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]	0.655 ± 0.398	18531262	0.995	0.770	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(3.713 \pm 106.830) \times 10^{-2}$	18531262	0.263	0.463	1.118×10^{-2}	-103	481
sulfurdioxide total vertical column precision [DU]	0.536 ± 0.732	18531262	0.197	0.354	0.333	4.373×10^{-2}	57.2
sulfurdioxide slant column density corrected [DU]	$(2.339 \pm 48.525) \times 10^{-2}$	18531262	0.258	0.374	9.742×10^{-3}	-23.9	534
sulfurdioxide slant column density cobra [DU]	$(2.227 \pm 40.215) \times 10^{-2}$	18531262	0.258	0.374	9.742×10^{-3}	-23.9	37.8
sulfurdioxide slant column density cobra precision [DU]	0.303 ± 0.143	18531262	0.213	0.149	0.261	7.925×10^{-2}	22.7
sulfurdioxide slant column density window1 [DU]	0.156 ± 0.727	18531262	0.175	0.752	0.170	-34.0	92.0
sulfurdioxide slant column density window1 precision [DU]	0.303 ± 0.143	18531262	0.213	0.149	0.261	7.925×10^{-2}	22.7
sulfurdioxide slant column density corrected win1 [DU]	$(2.963 \pm 72.006) \times 10^{-2}$	18531262	2.500×10^{-2}	0.740	5.382×10^{-3}	-34.0	94.4
background so2 slant column offset window1 [DU]	-0.126 ± 0.186	18531262	-0.220	0.189	-0.167	-1.23	4.12
sulfurdioxide slant column density window2 [DU]	1.67 ± 9.17	18531262	1.25	11.7	1.47	-1.016×10^{3}	873
sulfurdioxide slant column density window2 precision [DU]	8.14 ± 2.17	18531262	7.43	2.46	7.83	2.21	570
sulfurdioxide slant column density corrected win2 [DU]	$(-5.195 \pm 871.082) \times 10^{-2}$	18531262	0.250	11.1	-4.157×10^{-2}	-1.016×10^{3}	873
background so2 slant column offset window2 [DU]	-1.73 ± 3.20	18531262	0.750	3.80	-0.642	-19.1	11.7
sulfurdioxide slant column density window3 [DU]	-5.24 ± 24.05	18531262	-7.28	30.6	-5.54	-273	1.003×10^{3}
sulfurdioxide slant column density window3 precision [DU]	28.3 ± 13.1	18531262	22.5	9.36	24.7	8.93	306
sulfurdioxide slant column density corrected win3 [DU]	3.28 ± 23.13	18531262	3.92	29.1	3.36	-267	1.004×10^{3}
background so2 slant column offset window3 [DU]	8.52 ± 6.80	18531262	2.80	11.5	8.11	-24.4	31.1
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.21	18531262	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(3.207 \pm 9.261) \times 10^{-2}$	18531262	1.316×10^{-2}	1.751×10^{-2}	1.383×10^{-2}	1.664×10^{-4}	2.78
fitted radiance shift [nm]	$(-3.441 \pm 25.990) \times 10^{-4}$	18531262	-5.000×10^{-4}	1.771×10^{-3}	-3.288×10^{-4}	-5.144×10^{-2}	0.110
fitted radiance squeeze [1]	$(-2.632 \pm 18.868) \times 10^{-5}$	18531262	-1.000×10^{-5}	2.065×10^{-4}	-1.550×10^{-5}	-1.574×10^{-2}	7.757×10^{-2}
fitted root mean square [1]	$(1.320 \pm 0.589) \times 10^{-3}$	18531262	9.750×10^{-4}	5.751×10^{-4}	1.148×10^{-3}	2.914×10^{-4}	6.577×10^{-2}
sulfurdioxide total air mass factor polluted [1]	0.858 ± 0.417	18531262	0.900	0.547	0.820	5.000×10^{-2}	2.82
sulfurdioxide total air mass factor polluted precision [1]	0.107 ± 0.110	18531262	3.500×10^{-2}	0.103	6.557×10^{-2}	2.500×10^{-3}	1.81
sulfurdioxide clear air mass factor polluted [1]	0.725 ± 0.287	18531262	0.660	0.389	0.708	3.769×10^{-2}	2.79
number of spectral points in retrieval [1]	73.4 ± 0.5	18531262	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	1.000×10^{-2}	6.000×10^{-2}	0.130	0.230	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	−2.37	−0.902	−0.548	−0.368	−0.217	0.246	0.411	0.614	1.03	2.83
sulfurdioxide total vertical column precision [DU]	0.101	0.139	0.166	0.188	0.220	0.574	0.771	1.01	1.51	3.61
sulfurdioxide slant column density corrected [DU]	−0.889	−0.509	−0.367	−0.273	−0.175	0.199	0.302	0.406	0.572	1.10
sulfurdioxide slant column density cobra [DU]	−0.889	−0.509	−0.367	−0.273	−0.175	0.199	0.302	0.406	0.572	1.10
sulfurdioxide slant column density cobra precision [DU]	0.143	0.169	0.182	0.194	0.209	0.358	0.413	0.467	0.562	0.833
sulfurdioxide slant column density window1 [DU]	−1.86	−0.952	−0.627	−0.421	−0.212	0.540	0.734	0.920	1.21	2.02
sulfurdioxide slant column density window1 precision [DU]	0.143	0.169	0.182	0.194	0.209	0.358	0.413	0.467	0.562	0.833
sulfurdioxide slant column density corrected win1 [DU]	−1.74	−0.998	−0.727	−0.547	−0.358	0.382	0.590	0.797	1.13	2.11
background so2 slant column offset window1 [DU]	−0.436	−0.317	−0.291	−0.271	−0.244	-5.519×10^{-2}	1.492×10^{-2}	9.268×10^{-2}	0.215	0.518
sulfurdioxide slant column density window2 [DU]	−19.6	−12.8	−9.55	−7.08	−4.28	7.43	10.5	13.2	16.9	24.6
sulfurdioxide slant column density window2 precision [DU]	4.36	5.31	5.84	6.25	6.73	9.19	10.0	10.8	12.0	14.6
sulfurdioxide slant column density corrected win2 [DU]	−21.1	−14.2	−10.8	−8.35	−5.59	5.50	8.24	10.7	14.0	20.9
background so2 slant column offset window2 [DU]	−11.1	−8.60	−6.61	−4.96	−3.27	0.535	0.832	1.08	1.48	3.26
sulfurdioxide slant column density window3 [DU]	−63.9	−44.1	−34.8	−28.1	−20.6	9.98	18.0	25.1	34.7	53.5
sulfurdioxide slant column density window3 precision [DU]	13.9	16.8	18.5	19.7	21.2	30.6	35.2	41.3	53.3	84.8
sulfurdioxide slant column density corrected win3 [DU]	−54.7	−34.7	−25.3	−18.5	−11.2	17.9	25.3	32.0	41.0	59.1
background so2 slant column offset window3 [DU]	−3.43	−0.879	0.435	1.42	2.58	14.1	16.2	17.7	19.6	22.8
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]	6.122×10^{-4}	1.283×10^{-3}	2.962×10^{-3}	4.913×10^{-3}	7.610×10^{-3}	2.512×10^{-2}	3.516×10^{-2}	5.395×10^{-2}	9.671×10^{-2}	0.406
fitted radiance shift [nm]	-8.242×10^{-3}	-4.208×10^{-3}	-2.778×10^{-3}	-1.960×10^{-3}	-1.260×10^{-3}	5.107×10^{-4}	1.194×10^{-3}	2.071×10^{-3}	3.605×10^{-3}	7.816×10^{-3}
fitted radiance squeeze [1]	-5.927×10^{-4}	-3.346×10^{-4}	-2.400×10^{-4}	-1.809×10^{-4}	-1.218×10^{-4}	8.468×10^{-5}	1.350×10^{-4}	1.811×10^{-4}	2.458×10^{-4}	3.970×10^{-4}
fitted root mean square [1]	5.978×10^{-4}	7.420×10^{-4}	8.169×10^{-4}	8.744×10^{-4}	9.461×10^{-4}	1.521×10^{-3}	1.780×10^{-3}	2.043×10^{-3}	2.445×10^{-3}	3.479×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.101	0.253	0.351	0.438	0.555	1.10	1.27	1.43	1.64	1.99
sulfurdioxide total air mass factor polluted precision [1]	1.059×10^{-2}	1.810×10^{-2}	2.428×10^{-2}	3.019×10^{-2}	3.813×10^{-2}	0.141	0.186	0.229	0.306	0.551
sulfurdioxide clear air mass factor polluted [1]	0.201	0.300	0.363	0.428	0.518	0.907	0.995	1.08	1.19	1.57
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]	0.621 ± 0.402	10747537	0.790	1.000	0.0	1.000	0.210	1.000
sulfurdioxide total vertical column [DU]	$(4.793 \pm 126.815) \times 10^{-2}$	10747537	0.508	1.139×10^{-2}	-103	154	-0.237	0.271
sulfurdioxide total vertical column precision [DU]	0.626 ± 0.876	10747537	0.448	0.374	4.449×10^{-2}	55.9	0.229	0.677
sulfurdioxide slant column density corrected [DU]	$(2.789 \pm 51.778) \times 10^{-2}$	10747537	0.382	9.433×10^{-3}	-9.74	144	-0.179	0.203
sulfurdioxide slant column density cobra [DU]	$(2.612 \pm 43.820) \times 10^{-2}$	10747537	0.382	9.433×10^{-3}	-9.74	30.0	-0.179	0.203
sulfurdioxide slant column density cobra precision [DU]	0.315 ± 0.157	10747537	0.173	0.270	7.925×10^{-2}	22.7	0.207	0.380
sulfurdioxide slant column density window1 [DU]	0.153 ± 0.779	10747537	0.770	0.170	-25.8	40.4	-0.222	0.548
sulfurdioxide slant column density window1 precision [DU]	0.315 ± 0.157	10747537	0.173	0.270	7.925×10^{-2}	22.7	0.207	0.380
sulfurdioxide slant column density corrected win1 [DU]	$(3.968 \pm 77.162) \times 10^{-2}$	10747537	0.759	7.711×10^{-3}	-25.8	40.4	-0.363	0.396
background so2 slant column offset window1 [DU]	-0.113 ± 0.212	10747537	0.208	-0.167	-0.786	4.12	-0.247	-3.913×10^{-2}
sulfurdioxide slant column density window2 [DU]	2.38 ± 9.06	10747537	11.7	2.14	-107	405	-3.59	8.11
sulfurdioxide slant column density window2 precision [DU]	7.90 ± 2.03	10747537	2.34	7.61	2.21	365	6.56	8.90
sulfurdioxide slant column density corrected win2 [DU]	-0.141 ± 8.401	10747537	10.8	-0.107	-110	406	-5.51	5.27
background so2 slant column offset window2 [DU]	-2.52 ± 3.72	10747537	5.69	-1.38	-19.1	11.2	-5.14	0.545
sulfurdioxide slant column density window3 [DU]	-7.12 ± 22.86	10747537	28.9	-7.49	-222	171	-21.7	7.20
sulfurdioxide slant column density window3 precision [DU]	26.8 ± 12.3	10747537	8.09	23.6	8.93	255	20.5	28.6
sulfurdioxide slant column density corrected win3 [DU]	3.45 ± 21.85	10747537	27.4	3.53	-220	172	-10.2	17.3
background so2 slant column offset window3 [DU]	10.6 ± 6.8	10747537	12.2	11.3	-18.3	31.1	4.00	16.2
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.20	10747537	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(4.310 \pm 11.804) \times 10^{-2}$	10747537	2.811×10^{-2}	1.594×10^{-2}	1.664×10^{-4}	2.78	5.886×10^{-3}	3.399×10^{-2}
fitted radiance shift [nm]	$(-2.003 \pm 24.510) \times 10^{-4}$	10747537	1.609×10^{-3}	-2.065×10^{-4}	-5.066×10^{-2}	4.392×10^{-2}	-1.034×10^{-3}	5.749×10^{-4}
fitted radiance squeeze [1]	$(-4.670 \pm 19.735) \times 10^{-5}$	10747537	2.113×10^{-4}	-2.797×10^{-5}	-1.177×10^{-2}	1.102×10^{-2}	-1.395×10^{-4}	7.178×10^{-5}
fitted root mean square [1]	$(1.366 \pm 0.656) \times 10^{-3}$	10747537	6.577×10^{-4}	1.168×10^{-3}	3.214×10^{-4}	6.577×10^{-2}	9.386×10^{-4}	1.596×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.814 ± 0.432	10747537	0.598	0.765	5.000×10^{-2}	2.82	0.480	1.08
sulfurdioxide total air mass factor polluted precision [1]	0.111 ± 0.128	10747537	0.106	6.261×10^{-2}	2.500×10^{-3}	1.81	3.364×10^{-2}	0.139
sulfurdioxide clear air mass factor polluted [1]	0.683 ± 0.324	10747537	0.456	0.636	3.769×10^{-2}	2.79	0.430	0.886
number of spectral points in retrieval [1]	73.4 ± 0.5	10747537	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]	0.703 ± 0.388	7783725	0.690	1.000	0.0	1.000	0.310	1.000
sulfurdioxide total vertical column [DU]	$(2.221 \pm 70.437) \times 10^{-2}$	7783725	0.413	1.093×10^{-2}	-36.2	481	-0.194	0.219
sulfurdioxide total vertical column precision [DU]	0.412 ± 0.435	7783725	0.258	0.295	4.373×10^{-2}	57.2	0.211	0.469
sulfurdioxide slant column density corrected [DU]	$(1.719 \pm 43.630) \times 10^{-2}$	7783725	0.364	1.015×10^{-2}	-23.9	534	-0.171	0.193
sulfurdioxide slant column density cobra [DU]	$(1.695 \pm 34.619) \times 10^{-2}$	7783725	0.364	1.015×10^{-2}	-23.9	37.8	-0.171	0.193
sulfurdioxide slant column density cobra precision [DU]	0.287 ± 0.118	7783725	0.119	0.254	8.450×10^{-2}	21.6	0.212	0.331
sulfurdioxide slant column density window1 [DU]	0.161 ± 0.649	7783725	0.729	0.170	-34.0	92.0	-0.200	0.530
sulfurdioxide slant column density window1 precision [DU]	0.287 ± 0.118	7783725	0.119	0.254	8.450×10^{-2}	21.6	0.212	0.331
sulfurdioxide slant column density corrected win1 [DU]	$(1.574 \pm 64.184) \times 10^{-2}$	7783725	0.716	2.285×10^{-3}	-34.0	94.4	-0.352	0.364
background so2 slant column offset window1 [DU]	-0.145 ± 0.139	7783725	0.167	-0.167	-1.23	2.89	-0.240	-7.335×10^{-2}
sulfurdioxide slant column density window2 [DU]	0.696 ± 9.227	7783725	11.6	0.554	-1.016×10^{3}	873	-5.20	6.44
sulfurdioxide slant column density window2 precision [DU]	8.47 ± 2.32	7783725	2.55	8.14	2.38	570	7.01	9.56
sulfurdioxide slant column density corrected win2 [DU]	$(7.040 \pm 912.005) \times 10^{-2}$	7783725	11.5	5.519×10^{-2}	-1.016×10^{3}	873	-5.70	5.83
background so2 slant column offset window2 [DU]	-0.626 ± 1.759	7783725	2.13	-0.260	-8.88	11.7	-1.61	0.524
sulfurdioxide slant column density window3 [DU]	-2.63 ± 25.38	7783725	32.3	-2.54	-273	1.003×10^{3}	-18.6	13.7
sulfurdioxide slant column density window3 precision [DU]	30.4 ± 14.0	7783725	10.4	26.5	10.0	306	22.6	33.0
sulfurdioxide slant column density corrected win3 [DU]	3.04 ± 24.79	7783725	31.6	3.08	-267	1.004×10^{3}	-12.6	19.0
background so2 slant column offset window3 [DU]	5.68 ± 5.71	7783725	9.36	4.33	-24.4	25.3	1.20	10.6
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.23	7783725	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(1.683 \pm 2.794) \times 10^{-2}$	7783725	9.316×10^{-3}	1.271×10^{-2}	1.314×10^{-3}	1.40	8.714×10^{-3}	1.803×10^{-2}
fitted radiance shift [nm]	$(-5.426 \pm 27.782) \times 10^{-4}$	7783725	1.965×10^{-3}	-5.272×10^{-4}	-5.144×10^{-2}	0.110	-1.573×10^{-3}	3.922×10^{-4}
fitted radiance squeeze [1]	$(1.831 \pm 172.081) \times 10^{-6}$	7783725	2.010×10^{-4}	1.221×10^{-6}	-1.574×10^{-2}	7.757×10^{-2}	-9.907×10^{-5}	1.019×10^{-4}
fitted root mean square [1]	$(1.258 \pm 0.477) \times 10^{-3}$	7783725	4.774×10^{-4}	1.129×10^{-3}	2.914×10^{-4}	6.461×10^{-2}	9.551×10^{-4}	1.433×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.918 ± 0.386	7783725	0.470	0.874	5.000×10^{-2}	2.70	0.658	1.13
sulfurdioxide total air mass factor polluted precision [1]	0.101 ± 0.079	7783725	0.100	6.945×10^{-2}	4.944×10^{-3}	1.45	4.280×10^{-2}	0.143
sulfurdioxide clear air mass factor polluted [1]	0.783 ± 0.213	7783725	0.293	0.764	0.143	2.54	0.634	0.927
number of spectral points in retrieval [1]	73.4 ± 0.5	7783725	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]	0.691 ± 0.394	12741327	0.730	1.000	0.0	1.000	0.270	1.000
sulfurdioxide total vertical column [DU]	$(2.488 \pm 85.381) \times 10^{-2}$	12741327	0.427	9.235×10^{-3}	-103	481	-0.202	0.225
sulfurdioxide total vertical column precision [DU]	0.462 ± 0.576	12741327	0.291	0.303	4.530×10^{-2}	55.9	0.211	0.502
sulfurdioxide slant column density corrected [DU]	$(1.637 \pm 40.621) \times 10^{-2}$	12741327	0.360	8.253×10^{-3}	-23.9	534	-0.170	0.190
sulfurdioxide slant column density cobra [DU]	$(1.622 \pm 35.349) \times 10^{-2}$	12741327	0.360	8.253×10^{-3}	-23.9	36.3	-0.170	0.190
sulfurdioxide slant column density cobra precision [DU]	0.290 ± 0.132	12741327	0.136	0.249	7.925×10^{-2}	22.7	0.204	0.340
sulfurdioxide slant column density window1 [DU]	0.159 ± 0.674	12741327	0.728	0.173	-29.7	91.5	-0.197	0.532
sulfurdioxide slant column density window1 precision [DU]	0.290 ± 0.132	12741327	0.136	0.249	7.925×10^{-2}	22.7	0.204	0.340
sulfurdioxide slant column density corrected win1 [DU]	$(1.833 \pm 66.555) \times 10^{-2}$	12741327	0.716	1.304×10^{-3}	-29.7	94.4	-0.352	0.365
background so2 slant column offset window1 [DU]	-0.140 ± 0.163	12741327	0.178	-0.173	-1.13	3.30	-0.247	-6.864×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.17 ± 8.99	12741327	11.5	0.973	-1.016×10^{3}	826	-4.67	6.79
sulfurdioxide slant column density window2 precision [DU]	8.08 ± 2.10	12741327	2.44	7.78	2.21	570	6.70	9.14
sulfurdioxide slant column density corrected win2 [DU]	$(-8.797 \pm 867.322) \times 10^{-2}$	12741327	11.1	-8.030×10^{-2}	-1.016×10^{3}	826	-5.61	5.45
background so2 slant column offset window2 [DU]	-1.26 ± 2.86	12741327	2.98	-0.377	-19.1	11.7	-2.38	0.605
sulfurdioxide slant column density window3 [DU]	-2.24 ± 24.20	12741327	31.0	-2.52	-270	270	-17.8	13.3
sulfurdioxide slant column density window3 precision [DU]	27.8 ± 12.3	12741327	8.99	24.5	9.52	233	21.2	30.2
sulfurdioxide slant column density corrected win3 [DU]	5.33 ± 23.09	12741327	29.4	5.21	-267	271	-9.34	20.1
background so2 slant column offset window3 [DU]	7.57 ± 6.46	12741327	10.5	6.63	-24.4	31.0	2.23	12.7
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.23	12741327	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.151 \pm 5.124) \times 10^{-2}$	12741327	1.322×10^{-2}	1.361×10^{-2}	2.410×10^{-4}	2.26	8.475×10^{-3}	2.170×10^{-2}
fitted radiance shift [nm]	$(-3.516 \pm 24.277) \times 10^{-4}$	12741327	1.728×10^{-3}	-3.218×10^{-4}	-5.144×10^{-2}	5.635×10^{-2}	-1.243×10^{-3}	4.848×10^{-4}
fitted radiance squeeze [1]	$(-1.328 \pm 17.713) \times 10^{-5}$	12741327	1.981×10^{-4}	-6.516×10^{-6}	-1.574×10^{-2}	2.896×10^{-2}	-1.072×10^{-4}	9.087×10^{-5}
fitted root mean square [1]	$(1.272 \pm 0.543) \times 10^{-3}$	12741327	5.287×10^{-4}	1.107×10^{-3}	3.214×10^{-4}	6.461×10^{-2}	9.274×10^{-4}	1.456×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.882 ± 0.382	12741327	0.484	0.858	5.000×10^{-2}	2.58	0.620	1.10
sulfurdioxide total air mass factor polluted precision [1]	0.102 ± 0.094	12741327	9.451×10^{-2}	6.616×10^{-2}	2.500×10^{-3}	1.74	4.161×10^{-2}	0.136
sulfurdioxide clear air mass factor polluted [1]	0.749 ± 0.250	12741327	0.343	0.743	4.588×10^{-2}	2.54	0.574	0.916
number of spectral points in retrieval [1]	73.4 ± 0.5	12741327	1.000	73.0	53.0	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]	0.620 ± 0.401	4069720	0.790	0.490	0.0	1.000	0.210	1.000
sulfurdioxide total vertical column [DU]	$(4.487 \pm 124.940) \times 10^{-2}$	4069720	0.538	1.320×10^{-2}	-96.4	171	-0.250	0.288
sulfurdioxide total vertical column precision [DU]	0.647 ± 0.888	4069720	0.463	0.407	4.373×10^{-2}	57.2	0.249	0.712
sulfurdioxide slant column density corrected [DU]	$(2.548 \pm 45.322) \times 10^{-2}$	4069720	0.385	1.075×10^{-2}	-9.39	141	-0.180	0.206
sulfurdioxide slant column density cobra [DU]	$(2.472 \pm 41.062) \times 10^{-2}$	4069720	0.385	1.075×10^{-2}	-9.39	37.8	-0.180	0.206
sulfurdioxide slant column density cobra precision [DU]	0.313 ± 0.151	4069720	0.156	0.269	8.450×10^{-2}	19.4	0.216	0.372
sulfurdioxide slant column density window1 [DU]	0.161 ± 0.748	4069720	0.763	0.174	-34.0	92.0	-0.213	0.551
sulfurdioxide slant column density window1 precision [DU]	0.313 ± 0.151	4069720	0.156	0.269	8.450×10^{-2}	19.4	0.216	0.372
sulfurdioxide slant column density corrected win1 [DU]	$(3.678 \pm 74.215) \times 10^{-2}$	4069720	0.751	7.431×10^{-3}	-34.0	92.5	-0.360	0.391
background so2 slant column offset window1 [DU]	-0.124 ± 0.207	4069720	0.185	-0.175	-1.23	3.11	-0.248	-6.318×10^{-2}
sulfurdioxide slant column density window2 [DU]	2.04 ± 9.38	4069720	12.0	1.89	-911	873	-4.02	7.96
sulfurdioxide slant column density window2 precision [DU]	8.28 ± 2.36	4069720	2.48	7.97	2.37	456	6.83	9.32
sulfurdioxide slant column density corrected win2 [DU]	$(7.527 \pm 880.593) \times 10^{-2}$	4069720	11.1	8.927×10^{-2}	-911	873	-5.48	5.64
background so2 slant column offset window2 [DU]	-1.96 ± 3.31	4069720	4.50	-0.728	-19.0	9.17	-4.01	0.497
sulfurdioxide slant column density window3 [DU]	-11.6 ± 22.9	4069720	28.6	-11.3	-273	1.003×10^{3}	-25.8	2.85
sulfurdioxide slant column density window3 precision [DU]	30.2 ± 15.6	4069720	10.9	25.8	8.93	306	21.6	32.4
sulfurdioxide slant column density corrected win3 [DU]	-2.39 ± 23.08	4069720	28.8	-1.66	-265	1.004×10^{3}	-16.4	12.4
background so2 slant column offset window3 [DU]	9.23 ± 6.93	4069720	12.2	9.09	-24.4	31.0	2.98	15.2
sulfurdioxide slant column cobra flag [1]	1.99 ± 0.14	4069720	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(5.758 \pm 14.055) \times 10^{-2}$	4069720	4.074×10^{-2}	1.766×10^{-2}	1.664×10^{-4}	2.78	6.342×10^{-3}	4.708×10^{-2}
fitted radiance shift [nm]	$(-2.961 \pm 31.284) \times 10^{-4}$	4069720	1.912×10^{-3}	-3.217×10^{-4}	-4.390×10^{-2}	0.110	-1.286×10^{-3}	6.264×10^{-4}
fitted radiance squeeze [1]	$(-4.404 \pm 19.817) \times 10^{-5}$	4069720	2.146×10^{-4}	-3.084×10^{-5}	-1.422×10^{-2}	7.757×10^{-2}	-1.422×10^{-4}	7.244×10^{-5}
fitted root mean square [1]	$(1.347 \pm 0.621) \times 10^{-3}$	4069720	5.625×10^{-4}	1.181×10^{-3}	2.914×10^{-4}	6.577×10^{-2}	9.705×10^{-4}	1.533×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.798 ± 0.473	4069720	0.609	0.681	5.000×10^{-2}	2.82	0.451	1.06
sulfurdioxide total air mass factor polluted precision [1]	0.120 ± 0.143	4069720	0.131	6.321×10^{-2}	2.837×10^{-3}	1.79	2.996×10^{-2}	0.161
sulfurdioxide clear air mass factor polluted [1]	0.664 ± 0.320	4069720	0.414	0.607	4.884×10^{-2}	2.79	0.425	0.839
number of spectral points in retrieval [1]	73.4 ± 0.5	4069720	1.000	73.0	52.0	74.0	73.0	74.0

3 Granule outlines

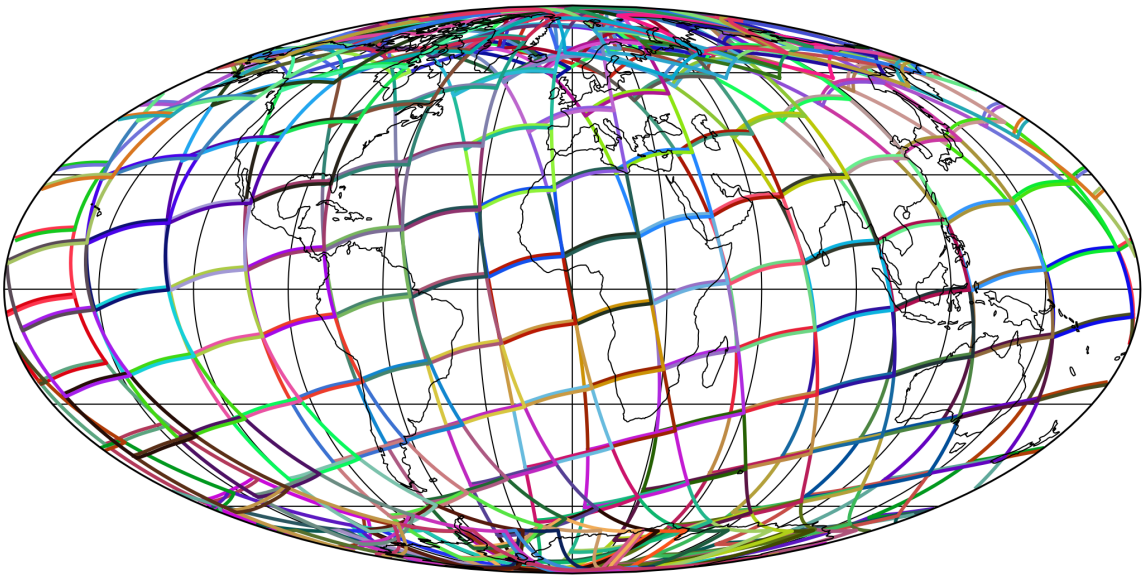

Figure 1: Outline of the granules.

4 Input data monitoring

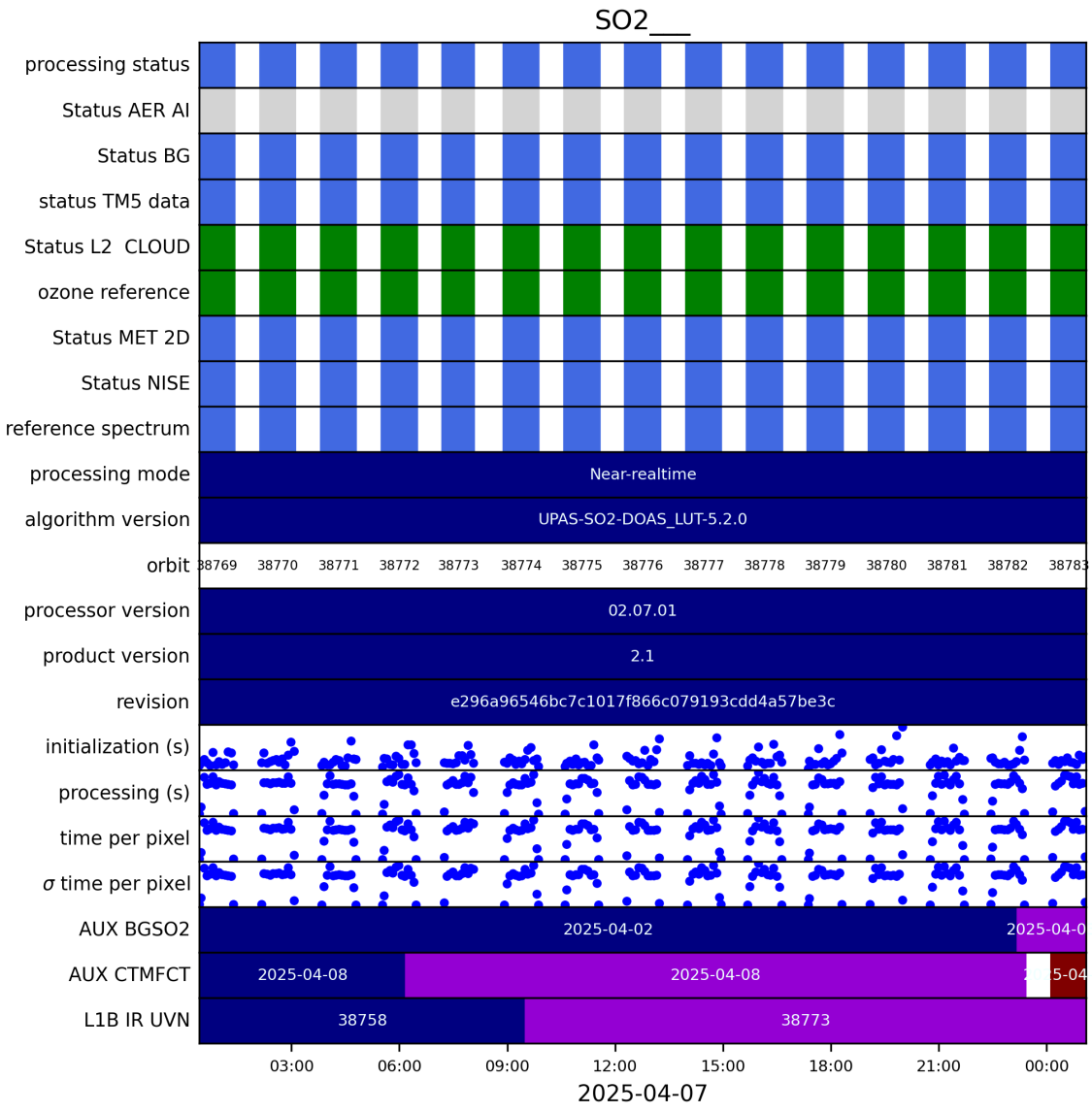

Figure 2: Input data per granule

5 Warnings and errors

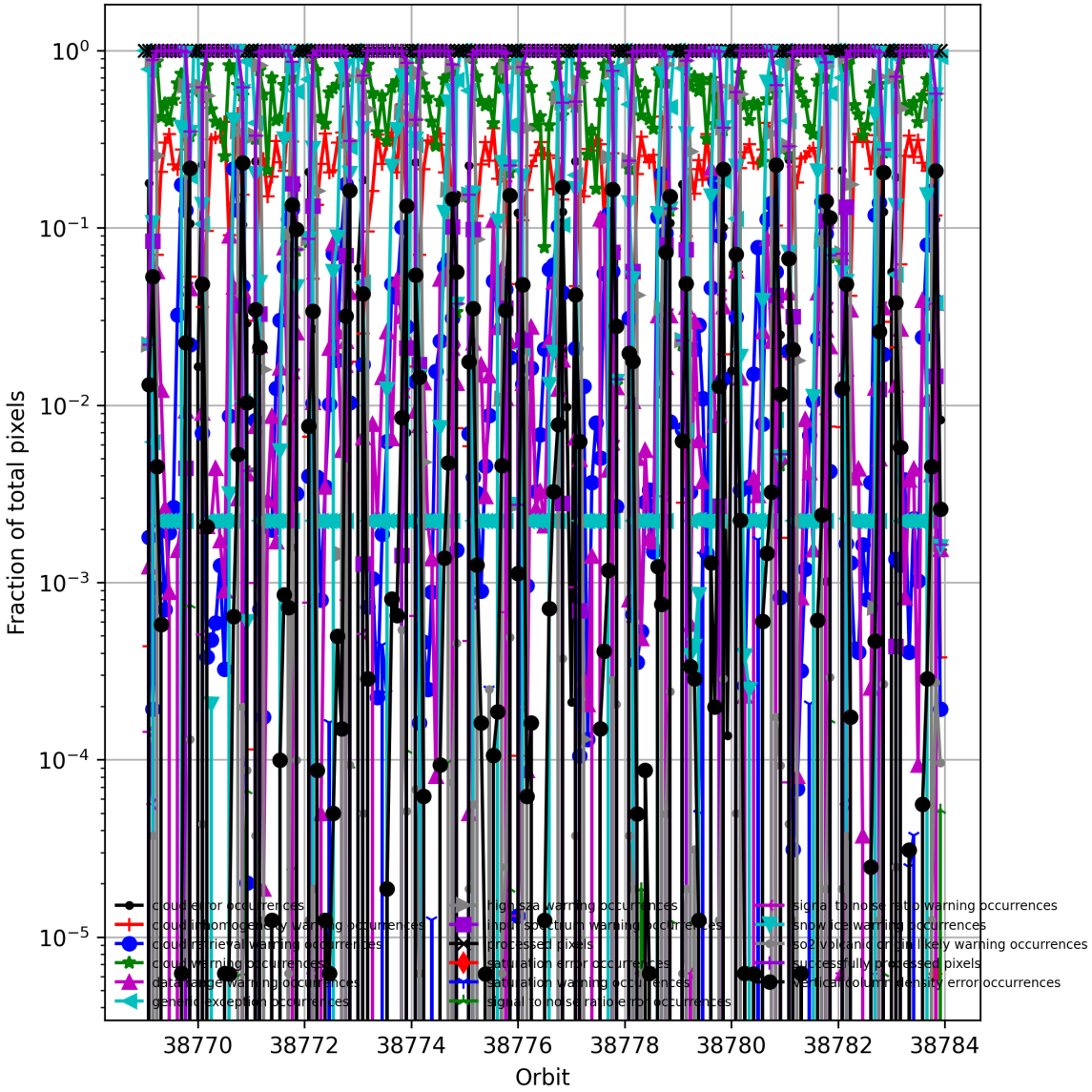

Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

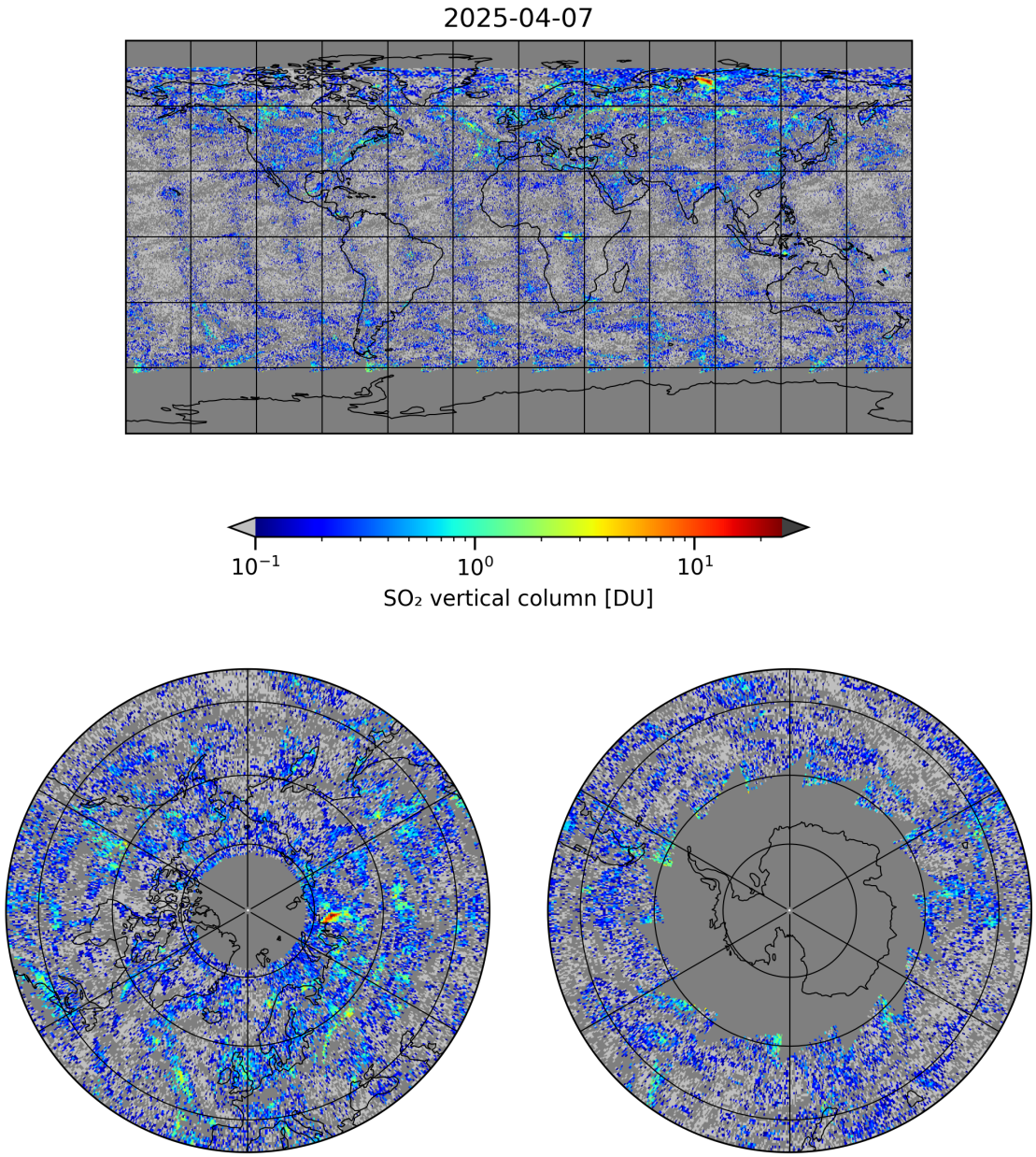

Figure 4: Map of "SO_2 vertical column" for 2025-04-07 to 2025-04-08

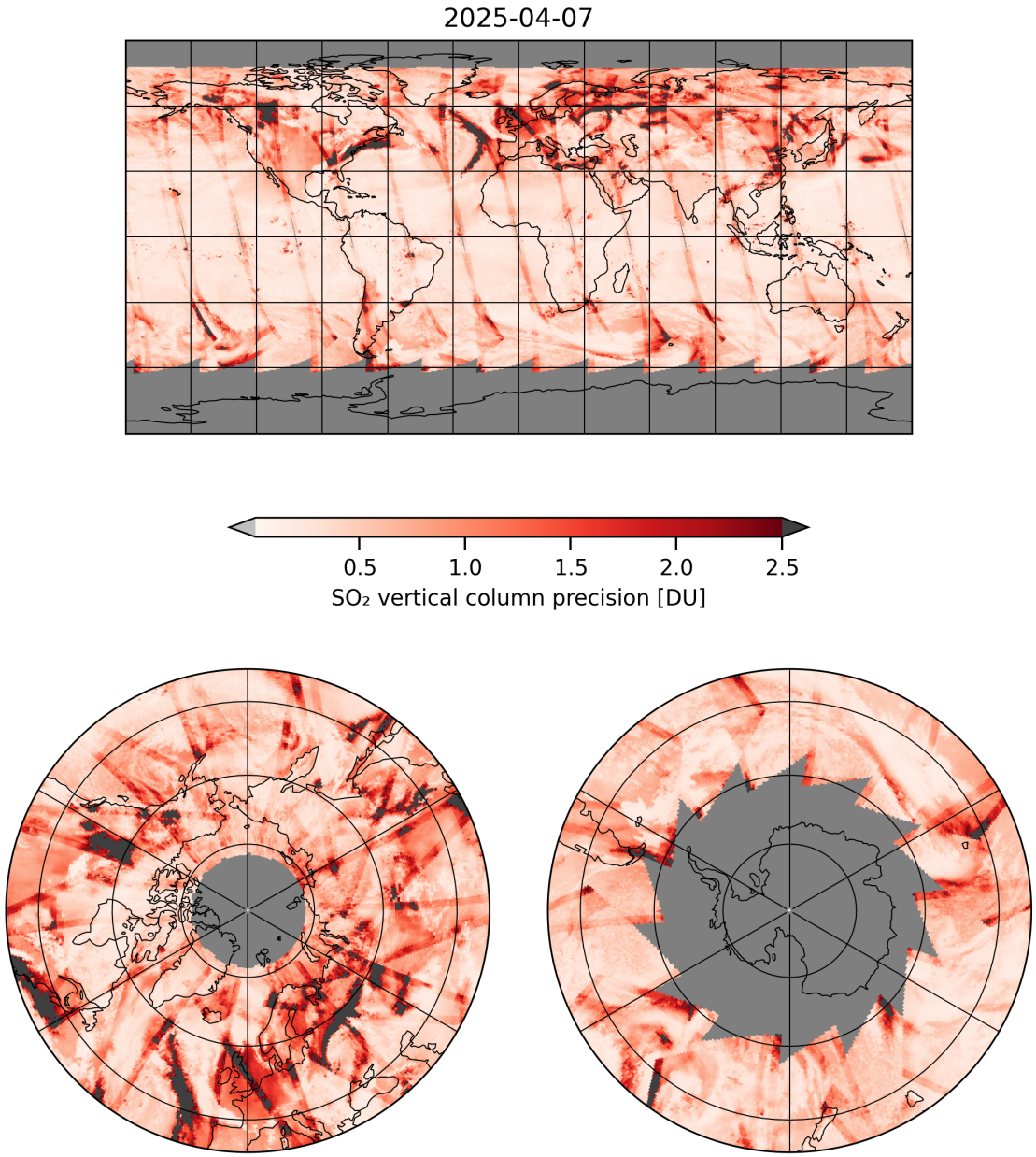

Figure 5: Map of "SO_2 vertical column precision" for 2025-04-07 to 2025-04-08

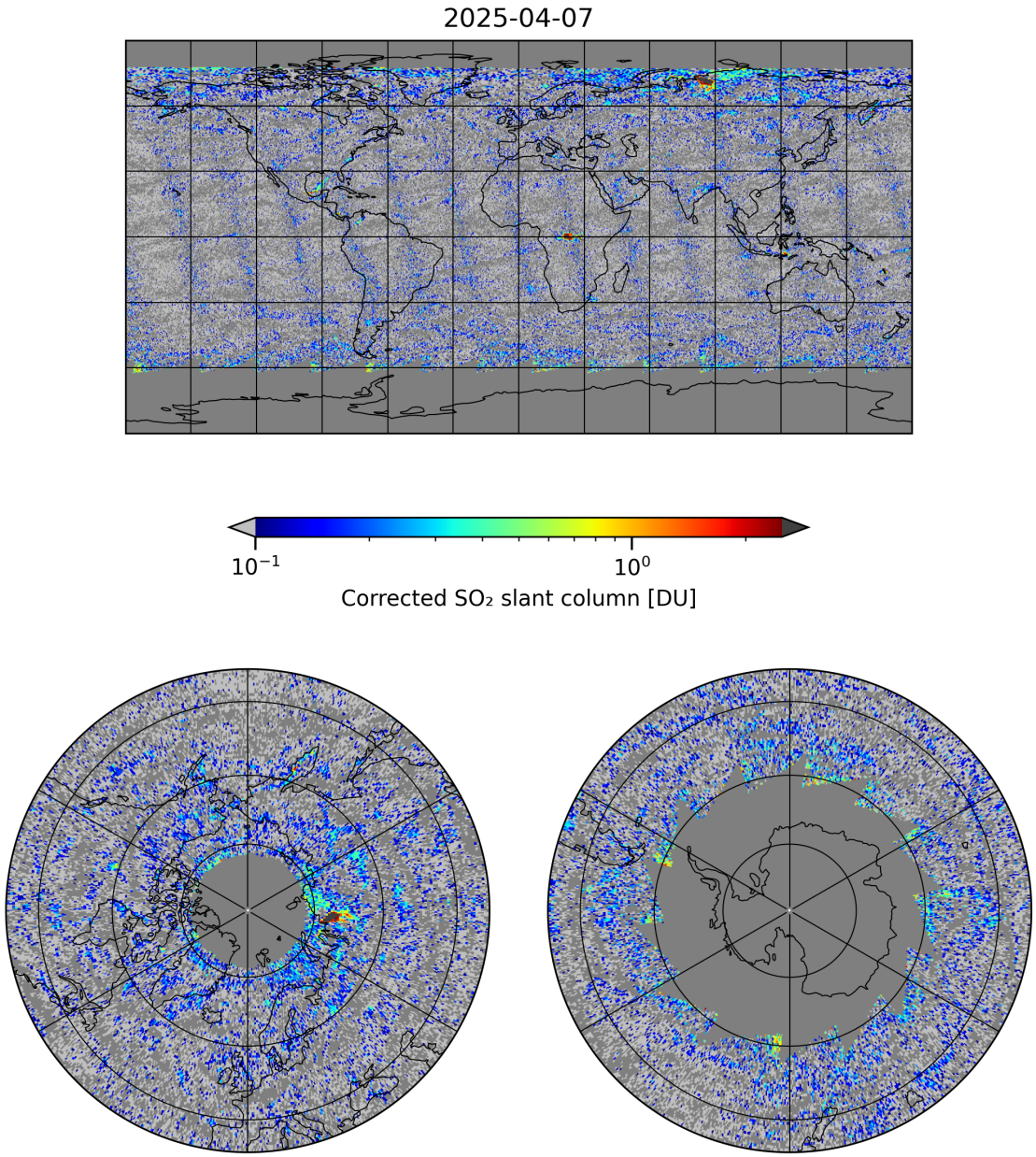

Figure 6: Map of "Corrected SO_2 slant column" for 2025-04-07 to 2025-04-08

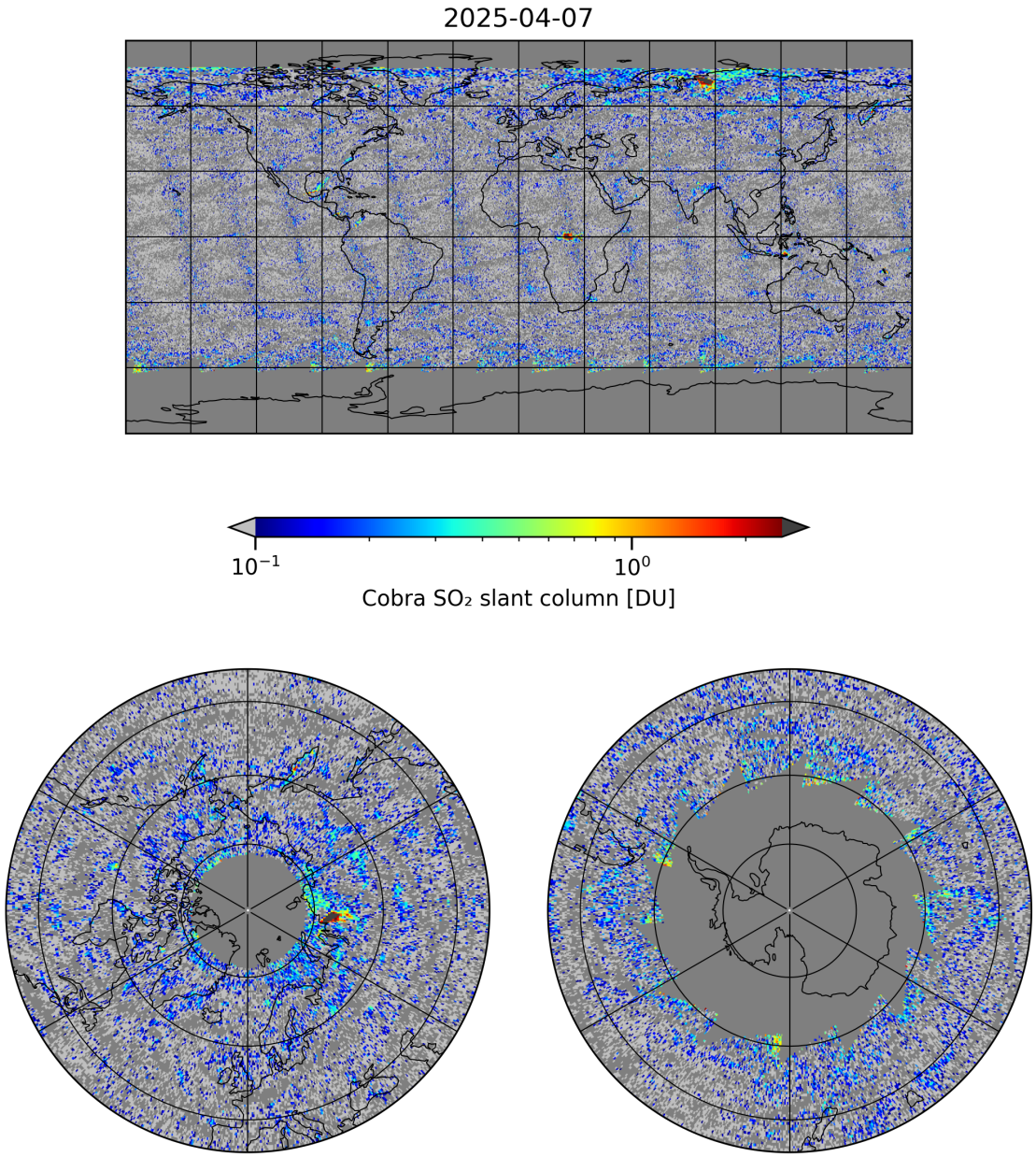

Figure 7: Map of "Cobra SO_2 slant column" for 2025-04-07 to 2025-04-08

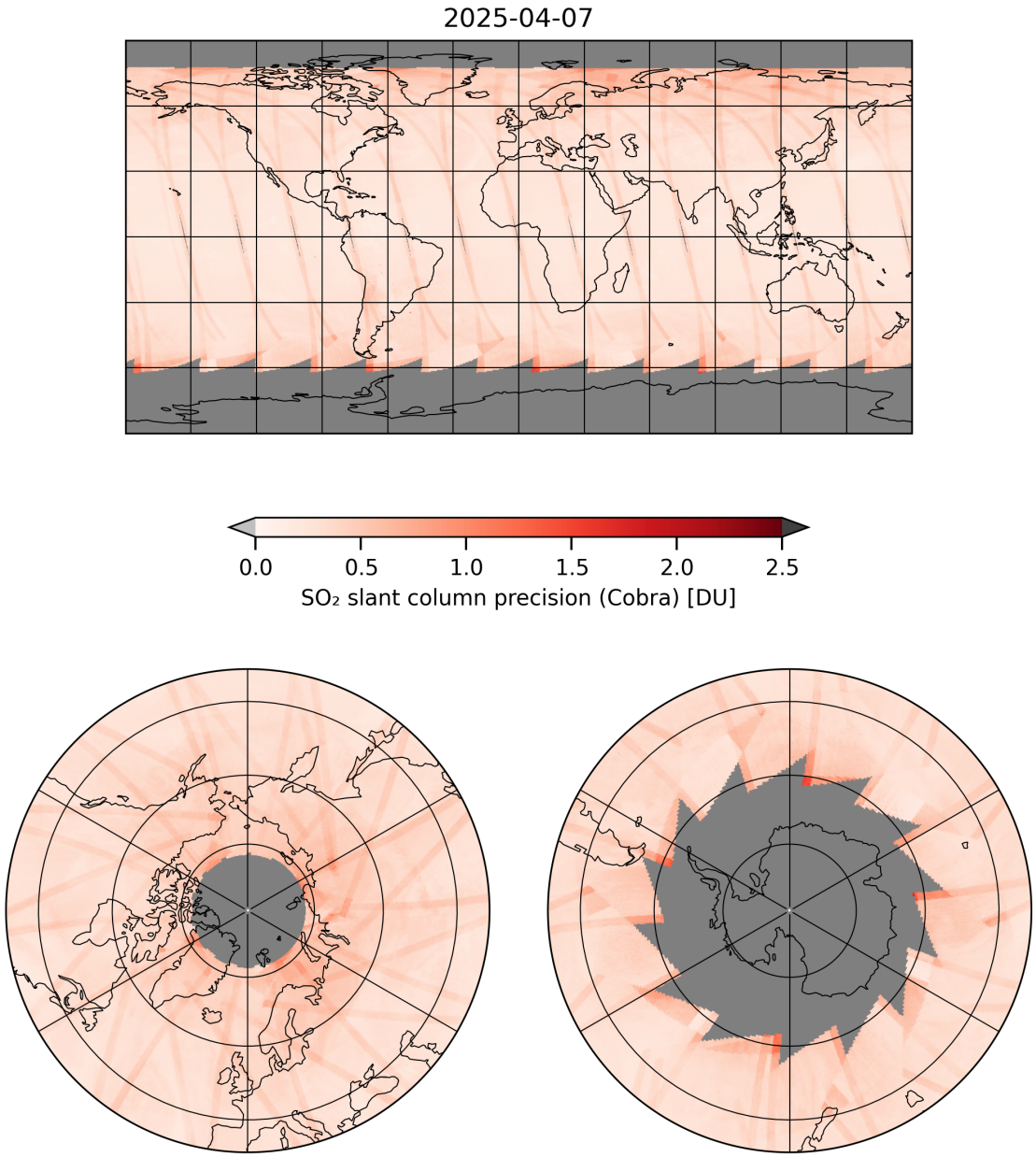

Figure 8: Map of "SO_2 slant column precision (Cobra)" for 2025-04-07 to 2025-04-08

