

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]	0.653 ± 0.408	17306402	0.995	0.780	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(5.003 \pm 177.070) \times 10^{-2}$	17306402	0.263	0.473	1.114×10^{-2}	-286	301
sulfurdioxide total vertical column precision [DU]	0.681 ± 1.275	17306402	0.197	0.425	0.335	4.159×10^{-2}	75.9
sulfurdioxide slant column density corrected [DU]	$(2.010 \pm 37.755) \times 10^{-2}$	17306402	0.250	0.357	9.337×10^{-3}	-27.0	58.2
sulfurdioxide slant column density cobra [DU]	$(1.999 \pm 37.173) \times 10^{-2}$	17306402	0.250	0.357	9.337×10^{-3}	-27.0	33.3
sulfurdioxide slant column density cobra precision [DU]	0.293 ± 0.147	17306402	0.213	0.149	0.245	7.564×10^{-2}	28.3
sulfurdioxide slant column density window1 [DU]	0.176 ± 0.706	17306402	0.225	0.733	0.193	-51.5	43.3
sulfurdioxide slant column density window1 precision [DU]	0.293 ± 0.147	17306402	0.213	0.149	0.245	7.564×10^{-2}	28.3
sulfurdioxide slant column density corrected win1 [DU]	$(2.694 \pm 69.241) \times 10^{-2}$	17306402	-2.500×10^{-2}	0.714	6.932×10^{-3}	-51.5	43.2
background so2 slant column offset window1 [DU]	-0.149 ± 0.195	17306402	-0.260	0.202	-0.195	-1.50	3.42
sulfurdioxide slant column density window2 [DU]	0.332 ± 9.026	17306402	-0.250	11.4	0.137	-724	994
sulfurdioxide slant column density window2 precision [DU]	8.11 ± 2.20	17306402	7.43	2.59	7.77	2.11	511
sulfurdioxide slant column density corrected win2 [DU]	-1.32 ± 8.78	17306402	-0.750	11.1	-1.28	-725	995
background so2 slant column offset window2 [DU]	-1.65 ± 2.62	17306402	0.250	3.42	-0.854	-12.7	8.06
sulfurdioxide slant column density window3 [DU]	-4.04 ± 24.37	17306402	-3.92	30.8	-4.16	-2.385×10^3	974
sulfurdioxide slant column density window3 precision [DU]	28.5 ± 12.9	17306402	22.5	9.55	25.0	10.5	754
sulfurdioxide slant column density corrected win3 [DU]	4.24 ± 23.36	17306402	2.80	29.5	4.24	-2.381×10^3	980
background so2 slant column offset window3 [DU]	8.28 ± 7.48	17306402	2.80	11.9	7.84	-27.2	31.6
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.22	17306402	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(3.431 \pm 9.214) \times 10^{-2}$	17306402	1.664×10^{-2}	1.769×10^{-2}	1.543×10^{-2}	1.114×10^{-4}	1.98
fitted radiance shift [nm]	$(-3.842 \pm 25.425) \times 10^{-4}$	17306402	-5.000×10^{-4}	1.804×10^{-3}	-3.588×10^{-4}	-6.930×10^{-2}	6.568×10^{-2}
fitted radiance squeeze [1]	$(-1.883 \pm 20.575) \times 10^{-5}$	17306402	1.000×10^{-5}	2.067×10^{-4}	-4.112×10^{-6}	-1.681×10^{-2}	2.702×10^{-2}
fitted root mean square [1]	$(1.290 \pm 0.612) \times 10^{-3}$	17306402	9.250×10^{-4}	5.988×10^{-4}	1.097×10^{-3}	3.257×10^{-4}	6.999×10^{-2}
sulfurdioxide total air mass factor polluted [1]	0.806 ± 0.444	17306402	0.620	0.566	0.755	5.000×10^{-2}	2.78
sulfurdioxide total air mass factor polluted precision [1]	0.113 ± 0.127	17306402	3.500×10^{-2}	0.119	6.494×10^{-2}	2.500×10^{-3}	1.88
sulfurdioxide clear air mass factor polluted [1]	0.695 ± 0.332	17306402	0.620	0.402	0.658	2.549×10^{-2}	2.79
number of spectral points in retrieval [1]	73.4 ± 0.5	17306402	73.0	1.000	73.0	52.0	74.0

Table 2: Percentile ranges

Variable	1 %	5 %	10 %	15.9 %	25 %	75 %	84.1 %	90 %	95 %	99 %
qa value [1]	0.0	0.0	5.000×10^{-2}	0.110	0.220	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	-3.58	-1.11	-0.607	-0.387	-0.221	0.252	0.437	0.689	1.28	4.27
sulfurdioxide total vertical column precision [DU]	9.413×10^{-2}	0.130	0.158	0.182	0.214	0.639	0.958	1.39	2.25	5.94
sulfurdioxide slant column density corrected [DU]	-0.878	-0.493	-0.352	-0.261	-0.167	0.190	0.290	0.390	0.553	1.08
sulfurdioxide slant column density cobra [DU]	-0.878	-0.493	-0.352	-0.261	-0.167	0.190	0.290	0.390	0.553	1.08
sulfurdioxide slant column density cobra precision [DU]	0.133	0.161	0.174	0.185	0.199	0.348	0.402	0.462	0.566	0.822
sulfurdioxide slant column density window1 [DU]	-1.82	-0.908	-0.587	-0.384	-0.180	0.554	0.742	0.924	1.20	2.00
sulfurdioxide slant column density window1 precision [DU]	0.133	0.161	0.174	0.185	0.199	0.348	0.402	0.462	0.566	0.822
sulfurdioxide slant column density corrected win1 [DU]	-1.73	-0.970	-0.704	-0.528	-0.345	0.369	0.569	0.769	1.09	2.04
background so2 slant column offset window1 [DU]	-0.480	-0.348	-0.316	-0.296	-0.273	-7.136×10^{-2}	7.580×10^{-3}	9.081×10^{-2}	0.206	0.483
sulfurdioxide slant column density window2 [DU]	-20.8	-14.0	-10.7	-8.23	-5.48	5.94	8.91	11.6	15.3	23.1
sulfurdioxide slant column density window2 precision [DU]	4.33	5.22	5.74	6.15	6.64	9.23	10.1	10.9	12.1	14.6
sulfurdioxide slant column density corrected win2 [DU]	-22.9	-15.6	-12.1	-9.63	-6.84	4.26	7.01	9.47	12.8	19.8
background so2 slant column offset window2 [DU]	-8.78	-6.88	-5.62	-4.54	-3.18	0.245	0.527	0.766	1.19	3.18
sulfurdioxide slant column density window3 [DU]	-64.2	-43.9	-34.2	-27.1	-19.4	11.4	19.4	26.5	36.1	55.0
sulfurdioxide slant column density window3 precision [DU]	14.8	17.1	18.7	19.9	21.4	30.9	35.3	41.1	52.9	84.1
sulfurdioxide slant column density corrected win3 [DU]	-54.0	-34.0	-24.6	-17.8	-10.4	19.1	26.6	33.3	42.4	60.8
background so2 slant column offset window3 [DU]	-5.39	-2.60	-1.11	0.375	2.30	14.2	16.5	18.4	20.5	23.8
sulfurdioxide slant column cobra flag [1]	0.0	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
integrated so2 profile apriori [DU]	1.266×10^{-3}	3.111×10^{-3}	5.020×10^{-3}	6.753×10^{-3}	9.204×10^{-3}	2.690×10^{-2}	3.643×10^{-2}	5.479×10^{-2}	0.109	0.408
fitted radiance shift [nm]	-8.043×10^{-3}	-4.197×10^{-3}	-2.840×10^{-3}	-2.041×10^{-3}	-1.321×10^{-3}	4.832×10^{-4}	1.171×10^{-3}	2.026×10^{-3}	3.505×10^{-3}	7.586×10^{-3}
fitted radiance squeeze [1]	-7.128×10^{-4}	-3.485×10^{-4}	-2.356×10^{-4}	-1.716×10^{-4}	-1.106×10^{-4}	9.614×10^{-5}	1.475×10^{-4}	1.955×10^{-4}	2.656×10^{-4}	4.366×10^{-4}
fitted root mean square [1]	5.816×10^{-4}	7.163×10^{-4}	7.871×10^{-4}	8.413×10^{-4}	9.080×10^{-4}	1.507×10^{-3}	1.756×10^{-3}	2.004×10^{-3}	2.439×10^{-3}	3.535×10^{-3}
sulfurdioxide total air mass factor polluted [1]	5.832×10^{-2}	0.180	0.269	0.359	0.487	1.05	1.23	1.42	1.66	2.06
sulfurdioxide total air mass factor polluted precision [1]	7.960×10^{-3}	1.379×10^{-2}	1.962×10^{-2}	2.622×10^{-2}	3.394×10^{-2}	0.153	0.203	0.254	0.348	0.616
sulfurdioxide clear air mass factor polluted [1]	0.150	0.241	0.310	0.378	0.474	0.876	0.969	1.06	1.21	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]	0.659 ± 0.407	8417689	0.780	1.000	0.0	1.000	0.220	1.000
sulfurdioxide total vertical column [DU]	$(8.372 \pm 241.454) \times 10^{-2}$	8417689	0.620	1.478×10^{-2}	-286	301	-0.284	0.337
sulfurdioxide total vertical column precision [DU]	0.979 ± 1.696	8417689	0.792	0.460	4.688×10^{-2}	75.9	0.248	1.04
sulfurdioxide slant column density corrected [DU]	$(2.662 \pm 43.385) \times 10^{-2}$	8417689	0.384	1.093×10^{-2}	-15.7	58.2	-0.178	0.206
sulfurdioxide slant column density cobra [DU]	$(2.640 \pm 42.394) \times 10^{-2}$	8417689	0.384	1.093×10^{-2}	-15.7	29.4	-0.178	0.206
sulfurdioxide slant column density cobra precision [DU]	0.322 ± 0.174	8417689	0.176	0.271	7.564×10^{-2}	24.8	0.206	0.382
sulfurdioxide slant column density window1 [DU]	0.193 ± 0.797	8417689	0.788	0.213	-18.2	31.4	-0.186	0.602
sulfurdioxide slant column density window1 precision [DU]	0.322 ± 0.174	8417689	0.176	0.271	7.564×10^{-2}	24.8	0.206	0.382
sulfurdioxide slant column density corrected win1 [DU]	$(4.402 \pm 78.551) \times 10^{-2}$	8417689	0.772	1.654×10^{-2}	-18.0	31.1	-0.362	0.411
background so2 slant column offset window1 [DU]	-0.149 ± 0.220	8417689	0.209	-0.204	-0.707	3.42	-0.283	-7.339×10^{-2}
sulfurdioxide slant column density window2 [DU]	0.919 ± 9.314	8417689	11.9	0.669	-548	589	-5.15	6.73
sulfurdioxide slant column density window2 precision [DU]	8.30 ± 2.21	8417689	2.71	7.96	2.28	286	6.78	9.49
sulfurdioxide slant column density corrected win2 [DU]	-1.49 ± 8.96	8417689	11.4	-1.43	-553	585	-7.14	4.24
background so2 slant column offset window2 [DU]	-2.41 ± 3.04	8417689	4.96	-1.65	-12.7	7.74	-4.82	0.138
sulfurdioxide slant column density window3 [DU]	-6.71 ± 24.28	8417689	30.8	-6.62	-178	231	-22.0	8.79
sulfurdioxide slant column density window3 precision [DU]	28.5 ± 12.5	8417689	9.26	25.3	10.7	337	21.7	31.0
sulfurdioxide slant column density corrected win3 [DU]	4.24 ± 23.40	8417689	29.5	4.37	-183	254	-10.4	19.1
background so2 slant column offset window3 [DU]	10.9 ± 7.1	8417689	12.3	11.1	-23.4	31.6	4.48	16.8
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.22	8417689	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(4.954 \pm 12.643) \times 10^{-2}$	8417689	2.861×10^{-2}	1.716×10^{-2}	1.114×10^{-4}	1.98	7.887×10^{-3}	3.650×10^{-2}
fitted radiance shift [nm]	$(-2.166 \pm 24.471) \times 10^{-4}$	8417689	1.620×10^{-3}	-2.107×10^{-4}	-5.375×10^{-2}	3.703×10^{-2}	-1.041×10^{-3}	5.790×10^{-4}
fitted radiance squeeze [1]	$(-2.053 \pm 24.405) \times 10^{-5}$	8417689	2.262×10^{-4}	4.515×10^{-6}	-1.249×10^{-2}	5.058×10^{-3}	-1.132×10^{-4}	1.130×10^{-4}
fitted root mean square [1]	$(1.413 \pm 0.728) \times 10^{-3}$	8417689	7.258×10^{-4}	1.178×10^{-3}	3.257×10^{-4}	5.515×10^{-2}	9.396×10^{-4}	1.665×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.679 ± 0.425	8417689	0.560	0.613	5.000×10^{-2}	2.77	0.352	0.912
sulfurdioxide total air mass factor polluted precision [1]	0.103 ± 0.147	8417689	9.732×10^{-2}	4.747×10^{-2}	2.500×10^{-3}	1.88	2.510×10^{-2}	0.122
sulfurdioxide clear air mass factor polluted [1]	0.584 ± 0.300	8417689	0.453	0.536	2.549×10^{-2}	2.66	0.346	0.799
number of spectral points in retrieval [1]	73.5 ± 0.5	8417689	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]	0.647 ± 0.409	8888713	0.790	1.000	0.0	1.000	0.210	1.000
sulfurdioxide total vertical column [DU]	$(1.812 \pm 76.251) \times 10^{-2}$	8888713	0.386	8.707×10^{-3}	-116	107	-0.182	0.203
sulfurdioxide total vertical column precision [DU]	0.399 ± 0.528	8888713	0.241	0.278	4.159×10^{-2}	29.7	0.195	0.436
sulfurdioxide slant column density corrected [DU]	$(1.393 \pm 31.496) \times 10^{-2}$	8888713	0.335	8.014×10^{-3}	-27.0	44.4	-0.158	0.177
sulfurdioxide slant column density cobra [DU]	$(1.392 \pm 31.426) \times 10^{-2}$	8888713	0.335	8.014×10^{-3}	-27.0	33.3	-0.158	0.177
sulfurdioxide slant column density cobra precision [DU]	0.266 ± 0.111	8888713	0.118	0.231	7.820×10^{-2}	28.3	0.194	0.312
sulfurdioxide slant column density window1 [DU]	0.161 ± 0.606	8888713	0.687	0.176	-51.5	43.3	-0.174	0.513
sulfurdioxide slant column density window1 precision [DU]	0.266 ± 0.111	8888713	0.118	0.231	7.820×10^{-2}	28.3	0.194	0.312
sulfurdioxide slant column density corrected win1 [DU]	$(1.077 \pm 59.042) \times 10^{-2}$	8888713	0.666	-1.044×10^{-3}	-51.5	43.2	-0.331	0.335
background so2 slant column offset window1 [DU]	-0.150 ± 0.167	8888713	0.196	-0.188	-1.50	1.45	-0.266	-6.944×10^{-2}
sulfurdioxide slant column density window2 [DU]	-0.224 ± 8.709	8888713	11.0	-0.330	-724	994	-5.77	5.22
sulfurdioxide slant column density window2 precision [DU]	7.93 ± 2.19	8888713	2.46	7.61	2.11	511	6.53	8.99
sulfurdioxide slant column density corrected win2 [DU]	-1.16 ± 8.59	8888713	10.8	-1.14	-725	995	-6.56	4.27
background so2 slant column offset window2 [DU]	-0.931 ± 1.875	8888713	2.26	-0.496	-9.45	8.06	-1.95	0.303
sulfurdioxide slant column density window3 [DU]	-1.52 ± 24.19	8888713	30.6	-1.84	-2.385×10^3	974	-16.9	13.7
sulfurdioxide slant column density window3 precision [DU]	28.5 ± 13.3	8888713	9.82	24.8	10.5	754	21.1	30.9
sulfurdioxide slant column density corrected win3 [DU]	4.24 ± 23.32	8888713	29.5	4.12	-2.381×10^3	980	-10.4	19.0
background so2 slant column offset window3 [DU]	5.76 ± 6.91	8888713	11.7	4.91	-27.2	26.6	-7.441×10^{-2}	11.6
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.22	8888713	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(1.988 \pm 3.105) \times 10^{-2}$	8888713	1.135×10^{-2}	1.466×10^{-2}	9.225×10^{-4}	1.83	1.004×10^{-2}	2.139×10^{-2}
fitted radiance shift [nm]	$(-5.429 \pm 26.197) \times 10^{-4}$	8888713	1.942×10^{-3}	-5.222×10^{-4}	-6.930×10^{-2}	6.568×10^{-2}	-1.574×10^{-3}	3.689×10^{-4}
fitted radiance squeeze [1]	$(-1.722 \pm 16.128) \times 10^{-5}$	8888713	1.903×10^{-4}	-1.108×10^{-5}	-1.681×10^{-2}	2.702×10^{-2}	-1.087×10^{-4}	8.164×10^{-5}
fitted root mean square [1]	$(1.173 \pm 0.446) \times 10^{-3}$	8888713	4.719×10^{-4}	1.044×10^{-3}	3.329×10^{-4}	6.999×10^{-2}	8.844×10^{-4}	1.356×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.926 ± 0.428	8888713	0.538	0.866	5.000×10^{-2}	2.78	0.620	1.16
sulfurdioxide total air mass factor polluted precision [1]	0.123 ± 0.104	8888713	0.130	8.820×10^{-2}	4.987×10^{-3}	1.52	4.384×10^{-2}	0.174
sulfurdioxide clear air mass factor polluted [1]	0.801 ± 0.326	8888713	0.346	0.737	0.126	2.79	0.590	0.936
number of spectral points in retrieval [1]	73.4 ± 0.5	8888713	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]	0.686 ± 0.399	12382549	0.740	1.000	0.0	1.000	0.260	1.000
sulfurdioxide total vertical column [DU]	$(3.210 \pm 137.168) \times 10^{-2}$	12382549	0.426	9.233×10^{-3}	-286	301	-0.201	0.225
sulfurdioxide total vertical column precision [DU]	0.548 ± 1.010	12382549	0.312	0.298	4.894×10^{-2}	75.7	0.206	0.518
sulfurdioxide slant column density corrected [DU]	$(1.482 \pm 33.033) \times 10^{-2}$	12382549	0.343	8.014×10^{-3}	-27.0	58.2	-0.162	0.181
sulfurdioxide slant column density cobra [DU]	$(1.477 \pm 32.680) \times 10^{-2}$	12382549	0.343	8.014×10^{-3}	-27.0	33.3	-0.162	0.181
sulfurdioxide slant column density cobra precision [DU]	0.276 ± 0.124	12382549	0.133	0.234	7.564×10^{-2}	28.3	0.196	0.328
sulfurdioxide slant column density window1 [DU]	0.172 ± 0.646	12382549	0.705	0.187	-51.5	33.4	-0.171	0.534
sulfurdioxide slant column density window1 precision [DU]	0.276 ± 0.124	12382549	0.133	0.234	7.564×10^{-2}	28.3	0.196	0.328
sulfurdioxide slant column density corrected win1 [DU]	$(1.560 \pm 63.356) \times 10^{-2}$	12382549	0.688	9.418×10^{-4}	-51.5	33.3	-0.339	0.349
background so2 slant column offset window1 [DU]	-0.157 ± 0.177	12382549	0.195	-0.196	-1.50	2.97	-0.272	-7.721×10^{-2}
sulfurdioxide slant column density window2 [DU]	$(4.210 \pm 87671.955) \times 10^{-4}$	12382549	11.1	-0.146	-724	994	-5.65	5.49
sulfurdioxide slant column density window2 precision [DU]	7.96 ± 2.10	12382549	2.44	7.62	2.28	511	6.56	9.00
sulfurdioxide slant column density corrected win2 [DU]	-1.28 ± 8.59	12382549	10.9	-1.25	-725	995	-6.72	4.20
background so2 slant column offset window2 [DU]	-1.28 ± 2.28	12382549	2.76	-0.675	-12.7	8.06	-2.48	0.283
sulfurdioxide slant column density window3 [DU]	-1.16 ± 24.13	12382549	30.7	-1.41	-632	504	-16.5	14.2
sulfurdioxide slant column density window3 precision [DU]	27.9 ± 12.4	12382549	9.23	24.5	10.7	319	21.1	30.3
sulfurdioxide slant column density corrected win3 [DU]	6.29 ± 22.94	12382549	29.2	6.10	-633	512	-8.33	20.9
background so2 slant column offset window3 [DU]	7.45 ± 7.01	12382549	11.0	6.92	-27.2	31.6	2.02	13.0
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.18	12382549	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.282 \pm 4.900) \times 10^{-2}$	12382549	1.334×10^{-2}	1.508×10^{-2}	4.162×10^{-4}	1.98	9.832×10^{-3}	2.317×10^{-2}
fitted radiance shift [nm]	$(-3.963 \pm 24.225) \times 10^{-4}$	12382549	1.790×10^{-3}	-3.563×10^{-4}	-6.930×10^{-2}	5.129×10^{-2}	-1.323×10^{-3}	4.664×10^{-4}
fitted radiance squeeze [1]	$(-1.427 \pm 18.590) \times 10^{-5}$	12382549	1.975×10^{-4}	-3.861×10^{-6}	-1.249×10^{-2}	2.702×10^{-2}	-1.051×10^{-4}	9.243×10^{-5}
fitted root mean square [1]	$(1.223 \pm 0.531) \times 10^{-3}$	12382549	5.189×10^{-4}	1.054×10^{-3}	3.257×10^{-4}	6.999×10^{-2}	8.927×10^{-4}	1.412×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.844 ± 0.407	12382549	0.509	0.813	5.000×10^{-2}	2.58	0.564	1.07
sulfurdioxide total air mass factor polluted precision [1]	0.109 ± 0.101	12382549	0.111	6.997×10^{-2}	2.500×10^{-3}	1.47	3.951×10^{-2}	0.151
sulfurdioxide clear air mass factor polluted [1]	0.731 ± 0.285	12382549	0.358	0.702	3.002×10^{-2}	2.59	0.539	0.898
number of spectral points in retrieval [1]	73.4 ± 0.5	12382549	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]	0.600 $\pm$ 0.417	3733938	0.830	0.490	0.0	1.000	0.170	1.000
sulfurdioxide total vertical column [DU]	$(8.344 \pm 231.561) \times 10^{-2}$	3733938	0.621	1.517×10^{-2}	-232	238	-0.282	0.339
sulfurdioxide total vertical column precision [DU]	0.948 $\pm$ 1.621	3733938	0.788	0.457	4.159×10^{-2}	60.6	0.256	1.04
sulfurdioxide slant column density corrected [DU]	$(3.007 \pm 45.295) \times 10^{-2}$	3733938	0.384	1.159×10^{-2}	-11.7	42.8	-0.177	0.207
sulfurdioxide slant column density cobra [DU]	$(2.986 \pm 44.476) \times 10^{-2}$	3733938	0.384	1.159×10^{-2}	-11.7	23.8	-0.177	0.207
sulfurdioxide slant column density cobra precision [DU]	0.322 $\pm$ 0.181	3733938	0.165	0.270	7.820×10^{-2}	21.7	0.210	0.374
sulfurdioxide slant column density window1 [DU]	0.193 $\pm$ 0.797	3733938	0.782	0.212	-42.1	43.3	-0.186	0.596
sulfurdioxide slant column density window1 precision [DU]	0.322 $\pm$ 0.181	3733938	0.165	0.270	7.820×10^{-2}	21.7	0.210	0.374
sulfurdioxide slant column density corrected win1 [DU]	$(4.544 \pm 78.098) \times 10^{-2}$	3733938	0.758	1.718×10^{-2}	-42.1	43.2	-0.354	0.404
background so2 slant column offset window1 [DU]	-0.148 $\pm$ 0.220	3733938	0.202	-0.207	-1.06	3.42	-0.282	-7.973×10^{-2}
sulfurdioxide slant column density window2 [DU]	0.751 $\pm$ 9.467	3733938	11.9	0.520	-586	742	-5.32	6.61
sulfurdioxide slant column density window2 precision [DU]	8.43 $\pm$ 2.41	3733938	2.83	8.15	2.11	405	6.86	9.69
sulfurdioxide slant column density corrected win2 [DU]	-1.38 $\pm$ 9.15	3733938	11.4	-1.31	-585	741	-7.06	4.39
background so2 slant column offset window2 [DU]	-2.13 $\pm$ 2.95	3733938	4.66	-1.17	-12.7	8.06	-4.44	0.218
sulfurdioxide slant column density window3 [DU]	-11.1 $\pm$ 23.6	3733938	29.5	-10.5	-2.385×10^3	974	-25.6	3.90
sulfurdioxide slant column density window3 precision [DU]	30.2 $\pm$ 14.4	3733938	9.85	26.6	10.5	754	22.5	32.4
sulfurdioxide slant column density corrected win3 [DU]	-1.72 $\pm$ 23.73	3733938	29.6	-1.25	-2.381×10^3	980	-16.3	13.3
background so2 slant column offset window3 [DU]	9.35 $\pm$ 8.04	3733938	13.7	9.38	-27.2	31.6	2.55	16.2
sulfurdioxide slant column cobra flag [1]	1.96 $\pm$ 0.27	3733938	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(6.064 \pm 14.056) \times 10^{-2}$	3733938	3.874×10^{-2}	1.881×10^{-2}	1.114×10^{-4}	1.93	7.866×10^{-3}	4.660×10^{-2}
fitted radiance shift [nm]	$(-3.459 \pm 29.156) \times 10^{-4}$	3733938	1.837×10^{-3}	-3.671×10^{-4}	-4.276×10^{-2}	6.568×10^{-2}	-1.312×10^{-3}	5.249×10^{-4}
fitted radiance squeeze [1]	$(-2.937 \pm 23.584) \times 10^{-5}$	3733938	2.239×10^{-4}	-5.581×10^{-6}	-1.681×10^{-2}	1.560×10^{-2}	-1.227×10^{-4}	1.012×10^{-4}
fitted root mean square [1]	$(1.396 \pm 0.719) \times 10^{-3}$	3733938	6.707×10^{-4}	1.185×10^{-3}	3.302×10^{-4}	4.882×10^{-2}	9.512×10^{-4}	1.622×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.719 $\pm$ 0.517	3733938	0.608	0.586	5.000×10^{-2}	2.78	0.341	0.949
sulfurdioxide total air mass factor polluted precision [1]	0.126 $\pm$ 0.181	3733938	0.139	4.530×10^{-2}	2.500×10^{-3}	1.88	2.273×10^{-2}	0.162
sulfurdioxide clear air mass factor polluted [1]	0.619 $\pm$ 0.423	3733938	0.429	0.531	2.549×10^{-2}	2.79	0.336	0.764
number of spectral points in retrieval [1]	73.4 $\pm$ 0.5	3733938	1.000	73.0	52.0	74.0	73.0	74.0

3 Granule outlines

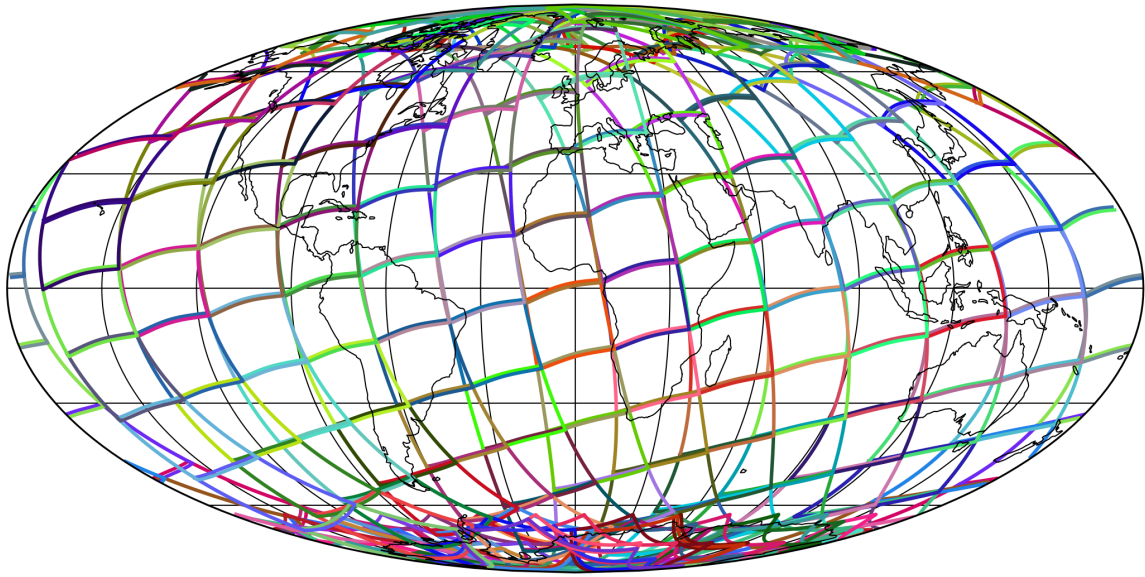


Figure 1: Outline of the granules.

4 Input data monitoring

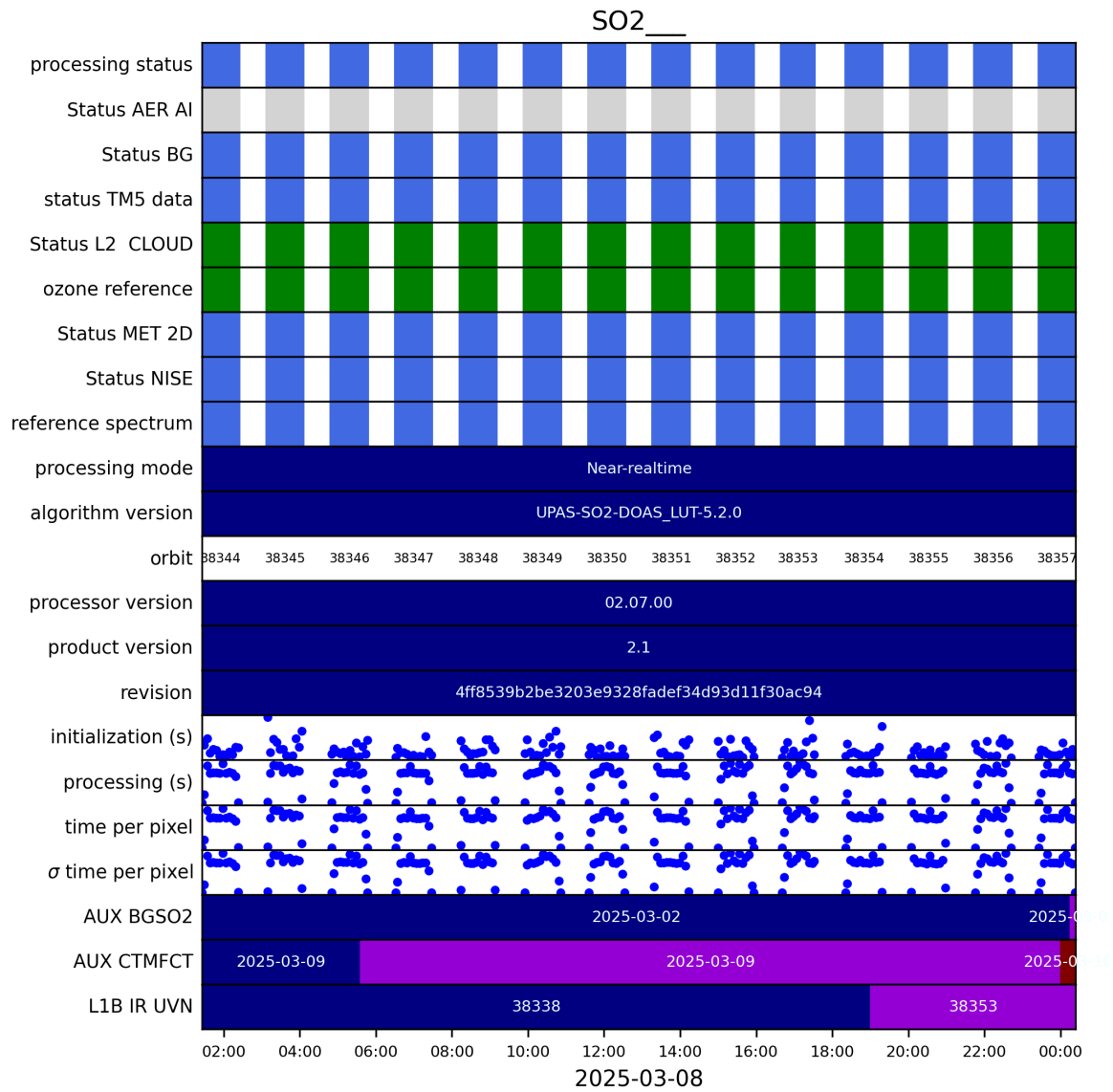


Figure 2: Input data per granule

5 Warnings and errors

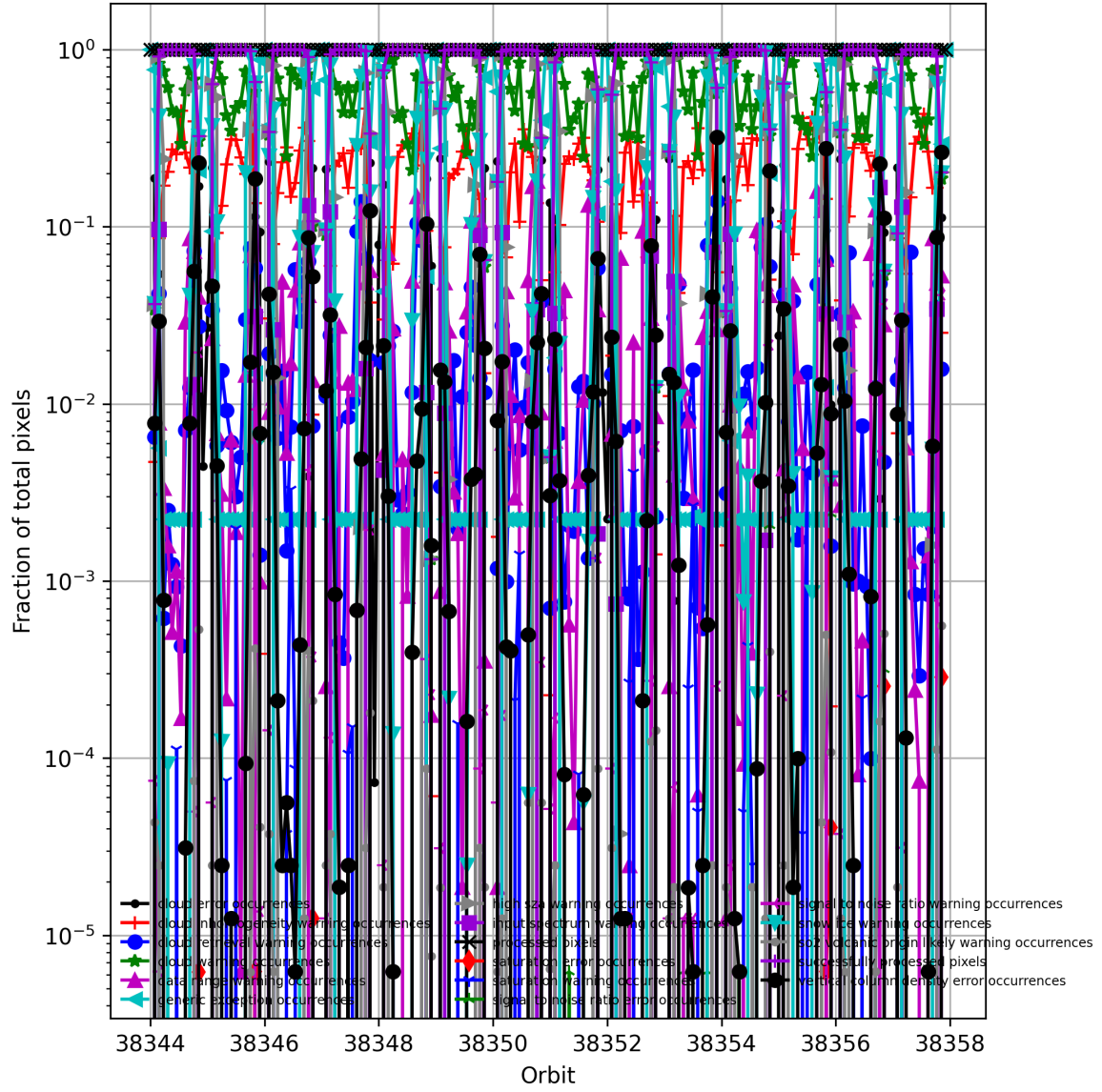


Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

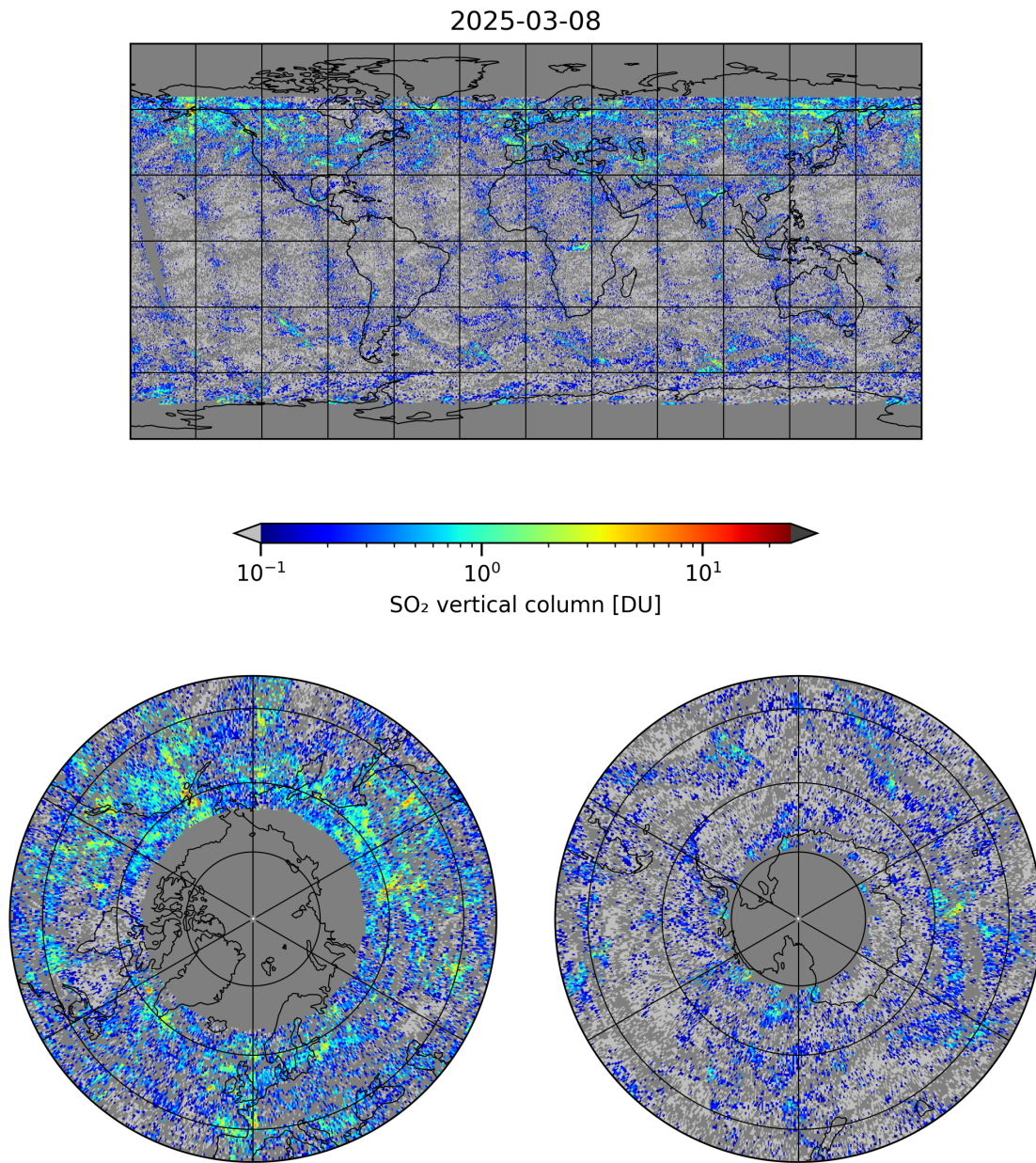


Figure 4: Map of “SO₂ vertical column” for 2025-03-08 to 2025-03-09

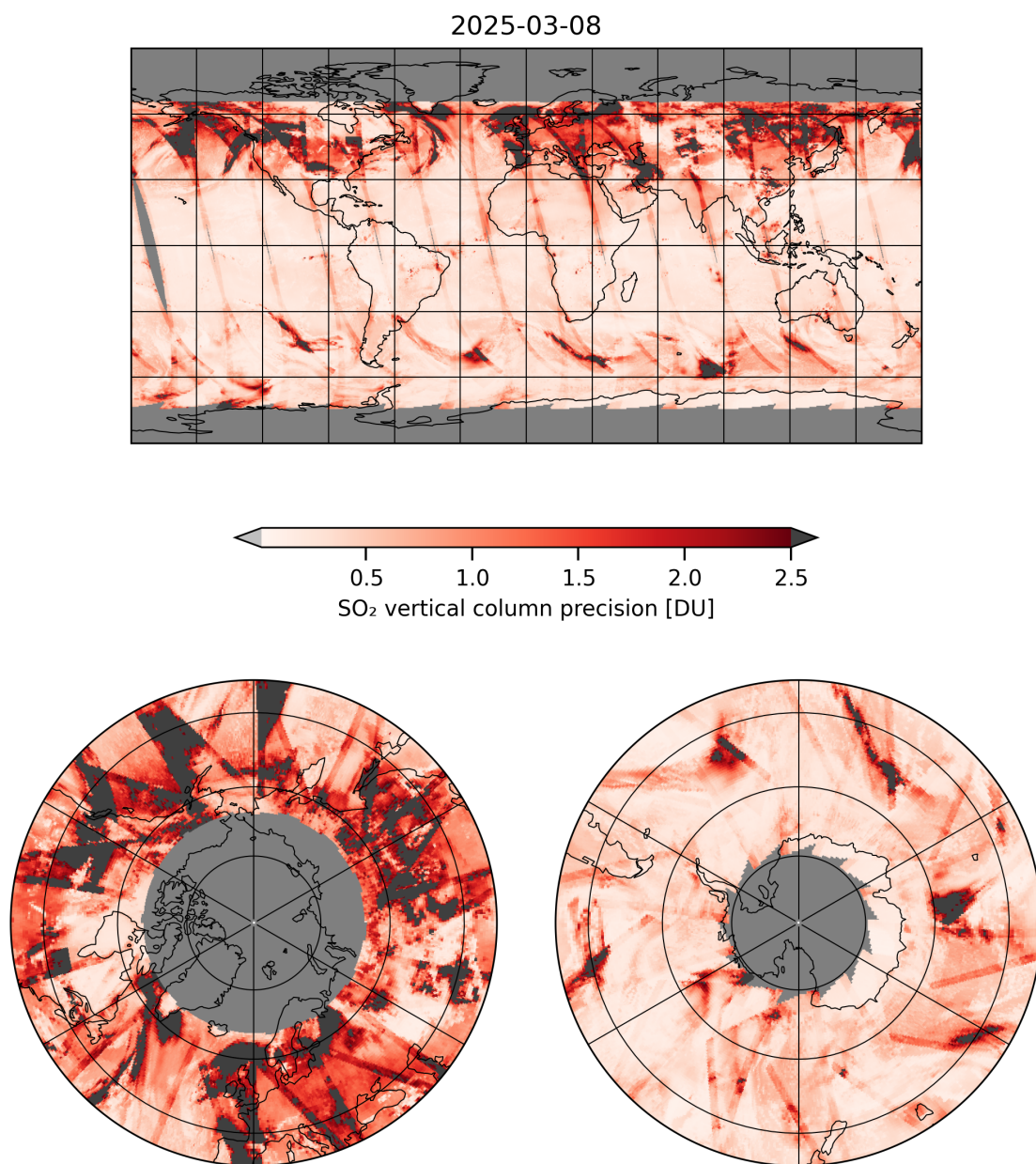


Figure 5: Map of “SO₂ vertical column precision” for 2025-03-08 to 2025-03-09

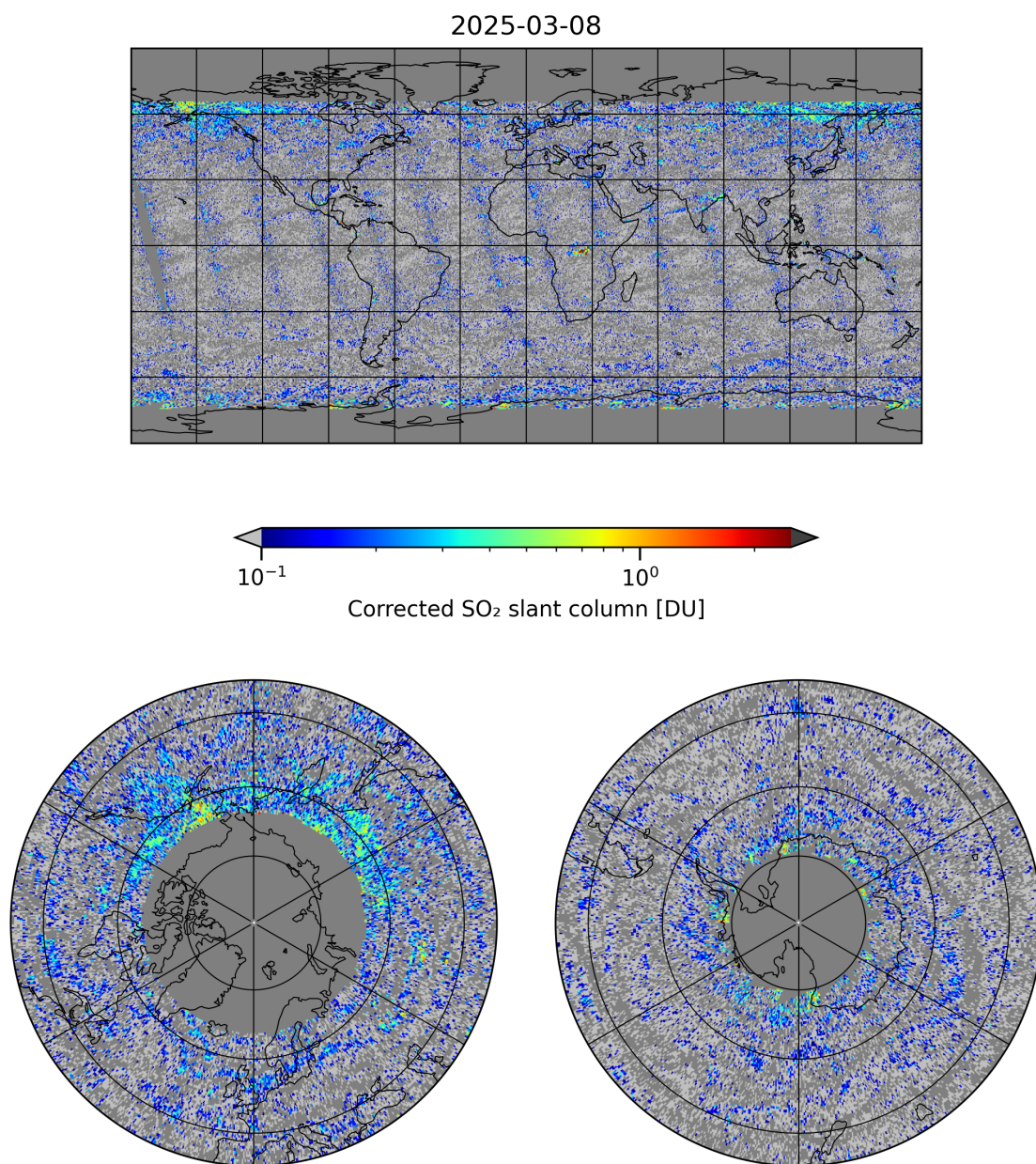


Figure 6: Map of “Corrected SO₂ slant column” for 2025-03-08 to 2025-03-09

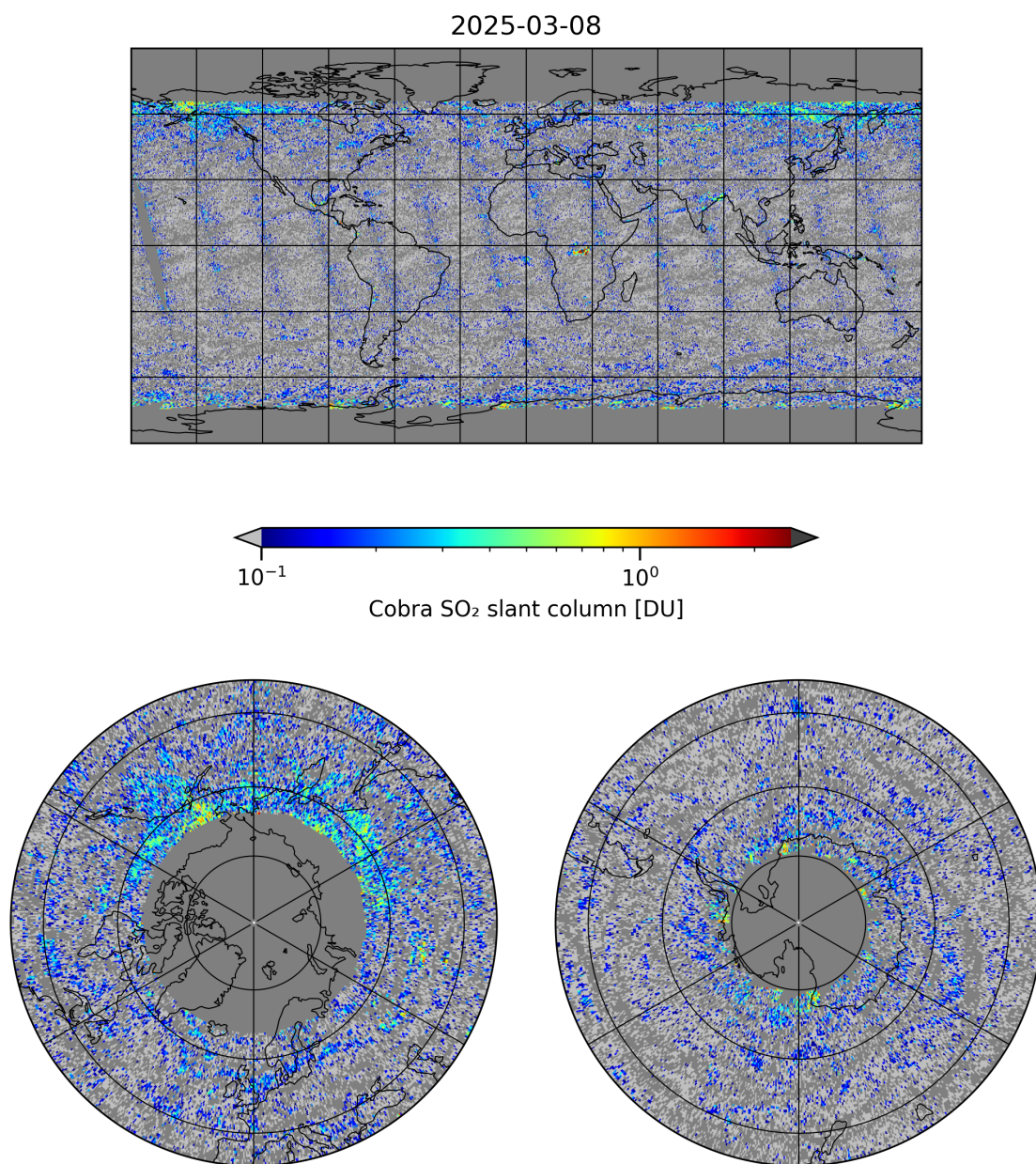


Figure 7: Map of “Cobra SO₂ slant column” for 2025-03-08 to 2025-03-09

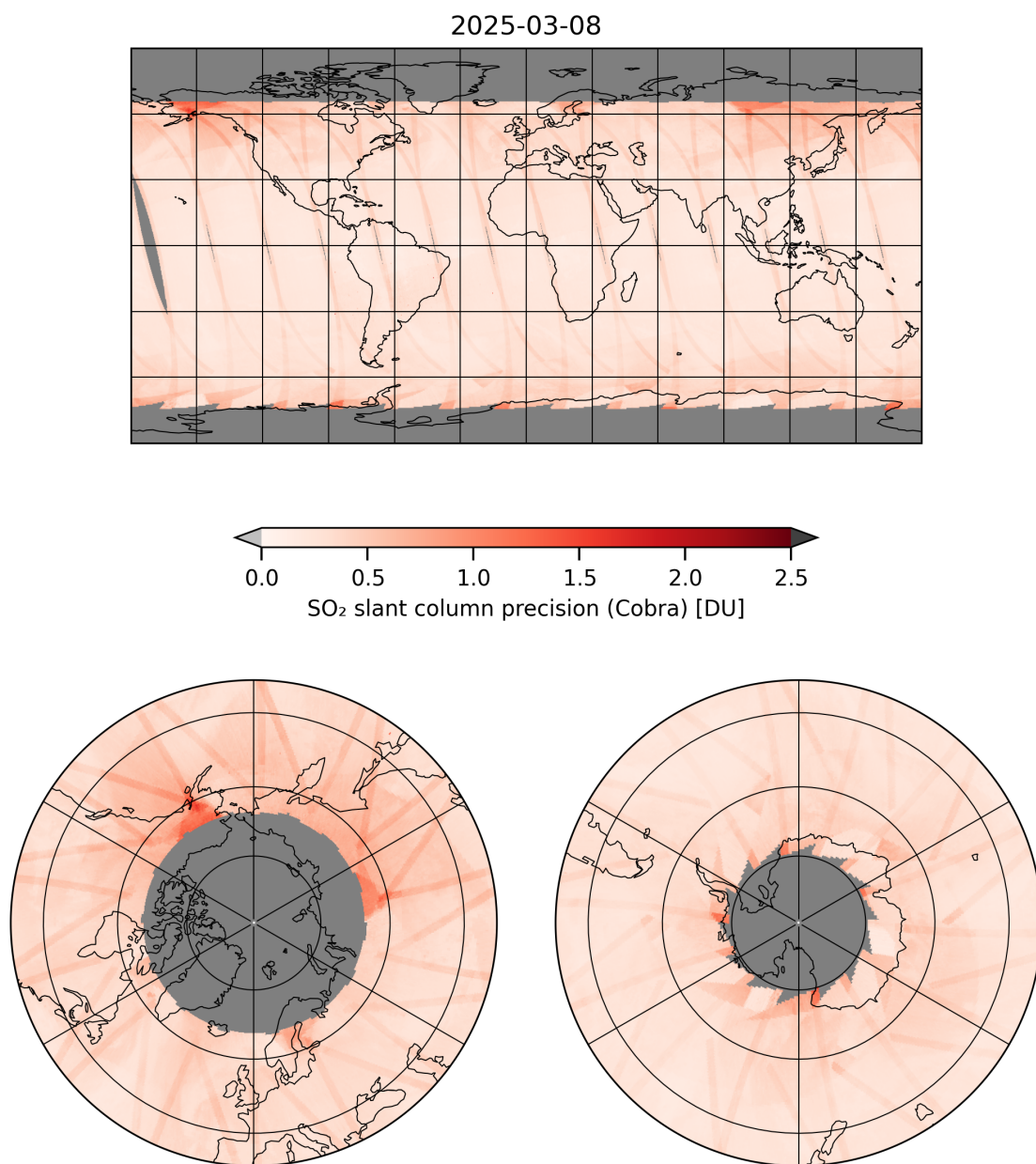


Figure 8: Map of “SO₂ slant column precision (Cobra)” for 2025-03-08 to 2025-03-09

