

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]	0.638 ± 0.408	17299247	0.995	0.790	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(4.139 \pm 138.610) \times 10^{-2}$	17299247	0.278	0.487	1.119×10^{-2}	-135	137
sulfurdioxide total vertical column precision [DU]	0.641 ± 1.023	17299247	0.197	0.435	0.352	4.355×10^{-2}	37.5
sulfurdioxide slant column density corrected [DU]	$(2.024 \pm 38.597) \times 10^{-2}$	17299247	0.235	0.360	9.161×10^{-3}	-15.0	64.1
sulfurdioxide slant column density cobra [DU]	$(2.006 \pm 37.694) \times 10^{-2}$	17299247	0.235	0.360	9.161×10^{-3}	-15.0	25.9
sulfurdioxide slant column density cobra precision [DU]	0.297 ± 0.149	17299247	0.213	0.154	0.247	8.002×10^{-2}	17.3
sulfurdioxide slant column density window1 [DU]	0.226 ± 0.715	17299247	0.325	0.736	0.253	-68.3	126
sulfurdioxide slant column density window1 precision [DU]	0.297 ± 0.149	17299247	0.213	0.154	0.247	8.002×10^{-2}	17.3
sulfurdioxide slant column density corrected win1 [DU]	$(4.976 \pm 69.971) \times 10^{-2}$	17299247	2.500×10^{-2}	0.714	3.246×10^{-2}	-68.3	125
background so2 slant column offset window1 [DU]	-0.177 ± 0.204	17299247	-0.300	0.214	-0.232	-1.46	3.65
sulfurdioxide slant column density window2 [DU]	3.32 ± 8.99	17299247	2.75	11.4	3.08	-641	806
sulfurdioxide slant column density window2 precision [DU]	8.07 ± 2.21	17299247	7.43	2.58	7.75	2.19	560
sulfurdioxide slant column density corrected win2 [DU]	-0.163 ± 8.765	17299247	0.250	11.1	-0.108	-644	798
background so2 slant column offset window2 [DU]	-3.48 ± 2.99	17299247	-1.25	3.96	-2.48	-23.7	4.91
sulfurdioxide slant column density window3 [DU]	-18.2 ± 24.2	17299247	-19.6	30.5	-18.4	-455	312
sulfurdioxide slant column density window3 precision [DU]	28.1 ± 13.2	17299247	22.5	9.48	24.7	9.77	251
sulfurdioxide slant column density corrected win3 [DU]	0.165 ± 23.258	17299247	-0.560	29.4	0.169	-451	320
background so2 slant column offset window3 [DU]	18.4 ± 7.6	17299247	12.9	12.5	17.8	-12.3	73.8
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.22	17299247	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(3.226 \pm 7.239) \times 10^{-2}$	17299247	1.539×10^{-2}	1.780×10^{-2}	1.592×10^{-2}	1.698×10^{-4}	2.01
fitted radiance shift [nm]	$(-6.155 \pm 26.366) \times 10^{-4}$	17299247	-5.000×10^{-4}	1.855×10^{-3}	-5.945×10^{-4}	-4.947×10^{-2}	4.505×10^{-2}
fitted radiance squeeze [1]	$(-3.355 \pm 19.804) \times 10^{-5}$	17299247	-1.000×10^{-5}	2.051×10^{-4}	-1.790×10^{-5}	-1.663×10^{-2}	2.403×10^{-2}
fitted root mean square [1]	$(1.300 \pm 0.614) \times 10^{-3}$	17299247	9.250×10^{-4}	6.108×10^{-4}	1.105×10^{-3}	3.249×10^{-4}	5.646×10^{-2}
sulfurdioxide total air mass factor polluted [1]	0.795 ± 0.430	17299247	0.540	0.563	0.744	5.000×10^{-2}	3.05
sulfurdioxide total air mass factor polluted precision [1]	0.115 ± 0.130	17299247	2.500×10^{-2}	0.116	6.391×10^{-2}	2.500×10^{-3}	1.81
sulfurdioxide clear air mass factor polluted [1]	0.682 ± 0.299	17299247	0.540	0.394	0.648	3.007×10^{-2}	3.26
number of spectral points in retrieval [1]	73.5 ± 0.5	17299247	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	4.000×10^{-2}	0.1000	0.210	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	-3.16	-1.08	-0.617	-0.399	-0.228	0.259	0.446	0.693	1.22	3.71
sulfurdioxide total vertical column precision [DU]	9.569×10^{-2}	0.135	0.162	0.186	0.221	0.656	0.923	1.27	2.00	4.90
sulfurdioxide slant column density corrected [DU]	-0.897	-0.500	-0.356	-0.264	-0.169	0.191	0.292	0.394	0.561	1.10
sulfurdioxide slant column density cobra [DU]	-0.897	-0.500	-0.356	-0.264	-0.169	0.191	0.292	0.394	0.561	1.10
sulfurdioxide slant column density cobra precision [DU]	0.134	0.161	0.175	0.186	0.200	0.355	0.415	0.472	0.568	0.857
sulfurdioxide slant column density window1 [DU]	-1.86	-0.892	-0.548	-0.336	-0.125	0.611	0.797	0.976	1.25	2.04
sulfurdioxide slant column density window1 precision [DU]	0.134	0.161	0.175	0.186	0.200	0.355	0.415	0.472	0.568	0.857
sulfurdioxide slant column density corrected win1 [DU]	-1.75	-0.965	-0.687	-0.507	-0.321	0.393	0.593	0.793	1.12	2.09
background so2 slant column offset window1 [DU]	-0.428	-0.373	-0.350	-0.334	-0.311	-9.749×10^{-2}	-1.725×10^{-2}	6.692×10^{-2}	0.196	0.531
sulfurdioxide slant column density window2 [DU]	-17.5	-10.9	-7.67	-5.25	-2.52	8.89	11.9	14.6	18.4	26.2
sulfurdioxide slant column density window2 precision [DU]	4.26	5.15	5.68	6.11	6.61	9.19	10.0	10.9	12.0	14.6
sulfurdioxide slant column density corrected win2 [DU]	-21.8	-14.5	-11.0	-8.49	-5.68	5.42	8.18	10.6	14.0	20.9
background so2 slant column offset window2 [DU]	-11.8	-9.28	-7.83	-6.72	-5.27	-1.31	-1.02	-0.771	-0.346	1.41
sulfurdioxide slant column density window3 [DU]	-77.5	-57.6	-48.0	-41.1	-33.5	-2.97	4.98	12.2	21.8	40.8
sulfurdioxide slant column density window3 precision [DU]	13.7	16.0	17.8	19.3	20.9	30.4	35.1	41.1	53.0	84.6
sulfurdioxide slant column density corrected win3 [DU]	-57.7	-38.0	-28.6	-21.9	-14.5	14.9	22.4	29.1	38.2	56.5
background so2 slant column offset window3 [DU]	4.24	7.72	9.05	10.4	12.0	24.6	27.0	28.8	30.9	34.2
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]	1.642×10^{-3}	3.144×10^{-3}	4.987×10^{-3}	6.954×10^{-3}	9.313×10^{-3}	2.712×10^{-2}	3.732×10^{-2}	5.507×10^{-2}	0.103	0.373
fitted radiance shift [nm]	-8.609×10^{-3}	-4.528×10^{-3}	-3.115×10^{-3}	-2.296×10^{-3}	-1.573×10^{-3}	2.825×10^{-4}	9.857×10^{-4}	1.855×10^{-3}	3.368×10^{-3}	7.616×10^{-3}
fitted radiance squeeze [1]	-6.798×10^{-4}	-3.611×10^{-4}	-2.509×10^{-4}	-1.862×10^{-4}	-1.245×10^{-4}	8.058×10^{-5}	1.303×10^{-4}	1.762×10^{-4}	2.416×10^{-4}	3.963×10^{-4}
fitted root mean square [1]	5.769×10^{-4}	7.112×10^{-4}	7.856×10^{-4}	8.426×10^{-4}	9.127×10^{-4}	1.523×10^{-3}	1.796×10^{-3}	2.049×10^{-3}	2.456×10^{-3}	3.571×10^{-3}
sulfurdioxide total air mass factor polluted [1]	7.158×10^{-2}	0.191	0.285	0.366	0.479	1.04	1.21	1.38	1.61	2.01
sulfurdioxide total air mass factor polluted precision [1]	9.112×10^{-3}	1.546×10^{-2}	2.076×10^{-2}	2.629×10^{-2}	3.406×10^{-2}	0.151	0.207	0.267	0.367	0.629
sulfurdioxide clear air mass factor polluted [1]	0.166	0.267	0.333	0.392	0.470	0.864	0.963	1.05	1.17	1.65
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]	0.641 $\pm$ 0.406	8903231	0.780	1.000	0.0	1.000	0.220	1.000
sulfurdioxide total vertical column [DU]	(6.088 $\pm$ 178.551) $\times 10^{-2}$	8903231	0.590	1.292 $\times 10^{-2}$	-135	137	-0.273	0.317
sulfurdioxide total vertical column precision [DU]	0.833 $\pm$ 1.298	8903231	0.650	0.448	4.355 $\times 10^{-2}$	37.5	0.247	0.897
sulfurdioxide slant column density corrected [DU]	(2.468 $\pm$ 42.905) $\times 10^{-2}$	8903231	0.384	9.848 $\times 10^{-3}$	-12.8	47.2	-0.180	0.205
sulfurdioxide slant column density cobra [DU]	(2.445 $\pm$ 41.975) $\times 10^{-2}$	8903231	0.384	9.848 $\times 10^{-3}$	-12.8	21.8	-0.180	0.205
sulfurdioxide slant column density cobra precision [DU]	0.322 $\pm$ 0.171	8903231	0.189	0.269	8.002 $\times 10^{-2}$	14.4	0.205	0.394
sulfurdioxide slant column density window1 [DU]	0.228 $\pm$ 0.792	8903231	0.785	0.262	-14.7	21.3	-0.141	0.644
sulfurdioxide slant column density window1 precision [DU]	0.322 $\pm$ 0.171	8903231	0.189	0.269	8.002 $\times 10^{-2}$	14.4	0.205	0.394
sulfurdioxide slant column density corrected win1 [DU]	(6.227 $\pm$ 77.650) $\times 10^{-2}$	8903231	0.764	3.877 $\times 10^{-2}$	-13.0	21.6	-0.337	0.427
background so2 slant column offset window1 [DU]	-0.165 $\pm$ 0.239	8903231	0.237	-0.234	-1.46	3.65	-0.319	-8.220 $\times 10^{-2}$
sulfurdioxide slant column density window2 [DU]	3.96 $\pm$ 9.15	8903231	11.7	3.67	-163	622	-2.05	9.67
sulfurdioxide slant column density window2 precision [DU]	8.12 $\pm$ 2.13	8903231	2.57	7.82	2.19	292	6.67	9.24
sulfurdioxide slant column density corrected win2 [DU]	-0.314 $\pm$ 8.815	8903231	11.2	-0.237	-172	615	-5.89	5.35
background so2 slant column offset window2 [DU]	-4.27 $\pm$ 3.43	8903231	5.56	-3.42	-23.5	4.91	-6.92	-1.36
sulfurdioxide slant column density window3 [DU]	-20.7 $\pm$ 23.7	8903231	30.0	-20.7	-188	174	-35.6	-5.62
sulfurdioxide slant column density window3 precision [DU]	27.5 $\pm$ 12.6	8903231	8.78	24.2	9.77	226	20.8	29.6
sulfurdioxide slant column density corrected win3 [DU]	0.455 $\pm$ 22.834	8903231	28.8	0.599	-171	184	-13.8	15.0
background so2 slant column offset window3 [DU]	21.1 $\pm$ 7.4	8903231	13.1	21.5	-10.2	73.8	14.2	27.3
sulfurdioxide slant column cobra flag [1]	1.97 $\pm$ 0.23	8903231	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	(4.434 $\pm$ 9.689) $\times 10^{-2}$	8903231	2.808 $\times 10^{-2}$	1.654 $\times 10^{-2}$	1.698 $\times 10^{-4}$	1.74	7.967 $\times 10^{-3}$	3.604 $\times 10^{-2}$
fitted radiance shift [nm]	(-4.762 $\pm$ 25.219) $\times 10^{-4}$	8903231	1.701 $\times 10^{-3}$	-4.671 $\times 10^{-4}$	-3.771 $\times 10^{-2}$	3.606 $\times 10^{-2}$	-1.346 $\times 10^{-3}$	3.552 $\times 10^{-4}$
fitted radiance squeeze [1]	(-4.793 $\pm$ 22.560) $\times 10^{-5}$	8903231	2.232 $\times 10^{-4}$	-2.267 $\times 10^{-5}$	-3.841 $\times 10^{-3}$	7.325 $\times 10^{-3}$	-1.413 $\times 10^{-4}$	8.191 $\times 10^{-5}$
fitted root mean square [1]	(1.401 $\pm$ 0.708) $\times 10^{-3}$	8903231	7.330 $\times 10^{-4}$	1.174 $\times 10^{-3}$	3.319 $\times 10^{-4}$	2.295 $\times 10^{-2}$	9.360 $\times 10^{-4}$	1.669 $\times 10^{-3}$
sulfurdioxide total air mass factor polluted [1]	0.719 $\pm$ 0.433	8903231	0.574	0.639	5.000 $\times 10^{-2}$	2.98	0.391	0.965
sulfurdioxide total air mass factor polluted precision [1]	0.105 $\pm$ 0.140	8903231	9.976 $\times 10^{-2}$	5.232 $\times 10^{-2}$	2.500 $\times 10^{-3}$	1.81	2.710 $\times 10^{-2}$	0.127
sulfurdioxide clear air mass factor polluted [1]	0.619 $\pm$ 0.307	8903231	0.464	0.552	3.007 $\times 10^{-2}$	3.16	0.379	0.843
number of spectral points in retrieval [1]	73.5 $\pm$ 0.5	8903231	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]	0.635 ± 0.411	8396016	0.800	1.000	0.0	1.000	0.200	1.000
sulfurdioxide total vertical column [DU]	$(2.071 \pm 75.970) \times 10^{-2}$	8396016	0.411	9.787×10^{-3}	-43.7	84.6	-0.194	0.217
sulfurdioxide total vertical column precision [DU]	0.437 ± 0.536	8396016	0.274	0.292	4.832×10^{-2}	31.7	0.206	0.480
sulfurdioxide slant column density corrected [DU]	$(1.553 \pm 33.420) \times 10^{-2}$	8396016	0.338	8.532×10^{-3}	-15.0	64.1	-0.159	0.179
sulfurdioxide slant column density cobra [DU]	$(1.541 \pm 32.537) \times 10^{-2}$	8396016	0.338	8.532×10^{-3}	-15.0	25.9	-0.159	0.179
sulfurdioxide slant column density cobra precision [DU]	0.270 ± 0.116	8396016	0.116	0.234	8.211×10^{-2}	17.3	0.196	0.312
sulfurdioxide slant column density window1 [DU]	0.225 ± 0.623	8396016	0.690	0.244	-68.3	126	-0.110	0.580
sulfurdioxide slant column density window1 precision [DU]	0.270 ± 0.116	8396016	0.116	0.234	8.211×10^{-2}	17.3	0.196	0.312
sulfurdioxide slant column density corrected win1 [DU]	$(3.649 \pm 60.749) \times 10^{-2}$	8396016	0.667	2.655×10^{-2}	-68.3	125	-0.306	0.362
background so2 slant column offset window1 [DU]	-0.189 ± 0.158	8396016	0.191	-0.231	-1.28	2.30	-0.304	-0.113
sulfurdioxide slant column density window2 [DU]	2.64 ± 8.77	8396016	11.0	2.48	-641	806	-2.97	8.07
sulfurdioxide slant column density window2 precision [DU]	8.02 ± 2.29	8396016	2.58	7.68	2.35	560	6.54	9.12
sulfurdioxide slant column density corrected win2 [DU]	$(-2.501 \pm 8708.549) \times 10^{-3}$	8396016	11.0	2.394×10^{-2}	-644	798	-5.47	5.50
background so2 slant column offset window2 [DU]	-2.64 ± 2.13	8396016	2.40	-2.11	-23.7	4.63	-3.68	-1.27
sulfurdioxide slant column density window3 [DU]	-15.6 ± 24.4	8396016	30.7	-15.9	-455	312	-31.0	-0.290
sulfurdioxide slant column density window3 precision [DU]	28.7 ± 13.8	8396016	10.2	25.2	9.91	251	21.1	31.3
sulfurdioxide slant column density corrected win3 [DU]	-0.142 ± 23.695	8396016	30.0	-0.307	-451	320	-15.1	14.9
background so2 slant column offset window3 [DU]	15.5 ± 6.8	8396016	11.4	14.0	-12.3	36.4	9.92	21.4
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.21	8396016	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(1.945 \pm 2.285) \times 10^{-2}$	8396016	1.253×10^{-2}	1.559×10^{-2}	9.546×10^{-4}	2.01	1.037×10^{-2}	2.290×10^{-2}
fitted radiance shift [nm]	$(-7.633 \pm 27.453) \times 10^{-4}$	8396016	1.994×10^{-3}	-7.488×10^{-4}	-4.947×10^{-2}	4.505×10^{-2}	-1.807×10^{-3}	1.864×10^{-4}
fitted radiance squeeze [1]	$(-1.830 \pm 16.245) \times 10^{-5}$	8396016	1.893×10^{-4}	-1.345×10^{-5}	-1.663×10^{-2}	2.403×10^{-2}	-1.101×10^{-4}	7.930×10^{-5}
fitted root mean square [1]	$(1.194 \pm 0.473) \times 10^{-3}$	8396016	4.657×10^{-4}	1.056×10^{-3}	3.249×10^{-4}	5.646×10^{-2}	8.929×10^{-4}	1.359×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.876 ± 0.411	8396016	0.522	0.827	5.000×10^{-2}	3.05	0.589	1.11
sulfurdioxide total air mass factor polluted precision [1]	0.125 ± 0.118	8396016	0.131	8.011×10^{-2}	6.630×10^{-3}	1.40	4.158×10^{-2}	0.172
sulfurdioxide clear air mass factor polluted [1]	0.749 ± 0.275	8396016	0.313	0.707	0.135	3.26	0.567	0.880
number of spectral points in retrieval [1]	73.4 ± 0.5	8396016	1.000	73.0	53.0	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]	0.666 ± 0.406	12113789	0.770	1.000	0.0	1.000	0.230	1.000
sulfurdioxide total vertical column [DU]	$(2.599 \pm 105.727) \times 10^{-2}$	12113789	0.442	9.292×10^{-3}	-82.9	98.6	-0.209	0.233
sulfurdioxide total vertical column precision [DU]	0.525 ± 0.788	12113789	0.336	0.313	4.507×10^{-2}	34.0	0.212	0.548
sulfurdioxide slant column density corrected [DU]	$(1.466 \pm 33.070) \times 10^{-2}$	12113789	0.343	7.772×10^{-3}	-8.09	43.9	-0.162	0.181
sulfurdioxide slant column density cobra [DU]	$(1.464 \pm 32.953) \times 10^{-2}$	12113789	0.343	7.772×10^{-3}	-8.09	25.9	-0.162	0.181
sulfurdioxide slant column density cobra precision [DU]	0.278 ± 0.126	12113789	0.130	0.235	8.211×10^{-2}	17.3	0.196	0.325
sulfurdioxide slant column density window1 [DU]	0.234 ± 0.647	12113789	0.702	0.253	-27.1	126	-0.105	0.597
sulfurdioxide slant column density window1 precision [DU]	0.278 ± 0.126	12113789	0.130	0.235	8.211×10^{-2}	17.3	0.196	0.325
sulfurdioxide slant column density corrected win1 [DU]	$(4.305 \pm 63.290) \times 10^{-2}$	12113789	0.682	2.911×10^{-2}	-27.1	125	-0.309	0.373
background so2 slant column offset window1 [DU]	-0.191 ± 0.179	12113789	0.200	-0.238	-1.28	3.22	-0.312	-0.112
sulfurdioxide slant column density window2 [DU]	2.90 ± 8.71	12113789	11.1	2.71	-641	535	-2.74	8.32
sulfurdioxide slant column density window2 precision [DU]	7.90 ± 2.10	12113789	2.47	7.57	2.24	323	6.49	8.96
sulfurdioxide slant column density corrected win2 [DU]	-0.139 ± 8.576	12113789	10.9	-9.217×10^{-2}	-644	533	-5.56	5.34
background so2 slant column offset window2 [DU]	-3.04 ± 2.59	12113789	3.13	-2.27	-23.7	4.91	-4.40	-1.26
sulfurdioxide slant column density window3 [DU]	-15.2 ± 24.0	12113789	30.4	-15.5	-286	312	-30.4	1.905×10^{-2}
sulfurdioxide slant column density window3 precision [DU]	27.3 ± 12.2	12113789	9.06	24.2	9.77	251	20.7	29.7
sulfurdioxide slant column density corrected win3 [DU]	2.31 ± 22.88	12113789	29.1	2.06	-278	320	-12.3	16.8
background so2 slant column offset window3 [DU]	17.5 ± 7.1	12113789	11.5	16.5	-12.3	51.1	11.7	23.2
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.19	12113789	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.228 \pm 3.581) \times 10^{-2}$	12113789	1.365×10^{-2}	1.561×10^{-2}	5.117×10^{-4}	1.60	1.012×10^{-2}	2.377×10^{-2}
fitted radiance shift [nm]	$(-6.089 \pm 24.385) \times 10^{-4}$	12113789	1.807×10^{-3}	-5.683×10^{-4}	-4.947×10^{-2}	4.505×10^{-2}	-1.538×10^{-3}	2.693×10^{-4}
fitted radiance squeeze [1]	$(-1.903 \pm 17.375) \times 10^{-5}$	12113789	1.922×10^{-4}	-1.110×10^{-5}	-1.663×10^{-2}	2.403×10^{-2}	-1.094×10^{-4}	8.284×10^{-5}
fitted root mean square [1]	$(1.223 \pm 0.526) \times 10^{-3}$	12113789	5.131×10^{-4}	1.057×10^{-3}	3.249×10^{-4}	5.646×10^{-2}	8.921×10^{-4}	1.405×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.823 ± 0.401	12113789	0.513	0.788	5.000×10^{-2}	2.73	0.538	1.05
sulfurdioxide total air mass factor polluted precision [1]	0.113 ± 0.112	12113789	0.111	6.812×10^{-2}	2.841×10^{-3}	1.61	3.881×10^{-2}	0.150
sulfurdioxide clear air mass factor polluted [1]	0.715 ± 0.273	12113789	0.359	0.684	4.712×10^{-2}	2.47	0.522	0.882
number of spectral points in retrieval [1]	73.5 ± 0.5	12113789	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]	0.617 $\pm$ 0.408	3806834	0.800	1.000	0.0	1.000	0.200	1.000
sulfurdioxide total vertical column [DU]	(6.020 $\pm$ 177.401) $\times 10^{-2}$	3806834	0.587	1.376 $\times 10^{-2}$	-135	137	-0.269	0.318
sulfurdioxide total vertical column precision [DU]	0.825 $\pm$ 1.290	3806834	0.641	0.445	4.355 $\times 10^{-2}$	37.5	0.251	0.893
sulfurdioxide slant column density corrected [DU]	(2.734 $\pm$ 44.968) $\times 10^{-2}$	3806834	0.384	1.084 $\times 10^{-2}$	-15.0	64.1	-0.179	0.206
sulfurdioxide slant column density cobra [DU]	(2.687 $\pm$ 42.753) $\times 10^{-2}$	3806834	0.384	1.084 $\times 10^{-2}$	-15.0	21.8	-0.179	0.206
sulfurdioxide slant column density cobra precision [DU]	0.319 $\pm$ 0.165	3806834	0.174	0.269	8.280 $\times 10^{-2}$	9.83	0.210	0.384
sulfurdioxide slant column density window1 [DU]	0.234 $\pm$ 0.784	3806834	0.778	0.266	-68.3	91.7	-0.136	0.642
sulfurdioxide slant column density window1 precision [DU]	0.319 $\pm$ 0.165	3806834	0.174	0.269	8.280 $\times 10^{-2}$	9.83	0.210	0.384
sulfurdioxide slant column density corrected win1 [DU]	(5.811 $\pm$ 76.784) $\times 10^{-2}$	3806834	0.753	3.930 $\times 10^{-2}$	-68.3	91.7	-0.334	0.420
background so2 slant column offset window1 [DU]	-0.176 $\pm$ 0.219	3806834	0.213	-0.240	-1.24	2.99	-0.316	-0.103
sulfurdioxide slant column density window2 [DU]	3.71 $\pm$ 9.39	3806834	11.9	3.48	-572	806	-2.36	9.56
sulfurdioxide slant column density window2 precision [DU]	8.44 $\pm$ 2.41	3806834	2.64	8.14	2.19	560	6.93	9.57
sulfurdioxide slant column density corrected win2 [DU]	-0.174 $\pm$ 9.099	3806834	11.5	-0.106	-573	798	-5.89	5.61
background so2 slant column offset window2 [DU]	-3.89 $\pm$ 3.32	3806834	4.97	-2.64	-23.5	4.91	-6.29	-1.32
sulfurdioxide slant column density window3 [DU]	-25.1 $\pm$ 23.3	3806834	29.4	-24.7	-455	174	-39.6	-10.2
sulfurdioxide slant column density window3 precision [DU]	30.6 $\pm$ 15.8	3806834	10.7	26.2	9.91	236	22.0	32.7
sulfurdioxide slant column density corrected win3 [DU]	-5.86 $\pm$ 23.67	3806834	29.9	-5.35	-451	184	-20.5	9.37
background so2 slant column offset window3 [DU]	19.2 $\pm$ 8.1	3806834	13.9	18.8	-10.4	73.8	12.3	26.2
sulfurdioxide slant column cobra flag [1]	1.97 $\pm$ 0.23	3806834	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	(5.629 $\pm$ 11.172) $\times 10^{-2}$	3806834	4.334 $\times 10^{-2}$	2.045 $\times 10^{-2}$	1.698 $\times 10^{-4}$	2.01	7.417 $\times 10^{-3}$	5.076 $\times 10^{-2}$
fitted radiance shift [nm]	(-6.239 $\pm$ 32.003) $\times 10^{-4}$	3806834	1.953 $\times 10^{-3}$	-6.600 $\times 10^{-4}$	-4.246 $\times 10^{-2}$	3.957 $\times 10^{-2}$	-1.638 $\times 10^{-3}$	3.147 $\times 10^{-4}$
fitted radiance squeeze [1]	(-5.027 $\pm$ 21.866) $\times 10^{-5}$	3806834	2.238 $\times 10^{-4}$	-2.816 $\times 10^{-5}$	-1.364 $\times 10^{-2}$	1.340 $\times 10^{-2}$	-1.466 $\times 10^{-4}$	7.717 $\times 10^{-5}$
fitted root mean square [1]	(1.386 $\pm$ 0.676) $\times 10^{-3}$	3806834	6.577 $\times 10^{-4}$	1.190 $\times 10^{-3}$	3.378 $\times 10^{-4}$	4.250 $\times 10^{-2}$	9.611 $\times 10^{-4}$	1.619 $\times 10^{-3}$
sulfurdioxide total air mass factor polluted [1]	0.742 $\pm$ 0.487	3806834	0.614	0.615	5.000 $\times 10^{-2}$	3.05	0.380	0.994
sulfurdioxide total air mass factor polluted precision [1]	0.123 $\pm$ 0.169	3806834	0.132	5.026 $\times 10^{-2}$	2.500 $\times 10^{-3}$	1.81	2.470 $\times 10^{-2}$	0.157
sulfurdioxide clear air mass factor polluted [1]	0.611 $\pm$ 0.328	3806834	0.429	0.542	3.007 $\times 10^{-2}$	3.26	0.363	0.792
number of spectral points in retrieval [1]	73.4 $\pm$ 0.5	3806834	1.000	73.0	52.0	74.0	73.0	74.0

3 Granule outlines

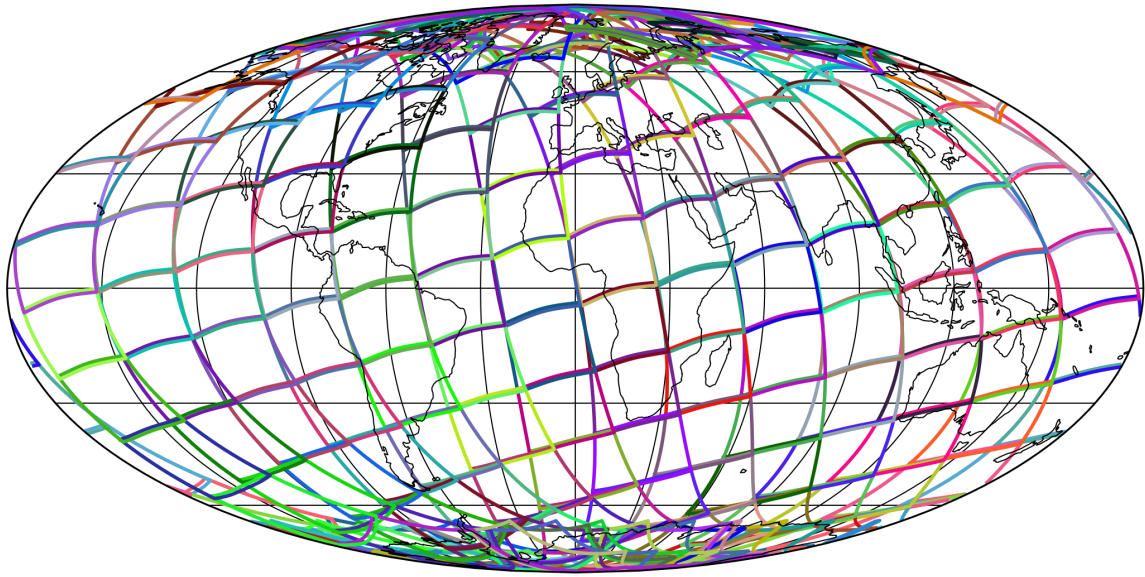


Figure 1: Outline of the granules.

4 Input data monitoring

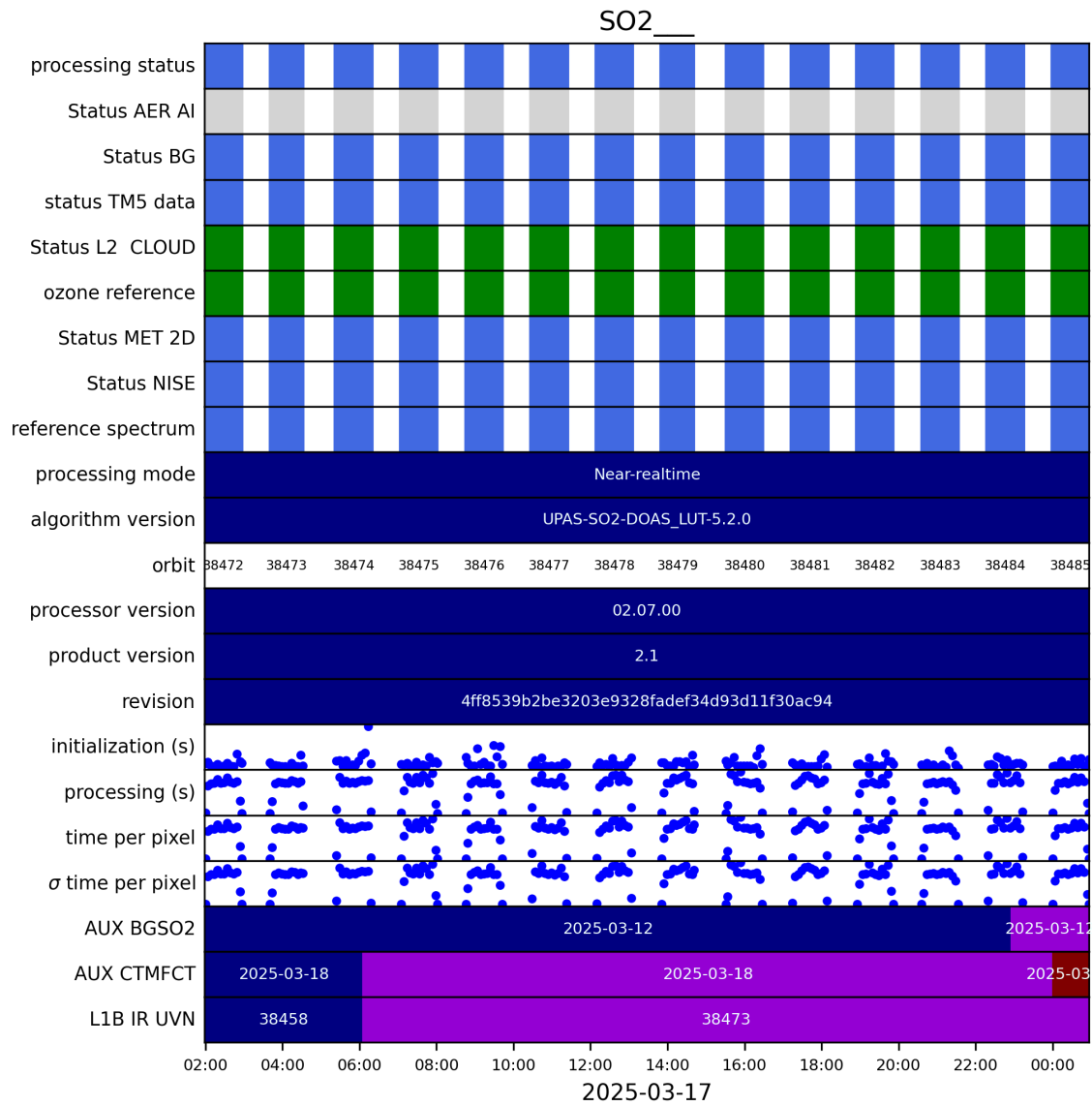


Figure 2: Input data per granule

5 Warnings and errors

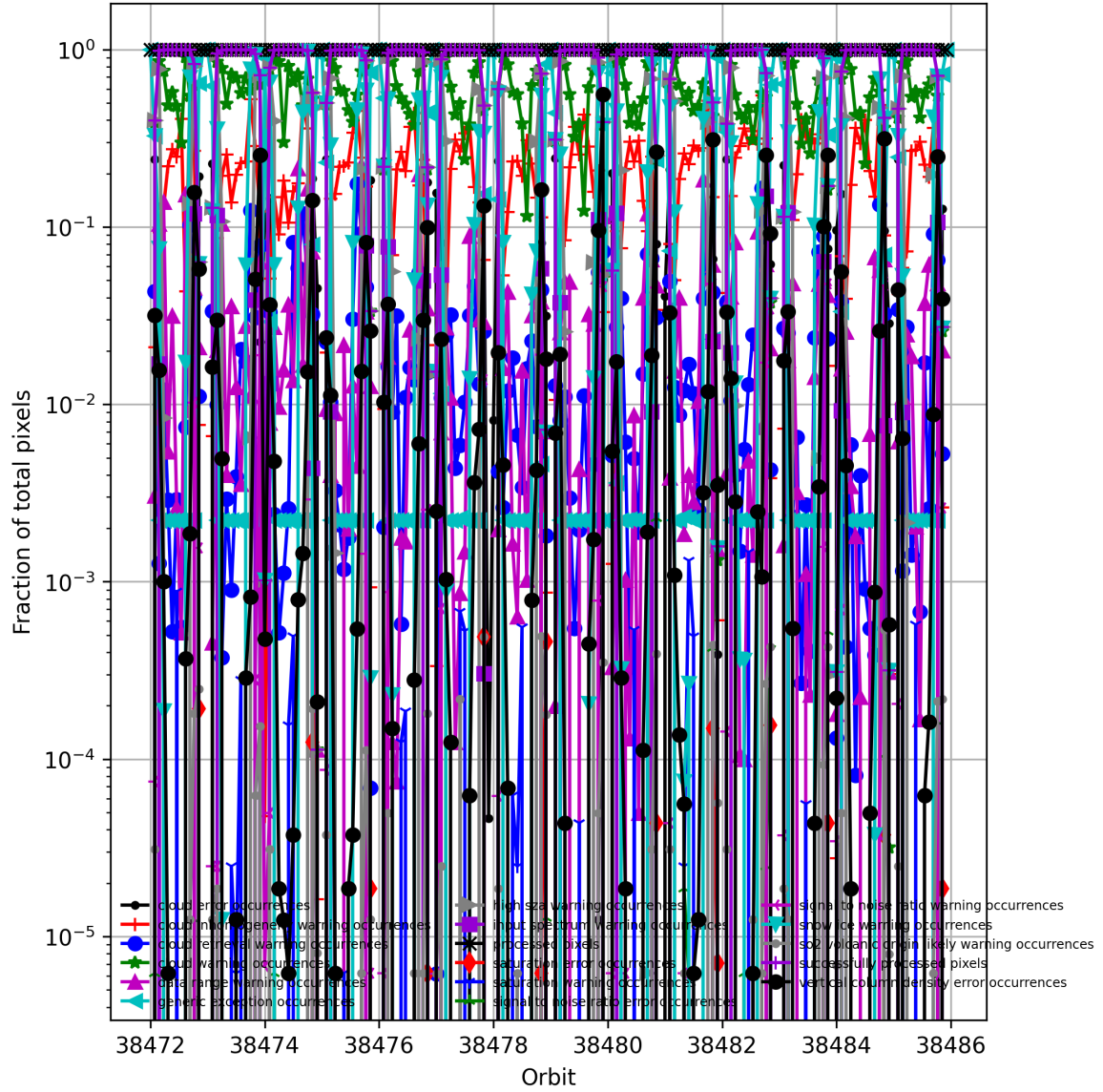


Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

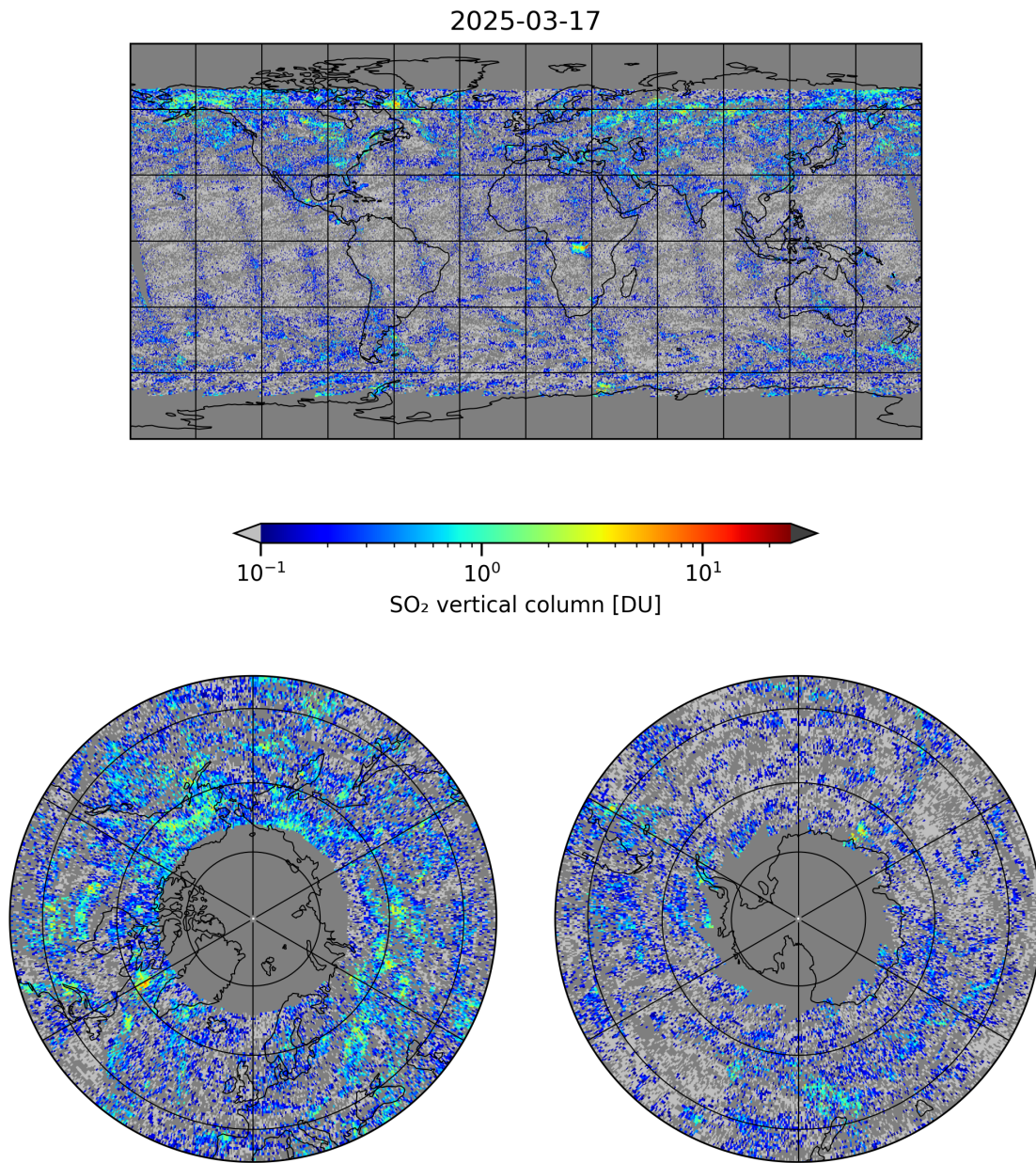


Figure 4: Map of “SO₂ vertical column” for 2025-03-17 to 2025-03-18

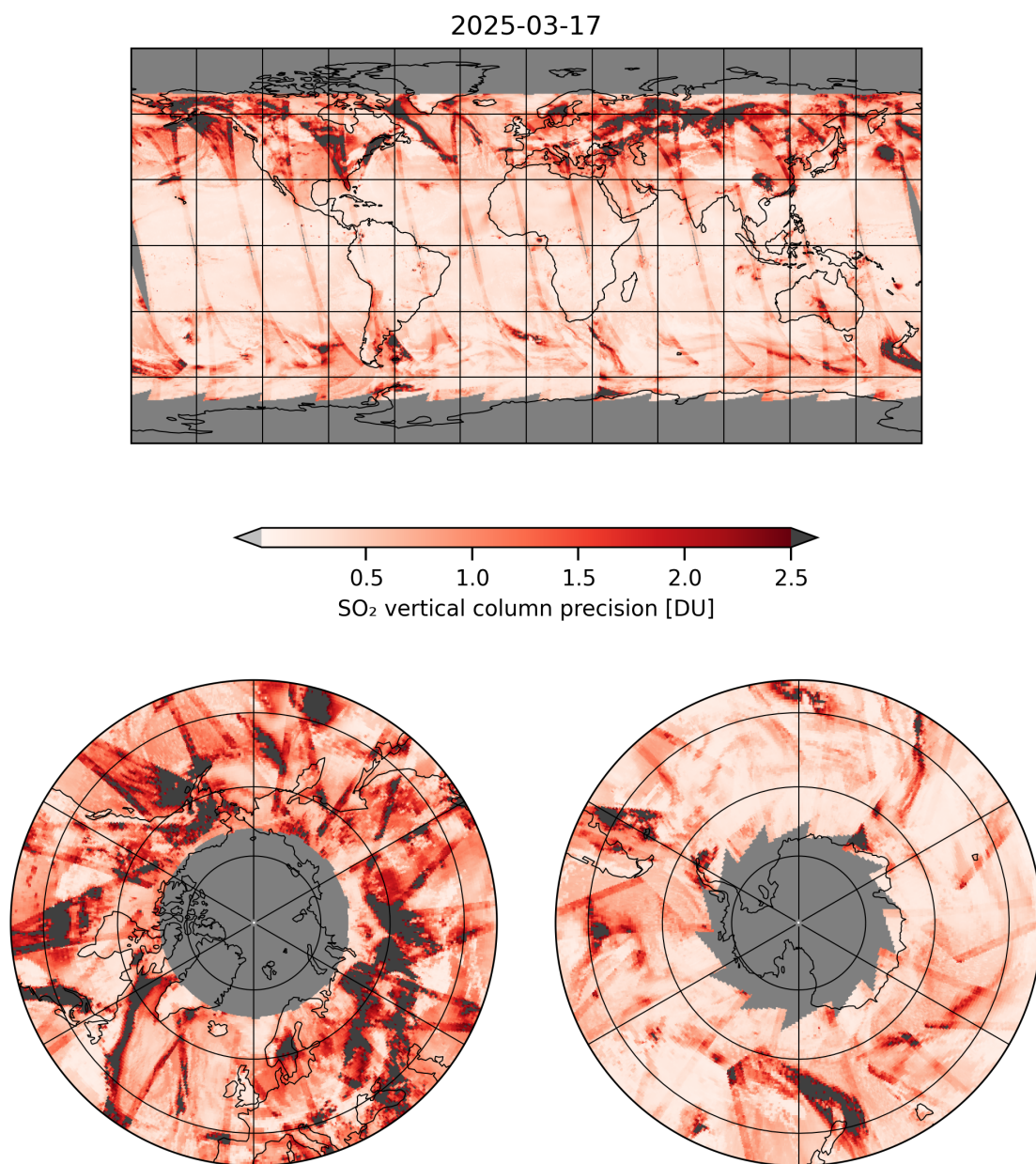


Figure 5: Map of “SO₂ vertical column precision” for 2025-03-17 to 2025-03-18

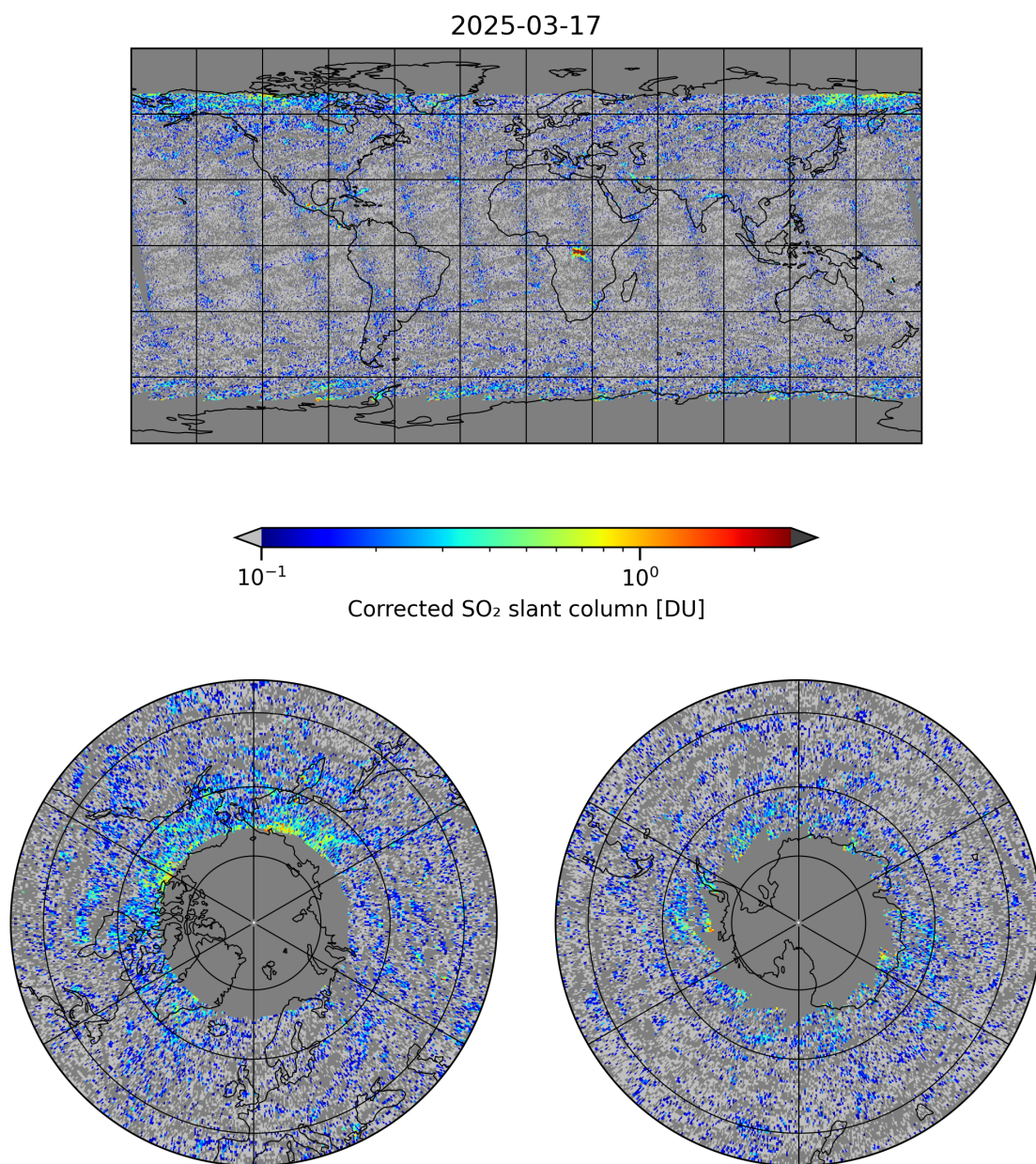


Figure 6: Map of “Corrected SO₂ slant column” for 2025-03-17 to 2025-03-18

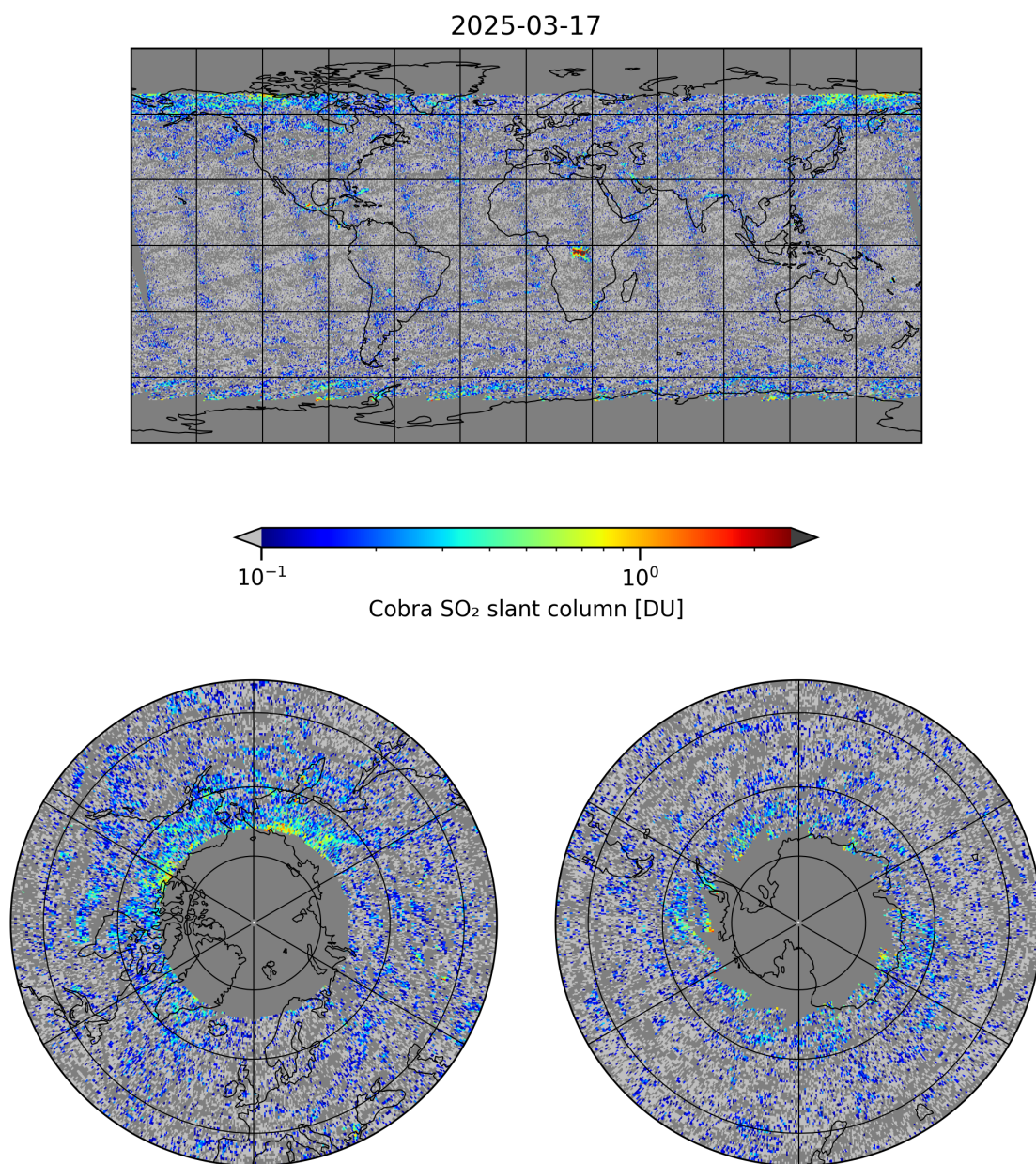


Figure 7: Map of “Cobra SO₂ slant column” for 2025-03-17 to 2025-03-18

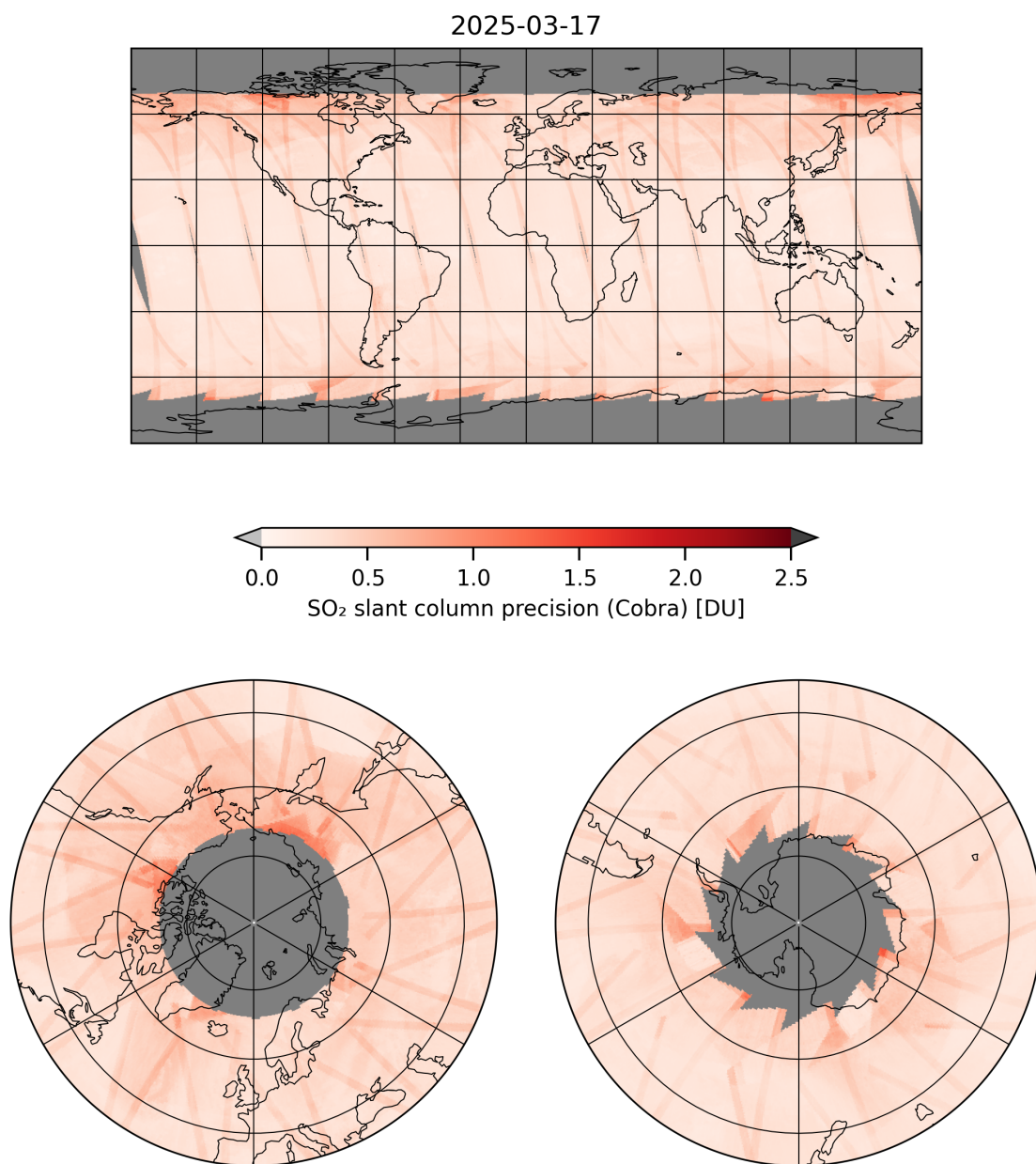


Figure 8: Map of “SO₂ slant column precision (Cobra)” for 2025-03-17 to 2025-03-18

