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]	0.653 ± 0.397	17136796	0.995	0.770	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(4.389 \pm 116.807) \times 10^{-2}$	17136796	0.263	0.461	1.210×10^{-2}	-149	254
sulfurdioxide total vertical column precision [DU]	0.531 ± 0.794	17136796	0.222	0.348	0.329	4.292×10^{-2}	50.6
sulfurdioxide slant column density corrected [DU]	$(2.481 \pm 41.664) \times 10^{-2}$	17136796	0.267	0.377	1.064×10^{-2}	-11.3	50.1
sulfurdioxide slant column density cobra [DU]	$(2.428 \pm 39.432) \times 10^{-2}$	17136796	0.267	0.377	1.064×10^{-2}	-11.3	43.0
sulfurdioxide slant column density cobra precision [DU]	0.303 ± 0.138	17136796	0.213	0.146	0.265	8.465×10^{-2}	30.6
sulfurdioxide slant column density window1 [DU]	0.160 ± 0.726	17136796	0.175	0.757	0.173	-240	75.6
sulfurdioxide slant column density window1 precision [DU]	0.303 ± 0.138	17136796	0.213	0.146	0.265	8.465×10^{-2}	30.6
sulfurdioxide slant column density corrected win1 [DU]	$(4.375 \pm 71.921) \times 10^{-2}$	17136796	-2.500×10^{-2}	0.745	1.991×10^{-2}	-240	76.0
background so2 slant column offset window1 [DU]	-0.116 ± 0.176	17136796	-0.220	0.184	-0.155	-0.545	2.15
sulfurdioxide slant column density window2 [DU]	2.08 ± 9.27	17136796	1.25	11.8	1.87	-1.461×10^{3}	1.668×10^{3}
sulfurdioxide slant column density window2 precision [DU]	8.19 ± 2.21	17136796	7.43	2.50	7.86	2.12	576
sulfurdioxide slant column density corrected win2 [DU]	0.548 ± 8.825	17136796	0.250	11.2	0.529	-1.460×10^{3}	1.669×10^{3}
background so2 slant column offset window2 [DU]	-1.53 ± 3.16	17136796	0.750	3.84	-0.420	-16.2	12.9
sulfurdioxide slant column density window3 [DU]	-7.73 ± 23.94	17136796	-8.40	30.3	-8.03	-430	568
sulfurdioxide slant column density window3 precision [DU]	28.5 ± 13.6	17136796	22.5	9.73	24.7	9.59	359
sulfurdioxide slant column density corrected win3 [DU]	-1.20 ± 23.11	17136796	-1.68	29.0	-1.13	-424	566
background so2 slant column offset window3 [DU]	6.53 ± 6.72	17136796	0.560	11.6	6.22	-16.2	26.3
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.22	17136796	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(3.463 \pm 9.701) \times 10^{-2}$	17136796	1.316×10^{-2}	1.759×10^{-2}	1.329×10^{-2}	1.627×10^{-4}	2.63
fitted radiance shift [nm]	$(-3.369 \pm 26.651) \times 10^{-4}$	17136796	-5.000×10^{-4}	1.810×10^{-3}	-3.186×10^{-4}	-5.083×10^{-2}	5.098×10^{-2}
fitted radiance squeeze [1]	$(-2.776 \pm 18.571) \times 10^{-5}$	17136796	-1.000×10^{-5}	2.068×10^{-4}	-1.810×10^{-5}	-1.584×10^{-2}	1.735×10^{-2}
fitted root mean square [1]	$(1.325 \pm 0.580) \times 10^{-3}$	17136796	9.750×10^{-4}	5.815×10^{-4}	1.158×10^{-3}	3.221×10^{-4}	6.461×10^{-2}
sulfurdioxide total air mass factor polluted [1]	0.868 ± 0.423	17136796	0.820	0.554	0.821	5.000×10^{-2}	2.87
sulfurdioxide total air mass factor polluted precision [1]	0.104 ± 0.105	17136796	3.500×10^{-2}	9.874×10^{-2}	6.619×10^{-2}	2.557×10^{-3}	1.69
sulfurdioxide clear air mass factor polluted [1]	0.739 ± 0.293	17136796	0.700	0.394	0.722	3.723×10^{-2}	2.53
number of spectral points in retrieval [1]	73.4 ± 0.5	17136796	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	6.000×10^{-2}	0.130	0.230	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	−2.27	−0.881	−0.539	−0.362	−0.214	0.247	0.410	0.612	1.02	2.81
sulfurdioxide total vertical column precision [DU]	0.106	0.140	0.166	0.188	0.218	0.566	0.751	0.985	1.45	3.56
sulfurdioxide slant column density corrected [DU]	−0.885	−0.509	−0.367	−0.273	−0.175	0.201	0.306	0.411	0.580	1.13
sulfurdioxide slant column density cobra [DU]	−0.885	−0.509	−0.367	−0.273	−0.175	0.201	0.306	0.411	0.580	1.13
sulfurdioxide slant column density cobra precision [DU]	0.141	0.169	0.183	0.195	0.211	0.357	0.409	0.462	0.562	0.813
sulfurdioxide slant column density window1 [DU]	−1.84	−0.953	−0.630	−0.423	−0.212	0.545	0.741	0.929	1.22	2.04
sulfurdioxide slant column density window1 precision [DU]	0.141	0.169	0.183	0.195	0.211	0.357	0.409	0.462	0.562	0.813
sulfurdioxide slant column density corrected win1 [DU]	−1.72	−0.991	−0.719	−0.537	−0.347	0.399	0.608	0.816	1.15	2.12
background so2 slant column offset window1 [DU]	−0.414	−0.302	−0.276	−0.255	−0.230	-4.628×10^{-2}	2.124×10^{-2}	9.632×10^{-2}	0.217	0.504
sulfurdioxide slant column density window2 [DU]	−19.3	−12.6	−9.27	−6.78	−3.95	7.89	10.9	13.7	17.4	25.2
sulfurdioxide slant column density window2 precision [DU]	4.40	5.34	5.86	6.27	6.75	9.25	10.1	11.0	12.2	14.9
sulfurdioxide slant column density corrected win2 [DU]	−20.6	−13.7	−10.3	−7.86	−5.07	6.13	8.93	11.4	14.8	22.0
background so2 slant column offset window2 [DU]	−10.6	−8.27	−6.48	−4.85	−3.09	0.755	1.04	1.26	1.57	2.67
sulfurdioxide slant column density window3 [DU]	−66.3	−46.5	−37.1	−30.4	−22.9	7.35	15.3	22.4	32.0	50.9
sulfurdioxide slant column density window3 precision [DU]	13.8	16.5	18.2	19.6	21.1	30.8	35.7	42.0	54.4	86.7
sulfurdioxide slant column density corrected win3 [DU]	−59.2	−39.2	−29.7	−23.0	−15.6	13.4	20.8	27.5	36.5	54.8
background so2 slant column offset window3 [DU]	−5.46	−2.59	−1.43	−0.559	0.538	12.1	14.1	15.6	17.5	20.5
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]	6.987×10^{-4}	1.496×10^{-3}	3.455×10^{-3}	5.388×10^{-3}	7.554×10^{-3}	2.514×10^{-2}	3.987×10^{-2}	6.659×10^{-2}	0.124	0.404
fitted radiance shift [nm]	-8.426×10^{-3}	-4.266×10^{-3}	-2.819×10^{-3}	-1.985×10^{-3}	-1.271×10^{-3}	5.385×10^{-4}	1.228×10^{-3}	2.109×10^{-3}	3.666×10^{-3}	8.050×10^{-3}
fitted radiance squeeze [1]	-5.744×10^{-4}	-3.332×10^{-4}	-2.419×10^{-4}	-1.835×10^{-4}	-1.246×10^{-4}	8.228×10^{-5}	1.328×10^{-4}	1.794×10^{-4}	2.454×10^{-4}	4.005×10^{-4}
fitted root mean square [1]	5.957×10^{-4}	7.443×10^{-4}	8.208×10^{-4}	8.795×10^{-4}	9.527×10^{-4}	1.534×10^{-3}	1.790×10^{-3}	2.041×10^{-3}	2.420×10^{-3}	3.477×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.106	0.262	0.358	0.447	0.559	1.11	1.30	1.47	1.68	1.98
sulfurdioxide total air mass factor polluted precision [1]	1.105×10^{-2}	1.877×10^{-2}	2.510×10^{-2}	3.084×10^{-2}	3.892×10^{-2}	0.138	0.178	0.219	0.290	0.533
sulfurdioxide clear air mass factor polluted [1]	0.199	0.298	0.371	0.441	0.531	0.925	1.02	1.10	1.23	1.59
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]	0.616 ± 0.400	9975062	0.790	0.490	0.0	1.000	0.210	1.000
sulfurdioxide total vertical column [DU]	$(5.720 \pm 144.459) \times 10^{-2}$	9975062	0.501	1.214×10^{-2}	-149	254	-0.232	0.269
sulfurdioxide total vertical column precision [DU]	0.622 ± 0.983	9975062	0.425	0.366	4.292×10^{-2}	50.6	0.227	0.652
sulfurdioxide slant column density corrected [DU]	$(2.804 \pm 44.999) \times 10^{-2}$	9975062	0.383	1.017×10^{-2}	-8.95	45.6	-0.178	0.204
sulfurdioxide slant column density cobra [DU]	$(2.720 \pm 41.723) \times 10^{-2}$	9975062	0.383	1.017×10^{-2}	-8.95	24.5	-0.178	0.204
sulfurdioxide slant column density cobra precision [DU]	0.313 ± 0.149	9975062	0.167	0.273	8.529×10^{-2}	14.8	0.207	0.375
sulfurdioxide slant column density window1 [DU]	0.156 ± 0.765	9975062	0.773	0.172	-44.6	75.6	-0.222	0.551
sulfurdioxide slant column density window1 precision [DU]	0.313 ± 0.149	9975062	0.167	0.273	8.529×10^{-2}	14.8	0.207	0.375
sulfurdioxide slant column density corrected win1 [DU]	$(5.244 \pm 75.928) \times 10^{-2}$	9975062	0.762	2.200×10^{-2}	-44.6	76.0	-0.351	0.411
background so2 slant column offset window1 [DU]	-0.103 ± 0.201	9975062	0.202	-0.154	-0.545	2.15	-0.233	-3.116×10^{-2}
sulfurdioxide slant column density window2 [DU]	2.79 ± 9.11	9975062	11.8	2.55	-313	119	-3.23	8.57
sulfurdioxide slant column density window2 precision [DU]	7.94 ± 2.07	9975062	2.35	7.63	2.45	427	6.58	8.93
sulfurdioxide slant column density corrected win2 [DU]	0.459 ± 8.472	9975062	10.9	0.460	-320	109	-4.99	5.89
background so2 slant column offset window2 [DU]	-2.34 ± 3.68	9975062	5.86	-1.24	-16.2	11.7	-5.07	0.788
sulfurdioxide slant column density window3 [DU]	-9.58 ± 22.69	9975062	28.6	-9.92	-188	251	-24.0	4.60
sulfurdioxide slant column density window3 precision [DU]	26.9 ± 12.7	9975062	8.20	23.5	9.59	234	20.3	28.5
sulfurdioxide slant column density corrected win3 [DU]	-1.07 ± 21.79	9975062	27.4	-0.965	-175	258	-14.7	12.7
background so2 slant column offset window3 [DU]	8.51 ± 6.83	9975062	12.5	9.51	-15.0	26.3	1.72	14.2
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.21	9975062	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(4.634 \pm 12.241) \times 10^{-2}$	9975062	3.068×10^{-2}	1.516×10^{-2}	1.627×10^{-4}	2.63	6.458×10^{-3}	3.714×10^{-2}
fitted radiance shift [nm]	$(-1.868 \pm 25.402) \times 10^{-4}$	9975062	1.645×10^{-3}	-1.927×10^{-4}	-5.083×10^{-2}	3.663×10^{-2}	-1.039×10^{-3}	6.059×10^{-4}
fitted radiance squeeze [1]	$(-4.821 \pm 19.302) \times 10^{-5}$	9975062	2.110×10^{-4}	-3.123×10^{-5}	-6.037×10^{-3}	1.735×10^{-2}	-1.426×10^{-4}	6.840×10^{-5}
fitted root mean square [1]	$(1.364 \pm 0.637) \times 10^{-3}$	9975062	6.580×10^{-4}	1.178×10^{-3}	3.221×10^{-4}	5.330×10^{-2}	9.431×10^{-4}	1.601×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.824 ± 0.441	9975062	0.599	0.759	5.000×10^{-2}	2.87	0.487	1.09
sulfurdioxide total air mass factor polluted precision [1]	0.107 ± 0.121	9975062	0.102	6.352×10^{-2}	2.557×10^{-3}	1.69	3.454×10^{-2}	0.136
sulfurdioxide clear air mass factor polluted [1]	0.700 ± 0.331	9975062	0.458	0.659	3.723×10^{-2}	2.53	0.445	0.902
number of spectral points in retrieval [1]	73.5 ± 0.5	9975062	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]	0.704 ± 0.386	7161734	0.690	1.000	0.0	1.000	0.310	1.000
sulfurdioxide total vertical column [DU]	$(2.535 \pm 59.794) \times 10^{-2}$	7161734	0.414	1.206×10^{-2}	-21.6	64.1	-0.193	0.222
sulfurdioxide total vertical column precision [DU]	0.403 ± 0.366	7161734	0.264	0.290	4.655×10^{-2}	39.1	0.210	0.475
sulfurdioxide slant column density corrected [DU]	$(2.030 \pm 36.512) \times 10^{-2}$	7161734	0.369	1.128×10^{-2}	-11.3	50.1	-0.172	0.197
sulfurdioxide slant column density cobra [DU]	$(2.022 \pm 35.995) \times 10^{-2}$	7161734	0.369	1.128×10^{-2}	-11.3	43.0	-0.172	0.197
sulfurdioxide slant column density cobra precision [DU]	0.290 ± 0.120	7161734	0.116	0.258	8.465×10^{-2}	30.6	0.215	0.331
sulfurdioxide slant column density window1 [DU]	0.166 ± 0.667	7161734	0.738	0.173	-240	74.4	-0.200	0.537
sulfurdioxide slant column density window1 precision [DU]	0.290 ± 0.120	7161734	0.116	0.258	8.465×10^{-2}	30.6	0.215	0.331
sulfurdioxide slant column density corrected win1 [DU]	$(3.166 \pm 65.916) \times 10^{-2}$	7161734	0.724	1.714×10^{-2}	-240	74.5	-0.341	0.383
background so2 slant column offset window1 [DU]	-0.134 ± 0.134	7161734	0.161	-0.156	-0.544	2.14	-0.226	-6.546×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.08 ± 9.39	7161734	11.8	0.912	-1.461×10^{3}	1.668×10^{3}	-4.91	6.88
sulfurdioxide slant column density window2 precision [DU]	8.55 ± 2.35	7161734	2.64	8.20	2.12	576	7.04	9.69
sulfurdioxide slant column density corrected win2 [DU]	0.674 ± 9.292	7161734	11.7	0.633	-1.460×10^{3}	1.669×10^{3}	-5.20	6.48
background so2 slant column offset window2 [DU]	-0.409 ± 1.702	7161734	2.04	-4.210×10^{-2}	-10.0	12.9	-1.32	0.720
sulfurdioxide slant column density window3 [DU]	-5.16 ± 25.35	7161734	32.2	-5.06	-430	568	-21.1	11.1
sulfurdioxide slant column density window3 precision [DU]	30.7 ± 14.4	7161734	10.9	26.7	9.81	359	22.6	33.5
sulfurdioxide slant column density corrected win3 [DU]	-1.37 ± 24.84	7161734	31.6	-1.39	-424	566	-17.1	14.5
background so2 slant column offset window3 [DU]	3.78 ± 5.50	7161734	9.01	2.52	-16.2	25.1	-0.562	8.44
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.23	7161734	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(1.833 \pm 3.449) \times 10^{-2}$	7161734	9.723×10^{-3}	1.219×10^{-2}	1.157×10^{-3}	1.75	8.422×10^{-3}	1.815×10^{-2}
fitted radiance shift [nm]	$(-5.459 \pm 28.166) \times 10^{-4}$	7161734	2.012×10^{-3}	-5.242×10^{-4}	-5.011×10^{-2}	5.098×10^{-2}	-1.598×10^{-3}	4.137×10^{-4}
fitted radiance squeeze [1]	$(7.117 \pm 1709.783) \times 10^{-7}$	7161734	2.021×10^{-4}	-1.292×10^{-7}	-1.584×10^{-2}	1.490×10^{-2}	-1.010×10^{-4}	1.011×10^{-4}
fitted root mean square [1]	$(1.271 \pm 0.484) \times 10^{-3}$	7161734	4.796×10^{-4}	1.139×10^{-3}	3.399×10^{-4}	6.461×10^{-2}	9.645×10^{-4}	1.444×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.930 ± 0.388	7161734	0.488	0.886	5.000×10^{-2}	2.59	0.656	1.14
sulfurdioxide total air mass factor polluted precision [1]	$(9.942 \pm 7.662) \times 10^{-2}$	7161734	9.518×10^{-2}	6.963×10^{-2}	5.074×10^{-3}	1.55	4.387×10^{-2}	0.139
sulfurdioxide clear air mass factor polluted [1]	0.794 ± 0.219	7161734	0.314	0.779	0.153	2.01	0.634	0.948
number of spectral points in retrieval [1]	73.4 ± 0.5	7161734	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]	0.682 ± 0.395	11428471	0.740	1.000	0.0	1.000	0.260	1.000
sulfurdioxide total vertical column [DU]	$(3.072 \pm 98.981) \times 10^{-2}$	11428471	0.421	1.051×10^{-2}	-149	219	-0.198	0.224
sulfurdioxide total vertical column precision [DU]	0.450 ± 0.648	11428471	0.288	0.293	5.553×10^{-2}	50.6	0.209	0.497
sulfurdioxide slant column density corrected [DU]	$(1.924 \pm 36.806) \times 10^{-2}$	11428471	0.363	9.558×10^{-3}	-9.07	45.2	-0.170	0.193
sulfurdioxide slant column density cobra [DU]	$(1.918 \pm 36.484) \times 10^{-2}$	11428471	0.363	9.558×10^{-3}	-9.07	43.0	-0.170	0.193
sulfurdioxide slant column density cobra precision [DU]	0.293 ± 0.135	11428471	0.136	0.252	8.465×10^{-2}	30.6	0.205	0.341
sulfurdioxide slant column density window1 [DU]	0.159 ± 0.684	11428471	0.734	0.172	-44.6	75.6	-0.200	0.534
sulfurdioxide slant column density window1 precision [DU]	0.293 ± 0.135	11428471	0.136	0.252	8.465×10^{-2}	30.6	0.205	0.341
sulfurdioxide slant column density corrected win1 [DU]	$(3.103 \pm 67.572) \times 10^{-2}$	11428471	0.722	1.388×10^{-2}	-44.6	76.0	-0.342	0.380
background so2 slant column offset window1 [DU]	-0.128 ± 0.157	11428471	0.173	-0.160	-0.545	2.15	-0.231	-5.793×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.60 ± 9.12	11428471	11.6	1.37	-596	1.361×10^{3}	-4.33	7.26
sulfurdioxide slant column density window2 precision [DU]	8.13 ± 2.14	11428471	2.50	7.80	2.12	576	6.70	9.20
sulfurdioxide slant column density corrected win2 [DU]	0.514 ± 8.789	11428471	11.2	0.489	-595	1.361×10^{3}	-5.09	6.08
background so2 slant column offset window2 [DU]	-1.08 ± 2.86	11428471	2.94	-0.159	-16.2	12.9	-2.13	0.815
sulfurdioxide slant column density window3 [DU]	-4.73 ± 24.10	11428471	30.7	-5.03	-235	568	-20.1	10.6
sulfurdioxide slant column density window3 precision [DU]	27.8 ± 12.1	11428471	9.23	24.5	9.59	359	21.1	30.3
sulfurdioxide slant column density corrected win3 [DU]	0.857 ± 23.069	11428471	29.3	0.697	-228	566	-13.8	15.5
background so2 slant column offset window3 [DU]	5.58 ± 6.40	11428471	10.5	4.65	-16.2	26.3	0.199	10.7
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.24	11428471	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.347 \pm 5.414) \times 10^{-2}$	11428471	1.290×10^{-2}	1.288×10^{-2}	3.204×10^{-4}	1.85	8.135×10^{-3}	2.103×10^{-2}
fitted radiance shift [nm]	$(-3.581 \pm 23.966) \times 10^{-4}$	11428471	1.768×10^{-3}	-3.201×10^{-4}	-5.083×10^{-2}	3.829×10^{-2}	-1.267×10^{-3}	5.006×10^{-4}
fitted radiance squeeze [1]	$(-1.553 \pm 17.783) \times 10^{-5}$	11428471	1.985×10^{-4}	-9.006×10^{-6}	-1.485×10^{-2}	1.735×10^{-2}	-1.100×10^{-4}	8.856×10^{-5}
fitted root mean square [1]	$(1.284 \pm 0.552) \times 10^{-3}$	11428471	5.467×10^{-4}	1.113×10^{-3}	3.399×10^{-4}	5.912×10^{-2}	9.295×10^{-4}	1.476×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.902 ± 0.391	11428471	0.493	0.867	5.000×10^{-2}	2.50	0.628	1.12
sulfurdioxide total air mass factor polluted precision [1]	0.100 ± 0.091	11428471	8.979×10^{-2}	6.803×10^{-2}	2.779×10^{-3}	1.69	4.282×10^{-2}	0.133
sulfurdioxide clear air mass factor polluted [1]	0.769 ± 0.251	11428471	0.339	0.766	3.723×10^{-2}	2.47	0.597	0.936
number of spectral points in retrieval [1]	73.4 ± 0.5	11428471	1.000	73.0	52.0	74.0	73.0	74.0

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

Variable	mean $\pm\sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.643 ± 0.400	4008576	0.780	1.000	0.0	1.000	0.220	1.000
sulfurdioxide total vertical column [DU]	$(4.710 \pm 125.098) \times 10^{-2}$	4008576	0.539	1.371×10^{-2}	-98.5	116	-0.249	0.290
sulfurdioxide total vertical column precision [DU]	0.639 ± 0.908	4008576	0.417	0.403	4.292×10^{-2}	37.8	0.252	0.669
sulfurdioxide slant column density corrected [DU]	$(2.626 \pm 40.575) \times 10^{-2}$	4008576	0.384	1.102×10^{-2}	-11.3	50.1	-0.179	0.206
sulfurdioxide slant column density cobra [DU]	$(2.595 \pm 39.117) \times 10^{-2}$	4008576	0.384	1.102×10^{-2}	-11.3	17.2	-0.179	0.206
sulfurdioxide slant column density cobra precision [DU]	0.306 ± 0.131	4008576	0.141	0.272	8.604×10^{-2}	11.0	0.219	0.360
sulfurdioxide slant column density window1 [DU]	0.178 ± 0.734	4008576	0.763	0.188	-240	33.2	-0.199	0.564
sulfurdioxide slant column density window1 precision [DU]	0.306 ± 0.131	4008576	0.141	0.272	8.604×10^{-2}	11.0	0.219	0.360
sulfurdioxide slant column density corrected win1 [DU]	$(5.414 \pm 72.784) \times 10^{-2}$	4008576	0.751	2.777×10^{-2}	-240	33.0	-0.341	0.410
background so2 slant column offset window1 [DU]	-0.124 ± 0.186	4008576	0.176	-0.168	-0.545	2.06	-0.239	-6.278×10^{-2}
sulfurdioxide slant column density window2 [DU]	2.27 ± 9.45	4008576	12.1	2.14	-1.461×10^{3}	1.668×10^{3}	-3.83	8.25
sulfurdioxide slant column density window2 precision [DU]	8.37 ± 2.39	4008576	2.49	8.03	2.36	457	6.90	9.39
sulfurdioxide slant column density corrected win2 [DU]	0.620 ± 8.957	4008576	11.3	0.615	-1.460×10^{3}	1.669×10^{3}	-5.03	6.25
background so2 slant column offset window2 [DU]	-1.65 ± 3.20	4008576	4.39	-0.439	-16.1	12.3	-3.64	0.757
sulfurdioxide slant column density window3 [DU]	-13.6 ± 23.0	4008576	28.8	-13.4	-430	406	-27.9	0.930
sulfurdioxide slant column density window3 precision [DU]	30.8 ± 16.8	4008576	11.5	25.9	9.73	238	21.5	33.0
sulfurdioxide slant column density corrected win3 [DU]	-6.49 ± 23.23	4008576	29.0	-5.82	-424	403	-20.7	8.37
background so2 slant column offset window3 [DU]	7.12 ± 6.82	4008576	12.2	7.04	-16.2	26.3	0.857	13.0
sulfurdioxide slant column cobra flag [1]	1.99 ± 0.13	4008576	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(6.003 \pm 14.433) \times 10^{-2}$	4008576	4.822×10^{-2}	1.834×10^{-2}	1.627×10^{-4}	2.63	7.529×10^{-3}	5.575×10^{-2}
fitted radiance shift [nm]	$(-2.701 \pm 33.261) \times 10^{-4}$	4008576	1.937×10^{-3}	-2.967×10^{-4}	-5.011×10^{-2}	3.729×10^{-2}	-1.272×10^{-3}	6.656×10^{-4}
fitted radiance squeeze [1]	$(-4.041 \pm 18.629) \times 10^{-5}$	4008576	2.130×10^{-4}	-3.015×10^{-5}	-1.584×10^{-2}	1.490×10^{-2}	-1.405×10^{-4}	7.258×10^{-5}
fitted root mean square [1]	$(1.329 \pm 0.566) \times 10^{-3}$	4008576	5.354×10^{-4}	1.188×10^{-3}	3.221×10^{-4}	6.461×10^{-2}	9.835×10^{-4}	1.519×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.792 ± 0.461	4008576	0.594	0.677	5.000×10^{-2}	2.87	0.458	1.05
sulfurdioxide total air mass factor polluted precision [1]	0.112 ± 0.128	4008576	0.121	5.902×10^{-2}	2.557×10^{-3}	1.56	3.045×10^{-2}	0.151
sulfurdioxide clear air mass factor polluted [1]	0.675 ± 0.330	4008576	0.418	0.609	4.486×10^{-2}	2.53	0.435	0.853
number of spectral points in retrieval [1]	73.4 ± 0.5	4008576	1.000	73.0	52.0	74.0	73.0	74.0

3 Granule outlines

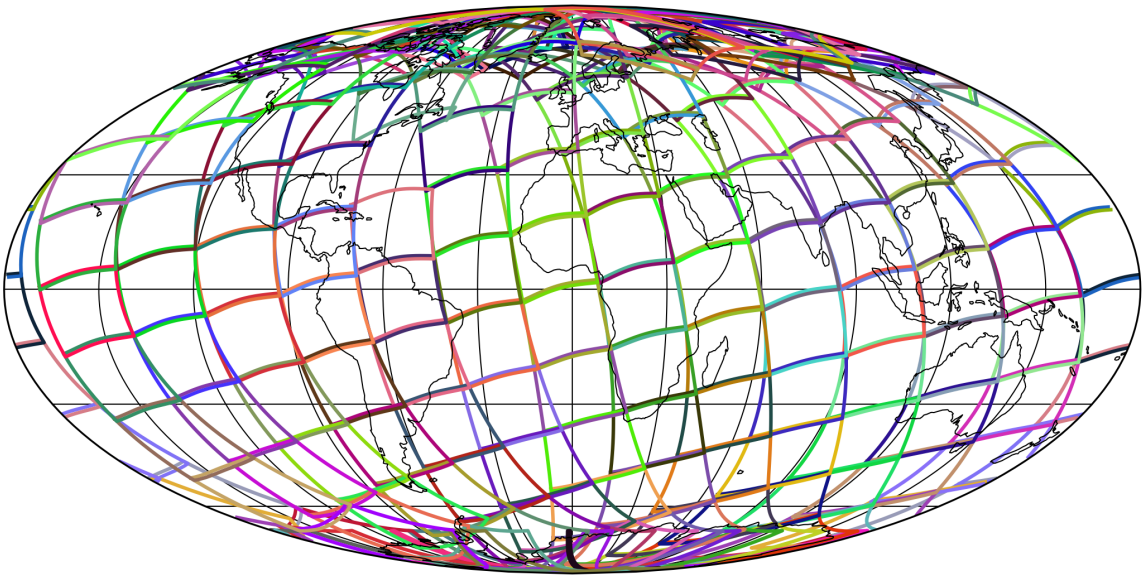

Figure 1: Outline of the granules.

4 Input data monitoring

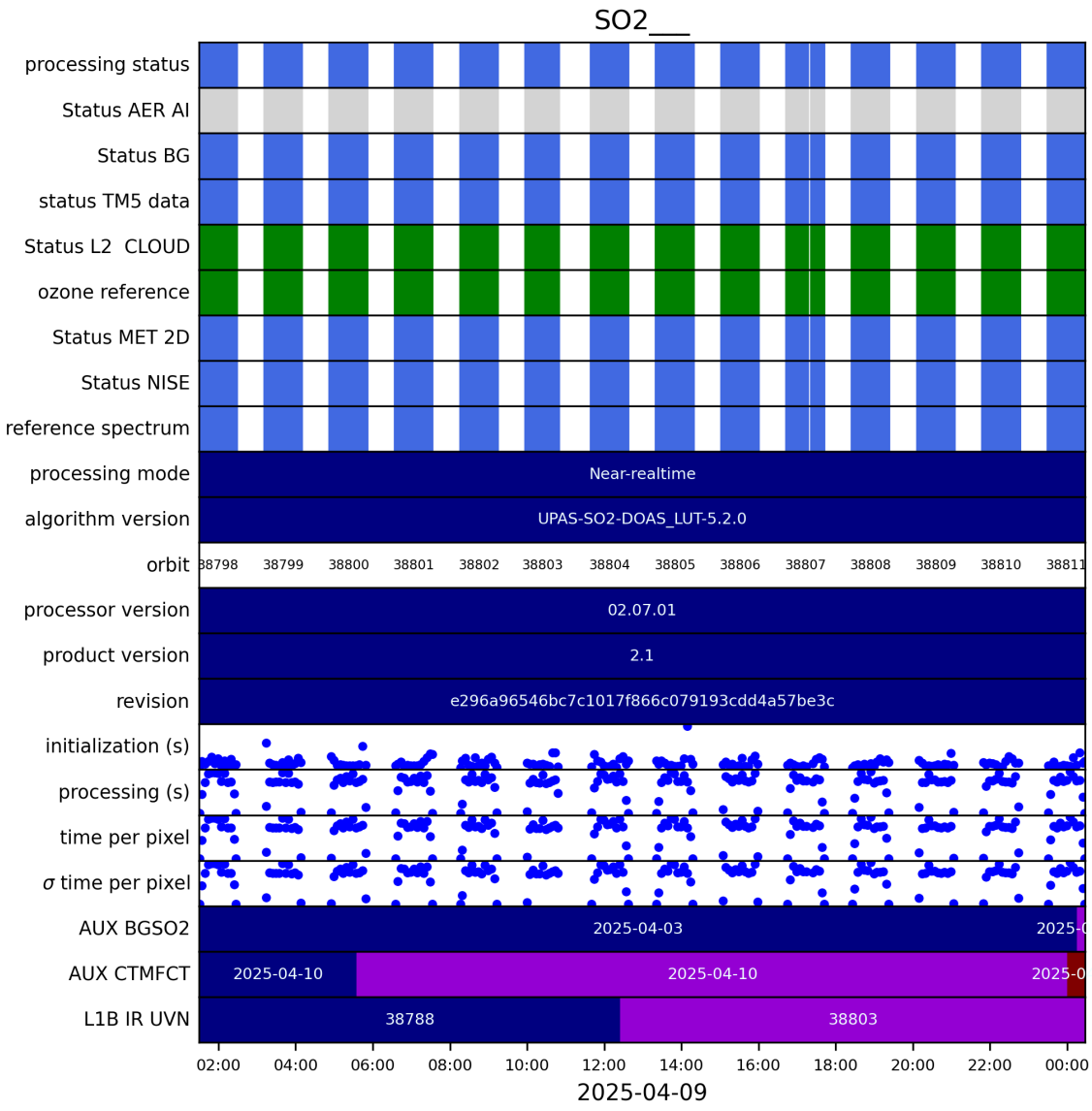

Figure 2: Input data per granule

5 Warnings and errors

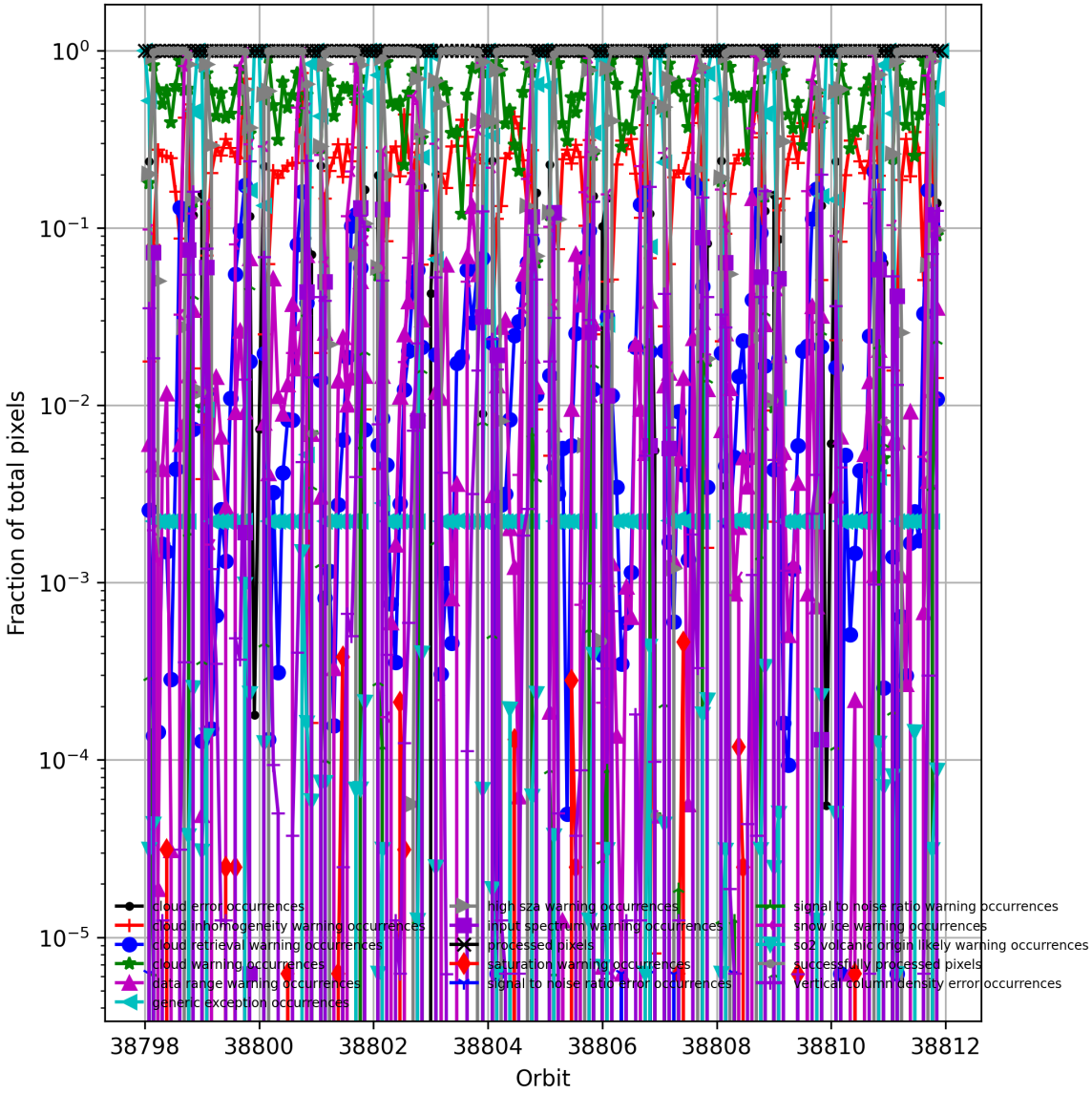

Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

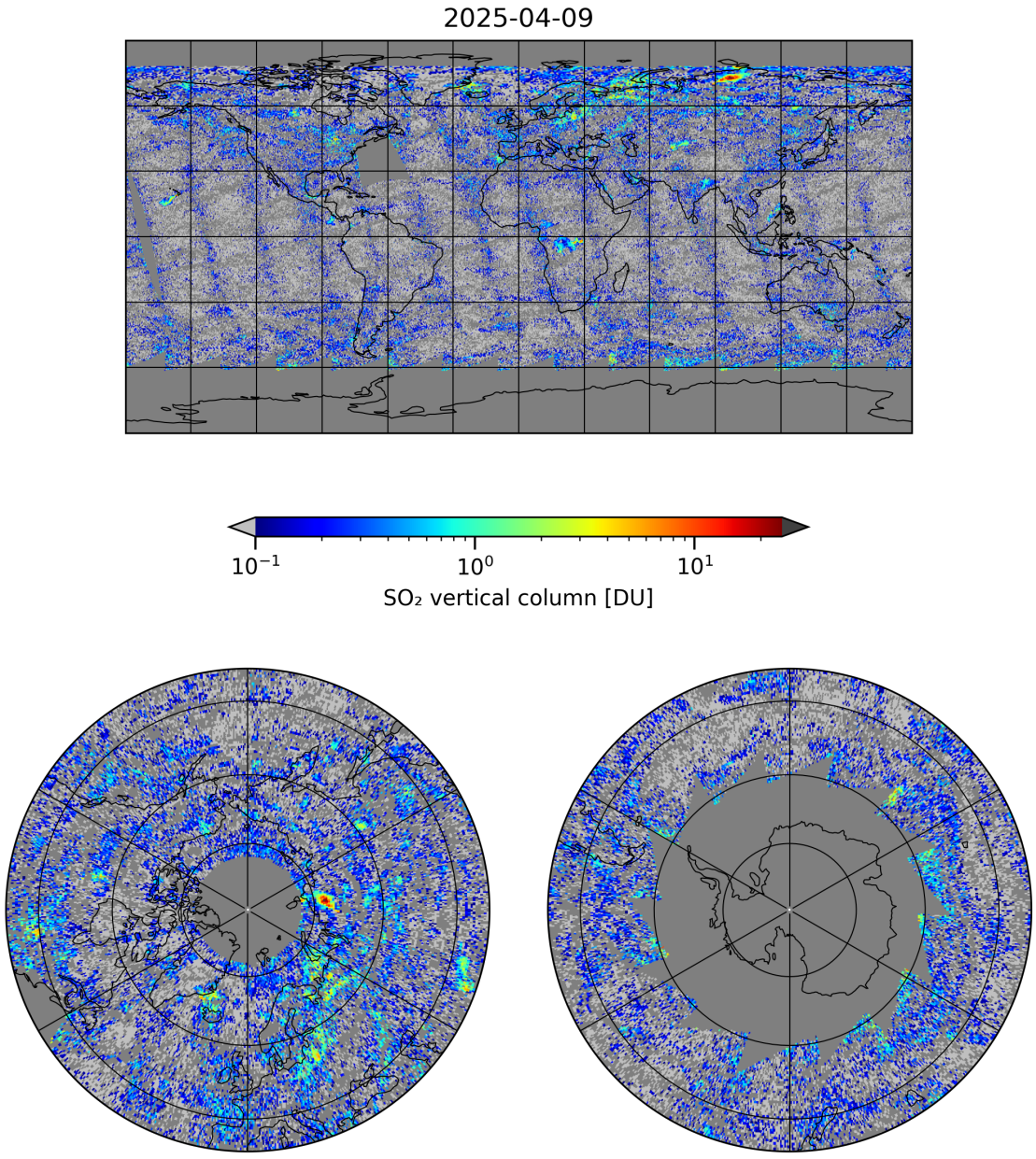

Figure 4: Map of "SO_2 vertical column" for 2025-04-09 to 2025-04-10

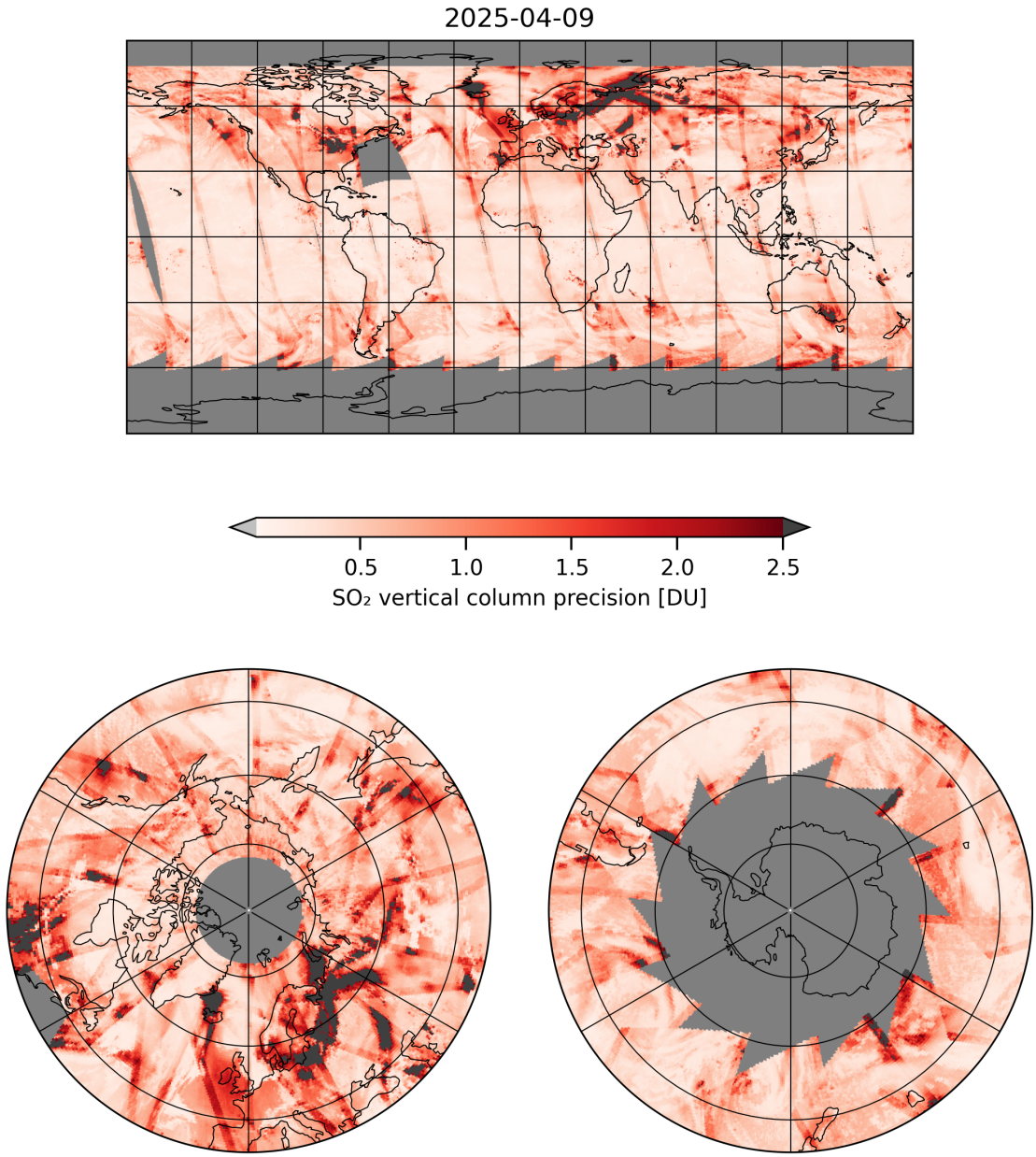

Figure 5: Map of "SO_2 vertical column precision" for 2025-04-09 to 2025-04-10

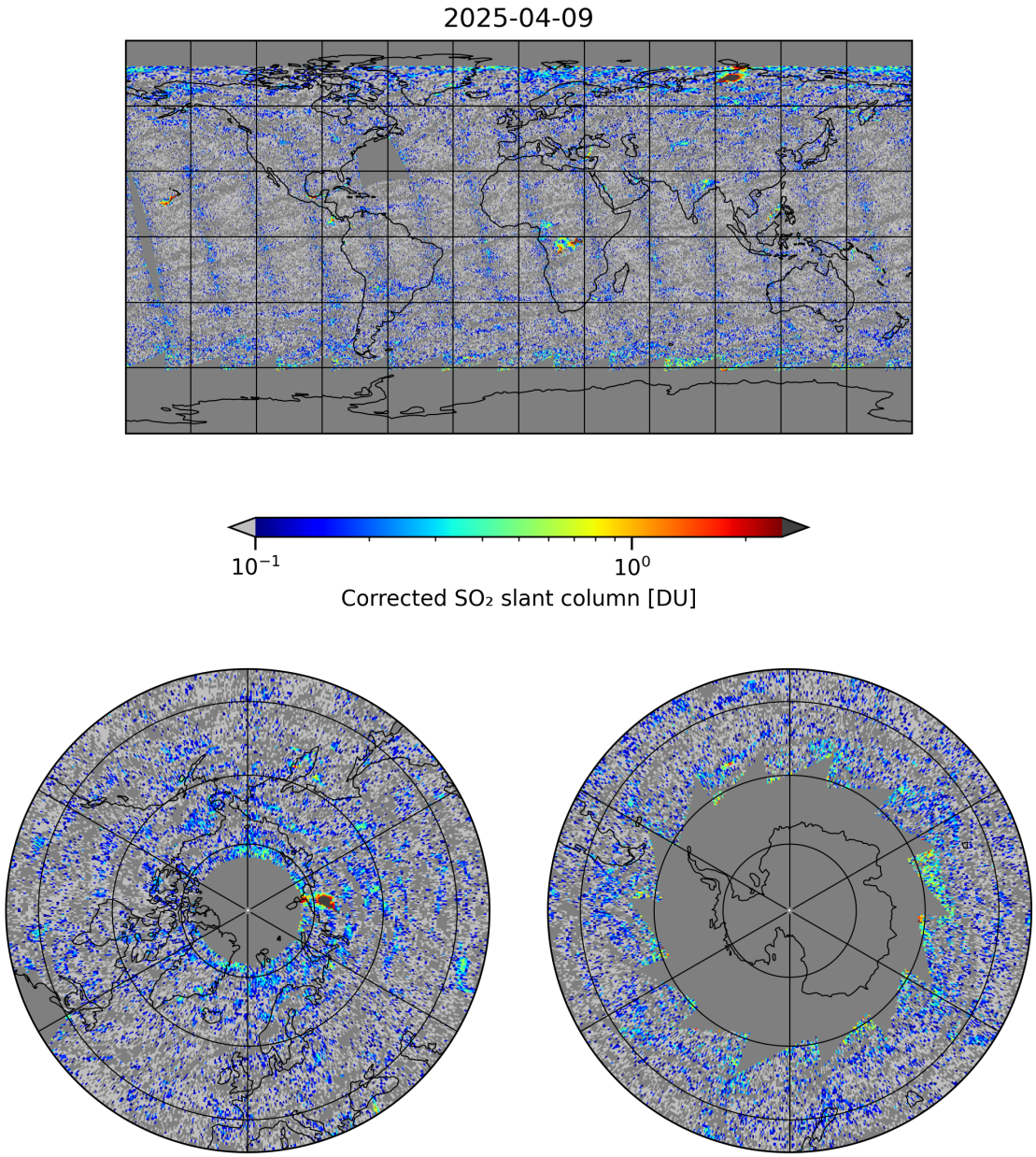

Figure 6: Map of “Corrected SO_2 slant column” for 2025-04-09 to 2025-04-10

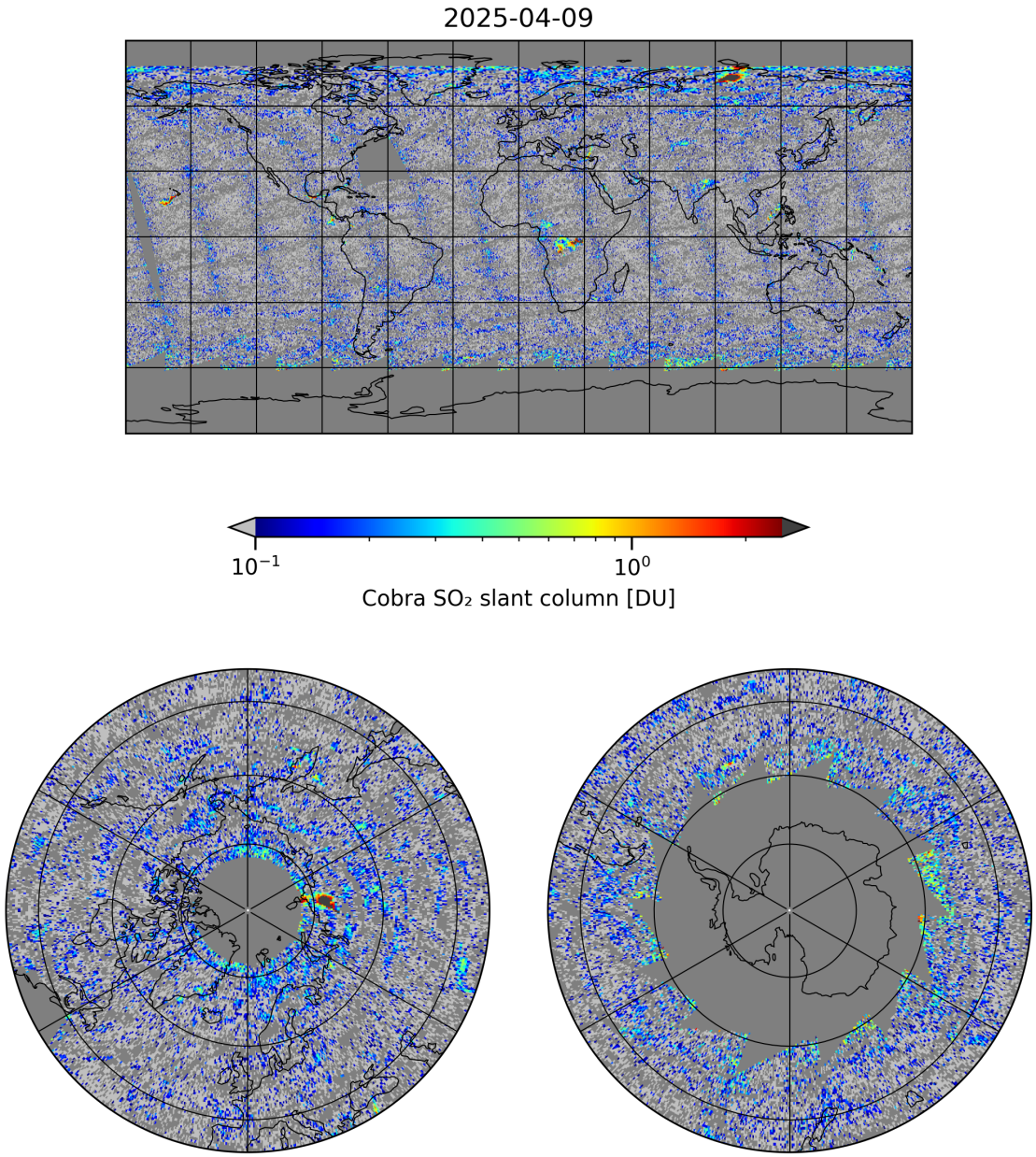

Figure 7: Map of "Cobra SO_2 slant column" for 2025-04-09 to 2025-04-10

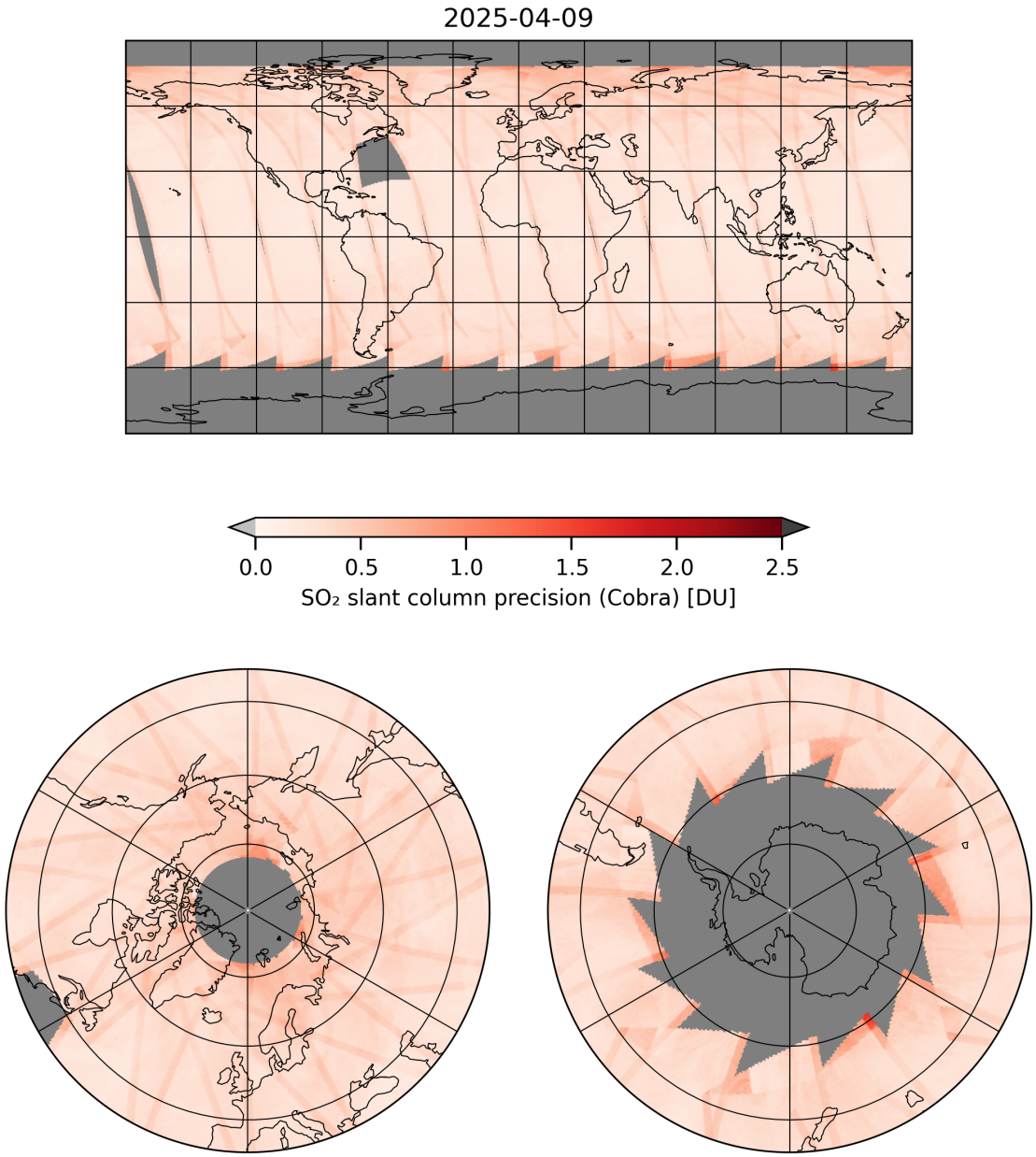

Figure 8: Map of "SO_2 slant column precision (Cobra)" for 2025-04-09 to 2025-04-10

