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]	0.651 ± 0.399	17295821	0.995	0.770	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(4.268 \pm 137.444) \times 10^{-2}$	17295821	0.294	0.486	1.191×10^{-2}	-145	560
sulfurdioxide total vertical column precision [DU]	0.632 ± 1.011	17295821	0.222	0.405	0.346	4.044×10^{-2}	399
sulfurdioxide slant column density corrected [DU]	$(2.245 \pm 40.709) \times 10^{-2}$	17295821	0.250	0.368	9.844×10^{-3}	-28.5	153
sulfurdioxide slant column density cobra [DU]	$(2.216 \pm 38.833) \times 10^{-2}$	17295821	0.250	0.368	9.844×10^{-3}	-28.5	28.0
sulfurdioxide slant column density cobra precision [DU]	0.300 ± 0.145	17295821	0.213	0.154	0.254	8.327×10^{-2}	23.2
sulfurdioxide slant column density window1 [DU]	0.168 ± 0.723	17295821	0.225	0.748	0.188	-77.6	71.9
sulfurdioxide slant column density window1 precision [DU]	0.300 ± 0.145	17295821	0.213	0.154	0.254	8.327×10^{-2}	23.2
sulfurdioxide slant column density corrected win1 [DU]	$(2.818 \pm 71.303) \times 10^{-2}$	17295821	-2.500×10^{-2}	0.731	5.372×10^{-3}	-77.6	71.7
background so2 slant column offset window1 [DU]	-0.140 ± 0.205	17295821	-0.300	0.214	-0.189	-1.03	2.73
sulfurdioxide slant column density window2 [DU]	1.13 ± 9.20	17295821	0.750	11.7	0.923	-1.724×10^{3}	706
sulfurdioxide slant column density window2 precision [DU]	8.14 ± 2.16	17295821	7.43	2.49	7.82	2.28	546
sulfurdioxide slant column density corrected win2 [DU]	0.273 ± 8.838	17295821	0.250	11.2	0.306	-1.722×10^{3}	707
background so2 slant column offset window2 [DU]	-0.853 ± 2.900	17295821	1.25	3.62	0.165	-18.8	6.87
sulfurdioxide slant column density window3 [DU]	-4.83 ± 24.14	17295821	-6.16	30.7	-5.06	-860	447
sulfurdioxide slant column density window3 precision [DU]	28.3 ± 12.8	17295821	22.5	9.31	24.9	10.0	680
sulfurdioxide slant column density corrected win3 [DU]	1.95 ± 23.19	17295821	1.68	29.3	1.90	-861	444
background so2 slant column offset window3 [DU]	6.79 ± 6.88	17295821	0.560	11.3	6.11	-19.1	35.5
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.21	17295821	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(3.617 \pm 9.308) \times 10^{-2}$	17295821	1.664×10^{-2}	1.717×10^{-2}	1.505×10^{-2}	2.767×10^{-4}	1.90
fitted radiance shift [nm]	$(-3.380 \pm 25.510) \times 10^{-4}$	17295821	-5.000×10^{-4}	1.824×10^{-3}	-3.139×10^{-4}	-7.330×10^{-2}	0.110
fitted radiance squeeze [1]	$(-3.693 \pm 19.418) \times 10^{-5}$	17295821	-1.000×10^{-5}	2.074×10^{-4}	-2.156×10^{-5}	-1.449×10^{-2}	4.232×10^{-2}
fitted root mean square [1]	$(1.309 \pm 0.601) \times 10^{-3}$	17295821	9.750×10^{-4}	5.906×10^{-4}	1.123×10^{-3}	3.195×10^{-4}	5.009×10^{-2}
sulfurdioxide total air mass factor polluted [1]	0.812 ± 0.429	17295821	0.660	0.567	0.761	5.000×10^{-2}	2.96
sulfurdioxide total air mass factor polluted precision [1]	0.109 ± 0.123	17295821	3.500×10^{-2}	0.111	6.266×10^{-2}	2.713×10^{-3}	1.91
sulfurdioxide clear air mass factor polluted [1]	0.688 ± 0.295	17295821	0.580	0.395	0.660	5.154×10^{-2}	2.47
number of spectral points in retrieval [1]	73.4 ± 0.5	17295821	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]	−3.15	−1.04	−0.599	−0.392	−0.227	0.260	0.442	0.679	1.19	3.71
sulfurdioxide total vertical column precision [DU]	0.101	0.139	0.166	0.191	0.225	0.630	0.876	1.22	1.94	5.28
sulfurdioxide slant column density corrected [DU]	−0.889	−0.504	−0.361	−0.268	−0.172	0.196	0.298	0.402	0.570	1.11
sulfurdioxide slant column density cobra [DU]	−0.889	−0.504	−0.361	−0.268	−0.172	0.196	0.298	0.402	0.570	1.11
sulfurdioxide slant column density cobra precision [DU]	0.140	0.165	0.179	0.190	0.204	0.358	0.416	0.468	0.558	0.839
sulfurdioxide slant column density window1 [DU]	−1.88	−0.951	−0.616	−0.405	−0.194	0.554	0.744	0.927	1.21	2.02
sulfurdioxide slant column density window1 precision [DU]	0.140	0.165	0.179	0.190	0.204	0.358	0.416	0.468	0.558	0.839
sulfurdioxide slant column density corrected win1 [DU]	−1.75	−0.996	−0.723	−0.543	−0.354	0.376	0.581	0.787	1.12	2.12
background so2 slant column offset window1 [DU]	−0.392	−0.344	−0.320	−0.303	−0.277	-6.338×10^{-2}	1.994×10^{-2}	0.103	0.233	0.587
sulfurdioxide slant column density window2 [DU]	−20.3	−13.4	−10.1	−7.62	−4.81	6.86	9.90	12.7	16.4	24.2
sulfurdioxide slant column density window2 precision [DU]	4.40	5.31	5.83	6.24	6.72	9.21	10.0	10.8	12.0	14.6
sulfurdioxide slant column density corrected win2 [DU]	−21.3	−14.1	−10.7	−8.13	−5.31	5.90	8.68	11.2	14.5	21.5
background so2 slant column offset window2 [DU]	−9.47	−6.83	−5.31	−3.95	−2.38	1.24	1.52	1.76	2.09	3.28
sulfurdioxide slant column density window3 [DU]	−63.8	−44.0	−34.7	−27.8	−20.2	10.5	18.5	25.6	35.1	53.9
sulfurdioxide slant column density window3 precision [DU]	14.4	17.0	18.6	19.9	21.4	30.7	35.2	40.9	52.3	83.1
sulfurdioxide slant column density corrected win3 [DU]	−55.6	−35.9	−26.7	−20.0	−12.7	16.7	24.2	30.9	39.9	58.2
background so2 slant column offset window3 [DU]	−5.13	−2.70	−1.47	−0.402	0.945	12.3	14.6	16.4	18.3	21.5
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]	1.250×10^{-3}	2.298×10^{-3}	3.666×10^{-3}	5.832×10^{-3}	8.496×10^{-3}	2.567×10^{-2}	3.713×10^{-2}	6.050×10^{-2}	0.120	0.533
fitted radiance shift [nm]	-7.979×10^{-3}	-4.129×10^{-3}	-2.784×10^{-3}	-1.993×10^{-3}	-1.280×10^{-3}	5.436×10^{-4}	1.222×10^{-3}	2.062×10^{-3}	3.518×10^{-3}	7.594×10^{-3}
fitted radiance squeeze [1]	-6.505×10^{-4}	-3.624×10^{-4}	-2.562×10^{-4}	-1.920×10^{-4}	-1.297×10^{-4}	7.766×10^{-5}	1.269×10^{-4}	1.719×10^{-4}	2.353×10^{-4}	3.821×10^{-4}
fitted root mean square [1]	5.952×10^{-4}	7.316×10^{-4}	8.042×10^{-4}	8.598×10^{-4}	9.291×10^{-4}	1.520×10^{-3}	1.789×10^{-3}	2.043×10^{-3}	2.443×10^{-3}	3.539×10^{-3}
sulfurdioxide total air mass factor polluted [1]	5.729×10^{-2}	0.194	0.297	0.387	0.497	1.06	1.24	1.41	1.62	1.97
sulfurdioxide total air mass factor polluted precision [1]	8.149×10^{-3}	1.524×10^{-2}	2.104×10^{-2}	2.652×10^{-2}	3.425×10^{-2}	0.145	0.193	0.247	0.336	0.572
sulfurdioxide clear air mass factor polluted [1]	0.167	0.260	0.331	0.396	0.478	0.873	0.972	1.06	1.18	1.56
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]	0.637 ± 0.399	9336722	0.770	1.000	0.0	1.000	0.230	1.000
sulfurdioxide total vertical column [DU]	$(5.926 \pm 175.935) \times 10^{-2}$	9336722	0.566	1.276×10^{-2}	-145	560	-0.262	0.304
sulfurdioxide total vertical column precision [DU]	0.809 ± 1.283	9336722	0.573	0.417	4.044×10^{-2}	399	0.243	0.815
sulfurdioxide slant column density corrected [DU]	$(2.565 \pm 44.188) \times 10^{-2}$	9336722	0.384	9.792×10^{-3}	-13.6	153	-0.179	0.204
sulfurdioxide slant column density cobra [DU]	$(2.522 \pm 41.811) \times 10^{-2}$	9336722	0.384	9.792×10^{-3}	-13.6	28.0	-0.179	0.204
sulfurdioxide slant column density cobra precision [DU]	0.319 ± 0.163	9336722	0.184	0.267	8.638×10^{-2}	20.0	0.206	0.390
sulfurdioxide slant column density window1 [DU]	0.164 ± 0.783	9336722	0.784	0.189	-16.0	33.7	-0.212	0.572
sulfurdioxide slant column density window1 precision [DU]	0.319 ± 0.163	9336722	0.184	0.267	8.638×10^{-2}	20.0	0.206	0.390
sulfurdioxide slant column density corrected win1 [DU]	$(3.646 \pm 77.497) \times 10^{-2}$	9336722	0.768	3.287×10^{-3}	-15.1	35.5	-0.372	0.396
background so2 slant column offset window1 [DU]	-0.128 ± 0.242	9336722	0.239	-0.192	-1.03	2.73	-0.289	-4.961×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.82 ± 9.27	9336722	11.9	1.58	-63.5	584	-4.25	7.66
sulfurdioxide slant column density window2 precision [DU]	8.07 ± 2.05	9336722	2.42	7.77	2.33	295	6.69	9.12
sulfurdioxide slant column density corrected win2 [DU]	0.175 ± 8.738	9336722	11.2	0.229	-70.9	585	-5.39	5.80
background so2 slant column offset window2 [DU]	-1.65 ± 3.42	9336722	5.46	-0.701	-18.8	6.69	-4.20	1.26
sulfurdioxide slant column density window3 [DU]	-7.21 ± 23.46	9336722	29.9	-7.49	-195	152	-22.2	7.66
sulfurdioxide slant column density window3 precision [DU]	27.6 ± 12.2	9336722	8.34	24.4	10.0	235	21.1	29.4
sulfurdioxide slant column density corrected win3 [DU]	2.11 ± 22.51	9336722	28.5	2.12	-188	167	-12.1	16.4
background so2 slant column offset window3 [DU]	9.31 ± 6.89	9336722	12.0	10.1	-17.4	35.5	2.92	14.9
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.21	9336722	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(4.964 \pm 12.111) \times 10^{-2}$	9336722	2.951×10^{-2}	1.515×10^{-2}	2.767×10^{-4}	1.90	6.312×10^{-3}	3.582×10^{-2}
fitted radiance shift [nm]	$(-1.919 \pm 24.443) \times 10^{-4}$	9336722	1.649×10^{-3}	-1.815×10^{-4}	-4.260×10^{-2}	3.891×10^{-2}	-1.037×10^{-3}	6.120×10^{-4}
fitted radiance squeeze [1]	$(-5.606 \pm 21.332) \times 10^{-5}$	9336722	2.215×10^{-4}	-3.115×10^{-5}	-1.314×10^{-2}	9.411×10^{-3}	-1.500×10^{-4}	7.148×10^{-5}
fitted root mean square [1]	$(1.387 \pm 0.681) \times 10^{-3}$	9336722	7.010×10^{-4}	1.167×10^{-3}	3.195×10^{-4}	3.844×10^{-2}	9.402×10^{-4}	1.641×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.742 ± 0.432	9336722	0.594	0.678	5.000×10^{-2}	2.96	0.411	1.00
sulfurdioxide total air mass factor polluted precision [1]	0.104 ± 0.140	9336722	0.100	5.325×10^{-2}	2.713×10^{-3}	1.91	2.767×10^{-2}	0.128
sulfurdioxide clear air mass factor polluted [1]	0.632 ± 0.315	9336722	0.459	0.579	5.154×10^{-2}	2.44	0.385	0.844
number of spectral points in retrieval [1]	73.5 ± 0.5	9336722	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]	0.667 ± 0.398	7959099	0.750	1.000	0.0	1.000	0.250	1.000
sulfurdioxide total vertical column [DU]	$(2.322 \pm 68.803) \times 10^{-2}$	7959099	0.417	1.113×10^{-2}	-73.7	165	-0.195	0.222
sulfurdioxide total vertical column precision [DU]	0.424 ± 0.460	7959099	0.271	0.298	4.376×10^{-2}	57.3	0.210	0.480
sulfurdioxide slant column density corrected [DU]	$(1.869 \pm 36.199) \times 10^{-2}$	7959099	0.350	9.899×10^{-3}	-28.5	145	-0.164	0.187
sulfurdioxide slant column density cobra [DU]	$(1.856 \pm 35.015) \times 10^{-2}$	7959099	0.350	9.899×10^{-3}	-28.5	27.7	-0.164	0.187
sulfurdioxide slant column density cobra precision [DU]	0.278 ± 0.118	7959099	0.118	0.244	8.327×10^{-2}	23.2	0.202	0.320
sulfurdioxide slant column density window1 [DU]	0.173 ± 0.646	7959099	0.711	0.188	-77.6	71.9	-0.175	0.536
sulfurdioxide slant column density window1 precision [DU]	0.278 ± 0.118	7959099	0.118	0.244	8.327×10^{-2}	23.2	0.202	0.320
sulfurdioxide slant column density corrected win1 [DU]	$(1.846 \pm 63.257) \times 10^{-2}$	7959099	0.691	7.593×10^{-3}	-77.6	71.7	-0.335	0.356
background so2 slant column offset window1 [DU]	-0.154 ± 0.150	7959099	0.186	-0.187	-0.775	2.15	-0.265	-7.919×10^{-2}
sulfurdioxide slant column density window2 [DU]	0.309 ± 9.053	7959099	11.3	0.188	-1.724×10^{3}	706	-5.43	5.92
sulfurdioxide slant column density window2 precision [DU]	8.21 ± 2.28	7959099	2.56	7.88	2.28	546	6.75	9.32
sulfurdioxide slant column density corrected win2 [DU]	0.388 ± 8.951	7959099	11.2	0.397	-1.722×10^{3}	707	-5.23	6.02
background so2 slant column offset window2 [DU]	$(7.911 \pm 171.945) \times 10^{-2}$	7959099	2.01	0.529	-8.68	6.87	-0.784	1.22
sulfurdioxide slant column density window3 [DU]	-2.05 ± 24.62	7959099	31.2	-2.10	-860	447	-17.5	13.6
sulfurdioxide slant column density window3 precision [DU]	29.2 ± 13.4	7959099	10.3	25.6	10.2	680	21.7	32.0
sulfurdioxide slant column density corrected win3 [DU]	1.77 ± 23.95	7959099	30.4	1.63	-861	444	-13.3	17.0
background so2 slant column offset window3 [DU]	3.82 ± 5.57	7959099	8.73	2.80	-19.1	27.2	-0.531	8.20
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.21	7959099	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.036 \pm 3.400) \times 10^{-2}$	7959099	1.138×10^{-2}	1.499×10^{-2}	1.071×10^{-3}	1.23	1.007×10^{-2}	2.145×10^{-2}
fitted radiance shift [nm]	$(-5.093 \pm 26.606) \times 10^{-4}$	7959099	1.991×10^{-3}	-4.979×10^{-4}	-7.330×10^{-2}	0.110	-1.552×10^{-3}	4.388×10^{-4}
fitted radiance squeeze [1]	$(-1.447 \pm 16.618) \times 10^{-5}$	7959099	1.941×10^{-4}	-1.148×10^{-5}	-1.449×10^{-2}	4.232×10^{-2}	-1.097×10^{-4}	8.439×10^{-5}
fitted root mean square [1]	$(1.217 \pm 0.473) \times 10^{-3}$	7959099	4.630×10^{-4}	1.086×10^{-3}	3.331×10^{-4}	5.009×10^{-2}	9.175×10^{-4}	1.381×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.894 ± 0.410	7959099	0.517	0.837	5.000×10^{-2}	2.86	0.607	1.12
sulfurdioxide total air mass factor polluted precision [1]	0.115 ± 0.100	7959099	0.120	7.648×10^{-2}	5.938×10^{-3}	1.48	4.151×10^{-2}	0.162
sulfurdioxide clear air mass factor polluted [1]	0.753 ± 0.254	7959099	0.320	0.710	0.145	2.47	0.576	0.897
number of spectral points in retrieval [1]	73.4 ± 0.5	7959099	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 ± 0.396	11844027	0.730	1.000	0.0	1.000	0.270	1.000
sulfurdioxide total vertical column [DU]	$(2.333 \pm 103.685) \times 10^{-2}$	11844027	0.441	9.794×10^{-3}	-85.1	165	-0.208	0.233
sulfurdioxide total vertical column precision [DU]	0.515 ± 0.765	11844027	0.313	0.307	5.372×10^{-2}	57.3	0.216	0.528
sulfurdioxide slant column density corrected [DU]	$(1.538 \pm 34.393) \times 10^{-2}$	11844027	0.351	8.292×10^{-3}	-28.5	153	-0.166	0.185
sulfurdioxide slant column density cobra [DU]	$(1.534 \pm 33.798) \times 10^{-2}$	11844027	0.351	8.291×10^{-3}	-28.5	26.4	-0.166	0.185
sulfurdioxide slant column density cobra precision [DU]	0.283 ± 0.127	11844027	0.133	0.242	8.327×10^{-2}	23.2	0.199	0.333
sulfurdioxide slant column density window1 [DU]	0.169 ± 0.653	11844027	0.716	0.187	-30.6	71.9	-0.178	0.538
sulfurdioxide slant column density window1 precision [DU]	0.283 ± 0.127	11844027	0.133	0.242	8.327×10^{-2}	23.2	0.199	0.333
sulfurdioxide slant column density corrected win1 [DU]	$(1.477 \pm 64.224) \times 10^{-2}$	11844027	0.699	5.291×10^{-4}	-30.6	71.7	-0.345	0.354
background so2 slant column offset window1 [DU]	-0.154 ± 0.172	11844027	0.200	-0.192	-1.03	2.23	-0.276	-7.635×10^{-2}
sulfurdioxide slant column density window2 [DU]	0.651 ± 8.915	11844027	11.3	0.486	-620	706	-5.10	6.22
sulfurdioxide slant column density window2 precision [DU]	8.00 ± 2.07	11844027	2.42	7.68	2.28	546	6.62	9.04
sulfurdioxide slant column density corrected win2 [DU]	0.295 ± 8.686	11844027	11.0	0.319	-619	707	-5.22	5.83
background so2 slant column offset window2 [DU]	-0.356 ± 2.425	11844027	2.74	0.399	-18.8	6.87	-1.46	1.29
sulfurdioxide slant column density window3 [DU]	-1.71 ± 24.03	11844027	30.7	-2.00	-860	234	-17.1	13.6
sulfurdioxide slant column density window3 precision [DU]	27.5 ± 11.7	11844027	8.96	24.4	10.0	680	21.0	30.0
sulfurdioxide slant column density corrected win3 [DU]	4.00 ± 22.97	11844027	29.3	3.71	-861	233	-10.7	18.6
background so2 slant column offset window3 [DU]	5.71 ± 6.31	11844027	9.89	4.83	-19.1	35.5	0.614	10.5
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.20	11844027	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.599 \pm 6.506) \times 10^{-2}$	11844027	1.258×10^{-2}	1.497×10^{-2}	3.754×10^{-4}	1.66	9.690×10^{-3}	2.227×10^{-2}
fitted radiance shift [nm]	$(-3.463 \pm 23.600) \times 10^{-4}$	11844027	1.807×10^{-3}	-3.050×10^{-4}	-4.445×10^{-2}	0.110	-1.280×10^{-3}	5.274×10^{-4}
fitted radiance squeeze [1]	$(-1.999 \pm 17.315) \times 10^{-5}$	11844027	1.948×10^{-4}	-1.221×10^{-5}	-1.385×10^{-2}	4.232×10^{-2}	-1.120×10^{-4}	8.283×10^{-5}
fitted root mean square [1]	$(1.239 \pm 0.521) \times 10^{-3}$	11844027	5.099×10^{-4}	1.079×10^{-3}	3.195×10^{-4}	4.428×10^{-2}	9.081×10^{-4}	1.418×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.842 ± 0.393	11844027	0.500	0.808	5.000×10^{-2}	2.50	0.571	1.07
sulfurdioxide total air mass factor polluted precision [1]	0.107 ± 0.105	11844027	0.105	6.724×10^{-2}	2.887×10^{-3}	1.91	3.922×10^{-2}	0.144
sulfurdioxide clear air mass factor polluted [1]	0.717 ± 0.258	11844027	0.342	0.696	6.726×10^{-2}	2.47	0.540	0.882
number of spectral points in retrieval [1]	73.5 ± 0.5	11844027	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]	0.629 ± 0.399	3903337	0.780	1.000	0.0	1.000	0.220	1.000
sulfurdioxide total vertical column [DU]	$(7.214 \pm 170.170) \times 10^{-2}$	3903337	0.586	1.505×10^{-2}	-112	101	-0.267	0.319
sulfurdioxide total vertical column precision [DU]	0.804 ± 1.225	3903337	0.569	0.449	4.044×10^{-2}	31.5	0.257	0.827
sulfurdioxide slant column density corrected [DU]	$(3.196 \pm 48.814) \times 10^{-2}$	3903337	0.384	1.180×10^{-2}	-10.1	68.8	-0.178	0.207
sulfurdioxide slant column density cobra [DU]	$(3.119 \pm 44.788) \times 10^{-2}$	3903337	0.384	1.180×10^{-2}	-10.1	27.7	-0.178	0.207
sulfurdioxide slant column density cobra precision [DU]	0.315 ± 0.161	3903337	0.164	0.264	8.909×10^{-2}	13.9	0.212	0.377
sulfurdioxide slant column density window1 [DU]	0.188 ± 0.788	3903337	0.776	0.208	-77.6	32.0	-0.188	0.588
sulfurdioxide slant column density window1 precision [DU]	0.315 ± 0.161	3903337	0.164	0.264	8.909×10^{-2}	13.9	0.212	0.377
sulfurdioxide slant column density corrected win1 [DU]	$(4.279 \pm 77.807) \times 10^{-2}$	3903337	0.757	1.160×10^{-2}	-77.6	31.7	-0.360	0.397
background so2 slant column offset window1 [DU]	-0.145 ± 0.229	3903337	0.213	-0.210	-0.837	2.47	-0.291	-7.755×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.43 ± 9.59	3903337	12.1	1.25	-1.724×10^{3}	584	-4.71	7.41
sulfurdioxide slant column density window2 precision [DU]	8.41 ± 2.37	3903337	2.57	8.10	2.44	493	6.93	9.50
sulfurdioxide slant column density corrected win2 [DU]	0.230 ± 9.132	3903337	11.5	0.279	-1.722×10^{3}	585	-5.50	6.00
background so2 slant column offset window2 [DU]	-1.20 ± 3.18	3903337	4.60	4.370×10^{-2}	-18.6	6.87	-3.35	1.24
sulfurdioxide slant column density window3 [DU]	-11.2 ± 23.4	3903337	29.6	-10.9	-471	447	-25.9	3.70
sulfurdioxide slant column density window3 precision [DU]	30.8 ± 15.5	3903337	10.6	26.3	10.6	246	22.4	33.0
sulfurdioxide slant column density corrected win3 [DU]	-3.39 ± 23.48	3903337	29.5	-2.86	-475	444	-17.9	11.6
background so2 slant column offset window3 [DU]	7.85 ± 7.31	3903337	12.8	7.87	-19.1	35.0	1.24	14.1
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.21	3903337	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(5.952 \pm 12.835) \times 10^{-2}$	3903337	4.584×10^{-2}	1.808×10^{-2}	2.767×10^{-4}	1.87	5.767×10^{-3}	5.160×10^{-2}
fitted radiance shift [nm]	$(-2.830 \pm 30.963) \times 10^{-4}$	3903337	1.864×10^{-3}	-3.071×10^{-4}	-7.330×10^{-2}	3.880×10^{-2}	-1.239×10^{-3}	6.251×10^{-4}
fitted radiance squeeze [1]	$(-5.461 \pm 20.838) \times 10^{-5}$	3903337	2.206×10^{-4}	-3.476×10^{-5}	-1.449×10^{-2}	1.193×10^{-2}	-1.512×10^{-4}	6.947×10^{-5}
fitted root mean square [1]	$(1.365 \pm 0.657) \times 10^{-3}$	3903337	6.130×10^{-4}	1.165×10^{-3}	3.331×10^{-4}	5.009×10^{-2}	9.628×10^{-4}	1.576×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.751 ± 0.495	3903337	0.638	0.605	5.000×10^{-2}	2.96	0.391	1.03
sulfurdioxide total air mass factor polluted precision [1]	0.115 ± 0.157	3903337	0.129	4.956×10^{-2}	2.713×10^{-3}	1.82	2.385×10^{-2}	0.153
sulfurdioxide clear air mass factor polluted [1]	0.623 ± 0.338	3903337	0.435	0.537	5.154×10^{-2}	2.44	0.374	0.809
number of spectral points in retrieval [1]	73.4 ± 0.5	3903337	1.000	73.0	52.0	74.0	73.0	74.0

3 Granule outlines

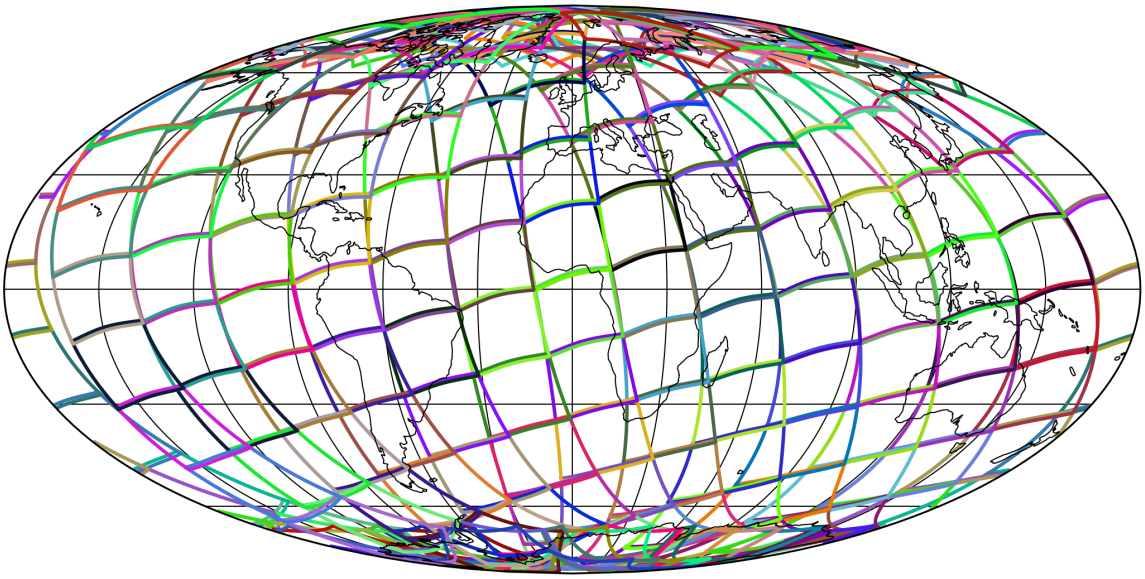

Figure 1: Outline of the granules.

4 Input data monitoring

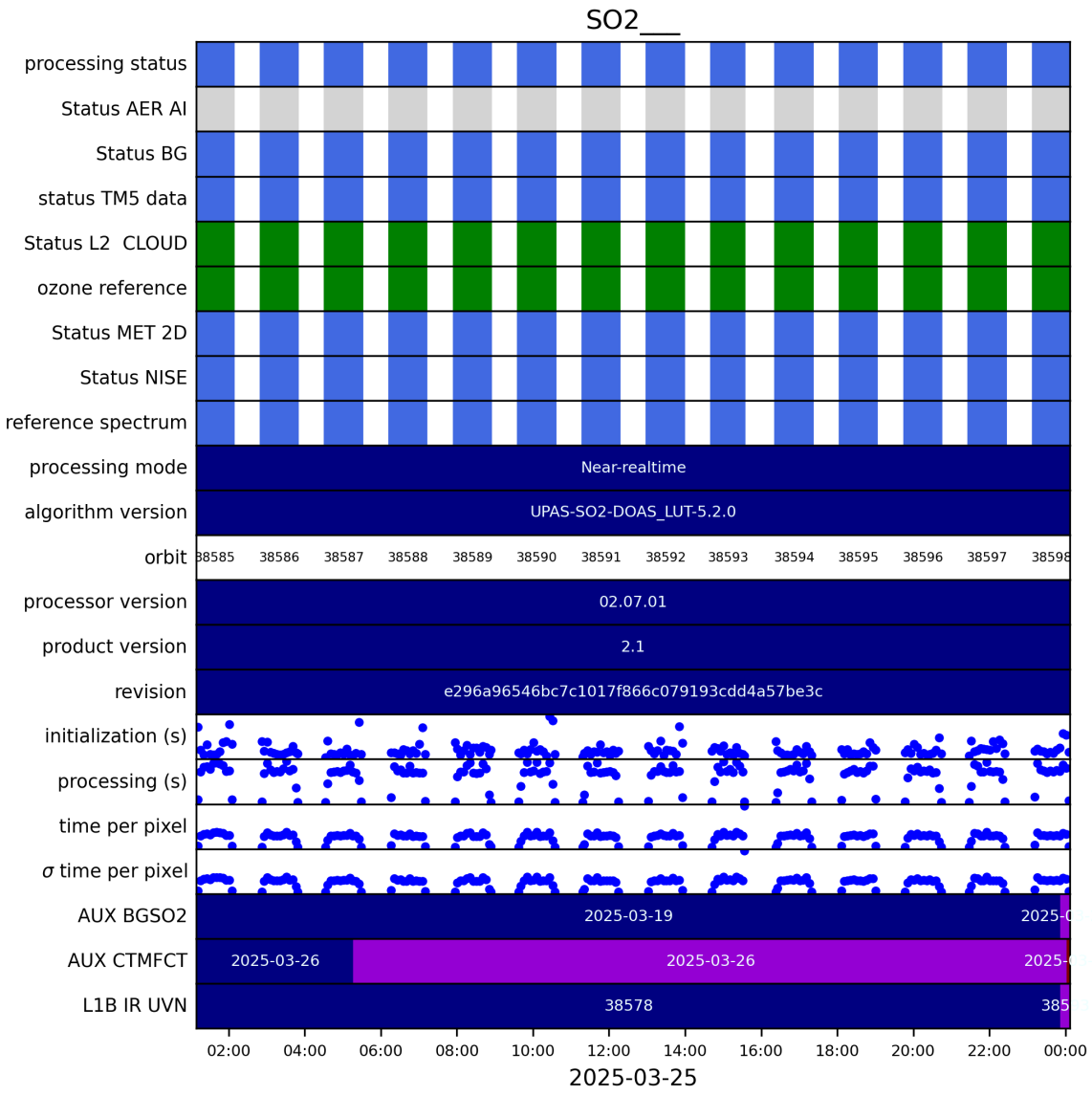

Figure 2: Input data per granule

5 Warnings and errors

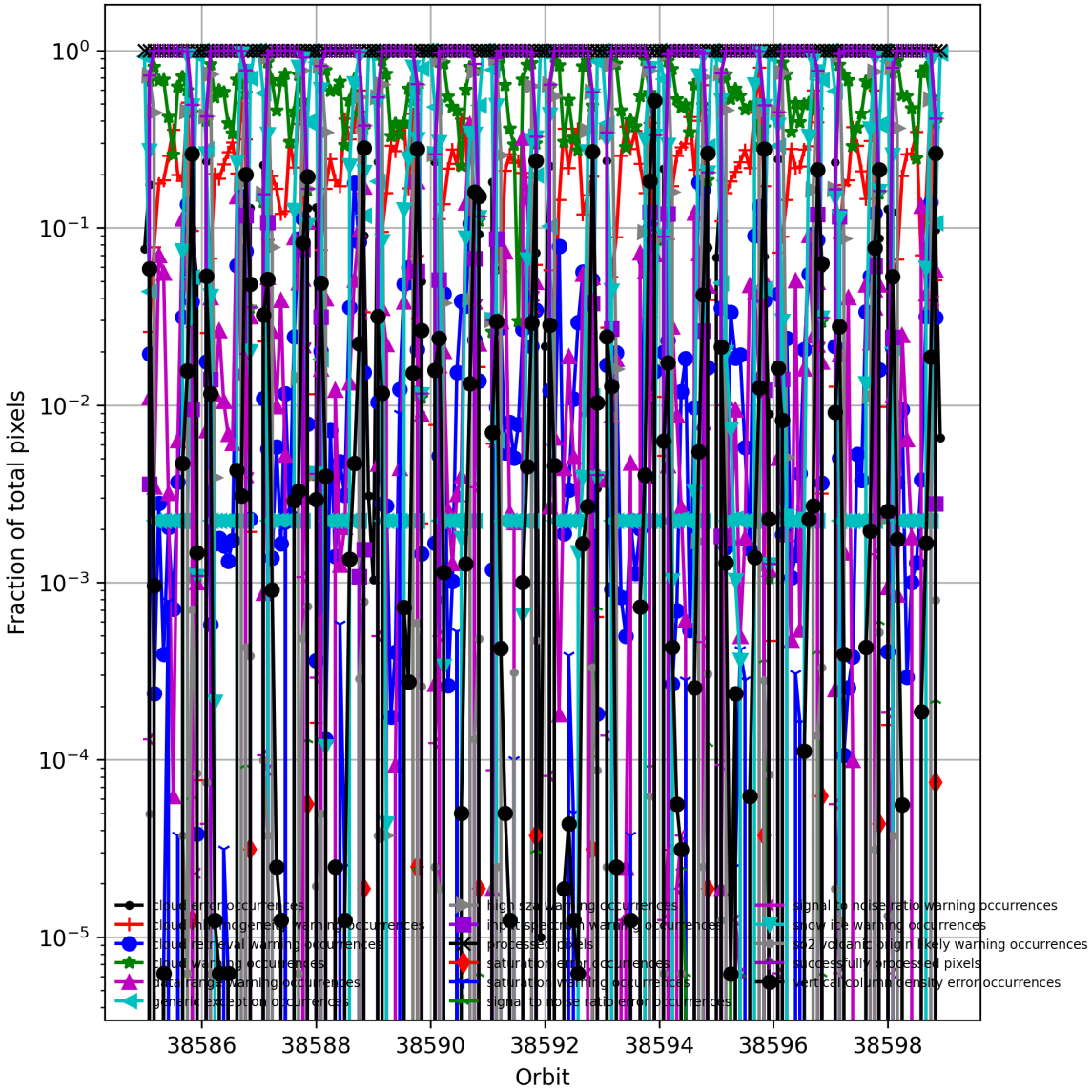

Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

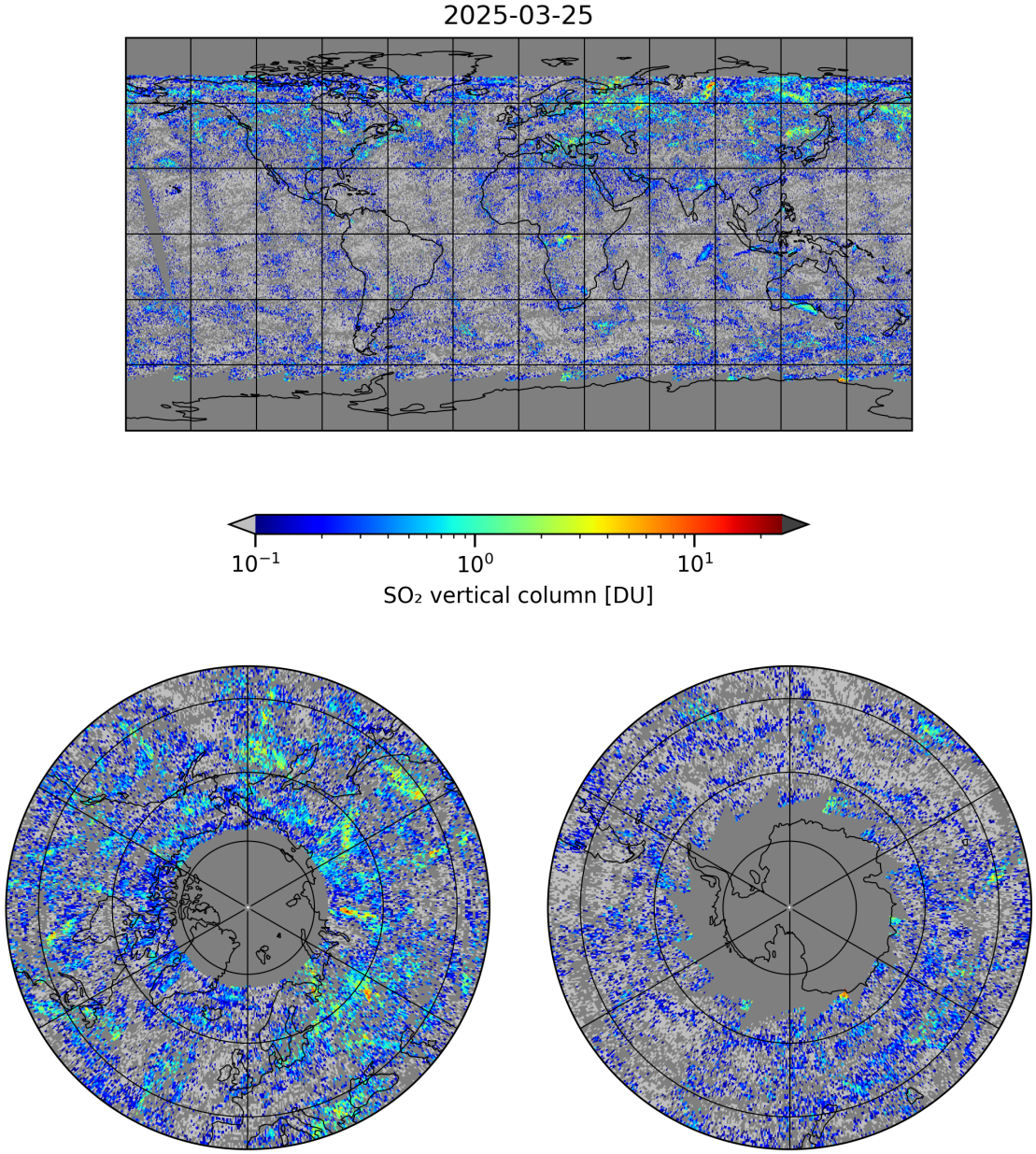

Figure 4: Map of "SO_2 vertical column" for 2025-03-25 to 2025-03-26

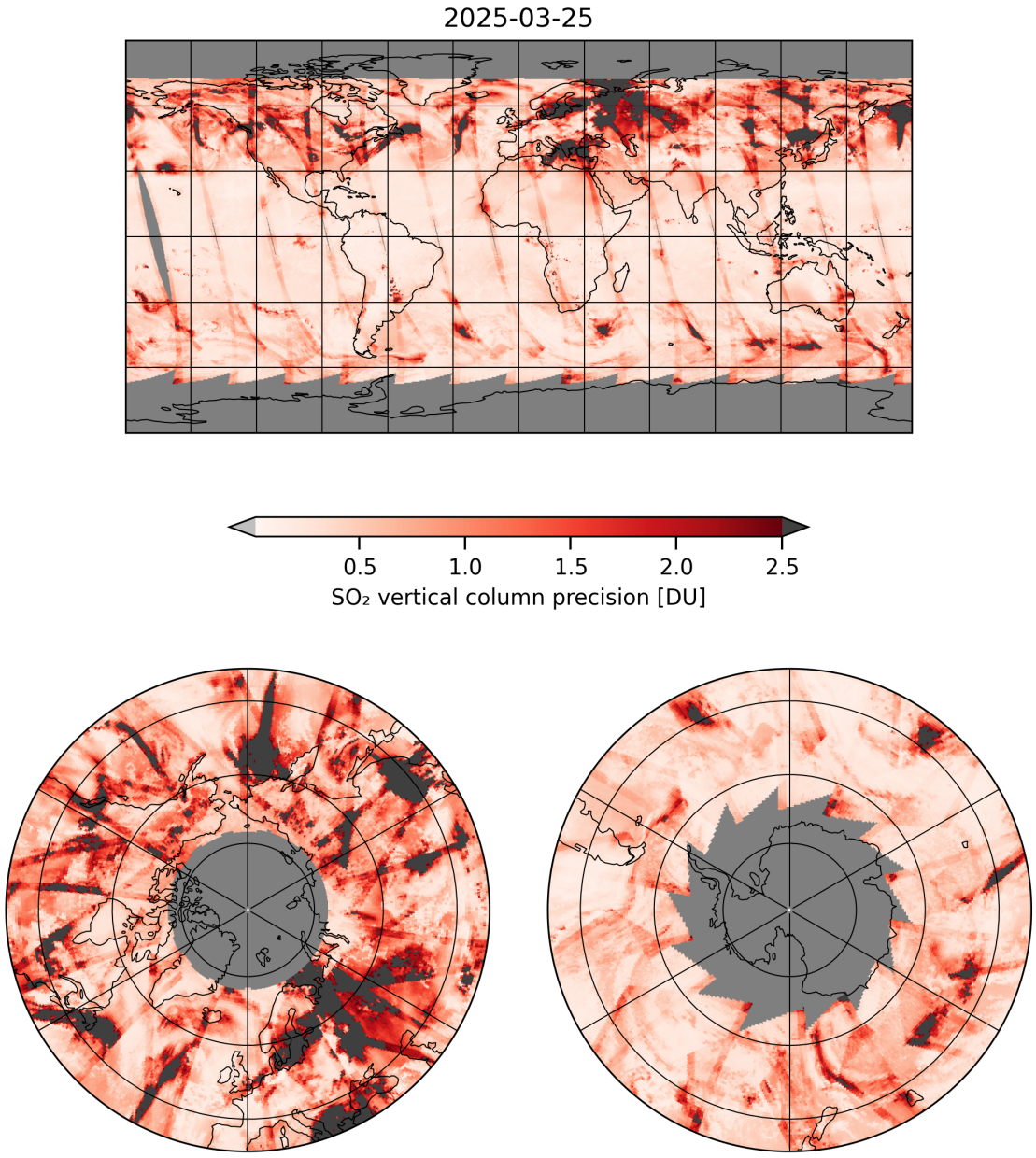

Figure 5: Map of "SO_2 vertical column precision" for 2025-03-25 to 2025-03-26

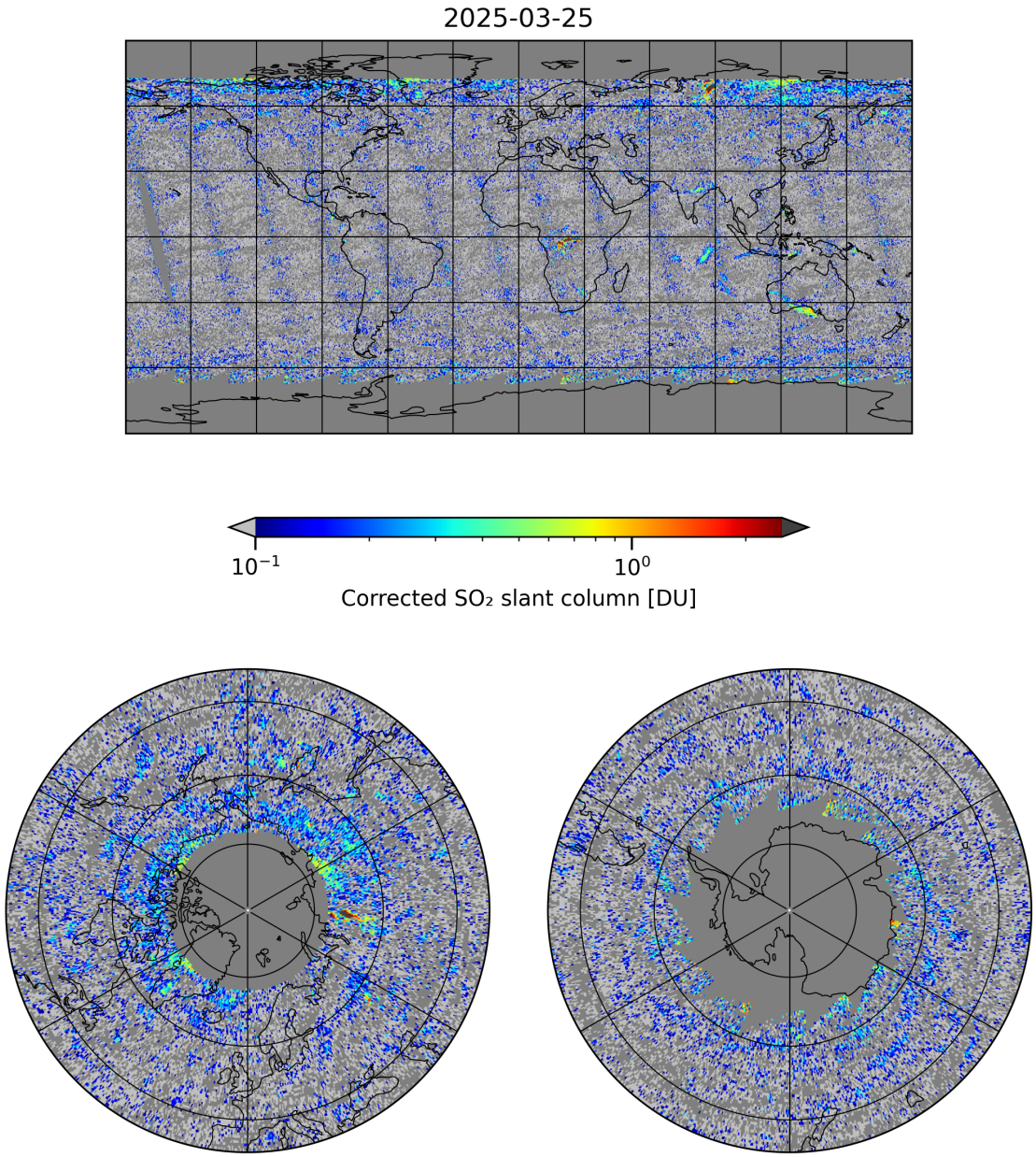

Figure 6: Map of "Corrected SO_2 slant column" for 2025-03-25 to 2025-03-26

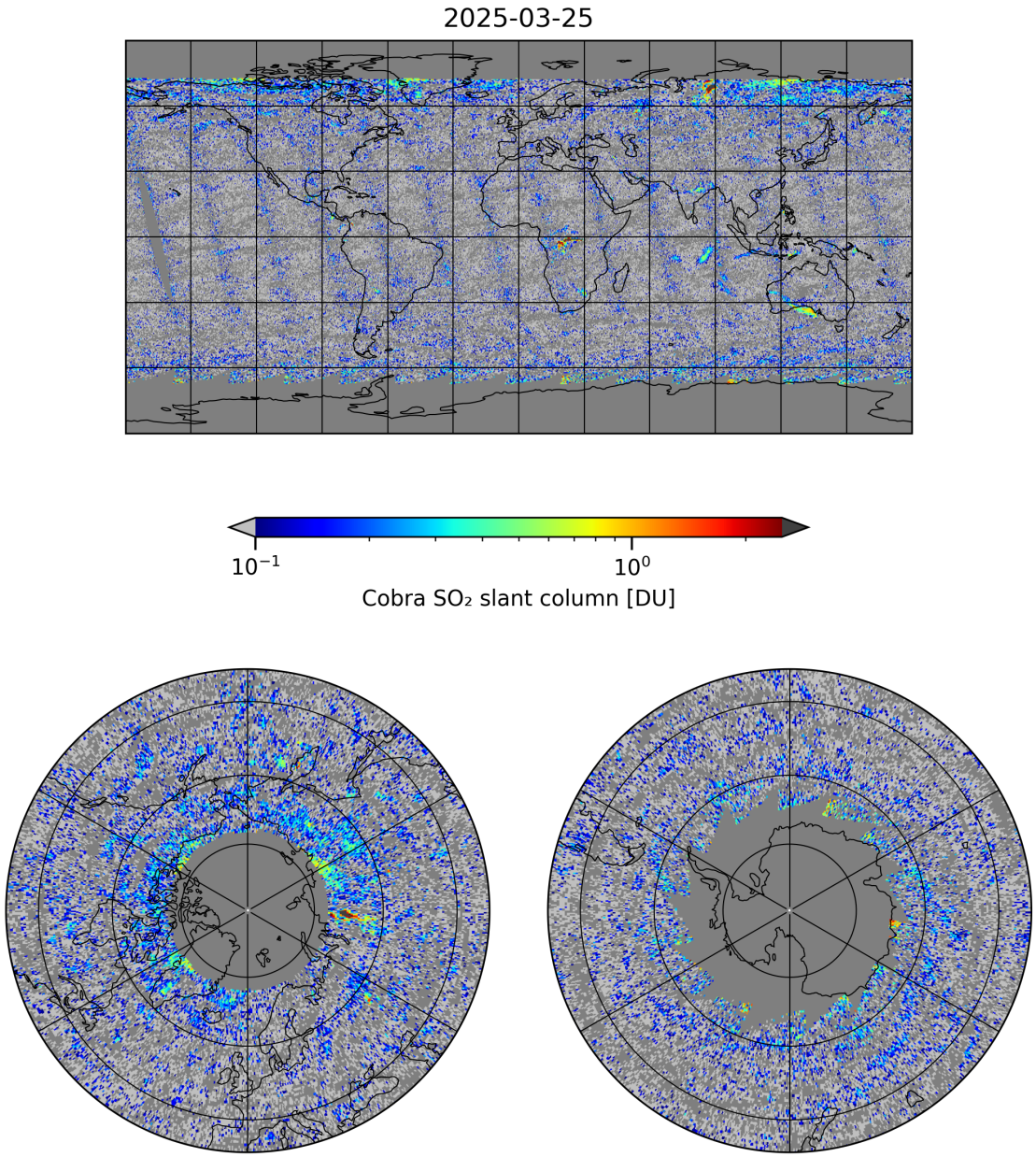

Figure 7: Map of "Cobra SO_2 slant column" for 2025-03-25 to 2025-03-26

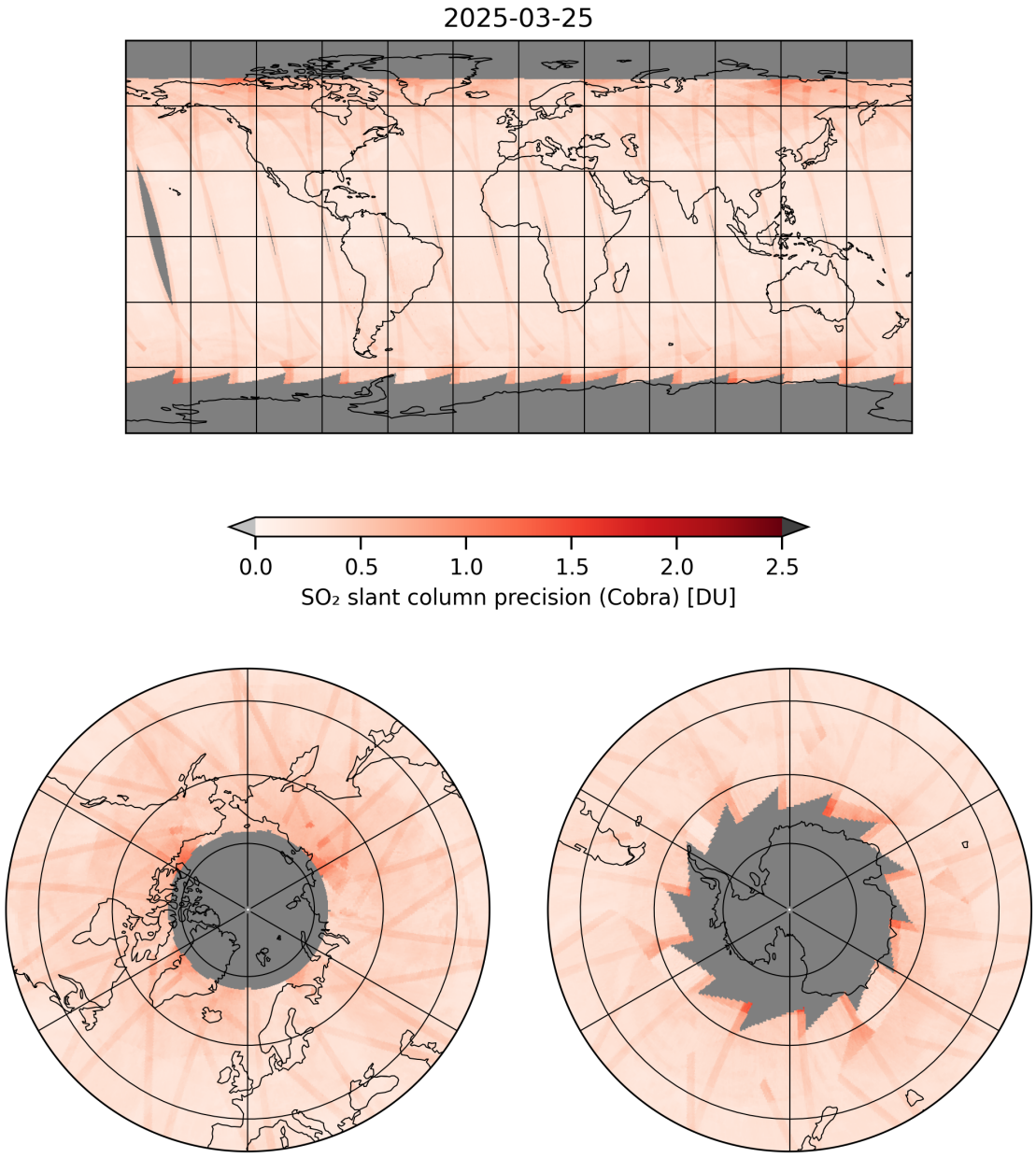

Figure 8: Map of "SO_2 slant column precision (Cobra)" for 2025-03-25 to 2025-03-26