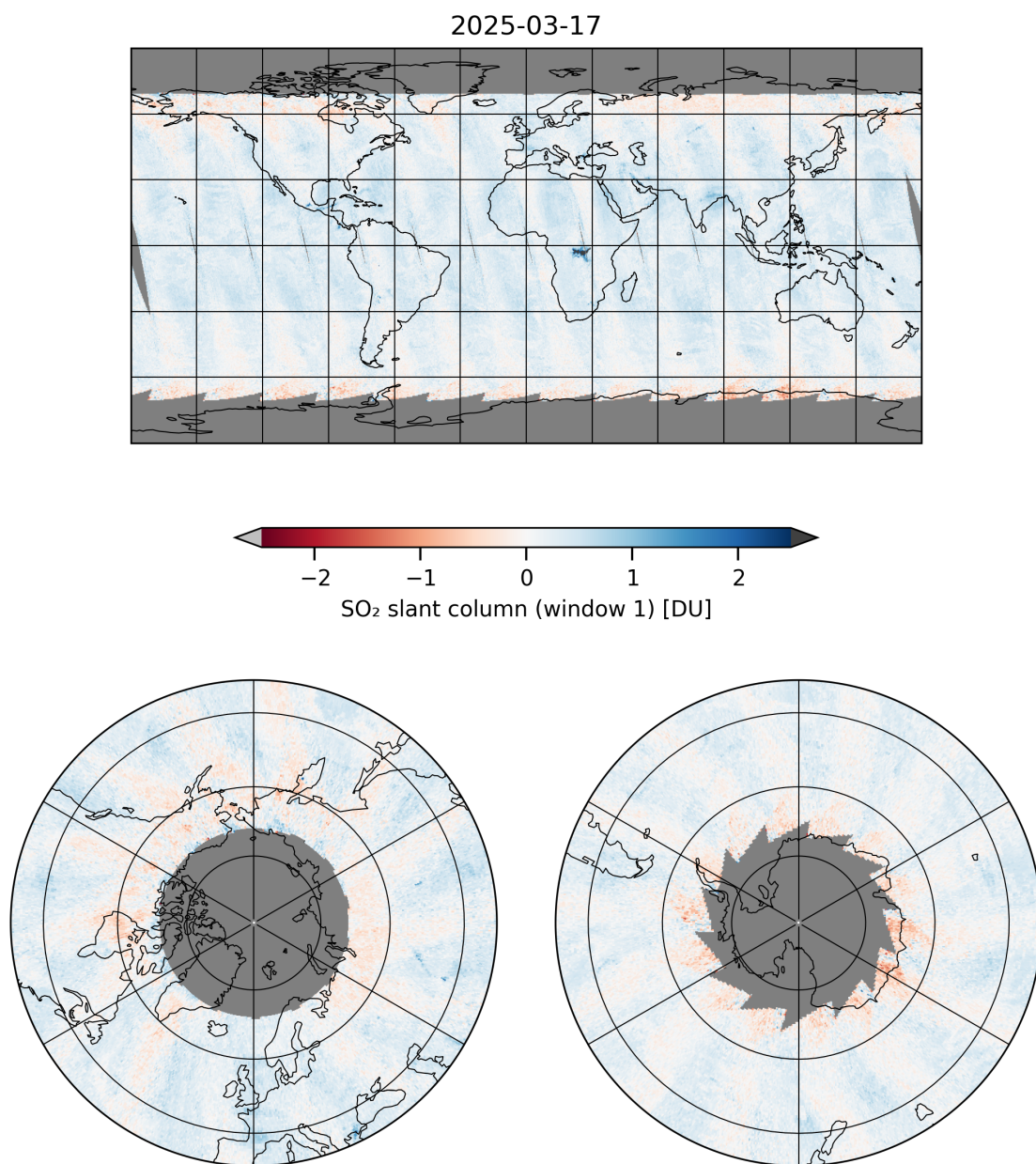


Figure 9: Map of “SO₂ slant column (window 1)” for 2025-03-17 to 2025-03-18

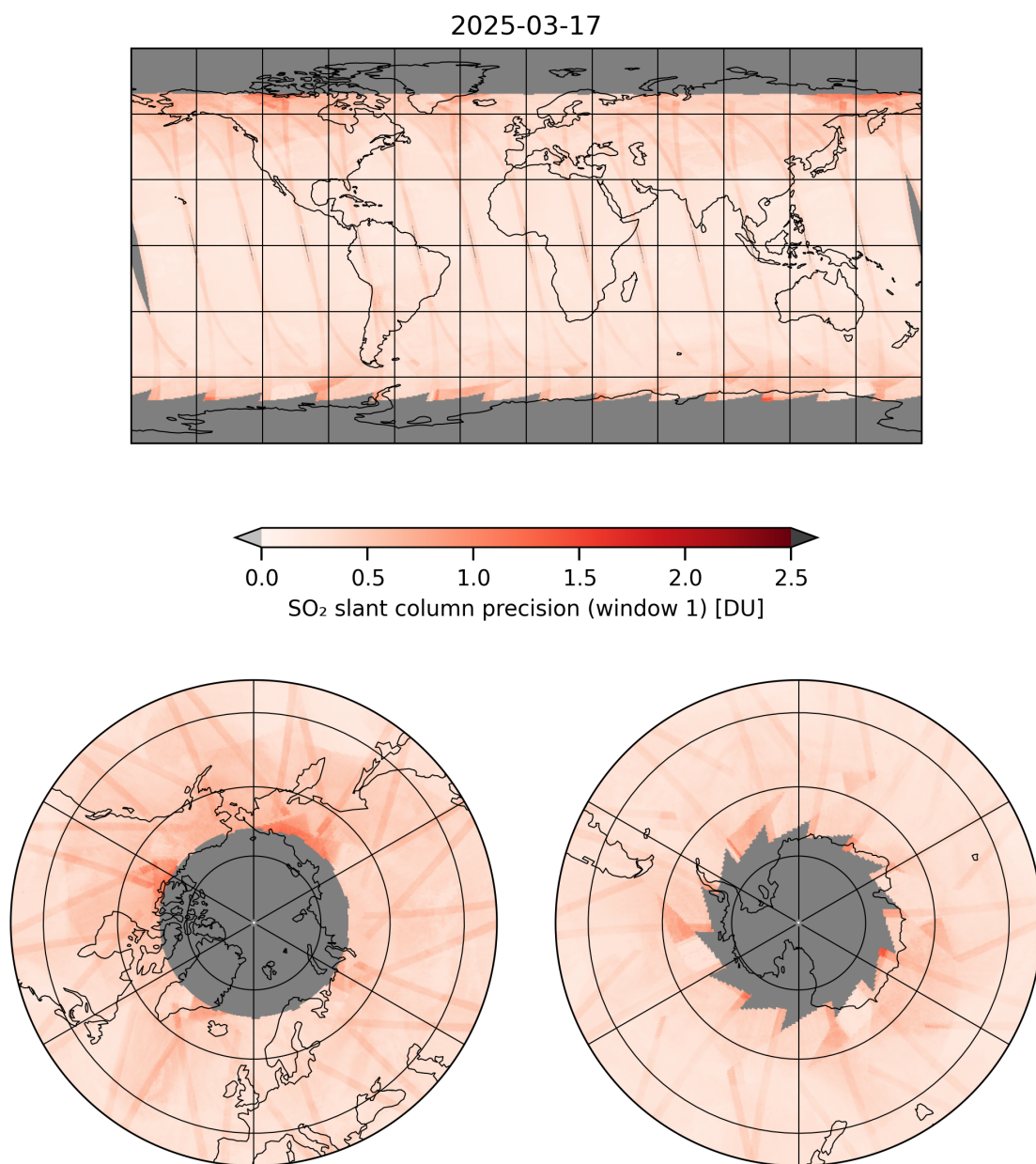


Figure 10: Map of “SO₂ slant column precision (window 1)” for 2025-03-17 to 2025-03-18

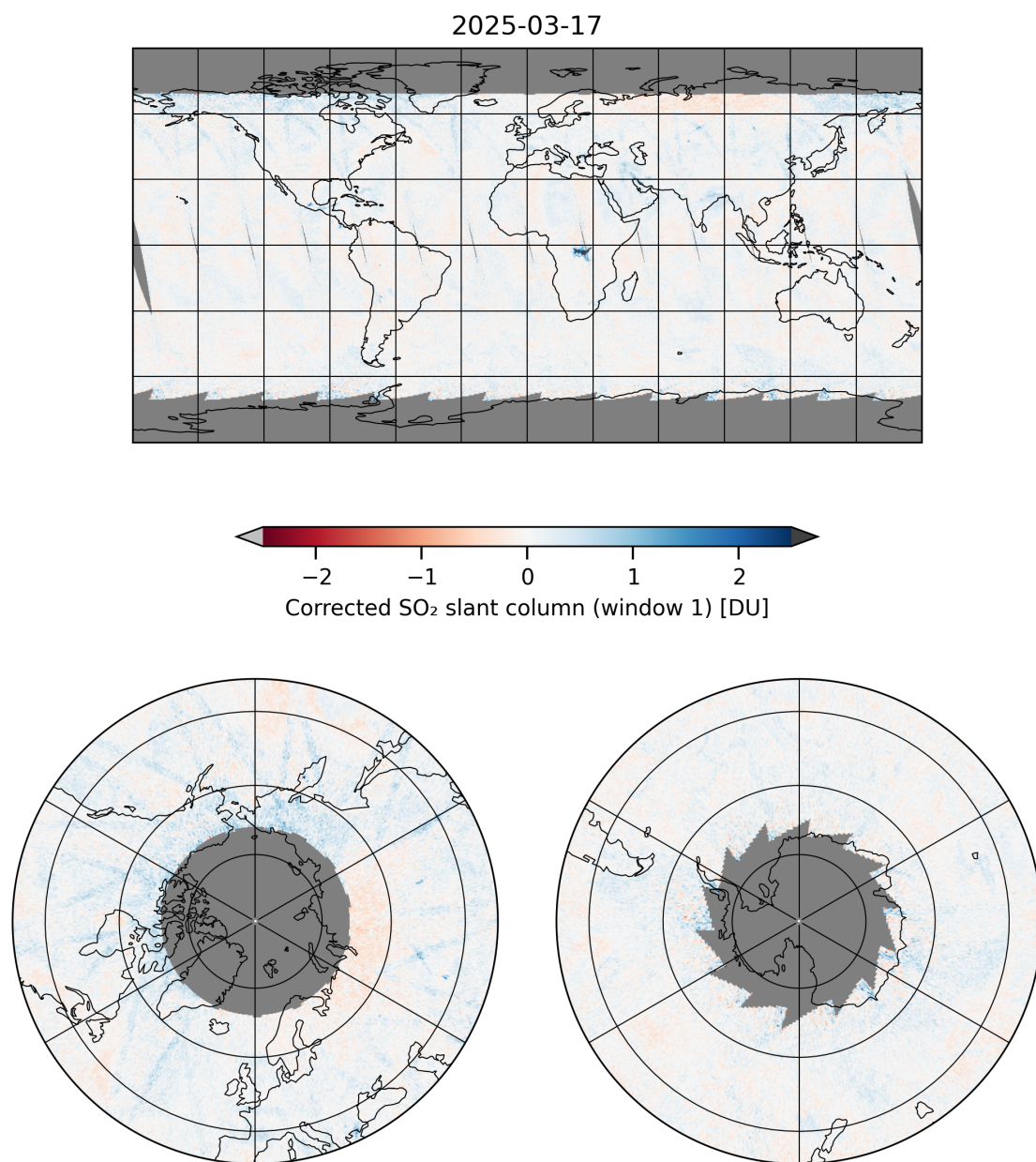


Figure 11: Map of “Corrected SO₂ slant column (window 1)” for 2025-03-17 to 2025-03-18

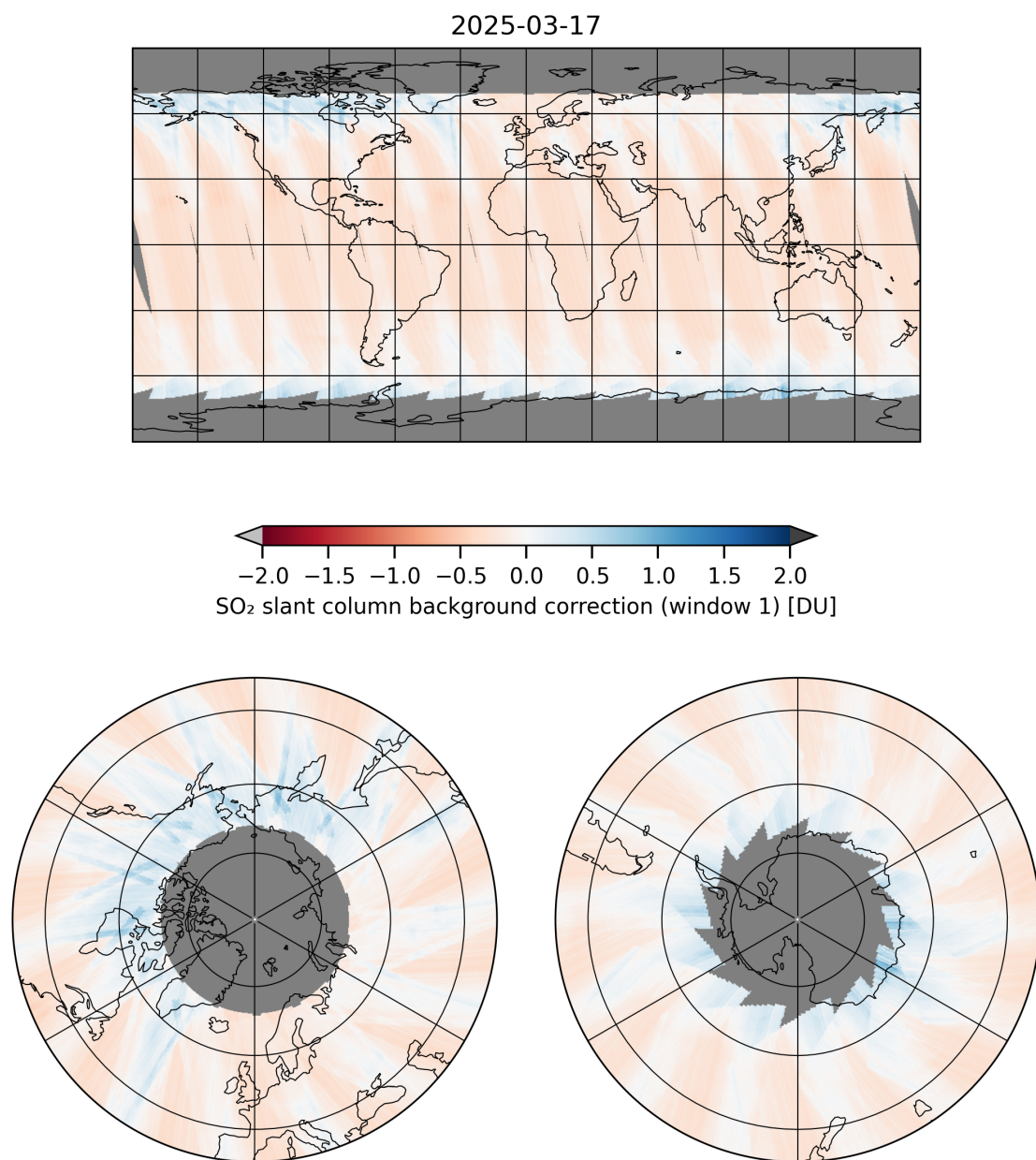


Figure 12: Map of “SO₂ slant column background correction (window 1)” for 2025-03-17 to 2025-03-18

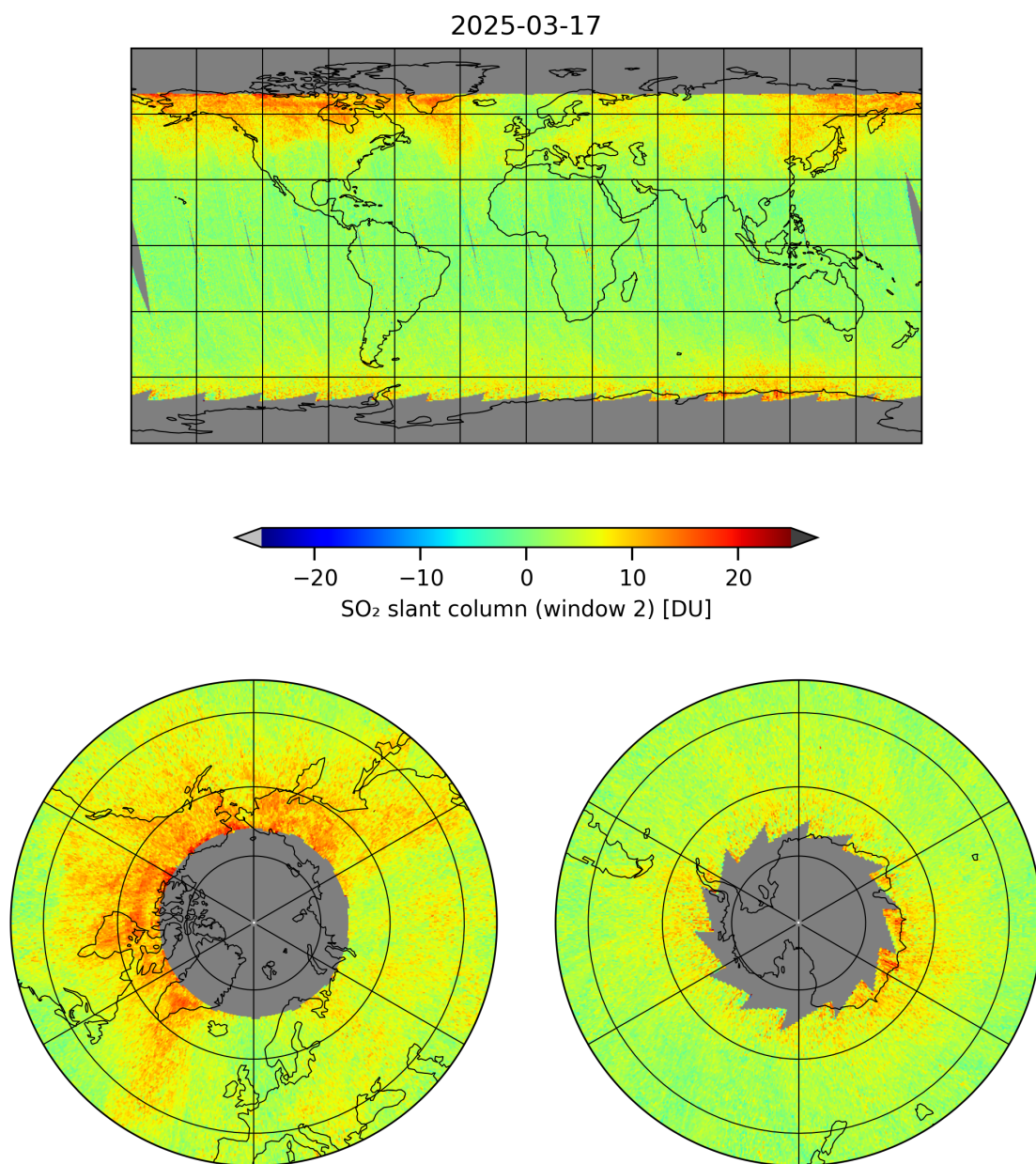


Figure 13: Map of “SO₂ slant column (window 2)” for 2025-03-17 to 2025-03-18

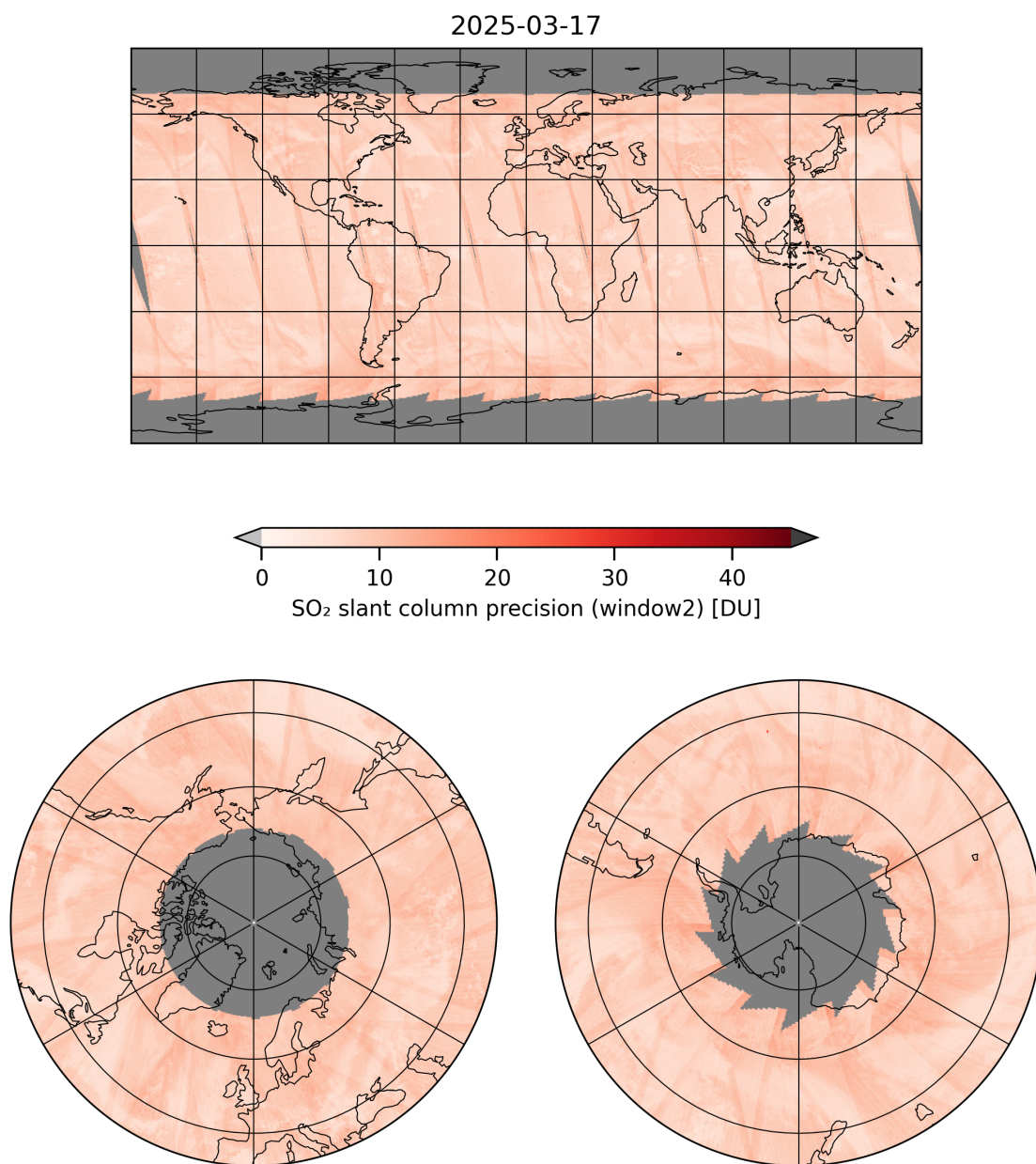


Figure 14: Map of “SO₂ slant column precision (window2)” for 2025-03-17 to 2025-03-18

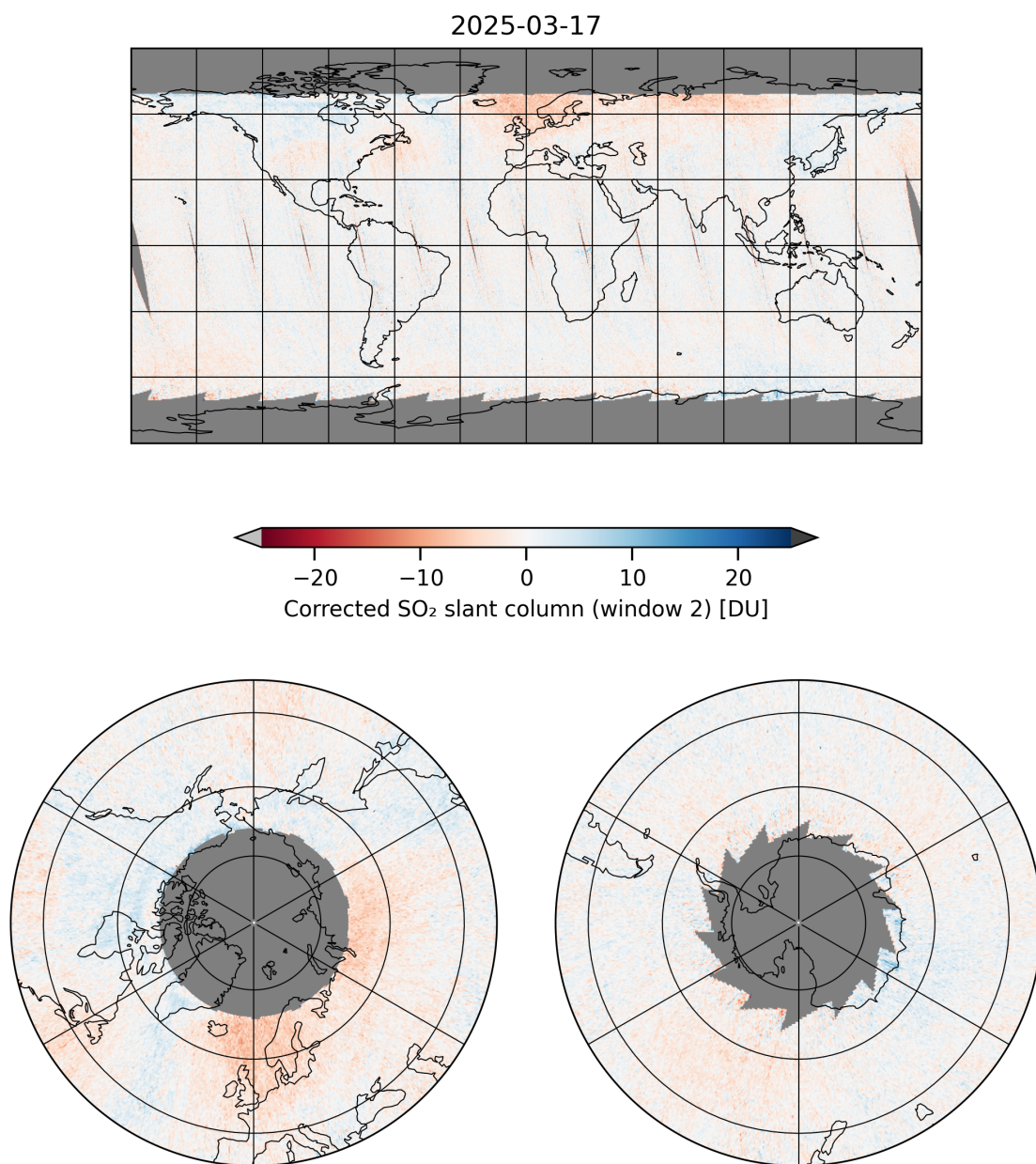


Figure 15: Map of “Corrected SO₂ slant column (window 2)” for 2025-03-17 to 2025-03-18

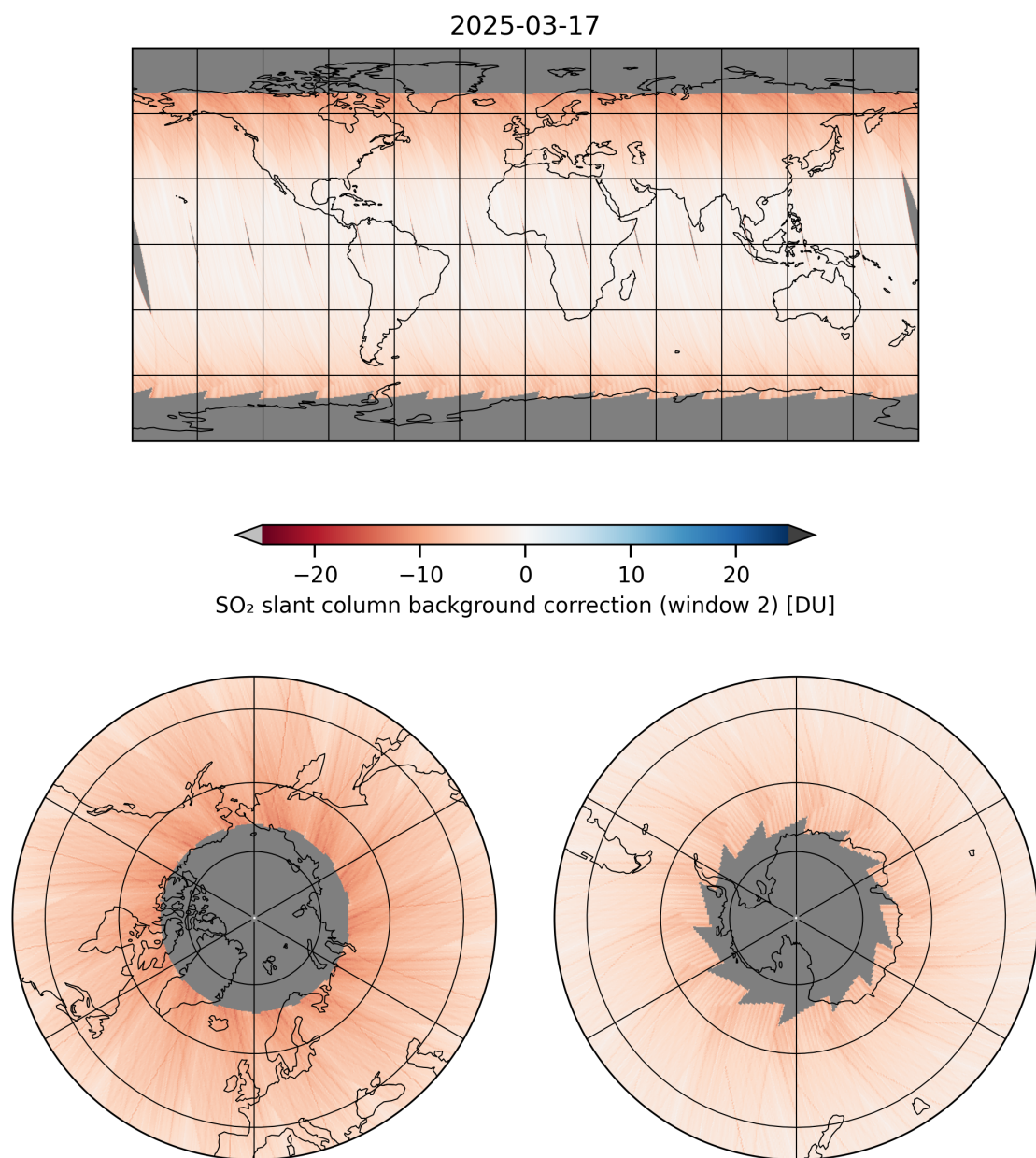


Figure 16: Map of “SO₂ slant column background correction (window 2)” for 2025-03-17 to 2025-03-18

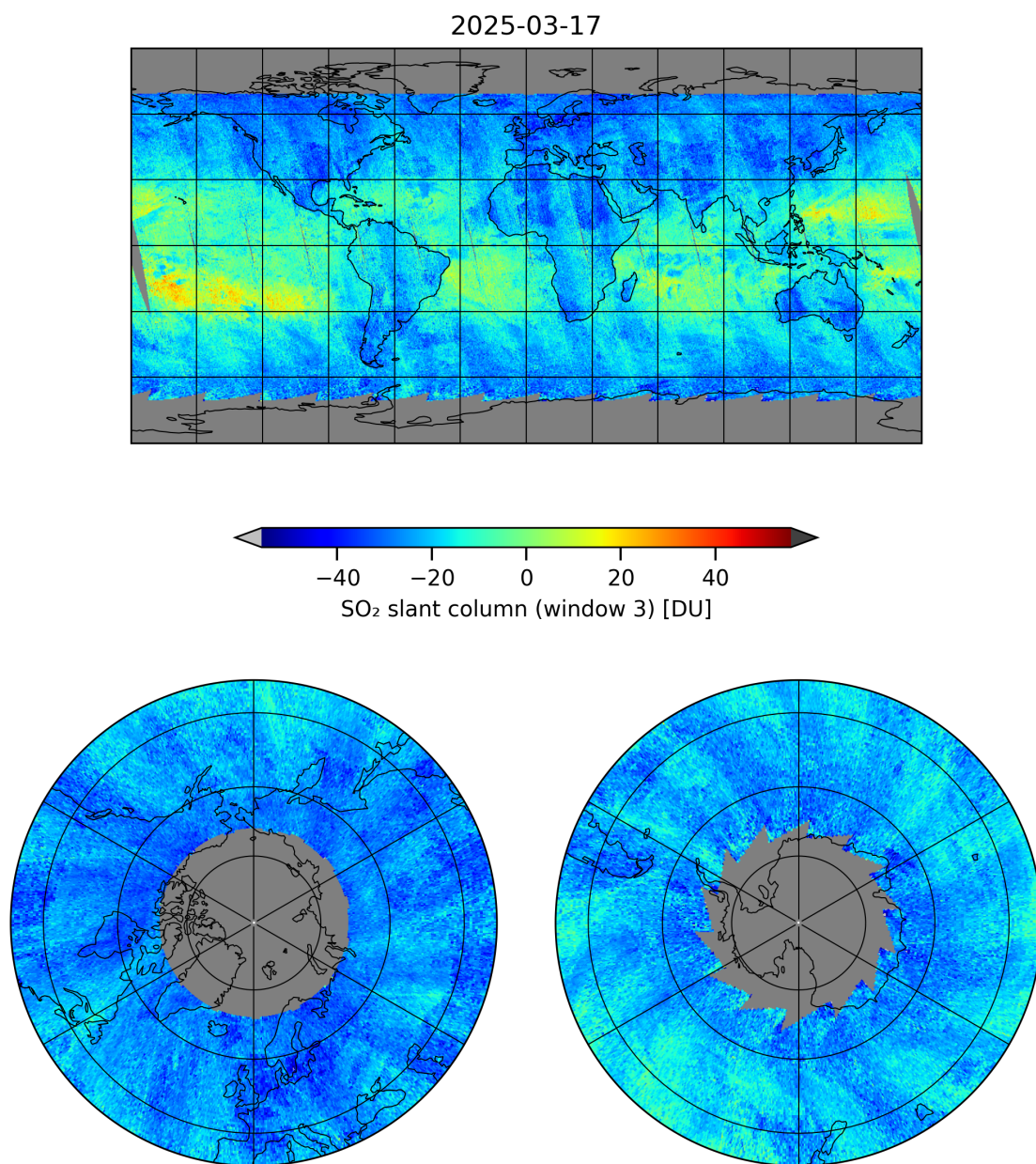


Figure 17: Map of “SO₂ slant column (window 3)” for 2025-03-17 to 2025-03-18

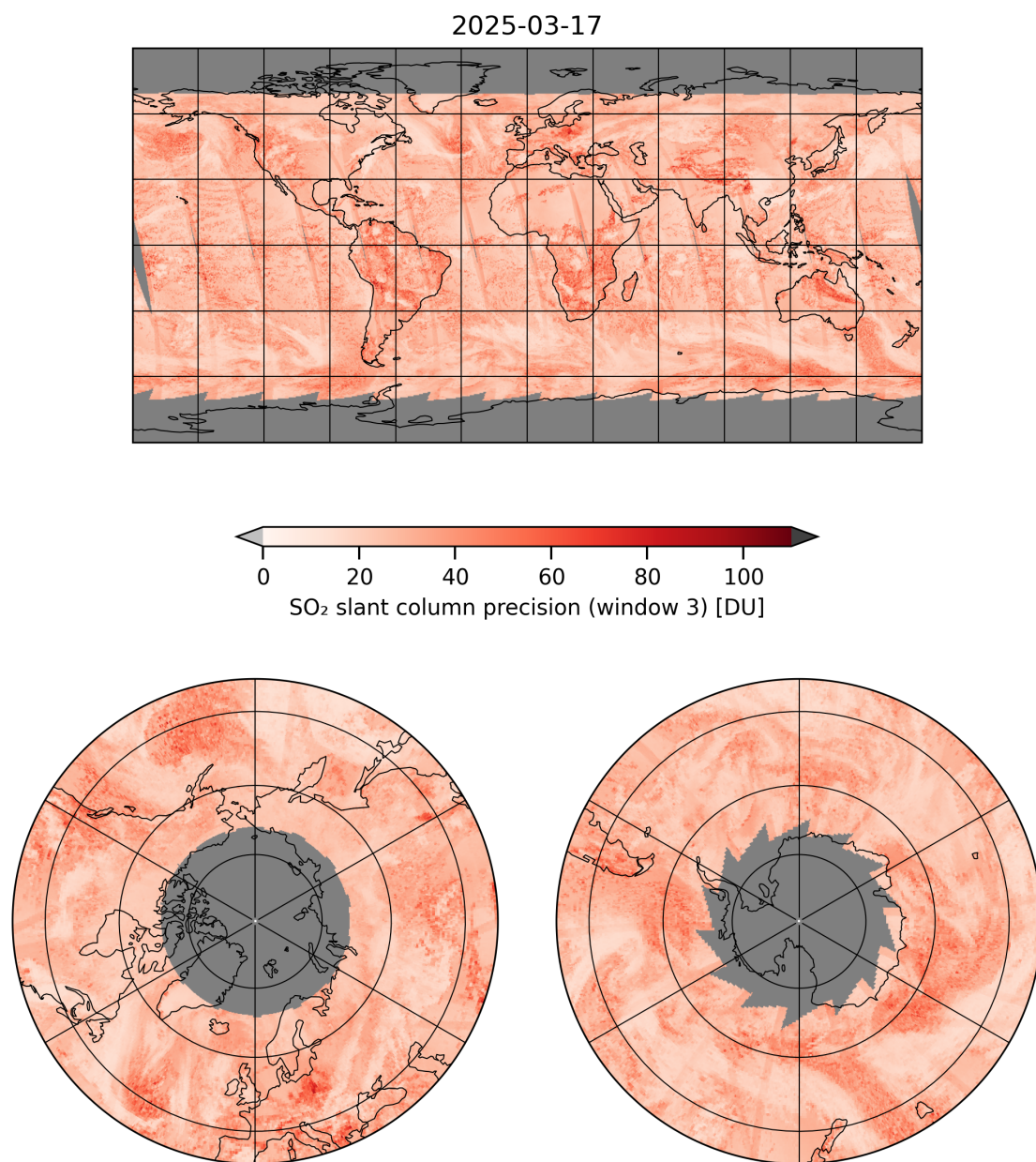


Figure 18: Map of “SO₂ slant column precision (window 3)” for 2025-03-17 to 2025-03-18

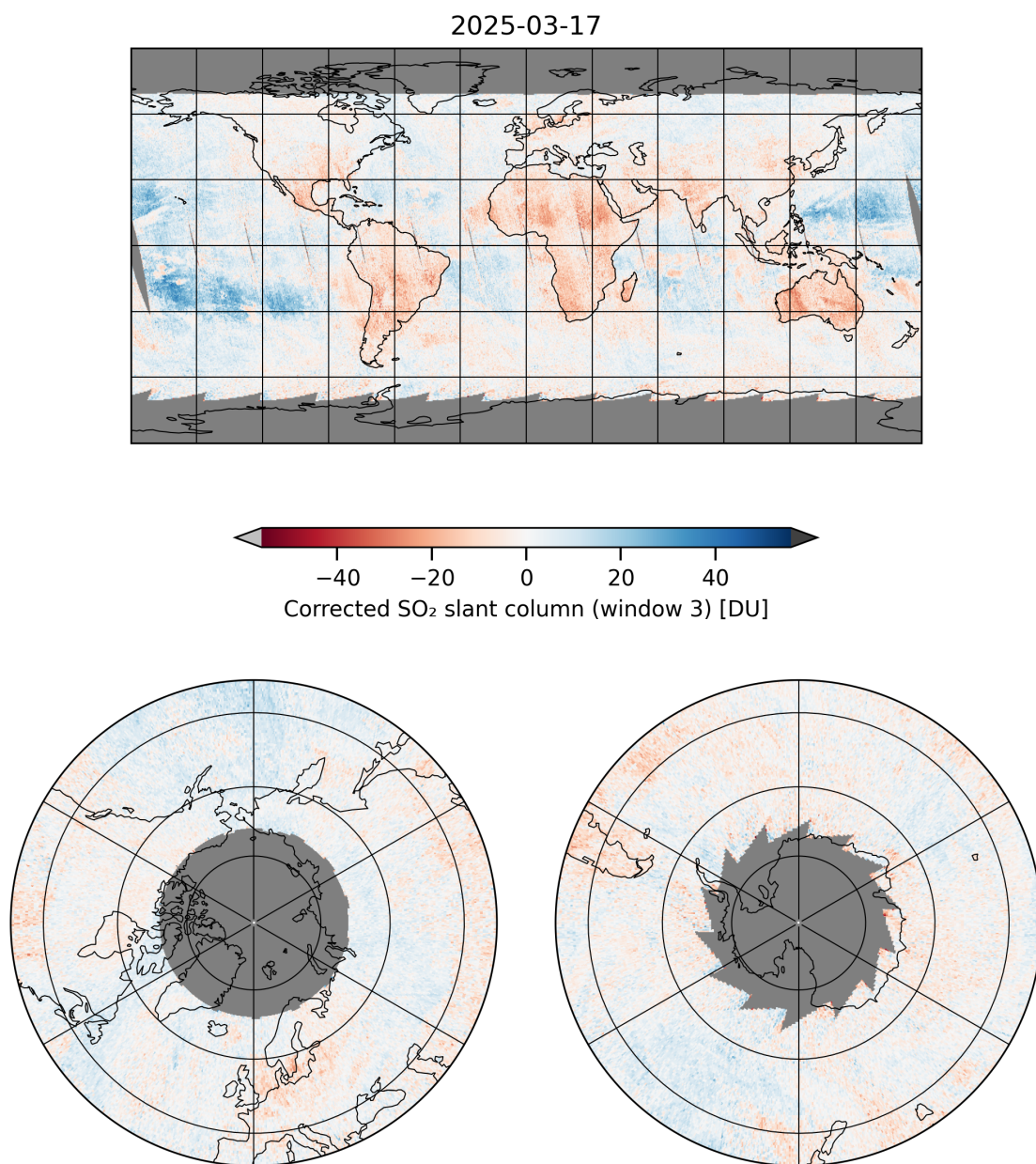


Figure 19: Map of “Corrected SO₂ slant column (window 3)” for 2025-03-17 to 2025-03-18

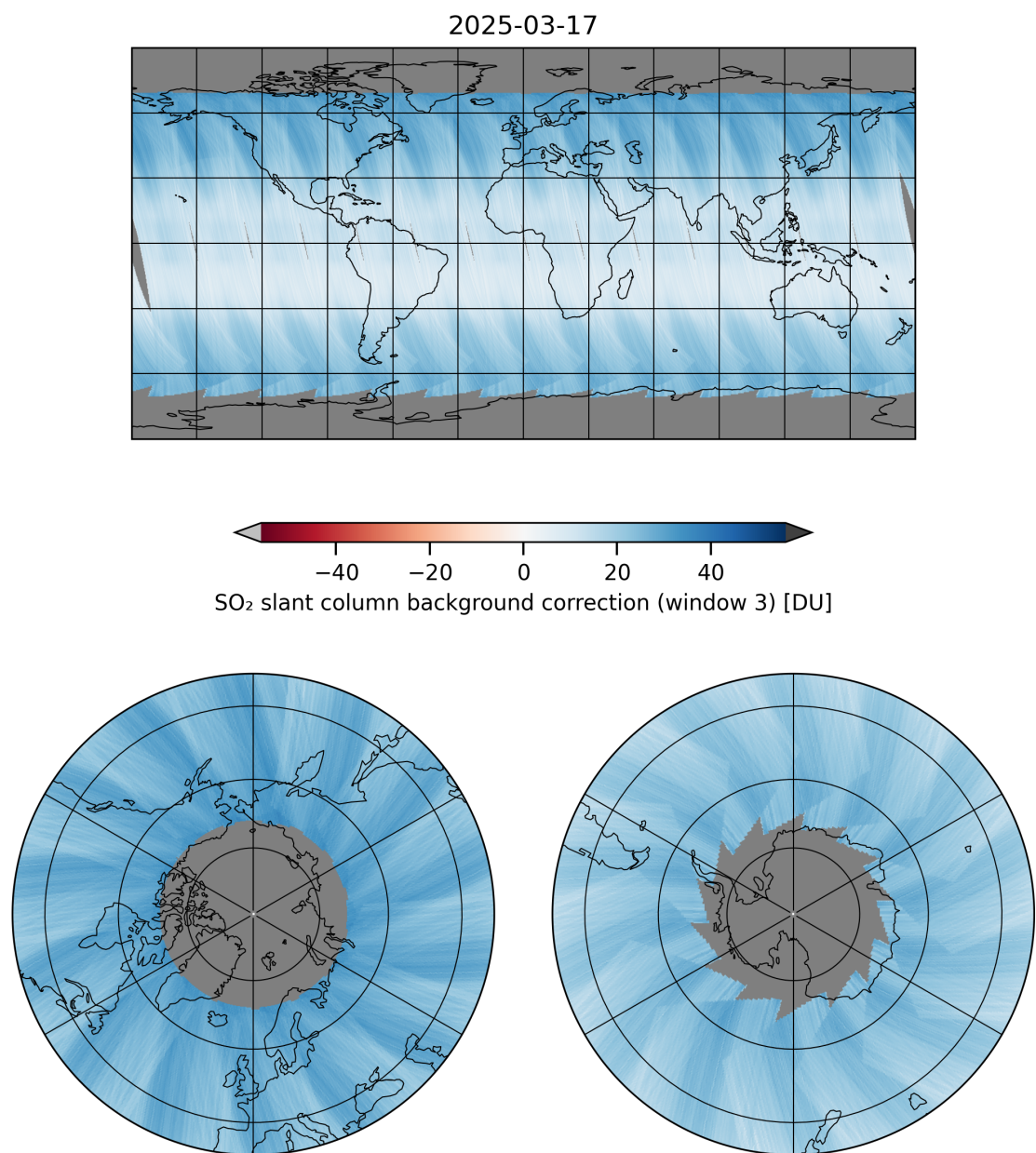


Figure 20: Map of “SO₂ slant column background correction (window 3)” for 2025-03-17 to 2025-03-18