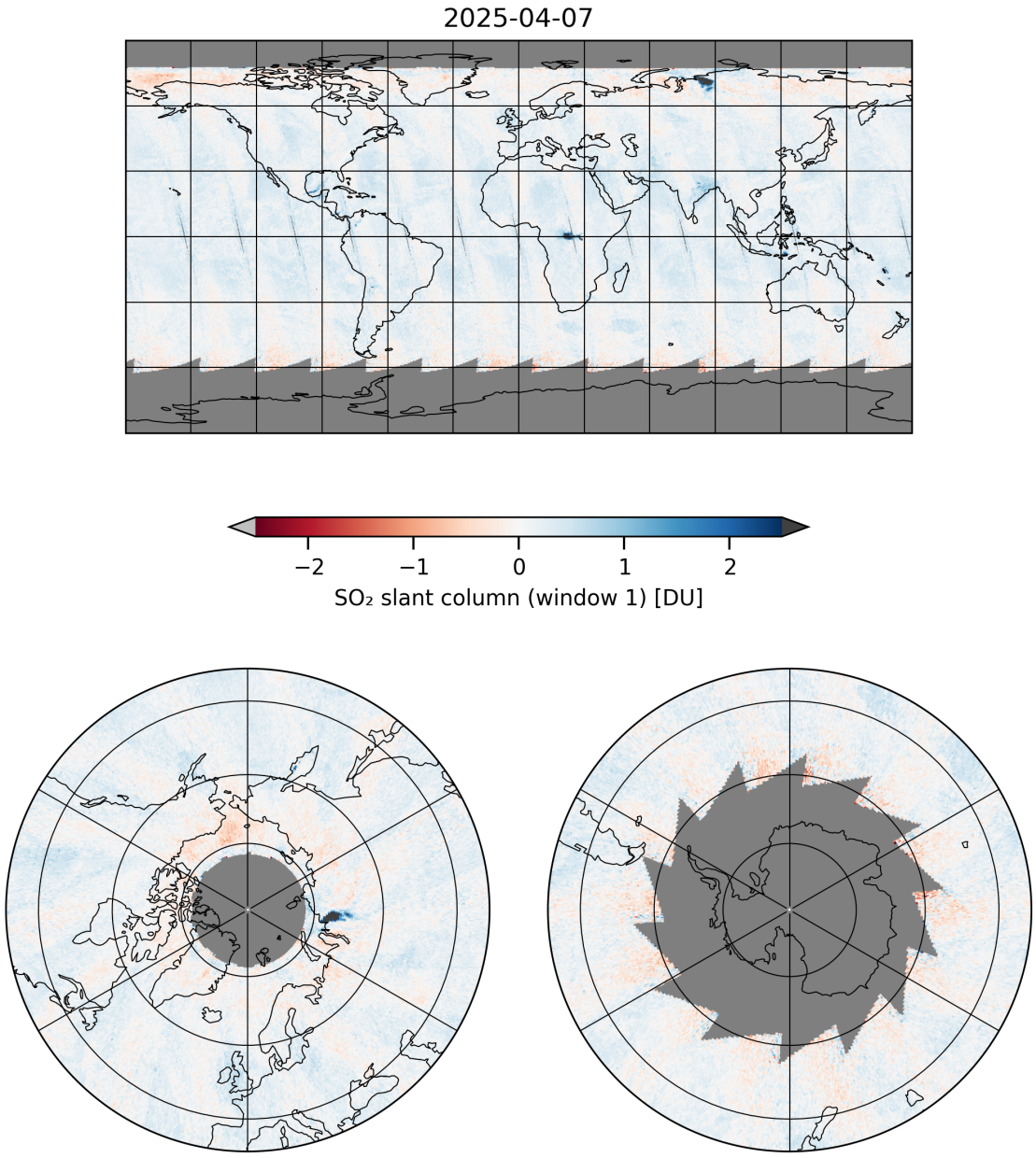

Figure 9: Map of "SO_2 slant column (window 1)" for 2025-04-07 to 2025-04-08

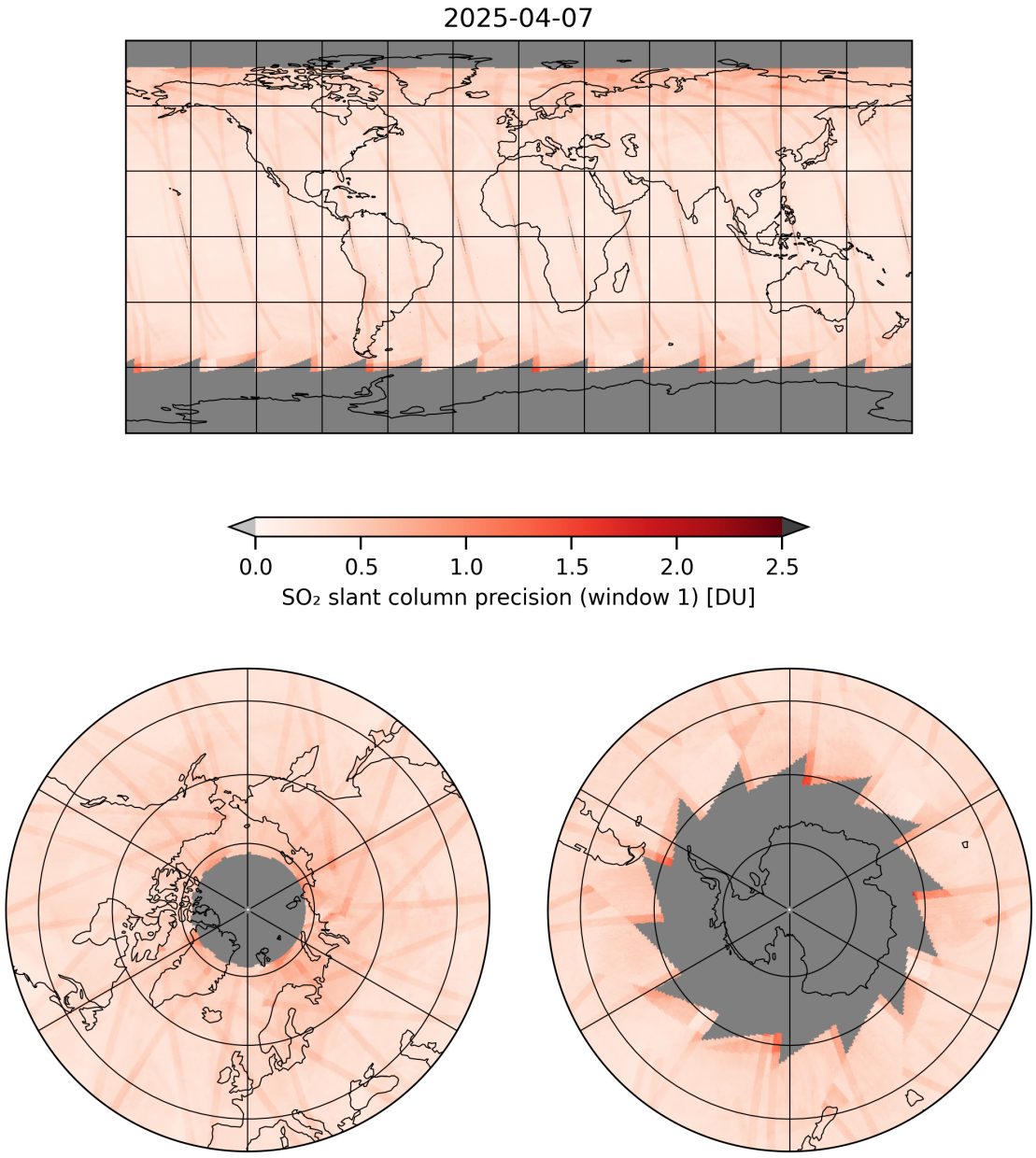

Figure 10: Map of "SO_2 slant column precision (window 1)" for 2025-04-07 to 2025-04-08

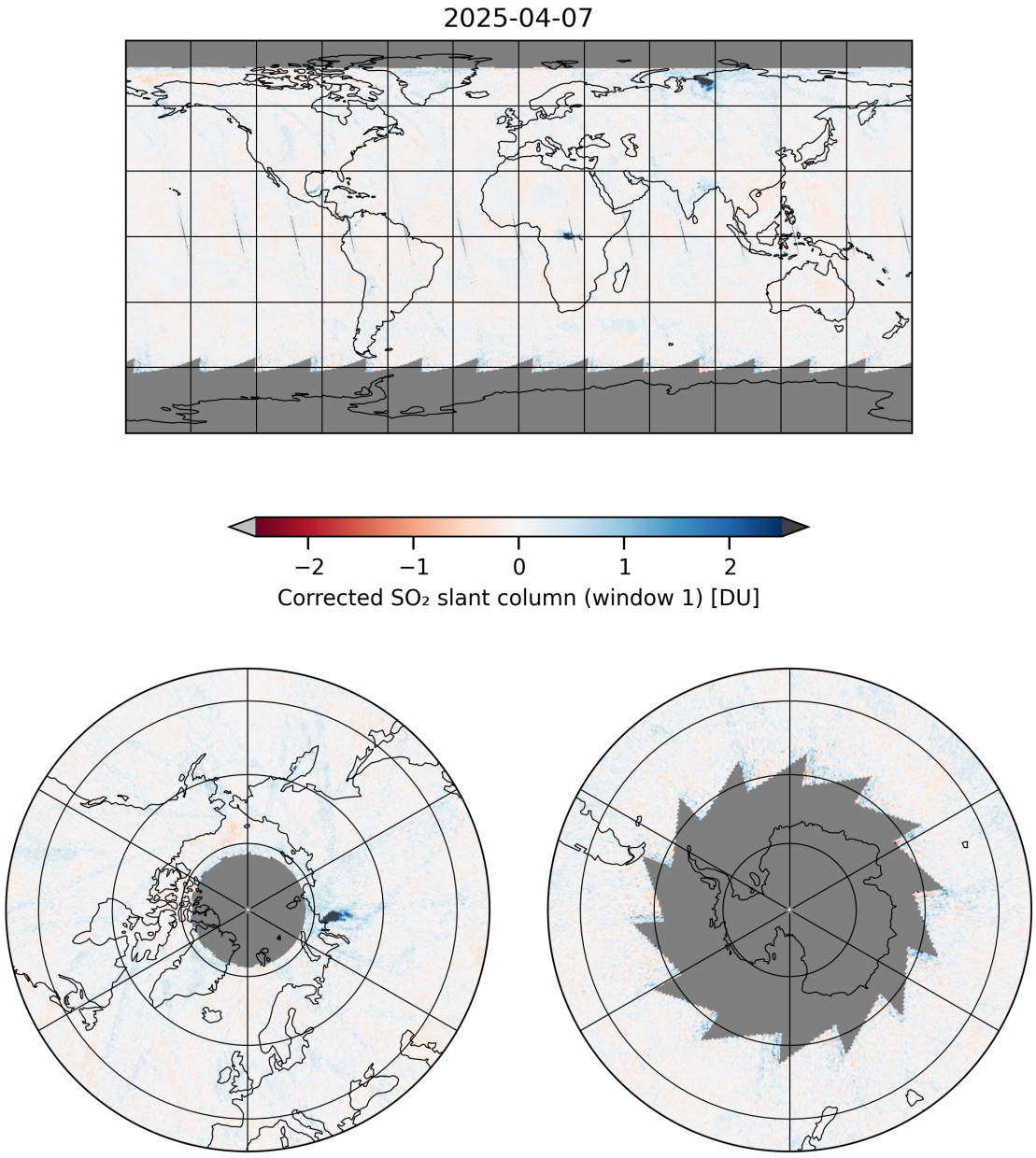

Figure 11: Map of “Corrected SO_2 slant column (window 1)” for 2025-04-07 to 2025-04-08

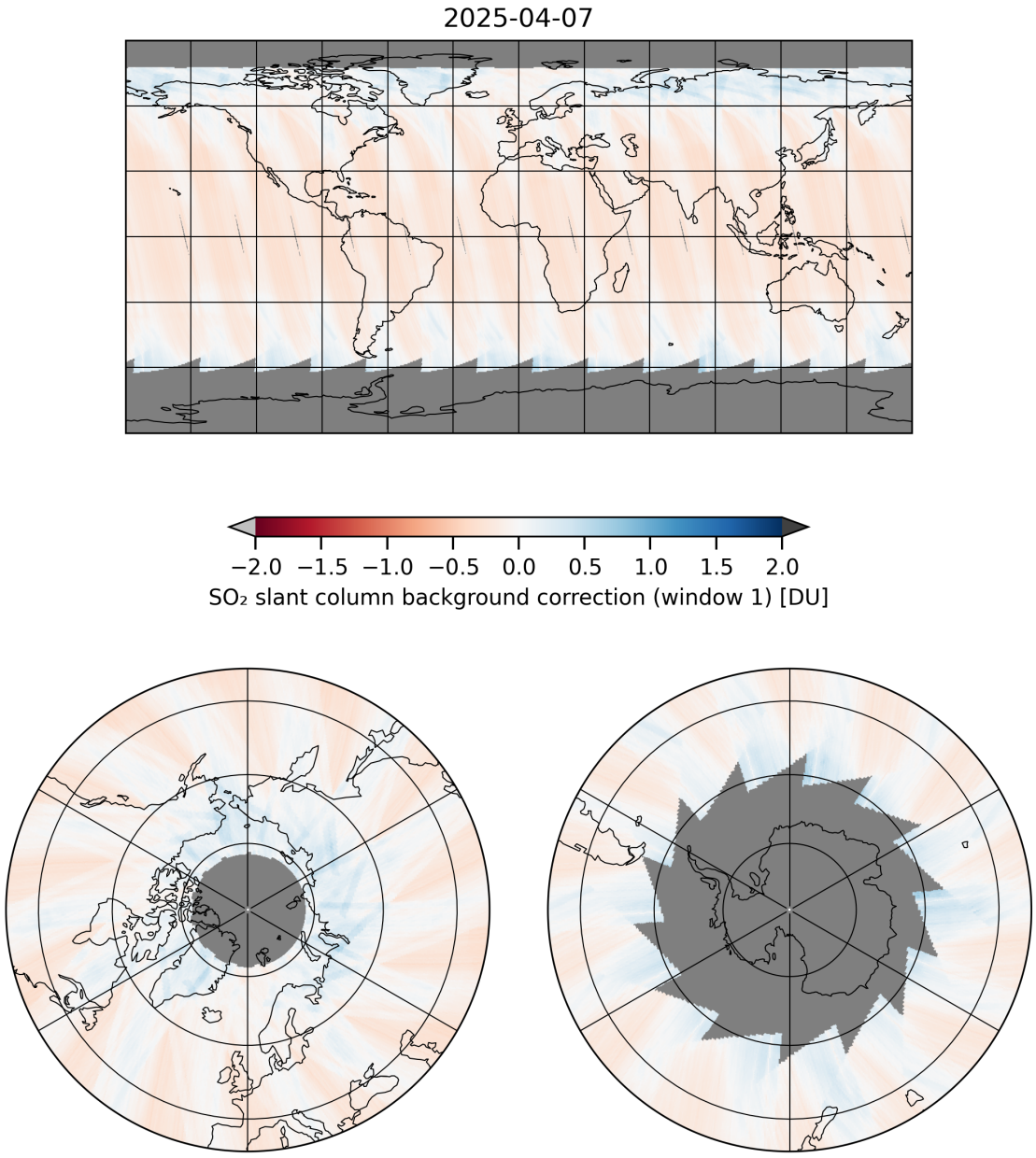

Figure 12: Map of "SO_2 slant column background correction (window 1)" for 2025-04-07 to 2025-04-08

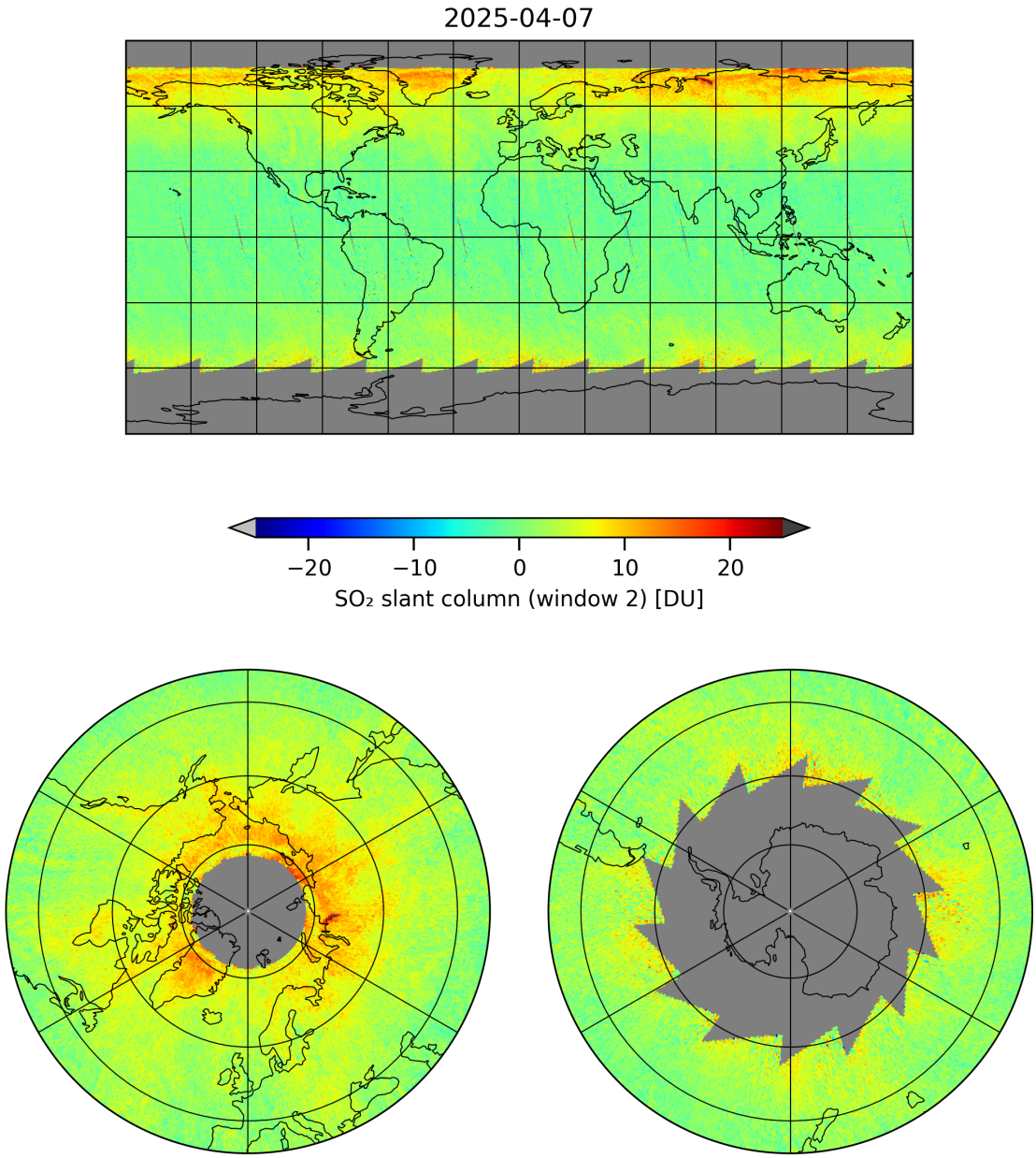

Figure 13: Map of "SO_2 slant column (window 2)" for 2025-04-07 to 2025-04-08

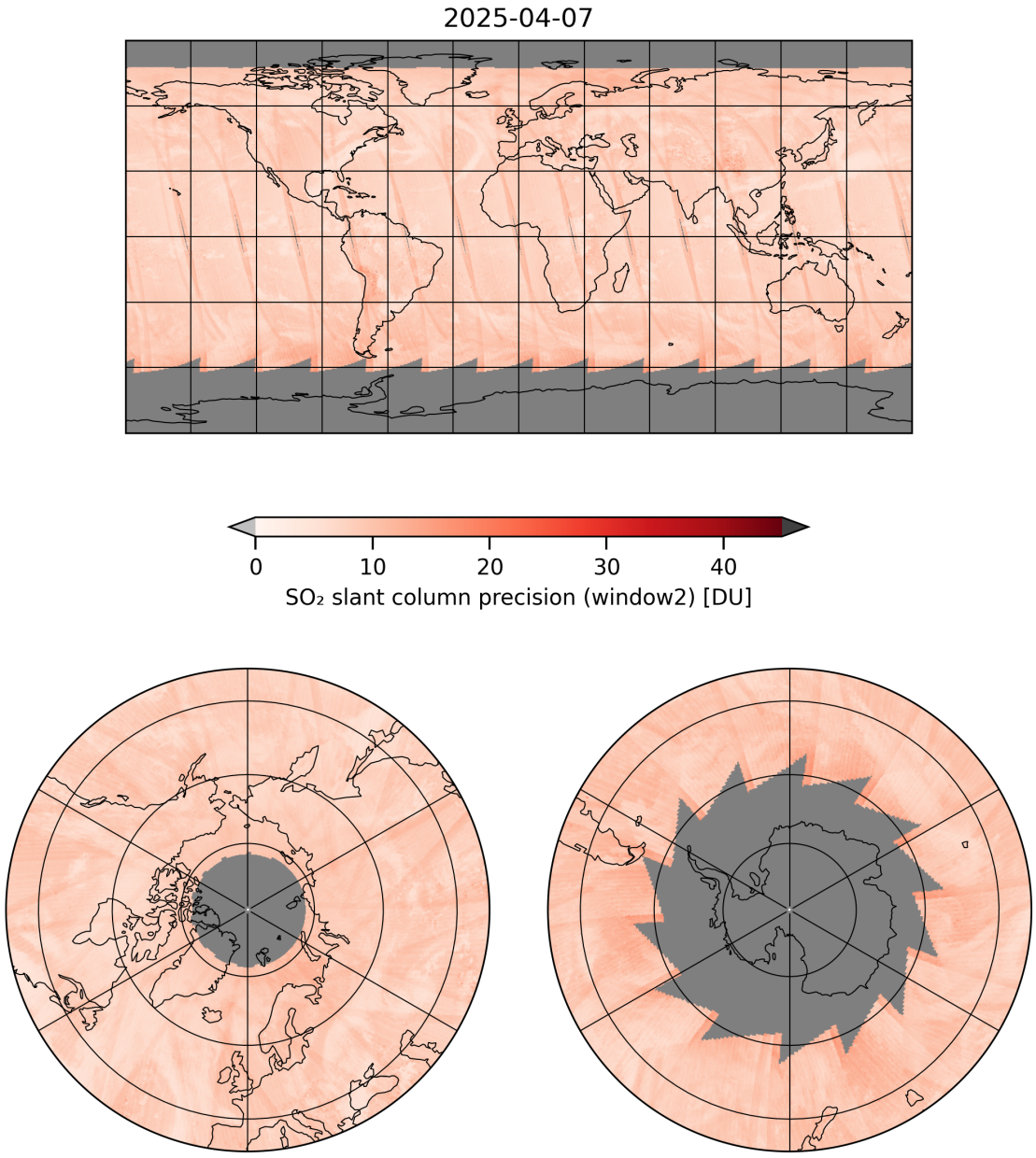

Figure 14: Map of "SO_2 slant column precision (window2)" for 2025-04-07 to 2025-04-08

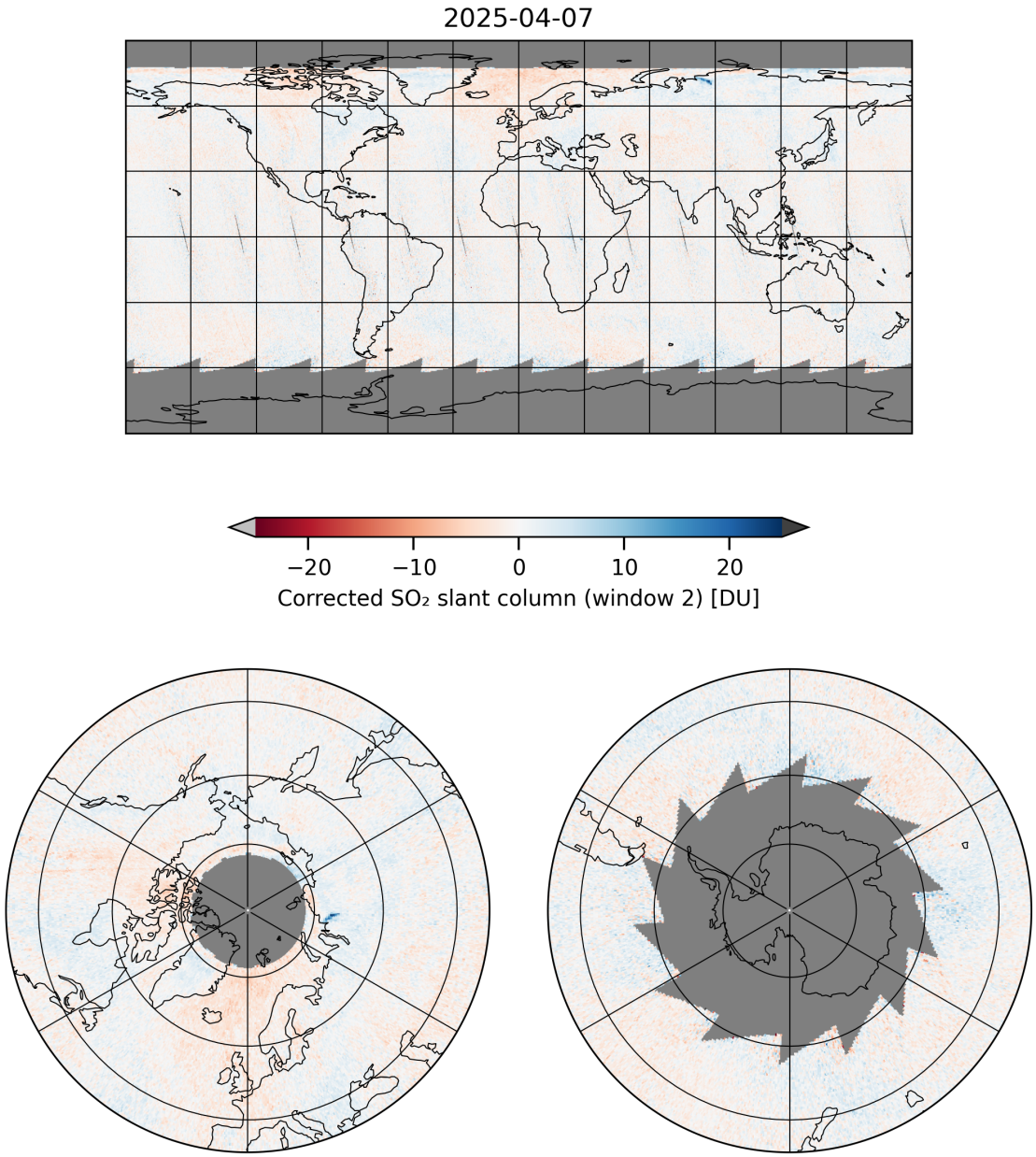

Figure 15: Map of "Corrected SO_2 slant column (window 2)" for 2025-04-07 to 2025-04-08

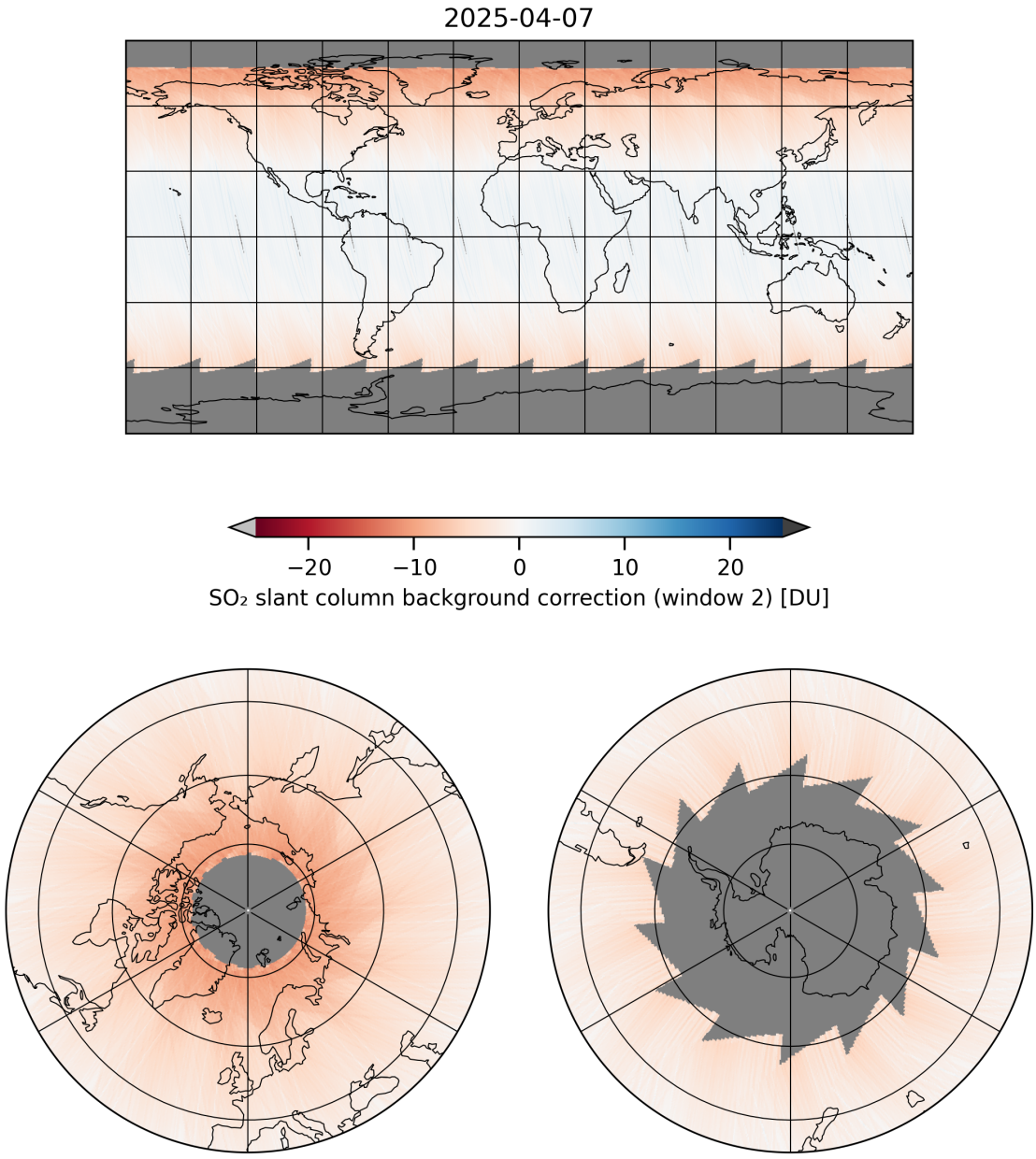

Figure 16: Map of "SO_2 slant column background correction (window 2)" for 2025-04-07 to 2025-04-08

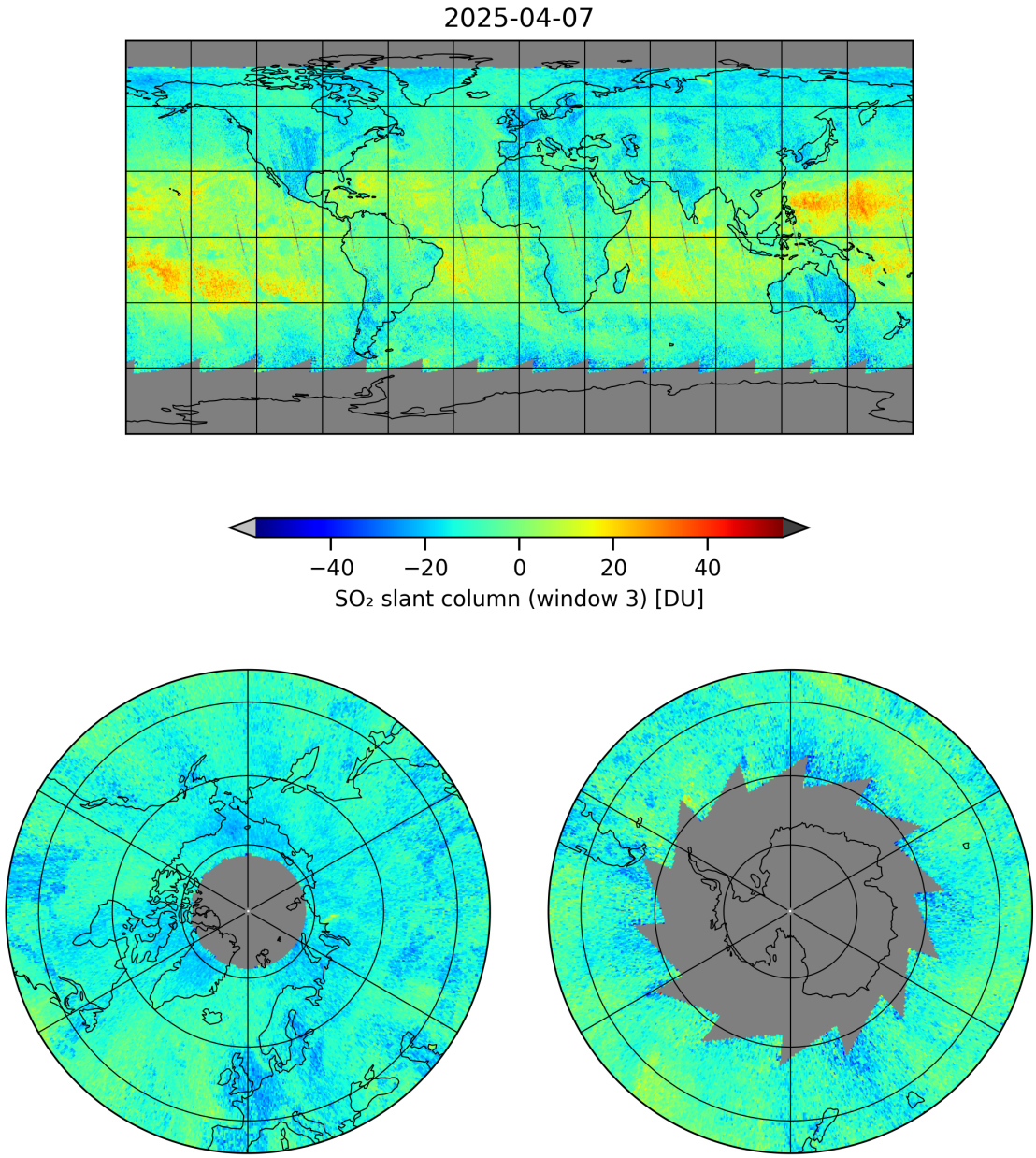

Figure 17: Map of "SO_2 slant column (window 3)" for 2025-04-07 to 2025-04-08

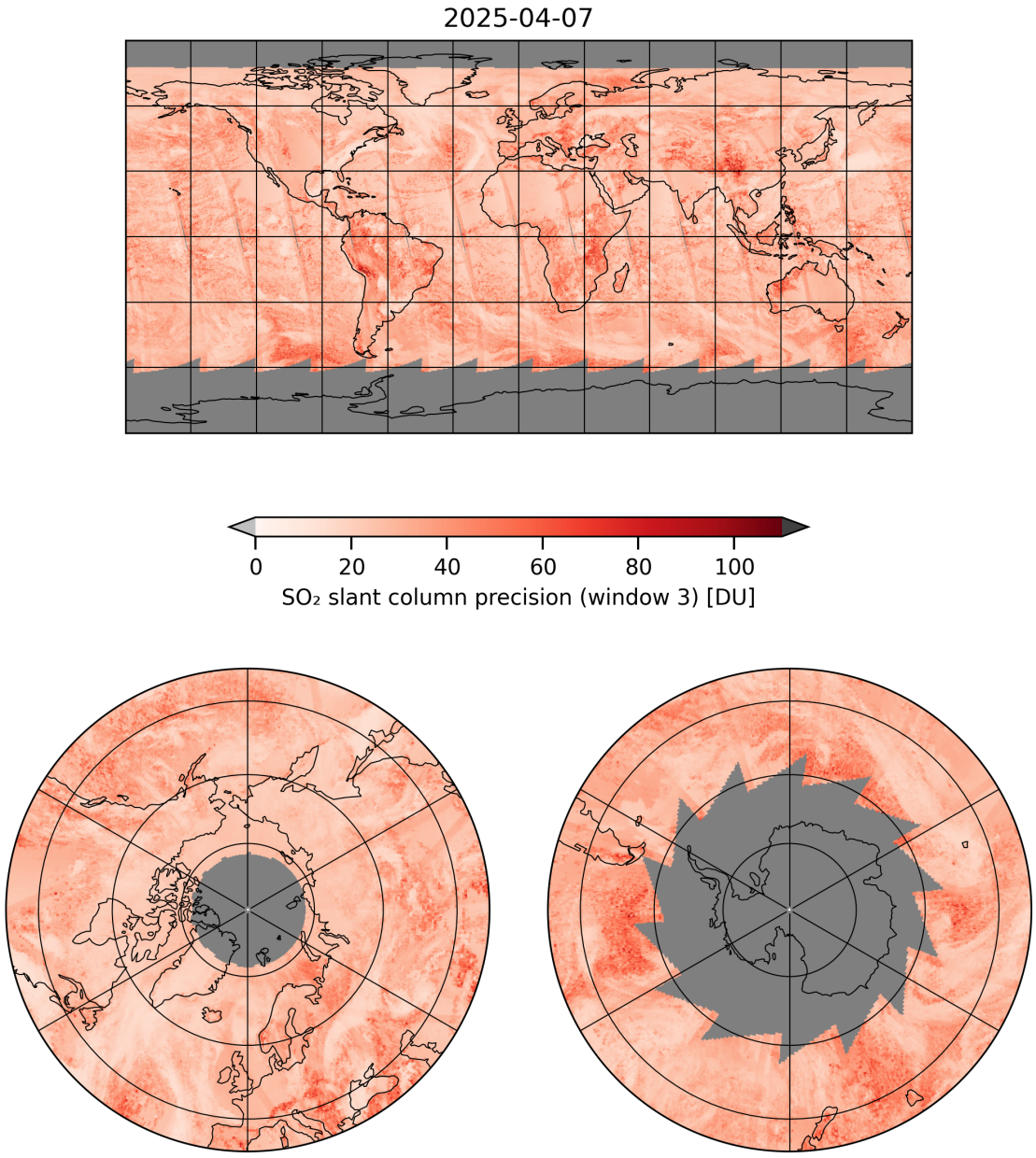

Figure 18: Map of "SO_2 slant column precision (window 3)" for 2025-04-07 to 2025-04-08

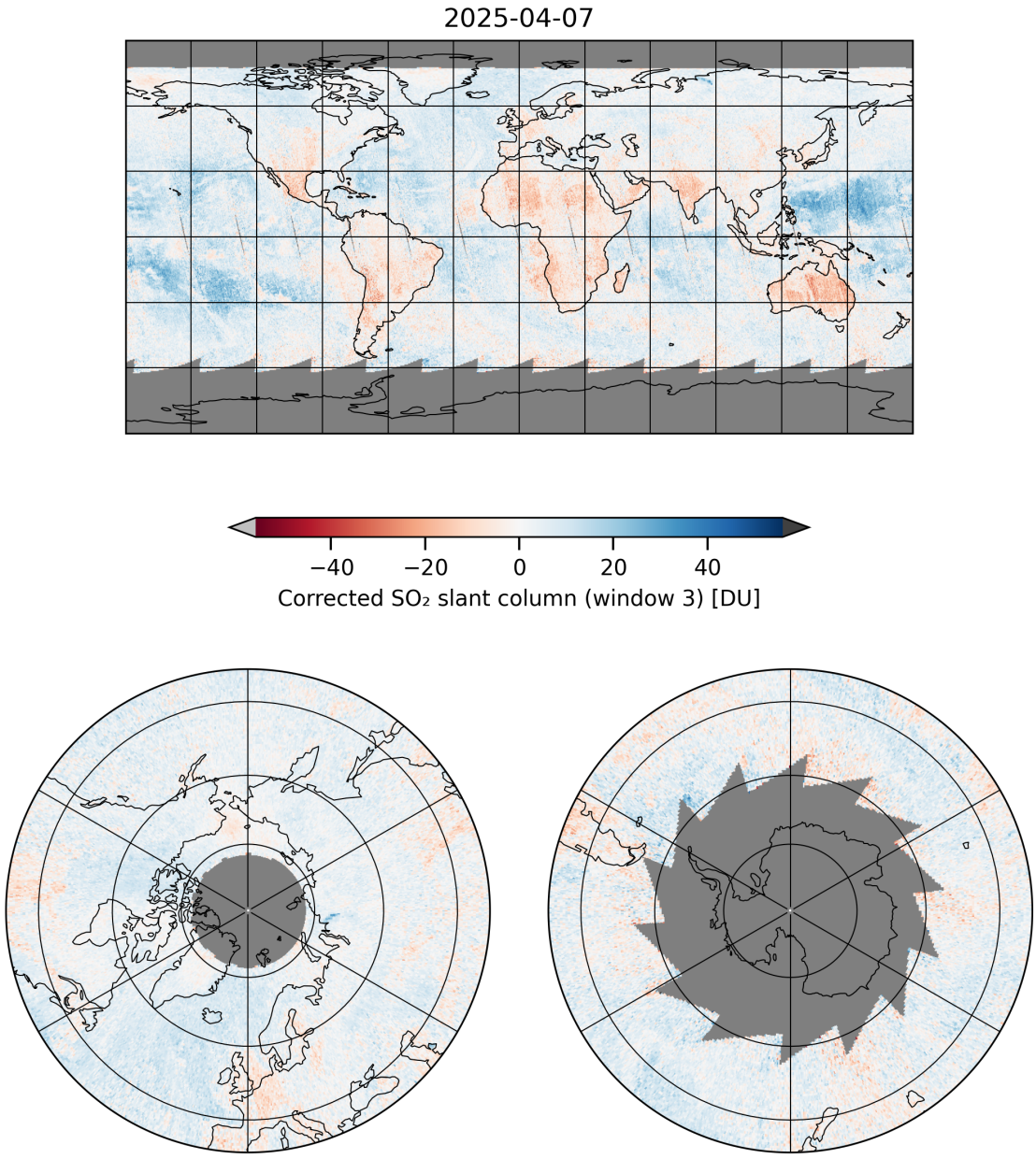

Figure 19: Map of "Corrected SO_2 slant column (window 3)" for 2025-04-07 to 2025-04-08

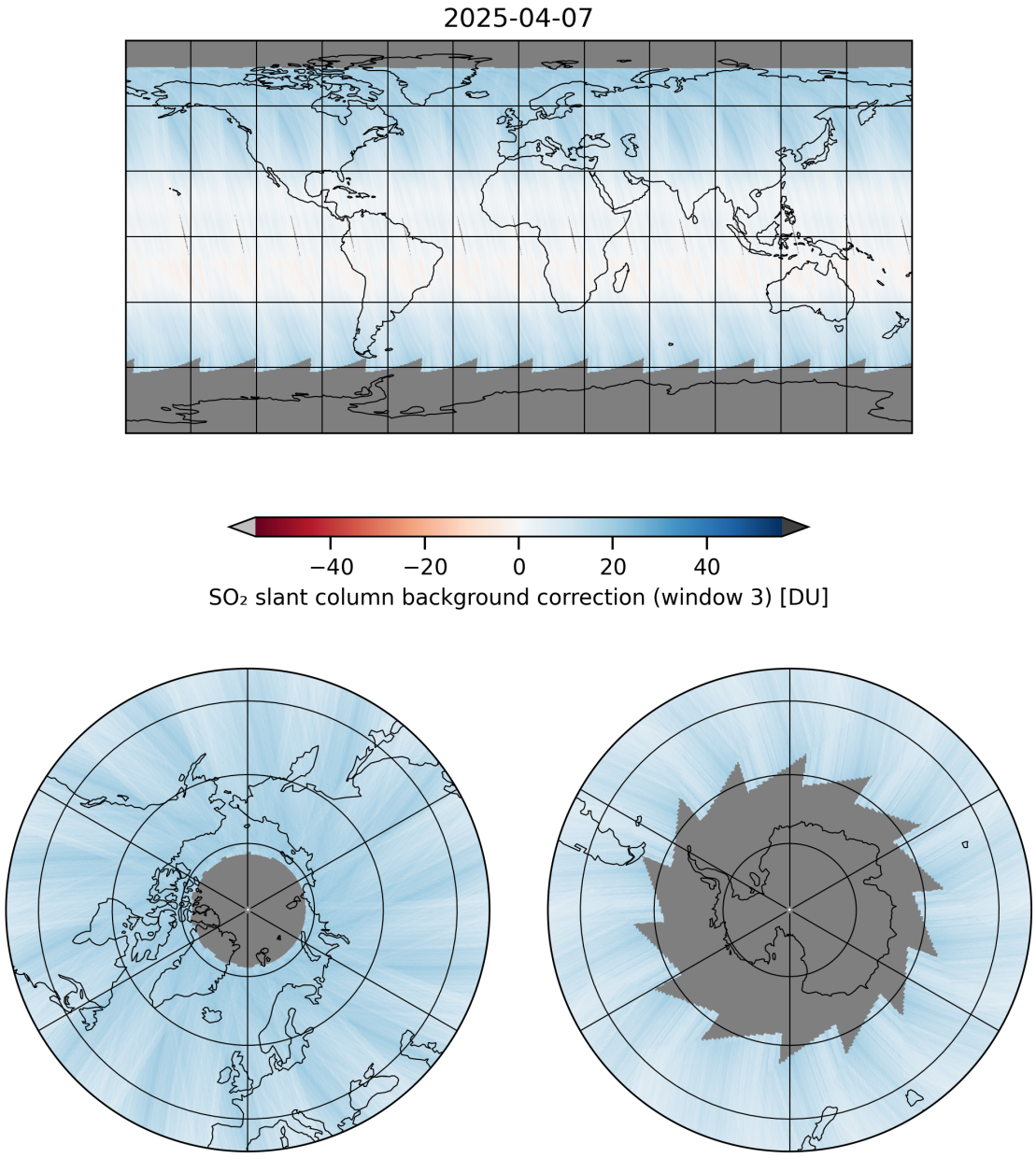

Figure 20: Map of "SO_2 slant column background correction (window 3)" for 2025-04-07 to 2025-04-08

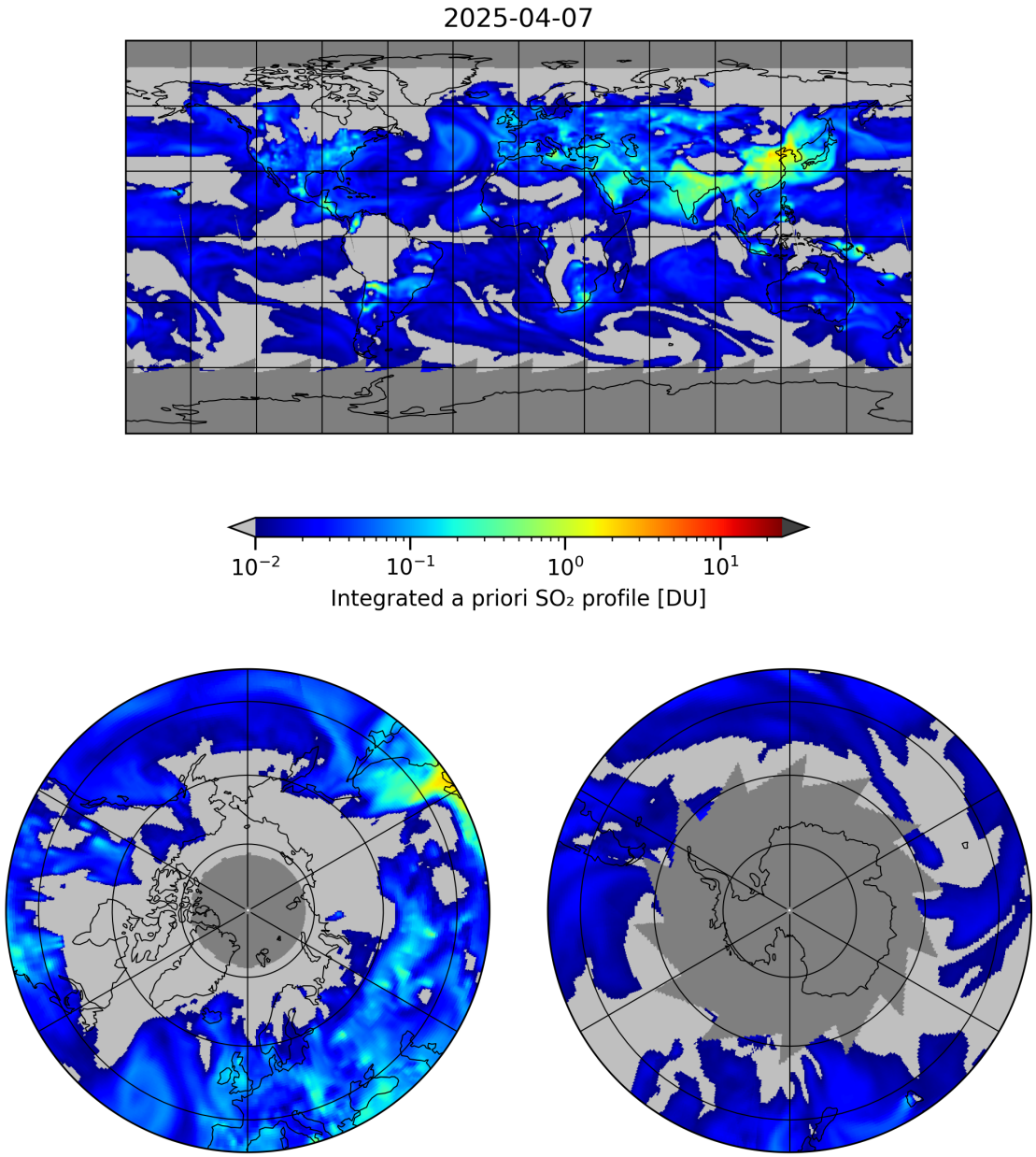

Figure 21: Map of “Integrated a priori SO_2 profile” for 2025-04-07 to 2025-04-08