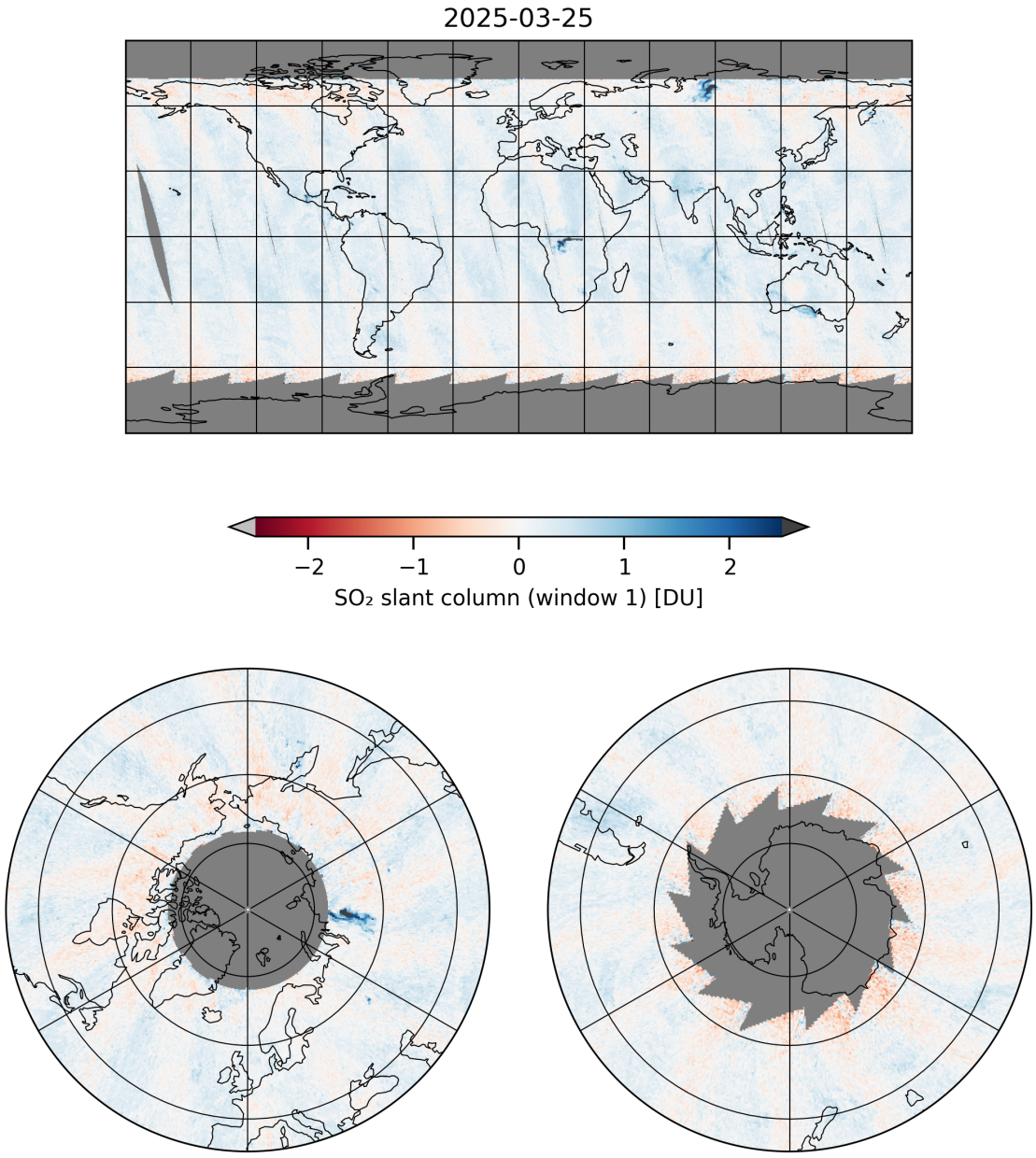

Figure 9: Map of "SO_2 slant column (window 1)" for 2025-03-25 to 2025-03-26

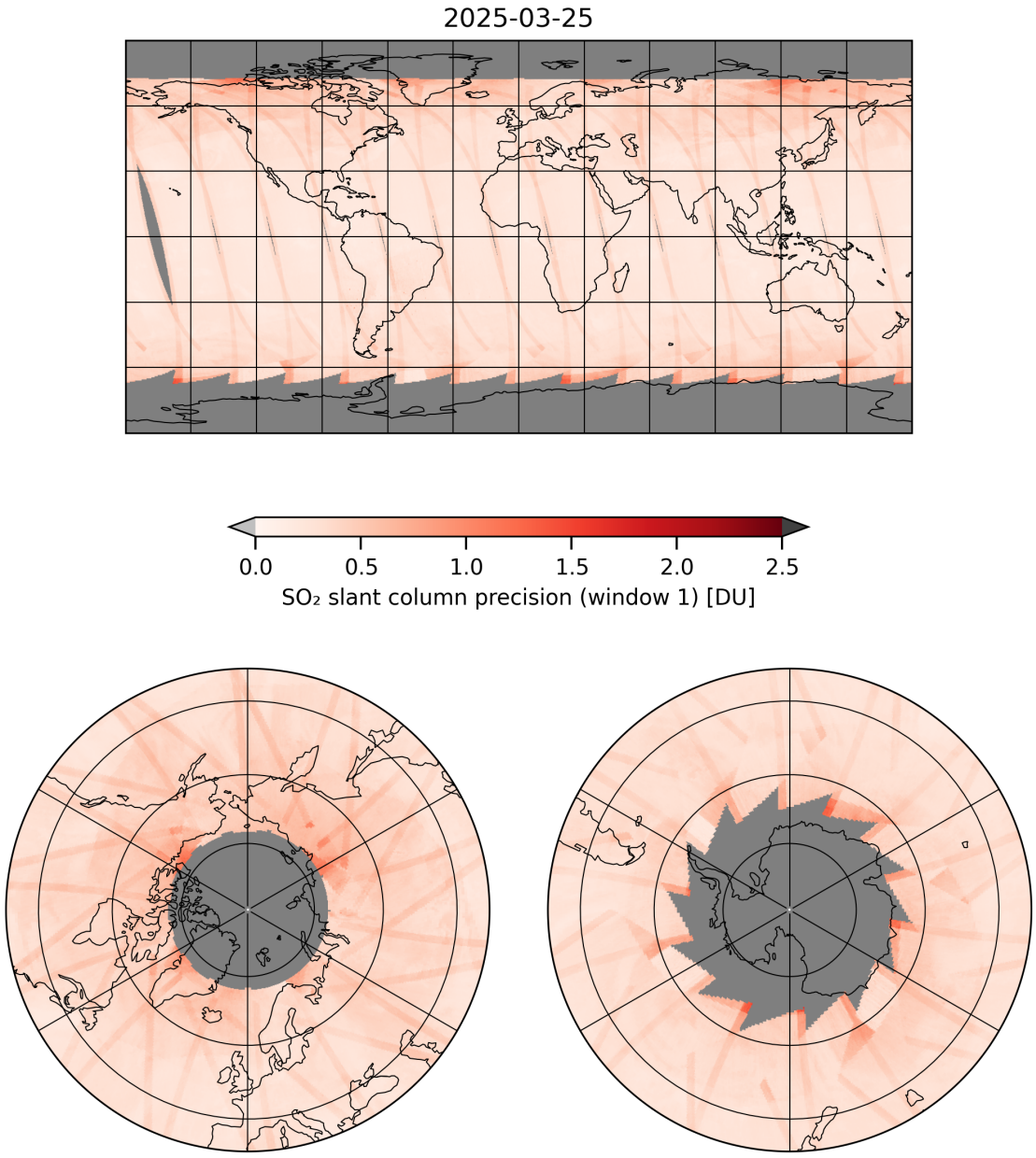

Figure 10: Map of "SO_2 slant column precision (window 1)" for 2025-03-25 to 2025-03-26

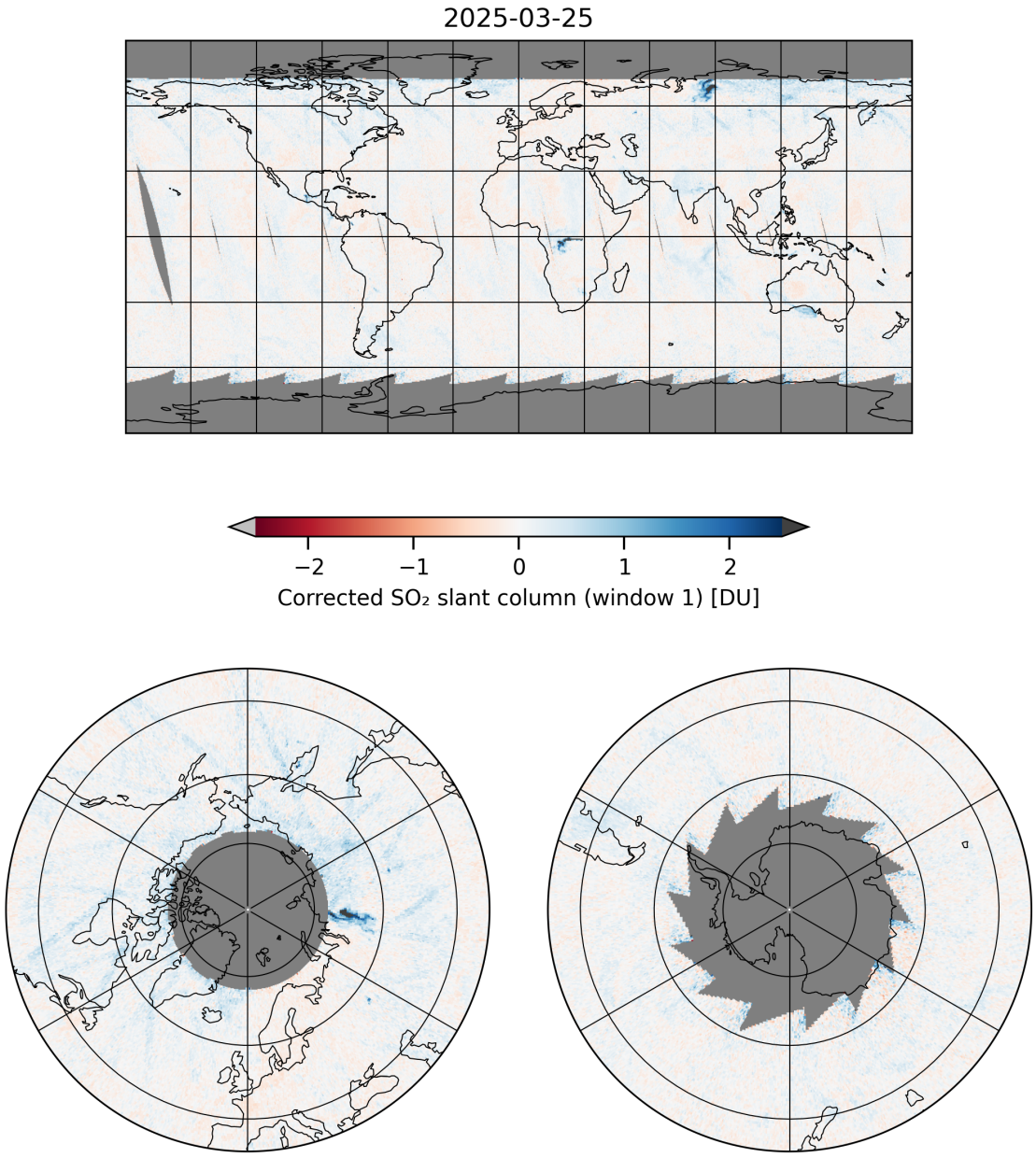

Figure 11: Map of “Corrected SO_2 slant column (window 1)” for 2025-03-25 to 2025-03-26

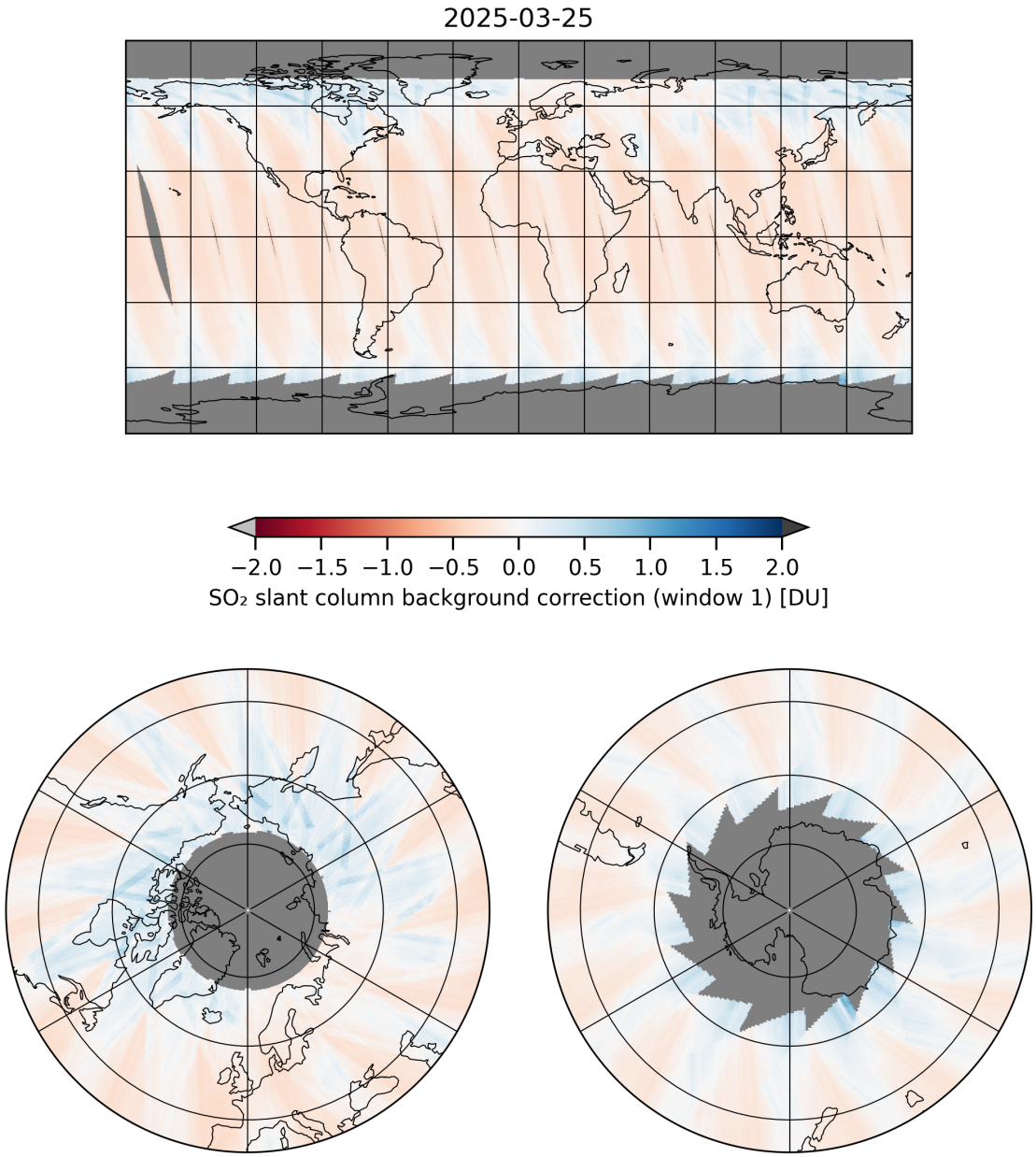

Figure 12: Map of "SO_2 slant column background correction (window 1)" for 2025-03-25 to 2025-03-26

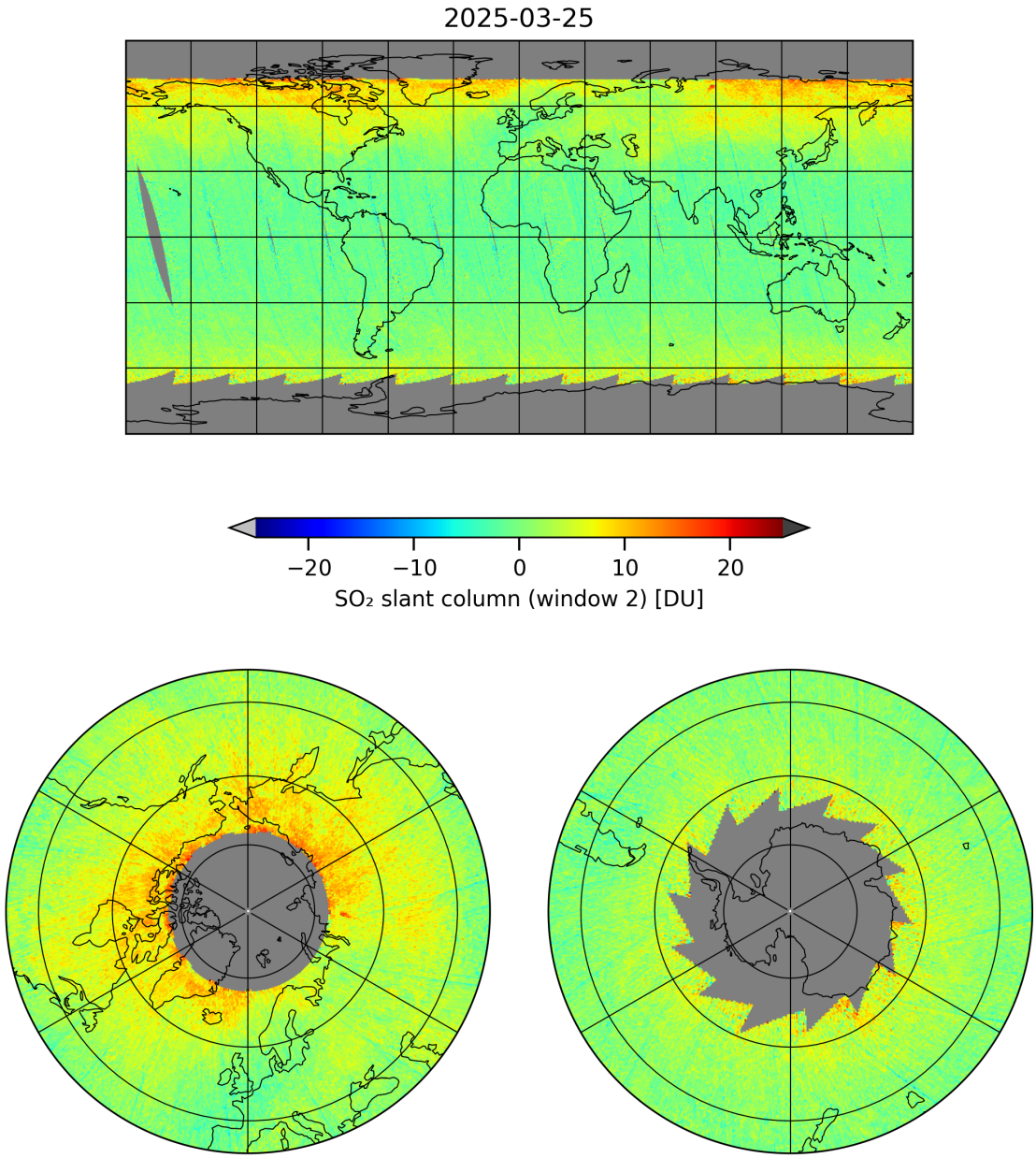

Figure 13: Map of "SO_2 slant column (window 2)" for 2025-03-25 to 2025-03-26

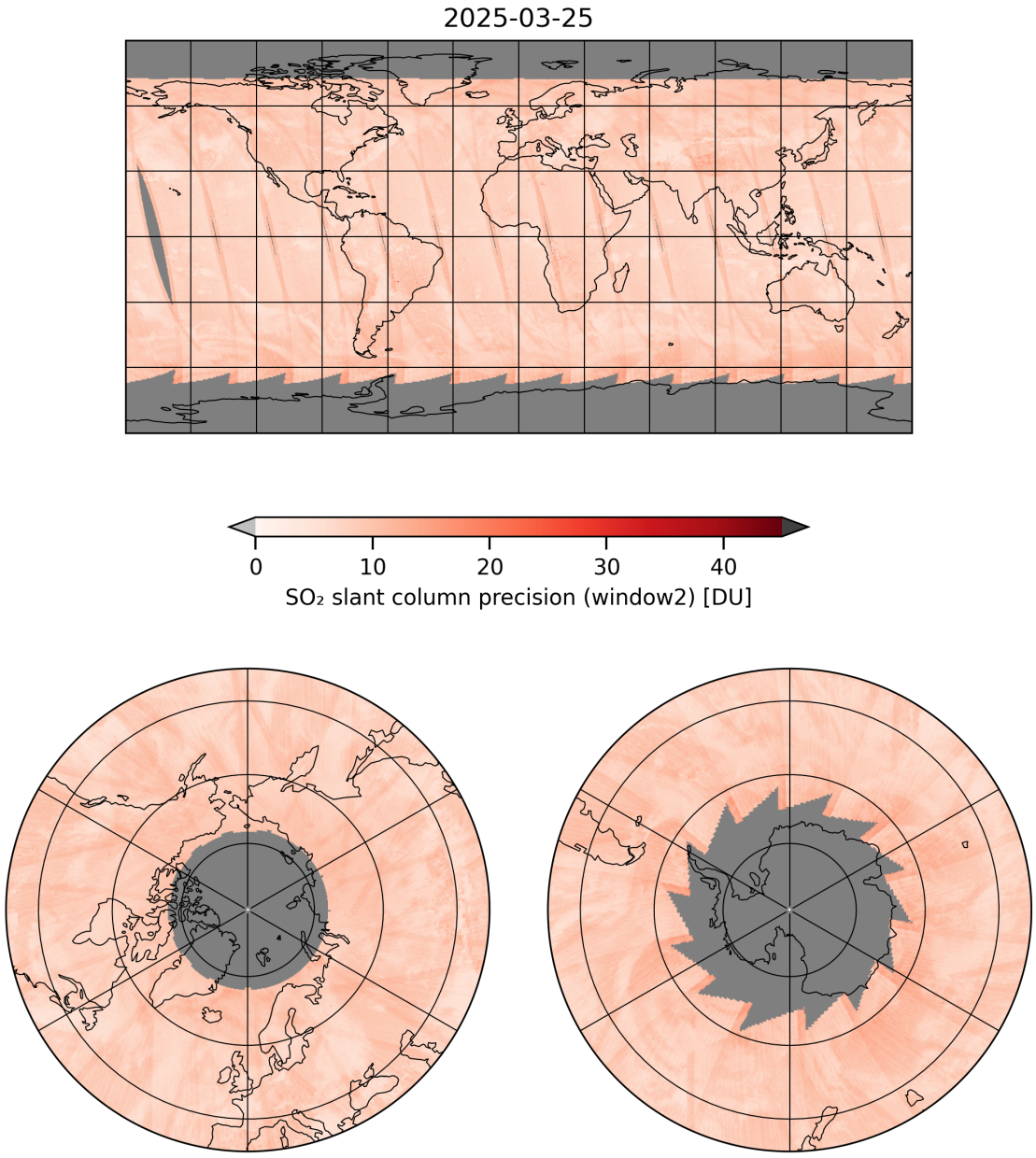

Figure 14: Map of "SO_2 slant column precision (window2)" for 2025-03-25 to 2025-03-26

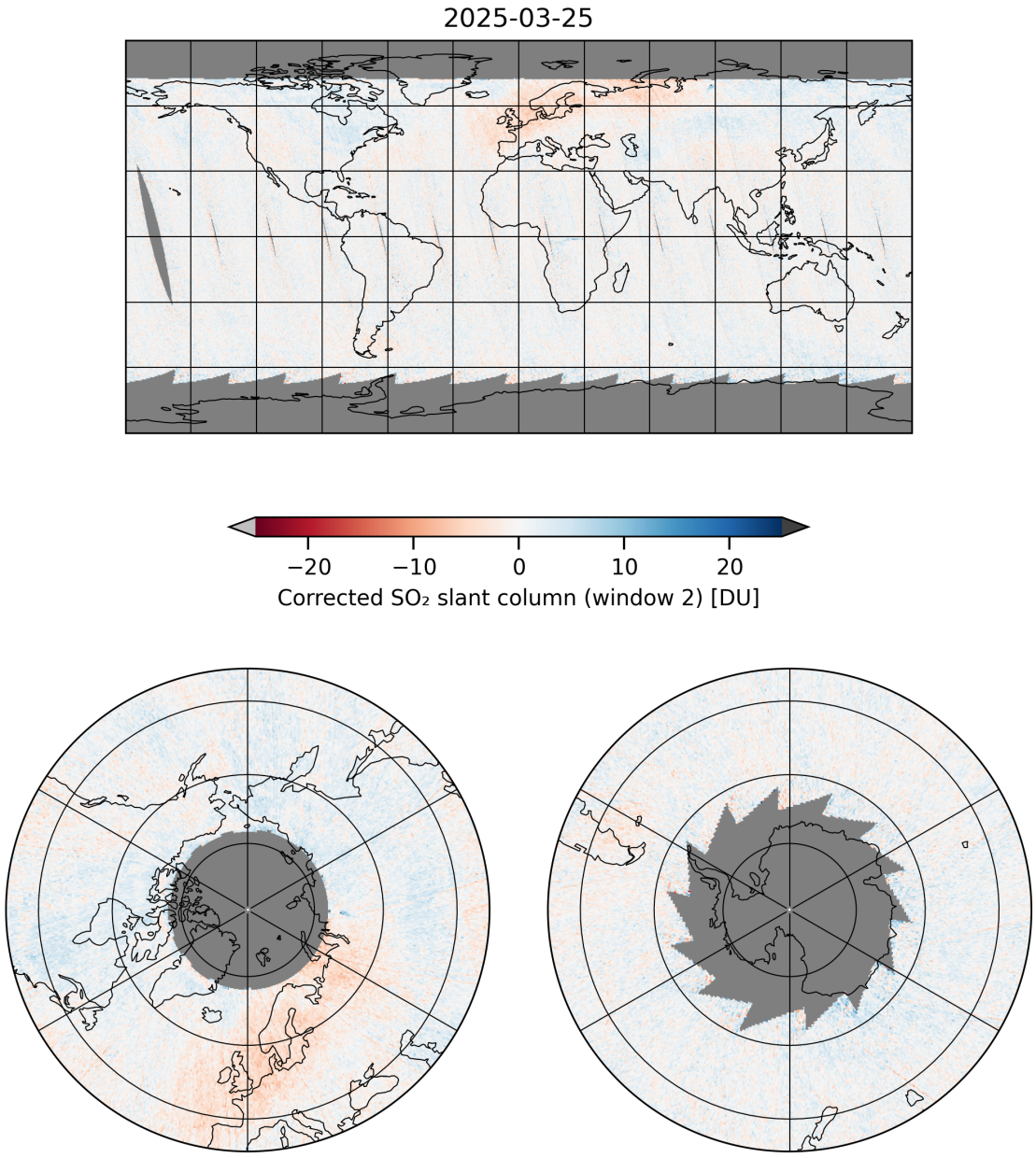

Figure 15: Map of "Corrected SO_2 slant column (window 2)" for 2025-03-25 to 2025-03-26

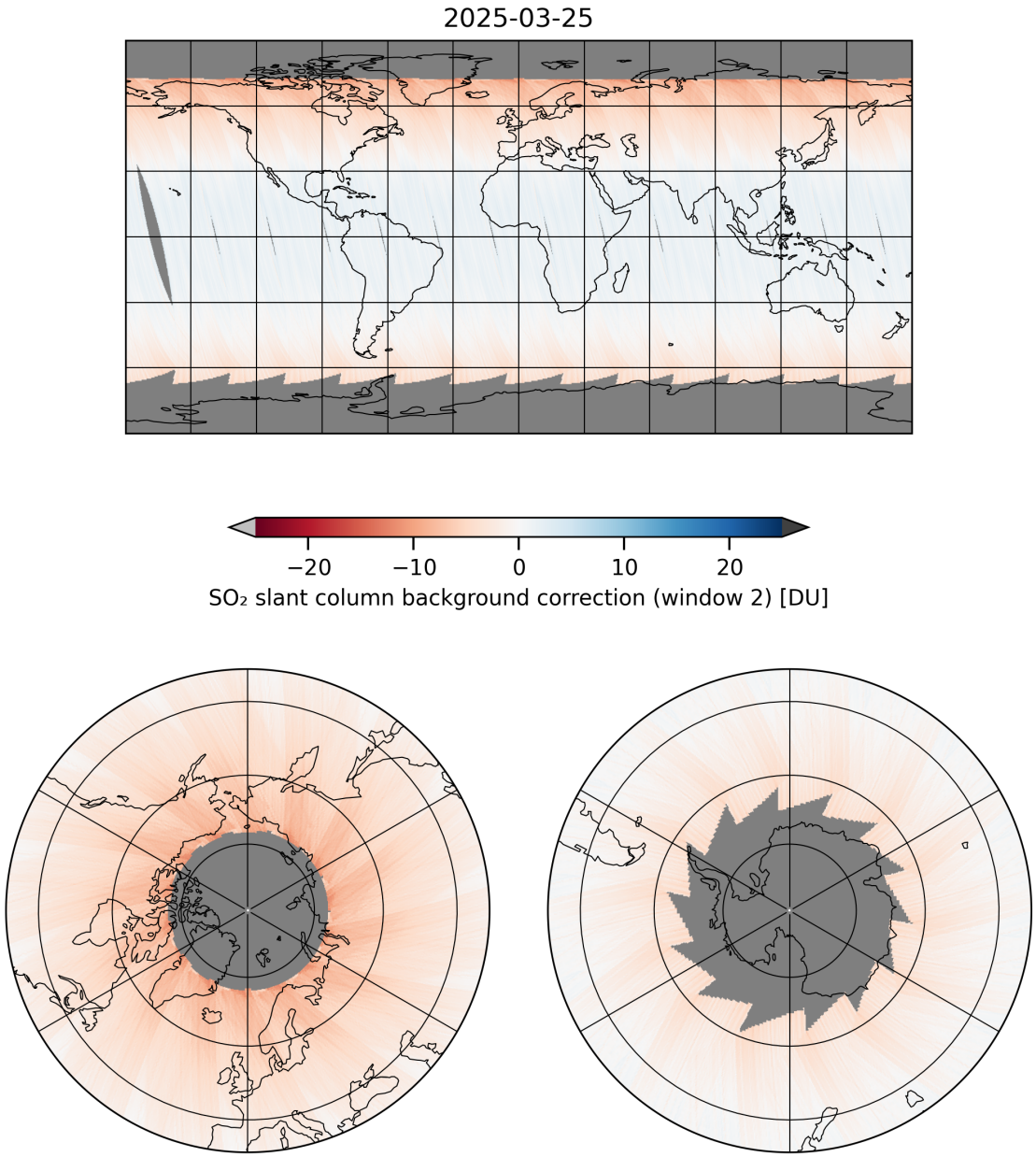

Figure 16: Map of "SO_2 slant column background correction (window 2)" for 2025-03-25 to 2025-03-26

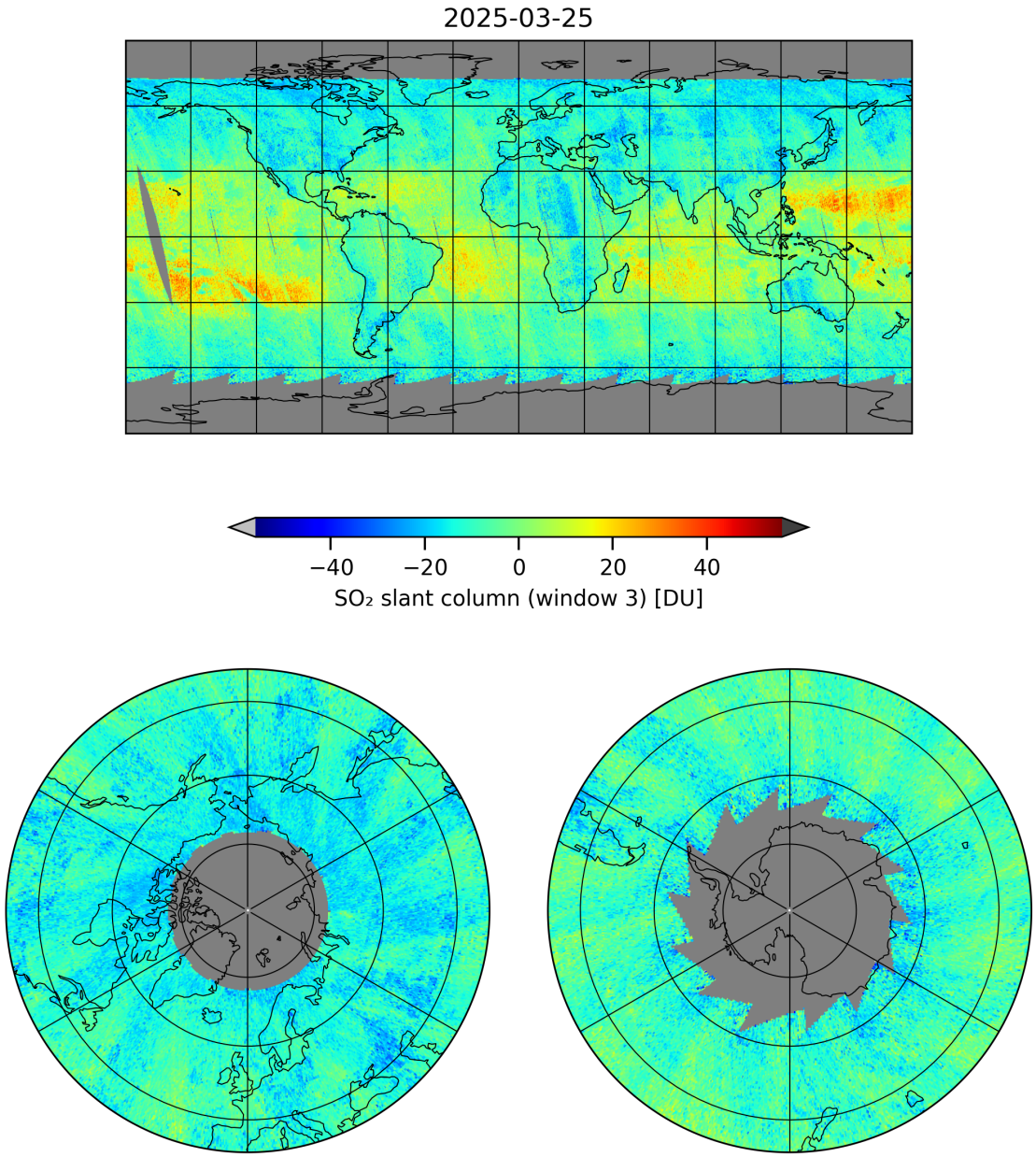

Figure 17: Map of "SO_2 slant column (window 3)" for 2025-03-25 to 2025-03-26

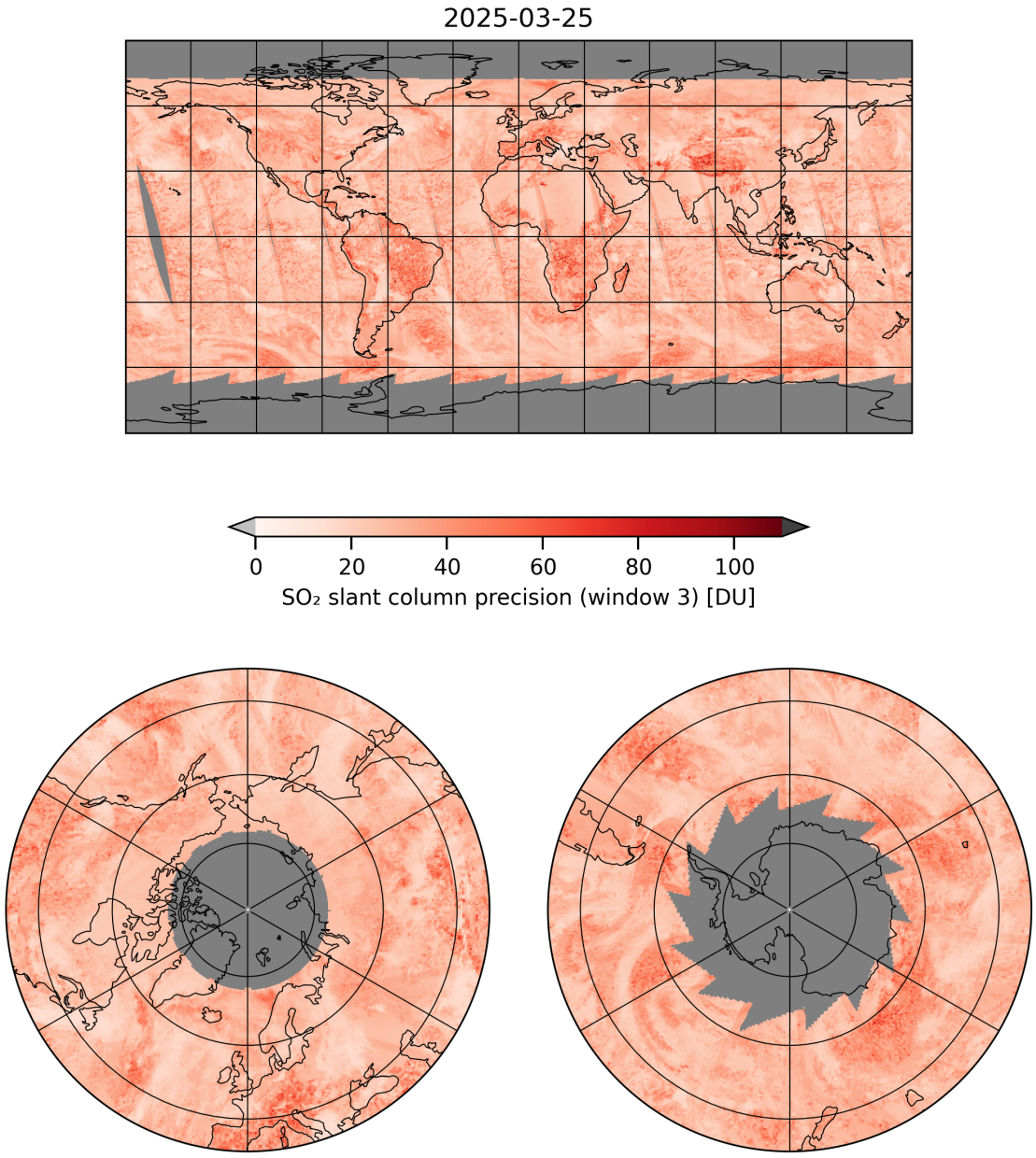

Figure 18: Map of "SO_2 slant column precision (window 3)" for 2025-03-25 to 2025-03-26

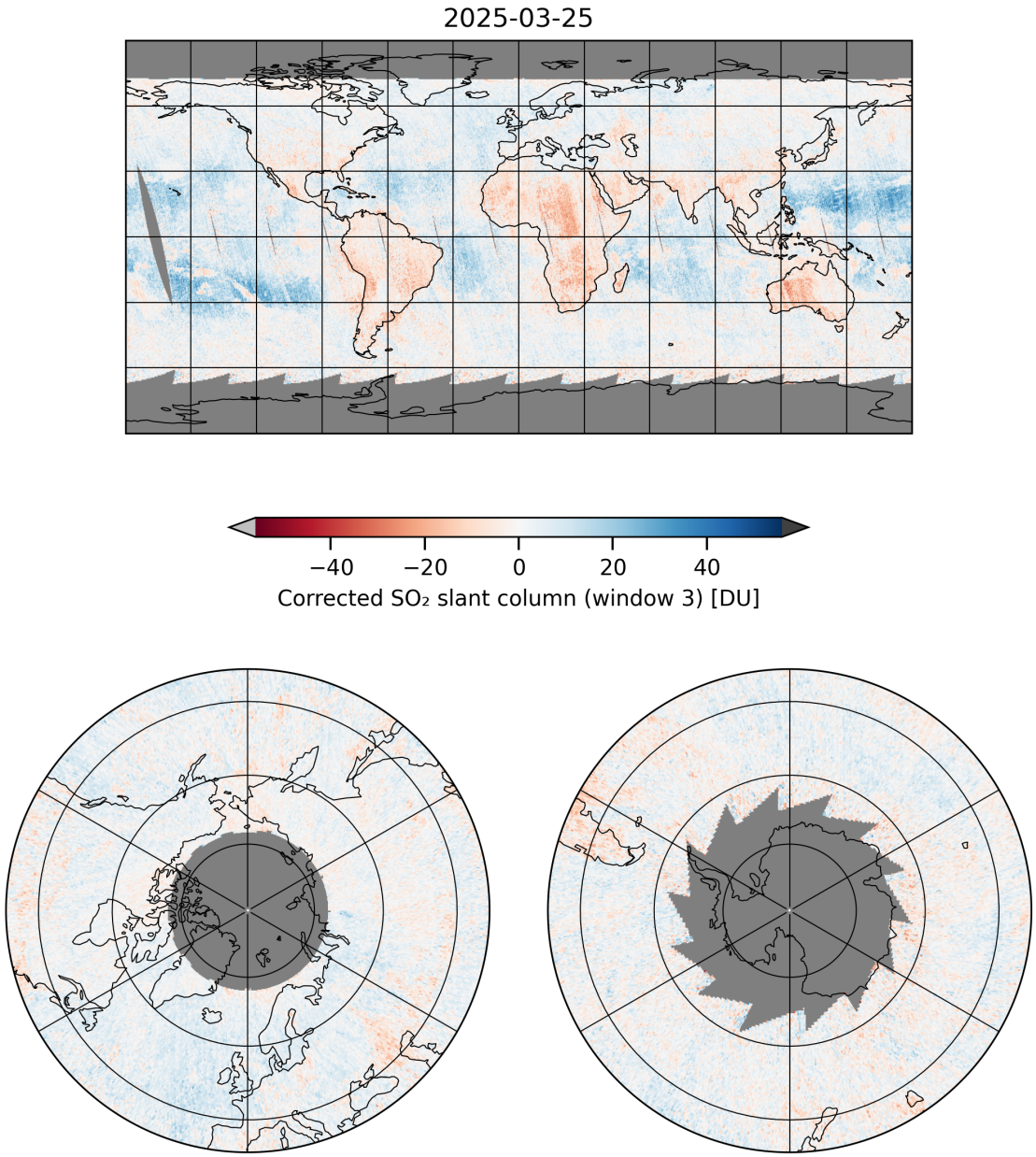

Figure 19: Map of "Corrected SO_2 slant column (window 3)" for 2025-03-25 to 2025-03-26

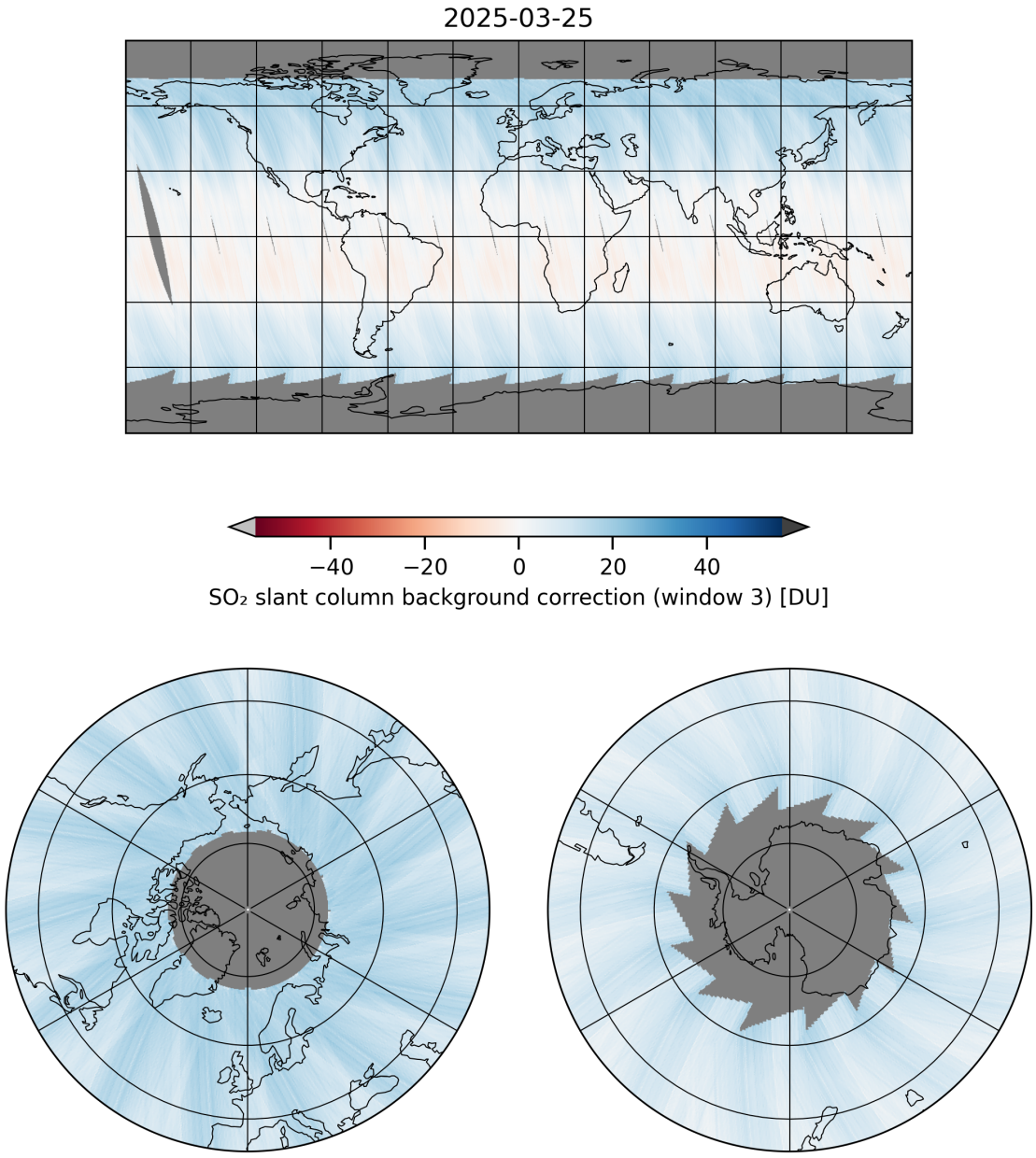

Figure 20: Map of "SO_2 slant column background correction (window 3)" for 2025-03-25 to 2025-03-26

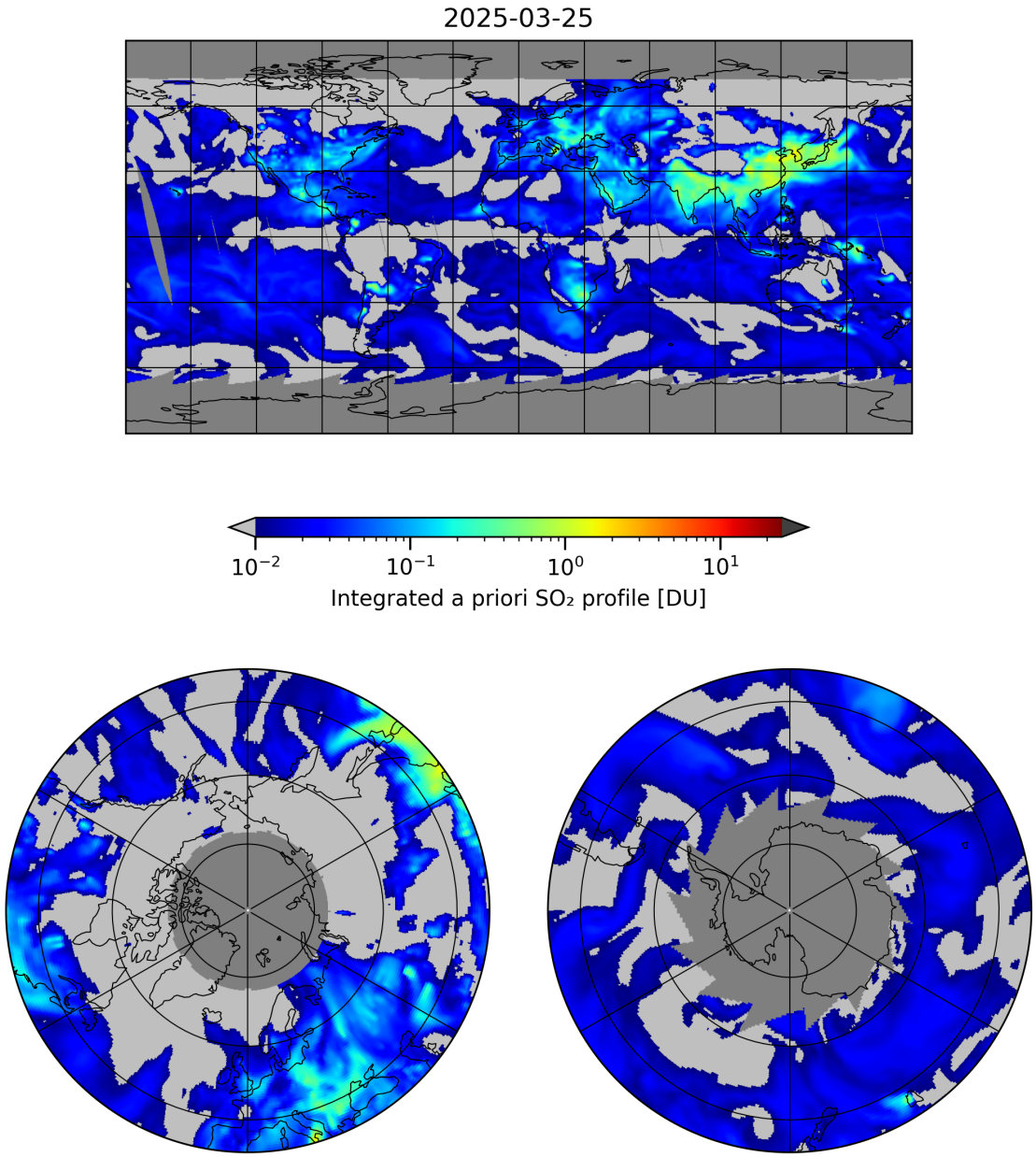

Figure 21: Map of “Integrated a priori SO_2 profile” for 2025-03-25 to 2025-03-26