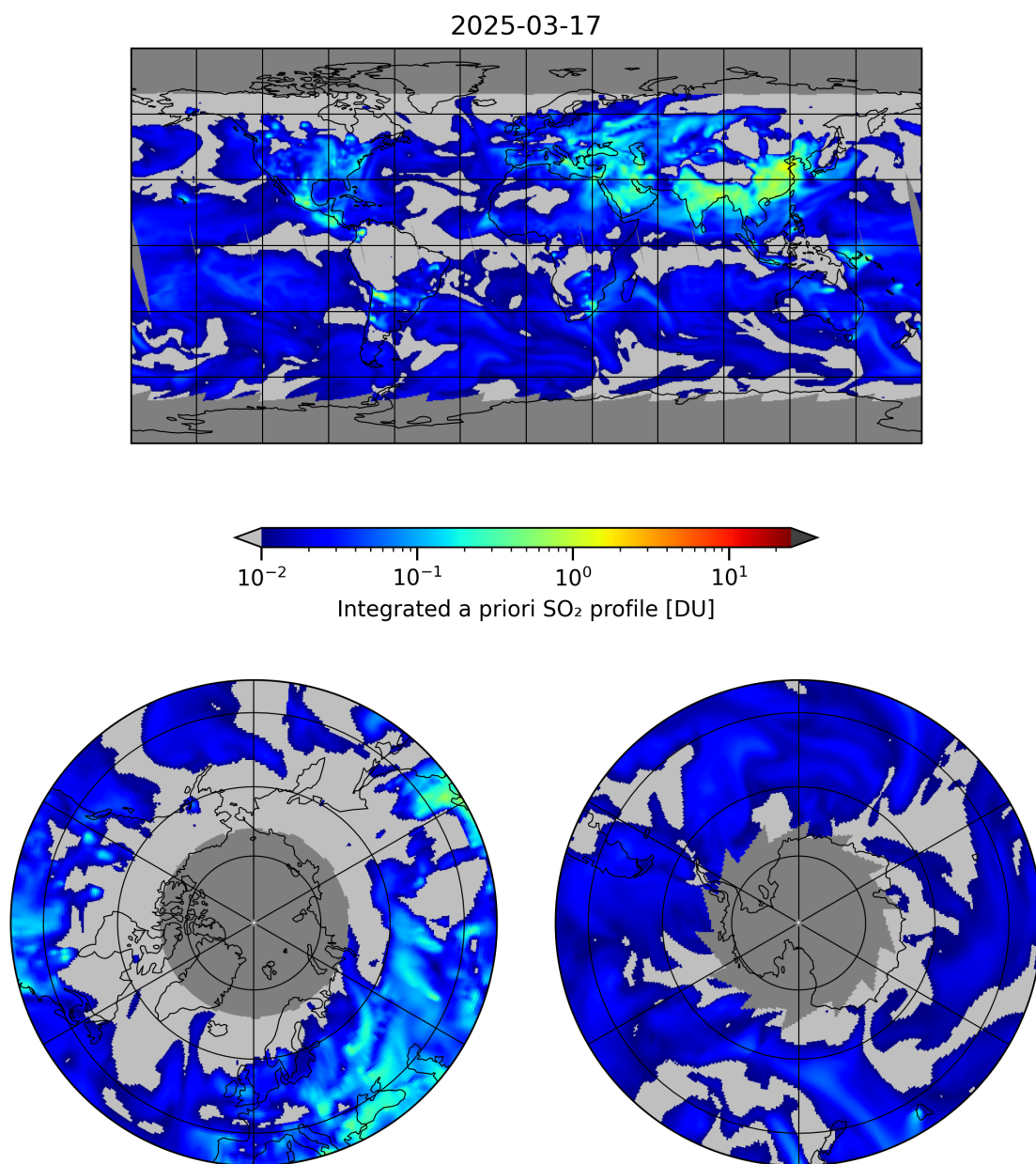


Figure 21: Map of “Integrated a priori SO₂ profile” for 2025-03-17 to 2025-03-18

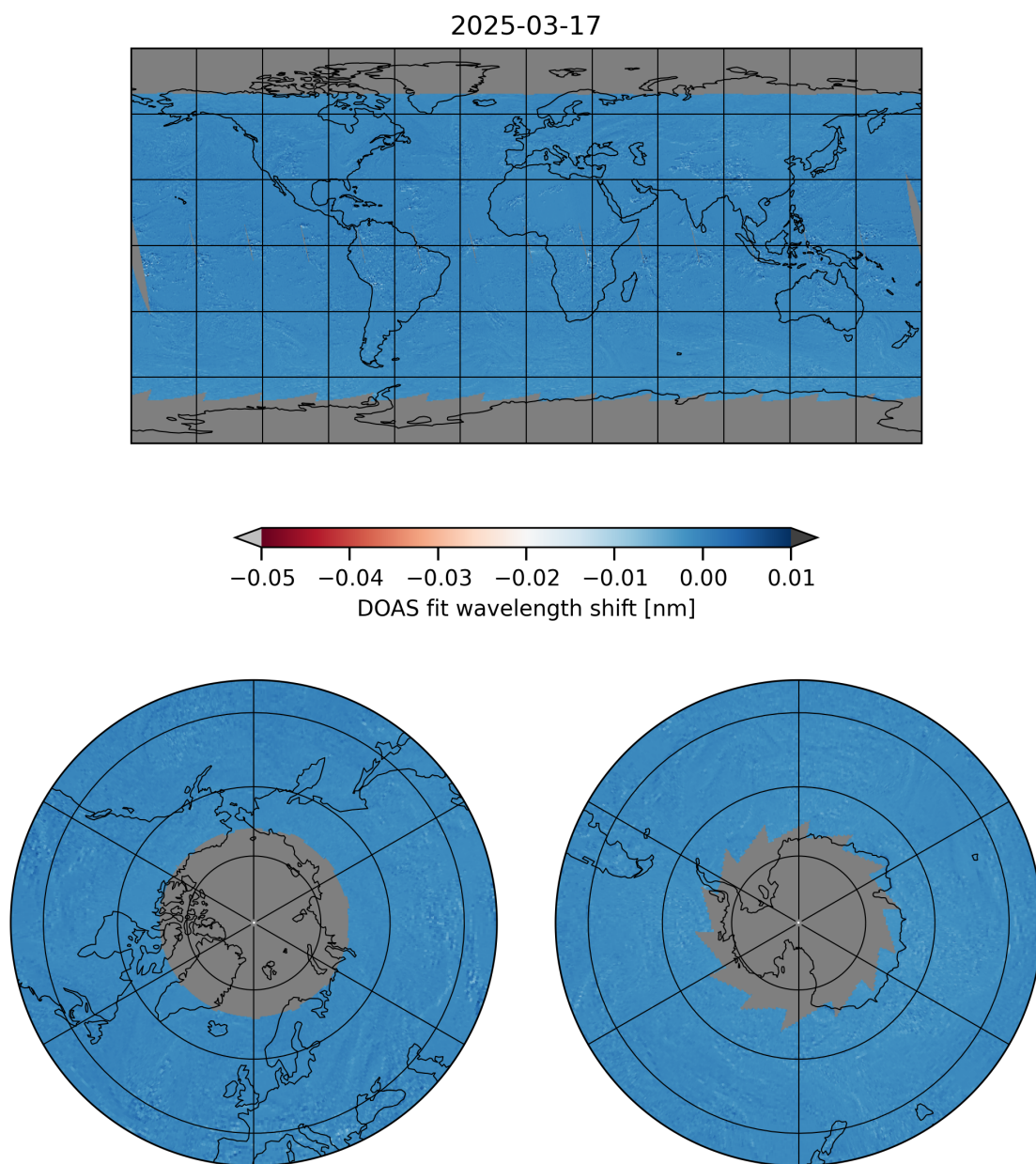


Figure 22: Map of “DOAS fit wavelength shift” for 2025-03-17 to 2025-03-18

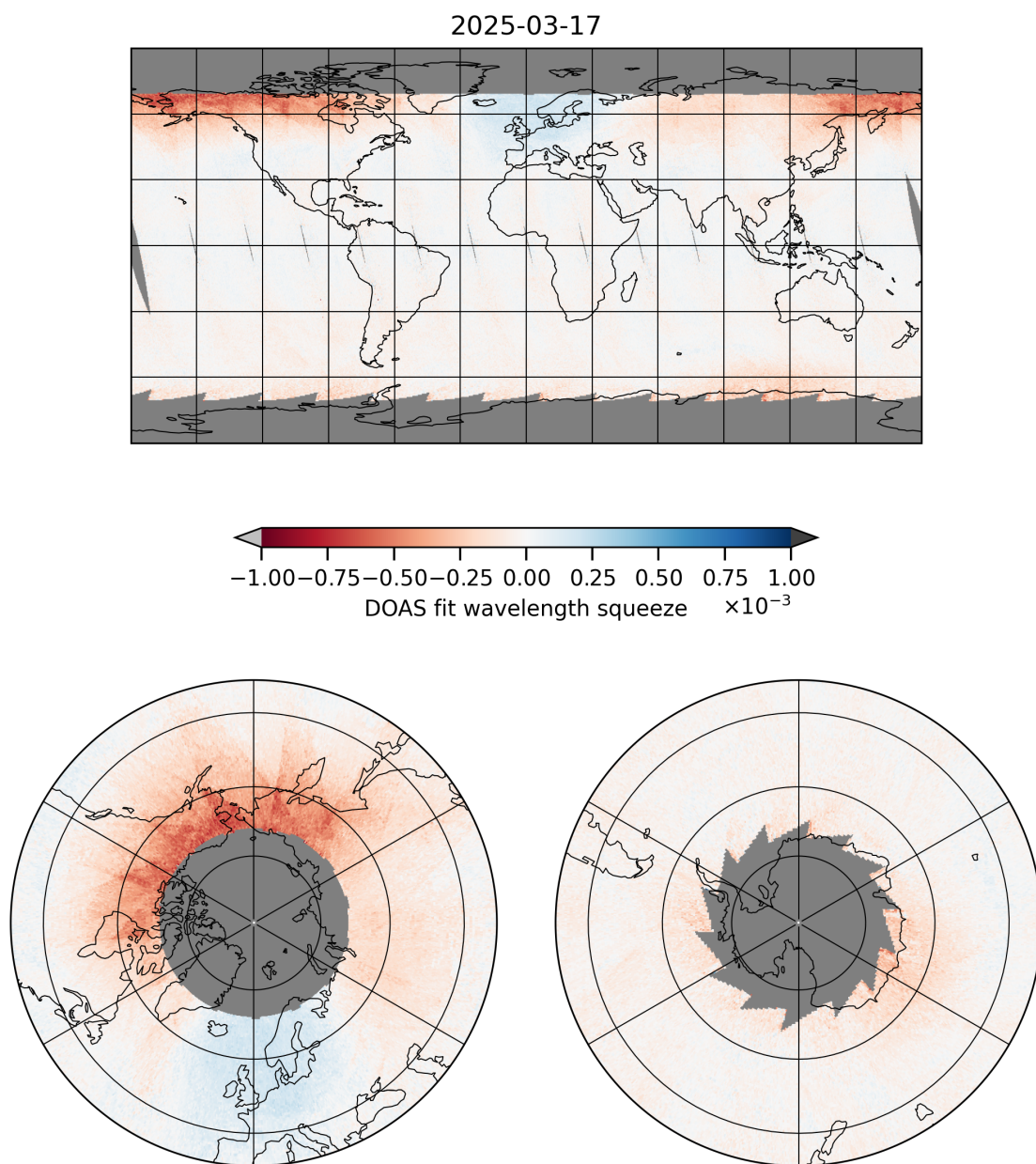


Figure 23: Map of “DOAS fit wavelength squeeze” for 2025-03-17 to 2025-03-18

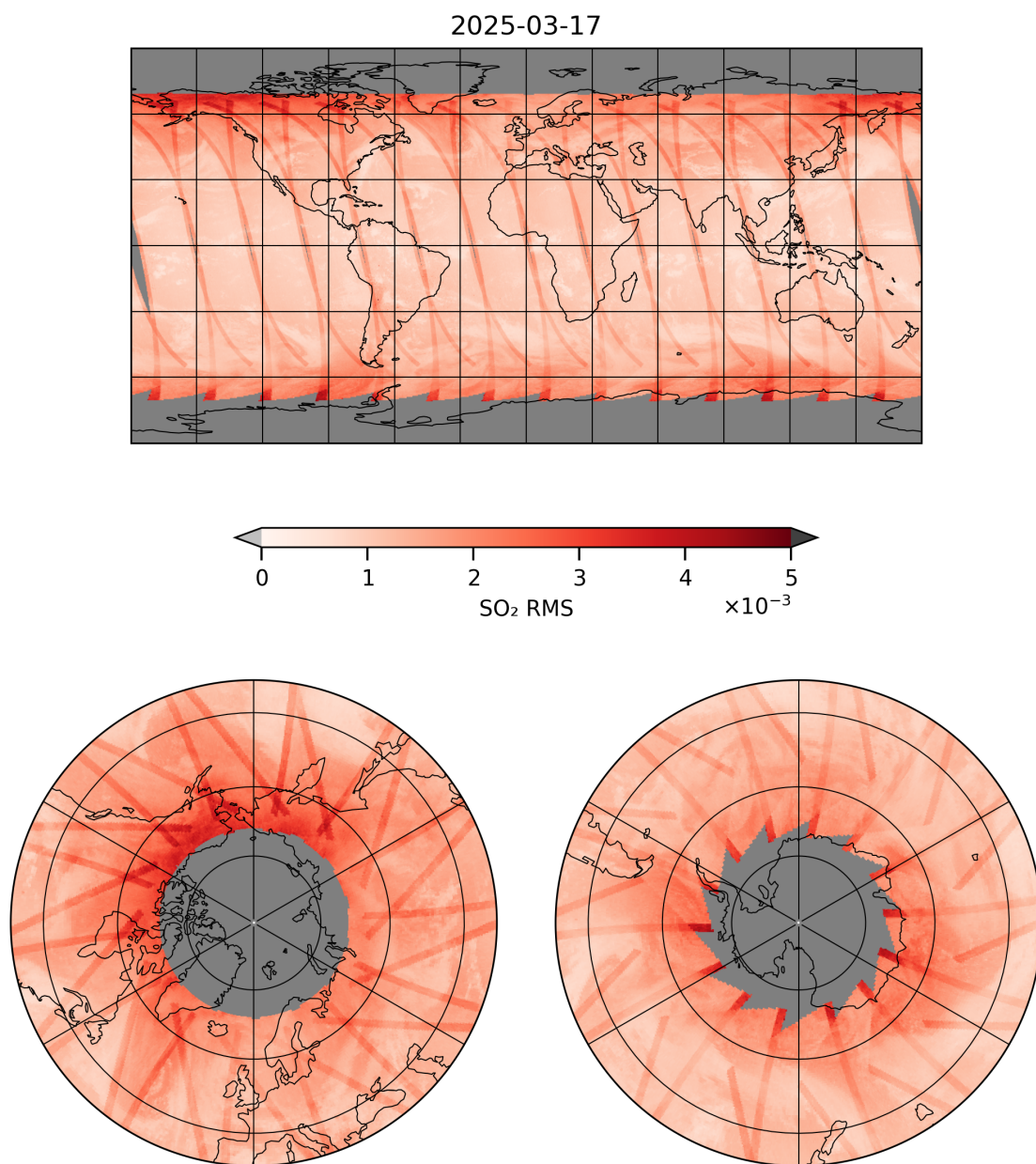


Figure 24: Map of “SO₂ RMS” for 2025-03-17 to 2025-03-18

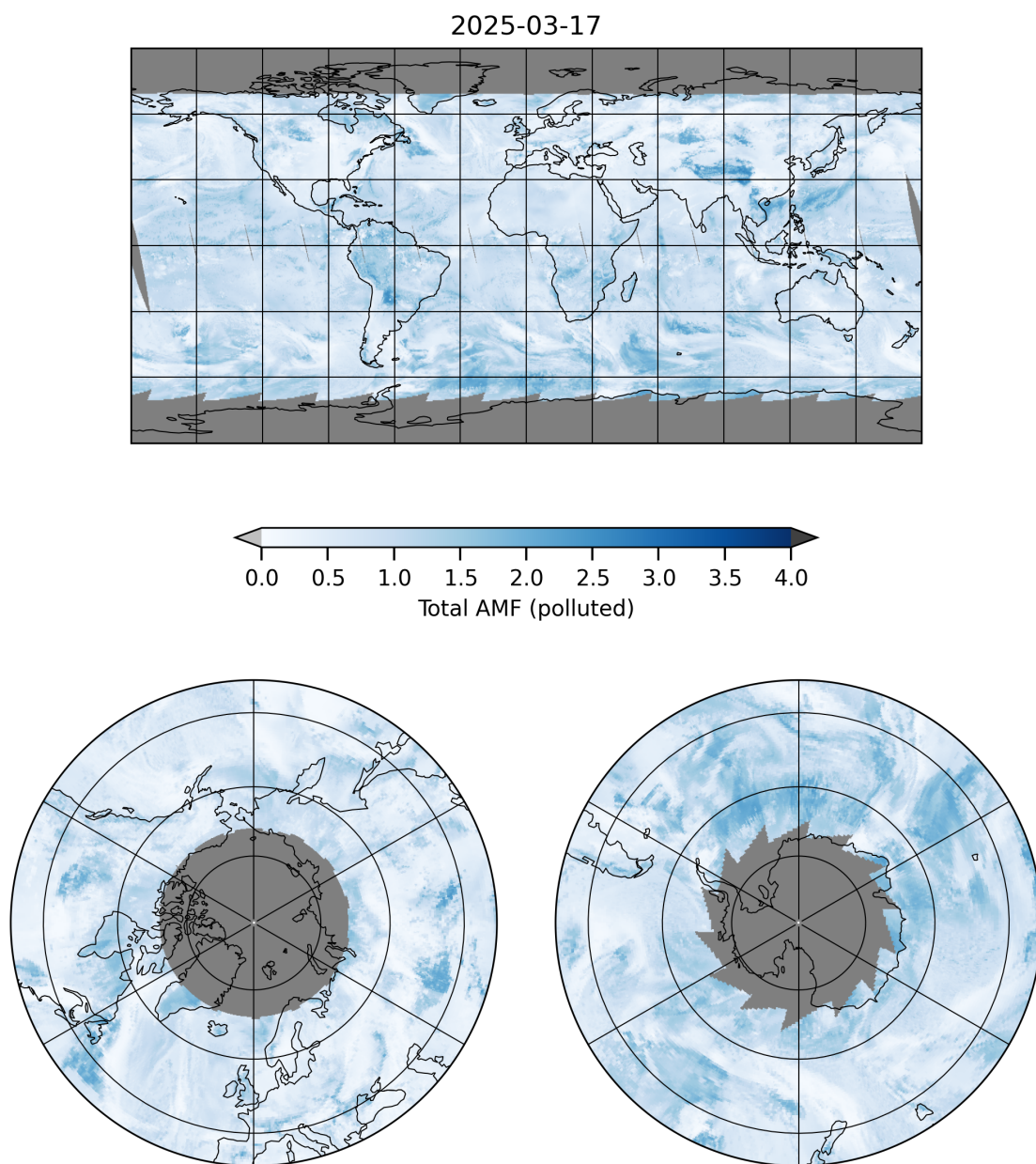


Figure 25: Map of “Total AMF (polluted)” for 2025-03-17 to 2025-03-18

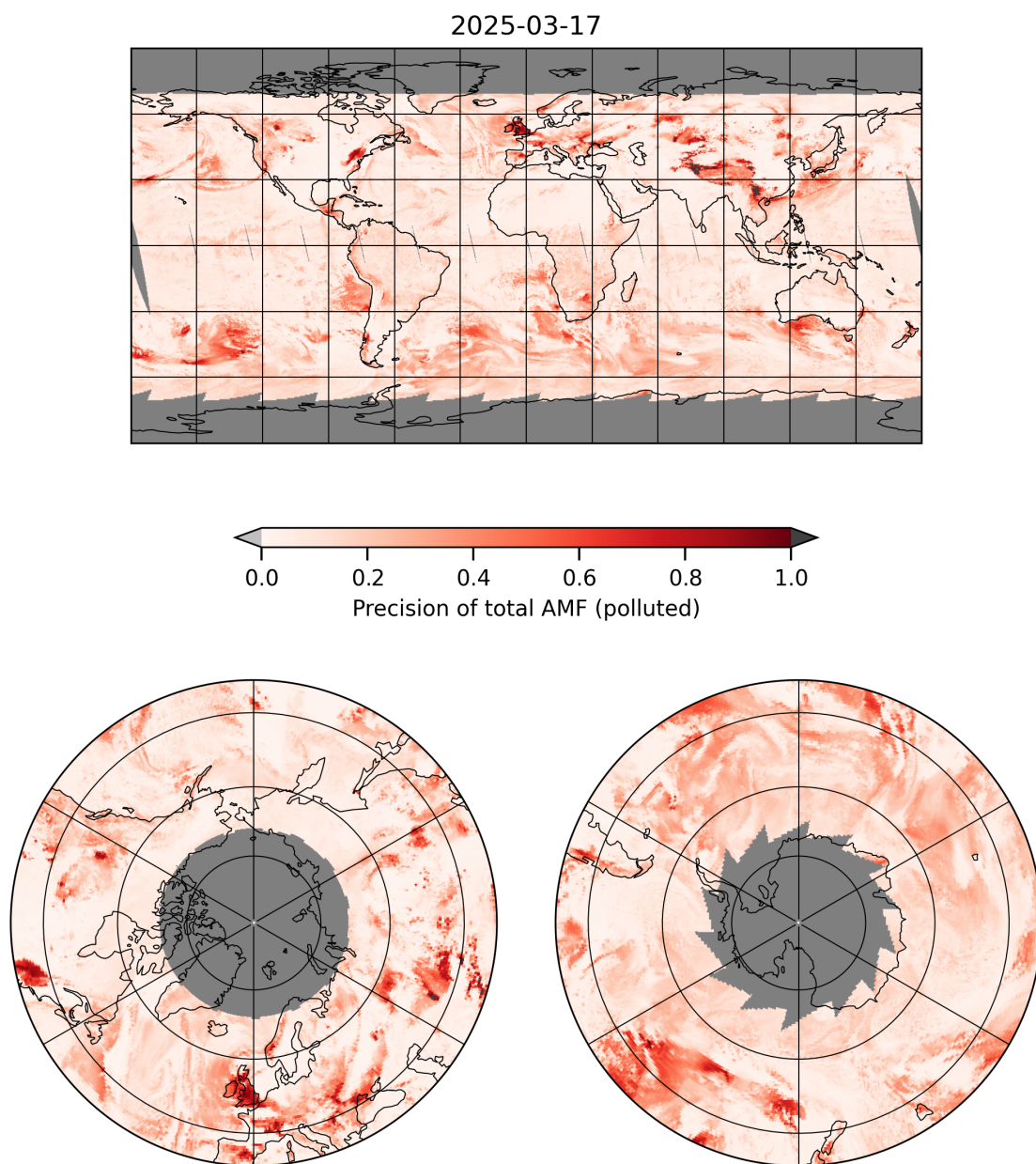


Figure 26: Map of “Precision of total AMF (polluted)” for 2025-03-17 to 2025-03-18

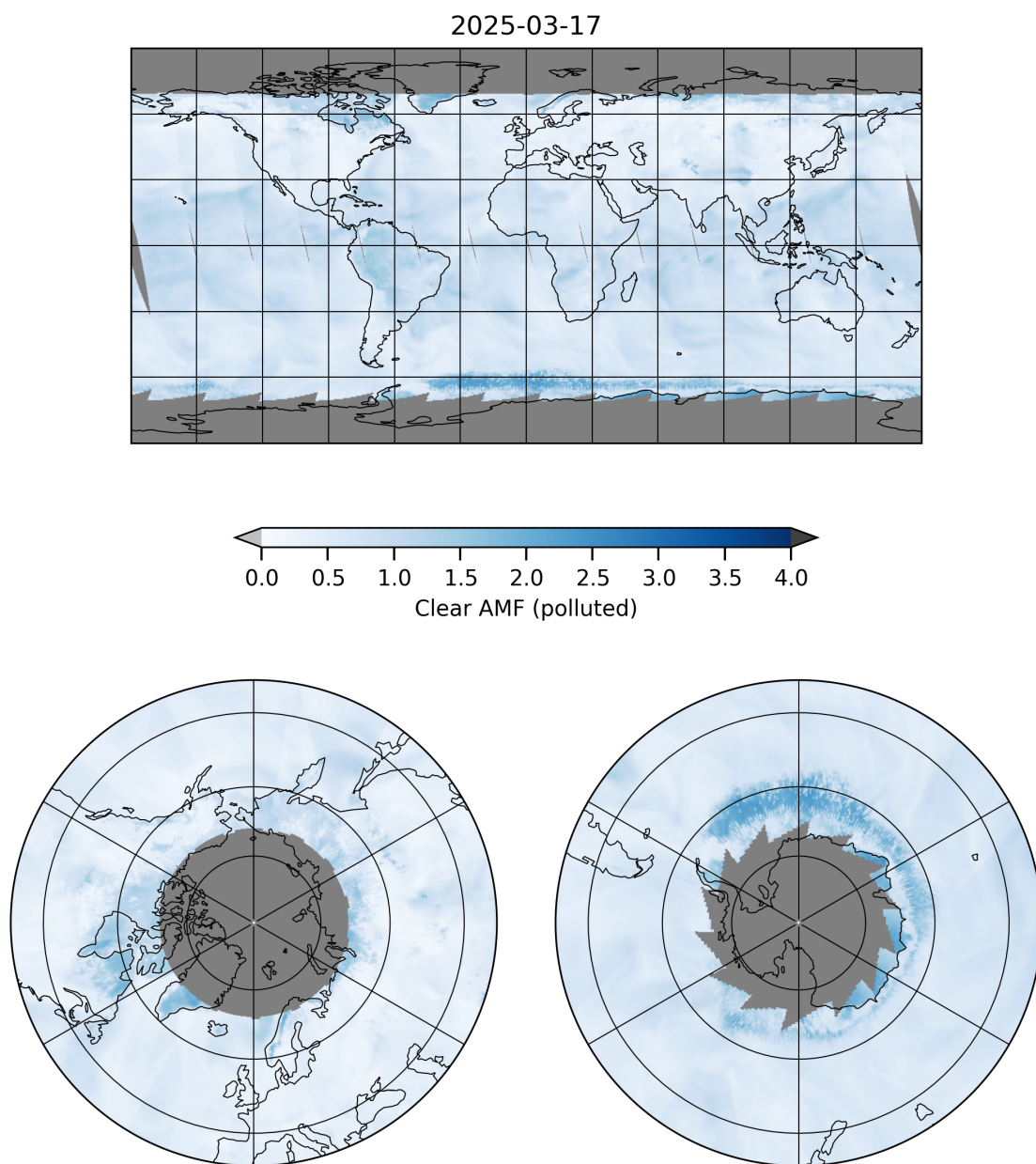


Figure 27: Map of “Clear AMF (polluted)” for 2025-03-17 to 2025-03-18

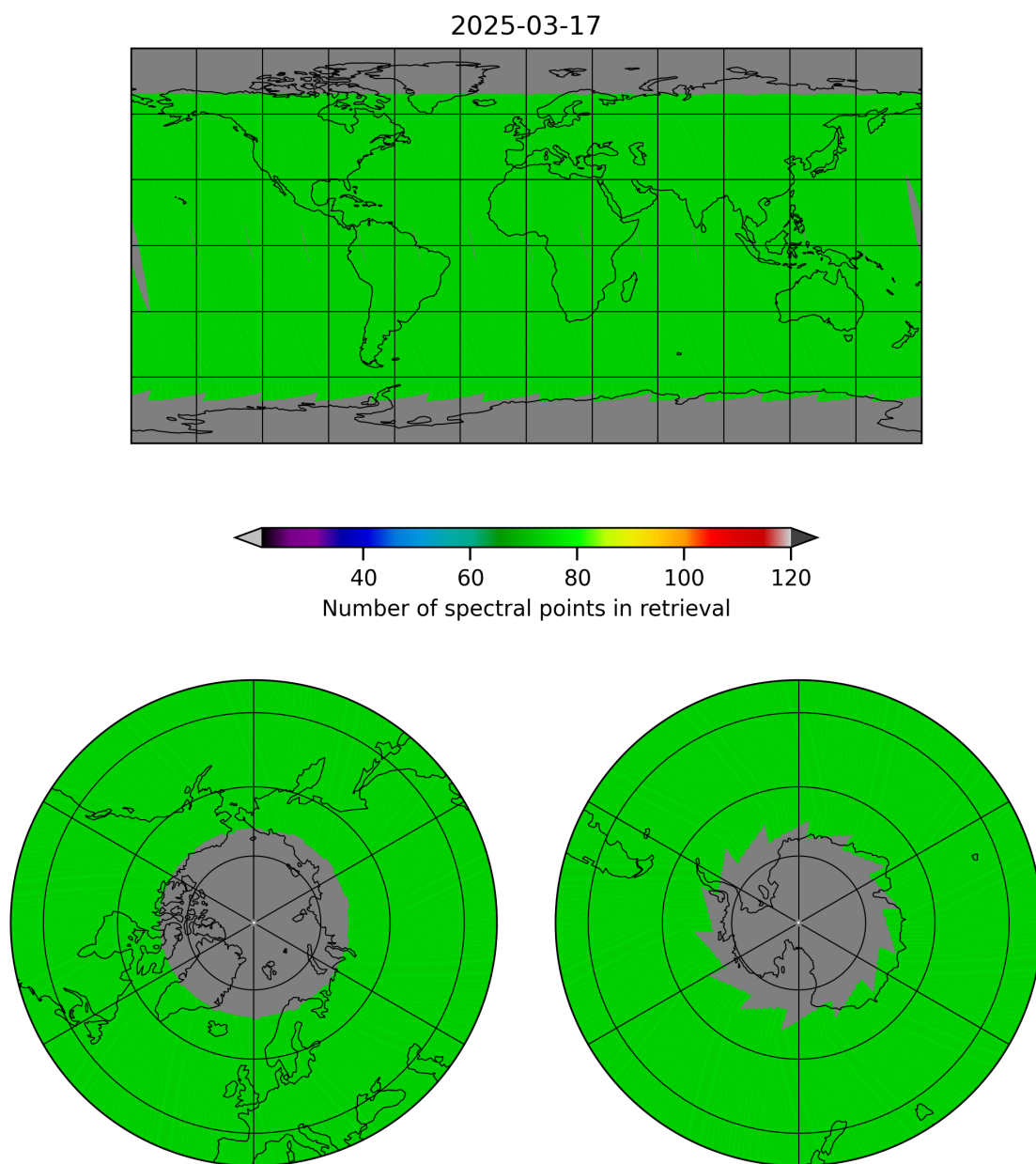


Figure 28: Map of “Number of spectral points in retrieval” for 2025-03-17 to 2025-03-18

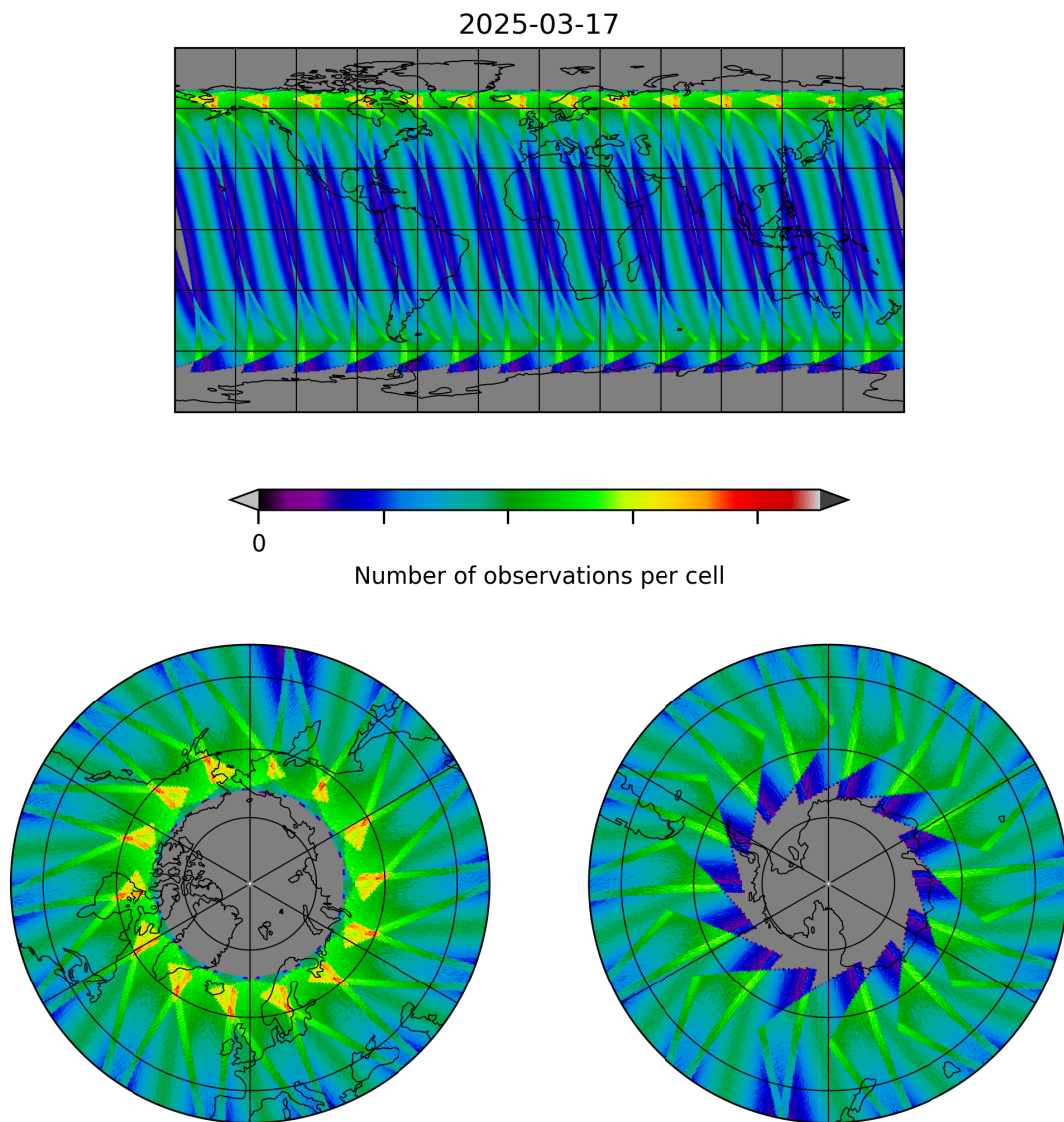


Figure 29: Map of the number of observations for 2025-03-17 to 2025-03-18

7 Zonal average

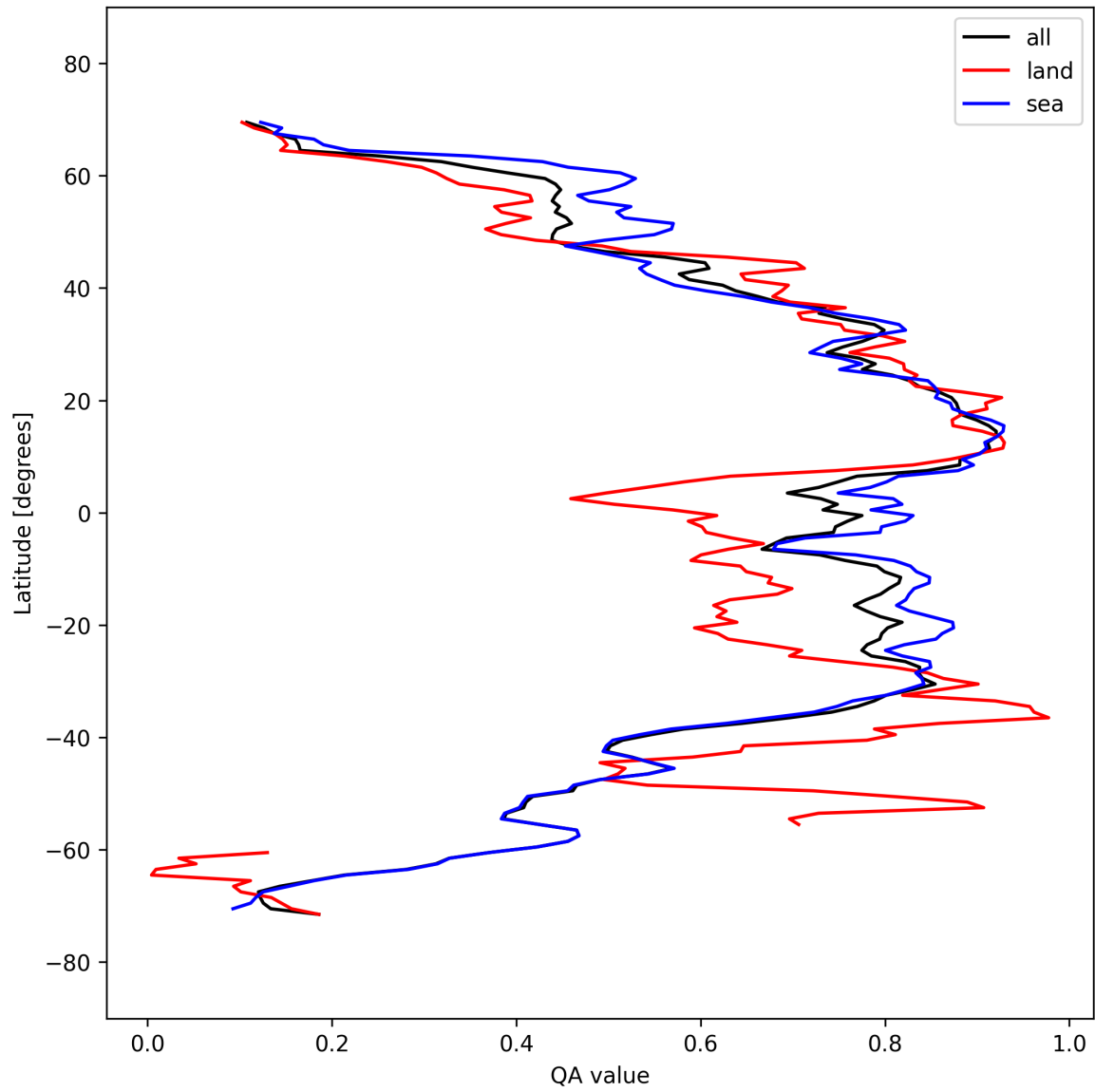


Figure 30: Zonal average of “QA value” for 2025-03-17 to 2025-03-18.

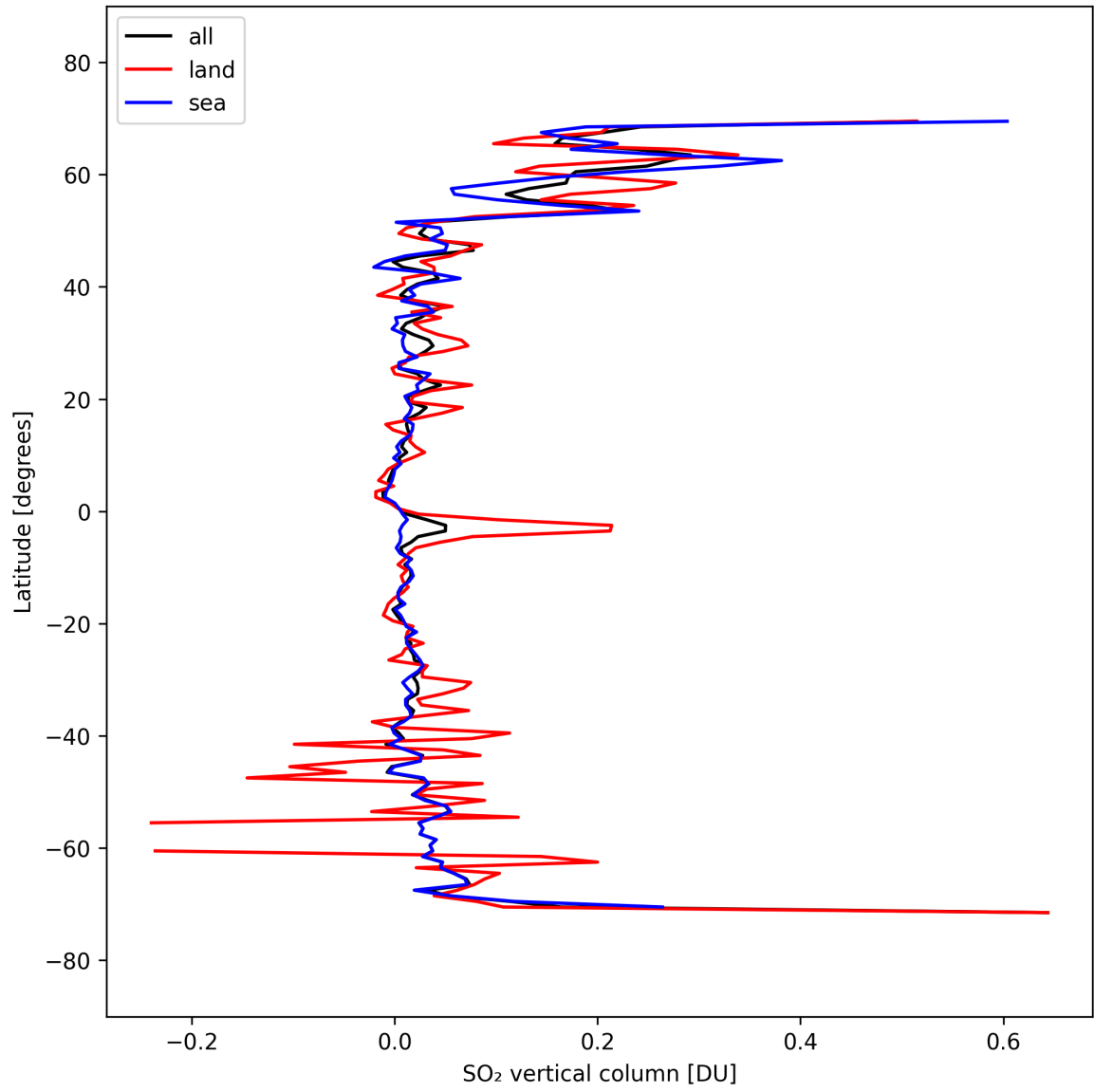


Figure 31: Zonal average of “SO₂ vertical column” for 2025-03-17 to 2025-03-18.

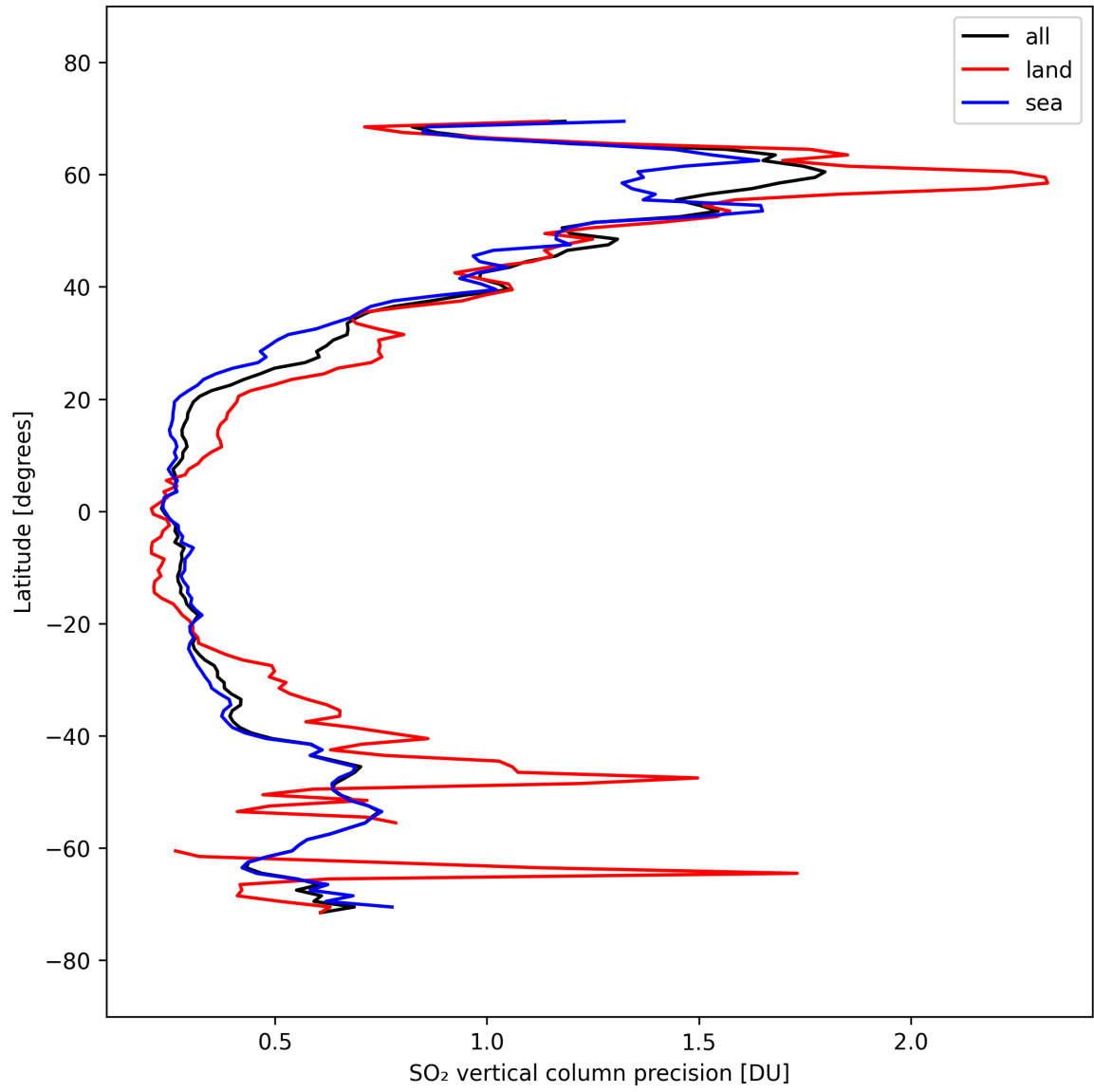


Figure 32: Zonal average of “SO₂ vertical column precision” for 2025-03-17 to 2025-03-18.

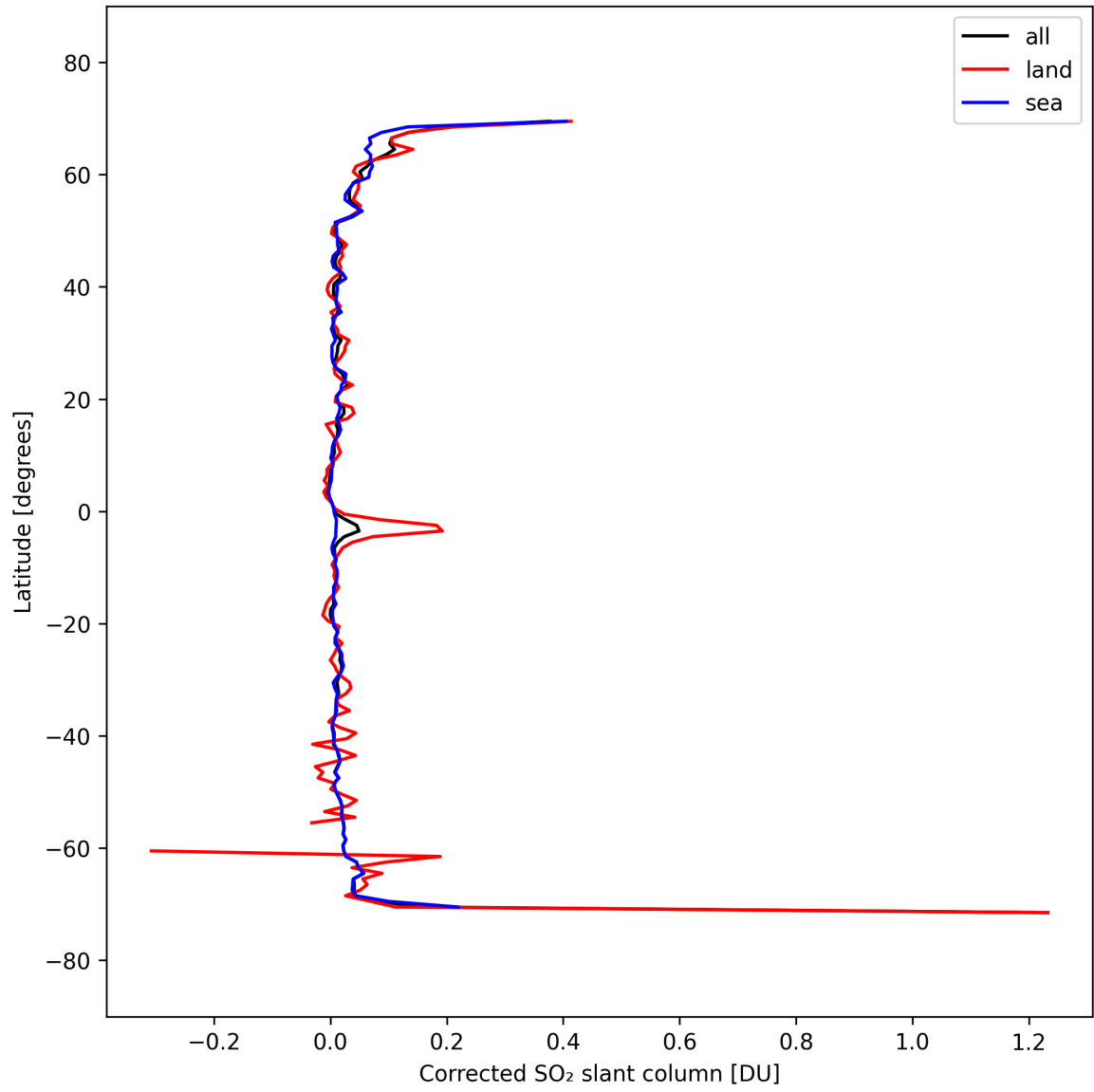


Figure 33: Zonal average of “Corrected SO₂ slant column” for 2025-03-17 to 2025-03-18.

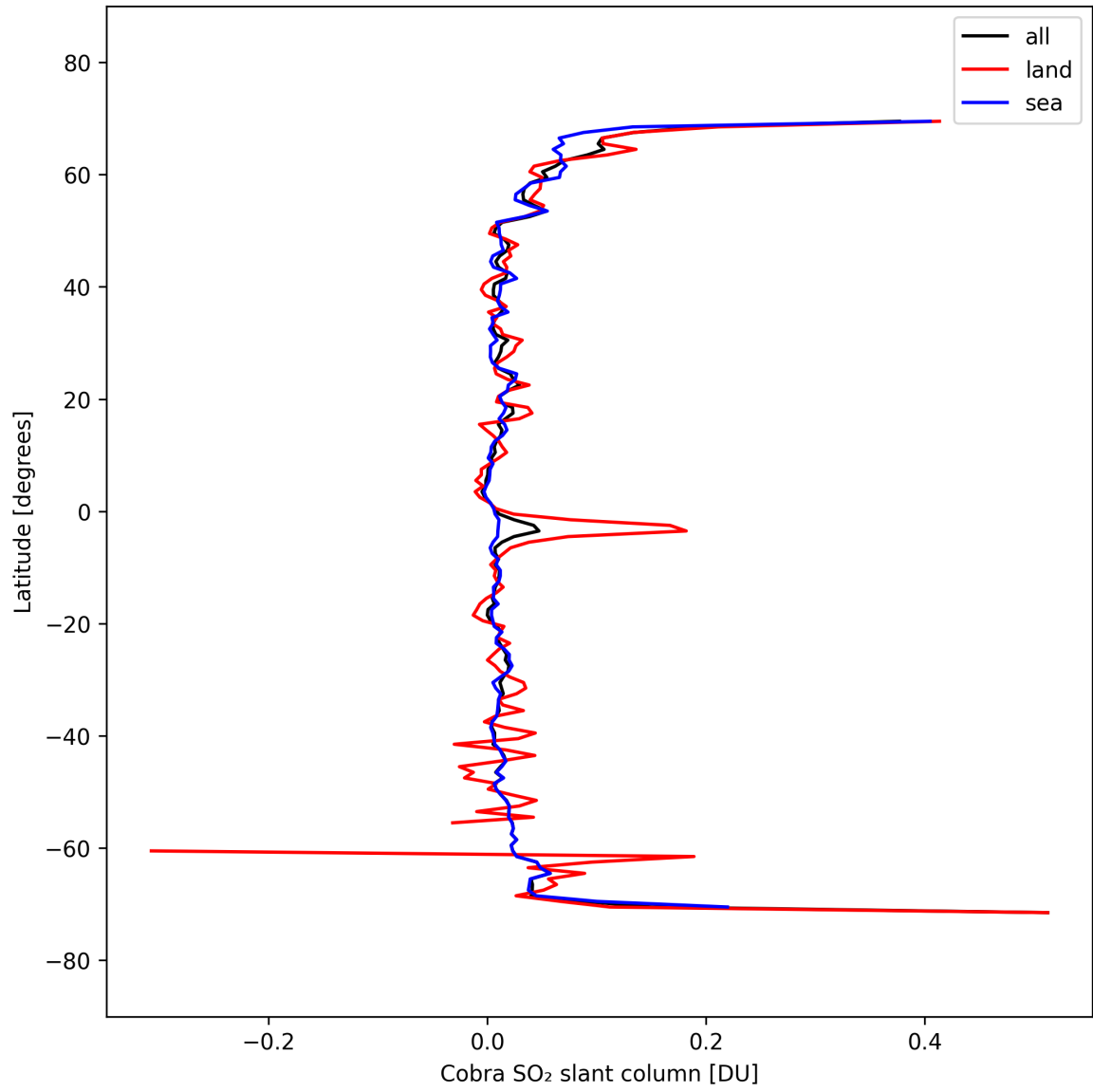


Figure 34: Zonal average of “Cobra SO₂ slant column” for 2025-03-17 to 2025-03-18.

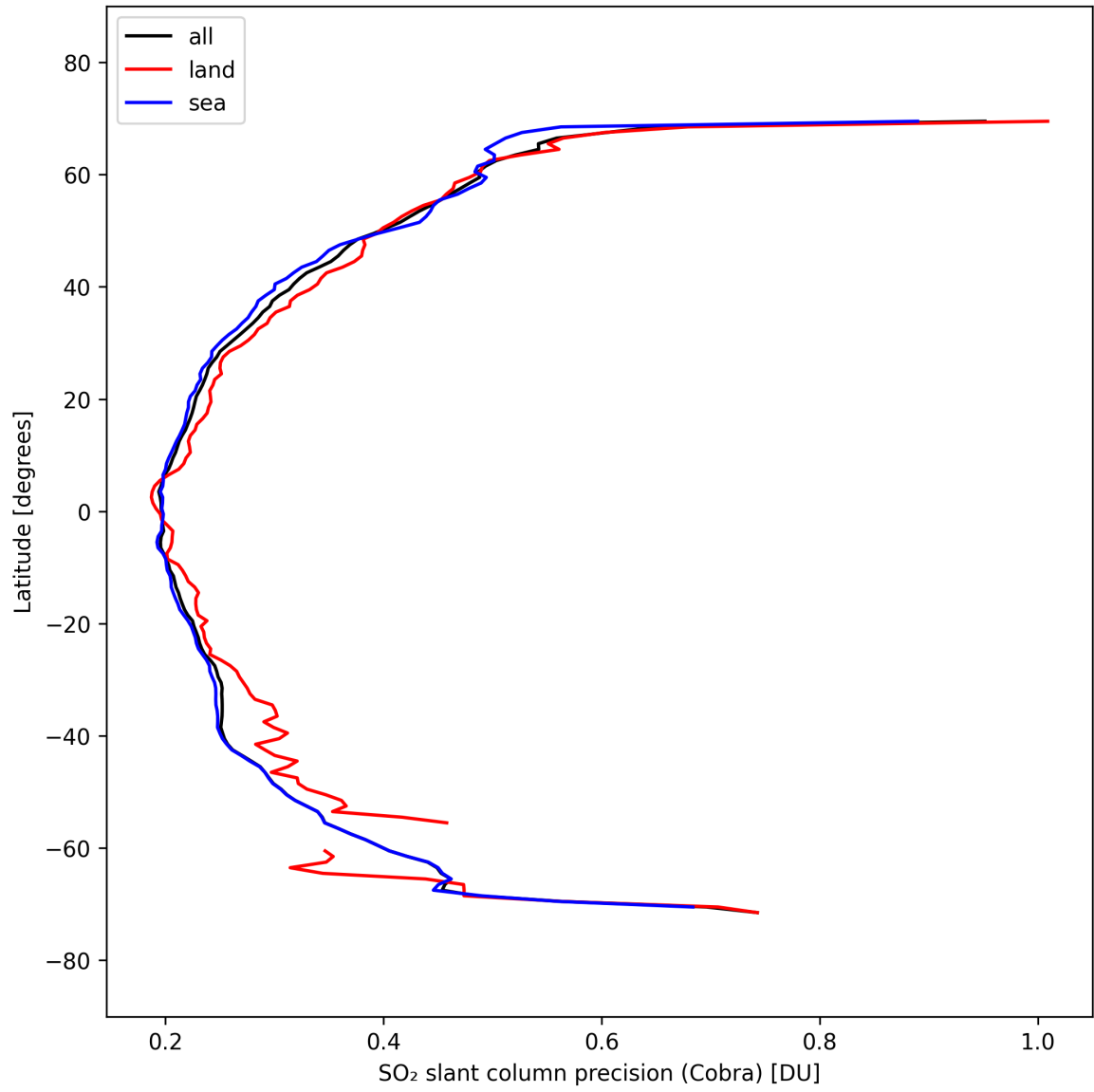


Figure 35: Zonal average of “SO₂ slant column precision (Cobra)” for 2025-03-17 to 2025-03-18.

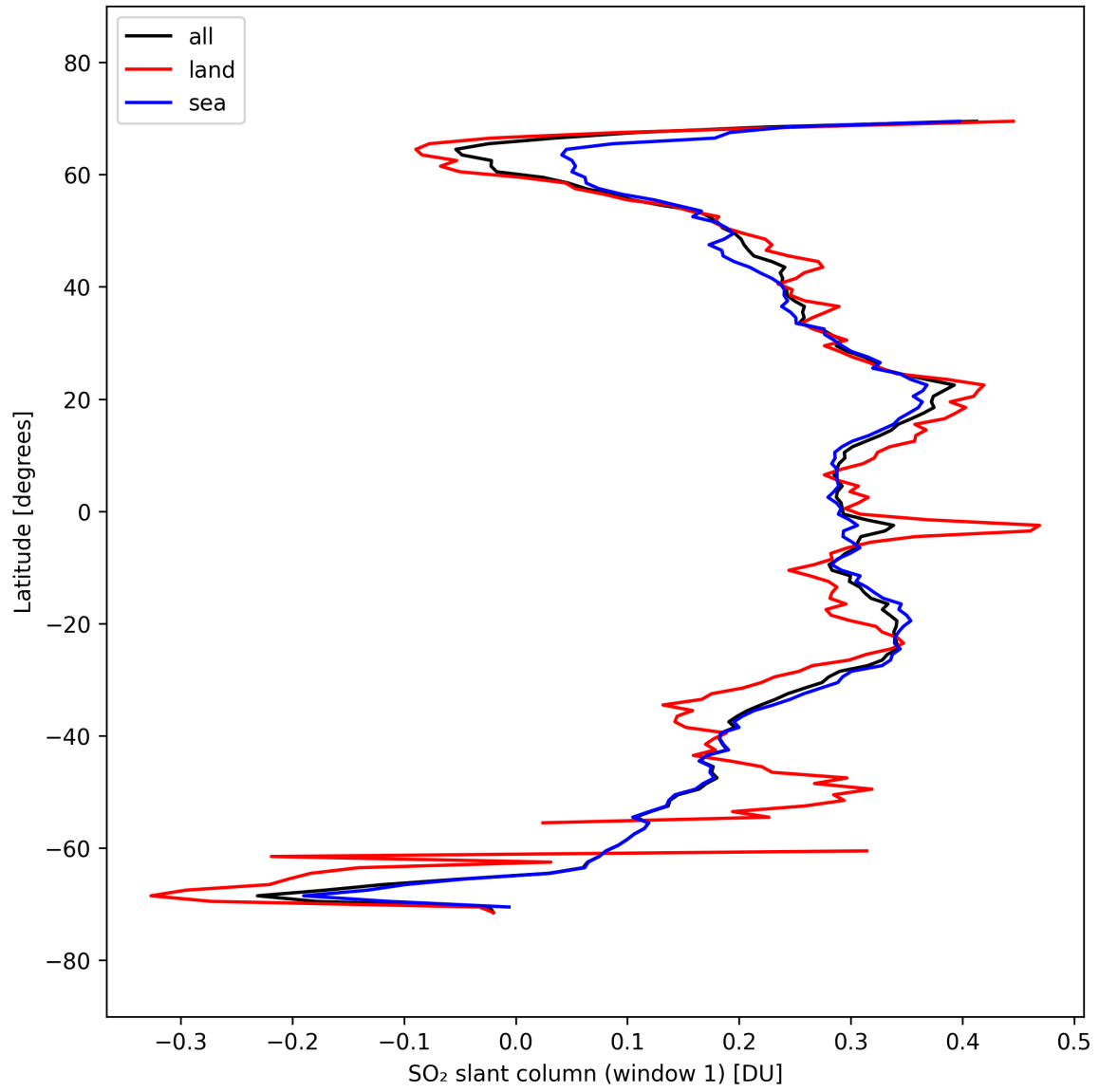


Figure 36: Zonal average of “SO₂ slant column (window 1)” for 2025-03-17 to 2025-03-18.