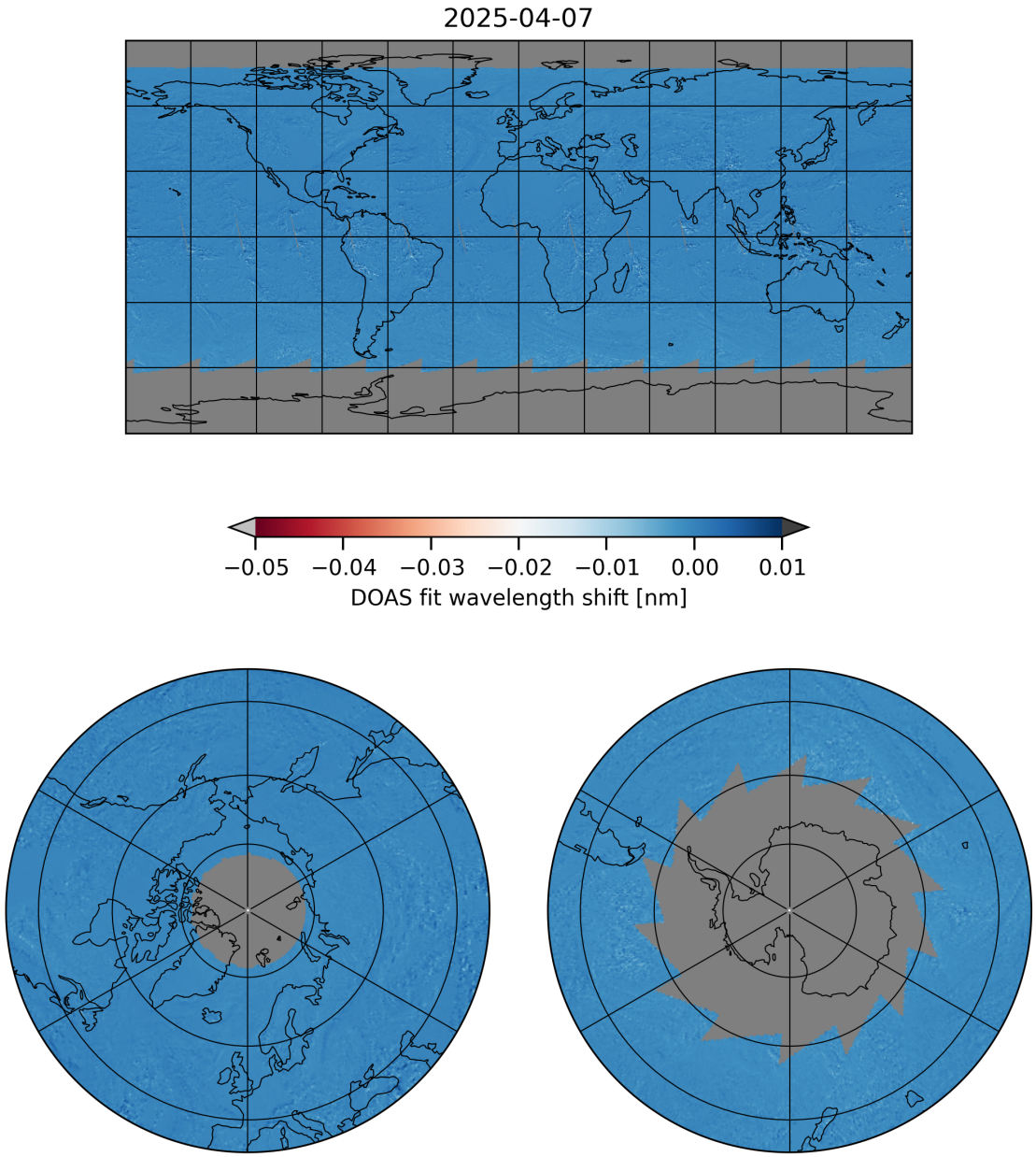

Figure 22: Map of “DOAS fit wavelength shift” for 2025-04-07 to 2025-04-08

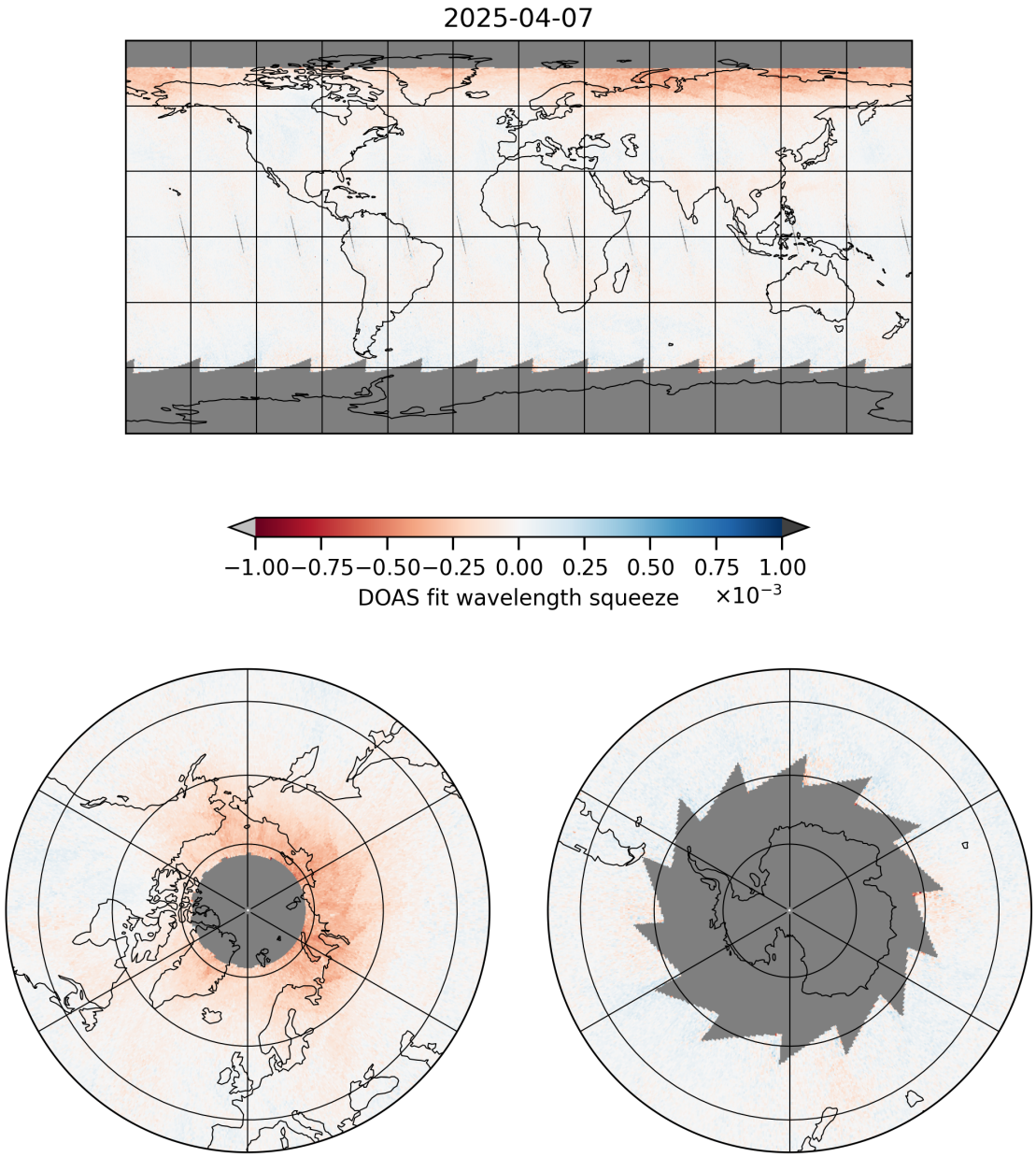

Figure 23: Map of “DOAS fit wavelength squeeze” for 2025-04-07 to 2025-04-08

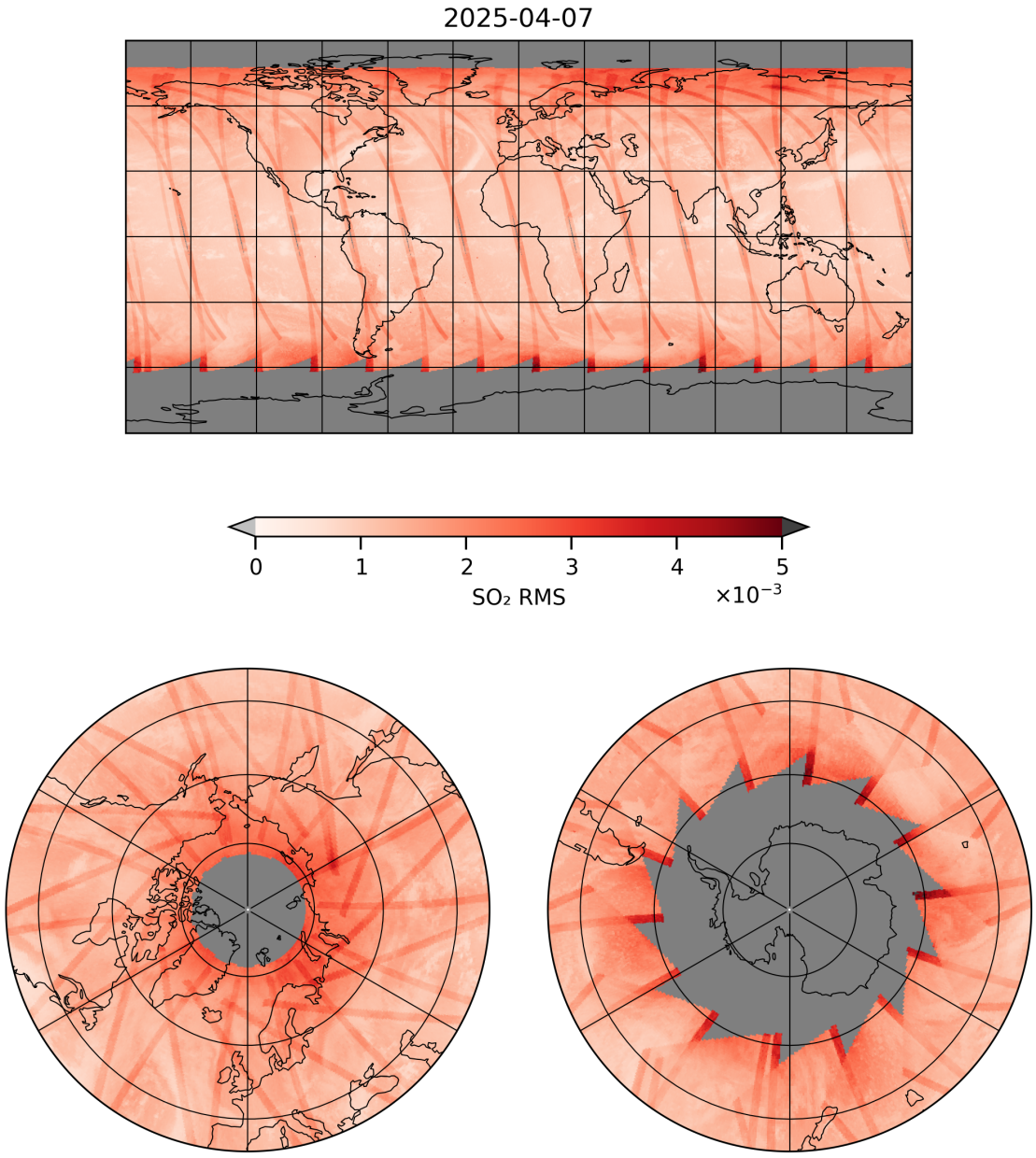

Figure 24: Map of "SO_2 RMS" for 2025-04-07 to 2025-04-08

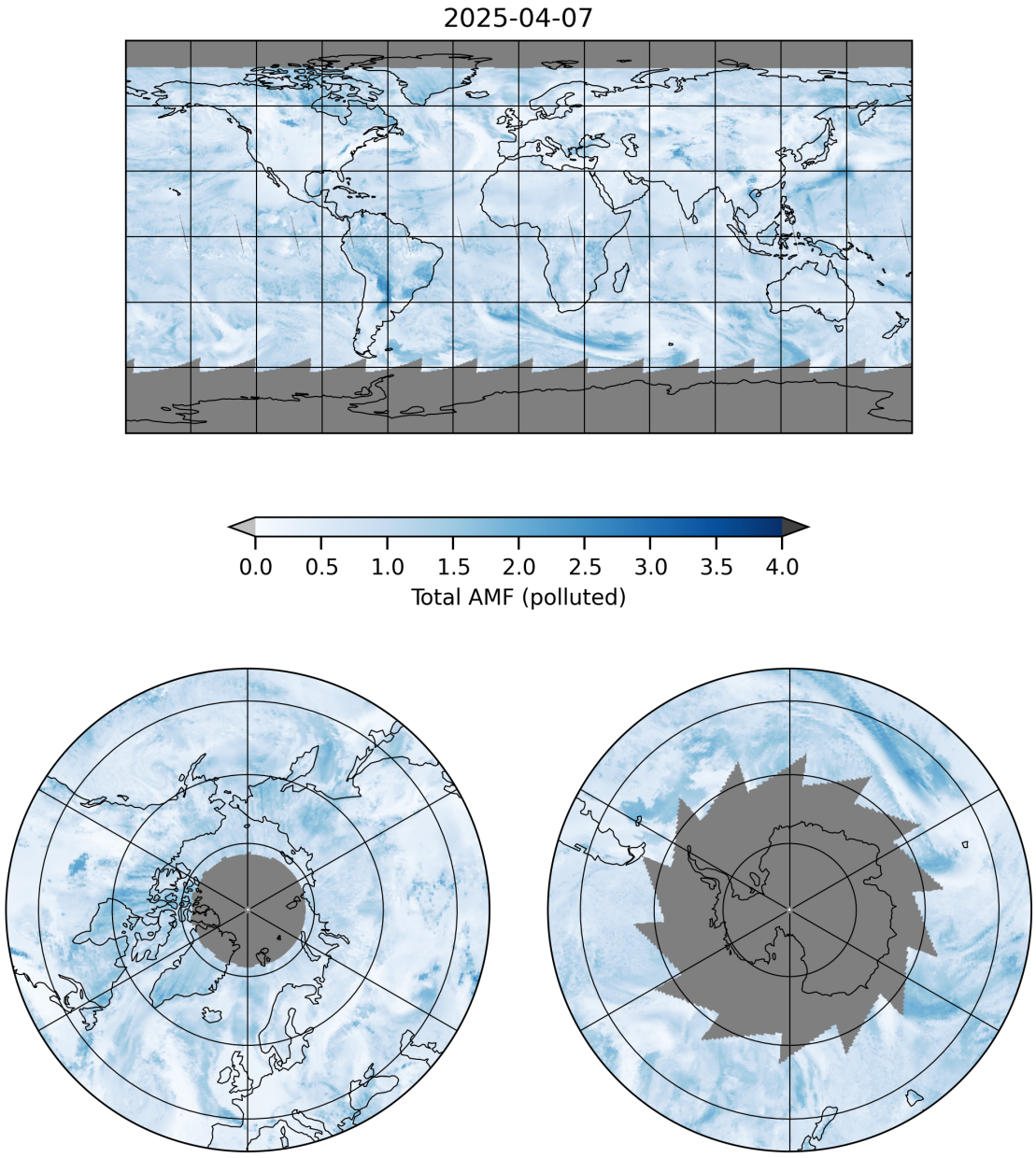

Figure 25: Map of “Total AMF (polluted)” for 2025-04-07 to 2025-04-08

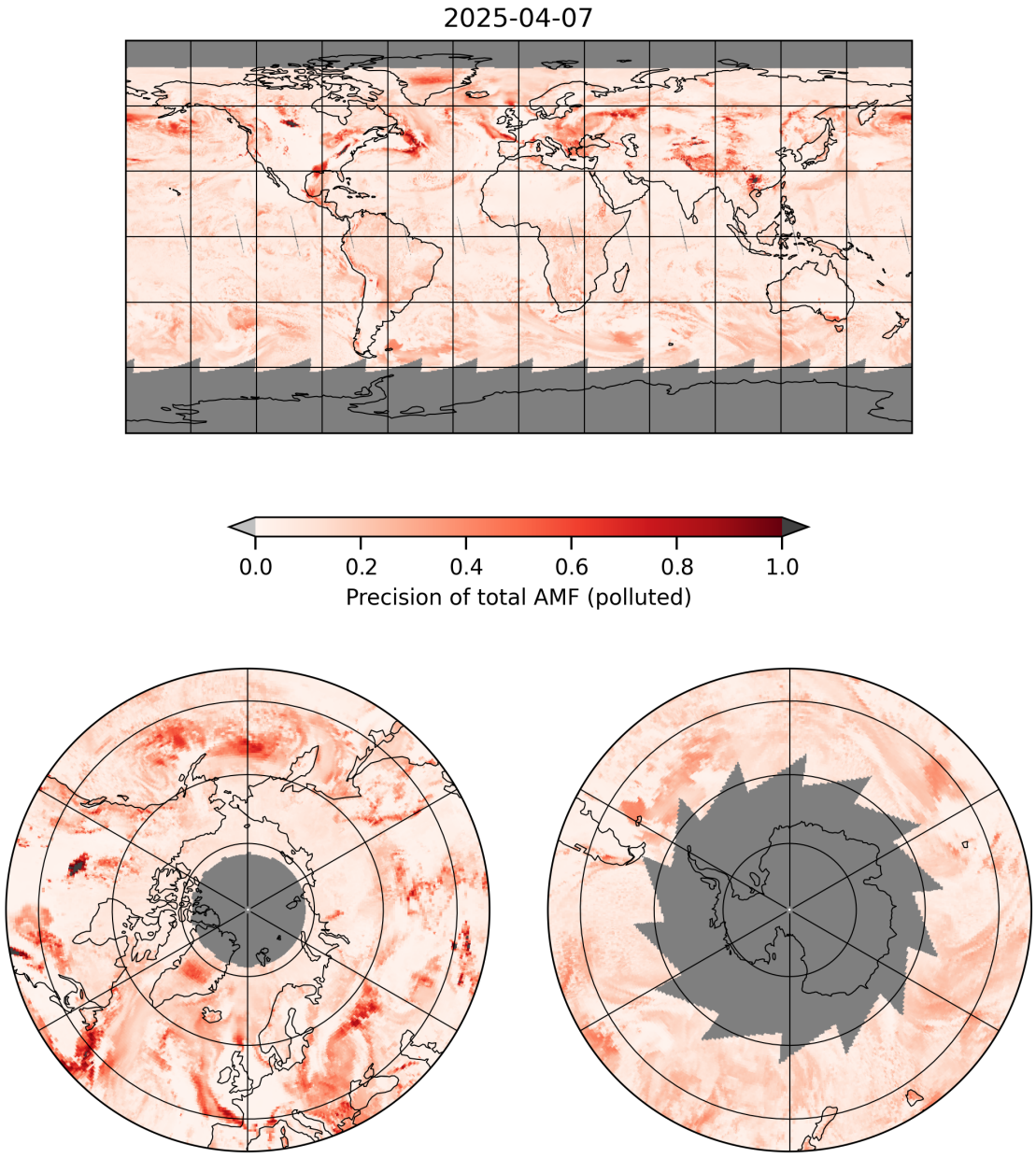

Figure 26: Map of “Precision of total AMF (polluted)” for 2025-04-07 to 2025-04-08

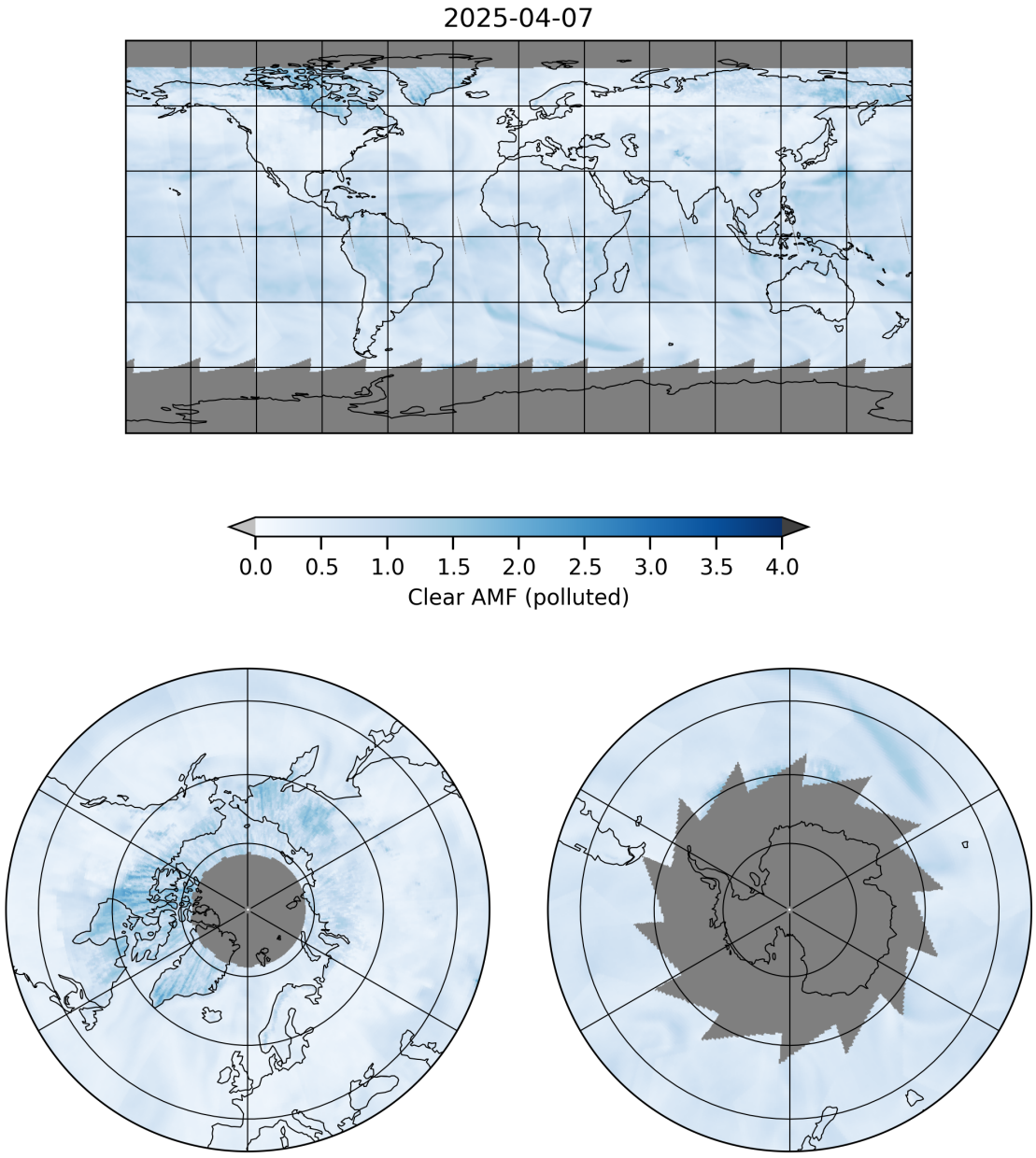

Figure 27: Map of “Clear AMF (polluted)” for 2025-04-07 to 2025-04-08

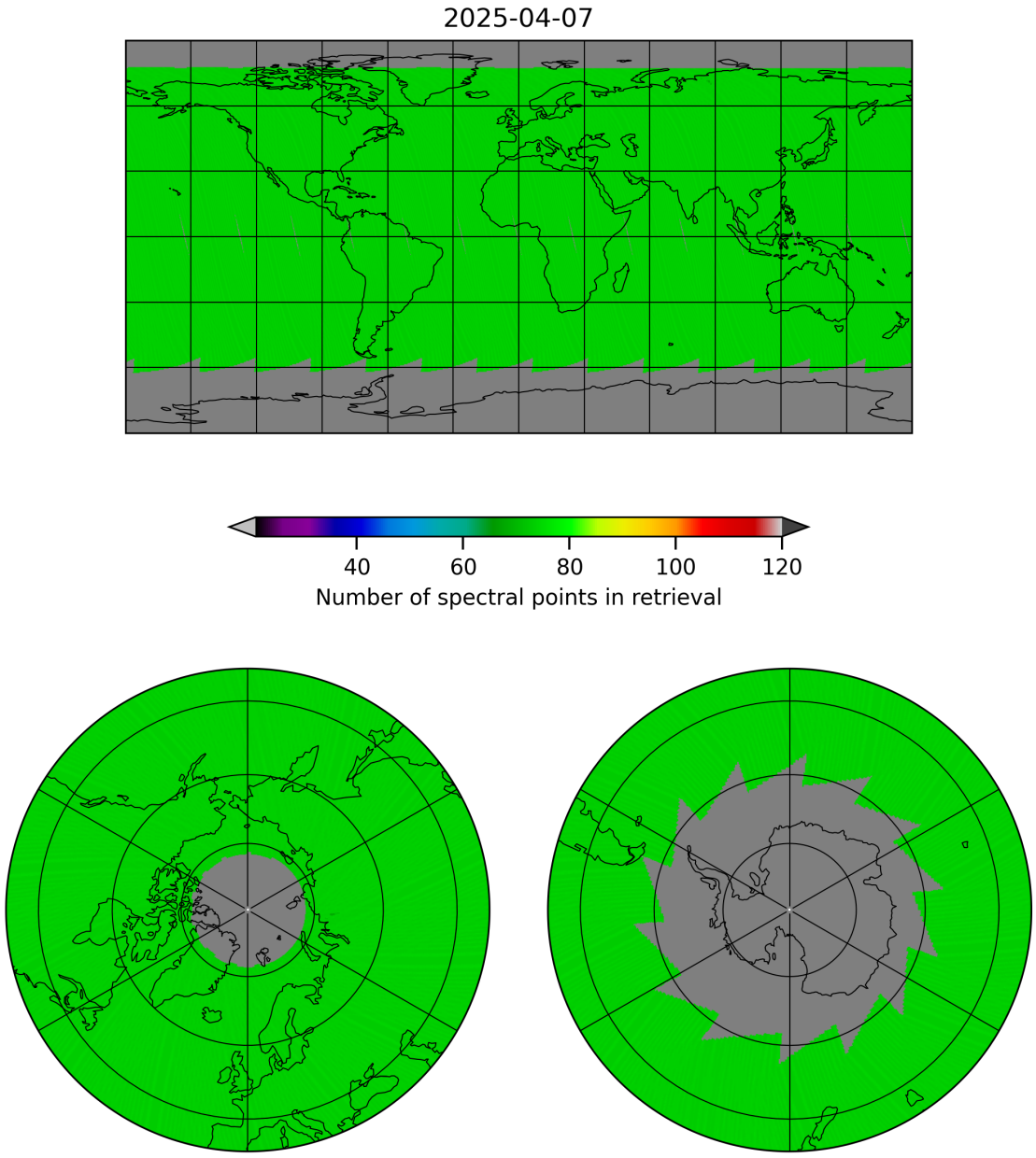

Figure 28: Map of “Number of spectral points in retrieval” for 2025-04-07 to 2025-04-08

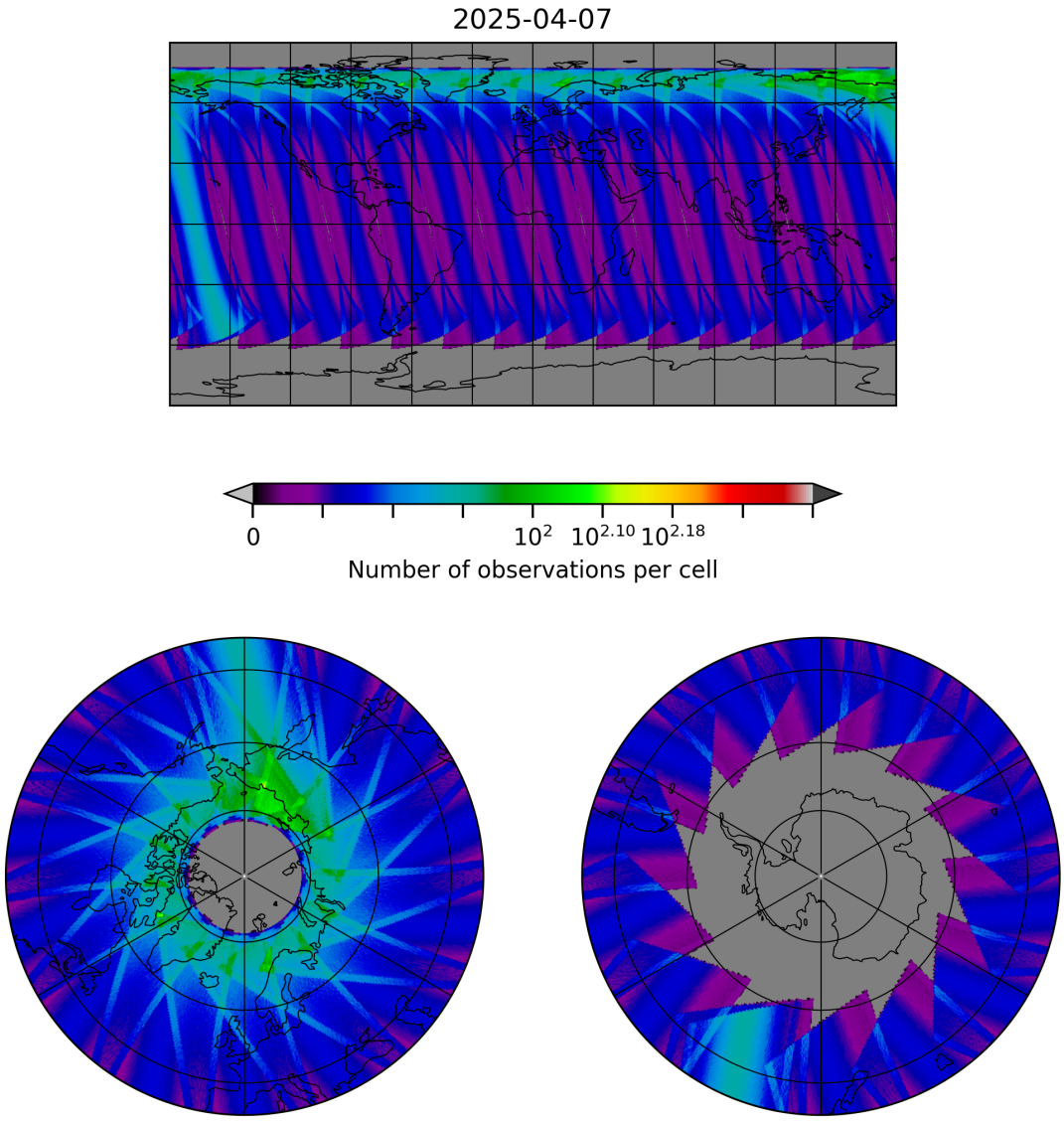

Figure 29: Map of the number of observations for 2025-04-07 to 2025-04-08

7 Zonal average

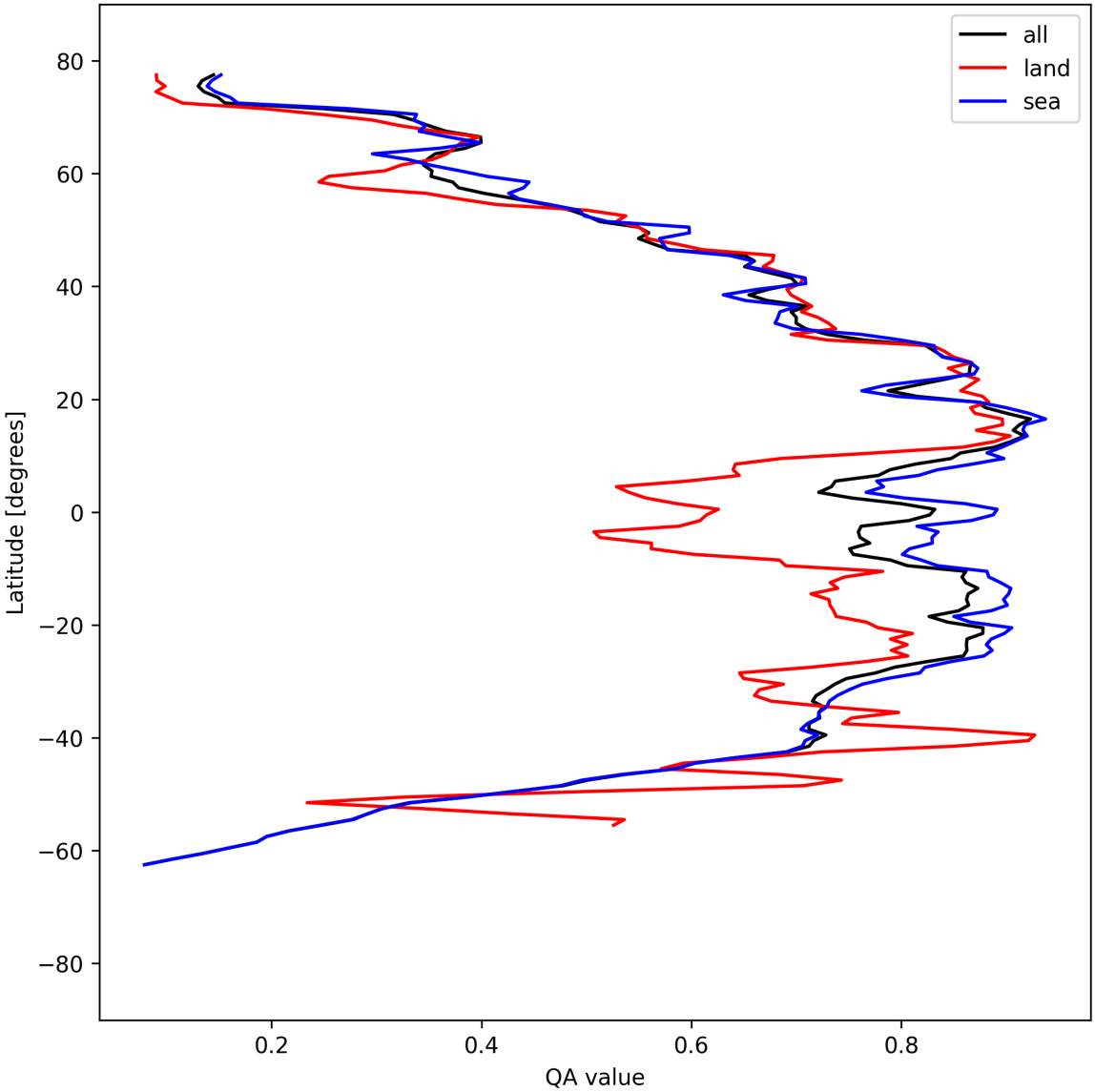

Figure 30: Zonal average of “QA value” for 2025-04-07 to 2025-04-08.

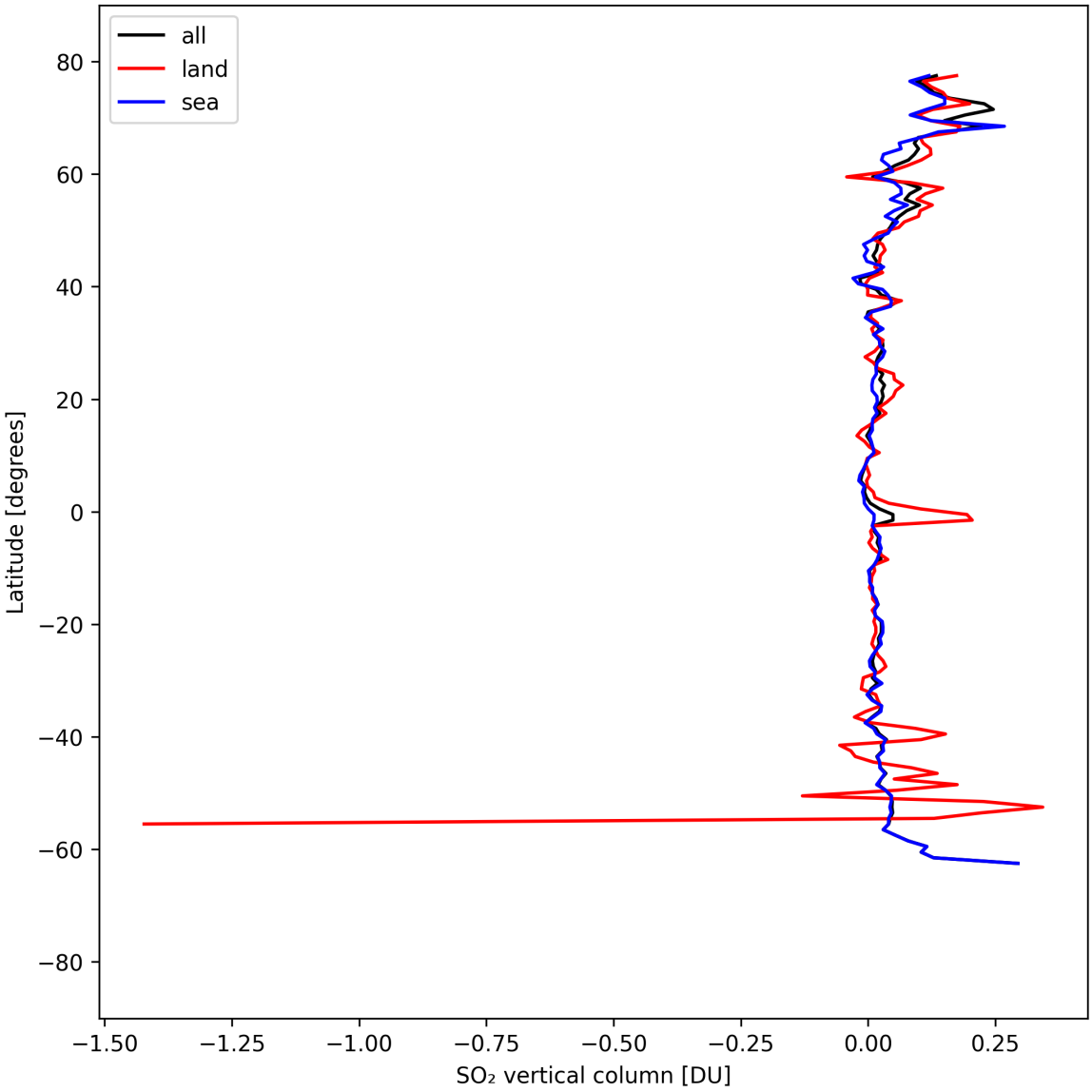

Figure 31: Zonal average of "SO_2 vertical column" for 2025-04-07 to 2025-04-08.

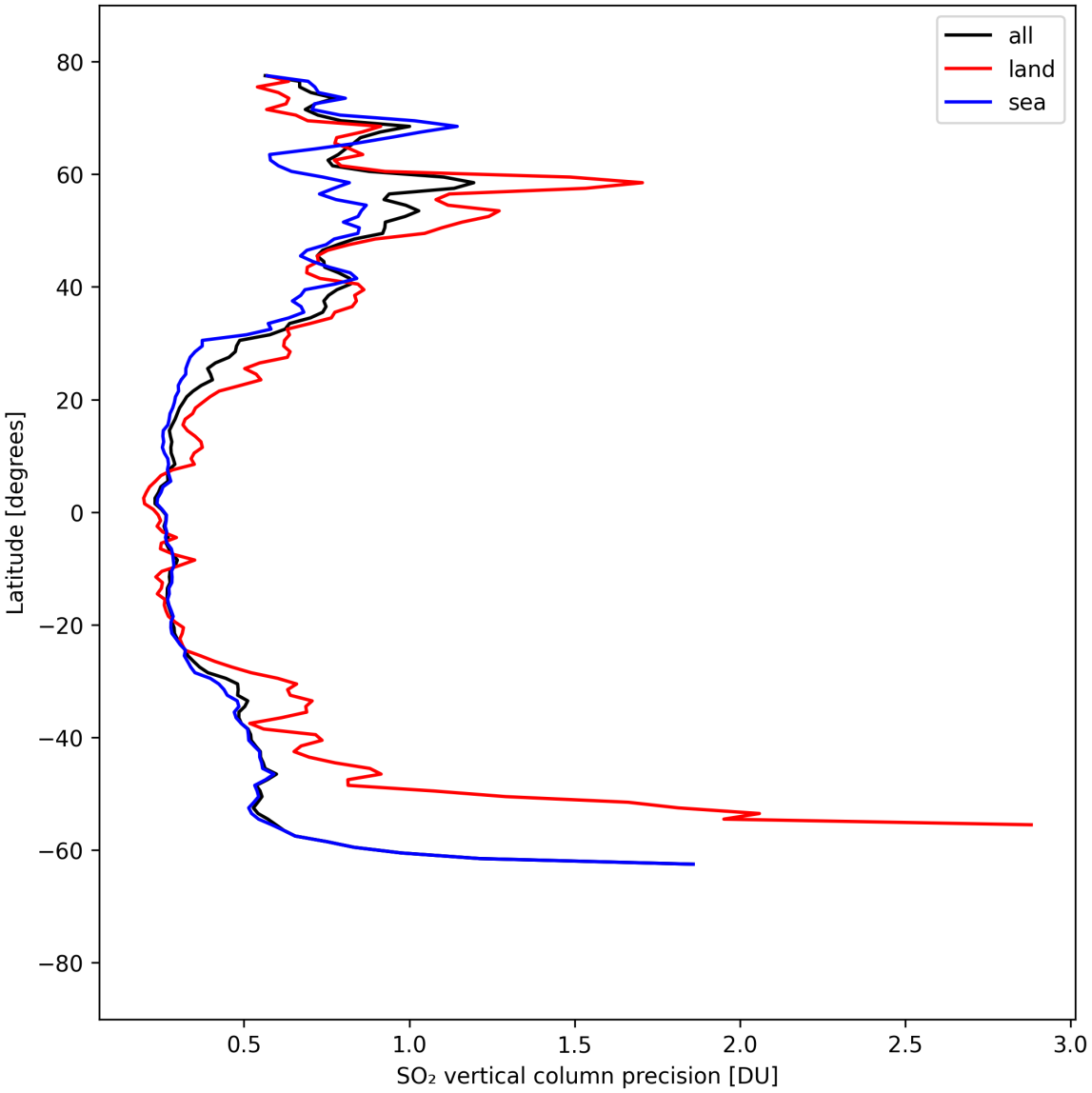

Figure 32: Zonal average of "SO_2 vertical column precision" for 2025-04-07 to 2025-04-08.

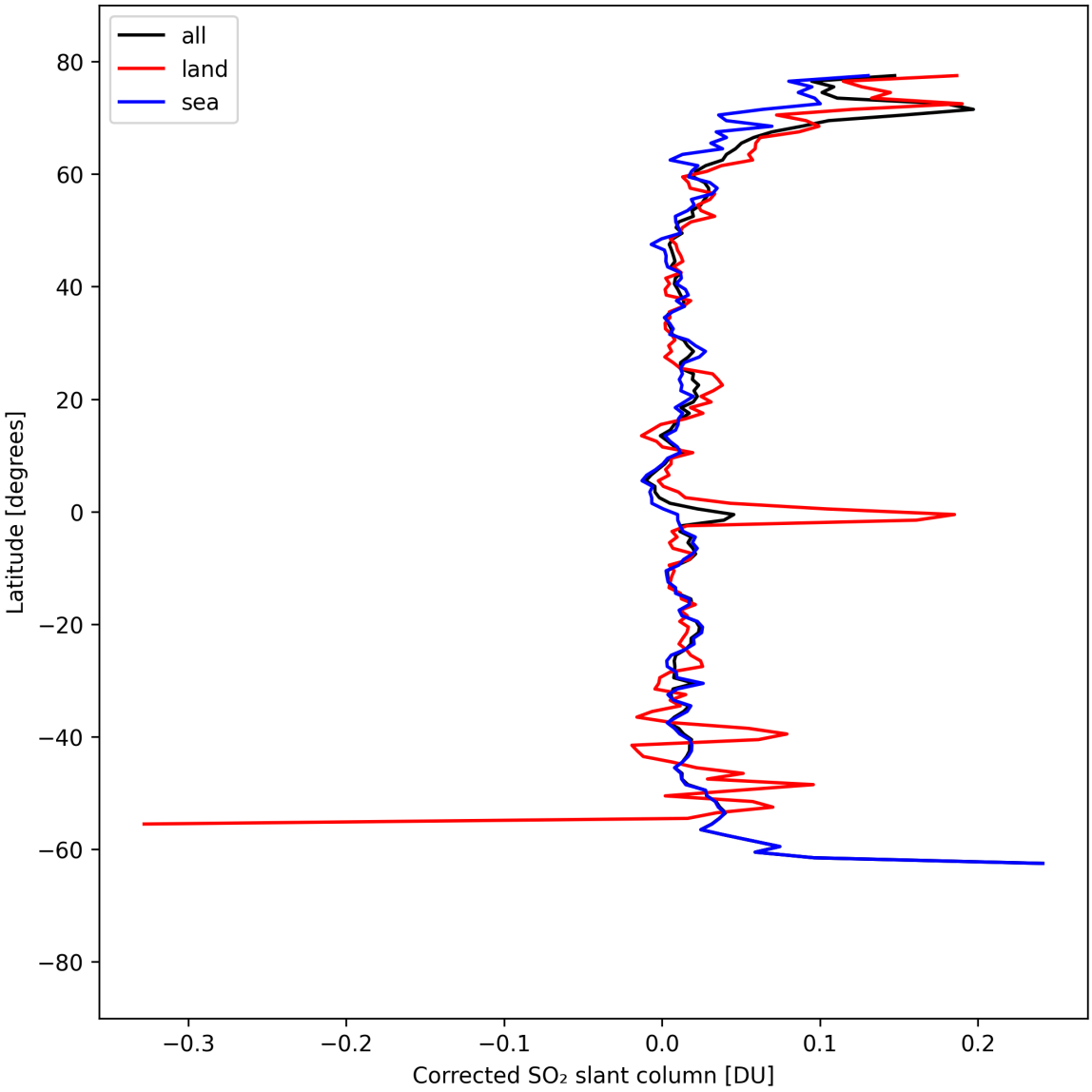

Figure 33: Zonal average of “Corrected SO_2 slant column” for 2025-04-07 to 2025-04-08.

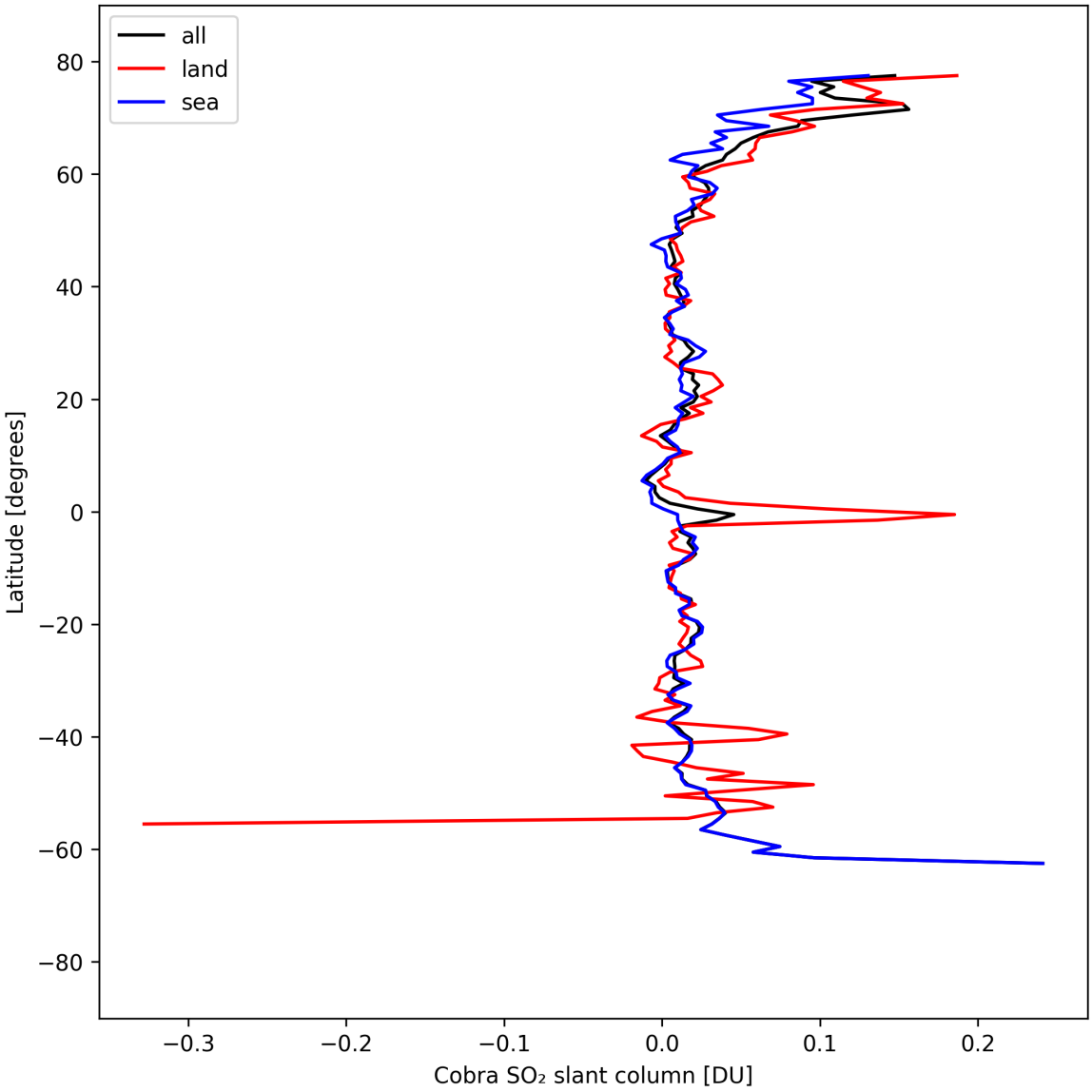

Figure 34: Zonal average of “Cobra SO_2 slant column” for 2025-04-07 to 2025-04-08.

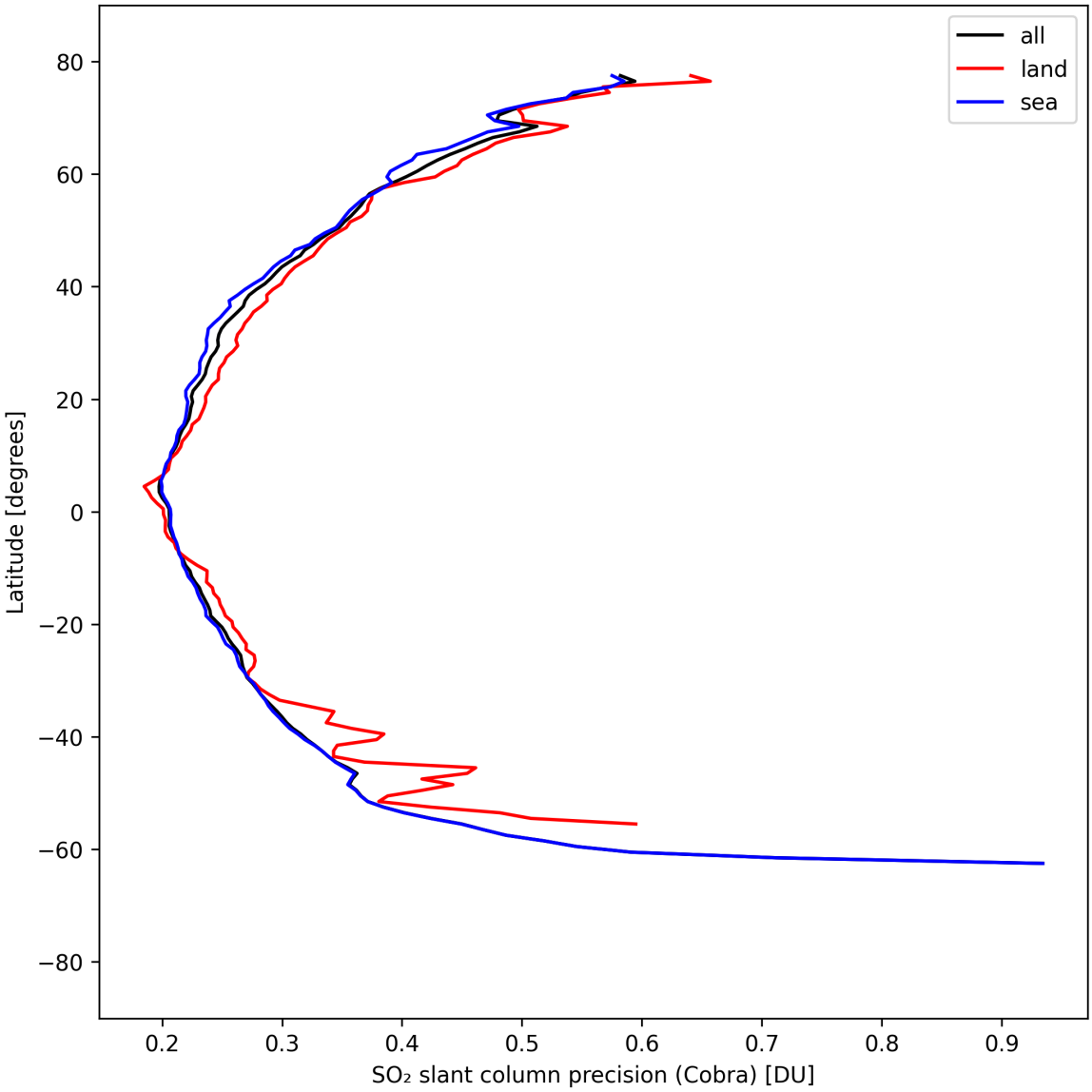

Figure 35: Zonal average of "SO_2 slant column precision (Cobra)" for 2025-04-07 to 2025-04-08.

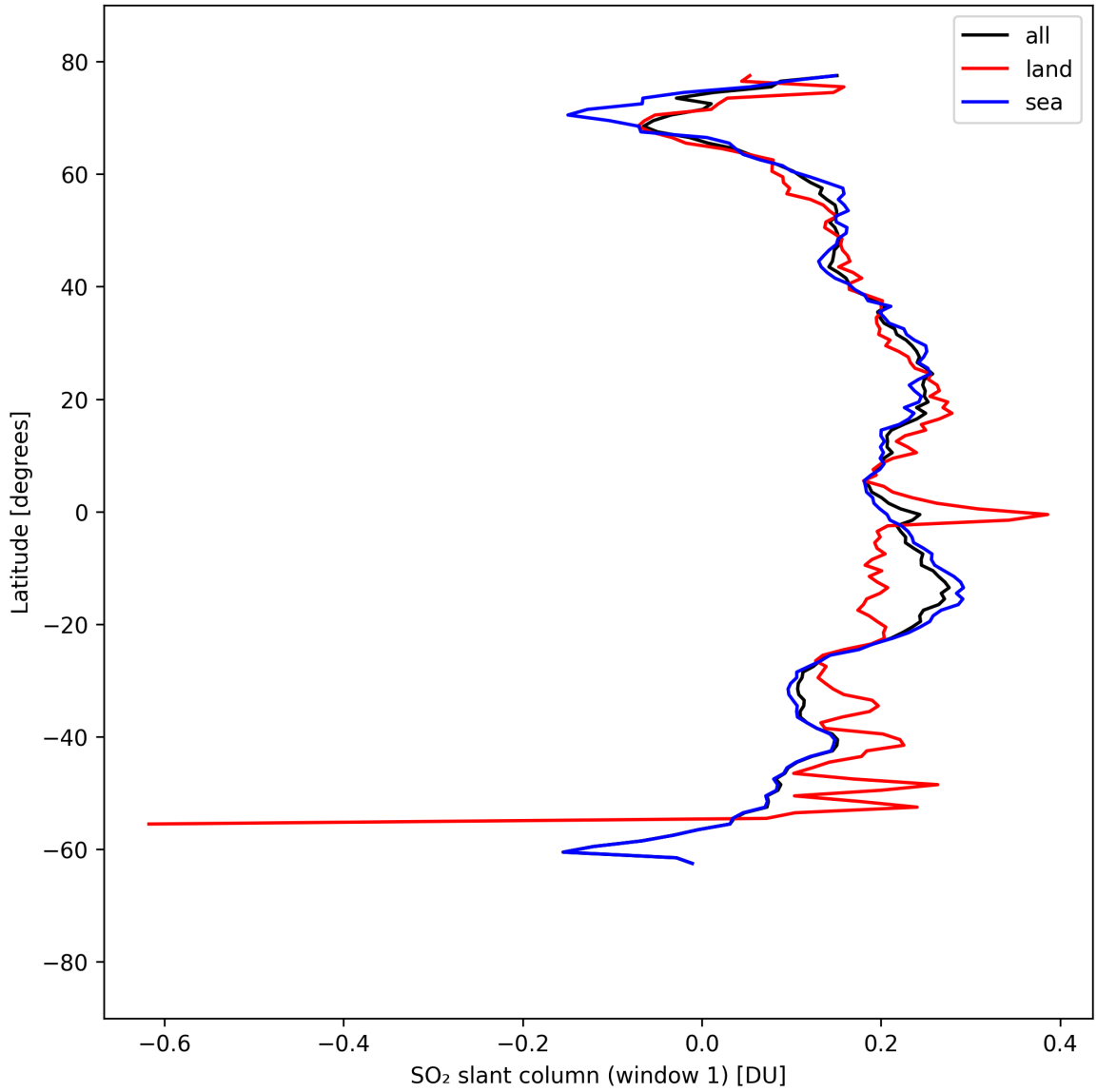

Figure 36: Zonal average of "SO_2 slant column (window 1)" for 2025-04-07 to 2025-04-08.

