

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:

$$\bar{x} = \frac{1}{N} \sum_{i=1}^N x_i \quad (1)$$

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 $\sigma(x) = \sqrt{V(x)}$.

$$V(x) = \frac{1}{N-1} \sum_{i=1}^N (x_i - \bar{x})^2 \quad (2)$$

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 :

$$P(x \leq m) = P(x \geq m) = \int_{-\infty}^m f(x) dx = \frac{1}{2} \quad (3)$$

with $f(x)$ the probability density function.

The median is a special case of a percentile. Instead of 1/2 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} .

$$C_{kl} = C(x_{(k)}, x_{(l)}) = \frac{1}{N-1} \sum_{i=1}^N (x_{(k),i} - \bar{x}_{(k)})(x_{(l),i} - \bar{x}_{(l)}) \quad (4)$$

Rather than a dimensionally dependent covariance, it is often easier to interpret a correlation matrix R_{kl} , a matrix of Pearson's r coefficients:

$$R_{kl} = R(x_{(k)}, x_{(l)}) = \frac{C_{kl}}{\sqrt{C_{kk}C_{ll}}} = \frac{C_{kl}}{\sqrt{V(x_{(k)})V(x_{(l)})}} \quad (5)$$

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]	0.648 ± 0.409	17309081	0.995	0.780	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(5.838 \pm 184.915) \times 10^{-2}$	17309081	0.263	0.473	1.103×10^{-2}	-181	536
sulfurdioxide total vertical column precision [DU]	0.706 ± 1.354	17309081	0.197	0.413	0.334	4.062×10^{-2}	79.7
sulfurdioxide slant column density corrected [DU]	$(2.088 \pm 42.031) \times 10^{-2}$	17309081	0.250	0.358	9.220×10^{-3}	-12.5	564
sulfurdioxide slant column density cobra [DU]	$(2.067 \pm 37.854) \times 10^{-2}$	17309081	0.250	0.358	9.220×10^{-3}	-12.5	50.5
sulfurdioxide slant column density cobra precision [DU]	0.295 ± 0.152	17309081	0.213	0.150	0.244	7.776×10^{-2}	34.9
sulfurdioxide slant column density window1 [DU]	0.179 ± 0.712	17309081	0.225	0.733	0.194	-35.6	72.4
sulfurdioxide slant column density window1 precision [DU]	0.295 ± 0.152	17309081	0.213	0.150	0.244	7.776×10^{-2}	34.9
sulfurdioxide slant column density corrected win1 [DU]	$(2.928 \pm 70.029) \times 10^{-2}$	17309081	-2.500×10^{-2}	0.714	6.997×10^{-3}	-35.6	72.0
background so2 slant column offset window1 [DU]	-0.149 ± 0.201	17309081	-0.260	0.205	-0.196	-1.41	6.40
sulfurdioxide slant column density window2 [DU]	0.578 ± 9.021	17309081	0.250	11.4	0.352	-1.088×10^3	914
sulfurdioxide slant column density window2 precision [DU]	8.10 ± 2.22	17309081	7.43	2.58	7.75	2.09	619
sulfurdioxide slant column density corrected win2 [DU]	-1.30 ± 8.76	17309081	-1.25	11.1	-1.28	-1.088×10^3	915
background so2 slant column offset window2 [DU]	-1.88 ± 2.64	17309081	0.250	3.44	-1.11	-13.1	9.31
sulfurdioxide slant column density window3 [DU]	-4.02 ± 24.30	17309081	-5.04	30.7	-4.12	-808	1.078×10^3
sulfurdioxide slant column density window3 precision [DU]	28.4 ± 12.7	17309081	22.5	9.51	25.0	10.4	596
sulfurdioxide slant column density corrected win3 [DU]	6.00 ± 23.26	17309081	5.04	29.3	6.05	-805	1.077×10^3
background so2 slant column offset window3 [DU]	10.0 ± 7.5	17309081	5.04	11.9	9.62	-27.2	33.3
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.22	17309081	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(3.300 \pm 8.785) \times 10^{-2}$	17309081	1.316×10^{-2}	1.755×10^{-2}	1.569×10^{-2}	4.186×10^{-4}	3.76
fitted radiance shift [nm]	$(-3.650 \pm 25.298) \times 10^{-4}$	17309081	-5.000×10^{-4}	1.826×10^{-3}	-3.411×10^{-4}	-8.378×10^{-2}	7.064×10^{-2}
fitted radiance squeeze [1]	$(-2.204 \pm 20.519) \times 10^{-5}$	17309081	1.000×10^{-5}	2.061×10^{-4}	-6.521×10^{-6}	-1.715×10^{-2}	2.701×10^{-2}
fitted root mean square [1]	$(1.294 \pm 0.626) \times 10^{-3}$	17309081	9.250×10^{-4}	5.912×10^{-4}	1.093×10^{-3}	3.217×10^{-4}	6.442×10^{-2}
sulfurdioxide total air mass factor polluted [1]	0.806 ± 0.443	17309081	0.620	0.553	0.751	5.000×10^{-2}	3.00
sulfurdioxide total air mass factor polluted precision [1]	0.115 ± 0.133	17309081	3.500×10^{-2}	0.120	6.408×10^{-2}	2.500×10^{-3}	1.79
sulfurdioxide clear air mass factor polluted [1]	0.691 ± 0.328	17309081	0.620	0.384	0.658	1.816×10^{-2}	2.88
number of spectral points in retrieval [1]	73.4 ± 0.5	17309081	73.0	1.000	73.0	70.0	74.0

Table 2: Percentile ranges

Variable	1 %	5 %	10 %	15.9 %	25 %	75 %	84.1 %	90 %	95 %	99 %
qa value [1]	0.0	0.0	5.000×10^{-2}	0.110	0.220	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	-3.88	-1.11	-0.603	-0.386	-0.221	0.252	0.435	0.686	1.29	4.78
sulfurdioxide total vertical column precision [DU]	9.630×10^{-2}	0.133	0.159	0.183	0.215	0.628	0.934	1.41	2.40	6.65
sulfurdioxide slant column density corrected [DU]	-0.889	-0.494	-0.353	-0.261	-0.168	0.190	0.290	0.391	0.557	1.11
sulfurdioxide slant column density cobra [DU]	-0.889	-0.494	-0.353	-0.261	-0.168	0.190	0.290	0.391	0.557	1.11
sulfurdioxide slant column density cobra precision [DU]	0.134	0.162	0.175	0.186	0.200	0.350	0.406	0.463	0.574	0.855
sulfurdioxide slant column density window1 [DU]	-1.84	-0.908	-0.584	-0.381	-0.178	0.555	0.745	0.928	1.21	2.04
sulfurdioxide slant column density window1 precision [DU]	0.134	0.162	0.175	0.186	0.200	0.350	0.406	0.463	0.574	0.855
sulfurdioxide slant column density corrected win1 [DU]	-1.74	-0.968	-0.702	-0.527	-0.344	0.370	0.571	0.773	1.10	2.10
background so2 slant column offset window1 [DU]	-0.487	-0.351	-0.319	-0.300	-0.277	-7.160×10^{-2}	8.983×10^{-3}	9.472×10^{-2}	0.213	0.518
sulfurdioxide slant column density window2 [DU]	-20.3	-13.7	-10.4	-8.01	-5.27	6.17	9.15	11.9	15.6	23.5
sulfurdioxide slant column density window2 precision [DU]	4.33	5.22	5.73	6.14	6.62	9.21	10.1	10.9	12.1	14.7
sulfurdioxide slant column density corrected win2 [DU]	-22.6	-15.5	-12.1	-9.62	-6.84	4.25	7.02	9.49	12.8	19.9
background so2 slant column offset window2 [DU]	-8.99	-7.04	-5.81	-4.77	-3.44	-4.463×10^{-3}	0.282	0.545	1.05	3.10
sulfurdioxide slant column density window3 [DU]	-64.1	-43.7	-34.0	-27.0	-19.3	11.4	19.3	26.5	36.0	54.9
sulfurdioxide slant column density window3 precision [DU]	14.8	17.1	18.6	19.9	21.3	30.8	35.2	40.9	52.3	83.0
sulfurdioxide slant column density corrected win3 [DU]	-52.2	-32.2	-22.7	-16.0	-8.53	20.8	28.2	34.9	44.0	62.2
background so2 slant column offset window3 [DU]	-3.88	-1.02	0.463	2.03	4.11	16.0	18.2	20.0	22.1	25.4
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]	1.322×10^{-3}	3.003×10^{-3}	5.227×10^{-3}	6.967×10^{-3}	9.324×10^{-3}	2.688×10^{-2}	3.666×10^{-2}	5.523×10^{-2}	0.108	0.358
fitted radiance shift [nm]	-7.962×10^{-3}	-4.148×10^{-3}	-2.808×10^{-3}	-2.022×10^{-3}	-1.313×10^{-3}	5.133×10^{-4}	1.191×10^{-3}	2.037×10^{-3}	3.502×10^{-3}	7.530×10^{-3}
fitted radiance squeeze [1]	-7.099×10^{-4}	-3.502×10^{-4}	-2.386×10^{-4}	-1.744×10^{-4}	-1.132×10^{-4}	9.289×10^{-5}	1.433×10^{-4}	1.902×10^{-4}	2.584×10^{-4}	4.277×10^{-4}
fitted root mean square [1]	5.874×10^{-4}	7.213×10^{-4}	7.901×10^{-4}	8.430×10^{-4}	9.085×10^{-4}	1.500×10^{-3}	1.768×10^{-3}	2.028×10^{-3}	2.463×10^{-3}	3.652×10^{-3}
sulfurdioxide total air mass factor polluted [1]	5.000×10^{-2}	0.172	0.270	0.364	0.495	1.05	1.23	1.42	1.66	2.06
sulfurdioxide total air mass factor polluted precision [1]	7.514×10^{-3}	1.346×10^{-2}	1.986×10^{-2}	2.649×10^{-2}	3.389×10^{-2}	0.154	0.208	0.262	0.358	0.658
sulfurdioxide clear air mass factor polluted [1]	0.147	0.243	0.315	0.379	0.478	0.862	0.958	1.04	1.19	1.90
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]	0.642 ± 0.412	8367279	0.790	1.000	0.0	1.000	0.210	1.000
sulfurdioxide total vertical column [DU]	0.101 ± 2.536	8367279	0.634	1.416×10^{-2}	-181	461	-0.291	0.343
sulfurdioxide total vertical column precision [DU]	1.05 ± 1.81	8367279	0.806	0.471	4.062×10^{-2}	79.7	0.253	1.06
sulfurdioxide slant column density corrected [DU]	$(2.753 \pm 49.118) \times 10^{-2}$	8367279	0.385	1.025×10^{-2}	-12.5	564	-0.179	0.206
sulfurdioxide slant column density cobra [DU]	$(2.719 \pm 43.708) \times 10^{-2}$	8367279	0.385	1.025×10^{-2}	-12.5	35.6	-0.179	0.206
sulfurdioxide slant column density cobra precision [DU]	0.325 ± 0.182	8367279	0.182	0.268	7.776×10^{-2}	22.1	0.207	0.388
sulfurdioxide slant column density window1 [DU]	0.198 ± 0.806	8367279	0.785	0.218	-26.1	27.7	-0.180	0.605
sulfurdioxide slant column density window1 precision [DU]	0.325 ± 0.182	8367279	0.182	0.268	7.776×10^{-2}	22.1	0.207	0.388
sulfurdioxide slant column density corrected win1 [DU]	$(5.228 \pm 79.813) \times 10^{-2}$	8367279	0.771	2.067×10^{-2}	-26.1	27.9	-0.356	0.415
background so2 slant column offset window1 [DU]	-0.146 ± 0.232	8367279	0.214	-0.203	-1.41	4.42	-0.285	-7.034×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.24 ± 9.31	8367279	11.9	0.954	-488	570	-4.87	7.03
sulfurdioxide slant column density window2 precision [DU]	8.27 ± 2.23	8367279	2.72	7.92	2.09	574	6.74	9.46
sulfurdioxide slant column density corrected win2 [DU]	-1.38 ± 8.93	8367279	11.3	-1.35	-493	564	-7.04	4.31
background so2 slant column offset window2 [DU]	-2.63 ± 3.05	8367279	4.90	-1.88	-13.1	9.31	-5.03	-0.122
sulfurdioxide slant column density window3 [DU]	-6.64 ± 24.13	8367279	30.4	-6.54	-275	162	-21.7	8.70
sulfurdioxide slant column density window3 precision [DU]	28.4 ± 12.3	8367279	9.38	25.2	10.4	212	21.6	31.0
sulfurdioxide slant column density corrected win3 [DU]	6.13 ± 23.21	8367279	29.2	6.27	-271	180	-8.32	20.8
background so2 slant column offset window3 [DU]	12.8 ± 7.0	8367279	11.9	12.8	-23.4	33.3	6.60	18.5
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.23	8367279	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(4.676 \pm 12.129) \times 10^{-2}$	8367279	2.871×10^{-2}	1.679×10^{-2}	4.186×10^{-4}	3.76	7.341×10^{-3}	3.605×10^{-2}
fitted radiance shift [nm]	$(-2.026 \pm 24.374) \times 10^{-4}$	8367279	1.686×10^{-3}	-1.906×10^{-4}	-3.638×10^{-2}	3.136×10^{-2}	-1.062×10^{-3}	6.243×10^{-4}
fitted radiance squeeze [1]	$(-2.652 \pm 24.279) \times 10^{-5}$	8367279	2.253×10^{-4}	-6.005×10^{-7}	-1.189×10^{-2}	8.763×10^{-3}	-1.188×10^{-4}	1.064×10^{-4}
fitted root mean square [1]	$(1.420 \pm 0.753) \times 10^{-3}$	8367279	7.375×10^{-4}	1.167×10^{-3}	3.328×10^{-4}	1.775×10^{-2}	9.385×10^{-4}	1.676×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.667 ± 0.421	8367279	0.556	0.600	5.000×10^{-2}	2.82	0.347	0.904
sulfurdioxide total air mass factor polluted precision [1]	0.107 ± 0.157	8367279	9.780×10^{-2}	4.715×10^{-2}	2.500×10^{-3}	1.79	2.470×10^{-2}	0.122
sulfurdioxide clear air mass factor polluted [1]	0.569 ± 0.282	8367279	0.428	0.523	1.816×10^{-2}	2.63	0.346	0.774
number of spectral points in retrieval [1]	73.5 ± 0.5	8367279	1.000	73.0	71.0	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]	0.654 ± 0.405	8941802	0.780	1.000	0.0	1.000	0.220	1.000
sulfurdioxide total vertical column [DU]	$(1.897 \pm 77.317) \times 10^{-2}$	8941802	0.381	9.010×10^{-3}	-112	536	-0.179	0.201
sulfurdioxide total vertical column precision [DU]	0.383 ± 0.512	8941802	0.225	0.274	4.482×10^{-2}	51.4	0.194	0.420
sulfurdioxide slant column density corrected [DU]	$(1.465 \pm 34.078) \times 10^{-2}$	8941802	0.336	8.358×10^{-3}	-6.99	292	-0.158	0.177
sulfurdioxide slant column density cobra [DU]	$(1.457 \pm 31.391) \times 10^{-2}$	8941802	0.336	8.358×10^{-3}	-6.99	50.5	-0.158	0.177
sulfurdioxide slant column density cobra precision [DU]	0.266 ± 0.110	8941802	0.117	0.230	8.038×10^{-2}	34.9	0.195	0.312
sulfurdioxide slant column density window1 [DU]	0.161 ± 0.610	8941802	0.689	0.175	-35.6	72.4	-0.176	0.513
sulfurdioxide slant column density window1 precision [DU]	0.266 ± 0.110	8941802	0.117	0.230	8.038×10^{-2}	34.9	0.195	0.312
sulfurdioxide slant column density corrected win1 [DU]	$(7.750 \pm 593.513) \times 10^{-3}$	8941802	0.668	-4.305×10^{-3}	-35.6	72.0	-0.335	0.333
background so2 slant column offset window1 [DU]	-0.153 ± 0.167	8941802	0.197	-0.190	-1.27	6.40	-0.270	-7.295×10^{-2}
sulfurdioxide slant column density window2 [DU]	$(-4.543 \pm 869.177) \times 10^{-2}$	8941802	11.0	-0.170	-1.088×10^3	914	-5.62	5.39
sulfurdioxide slant column density window2 precision [DU]	7.94 ± 2.21	8941802	2.43	7.60	2.22	619	6.53	8.97
sulfurdioxide slant column density corrected win2 [DU]	-1.22 ± 8.59	8941802	10.9	-1.23	-1.088×10^3	915	-6.66	4.20
background so2 slant column offset window2 [DU]	-1.18 ± 1.94	8941802	2.32	-0.733	-11.4	9.10	-2.26	5.916×10^{-2}
sulfurdioxide slant column density window3 [DU]	-1.56 ± 24.21	8941802	30.7	-1.85	-808	1.078×10^3	-16.9	13.7
sulfurdioxide slant column density window3 precision [DU]	28.4 ± 13.1	8941802	9.60	24.8	10.7	596	21.1	30.7
sulfurdioxide slant column density corrected win3 [DU]	5.88 ± 23.30	8941802	29.4	5.84	-805	1.077×10^3	-8.73	20.7
background so2 slant column offset window3 [DU]	7.45 ± 6.96	8941802	11.9	6.56	-27.2	29.5	1.52	13.4
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.20	8941802	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.012 \pm 2.883) \times 10^{-2}$	8941802	1.183×10^{-2}	1.523×10^{-2}	7.131×10^{-4}	1.81	1.048×10^{-2}	2.232×10^{-2}
fitted radiance shift [nm]	$(-5.170 \pm 26.042) \times 10^{-4}$	8941802	1.918×10^{-3}	-4.974×10^{-4}	-8.378×10^{-2}	7.064×10^{-2}	-1.531×10^{-3}	3.863×10^{-4}
fitted radiance squeeze [1]	$(-1.785 \pm 16.217) \times 10^{-5}$	8941802	1.905×10^{-4}	-1.135×10^{-5}	-1.715×10^{-2}	2.701×10^{-2}	-1.091×10^{-4}	8.143×10^{-5}
fitted root mean square [1]	$(1.175 \pm 0.448) \times 10^{-3}$	8941802	4.617×10^{-4}	1.044×10^{-3}	3.217×10^{-4}	6.442×10^{-2}	8.867×10^{-4}	1.348×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.936 ± 0.423	8941802	0.533	0.871	5.000×10^{-2}	3.00	0.638	1.17
sulfurdioxide total air mass factor polluted precision [1]	0.124 ± 0.105	8941802	0.133	8.689×10^{-2}	4.963×10^{-3}	1.32	4.346×10^{-2}	0.177
sulfurdioxide clear air mass factor polluted [1]	0.806 ± 0.327	8941802	0.331	0.738	0.107	2.88	0.601	0.932
number of spectral points in retrieval [1]	73.4 ± 0.5	8941802	1.000	73.0	70.0	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 $\pm$ 0.400	12415192	0.750	1.000	0.0	1.000	0.250	1.000
sulfurdioxide total vertical column [DU]	$(3.624 \pm 136.841) \times 10^{-2}$	12415192	0.431	9.110×10^{-3}	-112	461	-0.204	0.227
sulfurdioxide total vertical column precision [DU]	0.562 $\pm$ 1.024	12415192	0.311	0.302	4.062×10^{-2}	49.3	0.209	0.520
sulfurdioxide slant column density corrected [DU]	$(1.569 \pm 39.569) \times 10^{-2}$	12415192	0.343	7.803×10^{-3}	-12.5	564	-0.162	0.181
sulfurdioxide slant column density cobra [DU]	$(1.554 \pm 34.538) \times 10^{-2}$	12415192	0.343	7.803×10^{-3}	-12.5	50.5	-0.162	0.181
sulfurdioxide slant column density cobra precision [DU]	0.279 $\pm$ 0.136	12415192	0.132	0.233	7.776×10^{-2}	22.1	0.196	0.328
sulfurdioxide slant column density window1 [DU]	0.174 $\pm$ 0.653	12415192	0.704	0.189	-35.6	60.9	-0.169	0.536
sulfurdioxide slant column density window1 precision [DU]	0.279 $\pm$ 0.136	12415192	0.132	0.233	7.776×10^{-2}	22.1	0.196	0.328
sulfurdioxide slant column density corrected win1 [DU]	$(1.660 \pm 64.066) \times 10^{-2}$	12415192	0.687	5.776×10^{-4}	-35.6	61.2	-0.338	0.348
background so2 slant column offset window1 [DU]	-0.158 $\pm$ 0.180	12415192	0.197	-0.197	-1.27	3.95	-0.276	-7.818×10^{-2}
sulfurdioxide slant column density window2 [DU]	0.250 $\pm$ 8.768	12415192	11.1	6.065×10^{-2}	-1.088×10^3	914	-5.43	5.71
sulfurdioxide slant column density window2 precision [DU]	7.94 $\pm$ 2.12	12415192	2.43	7.59	2.09	574	6.54	8.97
sulfurdioxide slant column density corrected win2 [DU]	-1.27 $\pm$ 8.57	12415192	10.9	-1.27	-1.088×10^3	915	-6.72	4.18
background so2 slant column offset window2 [DU]	-1.52 $\pm$ 2.33	12415192	2.80	-0.925	-13.1	9.31	-2.75	4.240×10^{-2}
sulfurdioxide slant column density window3 [DU]	-1.16 $\pm$ 24.05	12415192	30.6	-1.42	-808	1.078×10^3	-16.5	14.1
sulfurdioxide slant column density window3 precision [DU]	27.8 $\pm$ 12.1	12415192	9.11	24.4	10.4	252	21.0	30.1
sulfurdioxide slant column density corrected win3 [DU]	8.01 $\pm$ 22.79	12415192	29.0	7.81	-805	1.077×10^3	-6.49	22.5
background so2 slant column offset window3 [DU]	9.17 $\pm$ 7.01	12415192	11.0	8.68	-27.2	33.3	3.74	14.7
sulfurdioxide slant column cobra flag [1]	1.98 $\pm$ 0.20	12415192	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.177 \pm 3.096) \times 10^{-2}$	12415192	1.343×10^{-2}	1.496×10^{-2}	4.654×10^{-4}	2.16	9.653×10^{-3}	2.308×10^{-2}
fitted radiance shift [nm]	$(-3.627 \pm 23.999) \times 10^{-4}$	12415192	1.806×10^{-3}	-3.259×10^{-4}	-8.378×10^{-2}	4.148×10^{-2}	-1.297×10^{-3}	5.089×10^{-4}
fitted radiance squeeze [1]	$(-1.518 \pm 18.398) \times 10^{-5}$	12415192	1.960×10^{-4}	-4.675×10^{-6}	-1.715×10^{-2}	2.436×10^{-2}	-1.054×10^{-4}	9.063×10^{-5}
fitted root mean square [1]	$(1.225 \pm 0.544) \times 10^{-3}$	12415192	5.028×10^{-4}	1.052×10^{-3}	3.217×10^{-4}	5.571×10^{-2}	8.920×10^{-4}	1.395×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.837 $\pm$ 0.404	12415192	0.494	0.799	5.000×10^{-2}	2.85	0.562	1.06
sulfurdioxide total air mass factor polluted precision [1]	0.109 $\pm$ 0.105	12415192	0.112	6.760×10^{-2}	2.500×10^{-3}	1.35	3.851×10^{-2}	0.151
sulfurdioxide clear air mass factor polluted [1]	0.721 $\pm$ 0.276	12415192	0.338	0.697	4.090×10^{-2}	2.59	0.540	0.878
number of spectral points in retrieval [1]	73.4 $\pm$ 0.5	12415192	1.000	73.0	70.0	74.0	73.0	74.0

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

Variable	mean $\pm \sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.594 ± 0.419	3729830	0.840	0.490	0.0	1.000	0.160	1.000
sulfurdioxide total vertical column [DU]	0.100 ± 2.524	3729830	0.584	1.500×10^{-2}	-173	202	-0.265	0.320
sulfurdioxide total vertical column precision [DU]	0.983 ± 1.806	3729830	0.738	0.422	4.221×10^{-2}	79.7	0.237	0.975
sulfurdioxide slant column density corrected [DU]	$(3.091 \pm 43.884) \times 10^{-2}$	3729830	0.384	1.197×10^{-2}	-11.7	51.3	-0.177	0.207
sulfurdioxide slant column density cobra [DU]	$(3.070 \pm 42.958) \times 10^{-2}$	3729830	0.384	1.197×10^{-2}	-11.7	25.6	-0.177	0.207
sulfurdioxide slant column density cobra precision [DU]	0.320 ± 0.173	3729830	0.167	0.266	8.038×10^{-2}	34.9	0.210	0.376
sulfurdioxide slant column density window1 [DU]	0.196 ± 0.804	3729830	0.784	0.214	-22.6	72.4	-0.185	0.599
sulfurdioxide slant column density window1 precision [DU]	0.320 ± 0.173	3729830	0.167	0.266	8.038×10^{-2}	34.9	0.210	0.376
sulfurdioxide slant column density corrected win1 [DU]	$(5.127 \pm 79.190) \times 10^{-2}$	3729830	0.761	1.960×10^{-2}	-22.6	72.0	-0.353	0.408
background so2 slant column offset window1 [DU]	-0.144 ± 0.231	3729830	0.208	-0.206	-1.41	6.40	-0.283	-7.552×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.00 ± 9.45	3729830	12.0	0.773	-627	754	-5.11	6.88
sulfurdioxide slant column density window2 precision [DU]	8.44 ± 2.44	3729830	2.80	8.13	2.22	619	6.87	9.67
sulfurdioxide slant column density corrected win2 [DU]	-1.37 ± 9.14	3729830	11.5	-1.32	-627	753	-7.10	4.40
background so2 slant column offset window2 [DU]	-2.37 ± 2.95	3729830	4.62	-1.41	-13.1	9.31	-4.68	-5.591×10^{-2}
sulfurdioxide slant column density window3 [DU]	-11.1 ± 23.5	3729830	29.5	-10.5	-656	932	-25.6	3.93
sulfurdioxide slant column density window3 precision [DU]	30.4 ± 14.5	3729830	10.0	26.7	10.7	596	22.5	32.5
sulfurdioxide slant column density corrected win3 [DU]	0.109 ± 23.756	3729830	29.7	0.708	-656	936	-14.4	15.2
background so2 slant column offset window3 [DU]	11.2 ± 7.9	3729830	13.4	11.1	-22.7	33.3	4.59	18.0
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.23	3729830	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(6.046 \pm 15.183) \times 10^{-2}$	3729830	3.994×10^{-2}	2.047×10^{-2}	4.186×10^{-4}	3.76	8.690×10^{-3}	4.863×10^{-2}
fitted radiance shift [nm]	$(-3.693 \pm 29.399) \times 10^{-4}$	3729830	1.889×10^{-3}	-3.844×10^{-4}	-7.448×10^{-2}	7.064×10^{-2}	-1.364×10^{-3}	5.247×10^{-4}
fitted radiance squeeze [1]	$(-3.850 \pm 23.842) \times 10^{-5}$	3729830	2.271×10^{-4}	-1.229×10^{-5}	-1.360×10^{-2}	1.657×10^{-2}	-1.322×10^{-4}	9.486×10^{-5}
fitted root mean square [1]	$(1.405 \pm 0.734) \times 10^{-3}$	3729830	6.737×10^{-4}	1.180×10^{-3}	3.349×10^{-4}	6.442×10^{-2}	9.550×10^{-4}	1.629×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.751 ± 0.529	3729830	0.668	0.609	5.000×10^{-2}	2.99	0.356	1.02
sulfurdioxide total air mass factor polluted precision [1]	0.135 ± 0.190	3729830	0.145	5.250×10^{-2}	2.500×10^{-3}	1.79	2.465×10^{-2}	0.170
sulfurdioxide clear air mass factor polluted [1]	0.637 ± 0.440	3729830	0.436	0.545	1.816×10^{-2}	2.88	0.343	0.779
number of spectral points in retrieval [1]	73.4 ± 0.5	3729830	1.000	73.0	71.0	74.0	73.0	74.0

3 Granule outlines

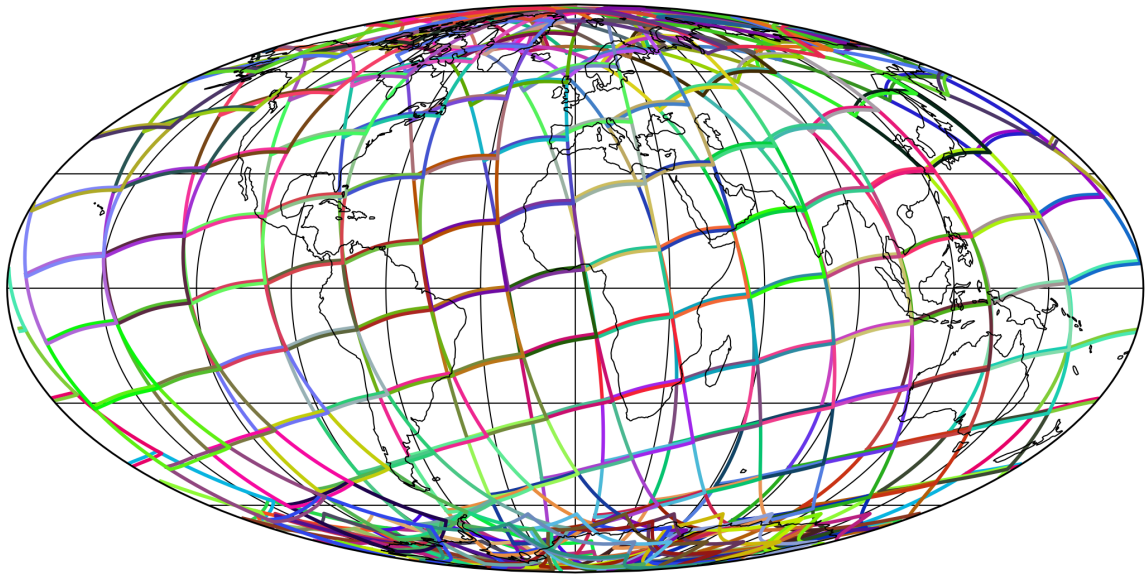


Figure 1: Outline of the granules.

4 Input data monitoring

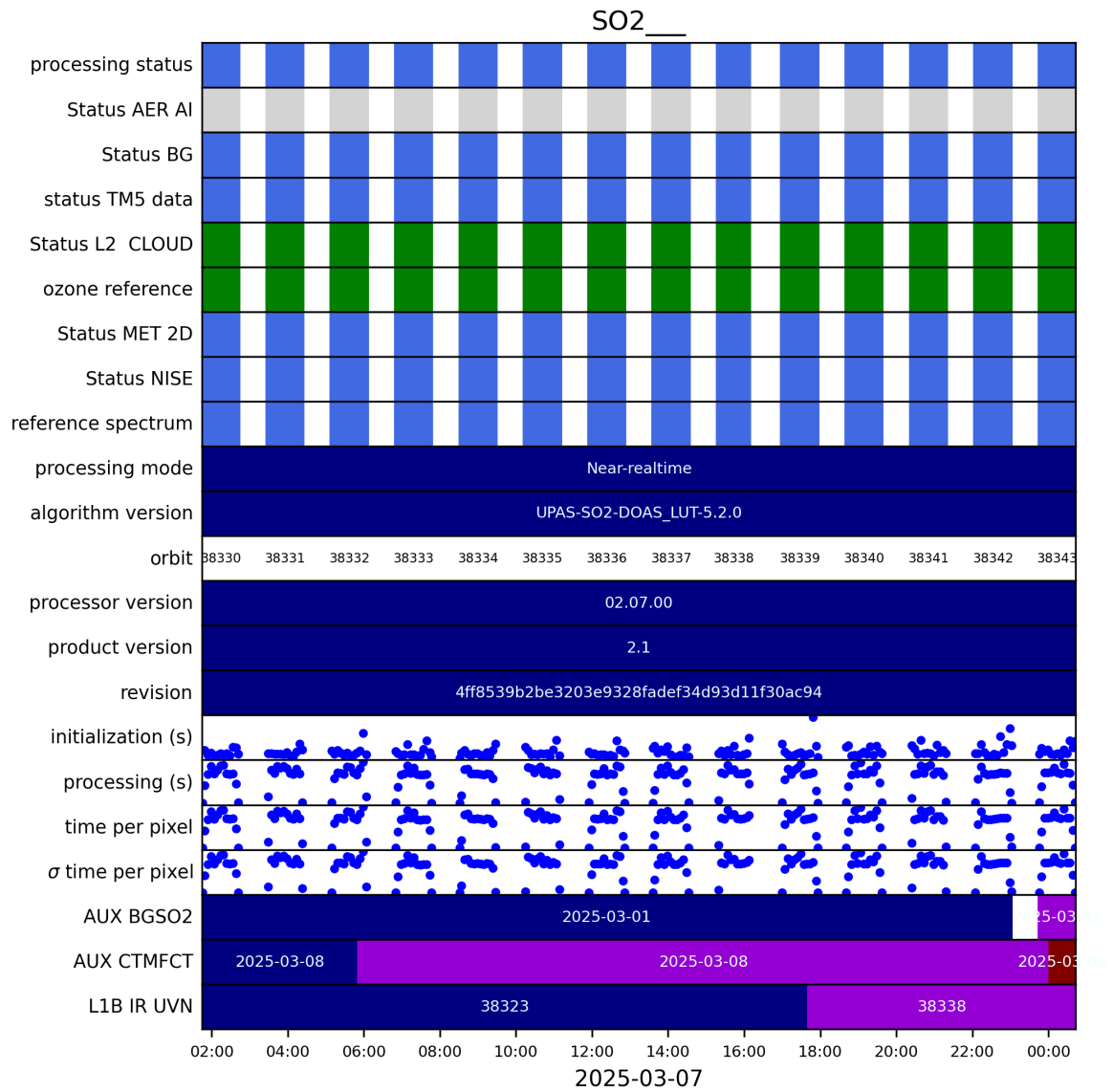


Figure 2: Input data per granule

5 Warnings and errors

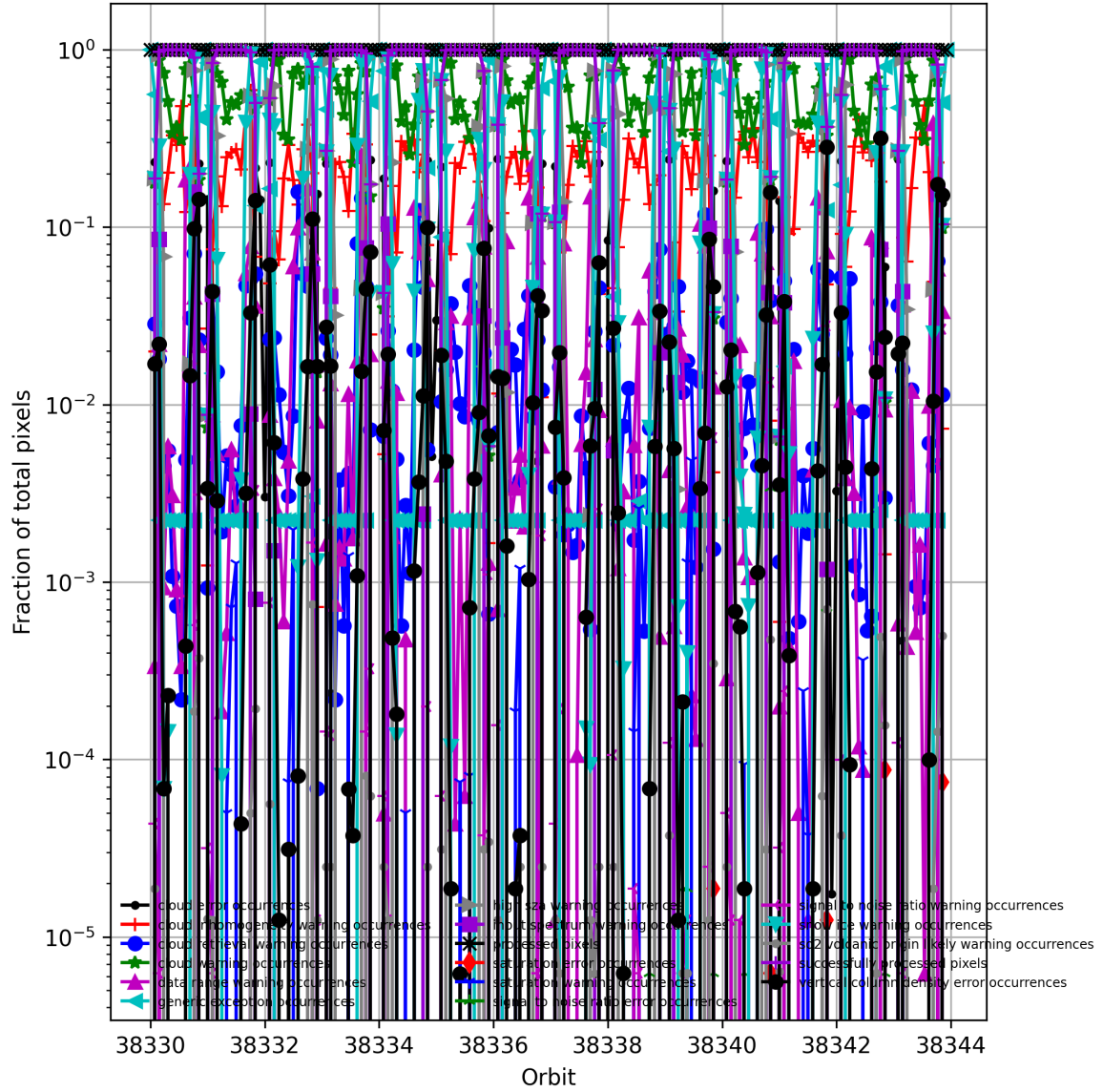


Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

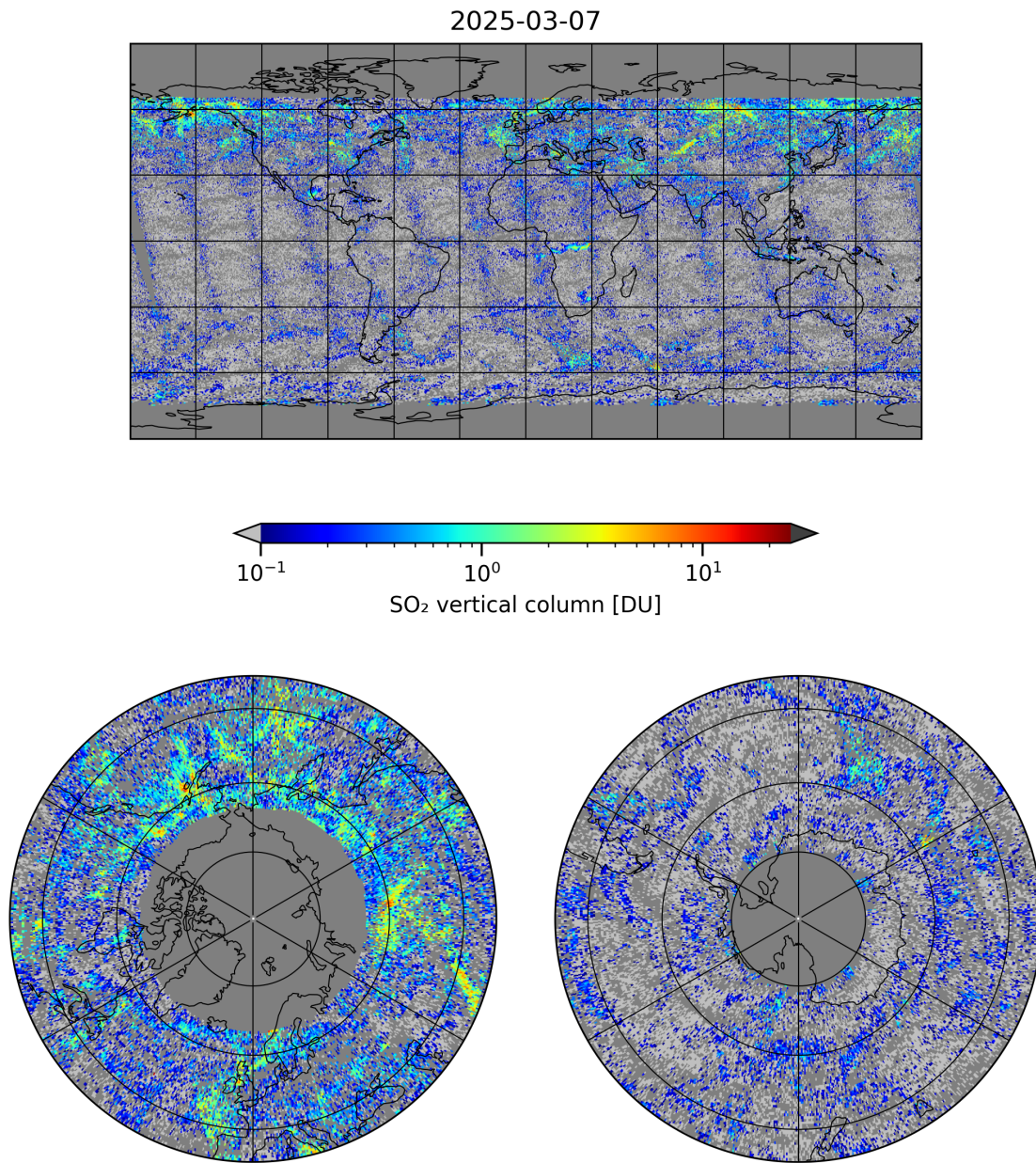


Figure 4: Map of “SO₂ vertical column” for 2025-03-07 to 2025-03-08

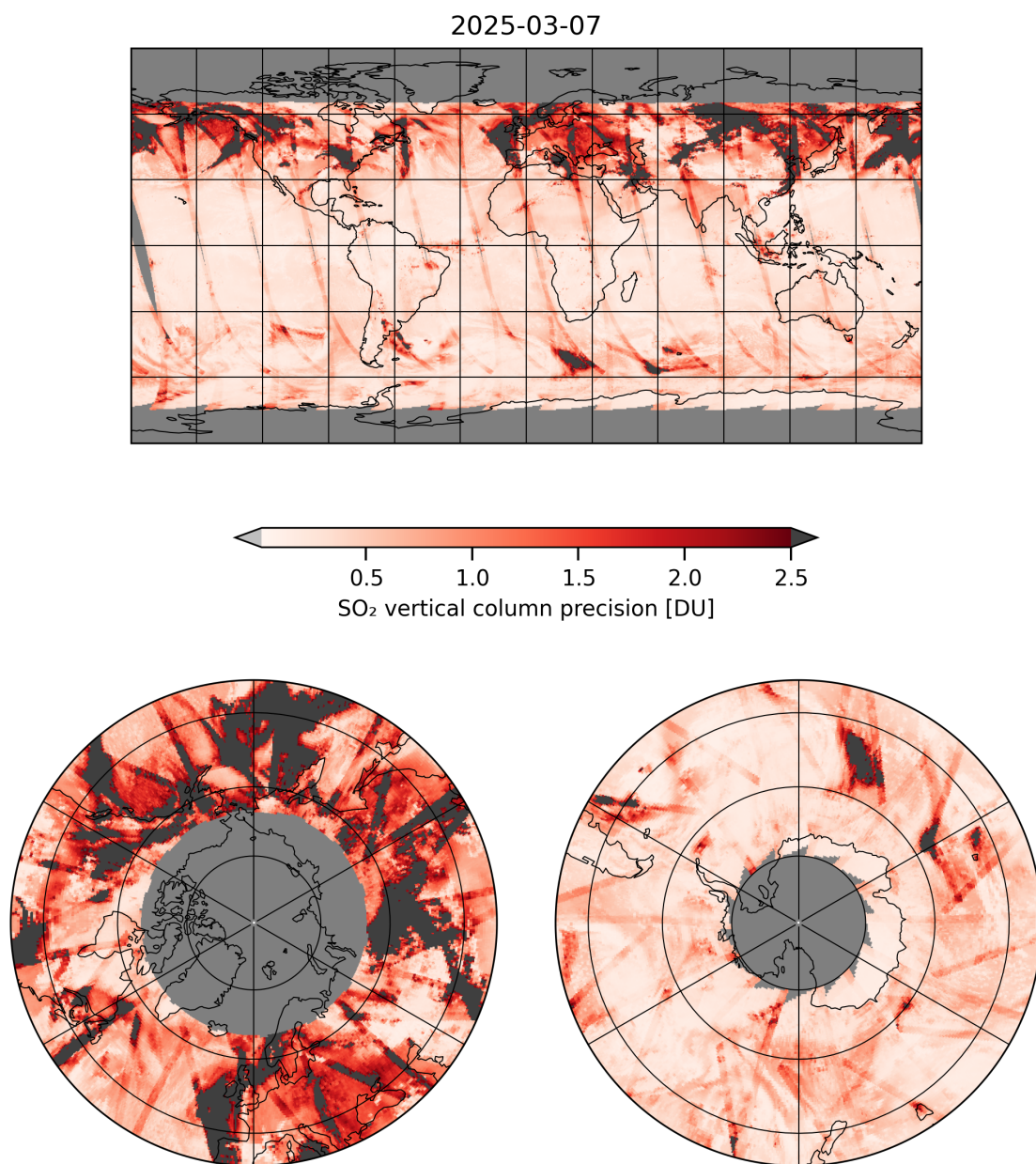


Figure 5: Map of “SO₂ vertical column precision” for 2025-03-07 to 2025-03-08

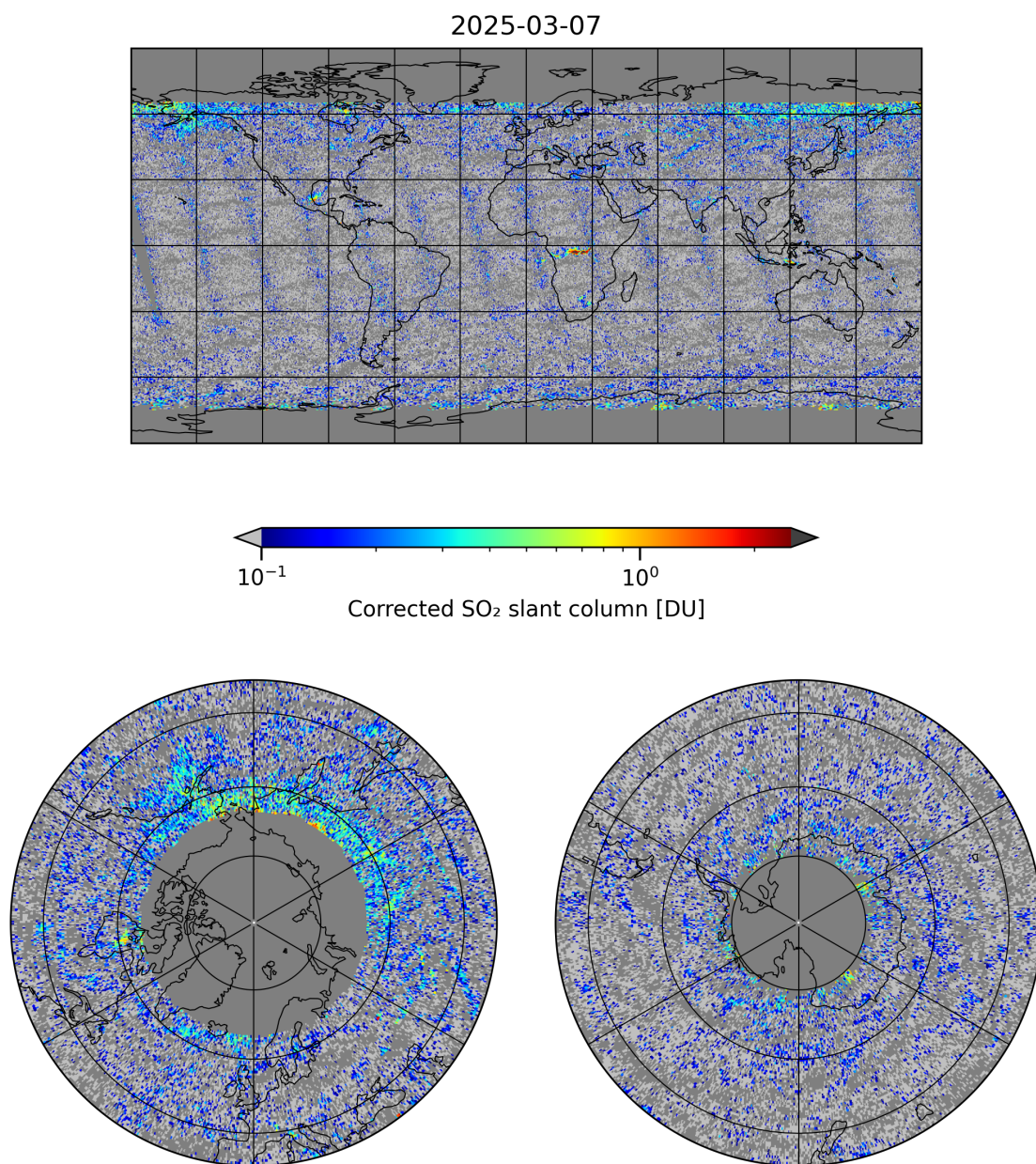


Figure 6: Map of “Corrected SO₂ slant column” for 2025-03-07 to 2025-03-08

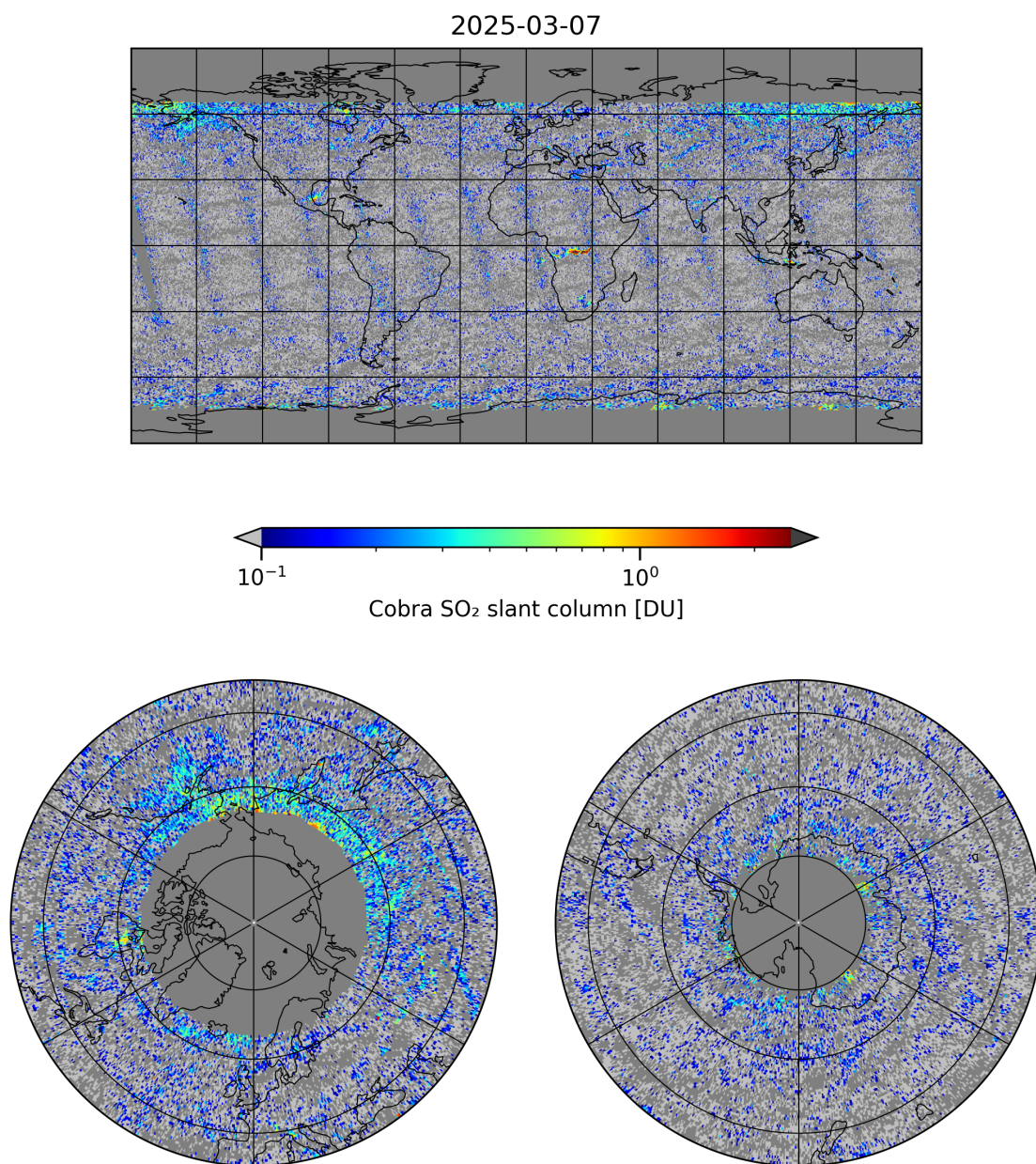


Figure 7: Map of “Cobra SO₂ slant column” for 2025-03-07 to 2025-03-08

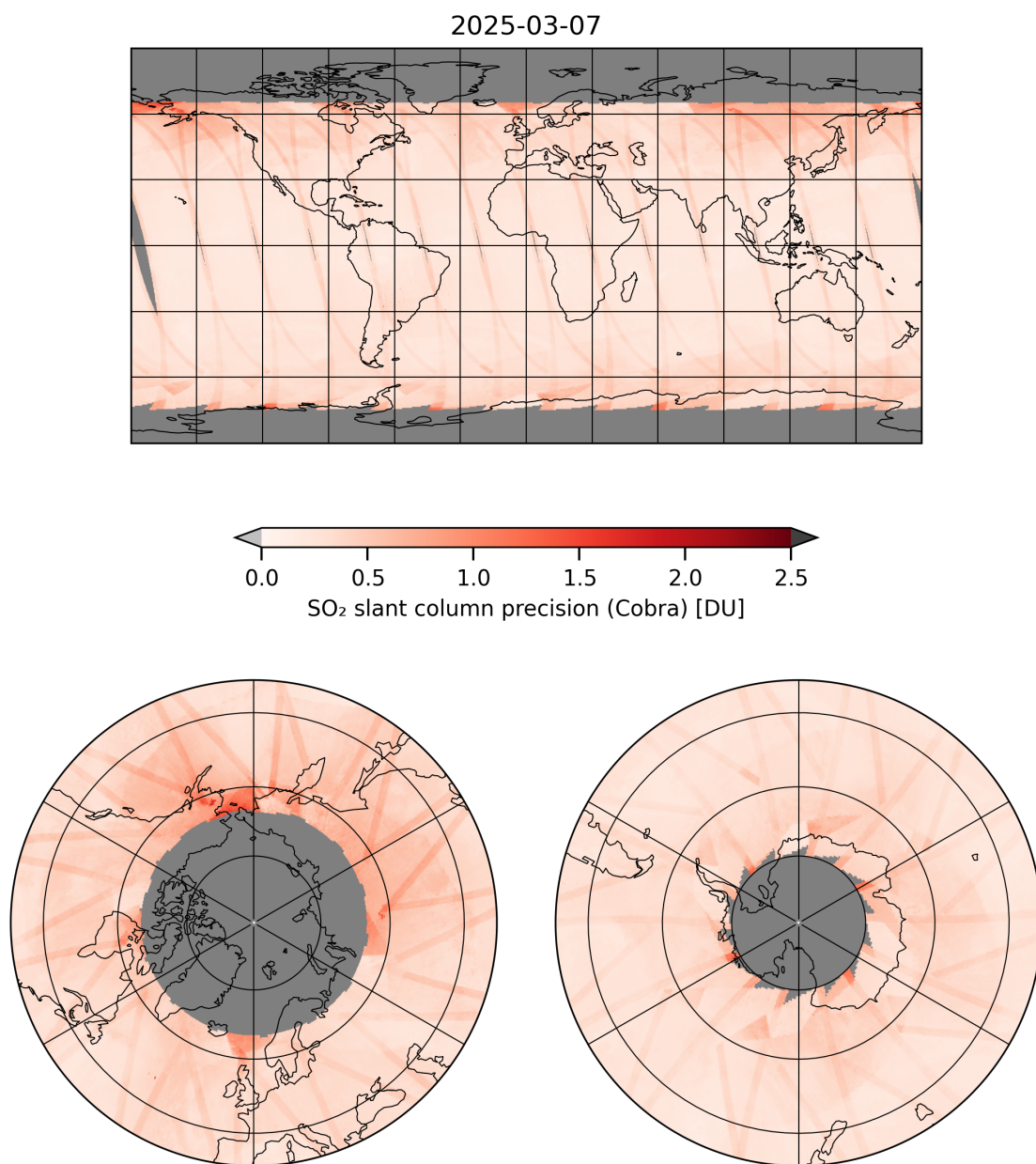


Figure 8: Map of “SO₂ slant column precision (Cobra)” for 2025-03-07 to 2025-03-08

