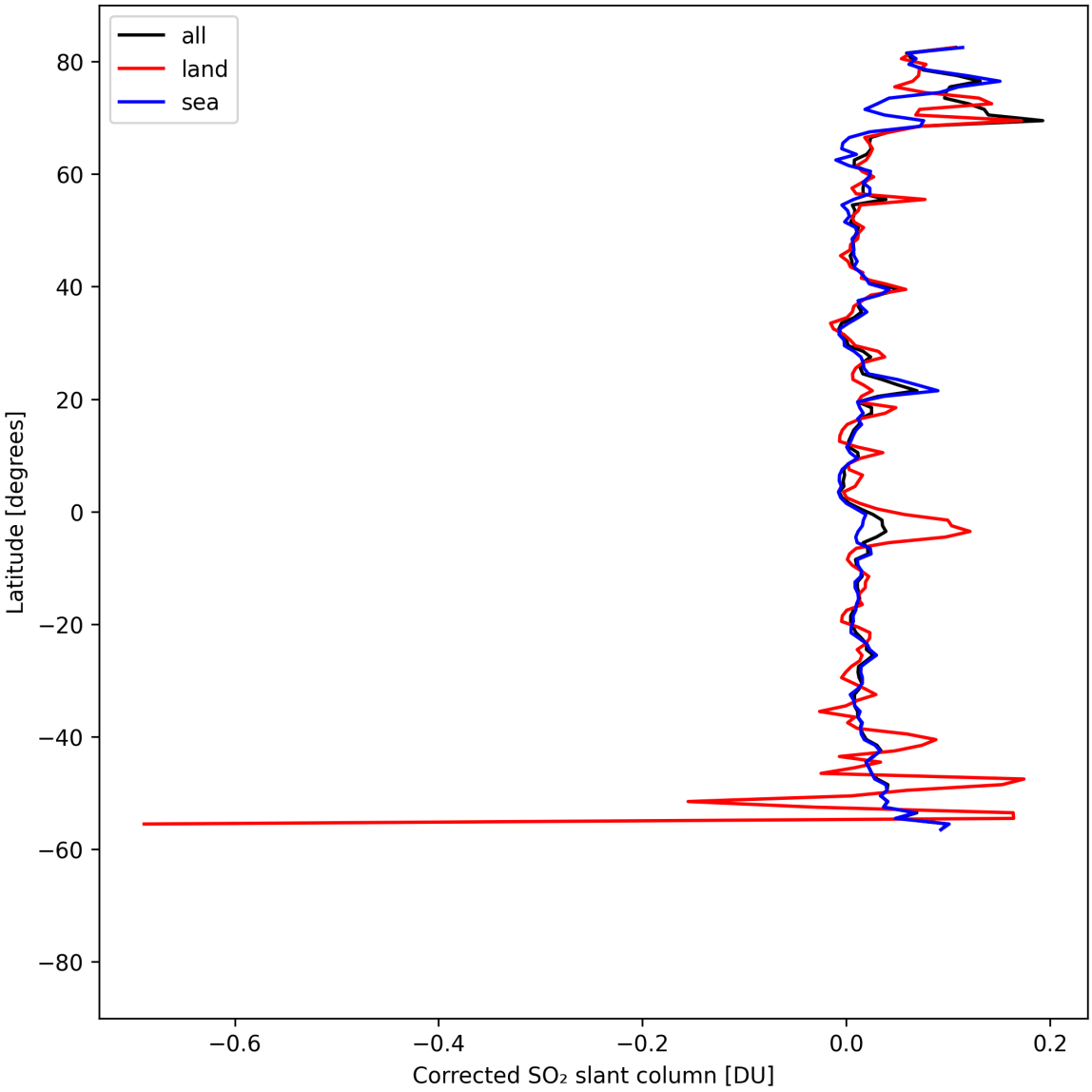

Figure 33: Zonal average of “Corrected SO_2 slant column” for 2025-04-23 to 2025-04-24.

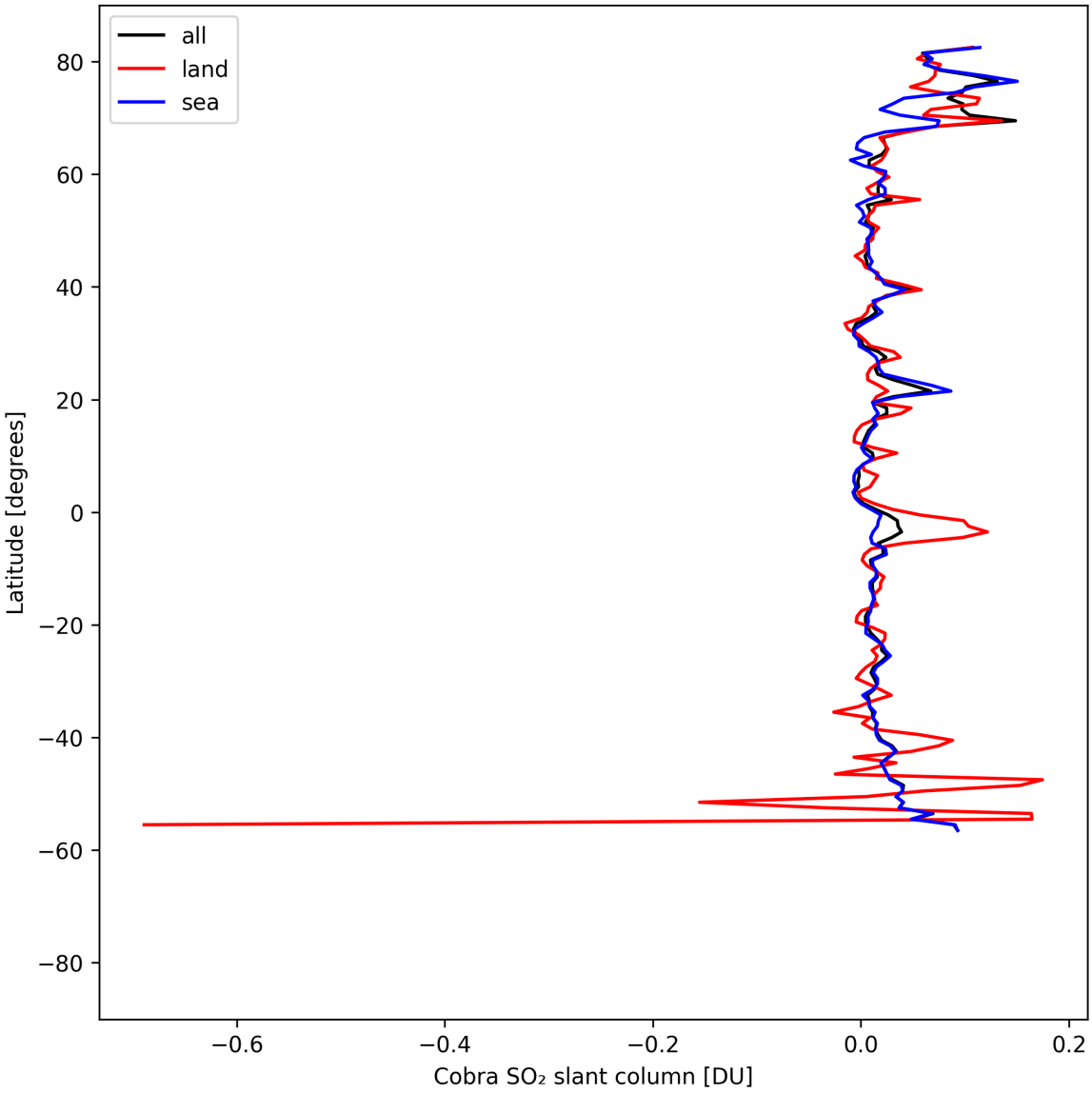

Figure 34: Zonal average of “Cobra SO_2 slant column” for 2025-04-23 to 2025-04-24.

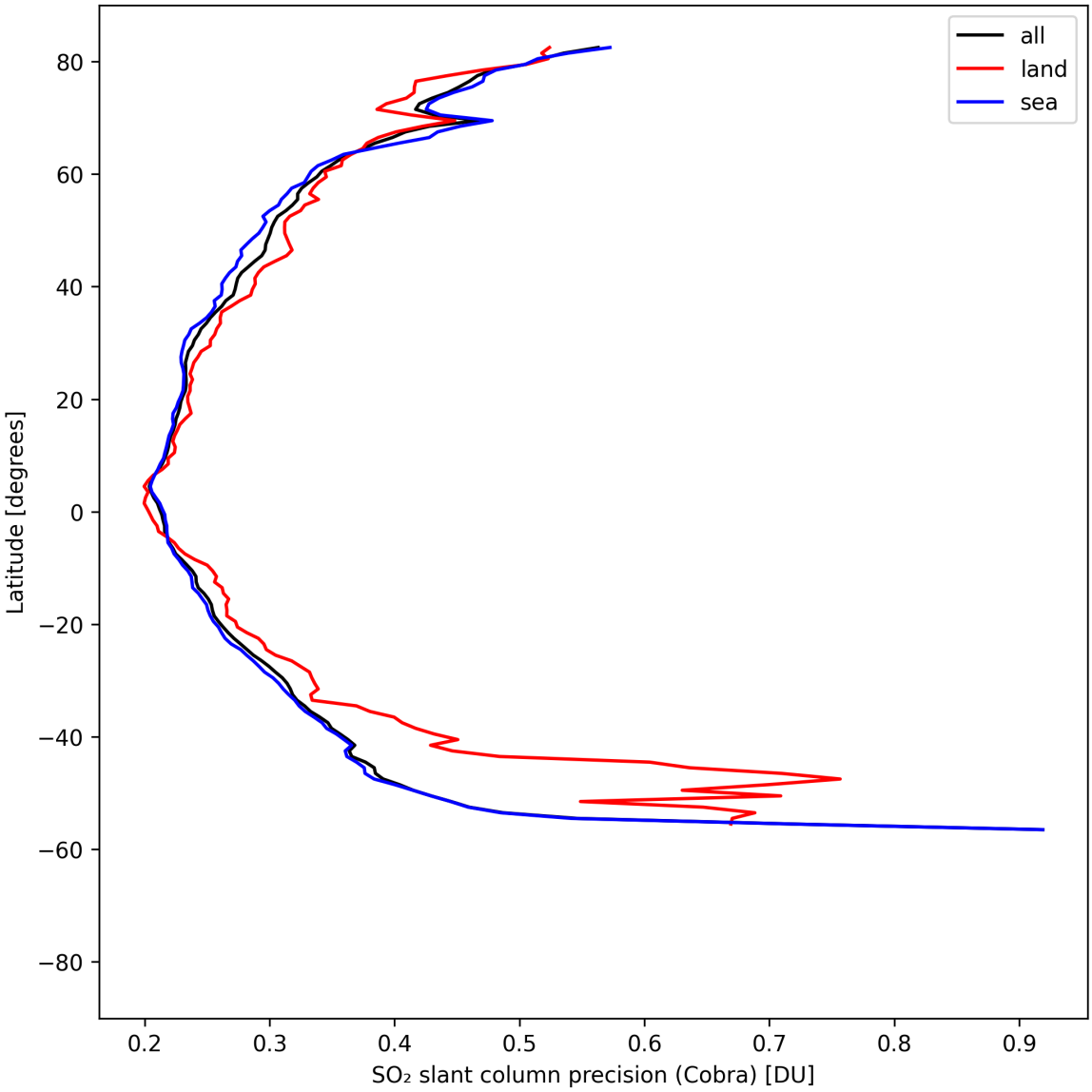

Figure 35: Zonal average of "SO_2 slant column precision (Cobra)" for 2025-04-23 to 2025-04-24.

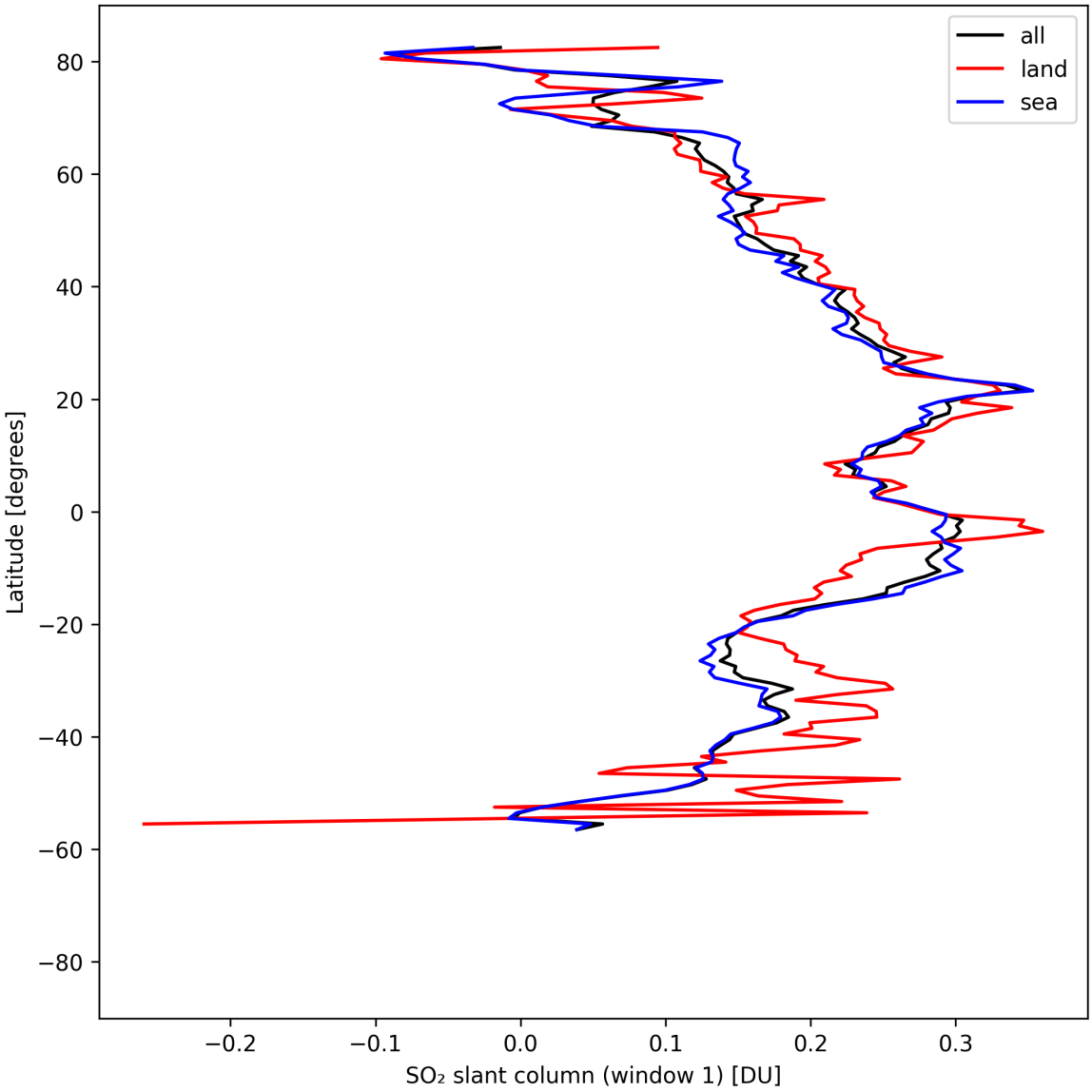

Figure 36: Zonal average of "SO_2 slant column (window 1)" for 2025-04-23 to 2025-04-24.

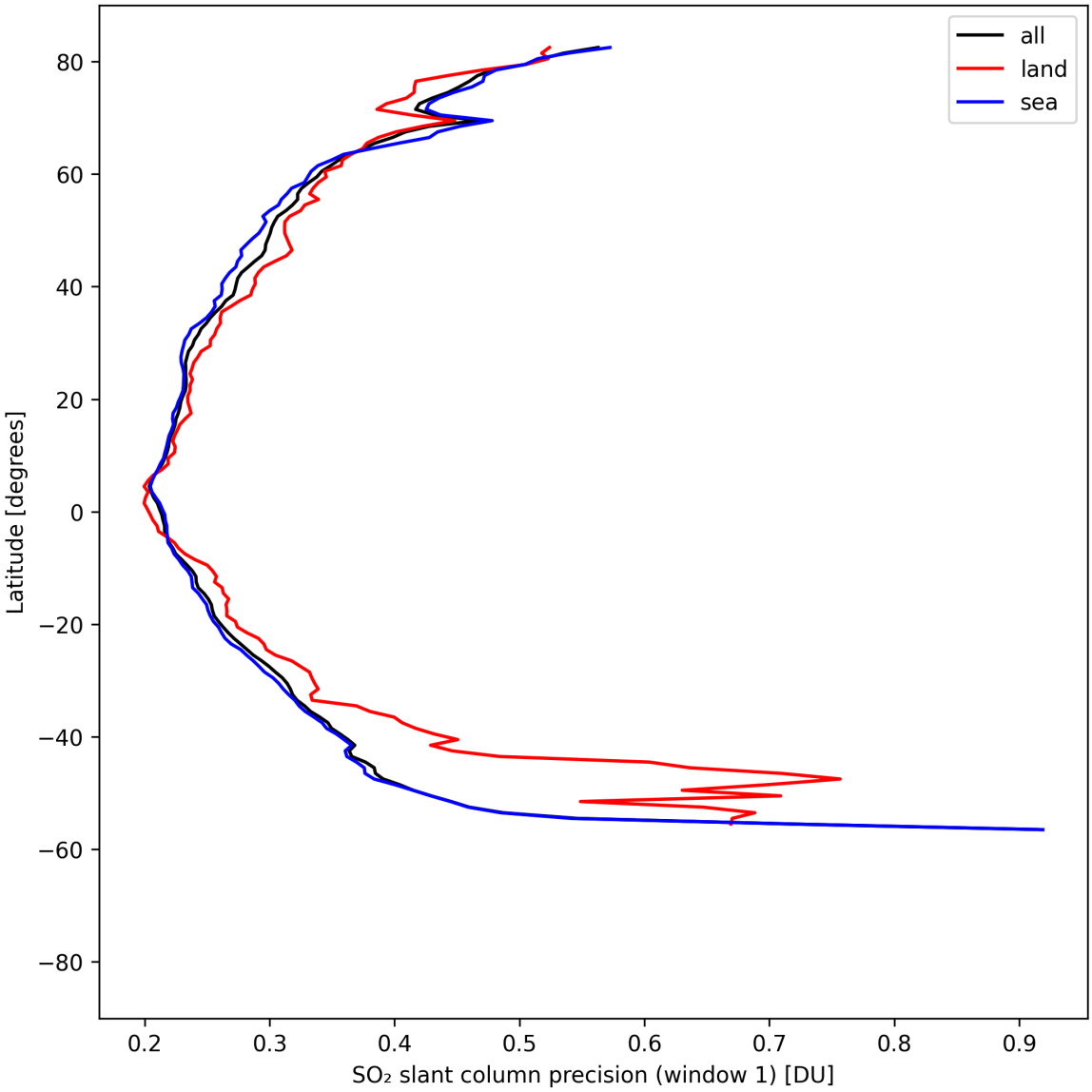

Figure 37: Zonal average of "SO_2 slant column precision (window 1)" for 2025-04-23 to 2025-04-24.

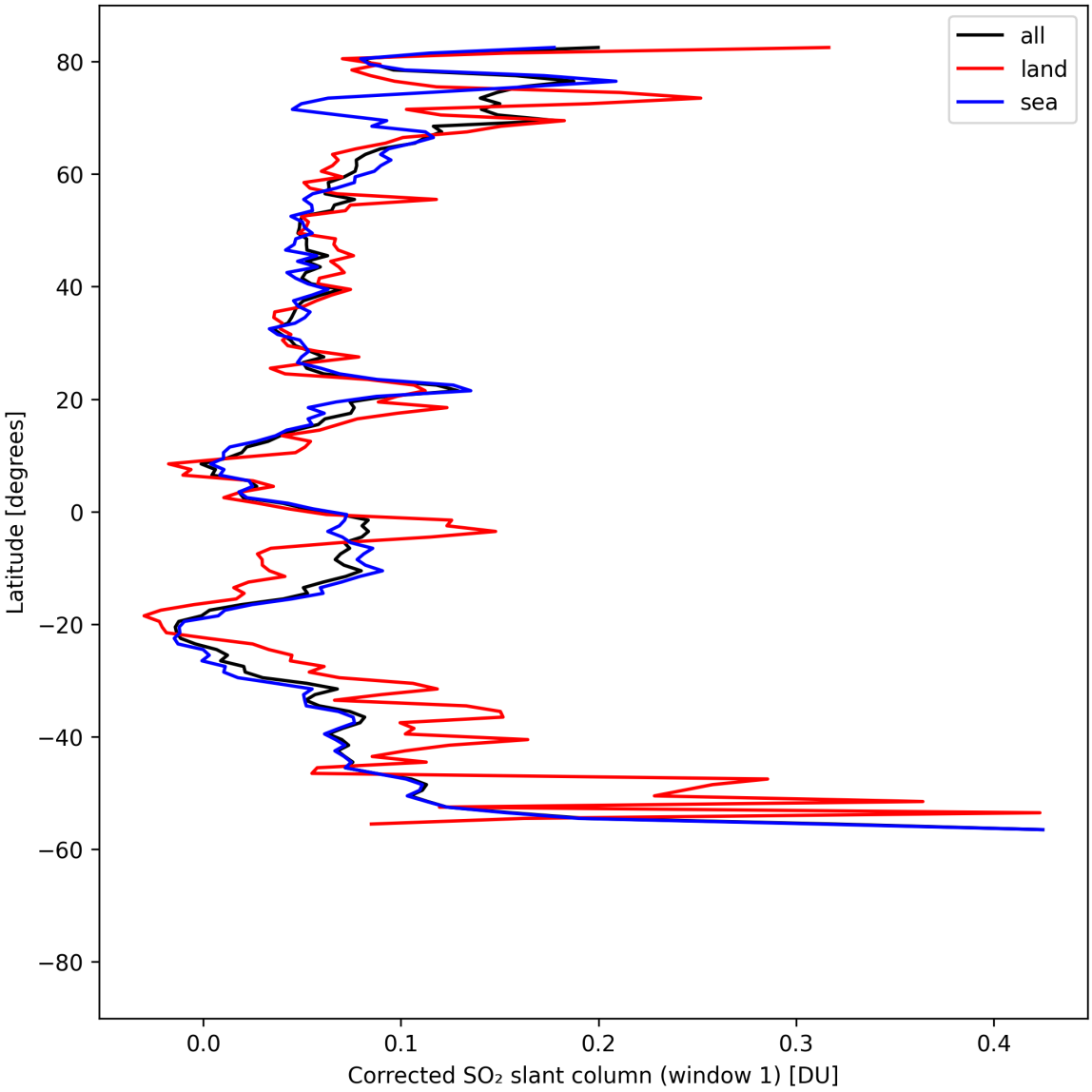

Figure 38: Zonal average of "Corrected SO_2 slant column (window 1)" for 2025-04-23 to 2025-04-24.

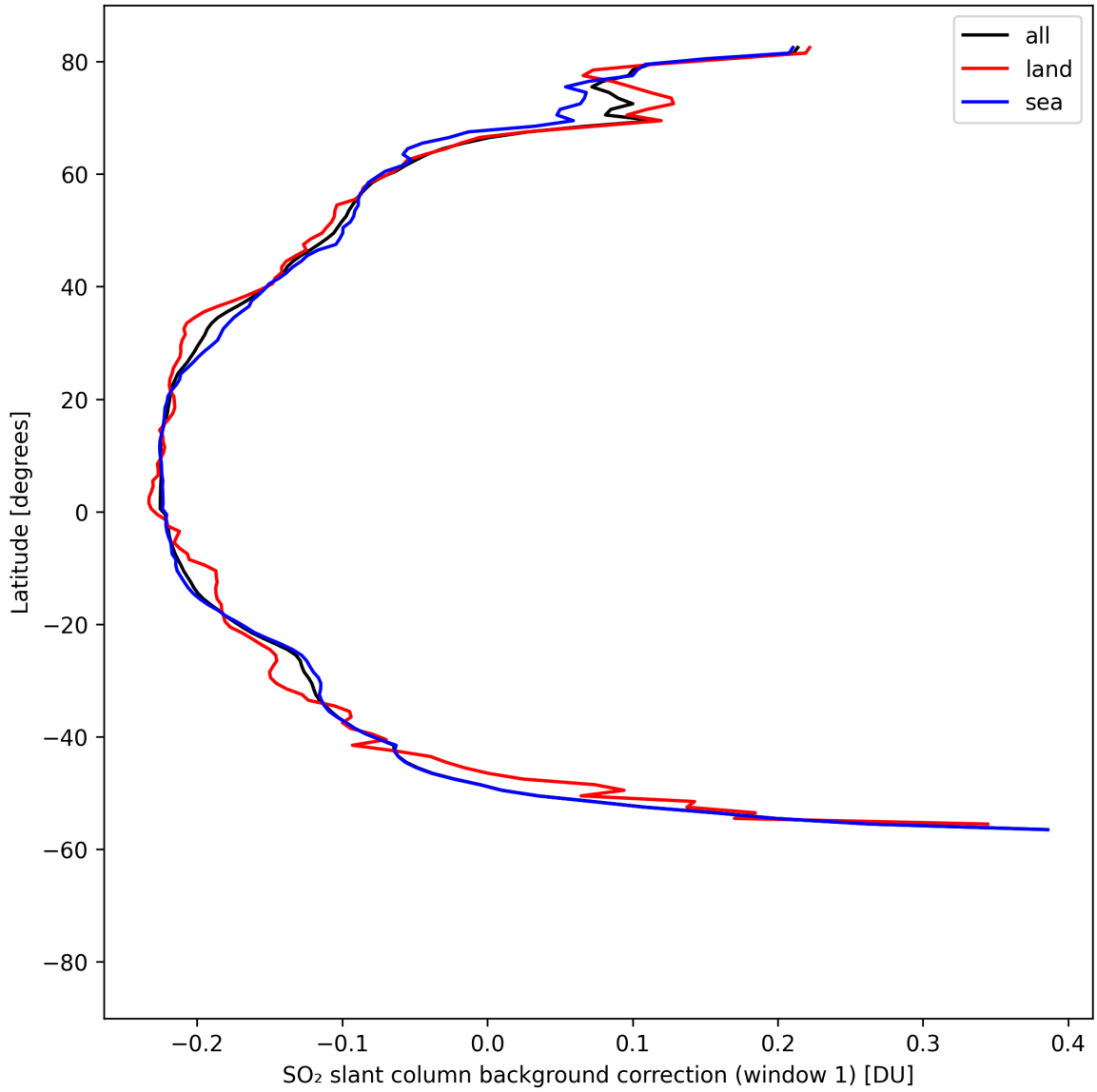

Figure 39: Zonal average of "SO_2 slant column background correction (window 1)" for 2025-04-23 to 2025-04-24.

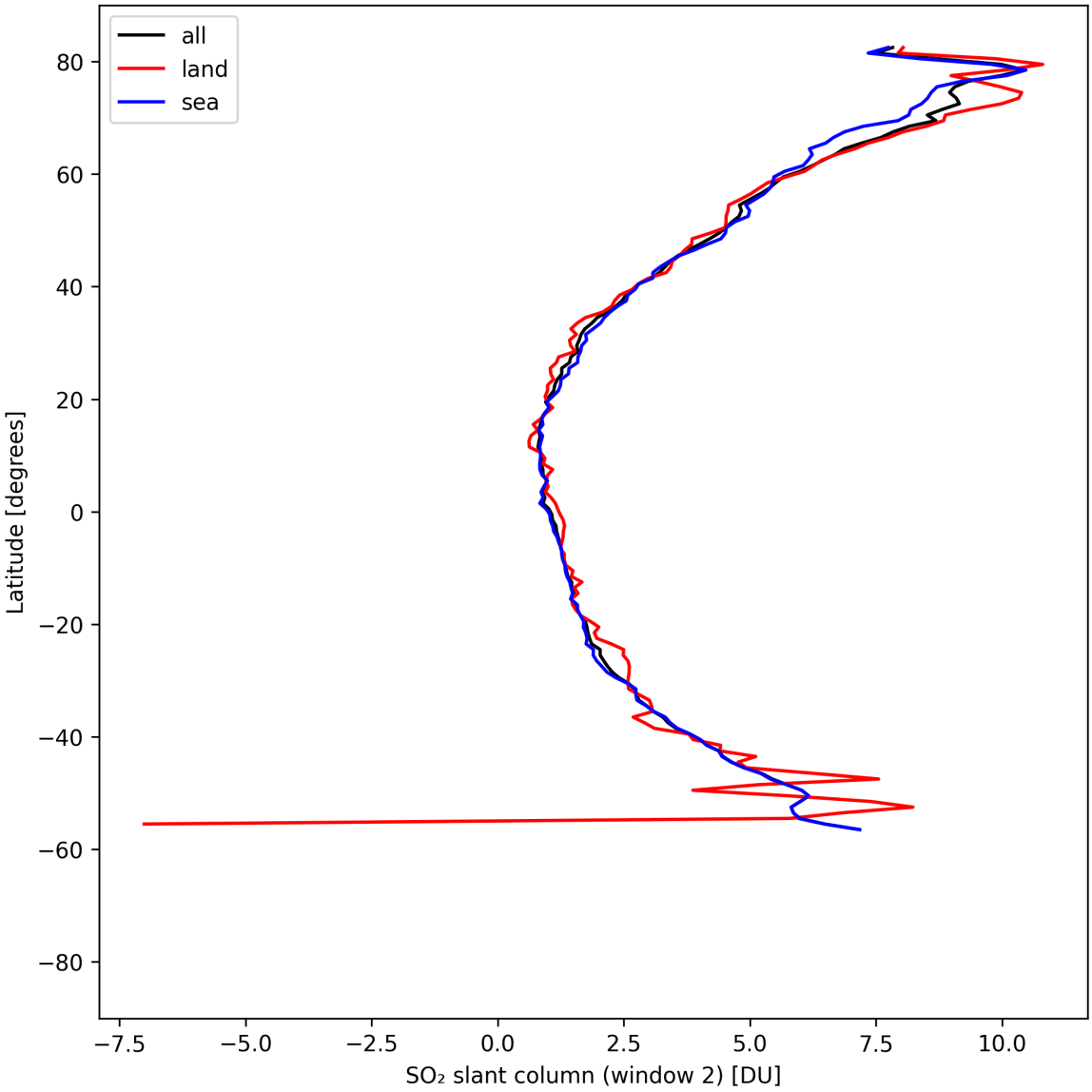

Figure 40: Zonal average of "SO_2 slant column (window 2)" for 2025-04-23 to 2025-04-24.

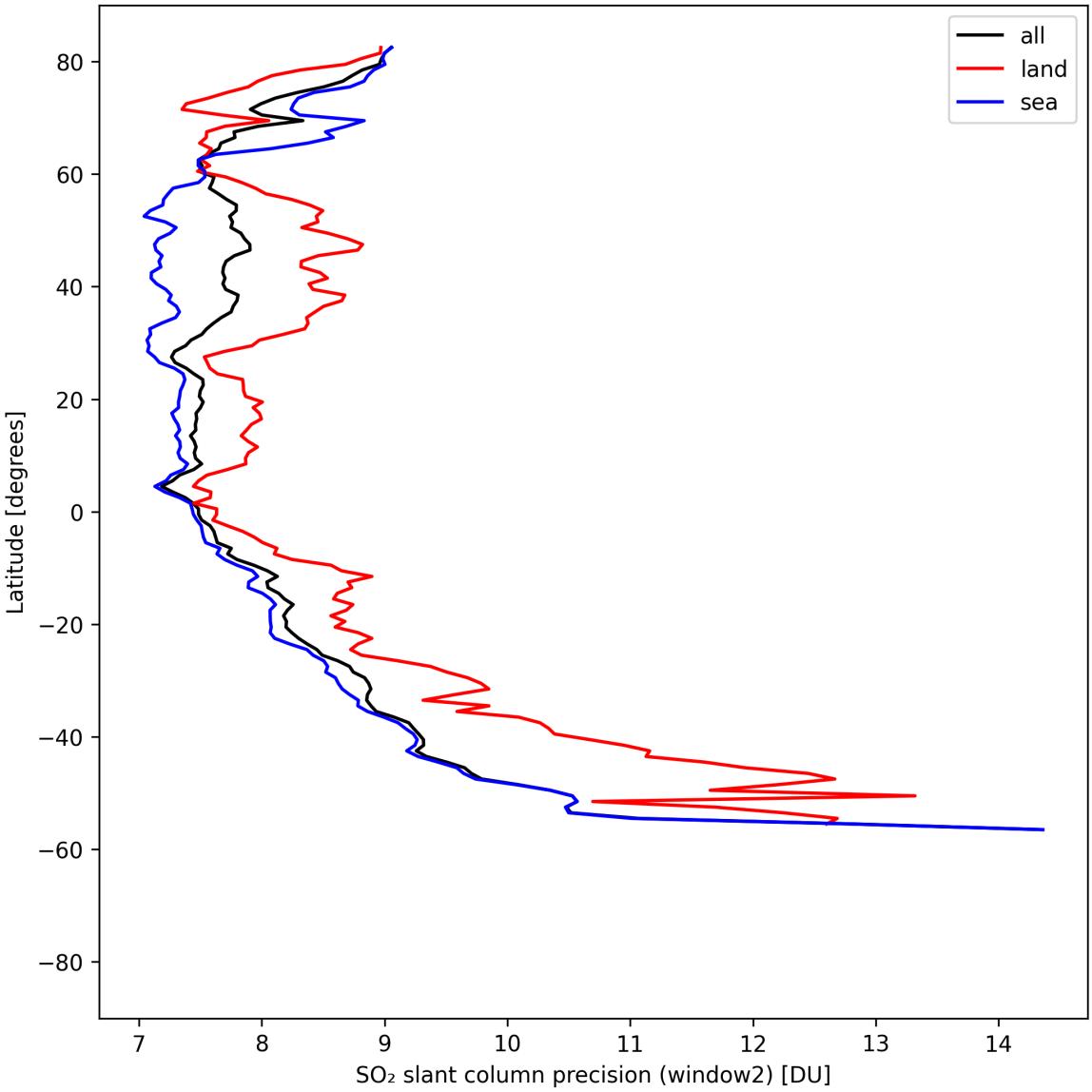

Figure 41: Zonal average of "SO_2 slant column precision (window2)" for 2025-04-23 to 2025-04-24.

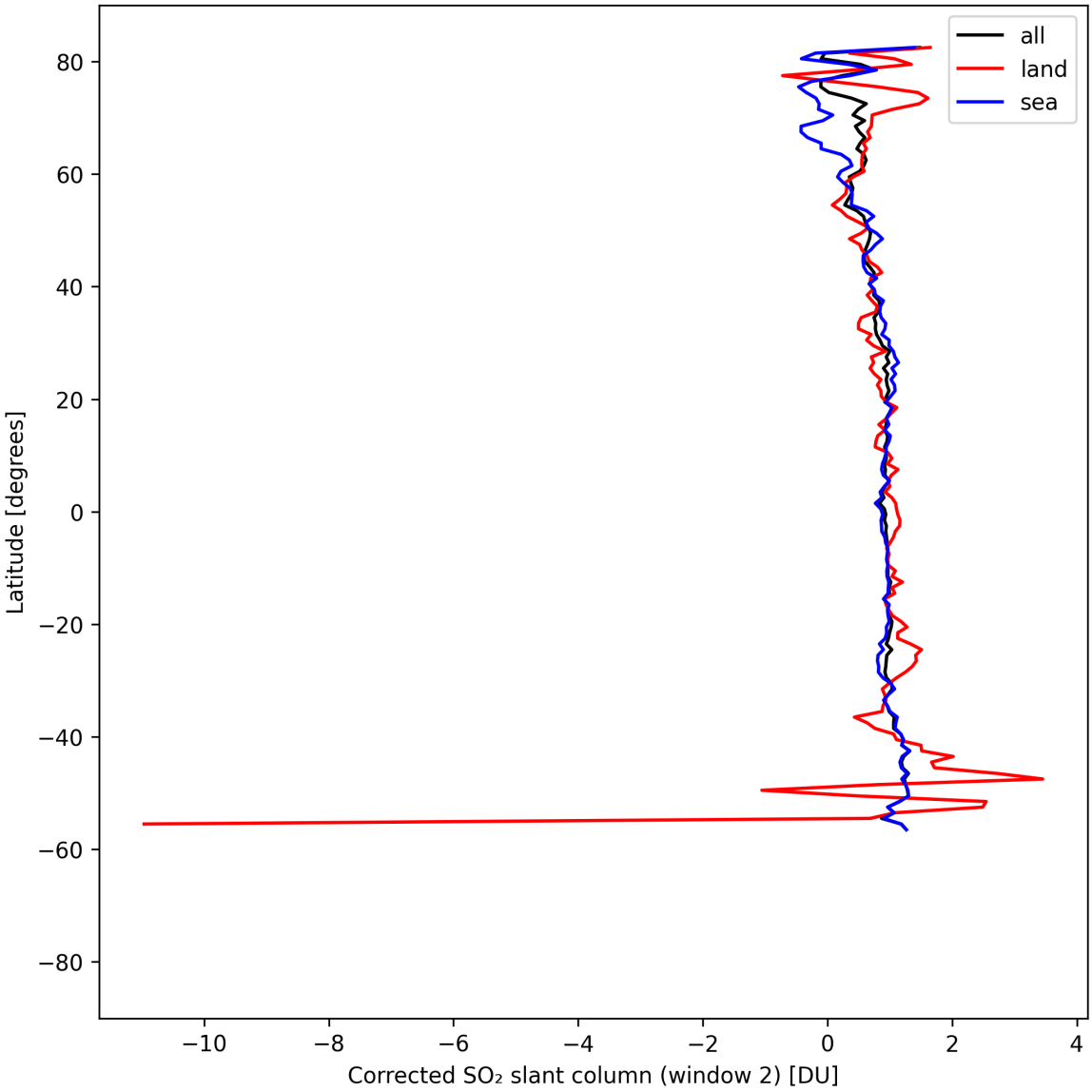

Figure 42: Zonal average of “Corrected SO_2 slant column (window 2)” for 2025-04-23 to 2025-04-24.