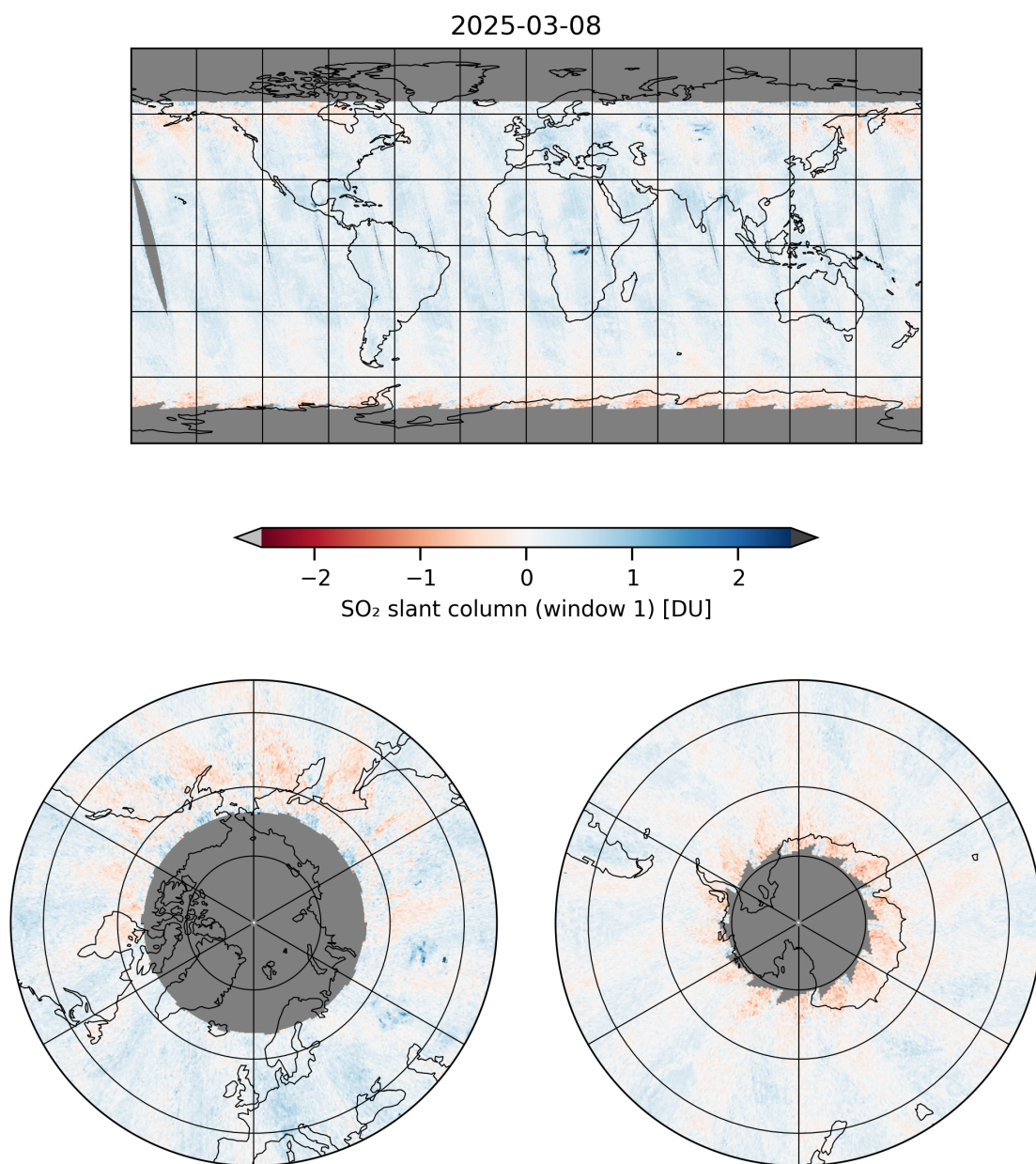


Figure 9: Map of “SO₂ slant column (window 1)” for 2025-03-08 to 2025-03-09

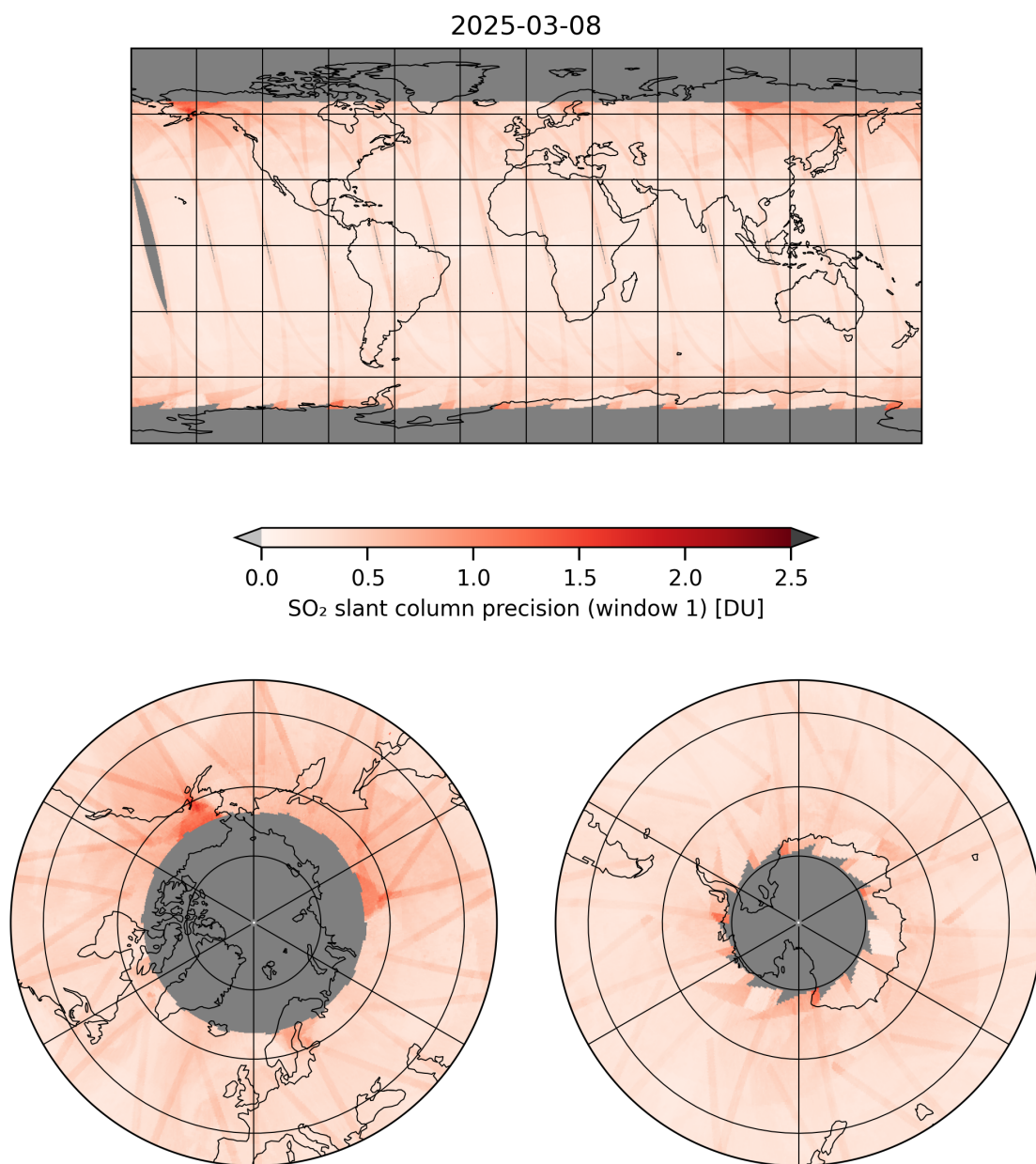


Figure 10: Map of “SO₂ slant column precision (window 1)” for 2025-03-08 to 2025-03-09

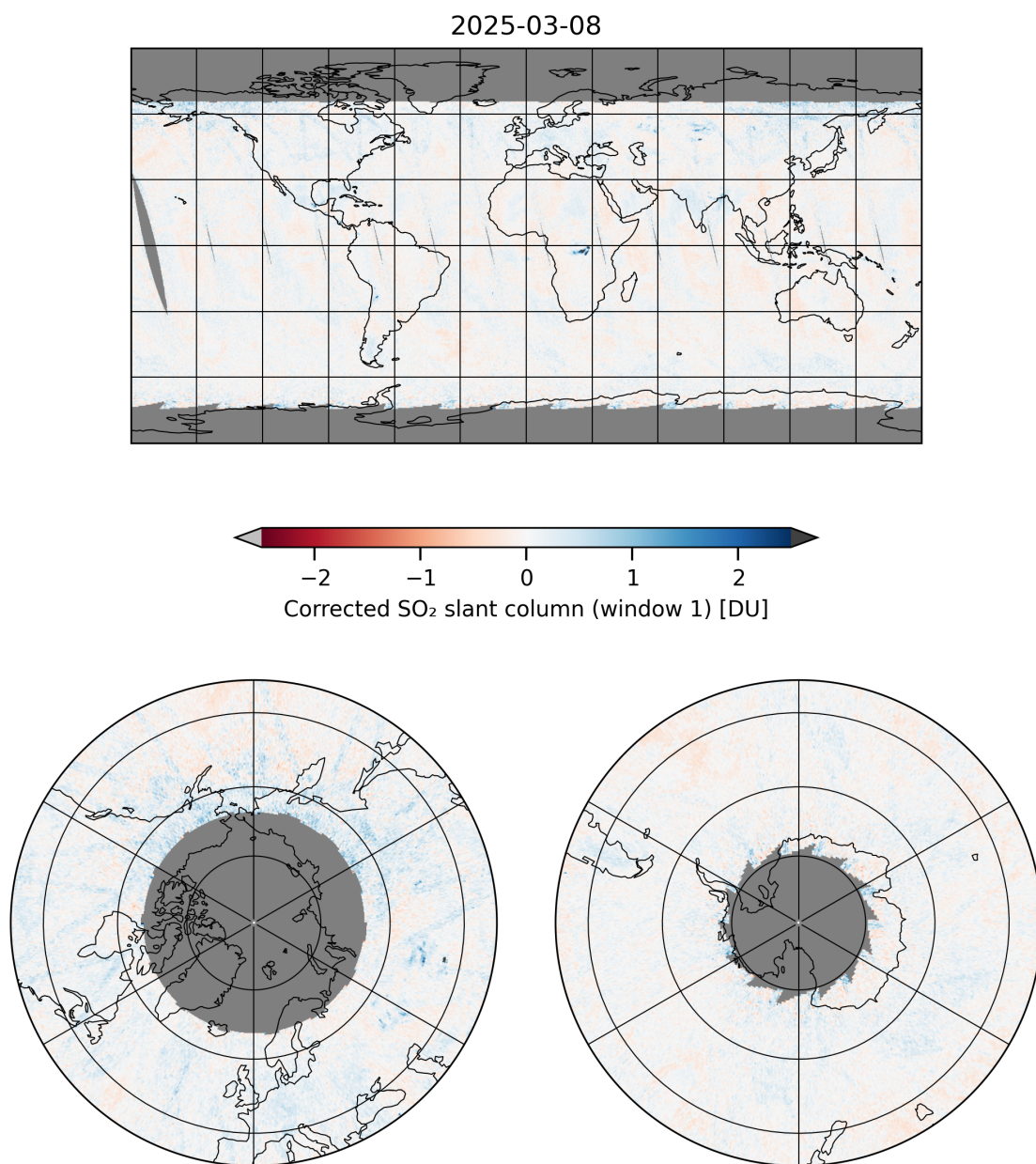


Figure 11: Map of “Corrected SO₂ slant column (window 1)” for 2025-03-08 to 2025-03-09

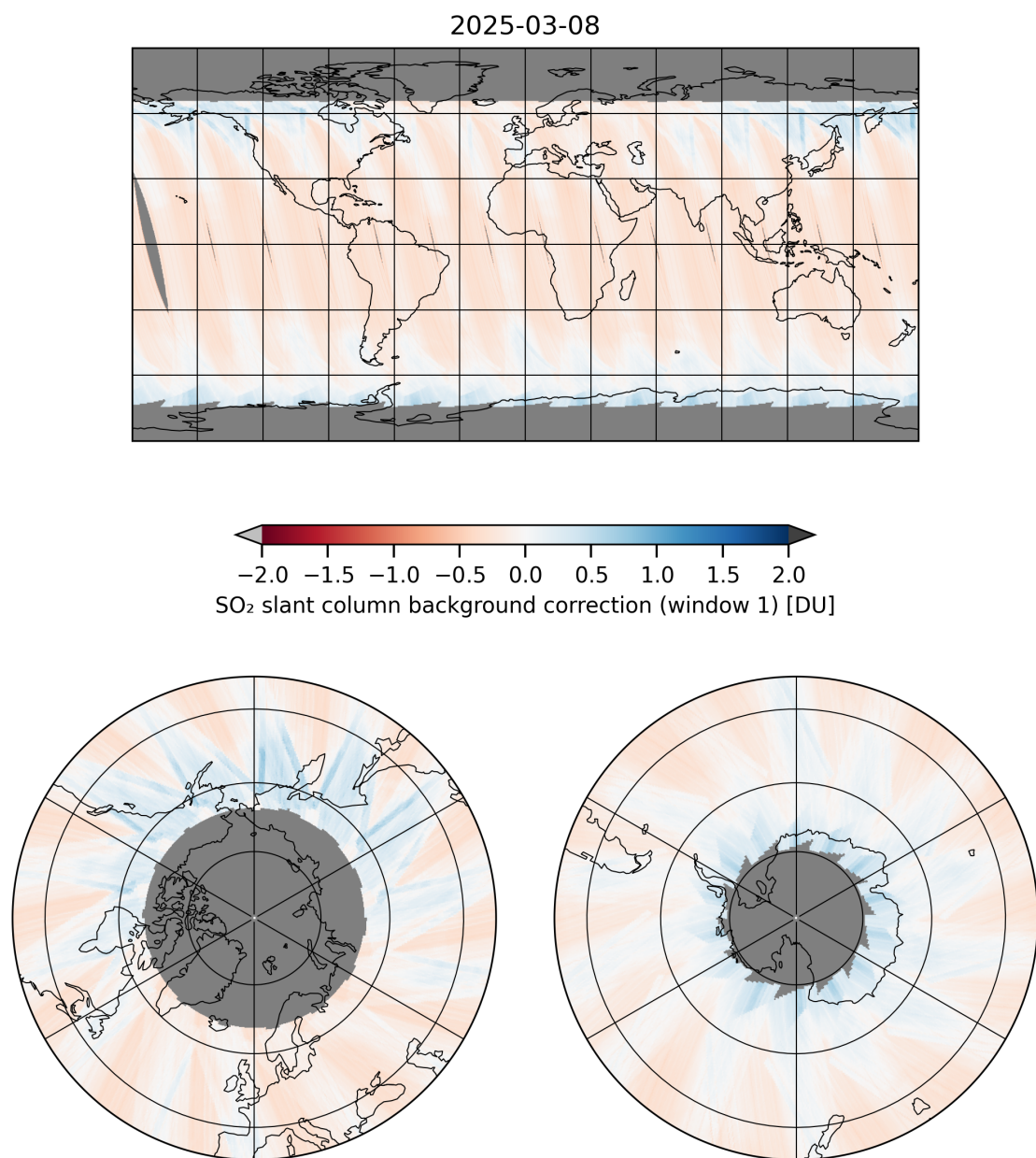


Figure 12: Map of “SO₂ slant column background correction (window 1)” for 2025-03-08 to 2025-03-09

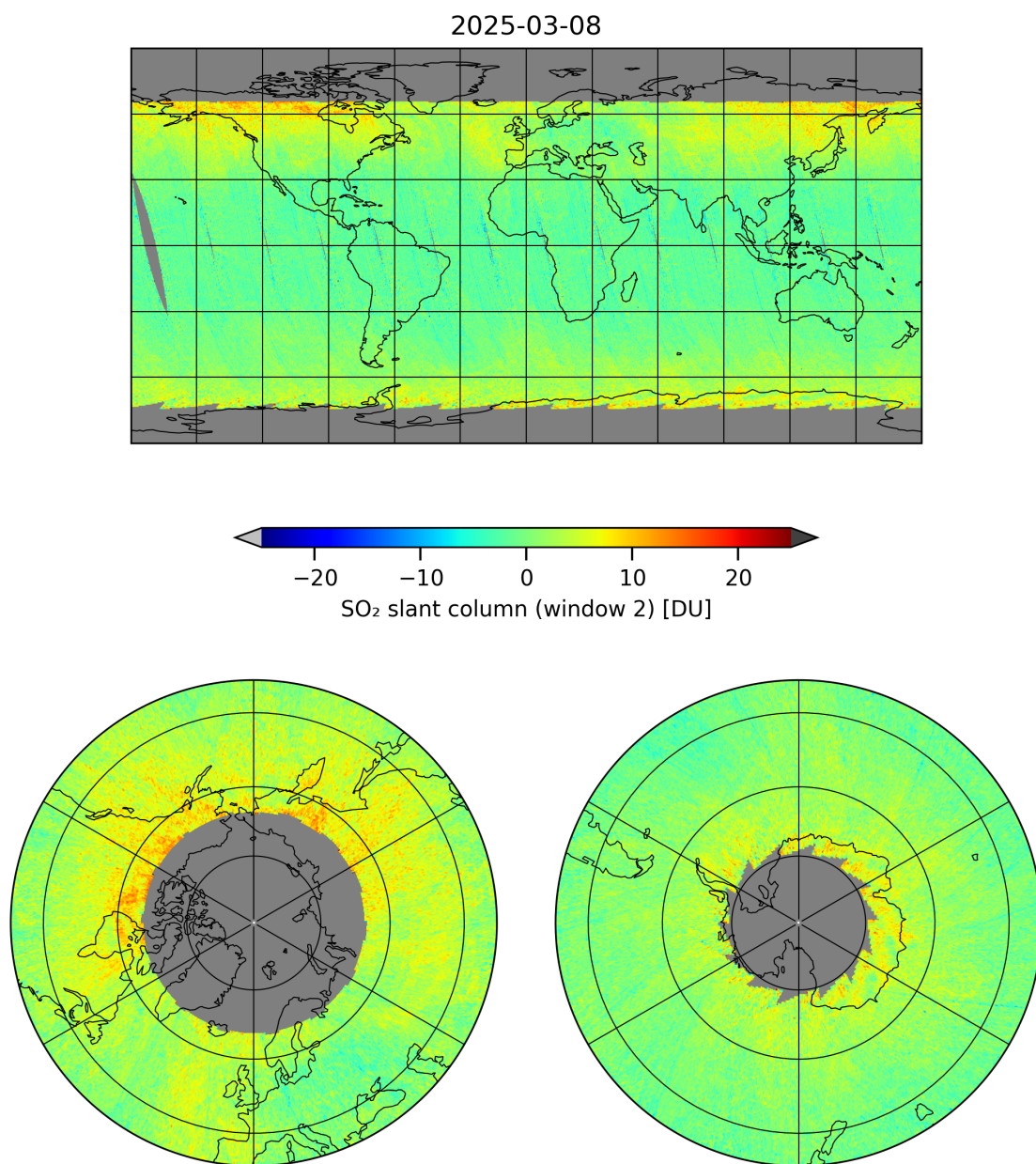


Figure 13: Map of “SO₂ slant column (window 2)” for 2025-03-08 to 2025-03-09

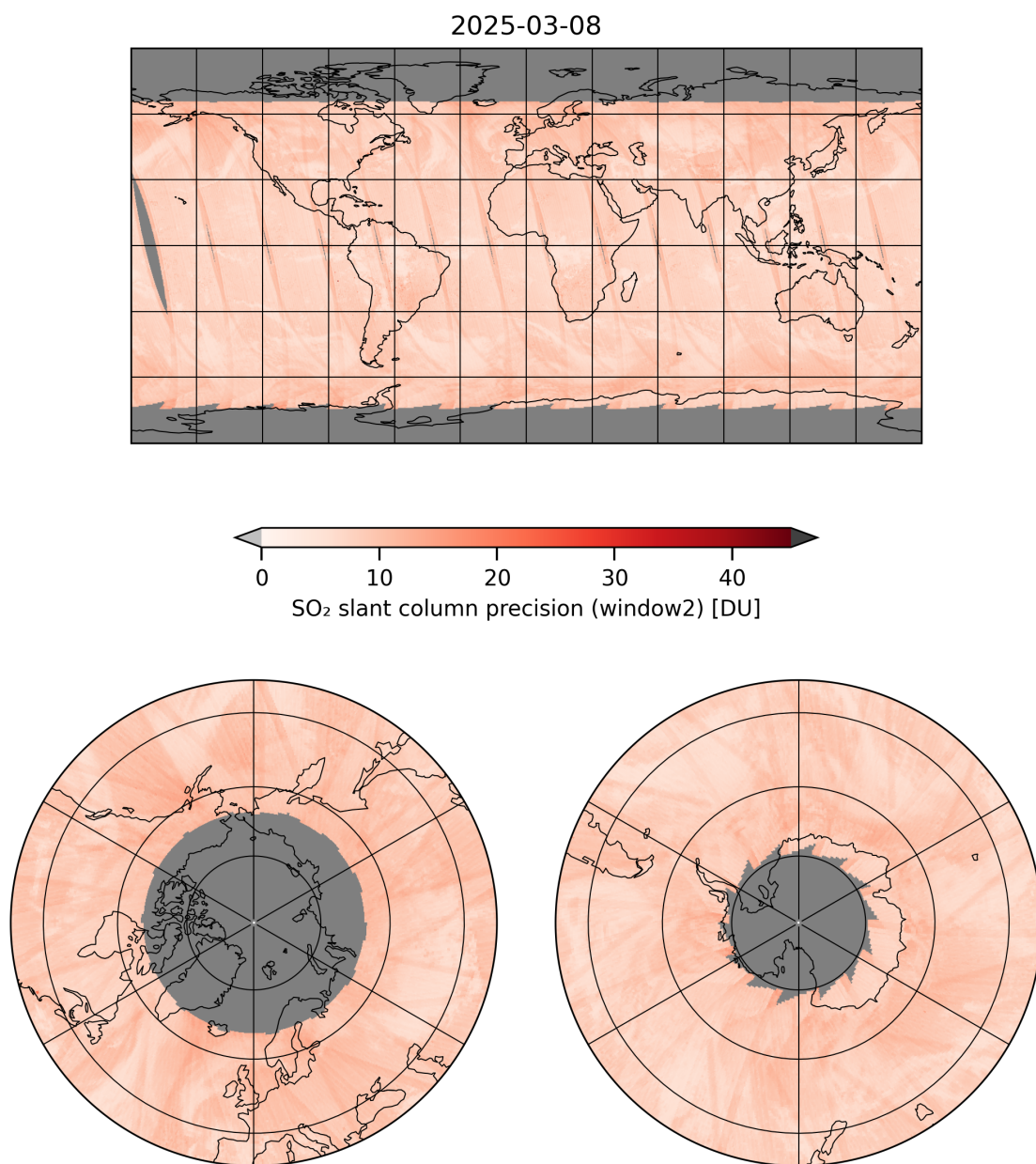


Figure 14: Map of “SO₂ slant column precision (window2)” for 2025-03-08 to 2025-03-09

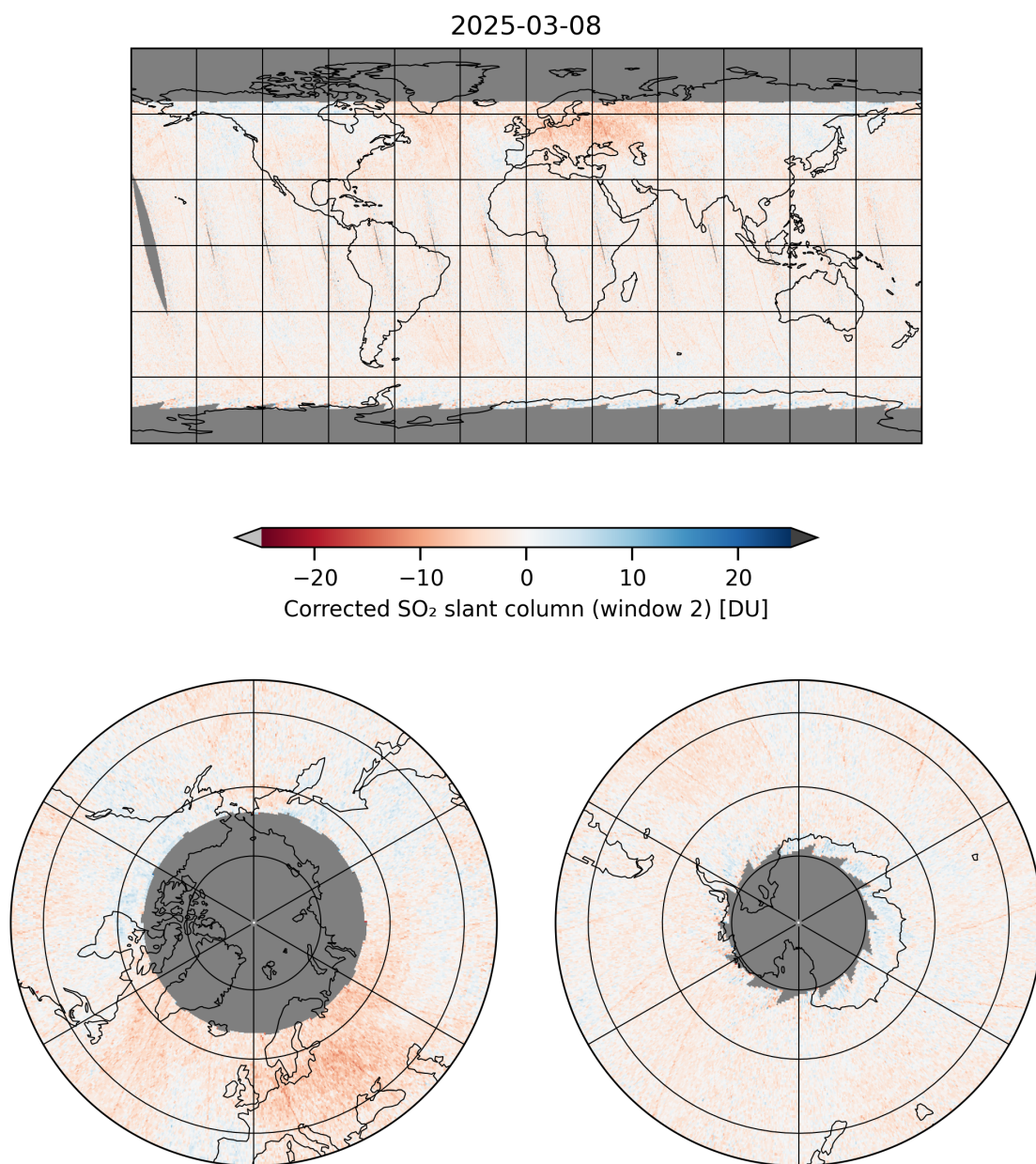


Figure 15: Map of “Corrected SO₂ slant column (window 2)” for 2025-03-08 to 2025-03-09

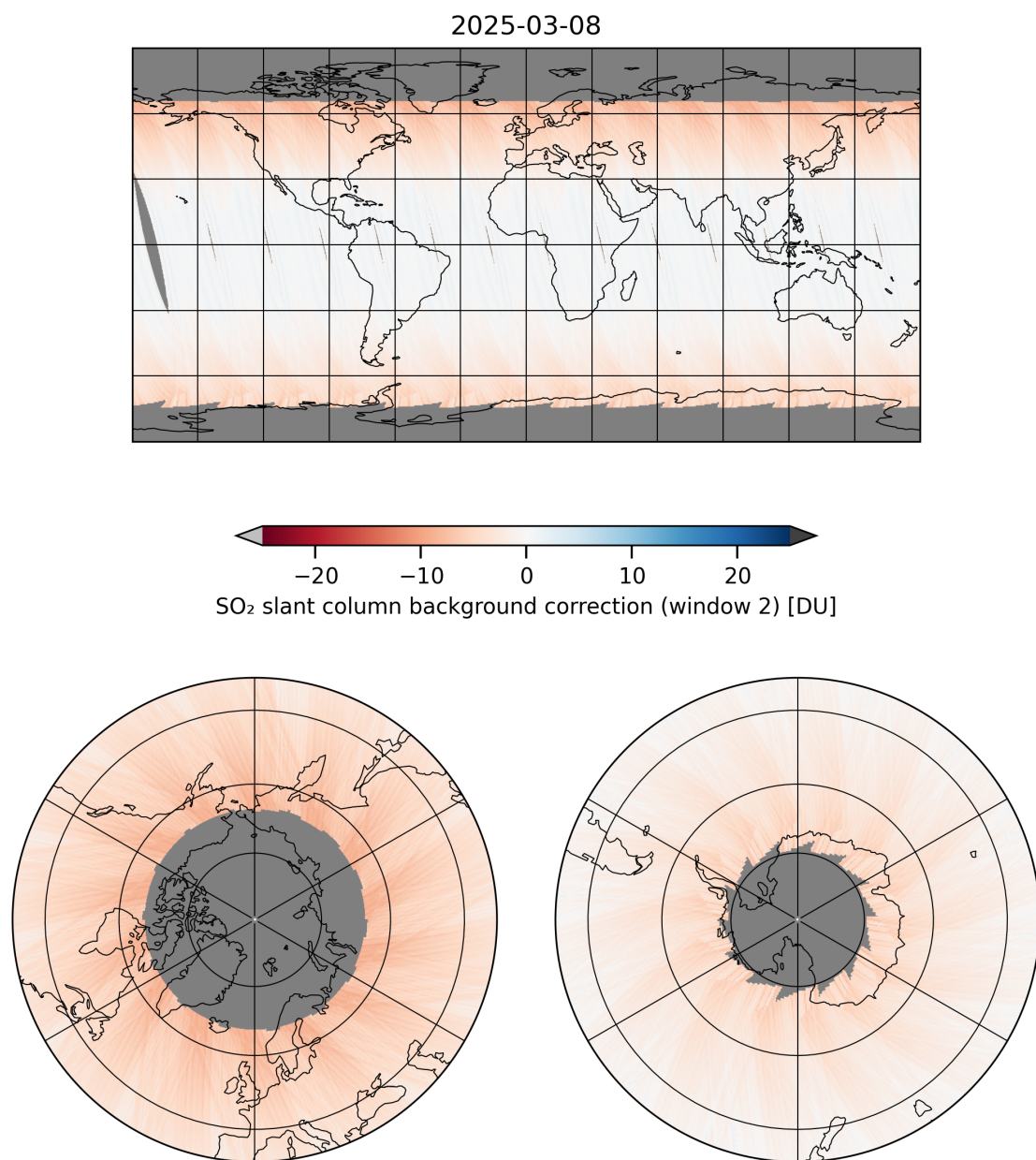


Figure 16: Map of “SO₂ slant column background correction (window 2)” for 2025-03-08 to 2025-03-09

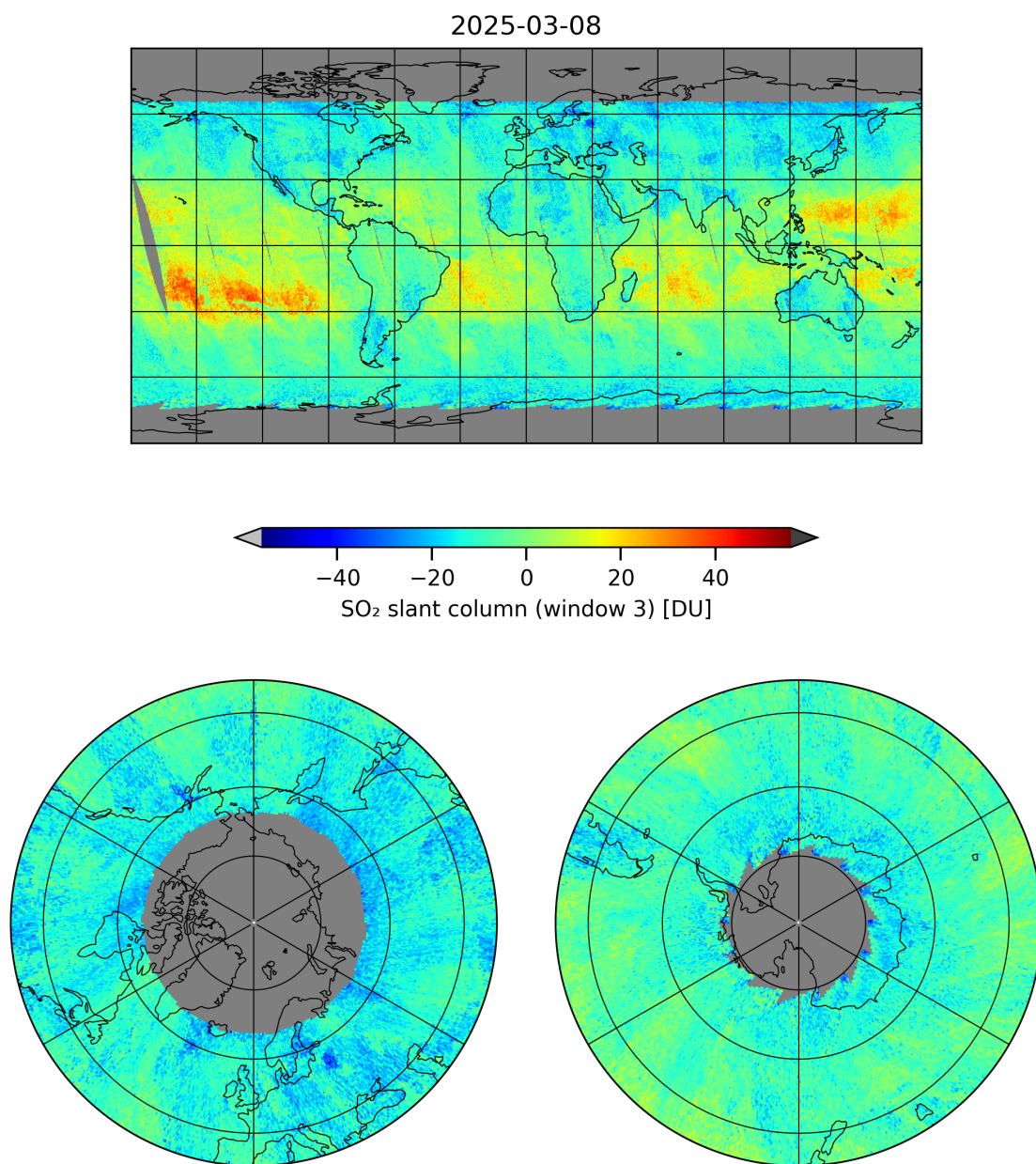


Figure 17: Map of “SO₂ slant column (window 3)” for 2025-03-08 to 2025-03-09

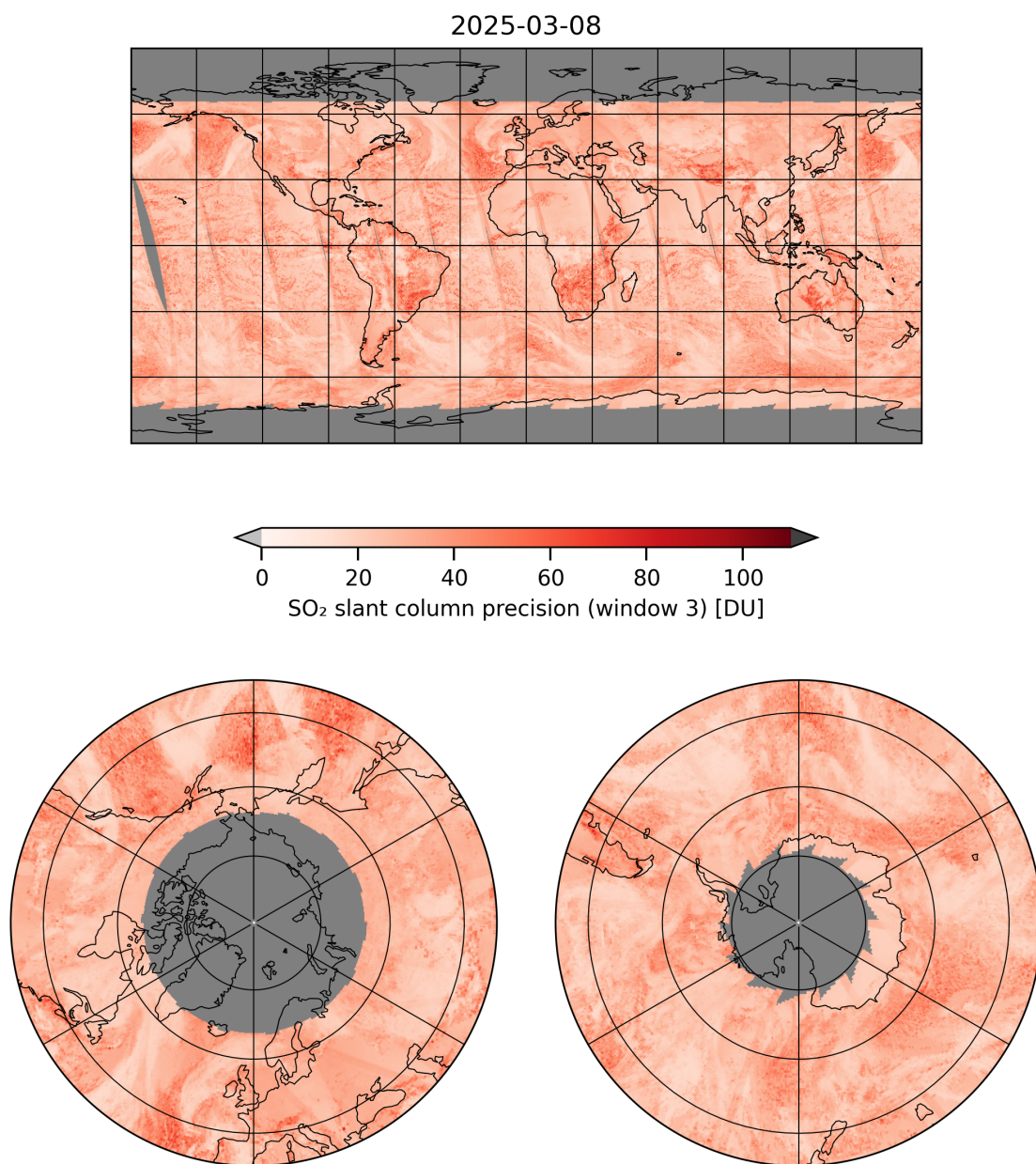


Figure 18: Map of “SO₂ slant column precision (window 3)” for 2025-03-08 to 2025-03-09

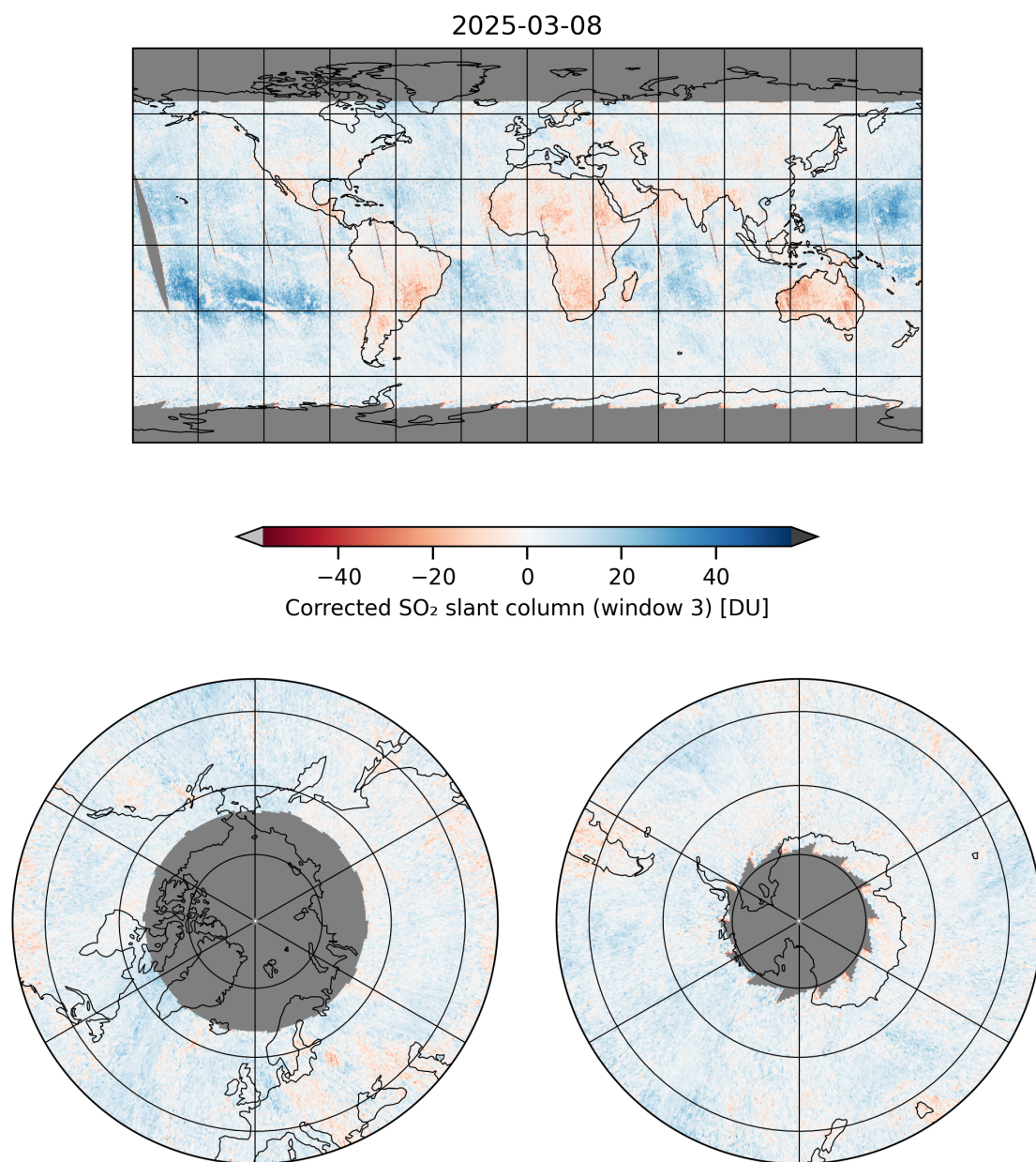


Figure 19: Map of “Corrected SO₂ slant column (window 3)” for 2025-03-08 to 2025-03-09

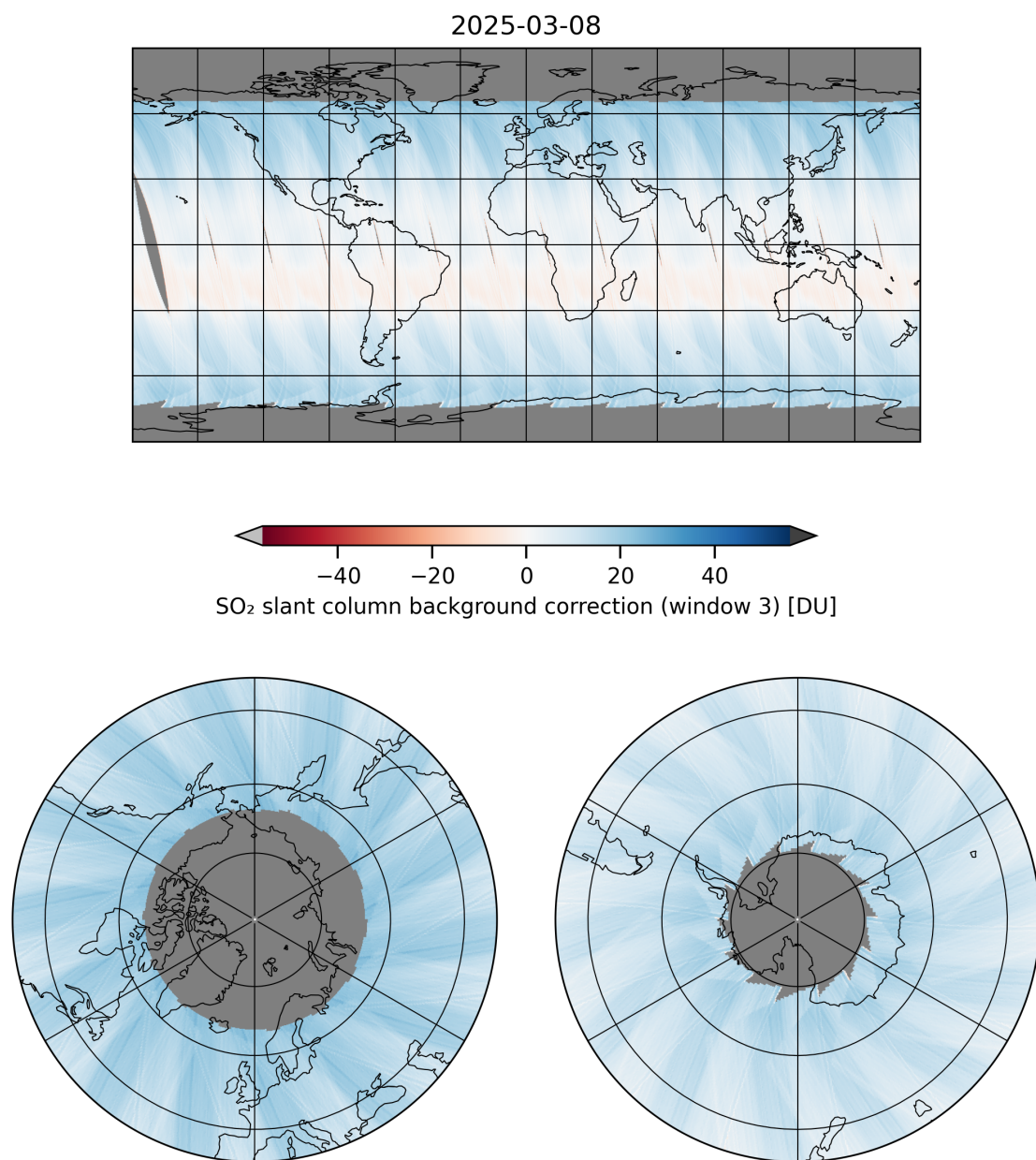


Figure 20: Map of “SO₂ slant column background correction (window 3)” for 2025-03-08 to 2025-03-09