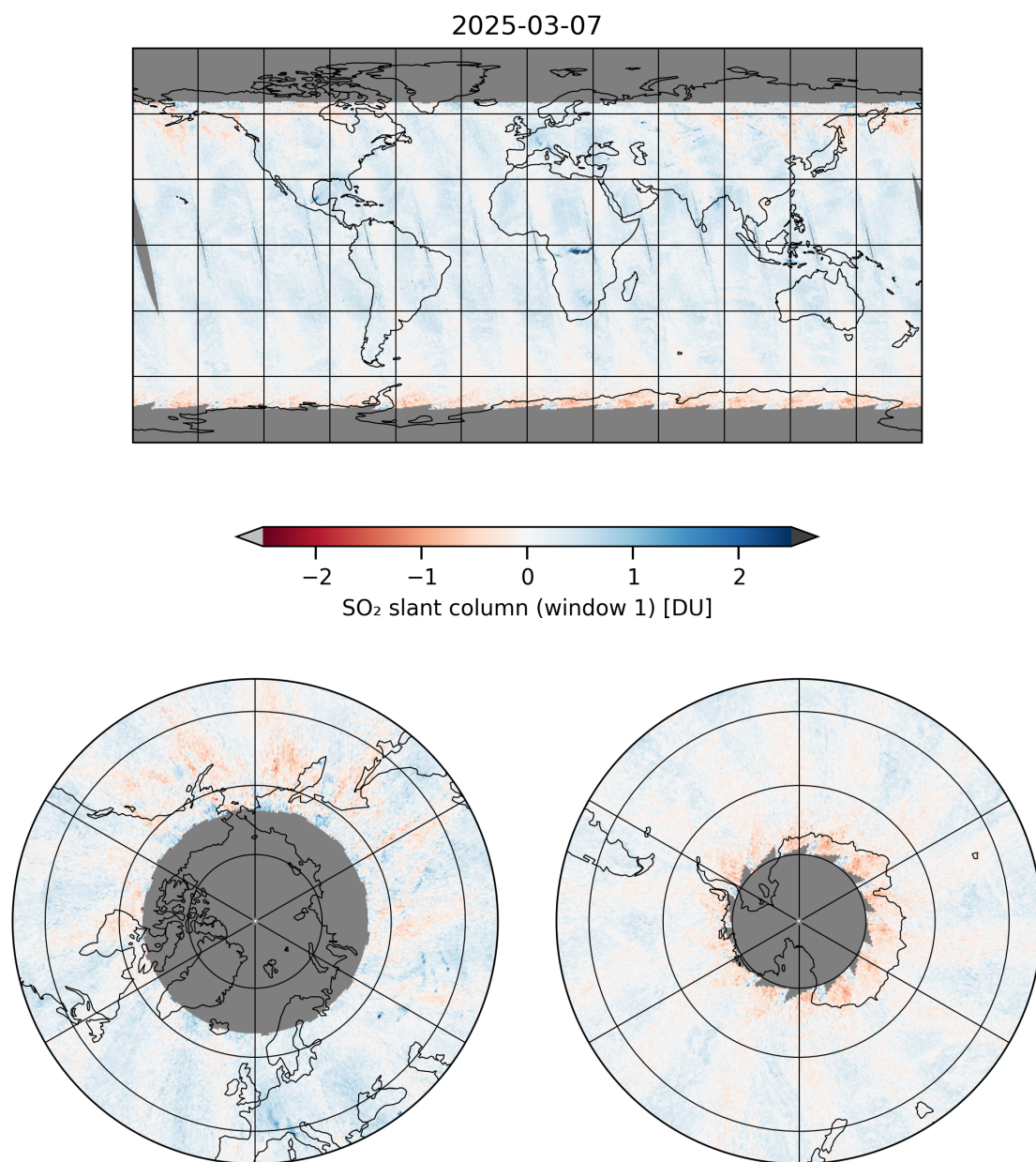


Figure 9: Map of “SO₂ slant column (window 1)” for 2025-03-07 to 2025-03-08

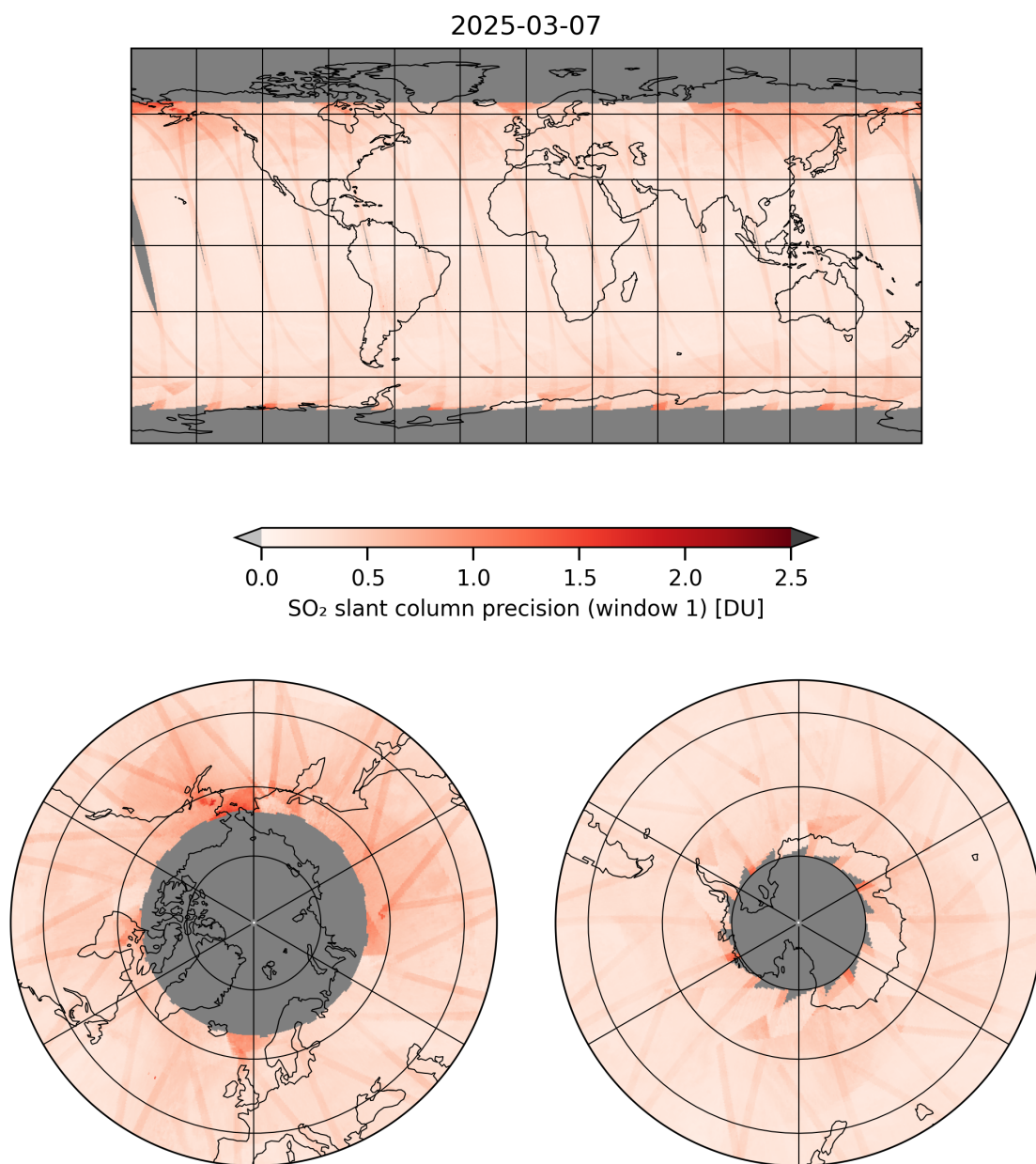


Figure 10: Map of “SO₂ slant column precision (window 1)” for 2025-03-07 to 2025-03-08

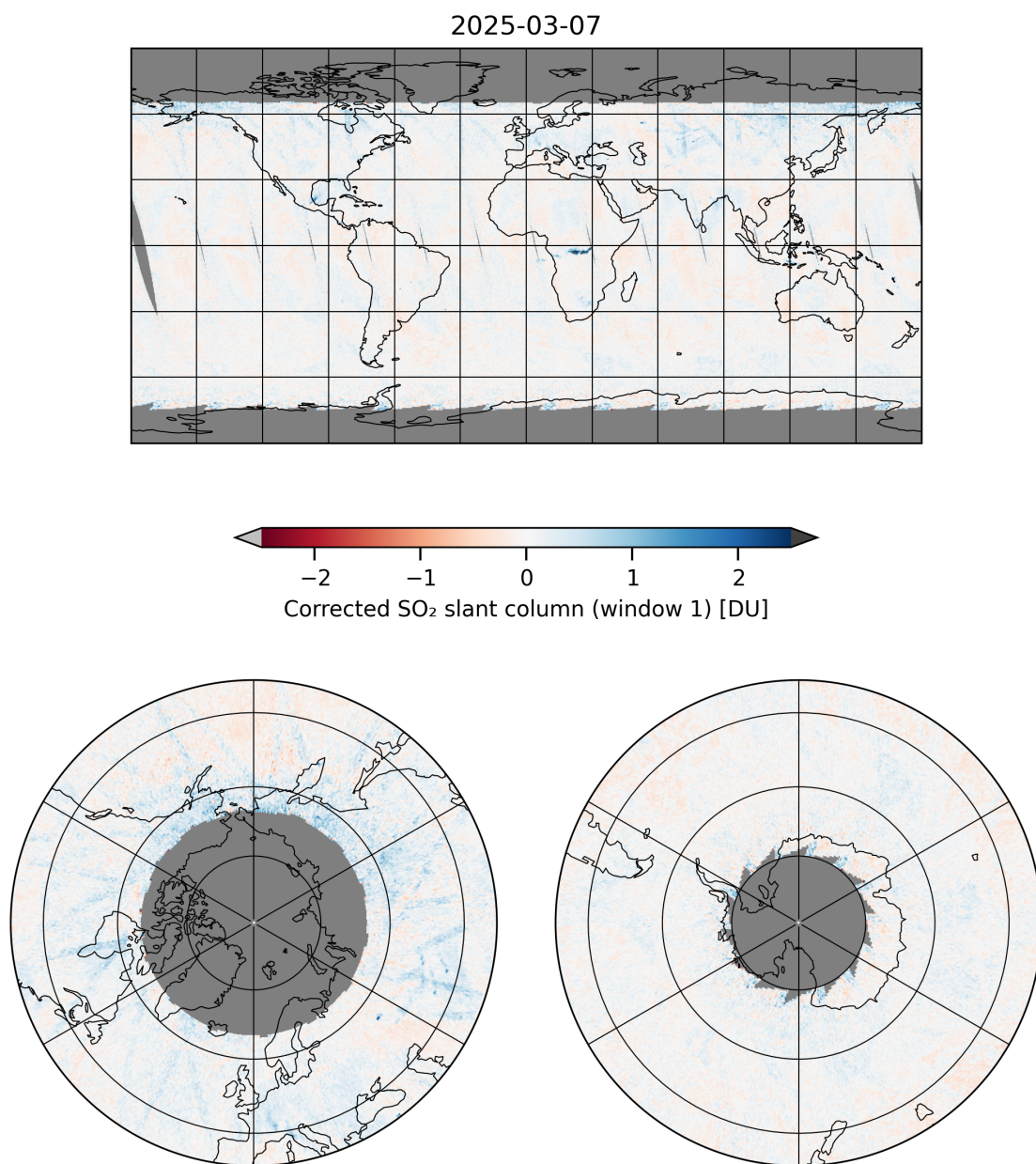


Figure 11: Map of “Corrected SO₂ slant column (window 1)” for 2025-03-07 to 2025-03-08

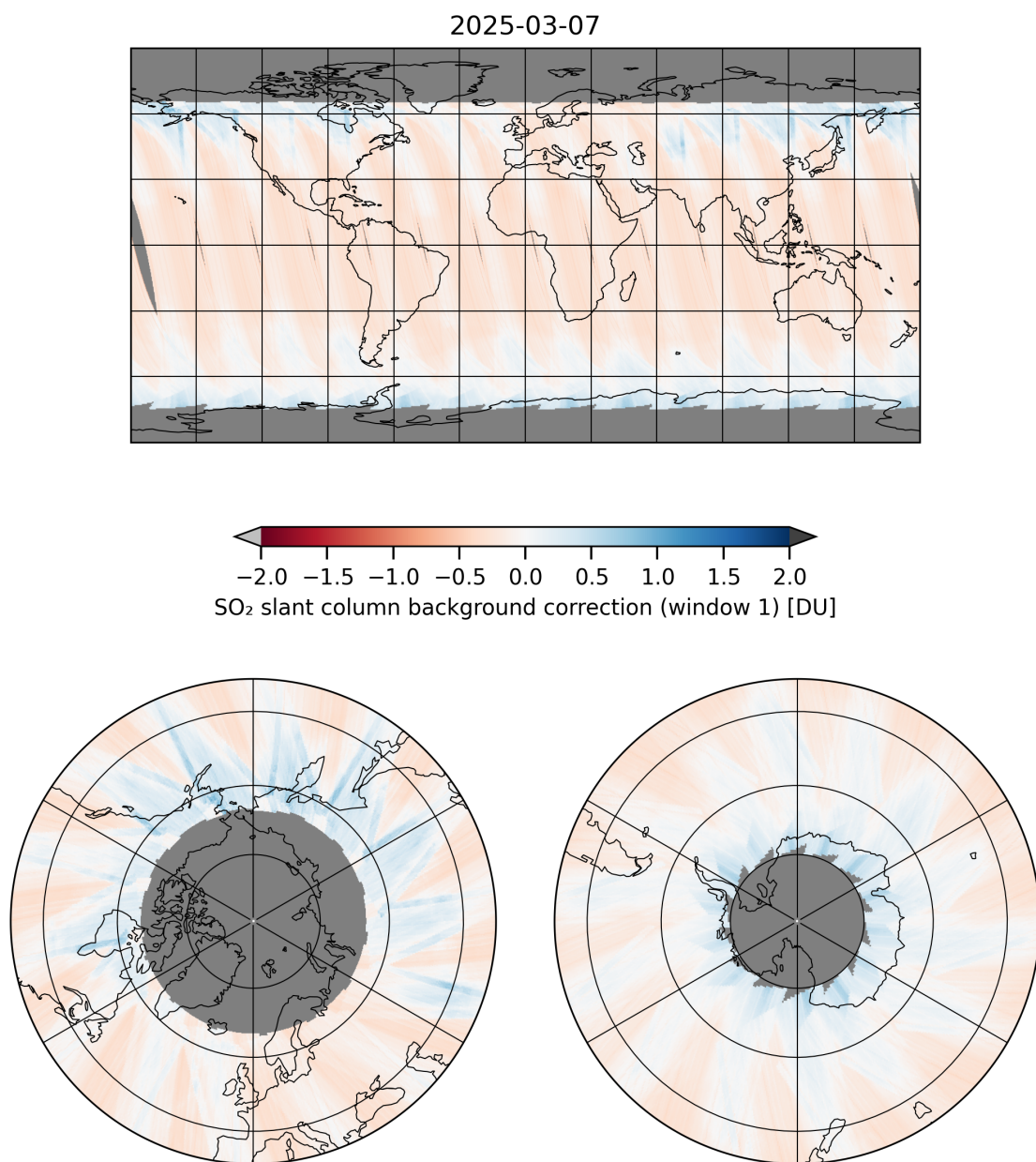


Figure 12: Map of “SO₂ slant column background correction (window 1)” for 2025-03-07 to 2025-03-08

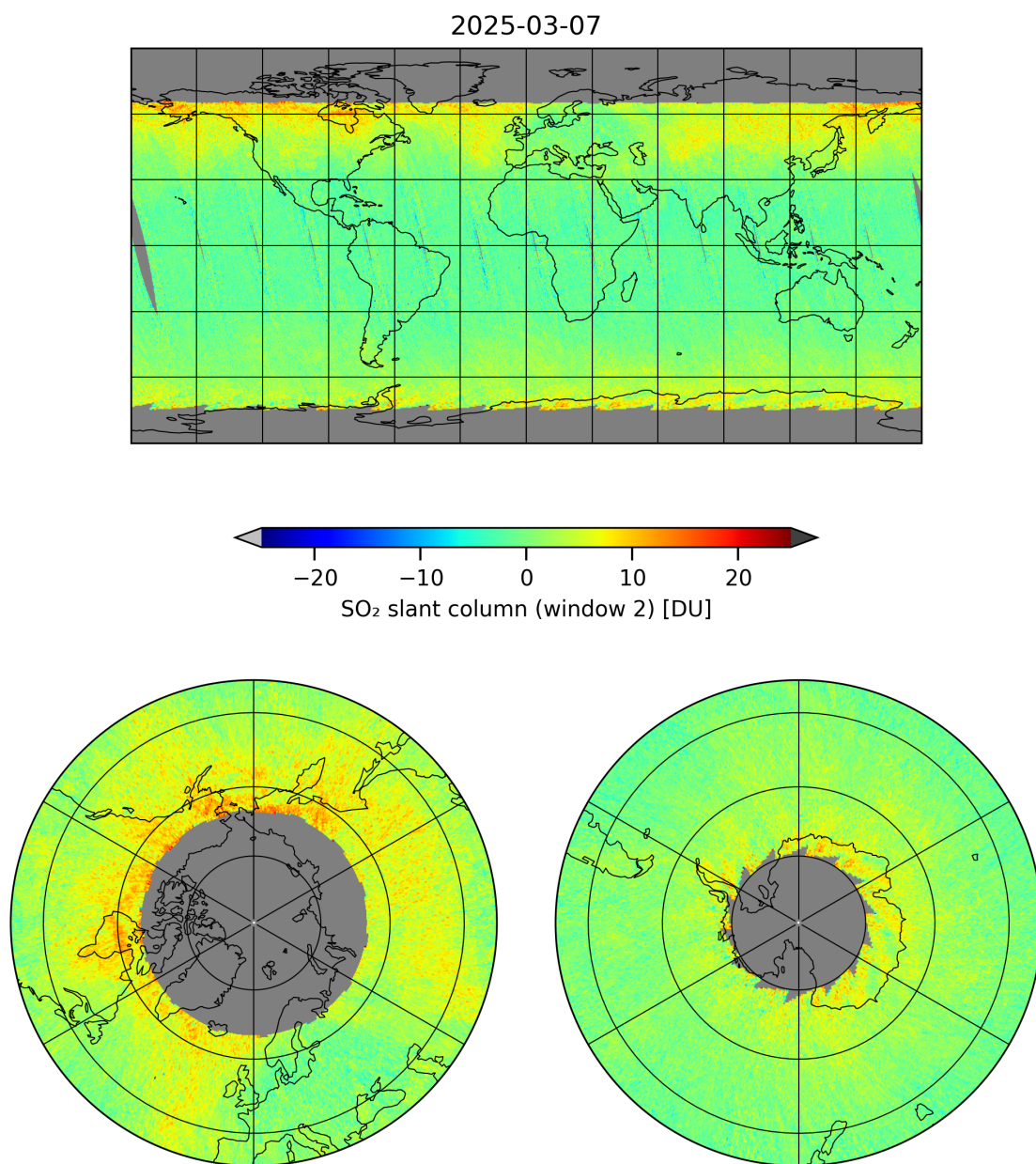


Figure 13: Map of “SO₂ slant column (window 2)” for 2025-03-07 to 2025-03-08

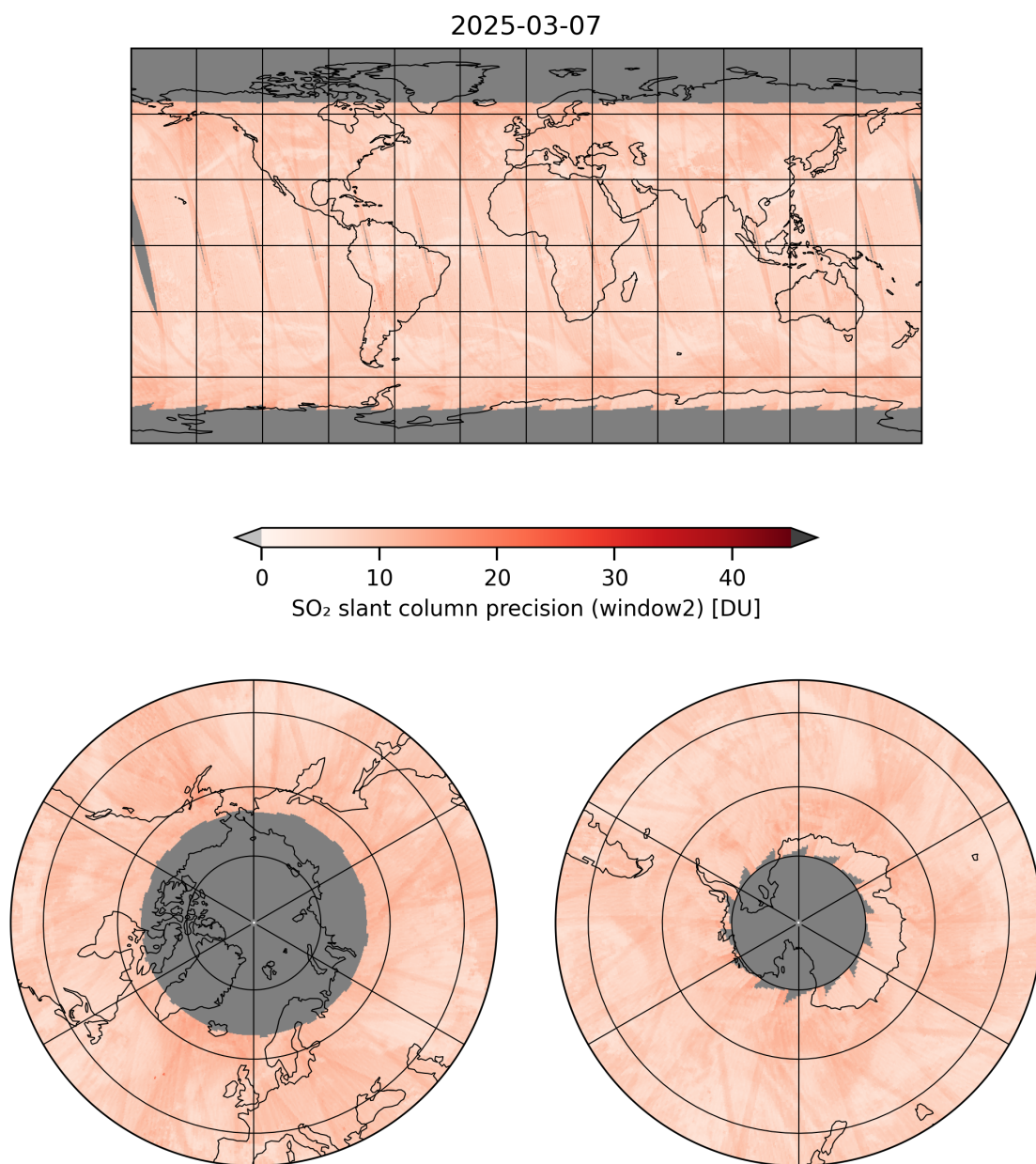


Figure 14: Map of “SO₂ slant column precision (window2)” for 2025-03-07 to 2025-03-08

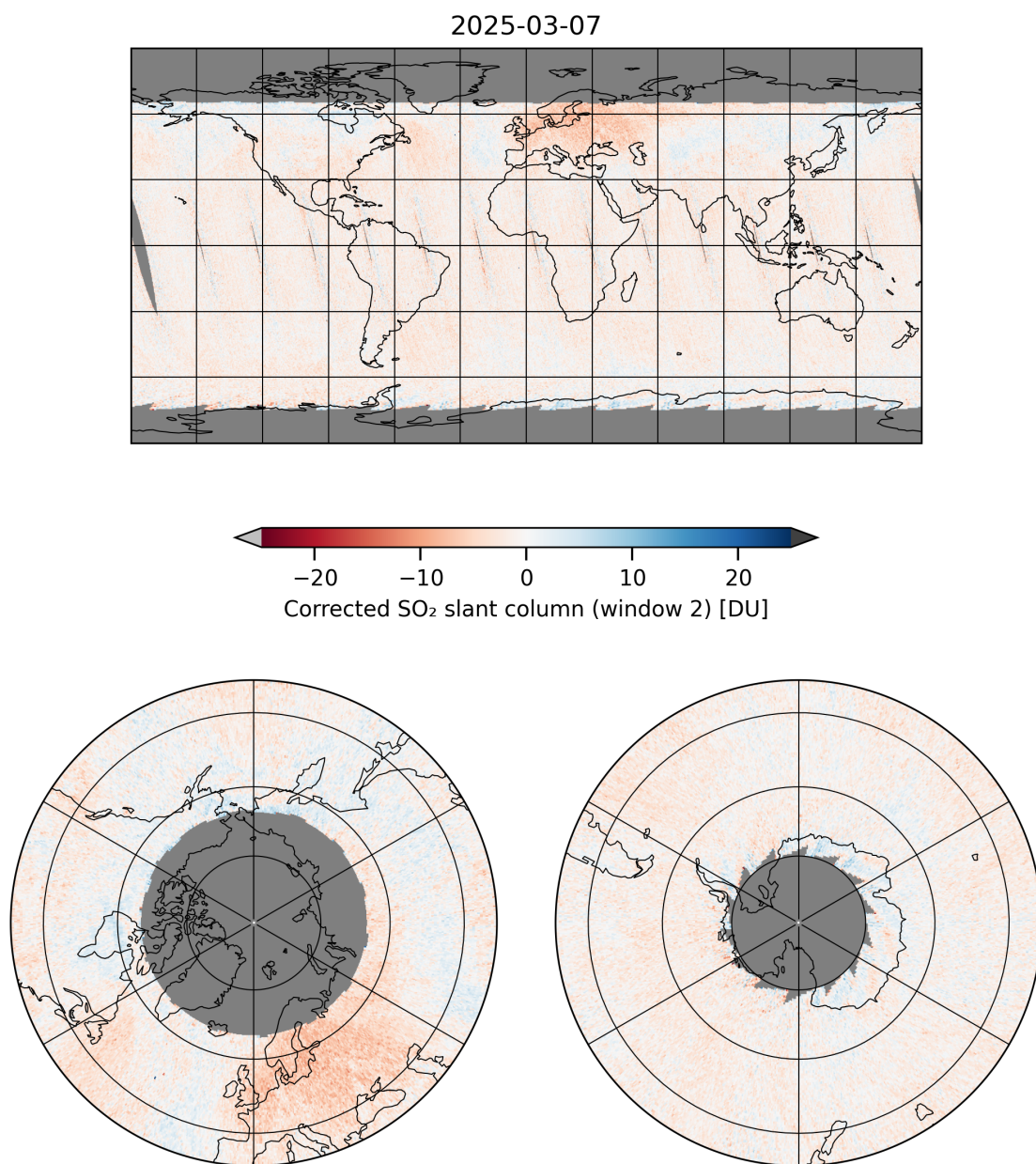


Figure 15: Map of “Corrected SO₂ slant column (window 2)” for 2025-03-07 to 2025-03-08

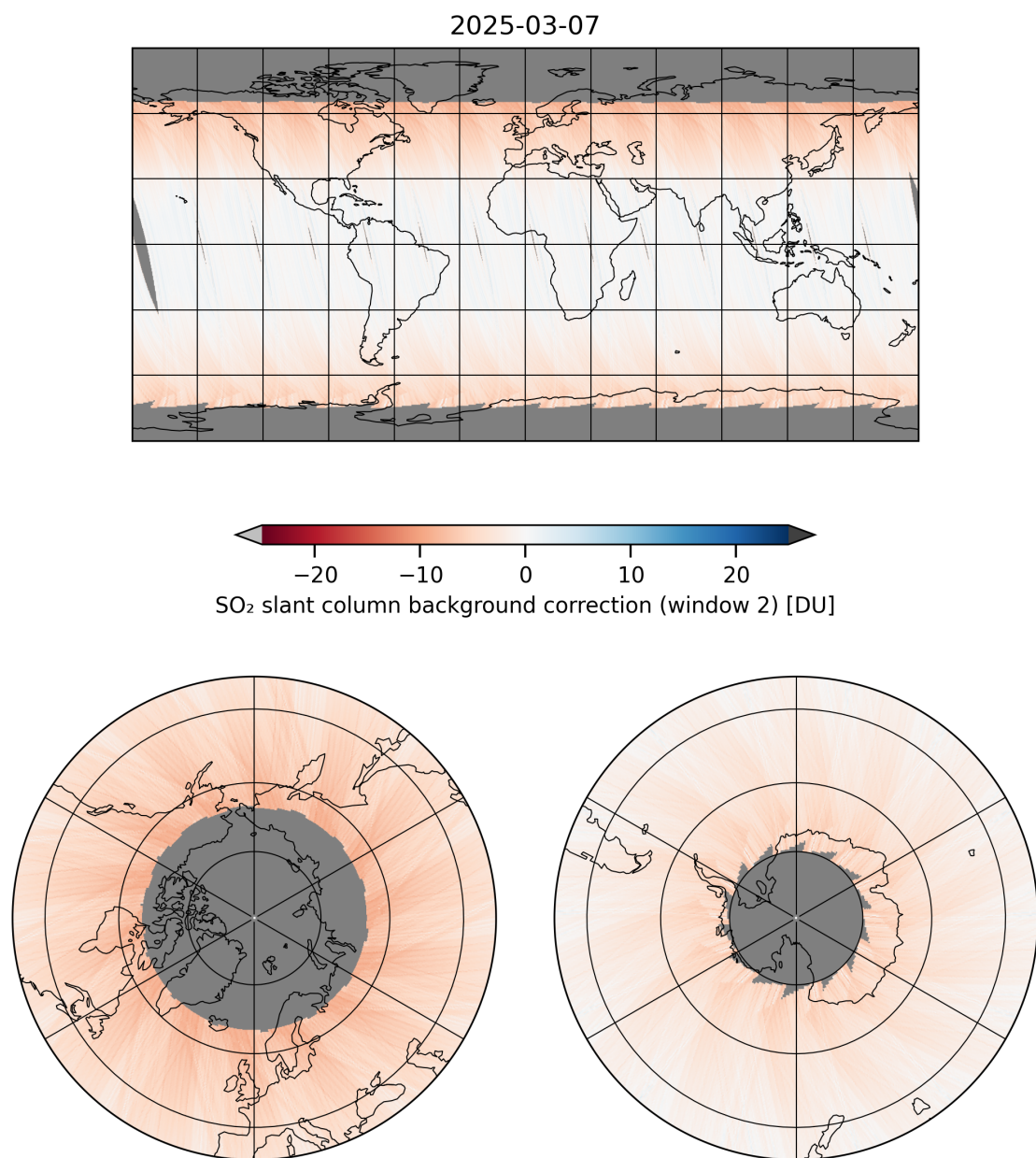


Figure 16: Map of “SO₂ slant column background correction (window 2)” for 2025-03-07 to 2025-03-08

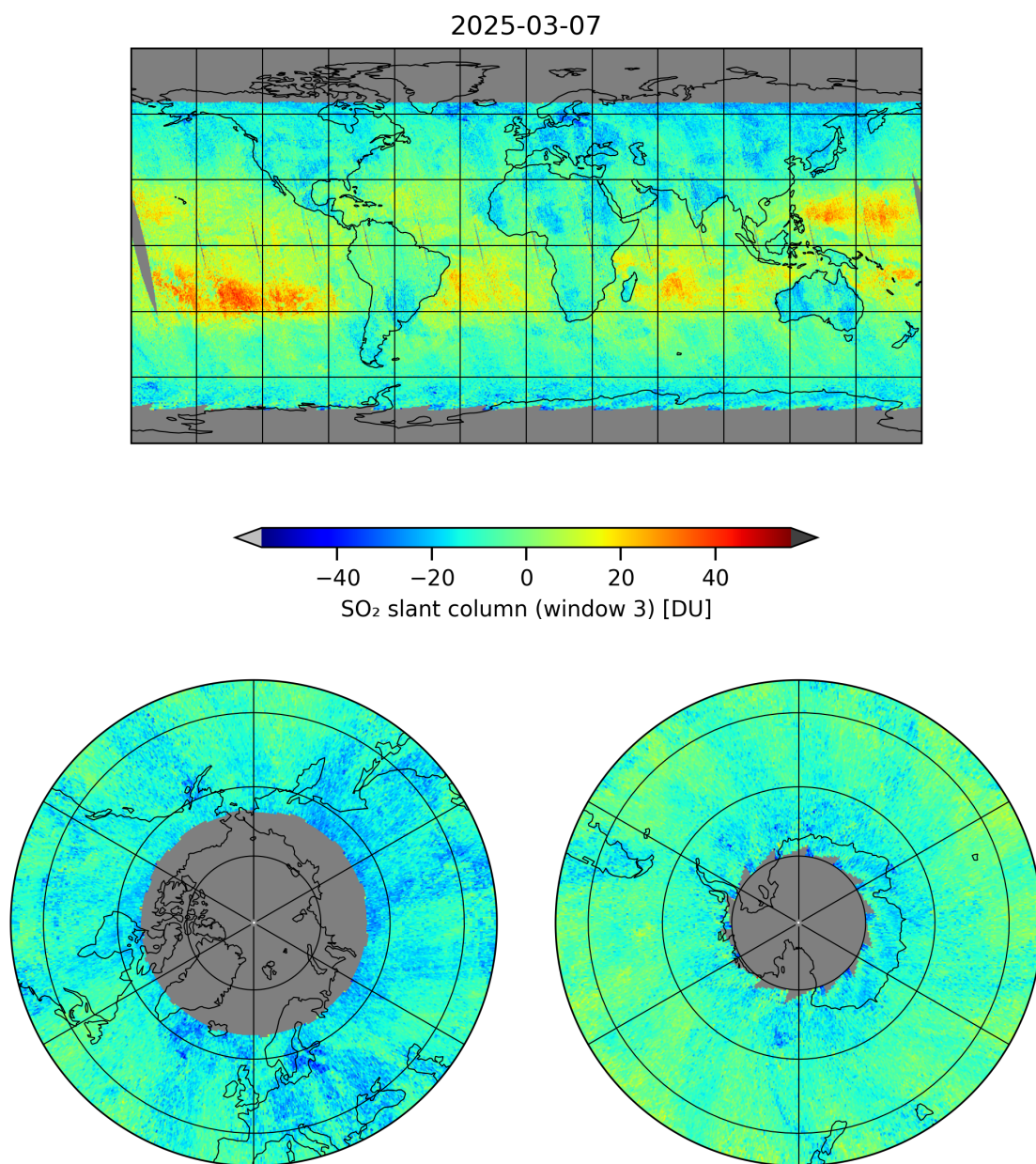


Figure 17: Map of “SO₂ slant column (window 3)” for 2025-03-07 to 2025-03-08

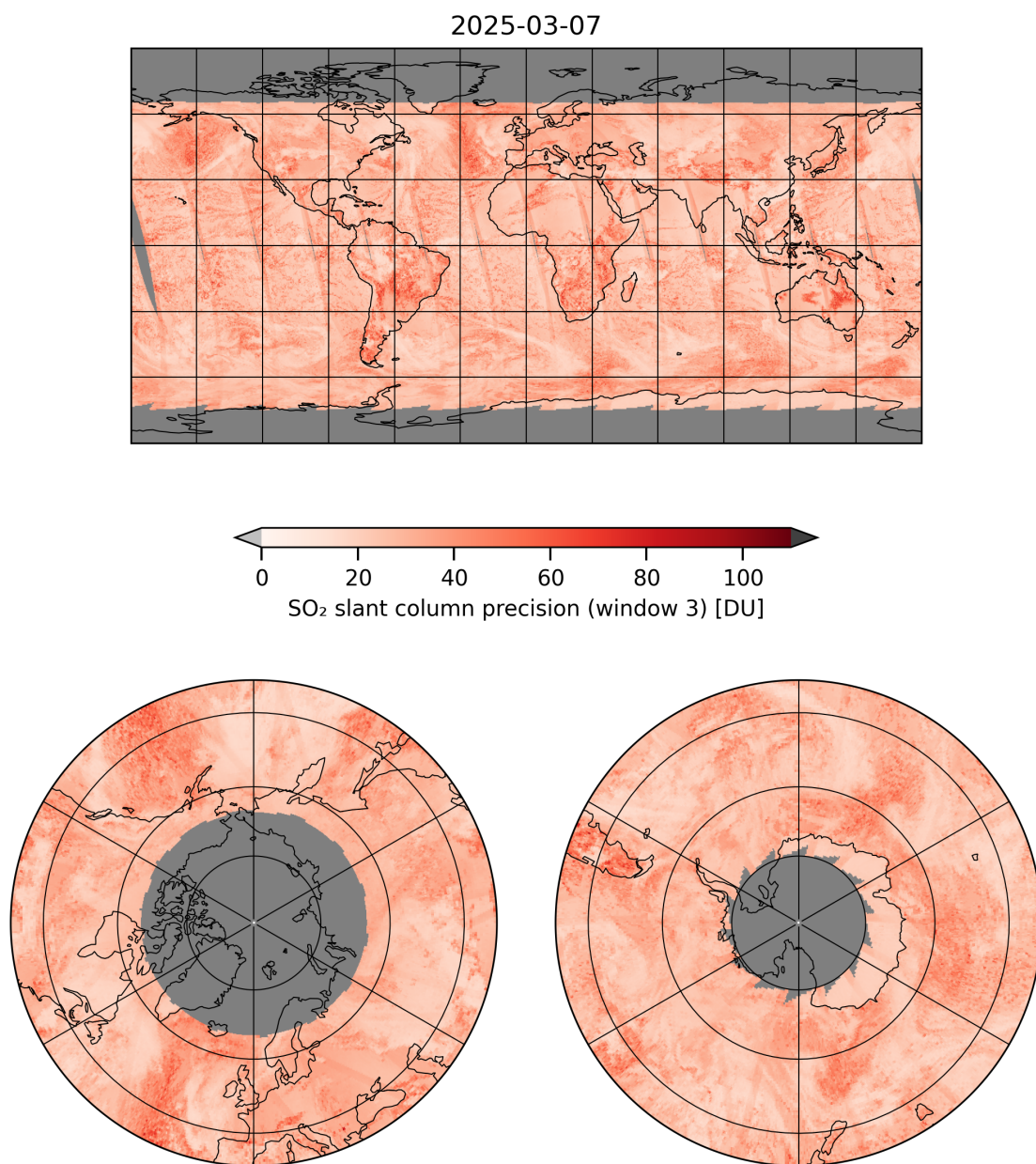


Figure 18: Map of “SO₂ slant column precision (window 3)” for 2025-03-07 to 2025-03-08

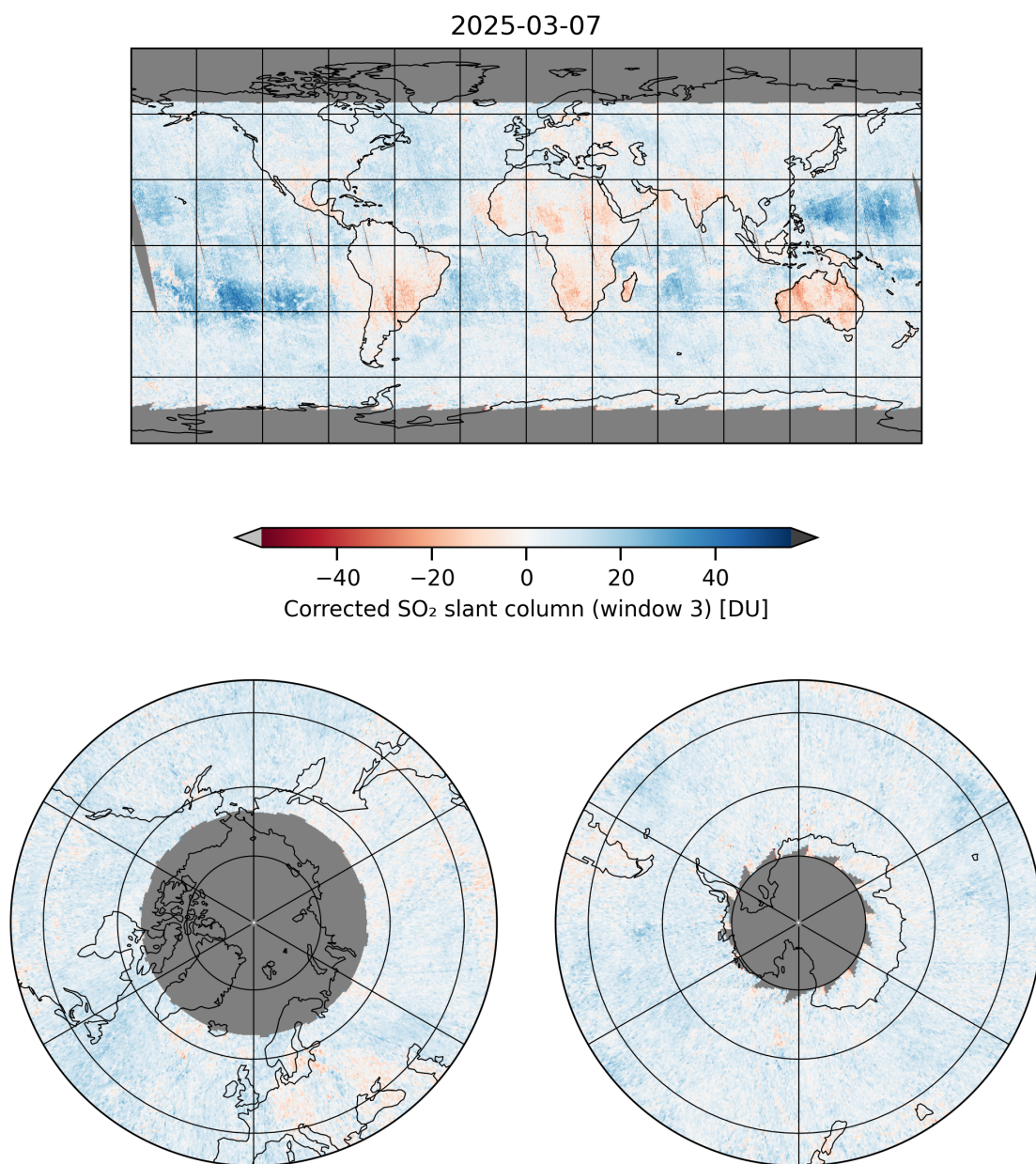


Figure 19: Map of “Corrected SO₂ slant column (window 3)” for 2025-03-07 to 2025-03-08

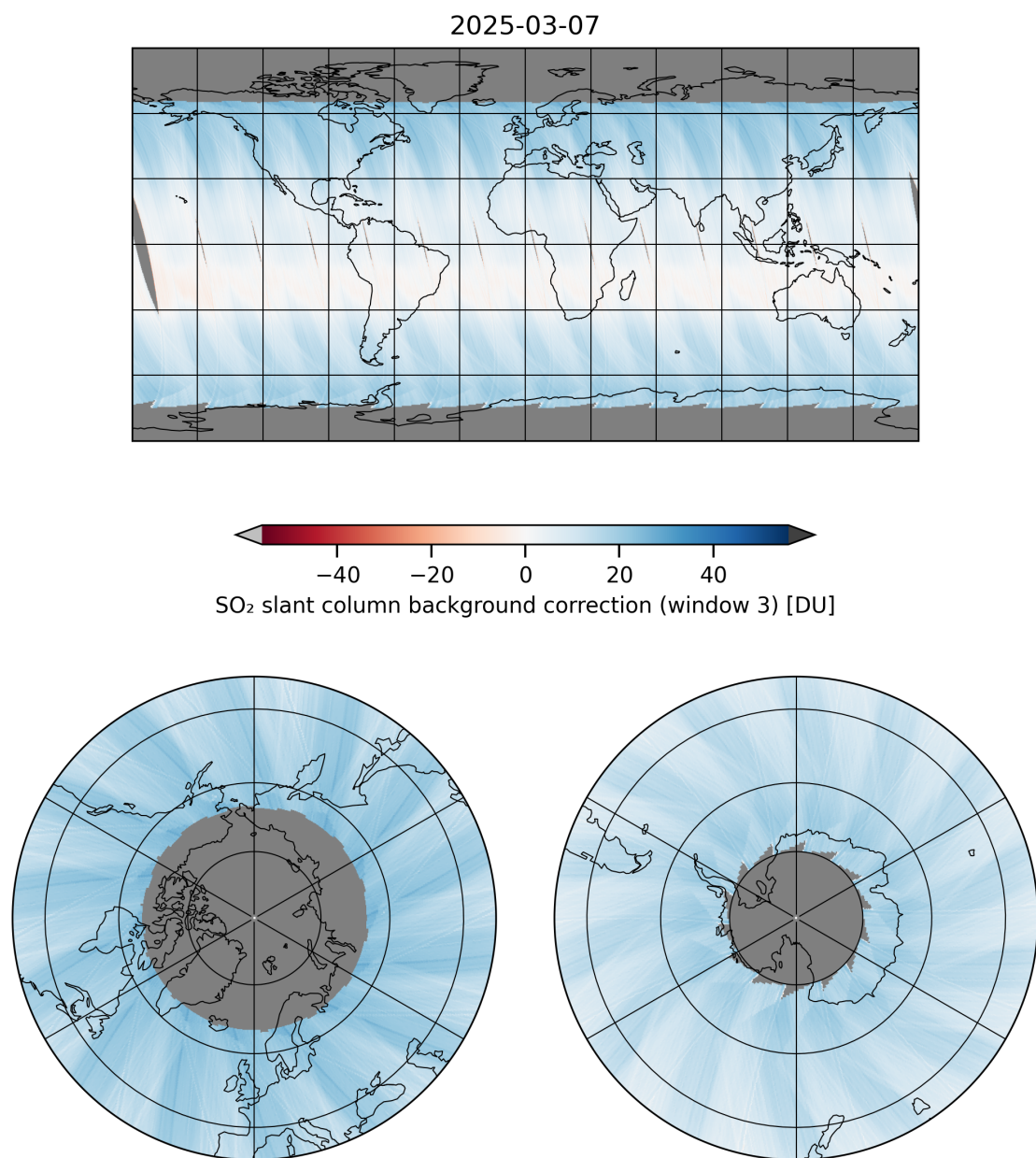


Figure 20: Map of “SO₂ slant column background correction (window 3)” for 2025-03-07 to 2025-03-08