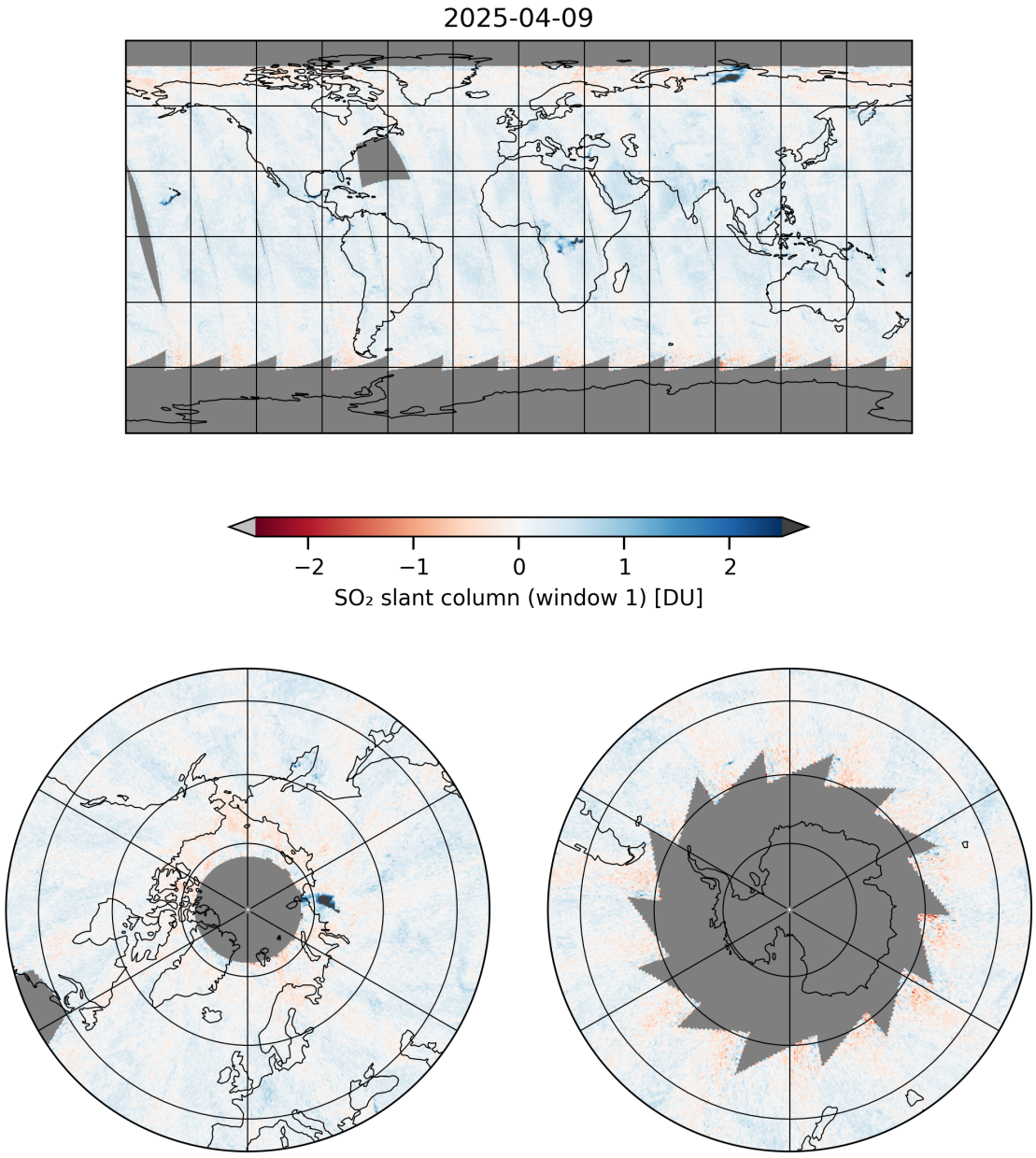

Figure 9: Map of "SO_2 slant column (window 1)" for 2025-04-09 to 2025-04-10

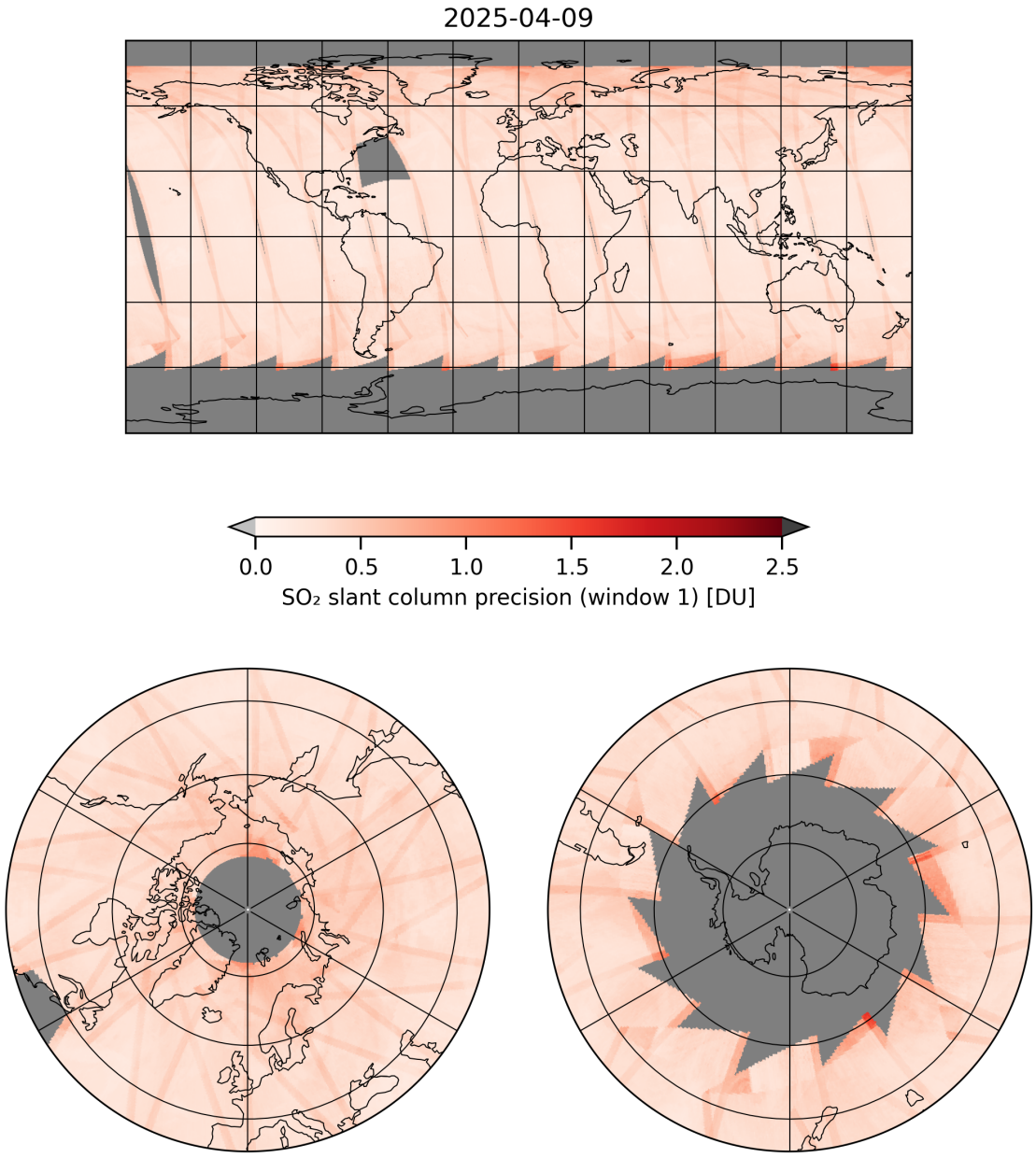

Figure 10: Map of "SO_2 slant column precision (window 1)" for 2025-04-09 to 2025-04-10

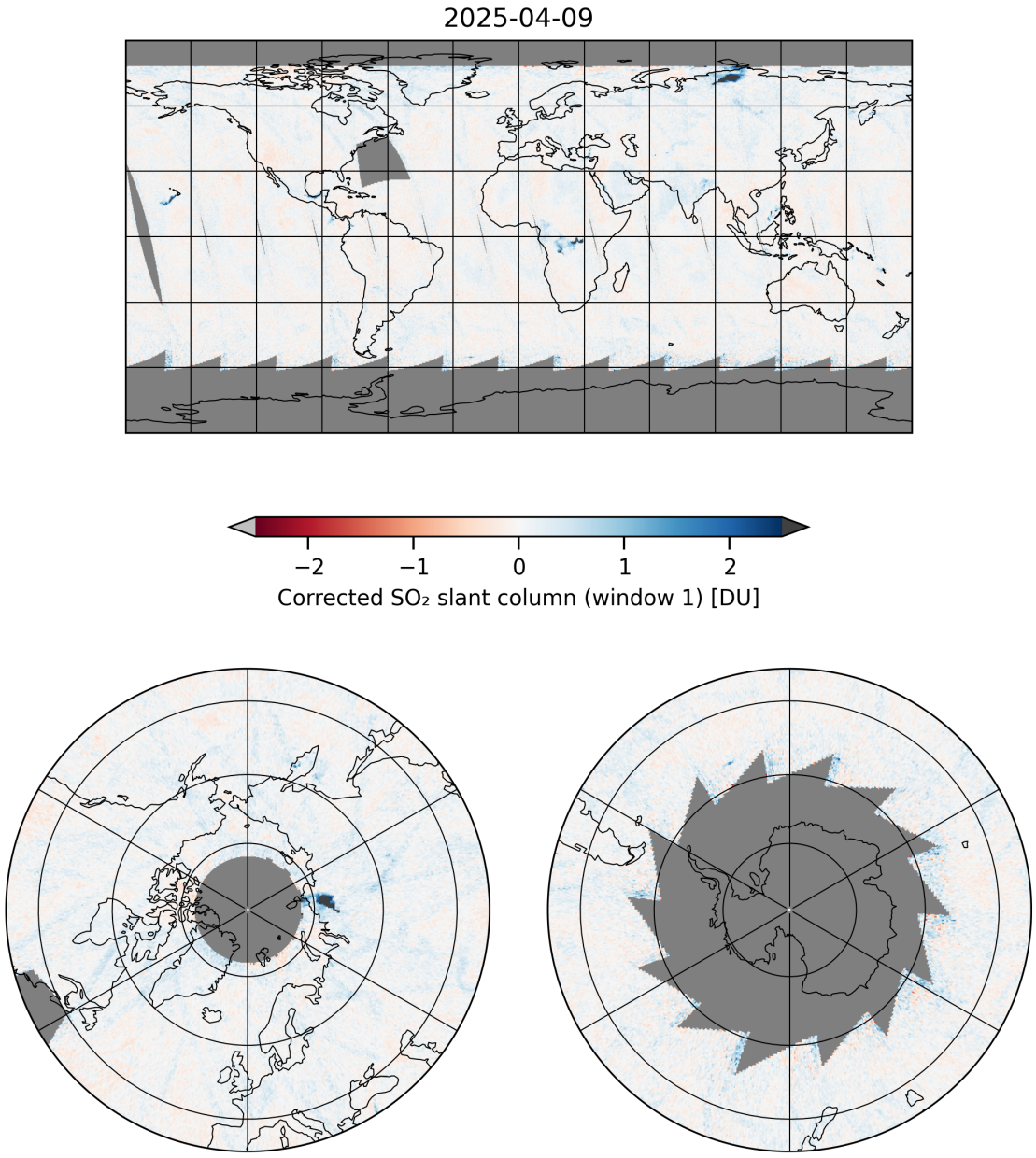

Figure 11: Map of “Corrected SO_2 slant column (window 1)” for 2025-04-09 to 2025-04-10

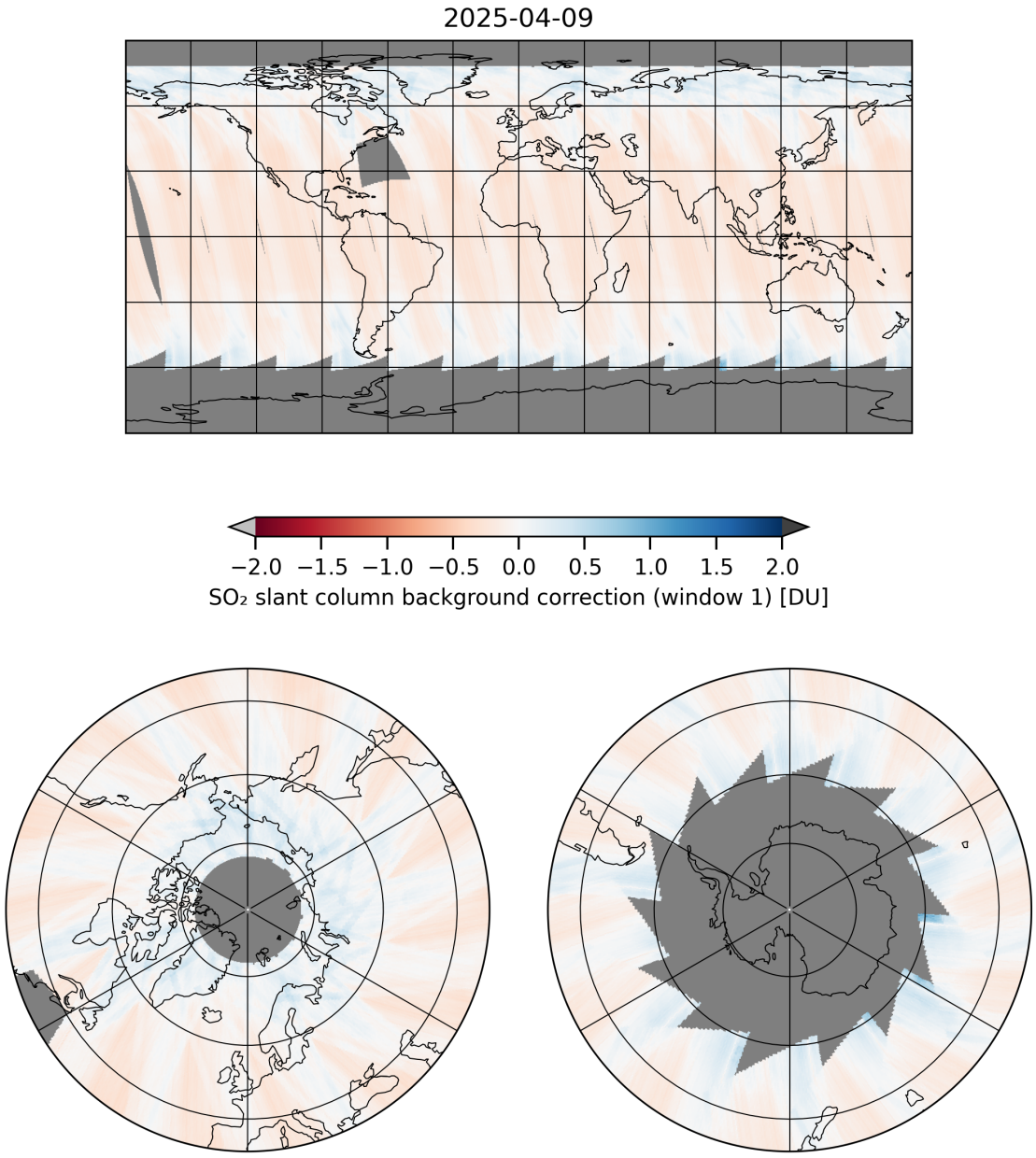

Figure 12: Map of "SO_2 slant column background correction (window 1)" for 2025-04-09 to 2025-04-10

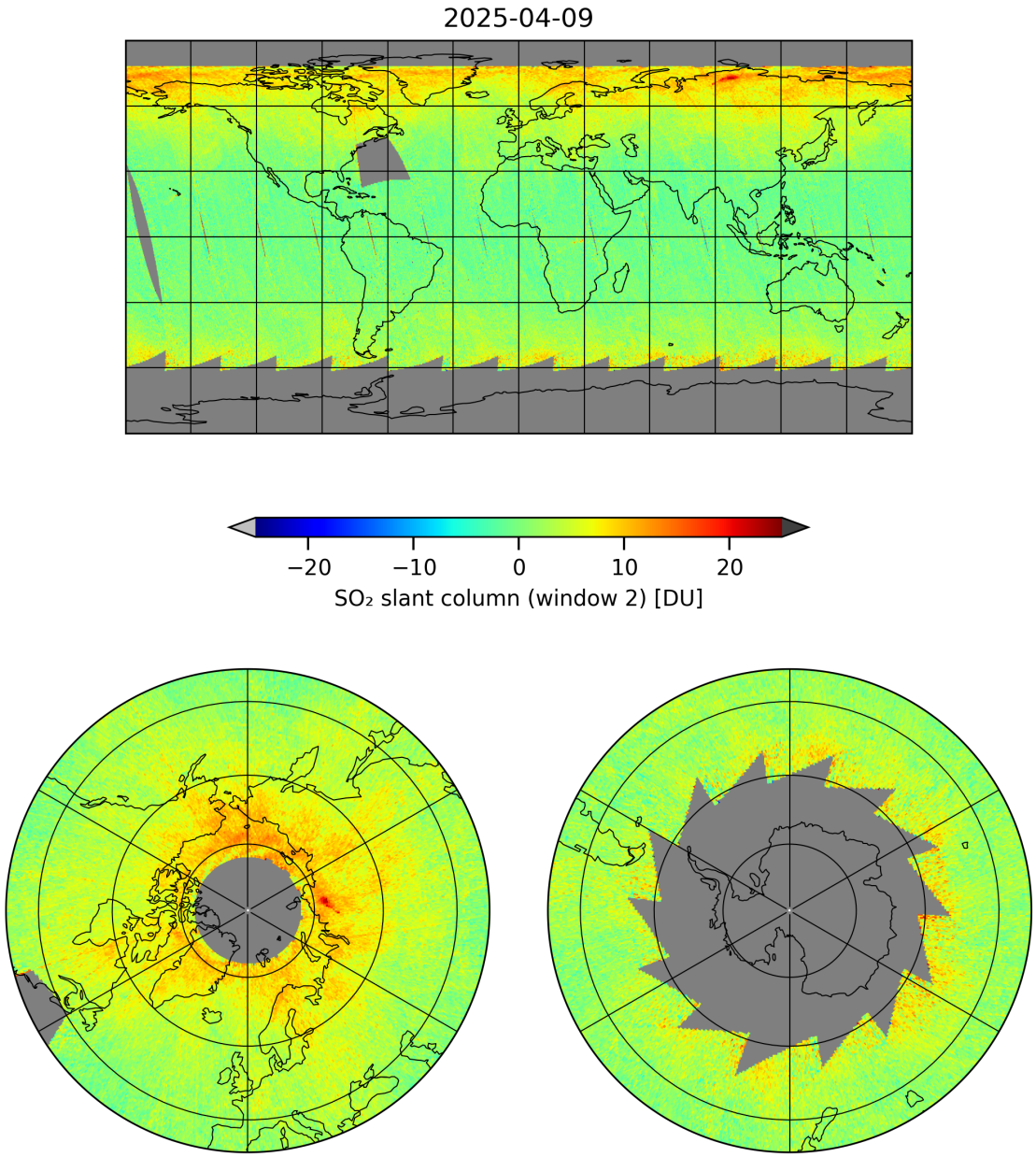

Figure 13: Map of "SO_2 slant column (window 2)" for 2025-04-09 to 2025-04-10

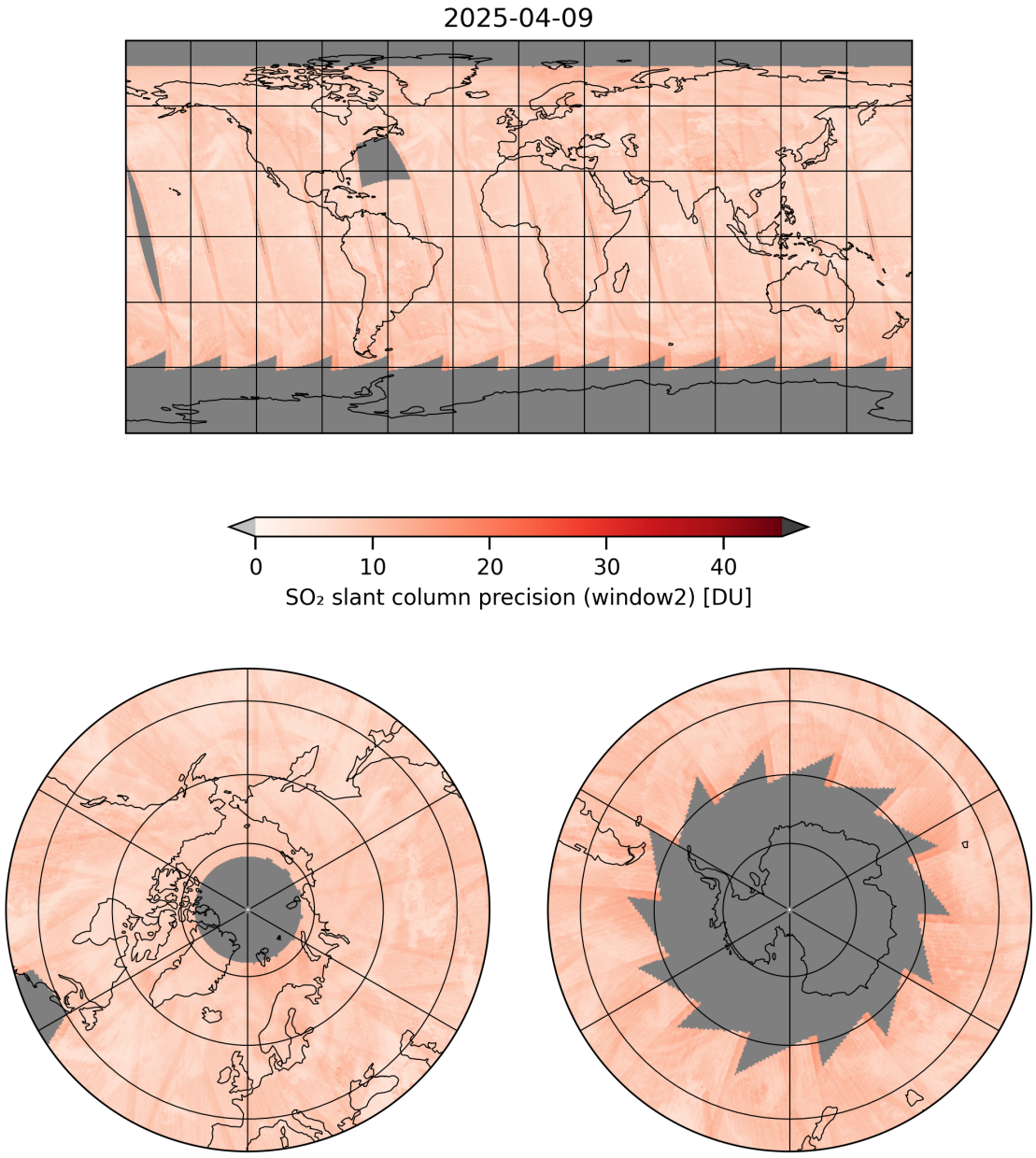

Figure 14: Map of "SO_2 slant column precision (window2)" for 2025-04-09 to 2025-04-10

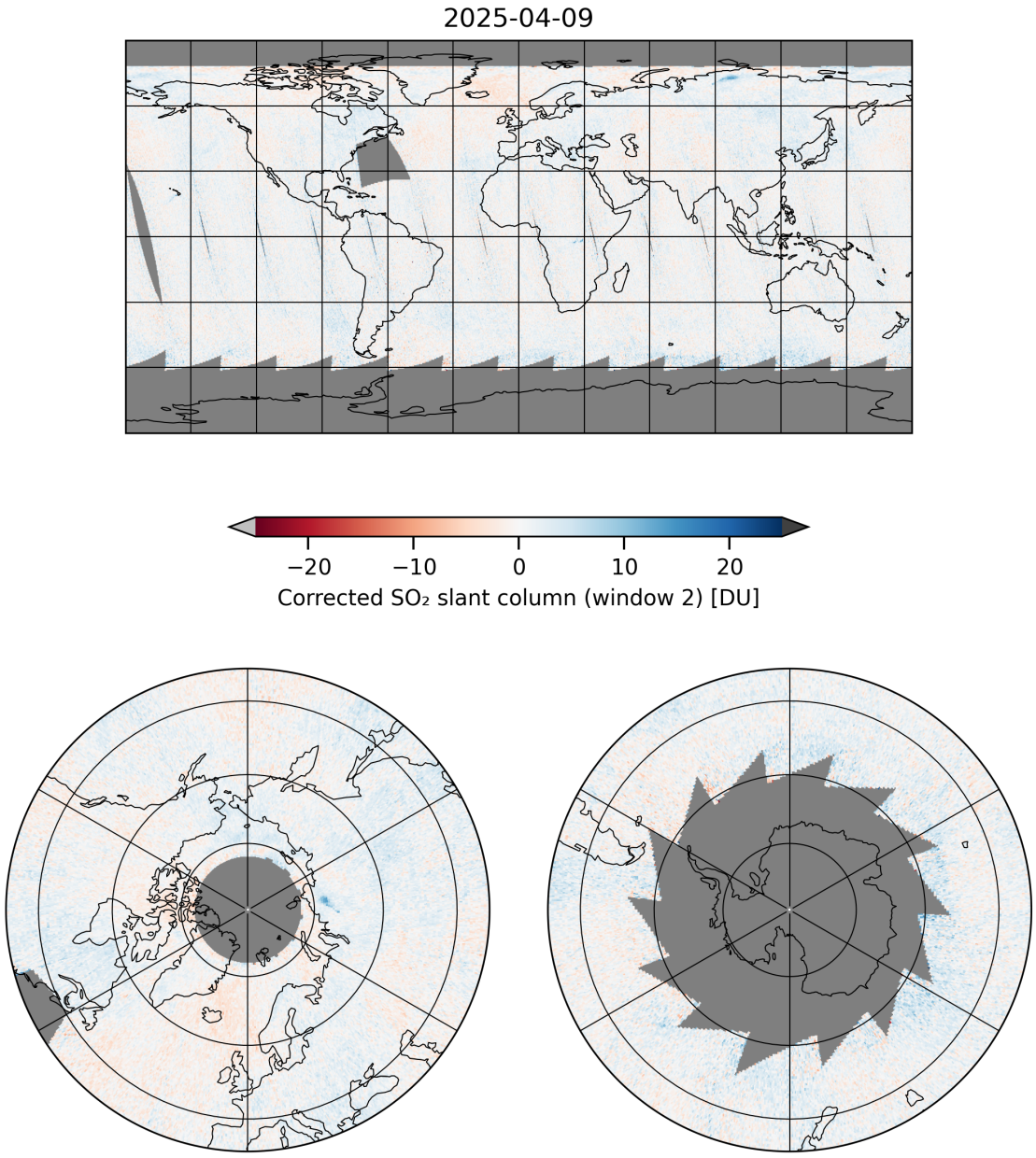

Figure 15: Map of “Corrected SO_2 slant column (window 2)” for 2025-04-09 to 2025-04-10

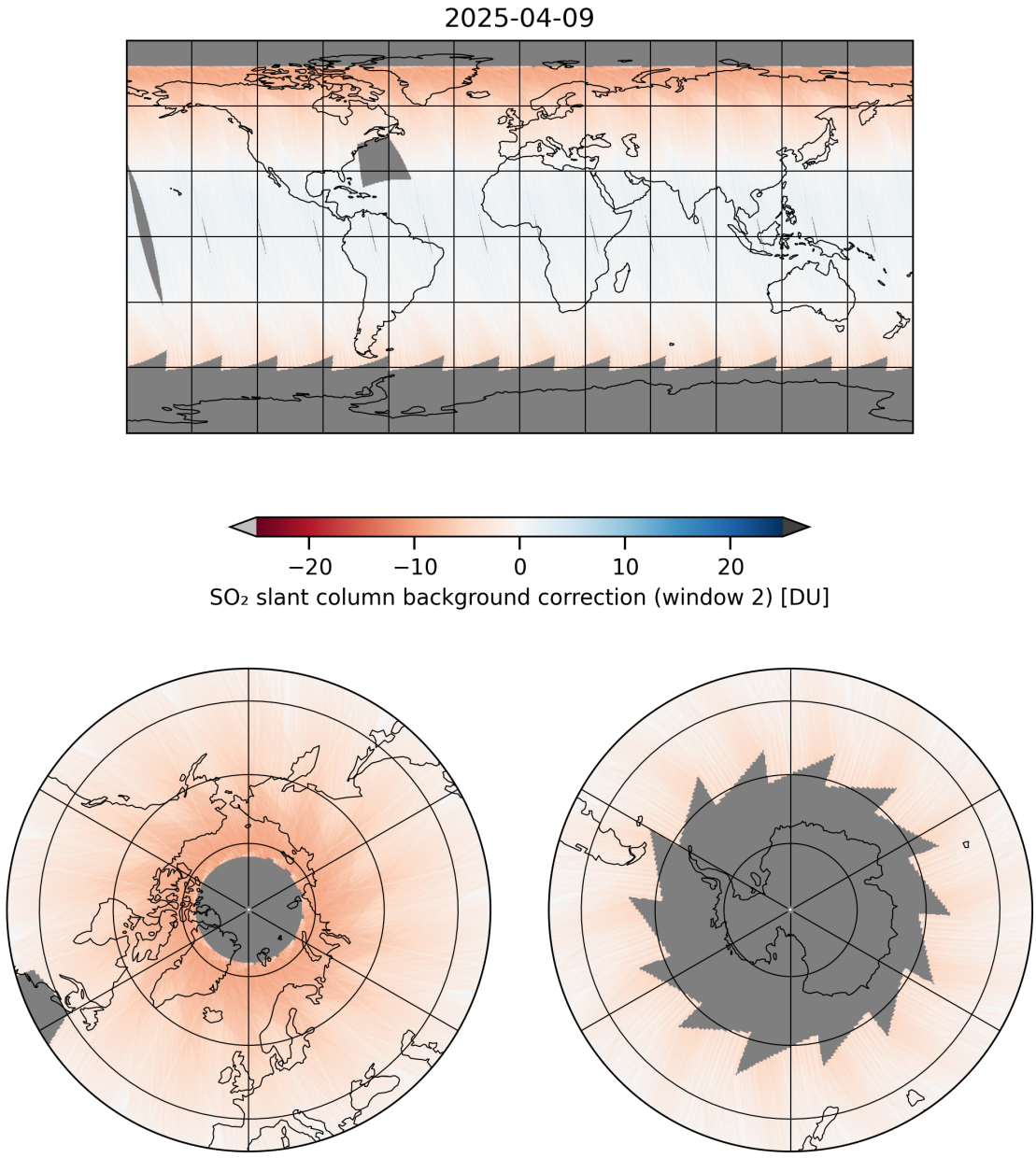

Figure 16: Map of "SO_2 slant column background correction (window 2)" for 2025-04-09 to 2025-04-10

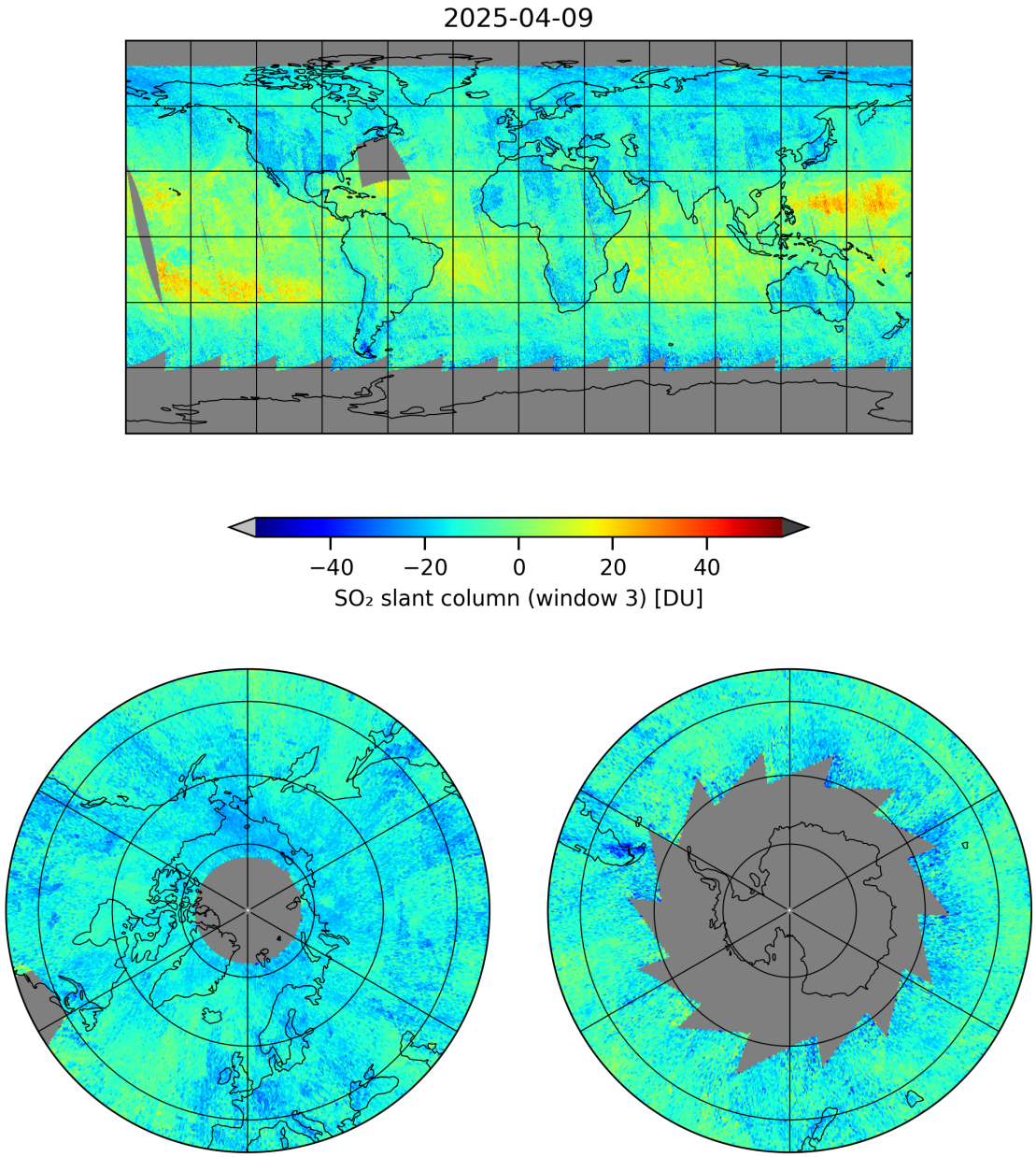

Figure 17: Map of "SO_2 slant column (window 3)" for 2025-04-09 to 2025-04-10

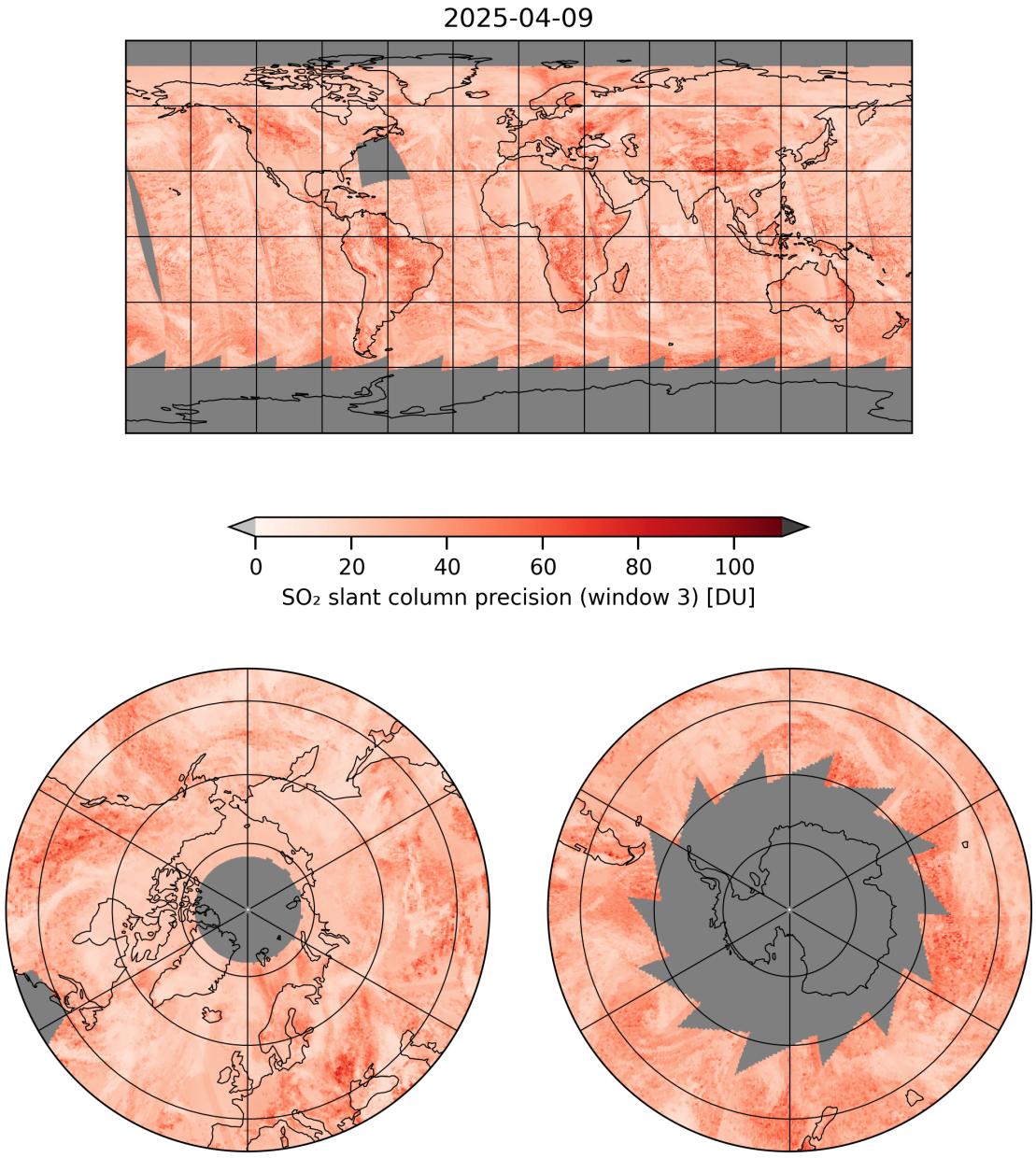

Figure 18: Map of "SO_2 slant column precision (window 3)" for 2025-04-09 to 2025-04-10

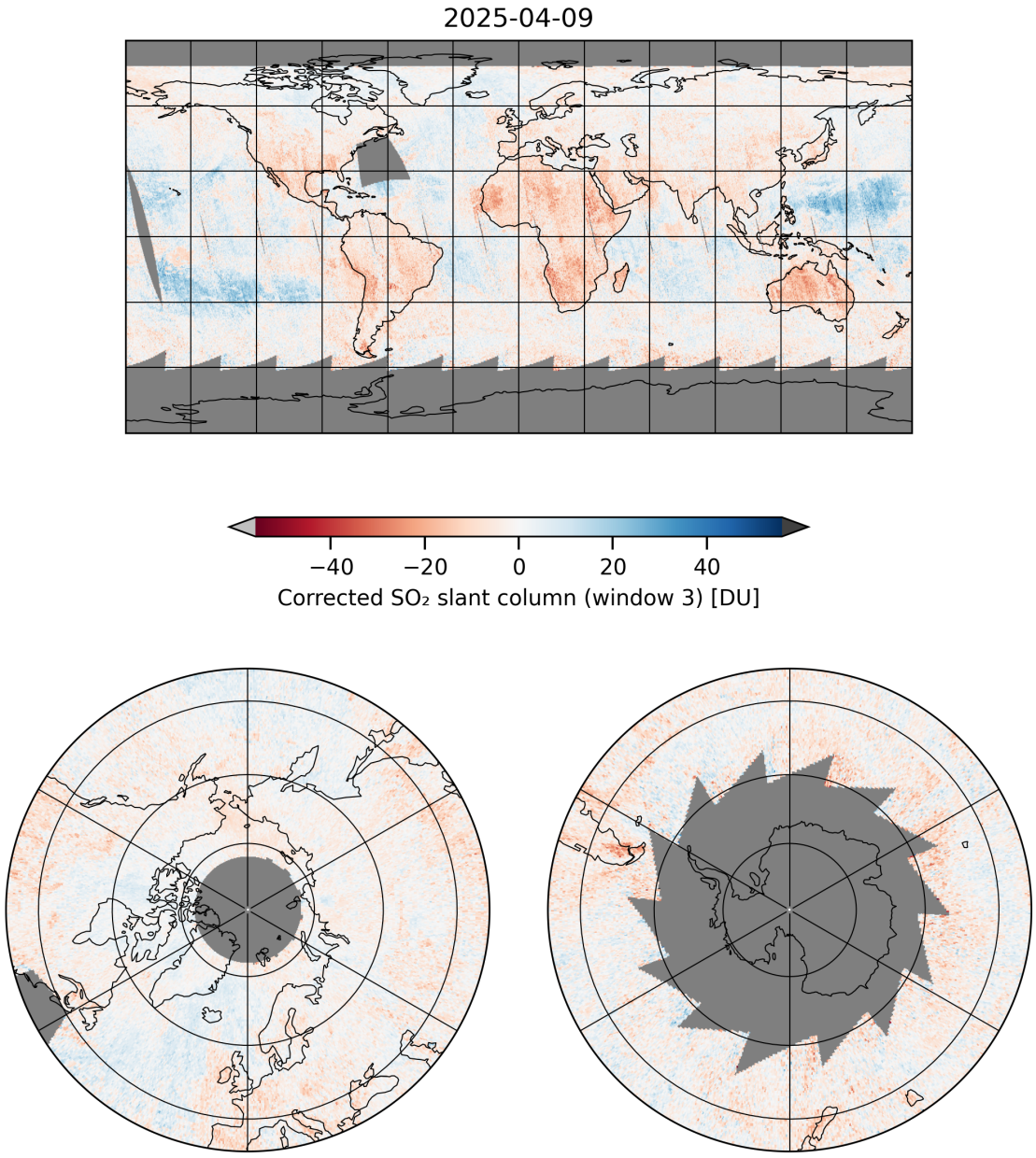

Figure 19: Map of "Corrected SO_2 slant column (window 3)" for 2025-04-09 to 2025-04-10

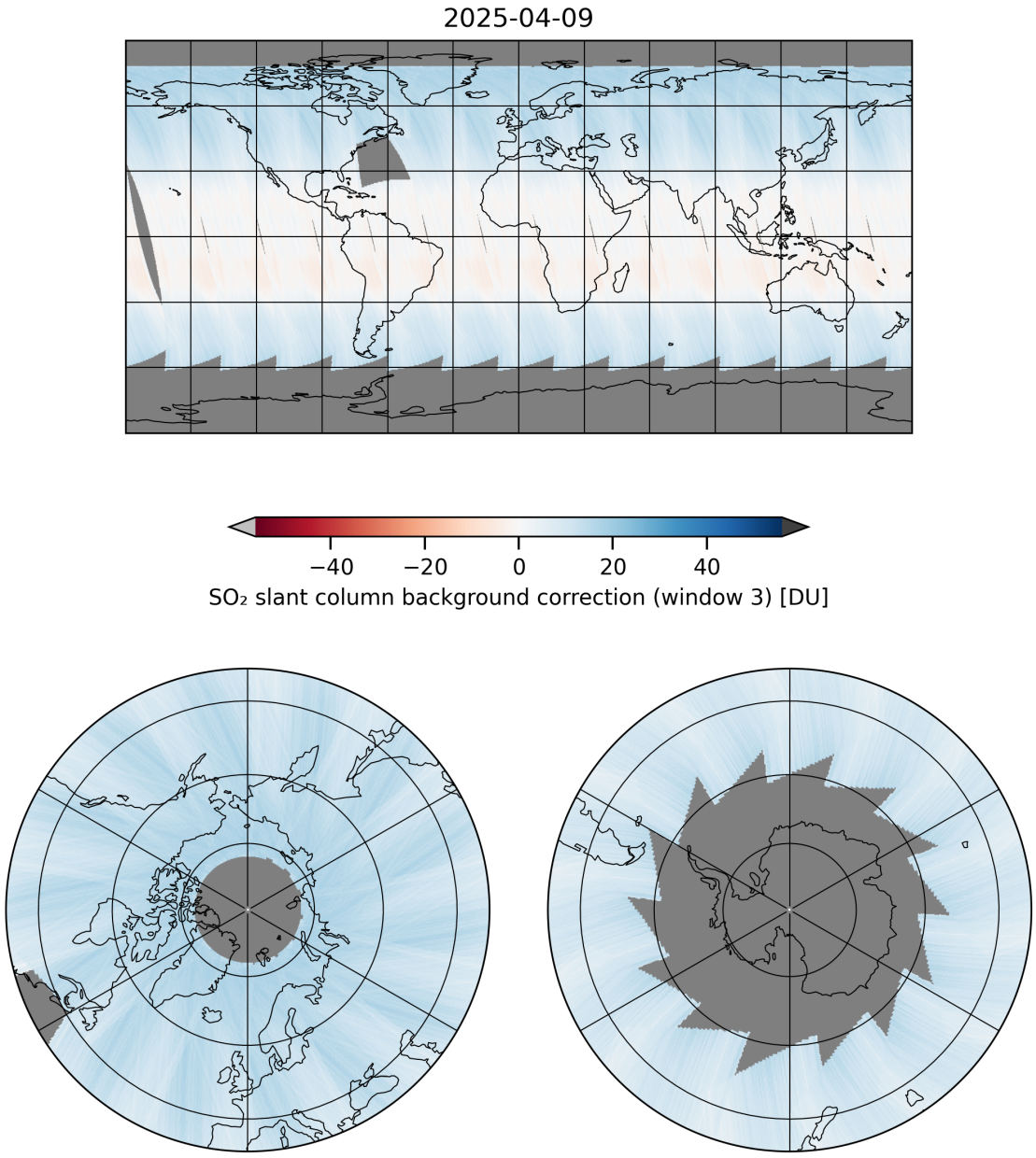

Figure 20: Map of "SO_2 slant column background correction (window 3)" for 2025-04-09 to 2025-04-10

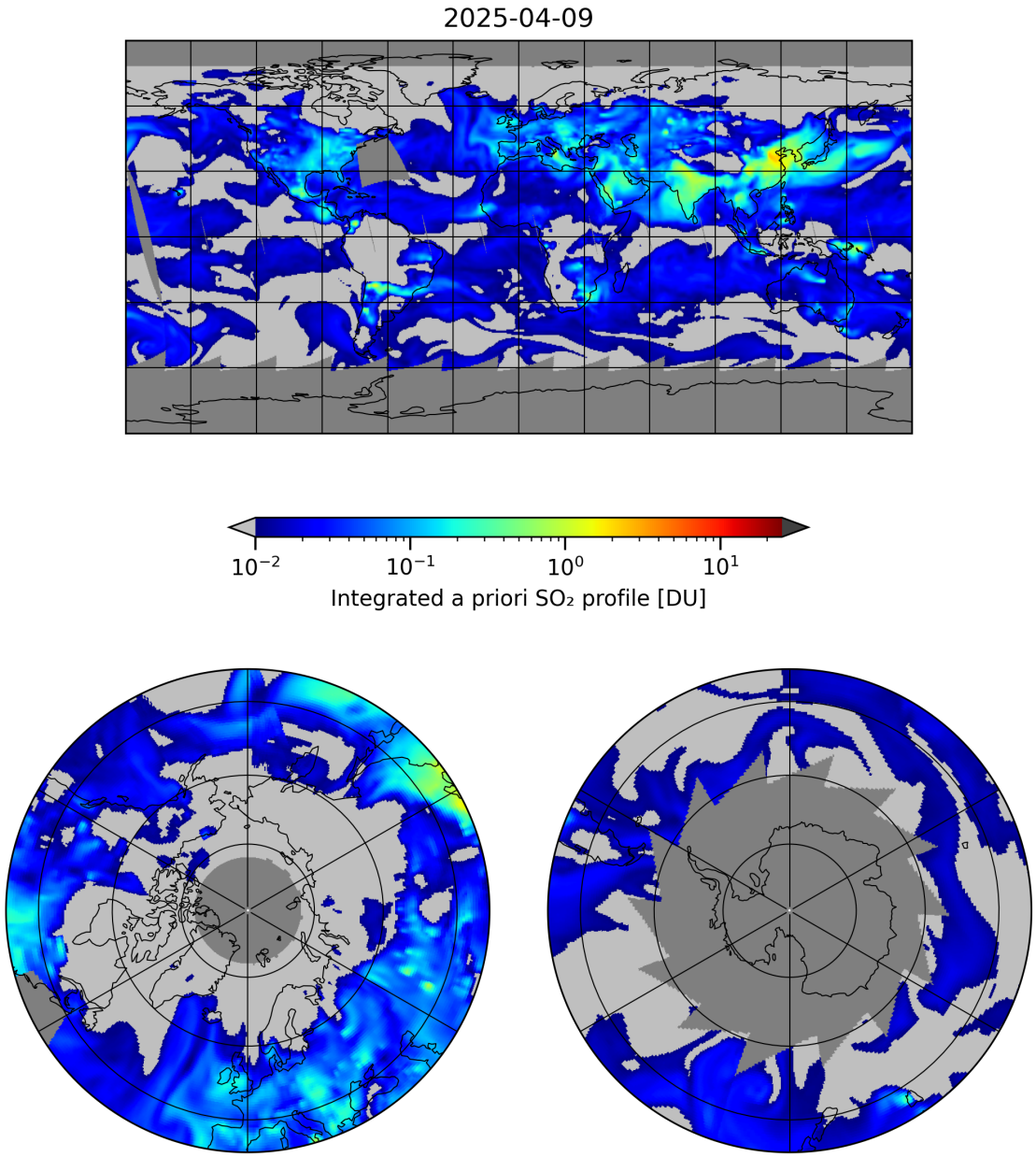

Figure 21: Map of “Integrated a priori SO_2 profile” for 2025-04-09 to 2025-04-10