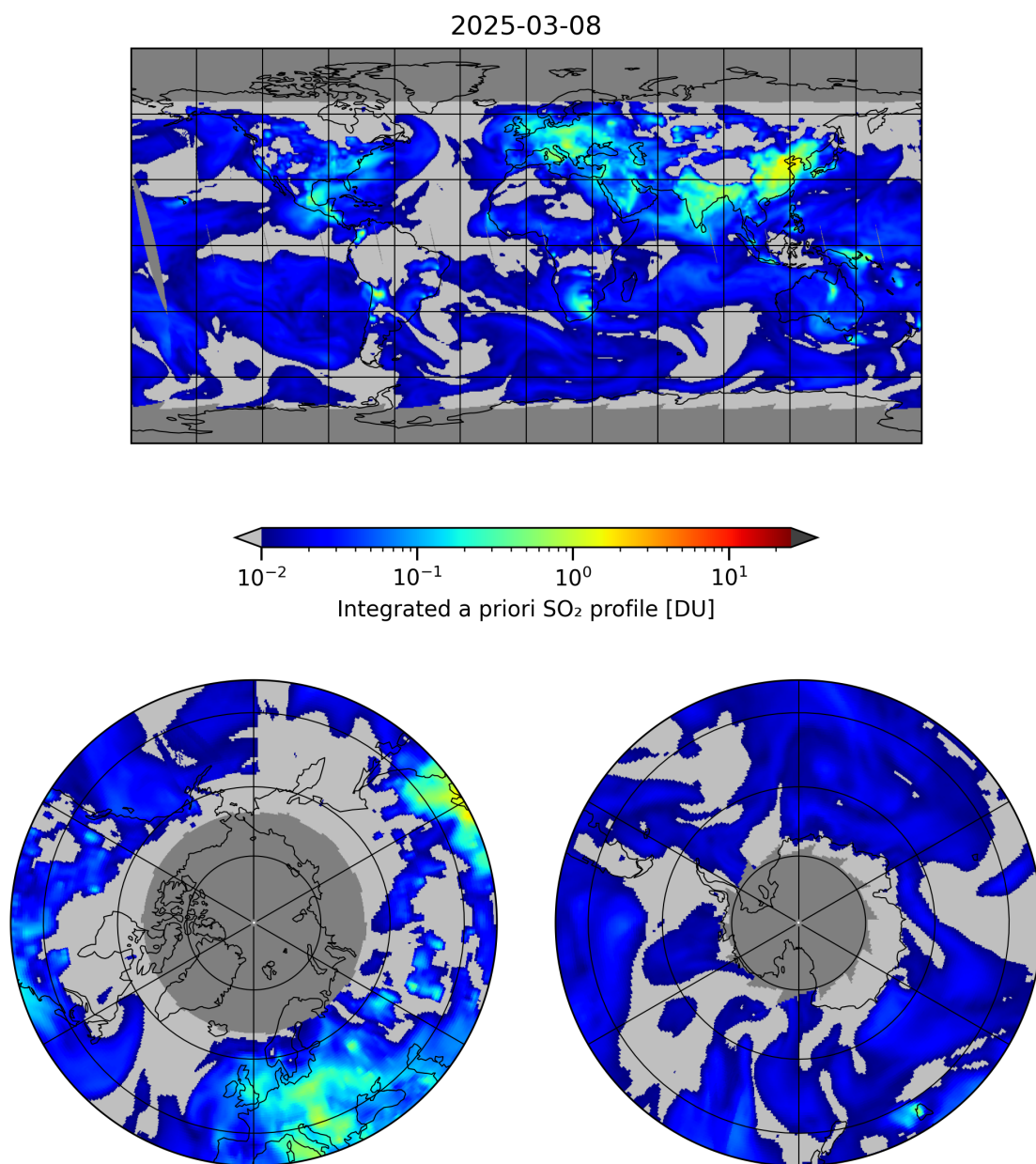


Figure 21: Map of “Integrated a priori SO₂ profile” for 2025-03-08 to 2025-03-09

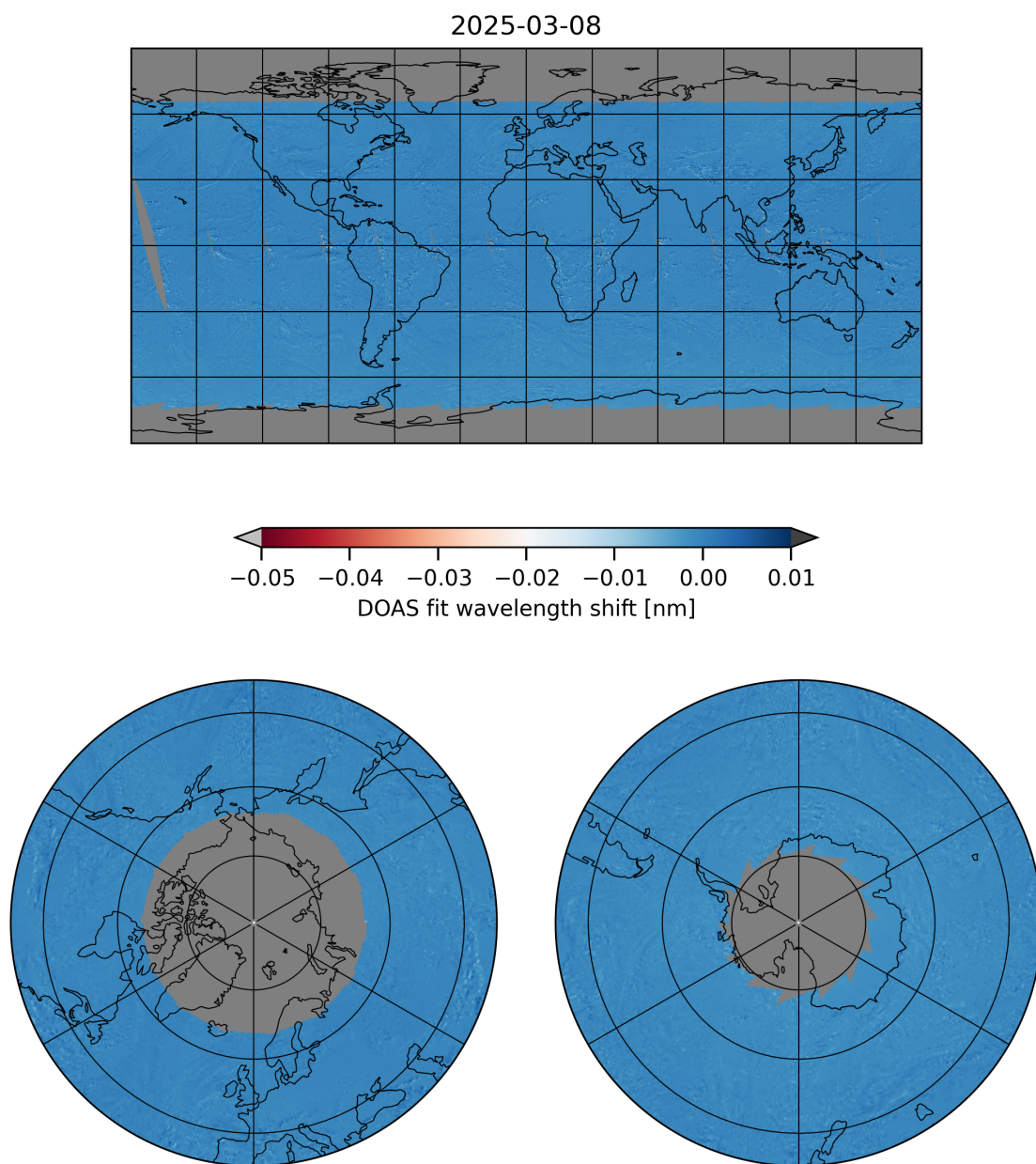


Figure 22: Map of “DOAS fit wavelength shift” for 2025-03-08 to 2025-03-09

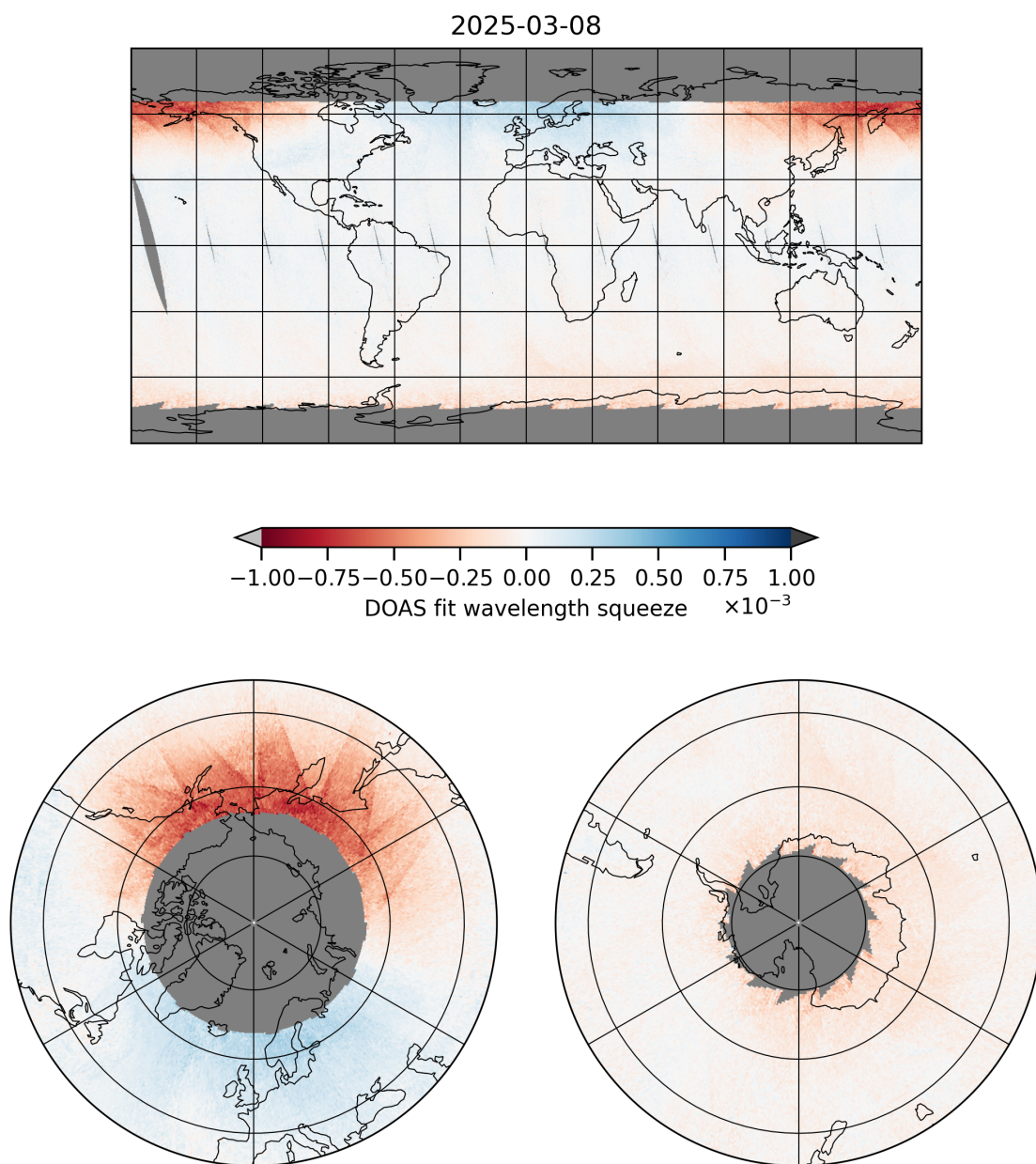


Figure 23: Map of “DOAS fit wavelength squeeze” for 2025-03-08 to 2025-03-09

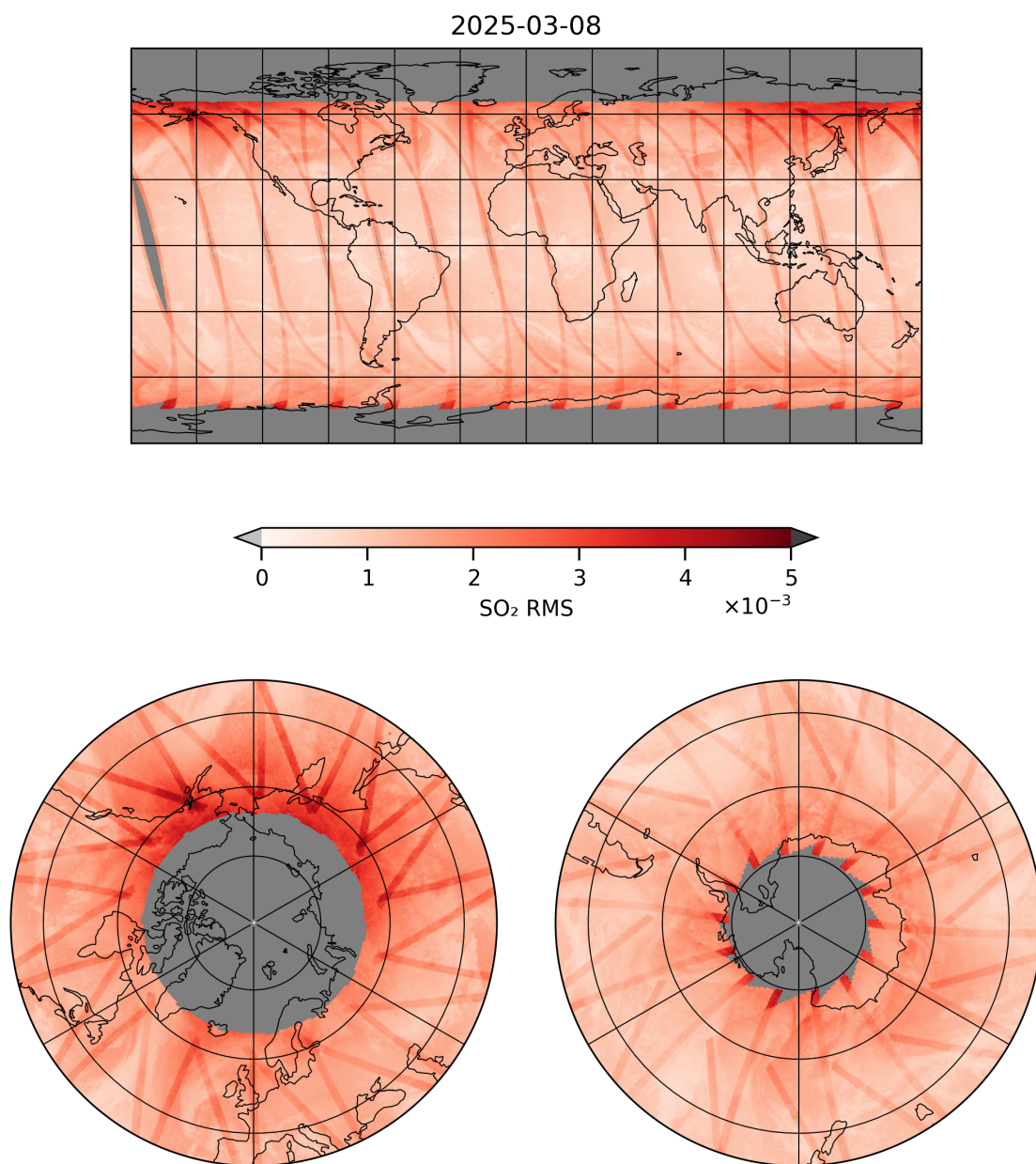


Figure 24: Map of “SO₂ RMS” for 2025-03-08 to 2025-03-09

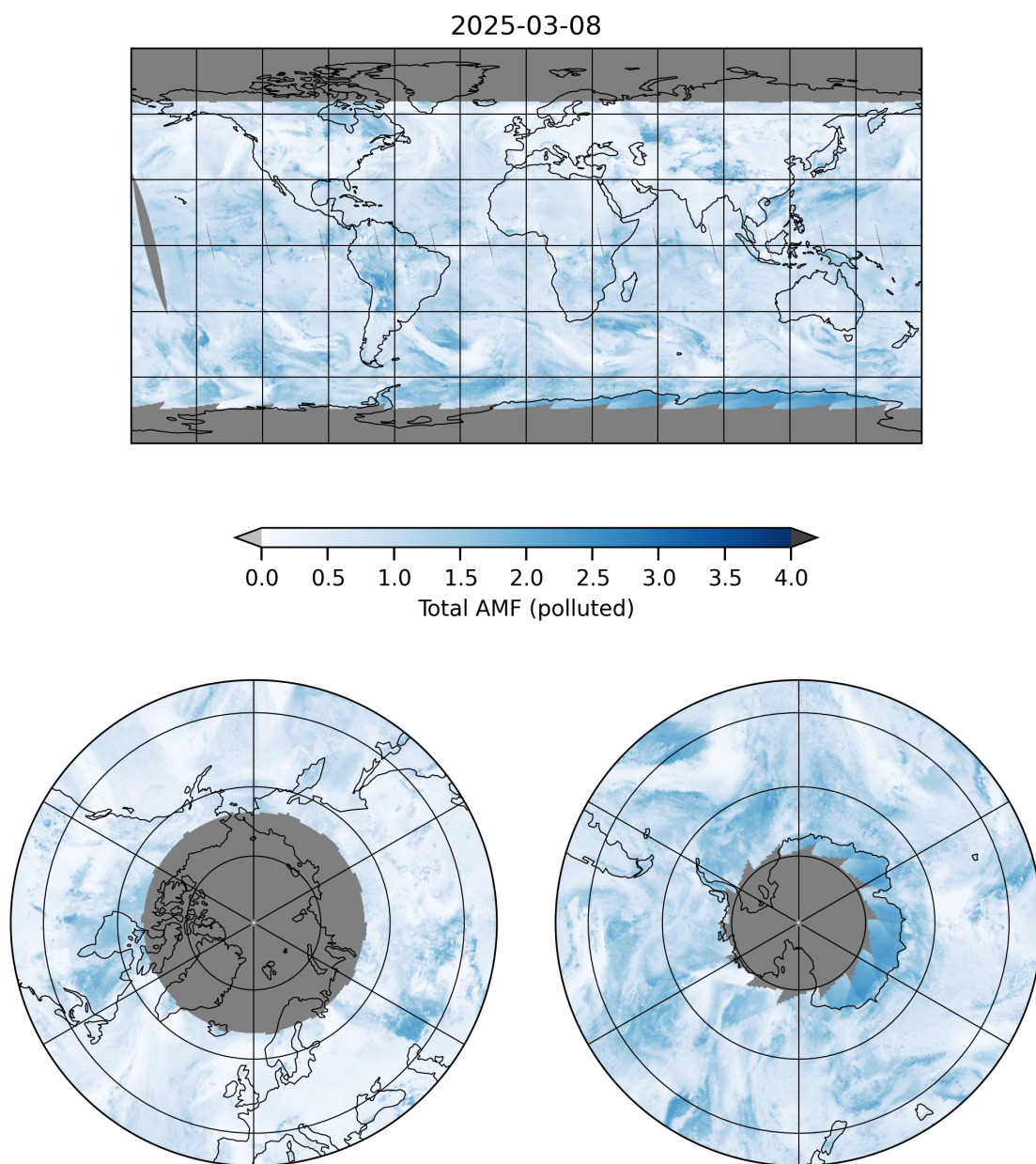


Figure 25: Map of “Total AMF (polluted)” for 2025-03-08 to 2025-03-09

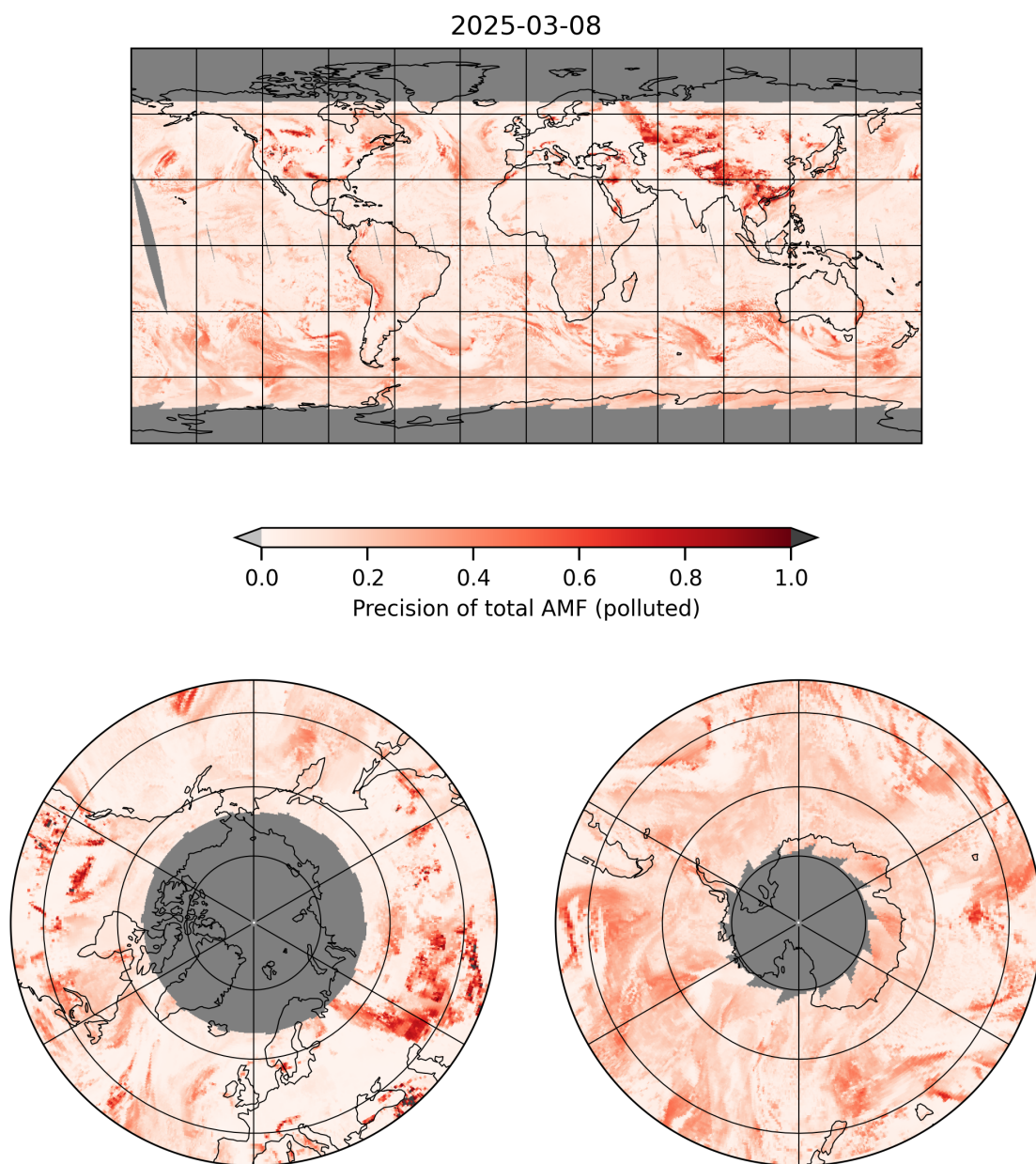


Figure 26: Map of “Precision of total AMF (polluted)” for 2025-03-08 to 2025-03-09

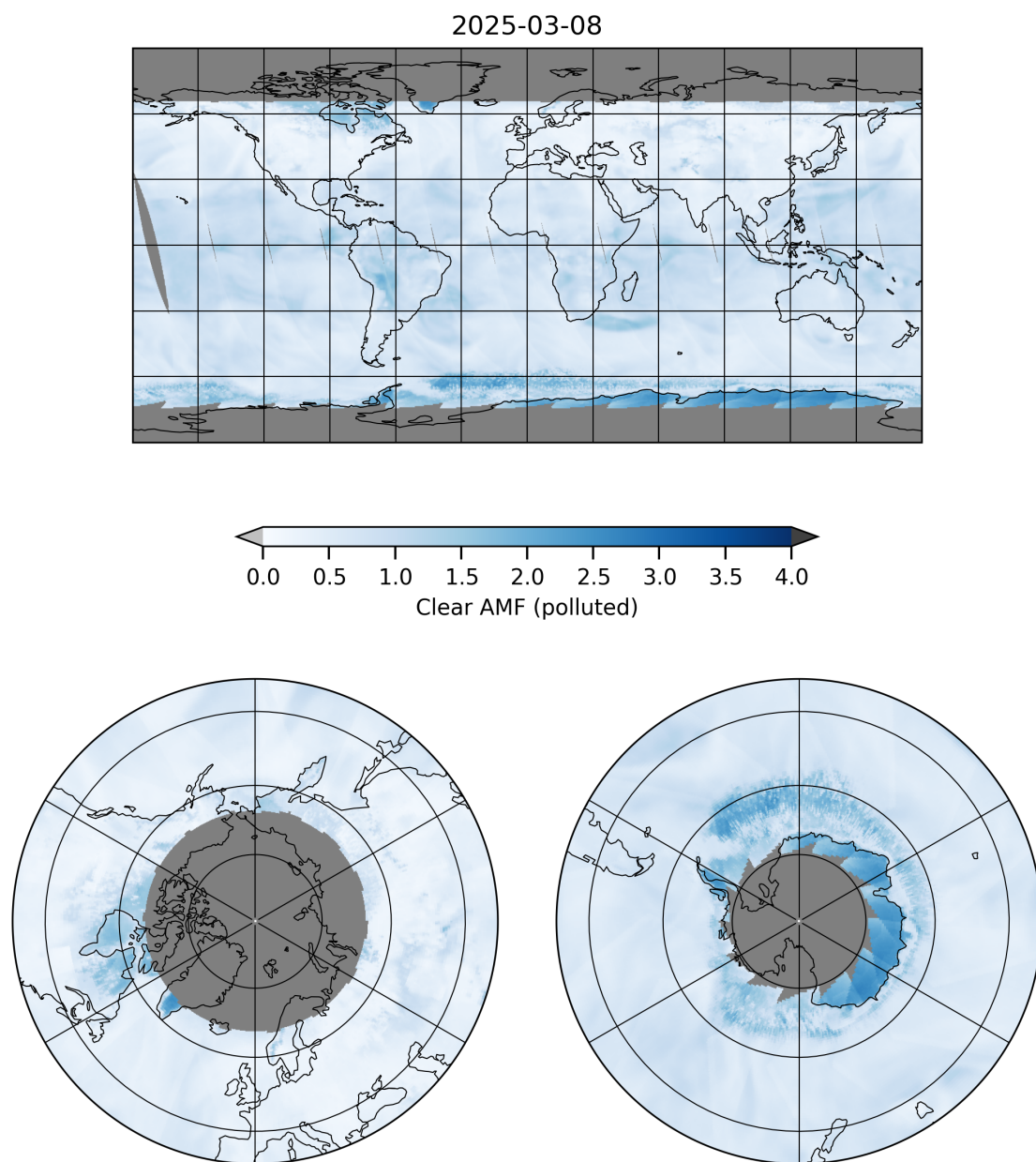


Figure 27: Map of “Clear AMF (polluted)” for 2025-03-08 to 2025-03-09

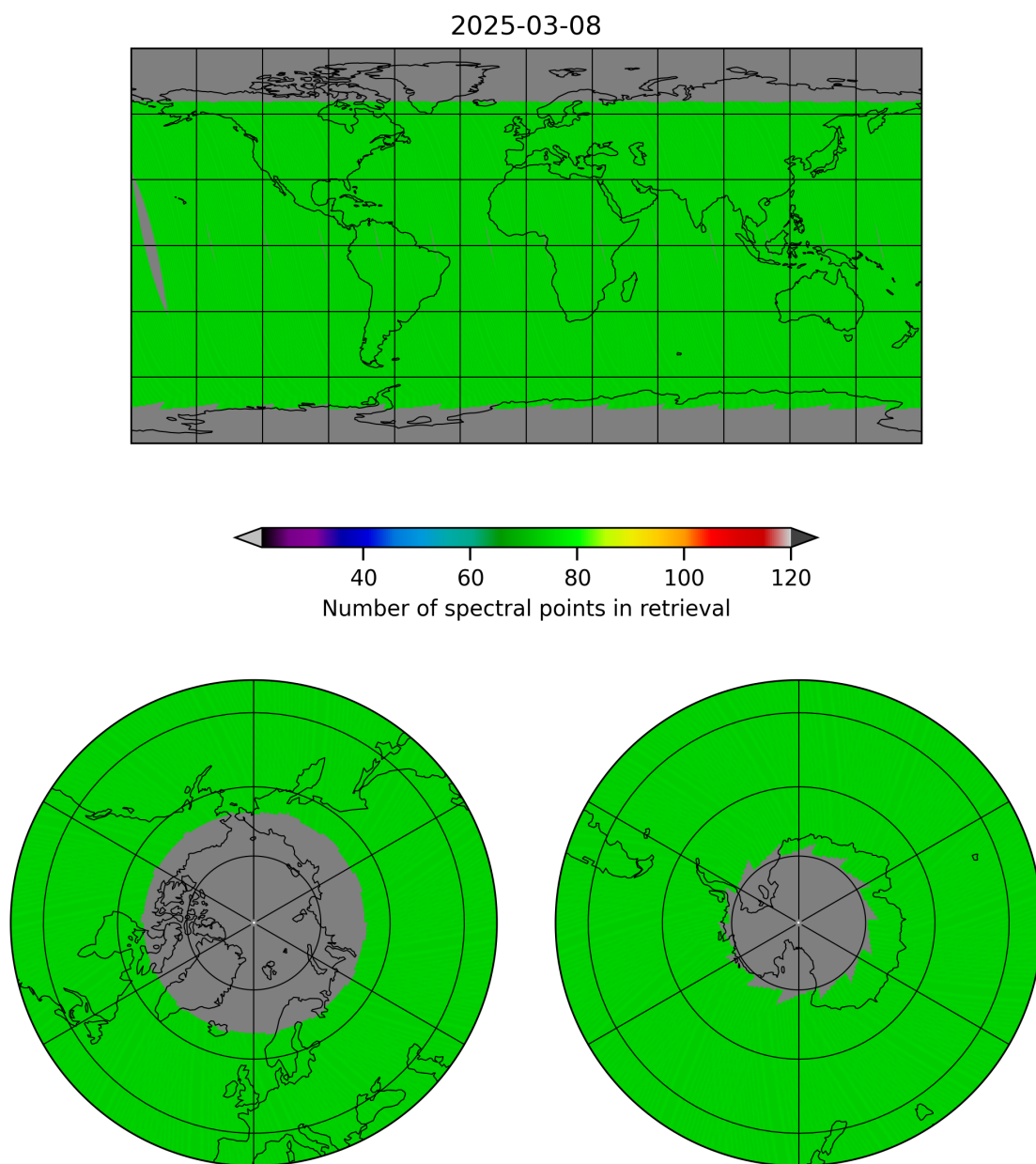


Figure 28: Map of “Number of spectral points in retrieval” for 2025-03-08 to 2025-03-09

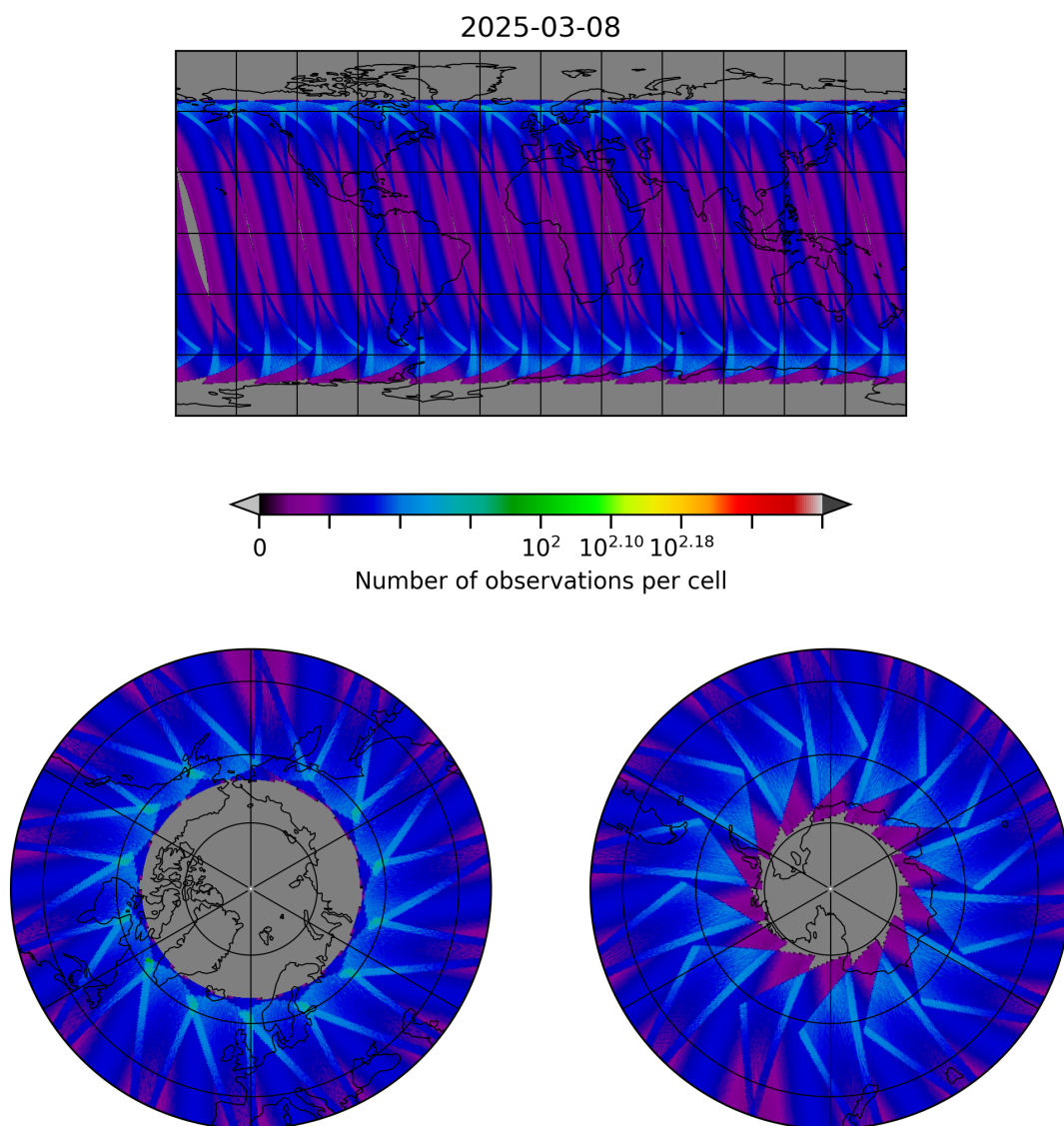


Figure 29: Map of the number of observations for 2025-03-08 to 2025-03-09

7 Zonal average

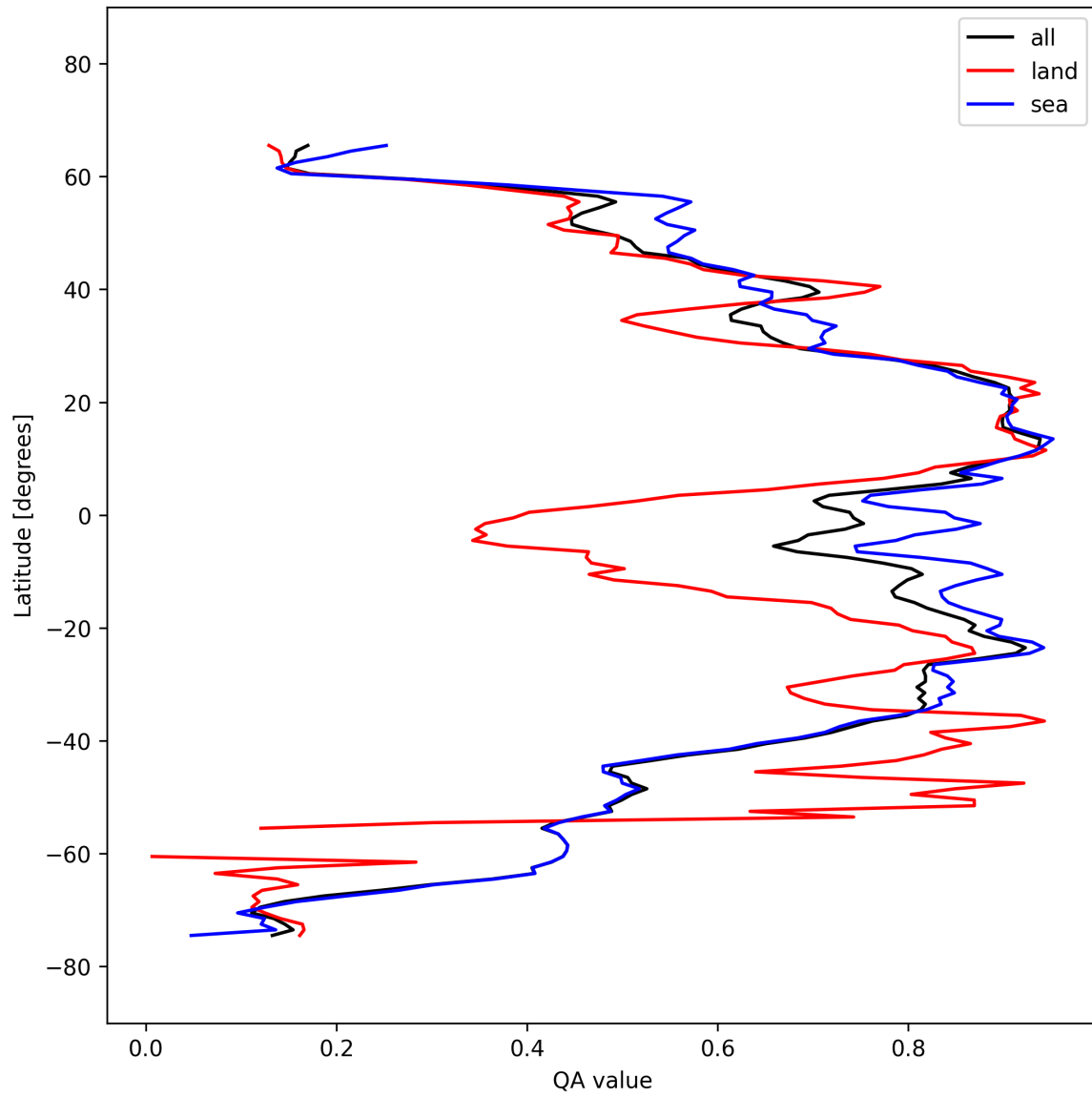


Figure 30: Zonal average of “QA value” for 2025-03-08 to 2025-03-09.

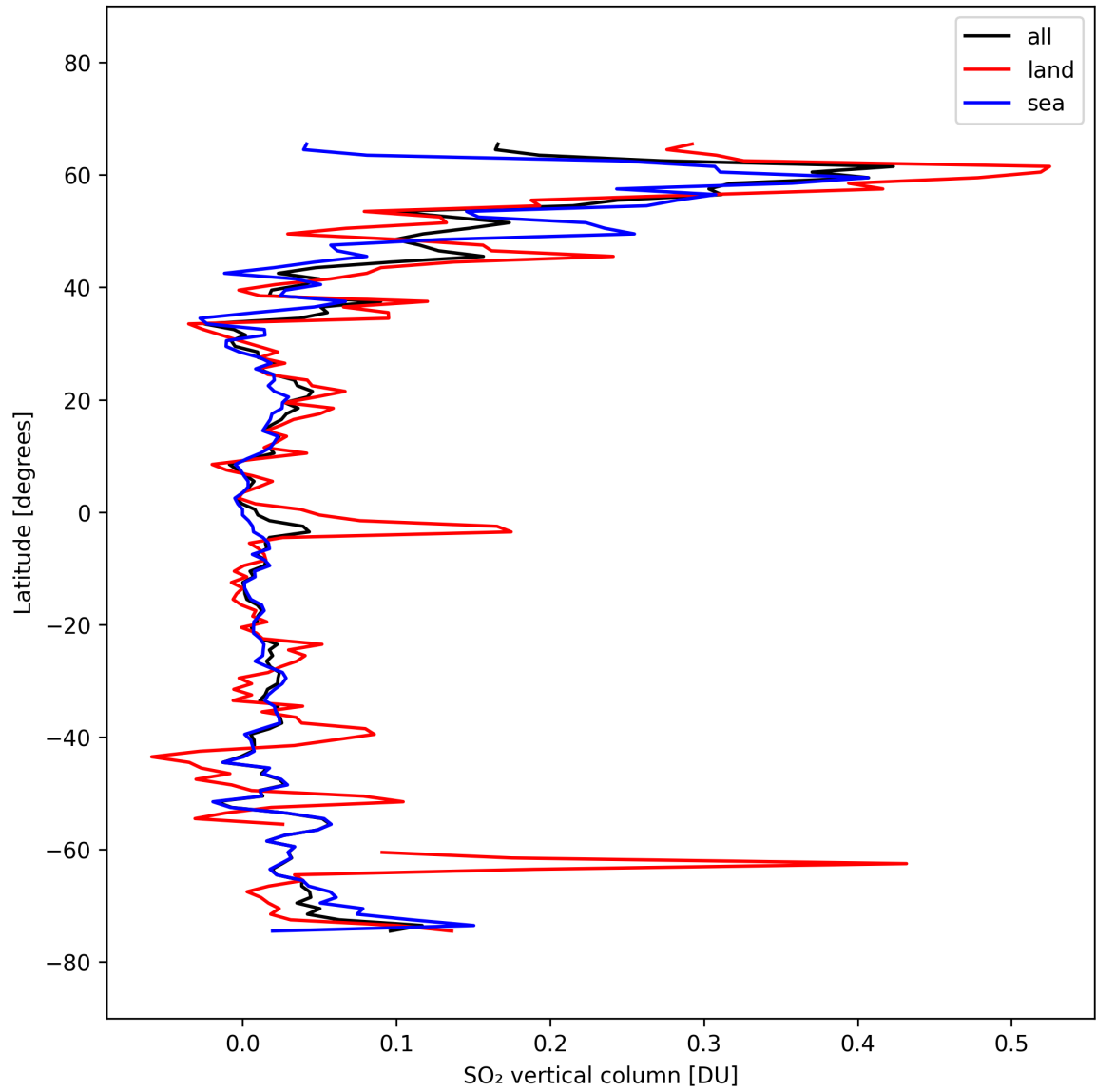


Figure 31: Zonal average of “SO₂ vertical column” for 2025-03-08 to 2025-03-09.

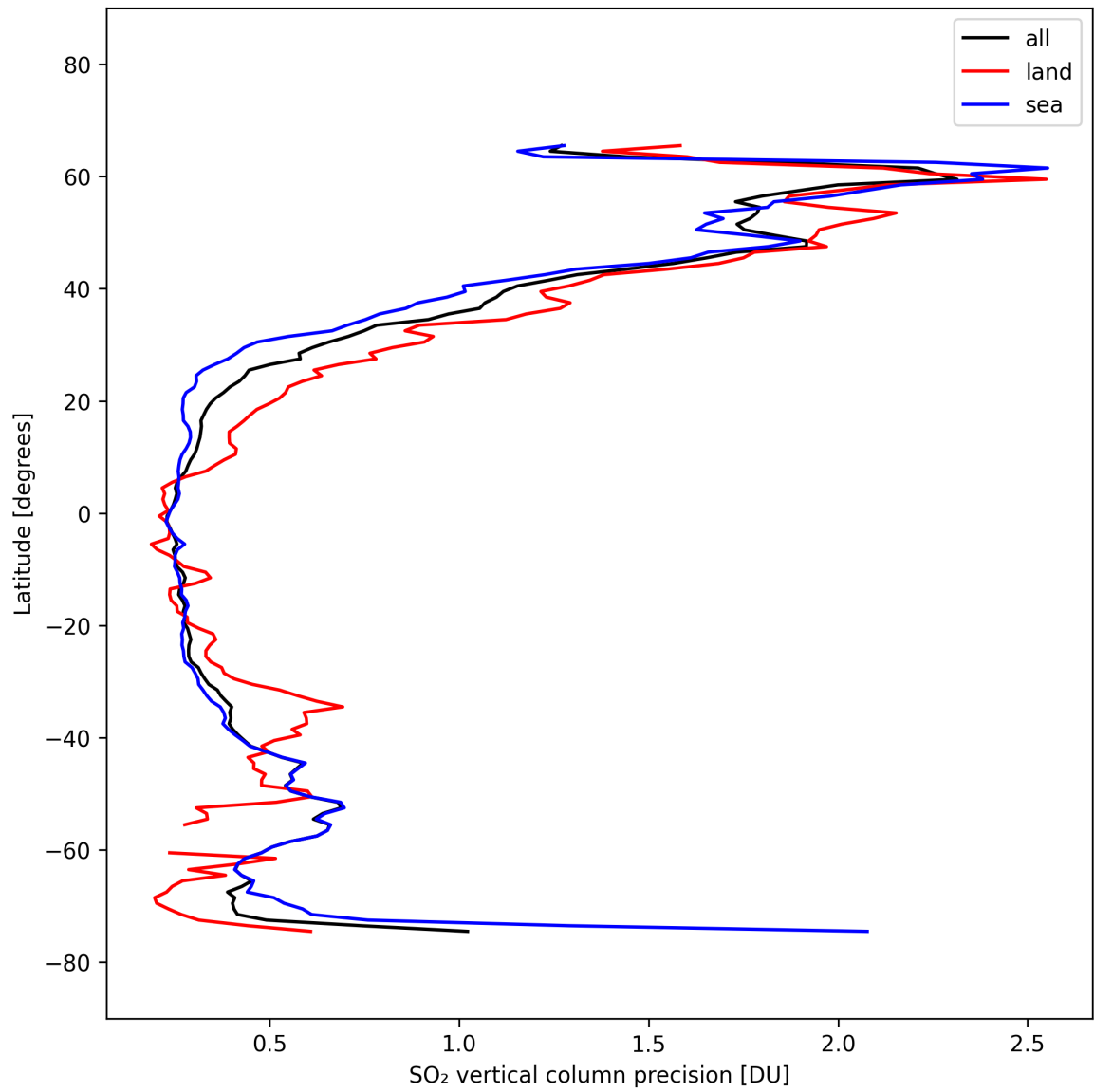


Figure 32: Zonal average of “SO₂ vertical column precision” for 2025-03-08 to 2025-03-09.

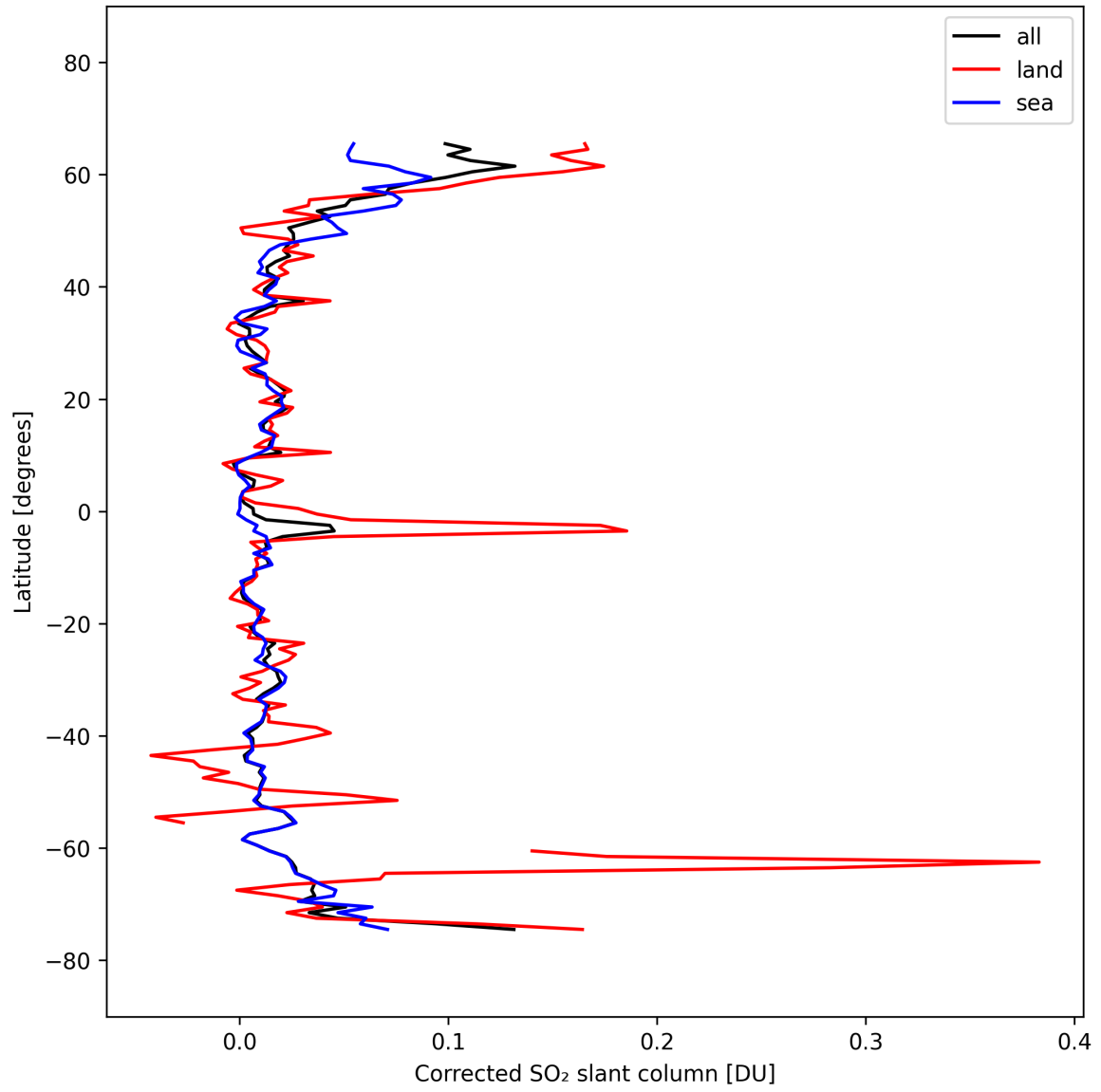


Figure 33: Zonal average of “Corrected SO₂ slant column” for 2025-03-08 to 2025-03-09.

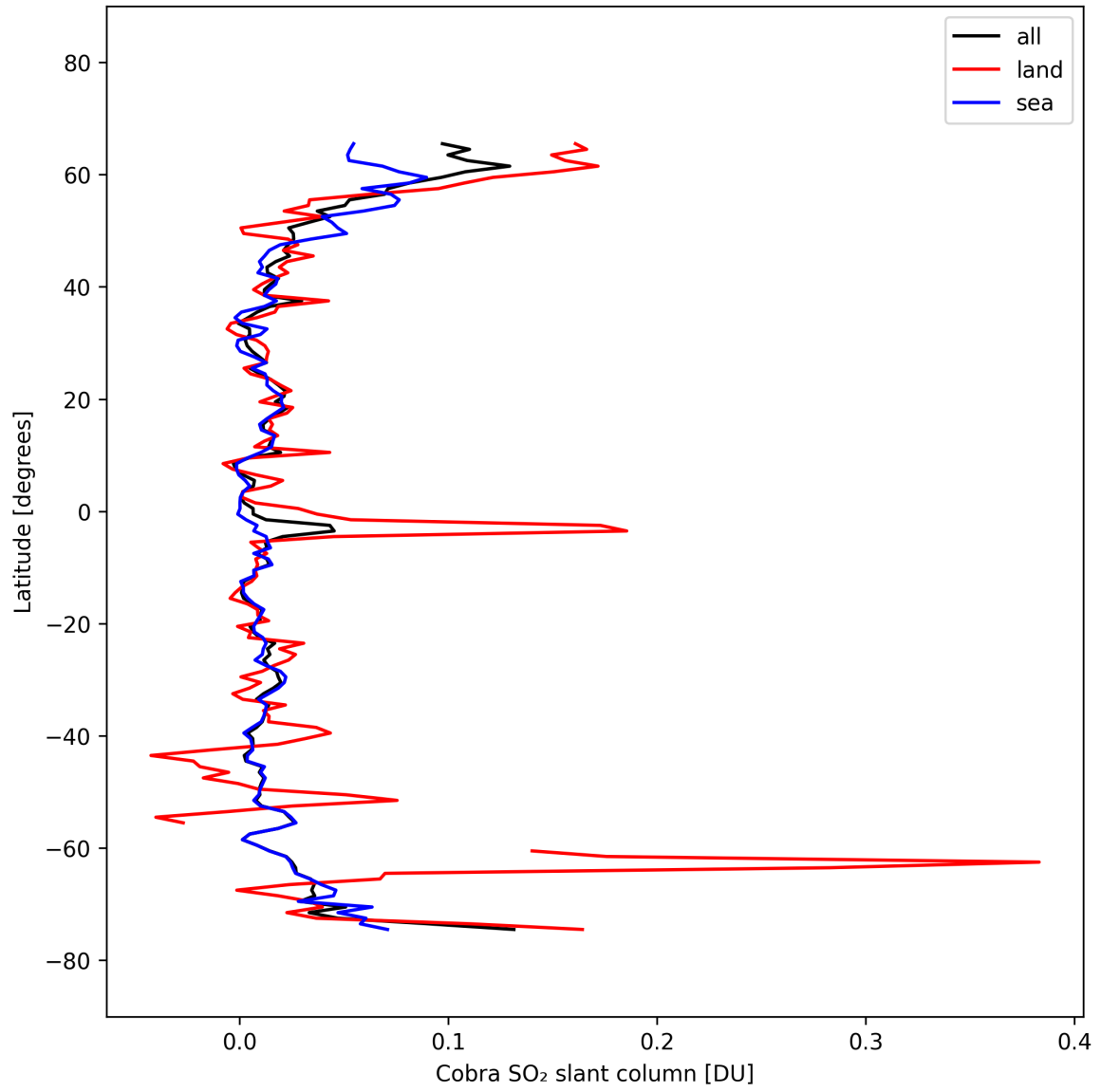


Figure 34: Zonal average of “Cobra SO₂ slant column” for 2025-03-08 to 2025-03-09.

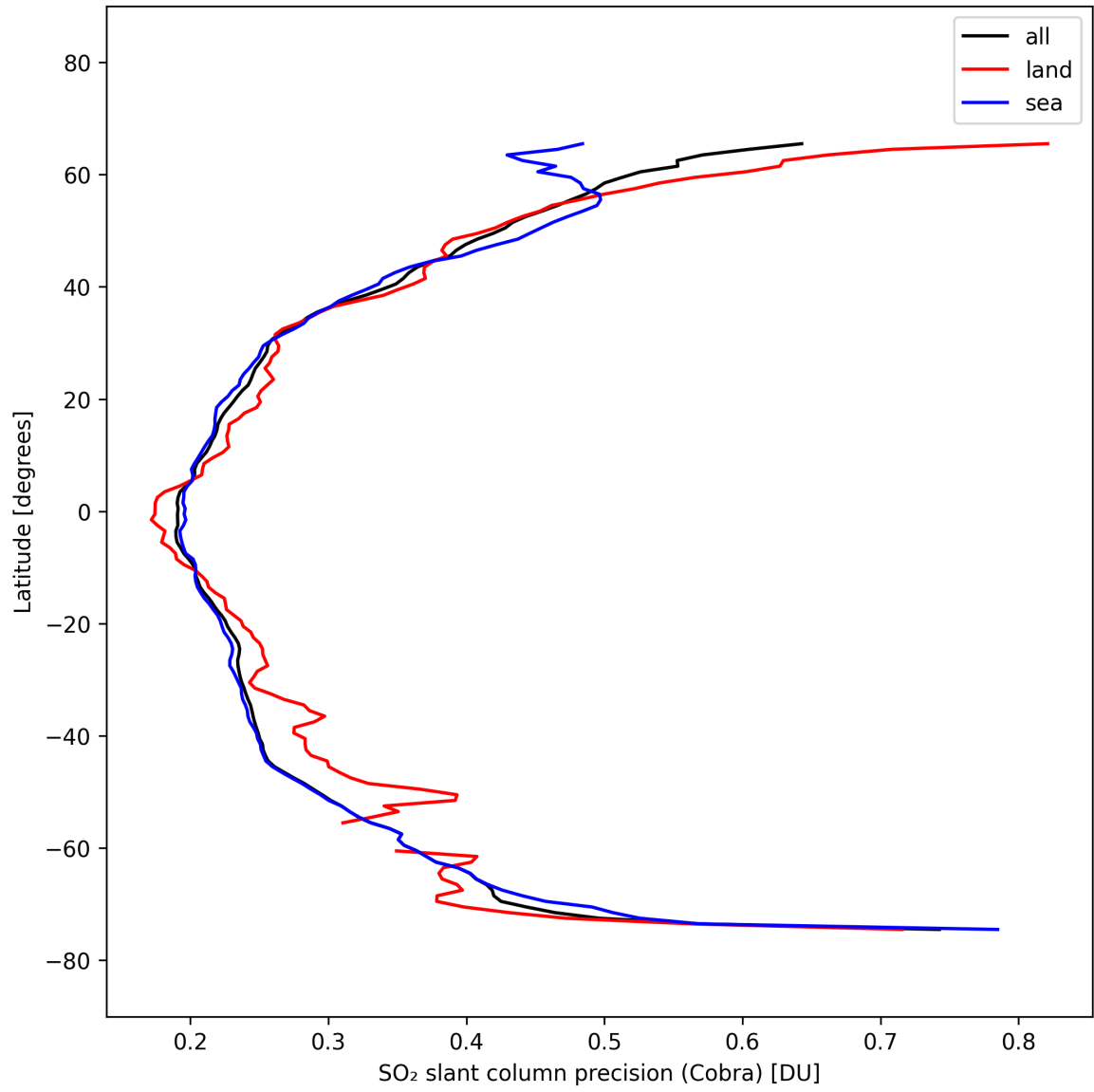


Figure 35: Zonal average of “SO₂ slant column precision (Cobra)” for 2025-03-08 to 2025-03-09.

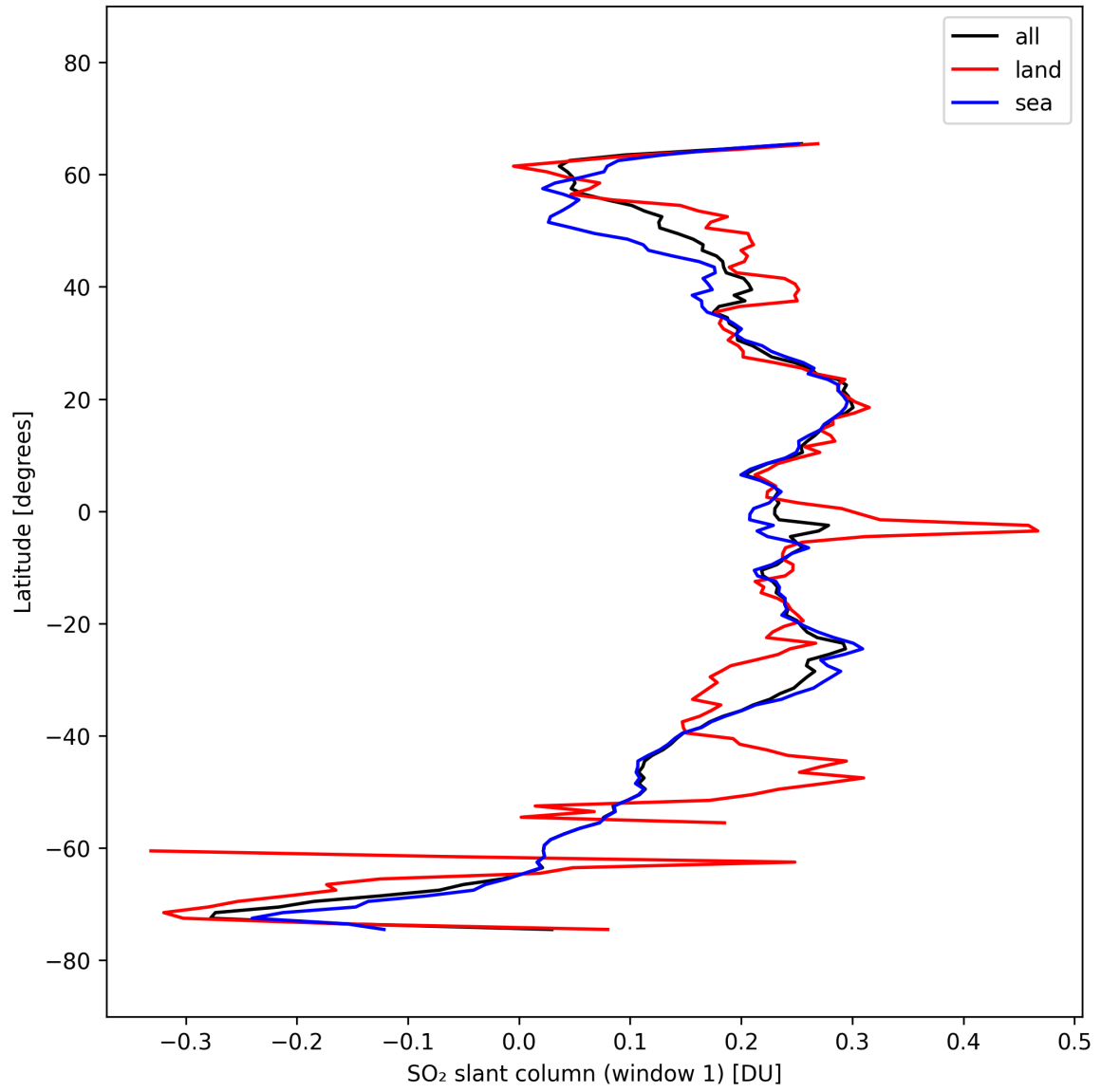


Figure 36: Zonal average of “SO₂ slant column (window 1)” for 2025-03-08 to 2025-03-09.

