

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]	0.632 ± 0.415	16912808	0.995	0.800	1.000	0.0	1.000
sulfurdioxide total vertical column [DU]	$(3.036 \pm 122.887) \times 10^{-2}$	16912808	0.235	0.440	8.529×10^{-3}	-102	206
sulfurdioxide total vertical column precision [DU]	0.580 ± 0.928	16912808	0.222	0.369	0.318	2.847×10^{-2}	40.9
sulfurdioxide slant column density corrected [DU]	$(1.449 \pm 35.155) \times 10^{-2}$	16912808	0.250	0.365	8.010×10^{-3}	-11.1	204
sulfurdioxide slant column density cobra [DU]	$(1.443 \pm 34.507) \times 10^{-2}$	16912808	0.250	0.365	8.010×10^{-3}	-11.1	39.8
sulfurdioxide slant column density cobra precision [DU]	0.290 ± 0.119	16912808	0.213	0.127	0.253	8.355×10^{-2}	21.7
sulfurdioxide slant column density window1 [DU]	0.128 ± 0.659	16912808	0.125	0.743	0.131	-71.2	96.1
sulfurdioxide slant column density window1 precision [DU]	0.290 ± 0.119	16912808	0.213	0.127	0.253	8.355×10^{-2}	21.7
sulfurdioxide slant column density corrected win1 [DU]	$(-5.583 \pm 651.659) \times 10^{-3}$	16912808	-2.500×10^{-2}	0.729	-1.924×10^{-2}	-71.2	95.9
background so2 slant column offset window1 [DU]	-0.133 ± 0.122	16912808	-0.140	0.143	-0.145	-1.21	3.29
sulfurdioxide slant column density window2 [DU]	0.893 ± 8.962	16912808	0.250	11.4	0.762	-1.946×10^3	719
sulfurdioxide slant column density window2 precision [DU]	8.08 ± 2.21	16912808	7.43	2.55	7.72	2.32	577
sulfurdioxide slant column density corrected win2 [DU]	-1.05 ± 8.81	16912808	-0.750	11.2	-1.08	-1.945×10^3	716
background so2 slant column offset window2 [DU]	-1.95 ± 2.47	16912808	0.250	3.65	-1.42	-18.1	10.8
sulfurdioxide slant column density window3 [DU]	-3.86 ± 24.00	16912808	-5.04	30.1	-3.92	-489	224
sulfurdioxide slant column density window3 precision [DU]	28.2 ± 13.1	16912808	22.5	10.0	24.7	9.45	369
sulfurdioxide slant column density corrected win3 [DU]	4.84 ± 23.27	16912808	5.04	28.9	4.96	-487	227
background so2 slant column offset window3 [DU]	8.71 ± 6.49	16912808	2.80	10.3	8.11	-18.8	46.2
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.21	16912808	1.67	0.0	2.00	0.0	2.00
integrated so2 profile apriori [DU]	$(3.276 \pm 8.388) \times 10^{-2}$	16912808	1.423×10^{-2}	1.812×10^{-2}	1.335×10^{-2}	2.768×10^{-4}	2.31
fitted radiance shift [nm]	$(-5.326 \pm 25.580) \times 10^{-4}$	16912808	-5.000×10^{-4}	1.857×10^{-3}	-5.706×10^{-4}	-6.731×10^{-2}	4.031×10^{-2}
fitted radiance squeeze [1]	$(1.353 \pm 179.050) \times 10^{-6}$	16912808	1.000×10^{-5}	2.088×10^{-4}	6.499×10^{-6}	-1.669×10^{-2}	1.420×10^{-2}
fitted root mean square [1]	$(1.268 \pm 0.489) \times 10^{-3}$	16912808	9.750×10^{-4}	5.126×10^{-4}	1.135×10^{-3}	3.309×10^{-4}	6.090×10^{-2}
sulfurdioxide total air mass factor polluted [1]	0.910 ± 0.544	16912808	0.740	0.623	0.793	5.000×10^{-2}	3.47
sulfurdioxide total air mass factor polluted precision [1]	0.120 ± 0.116	16912808	3.500×10^{-2}	0.134	7.739×10^{-2}	2.791×10^{-3}	1.65
sulfurdioxide clear air mass factor polluted [1]	0.768 ± 0.433	16912808	0.620	0.392	0.691	5.581×10^{-2}	3.47
number of spectral points in retrieval [1]	73.4 ± 0.5	16912808	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}	0.200	1.000	1.000	1.000	1.000	1.000
sulfurdioxide total vertical column [DU]	-2.94	-0.959	-0.555	-0.363	-0.208	0.232	0.398	0.608	1.07	3.34
sulfurdioxide total vertical column precision [DU]	7.783×10^{-2}	0.111	0.140	0.169	0.208	0.577	0.803	1.13	1.82	4.86
sulfurdioxide slant column density corrected [DU]	-0.833	-0.488	-0.356	-0.267	-0.173	0.192	0.290	0.385	0.530	0.946
sulfurdioxide slant column density cobra [DU]	-0.833	-0.488	-0.356	-0.267	-0.173	0.192	0.290	0.385	0.530	0.946
sulfurdioxide slant column density cobra precision [DU]	0.147	0.172	0.185	0.196	0.211	0.338	0.388	0.436	0.513	0.714
sulfurdioxide slant column density window1 [DU]	-1.59	-0.899	-0.626	-0.440	-0.243	0.499	0.691	0.872	1.14	1.85
sulfurdioxide slant column density window1 precision [DU]	0.147	0.172	0.185	0.196	0.211	0.338	0.388	0.436	0.513	0.714
sulfurdioxide slant column density corrected win1 [DU]	-1.62	-0.990	-0.739	-0.566	-0.380	0.349	0.545	0.734	1.02	1.79
background so2 slant column offset window1 [DU]	-0.360	-0.300	-0.271	-0.245	-0.214	-7.089×10^{-2}	-2.808×10^{-2}	1.442×10^{-2}	8.378×10^{-2}	0.244
sulfurdioxide slant column density window2 [DU]	-20.1	-13.4	-10.1	-7.65	-4.88	6.51	9.41	12.0	15.6	23.2
sulfurdioxide slant column density window2 precision [DU]	4.45	5.25	5.73	6.12	6.61	9.16	10.0	10.9	12.2	14.7
sulfurdioxide slant column density corrected win2 [DU]	-22.3	-15.3	-11.9	-9.43	-6.66	4.51	7.31	9.83	13.3	20.5
background so2 slant column offset window2 [DU]	-7.95	-6.20	-5.34	-4.64	-3.73	-8.506×10^{-2}	0.241	0.489	0.917	3.00
sulfurdioxide slant column density window3 [DU]	-64.4	-42.9	-33.2	-26.3	-18.8	11.3	19.0	26.0	35.5	54.2
sulfurdioxide slant column density window3 precision [DU]	14.4	16.7	18.2	19.4	20.9	30.9	35.6	41.1	52.8	84.2
sulfurdioxide slant column density corrected win3 [DU]	-54.5	-33.4	-23.7	-16.8	-9.46	19.4	26.8	33.5	42.7	61.3
background so2 slant column offset window3 [DU]	-3.76	-0.264	1.03	2.02	3.40	13.7	16.0	17.7	19.7	22.8
sulfurdioxide slant column cobra flag [1]	0.0	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
integrated so2 profile apriori [DU]	1.855×10^{-3}	3.226×10^{-3}	4.437×10^{-3}	5.580×10^{-3}	7.493×10^{-3}	2.561×10^{-2}	4.071×10^{-2}	6.567×10^{-2}	0.118	0.366
fitted radiance shift [nm]	-8.142×10^{-3}	-4.221×10^{-3}	-2.871×10^{-3}	-2.143×10^{-3}	-1.520×10^{-3}	3.367×10^{-4}	1.027×10^{-3}	1.907×10^{-3}	3.443×10^{-3}	7.606×10^{-3}
fitted radiance squeeze [1]	-4.811×10^{-4}	-2.923×10^{-4}	-2.121×10^{-4}	-1.573×10^{-4}	-9.993×10^{-5}	1.088×10^{-4}	1.607×10^{-4}	2.085×10^{-4}	2.766×10^{-4}	4.375×10^{-4}
fitted root mean square [1]	6.228×10^{-4}	7.500×10^{-4}	8.204×10^{-4}	8.768×10^{-4}	9.473×10^{-4}	1.460×10^{-3}	1.677×10^{-3}	1.885×10^{-3}	2.198×10^{-3}	3.021×10^{-3}
sulfurdioxide total air mass factor polluted [1]	6.243×10^{-2}	0.198	0.317	0.416	0.541	1.16	1.42	1.68	2.04	2.58
sulfurdioxide total air mass factor polluted precision [1]	8.776×10^{-3}	1.638×10^{-2}	2.383×10^{-2}	2.983×10^{-2}	3.762×10^{-2}	0.172	0.223	0.271	0.339	0.515
sulfurdioxide clear air mass factor polluted [1]	0.175	0.281	0.355	0.426	0.513	0.904	1.03	1.18	1.58	2.62
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]	0.700 ± 0.398	6976400	0.700	1.000	0.0	1.000	0.300	1.000
sulfurdioxide total vertical column [DU]	$(4.715 \pm 167.175) \times 10^{-2}$	6976400	0.570	1.378×10^{-2}	-102	206	-0.266	0.304
sulfurdioxide total vertical column precision [DU]	0.807 ± 1.240	6976400	0.559	0.406	5.169×10^{-2}	40.9	0.255	0.814
sulfurdioxide slant column density corrected [DU]	$(1.958 \pm 36.834) \times 10^{-2}$	6976400	0.380	1.047×10^{-2}	-7.04	43.3	-0.178	0.202
sulfurdioxide slant column density cobra [DU]	$(1.954 \pm 36.644) \times 10^{-2}$	6976400	0.380	1.047×10^{-2}	-7.04	38.5	-0.178	0.202
sulfurdioxide slant column density cobra precision [DU]	0.304 ± 0.129	6976400	0.142	0.265	9.324×10^{-2}	19.3	0.217	0.359
sulfurdioxide slant column density window1 [DU]	0.180 ± 0.686	6976400	0.764	0.178	-9.47	96.1	-0.203	0.561
sulfurdioxide slant column density window1 precision [DU]	0.304 ± 0.129	6976400	0.142	0.265	9.324×10^{-2}	19.3	0.217	0.359
sulfurdioxide slant column density corrected win1 [DU]	$(1.447 \pm 68.356) \times 10^{-2}$	6976400	0.756	-5.348×10^{-3}	-9.03	95.9	-0.377	0.379
background so2 slant column offset window1 [DU]	-0.166 ± 0.112	6976400	0.113	-0.171	-1.21	3.29	-0.234	-0.121
sulfurdioxide slant column density window2 [DU]	0.606 ± 9.521	6976400	12.1	0.349	-76.7	212	-5.57	6.48
sulfurdioxide slant column density window2 precision [DU]	8.70 ± 2.33	6976400	2.93	8.36	2.47	520	7.07	10.0
sulfurdioxide slant column density corrected win2 [DU]	-0.952 ± 9.384	6976400	11.9	-0.977	-84.4	209	-6.94	4.99
background so2 slant column offset window2 [DU]	-1.56 ± 2.35	6976400	2.71	-0.933	-17.3	10.8	-2.76	-4.804×10^{-2}
sulfurdioxide slant column density window3 [DU]	-4.46 ± 26.11	6976400	32.7	-3.71	-205	187	-20.3	12.3
sulfurdioxide slant column density window3 precision [DU]	30.5 ± 13.5	6976400	11.0	27.0	9.87	234	22.8	33.8
sulfurdioxide slant column density corrected win3 [DU]	4.58 ± 25.54	6976400	32.0	4.96	-201	205	-11.2	20.9
background so2 slant column offset window3 [DU]	9.03 ± 5.88	6976400	9.07	7.88	-16.2	28.6	4.47	13.5
sulfurdioxide slant column cobra flag [1]	1.97 ± 0.23	6976400	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(5.898 \pm 12.225) \times 10^{-2}$	6976400	4.345×10^{-2}	2.375×10^{-2}	2.768×10^{-4}	2.31	1.322×10^{-2}	5.667×10^{-2}
fitted radiance shift [nm]	$(-1.762 \pm 26.749) \times 10^{-4}$	6976400	1.774×10^{-3}	-2.364×10^{-4}	-4.316×10^{-2}	4.031×10^{-2}	-1.086×10^{-3}	6.888×10^{-4}
fitted radiance squeeze [1]	$(3.177 \pm 17.918) \times 10^{-5}$	6976400	2.097×10^{-4}	2.913×10^{-5}	-7.978×10^{-3}	1.836×10^{-3}	-7.419×10^{-5}	1.355×10^{-4}
fitted root mean square [1]	$(1.337 \pm 0.531) \times 10^{-3}$	6976400	6.001×10^{-4}	1.189×10^{-3}	3.309×10^{-4}	6.090×10^{-2}	9.764×10^{-4}	1.577×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.714 ± 0.401	6976400	0.519	0.678	5.000×10^{-2}	3.02	0.420	0.940
sulfurdioxide total air mass factor polluted precision [1]	$(9.103 \pm 10.938) \times 10^{-2}$	6976400	8.400×10^{-2}	5.104×10^{-2}	2.861×10^{-3}	1.65	3.005×10^{-2}	0.114
sulfurdioxide clear air mass factor polluted [1]	0.653 ± 0.274	6976400	0.417	0.651	5.581×10^{-2}	2.33	0.436	0.853
number of spectral points in retrieval [1]	73.5 ± 0.5	6976400	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]	0.584 ± 0.421	9936408	0.850	0.490	0.0	1.000	0.150	1.000