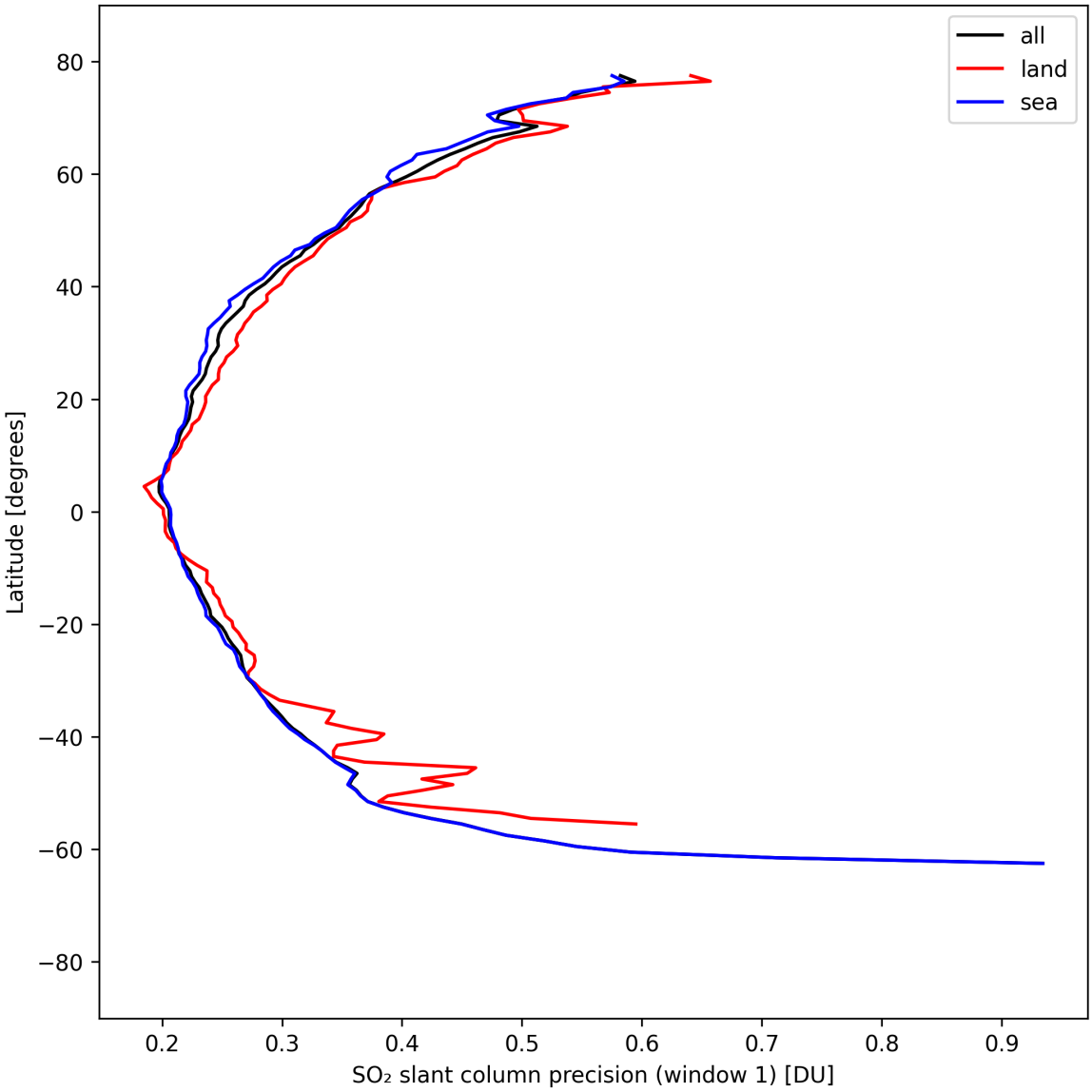

Figure 37: Zonal average of "SO_2 slant column precision (window 1)" for 2025-04-07 to 2025-04-08.

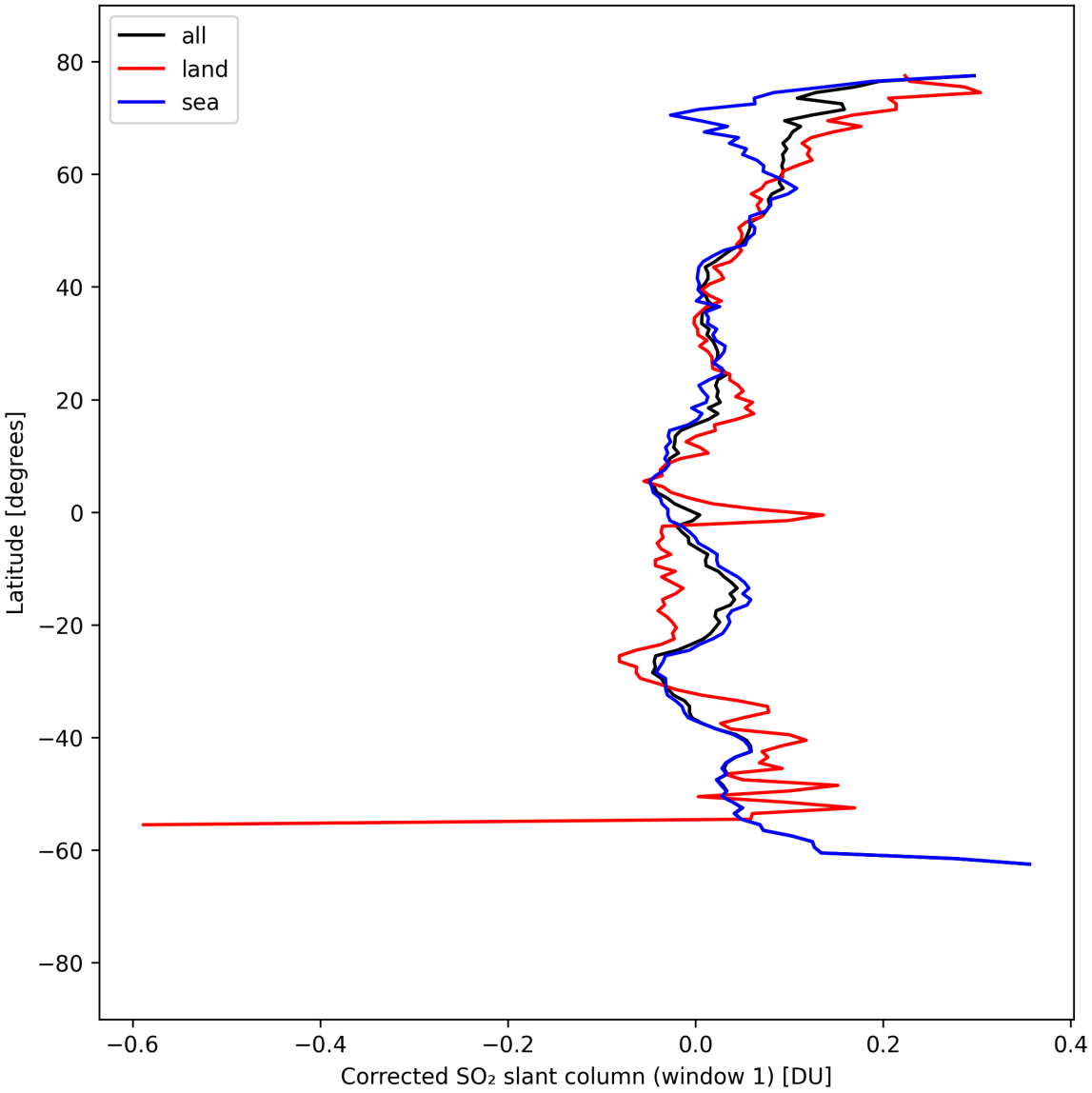

Figure 38: Zonal average of "Corrected SO_2 slant column (window 1)" for 2025-04-07 to 2025-04-08.

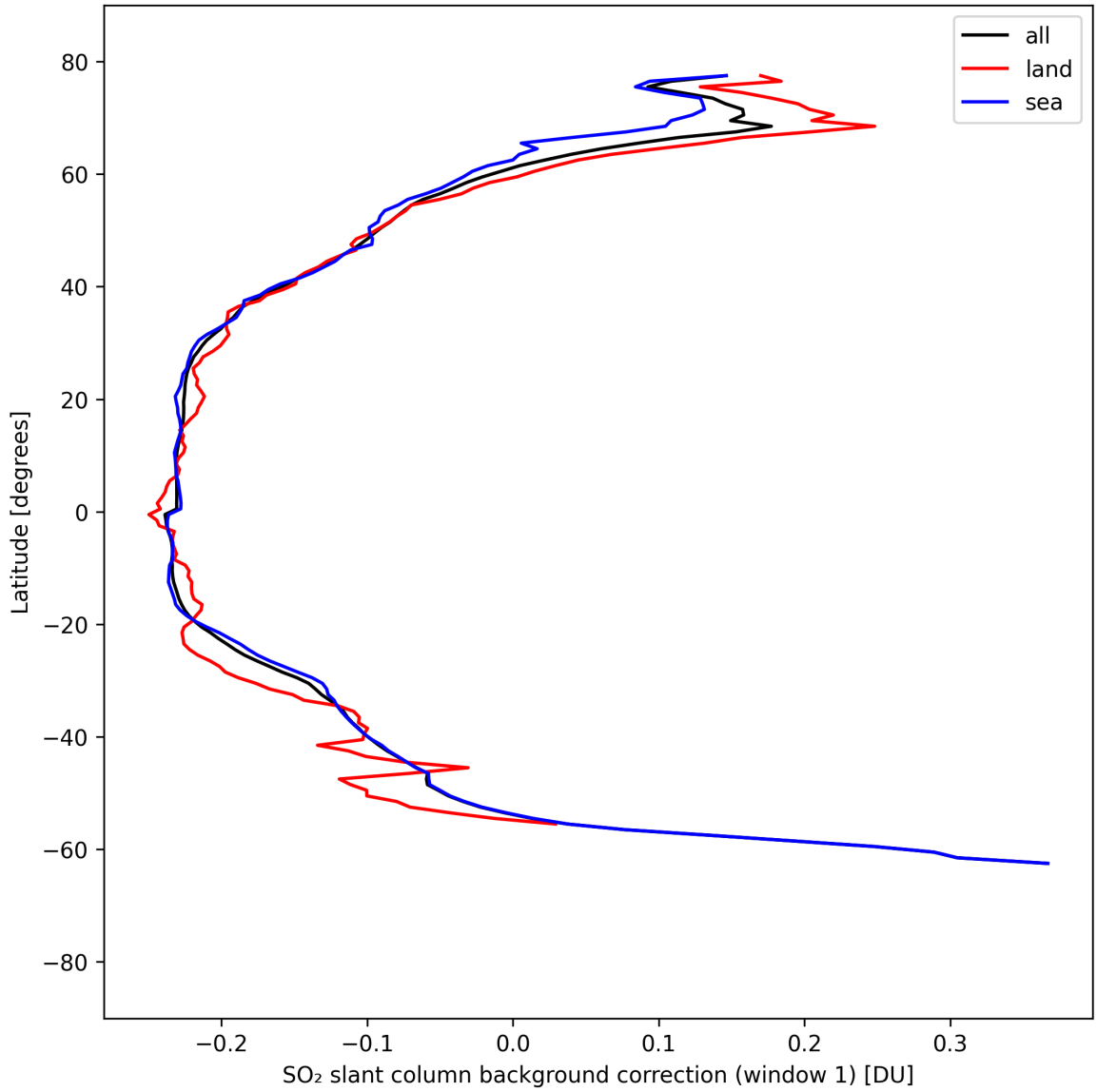

Figure 39: Zonal average of "SO_2 slant column background correction (window 1)" for 2025-04-07 to 2025-04-08.

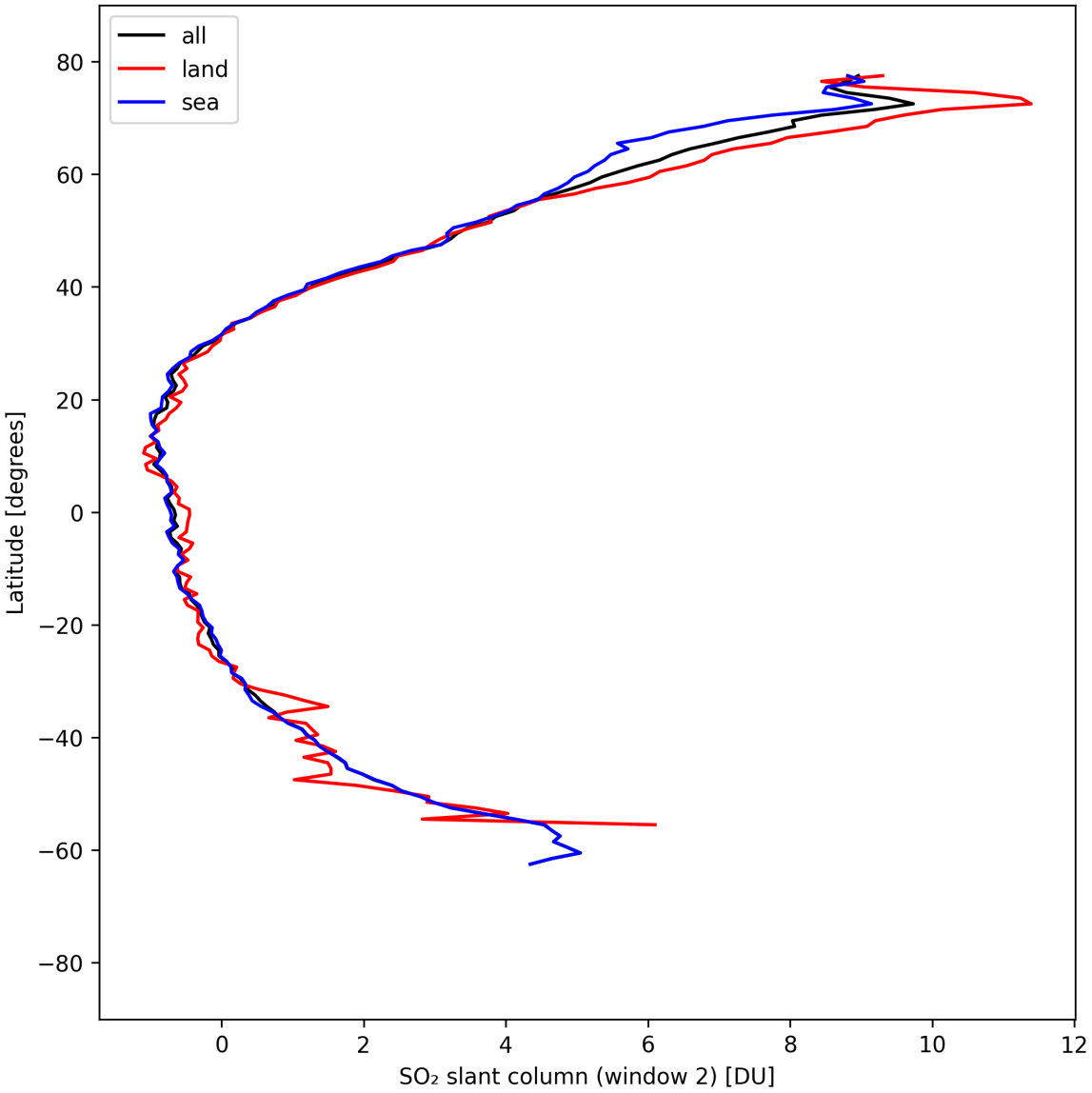

Figure 40: Zonal average of "SO_2 slant column (window 2)" for 2025-04-07 to 2025-04-08.

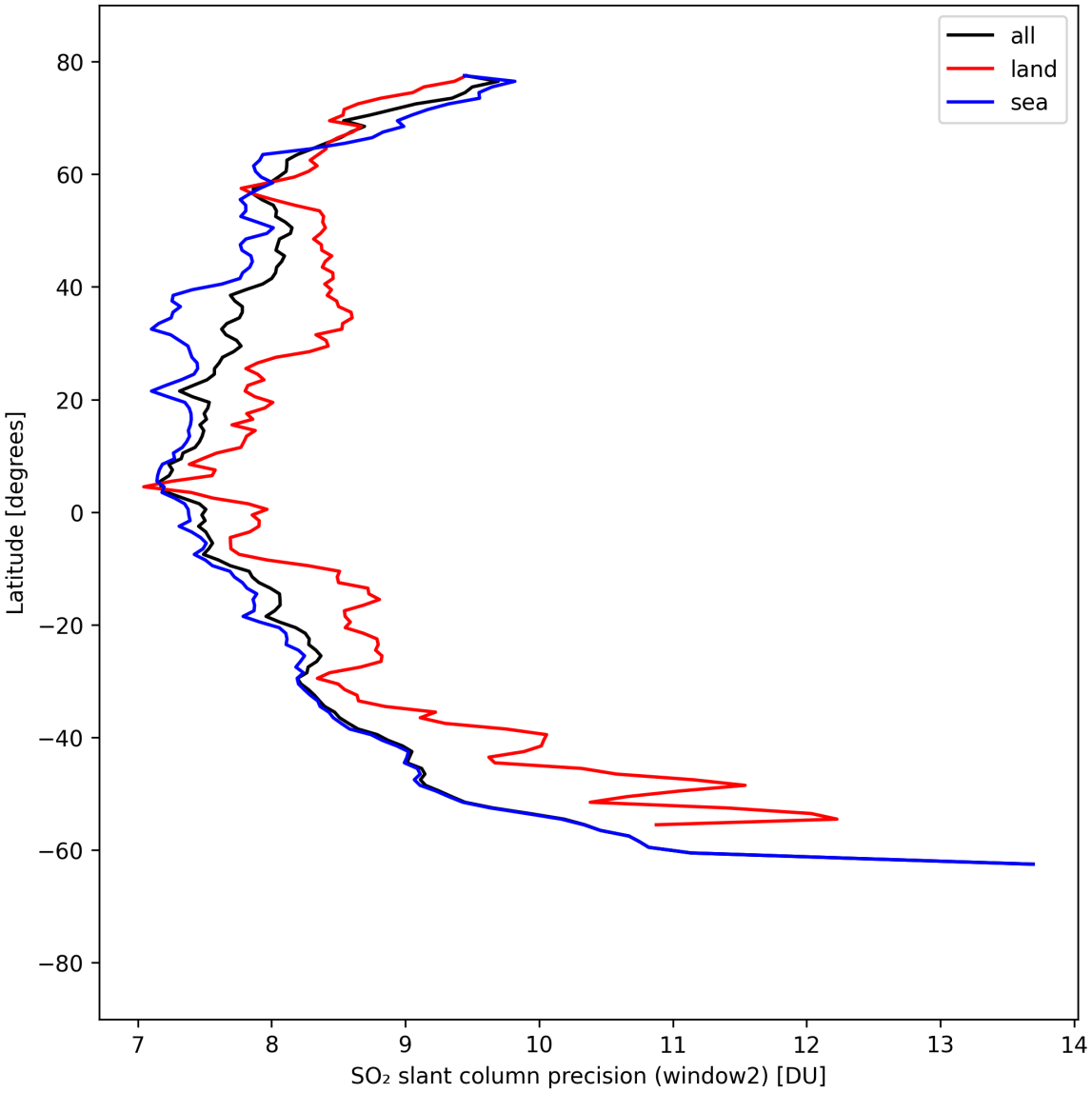

Figure 41: Zonal average of "SO_2 slant column precision (window2)" for 2025-04-07 to 2025-04-08.

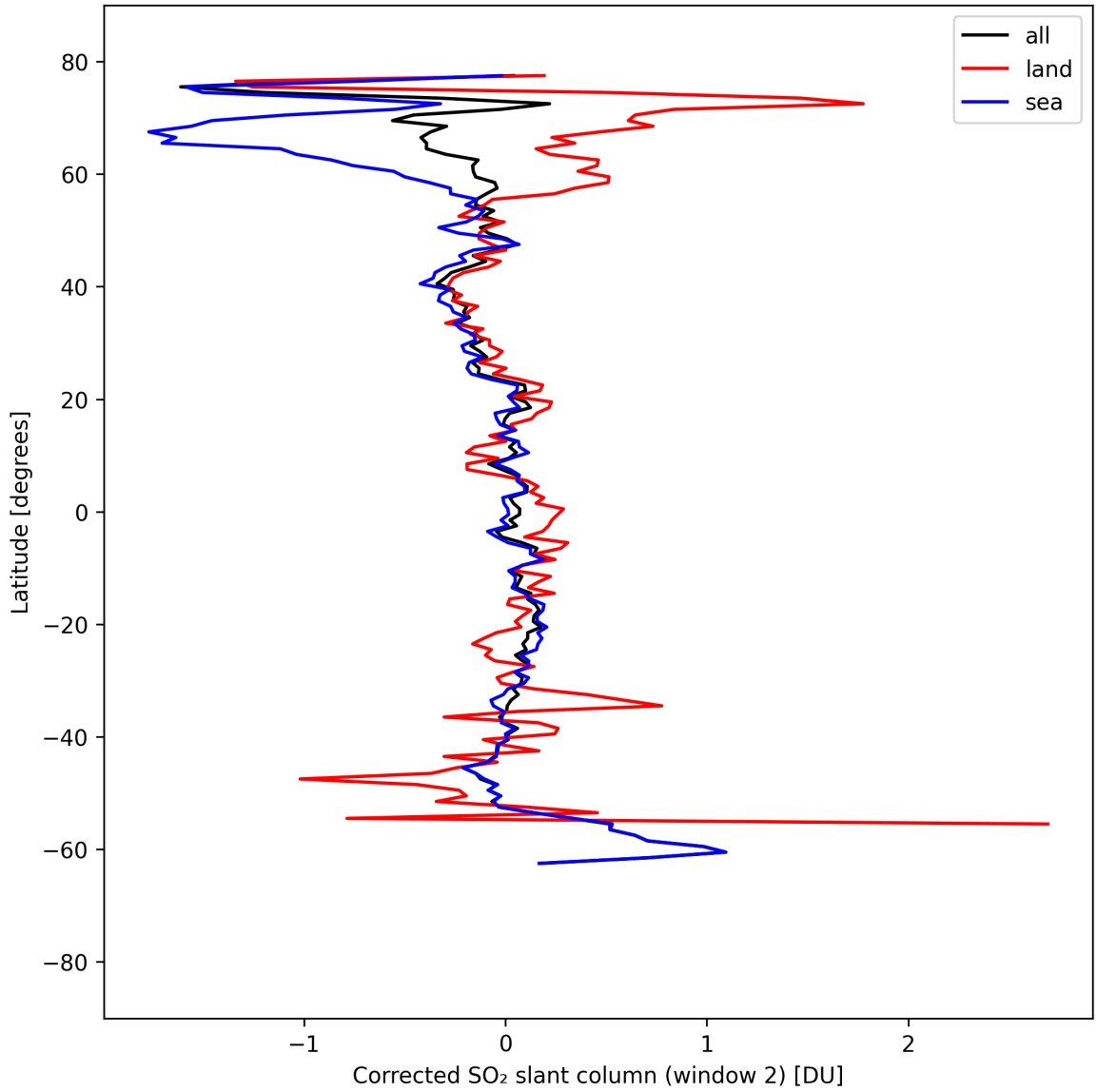

Figure 42: Zonal average of "Corrected SO_2 slant column (window 2)" for 2025-04-07 to 2025-04-08.

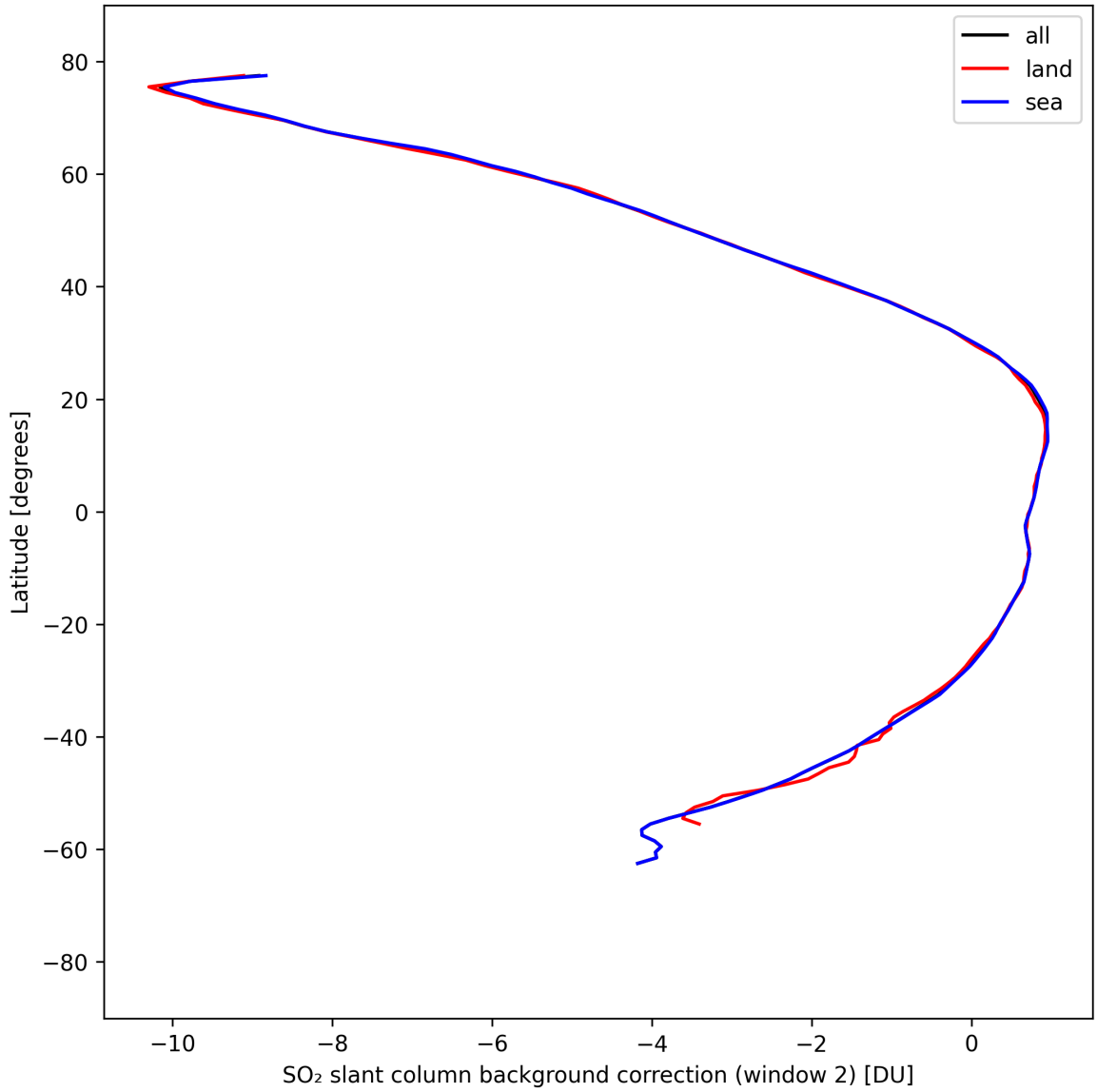

Figure 43: Zonal average of "SO_2 slant column background correction (window 2)" for 2025-04-07 to 2025-04-08.

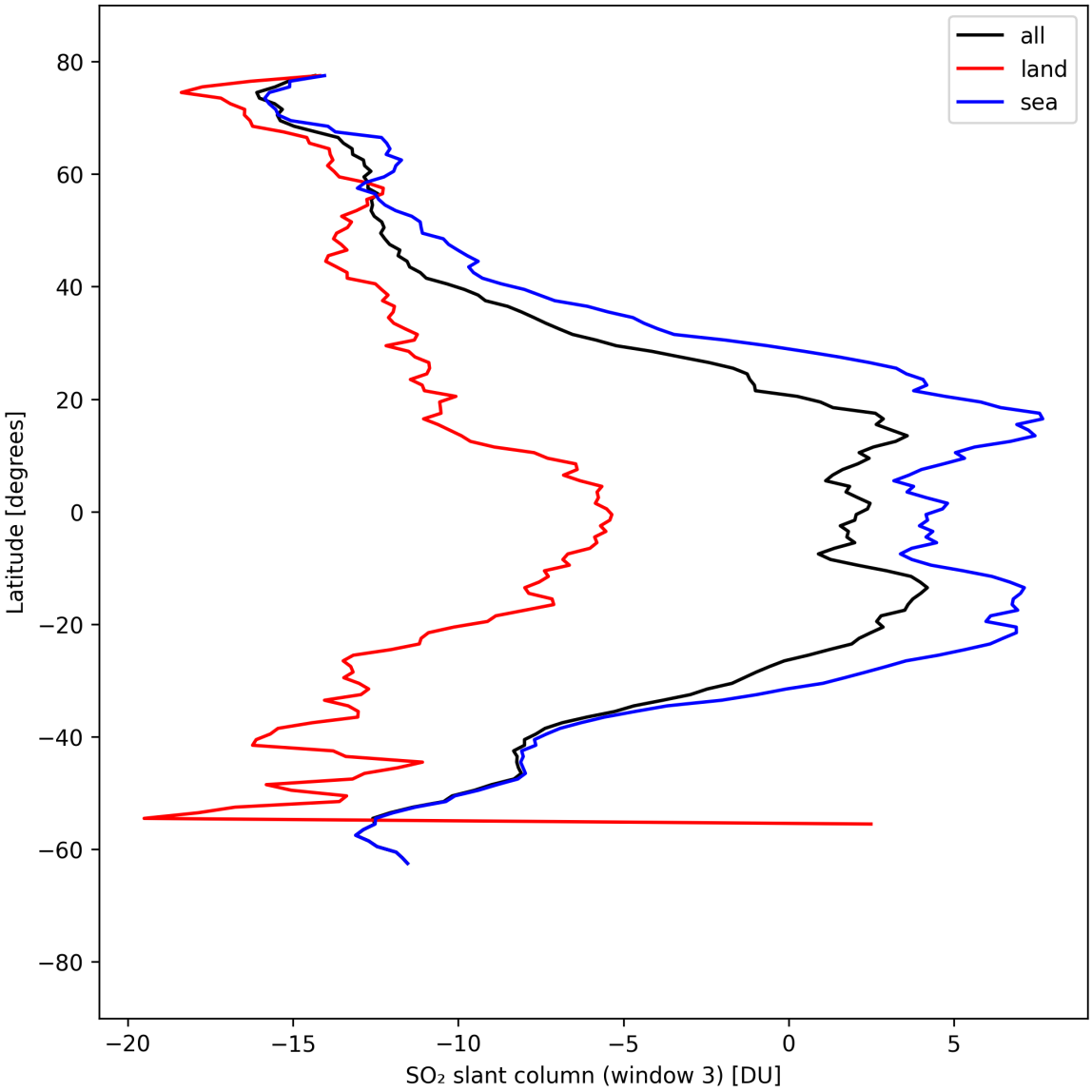

Figure 44: Zonal average of "SO_2 slant column (window 3)" for 2025-04-07 to 2025-04-08.

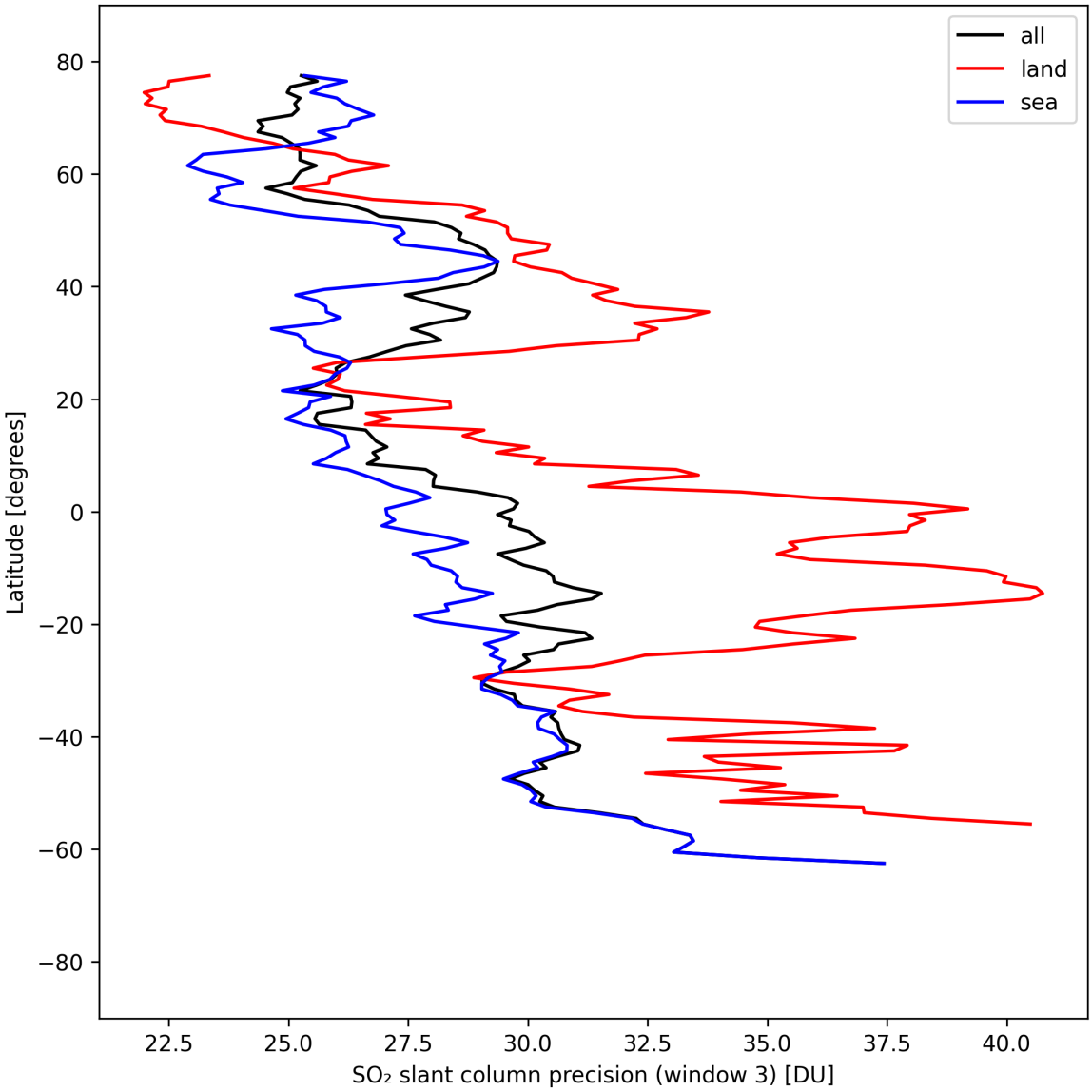

Figure 45: Zonal average of "SO_2 slant column precision (window 3)" for 2025-04-07 to 2025-04-08.

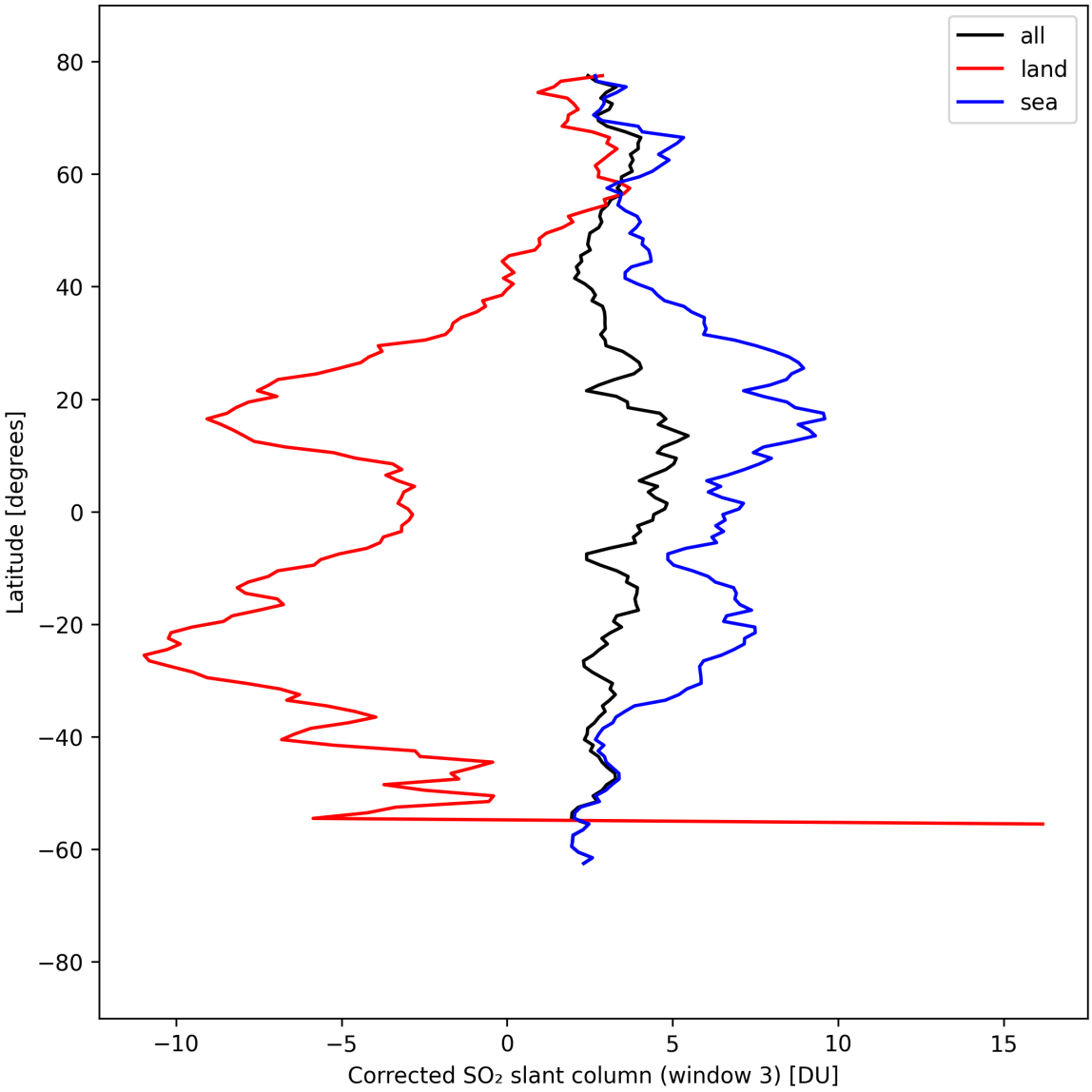

Figure 46: Zonal average of "Corrected SO_2 slant column (window 3)" for 2025-04-07 to 2025-04-08.

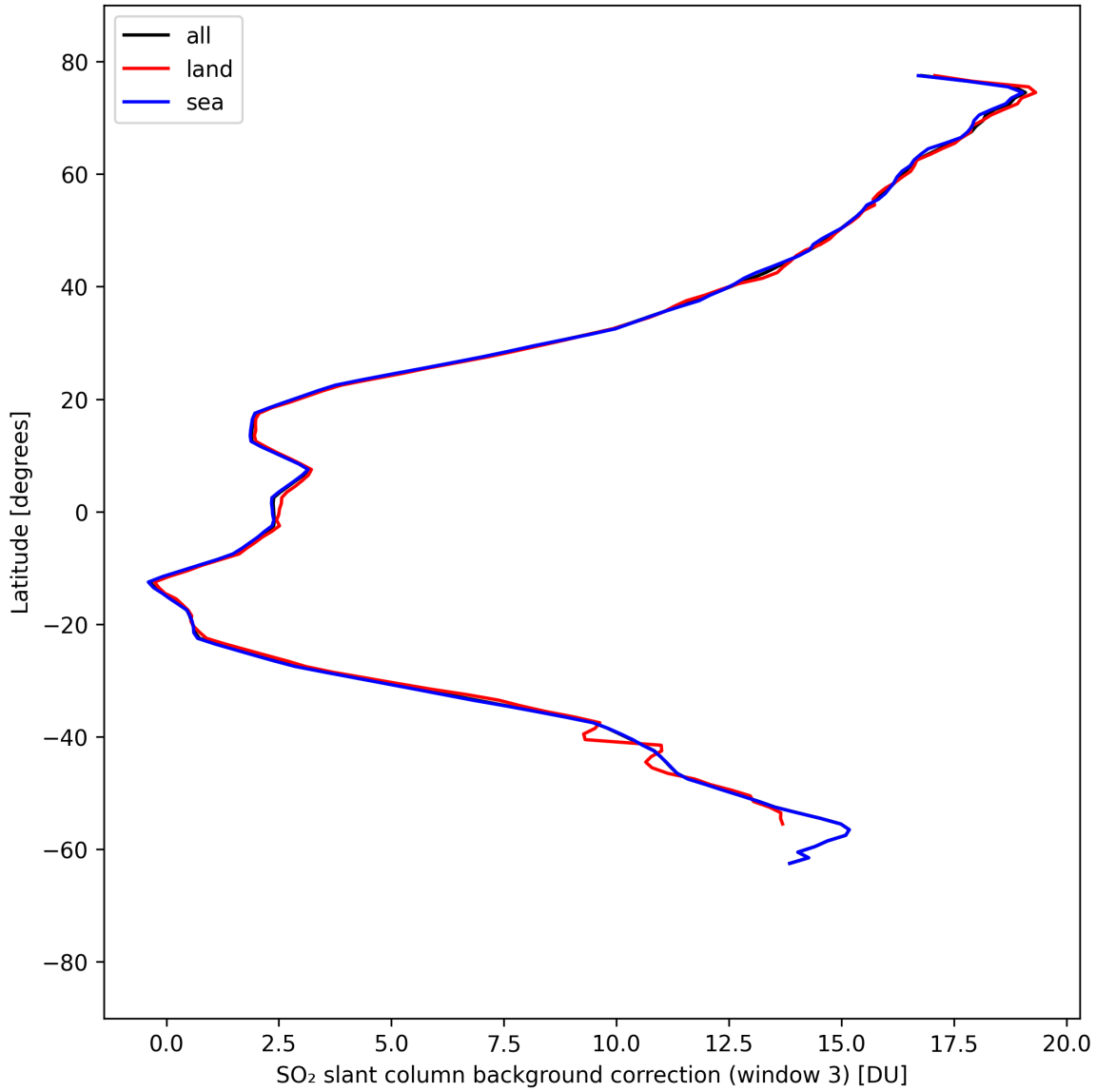

Figure 47: Zonal average of "SO_2 slant column background correction (window 3)" for 2025-04-07 to 2025-04-08.

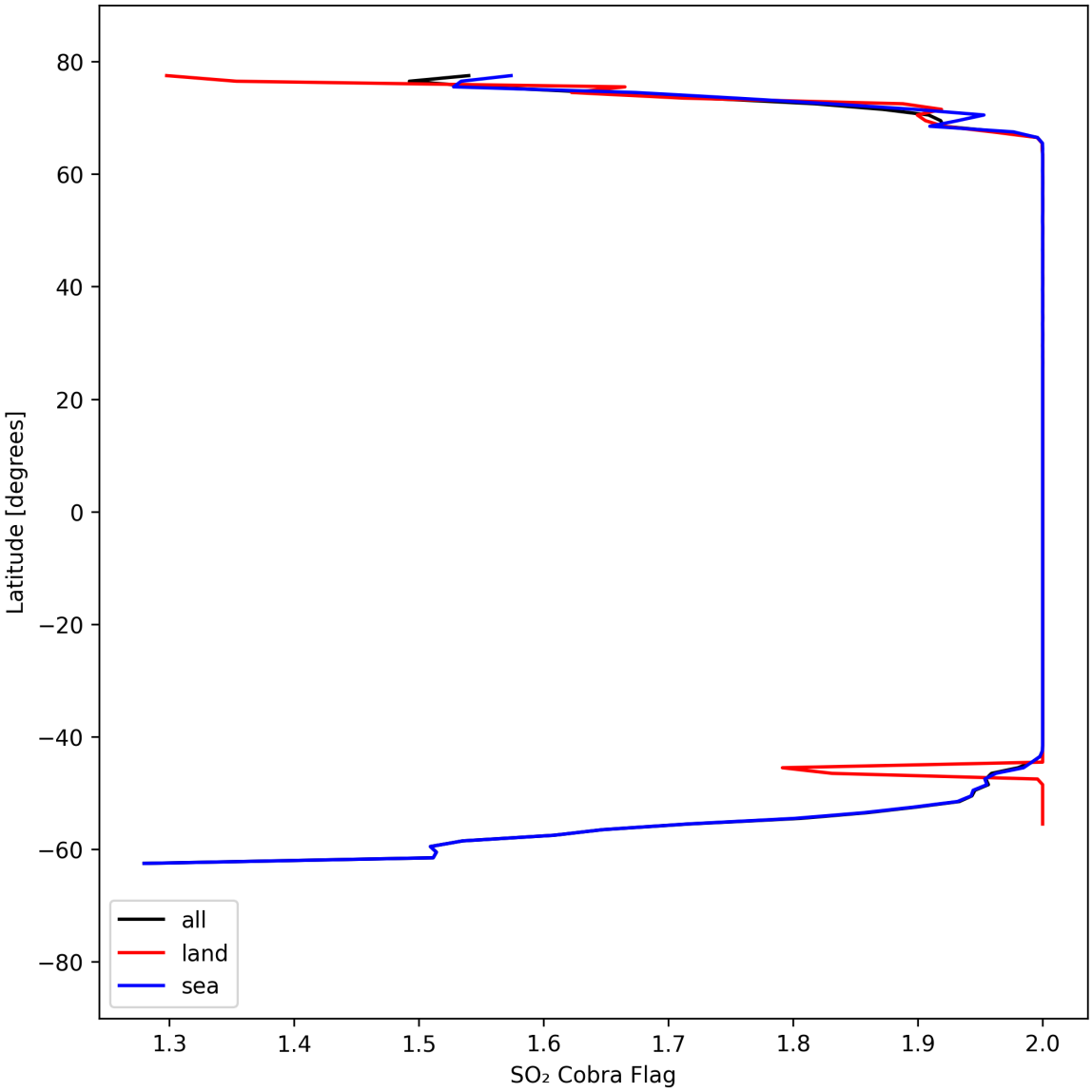

Figure 48: Zonal average of "SO_2 Cobra Flag" for 2025-04-07 to 2025-04-08.

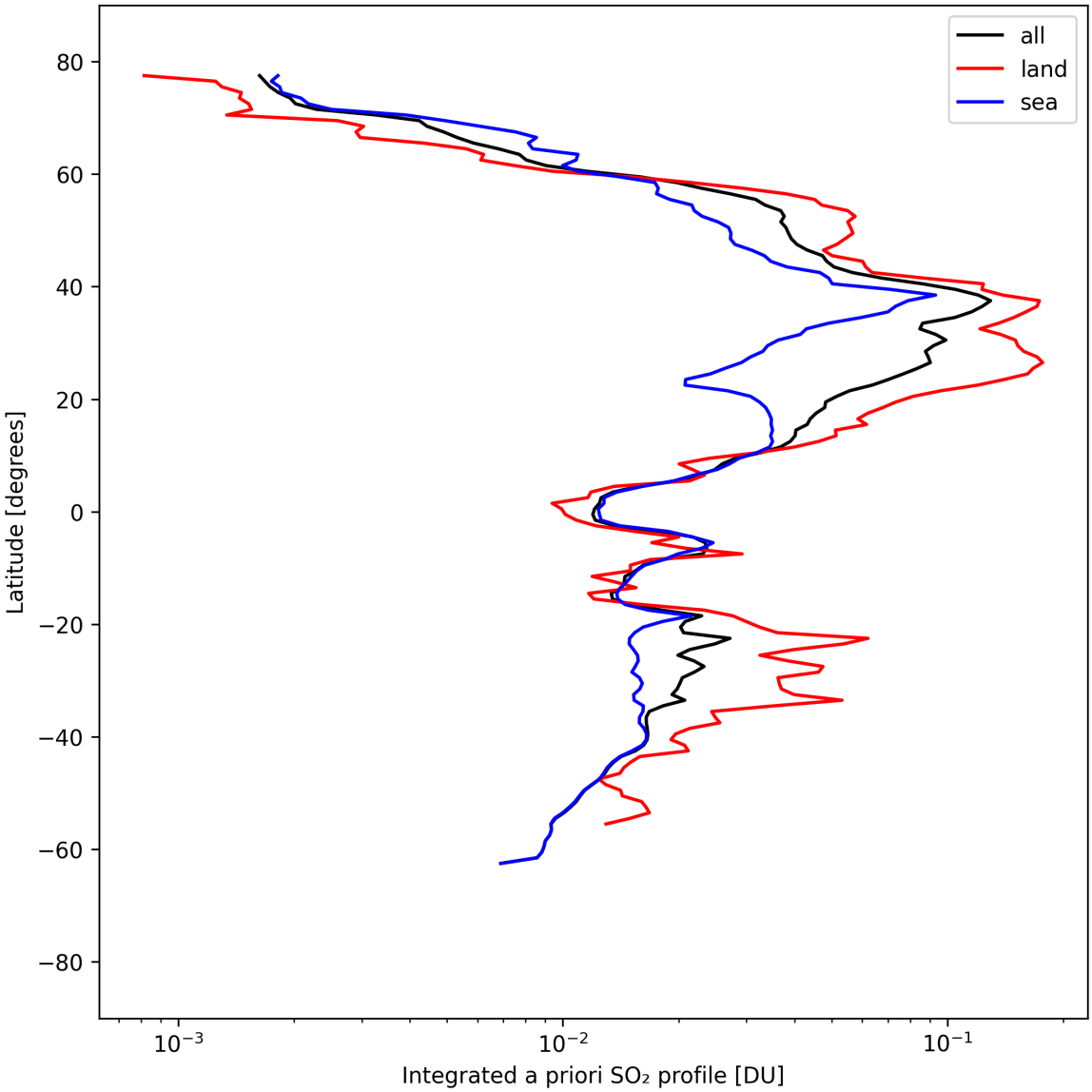

Figure 49: Zonal average of “Integrated a priori SO_2 profile” for 2025-04-07 to 2025-04-08.

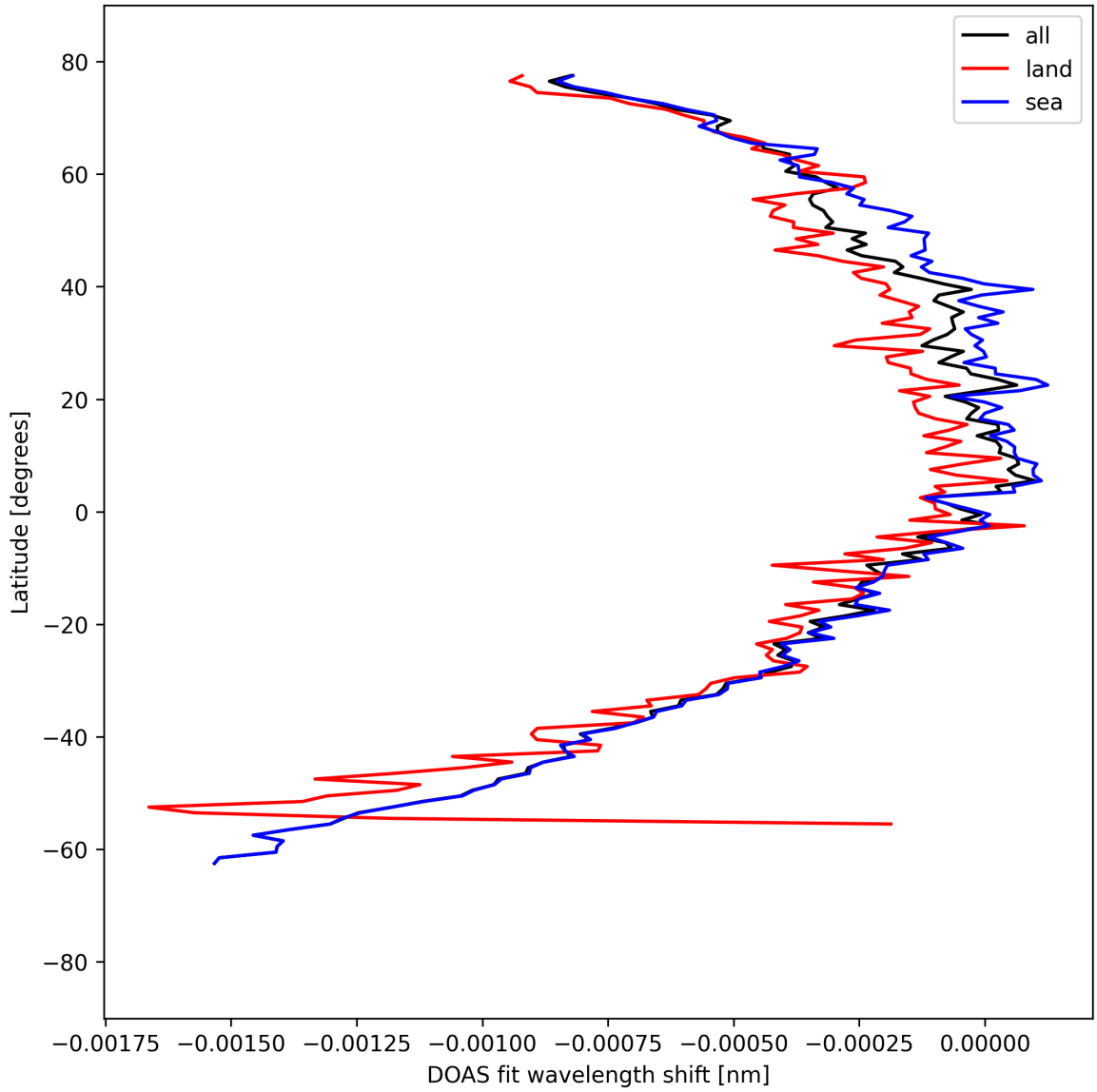

Figure 50: Zonal average of “DOAS fit wavelength shift” for 2025-04-07 to 2025-04-08.

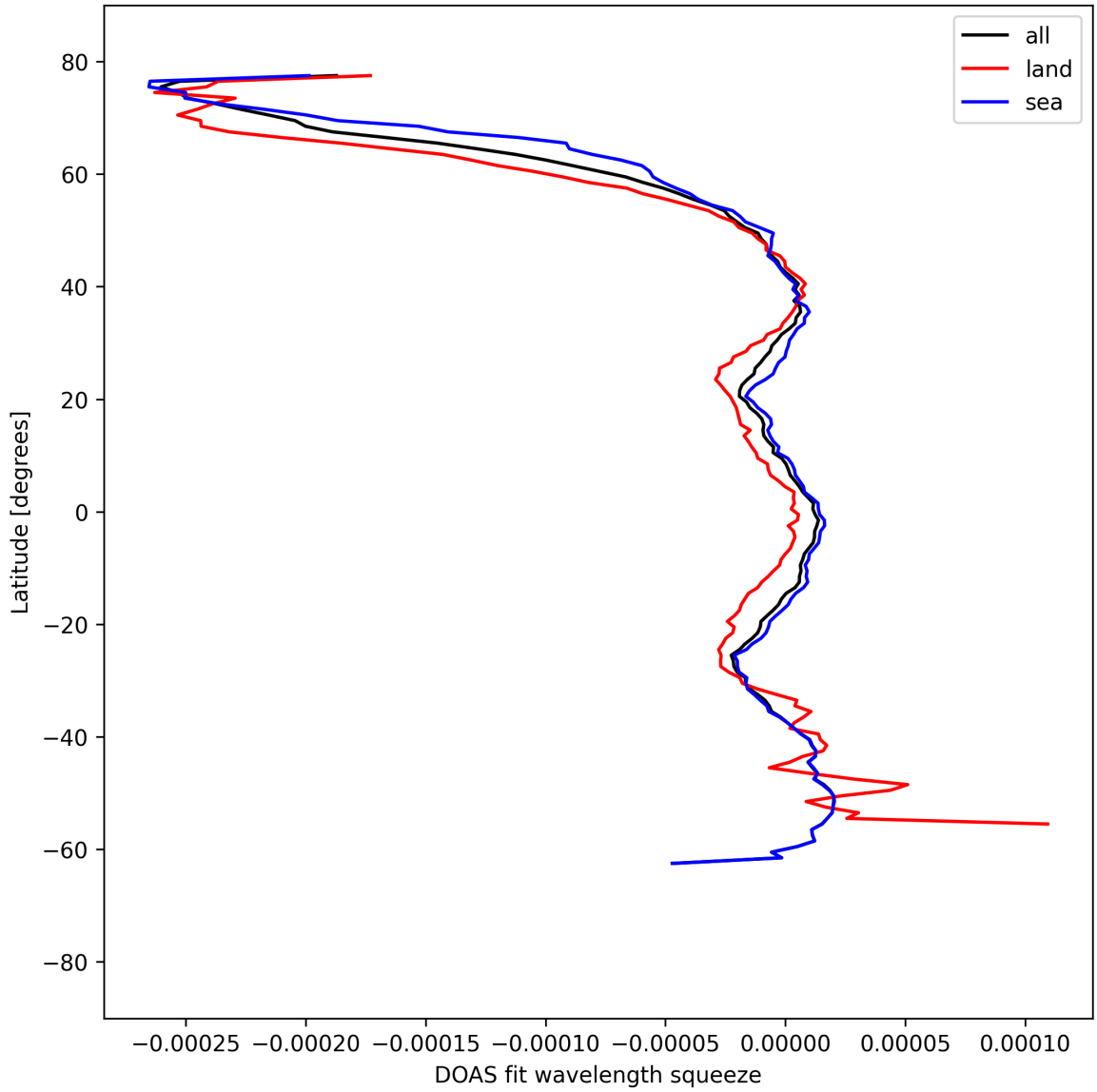

Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-04-07 to 2025-04-08.