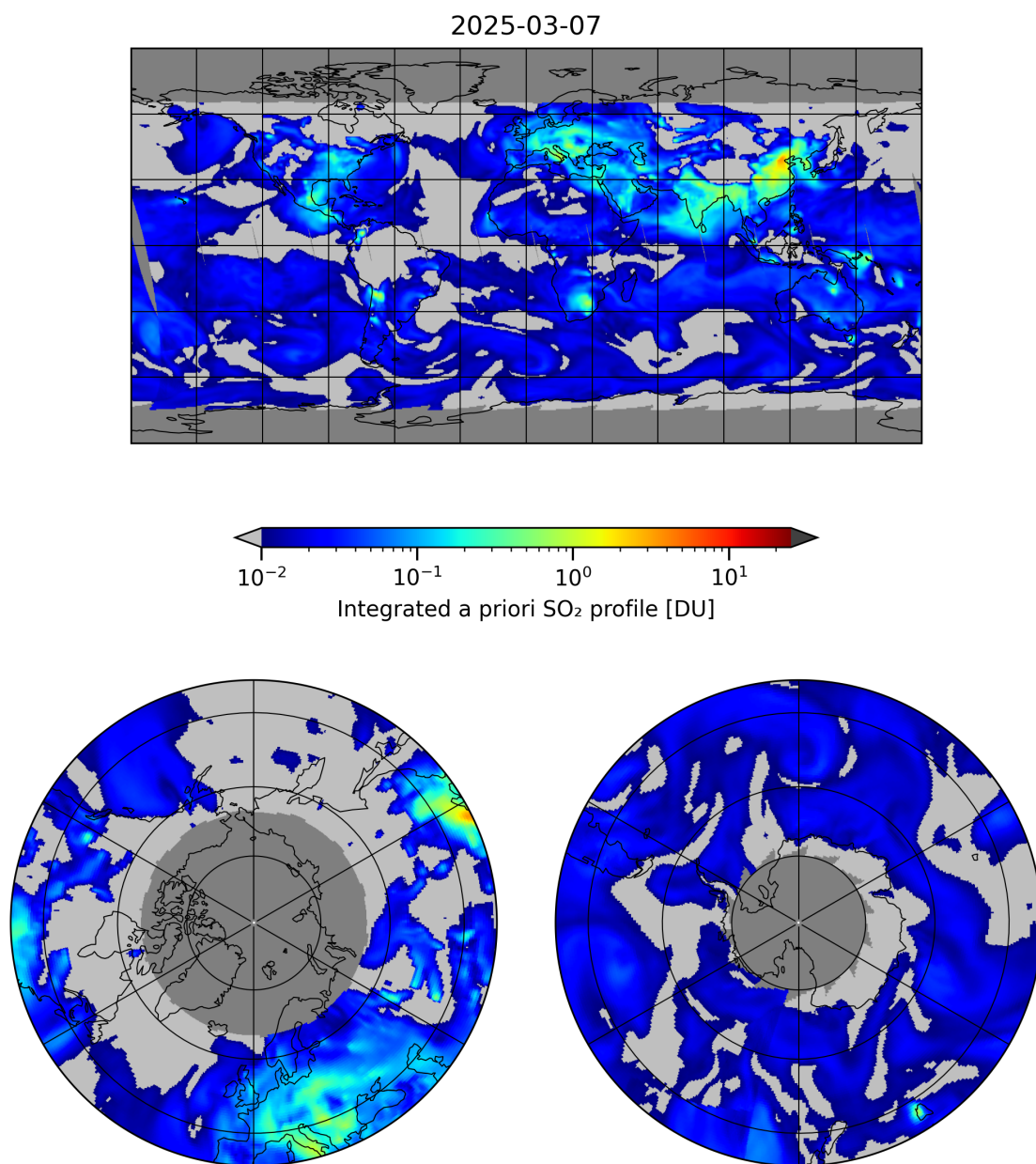


Figure 21: Map of “Integrated a priori SO₂ profile” for 2025-03-07 to 2025-03-08

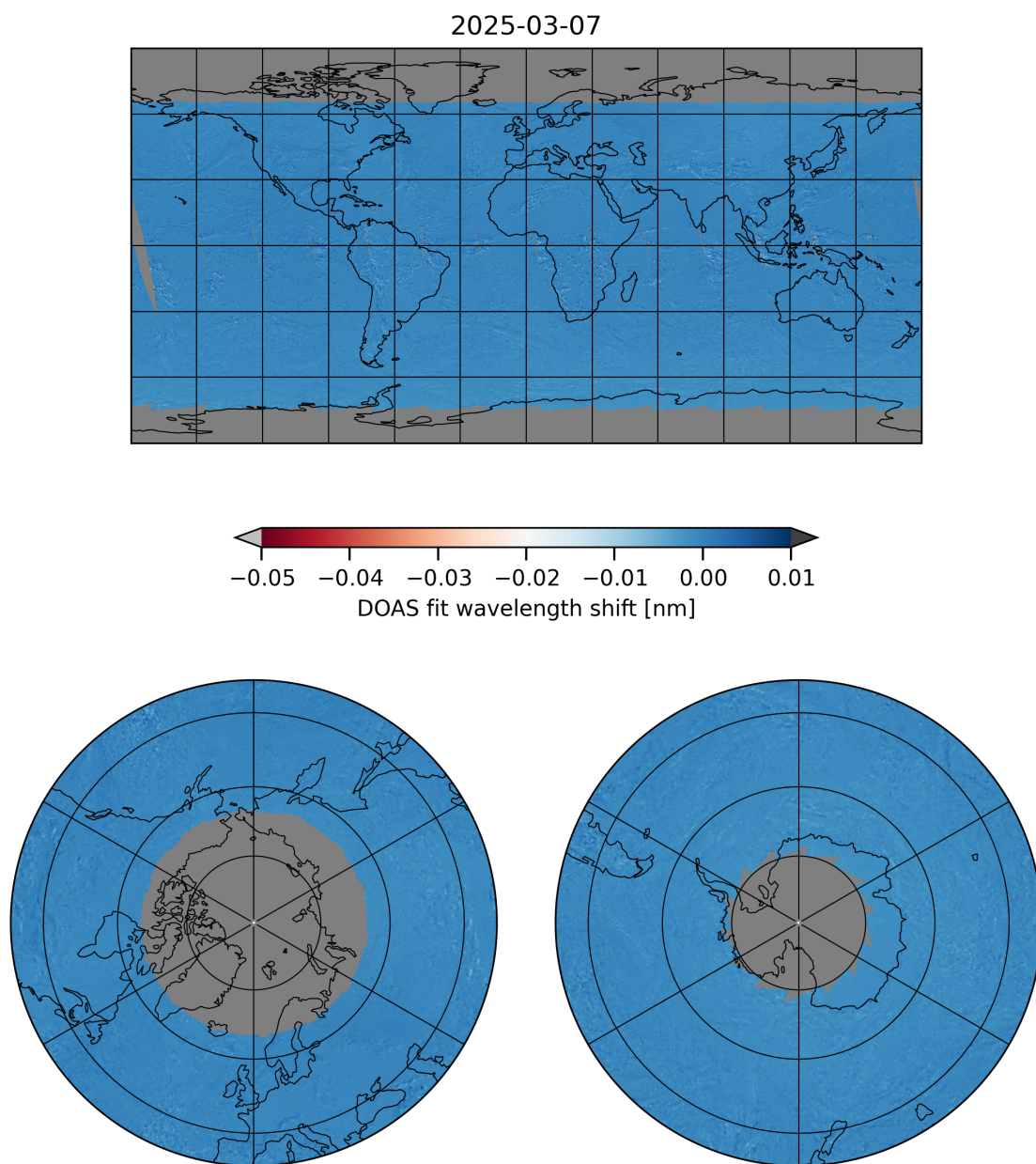


Figure 22: Map of “DOAS fit wavelength shift” for 2025-03-07 to 2025-03-08

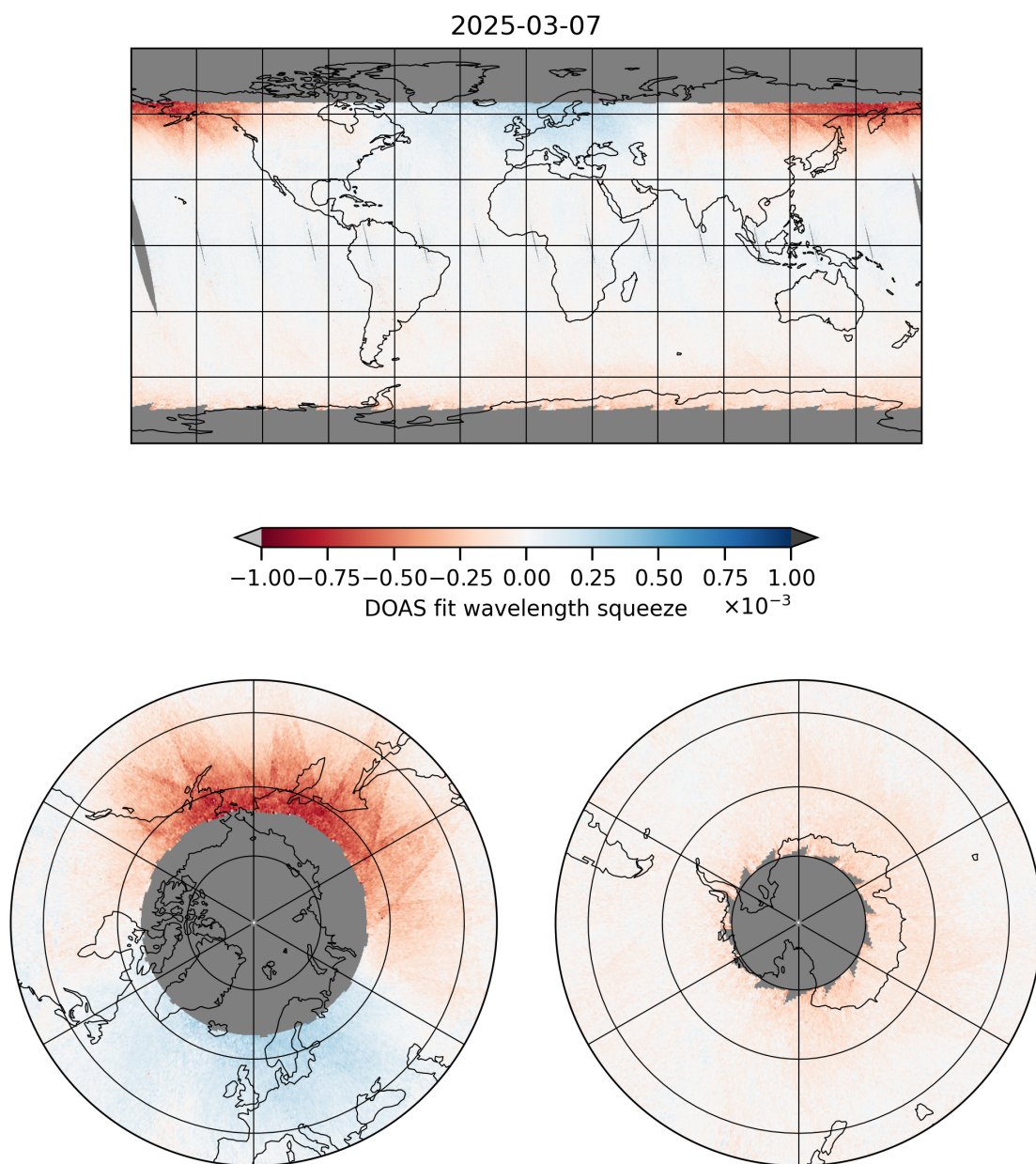


Figure 23: Map of “DOAS fit wavelength squeeze” for 2025-03-07 to 2025-03-08

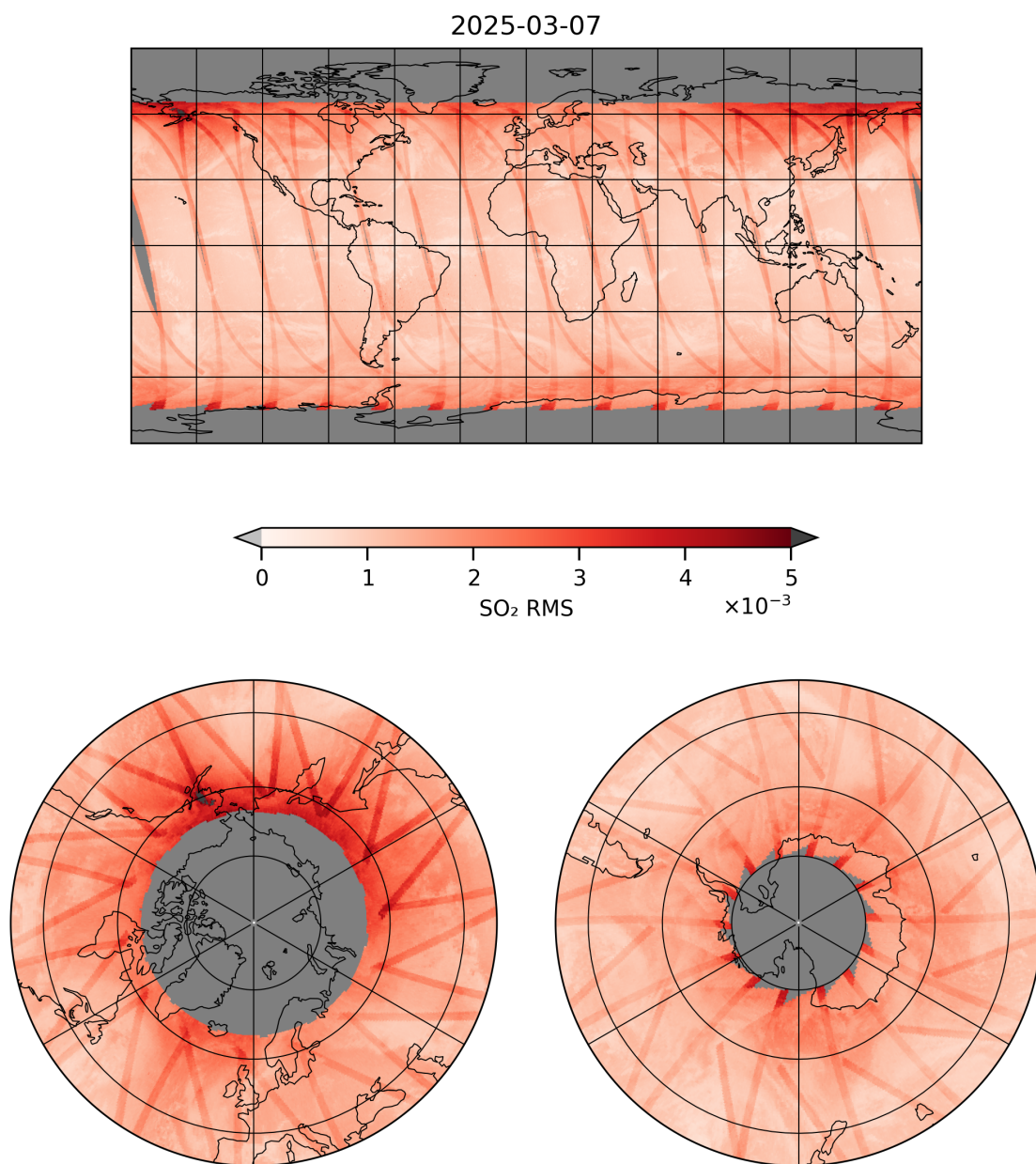


Figure 24: Map of “SO₂ RMS” for 2025-03-07 to 2025-03-08

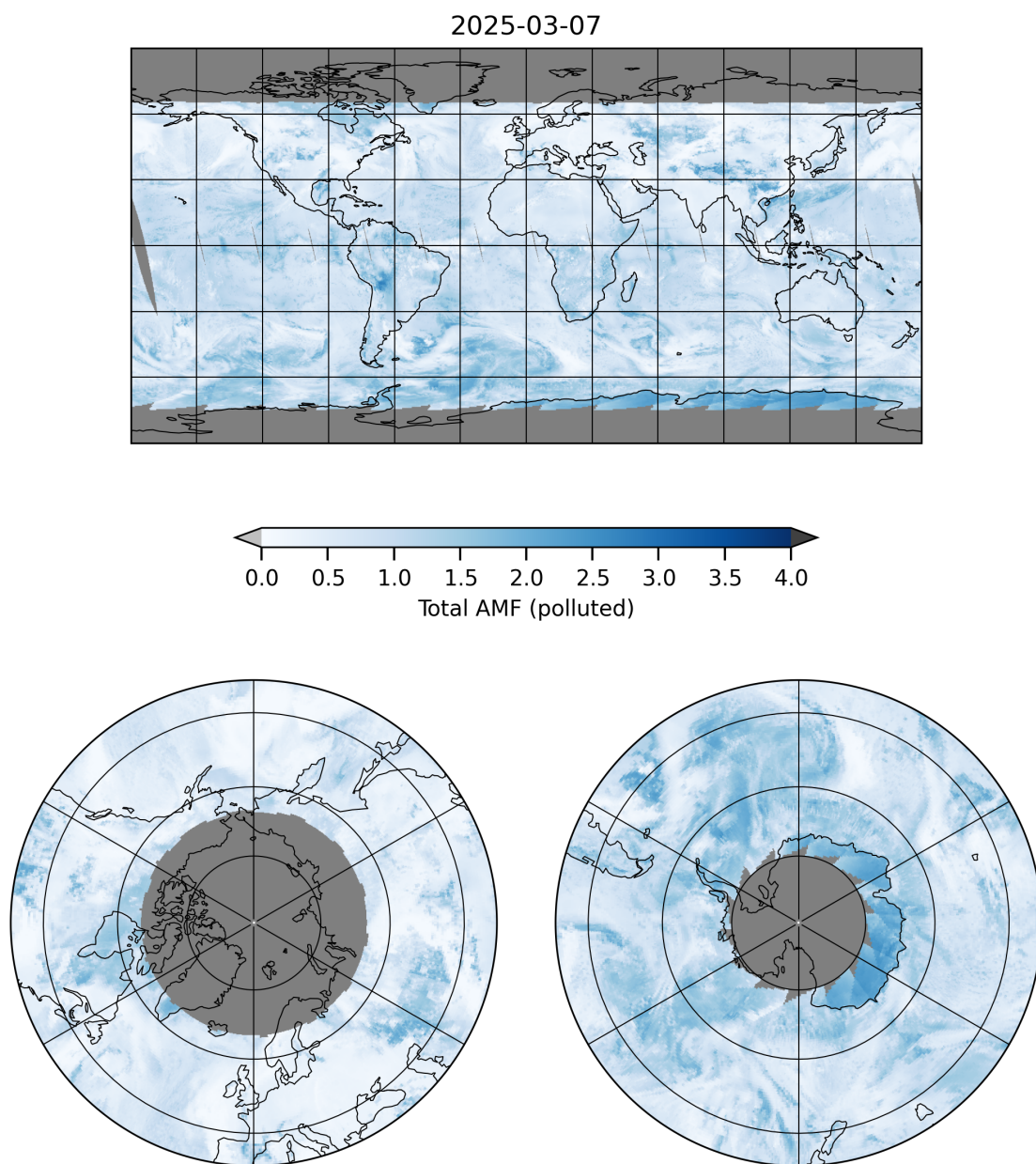


Figure 25: Map of “Total AMF (polluted)” for 2025-03-07 to 2025-03-08

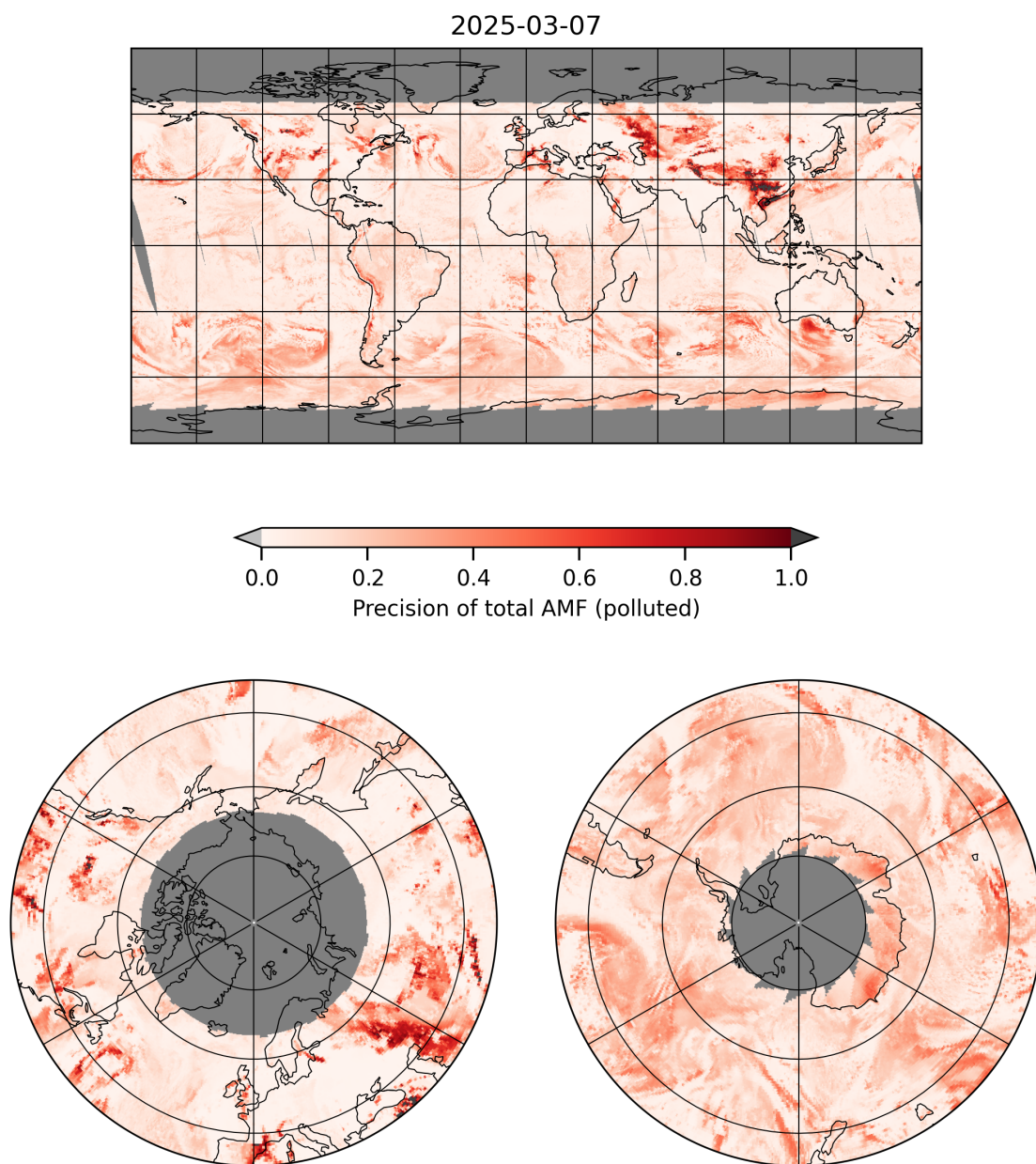


Figure 26: Map of “Precision of total AMF (polluted)” for 2025-03-07 to 2025-03-08

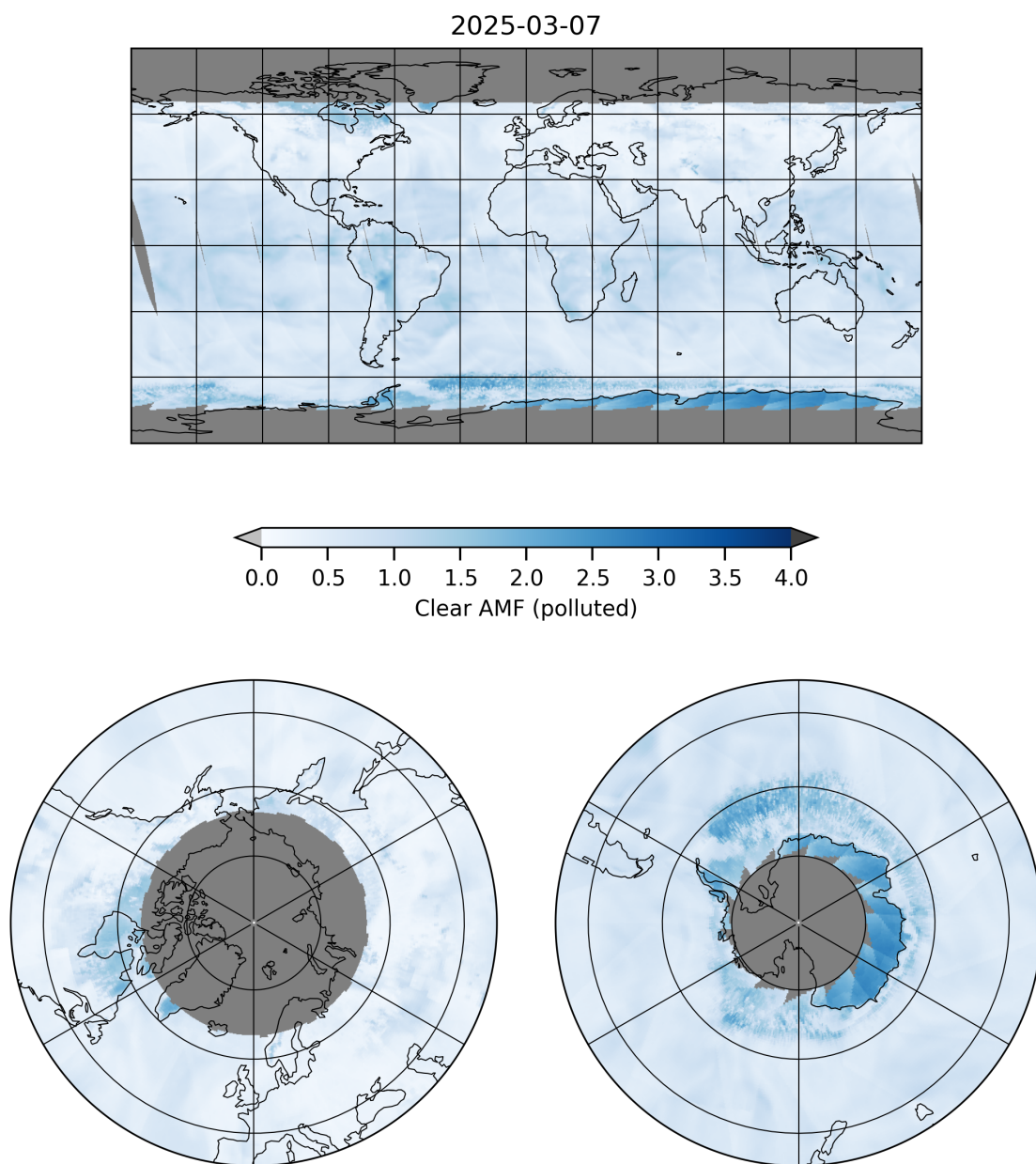


Figure 27: Map of “Clear AMF (polluted)” for 2025-03-07 to 2025-03-08

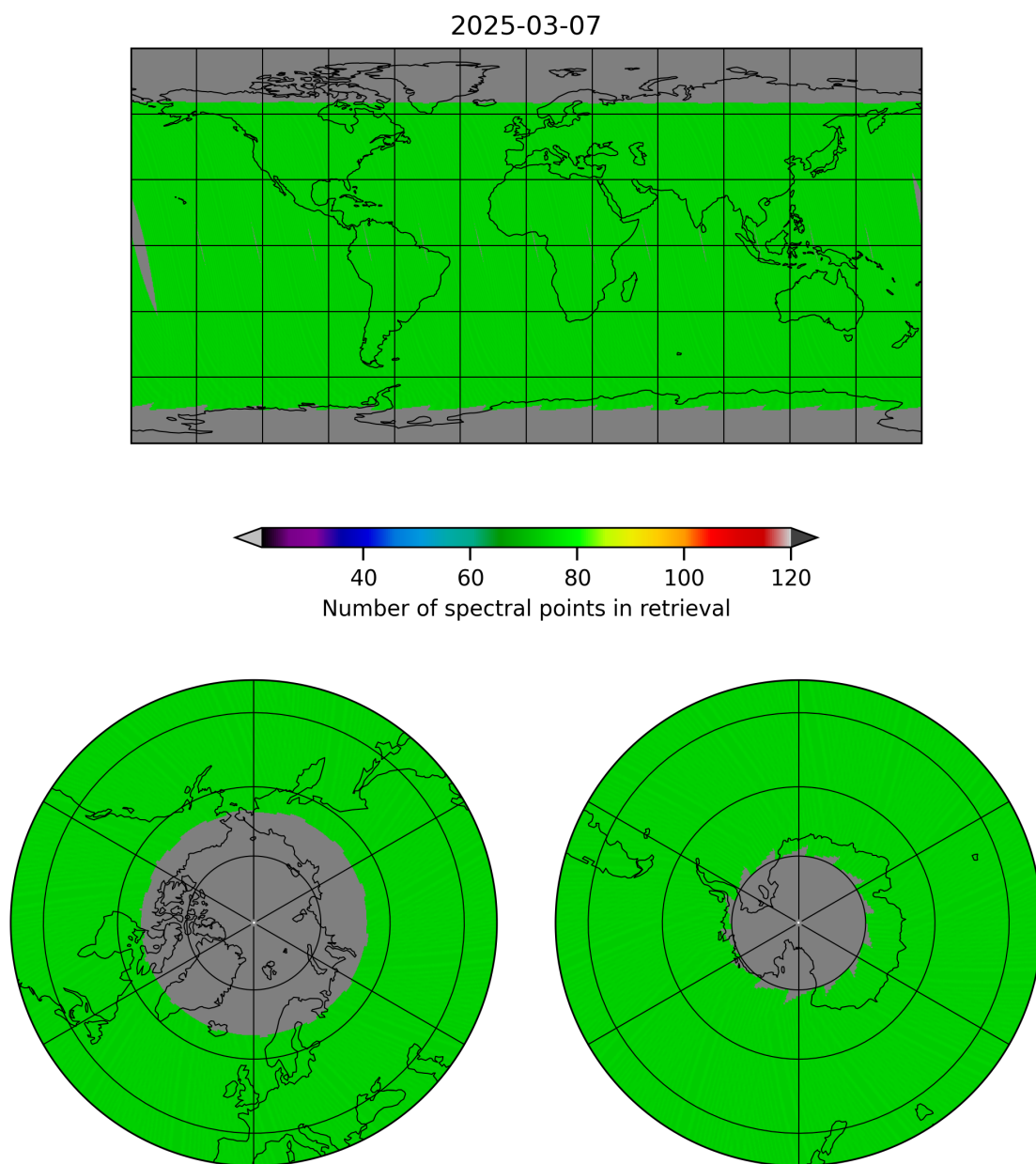


Figure 28: Map of “Number of spectral points in retrieval” for 2025-03-07 to 2025-03-08

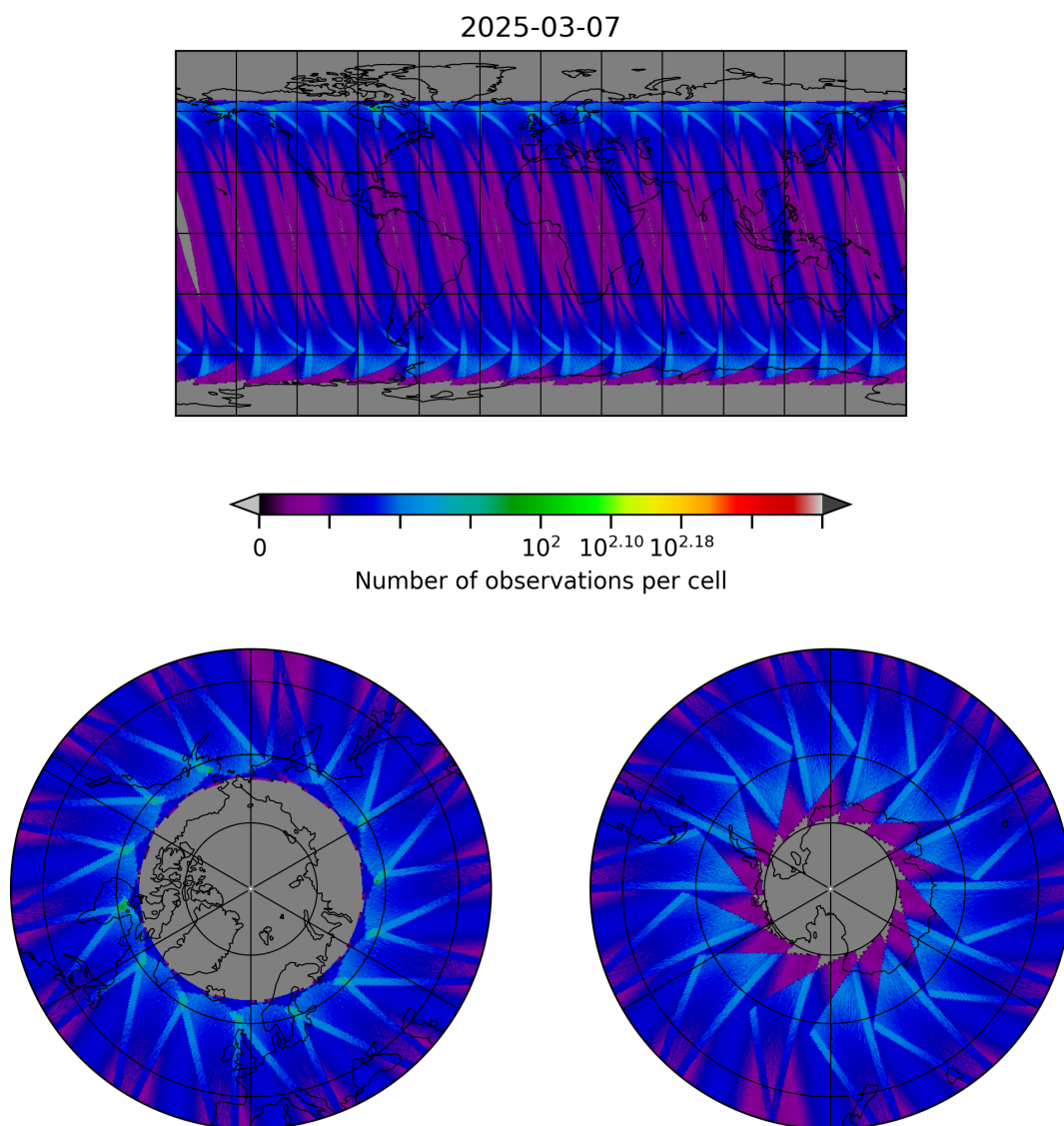


Figure 29: Map of the number of observations for 2025-03-07 to 2025-03-08

7 Zonal average

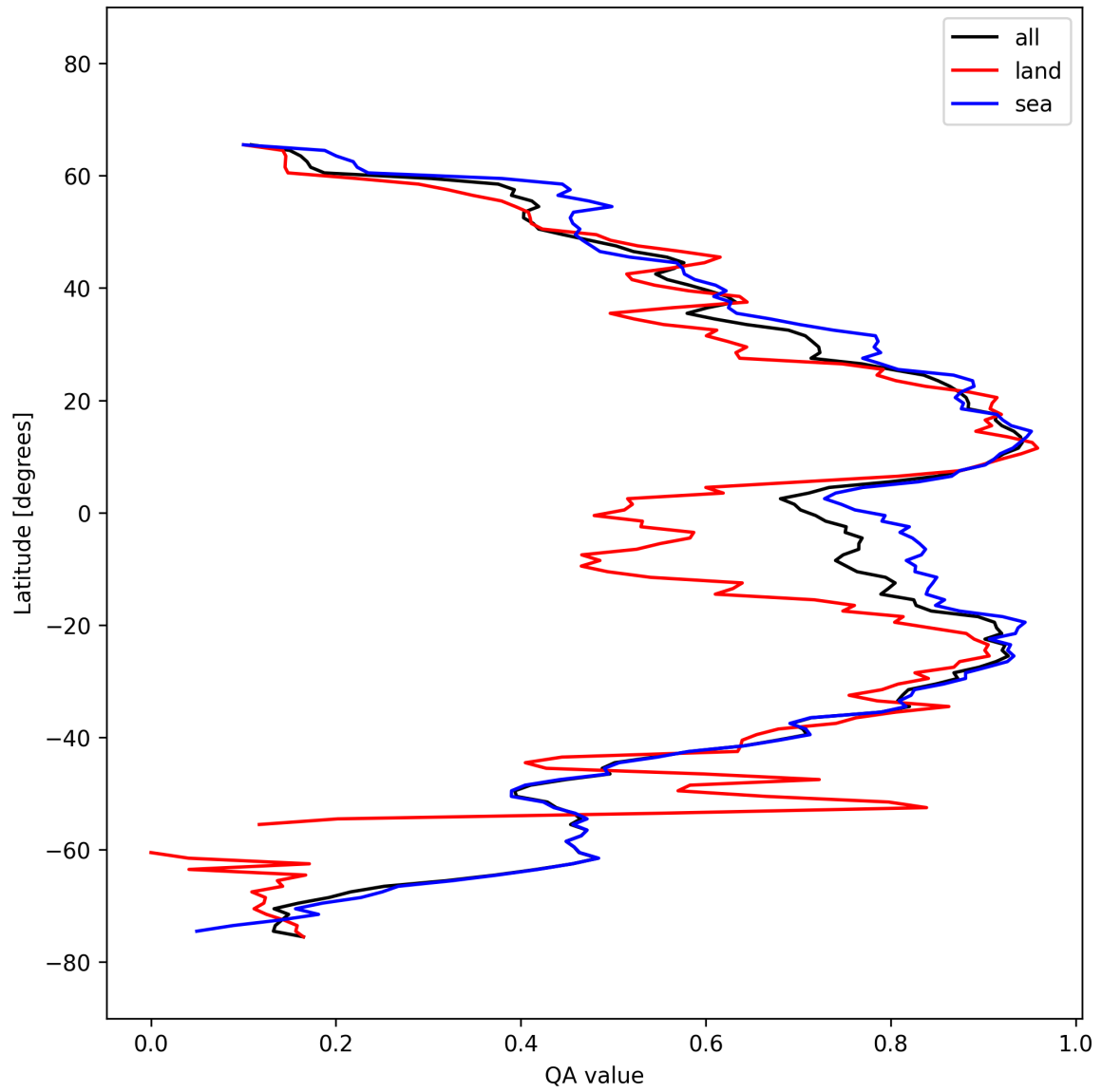


Figure 30: Zonal average of “QA value” for 2025-03-07 to 2025-03-08.

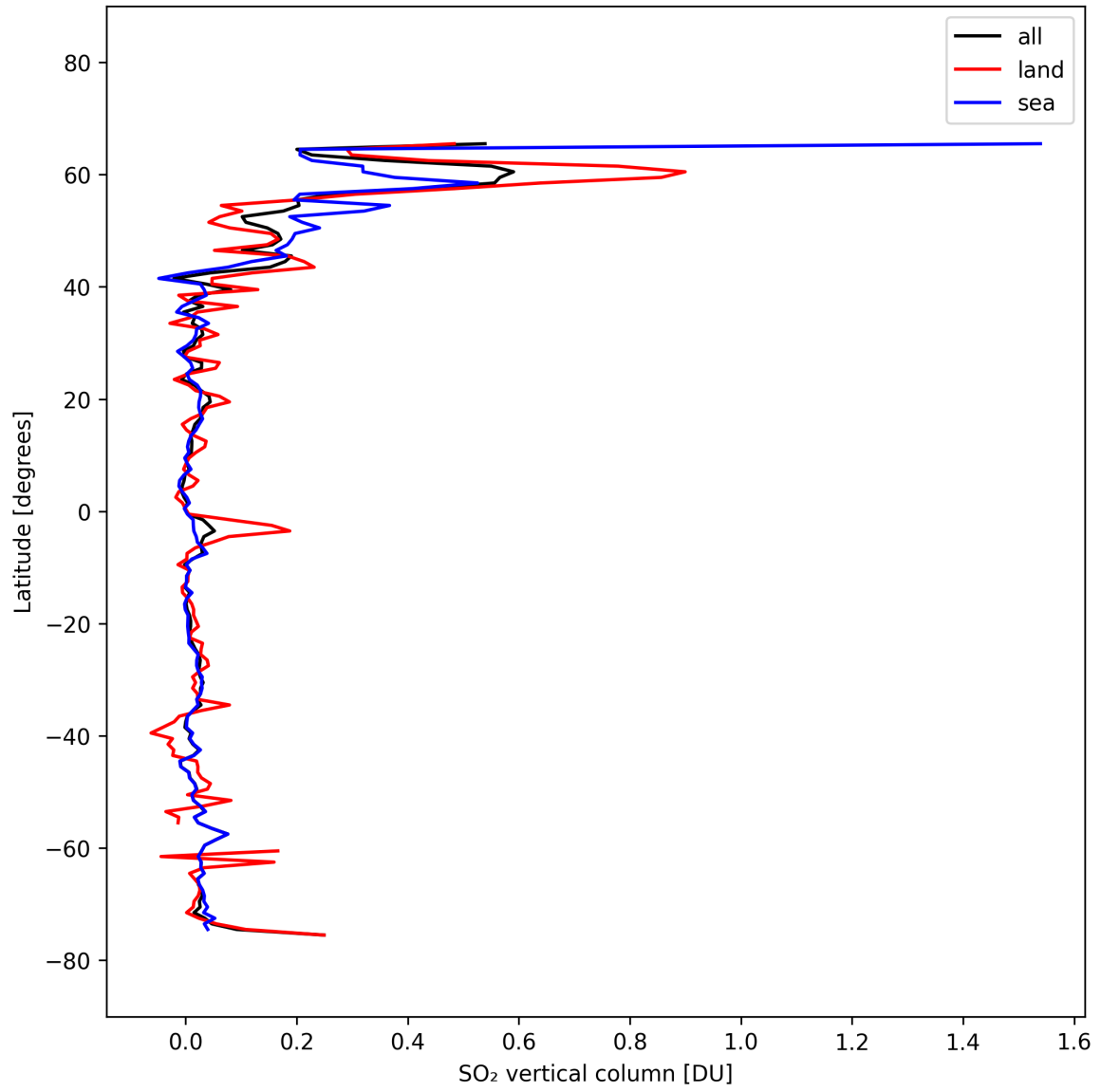


Figure 31: Zonal average of “SO₂ vertical column” for 2025-03-07 to 2025-03-08.

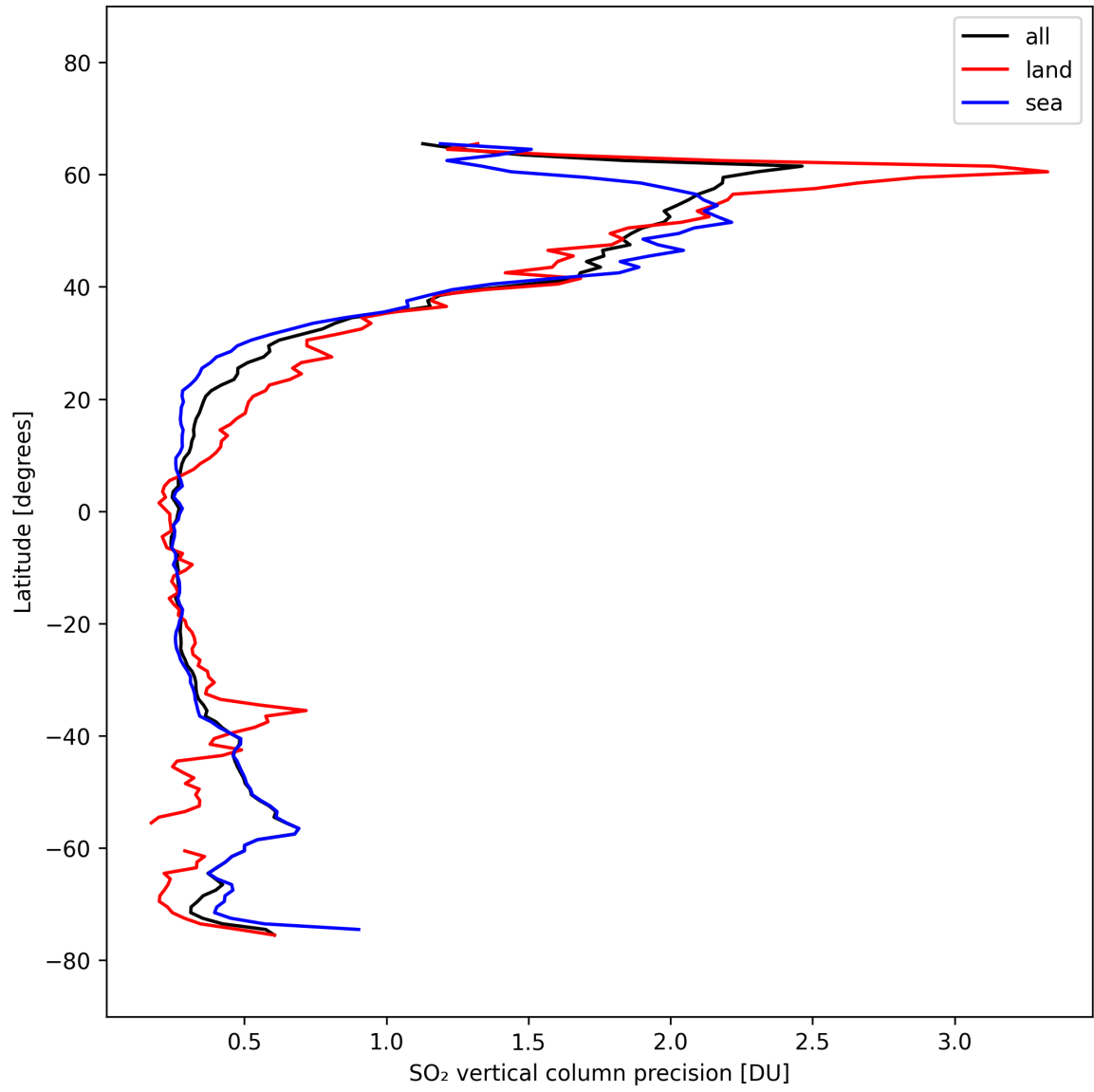


Figure 32: Zonal average of “SO₂ vertical column precision” for 2025-03-07 to 2025-03-08.

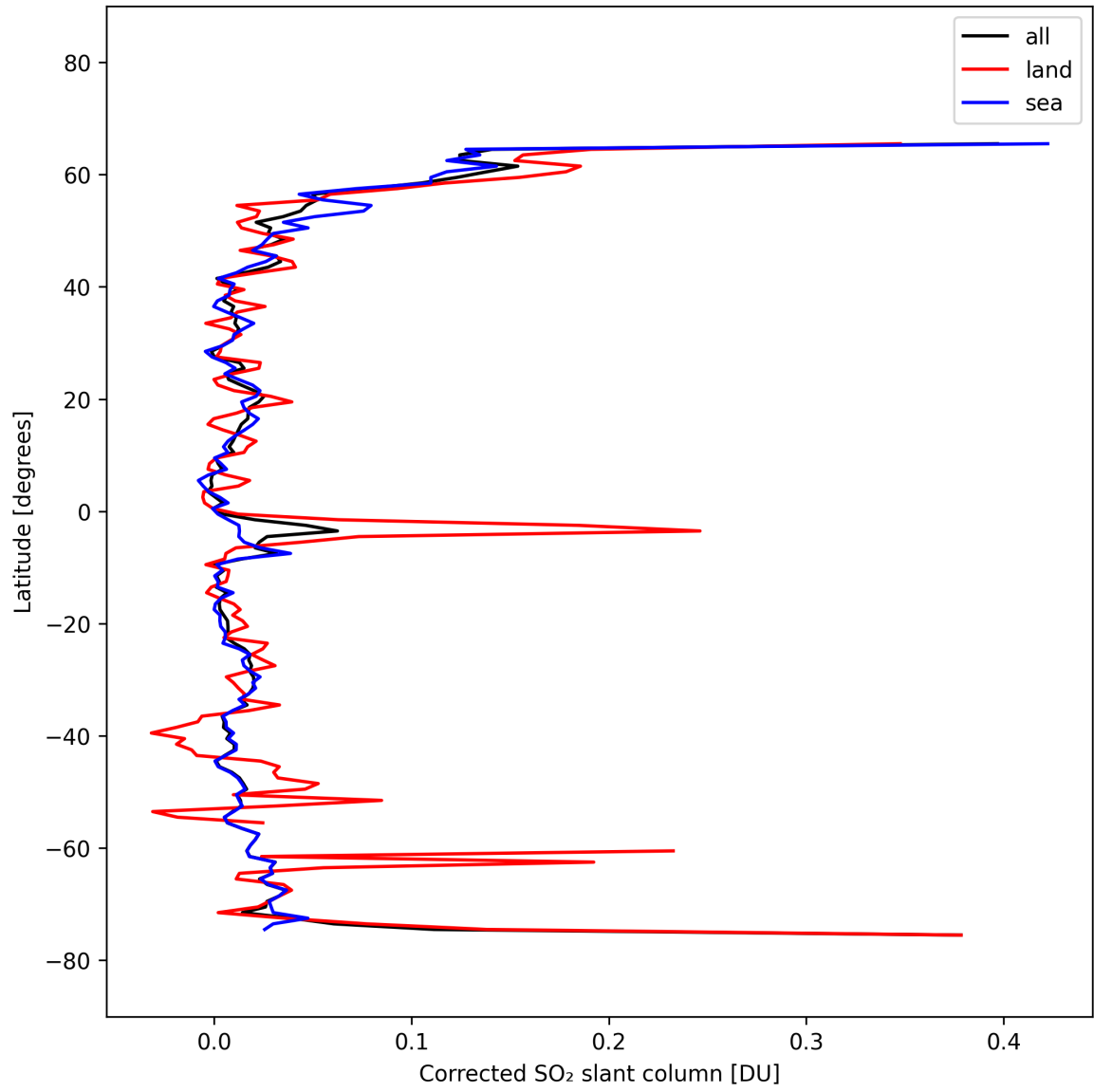


Figure 33: Zonal average of “Corrected SO₂ slant column” for 2025-03-07 to 2025-03-08.

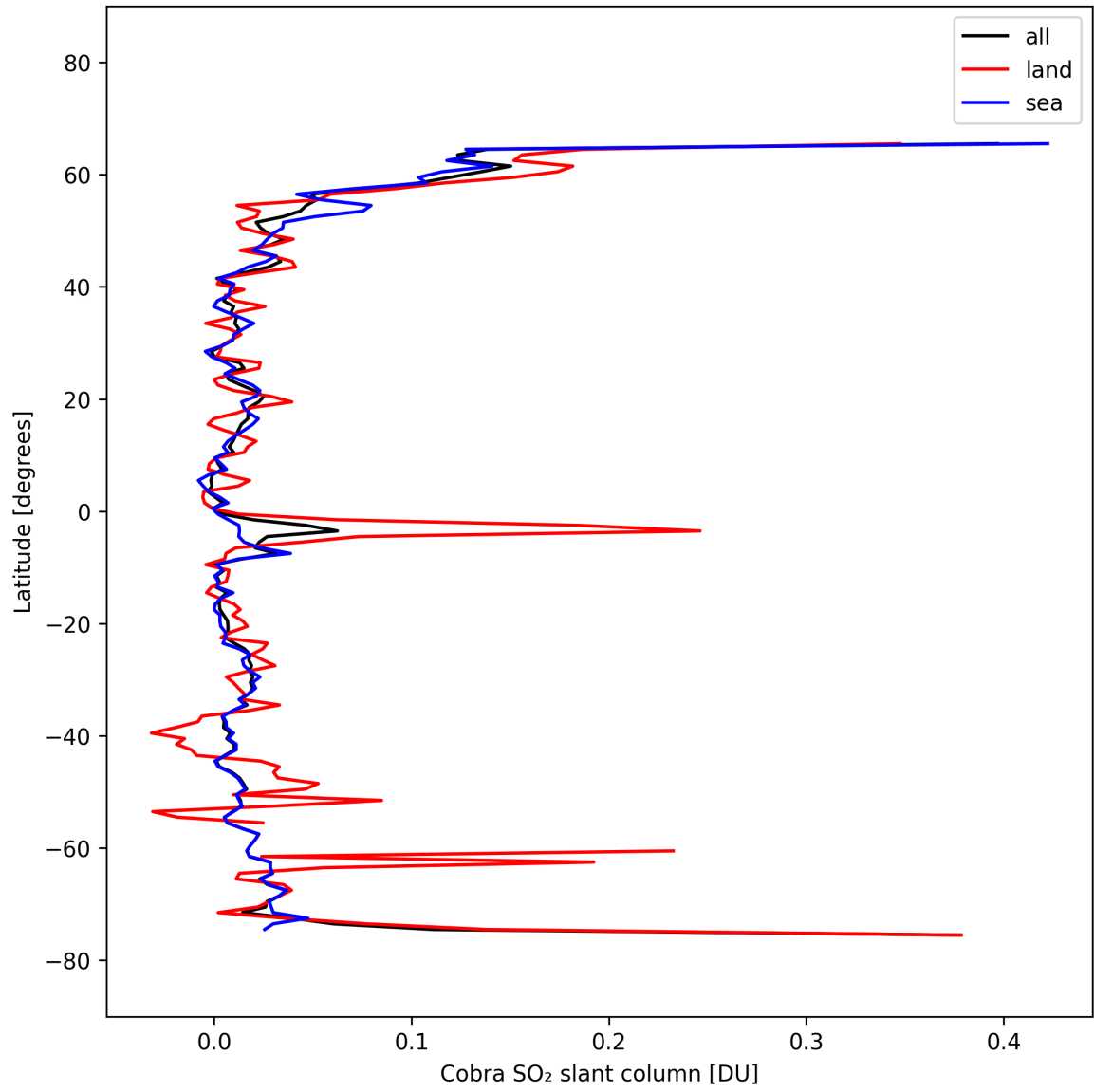


Figure 34: Zonal average of “Cobra SO₂ slant column” for 2025-03-07 to 2025-03-08.

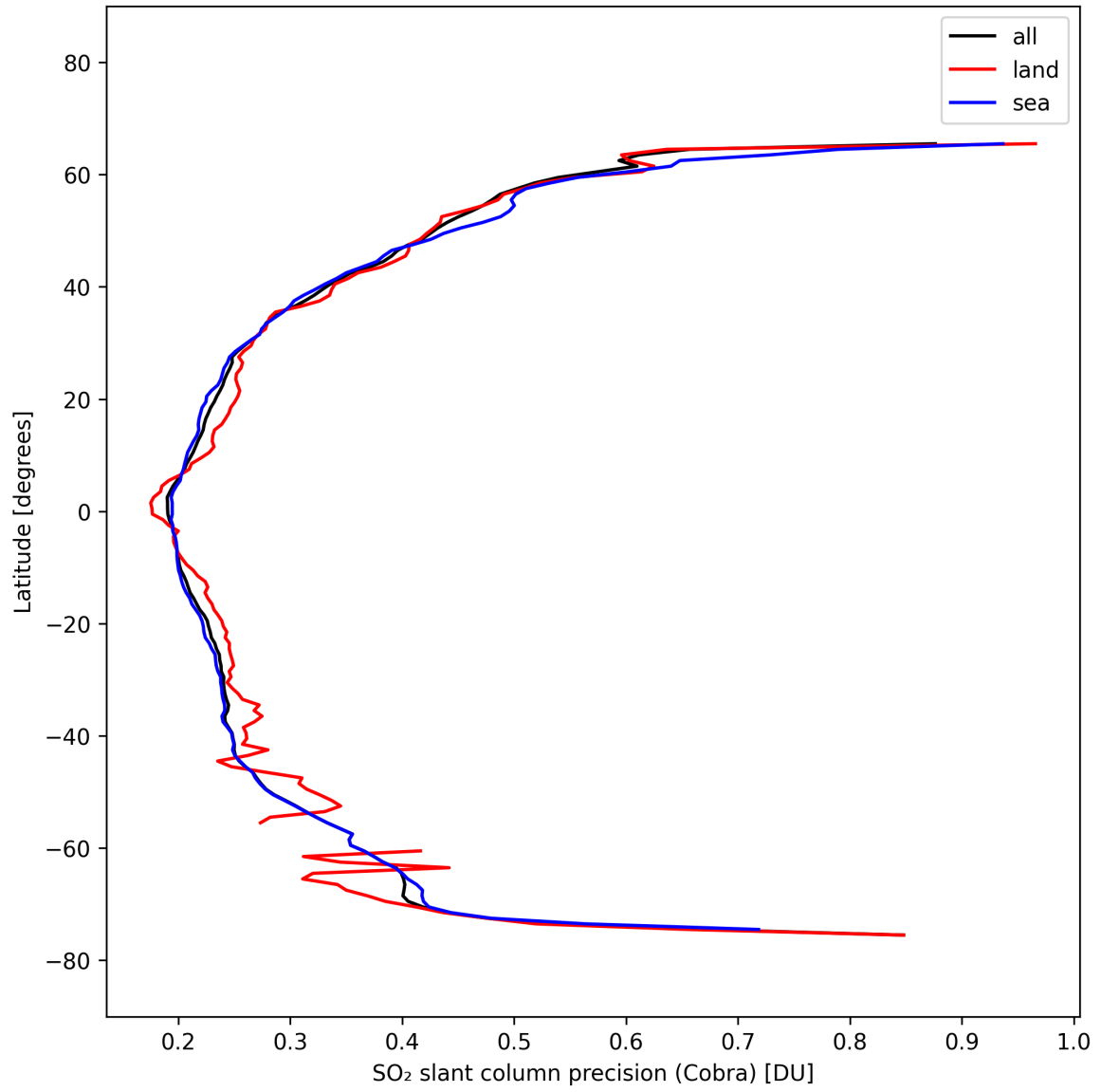


Figure 35: Zonal average of “SO₂ slant column precision (Cobra)” for 2025-03-07 to 2025-03-08.

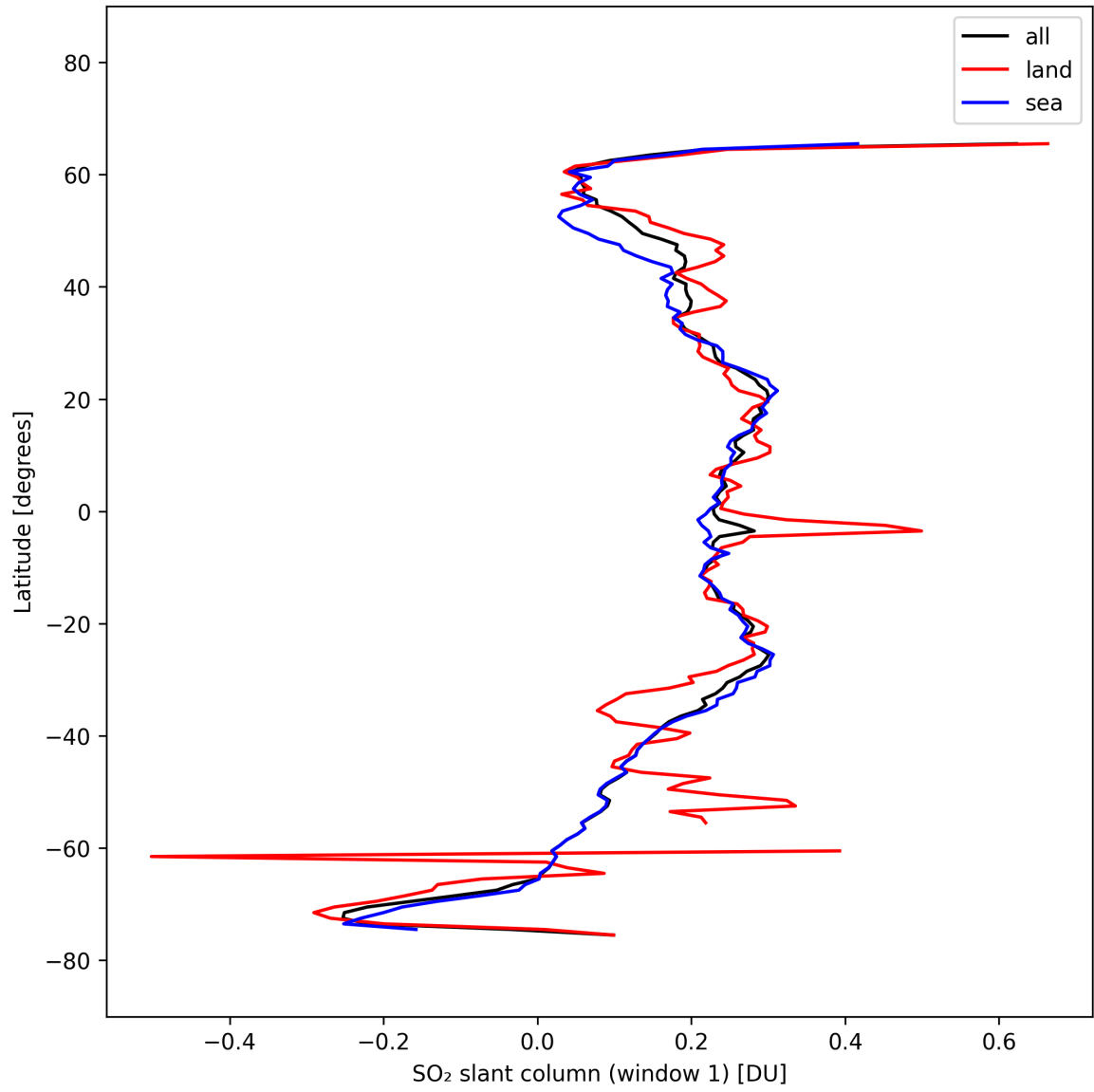


Figure 36: Zonal average of “SO₂ slant column (window 1)” for 2025-03-07 to 2025-03-08.