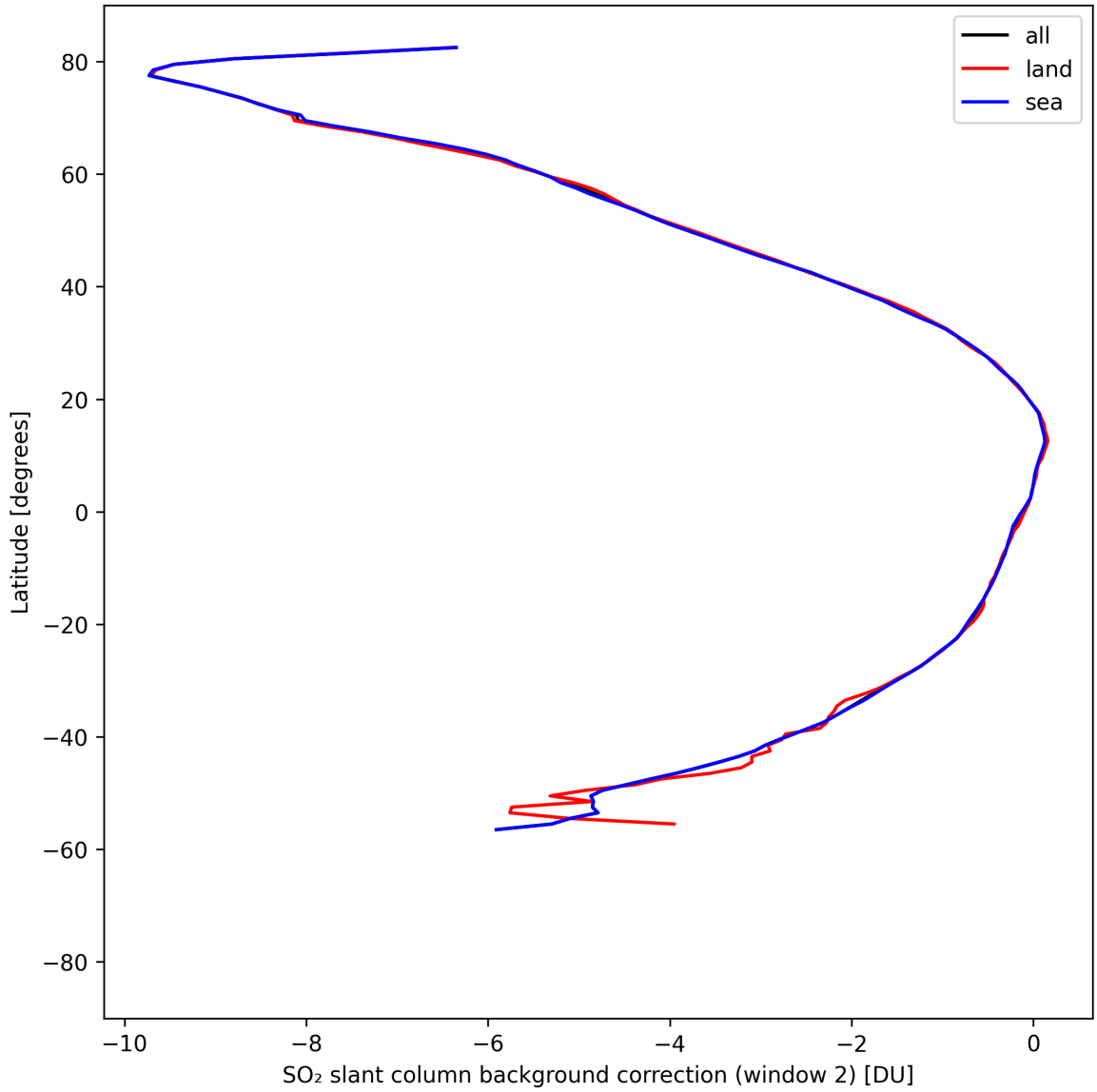

Figure 43: Zonal average of "SO_2 slant column background correction (window 2)" for 2025-04-23 to 2025-04-24.

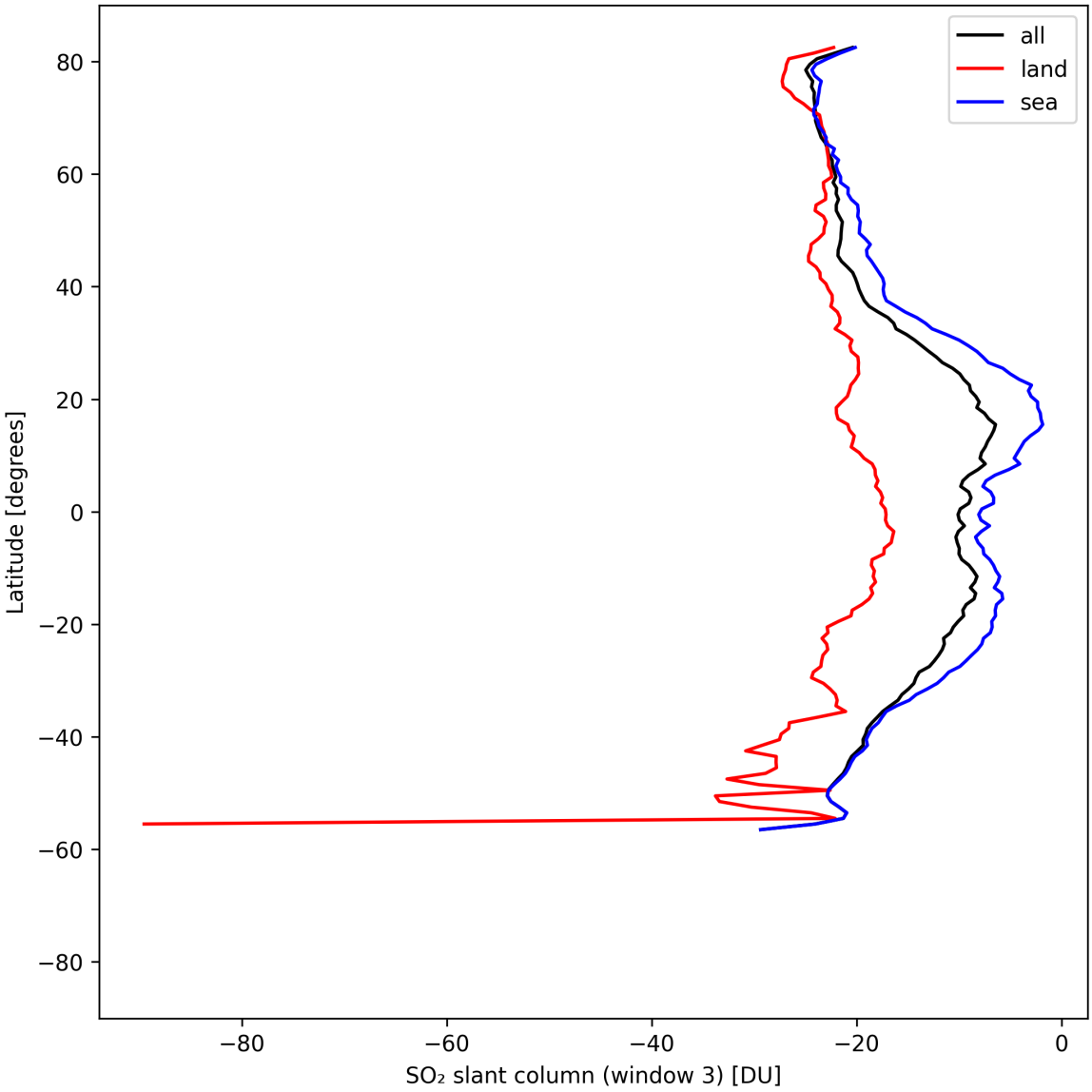

Figure 44: Zonal average of "SO_2 slant column (window 3)" for 2025-04-23 to 2025-04-24.

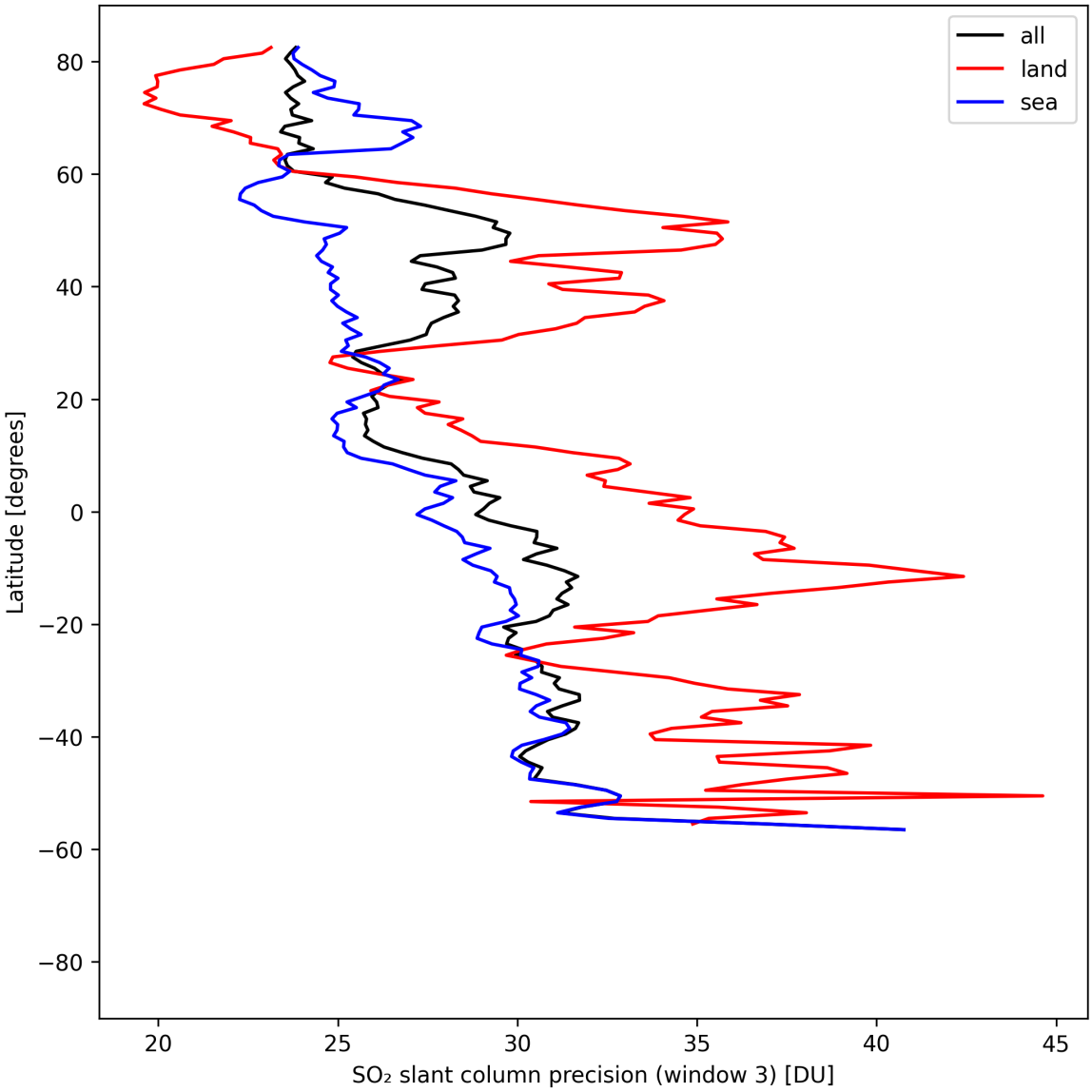

Figure 45: Zonal average of "SO_2 slant column precision (window 3)" for 2025-04-23 to 2025-04-24.

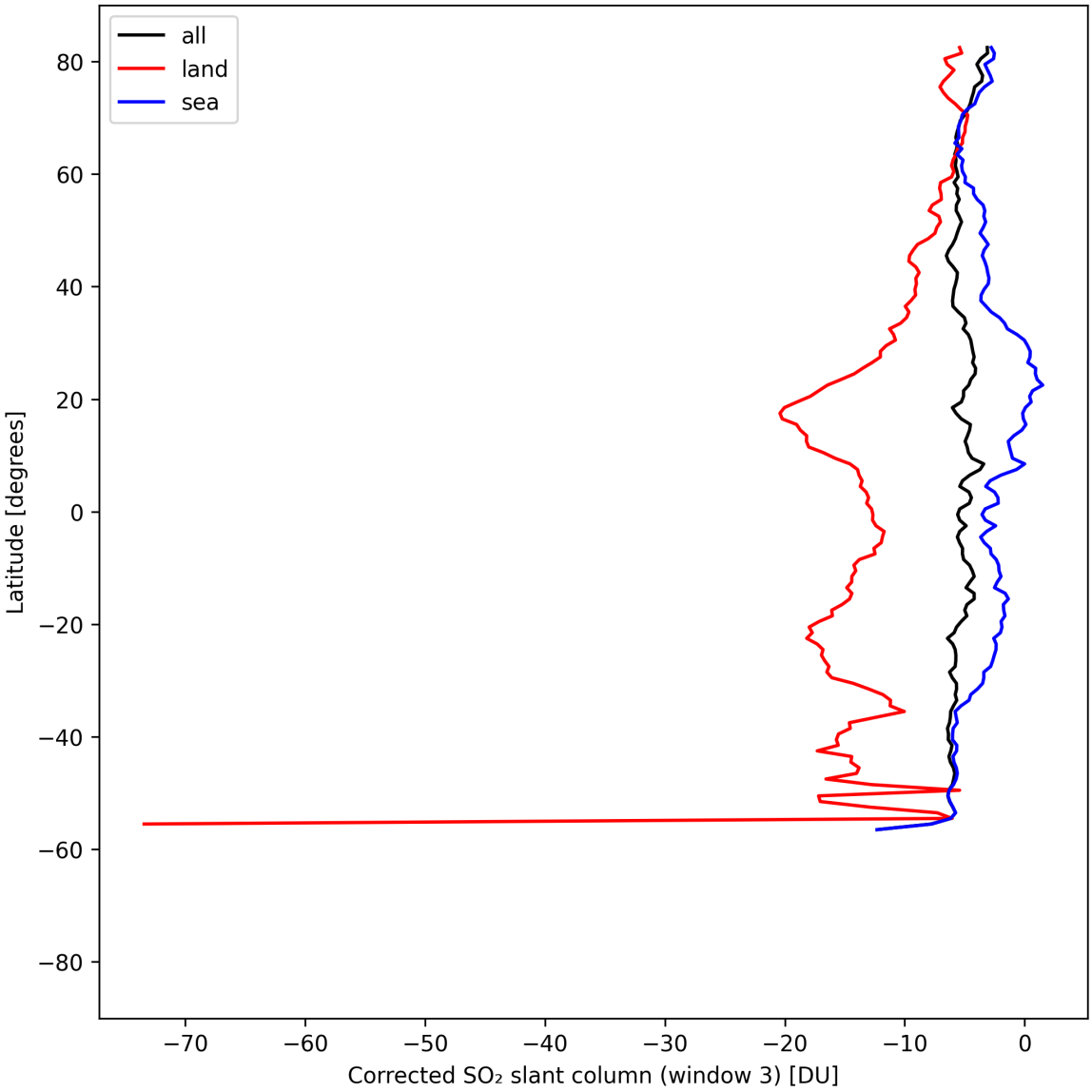

Figure 46: Zonal average of “Corrected SO_2 slant column (window 3)” for 2025-04-23 to 2025-04-24.

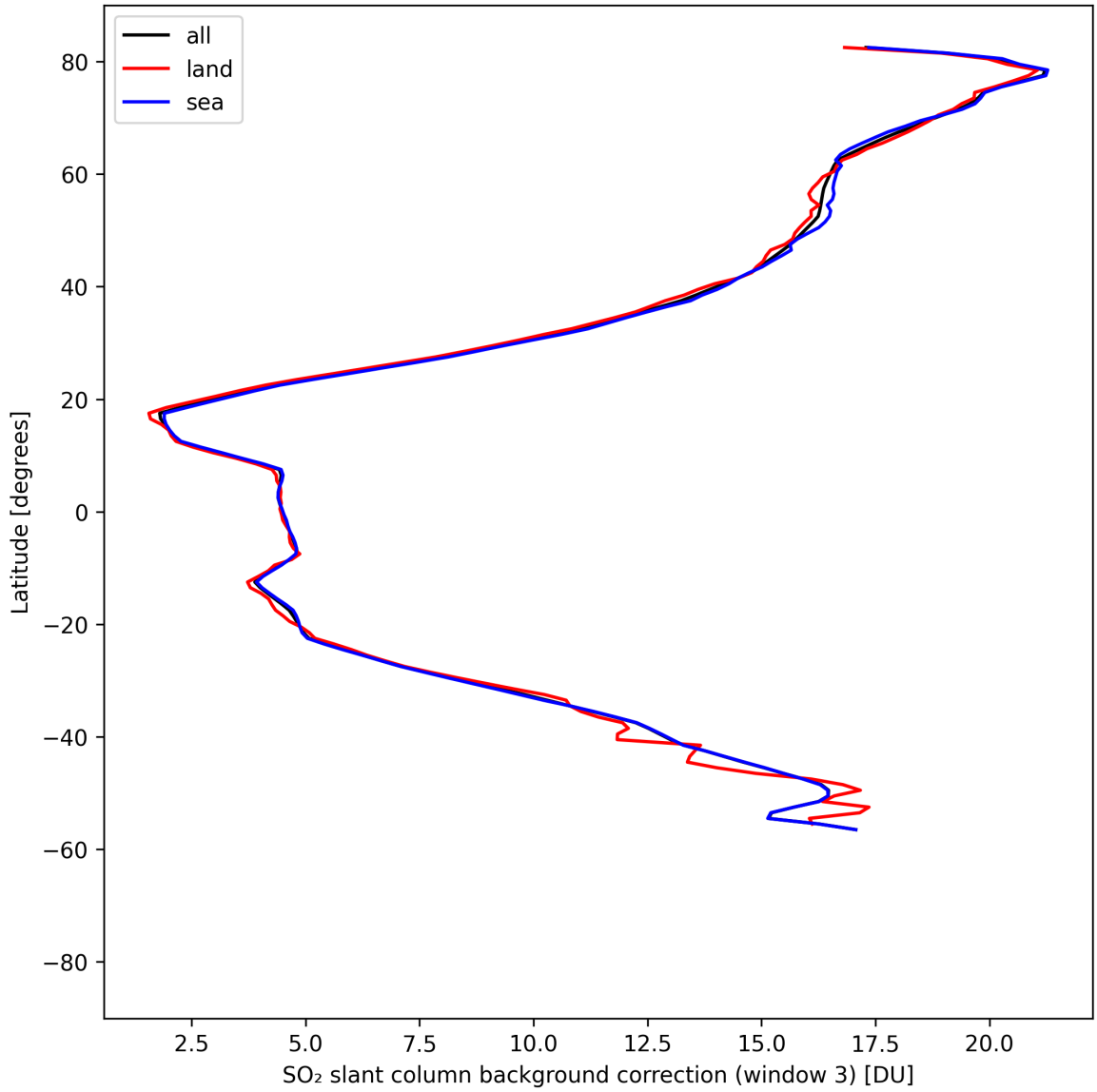

Figure 47: Zonal average of "SO_2 slant column background correction (window 3)" for 2025-04-23 to 2025-04-24.

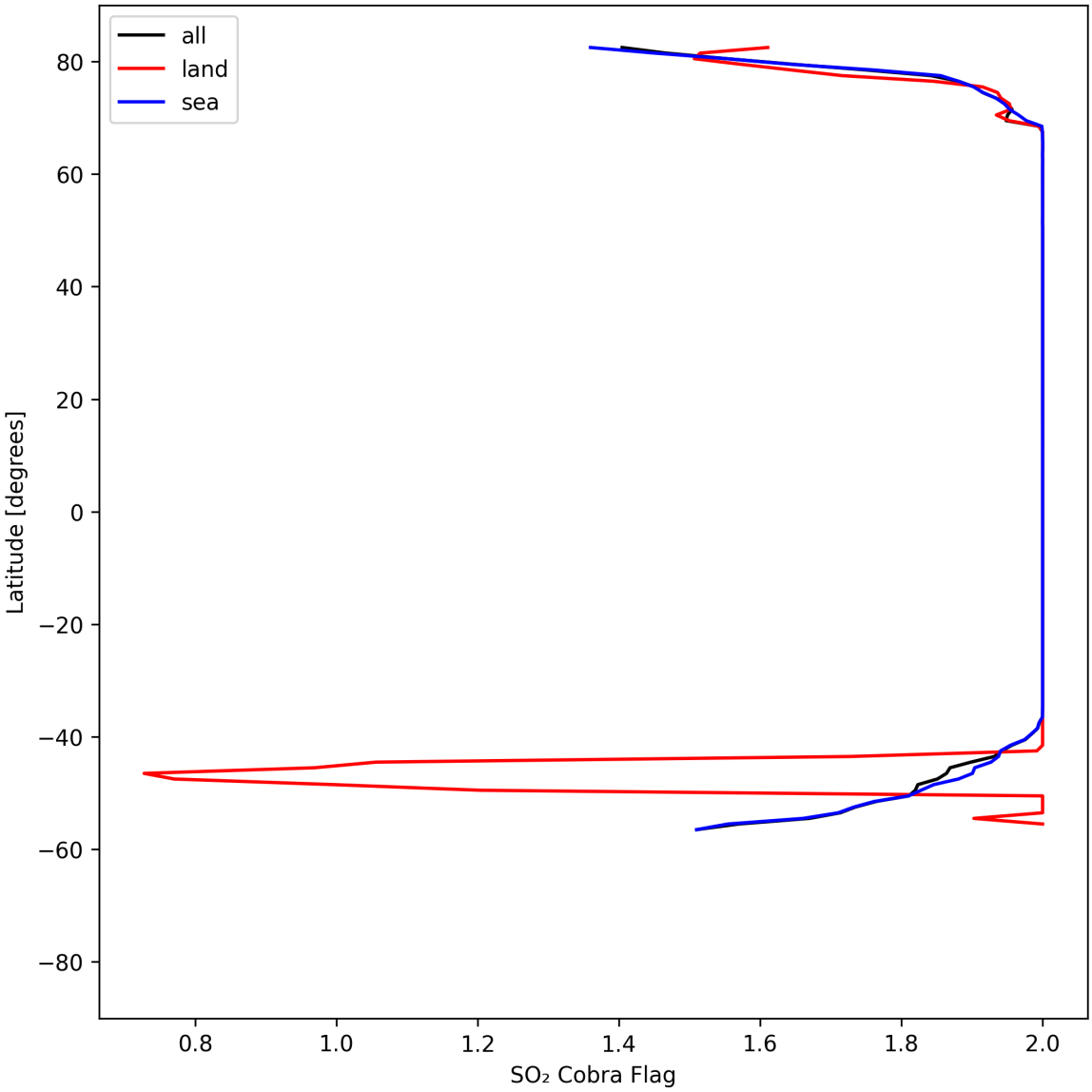

Figure 48: Zonal average of "SO_2 Cobra Flag" for 2025-04-23 to 2025-04-24.

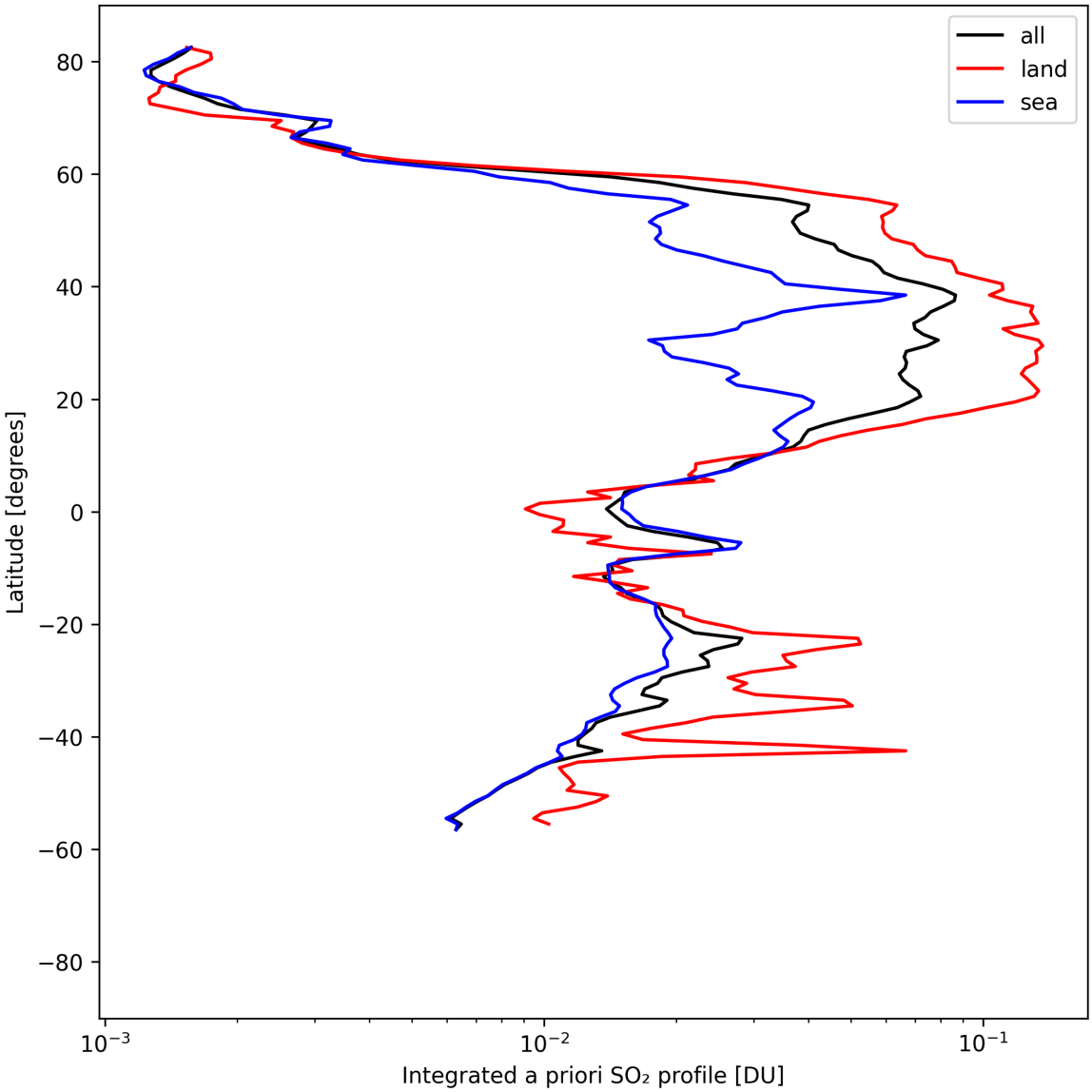

Figure 49: Zonal average of “Integrated a priori SO_2 profile” for 2025-04-23 to 2025-04-24.

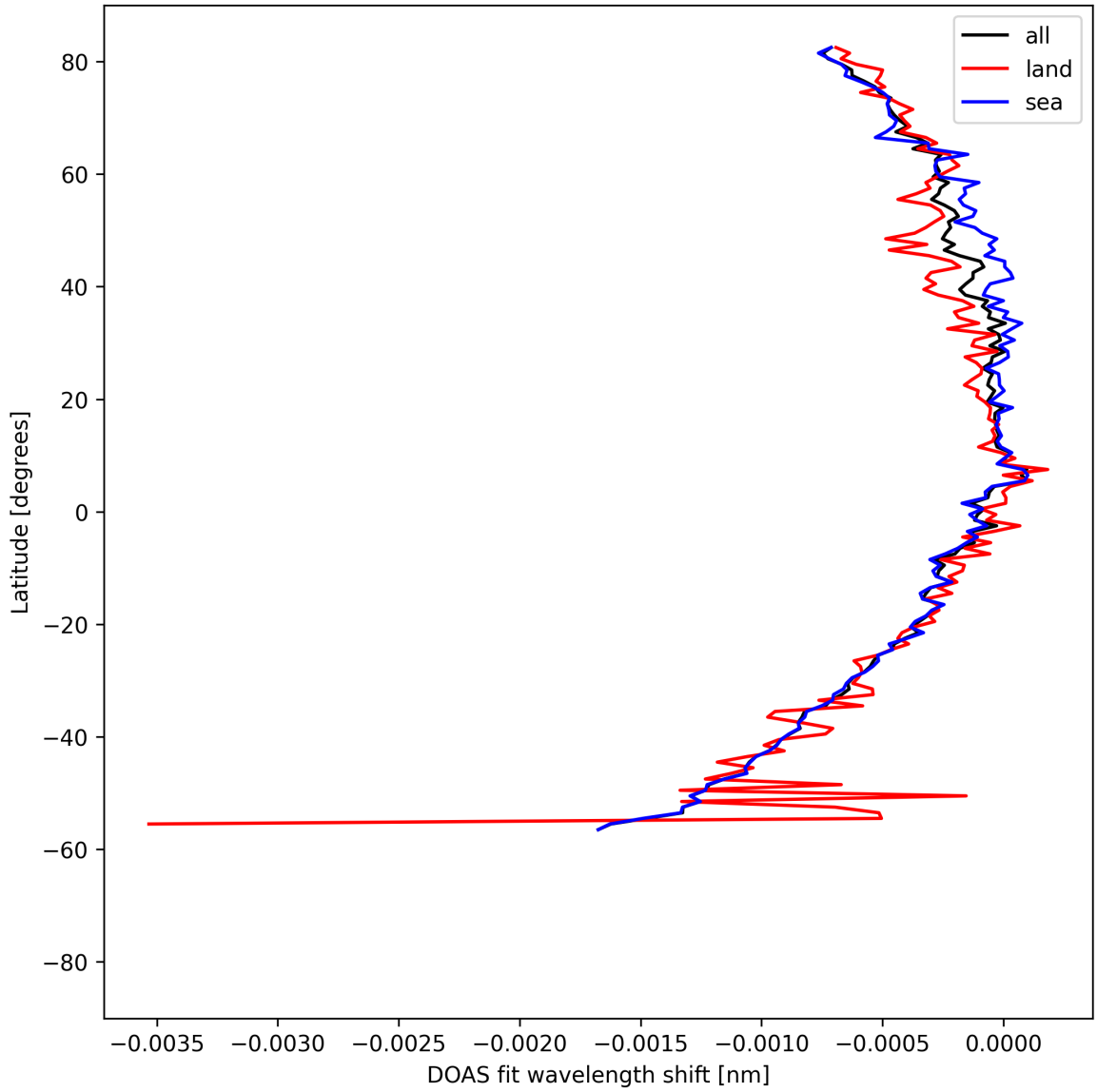

Figure 50: Zonal average of “DOAS fit wavelength shift” for 2025-04-23 to 2025-04-24.

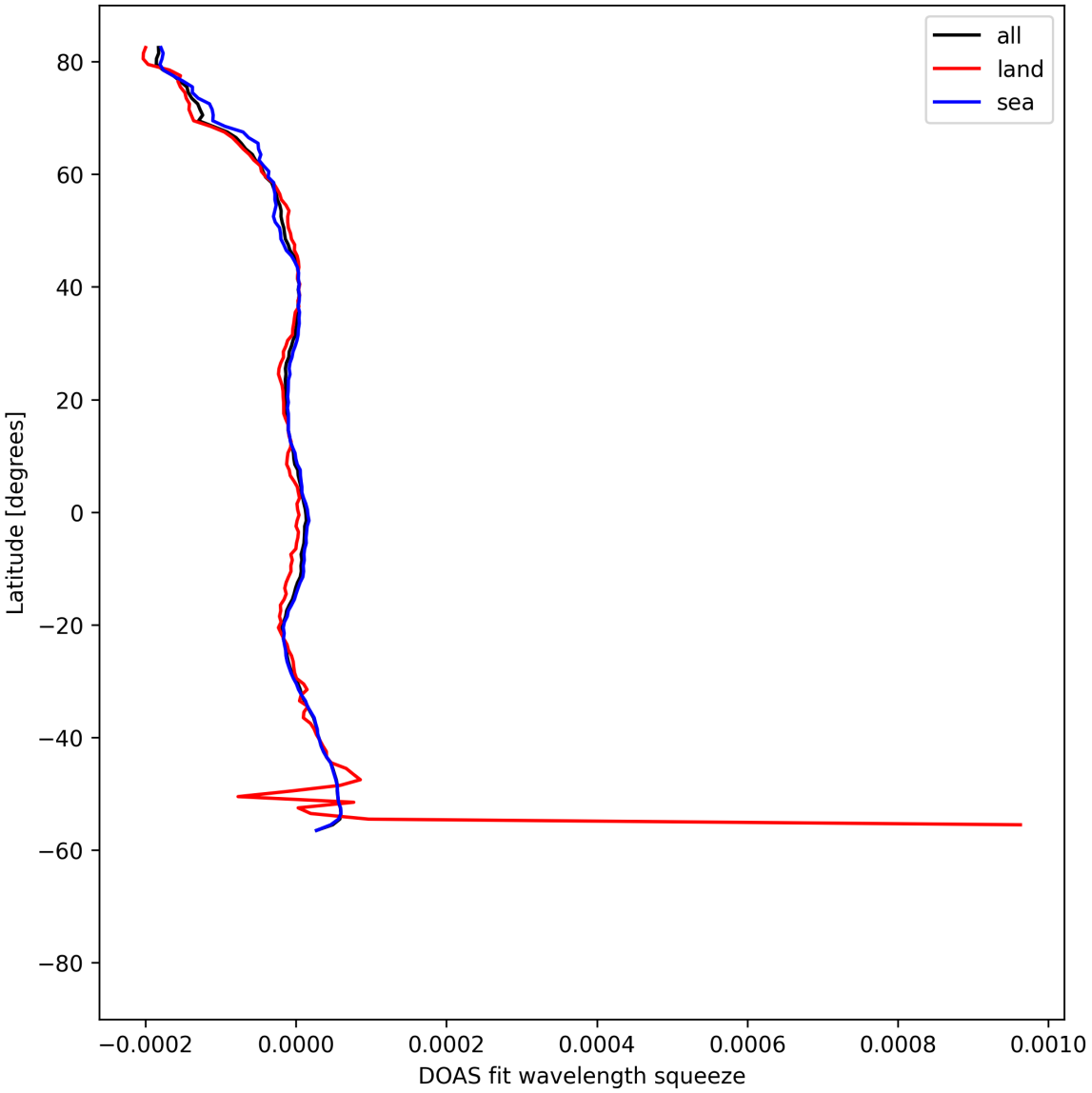

Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-04-23 to 2025-04-24.

