

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 ± 0.407	14848890	0.995	0.790	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(2.832 \pm 93.845) \times 10^{-2}$	14848890	0.263	0.461	1.113×10^{-2}	-130	737
sulfurdioxide total vertical column precision [DU]	0.501 ± 0.637	14848890	0.222	0.326	0.331	4.883×10^{-2}	48.0
sulfurdioxide slant column density corrected [DU]	$(1.975 \pm 40.202) \times 10^{-2}$	14848890	0.285	0.381	9.837×10^{-3}	-39.3	343
sulfurdioxide slant column density cobra [DU]	$(1.959 \pm 37.446) \times 10^{-2}$	14848890	0.285	0.381	9.837×10^{-3}	-39.3	31.4
sulfurdioxide slant column density cobra precision [DU]	0.303 ± 0.131	14848890	0.213	0.136	0.267	8.909×10^{-2}	23.8
sulfurdioxide slant column density window1 [DU]	0.115 ± 0.697	14848890	0.125	0.756	0.122	-73.1	56.2
sulfurdioxide slant column density window1 precision [DU]	0.303 ± 0.131	14848890	0.213	0.136	0.267	8.909×10^{-2}	23.8
sulfurdioxide slant column density corrected win1 [DU]	$(-1.697 \pm 69.112) \times 10^{-2}$	14848890	-2.500×10^{-2}	0.747	-3.691×10^{-2}	-73.1	56.4
background so2 slant column offset window1 [DU]	-0.132 ± 0.140	14848890	-0.180	0.146	-0.159	-0.797	2.78
sulfurdioxide slant column density window2 [DU]	0.623 ± 9.156	14848890	0.250	11.6	0.552	-1.202×10^3	1.288×10^3
sulfurdioxide slant column density window2 precision [DU]	8.17 ± 2.35	14848890	7.43	2.55	7.83	2.13	762
sulfurdioxide slant column density corrected win2 [DU]	-1.34 ± 8.91	14848890	-0.750	11.2	-1.32	-1.202×10^3	1.288×10^3
background so2 slant column offset window2 [DU]	-1.97 ± 2.82	14848890	0.250	3.82	-1.09	-17.4	7.80
sulfurdioxide slant column density window3 [DU]	-4.12 ± 23.88	14848890	-5.04	29.8	-4.45	-423	250
sulfurdioxide slant column density window3 precision [DU]	29.3 ± 13.6	14848890	23.7	9.60	25.5	10.6	1.056×10^3
sulfurdioxide slant column density corrected win3 [DU]	4.60 ± 23.32	14848890	3.92	28.9	4.74	-420	254
background so2 slant column offset window3 [DU]	8.71 ± 6.10	14848890	3.92	10.4	8.31	-10.2	26.9
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.21	14848890	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(3.725 \pm 8.745) \times 10^{-2}$	14848890	1.664×10^{-2}	2.141×10^{-2}	1.379×10^{-2}	2.360×10^{-4}	1.65
fitted radiance shift [nm]	$(-2.737 \pm 26.813) \times 10^{-4}$	14848890	-5.000×10^{-4}	1.691×10^{-3}	-2.636×10^{-4}	-4.691×10^{-2}	4.007×10^{-2}
fitted radiance squeeze [1]	$(-1.404 \pm 18.186) \times 10^{-5}$	14848890	-1.000×10^{-5}	2.084×10^{-4}	-9.129×10^{-6}	-1.824×10^{-2}	2.158×10^{-2}
fitted root mean square [1]	$(1.314 \pm 0.533) \times 10^{-3}$	14848890	1.025×10^{-3}	5.442×10^{-4}	1.174×10^{-3}	3.061×10^{-4}	5.075×10^{-2}
sulfurdioxide total air mass factor polluted [1]	0.890 ± 0.455	14848890	0.780	0.577	0.814	5.000×10^{-2}	3.04
sulfurdioxide total air mass factor polluted precision [1]	0.110 ± 0.114	14848890	3.500×10^{-2}	0.105	6.810×10^{-2}	2.607×10^{-3}	1.69
sulfurdioxide clear air mass factor polluted [1]	0.754 ± 0.322	14848890	0.580	0.403	0.714	5.866×10^{-2}	3.04
number of spectral points in retrieval [1]	73.4 ± 0.5	14848890	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	3.000×10^{-2}	9.000×10^{-2}	0.210	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	-2.11	-0.852	-0.532	-0.362	-0.216	0.245	0.402	0.588	0.948	2.41
sulfurdioxide total vertical column precision [DU]	0.105	0.141	0.168	0.192	0.225	0.551	0.727	0.923	1.33	3.00
sulfurdioxide slant column density corrected [DU]	-0.871	-0.509	-0.370	-0.277	-0.179	0.202	0.306	0.408	0.567	1.04
sulfurdioxide slant column density cobra [DU]	-0.871	-0.509	-0.370	-0.277	-0.179	0.202	0.306	0.408	0.567	1.04
sulfurdioxide slant column density cobra precision [DU]	0.146	0.175	0.190	0.202	0.217	0.354	0.405	0.455	0.545	0.774
sulfurdioxide slant column density window1 [DU]	-1.74	-0.964	-0.664	-0.466	-0.260	0.496	0.692	0.879	1.16	1.93
sulfurdioxide slant column density window1 precision [DU]	0.146	0.175	0.190	0.202	0.217	0.354	0.405	0.455	0.545	0.774
sulfurdioxide slant column density corrected win1 [DU]	-1.72	-1.04	-0.774	-0.595	-0.404	0.342	0.549	0.750	1.06	1.93
background so2 slant column offset window1 [DU]	-0.364	-0.292	-0.266	-0.248	-0.223	-7.679×10^{-2}	-2.319×10^{-2}	3.871×10^{-2}	0.135	0.355
sulfurdioxide slant column density window2 [DU]	-21.0	-14.0	-10.6	-8.08	-5.23	6.39	9.32	11.9	15.5	22.9
sulfurdioxide slant column density window2 precision [DU]	4.35	5.24	5.77	6.19	6.70	9.25	10.1	11.0	12.2	15.0
sulfurdioxide slant column density corrected win2 [DU]	-22.9	-15.7	-12.3	-9.74	-6.93	4.26	7.04	9.54	12.9	20.1
background so2 slant column offset window2 [DU]	-9.35	-7.62	-6.33	-5.13	-3.66	0.157	0.473	0.714	1.08	2.60
sulfurdioxide slant column density window3 [DU]	-63.2	-42.7	-33.2	-26.4	-19.1	10.7	18.6	25.9	35.6	54.9
sulfurdioxide slant column density window3 precision [DU]	15.1	17.6	19.3	20.6	22.0	31.6	36.3	42.5	55.1	88.0
sulfurdioxide slant column density corrected win3 [DU]	-54.5	-33.9	-24.1	-17.2	-9.72	19.2	26.6	33.3	42.5	61.2
background so2 slant column offset window3 [DU]	-3.30	-5.667×10^{-2}	1.21	2.21	3.52	14.0	15.6	16.9	18.2	20.6
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]	4.745×10^{-4}	8.706×10^{-4}	1.389×10^{-3}	2.629×10^{-3}	6.316×10^{-3}	2.772×10^{-2}	4.723×10^{-2}	7.946×10^{-2}	0.150	0.454
fitted radiance shift [nm]	-8.521×10^{-3}	-4.186×10^{-3}	-2.675×10^{-3}	-1.831×10^{-3}	-1.146×10^{-3}	5.446×10^{-4}	1.216×10^{-3}	2.104×10^{-3}	3.711×10^{-3}	8.268×10^{-3}
fitted radiance squeeze [1]	-5.075×10^{-4}	-3.075×10^{-4}	-2.266×10^{-4}	-1.721×10^{-4}	-1.151×10^{-4}	9.331×10^{-5}	1.456×10^{-4}	1.940×10^{-4}	2.632×10^{-4}	4.269×10^{-4}
fitted root mean square [1]	6.016×10^{-4}	7.551×10^{-4}	8.372×10^{-4}	8.980×10^{-4}	9.717×10^{-4}	1.516×10^{-3}	1.742×10^{-3}	1.963×10^{-3}	2.299×10^{-3}	3.278×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.115	0.275	0.369	0.452	0.559	1.14	1.35	1.56	1.80	2.12
sulfurdioxide total air mass factor polluted precision [1]	1.236×10^{-2}	1.958×10^{-2}	2.532×10^{-2}	3.074×10^{-2}	3.842×10^{-2}	0.144	0.188	0.238	0.332	0.571
sulfurdioxide clear air mass factor polluted [1]	0.218	0.319	0.382	0.443	0.525	0.928	1.05	1.16	1.35	1.79
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]	0.591 ± 0.414	9569562	0.840	0.490	0.0	1.000	0.160	1.000
sulfurdioxide total vertical column [DU]	$(2.628 \pm 98.217) \times 10^{-2}$	9569562	0.442	9.484×10^{-3}	-130	144	-0.208	0.233
sulfurdioxide total vertical column precision [DU]	0.506 ± 0.716	9569562	0.329	0.313	4.945×10^{-2}	43.8	0.213	0.542
sulfurdioxide slant column density corrected [DU]	$(1.844 \pm 36.647) \times 10^{-2}$	9569562	0.373	8.566×10^{-3}	-8.78	39.5	-0.176	0.197
sulfurdioxide slant column density cobra [DU]	$(1.840 \pm 36.467) \times 10^{-2}$	9569562	0.373	8.566×10^{-3}	-8.78	20.0	-0.176	0.197
sulfurdioxide slant column density cobra precision [DU]	0.298 ± 0.132	9569562	0.137	0.260	8.956×10^{-2}	12.2	0.212	0.348
sulfurdioxide slant column density window1 [DU]	0.108 ± 0.692	9569562	0.744	0.119	-9.19	19.5	-0.258	0.486
sulfurdioxide slant column density window1 precision [DU]	0.298 ± 0.132	9569562	0.137	0.260	8.956×10^{-2}	12.2	0.212	0.348
sulfurdioxide slant column density corrected win1 [DU]	$(-1.671 \pm 68.514) \times 10^{-2}$	9569562	0.733	-3.703×10^{-2}	-8.79	19.3	-0.397	0.335
background so2 slant column offset window1 [DU]	-0.125 ± 0.152	9569562	0.162	-0.162	-0.603	1.61	-0.227	-6.451×10^{-2}
sulfurdioxide slant column density window2 [DU]	0.991 ± 8.693	9569562	11.2	0.926	-335	524	-4.67	6.57
sulfurdioxide slant column density window2 precision [DU]	7.76 ± 2.05	9569562	2.28	7.47	2.13	580	6.43	8.71
sulfurdioxide slant column density corrected win2 [DU]	-1.49 ± 8.33	9569562	10.7	-1.43	-339	519	-6.80	3.87
background so2 slant column offset window2 [DU]	-2.48 ± 3.15	9569562	5.11	-1.72	-17.4	7.80	-4.91	0.198
sulfurdioxide slant column density window3 [DU]	-4.90 ± 22.44	9569562	28.0	-5.40	-423	168	-19.1	8.88
sulfurdioxide slant column density window3 precision [DU]	27.7 ± 13.0	9569562	7.76	24.2	10.6	247	21.3	29.0
sulfurdioxide slant column density corrected win3 [DU]	4.99 ± 21.71	9569562	27.0	5.07	-420	185	-8.43	18.6
background so2 slant column offset window3 [DU]	9.89 ± 6.34	9569562	11.1	11.1	-10.2	25.5	4.05	15.2
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.18	9569562	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(4.488 \pm 10.175) \times 10^{-2}$	9569562	3.397×10^{-2}	1.370×10^{-2}	2.360×10^{-4}	1.56	2.808×10^{-3}	3.678×10^{-2}
fitted radiance shift [nm]	$(-1.383 \pm 26.106) \times 10^{-4}$	9569562	1.532×10^{-3}	-1.561×10^{-4}	-4.419×10^{-2}	4.007×10^{-2}	-9.297×10^{-4}	6.025×10^{-4}
fitted radiance squeeze [1]	$(-3.424 \pm 17.742) \times 10^{-5}$	9569562	2.044×10^{-4}	-2.339×10^{-5}	-9.758×10^{-3}	2.318×10^{-3}	-1.296×10^{-4}	7.479×10^{-5}
fitted root mean square [1]	$(1.297 \pm 0.549) \times 10^{-3}$	9569562	5.394×10^{-4}	1.145×10^{-3}	3.061×10^{-4}	1.575×10^{-2}	9.493×10^{-4}	1.489×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.924 ± 0.501	9569562	0.692	0.839	5.000×10^{-2}	3.04	0.534	1.23
sulfurdioxide total air mass factor polluted precision [1]	0.118 ± 0.125	9569562	0.112	7.418×10^{-2}	2.607×10^{-3}	1.69	3.879×10^{-2}	0.151
sulfurdioxide clear air mass factor polluted [1]	0.768 ± 0.370	9569562	0.500	0.718	5.866×10^{-2}	3.04	0.478	0.978
number of spectral points in retrieval [1]	73.4 ± 0.5	9569562	1.000	73.0	53.0	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]	0.724 ± 0.380	5279328	0.650	1.000	0.0	1.000	0.350	1.000
sulfurdioxide total vertical column [DU]	$(3.203 \pm 85.350) \times 10^{-2}$	5279328	0.498	1.454×10^{-2}	-53.3	737	-0.231	0.267
sulfurdioxide total vertical column precision [DU]	0.493 ± 0.461	5279328	0.315	0.360	4.883×10^{-2}	48.0	0.250	0.565
sulfurdioxide slant column density corrected [DU]	$(2.213 \pm 45.947) \times 10^{-2}$	5279328	0.397	1.230×10^{-2}	-39.3	343	-0.184	0.212
sulfurdioxide slant column density cobra [DU]	$(2.175 \pm 39.157) \times 10^{-2}$	5279328	0.397	1.230×10^{-2}	-39.3	31.4	-0.184	0.212
sulfurdioxide slant column density cobra precision [DU]	0.312 ± 0.128	5279328	0.133	0.279	8.909×10^{-2}	23.8	0.229	0.362
sulfurdioxide slant column density window1 [DU]	0.128 ± 0.704	5279328	0.779	0.126	-73.1	56.2	-0.264	0.515
sulfurdioxide slant column density window1 precision [DU]	0.312 ± 0.128	5279328	0.133	0.279	8.909×10^{-2}	23.8	0.229	0.362
sulfurdioxide slant column density corrected win1 [DU]	$(-1.743 \pm 70.182) \times 10^{-2}$	5279328	0.773	-3.665×10^{-2}	-73.1	56.4	-0.417	0.356
background so2 slant column offset window1 [DU]	-0.145 ± 0.112	5279328	0.124	-0.155	-0.797	2.78	-0.215	-9.113×10^{-2}
sulfurdioxide slant column density window2 [DU]	$(-4.449 \pm 990.417) \times 10^{-2}$	5279328	12.3	-0.185	-1.202×10^3	1.288×10^3	-6.27	6.01
sulfurdioxide slant column density window2 precision [DU]	8.91 ± 2.67	5279328	2.76	8.57	2.44	762	7.34	10.1
sulfurdioxide slant column density corrected win2 [DU]	-1.08 ± 9.86	5279328	12.2	-1.08	-1.202×10^3	1.288×10^3	-7.19	5.03
background so2 slant column offset window2 [DU]	-1.03 ± 1.75	5279328	2.00	-0.675	-12.3	7.29	-1.90	0.103
sulfurdioxide slant column density window3 [DU]	-2.70 ± 26.24	5279328	33.2	-2.38	-376	250	-19.0	14.1
sulfurdioxide slant column density window3 precision [DU]	32.2 ± 14.1	5279328	10.9	28.4	11.5	1.056×10^3	24.2	35.1
sulfurdioxide slant column density corrected win3 [DU]	3.88 ± 25.95	5279328	32.9	4.02	-373	254	-12.4	20.5
background so2 slant column offset window3 [DU]	6.58 ± 4.97	5279328	7.06	5.59	-9.03	26.9	3.01	10.1
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.25	5279328	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.343 \pm 4.949) \times 10^{-2}$	5279328	1.409×10^{-2}	1.388×10^{-2}	1.232×10^{-3}	1.65	8.614×10^{-3}	2.271×10^{-2}
fitted radiance shift [nm]	$(-5.191 \pm 27.883) \times 10^{-4}$	5279328	1.934×10^{-3}	-5.070×10^{-4}	-4.691×10^{-2}	3.994×10^{-2}	-1.530×10^{-3}	4.034×10^{-4}
fitted radiance squeeze [1]	$(2.258 \pm 18.406) \times 10^{-5}$	5279328	2.152×10^{-4}	1.835×10^{-5}	-1.824×10^{-2}	2.158×10^{-2}	-8.751×10^{-5}	1.277×10^{-4}
fitted root mean square [1]	$(1.345 \pm 0.501) \times 10^{-3}$	5279328	5.399×10^{-4}	1.224×10^{-3}	3.525×10^{-4}	5.075×10^{-2}	1.018×10^{-3}	1.558×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.829 ± 0.347	5279328	0.430	0.786	5.000×10^{-2}	2.55	0.594	1.02
sulfurdioxide total air mass factor polluted precision [1]	$(9.635 \pm 8.895) \times 10^{-2}$	5279328	9.291×10^{-2}	5.860×10^{-2}	5.897×10^{-3}	1.62	3.804×10^{-2}	0.131
sulfurdioxide clear air mass factor polluted [1]	0.729 ± 0.206	5279328	0.277	0.711	0.105	1.56	0.586	0.863
number of spectral points in retrieval [1]	73.4 ± 0.5	5279328	1.000	73.0	52.0	74.0	73.0	74.0

Table 5: Parameterlist and basic statistics for the analysis for observations over water

Variable	mean $\pm \sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.668 ± 0.398	9076270	0.760	1.000	0.0	1.000	0.240	1.000
sulfurdioxide total vertical column [DU]	$(2.368 \pm 91.101) \times 10^{-2}$	9076270	0.452	1.019×10^{-2}	-130	737	-0.213	0.239
sulfurdioxide total vertical column precision [DU]	0.476 ± 0.610	9076270	0.288	0.320	5.782×10^{-2}	43.8	0.226	0.515
sulfurdioxide slant column density corrected [DU]	$(1.643 \pm 39.589) \times 10^{-2}$	9076270	0.379	8.969×10^{-3}	-39.3	343	-0.179	0.200
sulfurdioxide slant column density cobra [DU]	$(1.634 \pm 36.248) \times 10^{-2}$	9076270	0.379	8.969×10^{-3}	-39.3	28.6	-0.179	0.200
sulfurdioxide slant column density cobra precision [DU]	0.304 ± 0.132	9076270	0.149	0.263	9.018×10^{-2}	23.8	0.214	0.363
sulfurdioxide slant column density window1 [DU]	0.110 ± 0.692	9076270	0.757	0.122	-59.0	56.2	-0.262	0.495
sulfurdioxide slant column density window1 precision [DU]	0.304 ± 0.132	9076270	0.149	0.263	9.018×10^{-2}	23.8	0.214	0.363
sulfurdioxide slant column density corrected win1 [DU]	$(-2.252 \pm 68.536) \times 10^{-2}$	9076270	0.748	-3.813×10^{-2}	-59.0	56.4	-0.407	0.340
background so2 slant column offset window1 [DU]	-0.132 ± 0.137	9076270	0.144	-0.158	-0.797	2.78	-0.221	-7.792×10^{-2}
sulfurdioxide slant column density window2 [DU]	0.412 ± 9.148	9076270	11.6	0.277	-967	524	-5.47	6.15
sulfurdioxide slant column density window2 precision [DU]	8.19 ± 2.22	9076270	2.50	7.87	2.13	622	6.76	9.27
sulfurdioxide slant column density corrected win2 [DU]	-1.33 ± 8.93	9076270	11.3	-1.30	-968	519	-6.96	4.32
background so2 slant column offset window2 [DU]	-1.74 ± 2.77	9076270	3.34	-0.851	-17.4	7.80	-3.11	0.234
sulfurdioxide slant column density window3 [DU]	-1.00 ± 24.07	9076270	30.5	-1.42	-376	250	-16.3	14.2
sulfurdioxide slant column density window3 precision [DU]	28.4 ± 11.8	9076270	8.75	25.2	10.6	275	22.1	30.8
sulfurdioxide slant column density corrected win3 [DU]	7.03 ± 23.21	9076270	29.3	6.87	-373	254	-7.61	21.7
background so2 slant column offset window3 [DU]	8.03 ± 6.01	9076270	9.94	7.02	-10.2	26.9	3.16	13.1
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.24	9076270	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(2.489 \pm 5.966) \times 10^{-2}$	9076270	1.545×10^{-2}	1.276×10^{-2}	2.420×10^{-4}	1.65	7.027×10^{-3}	2.247×10^{-2}
fitted radiance shift [nm]	$(-3.109 \pm 23.676) \times 10^{-4}$	9076270	1.654×10^{-3}	-2.774×10^{-4}	-4.606×10^{-2}	3.994×10^{-2}	-1.156×10^{-3}	4.977×10^{-4}
fitted radiance squeeze [1]	$(-6.188 \pm 182.553) \times 10^{-6}$	9076270	2.077×10^{-4}	-1.470×10^{-6}	-1.378×10^{-2}	2.158×10^{-2}	-1.069×10^{-4}	1.008×10^{-4}
fitted root mean square [1]	$(1.322 \pm 0.540) \times 10^{-3}$	9076270	6.052×10^{-4}	1.165×10^{-3}	3.061×10^{-4}	4.911×10^{-2}	9.610×10^{-4}	1.566×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.885 ± 0.397	9076270	0.494	0.840	5.000×10^{-2}	3.04	0.611	1.11
sulfurdioxide total air mass factor polluted precision [1]	0.100 ± 0.099	9076270	8.563×10^{-2}	6.479×10^{-2}	2.607×10^{-3}	1.58	4.080×10^{-2}	0.126
sulfurdioxide clear air mass factor polluted [1]	0.773 ± 0.295	9076270	0.350	0.748	5.866×10^{-2}	3.04	0.575	0.926
number of spectral points in retrieval [1]	73.4 ± 0.5	9076270	1.000	73.0	53.0	74.0	73.0	74.0

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

Variable	mean $\pm \sigma$	Count	IQR	Median	Minimum	Maximum	25 % percentile	75 % percentile
qa value [1]	0.638 ± 0.416	4067054	0.810	1.000	0.0	1.000	0.190	1.000
sulfurdioxide total vertical column [DU]	$(3.033 \pm 86.882) \times 10^{-2}$	4067054	0.468	1.146×10^{-2}	-97.1	144	-0.218	0.250
sulfurdioxide total vertical column precision [DU]	0.505 ± 0.586	4067054	0.358	0.351	4.923×10^{-2}	48.0	0.225	0.583
sulfurdioxide slant column density corrected [DU]	$(2.227 \pm 40.332) \times 10^{-2}$	4067054	0.371	1.001×10^{-2}	-8.78	151	-0.174	0.197
sulfurdioxide slant column density cobra [DU]	$(2.195 \pm 37.848) \times 10^{-2}$	4067054	0.371	1.001×10^{-2}	-8.78	31.4	-0.174	0.197
sulfurdioxide slant column density cobra precision [DU]	0.292 ± 0.121	4067054	0.110	0.261	8.909×10^{-2}	12.7	0.217	0.327
sulfurdioxide slant column density window1 [DU]	0.139 ± 0.672	4067054	0.728	0.136	-38.7	52.0	-0.229	0.499
sulfurdioxide slant column density window1 precision [DU]	0.292 ± 0.121	4067054	0.110	0.261	8.909×10^{-2}	12.7	0.217	0.327
sulfurdioxide slant column density corrected win1 [DU]	$(-1.449 \pm 66.721) \times 10^{-2}$	4067054	0.721	-3.719×10^{-2}	-38.7	52.0	-0.391	0.330
background so2 slant column offset window1 [DU]	-0.153 ± 0.125	4067054	0.136	-0.176	-0.626	1.38	-0.236	-9.937×10^{-2}
sulfurdioxide slant column density window2 [DU]	0.410 ± 9.233	4067054	11.6	0.412	-1.202×10^3	1.288×10^3	-5.41	6.22
sulfurdioxide slant column density window2 precision [DU]	8.28 ± 2.64	4067054	2.61	7.89	2.41	762	6.72	9.33
sulfurdioxide slant column density corrected win2 [DU]	-1.33 ± 9.01	4067054	11.2	-1.31	-1.202×10^3	1.288×10^3	-6.91	4.27
background so2 slant column offset window2 [DU]	-1.75 ± 2.65	4067054	3.40	-0.918	-17.4	7.80	-3.23	0.175
sulfurdioxide slant column density window3 [DU]	-8.95 ± 23.37	4067054	28.8	-8.64	-423	208	-23.2	5.62
sulfurdioxide slant column density window3 precision [DU]	31.8 ± 16.7	4067054	12.0	26.8	11.1	1.056×10^3	22.4	34.4
sulfurdioxide slant column density corrected win3 [DU]	-0.280 ± 23.591	4067054	29.1	0.498	-420	211	-14.5	14.7
background so2 slant column offset window3 [DU]	8.67 ± 5.99	4067054	10.3	8.26	-10.2	25.5	3.59	13.9
sulfurdioxide slant column cobra flag [1]	1.99 ± 0.13	4067054	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(6.061 \pm 11.530) \times 10^{-2}$	4067054	5.131×10^{-2}	1.961×10^{-2}	2.360×10^{-4}	1.52	7.498×10^{-3}	5.881×10^{-2}
fitted radiance shift [nm]	$(-2.010 \pm 33.296) \times 10^{-4}$	4067054	1.838×10^{-3}	-2.333×10^{-4}	-4.419×10^{-2}	4.007×10^{-2}	-1.160×10^{-3}	6.784×10^{-4}
fitted radiance squeeze [1]	$(-1.667 \pm 17.473) \times 10^{-5}$	4067054	2.038×10^{-4}	-1.348×10^{-5}	-1.824×10^{-2}	1.334×10^{-2}	-1.165×10^{-4}	8.725×10^{-5}
fitted root mean square [1]	$(1.258 \pm 0.477) \times 10^{-3}$	4067054	4.363×10^{-4}	1.150×10^{-3}	3.344×10^{-4}	5.075×10^{-2}	9.697×10^{-4}	1.406×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.878 ± 0.512	4067054	0.657	0.730	5.000×10^{-2}	2.85	0.500	1.16
sulfurdioxide total air mass factor polluted precision [1]	0.126 ± 0.132	4067054	0.143	7.735×10^{-2}	4.288×10^{-3}	1.69	3.289×10^{-2}	0.176
sulfurdioxide clear air mass factor polluted [1]	0.718 ± 0.341	4067054	0.426	0.635	7.446×10^{-2}	2.54	0.473	0.899
number of spectral points in retrieval [1]	73.4 ± 0.5	4067054	1.000	73.0	52.0	74.0	73.0	74.0

3 Granule outlines

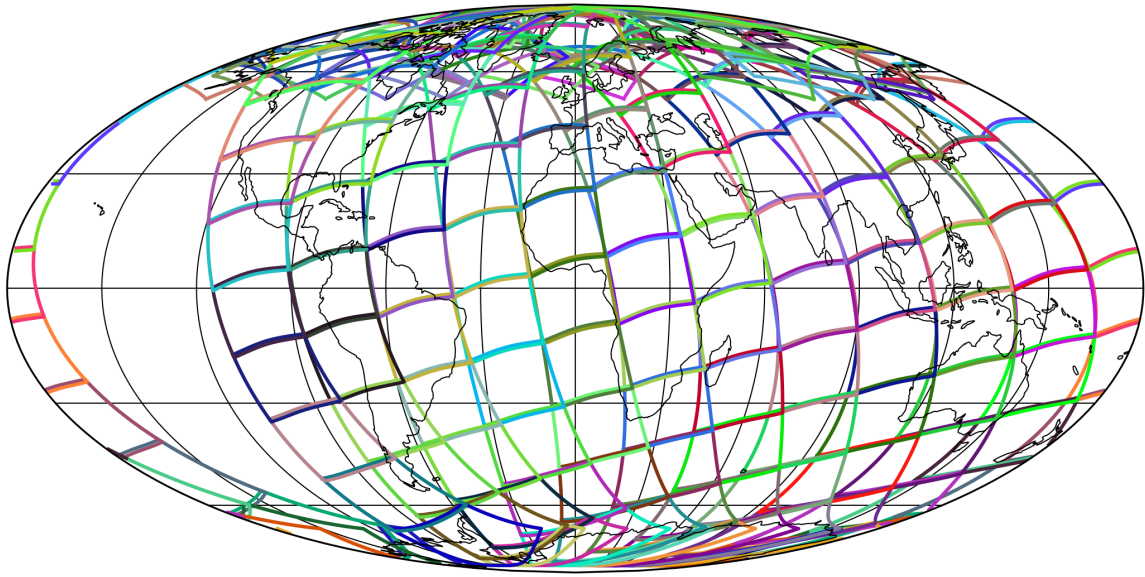


Figure 1: Outline of the granules.

4 Input data monitoring

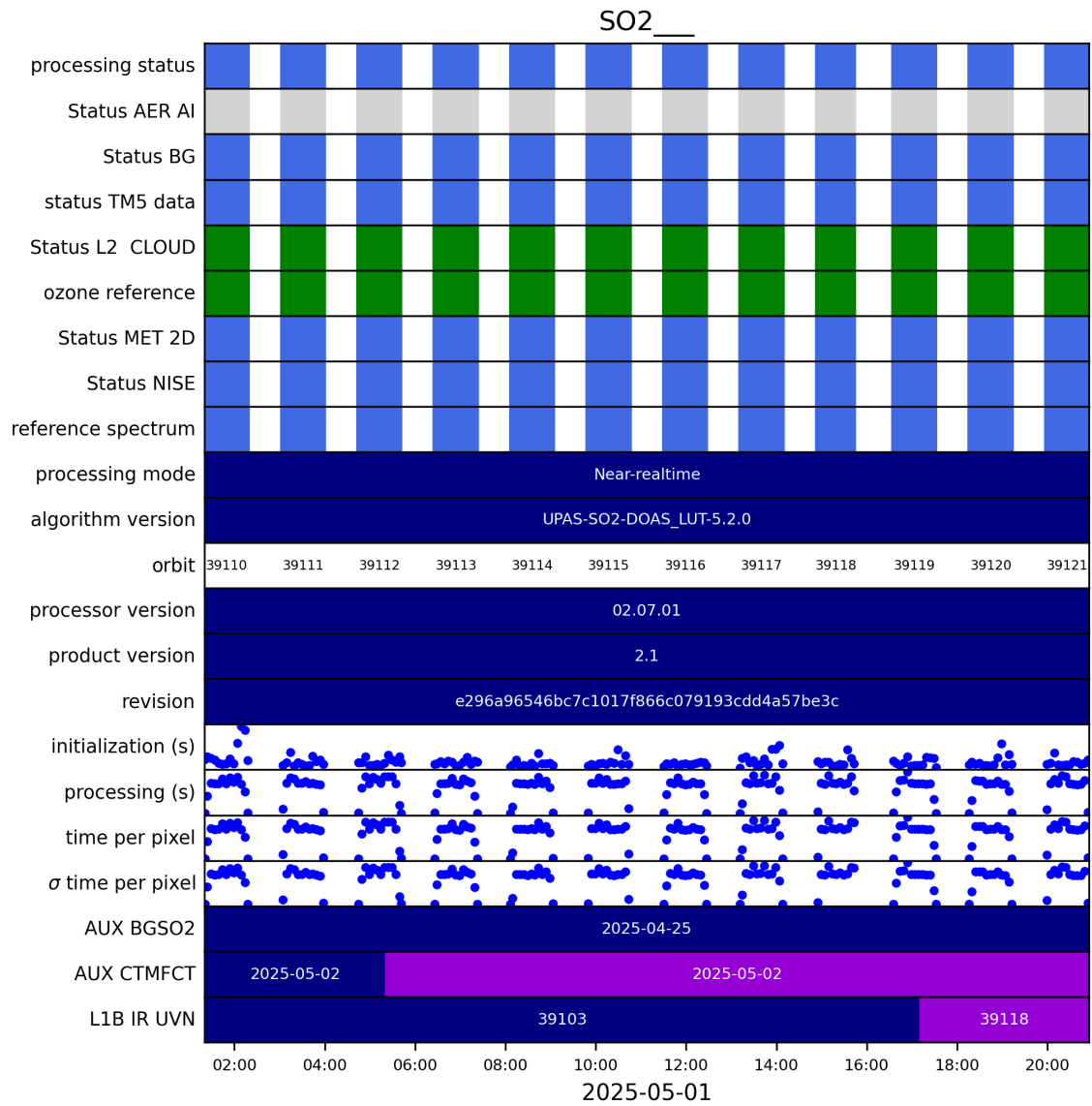


Figure 2: Input data per granule

5 Warnings and errors

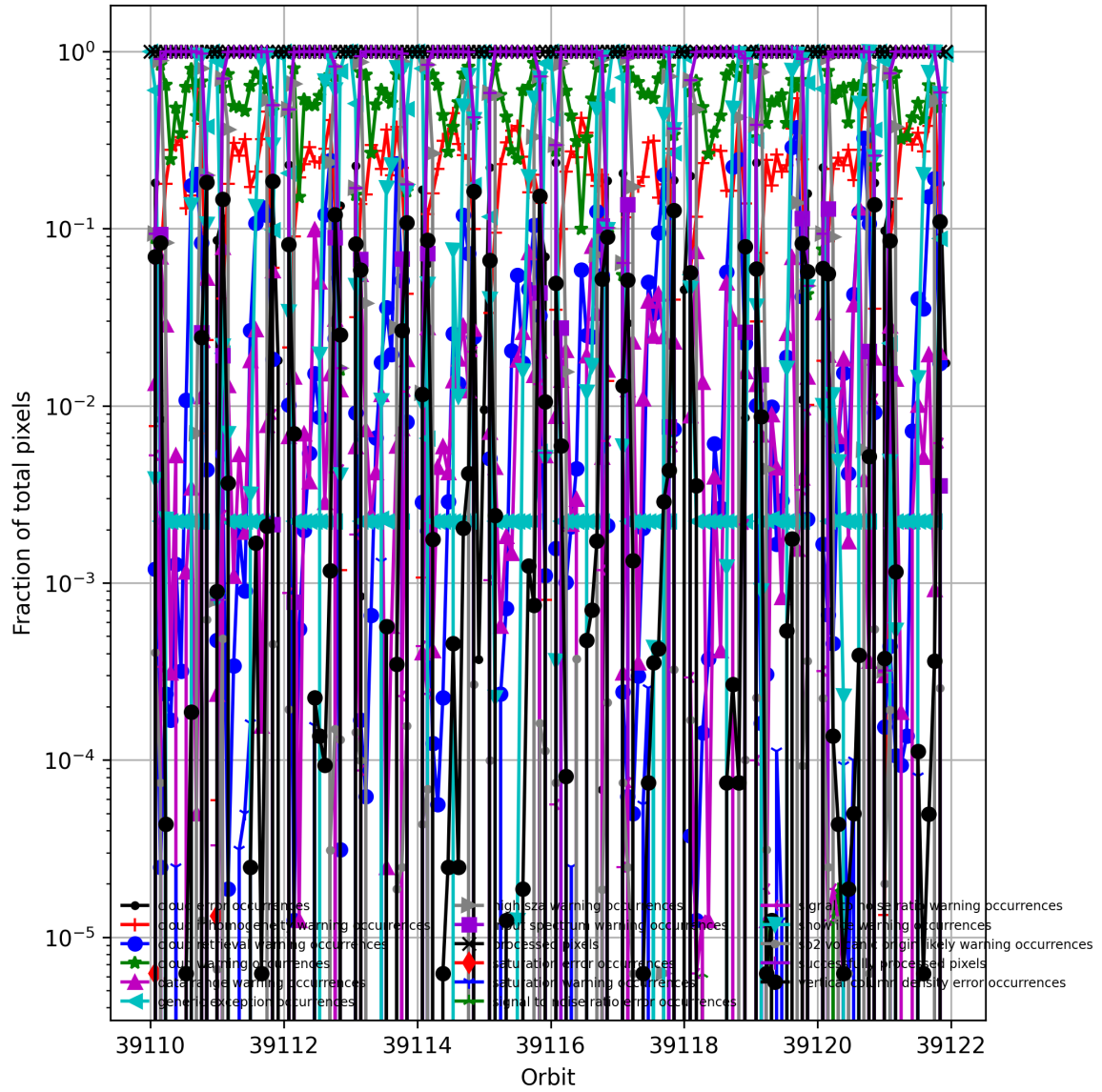


Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

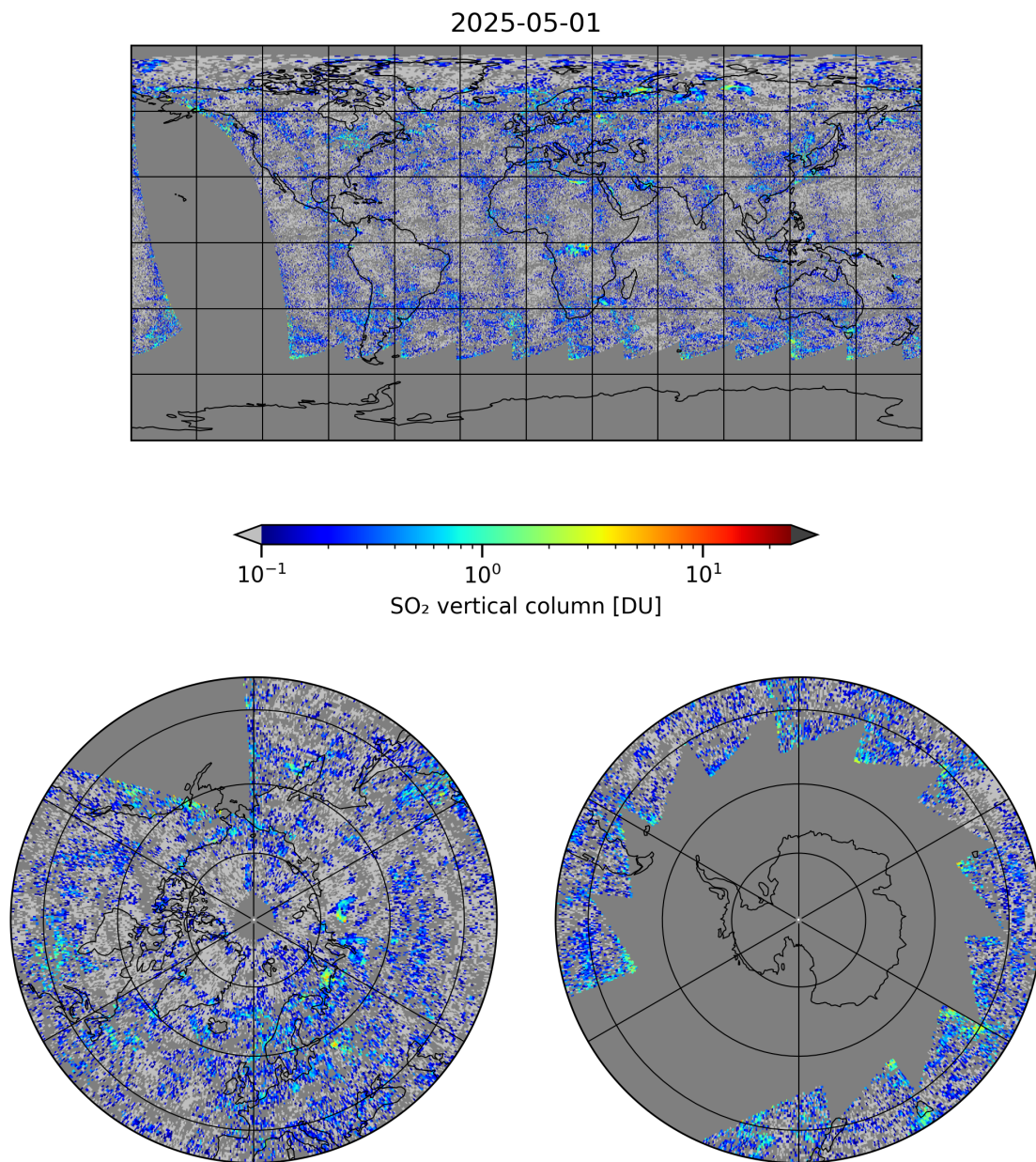


Figure 4: Map of “SO₂ vertical column” for 2025-05-01 to 2025-05-01

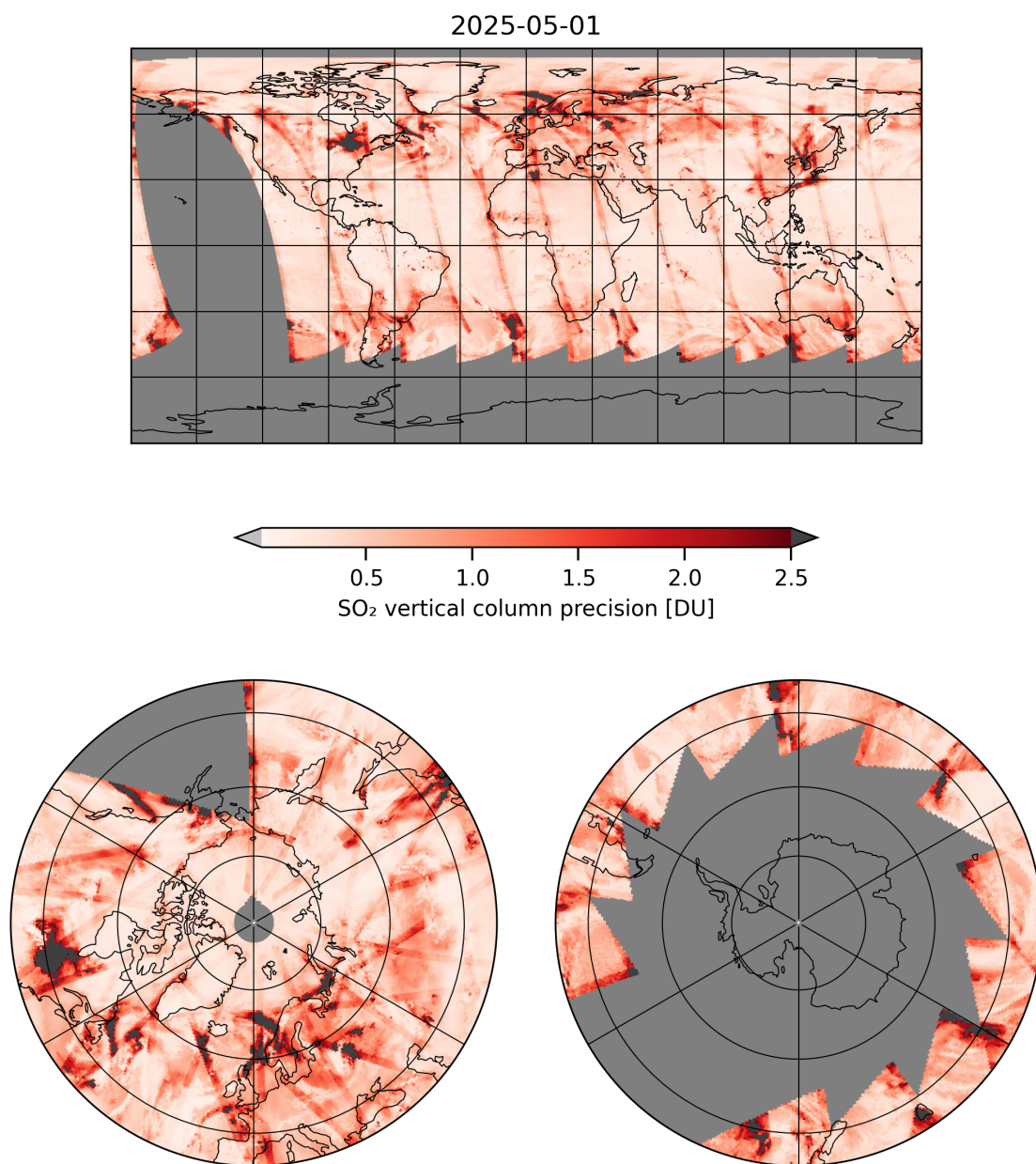


Figure 5: Map of “SO₂ vertical column precision” for 2025-05-01 to 2025-05-01

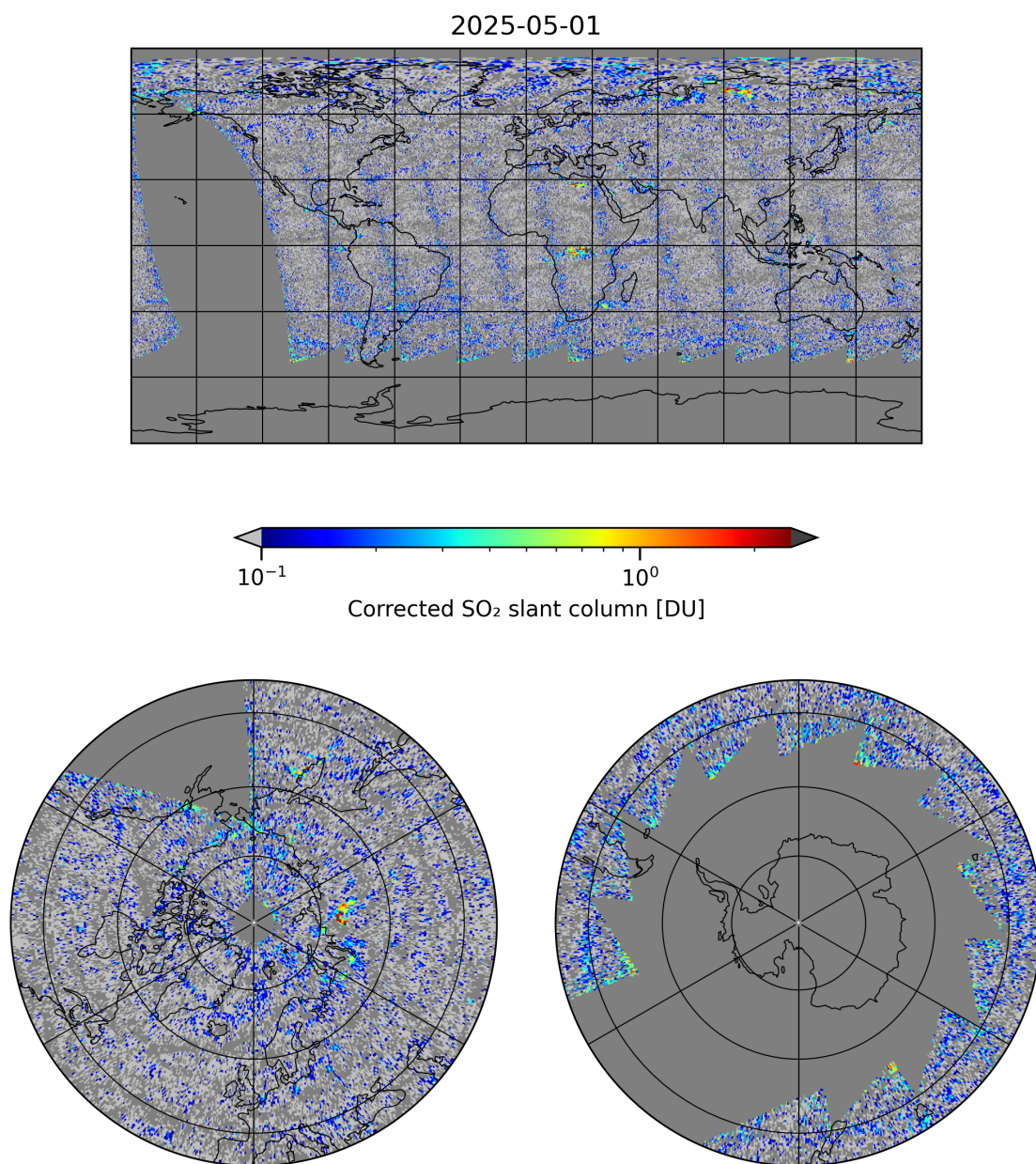


Figure 6: Map of “Corrected SO₂ slant column” for 2025-05-01 to 2025-05-01

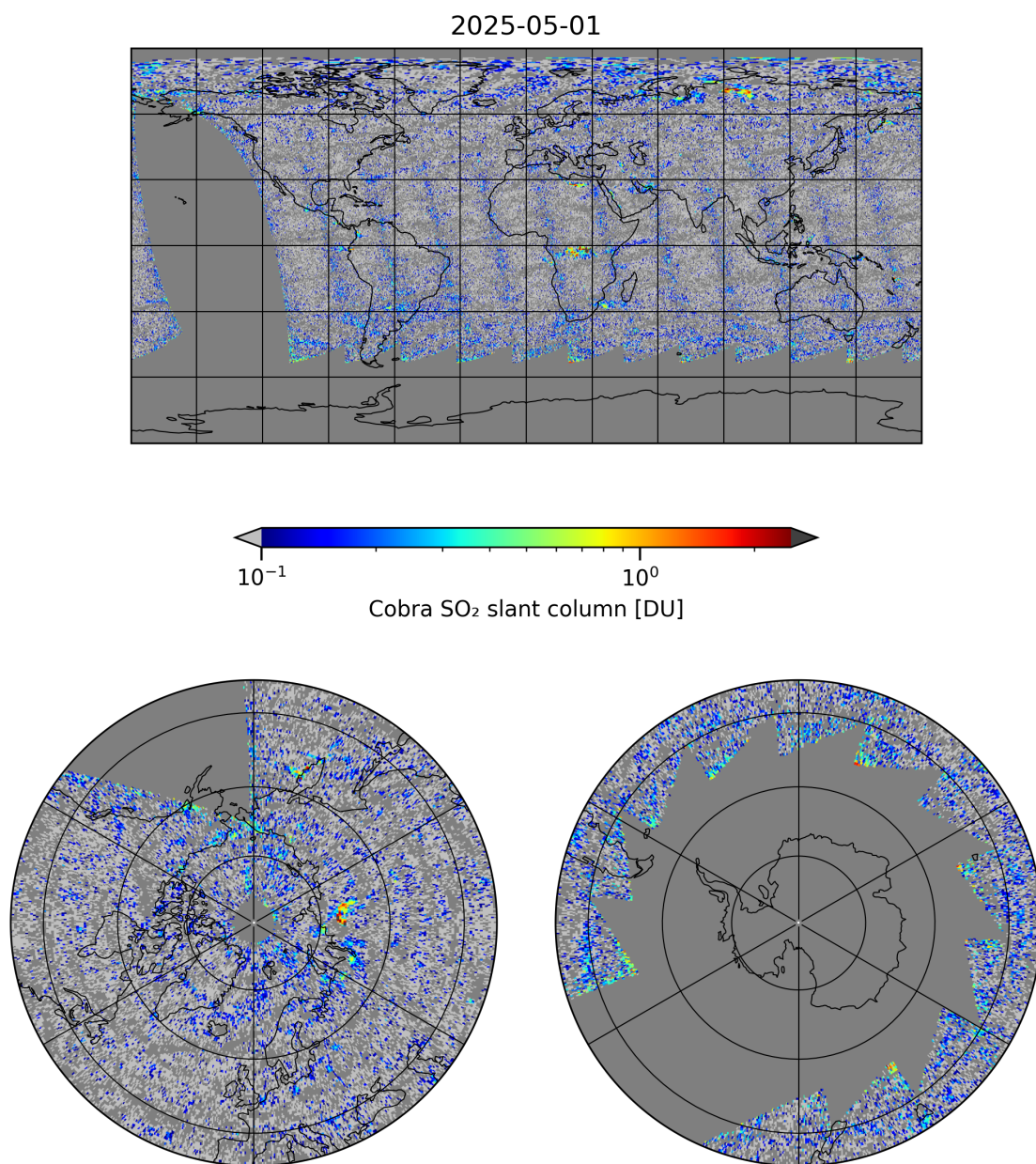


Figure 7: Map of “Cobra SO₂ slant column” for 2025-05-01 to 2025-05-01

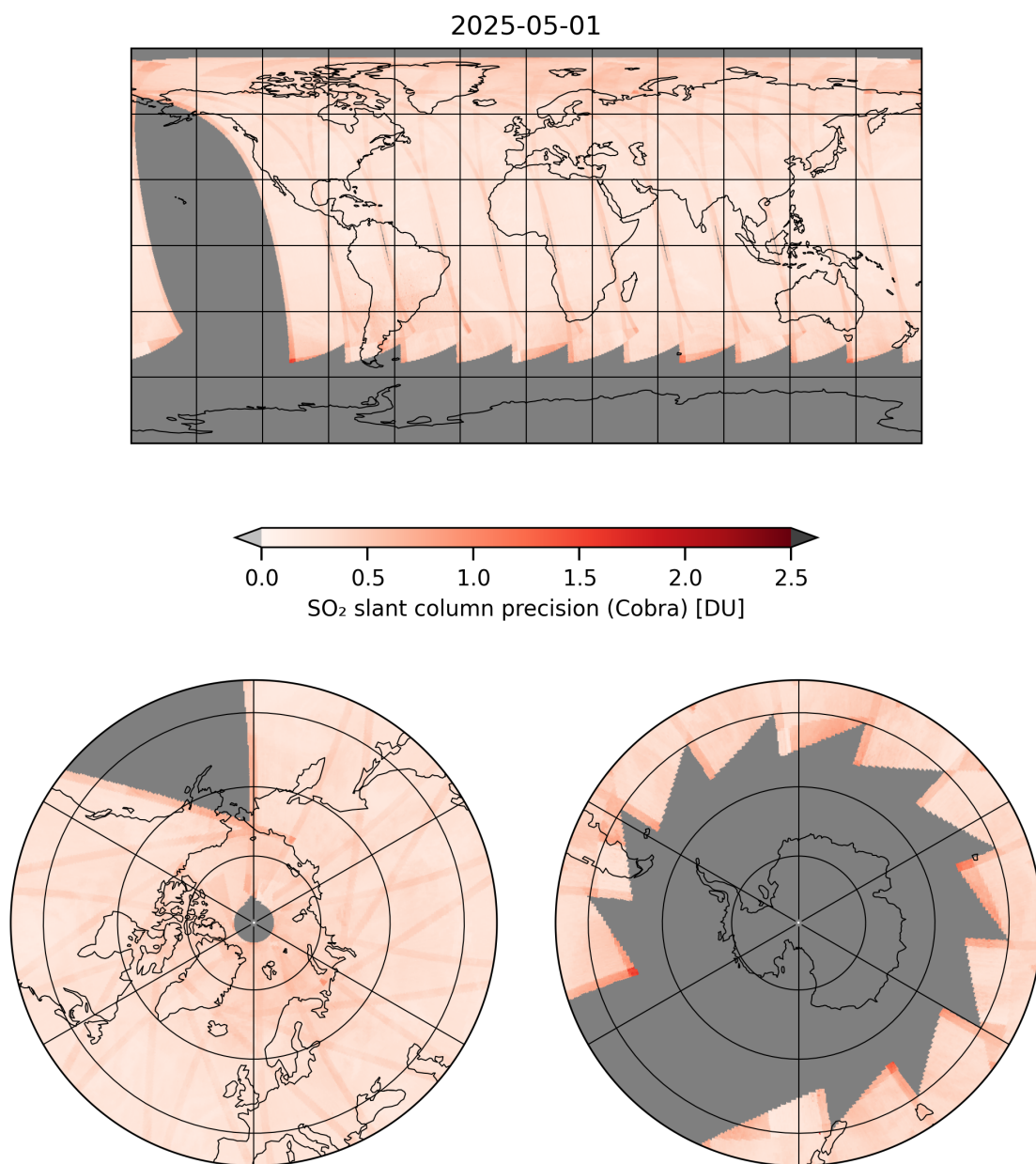


Figure 8: Map of “SO₂ slant column precision (Cobra)” for 2025-05-01 to 2025-05-01