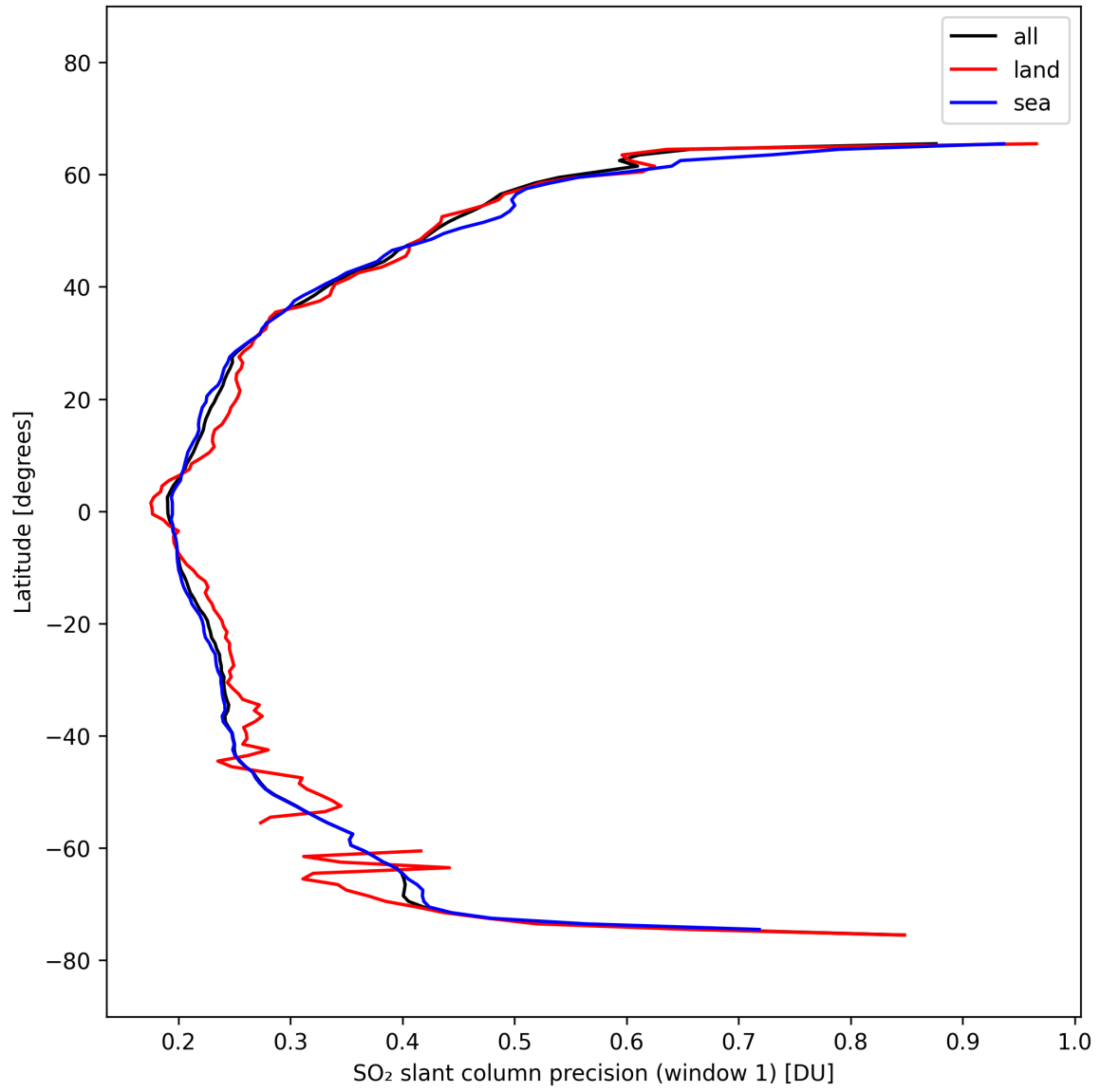


Figure 37: Zonal average of “SO₂ slant column precision (window 1)” for 2025-03-07 to 2025-03-08.

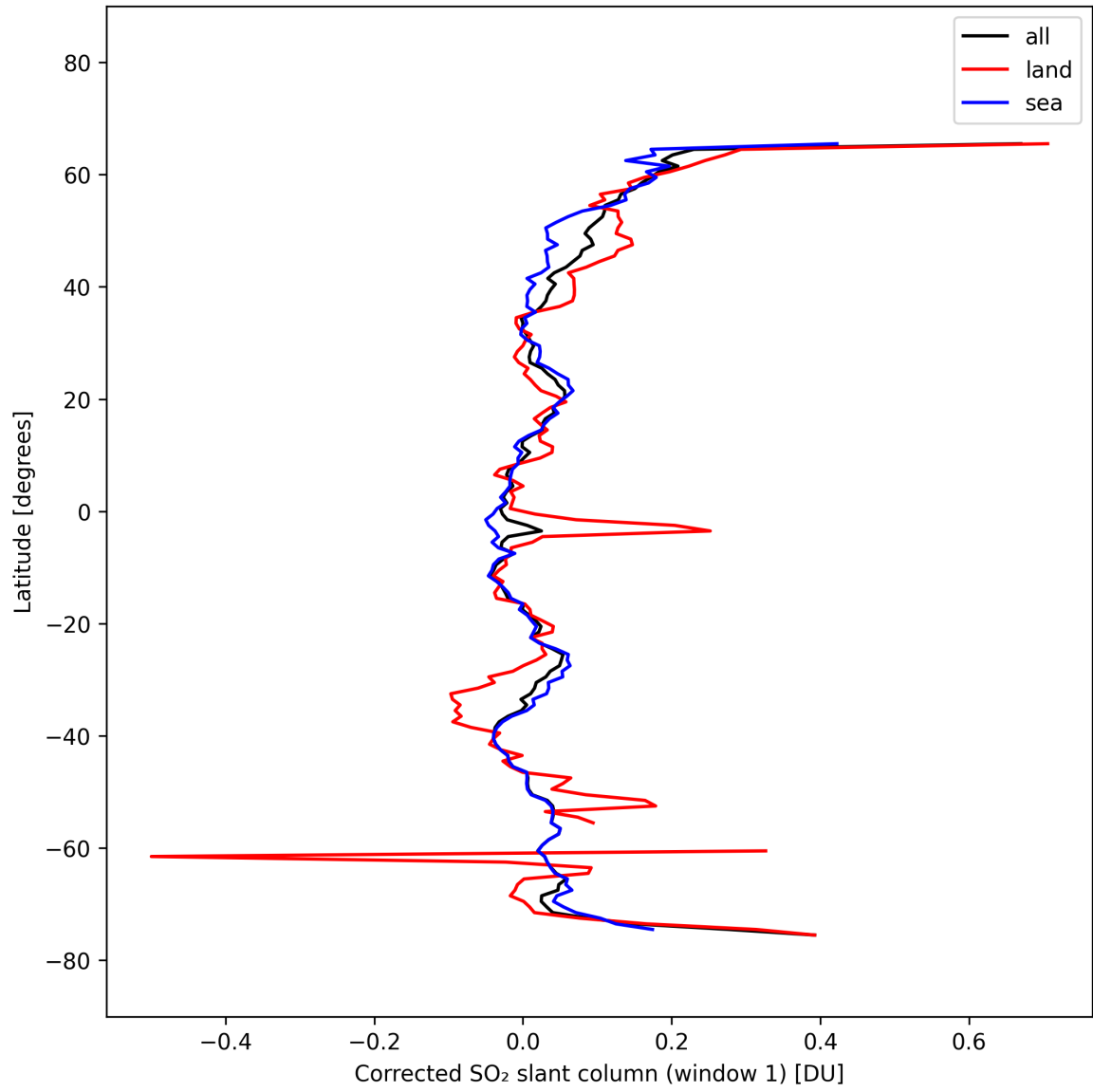


Figure 38: Zonal average of “Corrected SO₂ slant column (window 1)” for 2025-03-07 to 2025-03-08.

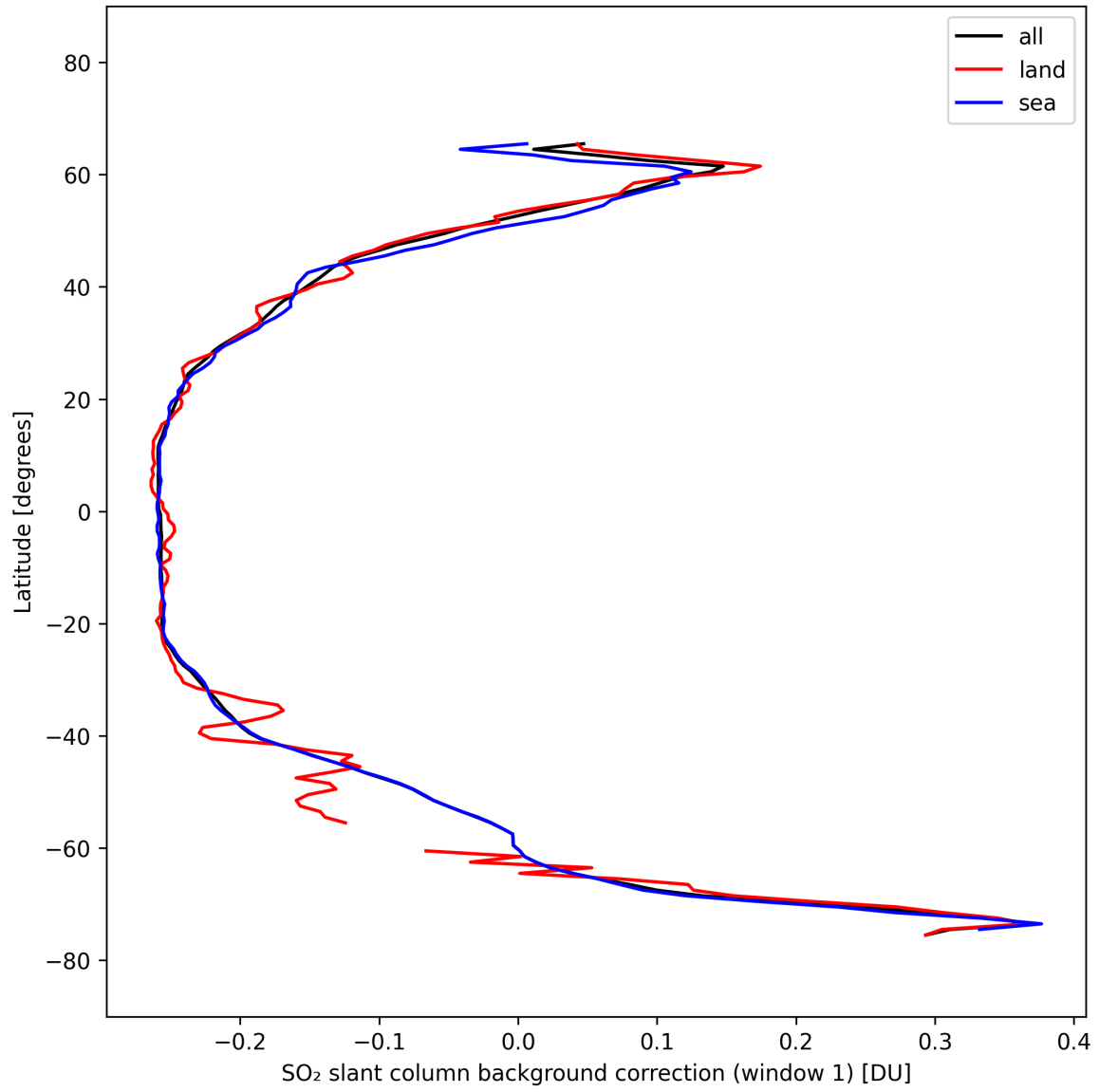


Figure 39: Zonal average of “SO₂ slant column background correction (window 1)” for 2025-03-07 to 2025-03-08.

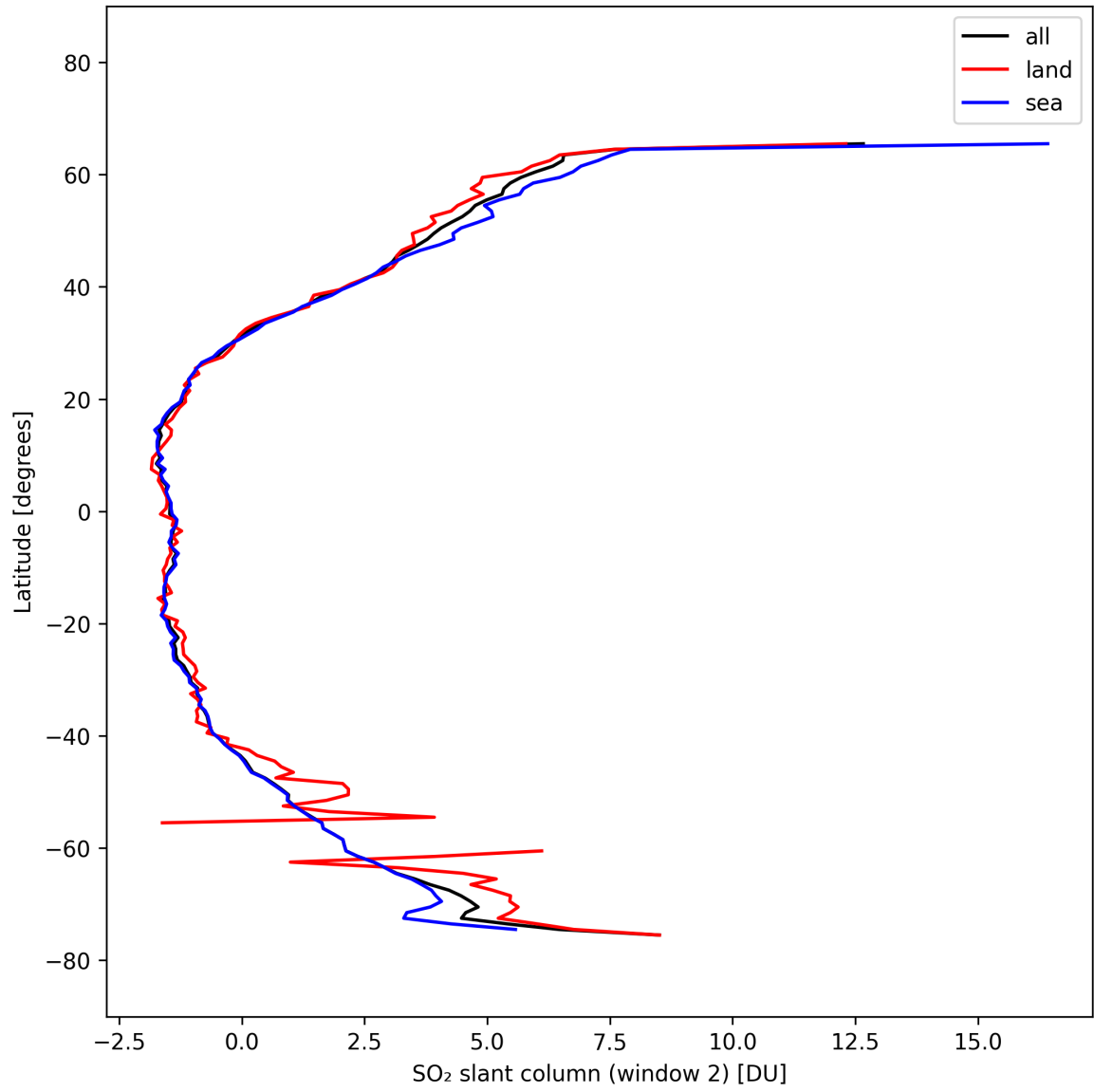


Figure 40: Zonal average of “SO₂ slant column (window 2)” for 2025-03-07 to 2025-03-08.

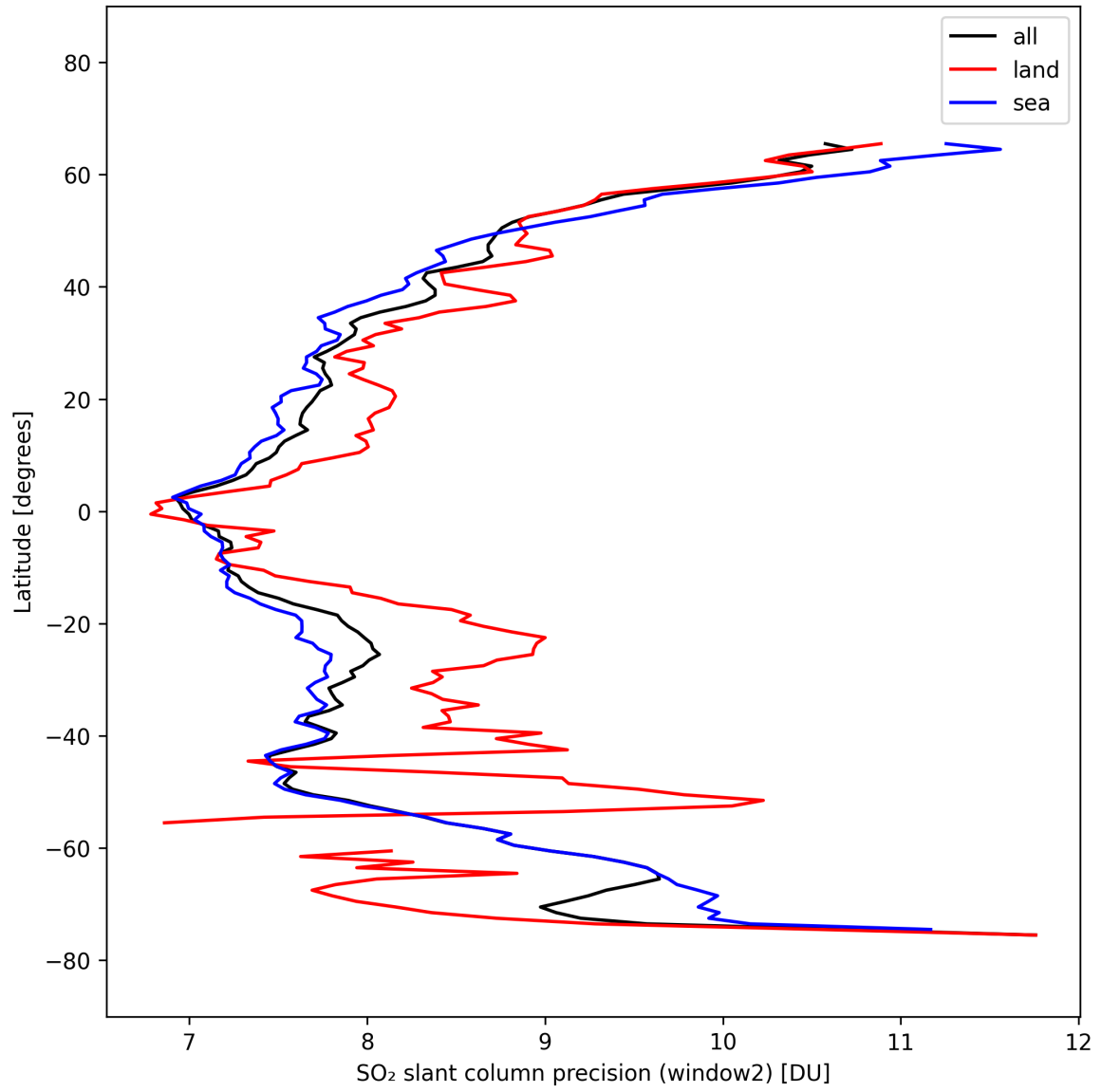


Figure 41: Zonal average of “SO₂ slant column precision (window2)” for 2025-03-07 to 2025-03-08.

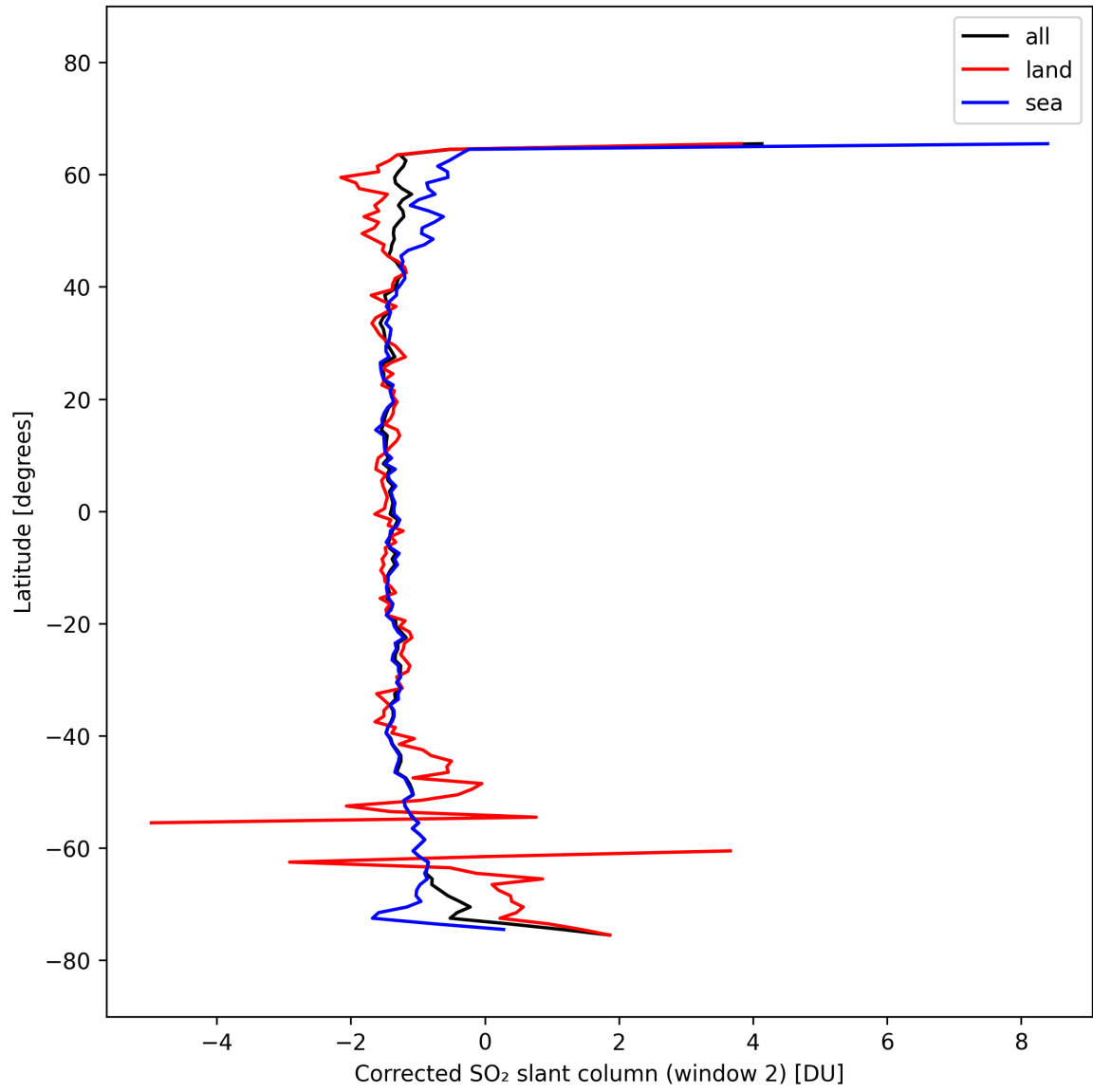


Figure 42: Zonal average of "Corrected SO₂ slant column (window 2)" for 2025-03-07 to 2025-03-08.

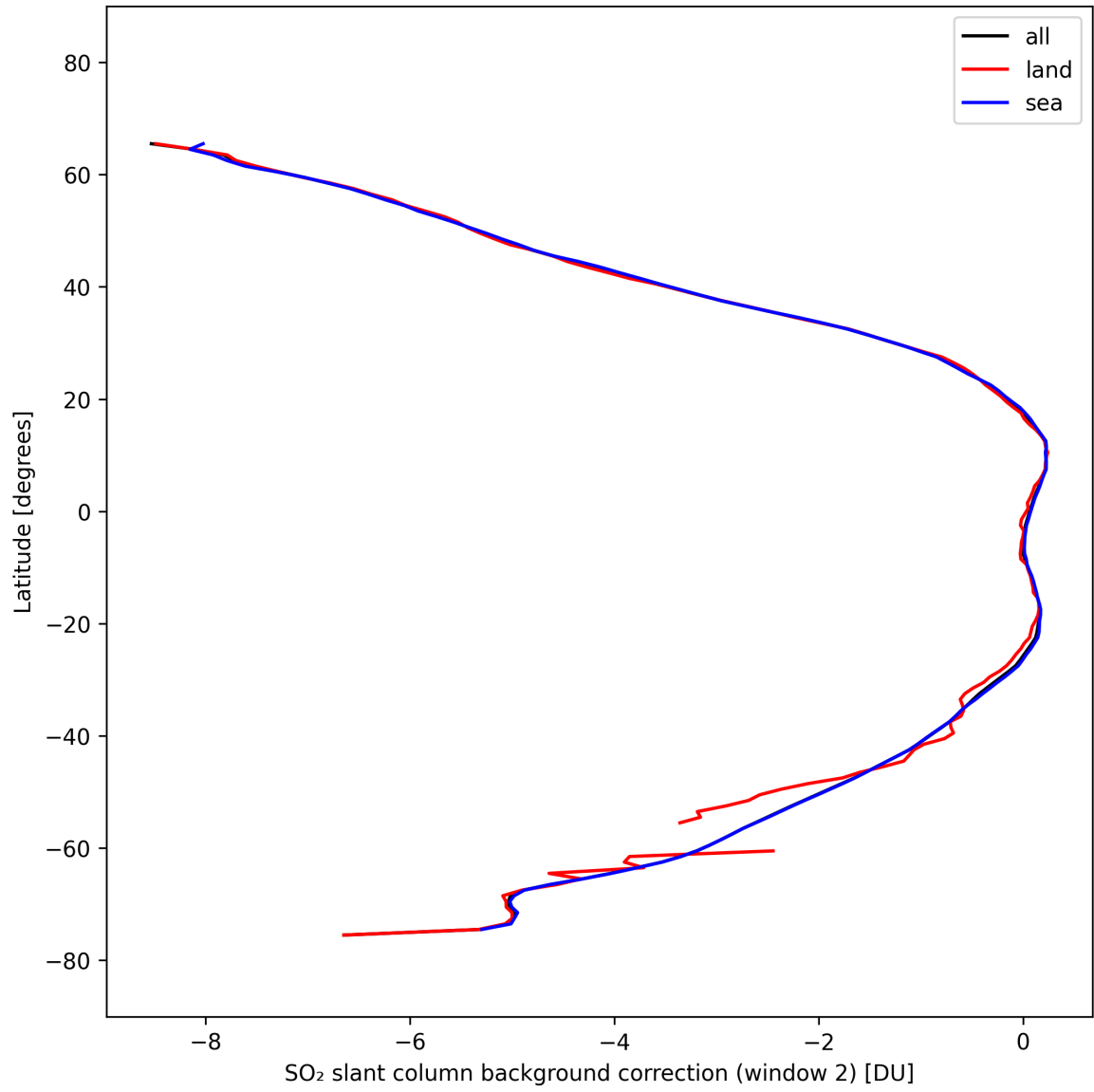


Figure 43: Zonal average of “SO₂ slant column background correction (window 2)” for 2025-03-07 to 2025-03-08.

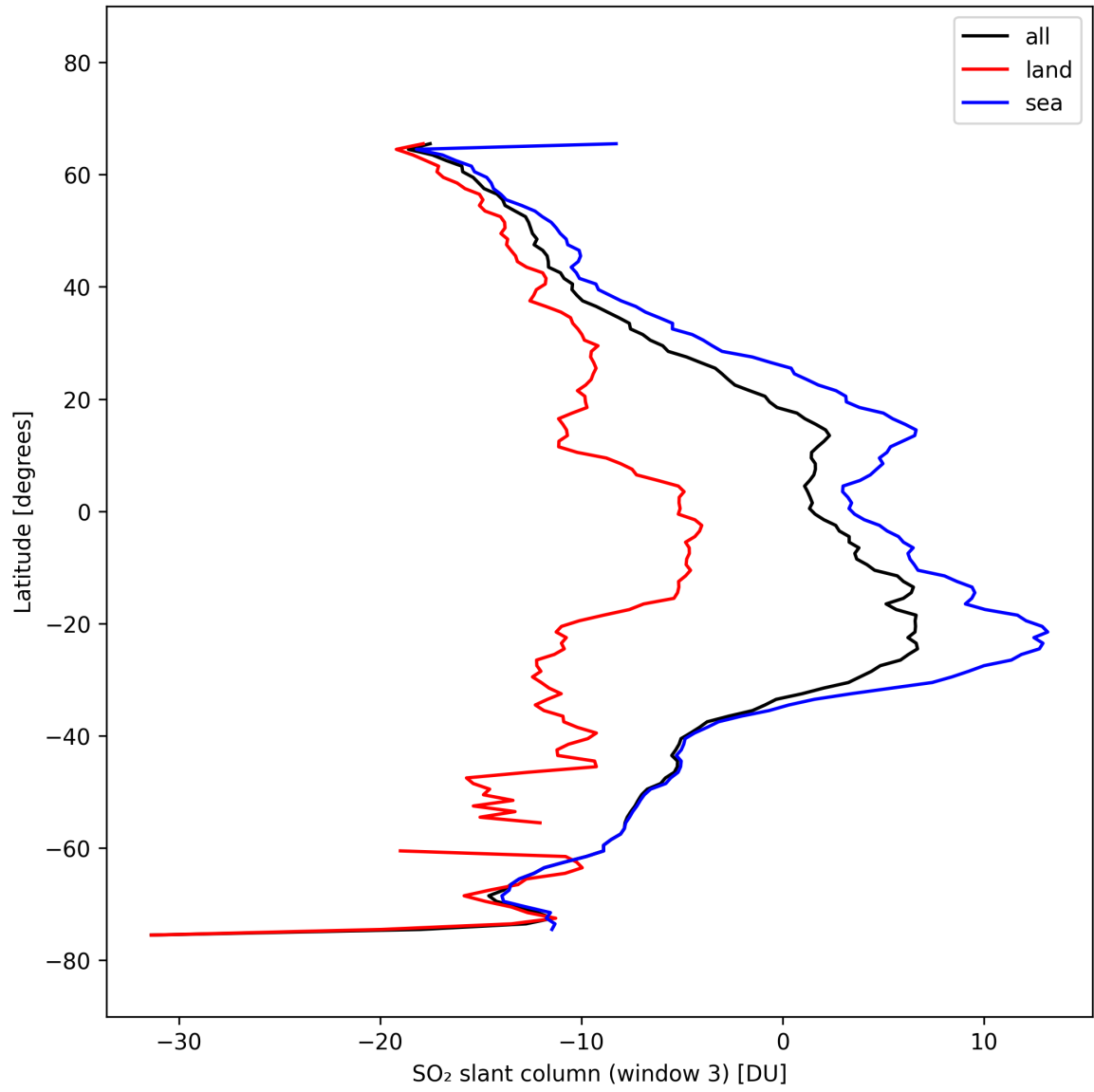


Figure 44: Zonal average of “SO₂ slant column (window 3)” for 2025-03-07 to 2025-03-08.

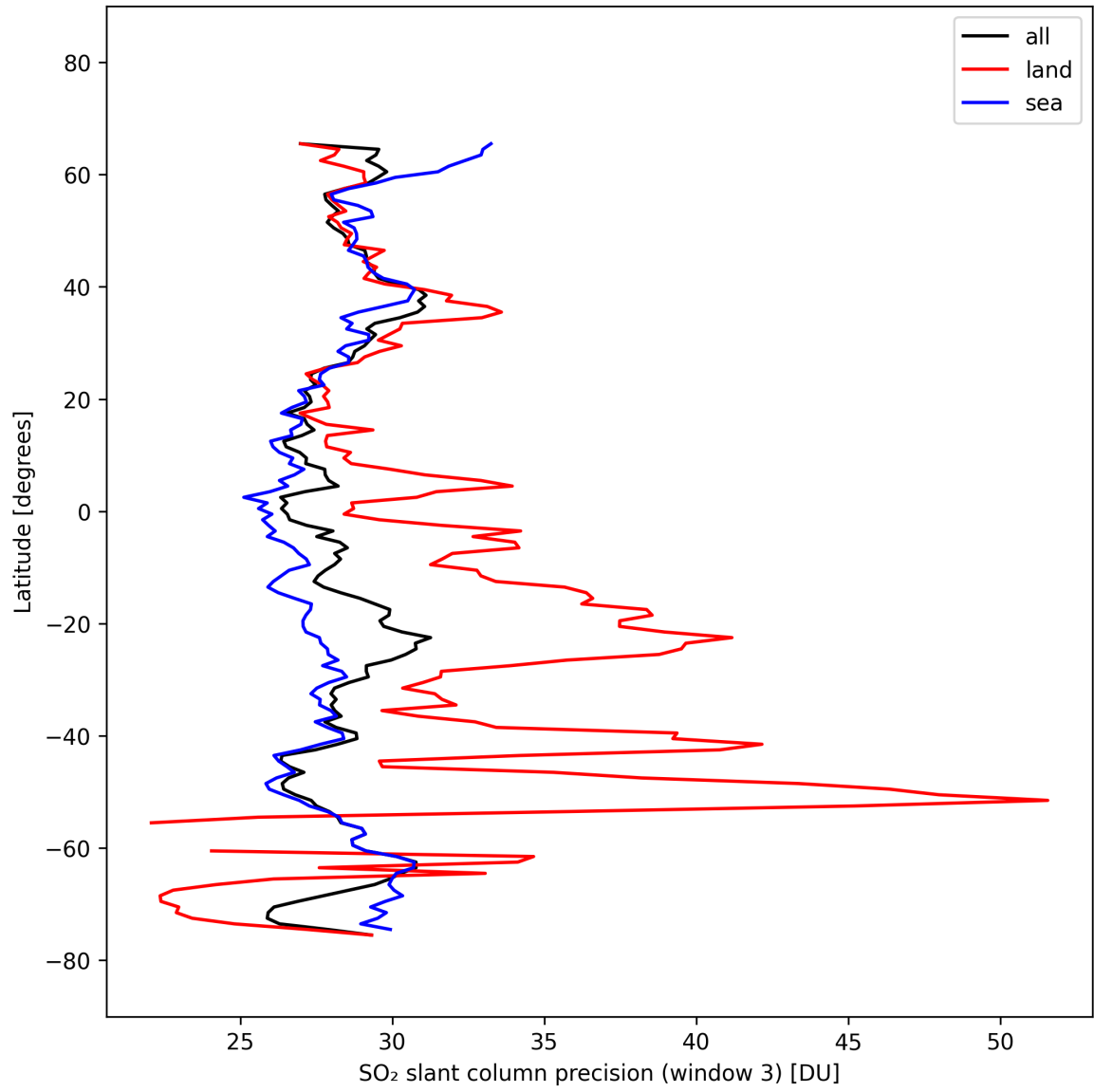


Figure 45: Zonal average of “SO₂ slant column precision (window 3)” for 2025-03-07 to 2025-03-08.

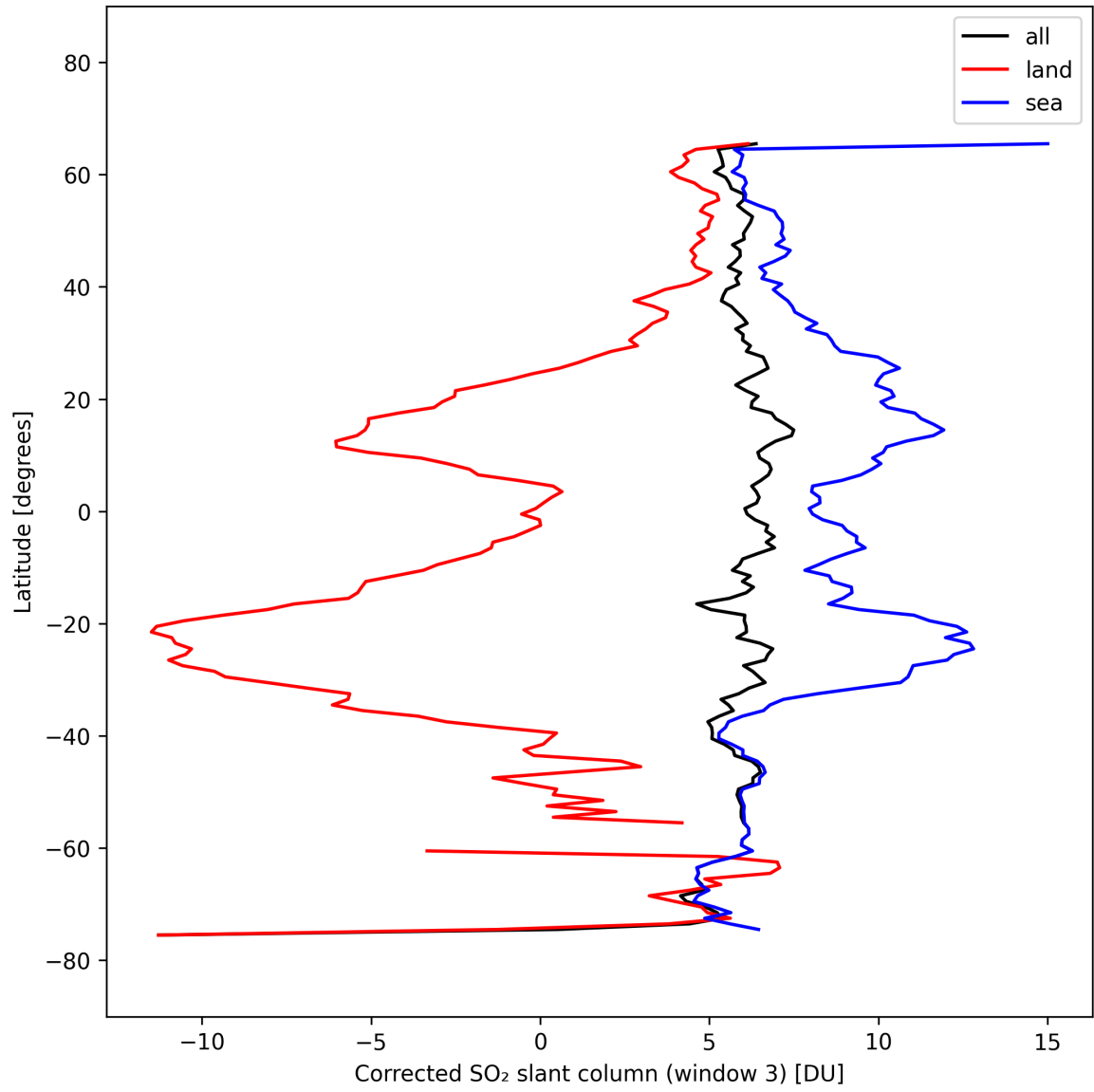


Figure 46: Zonal average of “Corrected SO₂ slant column (window 3)” for 2025-03-07 to 2025-03-08.

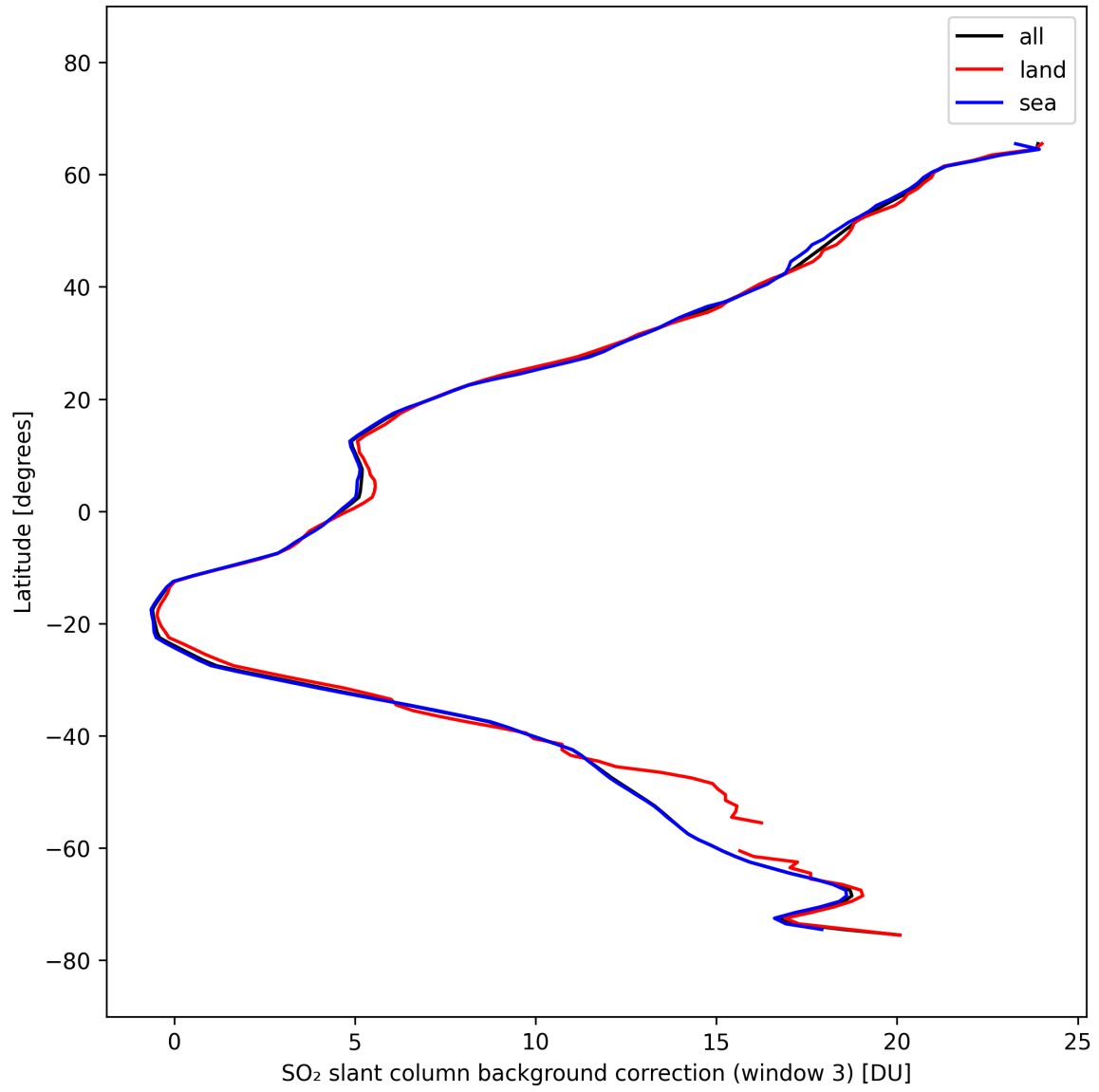


Figure 47: Zonal average of “SO₂ slant column background correction (window 3)” for 2025-03-07 to 2025-03-08.

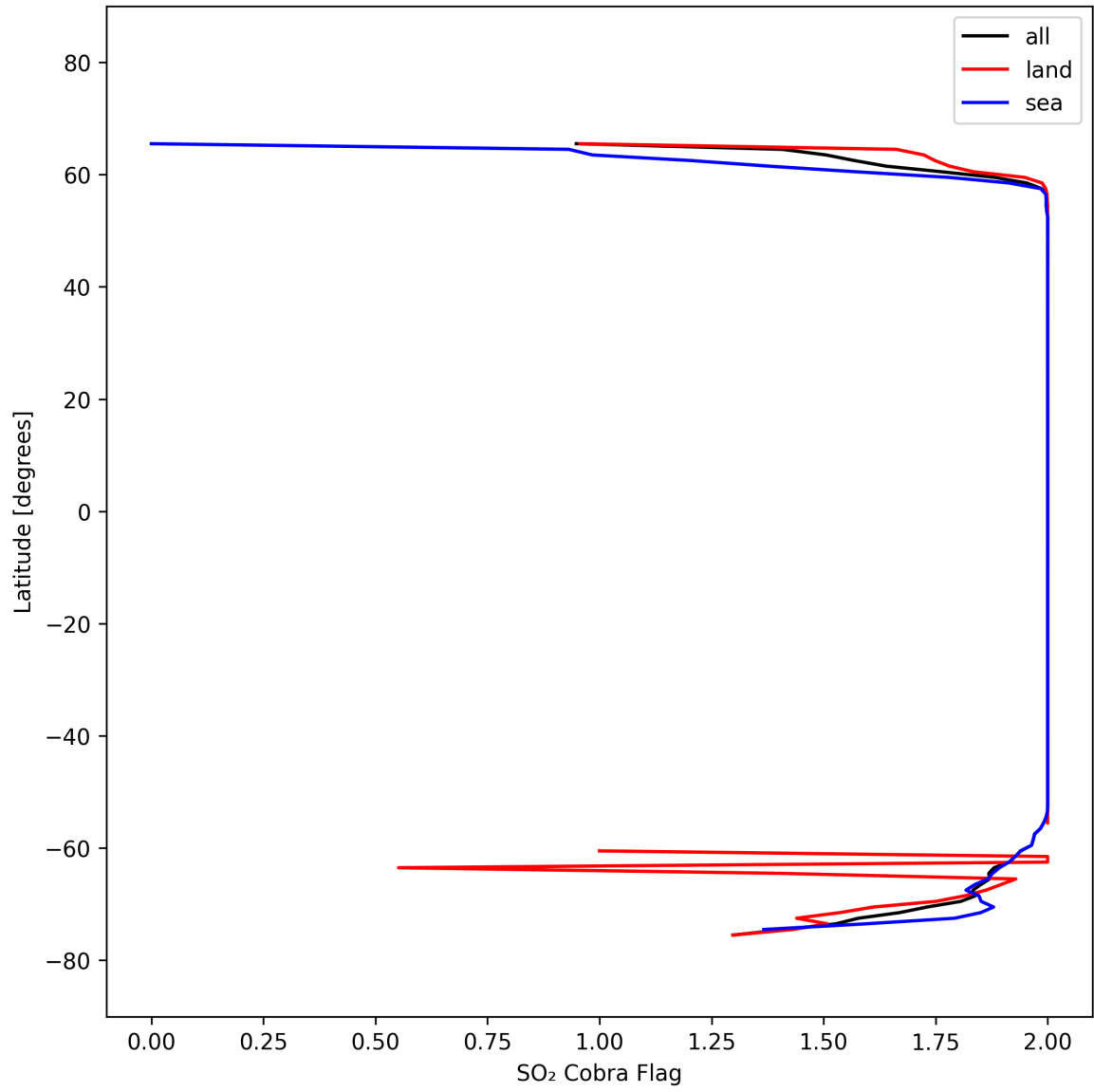


Figure 48: Zonal average of “SO₂ Cobra Flag” for 2025-03-07 to 2025-03-08.

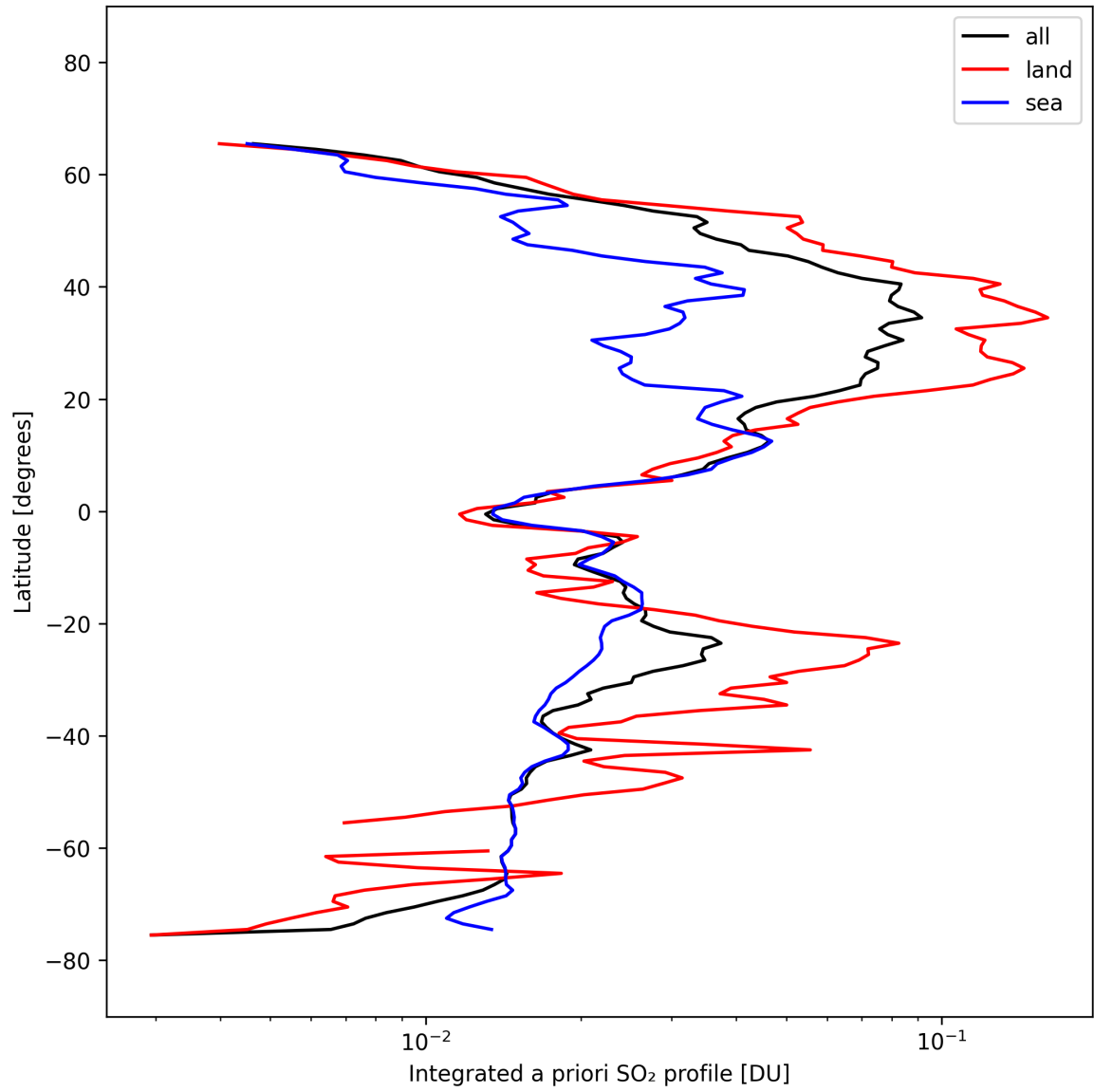


Figure 49: Zonal average of “Integrated a priori SO₂ profile” for 2025-03-07 to 2025-03-08.

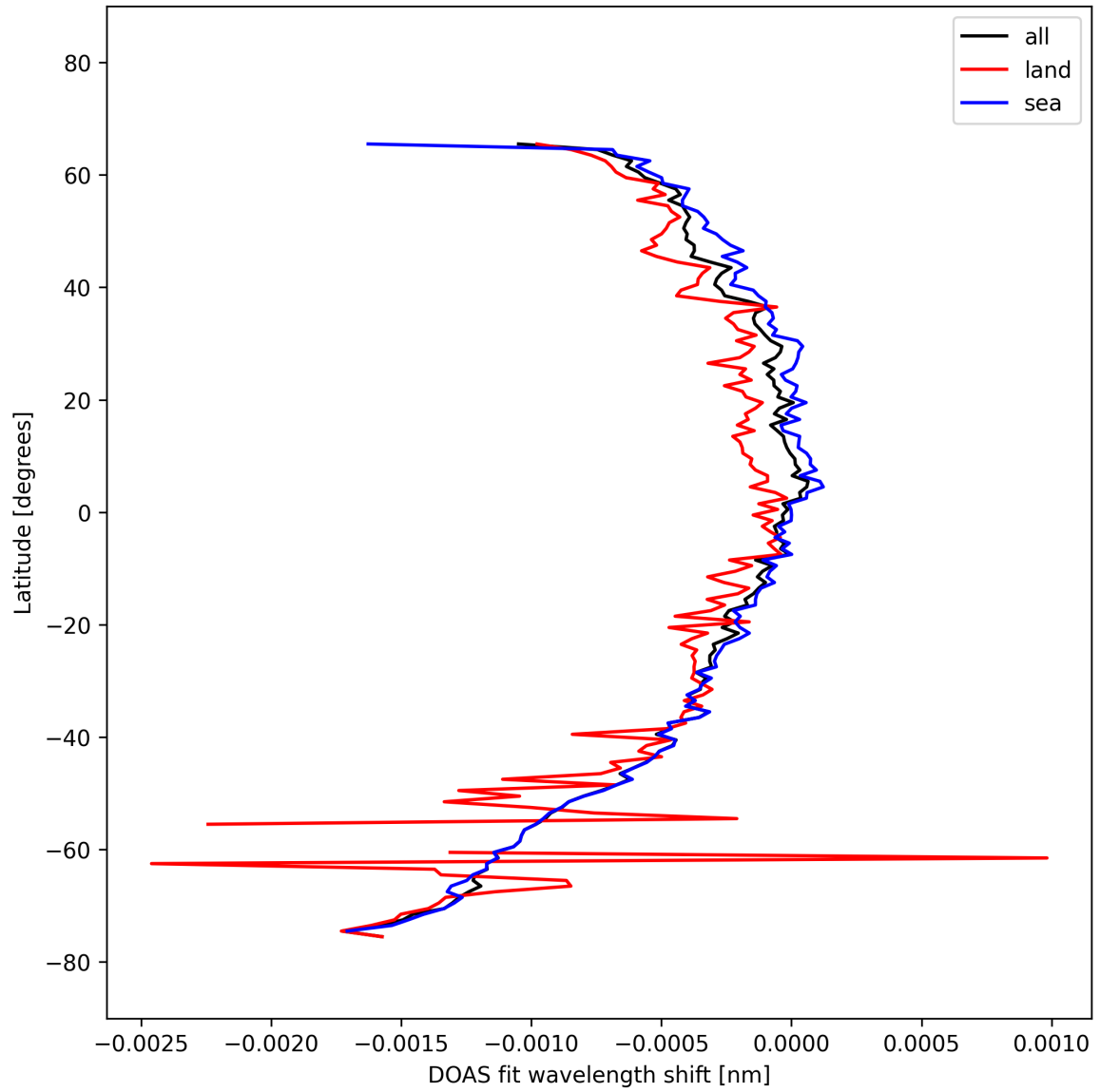


Figure 50: Zonal average of “DOAS fit wavelength shift” for 2025-03-07 to 2025-03-08.