sulfurdioxide total vertical column [DU]	$(1.857 \pm 77.964) \times 10^{-2}$	9936408	0.372	6.031×10^{-3}	-85.5	201	-0.178	0.194
sulfurdioxide total vertical column precision [DU]	0.420 ± 0.568	9936408	0.279	0.277	2.847×10^{-2}	38.3	0.182	0.461
sulfurdioxide slant column density corrected [DU]	$(1.092 \pm 33.923) \times 10^{-2}$	9936408	0.355	6.421×10^{-3}	-11.1	204	-0.170	0.185
sulfurdioxide slant column density cobra [DU]	$(1.084 \pm 32.920) \times 10^{-2}$	9936408	0.355	6.421×10^{-3}	-11.1	39.8	-0.170	0.185
sulfurdioxide slant column density cobra precision [DU]	0.280 ± 0.111	9936408	0.116	0.246	8.355×10^{-2}	21.7	0.207	0.324
sulfurdioxide slant column density window1 [DU]	$(9.094 \pm 63.682) \times 10^{-2}$	9936408	0.726	9.916×10^{-2}	-71.2	67.0	-0.269	0.457
sulfurdioxide slant column density window1 precision [DU]	0.280 ± 0.111	9936408	0.116	0.246	8.355×10^{-2}	21.7	0.207	0.324
sulfurdioxide slant column density corrected win1 [DU]	$(-1.966 \pm 62.792) \times 10^{-2}$	9936408	0.711	-2.850×10^{-2}	-71.2	66.7	-0.383	0.329
background so2 slant column offset window1 [DU]	-0.111 ± 0.124	9936408	0.154	-0.119	-0.781	2.71	-0.197	-4.301×10^{-2}
sulfurdioxide slant column density window2 [DU]	1.10 ± 8.54	9936408	10.9	1.03	-1.946×10^3	719	-4.41	6.52
sulfurdioxide slant column density window2 precision [DU]	7.65 ± 2.01	9936408	2.18	7.37	2.32	577	6.38	8.56
sulfurdioxide slant column density corrected win2 [DU]	-1.12 ± 8.39	9936408	10.7	-1.15	-1.945×10^3	716	-6.48	4.20
background so2 slant column offset window2 [DU]	-2.22 ± 2.52	9936408	4.01	-2.04	-18.1	10.8	-4.14	-0.124
sulfurdioxide slant column density window3 [DU]	-3.44 ± 22.38	9936408	28.4	-4.05	-489	224	-17.9	10.5
sulfurdioxide slant column density window3 precision [DU]	26.7 ± 12.6	9936408	8.10	23.2	9.45	369	20.1	28.2
sulfurdioxide slant column density corrected win3 [DU]	5.03 ± 21.54	9936408	27.0	4.97	-487	227	-8.43	18.5
background so2 slant column offset window3 [DU]	8.47 ± 6.88	9936408	11.3	8.36	-18.8	46.2	2.43	13.8
sulfurdioxide slant column cobra flag [1]	1.98 ± 0.19	9936408	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(1.435 \pm 2.571) \times 10^{-2}$	9936408	9.974×10^{-3}	9.557×10^{-3}	6.195×10^{-4}	1.27	5.692×10^{-3}	1.567×10^{-2}
fitted radiance shift [nm]	$(-7.828 \pm 24.417) \times 10^{-4}$	9936408	1.781×10^{-3}	-8.164×10^{-4}	-6.731×10^{-2}	3.797×10^{-2}	-1.733×10^{-3}	4.769×10^{-5}
fitted radiance squeeze [1]	$(-2.001 \pm 17.584) \times 10^{-5}$	9936408	2.080×10^{-4}	-9.153×10^{-6}	-1.669×10^{-2}	1.420×10^{-2}	-1.177×10^{-4}	9.036×10^{-5}
fitted root mean square [1]	$(1.219 \pm 0.451) \times 10^{-3}$	9936408	4.577×10^{-4}	1.102×10^{-3}	3.345×10^{-4}	4.447×10^{-2}	9.312×10^{-4}	1.389×10^{-3}
sulfurdioxide total air mass factor polluted [1]	1.05 ± 0.59	9936408	0.742	0.900	5.000×10^{-2}	3.47	0.626	1.37
sulfurdioxide total air mass factor polluted precision [1]	0.141 ± 0.115	9936408	0.157	0.112	2.791×10^{-3}	1.46	4.525×10^{-2}	0.203
sulfurdioxide clear air mass factor polluted [1]	0.849 ± 0.500	9936408	0.399	0.718	6.508×10^{-2}	3.47	0.553	0.952
number of spectral points in retrieval [1]	73.4 ± 0.5	9936408	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]	0.653 ± 0.409	12276668	0.780	1.000	0.0	1.000	0.220	1.000
sulfurdioxide total vertical column [DU]	$(2.461 \pm 96.043) \times 10^{-2}$	12276668	0.419	8.264×10^{-3}	-89.8	116	-0.199	0.220
sulfurdioxide total vertical column precision [DU]	0.492 ± 0.718	12276668	0.314	0.302	4.277×10^{-2}	40.9	0.208	0.522
sulfurdioxide slant column density corrected [DU]	$(1.336 \pm 32.732) \times 10^{-2}$	12276668	0.356	7.761×10^{-3}	-8.81	30.9	-0.169	0.187
sulfurdioxide slant column density cobra [DU]	$(1.334 \pm 32.642) \times 10^{-2}$	12276668	0.356	7.761×10^{-3}	-8.81	28.7	-0.169	0.187
sulfurdioxide slant column density cobra precision [DU]	0.282 ± 0.116	12276668	0.115	0.245	8.459×10^{-2}	21.7	0.208	0.323
sulfurdioxide slant column density window1 [DU]	0.129 ± 0.634	12276668	0.720	0.132	-71.2	40.3	-0.230	0.490
sulfurdioxide slant column density window1 precision [DU]	0.282 ± 0.116	12276668	0.115	0.245	8.459×10^{-2}	21.7	0.208	0.323
sulfurdioxide slant column density corrected win1 [DU]	$(-4.231 \pm 627.814) \times 10^{-3}$	12276668	0.708	-1.681×10^{-2}	-71.2	40.2	-0.368	0.341
background so2 slant column offset window1 [DU]	-0.133 ± 0.121	12276668	0.145	-0.144	-1.21	3.29	-0.214	-6.830×10^{-2}
sulfurdioxide slant column density window2 [DU]	0.826 ± 8.708	12276668	11.1	0.710	-1.946×10^3	719	-4.80	6.31
sulfurdioxide slant column density window2 precision [DU]	7.87 ± 2.07	12276668	2.36	7.55	2.32	577	6.50	8.86
sulfurdioxide slant column density corrected win2 [DU]	-1.14 ± 8.57	12276668	10.9	-1.17	-1.945×10^3	716	-6.62	4.30
background so2 slant column offset window2 [DU]	-1.96 ± 2.47	12276668	3.71	-1.48	-18.1	10.8	-3.79	-7.284×10^{-2}
sulfurdioxide slant column density window3 [DU]	-1.41 ± 23.21	12276668	29.5	-1.83	-209	187	-16.2	13.2
sulfurdioxide slant column density window3 precision [DU]	27.5 ± 12.6	12276668	8.99	24.0	9.45	221	20.7	29.7
sulfurdioxide slant column density corrected win3 [DU]	6.81 ± 22.34	12276668	28.1	6.56	-207	205	-7.32	20.8
background so2 slant column offset window3 [DU]	8.22 ± 6.14	12276668	9.66	7.75	-18.8	28.6	3.26	12.9
sulfurdioxide slant column cobra flag [1]	1.99 ± 0.15	12276668	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(1.991 \pm 3.558) \times 10^{-2}$	12276668	1.257×10^{-2}	1.252×10^{-2}	6.885×10^{-4}	1.95	7.648×10^{-3}	2.022×10^{-2}
fitted radiance shift [nm]	$(-5.379 \pm 24.849) \times 10^{-4}$	12276668	1.874×10^{-3}	-5.590×10^{-4}	-4.316×10^{-2}	4.031×10^{-2}	-1.528×10^{-3}	3.459×10^{-4}
fitted radiance squeeze [1]	$(1.825 \pm 1723.986) \times 10^{-7}$	12276668	2.019×10^{-4}	6.574×10^{-6}	-1.299×10^{-2}	1.420×10^{-2}	-9.672×10^{-5}	1.052×10^{-4}
fitted root mean square [1]	$(1.231 \pm 0.476) \times 10^{-3}$	12276668	4.544×10^{-4}	1.099×10^{-3}	3.365×10^{-4}	4.085×10^{-2}	9.318×10^{-4}	1.386×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.910 ± 0.484	12276668	0.562	0.818	5.000×10^{-2}	2.94	0.585	1.15
sulfurdioxide total air mass factor polluted precision [1]	0.116 ± 0.103	12276668	0.124	7.783×10^{-2}	2.791×10^{-3}	1.15	4.054×10^{-2}	0.165
sulfurdioxide clear air mass factor polluted [1]	0.743 ± 0.305	12276668	0.351	0.704	6.429×10^{-2}	2.95	0.542	0.893
number of spectral points in retrieval [1]	73.5 ± 0.5	12276668	1.000	73.0	71.0	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]	0.591 ± 0.424	3856141	0.870	0.490	0.0	1.000	0.130	1.000
sulfurdioxide total vertical column [DU]	$(4.024 \pm 161.705) \times 10^{-2}$	3856141	0.481	8.025×10^{-3}	-102	206	-0.227	0.255
sulfurdioxide total vertical column precision [DU]	0.740 ± 1.203	3856141	0.531	0.369	2.847×10^{-2}	34.3	0.196	0.727
sulfurdioxide slant column density corrected [DU]	$(1.603 \pm 41.070) \times 10^{-2}$	3856141	0.389	7.943×10^{-3}	-5.52	204	-0.186	0.204
sulfurdioxide slant column density cobra [DU]	$(1.585 \pm 38.981) \times 10^{-2}$	3856141	0.389	7.943×10^{-3}	-5.52	39.8	-0.186	0.204
sulfurdioxide slant column density cobra precision [DU]	0.307 ± 0.125	3856141	0.141	0.279	8.355×10^{-2}	19.3	0.222	0.363
sulfurdioxide slant column density window1 [DU]	0.119 ± 0.720	3856141	0.808	0.121	-48.6	96.1	-0.288	0.521
sulfurdioxide slant column density window1 precision [DU]	0.307 ± 0.125	3856141	0.141	0.279	8.355×10^{-2}	19.3	0.222	0.363
sulfurdioxide slant column density corrected win1 [DU]	$(-1.572 \pm 70.752) \times 10^{-2}$	3856141	0.787	-3.193×10^{-2}	-48.6	95.9	-0.421	0.366
background so2 slant column offset window1 [DU]	-0.134 ± 0.126	3856141	0.136	-0.149	-0.854	2.71	-0.216	-7.995×10^{-2}
sulfurdioxide slant column density window2 [DU]	0.997 ± 9.574	3856141	12.1	0.852	-859	469	-5.15	7.00
sulfurdioxide slant column density window2 precision [DU]	8.61 ± 2.44	3856141	2.93	8.24	2.56	520	6.96	9.89
sulfurdioxide slant column density corrected win2 [DU]	-0.786 ± 9.399	3856141	11.8	-0.793	-859	468	-6.72	5.13
background so2 slant column offset window2 [DU]	-1.78 ± 2.41	3856141	3.18	-1.19	-17.3	10.8	-3.28	-9.601×10^{-2}
sulfurdioxide slant column density window3 [DU]	-10.7 ± 24.8	3856141	30.8	-10.1	-489	224	-25.7	5.03
sulfurdioxide slant column density window3 precision [DU]	29.9 ± 14.0	3856141	11.6	26.5	10.6	369	21.6	33.3
sulfurdioxide slant column density corrected win3 [DU]	-0.824 ± 24.784	3856141	30.5	-2.950×10^{-2}	-487	227	-15.7	14.8
background so2 slant column offset window3 [DU]	9.84 ± 7.23	3856141	12.5	8.99	-18.8	46.2	3.70	16.2
sulfurdioxide slant column cobra flag [1]	1.95 ± 0.31	3856141	0.0	2.00	0.0	2.00	2.00	2.00
integrated so2 profile apriori [DU]	$(6.300 \pm 13.449) \times 10^{-2}$	3856141	6.028×10^{-2}	1.994×10^{-2}	2.849×10^{-4}	2.30	5.861×10^{-3}	6.614×10^{-2}
fitted radiance shift [nm]	$(-5.543 \pm 27.080) \times 10^{-4}$	3856141	1.745×10^{-3}	-6.396×10^{-4}	-6.731×10^{-2}	3.797×10^{-2}	-1.514×10^{-3}	2.312×10^{-4}
fitted radiance squeeze [1]	$(-2.317 \pm 195.841) \times 10^{-6}$	3856141	2.300×10^{-4}	7.609×10^{-7}	-1.669×10^{-2}	1.272×10^{-2}	-1.159×10^{-4}	1.141×10^{-4}
fitted root mean square [1]	$(1.358 \pm 0.500) \times 10^{-3}$	3856141	6.005×10^{-4}	1.253×10^{-3}	3.309×10^{-4}	6.090×10^{-2}	1.011×10^{-3}	1.611×10^{-3}
sulfurdioxide total air mass factor polluted [1]	0.955 ± 0.699	3856141	0.872	0.732	5.000×10^{-2}	3.47	0.448	1.32
sulfurdioxide total air mass factor polluted precision [1]	0.134 ± 0.145	3856141	0.168	7.910×10^{-2}	2.861×10^{-3}	1.65	2.965×10^{-2}	0.198
sulfurdioxide clear air mass factor polluted [1]	0.887 ± 0.692	3856141	0.612	0.665	5.654×10^{-2}	3.47	0.434	1.05
number of spectral points in retrieval [1]	73.4 ± 0.5	3856141	1.000	73.0	52.0	74.0	73.0	74.0