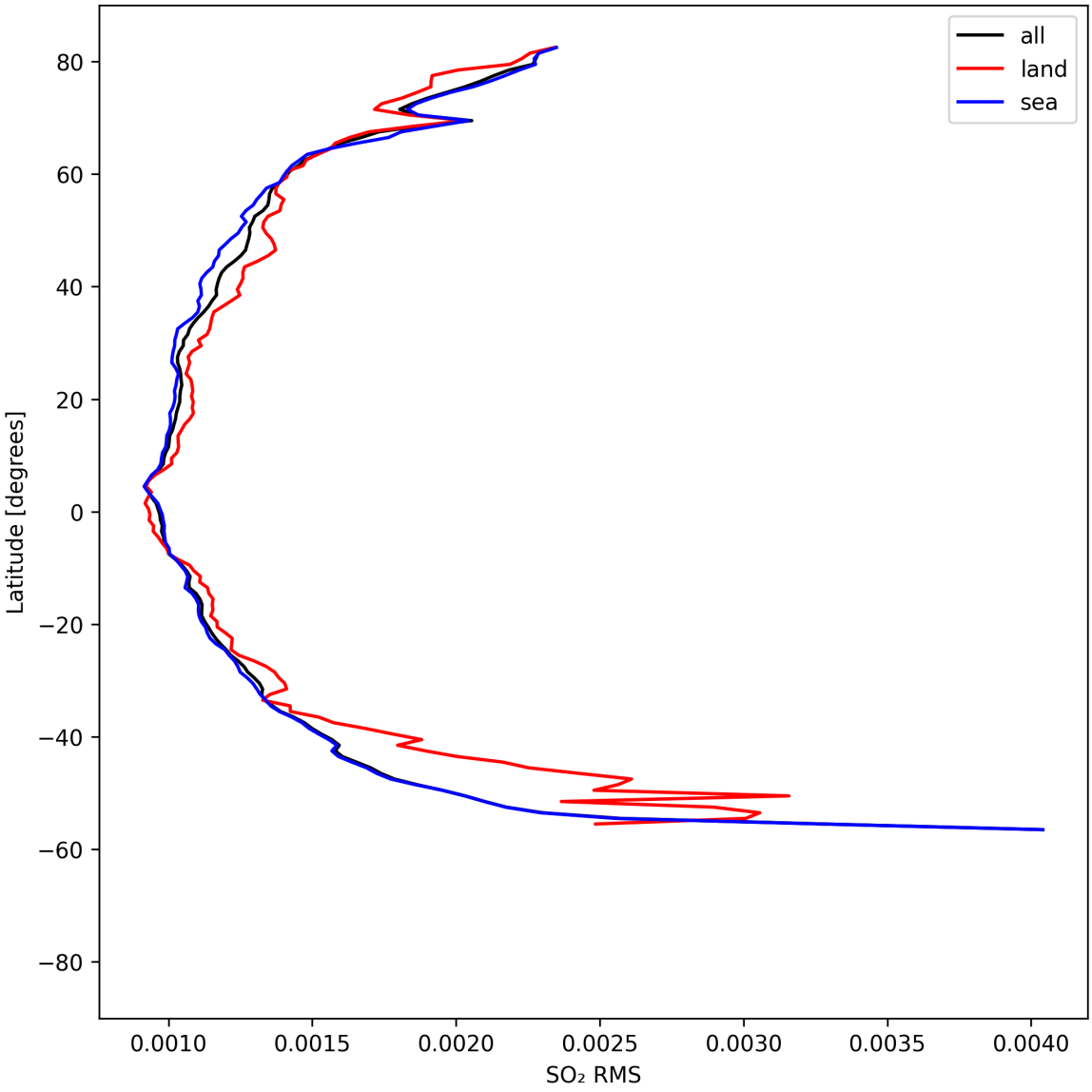

Figure 52: Zonal average of "SO_2 RMS" for 2025-04-23 to 2025-04-24.

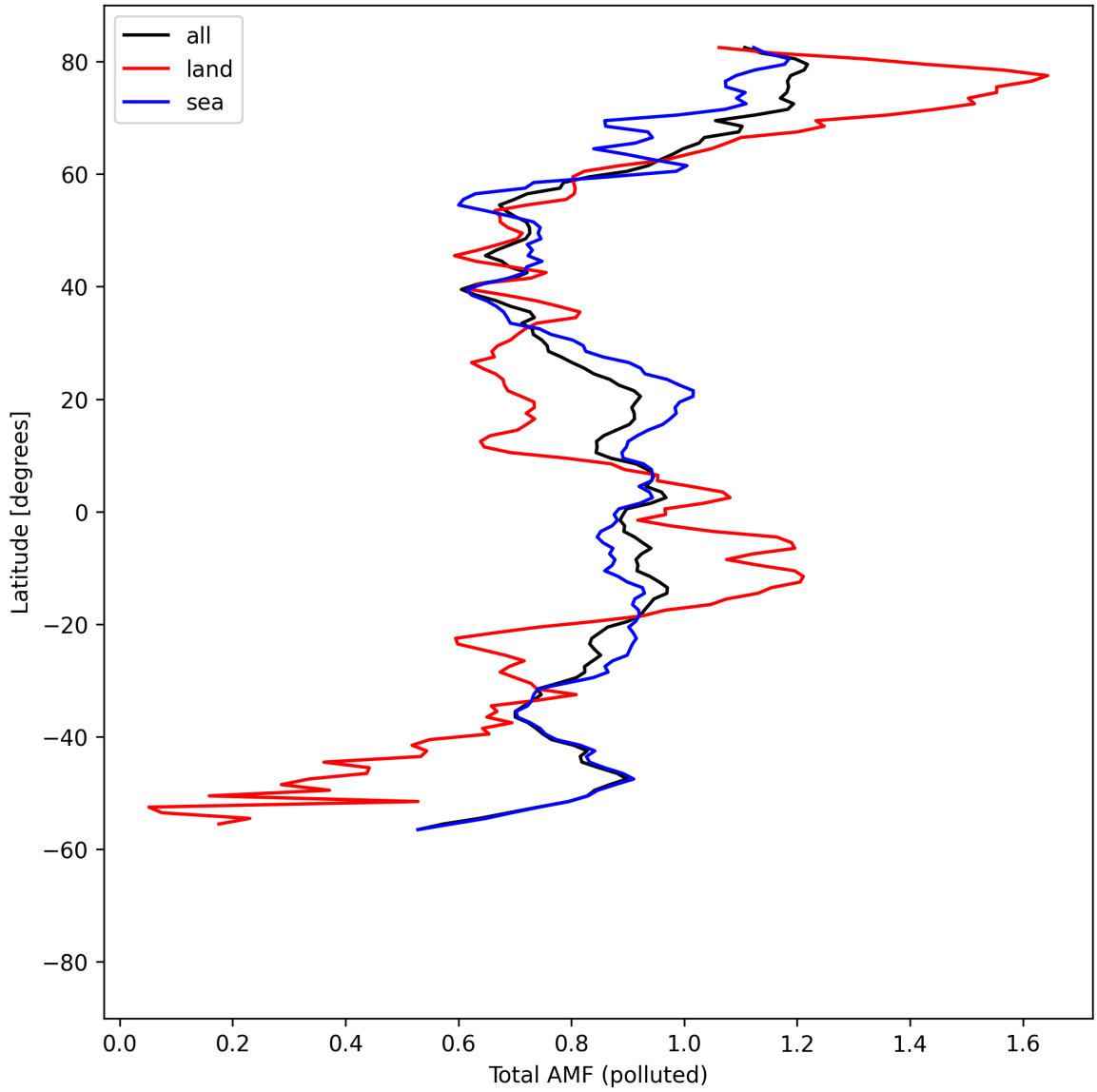

Figure 53: Zonal average of “Total AMF (polluted)” for 2025-04-23 to 2025-04-24.

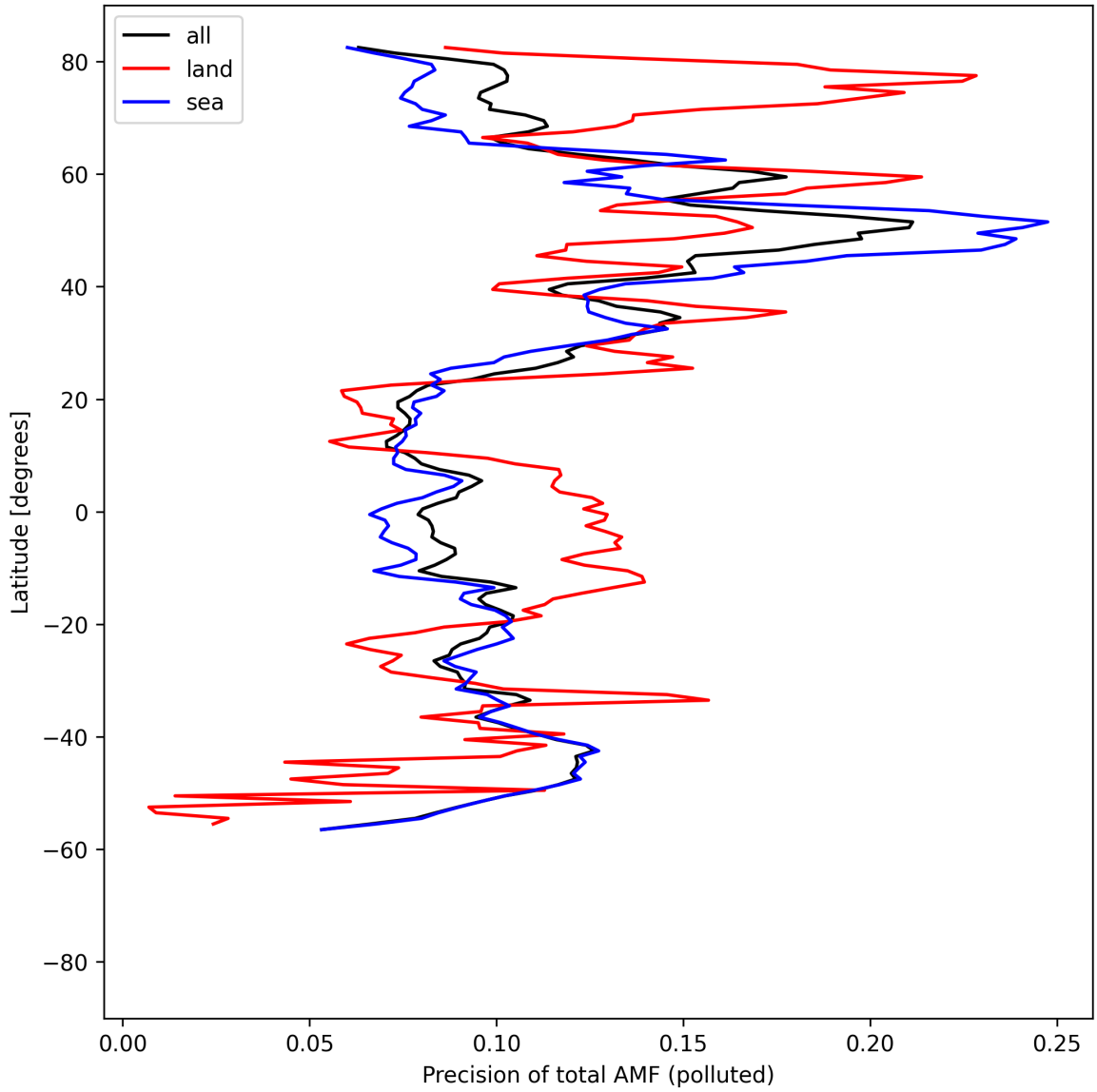

Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-04-23 to 2025-04-24.

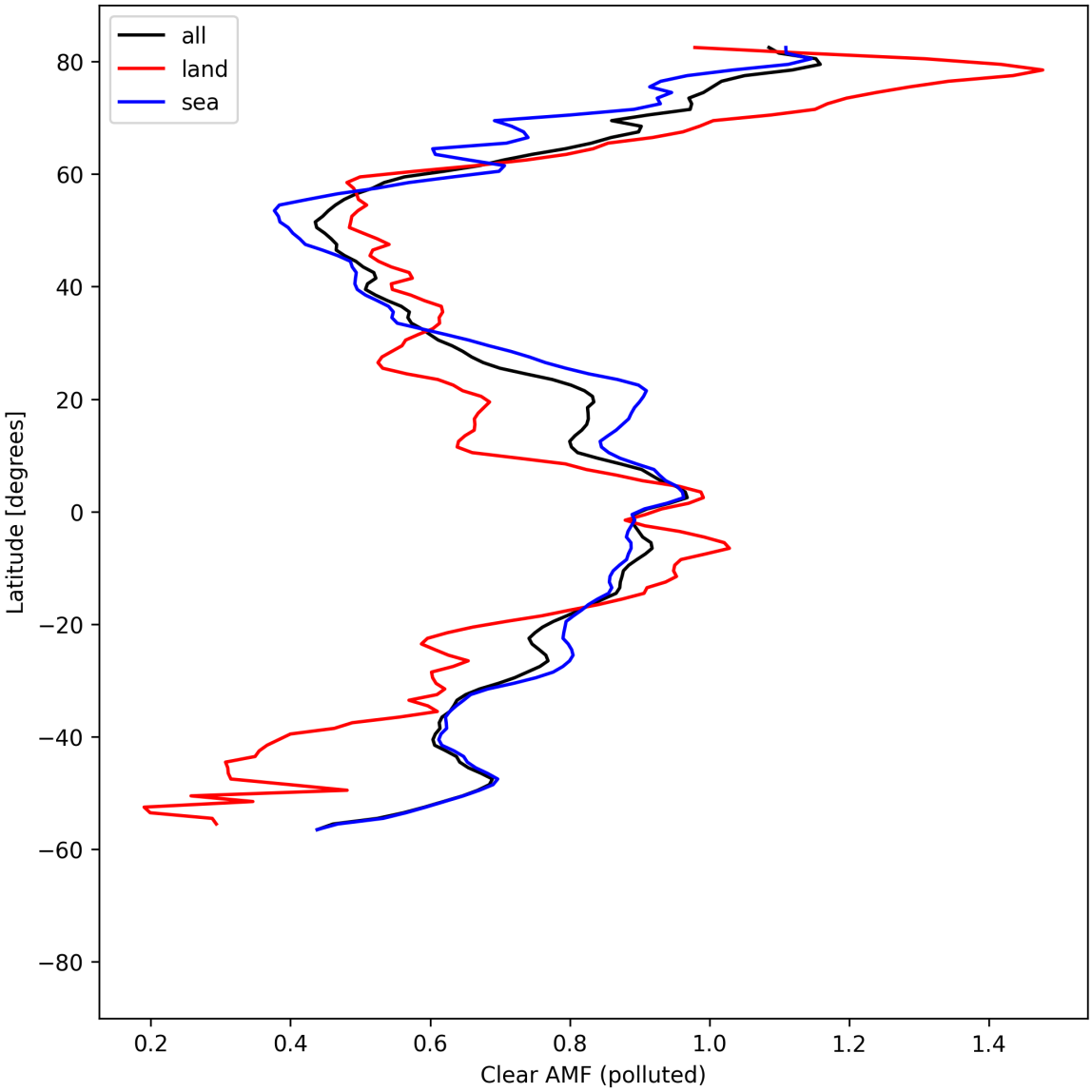

Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-04-23 to 2025-04-24.

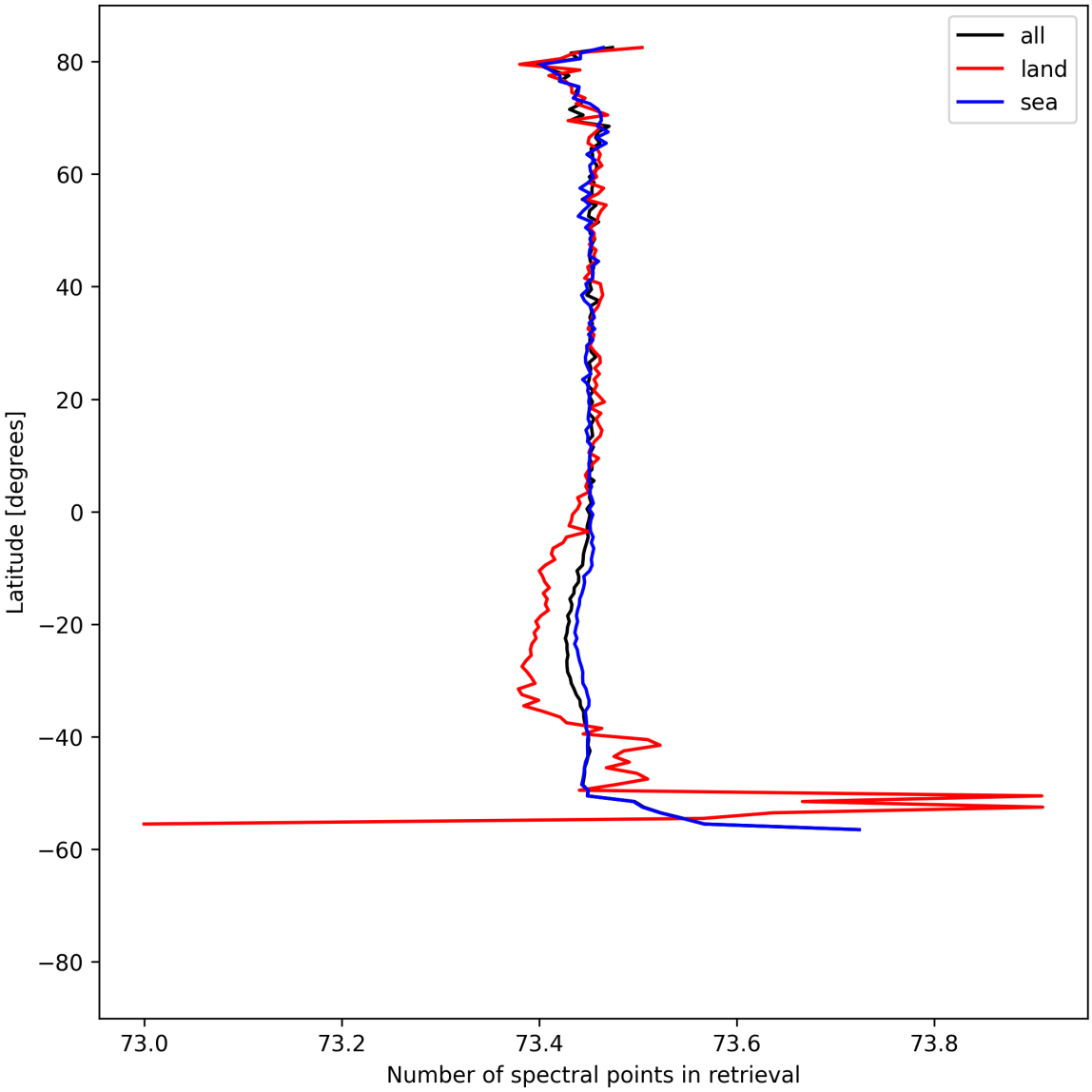

Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-04-23 to 2025-04-24.

8 Histograms

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

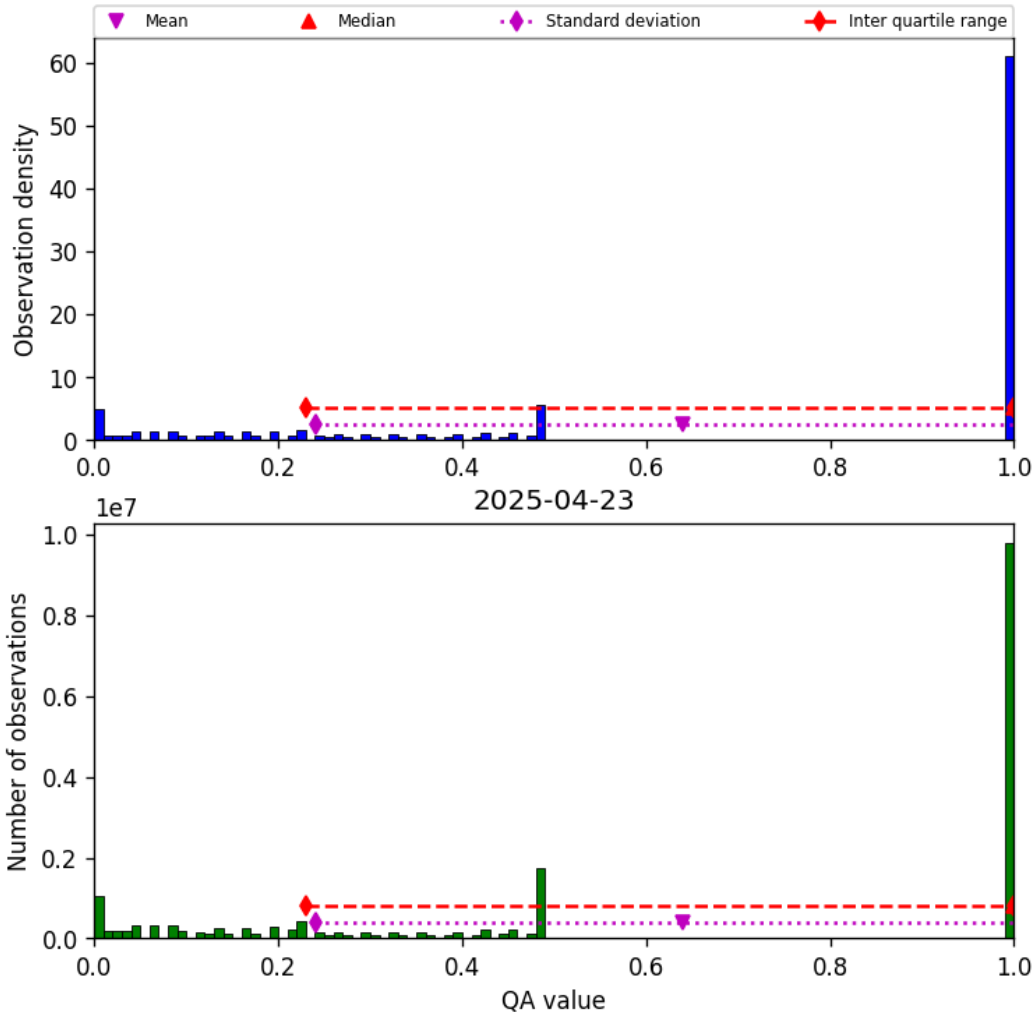

Figure 57: Histogram of “QA value” for 2025-04-23 to 2025-04-24

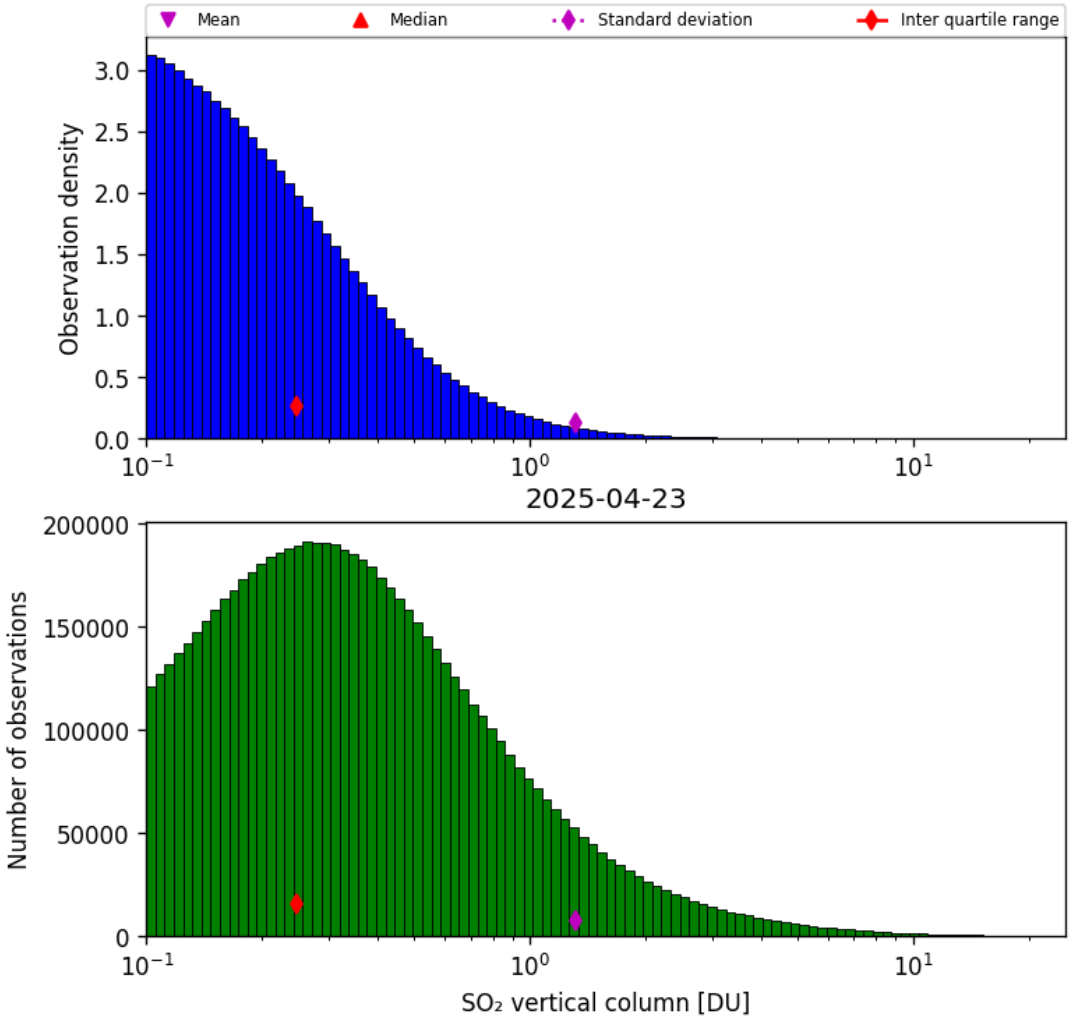

Figure 58: Histogram of "SO_2 vertical column" for 2025-04-23 to 2025-04-24

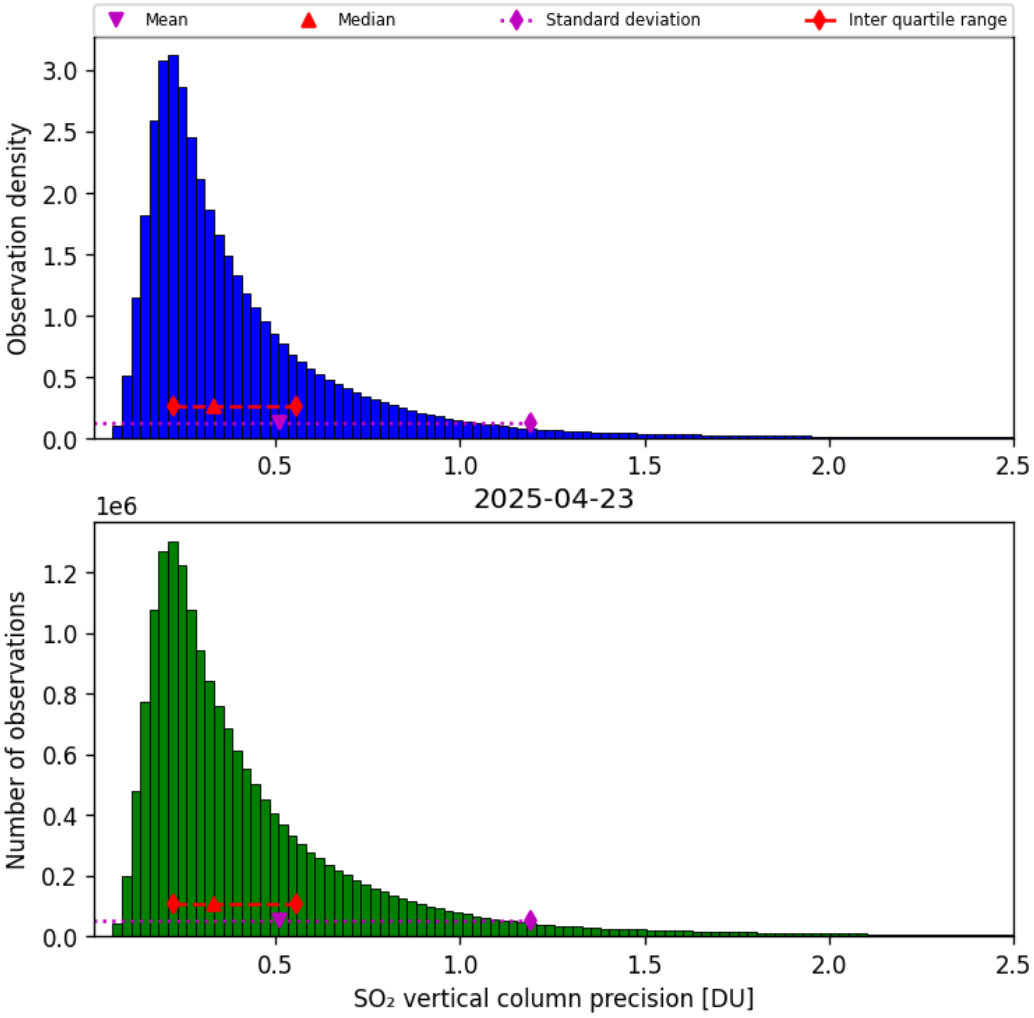

Figure 59: Histogram of "SO_2 vertical column precision" for 2025-04-23 to 2025-04-24

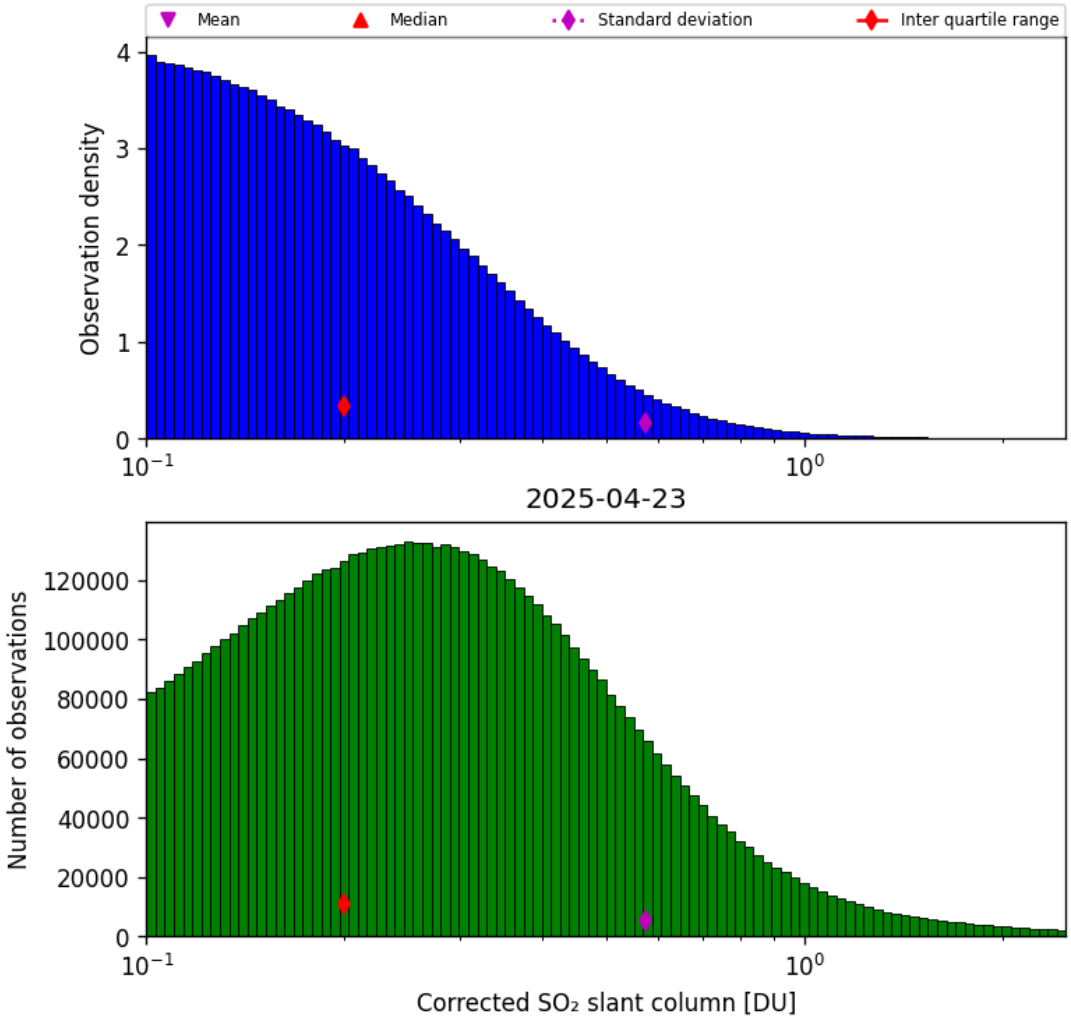

Figure 60: Histogram of "Corrected SO_2 slant column" for 2025-04-23 to 2025-04-24

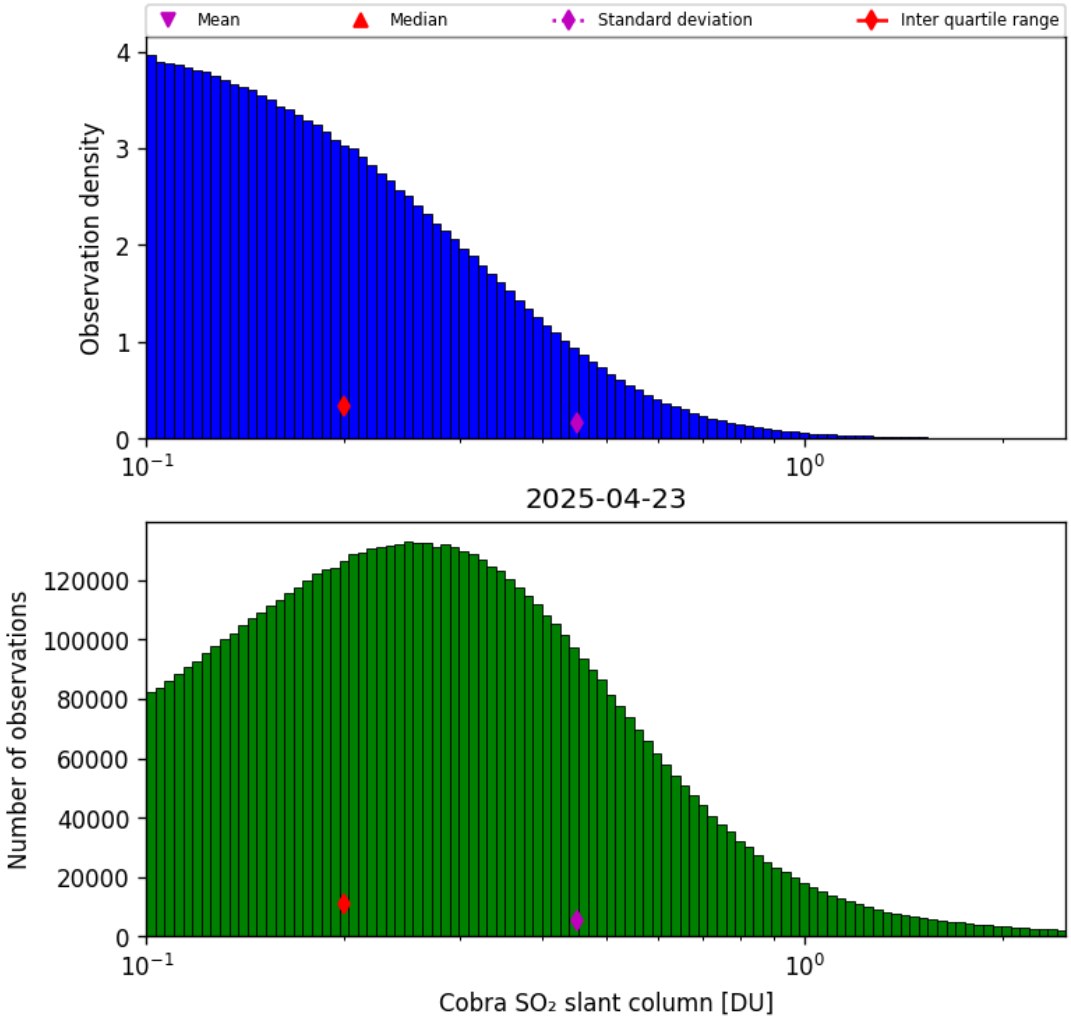

Figure 61: Histogram of "Cobra SO_2 slant column" for 2025-04-23 to 2025-04-24

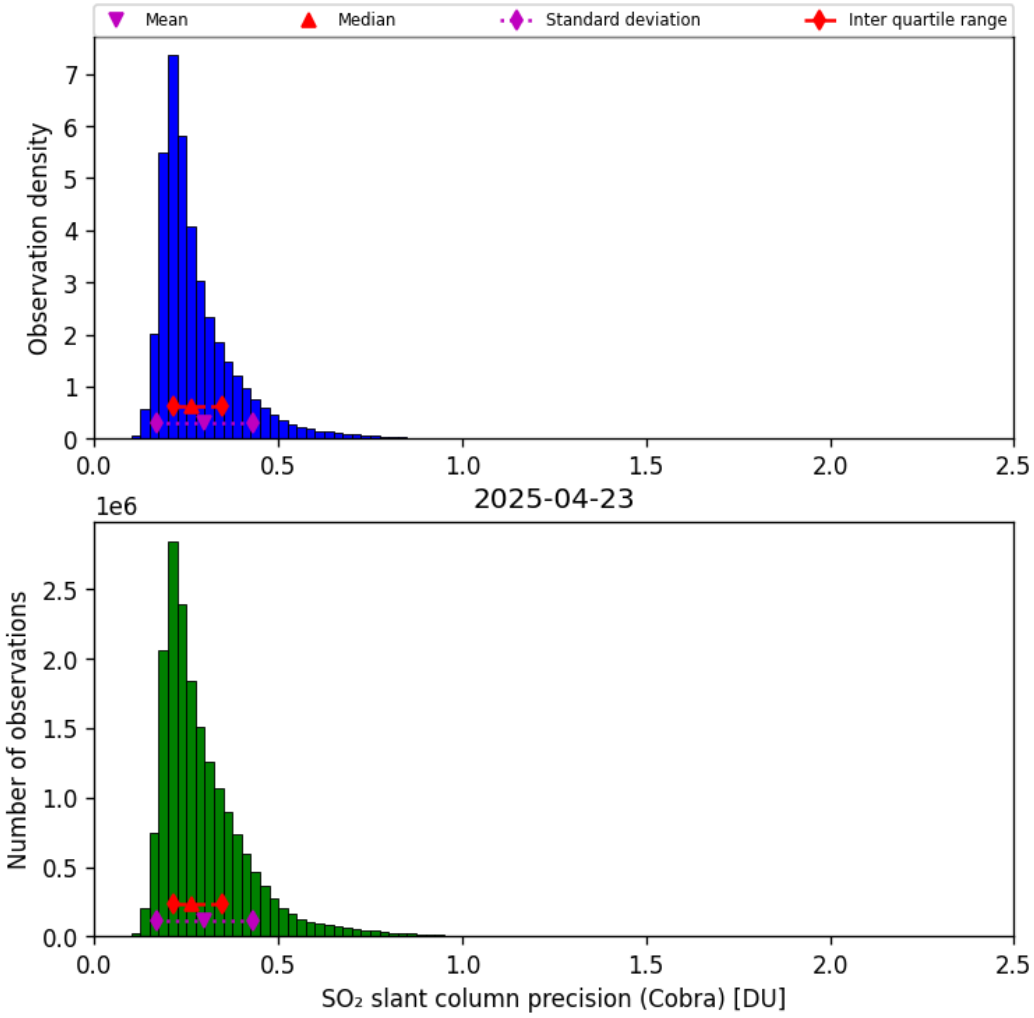

Figure 62: Histogram of "SO_2 slant column precision (Cobra)" for 2025-04-23 to 2025-04-24