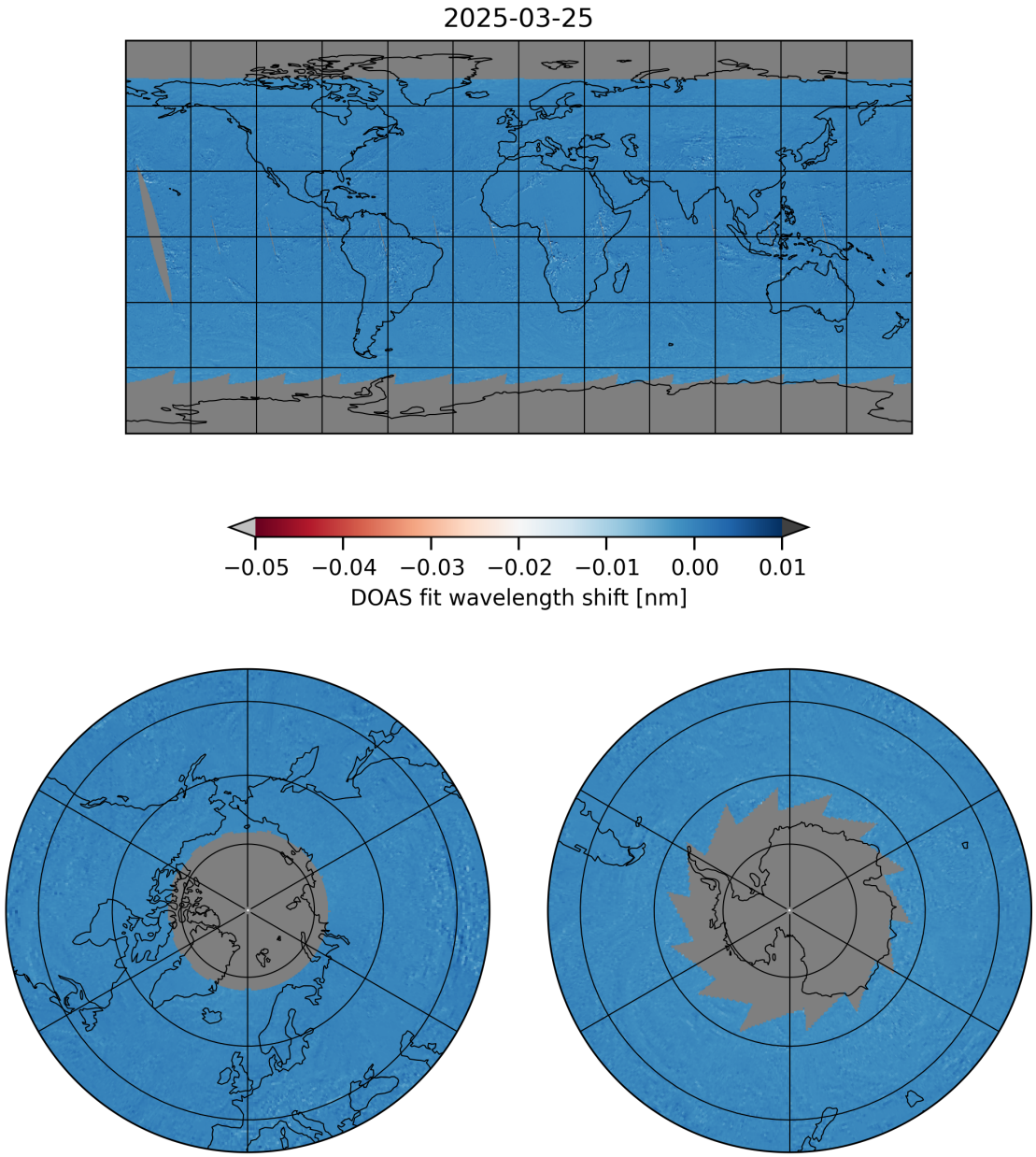

Figure 22: Map of “DOAS fit wavelength shift” for 2025-03-25 to 2025-03-26

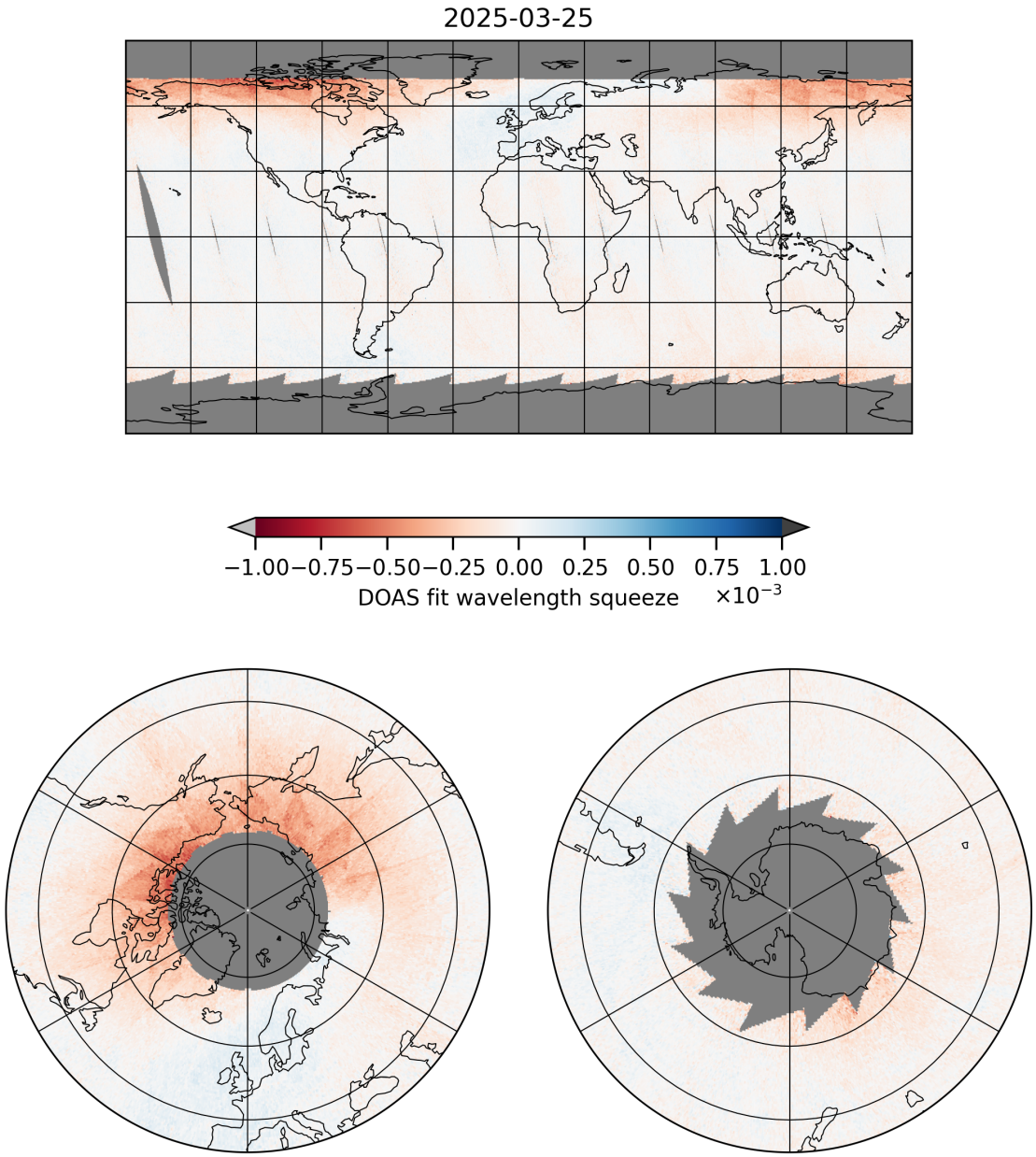

Figure 23: Map of “DOAS fit wavelength squeeze” for 2025-03-25 to 2025-03-26

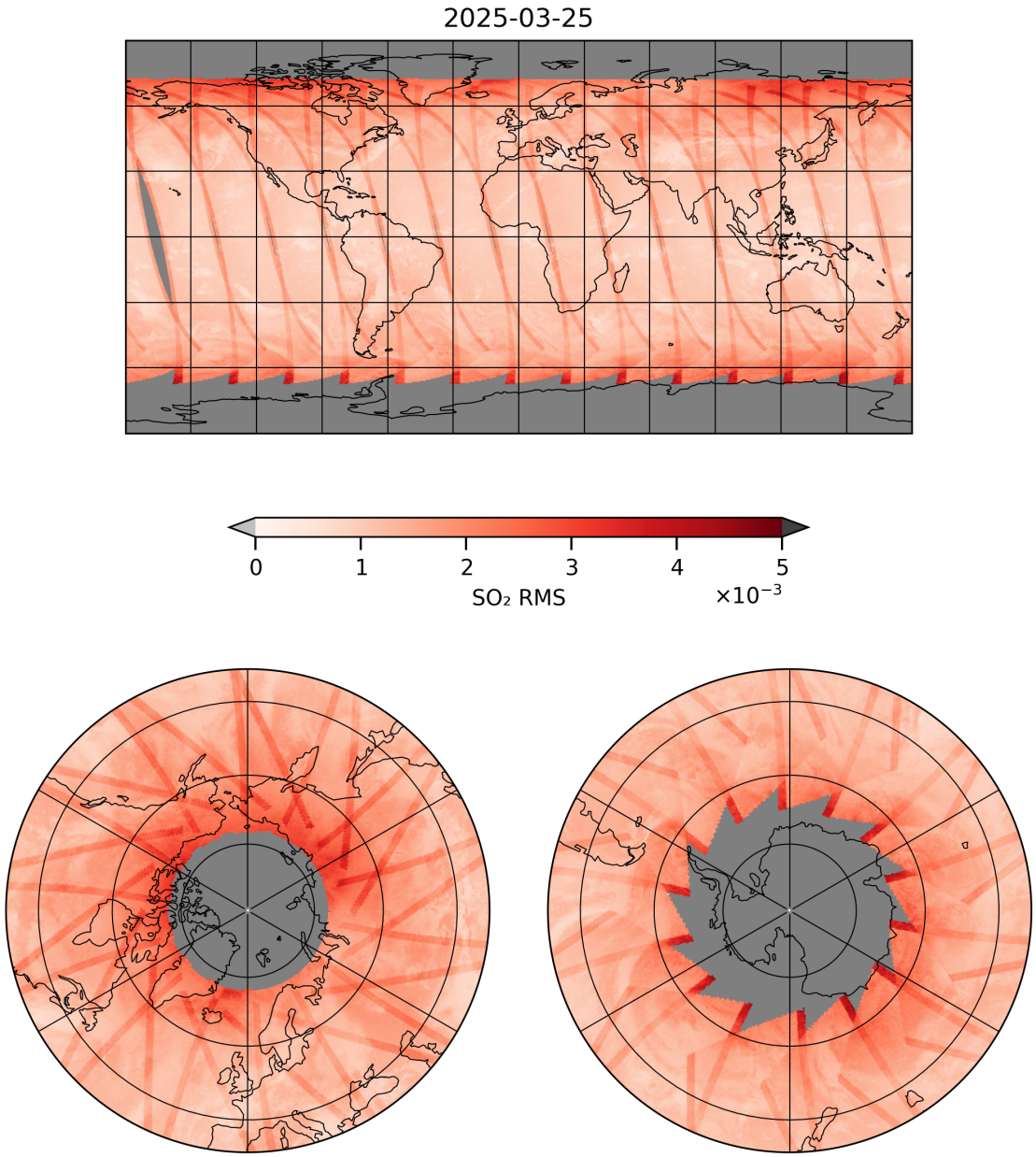

Figure 24: Map of "SO_2 RMS" for 2025-03-25 to 2025-03-26

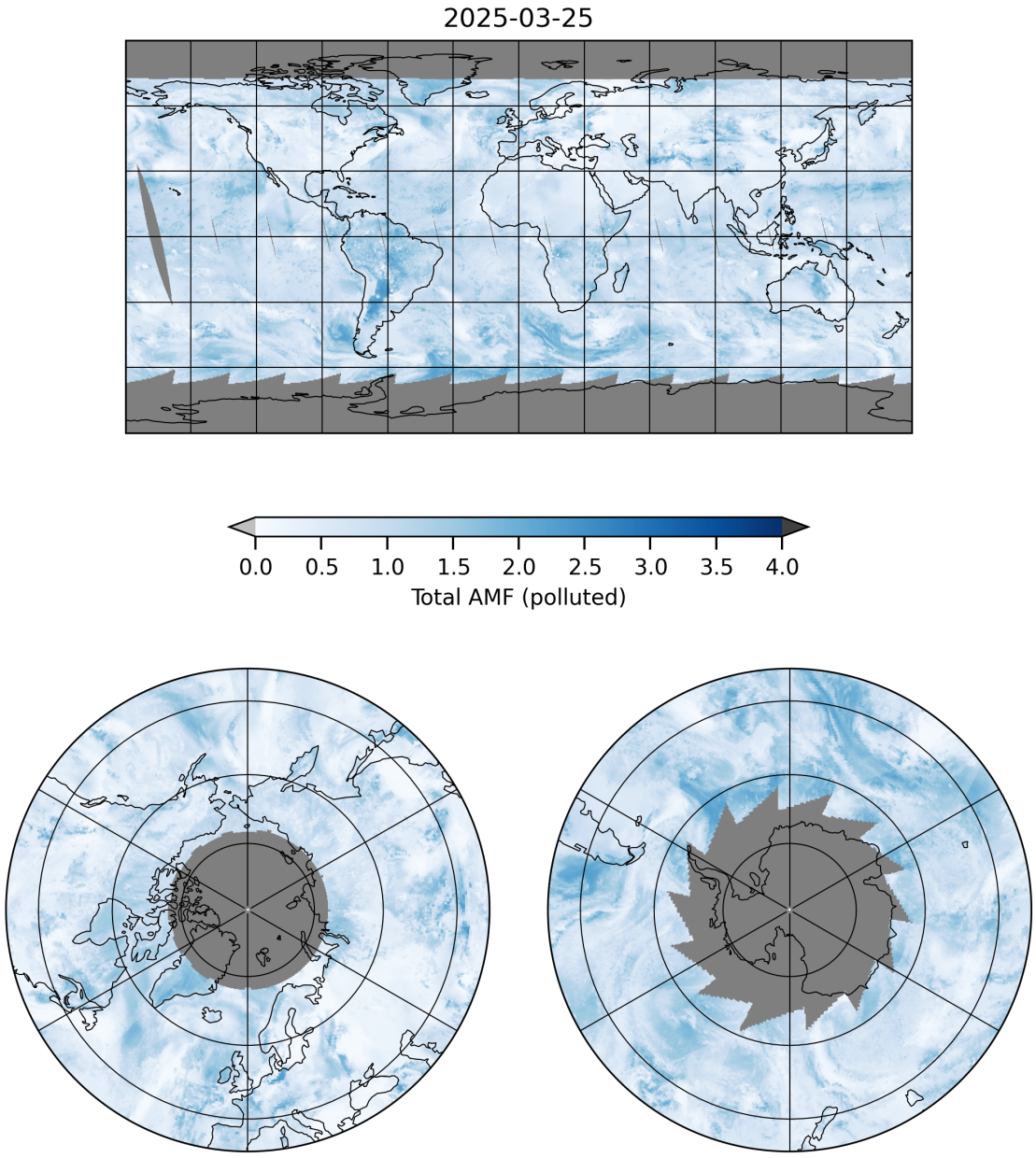

Figure 25: Map of “Total AMF (polluted)” for 2025-03-25 to 2025-03-26

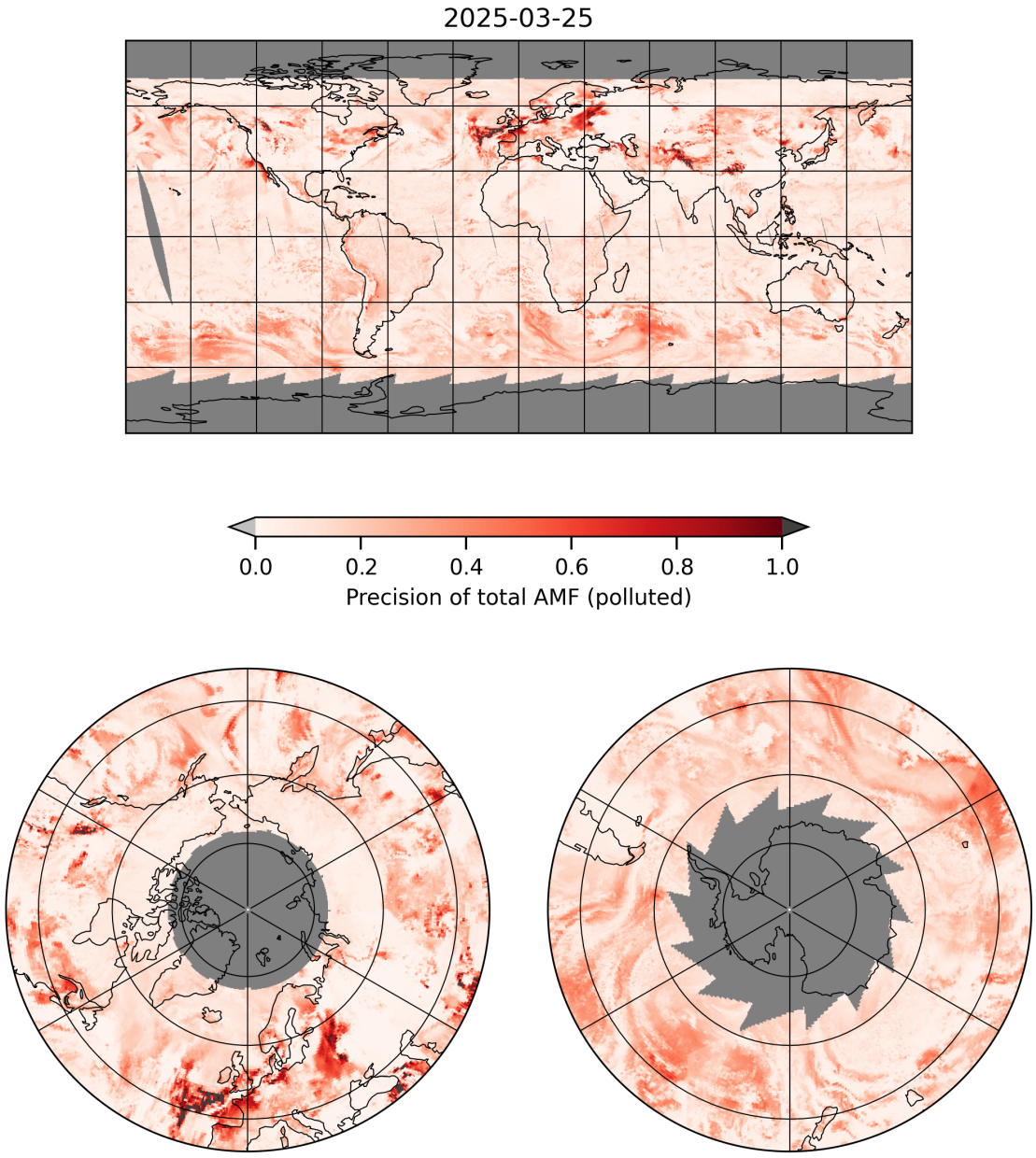

Figure 26: Map of “Precision of total AMF (polluted)” for 2025-03-25 to 2025-03-26

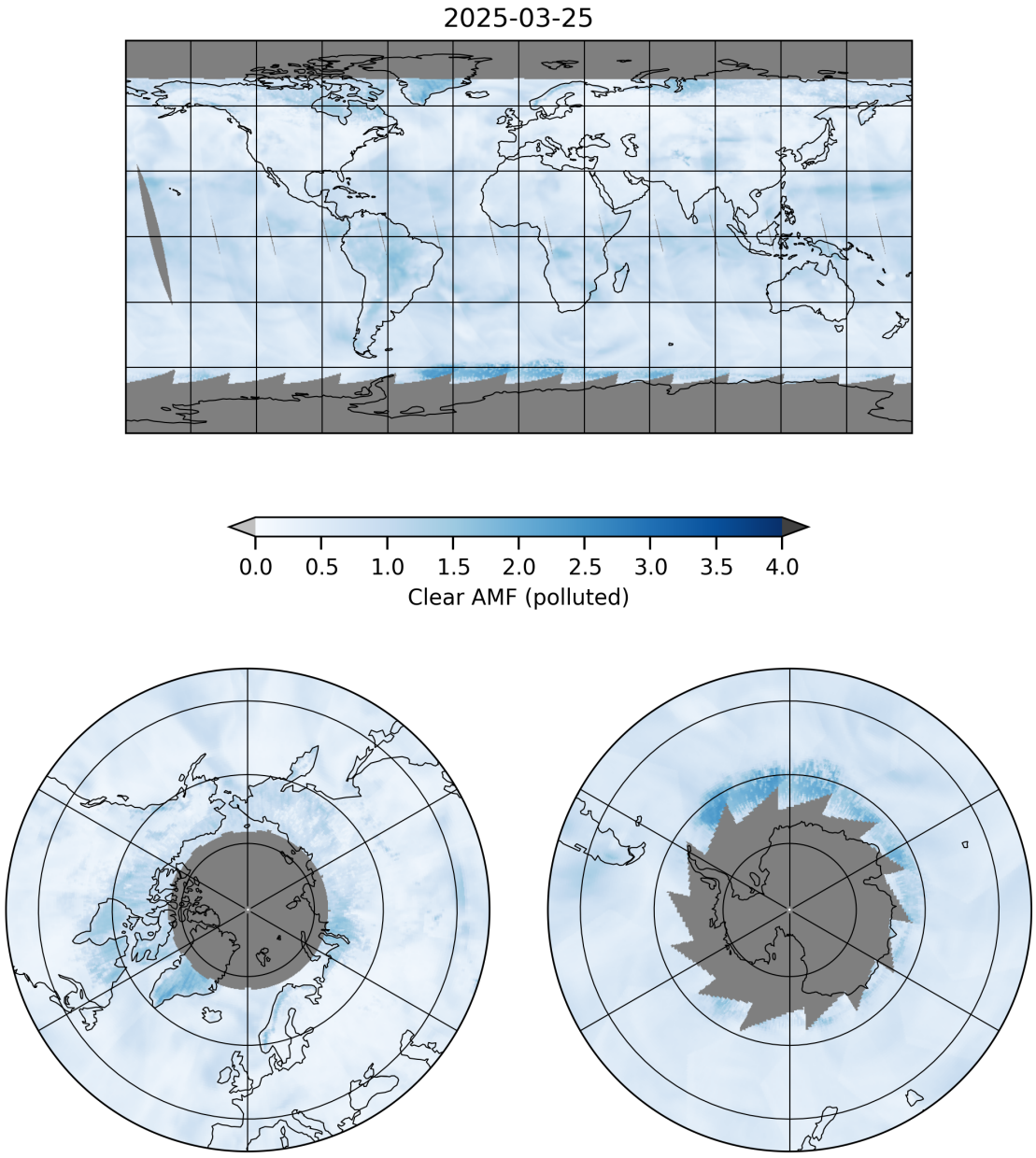

Figure 27: Map of “Clear AMF (polluted)” for 2025-03-25 to 2025-03-26

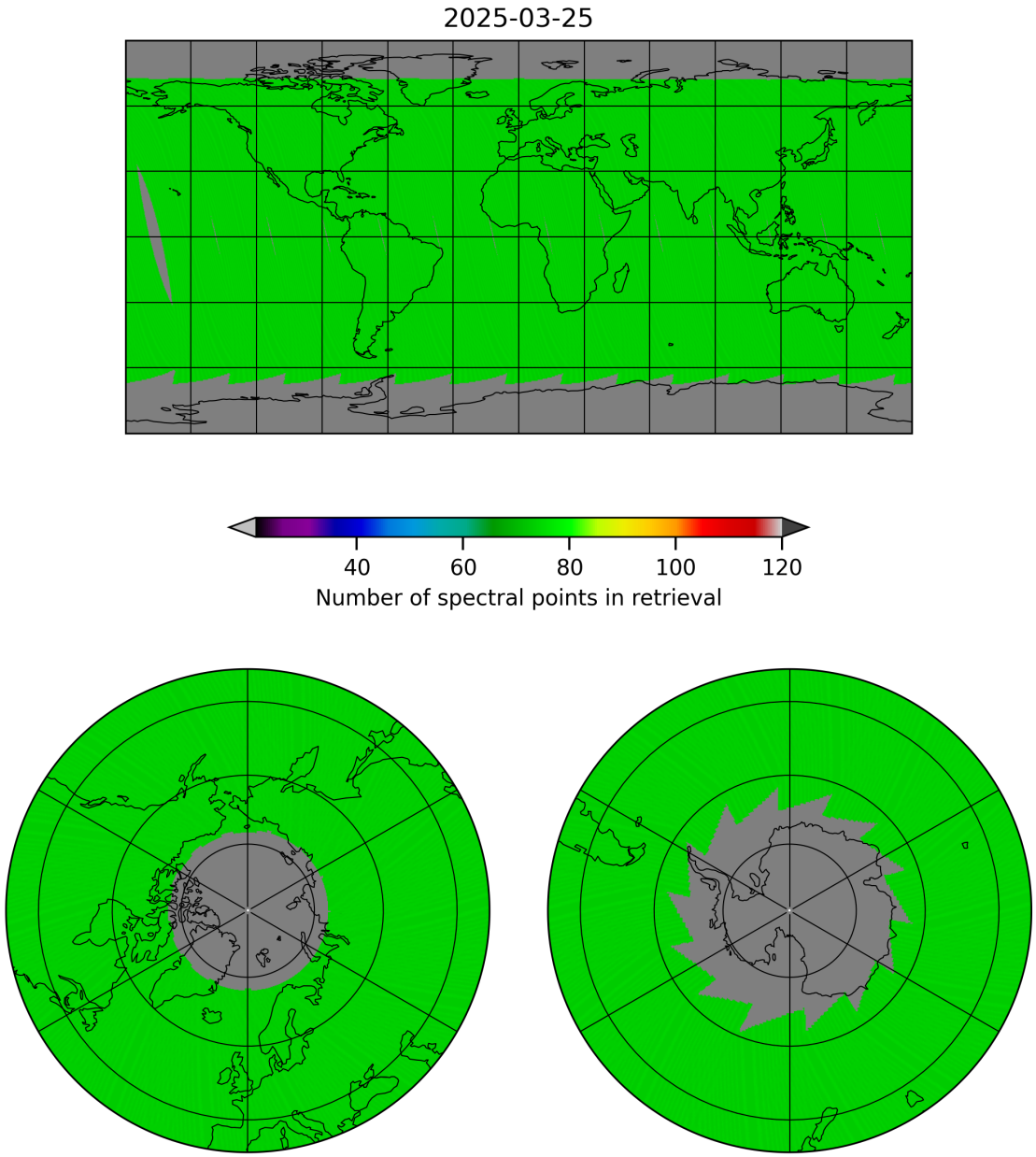

Figure 28: Map of “Number of spectral points in retrieval” for 2025-03-25 to 2025-03-26

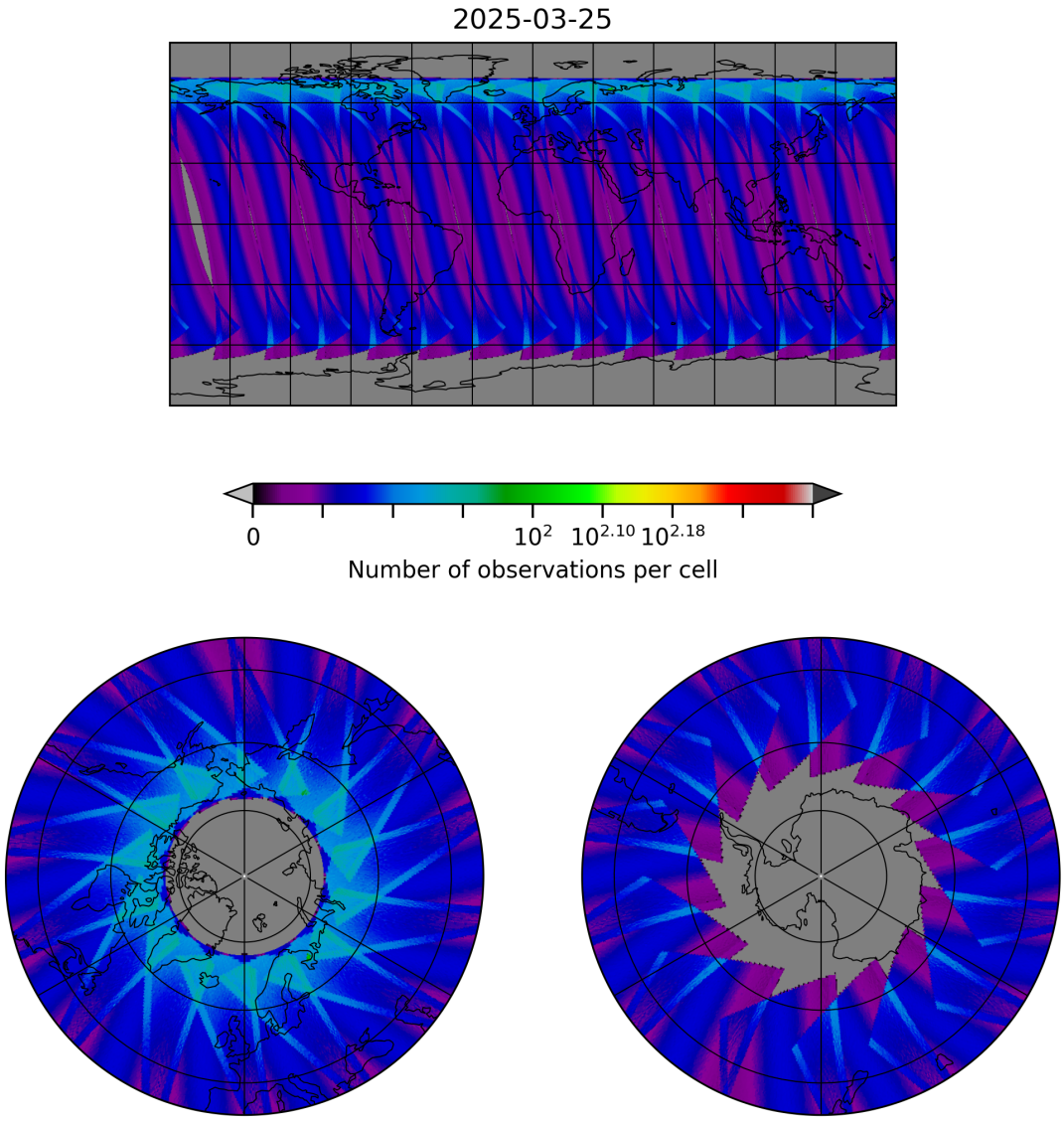

Figure 29: Map of the number of observations for 2025-03-25 to 2025-03-26

7 Zonal average

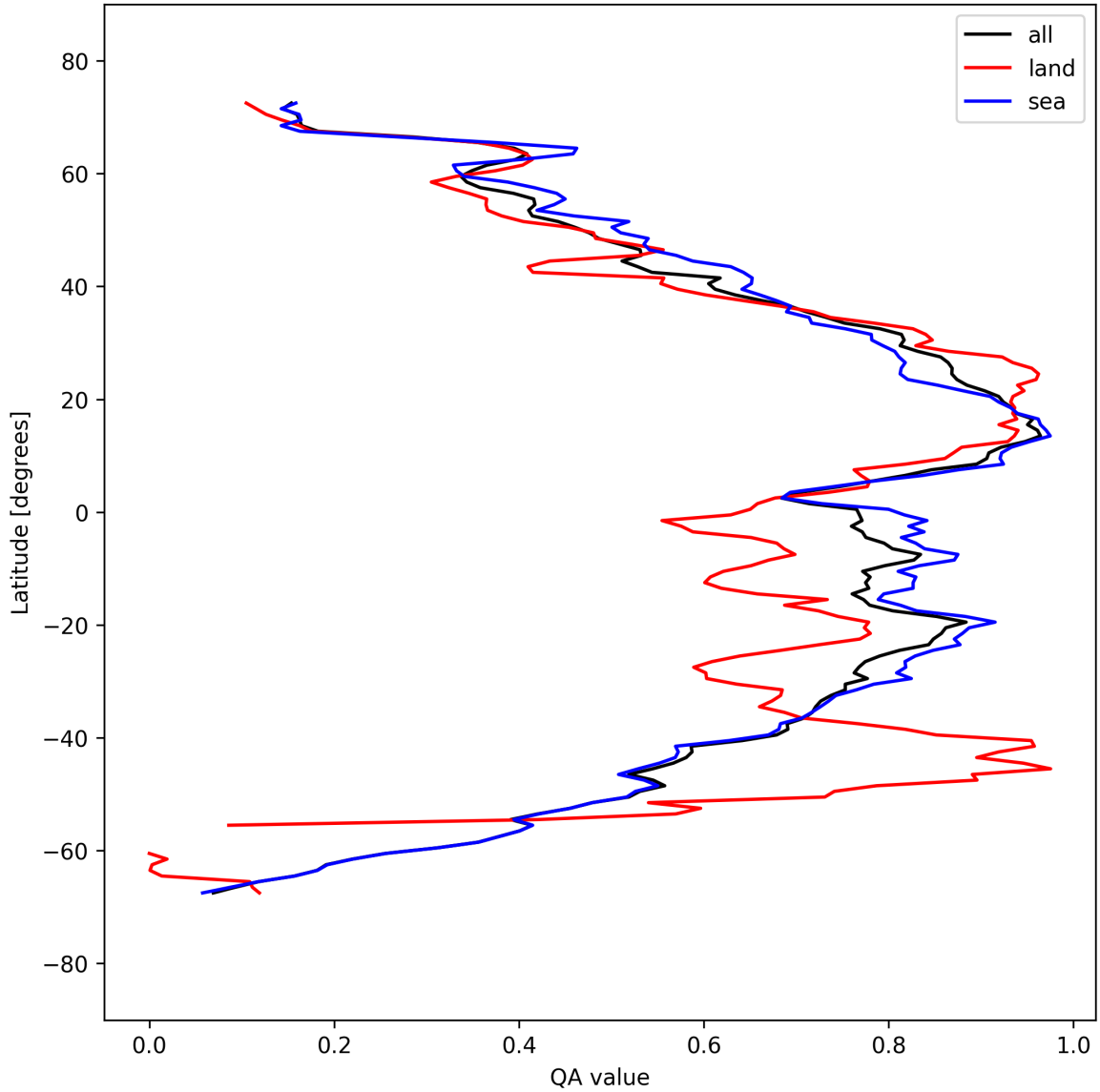

Figure 30: Zonal average of “QA value” for 2025-03-25 to 2025-03-26.

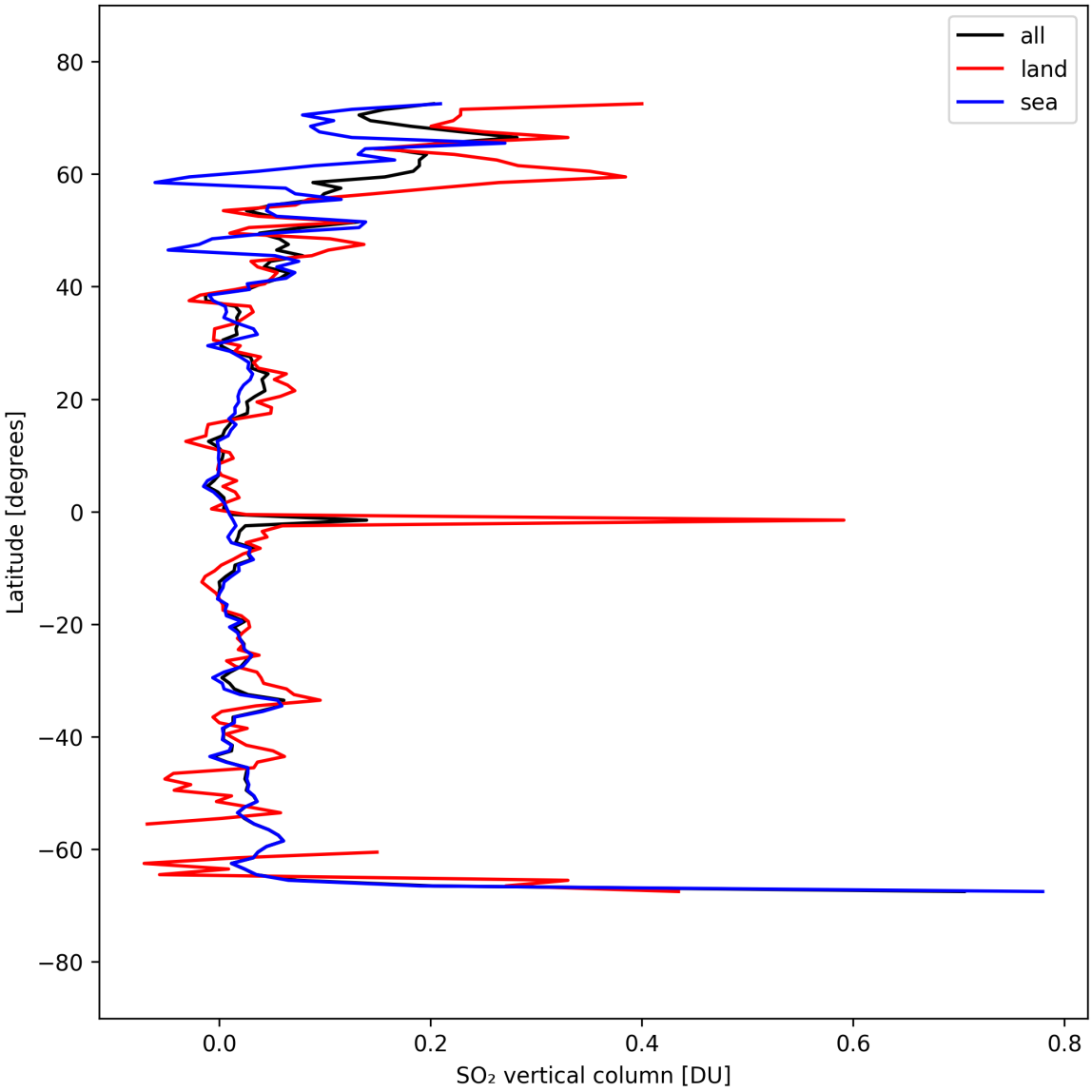

Figure 31: Zonal average of "SO_2 vertical column" for 2025-03-25 to 2025-03-26.

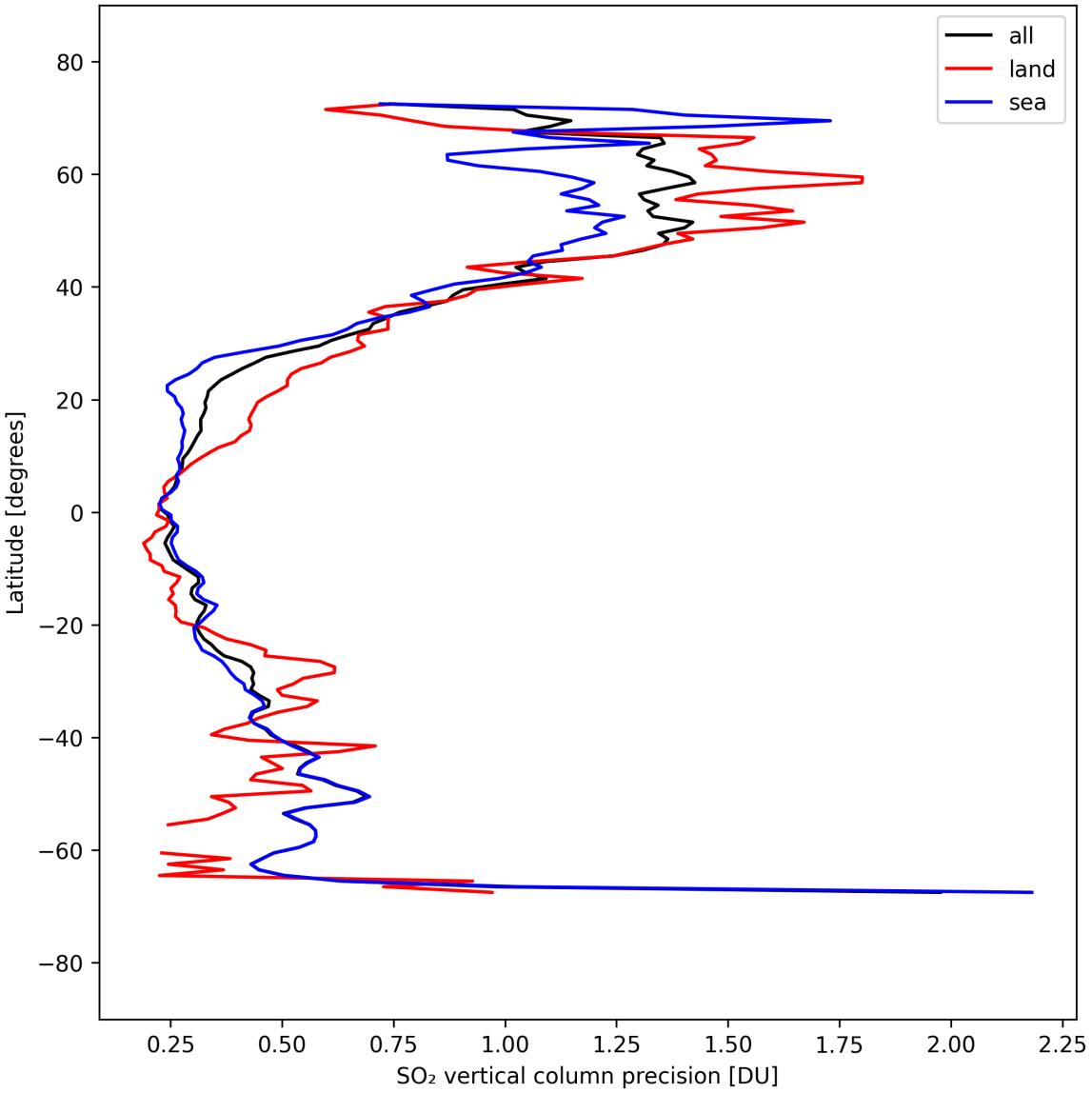

Figure 32: Zonal average of "SO_2 vertical column precision" for 2025-03-25 to 2025-03-26.

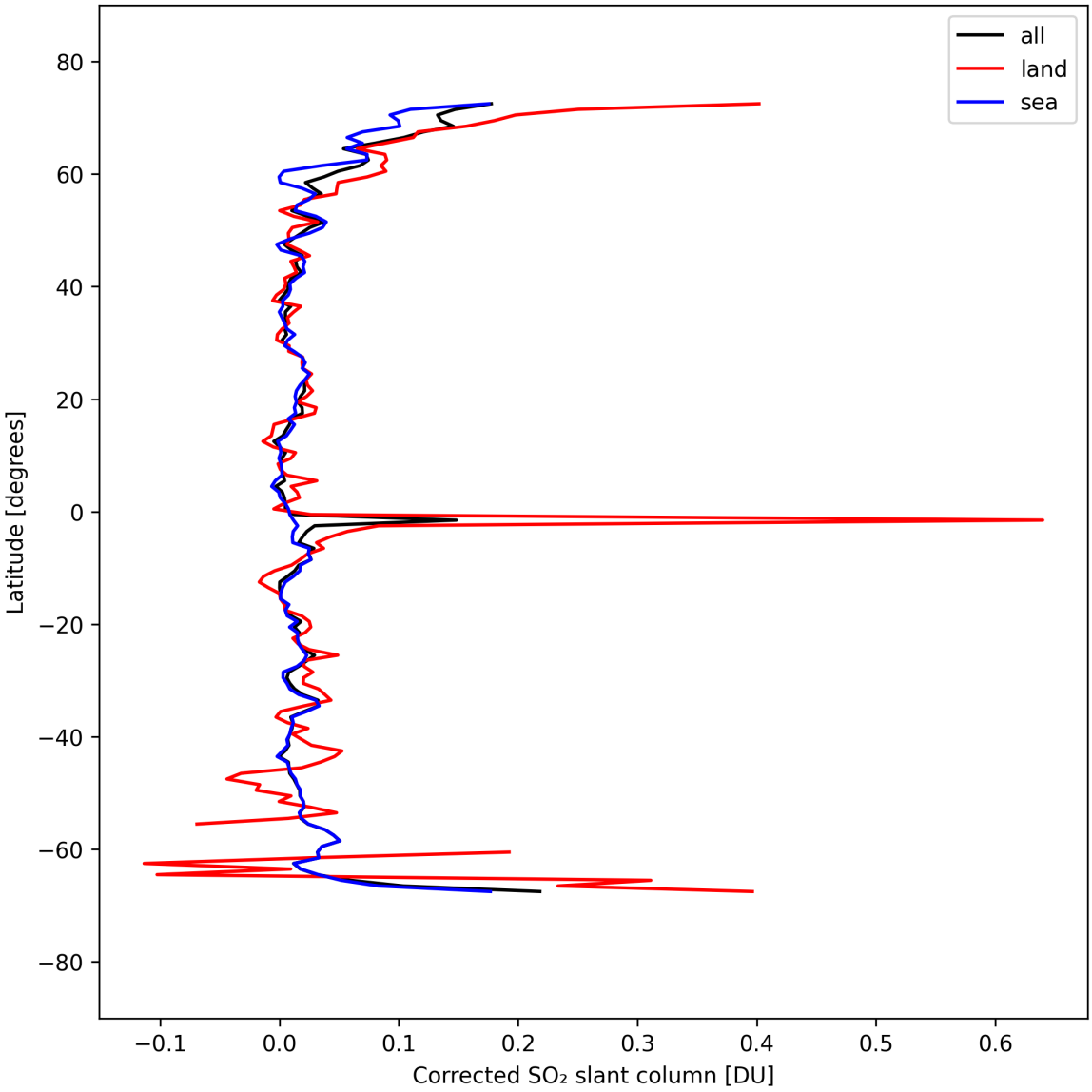

Figure 33: Zonal average of “Corrected SO_2 slant column” for 2025-03-25 to 2025-03-26.

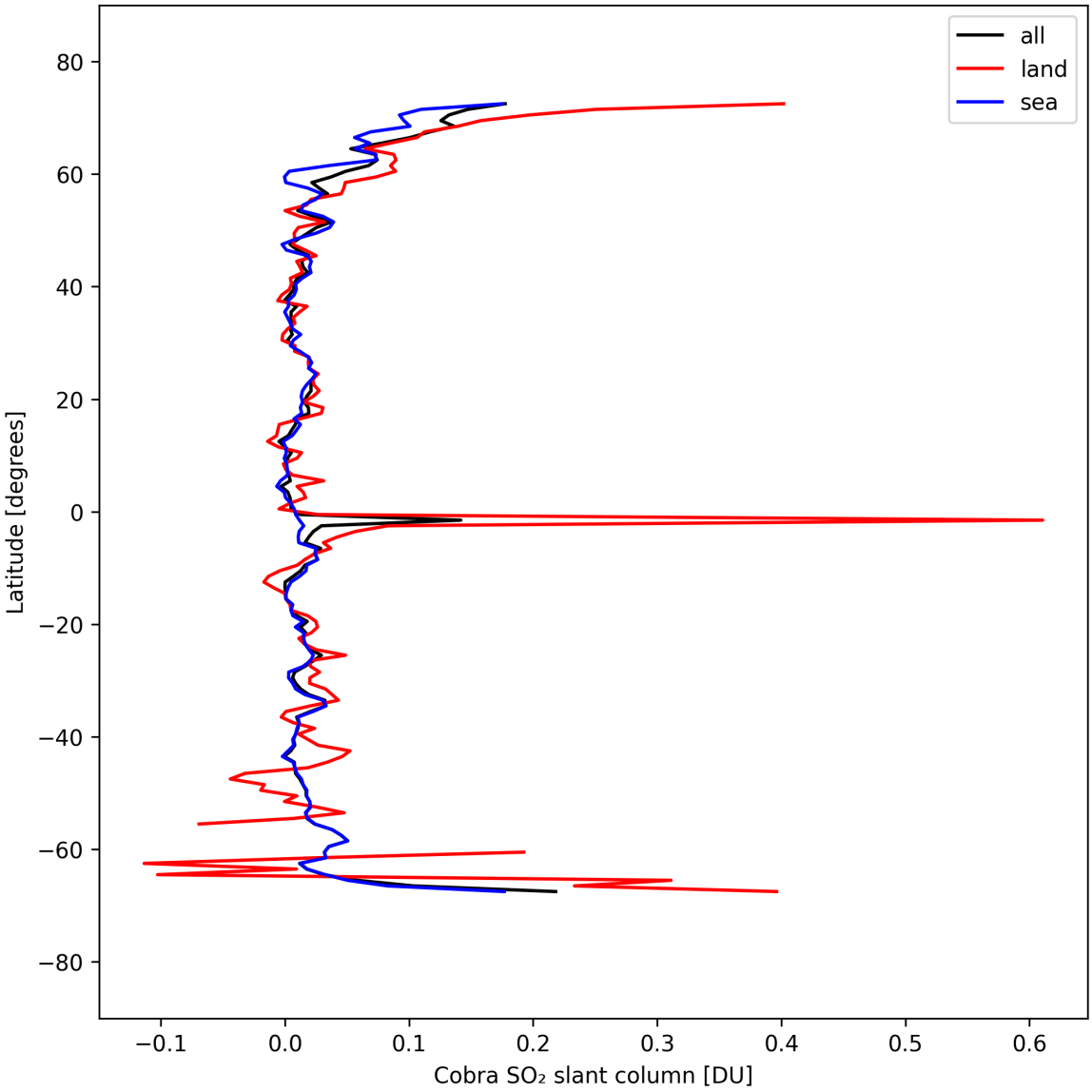

Figure 34: Zonal average of "Cobra SO_2 slant column" for 2025-03-25 to 2025-03-26.

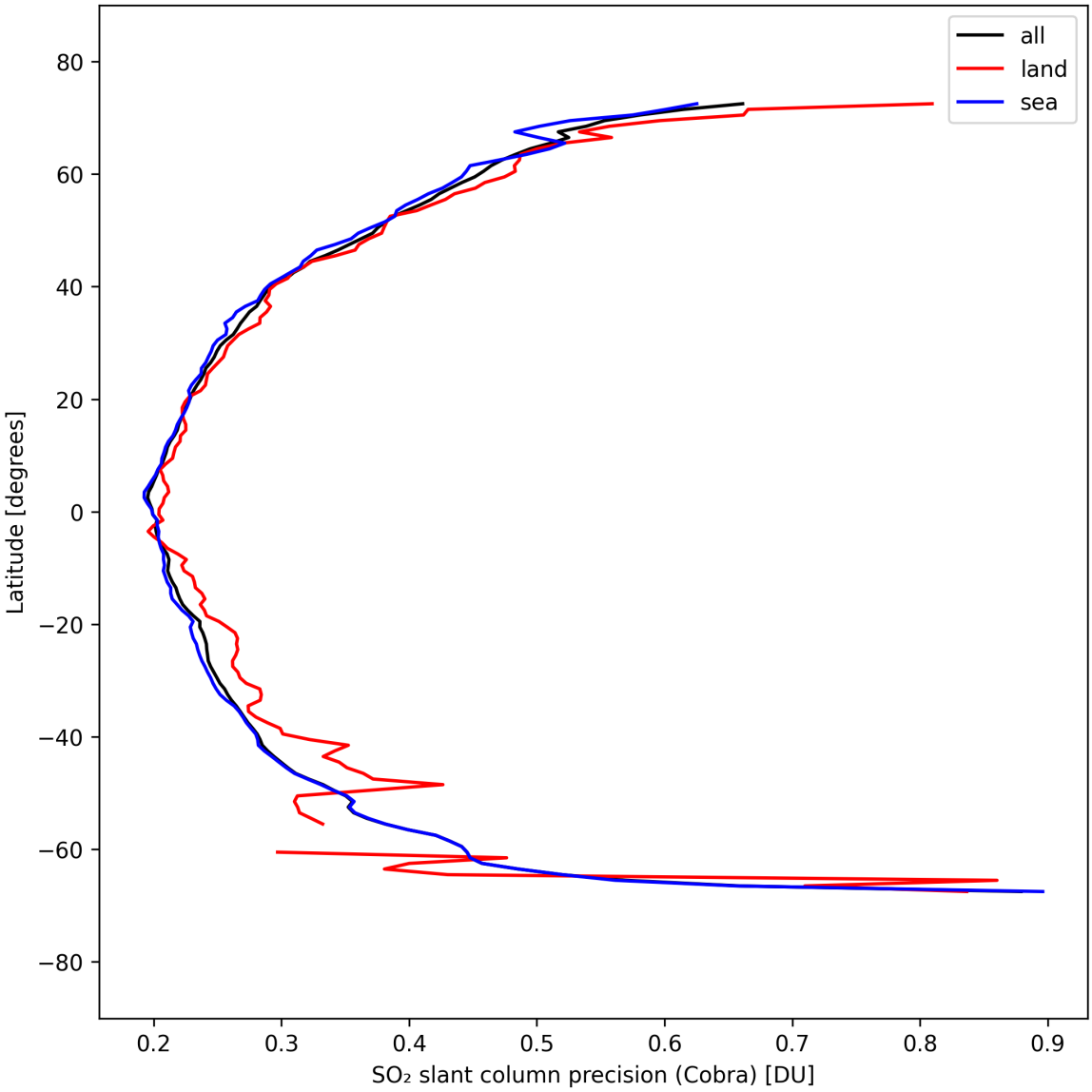

Figure 35: Zonal average of "SO_2 slant column precision (Cobra)" for 2025-03-25 to 2025-03-26.

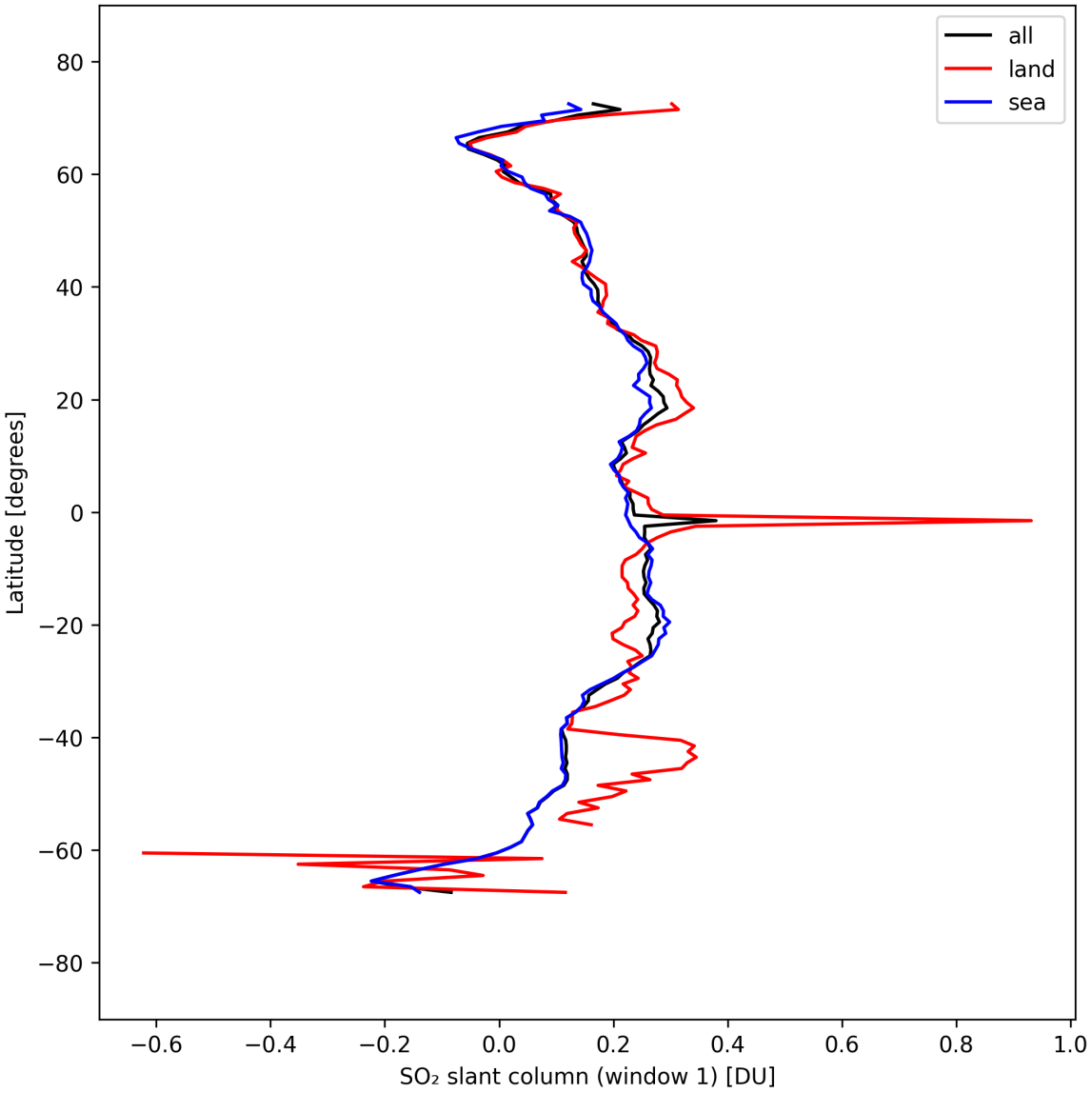

Figure 36: Zonal average of "SO_2 slant column (window 1)" for 2025-03-25 to 2025-03-26.