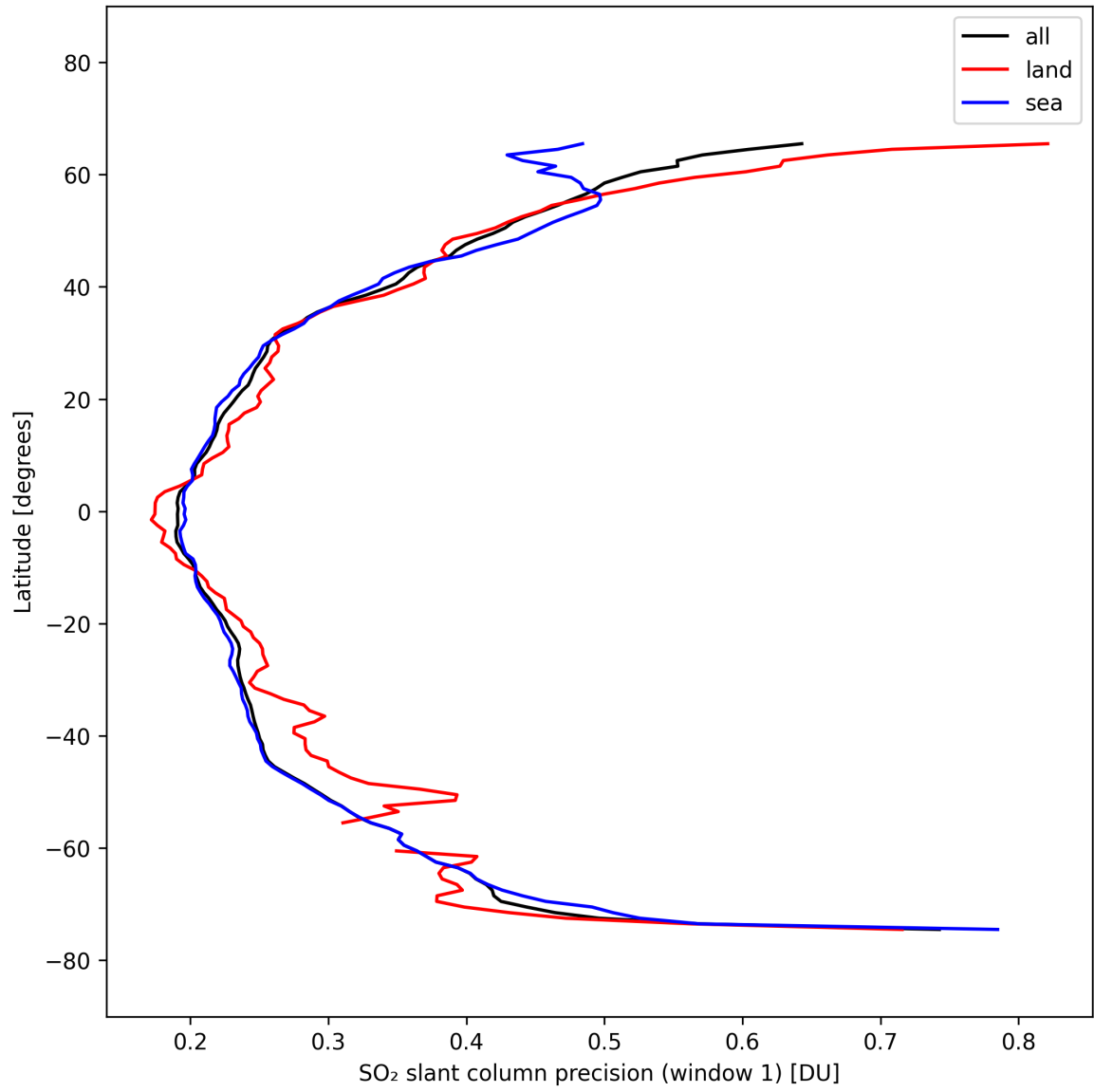


Figure 37: Zonal average of “SO₂ slant column precision (window 1)” for 2025-03-08 to 2025-03-09.

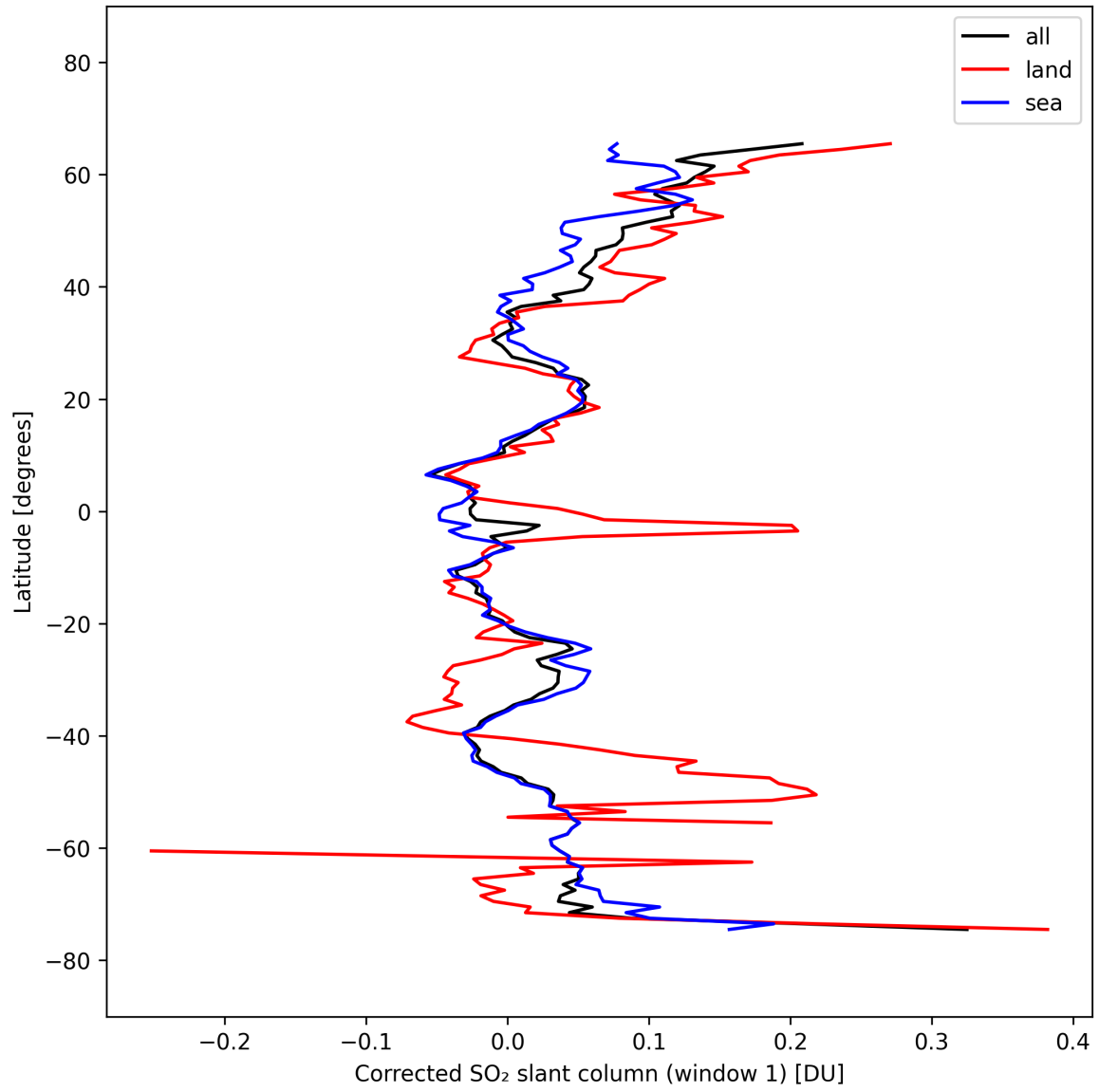


Figure 38: Zonal average of “Corrected SO₂ slant column (window 1)” for 2025-03-08 to 2025-03-09.

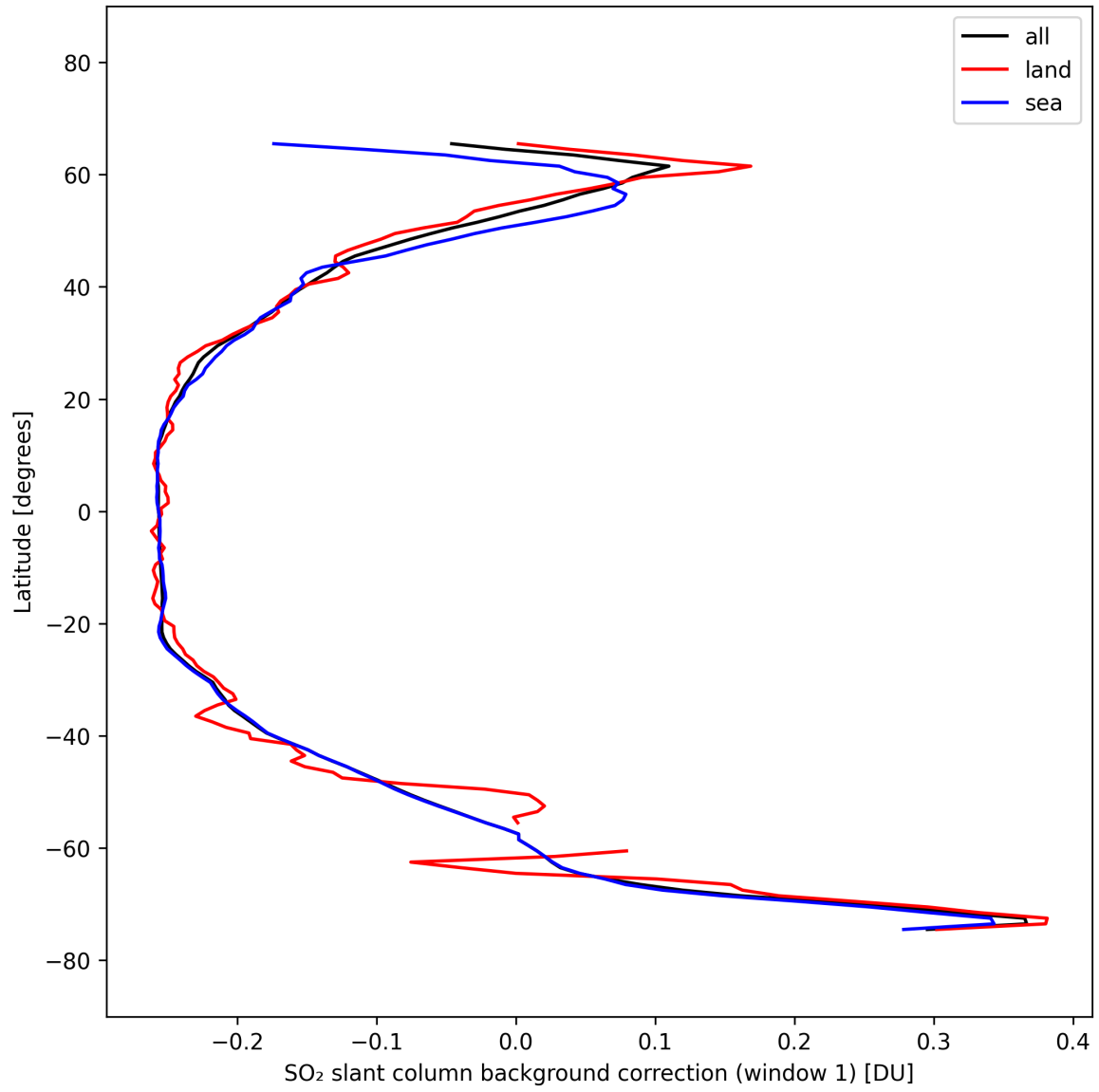


Figure 39: Zonal average of “SO₂ slant column background correction (window 1)” for 2025-03-08 to 2025-03-09.

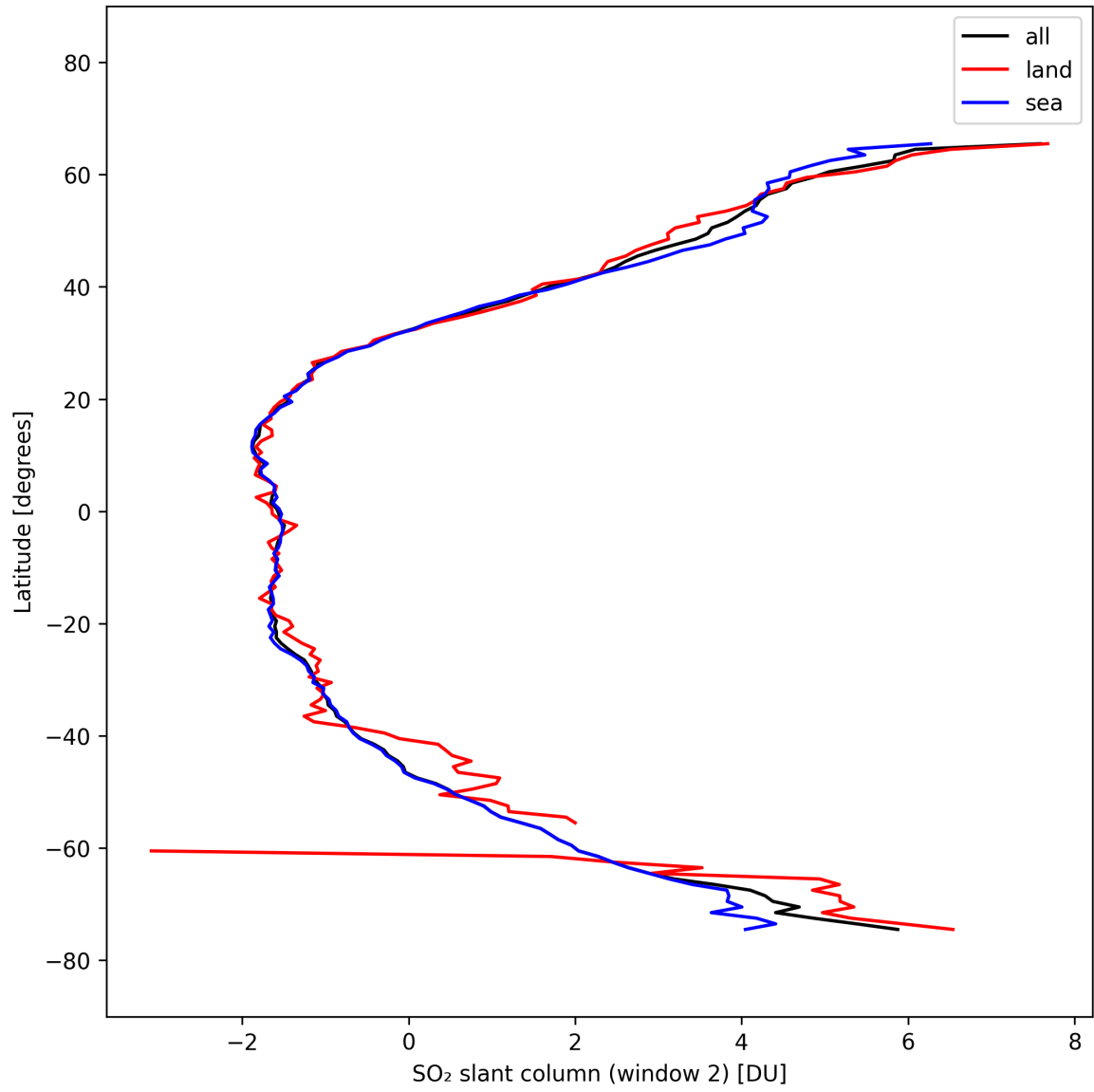


Figure 40: Zonal average of “SO₂ slant column (window 2)” for 2025-03-08 to 2025-03-09.

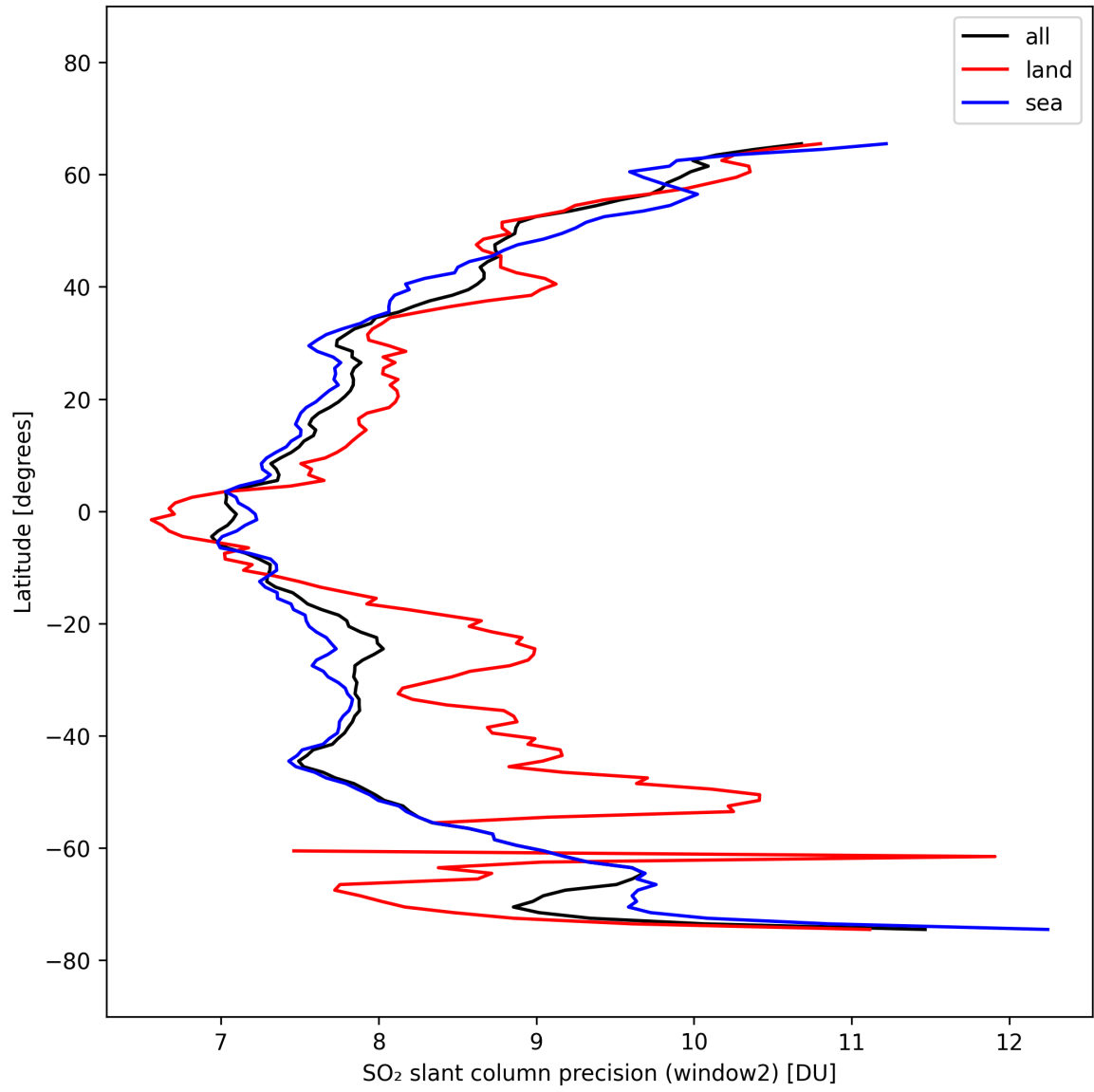


Figure 41: Zonal average of “SO₂ slant column precision (window2)” for 2025-03-08 to 2025-03-09.

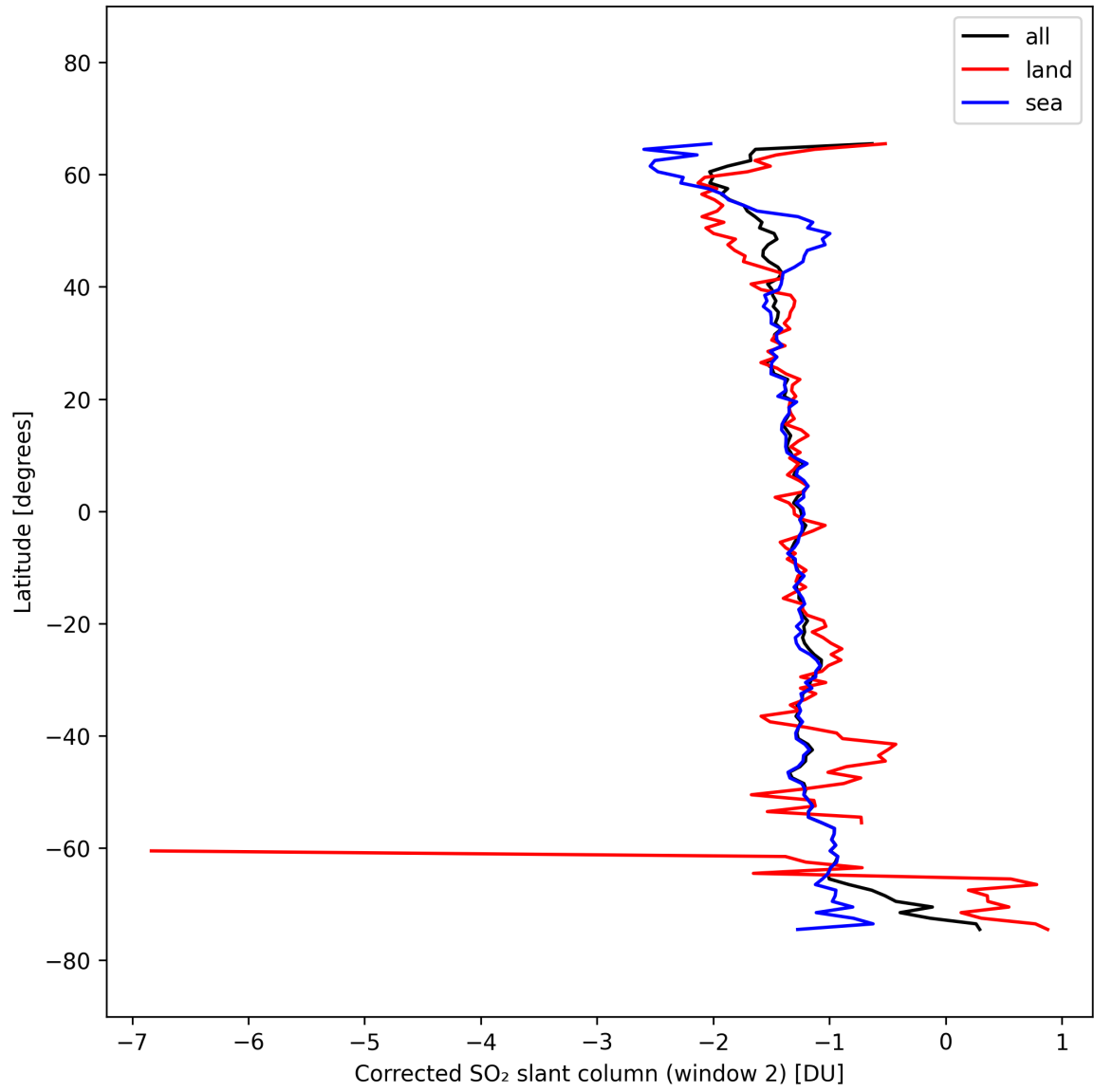


Figure 42: Zonal average of “Corrected SO₂ slant column (window 2)” for 2025-03-08 to 2025-03-09.

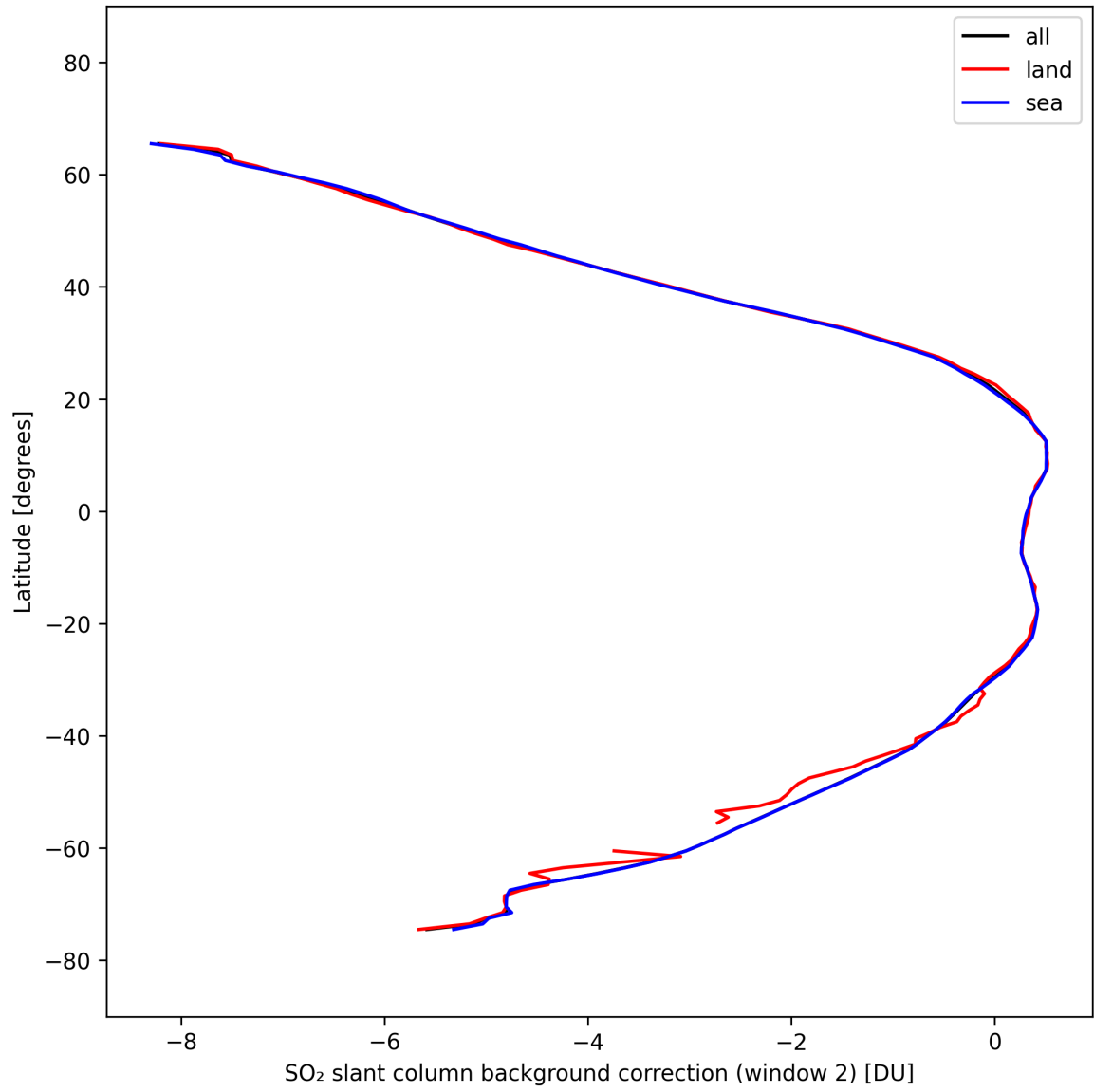


Figure 43: Zonal average of “SO₂ slant column background correction (window 2)” for 2025-03-08 to 2025-03-09.

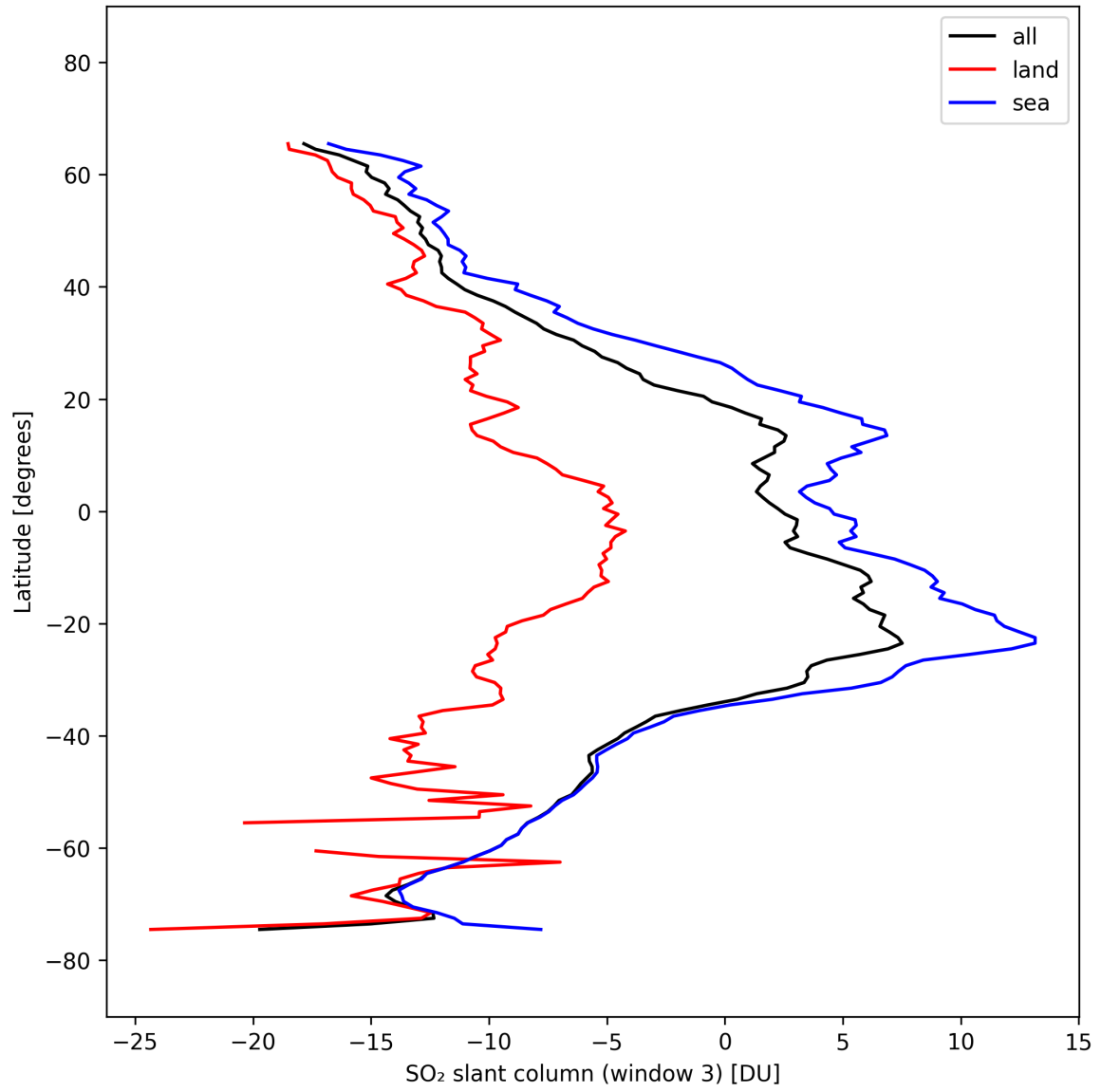


Figure 44: Zonal average of “SO₂ slant column (window 3)” for 2025-03-08 to 2025-03-09.

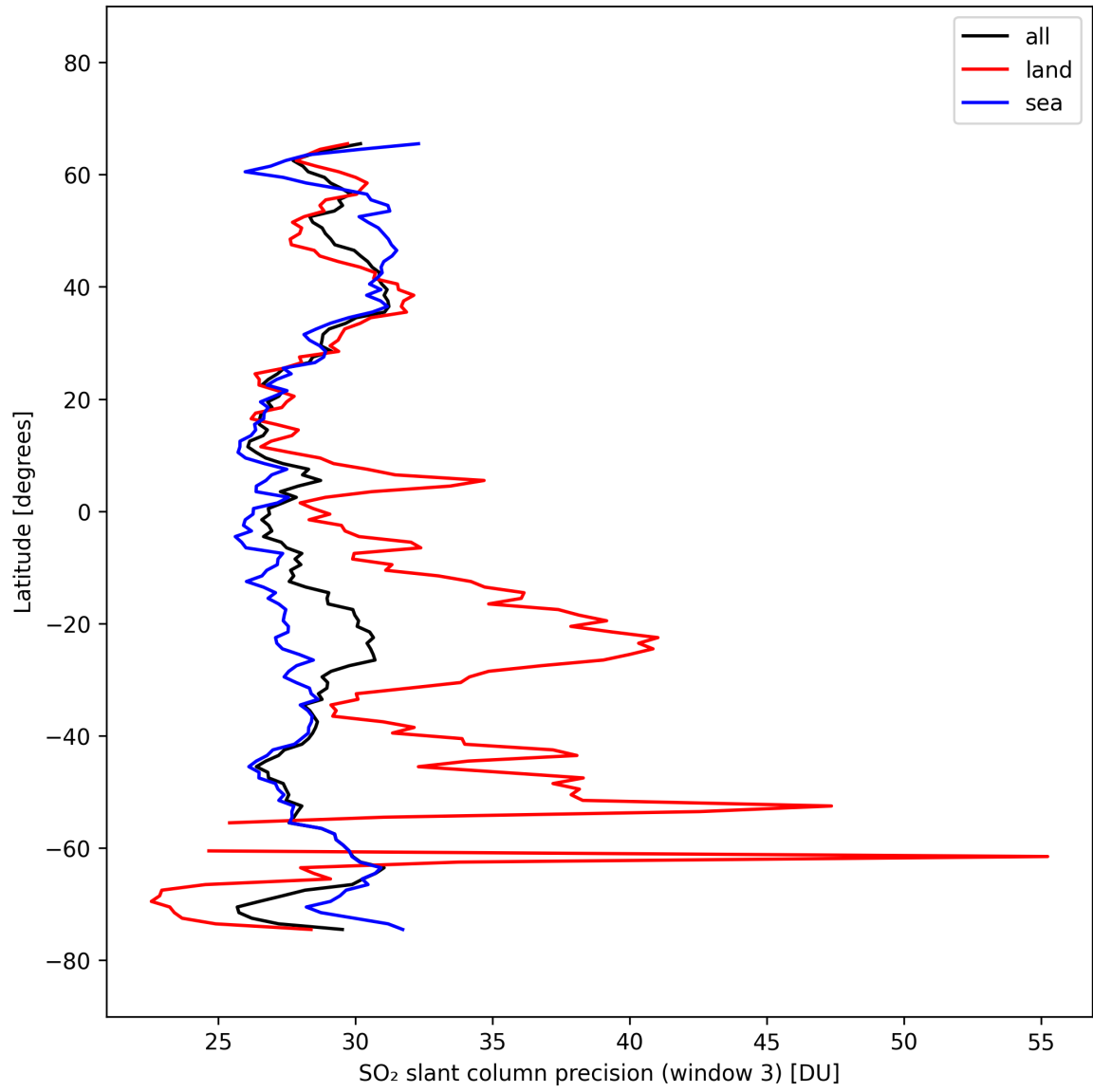


Figure 45: Zonal average of “SO₂ slant column precision (window 3)” for 2025-03-08 to 2025-03-09.

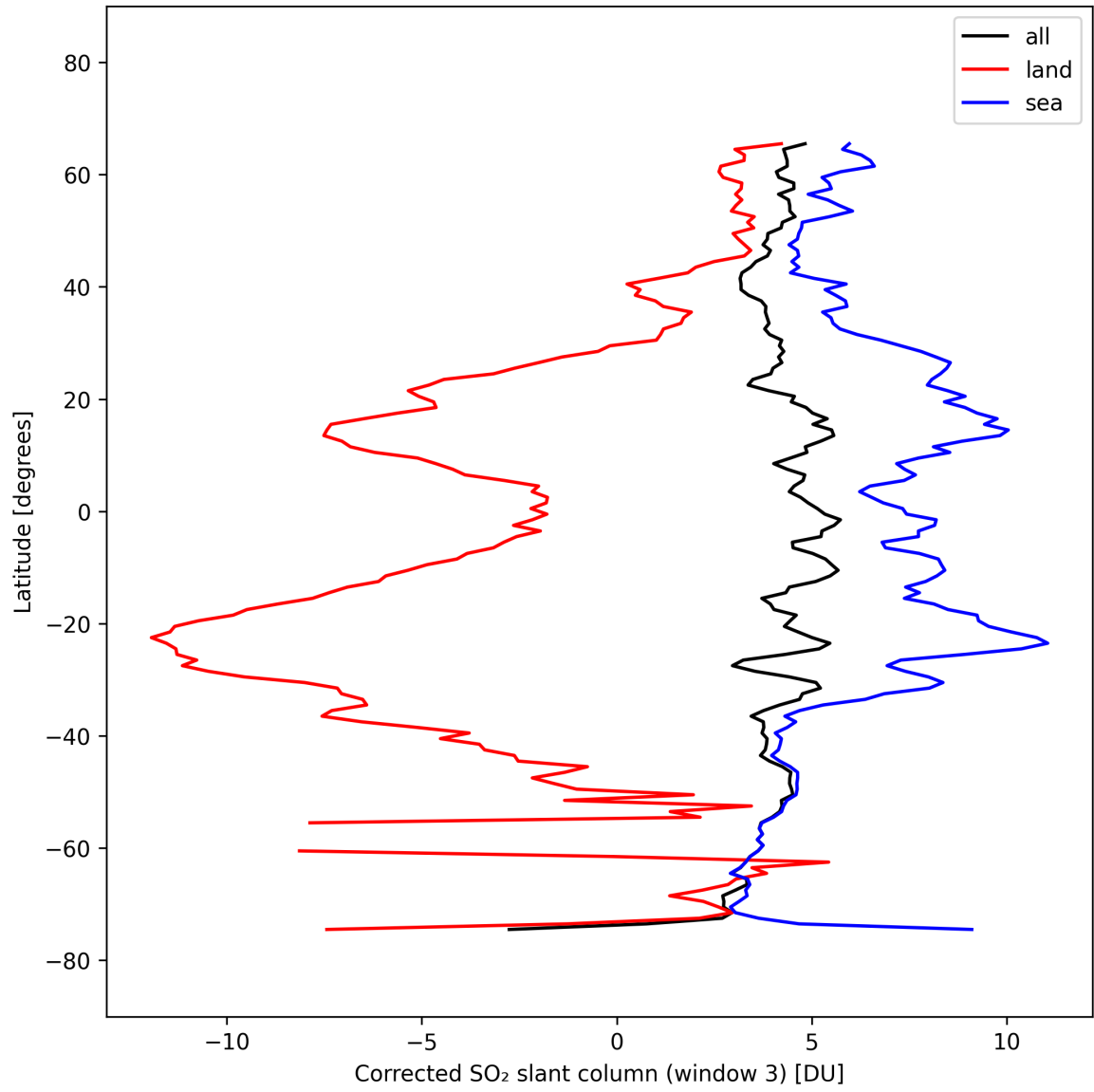


Figure 46: Zonal average of “Corrected SO₂ slant column (window 3)” for 2025-03-08 to 2025-03-09.

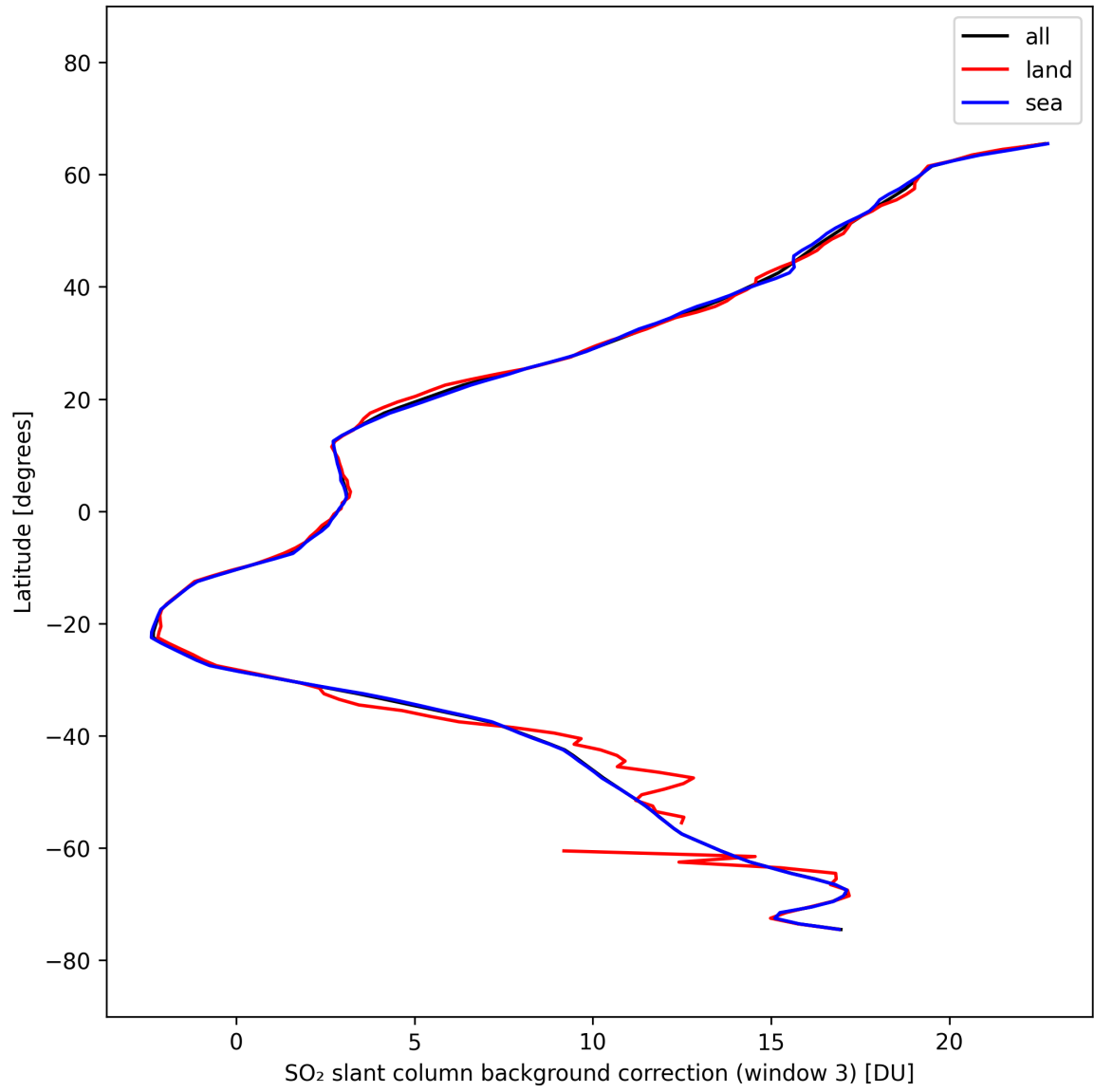


Figure 47: Zonal average of “SO₂ slant column background correction (window 3)” for 2025-03-08 to 2025-03-09.

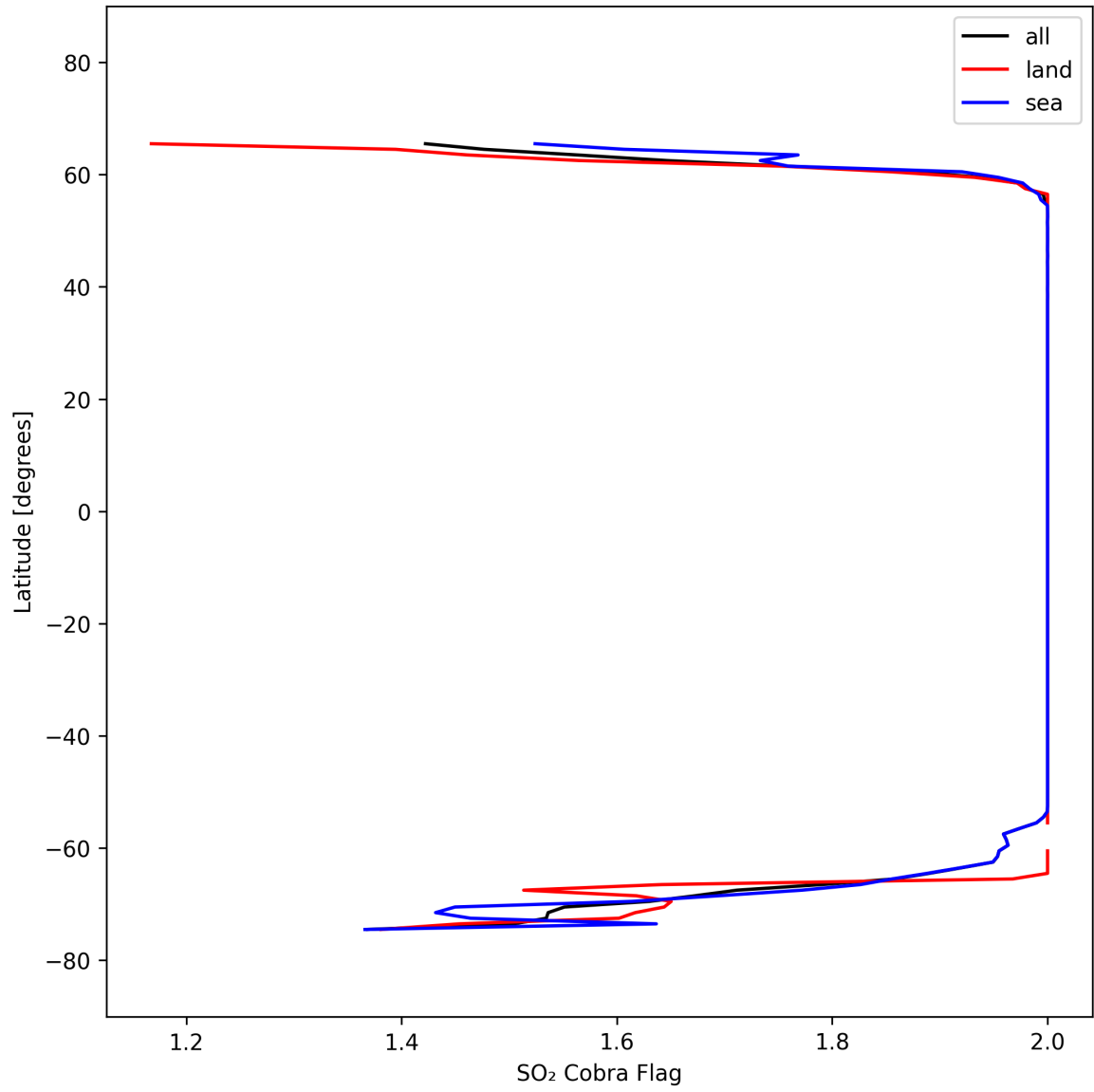


Figure 48: Zonal average of "SO₂ Cobra Flag" for 2025-03-08 to 2025-03-09.

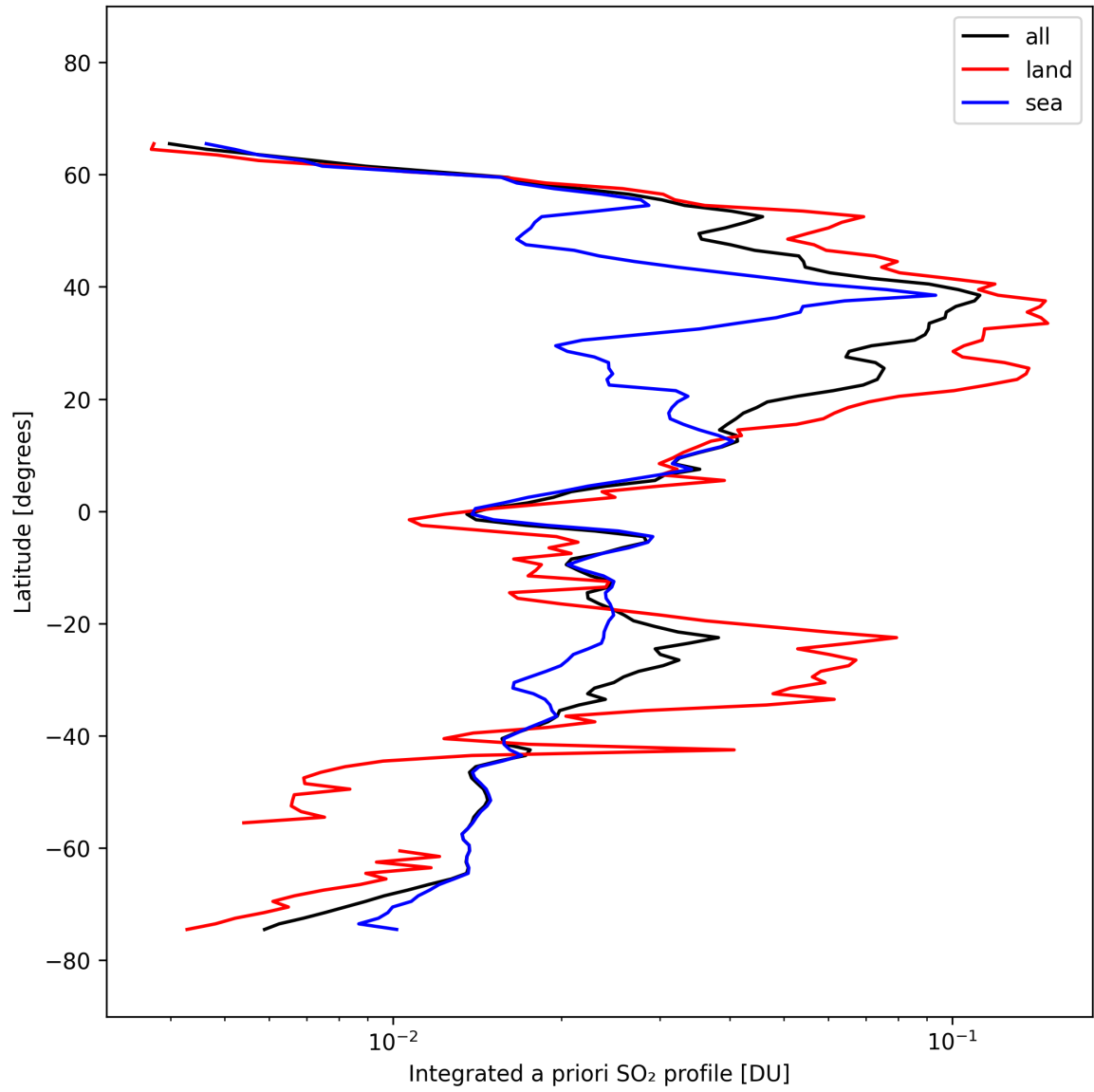


Figure 49: Zonal average of “Integrated a priori SO₂ profile” for 2025-03-08 to 2025-03-09.

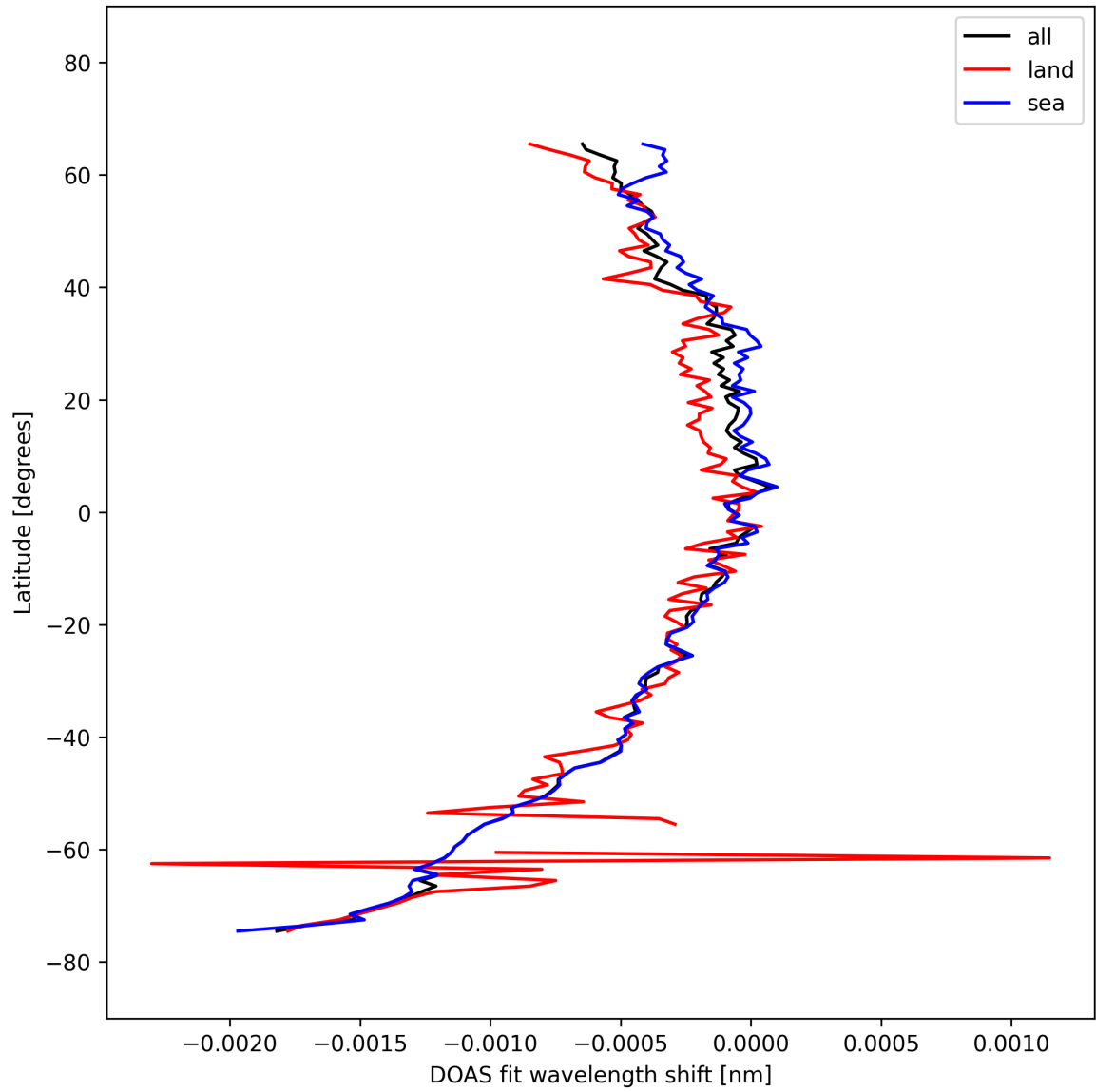


Figure 50: Zonal average of “DOAS fit wavelength shift” for 2025-03-08 to 2025-03-09.

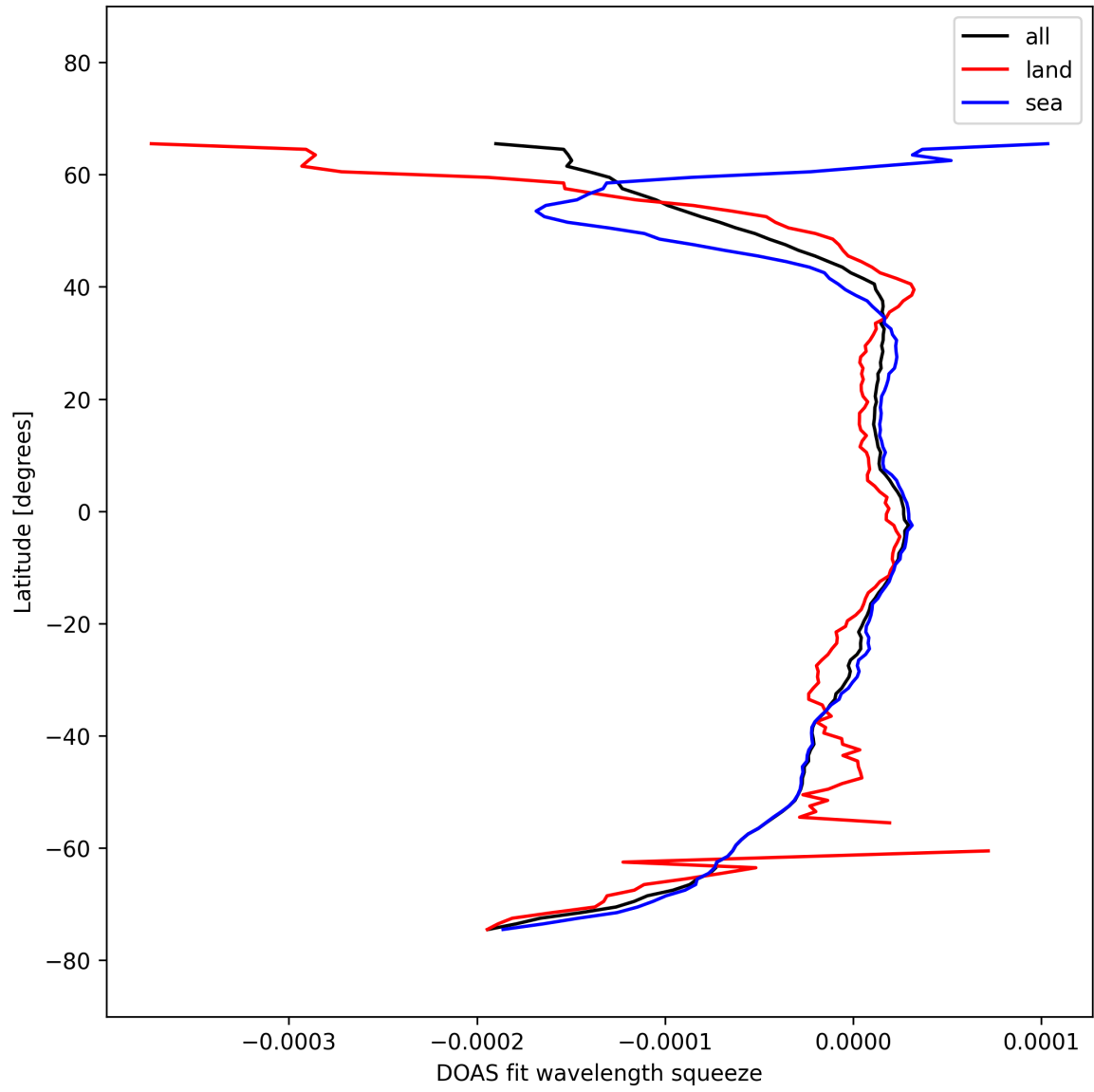


Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-03-08 to 2025-03-09.