3 Granule outlines

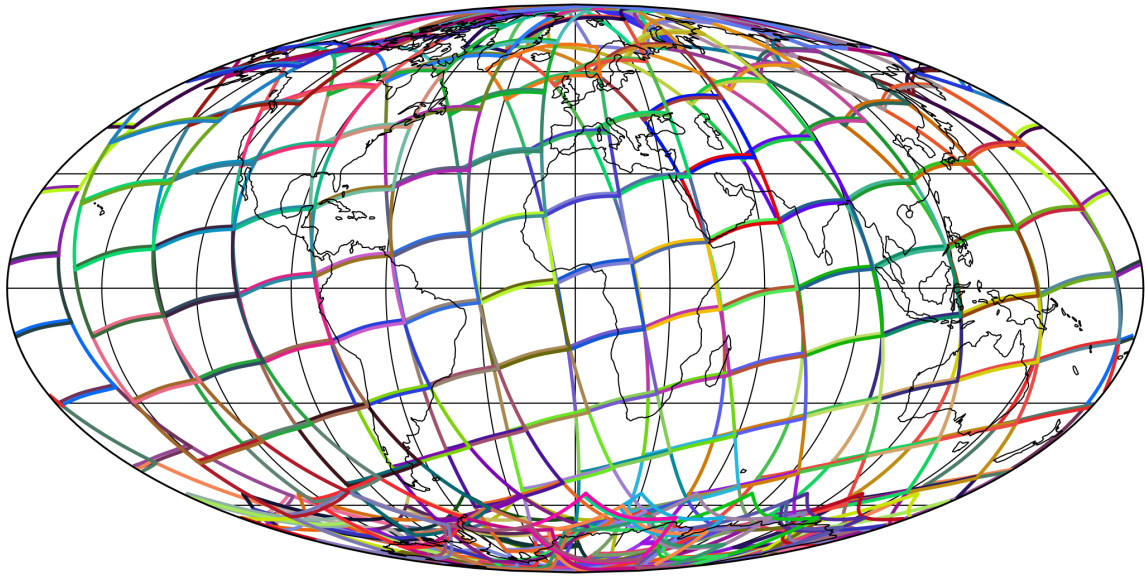


Figure 1: Outline of the granules.