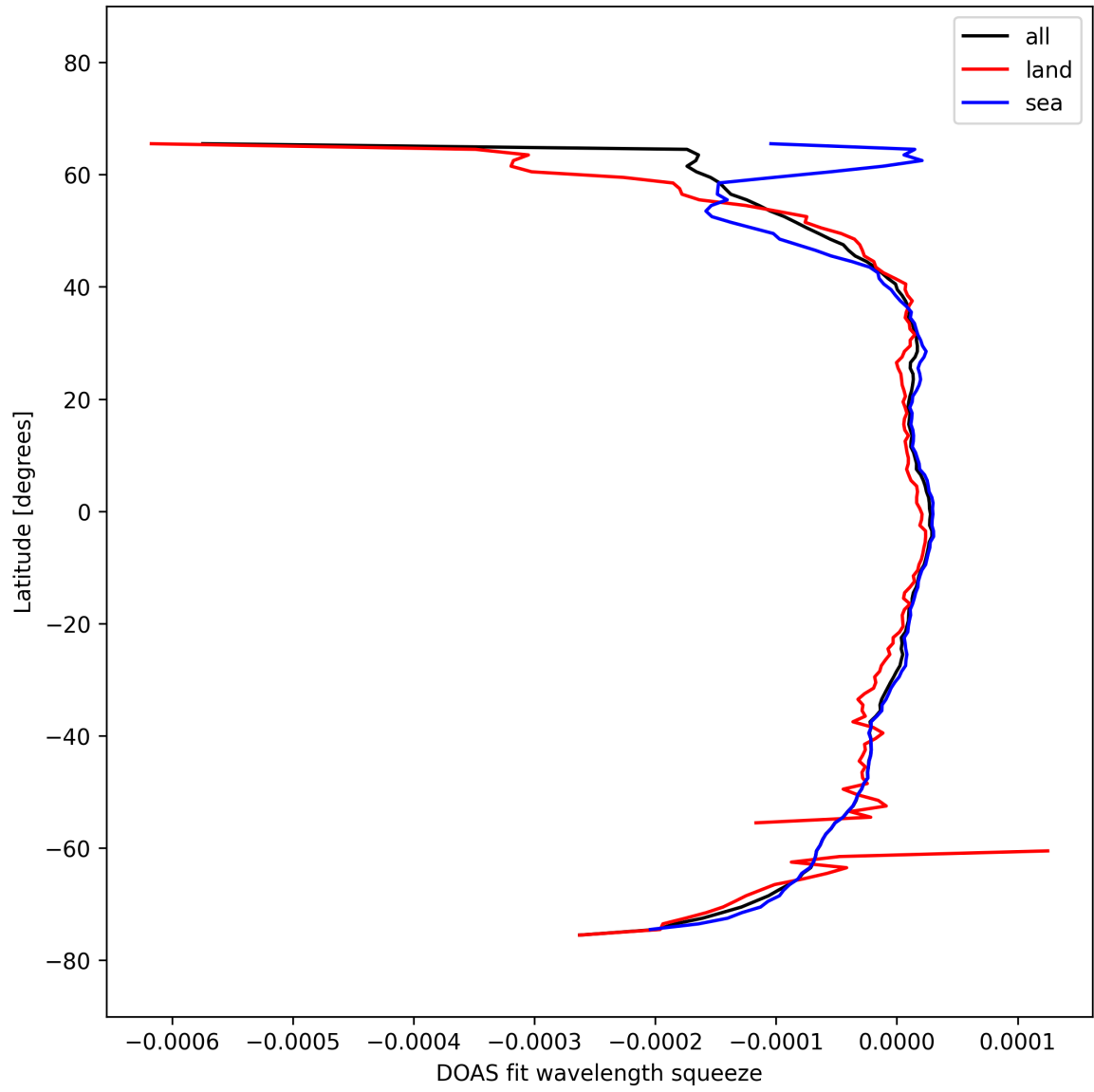


Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-03-07 to 2025-03-08.

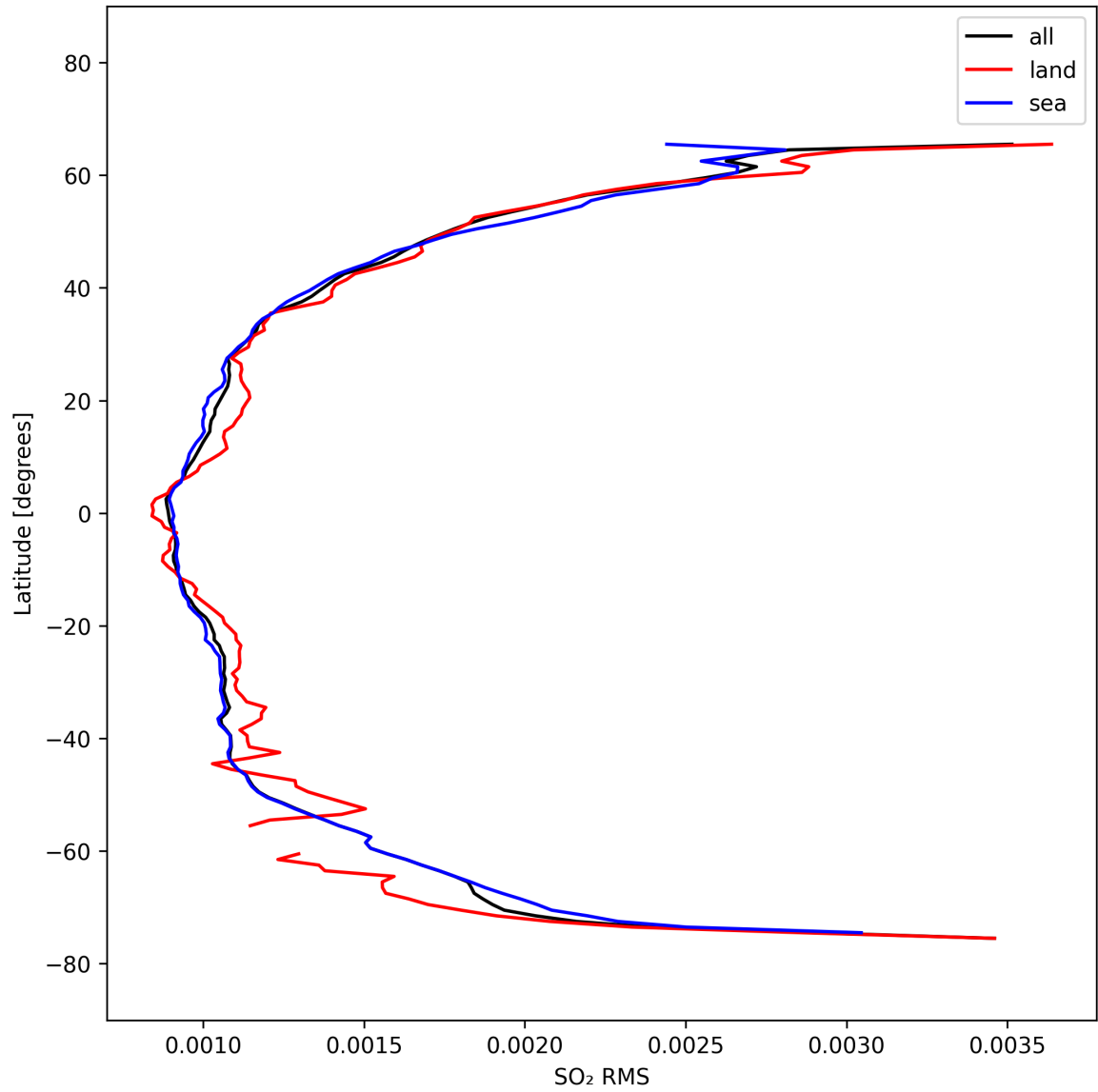


Figure 52: Zonal average of “SO₂ RMS” for 2025-03-07 to 2025-03-08.

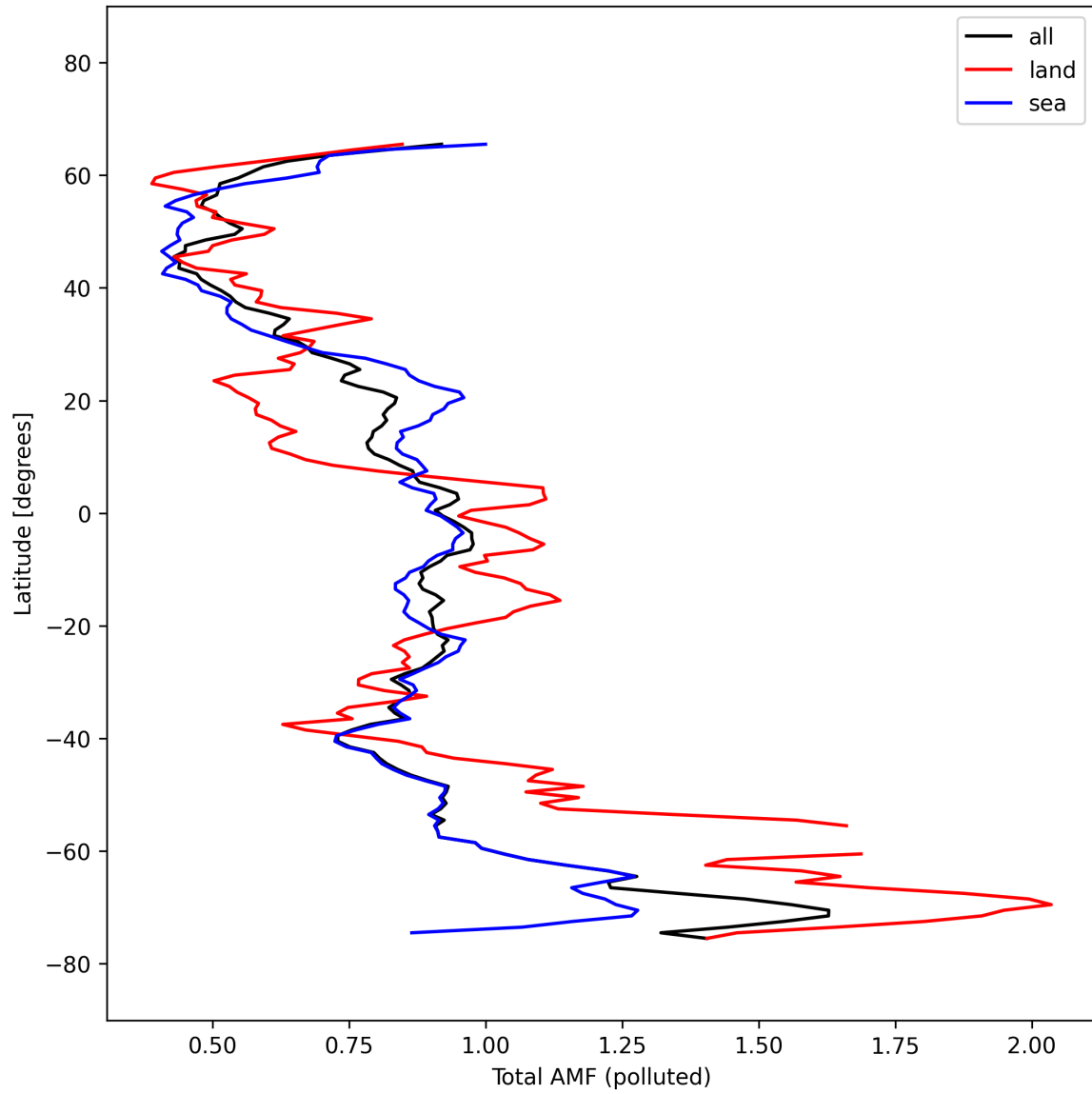


Figure 53: Zonal average of “Total AMF (polluted)” for 2025-03-07 to 2025-03-08.

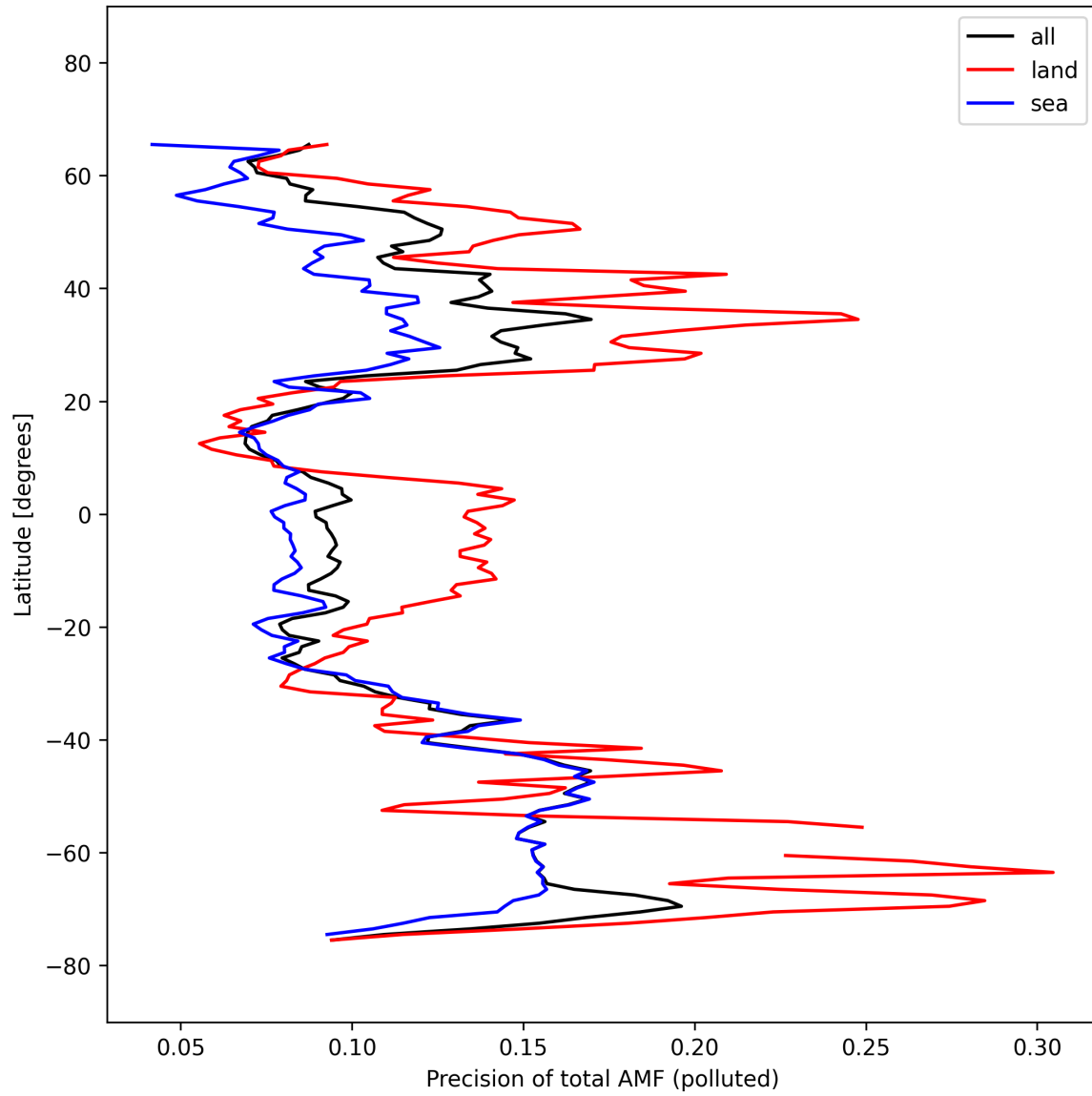


Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-03-07 to 2025-03-08.

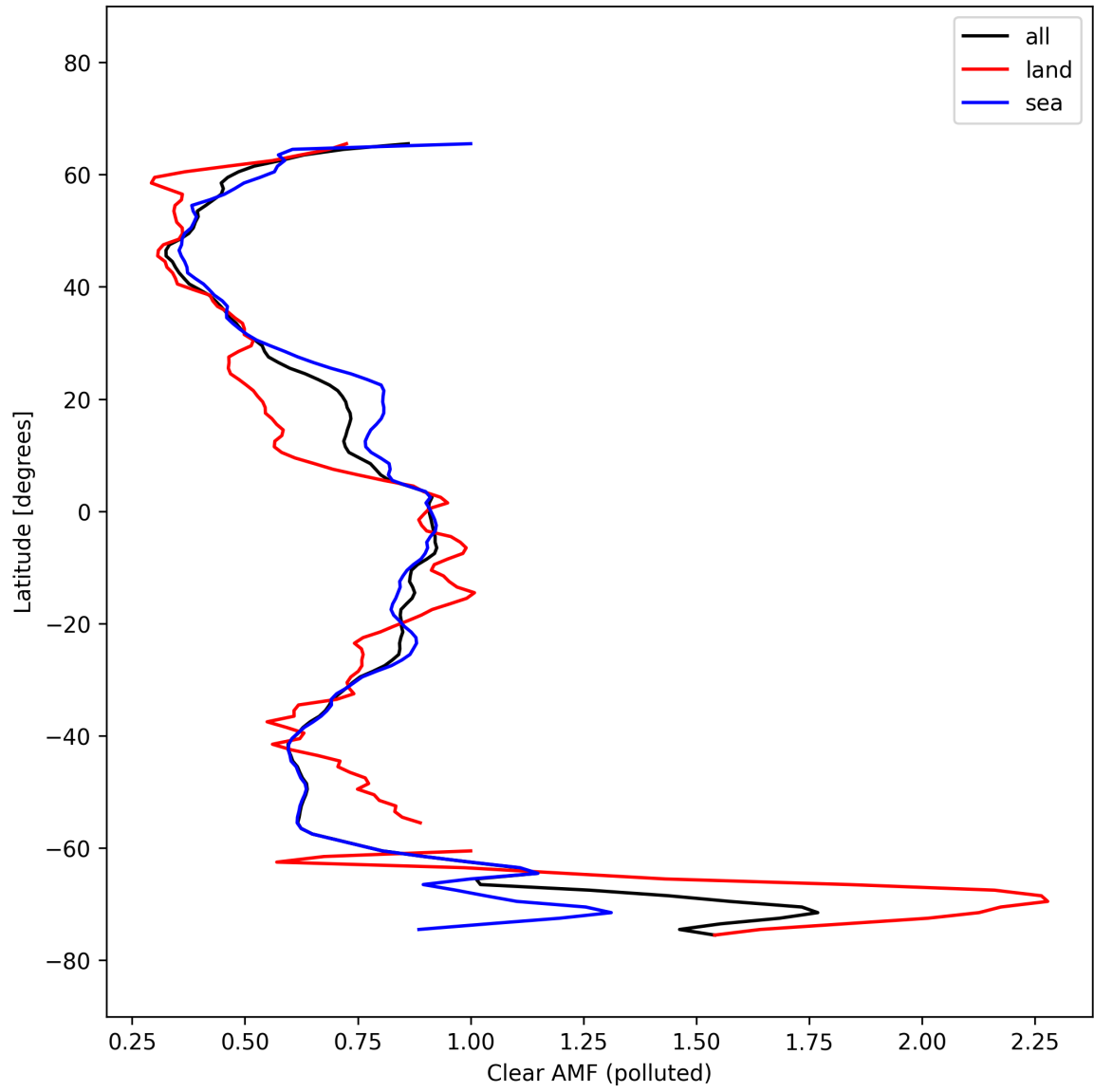


Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-03-07 to 2025-03-08.

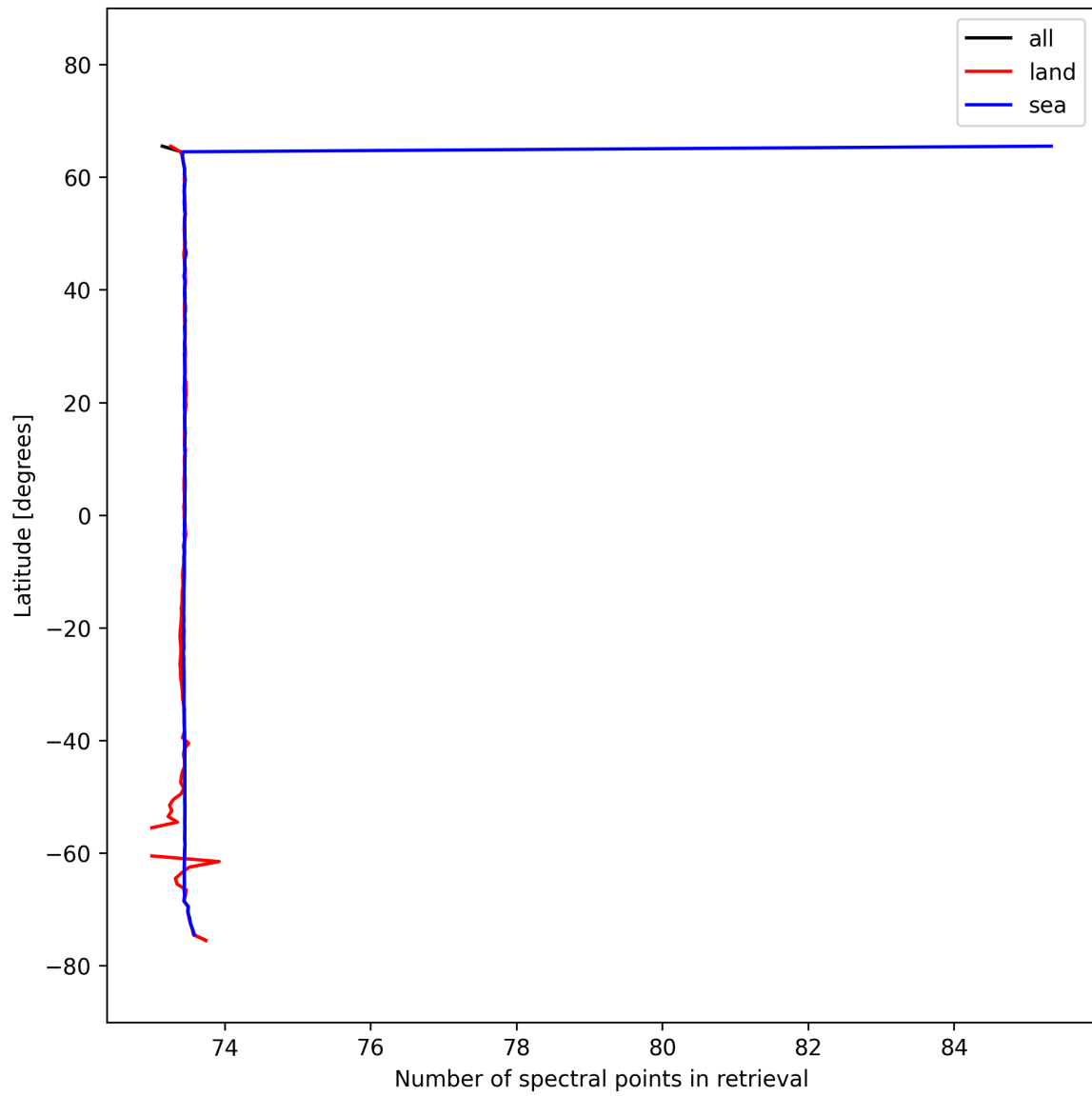


Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-03-07 to 2025-03-08.

8 Histograms

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

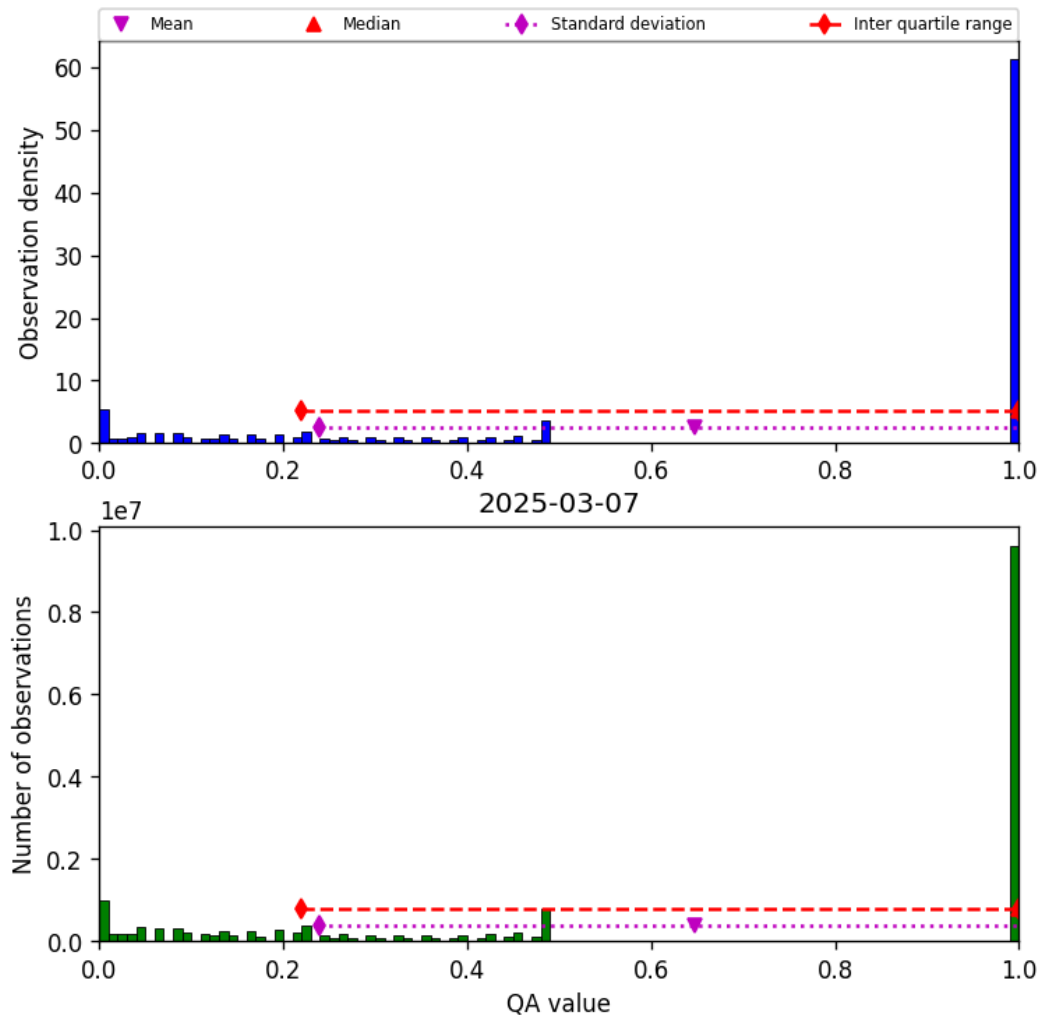


Figure 57: Histogram of “QA value” for 2025-03-07 to 2025-03-08

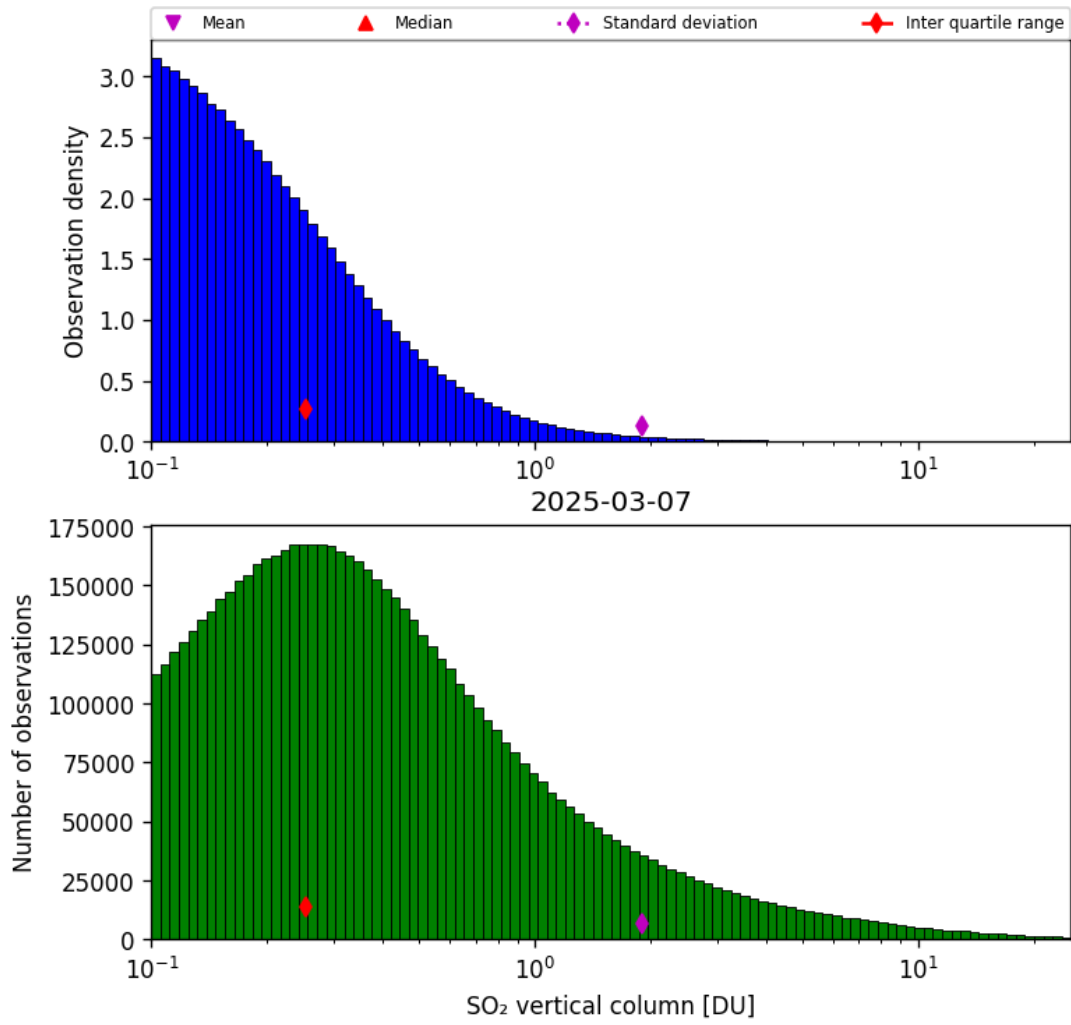


Figure 58: Histogram of “SO₂ vertical column” for 2025-03-07 to 2025-03-08

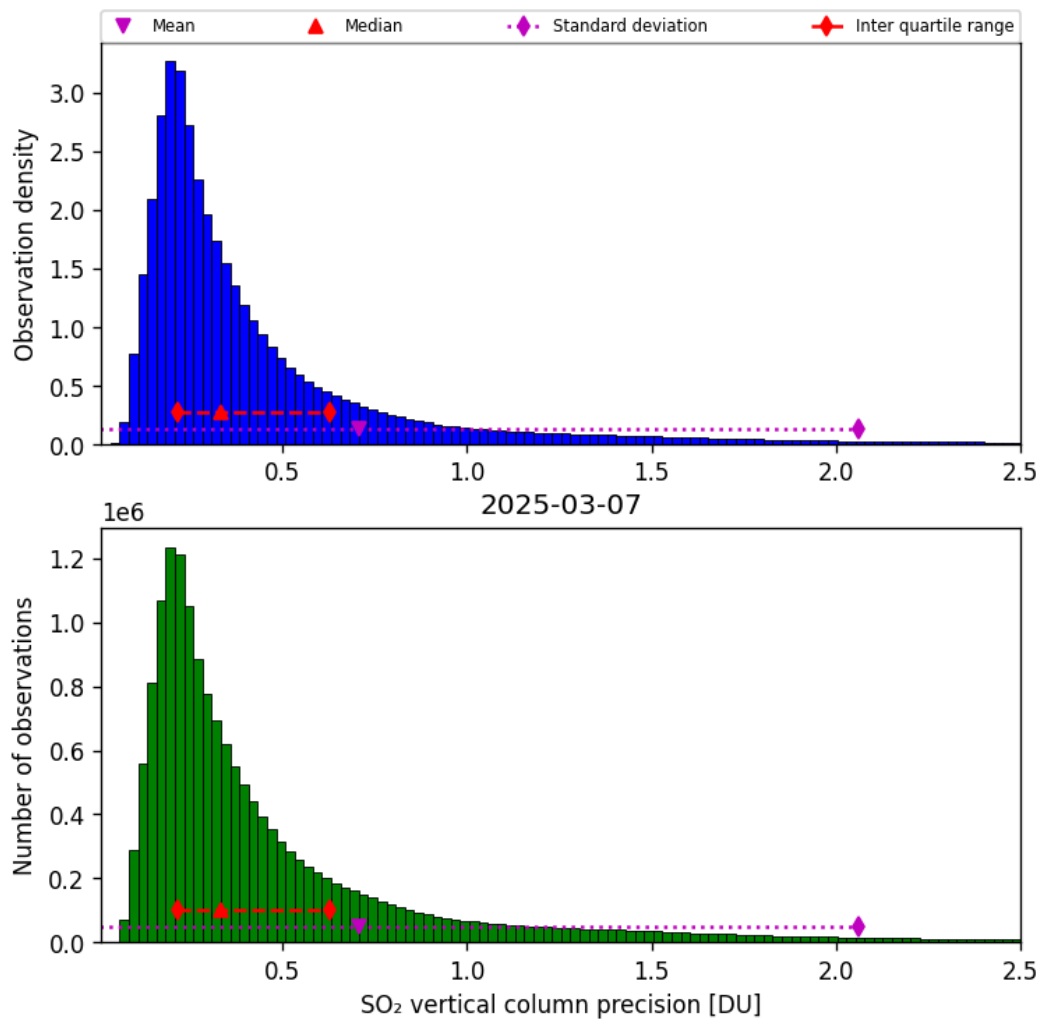


Figure 59: Histogram of “SO₂ vertical column precision” for 2025-03-07 to 2025-03-08

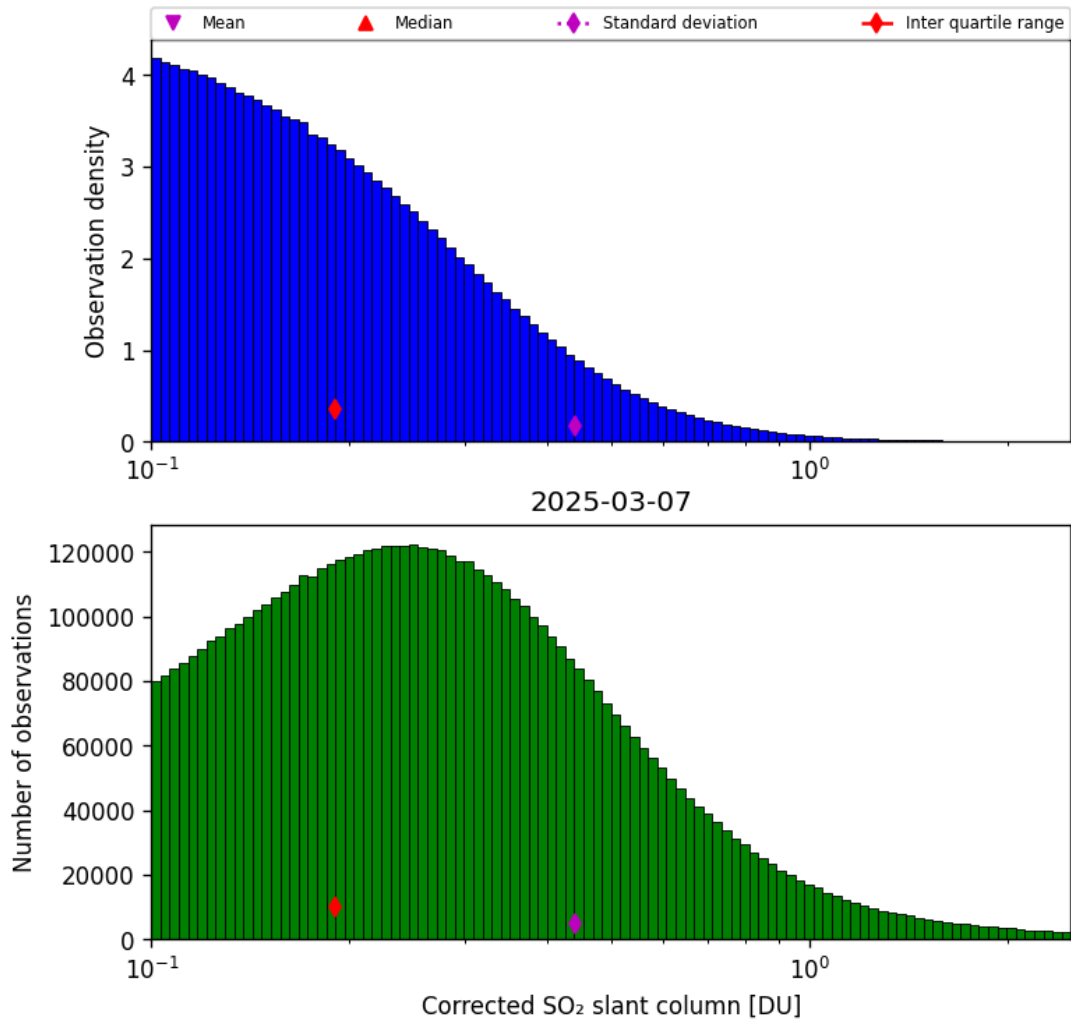


Figure 60: Histogram of “Corrected SO₂ slant column” for 2025-03-07 to 2025-03-08

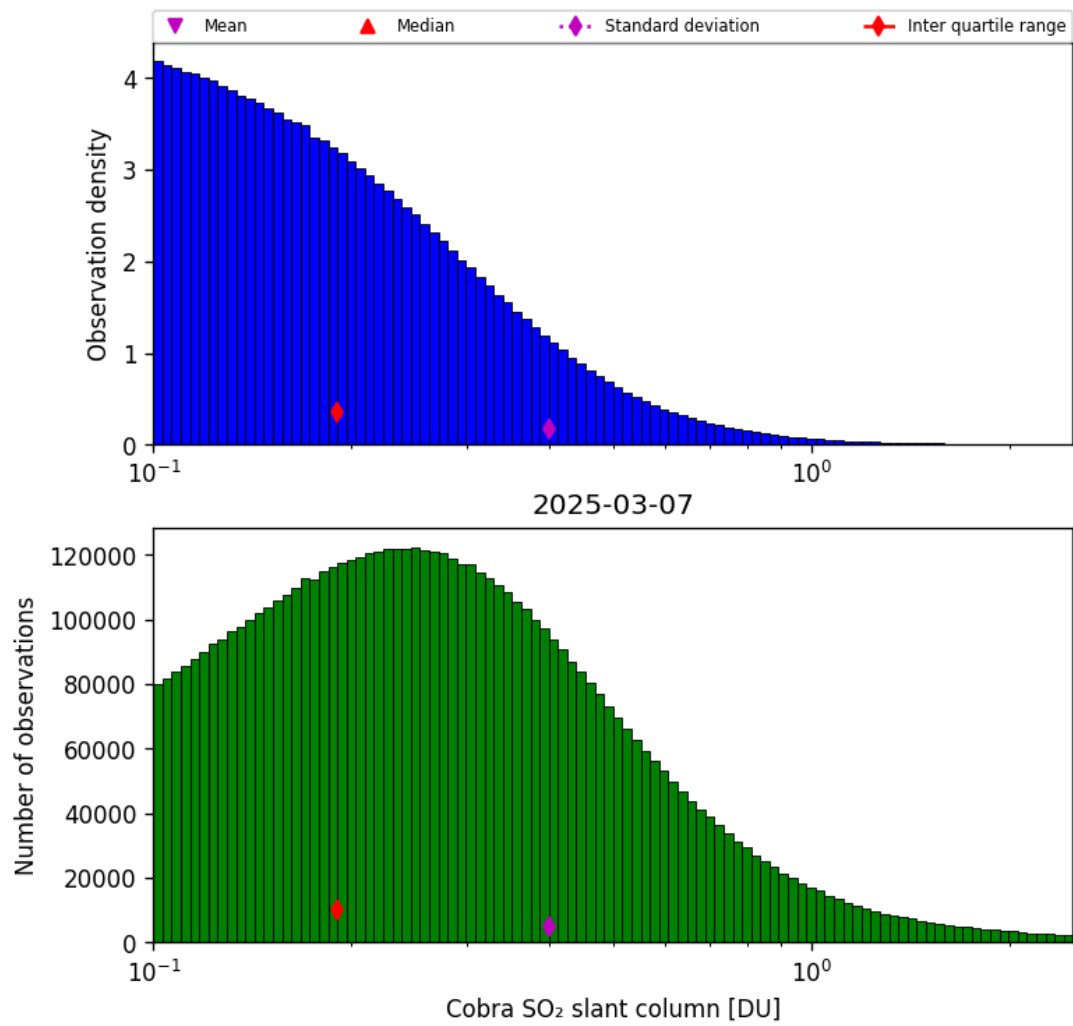


Figure 61: Histogram of “Cobra SO₂ slant column” for 2025-03-07 to 2025-03-08

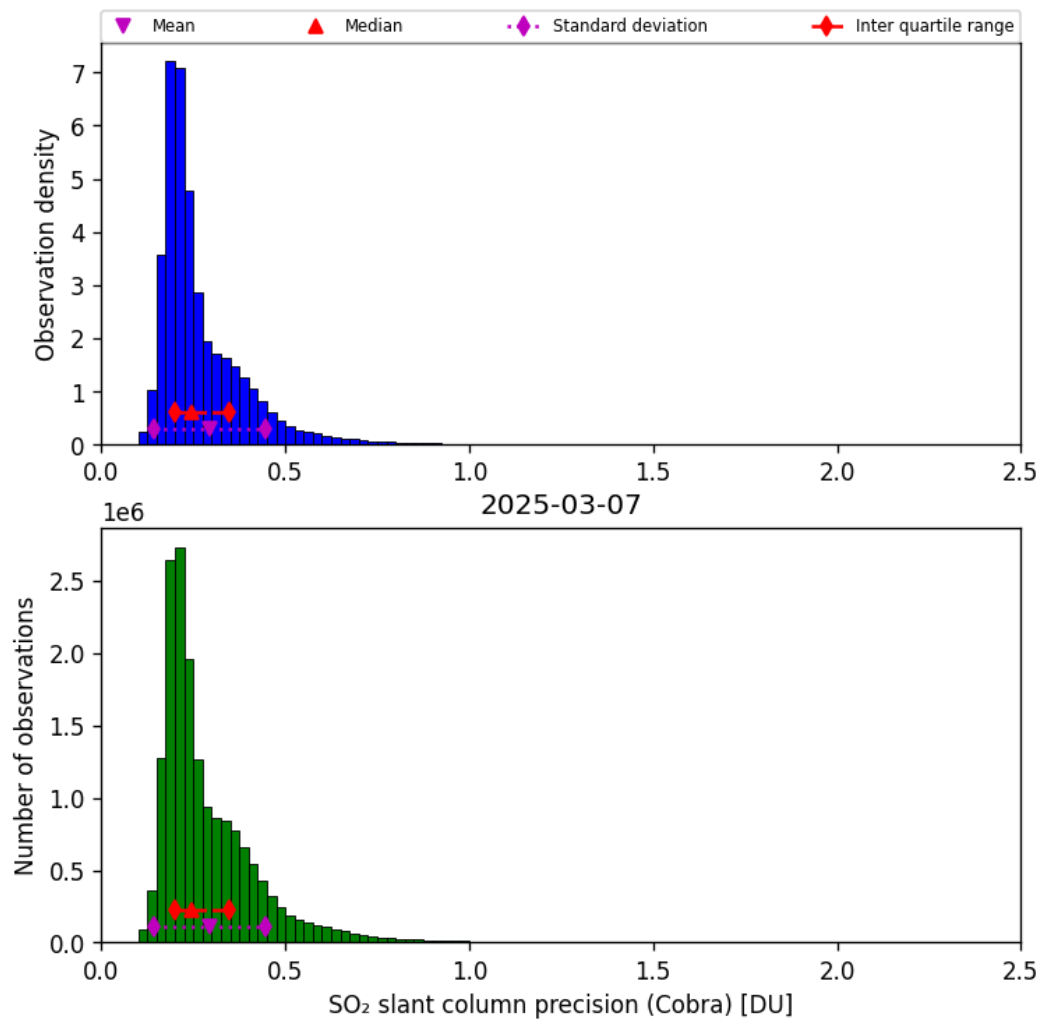


Figure 62: Histogram of “SO₂ slant column precision (Cobra)” for 2025-03-07 to 2025-03-08

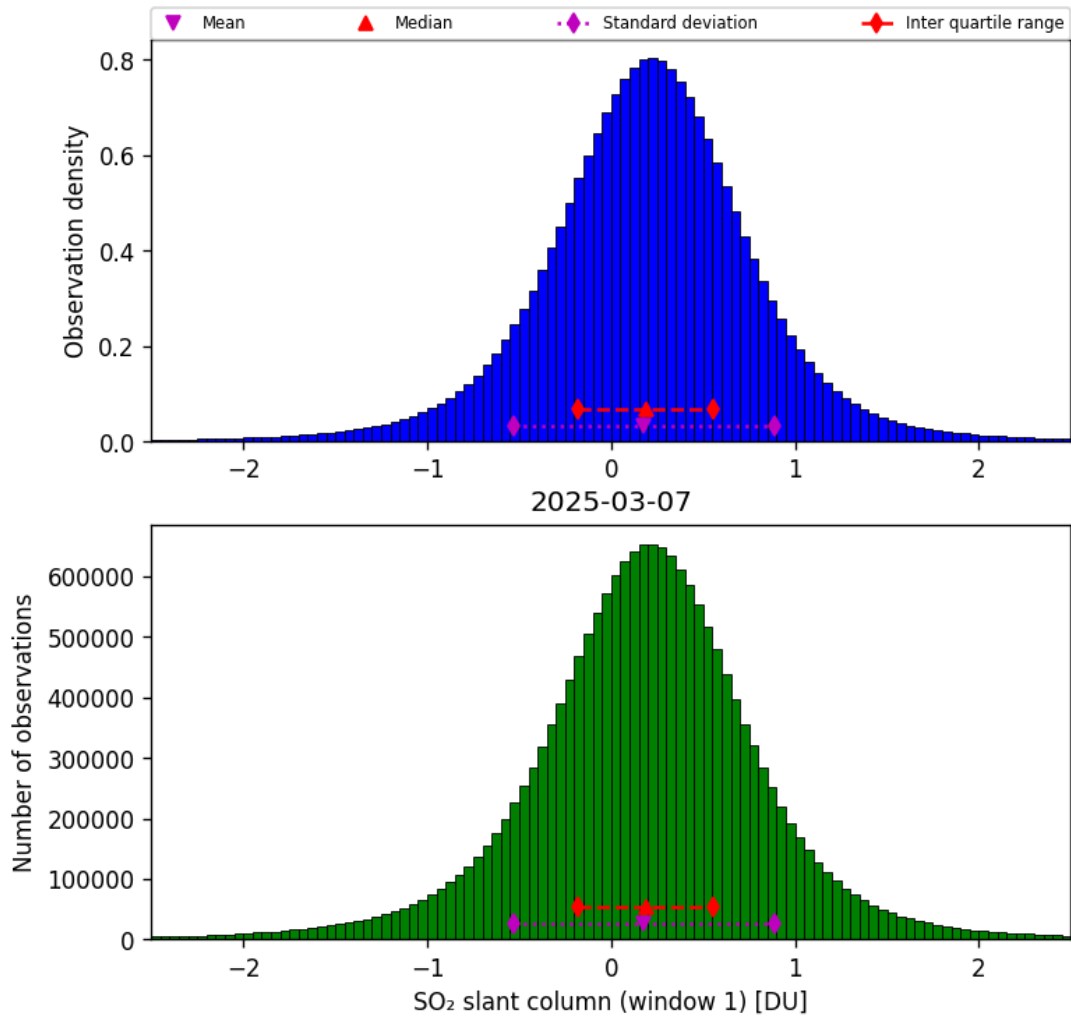


Figure 63: Histogram of “SO₂ slant column (window 1)” for 2025-03-07 to 2025-03-08

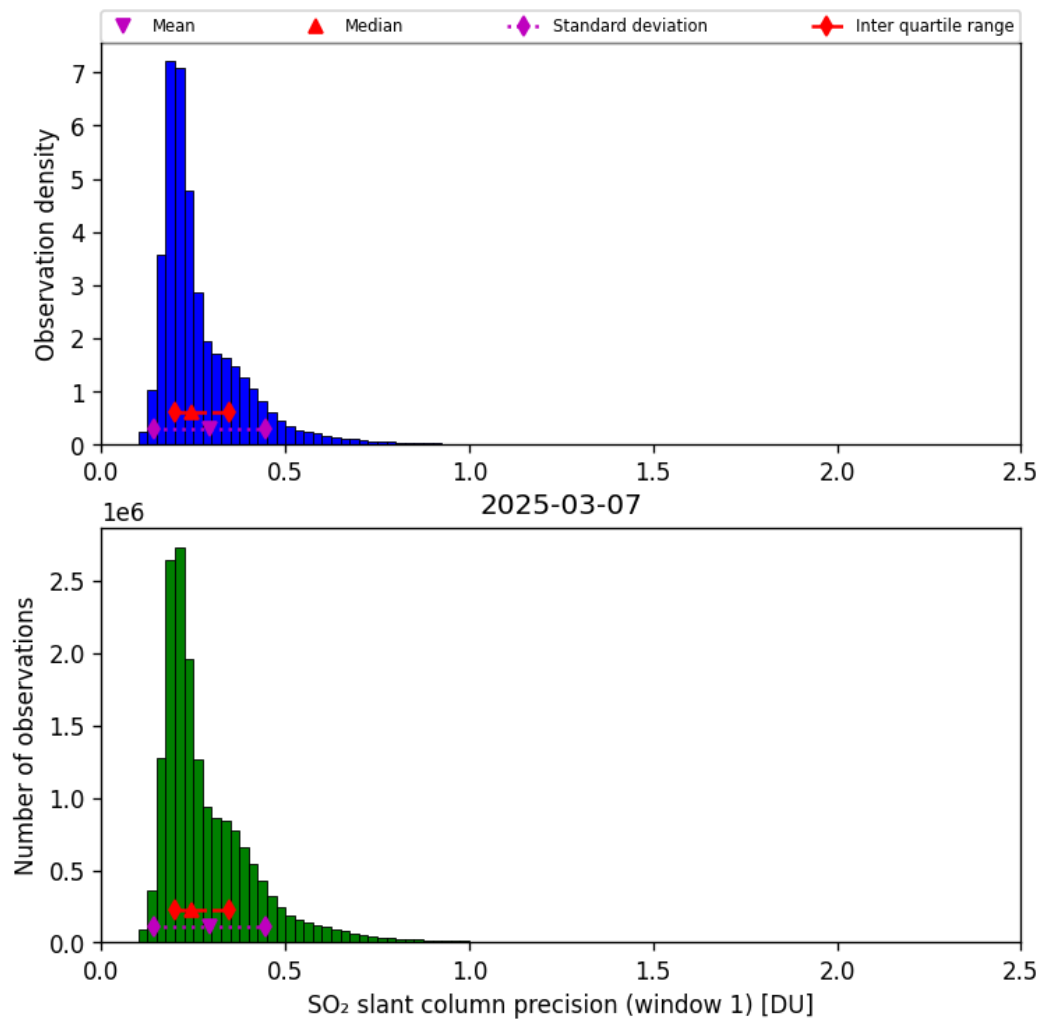


Figure 64: Histogram of “SO₂ slant column precision (window 1)” for 2025-03-07 to 2025-03-08

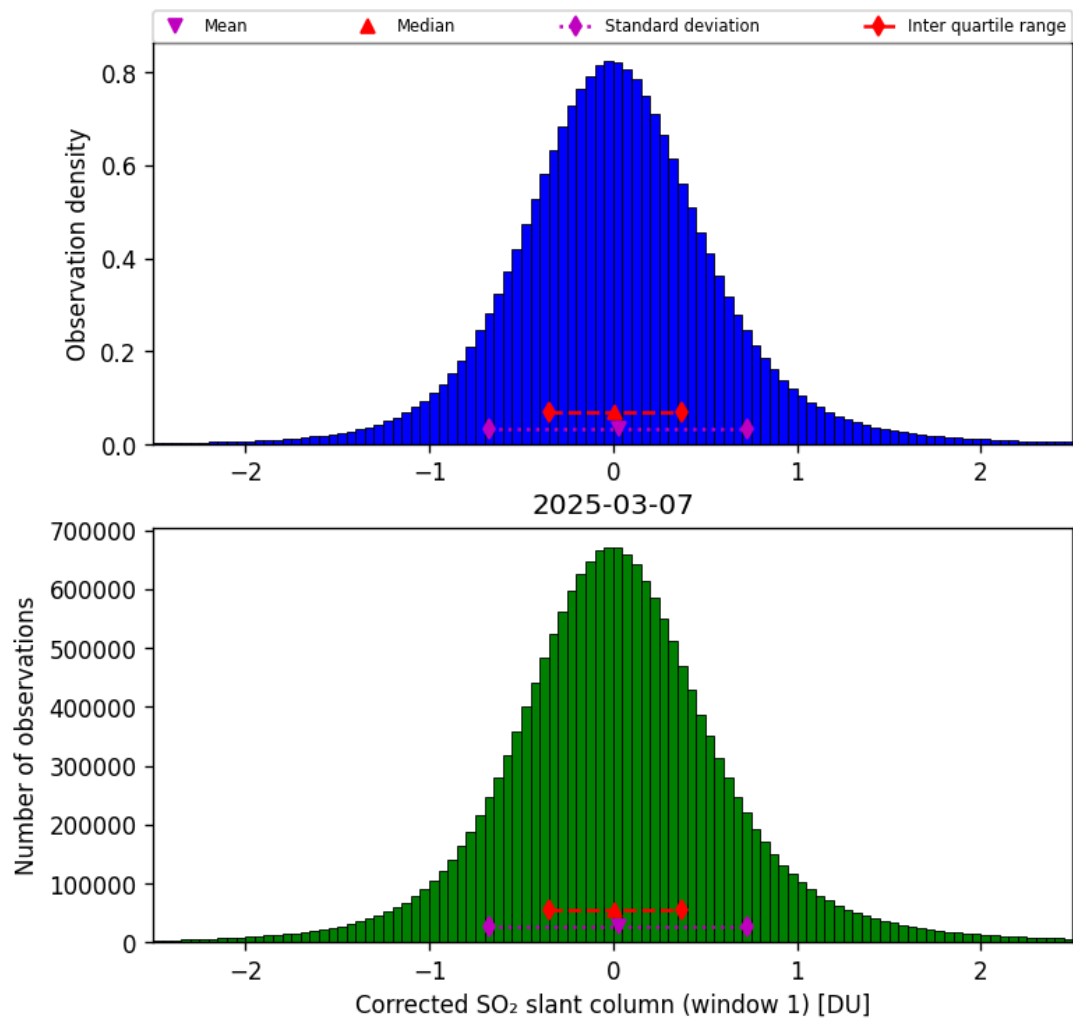


Figure 65: Histogram of “Corrected SO₂ slant column (window 1)” for 2025-03-07 to 2025-03-08

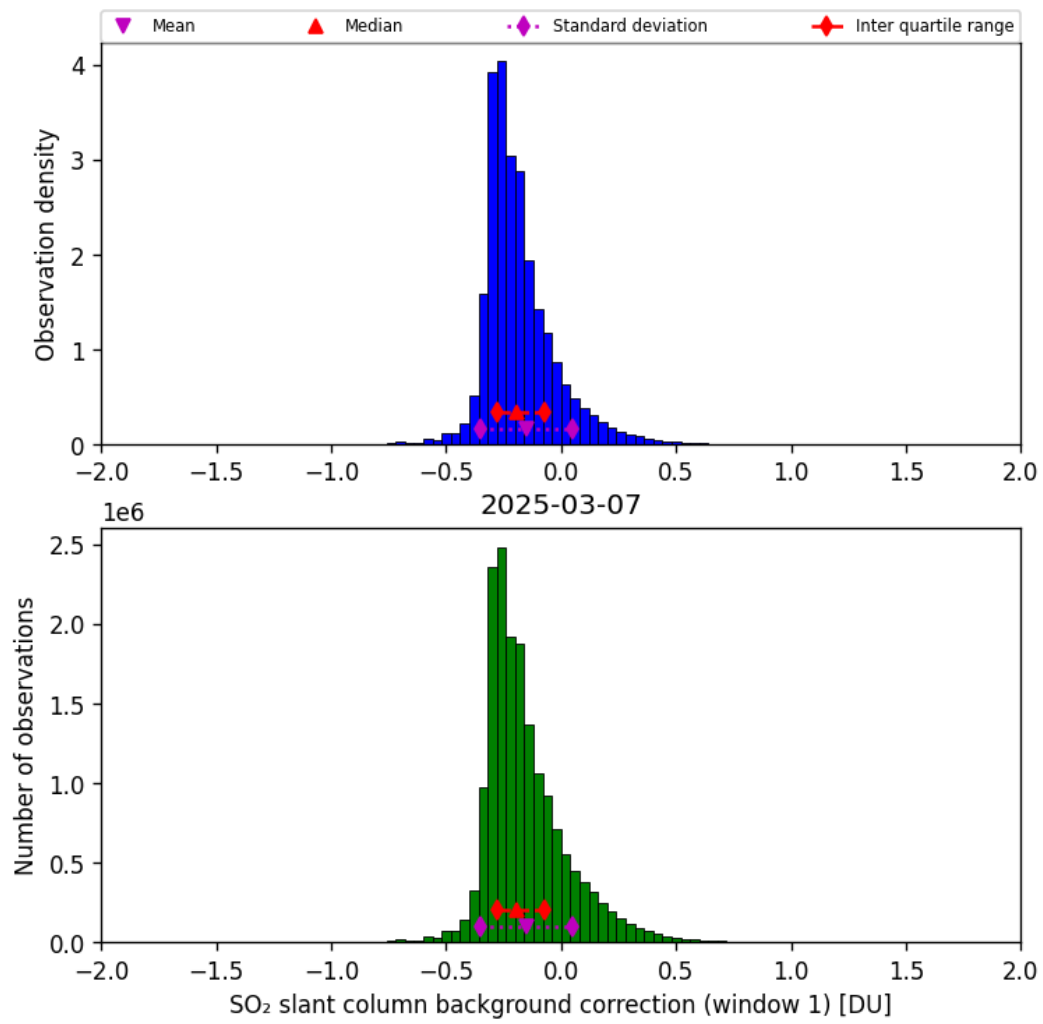


Figure 66: Histogram of “SO₂ slant column background correction (window 1)” for 2025-03-07 to 2025-03-08