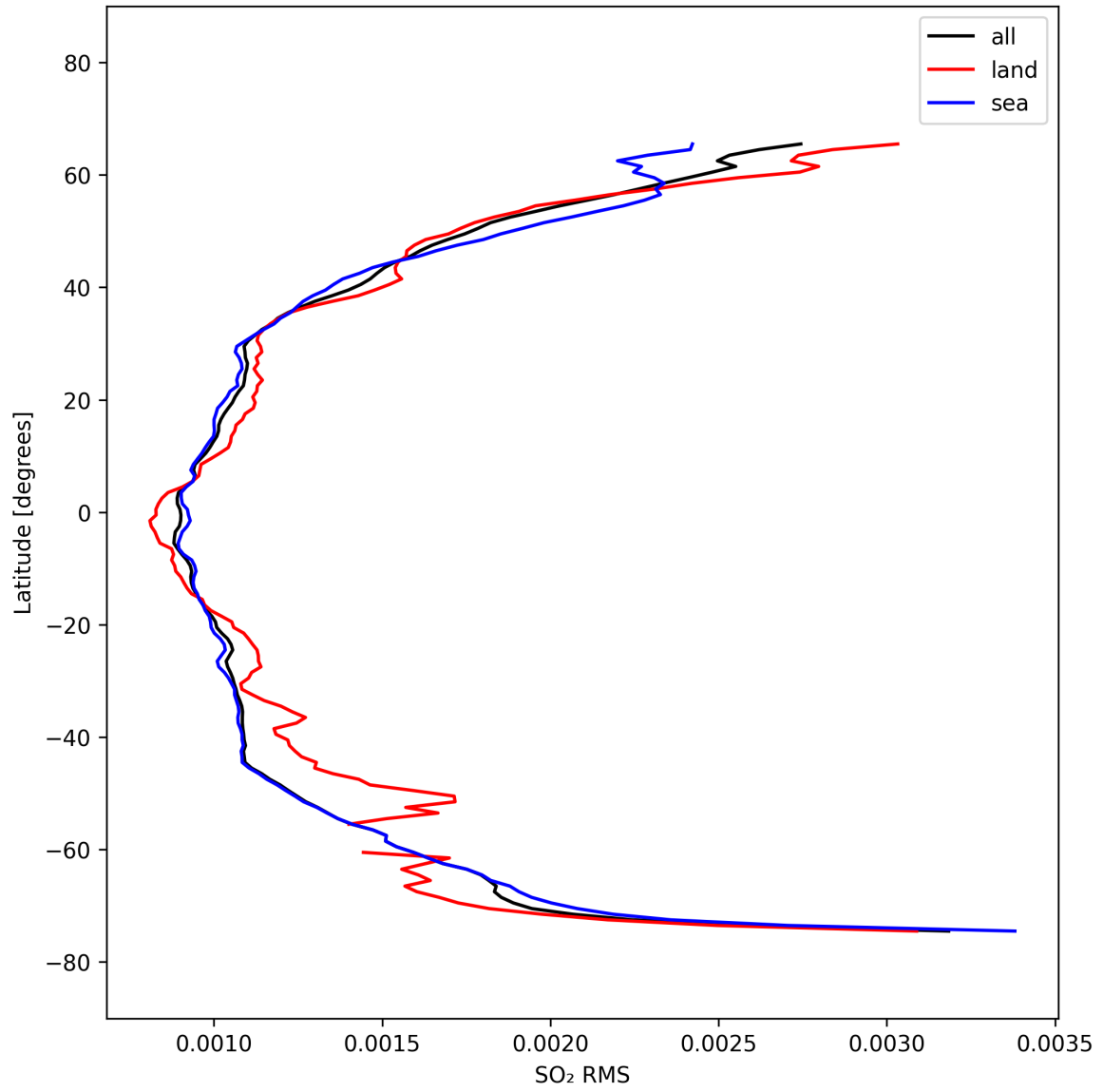


Figure 52: Zonal average of “SO₂ RMS” for 2025-03-08 to 2025-03-09.

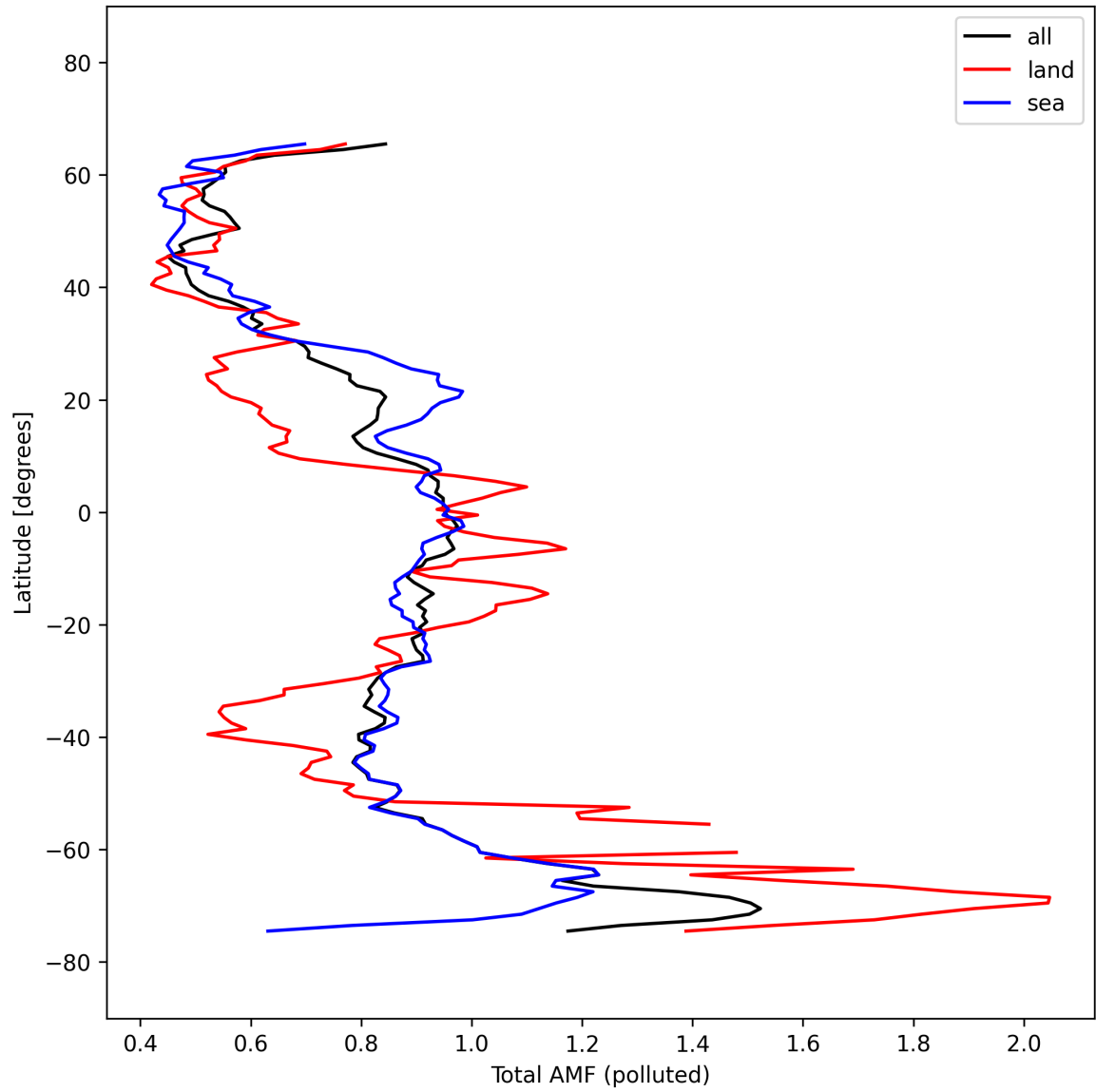


Figure 53: Zonal average of “Total AMF (polluted)” for 2025-03-08 to 2025-03-09.

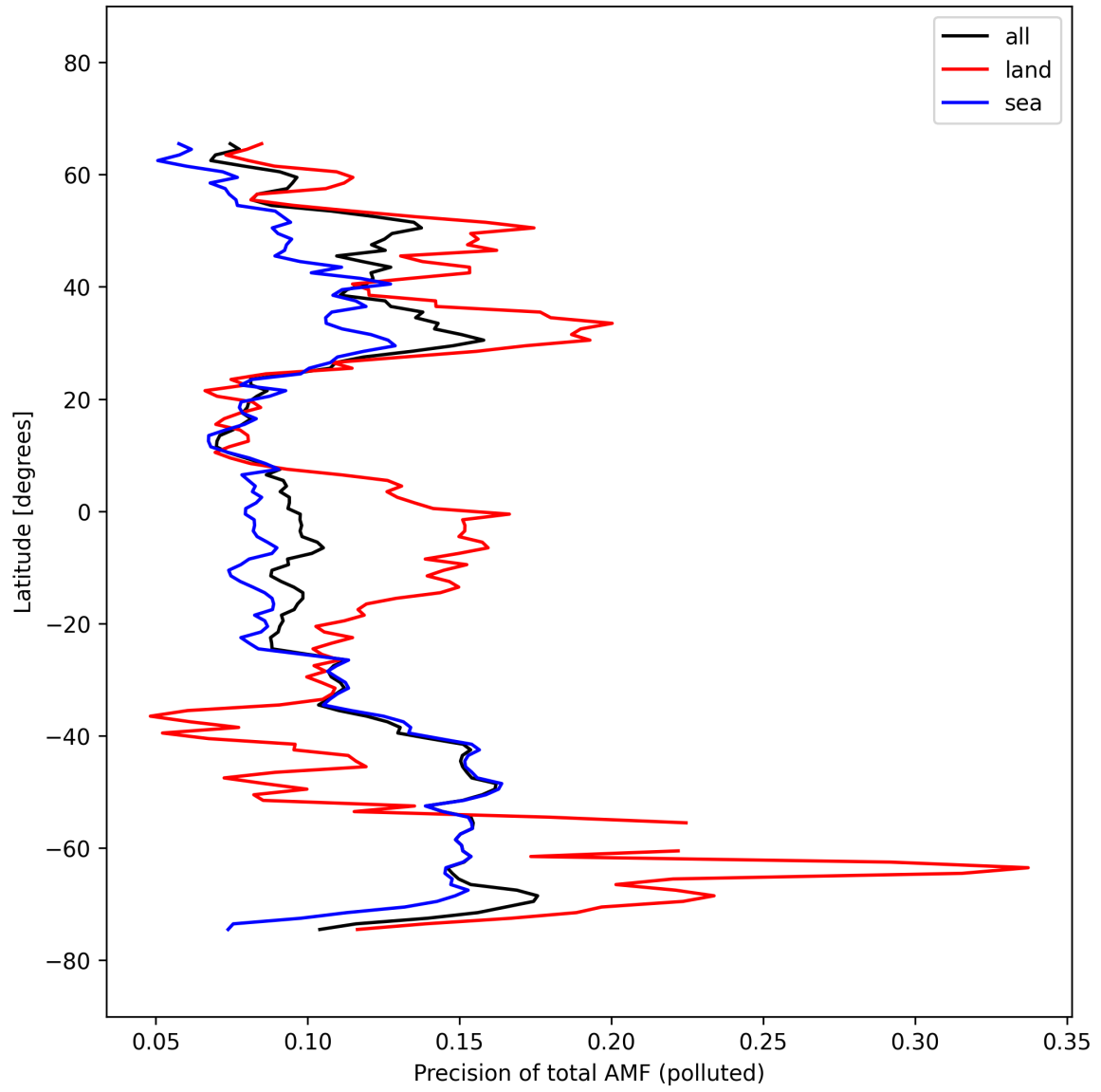


Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-03-08 to 2025-03-09.

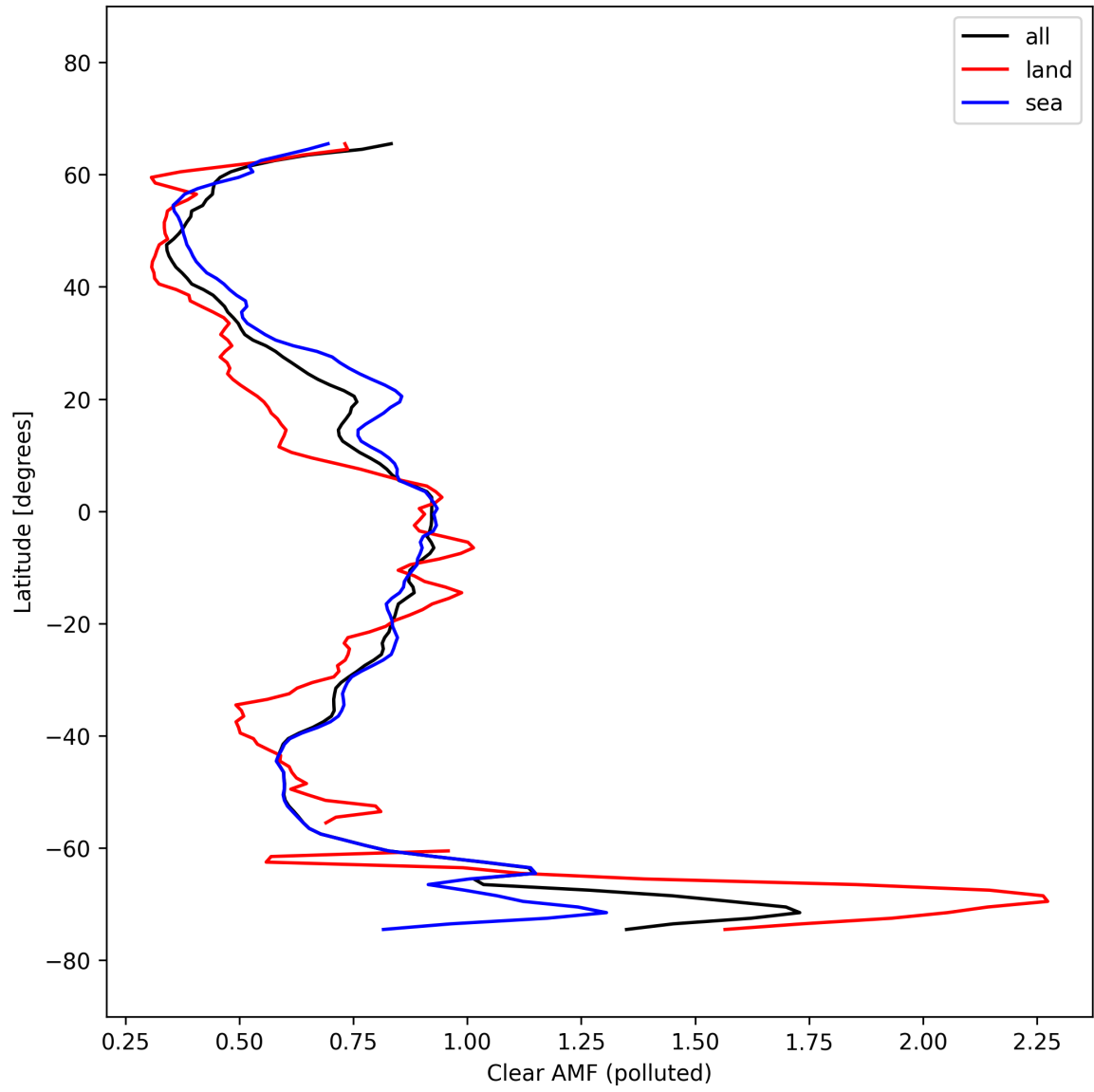


Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-03-08 to 2025-03-09.

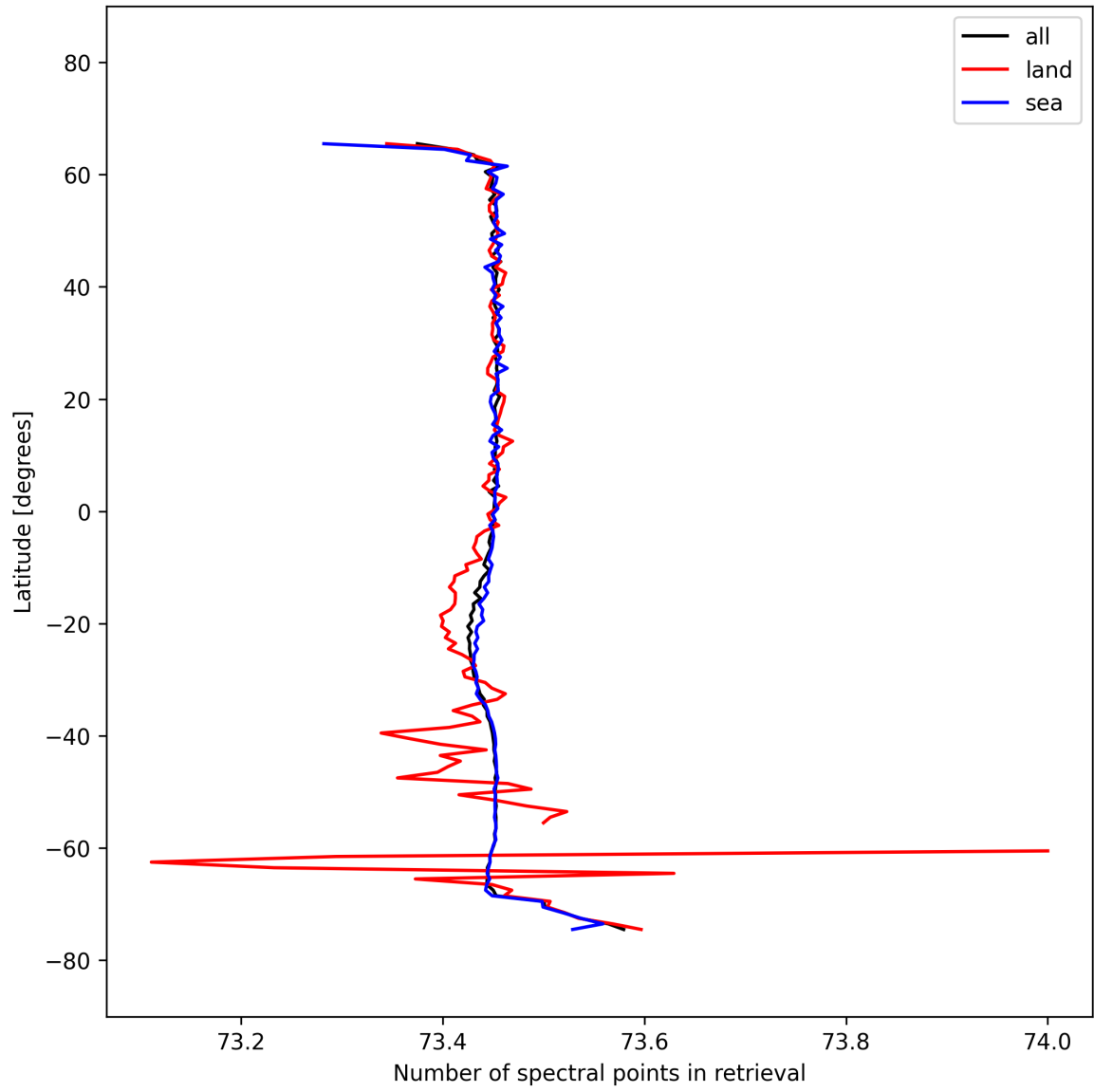


Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-03-08 to 2025-03-09.

8 Histograms

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

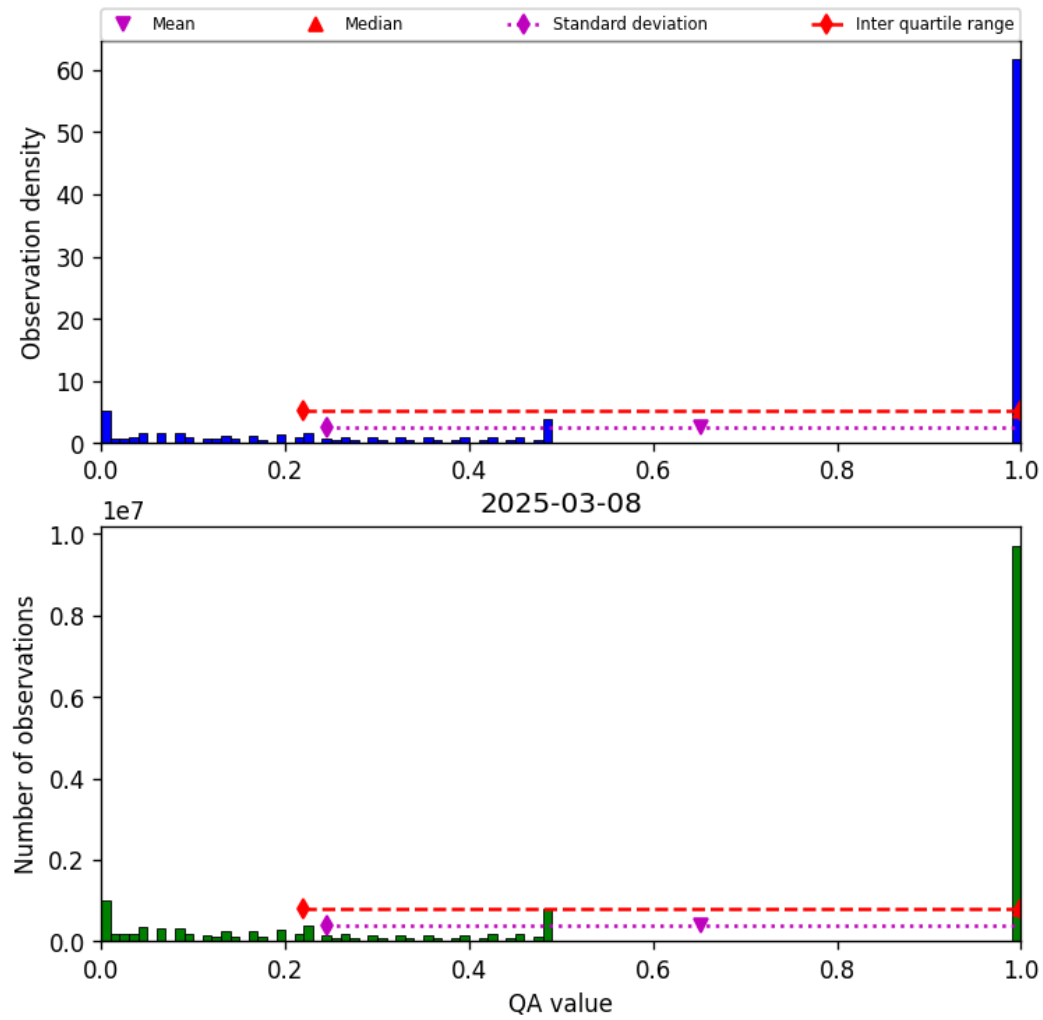


Figure 57: Histogram of “QA value” for 2025-03-08 to 2025-03-09

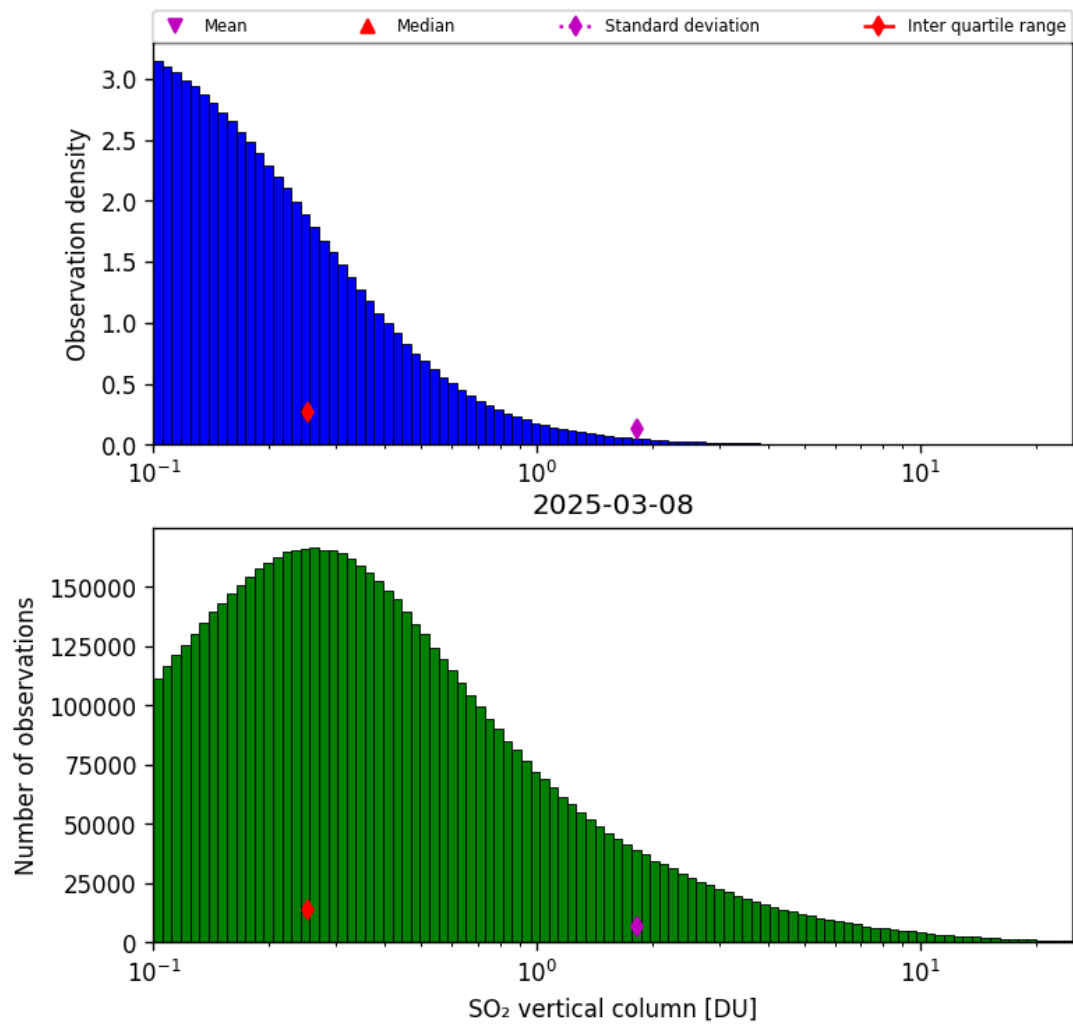


Figure 58: Histogram of “SO₂ vertical column” for 2025-03-08 to 2025-03-09

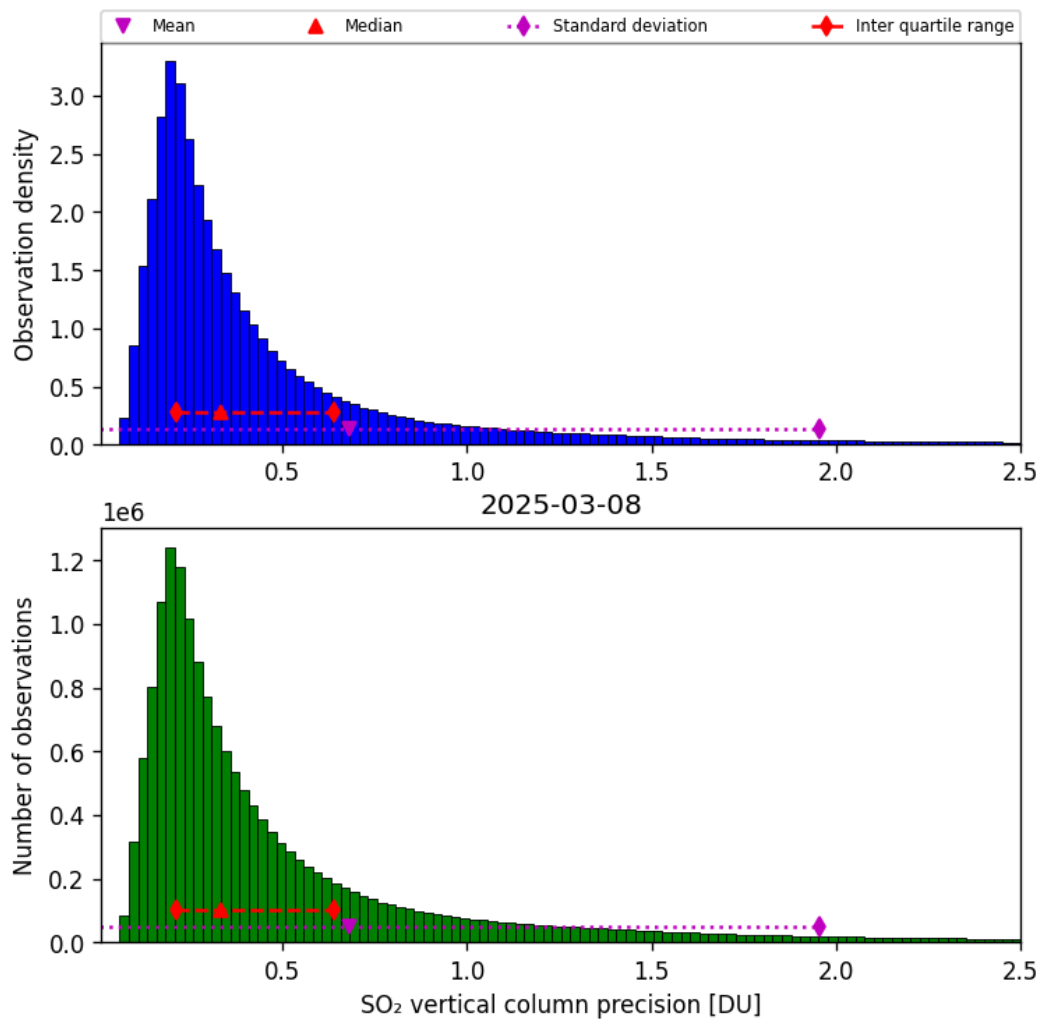


Figure 59: Histogram of “SO₂ vertical column precision” for 2025-03-08 to 2025-03-09

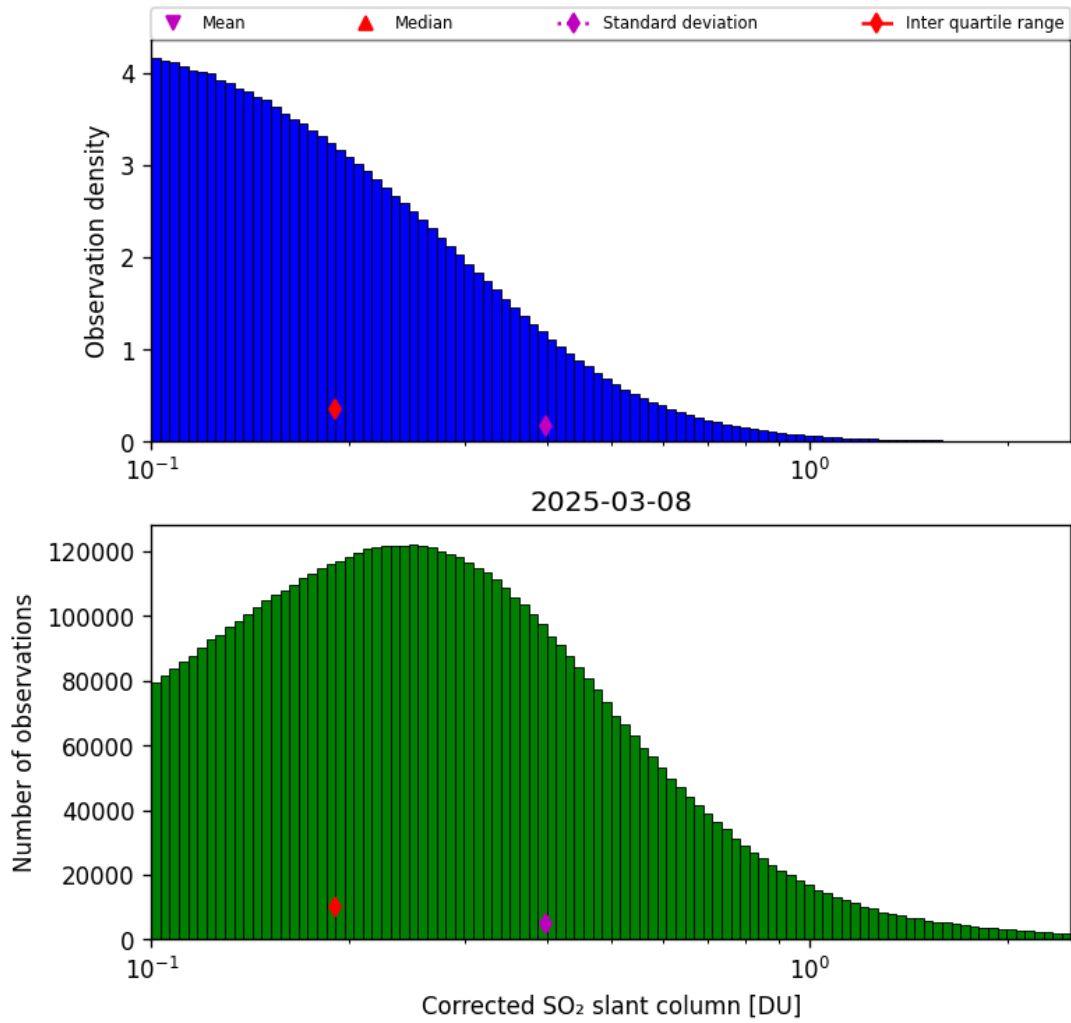


Figure 60: Histogram of “Corrected SO₂ slant column” for 2025-03-08 to 2025-03-09

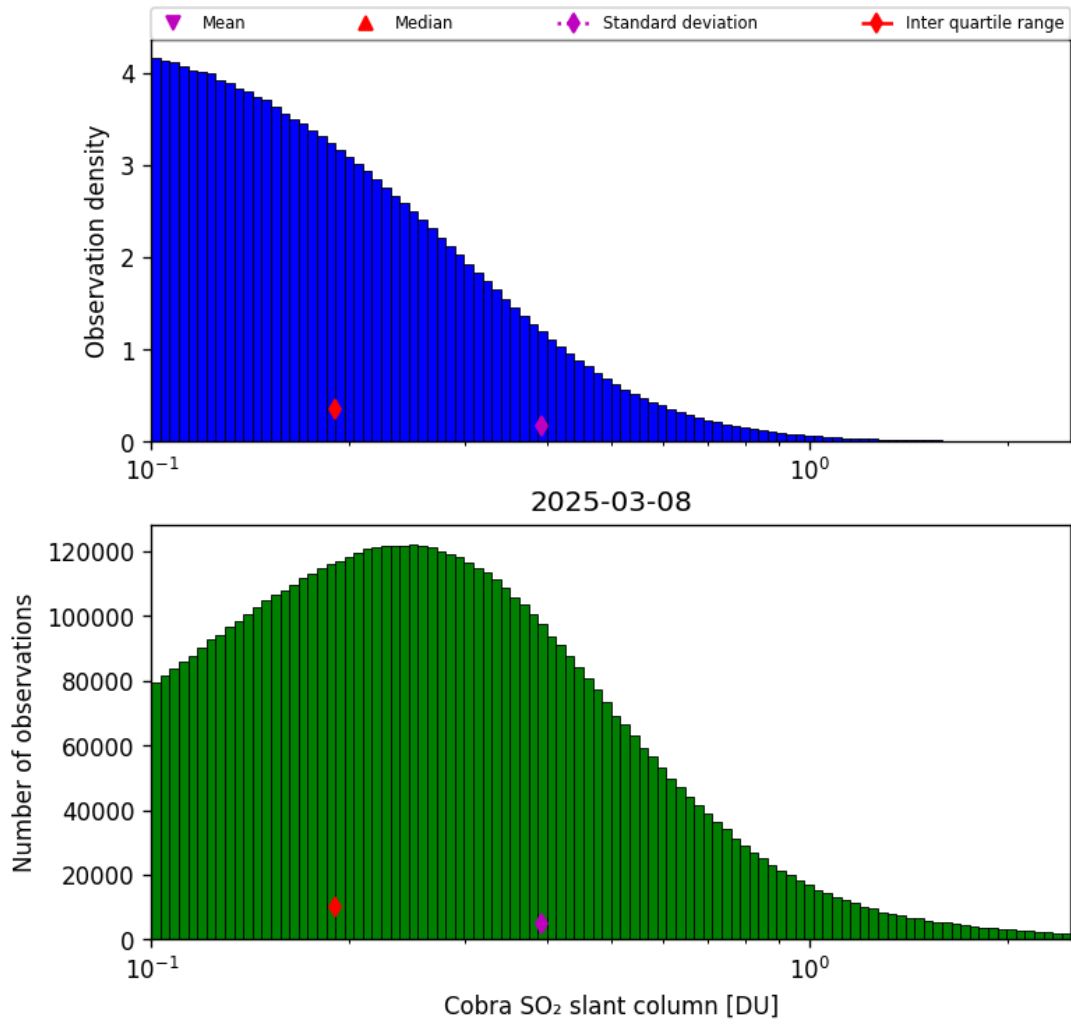


Figure 61: Histogram of “Cobra SO₂ slant column” for 2025-03-08 to 2025-03-09

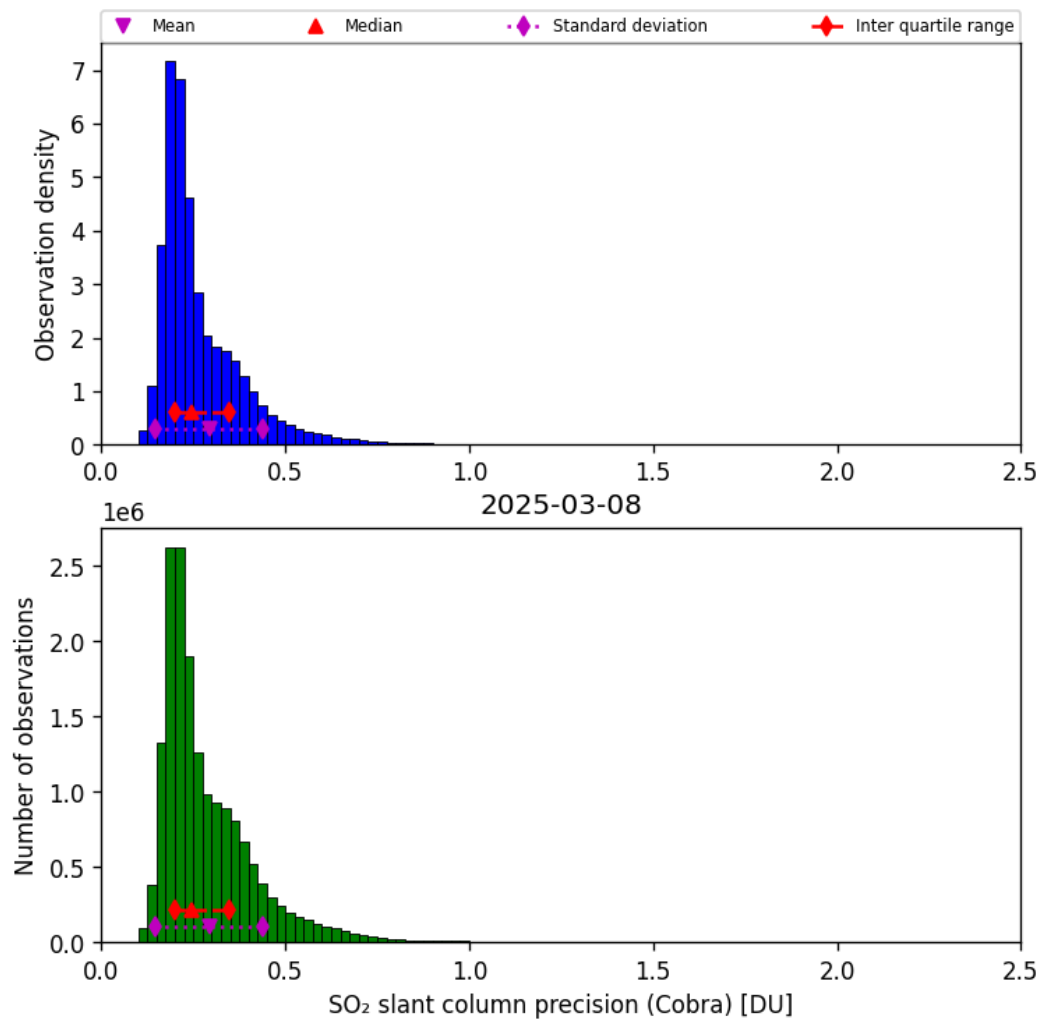


Figure 62: Histogram of “SO₂ slant column precision (Cobra)” for 2025-03-08 to 2025-03-09

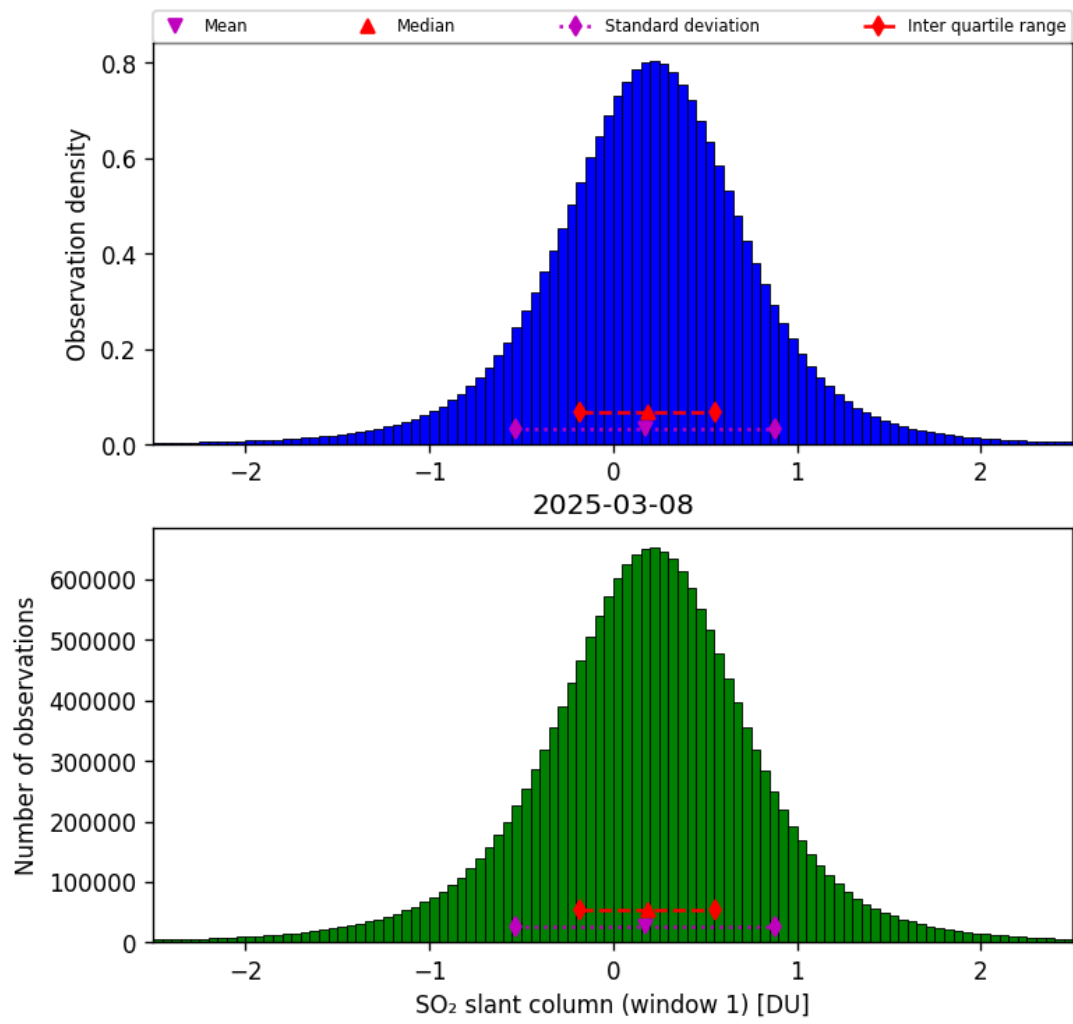


Figure 63: Histogram of “SO₂ slant column (window 1)” for 2025-03-08 to 2025-03-09

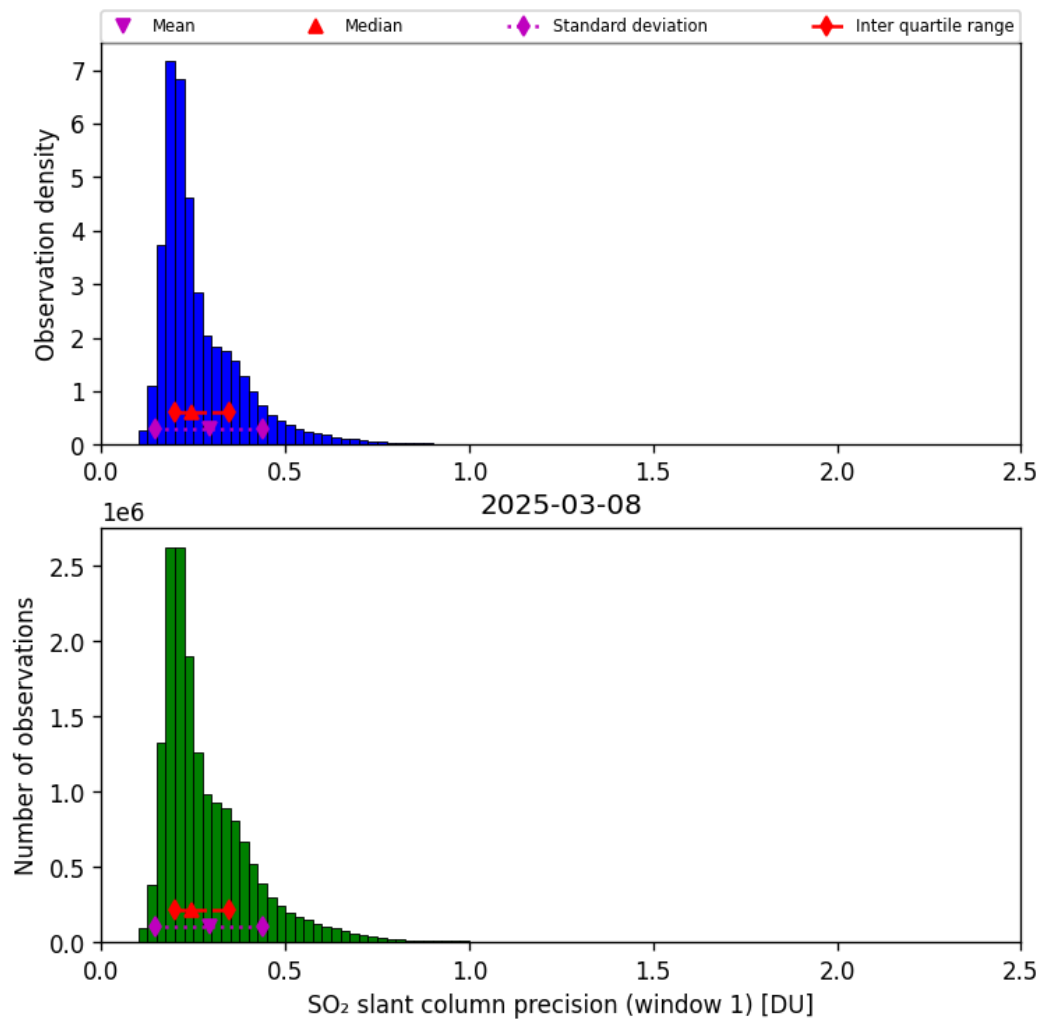


Figure 64: Histogram of “SO₂ slant column precision (window 1)” for 2025-03-08 to 2025-03-09

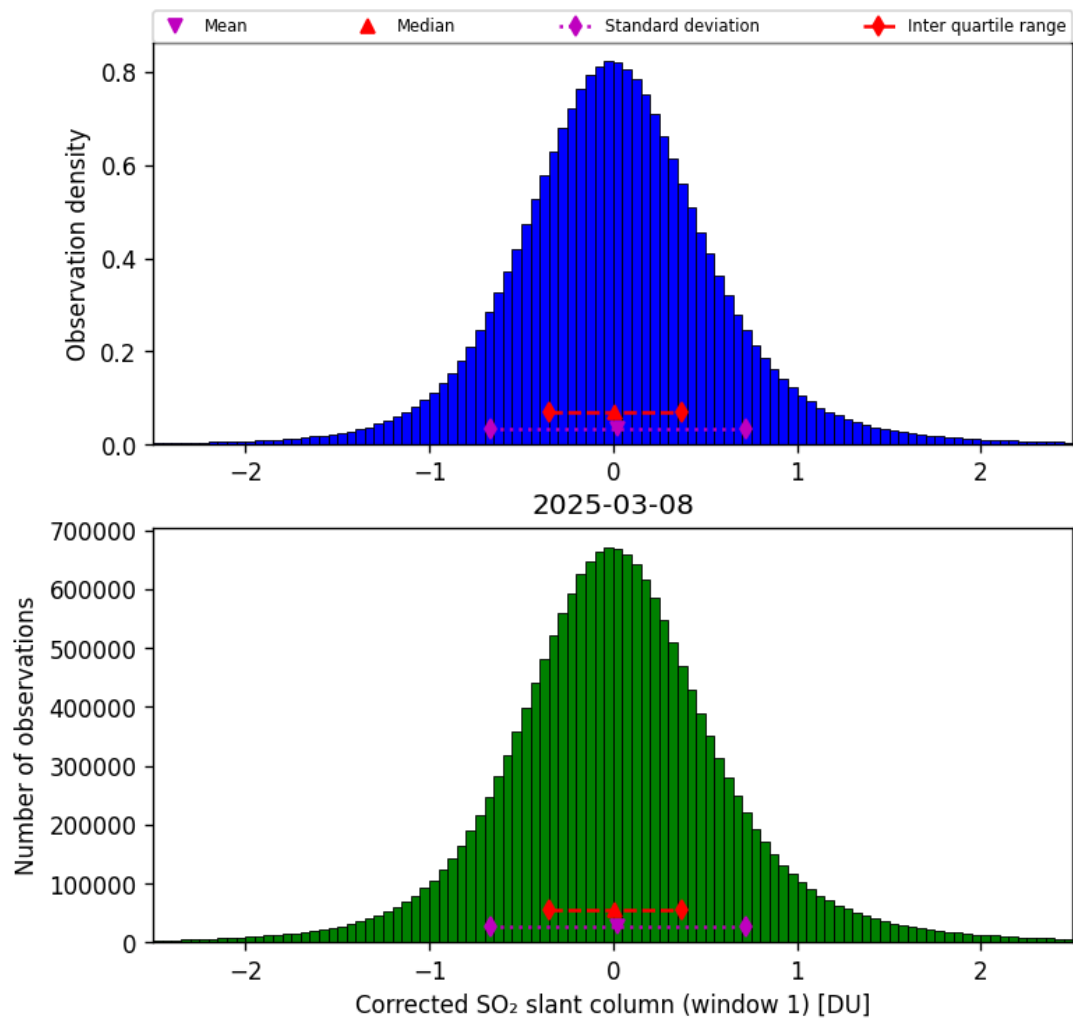


Figure 65: Histogram of “Corrected SO₂ slant column (window 1)” for 2025-03-08 to 2025-03-09

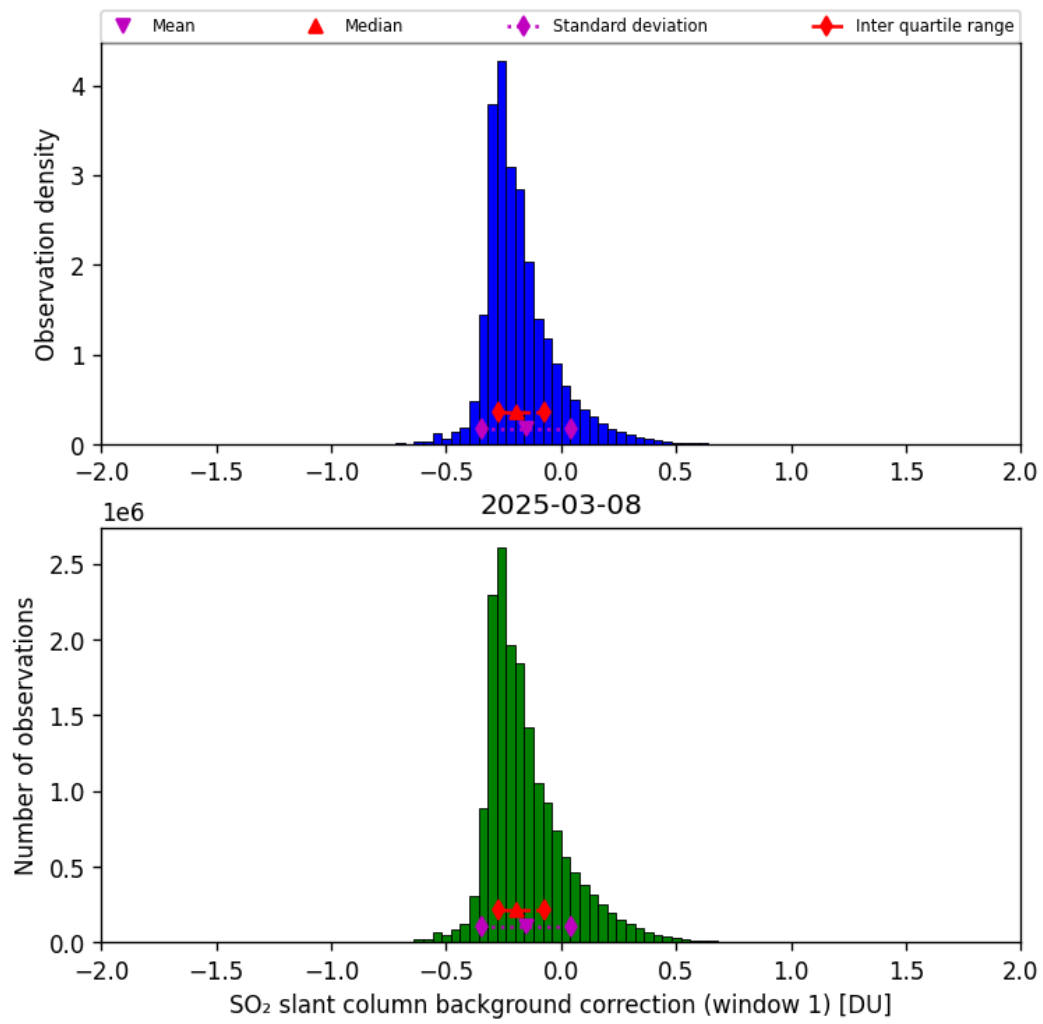


Figure 66: Histogram of “SO₂ slant column background correction (window 1)” for 2025-03-08 to 2025-03-09