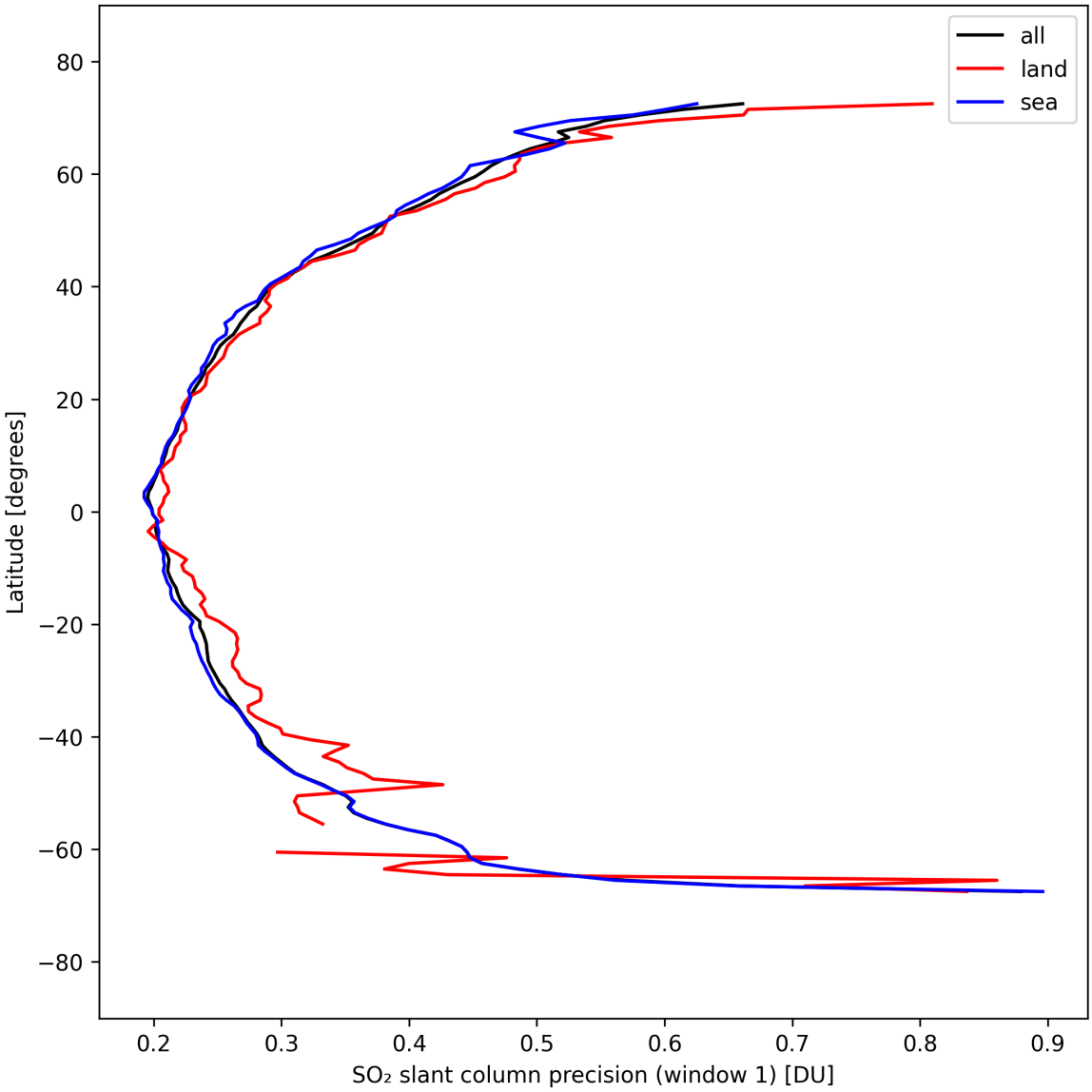

Figure 37: Zonal average of "SO_2 slant column precision (window 1)" for 2025-03-25 to 2025-03-26.

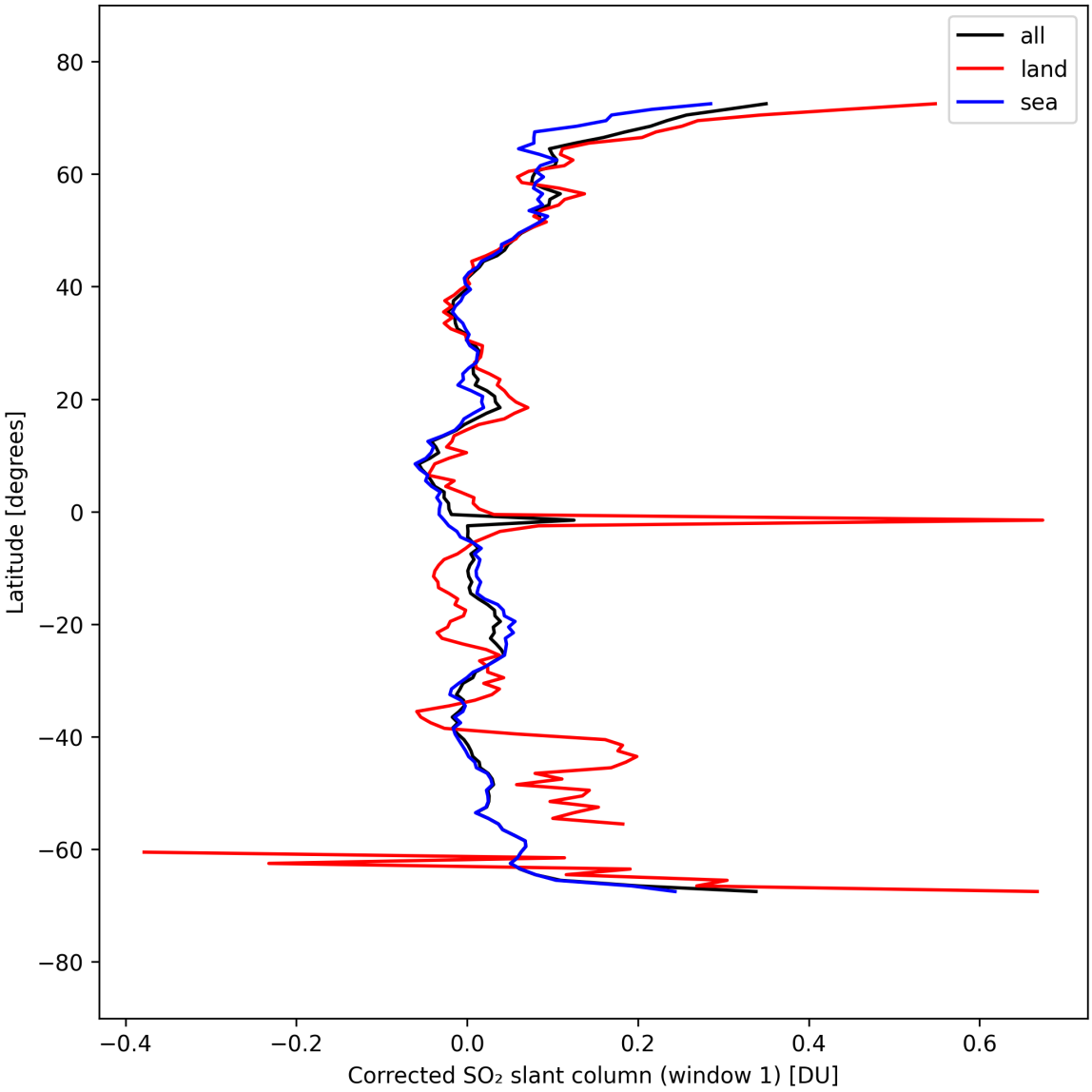

Figure 38: Zonal average of "Corrected SO_2 slant column (window 1)" for 2025-03-25 to 2025-03-26.

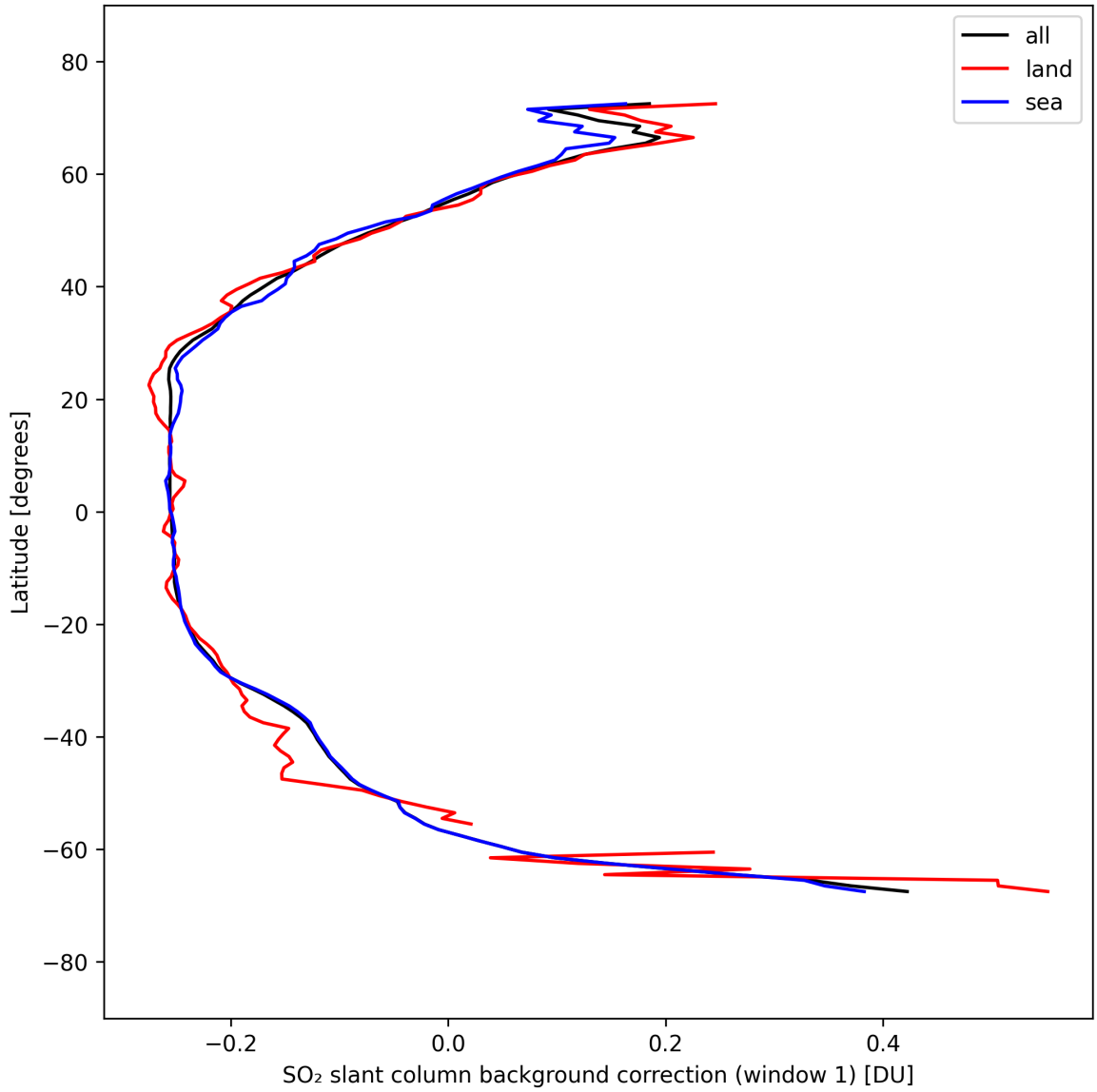

Figure 39: Zonal average of "SO_2 slant column background correction (window 1)" for 2025-03-25 to 2025-03-26.

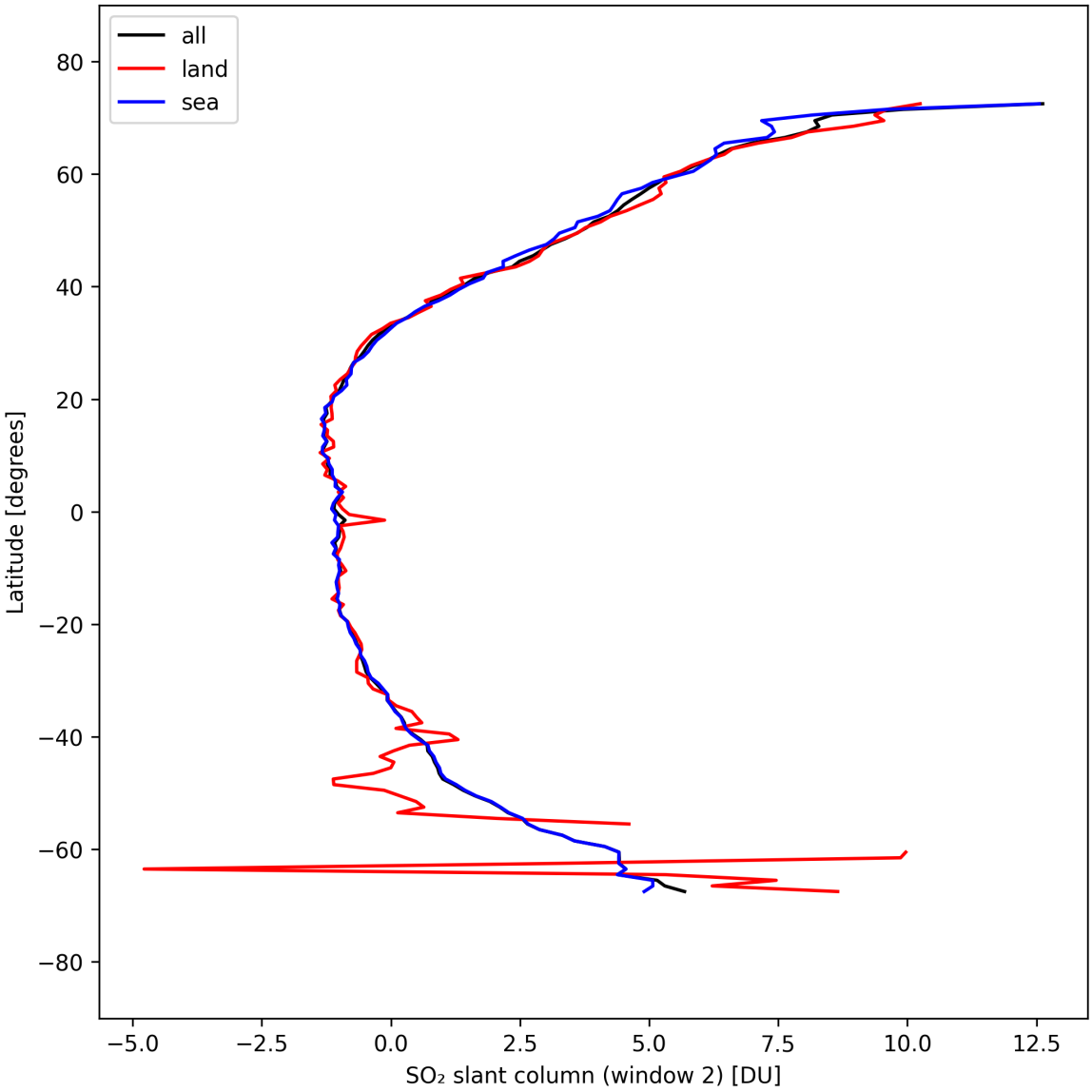

Figure 40: Zonal average of "SO_2 slant column (window 2)" for 2025-03-25 to 2025-03-26.

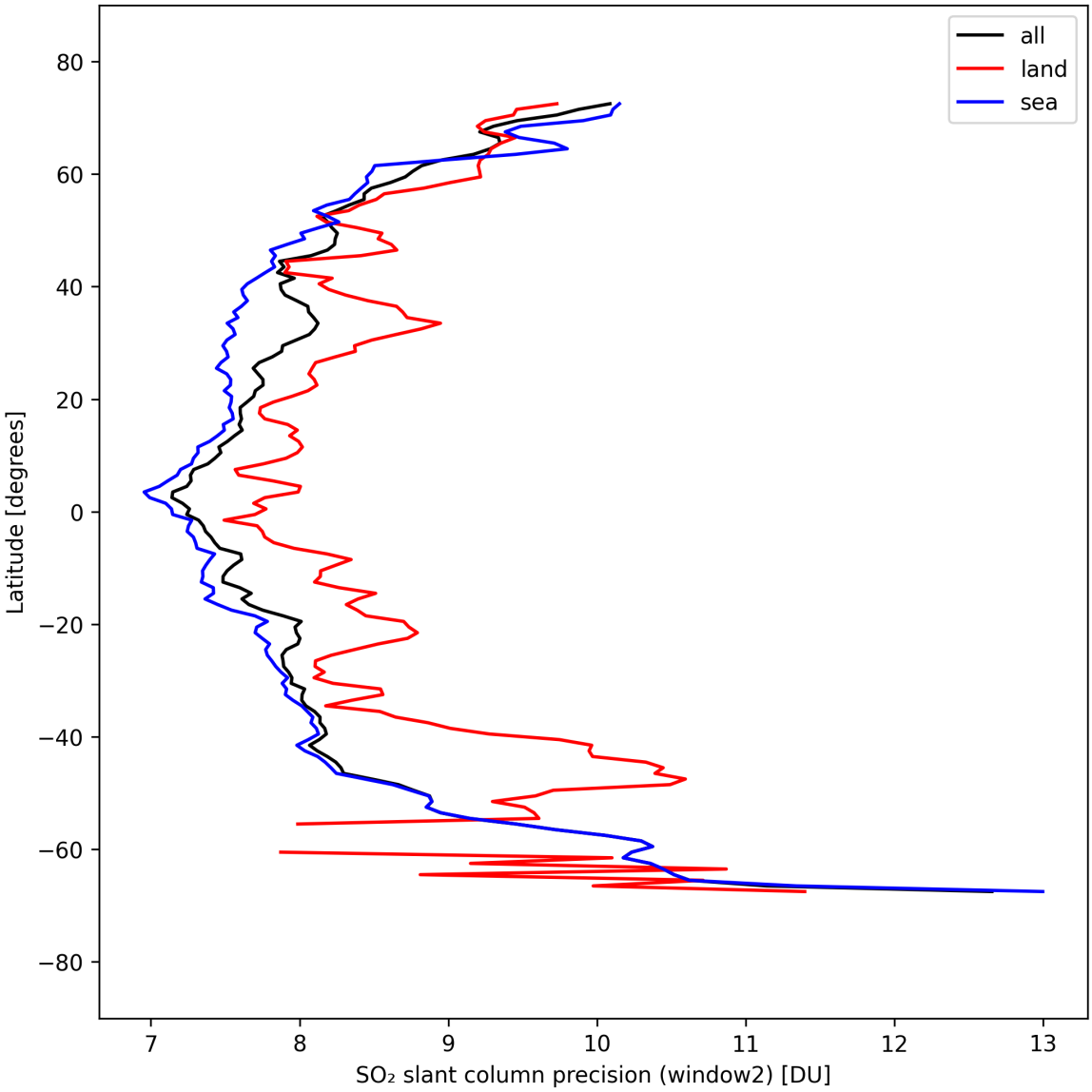

Figure 41: Zonal average of "SO_2 slant column precision (window2)" for 2025-03-25 to 2025-03-26.

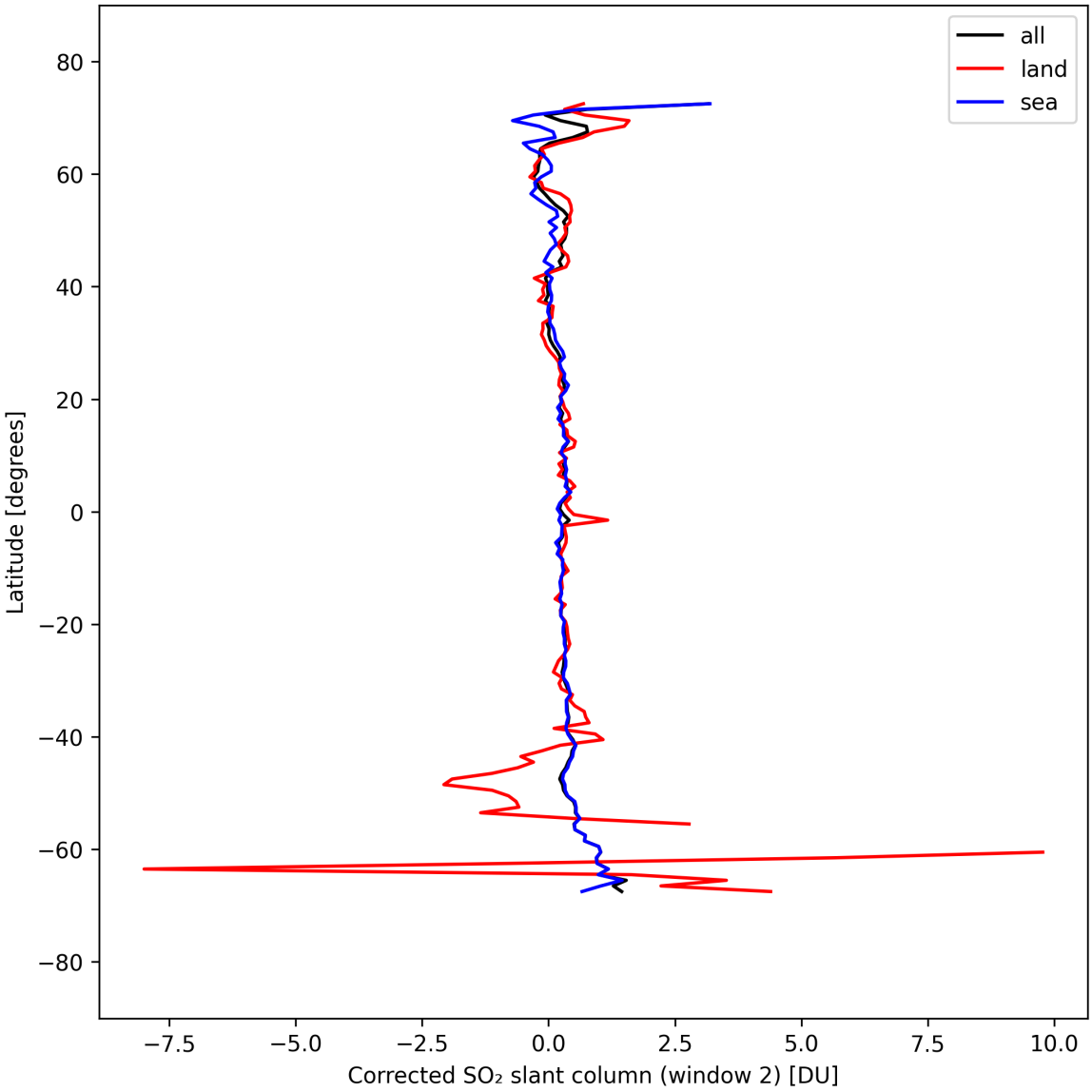

Figure 42: Zonal average of "Corrected SO_2 slant column (window 2)" for 2025-03-25 to 2025-03-26.

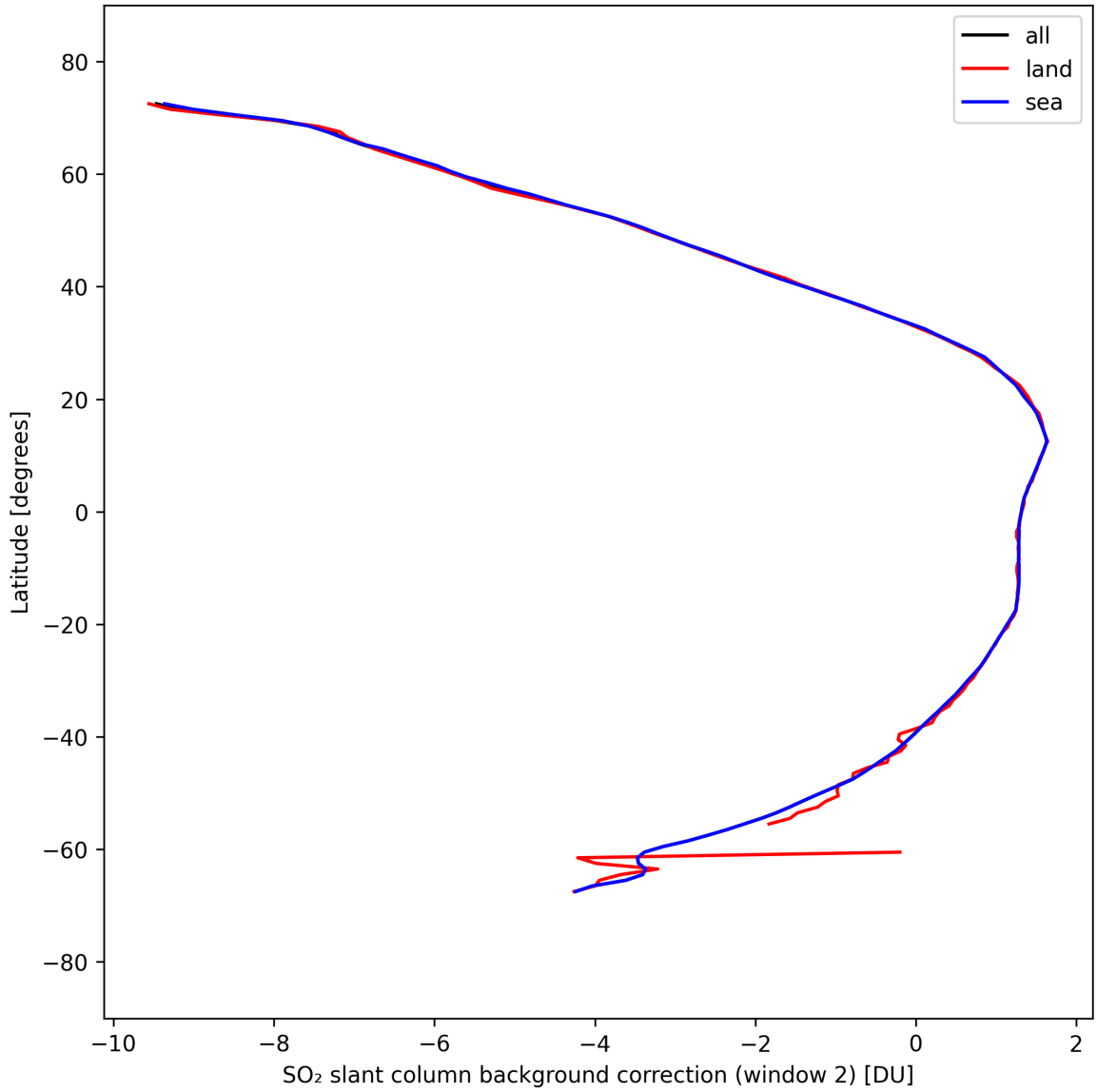

Figure 43: Zonal average of "SO_2 slant column background correction (window 2)" for 2025-03-25 to 2025-03-26.

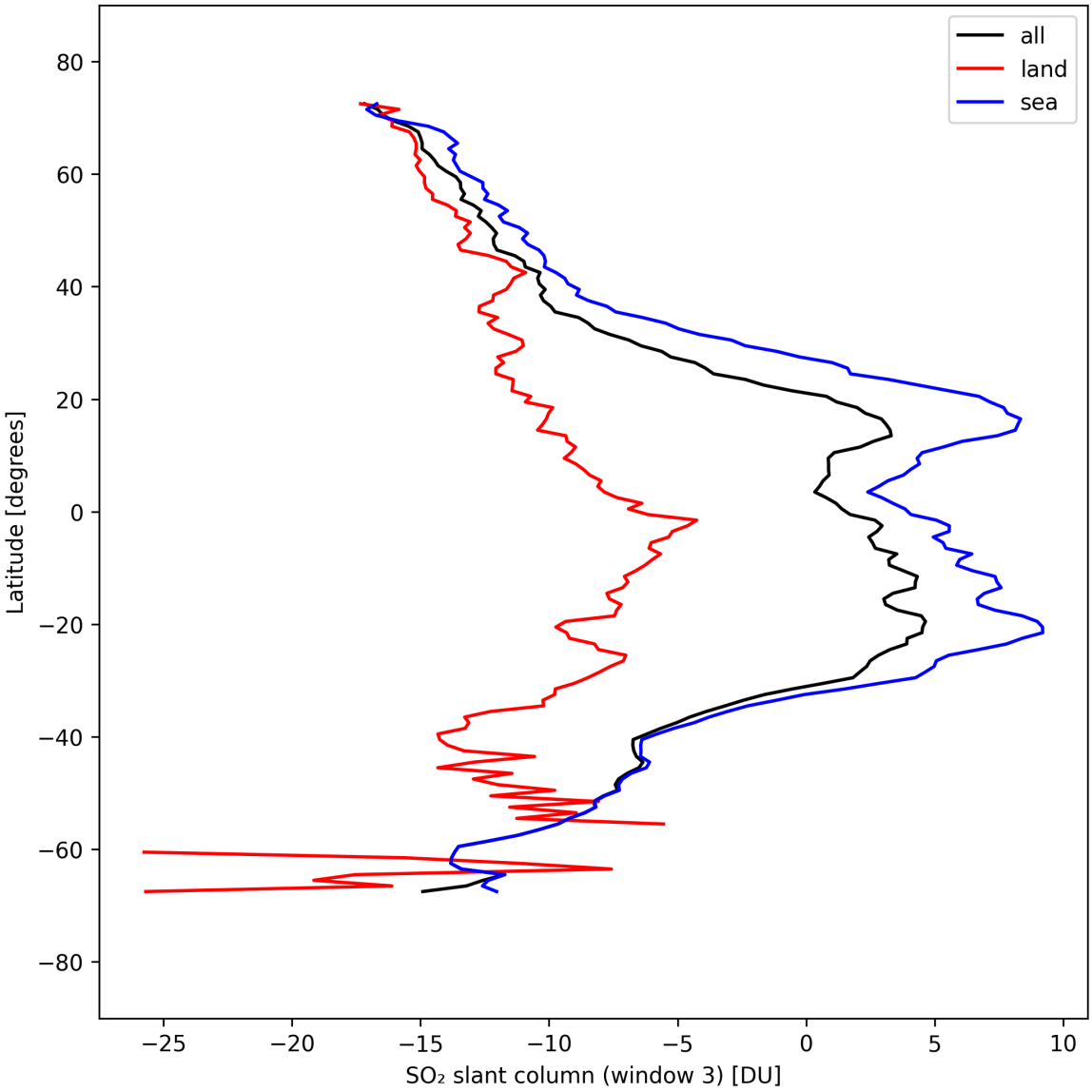

Figure 44: Zonal average of "SO_2 slant column (window 3)" for 2025-03-25 to 2025-03-26.

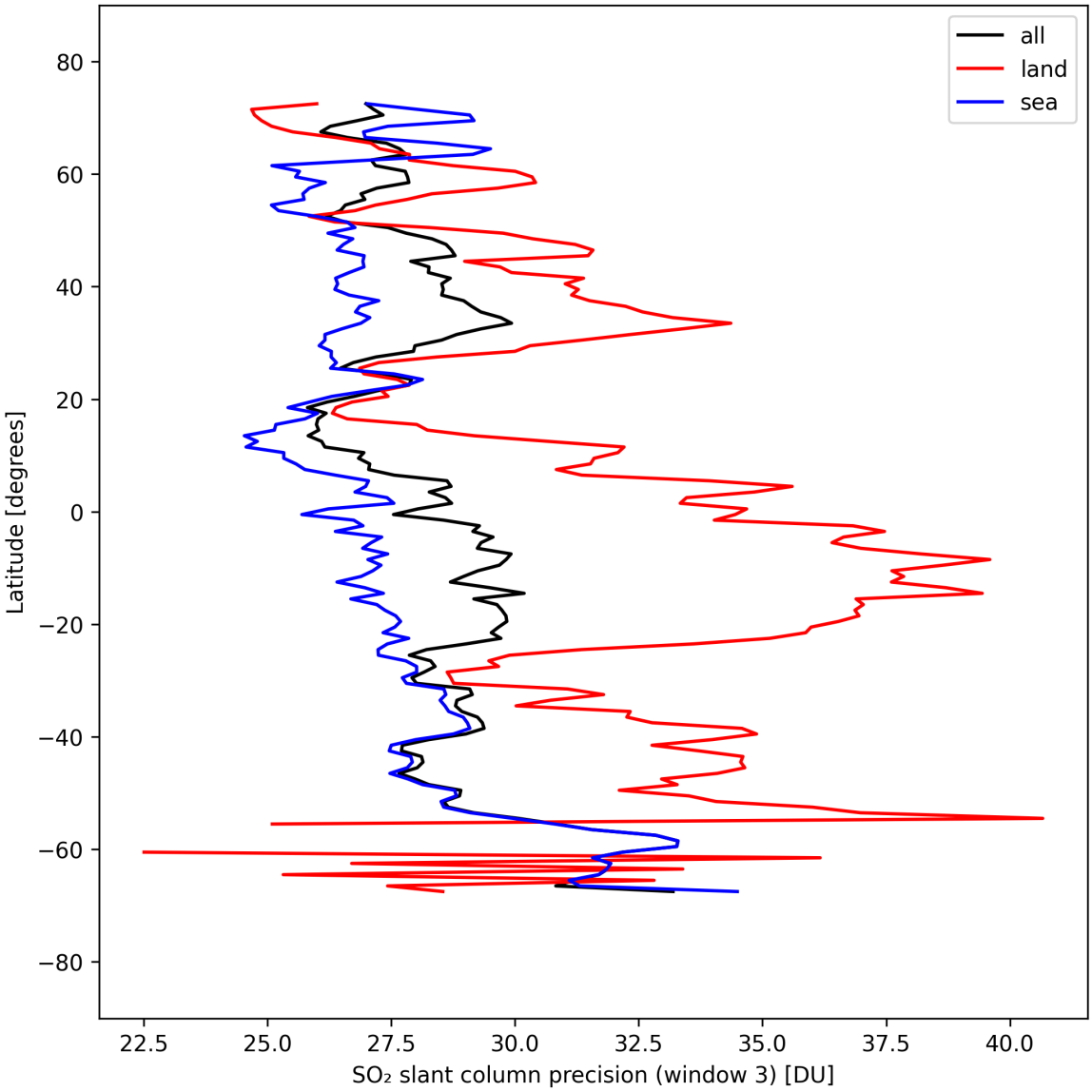

Figure 45: Zonal average of "SO_2 slant column precision (window 3)" for 2025-03-25 to 2025-03-26.

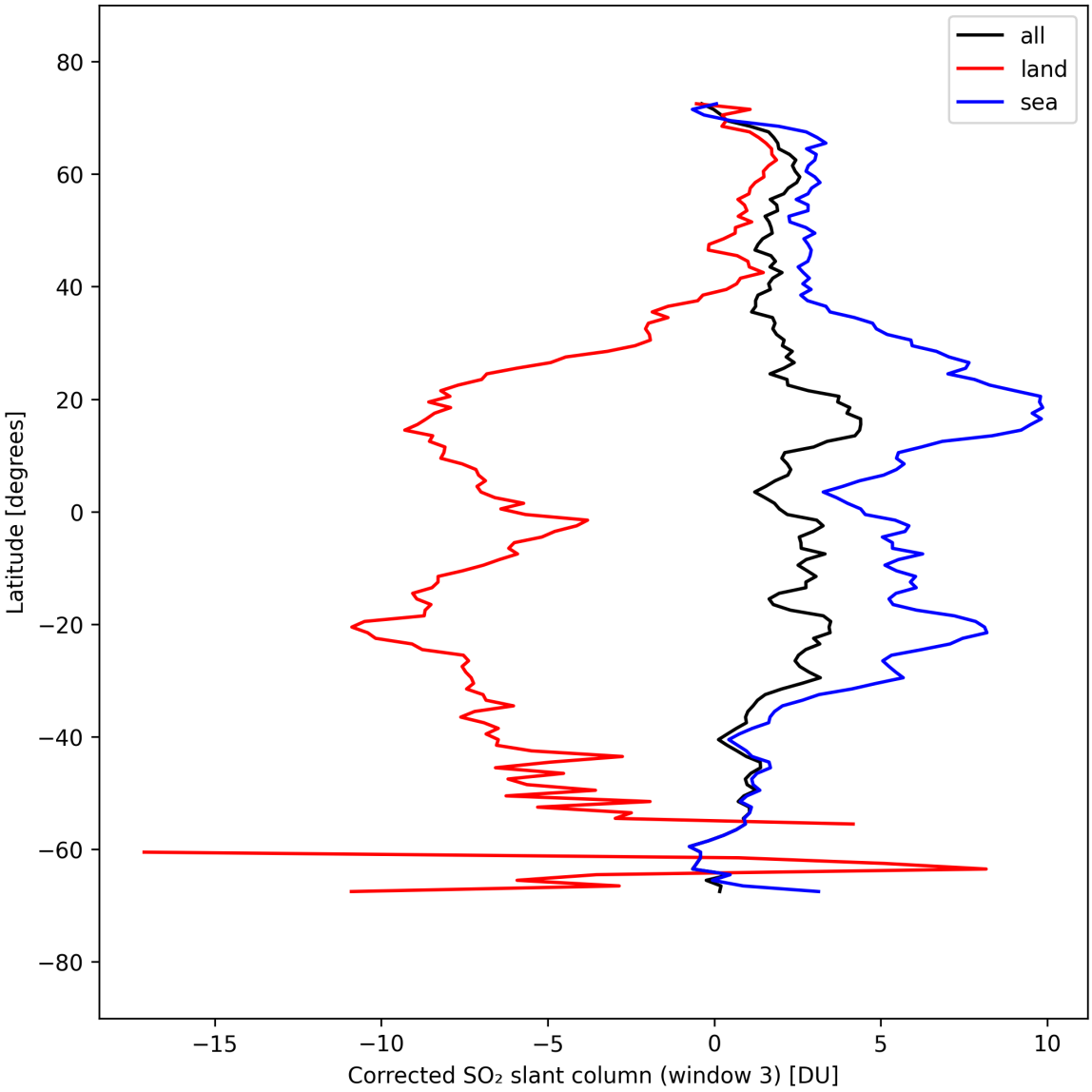

Figure 46: Zonal average of "Corrected SO_2 slant column (window 3)" for 2025-03-25 to 2025-03-26.

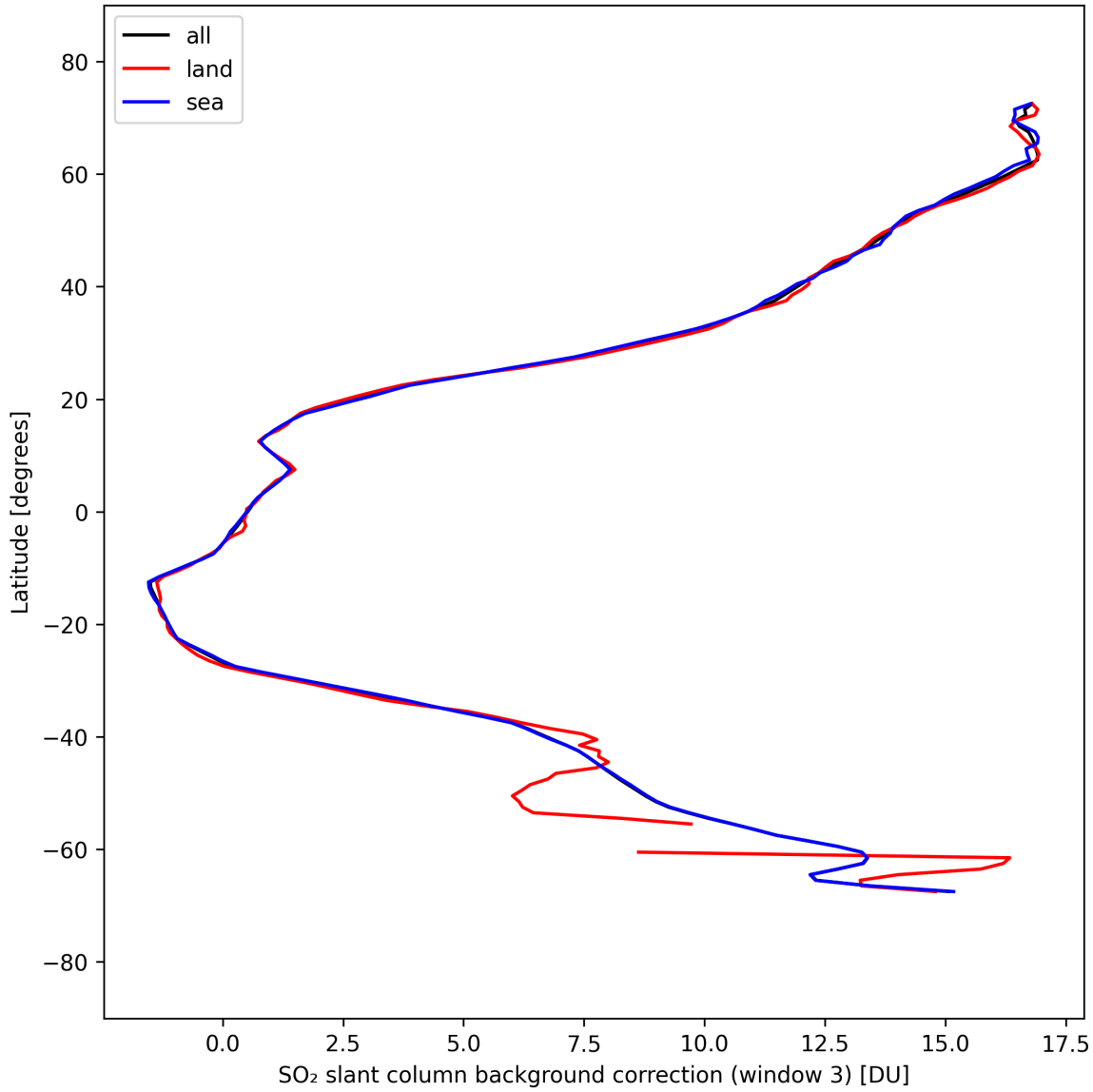

Figure 47: Zonal average of "SO_2 slant column background correction (window 3)" for 2025-03-25 to 2025-03-26.

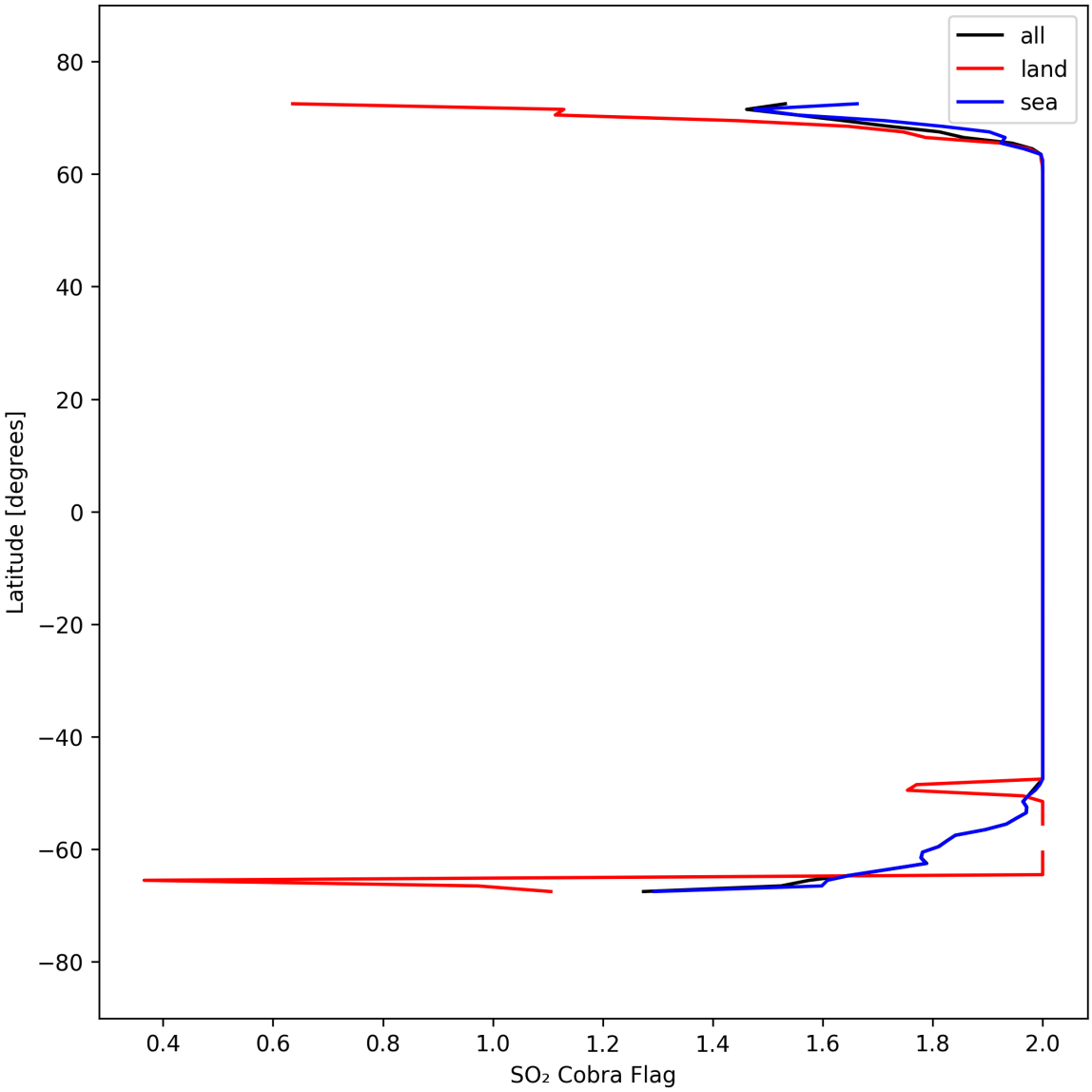

Figure 48: Zonal average of "SO_2 Cobra Flag" for 2025-03-25 to 2025-03-26.

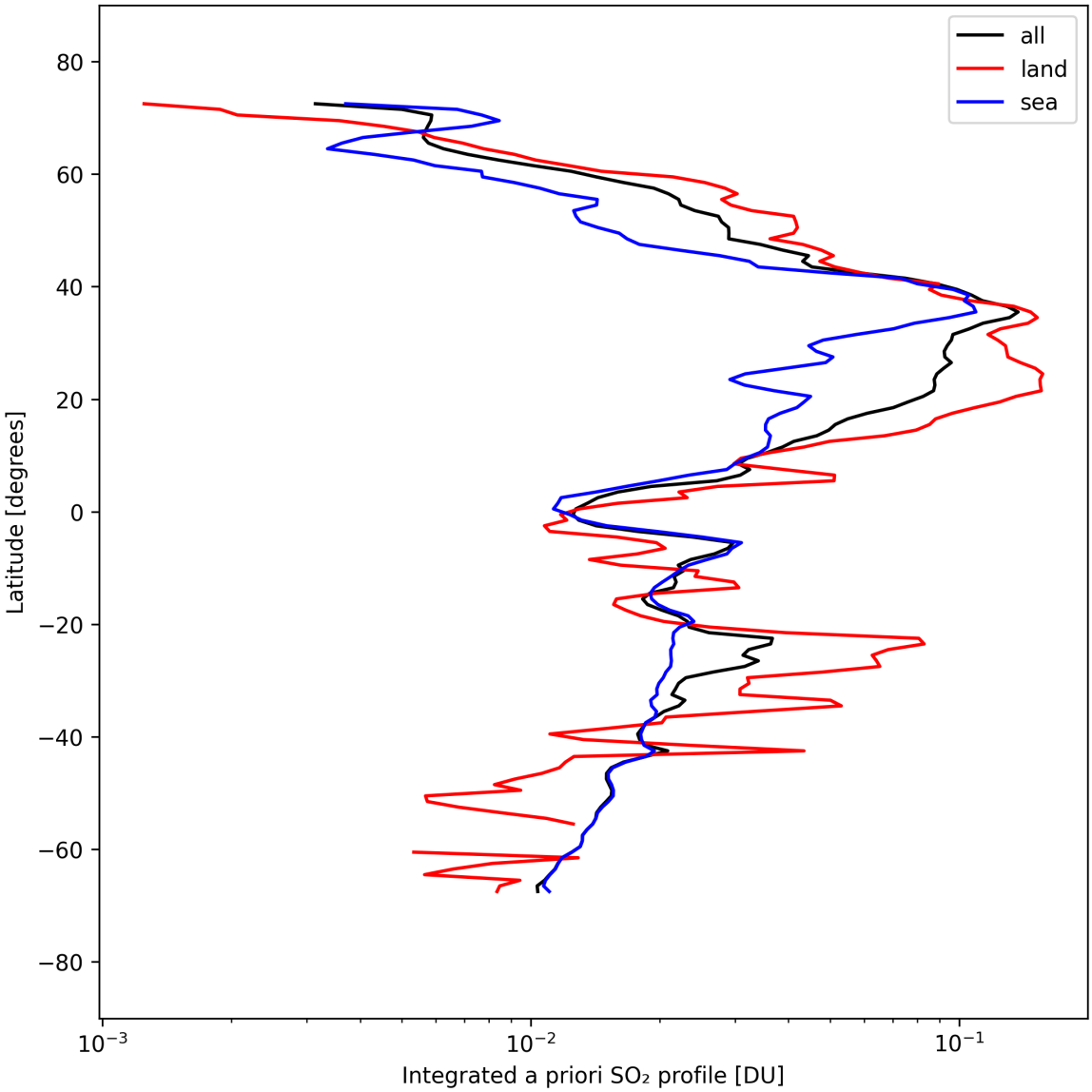

Figure 49: Zonal average of “Integrated a priori SO_2 profile” for 2025-03-25 to 2025-03-26.

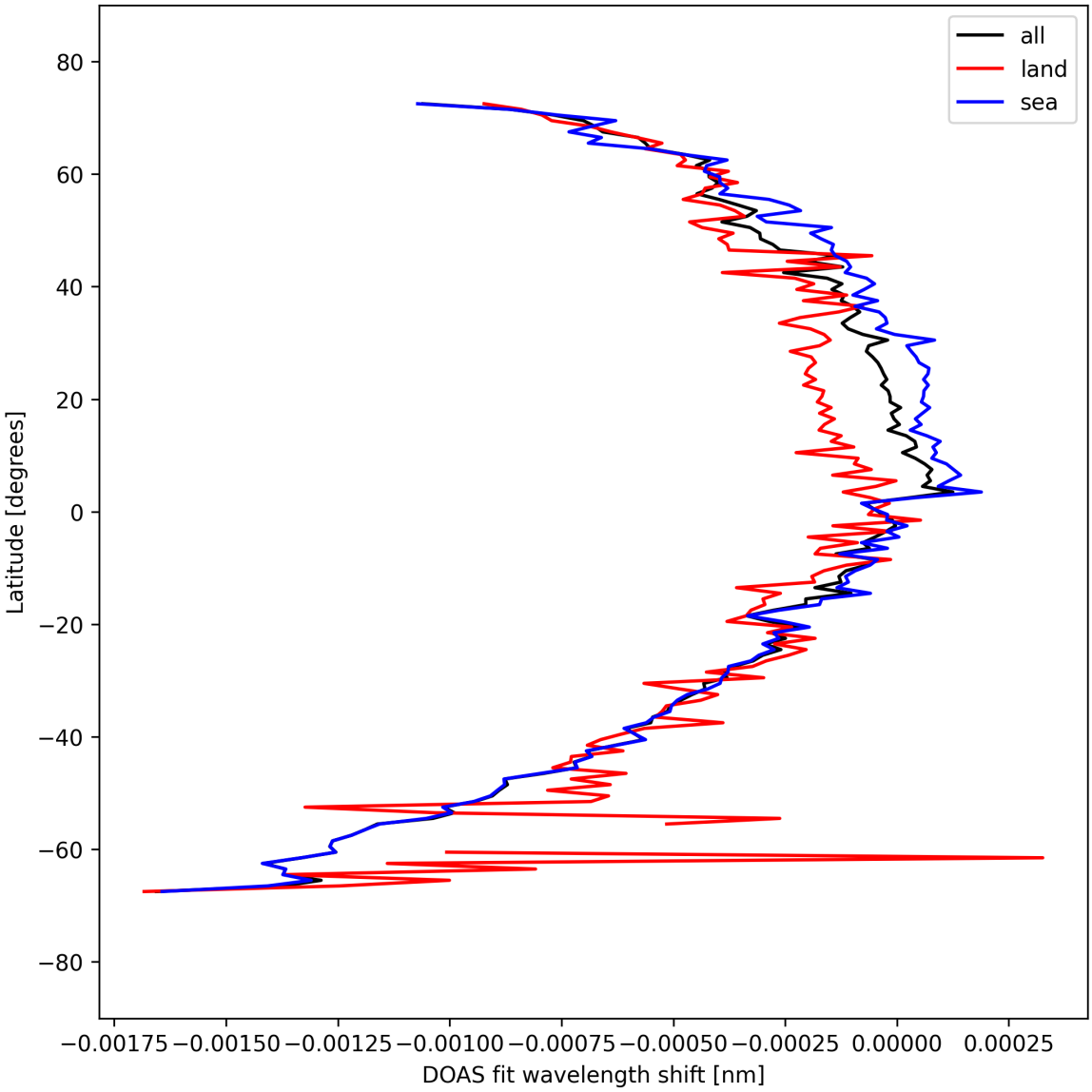

Figure 50: Zonal average of “DOAS fit wavelength shift” for 2025-03-25 to 2025-03-26.

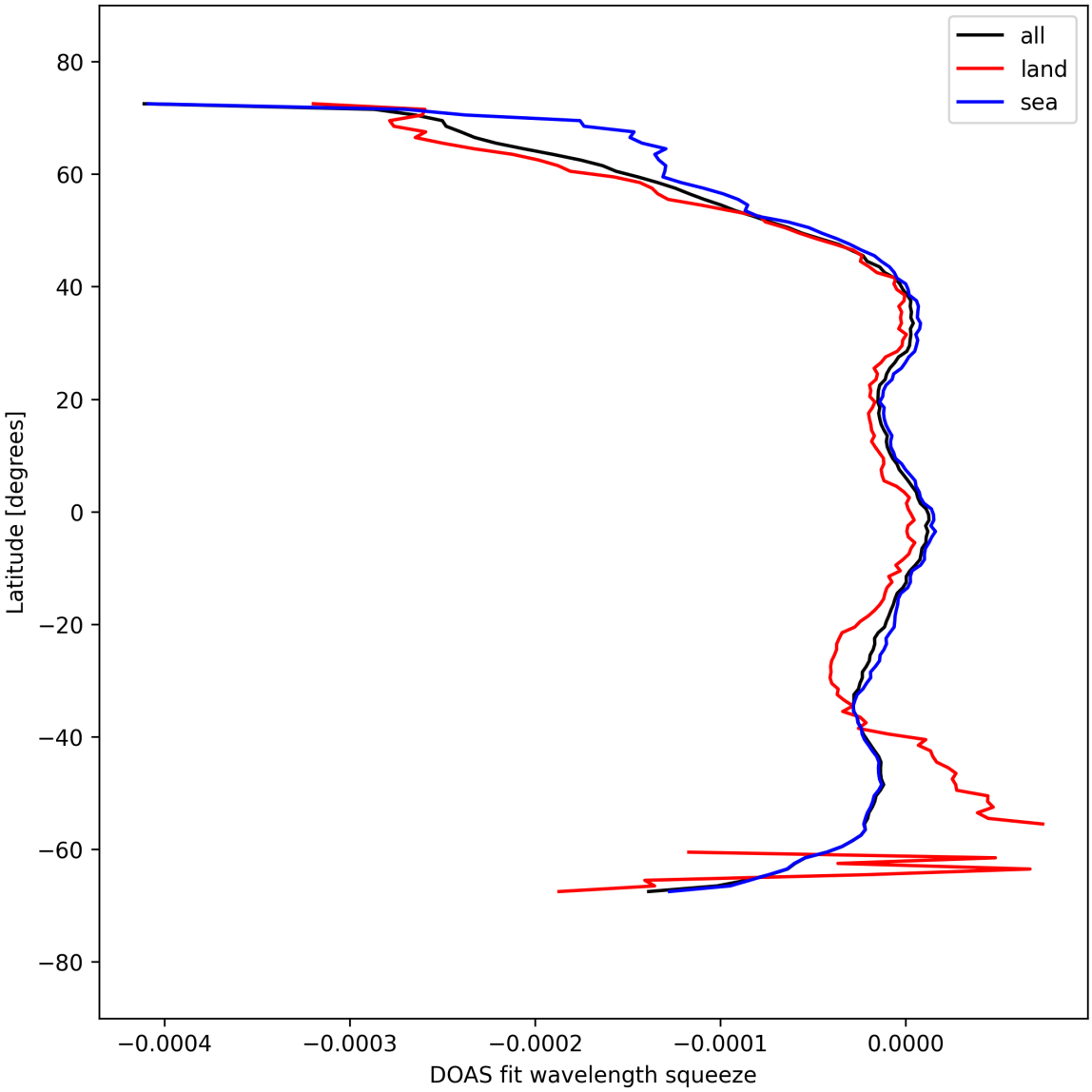

Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-03-25 to 2025-03-26.