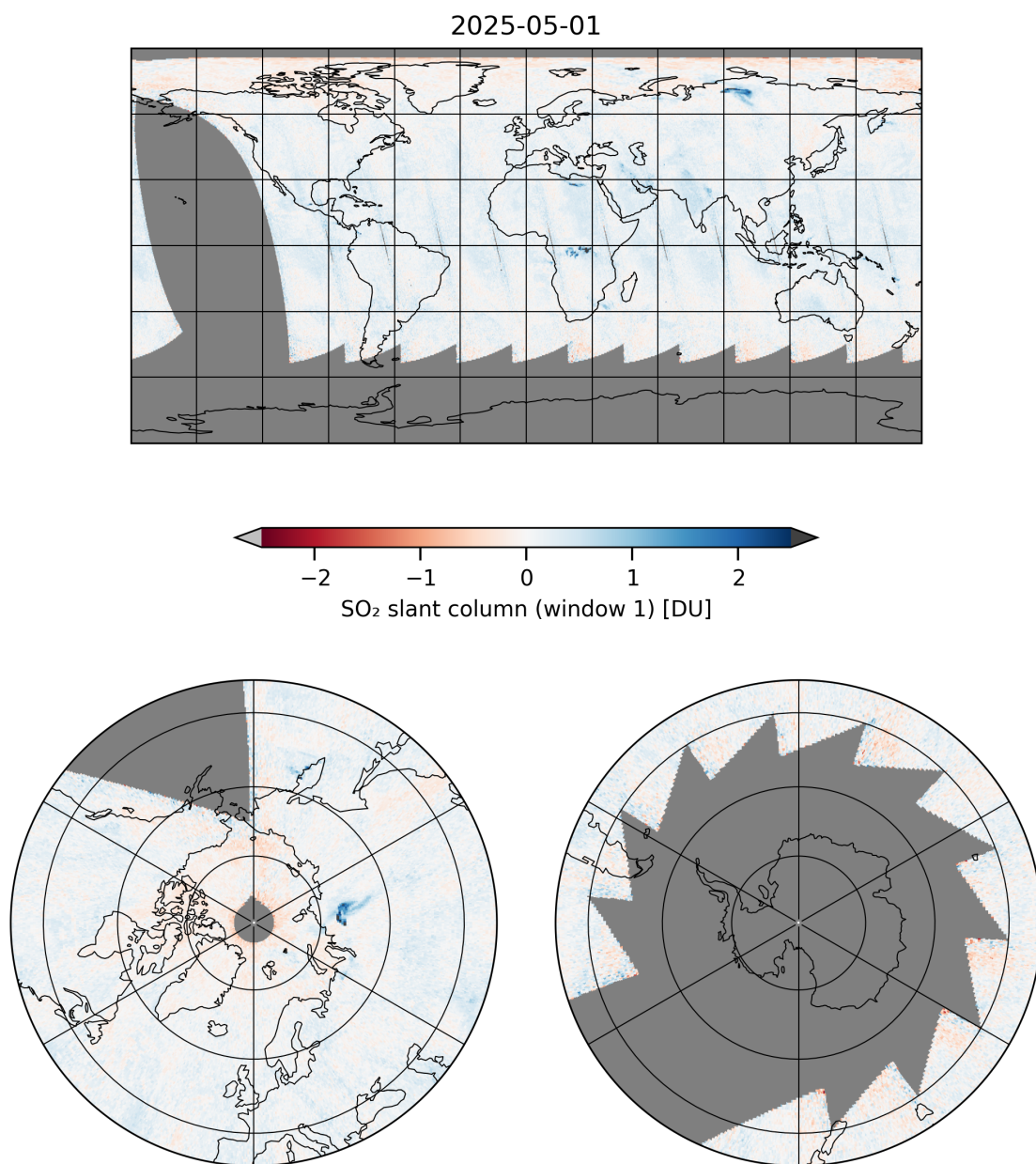


Figure 9: Map of “SO₂ slant column (window 1)” for 2025-05-01 to 2025-05-01

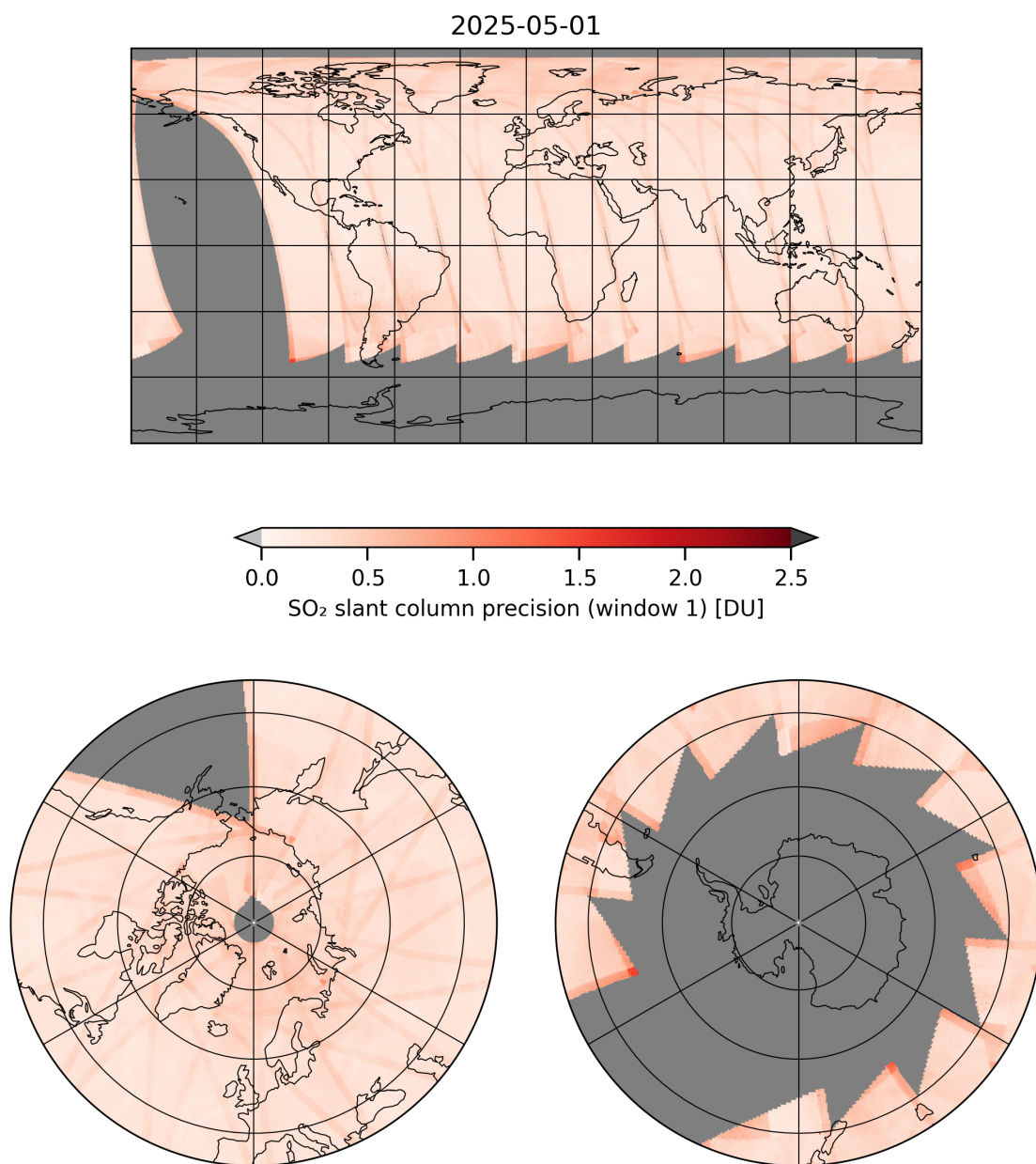


Figure 10: Map of “SO₂ slant column precision (window 1)” for 2025-05-01 to 2025-05-01

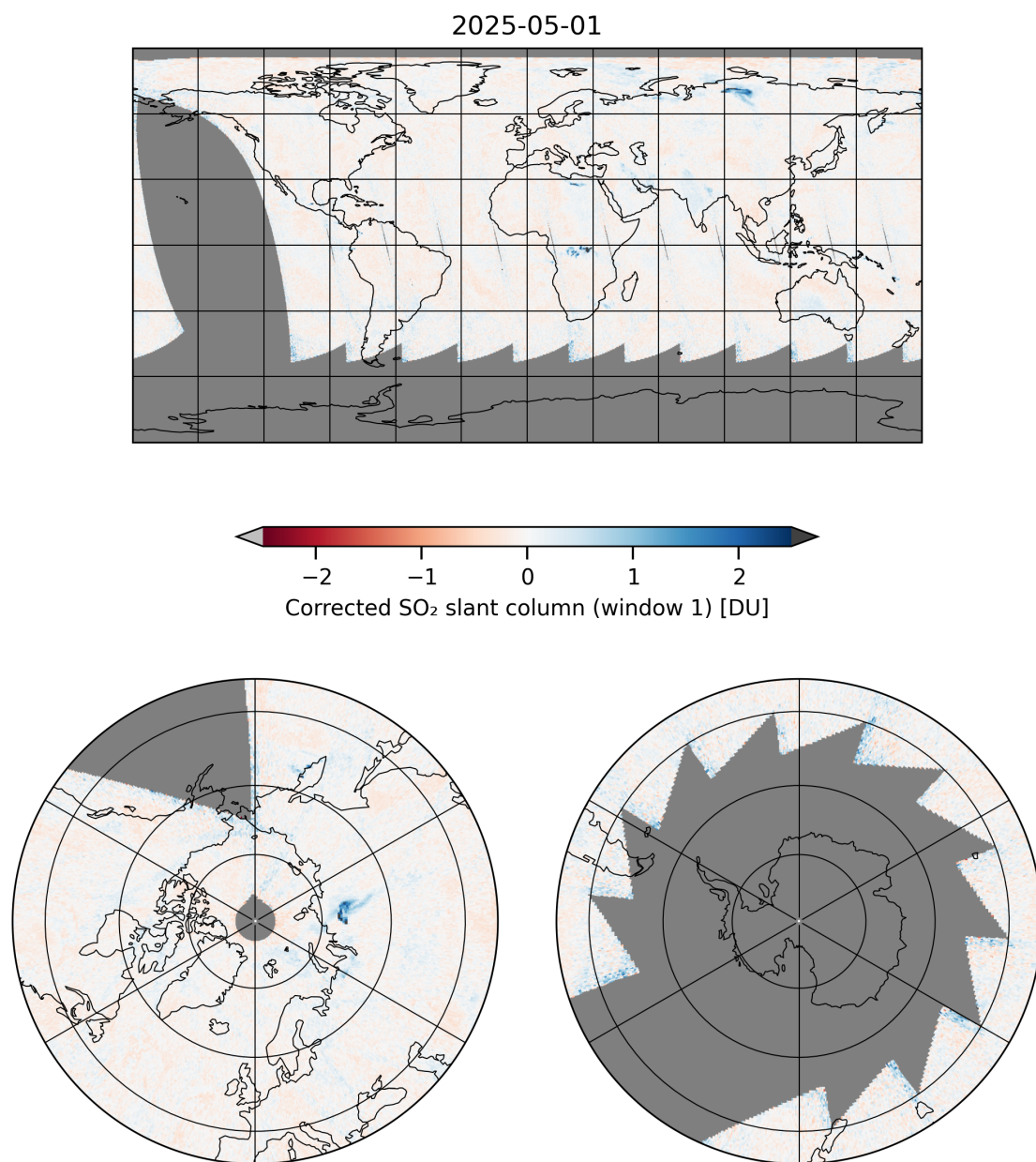


Figure 11: Map of “Corrected SO₂ slant column (window 1)” for 2025-05-01 to 2025-05-01

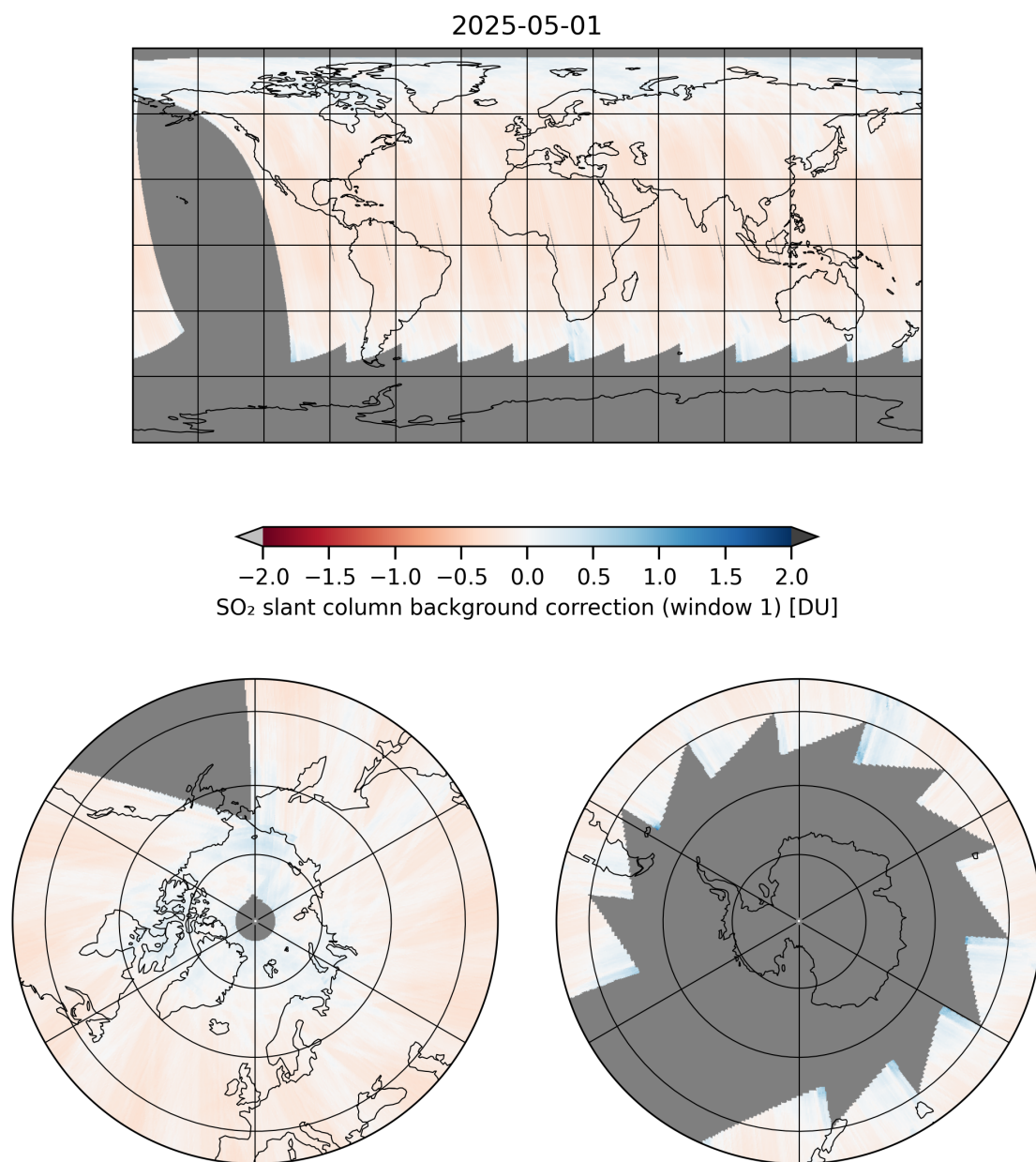


Figure 12: Map of “SO₂ slant column background correction (window 1)” for 2025-05-01 to 2025-05-01

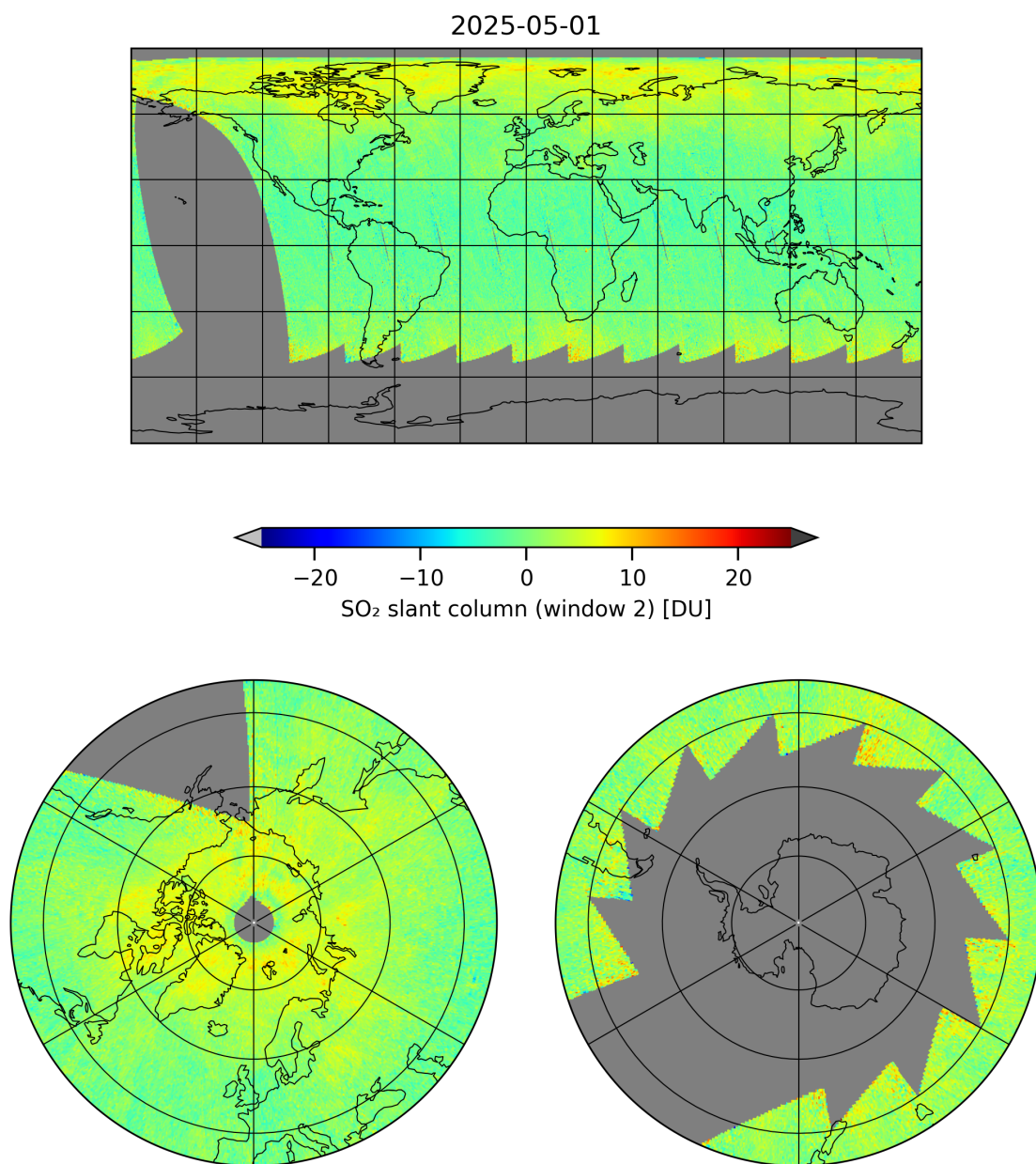


Figure 13: Map of “SO₂ slant column (window 2)” for 2025-05-01 to 2025-05-01

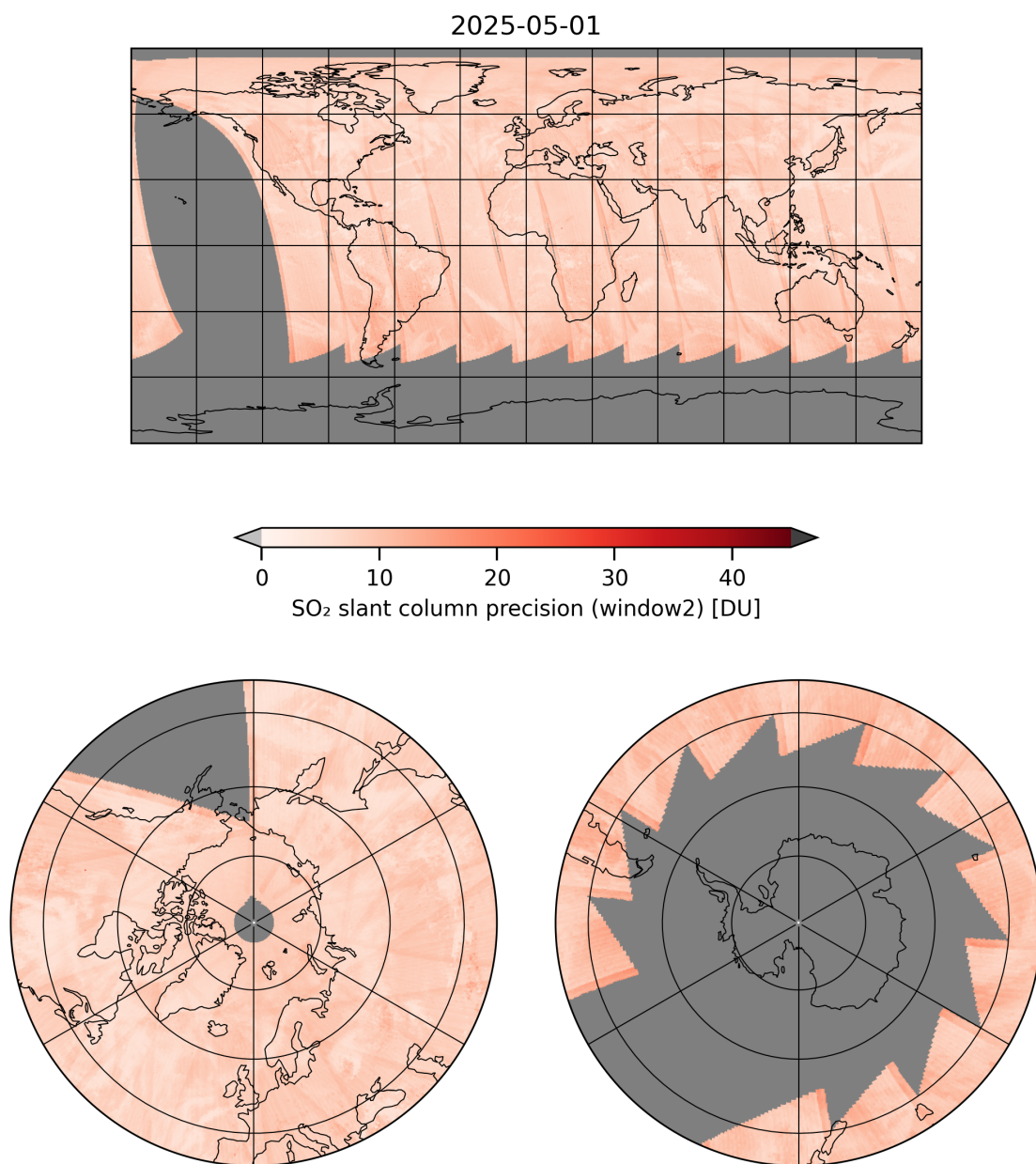


Figure 14: Map of “SO₂ slant column precision (window2)” for 2025-05-01 to 2025-05-01

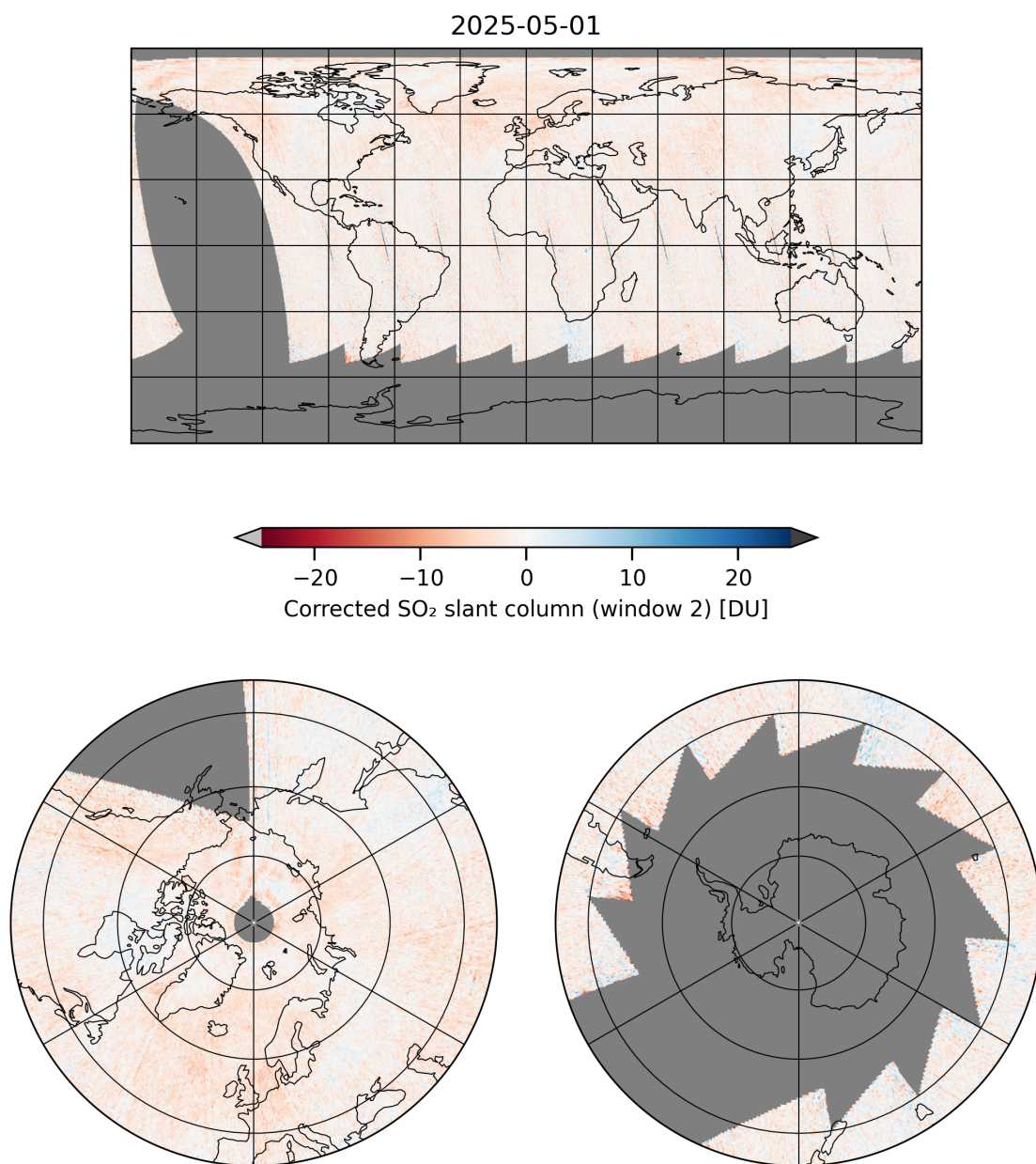


Figure 15: Map of “Corrected SO₂ slant column (window 2)” for 2025-05-01 to 2025-05-01

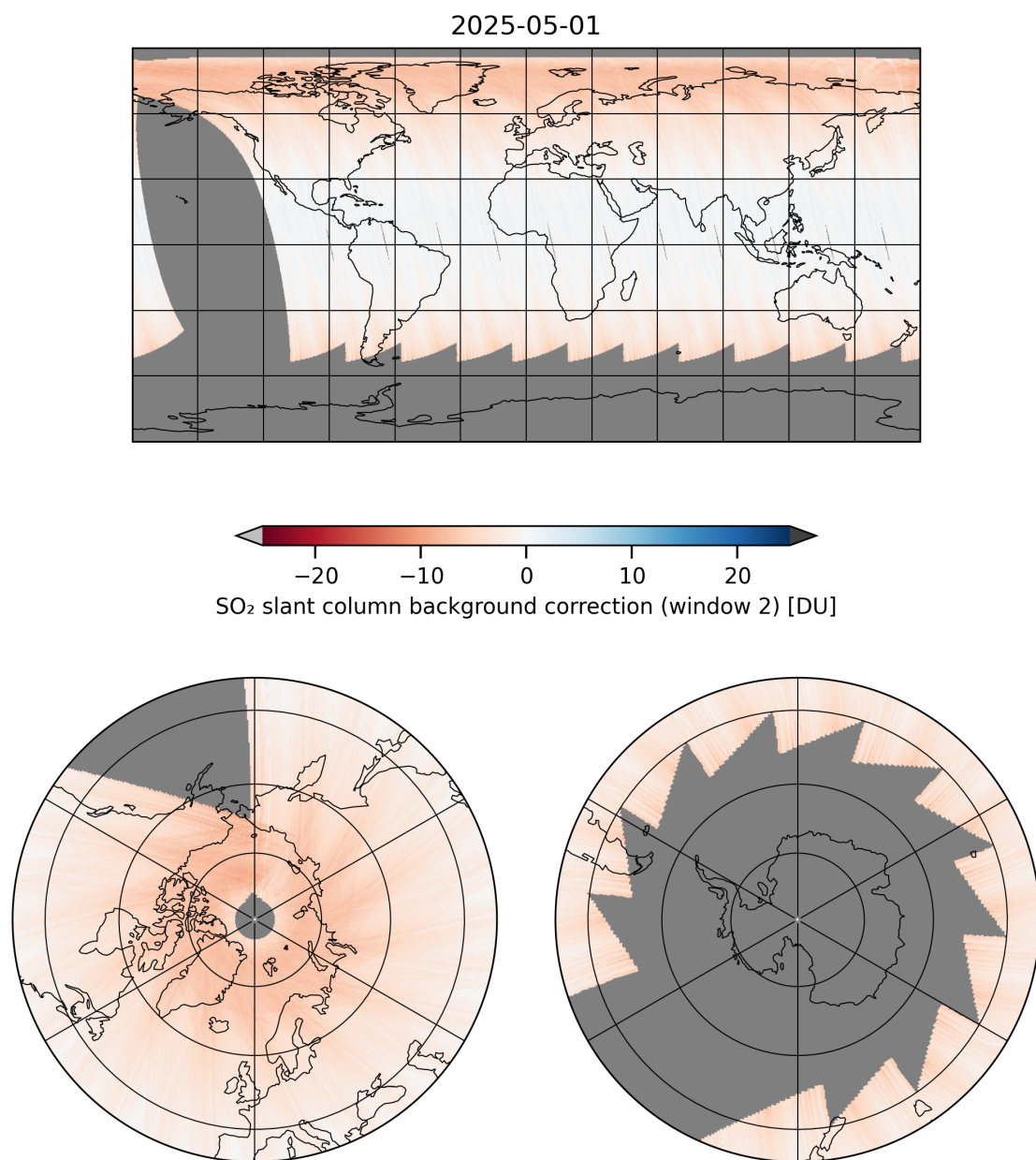


Figure 16: Map of “SO₂ slant column background correction (window 2)” for 2025-05-01 to 2025-05-01

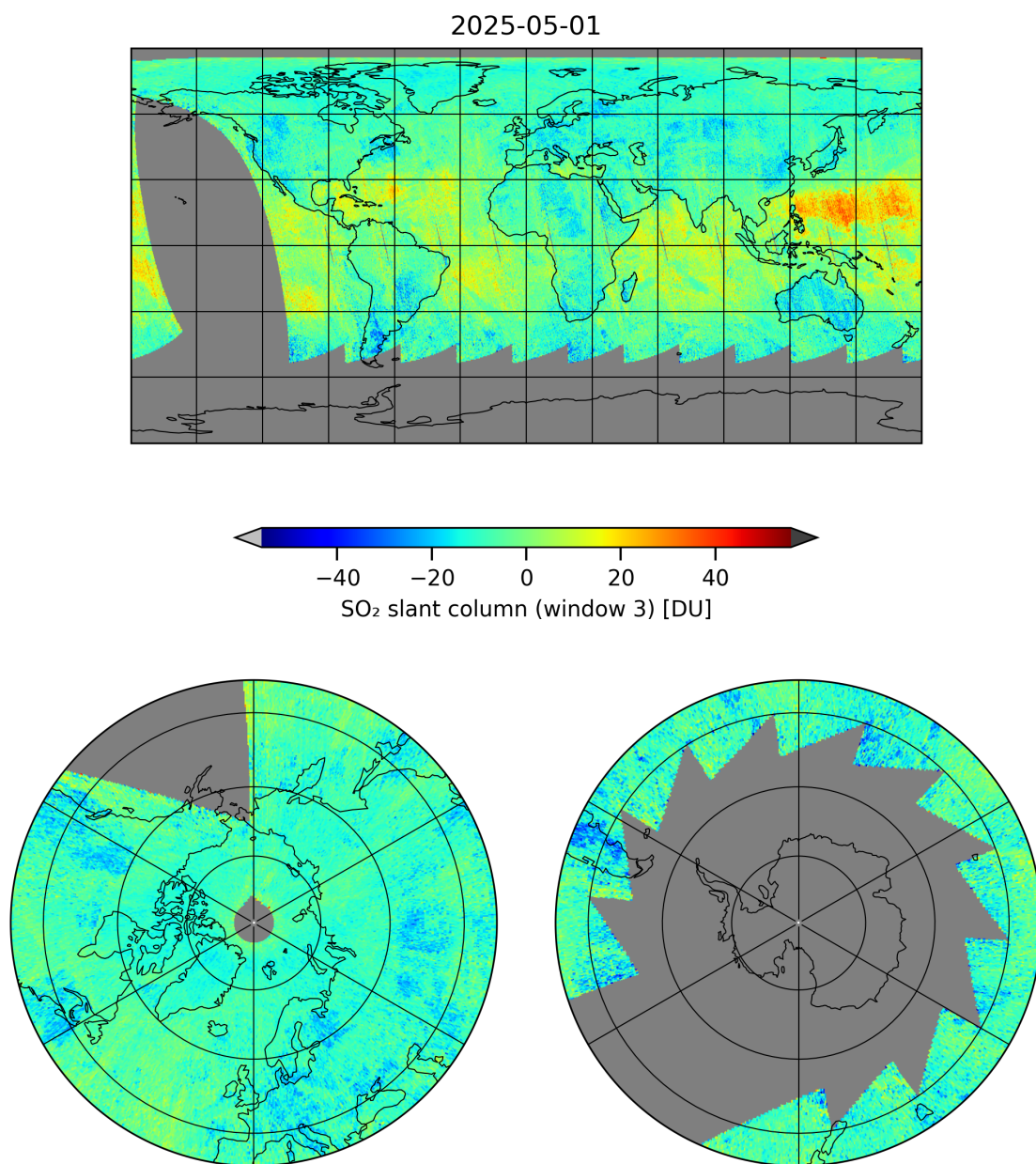


Figure 17: Map of “SO₂ slant column (window 3)” for 2025-05-01 to 2025-05-01

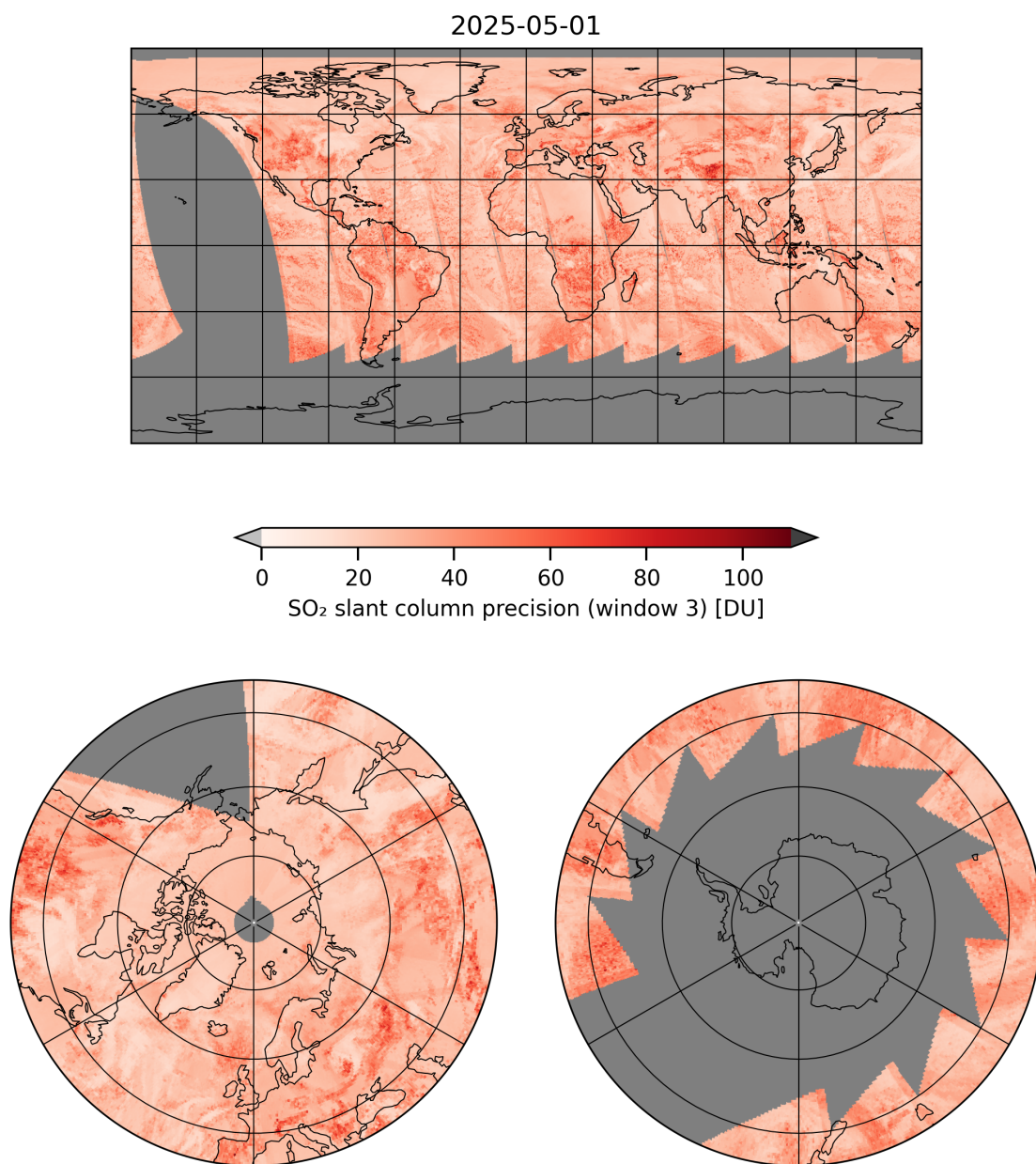


Figure 18: Map of “SO₂ slant column precision (window 3)” for 2025-05-01 to 2025-05-01

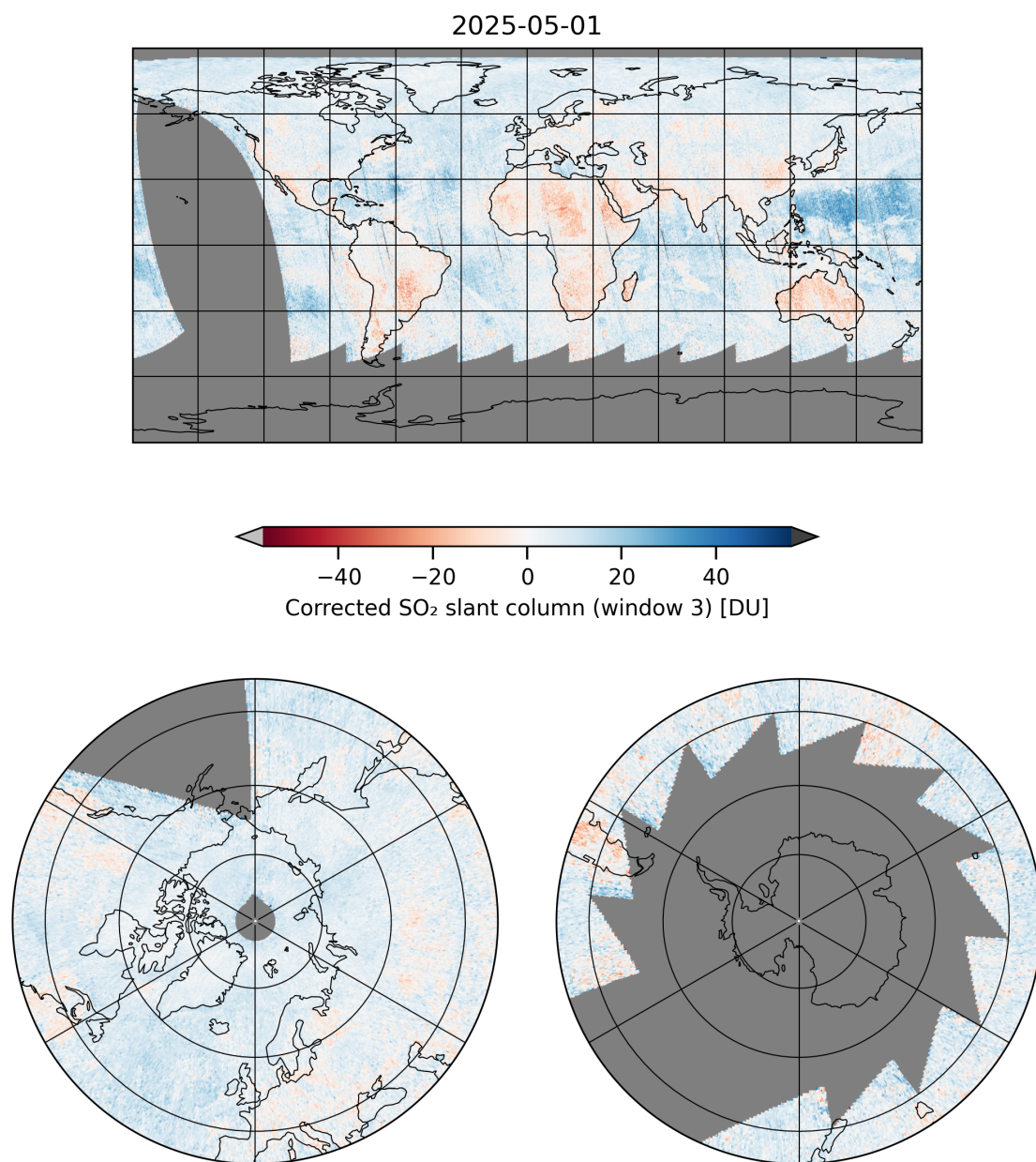


Figure 19: Map of “Corrected SO₂ slant column (window 3)” for 2025-05-01 to 2025-05-01

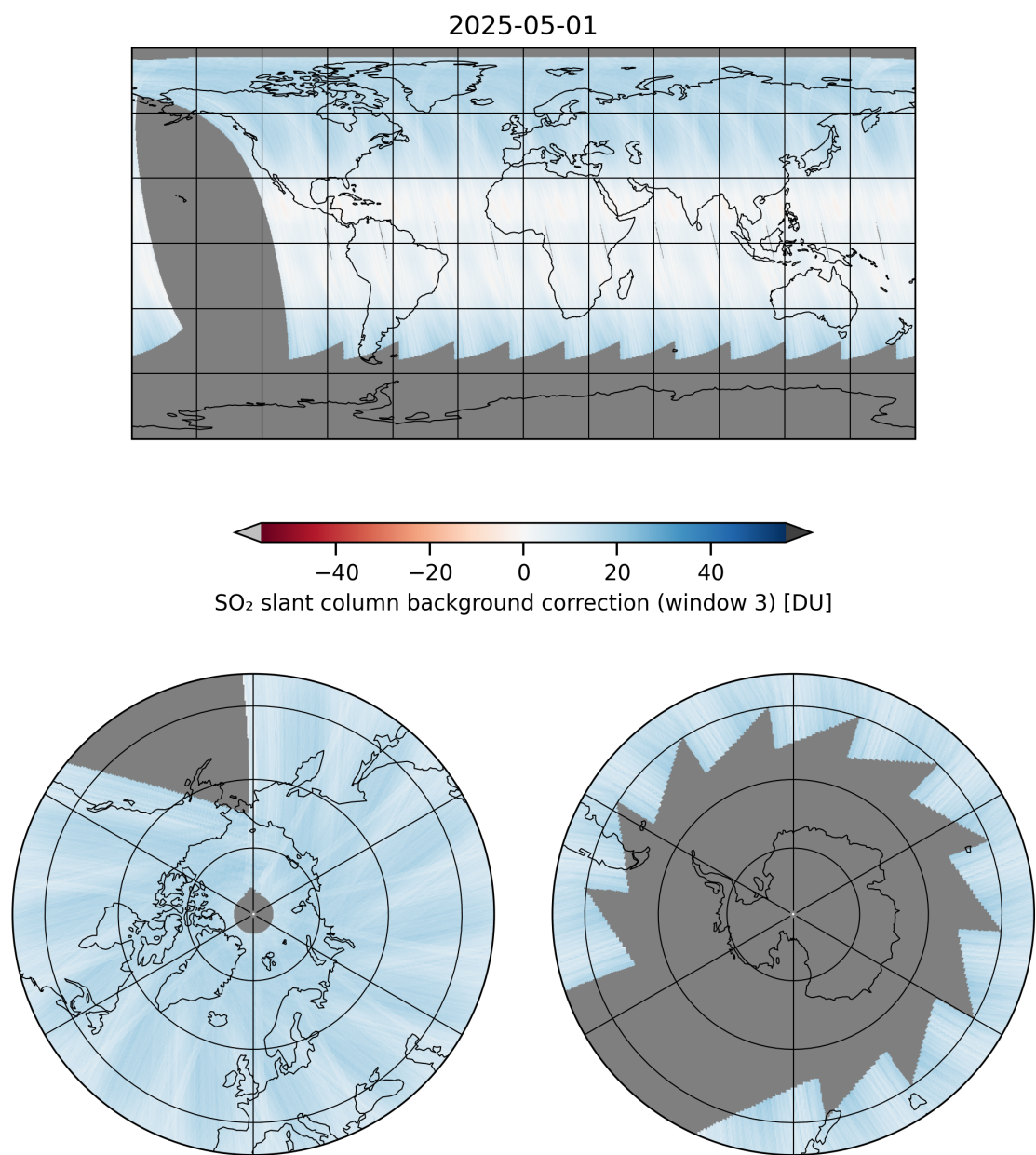


Figure 20: Map of “SO₂ slant column background correction (window 3)” for 2025-05-01 to 2025-05-01