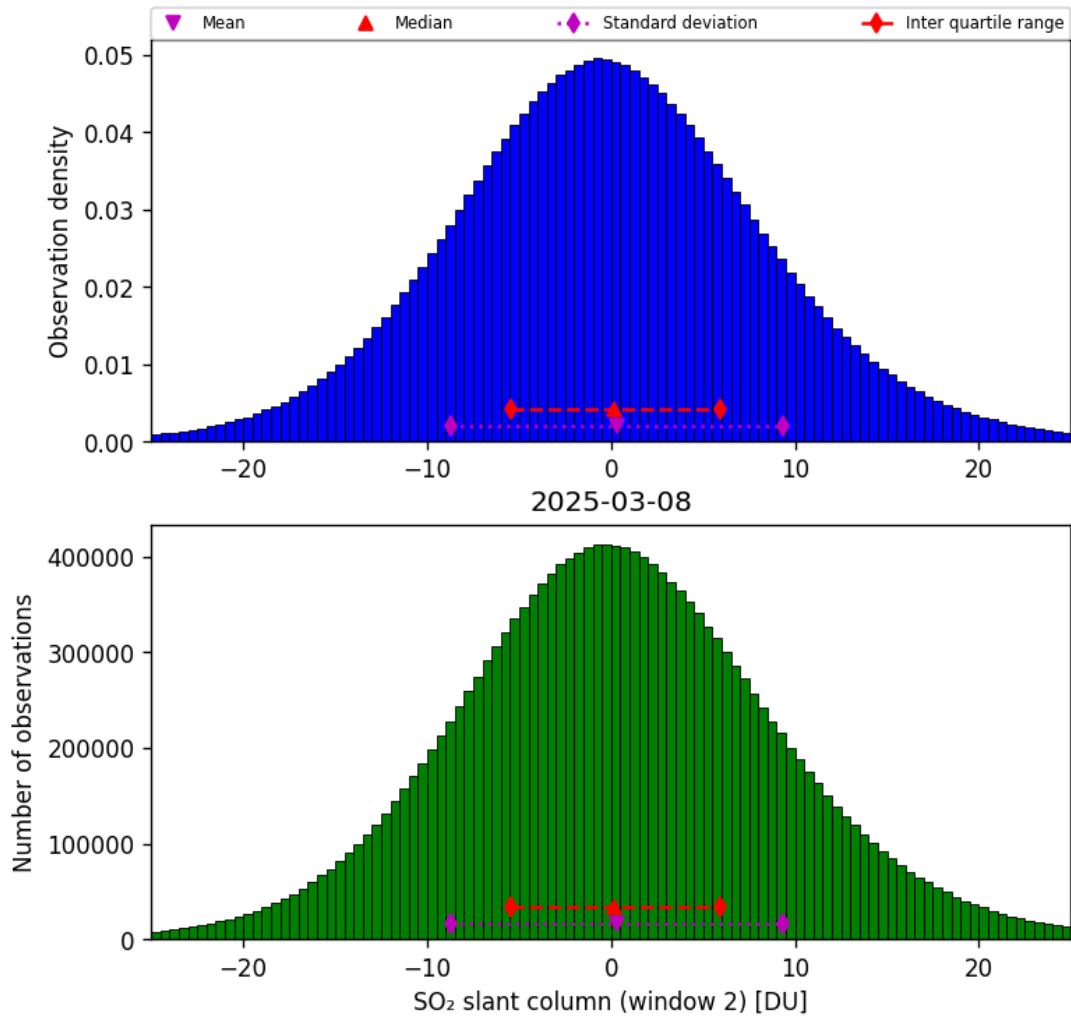


Figure 67: Histogram of “SO₂ slant column (window 2)” for 2025-03-08 to 2025-03-09

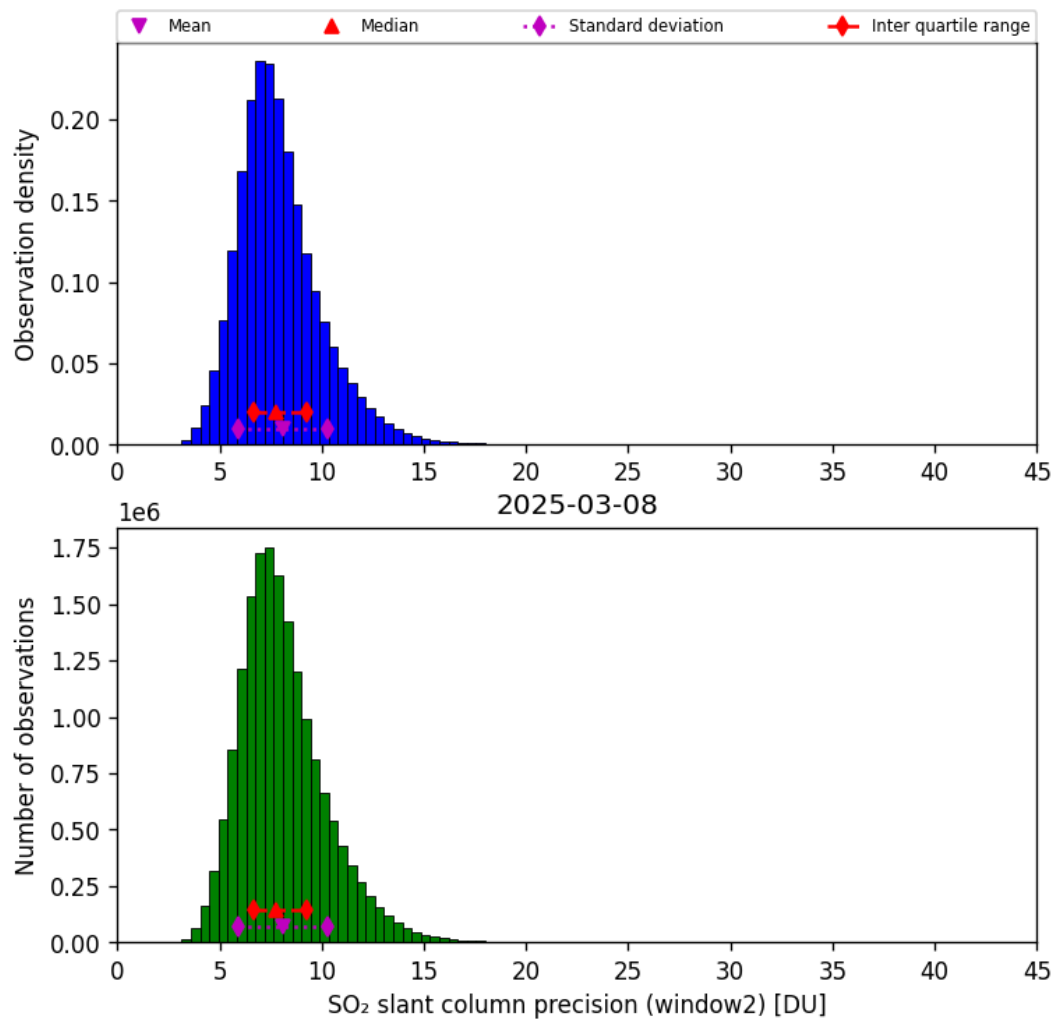


Figure 68: Histogram of “SO₂ slant column precision (window2)” for 2025-03-08 to 2025-03-09

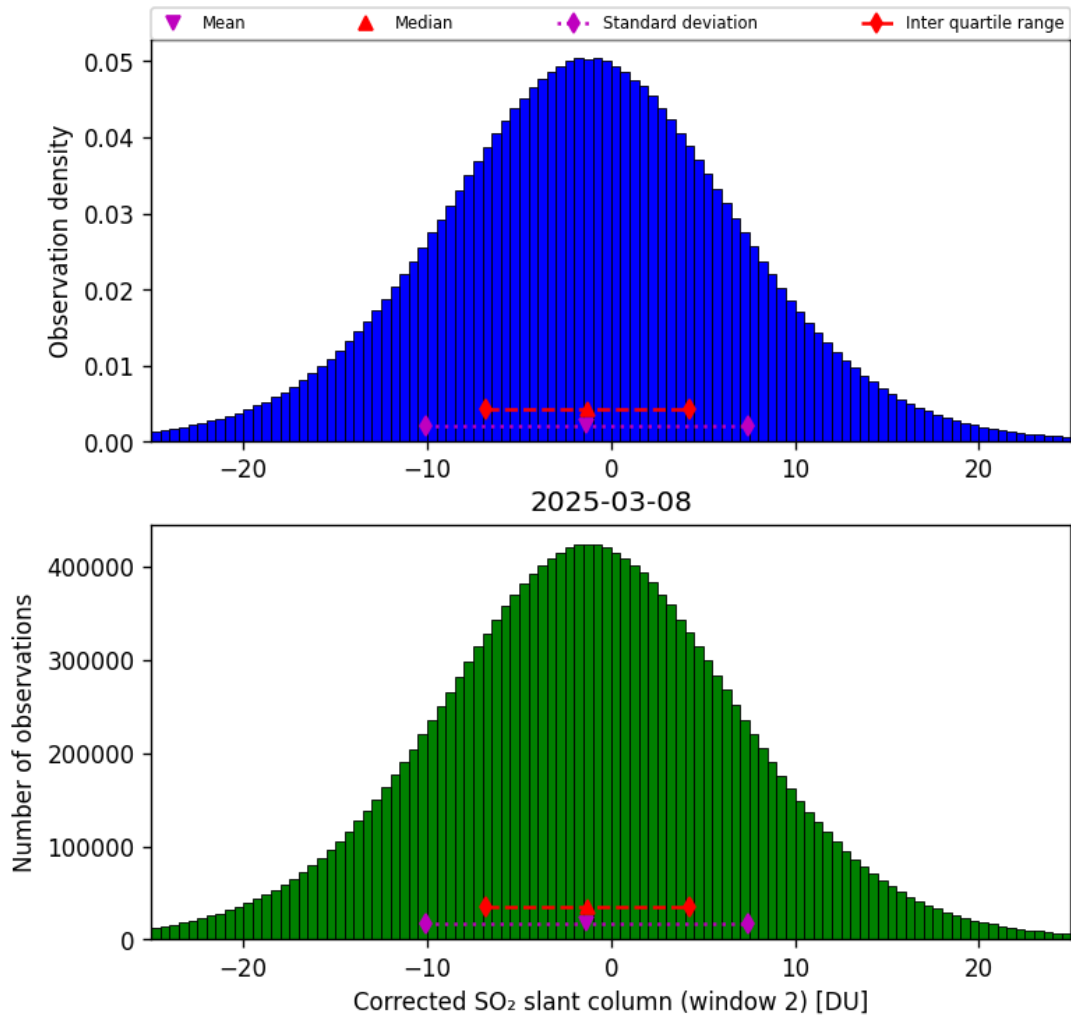


Figure 69: Histogram of “Corrected SO₂ slant column (window 2)” for 2025-03-08 to 2025-03-09

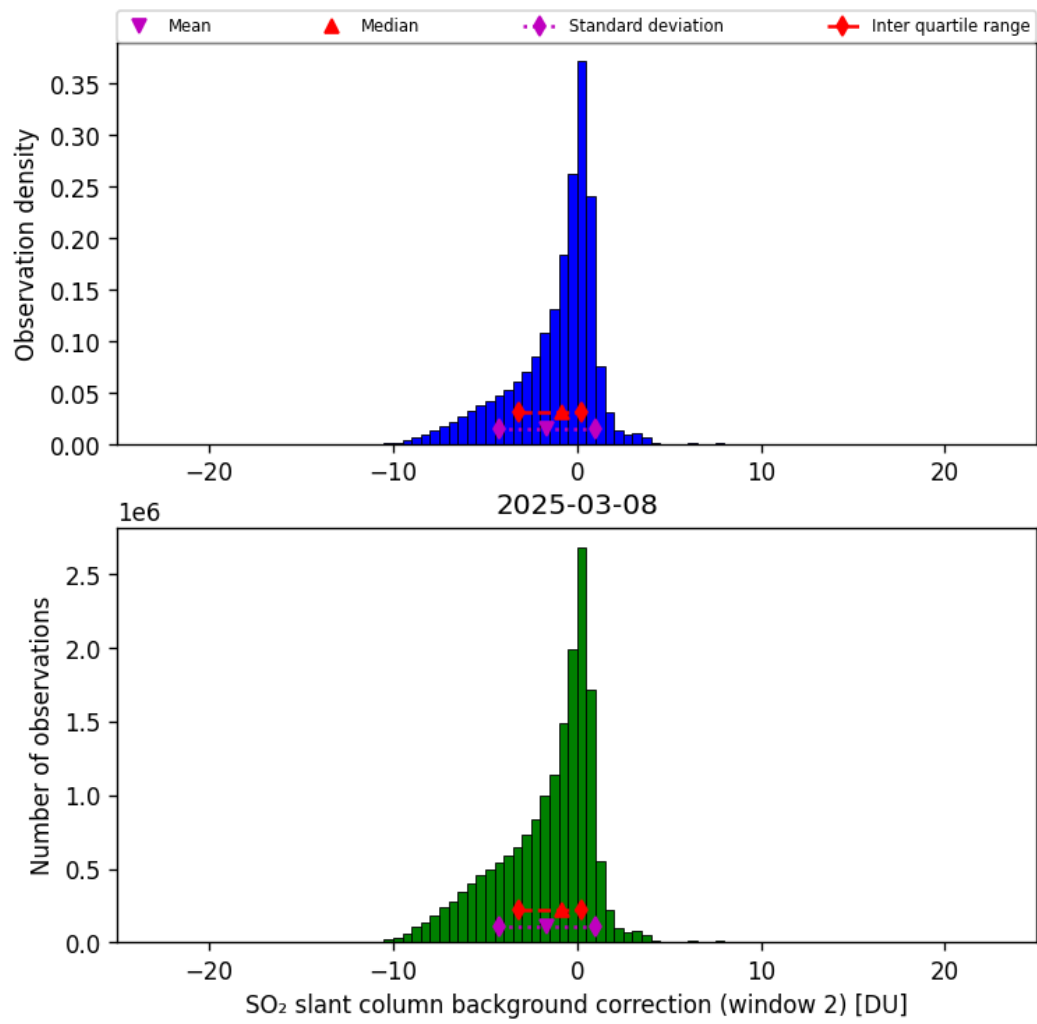


Figure 70: Histogram of “SO₂ slant column background correction (window 2)” for 2025-03-08 to 2025-03-09

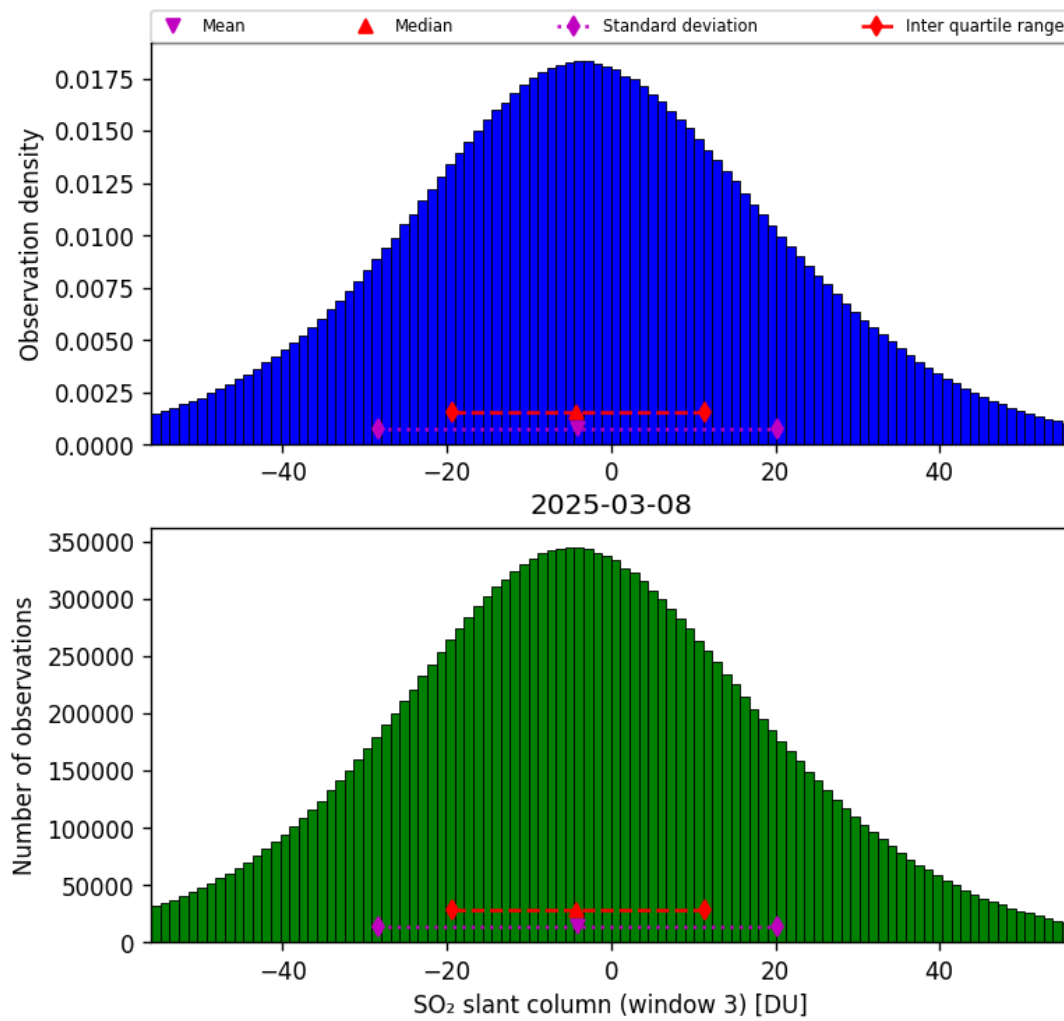


Figure 71: Histogram of “SO₂ slant column (window 3)” for 2025-03-08 to 2025-03-09

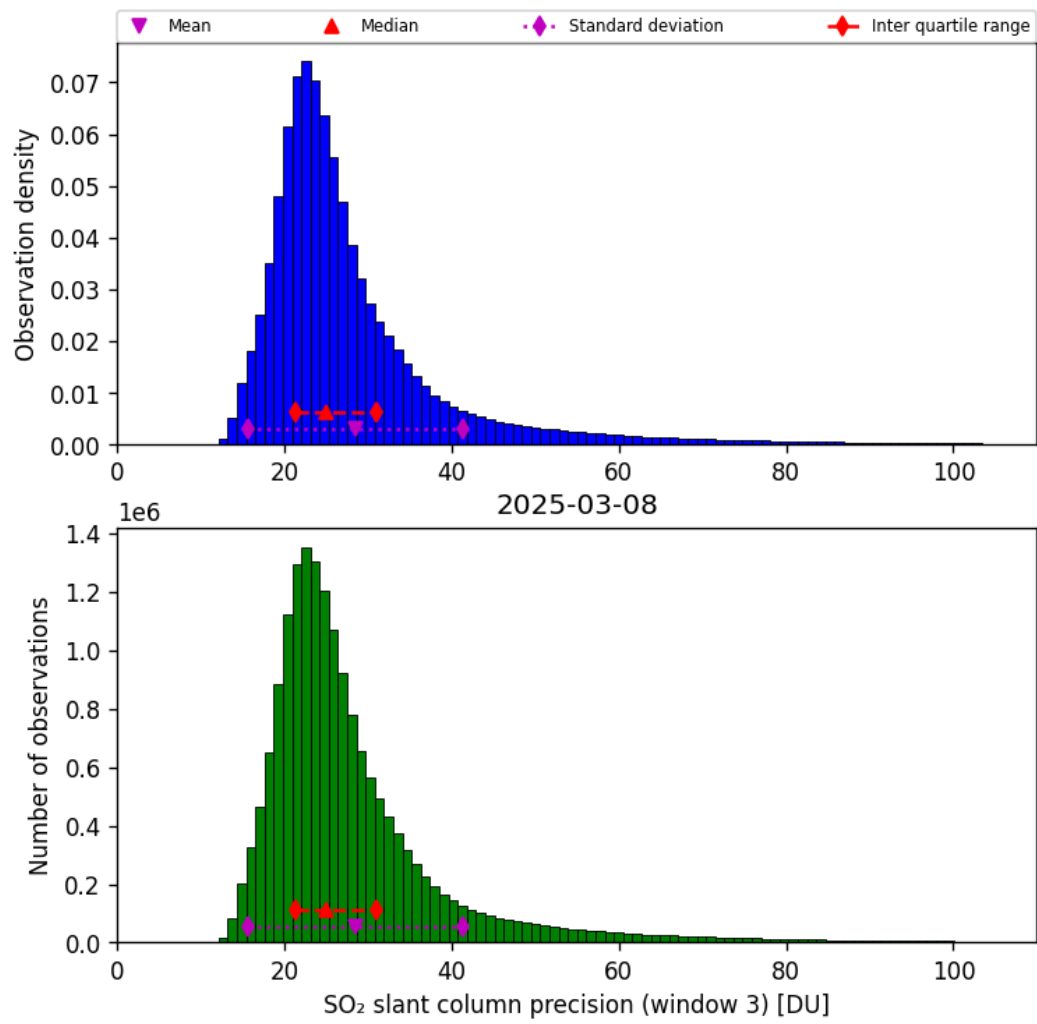


Figure 72: Histogram of “SO₂ slant column precision (window 3)” for 2025-03-08 to 2025-03-09

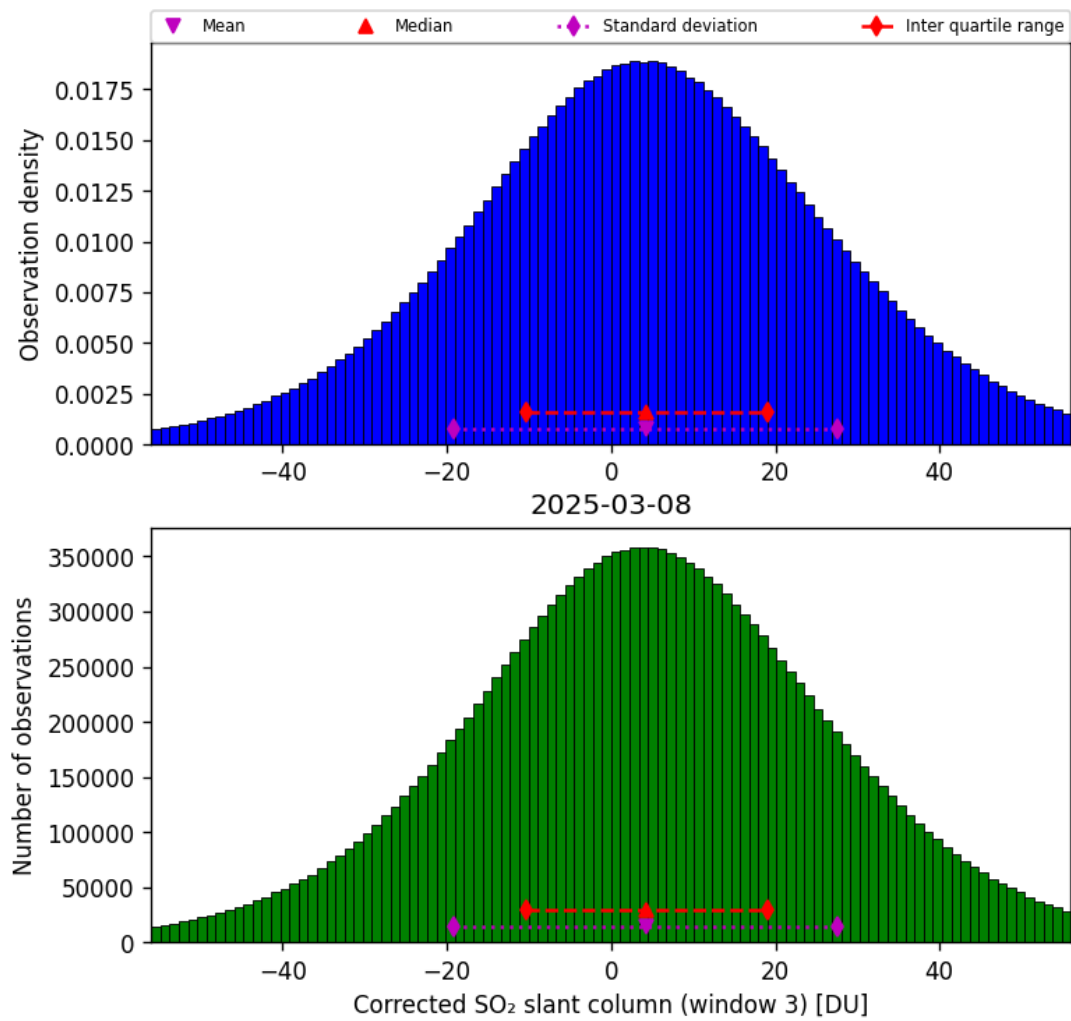


Figure 73: Histogram of “Corrected SO₂ slant column (window 3)” for 2025-03-08 to 2025-03-09

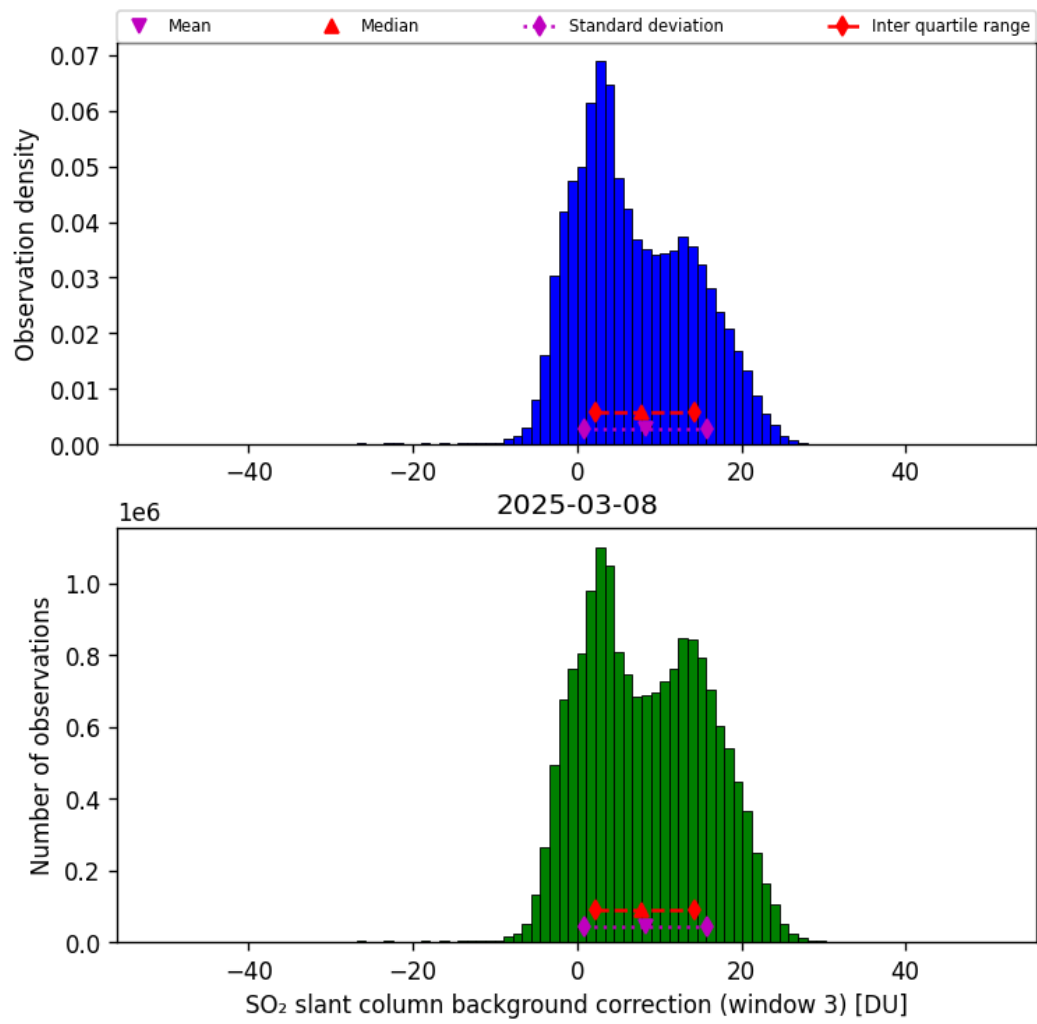


Figure 74: Histogram of “SO₂ slant column background correction (window 3)” for 2025-03-08 to 2025-03-09

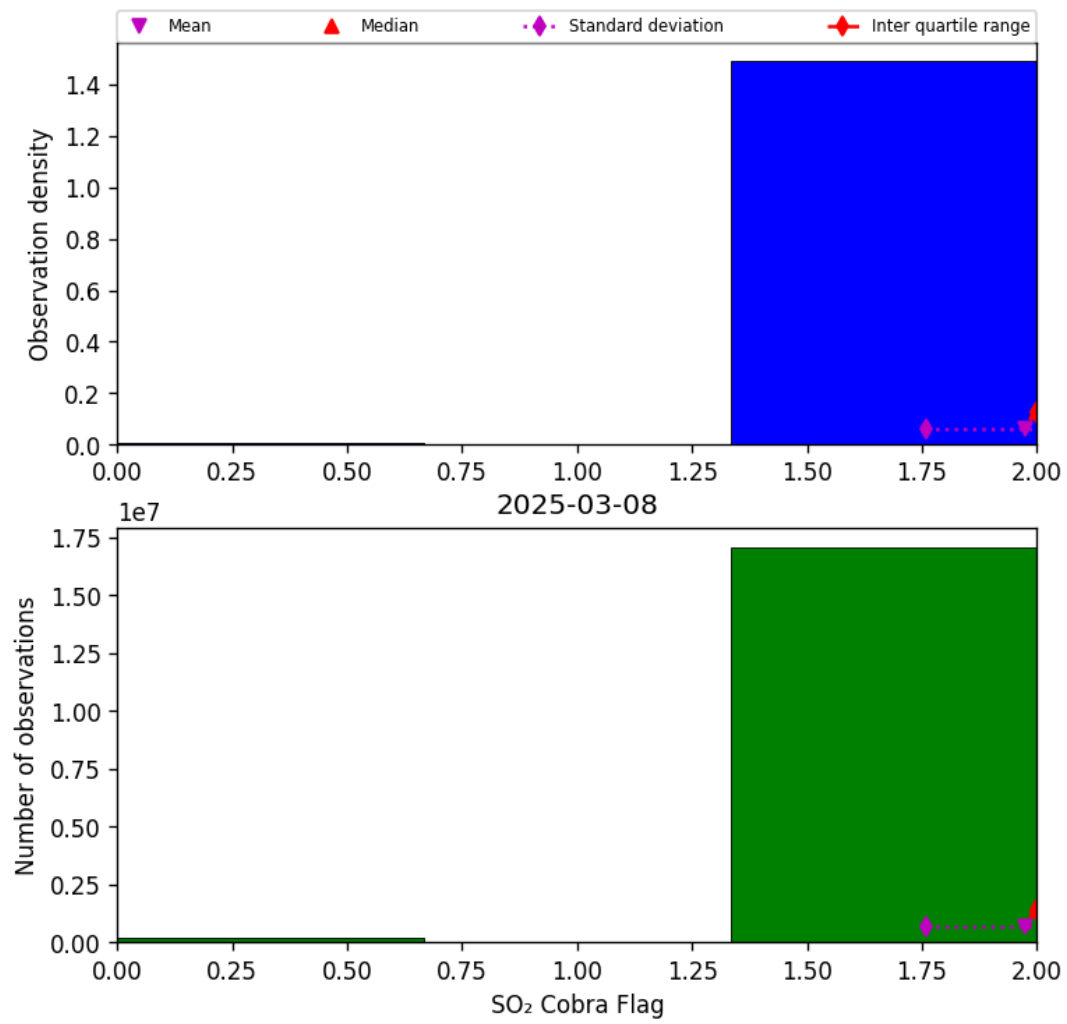


Figure 75: Histogram of “SO₂ Cobra Flag” for 2025-03-08 to 2025-03-09

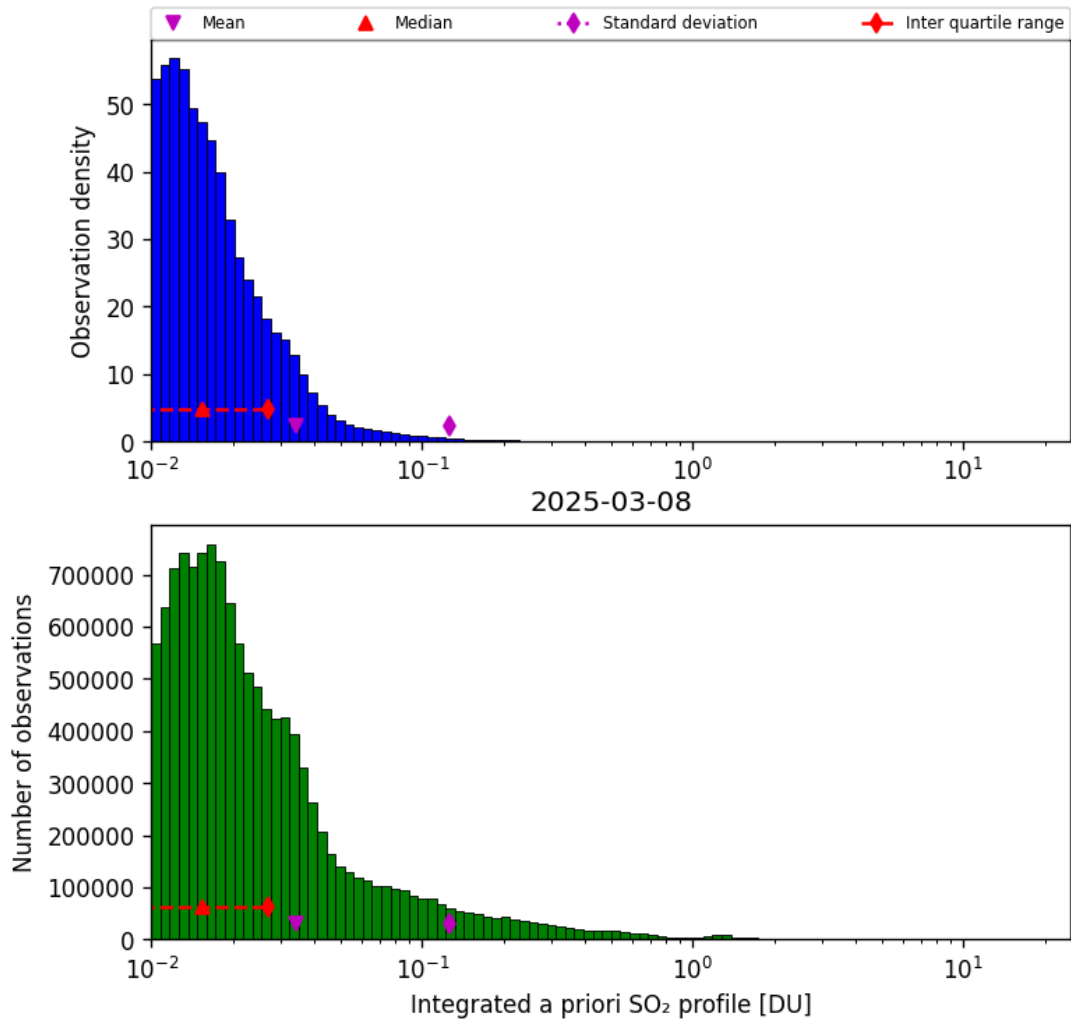


Figure 76: Histogram of “Integrated a priori SO₂ profile” for 2025-03-08 to 2025-03-09

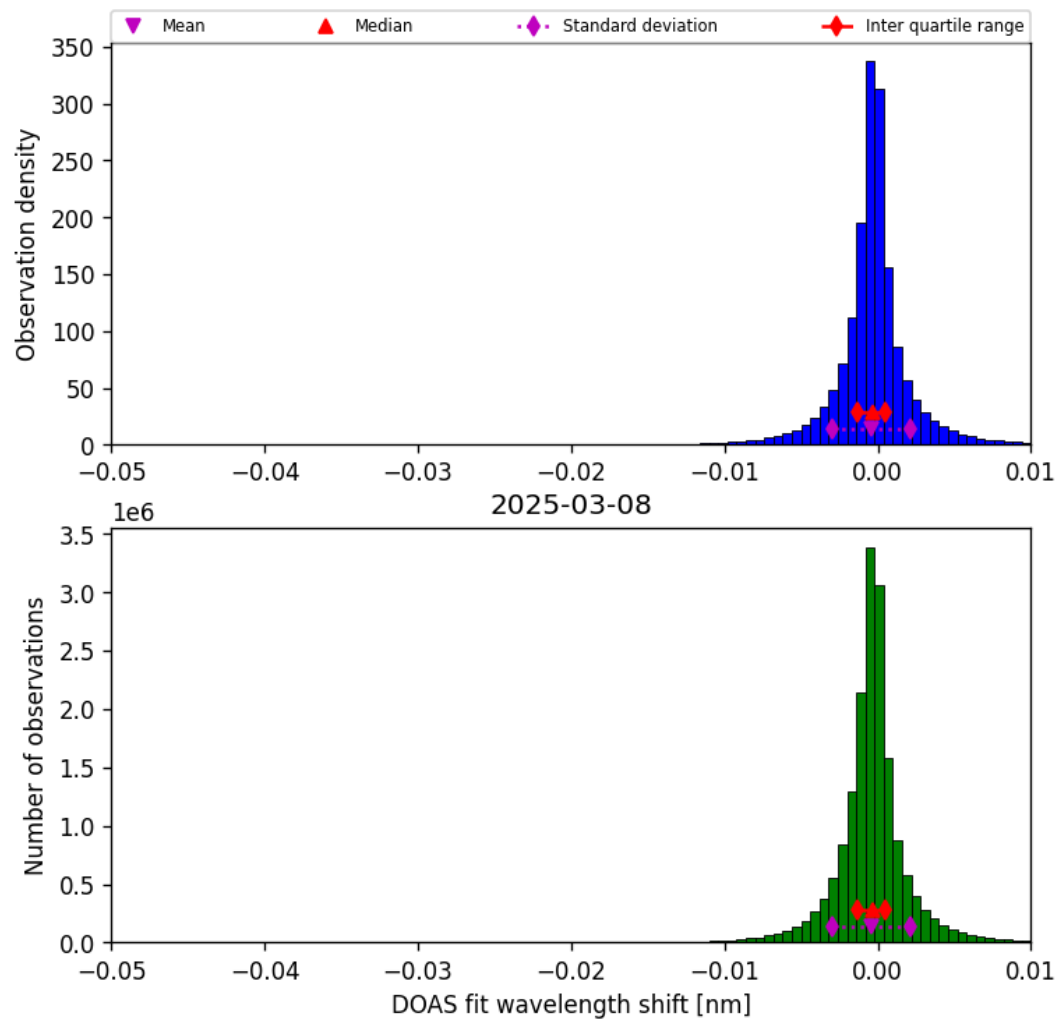


Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-03-08 to 2025-03-09

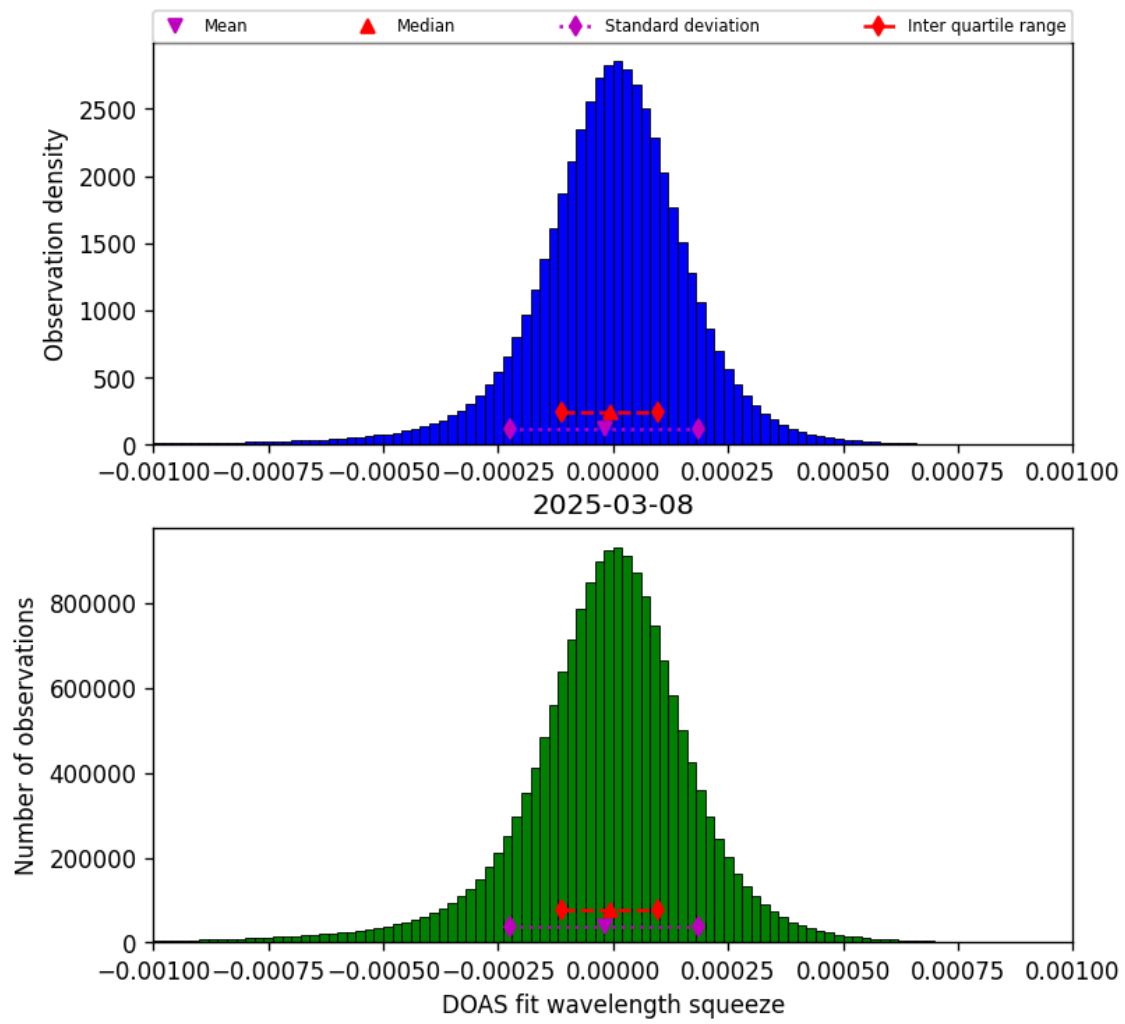


Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-03-08 to 2025-03-09

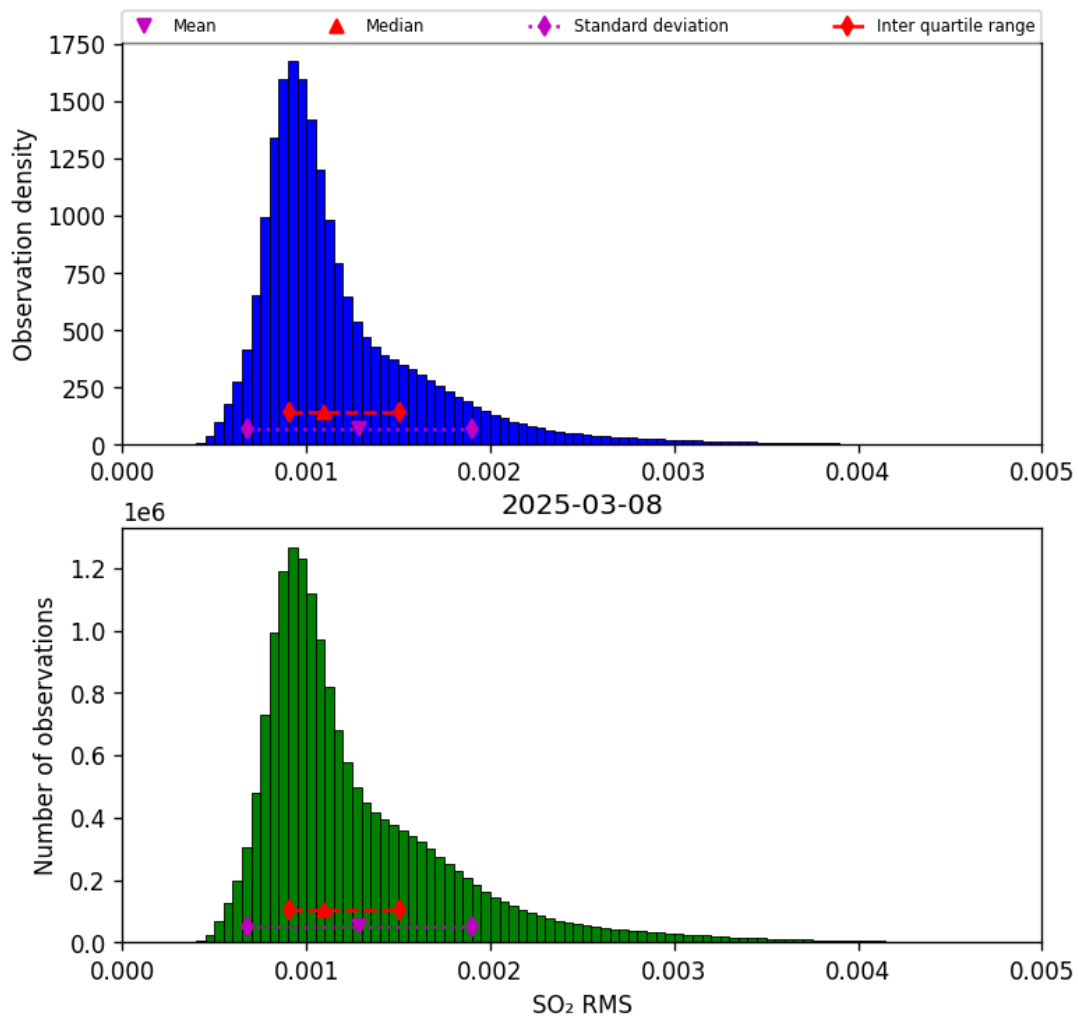


Figure 79: Histogram of “SO₂ RMS” for 2025-03-08 to 2025-03-09

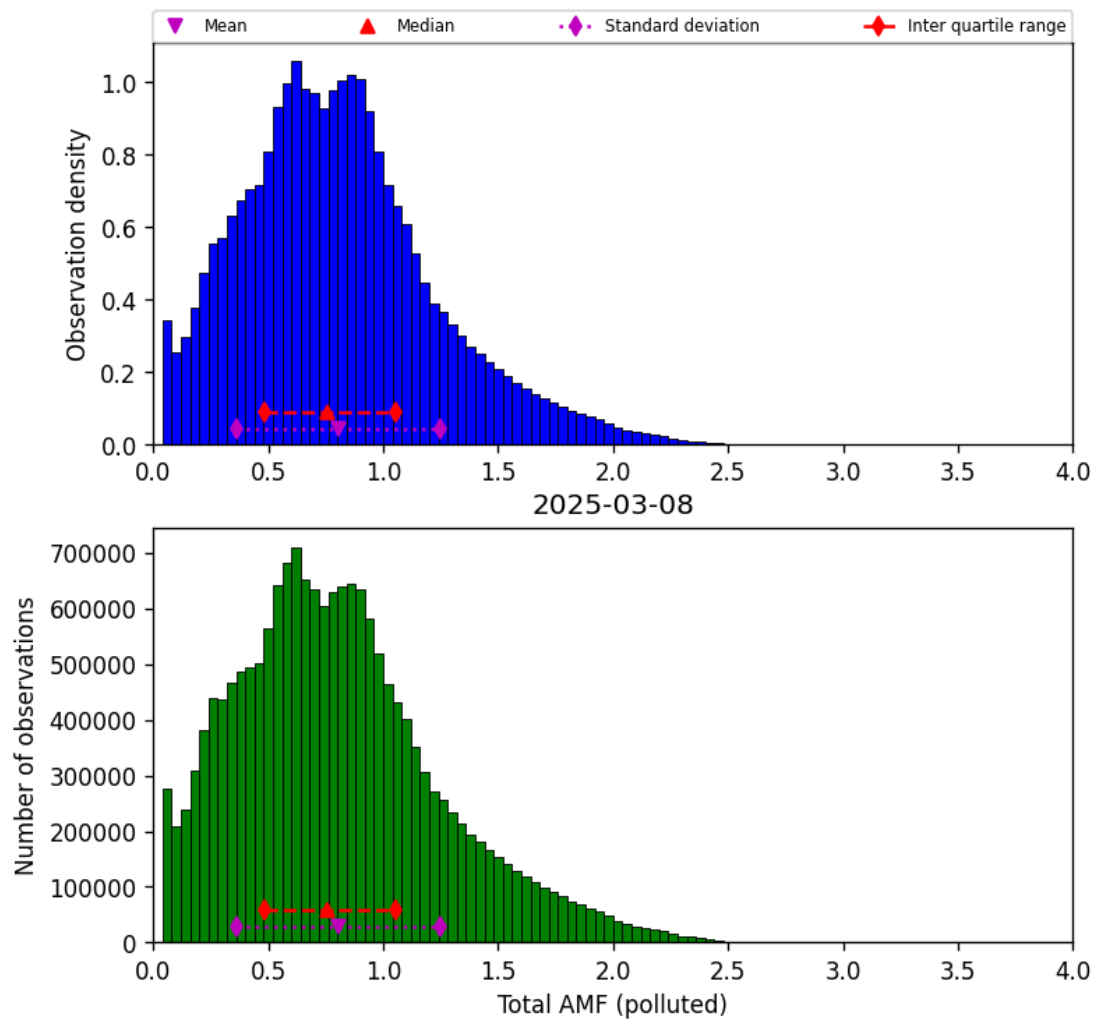


Figure 80: Histogram of “Total AMF (polluted)” for 2025-03-08 to 2025-03-09

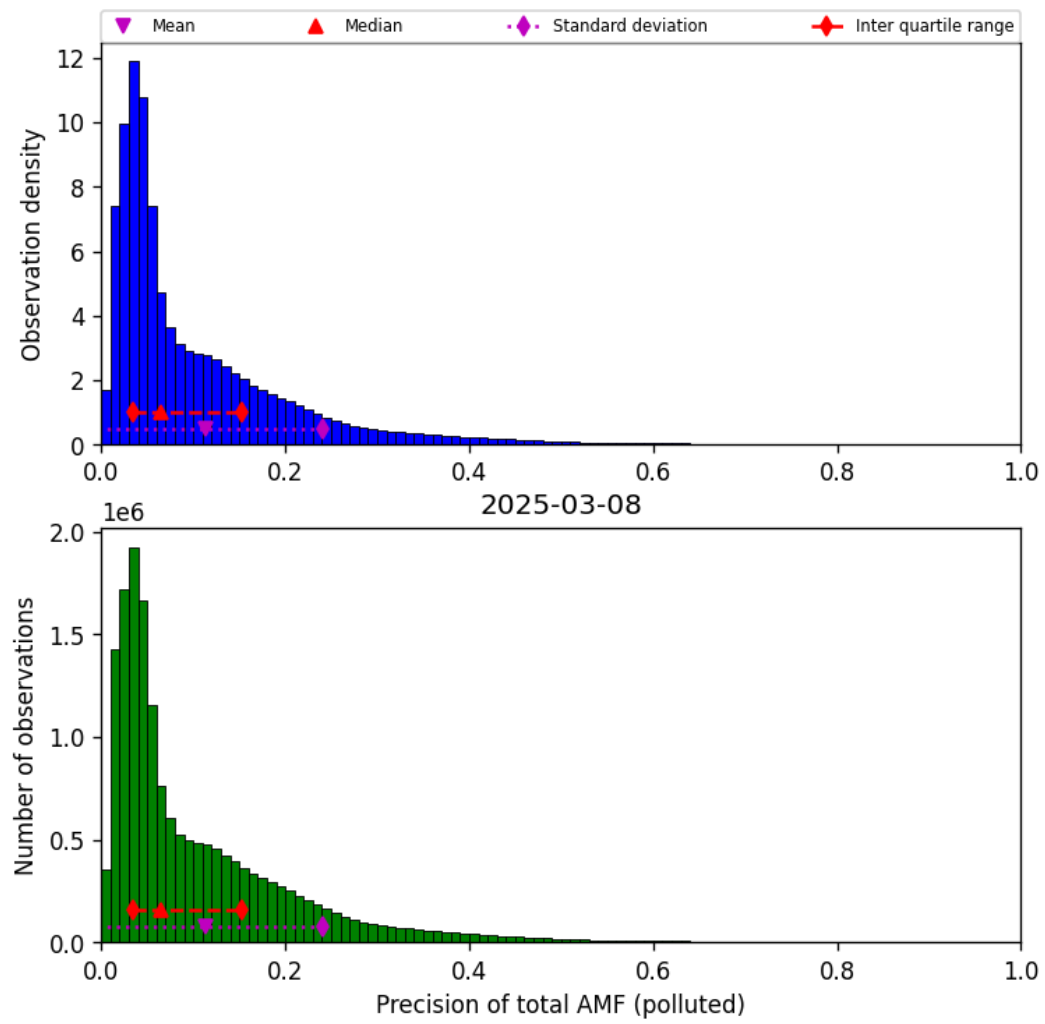


Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-03-08 to 2025-03-09

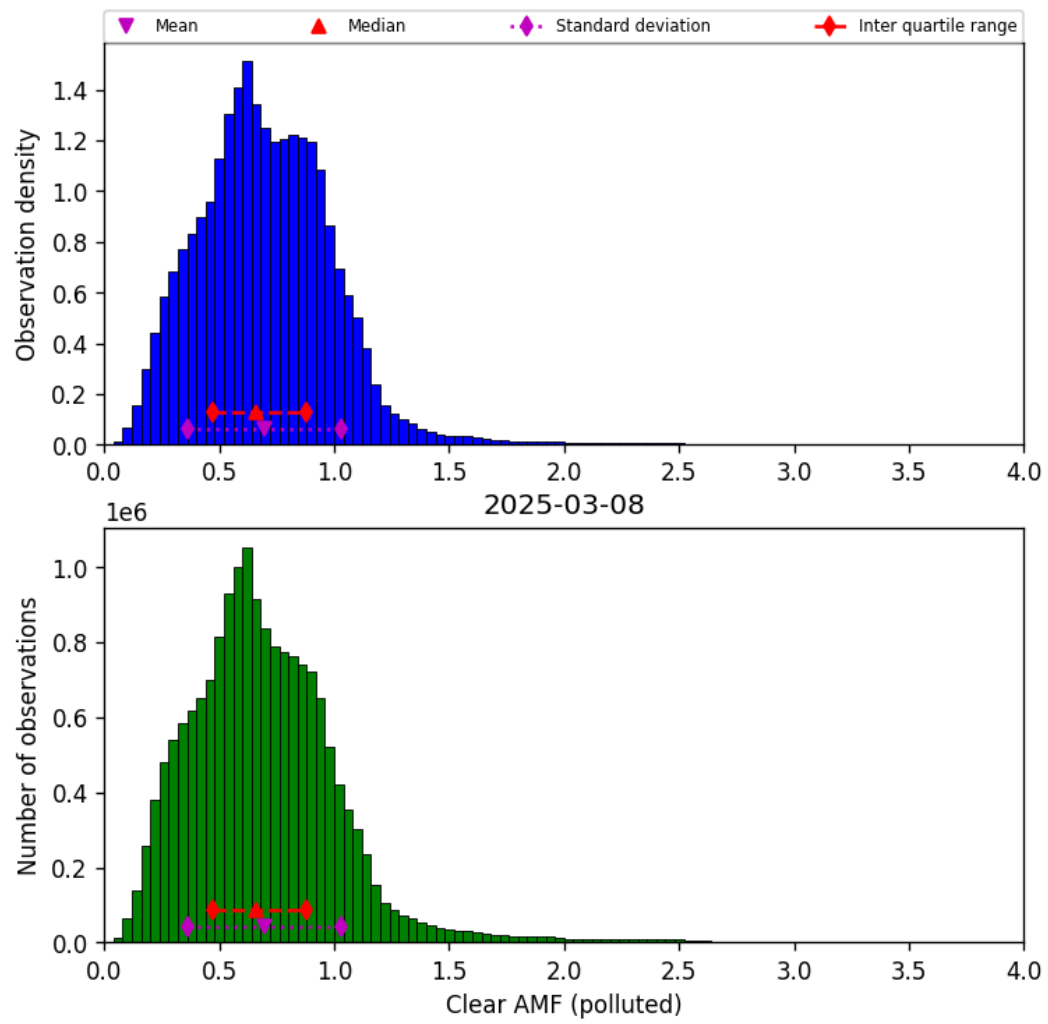


Figure 82: Histogram of “Clear AMF (polluted)” for 2025-03-08 to 2025-03-09

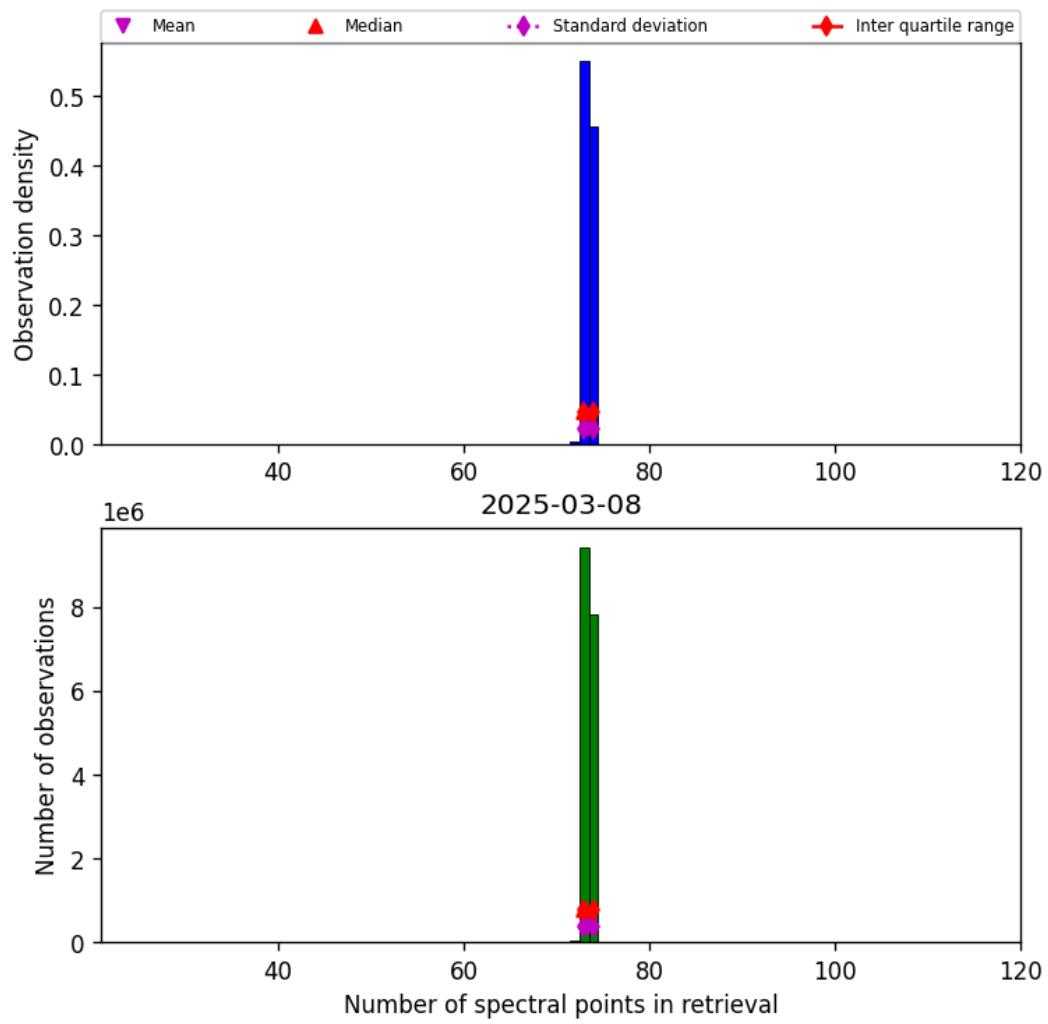


Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-03-08 to 2025-03-09

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.