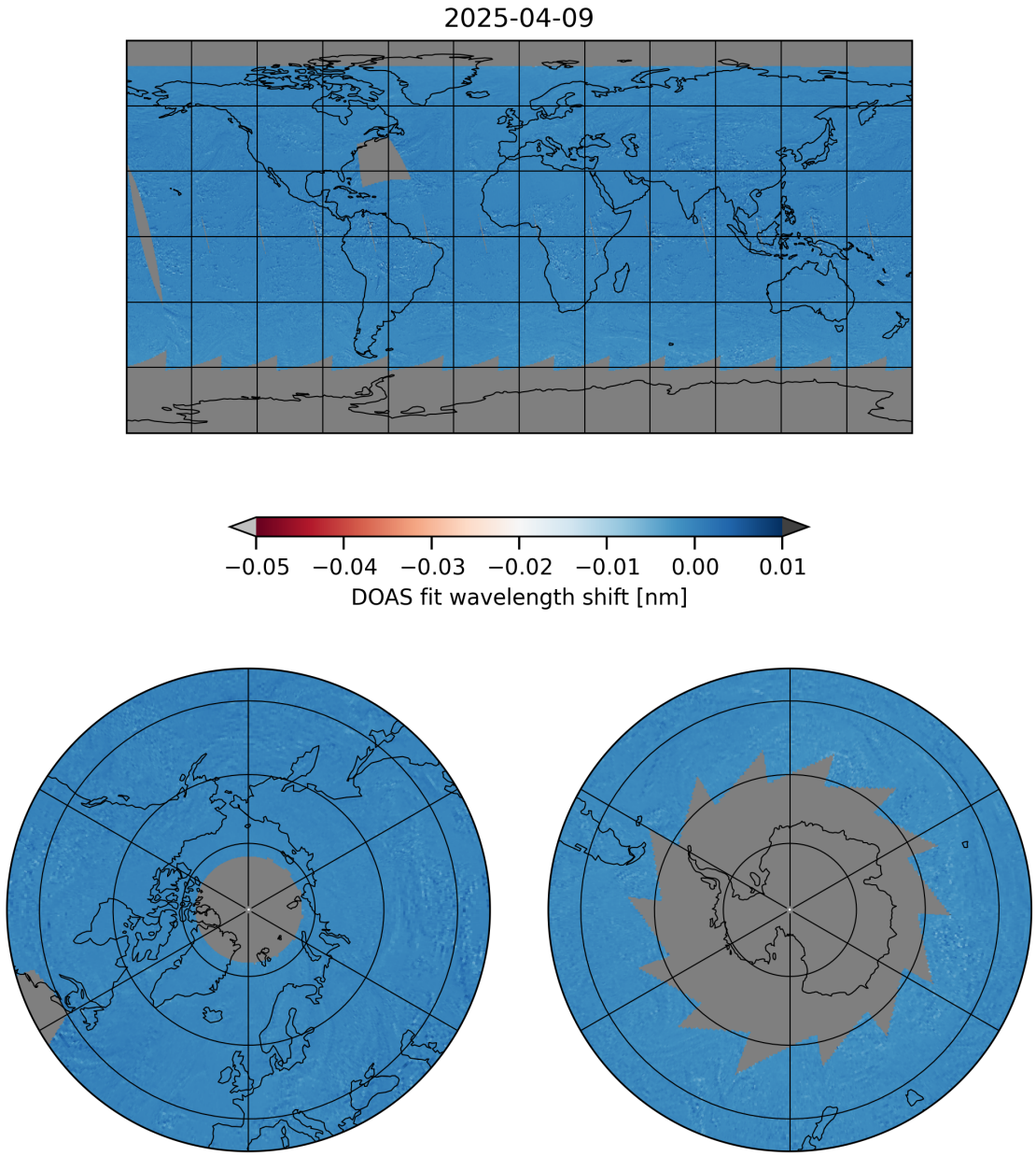

Figure 22: Map of “DOAS fit wavelength shift” for 2025-04-09 to 2025-04-10

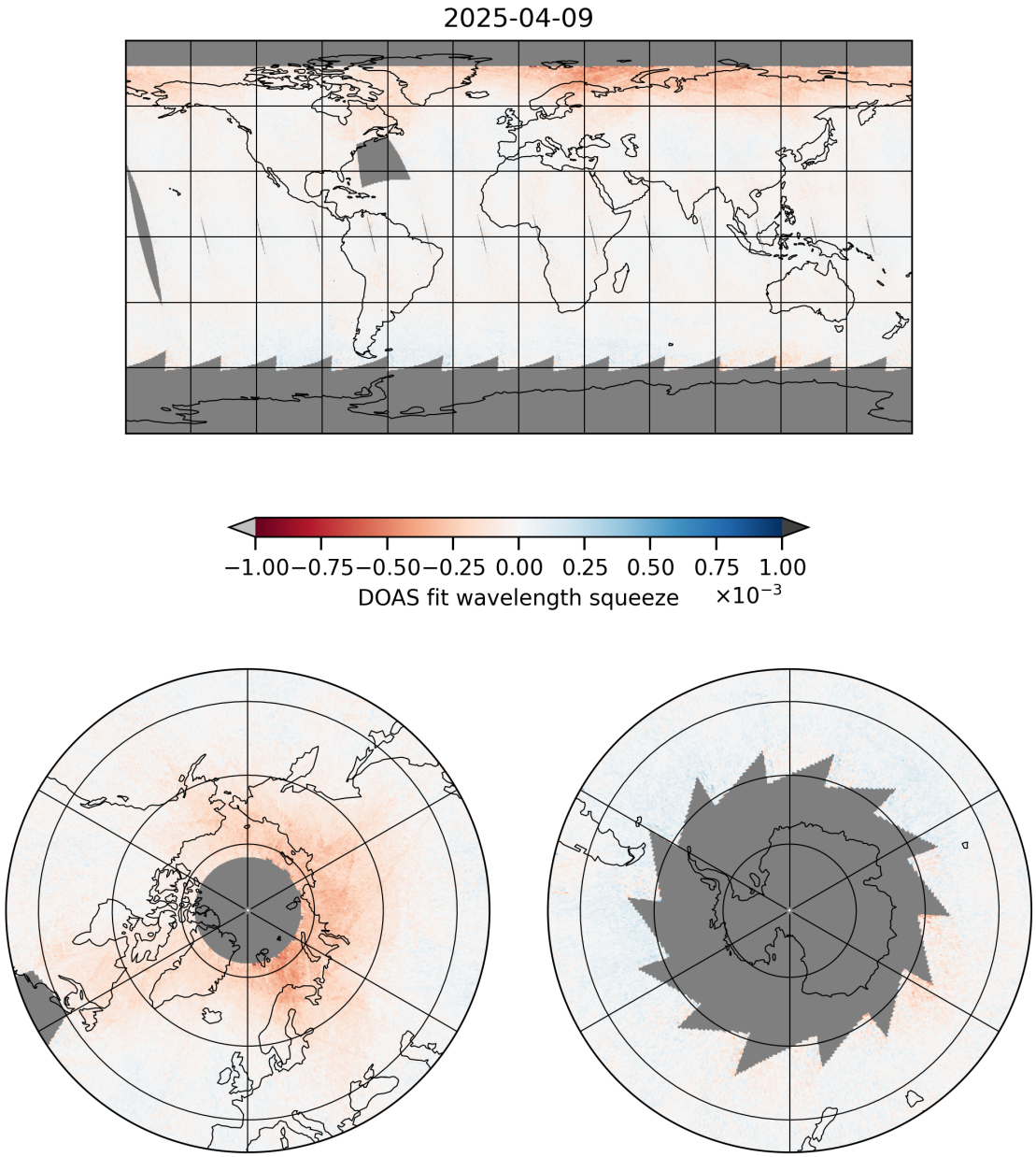

Figure 23: Map of “DOAS fit wavelength squeeze” for 2025-04-09 to 2025-04-10

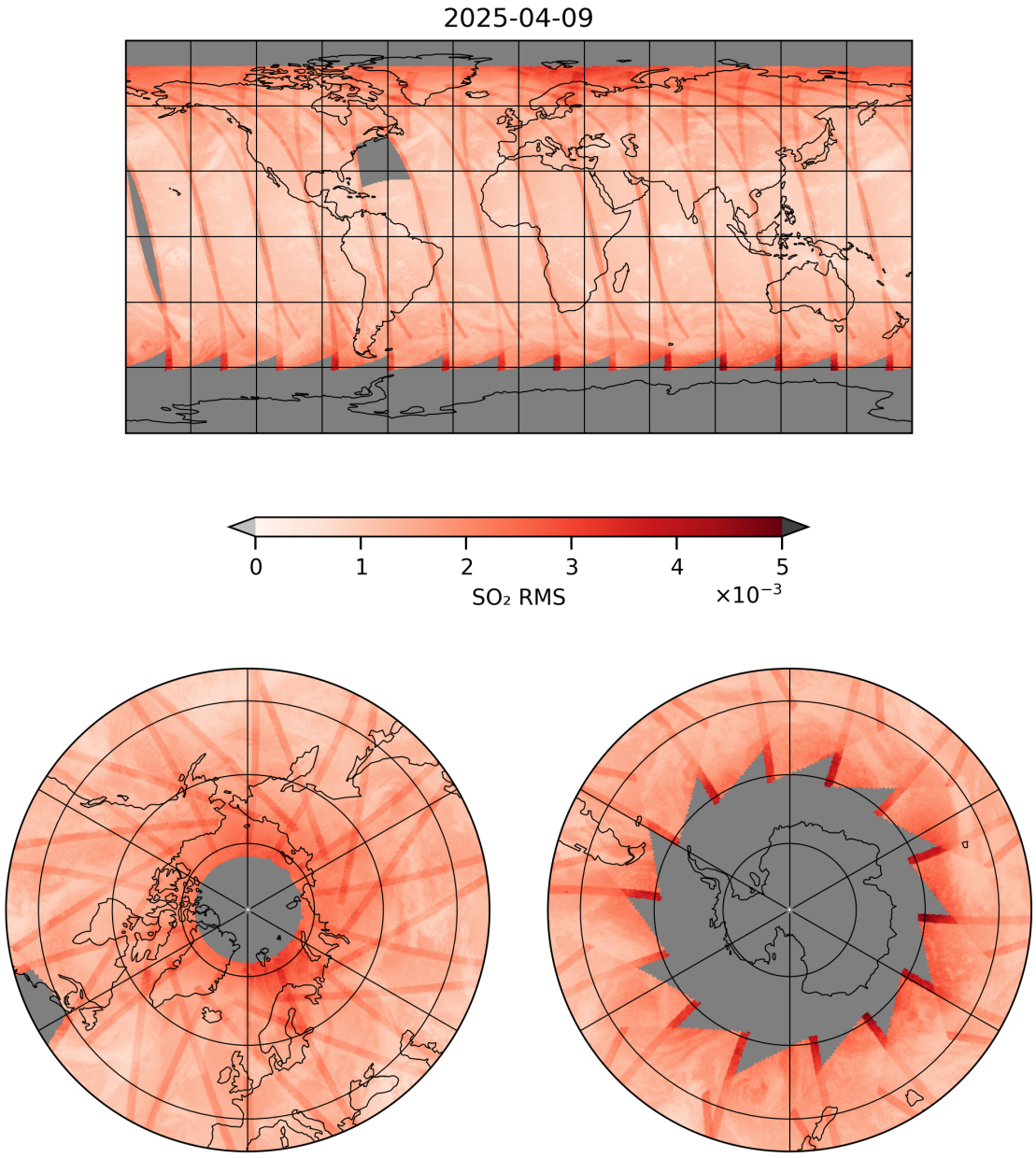

Figure 24: Map of "SO_2 RMS" for 2025-04-09 to 2025-04-10

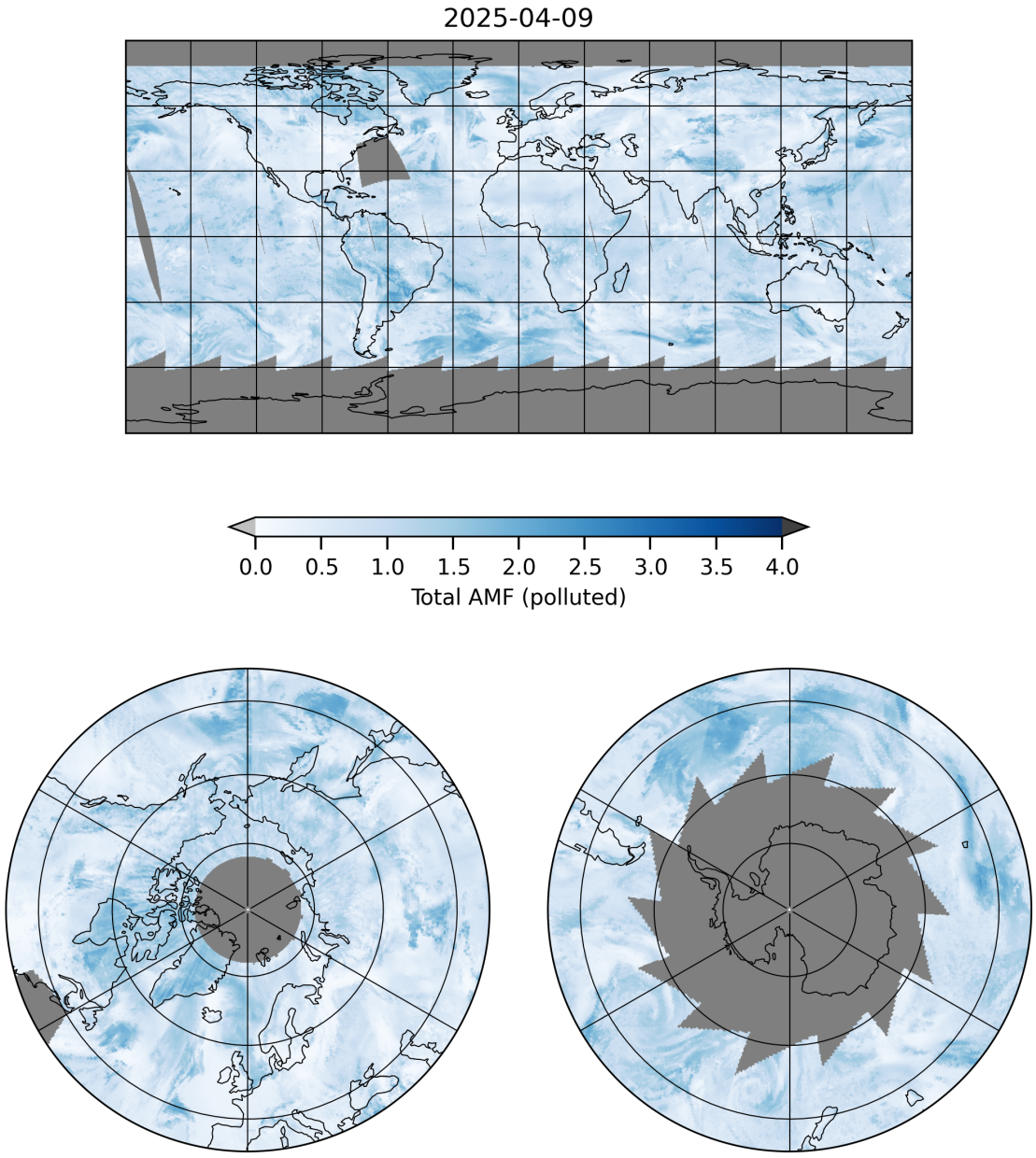

Figure 25: Map of “Total AMF (polluted)” for 2025-04-09 to 2025-04-10

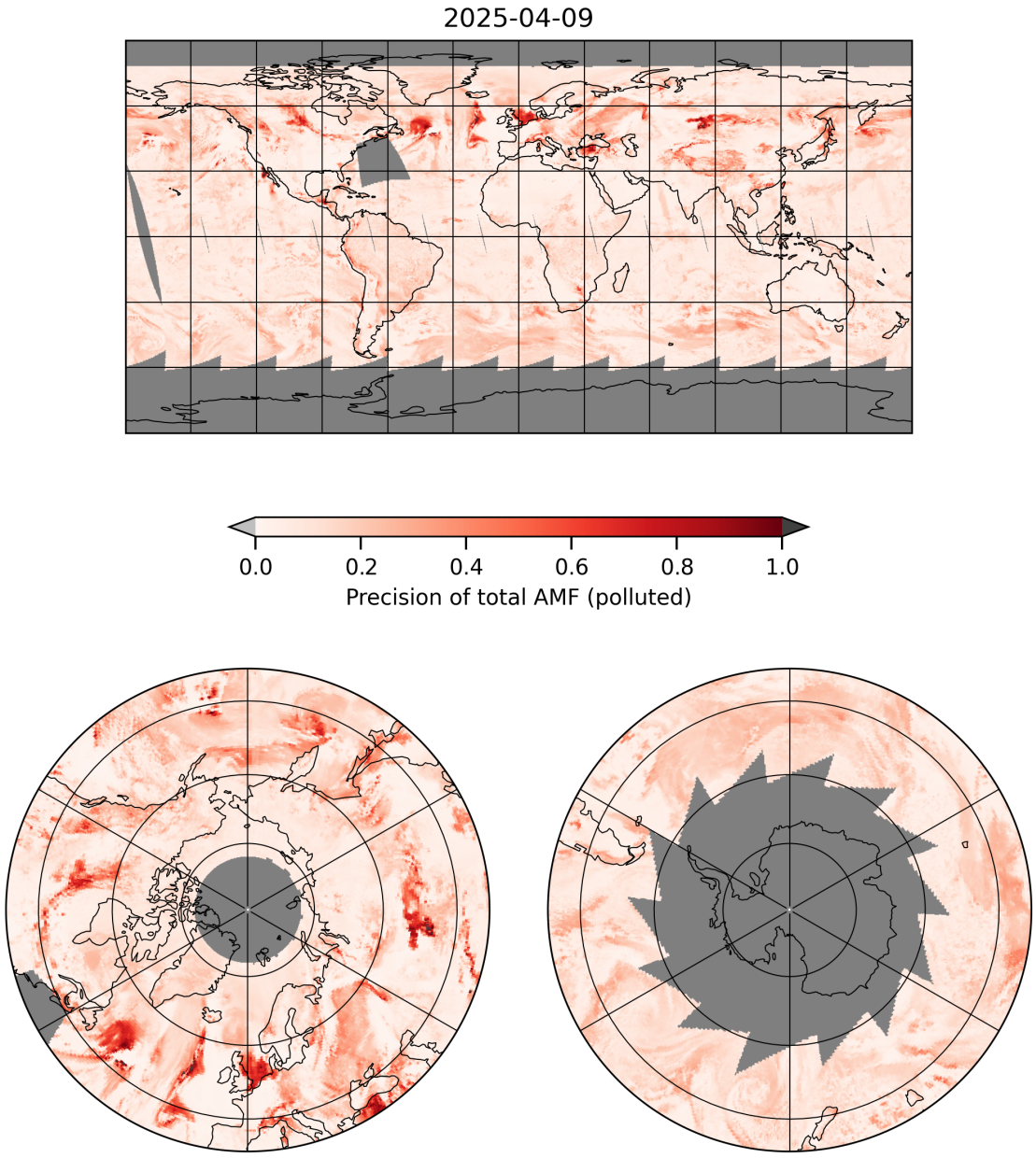

Figure 26: Map of “Precision of total AMF (polluted)” for 2025-04-09 to 2025-04-10

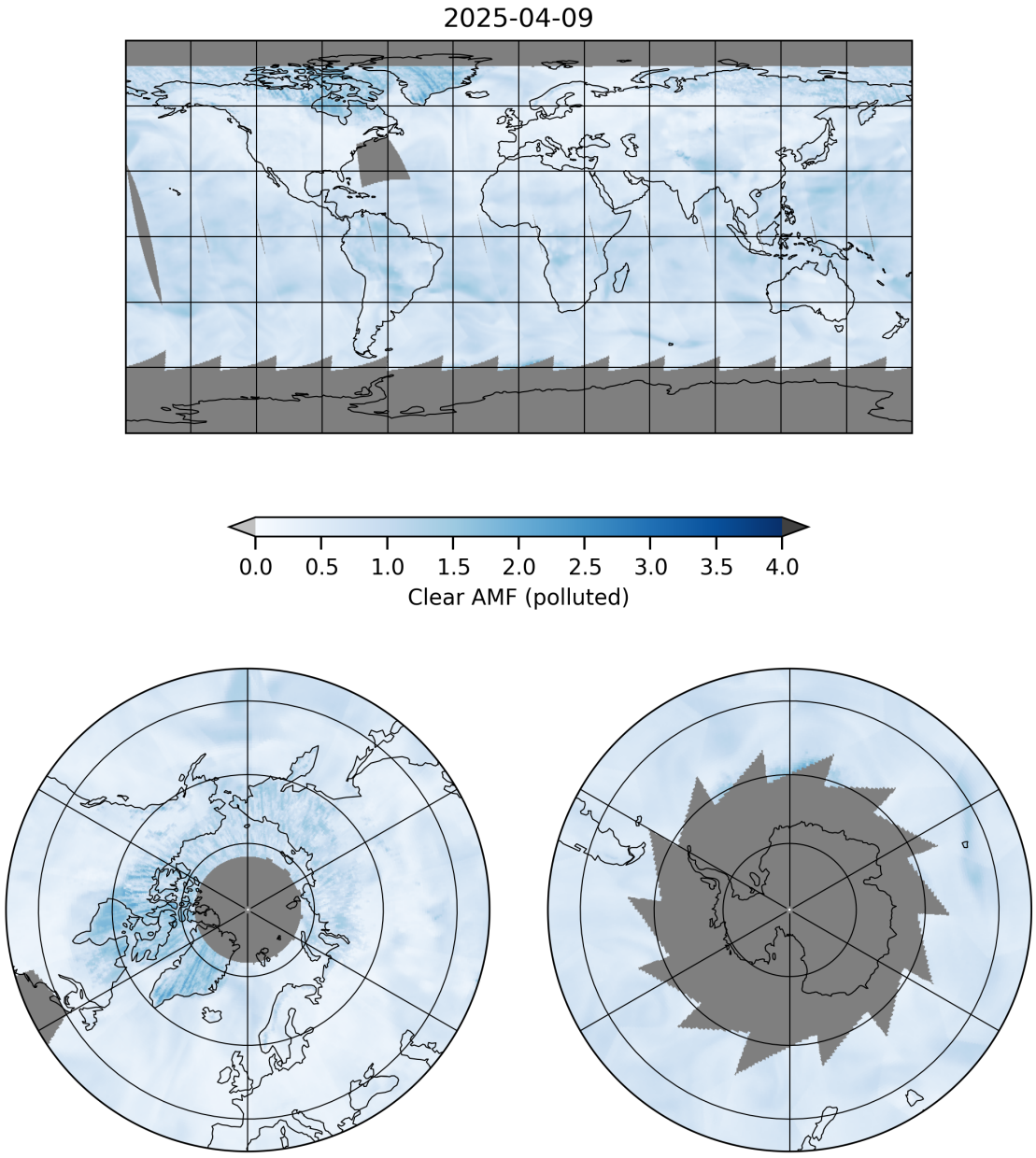

Figure 27: Map of “Clear AMF (polluted)” for 2025-04-09 to 2025-04-10

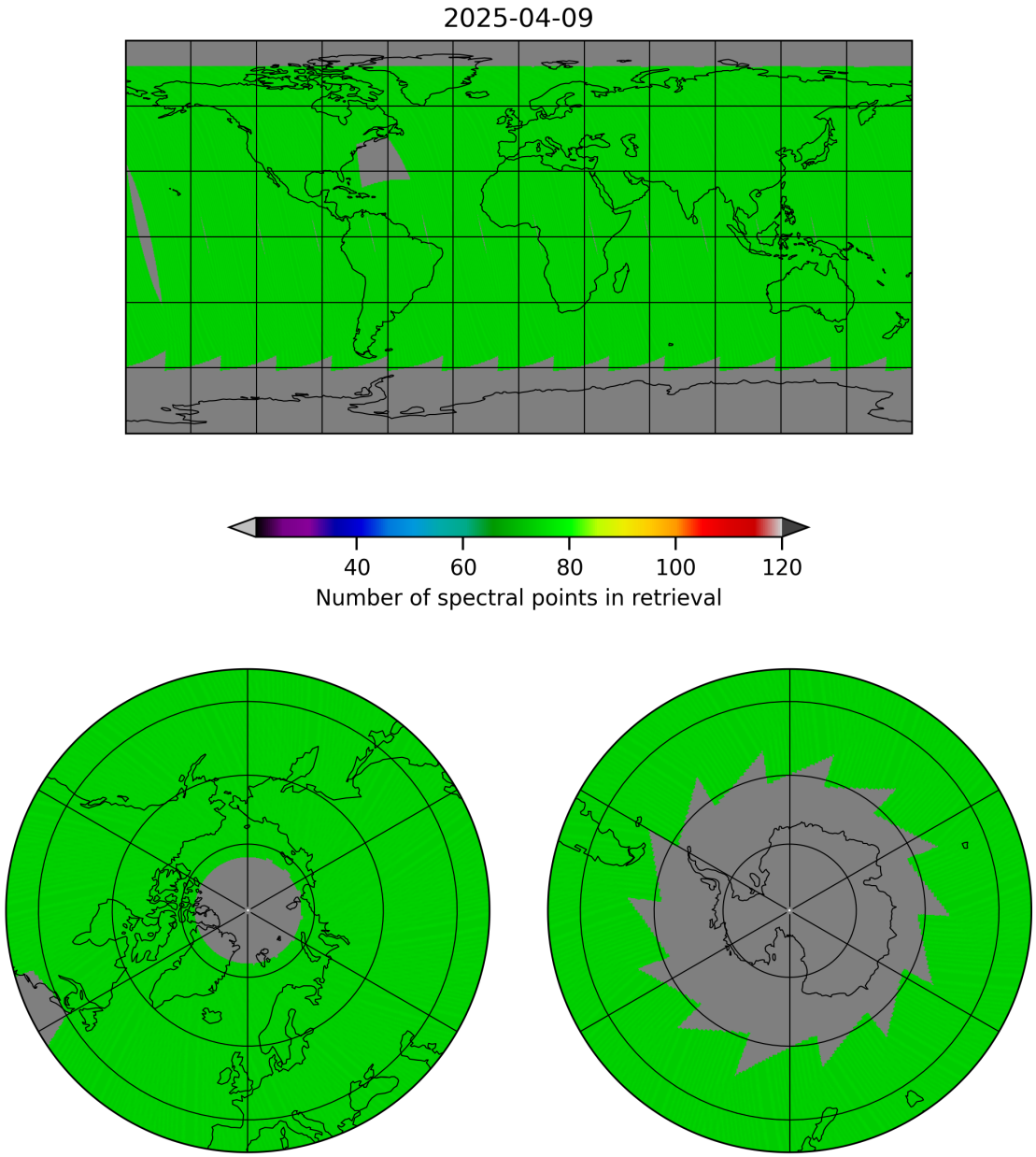

Figure 28: Map of “Number of spectral points in retrieval” for 2025-04-09 to 2025-04-10

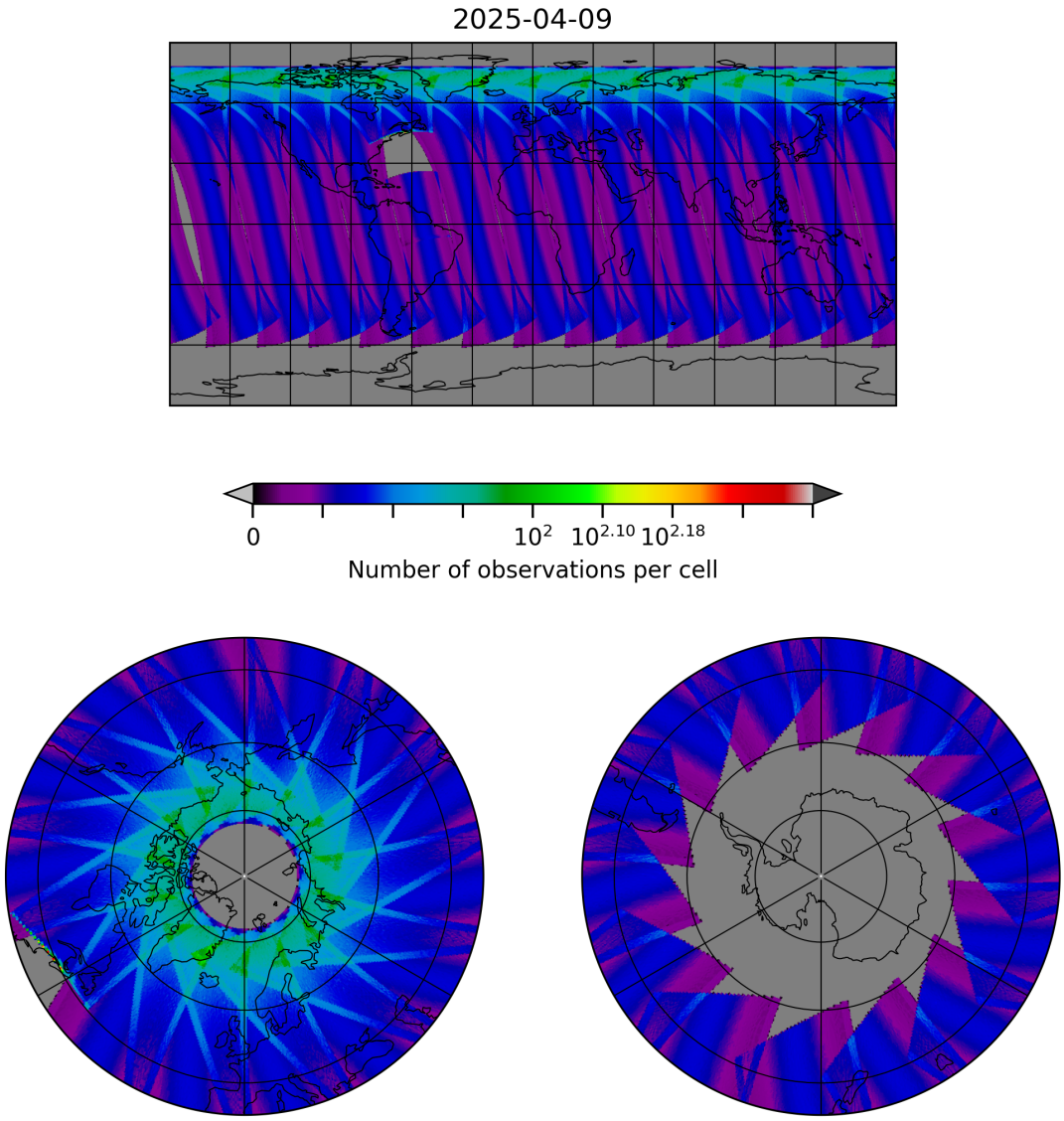

Figure 29: Map of the number of observations for 2025-04-09 to 2025-04-10

7 Zonal average

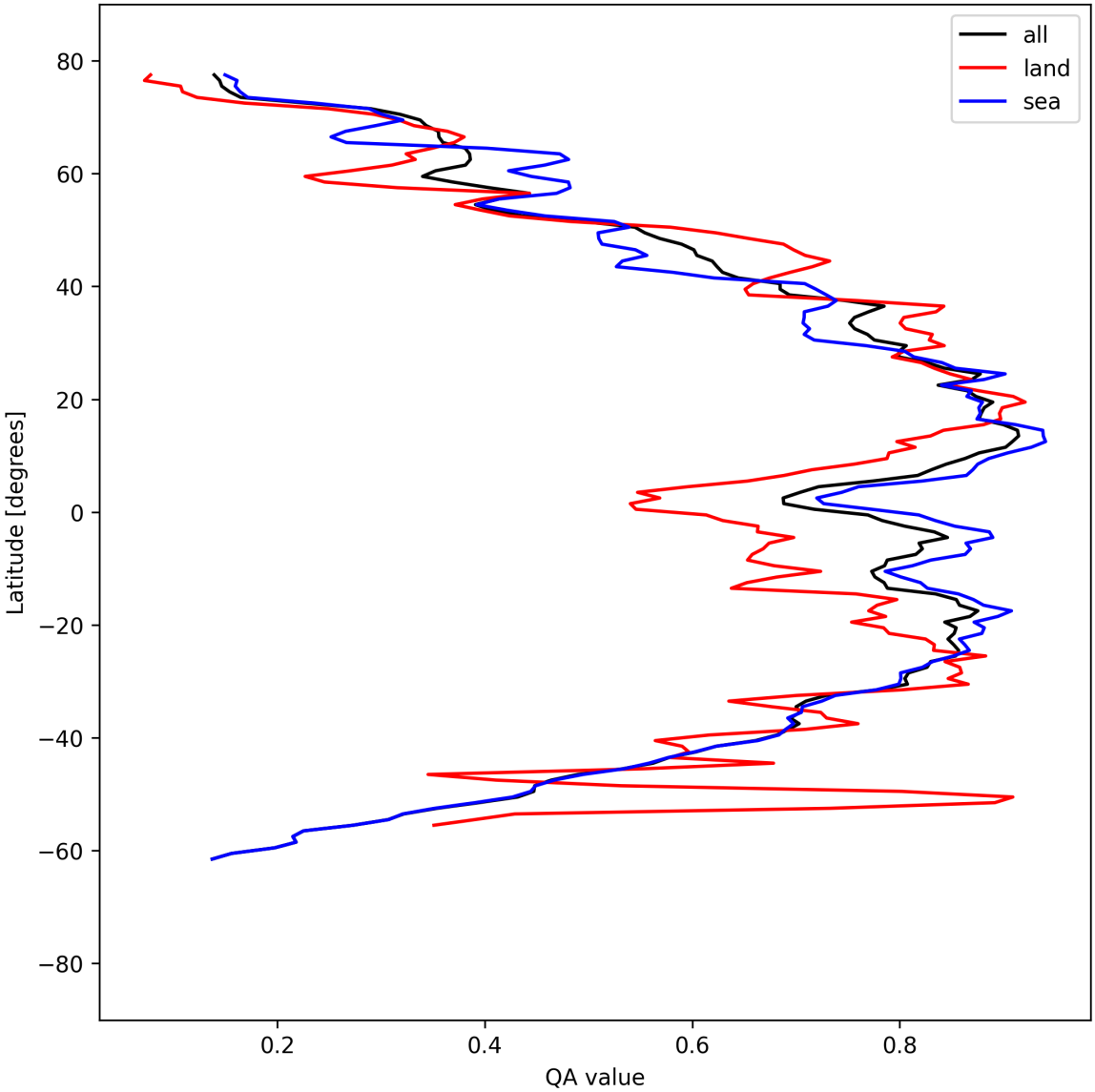

Figure 30: Zonal average of “QA value” for 2025-04-09 to 2025-04-10.

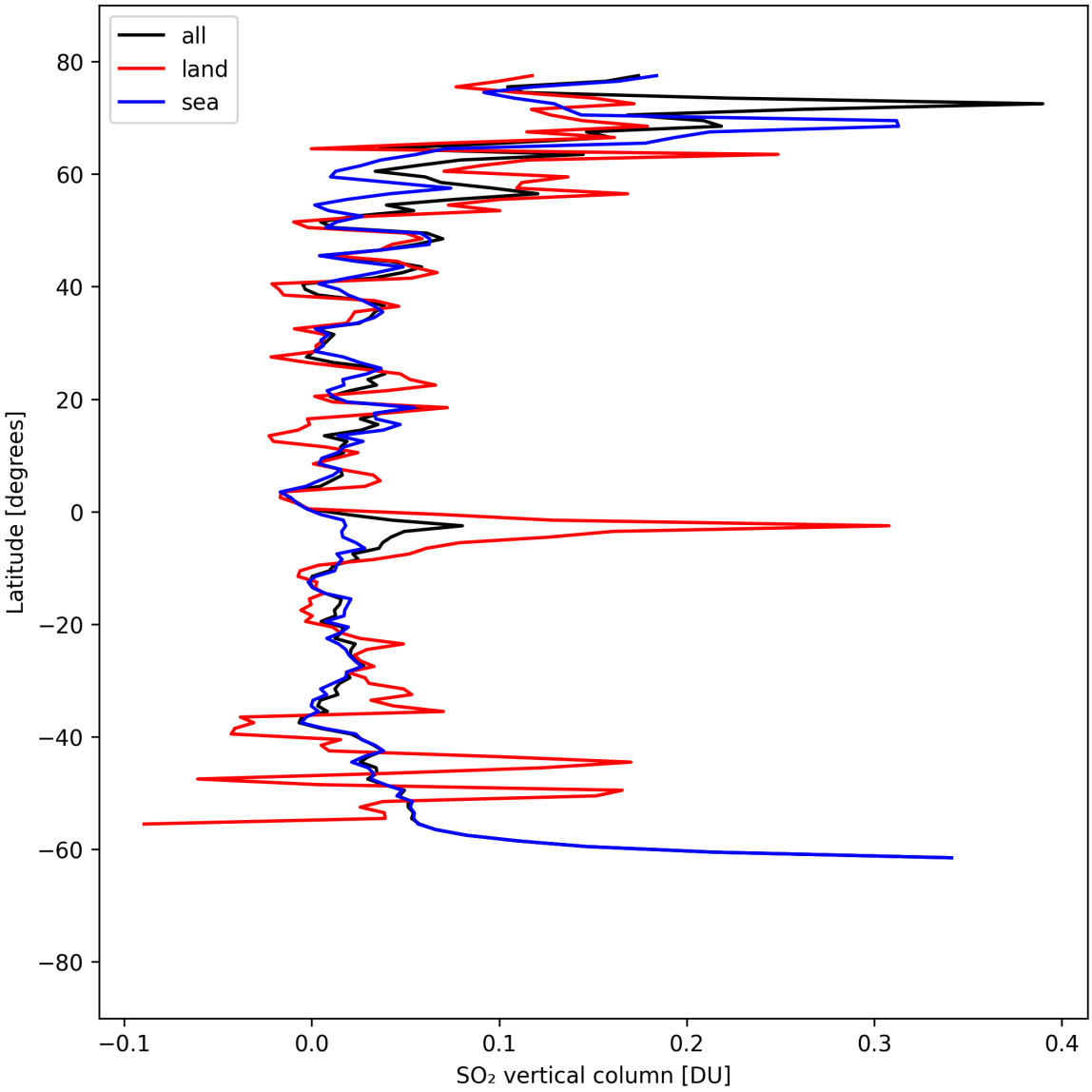

Figure 31: Zonal average of "SO_2 vertical column" for 2025-04-09 to 2025-04-10.

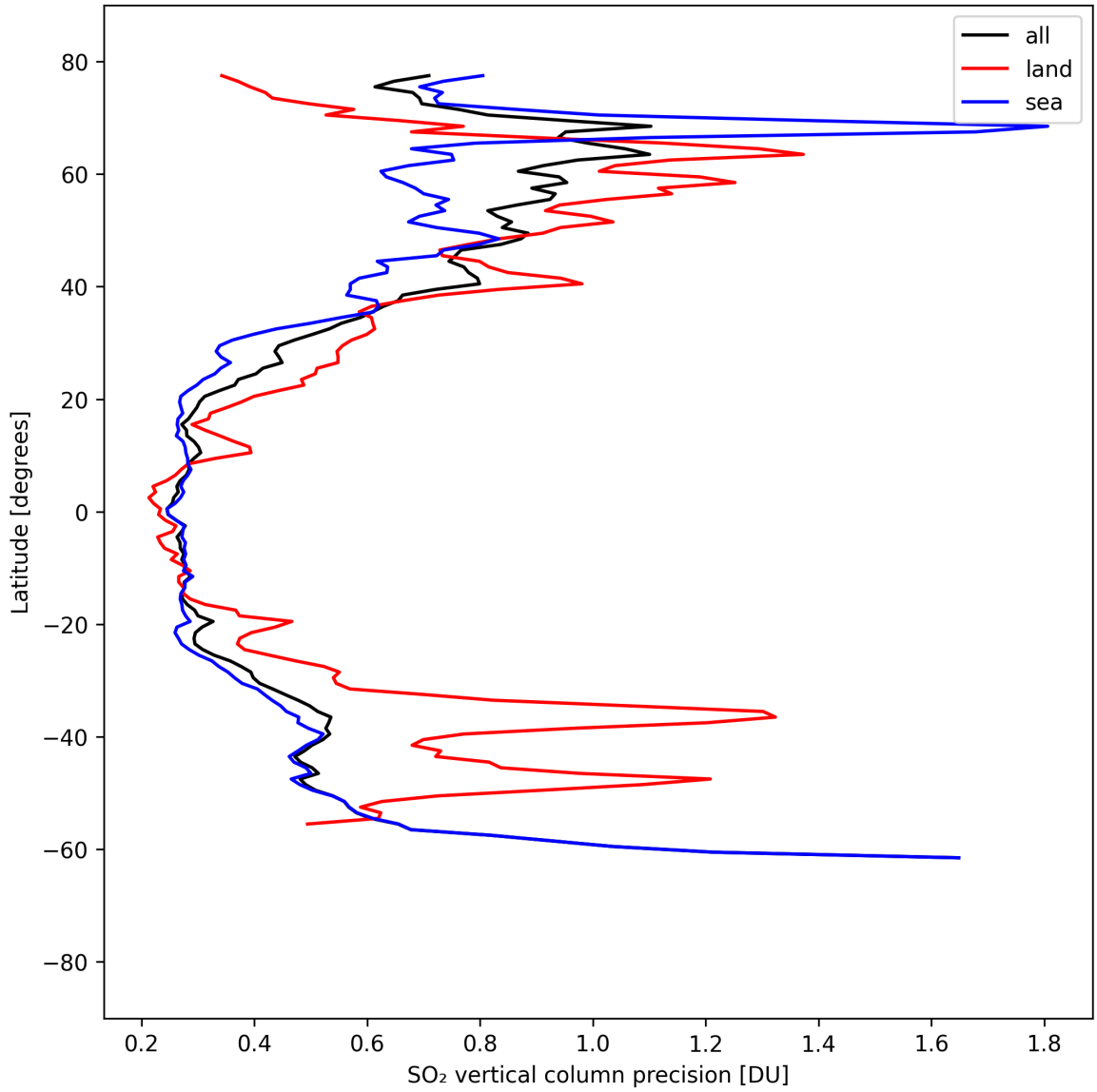

Figure 32: Zonal average of "SO_2 vertical column precision" for 2025-04-09 to 2025-04-10.

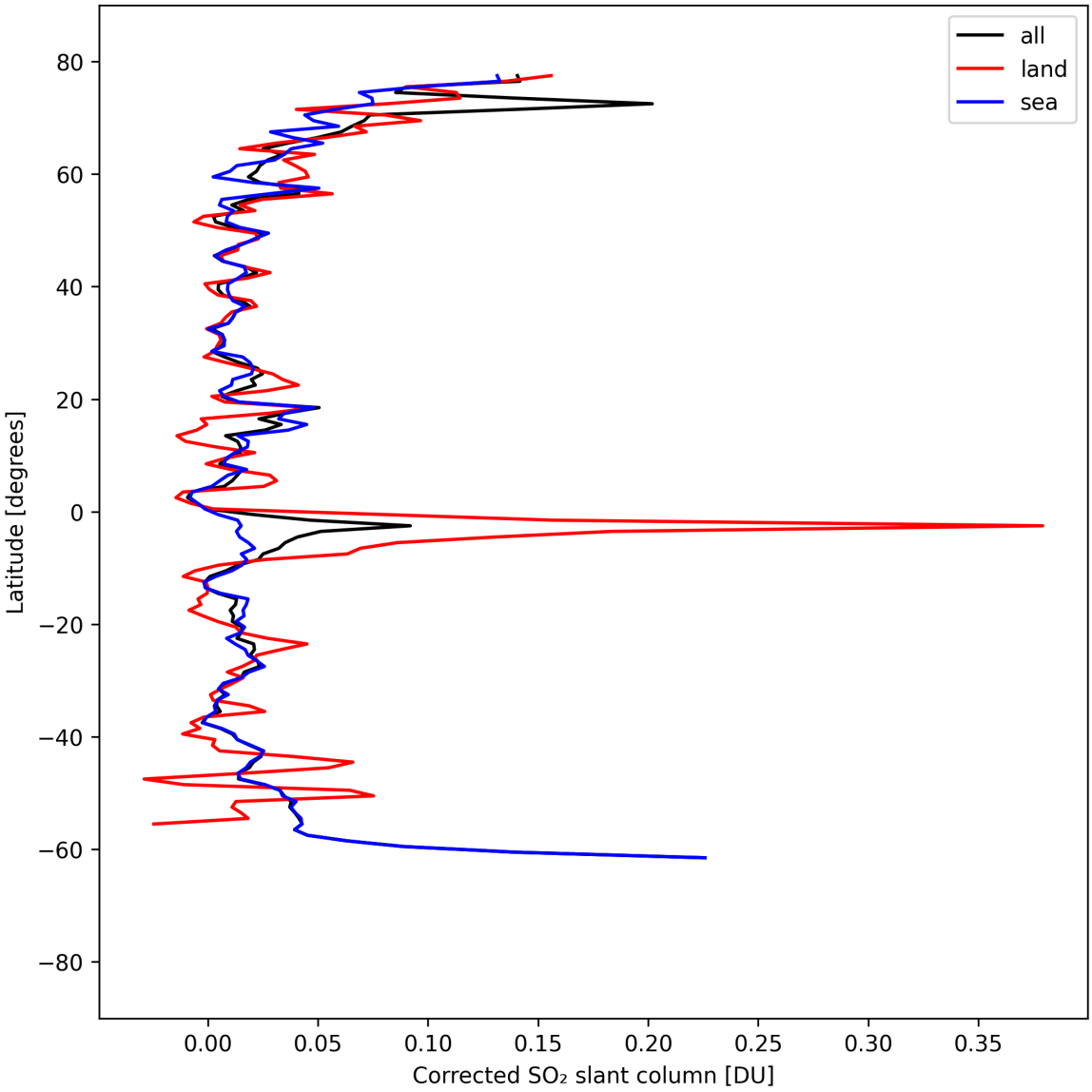

Figure 33: Zonal average of “Corrected SO_2 slant column” for 2025-04-09 to 2025-04-10.

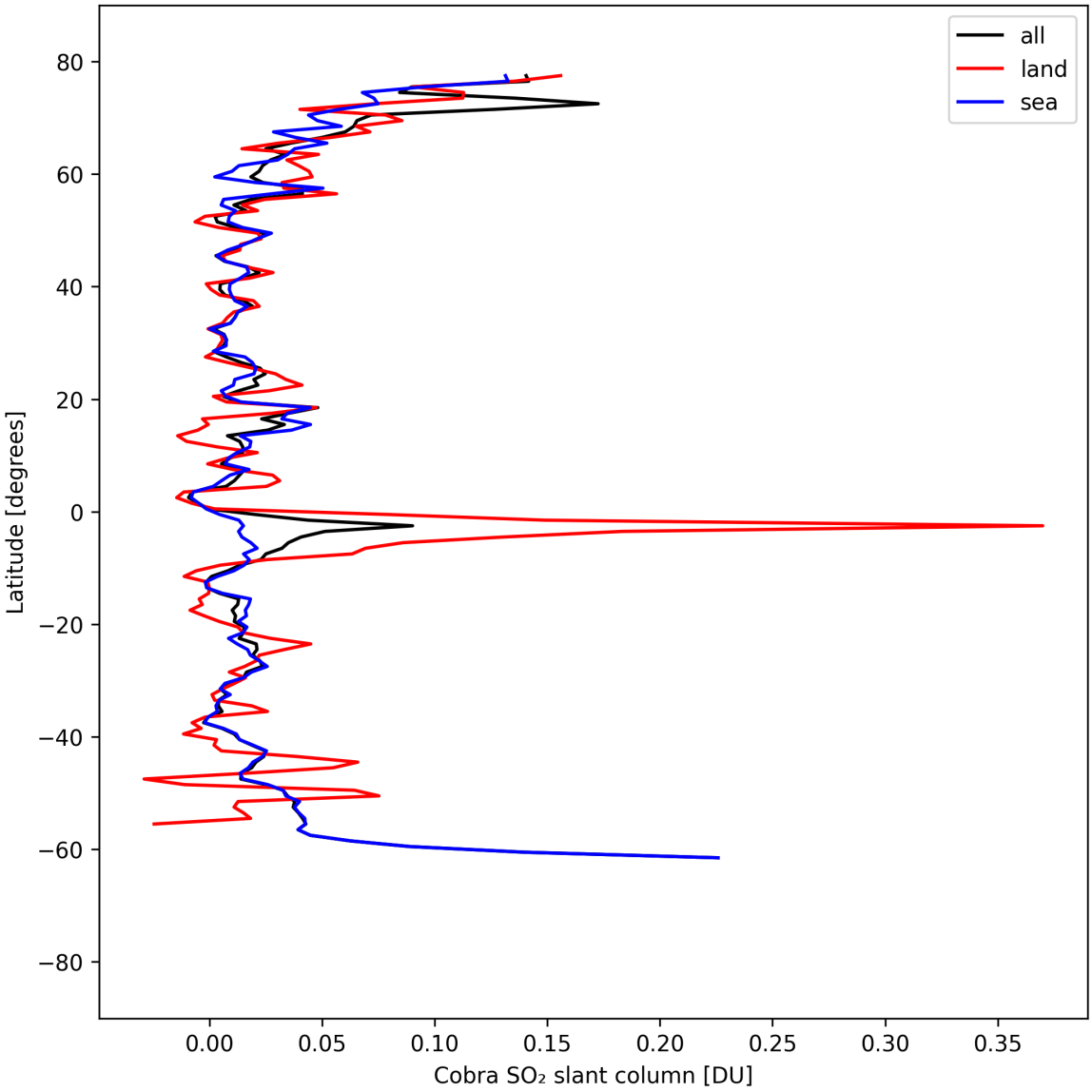

Figure 34: Zonal average of "Cobra SO_2 slant column" for 2025-04-09 to 2025-04-10.

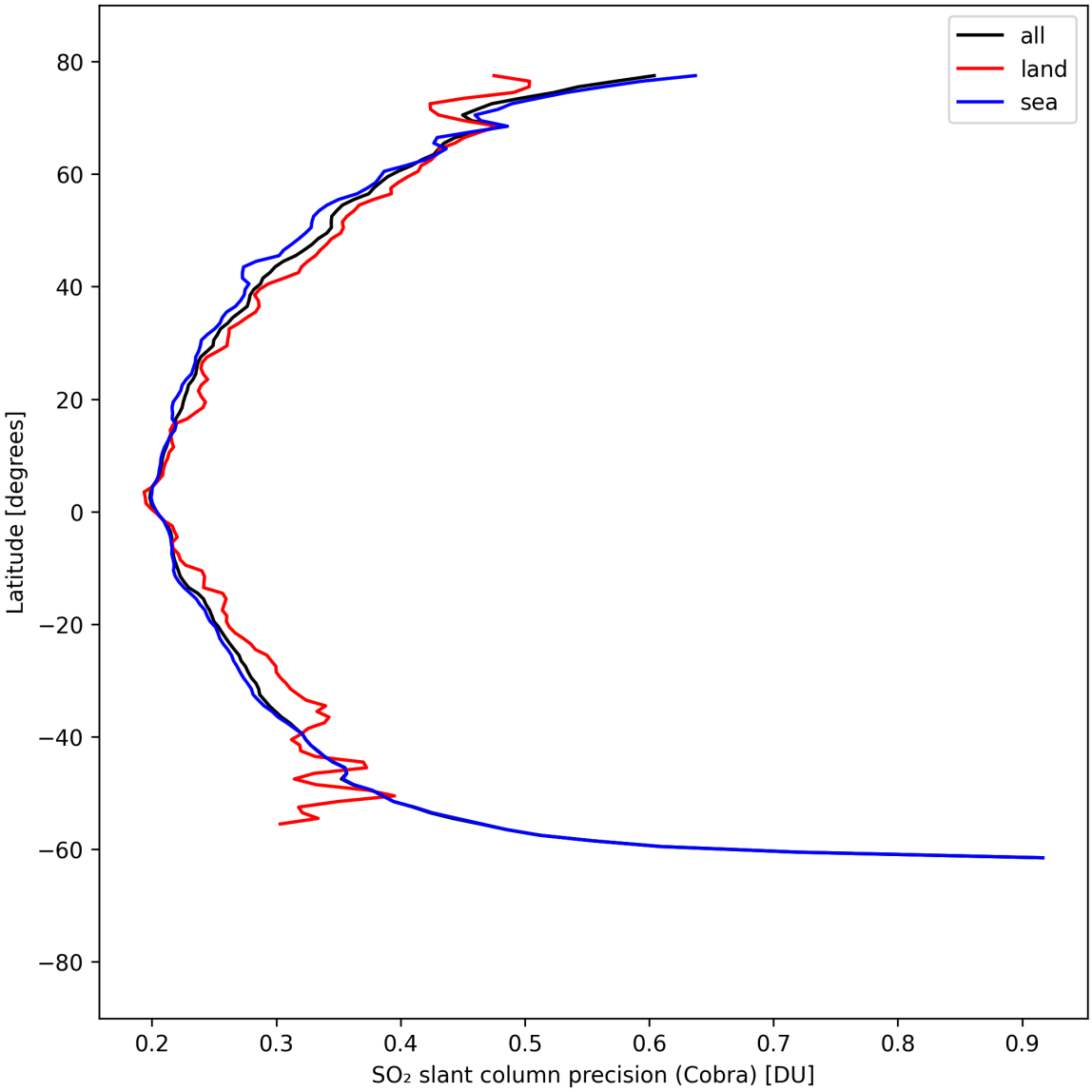

Figure 35: Zonal average of "SO_2 slant column precision (Cobra)" for 2025-04-09 to 2025-04-10.

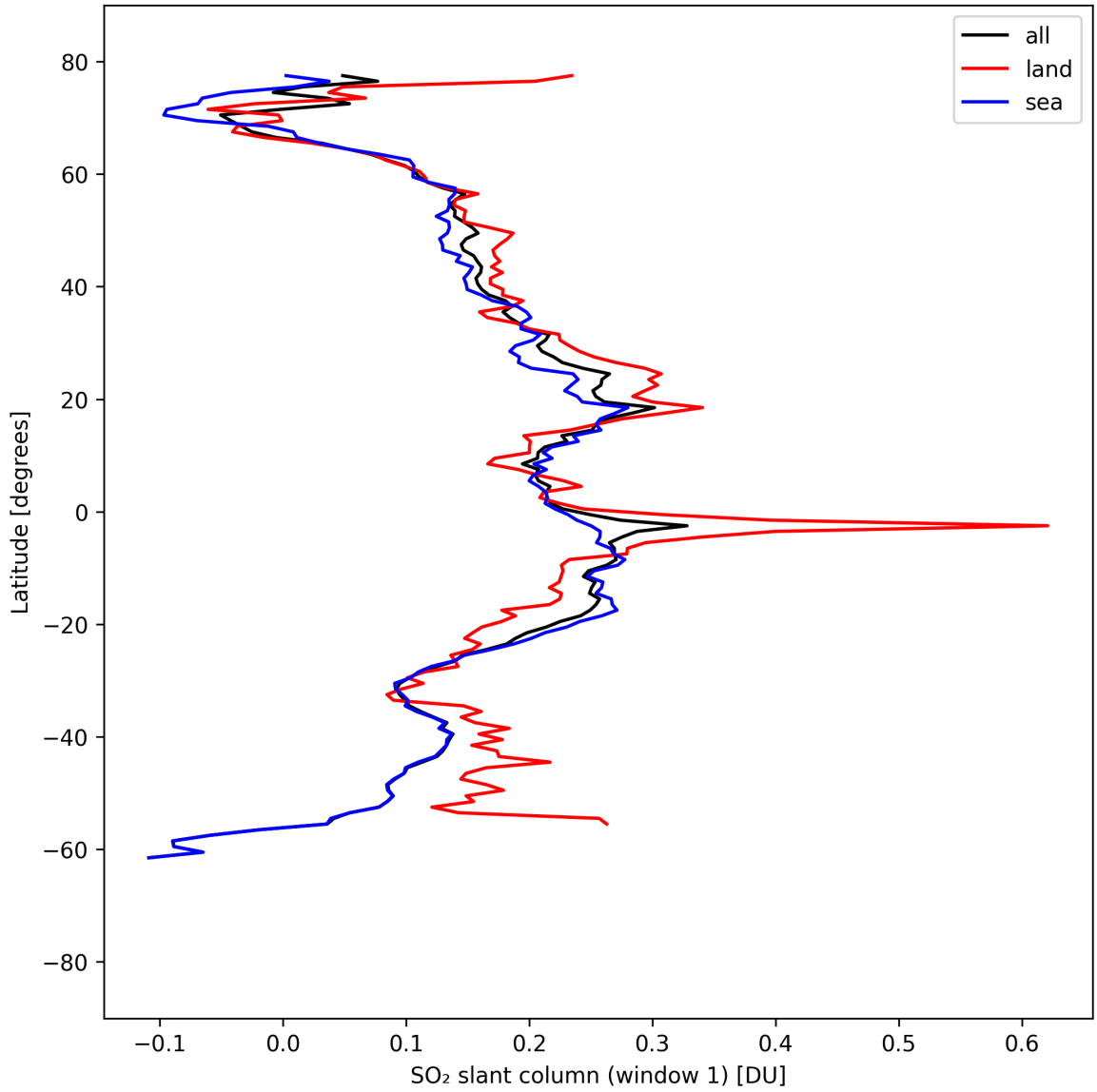

Figure 36: Zonal average of "SO_2 slant column (window 1)" for 2025-04-09 to 2025-04-10.