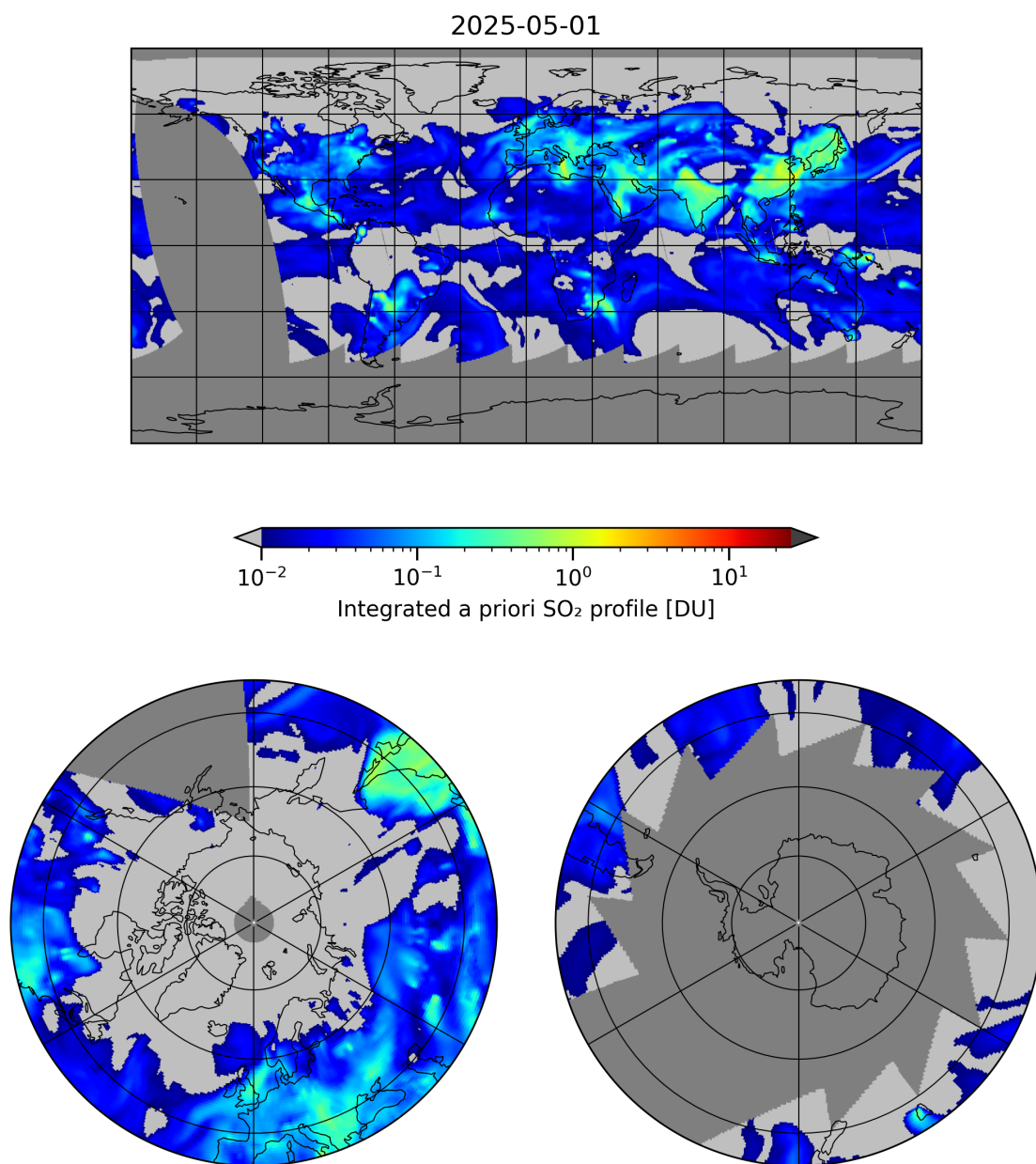


Figure 21: Map of “Integrated a priori SO₂ profile” for 2025-05-01 to 2025-05-01

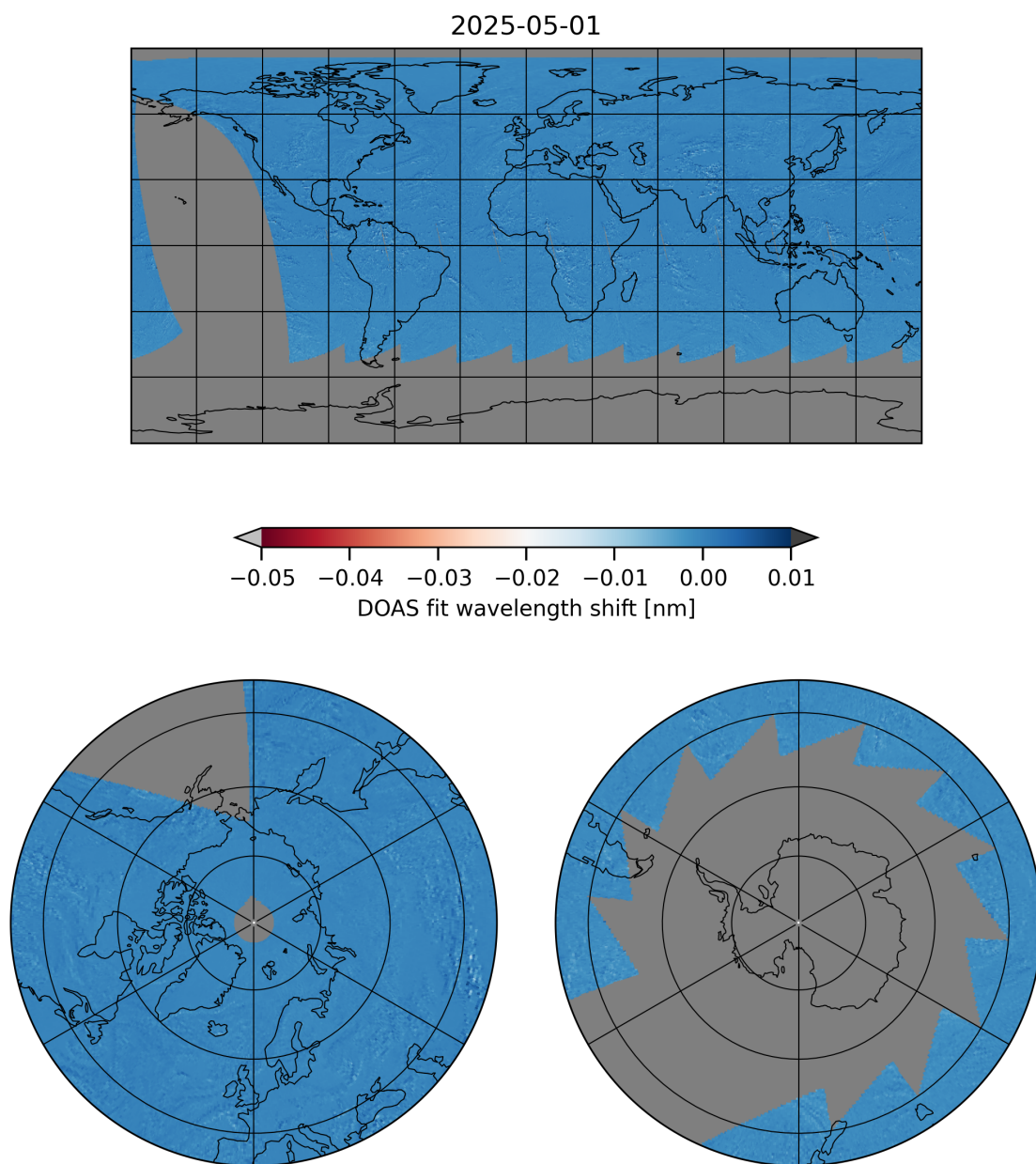


Figure 22: Map of “DOAS fit wavelength shift” for 2025-05-01 to 2025-05-01

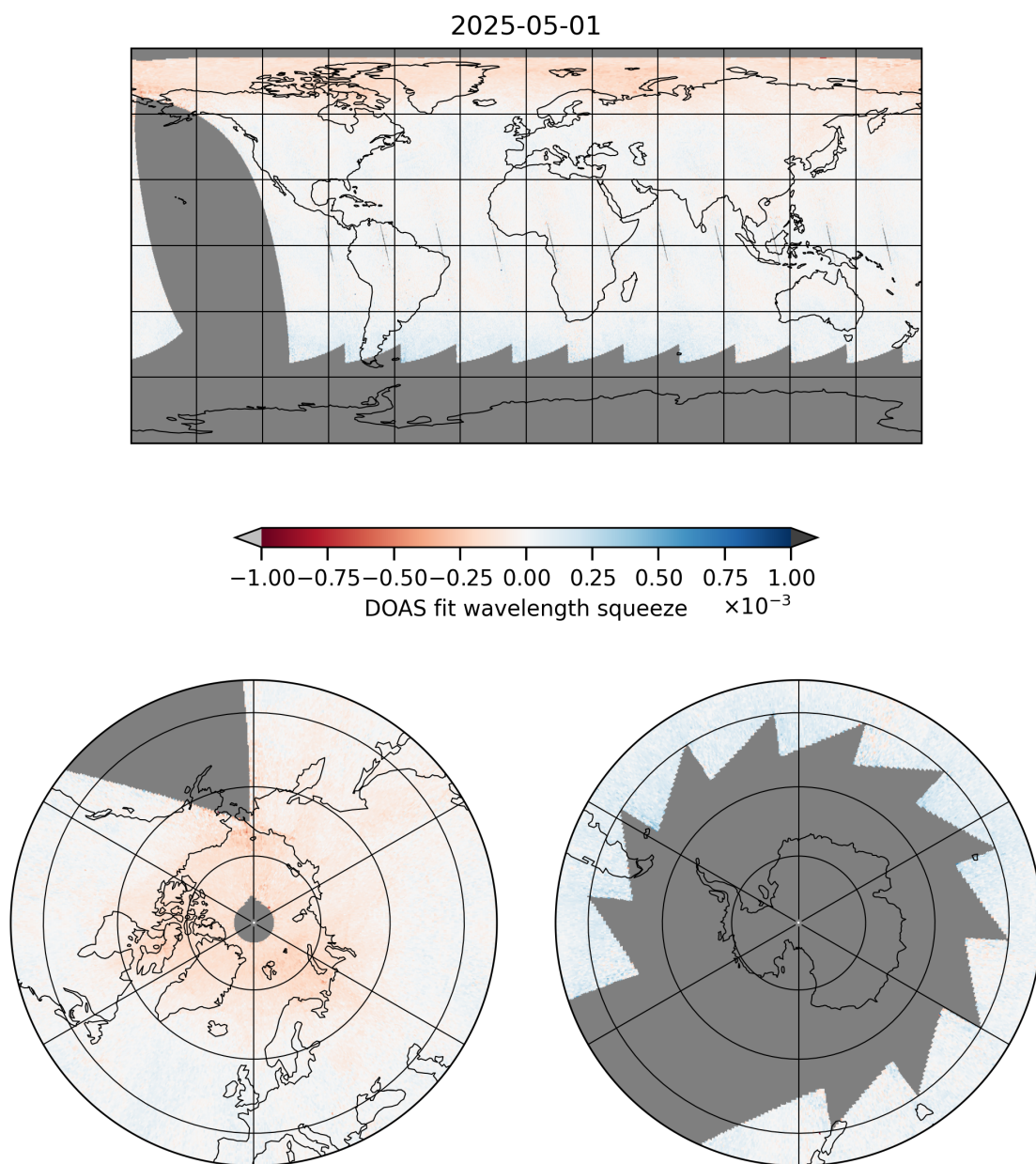


Figure 23: Map of “DOAS fit wavelength squeeze” for 2025-05-01 to 2025-05-01

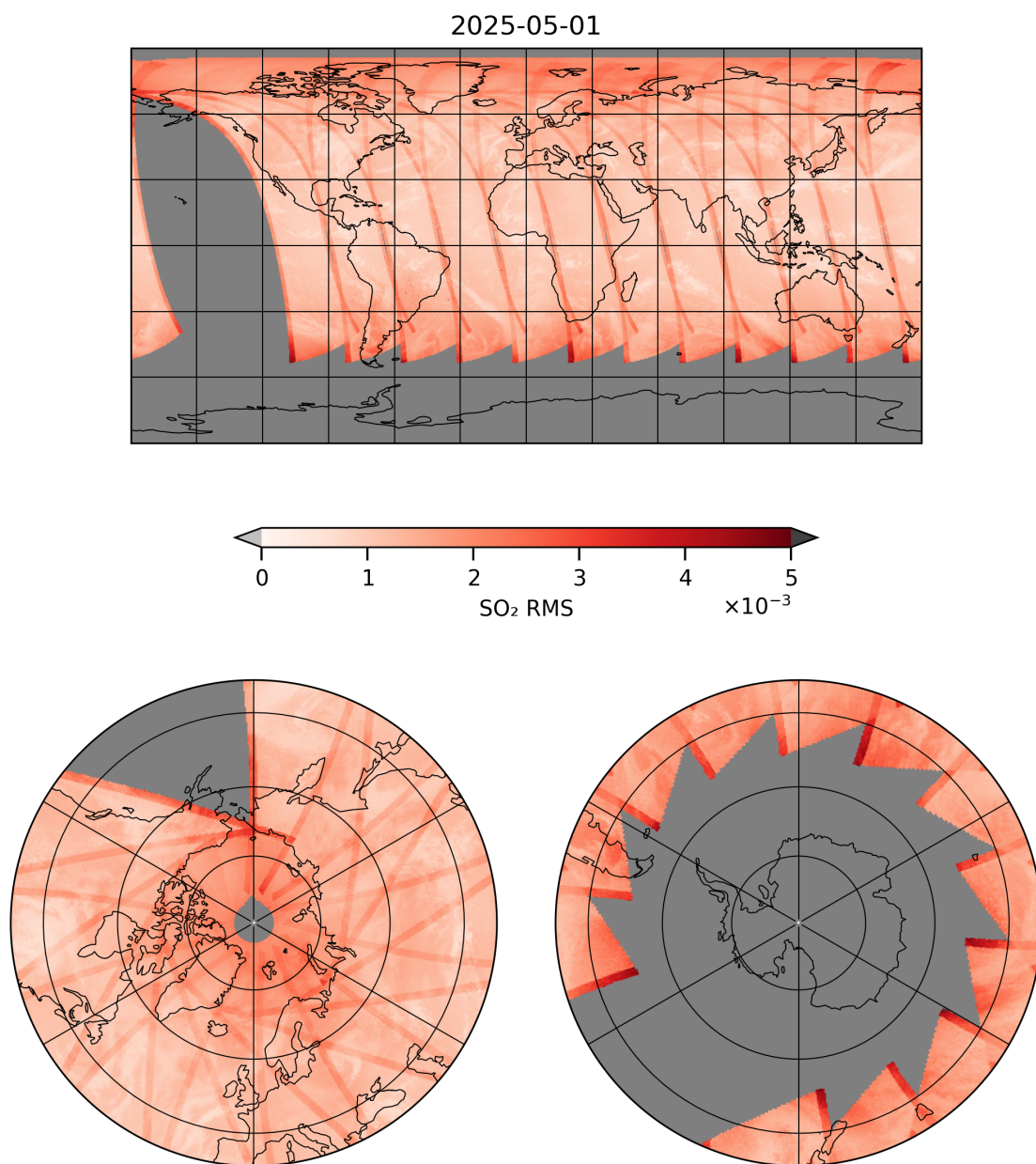


Figure 24: Map of “SO₂ RMS” for 2025-05-01 to 2025-05-01

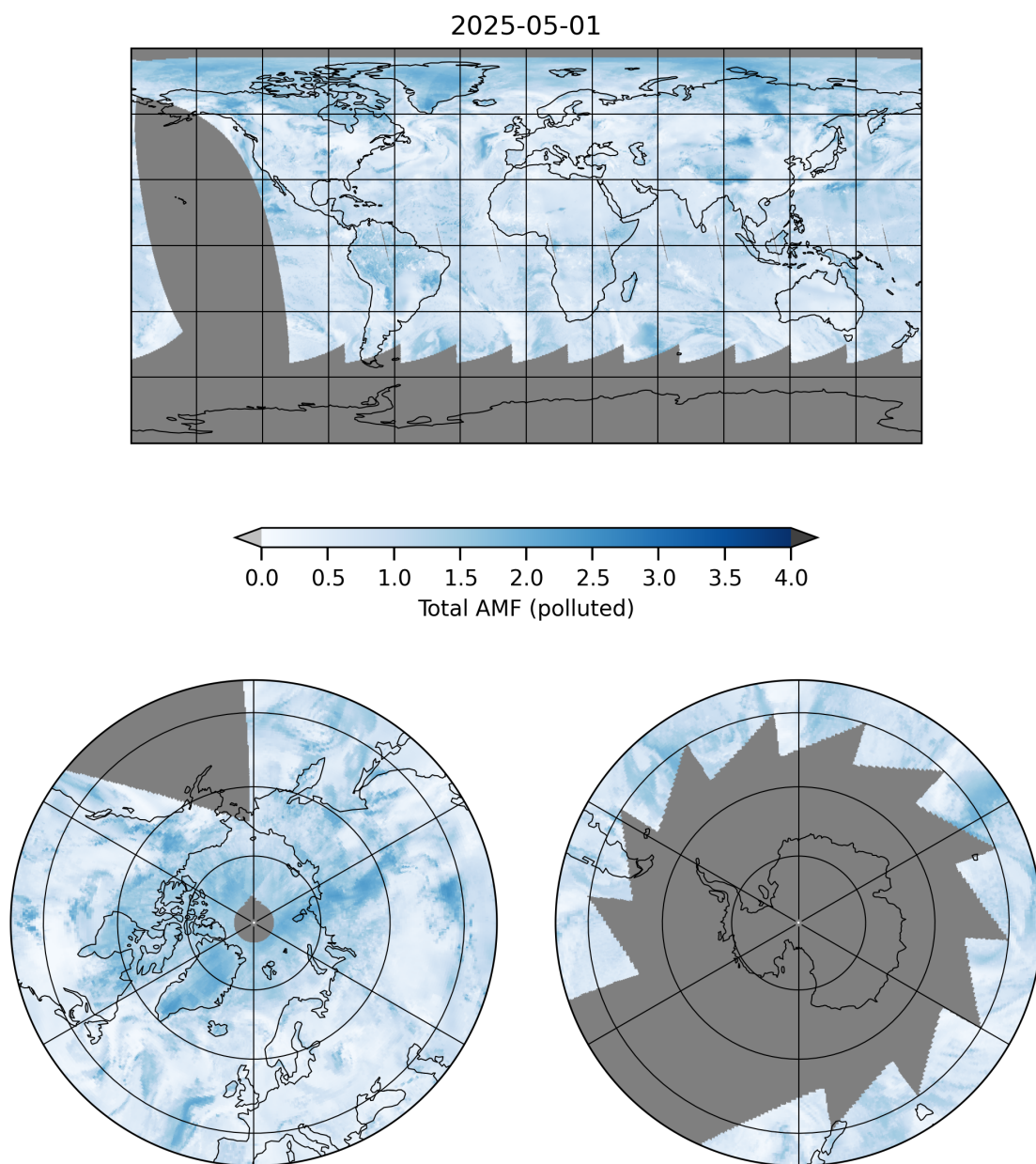


Figure 25: Map of “Total AMF (polluted)” for 2025-05-01 to 2025-05-01

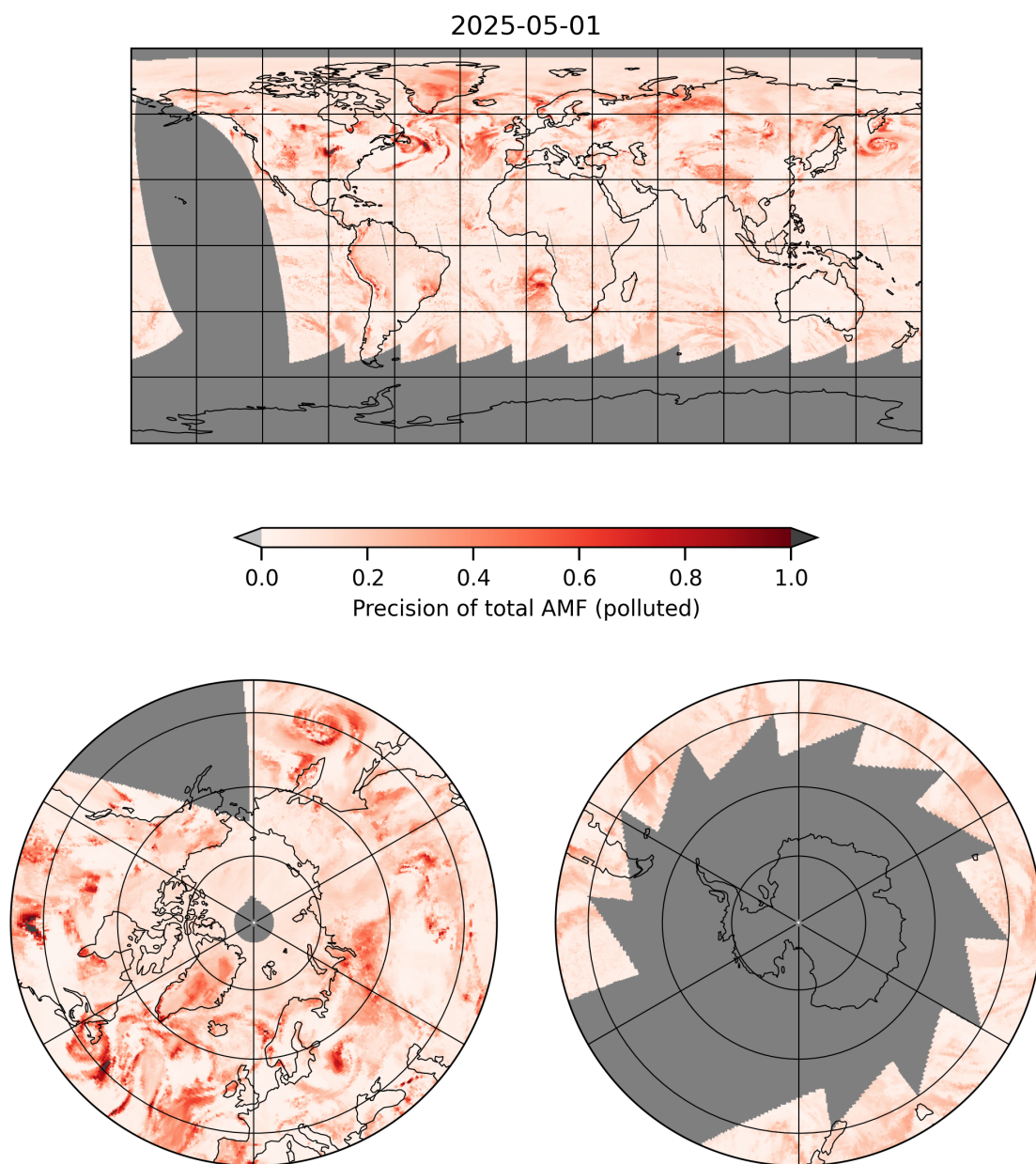


Figure 26: Map of “Precision of total AMF (polluted)” for 2025-05-01 to 2025-05-01

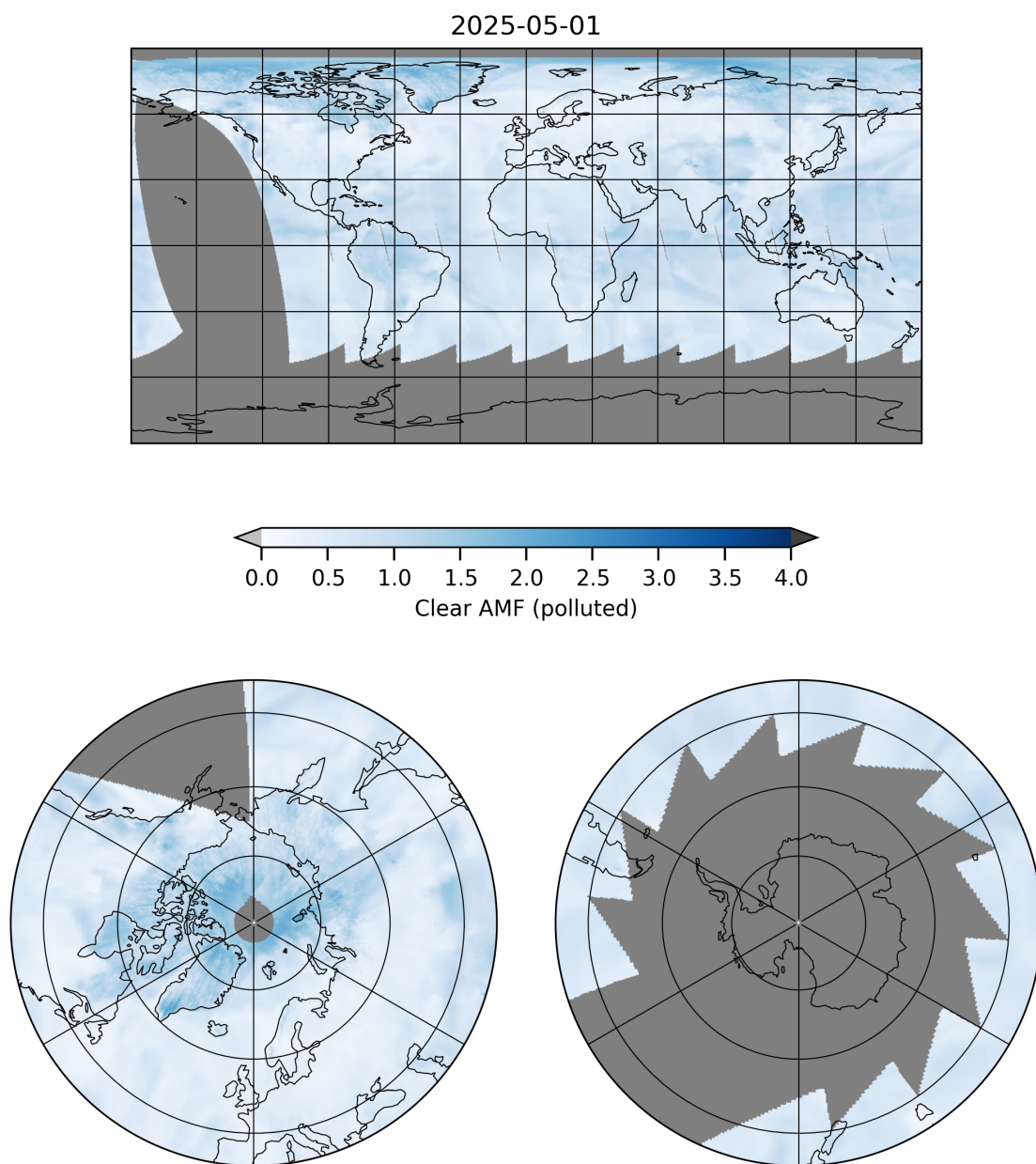


Figure 27: Map of “Clear AMF (polluted)” for 2025-05-01 to 2025-05-01

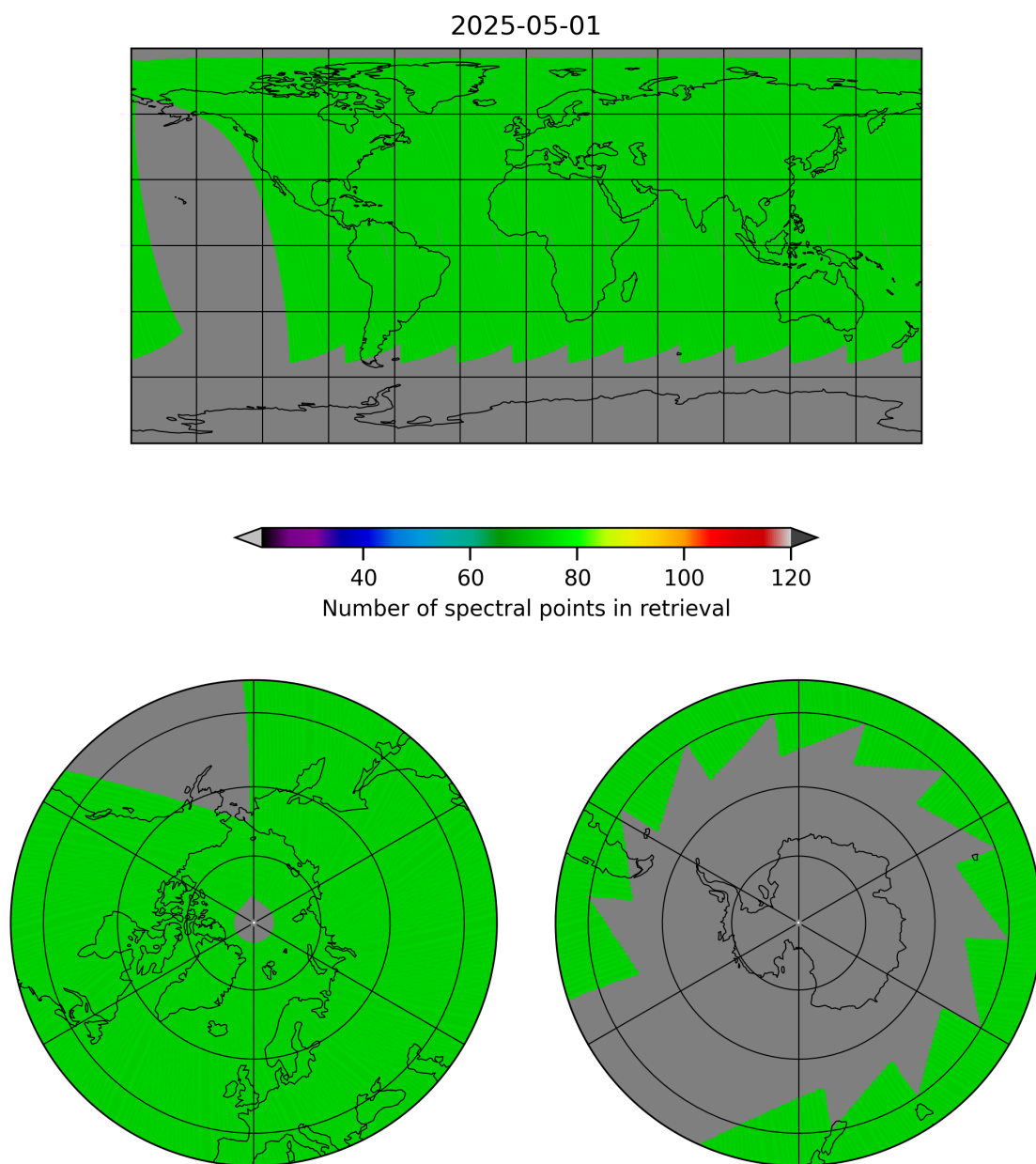


Figure 28: Map of “Number of spectral points in retrieval” for 2025-05-01 to 2025-05-01

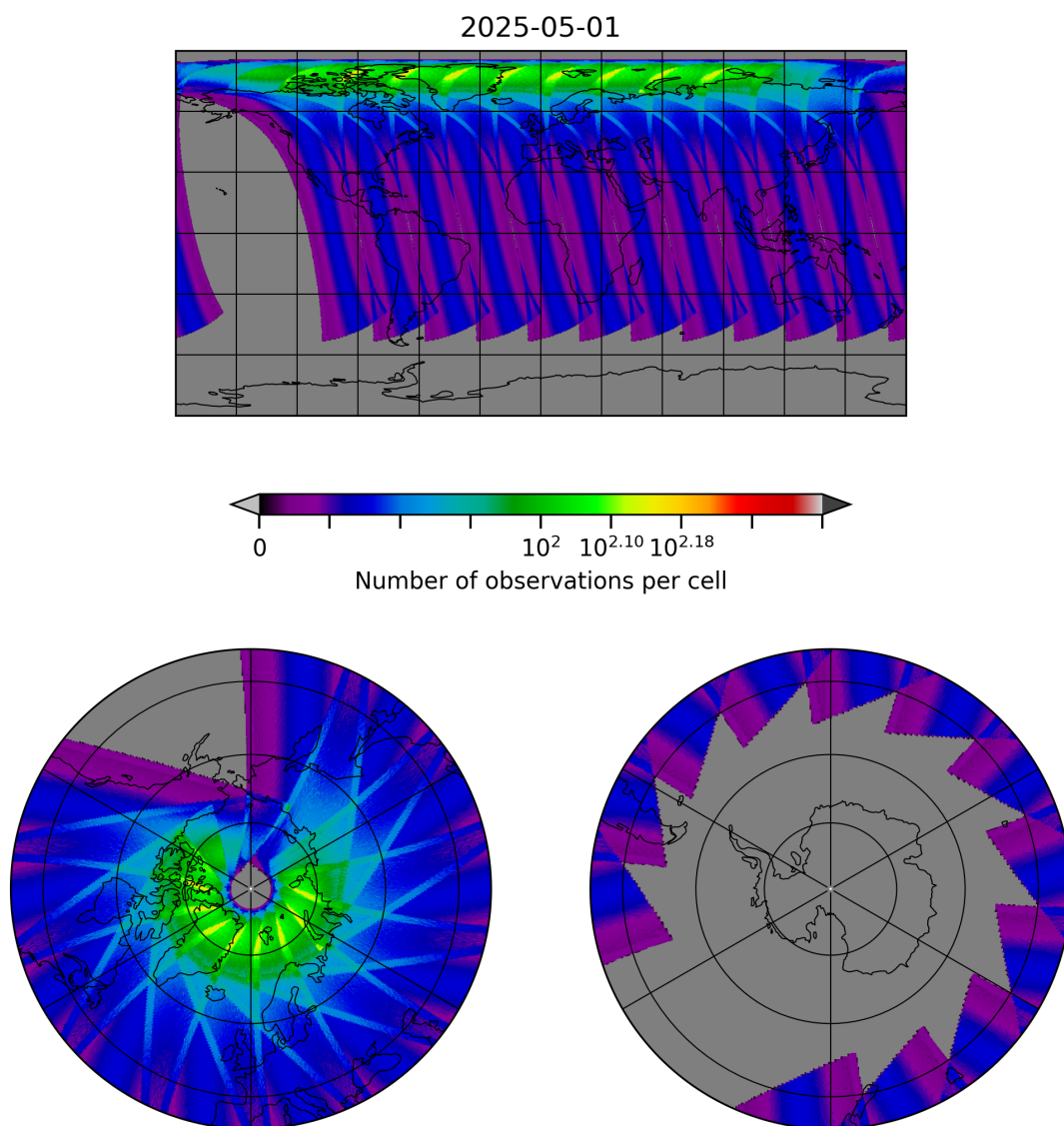


Figure 29: Map of the number of observations for 2025-05-01 to 2025-05-01

7 Zonal average

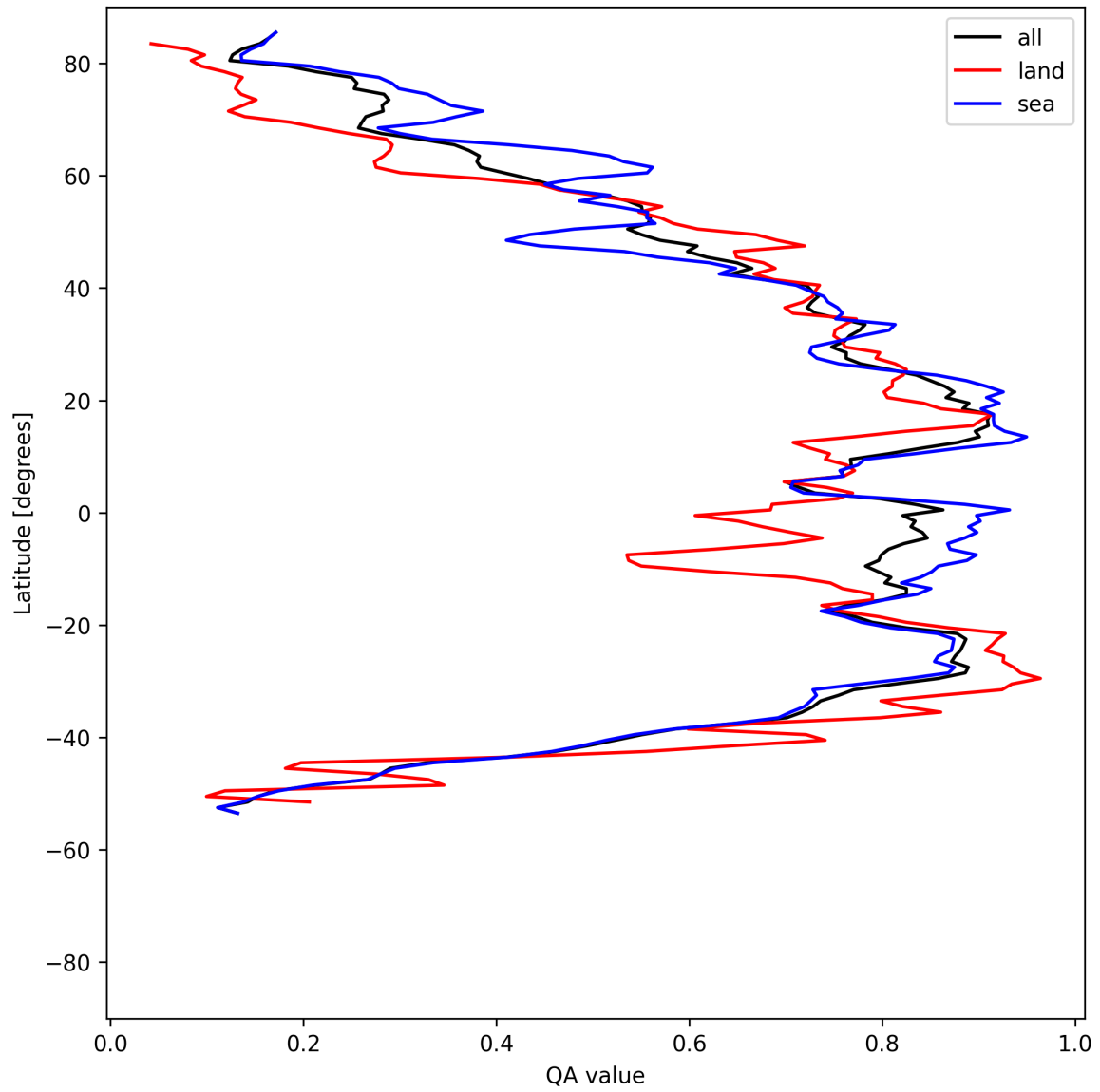


Figure 30: Zonal average of “QA value” for 2025-05-01 to 2025-05-01.

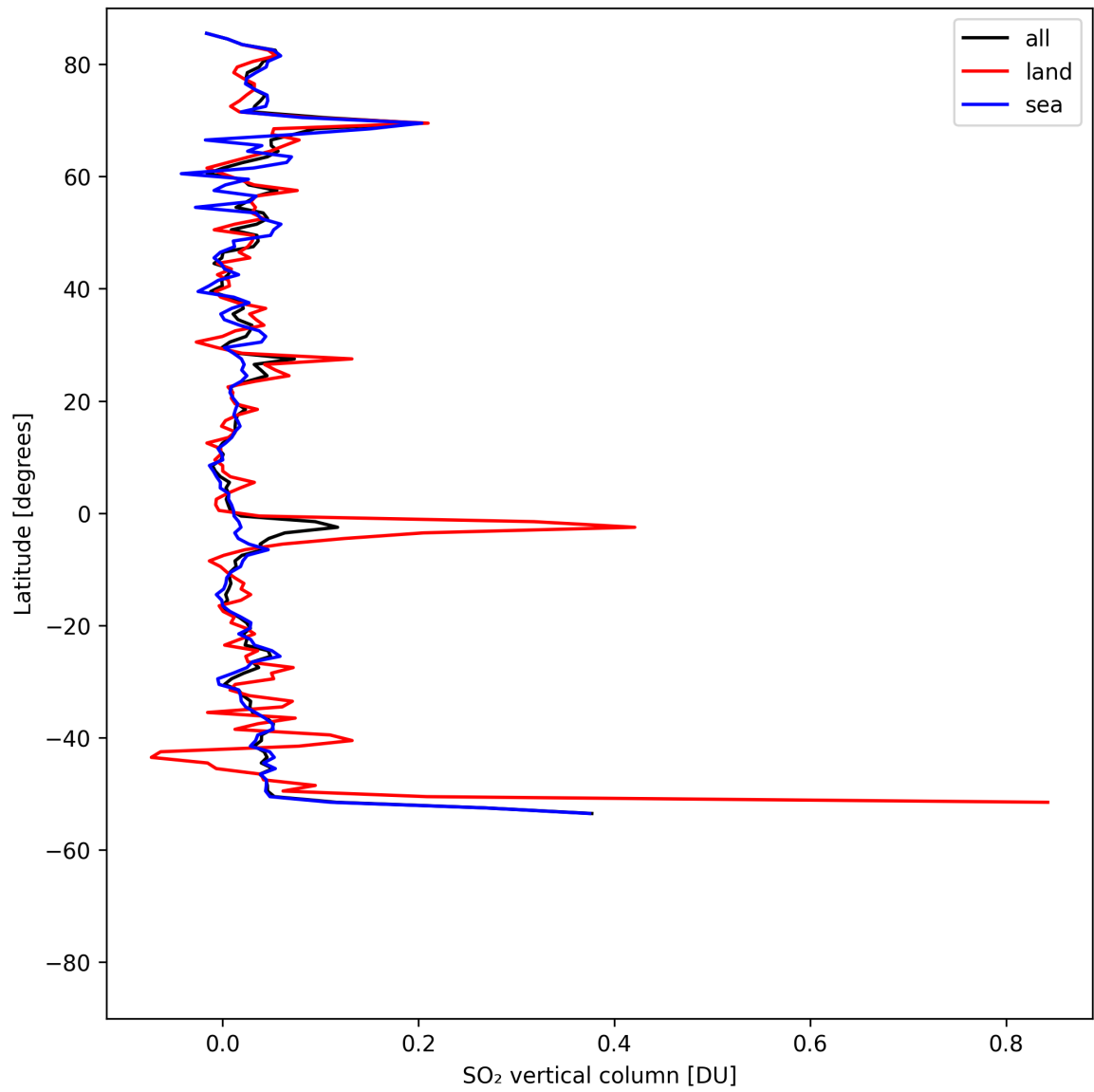


Figure 31: Zonal average of “SO₂ vertical column” for 2025-05-01 to 2025-05-01.

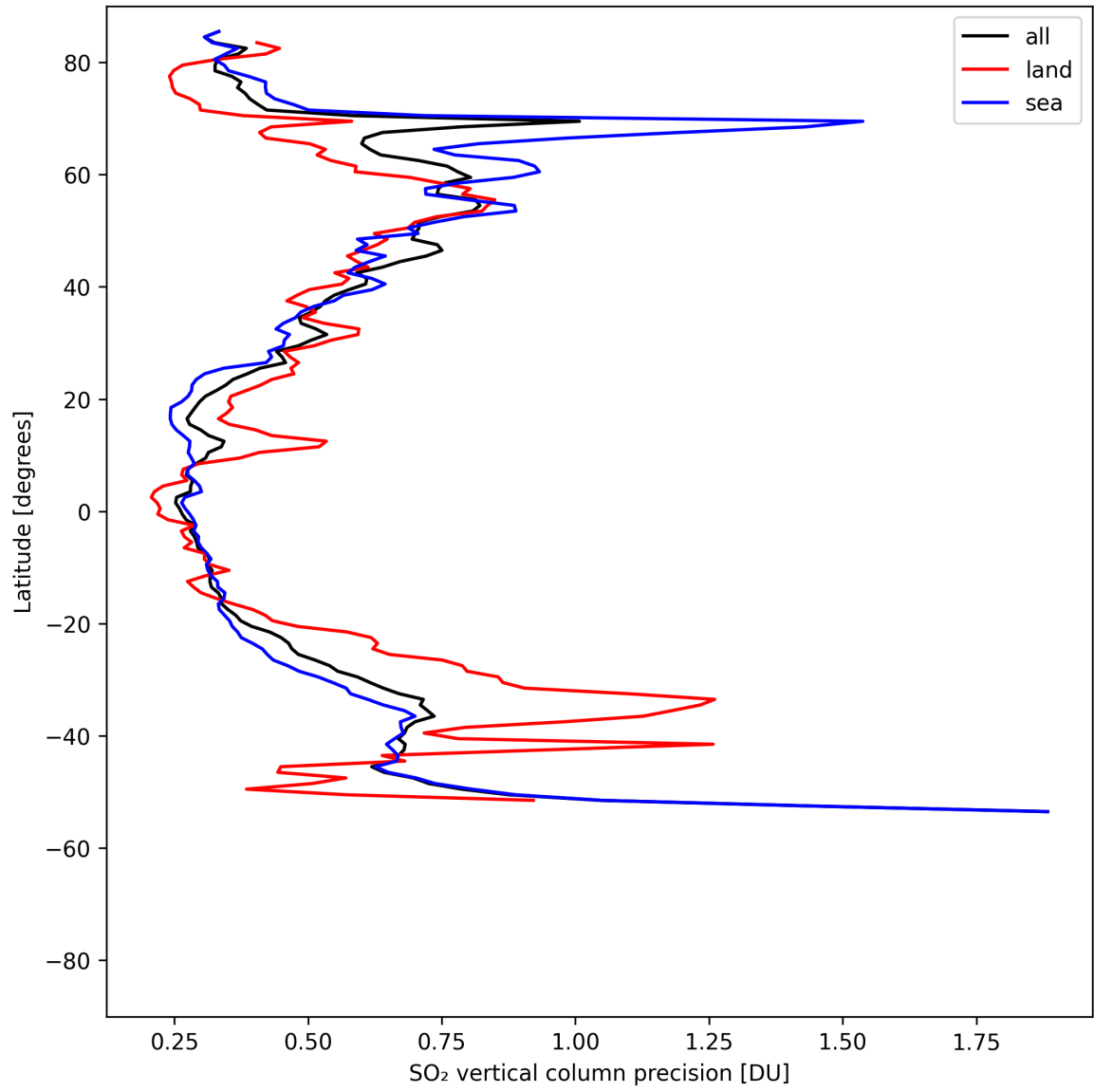


Figure 32: Zonal average of “SO₂ vertical column precision” for 2025-05-01 to 2025-05-01.

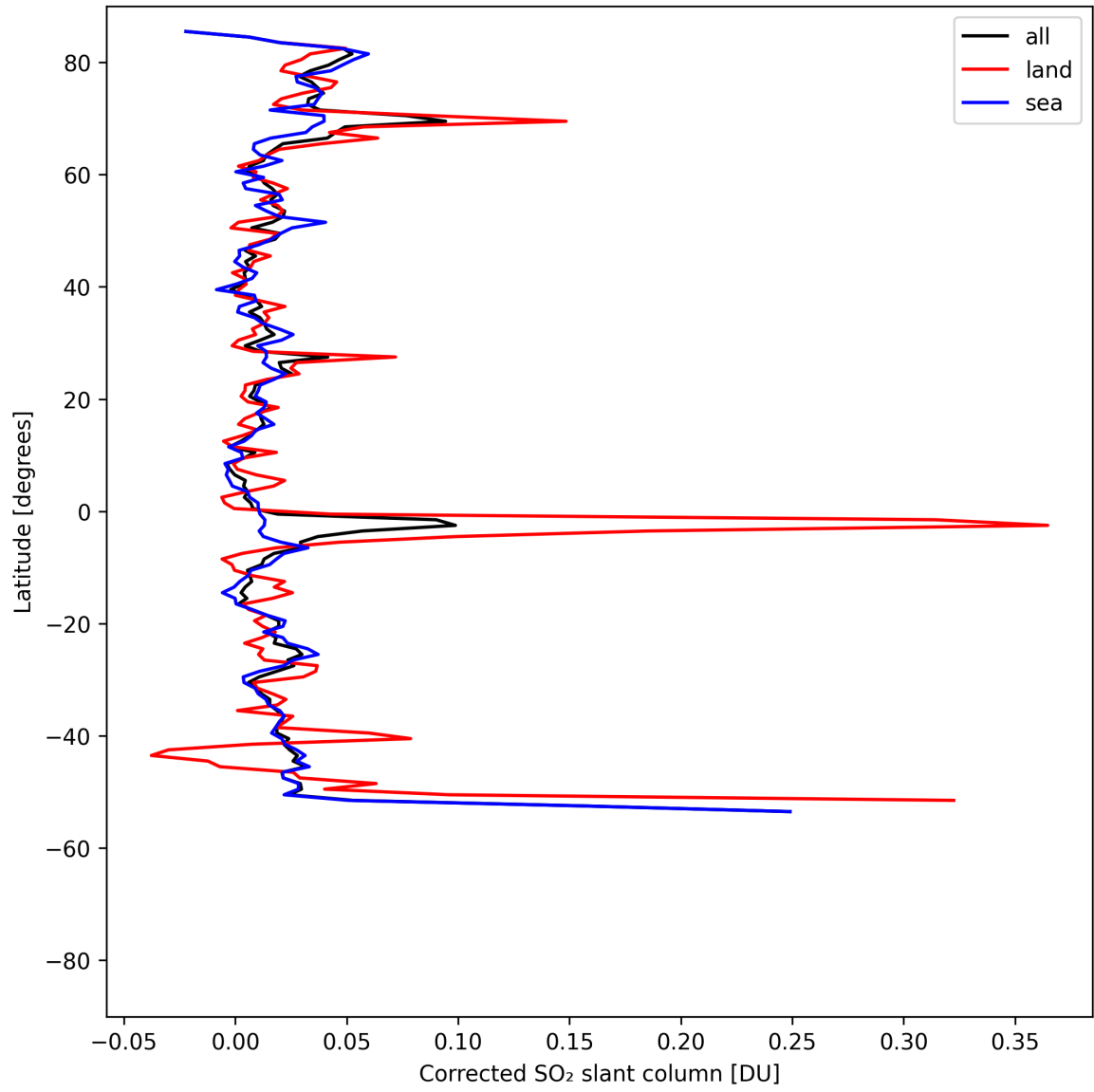


Figure 33: Zonal average of “Corrected SO₂ slant column” for 2025-05-01 to 2025-05-01.

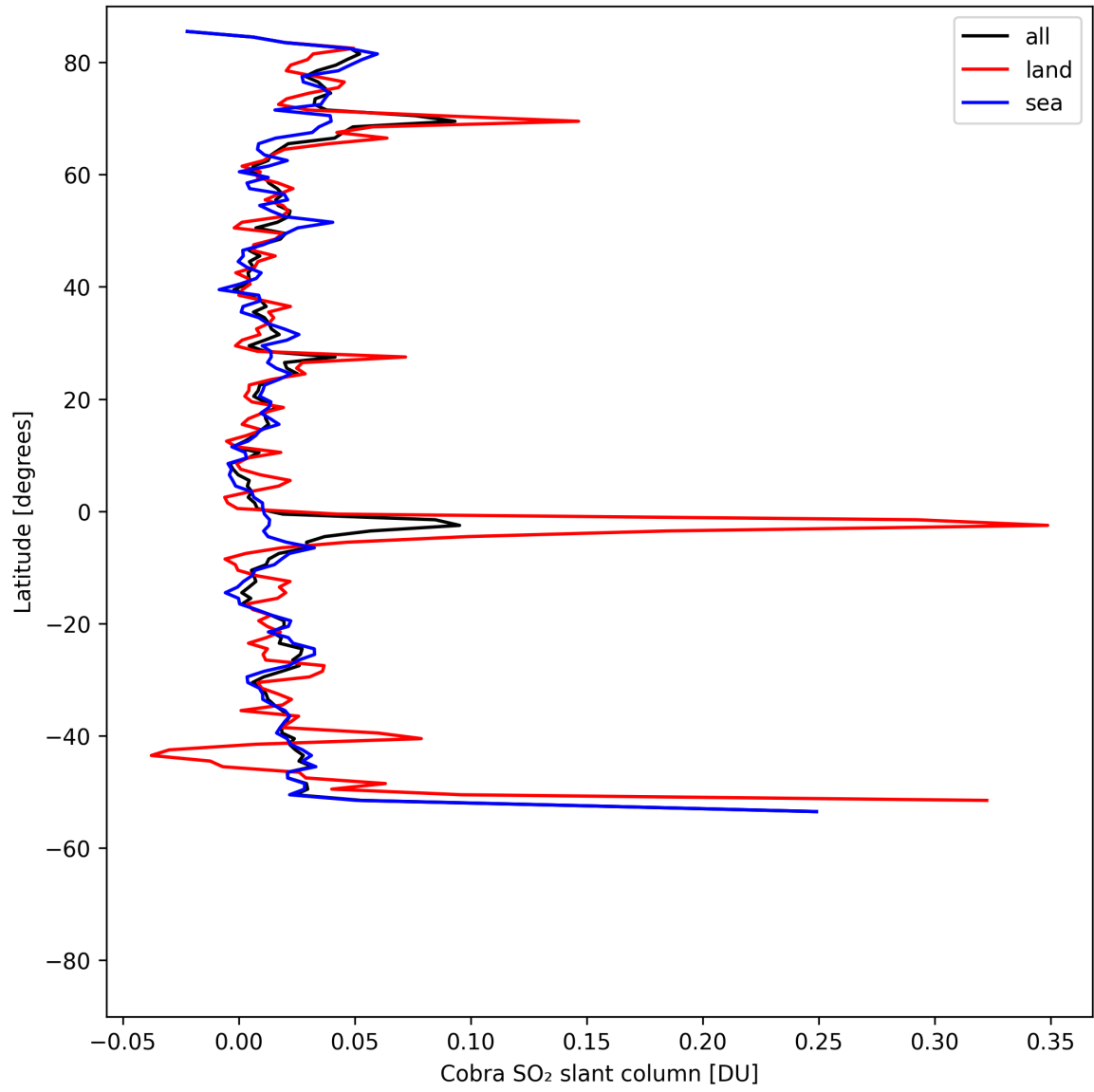


Figure 34: Zonal average of “Cobra SO₂ slant column” for 2025-05-01 to 2025-05-01.

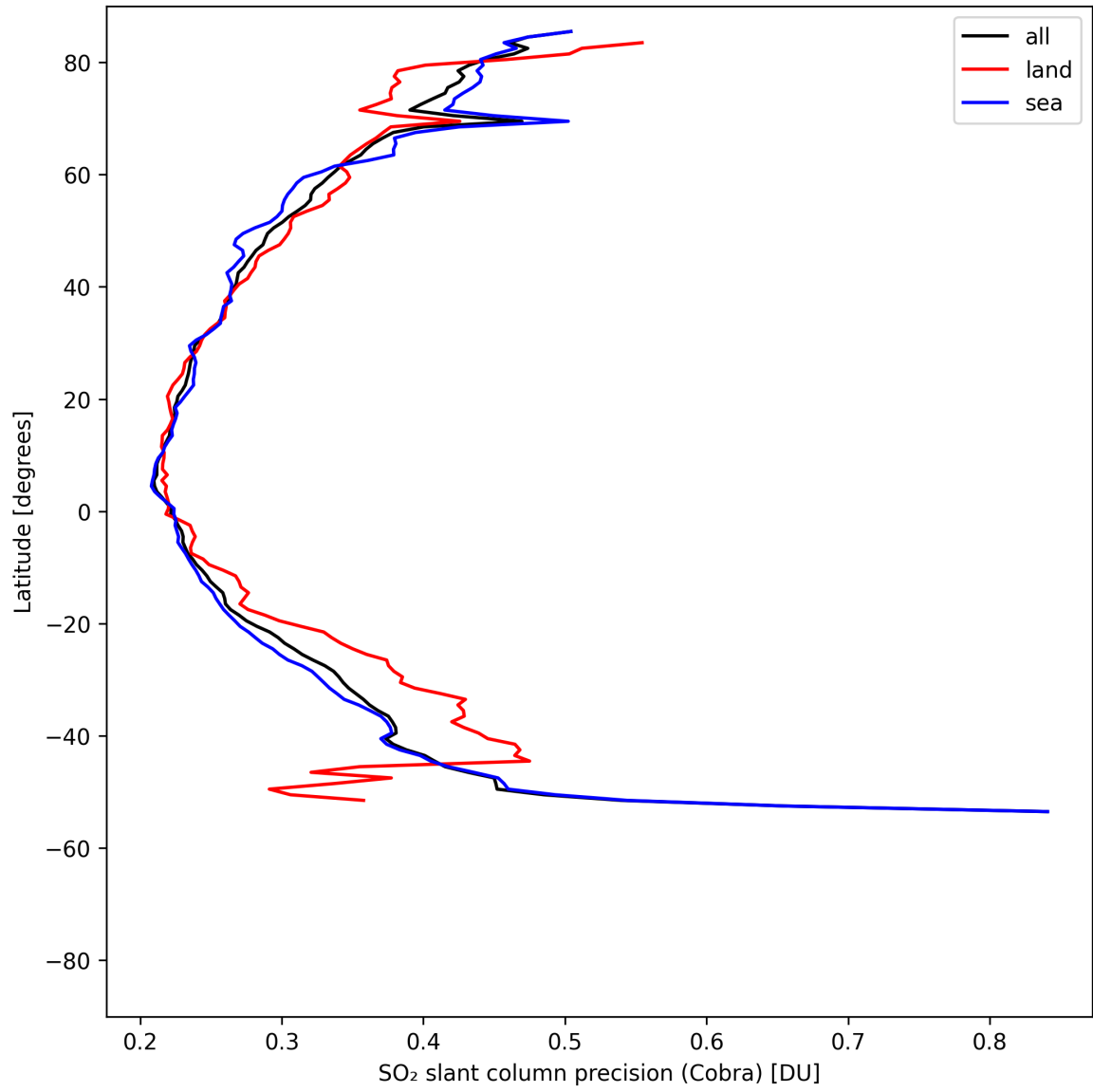


Figure 35: Zonal average of “SO₂ slant column precision (Cobra)” for 2025-05-01 to 2025-05-01.

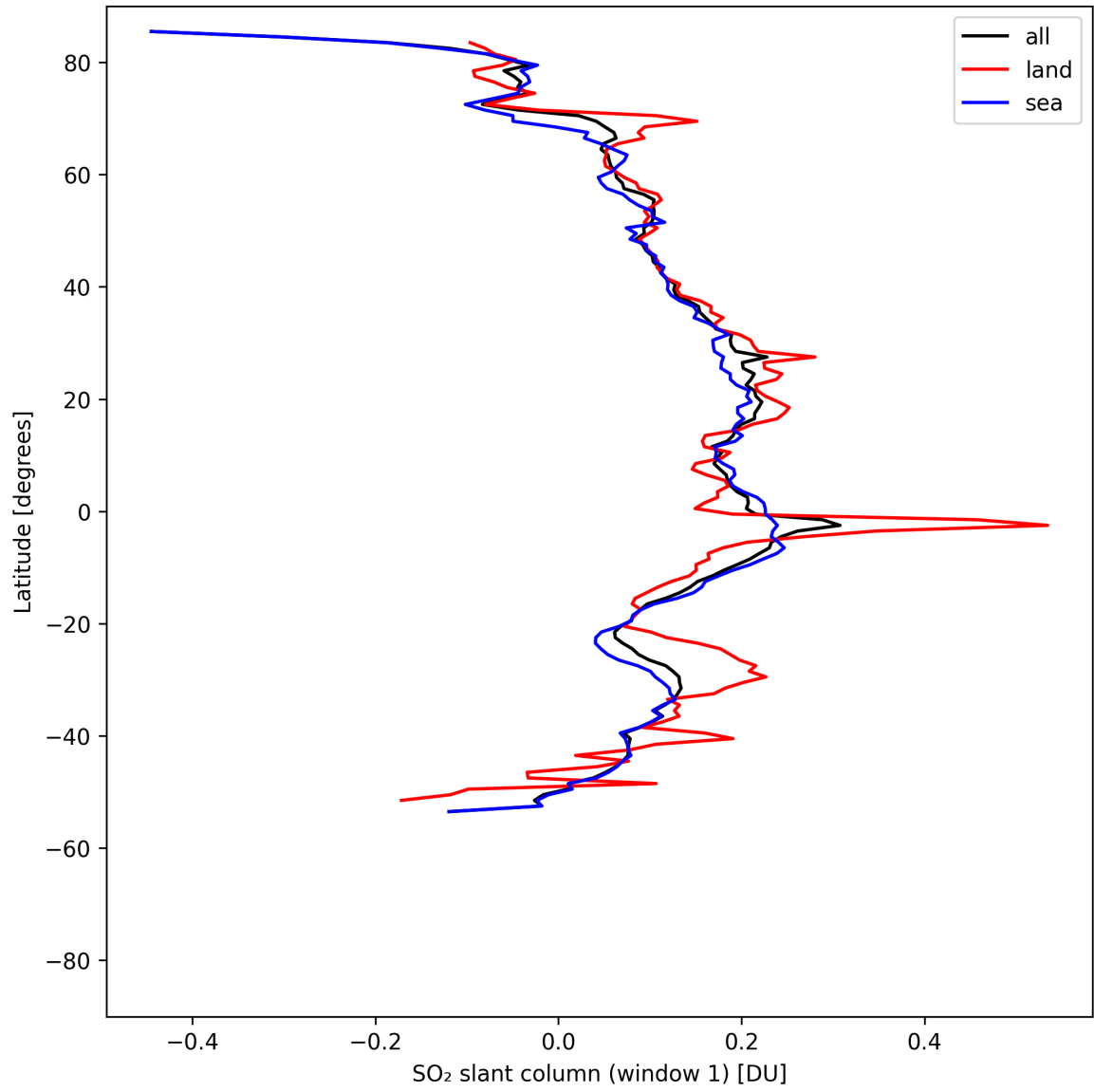


Figure 36: Zonal average of “SO₂ slant column (window 1)” for 2025-05-01 to 2025-05-01.