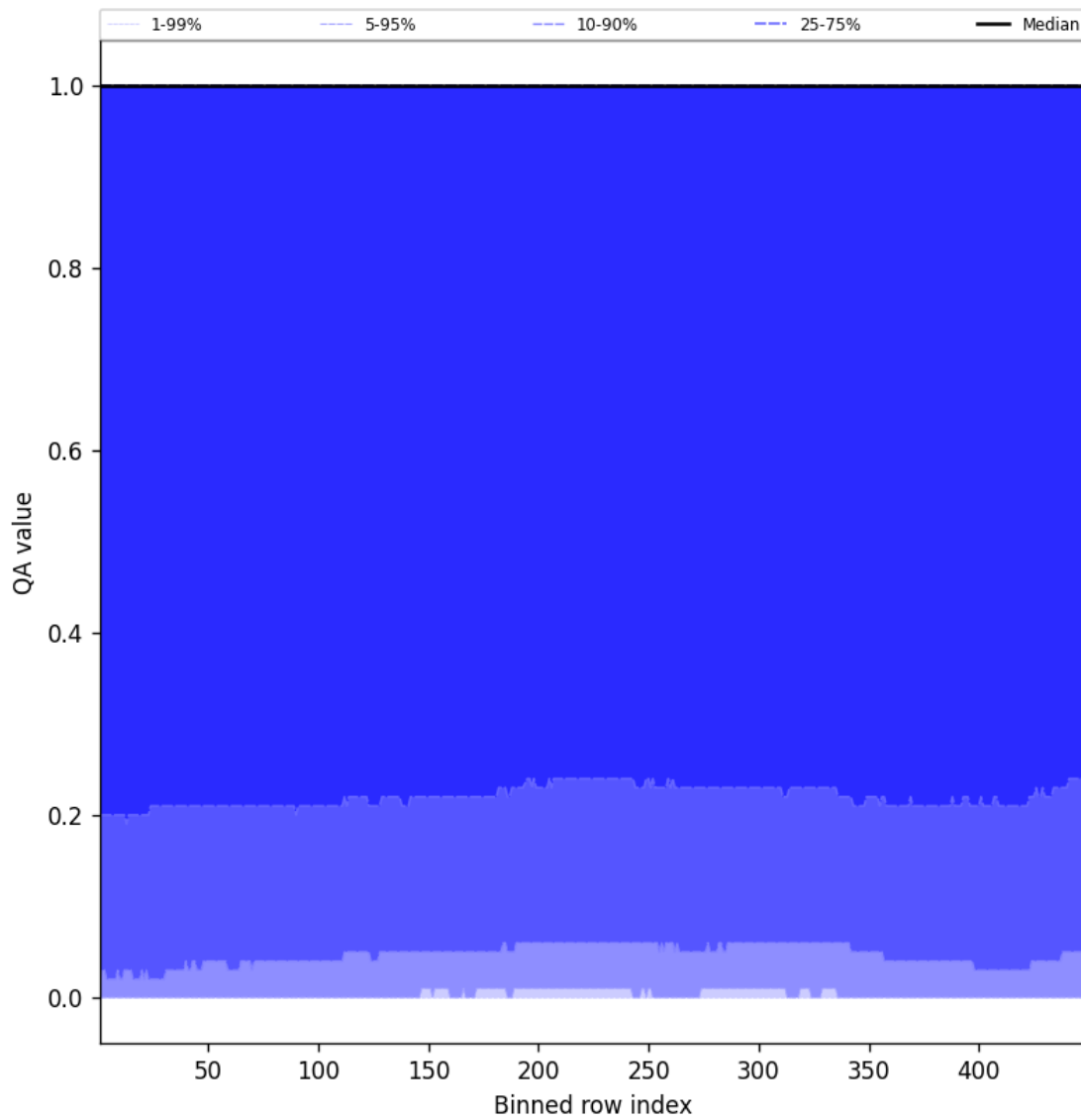


Figure 84: Along track statistics of “QA value” for 2025-03-08 to 2025-03-09

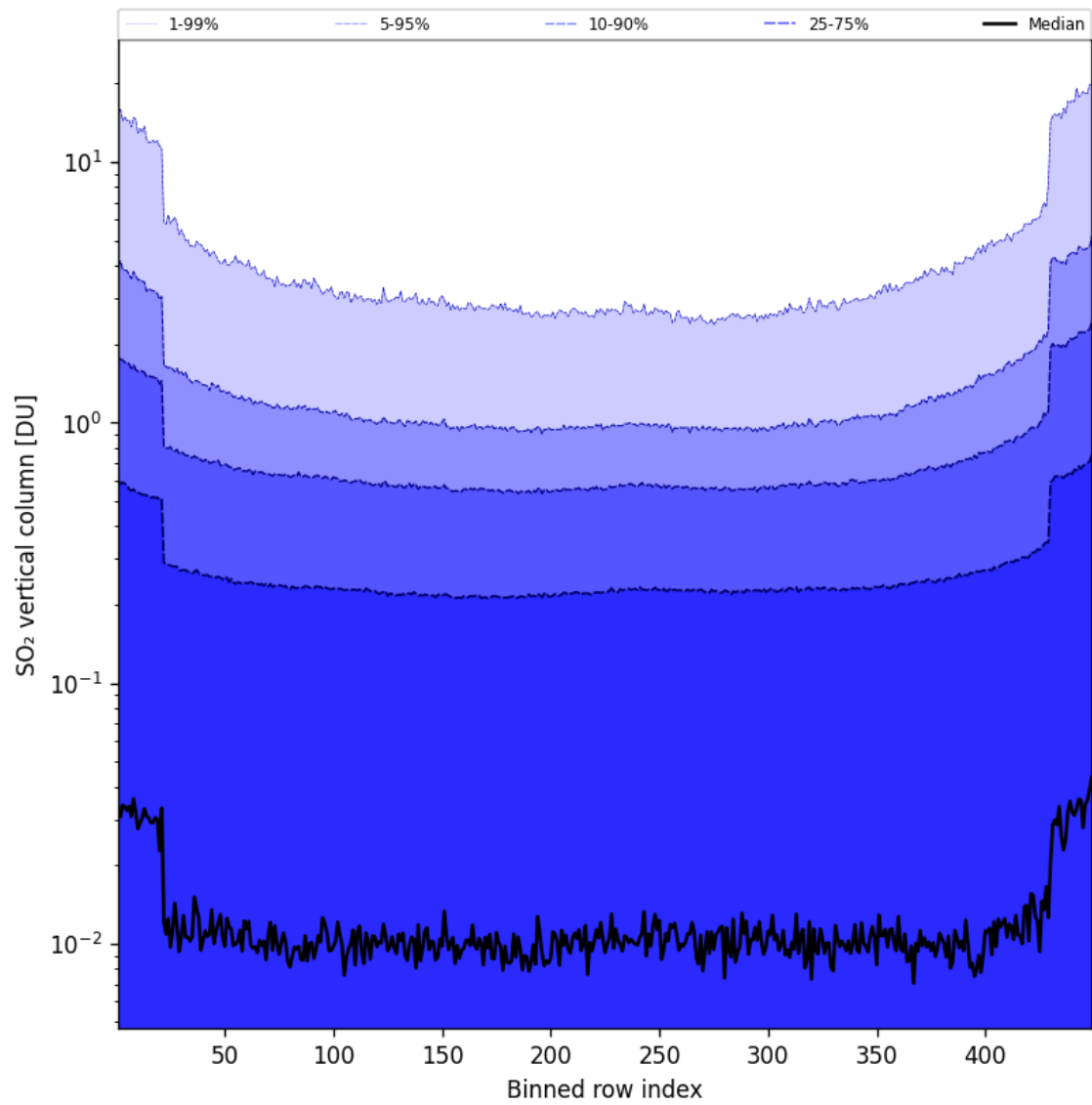


Figure 85: Along track statistics of “SO₂ vertical column” for 2025-03-08 to 2025-03-09

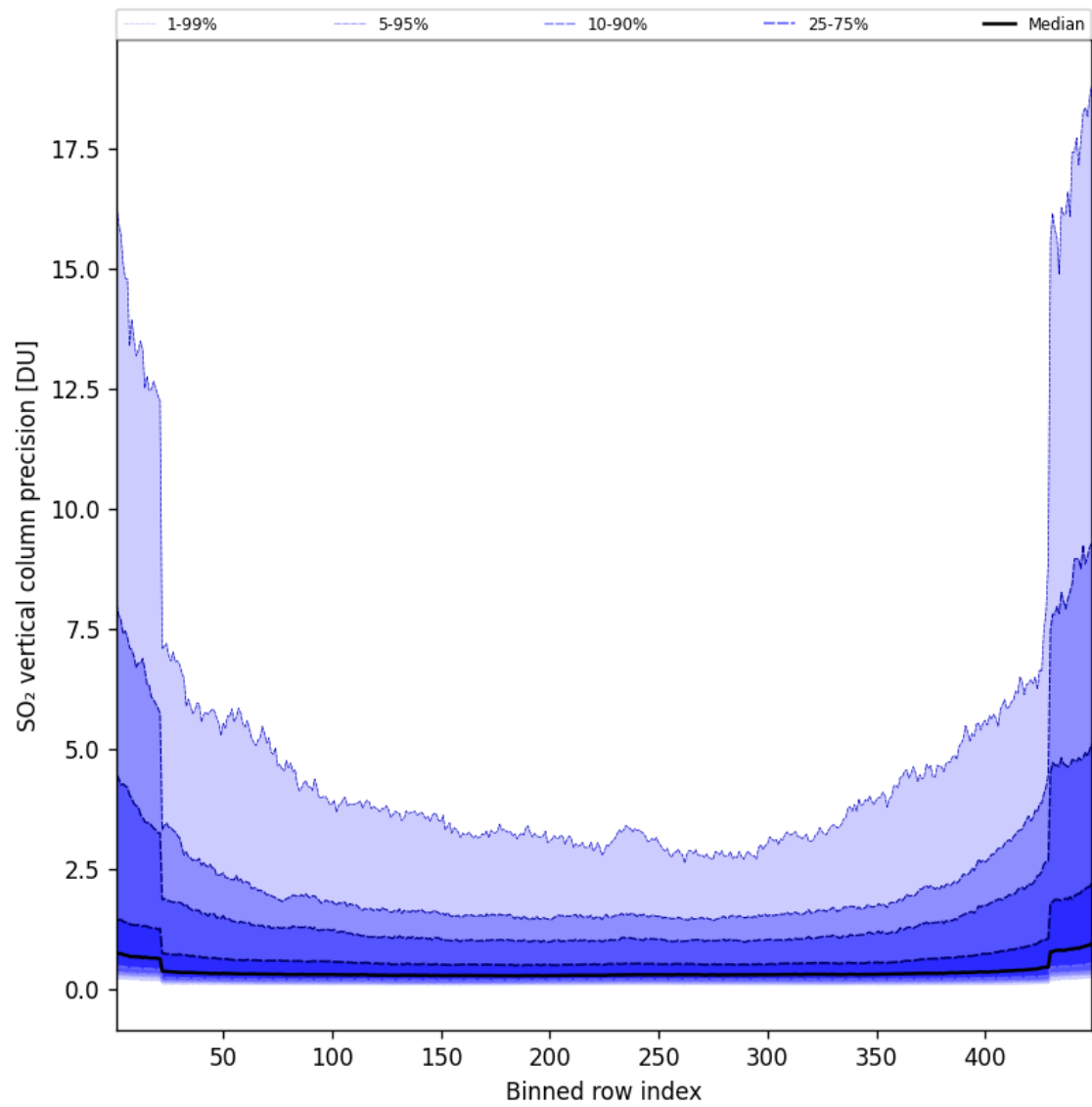


Figure 86: Along track statistics of “SO₂ vertical column precision” for 2025-03-08 to 2025-03-09

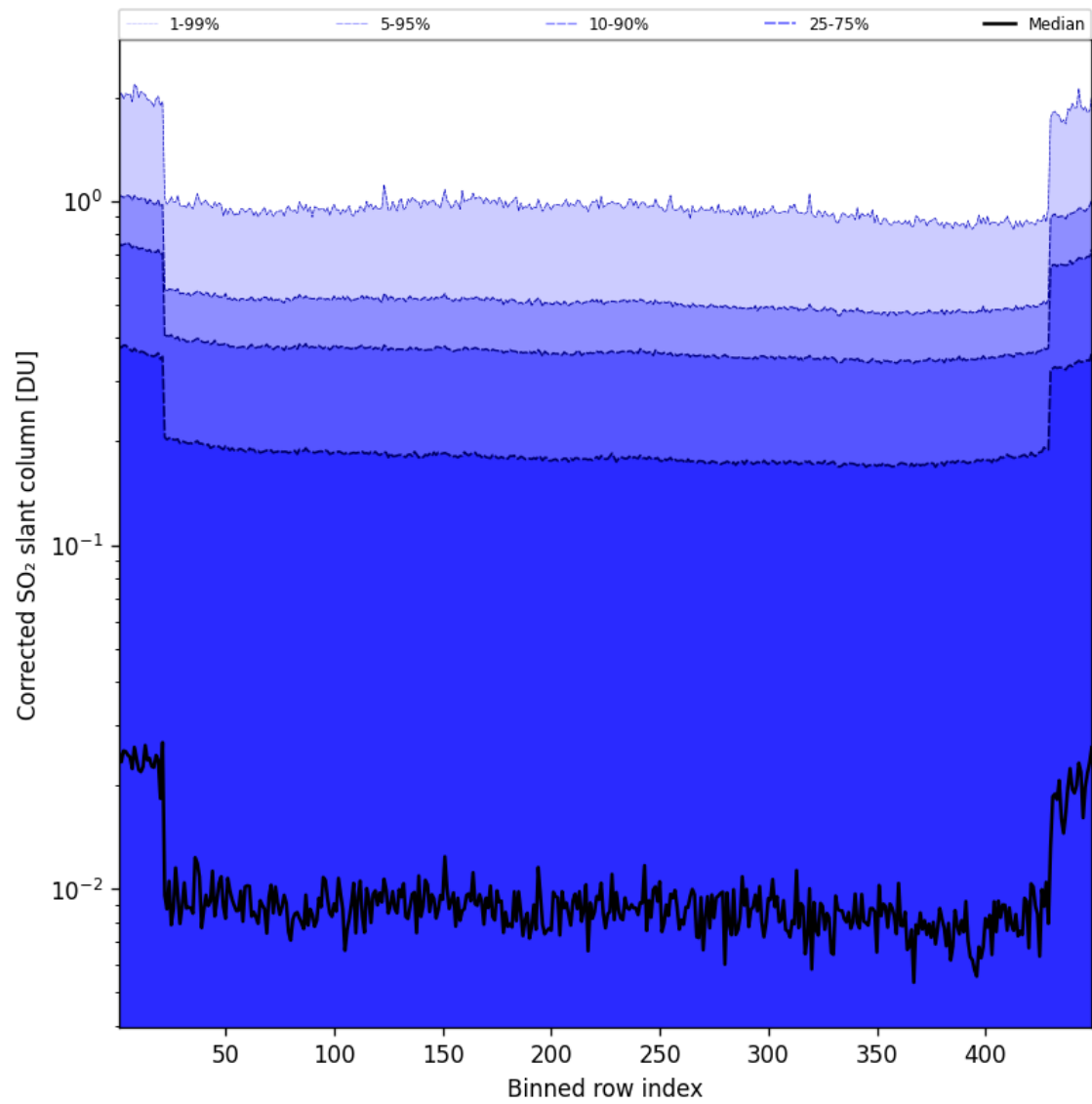


Figure 87: Along track statistics of “Corrected SO₂ slant column” for 2025-03-08 to 2025-03-09

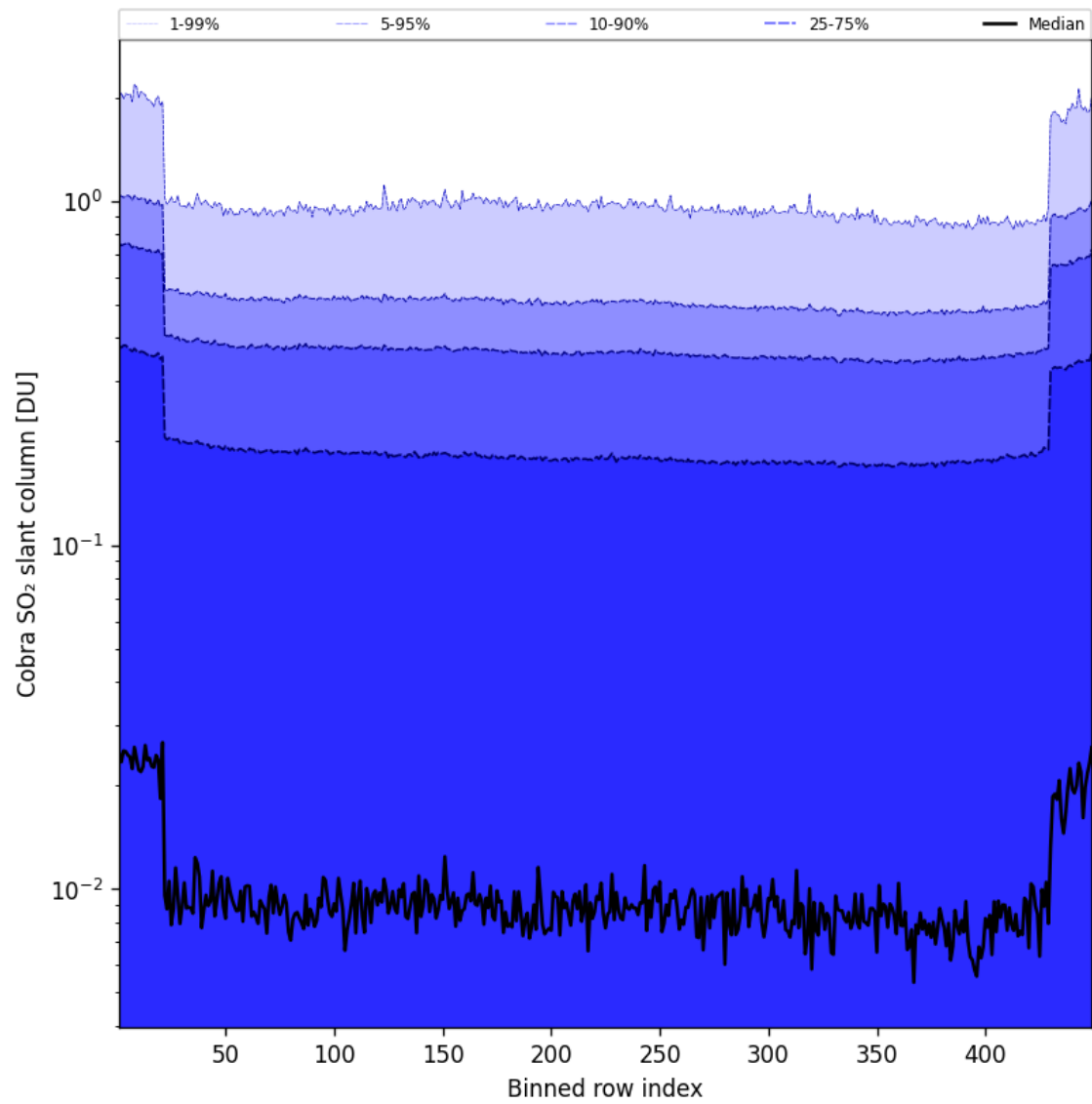


Figure 88: Along track statistics of “Cobra SO₂ slant column” for 2025-03-08 to 2025-03-09

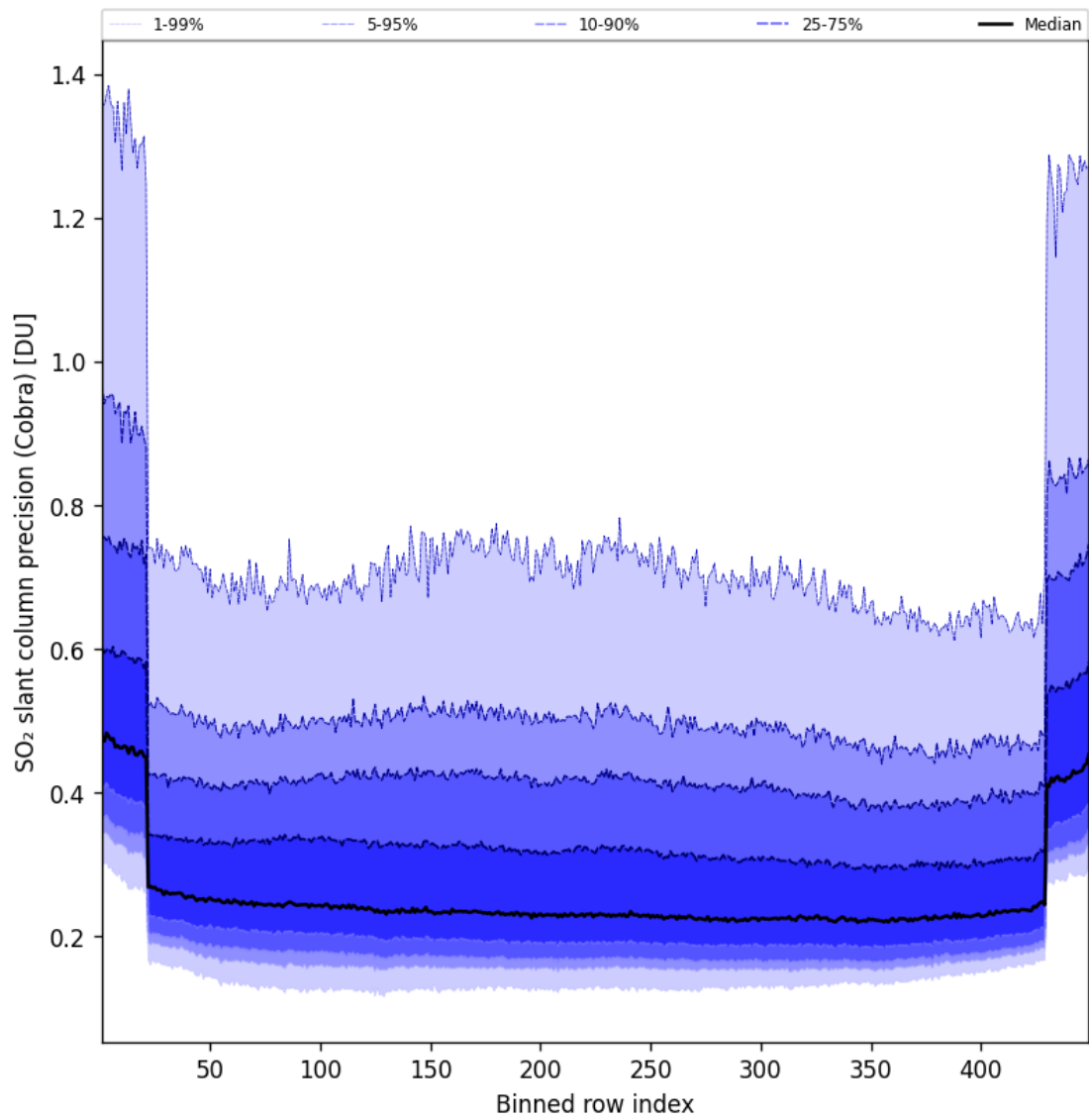


Figure 89: Along track statistics of “SO₂ slant column precision (Cobra)” for 2025-03-08 to 2025-03-09

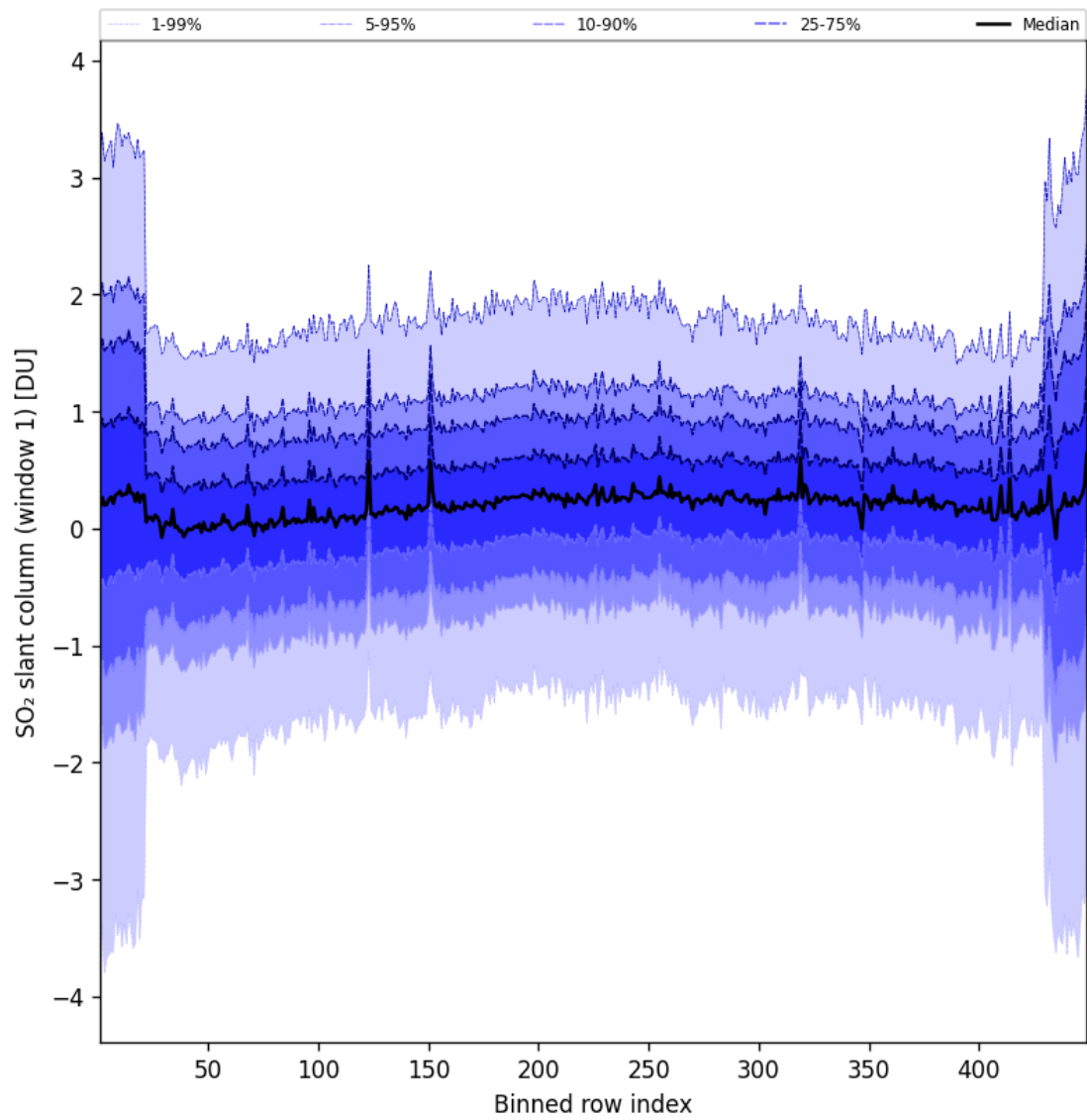


Figure 90: Along track statistics of “SO₂ slant column (window 1)” for 2025-03-08 to 2025-03-09

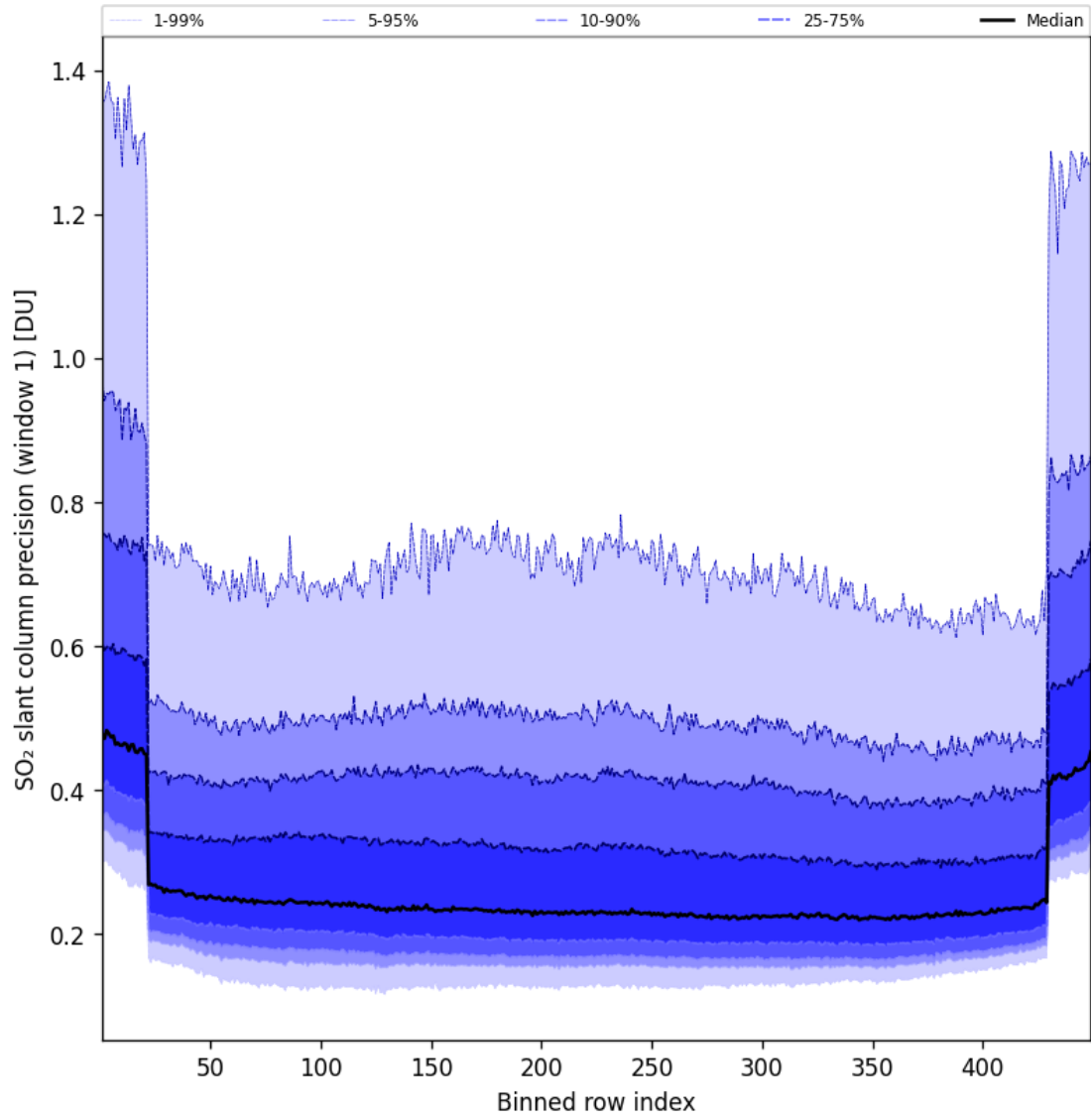


Figure 91: Along track statistics of “SO₂ slant column precision (window 1)” for 2025-03-08 to 2025-03-09

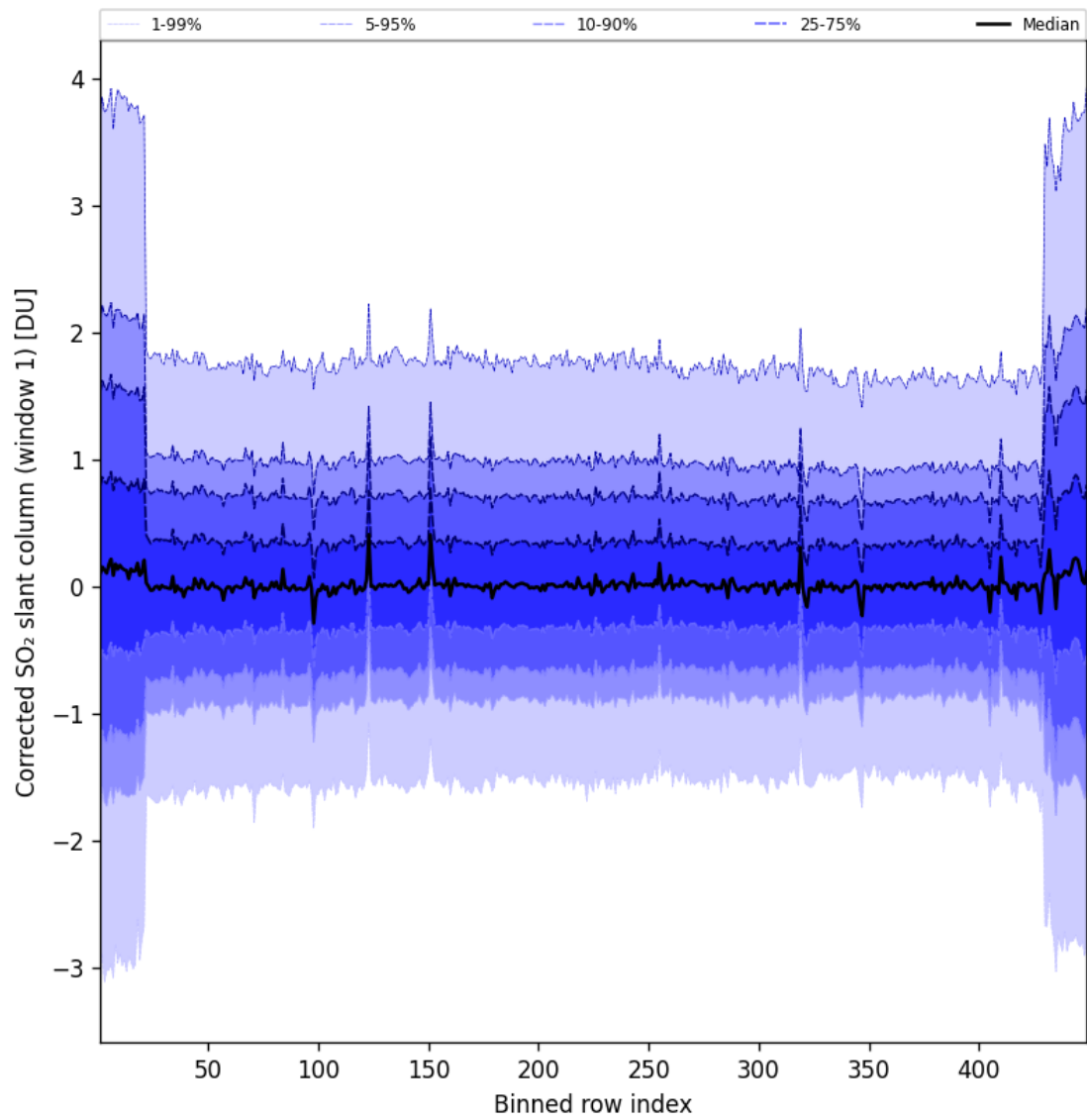


Figure 92: Along track statistics of “Corrected SO₂ slant column (window 1)” for 2025-03-08 to 2025-03-09

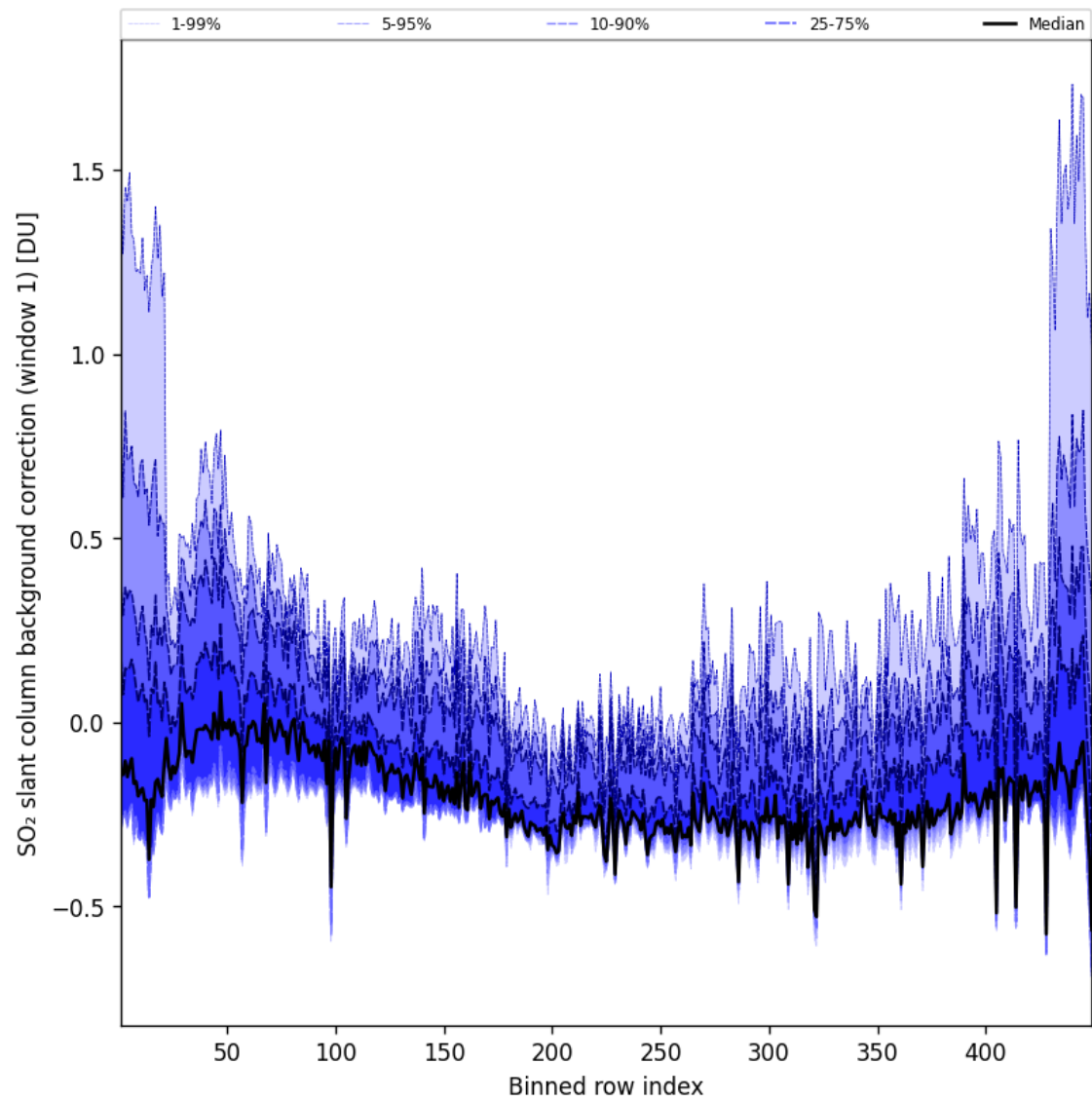


Figure 93: Along track statistics of “SO₂ slant column background correction (window 1)” for 2025-03-08 to 2025-03-09

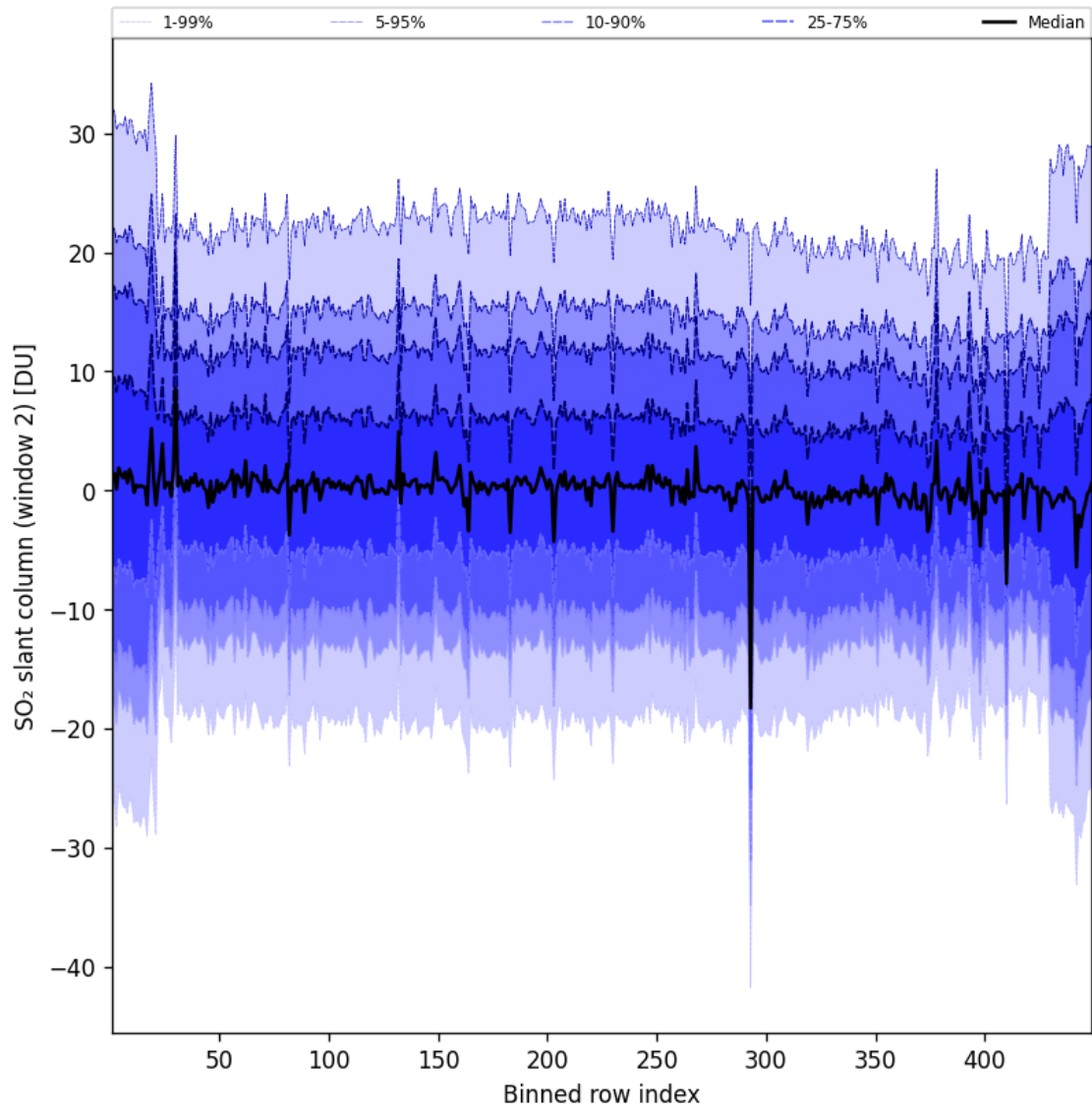


Figure 94: Along track statistics of “SO₂ slant column (window 2)” for 2025-03-08 to 2025-03-09

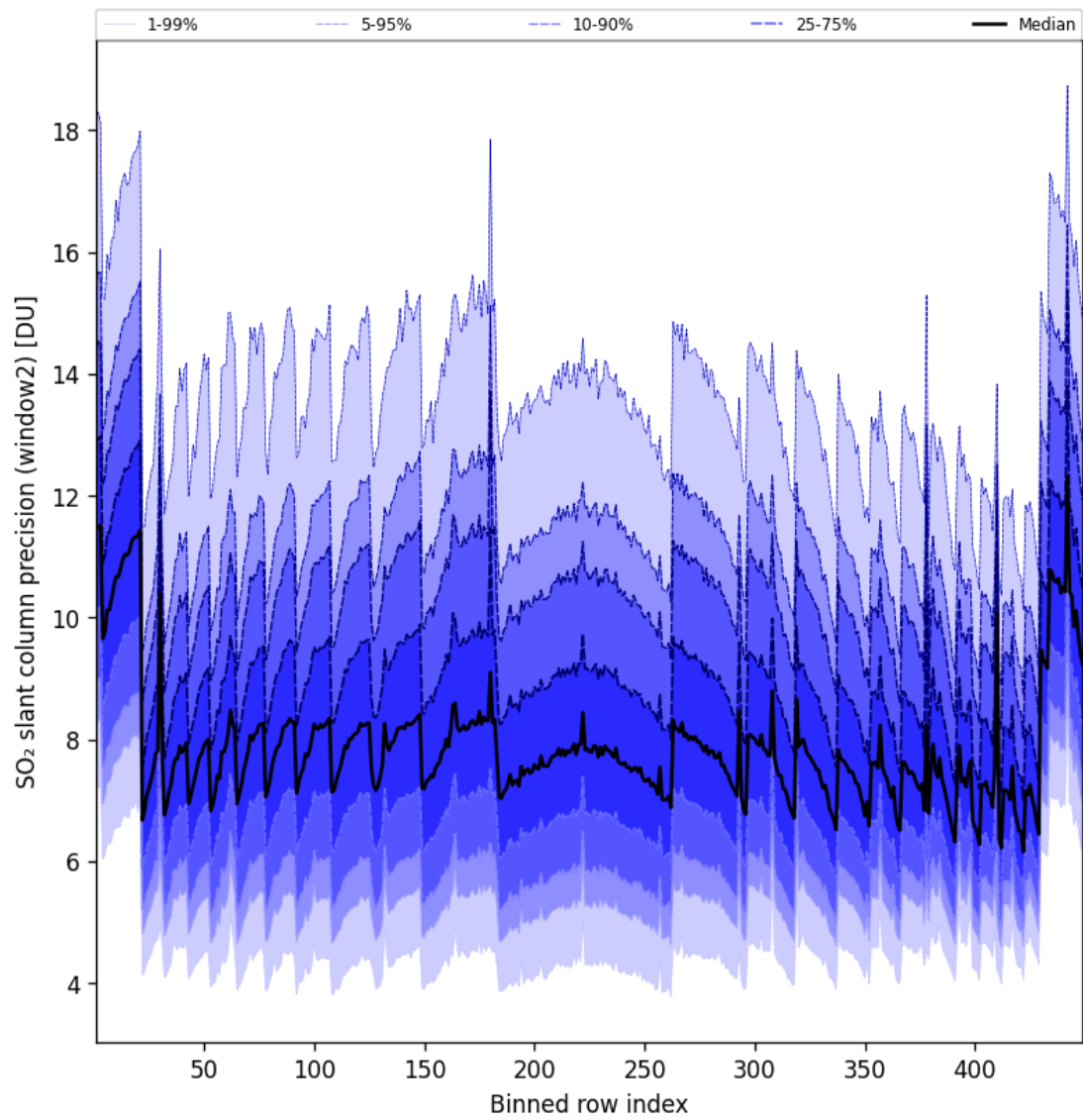


Figure 95: Along track statistics of “SO₂ slant column precision (window2)” for 2025-03-08 to 2025-03-09

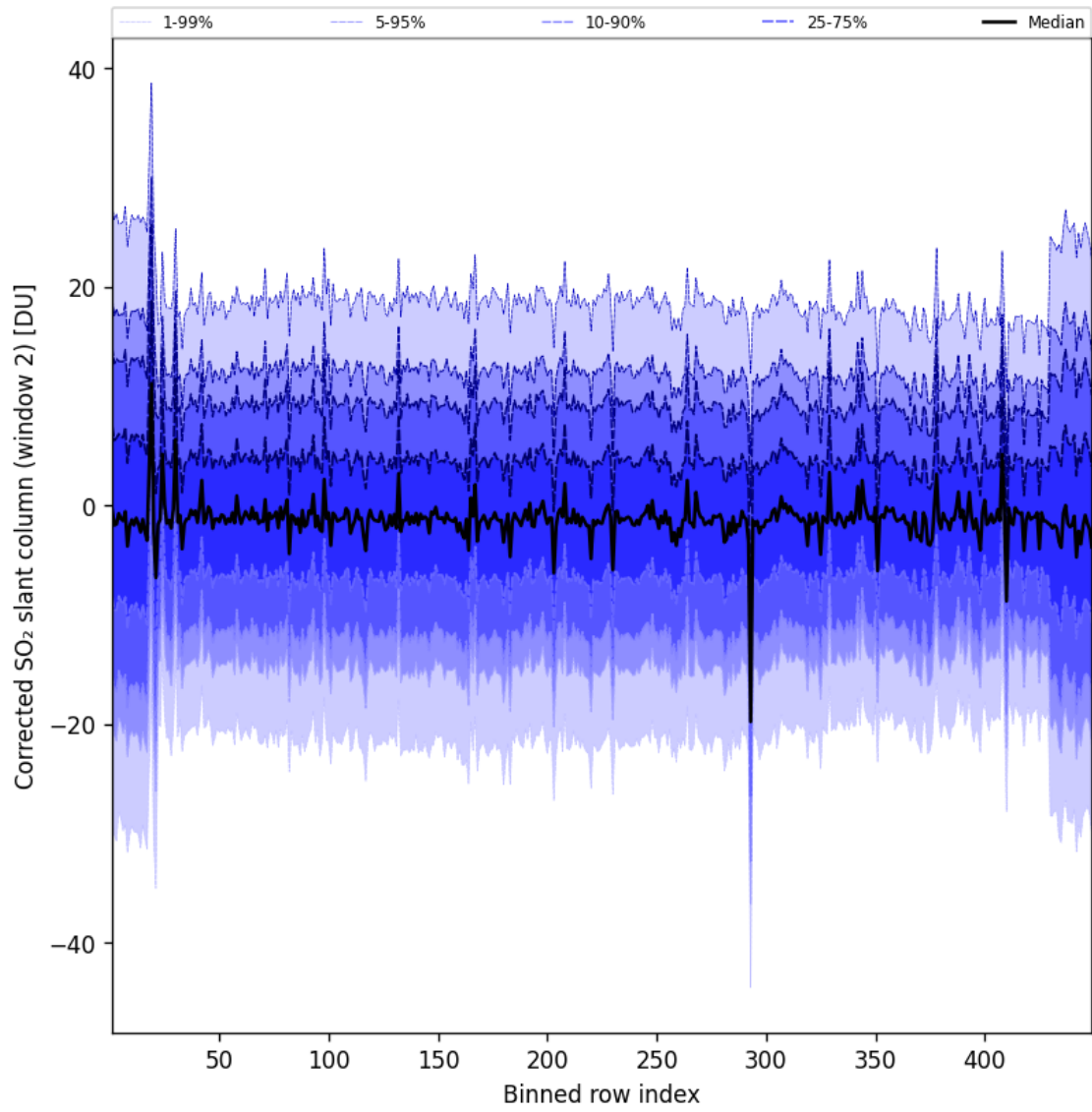


Figure 96: Along track statistics of “Corrected SO₂ slant column (window 2)” for 2025-03-08 to 2025-03-09