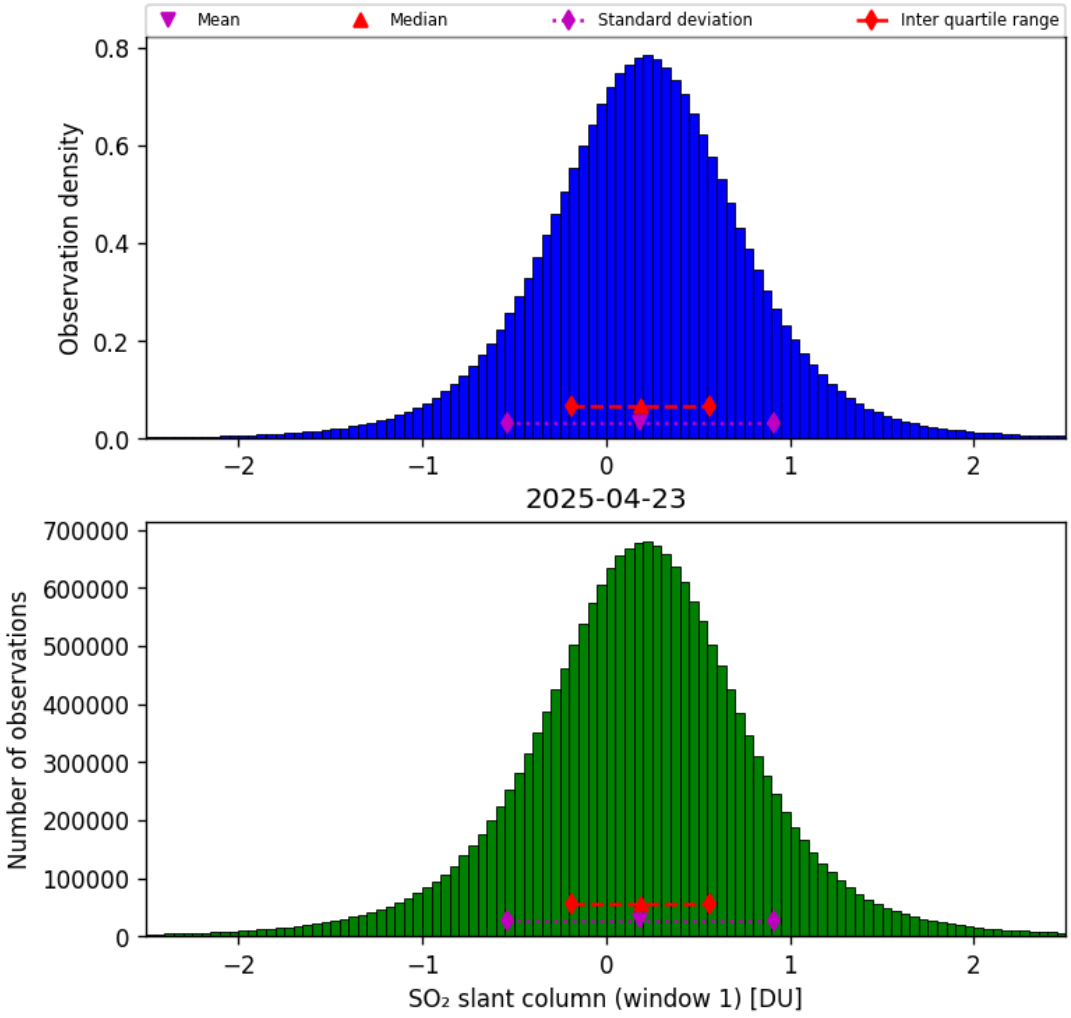

Figure 63: Histogram of "SO_2 slant column (window 1)" for 2025-04-23 to 2025-04-24

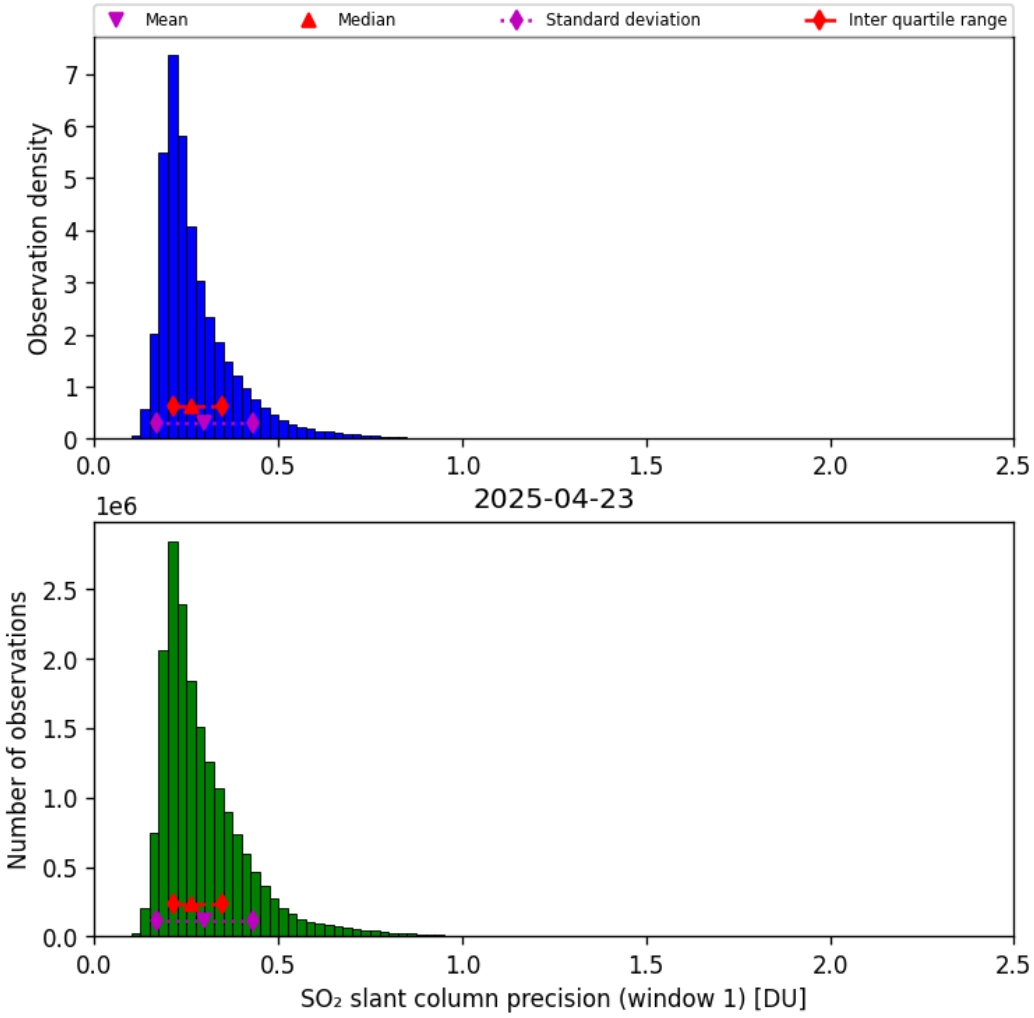

Figure 64: Histogram of "SO_2 slant column precision (window 1)" for 2025-04-23 to 2025-04-24

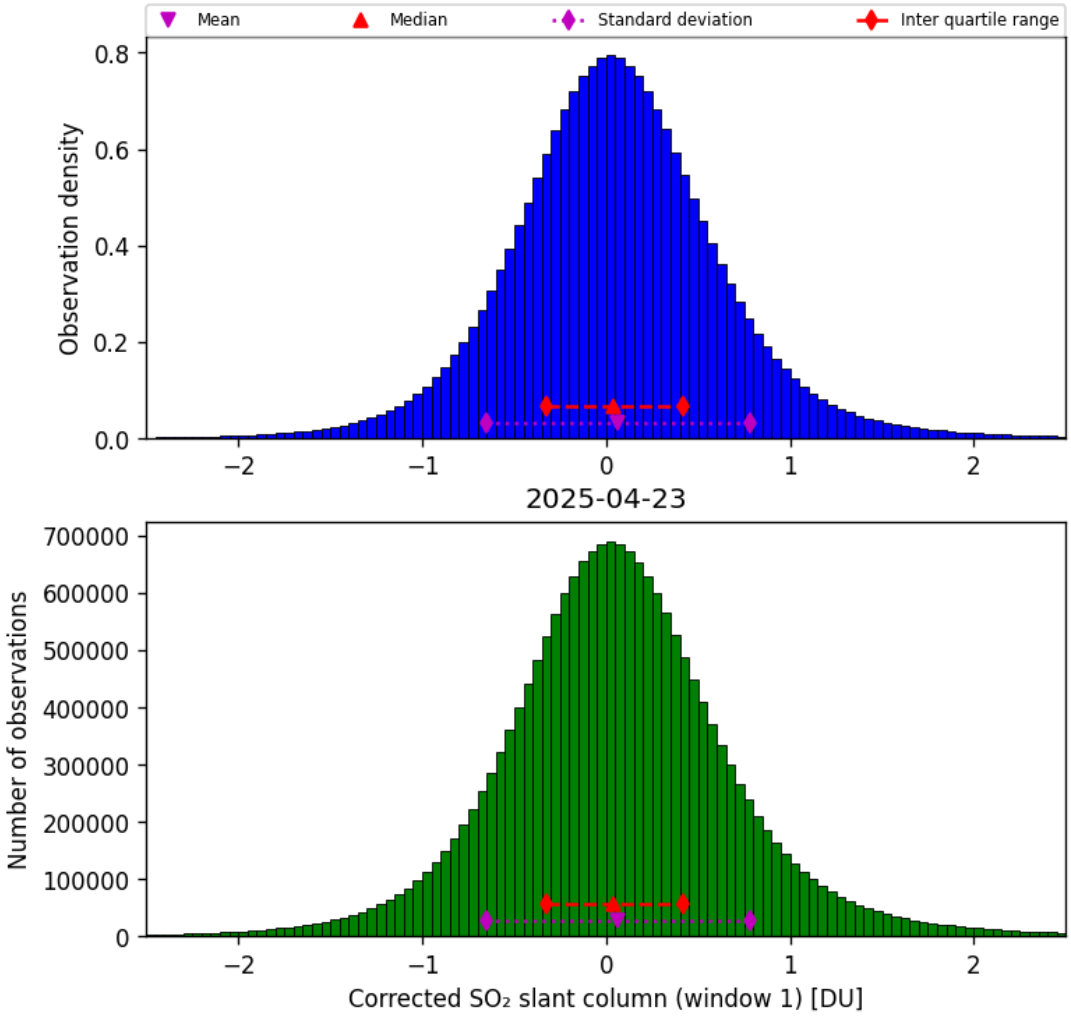

Figure 65: Histogram of "Corrected SO_2 slant column (window 1)" for 2025-04-23 to 2025-04-24

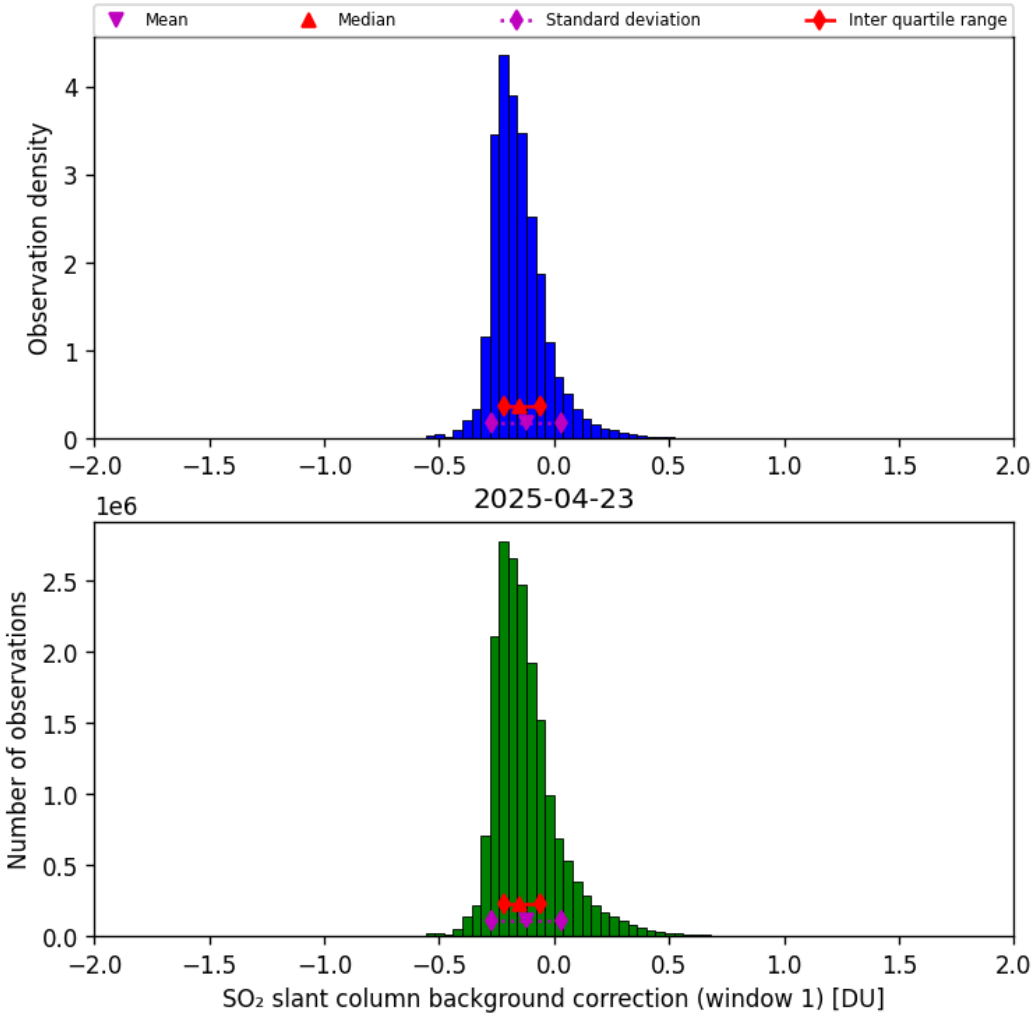

Figure 66: Histogram of "SO_2 slant column background correction (window 1)" for 2025-04-23 to 2025-04-24

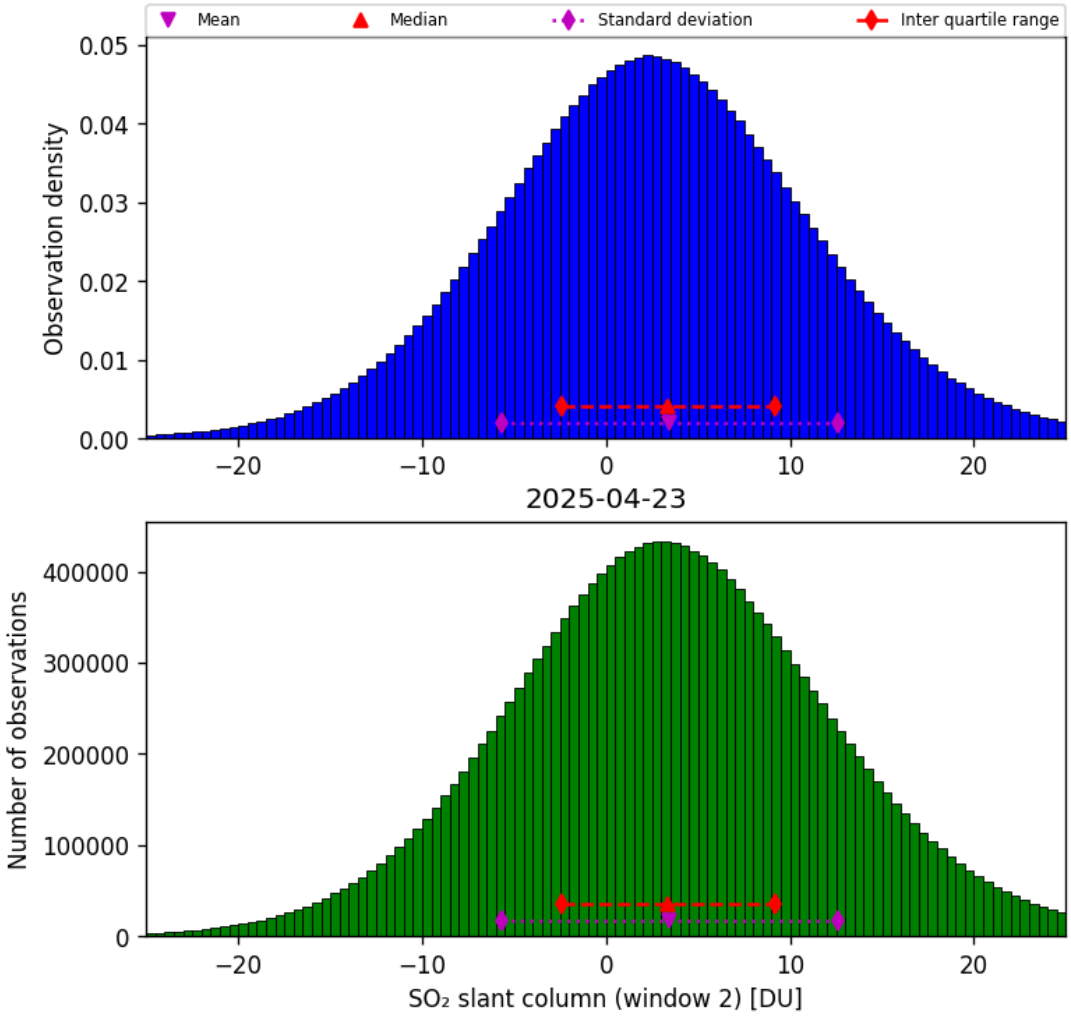

Figure 67: Histogram of "SO_2 slant column (window 2)" for 2025-04-23 to 2025-04-24

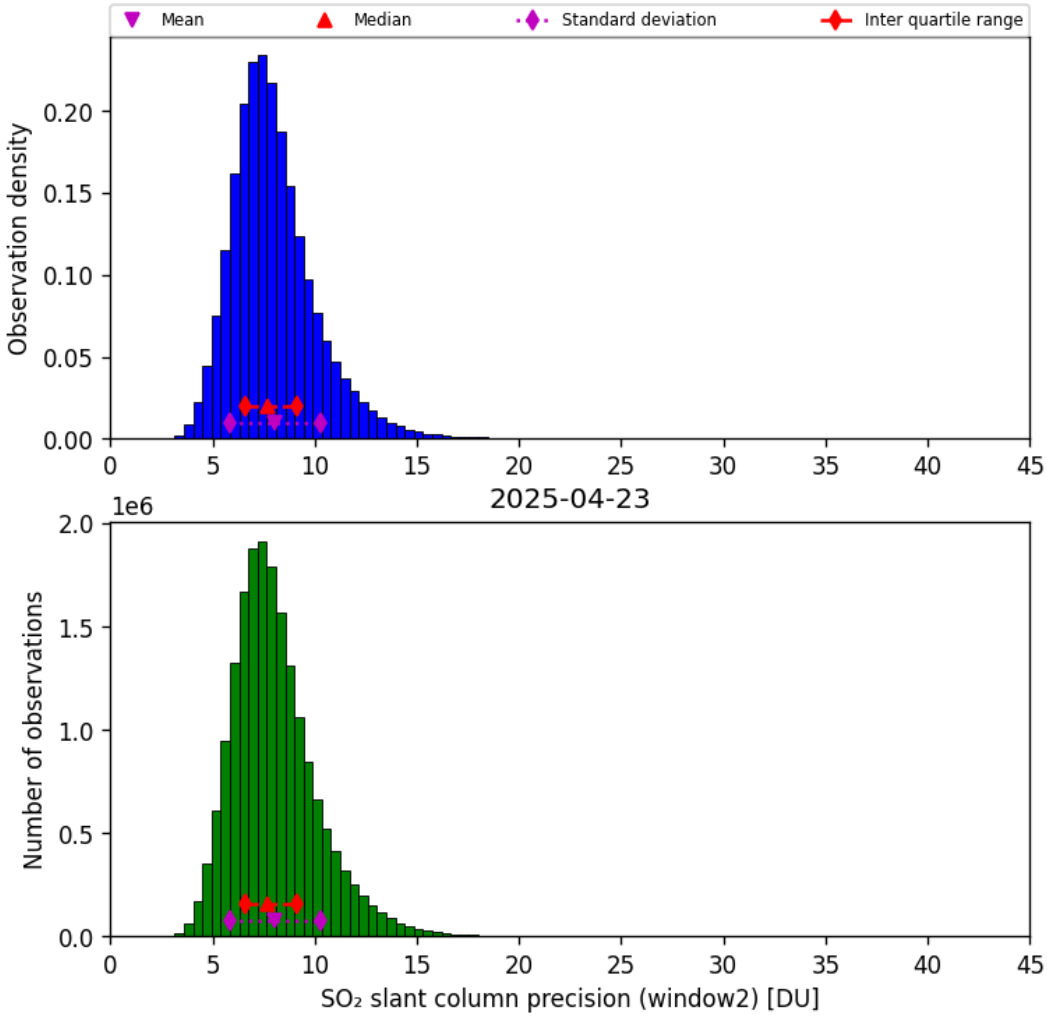

Figure 68: Histogram of "SO_2 slant column precision (window2)" for 2025-04-23 to 2025-04-24

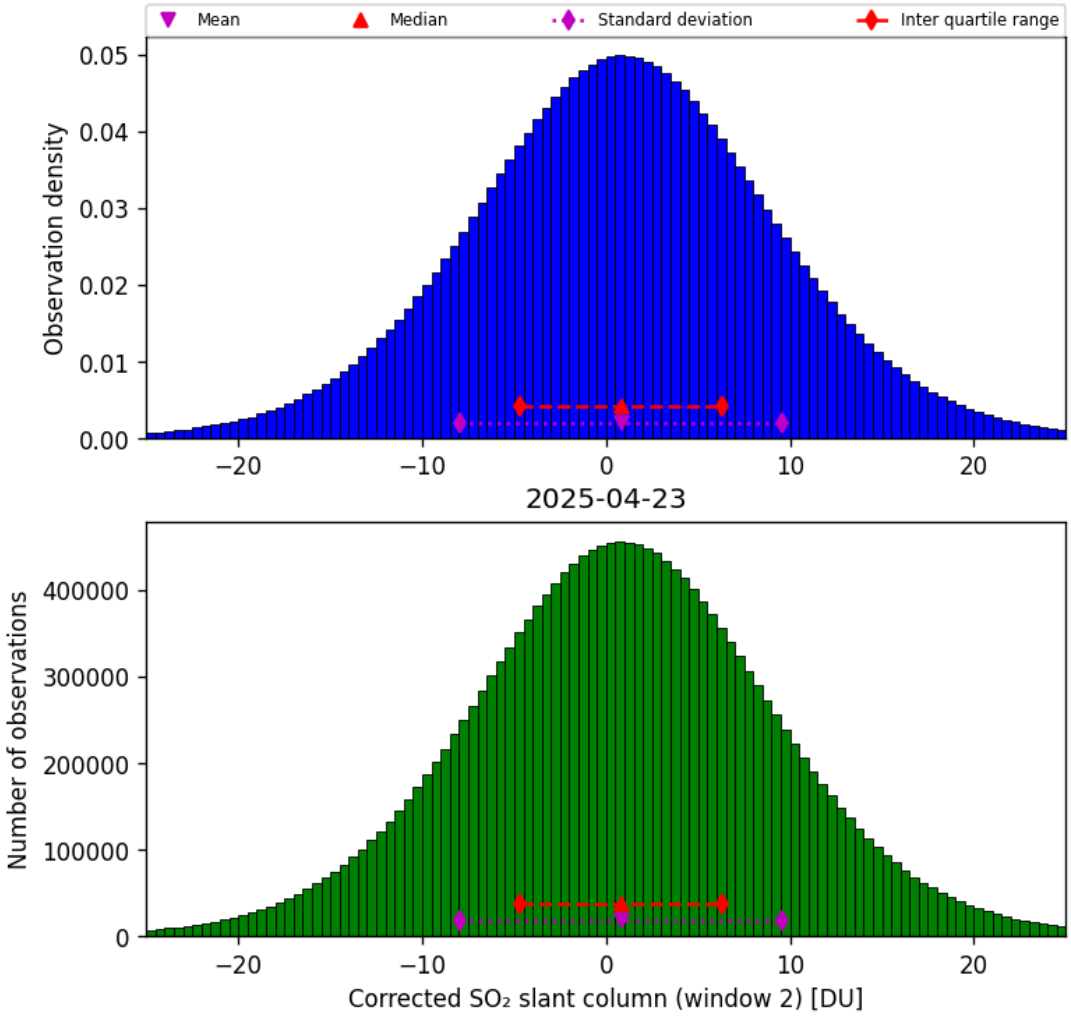

Figure 69: Histogram of "Corrected SO_2 slant column (window 2)" for 2025-04-23 to 2025-04-24

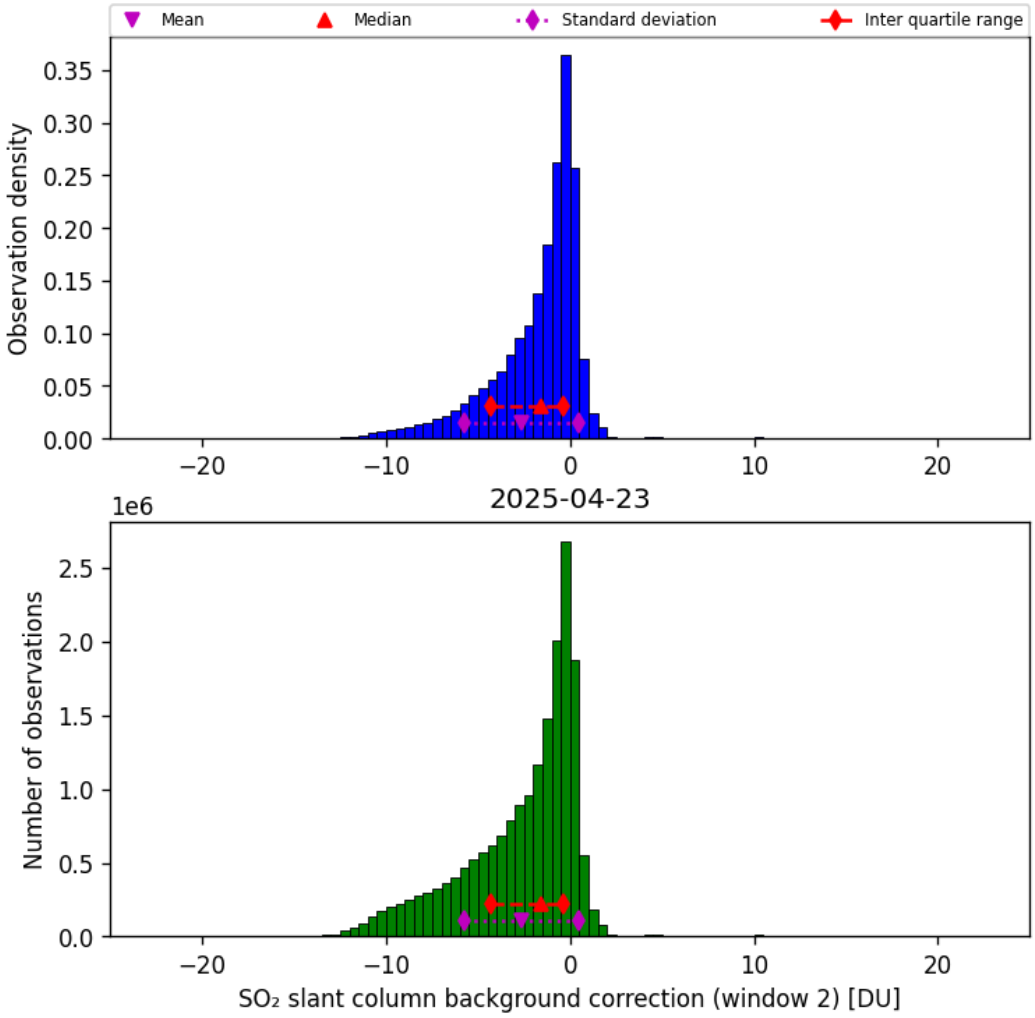

Figure 70: Histogram of "SO_2 slant column background correction (window 2)" for 2025-04-23 to 2025-04-24

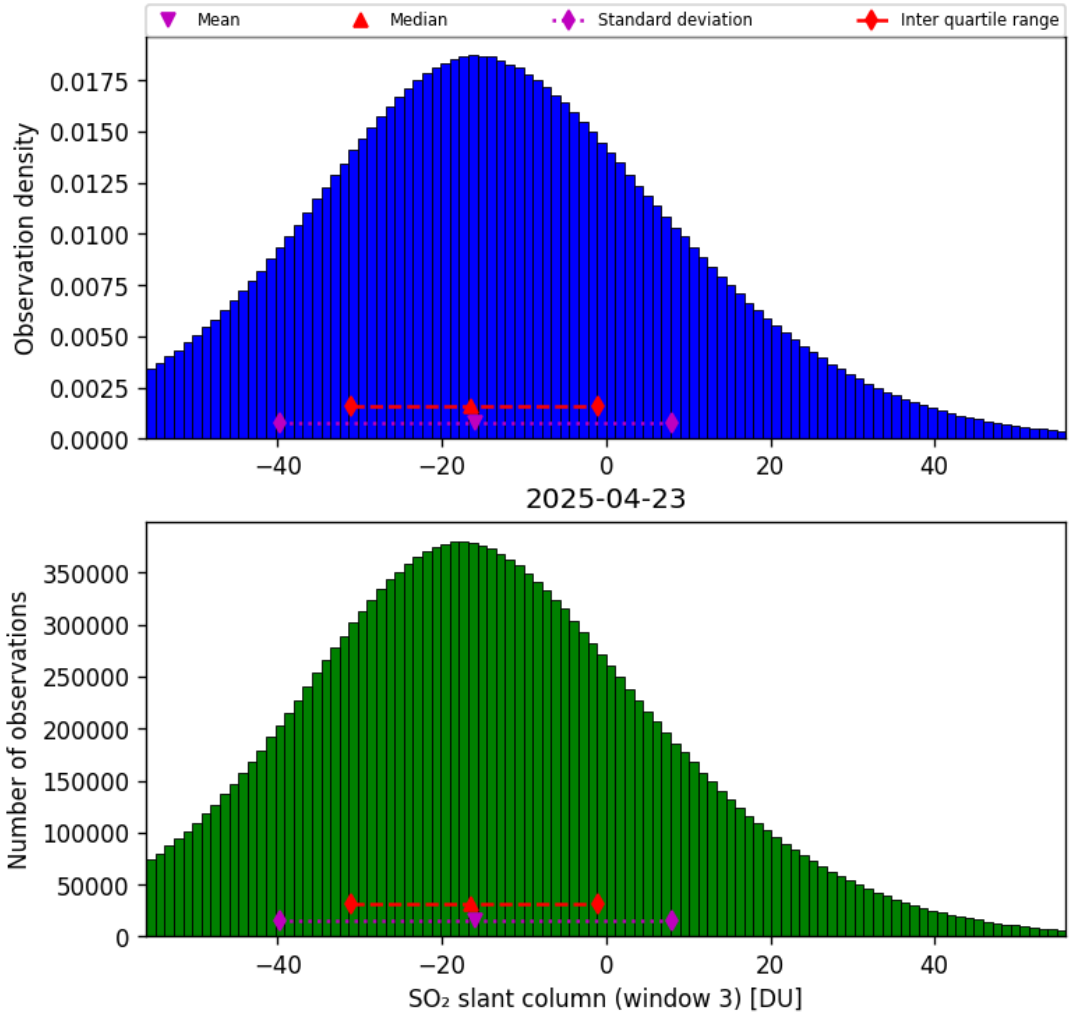

Figure 71: Histogram of "SO_2 slant column (window 3)" for 2025-04-23 to 2025-04-24