4 Input data monitoring

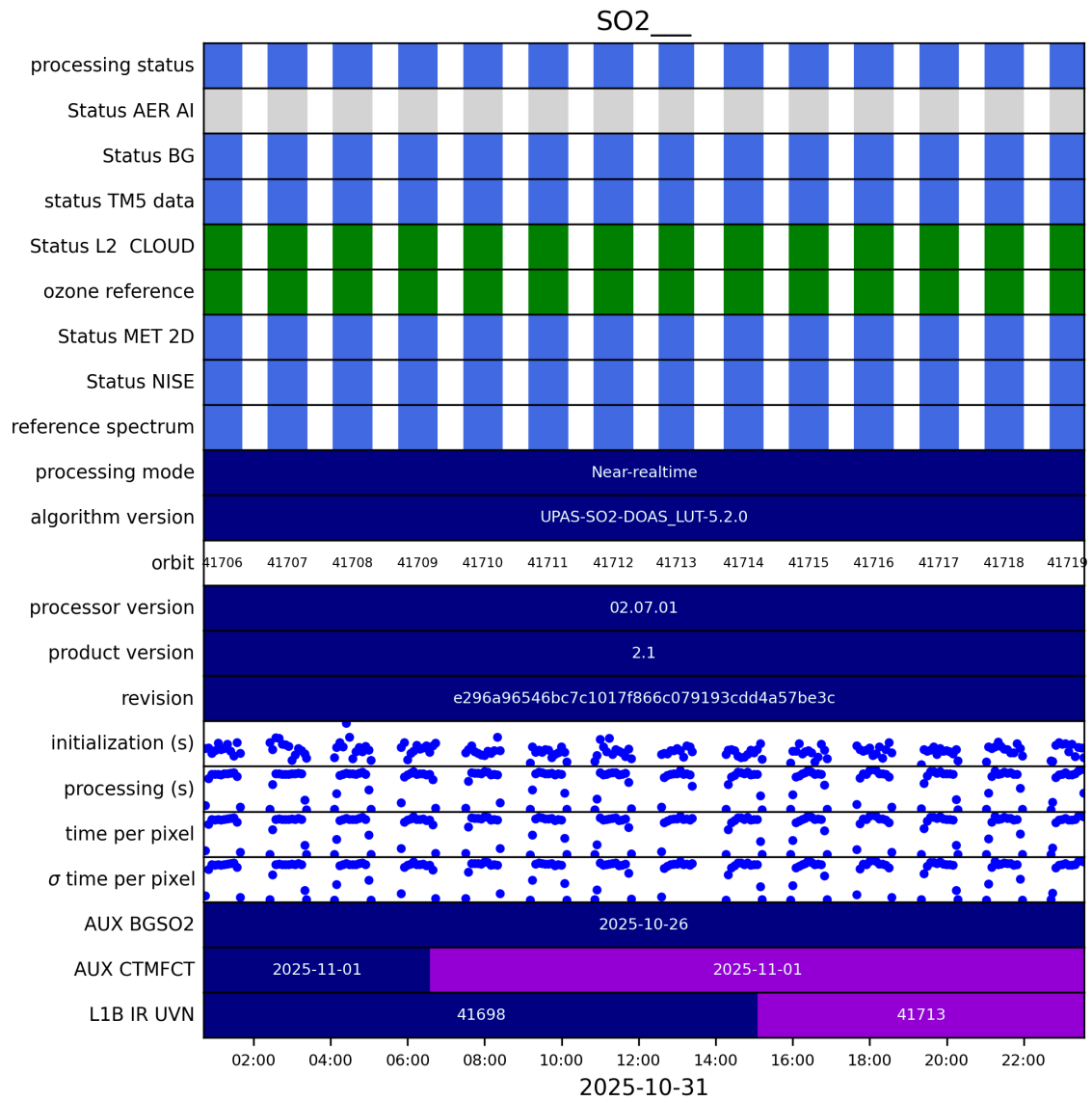


Figure 2: Input data per granule

5 Warnings and errors

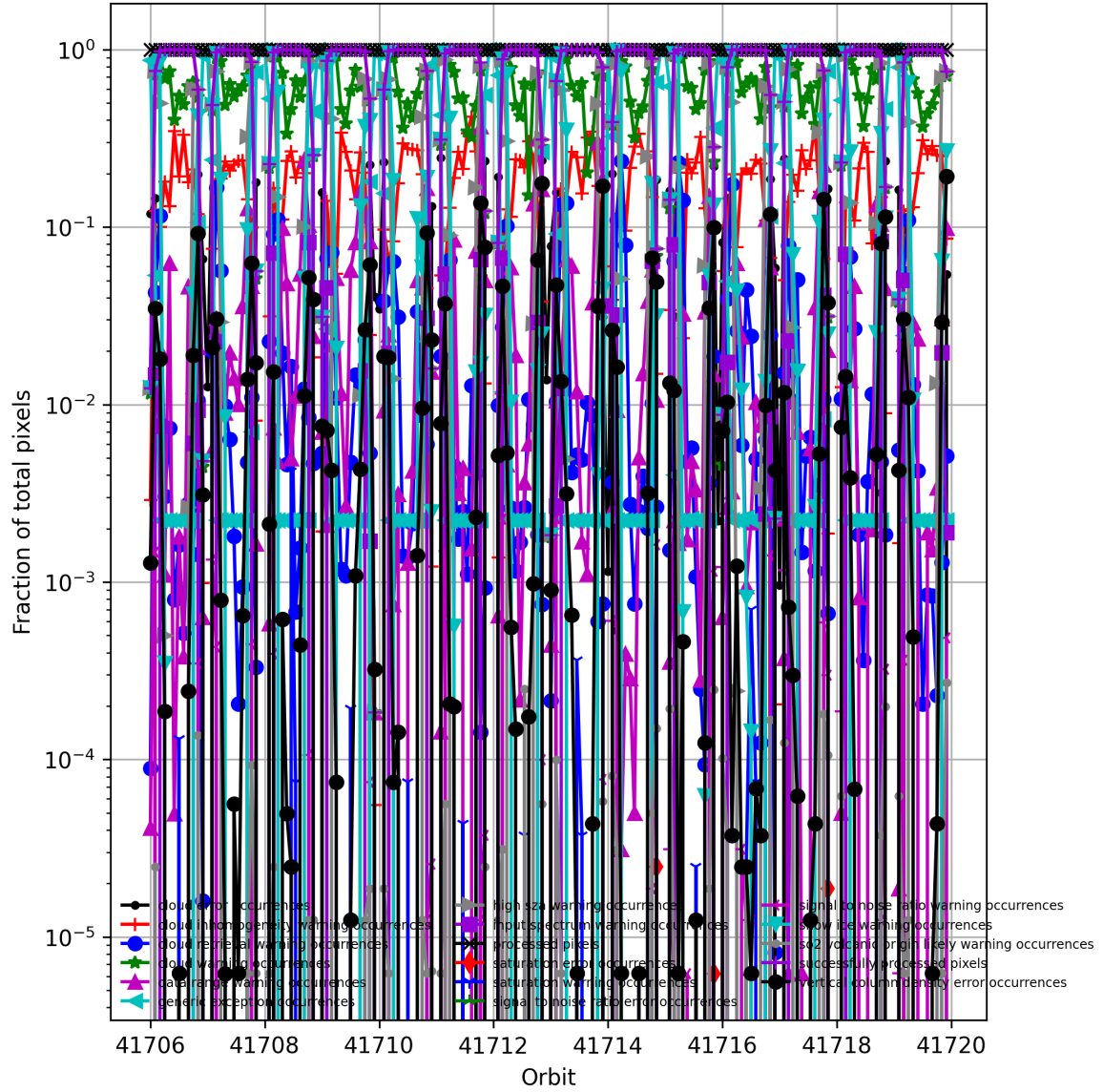


Figure 3: Fraction of pixels with specific warnings and errors during processing

6 World maps

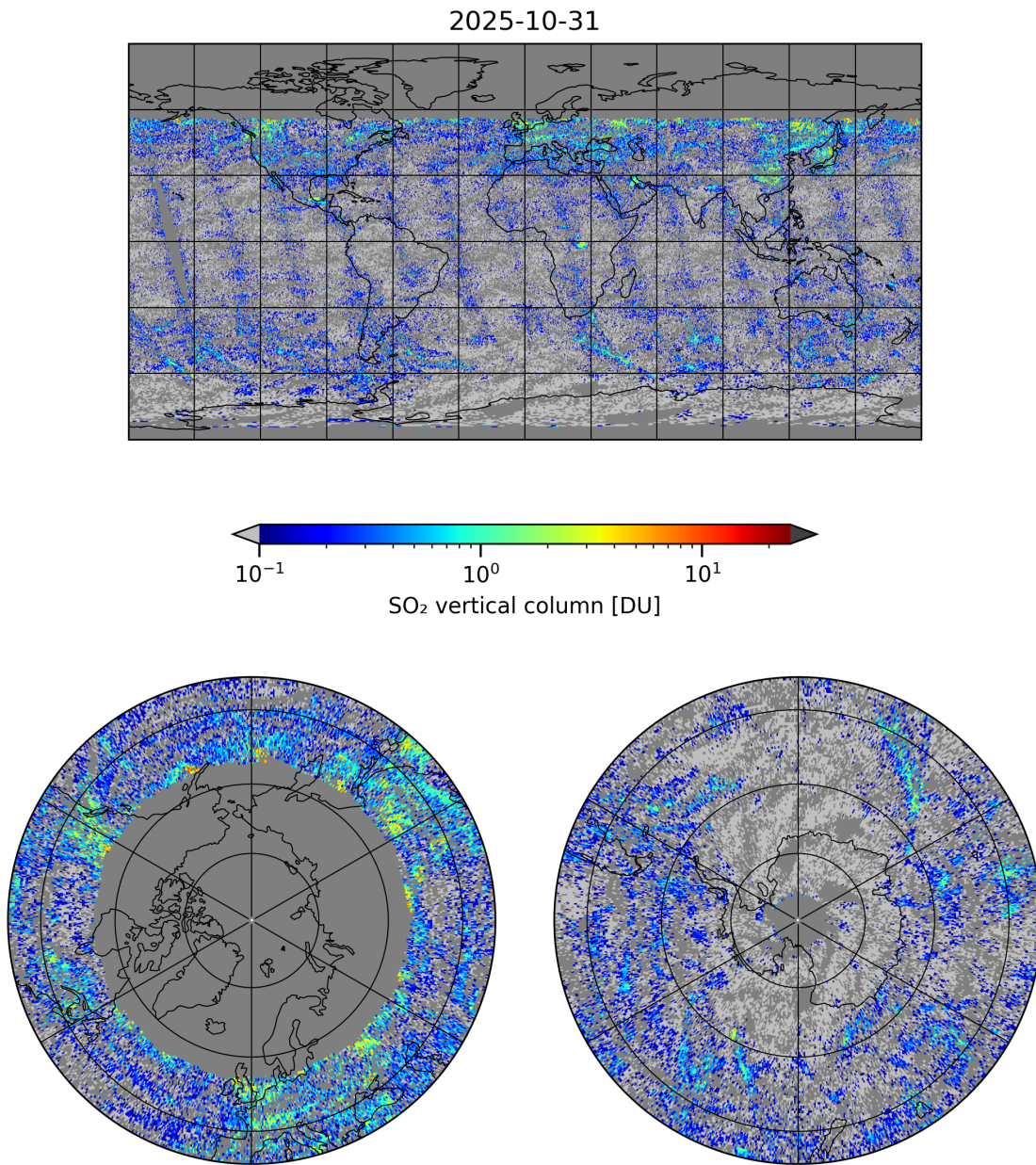


Figure 4: Map of “SO₂ vertical column” for 2025-10-31 to 2025-10-31