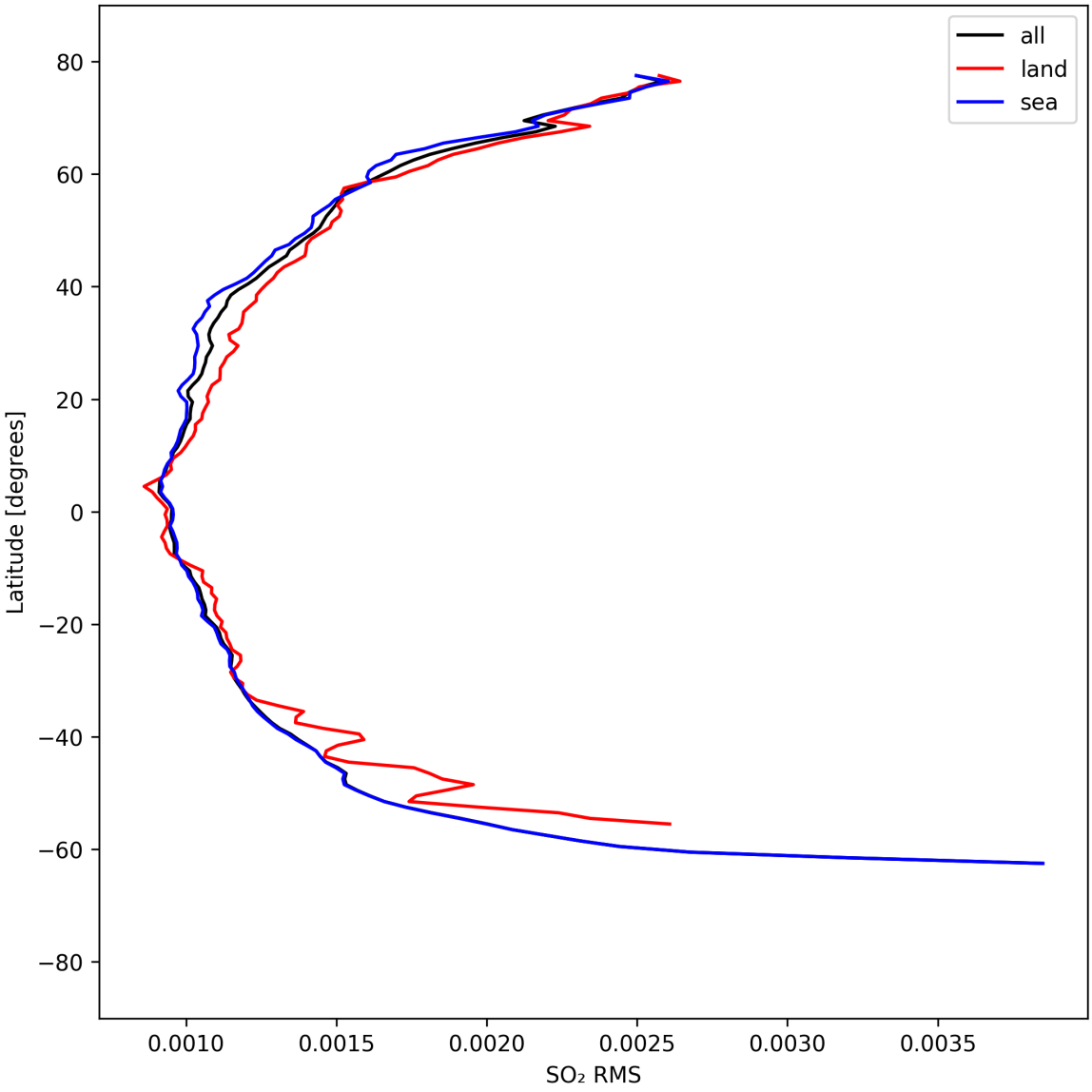

Figure 52: Zonal average of "SO_2 RMS" for 2025-04-07 to 2025-04-08.

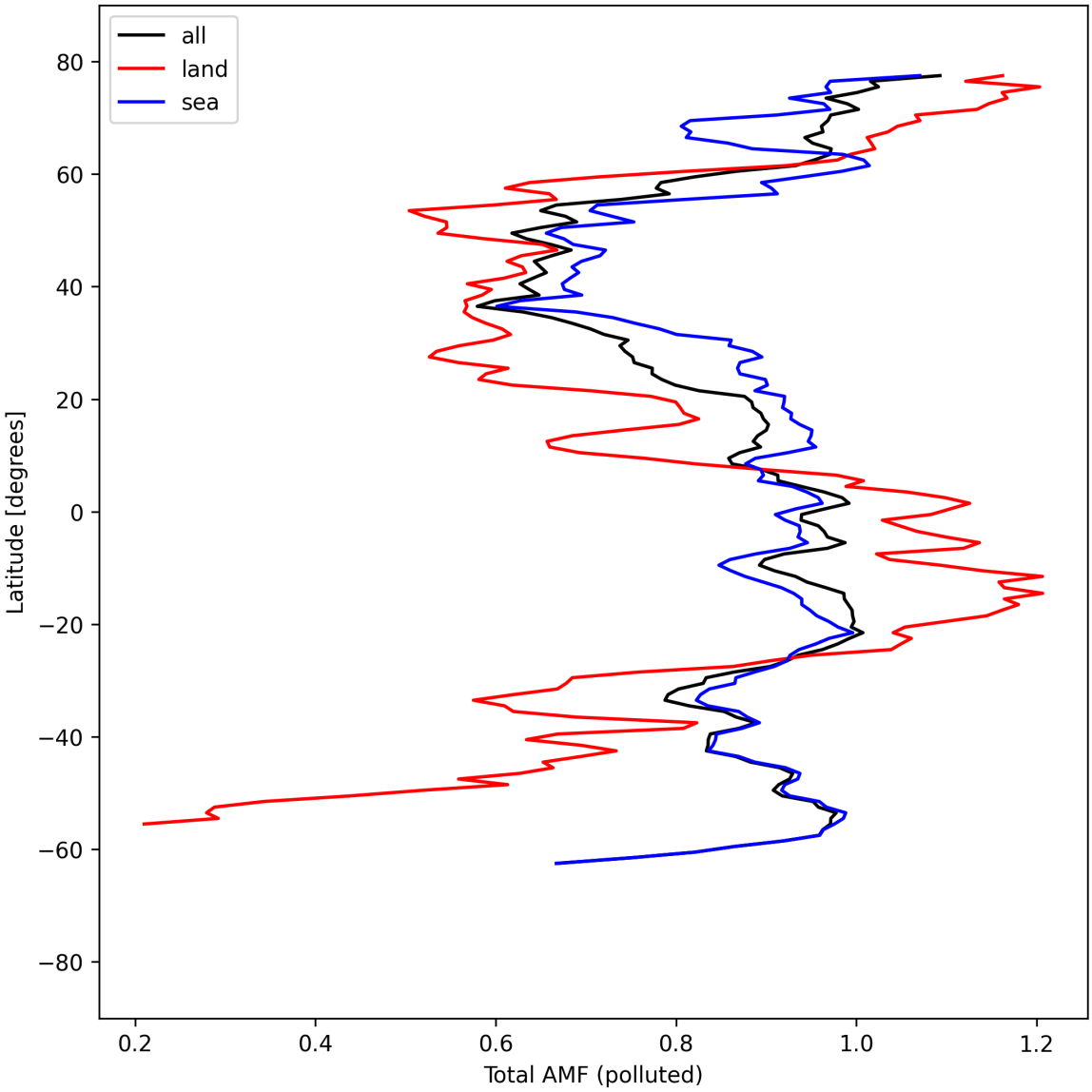

Figure 53: Zonal average of “Total AMF (polluted)” for 2025-04-07 to 2025-04-08.

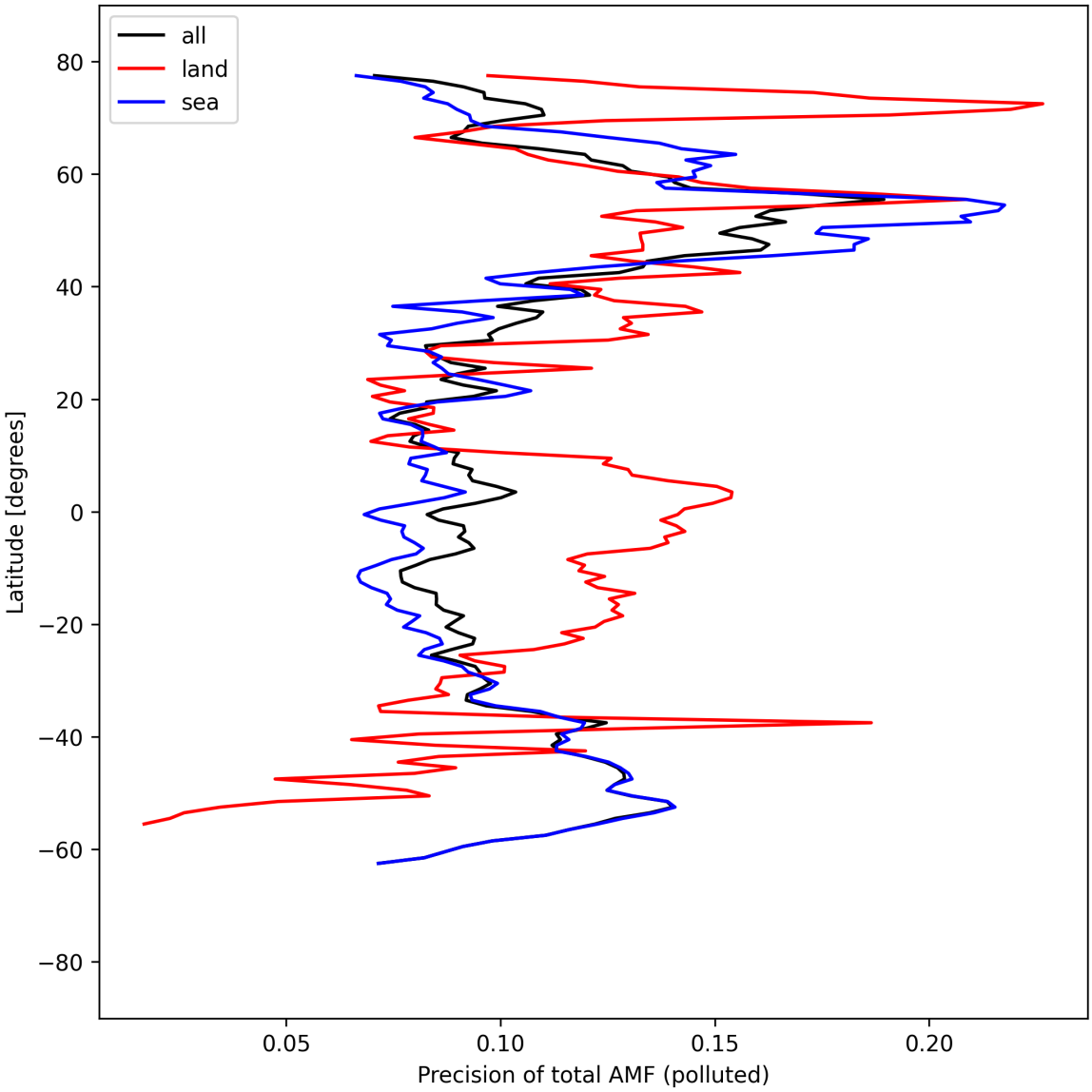

Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-04-07 to 2025-04-08.

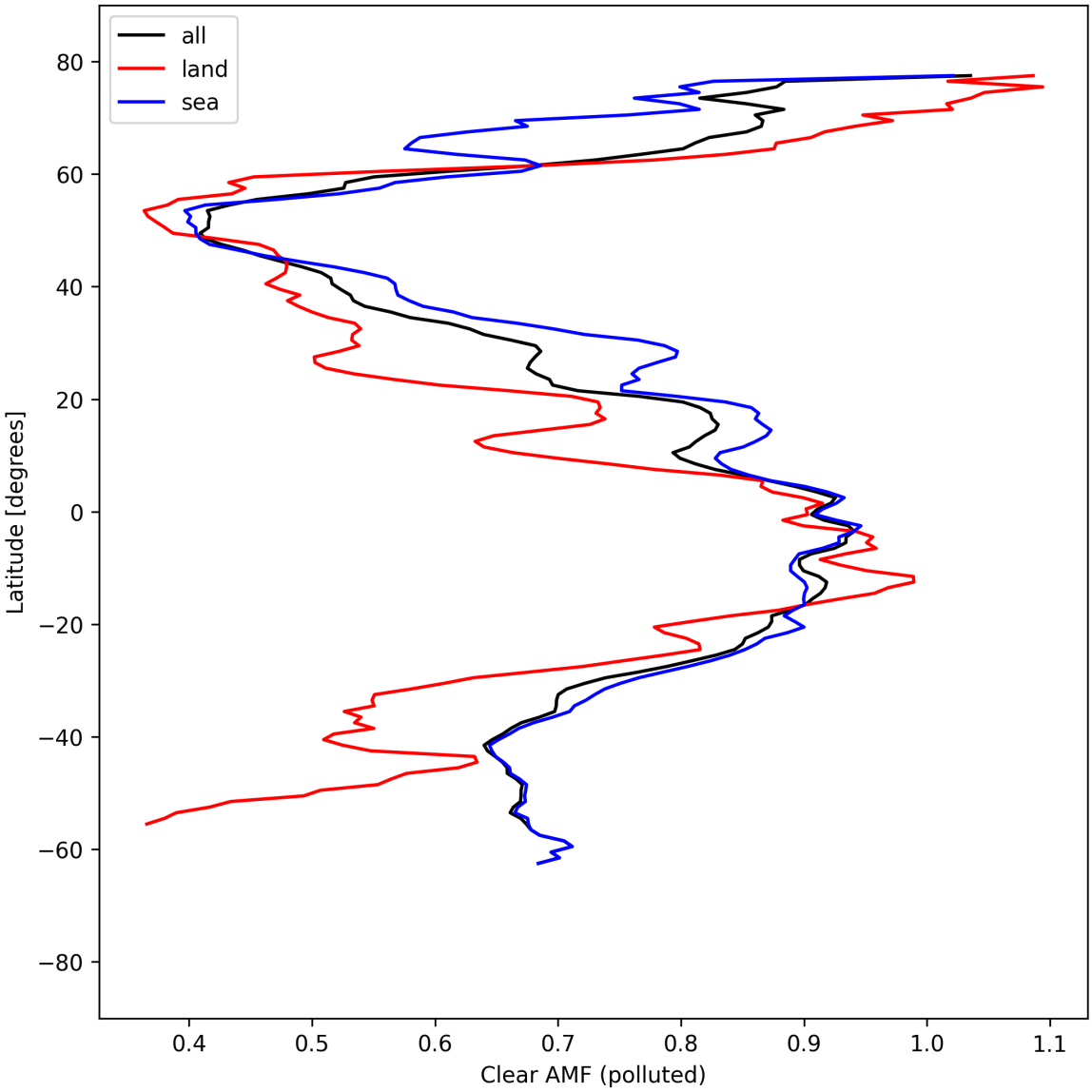

Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-04-07 to 2025-04-08.

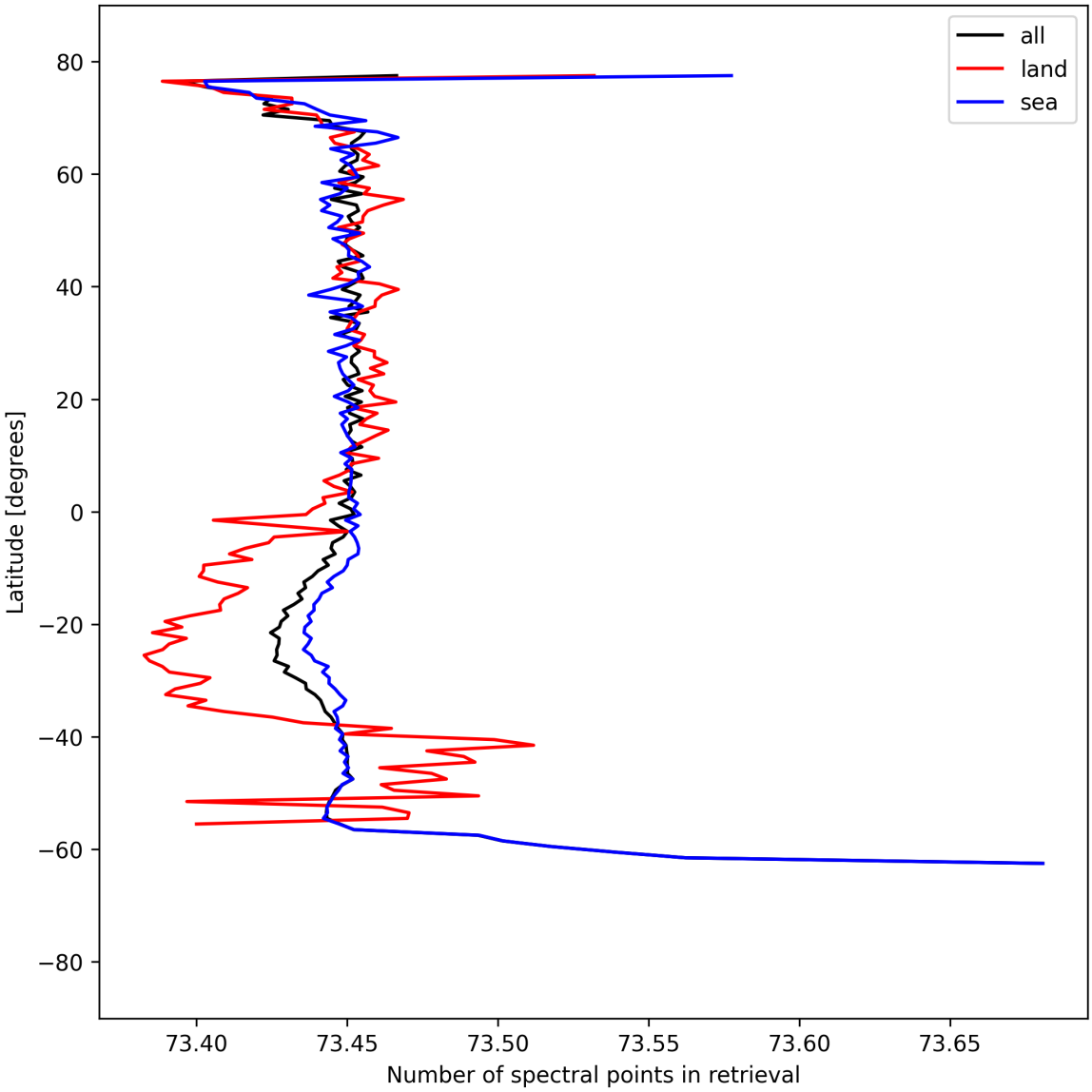

Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-04-07 to 2025-04-08.

8 Histograms

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

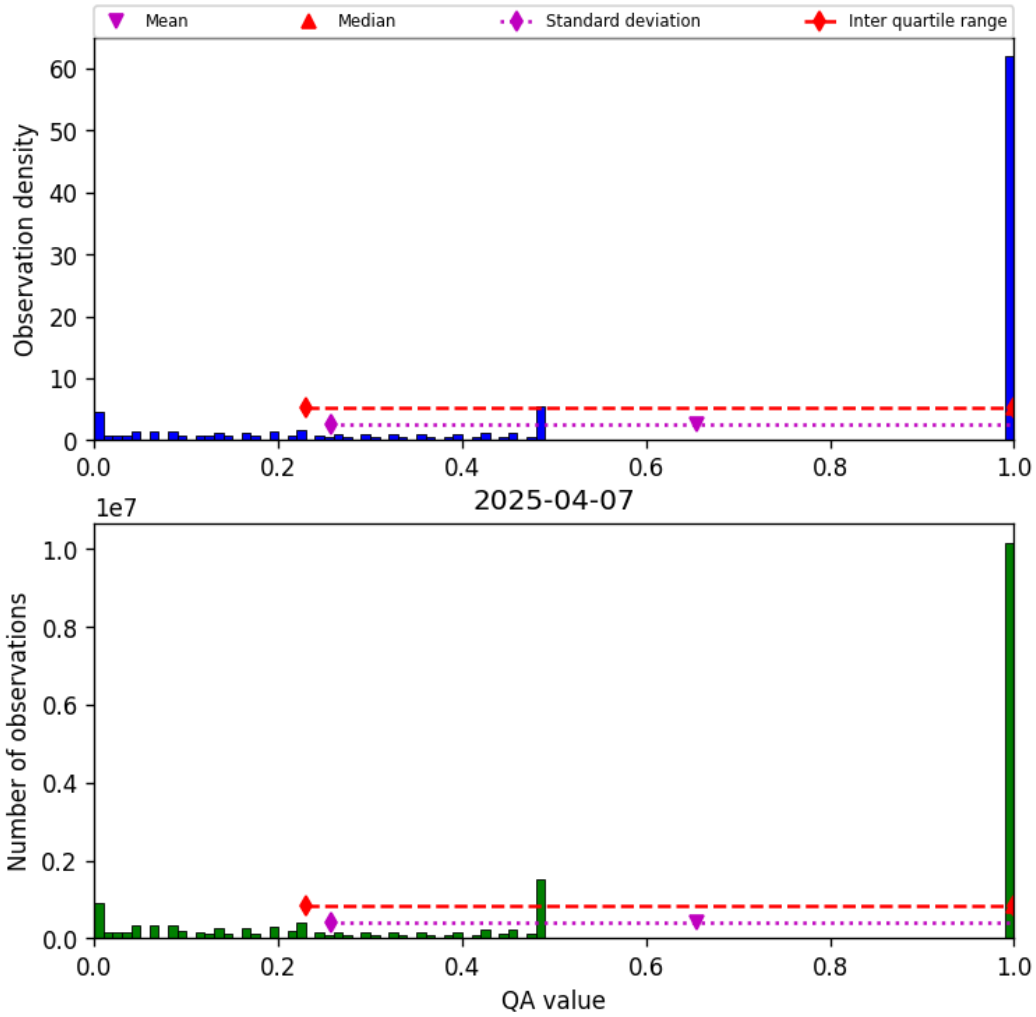

Figure 57: Histogram of “QA value” for 2025-04-07 to 2025-04-08

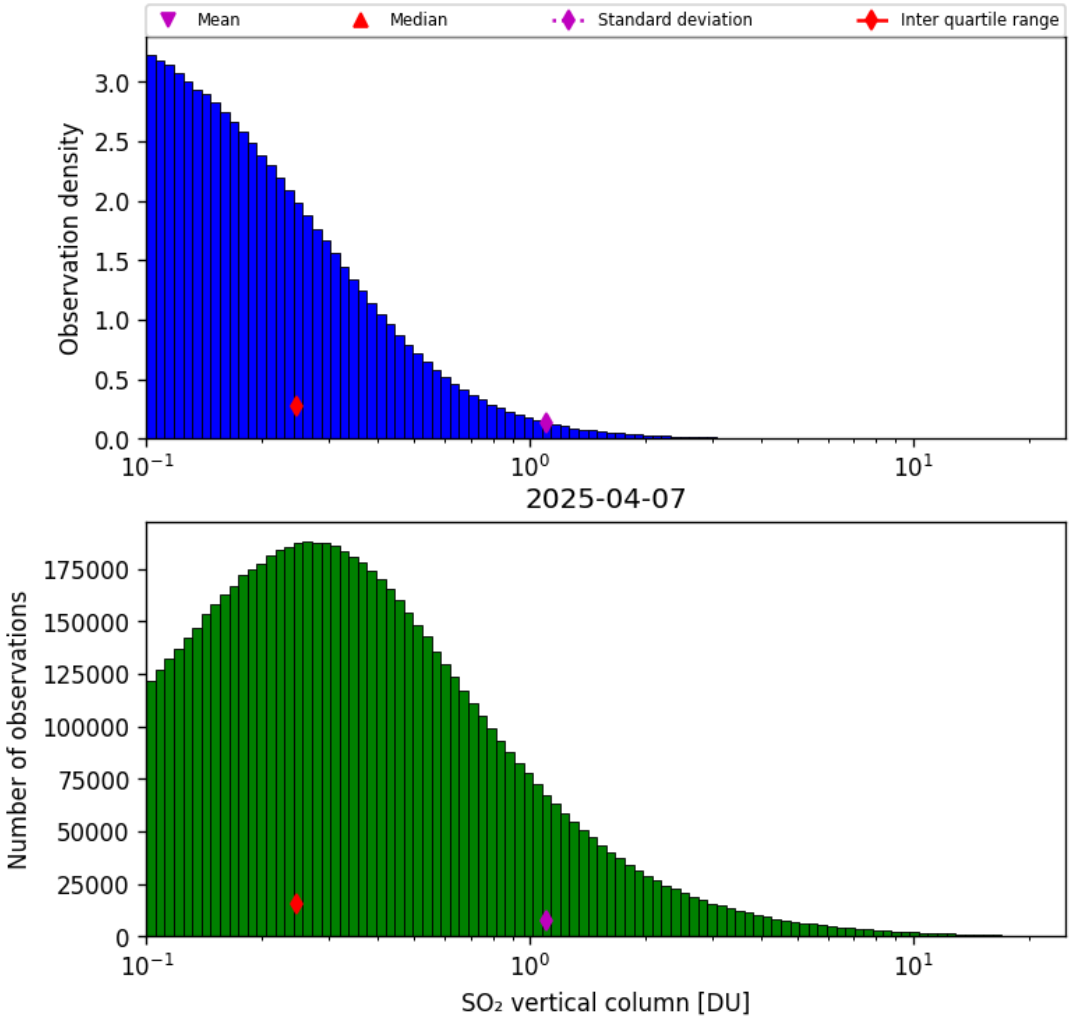

Figure 58: Histogram of "SO_2 vertical column" for 2025-04-07 to 2025-04-08

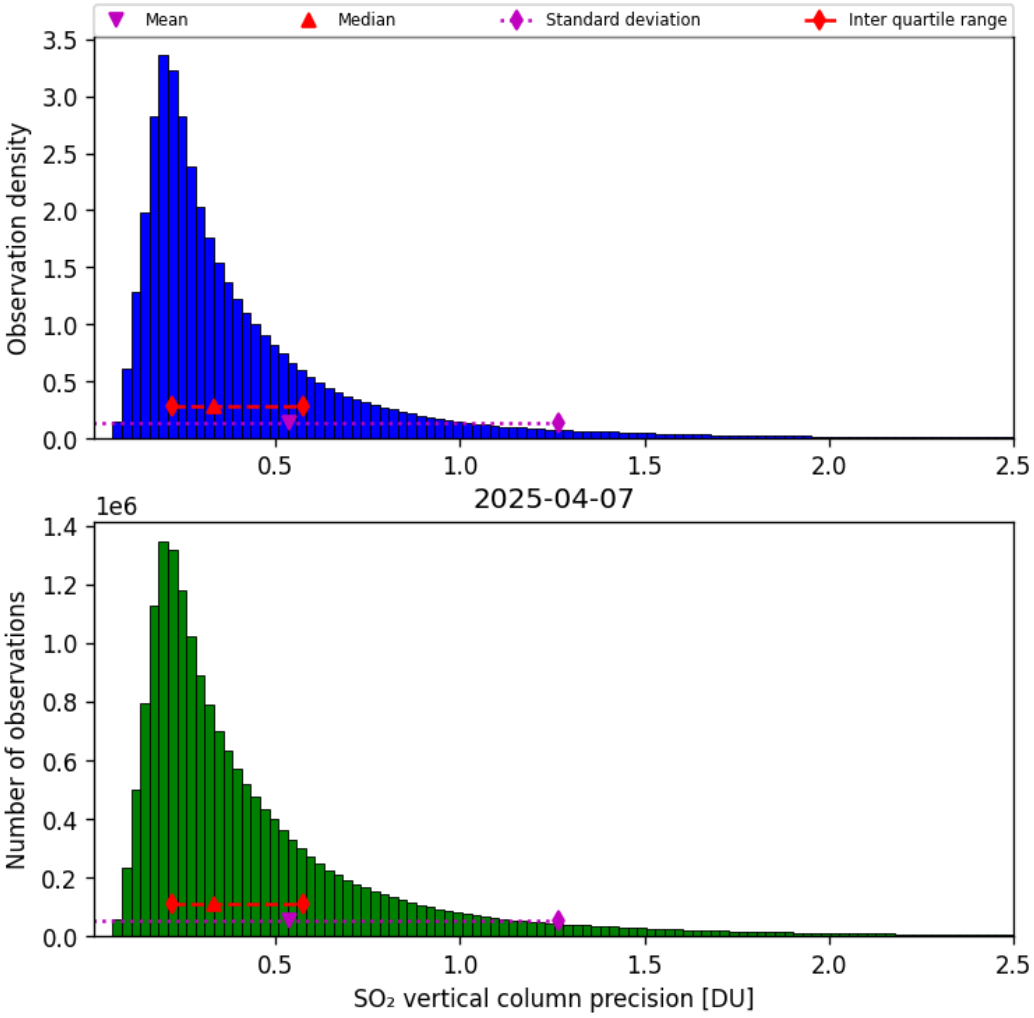

Figure 59: Histogram of "SO_2 vertical column precision" for 2025-04-07 to 2025-04-08

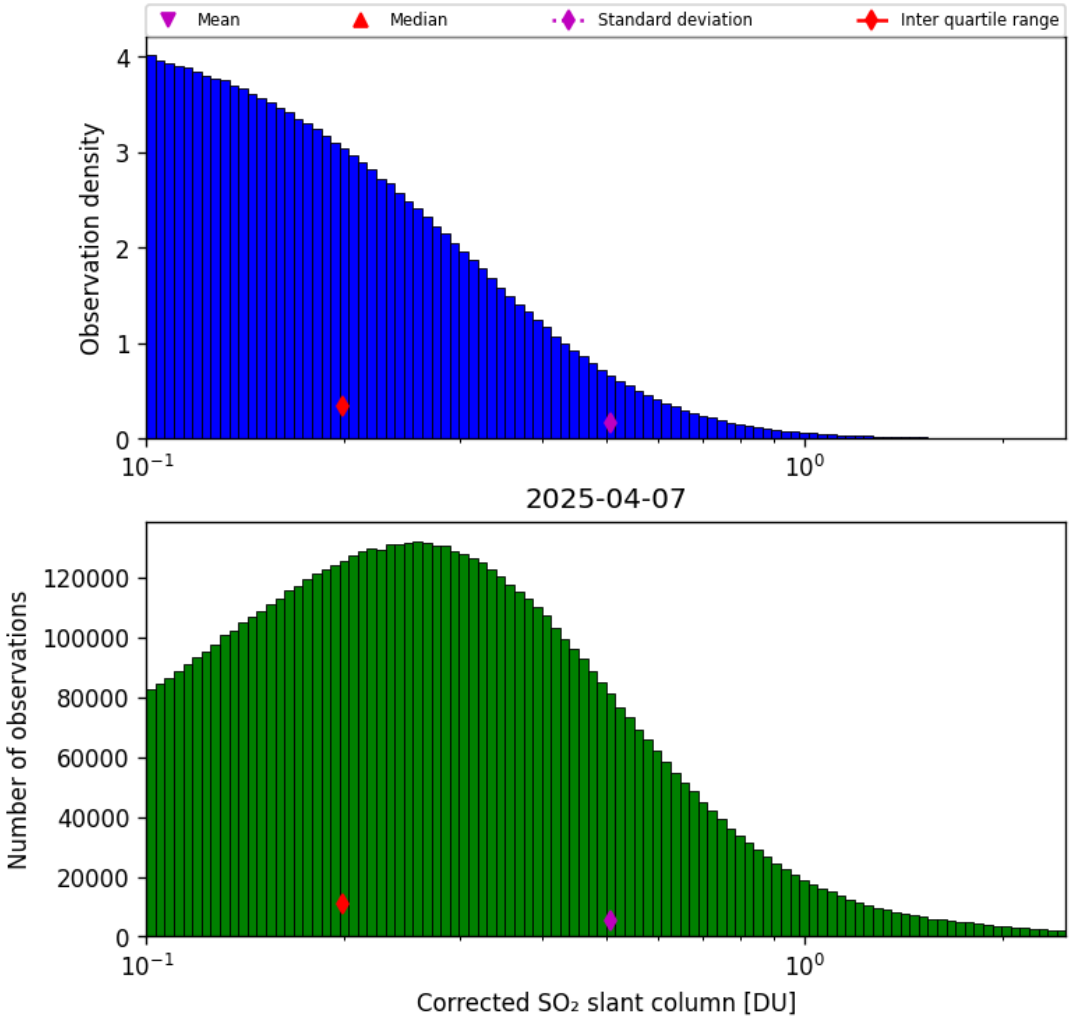

Figure 60: Histogram of "Corrected SO_2 slant column" for 2025-04-07 to 2025-04-08

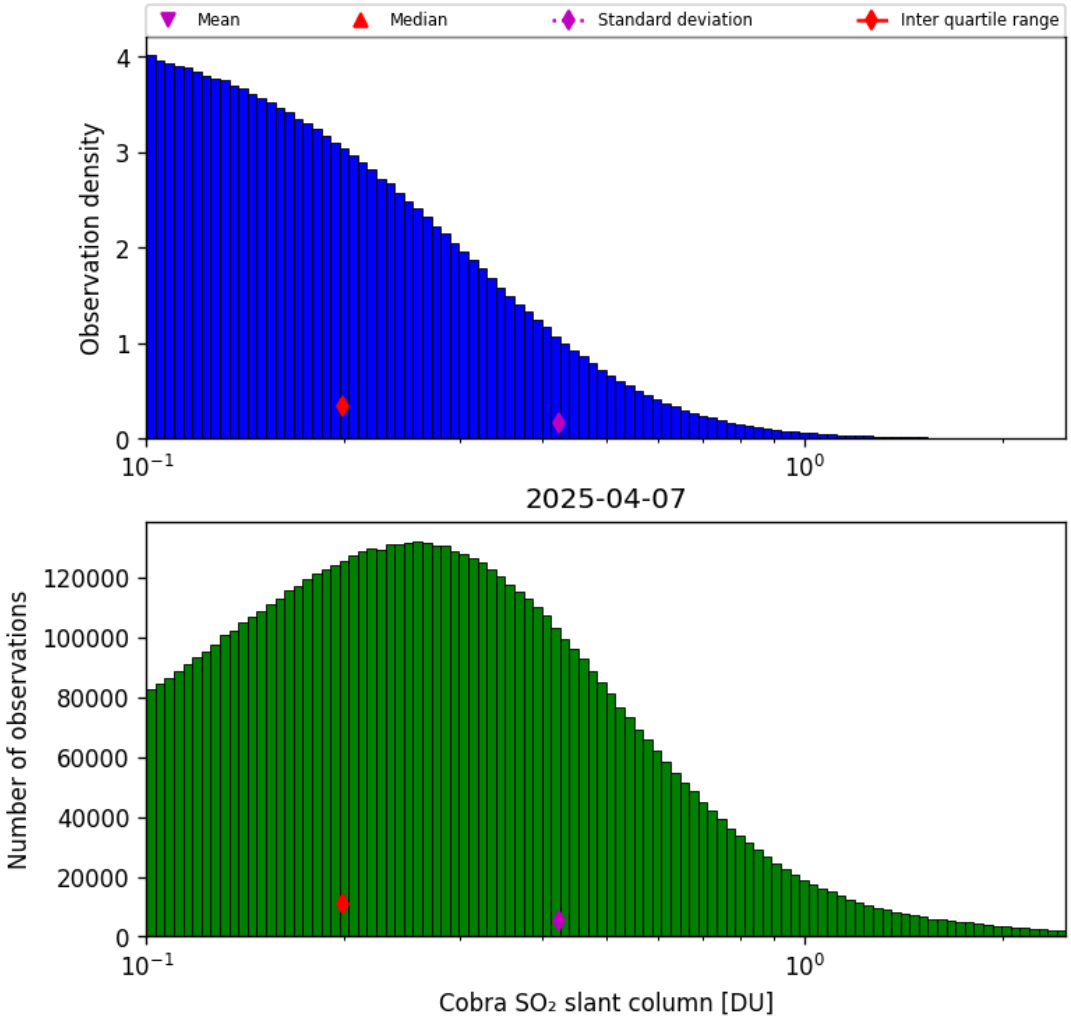

Figure 61: Histogram of “Cobra SO_2 slant column” for 2025-04-07 to 2025-04-08

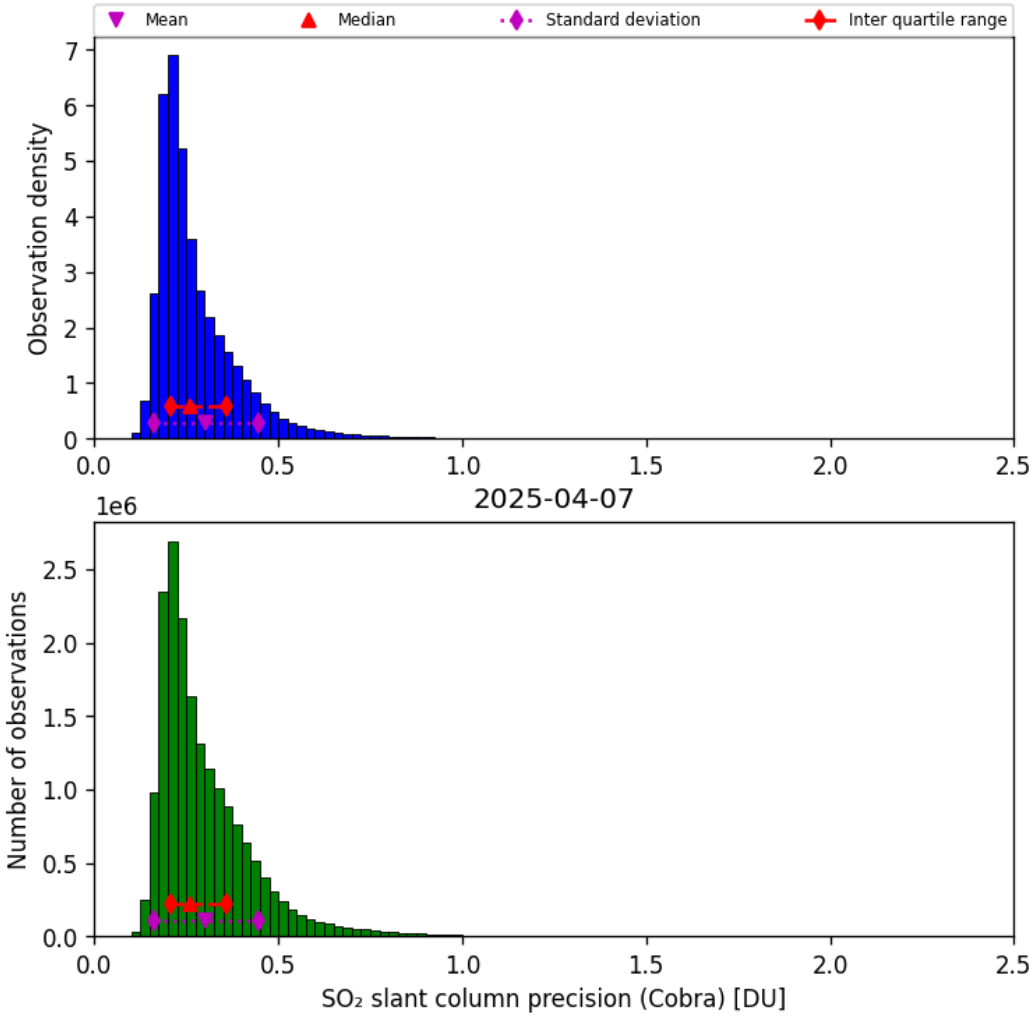

Figure 62: Histogram of "SO_2 slant column precision (Cobra)" for 2025-04-07 to 2025-04-08

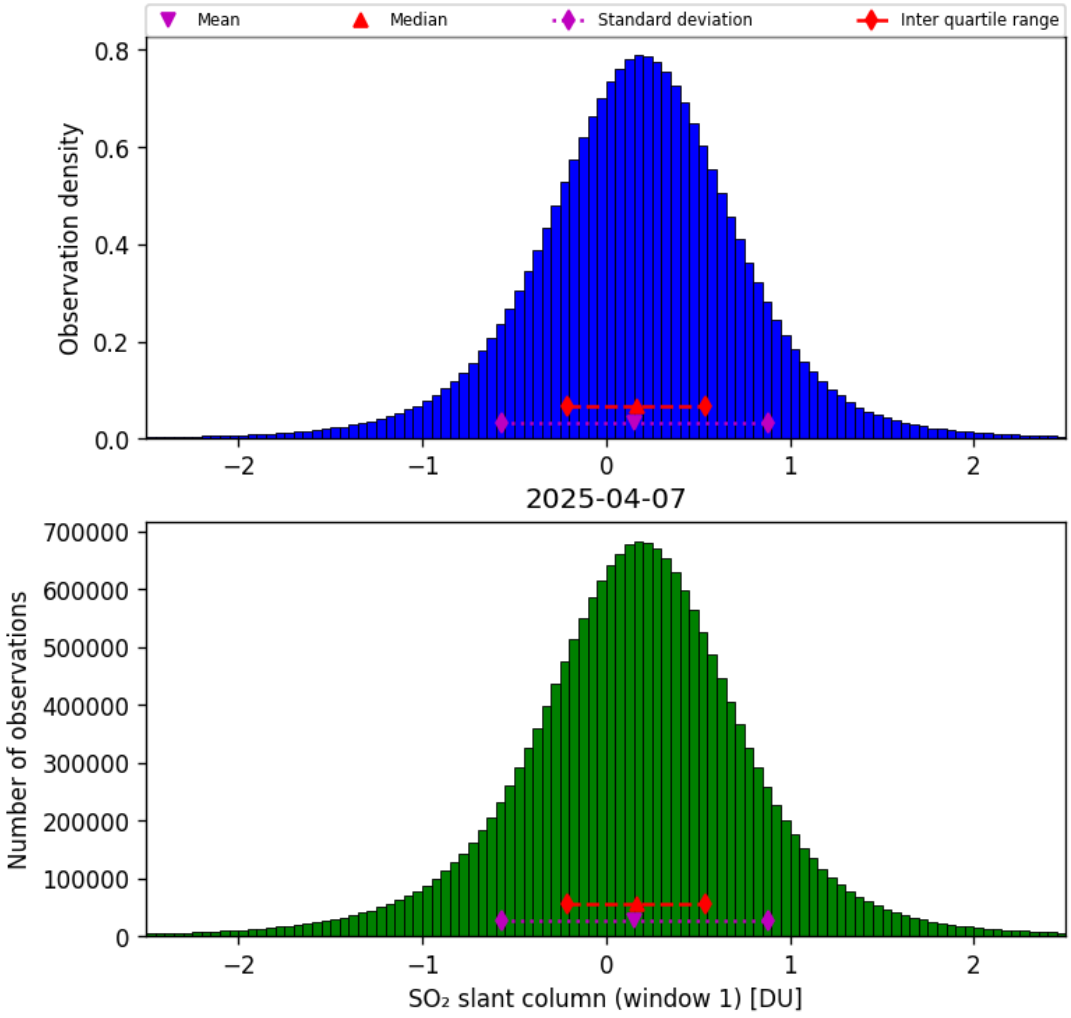

Figure 63: Histogram of "SO_2 slant column (window 1)" for 2025-04-07 to 2025-04-08

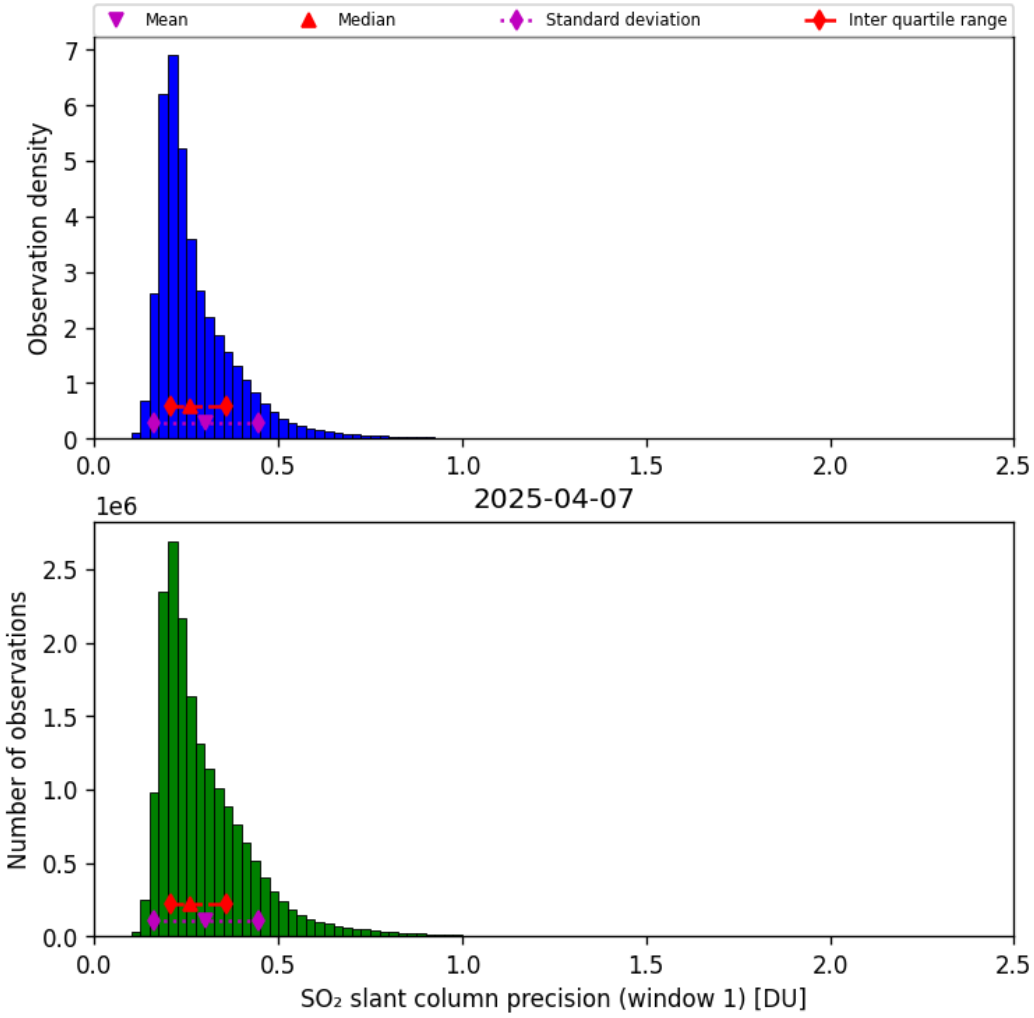

Figure 64: Histogram of "SO_2 slant column precision (window 1)" for 2025-04-07 to 2025-04-08

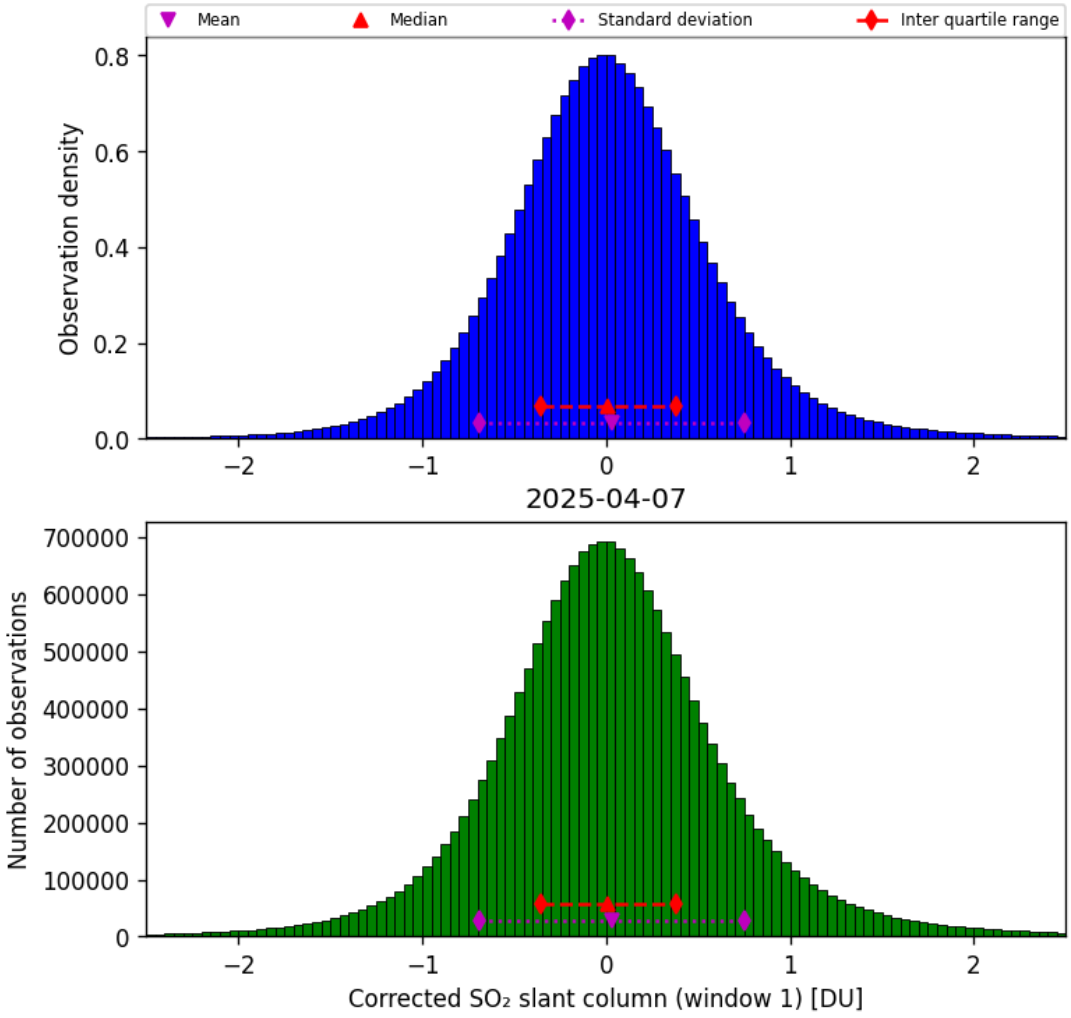

Figure 65: Histogram of "Corrected SO_2 slant column (window 1)" for 2025-04-07 to 2025-04-08

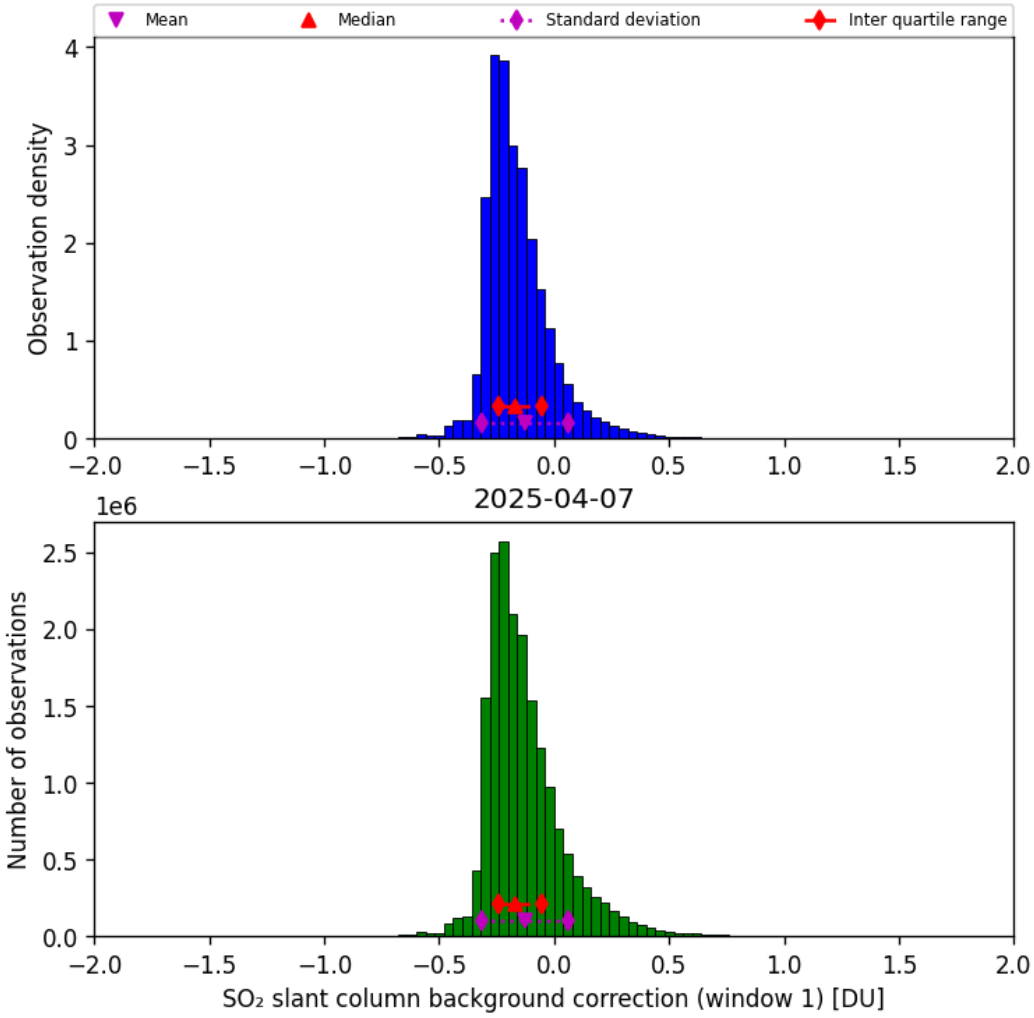

Figure 66: Histogram of "SO_2 slant column background correction (window 1)" for 2025-04-07 to 2025-04-08