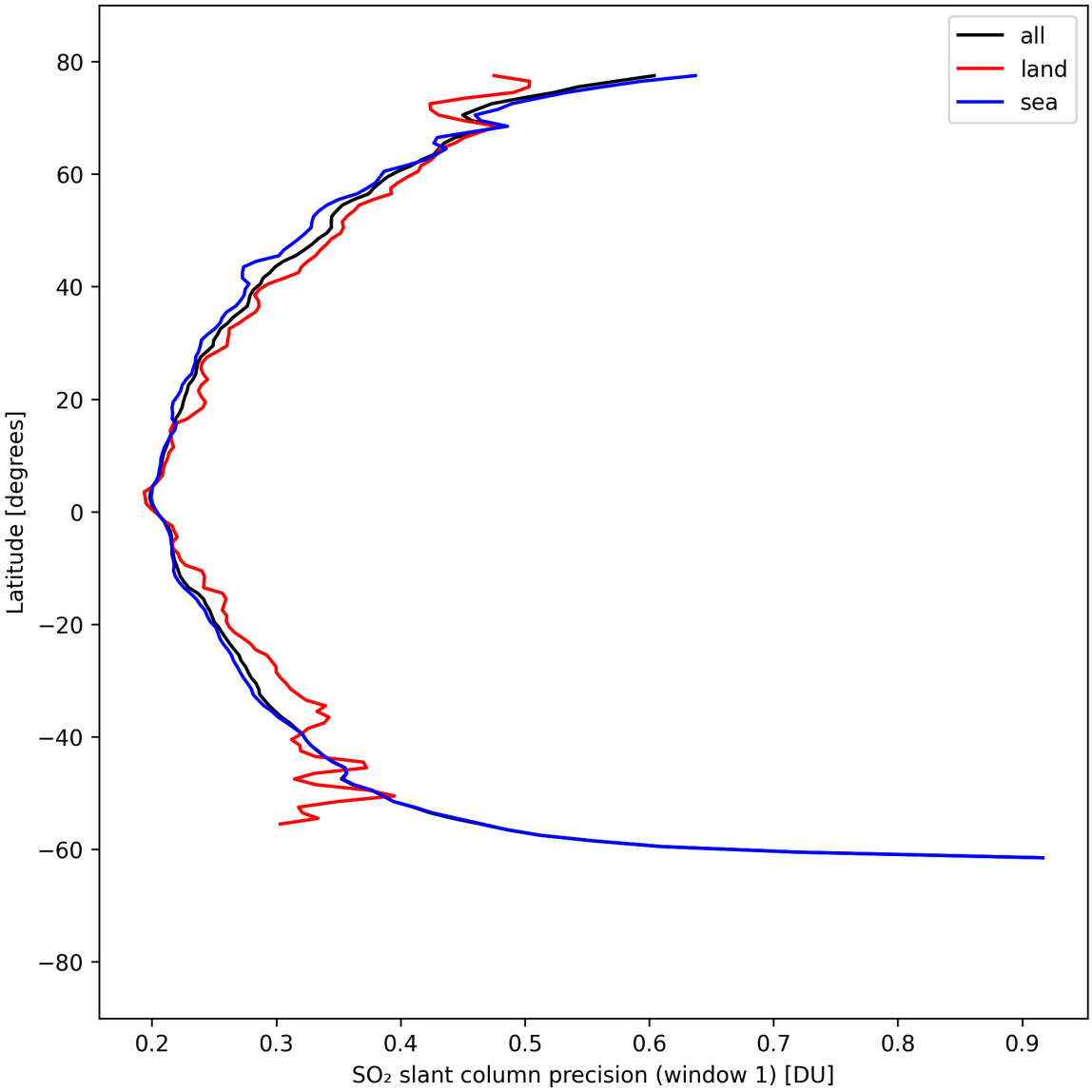

Figure 37: Zonal average of "SO_2 slant column precision (window 1)" for 2025-04-09 to 2025-04-10.

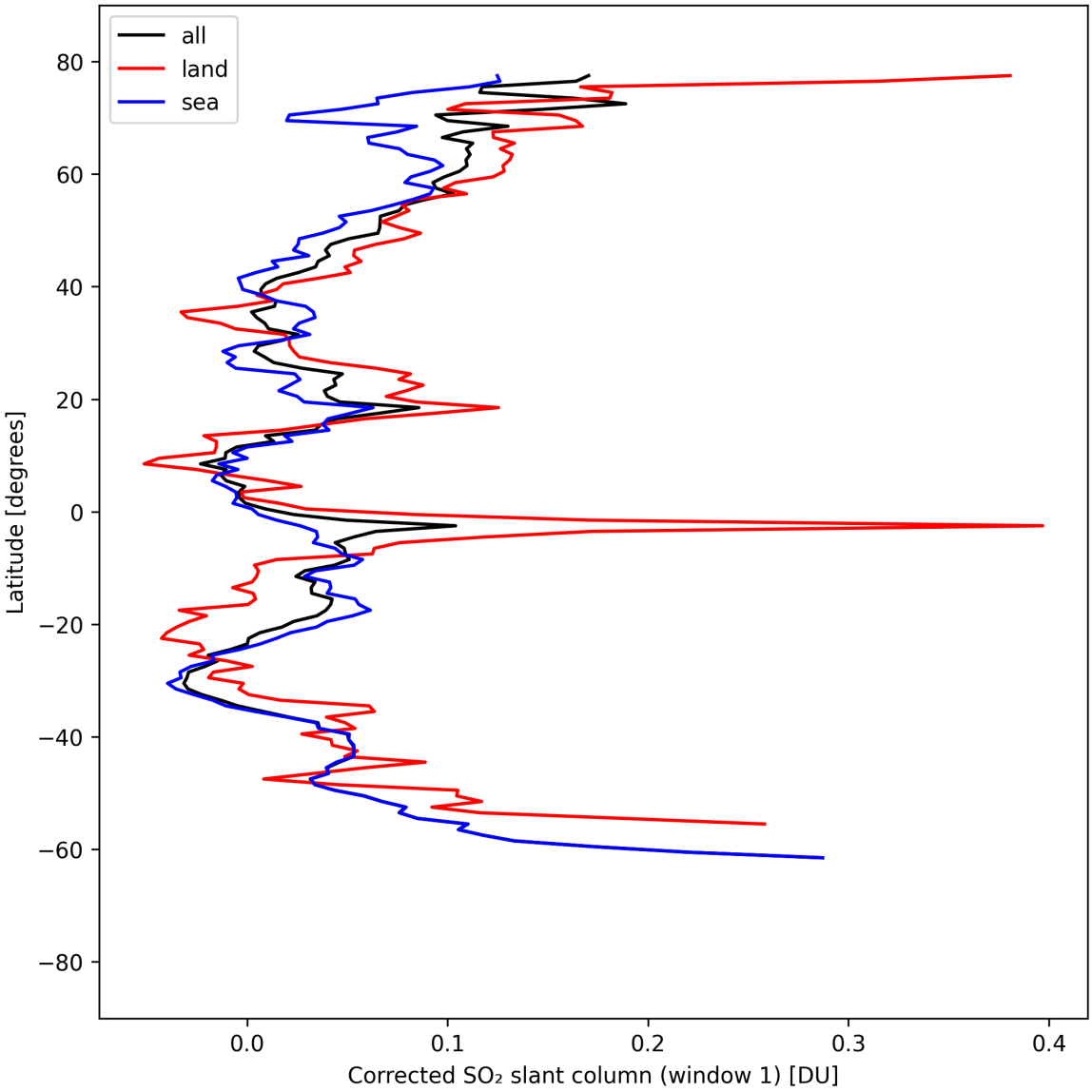

Figure 38: Zonal average of "Corrected SO_2 slant column (window 1)" for 2025-04-09 to 2025-04-10.

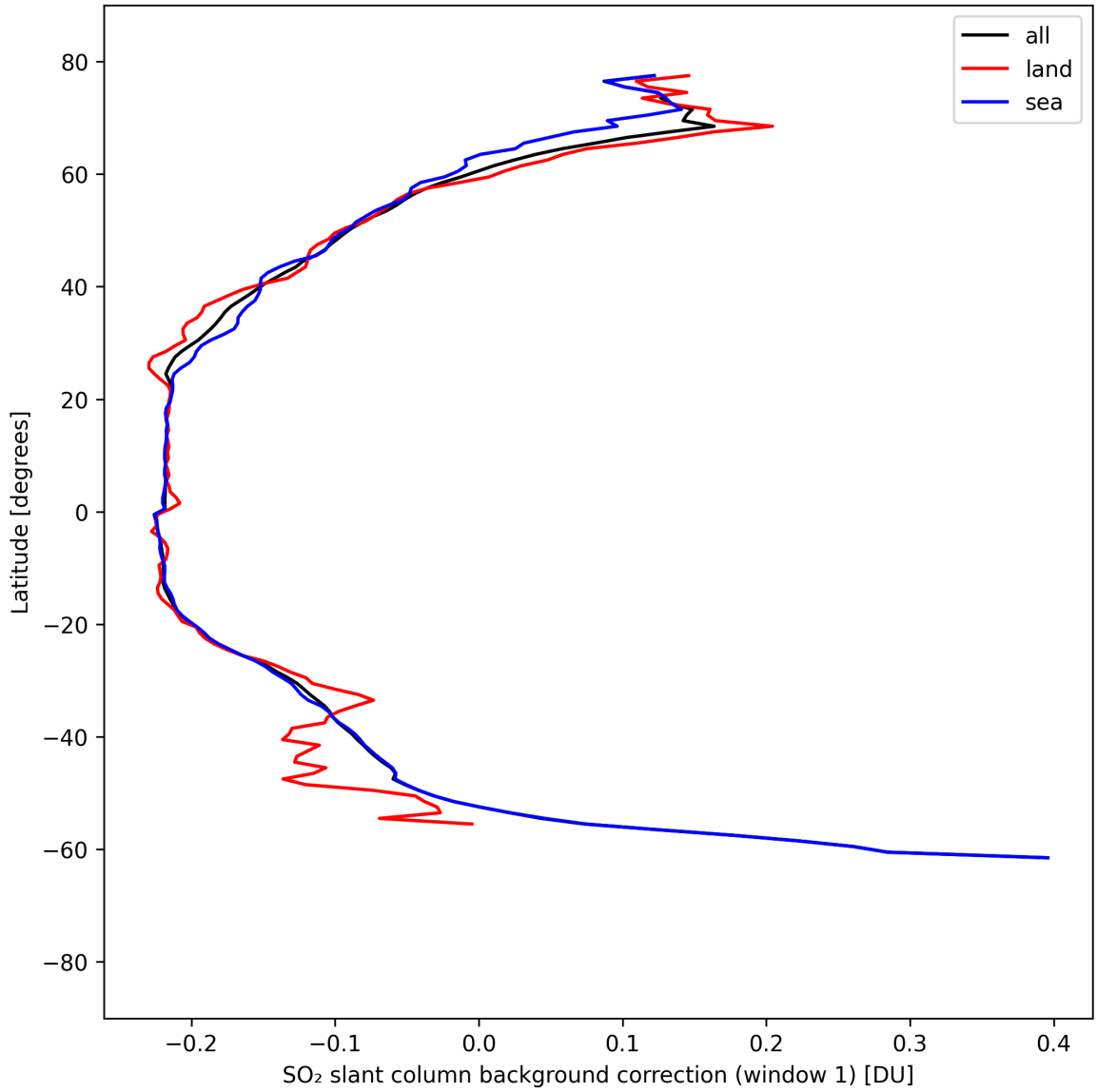

Figure 39: Zonal average of "SO_2 slant column background correction (window 1)" for 2025-04-09 to 2025-04-10.

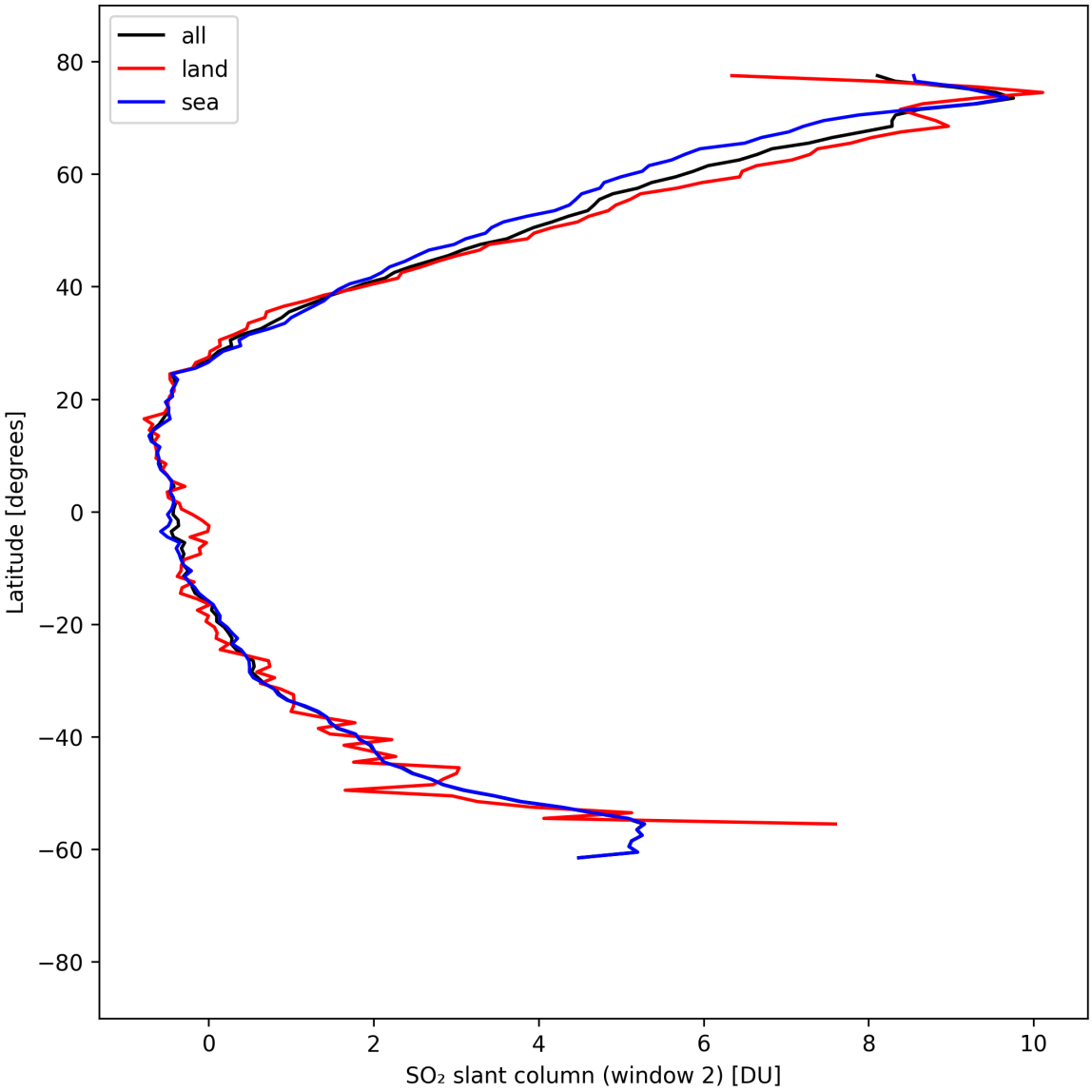

Figure 40: Zonal average of "SO_2 slant column (window 2)" for 2025-04-09 to 2025-04-10.

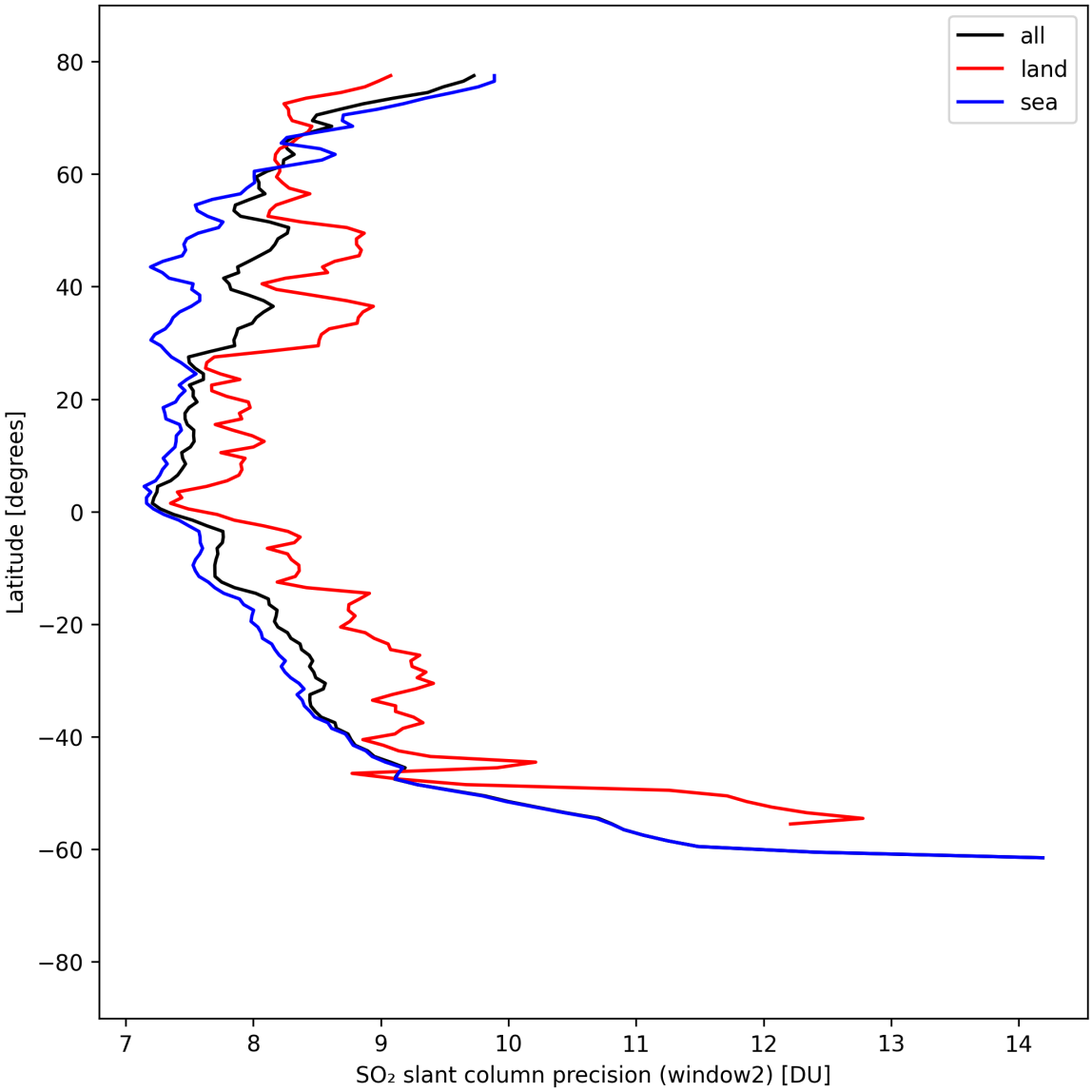

Figure 41: Zonal average of "SO_2 slant column precision (window2)" for 2025-04-09 to 2025-04-10.

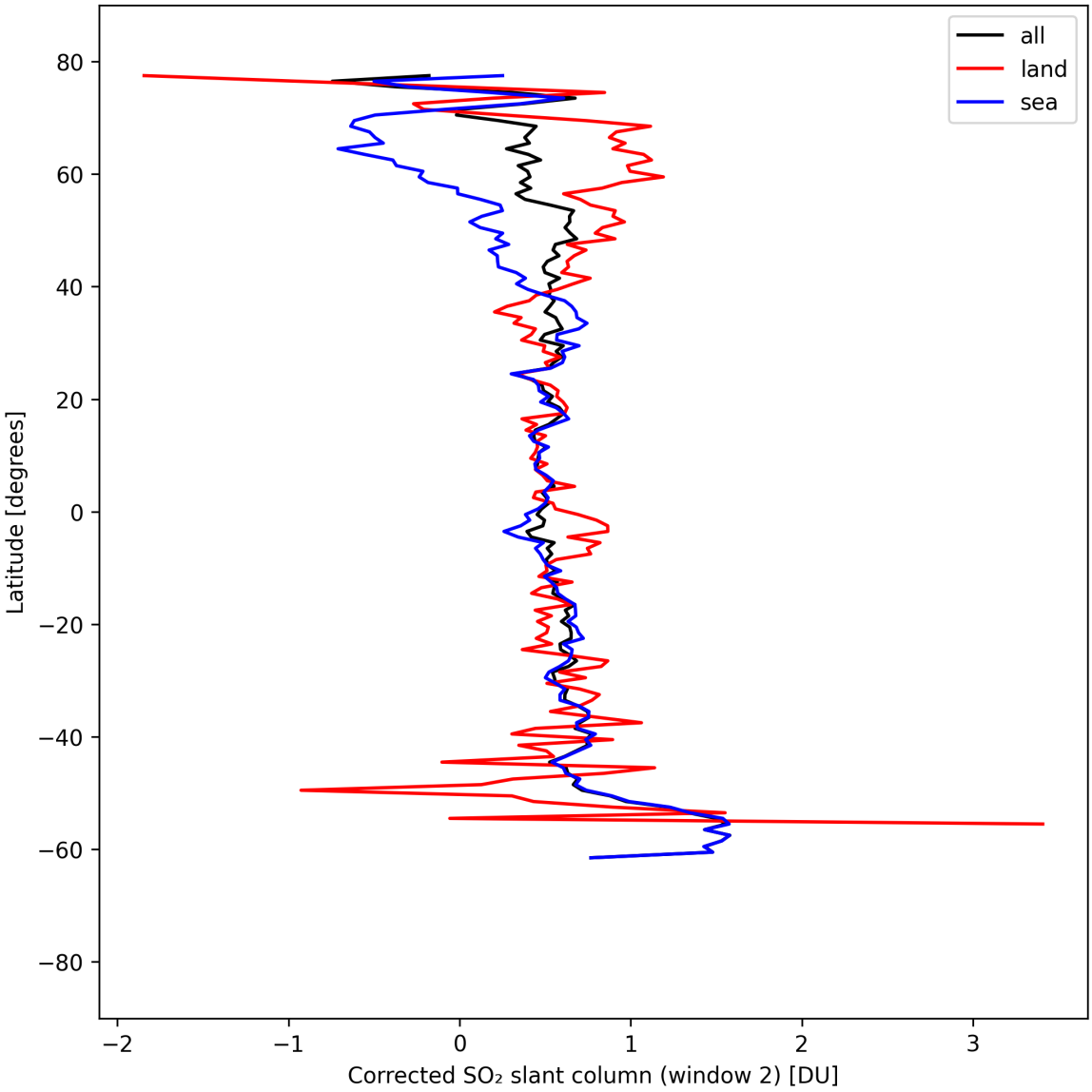

Figure 42: Zonal average of “Corrected SO_2 slant column (window 2)” for 2025-04-09 to 2025-04-10.

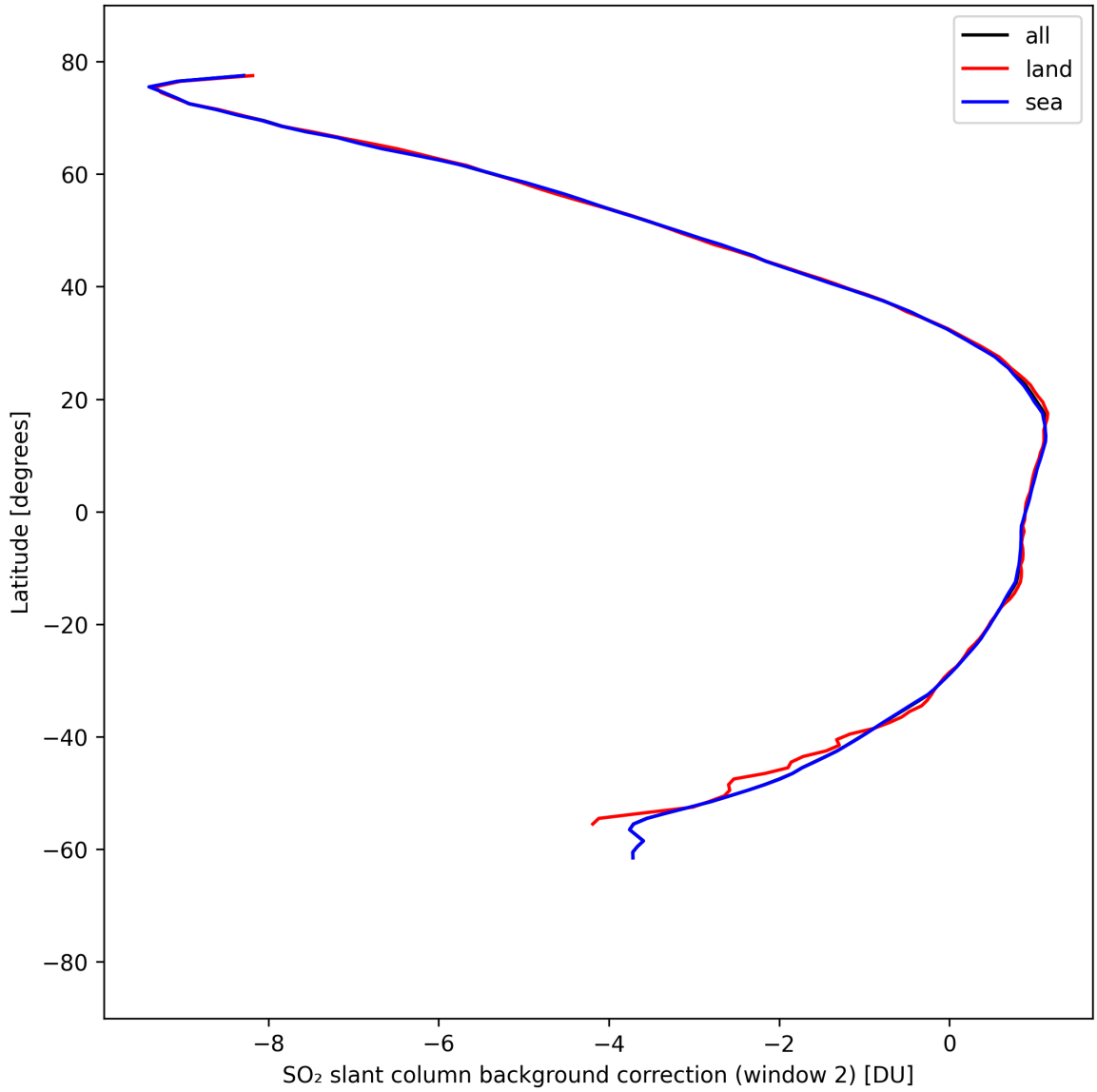

Figure 43: Zonal average of "SO_2 slant column background correction (window 2)" for 2025-04-09 to 2025-04-10.

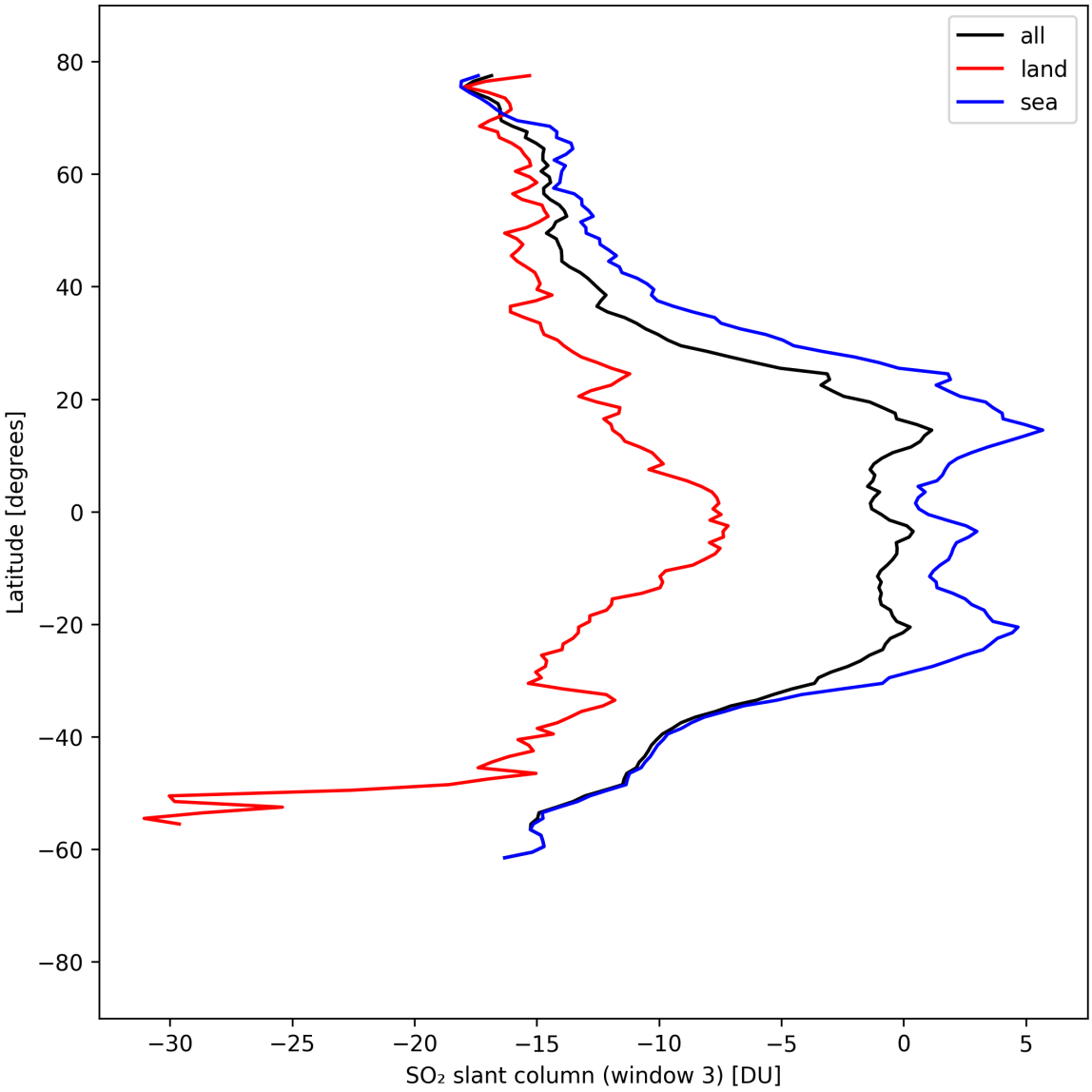

Figure 44: Zonal average of "SO_2 slant column (window 3)" for 2025-04-09 to 2025-04-10.

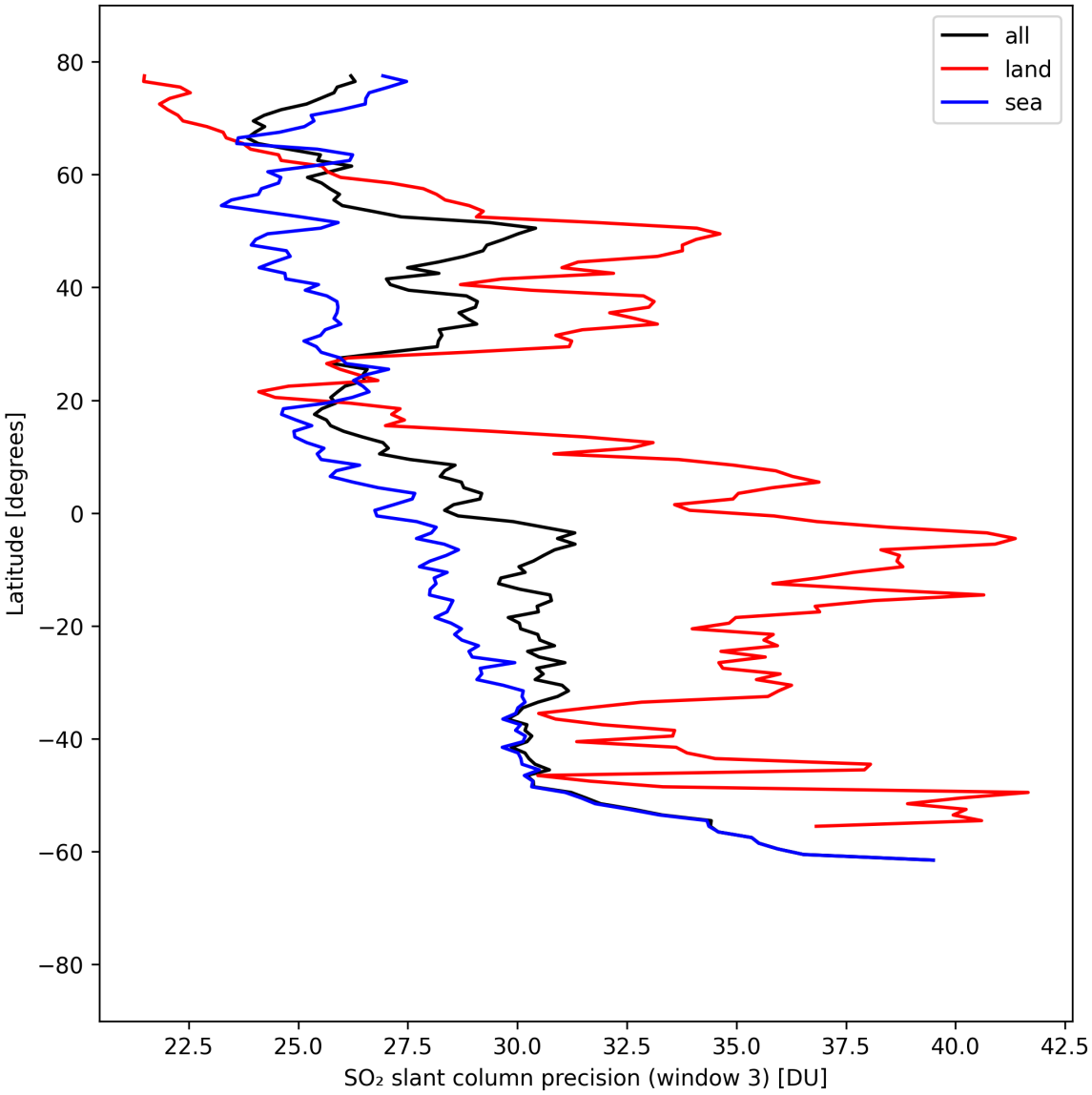

Figure 45: Zonal average of "SO_2 slant column precision (window 3)" for 2025-04-09 to 2025-04-10.

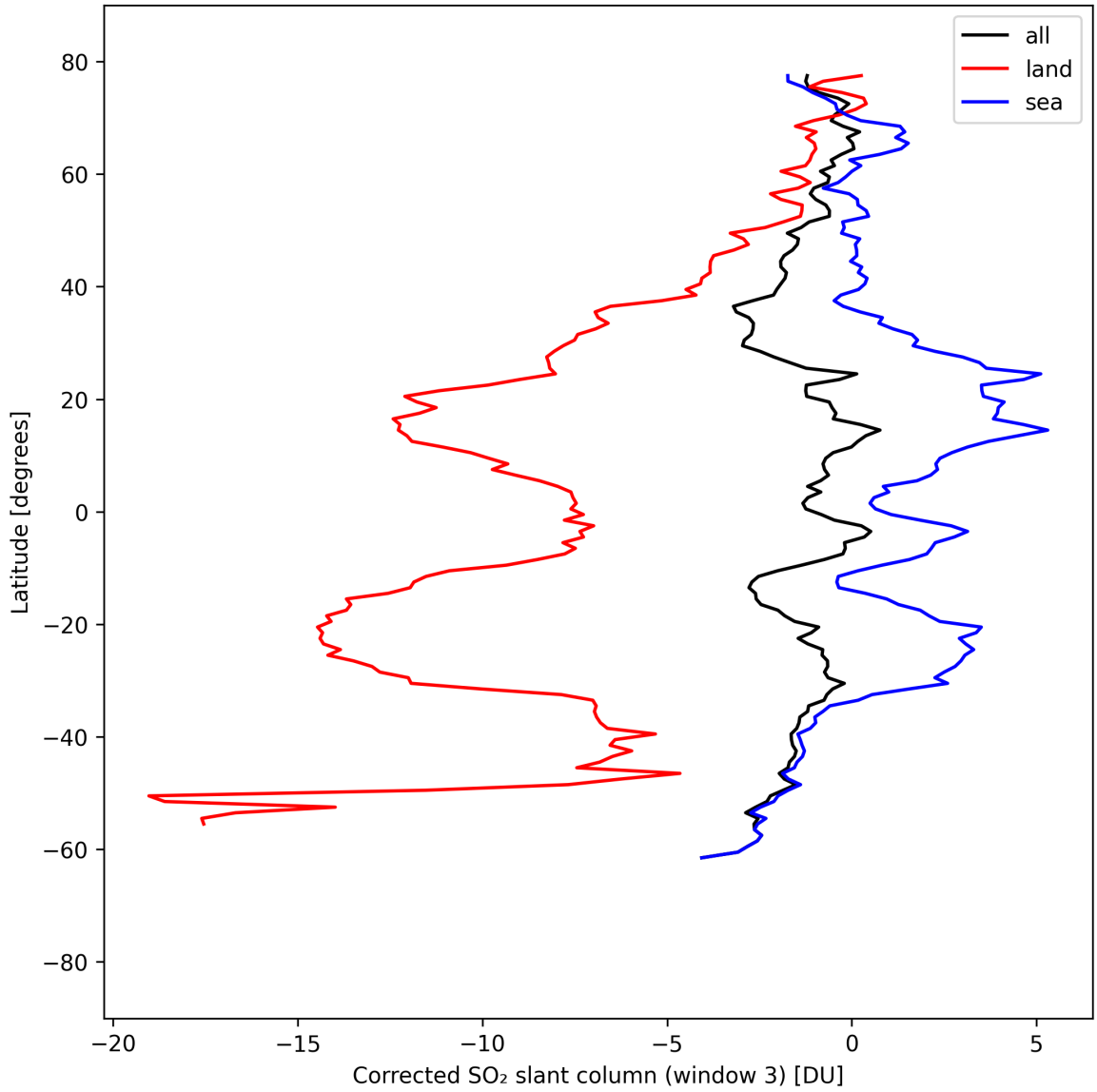

Figure 46: Zonal average of "Corrected SO_2 slant column (window 3)" for 2025-04-09 to 2025-04-10.

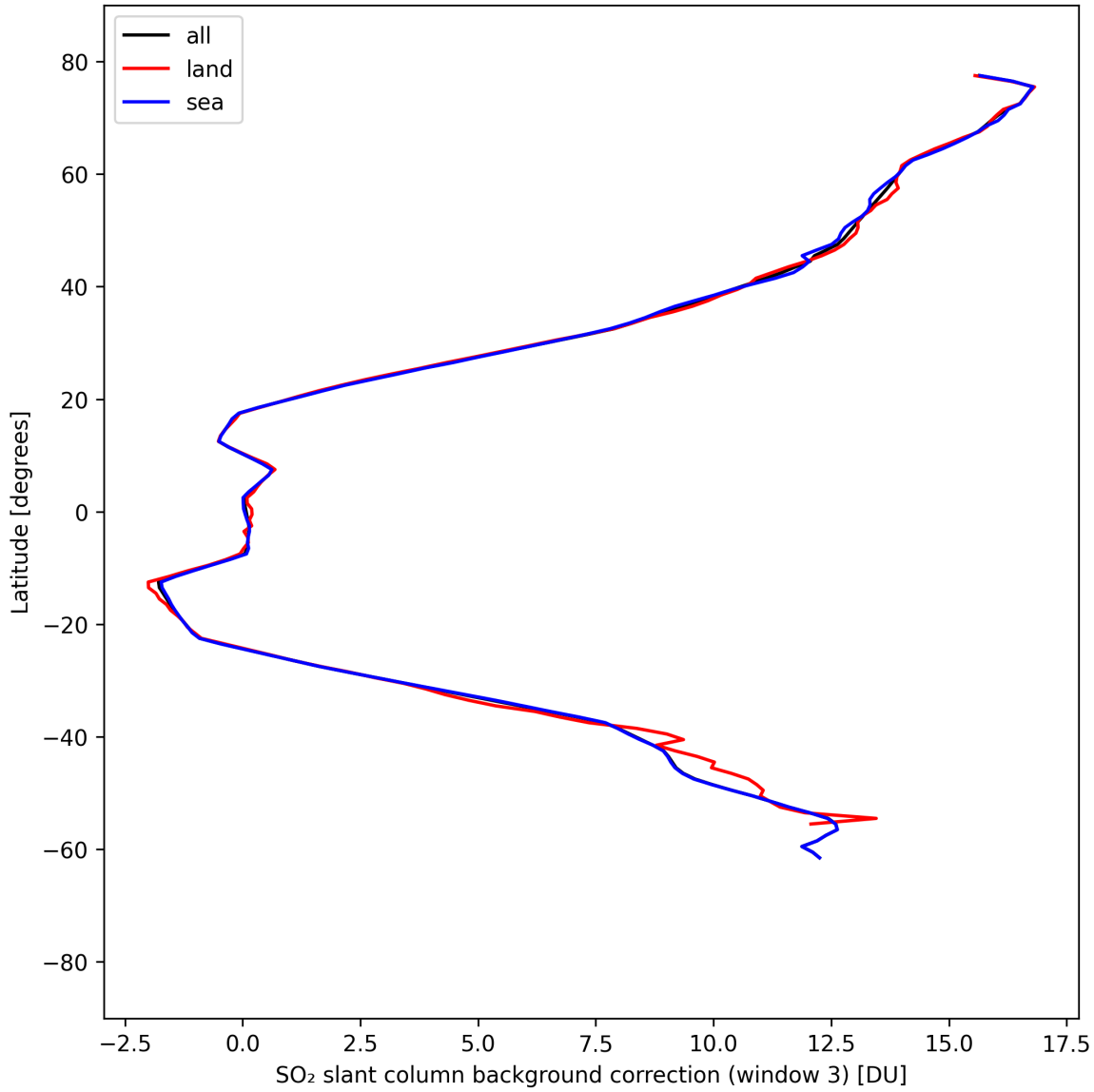

Figure 47: Zonal average of "SO_2 slant column background correction (window 3)" for 2025-04-09 to 2025-04-10.

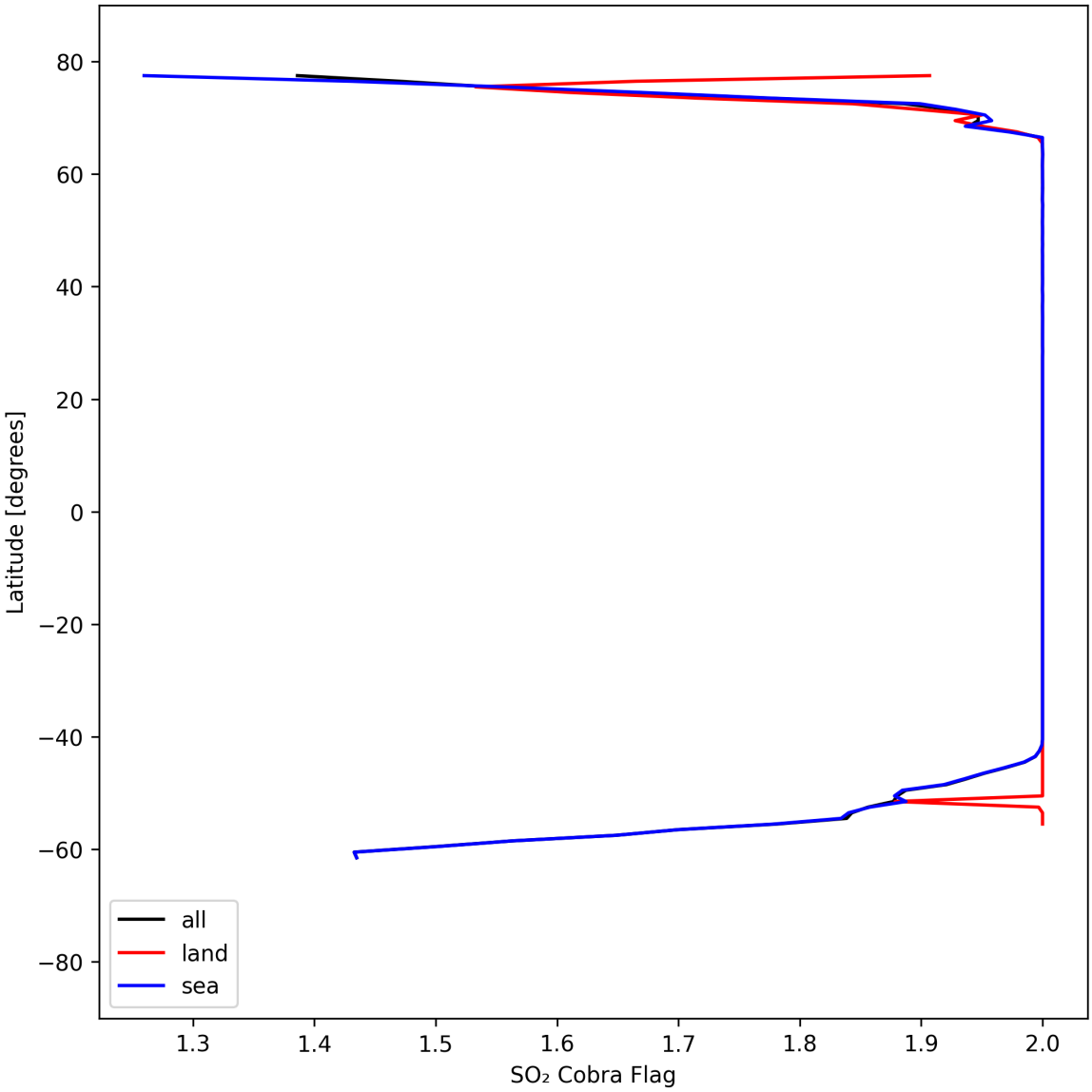

Figure 48: Zonal average of "SO_2 Cobra Flag" for 2025-04-09 to 2025-04-10.

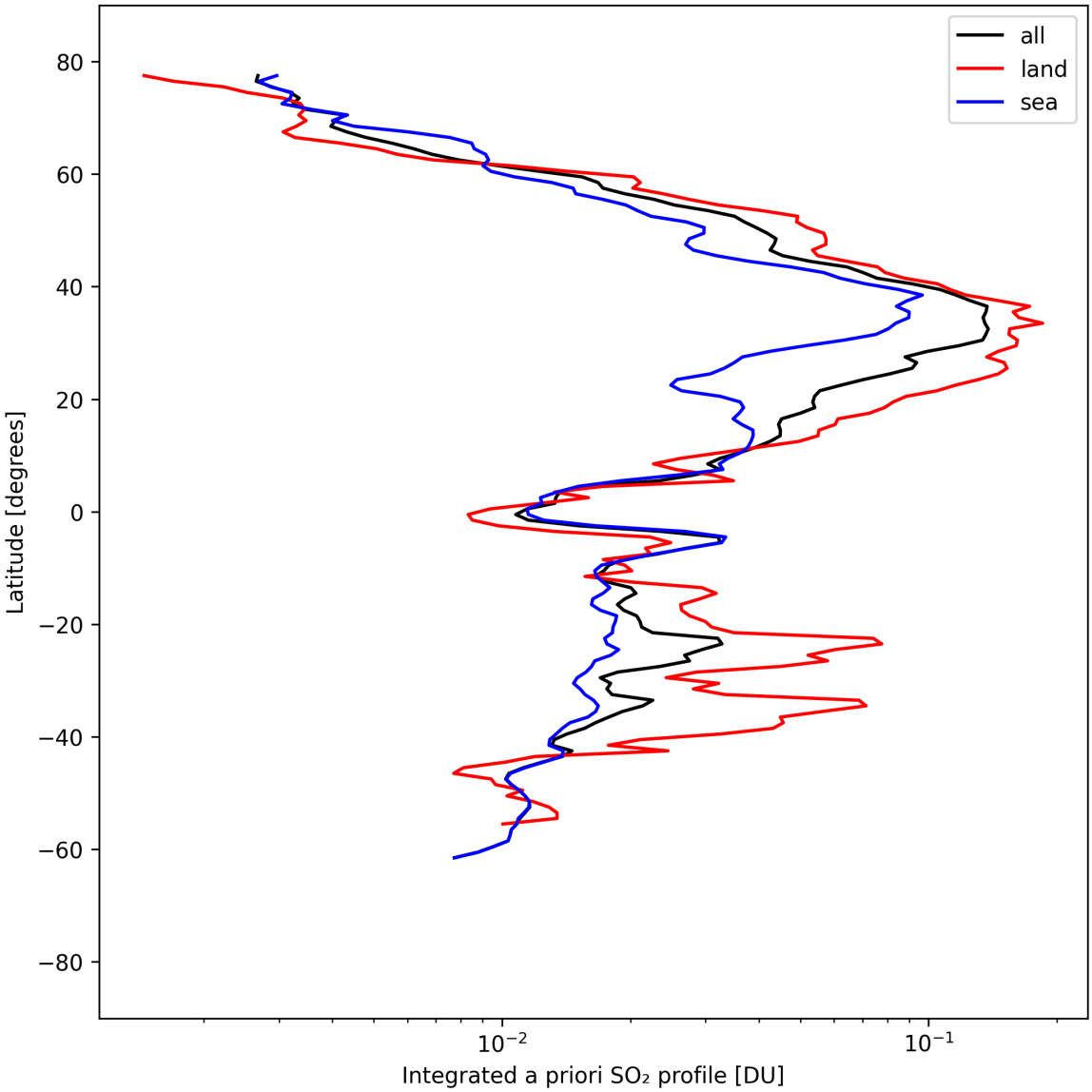

Figure 49: Zonal average of “Integrated a priori SO_2 profile” for 2025-04-09 to 2025-04-10.

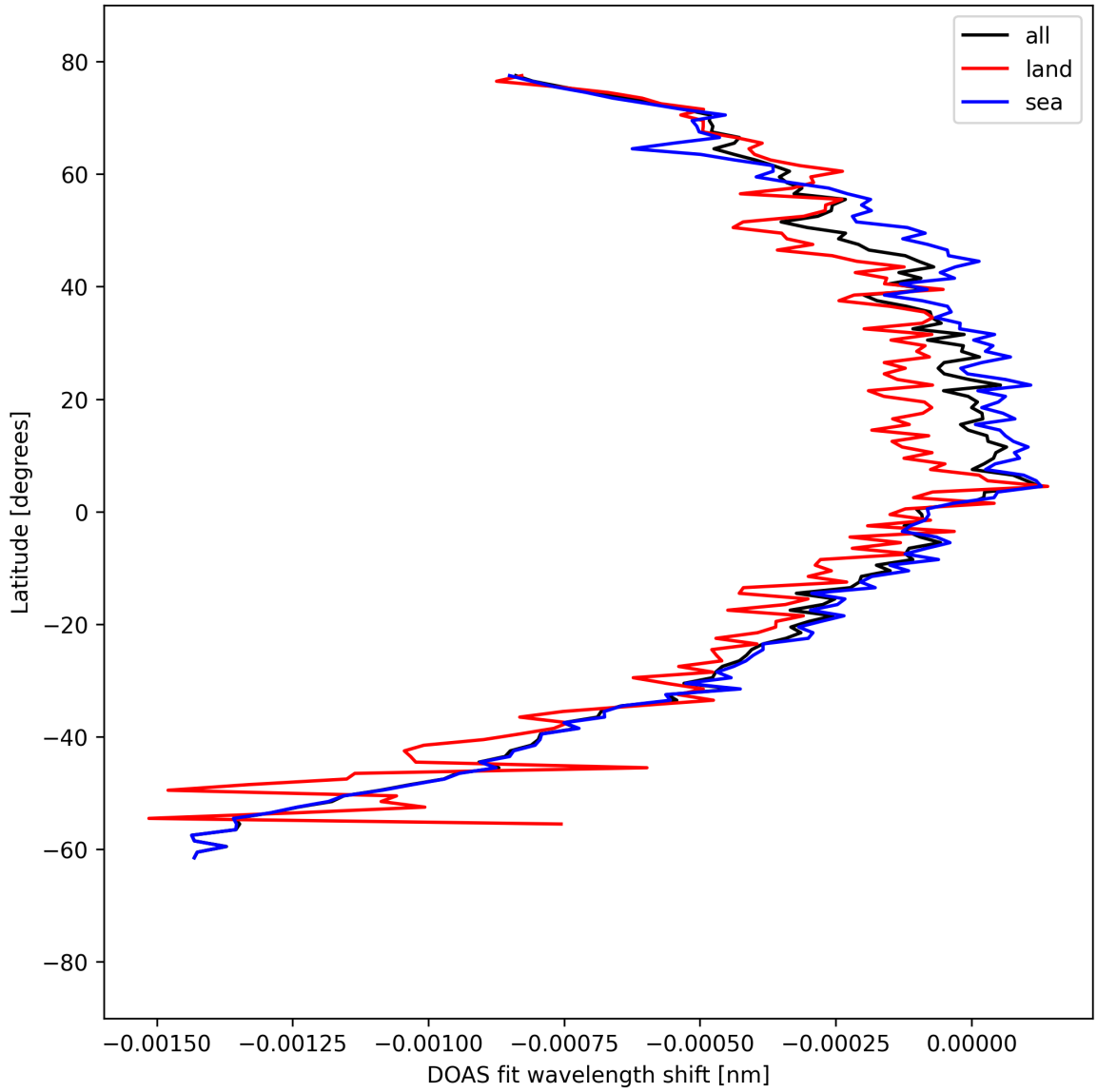

Figure 50: Zonal average of “DOAS fit wavelength shift” for 2025-04-09 to 2025-04-10.

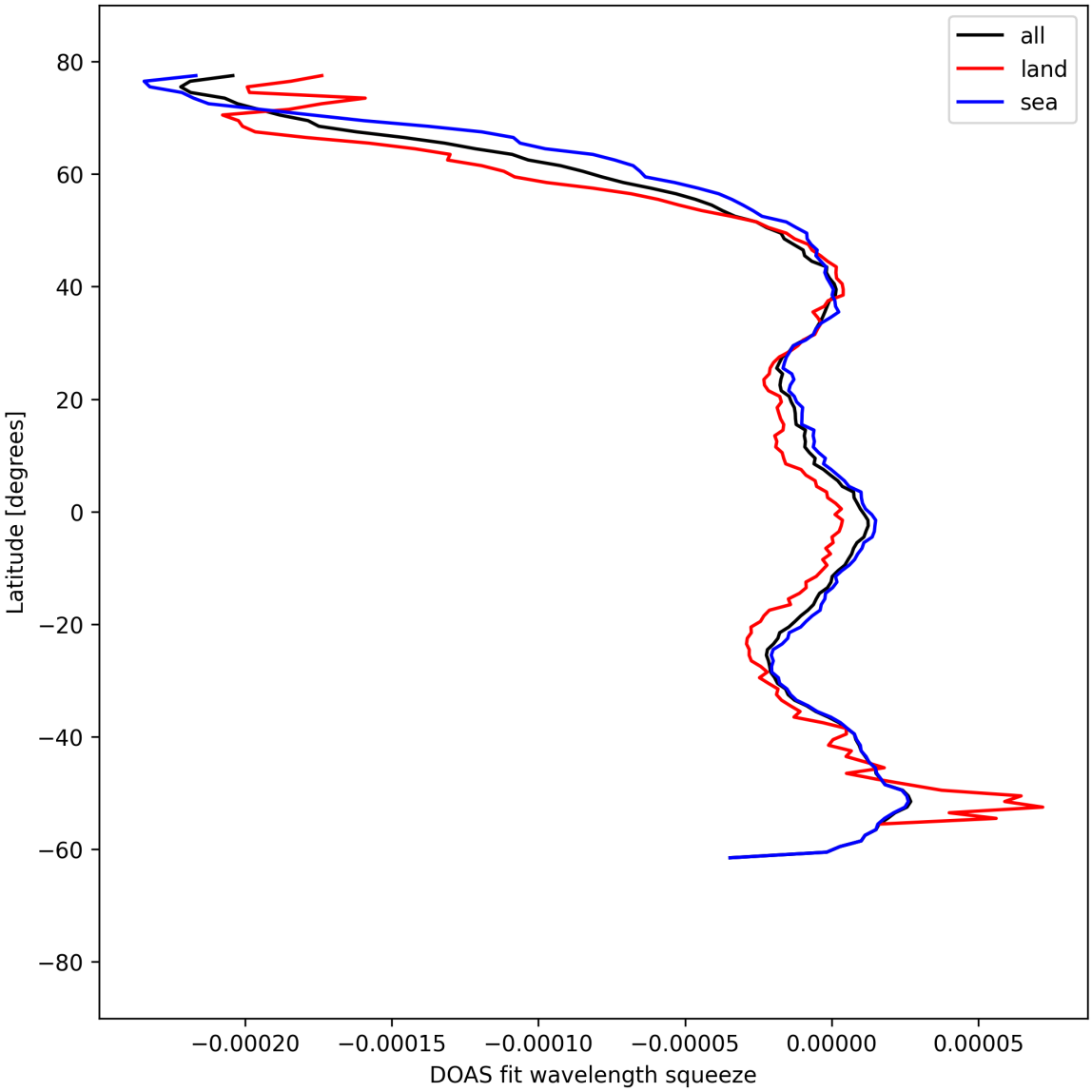

Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-04-09 to 2025-04-10.