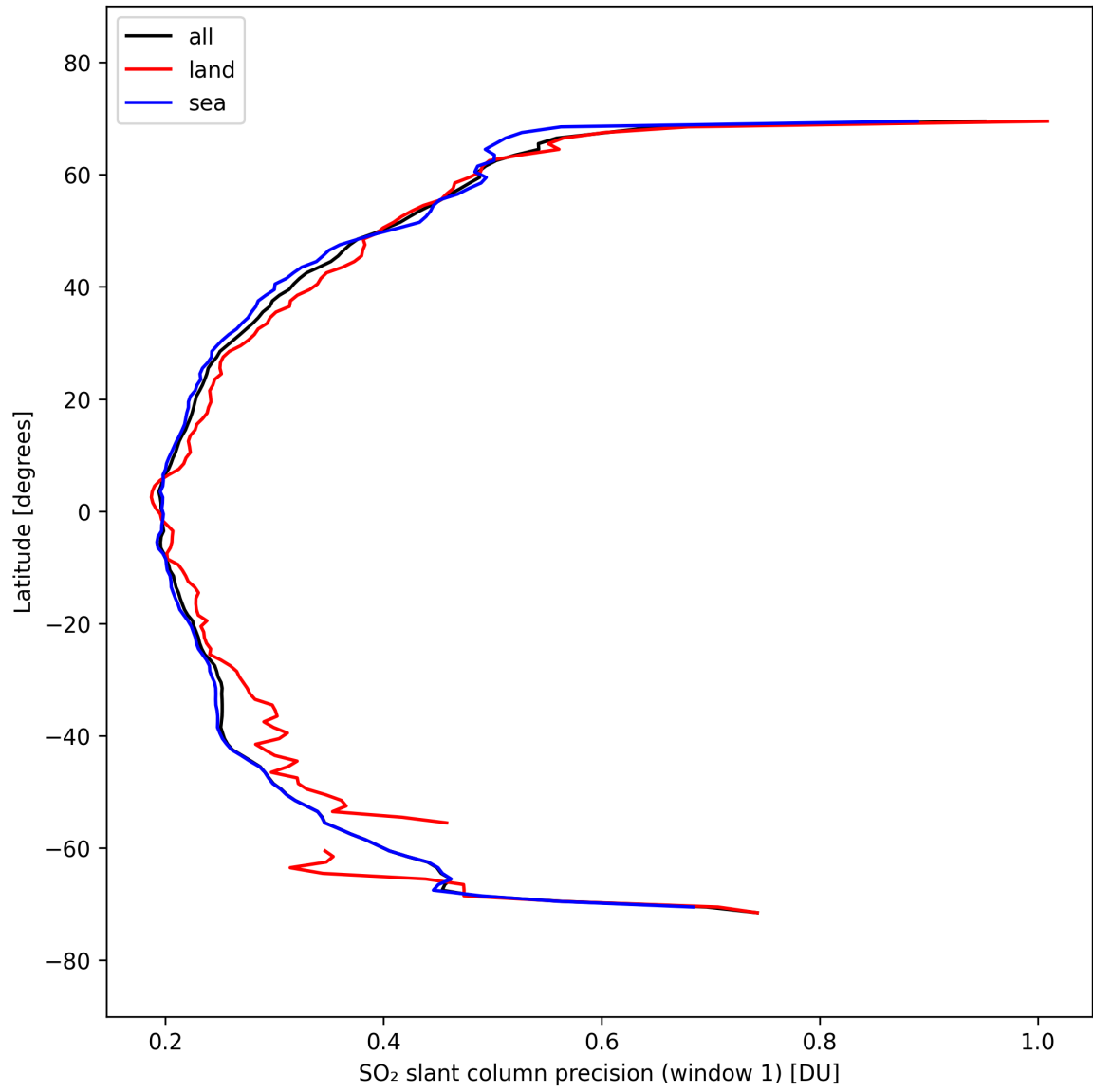


Figure 37: Zonal average of “SO₂ slant column precision (window 1)” for 2025-03-17 to 2025-03-18.

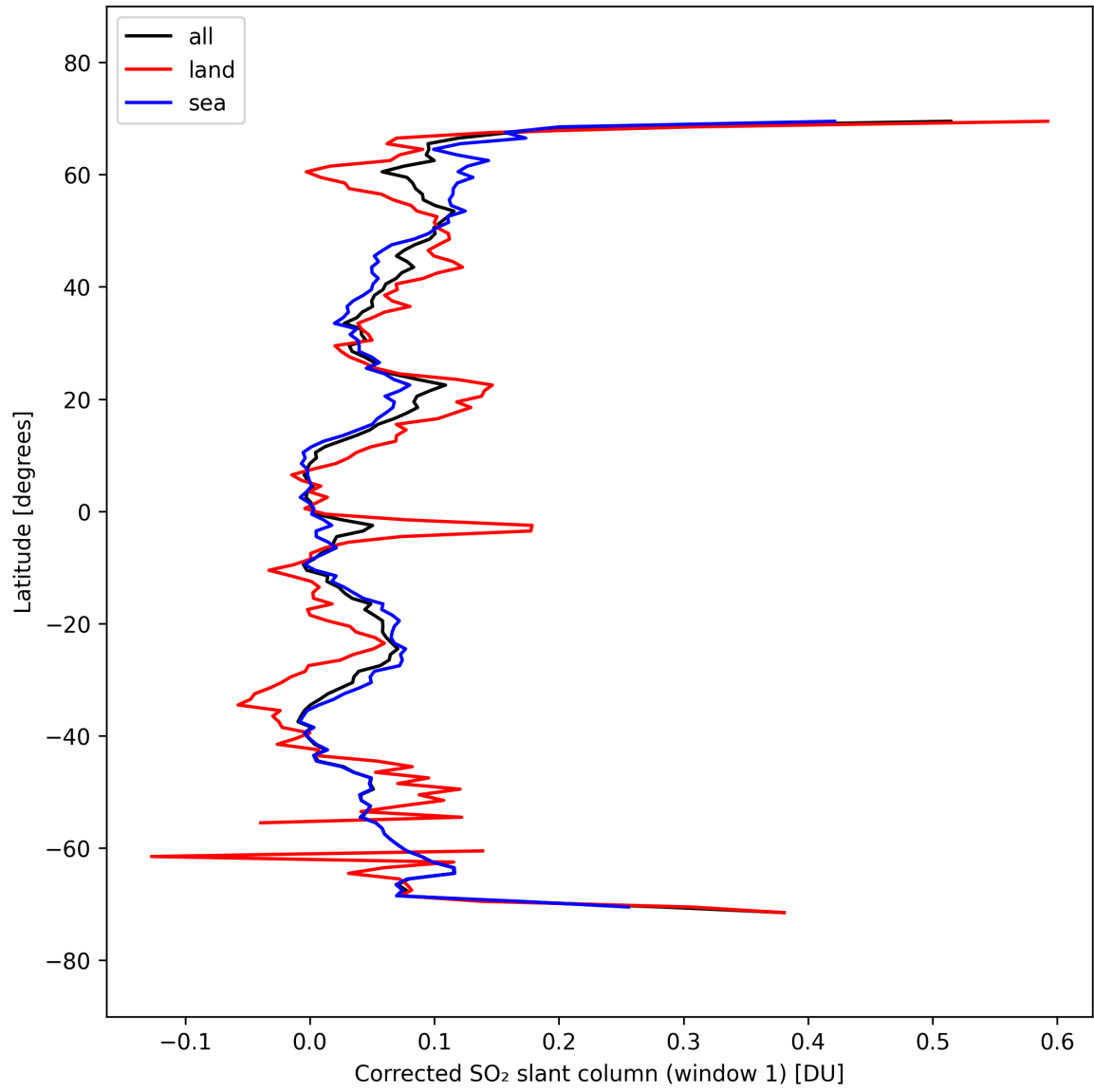


Figure 38: Zonal average of “Corrected SO₂ slant column (window 1)” for 2025-03-17 to 2025-03-18.

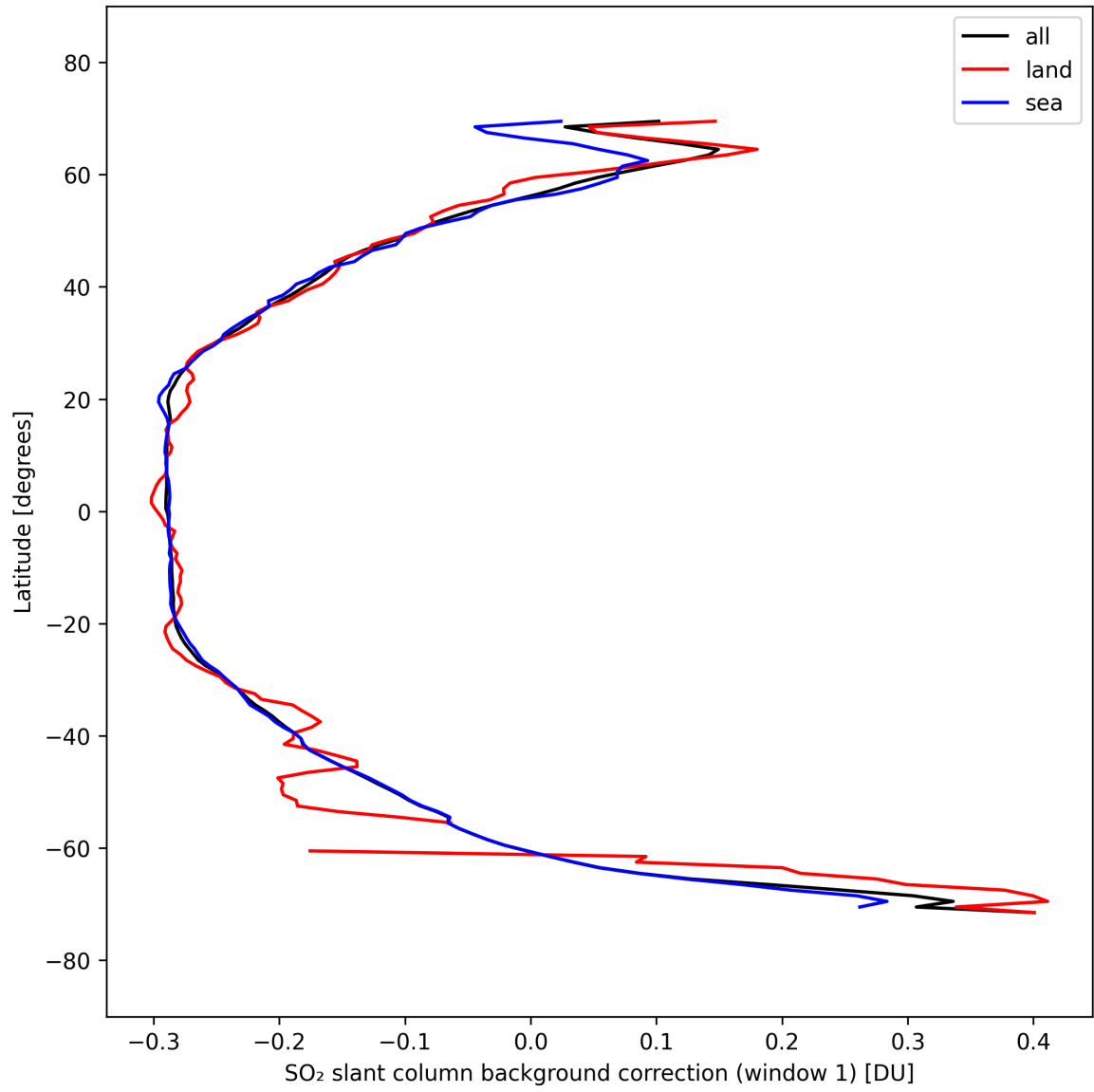


Figure 39: Zonal average of “SO₂ slant column background correction (window 1)” for 2025-03-17 to 2025-03-18.

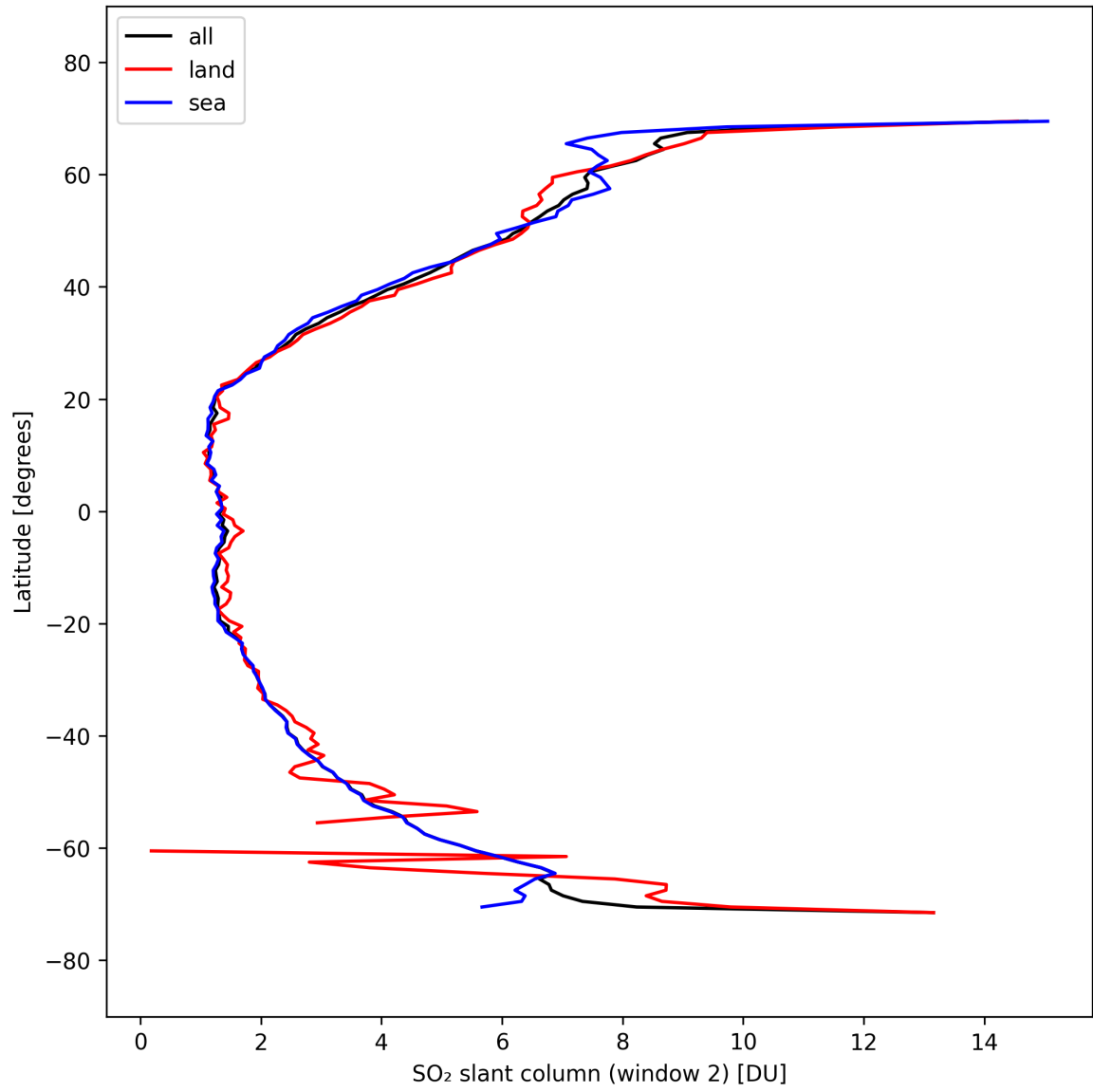


Figure 40: Zonal average of “SO₂ slant column (window 2)” for 2025-03-17 to 2025-03-18.

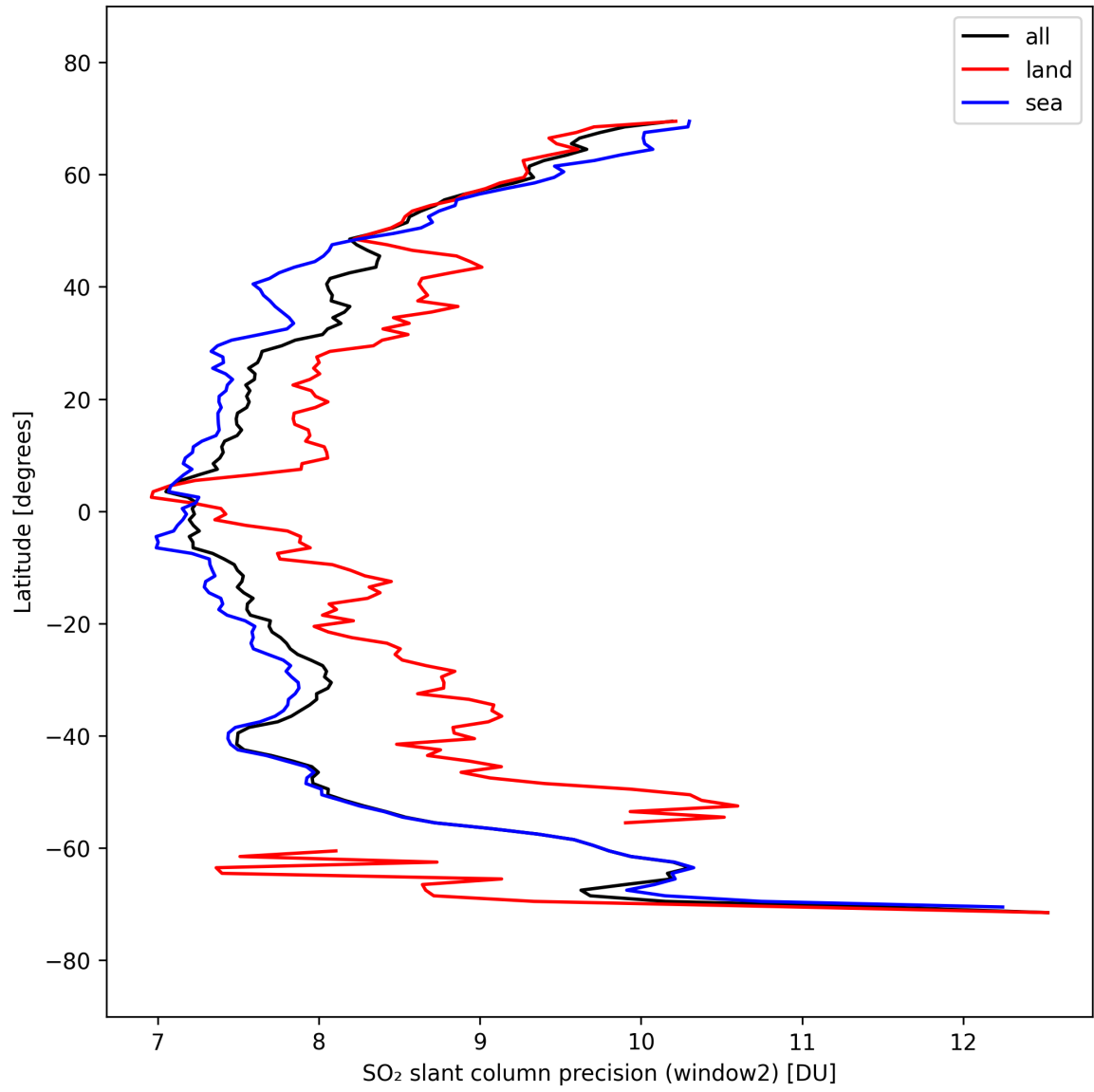


Figure 41: Zonal average of “SO₂ slant column precision (window2)” for 2025-03-17 to 2025-03-18.

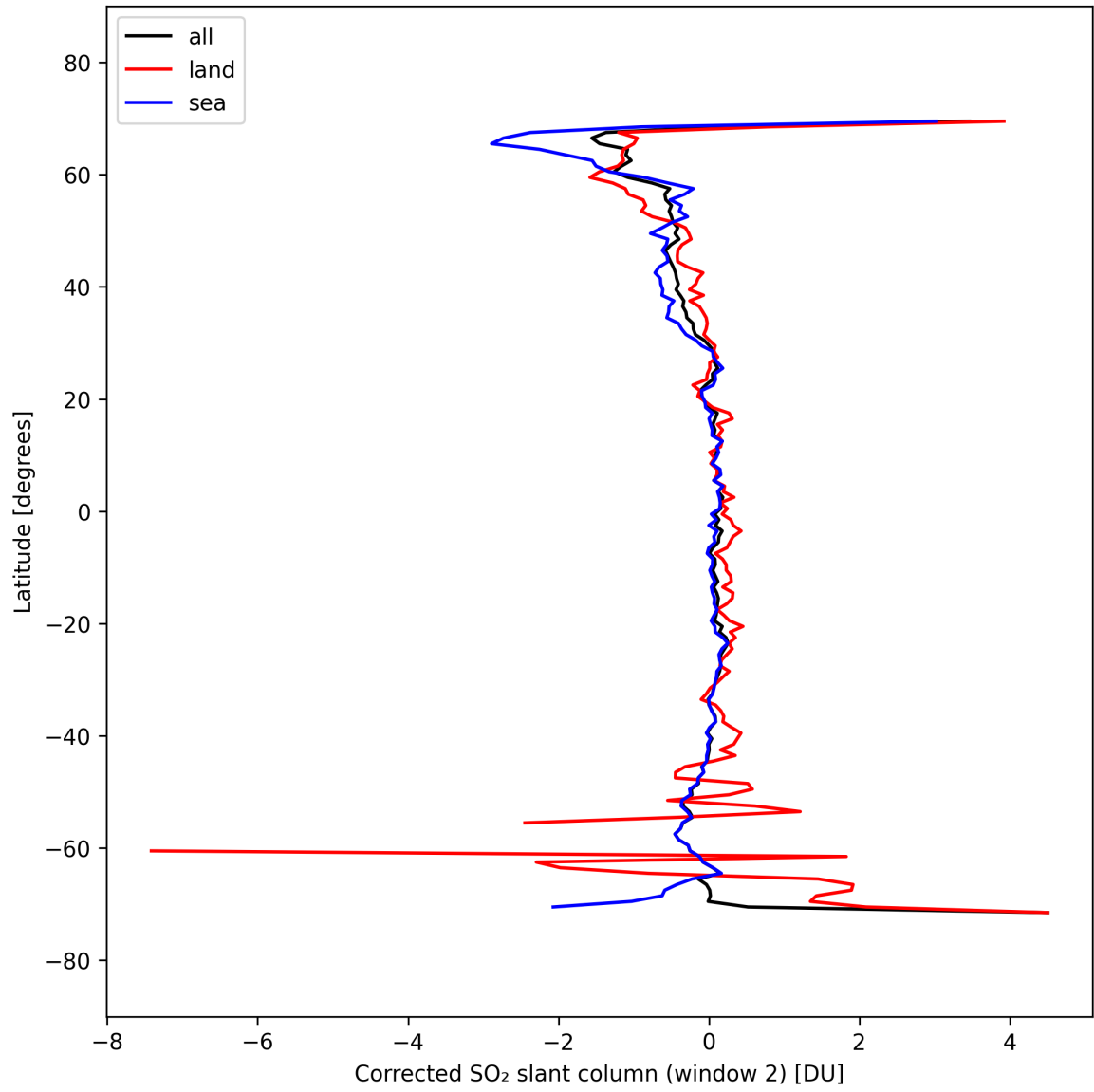


Figure 42: Zonal average of “Corrected SO₂ slant column (window 2)” for 2025-03-17 to 2025-03-18.

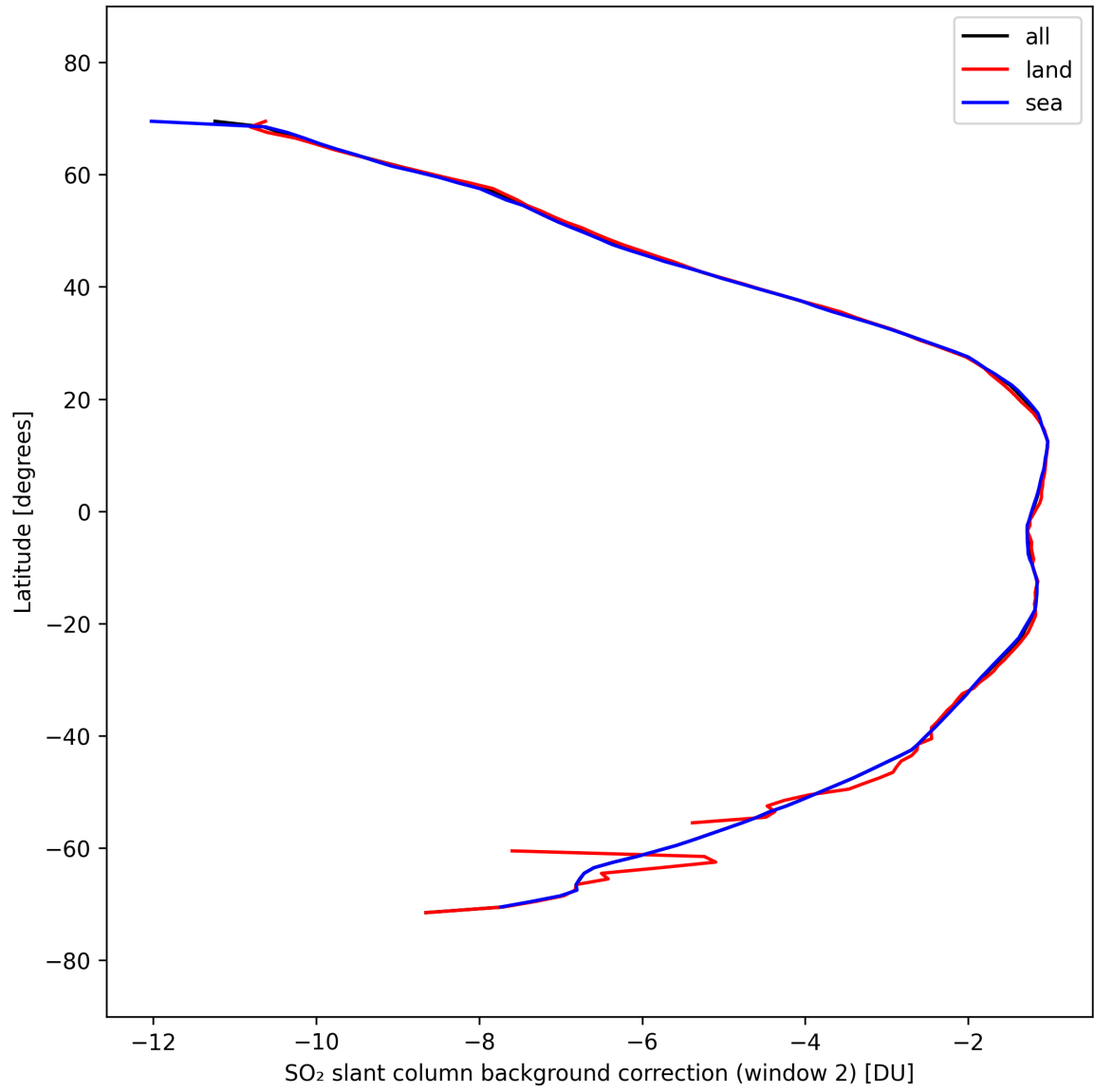


Figure 43: Zonal average of “SO₂ slant column background correction (window 2)” for 2025-03-17 to 2025-03-18.

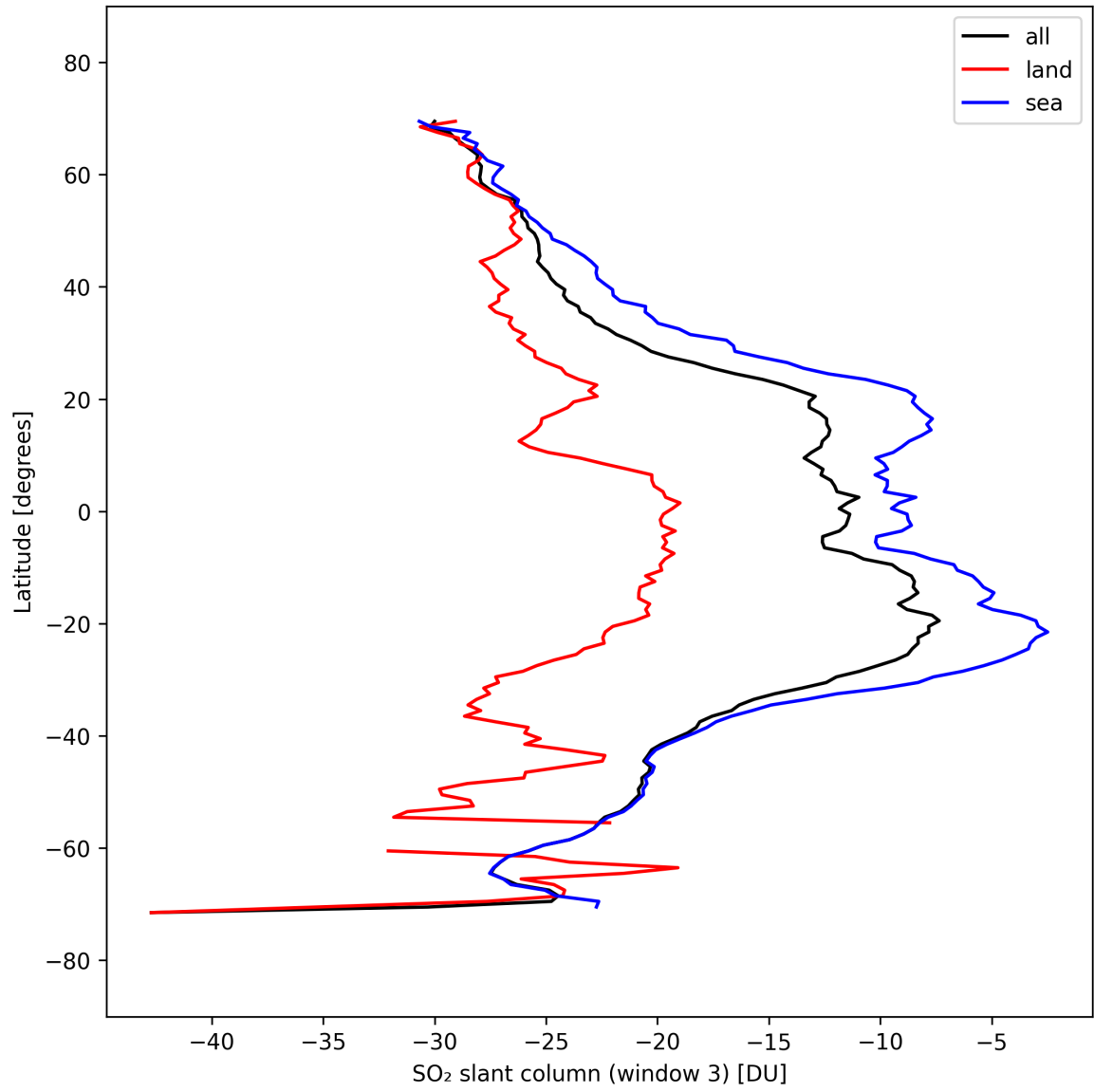


Figure 44: Zonal average of “SO₂ slant column (window 3)” for 2025-03-17 to 2025-03-18.

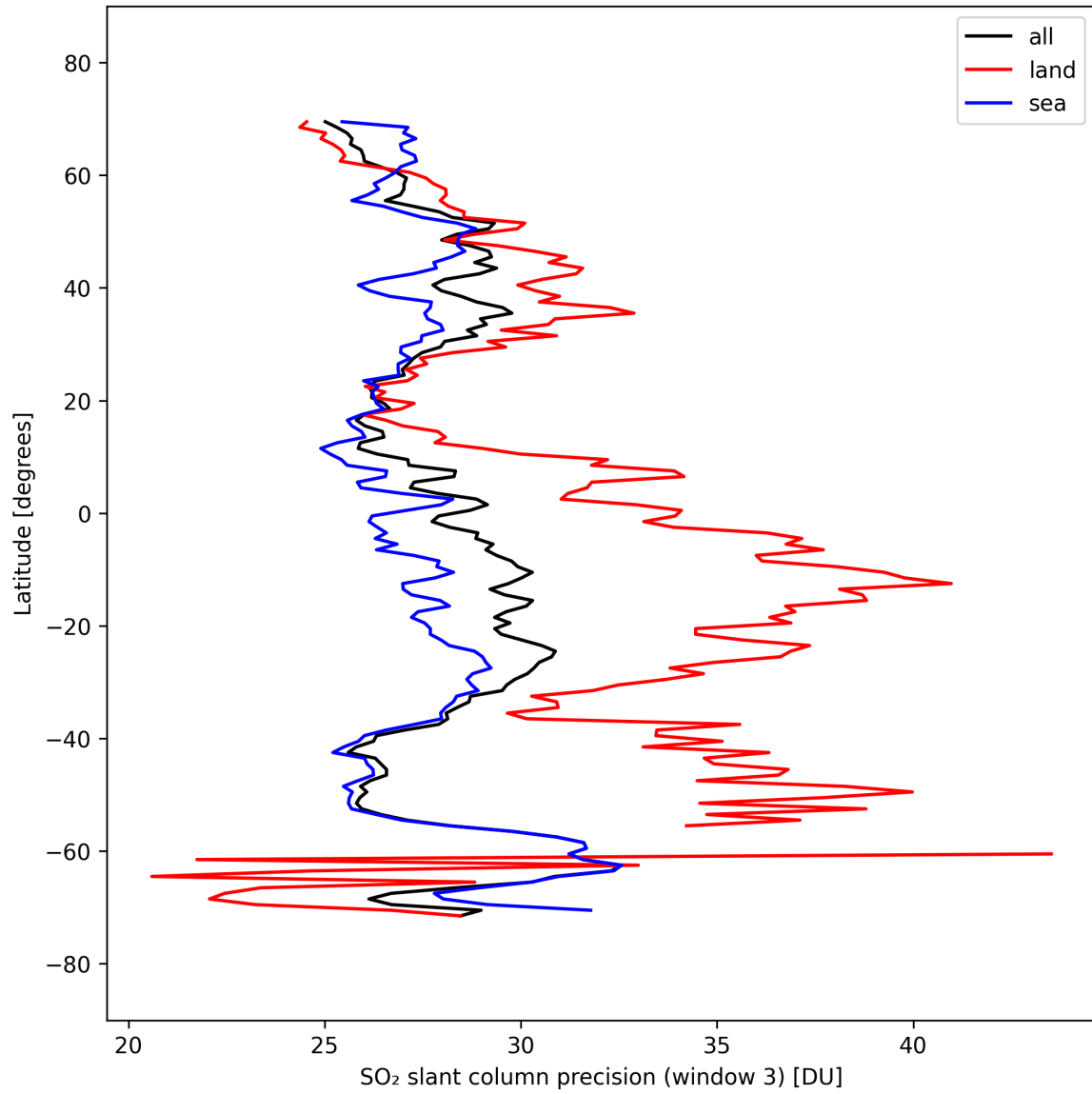


Figure 45: Zonal average of “SO₂ slant column precision (window 3)” for 2025-03-17 to 2025-03-18.

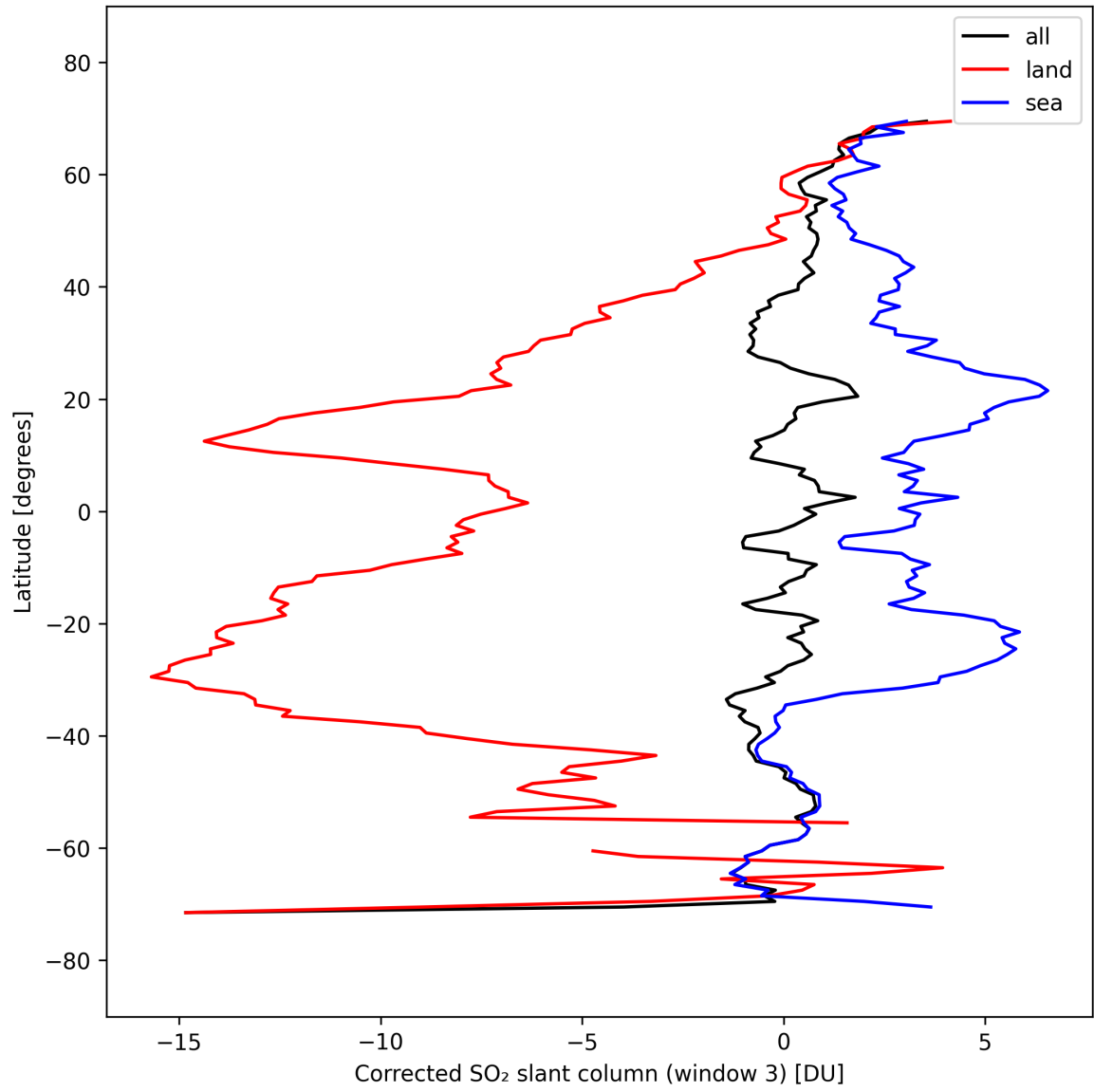


Figure 46: Zonal average of “Corrected SO₂ slant column (window 3)” for 2025-03-17 to 2025-03-18.

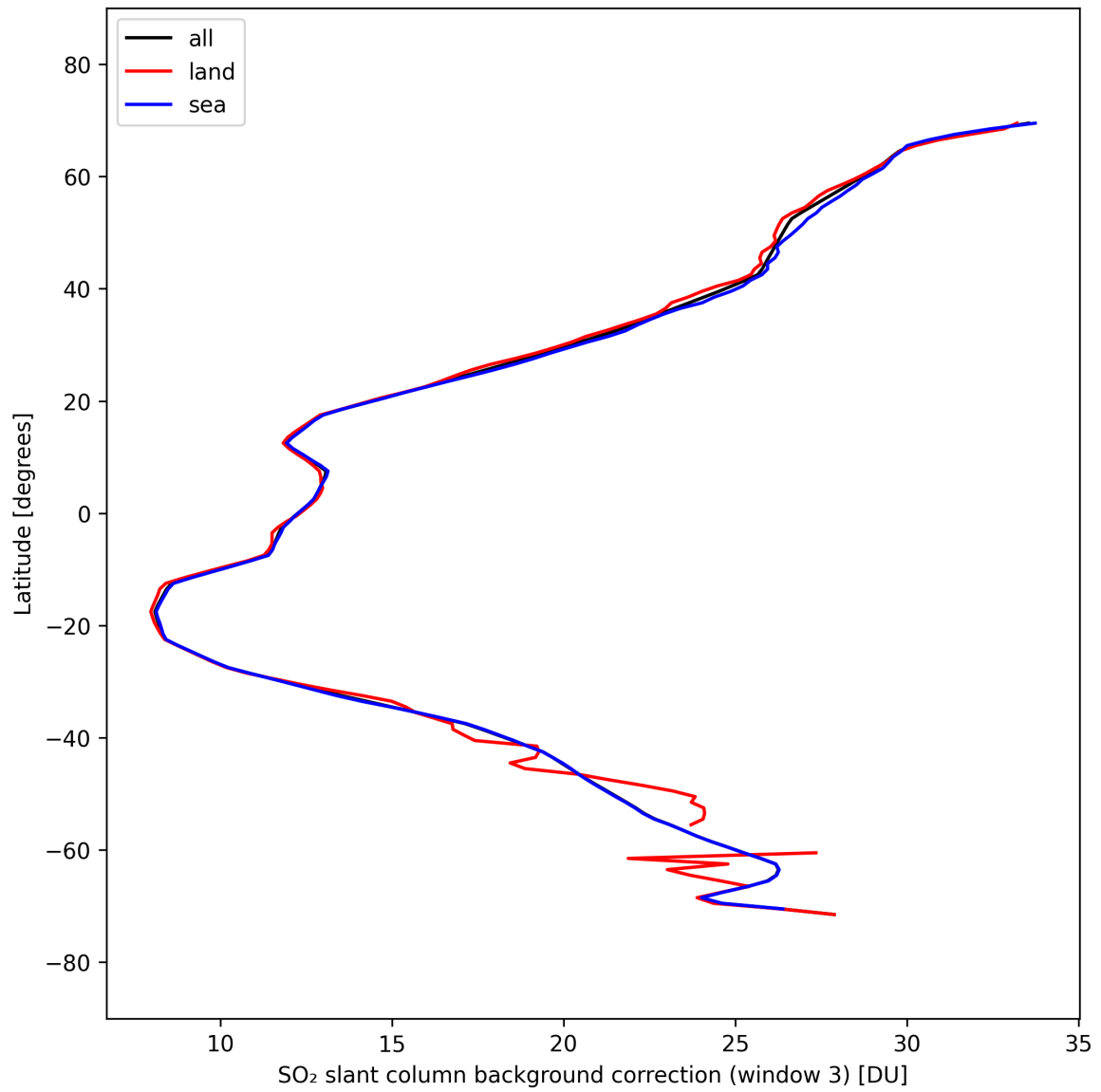


Figure 47: Zonal average of “SO₂ slant column background correction (window 3)” for 2025-03-17 to 2025-03-18.

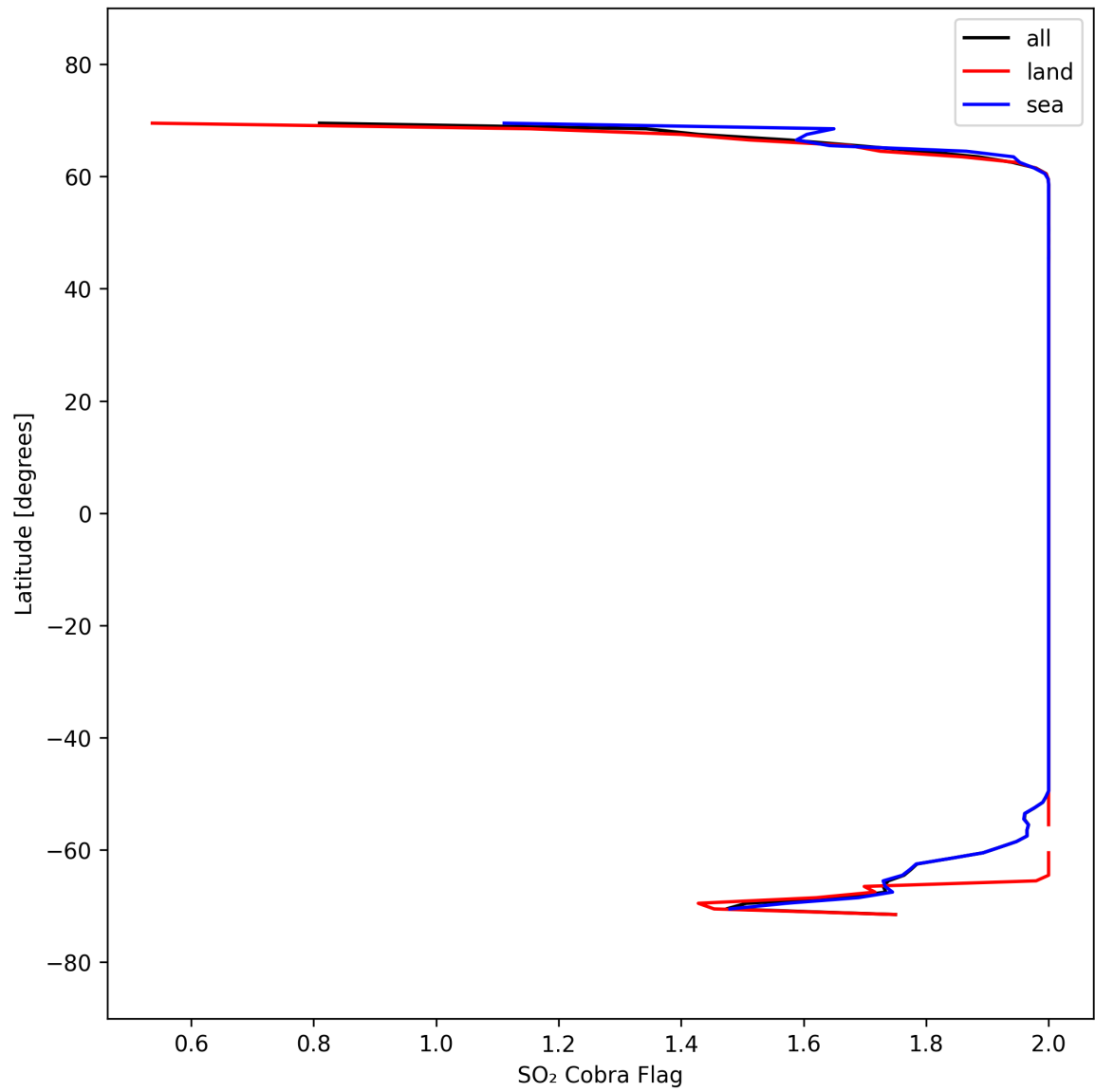


Figure 48: Zonal average of "SO₂ Cobra Flag" for 2025-03-17 to 2025-03-18.

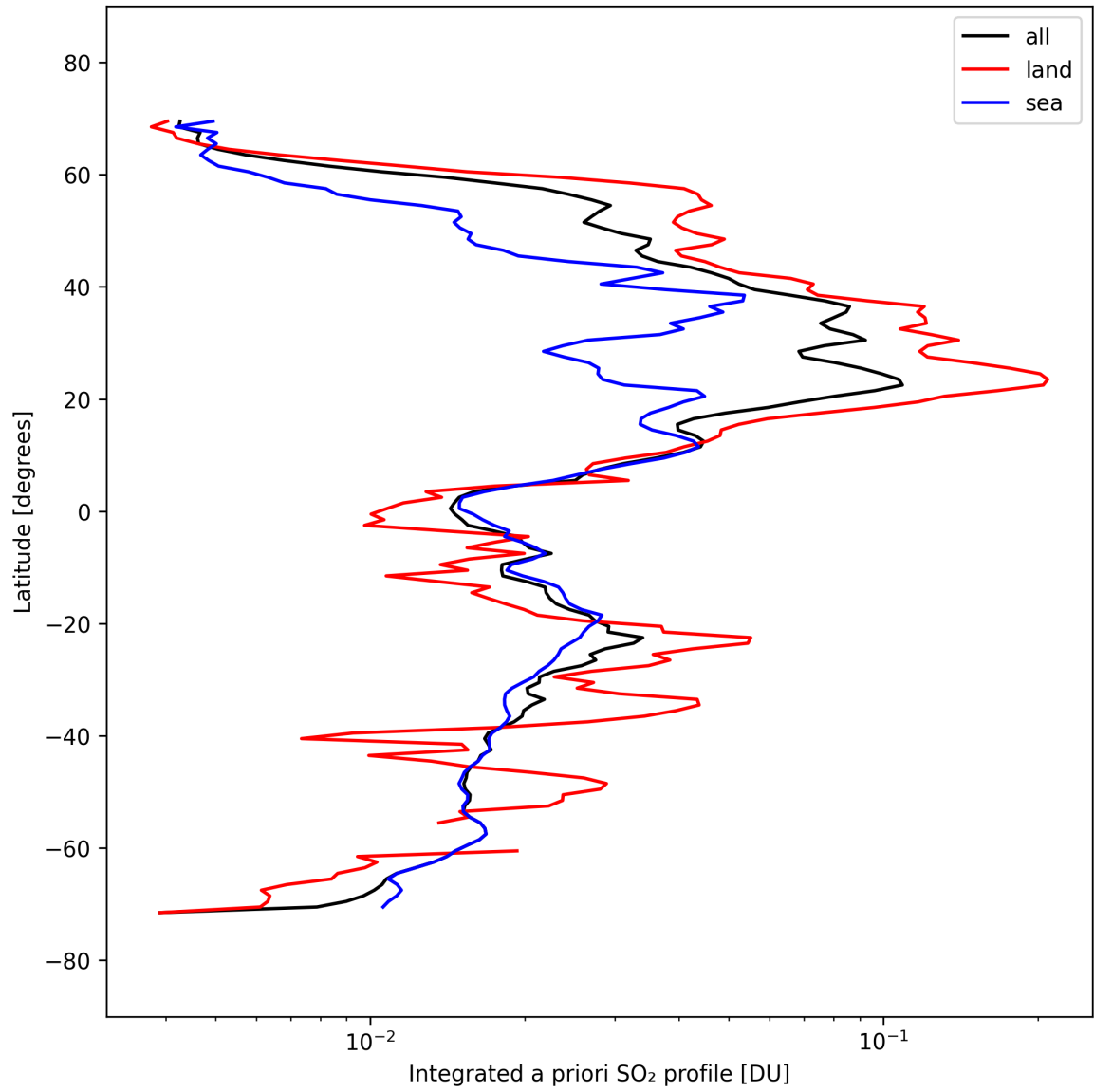


Figure 49: Zonal average of “Integrated a priori SO₂ profile” for 2025-03-17 to 2025-03-18.

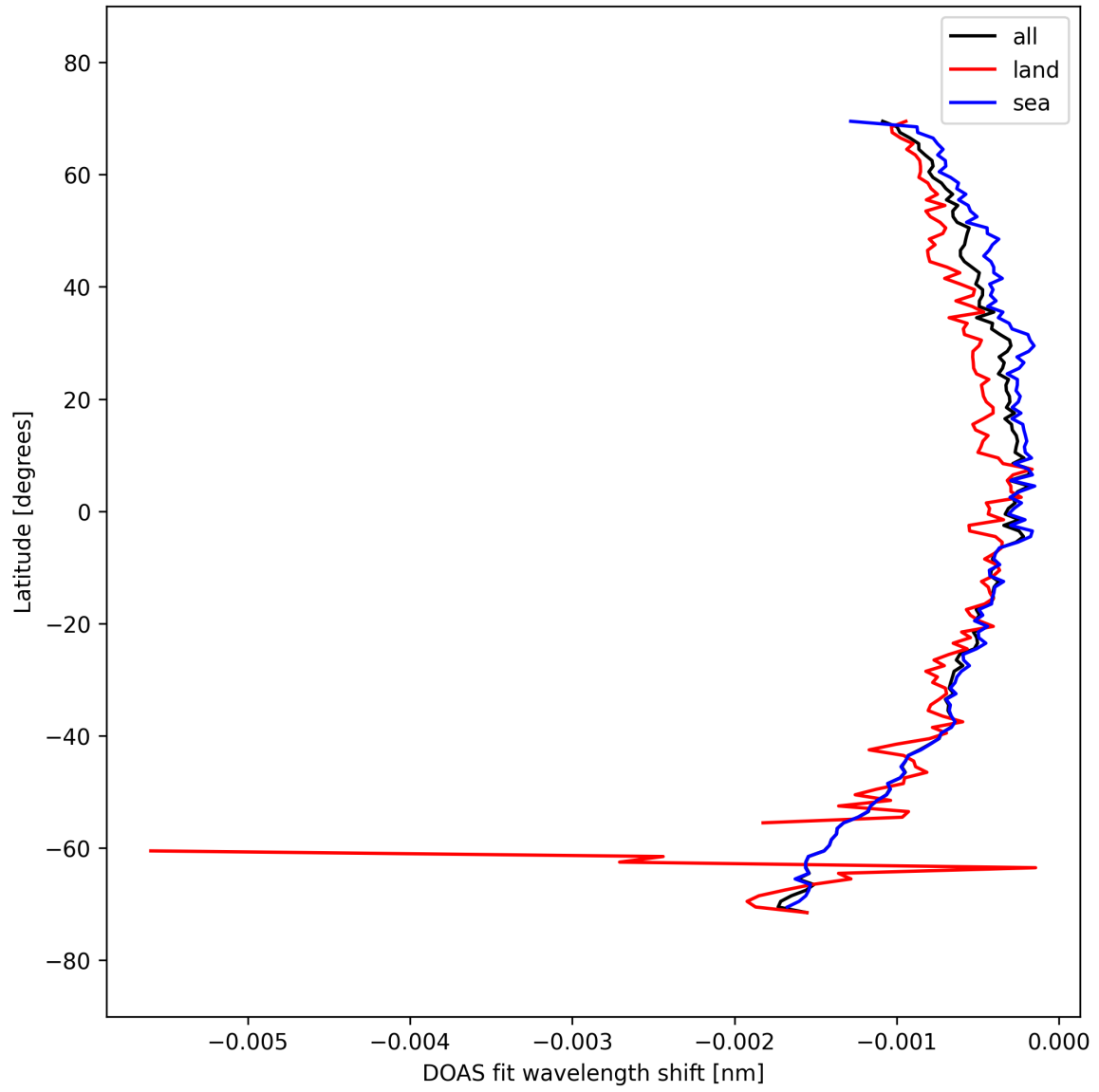


Figure 50: Zonal average of “DOAS fit wavelength shift” for 2025-03-17 to 2025-03-18.