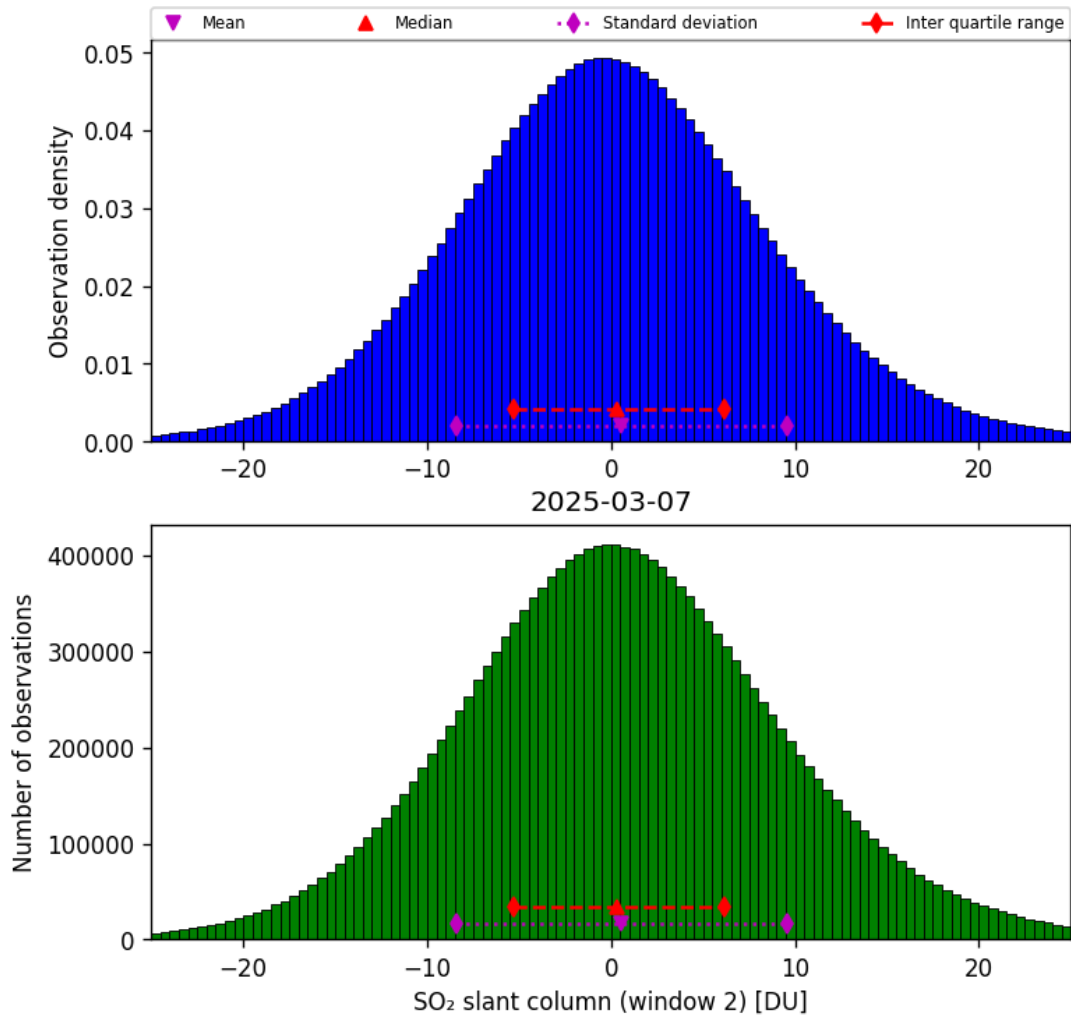


Figure 67: Histogram of “SO₂ slant column (window 2)” for 2025-03-07 to 2025-03-08

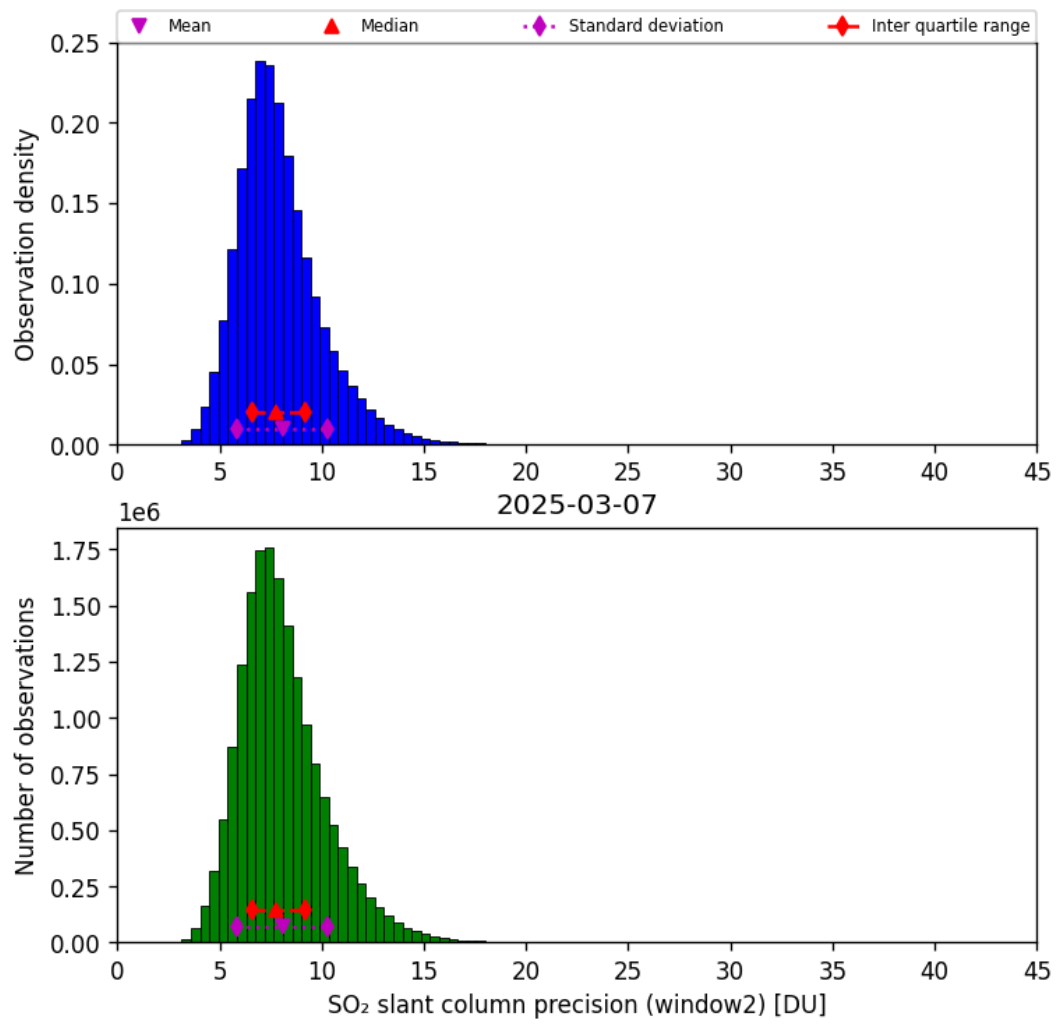


Figure 68: Histogram of “SO₂ slant column precision (window2)” for 2025-03-07 to 2025-03-08

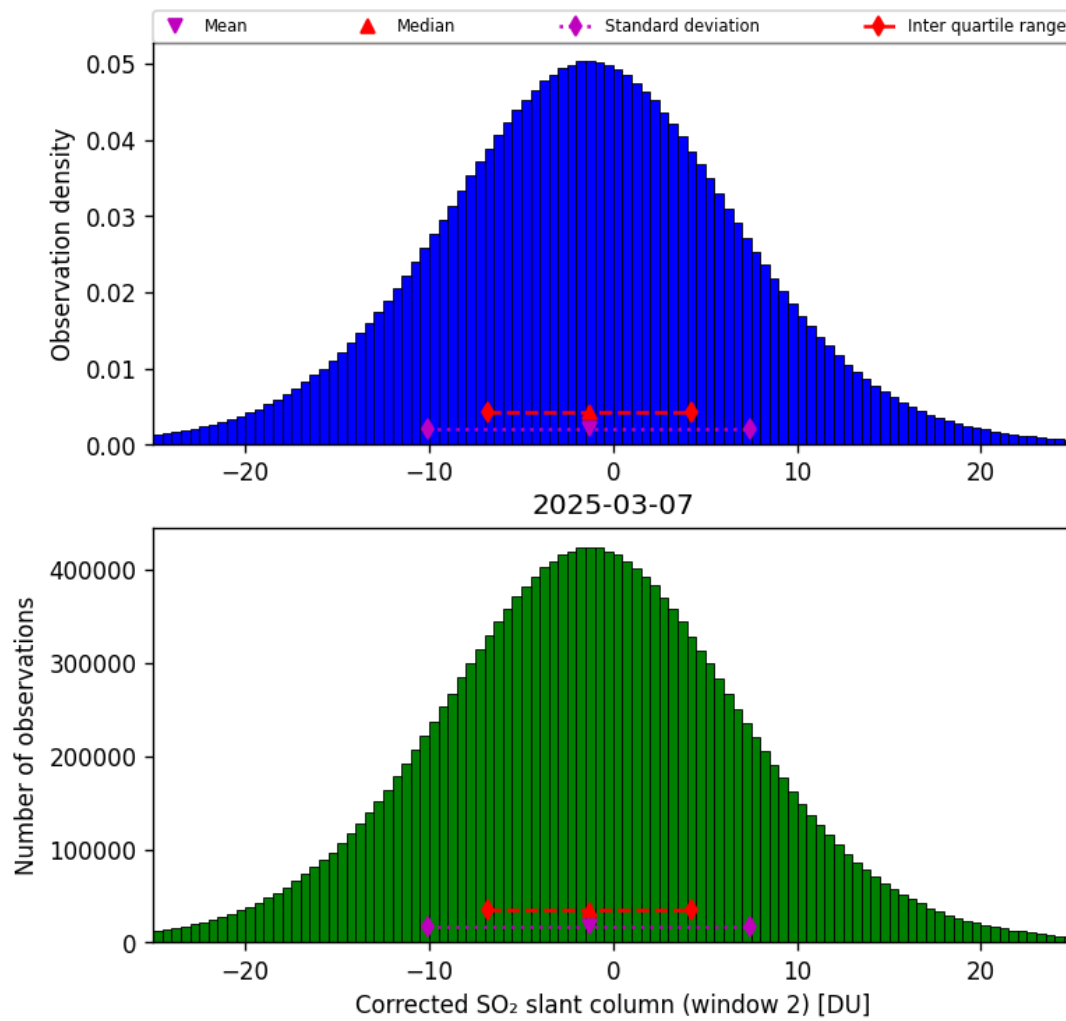


Figure 69: Histogram of “Corrected SO₂ slant column (window 2)” for 2025-03-07 to 2025-03-08

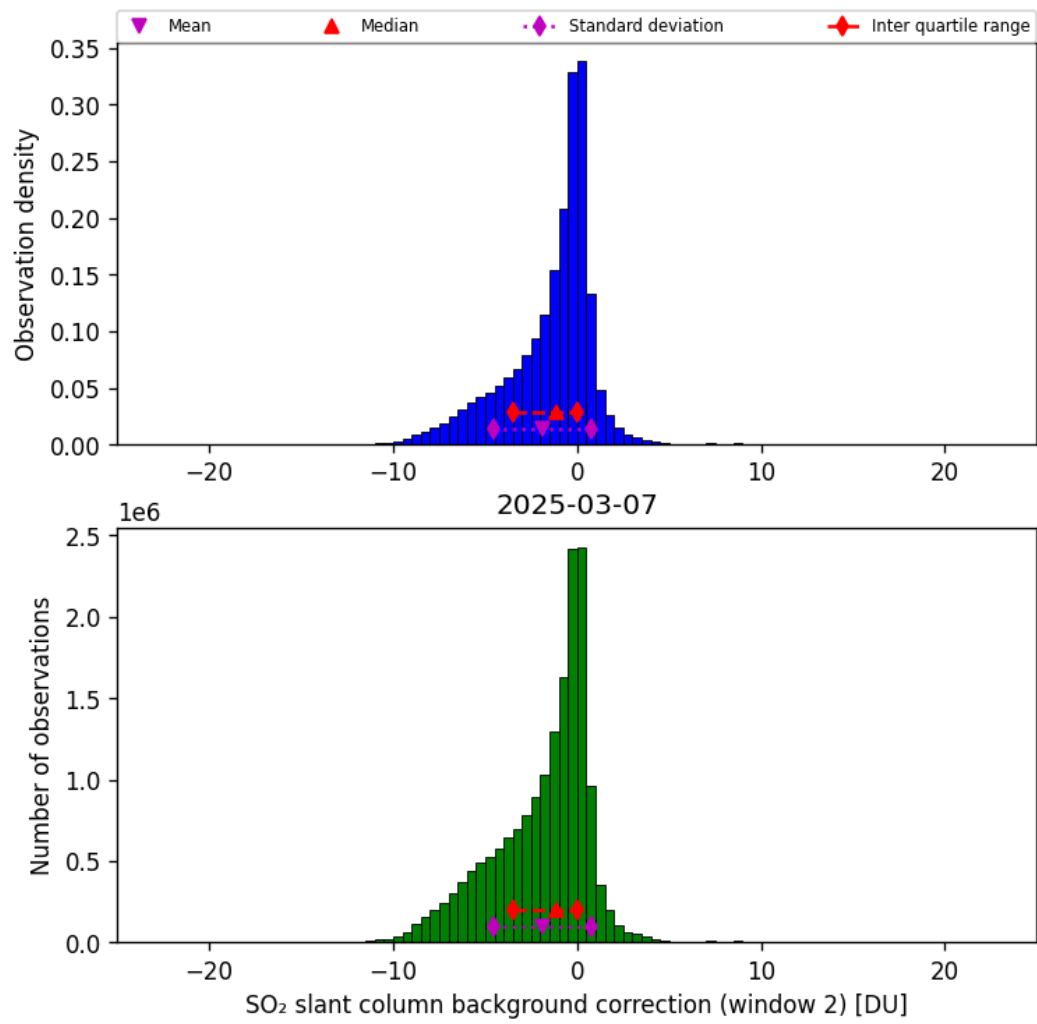


Figure 70: Histogram of “SO₂ slant column background correction (window 2)” for 2025-03-07 to 2025-03-08

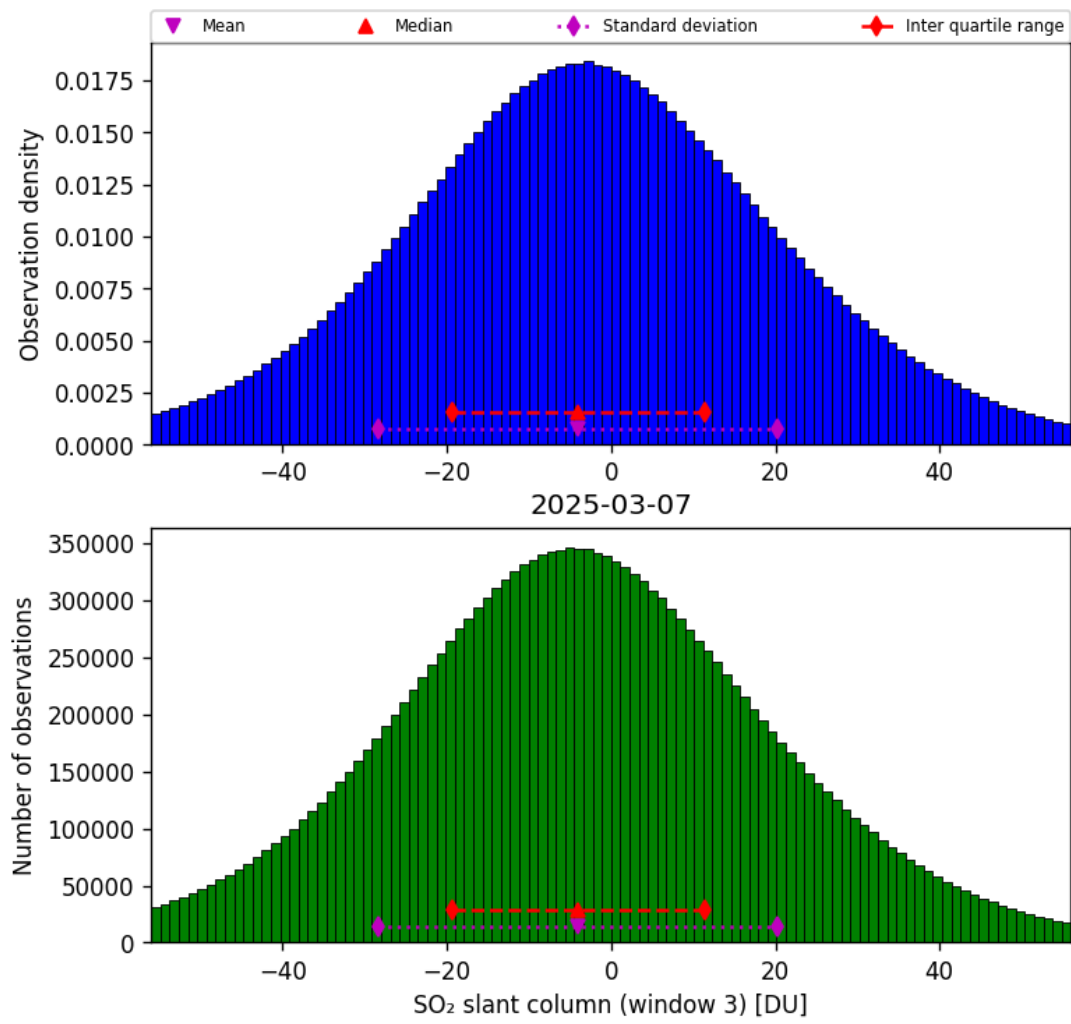


Figure 71: Histogram of “SO₂ slant column (window 3)” for 2025-03-07 to 2025-03-08

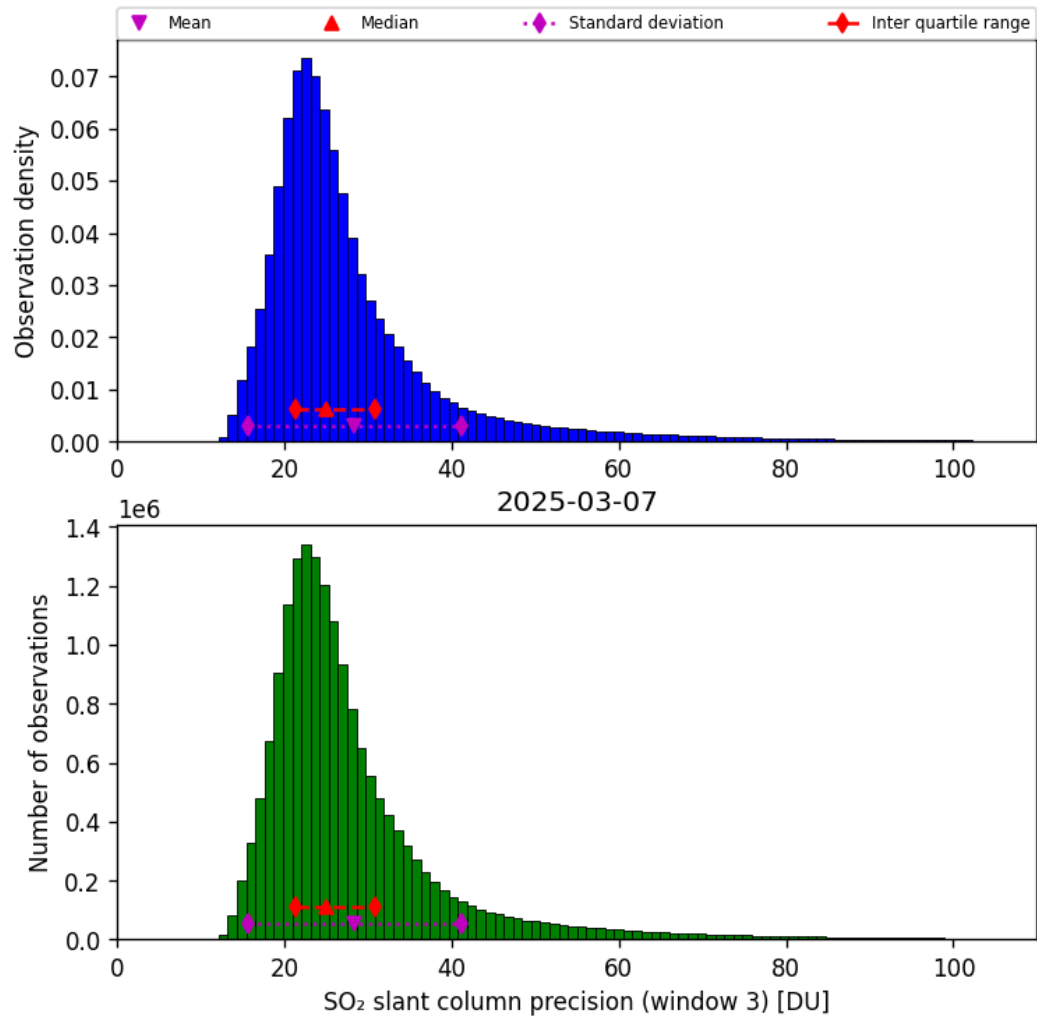


Figure 72: Histogram of “SO₂ slant column precision (window 3)” for 2025-03-07 to 2025-03-08

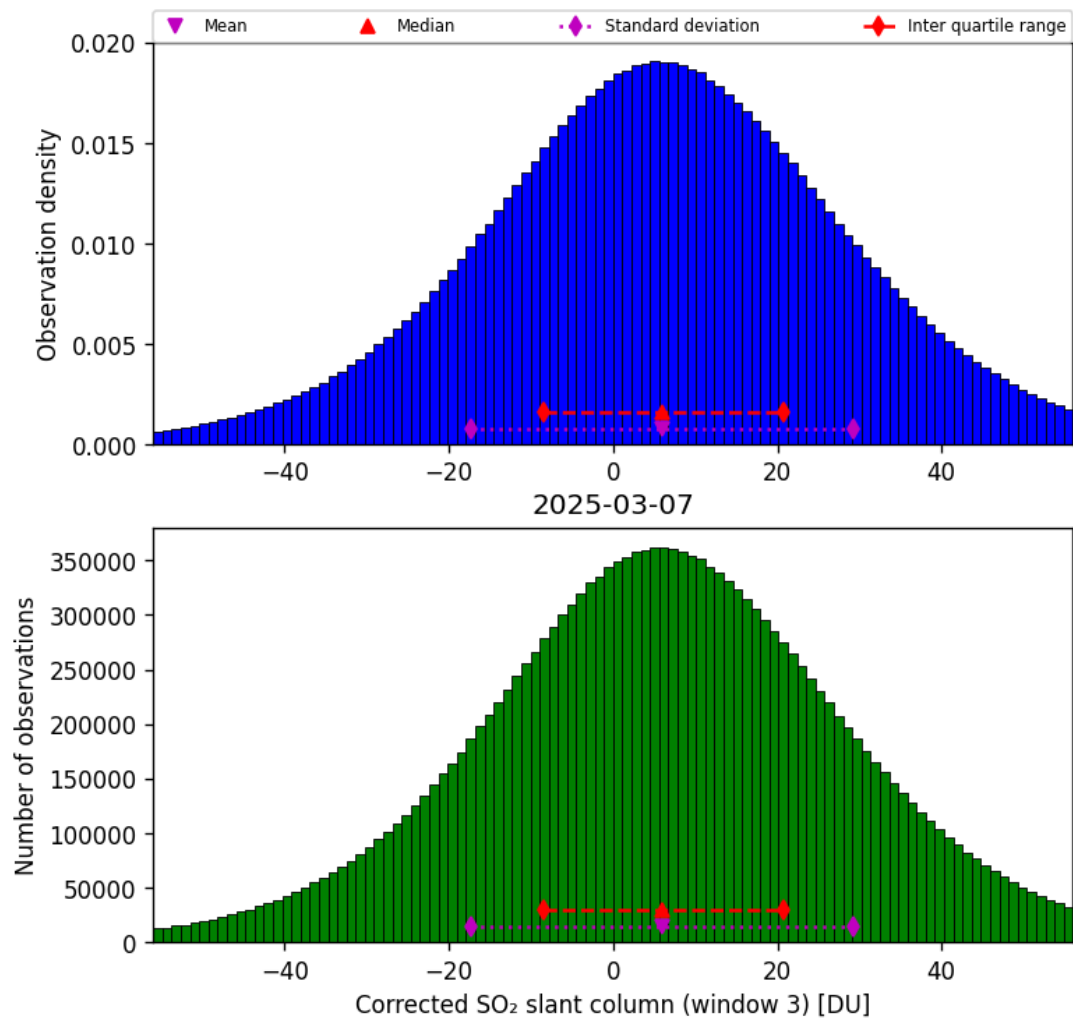


Figure 73: Histogram of "Corrected SO₂ slant column (window 3)" for 2025-03-07 to 2025-03-08

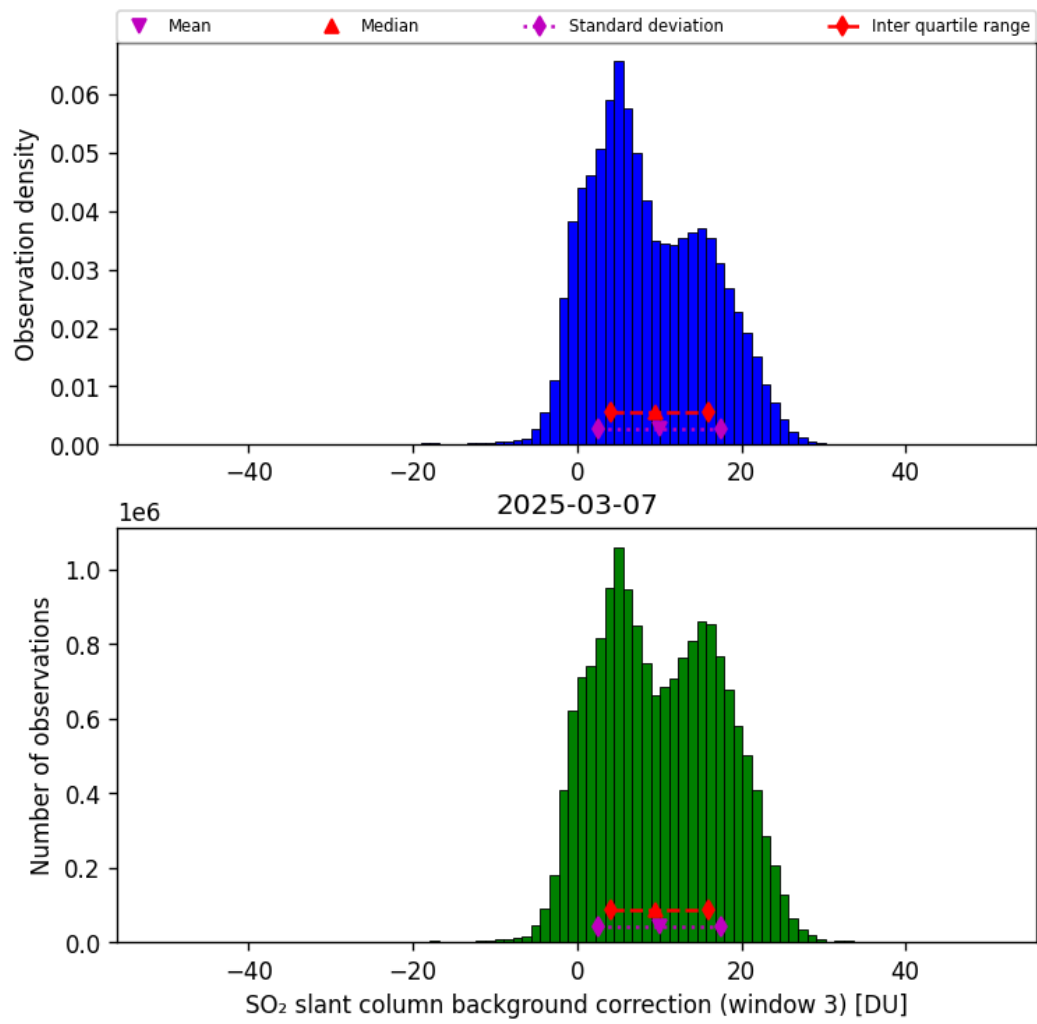


Figure 74: Histogram of “SO₂ slant column background correction (window 3)” for 2025-03-07 to 2025-03-08

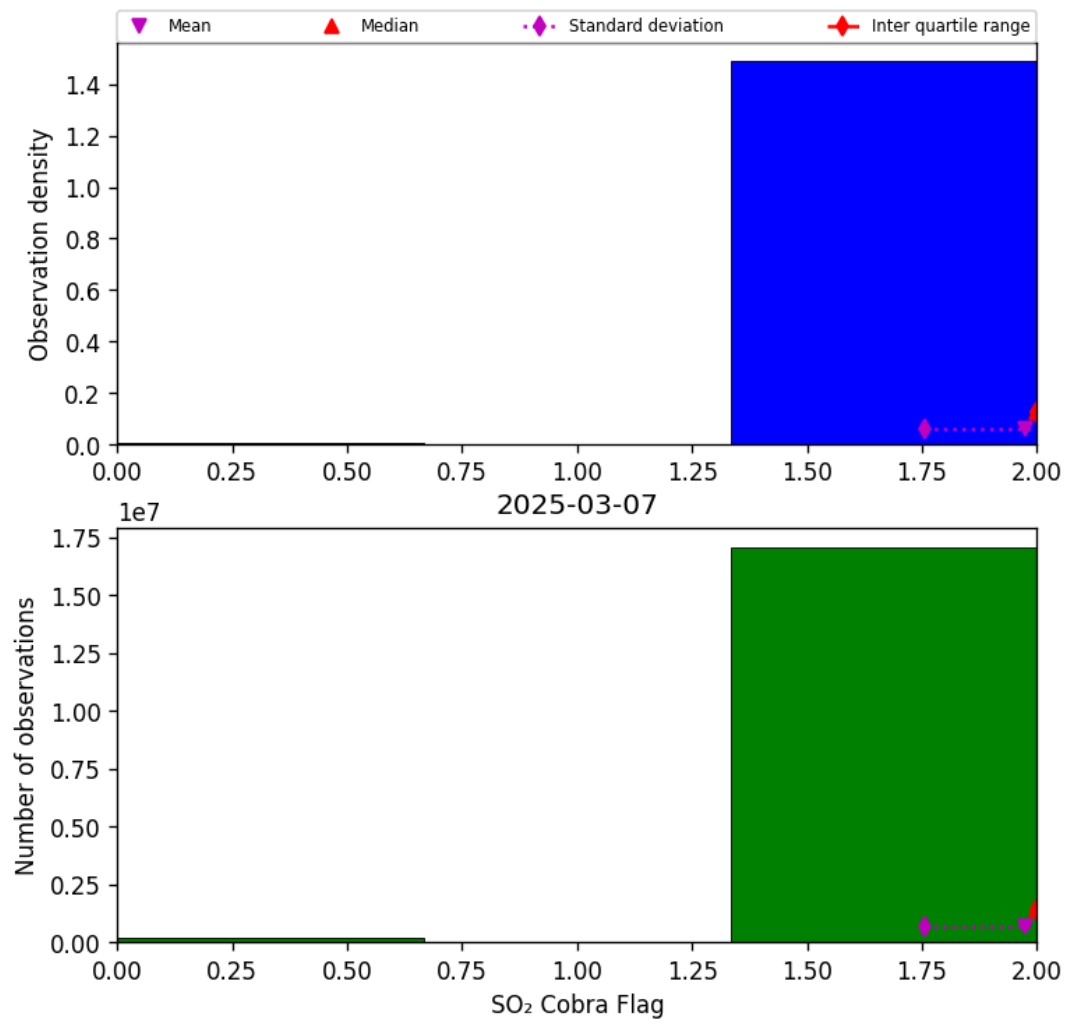


Figure 75: Histogram of "SO₂ Cobra Flag" for 2025-03-07 to 2025-03-08

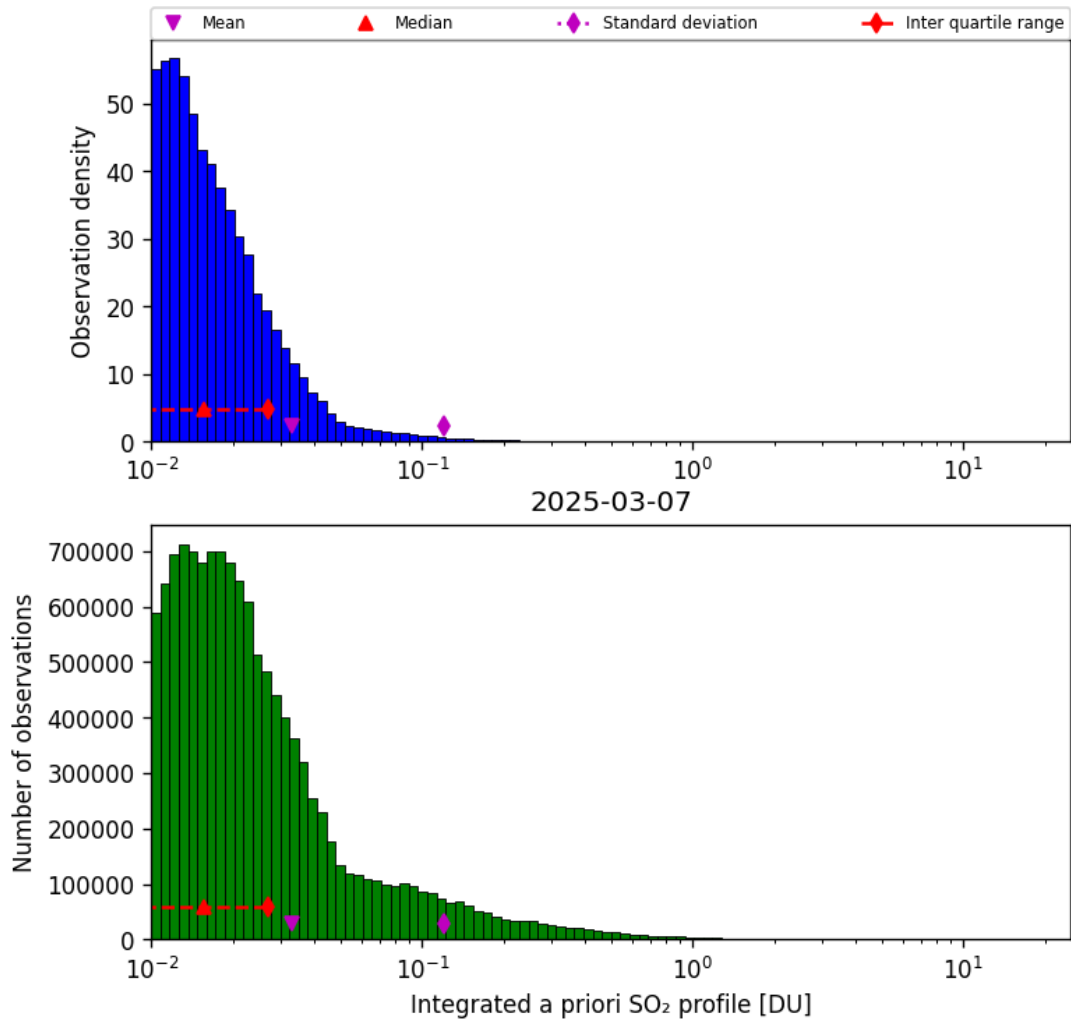


Figure 76: Histogram of “Integrated a priori SO₂ profile” for 2025-03-07 to 2025-03-08

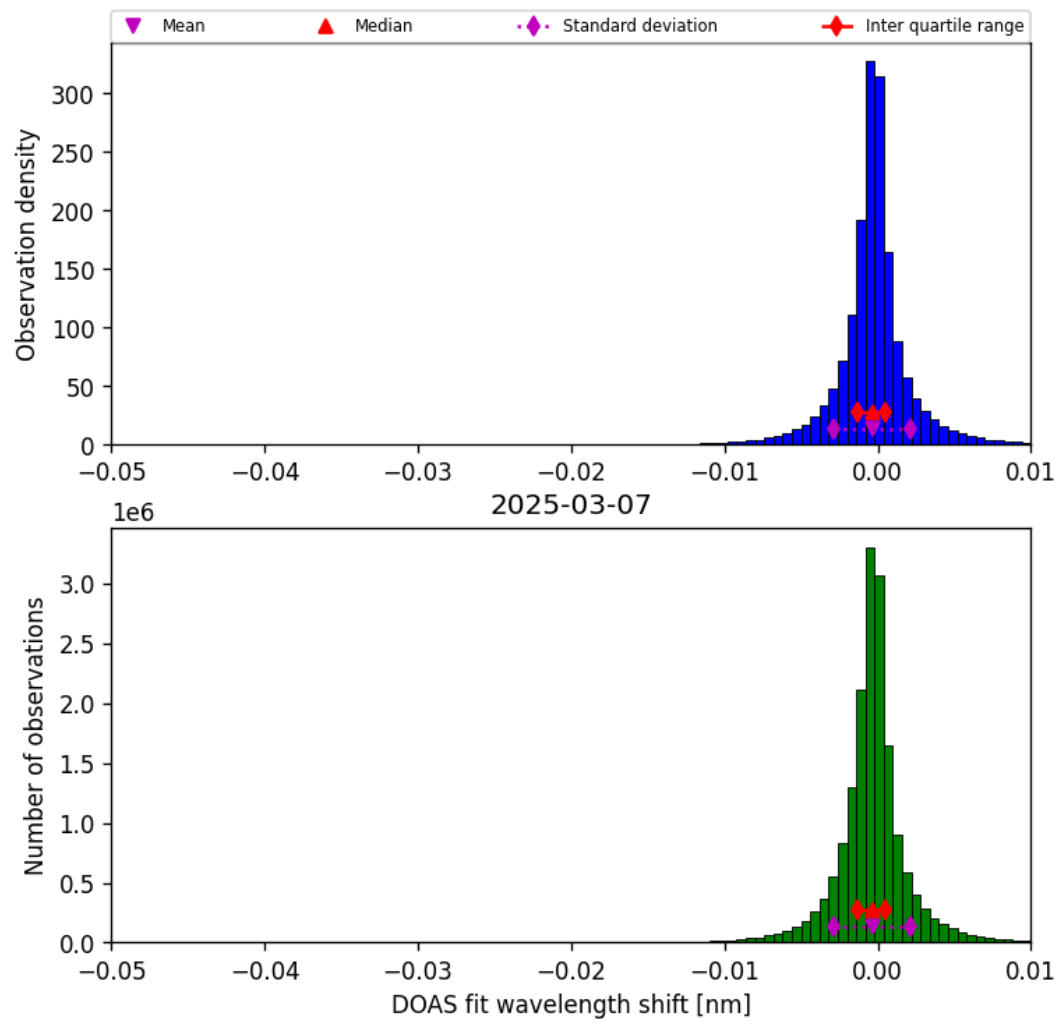


Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-03-07 to 2025-03-08

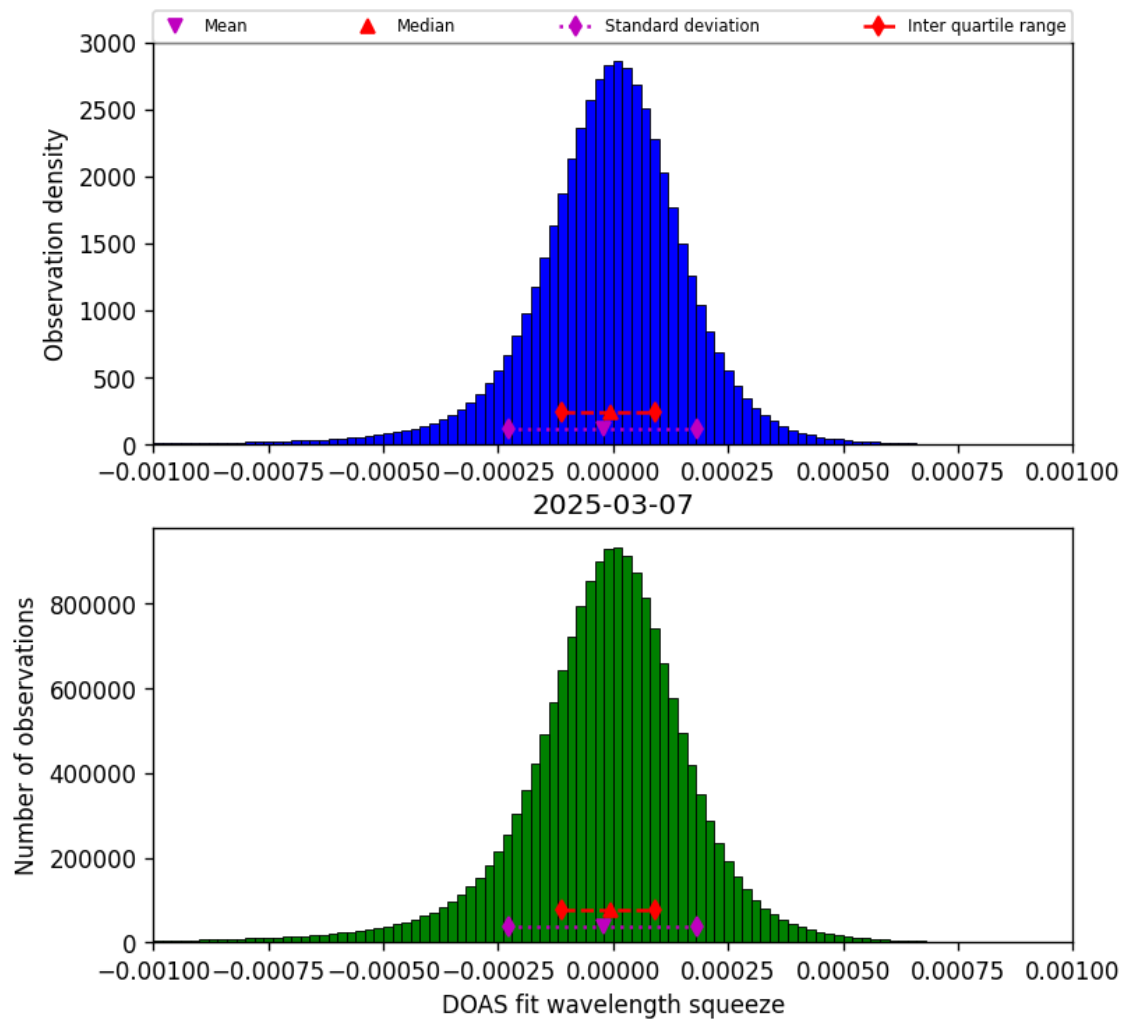


Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-03-07 to 2025-03-08

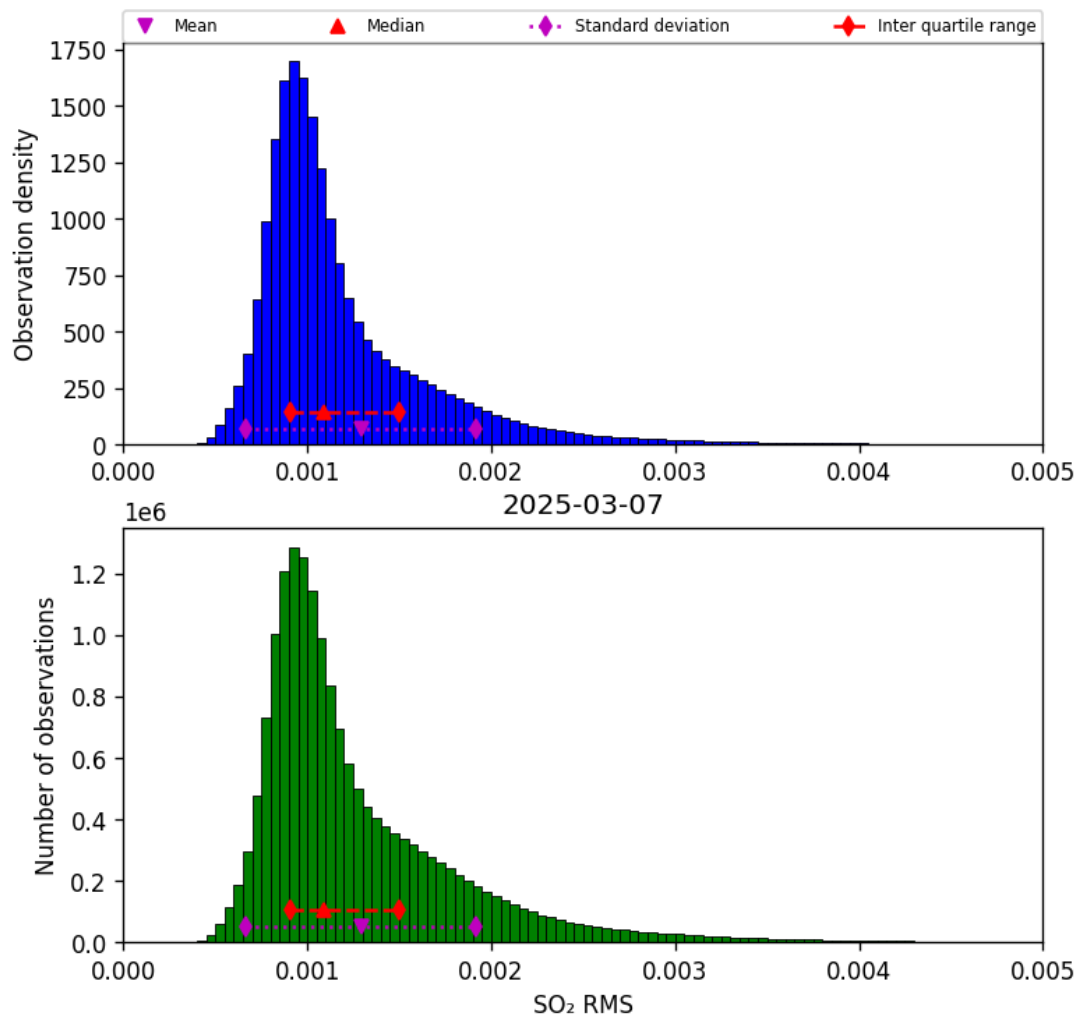


Figure 79: Histogram of “SO₂ RMS” for 2025-03-07 to 2025-03-08

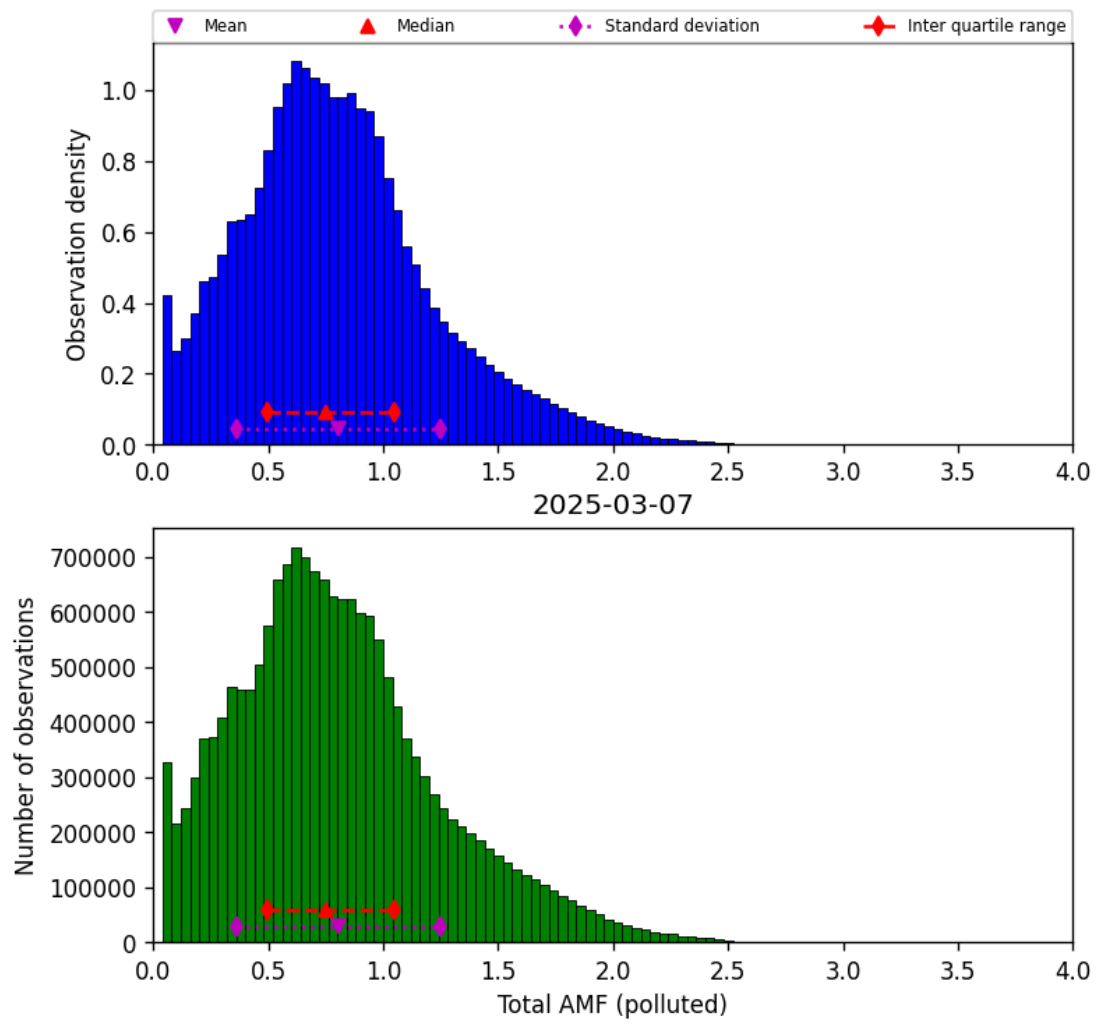


Figure 80: Histogram of “Total AMF (polluted)” for 2025-03-07 to 2025-03-08

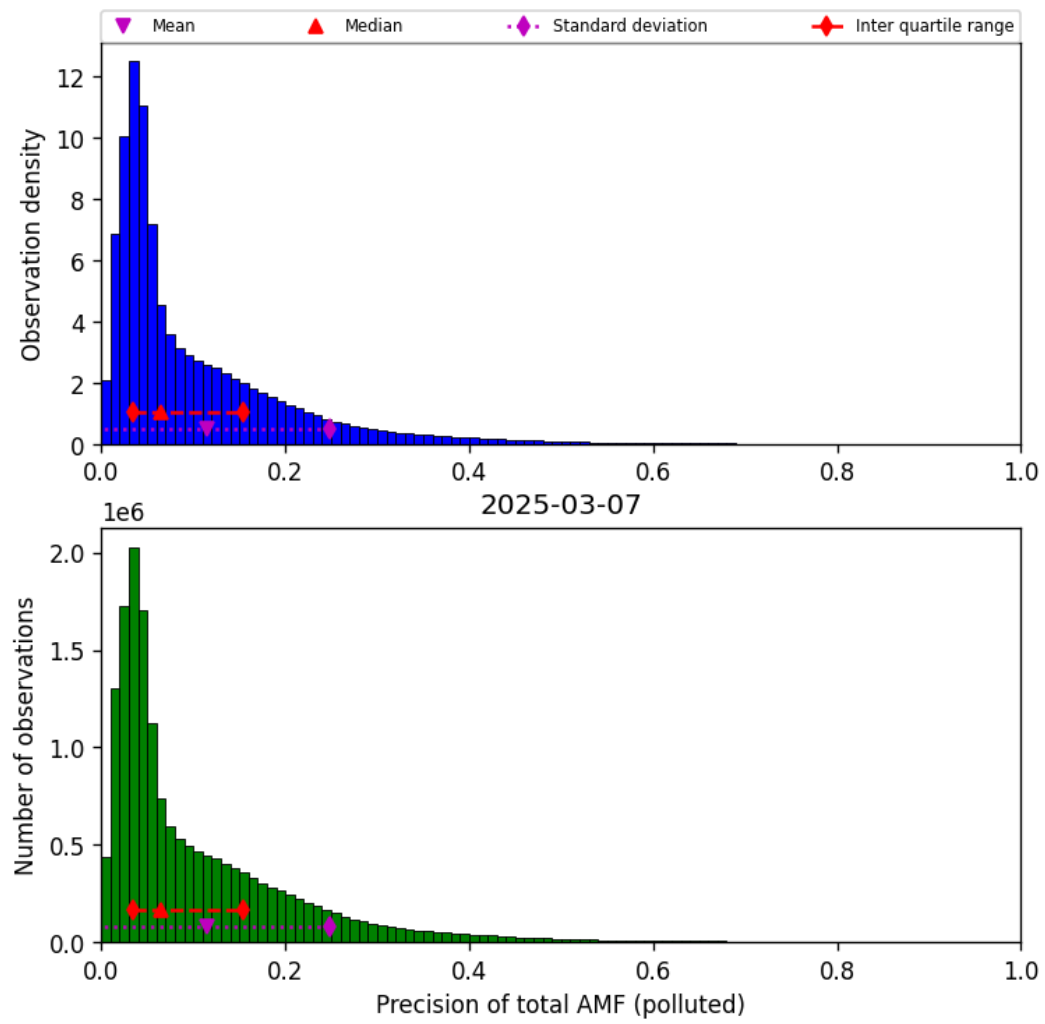


Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-03-07 to 2025-03-08

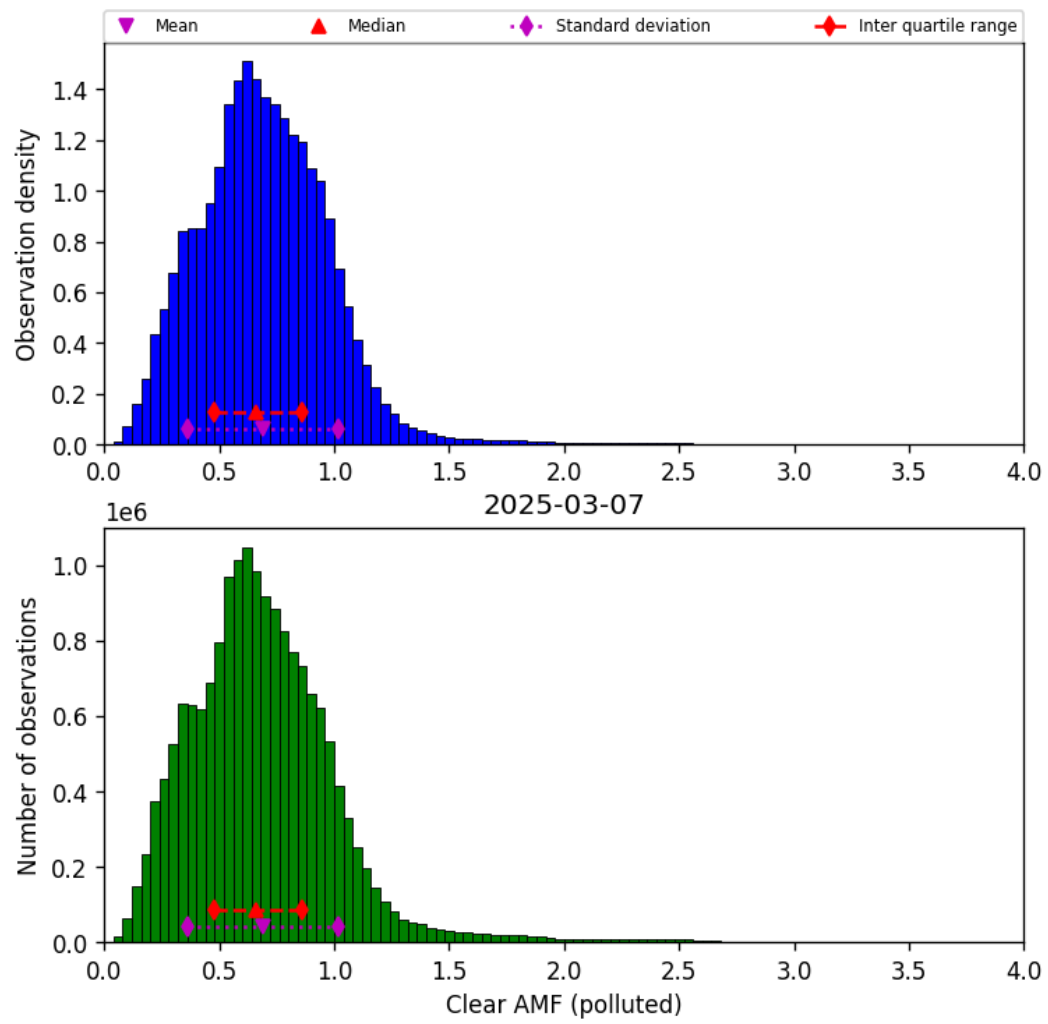


Figure 82: Histogram of “Clear AMF (polluted)” for 2025-03-07 to 2025-03-08

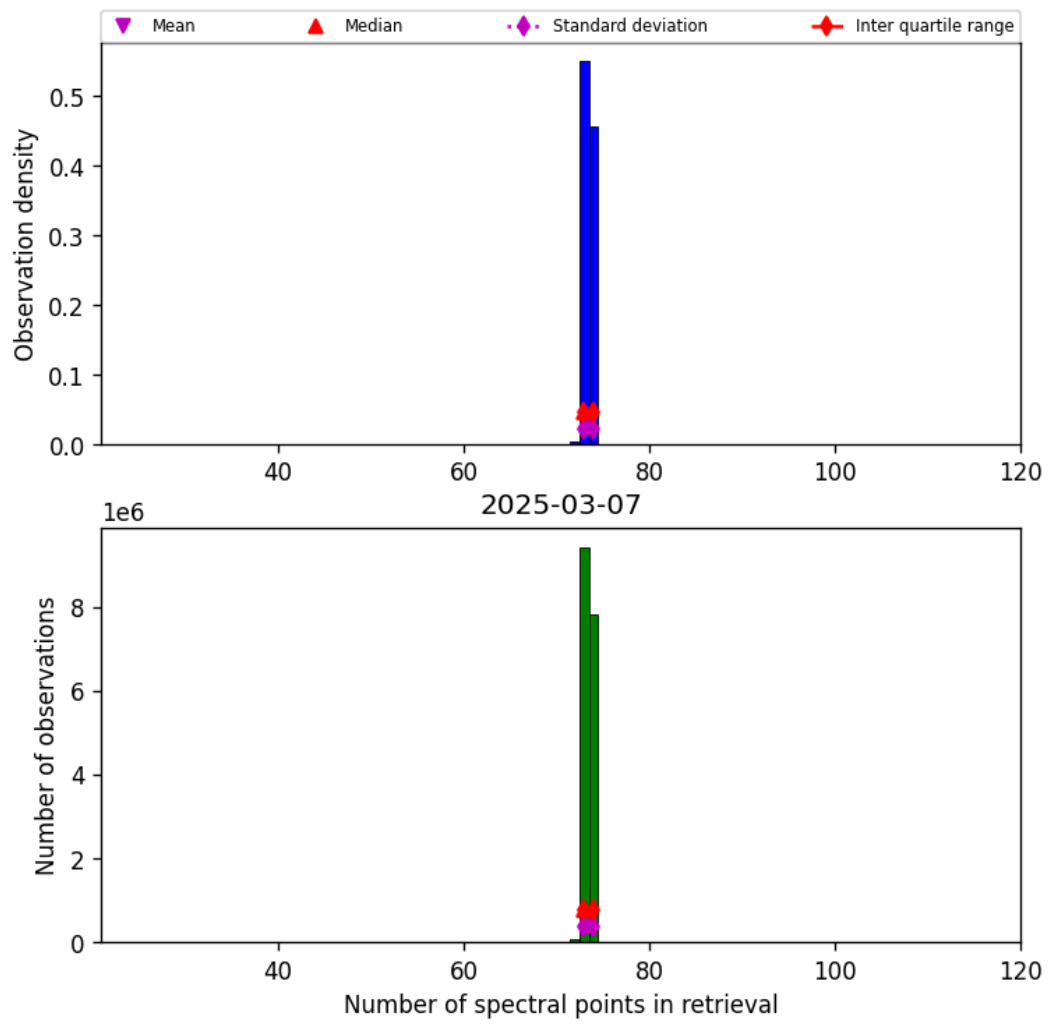


Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-03-07 to 2025-03-08

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.