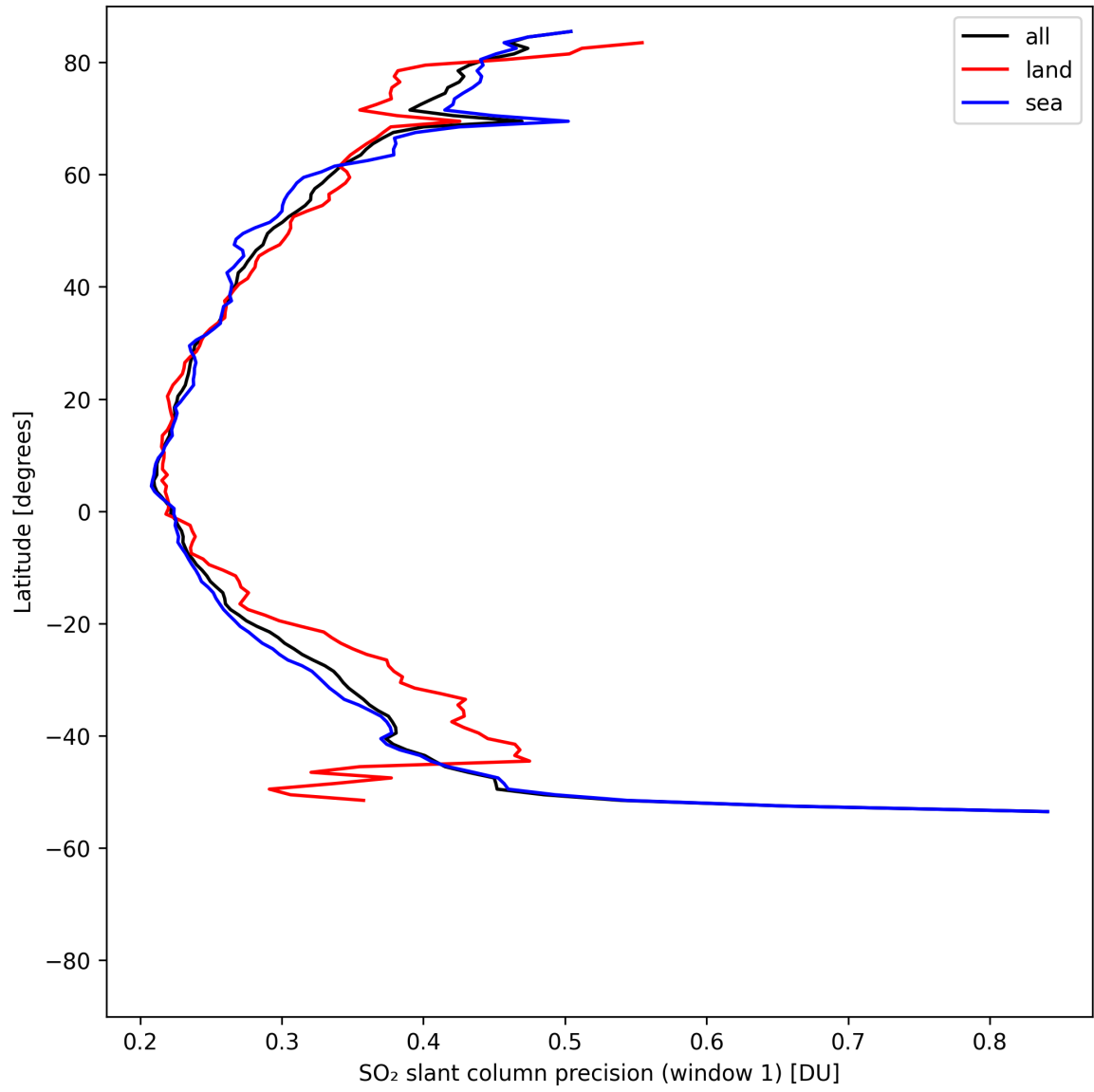


Figure 37: Zonal average of “SO₂ slant column precision (window 1)” for 2025-05-01 to 2025-05-01.

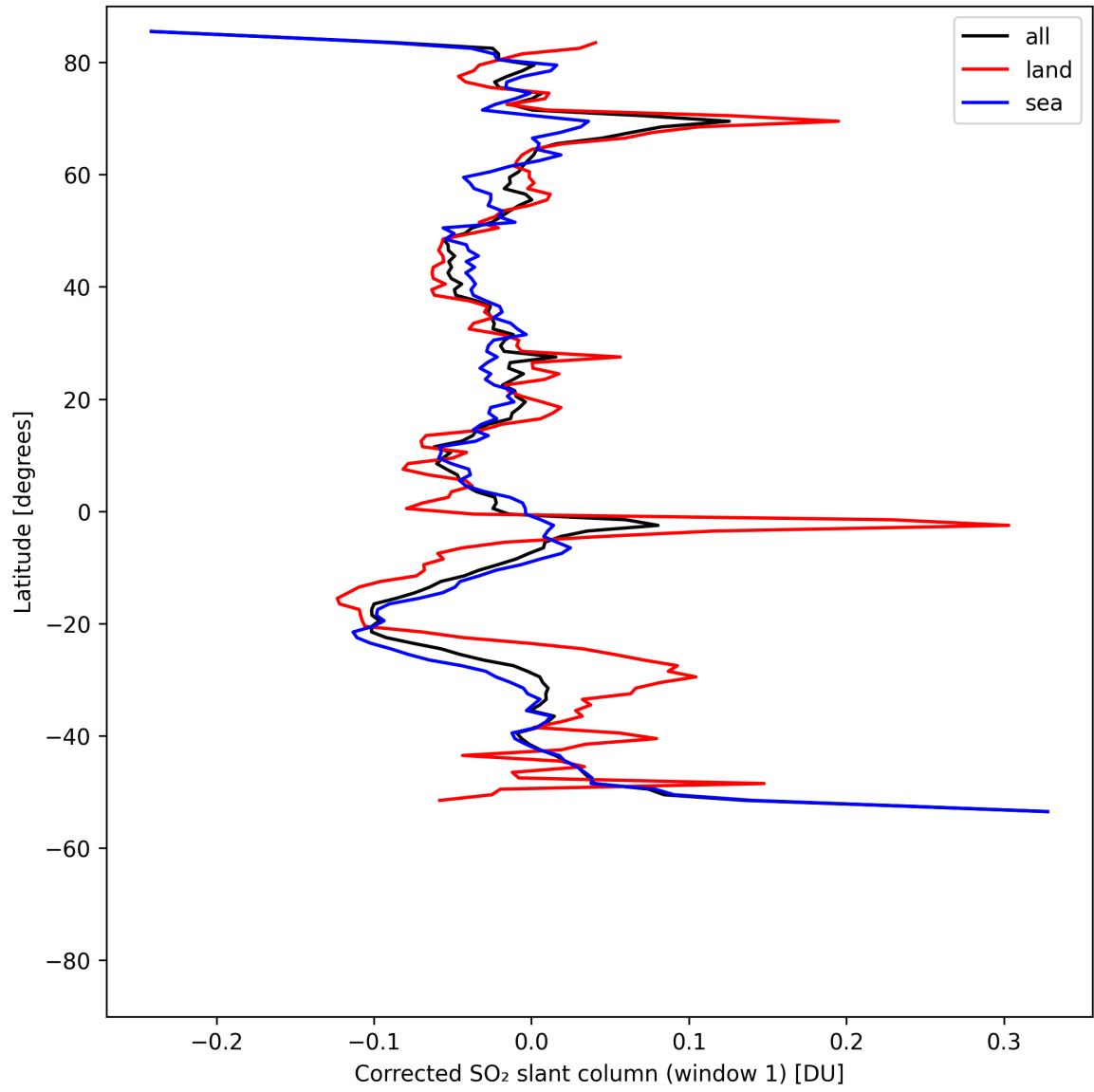


Figure 38: Zonal average of “Corrected SO₂ slant column (window 1)” for 2025-05-01 to 2025-05-01.

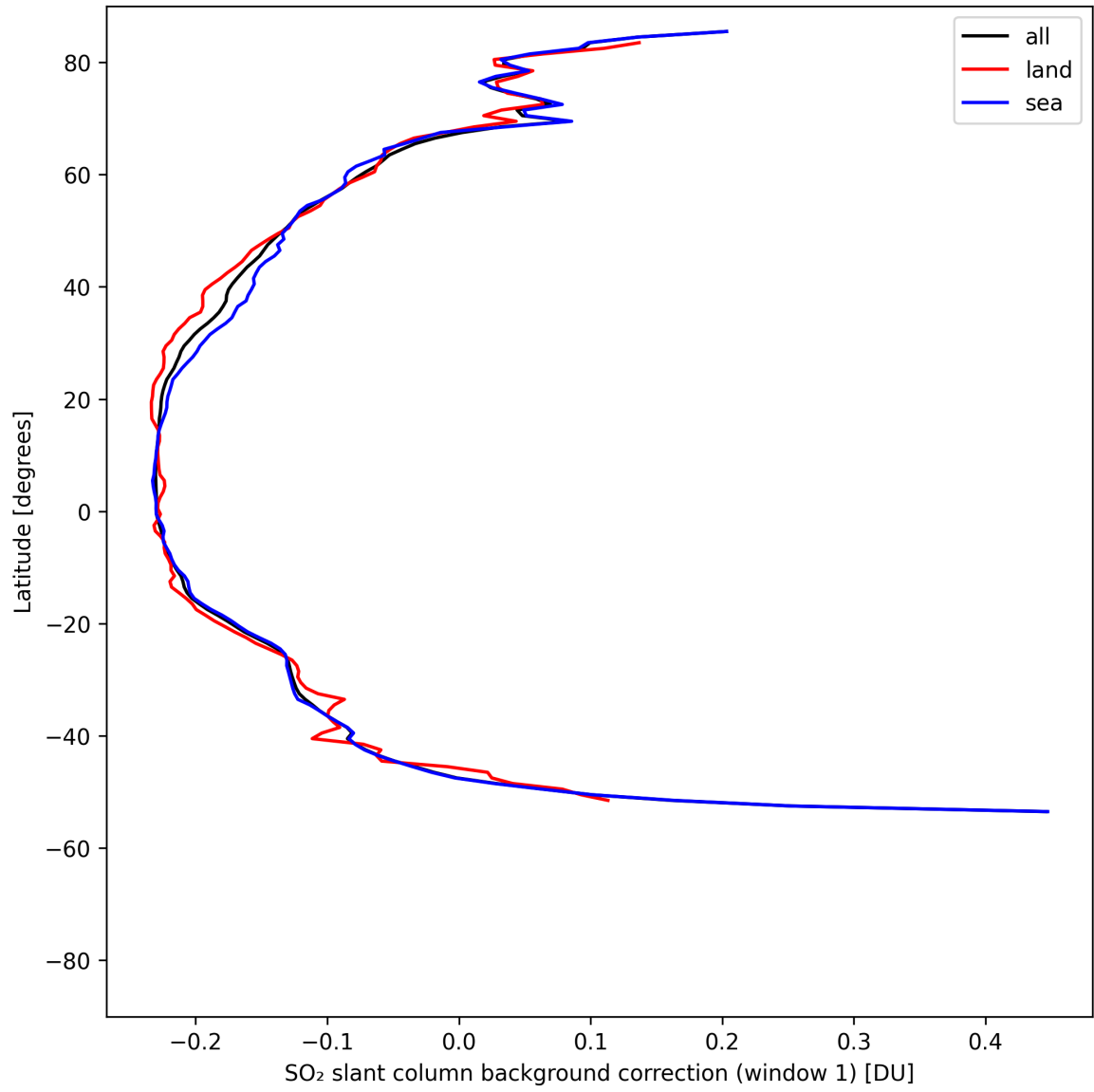


Figure 39: Zonal average of “SO₂ slant column background correction (window 1)” for 2025-05-01 to 2025-05-01.

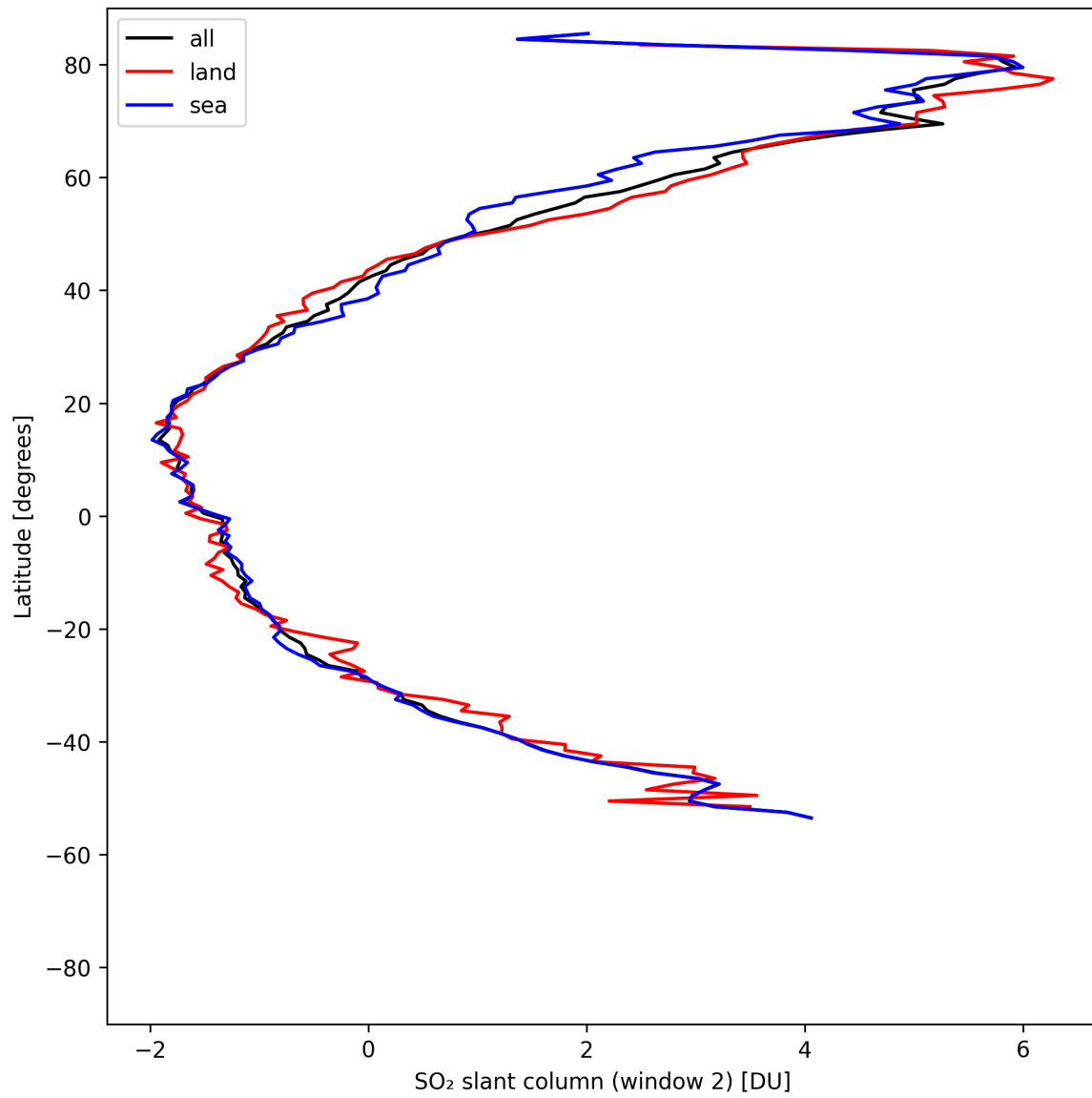


Figure 40: Zonal average of “SO₂ slant column (window 2)” for 2025-05-01 to 2025-05-01.

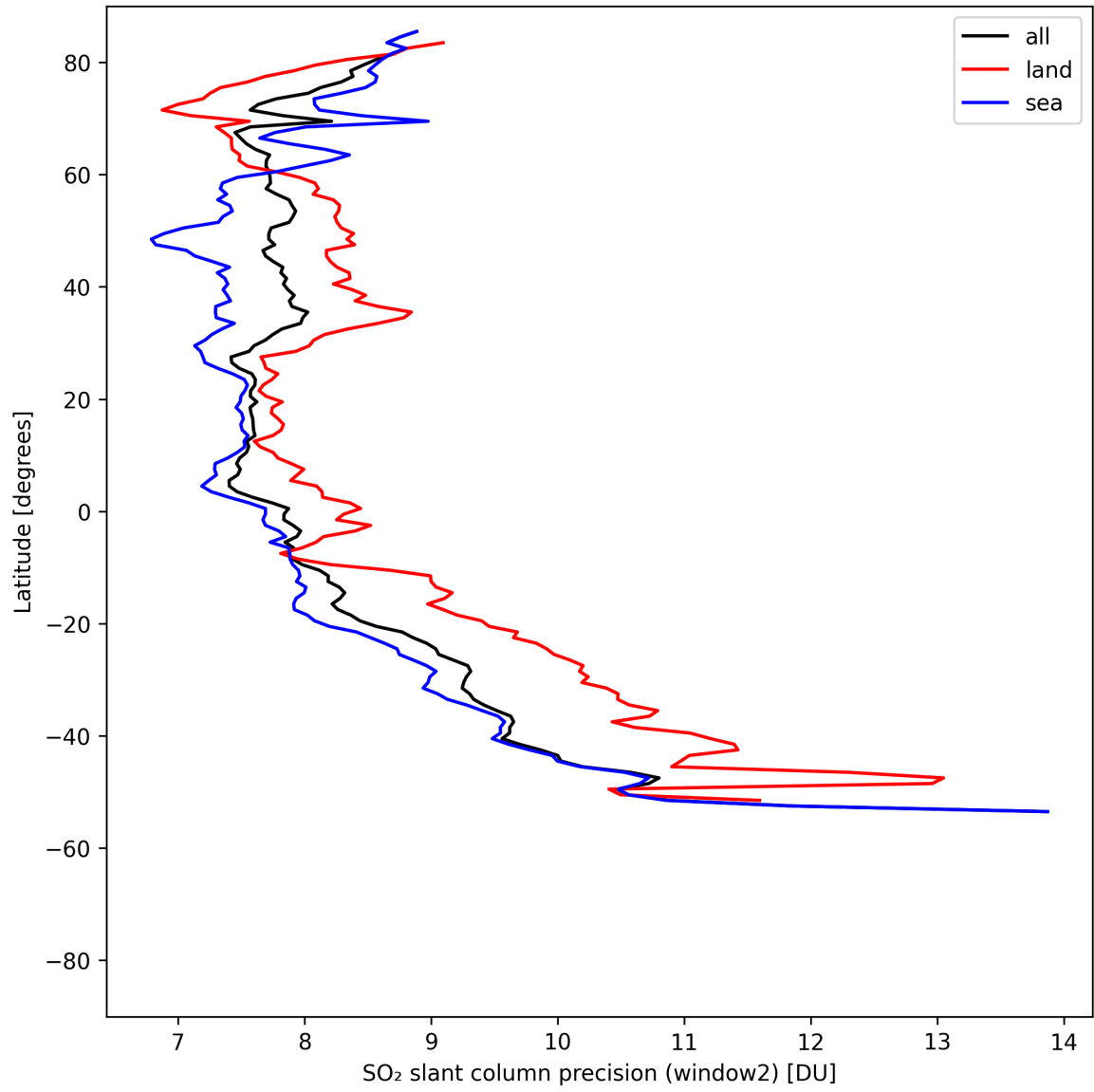


Figure 41: Zonal average of “SO₂ slant column precision (window2)” for 2025-05-01 to 2025-05-01.

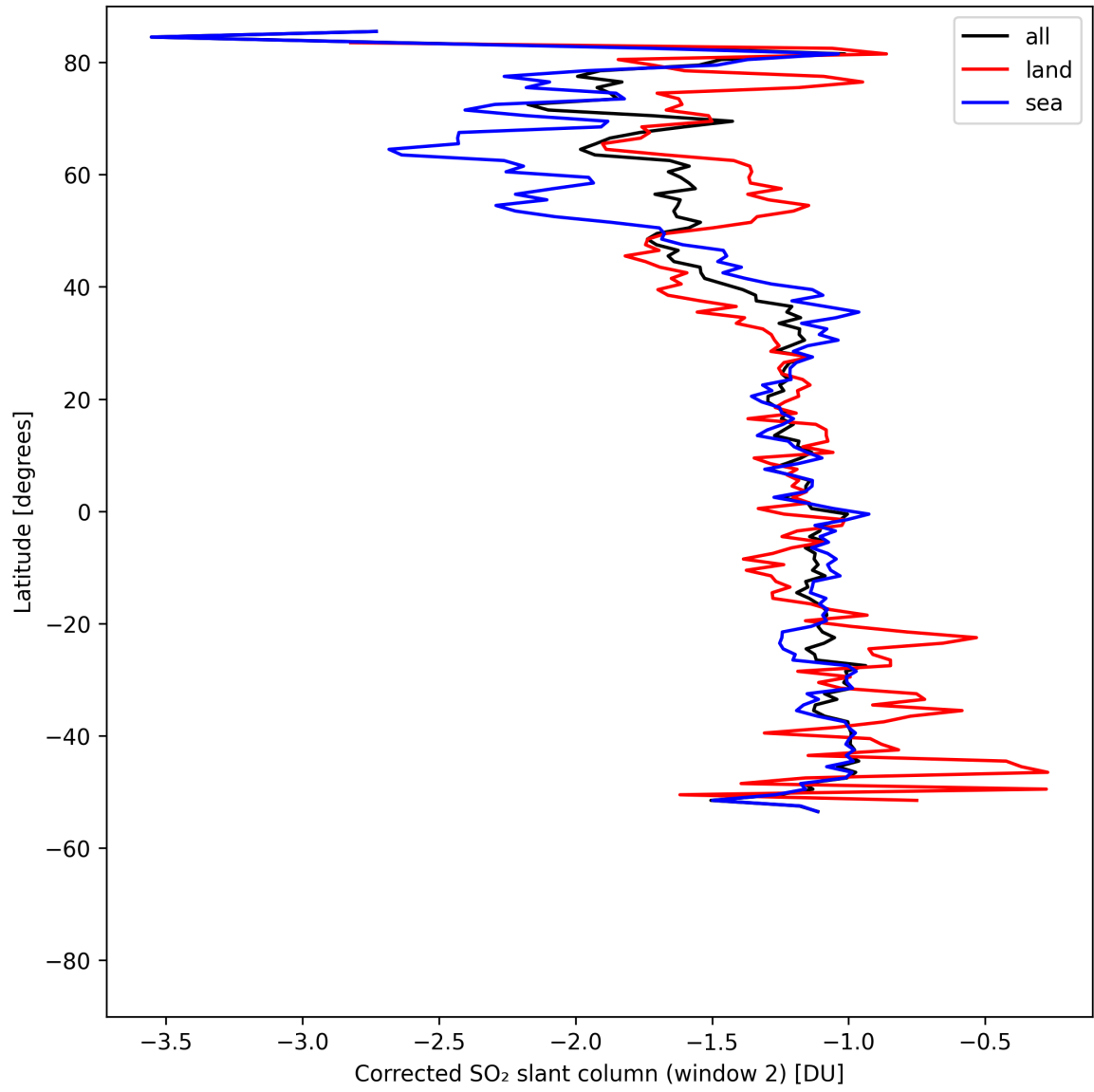


Figure 42: Zonal average of “Corrected SO₂ slant column (window 2)” for 2025-05-01 to 2025-05-01.

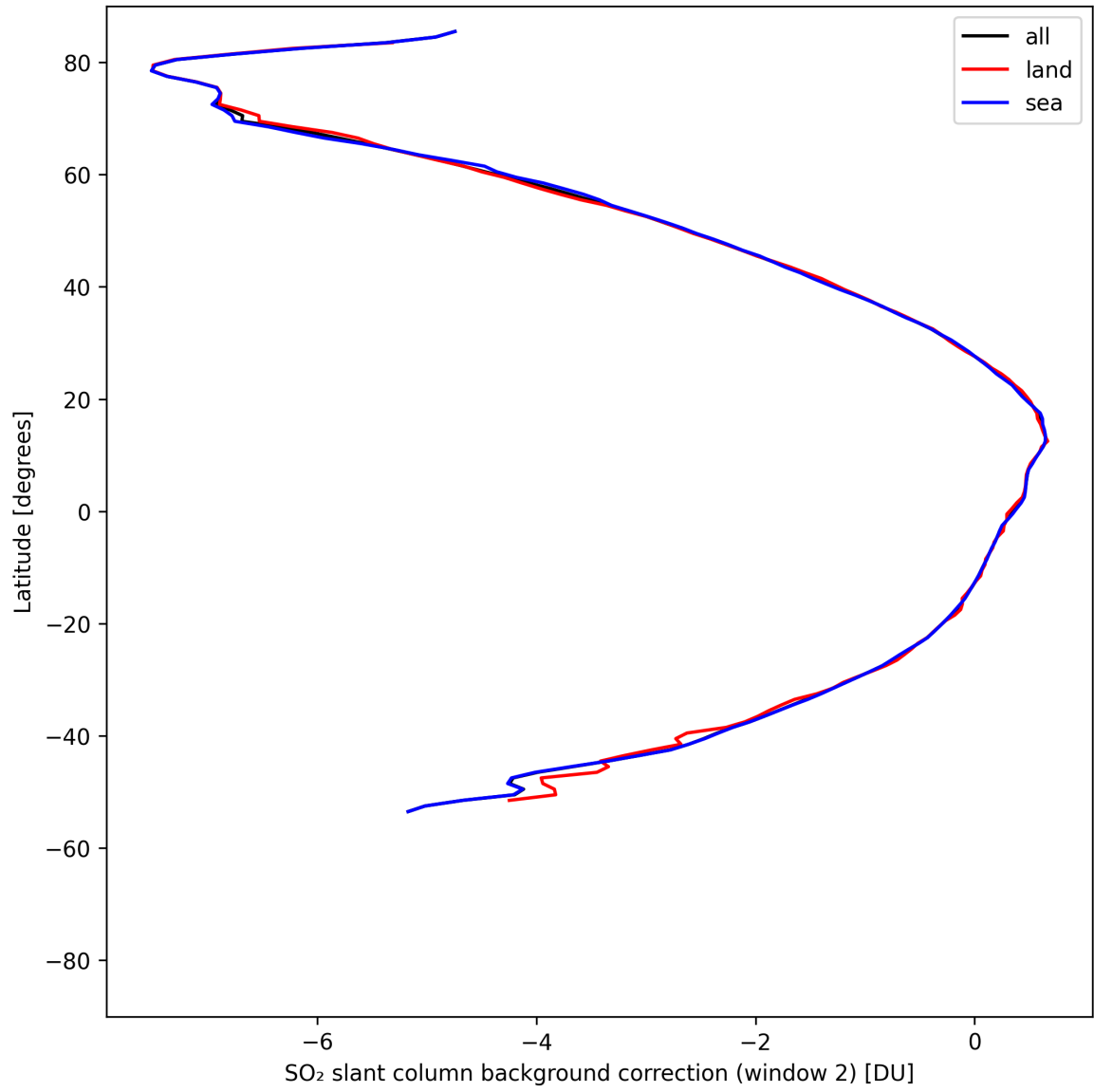


Figure 43: Zonal average of “SO₂ slant column background correction (window 2)” for 2025-05-01 to 2025-05-01.

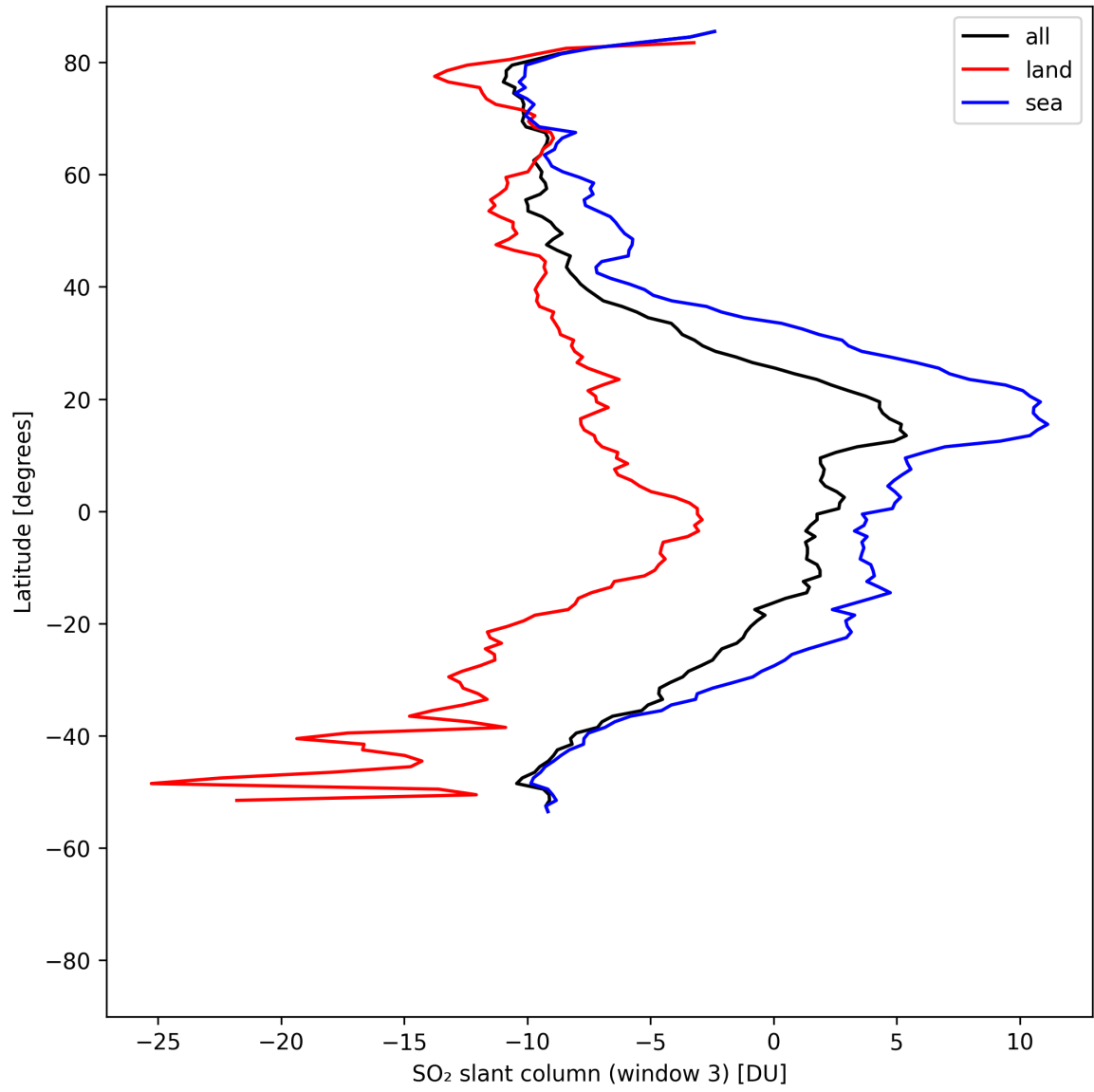


Figure 44: Zonal average of “SO₂ slant column (window 3)” for 2025-05-01 to 2025-05-01.

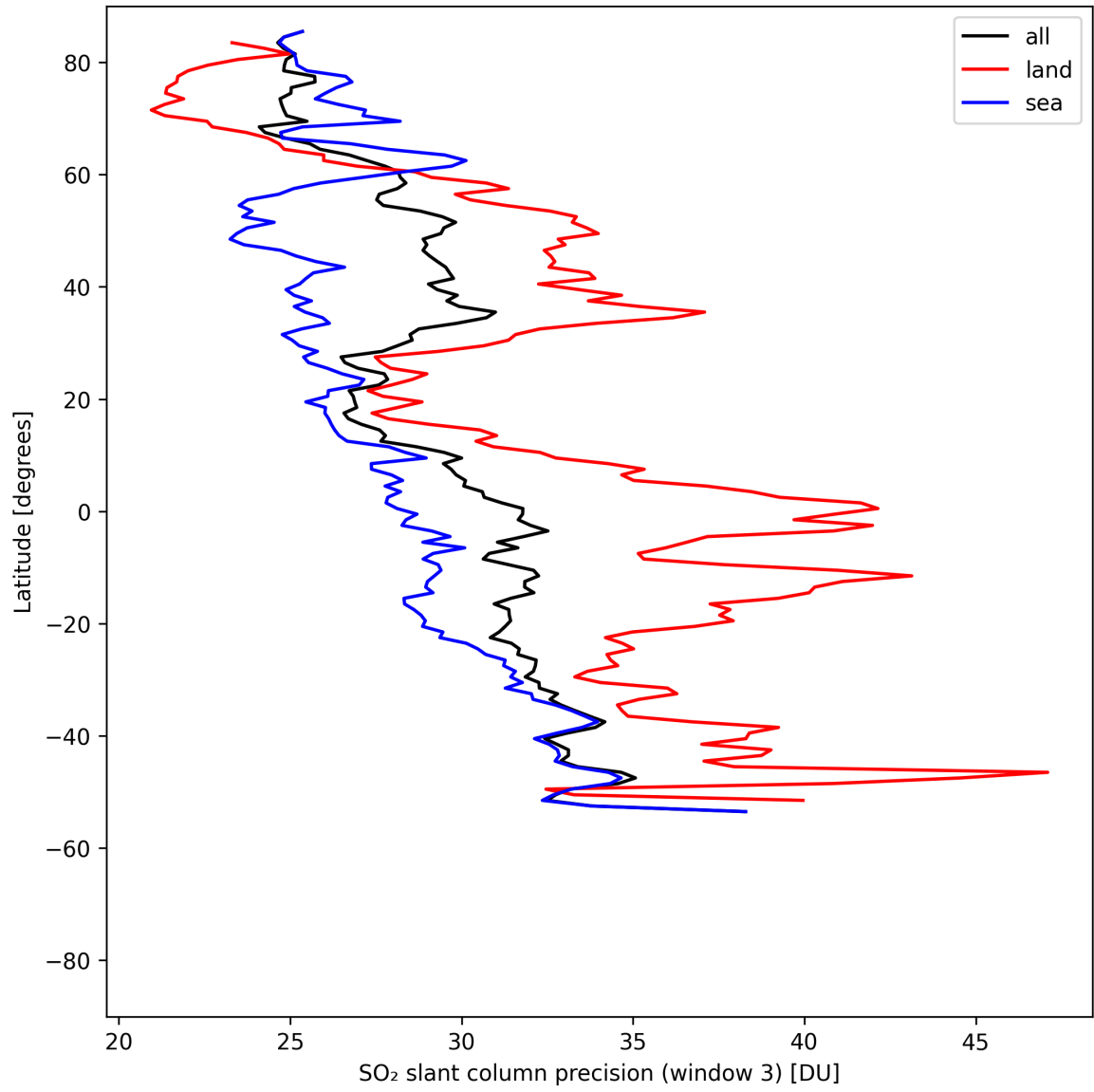


Figure 45: Zonal average of “SO₂ slant column precision (window 3)” for 2025-05-01 to 2025-05-01.

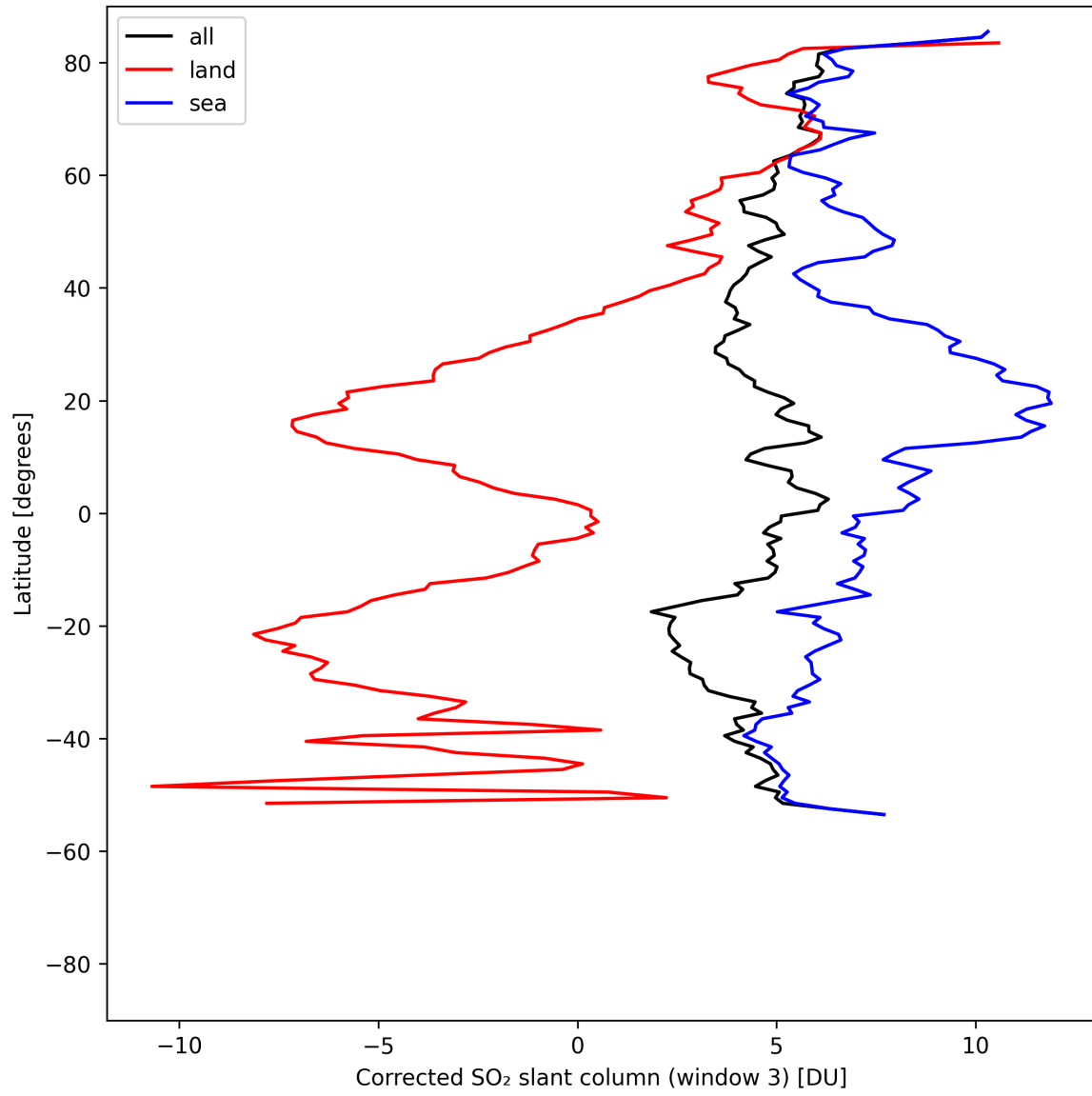


Figure 46: Zonal average of “Corrected SO₂ slant column (window 3)” for 2025-05-01 to 2025-05-01.

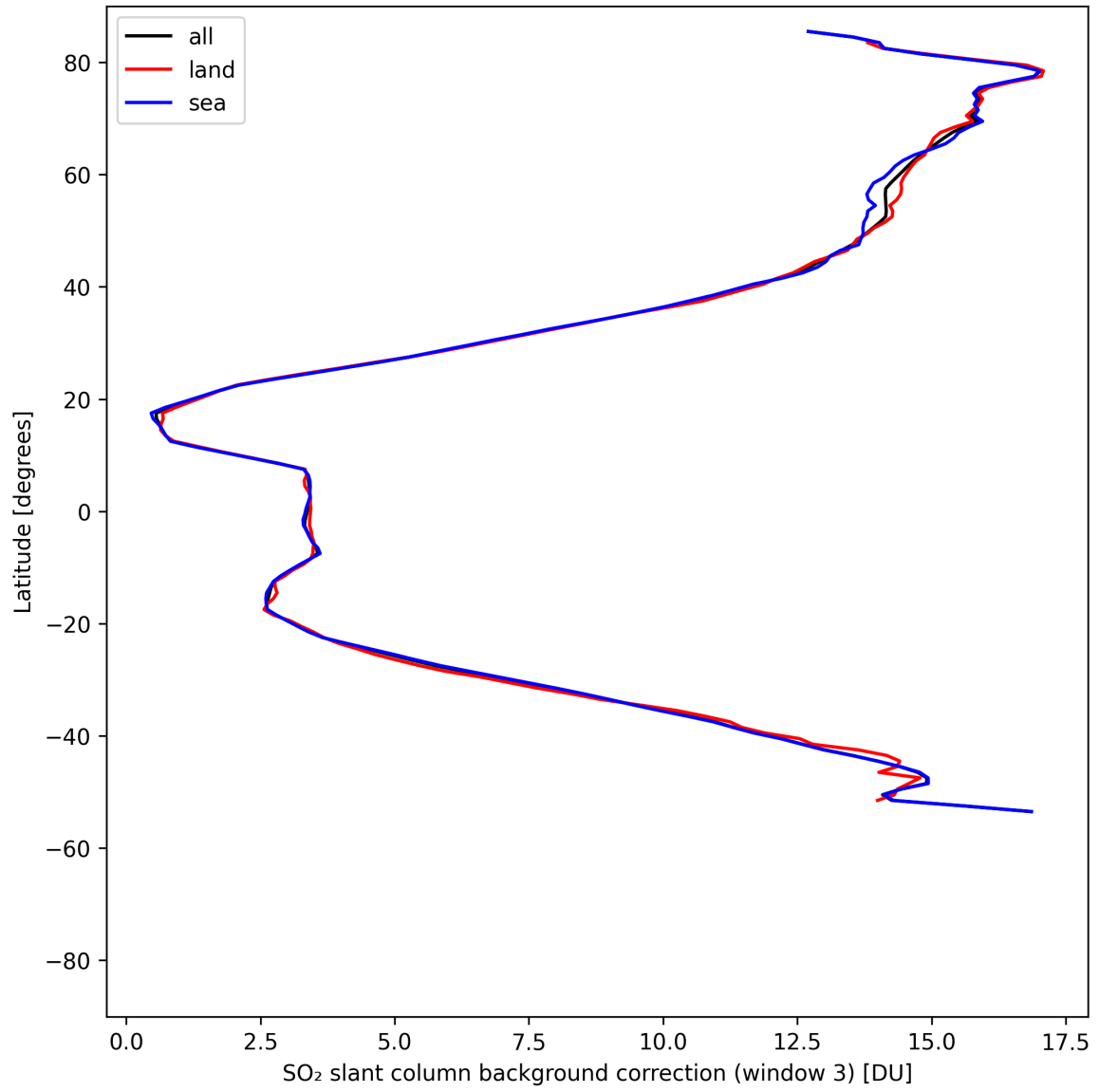


Figure 47: Zonal average of “SO₂ slant column background correction (window 3)” for 2025-05-01 to 2025-05-01.

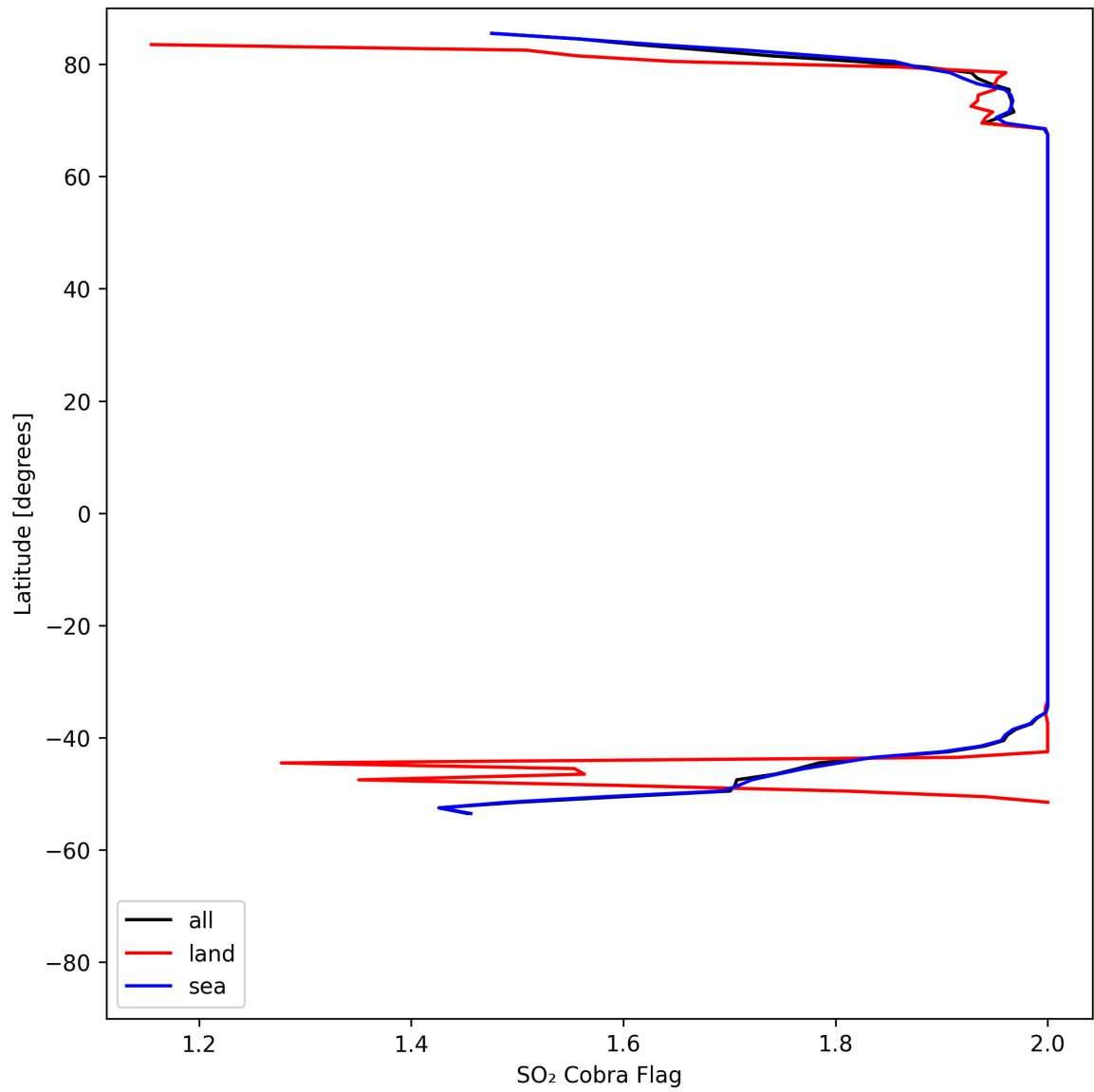


Figure 48: Zonal average of "SO₂ Cobra Flag" for 2025-05-01 to 2025-05-01.

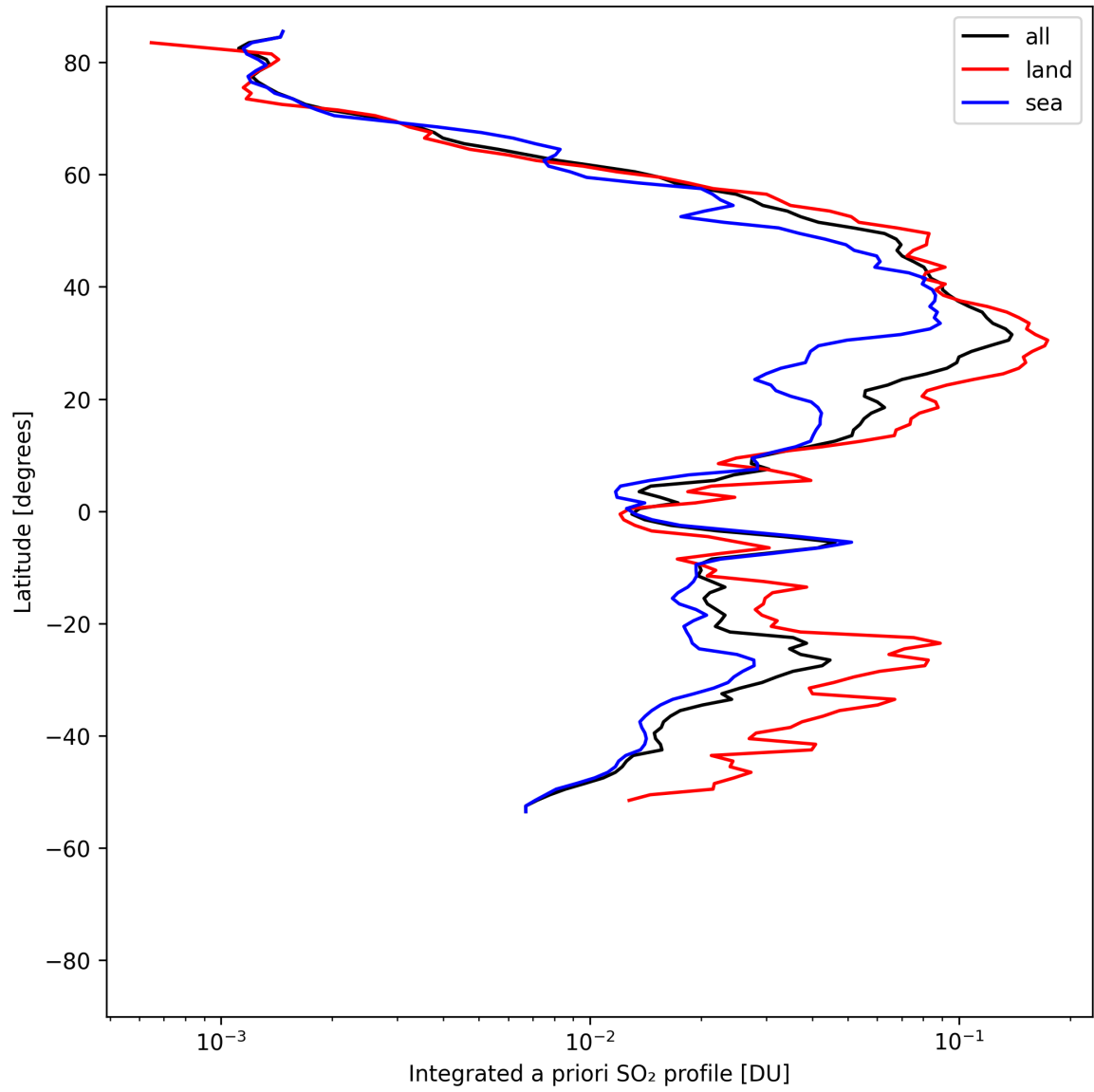


Figure 49: Zonal average of “Integrated a priori SO₂ profile” for 2025-05-01 to 2025-05-01.

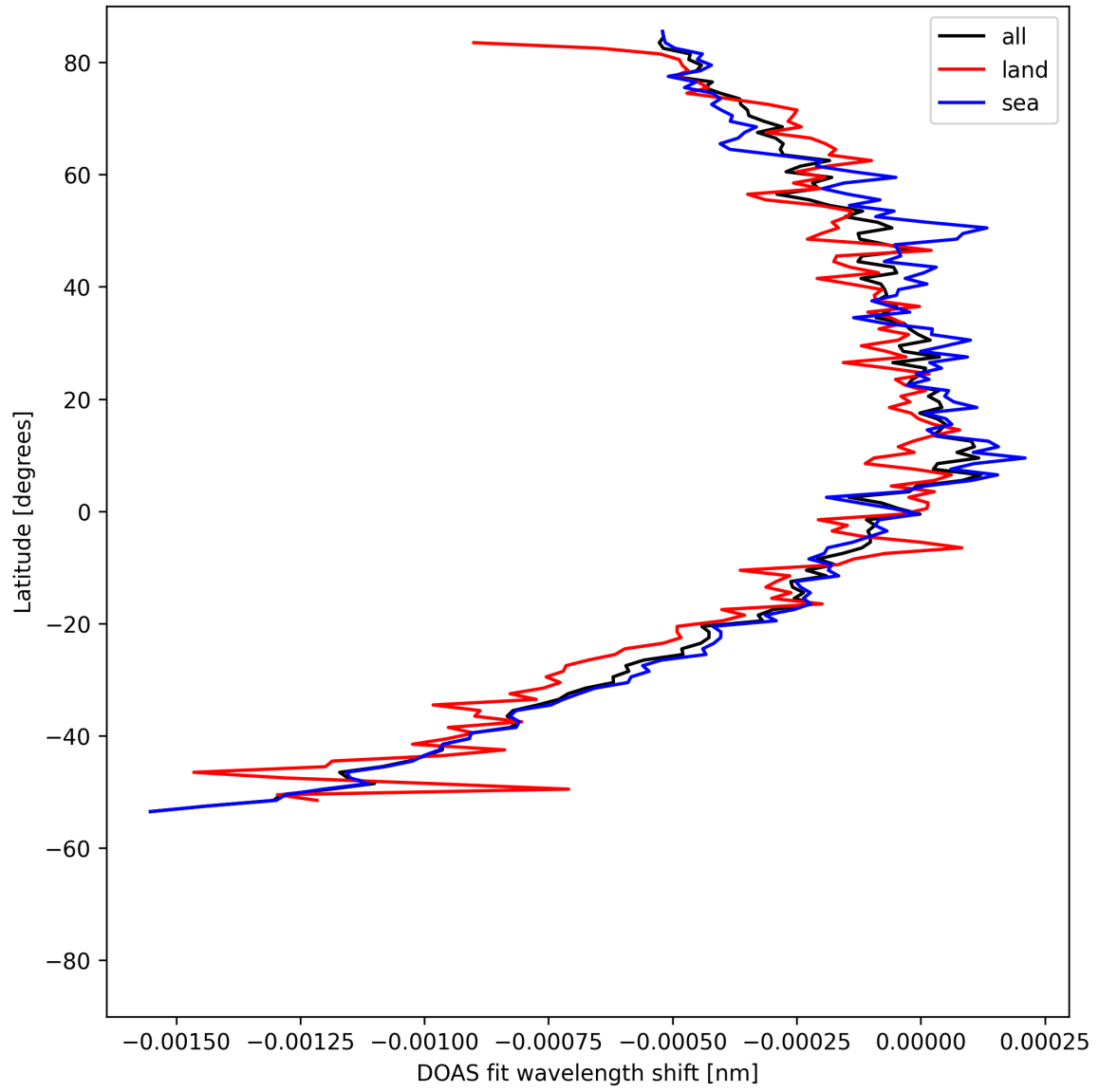


Figure 50: Zonal average of “DOAS fit wavelength shift” for 2025-05-01 to 2025-05-01.

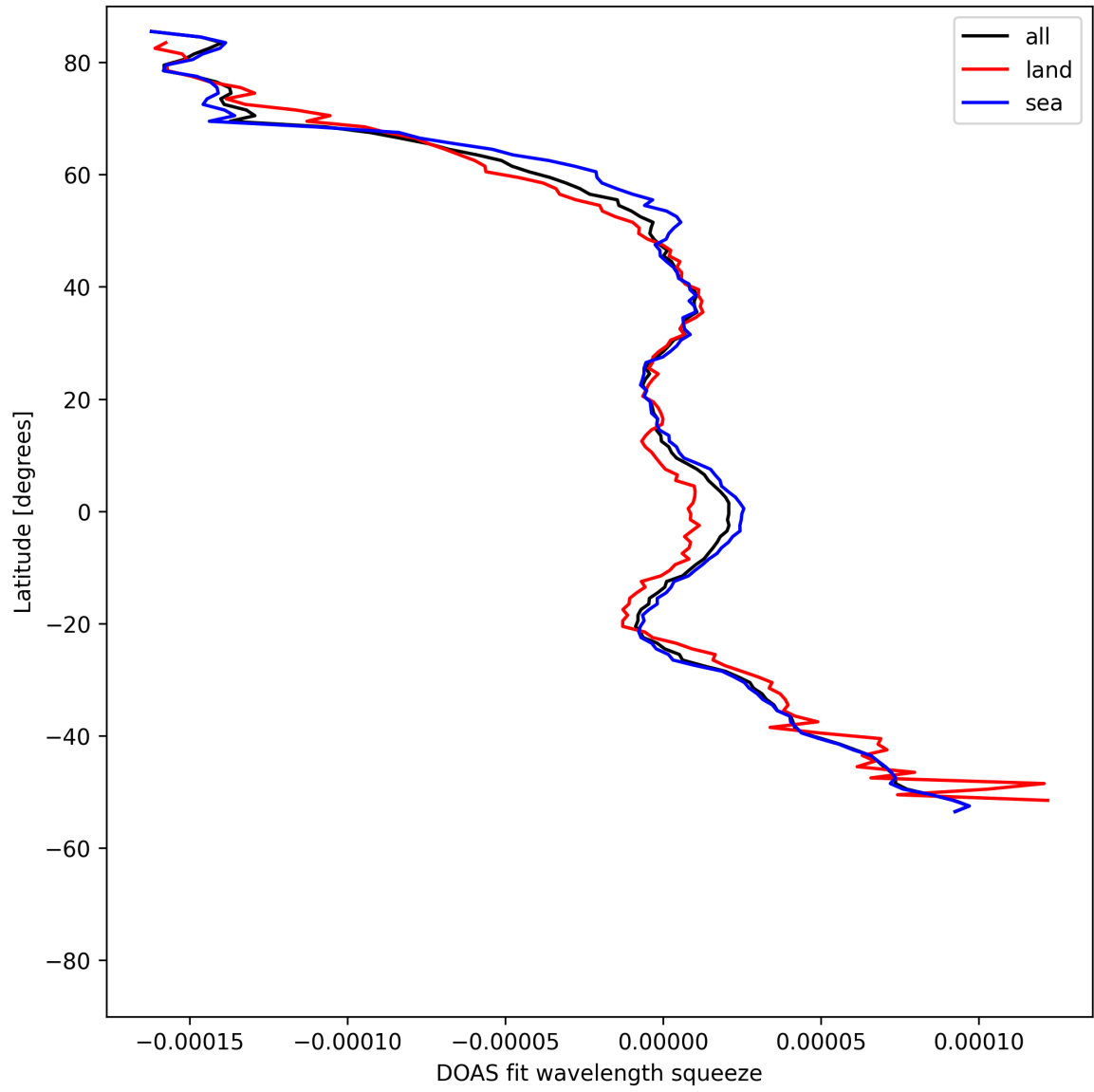


Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-05-01 to 2025-05-01.