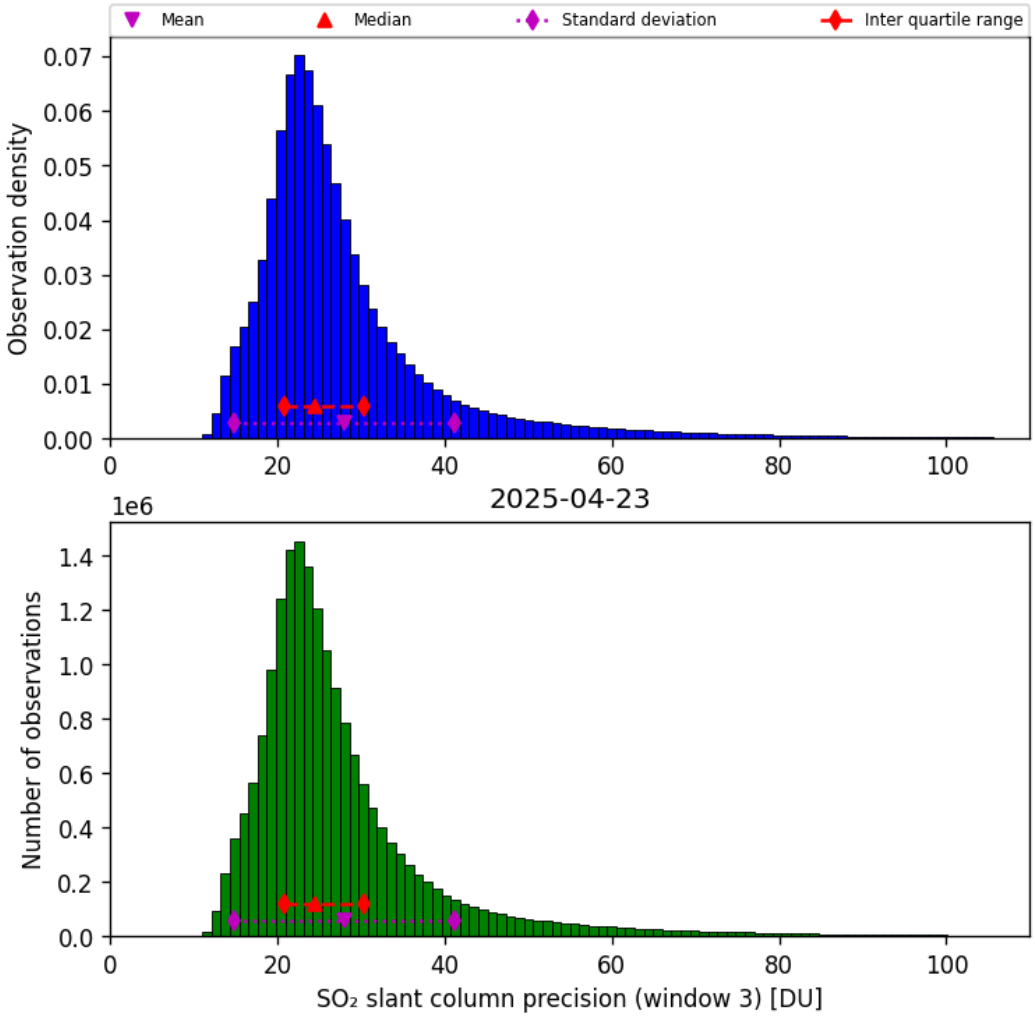

Figure 72: Histogram of "SO_2 slant column precision (window 3)" for 2025-04-23 to 2025-04-24

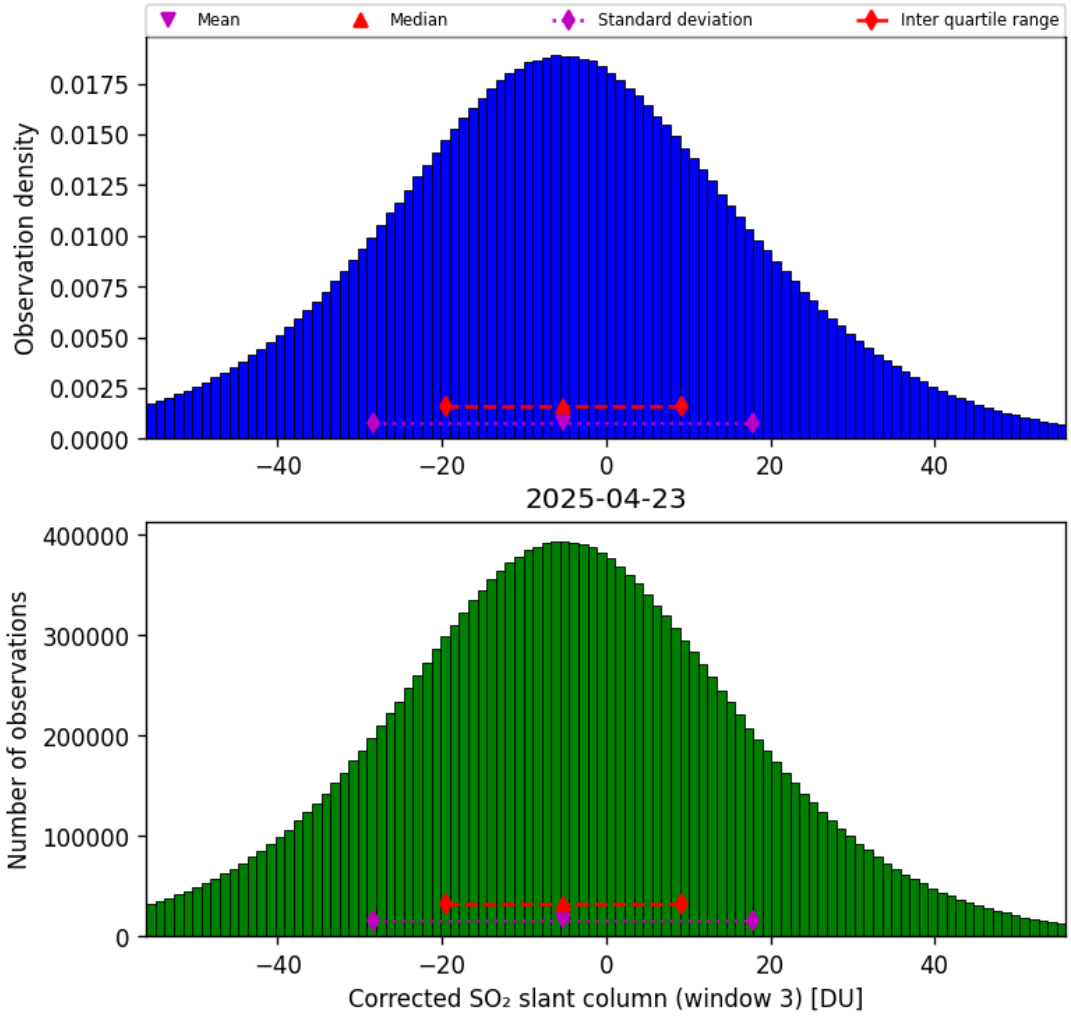

Figure 73: Histogram of "Corrected SO_2 slant column (window 3)" for 2025-04-23 to 2025-04-24

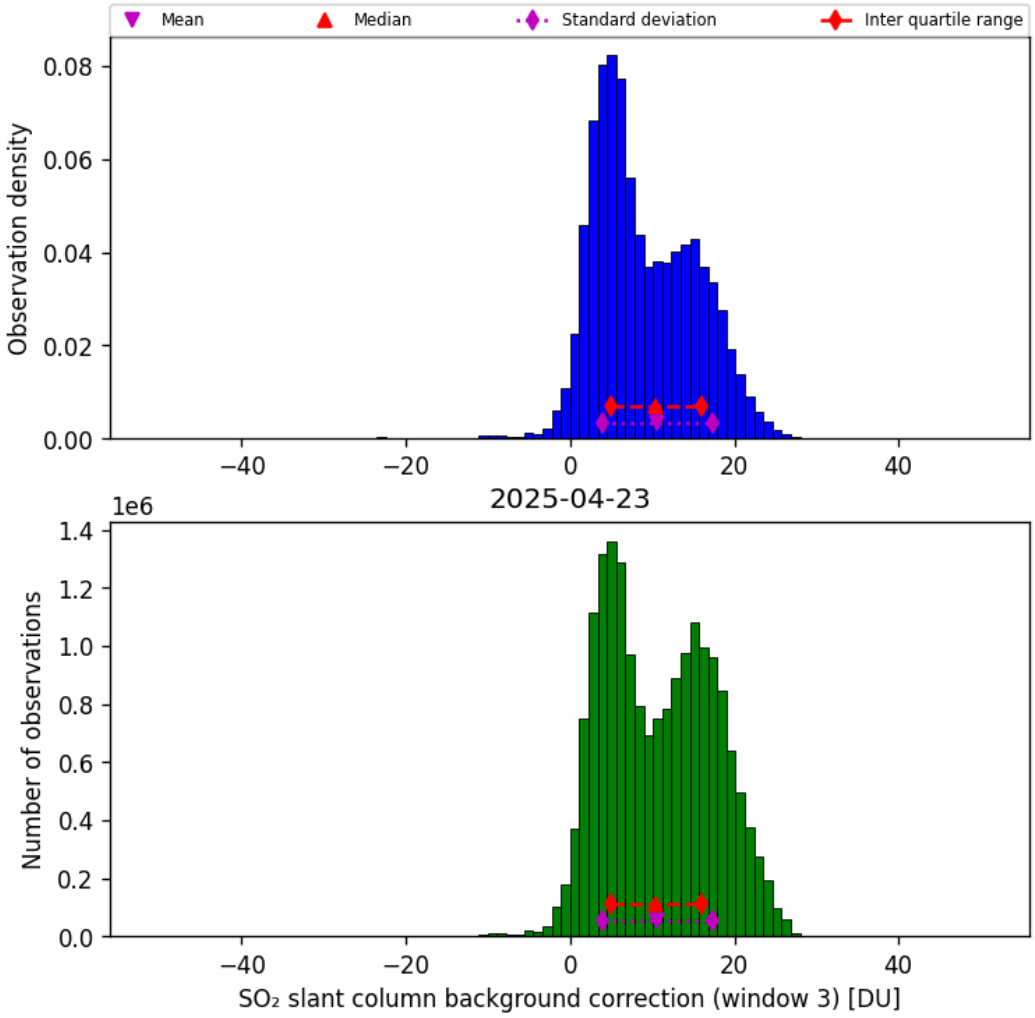

Figure 74: Histogram of "SO_2 slant column background correction (window 3)" for 2025-04-23 to 2025-04-24

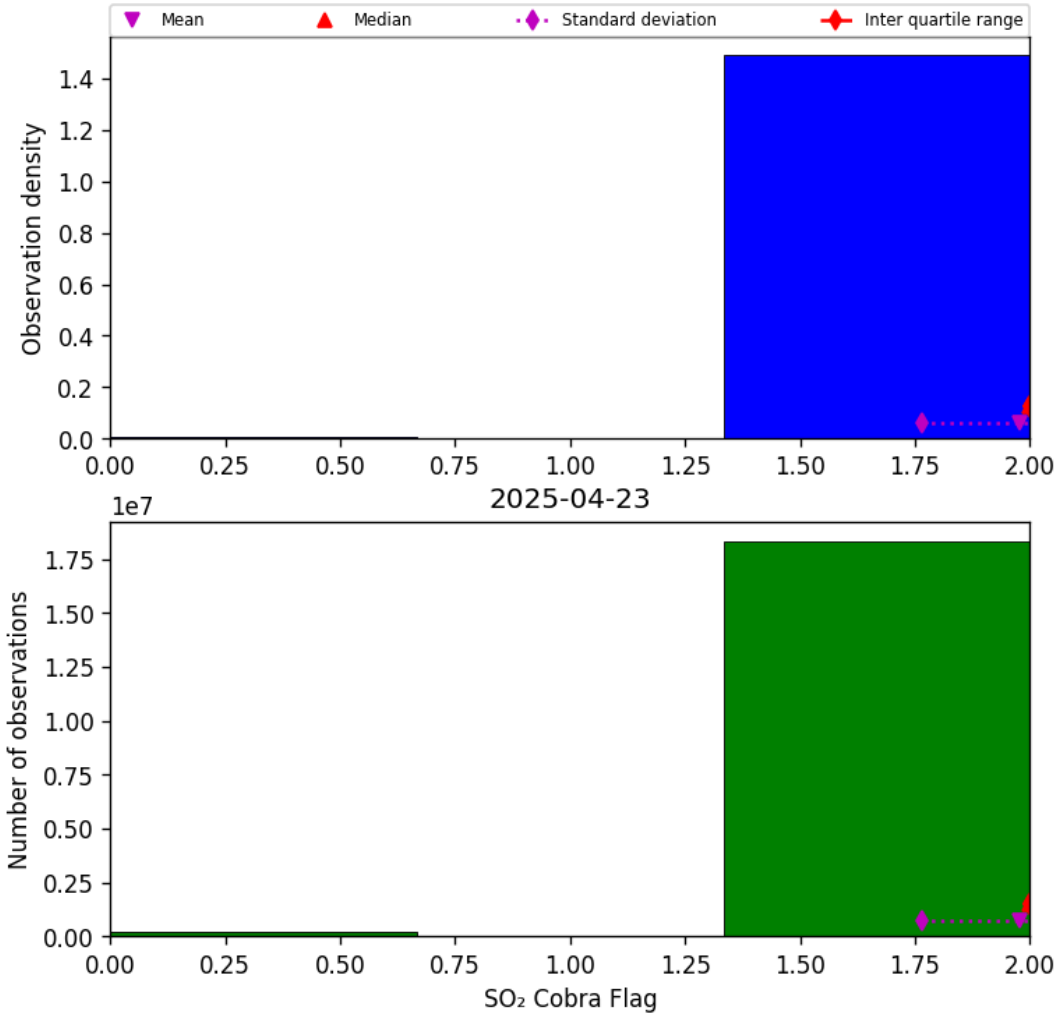

Figure 75: Histogram of "SO_2 Cobra Flag" for 2025-04-23 to 2025-04-24

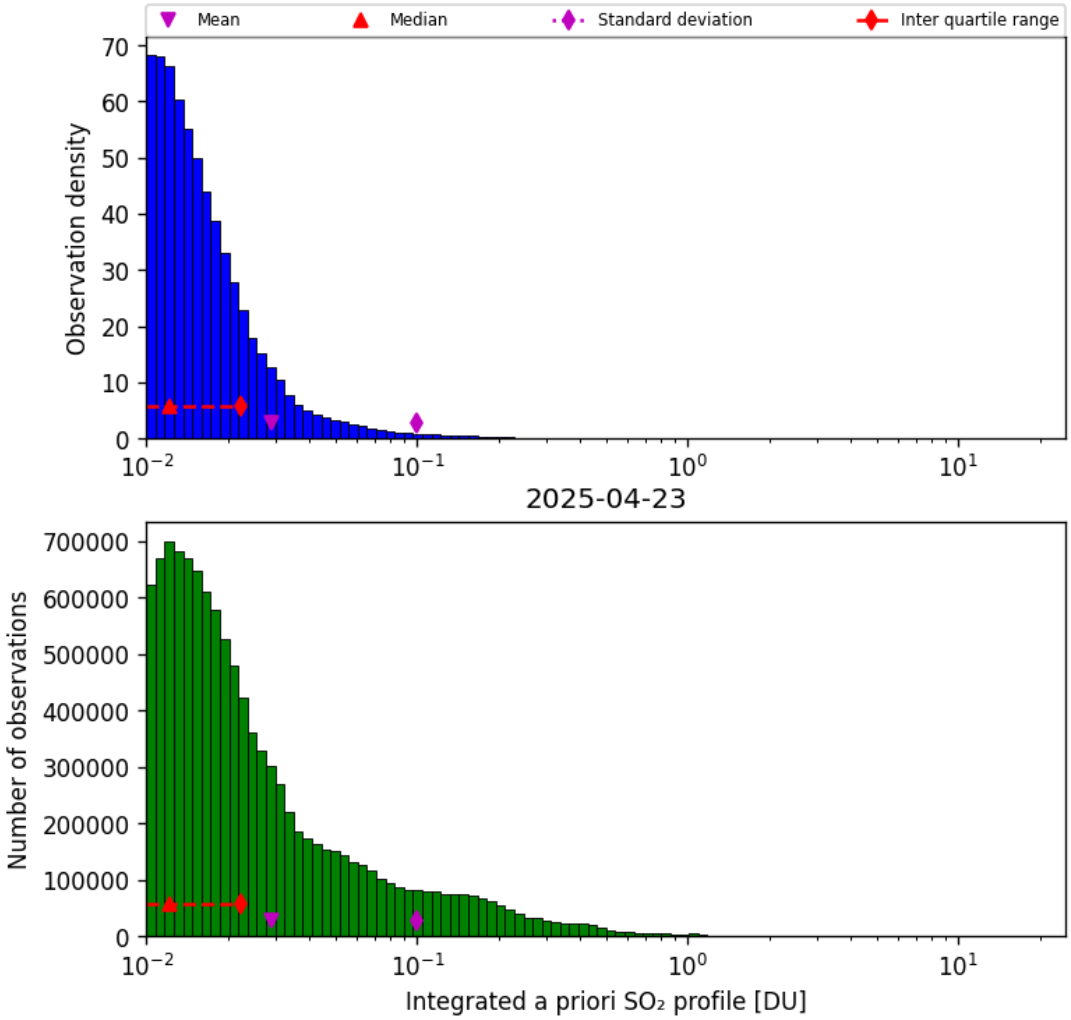

Figure 76: Histogram of "Integrated a priori SO_2 profile" for 2025-04-23 to 2025-04-24

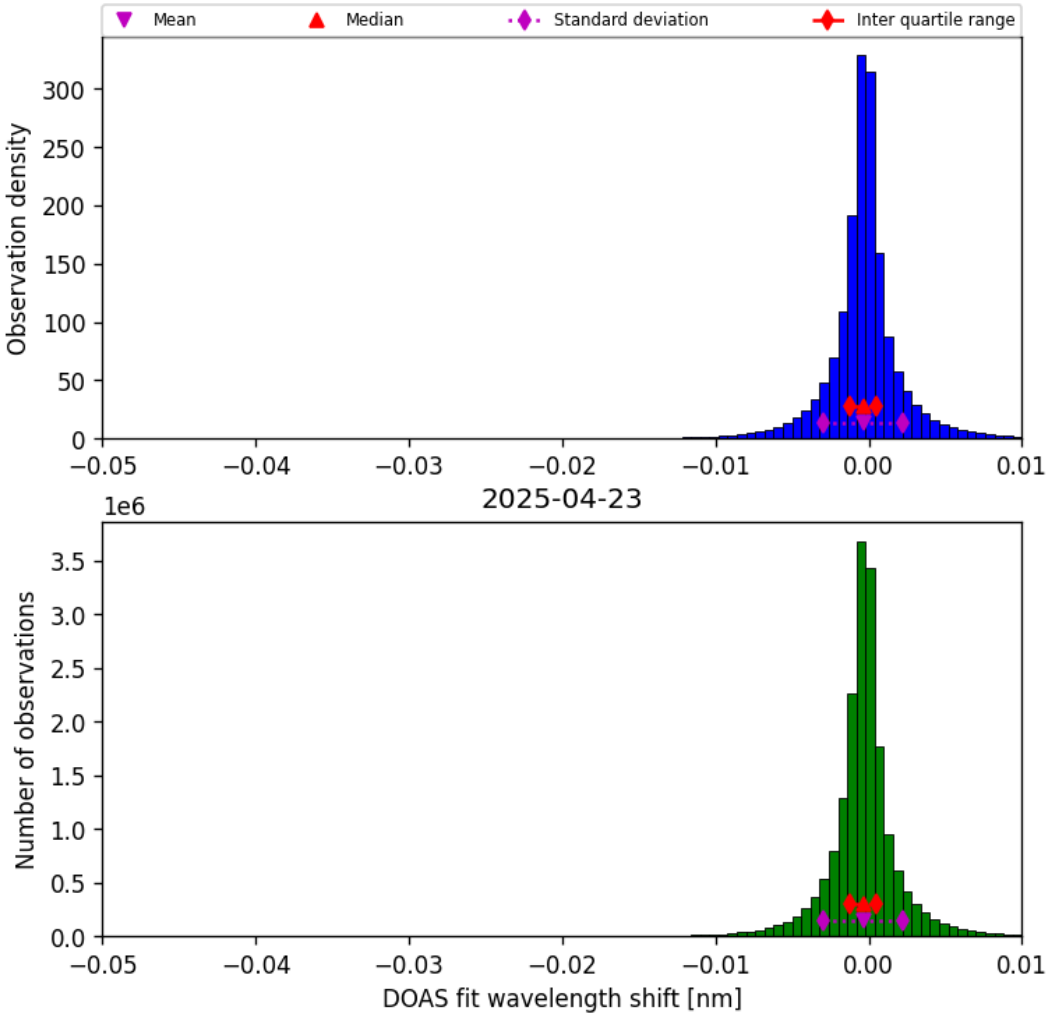

Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-04-23 to 2025-04-24

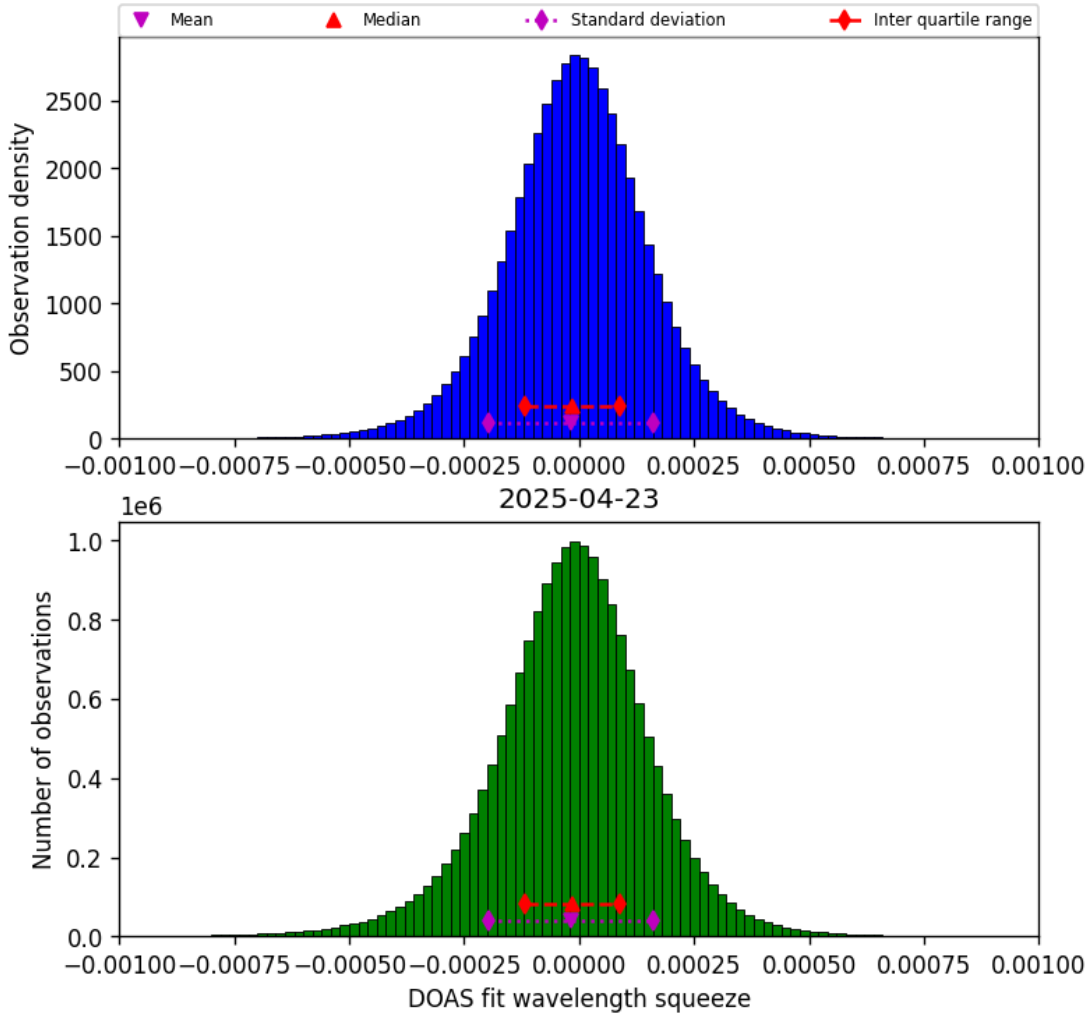

Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-04-23 to 2025-04-24

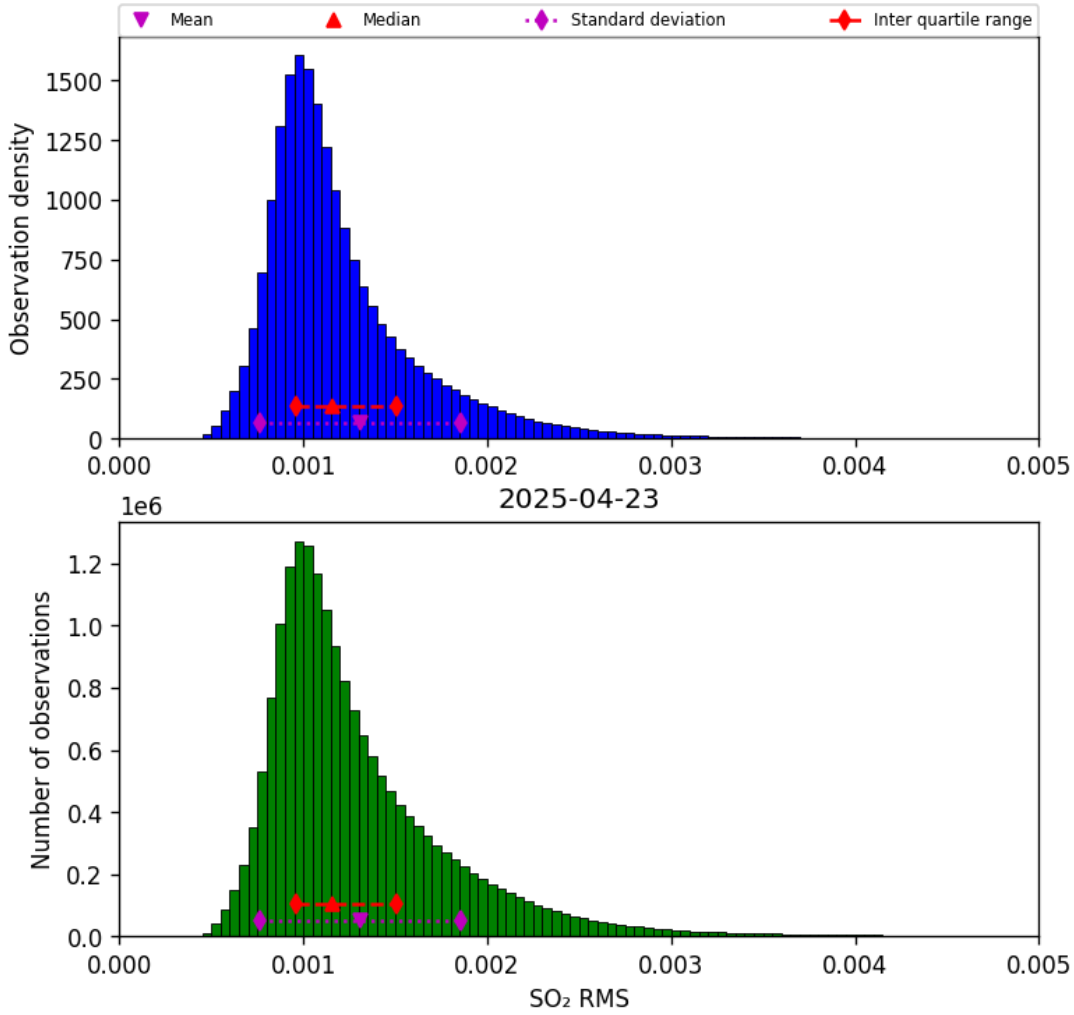

Figure 79: Histogram of "SO_2 RMS" for 2025-04-23 to 2025-04-24

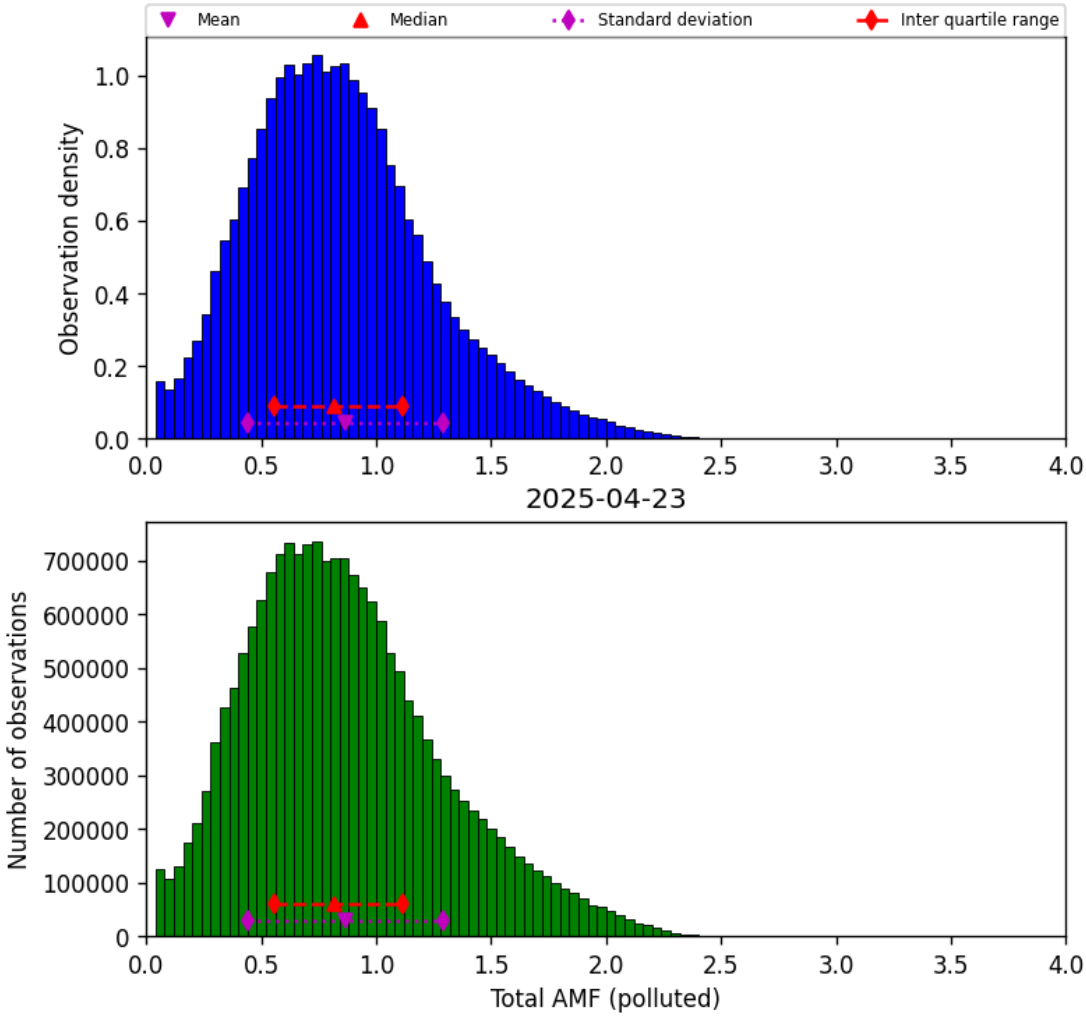

Figure 80: Histogram of “Total AMF (polluted)” for 2025-04-23 to 2025-04-24

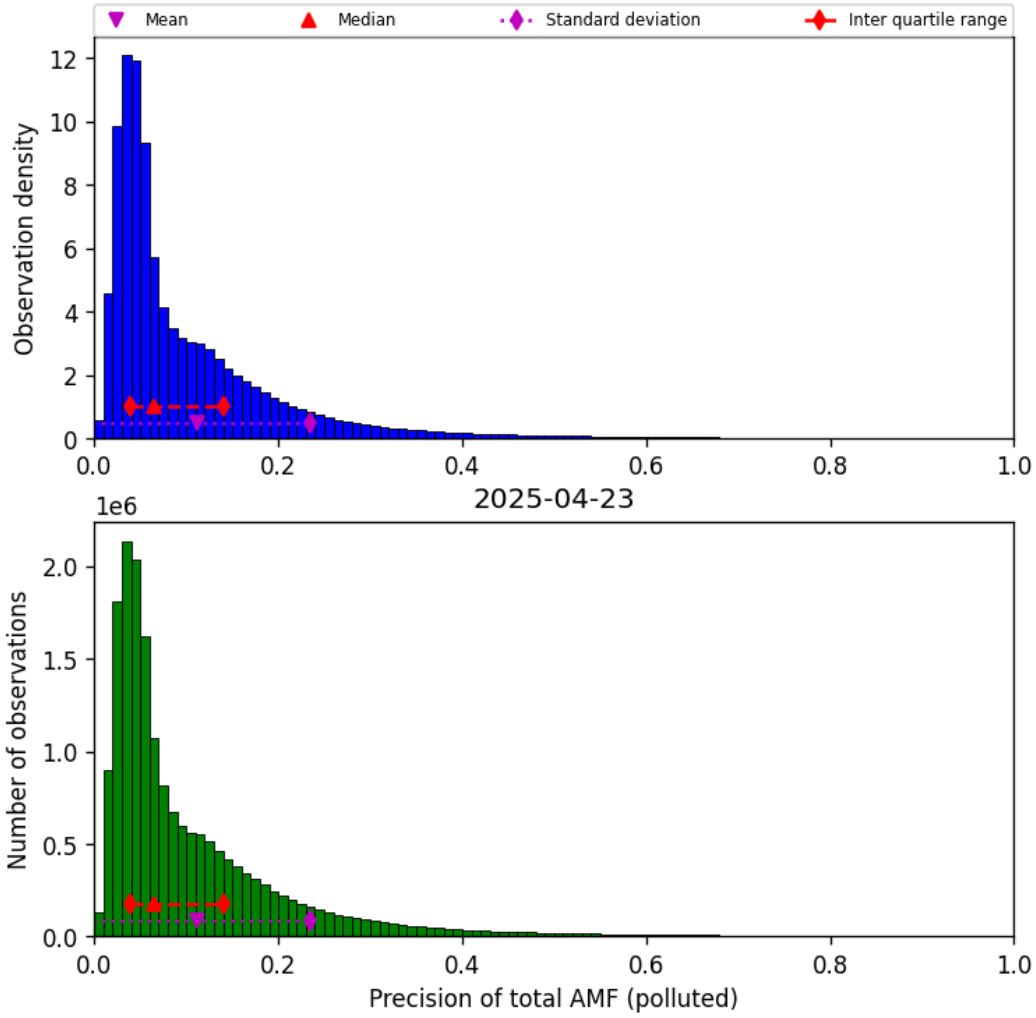

Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-04-23 to 2025-04-24

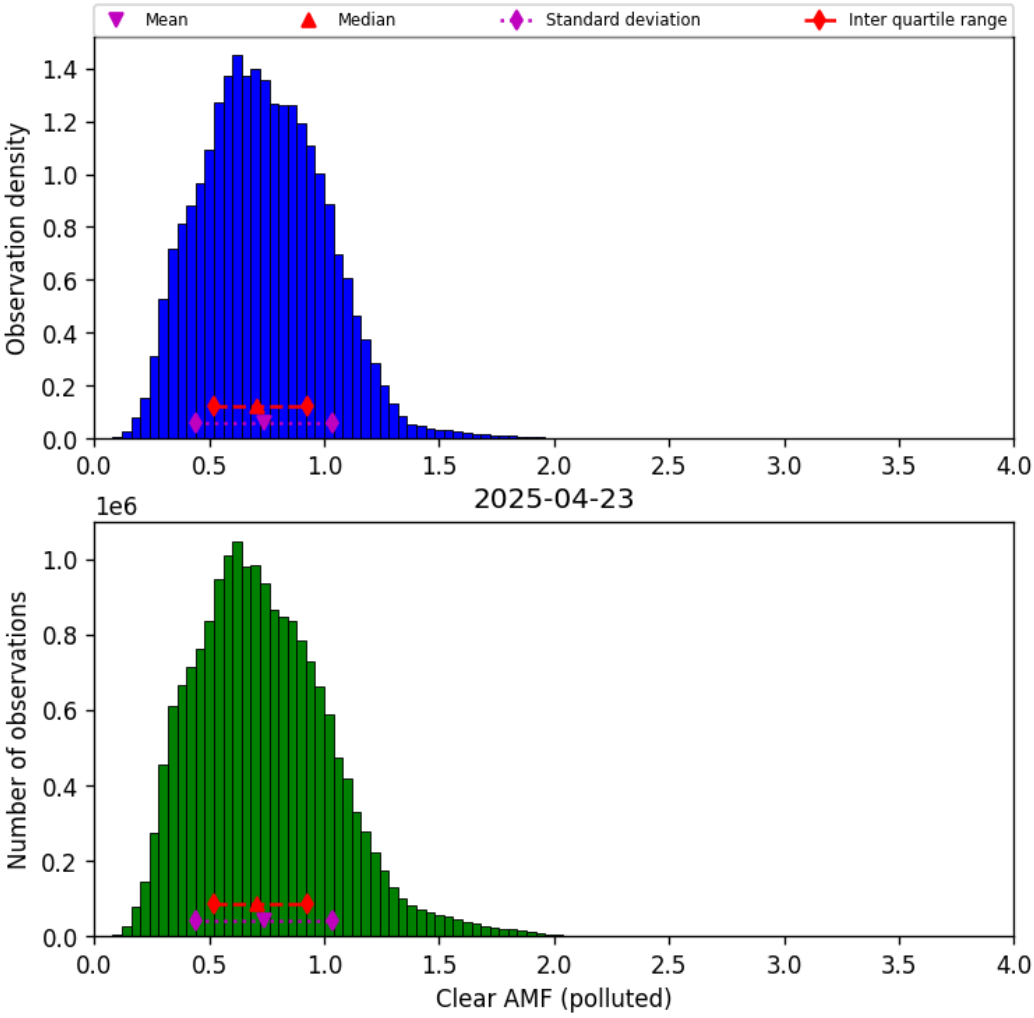

Figure 82: Histogram of “Clear AMF (polluted)” for 2025-04-23 to 2025-04-24

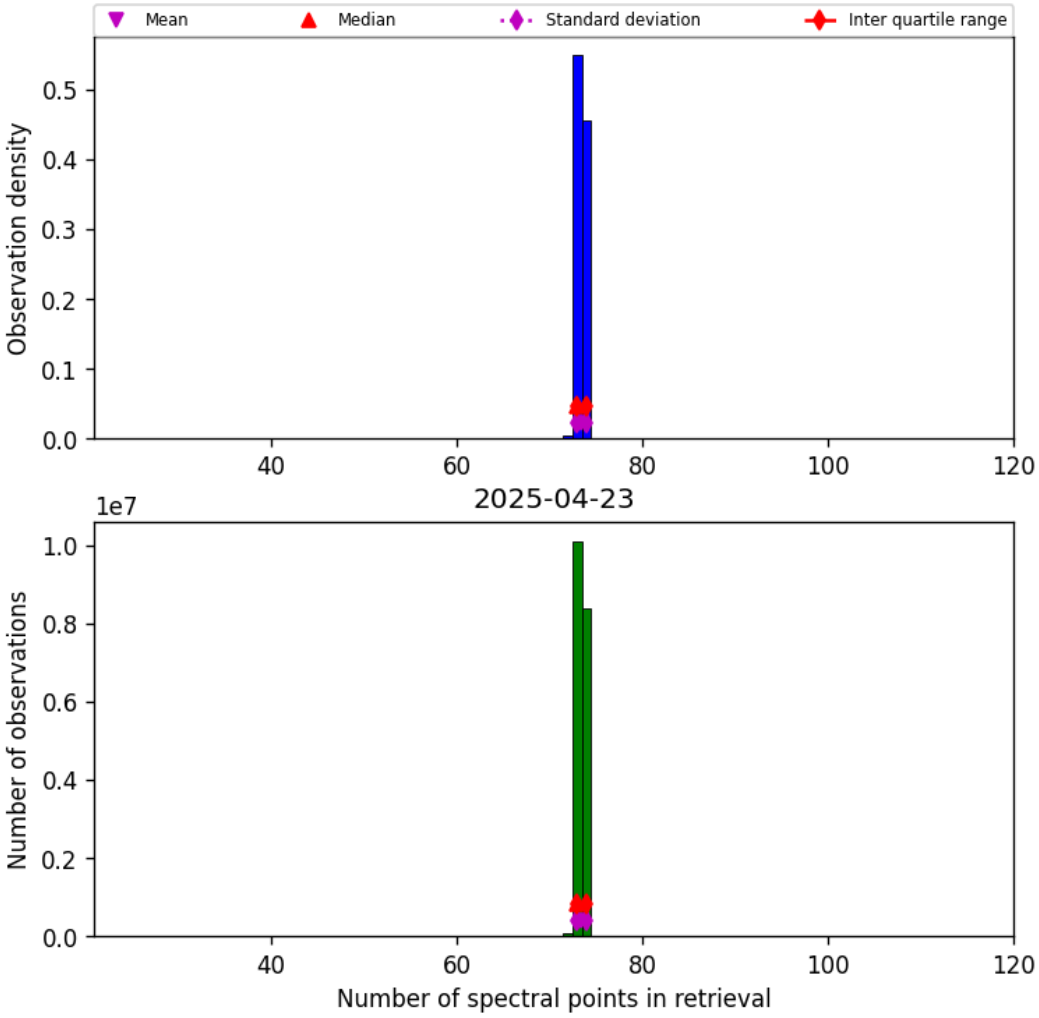

Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-04-23 to 2025-04-24

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.