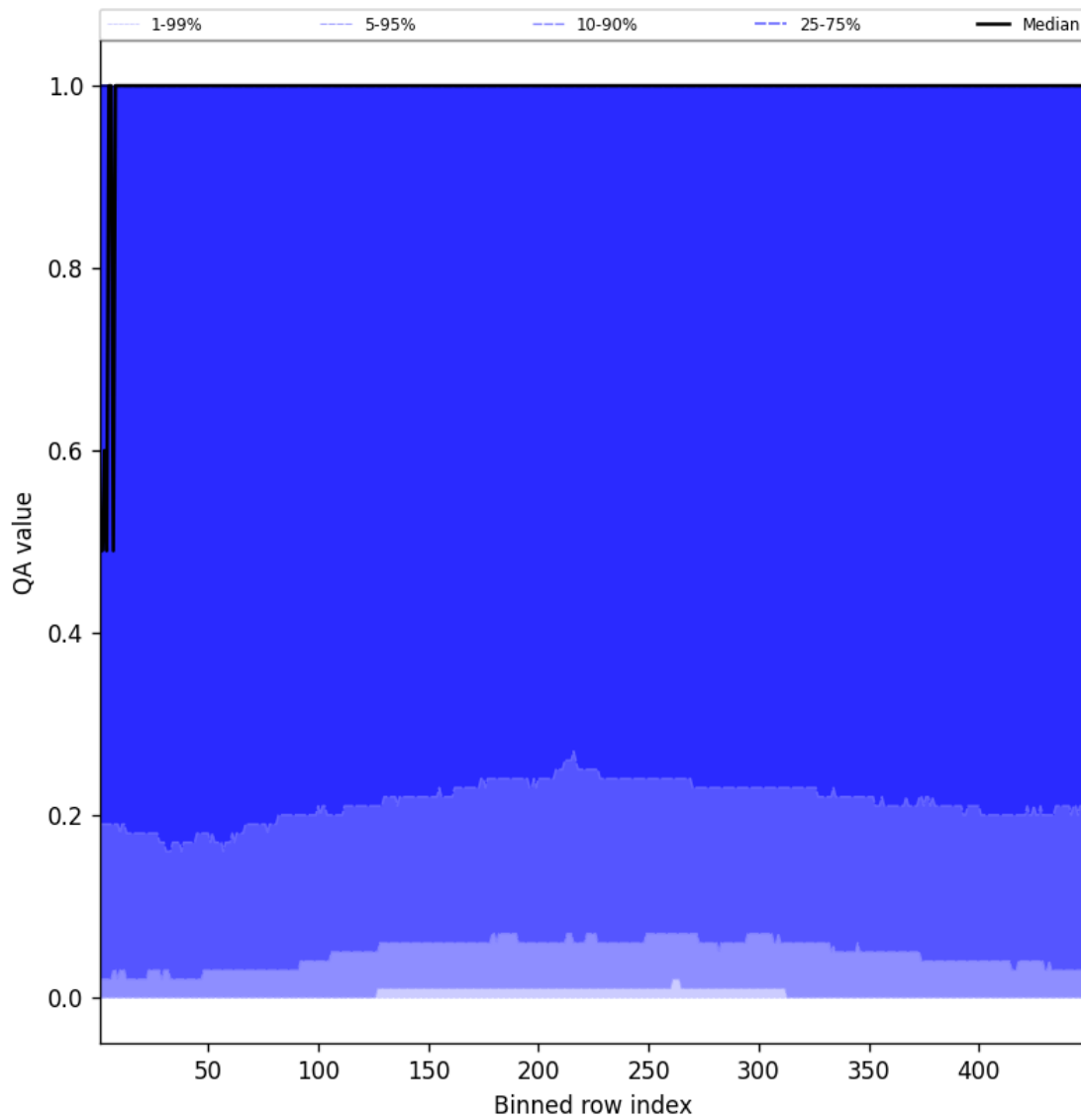


Figure 84: Along track statistics of “QA value” for 2025-03-07 to 2025-03-08

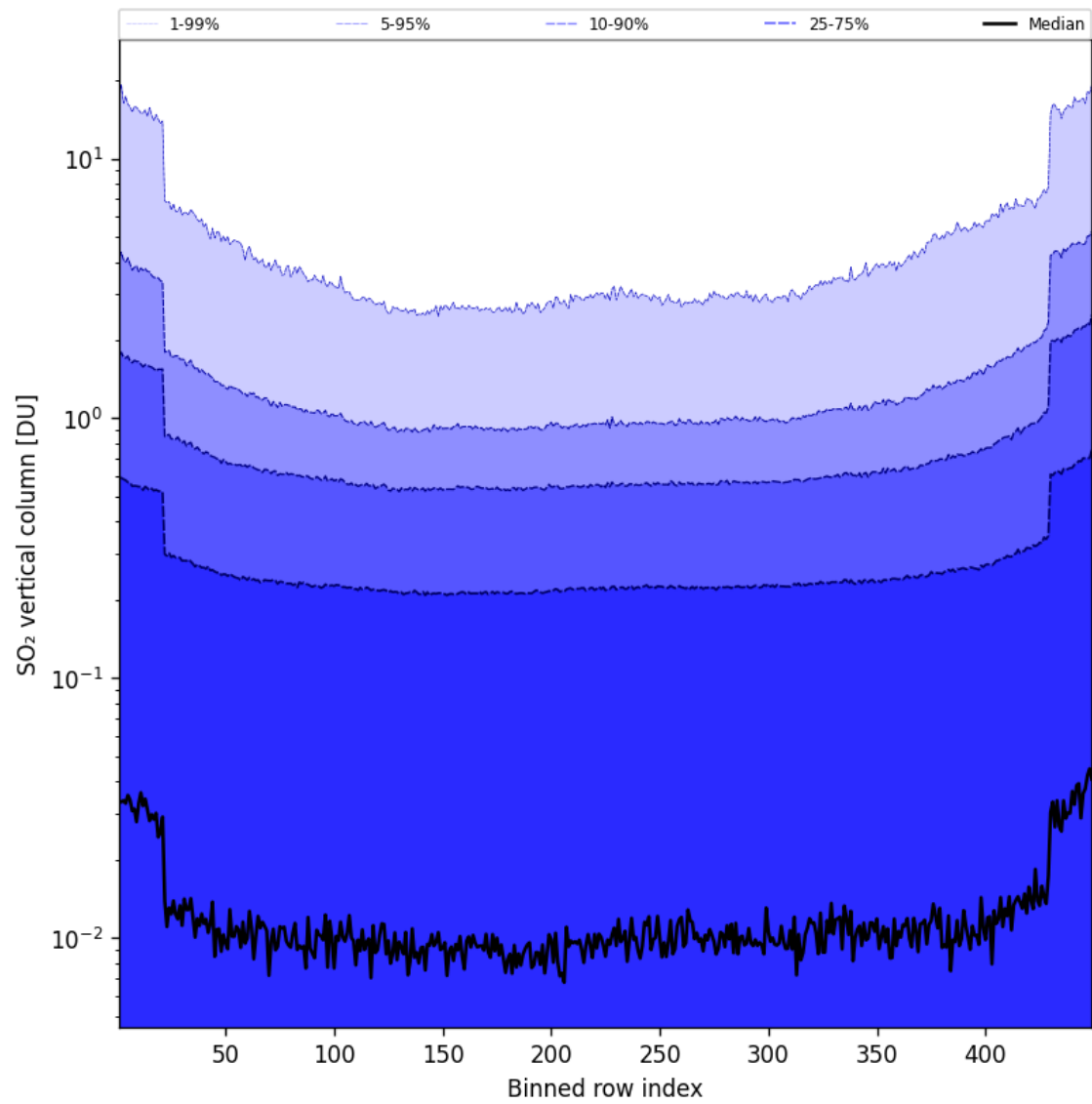


Figure 85: Along track statistics of “SO₂ vertical column” for 2025-03-07 to 2025-03-08

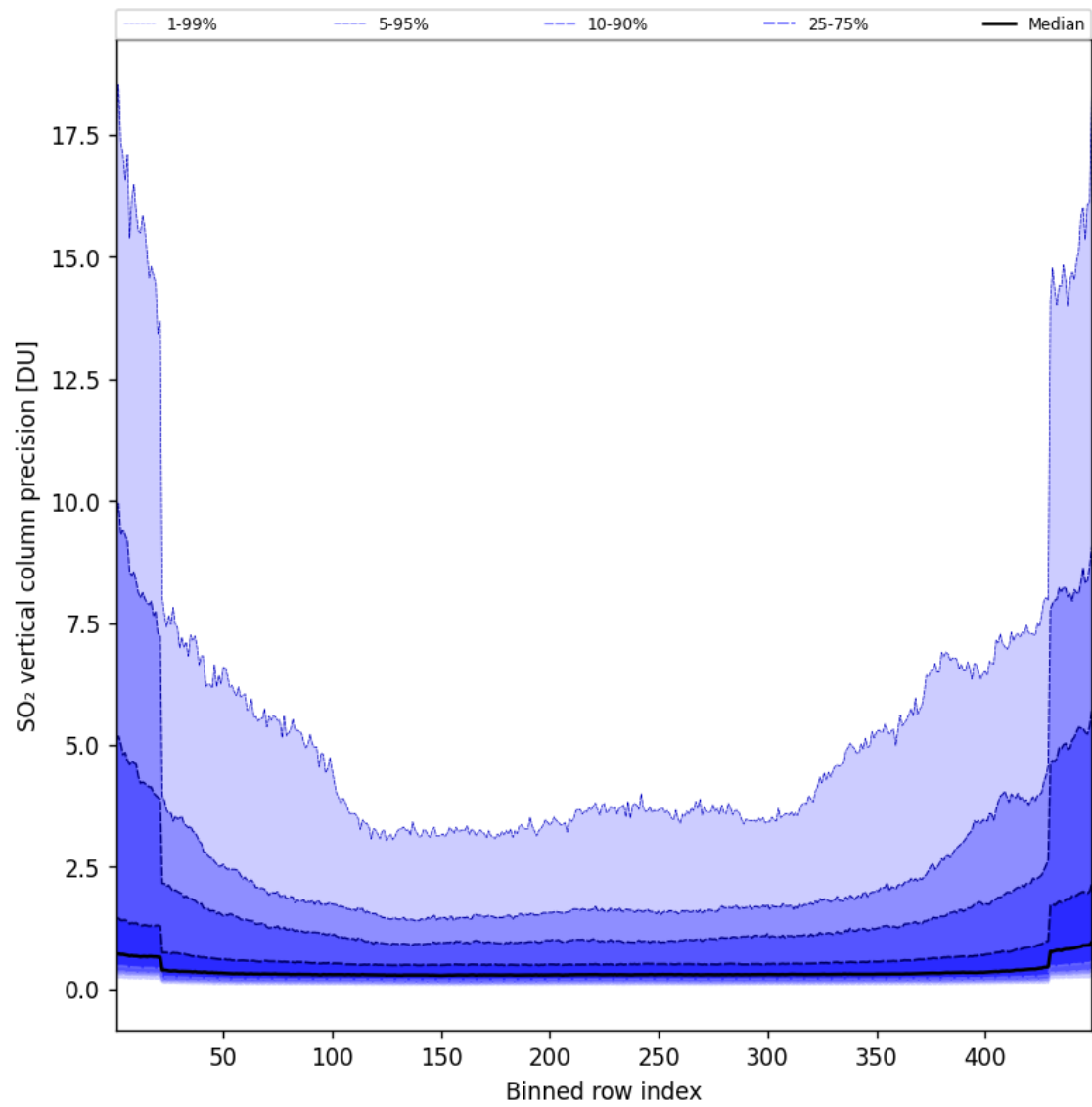


Figure 86: Along track statistics of “SO₂ vertical column precision” for 2025-03-07 to 2025-03-08

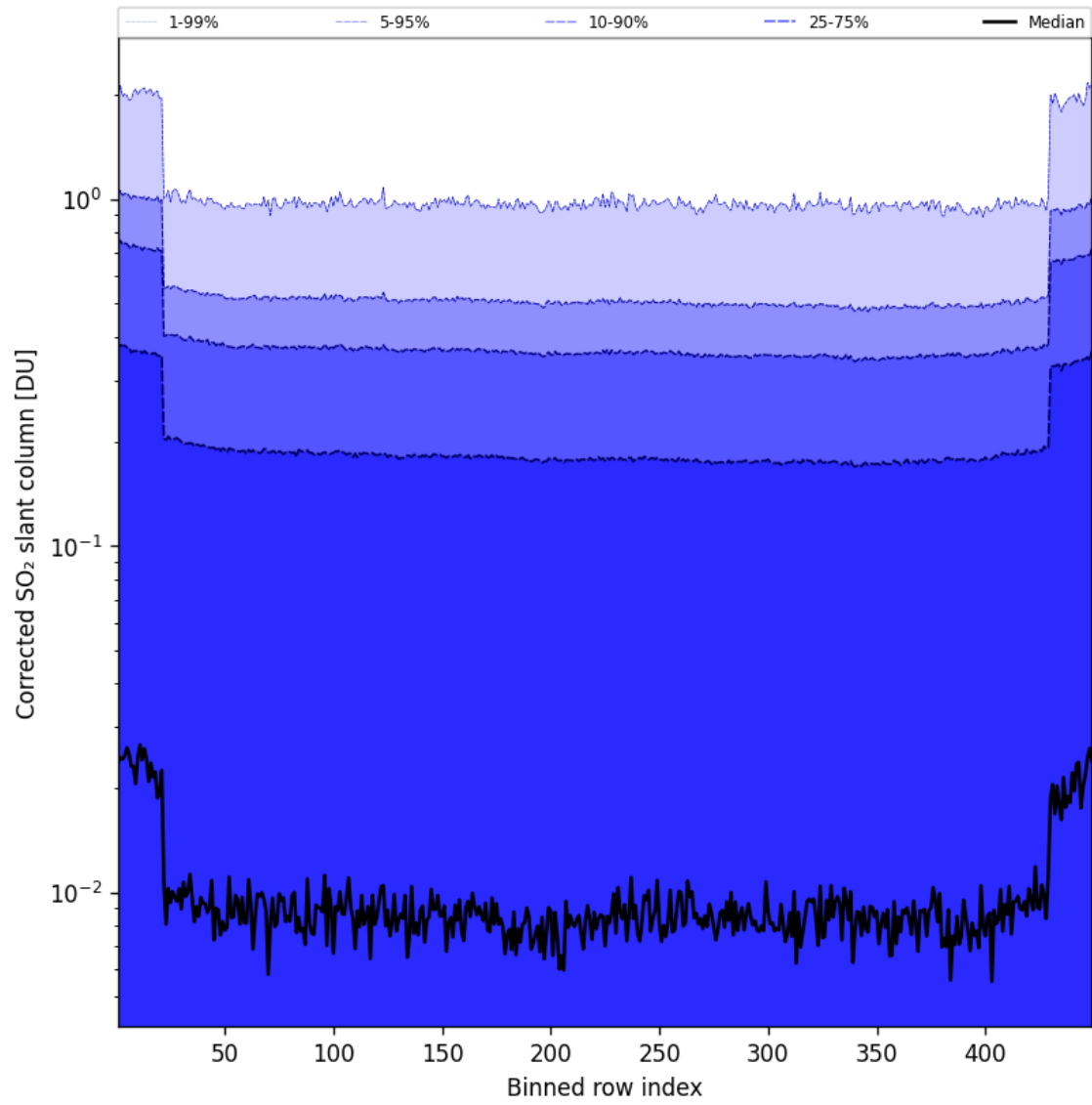


Figure 87: Along track statistics of “Corrected SO₂ slant column” for 2025-03-07 to 2025-03-08

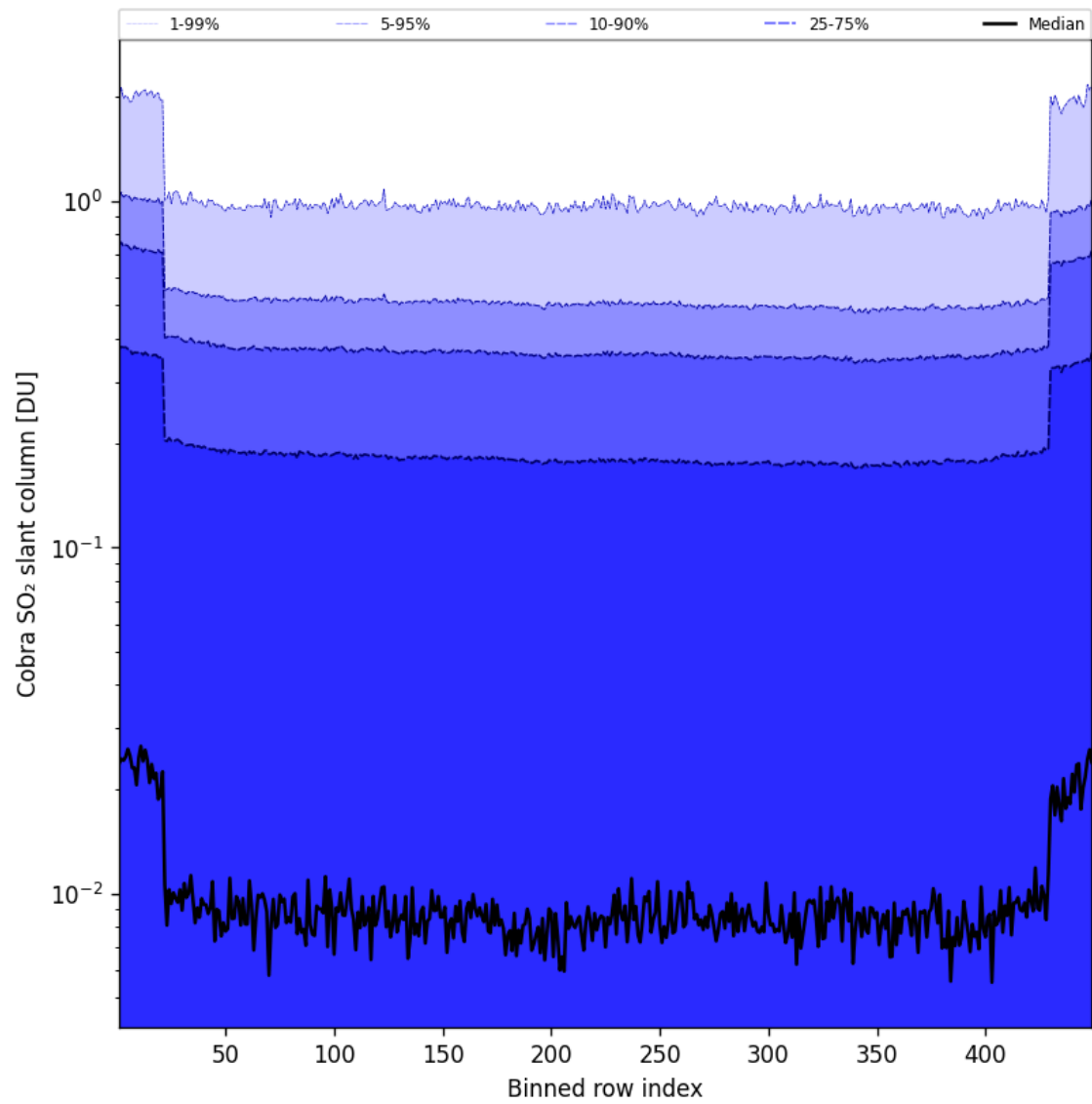


Figure 88: Along track statistics of “Cobra SO₂ slant column” for 2025-03-07 to 2025-03-08

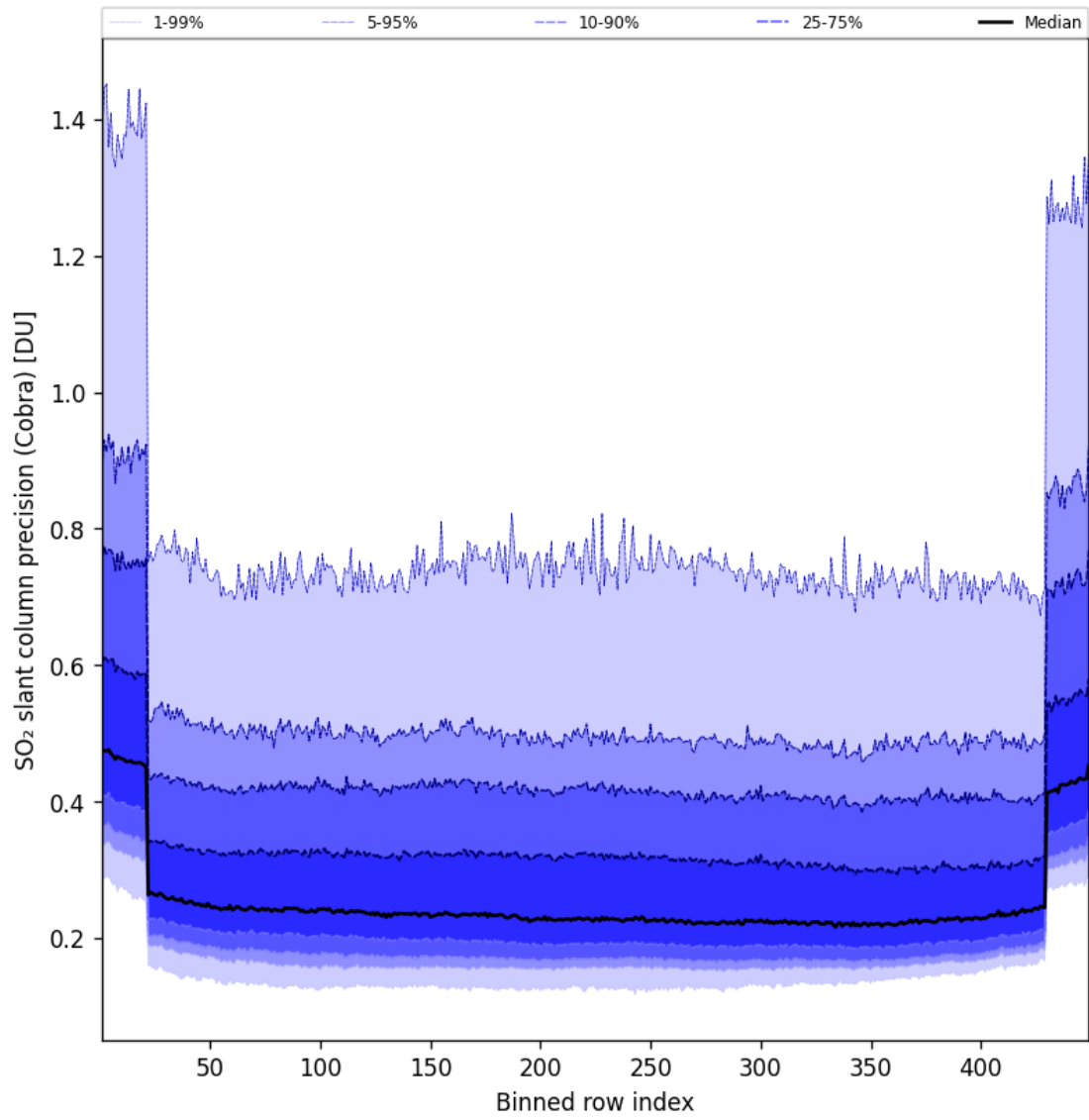


Figure 89: Along track statistics of “SO₂ slant column precision (Cobra)” for 2025-03-07 to 2025-03-08

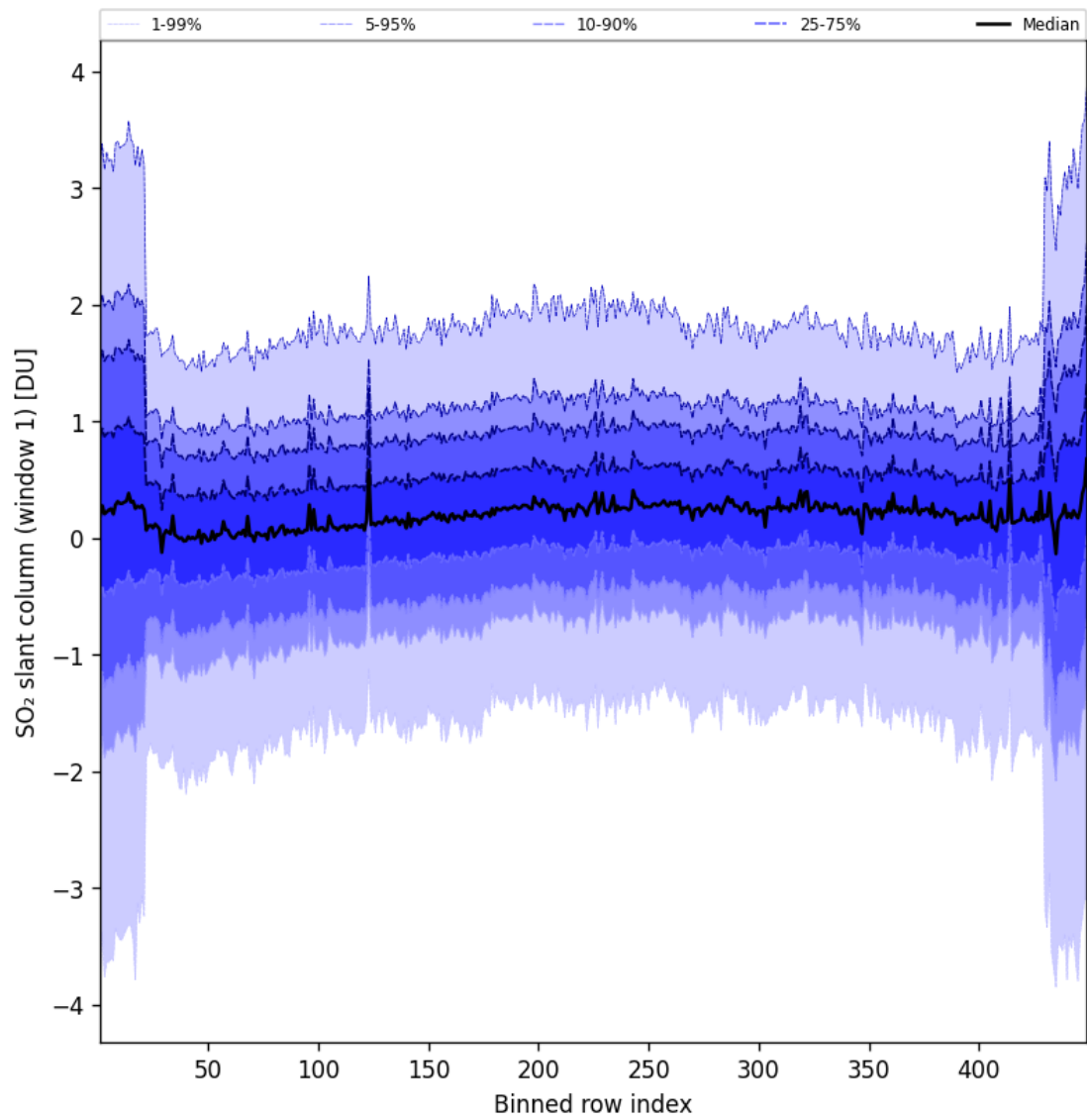


Figure 90: Along track statistics of “SO₂ slant column (window 1)” for 2025-03-07 to 2025-03-08

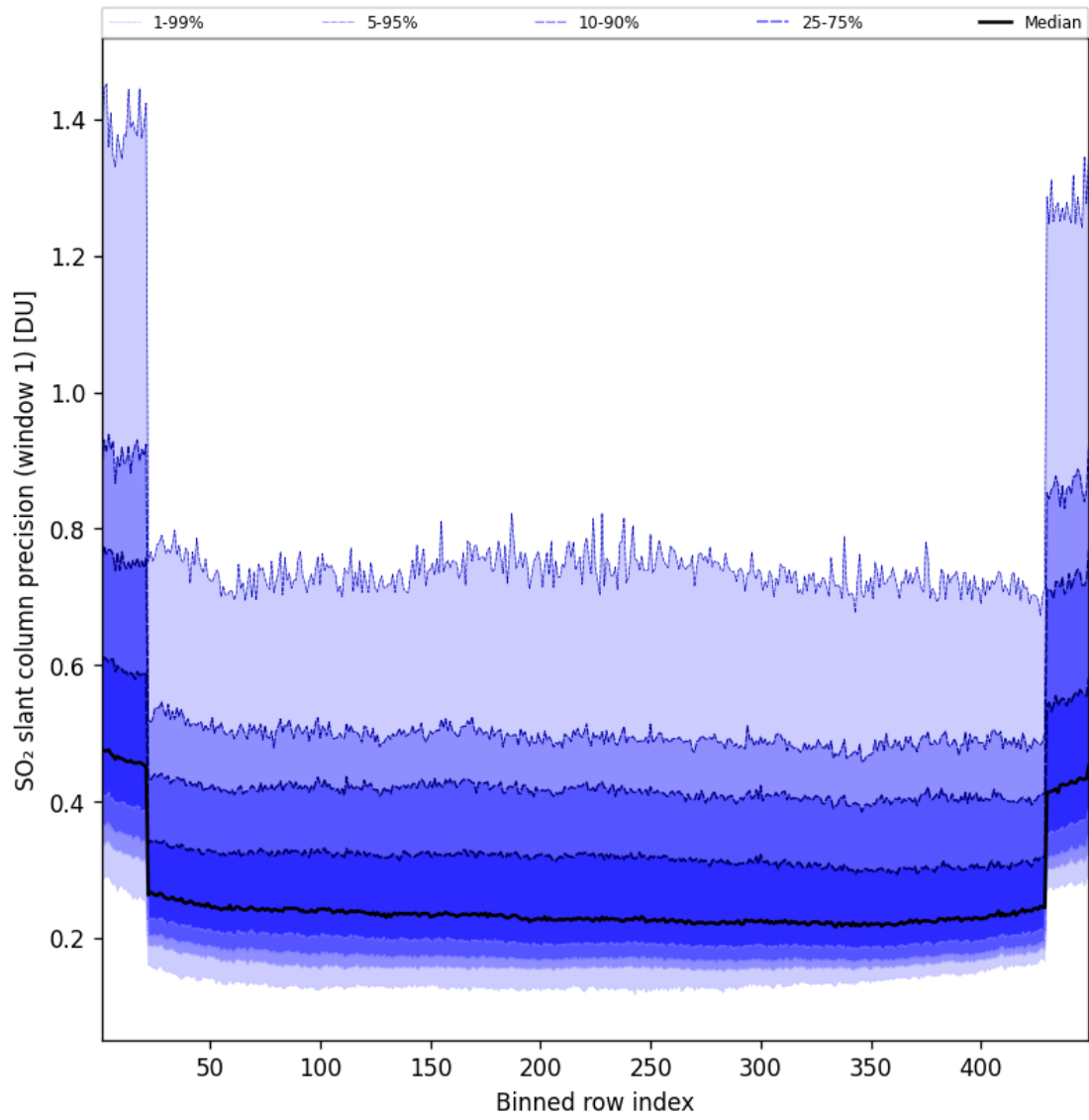


Figure 91: Along track statistics of "SO₂ slant column precision (window 1)" for 2025-03-07 to 2025-03-08

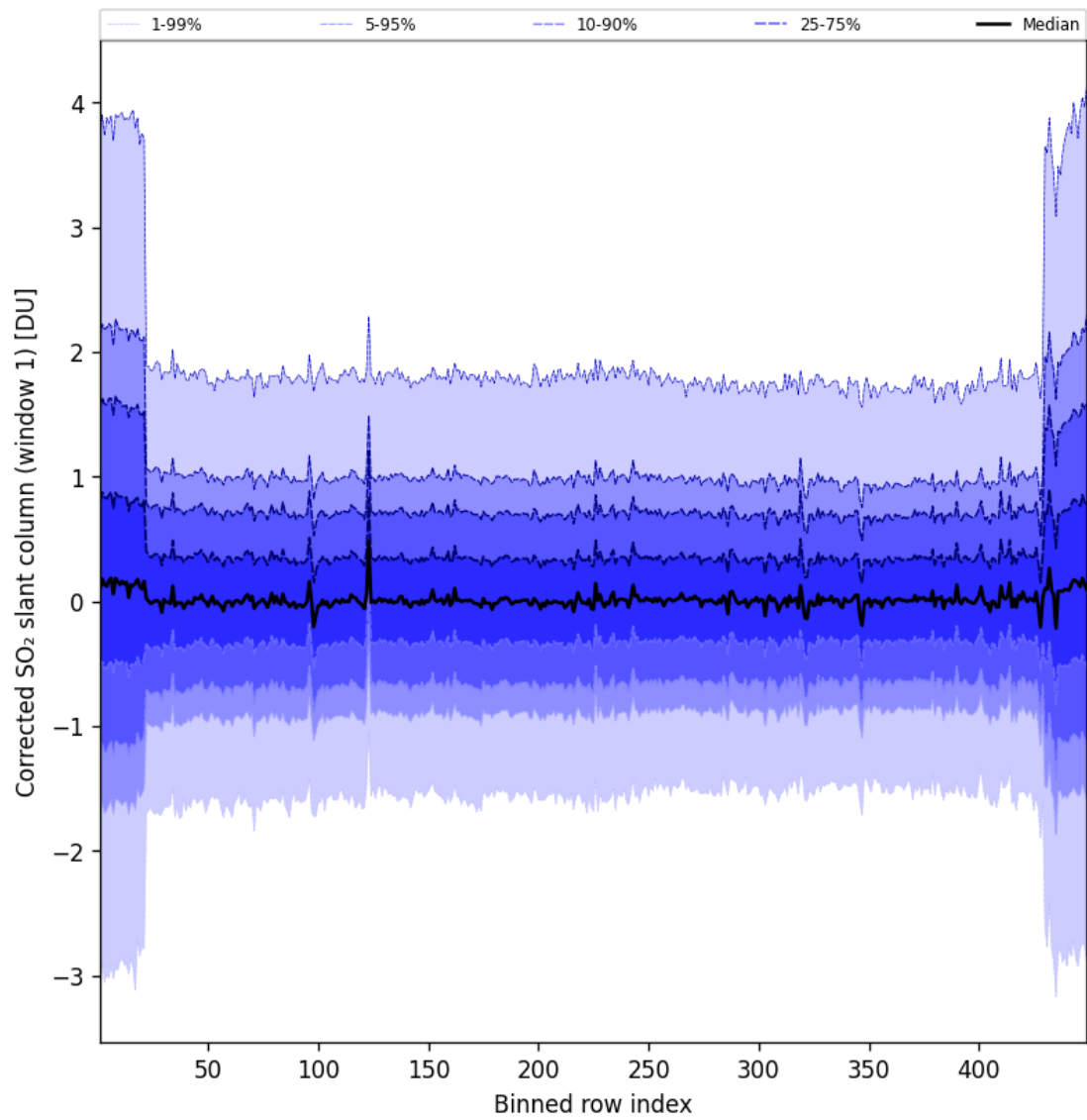


Figure 92: Along track statistics of “Corrected SO₂ slant column (window 1)” for 2025-03-07 to 2025-03-08

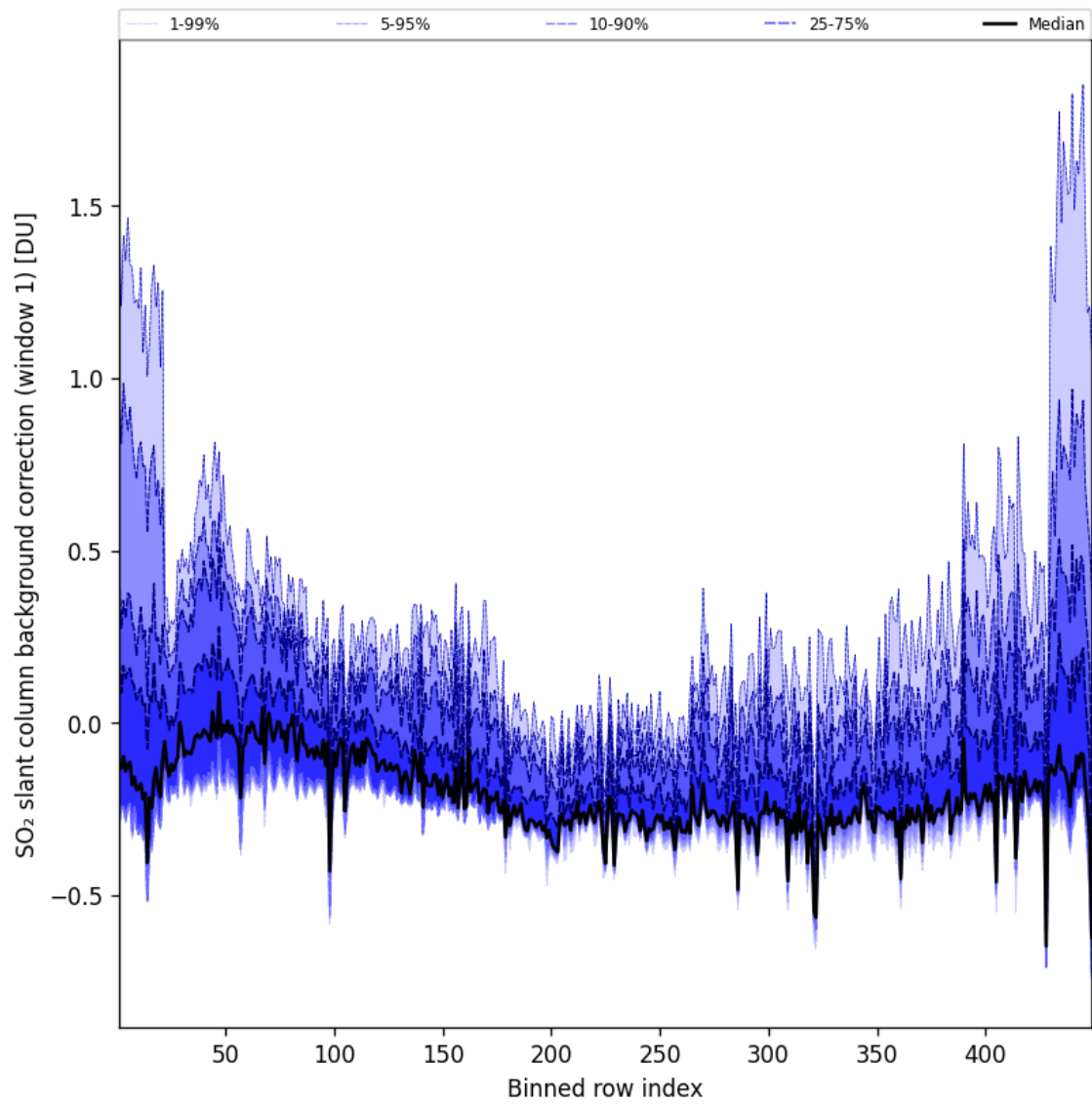


Figure 93: Along track statistics of “SO₂ slant column background correction (window 1)” for 2025-03-07 to 2025-03-08

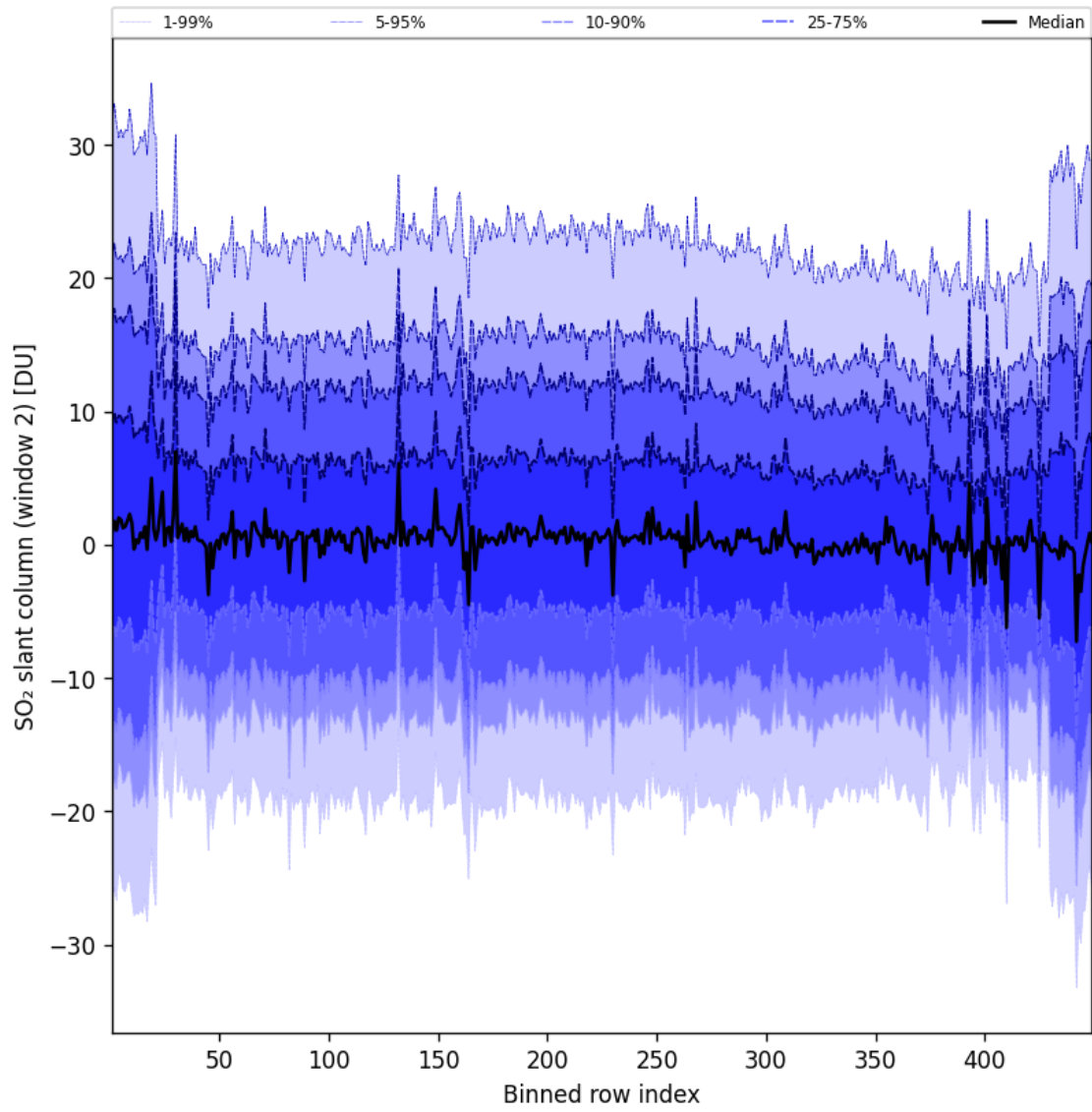


Figure 94: Along track statistics of “SO₂ slant column (window 2)” for 2025-03-07 to 2025-03-08

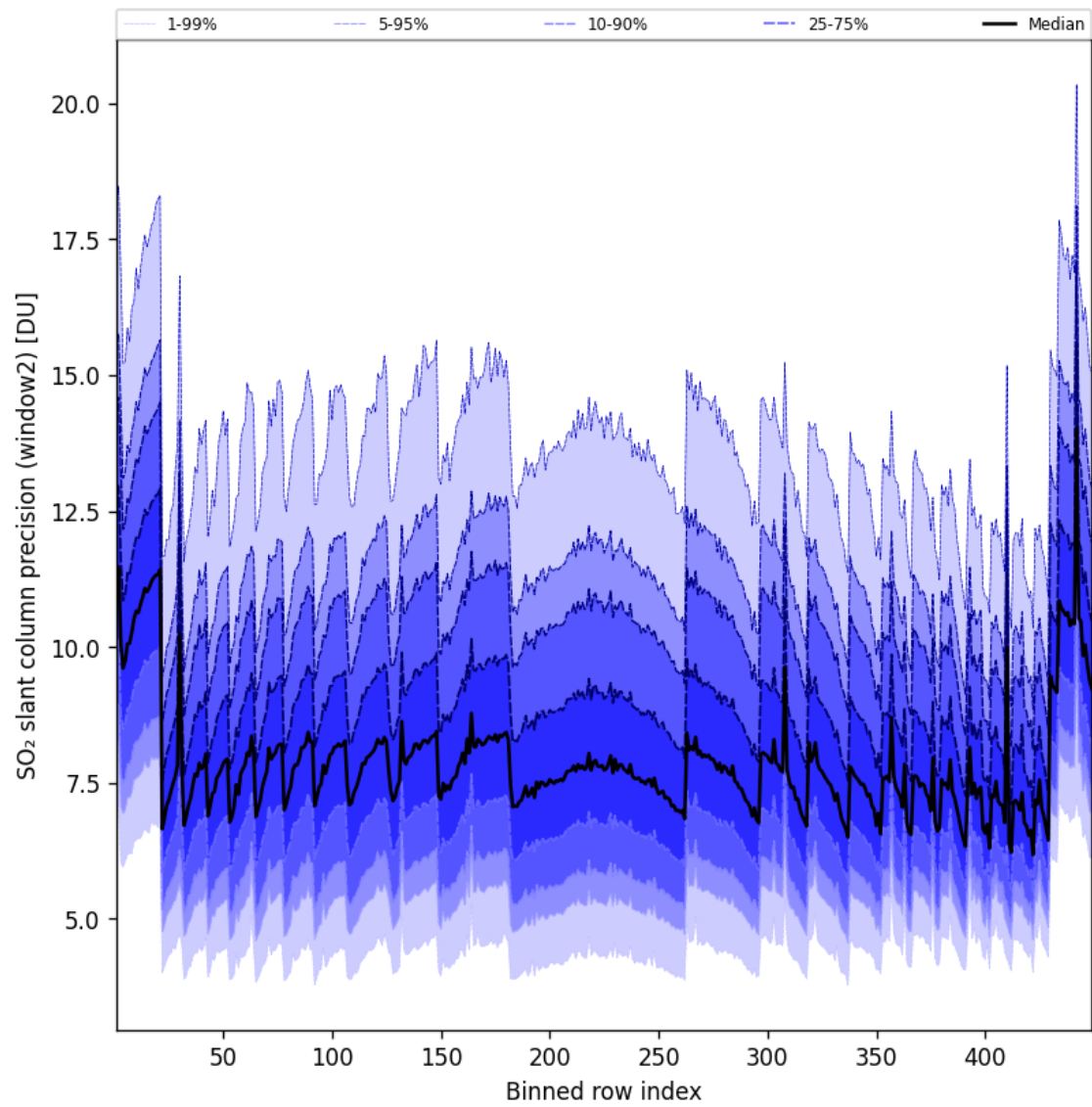


Figure 95: Along track statistics of “SO₂ slant column precision (window2)” for 2025-03-07 to 2025-03-08

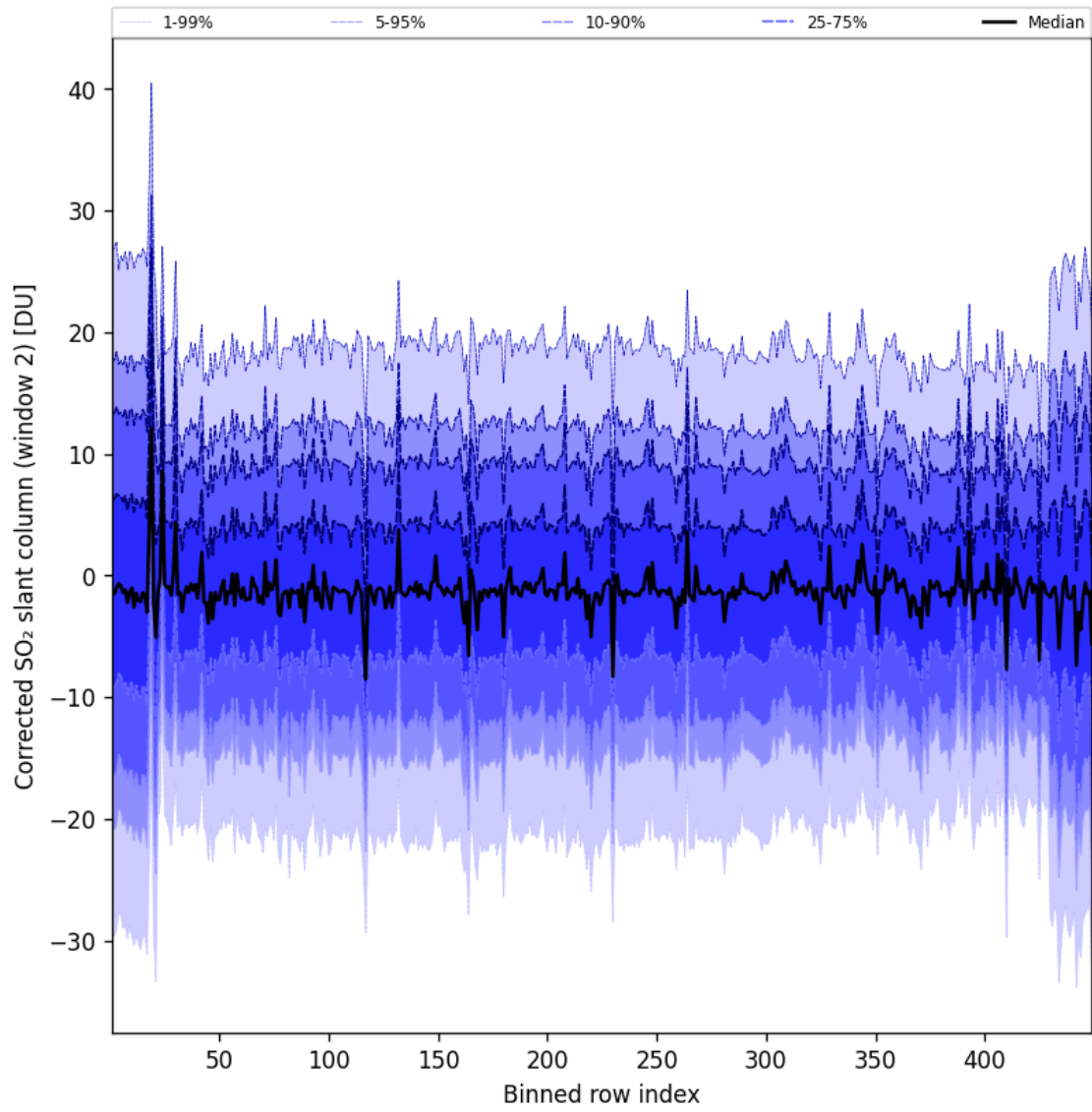


Figure 96: Along track statistics of “Corrected SO₂ slant column (window 2)” for 2025-03-07 to 2025-03-08