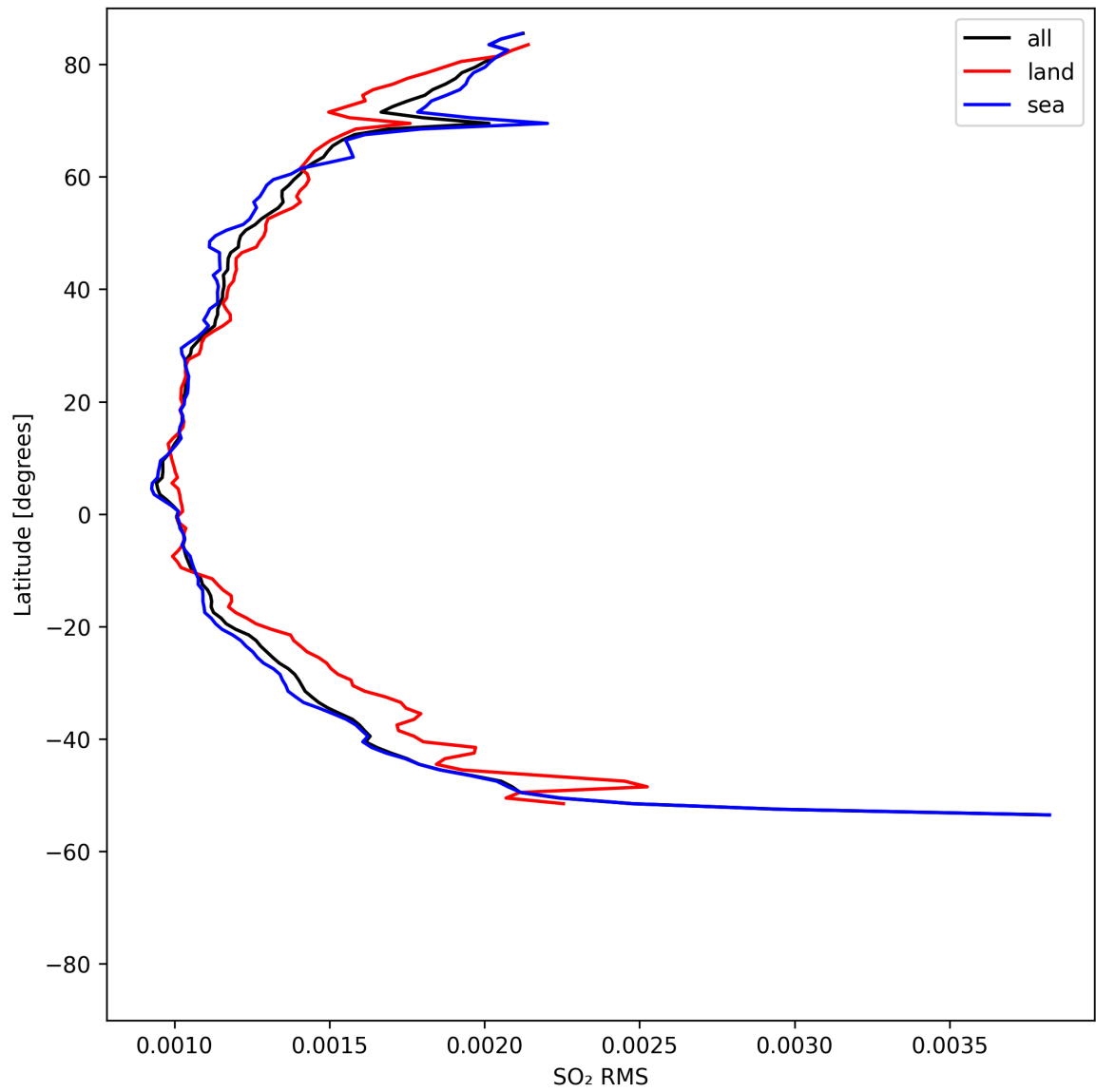


Figure 52: Zonal average of “SO₂ RMS” for 2025-05-01 to 2025-05-01.

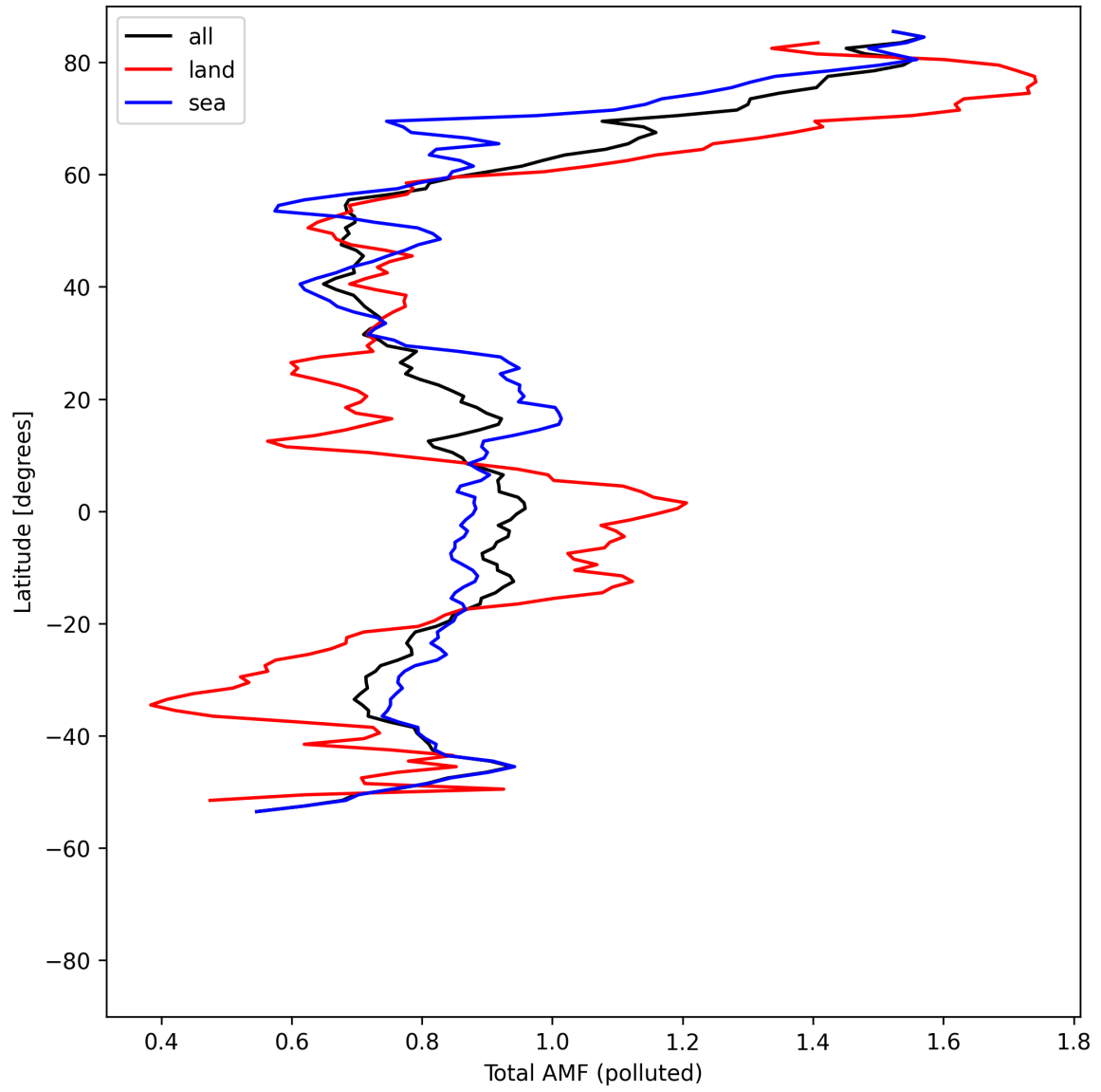


Figure 53: Zonal average of “Total AMF (polluted)” for 2025-05-01 to 2025-05-01.

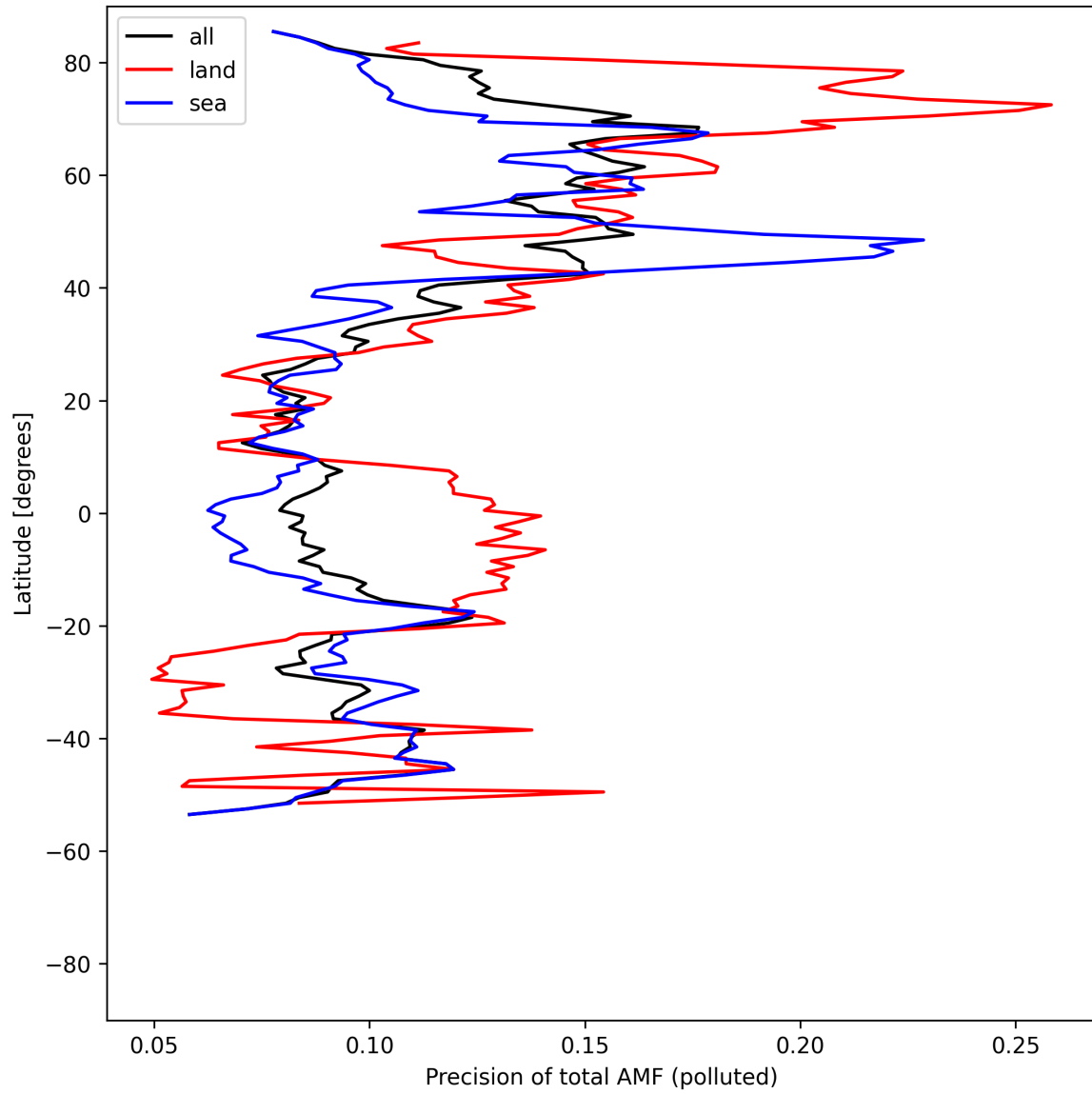


Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-05-01 to 2025-05-01.

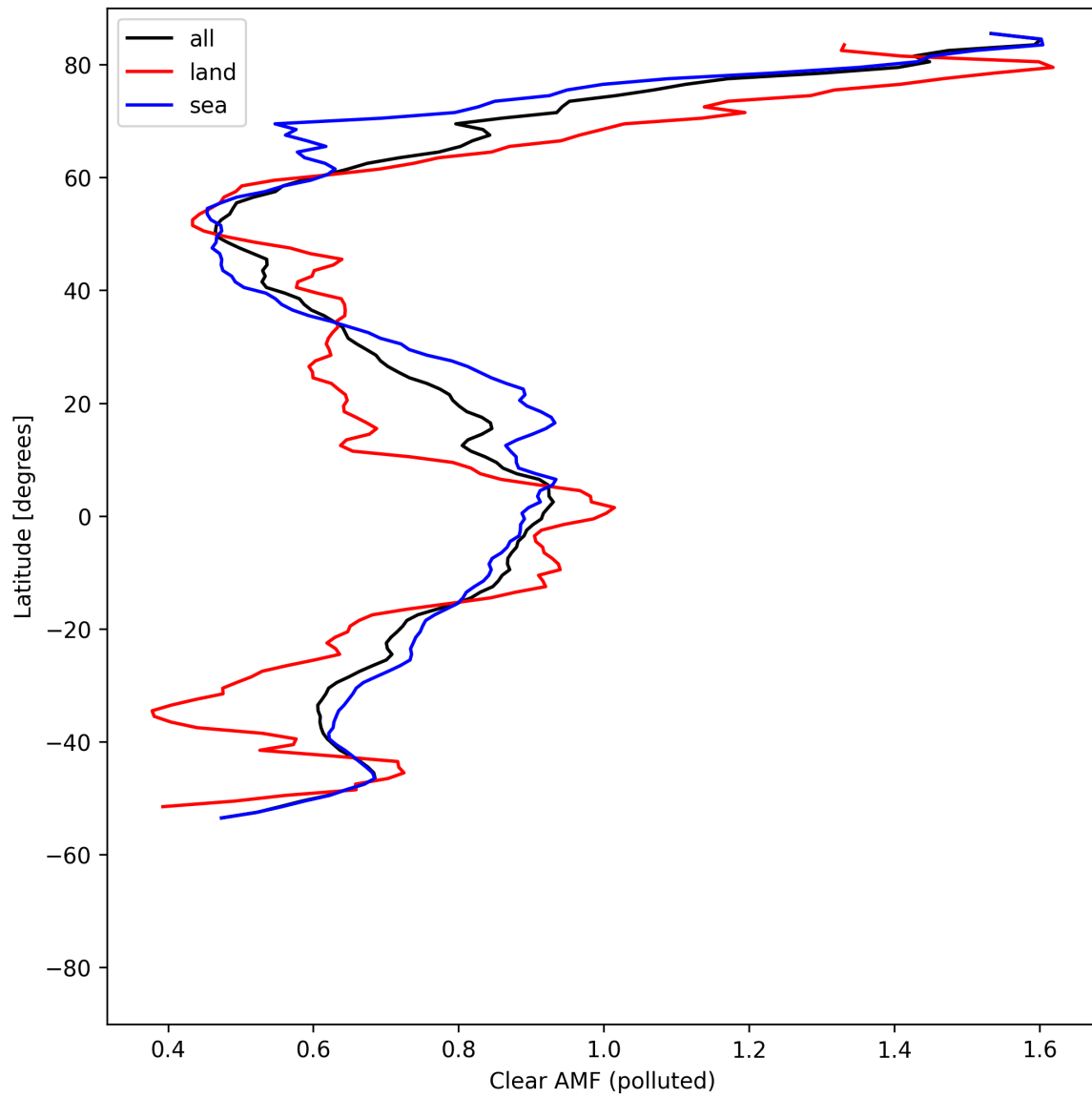


Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-05-01 to 2025-05-01.

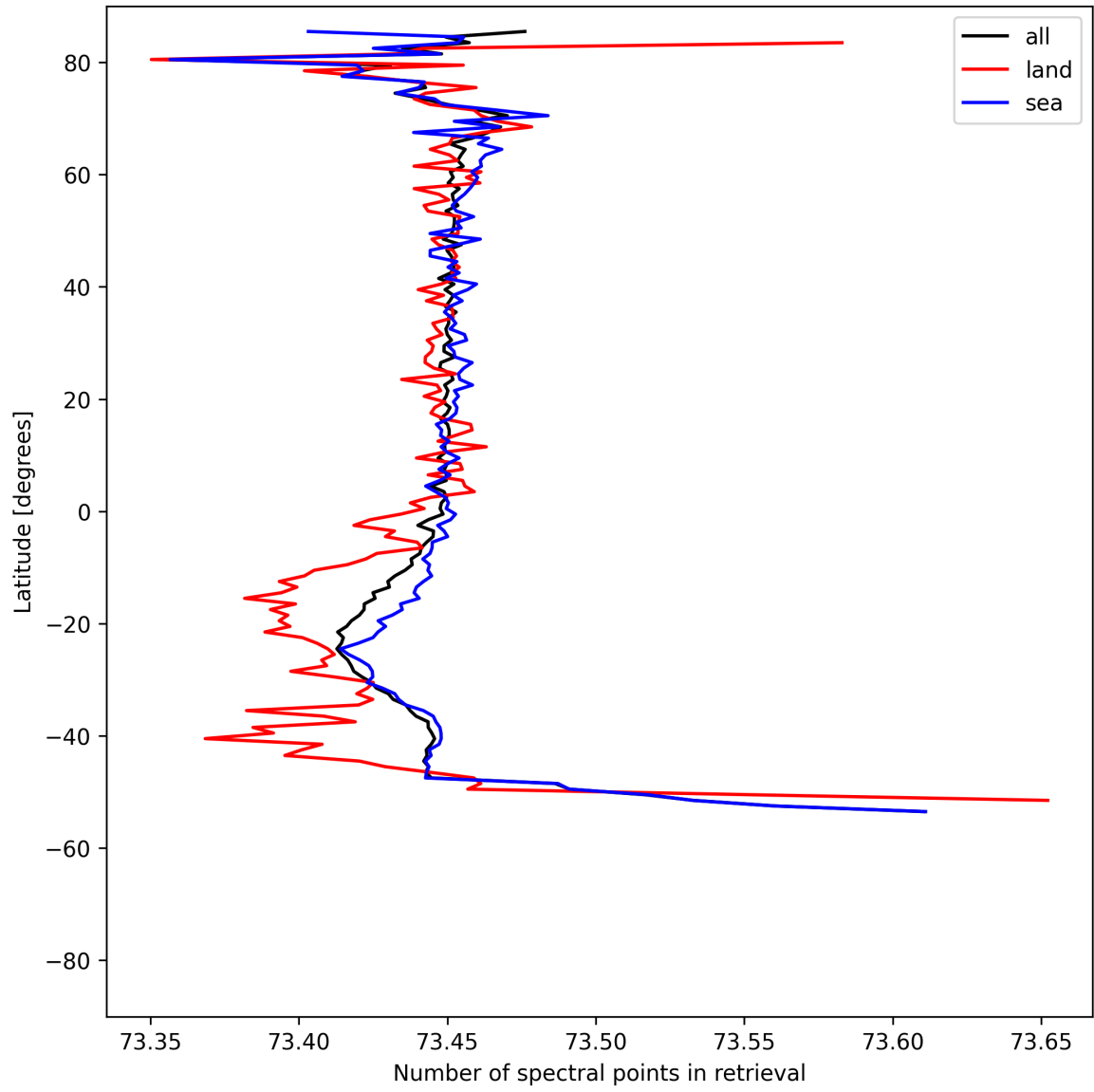


Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-05-01 to 2025-05-01.

8 Histograms

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

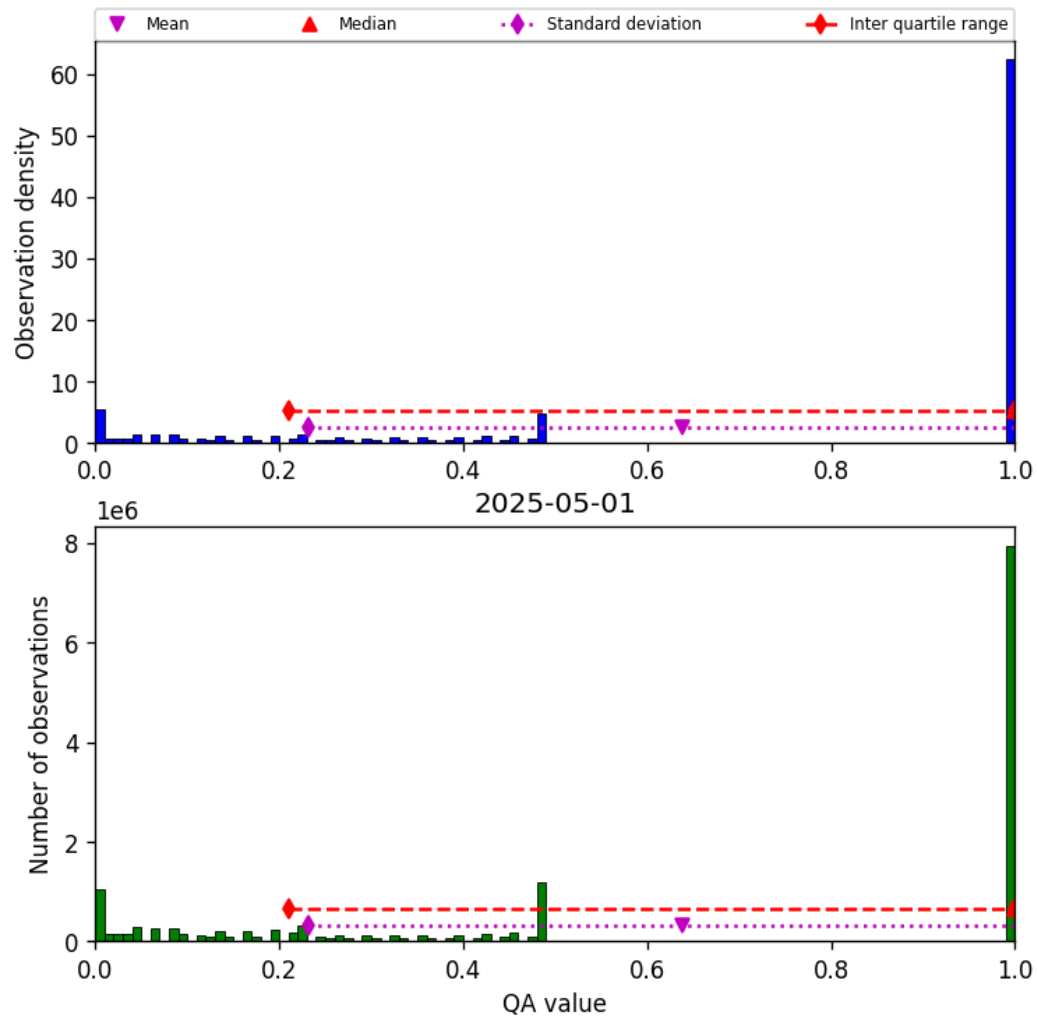


Figure 57: Histogram of “QA value” for 2025-05-01 to 2025-05-01

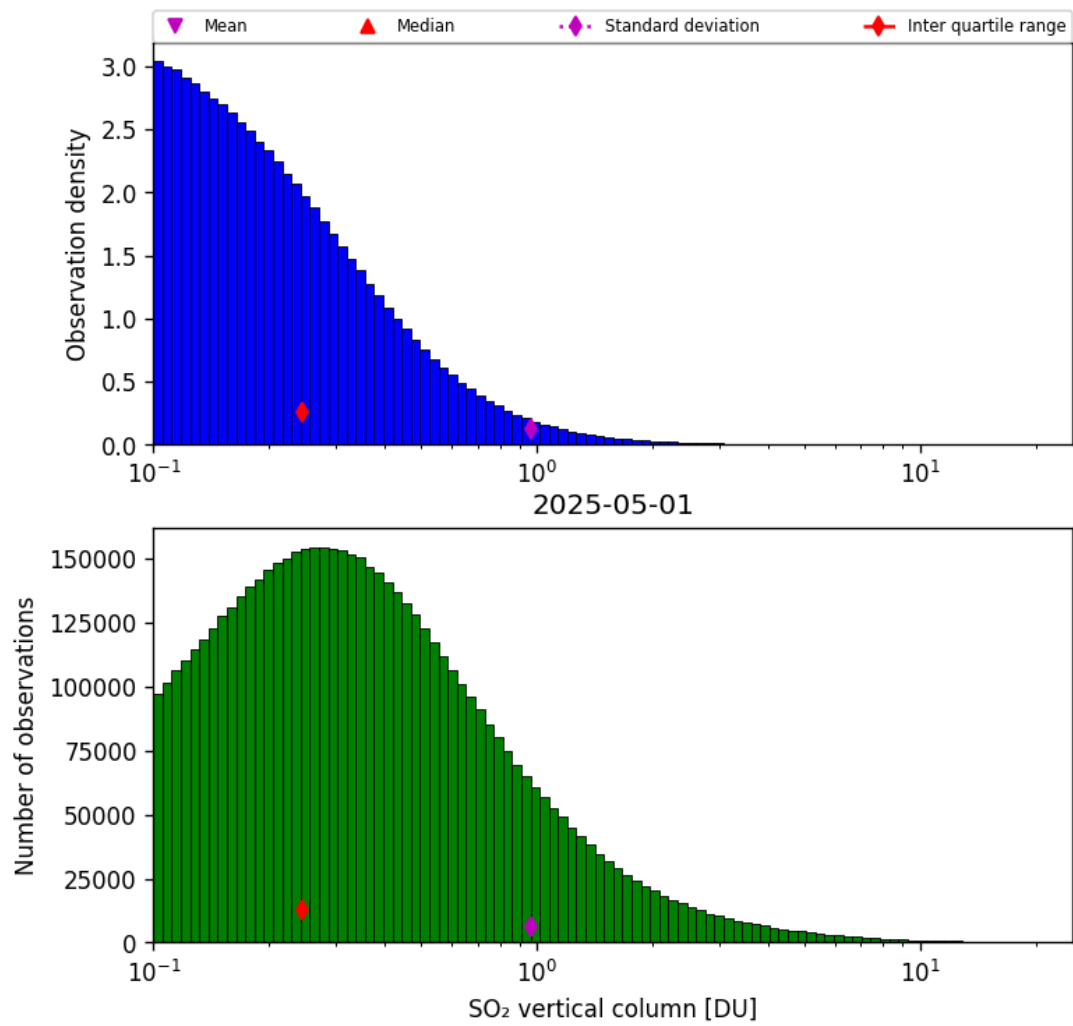


Figure 58: Histogram of “SO₂ vertical column” for 2025-05-01 to 2025-05-01

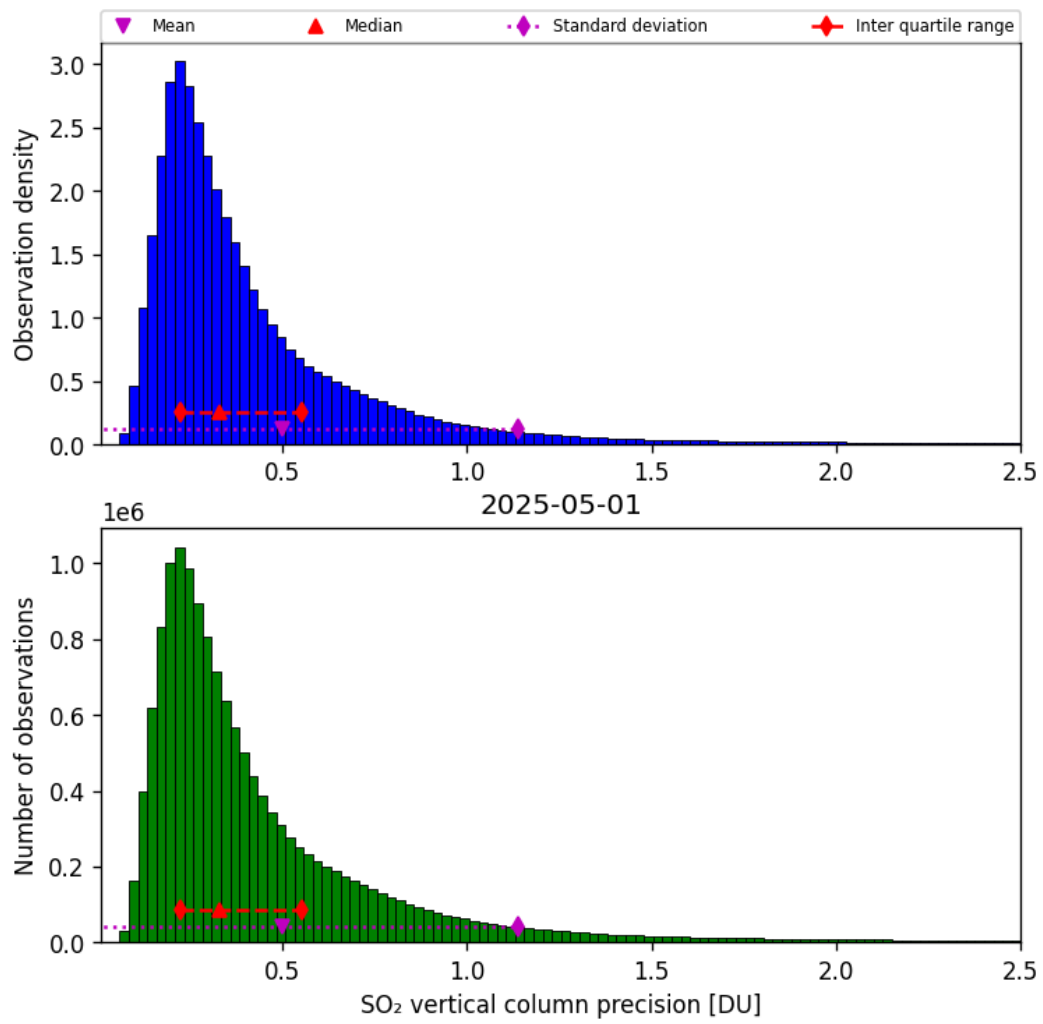


Figure 59: Histogram of “SO₂ vertical column precision” for 2025-05-01 to 2025-05-01

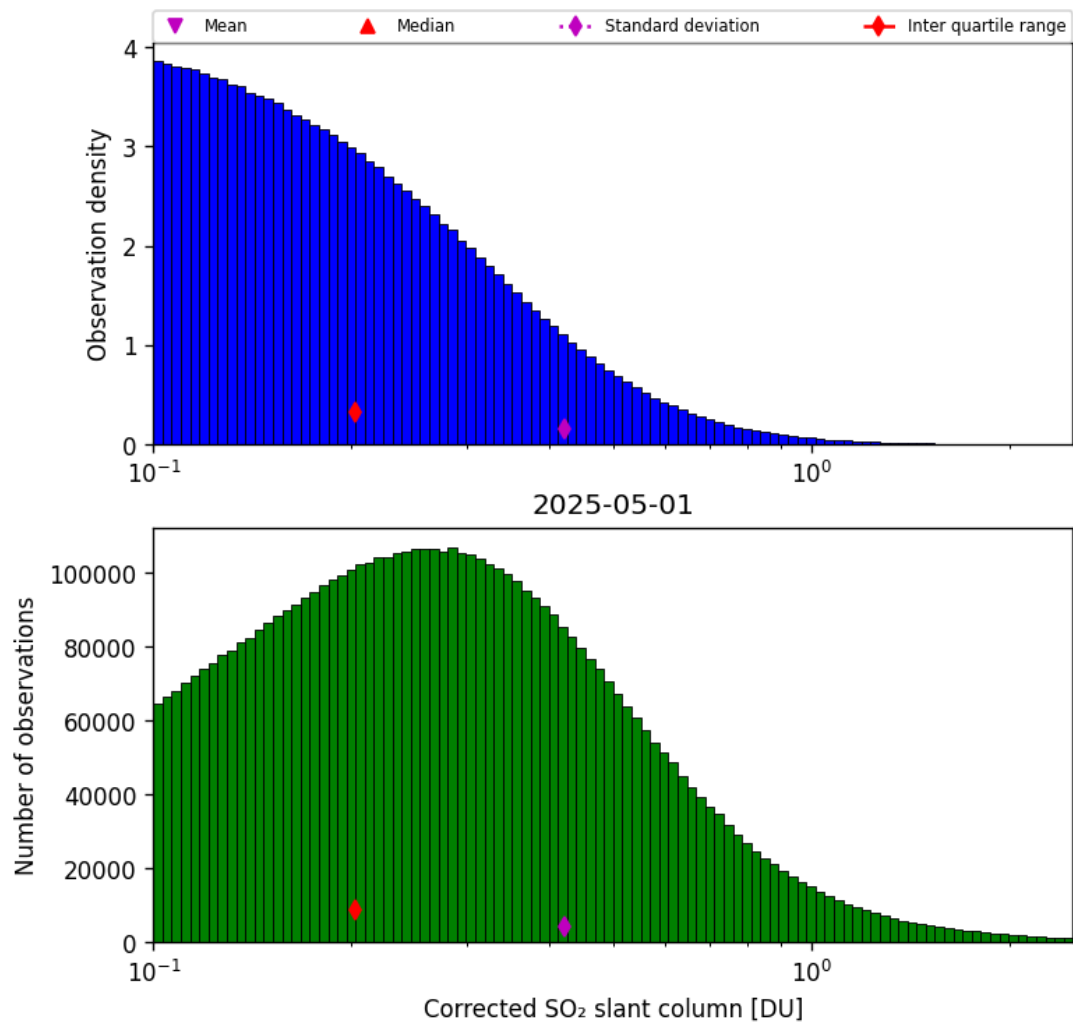


Figure 60: Histogram of “Corrected SO₂ slant column” for 2025-05-01 to 2025-05-01

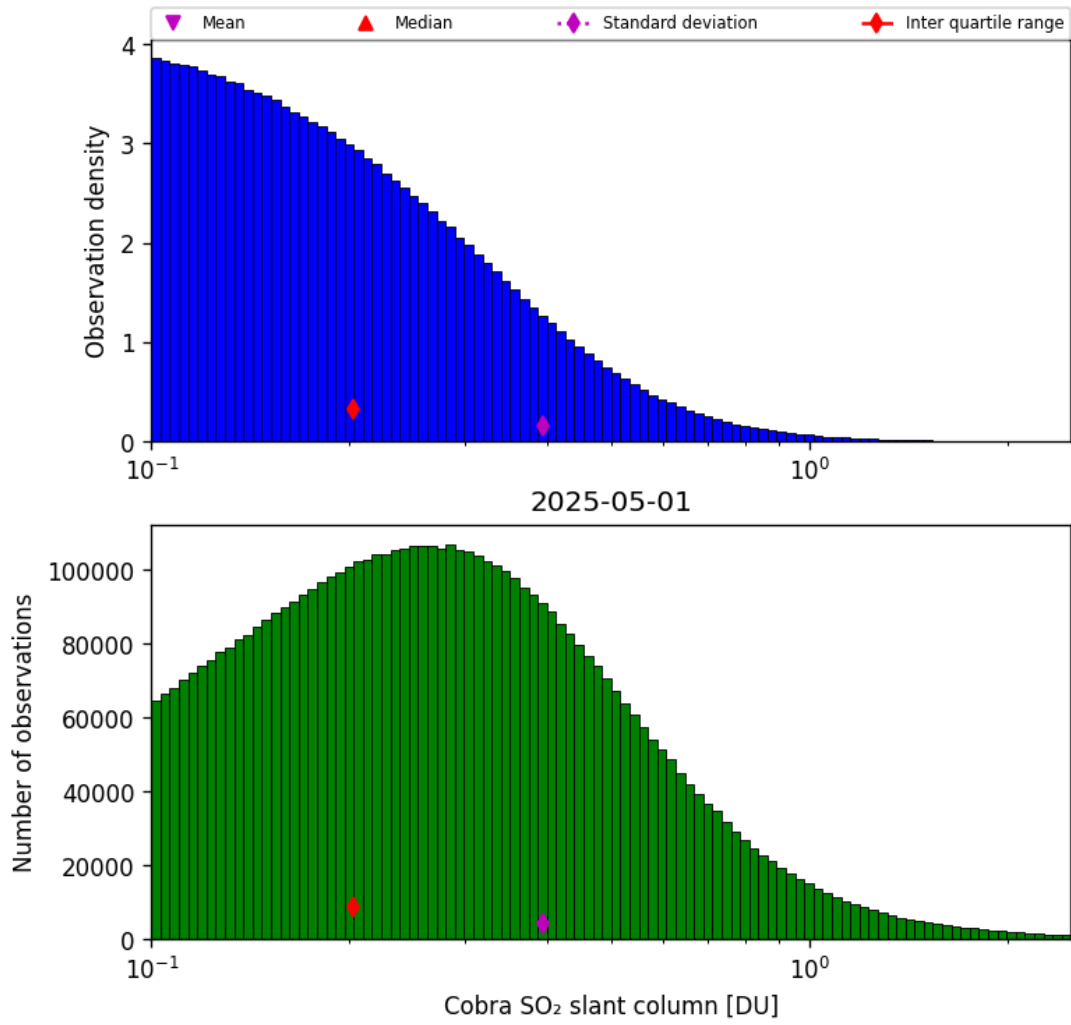


Figure 61: Histogram of “Cobra SO₂ slant column” for 2025-05-01 to 2025-05-01

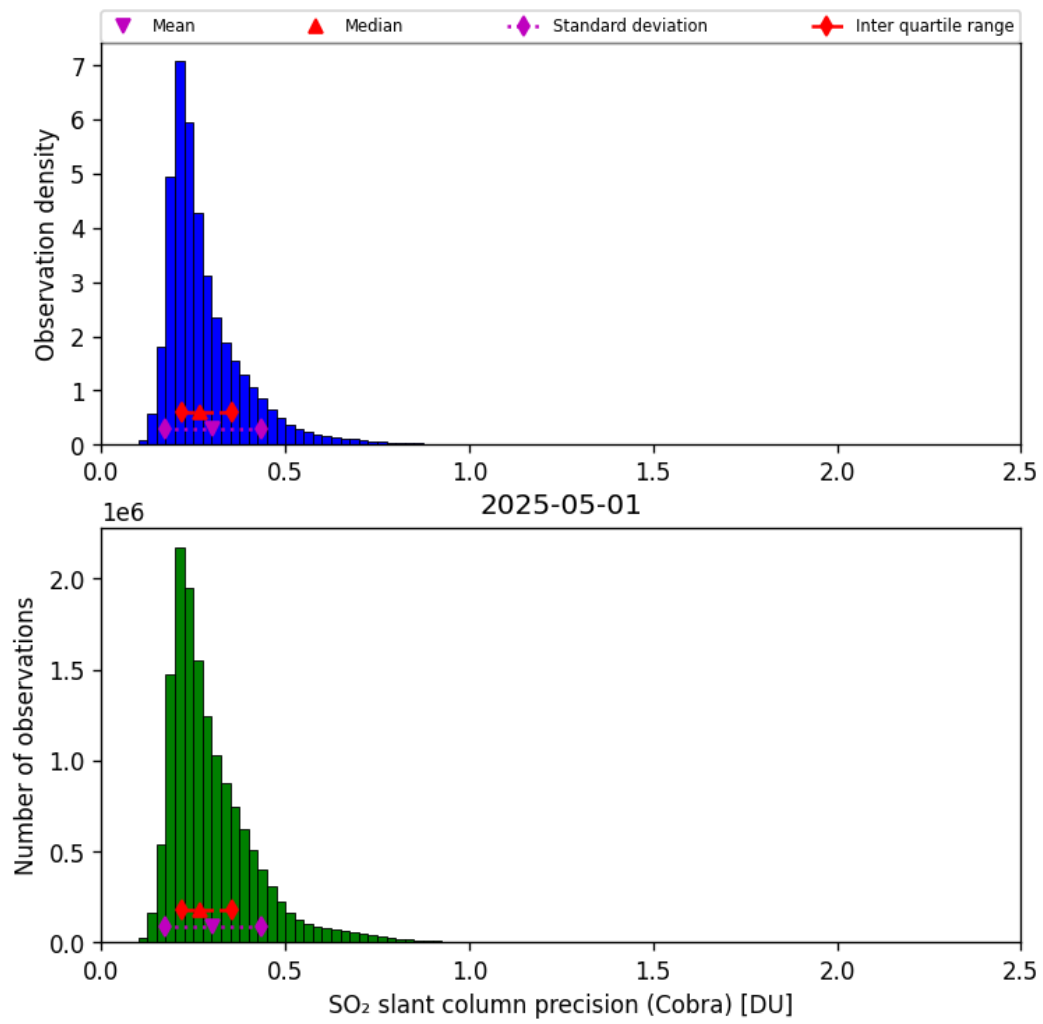


Figure 62: Histogram of “SO₂ slant column precision (Cobra)” for 2025-05-01 to 2025-05-01

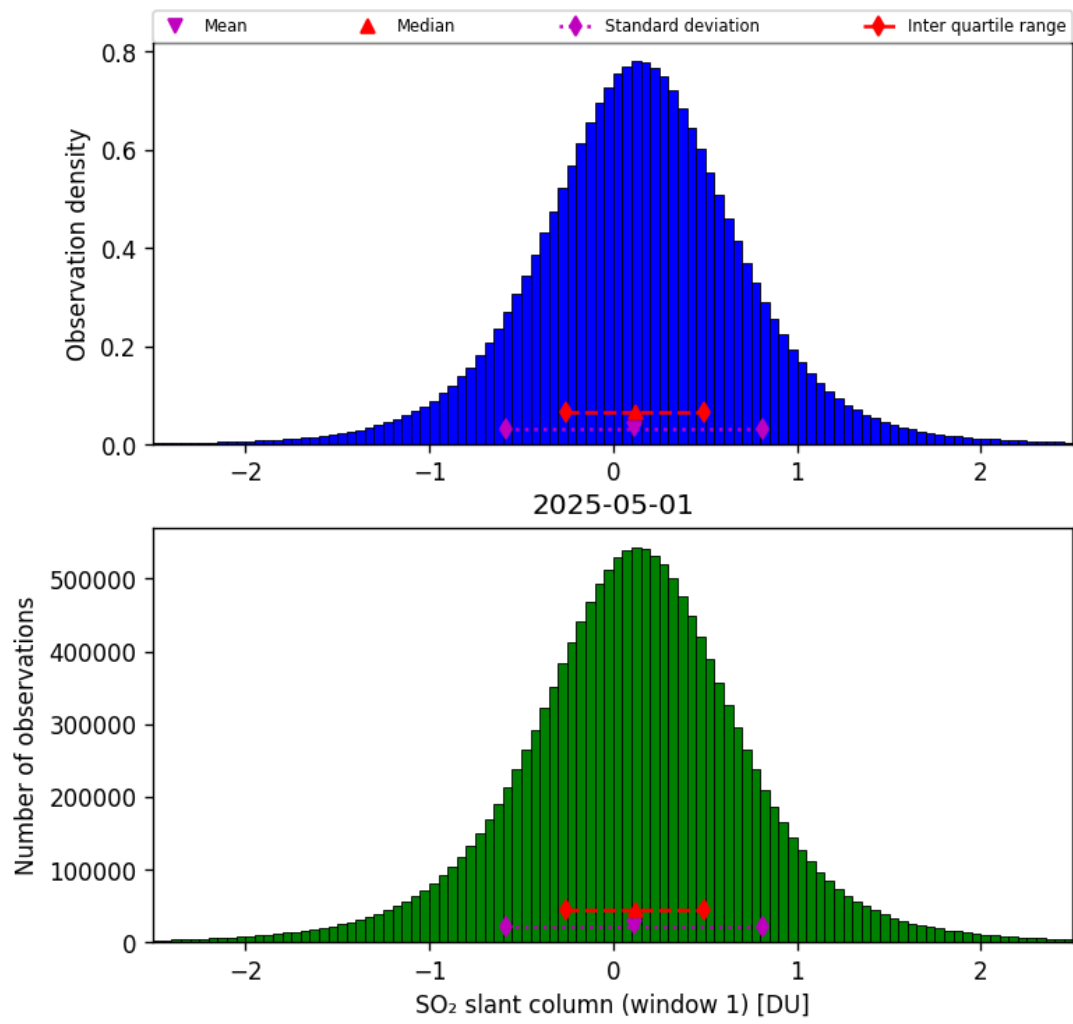


Figure 63: Histogram of “SO₂ slant column (window 1)” for 2025-05-01 to 2025-05-01

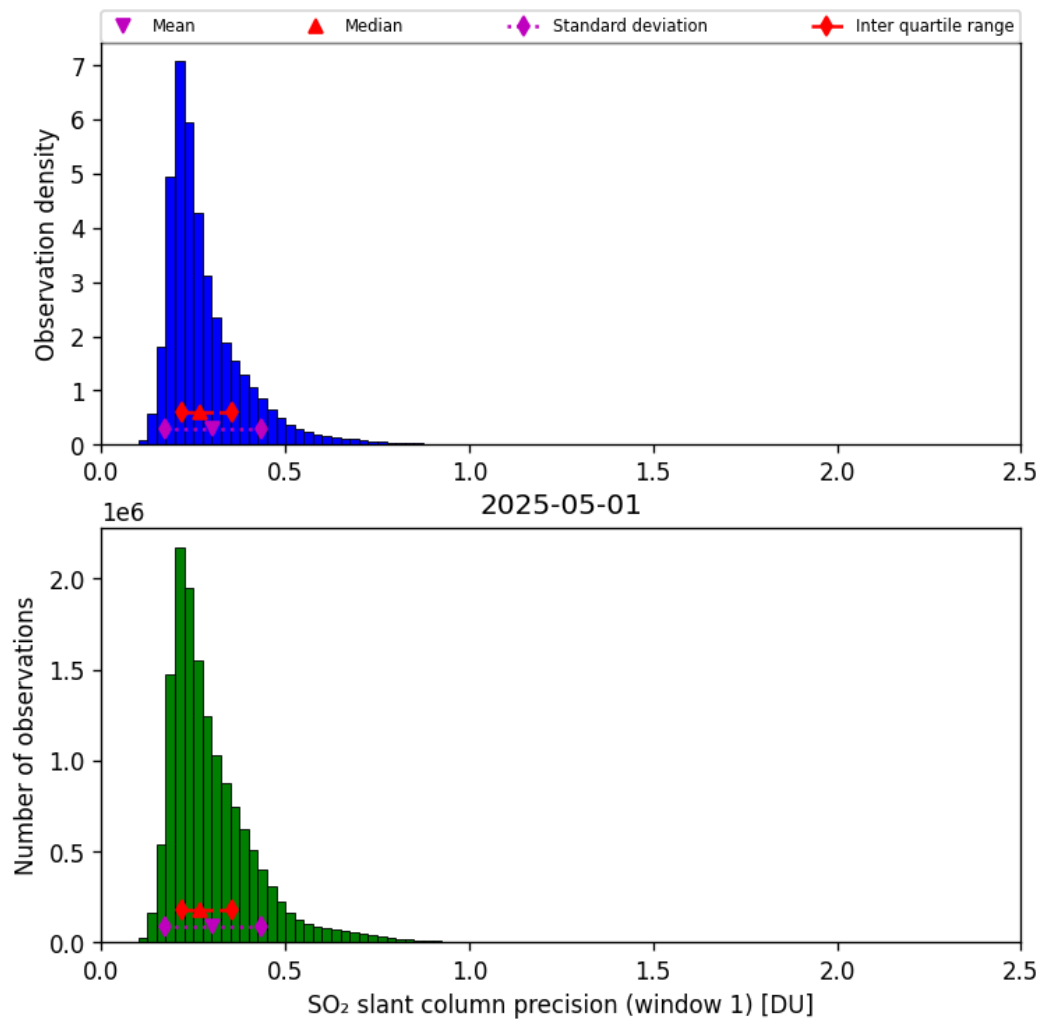


Figure 64: Histogram of “SO₂ slant column precision (window 1)” for 2025-05-01 to 2025-05-01

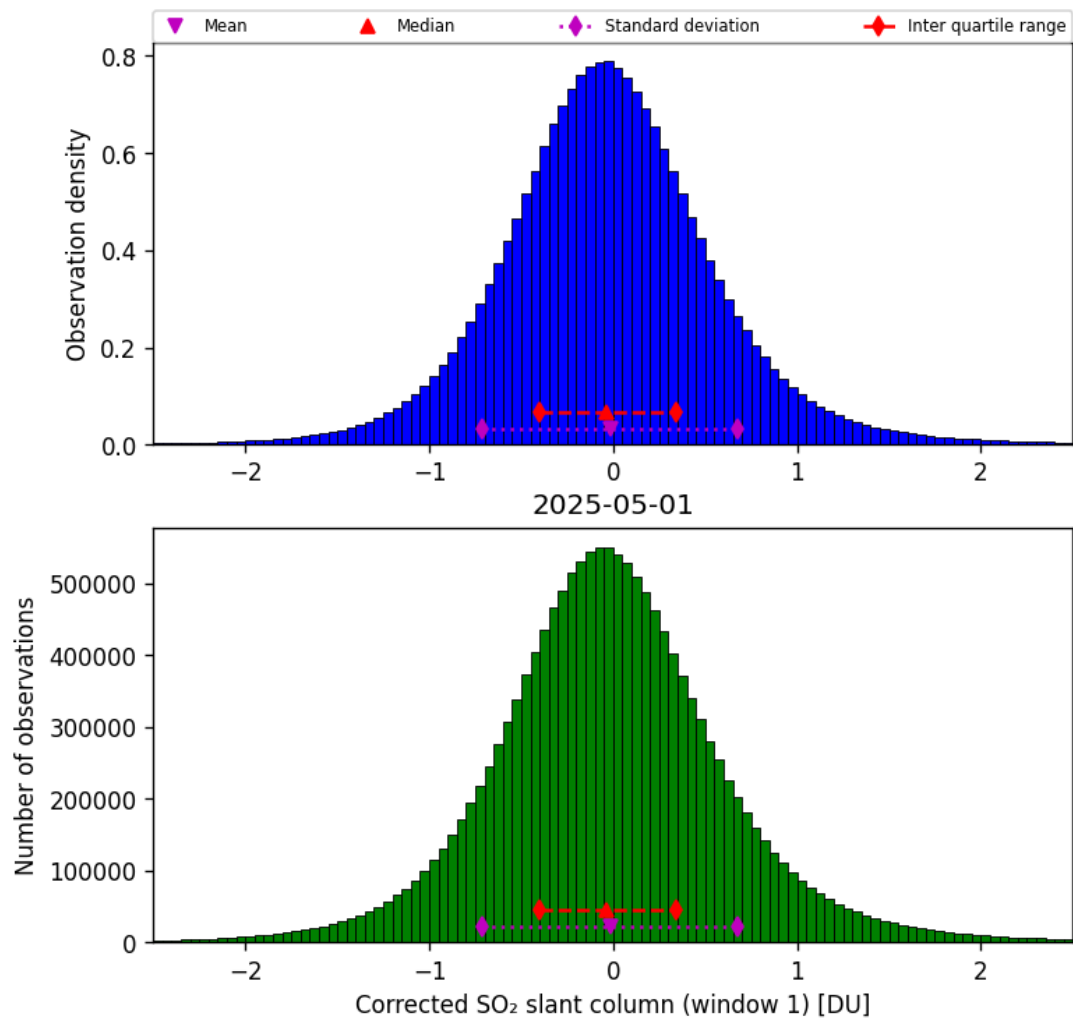


Figure 65: Histogram of “Corrected SO₂ slant column (window 1)” for 2025-05-01 to 2025-05-01

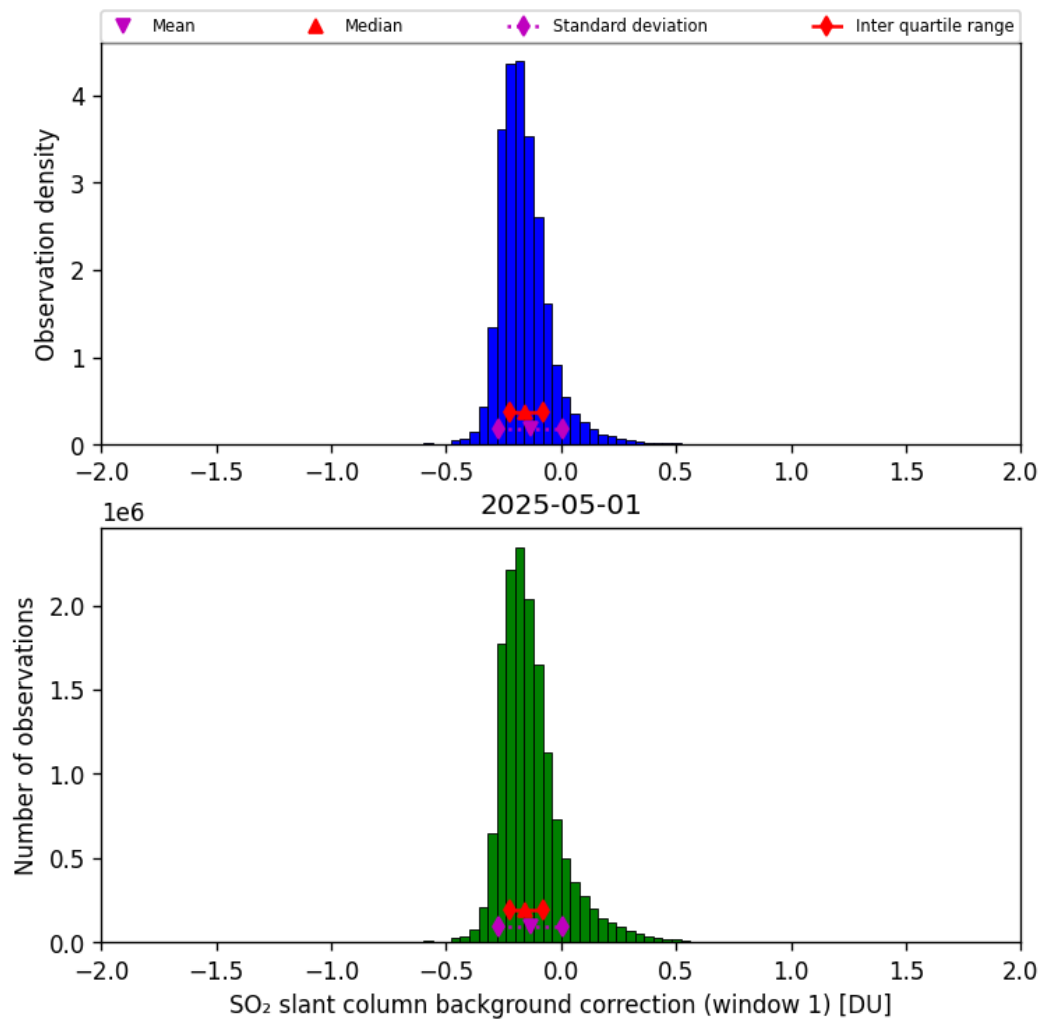


Figure 66: Histogram of “SO₂ slant column background correction (window 1)” for 2025-05-01 to 2025-05-01