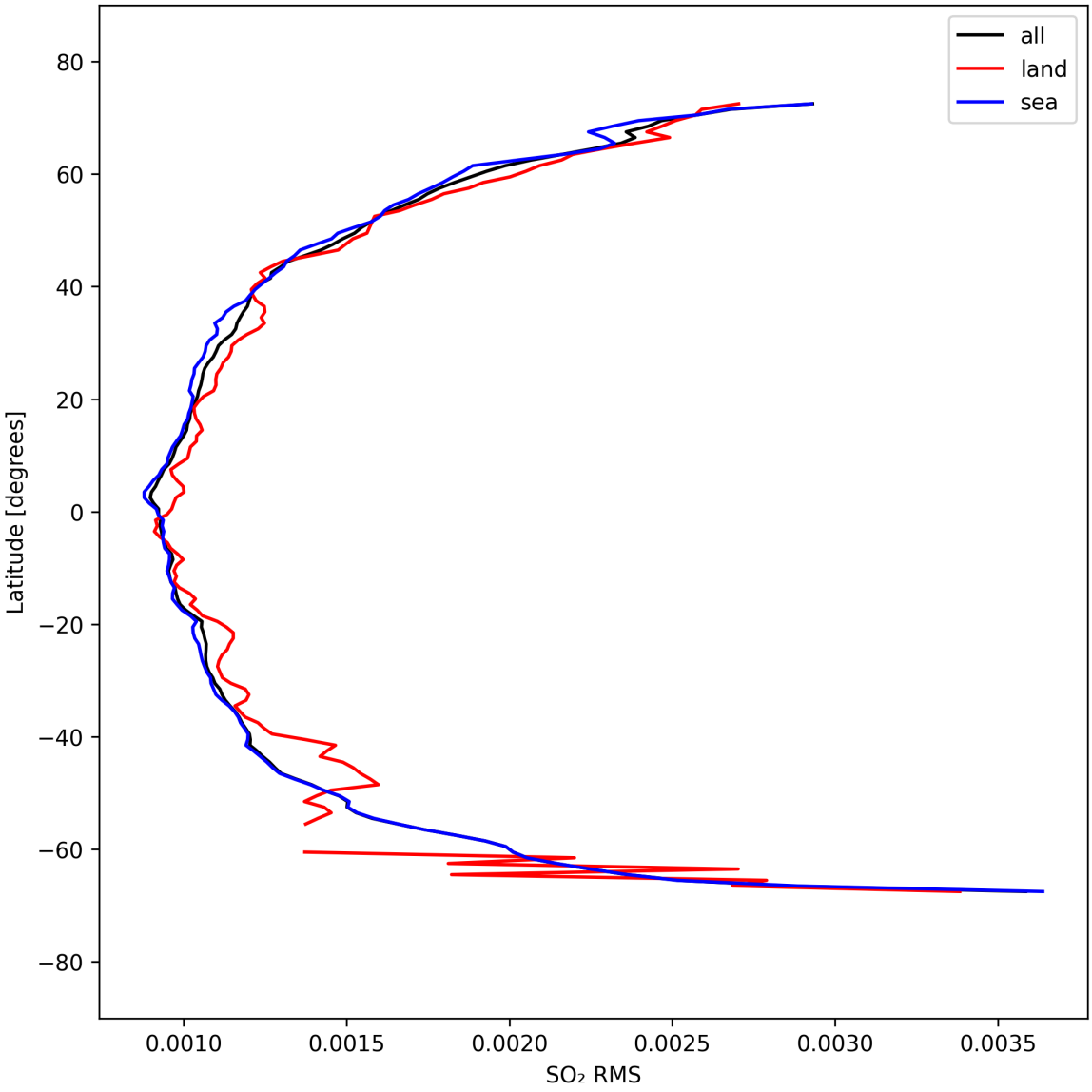

Figure 52: Zonal average of "SO_2 RMS" for 2025-03-25 to 2025-03-26.

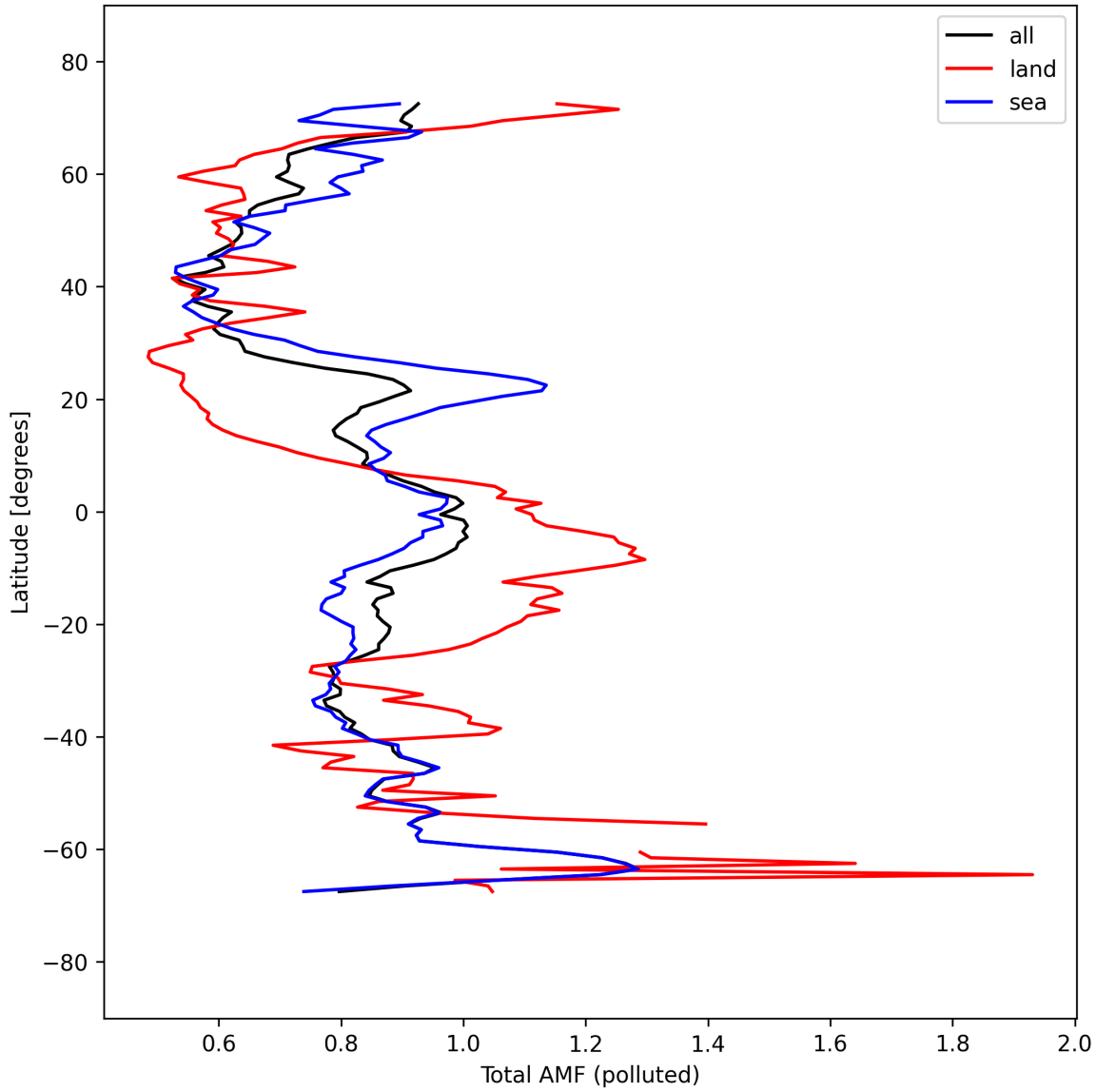

Figure 53: Zonal average of “Total AMF (polluted)” for 2025-03-25 to 2025-03-26.

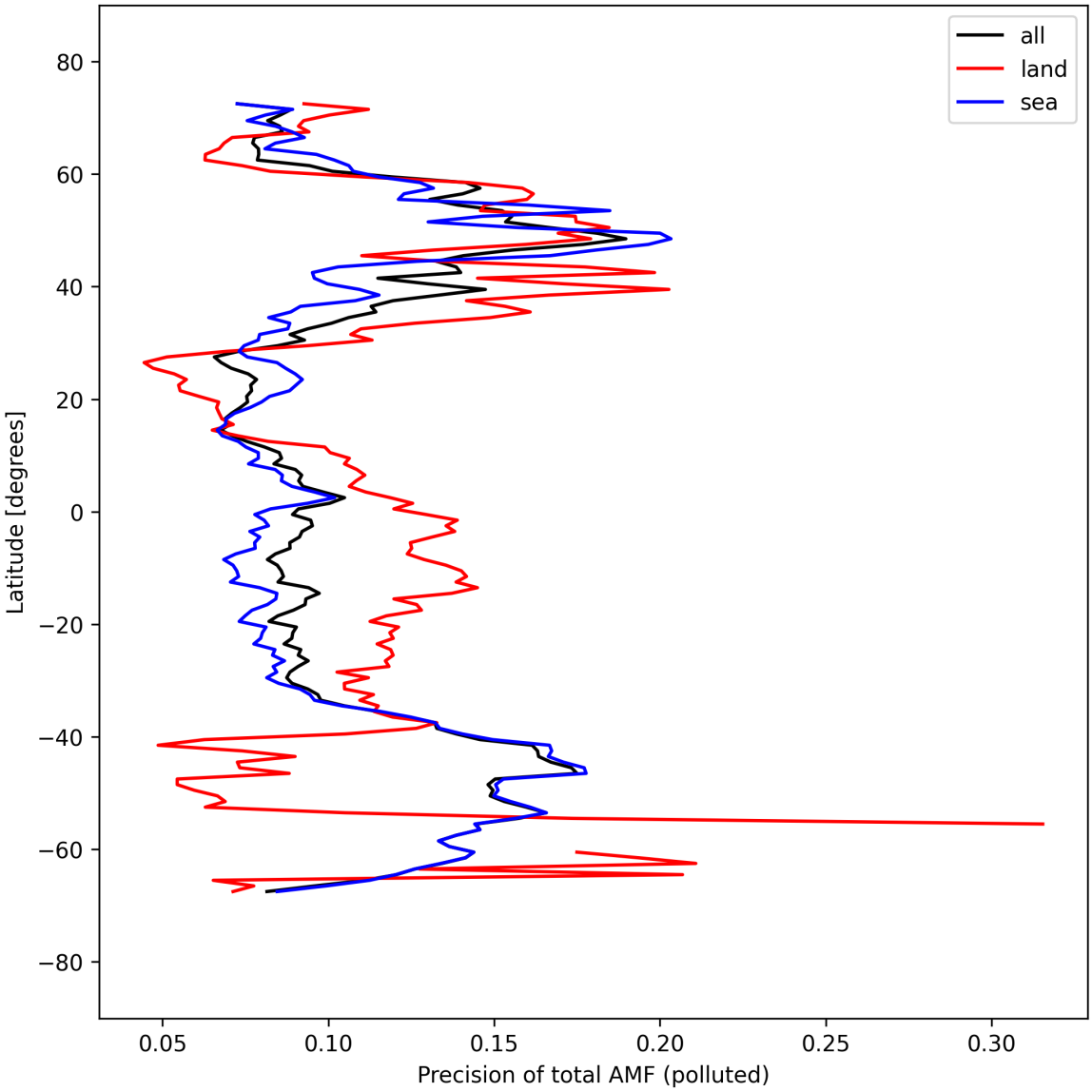

Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-03-25 to 2025-03-26.

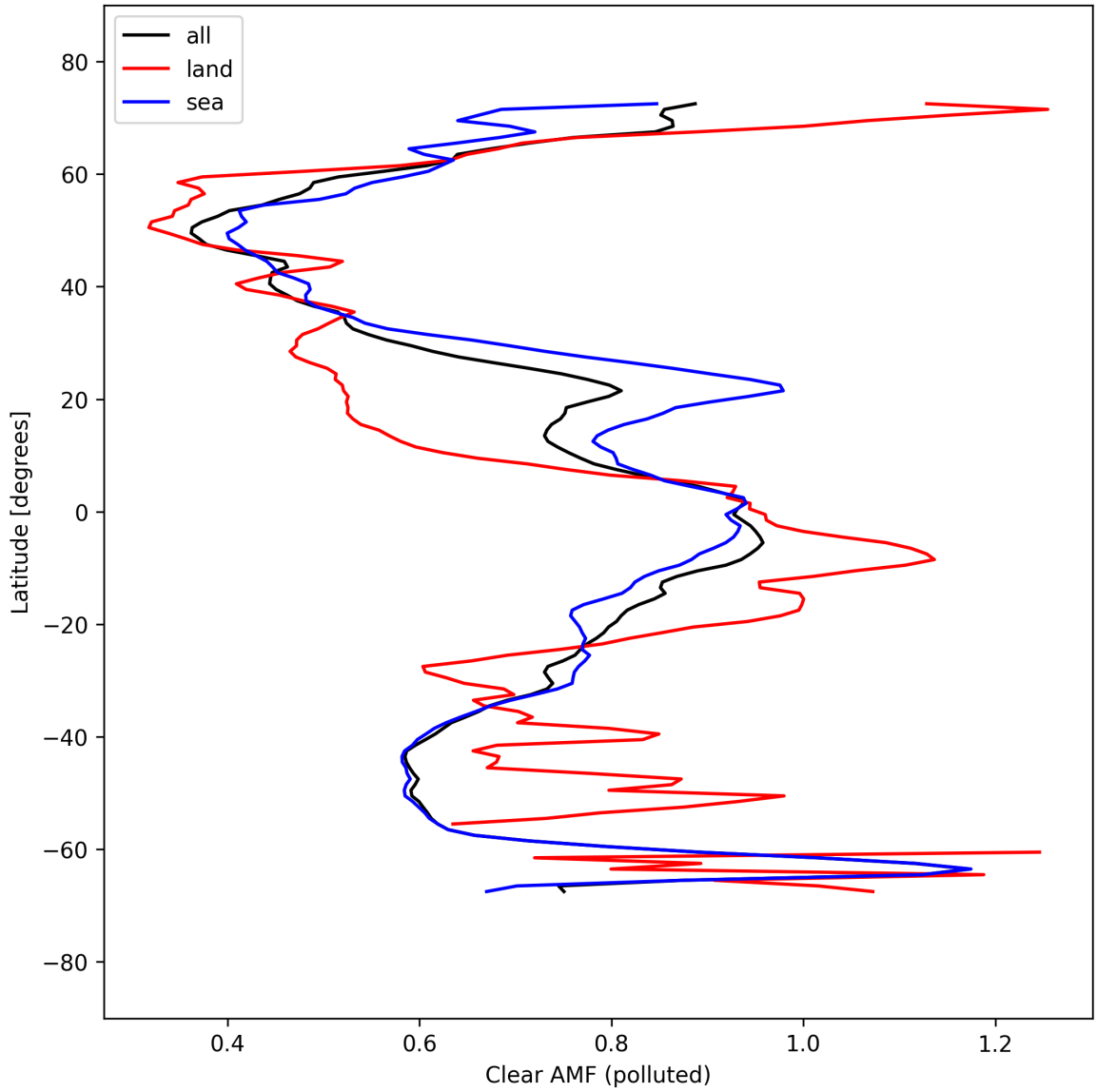

Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-03-25 to 2025-03-26.

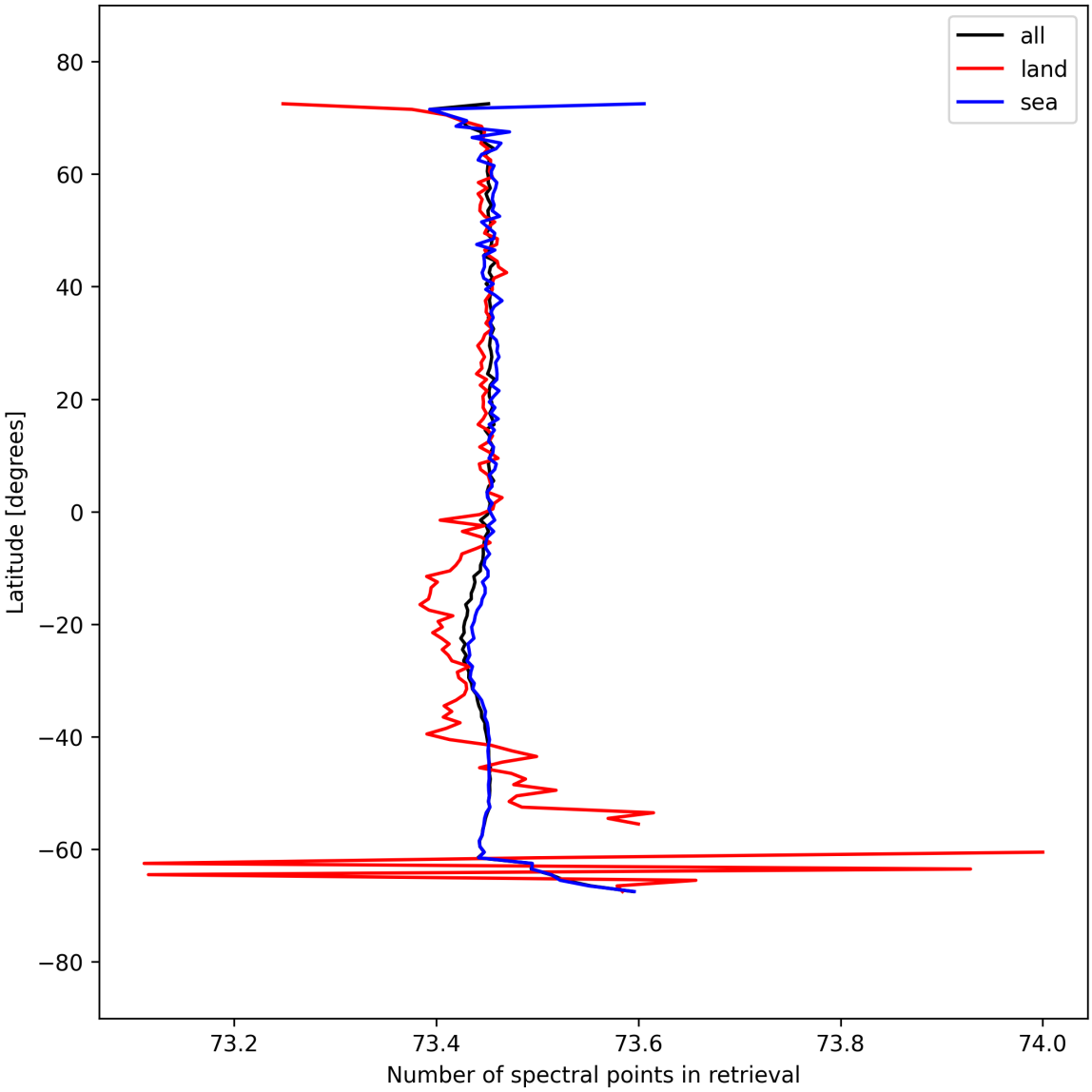

Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-03-25 to 2025-03-26.

8 Histograms

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

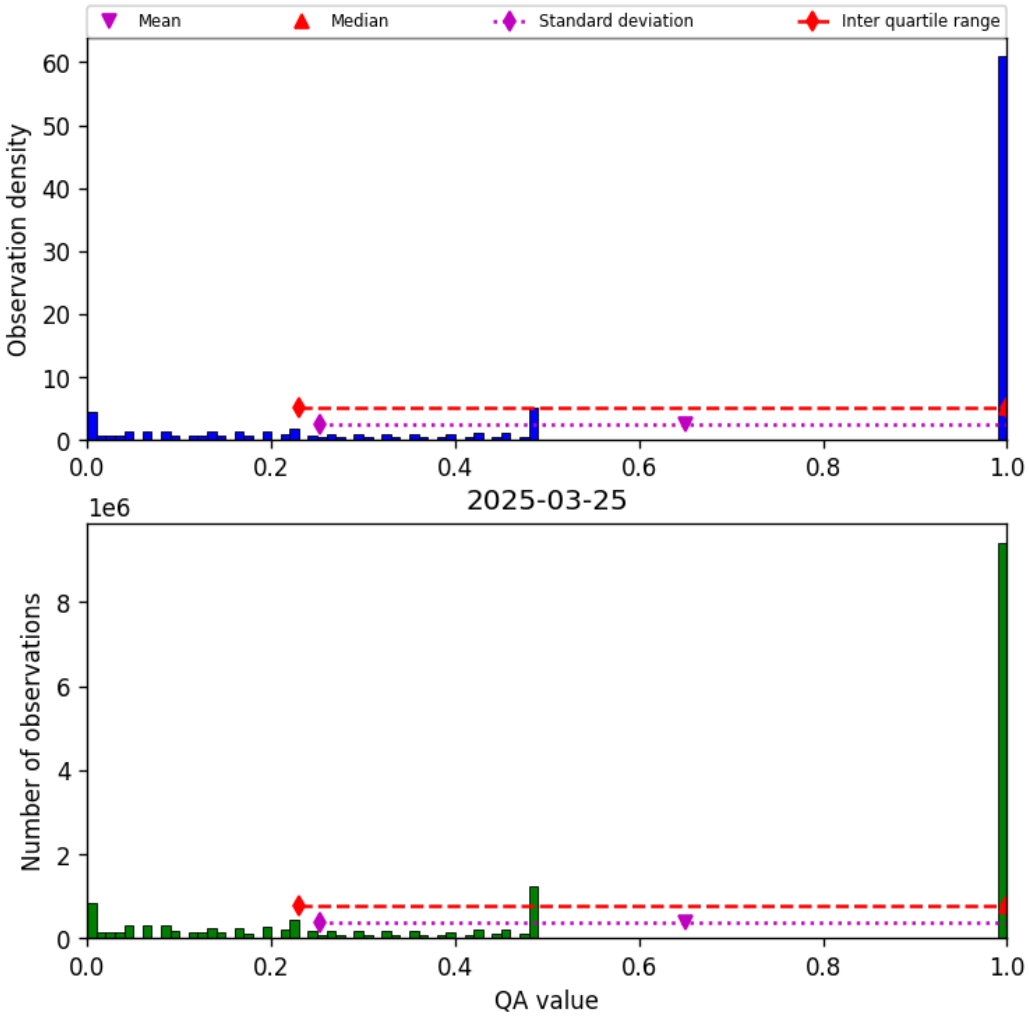

Figure 57: Histogram of “QA value” for 2025-03-25 to 2025-03-26

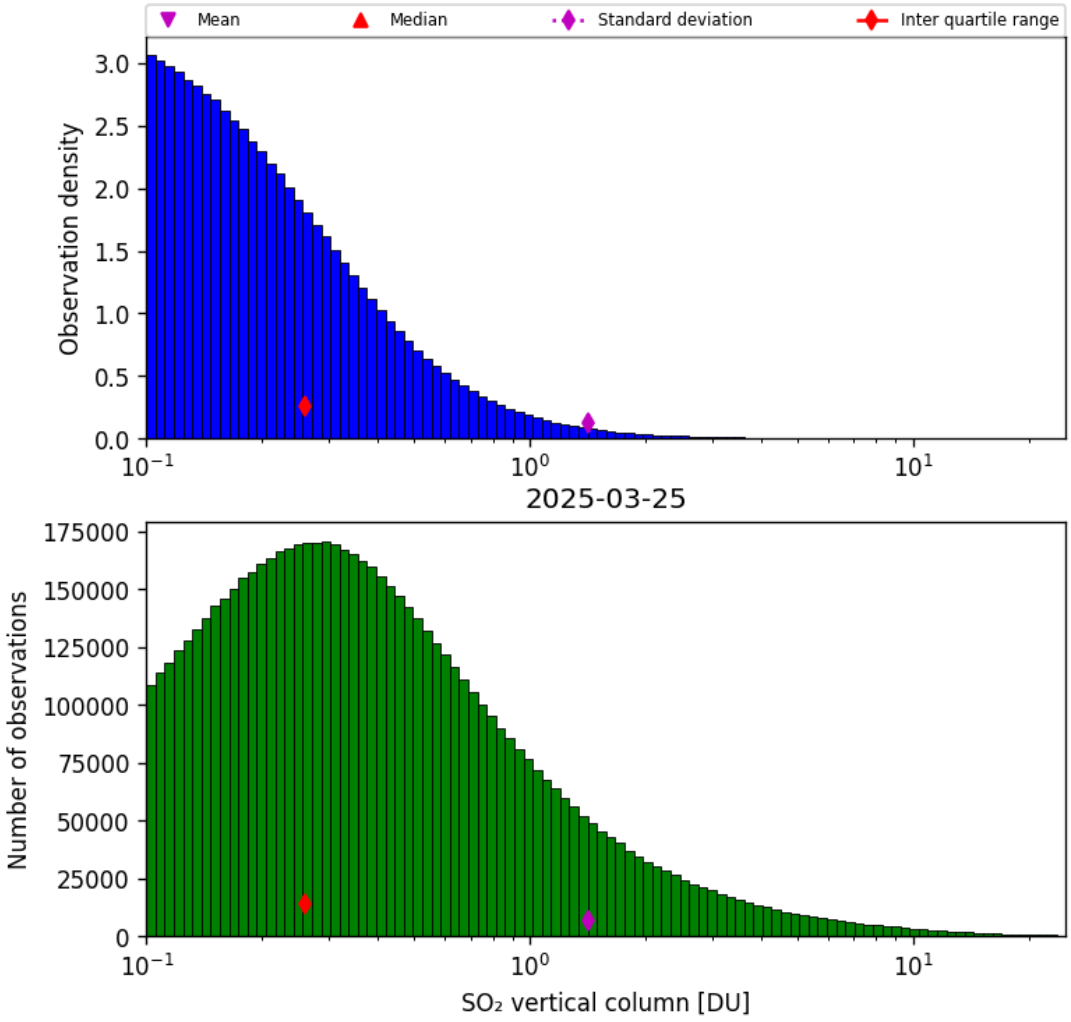

Figure 58: Histogram of "SO_2 vertical column" for 2025-03-25 to 2025-03-26

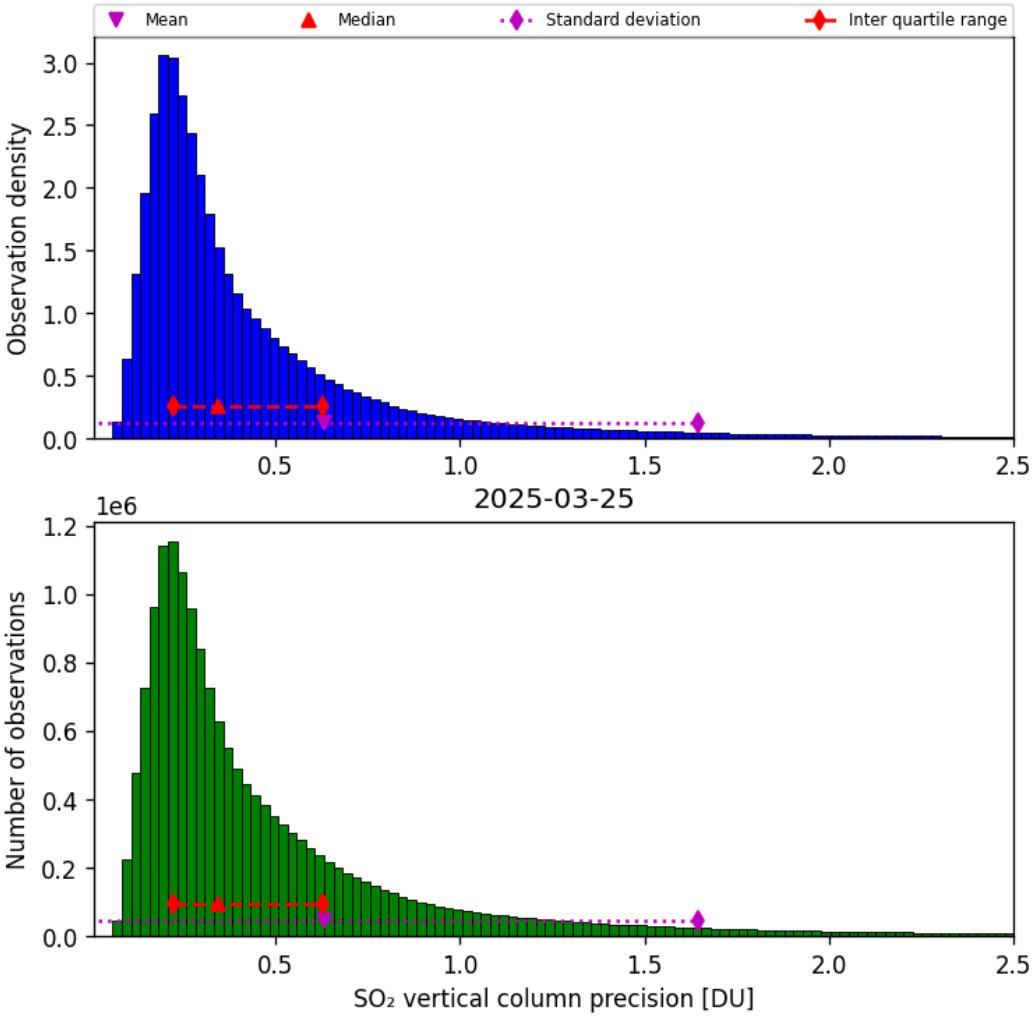

Figure 59: Histogram of "SO_2 vertical column precision" for 2025-03-25 to 2025-03-26

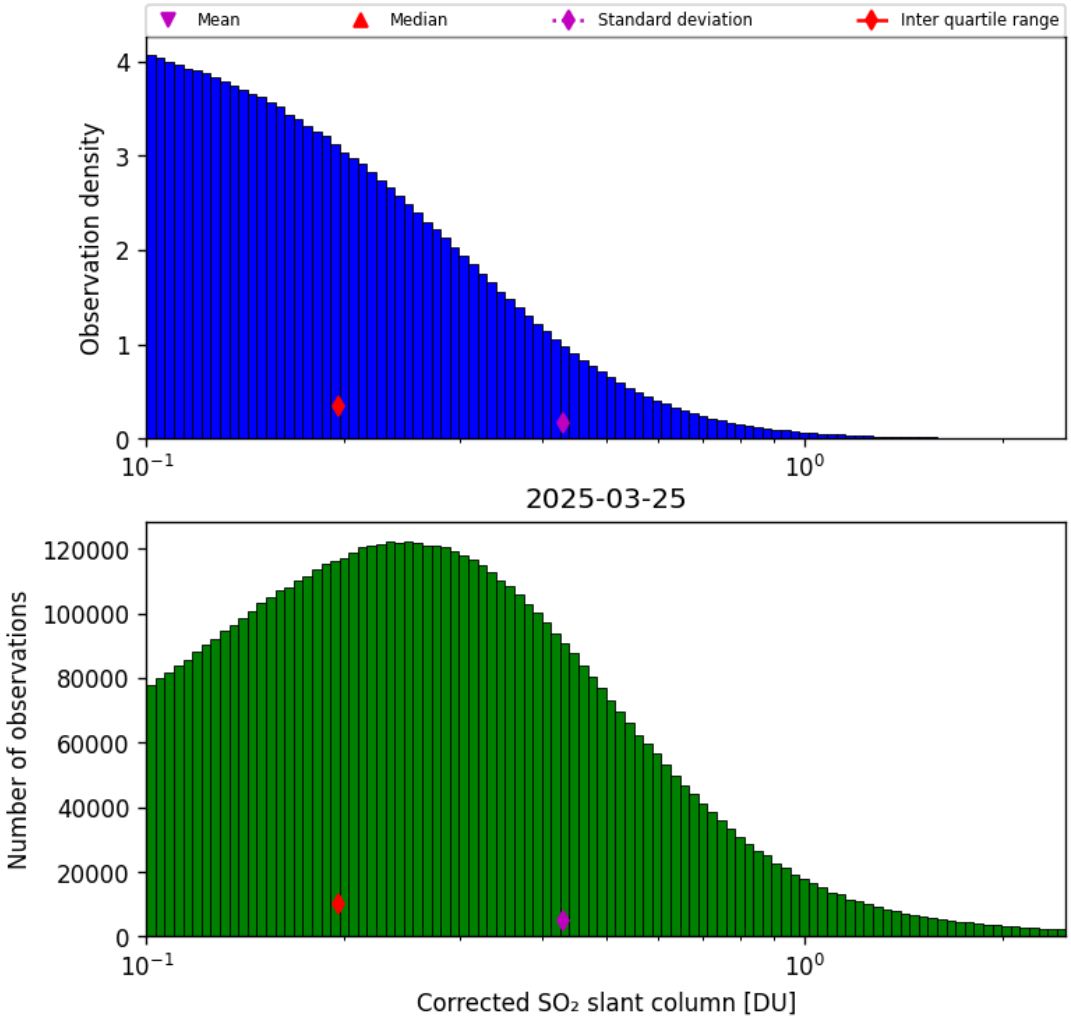

Figure 60: Histogram of "Corrected SO_2 slant column" for 2025-03-25 to 2025-03-26

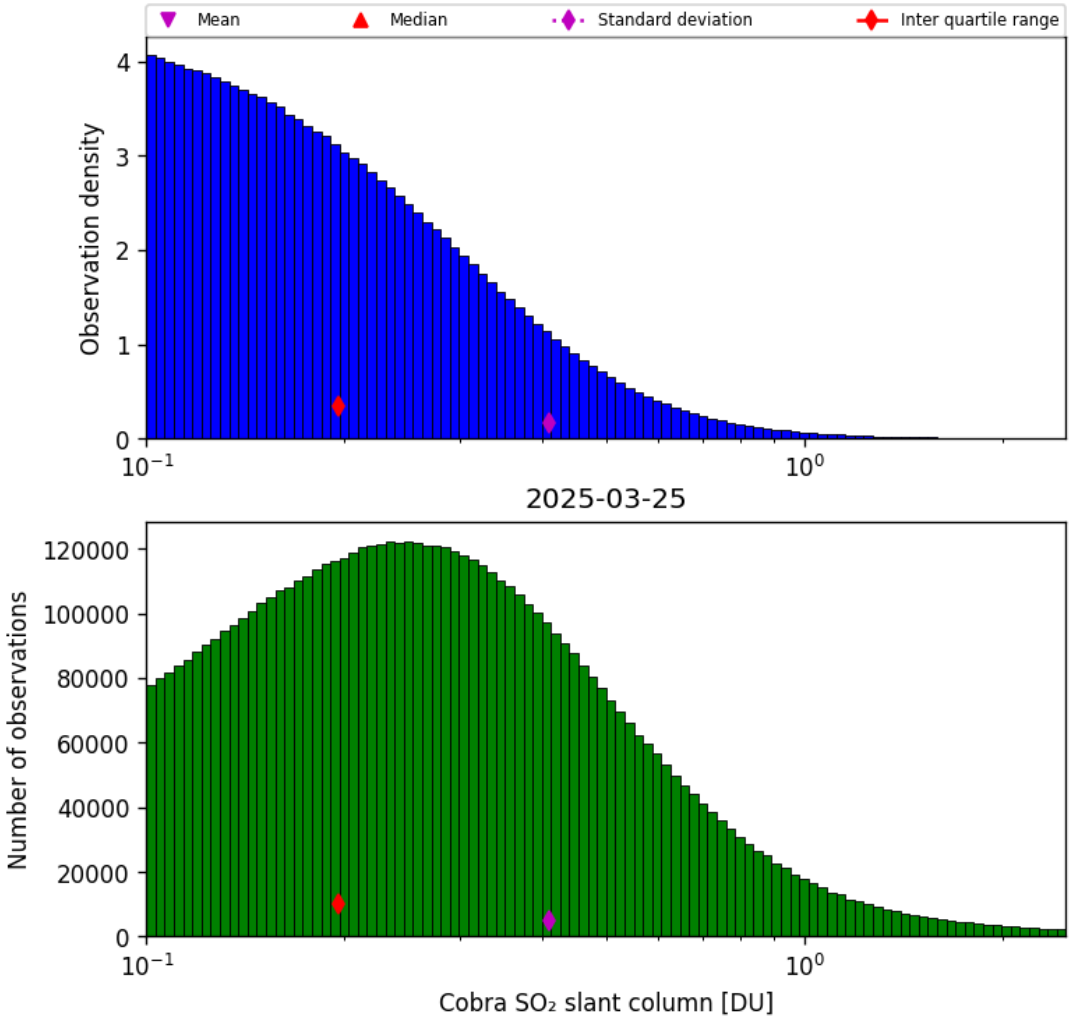

Figure 61: Histogram of "Cobra SO_2 slant column" for 2025-03-25 to 2025-03-26

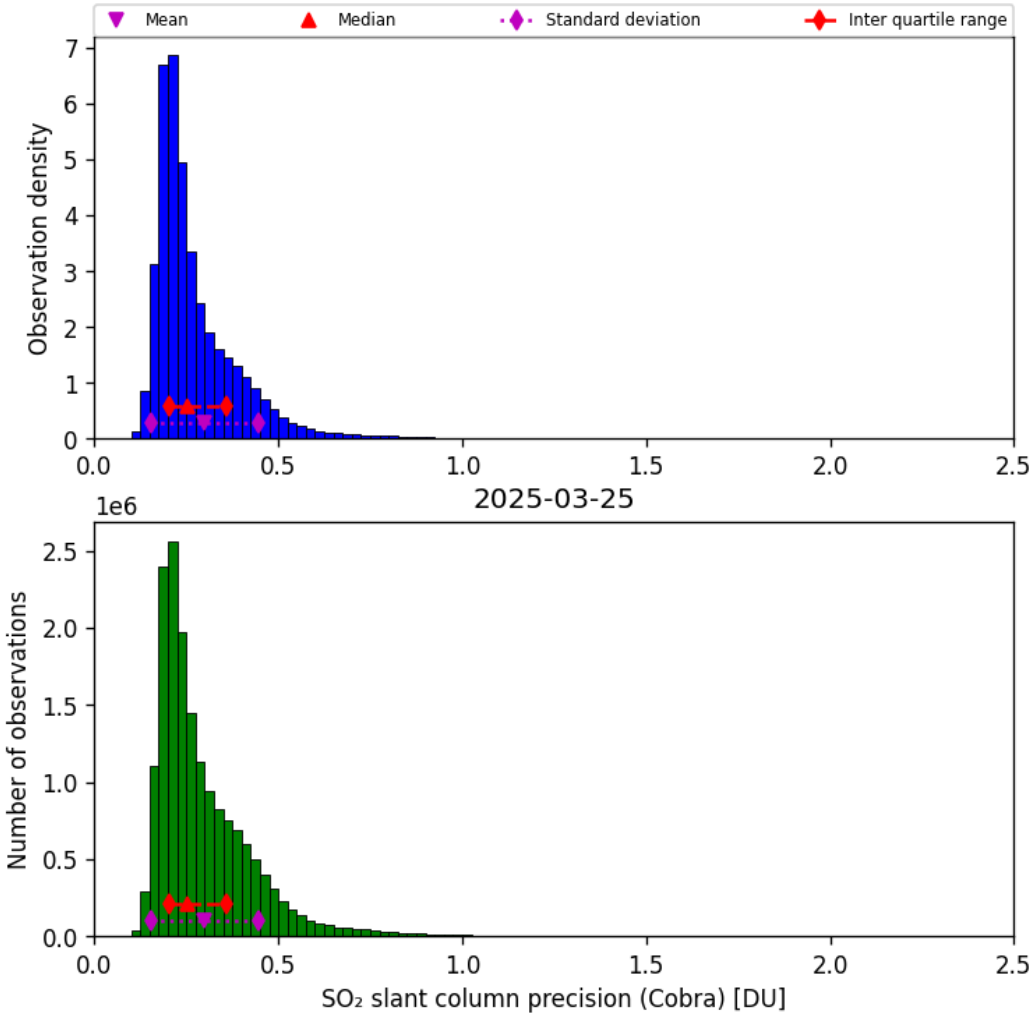

Figure 62: Histogram of "SO_2 slant column precision (Cobra)" for 2025-03-25 to 2025-03-26

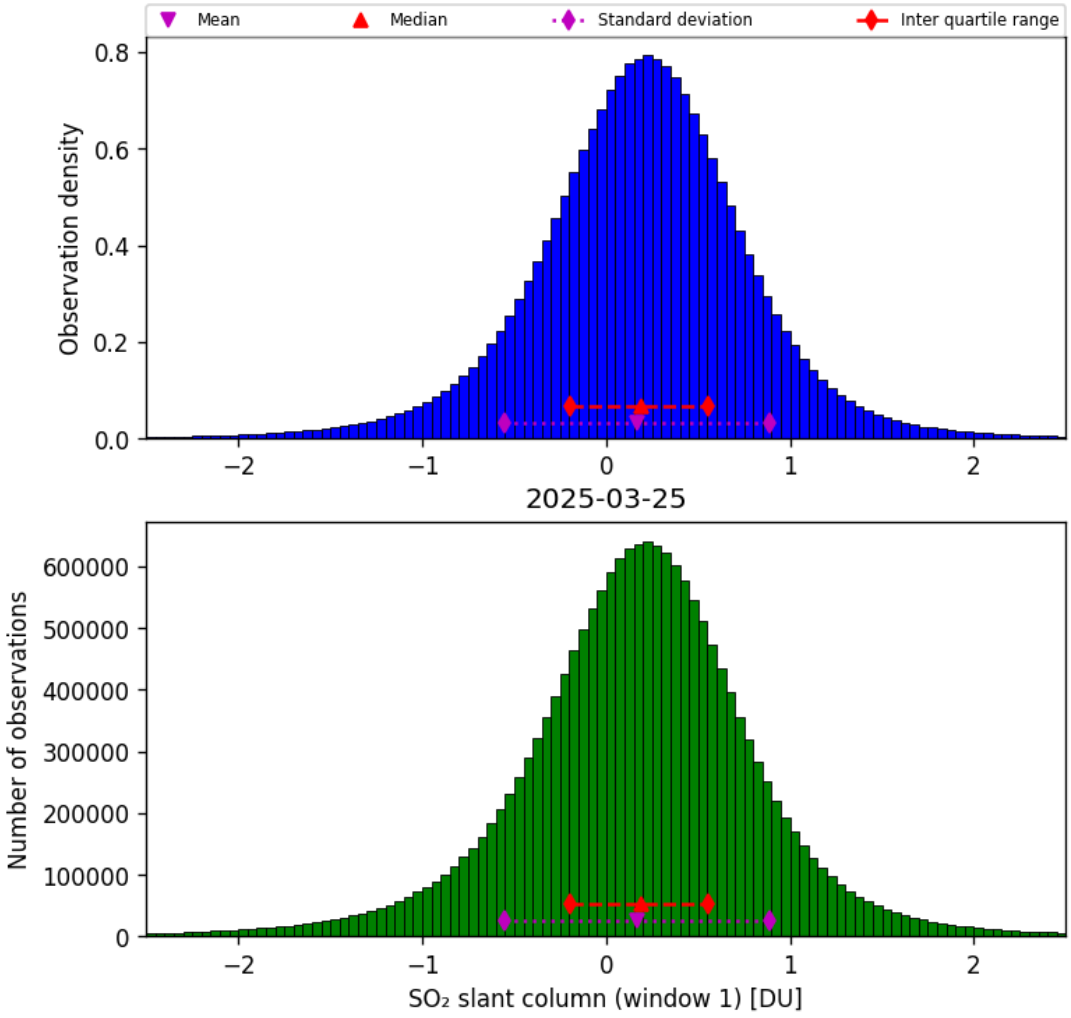

Figure 63: Histogram of "SO_2 slant column (window 1)" for 2025-03-25 to 2025-03-26

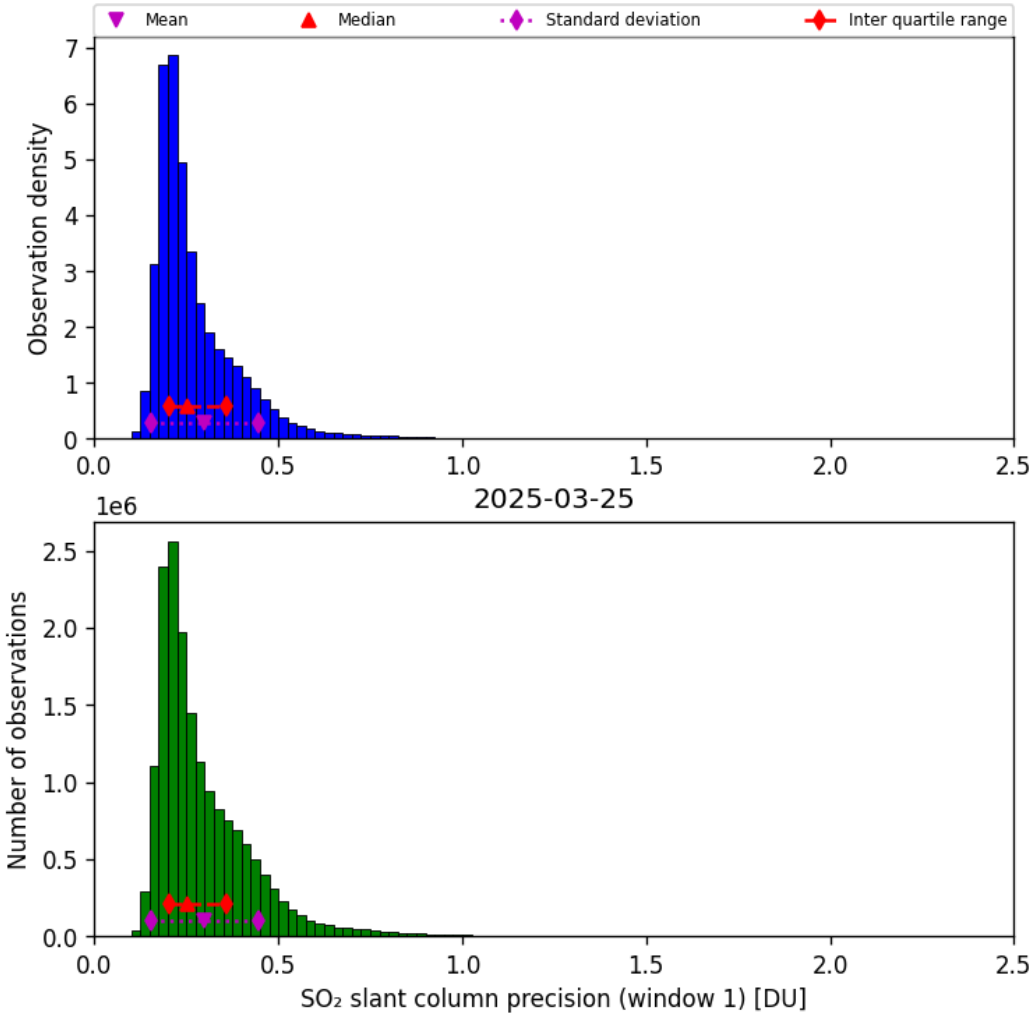

Figure 64: Histogram of "SO_2 slant column precision (window 1)" for 2025-03-25 to 2025-03-26

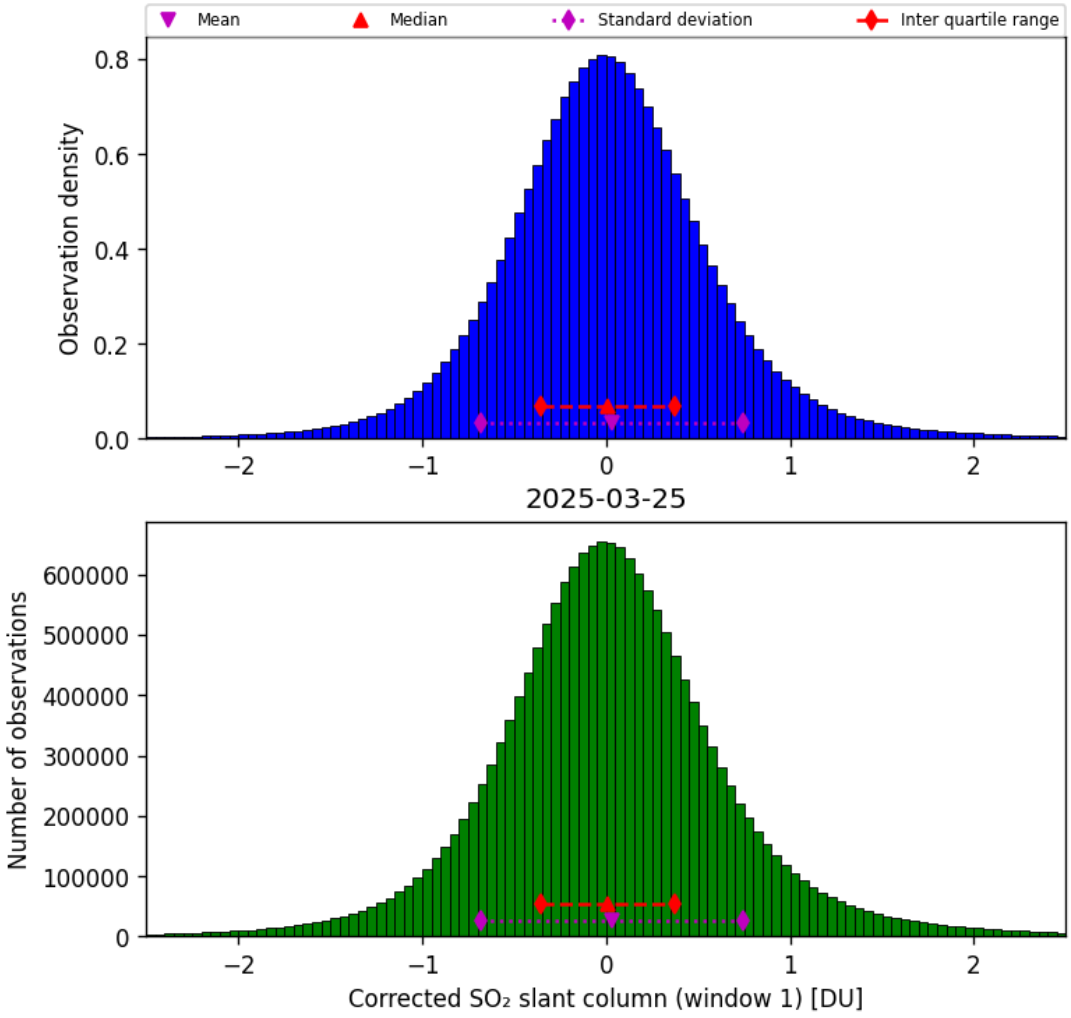

Figure 65: Histogram of "Corrected SO_2 slant column (window 1)" for 2025-03-25 to 2025-03-26

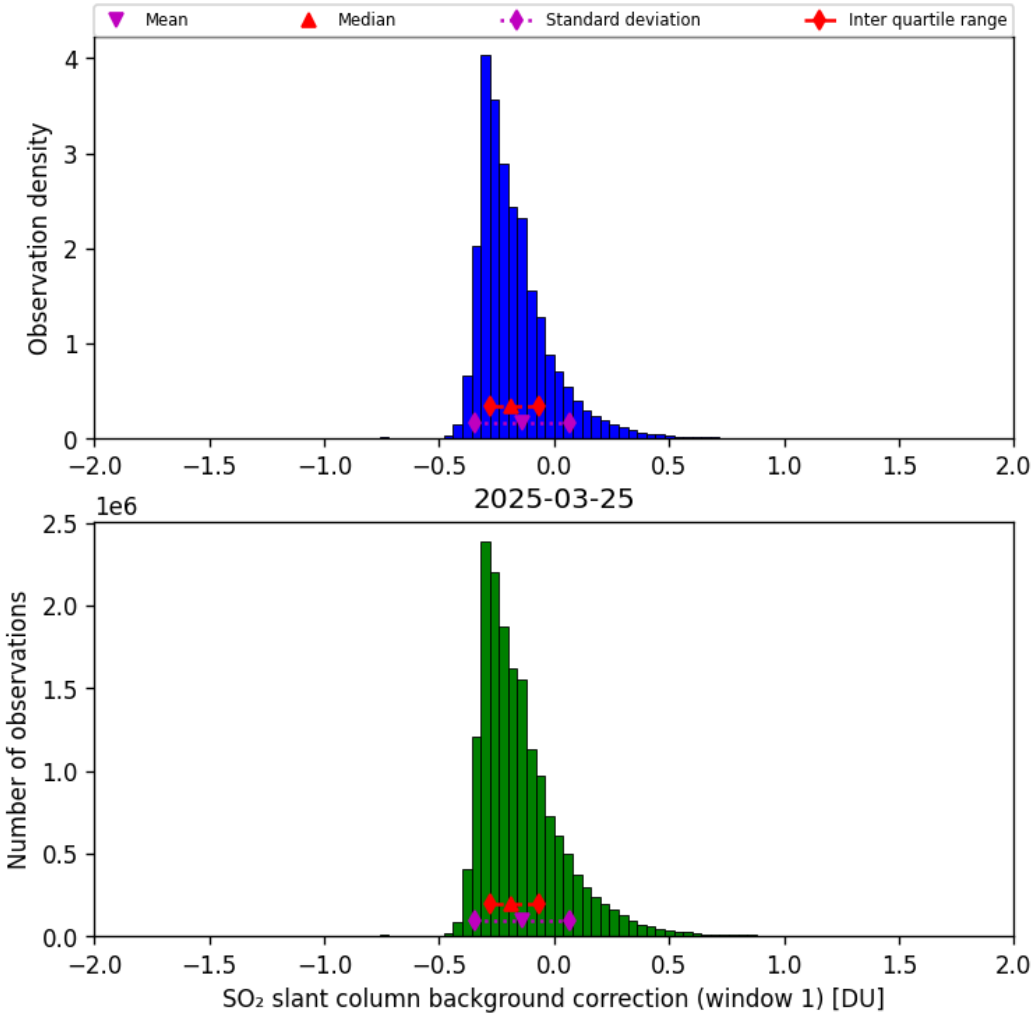

Figure 66: Histogram of "SO_2 slant column background correction (window 1)" for 2025-03-25 to 2025-03-26