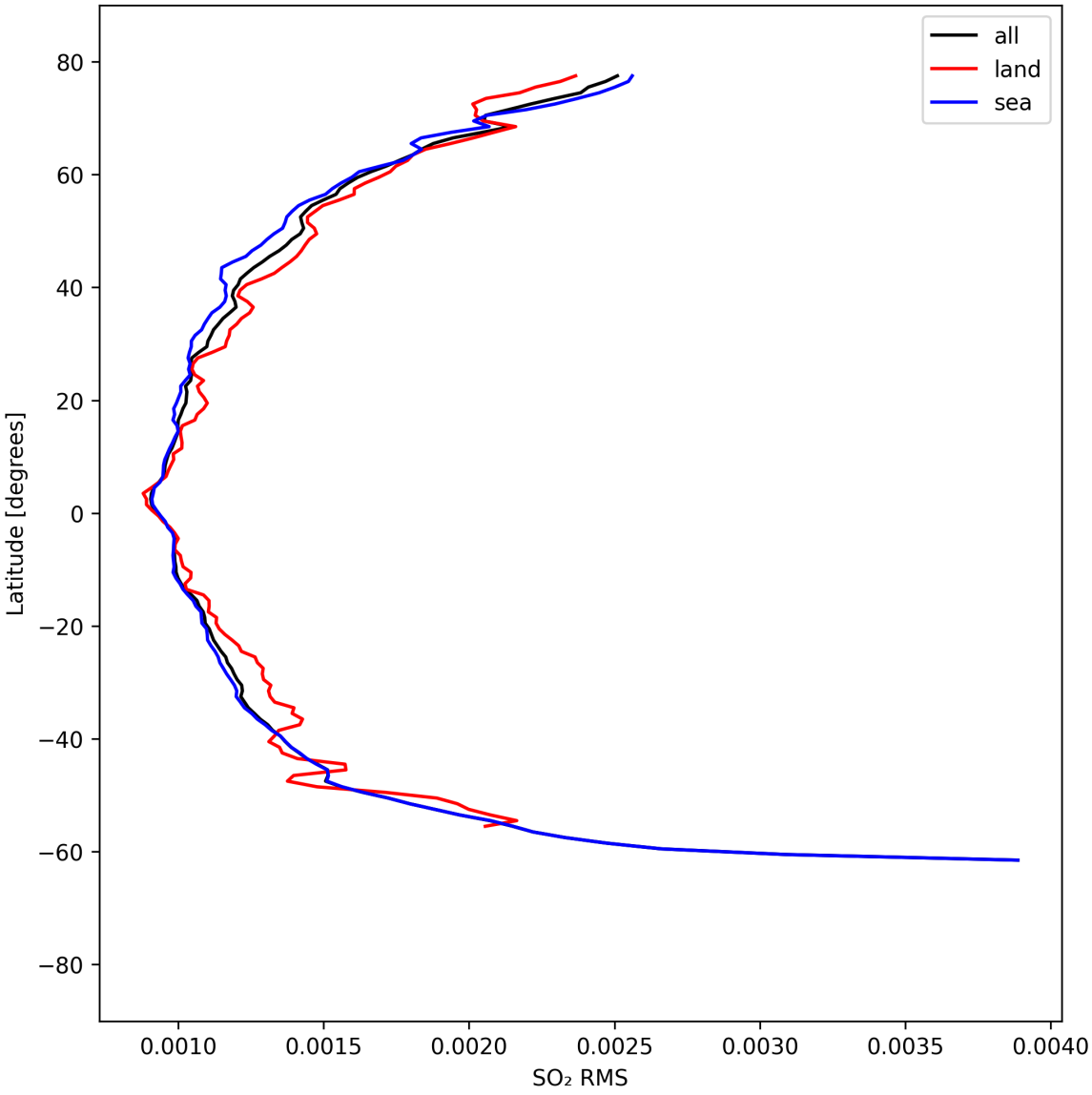

Figure 52: Zonal average of "SO_2 RMS" for 2025-04-09 to 2025-04-10.

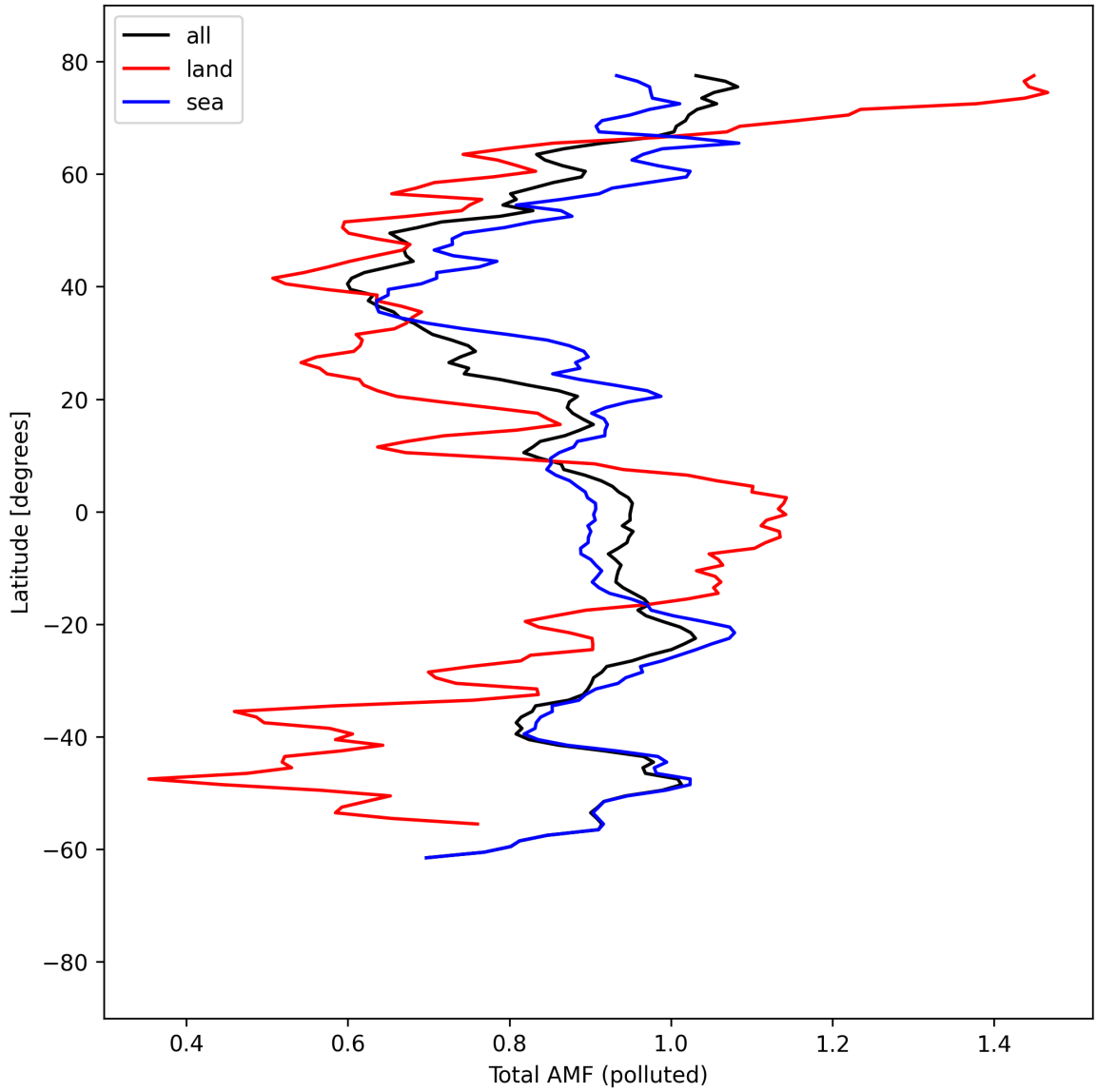

Figure 53: Zonal average of “Total AMF (polluted)” for 2025-04-09 to 2025-04-10.

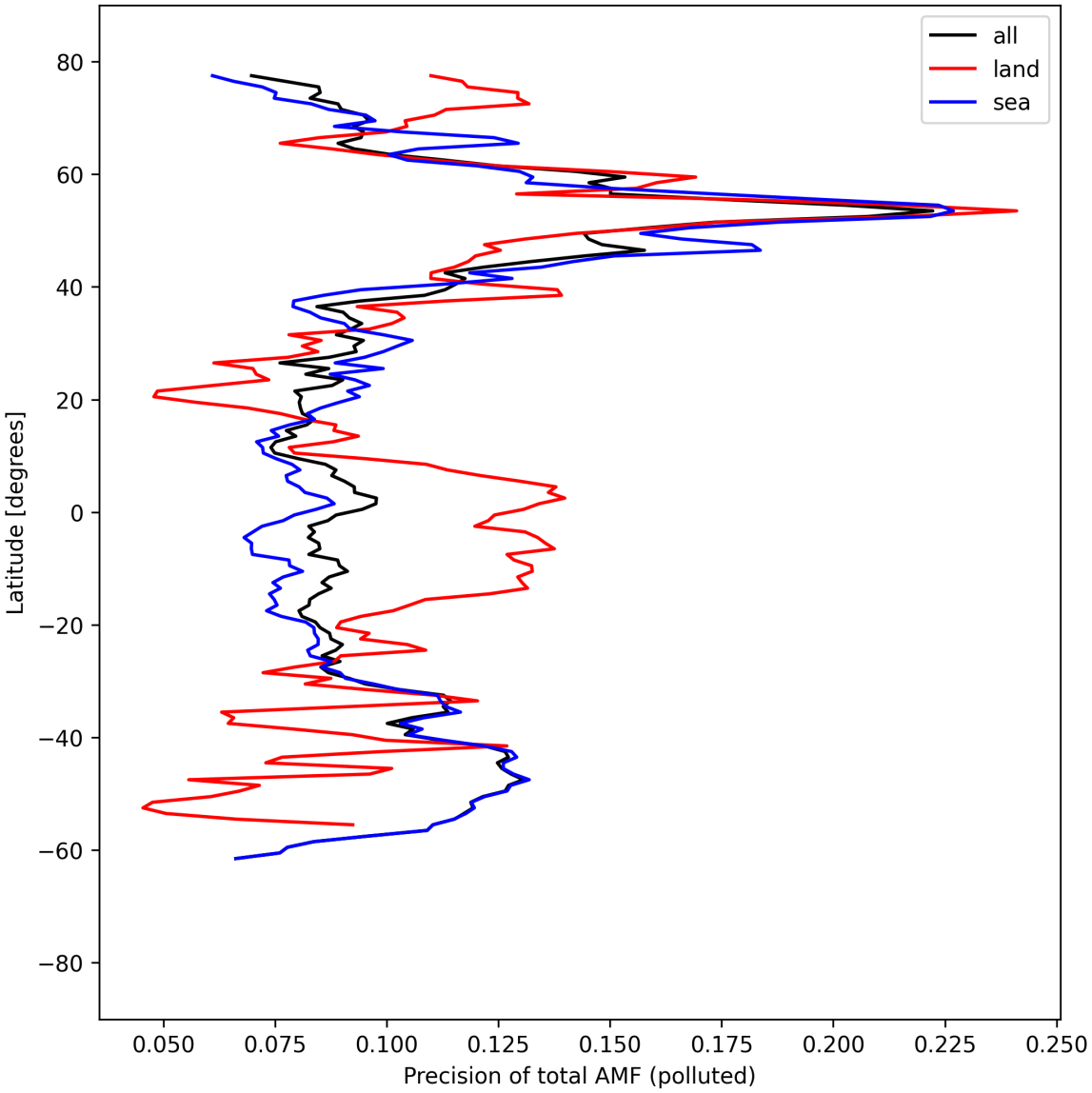

Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-04-09 to 2025-04-10.

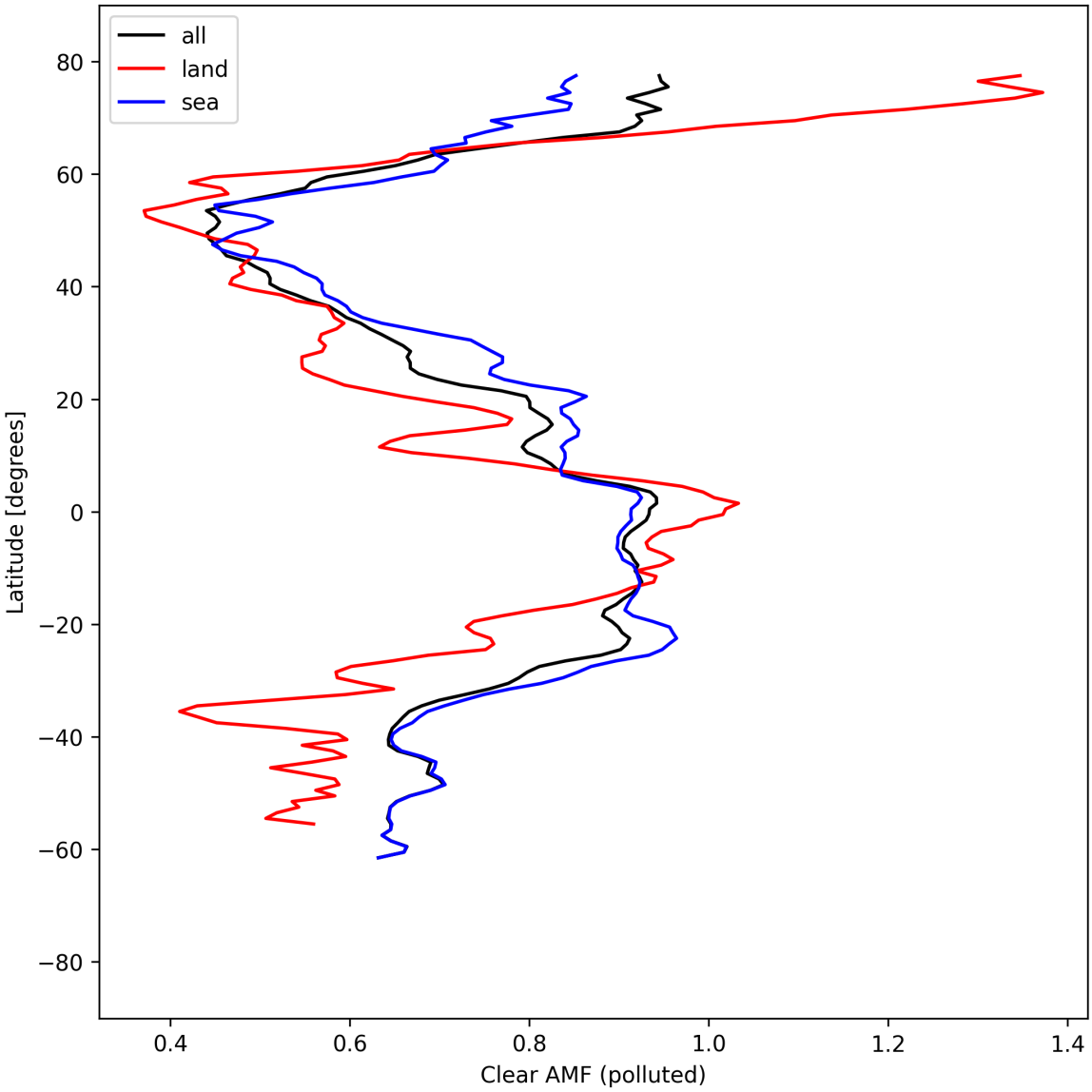

Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-04-09 to 2025-04-10.

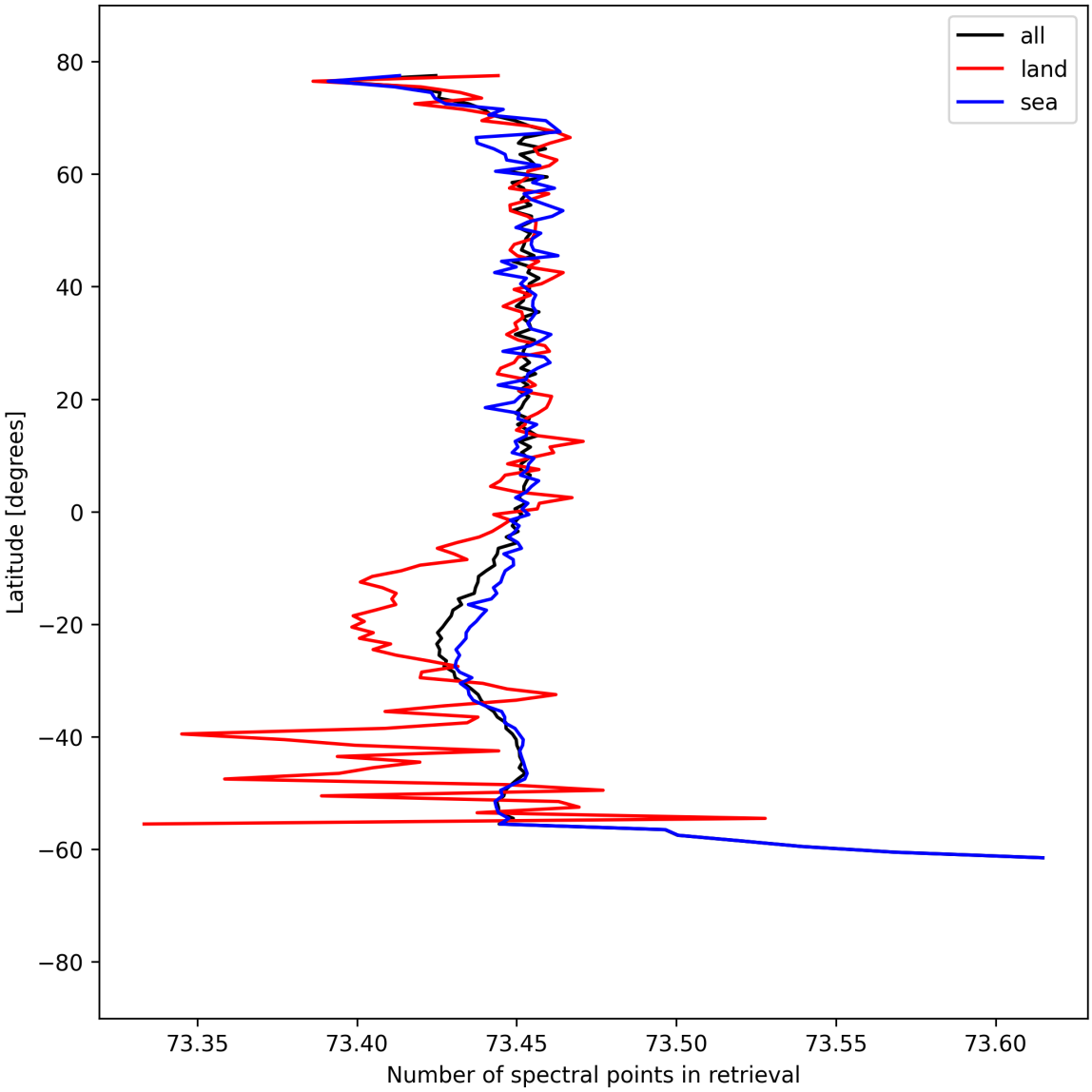

Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-04-09 to 2025-04-10.

8 Histograms

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

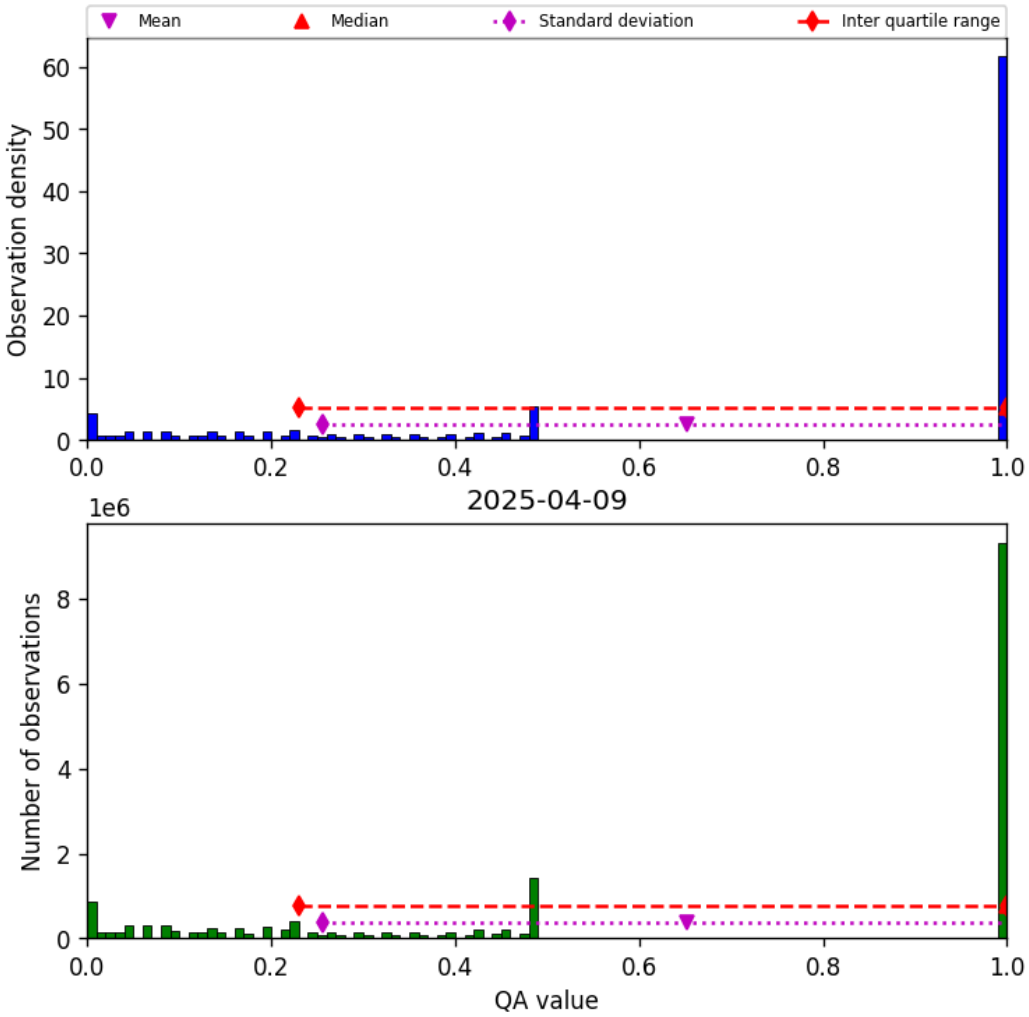

Figure 57: Histogram of “QA value” for 2025-04-09 to 2025-04-10

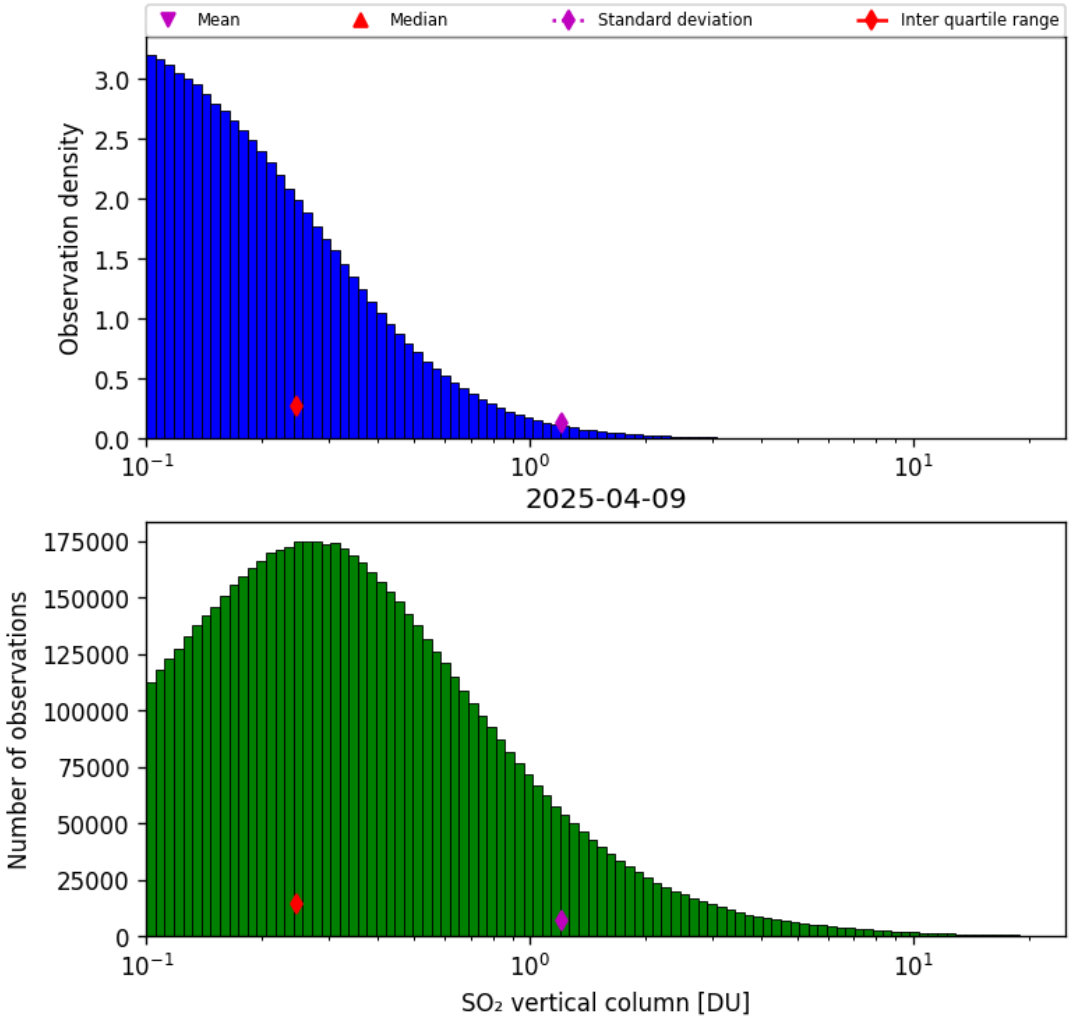

Figure 58: Histogram of "SO_2 vertical column" for 2025-04-09 to 2025-04-10

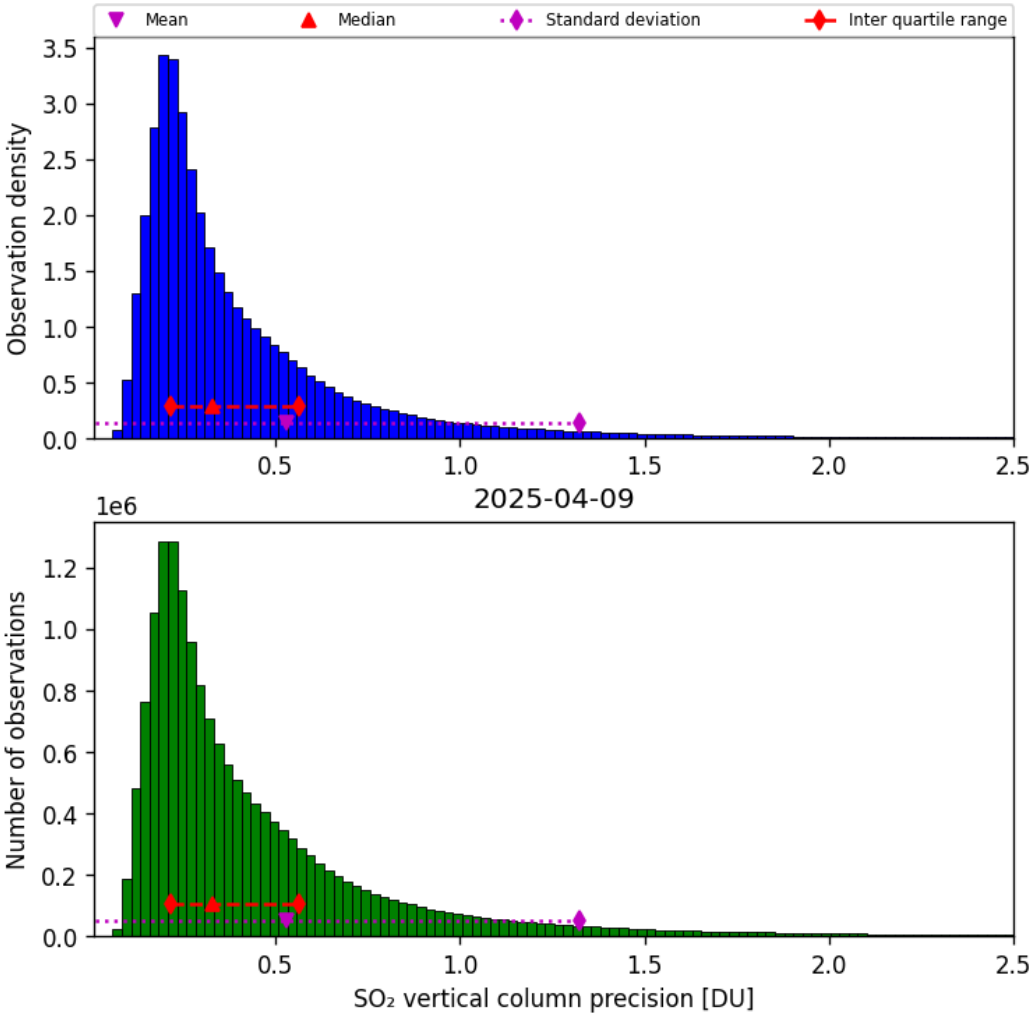

Figure 59: Histogram of "SO_2 vertical column precision" for 2025-04-09 to 2025-04-10

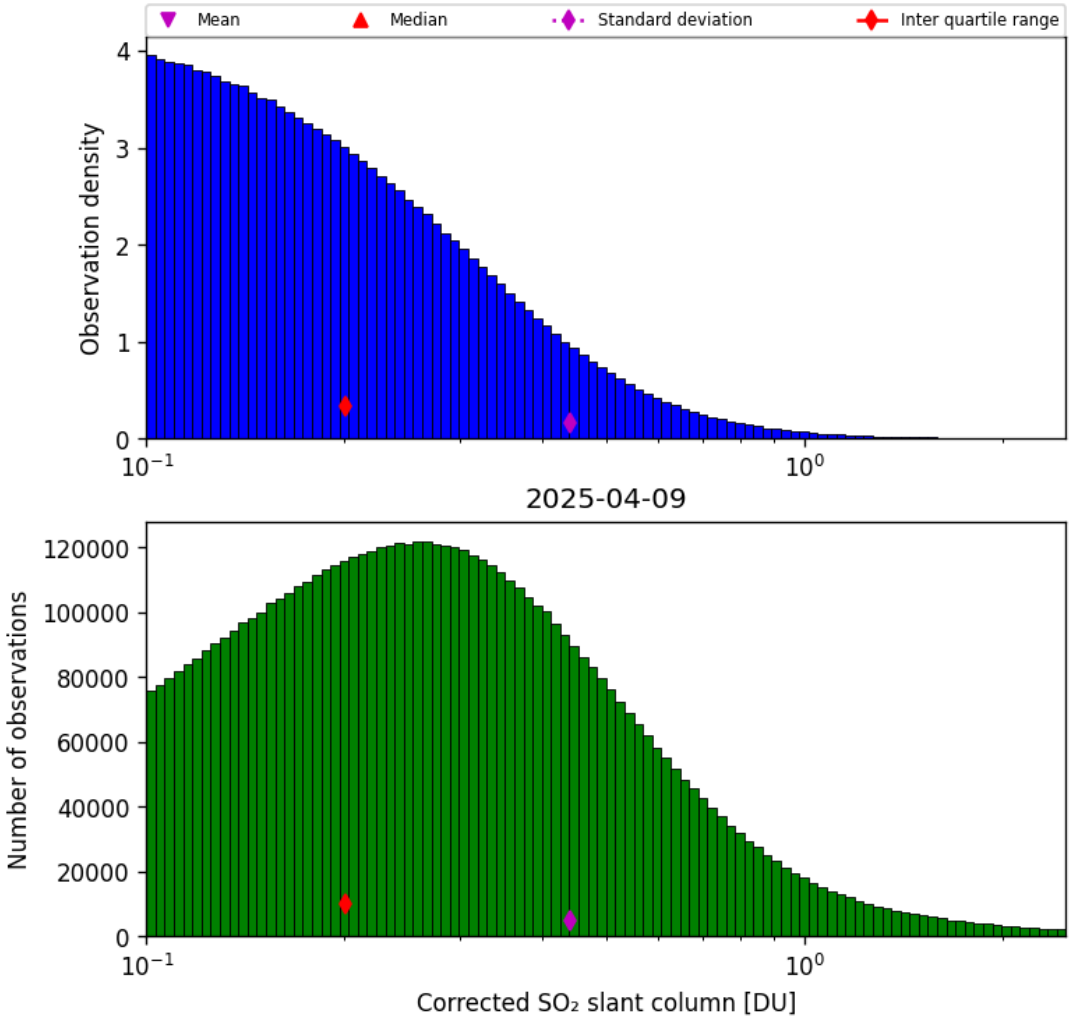

Figure 60: Histogram of "Corrected SO_2 slant column" for 2025-04-09 to 2025-04-10

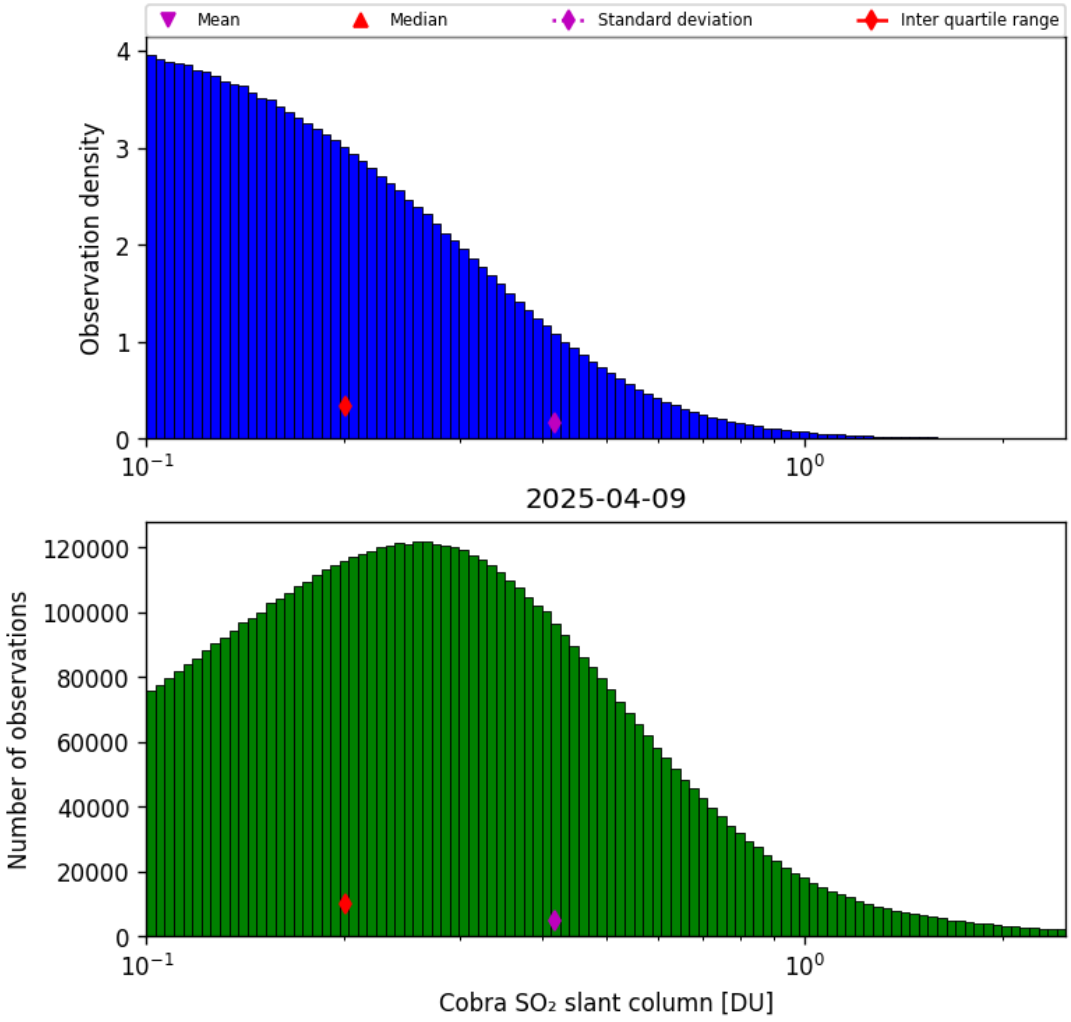

Figure 61: Histogram of "Cobra SO_2 slant column" for 2025-04-09 to 2025-04-10

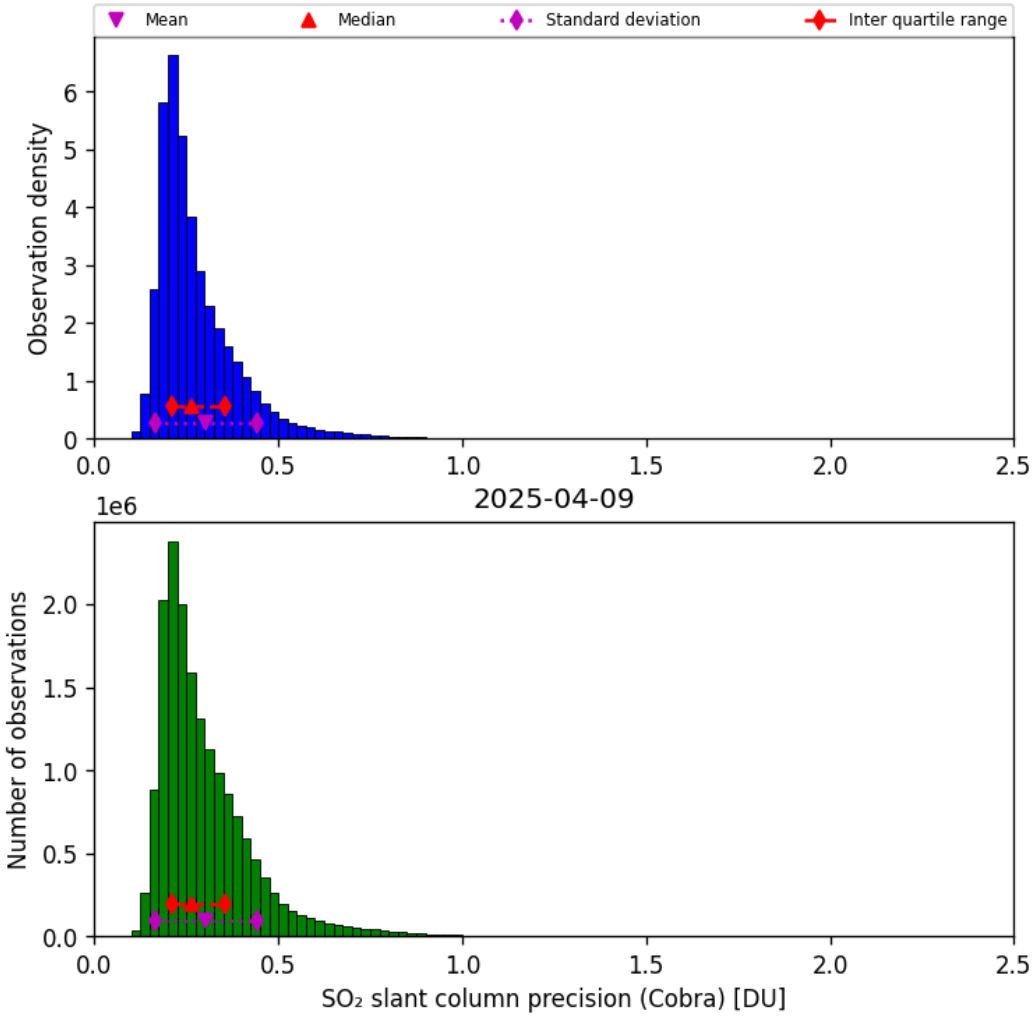

Figure 62: Histogram of "SO_2 slant column precision (Cobra)" for 2025-04-09 to 2025-04-10

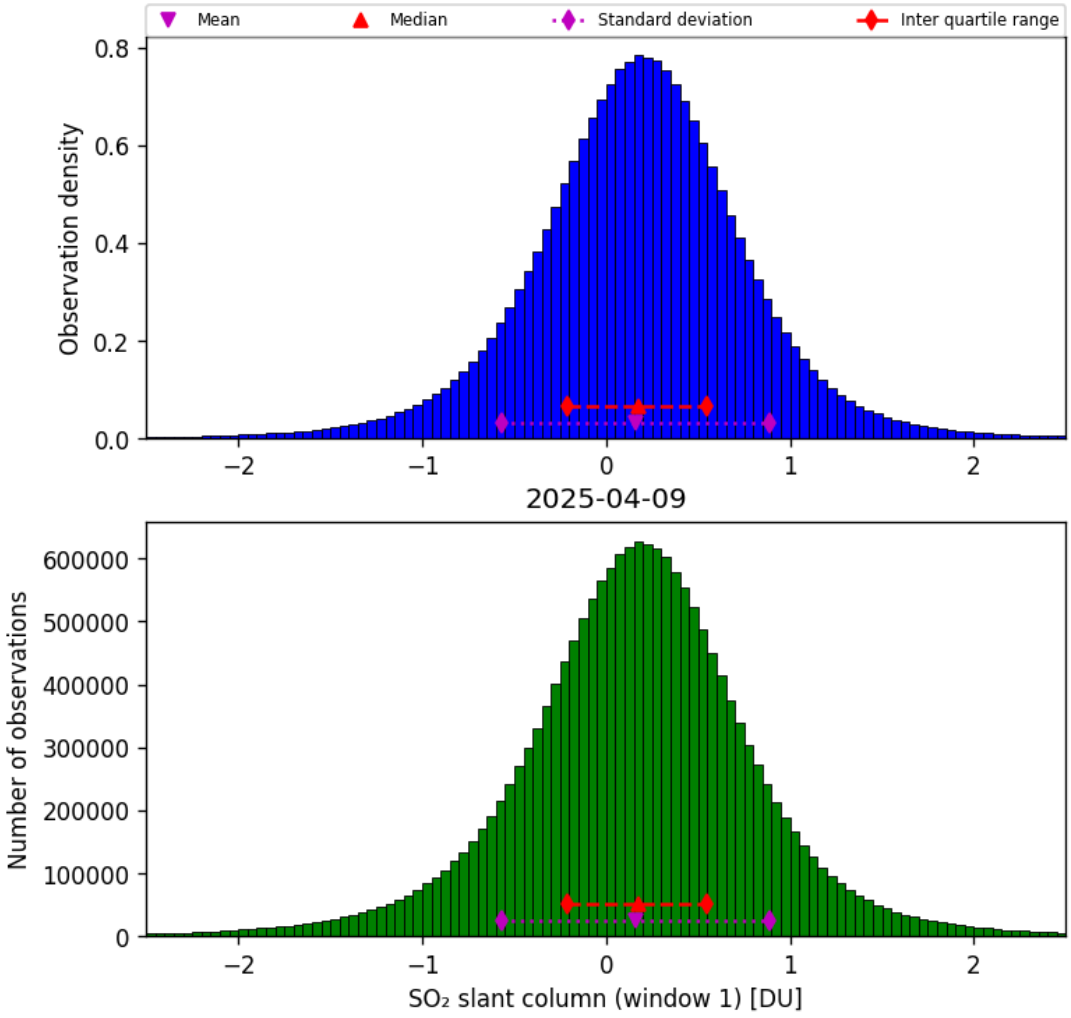

Figure 63: Histogram of "SO_2 slant column (window 1)" for 2025-04-09 to 2025-04-10

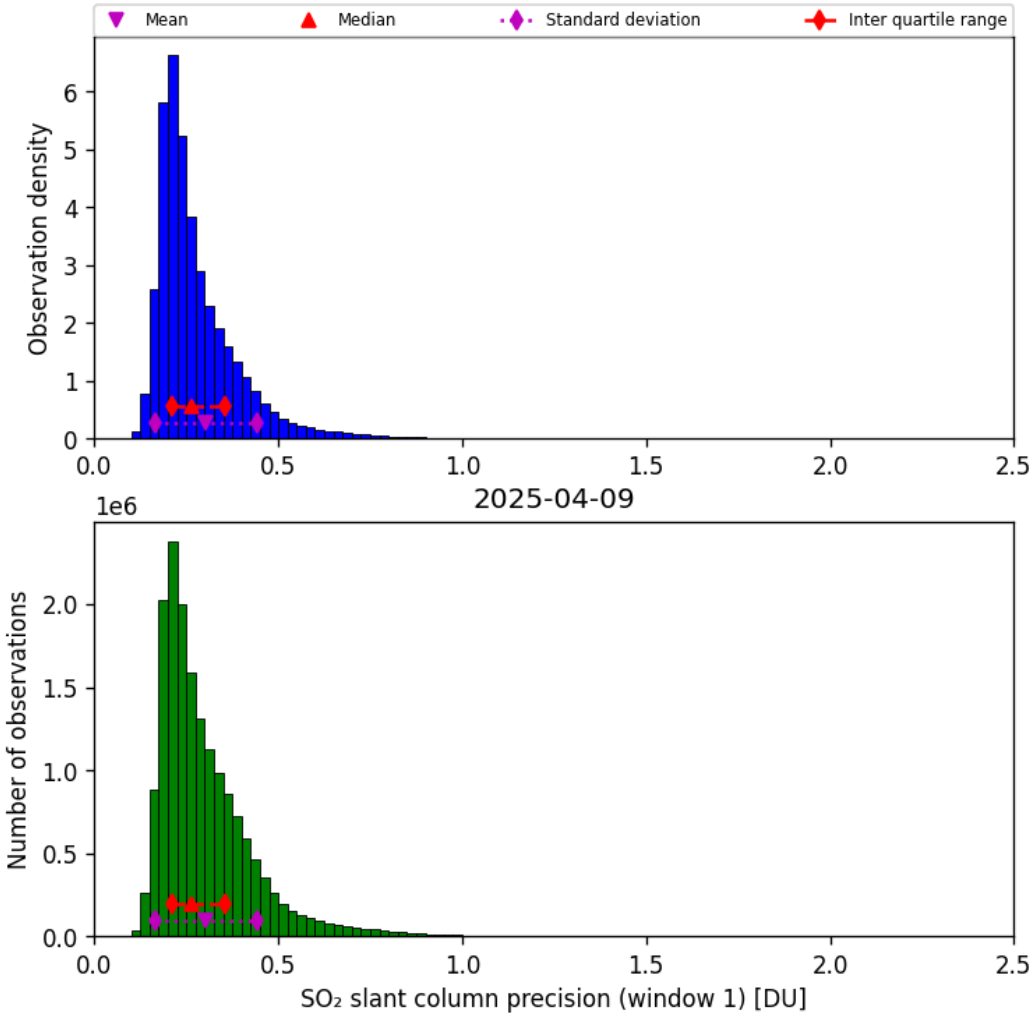

Figure 64: Histogram of "SO_2 slant column precision (window 1)" for 2025-04-09 to 2025-04-10

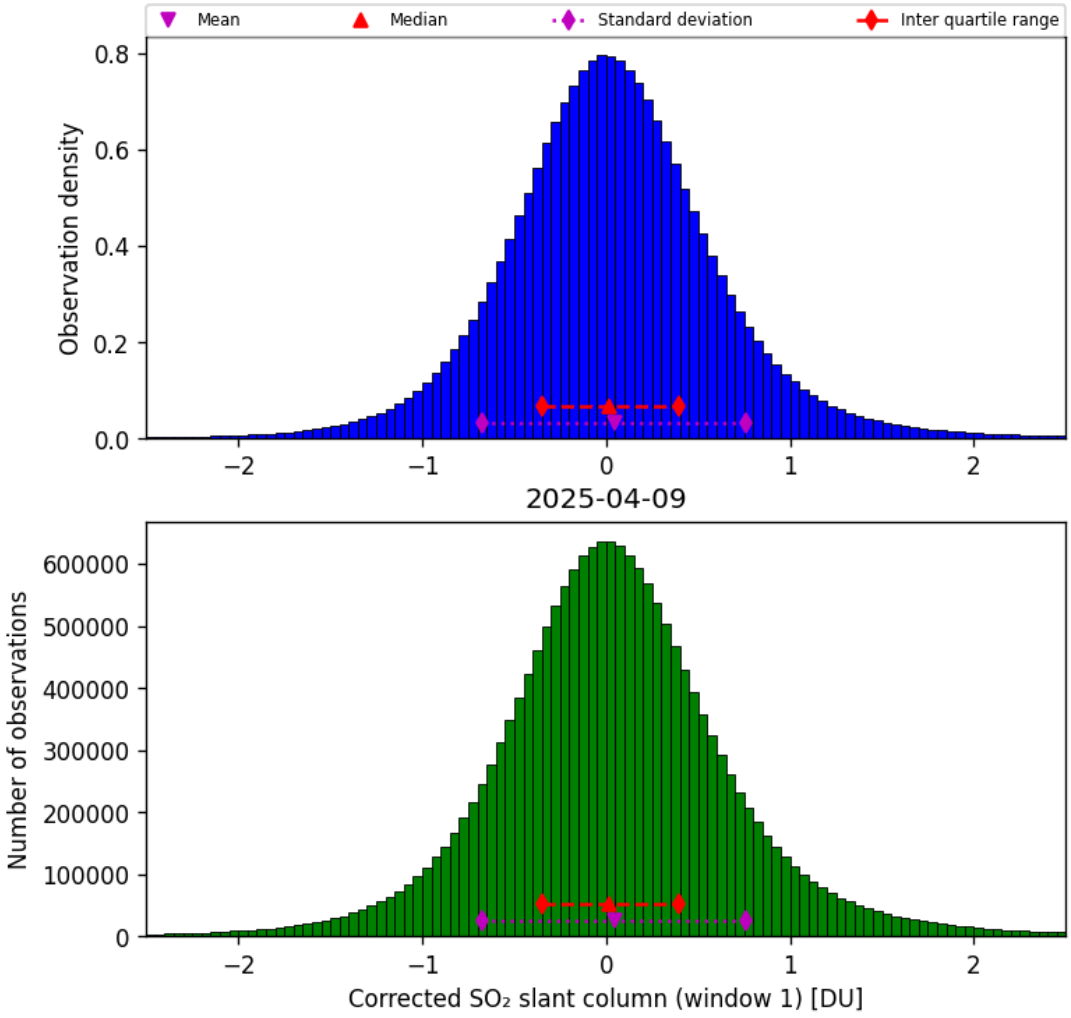

Figure 65: Histogram of "Corrected SO_2 slant column (window 1)" for 2025-04-09 to 2025-04-10

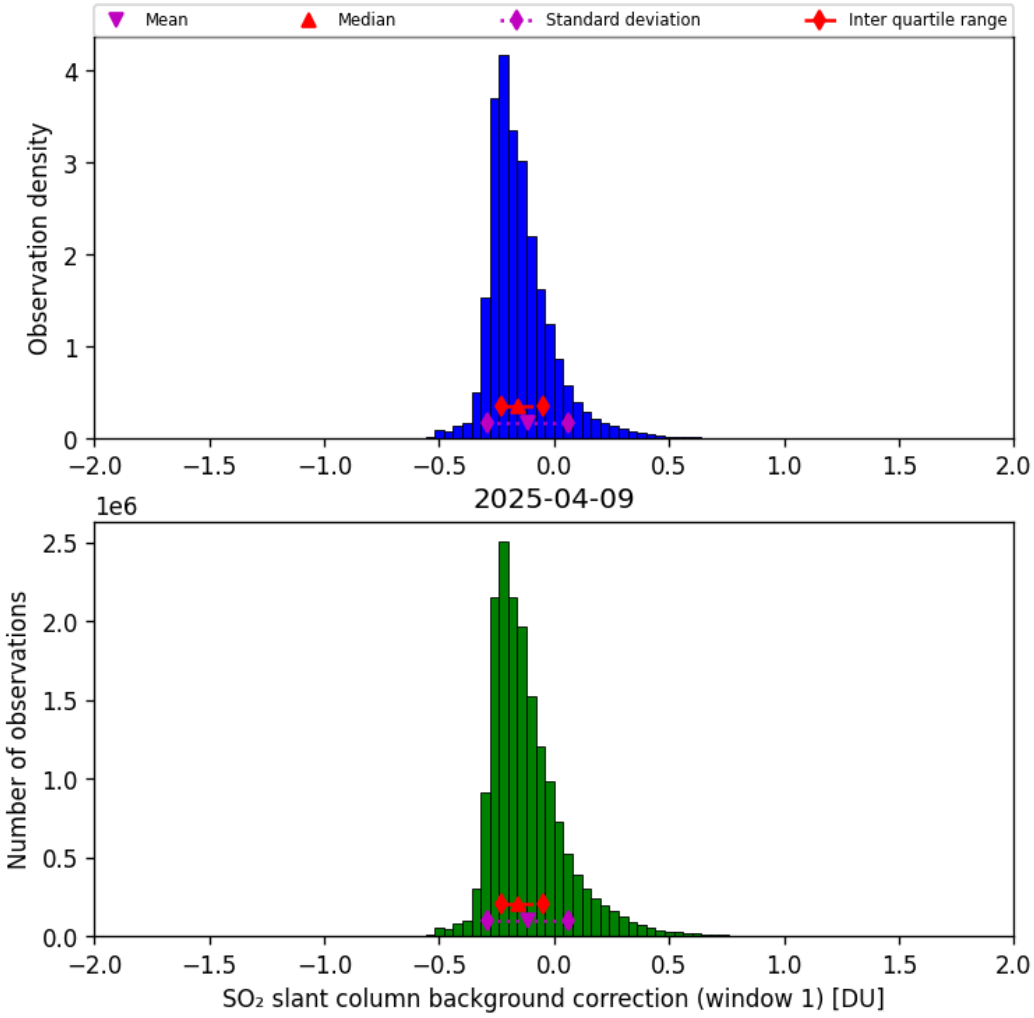

Figure 66: Histogram of "SO_2 slant column background correction (window 1)" for 2025-04-09 to 2025-04-10