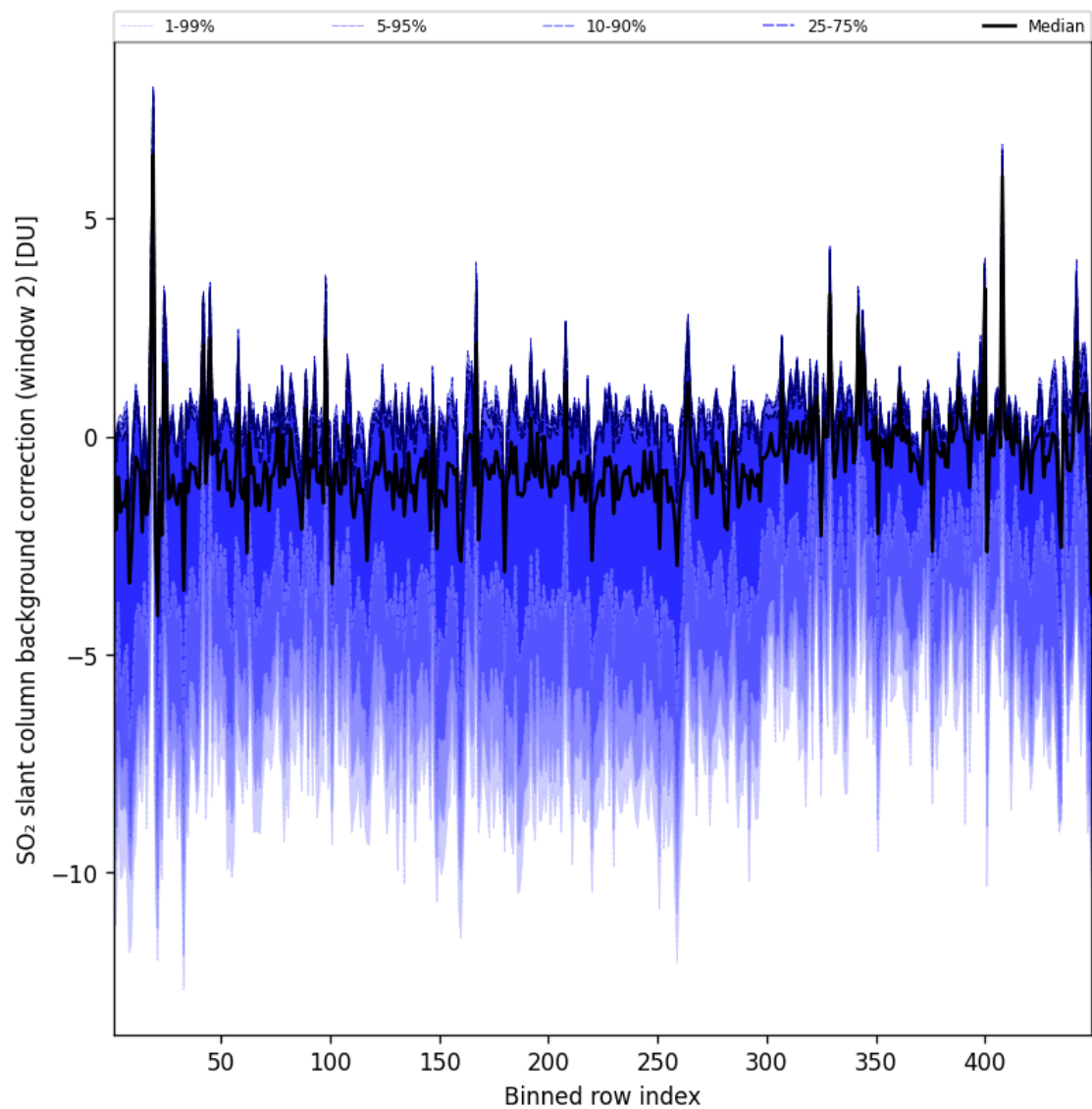


Figure 97: Along track statistics of “SO₂ slant column background correction (window 2)” for 2025-03-08 to 2025-03-09

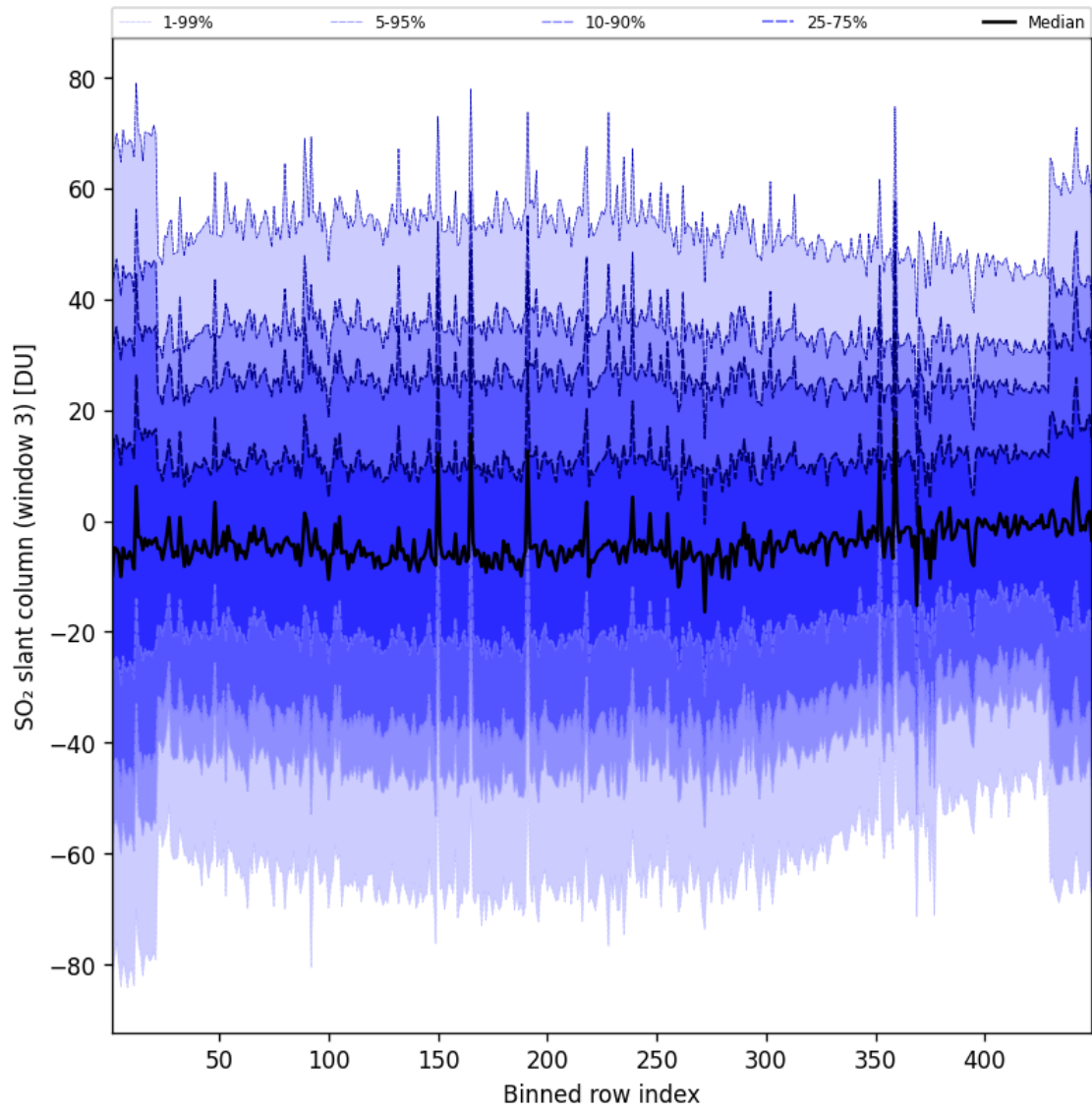


Figure 98: Along track statistics of “SO₂ slant column (window 3)” for 2025-03-08 to 2025-03-09

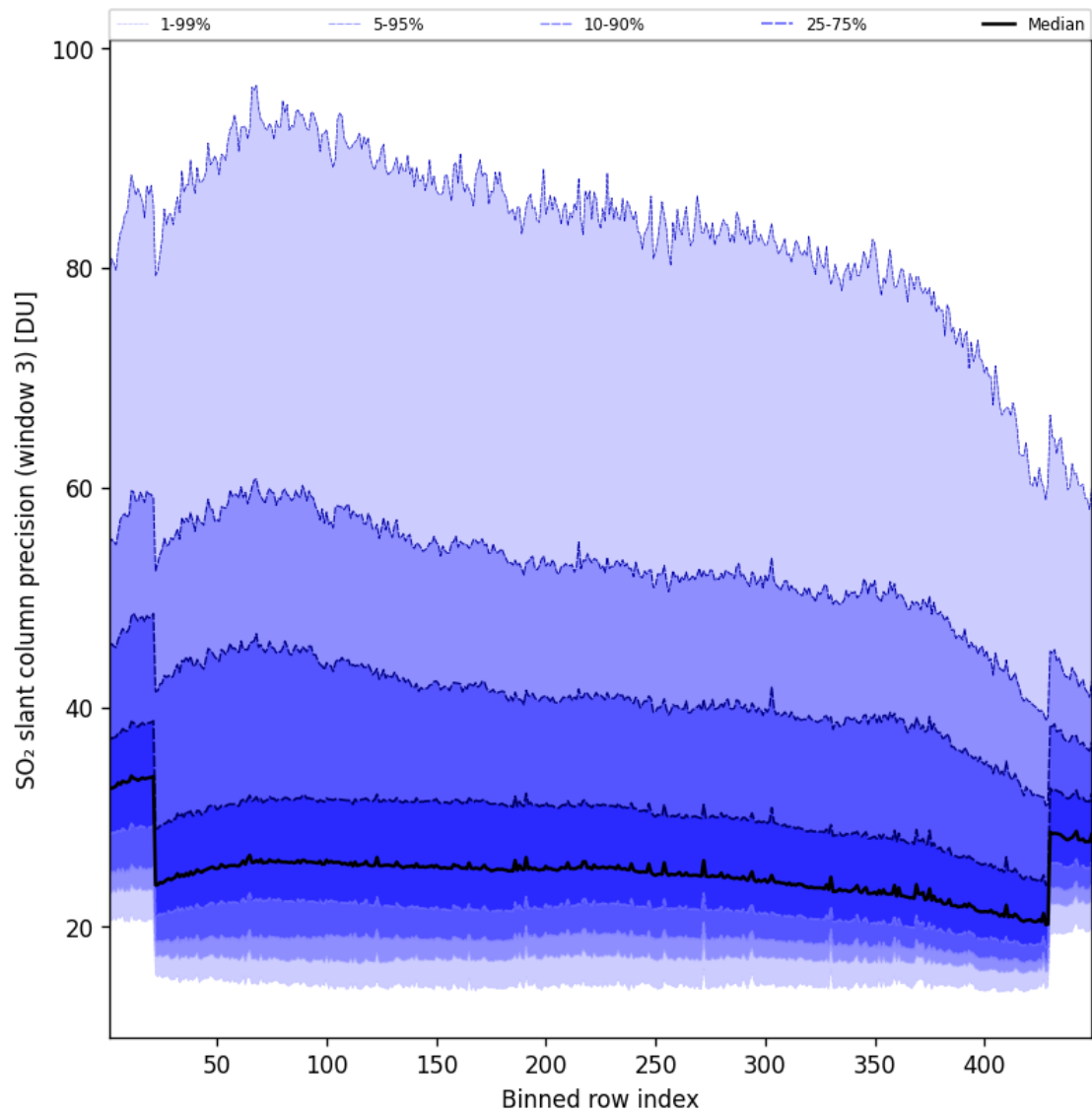


Figure 99: Along track statistics of “SO₂ slant column precision (window 3)” for 2025-03-08 to 2025-03-09

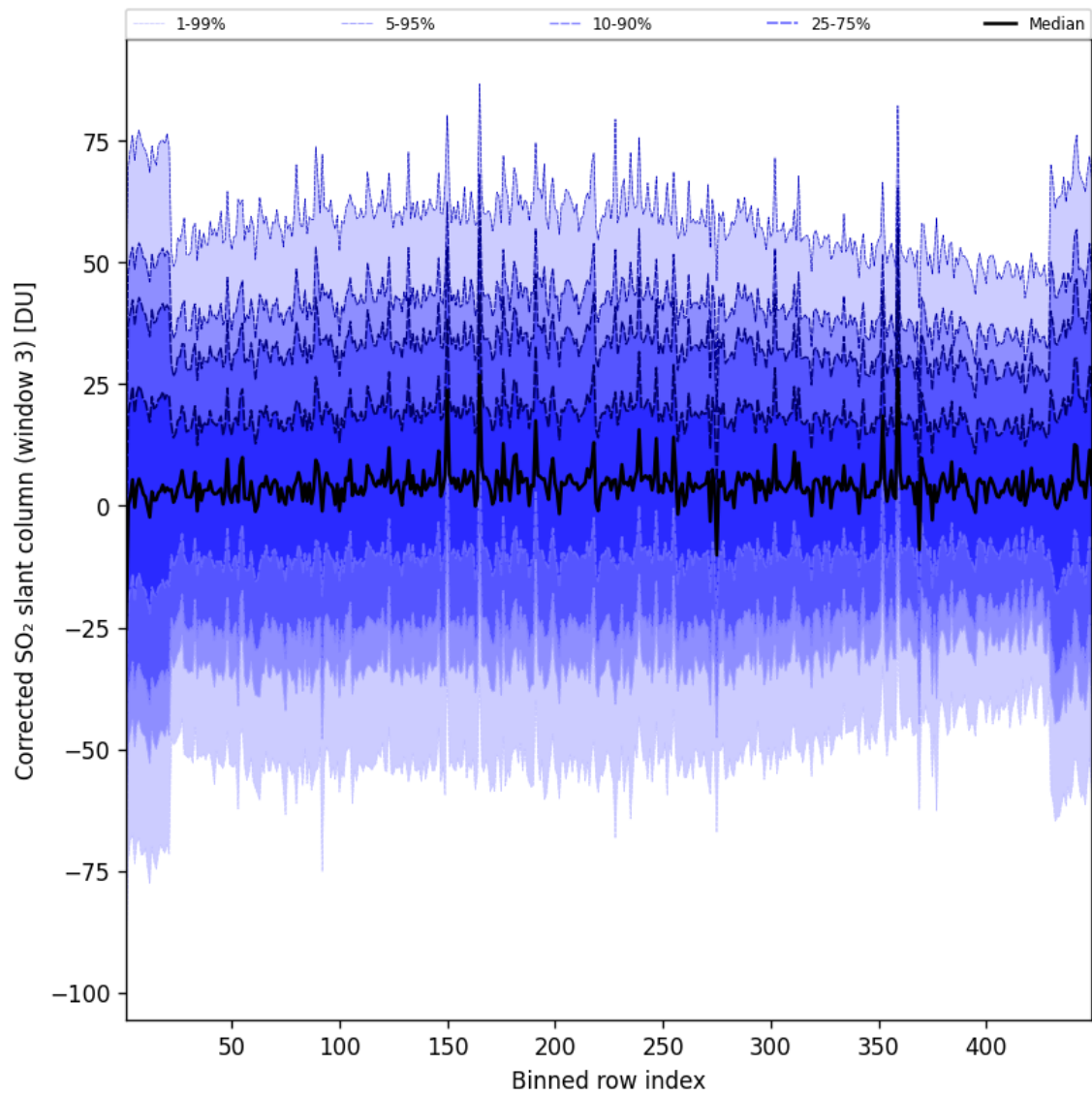


Figure 100: Along track statistics of “Corrected SO₂ slant column (window 3)” for 2025-03-08 to 2025-03-09

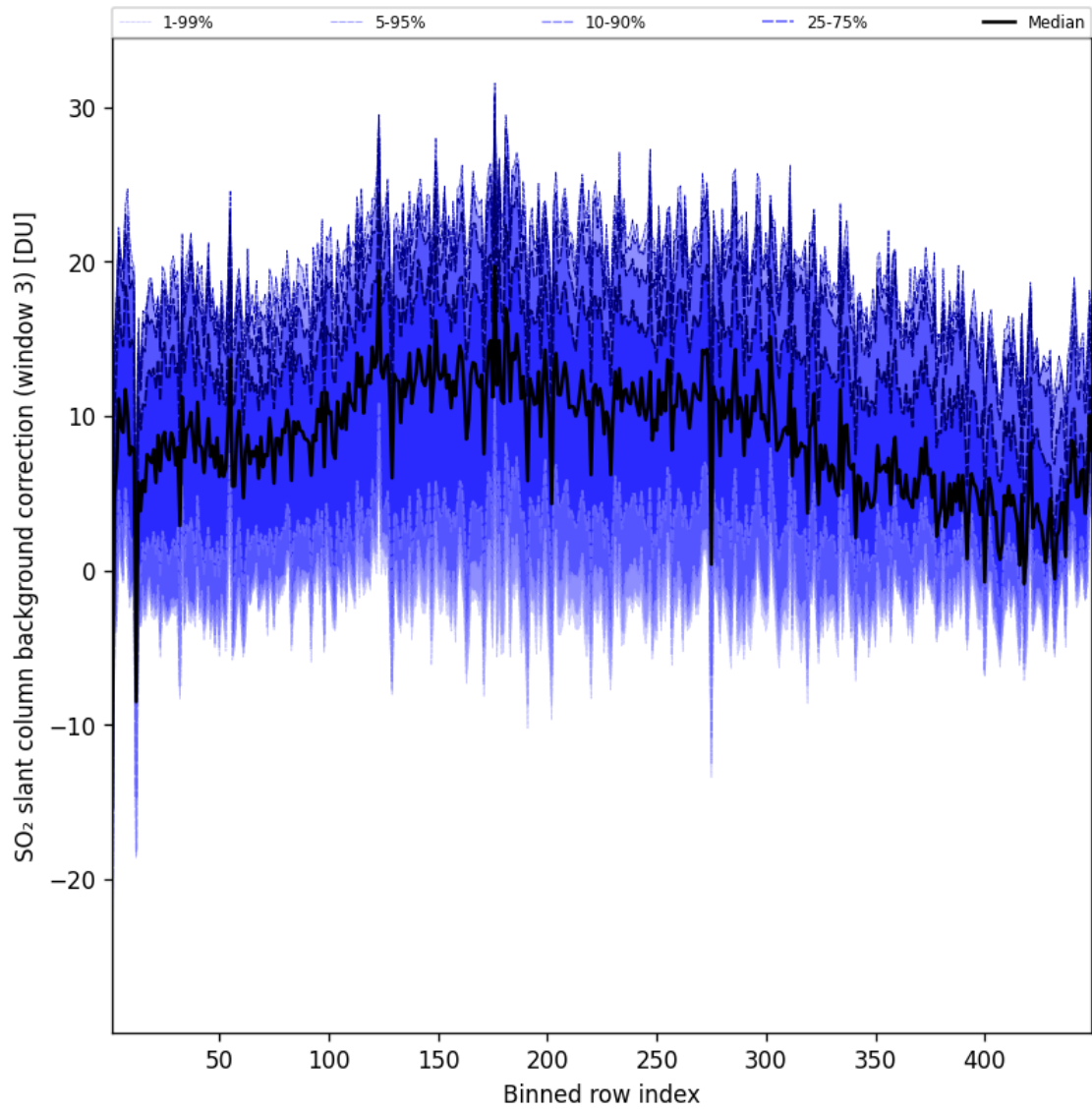


Figure 101: Along track statistics of “SO₂ slant column background correction (window 3)” for 2025-03-08 to 2025-03-09

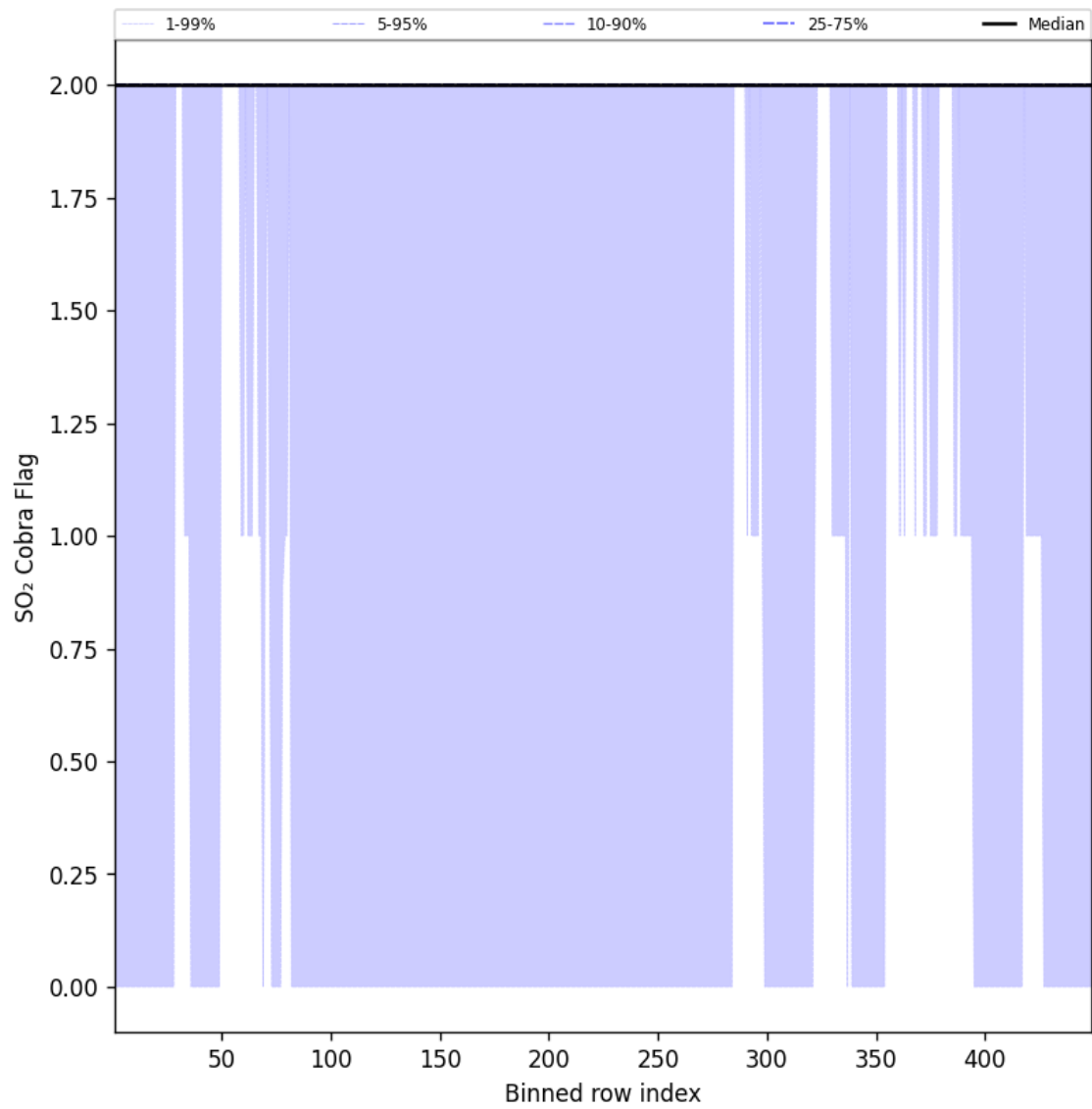


Figure 102: Along track statistics of "SO₂ Cobra Flag" for 2025-03-08 to 2025-03-09

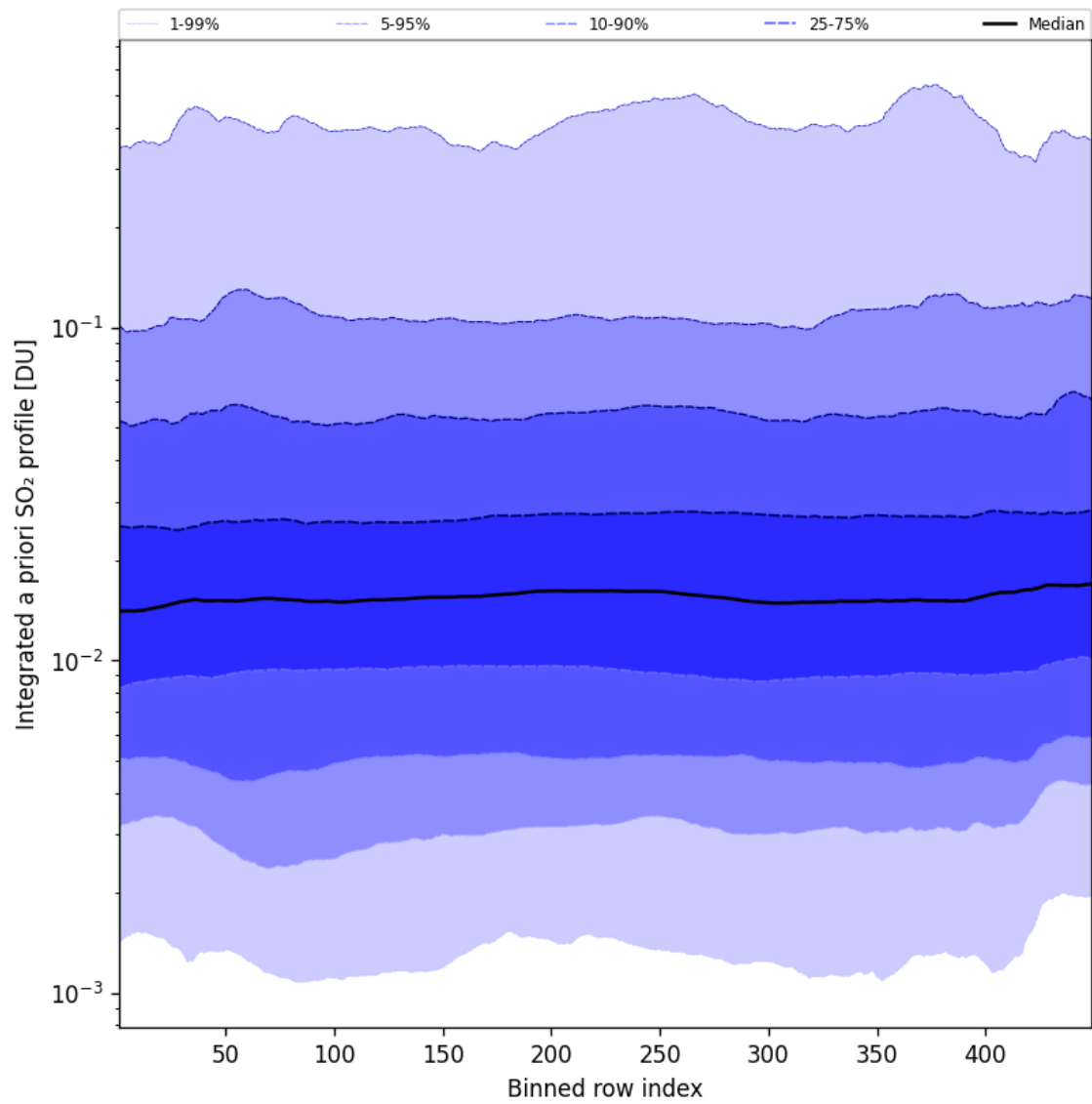


Figure 103: Along track statistics of “Integrated a priori SO₂ profile” for 2025-03-08 to 2025-03-09

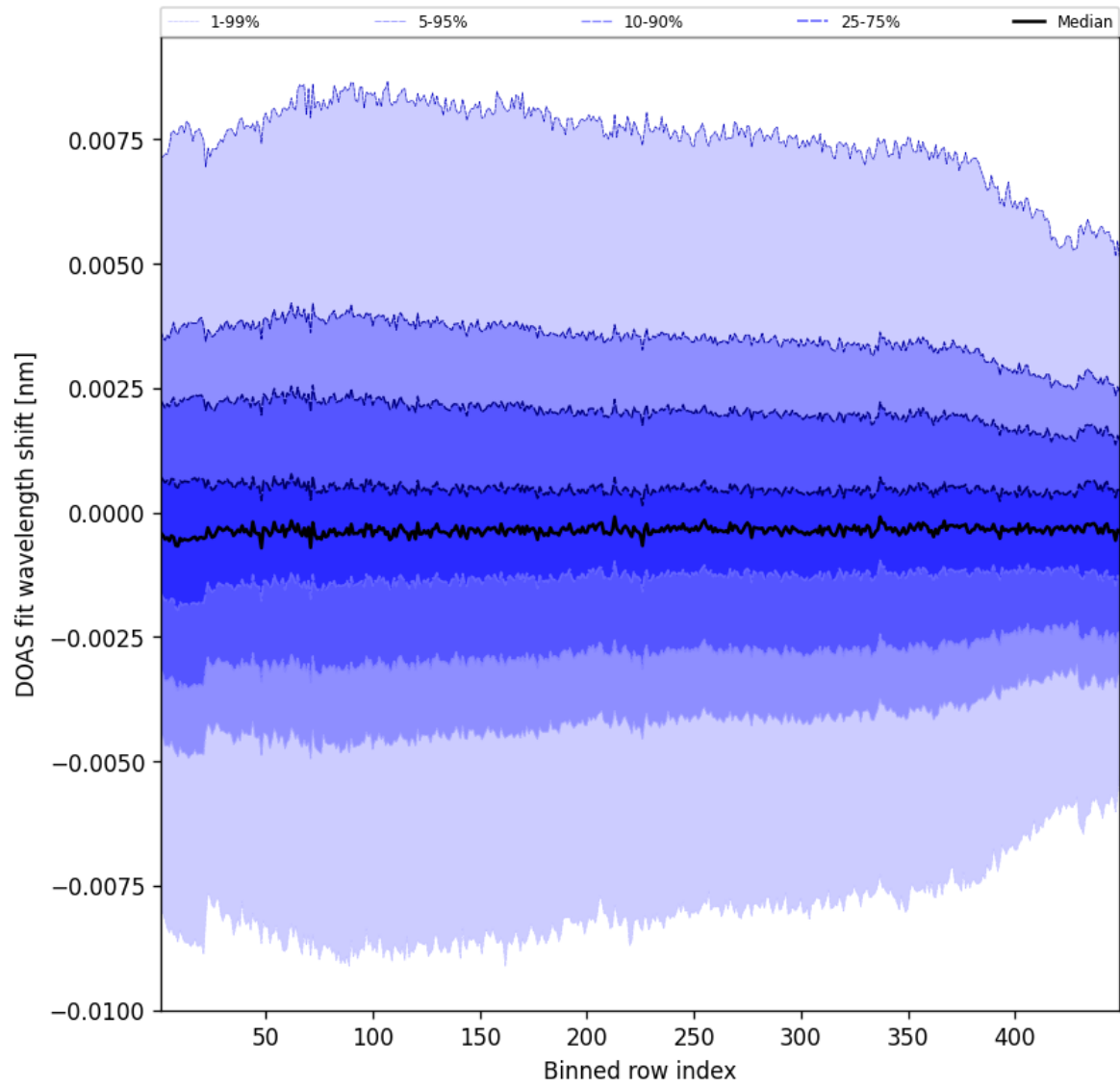


Figure 104: Along track statistics of "DOAS fit wavelength shift" for 2025-03-08 to 2025-03-09

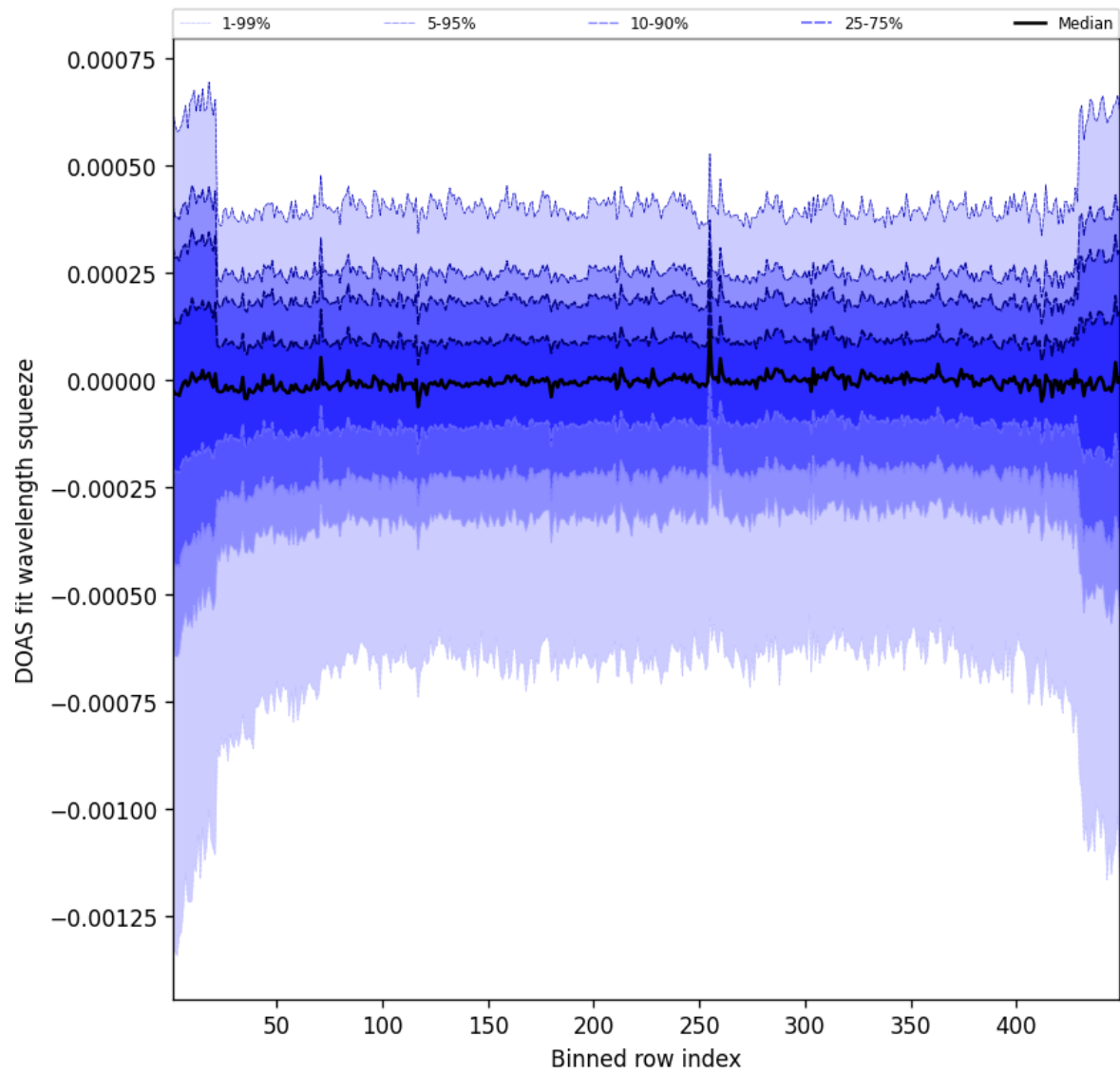


Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2025-03-08 to 2025-03-09

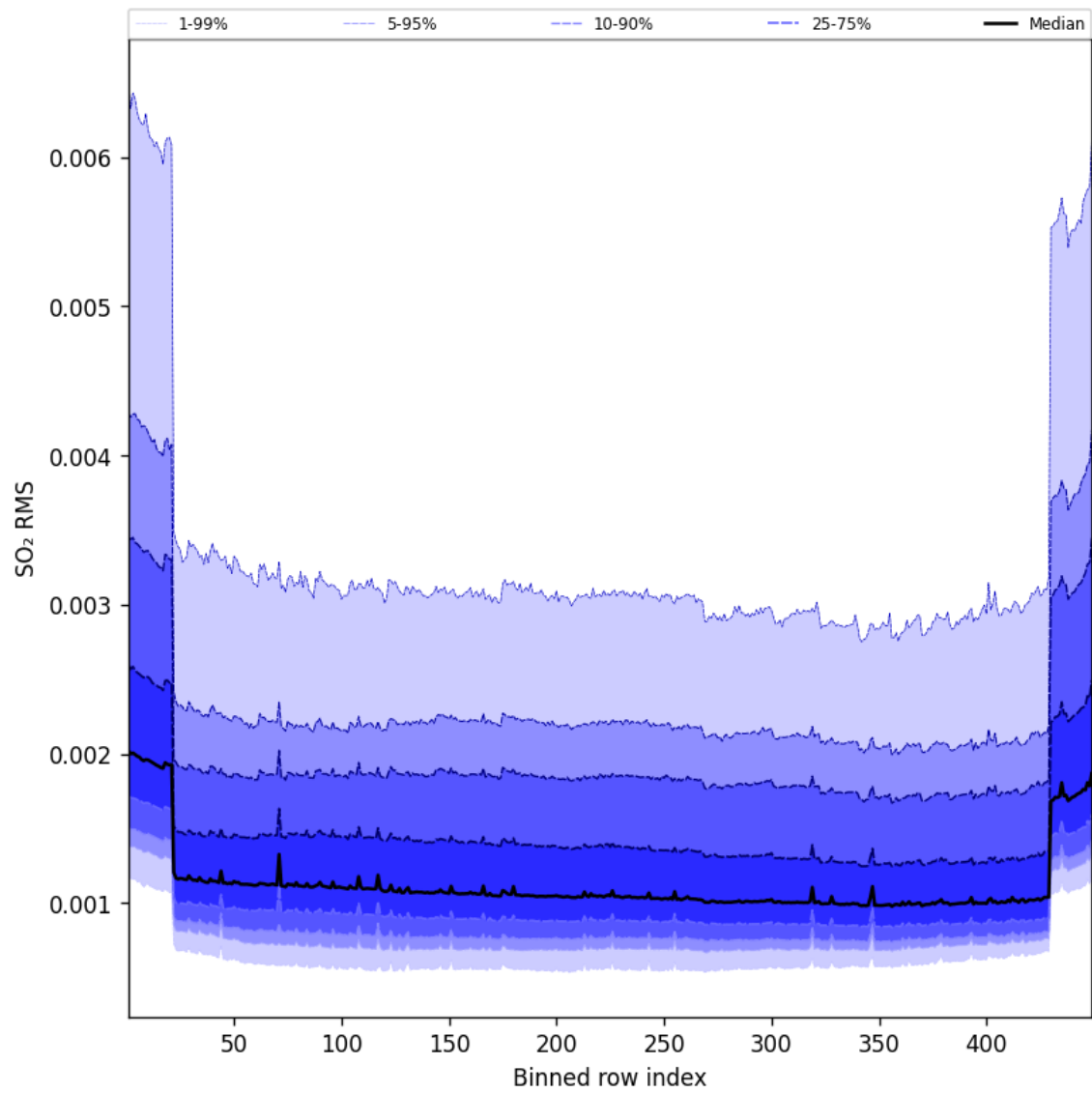


Figure 106: Along track statistics of “SO₂ RMS” for 2025-03-08 to 2025-03-09

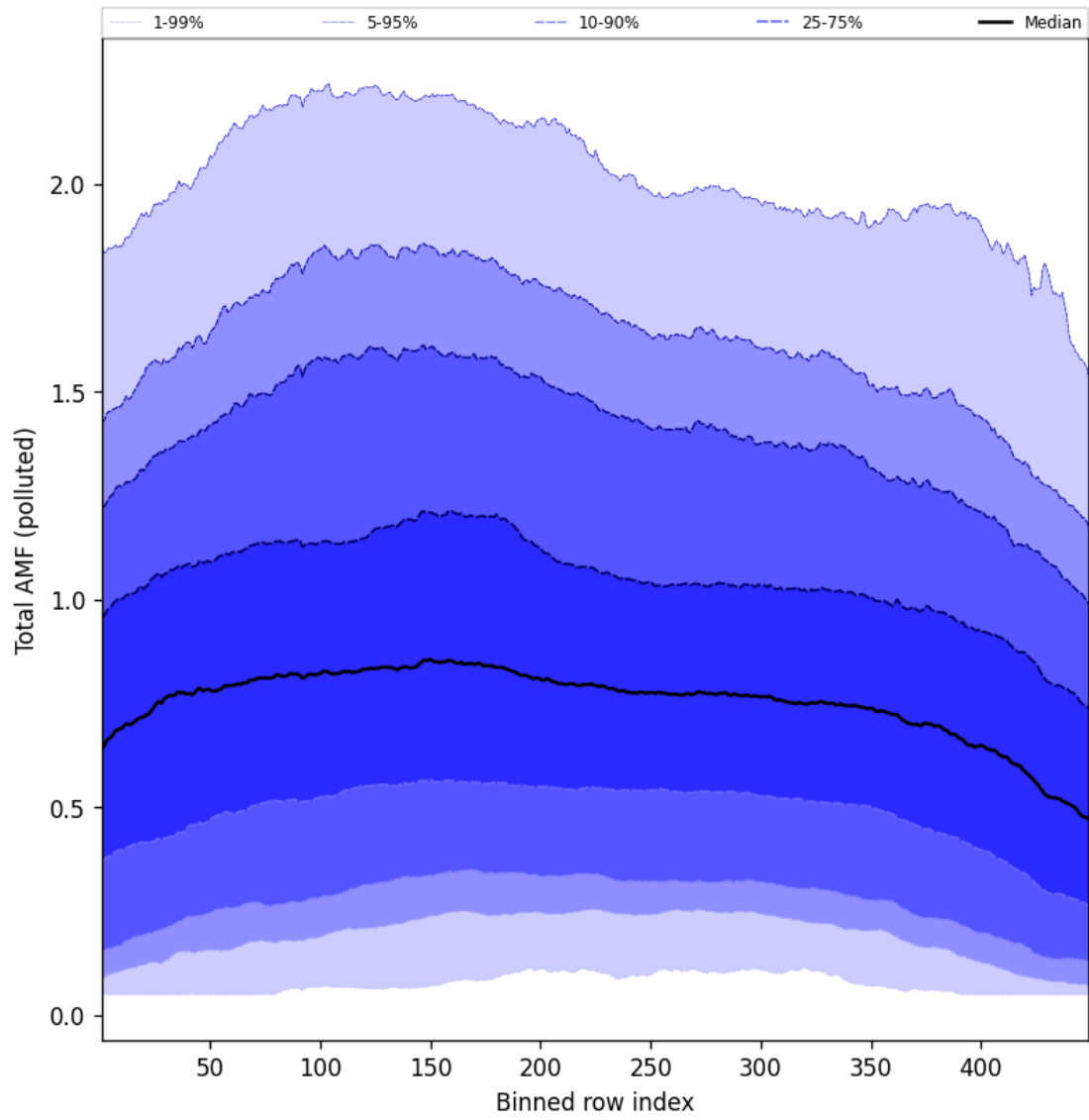


Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-03-08 to 2025-03-09

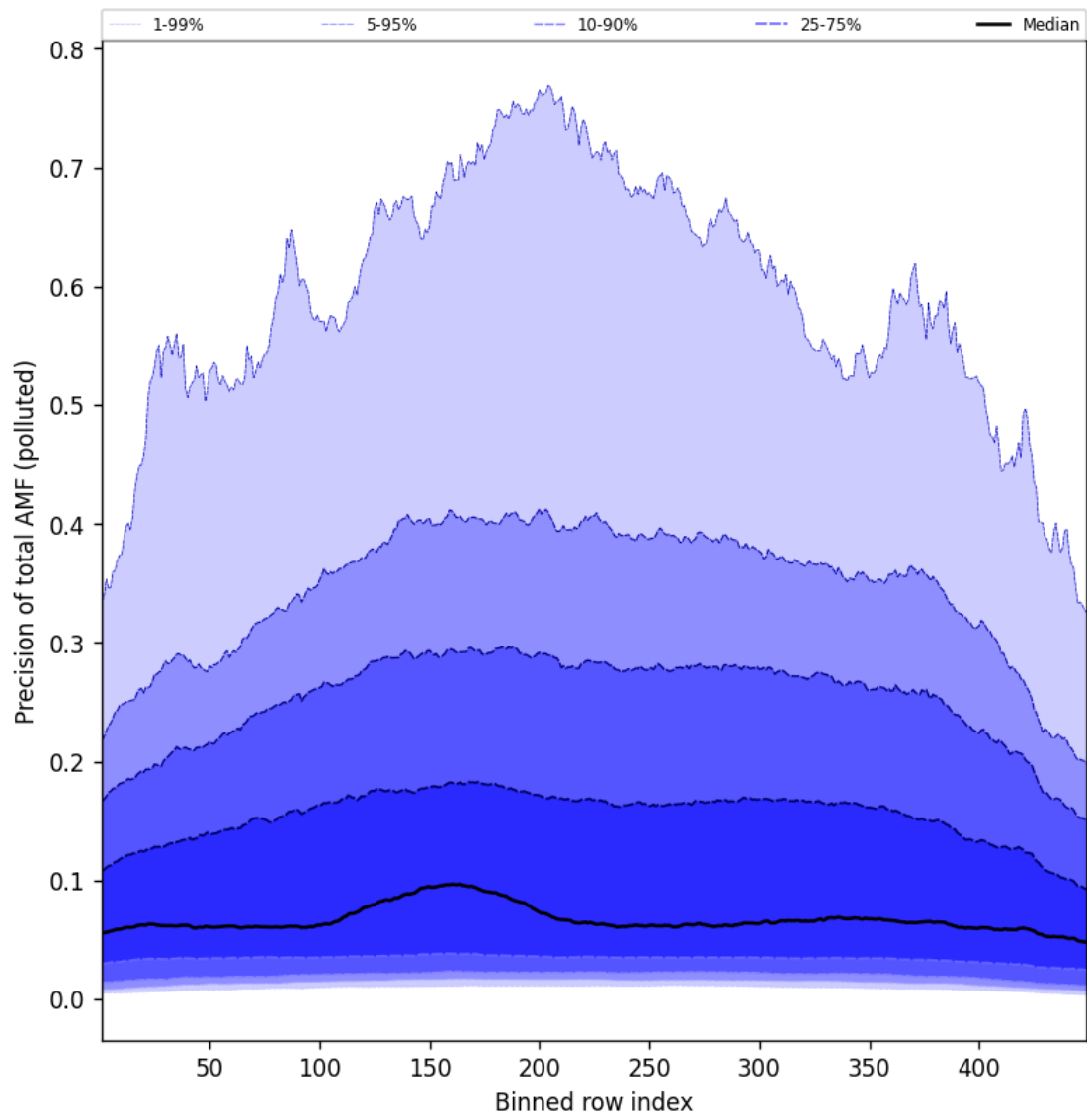


Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-03-08 to 2025-03-09

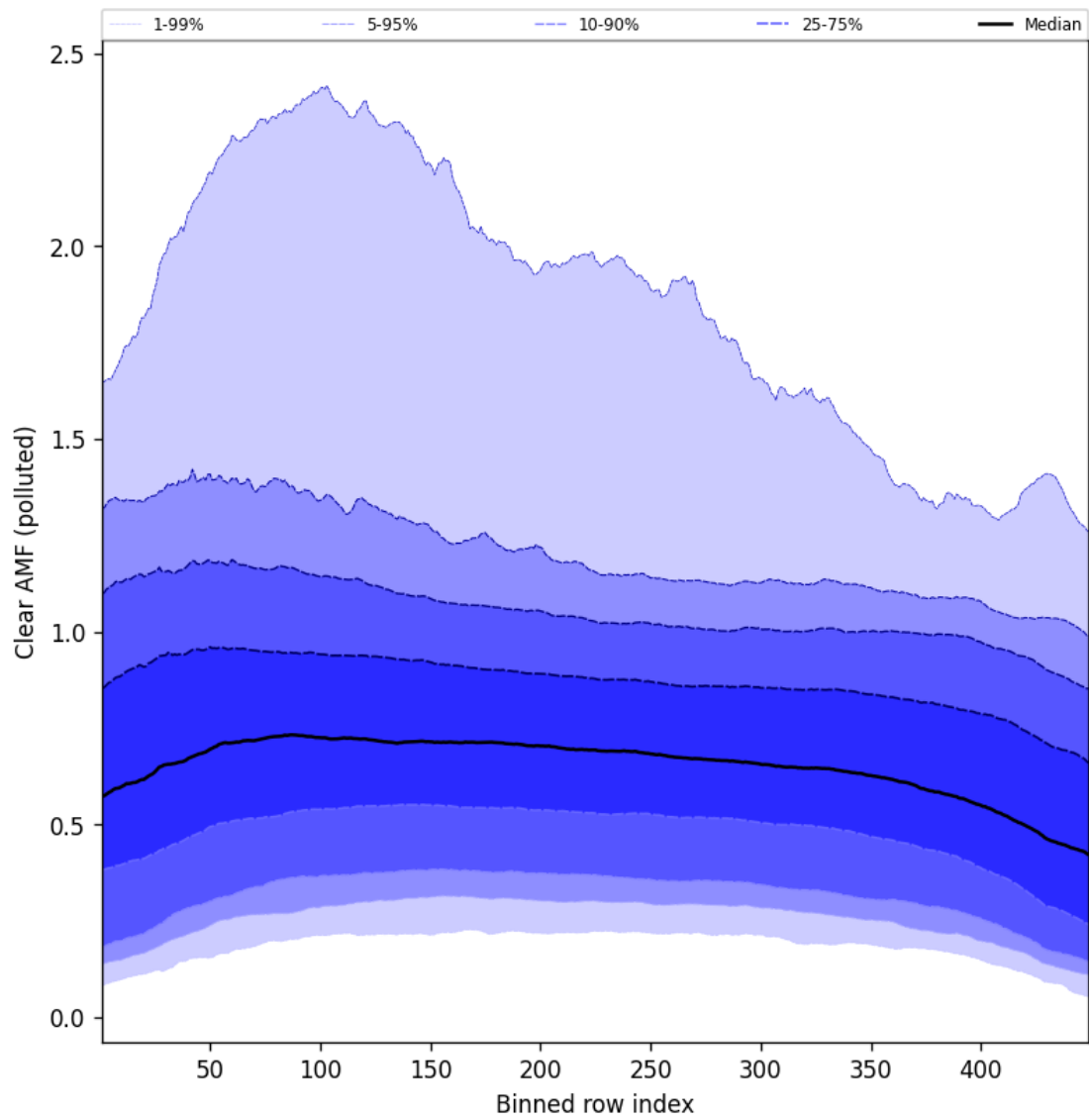


Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-03-08 to 2025-03-09

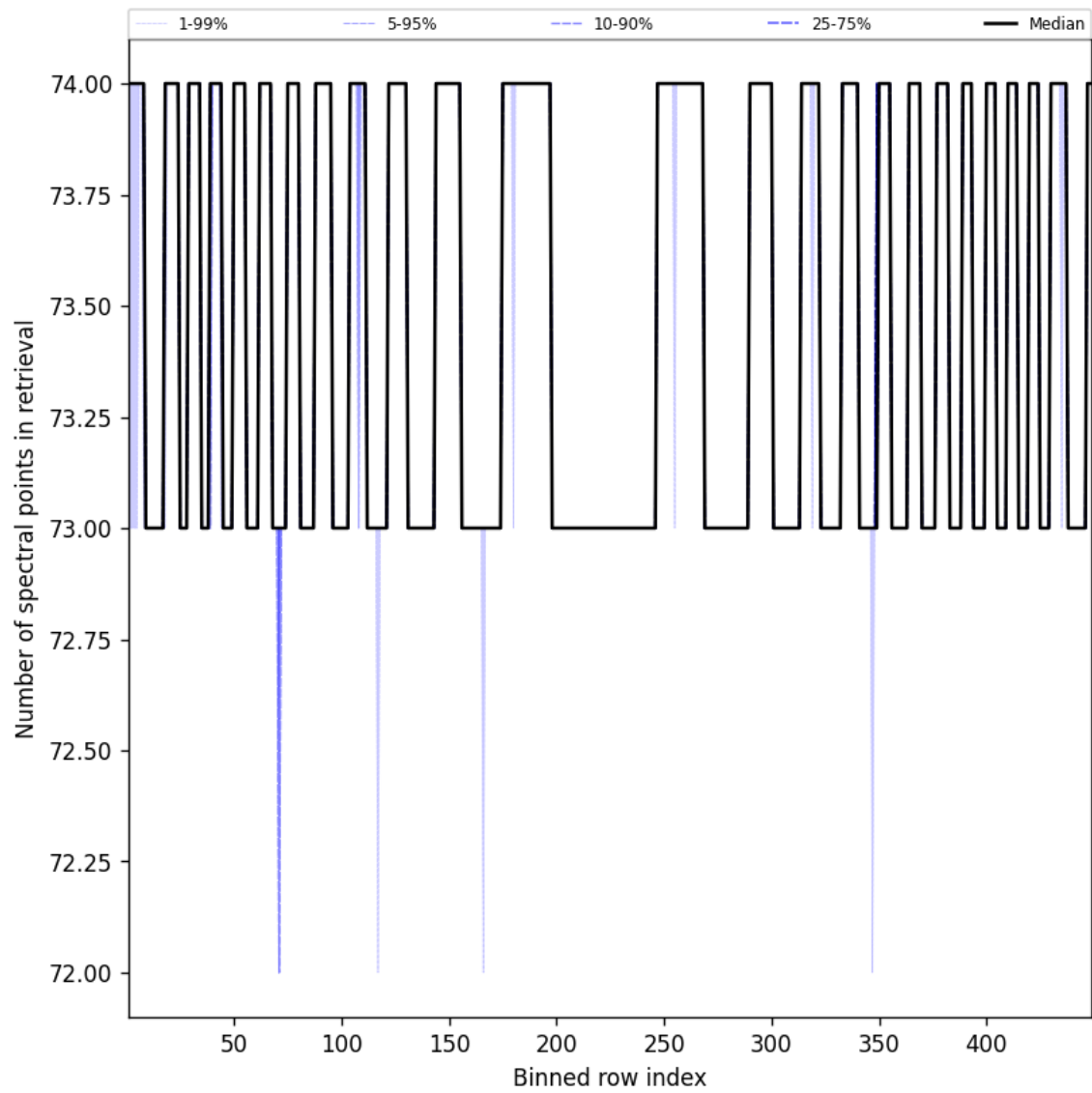


Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-03-08 to 2025-03-09

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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