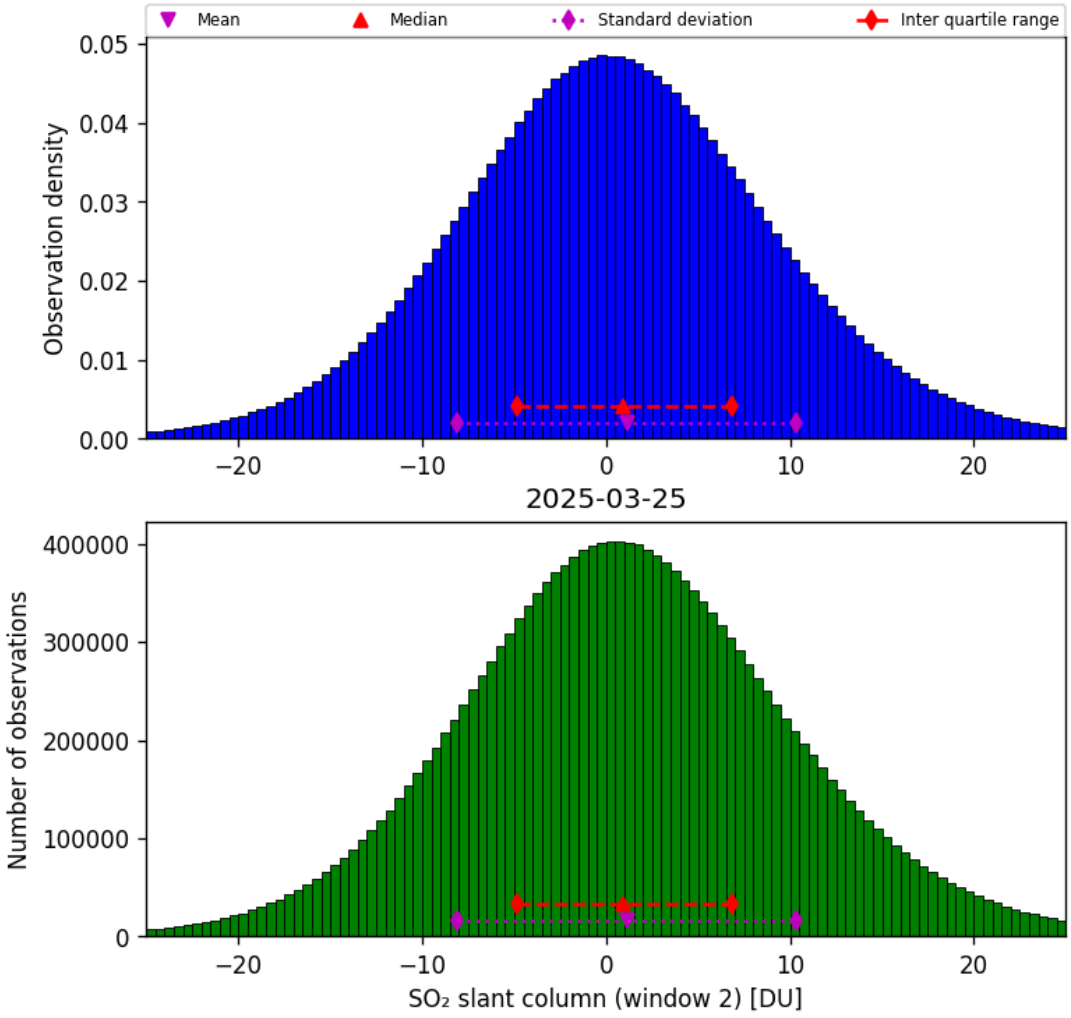

Figure 67: Histogram of "SO_2 slant column (window 2)" for 2025-03-25 to 2025-03-26

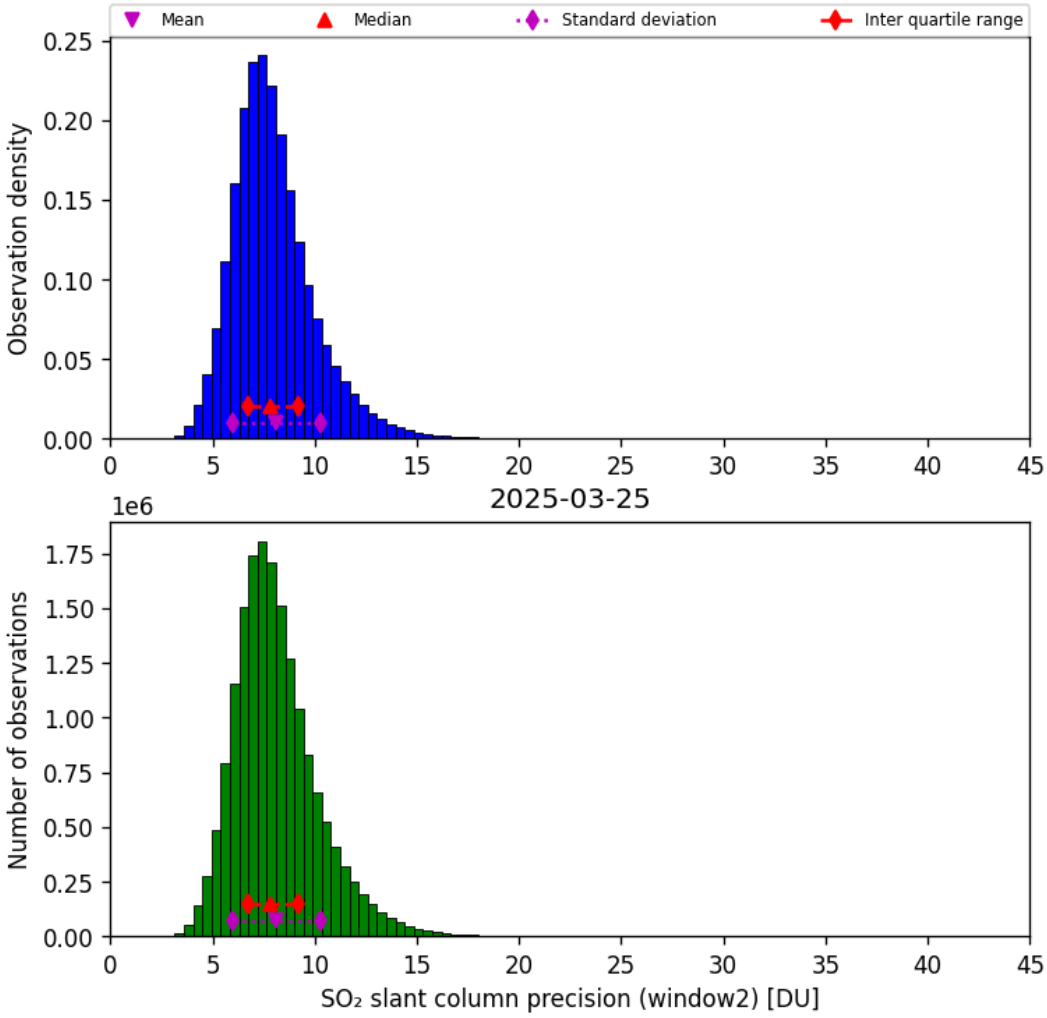

Figure 68: Histogram of "SO_2 slant column precision (window2)" for 2025-03-25 to 2025-03-26

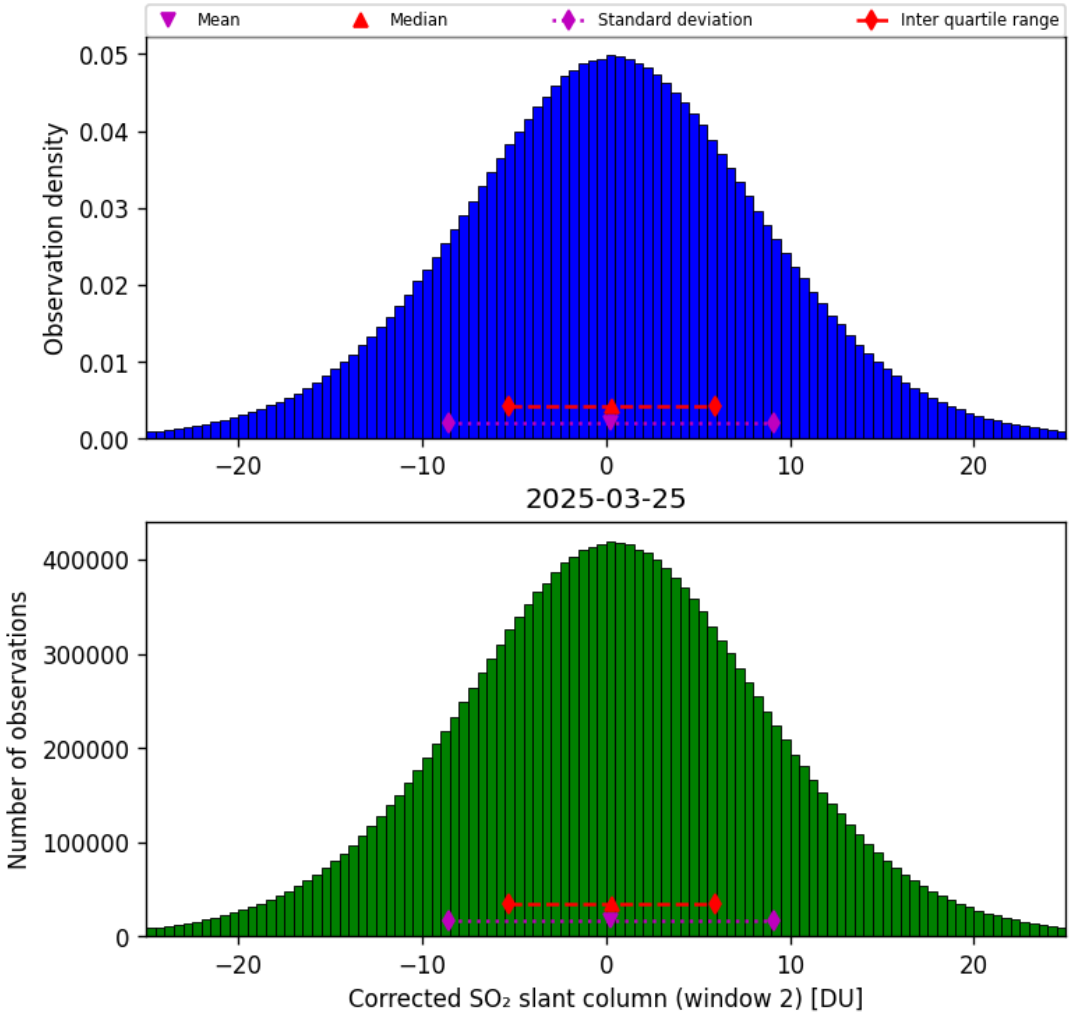

Figure 69: Histogram of "Corrected SO_2 slant column (window 2)" for 2025-03-25 to 2025-03-26

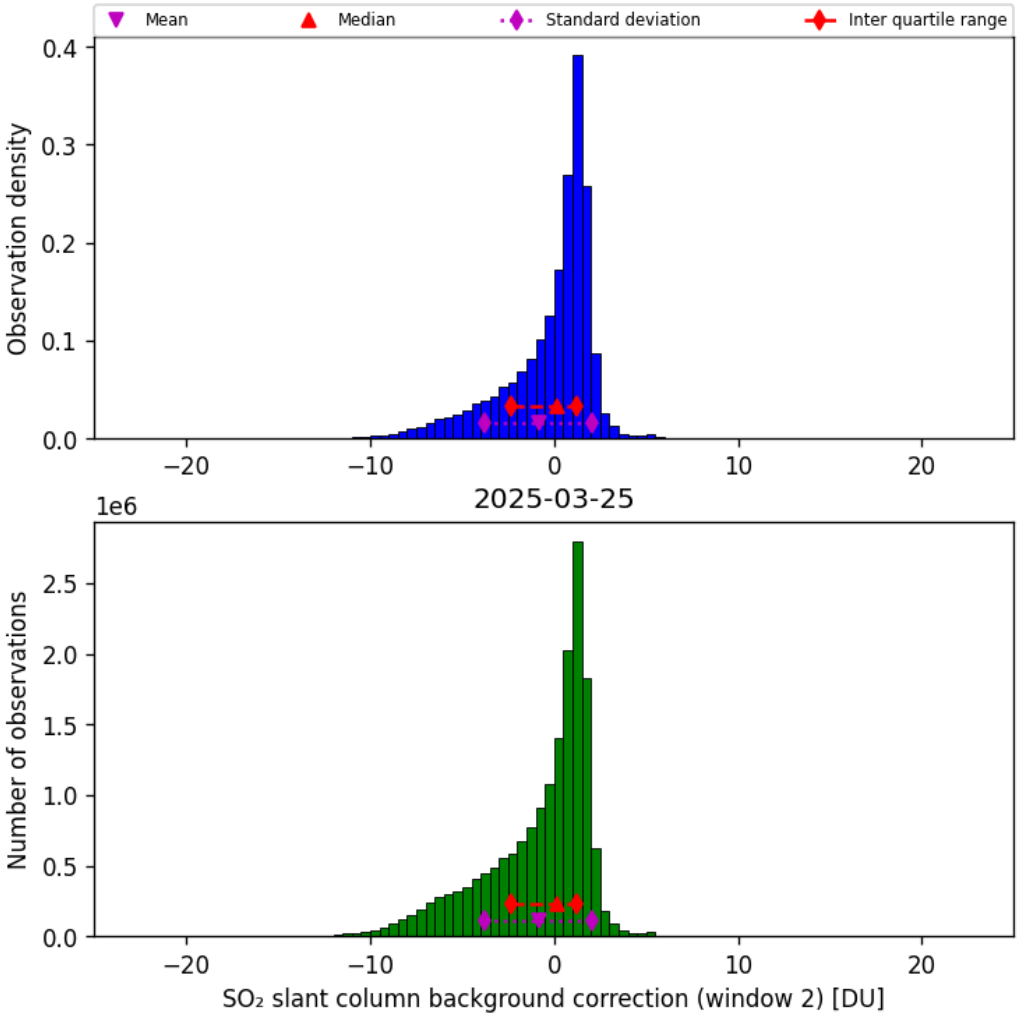

Figure 70: Histogram of "SO_2 slant column background correction (window 2)" for 2025-03-25 to 2025-03-26

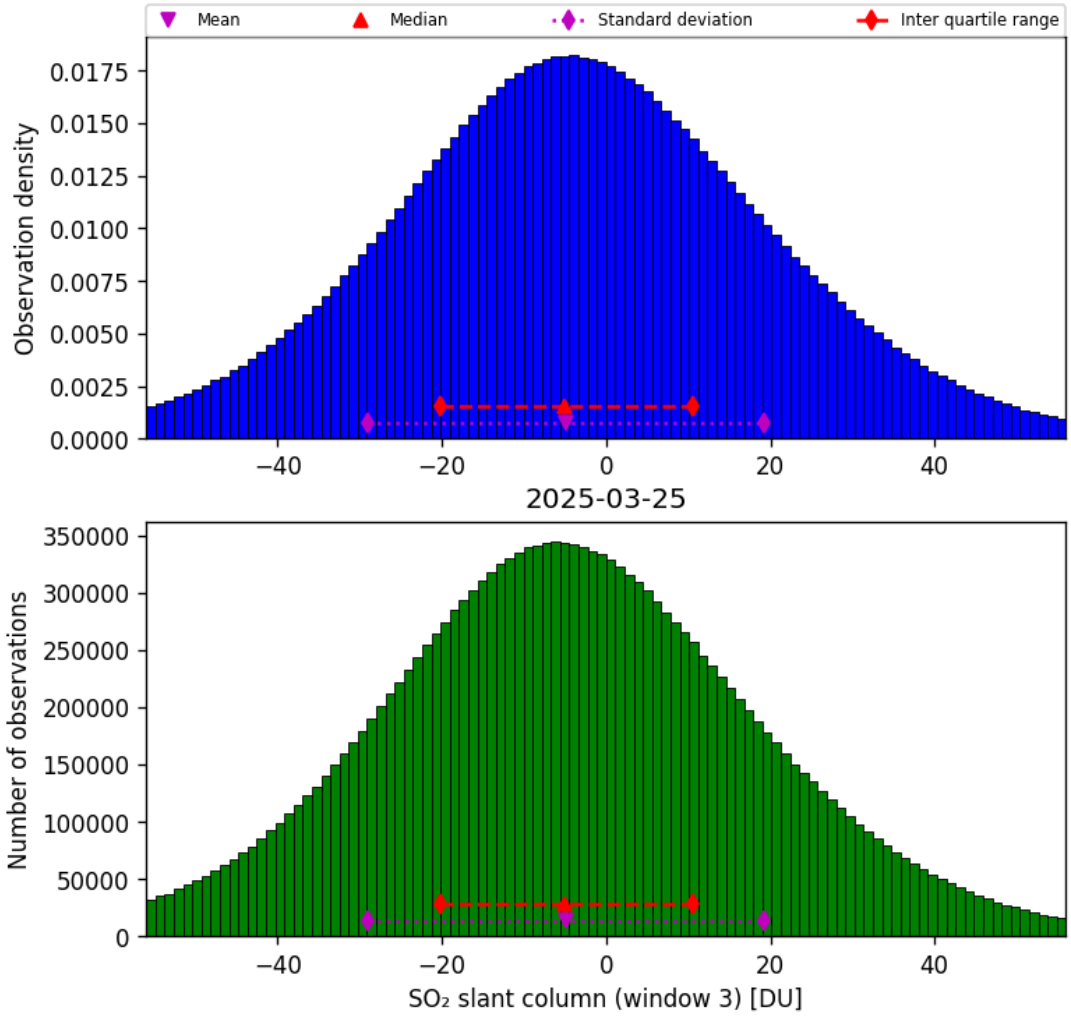

Figure 71: Histogram of "SO_2 slant column (window 3)" for 2025-03-25 to 2025-03-26

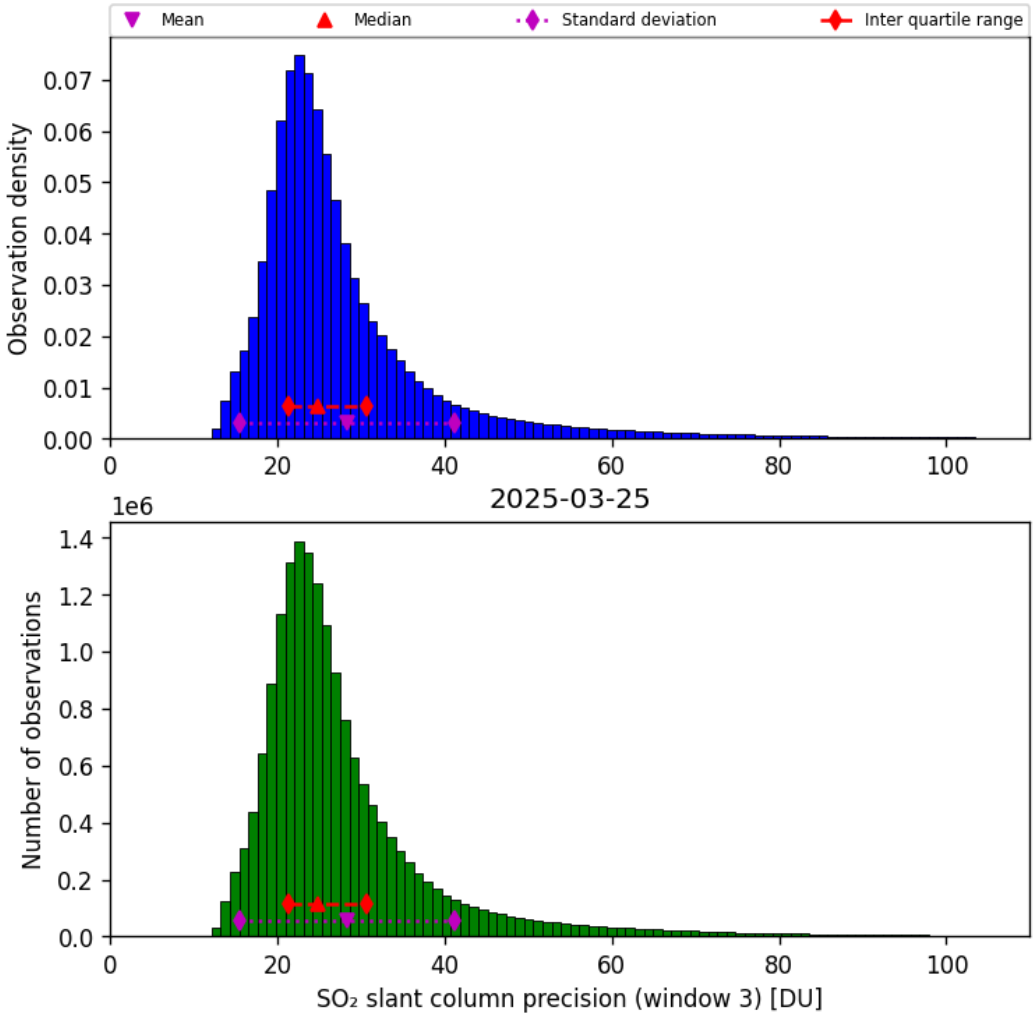

Figure 72: Histogram of "SO_2 slant column precision (window 3)" for 2025-03-25 to 2025-03-26

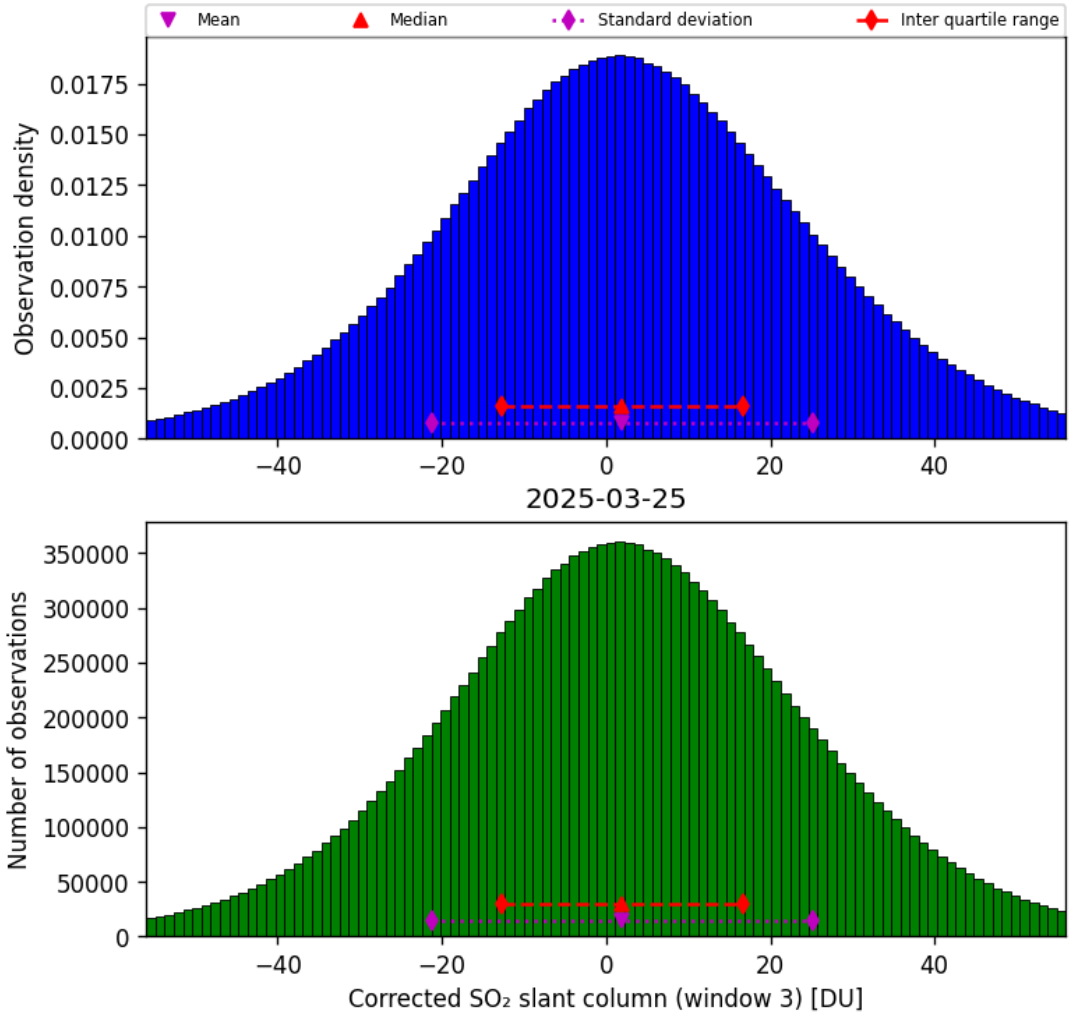

Figure 73: Histogram of "Corrected SO_2 slant column (window 3)" for 2025-03-25 to 2025-03-26

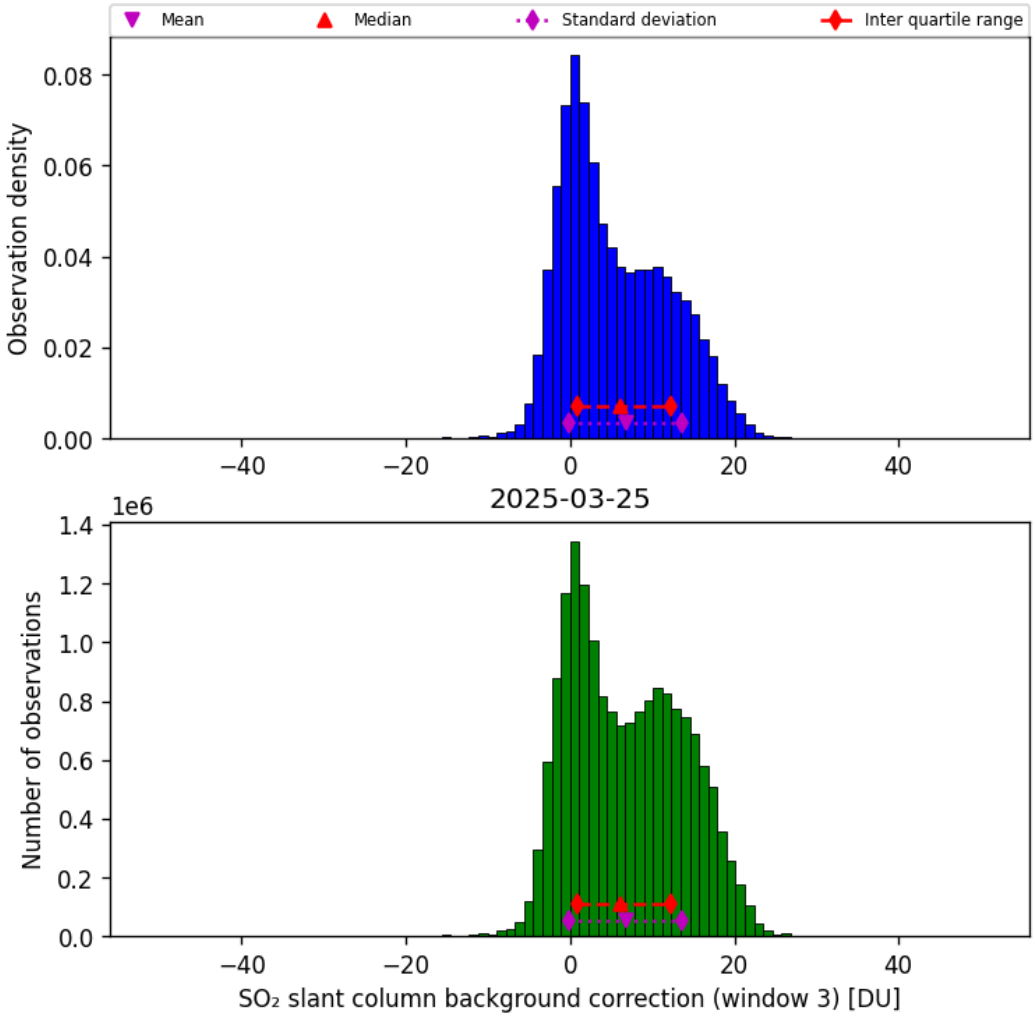

Figure 74: Histogram of "SO_2 slant column background correction (window 3)" for 2025-03-25 to 2025-03-26

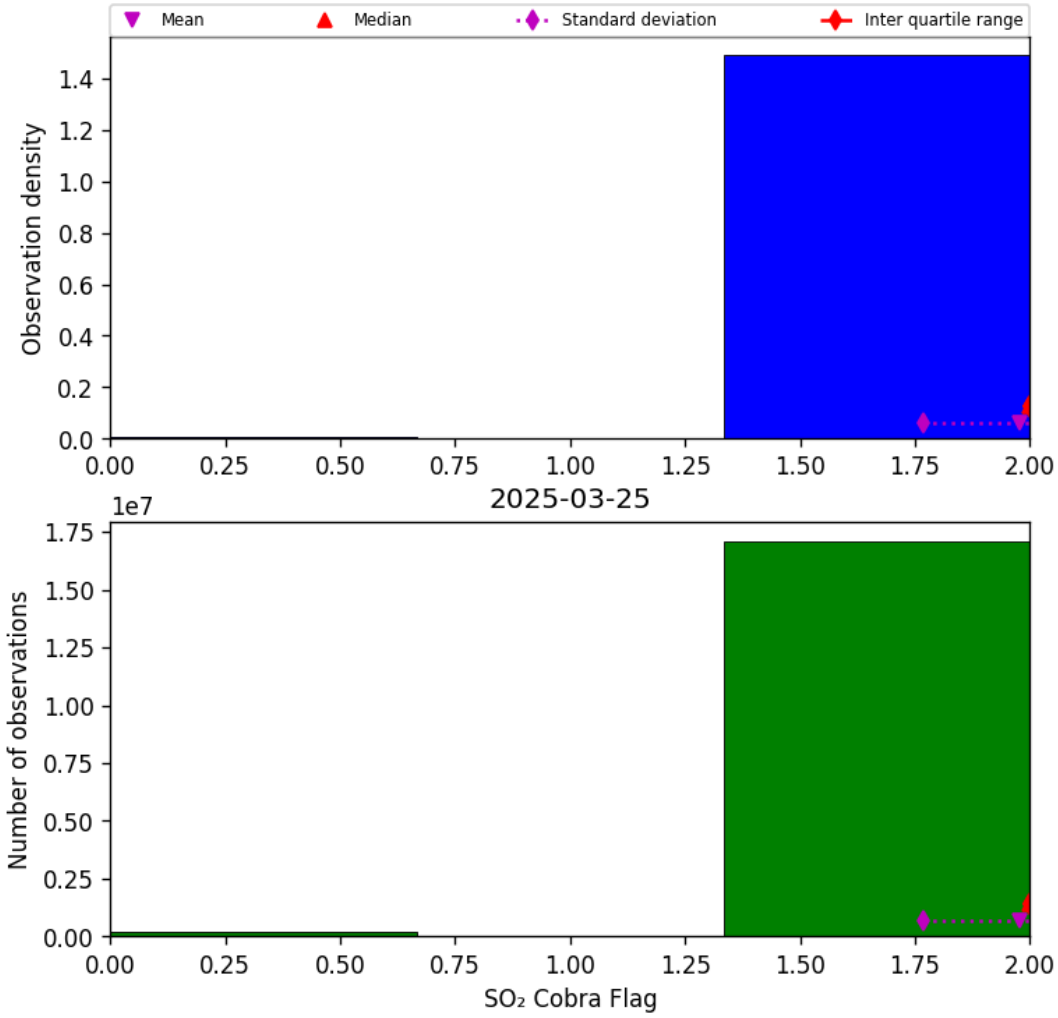

Figure 75: Histogram of "SO_2 Cobra Flag" for 2025-03-25 to 2025-03-26

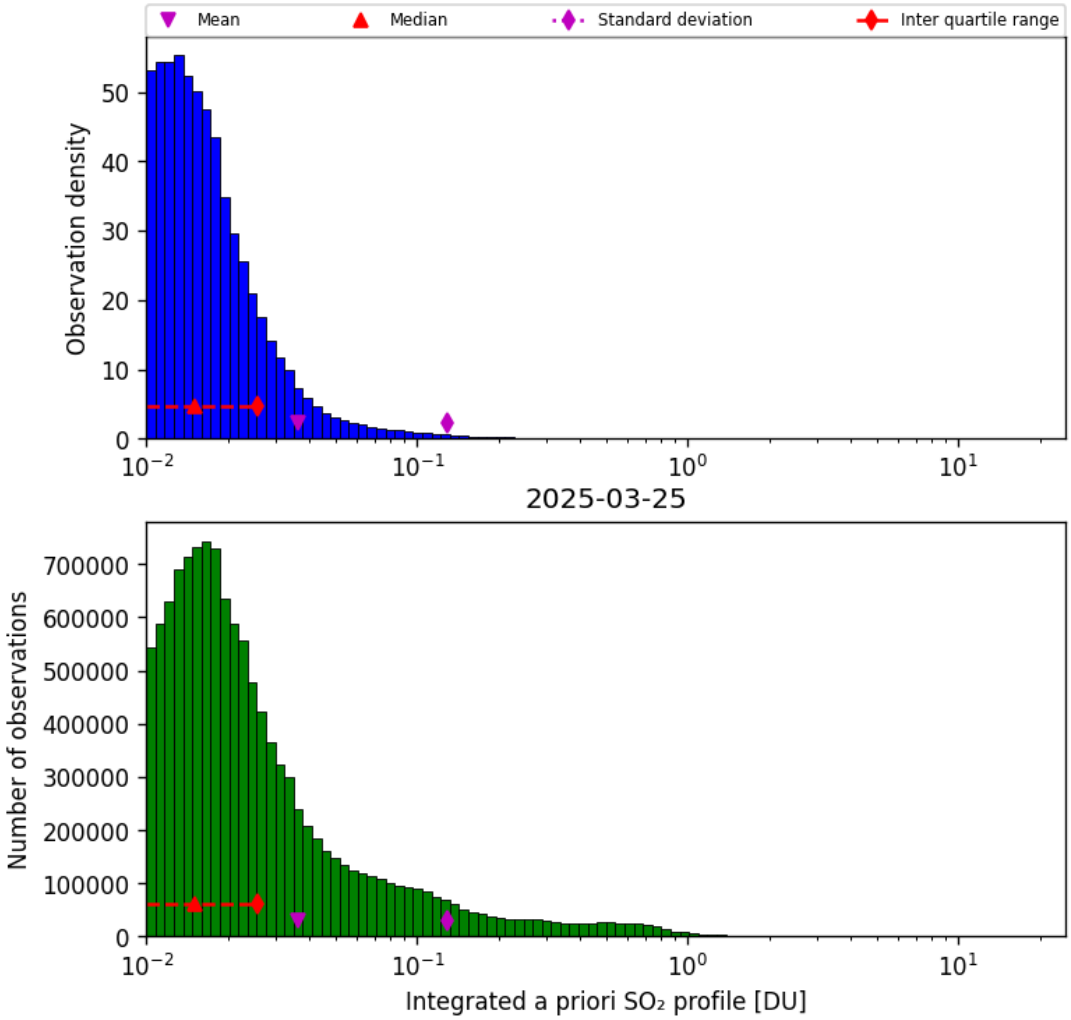

Figure 76: Histogram of "Integrated a priori SO_2 profile" for 2025-03-25 to 2025-03-26

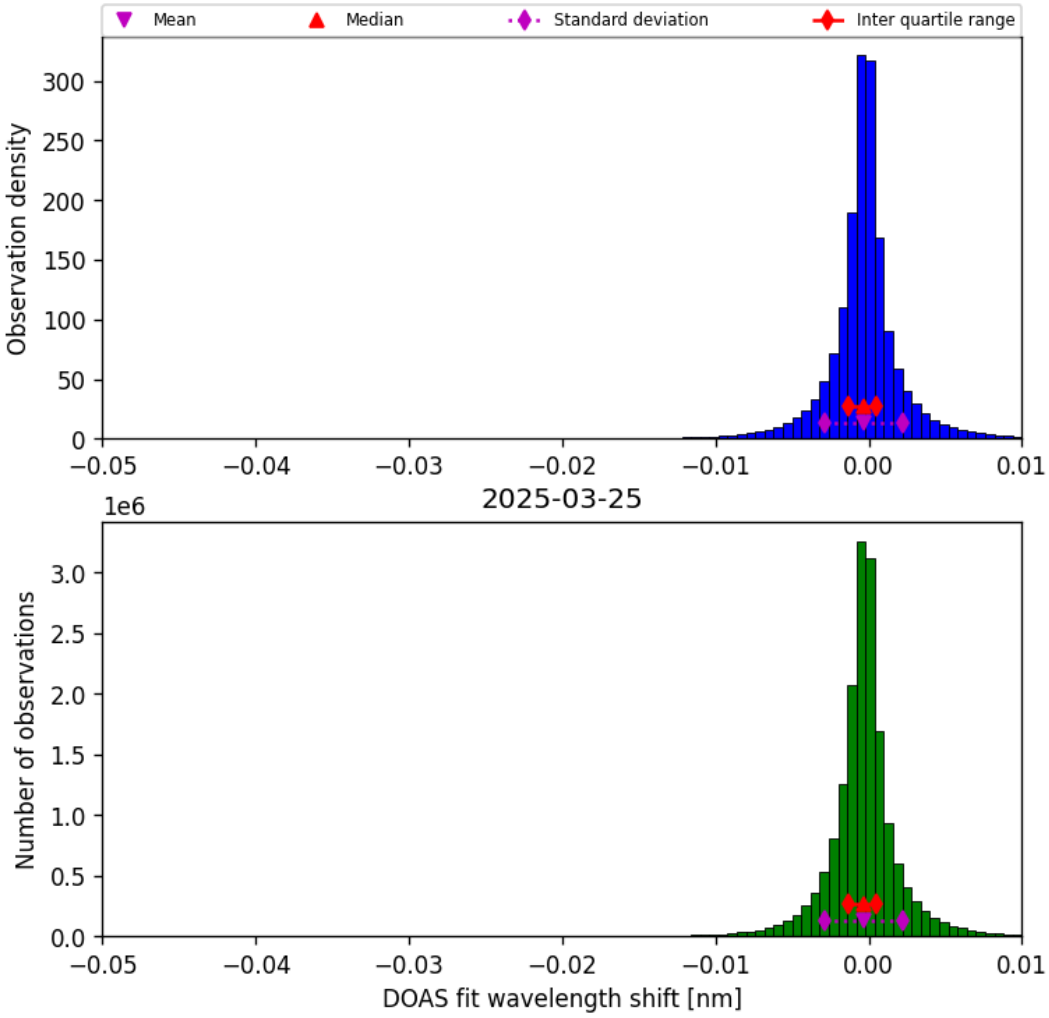

Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-03-25 to 2025-03-26

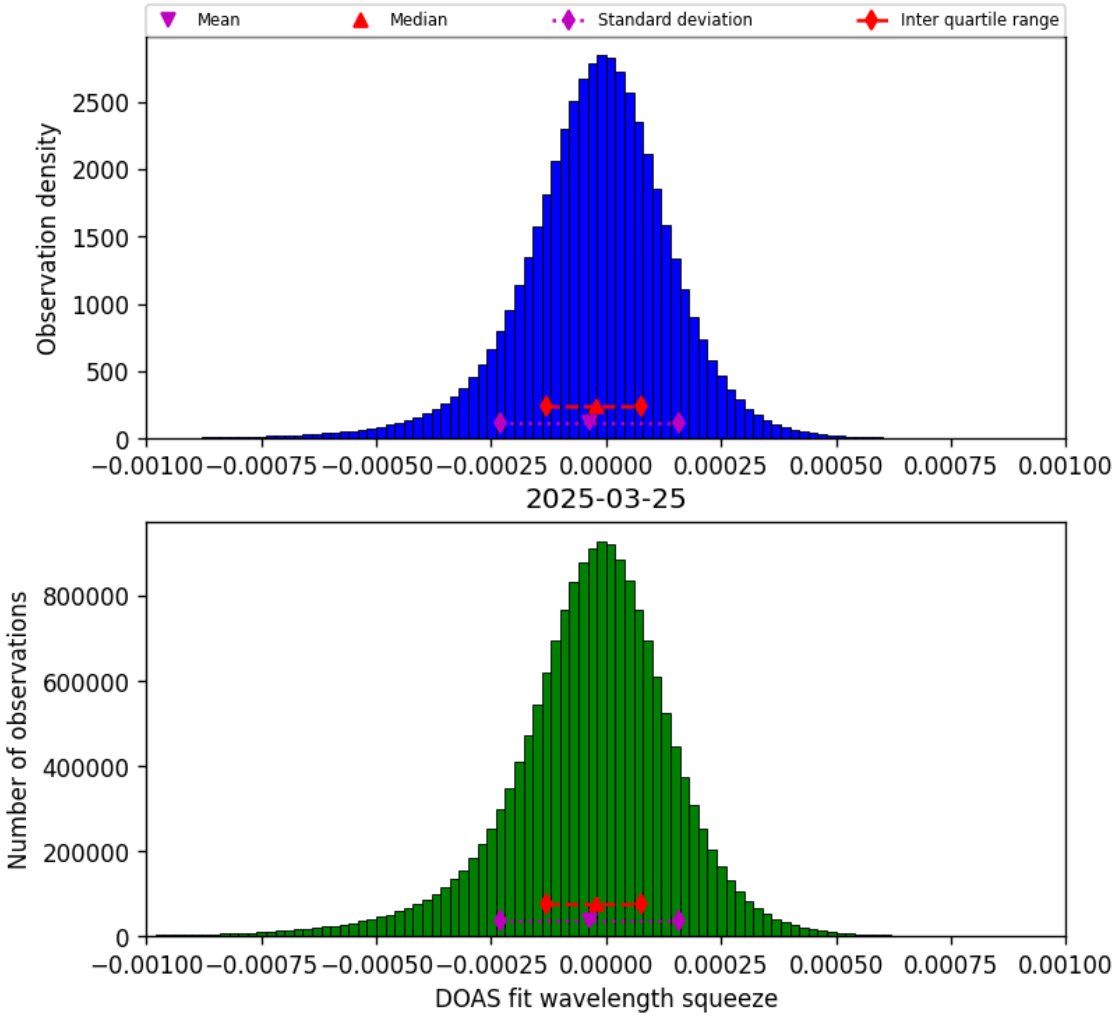

Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-03-25 to 2025-03-26

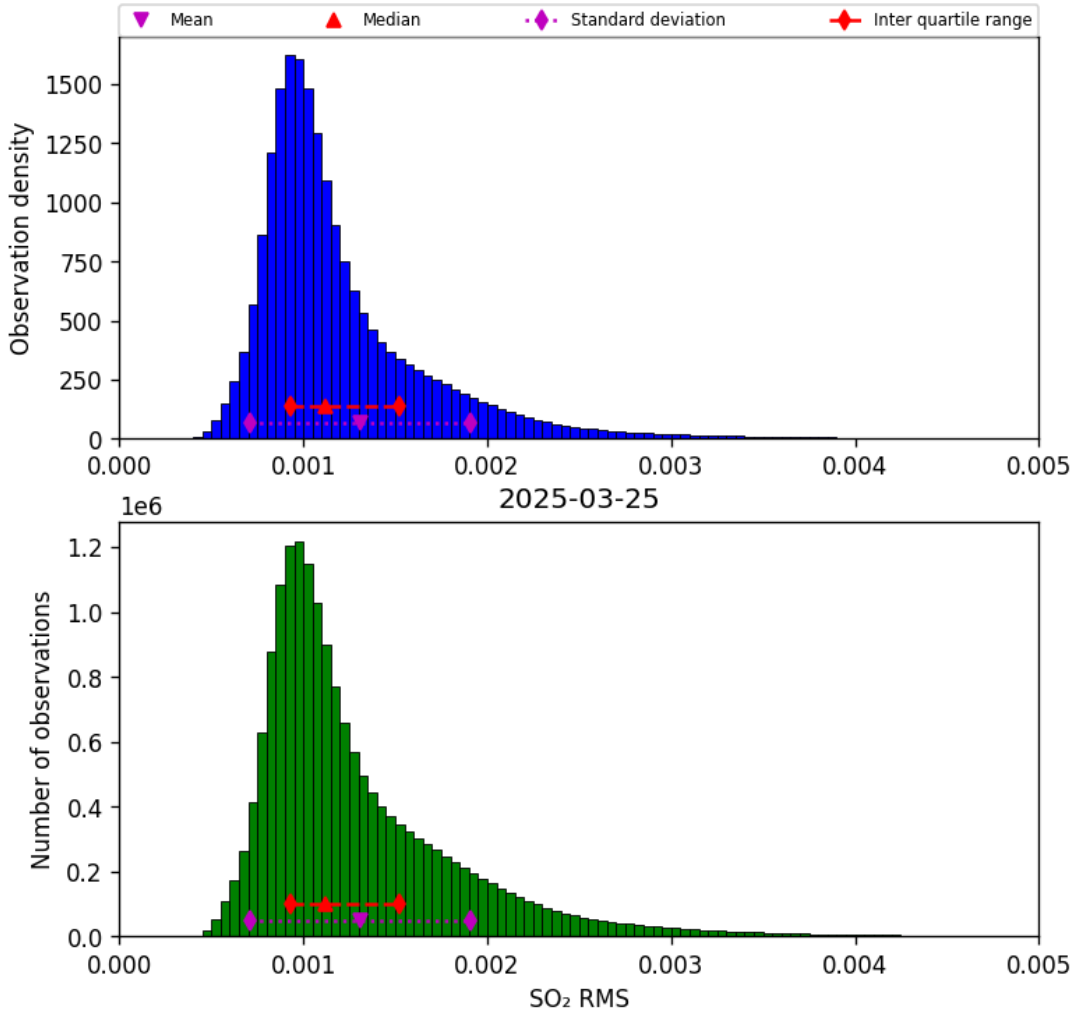

Figure 79: Histogram of "SO_2 RMS" for 2025-03-25 to 2025-03-26

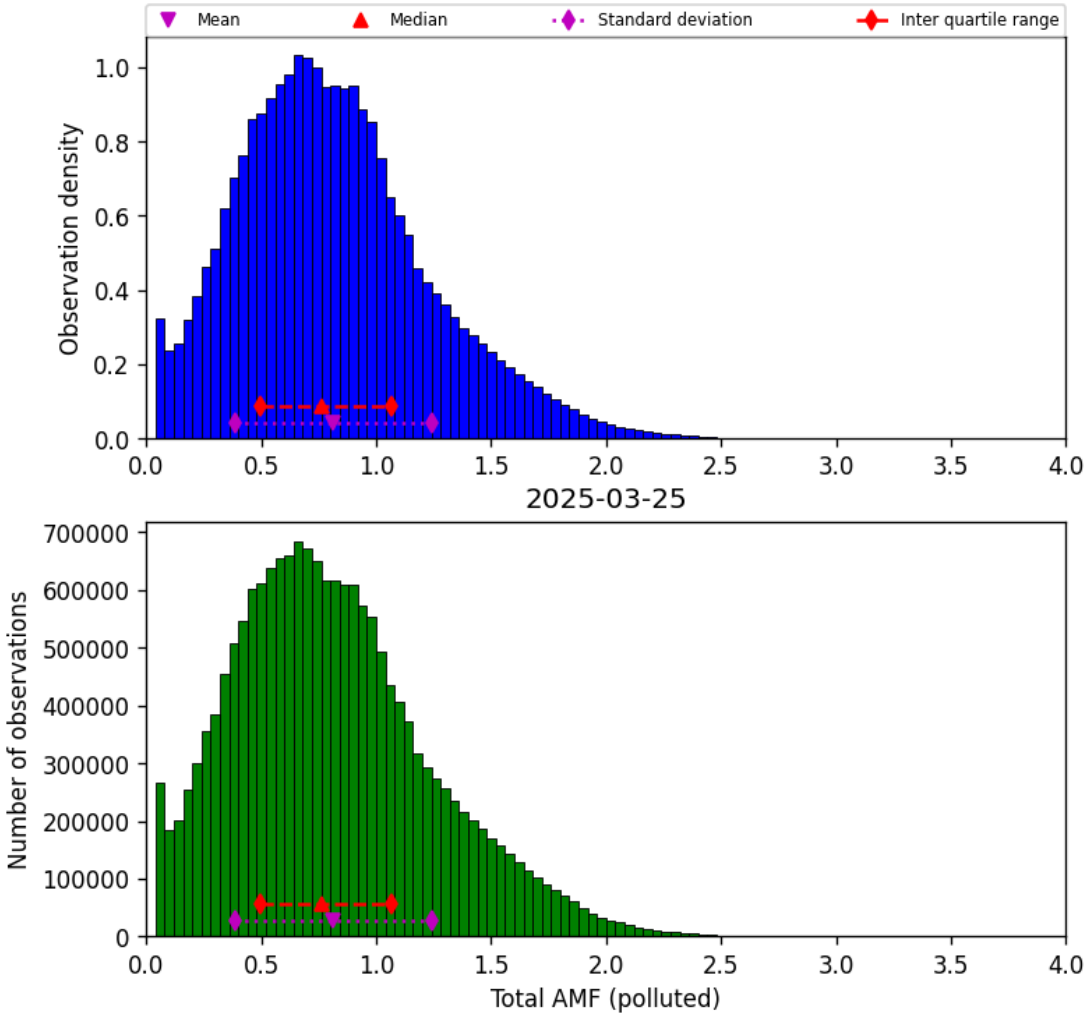

Figure 80: Histogram of “Total AMF (polluted)” for 2025-03-25 to 2025-03-26

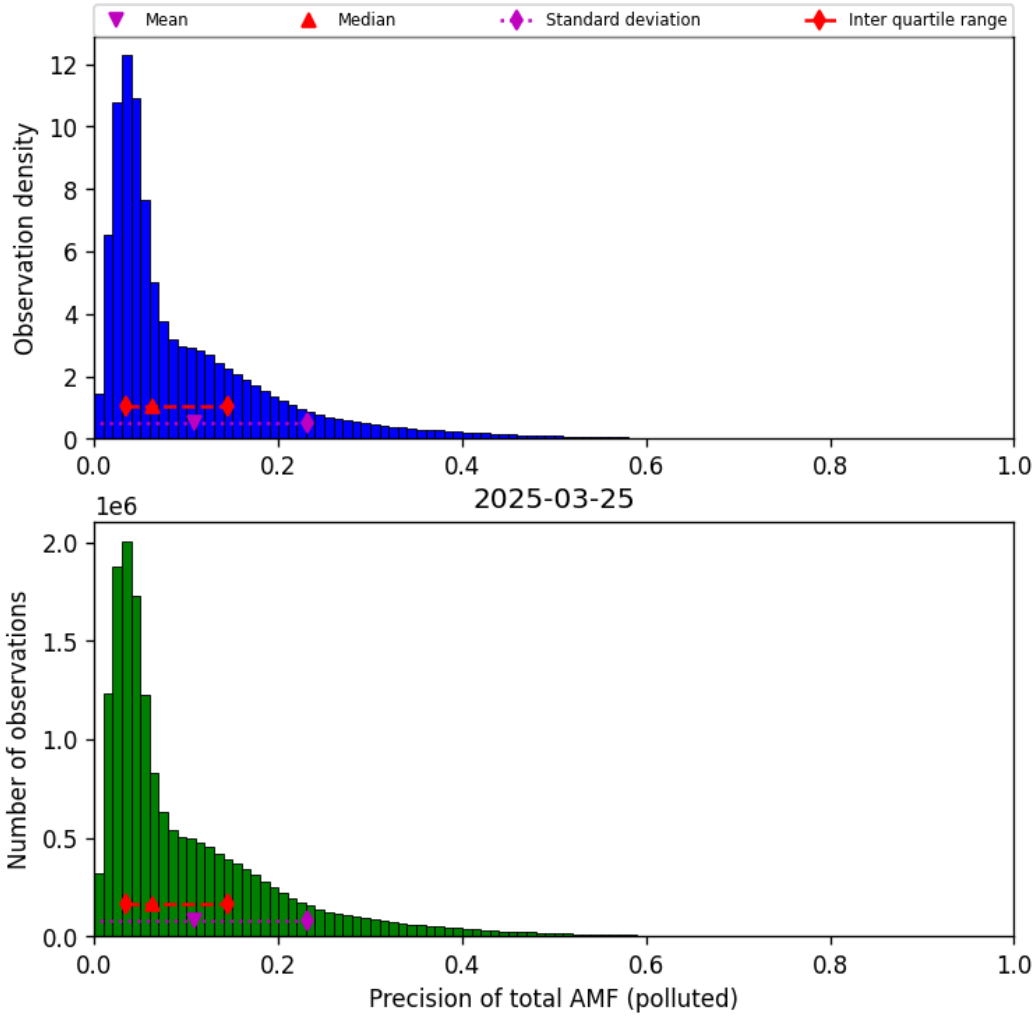

Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-03-25 to 2025-03-26

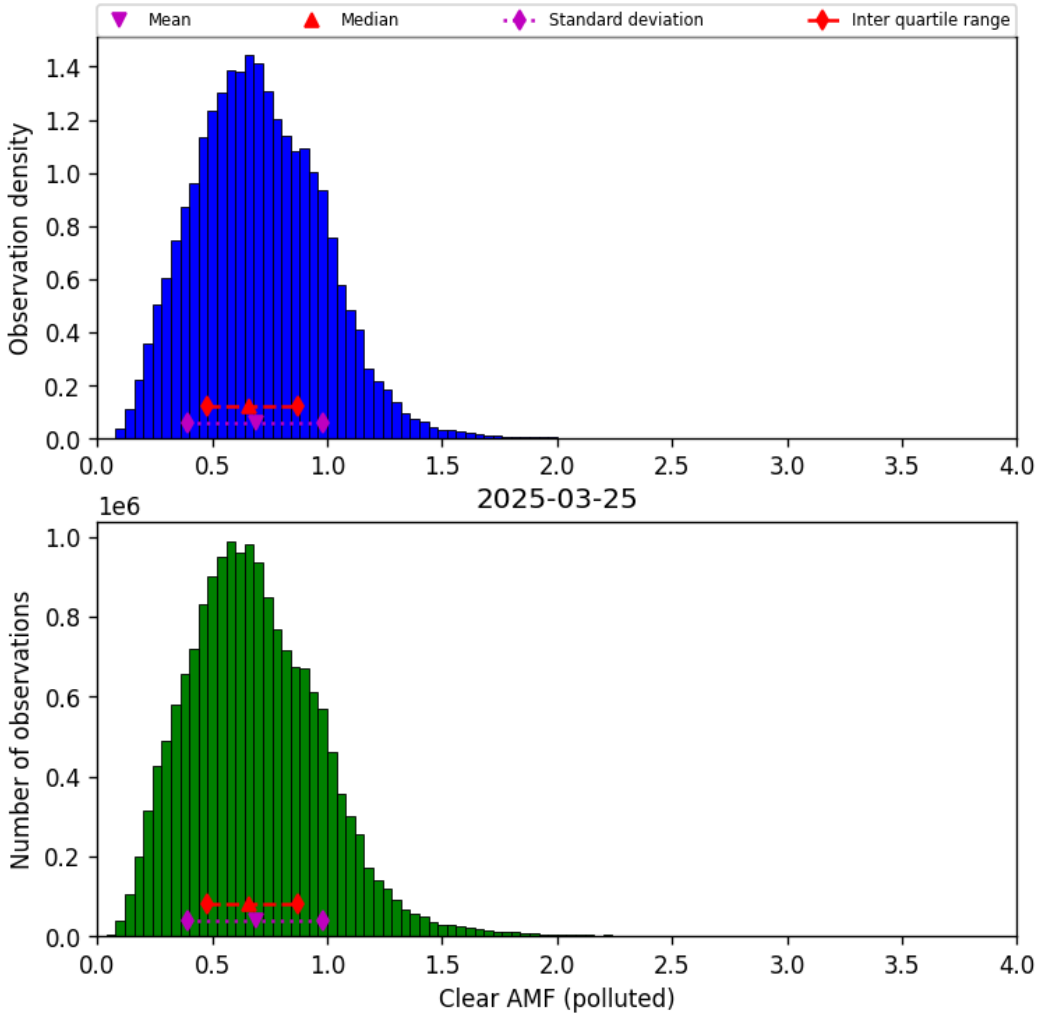

Figure 82: Histogram of “Clear AMF (polluted)” for 2025-03-25 to 2025-03-26

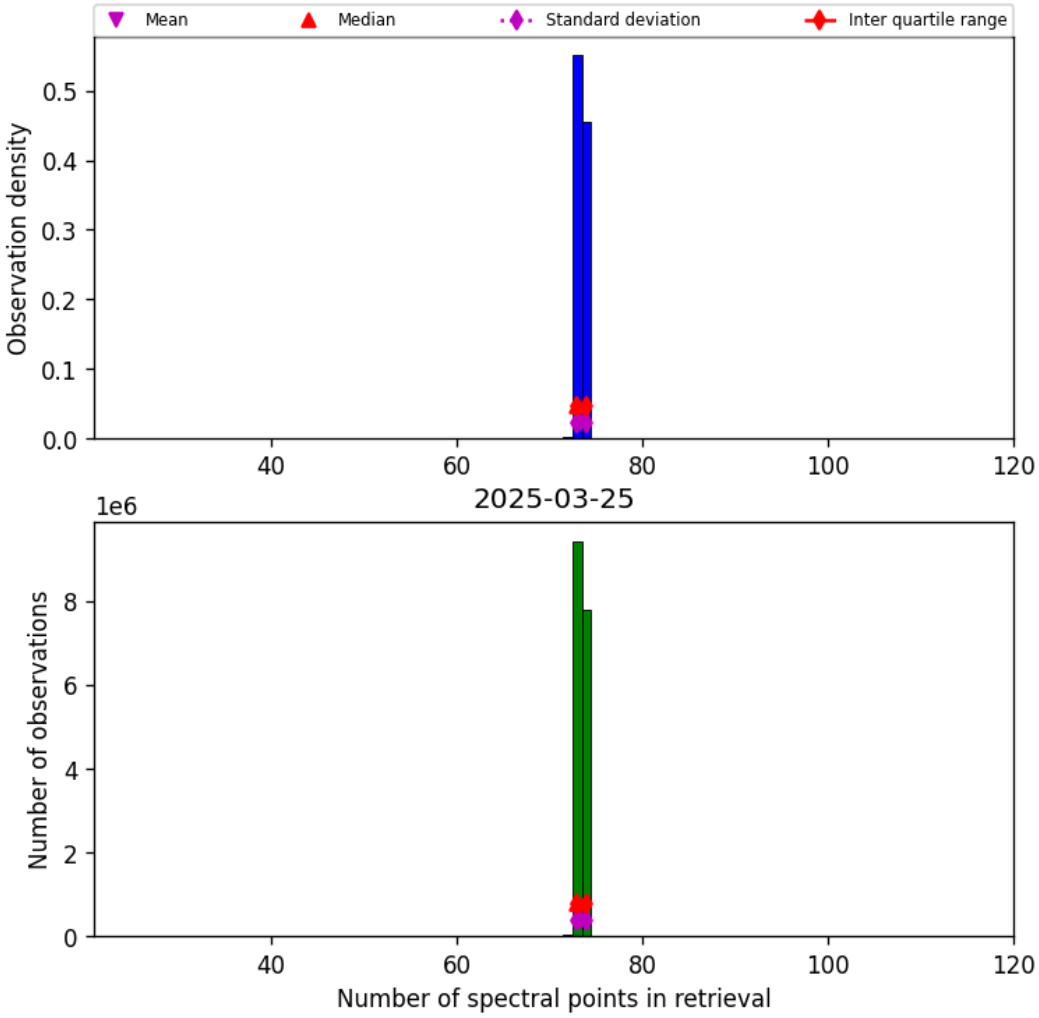

Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-03-25 to 2025-03-26

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.