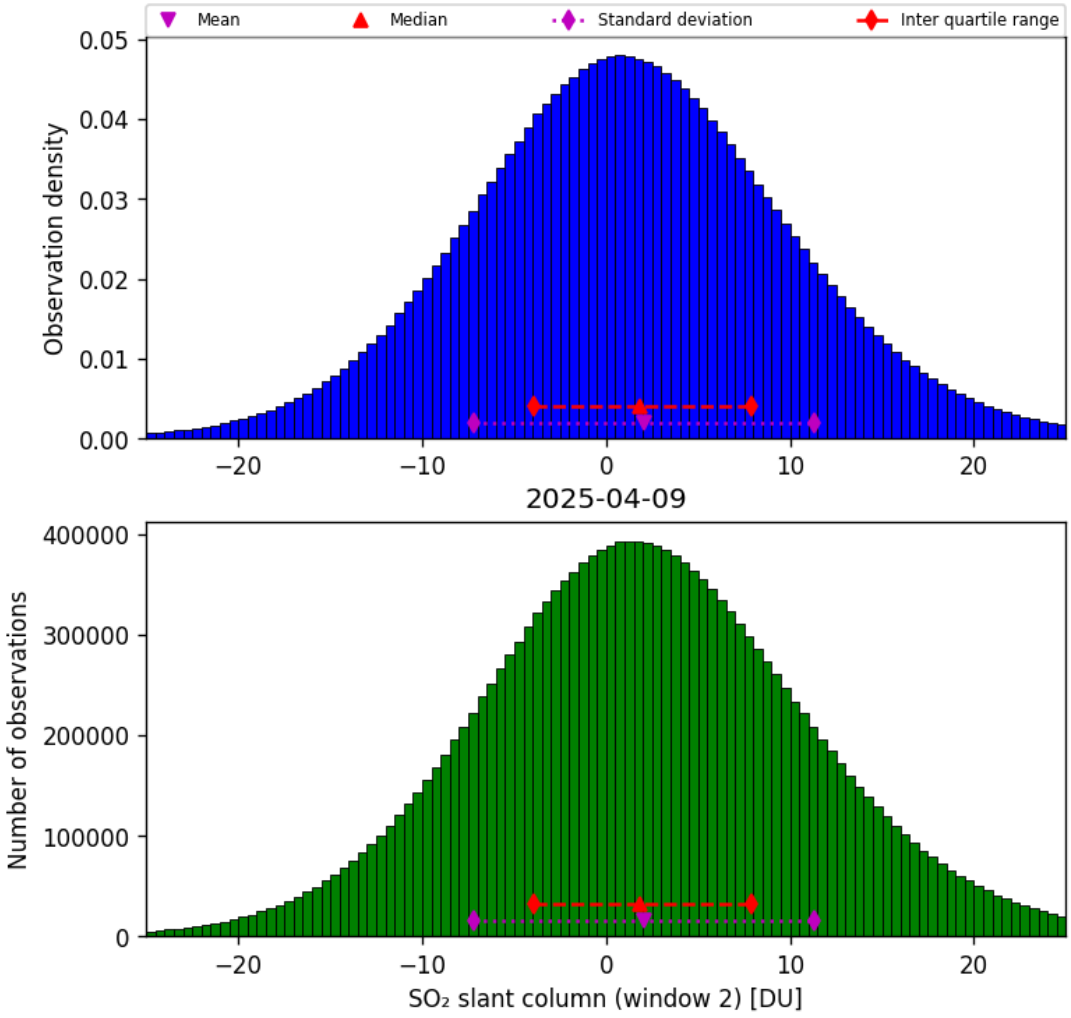

Figure 67: Histogram of "SO_2 slant column (window 2)" for 2025-04-09 to 2025-04-10

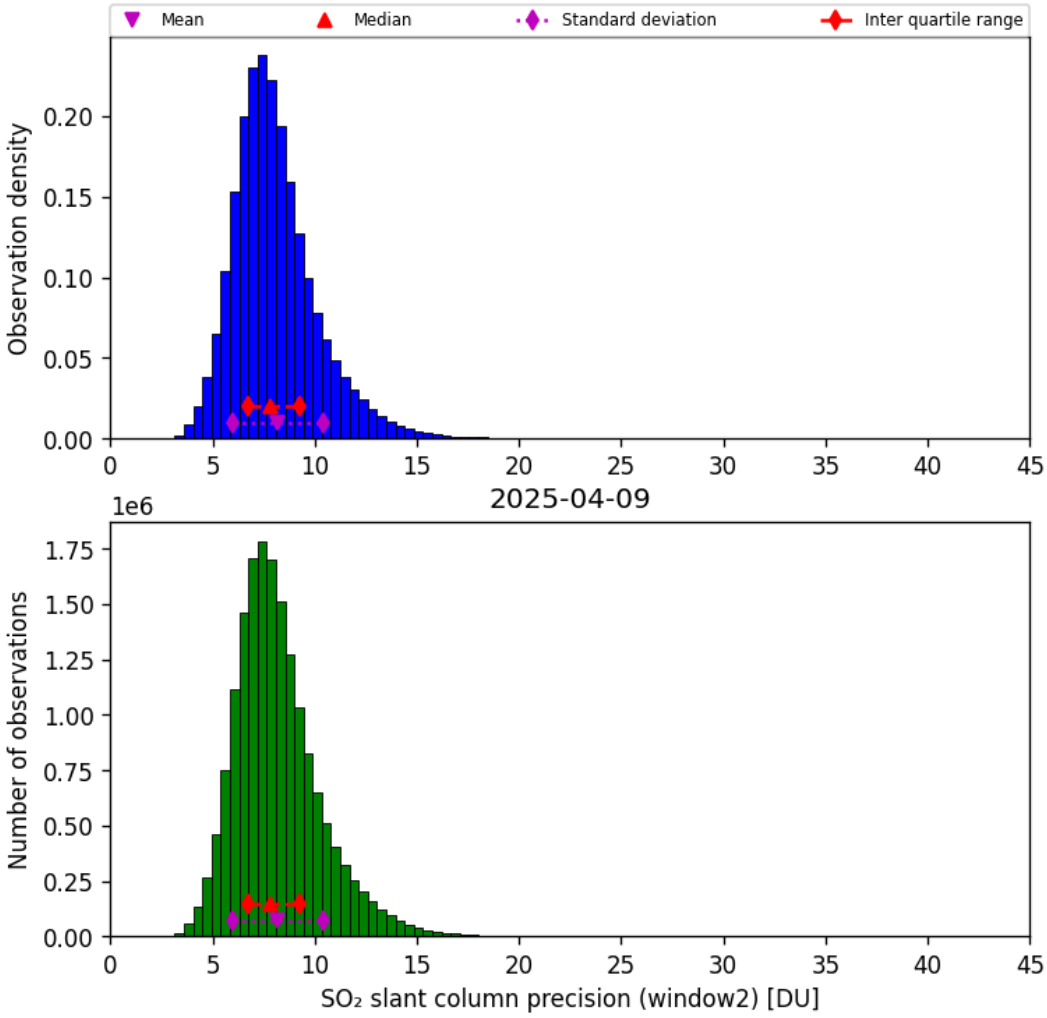

Figure 68: Histogram of "SO_2 slant column precision (window2)" for 2025-04-09 to 2025-04-10

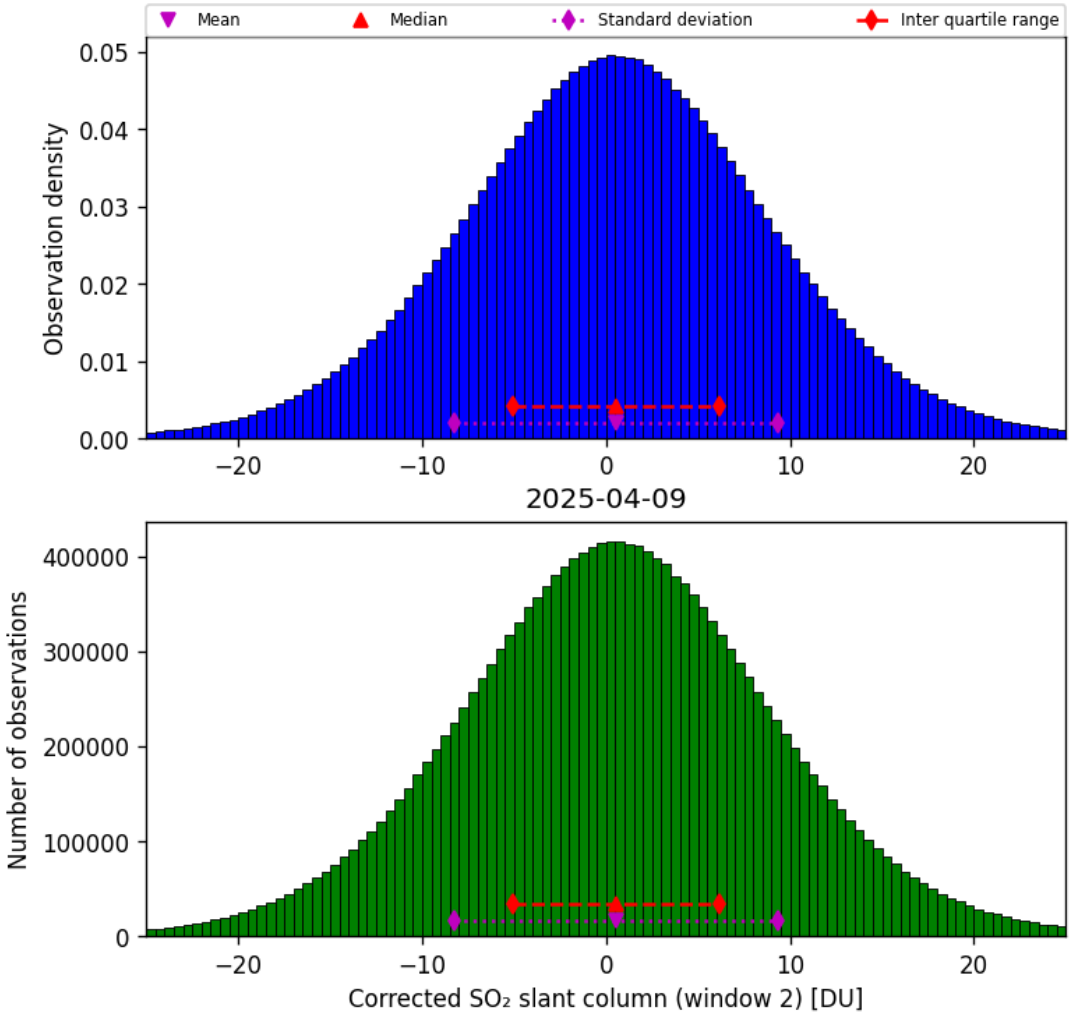

Figure 69: Histogram of "Corrected SO_2 slant column (window 2)" for 2025-04-09 to 2025-04-10

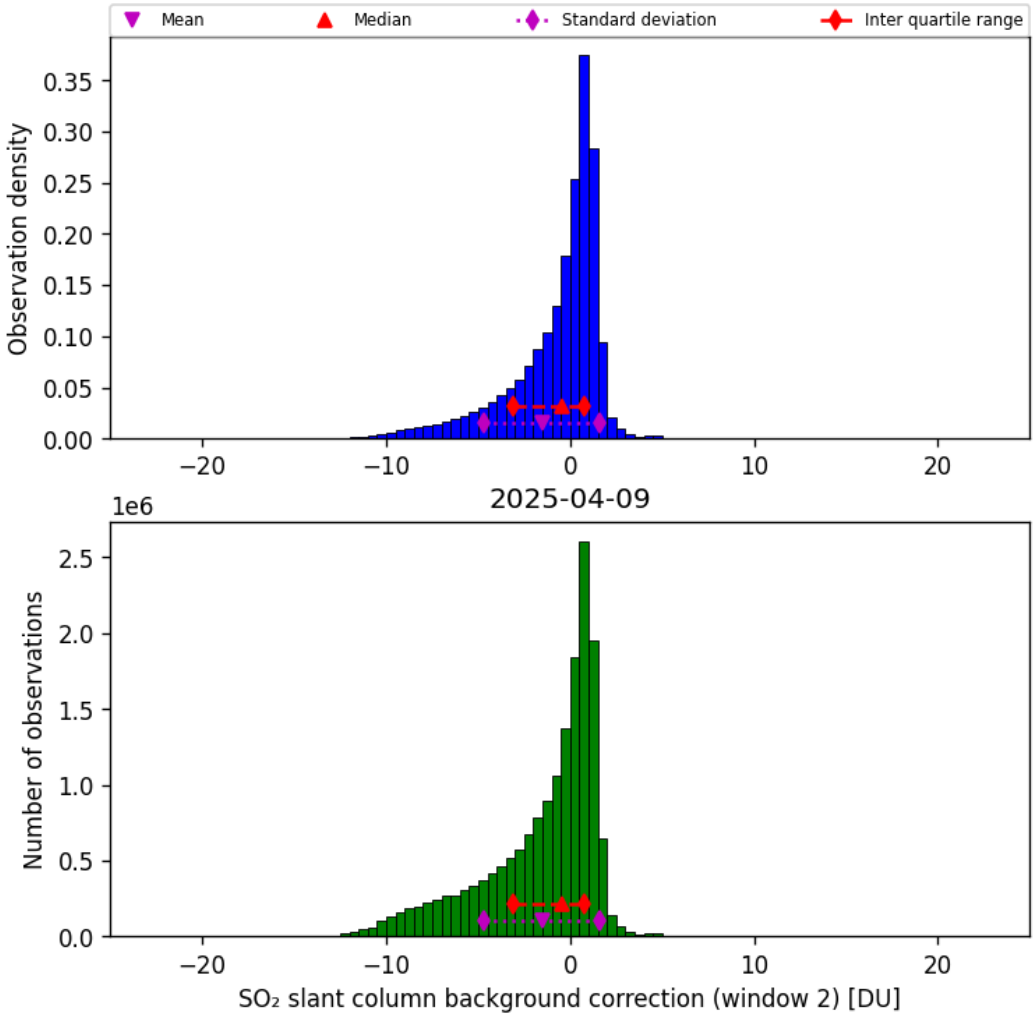

Figure 70: Histogram of "SO_2 slant column background correction (window 2)" for 2025-04-09 to 2025-04-10

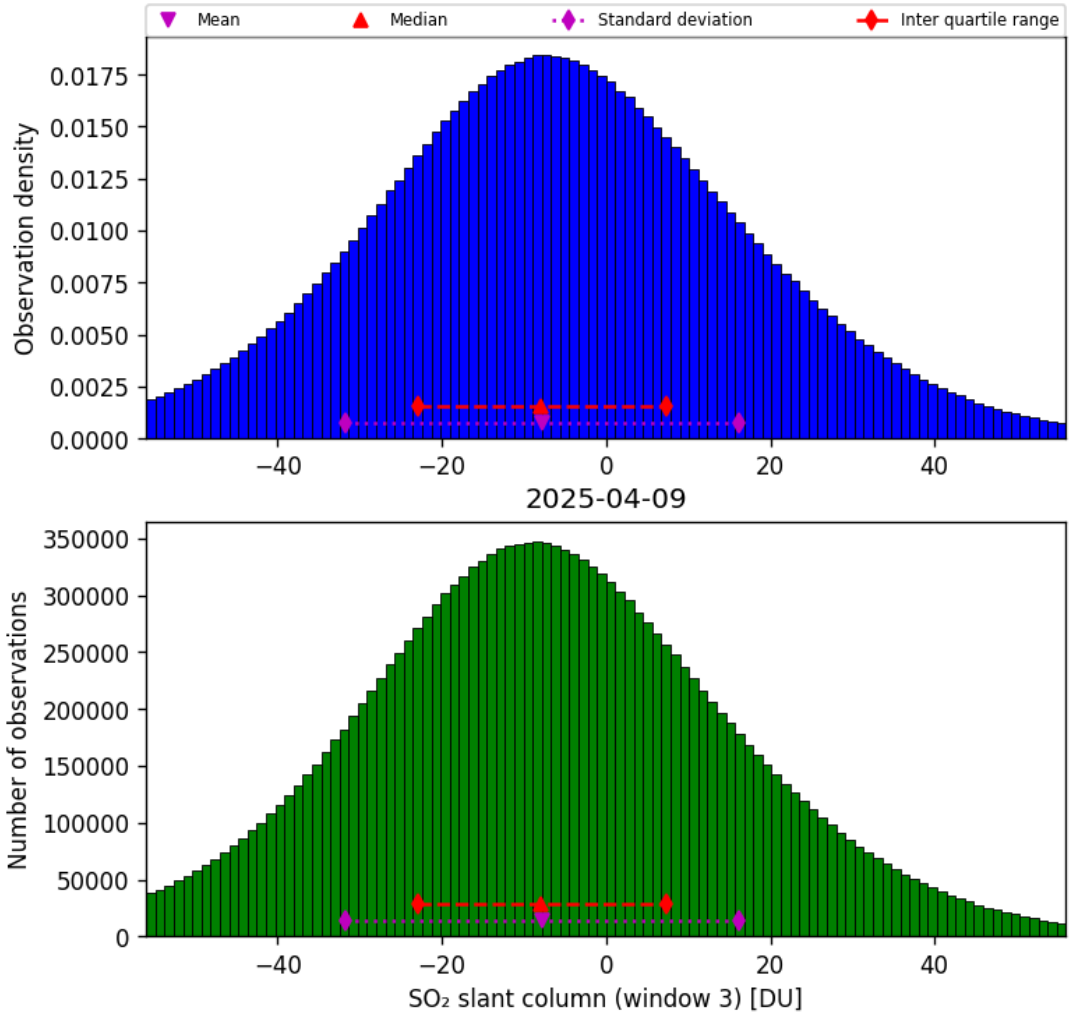

Figure 71: Histogram of "SO_2 slant column (window 3)" for 2025-04-09 to 2025-04-10

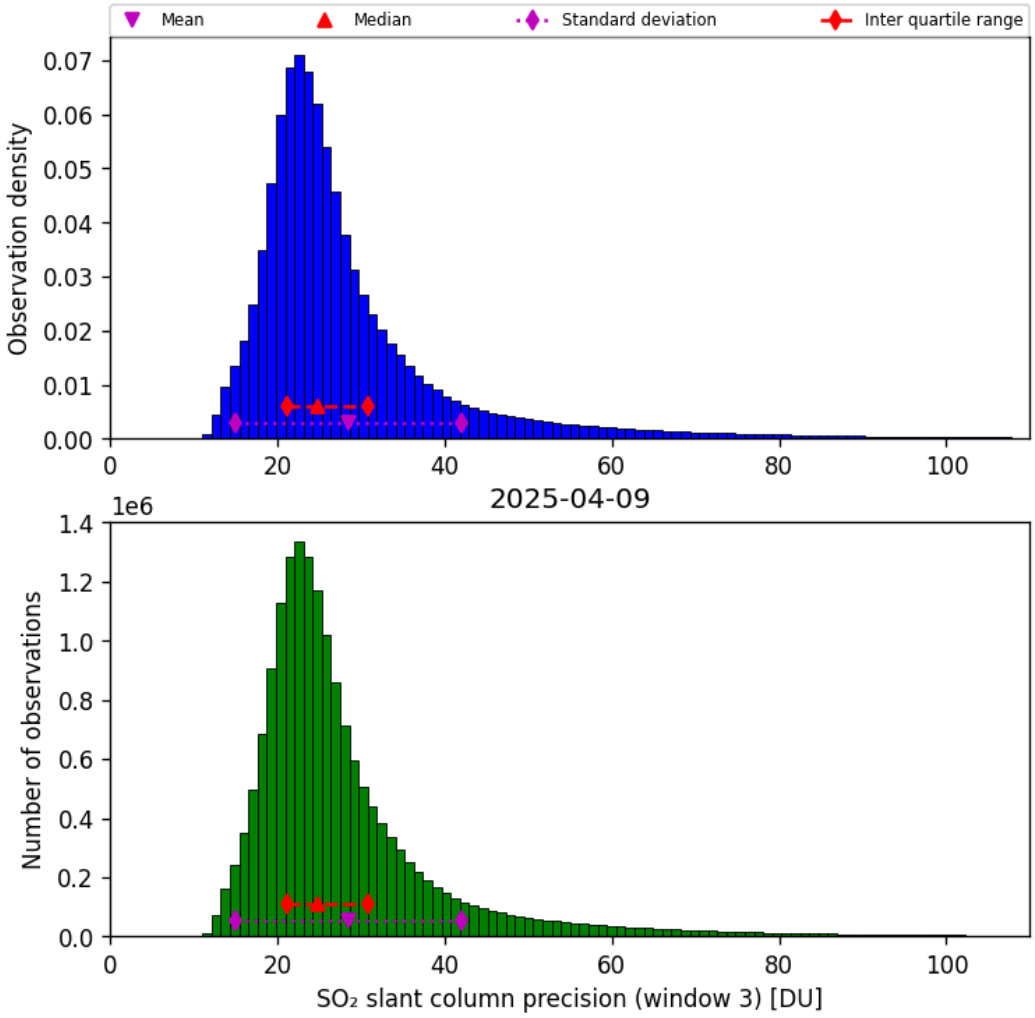

Figure 72: Histogram of "SO_2 slant column precision (window 3)" for 2025-04-09 to 2025-04-10

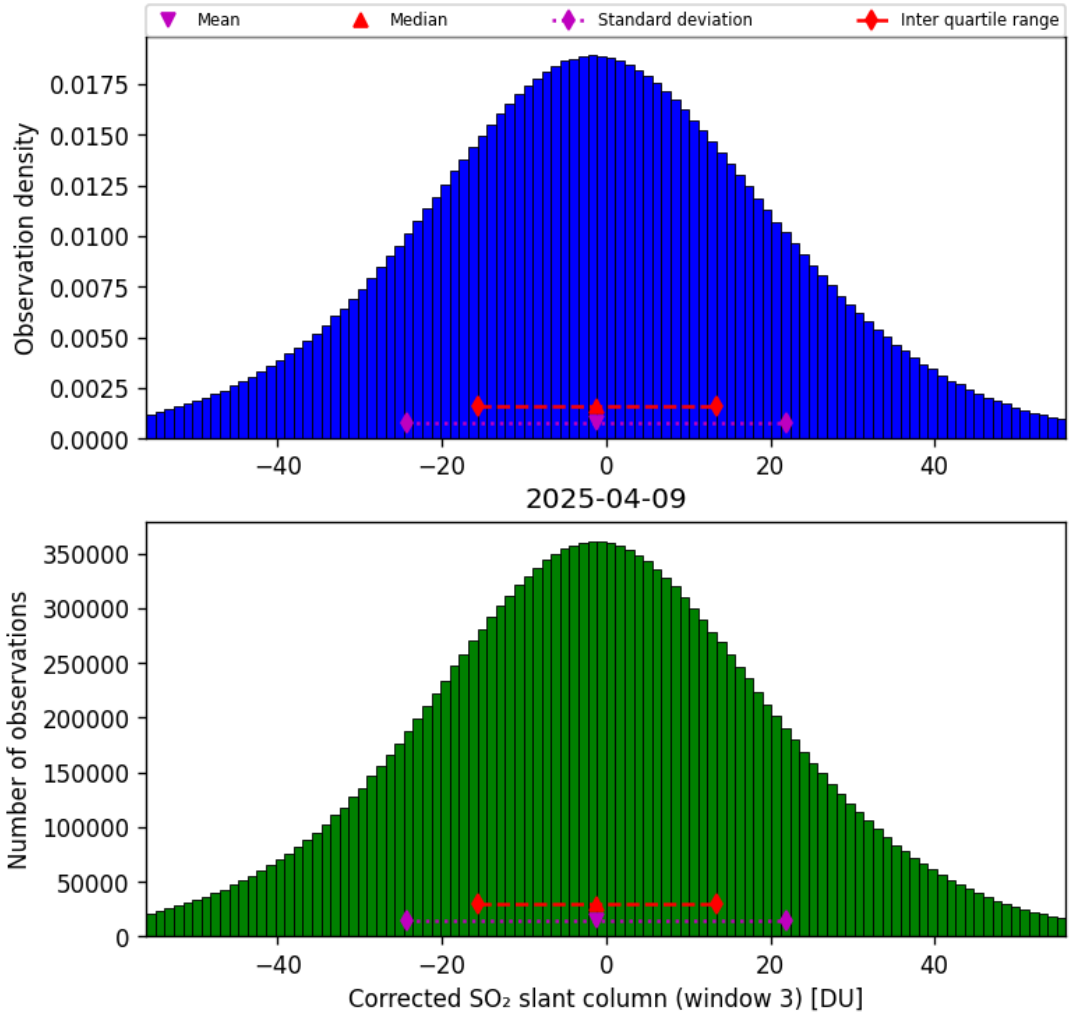

Figure 73: Histogram of "Corrected SO_2 slant column (window 3)" for 2025-04-09 to 2025-04-10

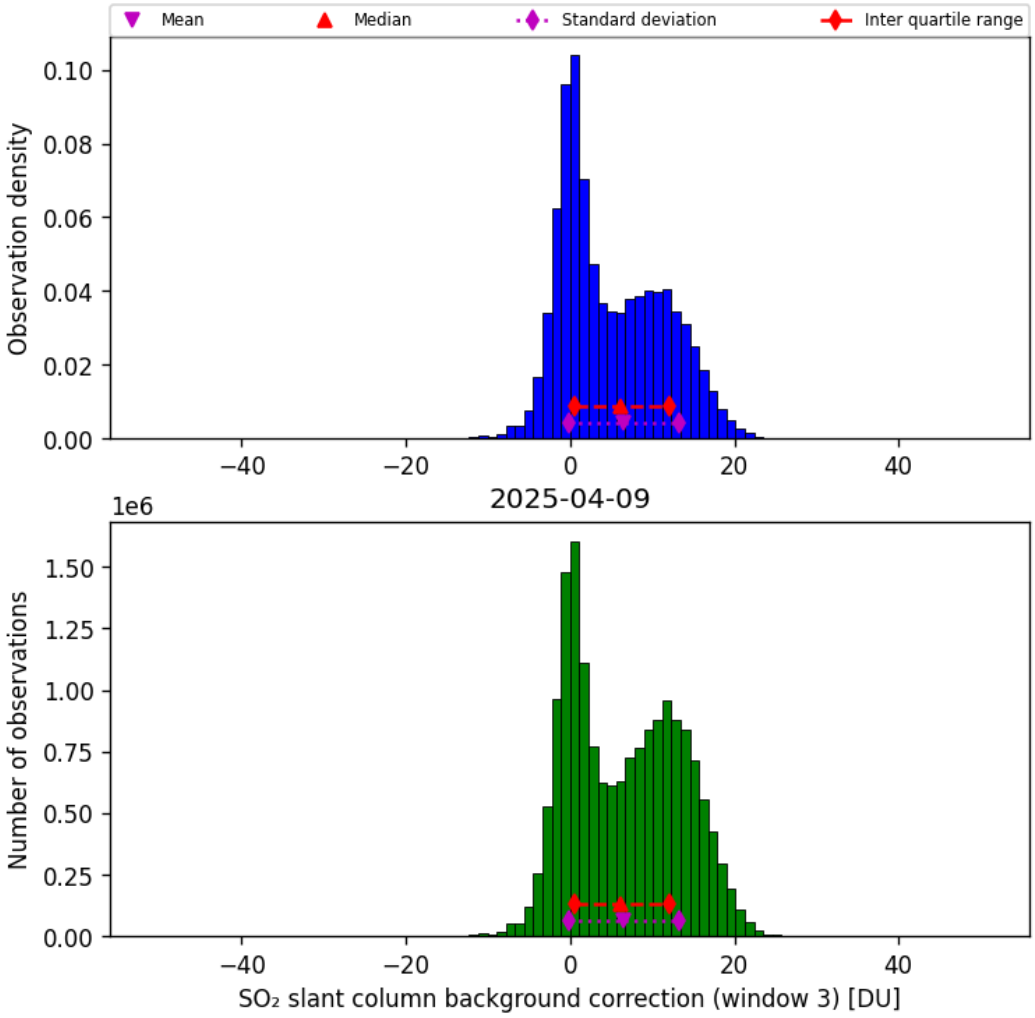

Figure 74: Histogram of "SO_2 slant column background correction (window 3)" for 2025-04-09 to 2025-04-10

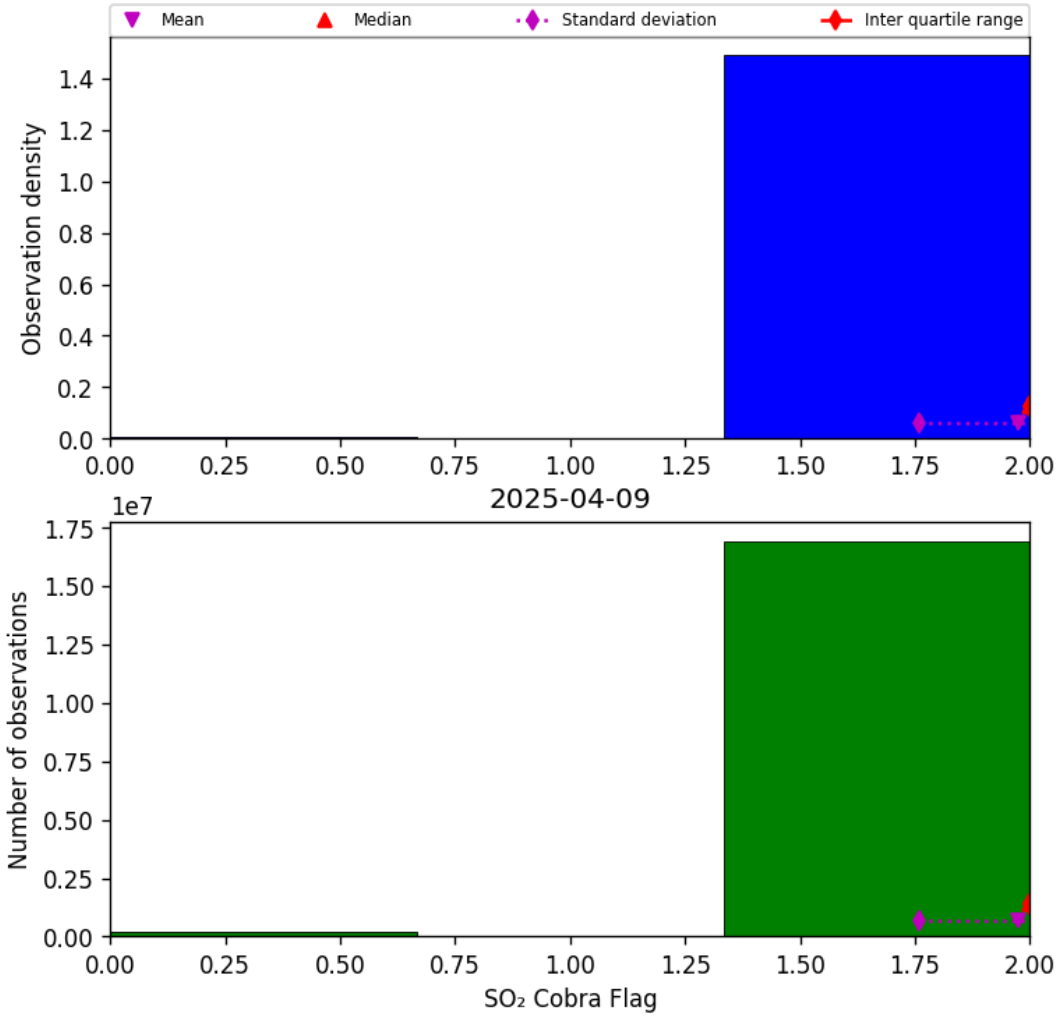

Figure 75: Histogram of "SO_2 Cobra Flag" for 2025-04-09 to 2025-04-10

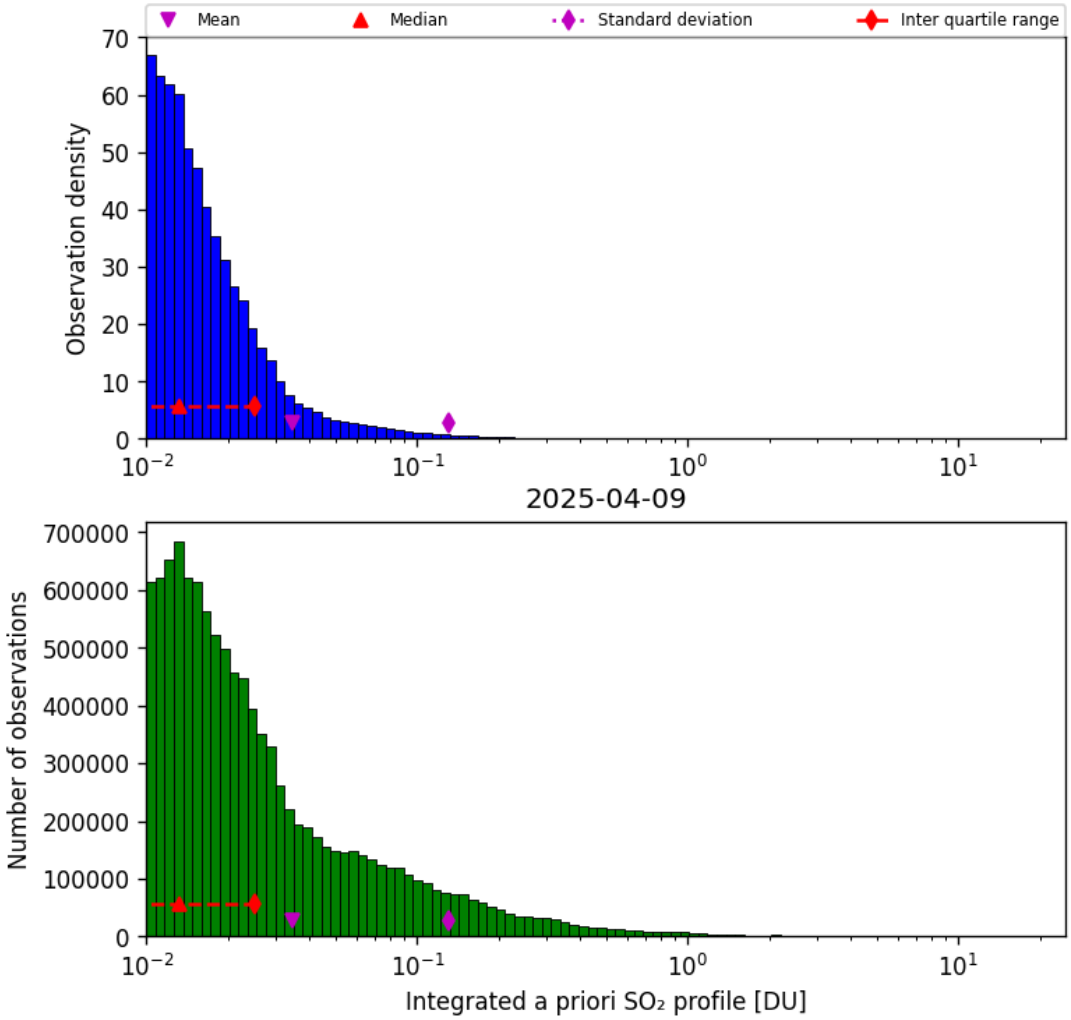

Figure 76: Histogram of "Integrated a priori SO_2 profile" for 2025-04-09 to 2025-04-10

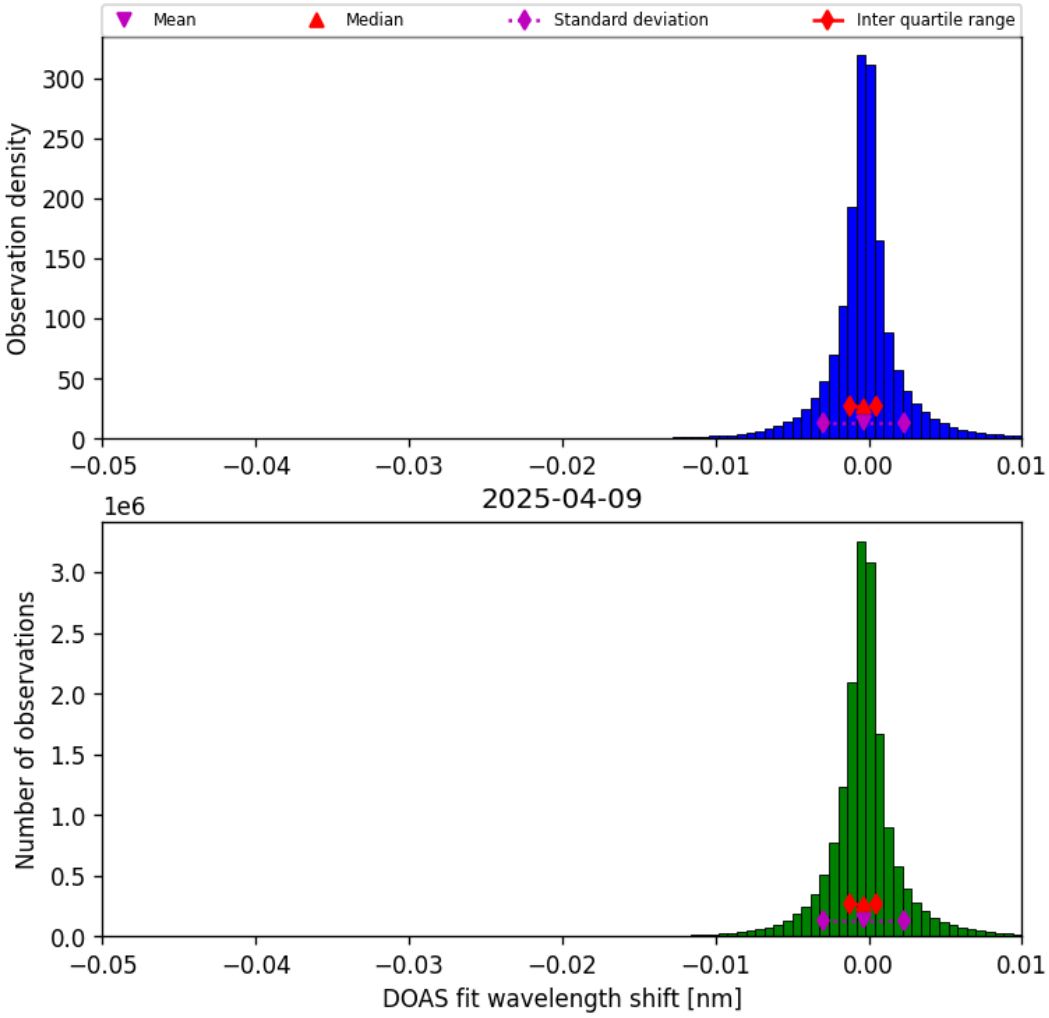

Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-04-09 to 2025-04-10

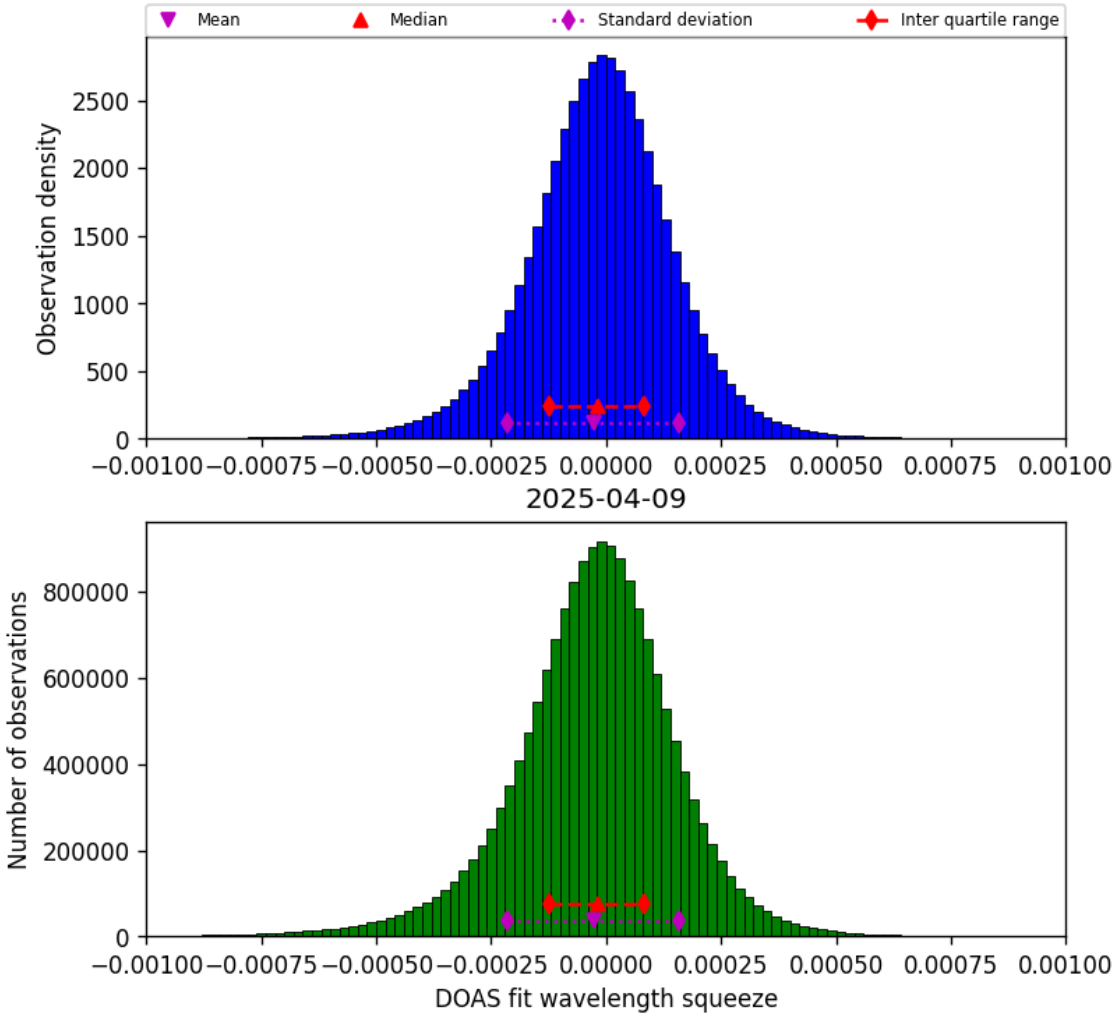

Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-04-09 to 2025-04-10

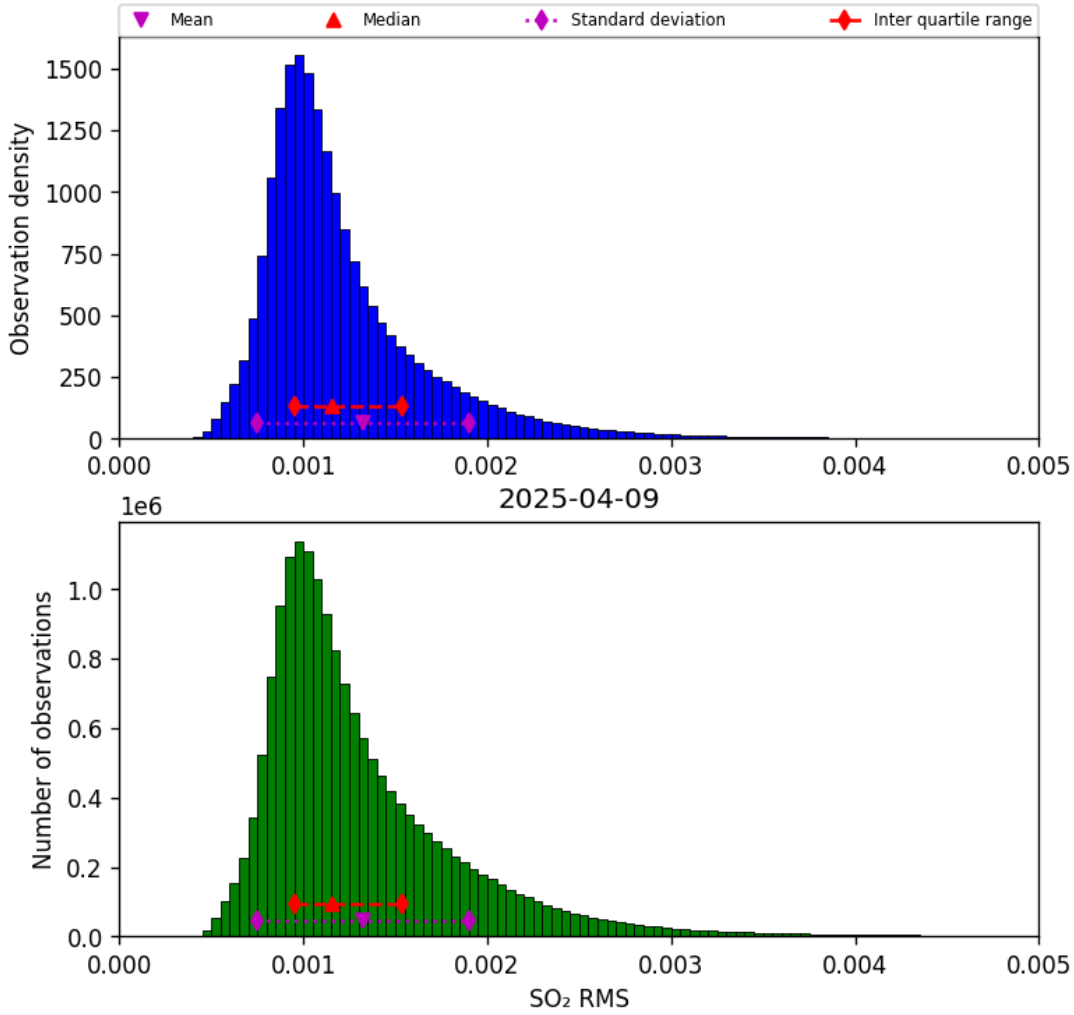

Figure 79: Histogram of "SO_2 RMS" for 2025-04-09 to 2025-04-10

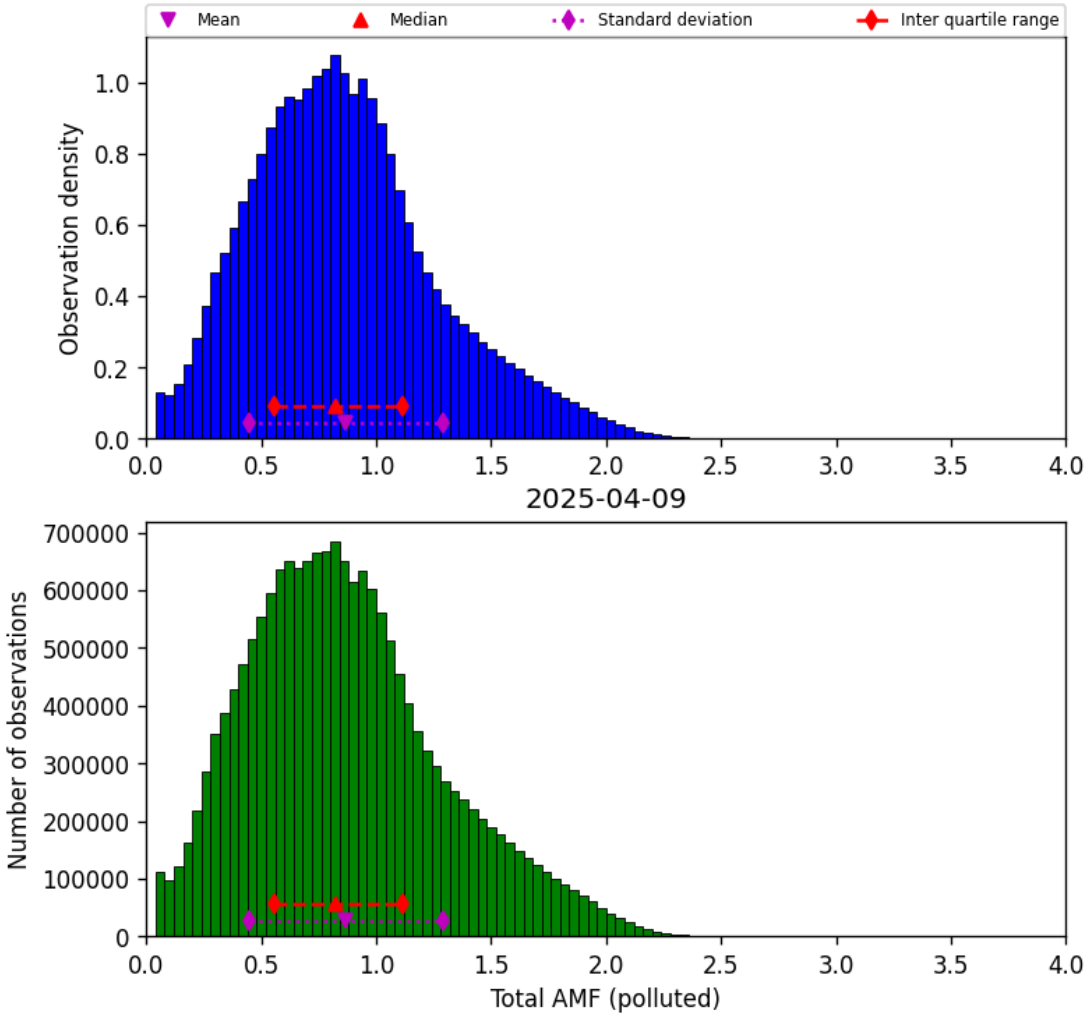

Figure 80: Histogram of “Total AMF (polluted)” for 2025-04-09 to 2025-04-10

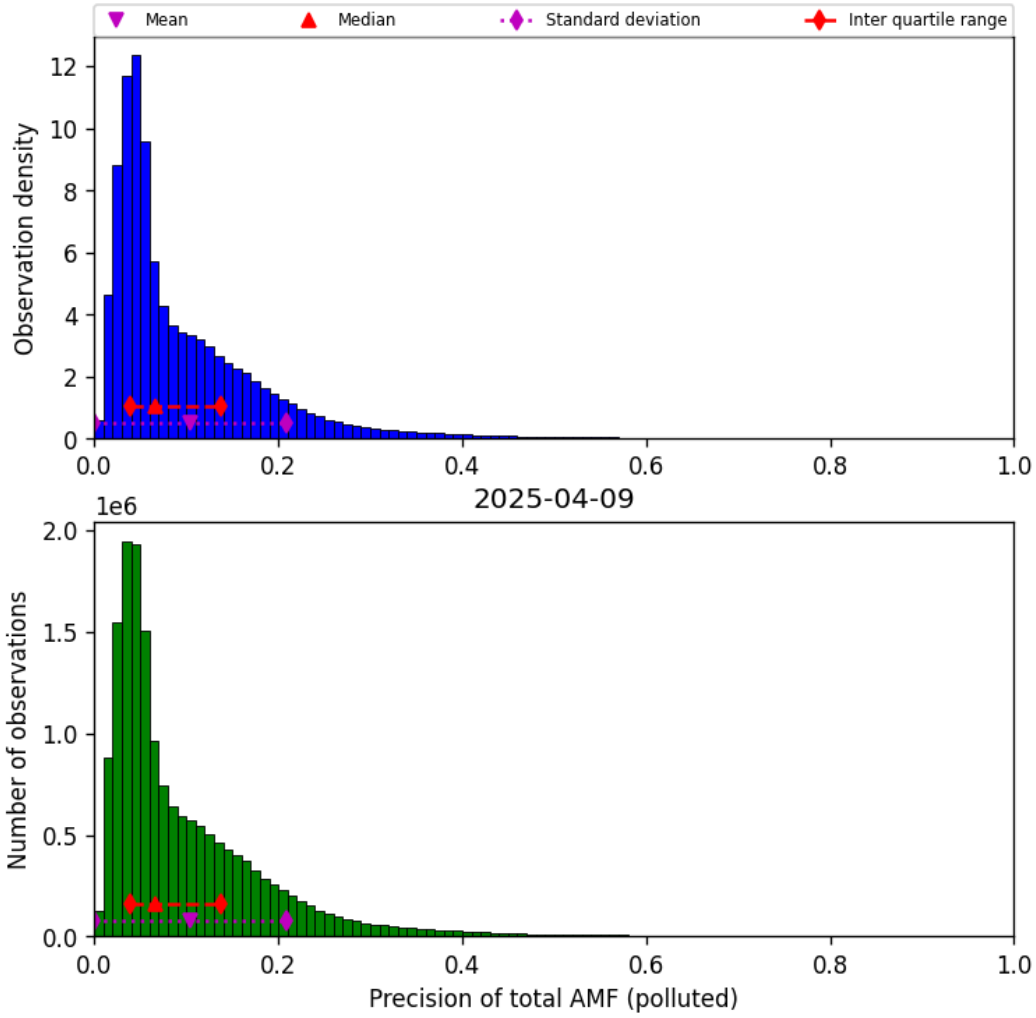

Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-04-09 to 2025-04-10

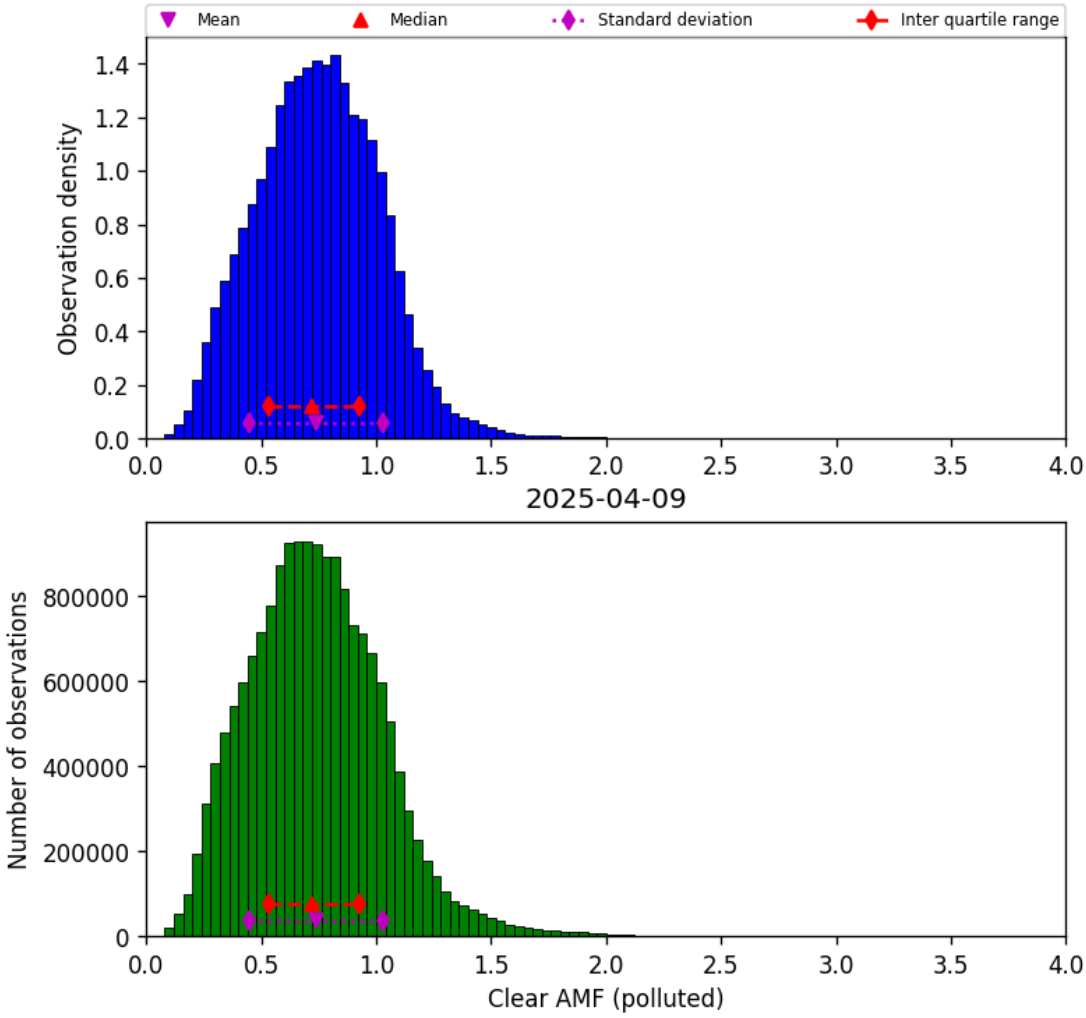

Figure 82: Histogram of “Clear AMF (polluted)” for 2025-04-09 to 2025-04-10

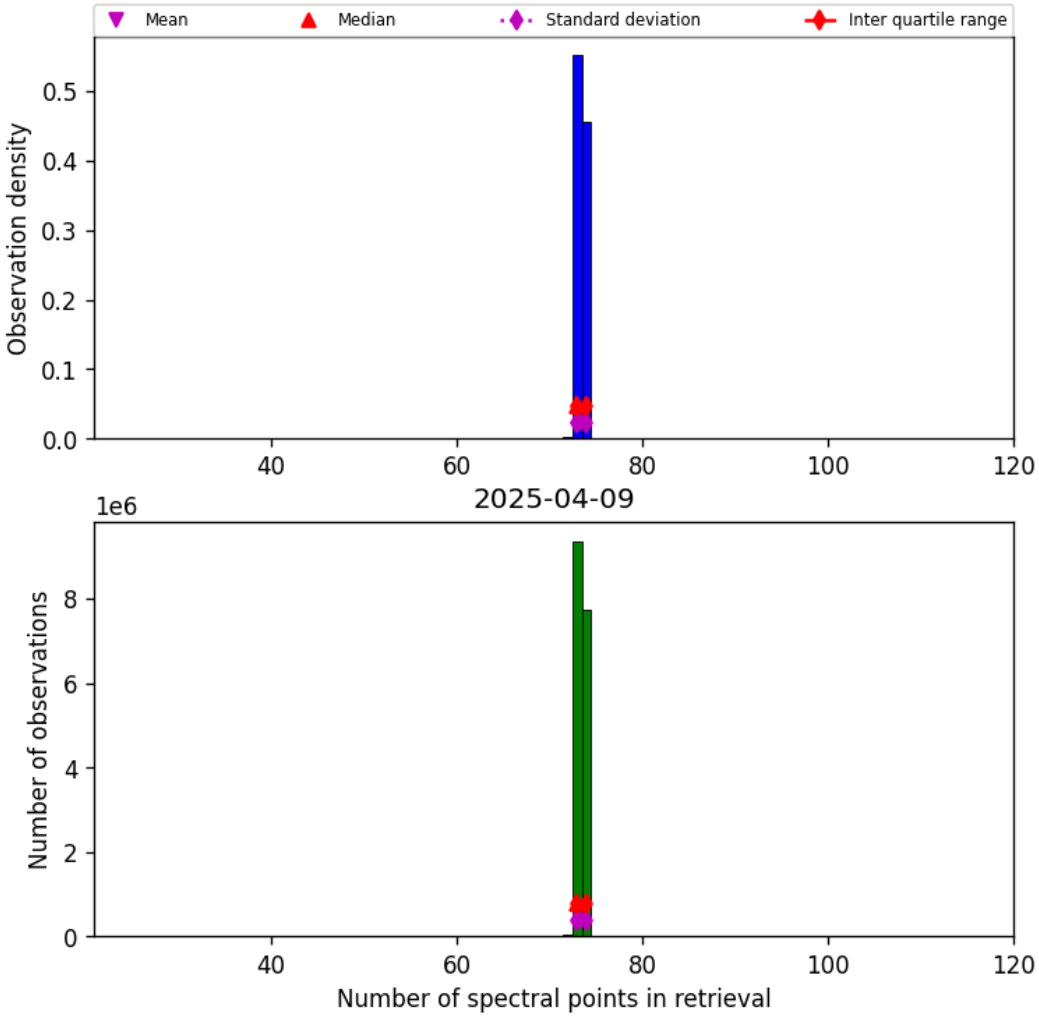

Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-04-09 to 2025-04-10

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.