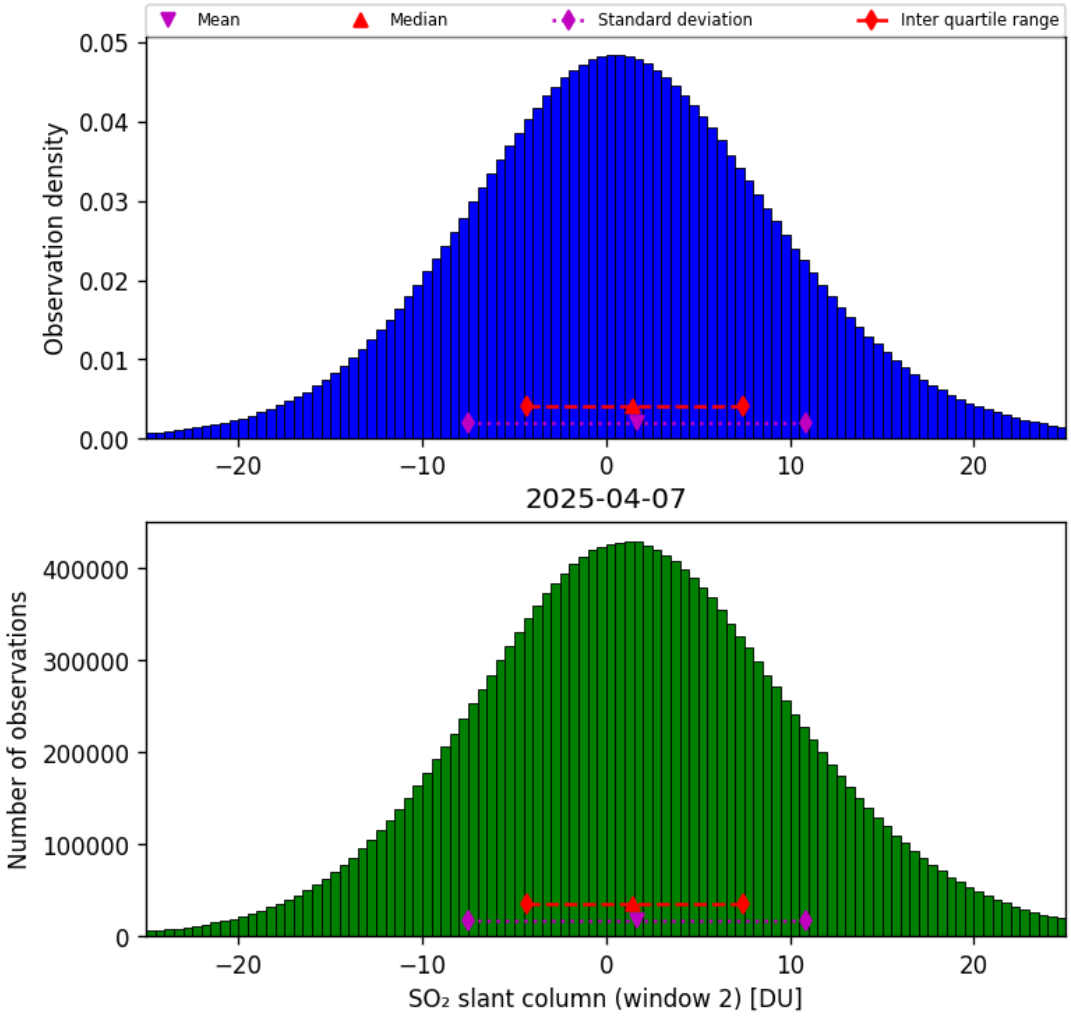

Figure 67: Histogram of "SO_2 slant column (window 2)" for 2025-04-07 to 2025-04-08

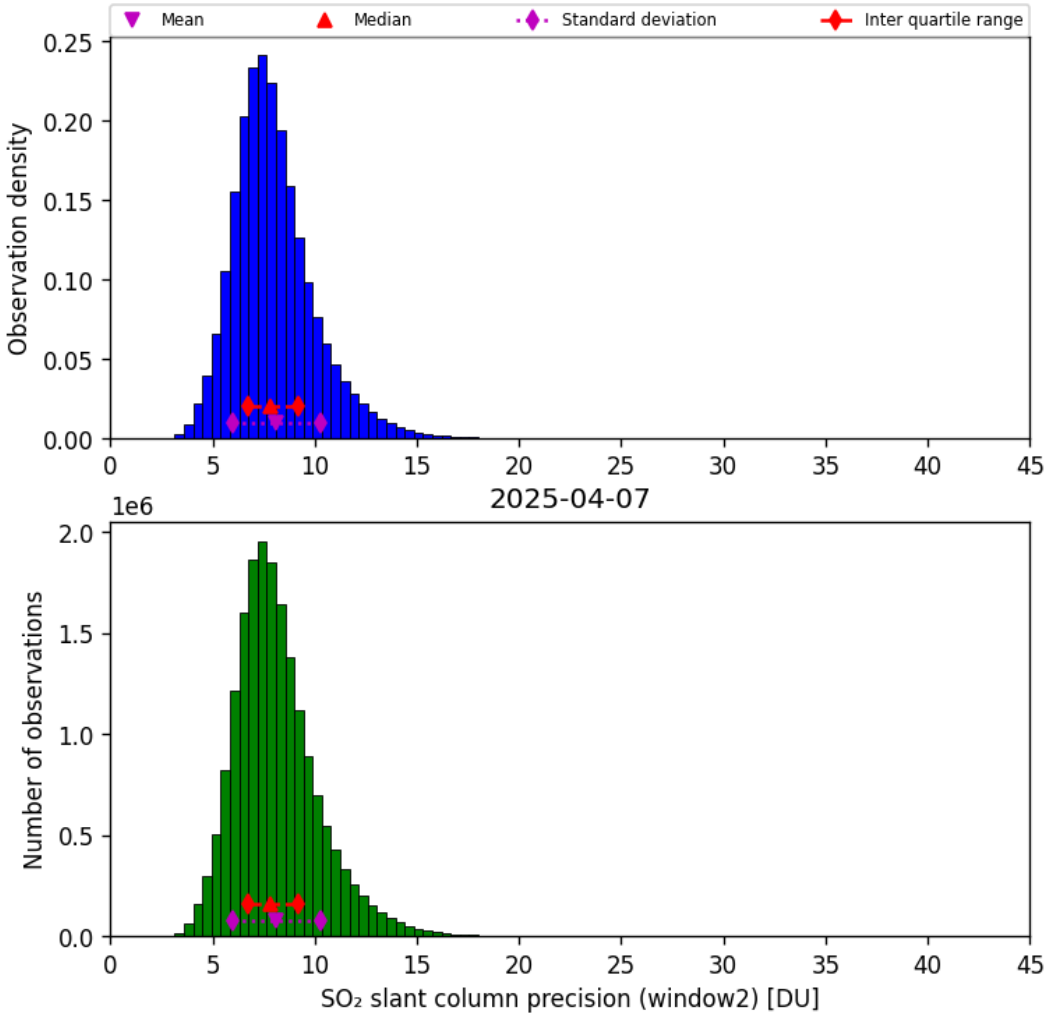

Figure 68: Histogram of "SO_2 slant column precision (window2)" for 2025-04-07 to 2025-04-08

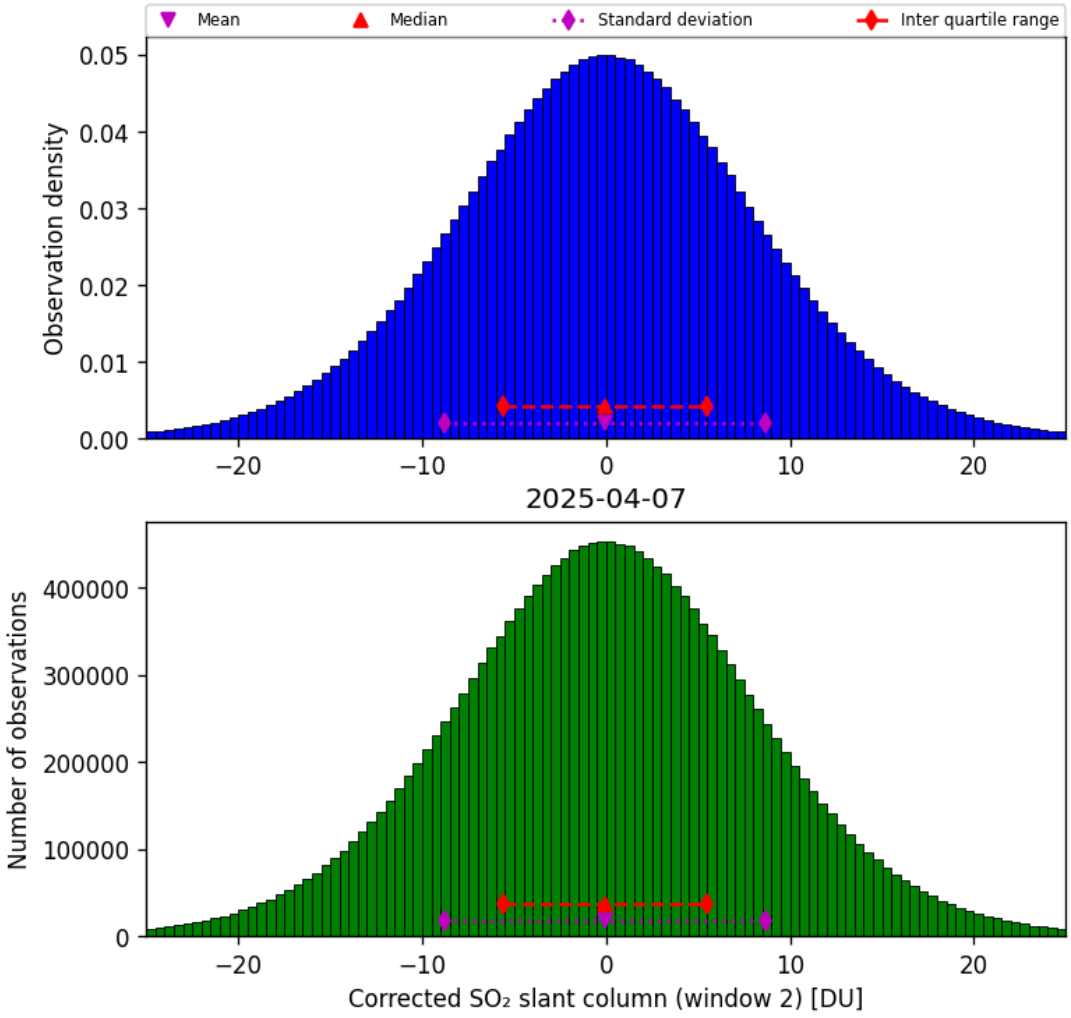

Figure 69: Histogram of "Corrected SO_2 slant column (window 2)" for 2025-04-07 to 2025-04-08

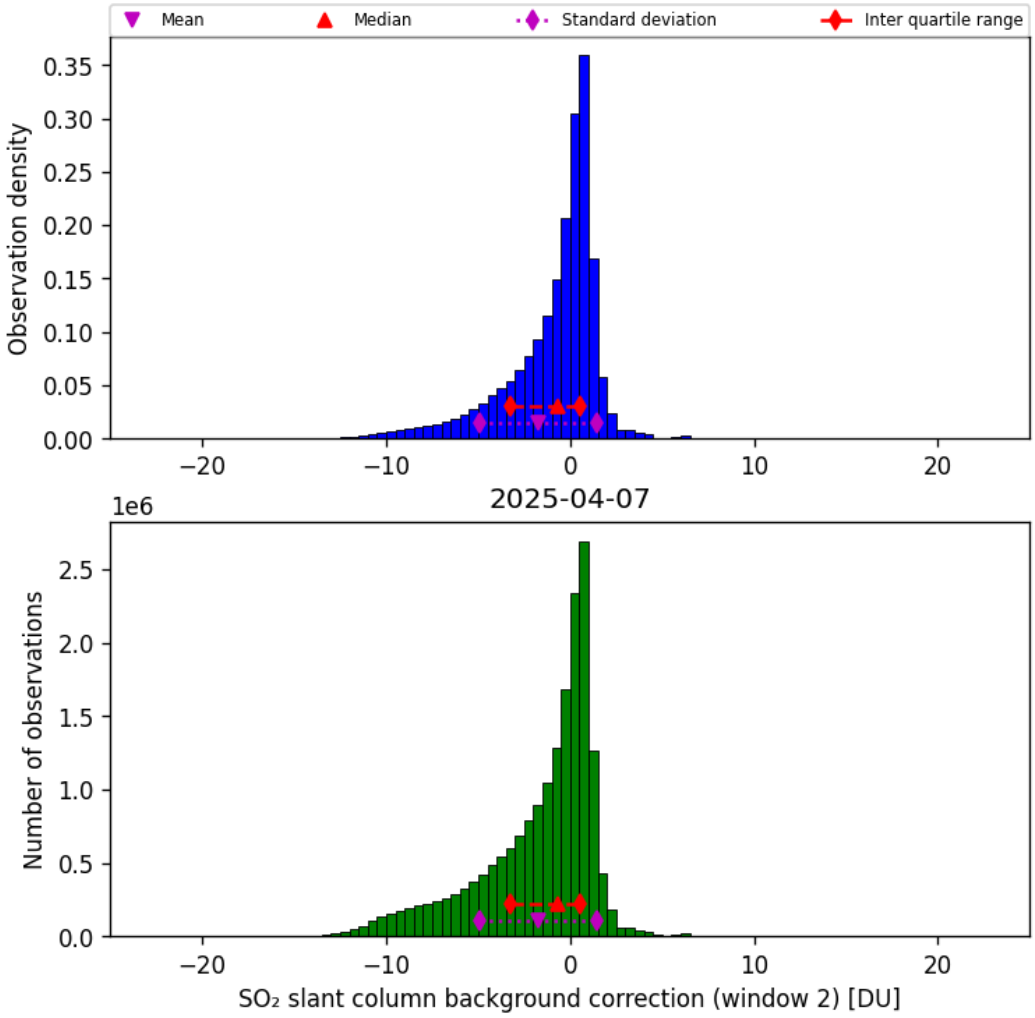

Figure 70: Histogram of "SO_2 slant column background correction (window 2)" for 2025-04-07 to 2025-04-08

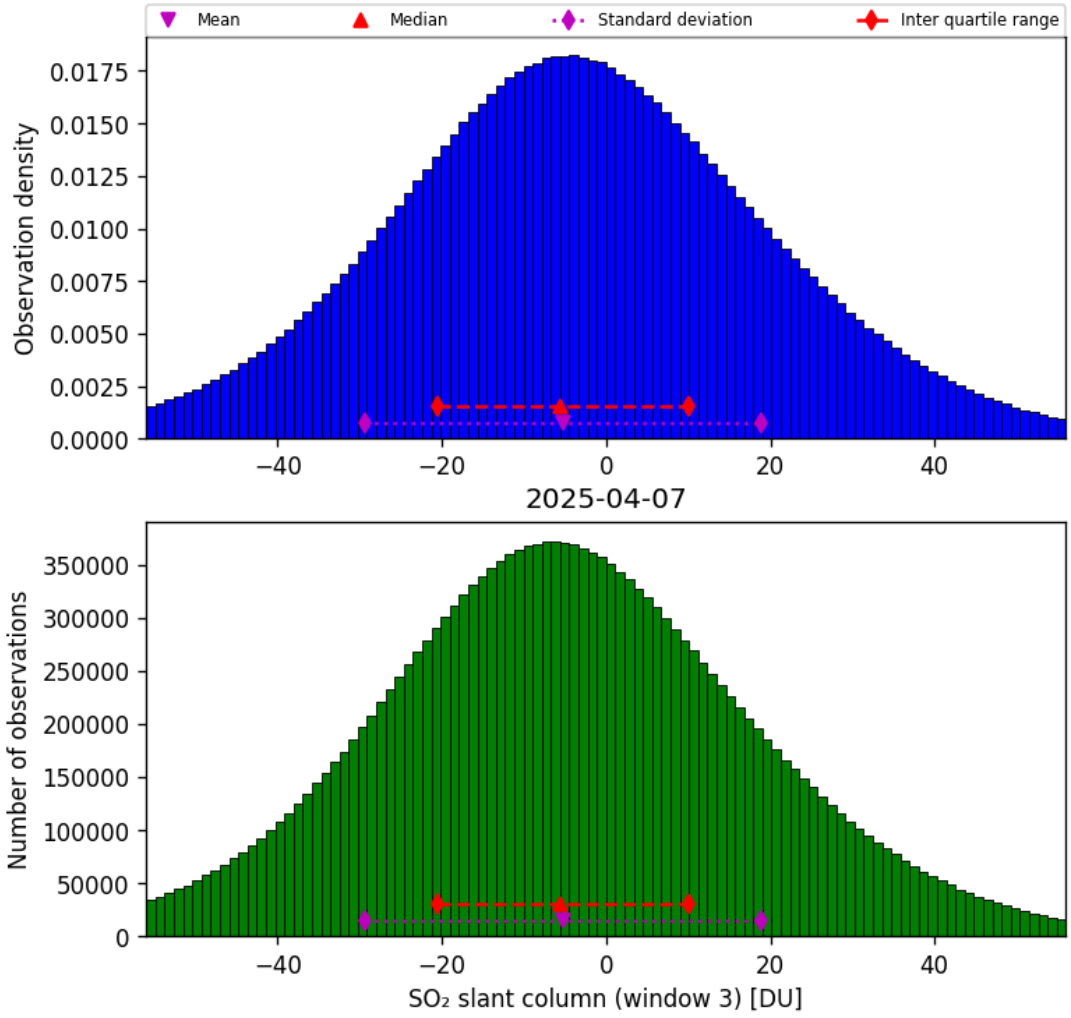

Figure 71: Histogram of "SO_2 slant column (window 3)" for 2025-04-07 to 2025-04-08

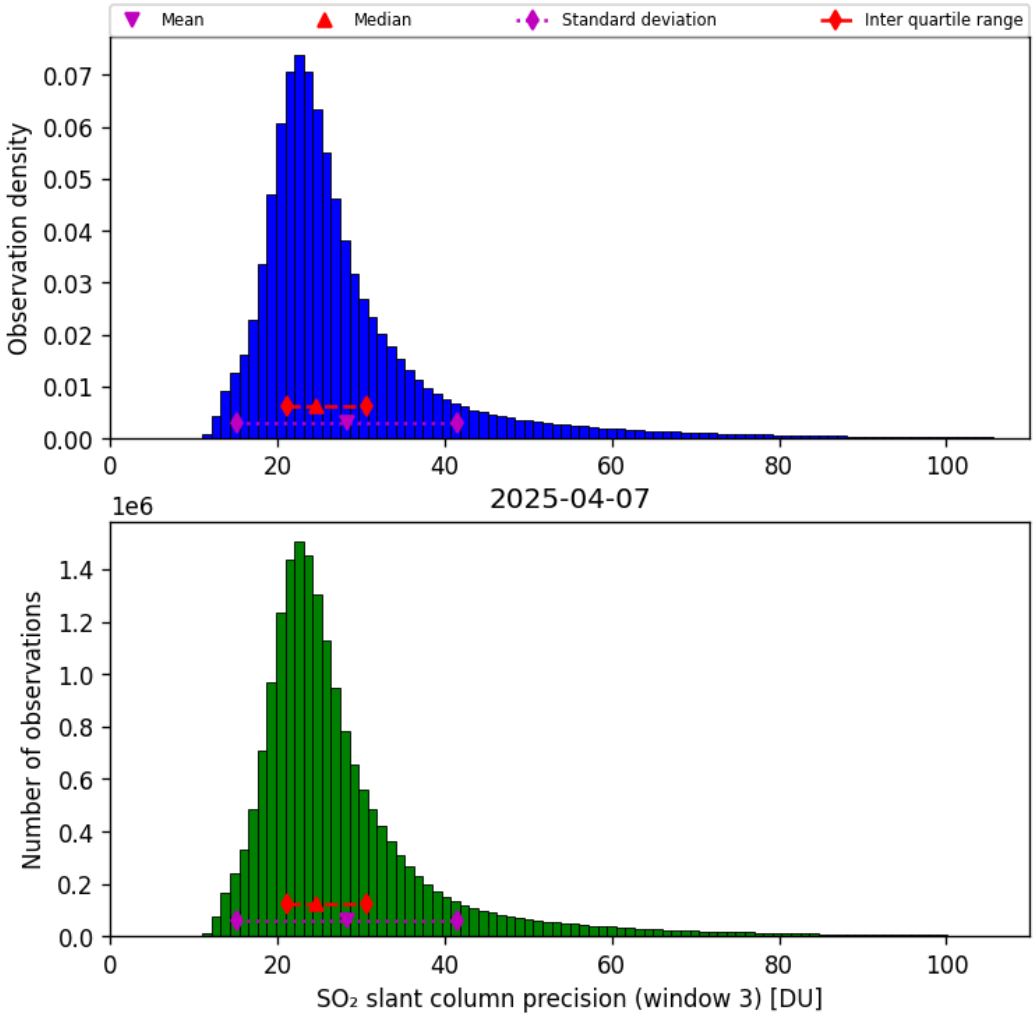

Figure 72: Histogram of "SO_2 slant column precision (window 3)" for 2025-04-07 to 2025-04-08

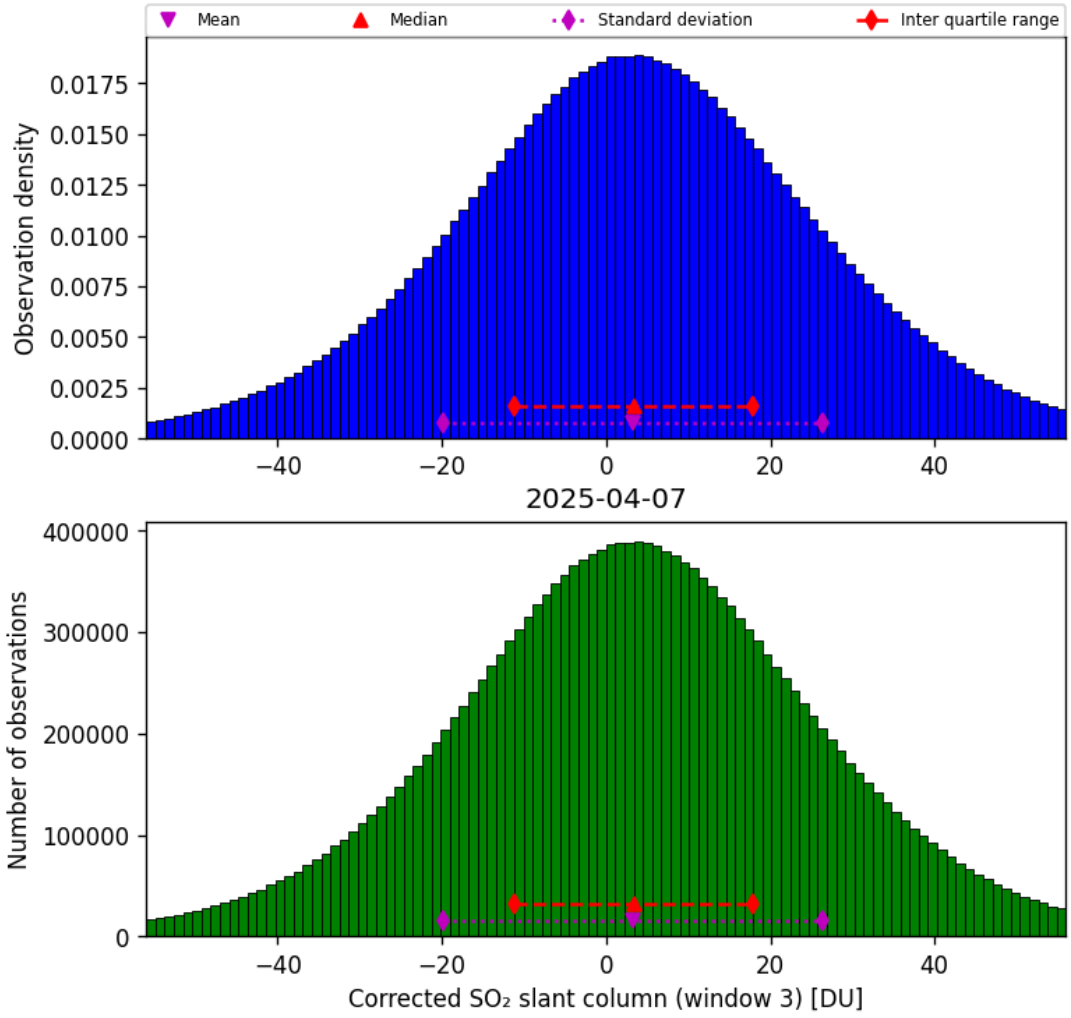

Figure 73: Histogram of "Corrected SO_2 slant column (window 3)" for 2025-04-07 to 2025-04-08

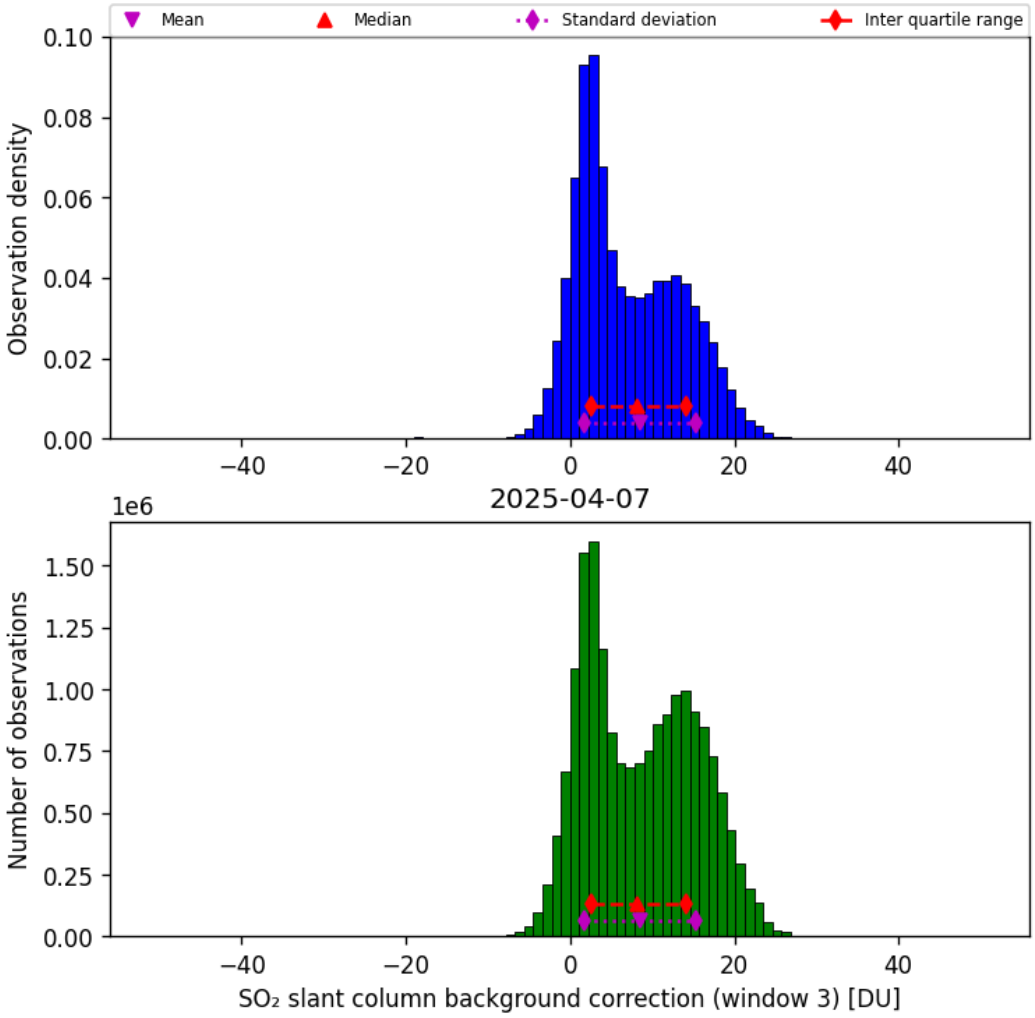

Figure 74: Histogram of "SO_2 slant column background correction (window 3)" for 2025-04-07 to 2025-04-08

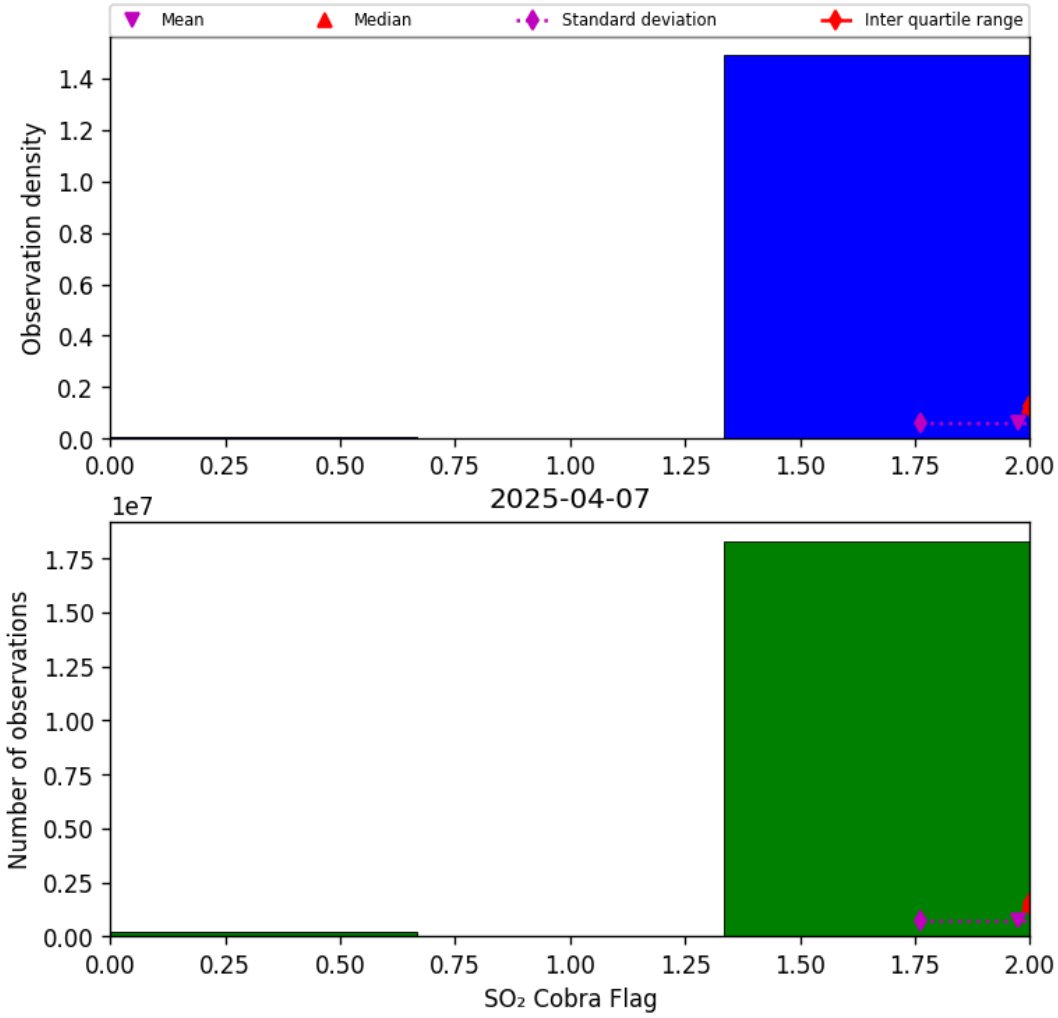

Figure 75: Histogram of "SO_2 Cobra Flag" for 2025-04-07 to 2025-04-08

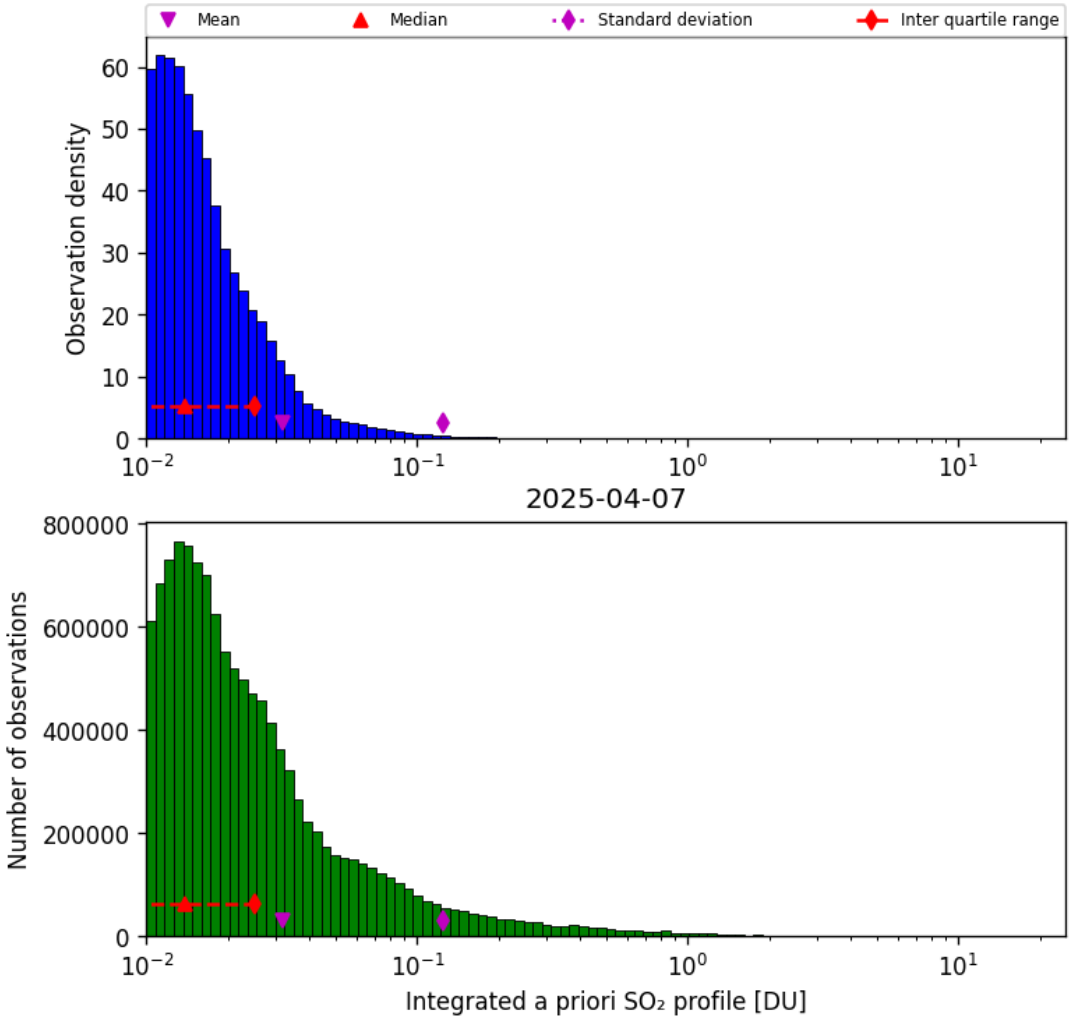

Figure 76: Histogram of “Integrated a priori SO_2 profile” for 2025-04-07 to 2025-04-08

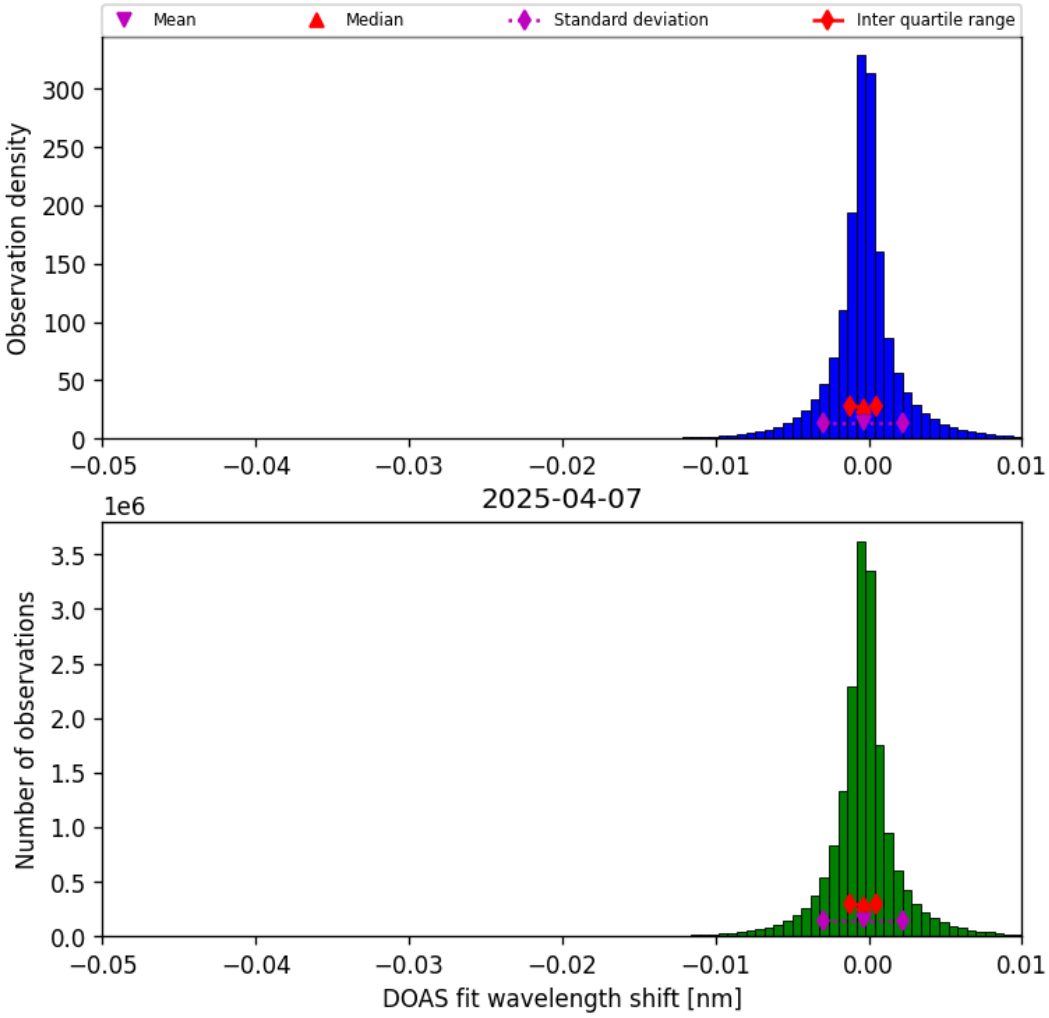

Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-04-07 to 2025-04-08

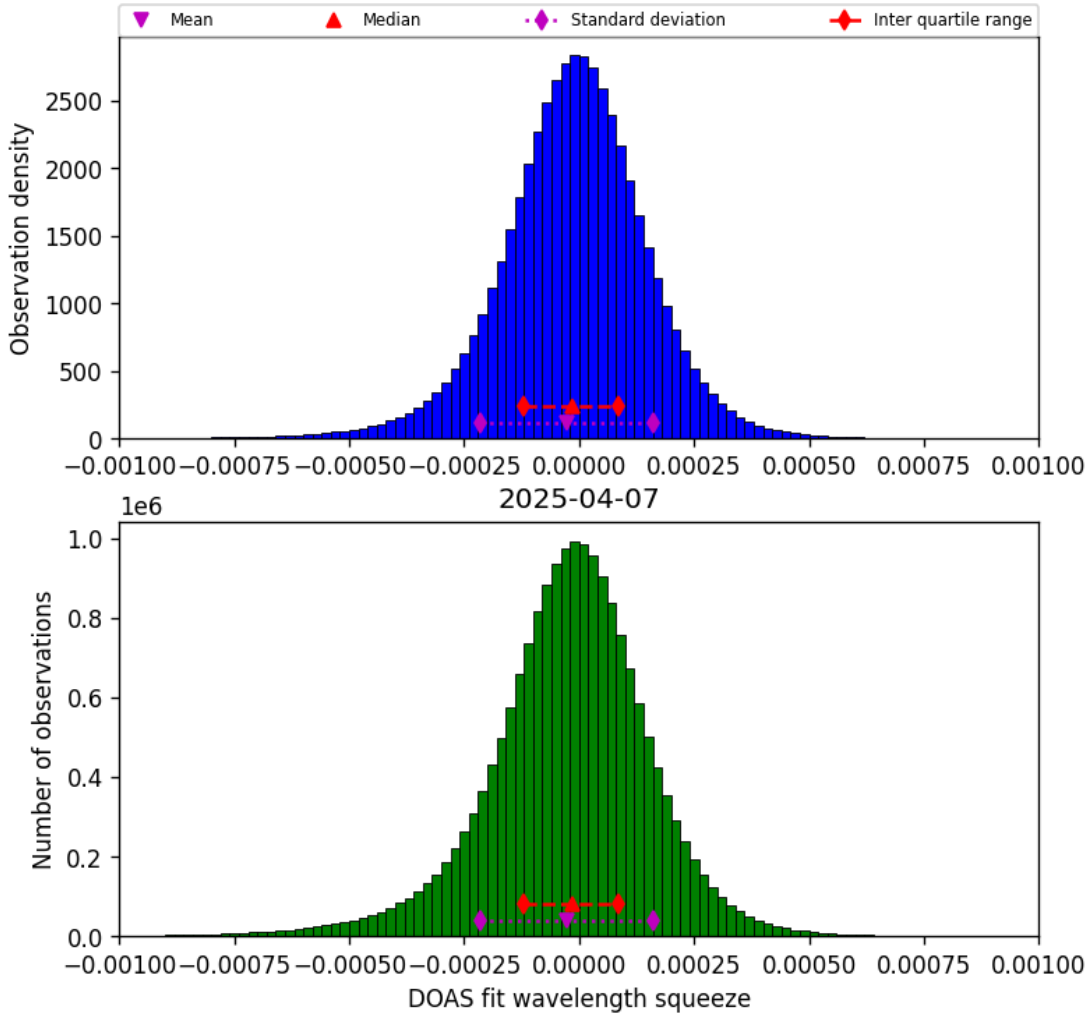

Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-04-07 to 2025-04-08

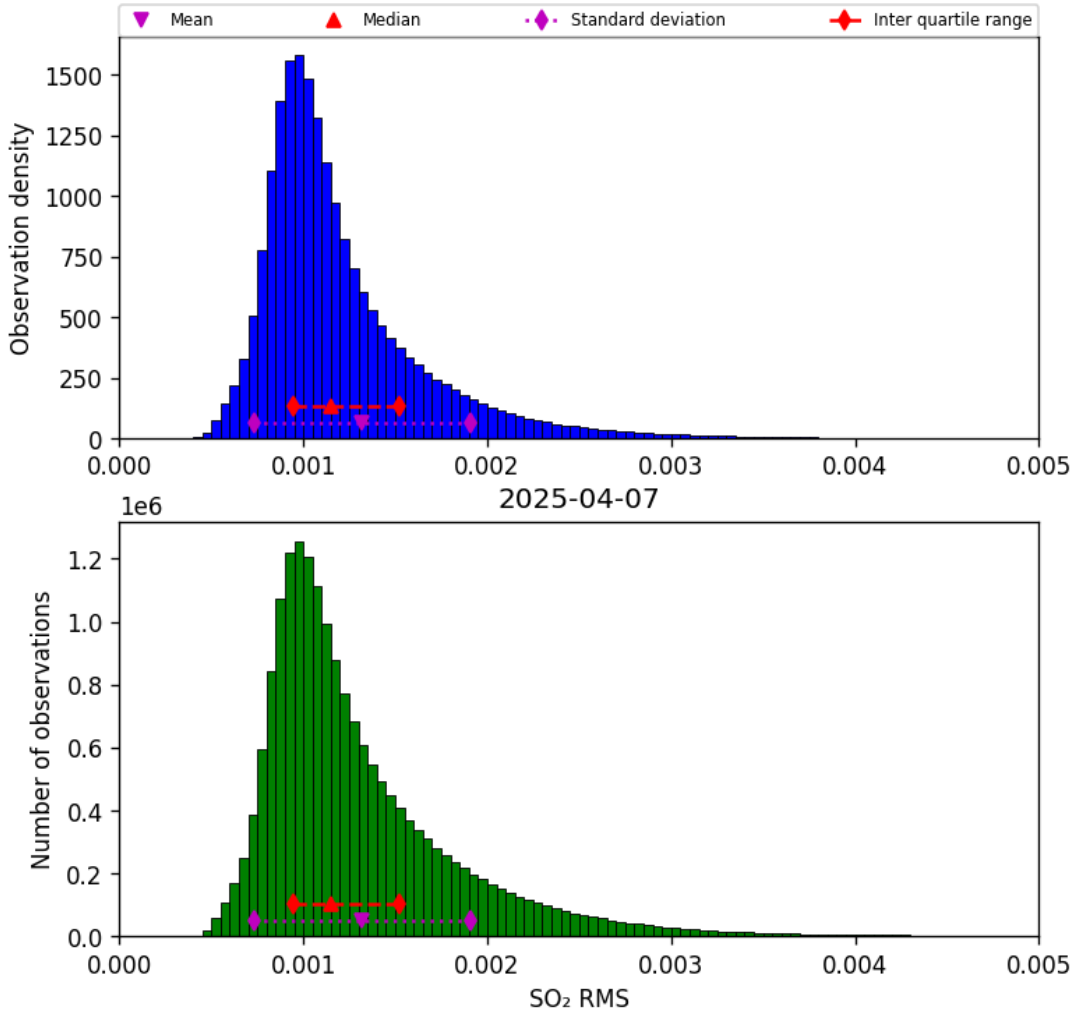

Figure 79: Histogram of "SO_2 RMS" for 2025-04-07 to 2025-04-08

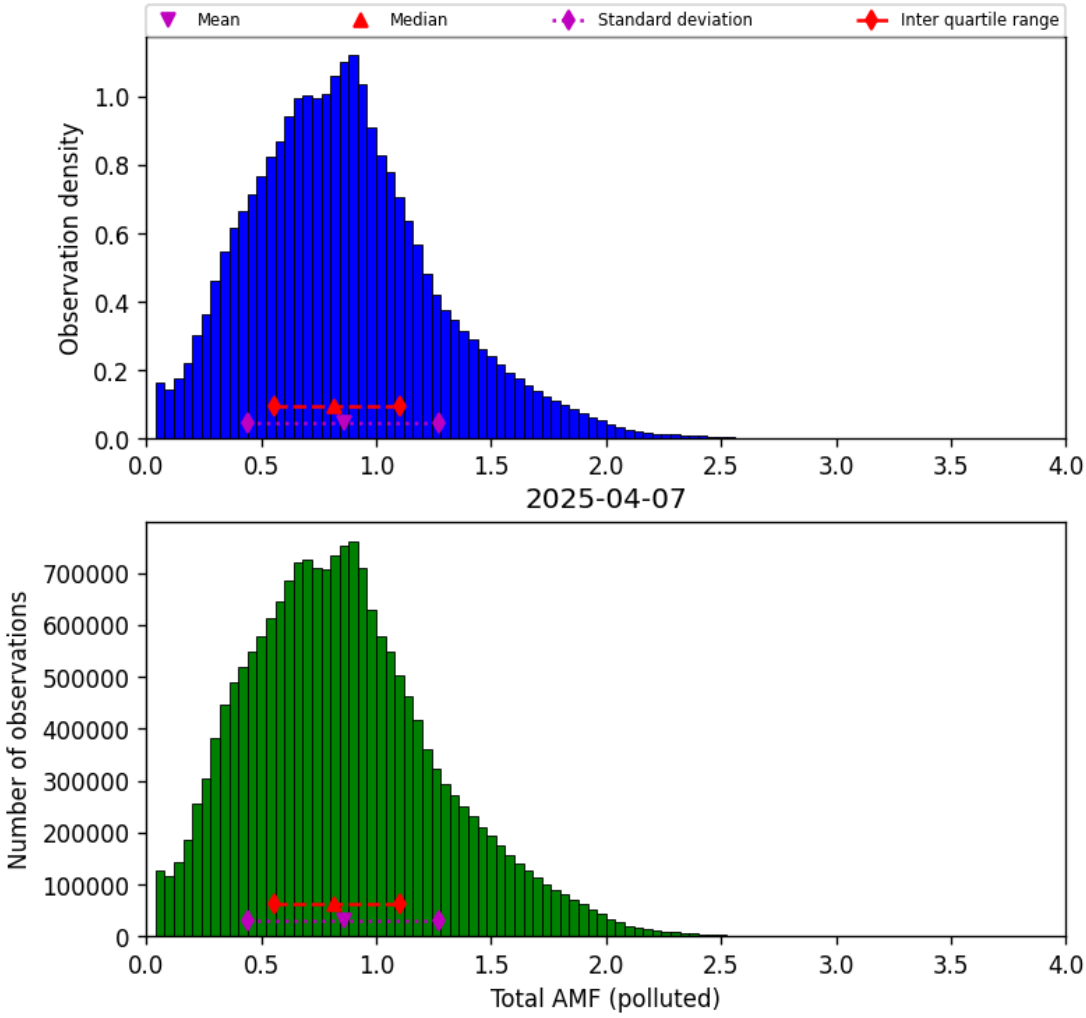

Figure 80: Histogram of “Total AMF (polluted)” for 2025-04-07 to 2025-04-08

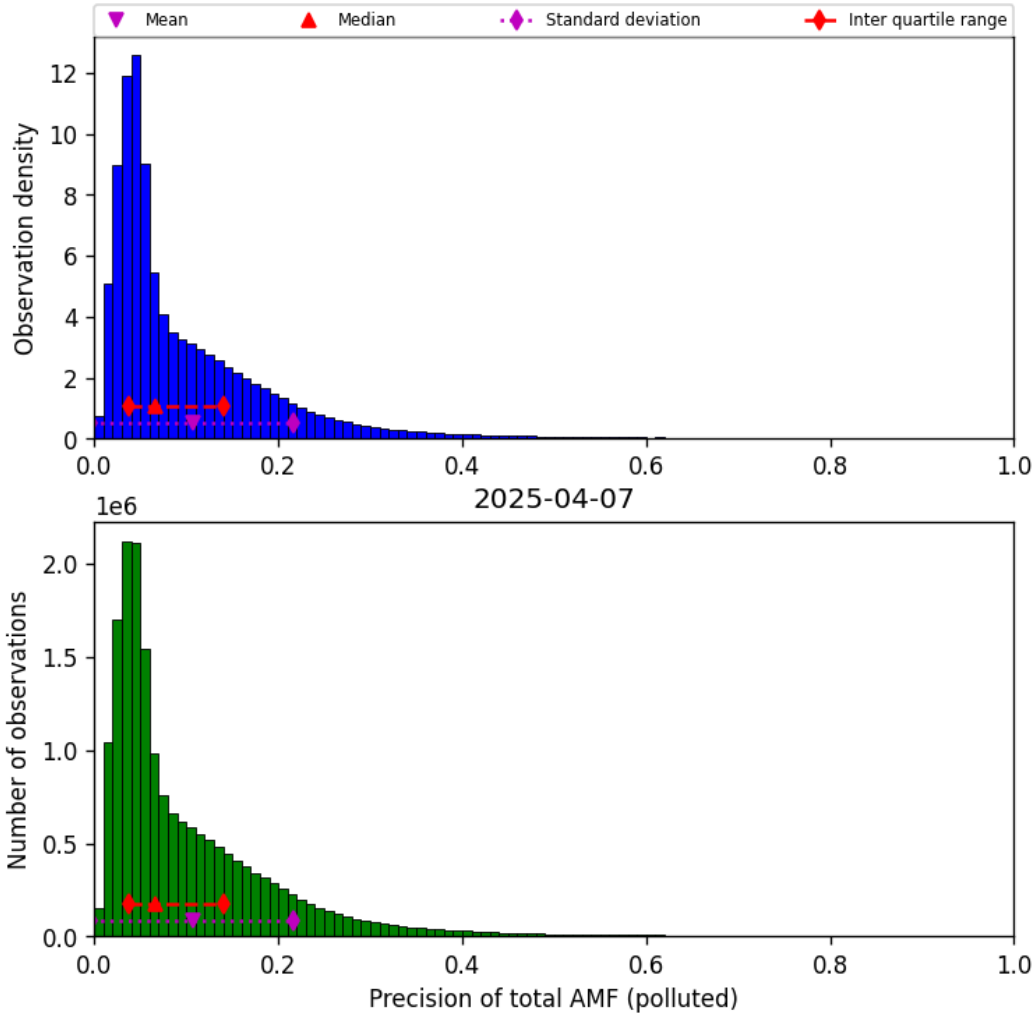

Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-04-07 to 2025-04-08

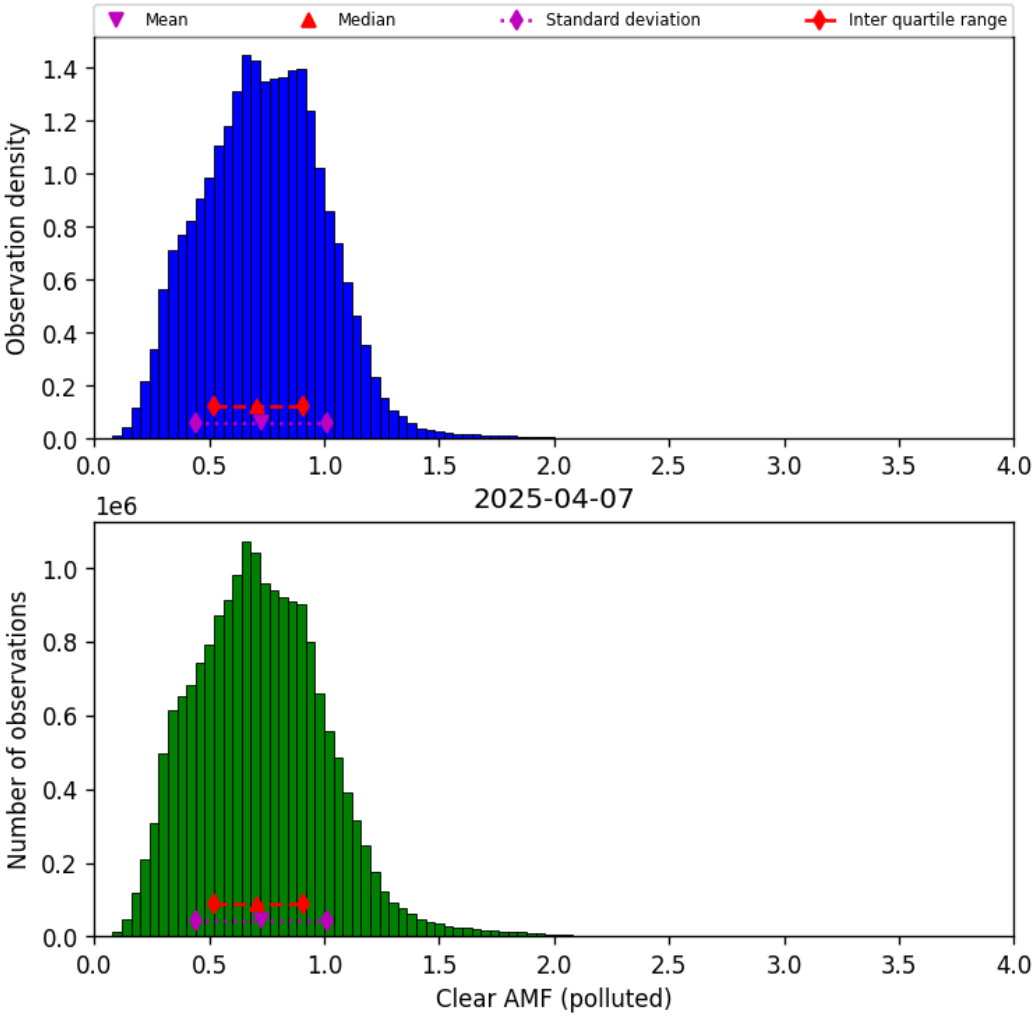

Figure 82: Histogram of “Clear AMF (polluted)” for 2025-04-07 to 2025-04-08

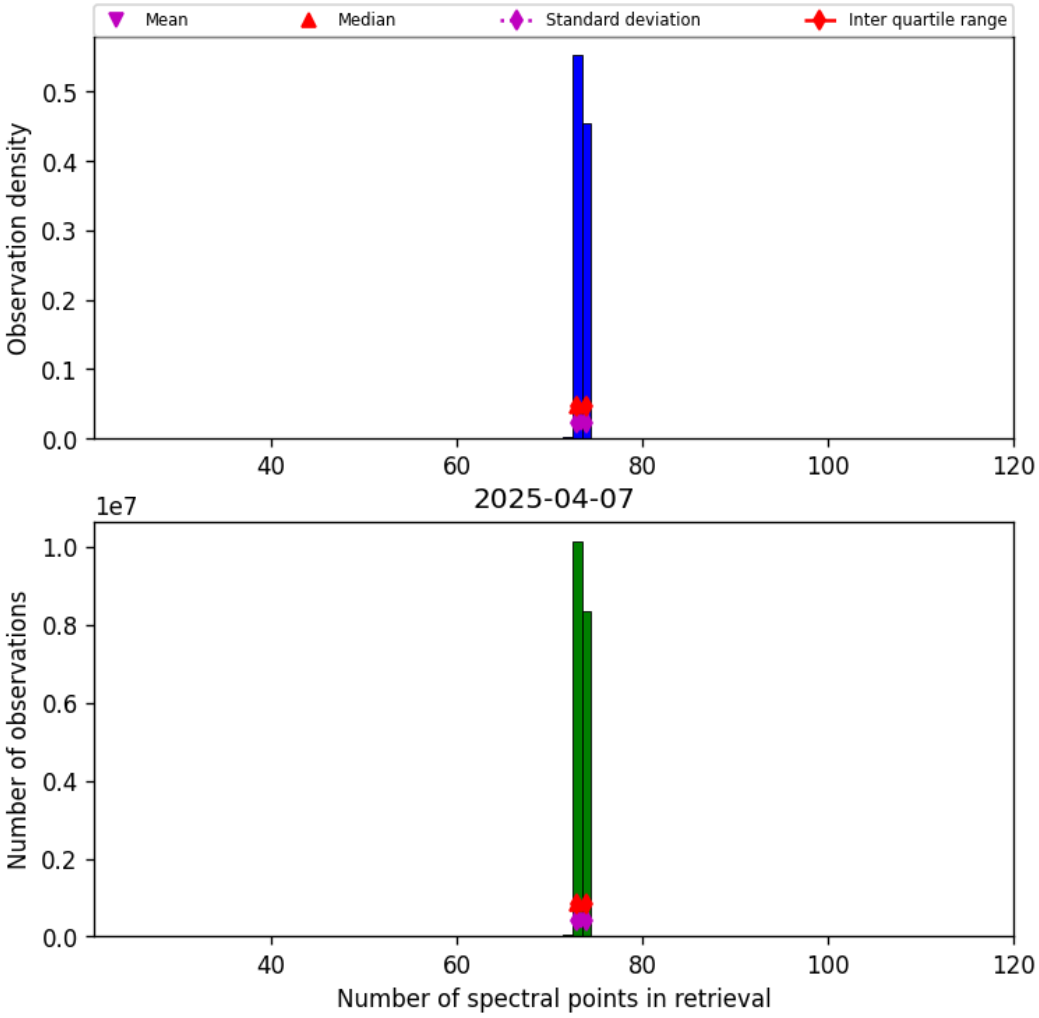

Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-04-07 to 2025-04-08

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.