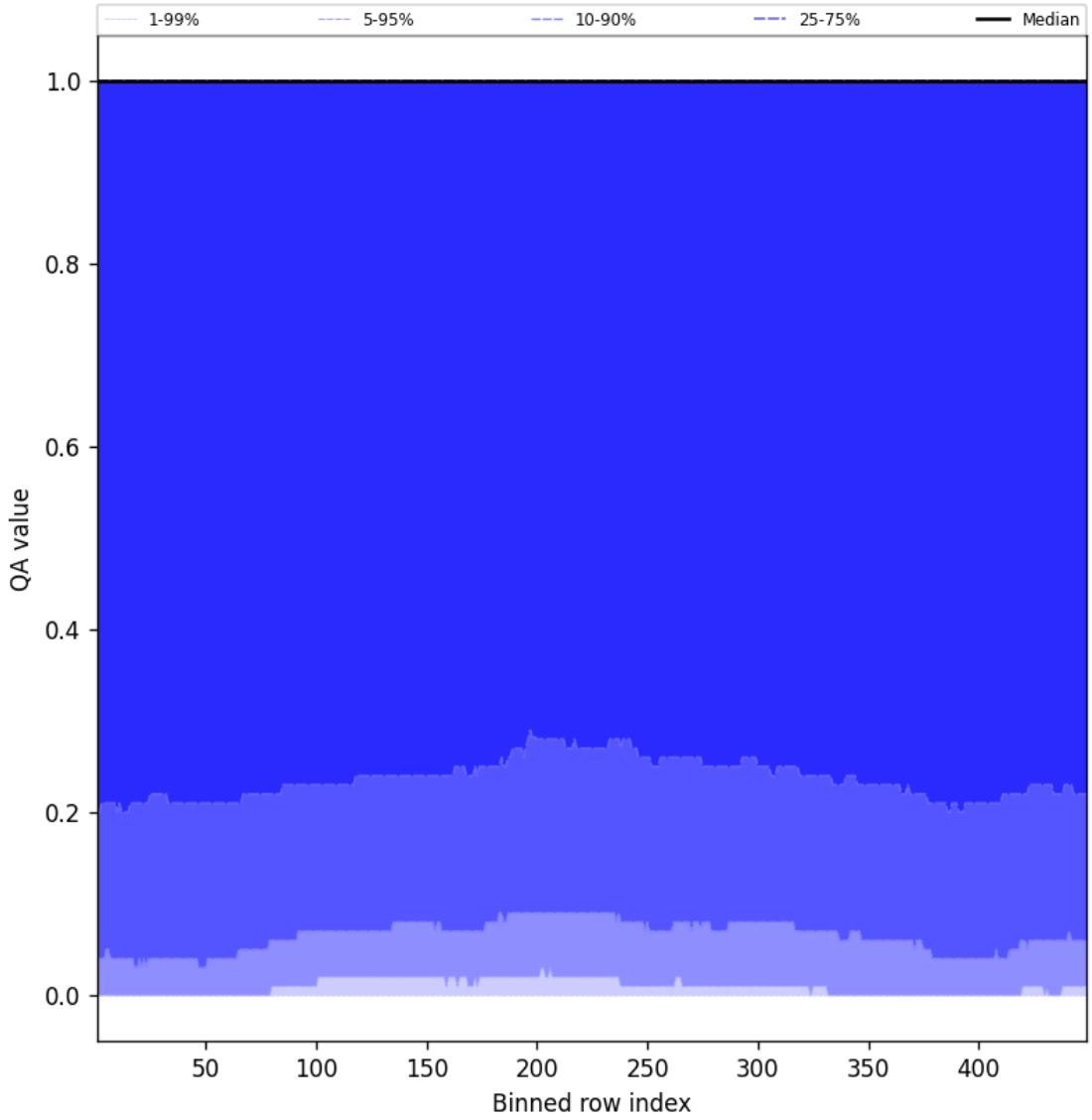

Figure 84: Along track statistics of “QA value” for 2025-03-25 to 2025-03-26

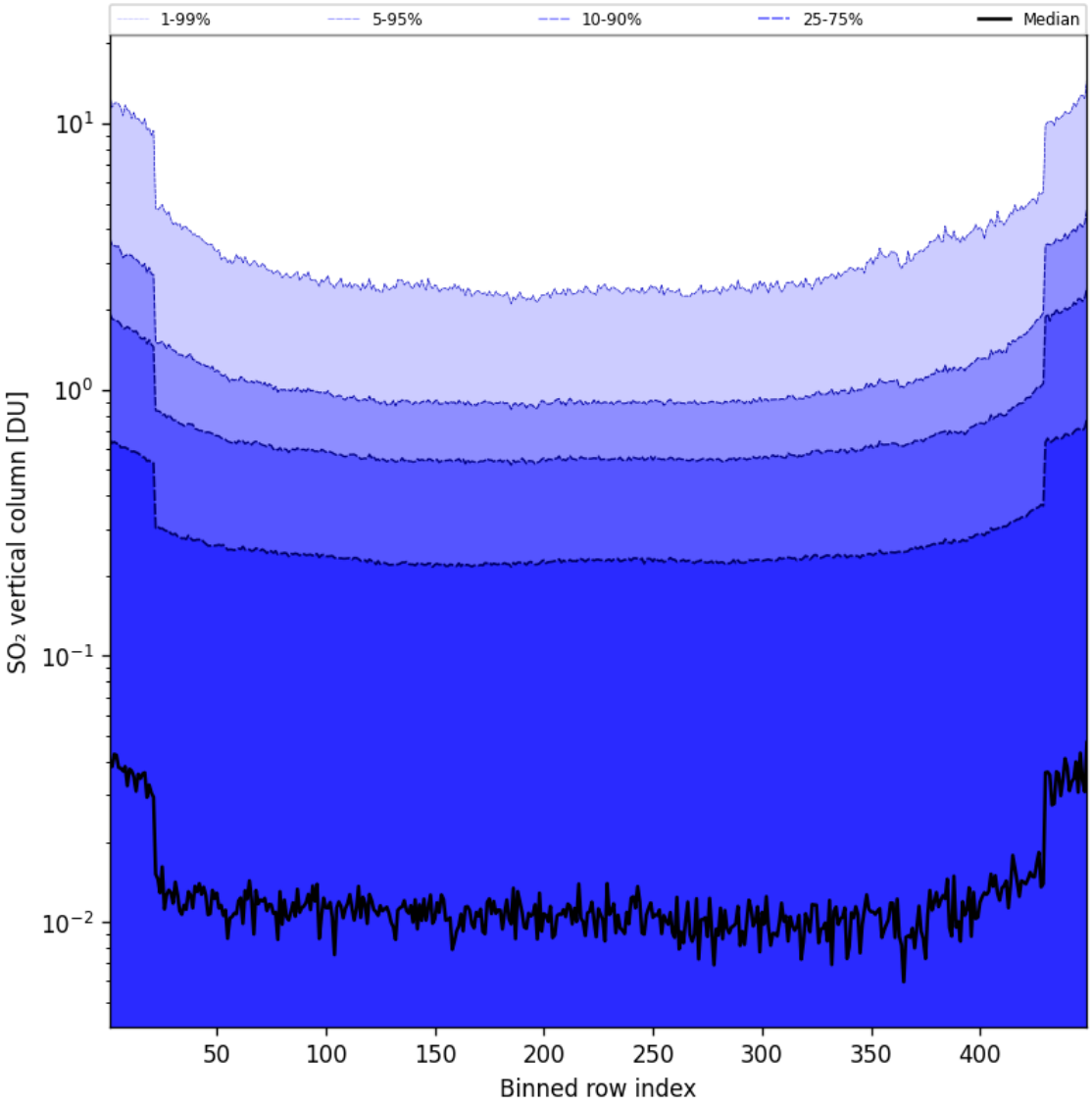

Figure 85: Along track statistics of "SO_2 vertical column" for 2025-03-25 to 2025-03-26

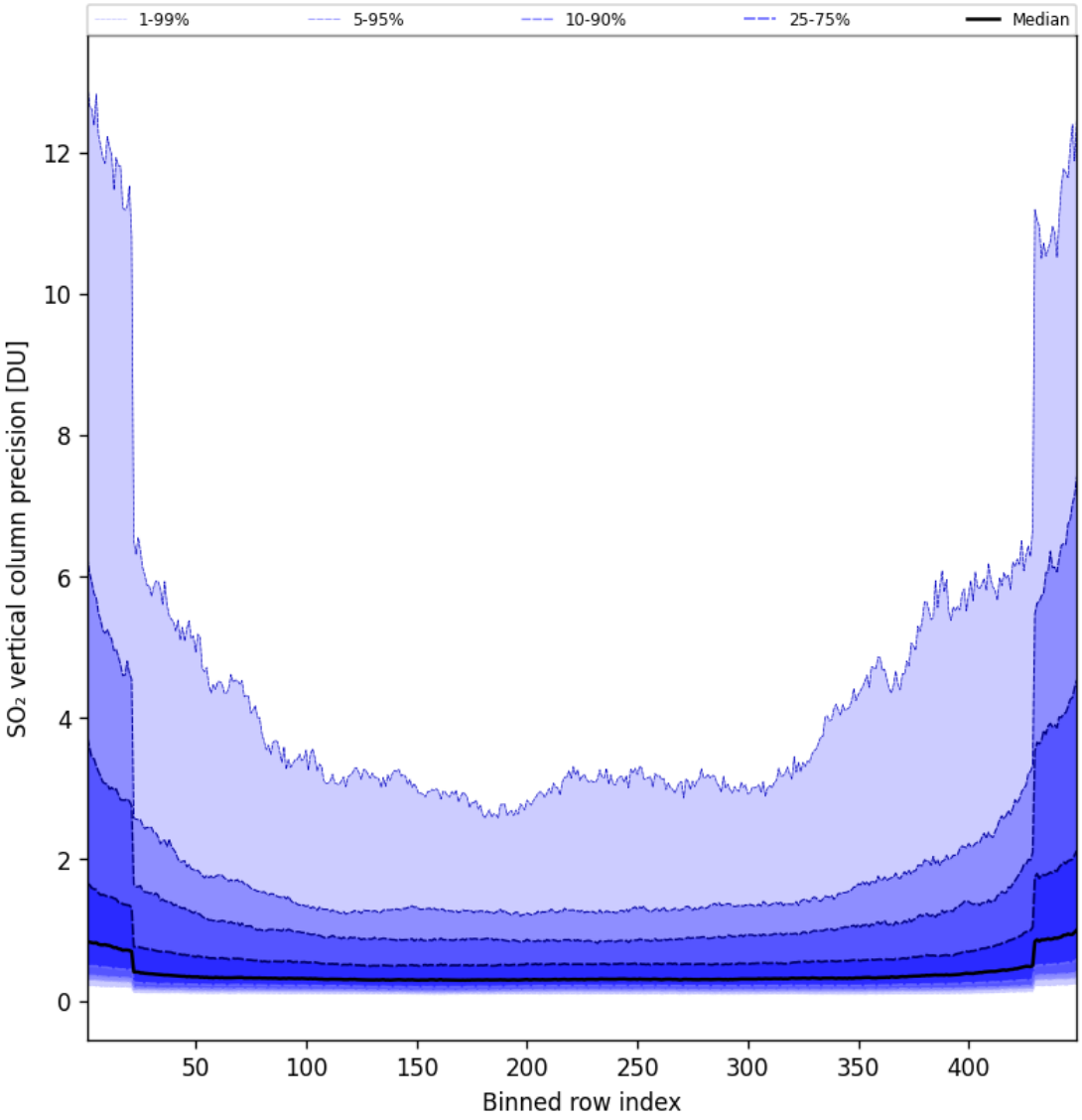

Figure 86: Along track statistics of "SO_2 vertical column precision" for 2025-03-25 to 2025-03-26

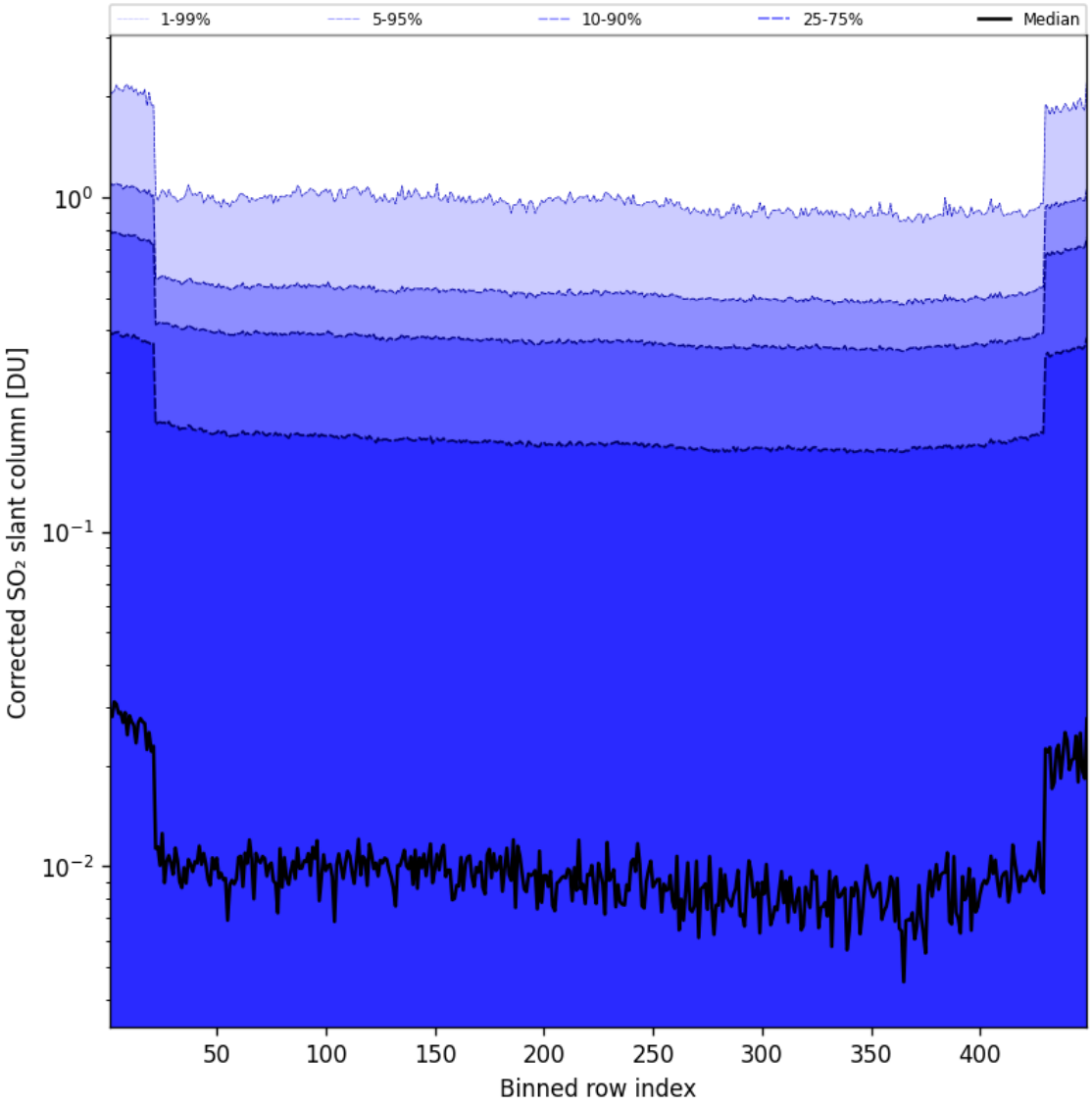

Figure 87: Along track statistics of “Corrected SO_2 slant column” for 2025-03-25 to 2025-03-26

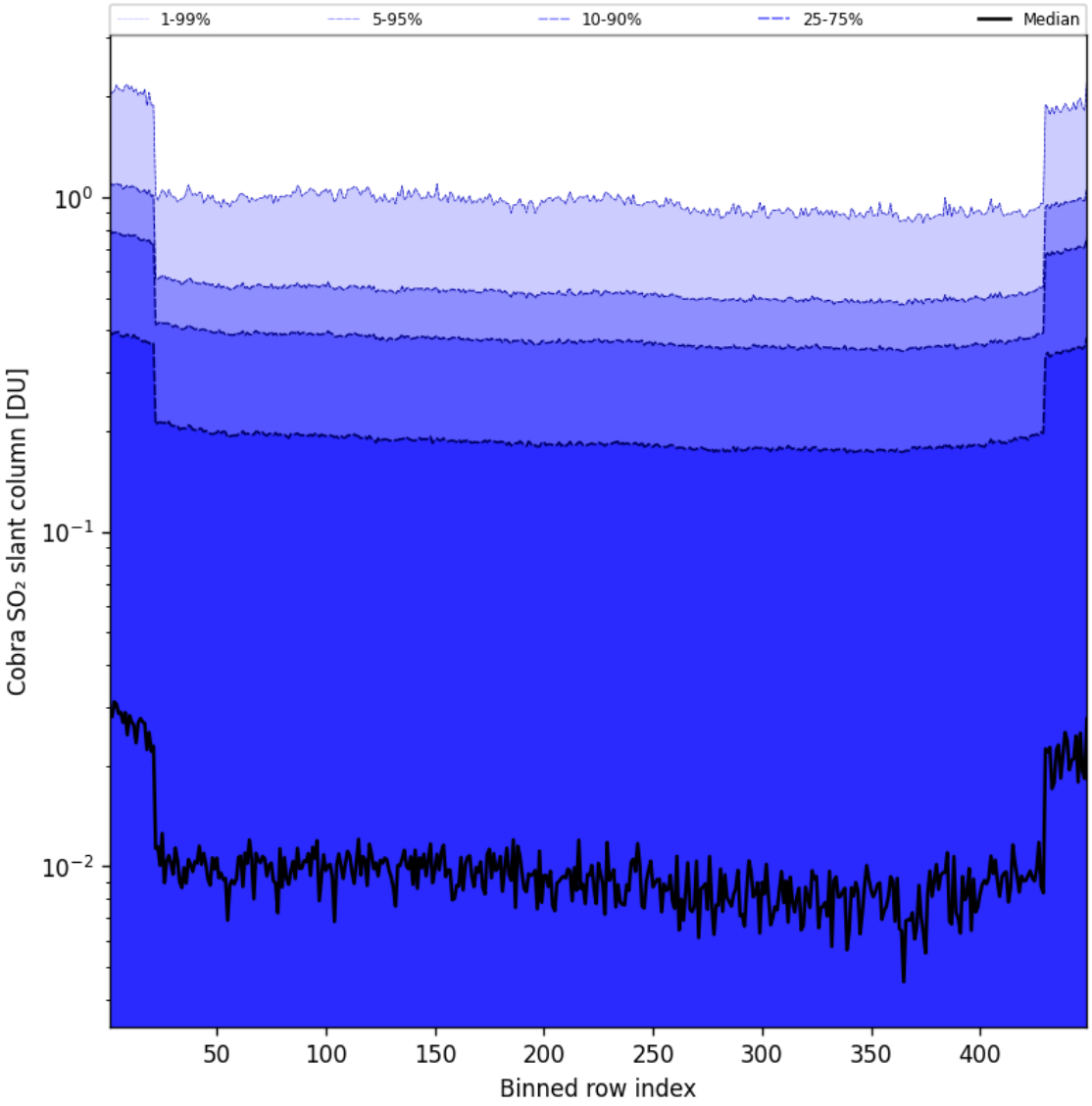

Figure 88: Along track statistics of "Cobra SO_2 slant column" for 2025-03-25 to 2025-03-26

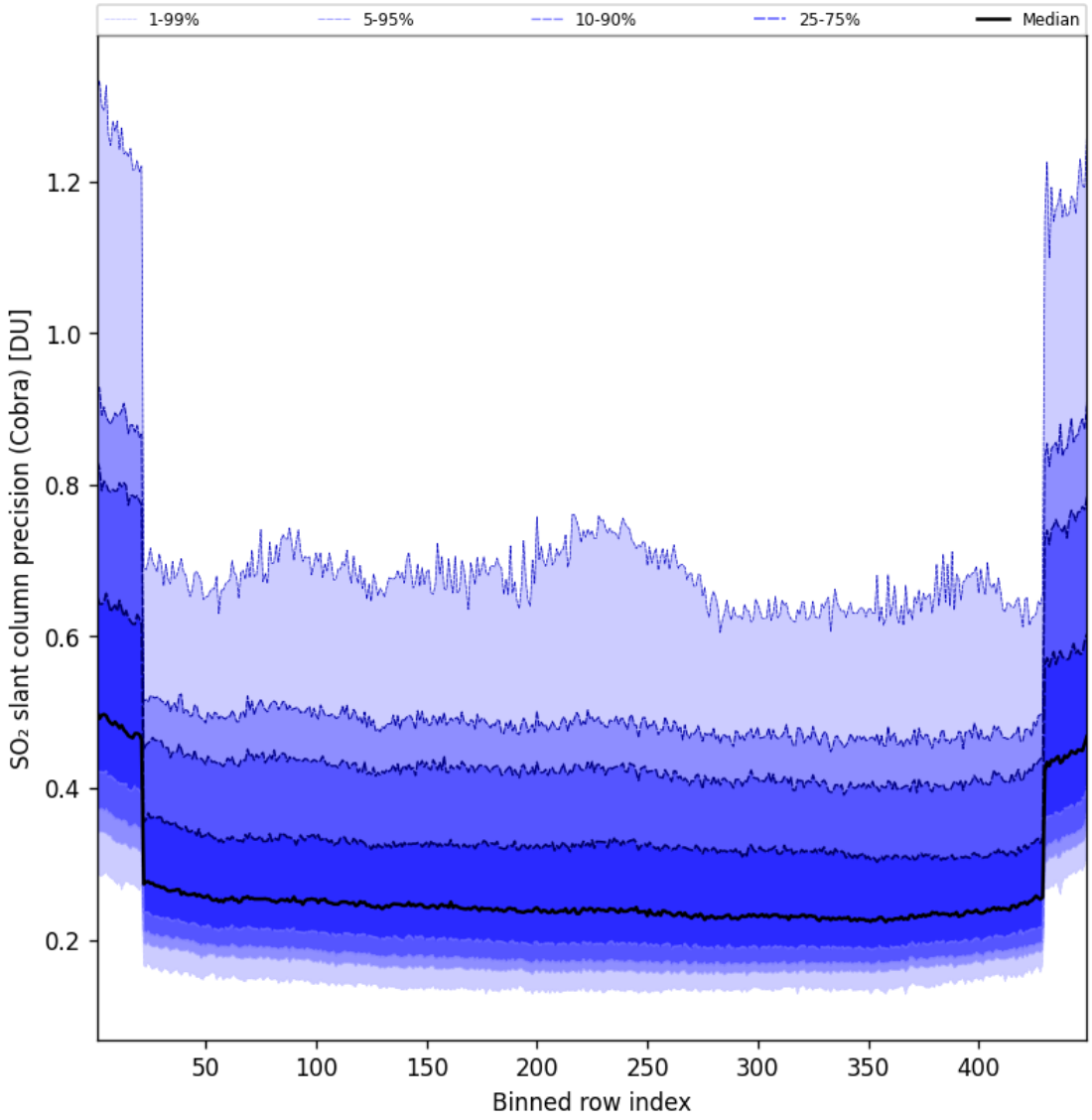

Figure 89: Along track statistics of "SO_2 slant column precision (Cobra)" for 2025-03-25 to 2025-03-26

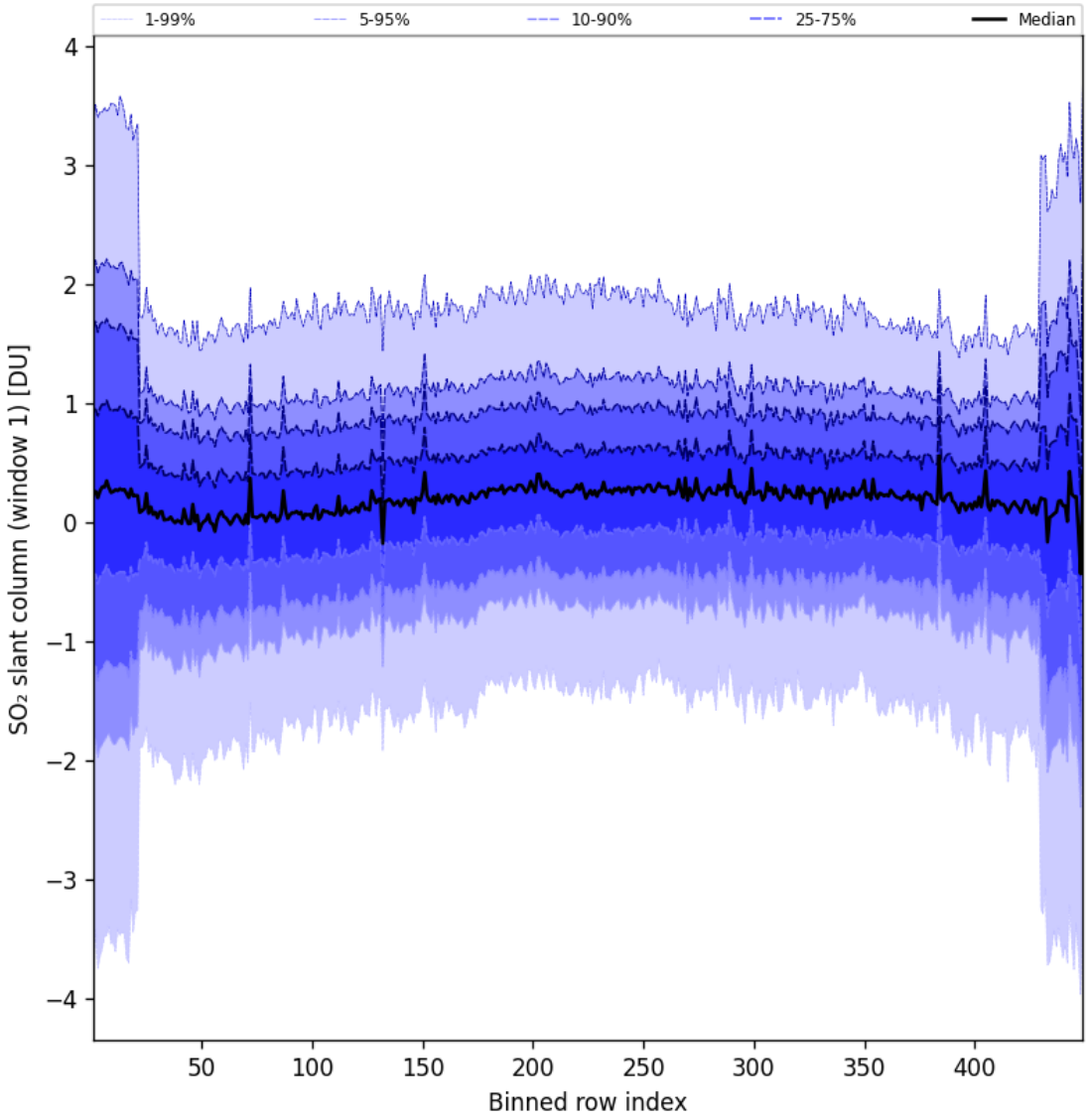

Figure 90: Along track statistics of "SO_2 slant column (window 1)" for 2025-03-25 to 2025-03-26

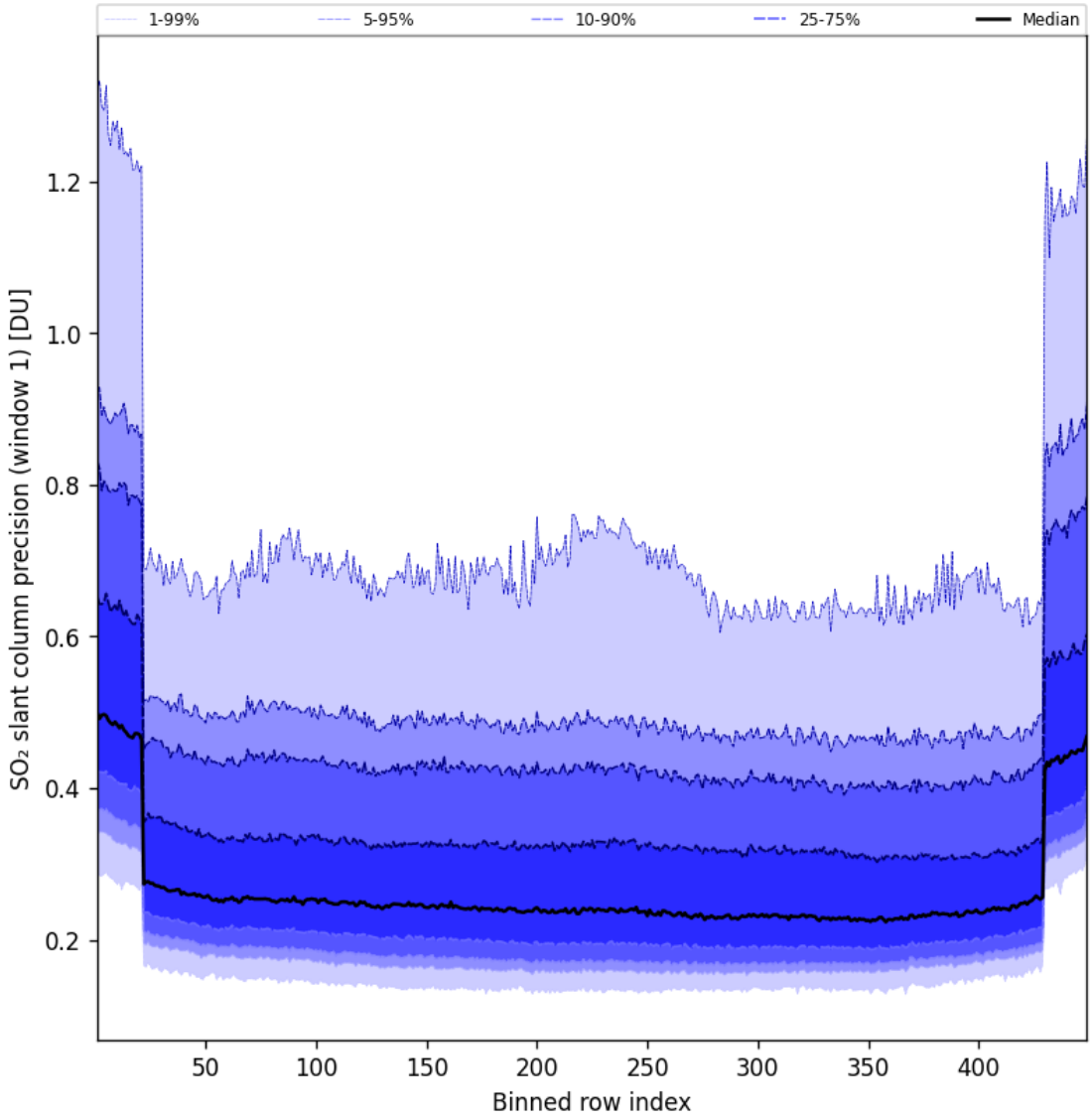

Figure 91: Along track statistics of "SO_2 slant column precision (window 1)" for 2025-03-25 to 2025-03-26

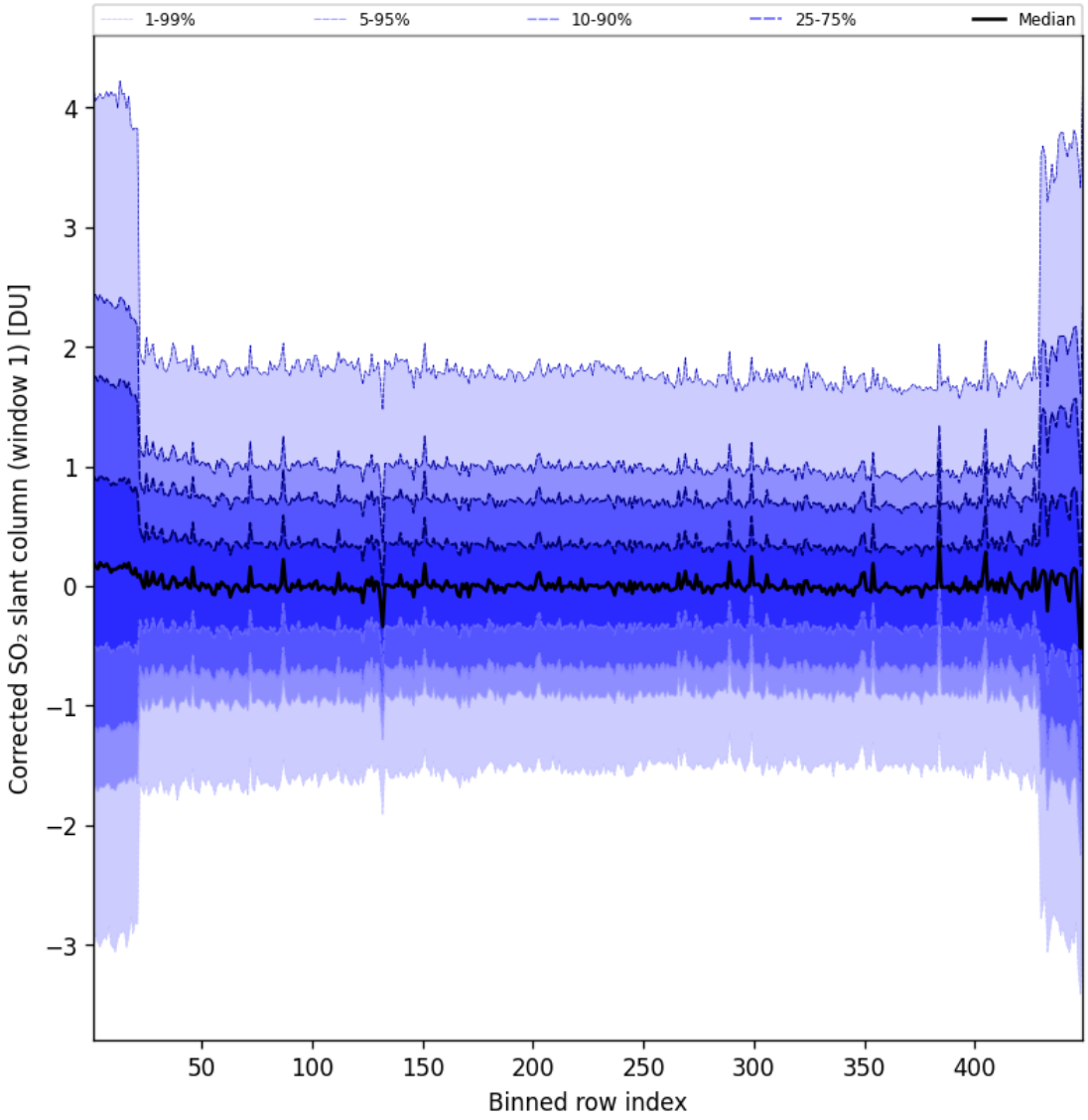

Figure 92: Along track statistics of “Corrected SO_2 slant column (window 1)” for 2025-03-25 to 2025-03-26

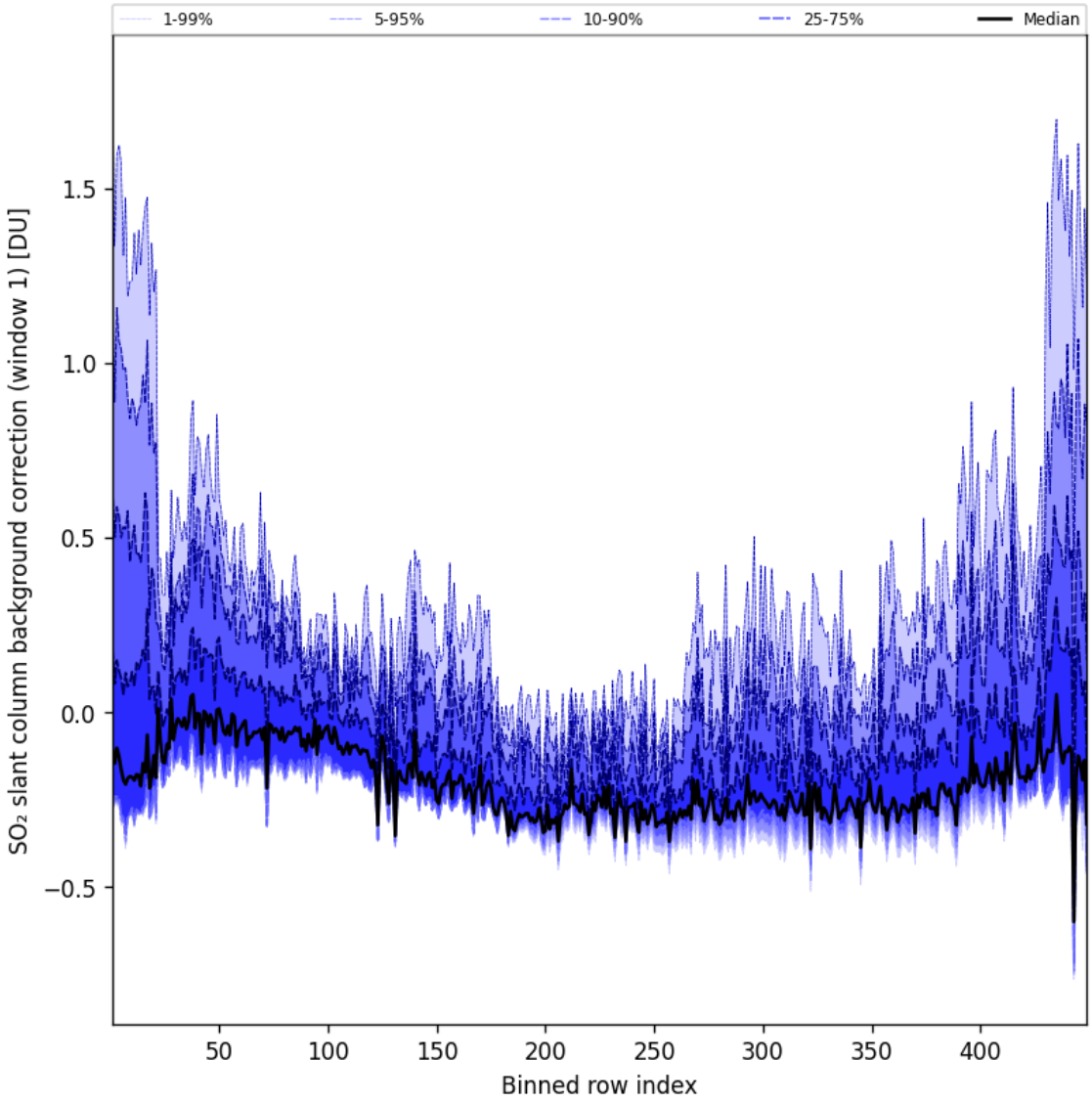

Figure 93: Along track statistics of "SO_2 slant column background correction (window 1)" for 2025-03-25 to 2025-03-26

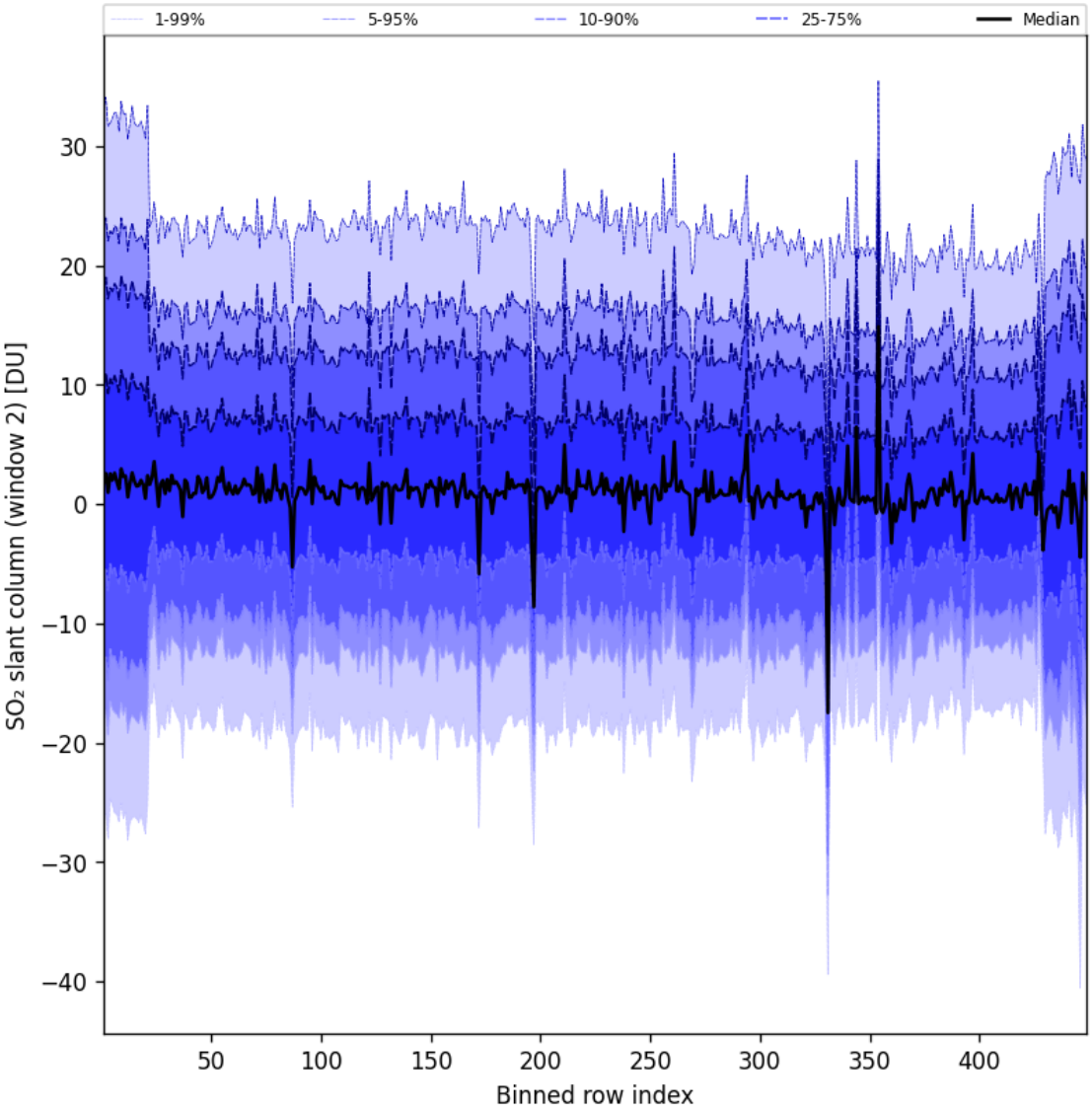

Figure 94: Along track statistics of "SO_2 slant column (window 2)" for 2025-03-25 to 2025-03-26

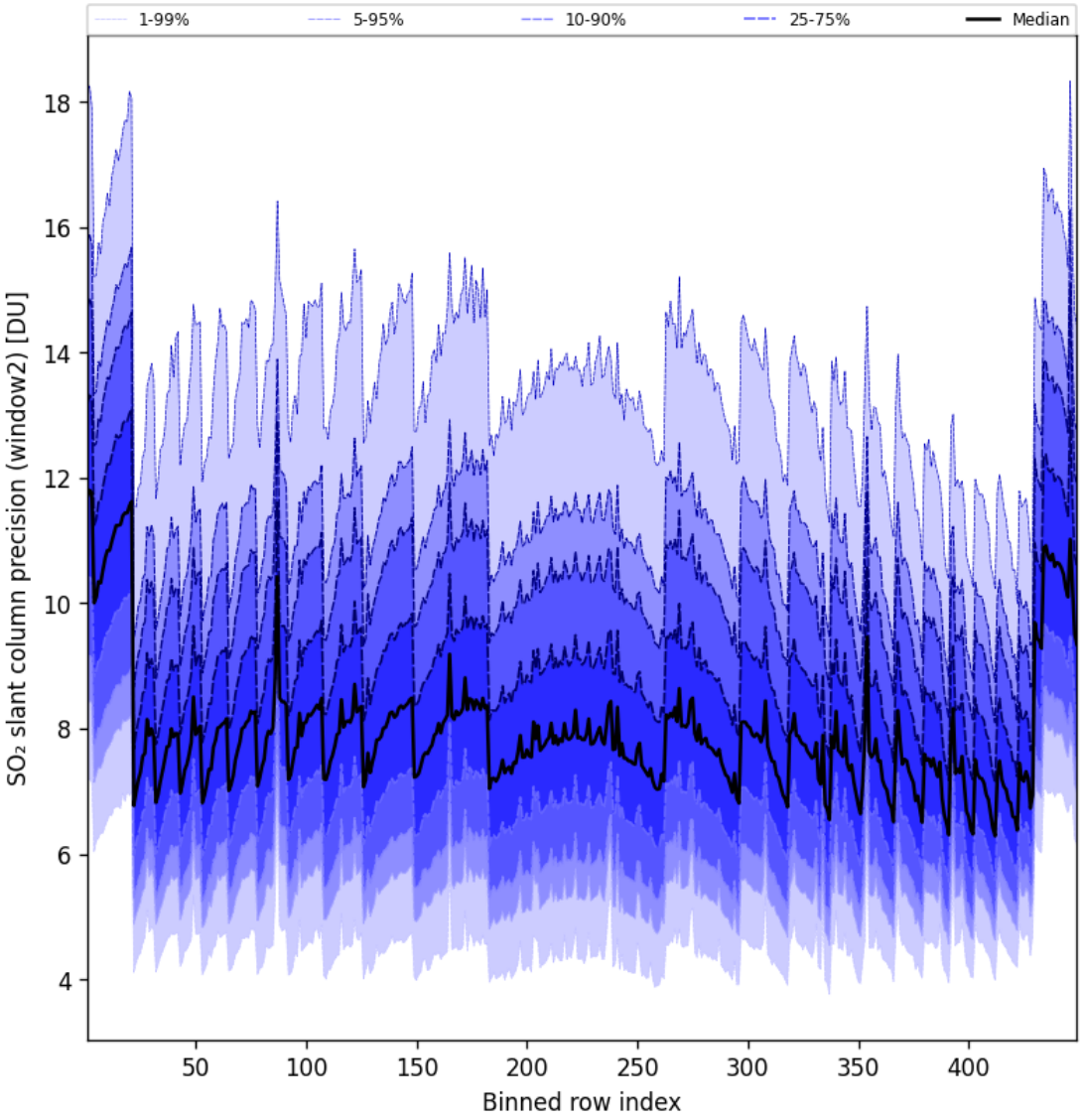

Figure 95: Along track statistics of "SO_2 slant column precision (window2)" for 2025-03-25 to 2025-03-26

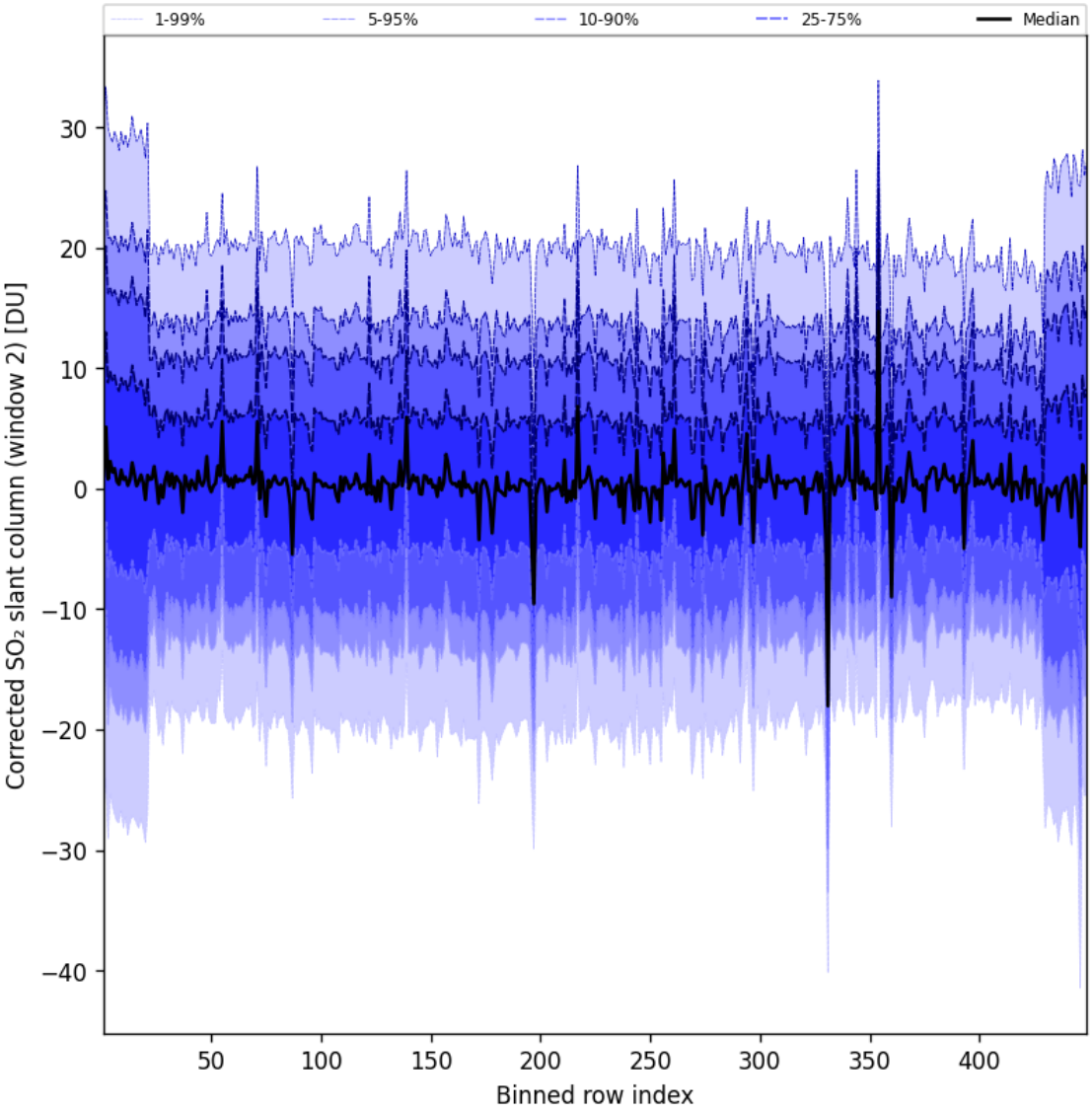

Figure 96: Along track statistics of “Corrected SO_2 slant column (window 2)” for 2025-03-25 to 2025-03-26