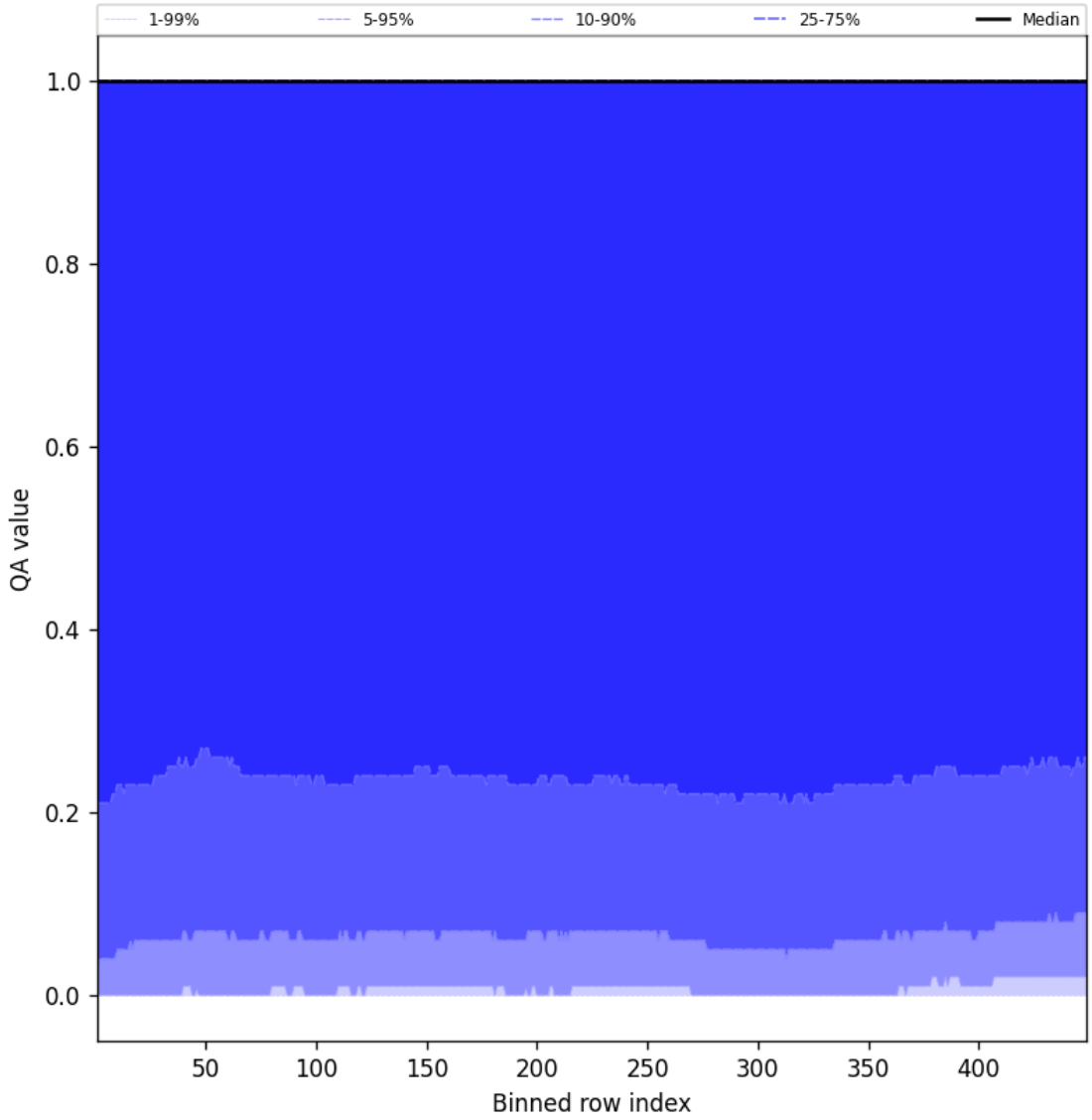

Figure 84: Along track statistics of “QA value” for 2025-04-09 to 2025-04-10

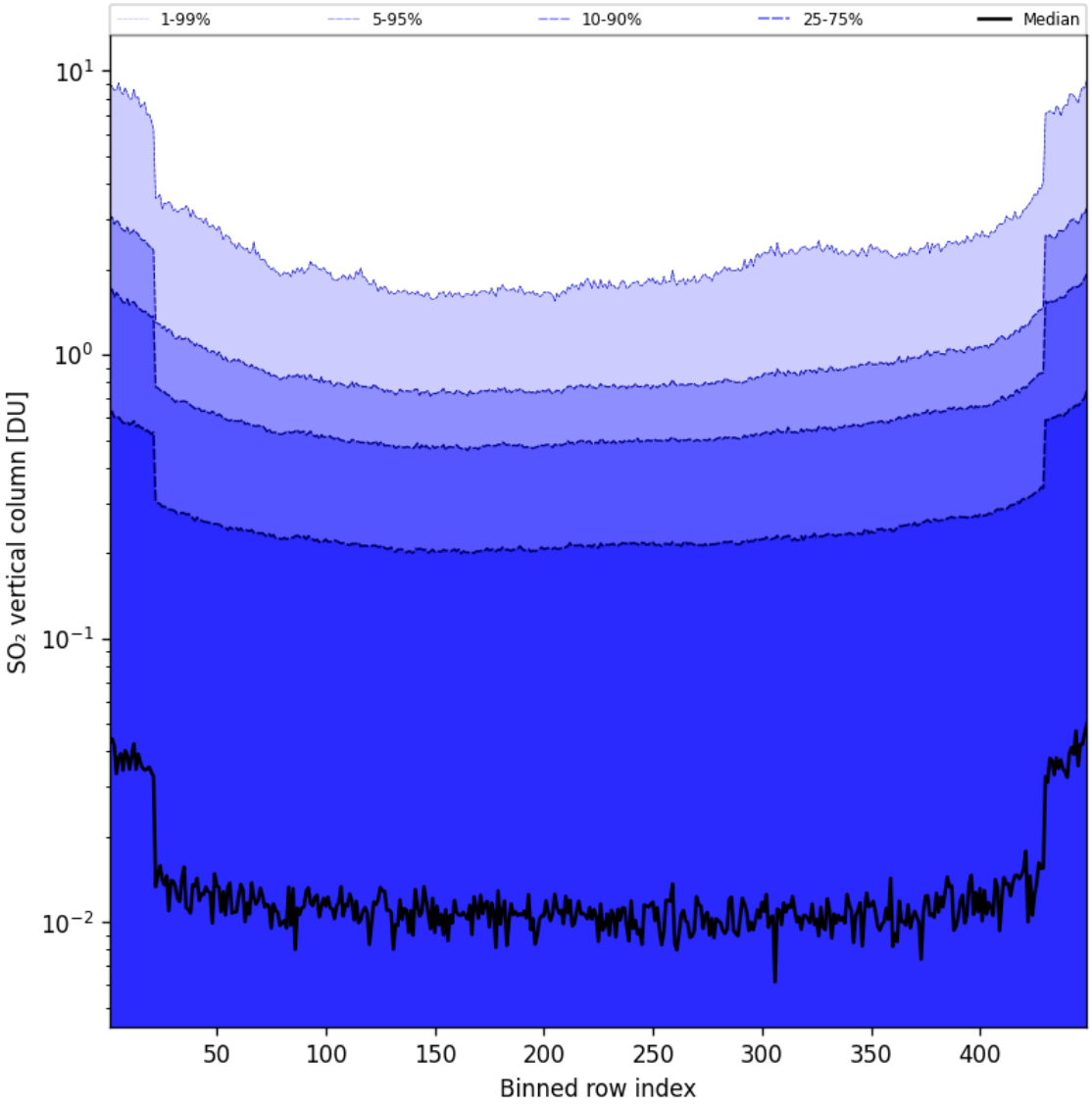

Figure 85: Along track statistics of "SO_2 vertical column" for 2025-04-09 to 2025-04-10

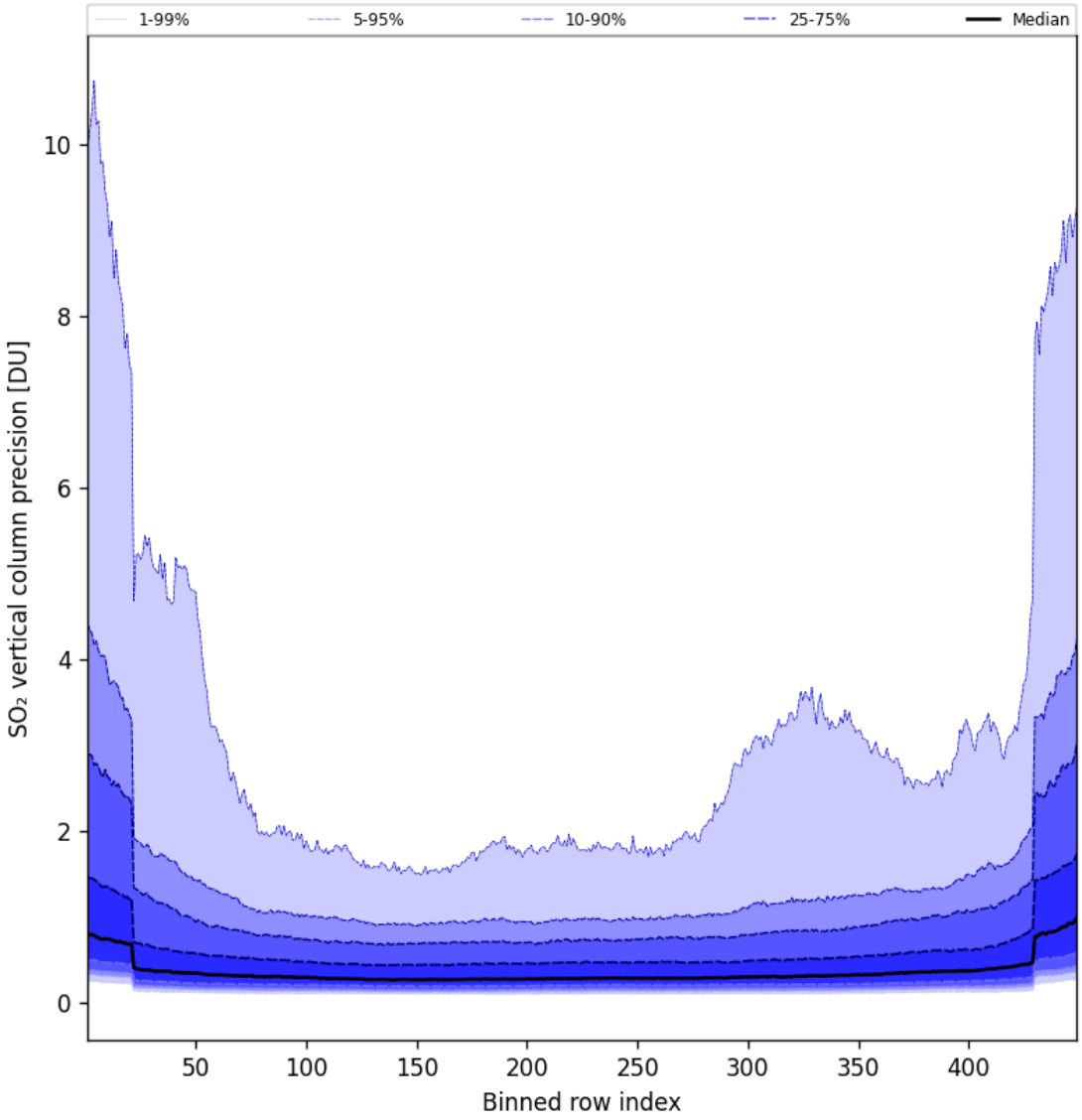

Figure 86: Along track statistics of "SO_2 vertical column precision" for 2025-04-09 to 2025-04-10

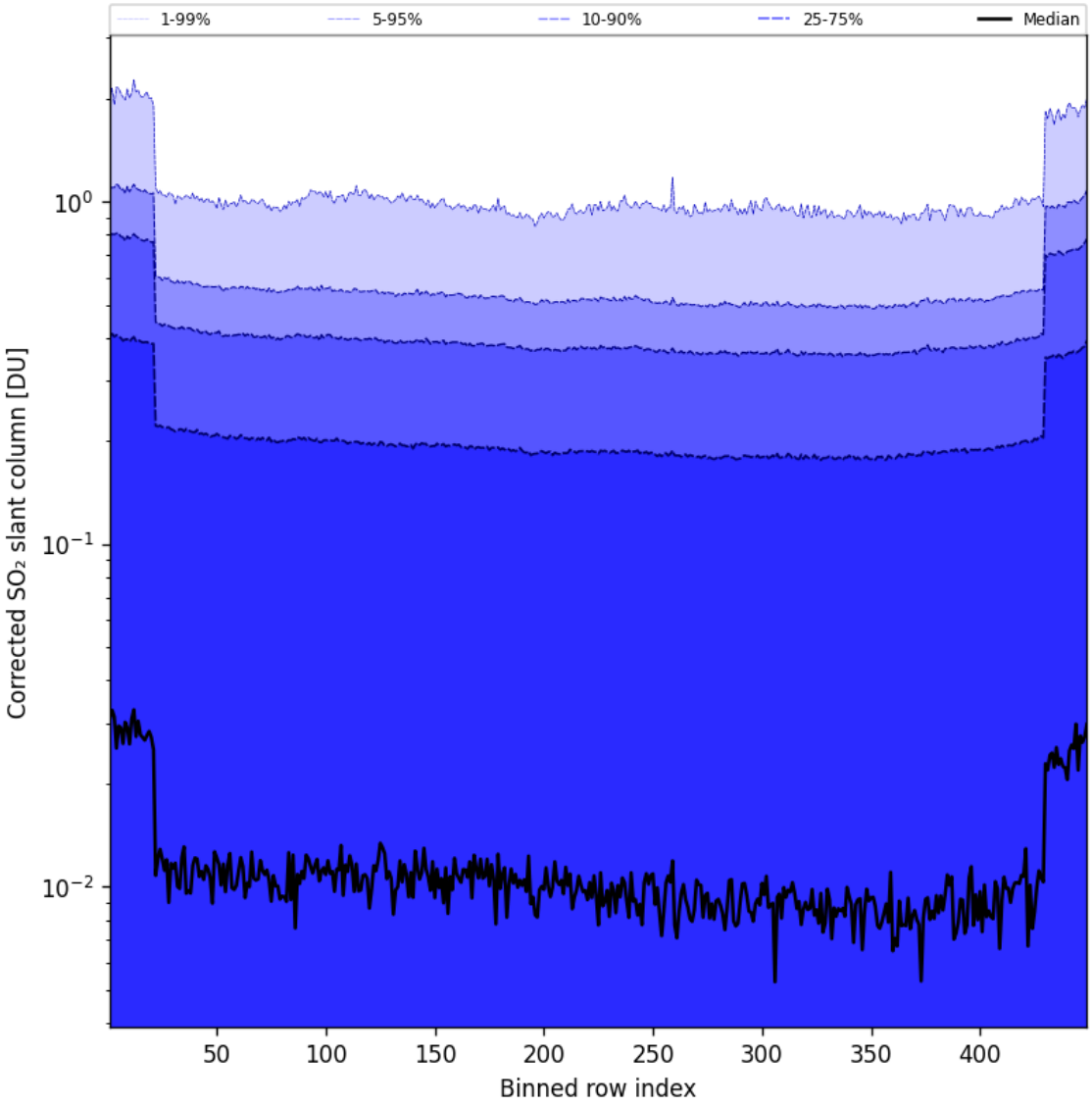

Figure 87: Along track statistics of "Corrected SO_2 slant column" for 2025-04-09 to 2025-04-10

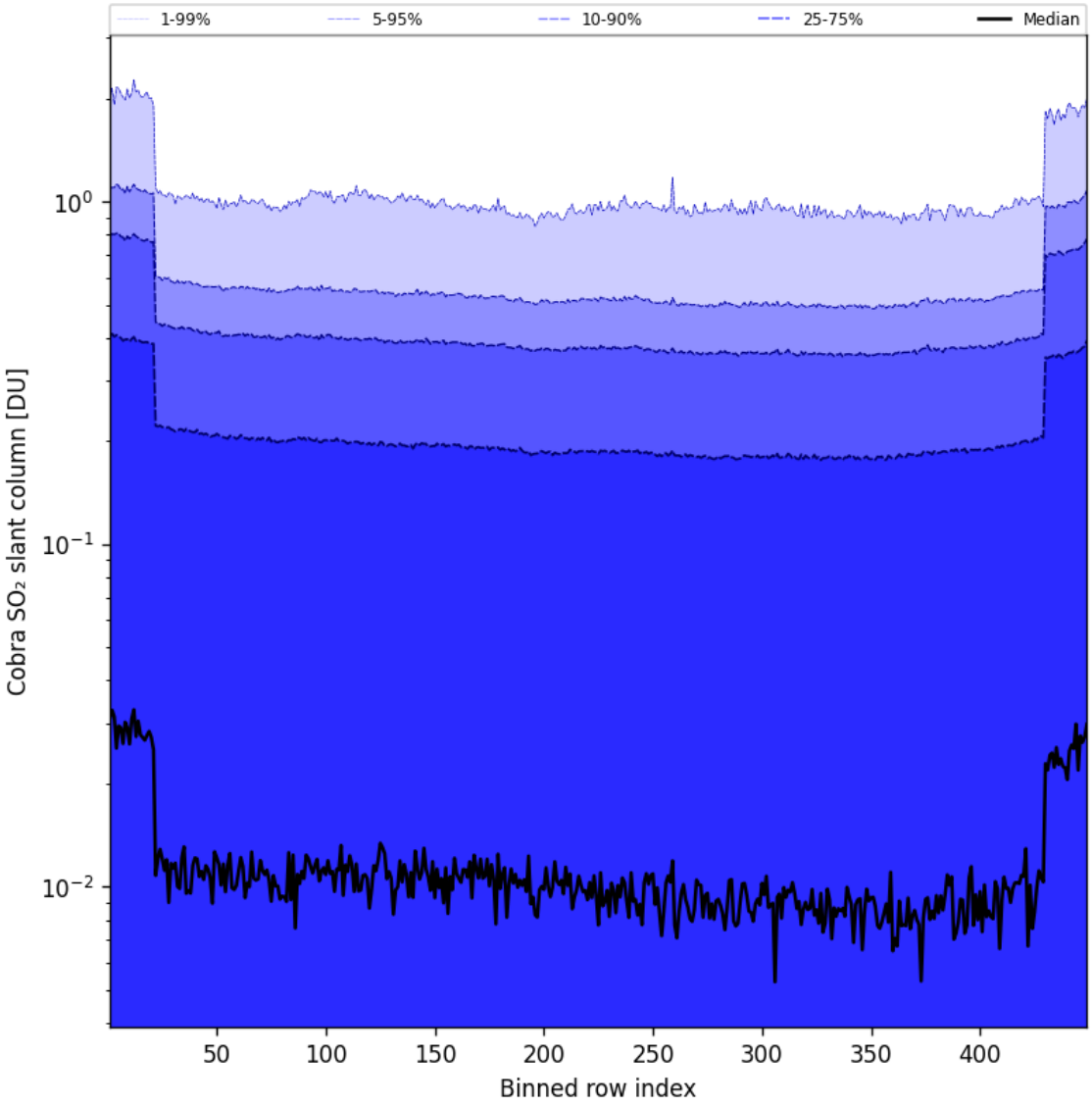

Figure 88: Along track statistics of “Cobra SO_2 slant column” for 2025-04-09 to 2025-04-10

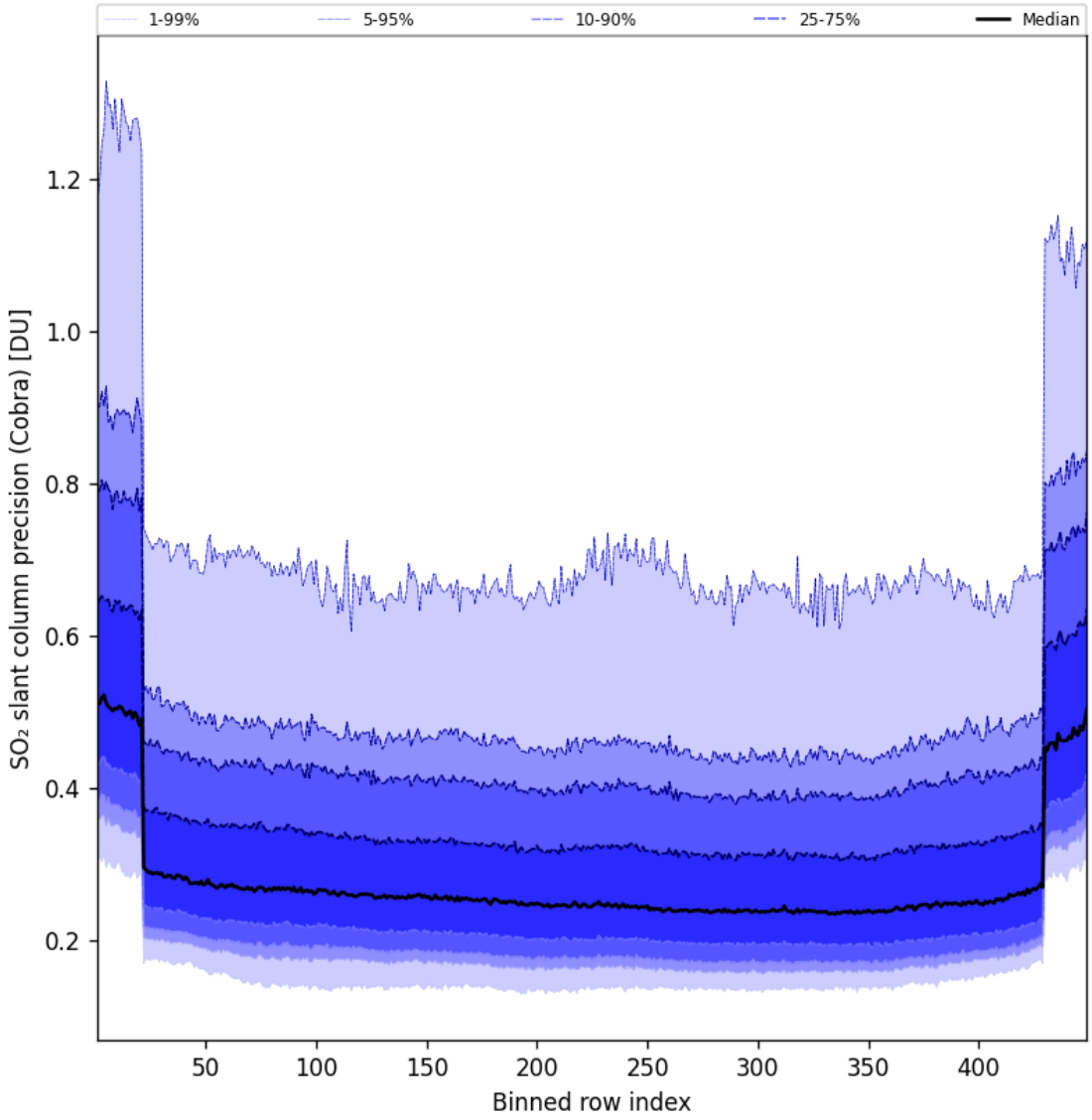

Figure 89: Along track statistics of "SO_2 slant column precision (Cobra)" for 2025-04-09 to 2025-04-10

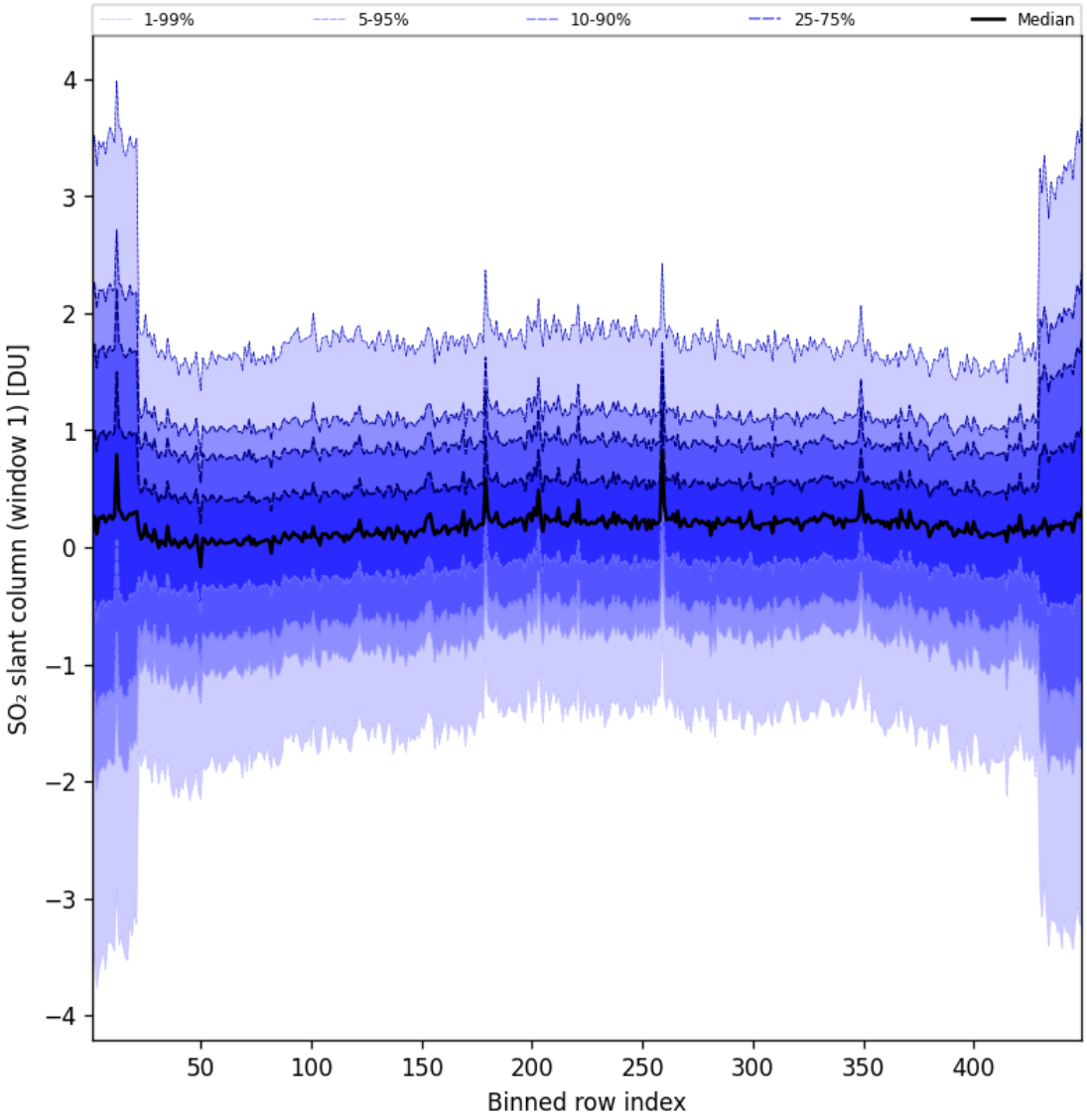

Figure 90: Along track statistics of "SO_2 slant column (window 1)" for 2025-04-09 to 2025-04-10

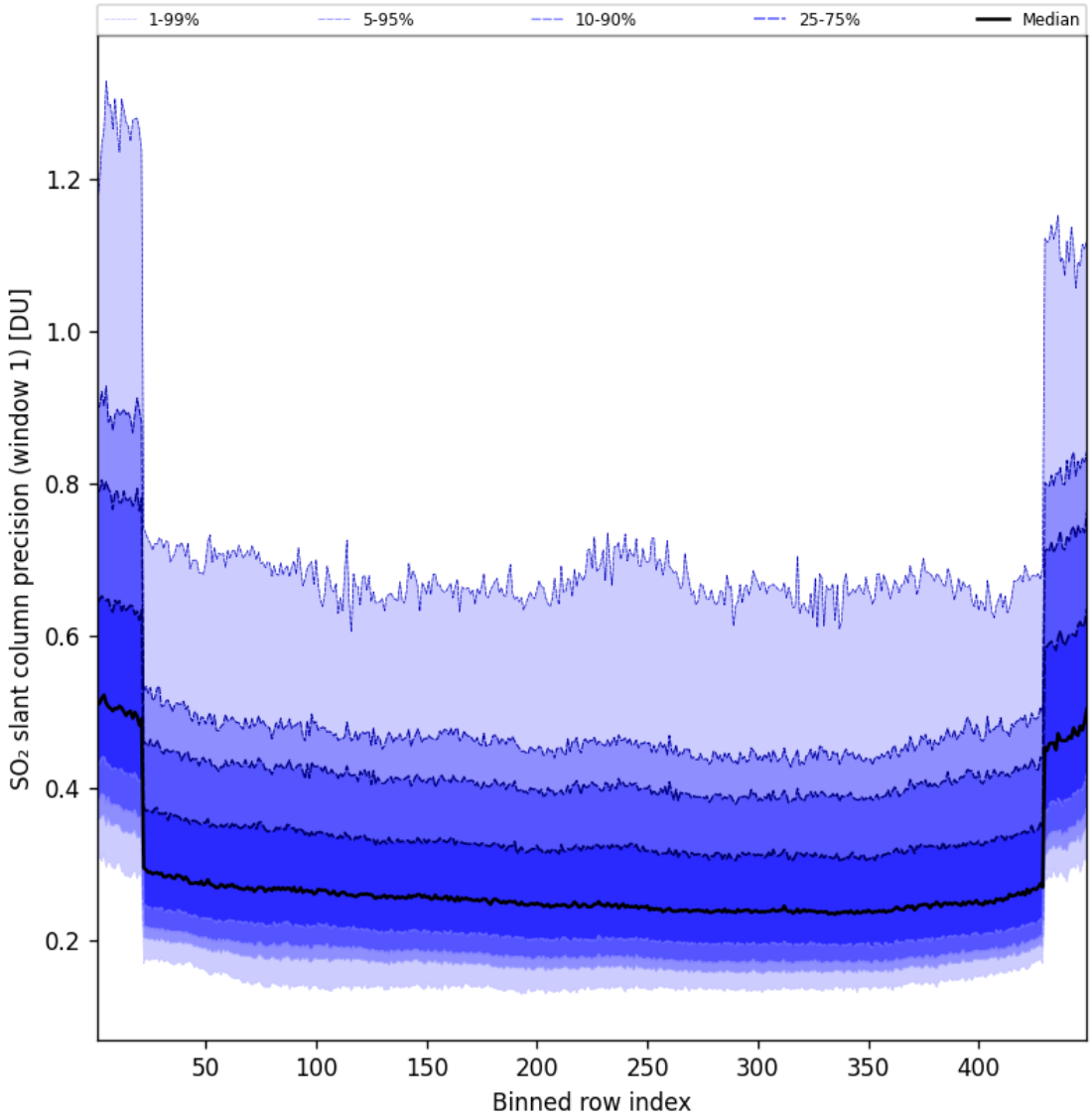

Figure 91: Along track statistics of "SO_2 slant column precision (window 1)" for 2025-04-09 to 2025-04-10

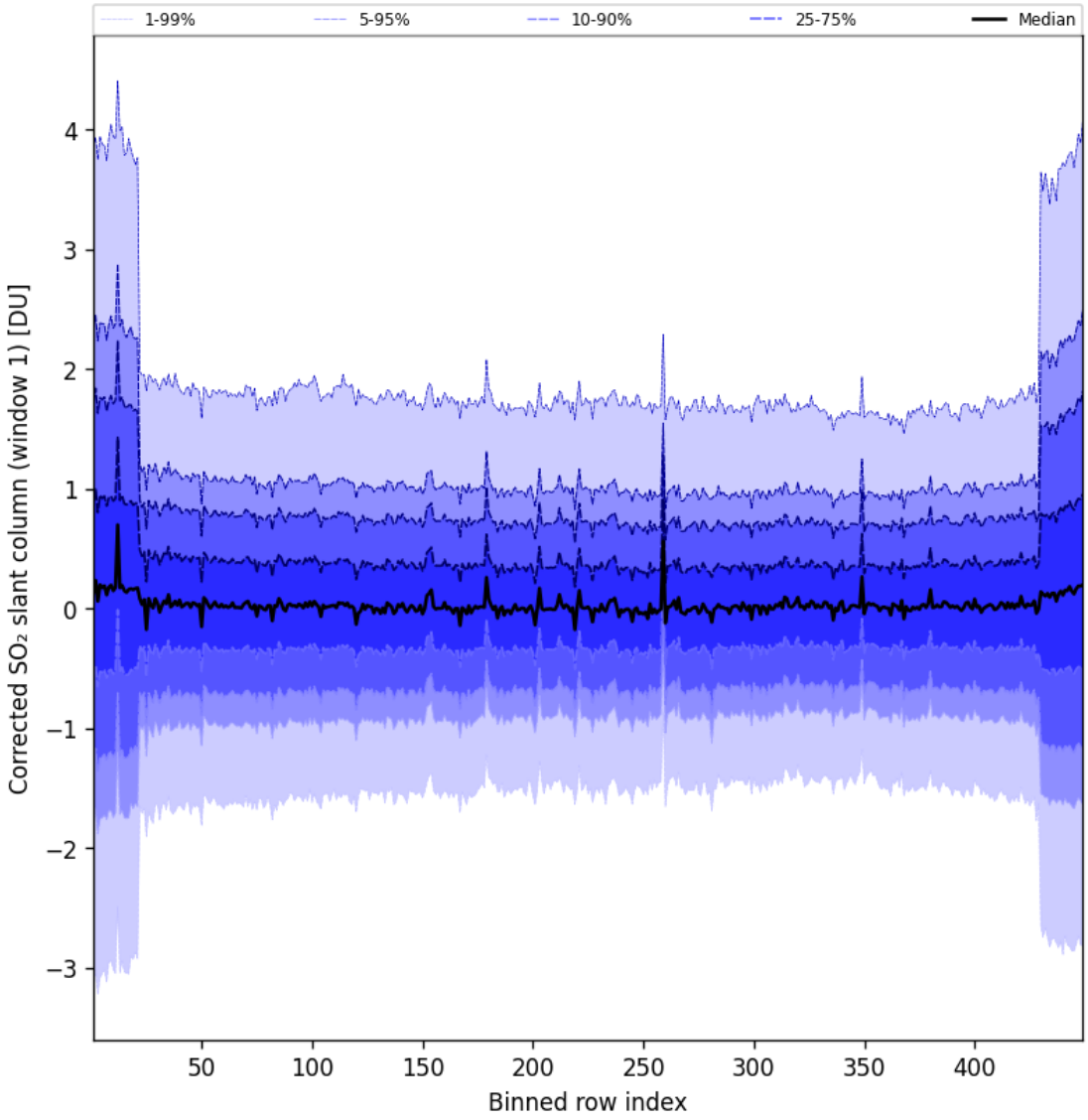

Figure 92: Along track statistics of “Corrected SO_2 slant column (window 1)” for 2025-04-09 to 2025-04-10

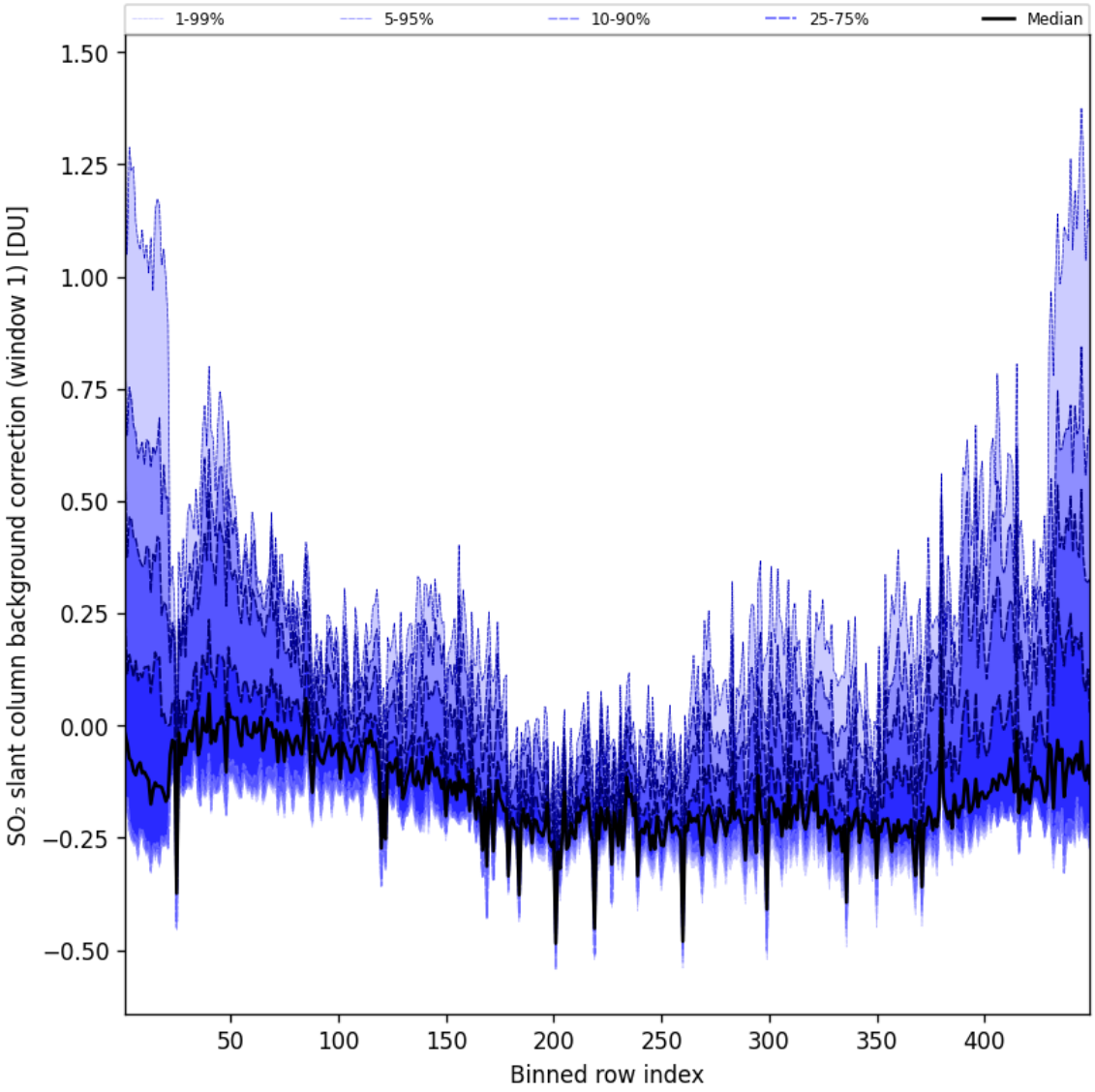

Figure 93: Along track statistics of "SO_2 slant column background correction (window 1)" for 2025-04-09 to 2025-04-10

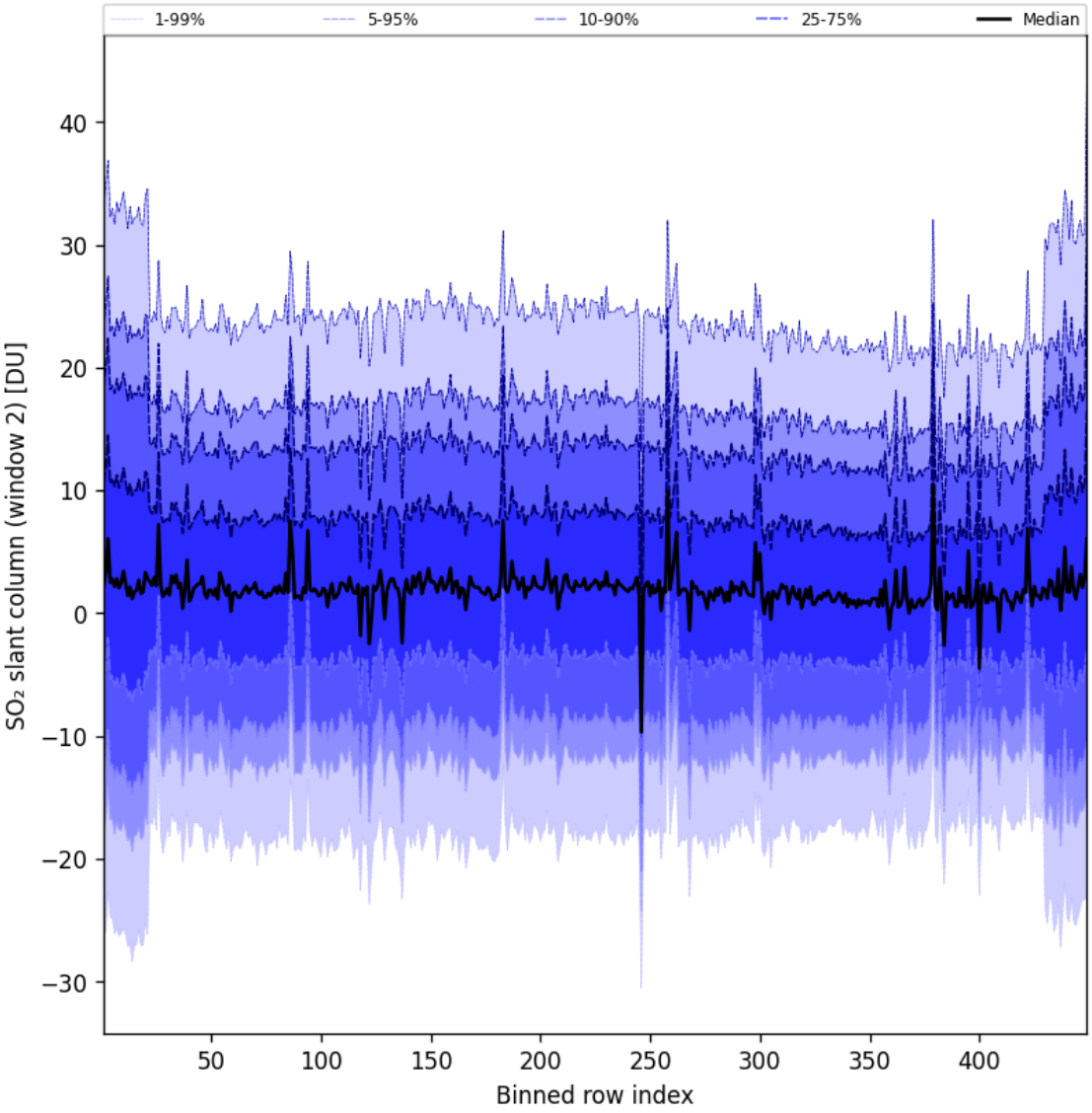

Figure 94: Along track statistics of "SO_2 slant column (window 2)" for 2025-04-09 to 2025-04-10

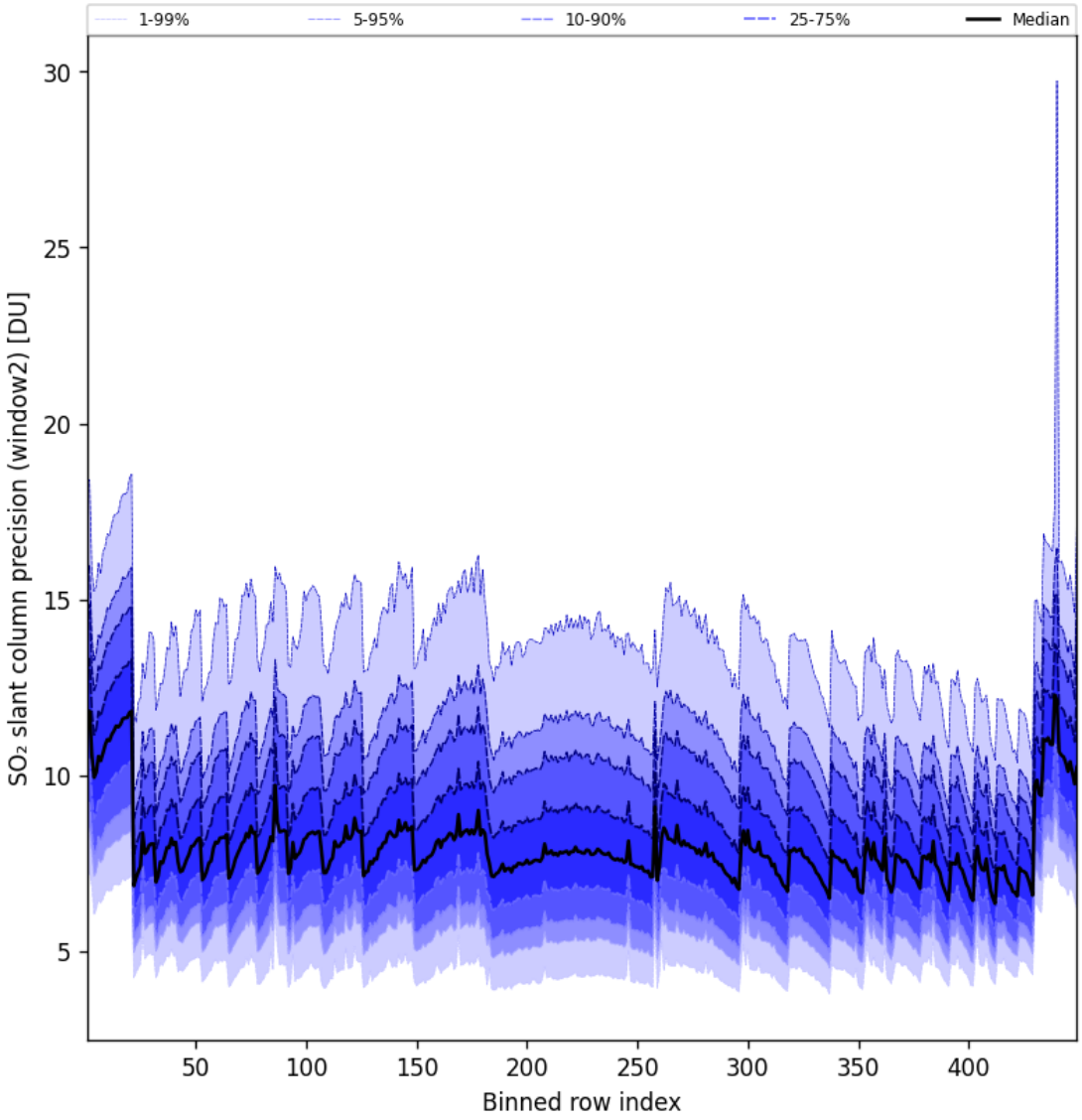

Figure 95: Along track statistics of "SO_2 slant column precision (window2)" for 2025-04-09 to 2025-04-10

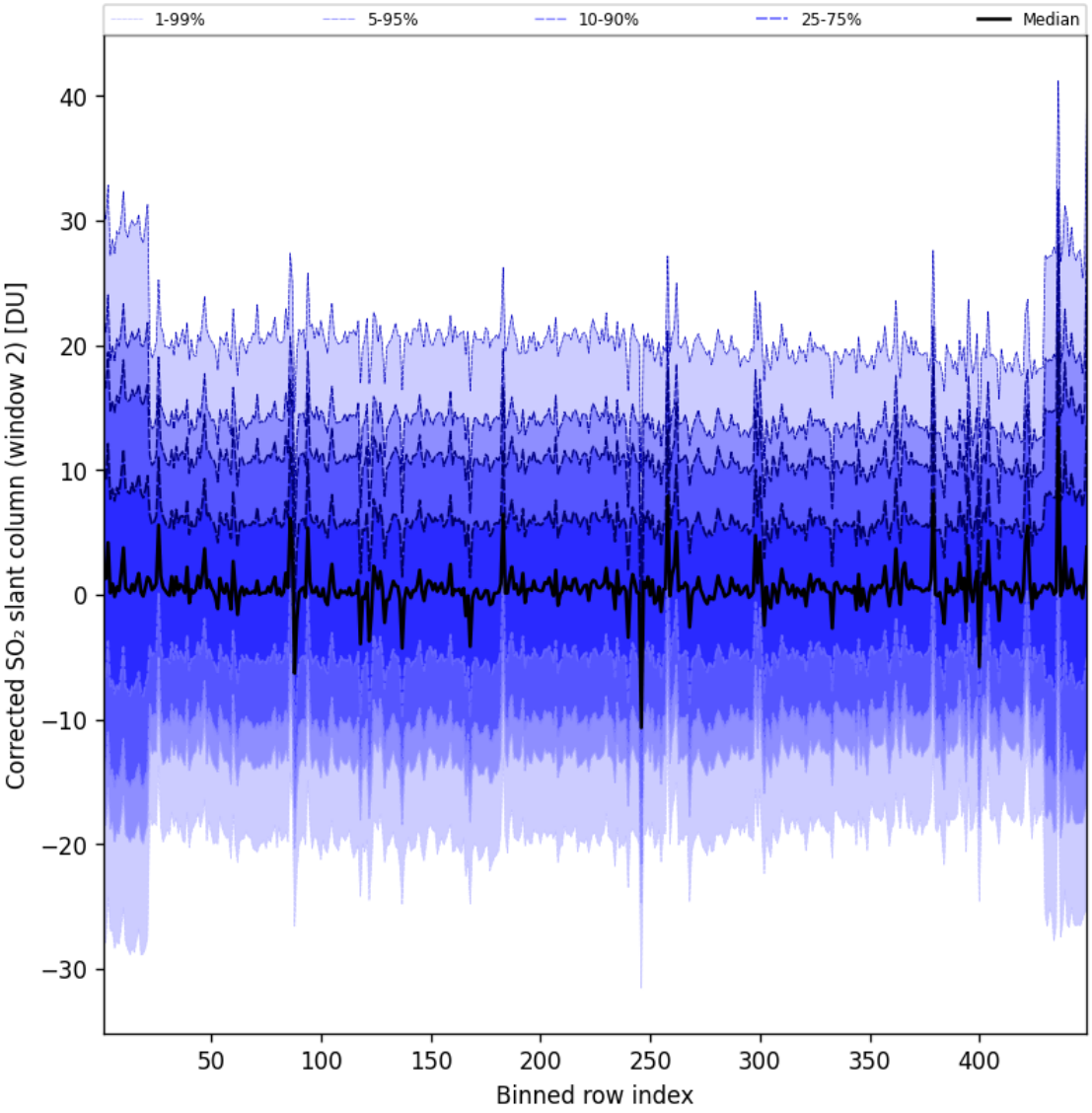

Figure 96: Along track statistics of “Corrected SO_2 slant column (window 2)” for 2025-04-09 to 2025-04-10