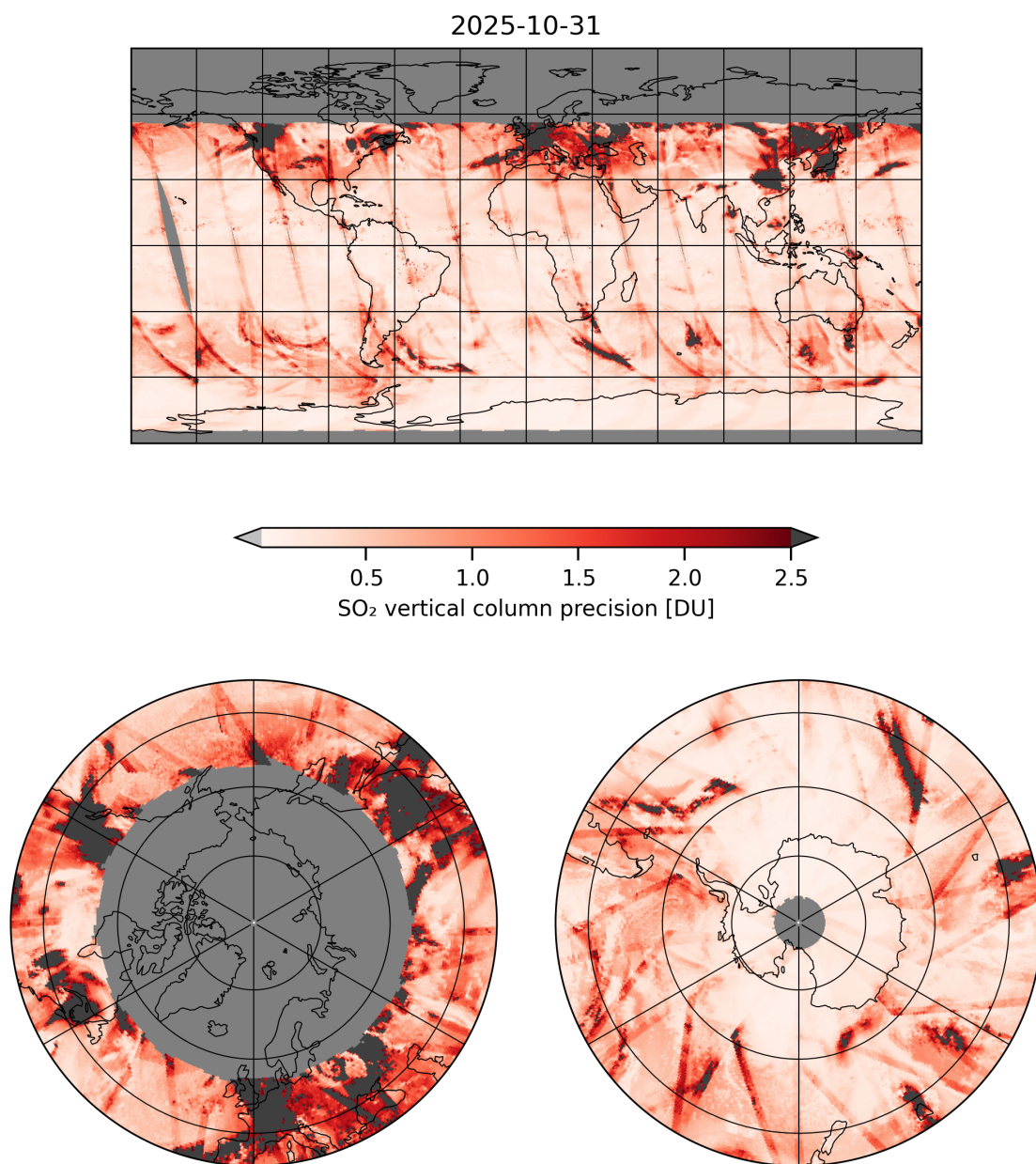


Figure 5: Map of “SO₂ vertical column precision” for 2025-10-31 to 2025-10-31

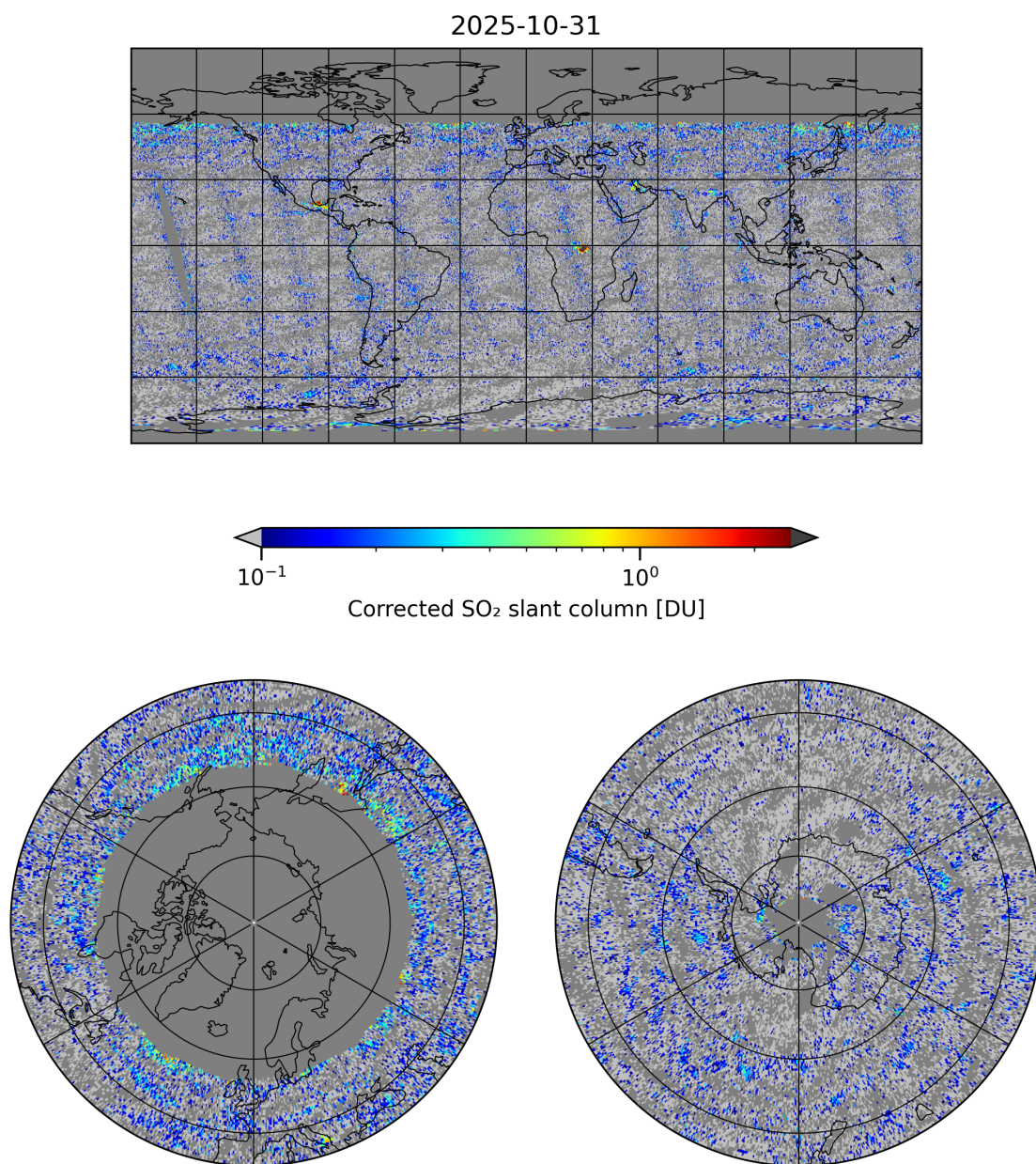


Figure 6: Map of “Corrected SO₂ slant column” for 2025-10-31 to 2025-10-31

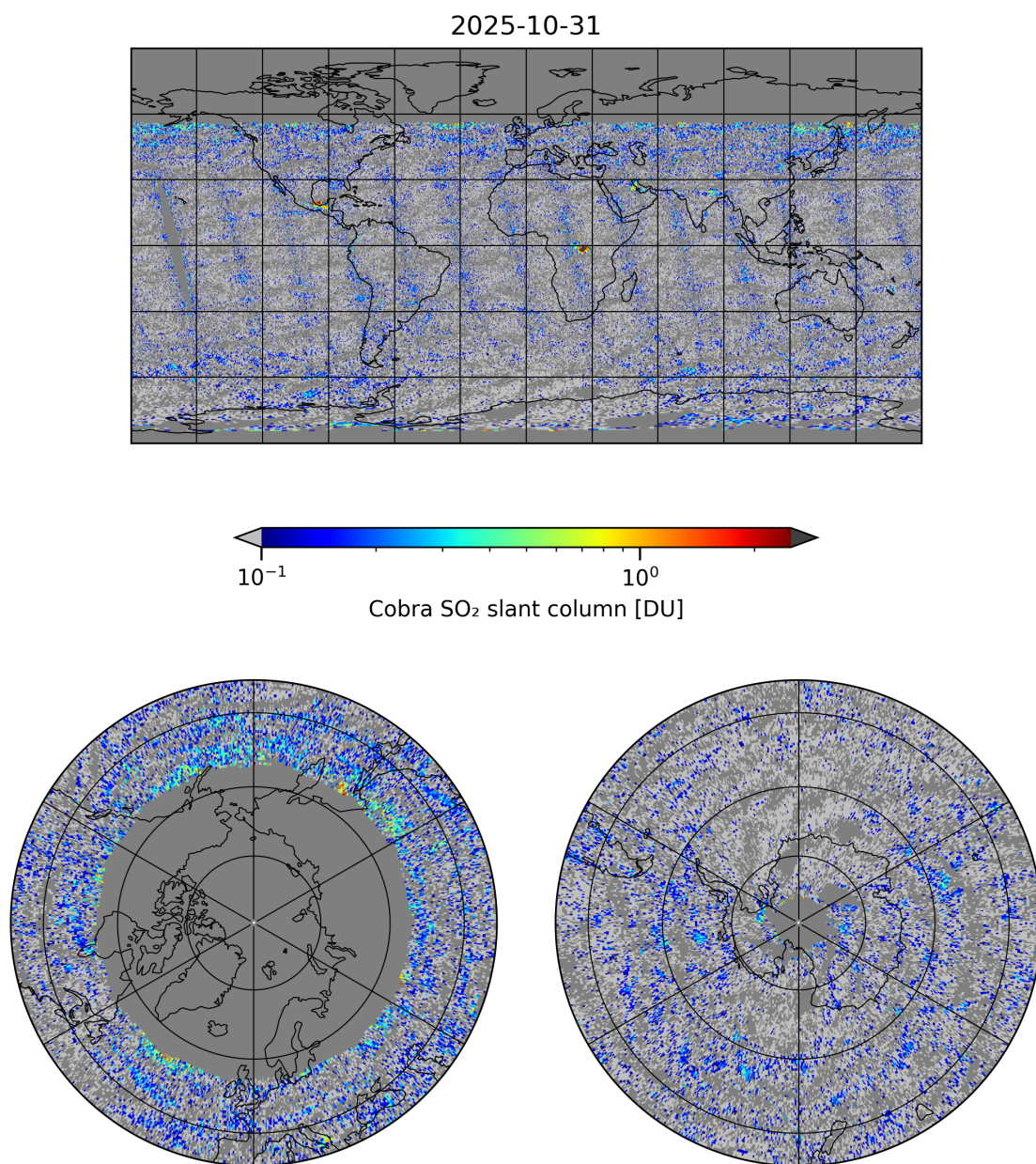


Figure 7: Map of “Cobra SO₂ slant column” for 2025-10-31 to 2025-10-31