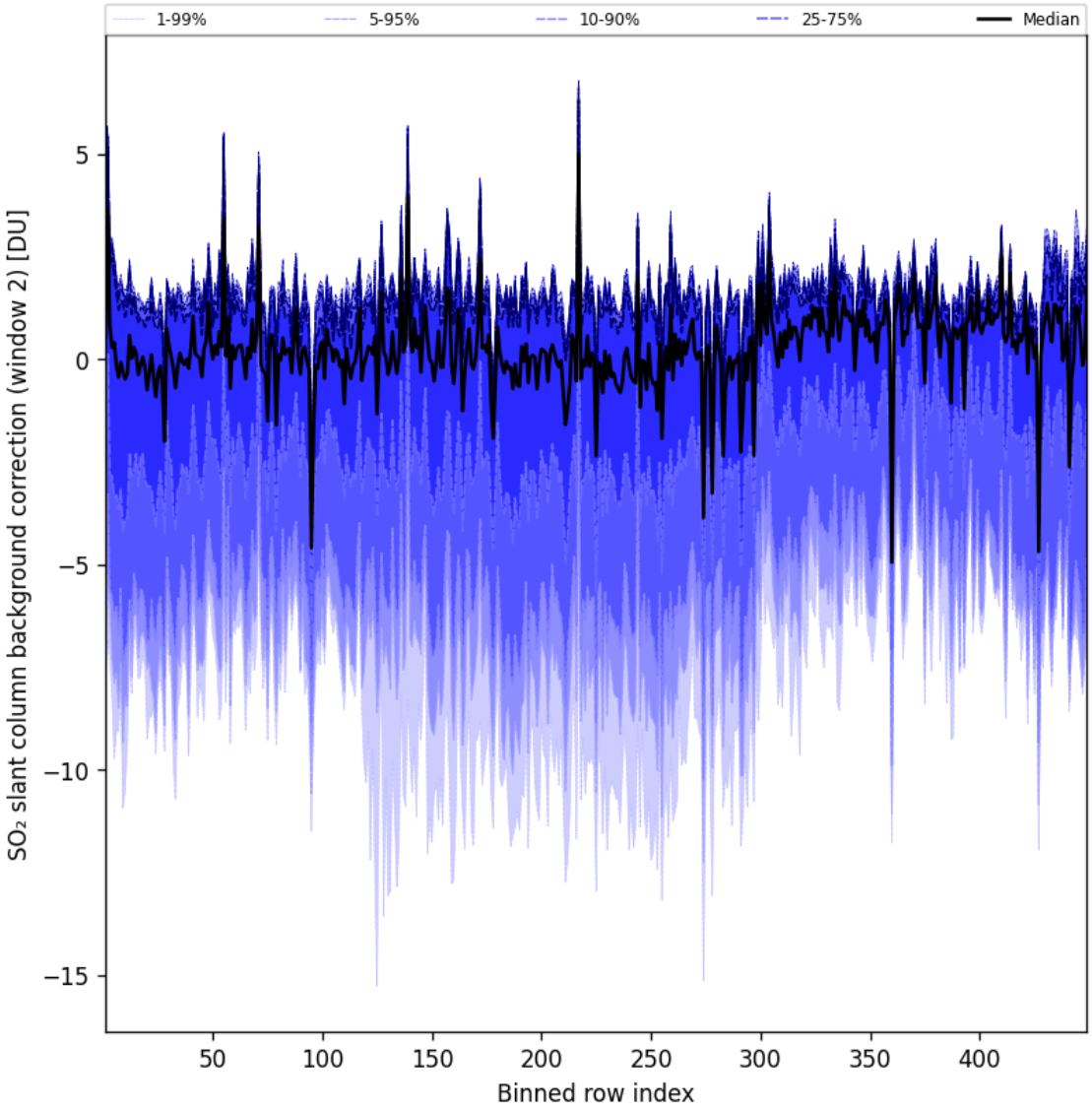

Figure 97: Along track statistics of "SO_2 slant column background correction (window 2)" for 2025-03-25 to 2025-03-26

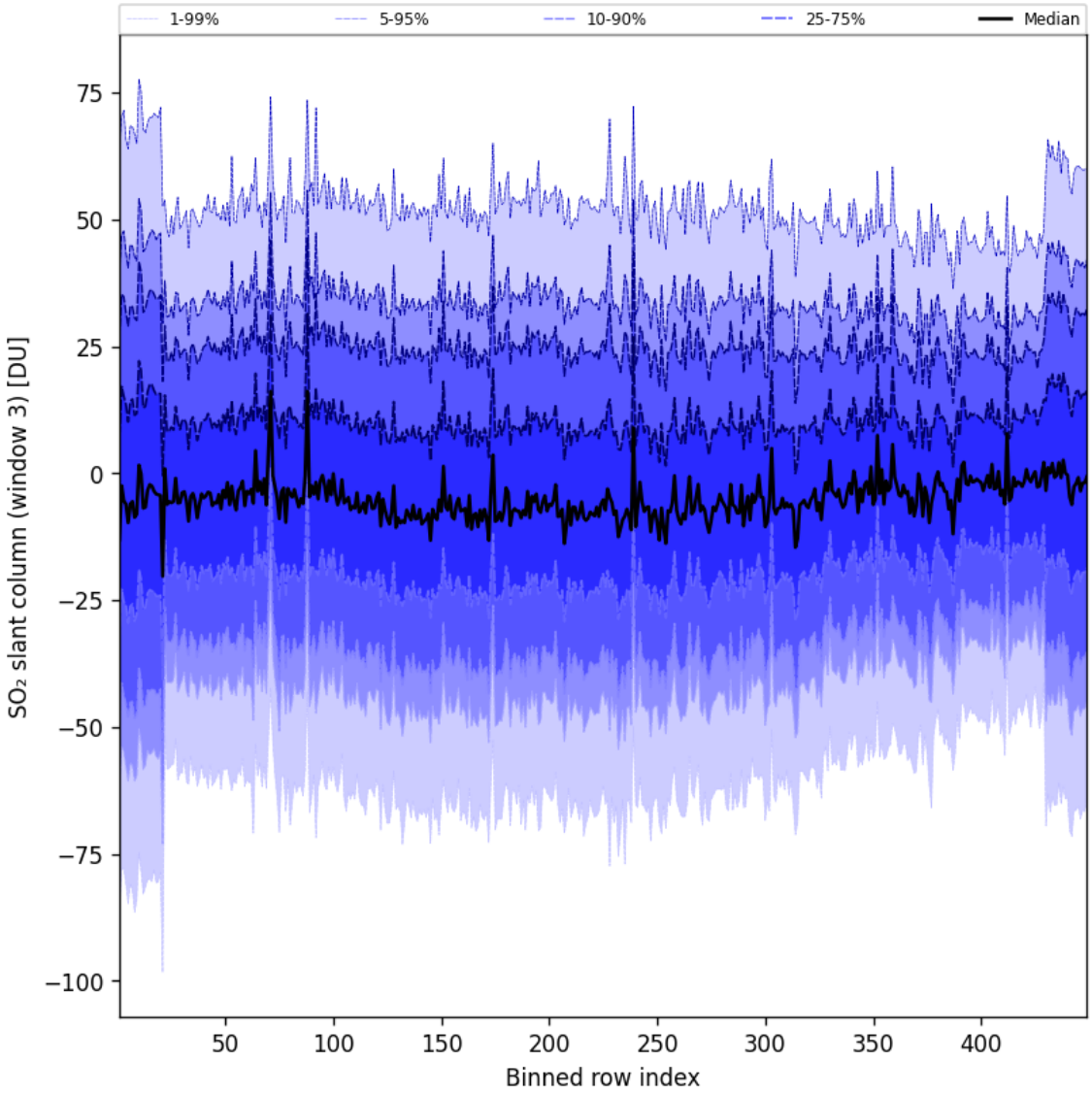

Figure 98: Along track statistics of "SO_2 slant column (window 3)" for 2025-03-25 to 2025-03-26

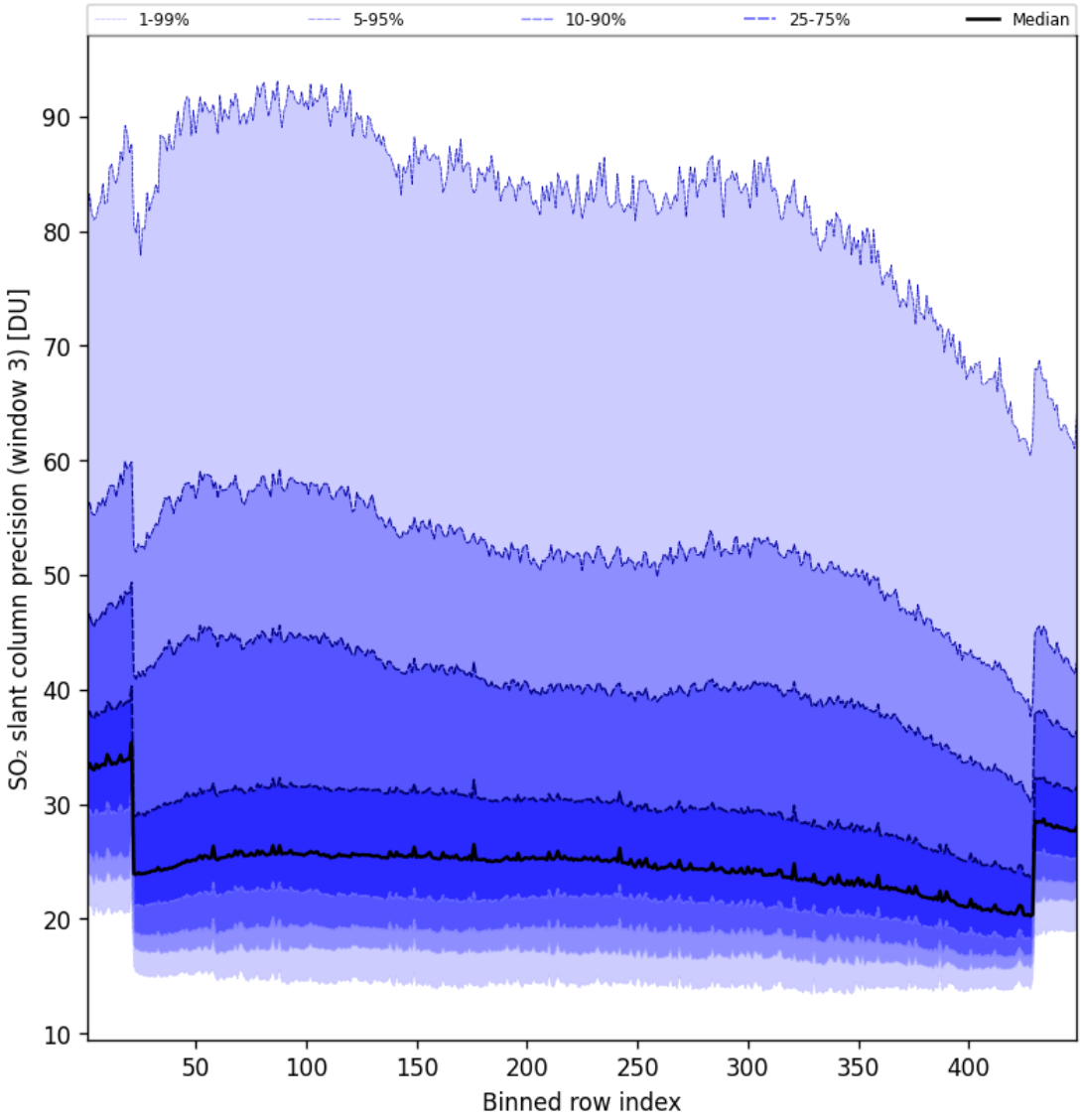

Figure 99: Along track statistics of "SO_2 slant column precision (window 3)" for 2025-03-25 to 2025-03-26

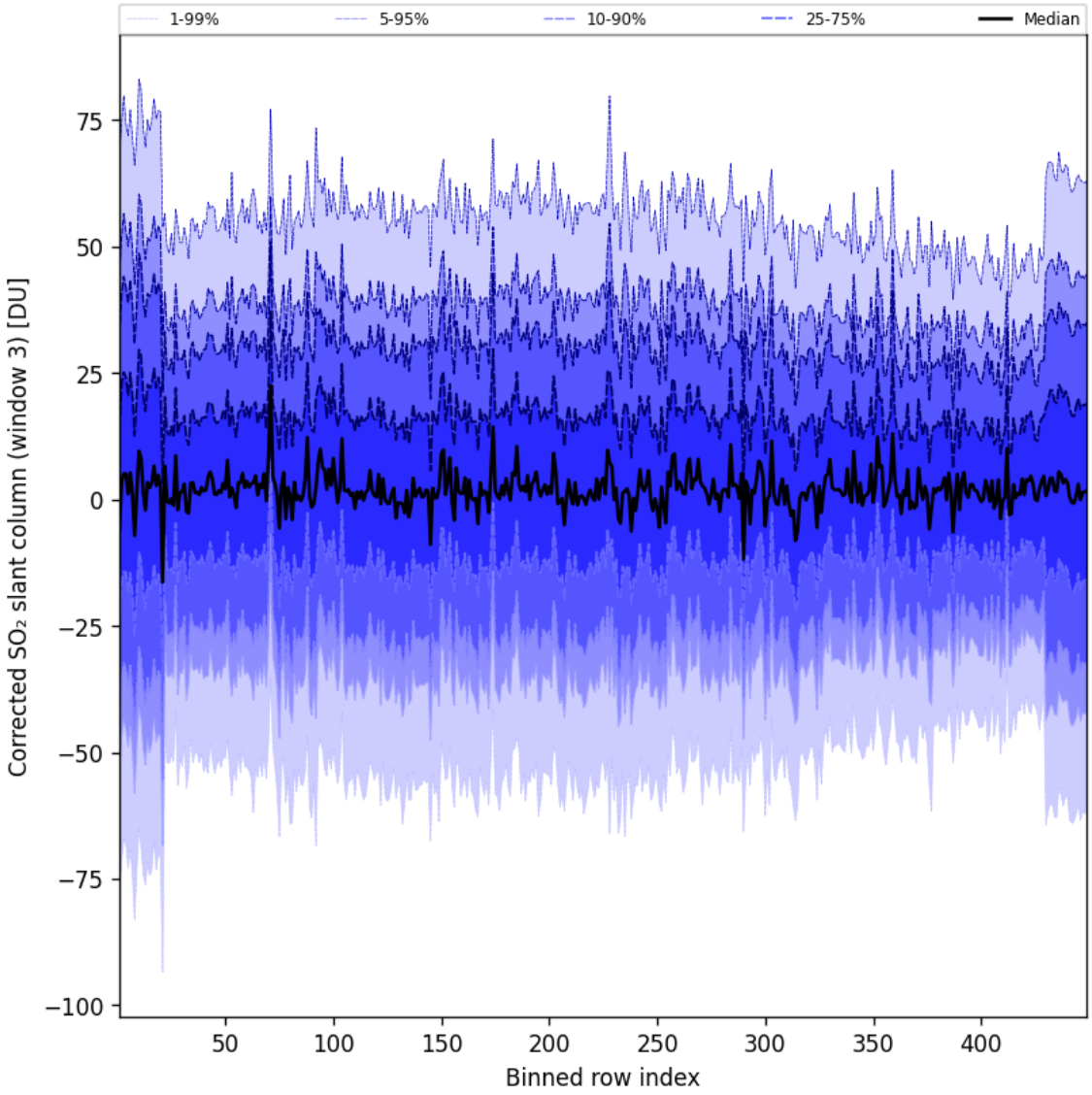

Figure 100: Along track statistics of “Corrected SO_2 slant column (window 3)” for 2025-03-25 to 2025-03-26

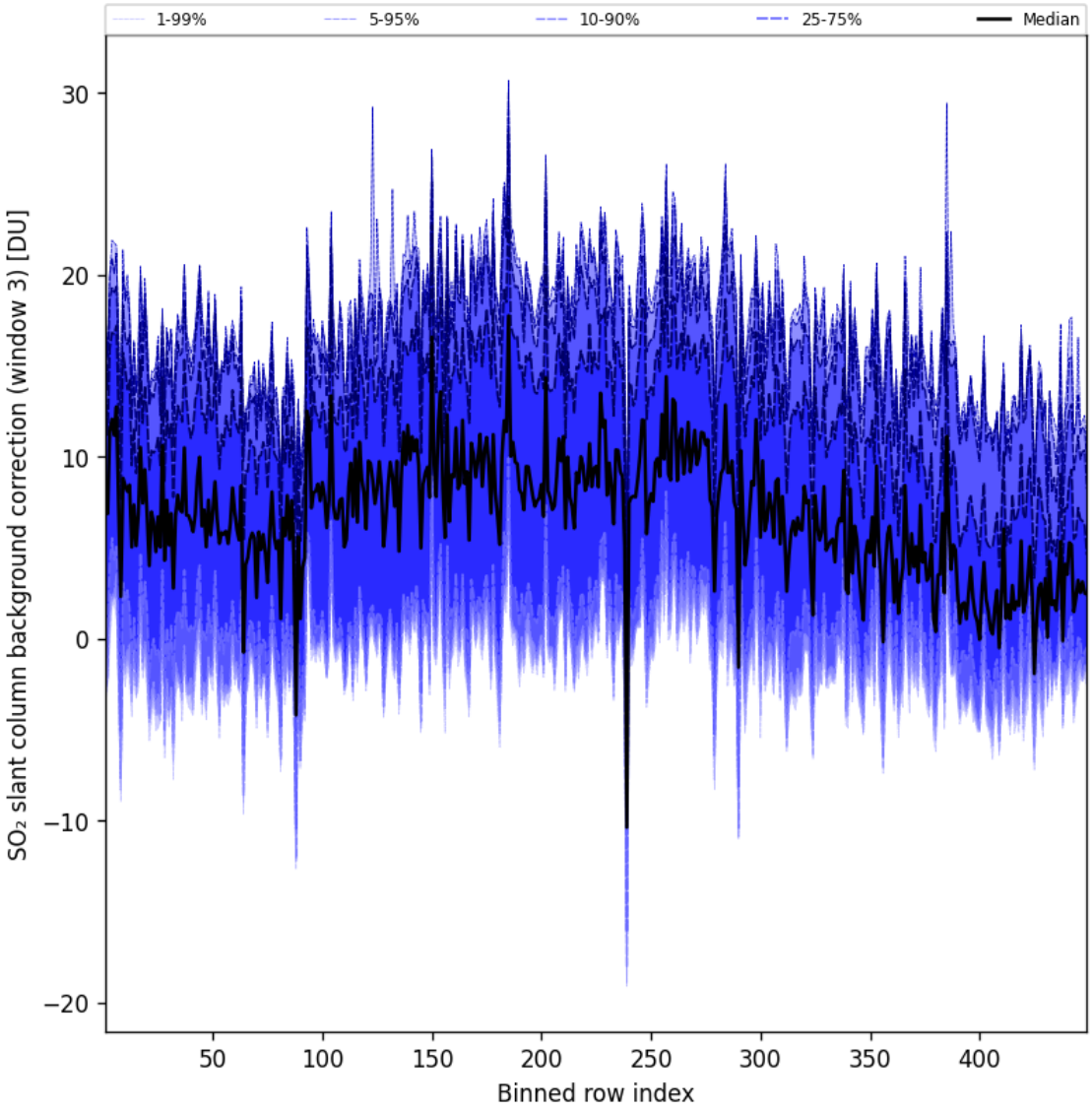

Figure 101: Along track statistics of "SO_2 slant column background correction (window 3)" for 2025-03-25 to 2025-03-26

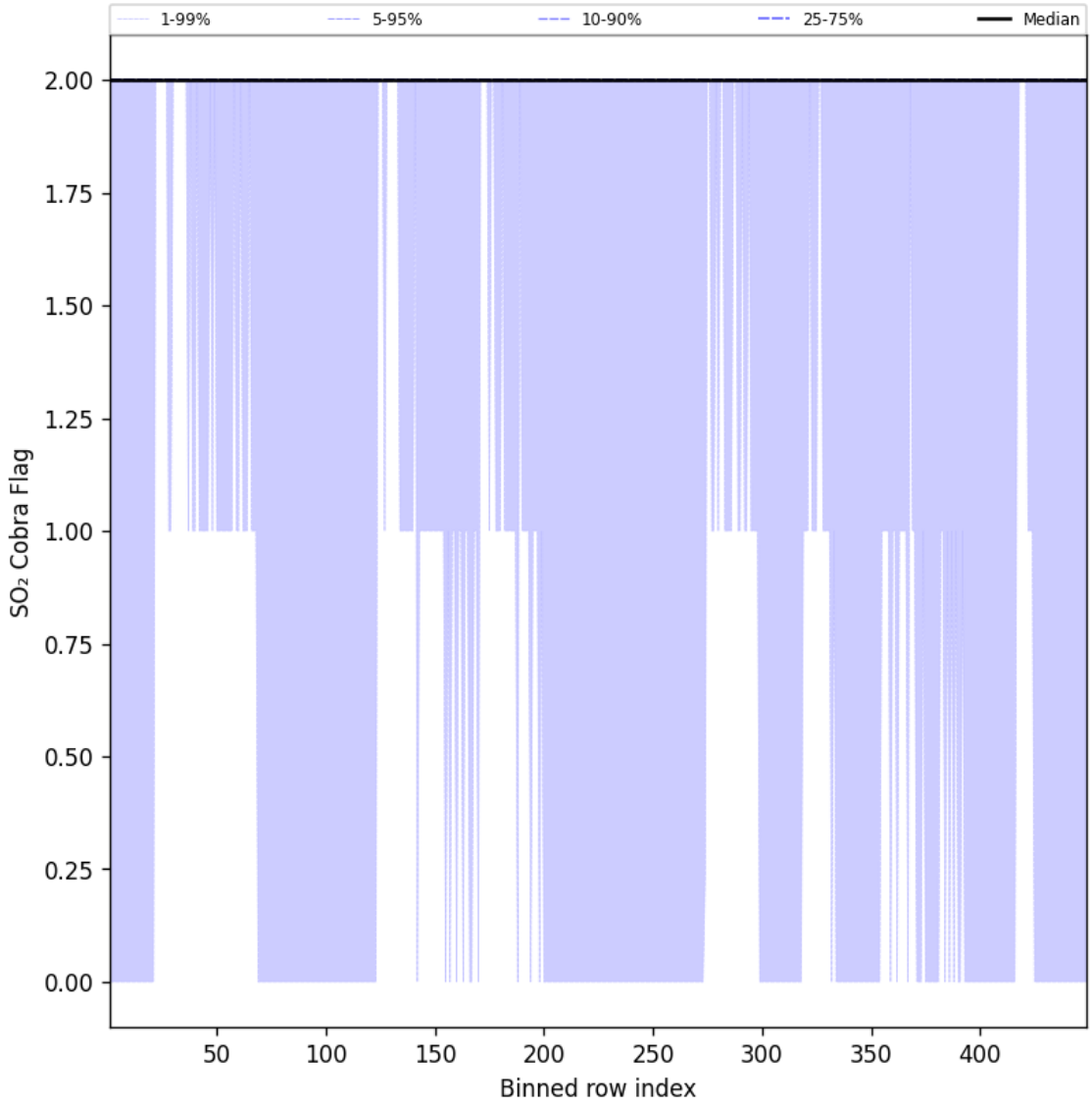

Figure 102: Along track statistics of "SO_2 Cobra Flag" for 2025-03-25 to 2025-03-26

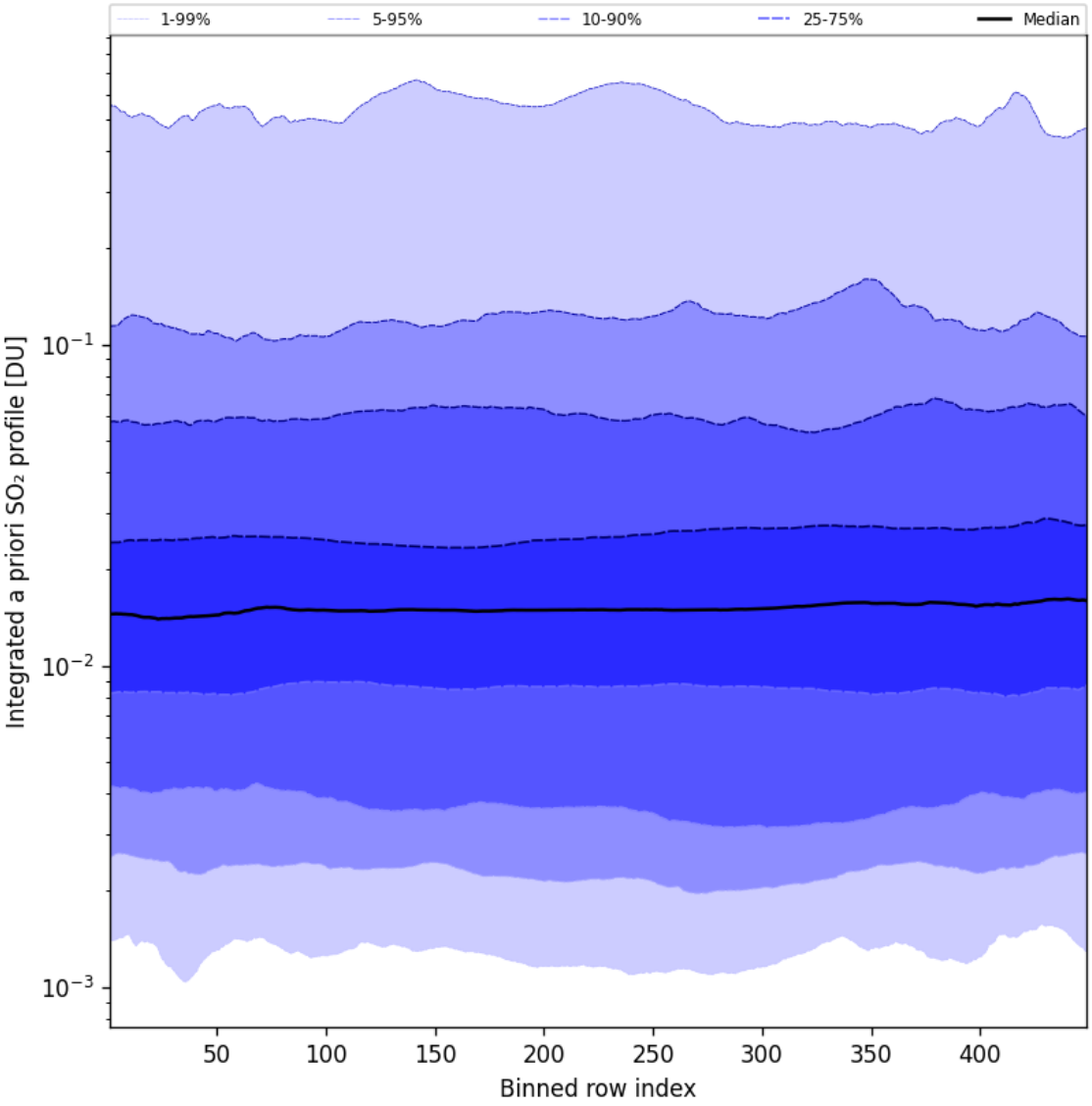

Figure 103: Along track statistics of “Integrated a priori SO_2 profile” for 2025-03-25 to 2025-03-26

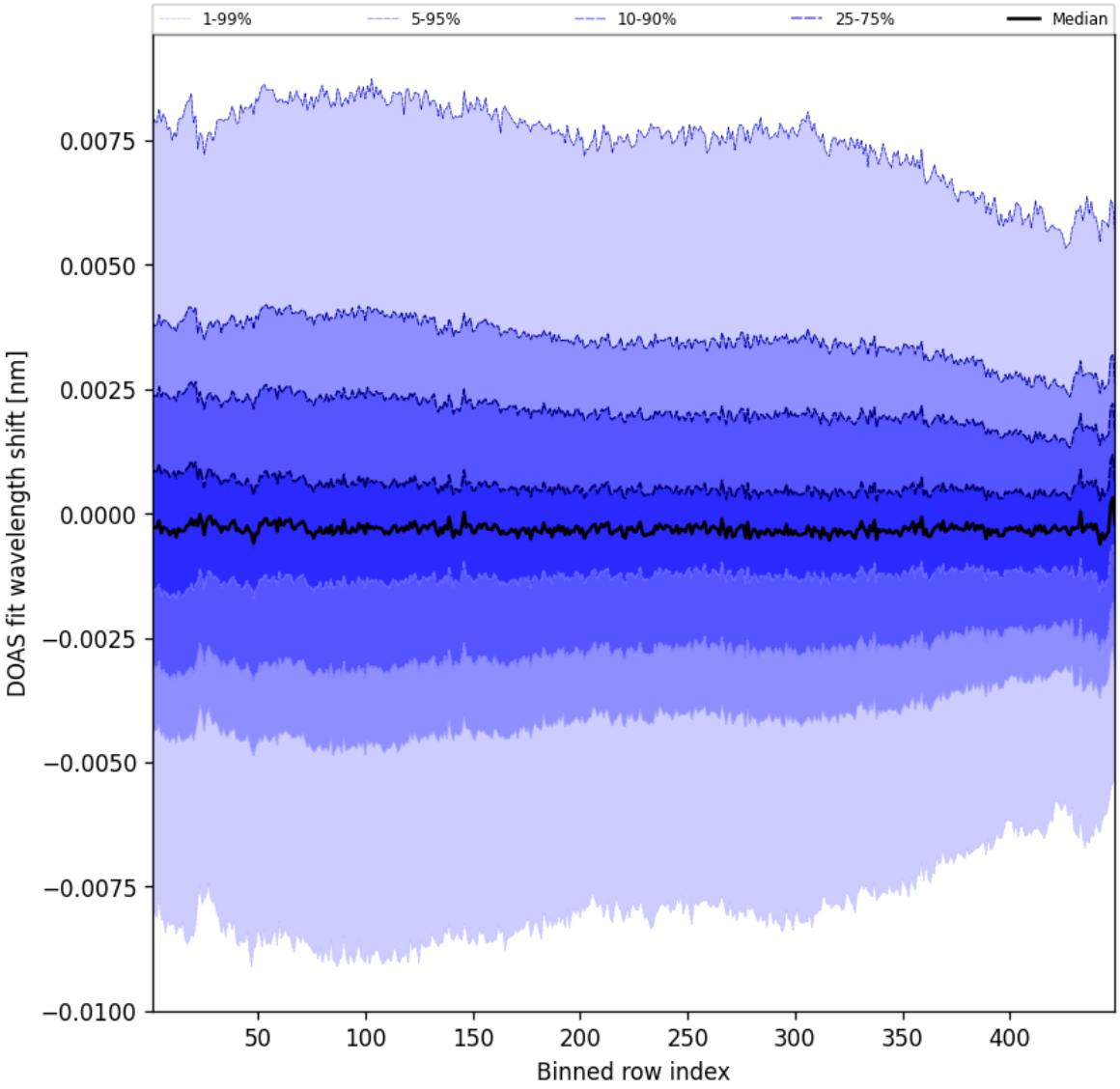

Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2025-03-25 to 2025-03-26

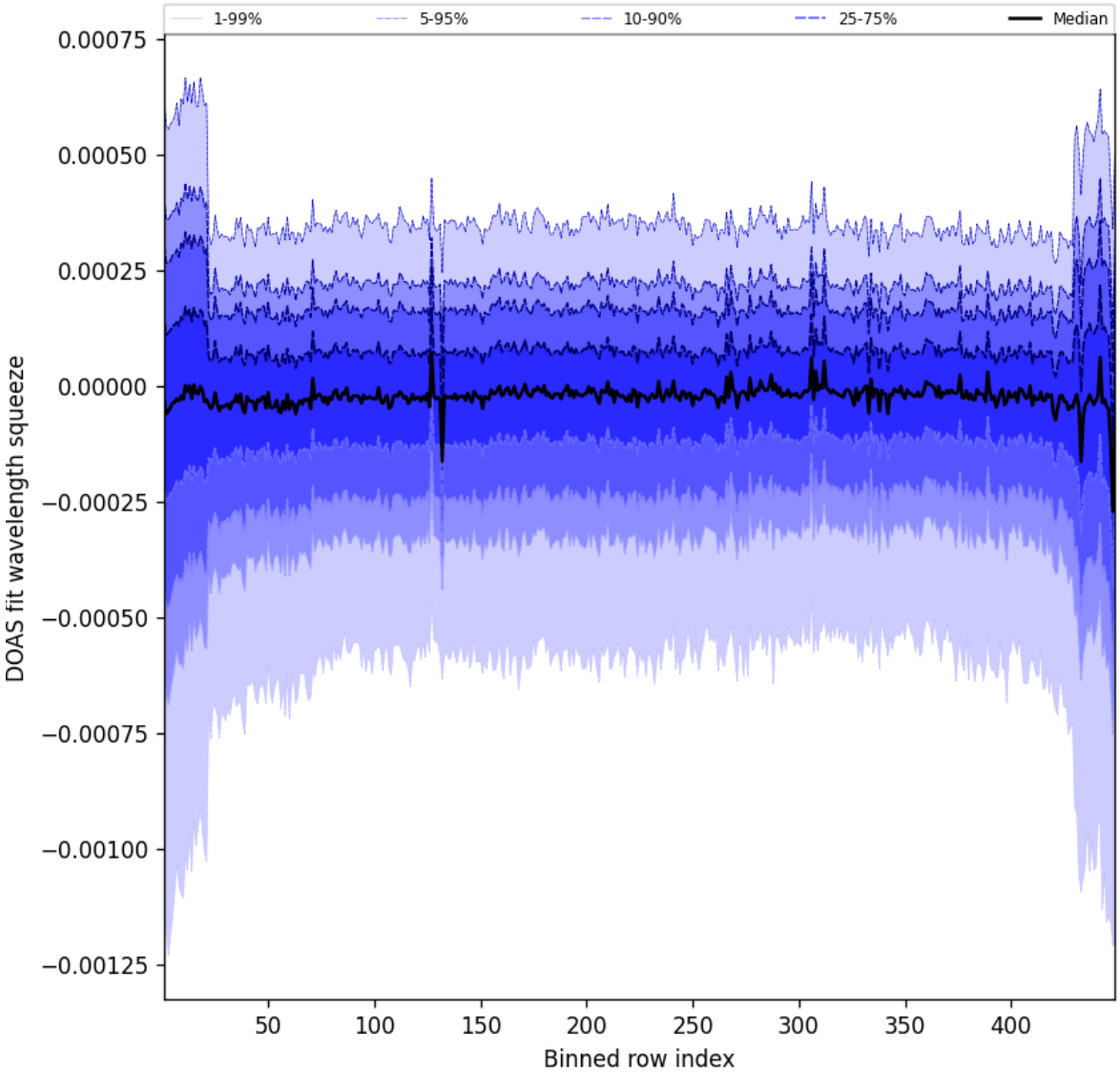

Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2025-03-25 to 2025-03-26

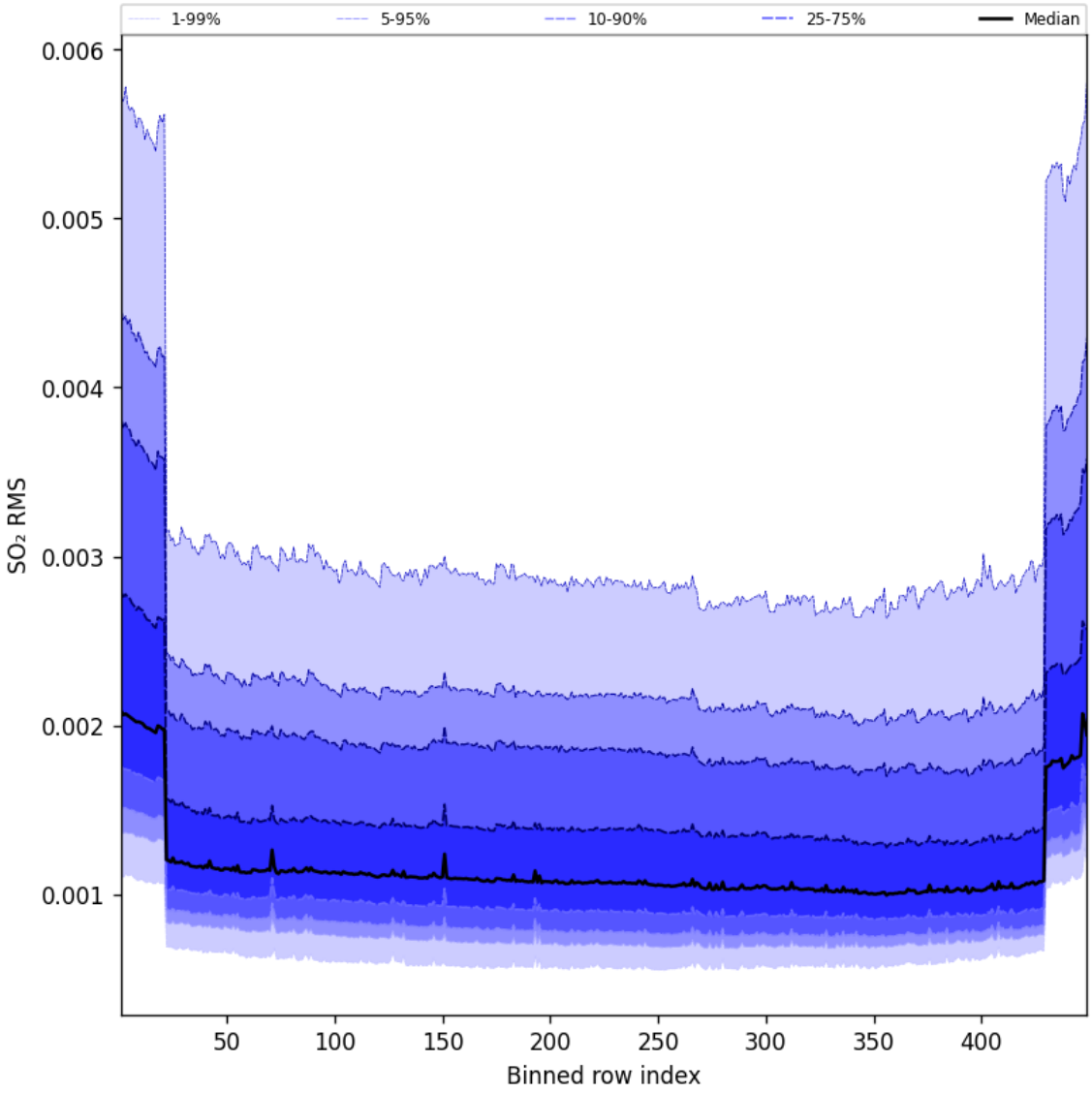

Figure 106: Along track statistics of "SO_2 RMS" for 2025-03-25 to 2025-03-26

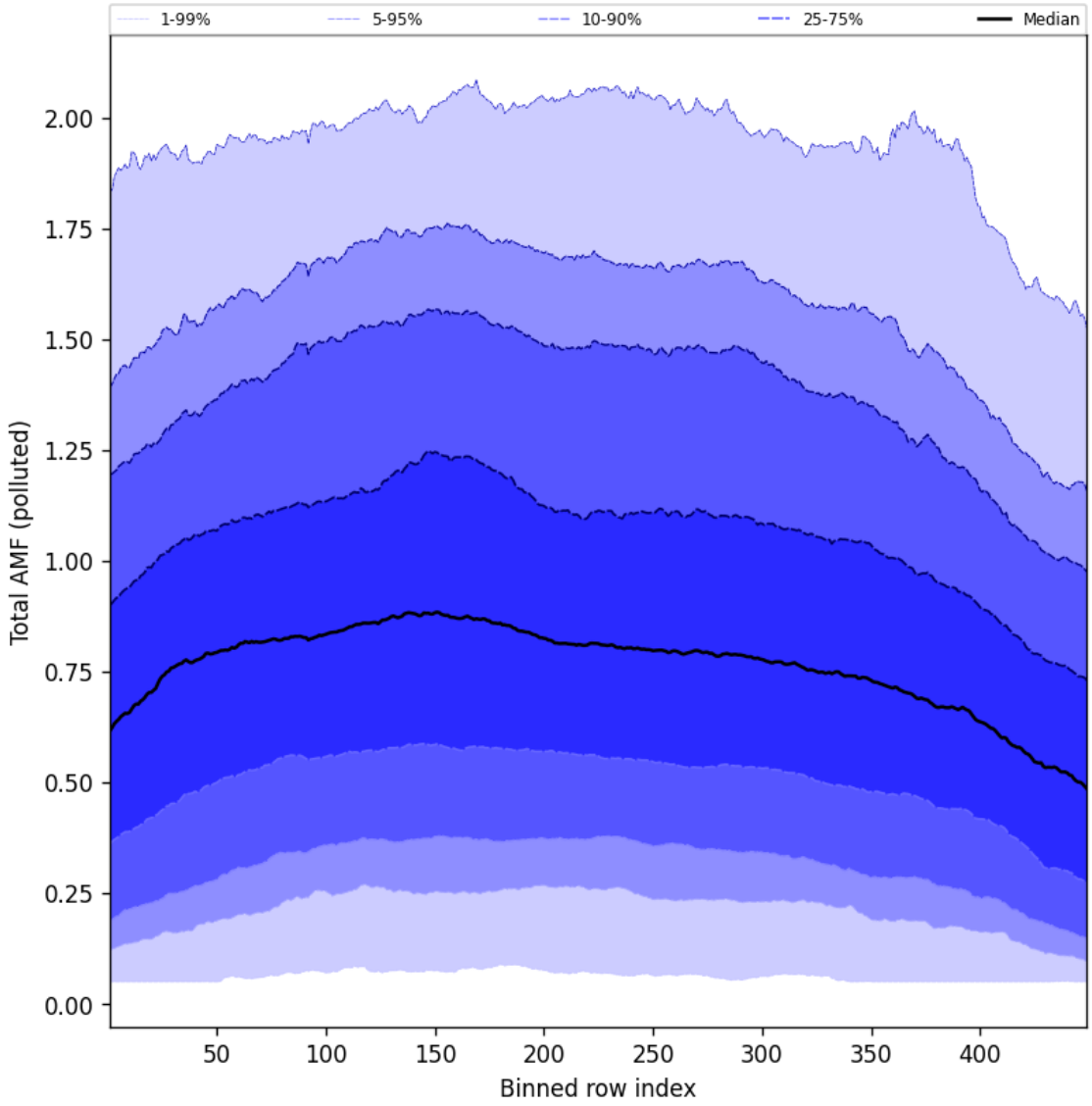

Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-03-25 to 2025-03-26

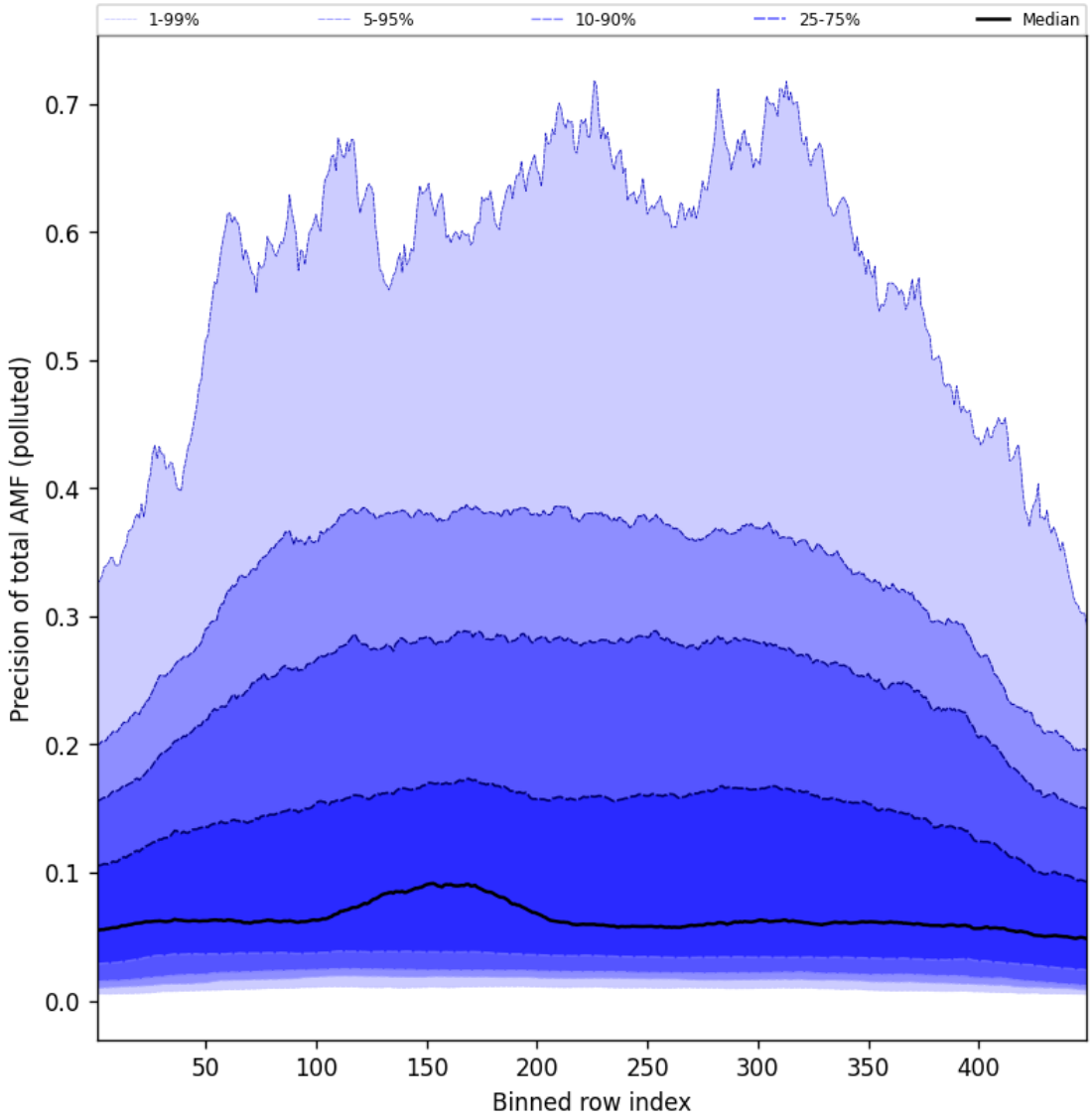

Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-03-25 to 2025-03-26

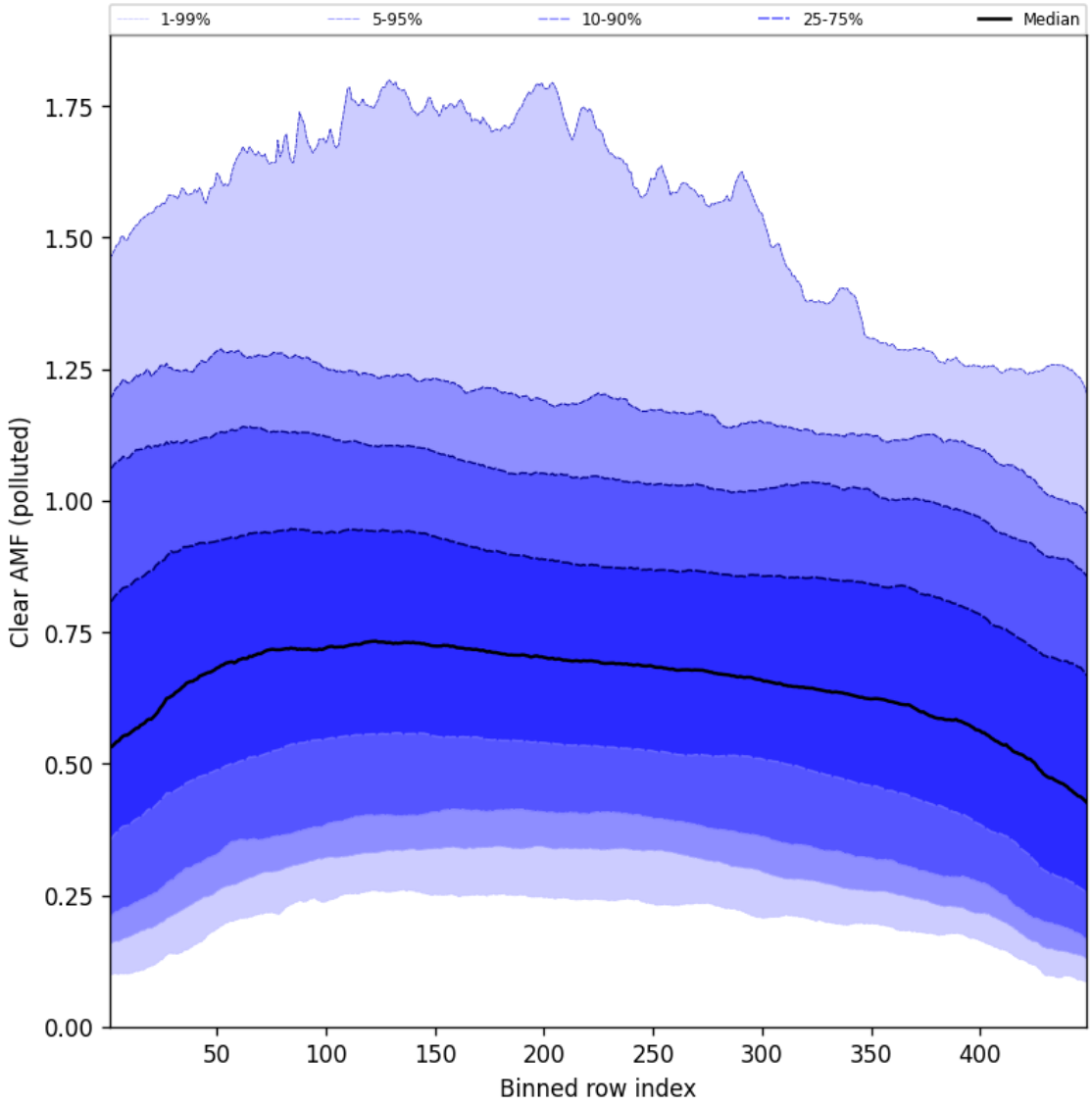

Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-03-25 to 2025-03-26

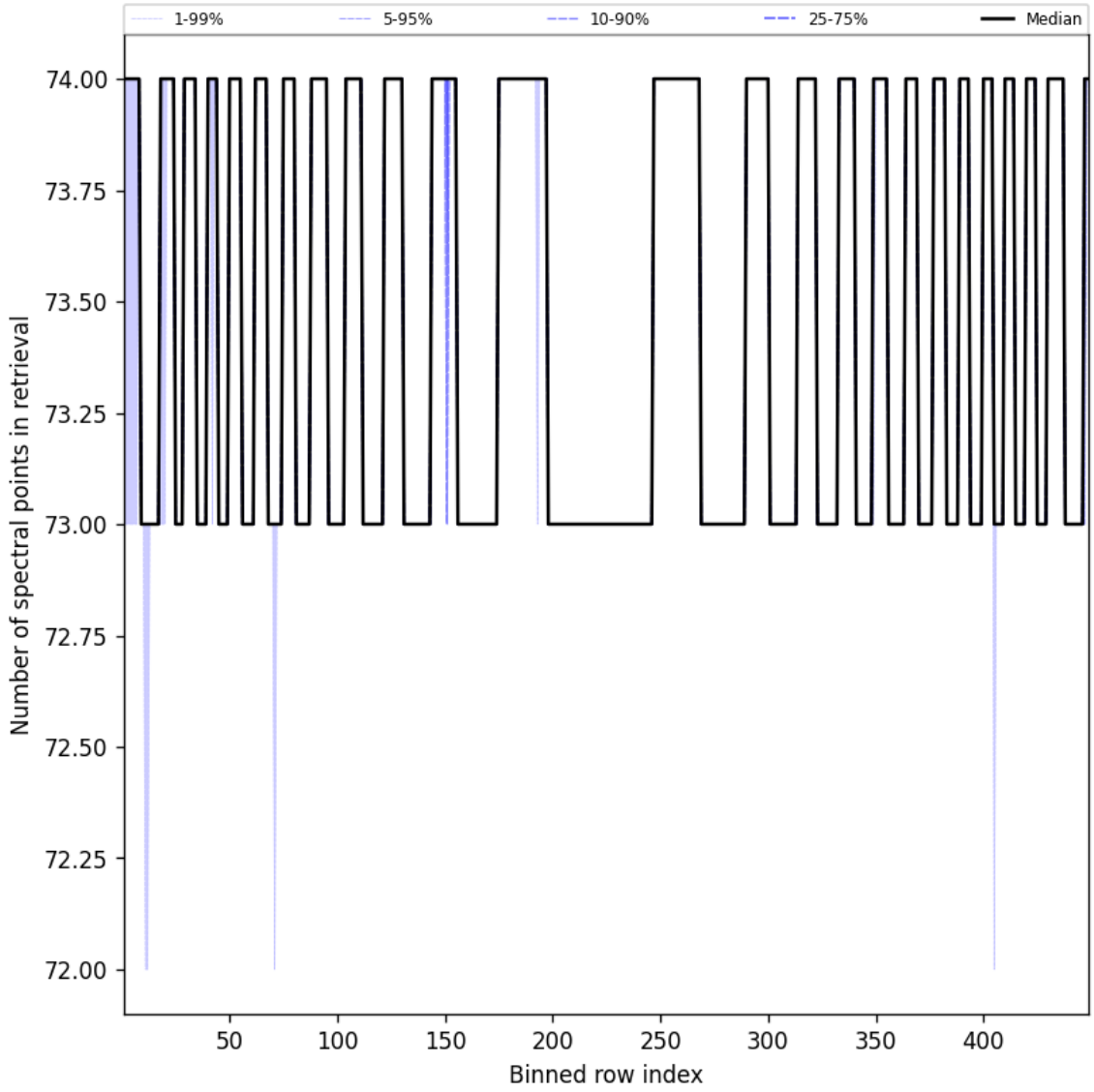

Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-03-25 to 2025-03-26

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