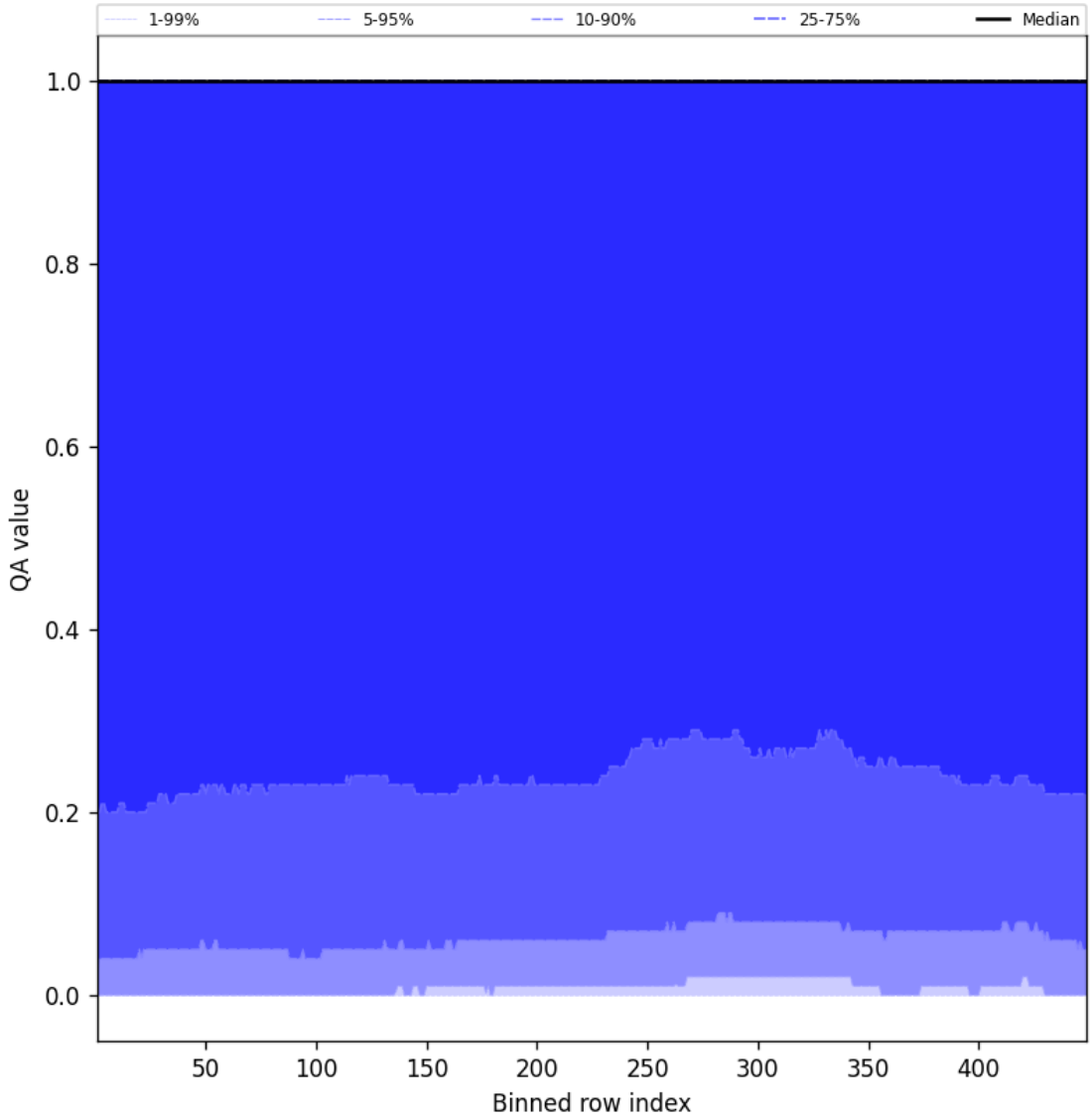

Figure 84: Along track statistics of “QA value” for 2025-04-07 to 2025-04-08

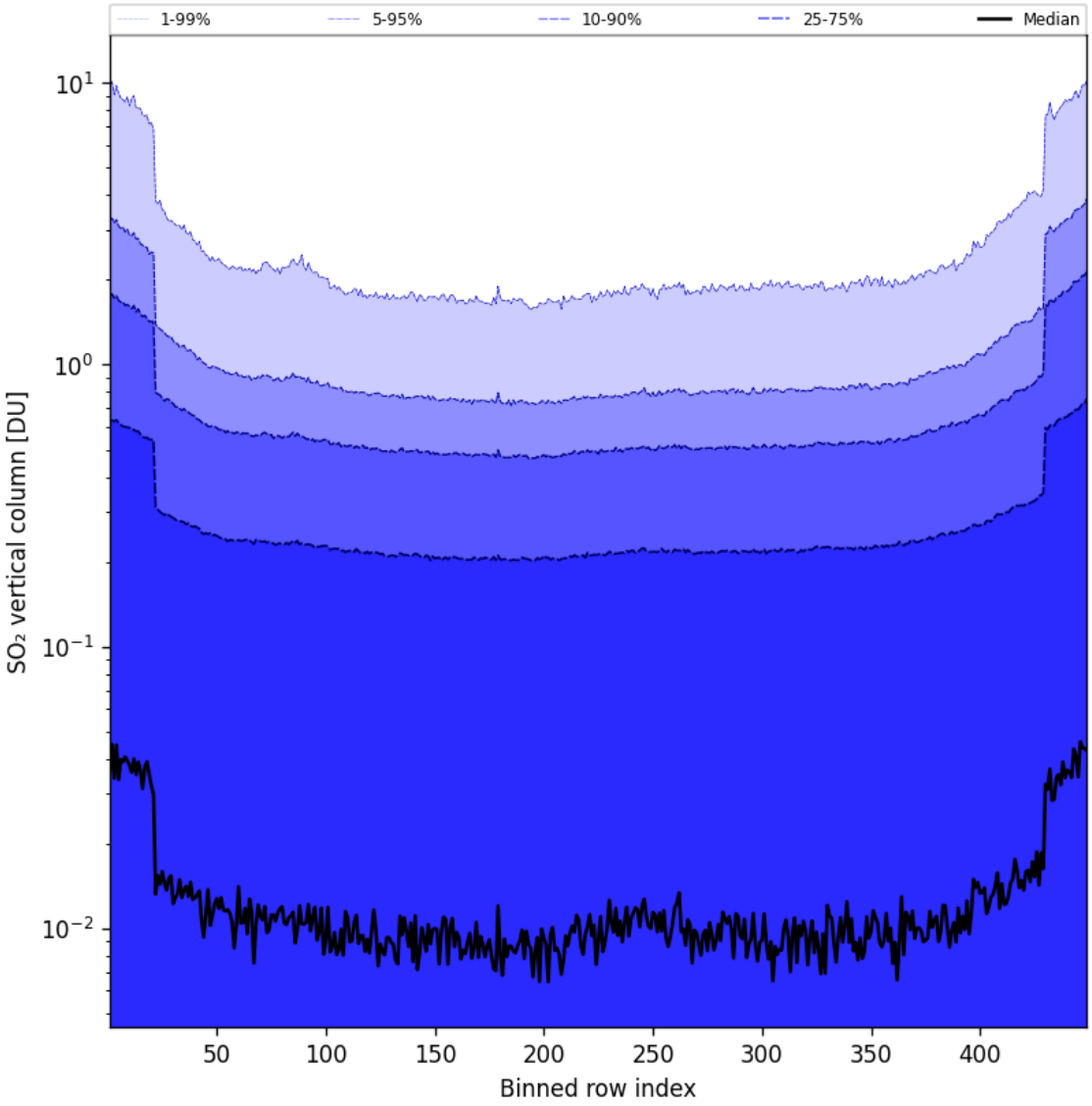

Figure 85: Along track statistics of "SO_2 vertical column" for 2025-04-07 to 2025-04-08

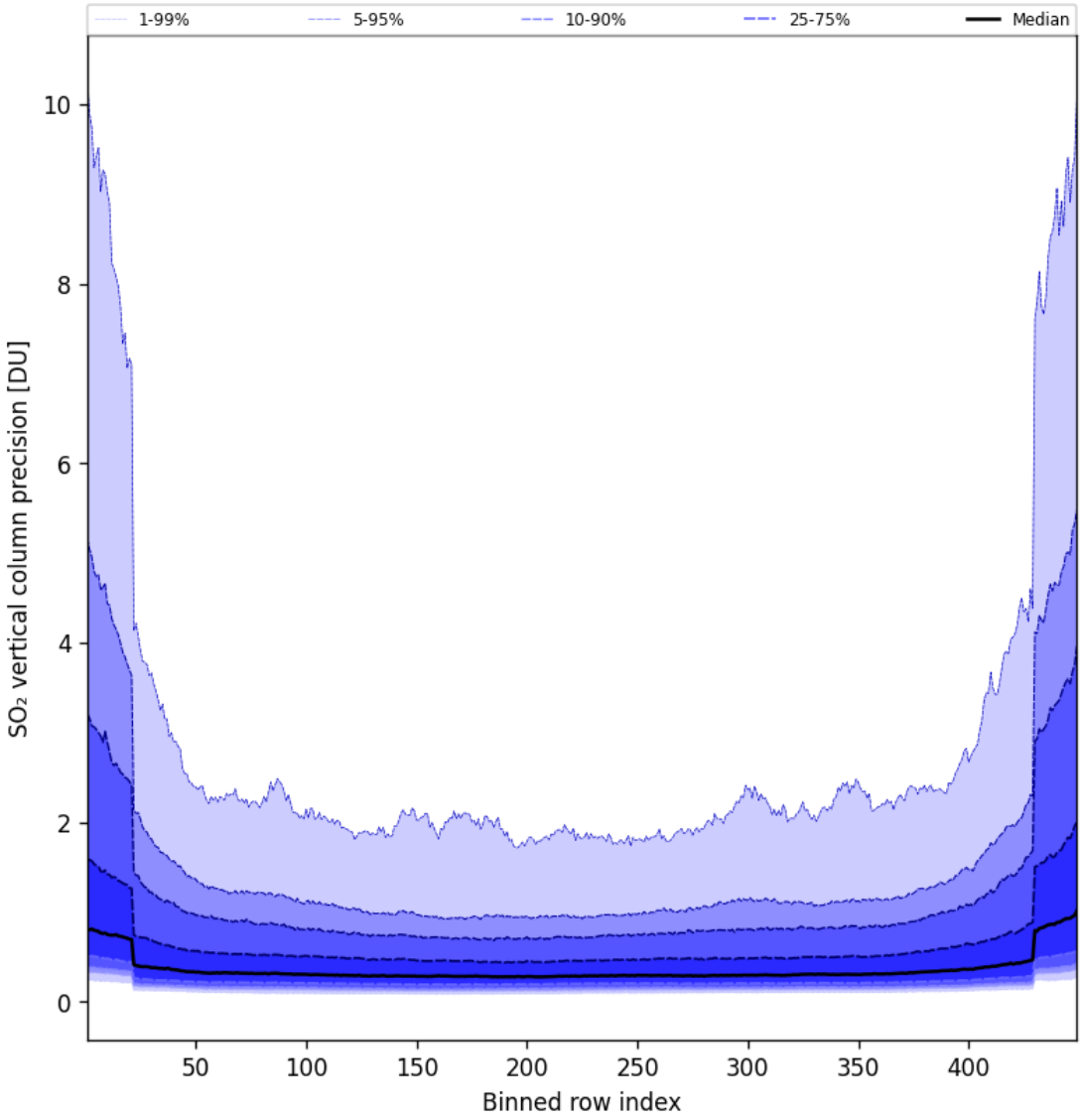

Figure 86: Along track statistics of "SO_2 vertical column precision" for 2025-04-07 to 2025-04-08

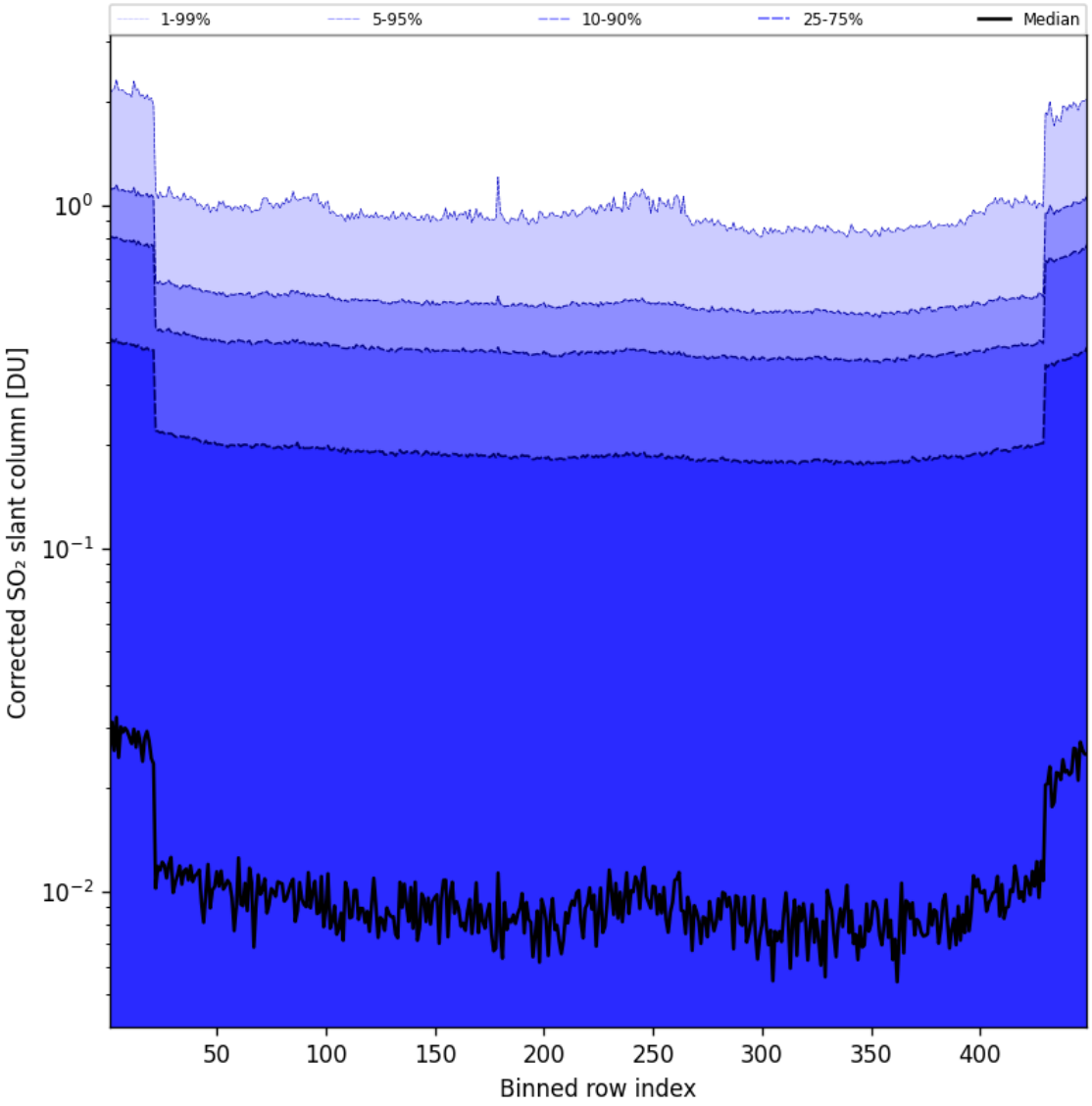

Figure 87: Along track statistics of "Corrected SO_2 slant column" for 2025-04-07 to 2025-04-08

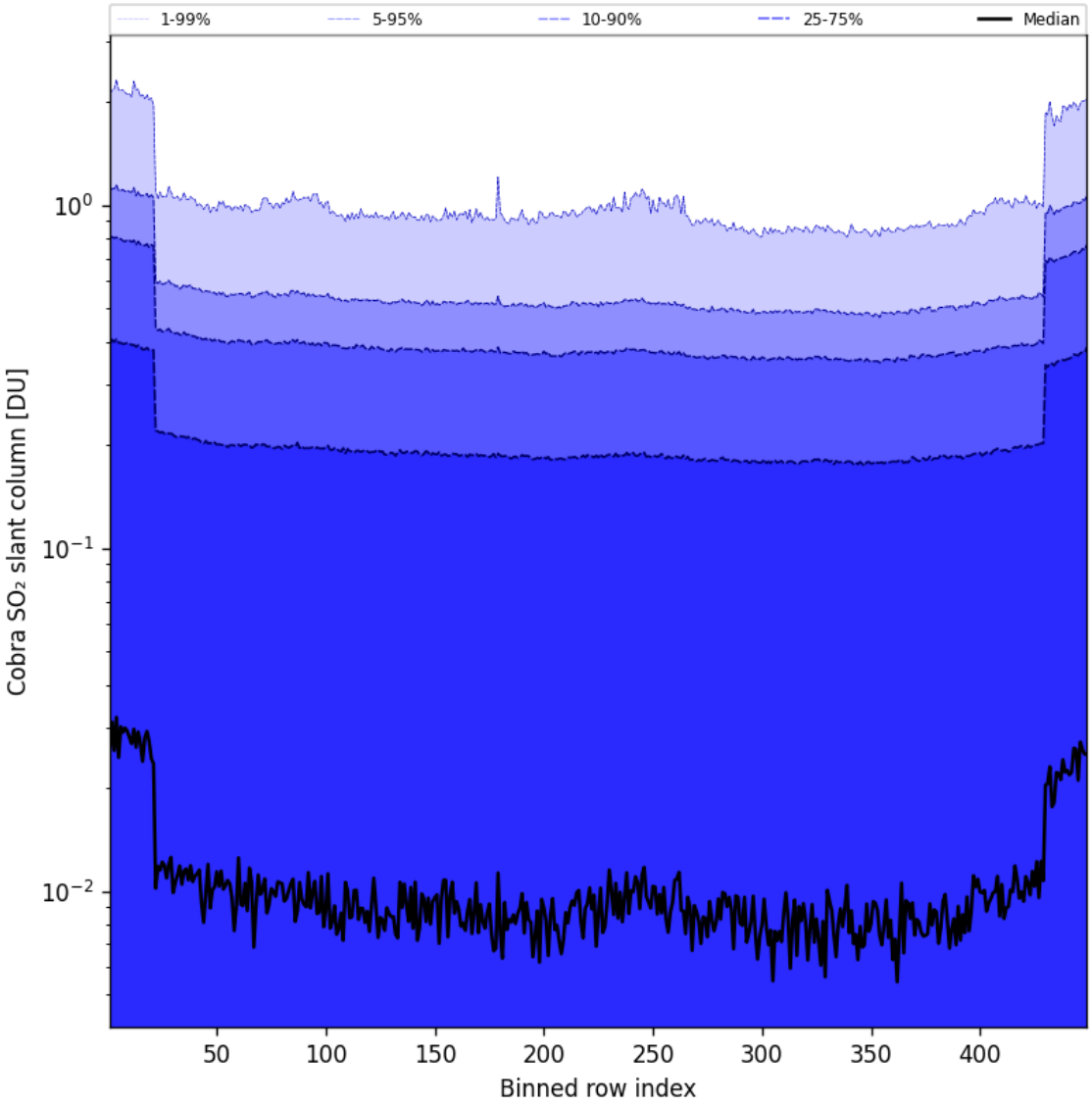

Figure 88: Along track statistics of "Cobra SO_2 slant column" for 2025-04-07 to 2025-04-08

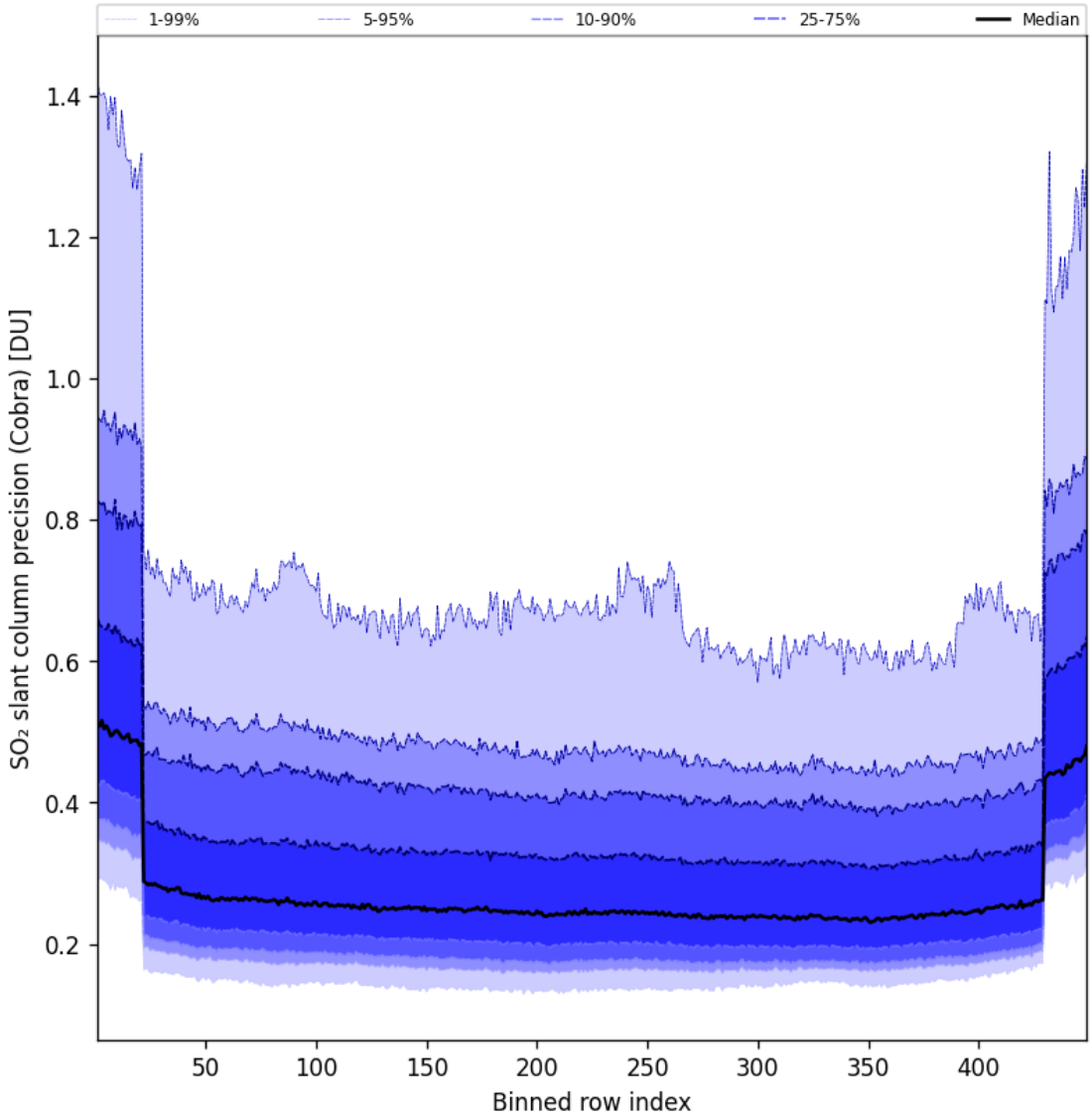

Figure 89: Along track statistics of "SO_2 slant column precision (Cobra)" for 2025-04-07 to 2025-04-08

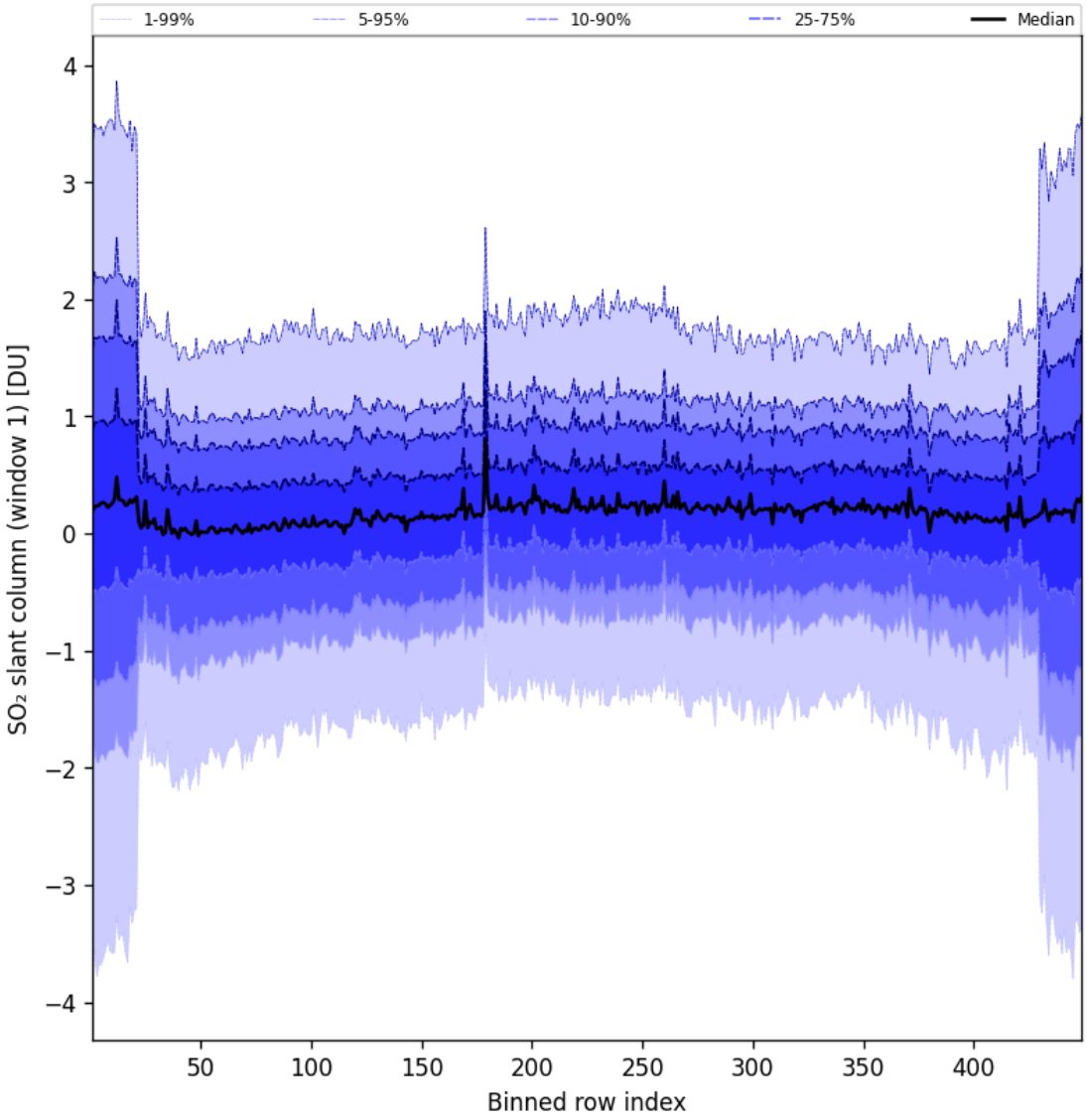

Figure 90: Along track statistics of "SO_2 slant column (window 1)" for 2025-04-07 to 2025-04-08

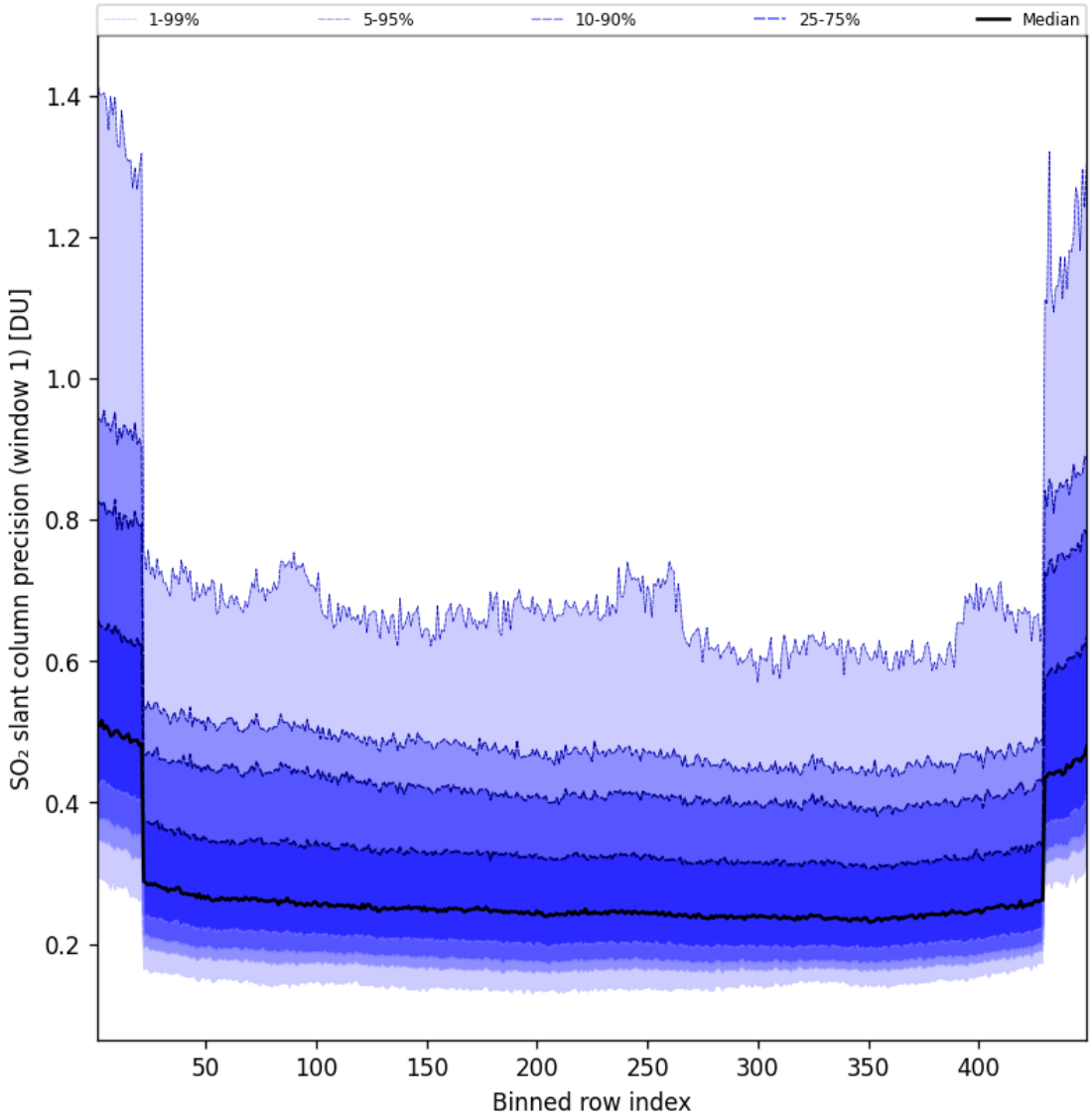

Figure 91: Along track statistics of "SO_2 slant column precision (window 1)" for 2025-04-07 to 2025-04-08

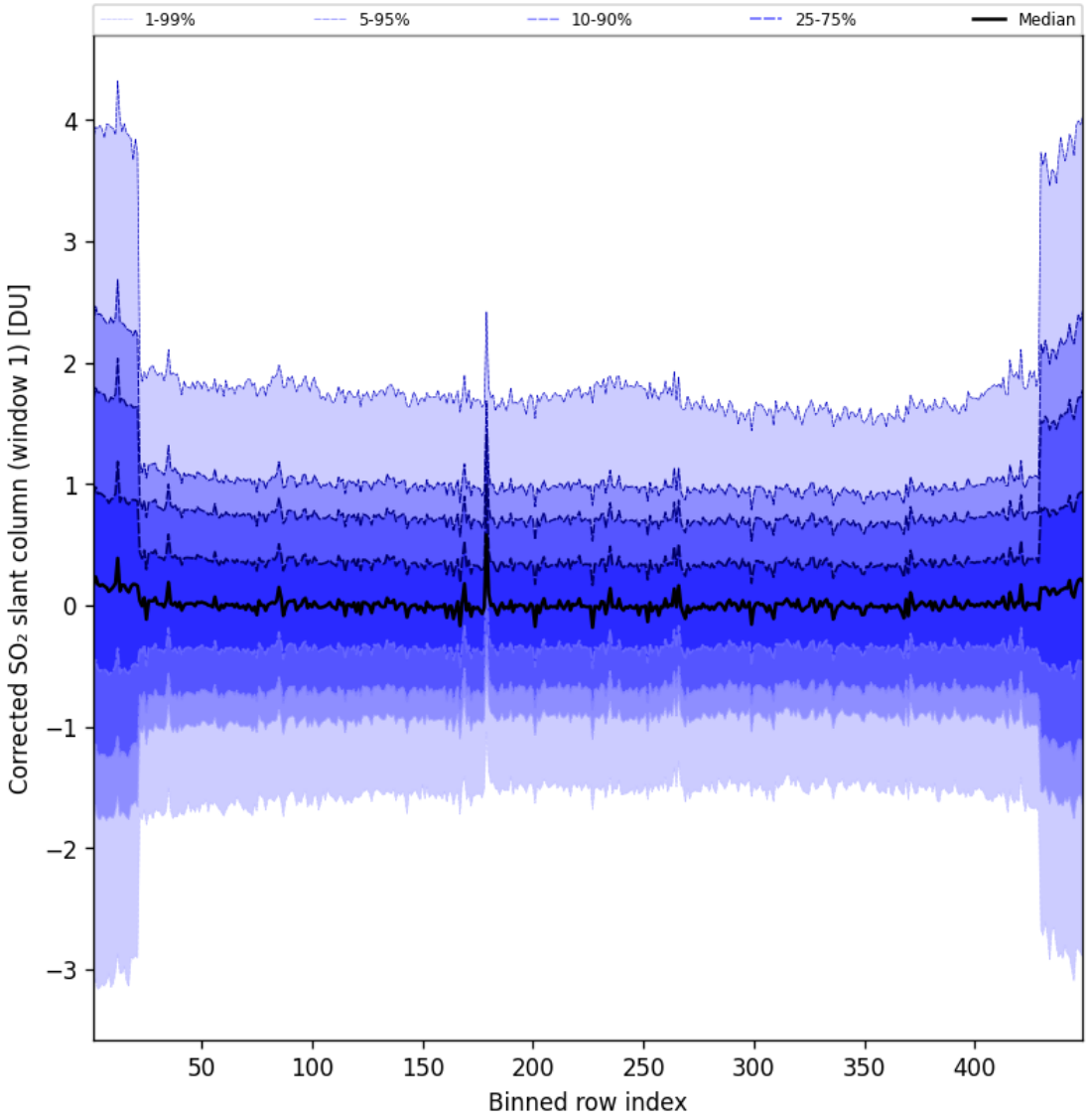

Figure 92: Along track statistics of "Corrected SO_2 slant column (window 1)" for 2025-04-07 to 2025-04-08

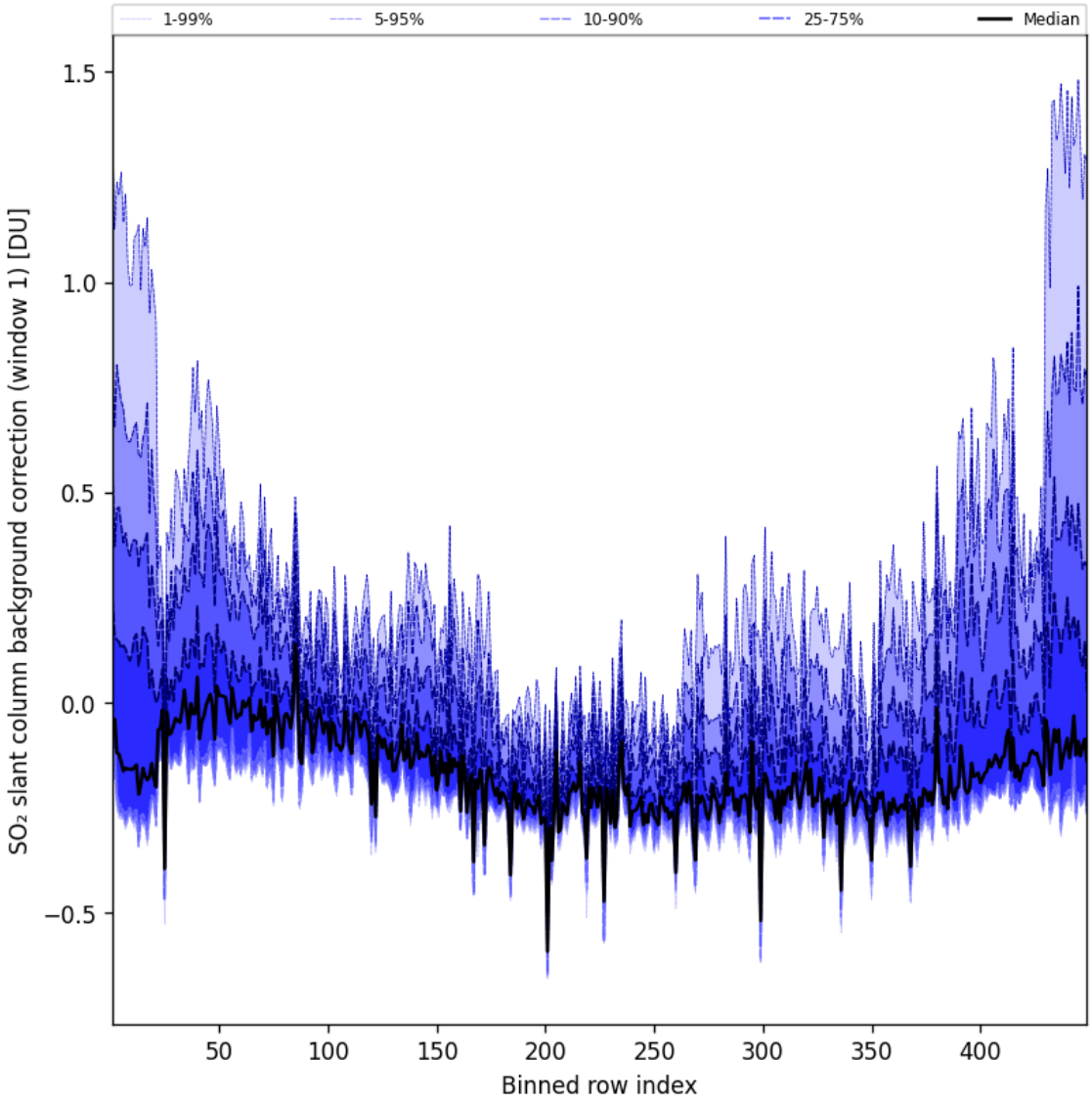

Figure 93: Along track statistics of "SO_2 slant column background correction (window 1)" for 2025-04-07 to 2025-04-08

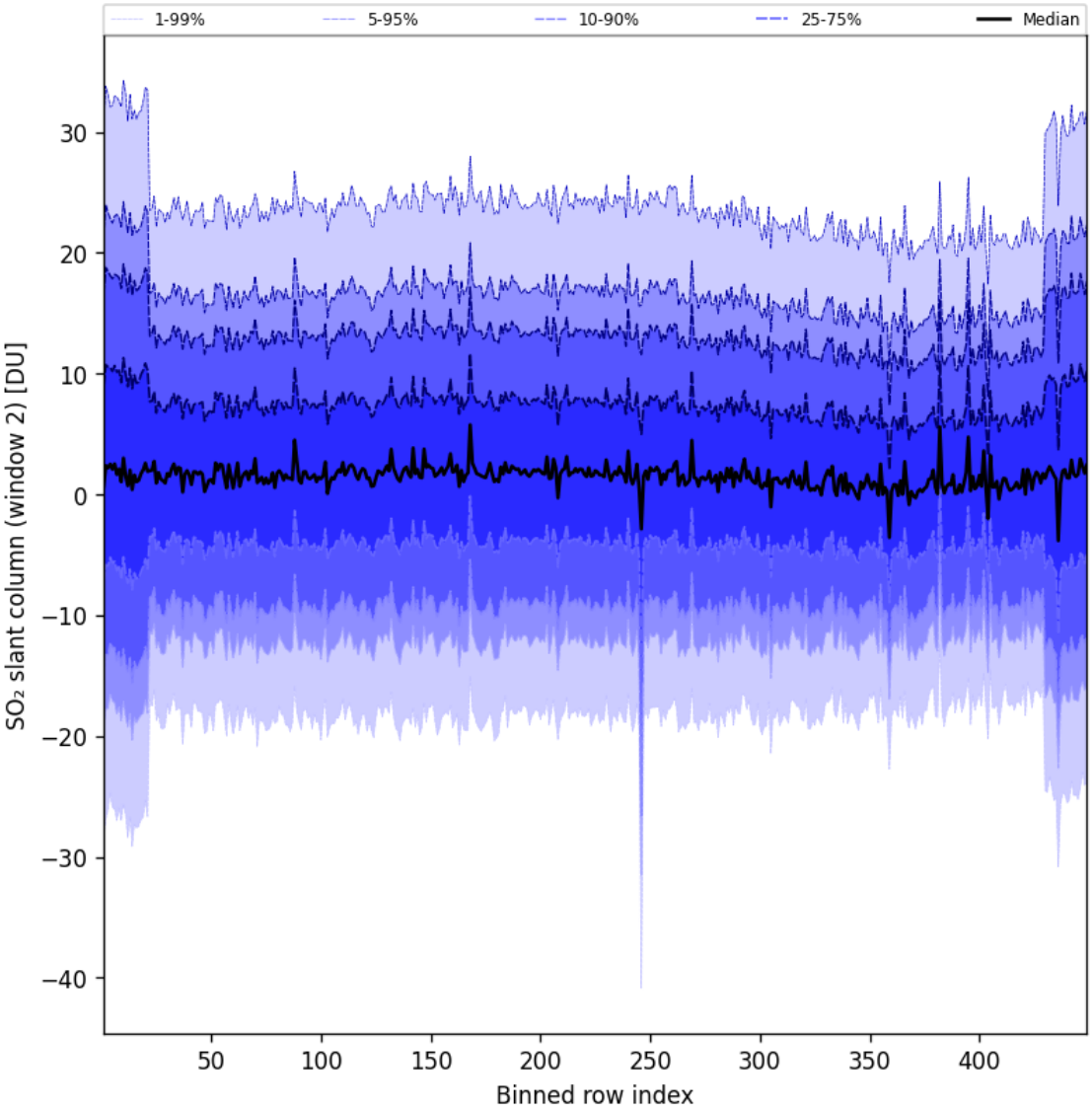

Figure 94: Along track statistics of "SO_2 slant column (window 2)" for 2025-04-07 to 2025-04-08

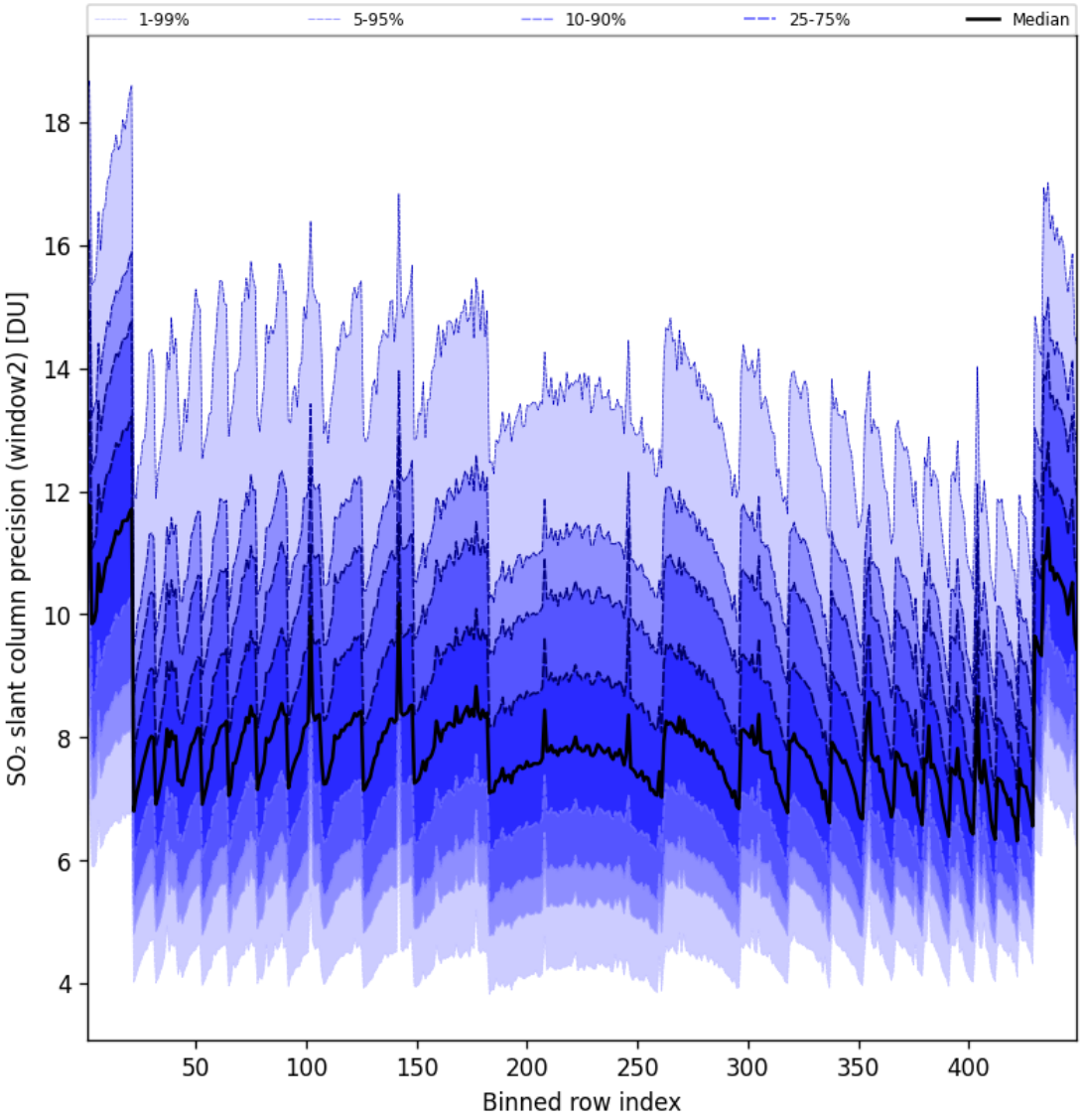

Figure 95: Along track statistics of "SO_2 slant column precision (window2)" for 2025-04-07 to 2025-04-08

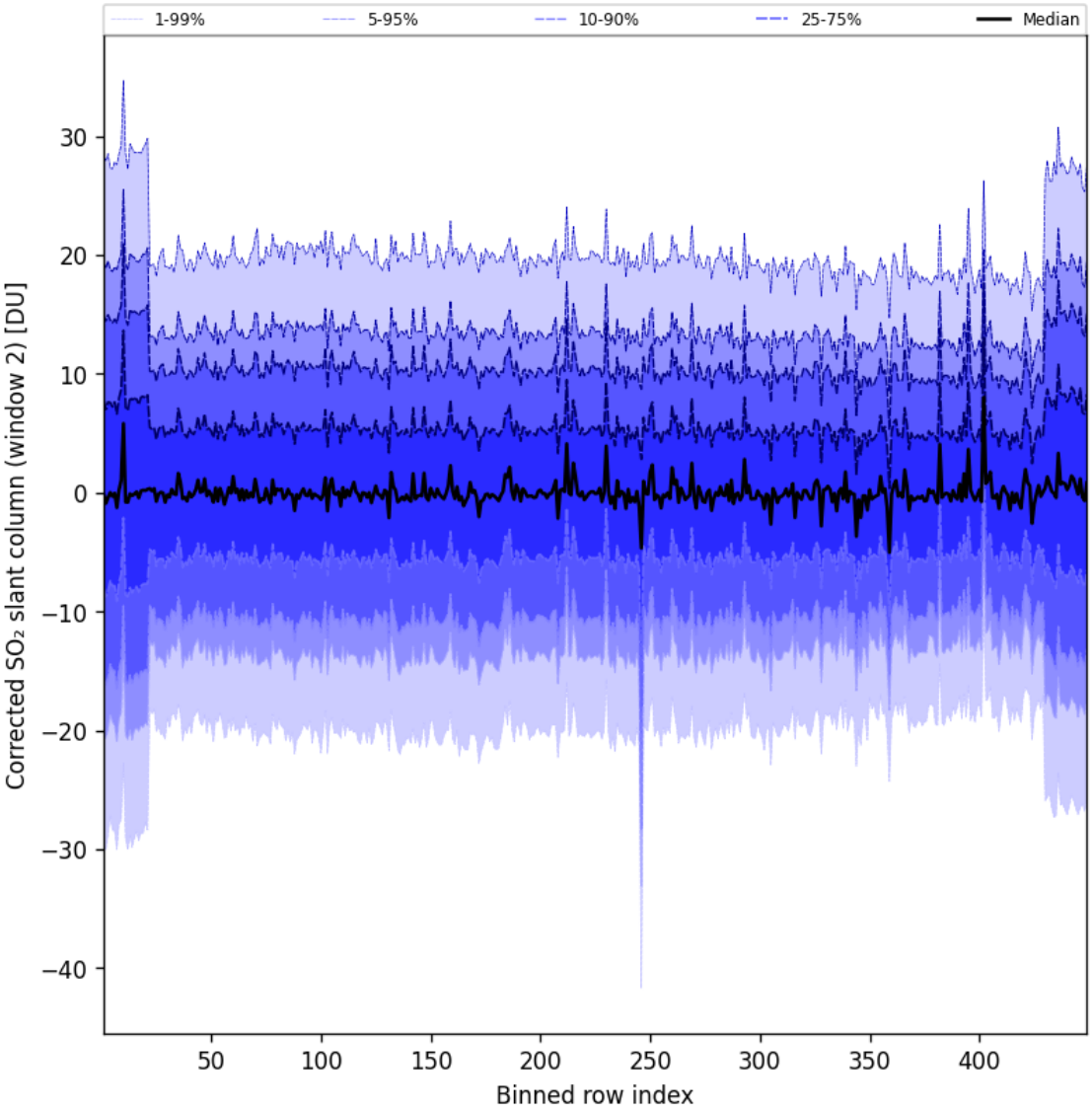

Figure 96: Along track statistics of “Corrected SO_2 slant column (window 2)” for 2025-04-07 to 2025-04-08