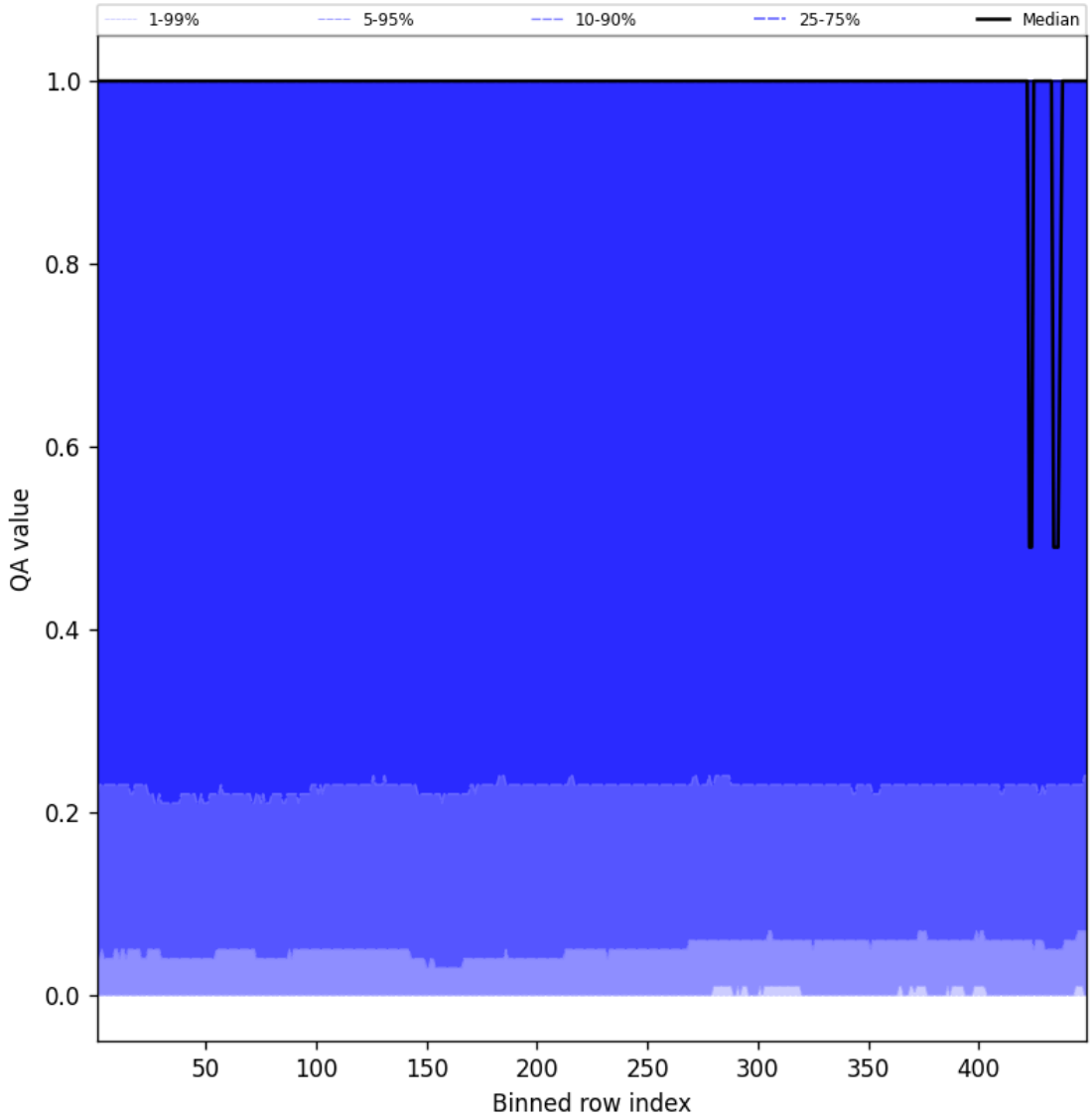

Figure 84: Along track statistics of “QA value” for 2025-04-23 to 2025-04-24

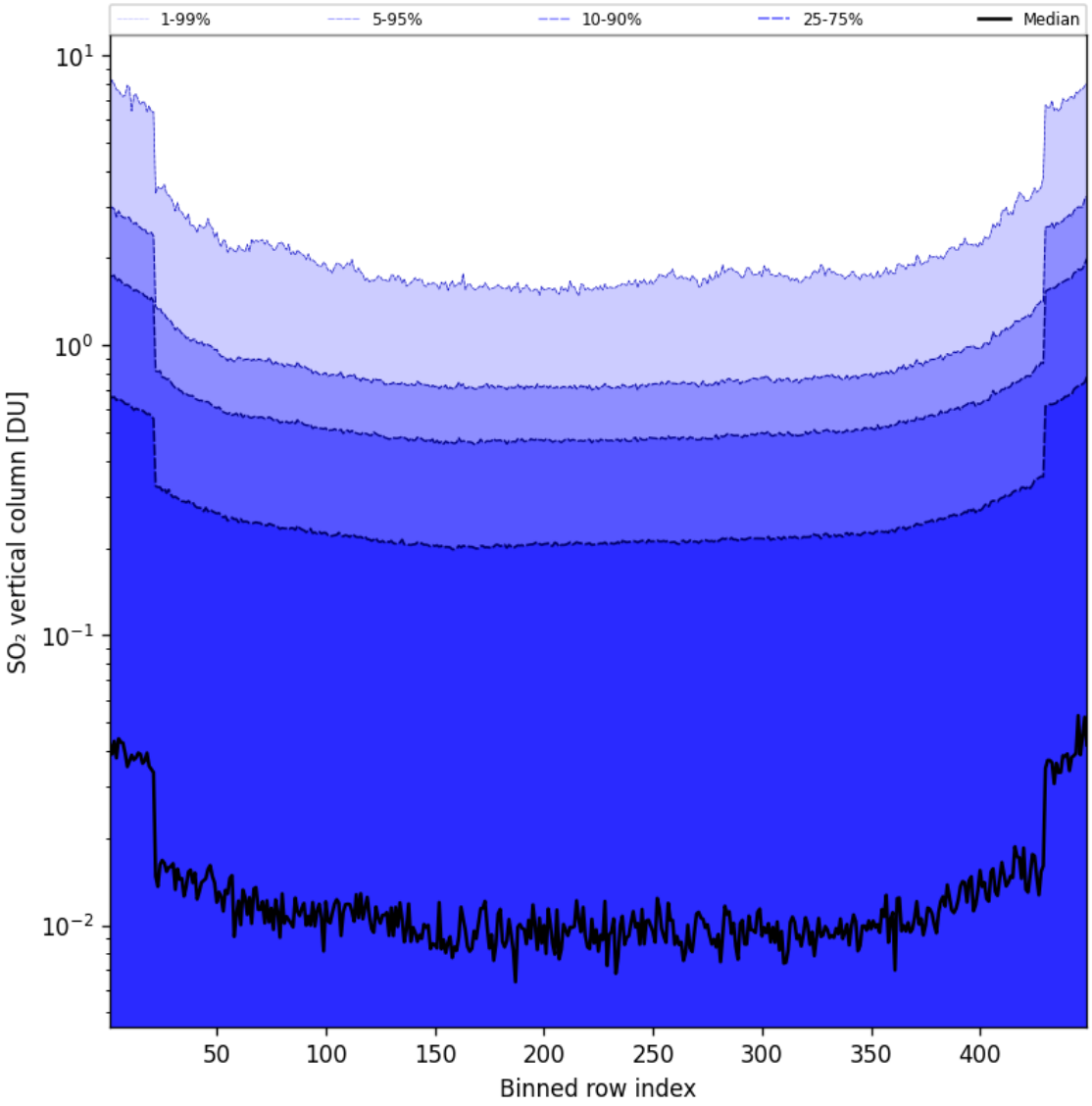

Figure 85: Along track statistics of "SO_2 vertical column" for 2025-04-23 to 2025-04-24

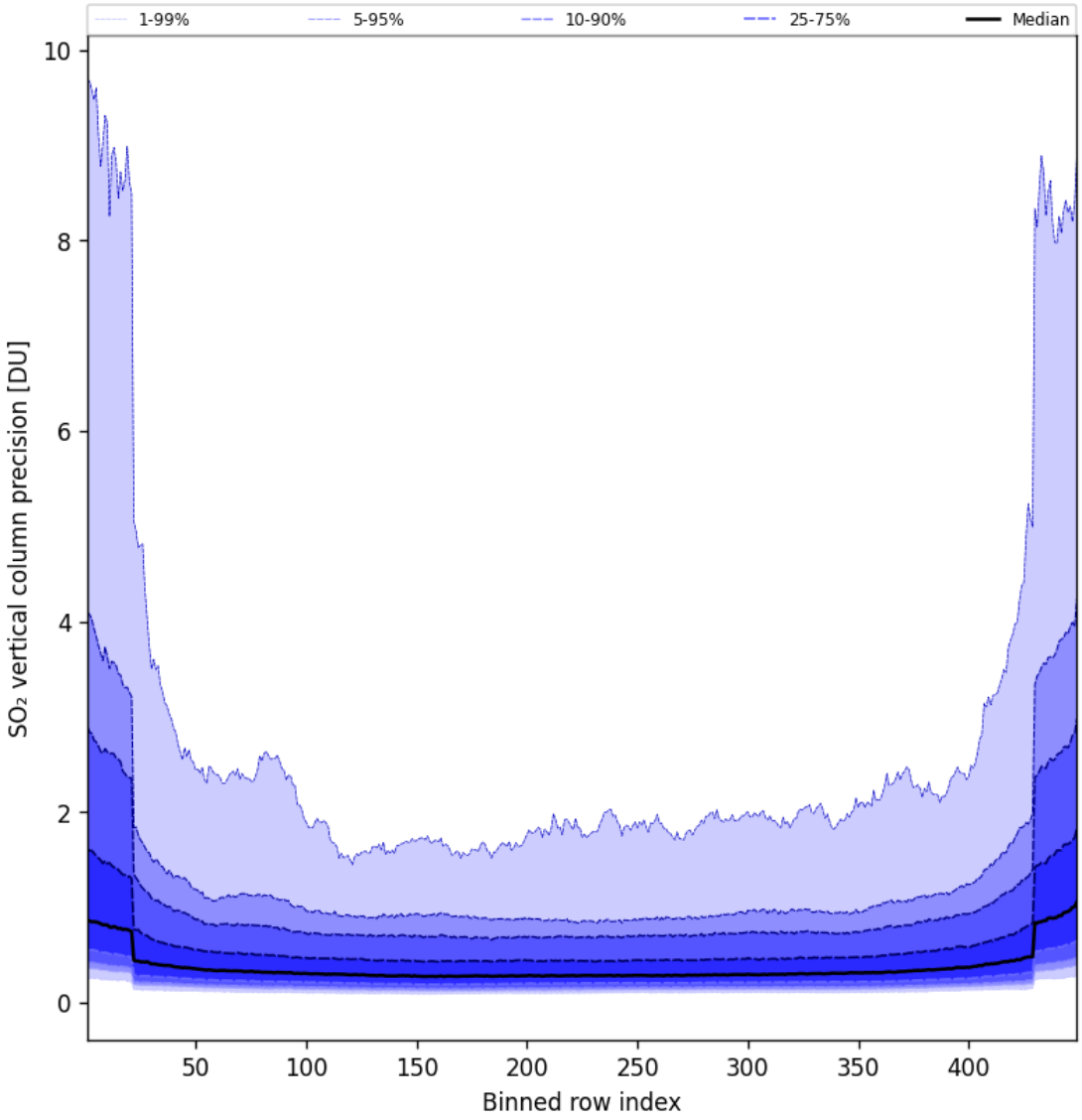

Figure 86: Along track statistics of "SO_2 vertical column precision" for 2025-04-23 to 2025-04-24

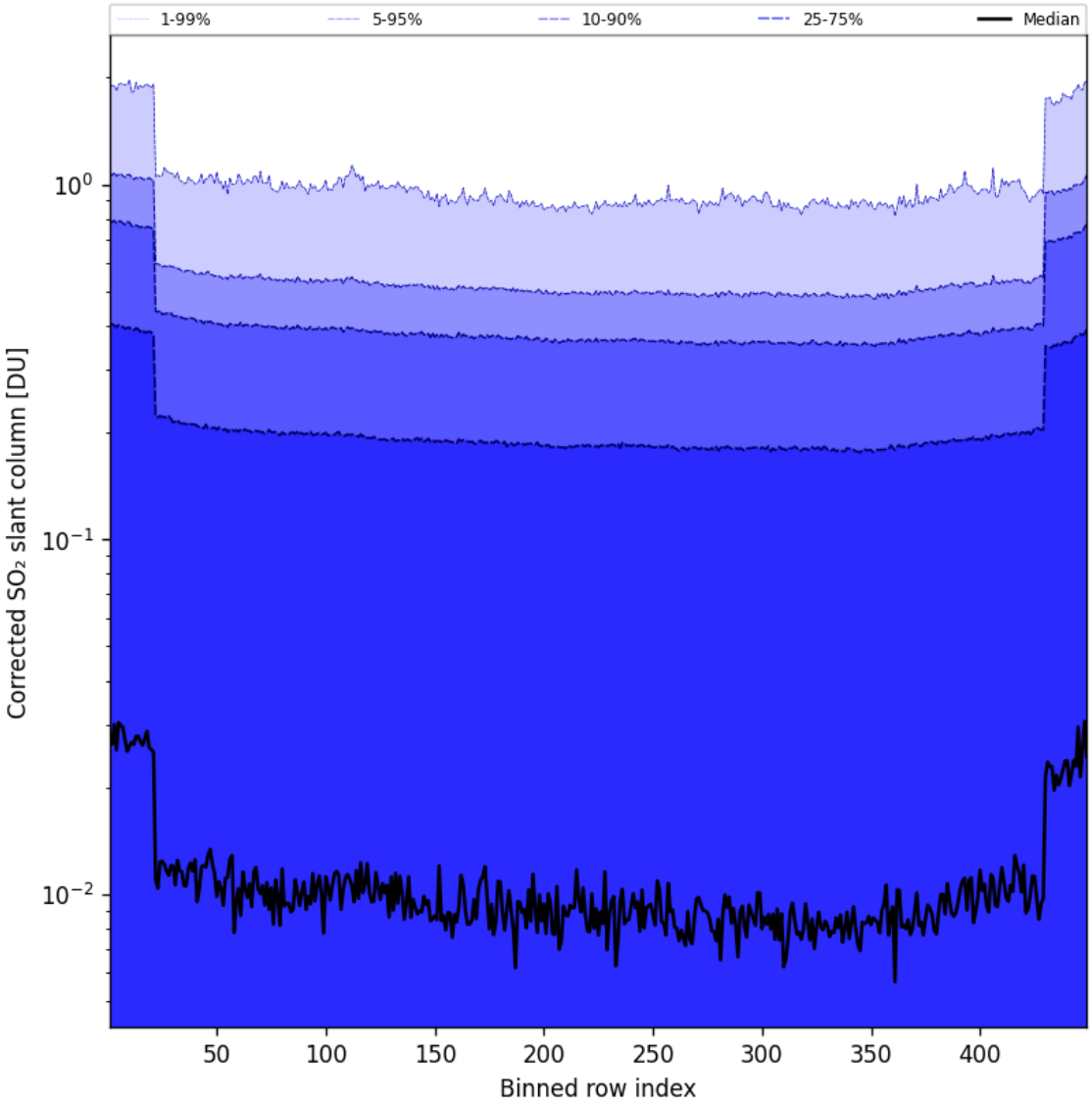

Figure 87: Along track statistics of "Corrected SO_2 slant column" for 2025-04-23 to 2025-04-24

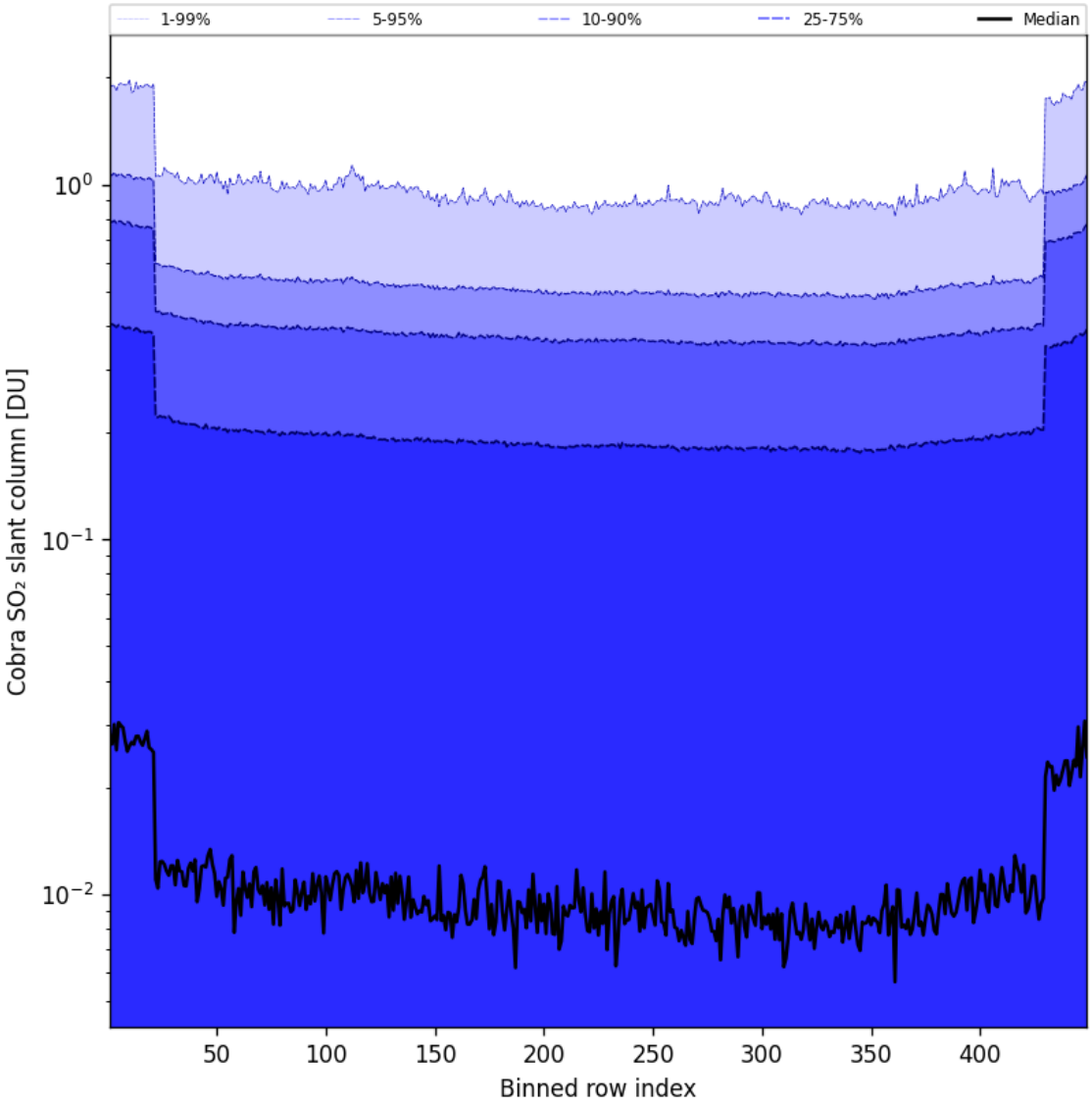

Figure 88: Along track statistics of "Cobra SO_2 slant column" for 2025-04-23 to 2025-04-24

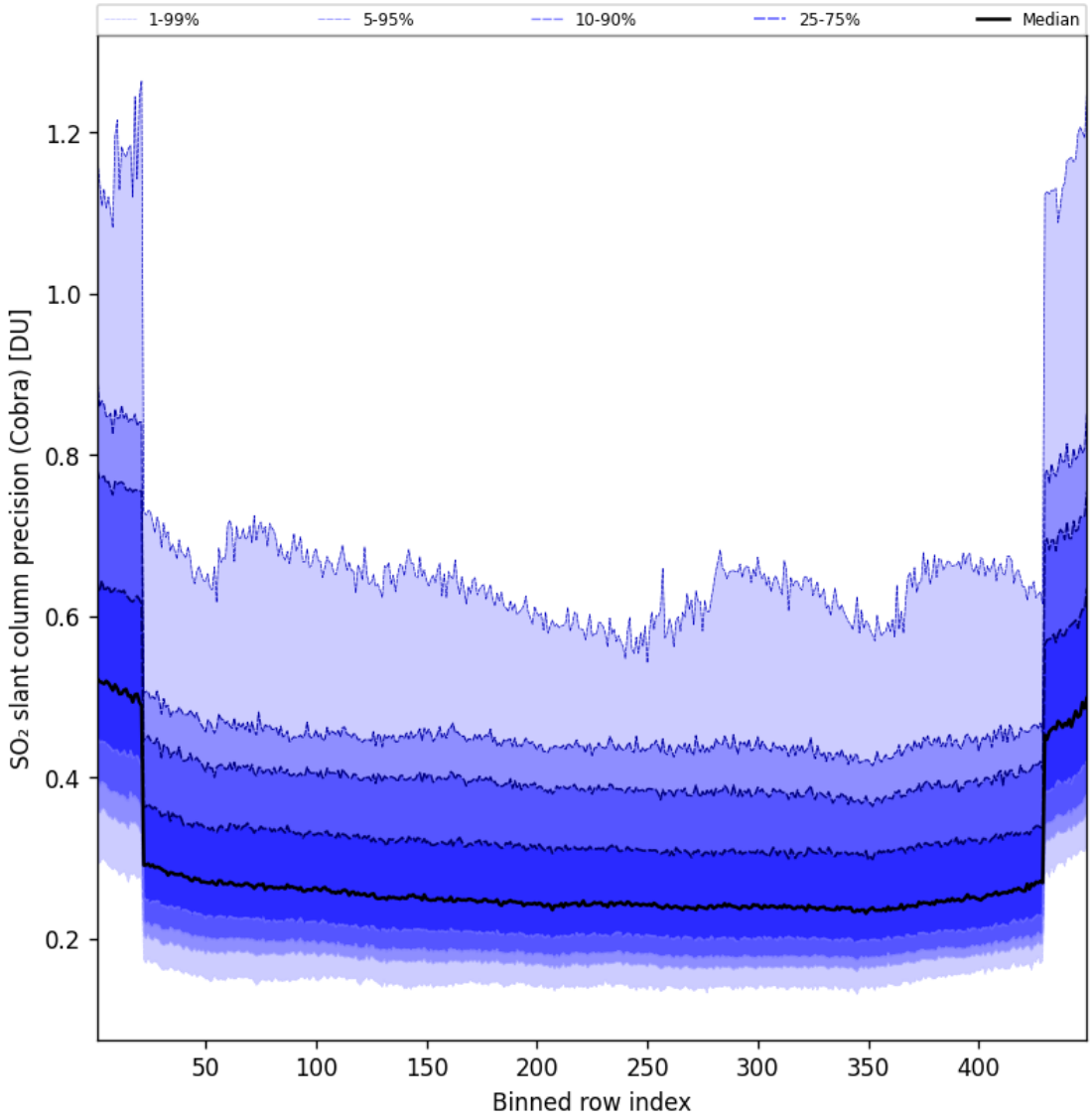

Figure 89: Along track statistics of "SO_2 slant column precision (Cobra)" for 2025-04-23 to 2025-04-24

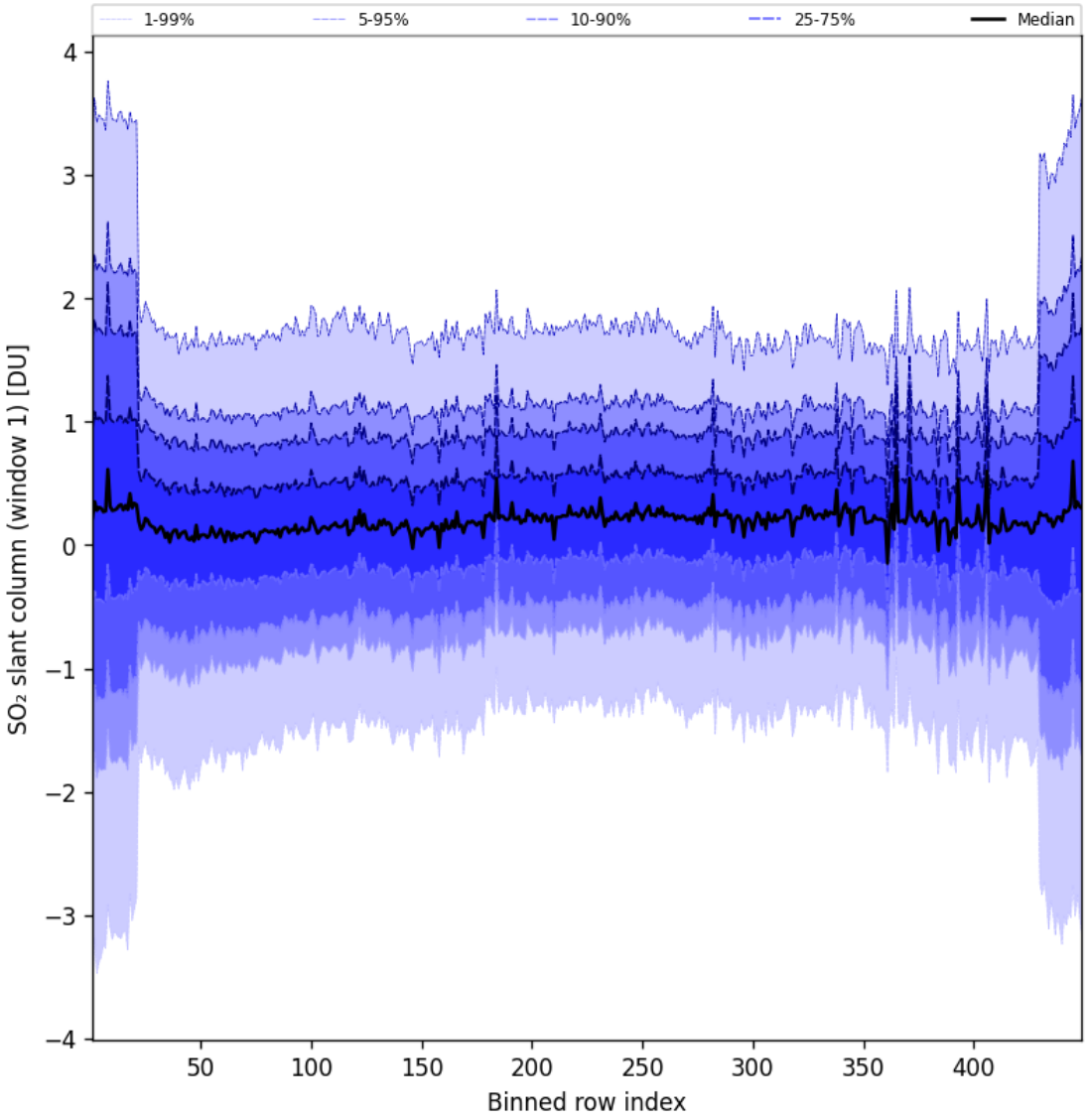

Figure 90: Along track statistics of "SO_2 slant column (window 1)" for 2025-04-23 to 2025-04-24

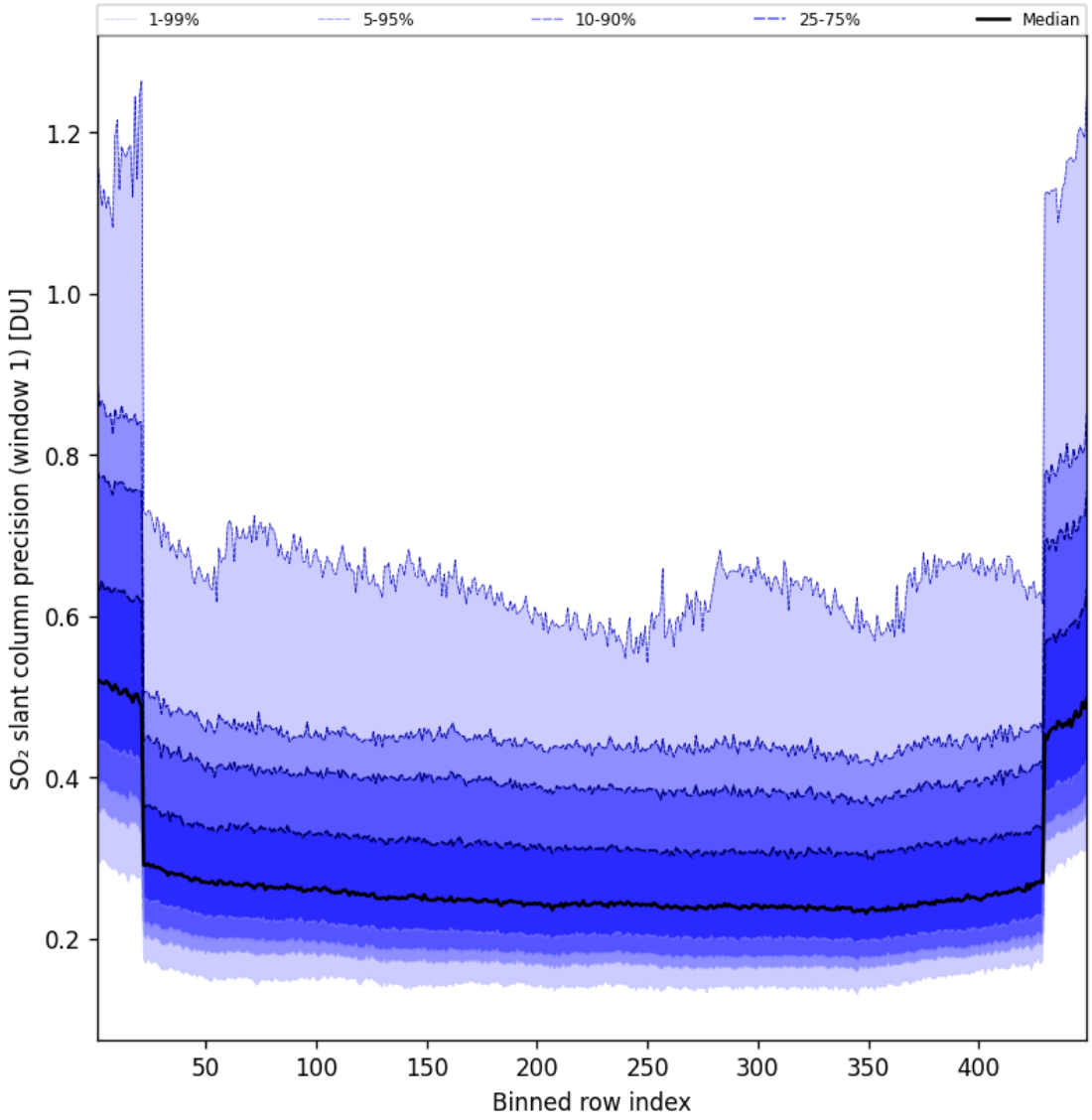

Figure 91: Along track statistics of "SO_2 slant column precision (window 1)" for 2025-04-23 to 2025-04-24