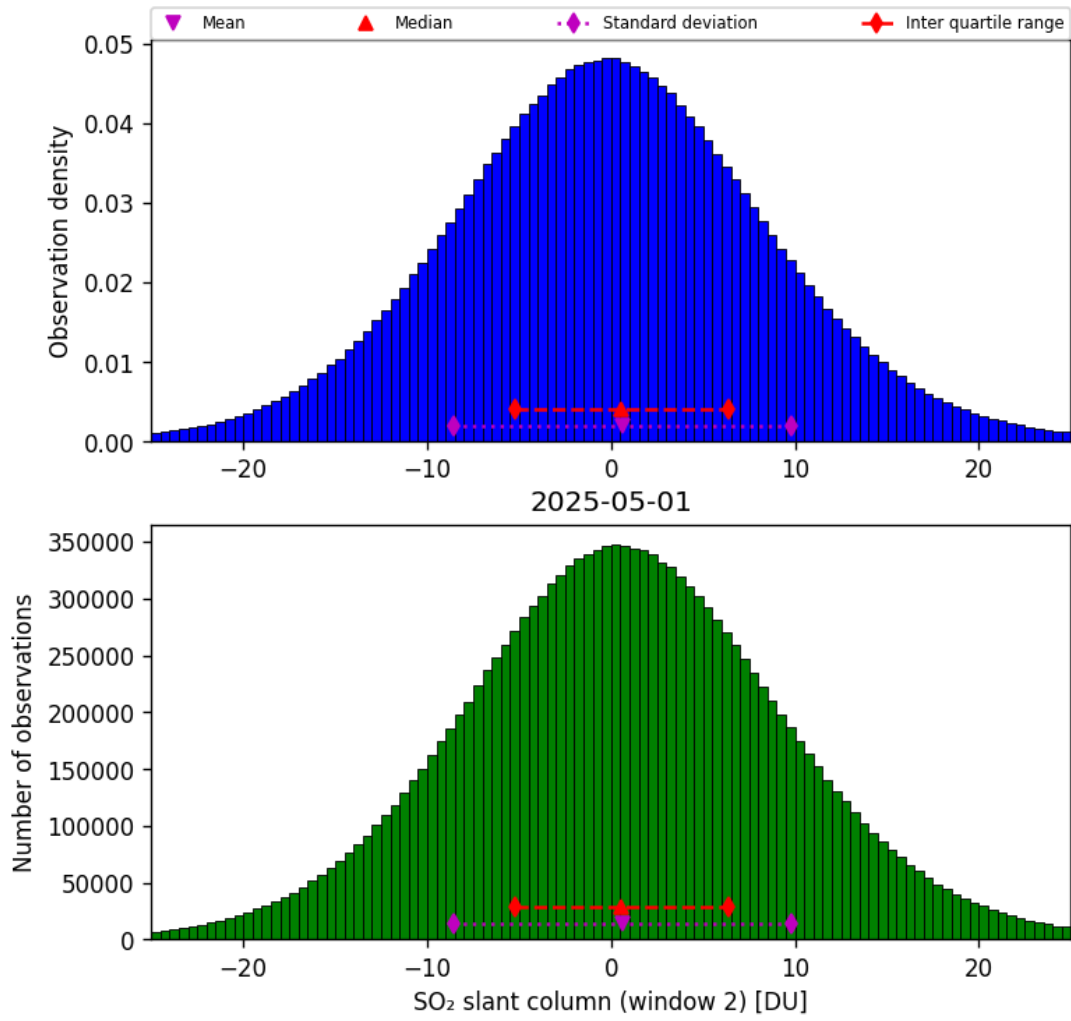


Figure 67: Histogram of “SO₂ slant column (window 2)” for 2025-05-01 to 2025-05-01

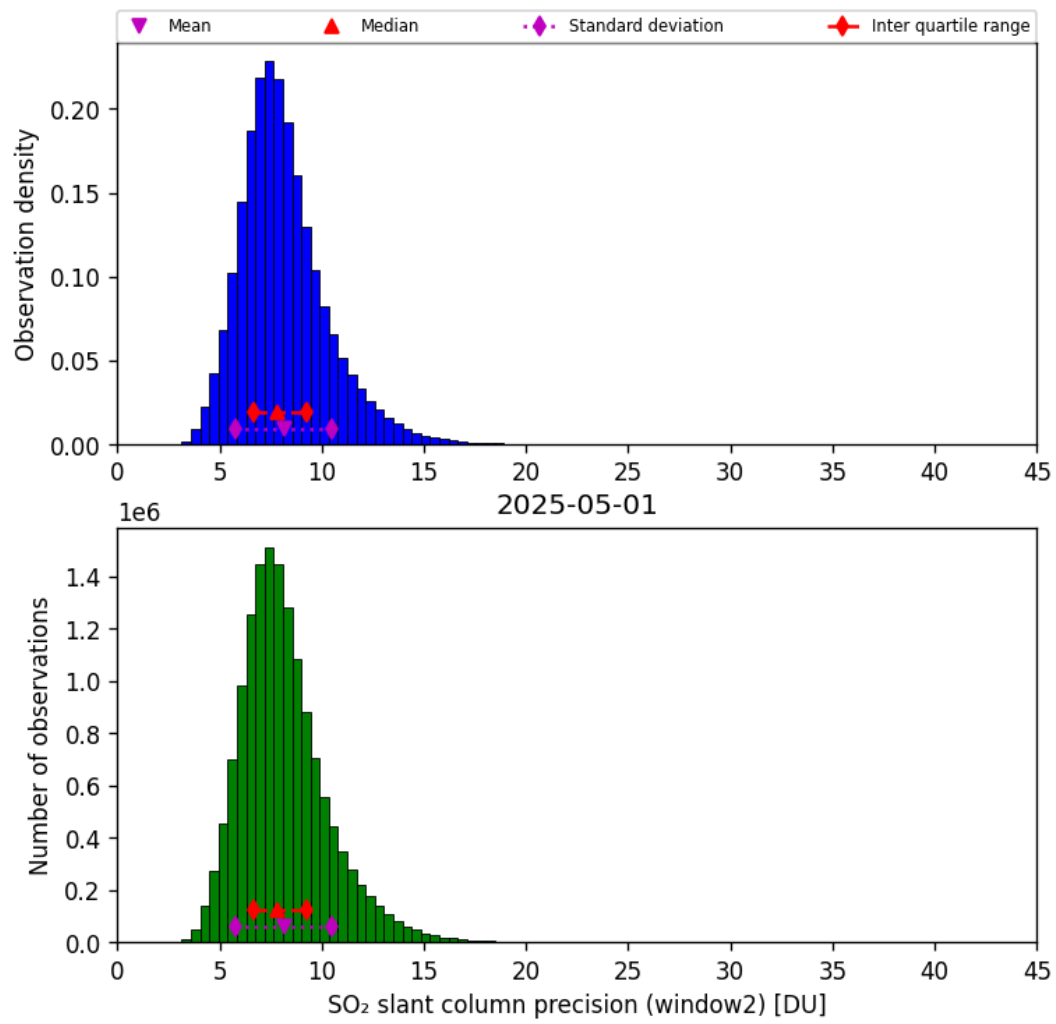


Figure 68: Histogram of “SO₂ slant column precision (window2)” for 2025-05-01 to 2025-05-01

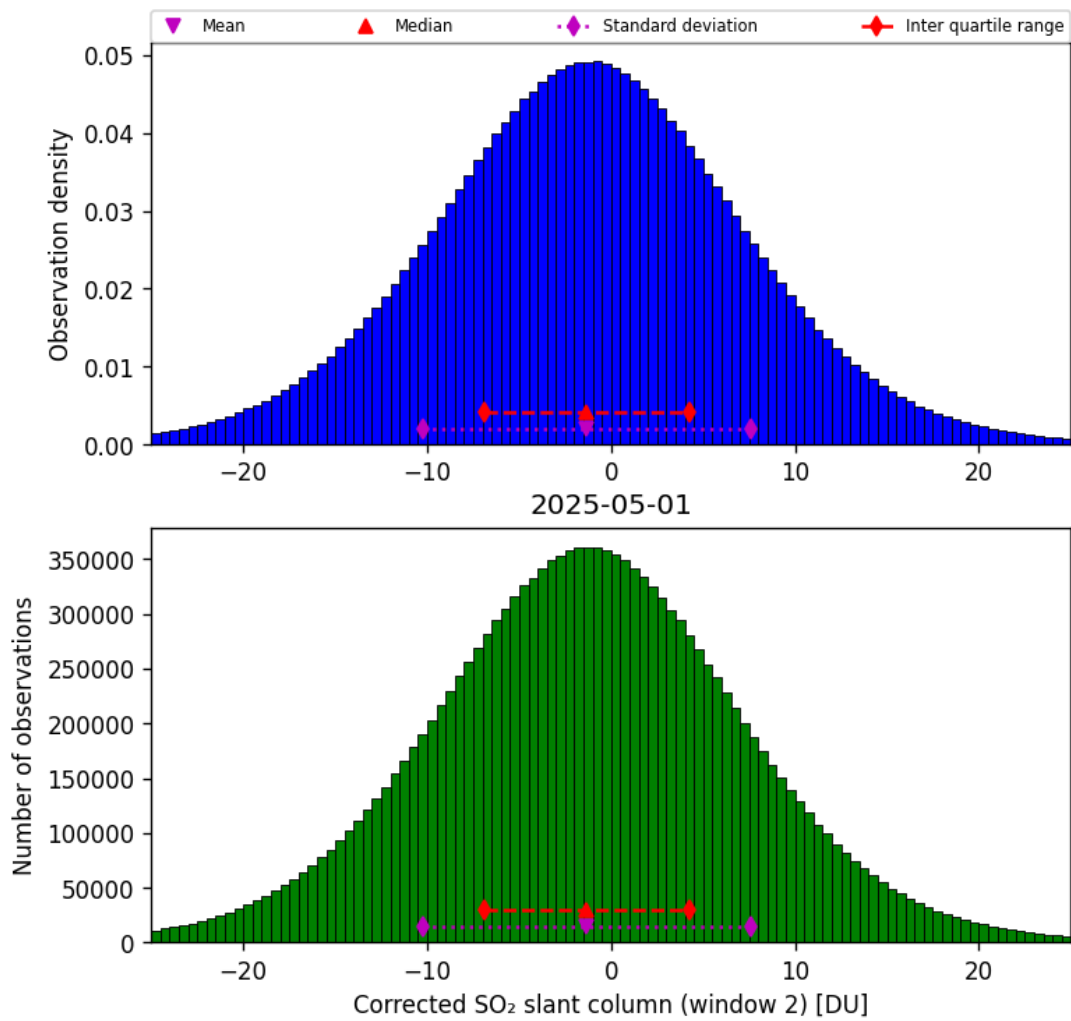


Figure 69: Histogram of “Corrected SO₂ slant column (window 2)” for 2025-05-01 to 2025-05-01

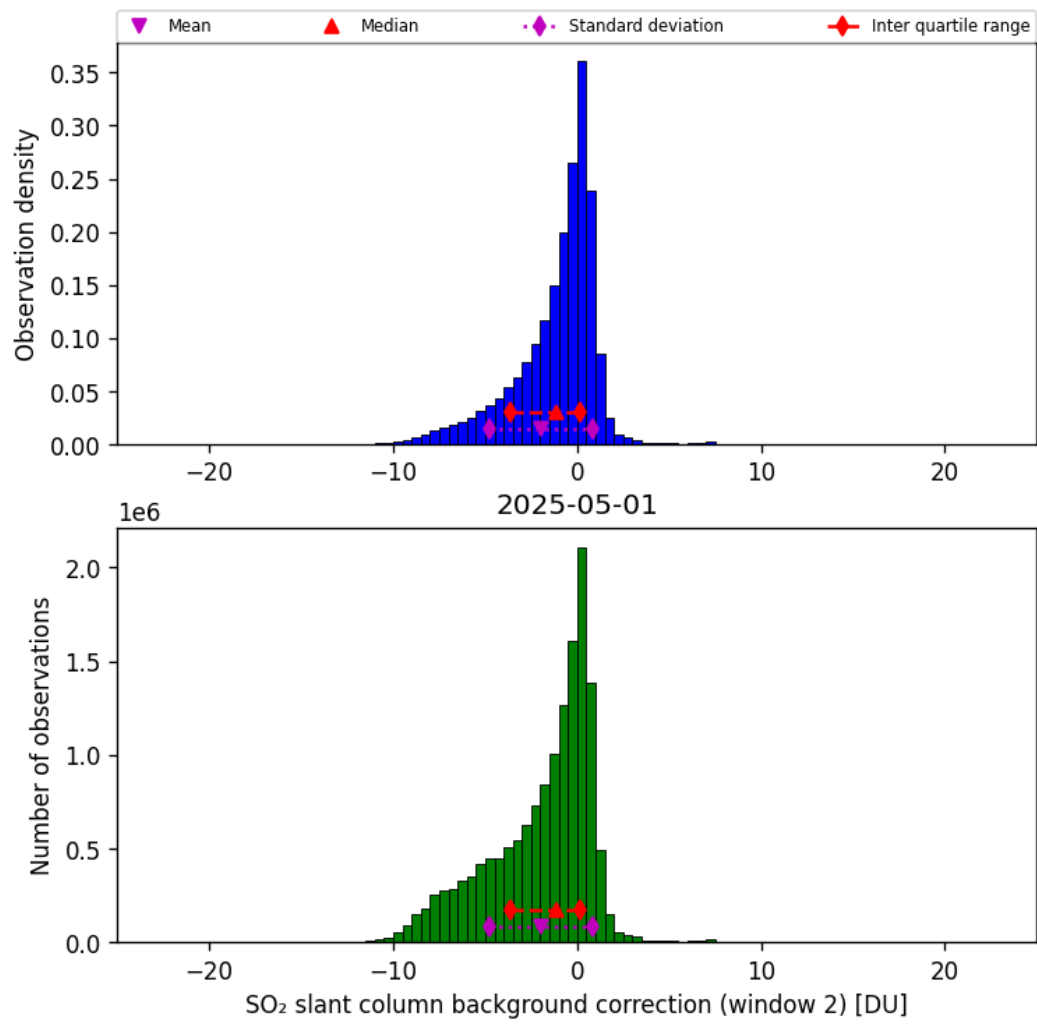


Figure 70: Histogram of “SO₂ slant column background correction (window 2)” for 2025-05-01 to 2025-05-01

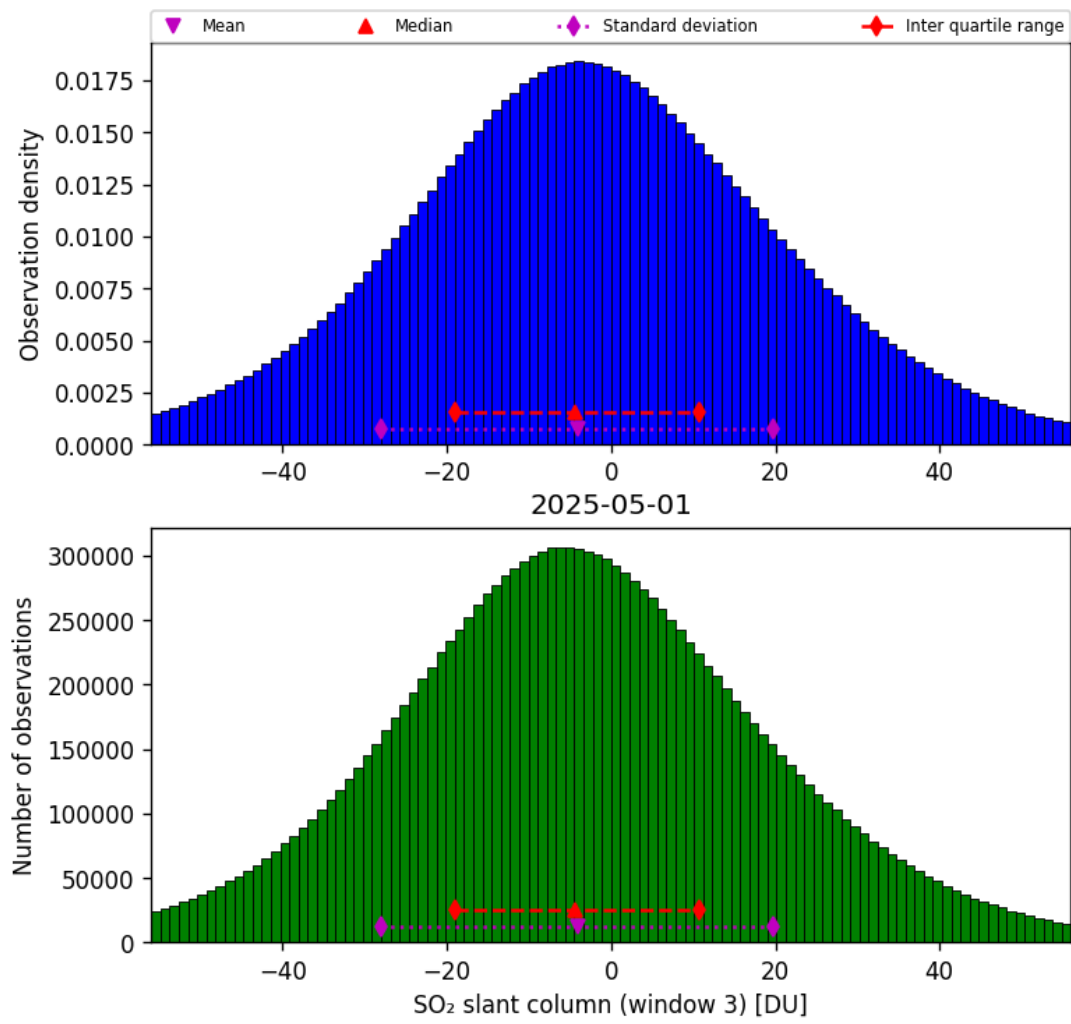


Figure 71: Histogram of “SO₂ slant column (window 3)” for 2025-05-01 to 2025-05-01

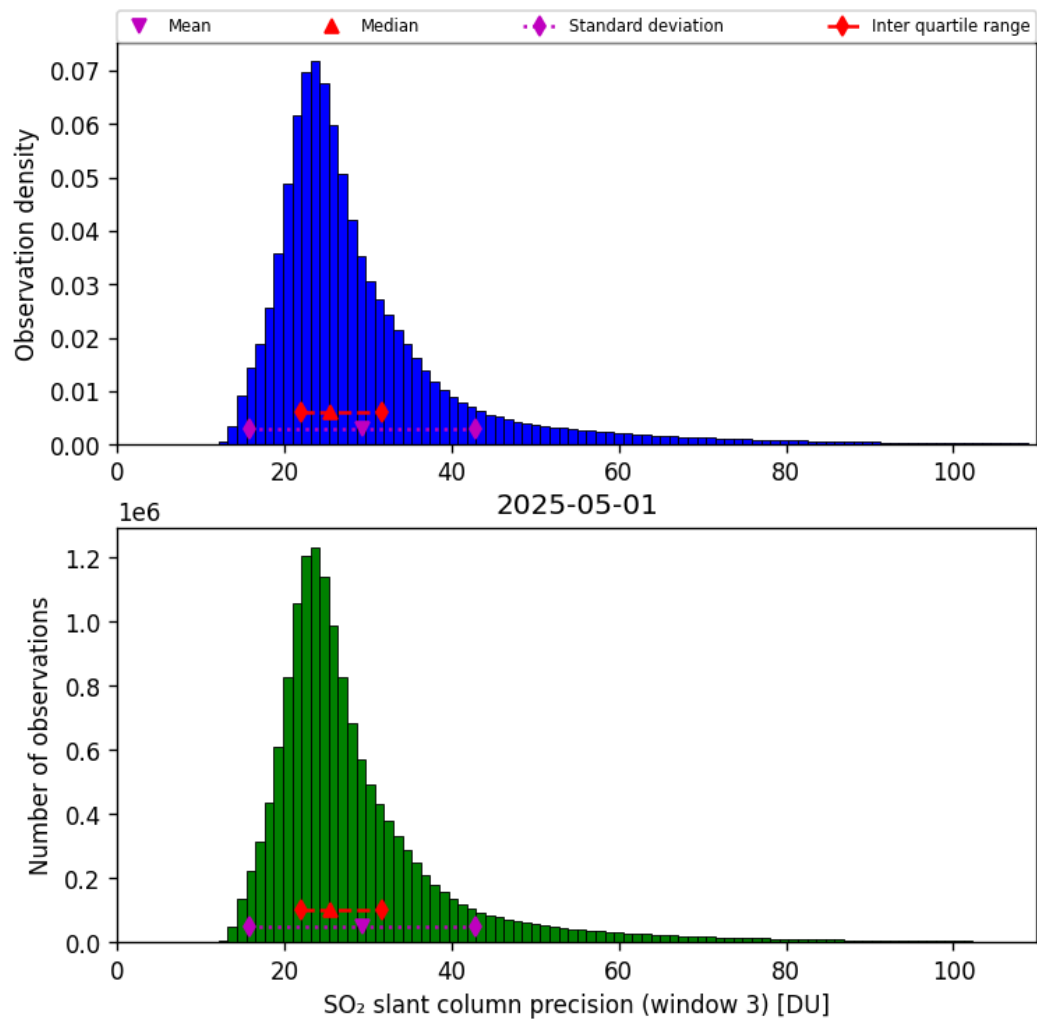


Figure 72: Histogram of “SO₂ slant column precision (window 3)” for 2025-05-01 to 2025-05-01

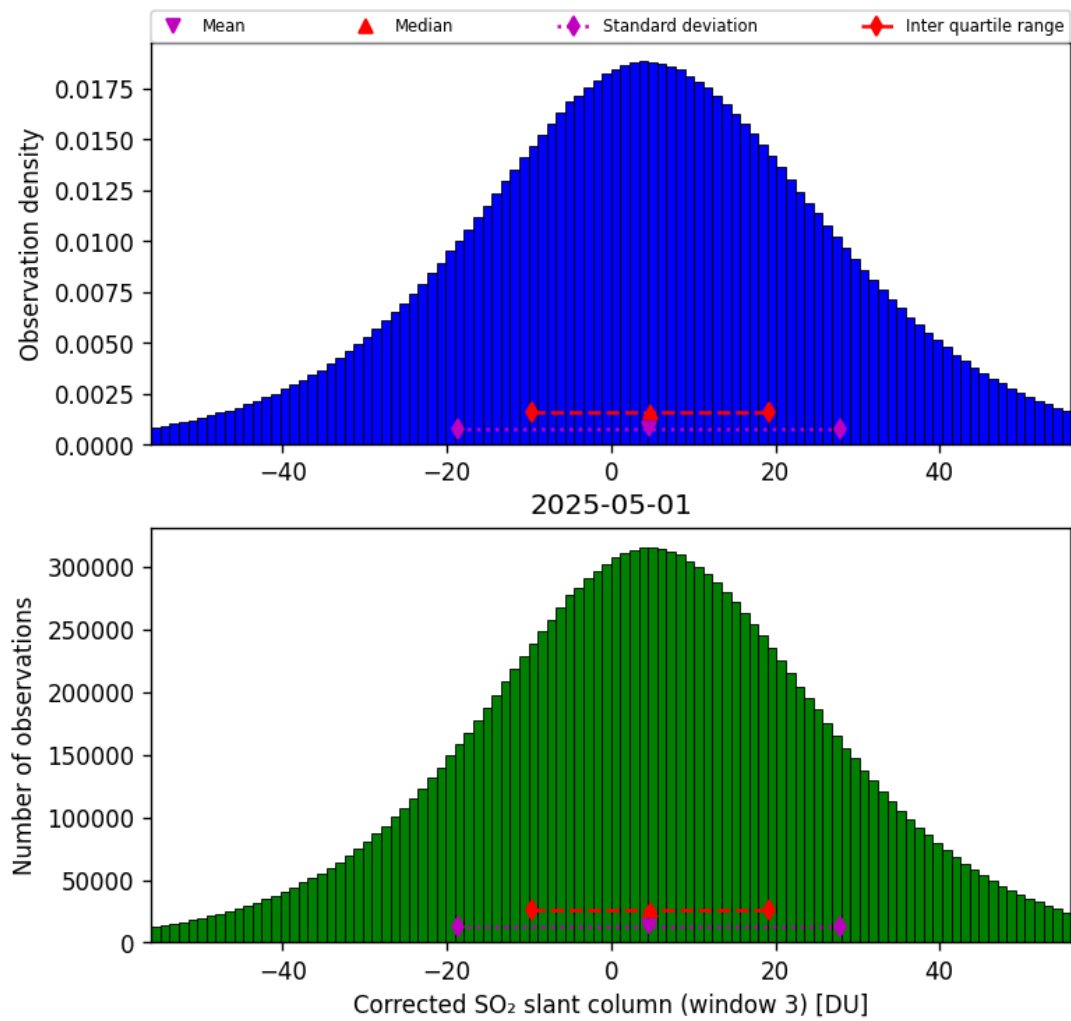


Figure 73: Histogram of “Corrected SO₂ slant column (window 3)” for 2025-05-01 to 2025-05-01

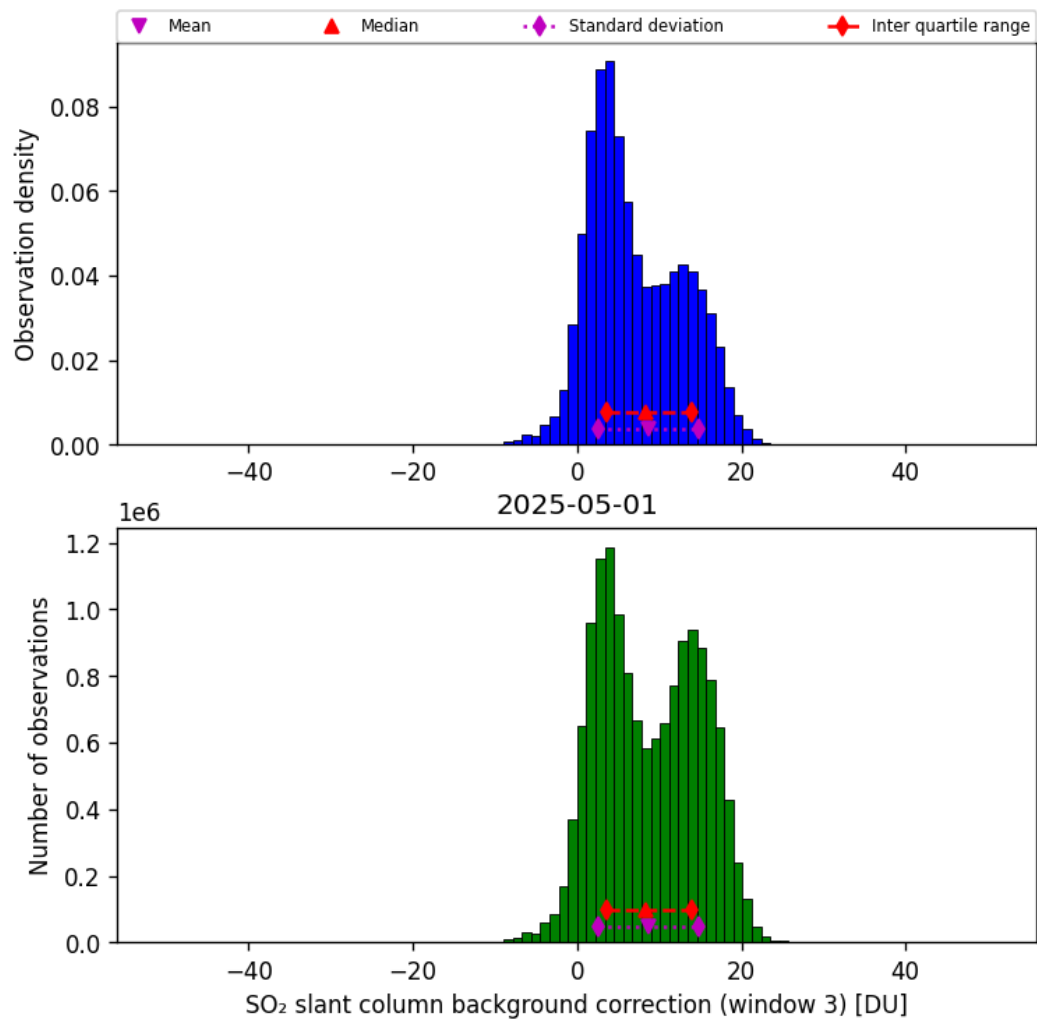


Figure 74: Histogram of “SO₂ slant column background correction (window 3)” for 2025-05-01 to 2025-05-01

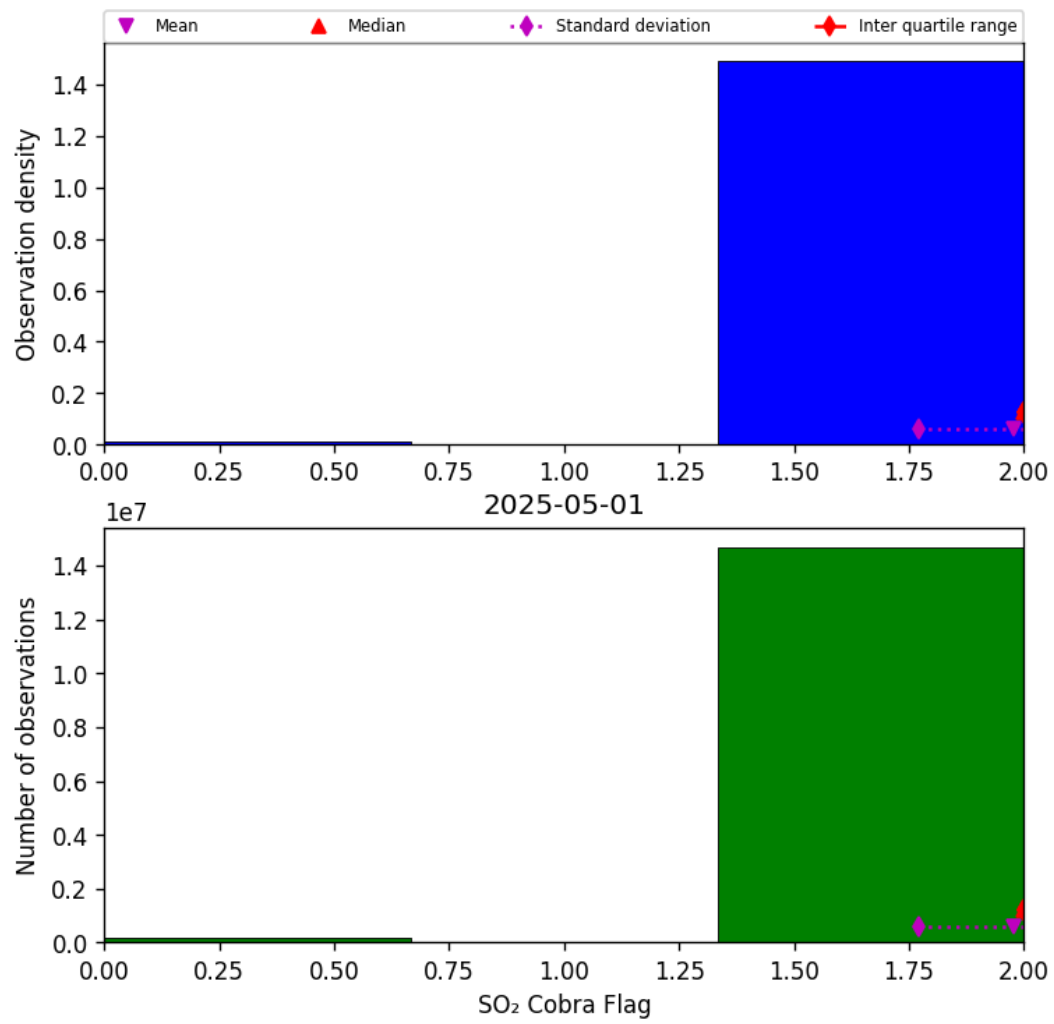


Figure 75: Histogram of “SO₂ Cobra Flag” for 2025-05-01 to 2025-05-01

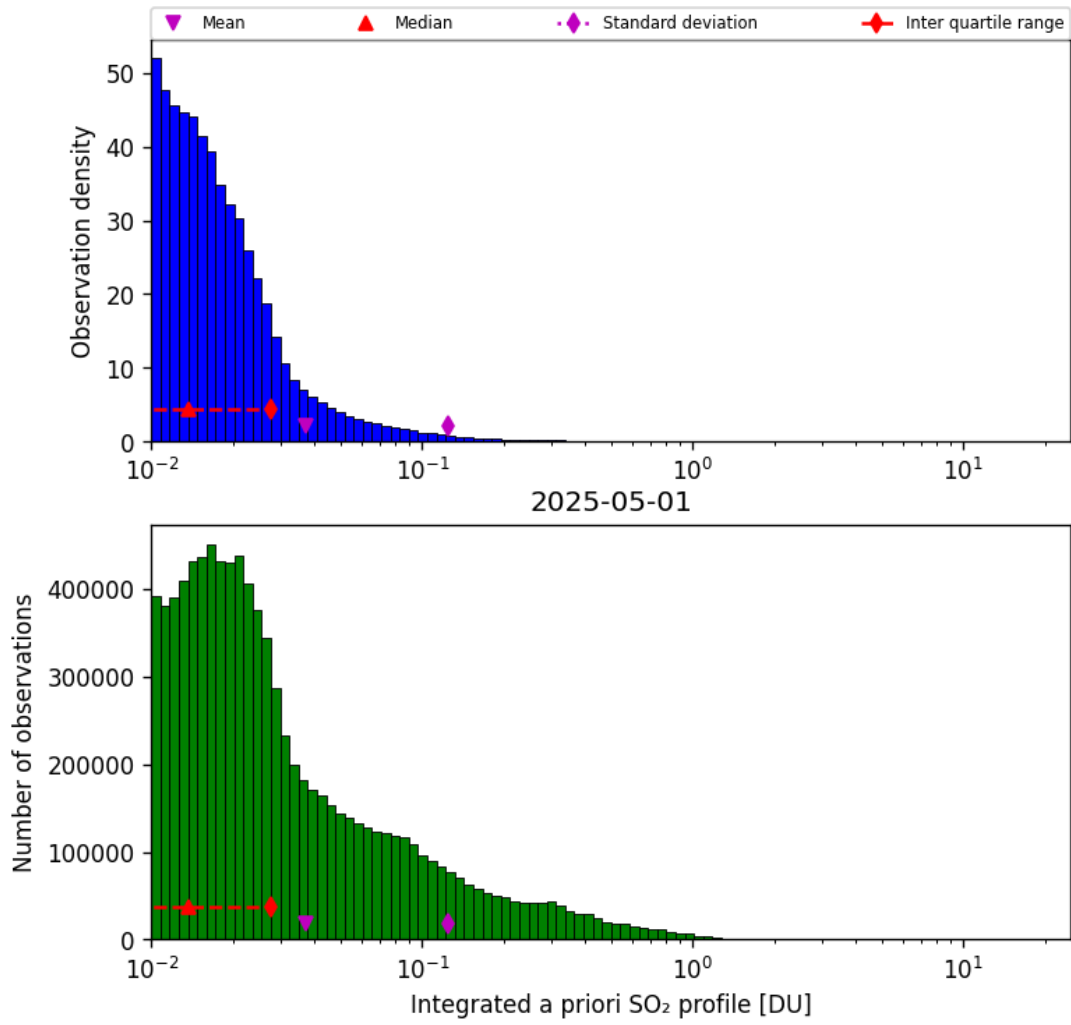


Figure 76: Histogram of “Integrated a priori SO₂ profile” for 2025-05-01 to 2025-05-01

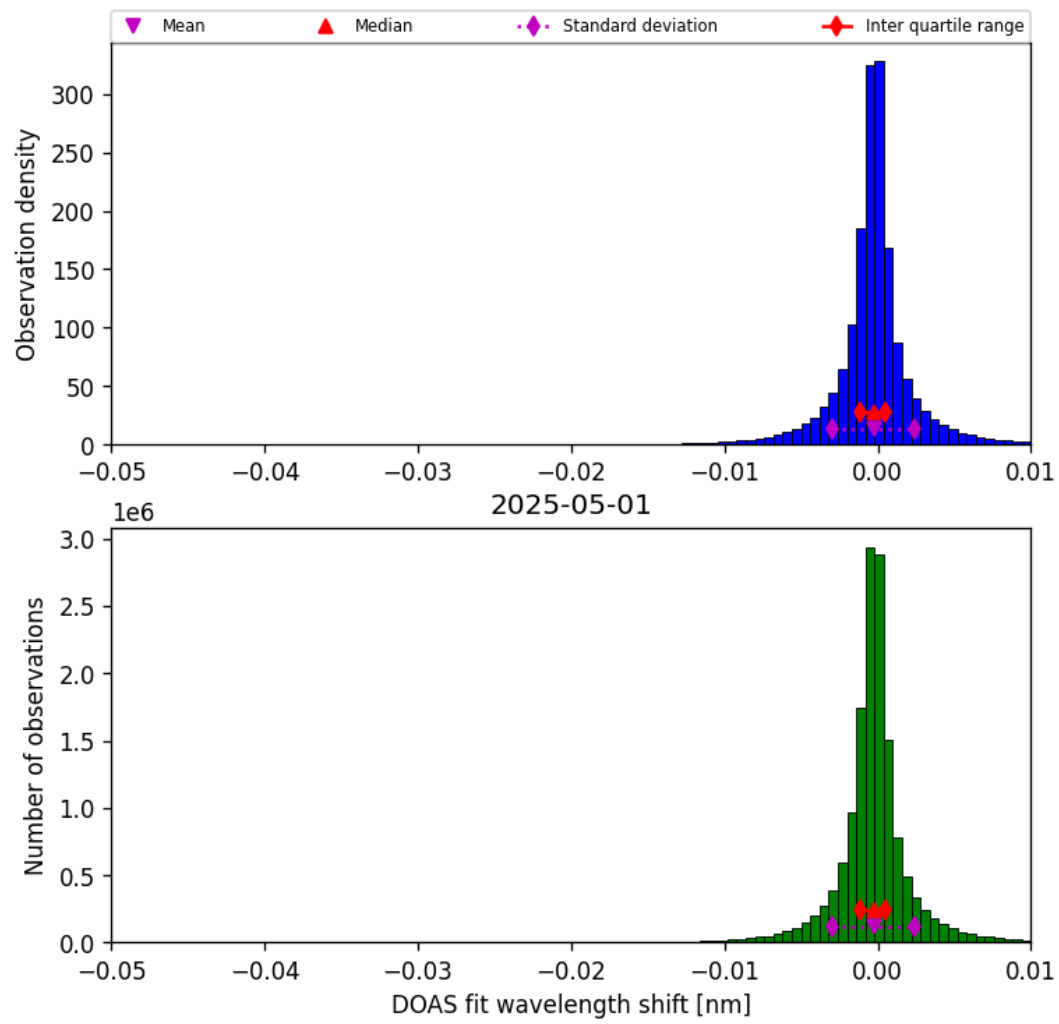


Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-05-01 to 2025-05-01

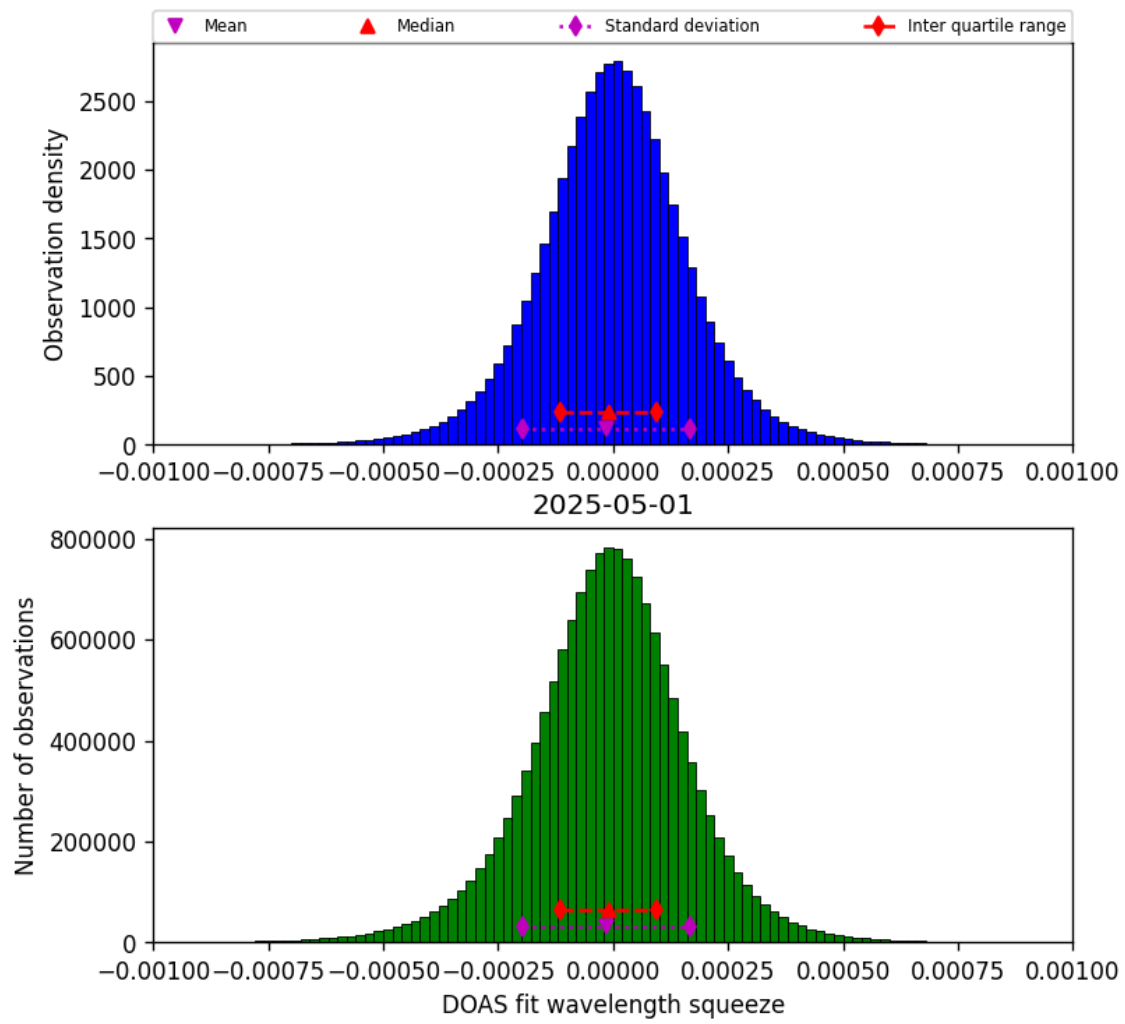


Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-05-01 to 2025-05-01

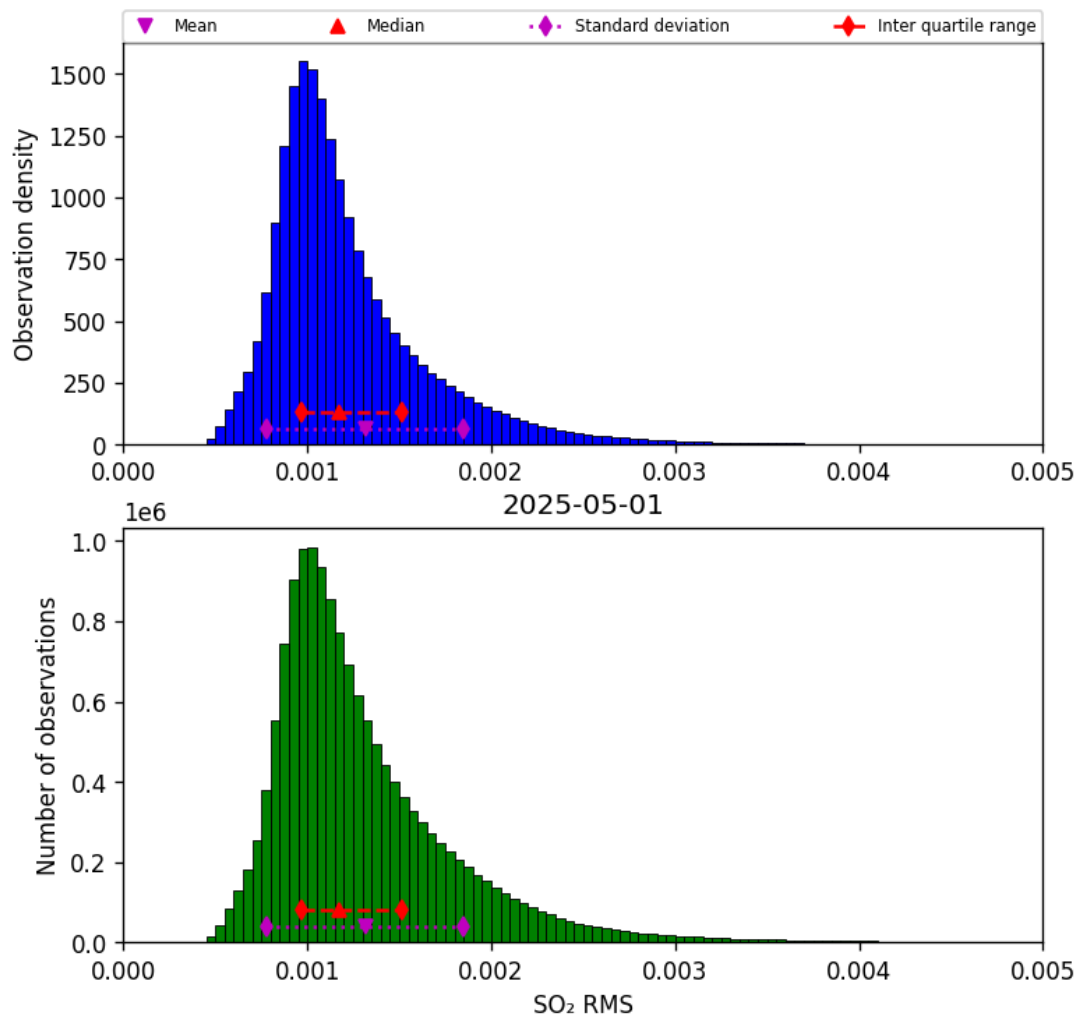


Figure 79: Histogram of “SO₂ RMS” for 2025-05-01 to 2025-05-01

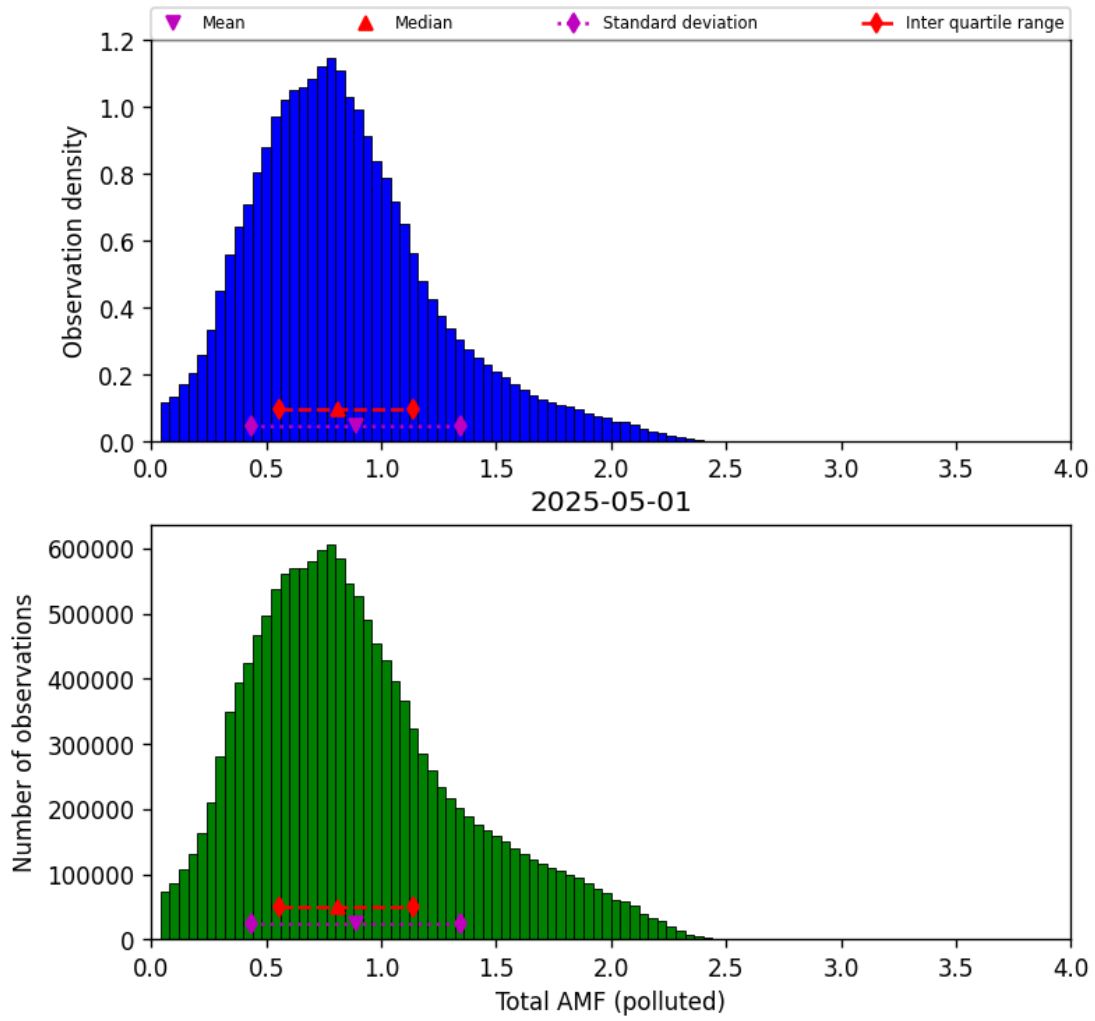


Figure 80: Histogram of “Total AMF (polluted)” for 2025-05-01 to 2025-05-01

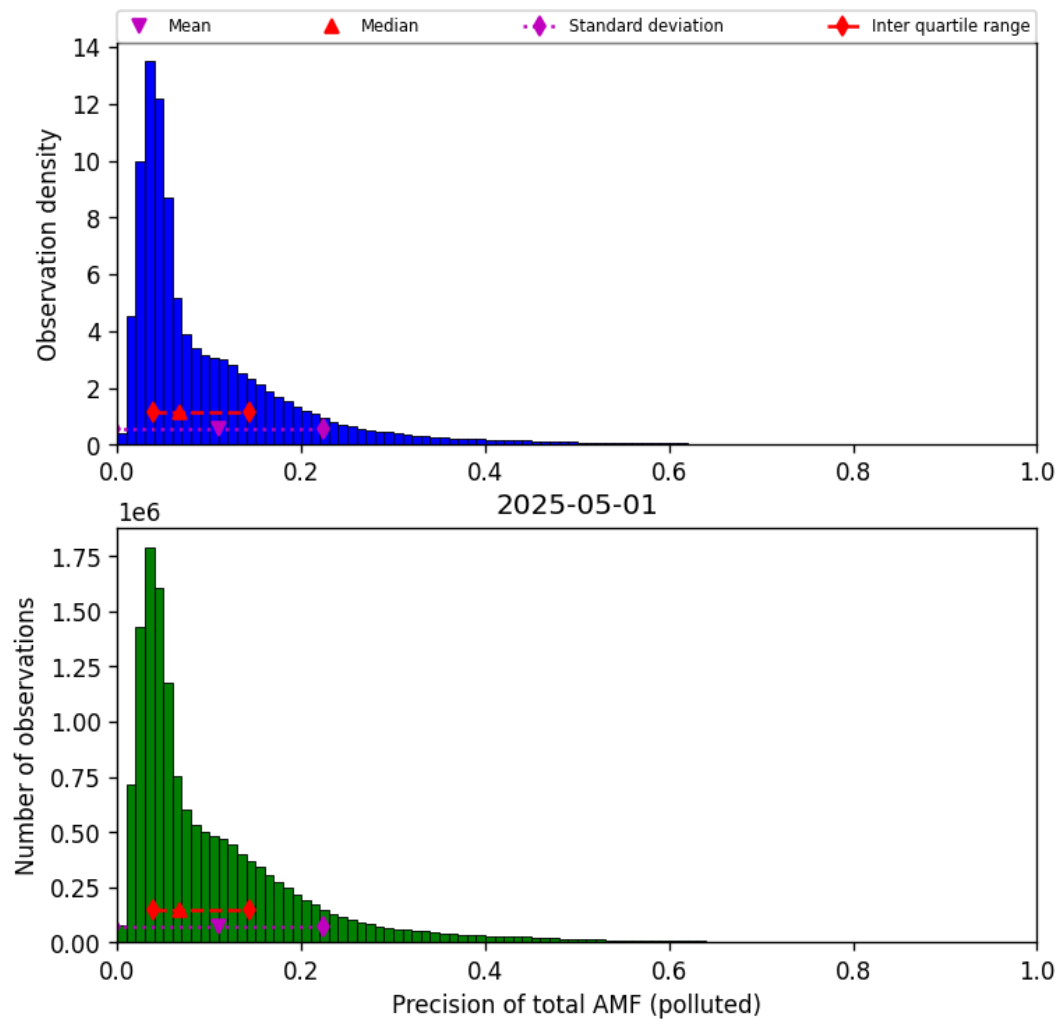


Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-05-01 to 2025-05-01

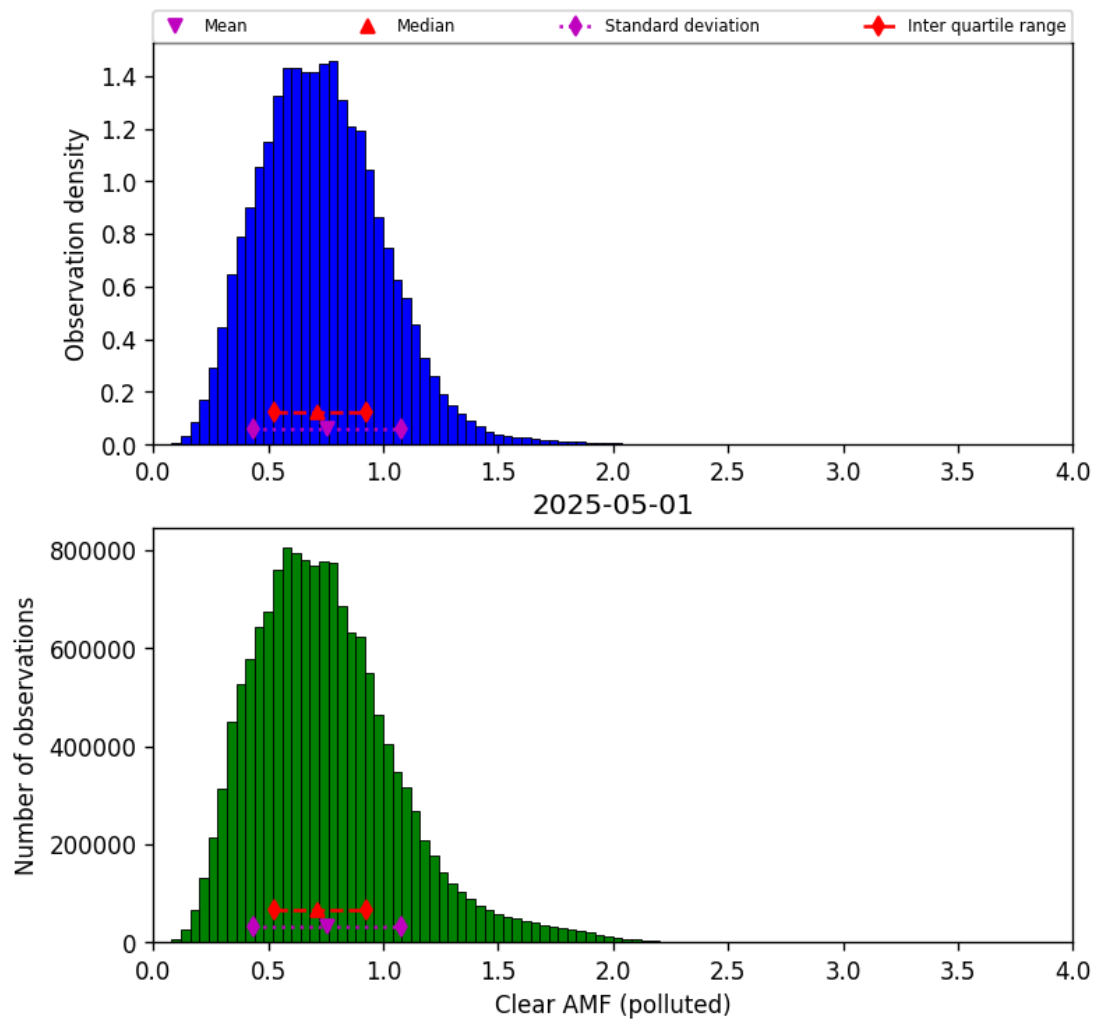


Figure 82: Histogram of “Clear AMF (polluted)” for 2025-05-01 to 2025-05-01

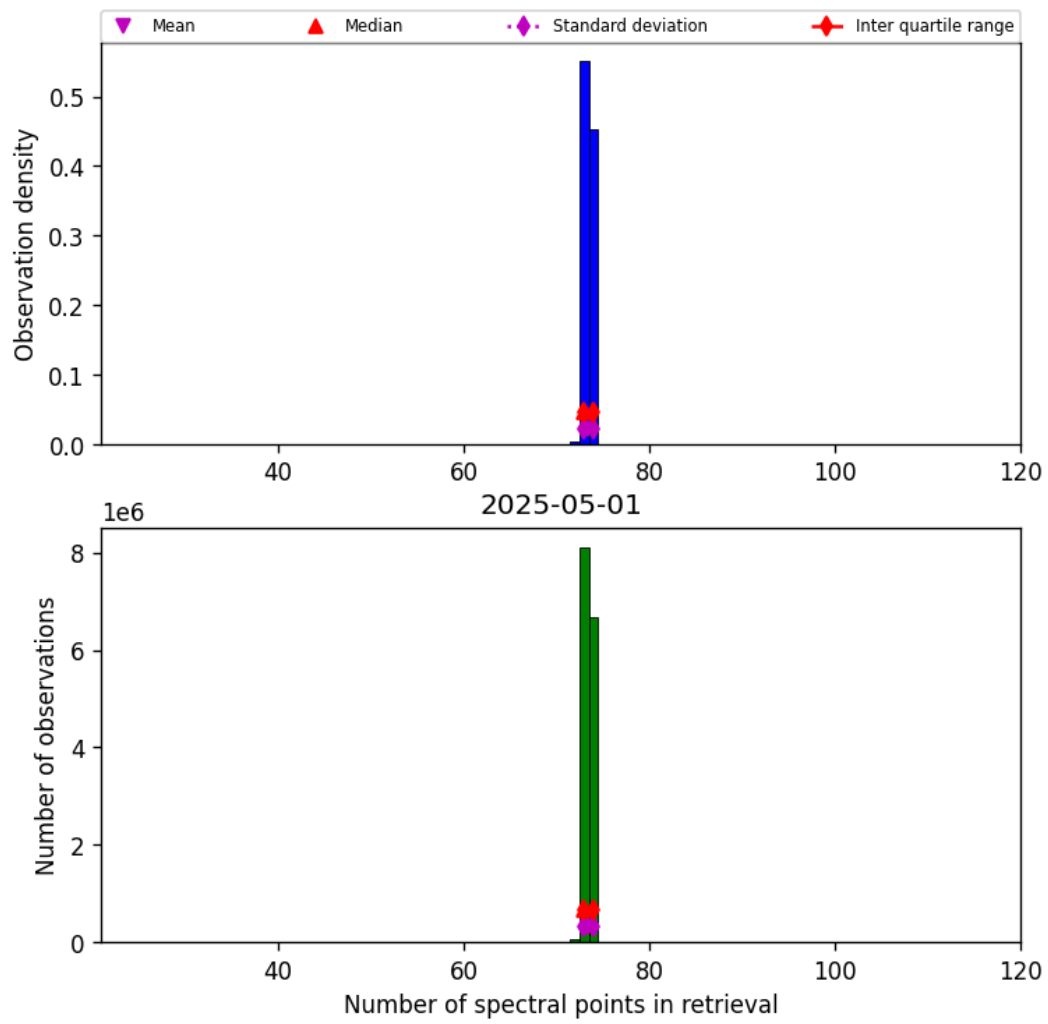


Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-05-01 to 2025-05-01

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.