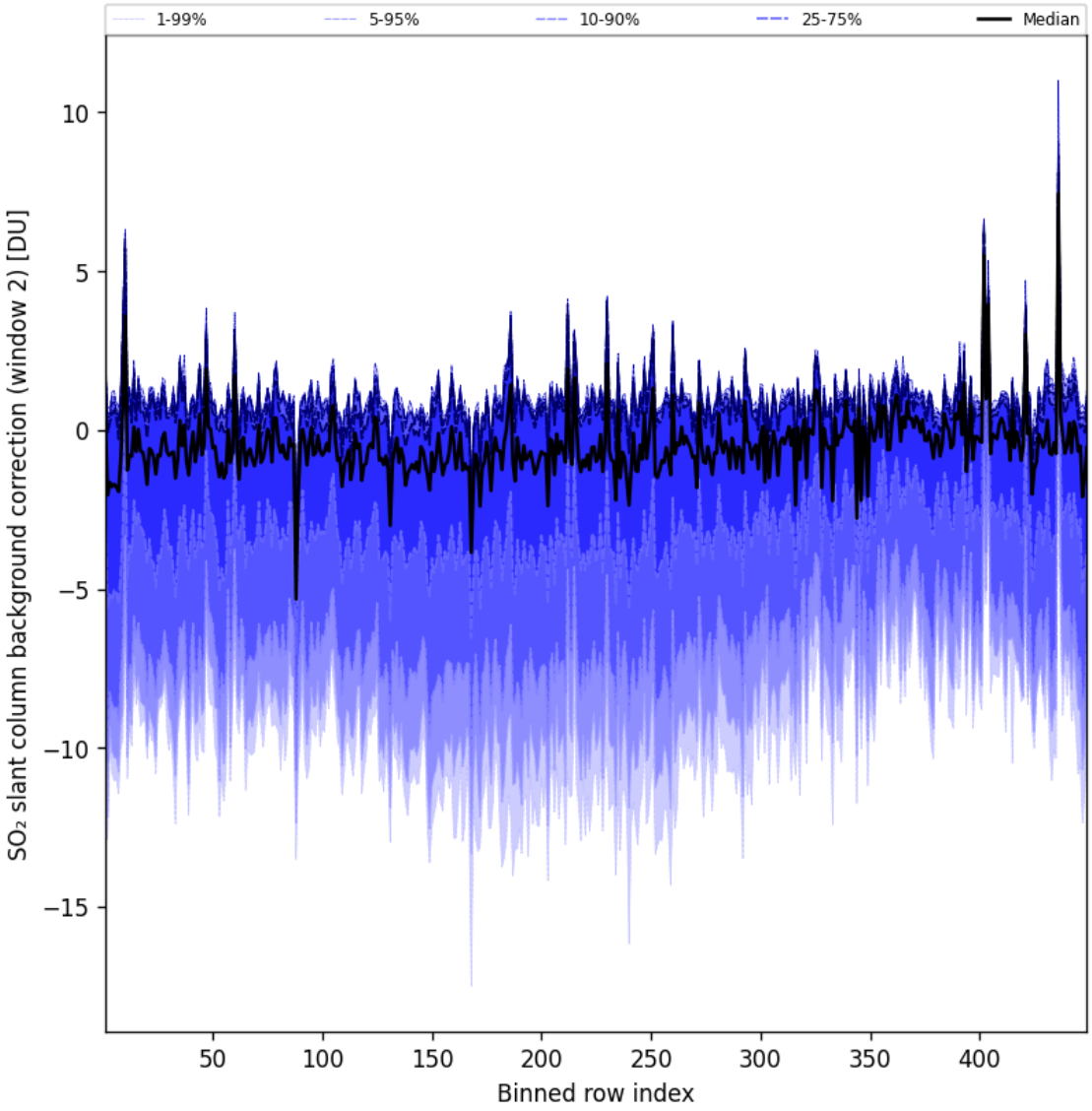

Figure 97: Along track statistics of "SO_2 slant column background correction (window 2)" for 2025-04-07 to 2025-04-08

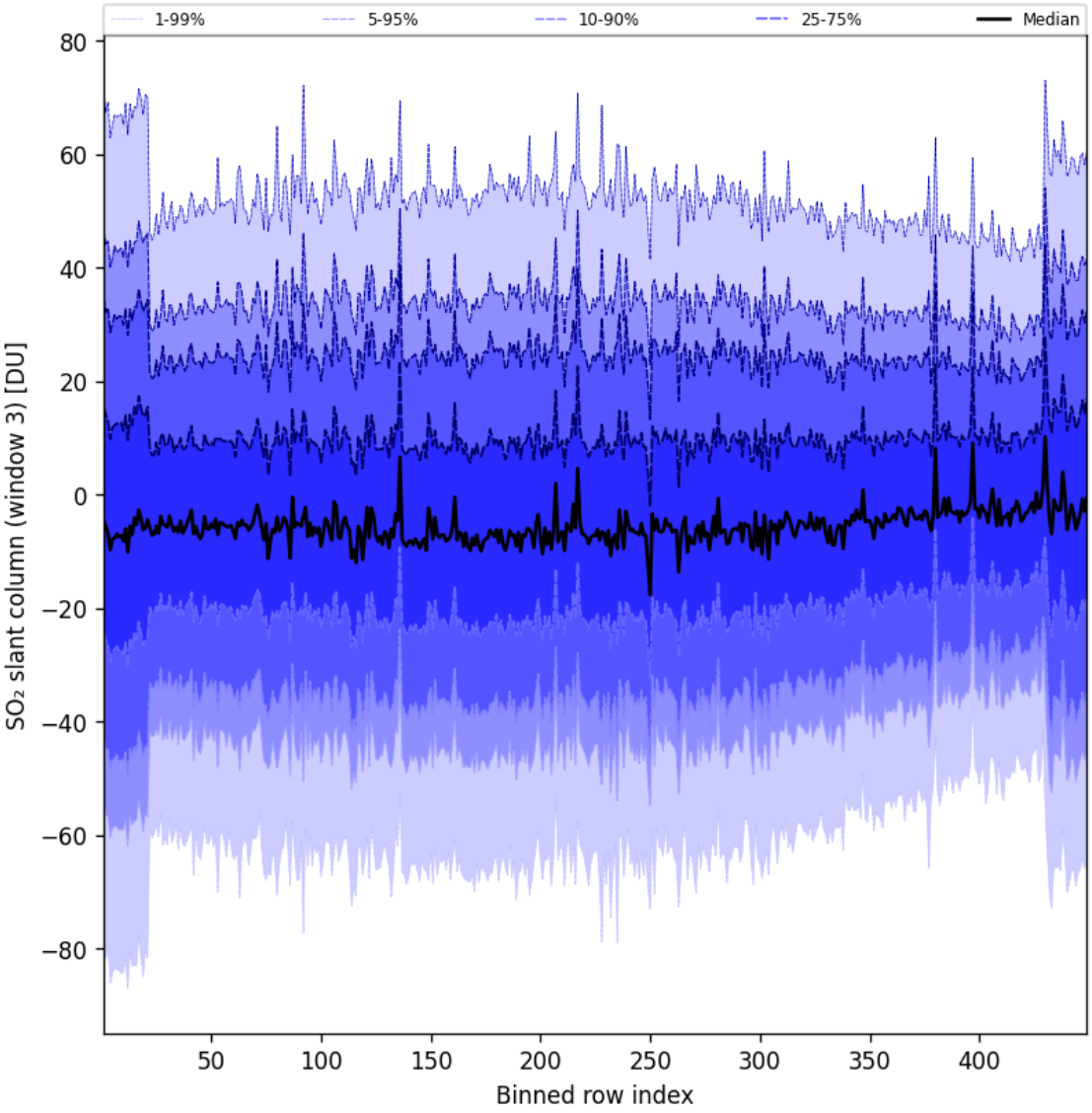

Figure 98: Along track statistics of "SO_2 slant column (window 3)" for 2025-04-07 to 2025-04-08

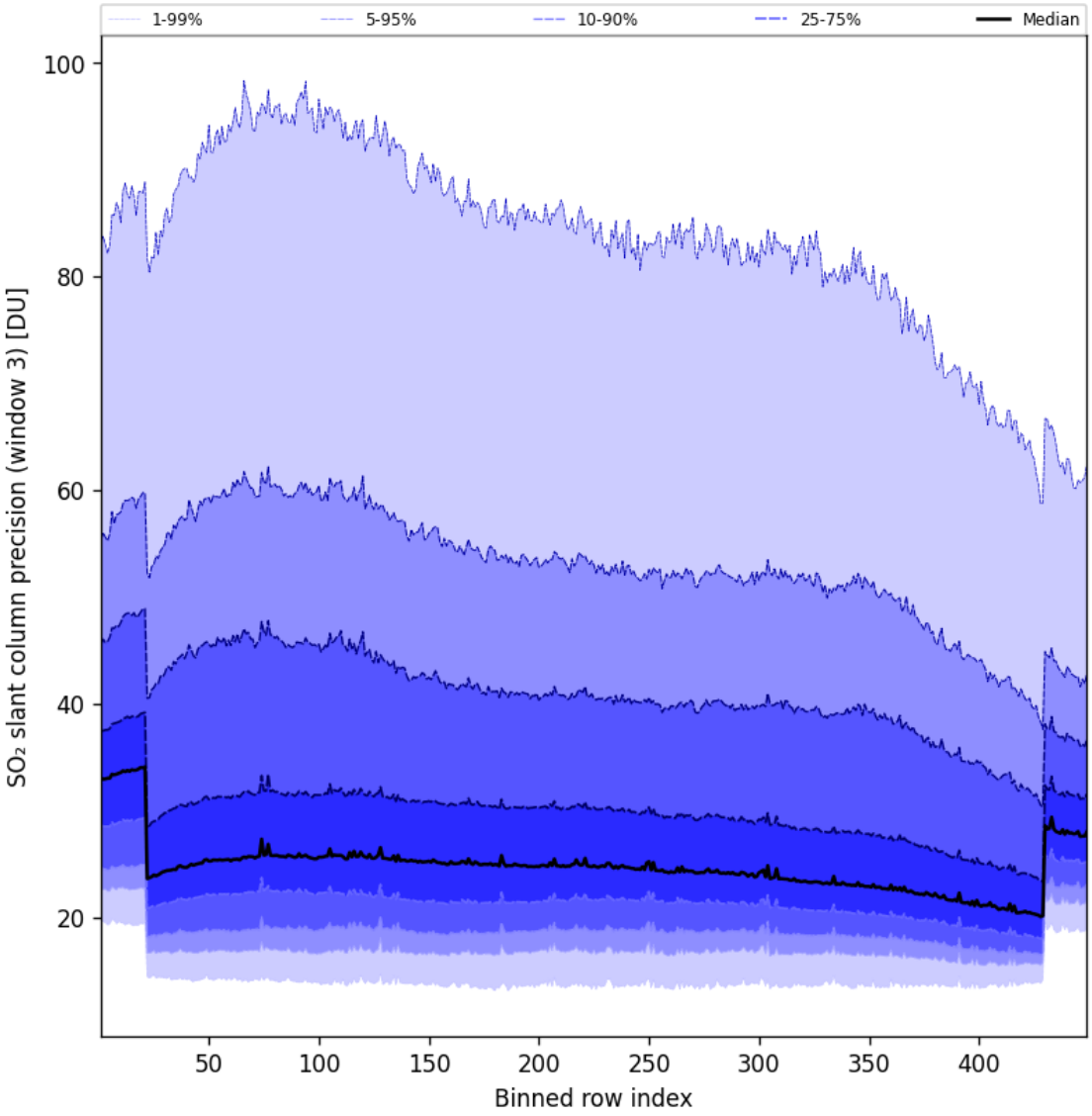

Figure 99: Along track statistics of "SO_2 slant column precision (window 3)" for 2025-04-07 to 2025-04-08

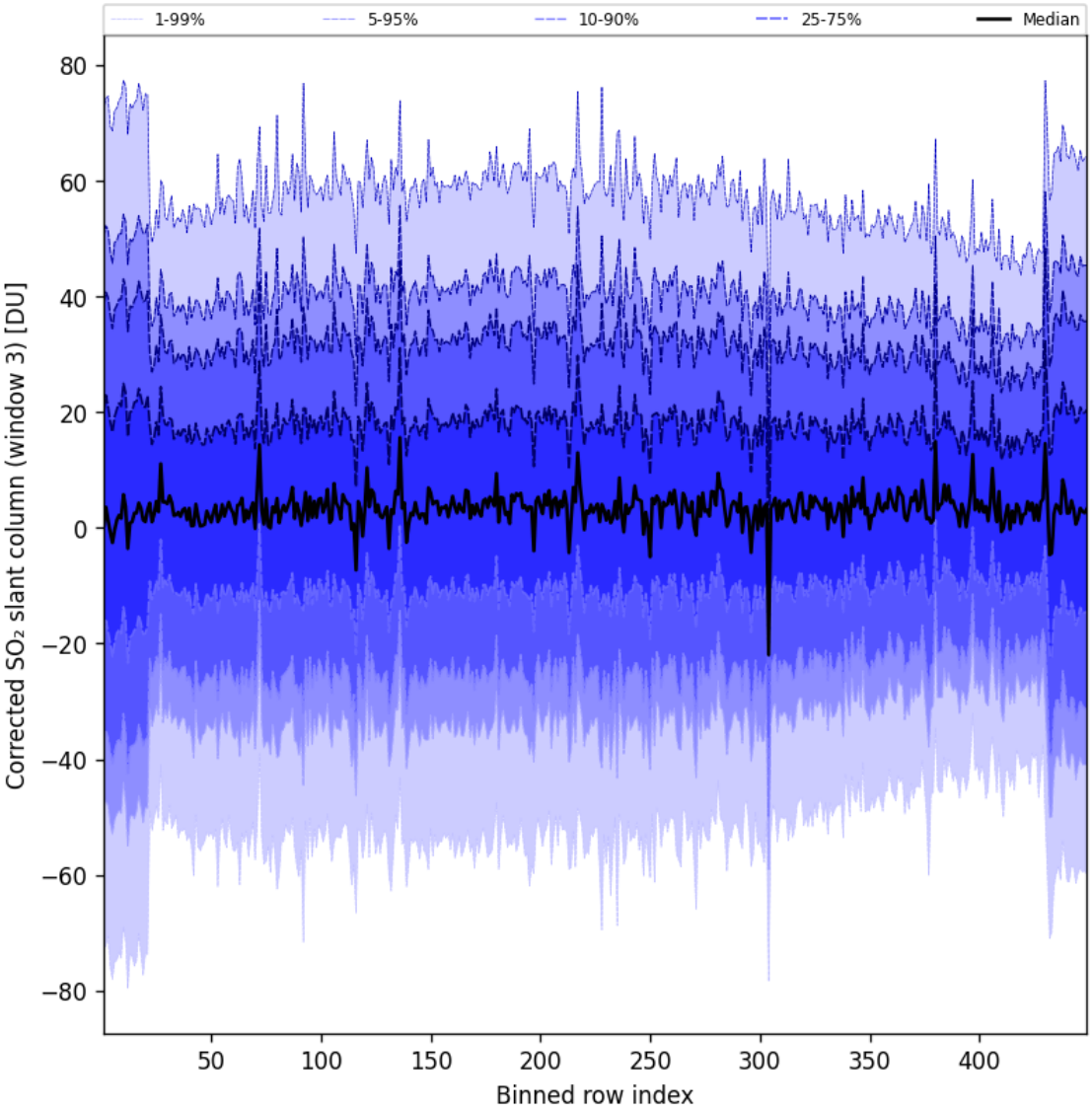

Figure 100: Along track statistics of “Corrected SO_2 slant column (window 3)” for 2025-04-07 to 2025-04-08

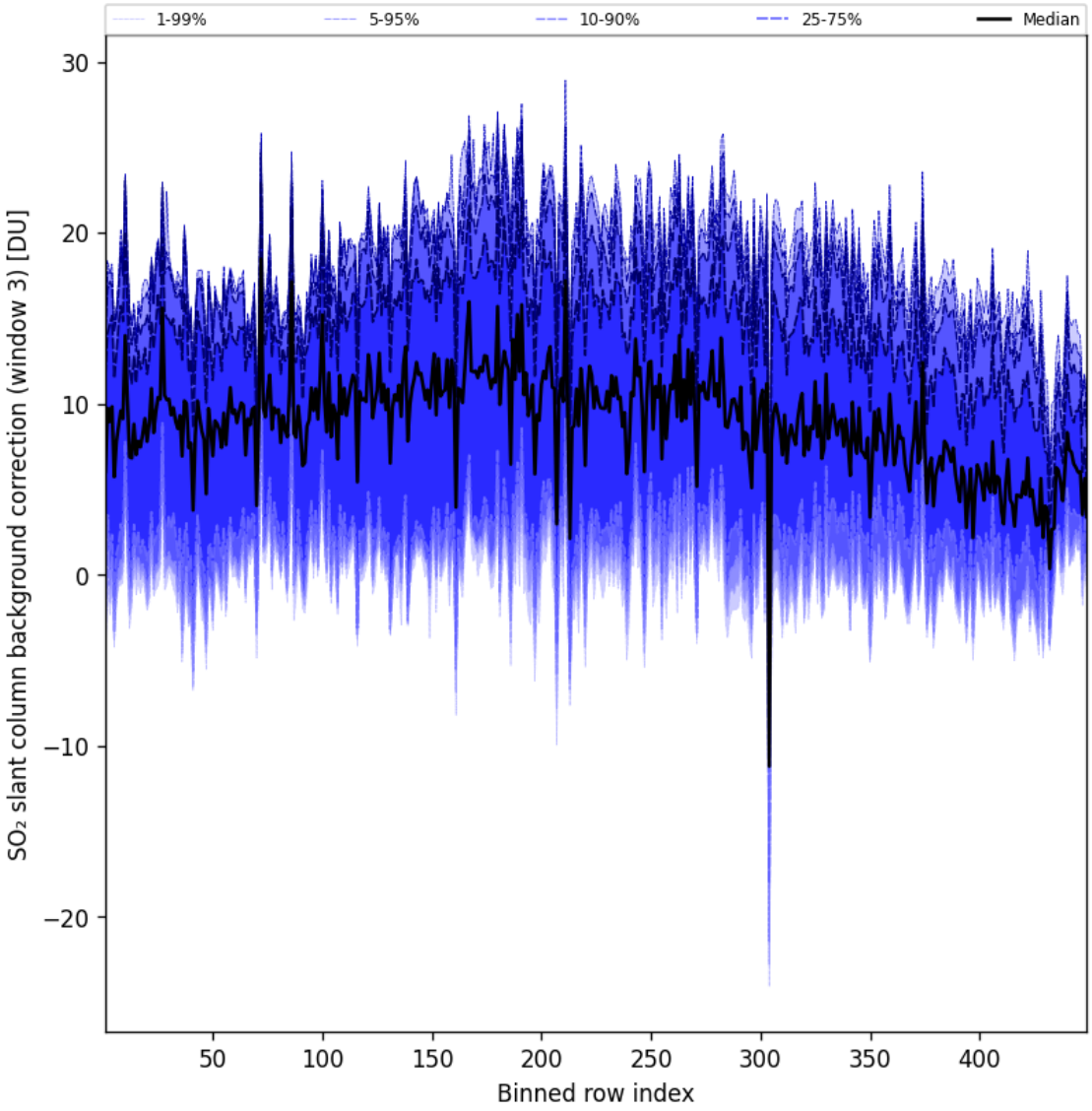

Figure 101: Along track statistics of "SO_2 slant column background correction (window 3)" for 2025-04-07 to 2025-04-08

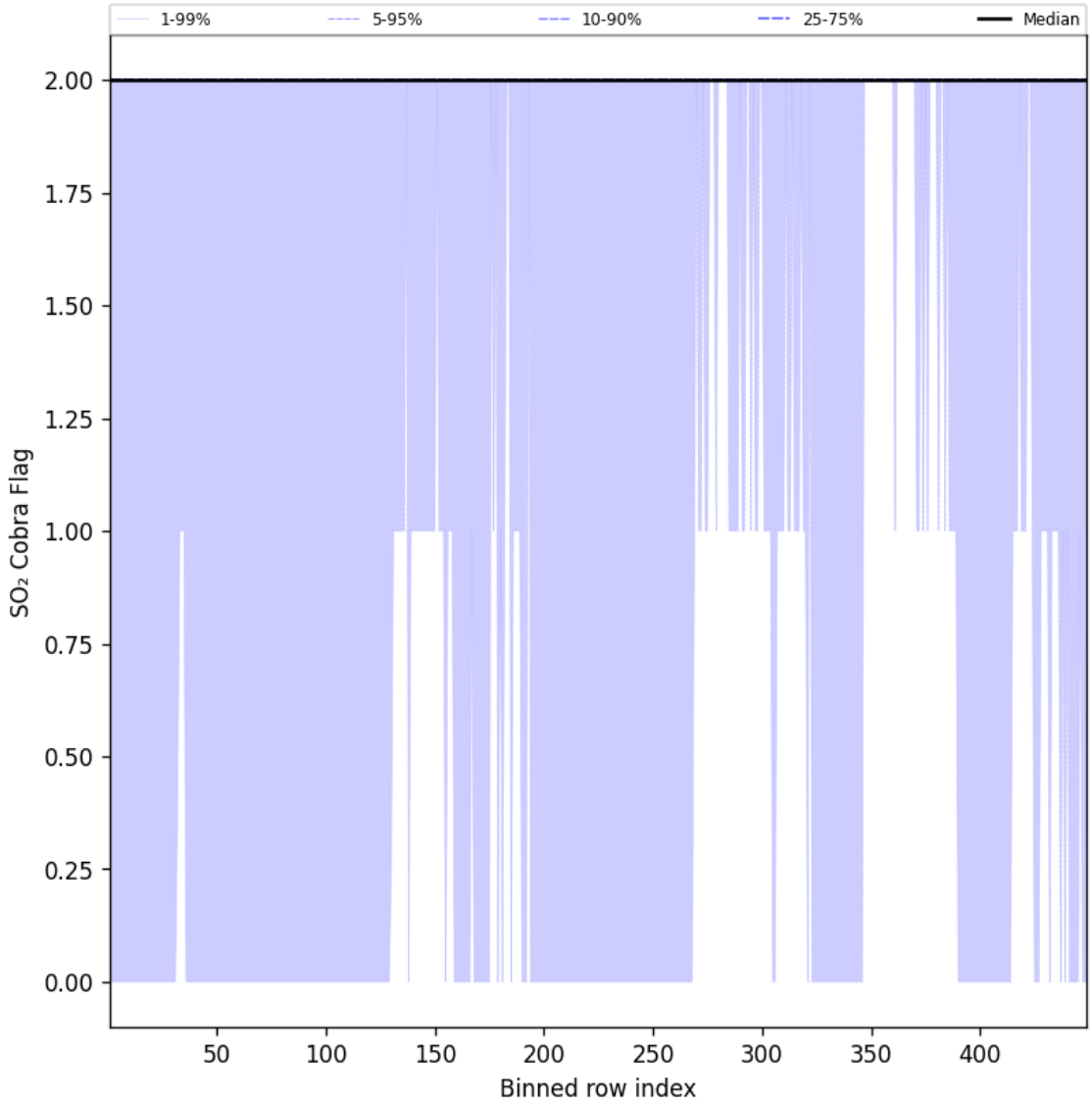

Figure 102: Along track statistics of "SO_2 Cobra Flag" for 2025-04-07 to 2025-04-08

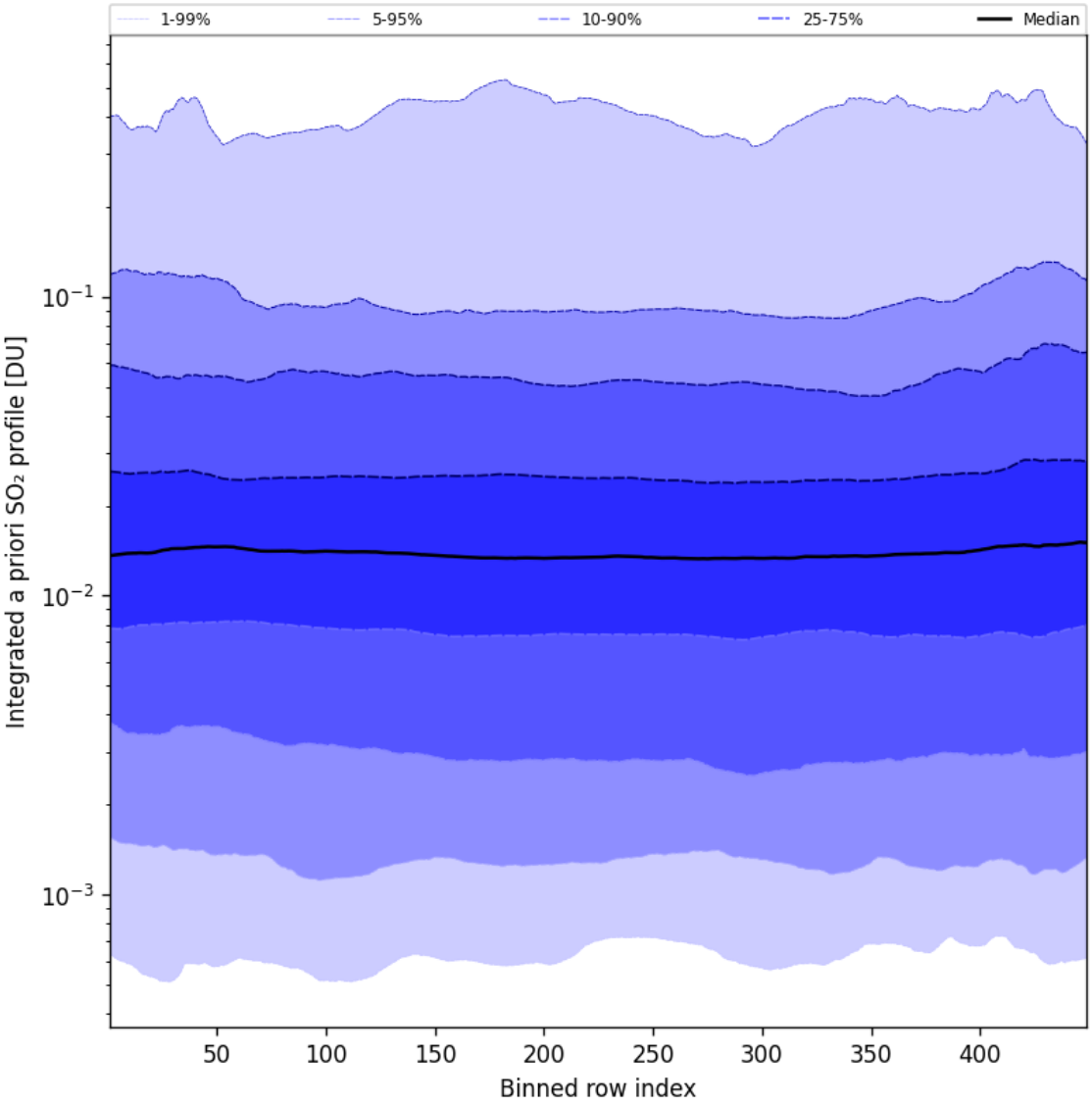

Figure 103: Along track statistics of “Integrated a priori SO_2 profile” for 2025-04-07 to 2025-04-08

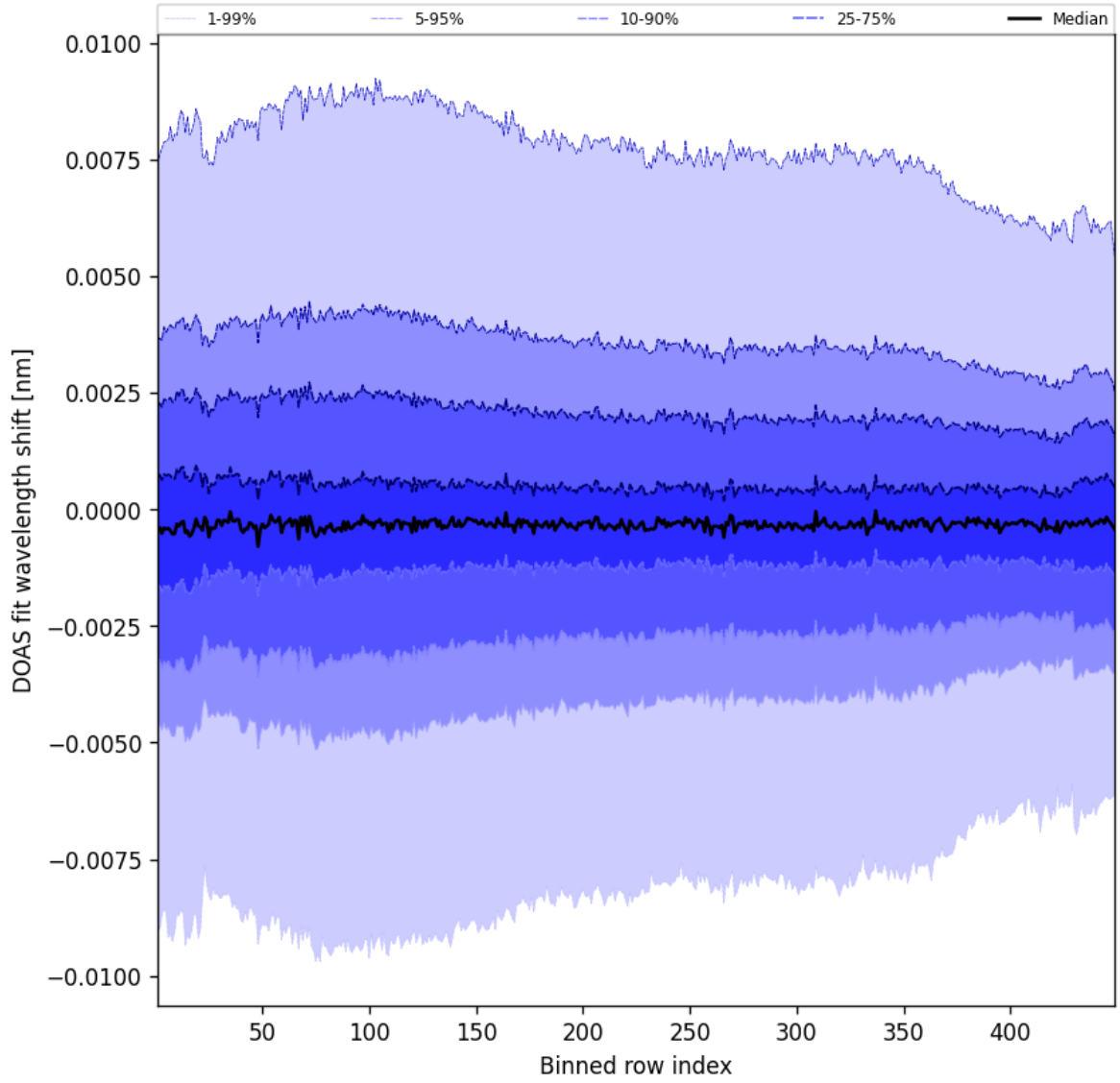

Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2025-04-07 to 2025-04-08

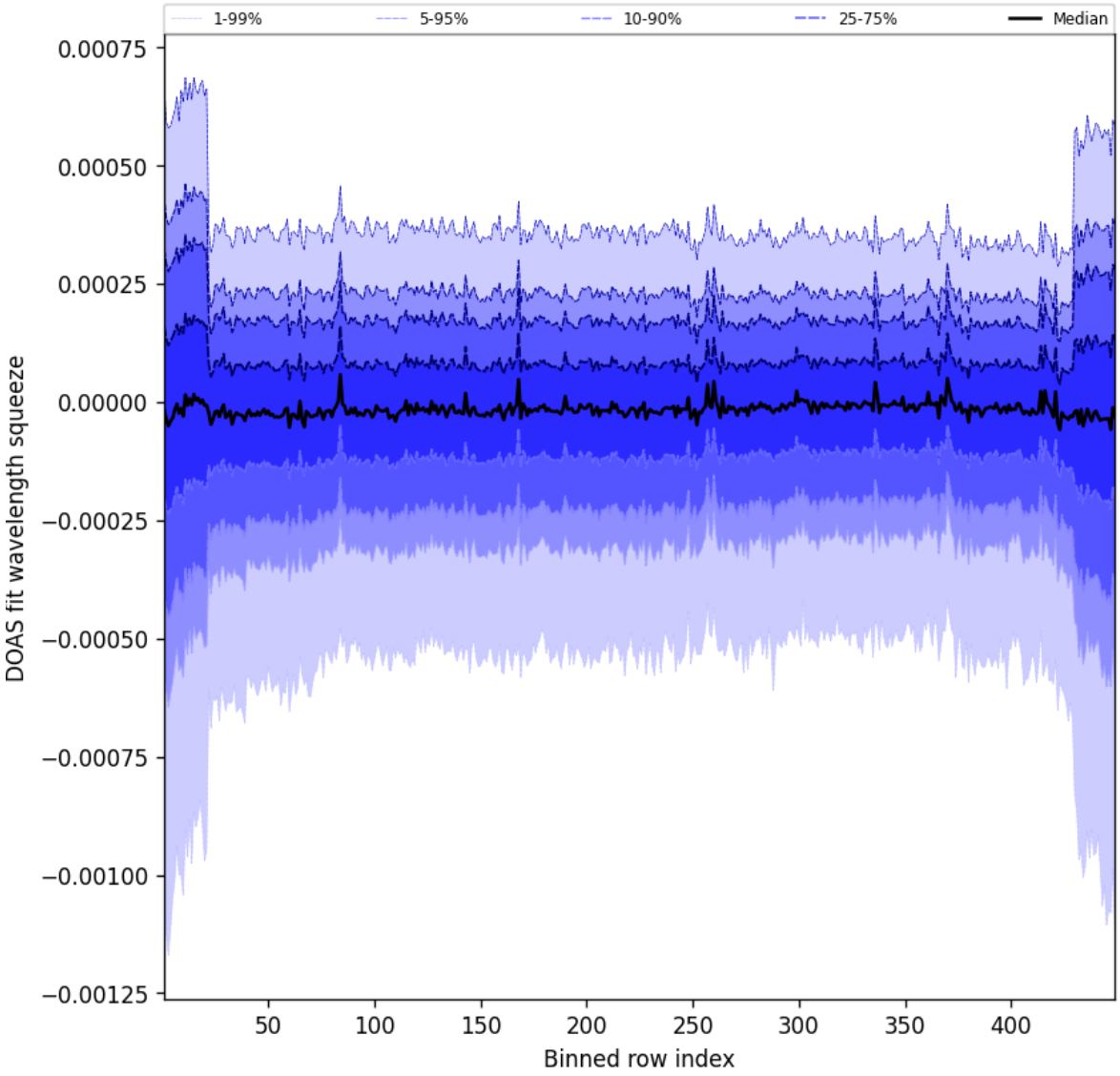

Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2025-04-07 to 2025-04-08

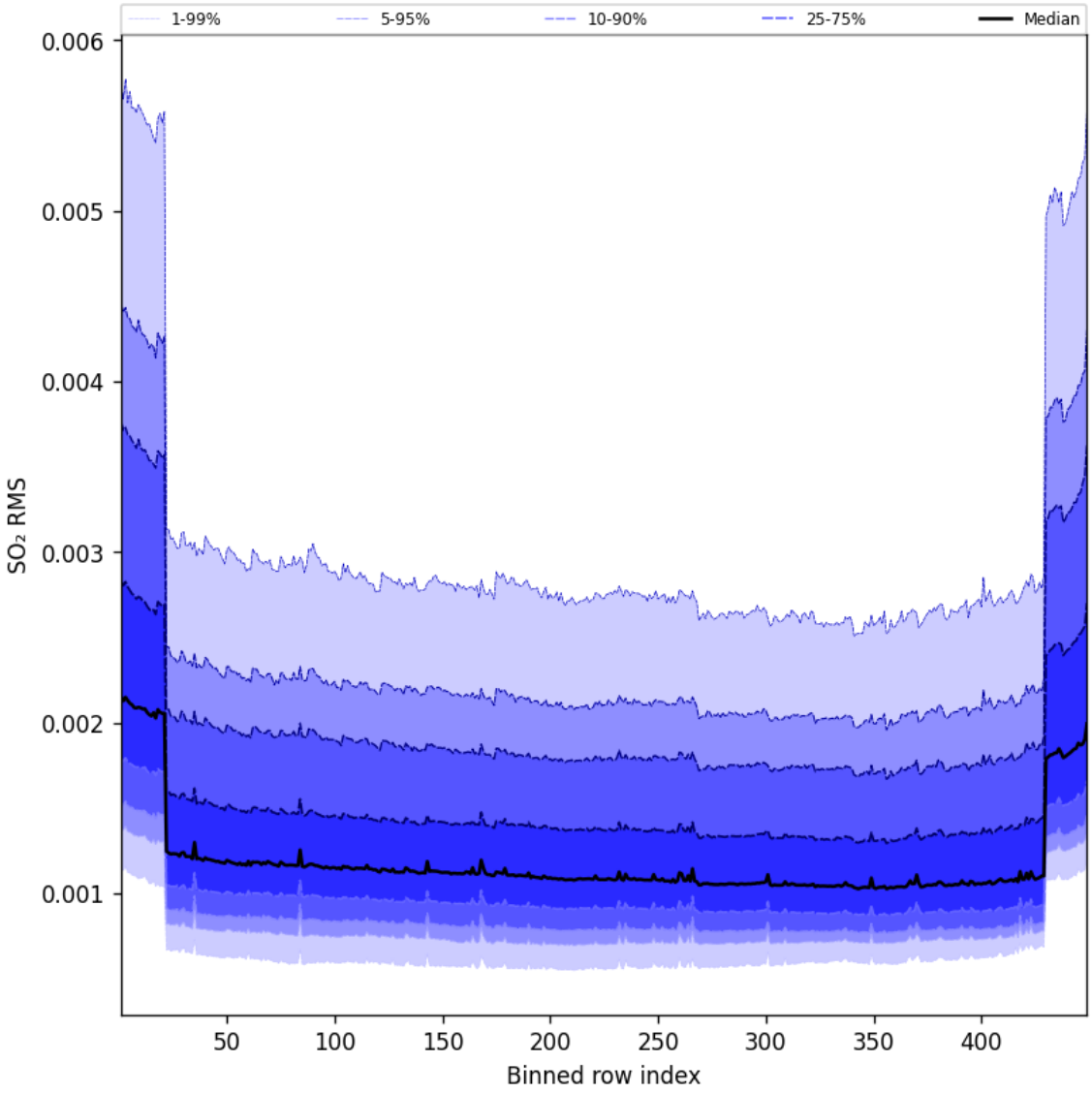

Figure 106: Along track statistics of "SO_2 RMS" for 2025-04-07 to 2025-04-08

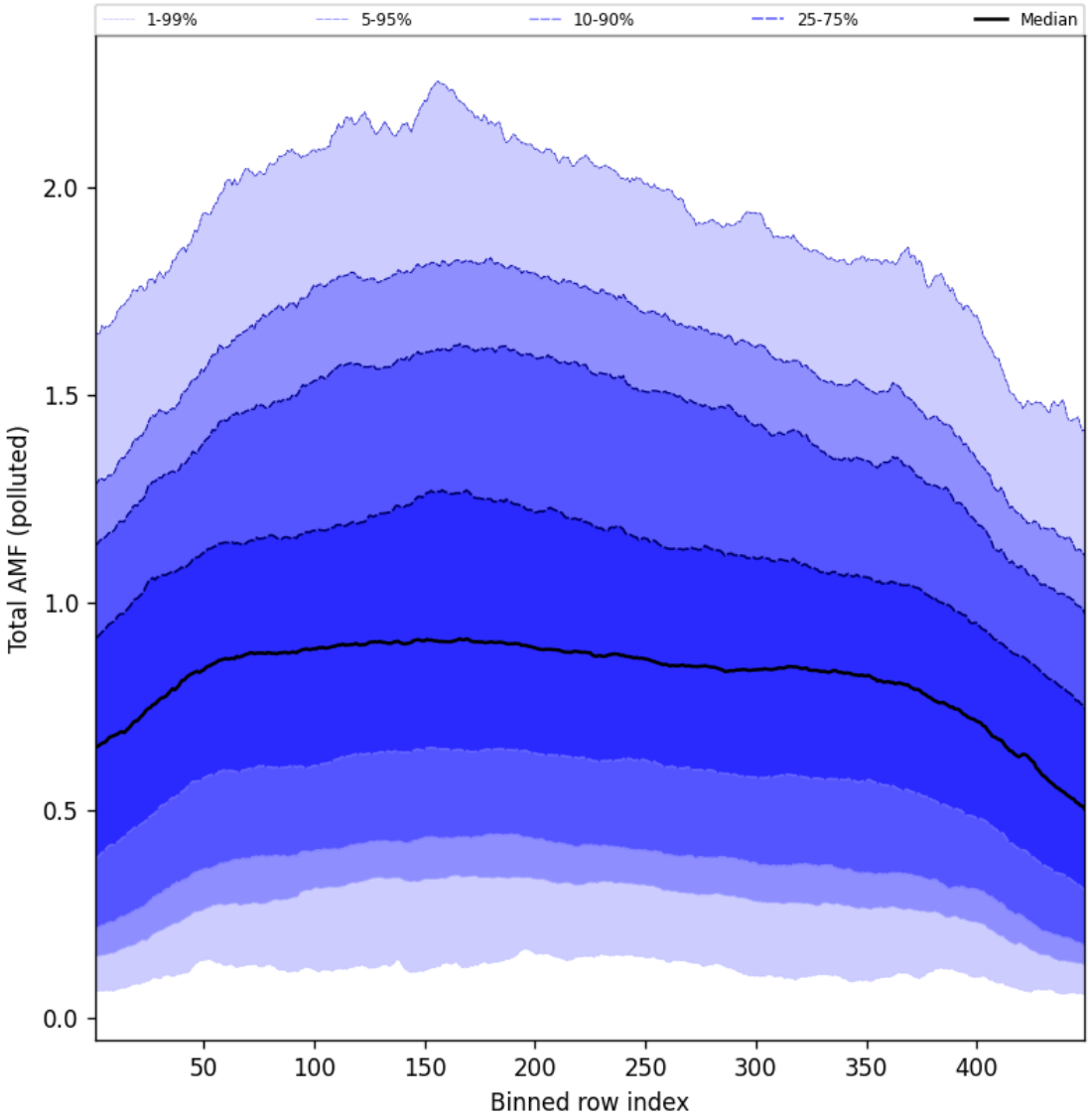

Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-04-07 to 2025-04-08

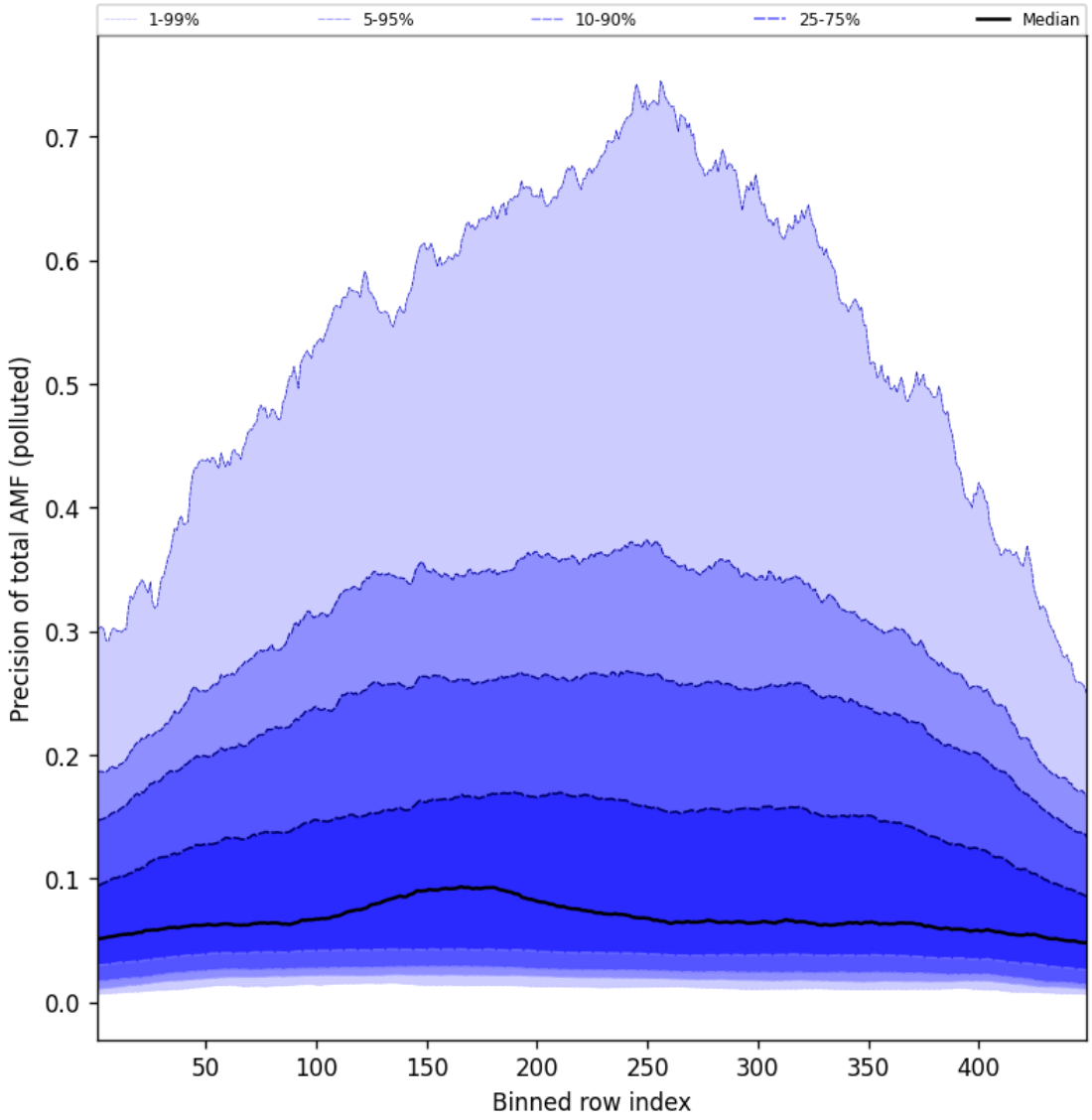

Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-04-07 to 2025-04-08

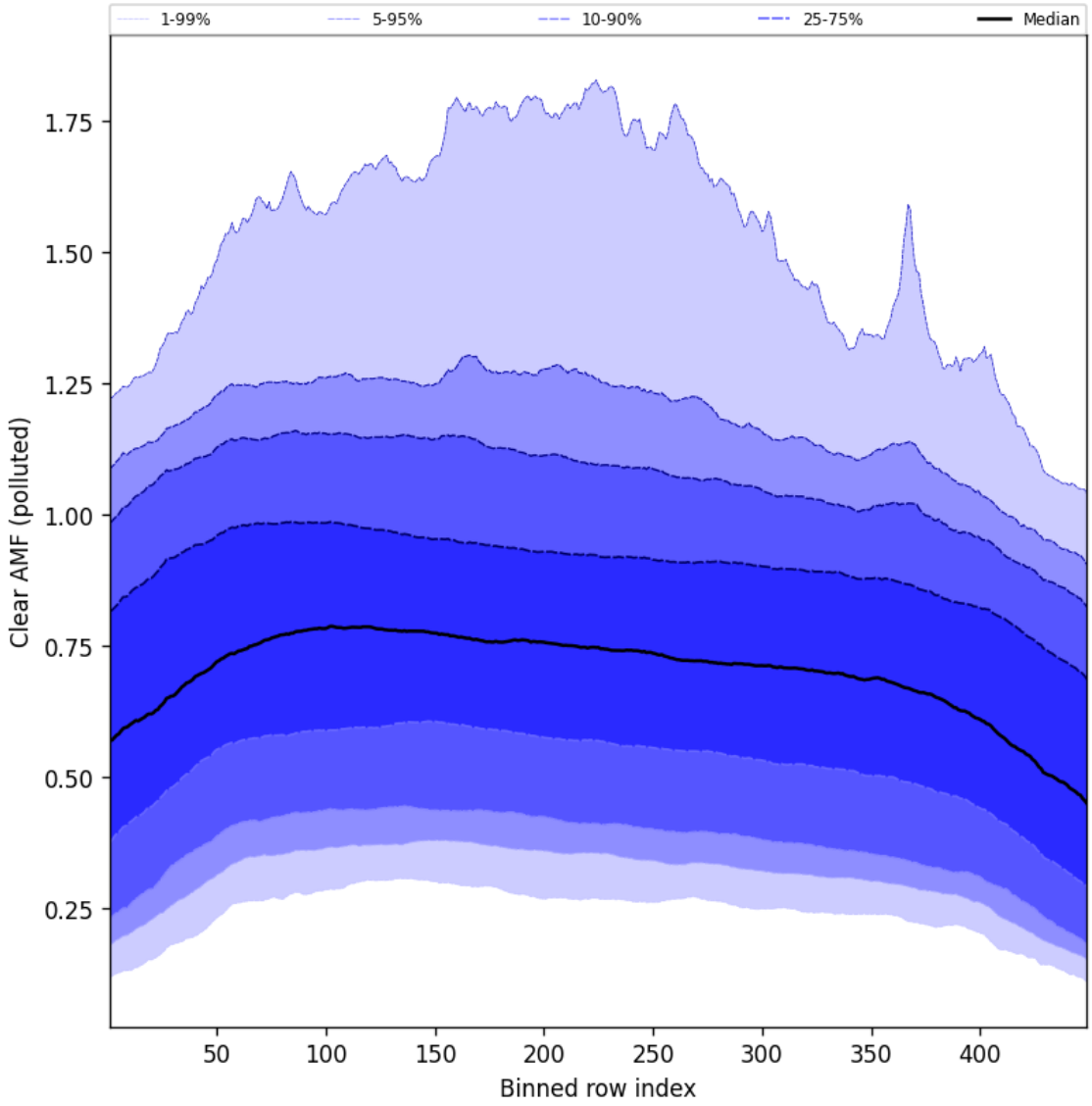

Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-04-07 to 2025-04-08

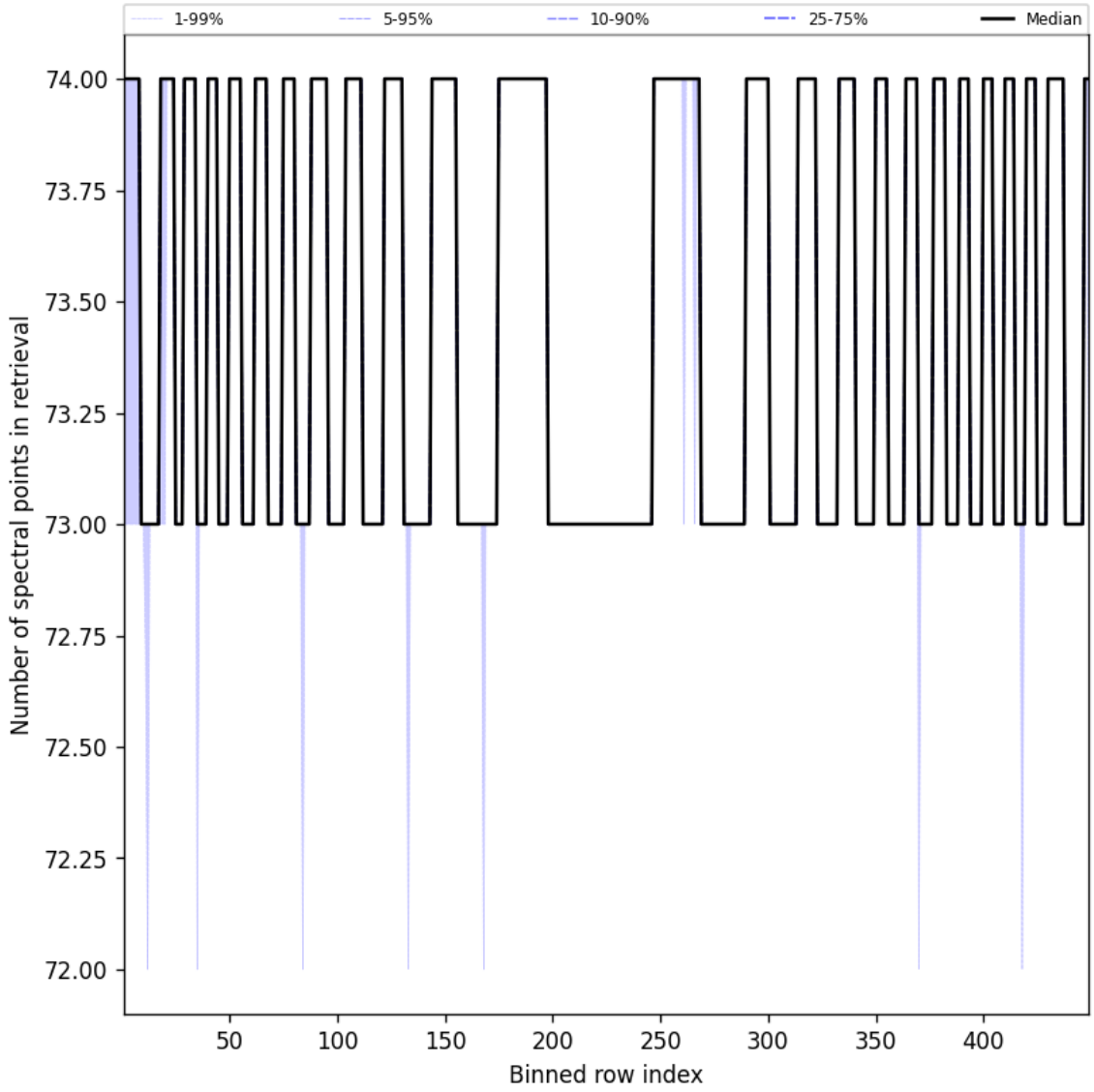

Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-04-07 to 2025-04-08

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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