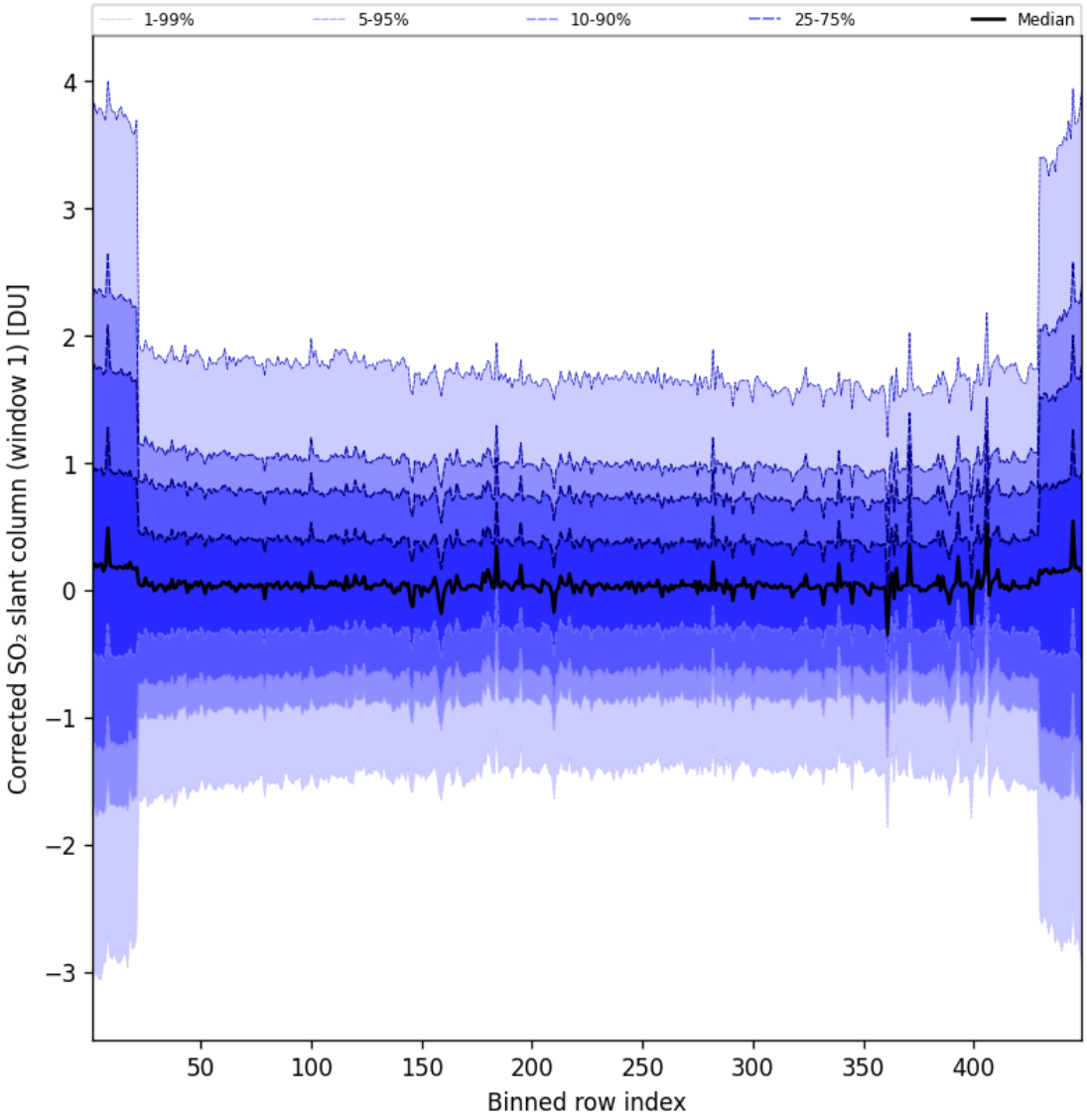

Figure 92: Along track statistics of “Corrected SO_2 slant column (window 1)” for 2025-04-23 to 2025-04-24

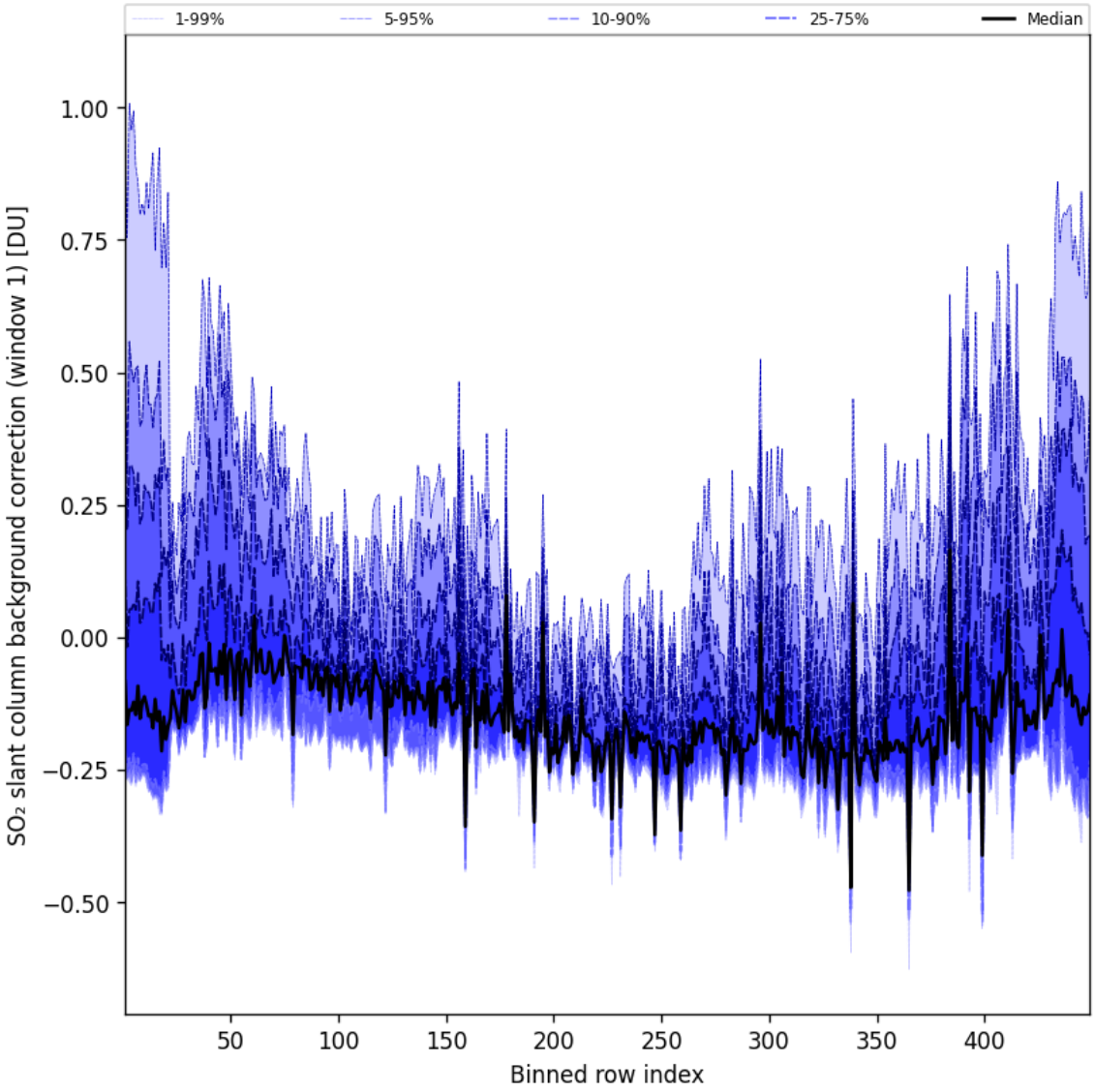

Figure 93: Along track statistics of "SO_2 slant column background correction (window 1)" for 2025-04-23 to 2025-04-24

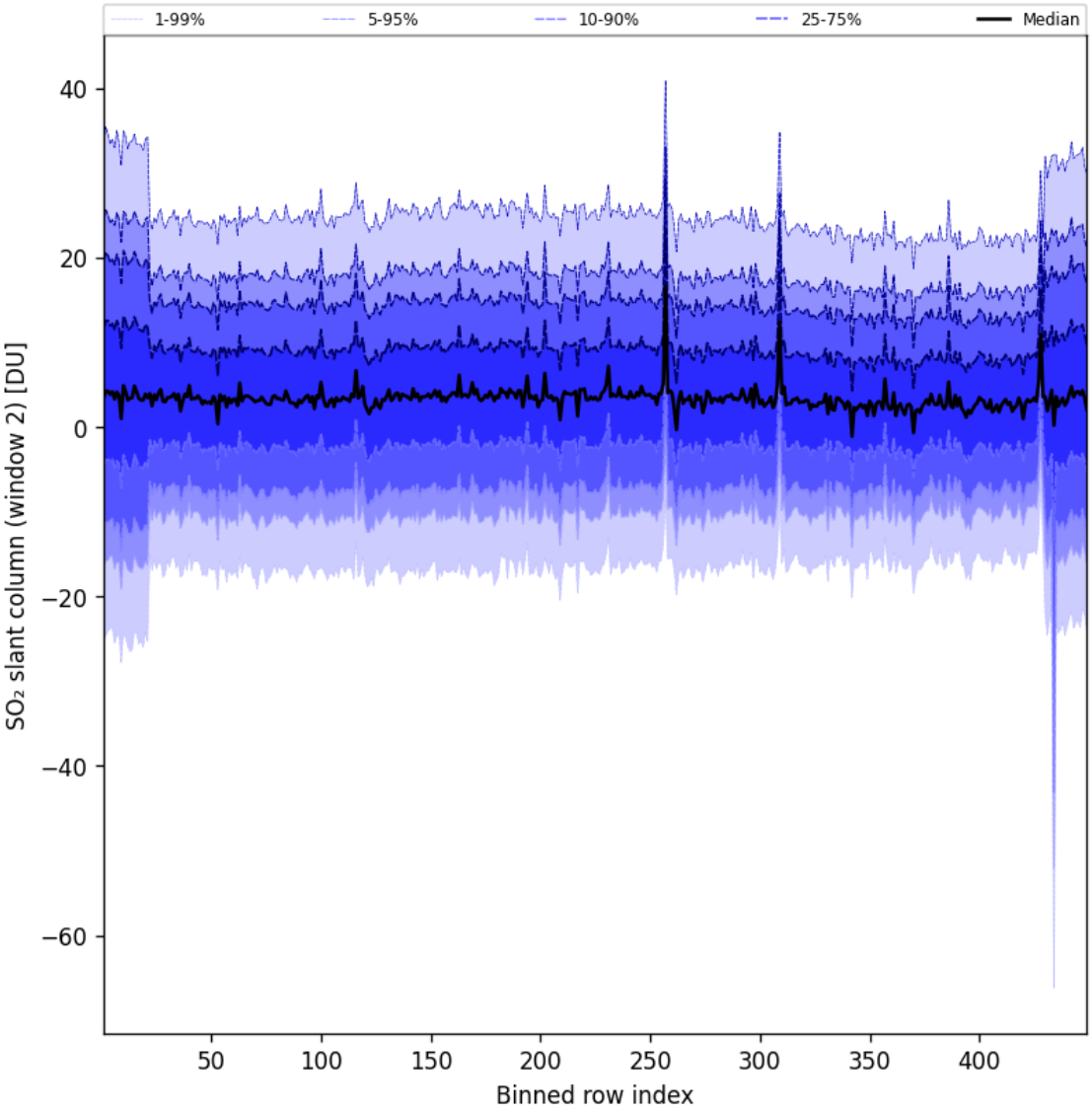

Figure 94: Along track statistics of "SO_2 slant column (window 2)" for 2025-04-23 to 2025-04-24

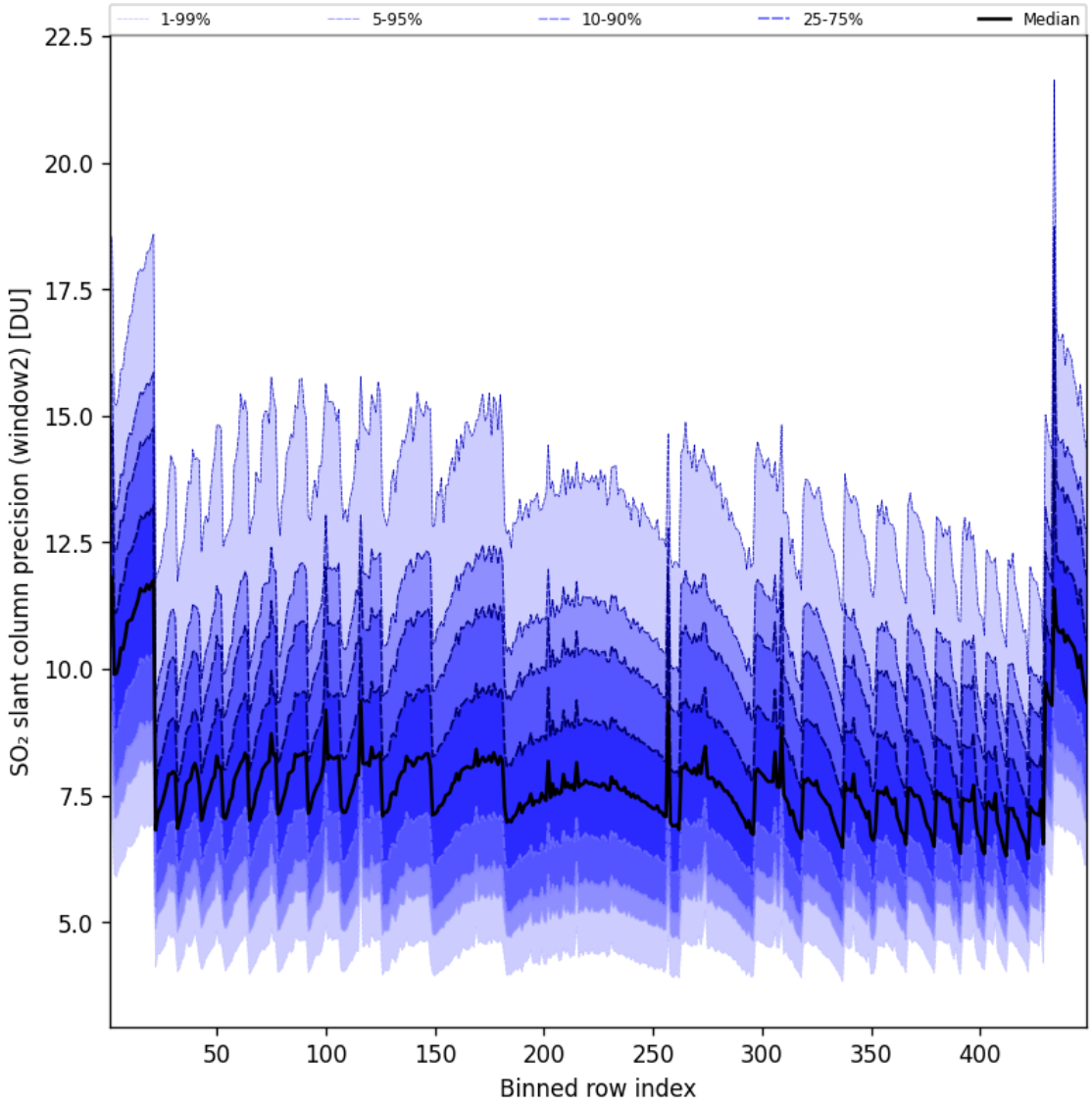

Figure 95: Along track statistics of "SO_2 slant column precision (window2)" for 2025-04-23 to 2025-04-24

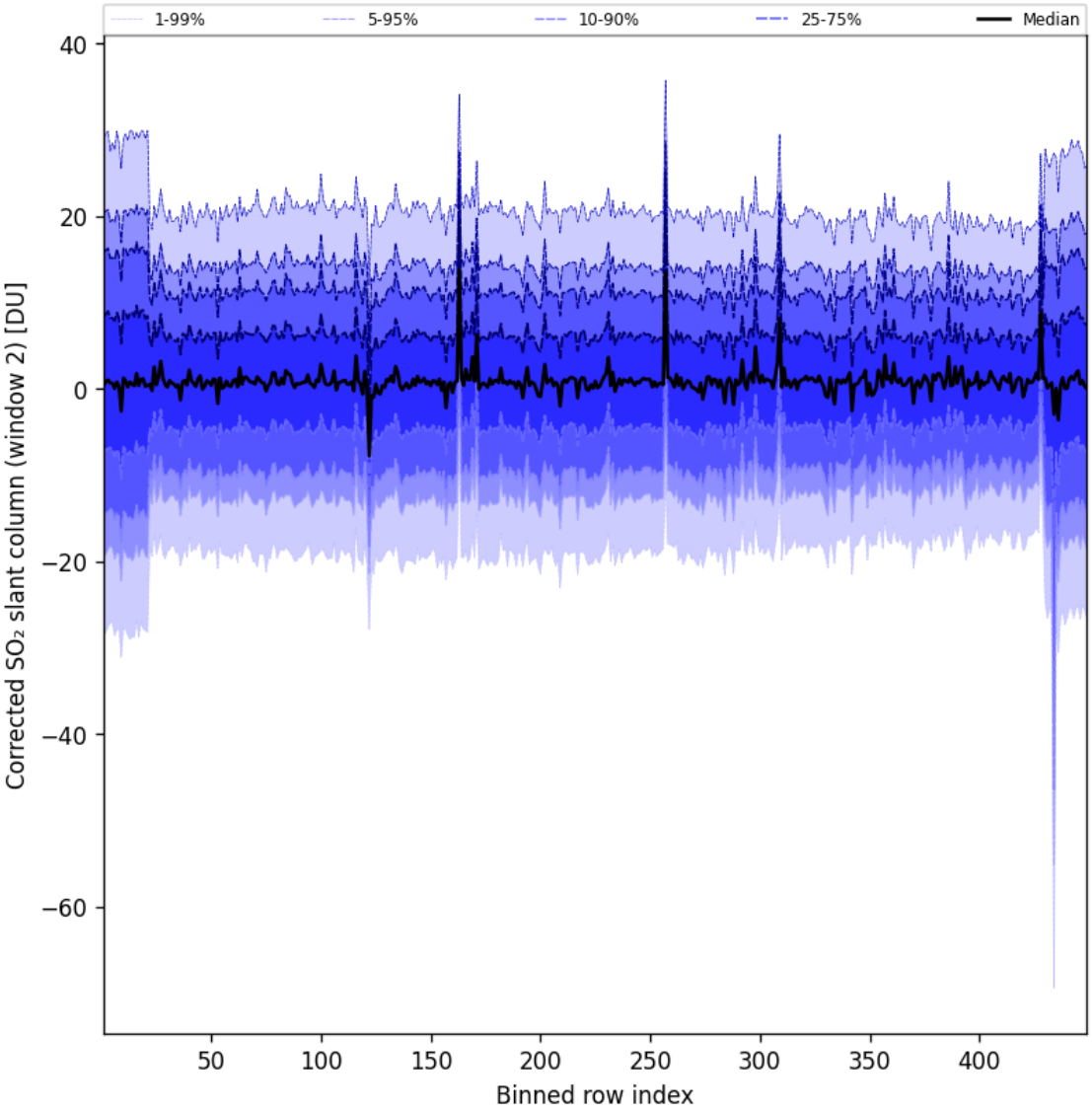

Figure 96: Along track statistics of "Corrected SO_2 slant column (window 2)" for 2025-04-23 to 2025-04-24

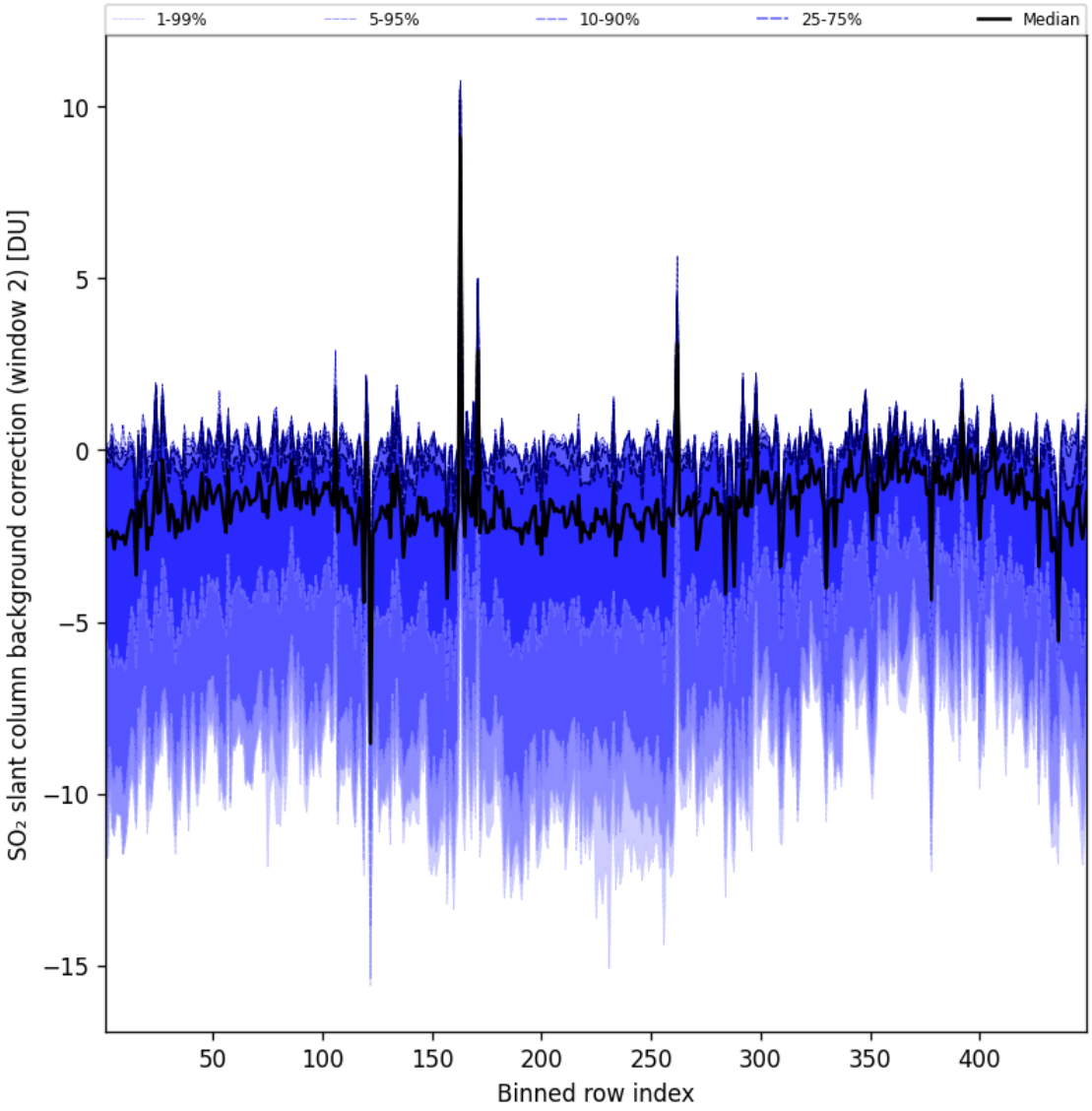

Figure 97: Along track statistics of "SO_2 slant column background correction (window 2)" for 2025-04-23 to 2025-04-24

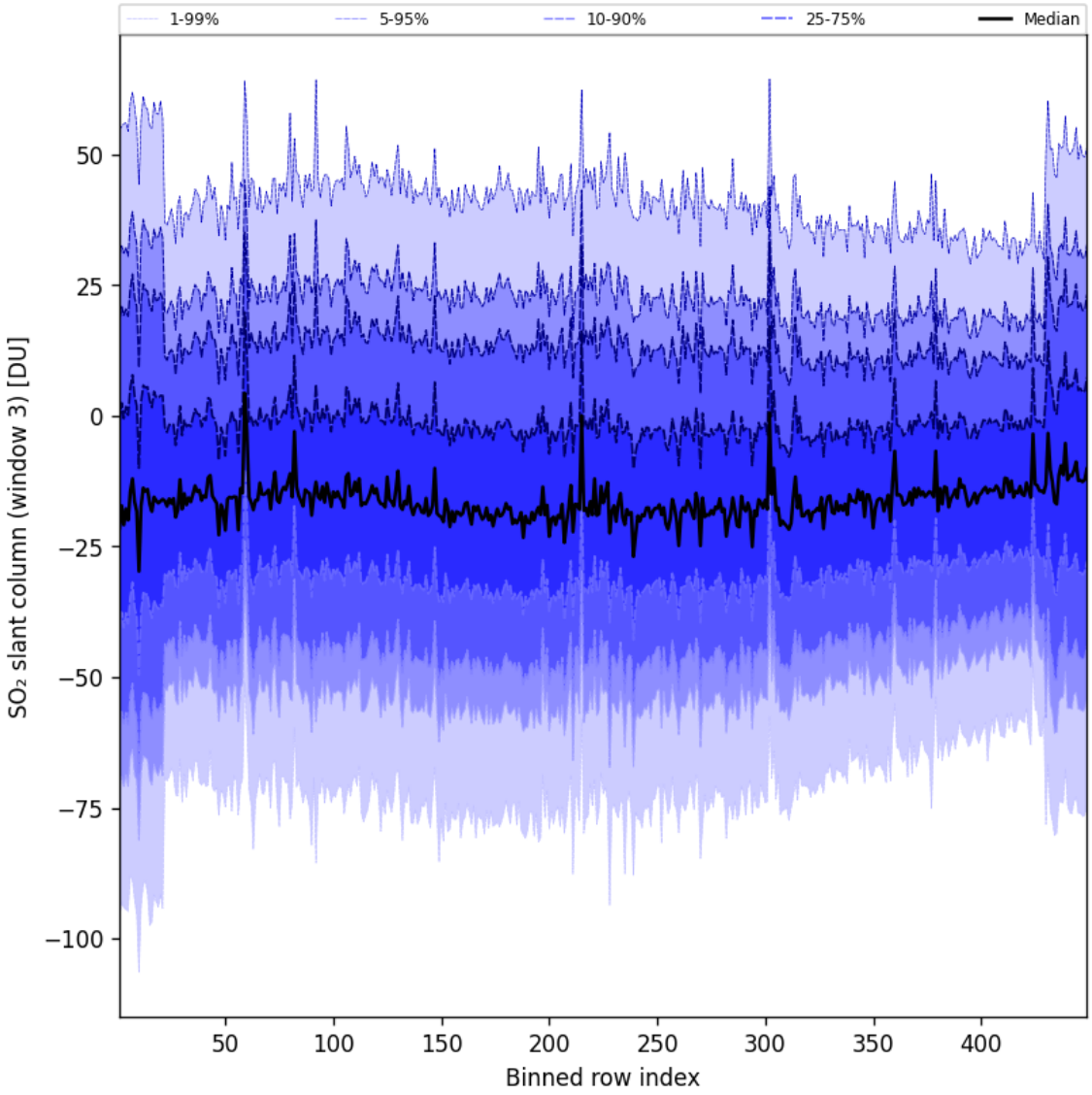

Figure 98: Along track statistics of "SO_2 slant column (window 3)" for 2025-04-23 to 2025-04-24

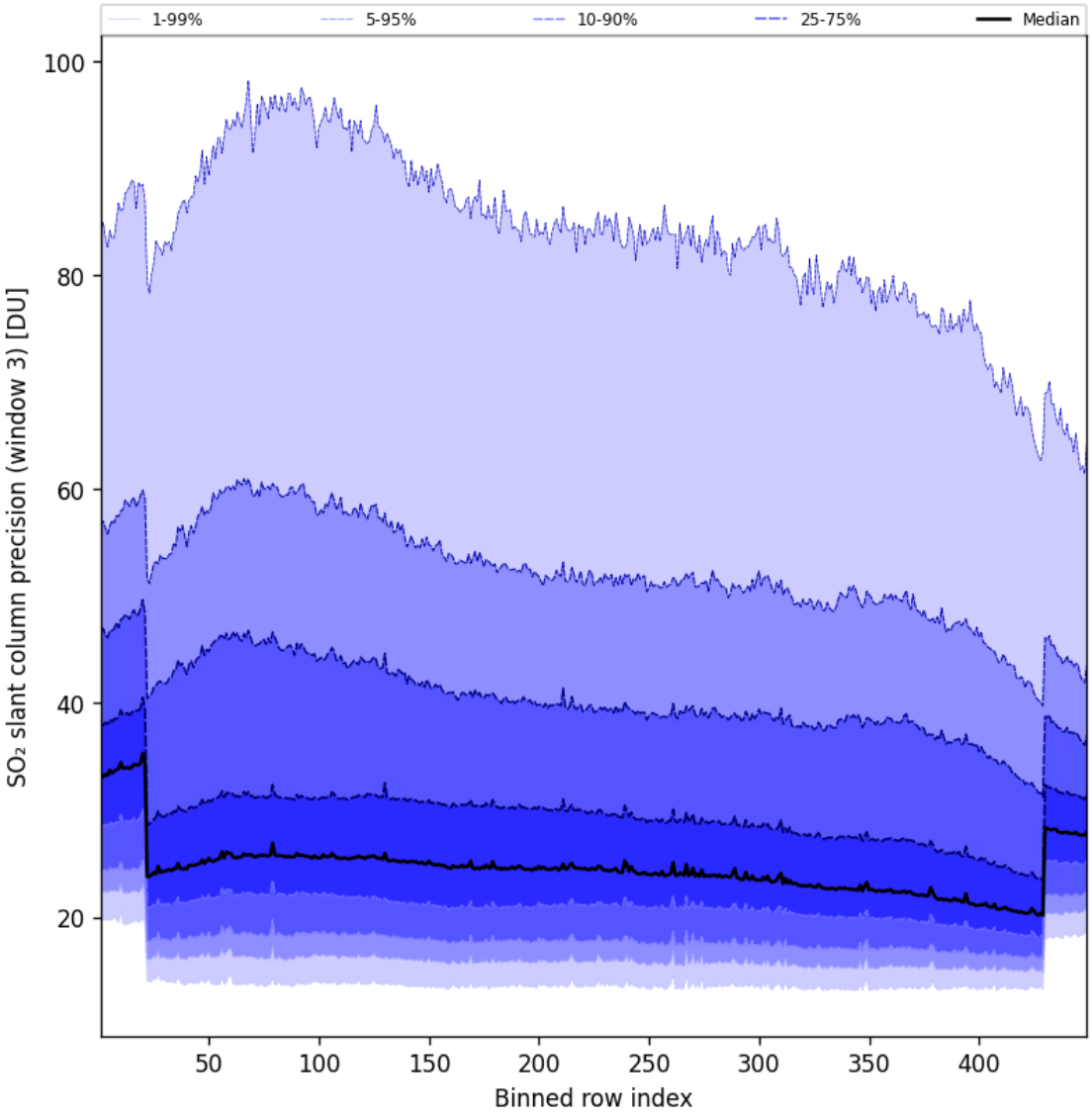

Figure 99: Along track statistics of "SO_2 slant column precision (window 3)" for 2025-04-23 to 2025-04-24

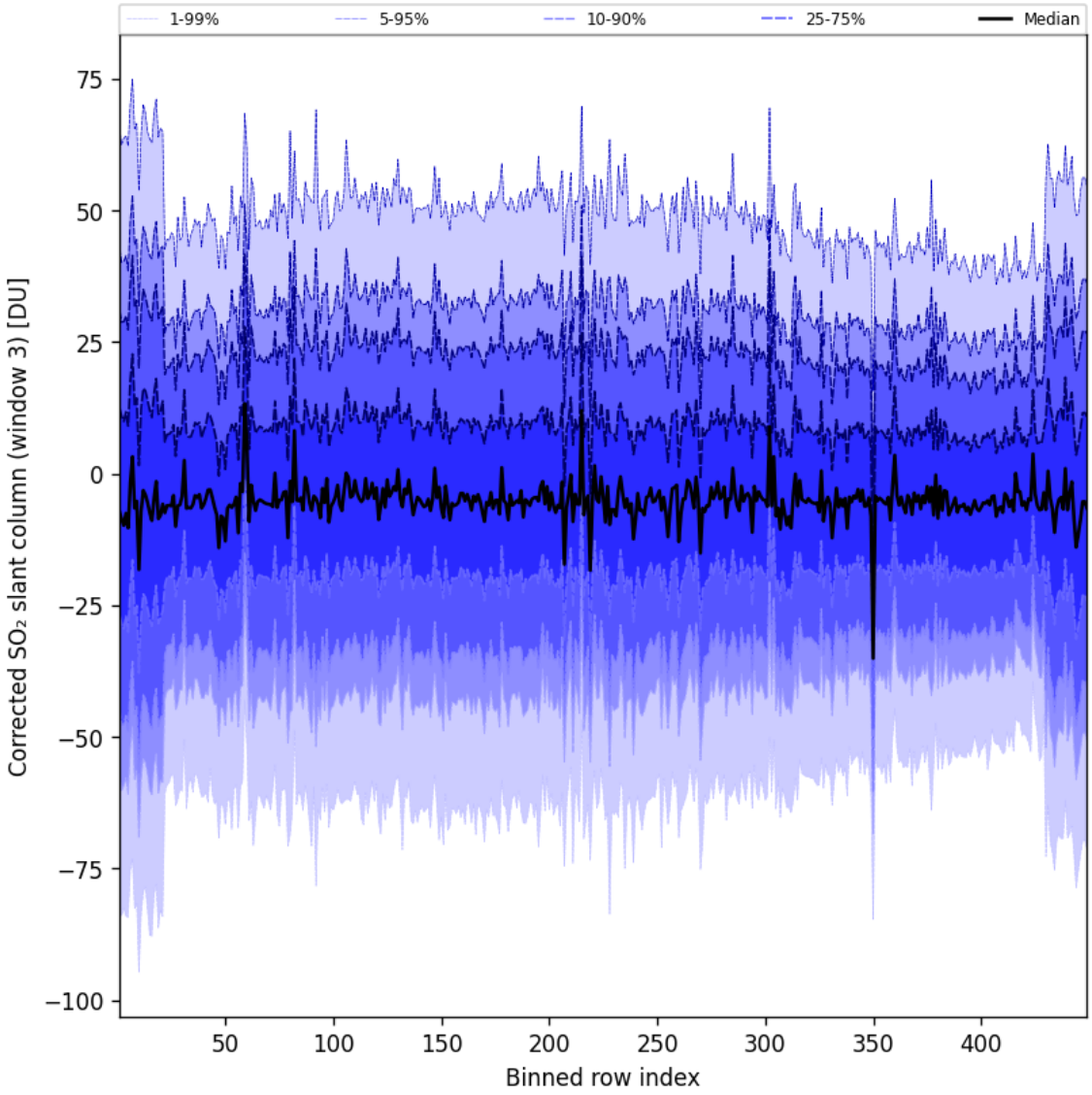

Figure 100: Along track statistics of “Corrected SO_2 slant column (window 3)” for 2025-04-23 to 2025-04-24

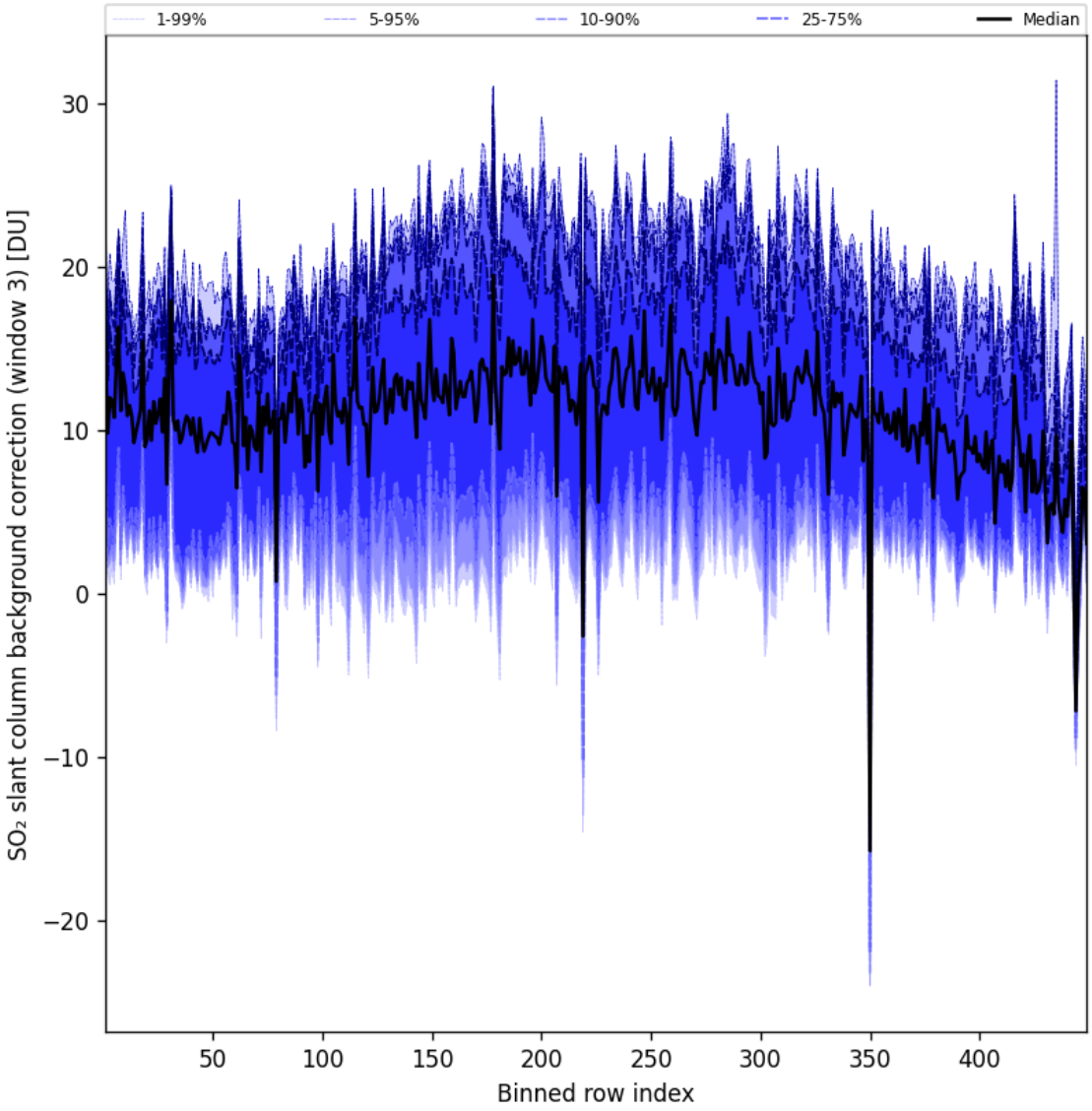

Figure 101: Along track statistics of "SO_2 slant column background correction (window 3)" for 2025-04-23 to 2025-04-24