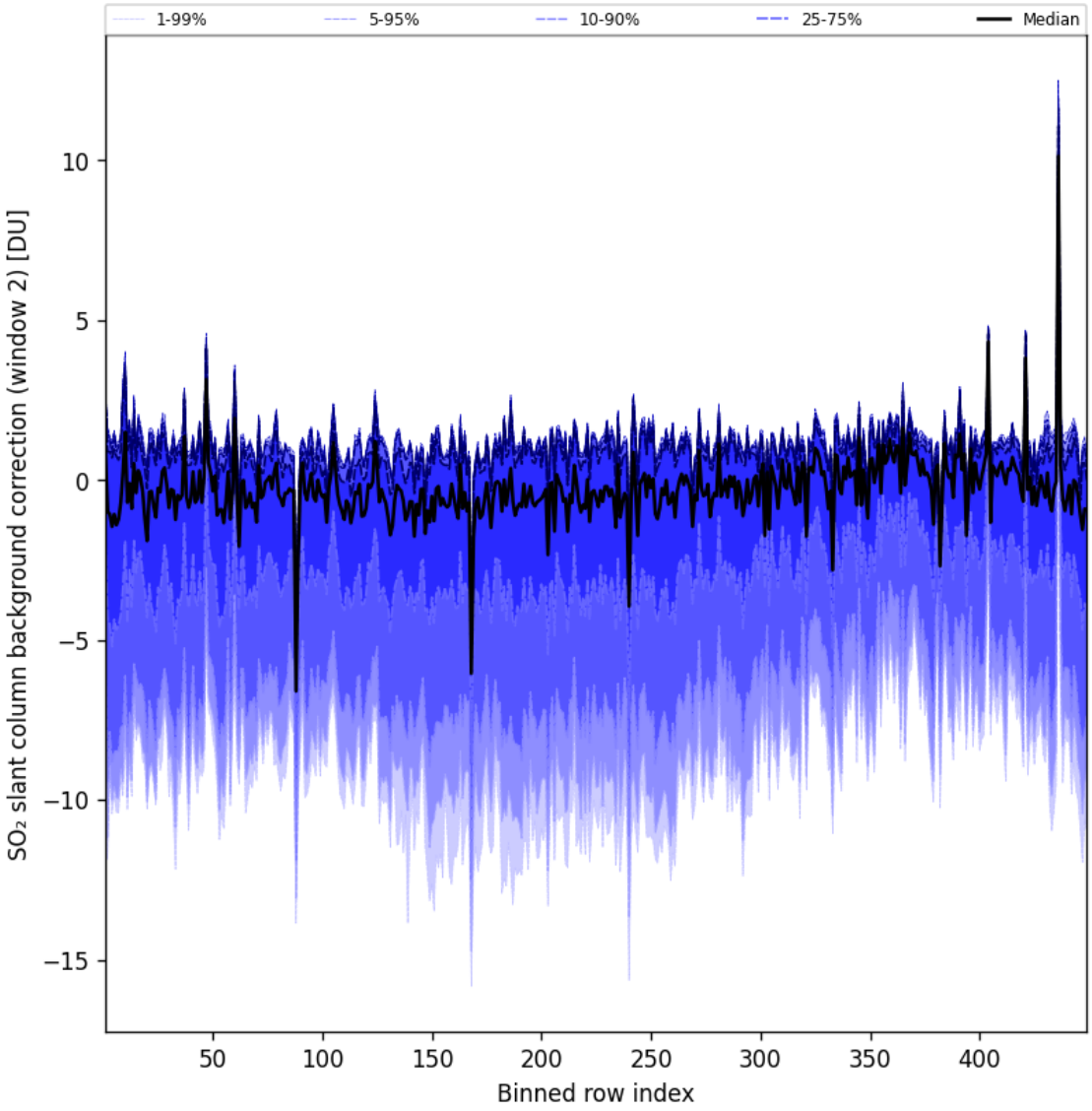

Figure 97: Along track statistics of "SO_2 slant column background correction (window 2)" for 2025-04-09 to 2025-04-10

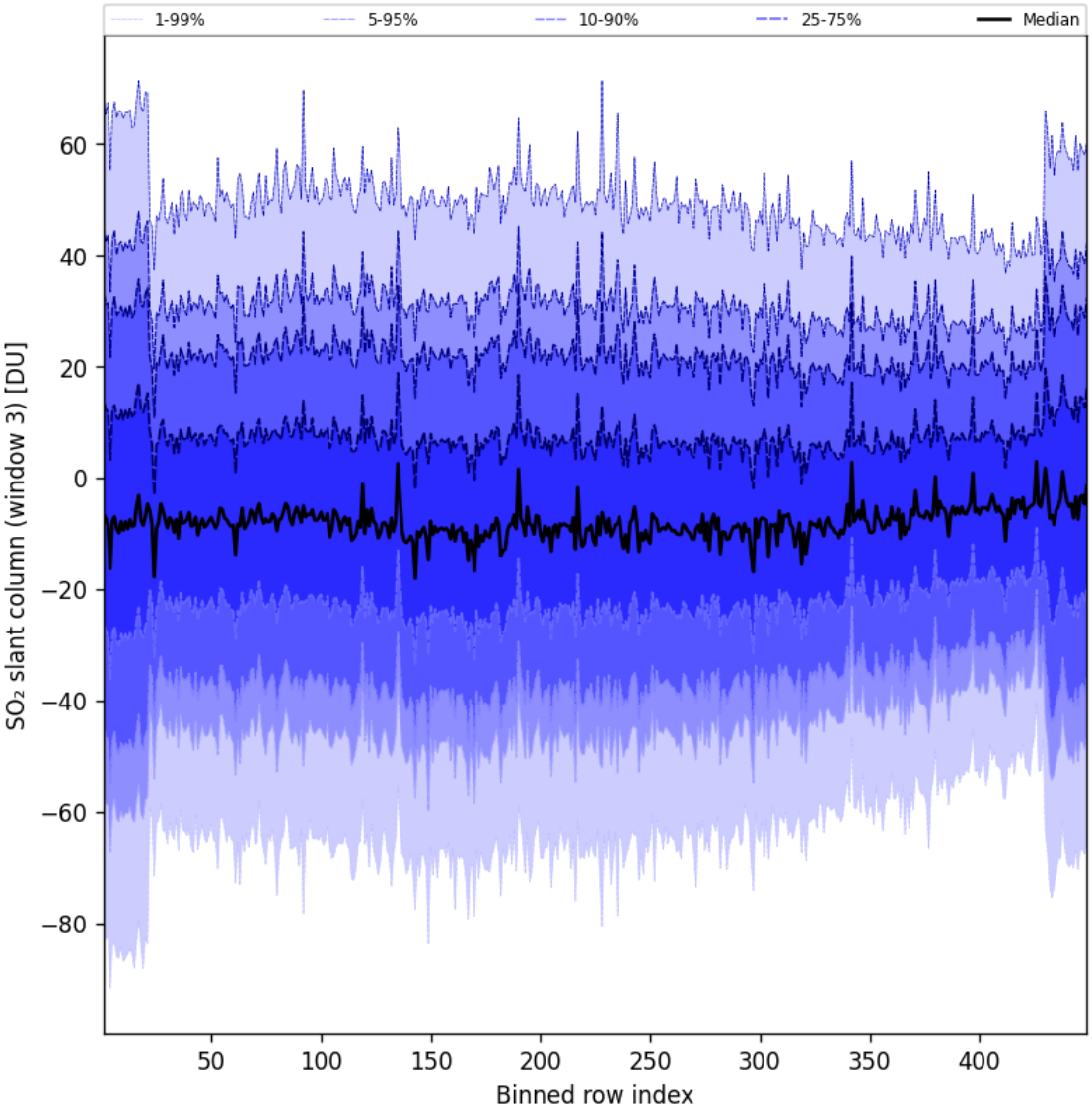

Figure 98: Along track statistics of "SO_2 slant column (window 3)" for 2025-04-09 to 2025-04-10

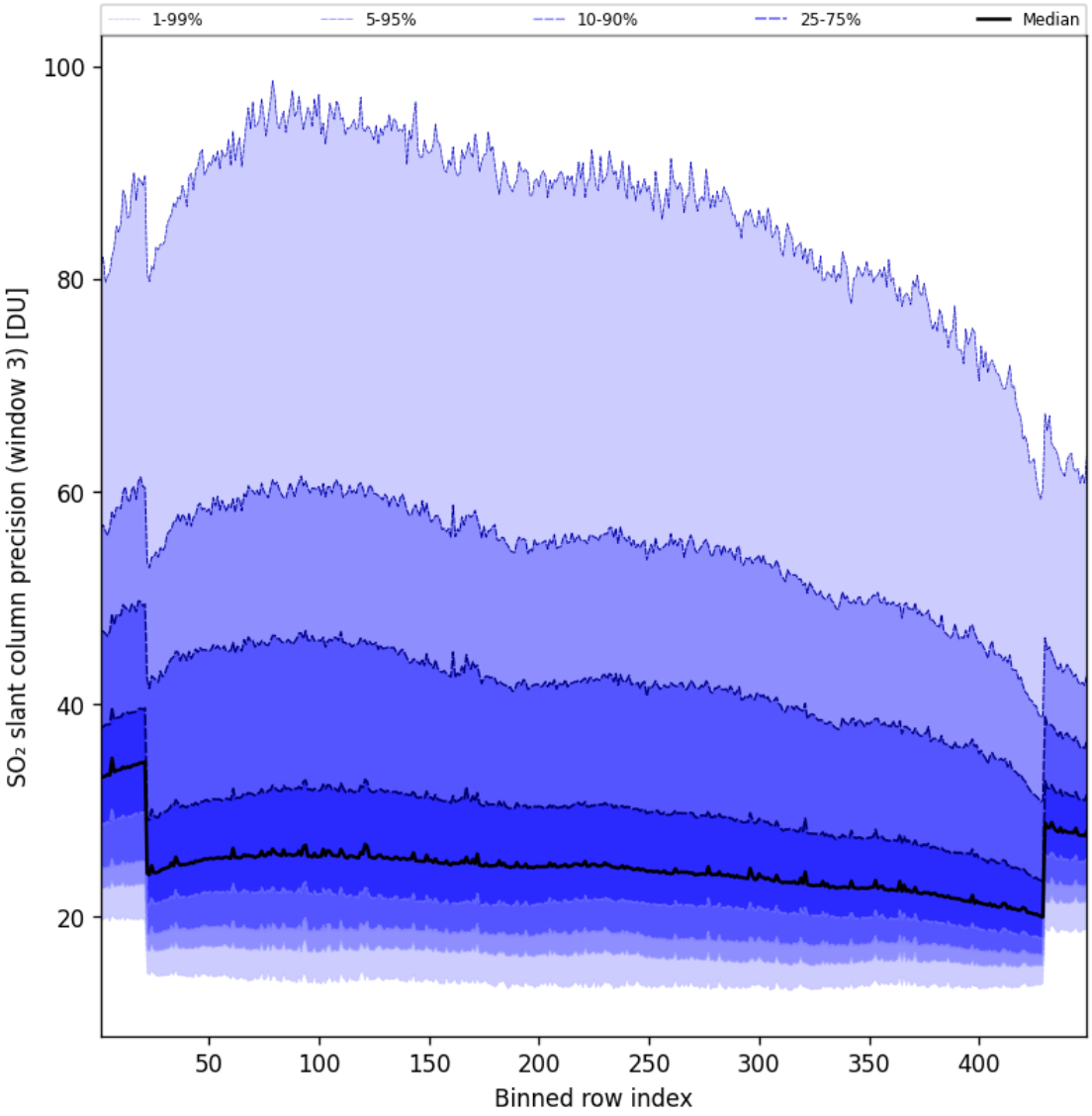

Figure 99: Along track statistics of "SO_2 slant column precision (window 3)" for 2025-04-09 to 2025-04-10

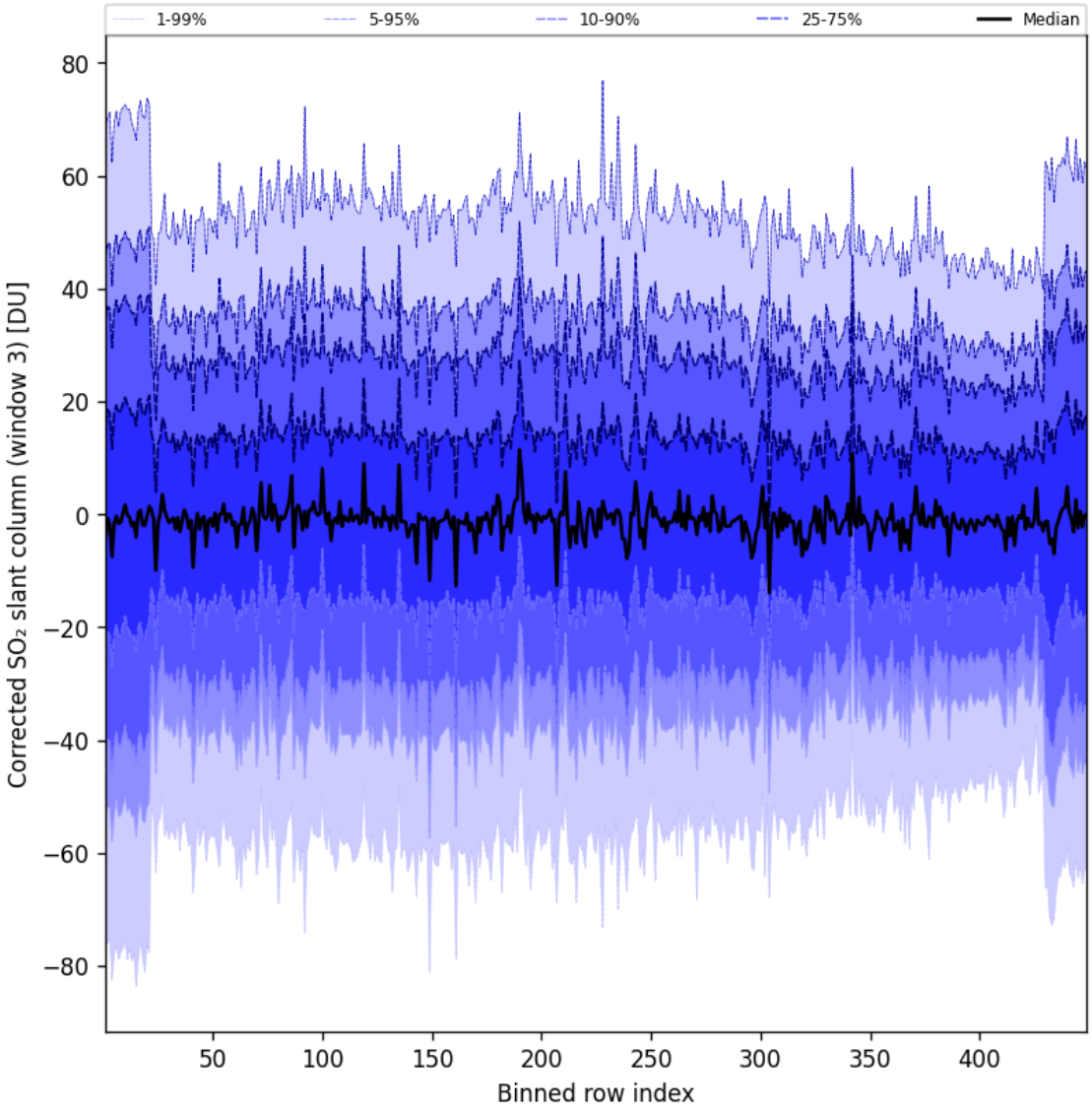

Figure 100: Along track statistics of “Corrected SO_2 slant column (window 3)” for 2025-04-09 to 2025-04-10

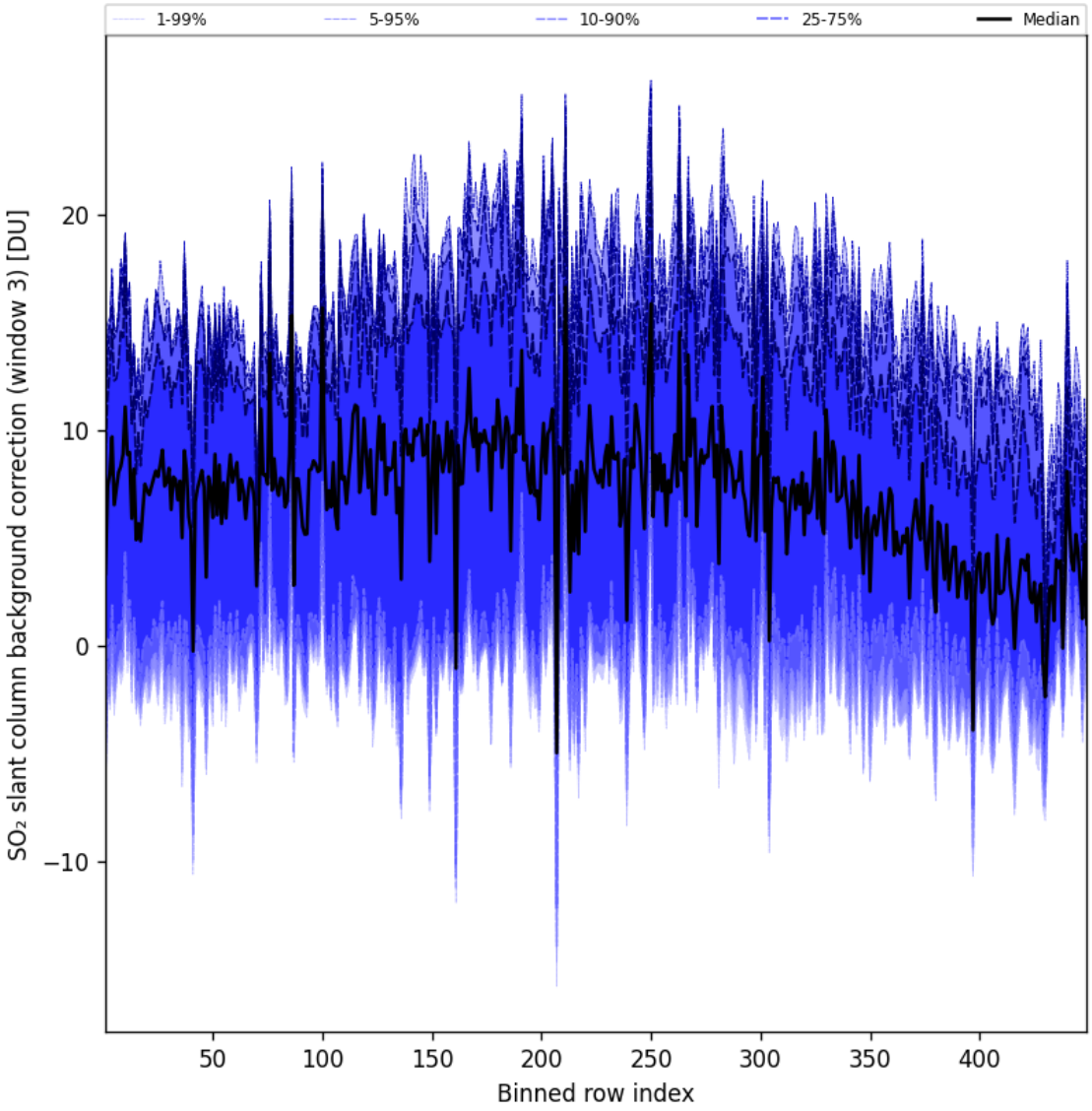

Figure 101: Along track statistics of "SO_2 slant column background correction (window 3)" for 2025-04-09 to 2025-04-10

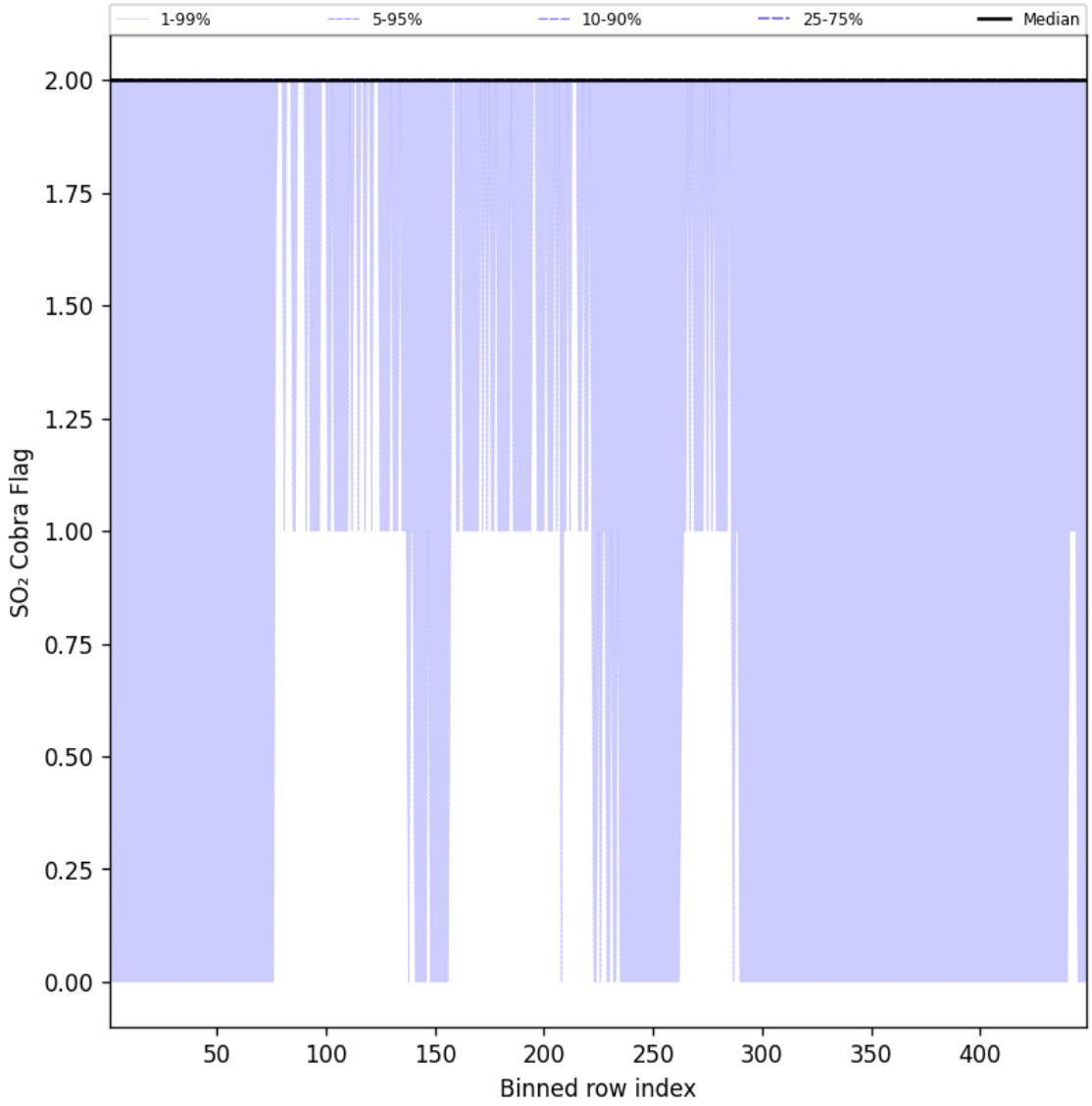

Figure 102: Along track statistics of "SO_2 Cobra Flag" for 2025-04-09 to 2025-04-10

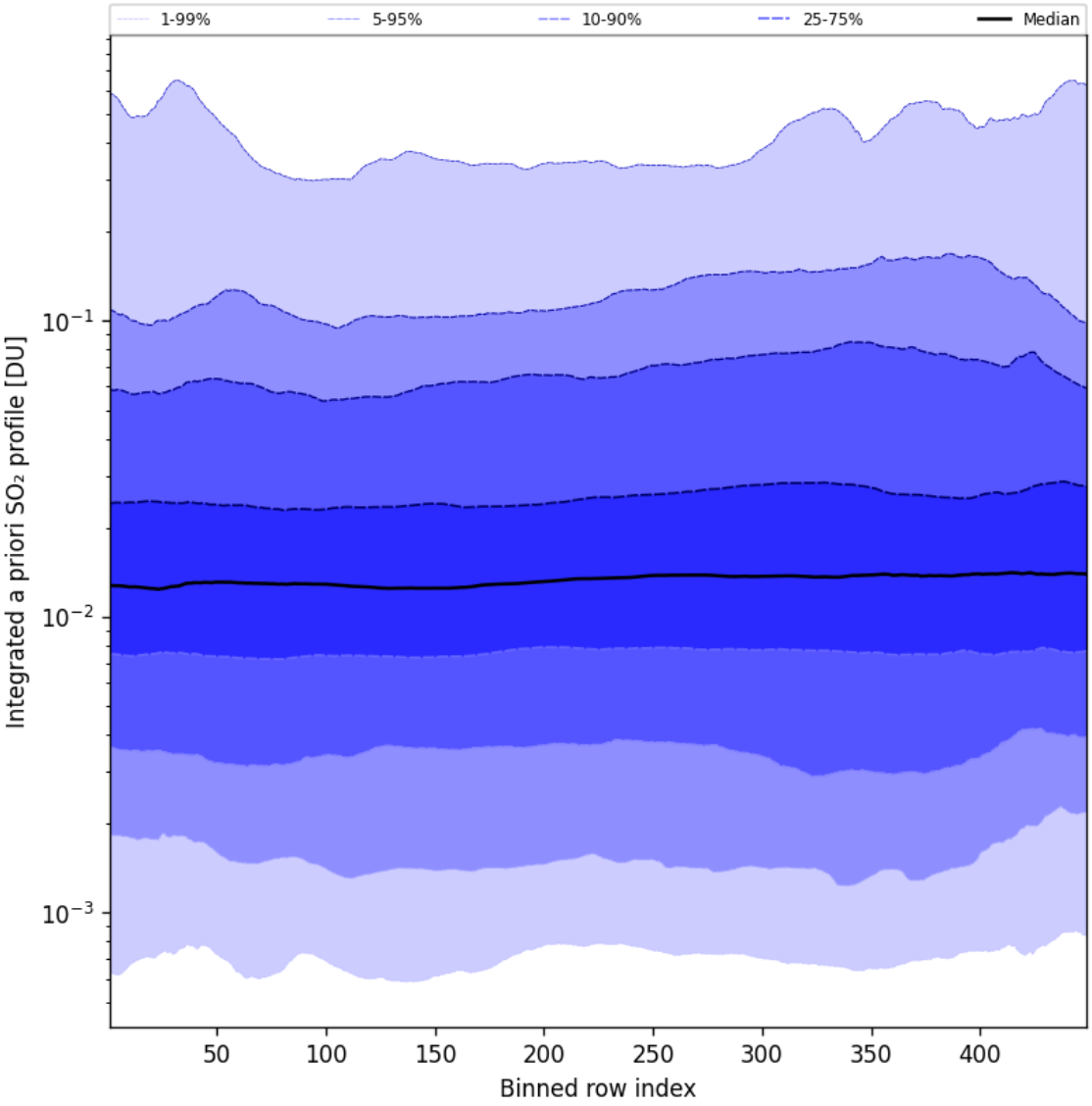

Figure 103: Along track statistics of “Integrated a priori SO_2 profile” for 2025-04-09 to 2025-04-10

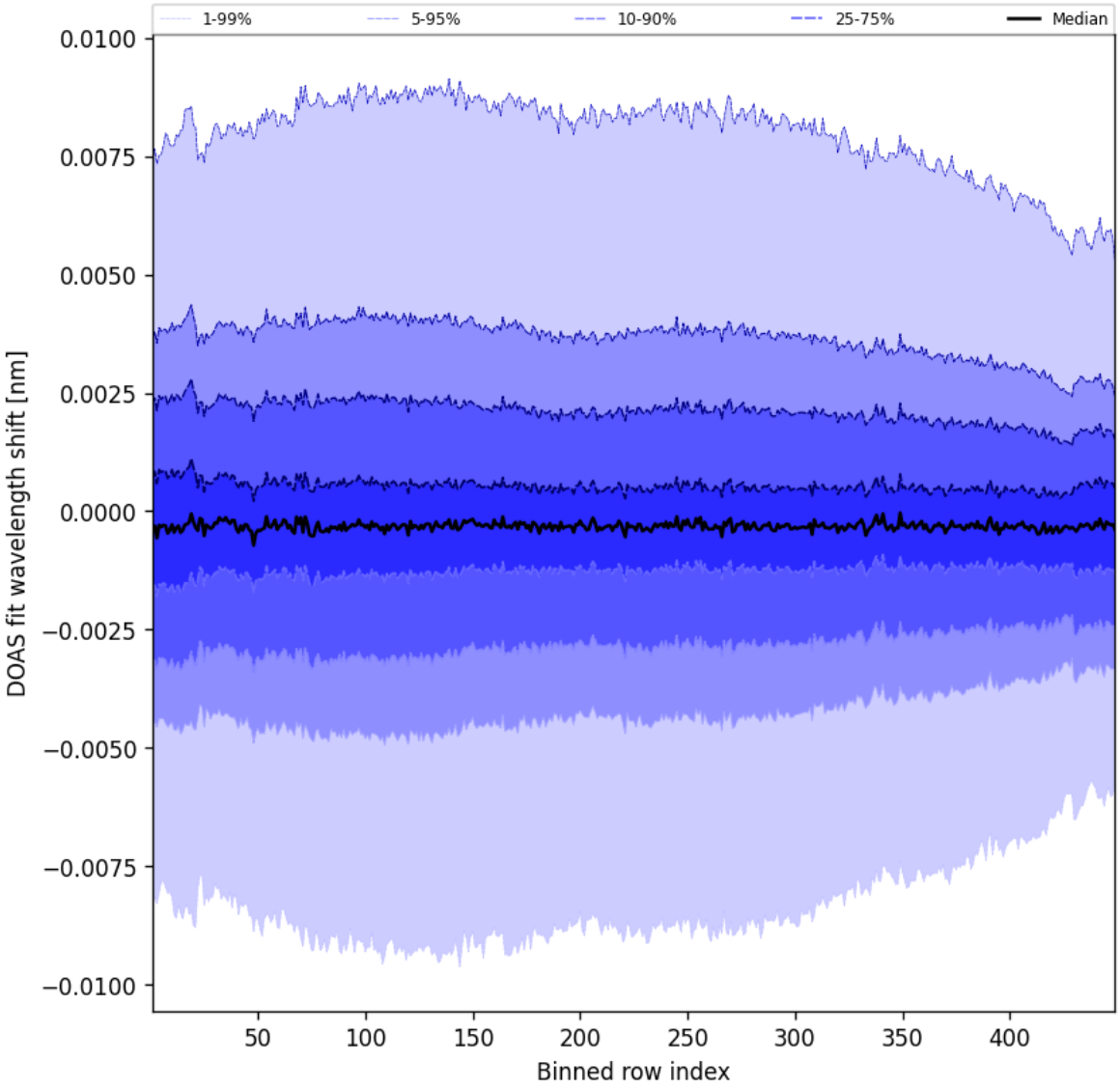

Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2025-04-09 to 2025-04-10

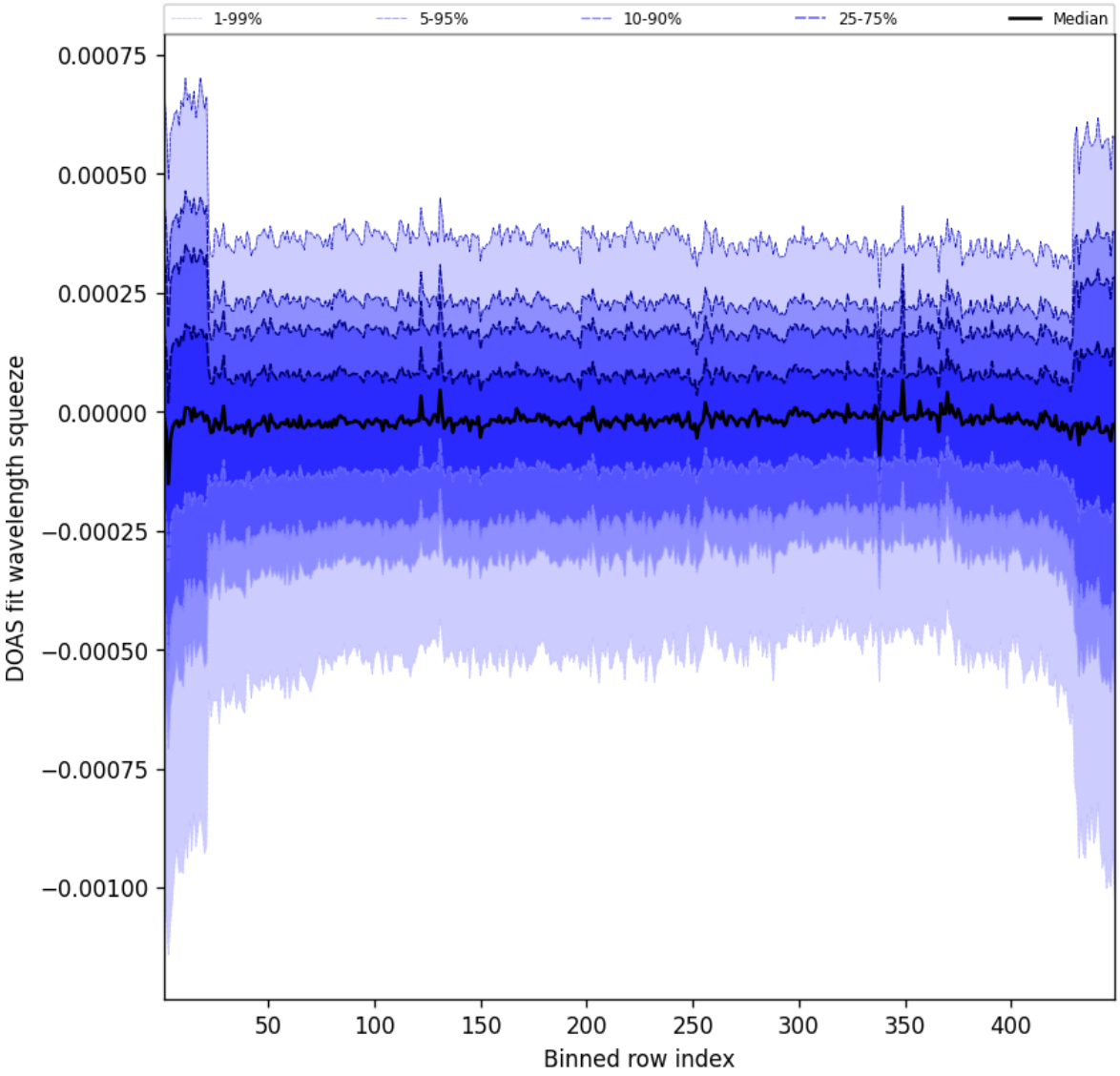

Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2025-04-09 to 2025-04-10

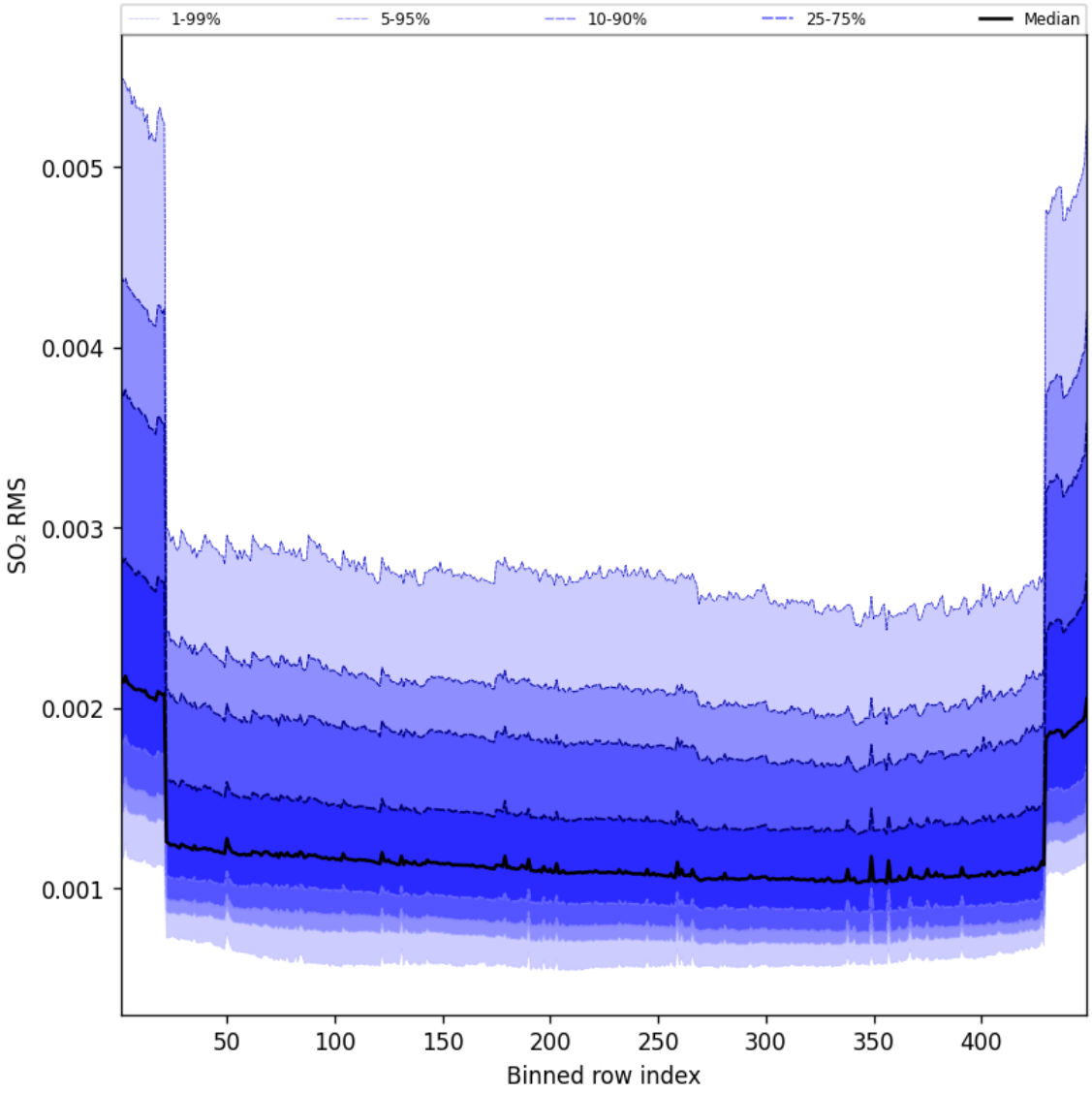

Figure 106: Along track statistics of "SO_2 RMS" for 2025-04-09 to 2025-04-10

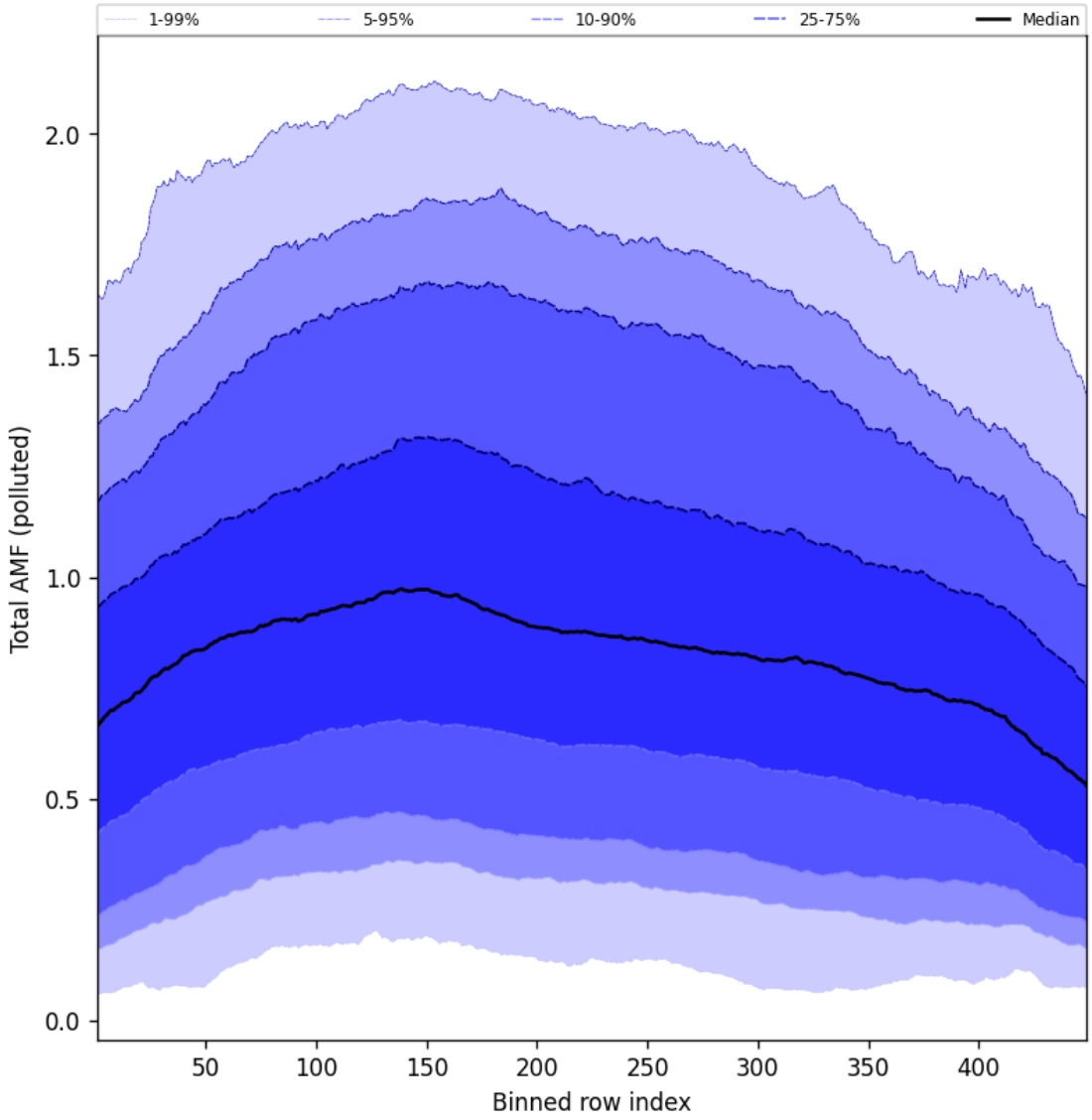

Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-04-09 to 2025-04-10

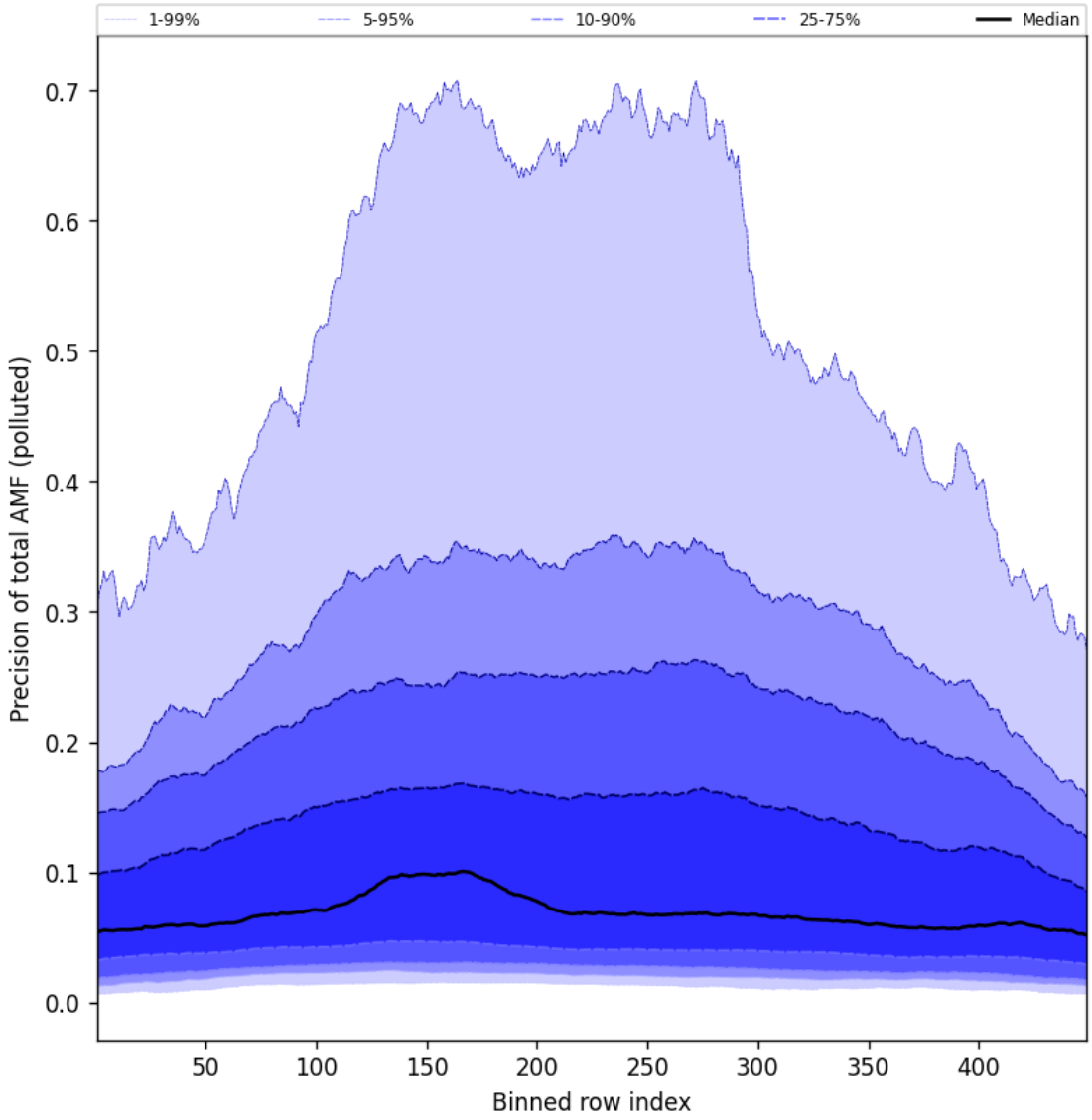

Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-04-09 to 2025-04-10

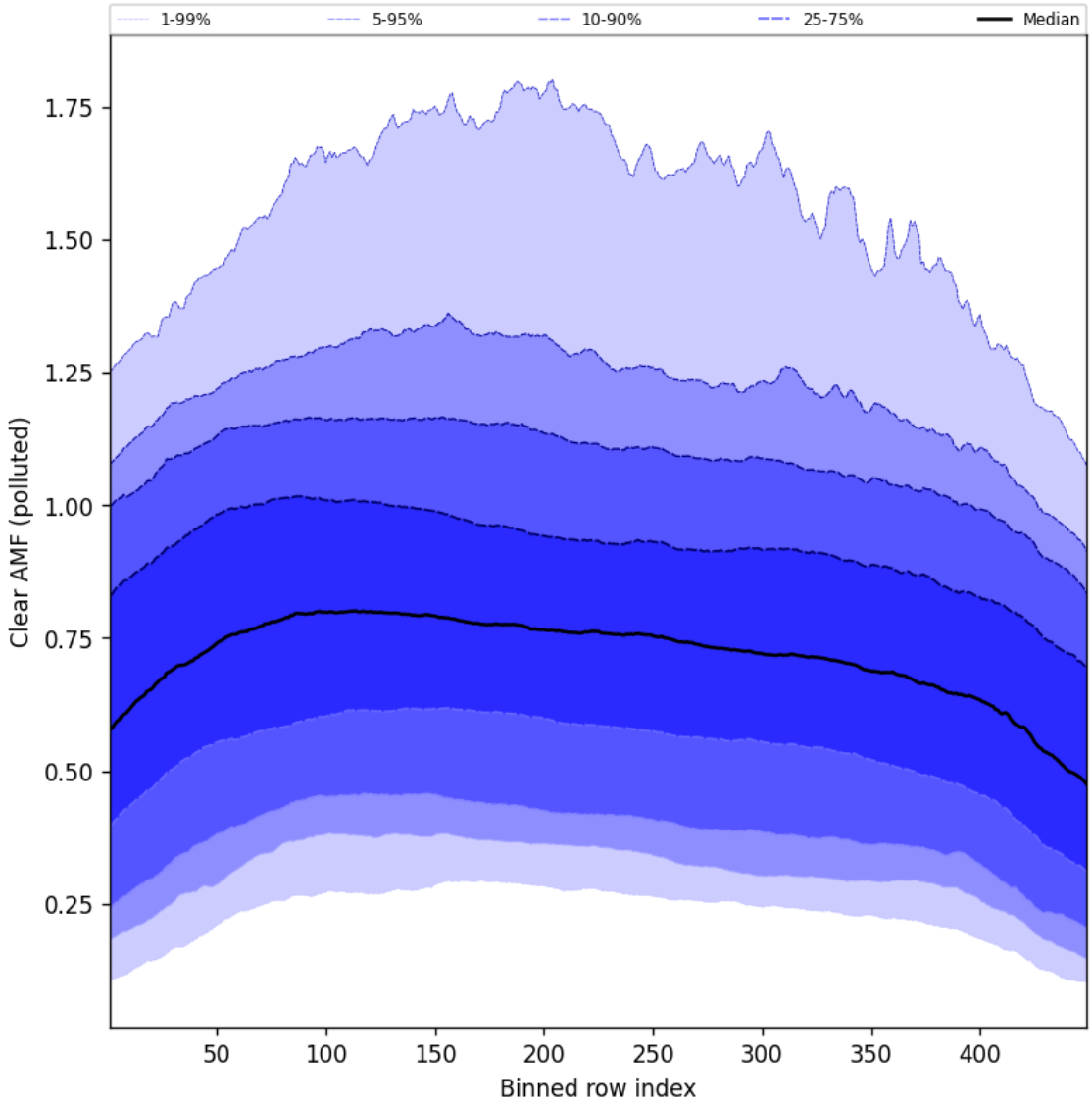

Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-04-09 to 2025-04-10

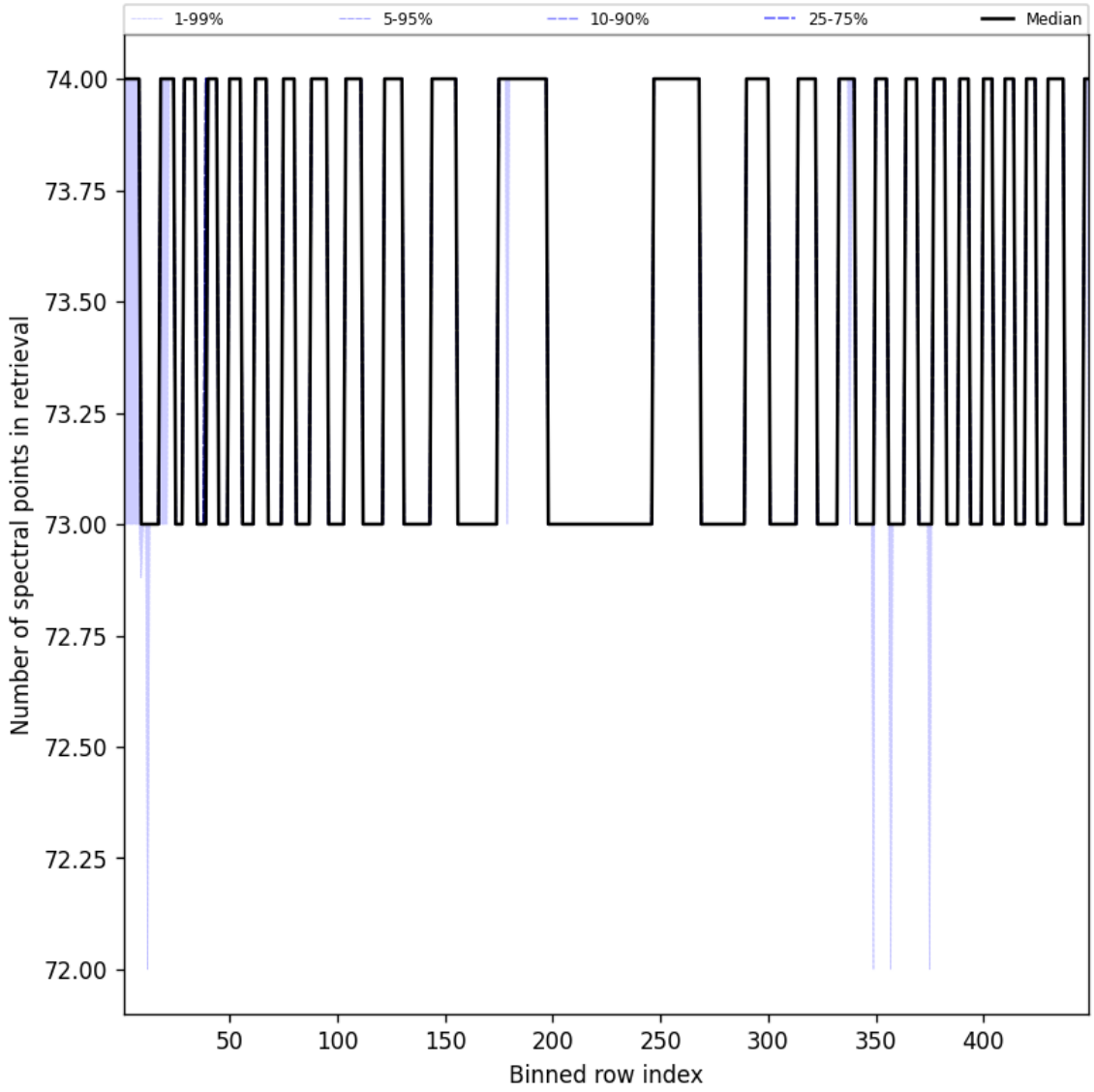

Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-04-09 to 2025-04-10

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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