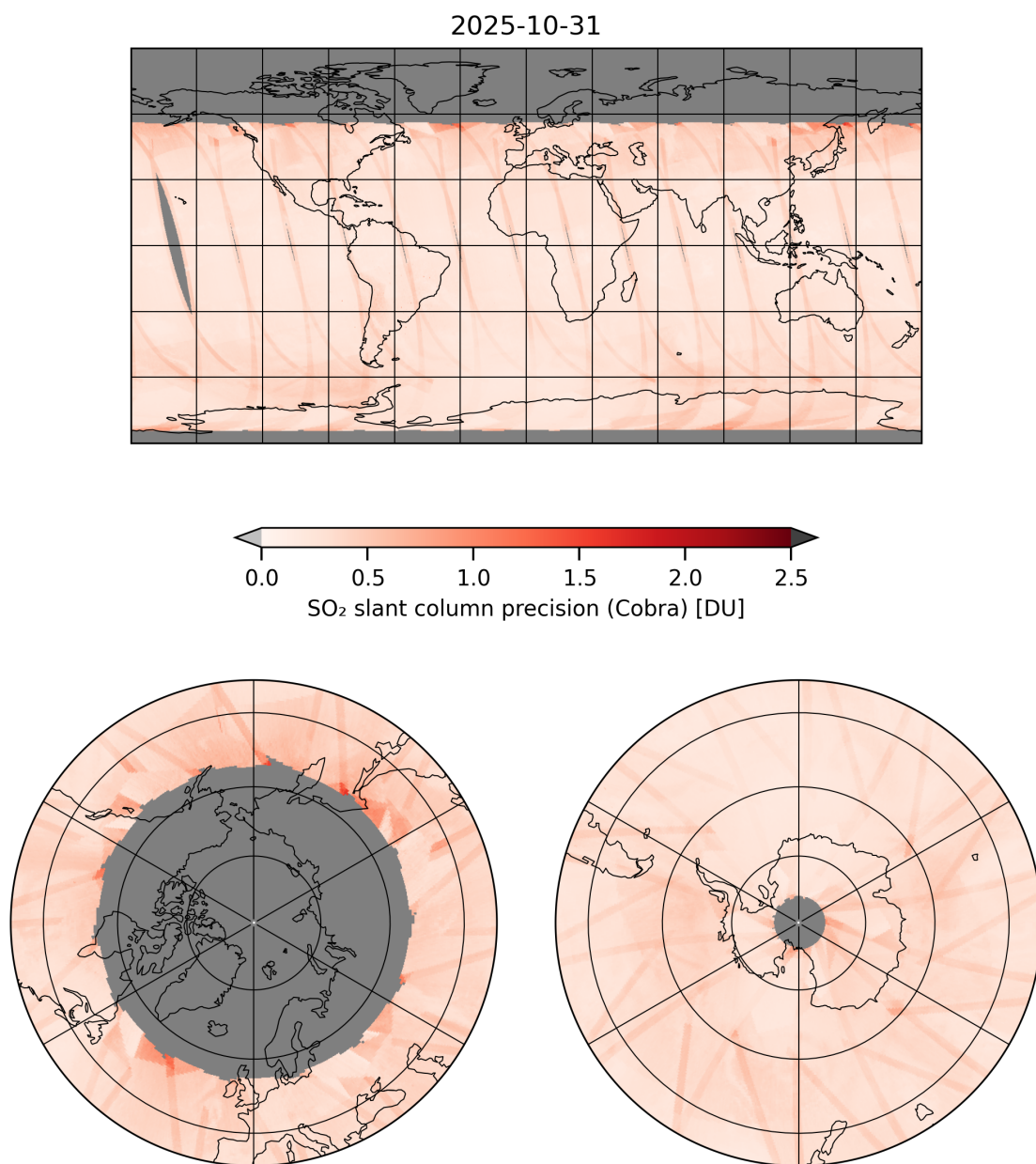


Figure 8: Map of “SO₂ slant column precision (Cobra)” for 2025-10-31 to 2025-10-31

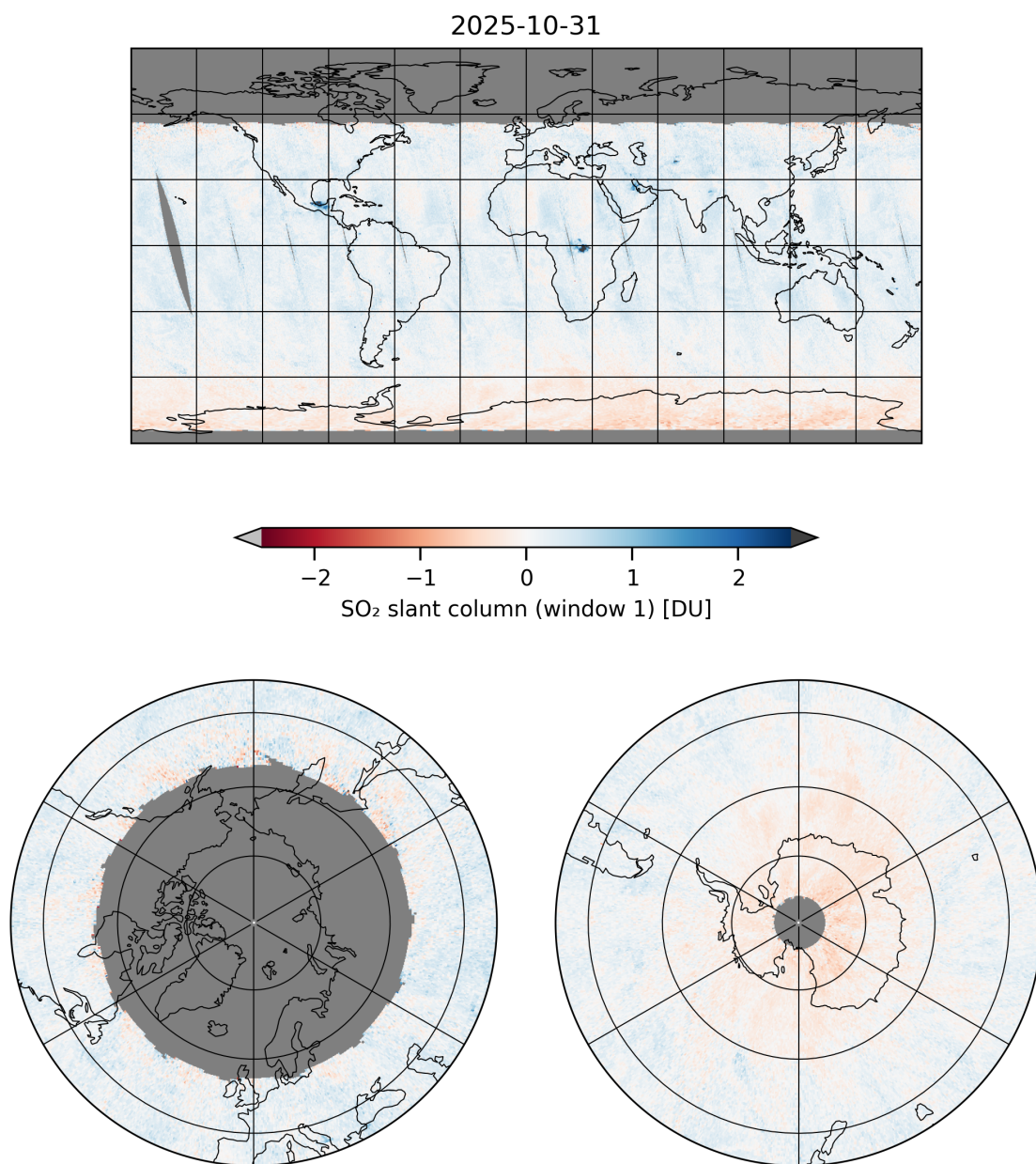


Figure 9: Map of “SO₂ slant column (window 1)” for 2025-10-31 to 2025-10-31

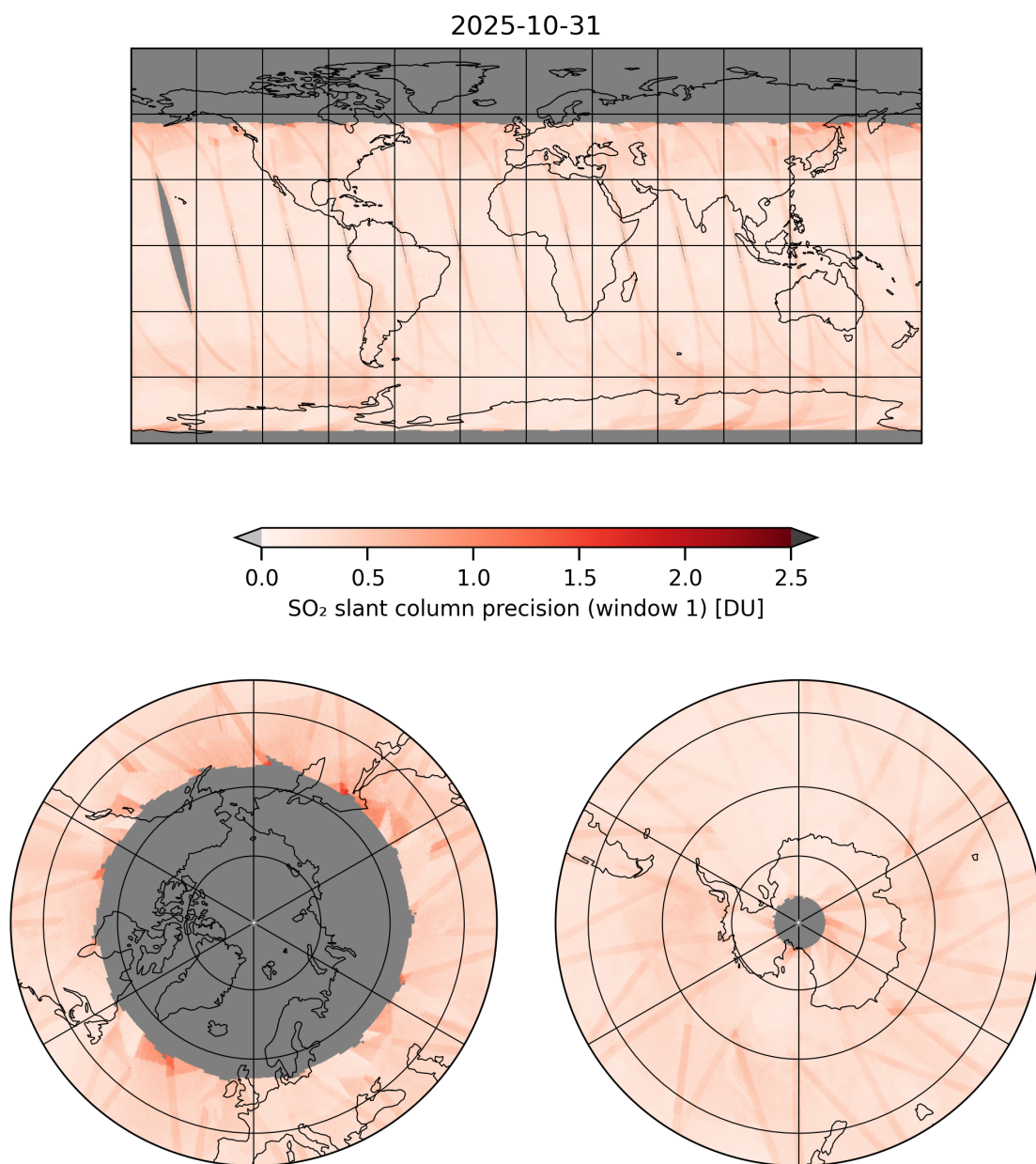


Figure 10: Map of “SO₂ slant column precision (window 1)” for 2025-10-31 to 2025-10-31