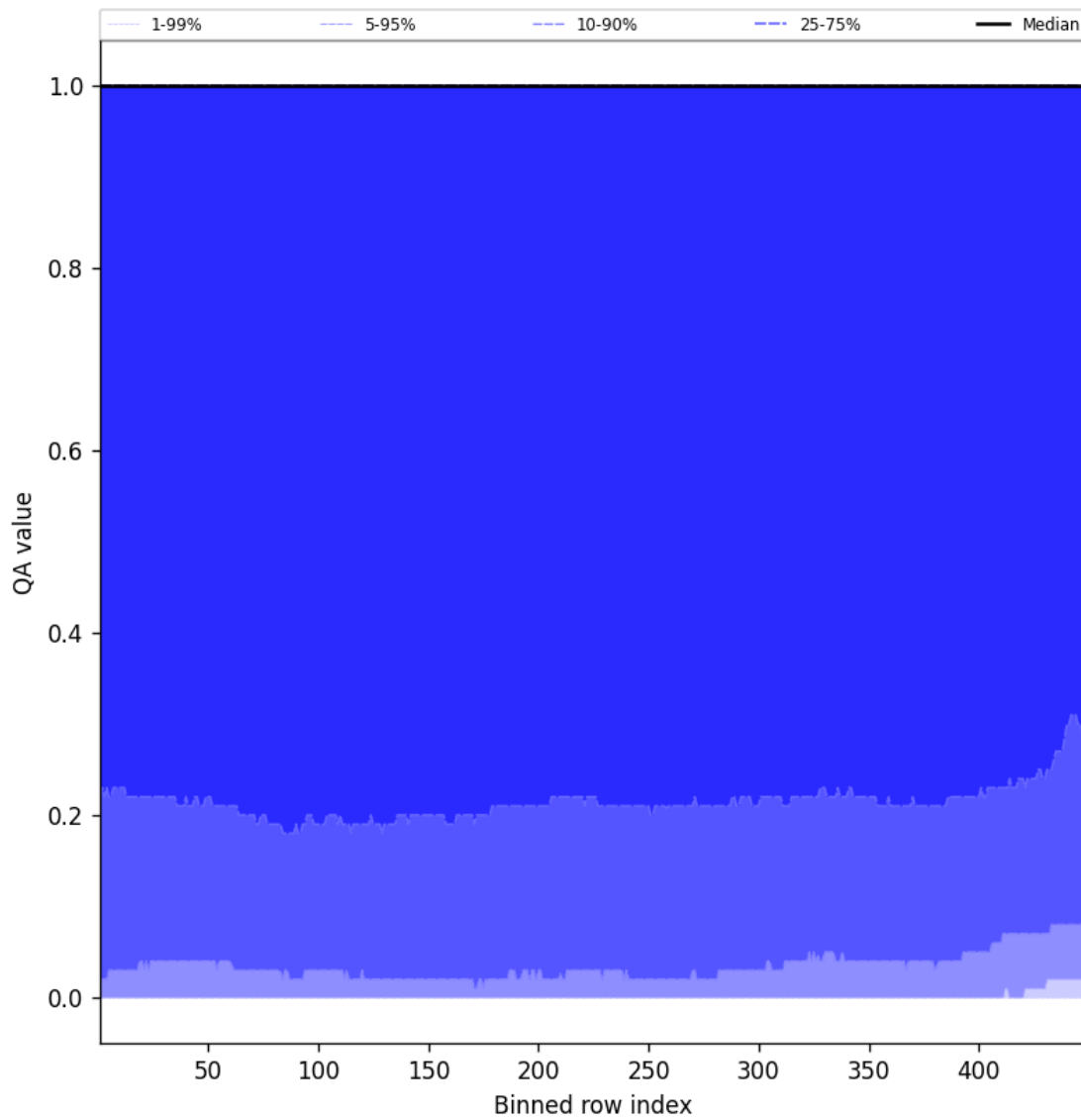


Figure 84: Along track statistics of “QA value” for 2025-05-01 to 2025-05-01

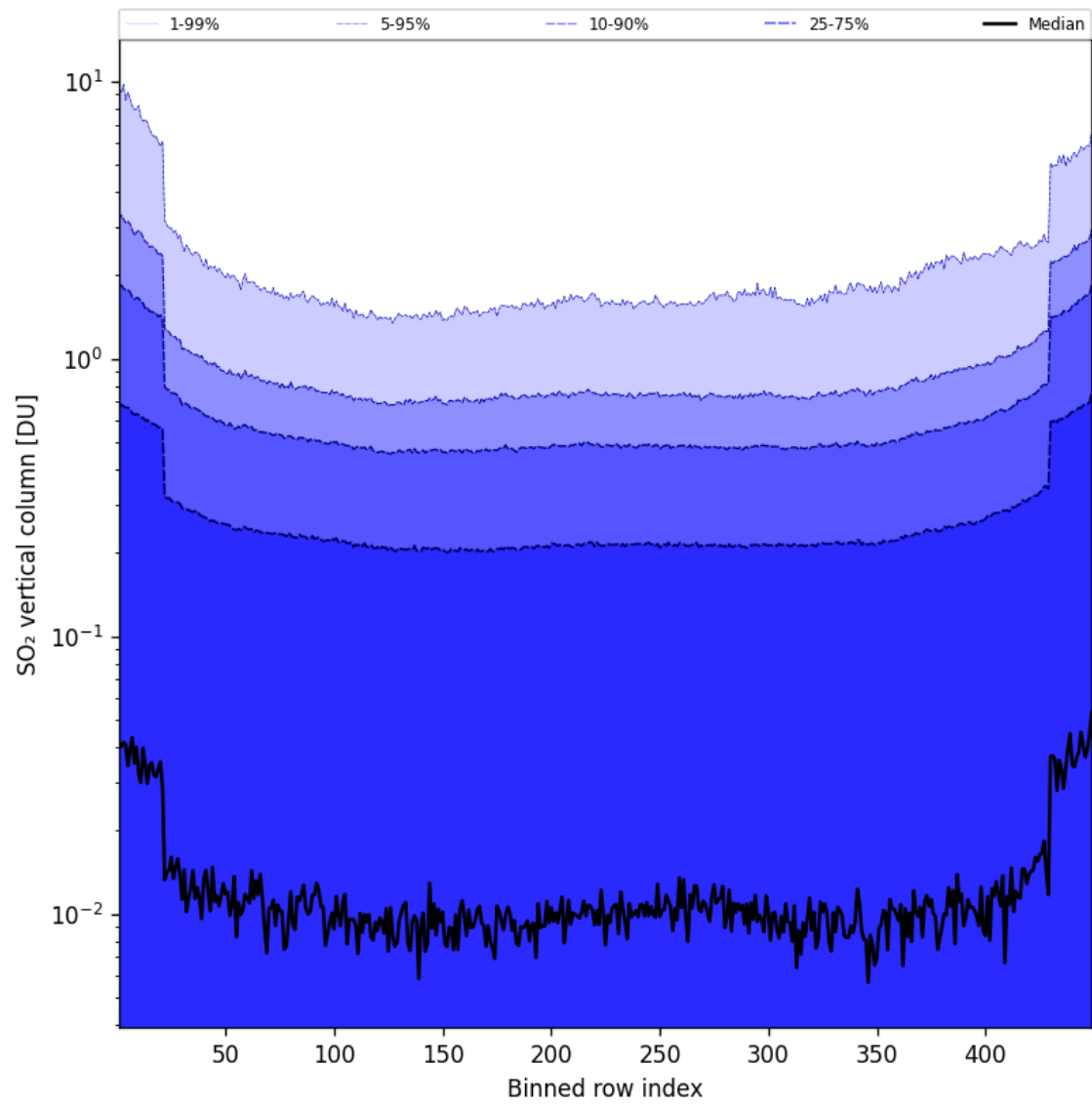


Figure 85: Along track statistics of “SO₂ vertical column” for 2025-05-01 to 2025-05-01

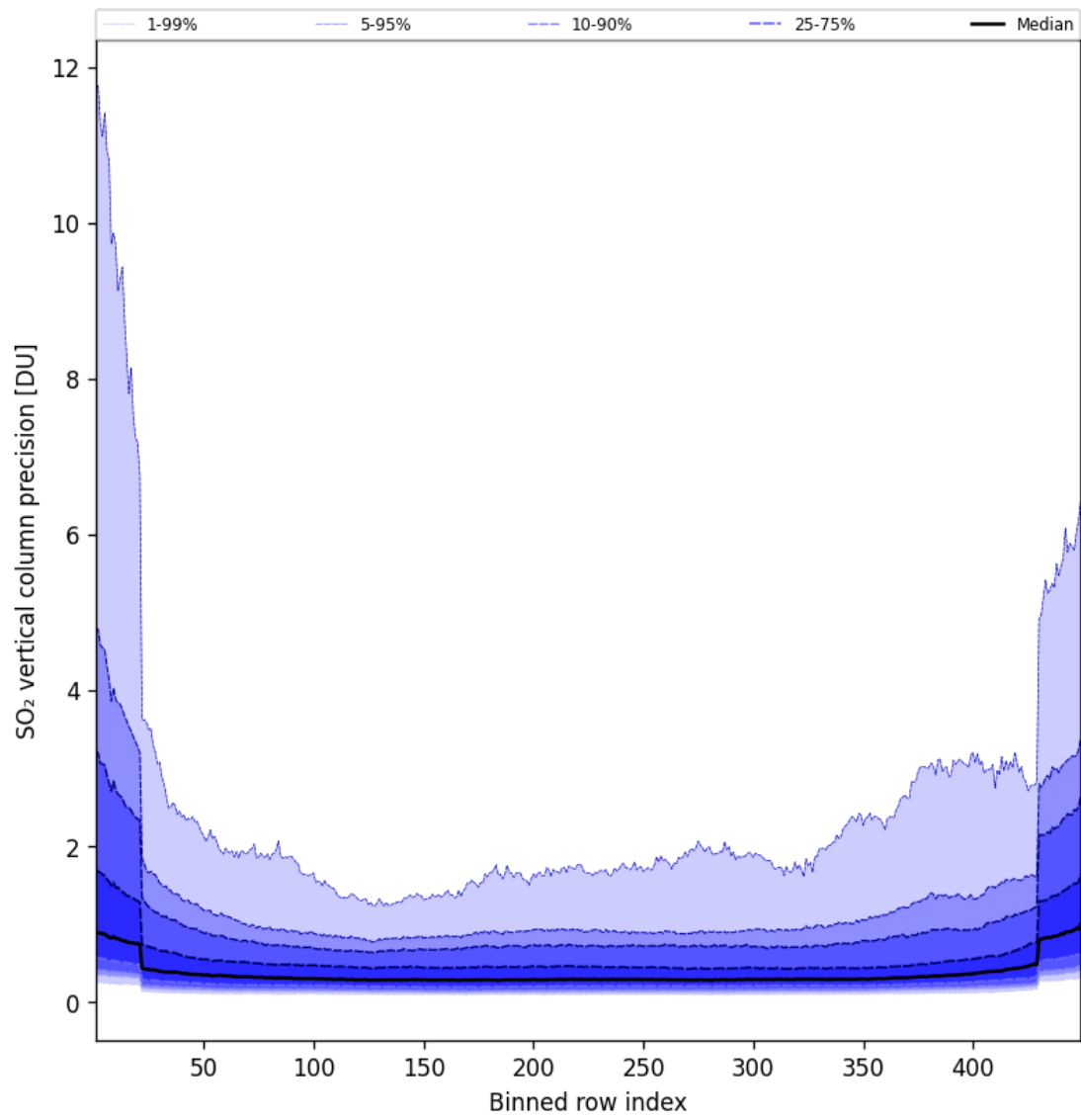


Figure 86: Along track statistics of “SO₂ vertical column precision” for 2025-05-01 to 2025-05-01

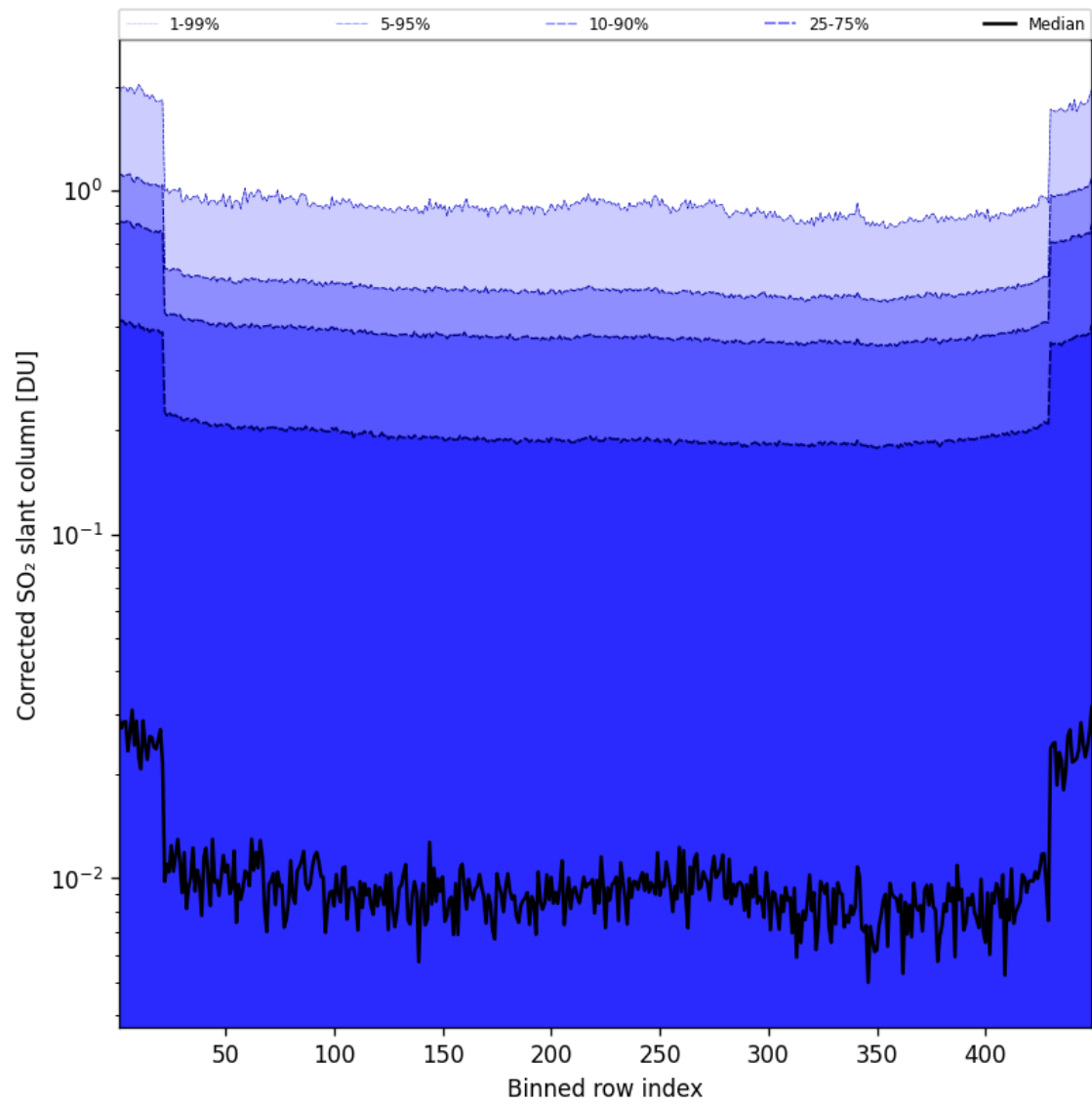


Figure 87: Along track statistics of “Corrected SO₂ slant column” for 2025-05-01 to 2025-05-01

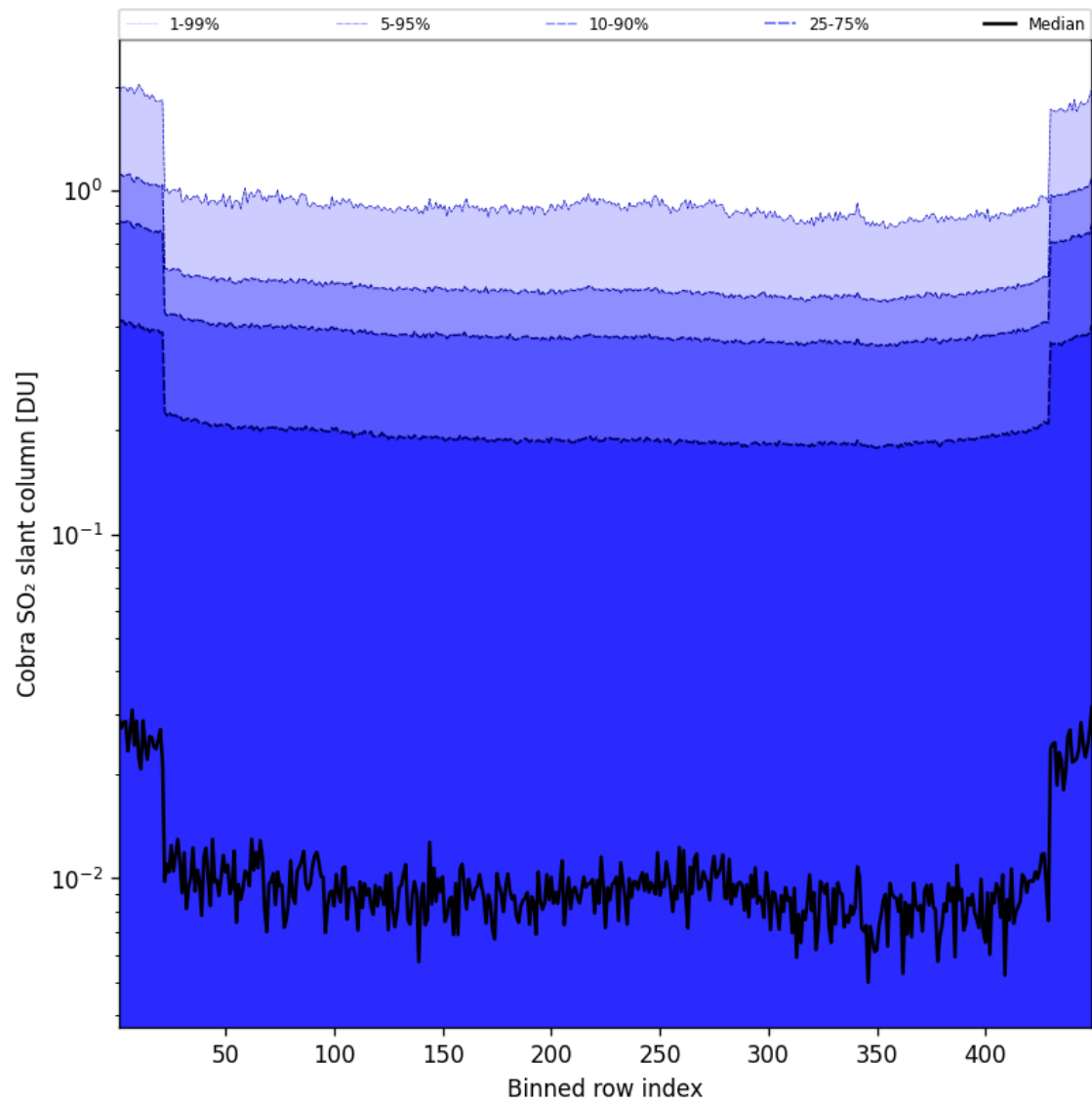


Figure 88: Along track statistics of "Cobra SO₂ slant column" for 2025-05-01 to 2025-05-01

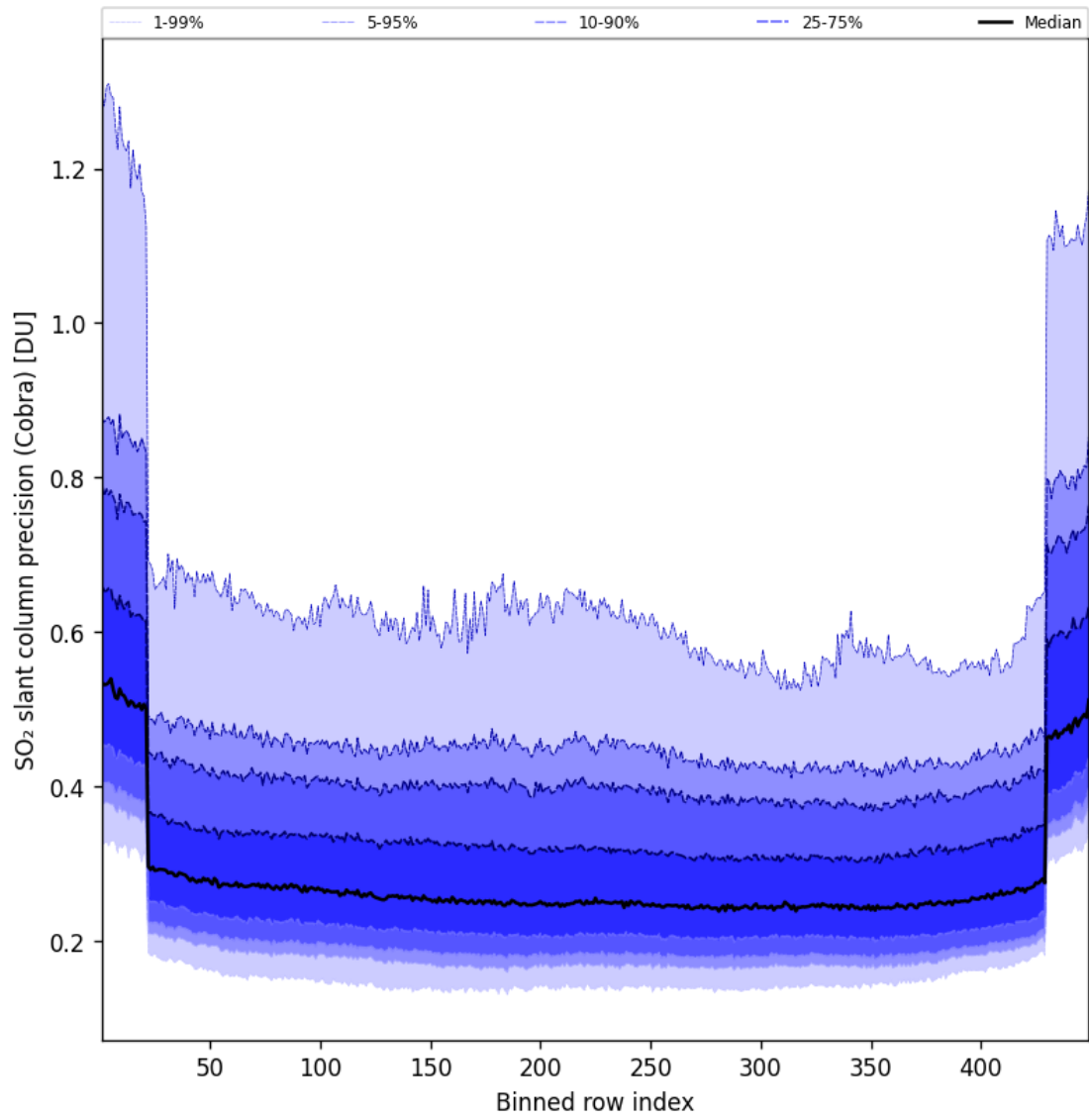


Figure 89: Along track statistics of “SO₂ slant column precision (Cobra)” for 2025-05-01 to 2025-05-01

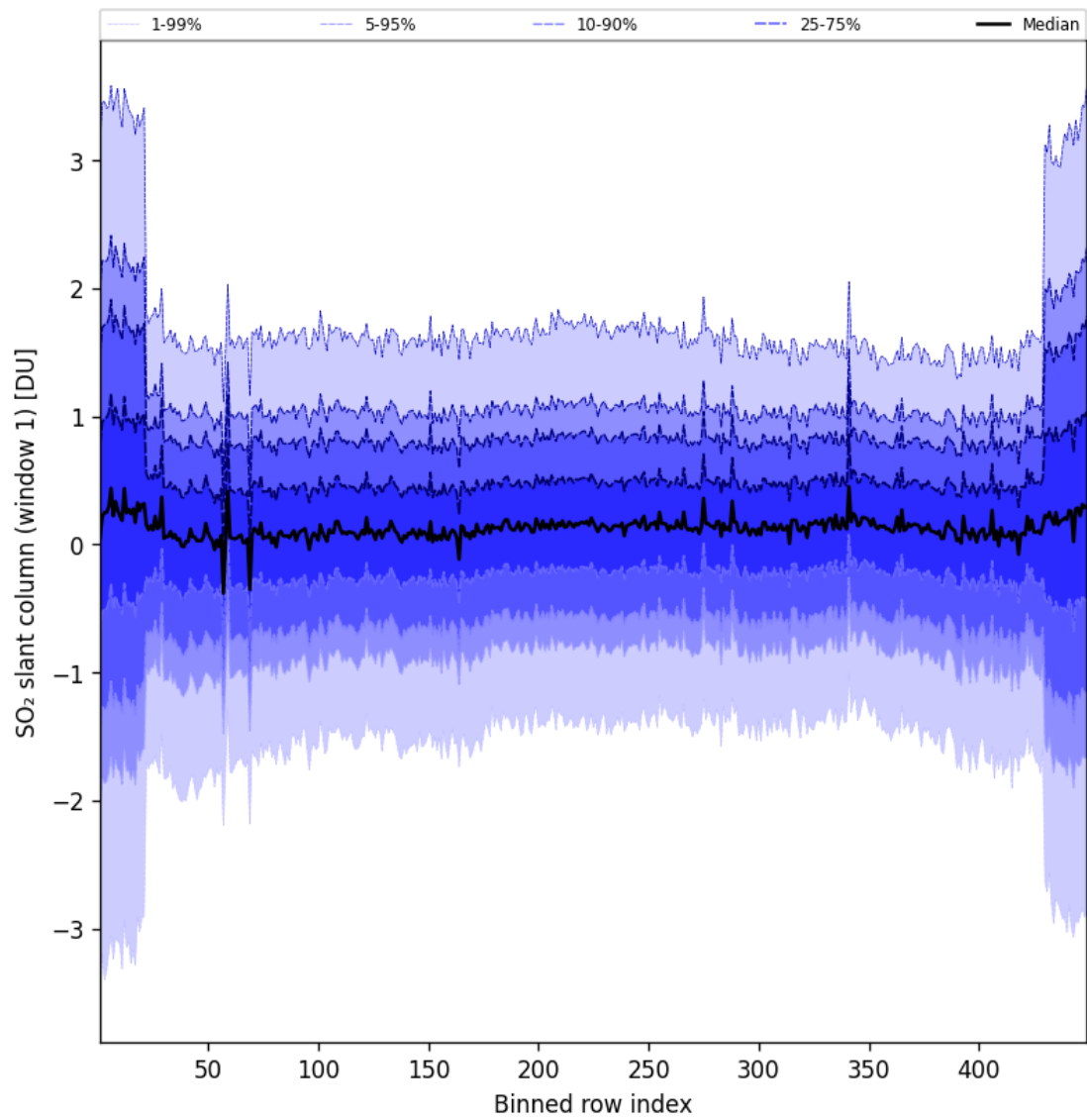


Figure 90: Along track statistics of “SO₂ slant column (window 1)” for 2025-05-01 to 2025-05-01

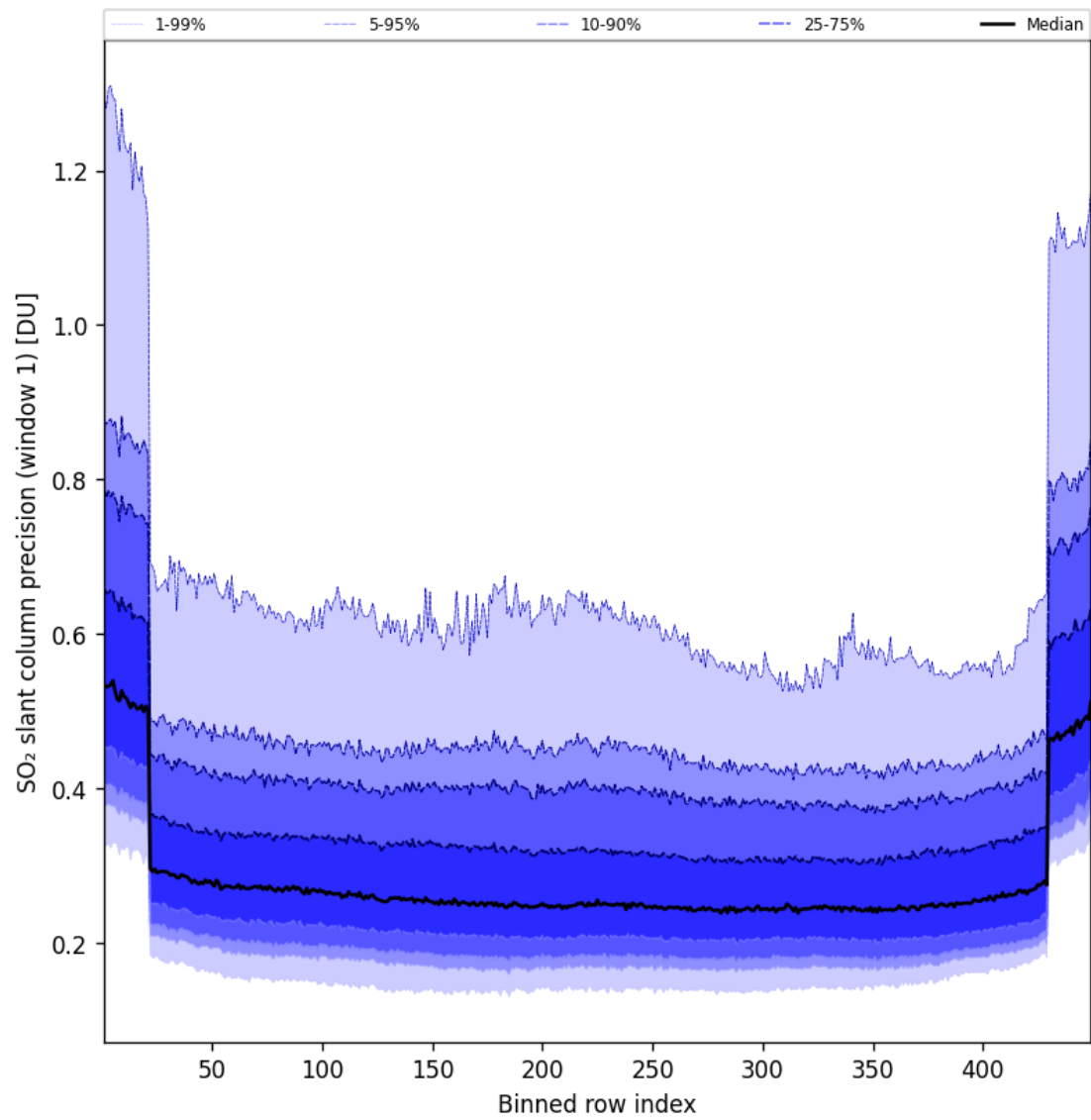


Figure 91: Along track statistics of “SO₂ slant column precision (window 1)” for 2025-05-01 to 2025-05-01

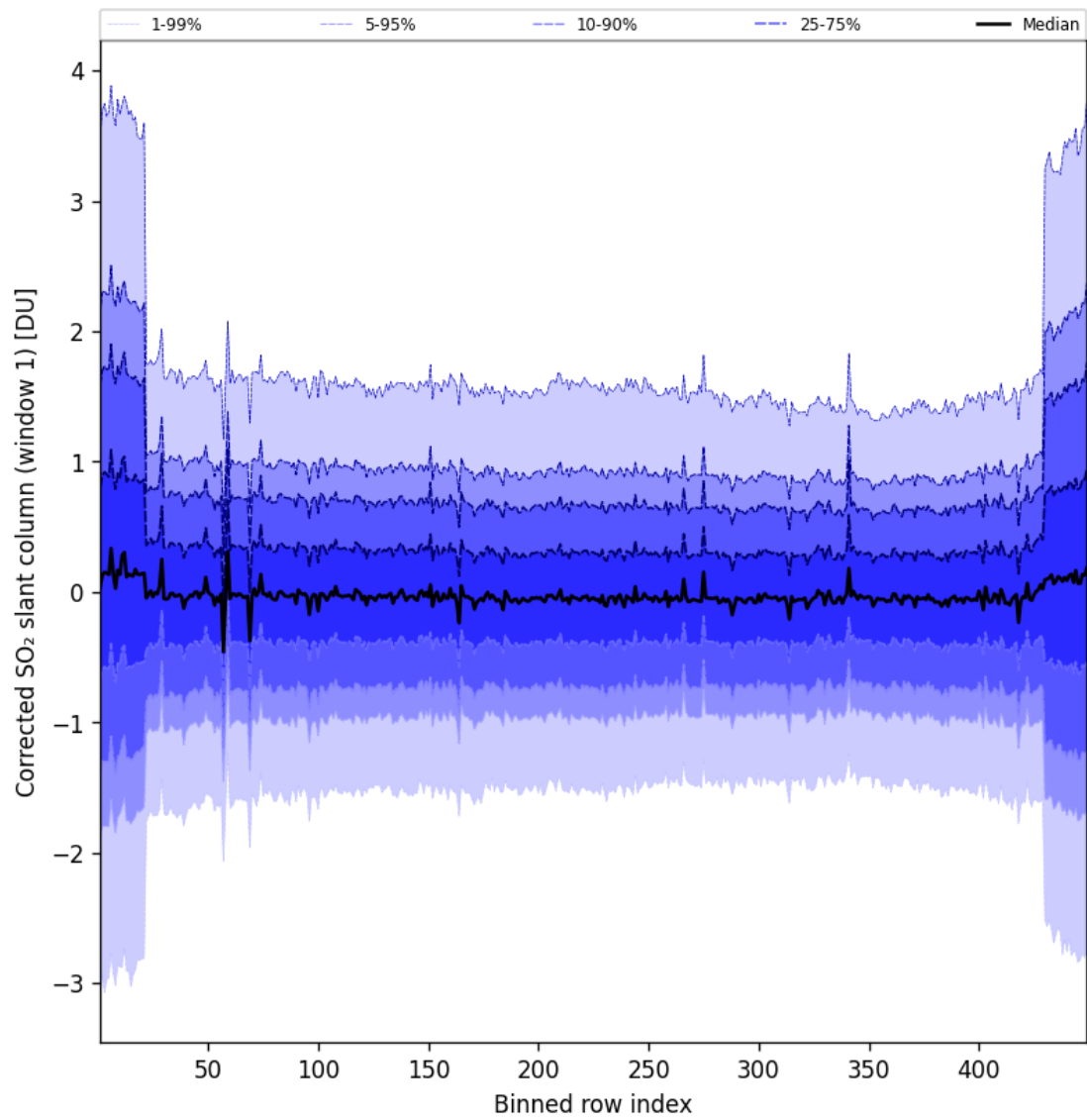


Figure 92: Along track statistics of “Corrected SO₂ slant column (window 1)” for 2025-05-01 to 2025-05-01

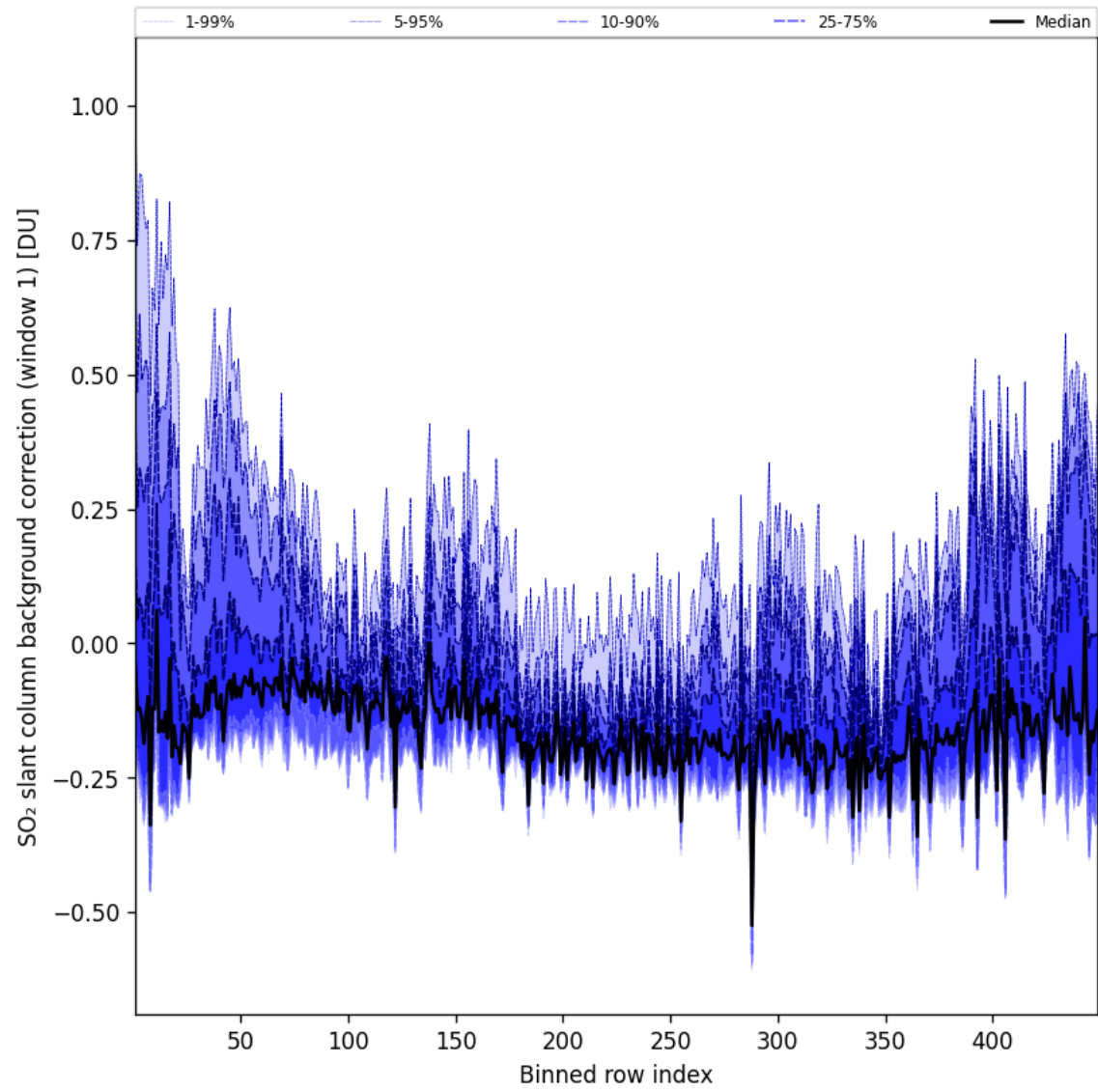


Figure 93: Along track statistics of “SO₂ slant column background correction (window 1)” for 2025-05-01 to 2025-05-01

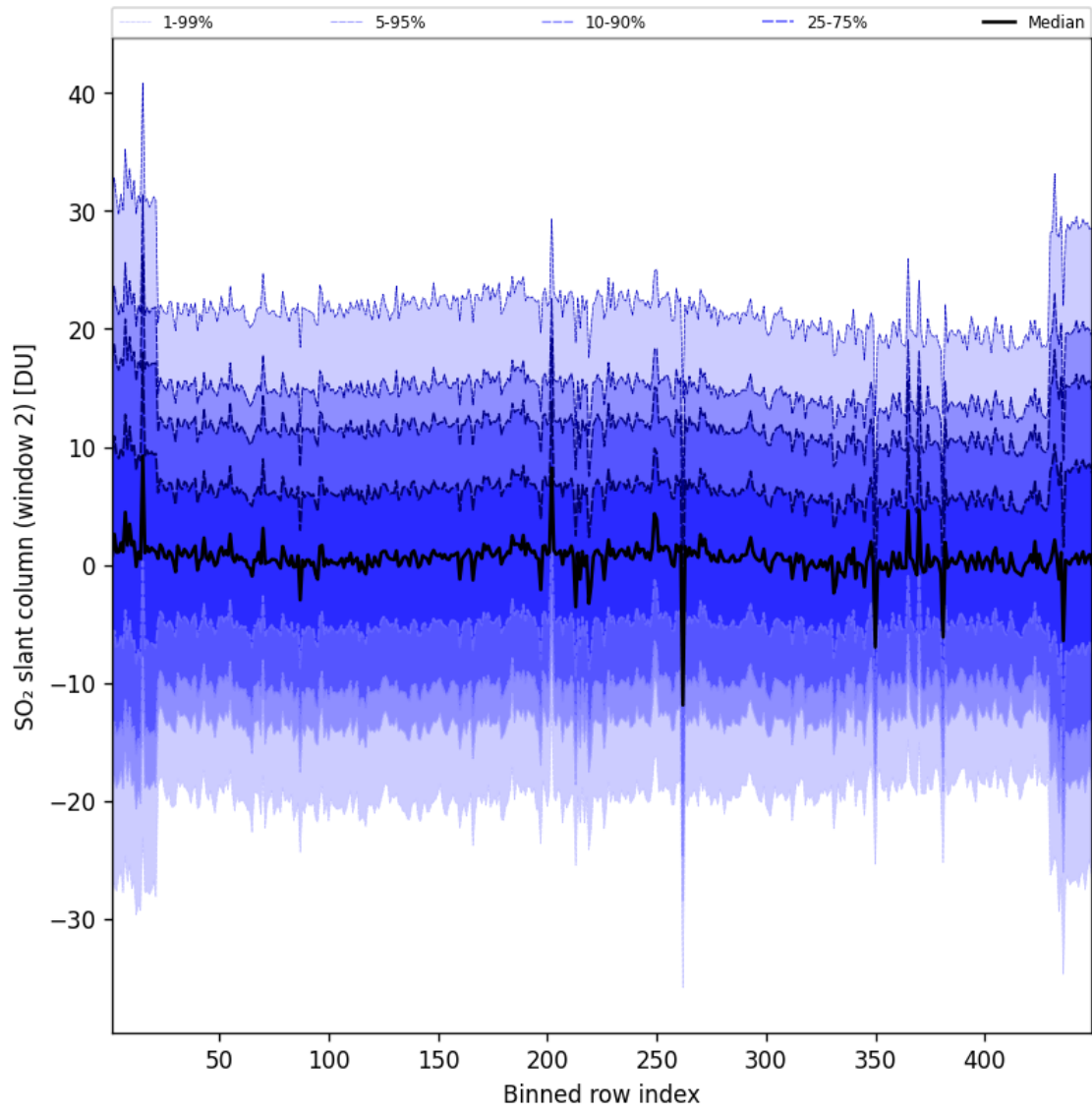


Figure 94: Along track statistics of “SO₂ slant column (window 2)” for 2025-05-01 to 2025-05-01

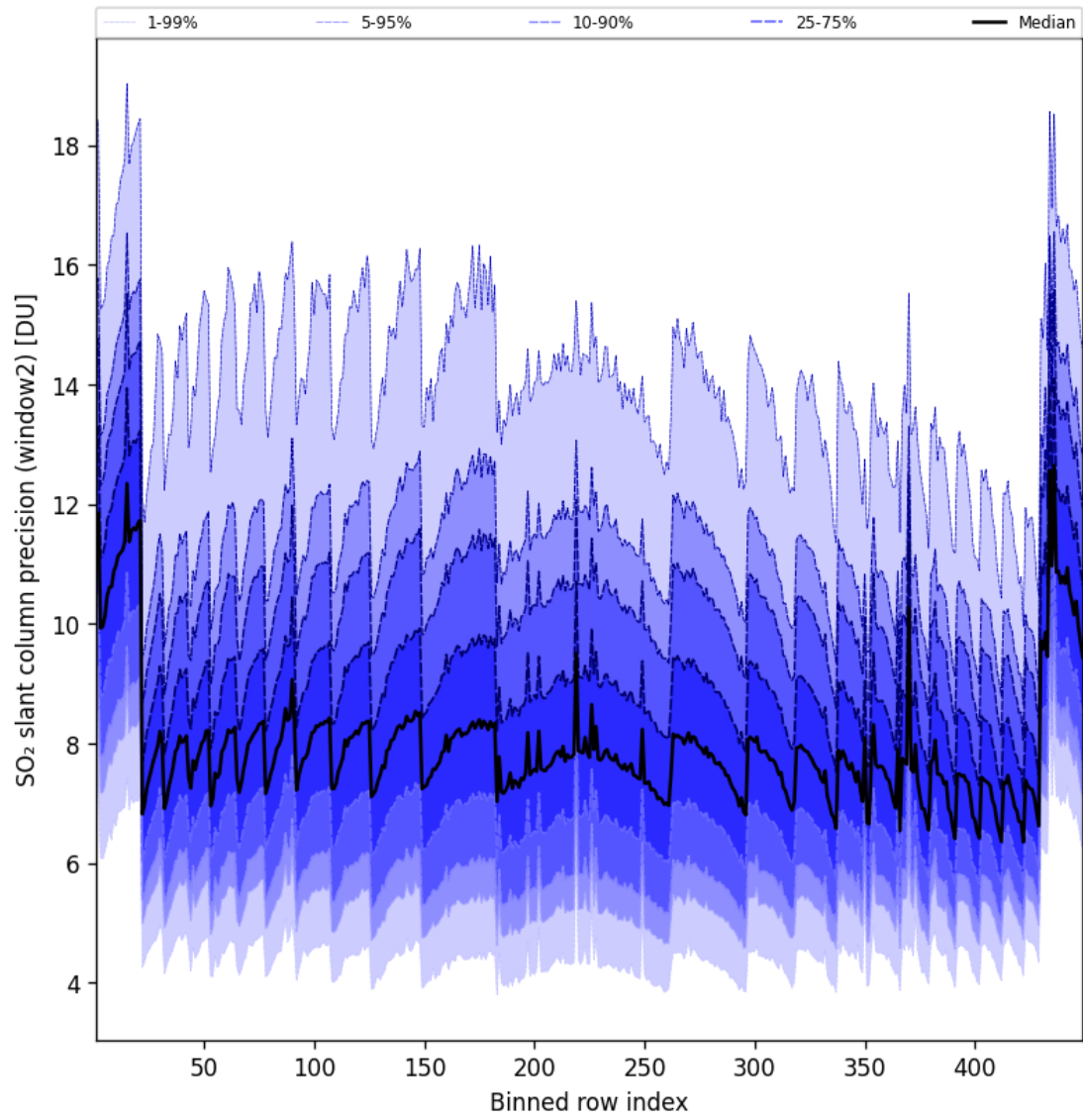


Figure 95: Along track statistics of “SO₂ slant column precision (window2)” for 2025-05-01 to 2025-05-01

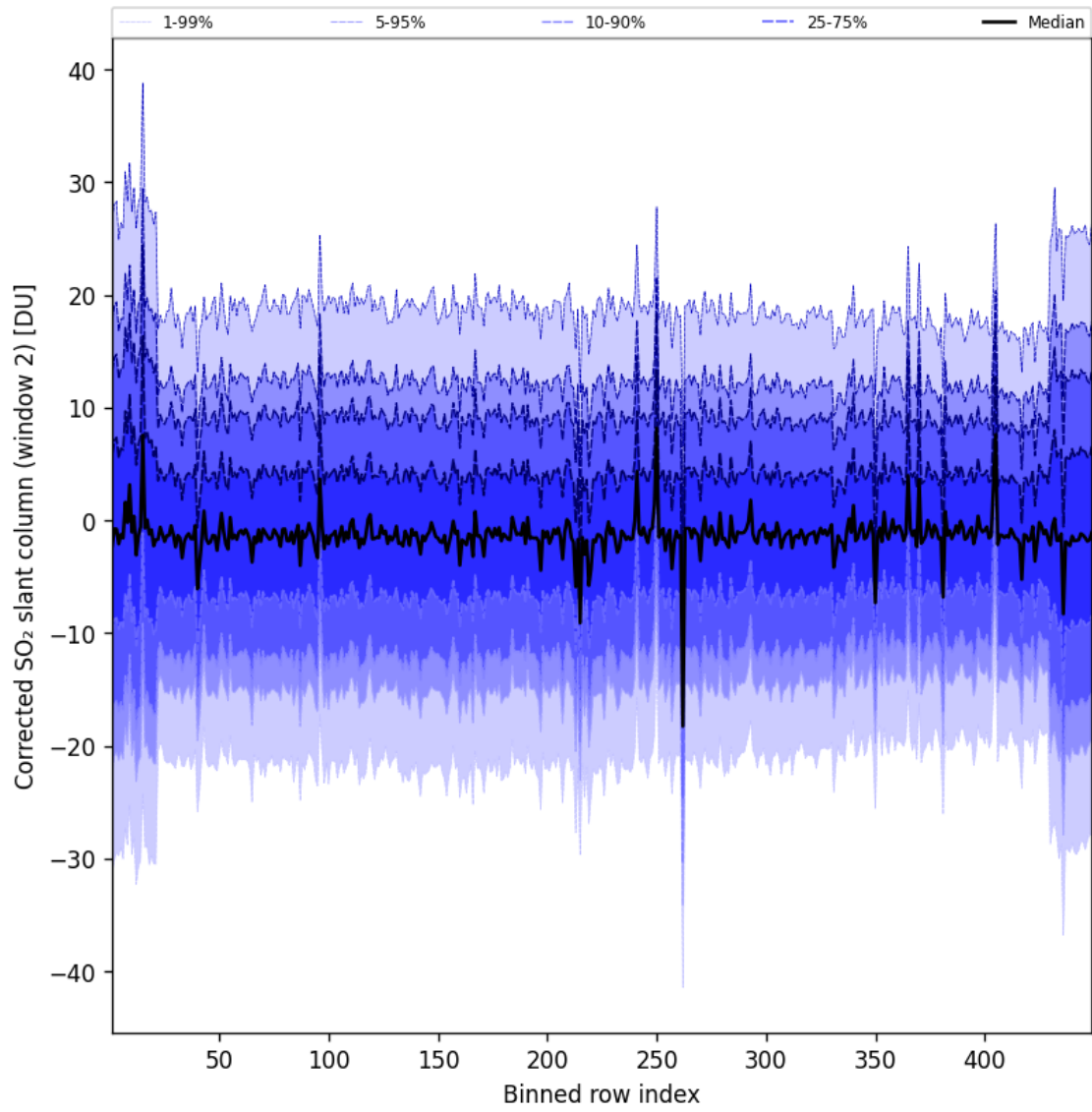


Figure 96: Along track statistics of “Corrected SO₂ slant column (window 2)” for 2025-05-01 to 2025-05-01