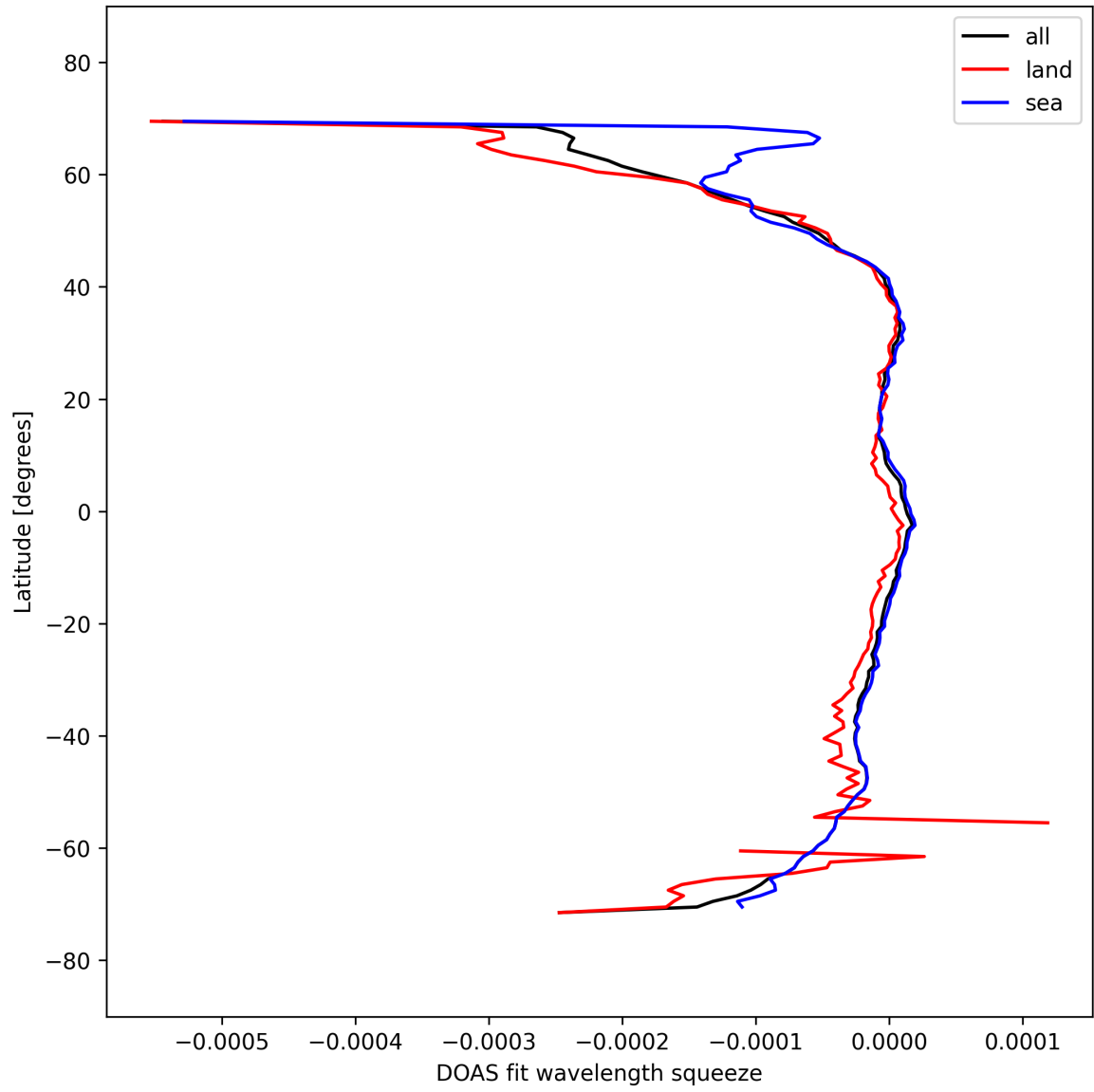


Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-03-17 to 2025-03-18.

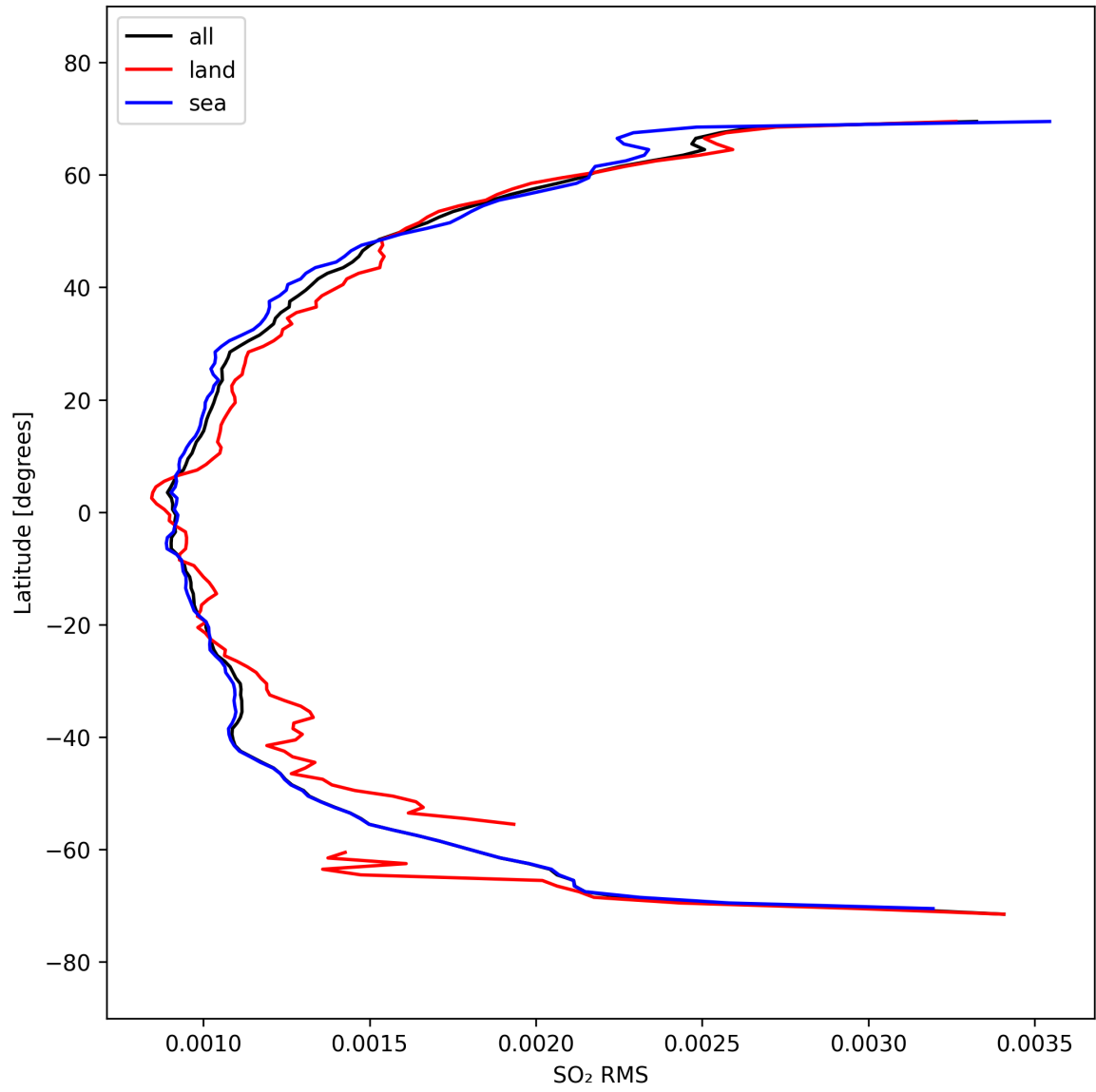


Figure 52: Zonal average of “SO₂ RMS” for 2025-03-17 to 2025-03-18.

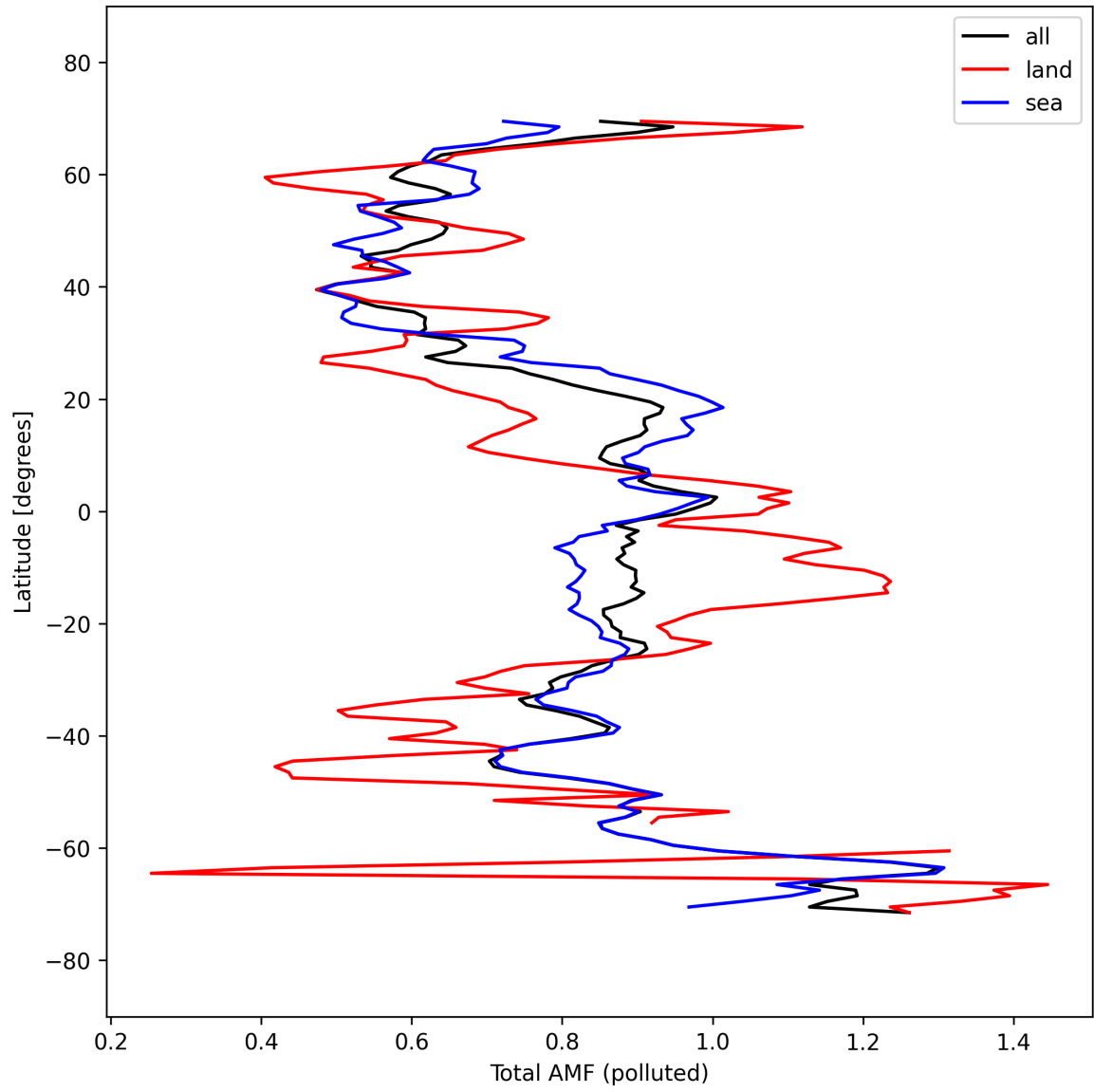


Figure 53: Zonal average of “Total AMF (polluted)” for 2025-03-17 to 2025-03-18.

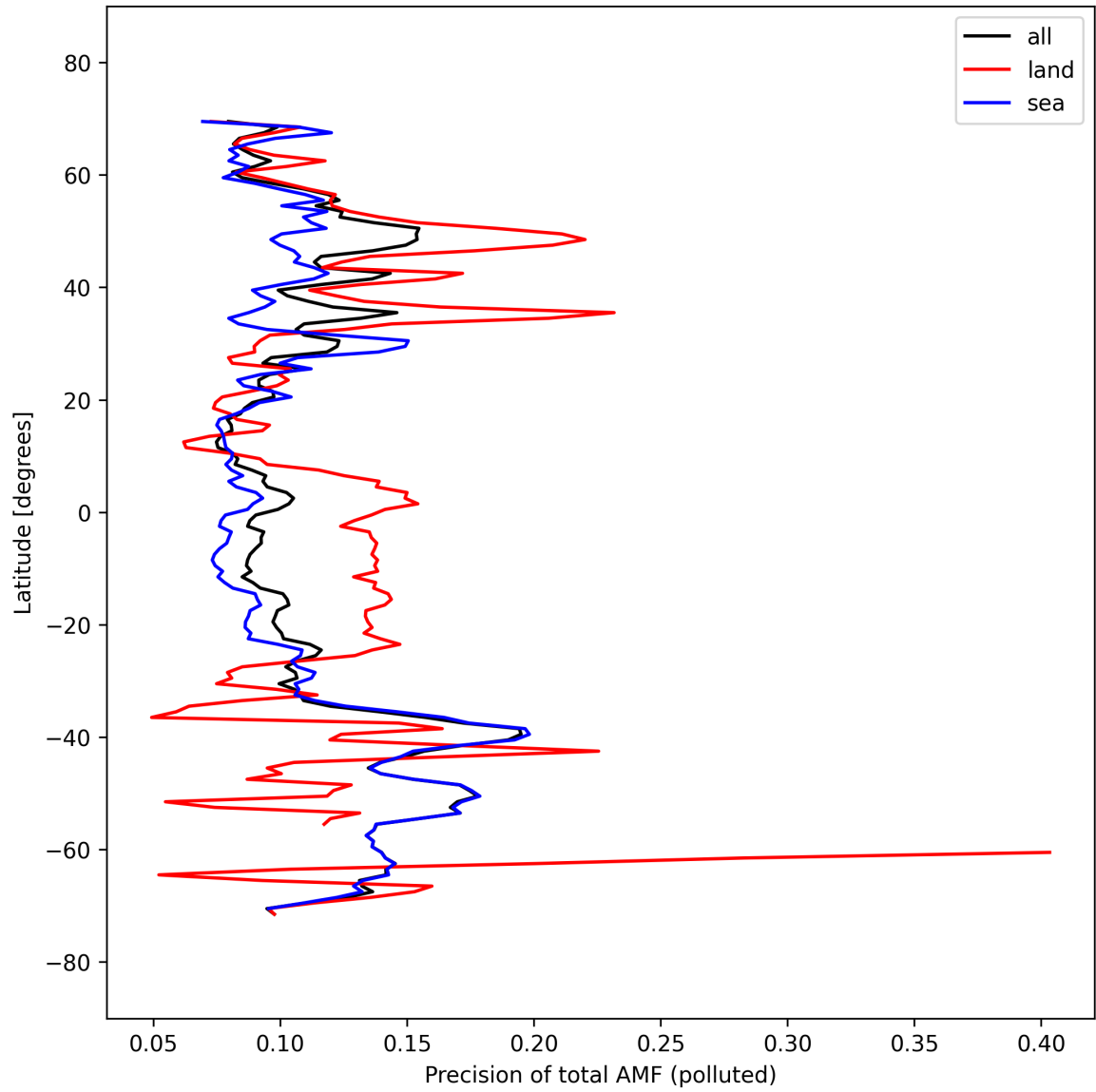


Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-03-17 to 2025-03-18.

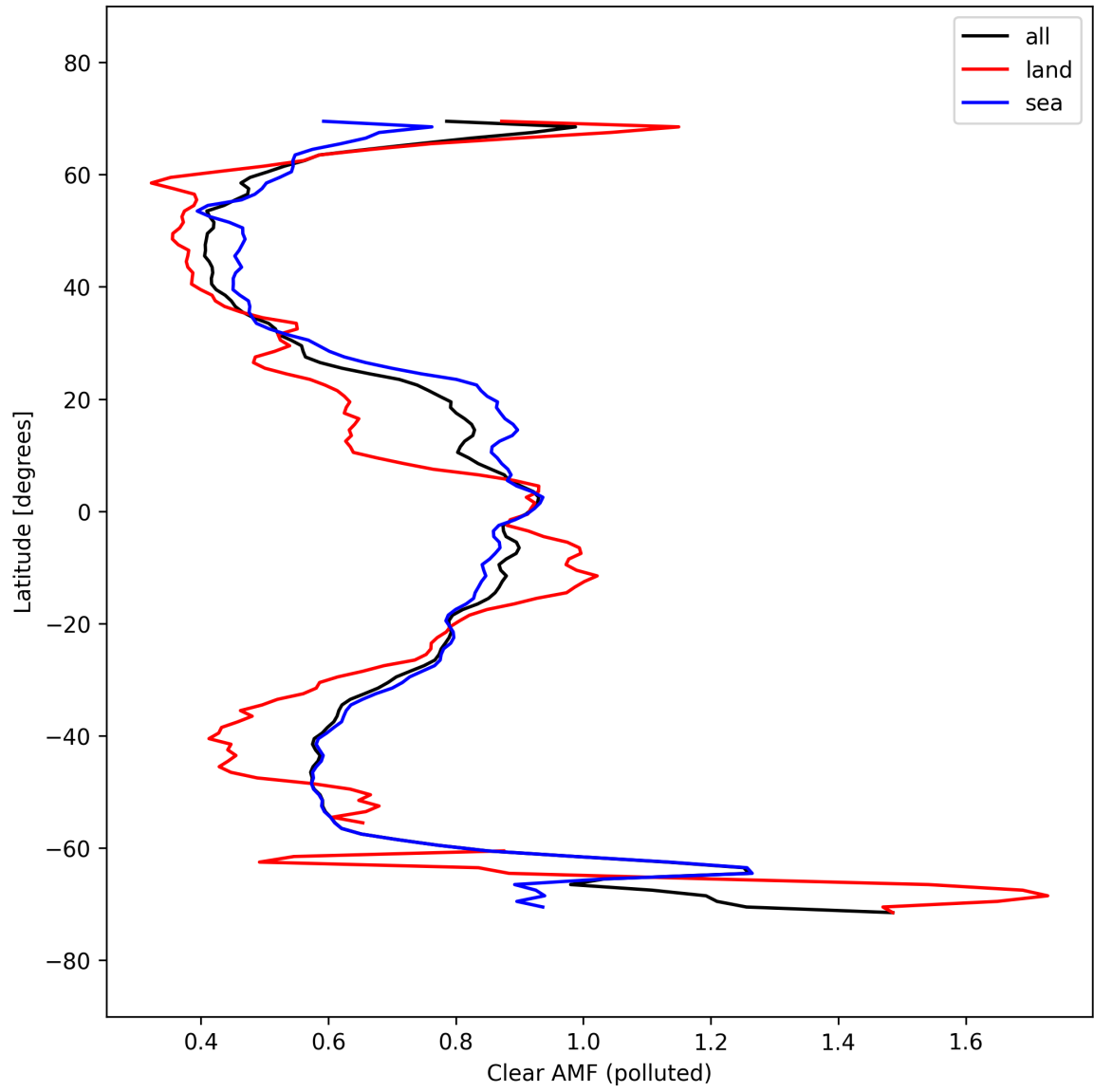


Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-03-17 to 2025-03-18.

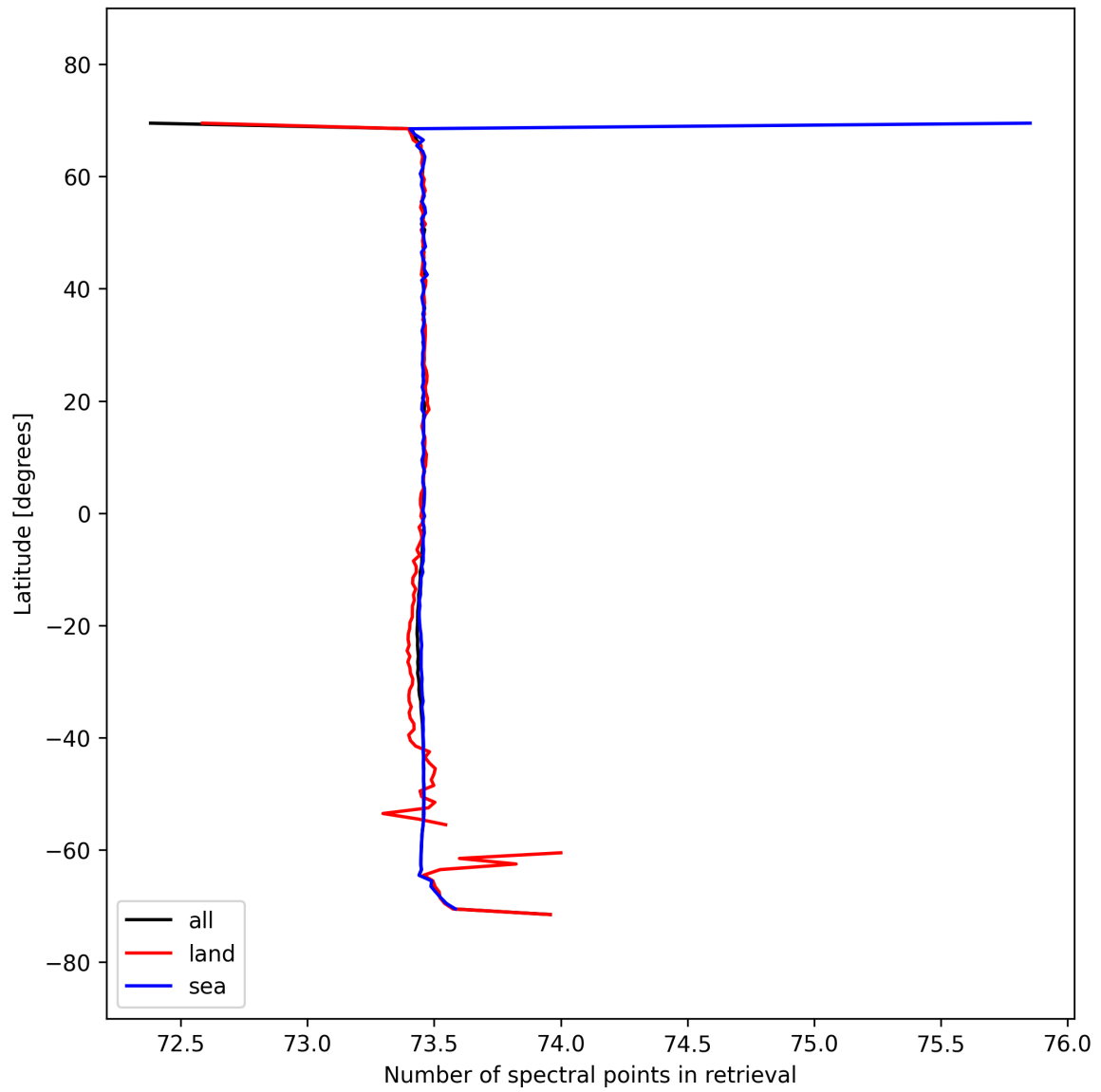


Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-03-17 to 2025-03-18.

8 Histograms

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

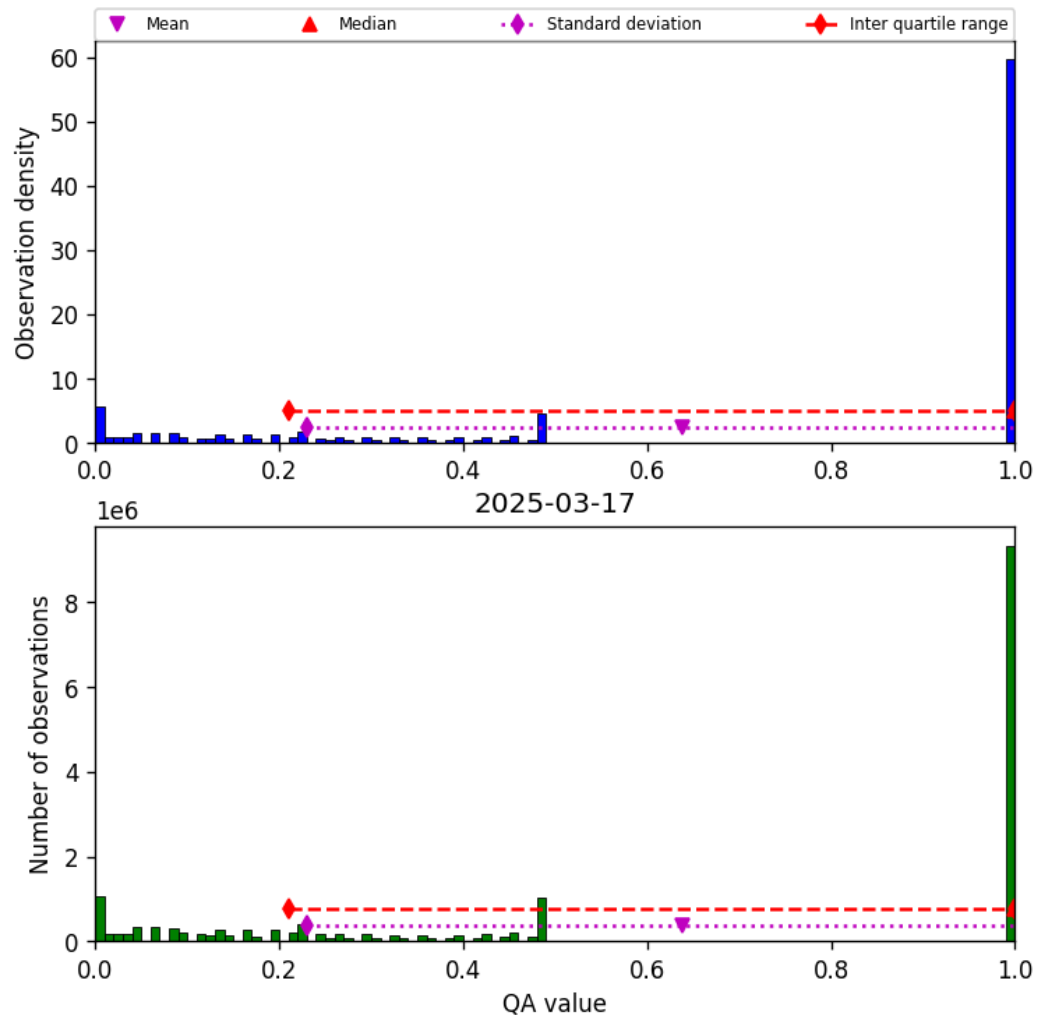


Figure 57: Histogram of “QA value” for 2025-03-17 to 2025-03-18

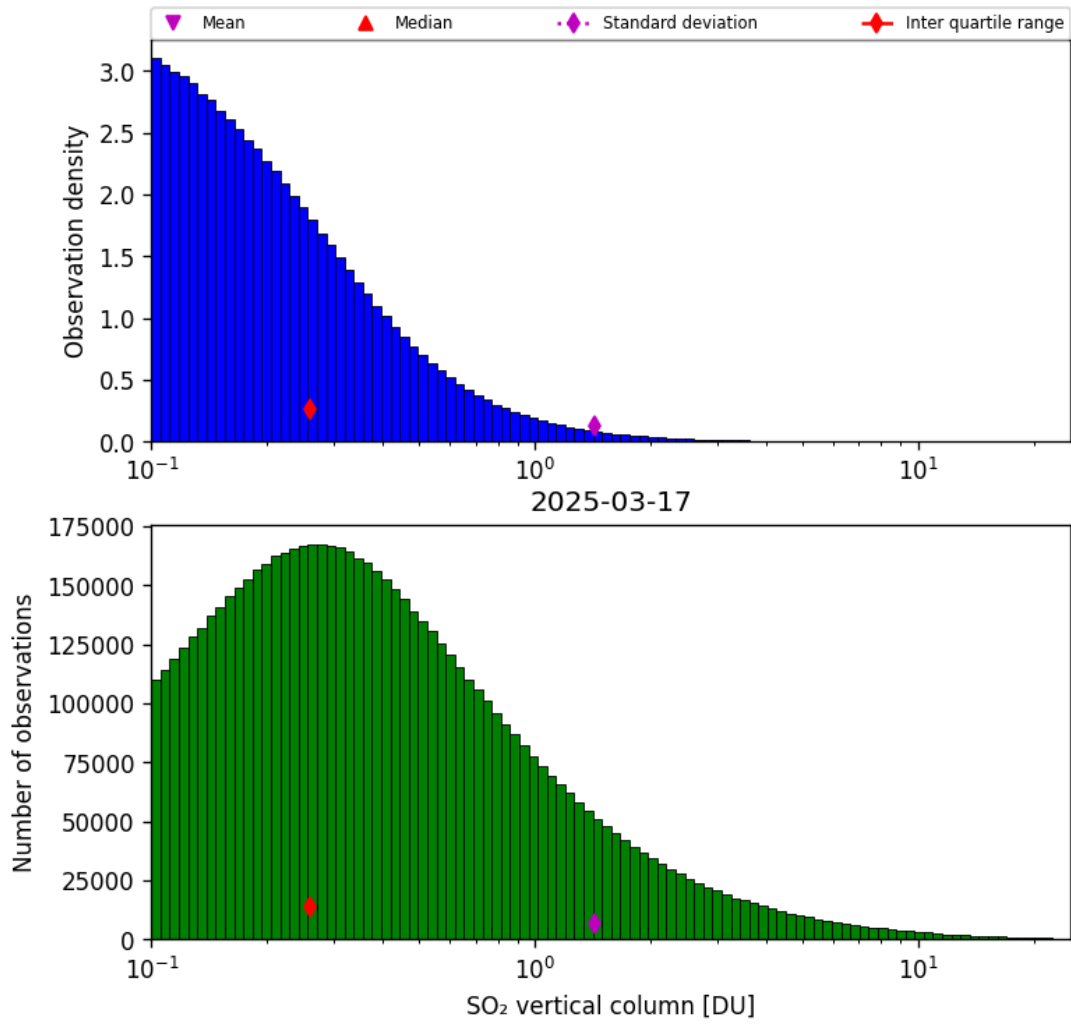


Figure 58: Histogram of “SO₂ vertical column” for 2025-03-17 to 2025-03-18

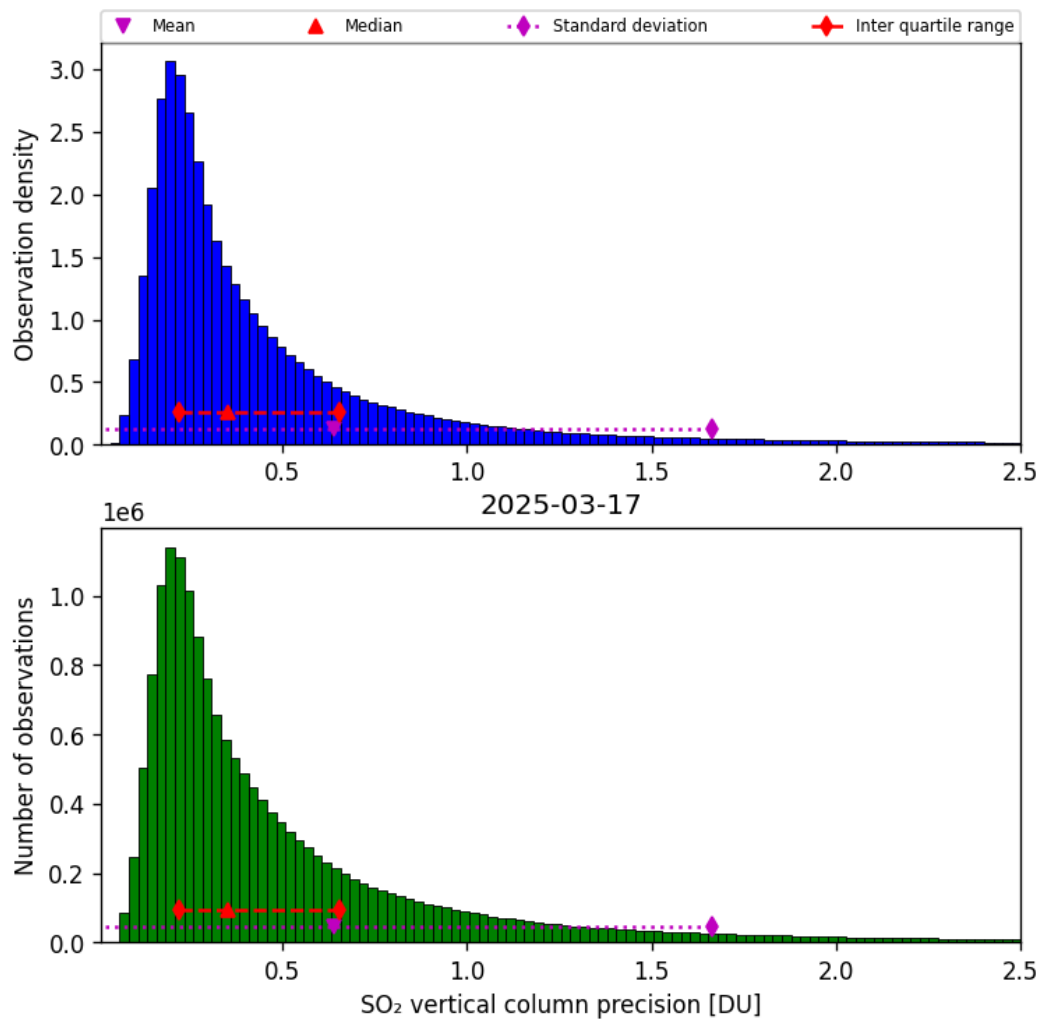


Figure 59: Histogram of “SO₂ vertical column precision” for 2025-03-17 to 2025-03-18

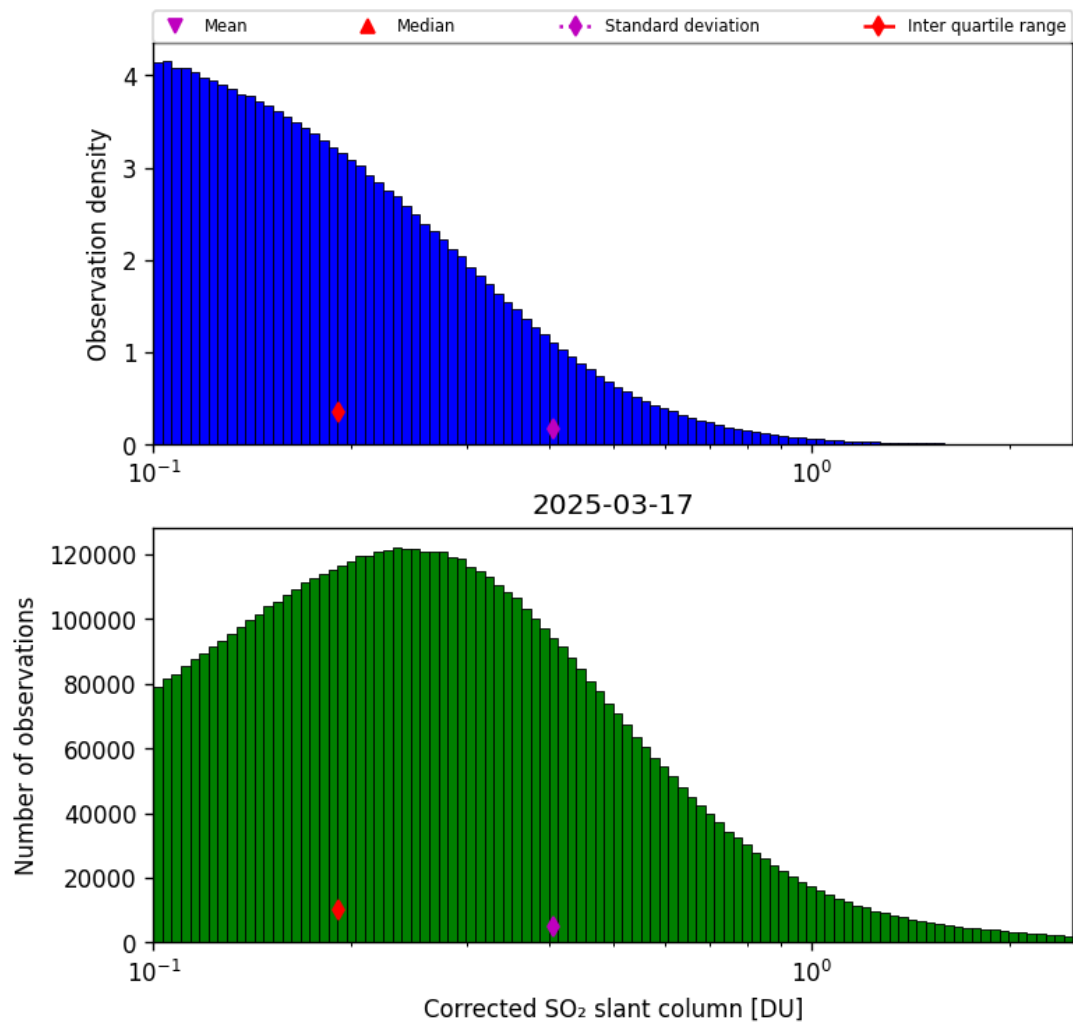


Figure 60: Histogram of “Corrected SO₂ slant column” for 2025-03-17 to 2025-03-18

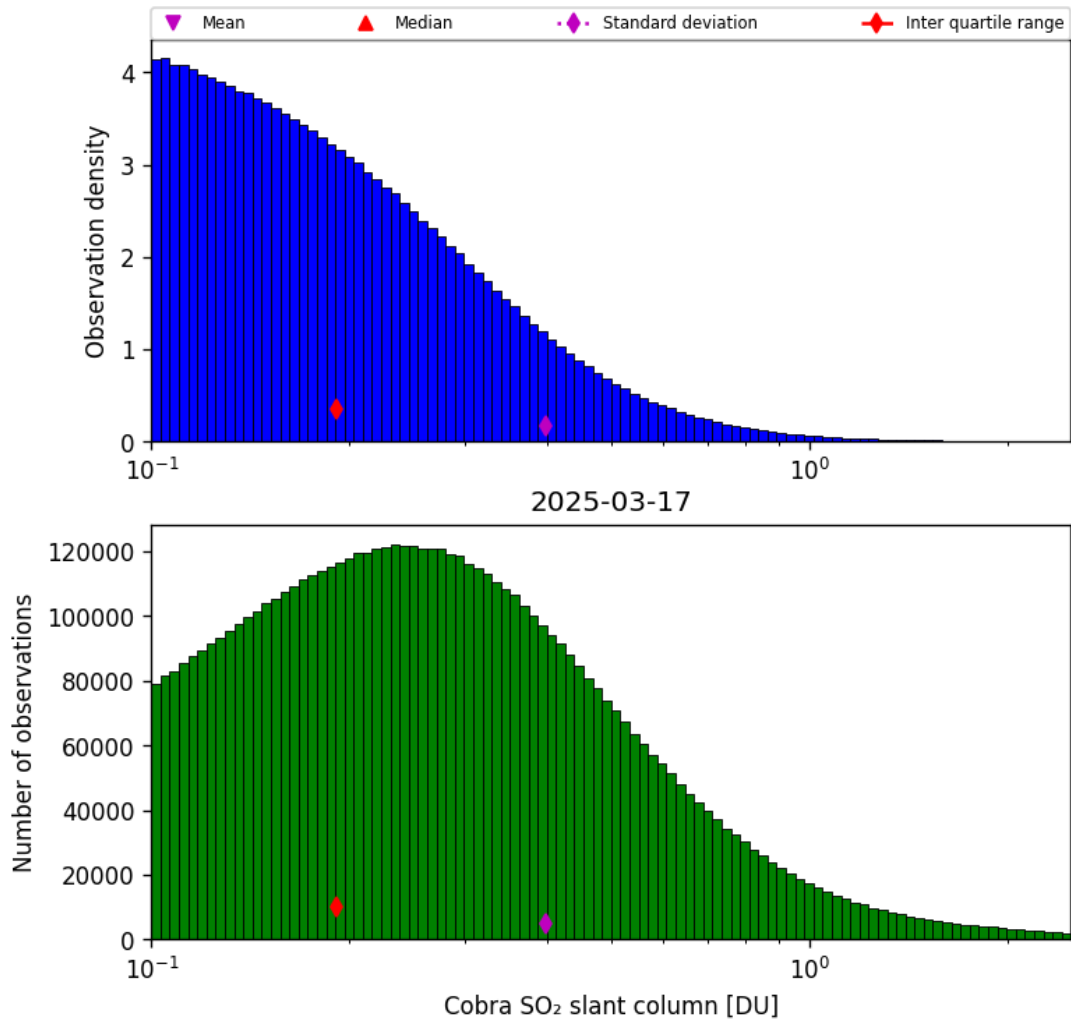


Figure 61: Histogram of “Cobra SO₂ slant column” for 2025-03-17 to 2025-03-18

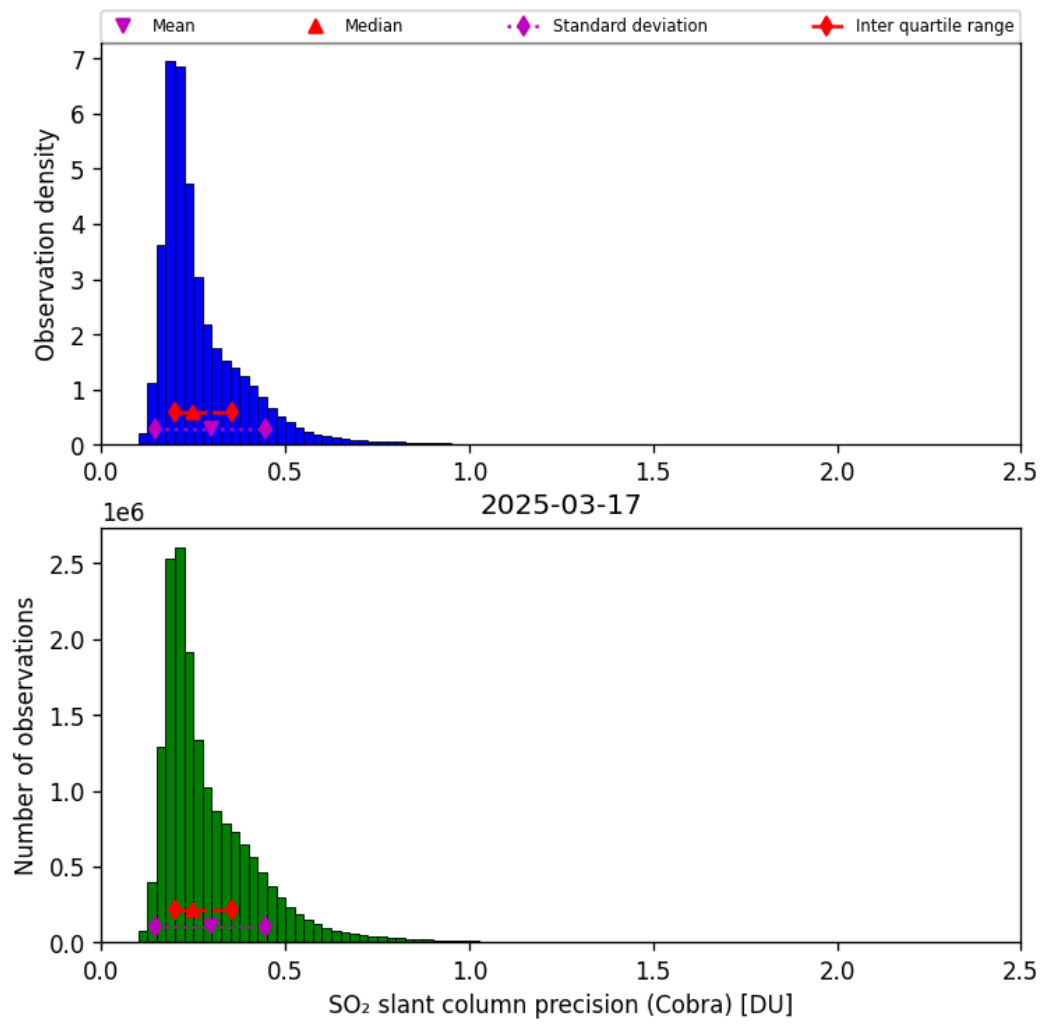


Figure 62: Histogram of “SO₂ slant column precision (Cobra)” for 2025-03-17 to 2025-03-18

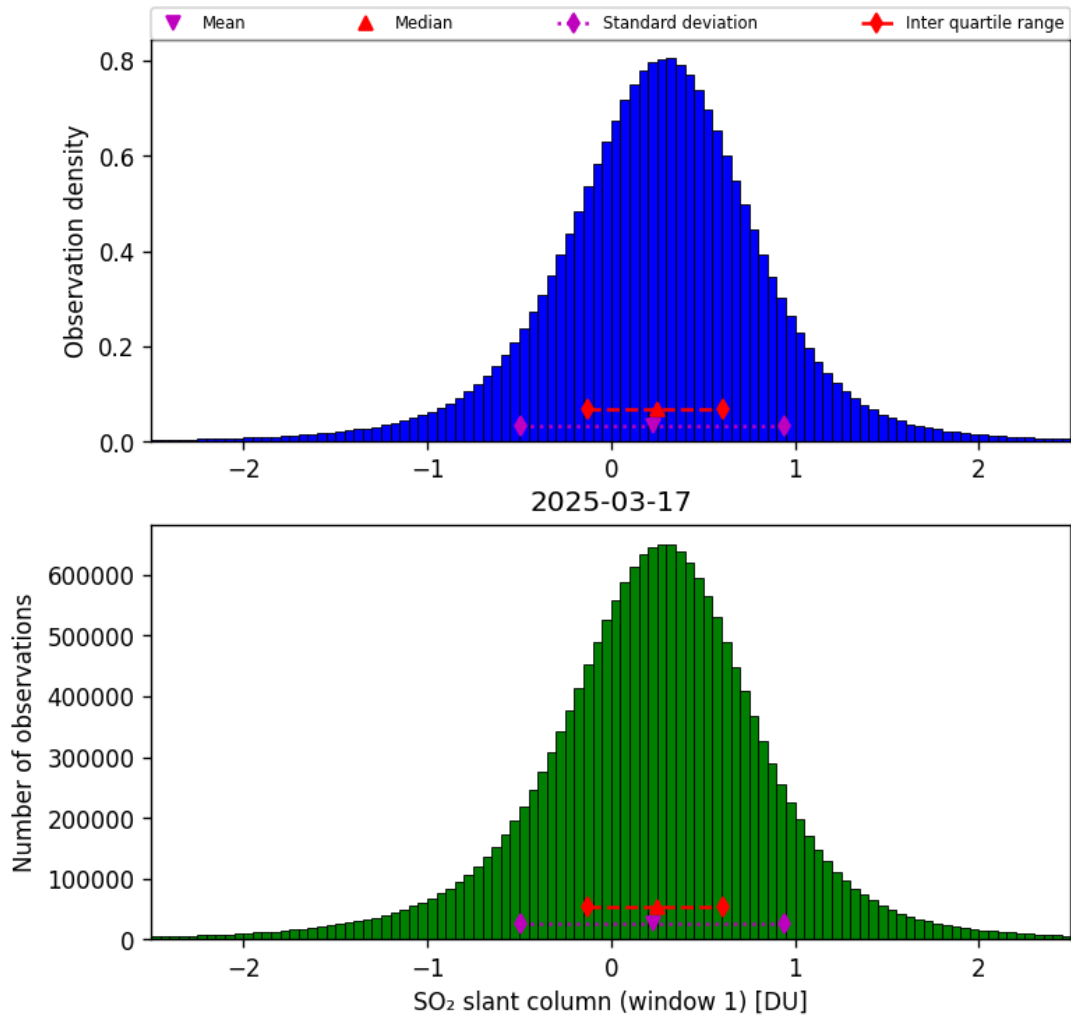


Figure 63: Histogram of “SO₂ slant column (window 1)” for 2025-03-17 to 2025-03-18

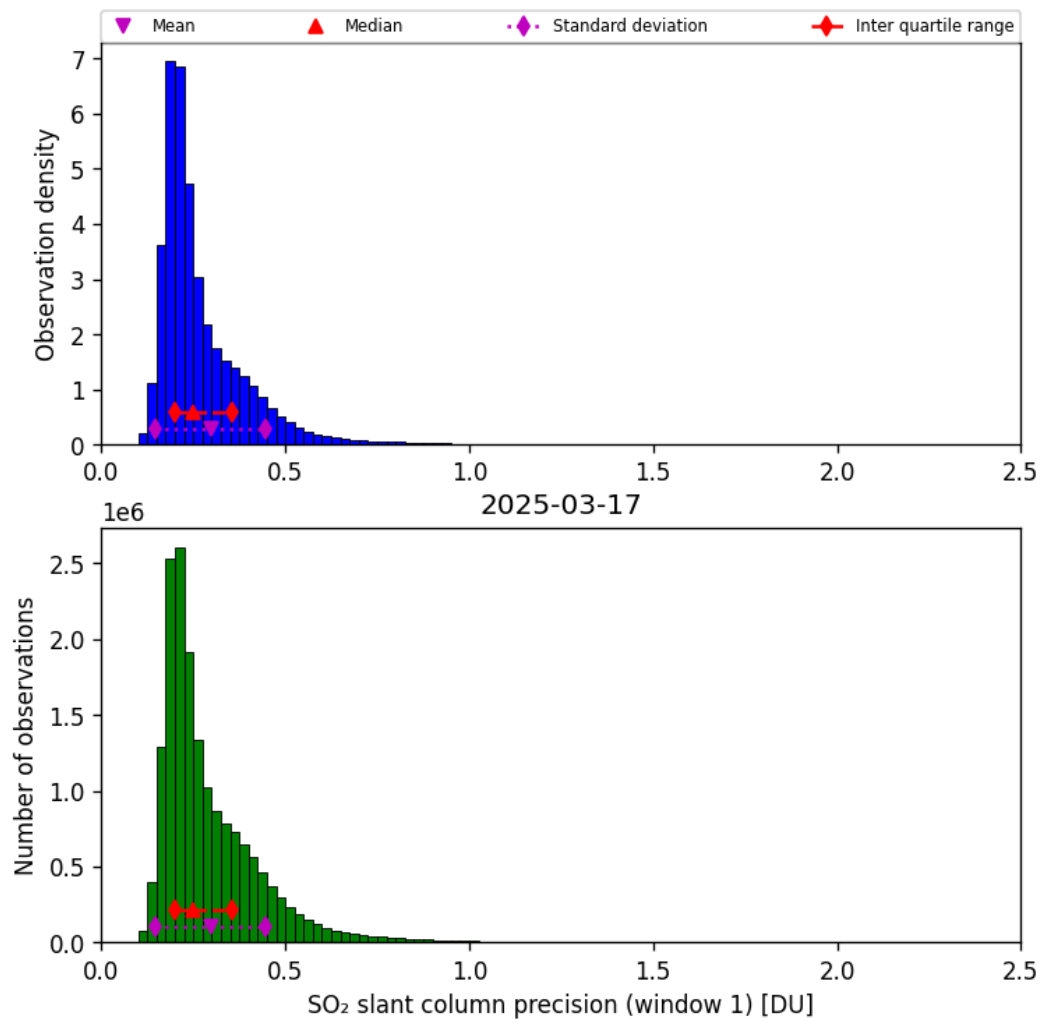


Figure 64: Histogram of “SO₂ slant column precision (window 1)” for 2025-03-17 to 2025-03-18

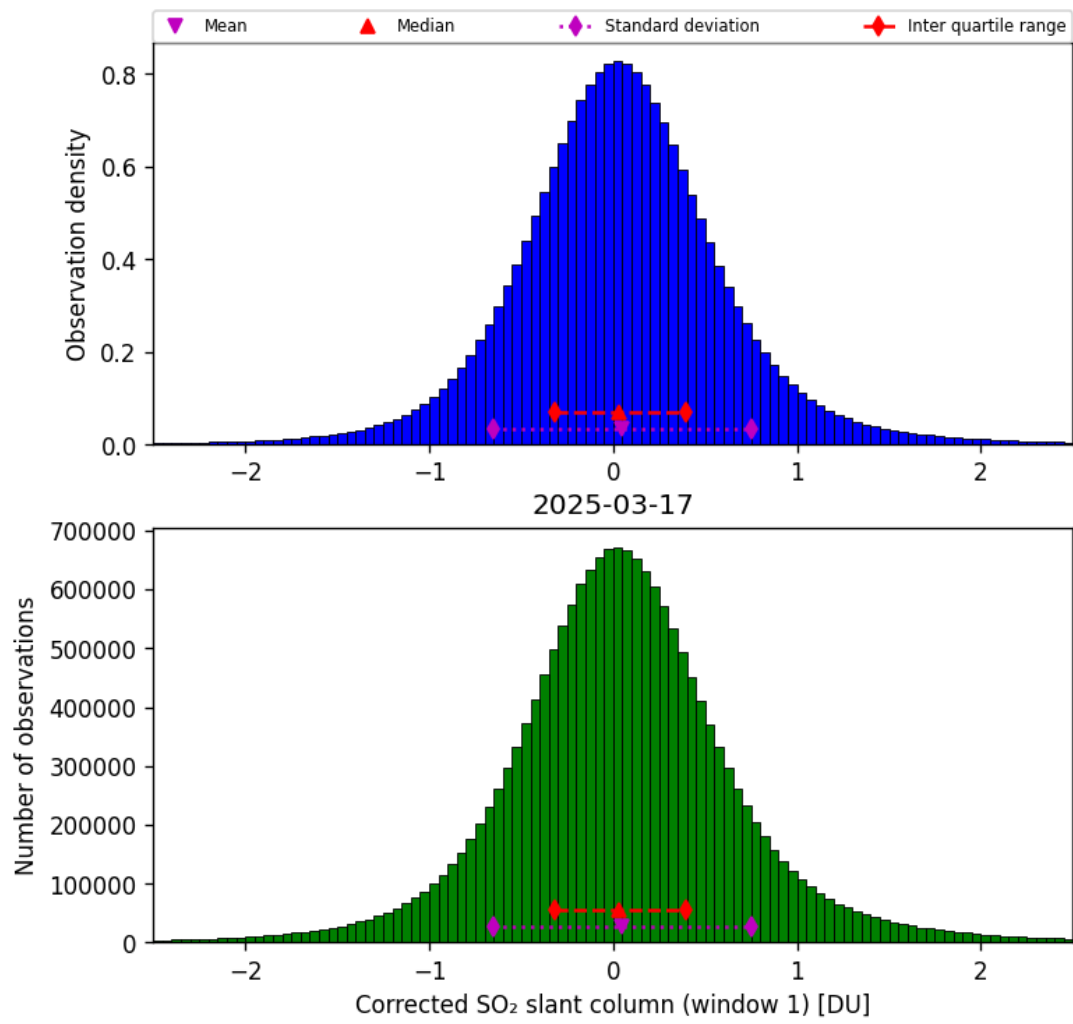


Figure 65: Histogram of “Corrected SO₂ slant column (window 1)” for 2025-03-17 to 2025-03-18

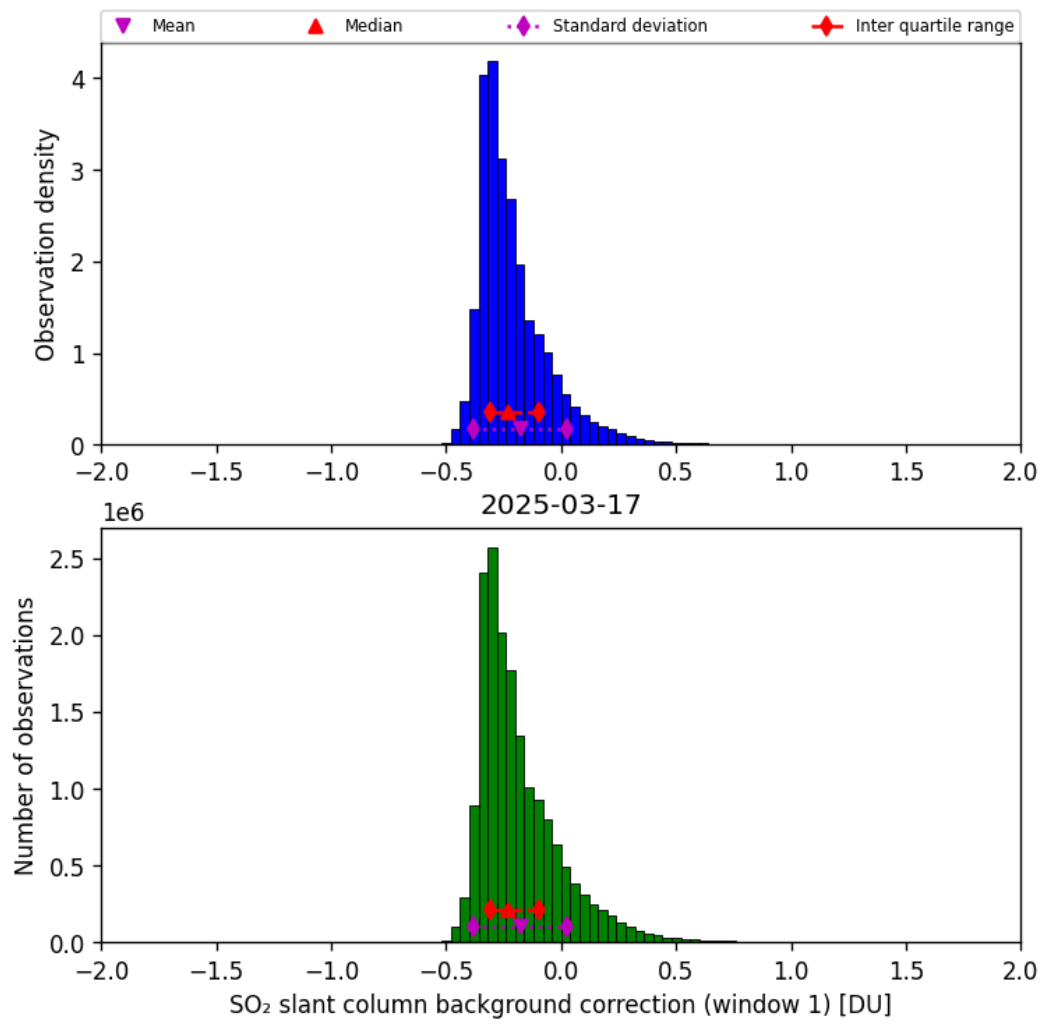


Figure 66: Histogram of “SO₂ slant column background correction (window 1)” for 2025-03-17 to 2025-03-18