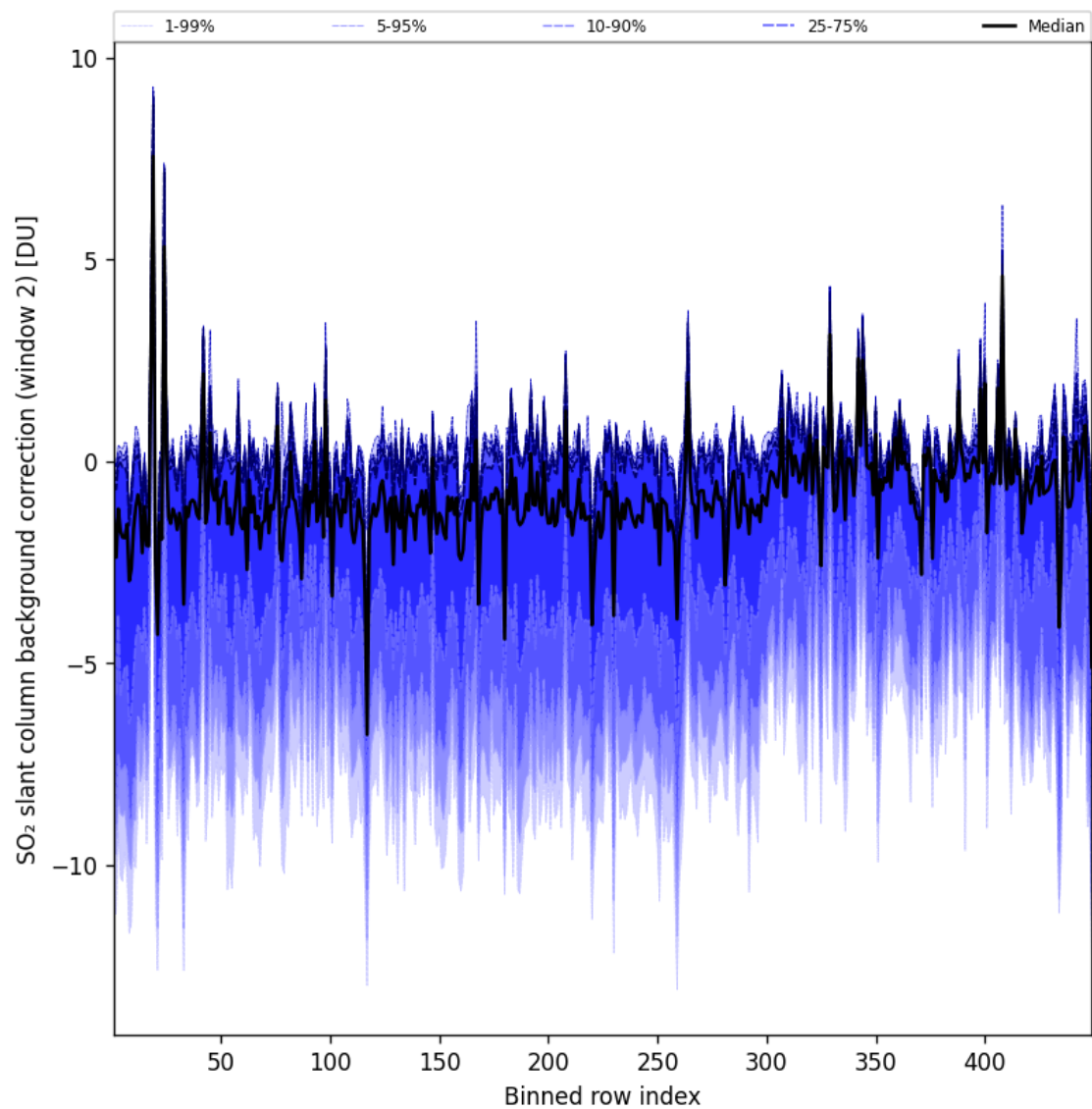


Figure 97: Along track statistics of “SO₂ slant column background correction (window 2)” for 2025-03-07 to 2025-03-08

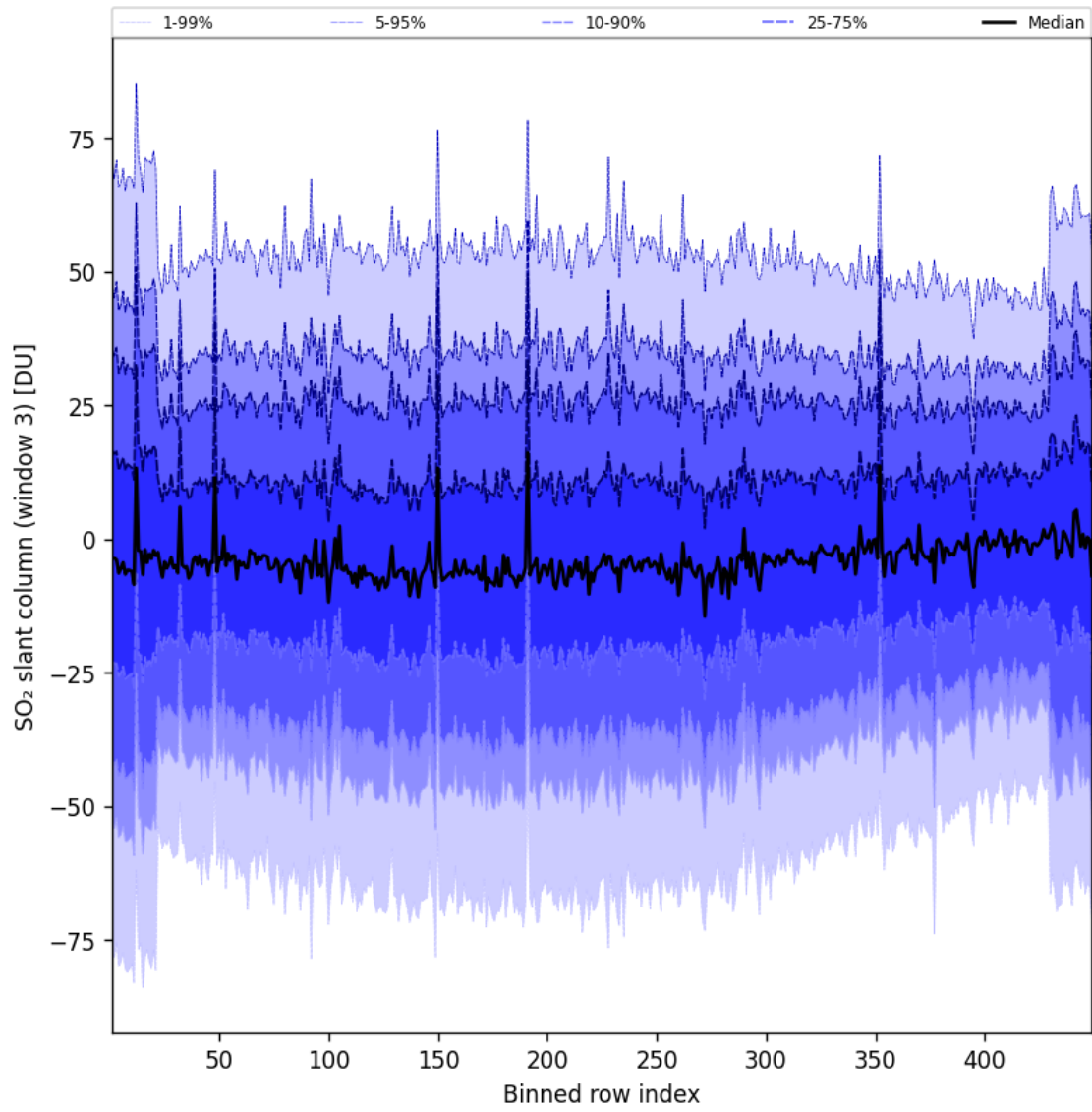


Figure 98: Along track statistics of “SO₂ slant column (window 3)” for 2025-03-07 to 2025-03-08

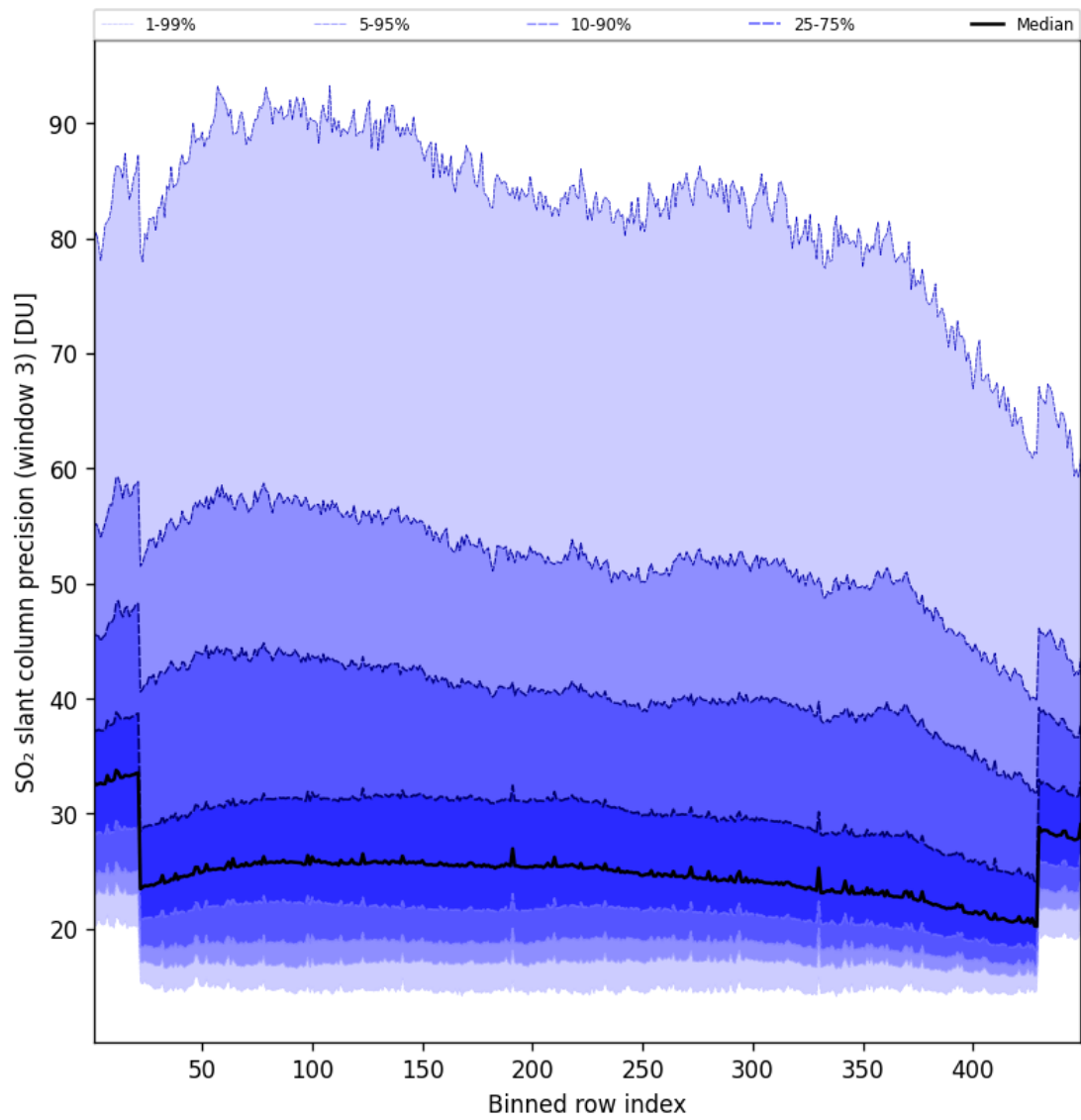


Figure 99: Along track statistics of “SO₂ slant column precision (window 3)” for 2025-03-07 to 2025-03-08

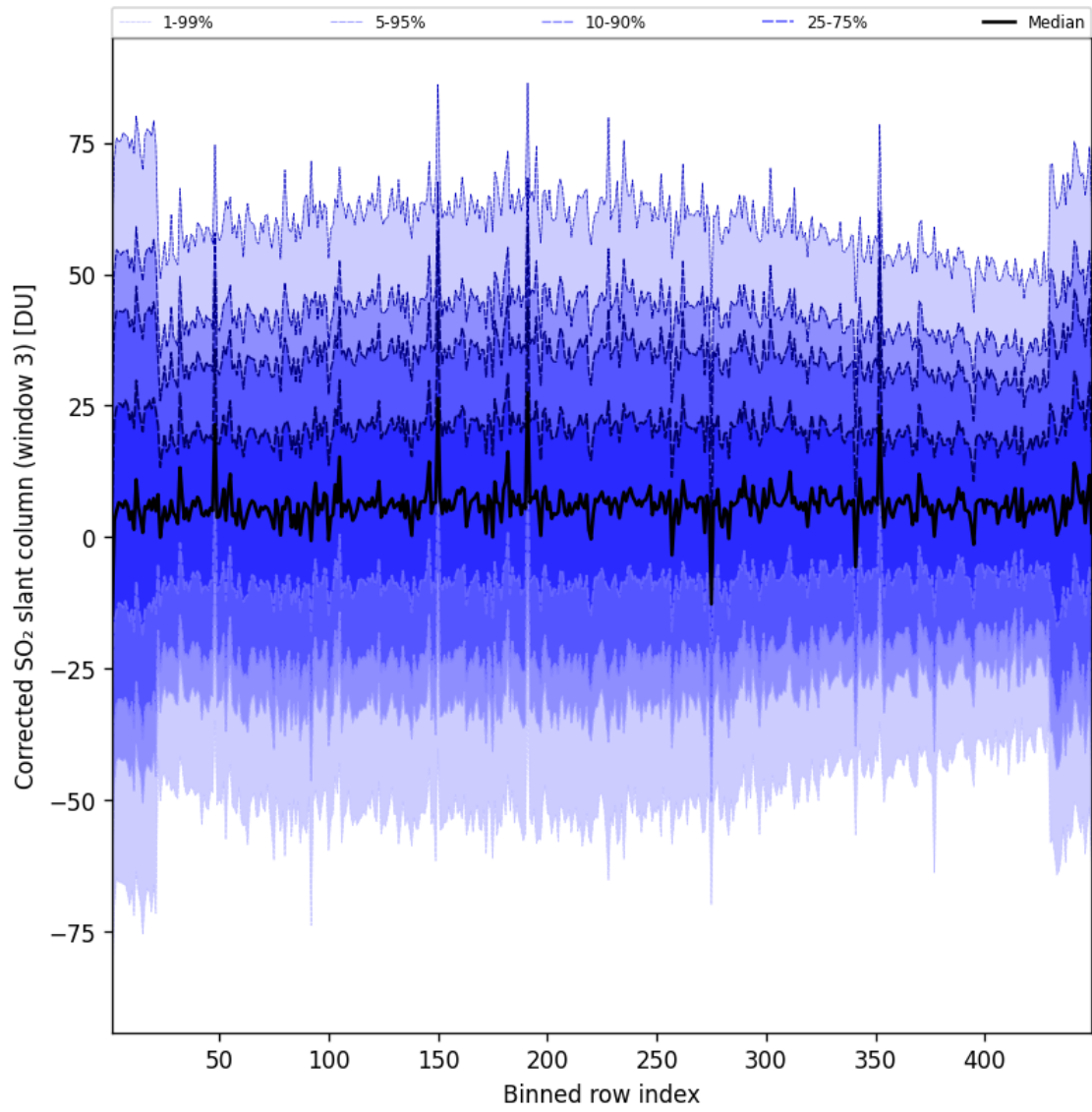


Figure 100: Along track statistics of “Corrected SO₂ slant column (window 3)” for 2025-03-07 to 2025-03-08

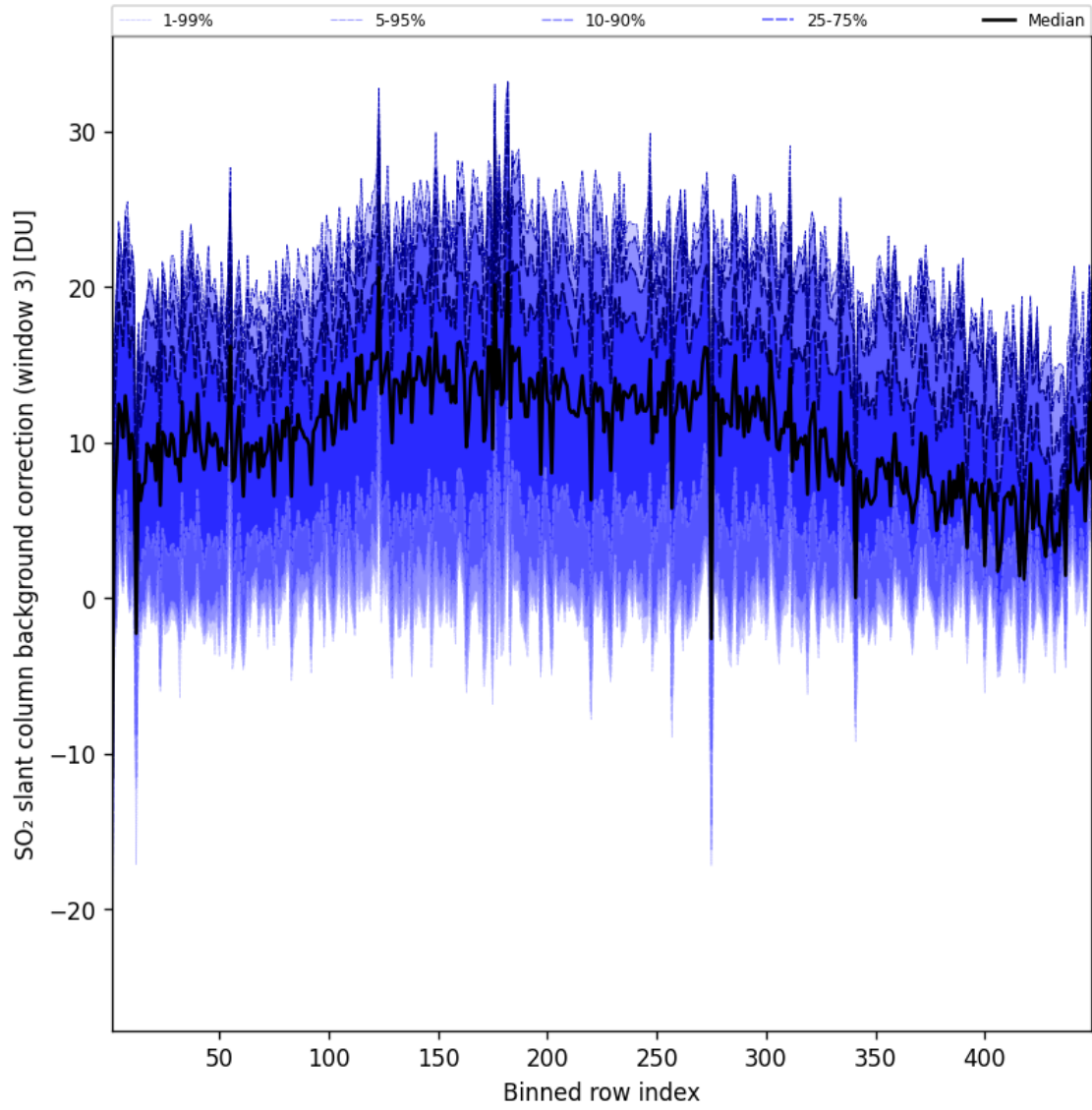


Figure 101: Along track statistics of “SO₂ slant column background correction (window 3)” for 2025-03-07 to 2025-03-08

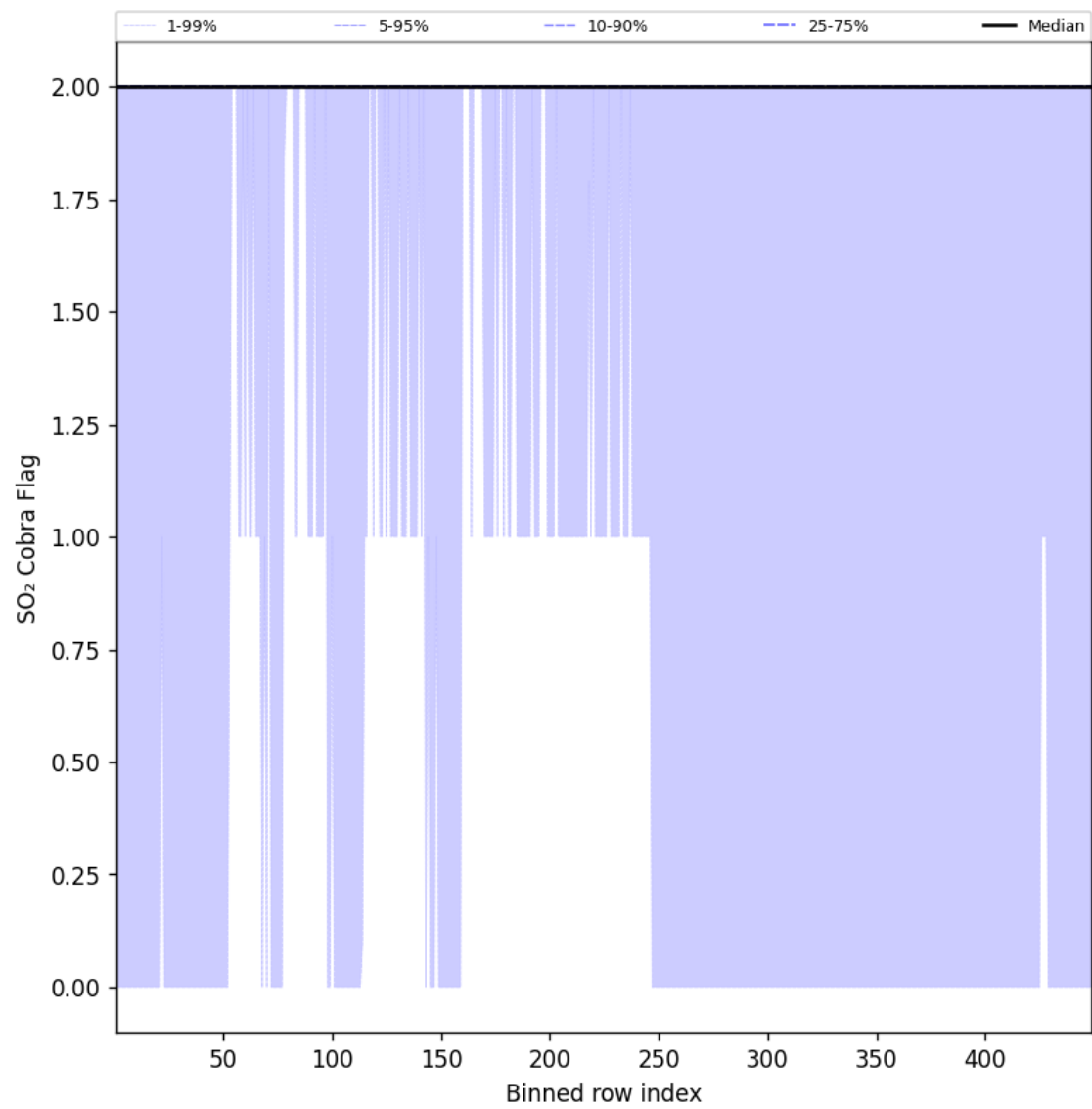


Figure 102: Along track statistics of “SO₂ Cobra Flag” for 2025-03-07 to 2025-03-08

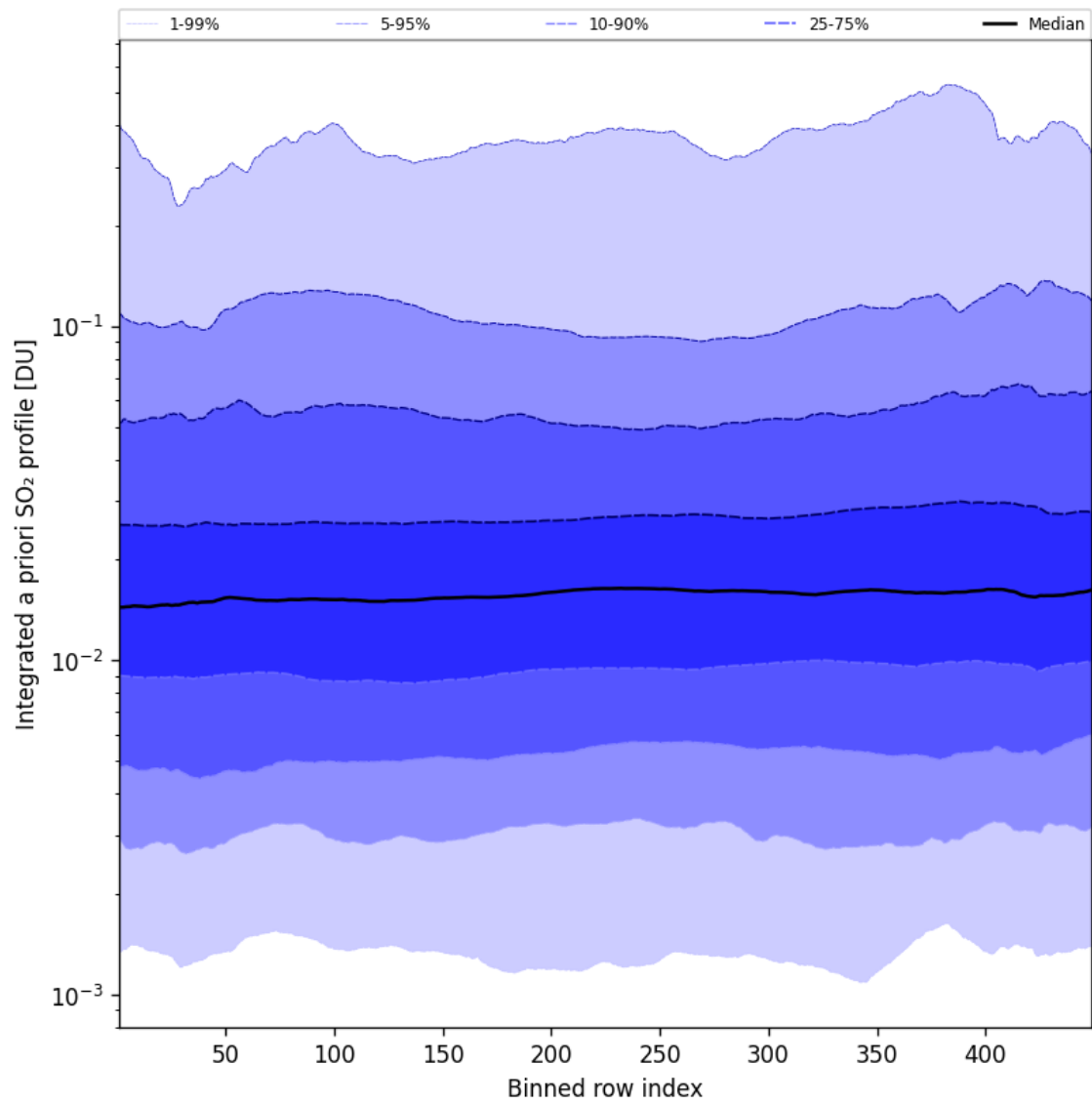


Figure 103: Along track statistics of “Integrated a priori SO₂ profile” for 2025-03-07 to 2025-03-08

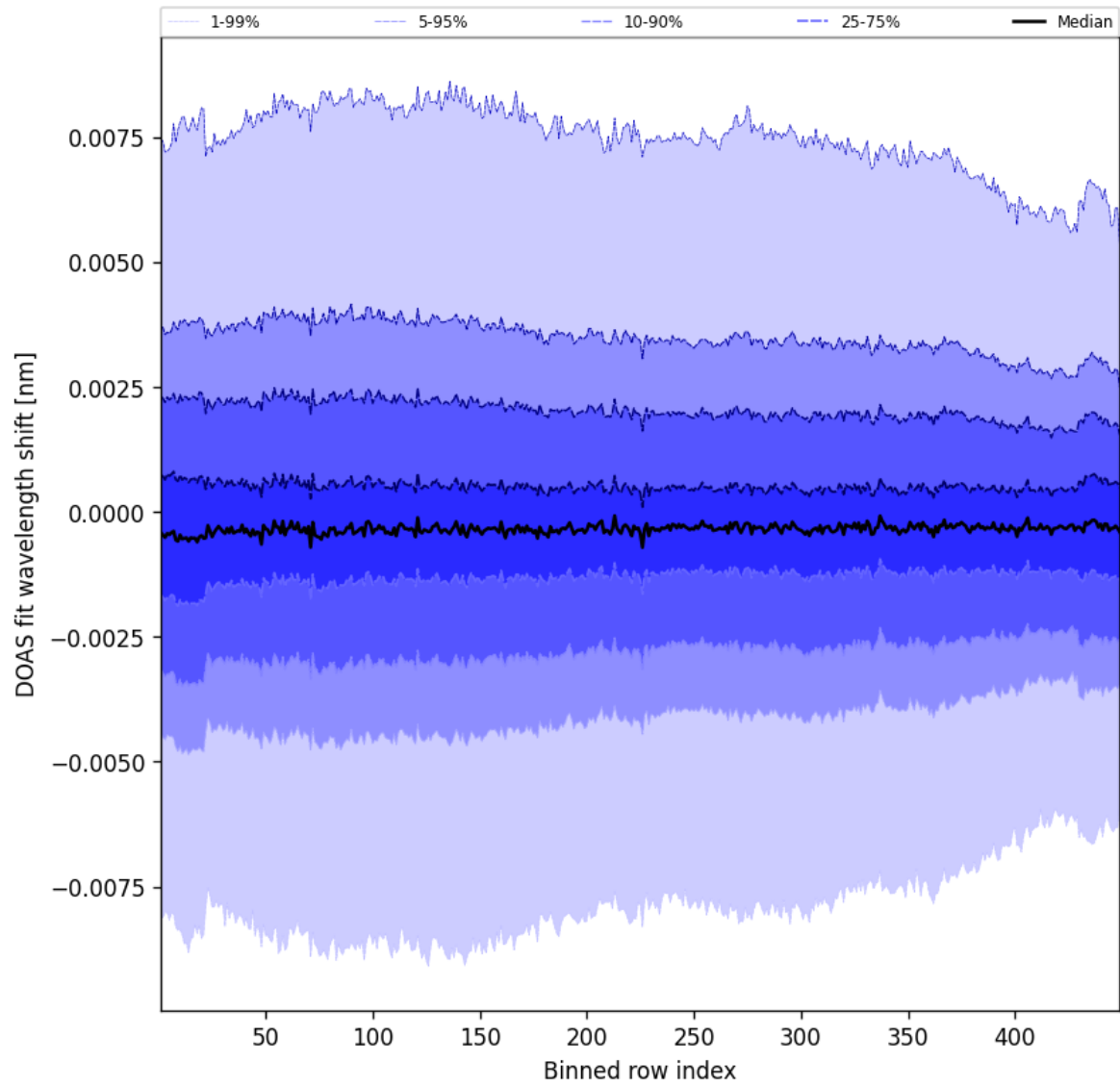


Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2025-03-07 to 2025-03-08

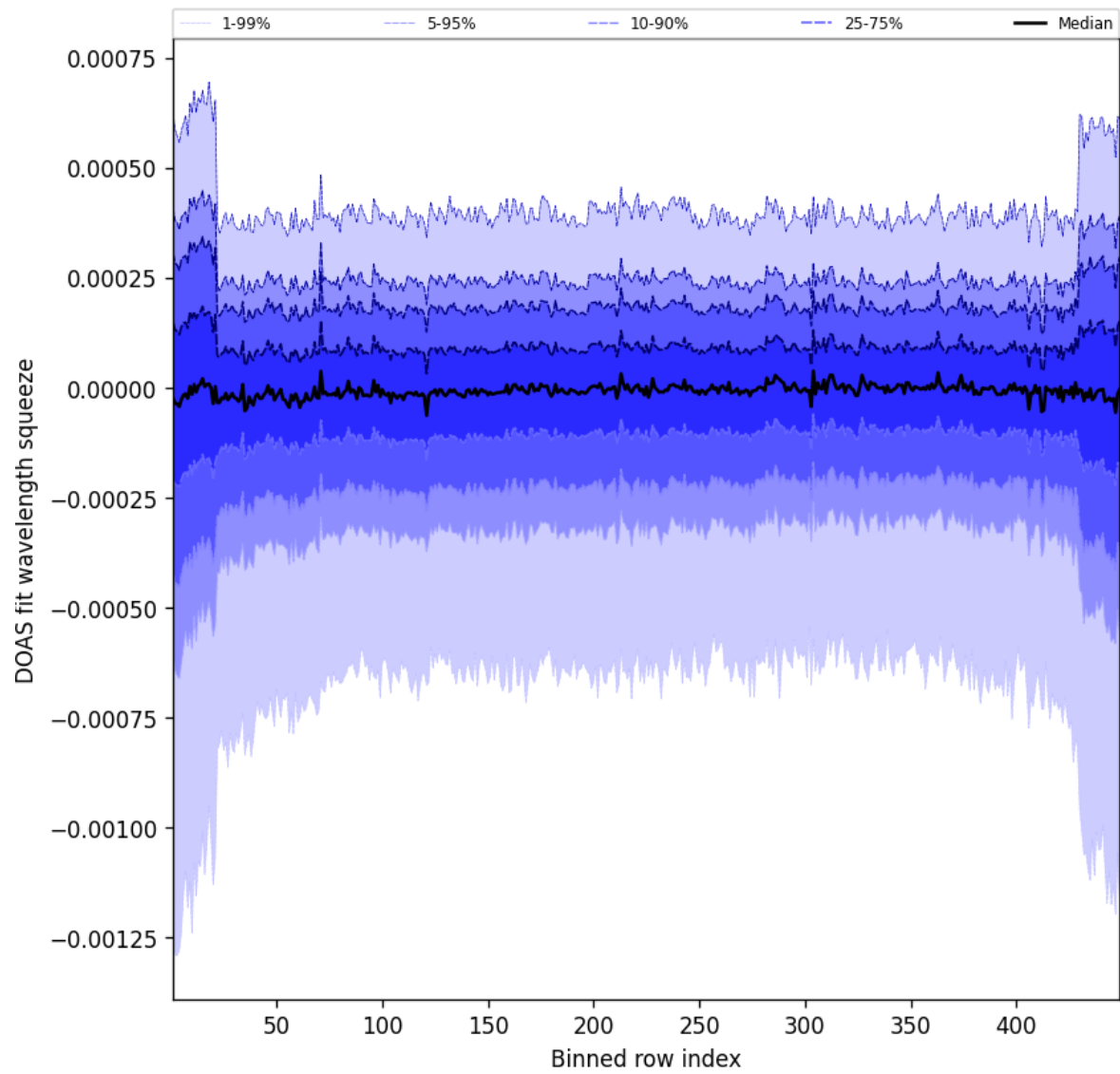


Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2025-03-07 to 2025-03-08

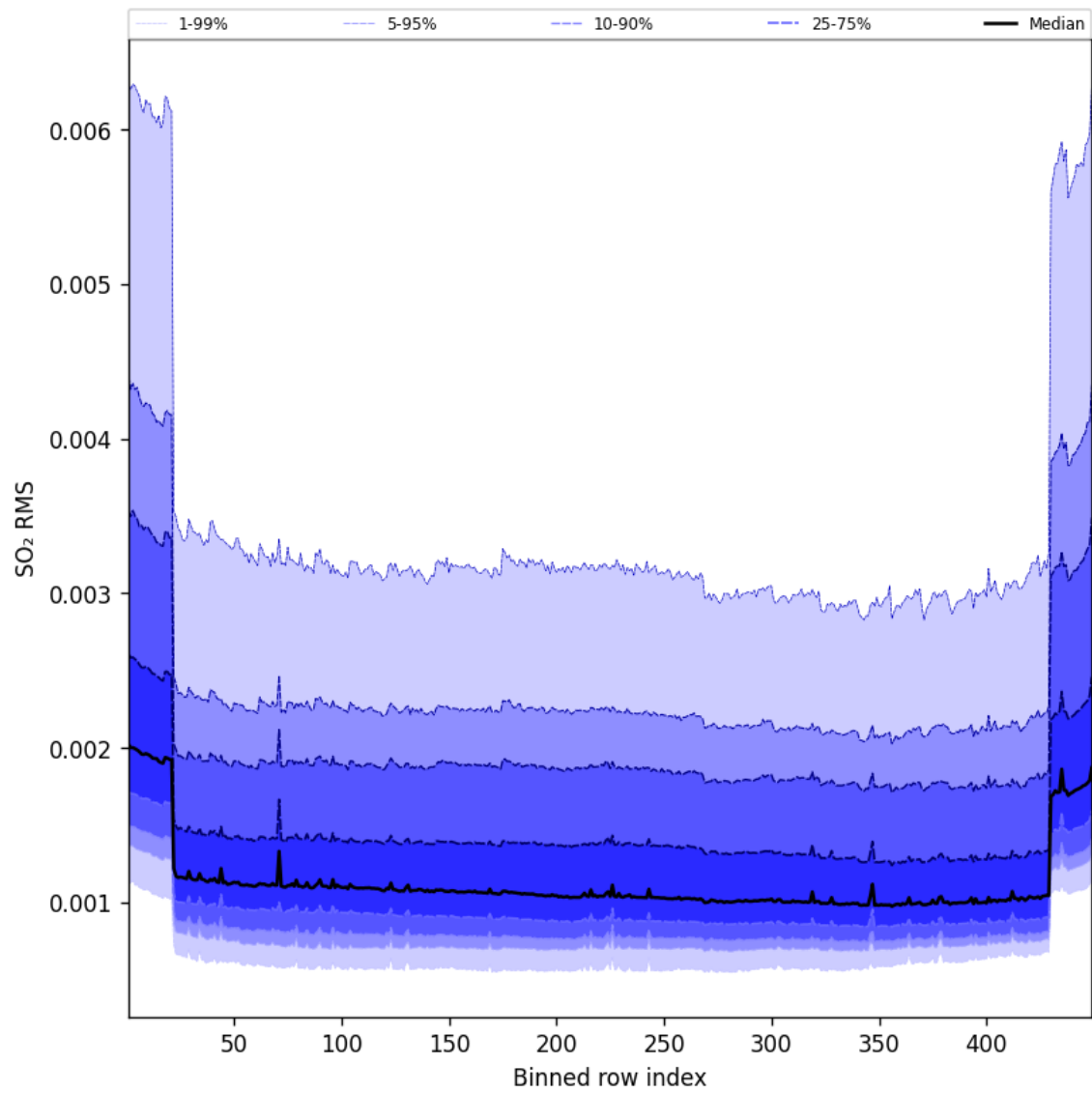


Figure 106: Along track statistics of “SO₂ RMS” for 2025-03-07 to 2025-03-08

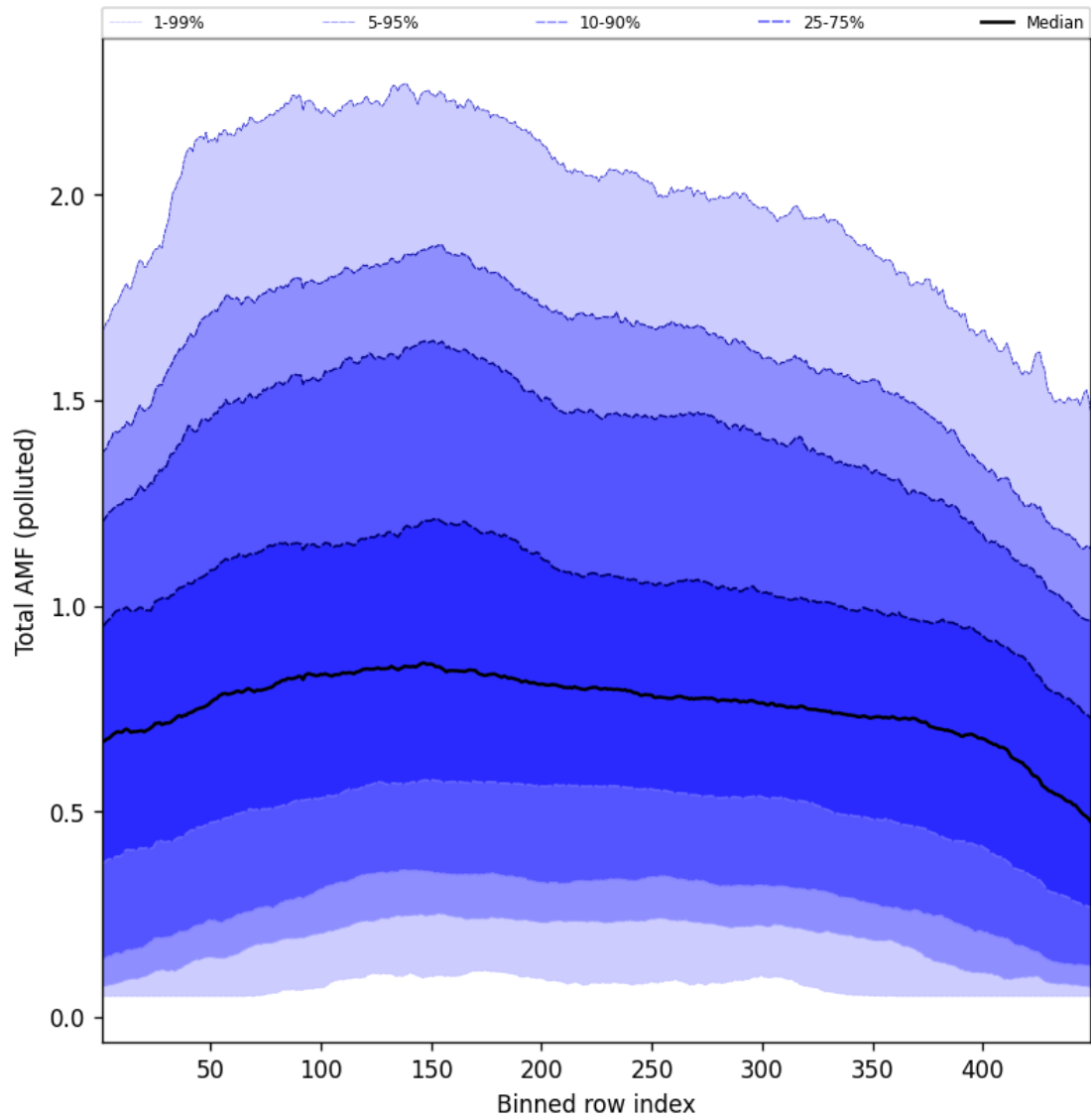


Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-03-07 to 2025-03-08

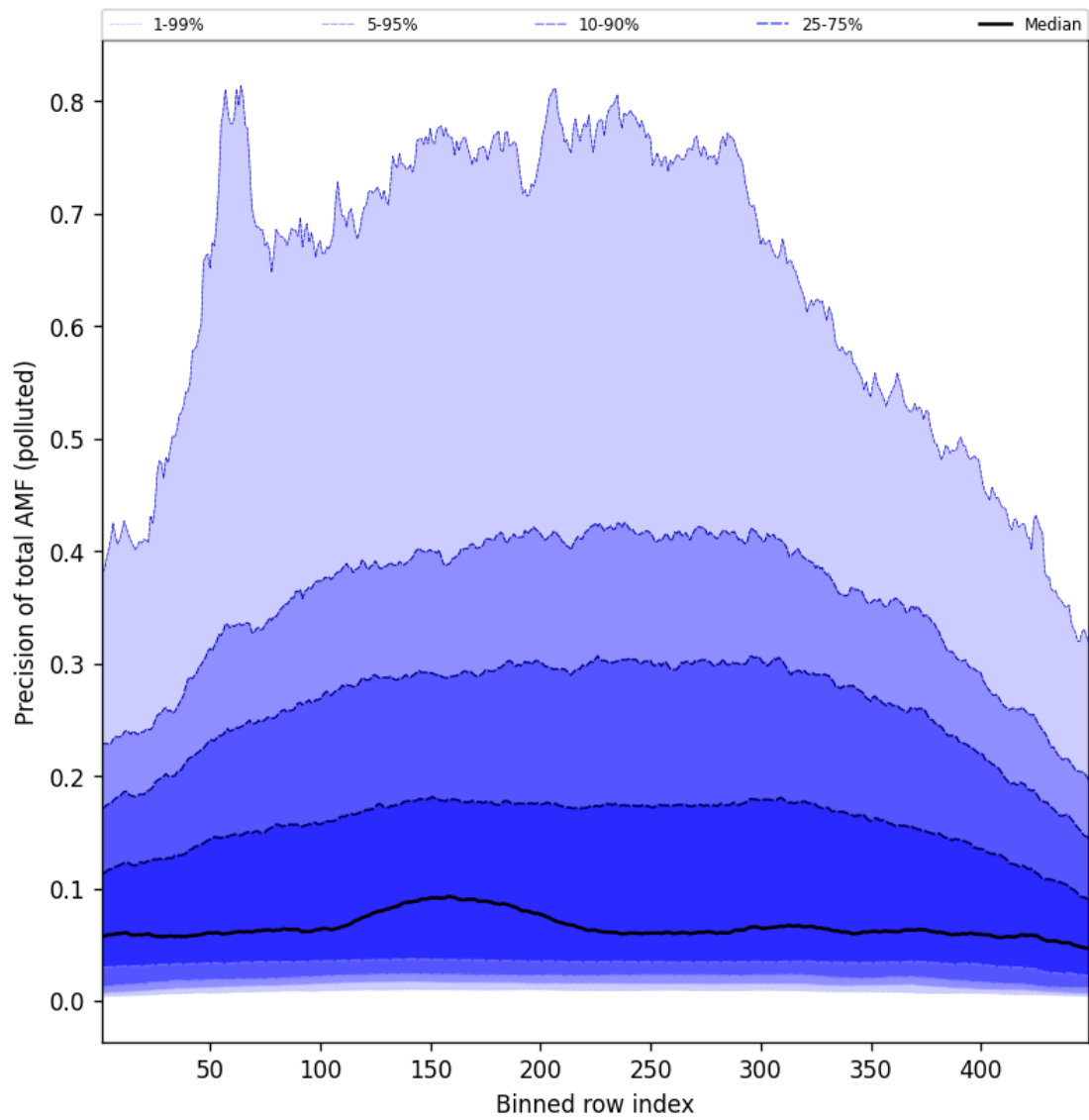


Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-03-07 to 2025-03-08

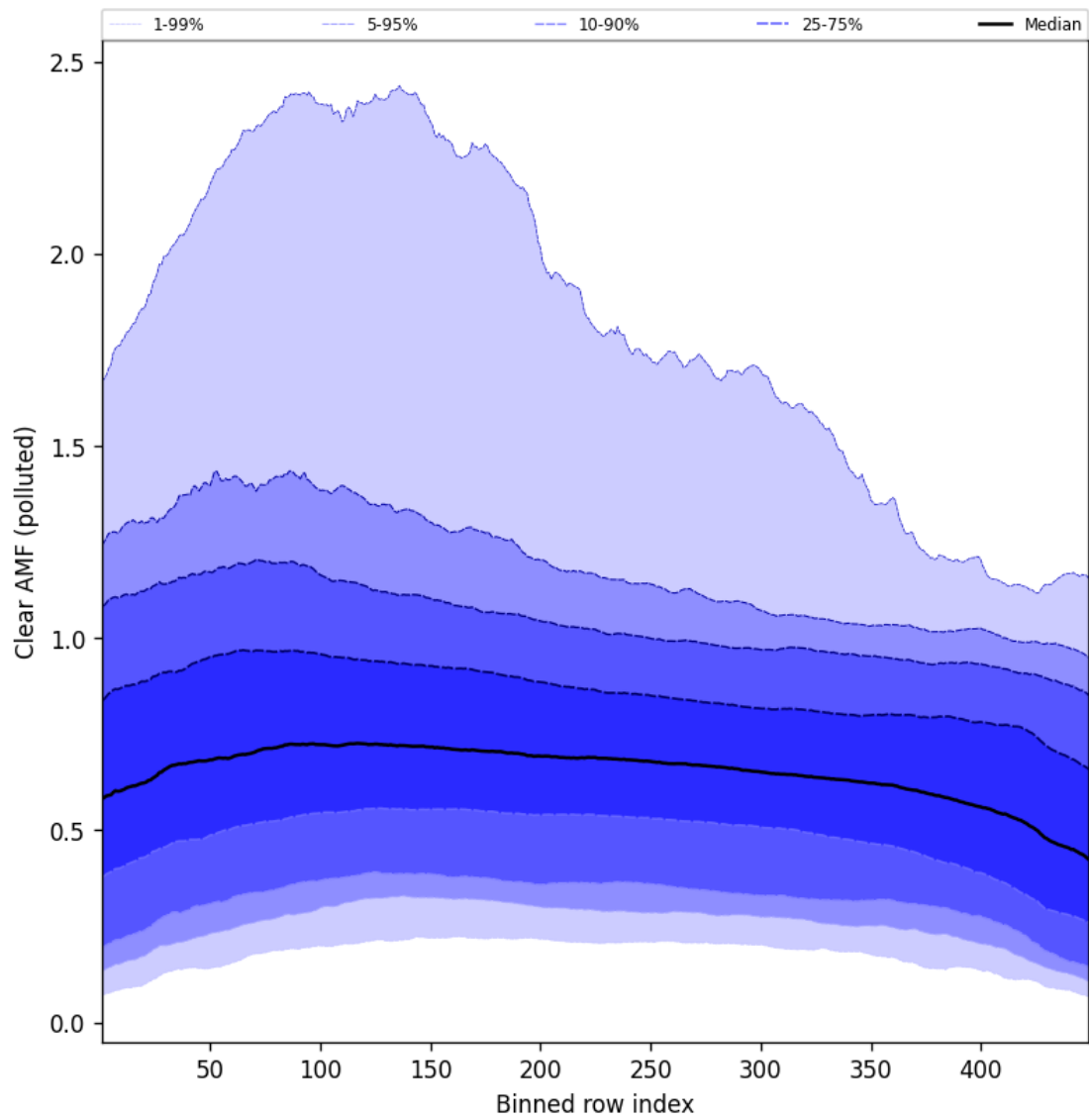


Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-03-07 to 2025-03-08

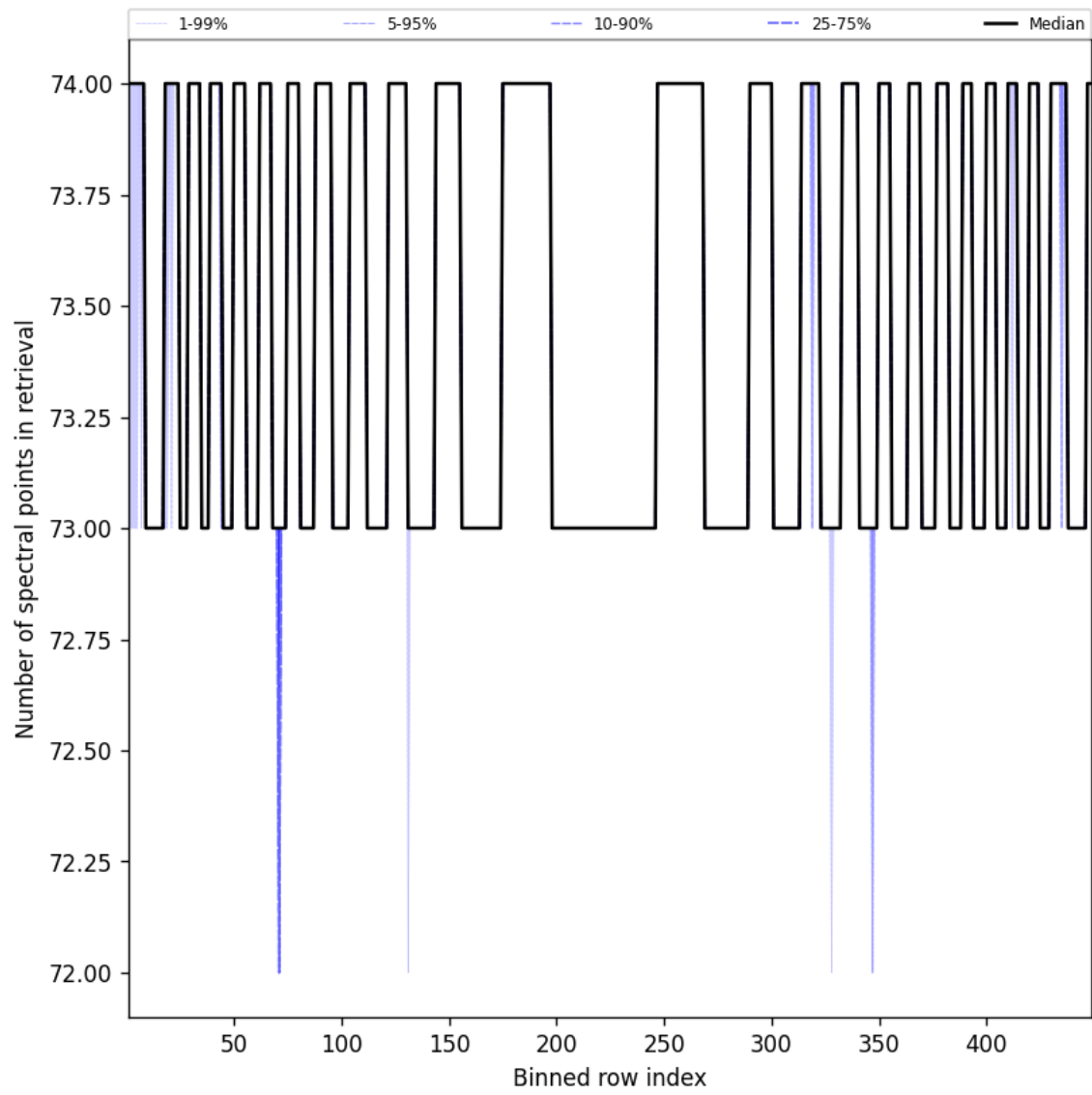


Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-03-07 to 2025-03-08

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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