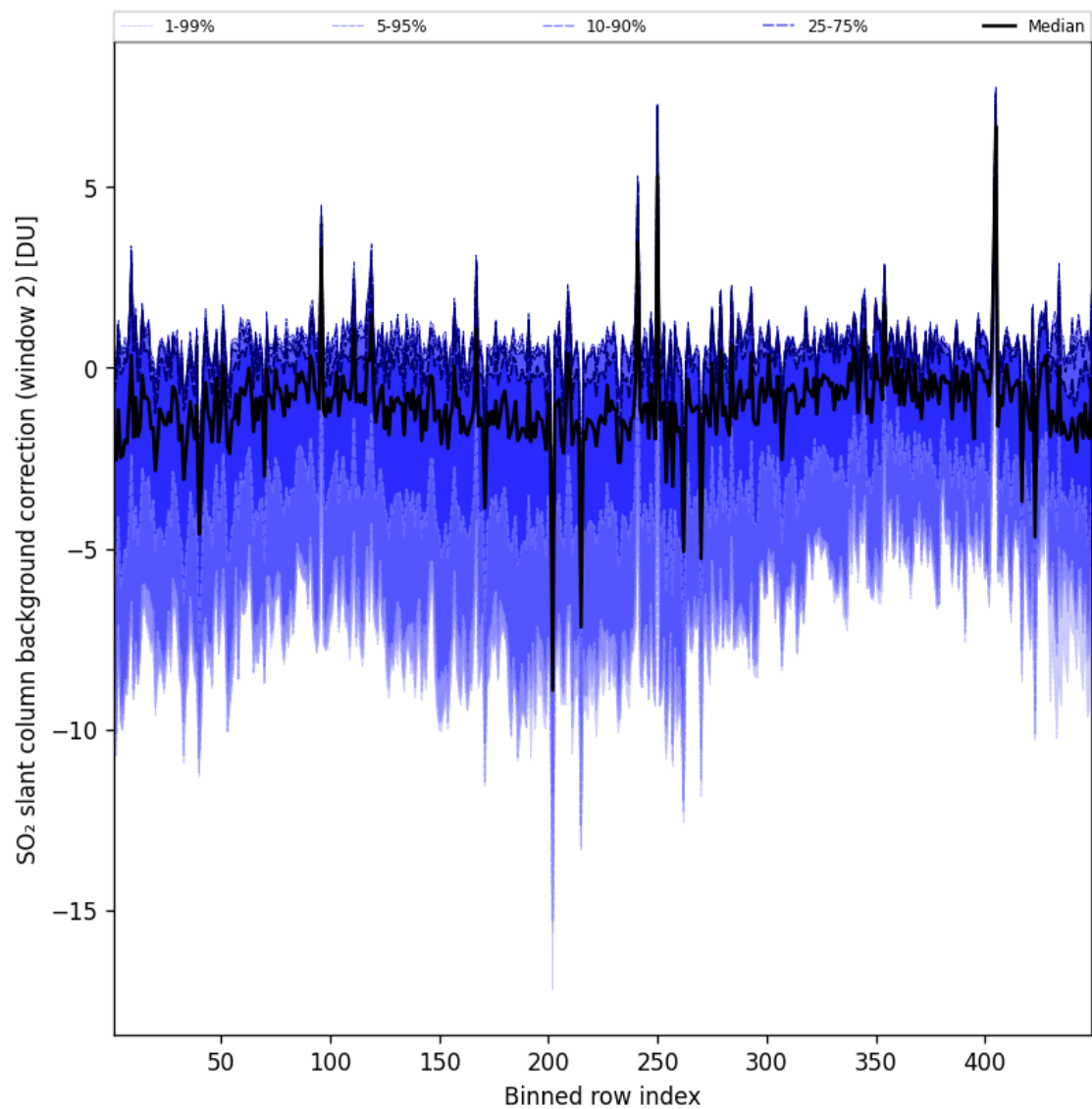


Figure 97: Along track statistics of “SO₂ slant column background correction (window 2)” for 2025-05-01 to 2025-05-01

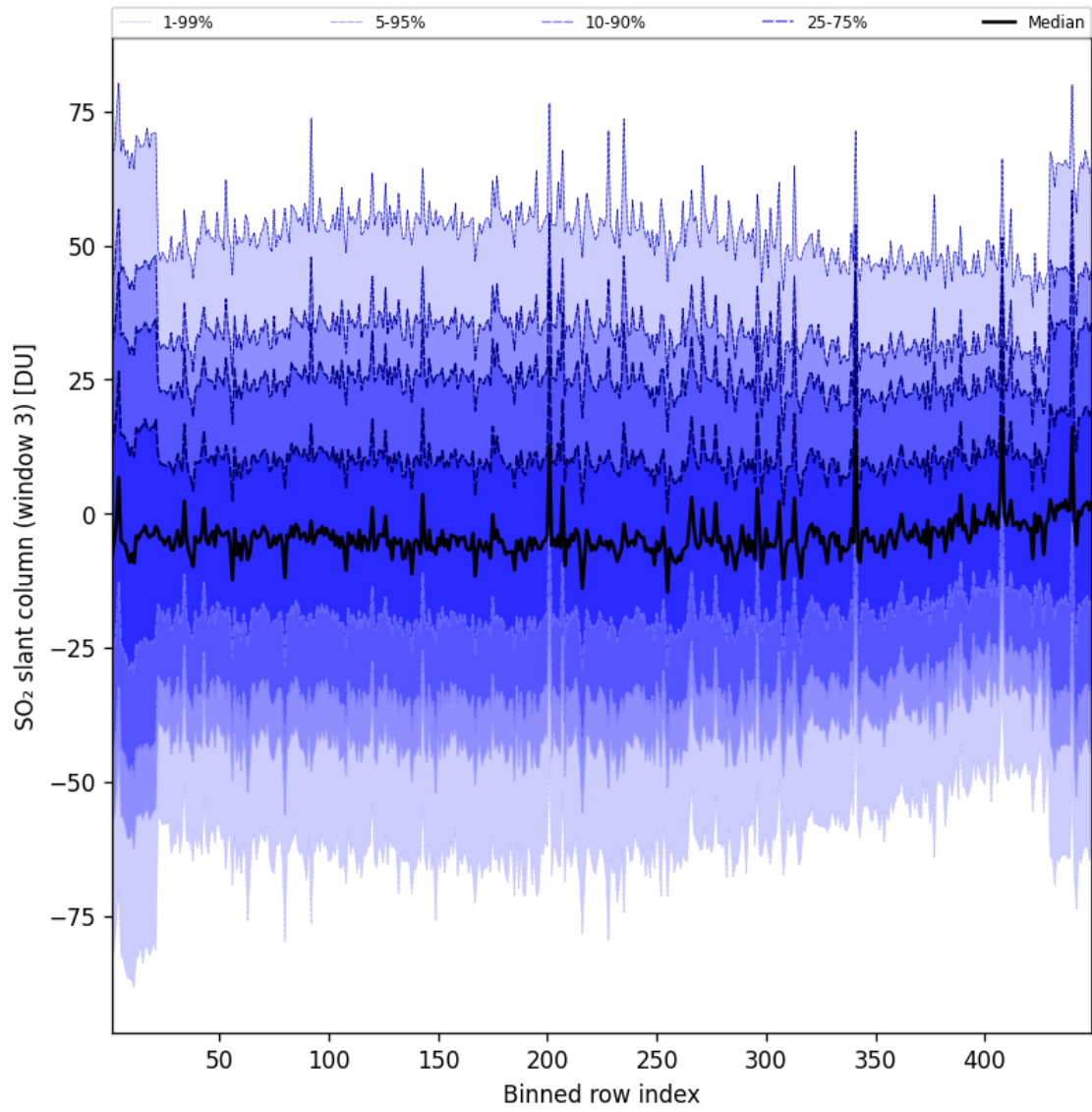


Figure 98: Along track statistics of “SO₂ slant column (window 3)” for 2025-05-01 to 2025-05-01

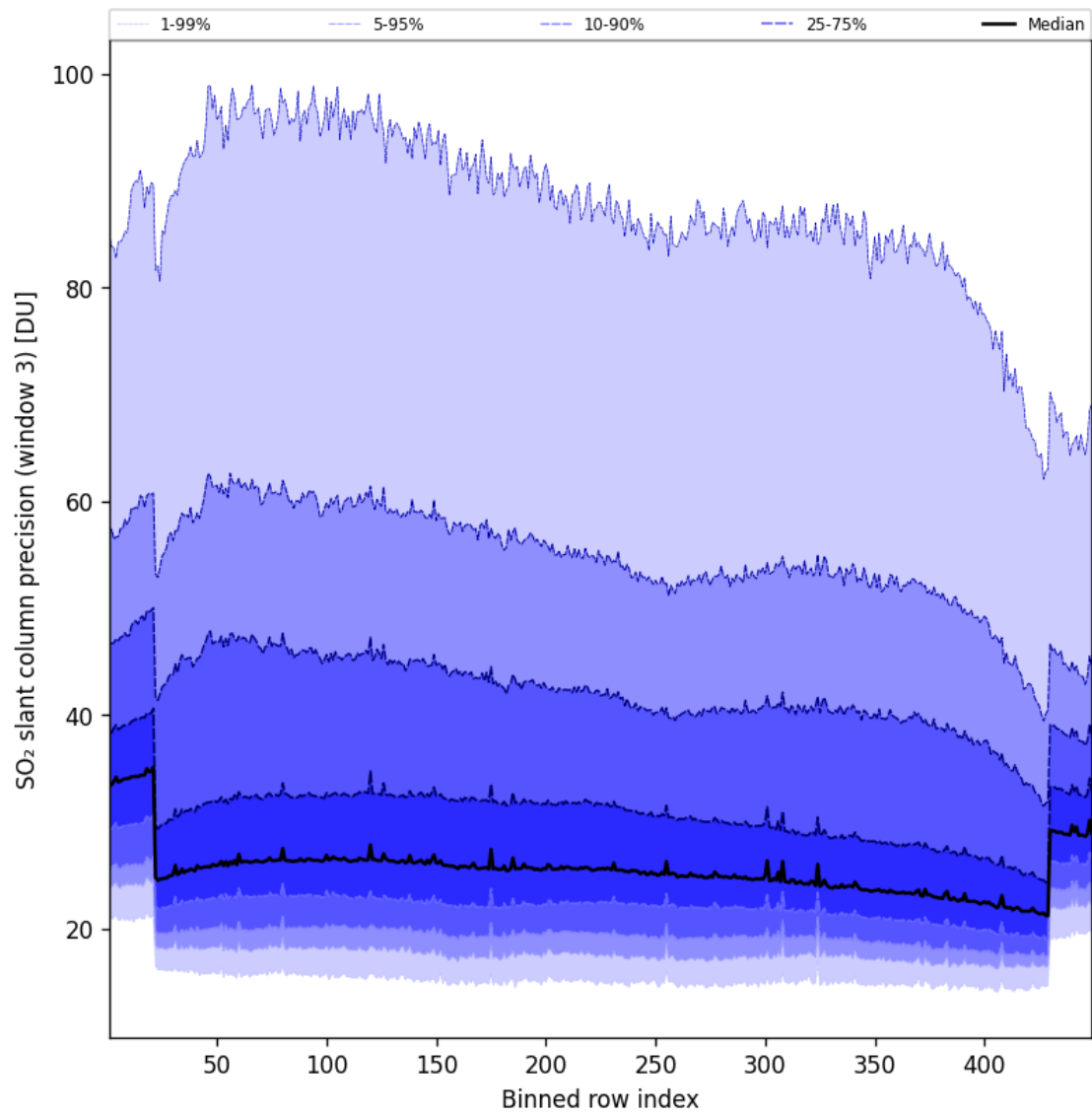


Figure 99: Along track statistics of “SO₂ slant column precision (window 3)” for 2025-05-01 to 2025-05-01

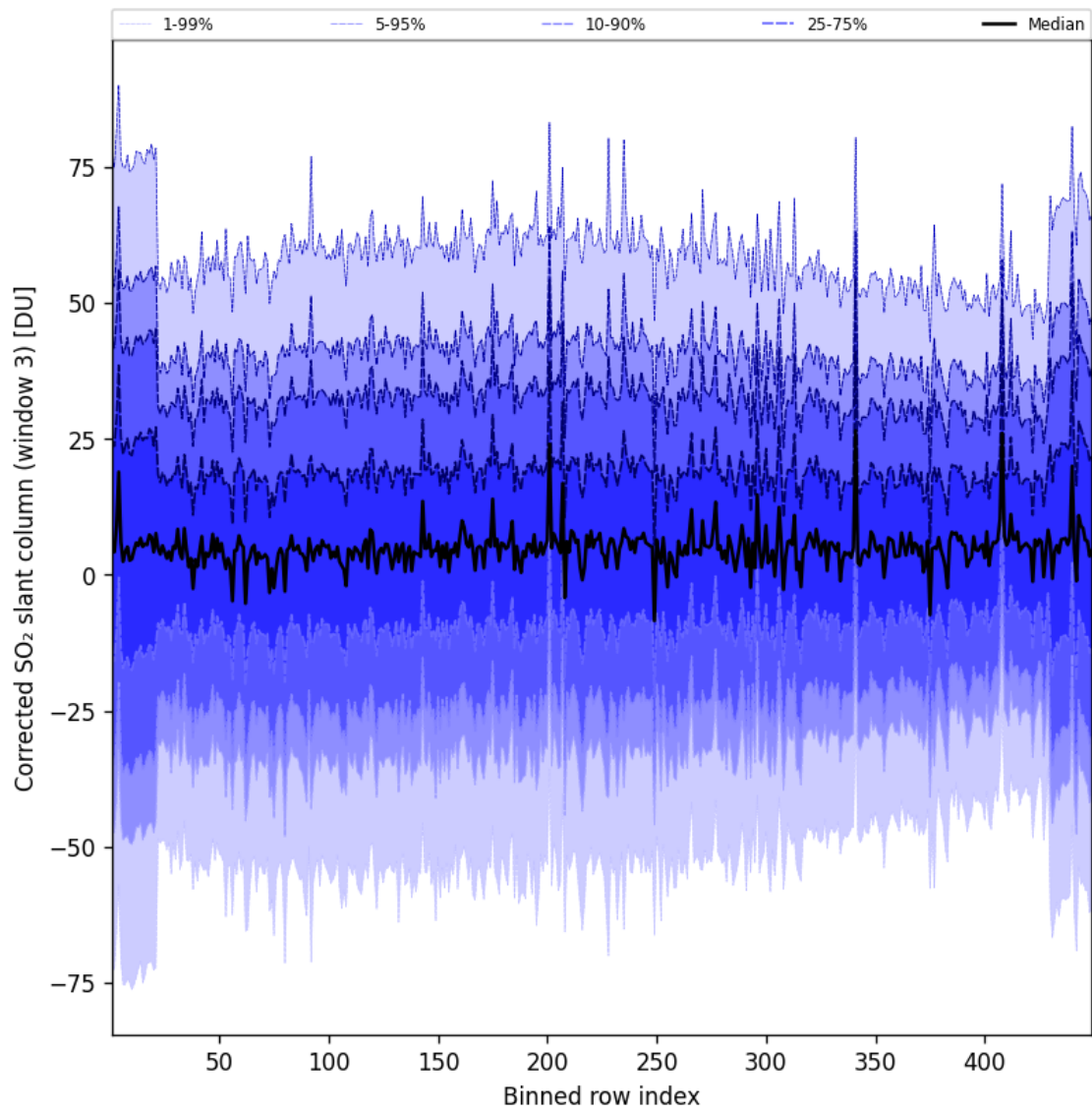


Figure 100: Along track statistics of “Corrected SO₂ slant column (window 3)” for 2025-05-01 to 2025-05-01

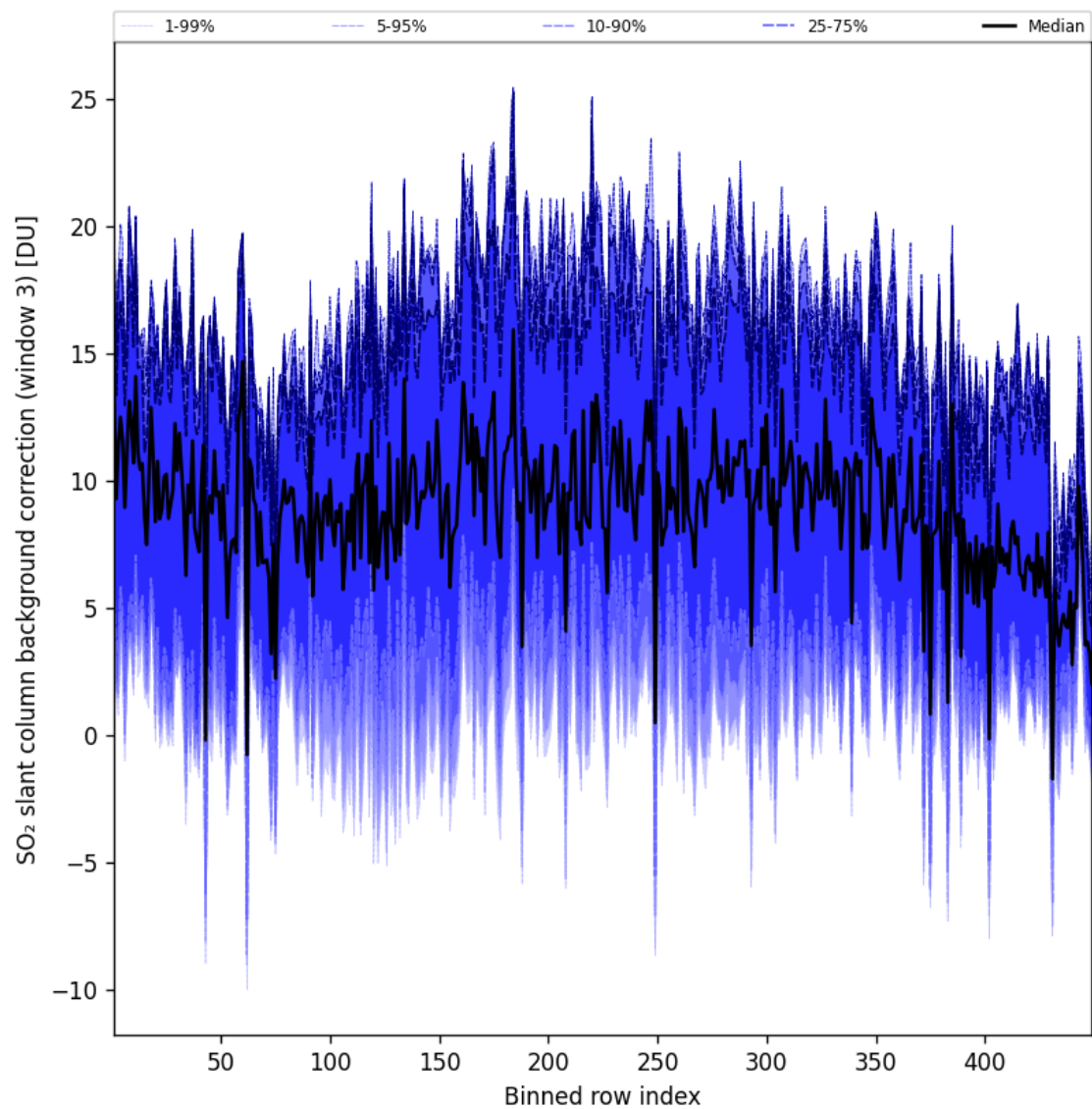


Figure 101: Along track statistics of “SO₂ slant column background correction (window 3)” for 2025-05-01 to 2025-05-01

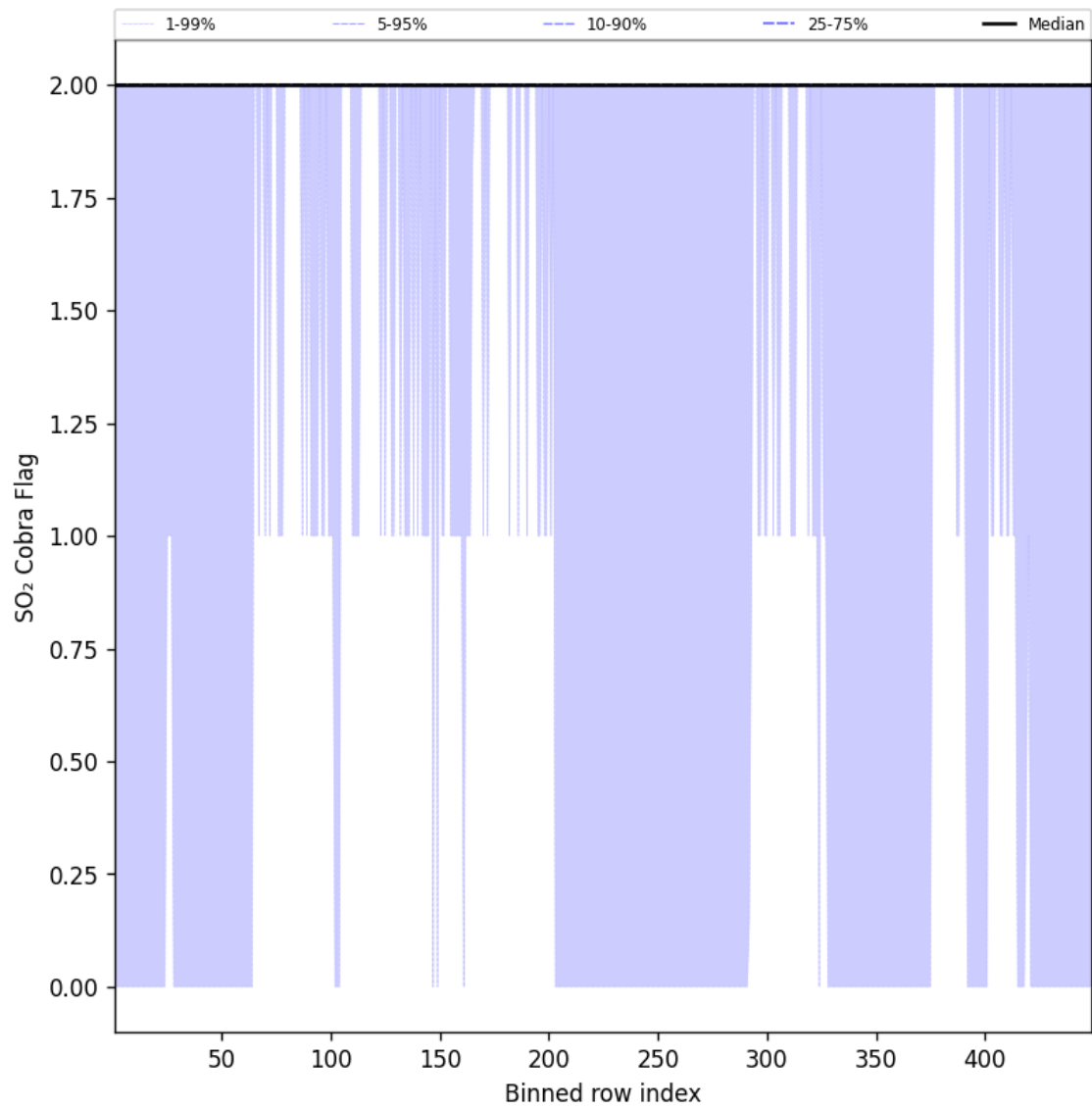


Figure 102: Along track statistics of “SO₂ Cobra Flag” for 2025-05-01 to 2025-05-01

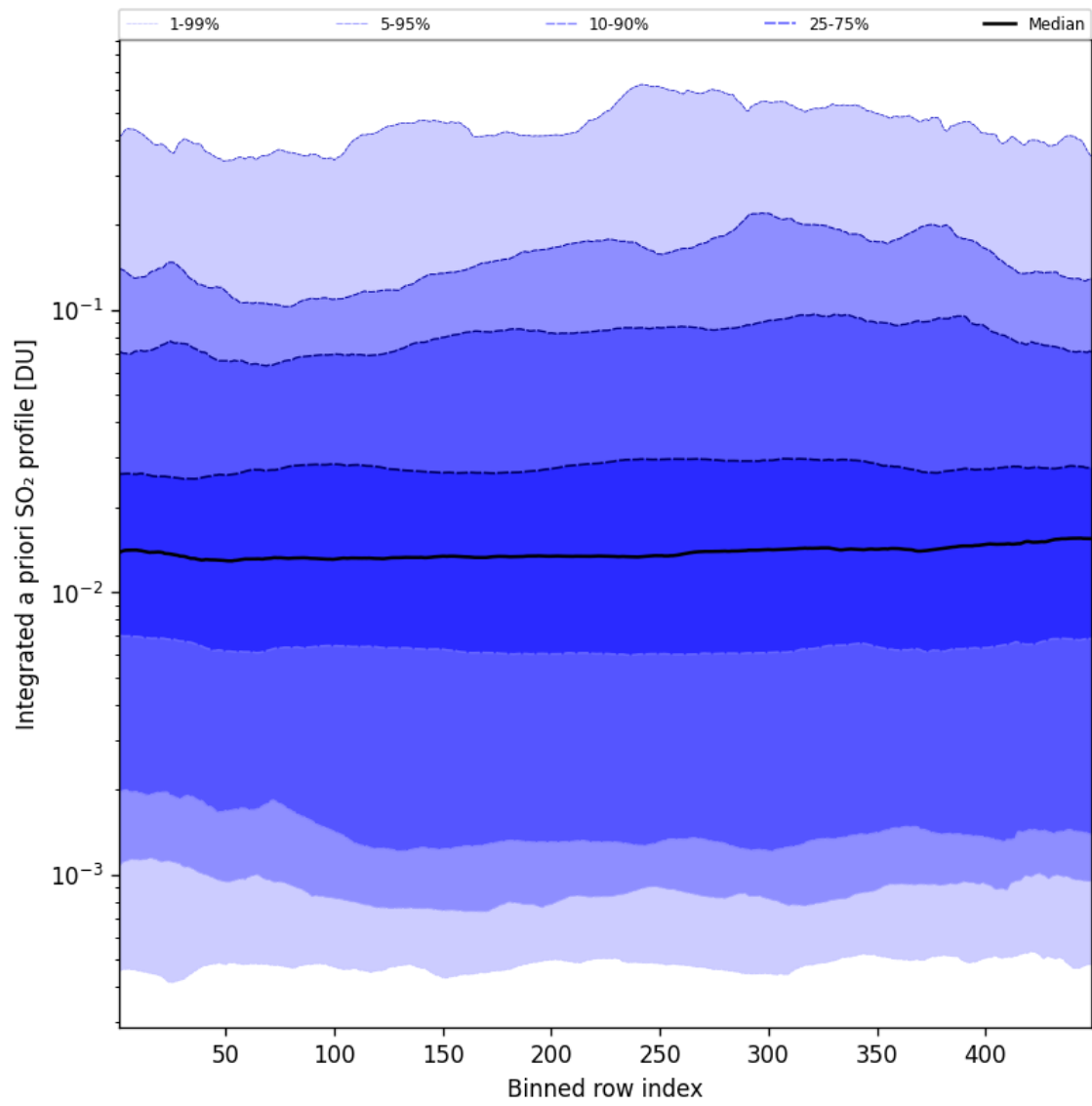


Figure 103: Along track statistics of “Integrated a priori SO₂ profile” for 2025-05-01 to 2025-05-01

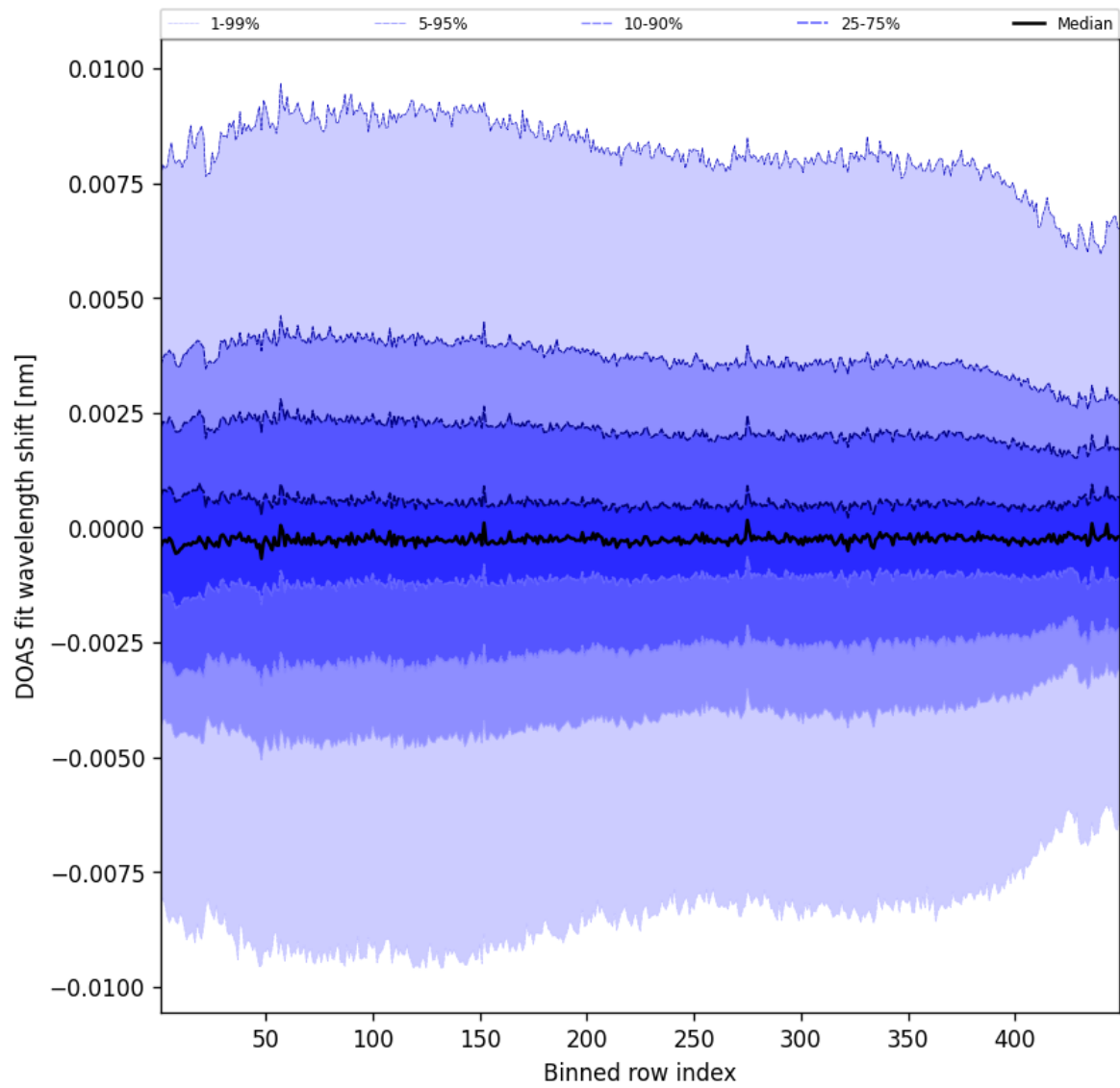


Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2025-05-01 to 2025-05-01

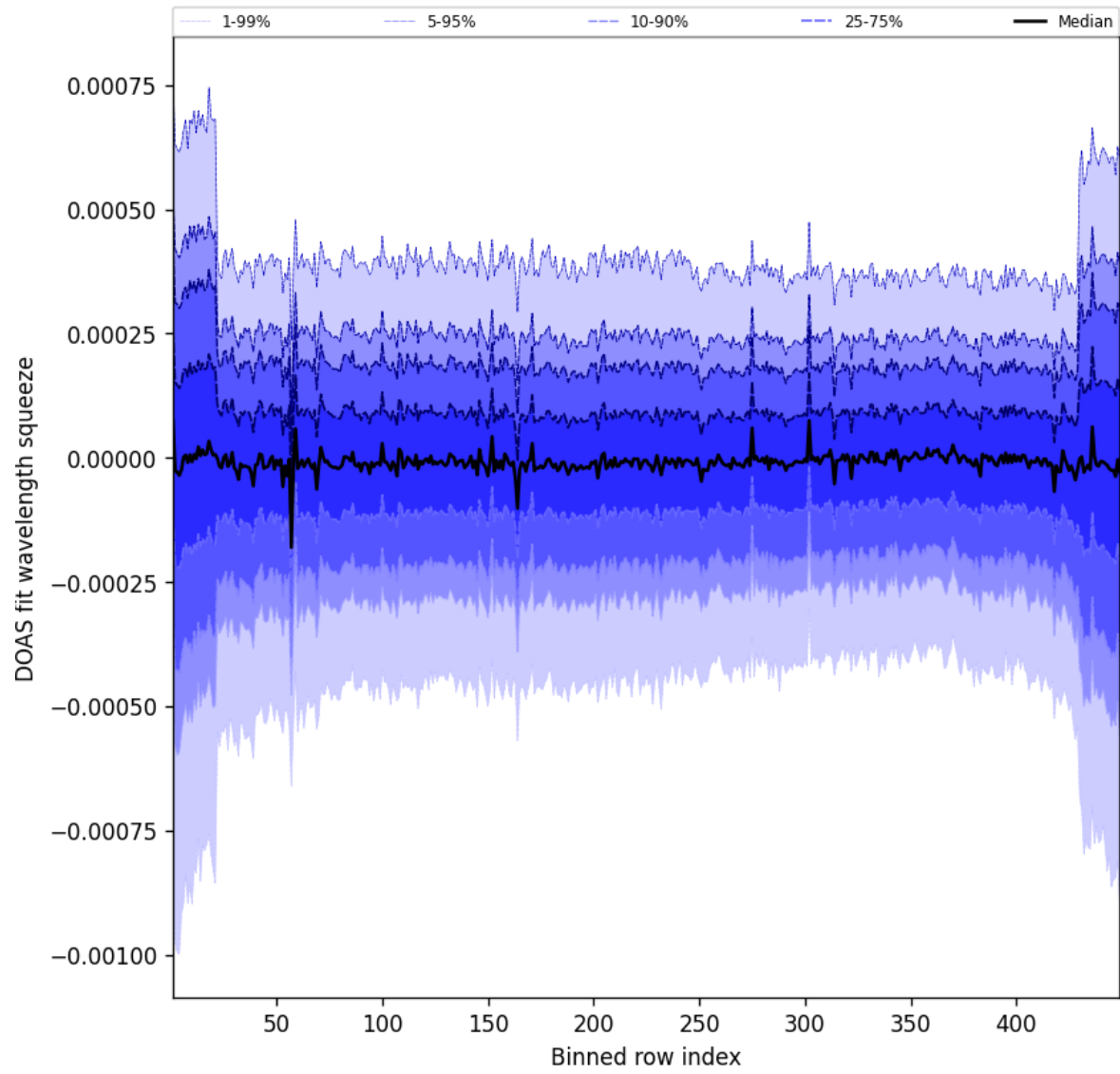


Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2025-05-01 to 2025-05-01

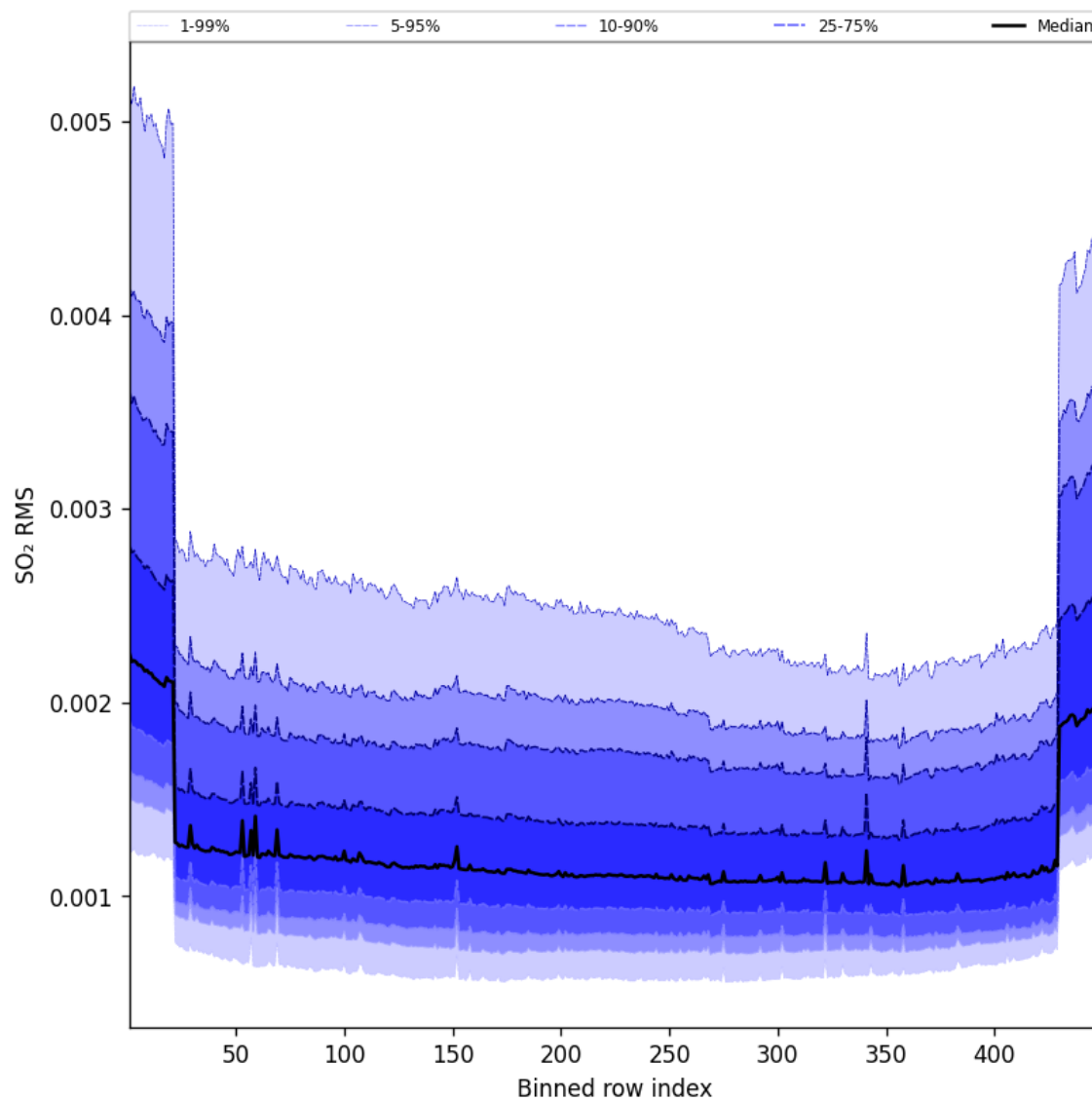


Figure 106: Along track statistics of “SO₂ RMS” for 2025-05-01 to 2025-05-01

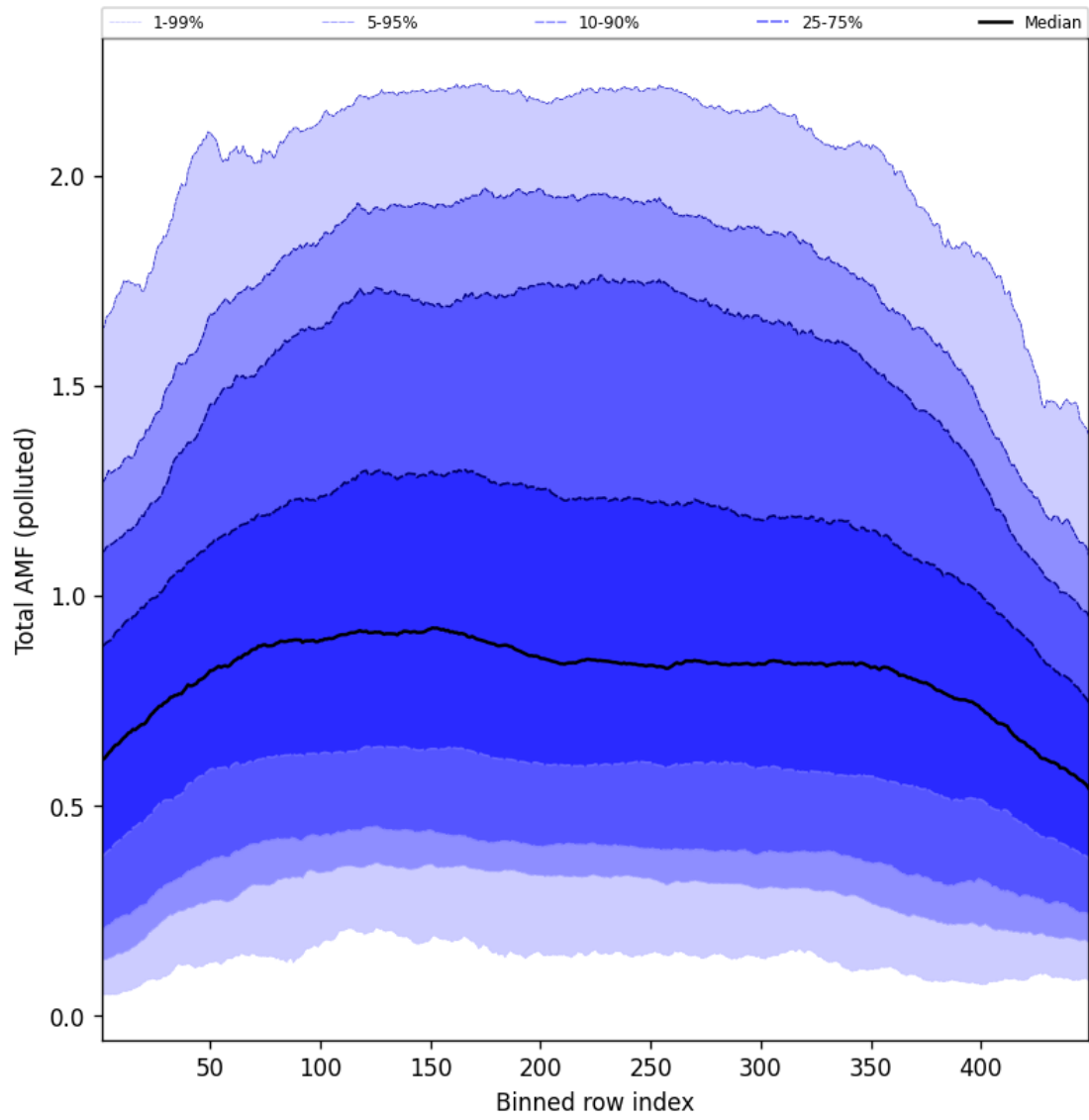


Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-05-01 to 2025-05-01

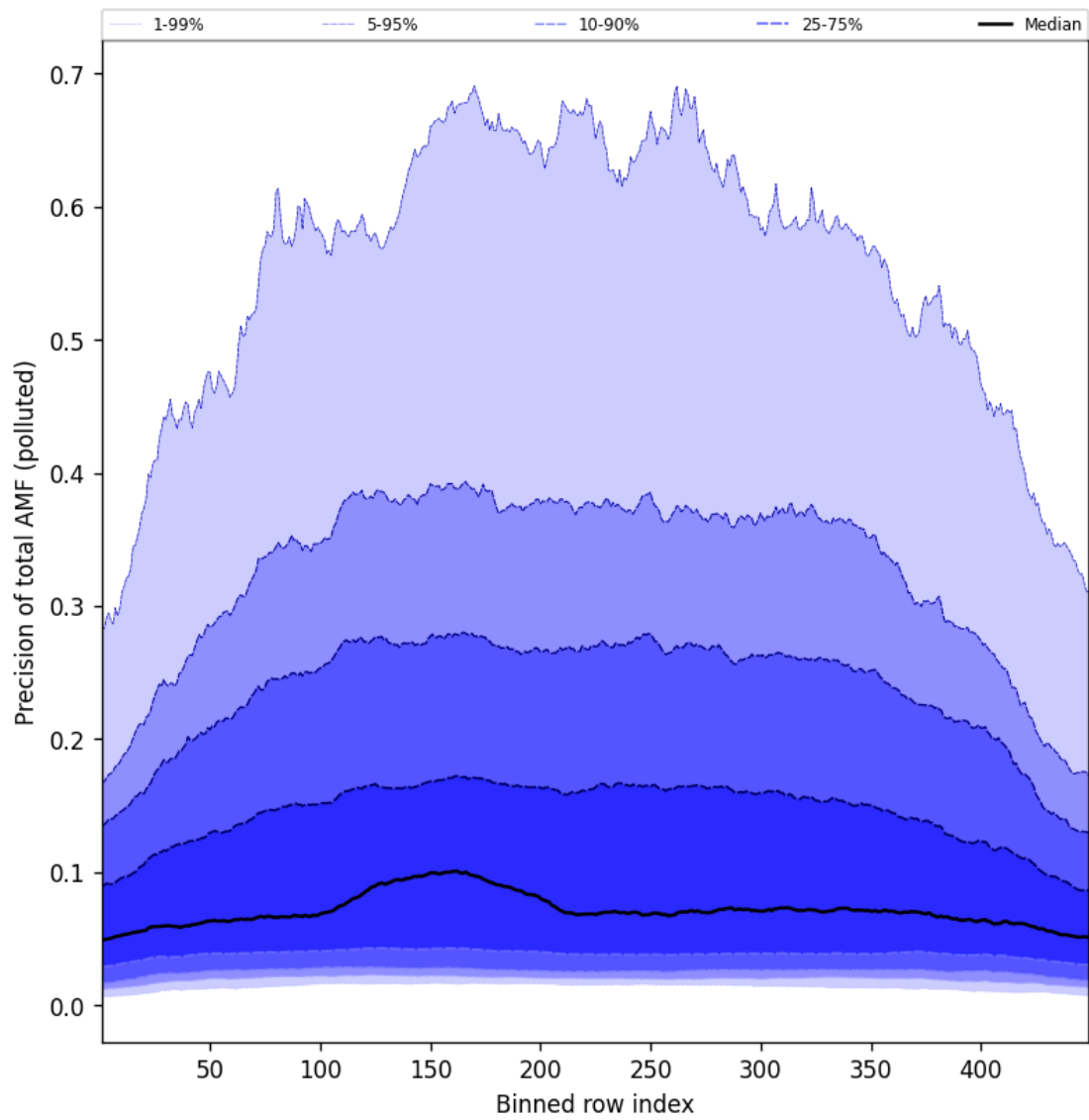


Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-05-01 to 2025-05-01

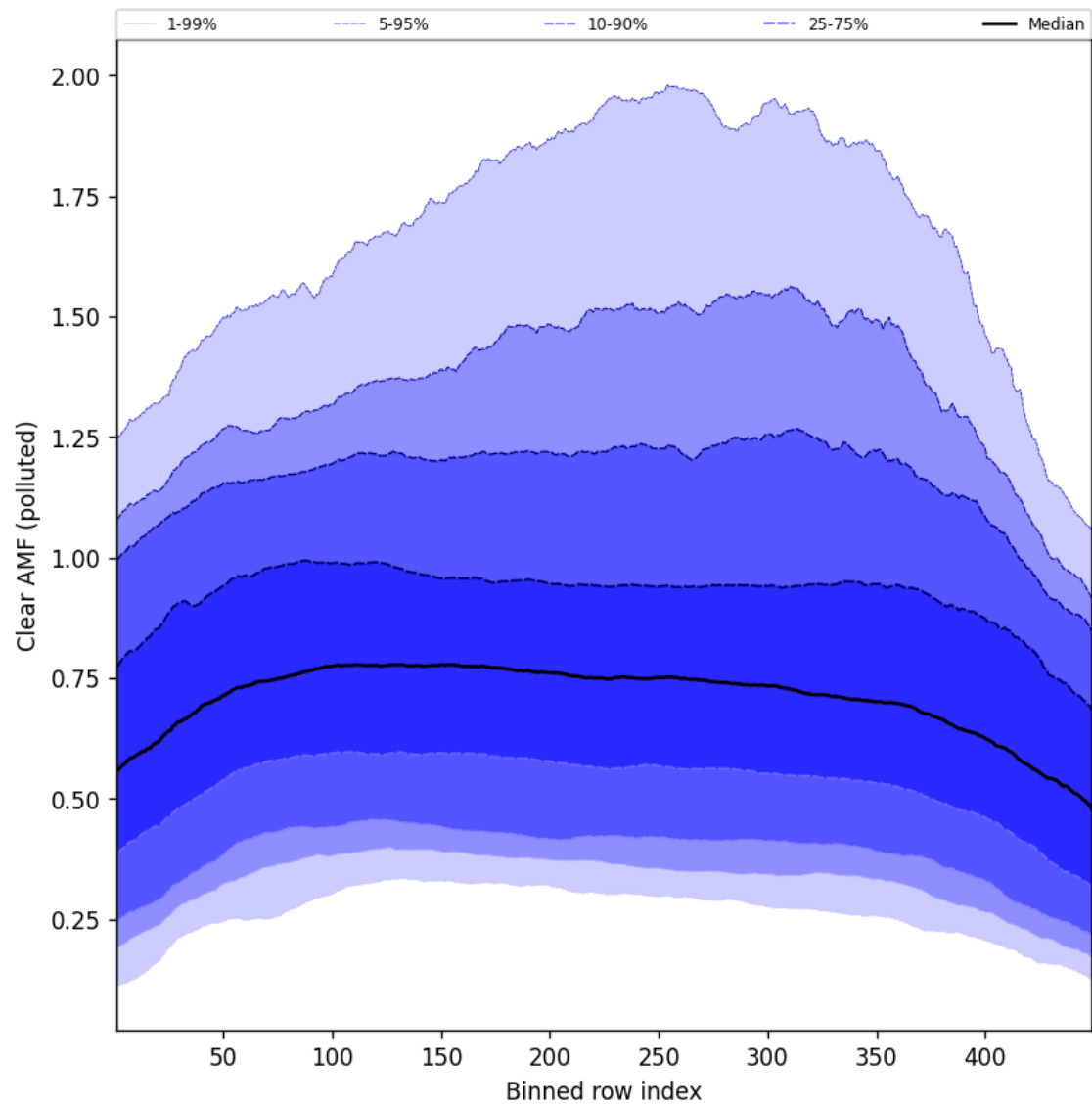


Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-05-01 to 2025-05-01

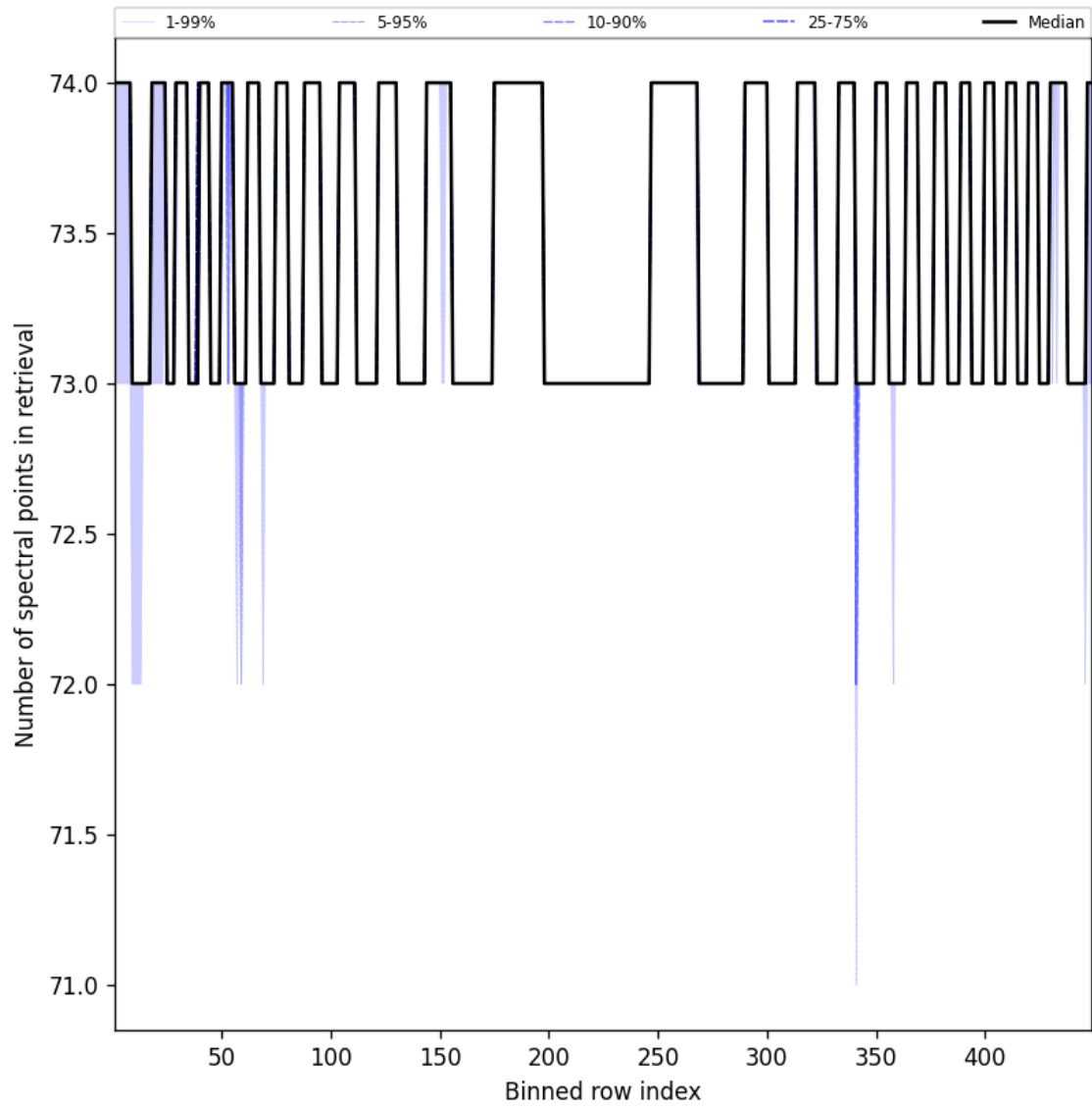


Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-05-01 to 2025-05-01

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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