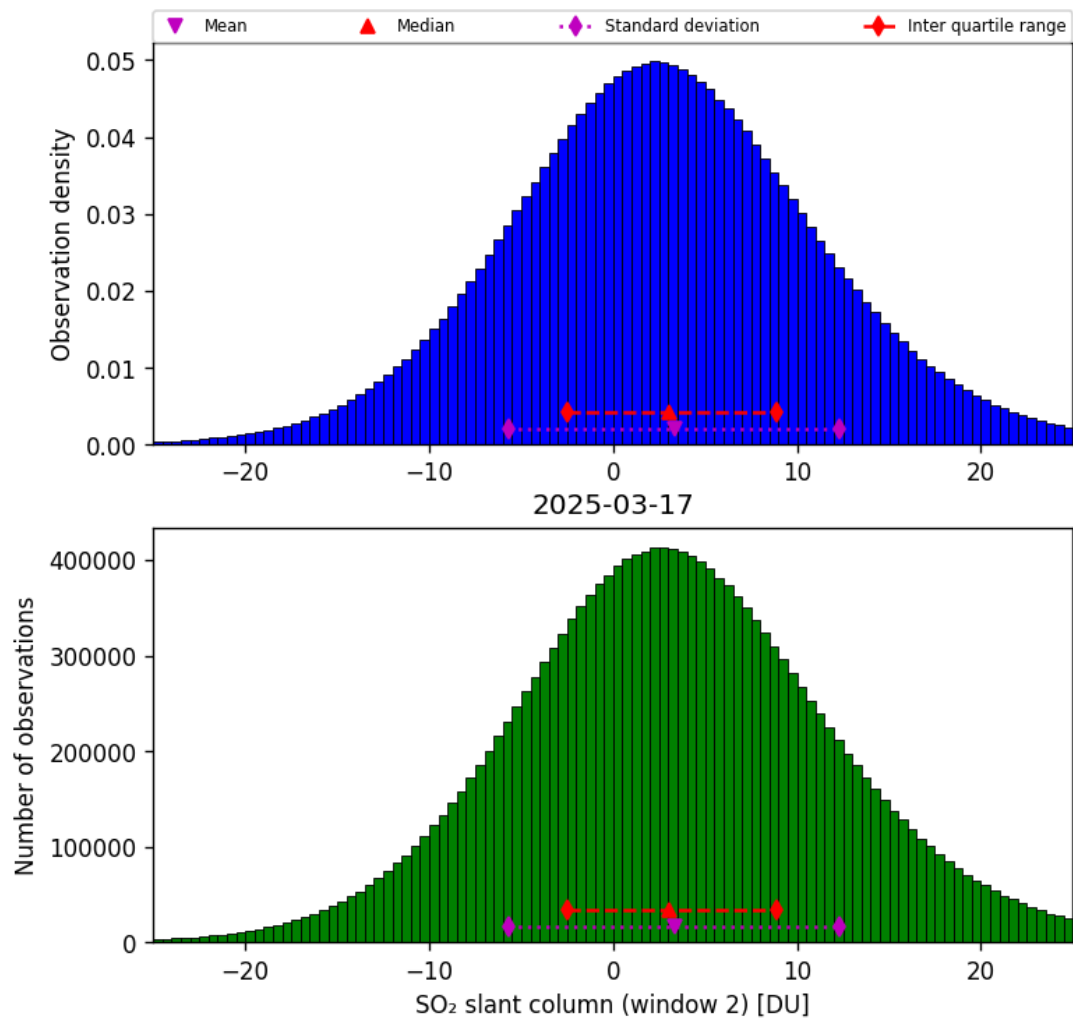


Figure 67: Histogram of “SO₂ slant column (window 2)” for 2025-03-17 to 2025-03-18

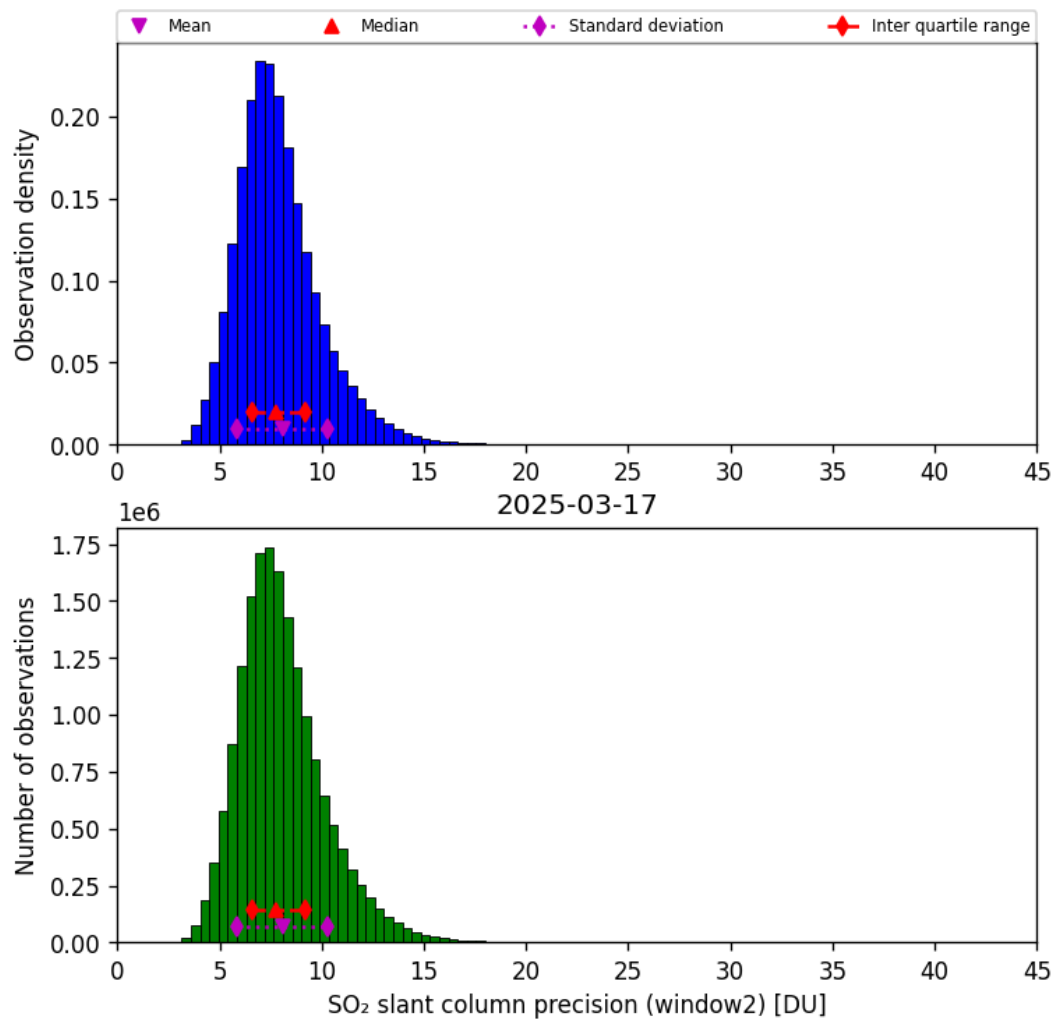


Figure 68: Histogram of “SO₂ slant column precision (window2)” for 2025-03-17 to 2025-03-18

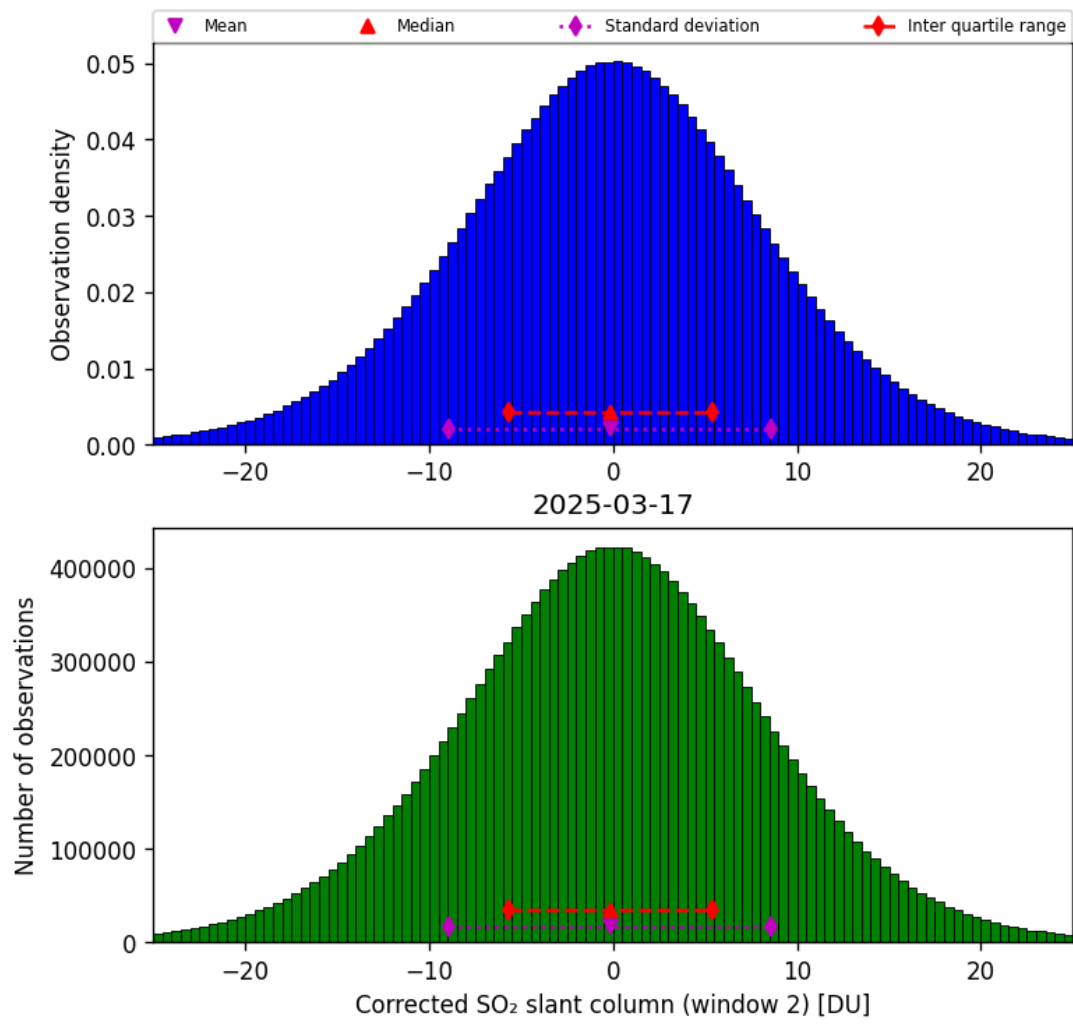


Figure 69: Histogram of “Corrected SO₂ slant column (window 2)” for 2025-03-17 to 2025-03-18

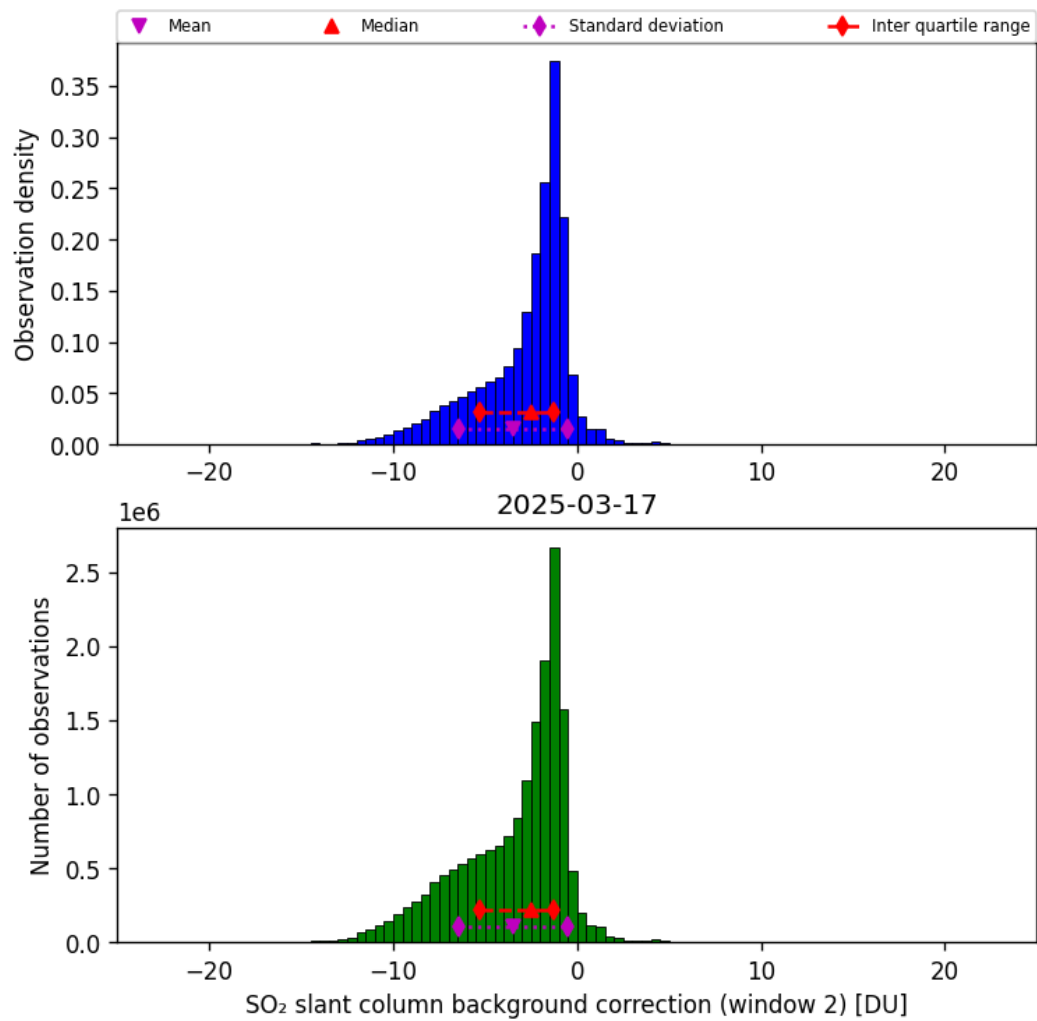


Figure 70: Histogram of “SO₂ slant column background correction (window 2)” for 2025-03-17 to 2025-03-18

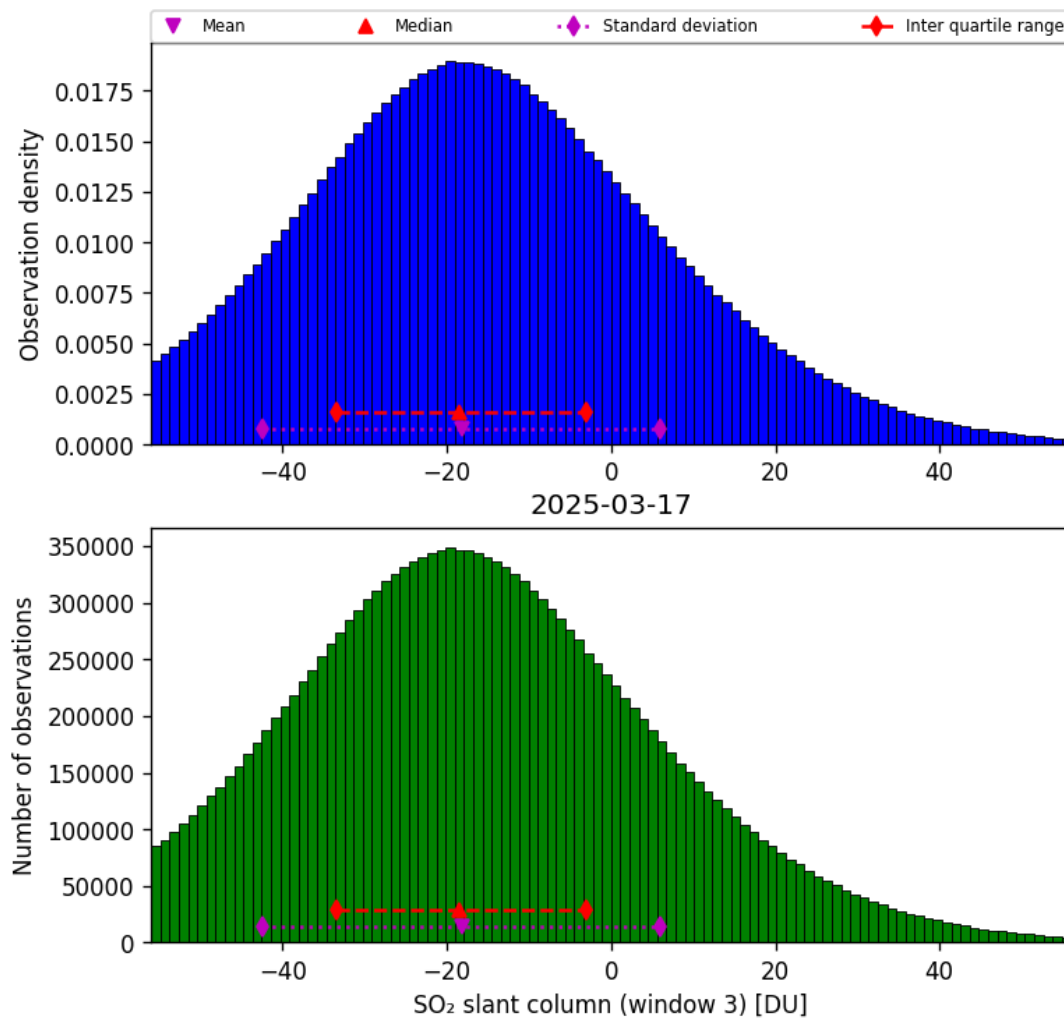


Figure 71: Histogram of “SO₂ slant column (window 3)” for 2025-03-17 to 2025-03-18

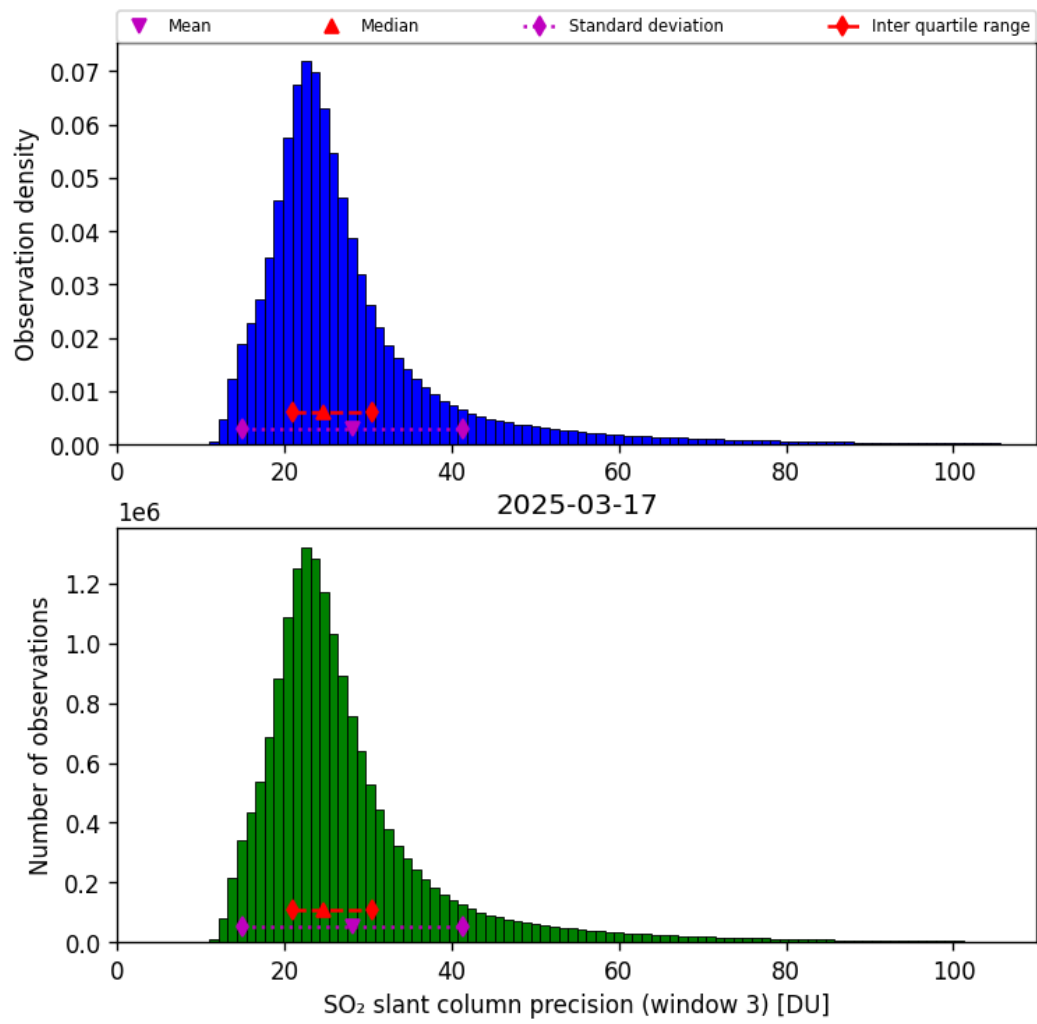


Figure 72: Histogram of “SO₂ slant column precision (window 3)” for 2025-03-17 to 2025-03-18

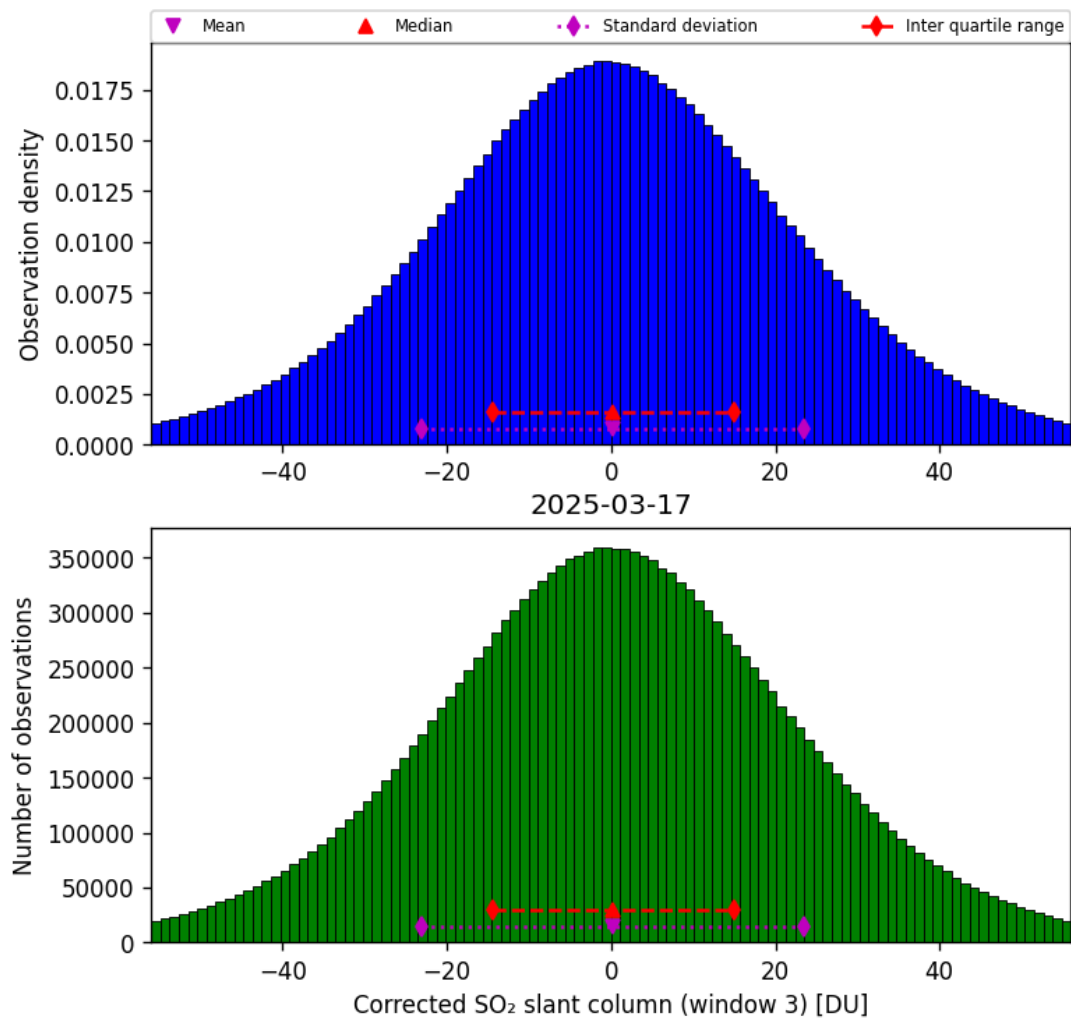


Figure 73: Histogram of "Corrected SO₂ slant column (window 3)" for 2025-03-17 to 2025-03-18

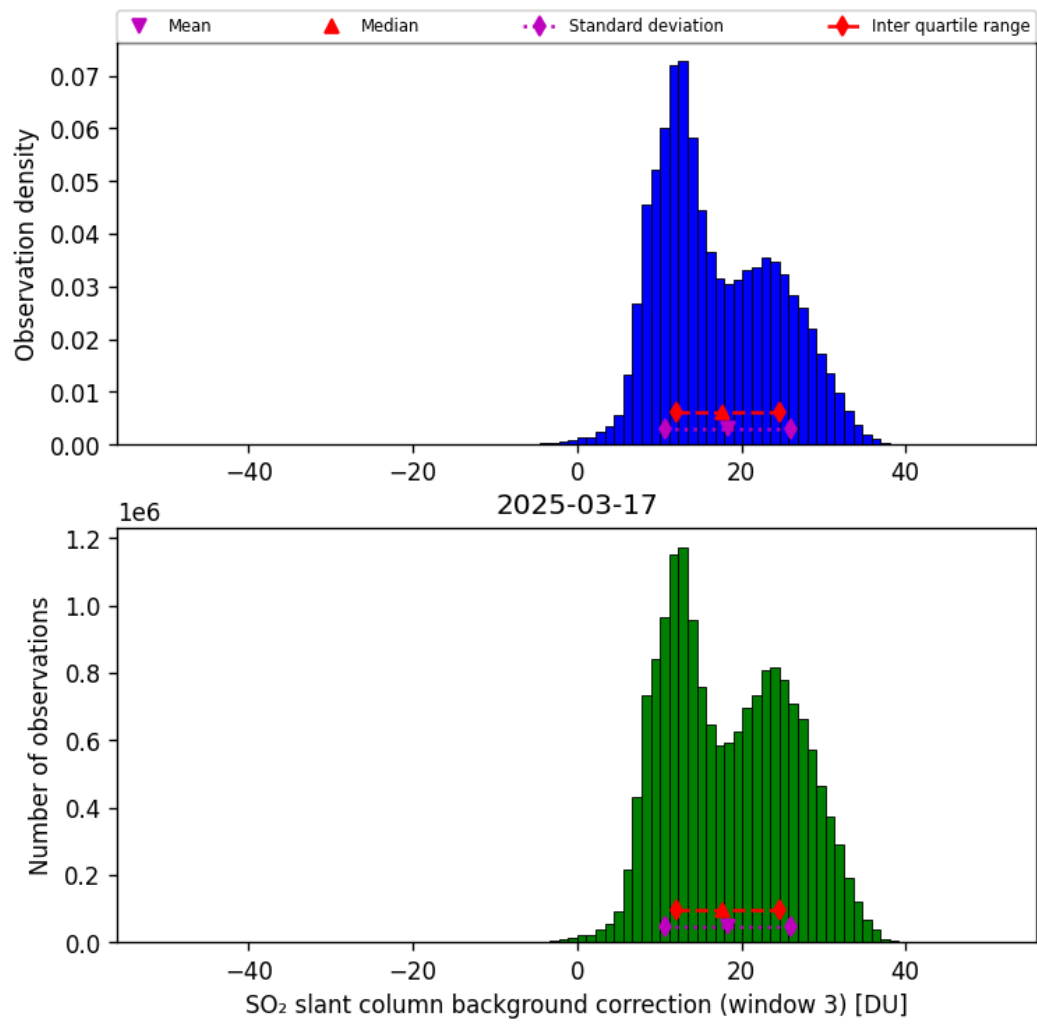


Figure 74: Histogram of “SO₂ slant column background correction (window 3)” for 2025-03-17 to 2025-03-18

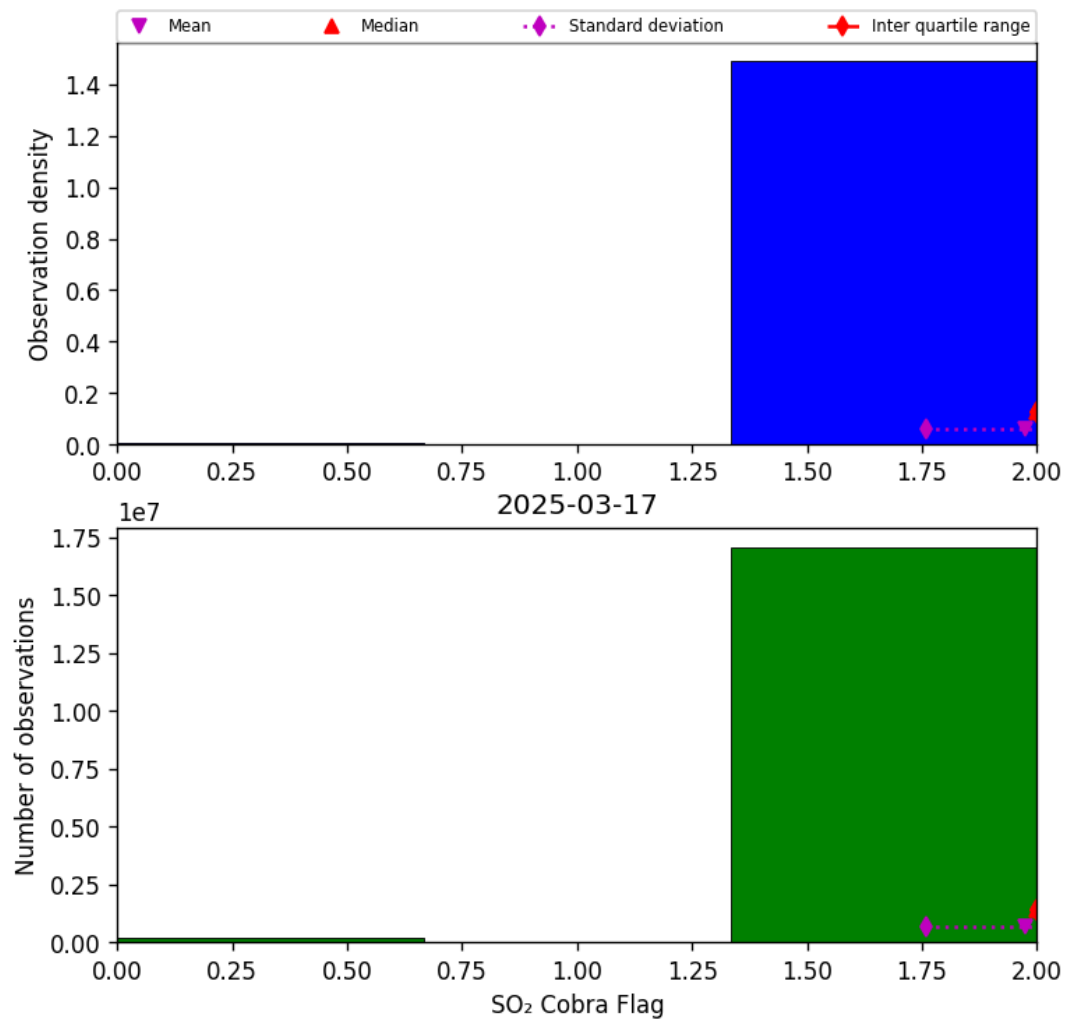


Figure 75: Histogram of “SO₂ Cobra Flag” for 2025-03-17 to 2025-03-18

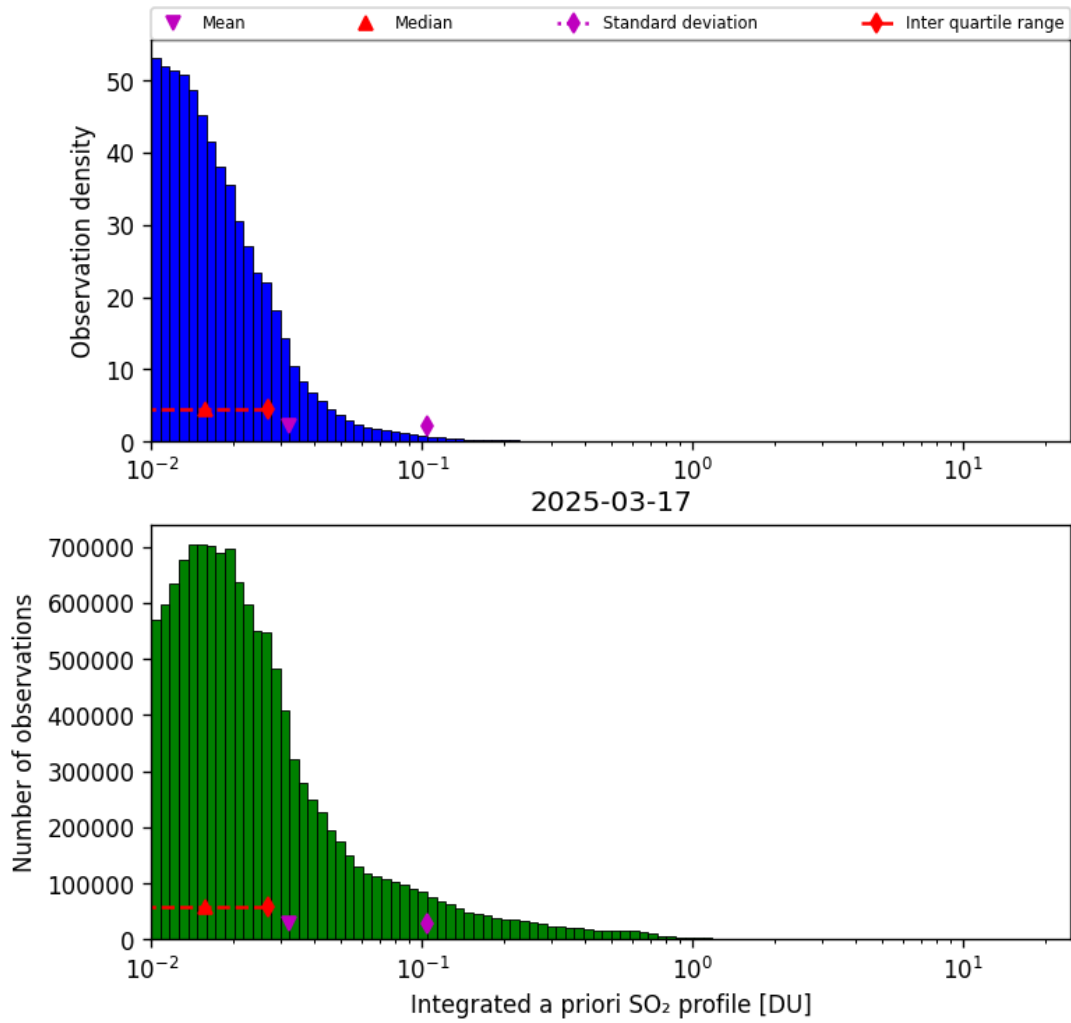


Figure 76: Histogram of “Integrated a priori SO₂ profile” for 2025-03-17 to 2025-03-18

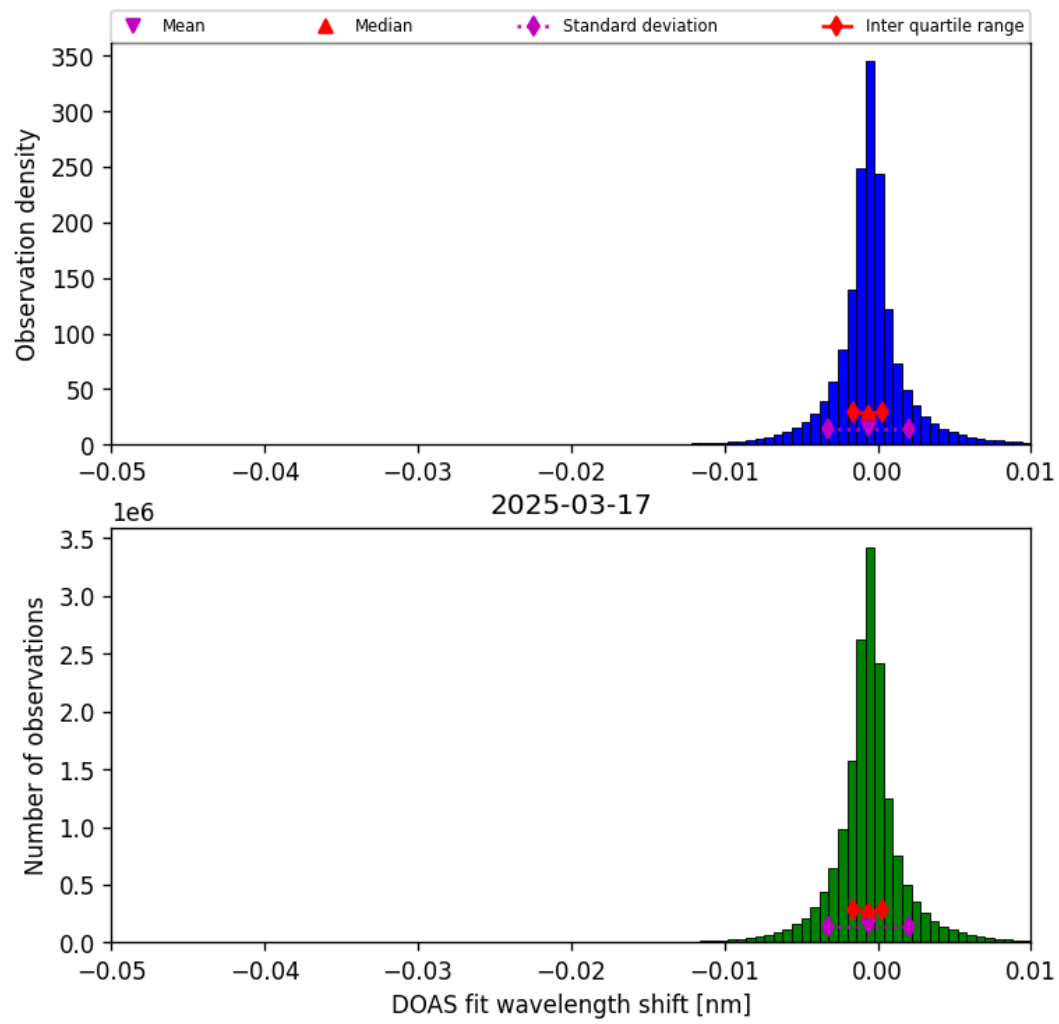


Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-03-17 to 2025-03-18

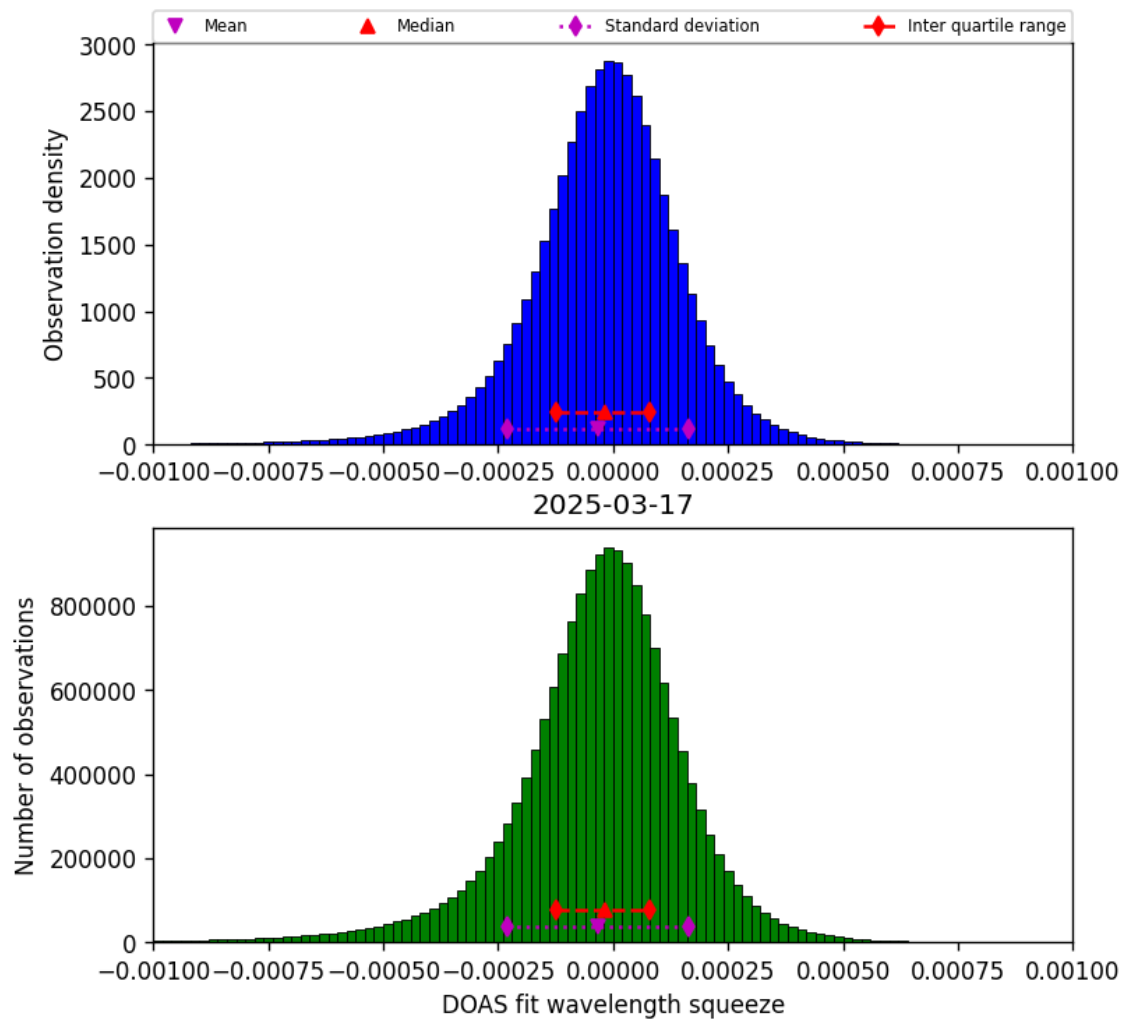


Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-03-17 to 2025-03-18

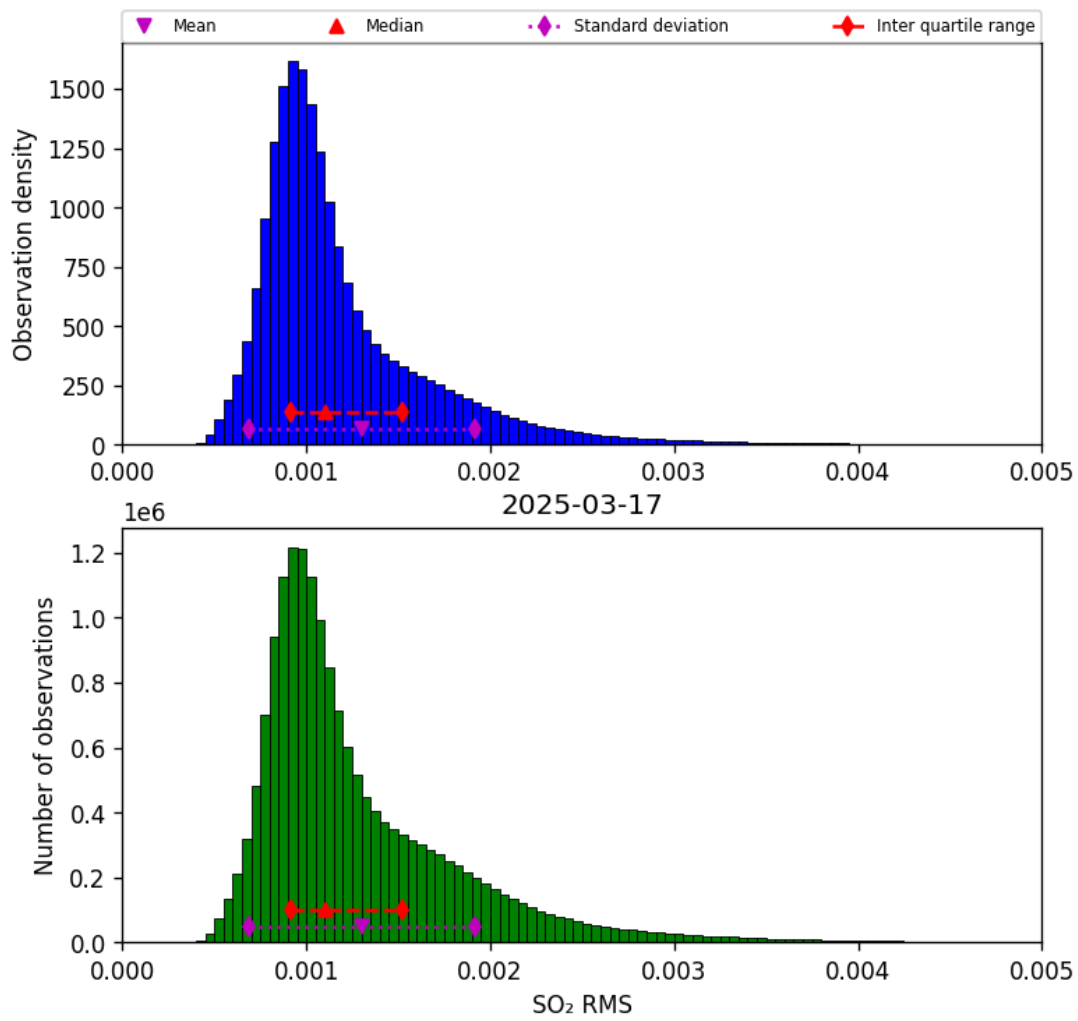


Figure 79: Histogram of “SO₂ RMS” for 2025-03-17 to 2025-03-18

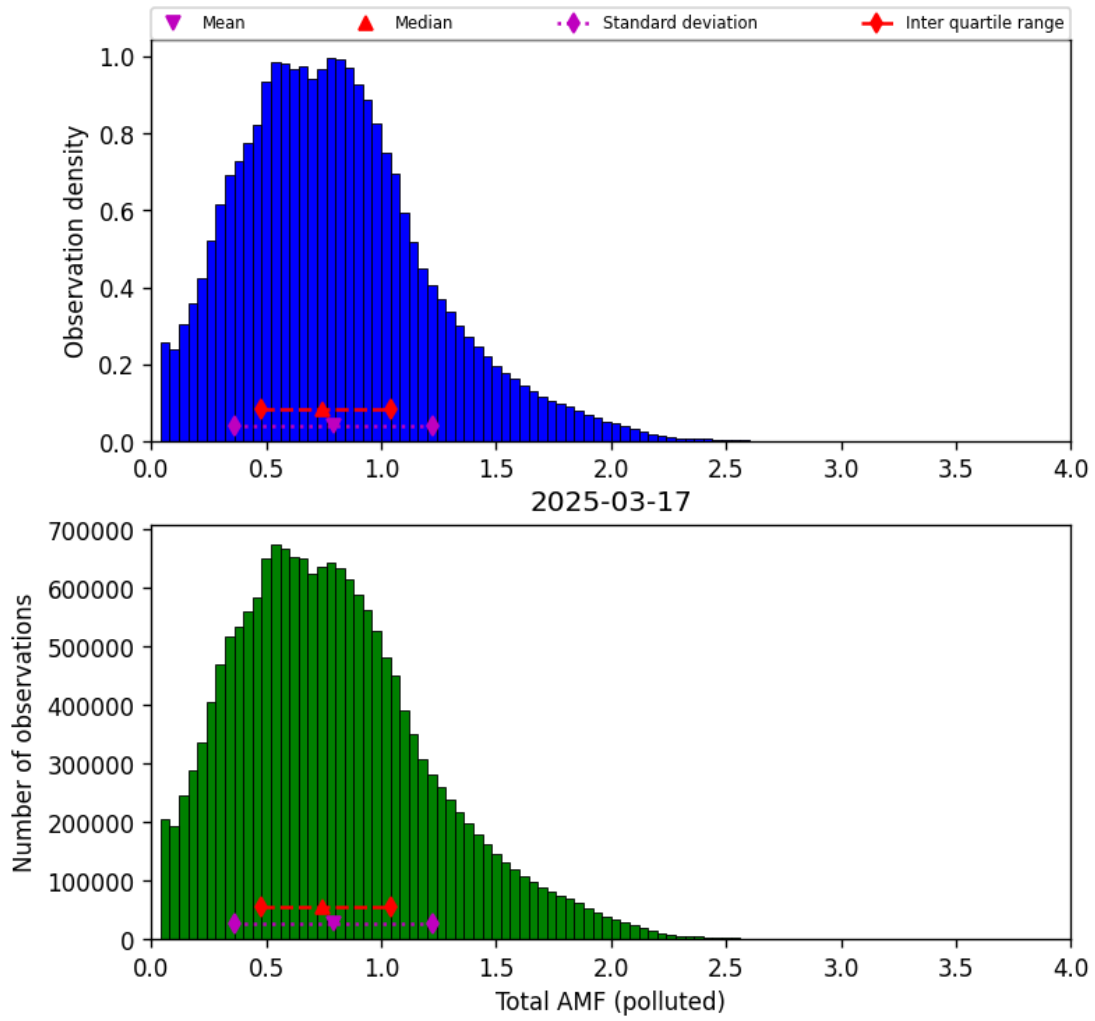


Figure 80: Histogram of “Total AMF (polluted)” for 2025-03-17 to 2025-03-18

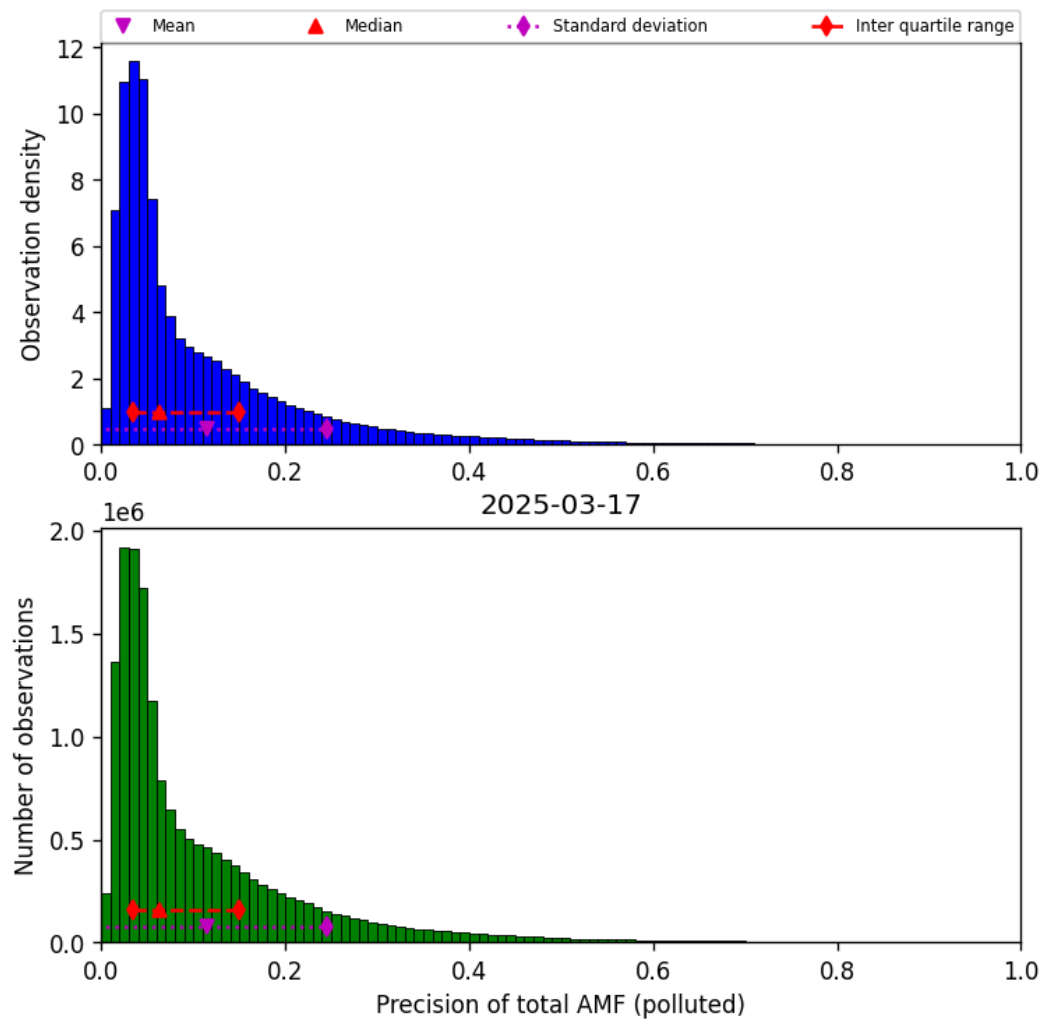


Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-03-17 to 2025-03-18

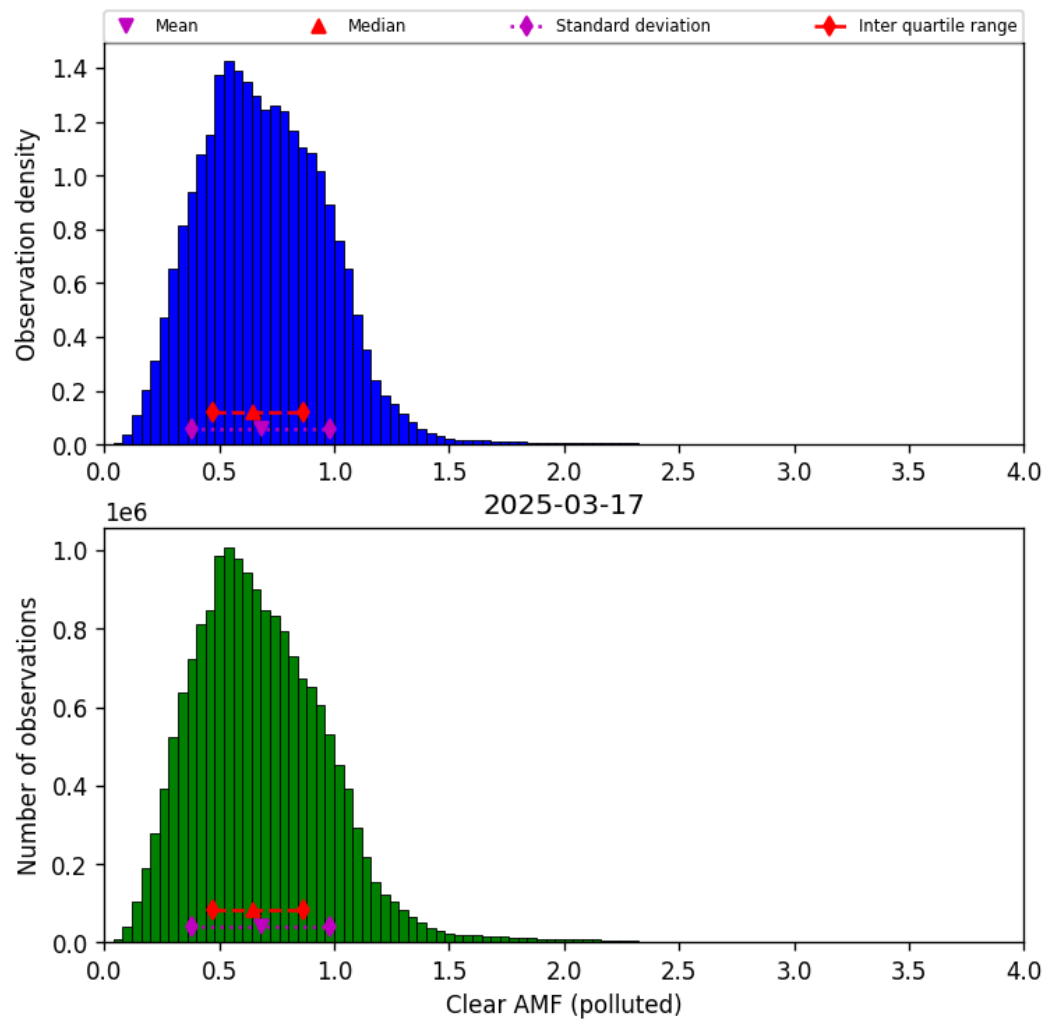


Figure 82: Histogram of "Clear AMF (polluted)" for 2025-03-17 to 2025-03-18

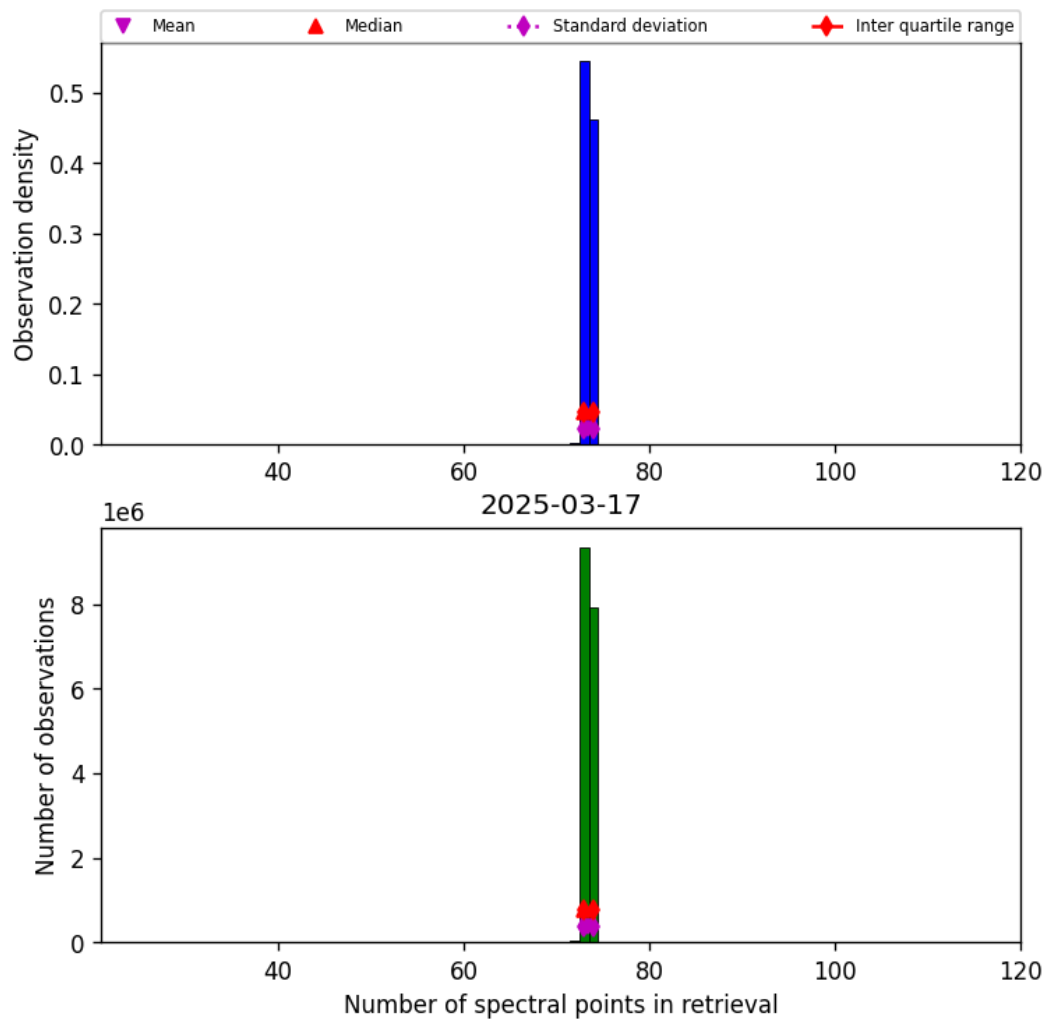


Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-03-17 to 2025-03-18

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.