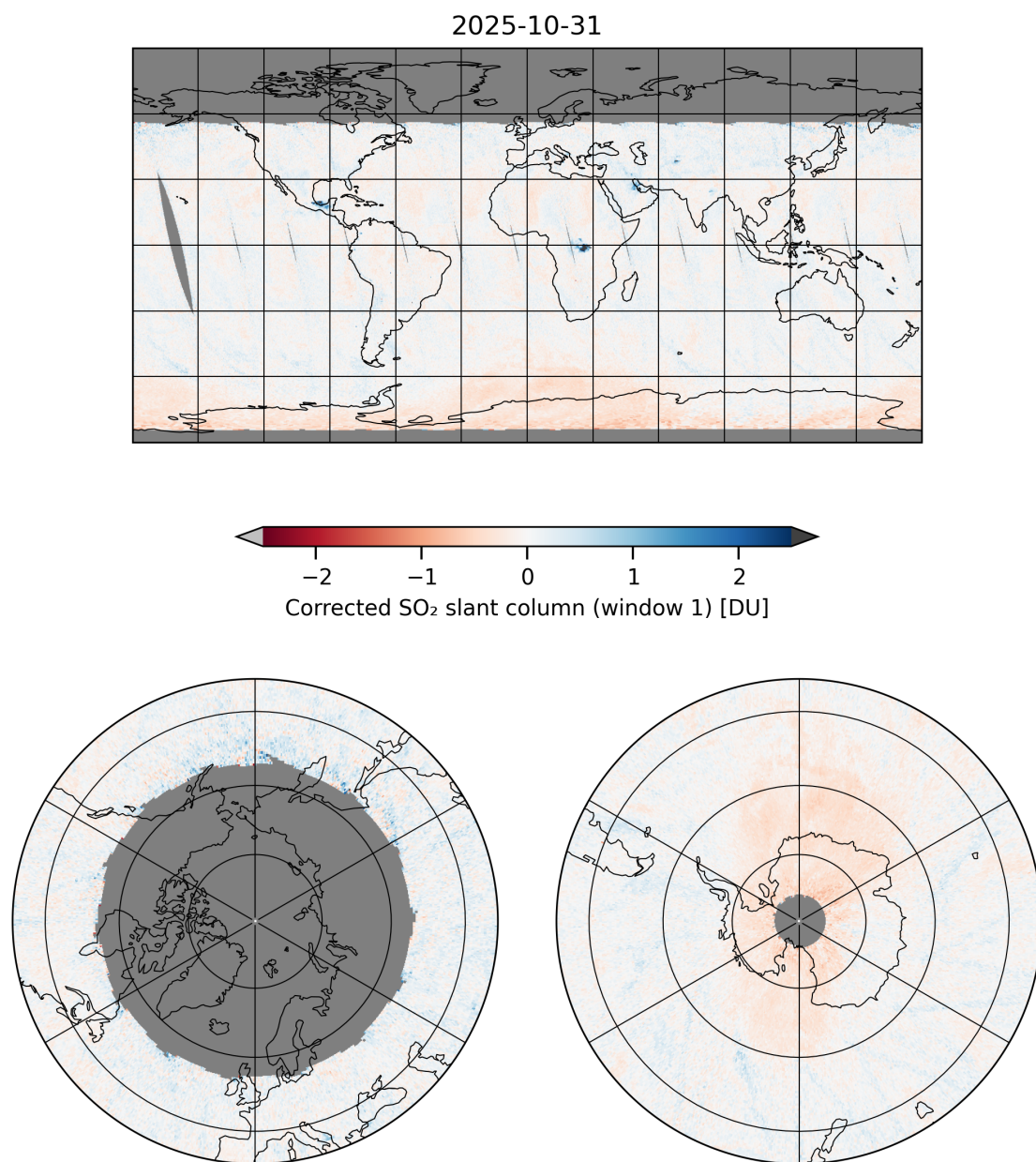


Figure 11: Map of “Corrected SO₂ slant column (window 1)” for 2025-10-31 to 2025-10-31

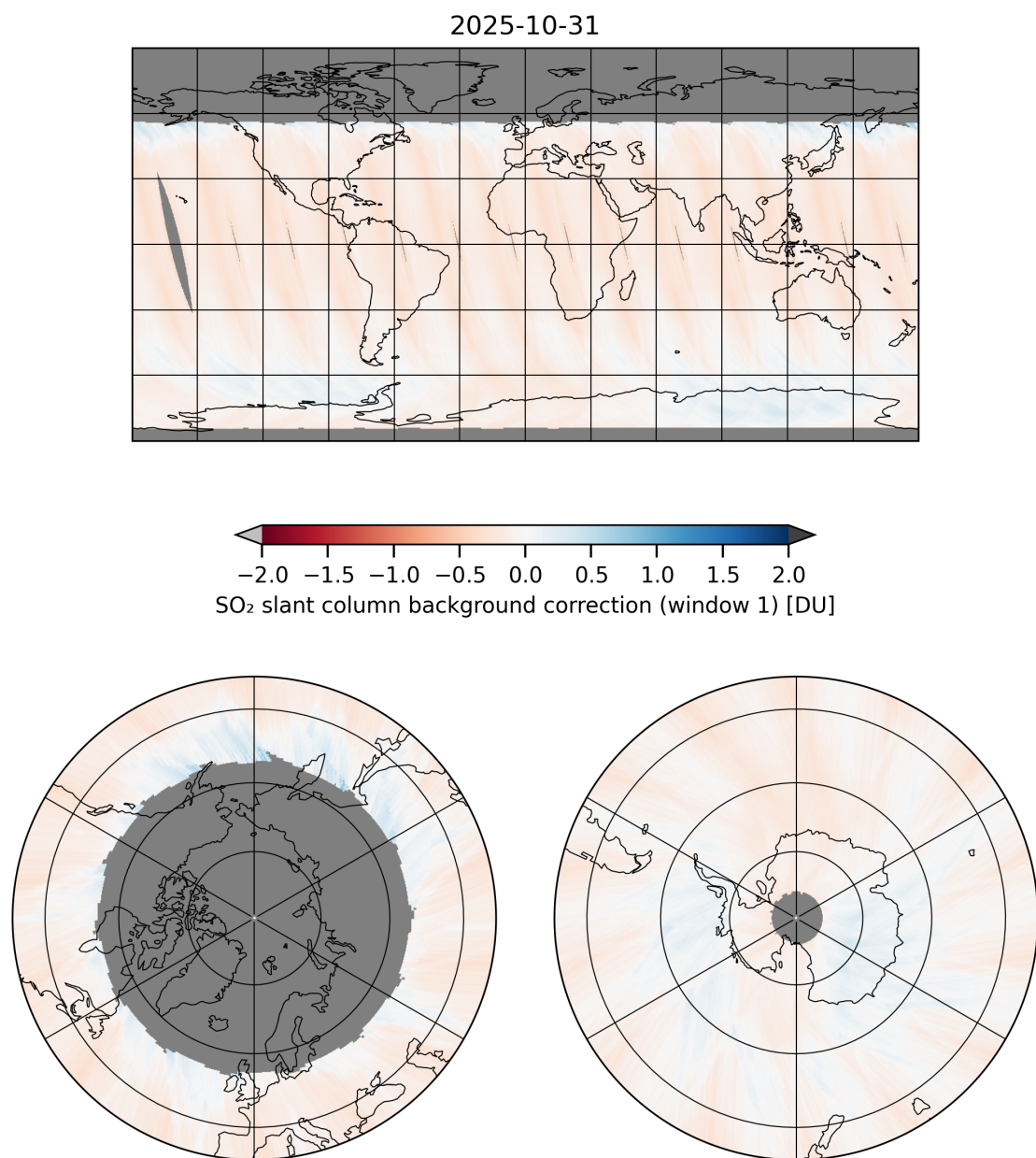


Figure 12: Map of “SO₂ slant column background correction (window 1)” for 2025-10-31 to 2025-10-31