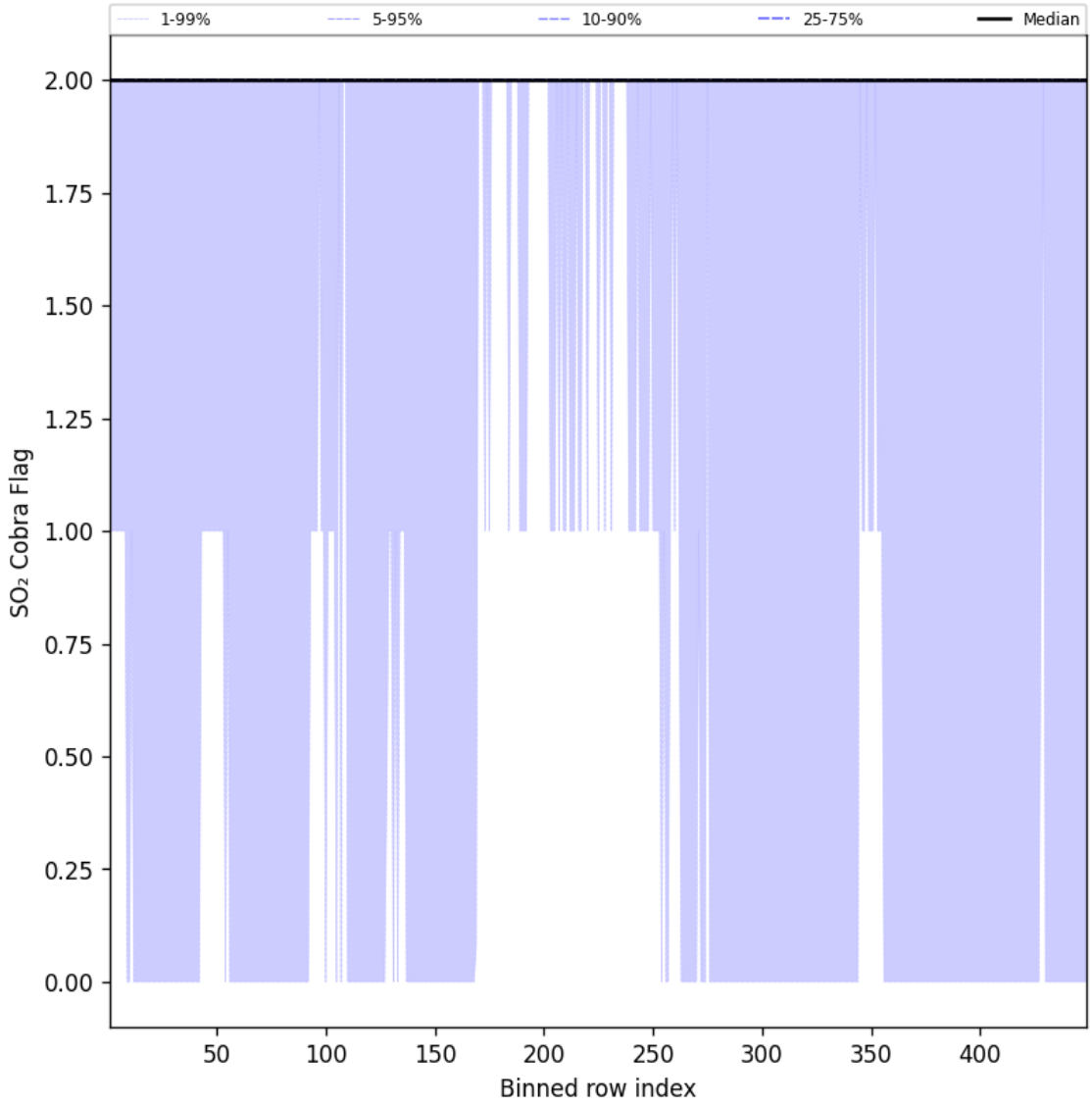

Figure 102: Along track statistics of "SO_2 Cobra Flag" for 2025-04-23 to 2025-04-24

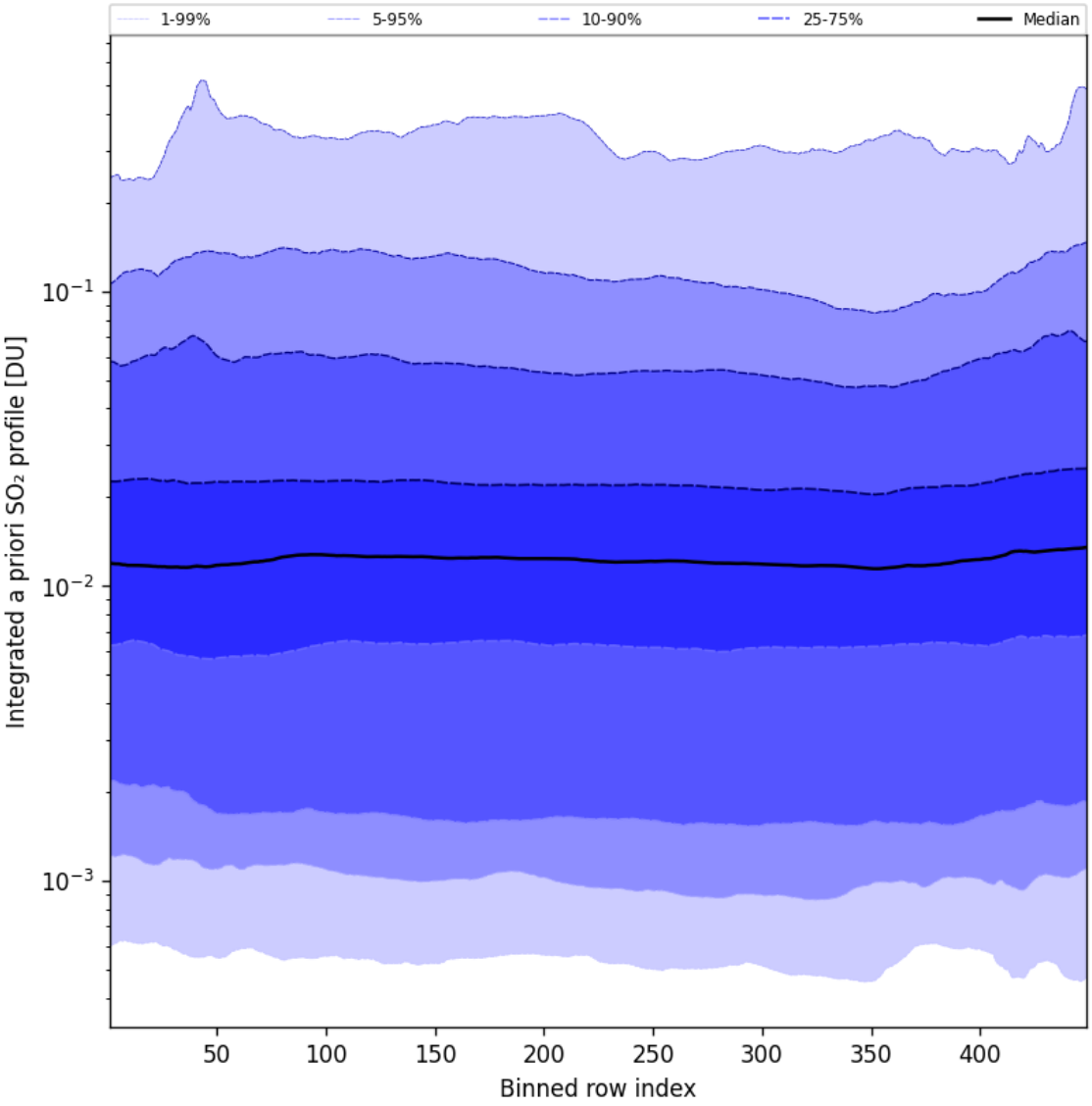

Figure 103: Along track statistics of “Integrated a priori SO_2 profile” for 2025-04-23 to 2025-04-24

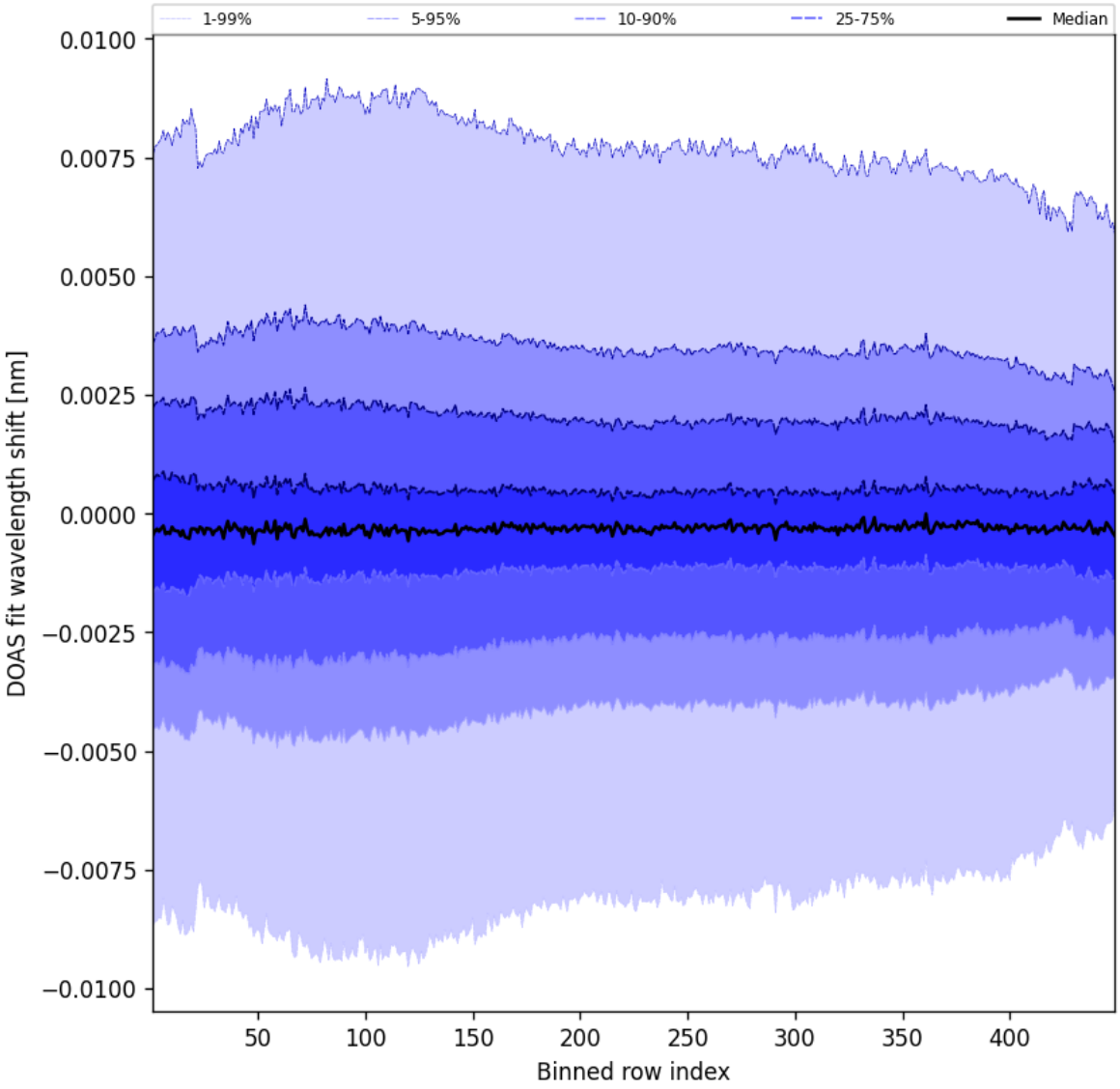

Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2025-04-23 to 2025-04-24

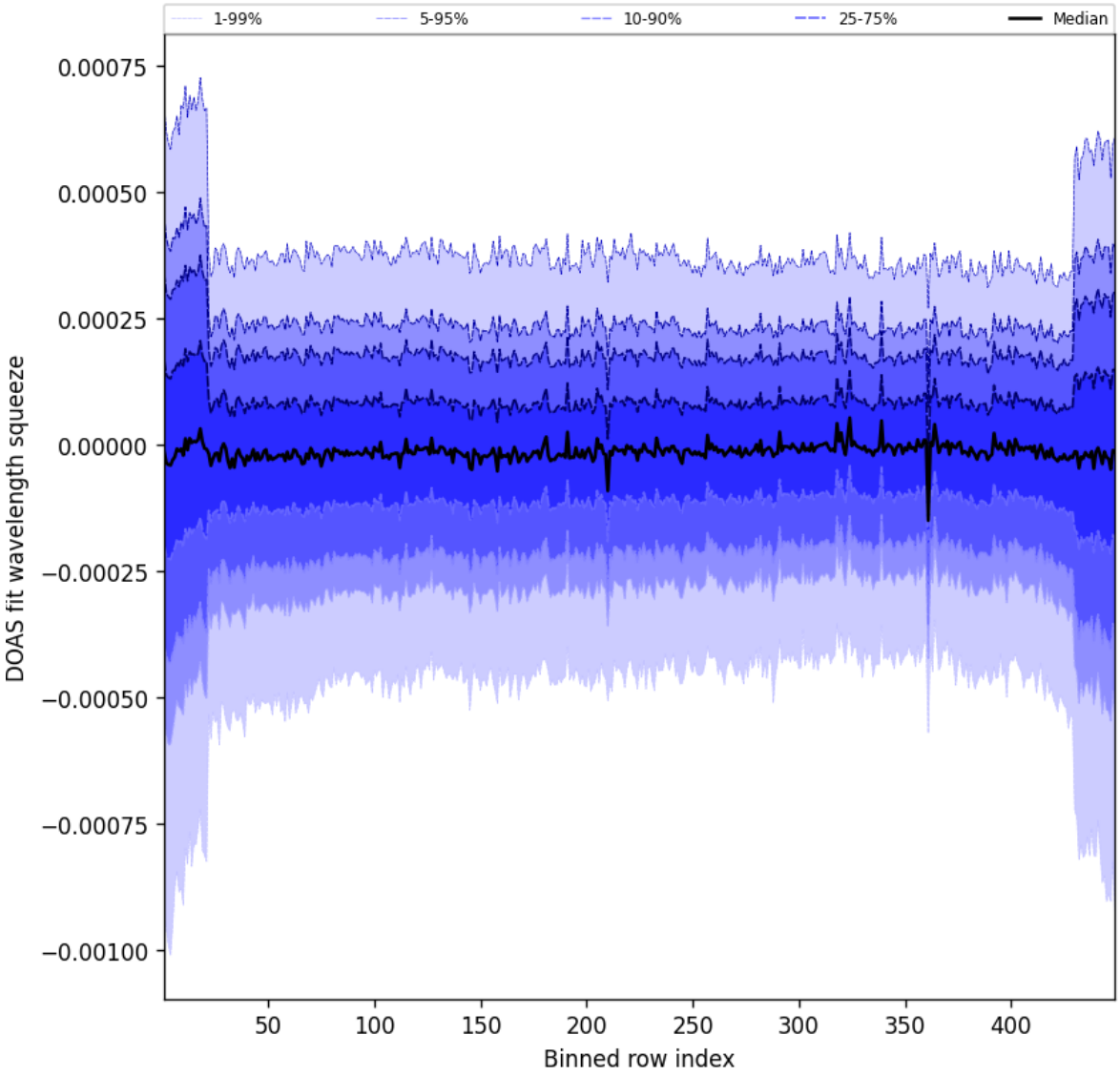

Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2025-04-23 to 2025-04-24

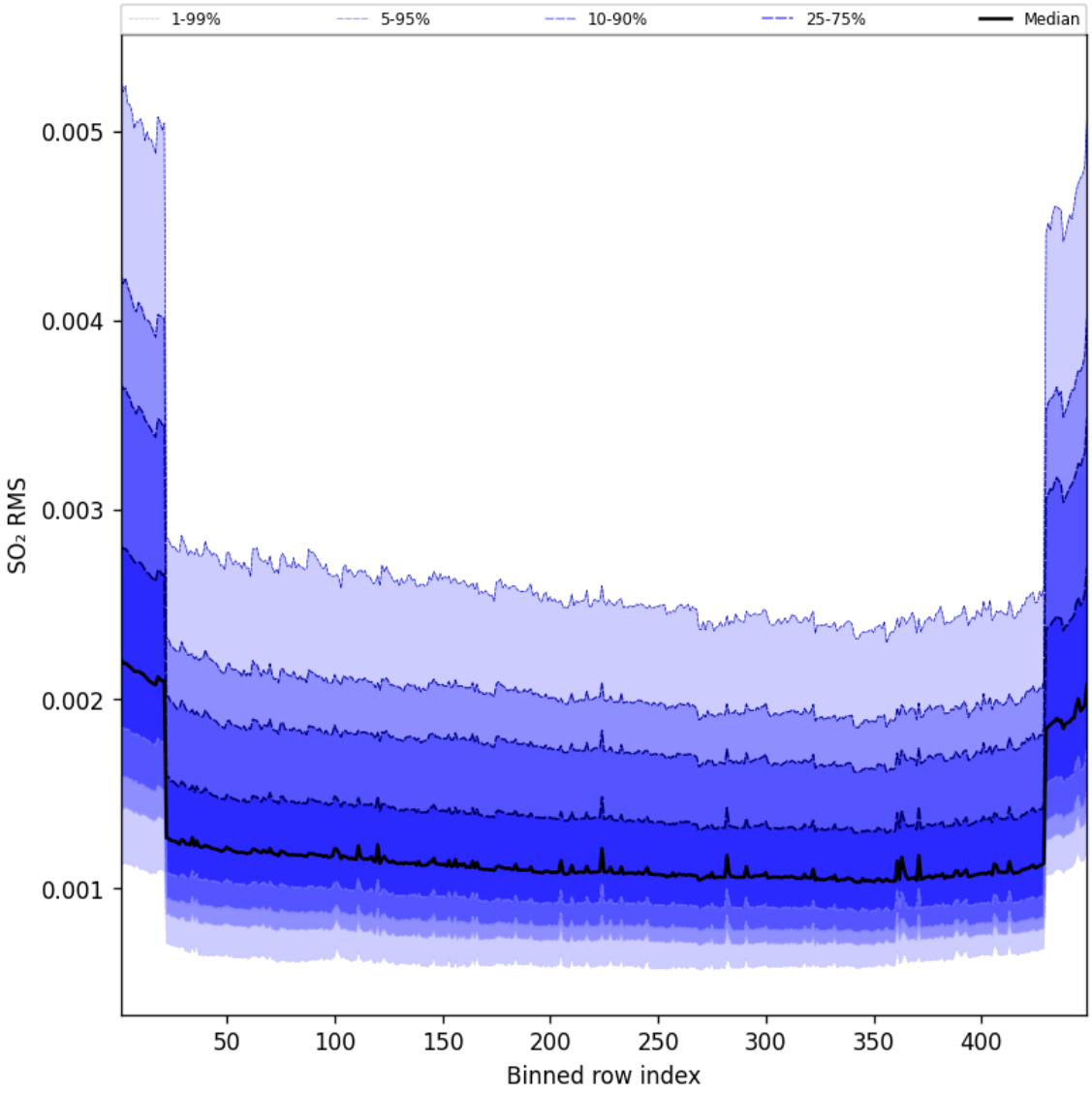

Figure 106: Along track statistics of "SO_2 RMS" for 2025-04-23 to 2025-04-24

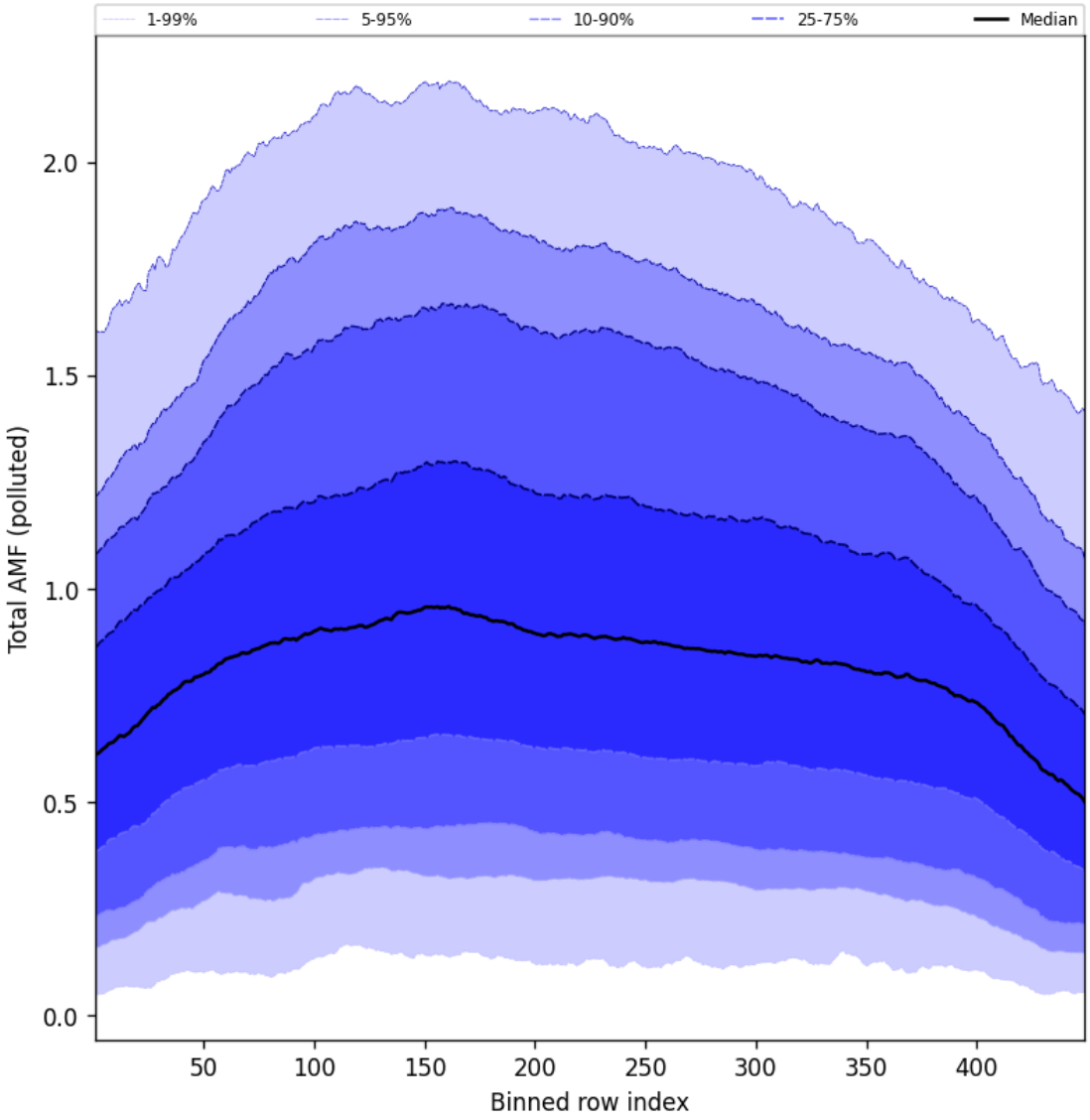

Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-04-23 to 2025-04-24

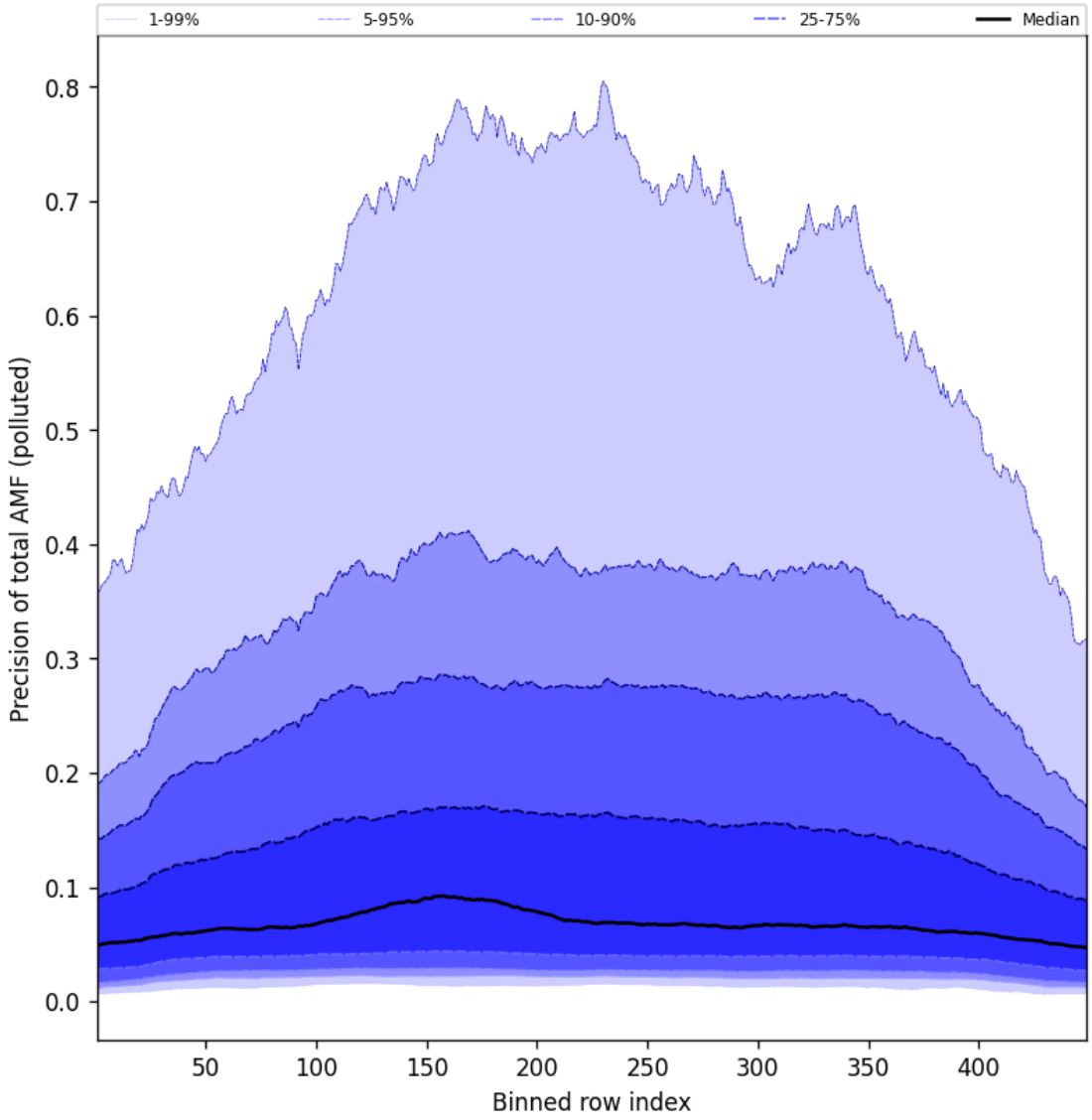

Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-04-23 to 2025-04-24

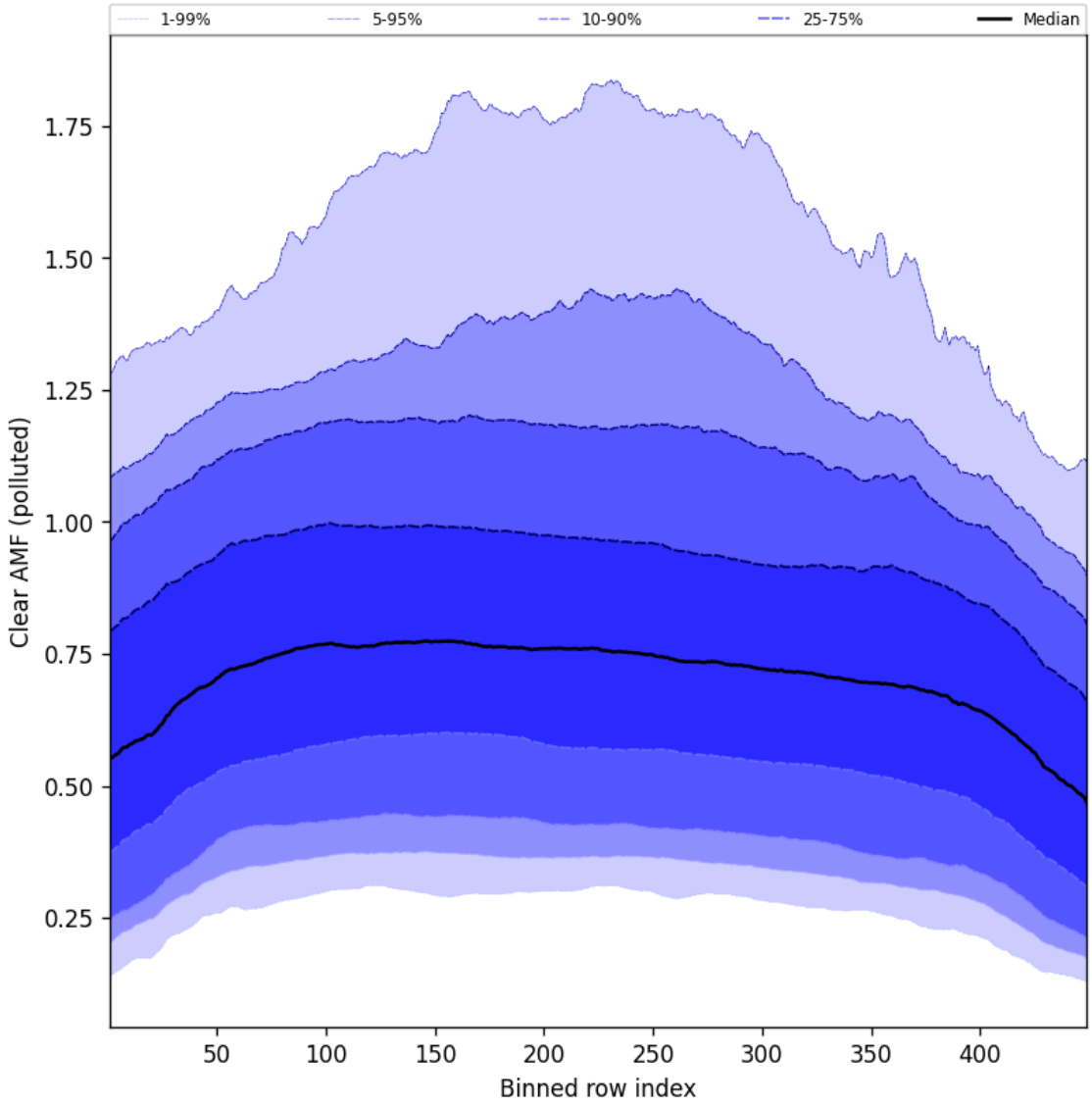

Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-04-23 to 2025-04-24

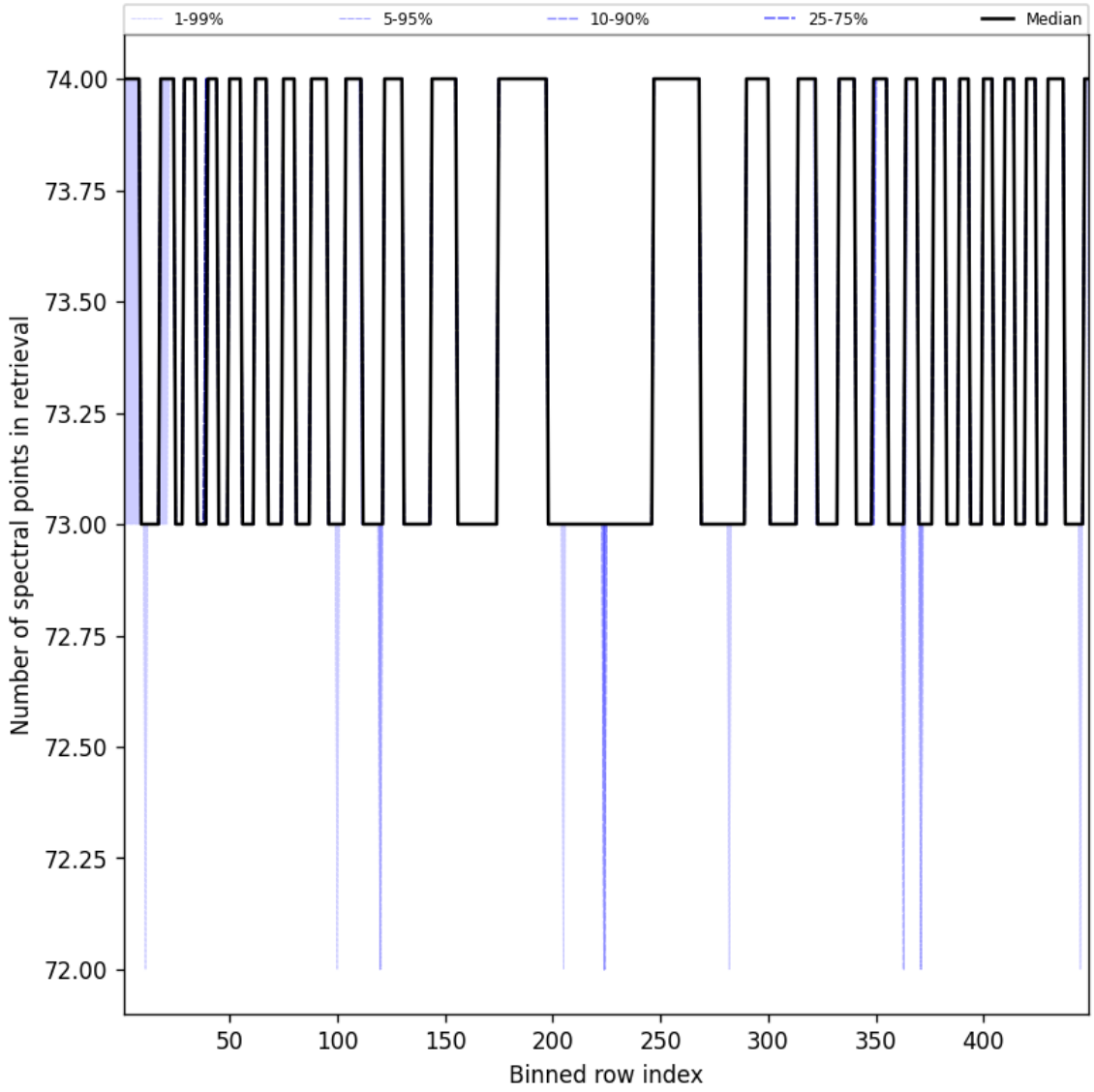

Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-04-23 to 2025-04-24

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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