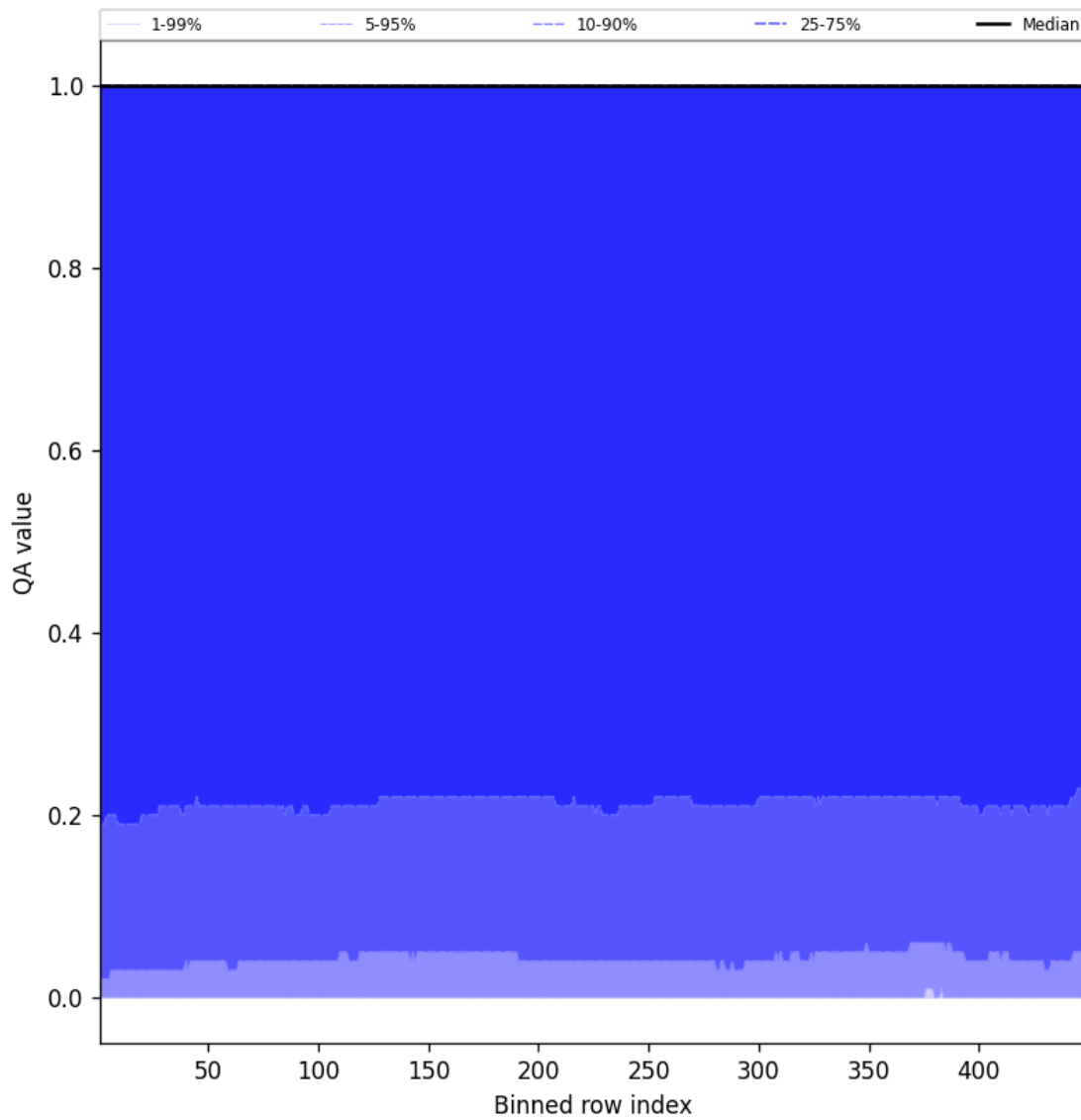


Figure 84: Along track statistics of “QA value” for 2025-03-17 to 2025-03-18

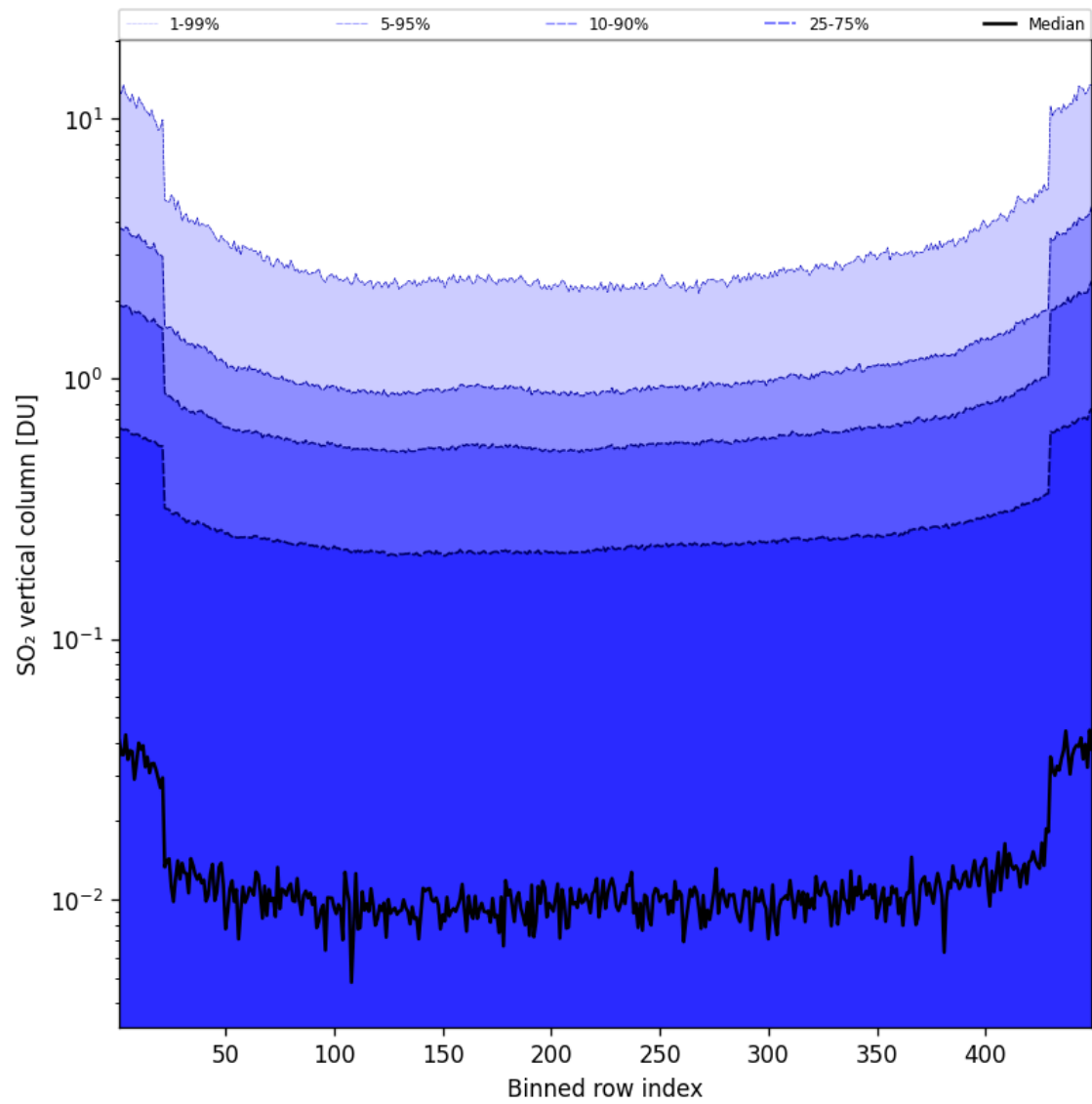


Figure 85: Along track statistics of “SO₂ vertical column” for 2025-03-17 to 2025-03-18

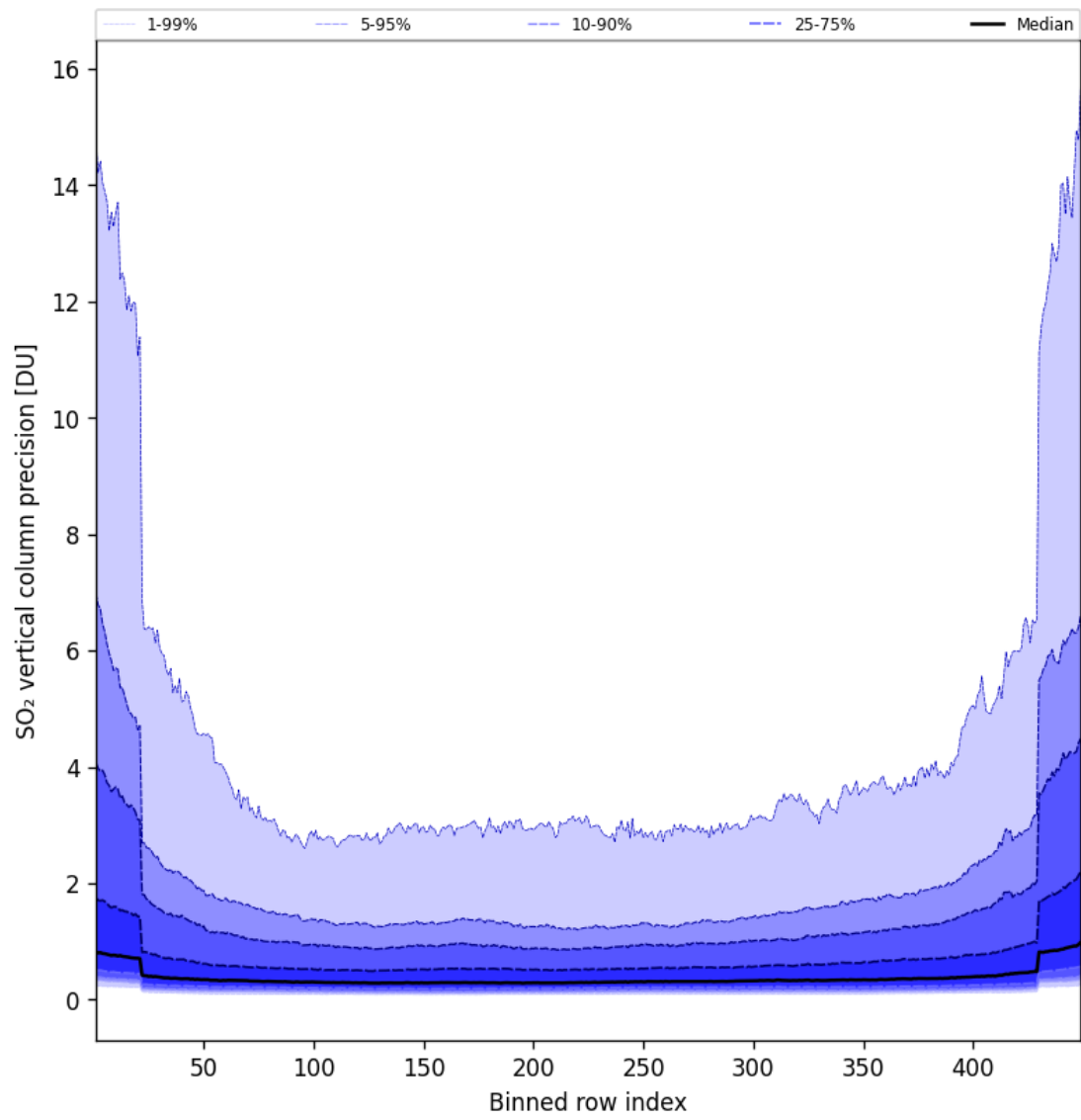


Figure 86: Along track statistics of "SO₂ vertical column precision" for 2025-03-17 to 2025-03-18

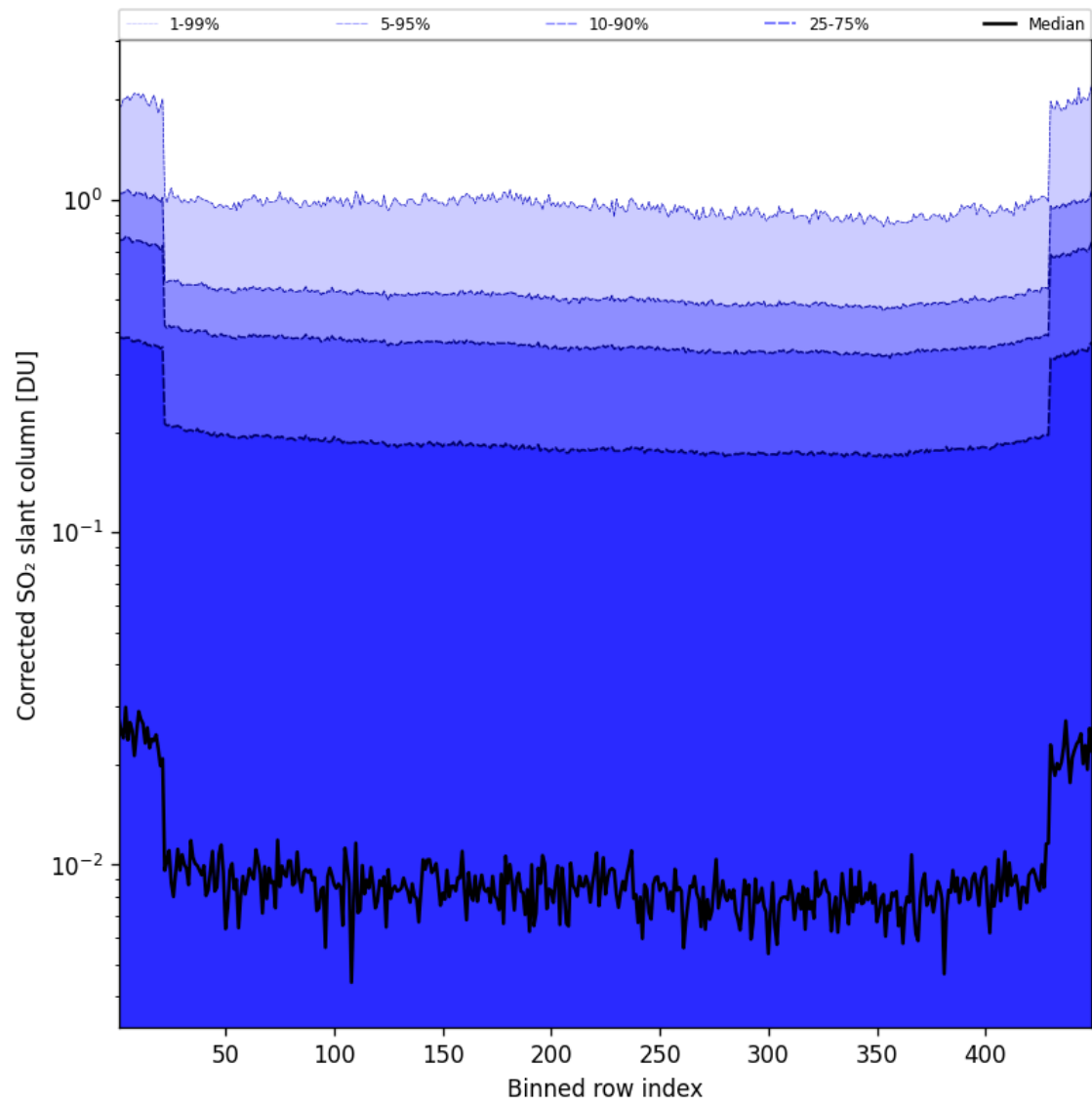


Figure 87: Along track statistics of “Corrected SO₂ slant column” for 2025-03-17 to 2025-03-18

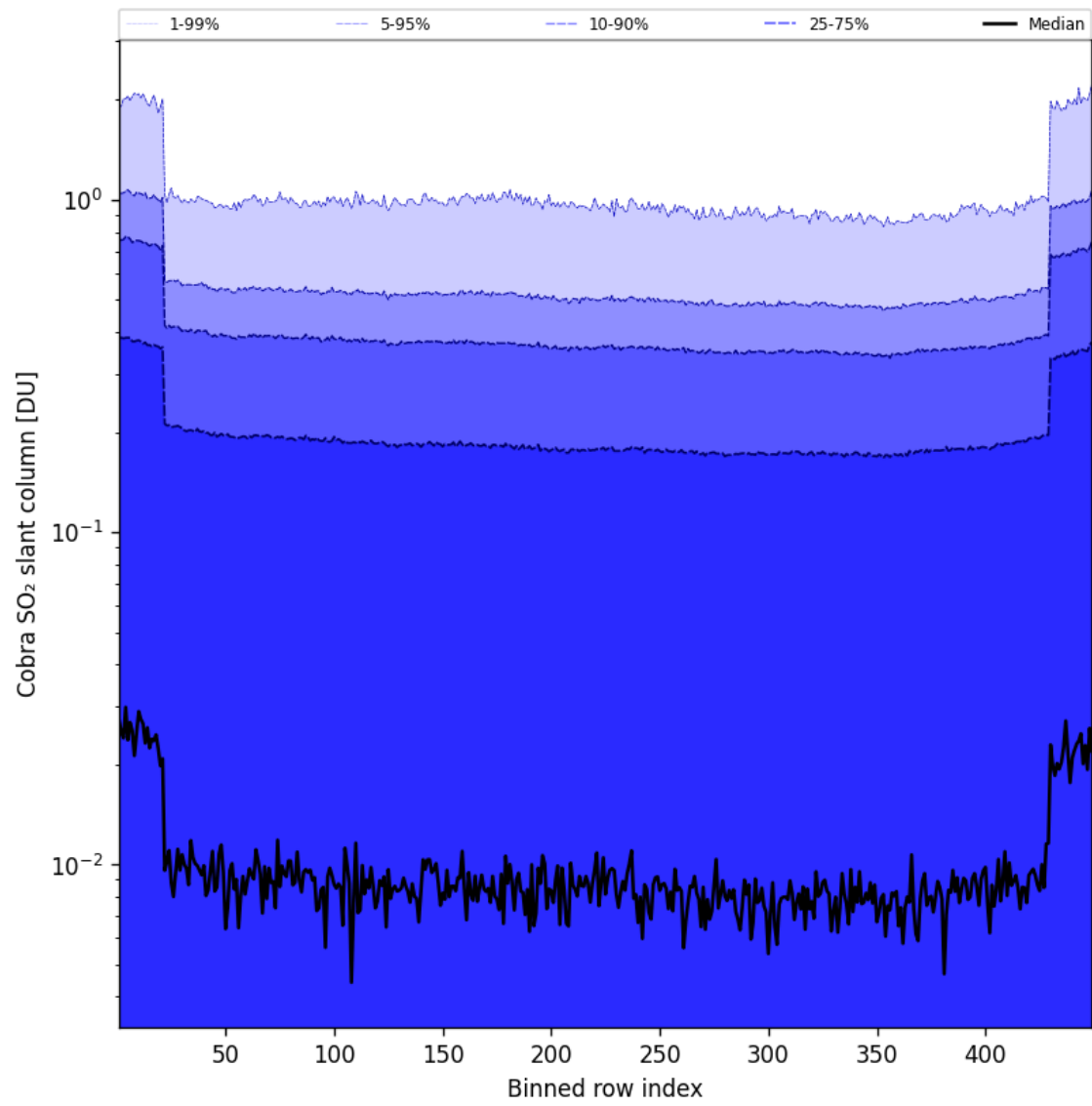


Figure 88: Along track statistics of “Cobra SO₂ slant column” for 2025-03-17 to 2025-03-18

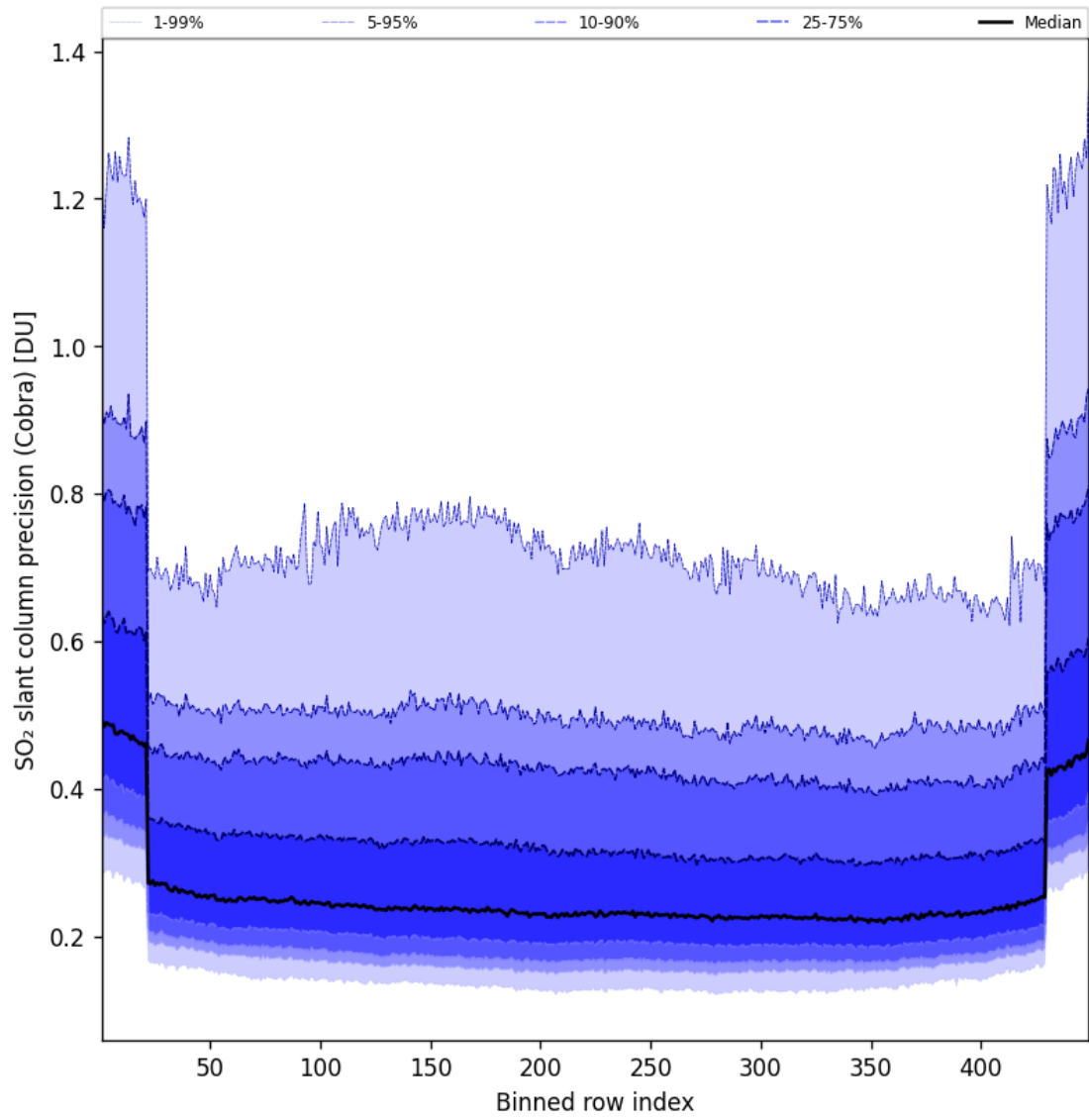


Figure 89: Along track statistics of “SO₂ slant column precision (Cobra)” for 2025-03-17 to 2025-03-18

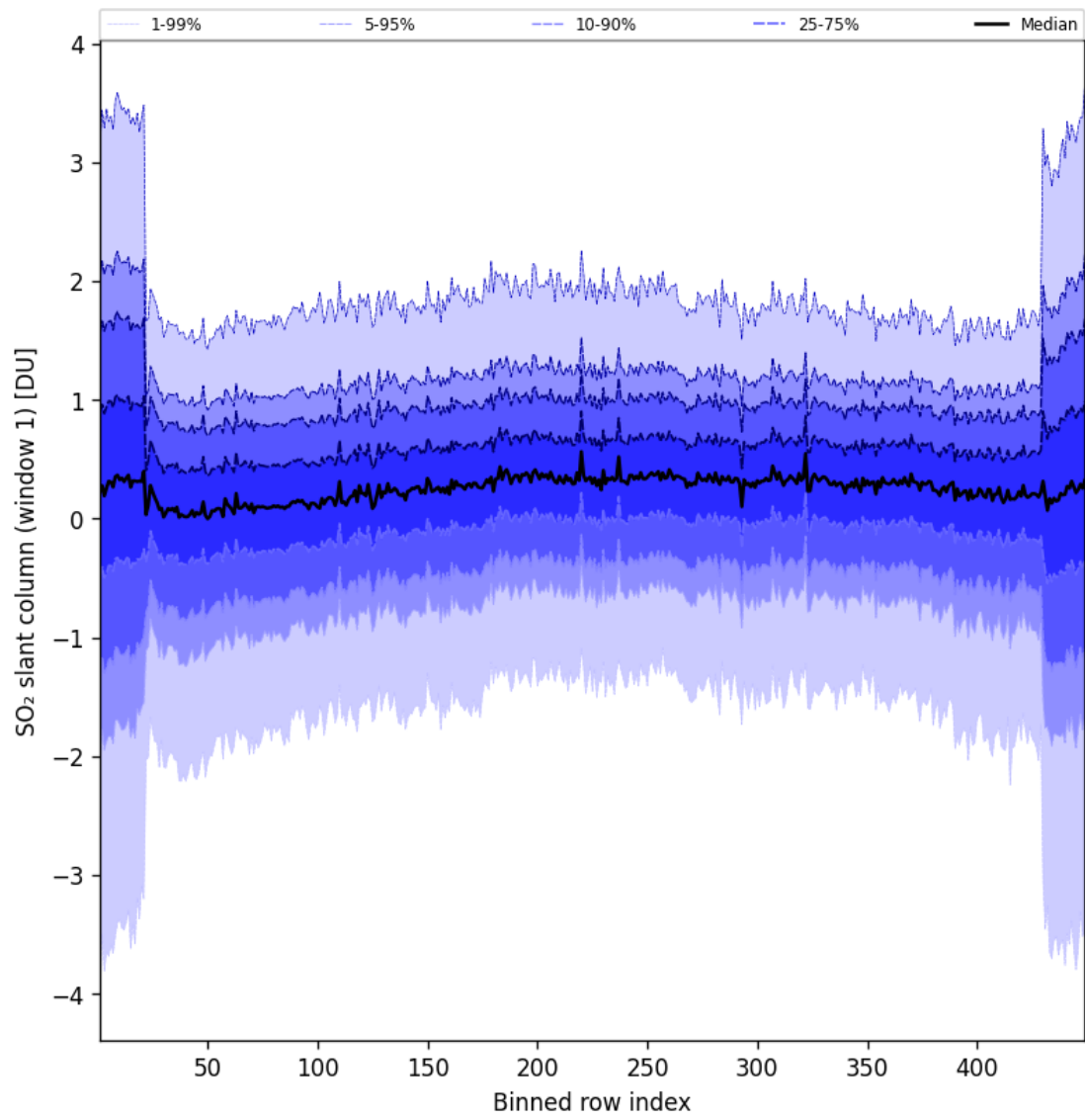


Figure 90: Along track statistics of “SO₂ slant column (window 1)” for 2025-03-17 to 2025-03-18

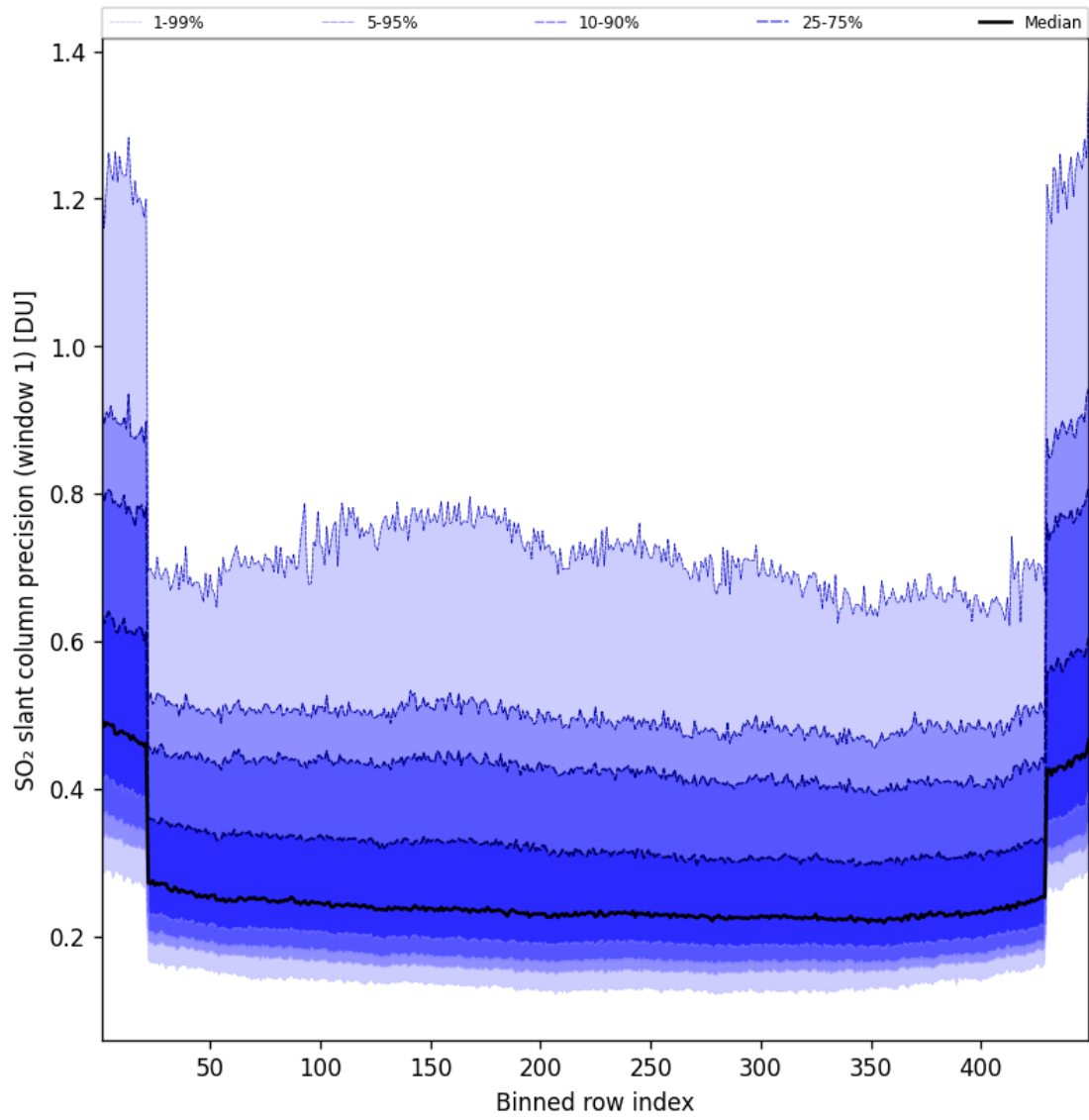


Figure 91: Along track statistics of “SO₂ slant column precision (window 1)” for 2025-03-17 to 2025-03-18

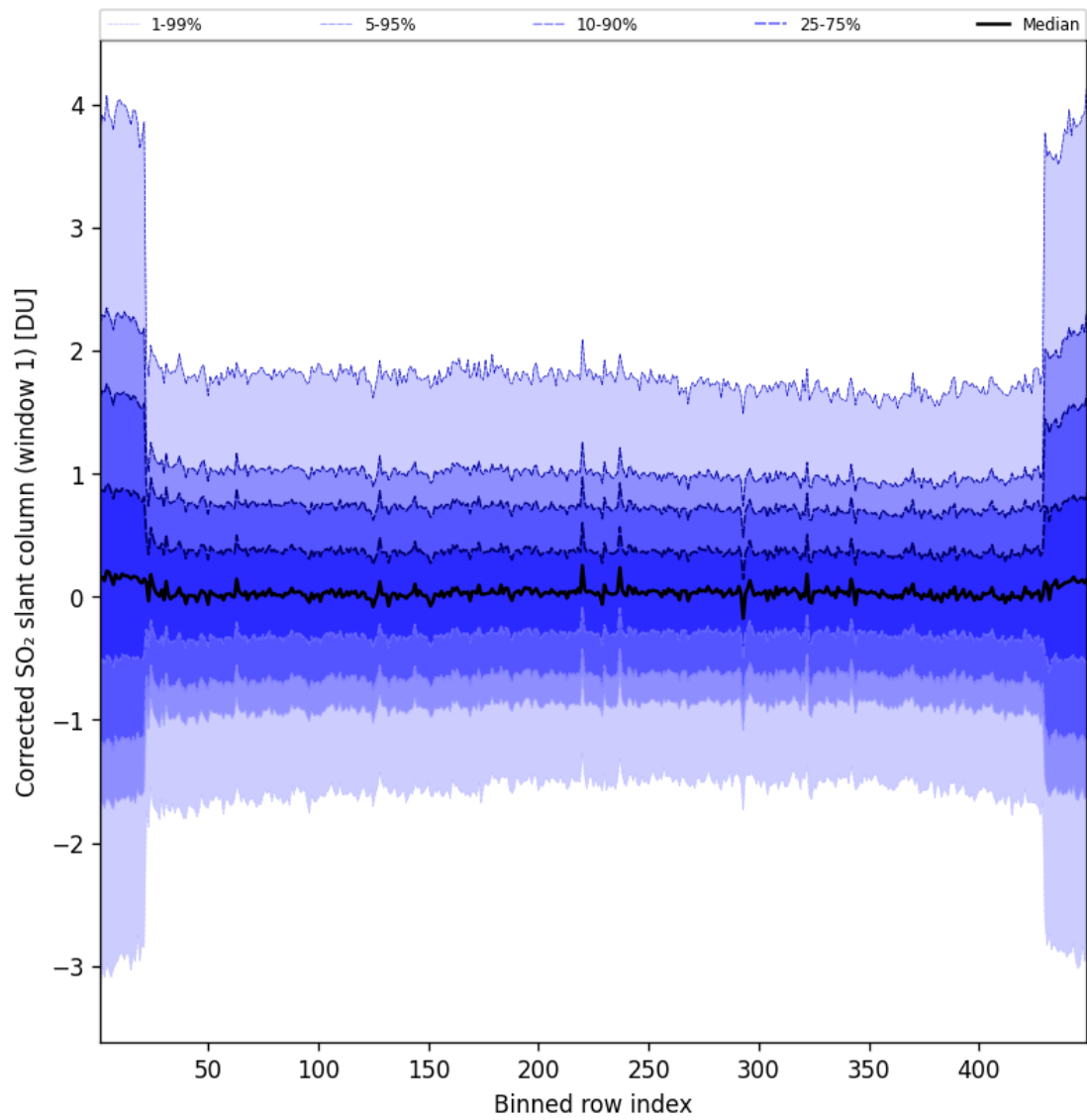


Figure 92: Along track statistics of "Corrected SO₂ slant column (window 1)" for 2025-03-17 to 2025-03-18

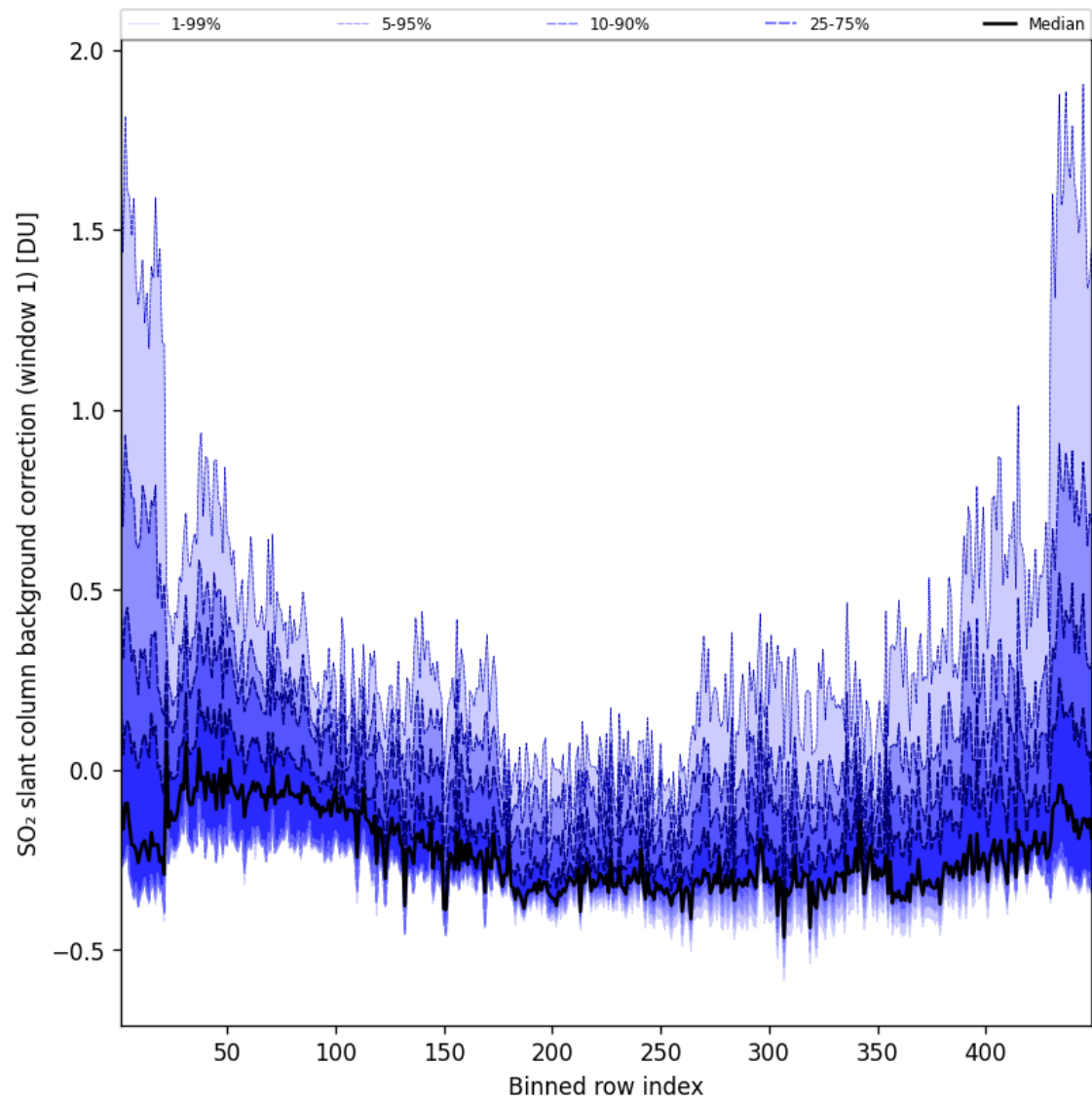


Figure 93: Along track statistics of “SO₂ slant column background correction (window 1)” for 2025-03-17 to 2025-03-18

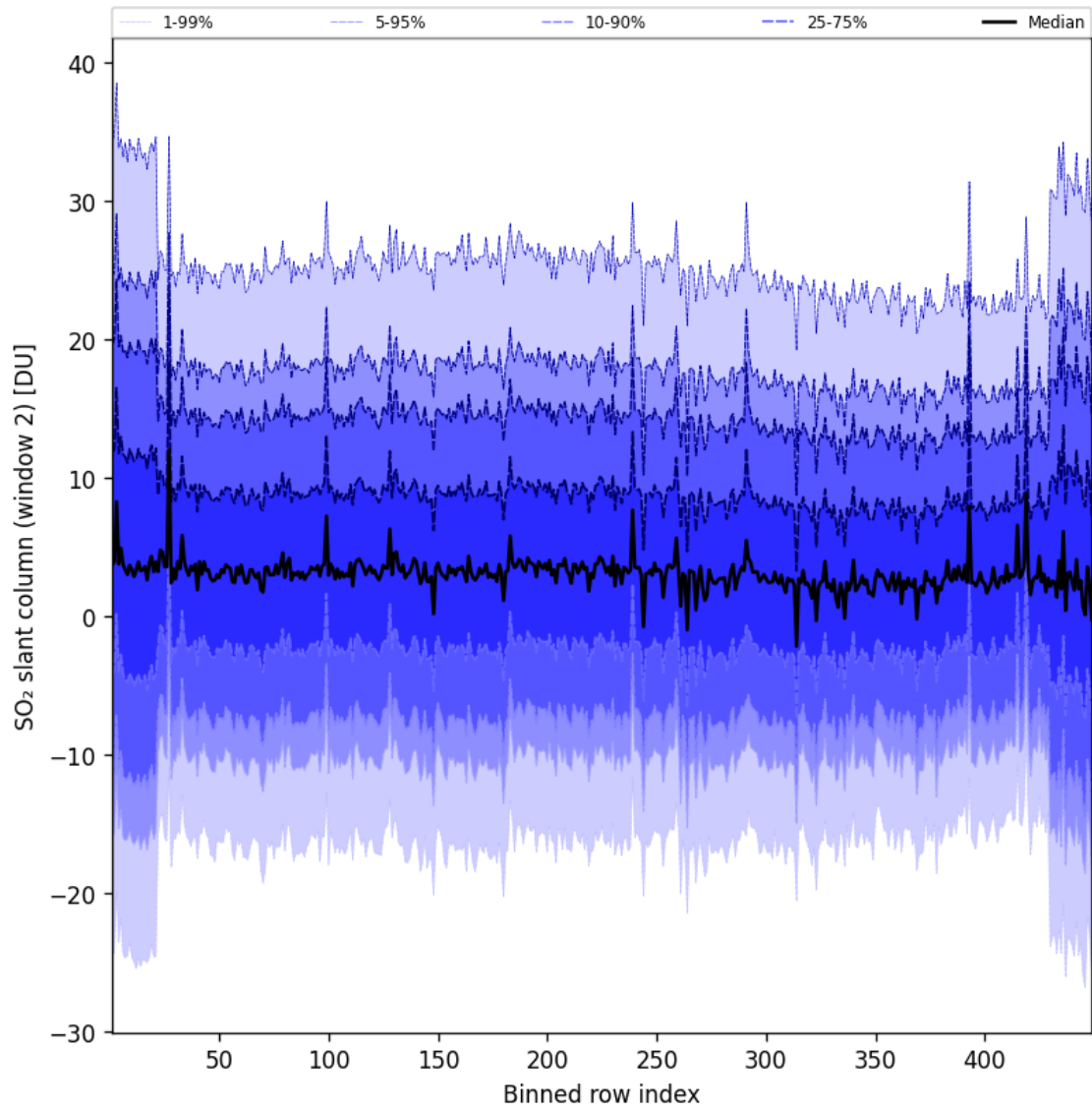


Figure 94: Along track statistics of “SO₂ slant column (window 2)” for 2025-03-17 to 2025-03-18

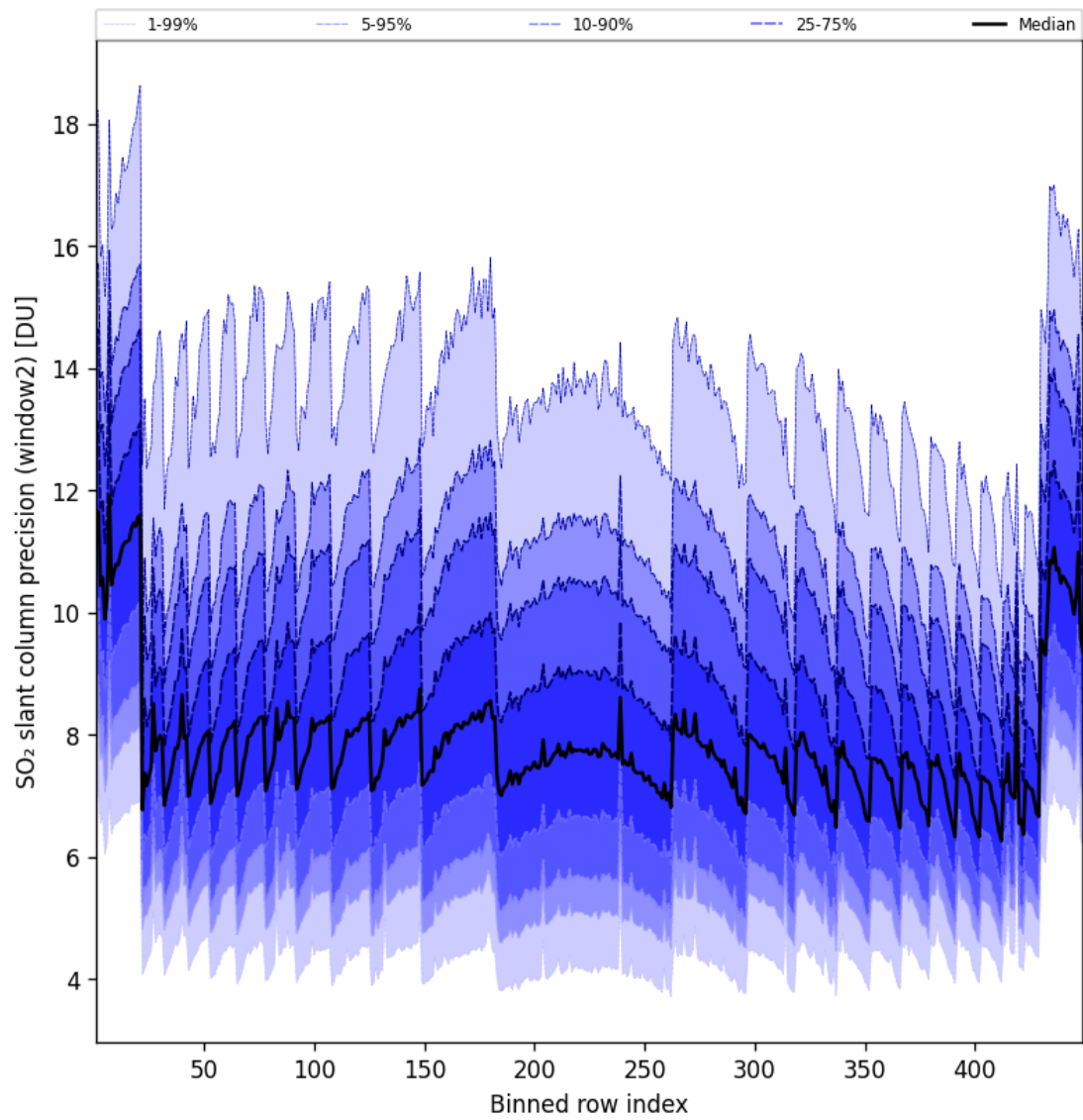


Figure 95: Along track statistics of “SO₂ slant column precision (window2)” for 2025-03-17 to 2025-03-18

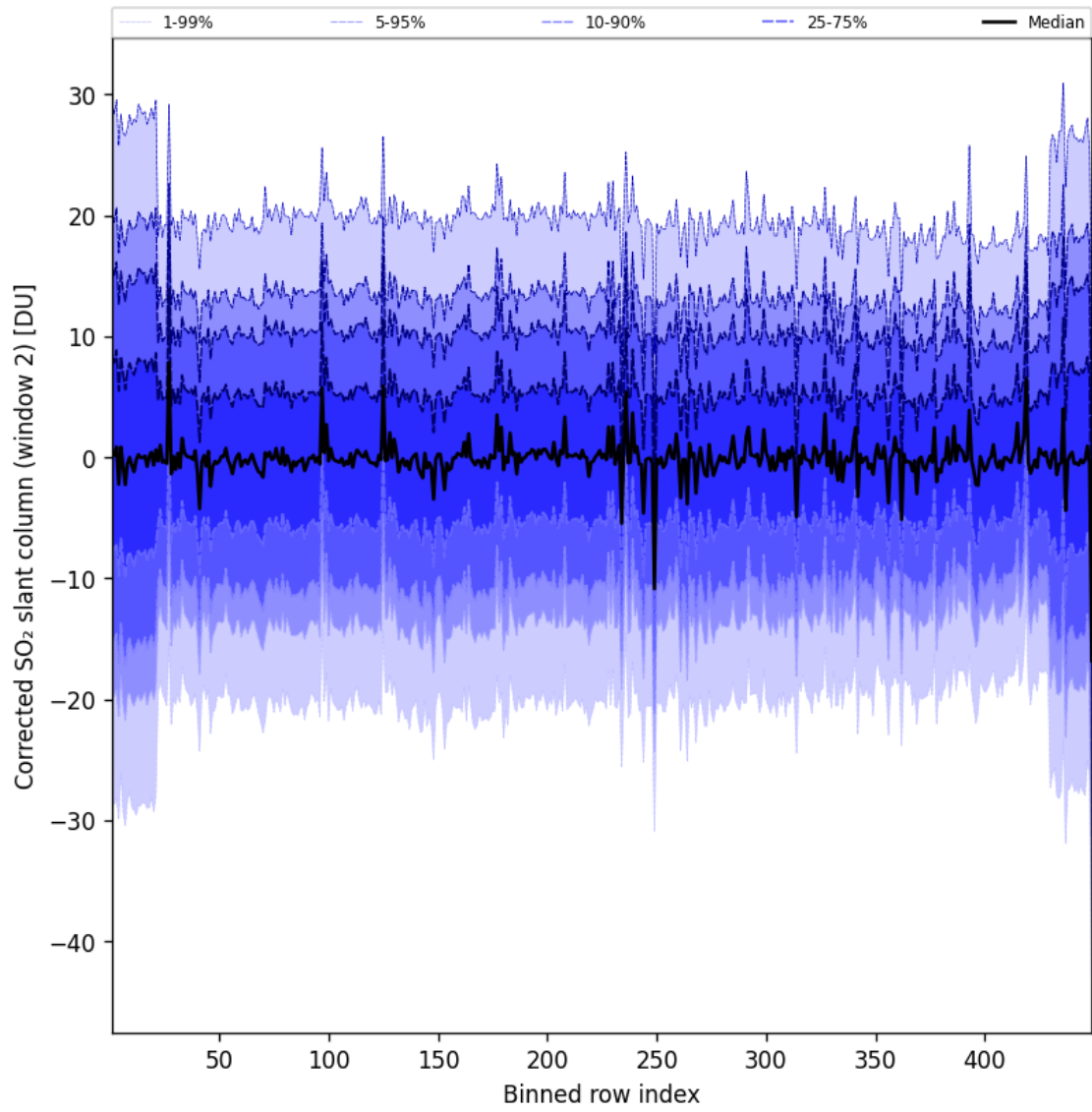


Figure 96: Along track statistics of “Corrected SO₂ slant column (window 2)” for 2025-03-17 to 2025-03-18

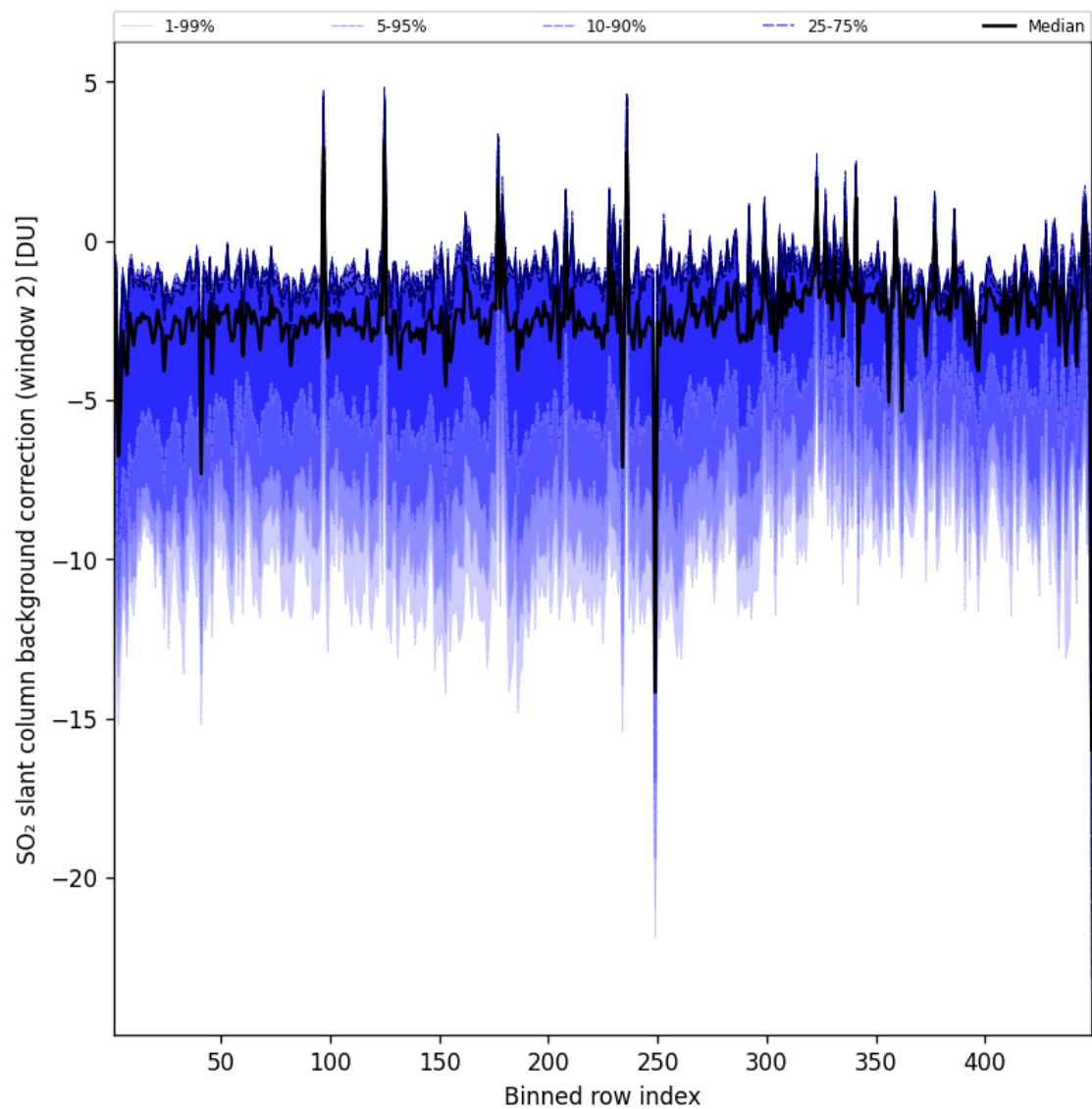


Figure 97: Along track statistics of “SO₂ slant column background correction (window 2)” for 2025-03-17 to 2025-03-18

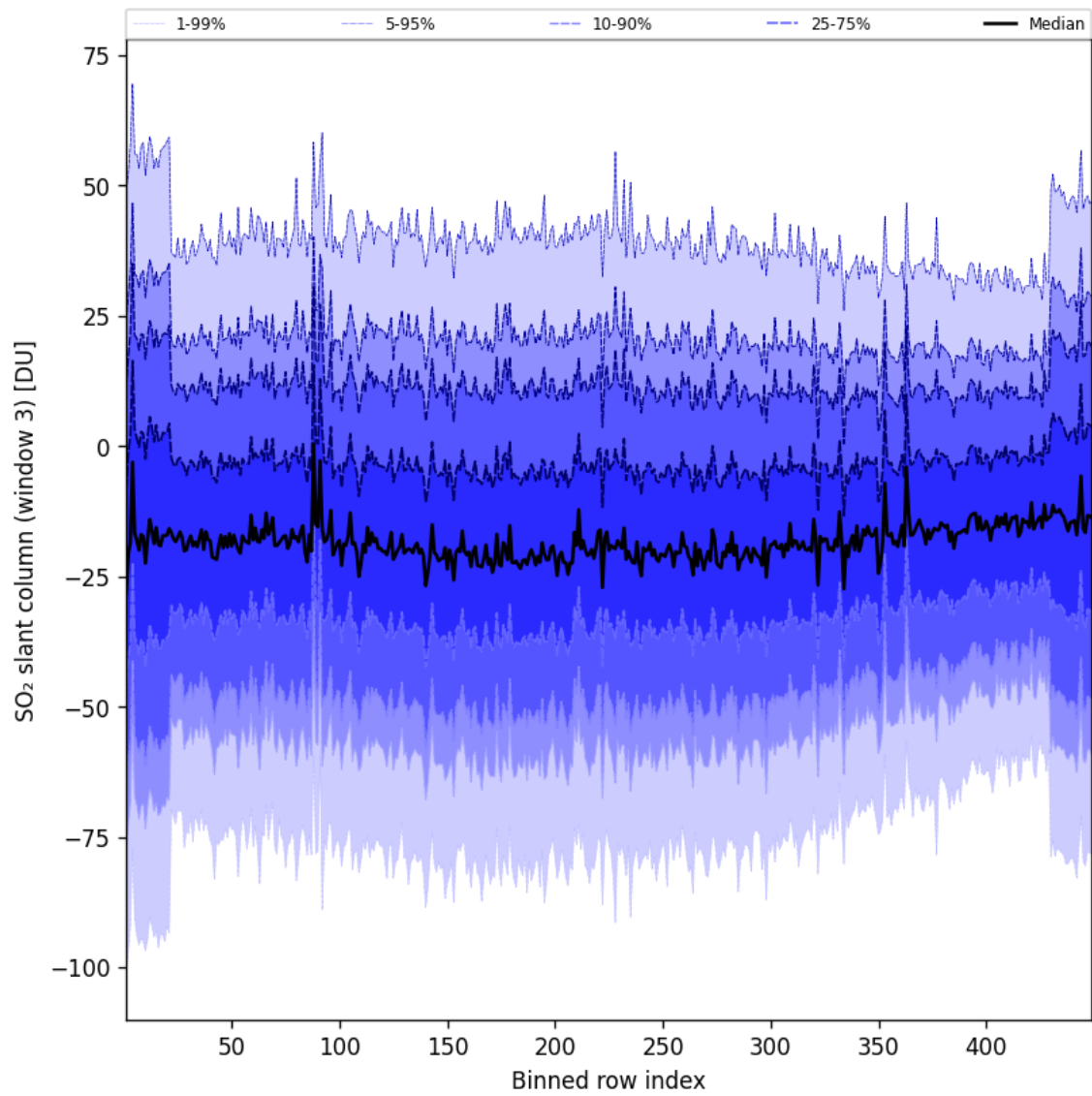


Figure 98: Along track statistics of “SO₂ slant column (window 3)” for 2025-03-17 to 2025-03-18

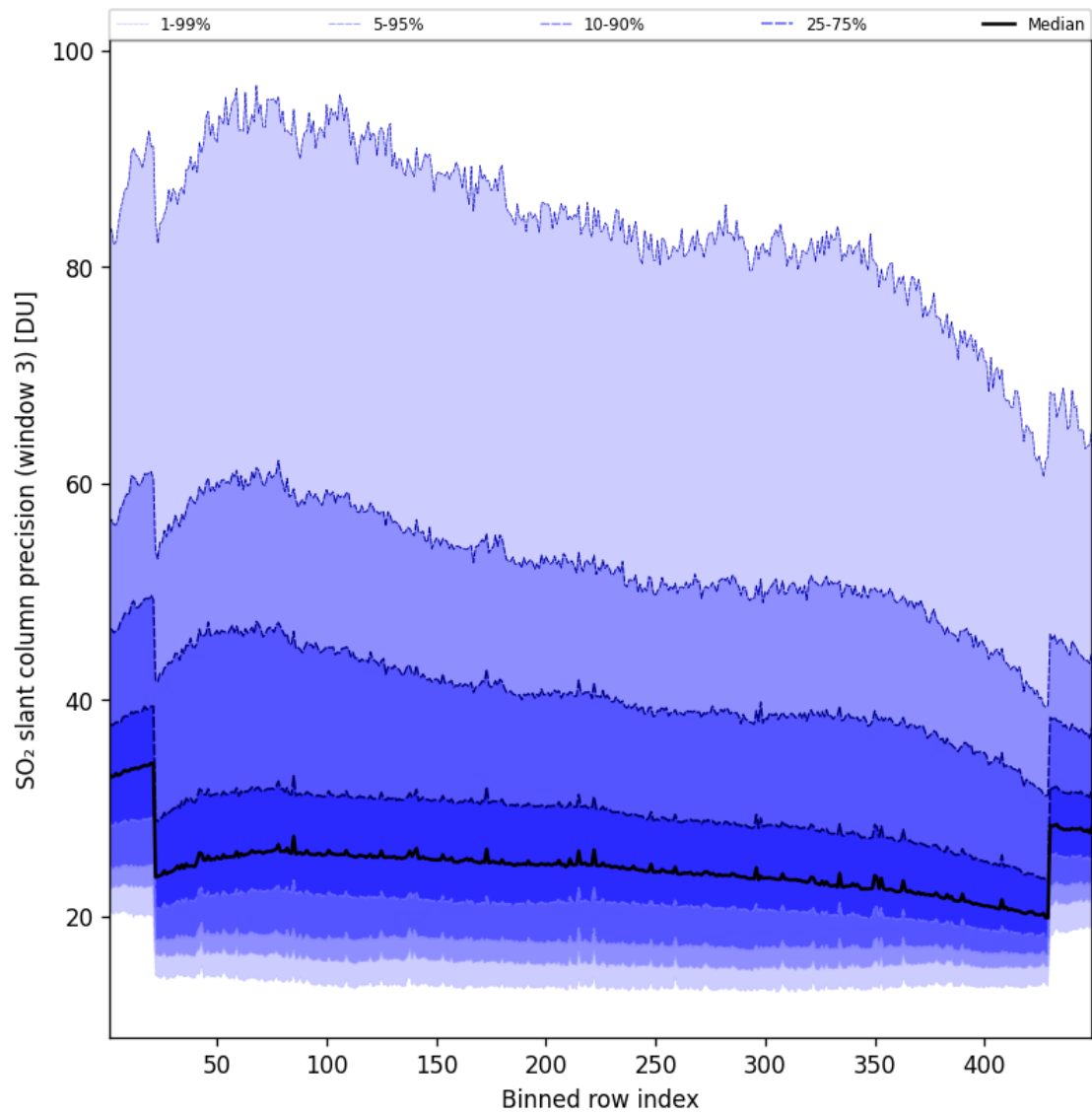


Figure 99: Along track statistics of “SO₂ slant column precision (window 3)” for 2025-03-17 to 2025-03-18

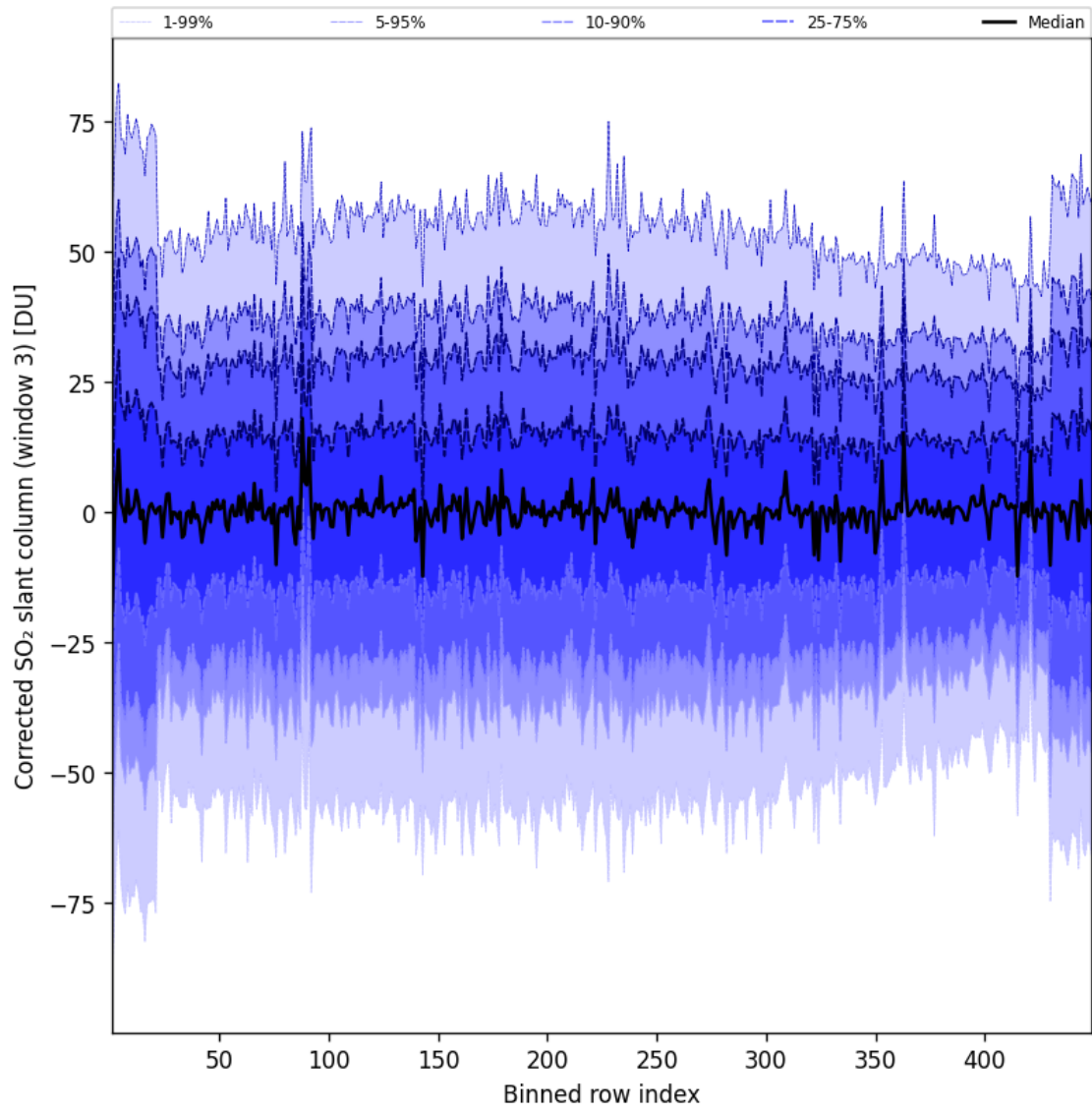


Figure 100: Along track statistics of “Corrected SO₂ slant column (window 3)” for 2025-03-17 to 2025-03-18

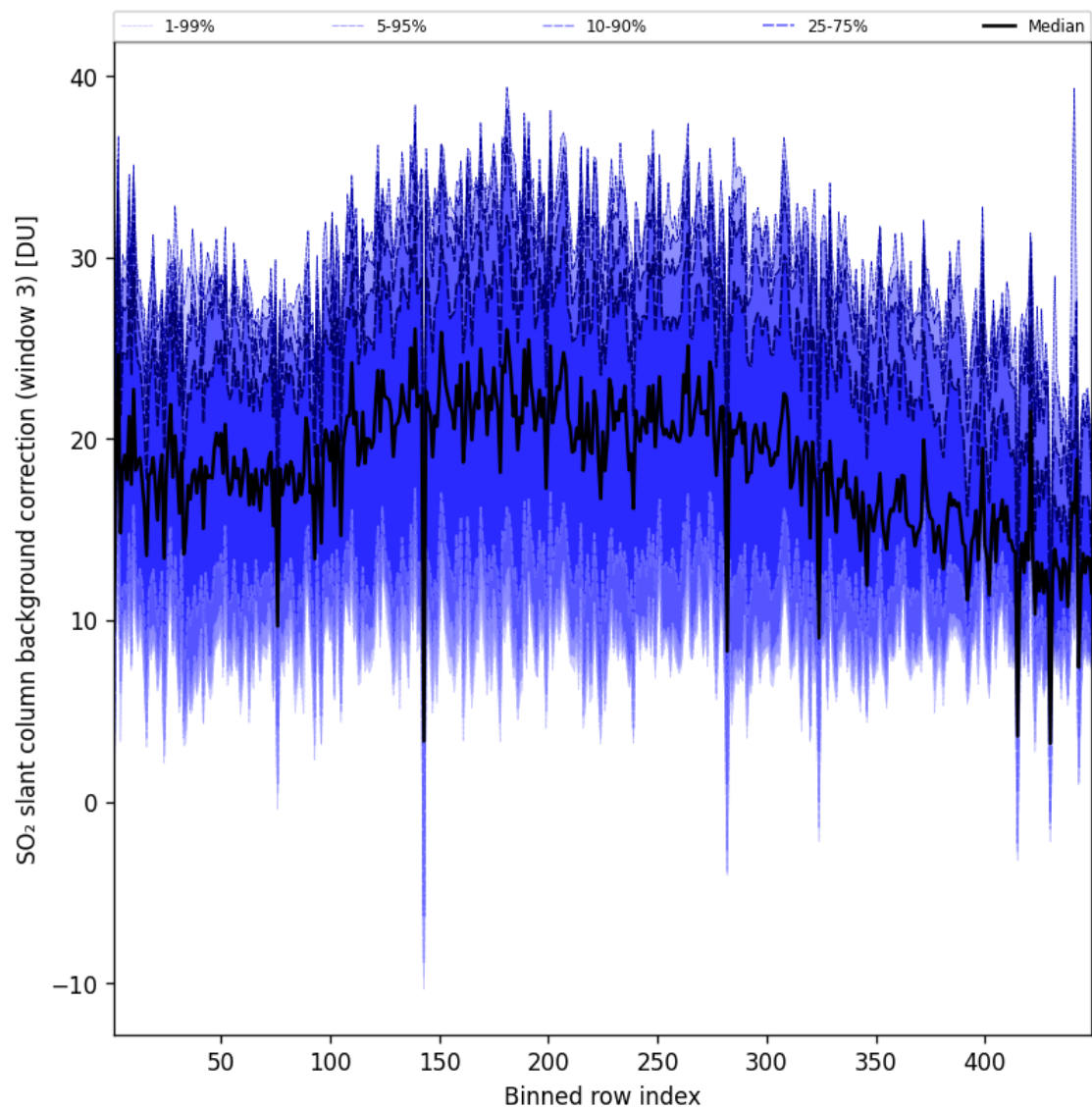


Figure 101: Along track statistics of “SO₂ slant column background correction (window 3)” for 2025-03-17 to 2025-03-18

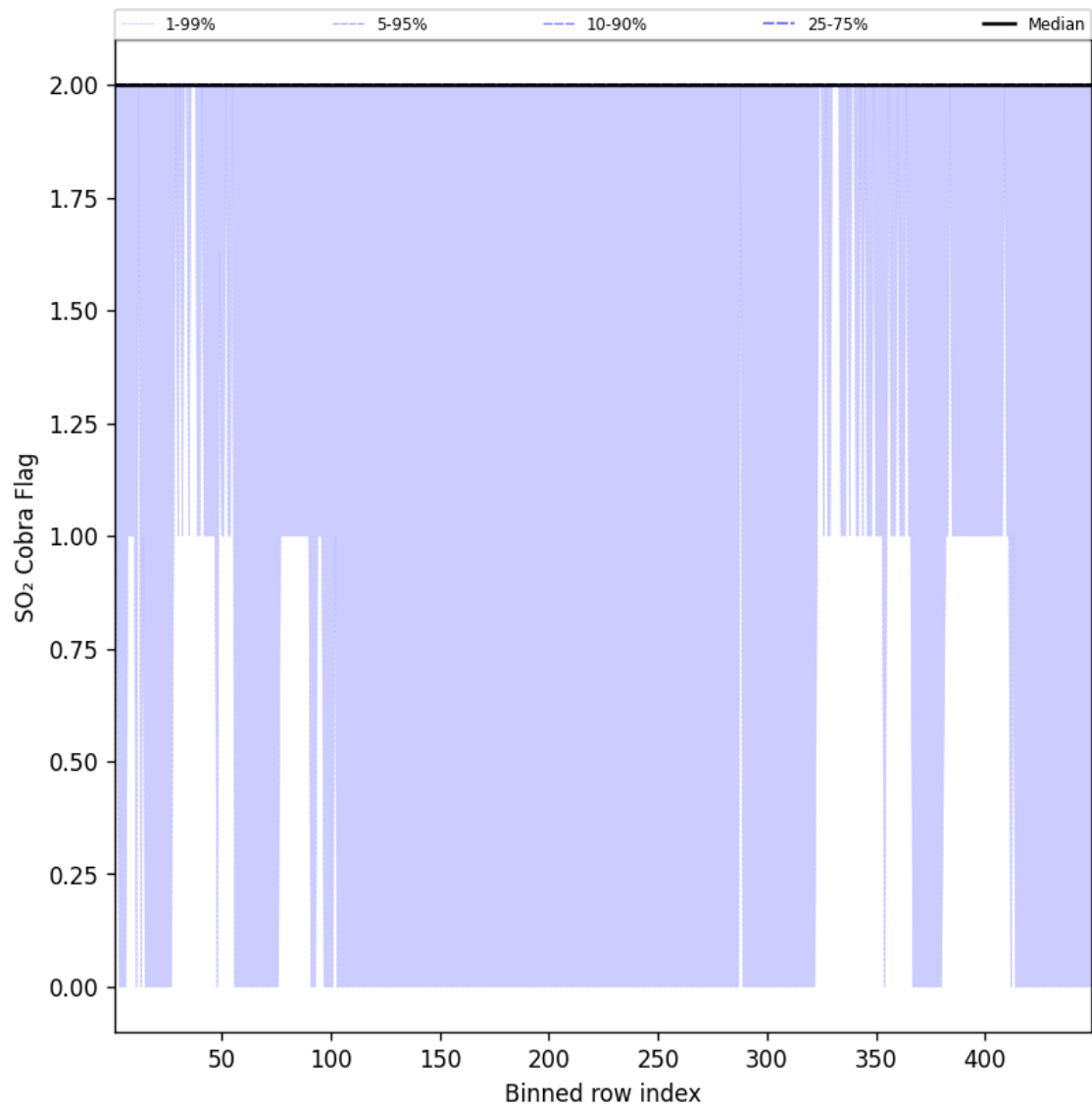


Figure 102: Along track statistics of “SO₂ Cobra Flag” for 2025-03-17 to 2025-03-18

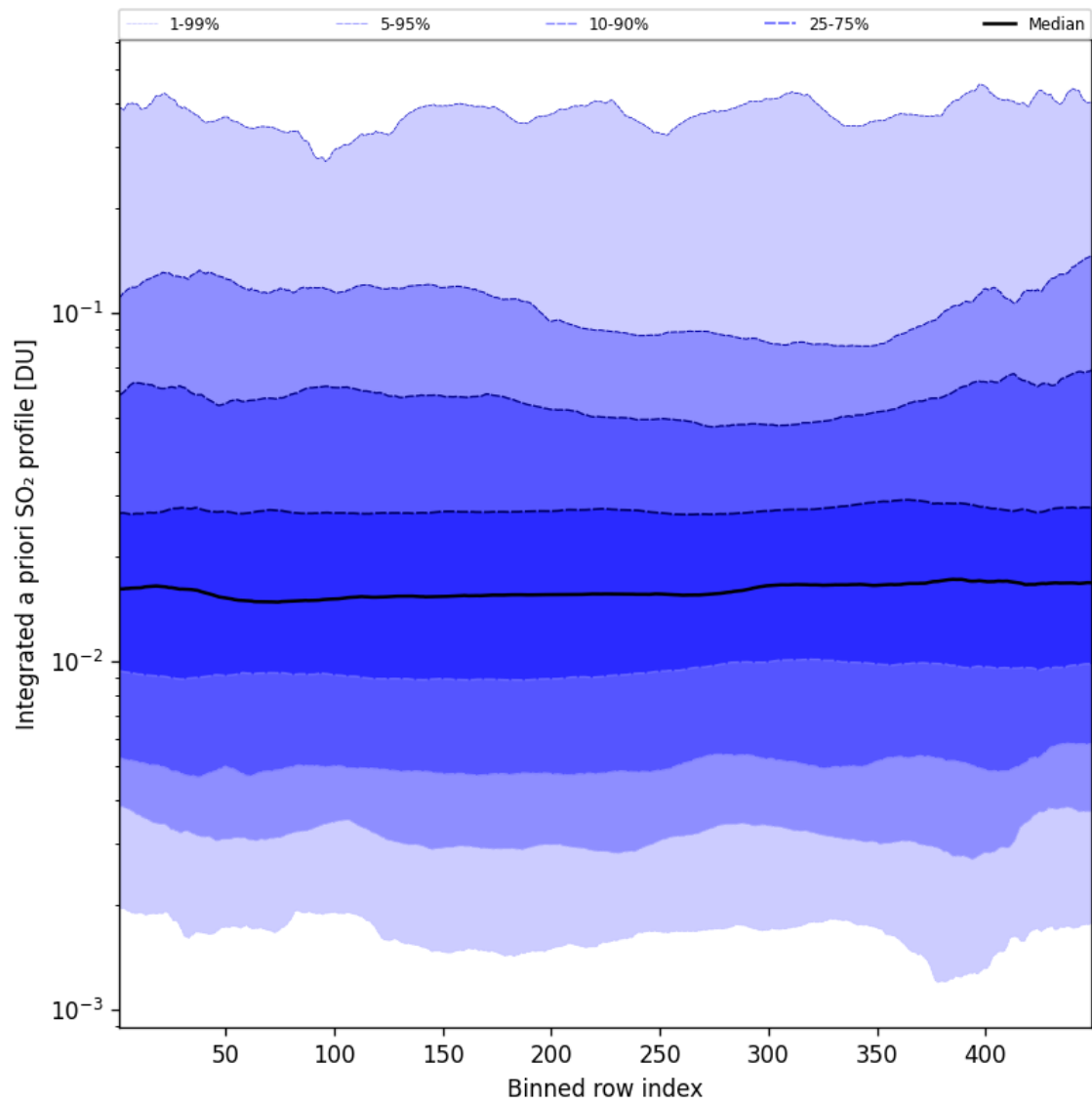


Figure 103: Along track statistics of “Integrated a priori SO₂ profile” for 2025-03-17 to 2025-03-18

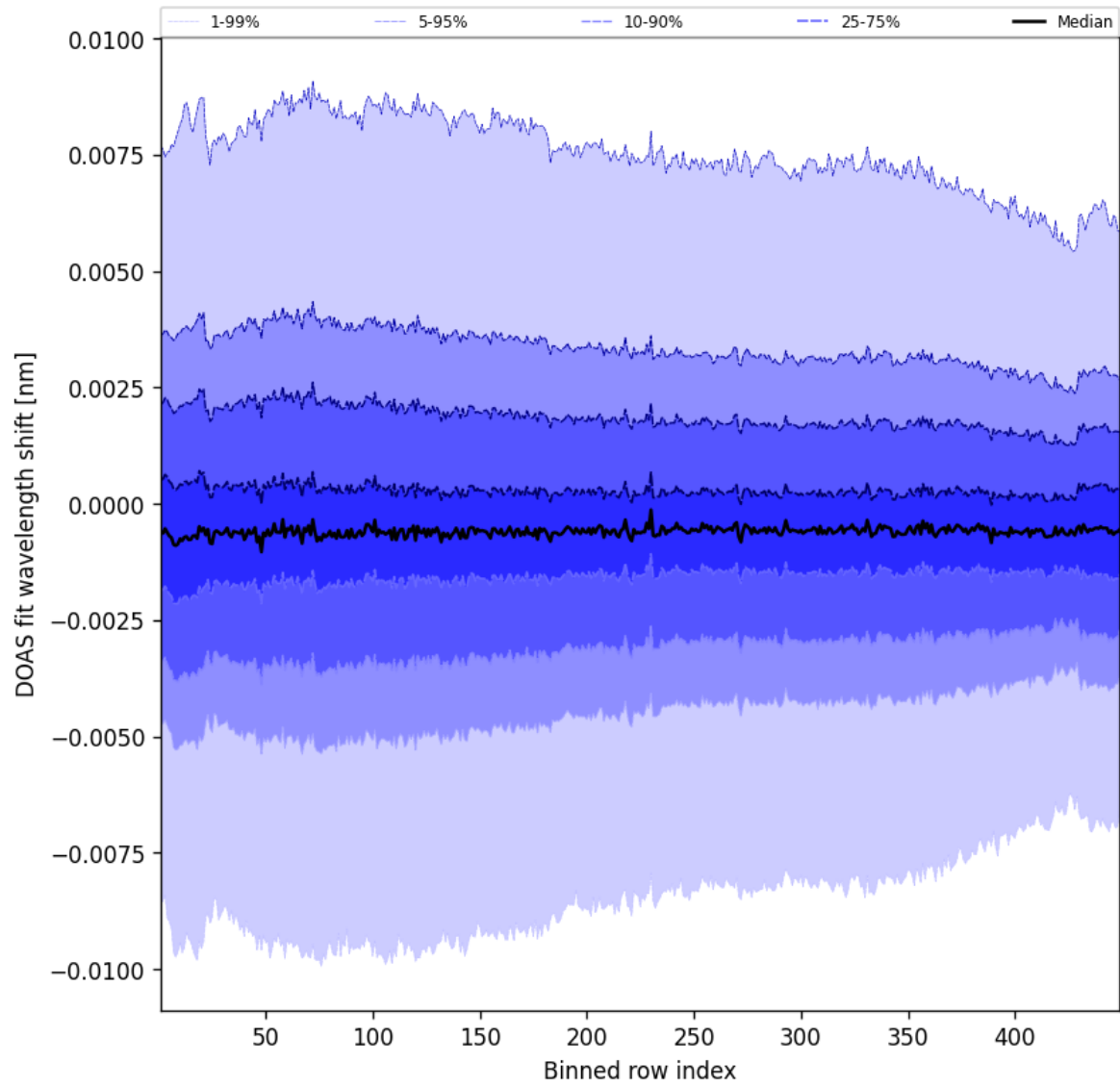


Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2025-03-17 to 2025-03-18

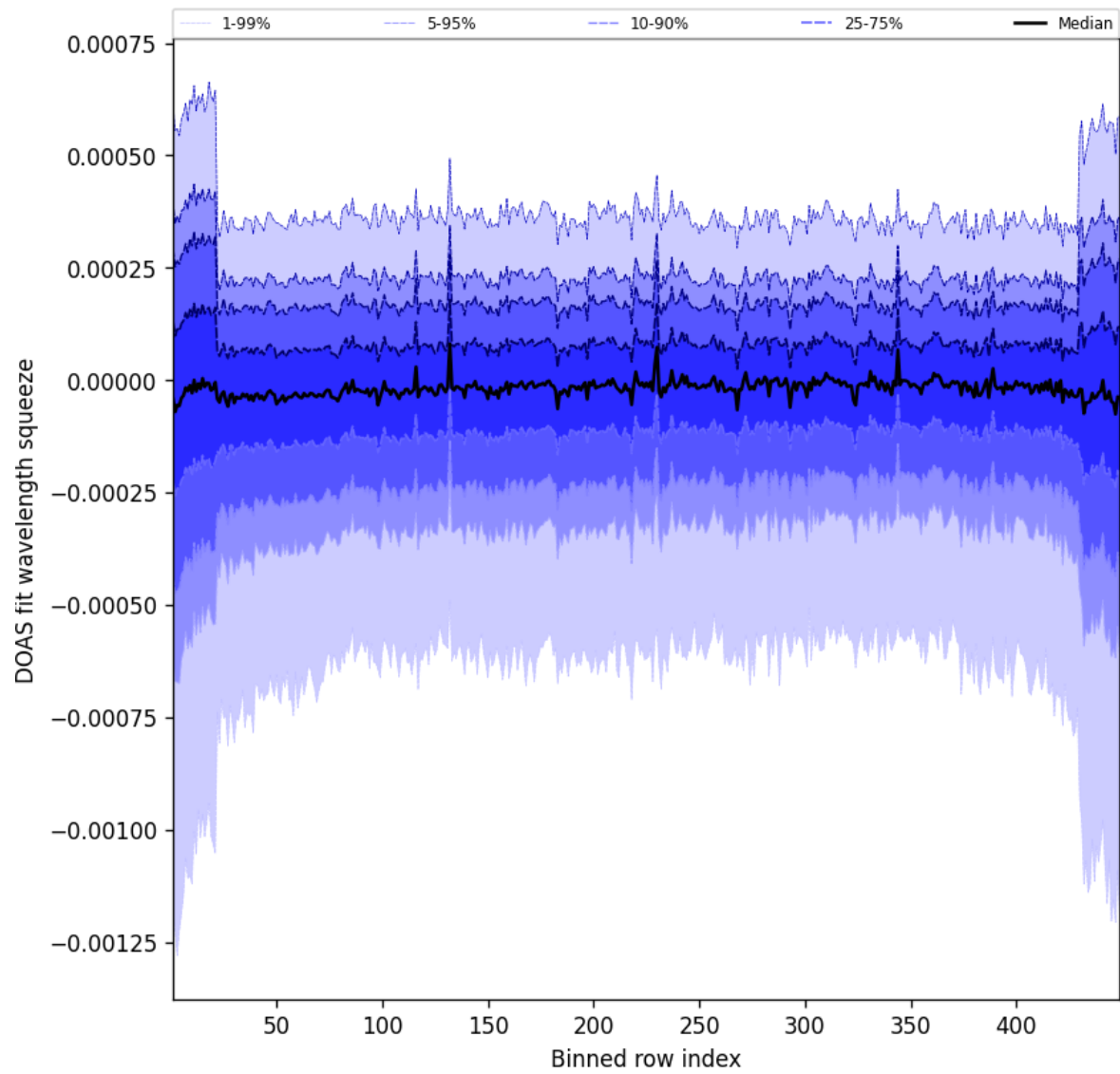


Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2025-03-17 to 2025-03-18

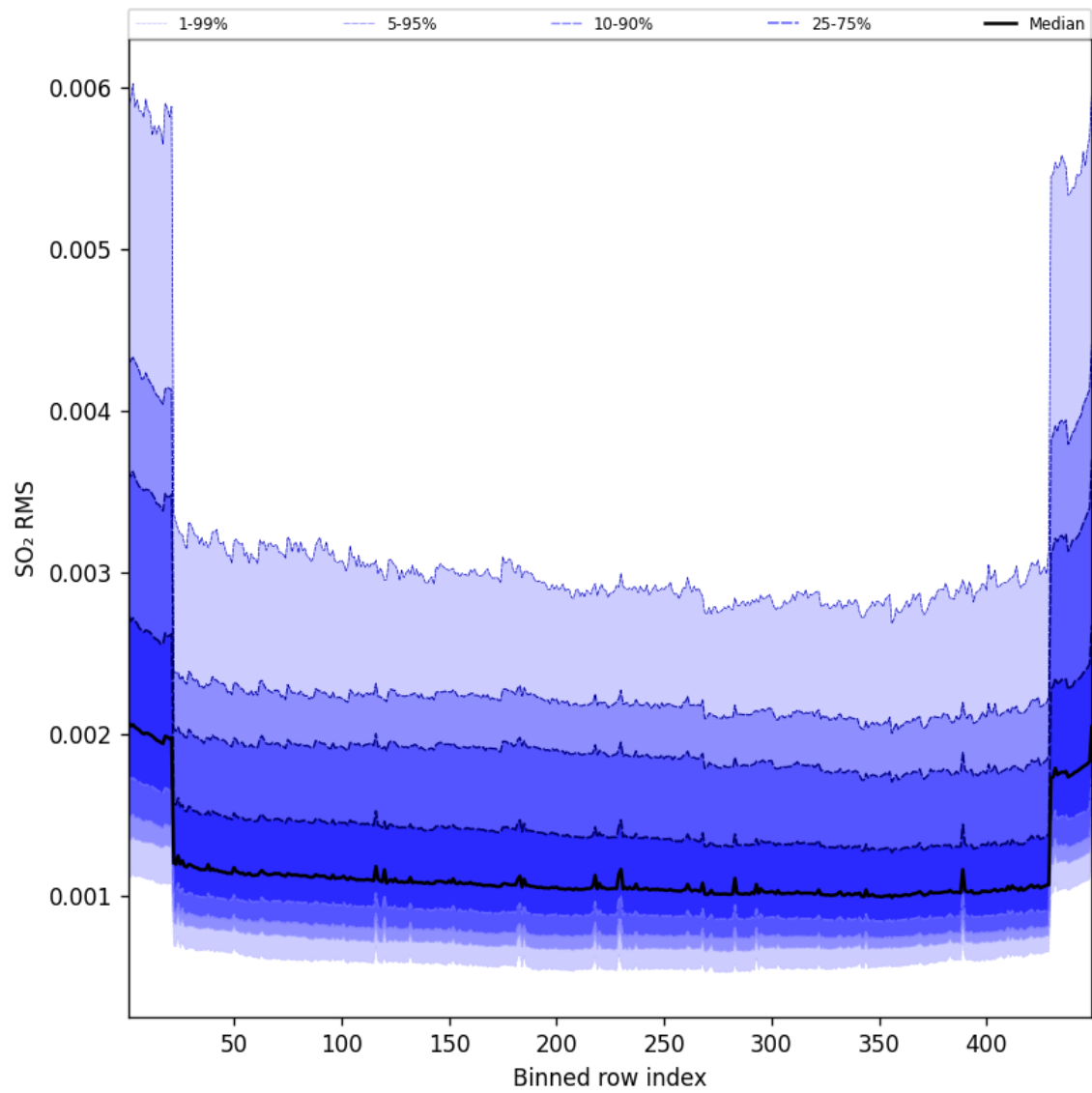


Figure 106: Along track statistics of “SO₂ RMS” for 2025-03-17 to 2025-03-18

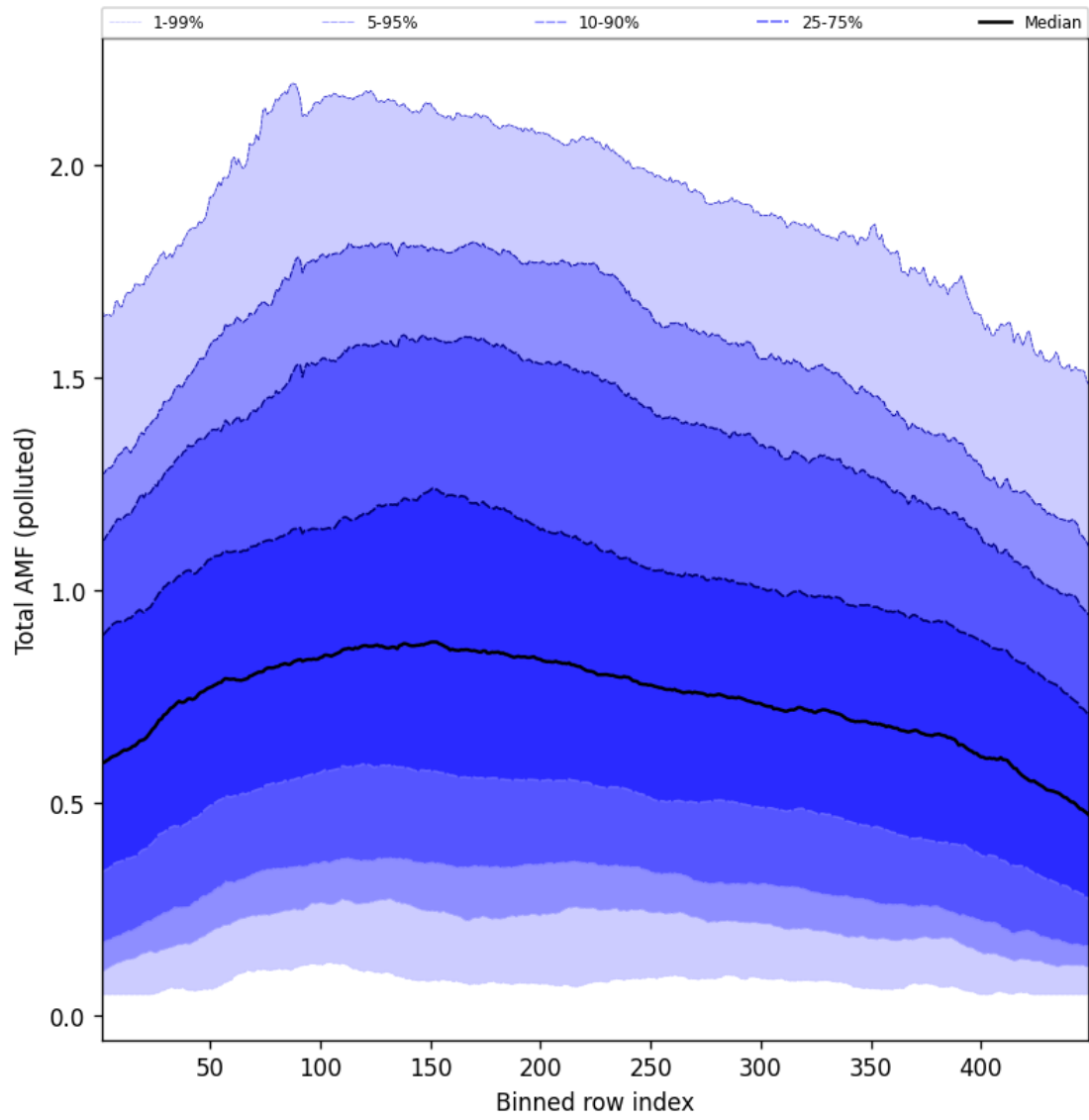


Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-03-17 to 2025-03-18

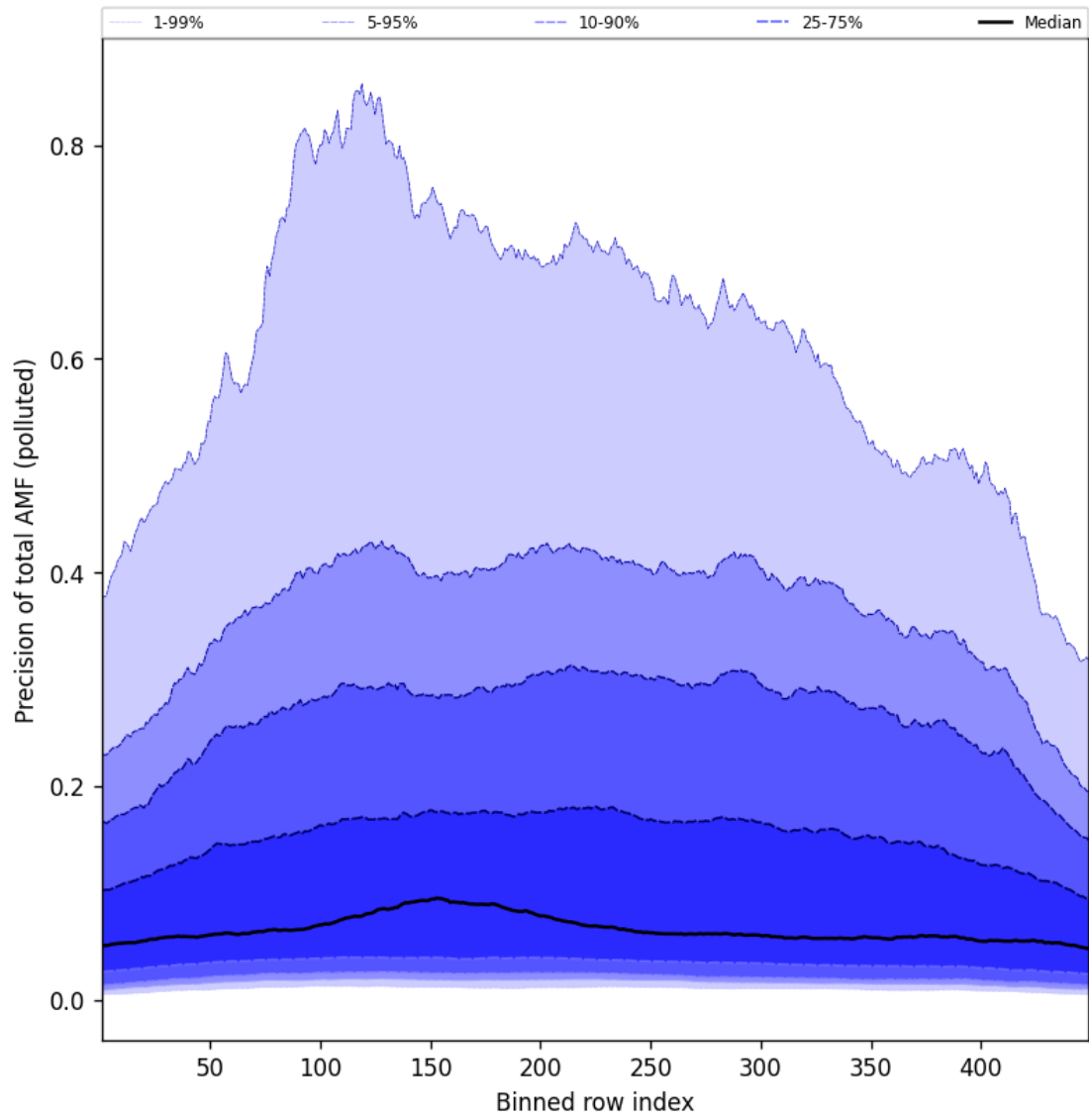


Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-03-17 to 2025-03-18

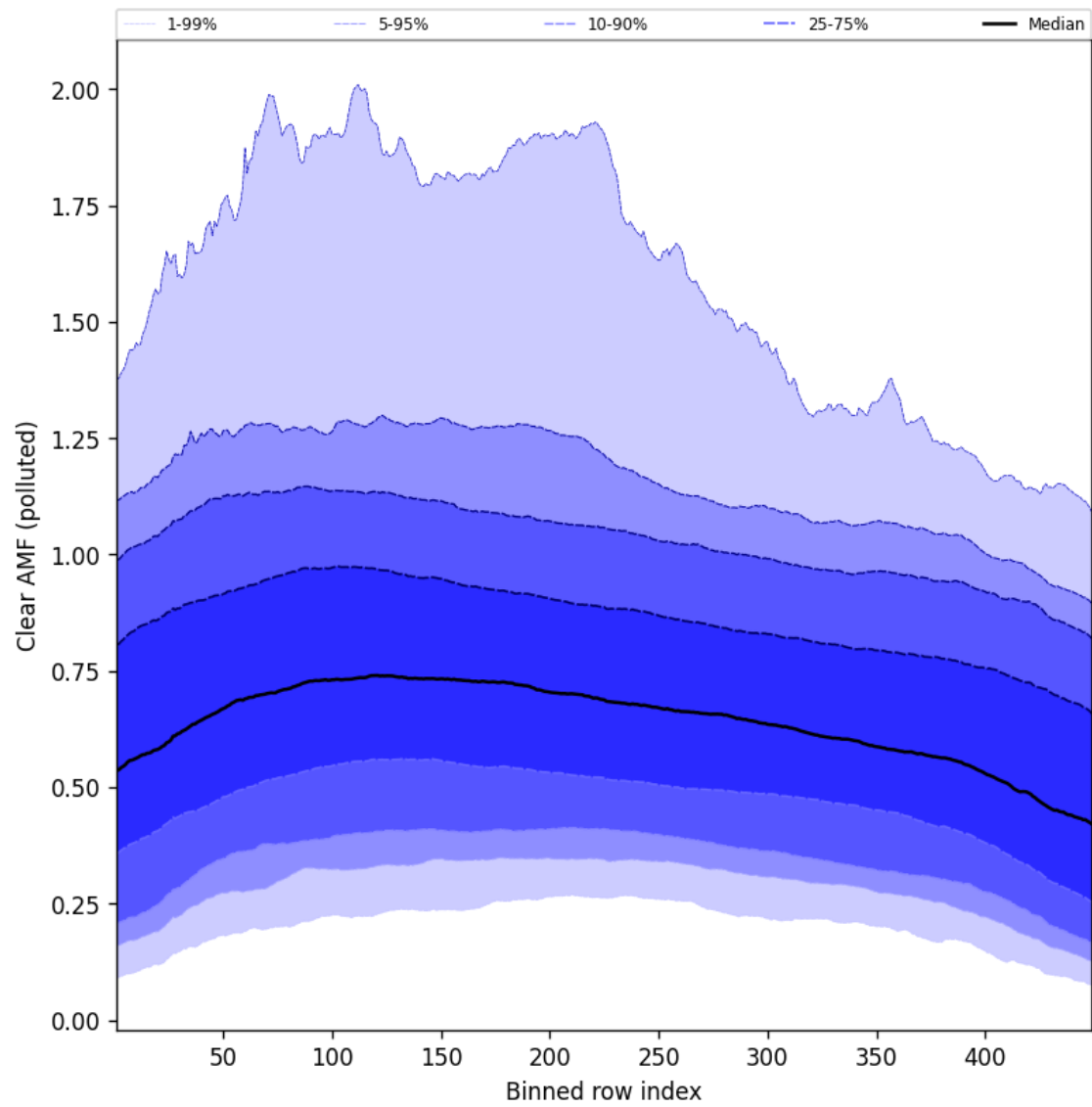


Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-03-17 to 2025-03-18

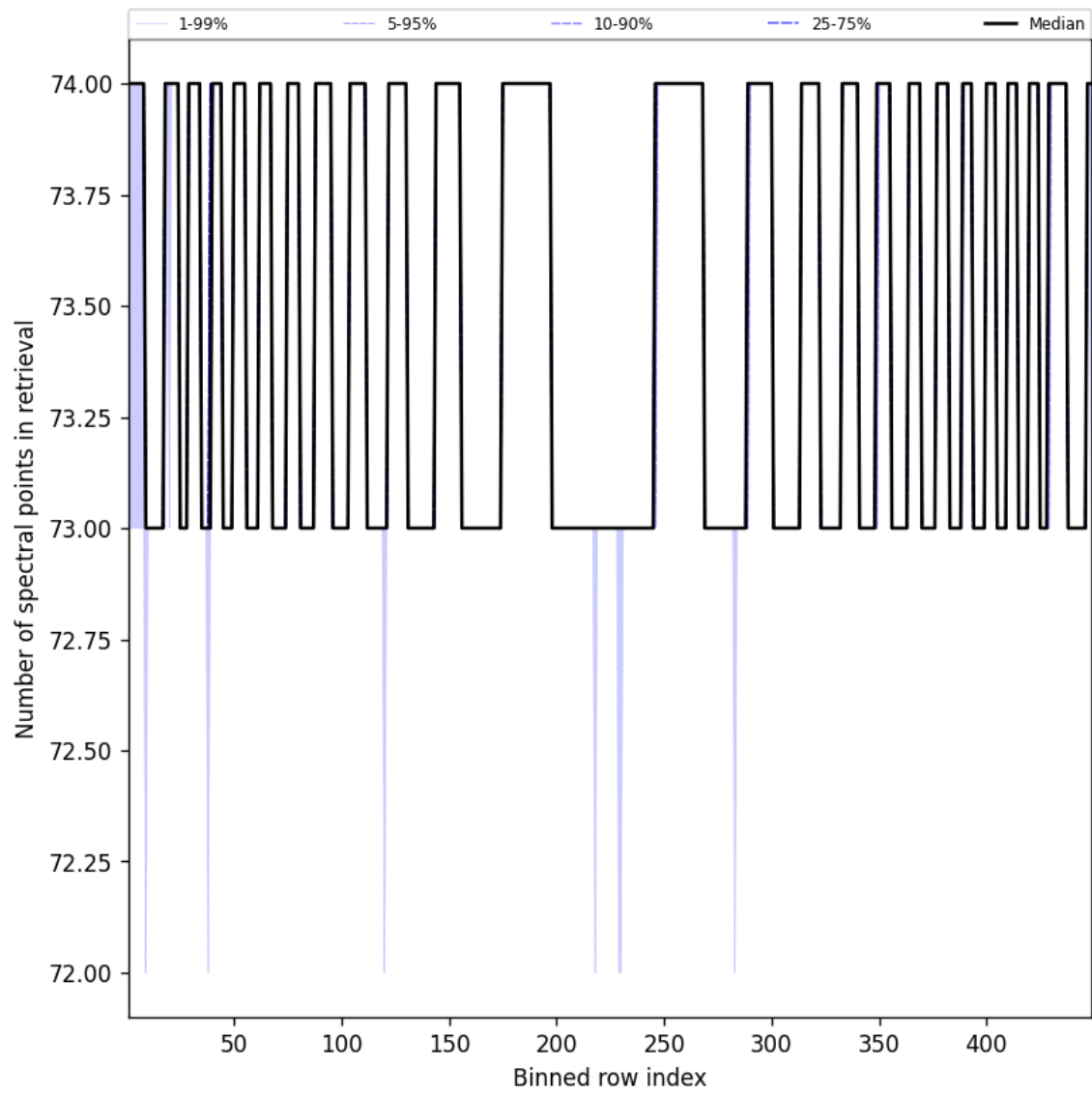


Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-03-17 to 2025-03-18

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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