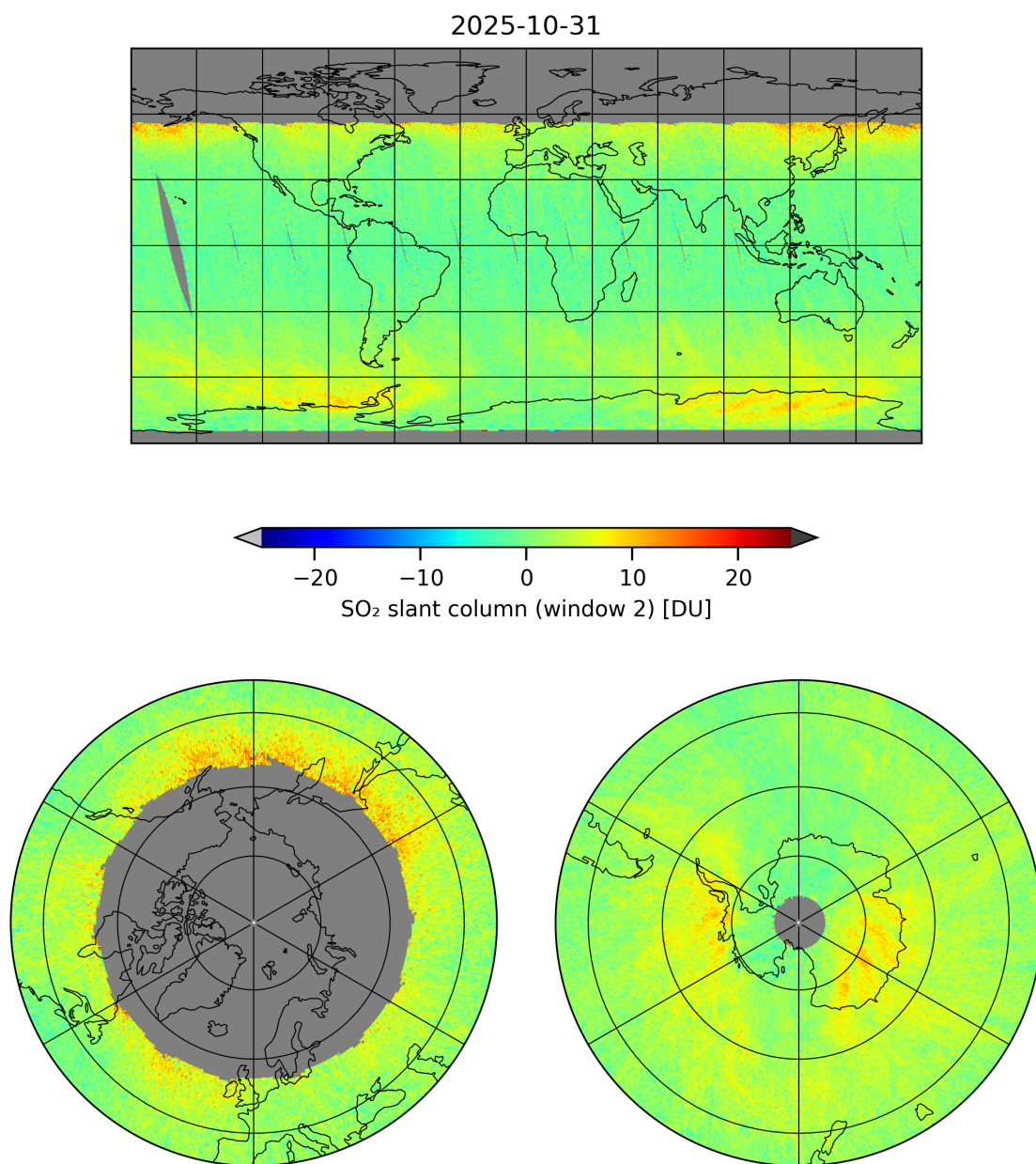


Figure 13: Map of “SO₂ slant column (window 2)” for 2025-10-31 to 2025-10-31

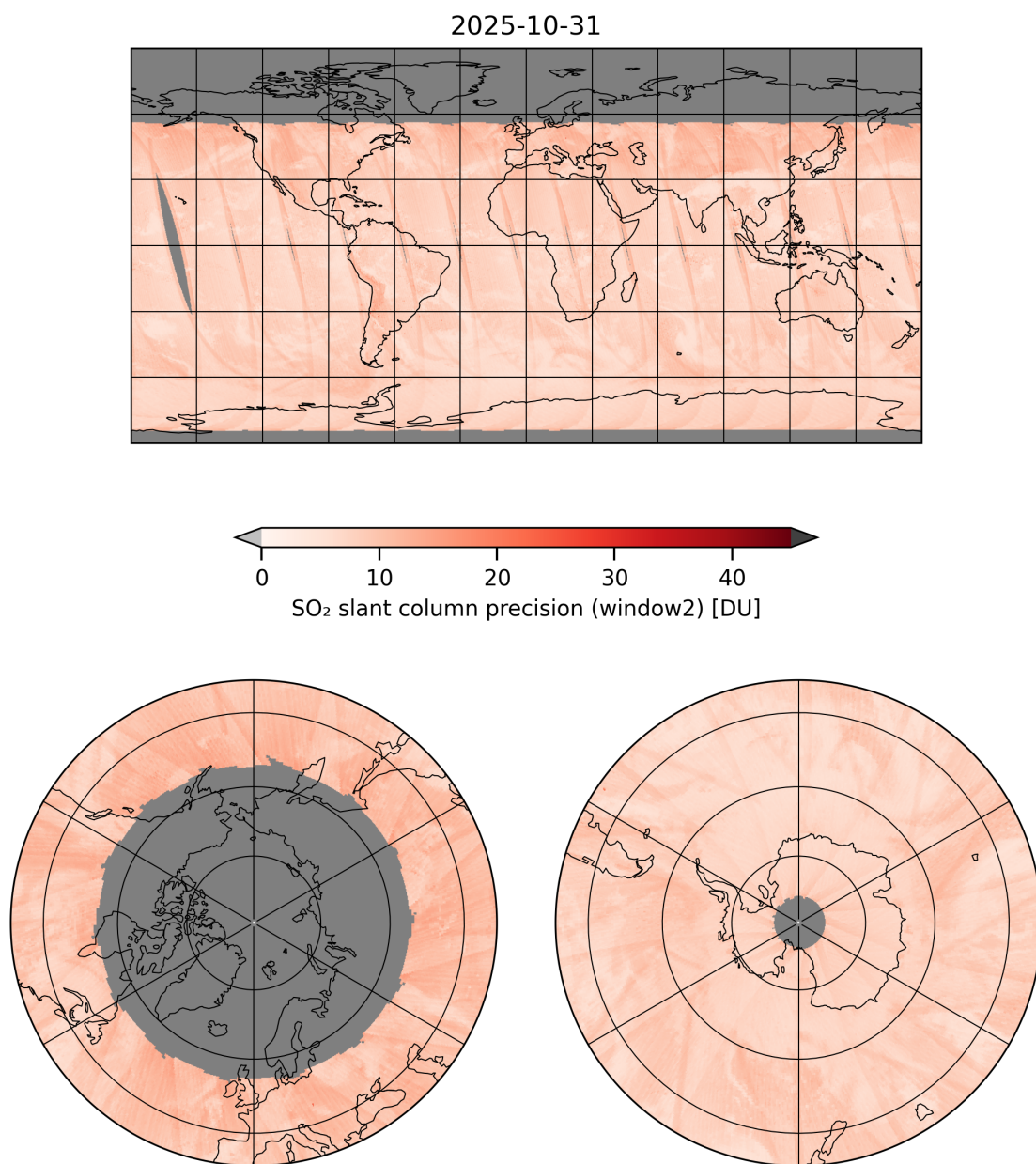


Figure 14: Map of “SO₂ slant column precision (window2)” for 2025-10-31 to 2025-10-31

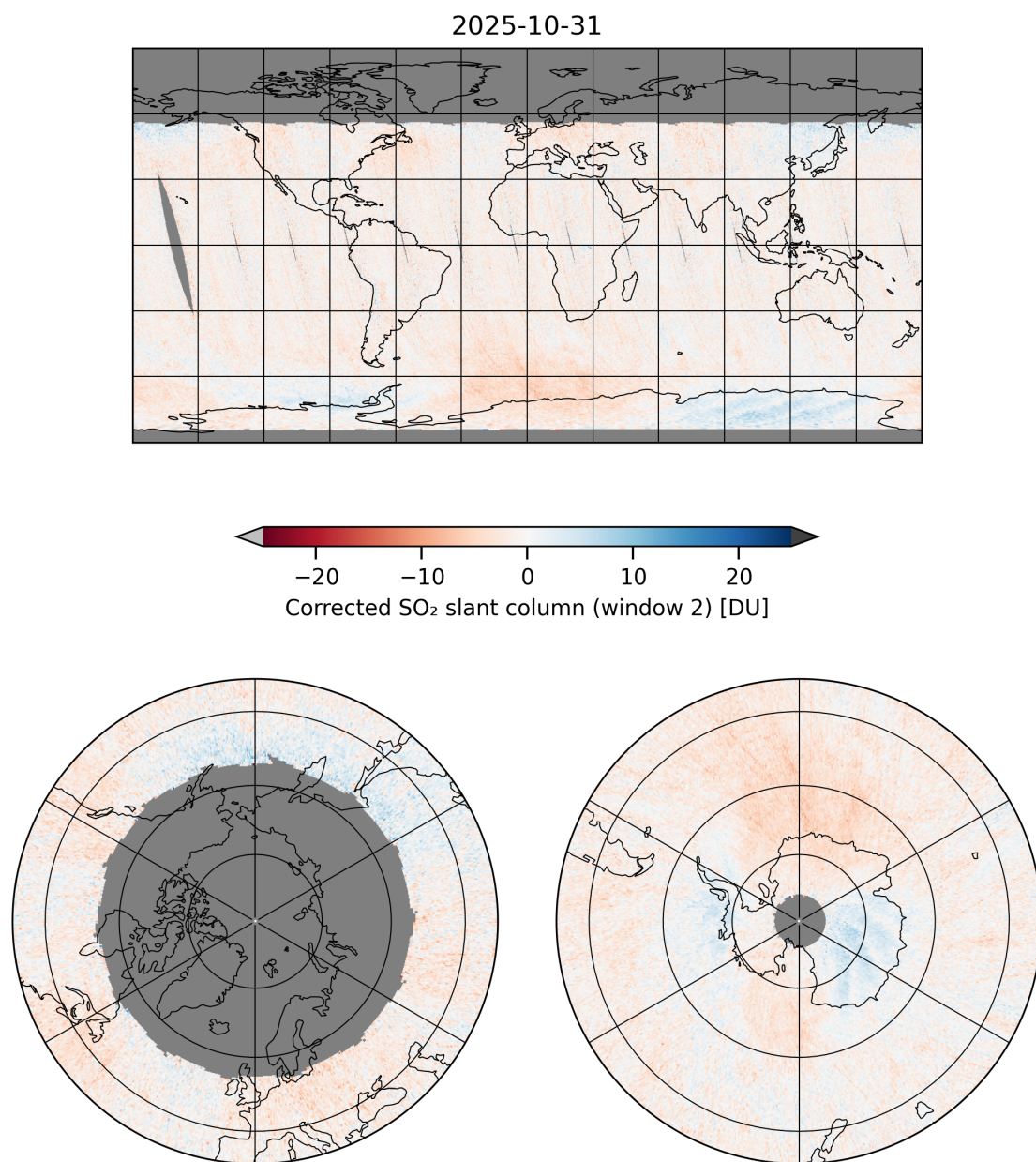


Figure 15: Map of “Corrected SO₂ slant column (window 2)” for 2025-10-31 to 2025-10-31

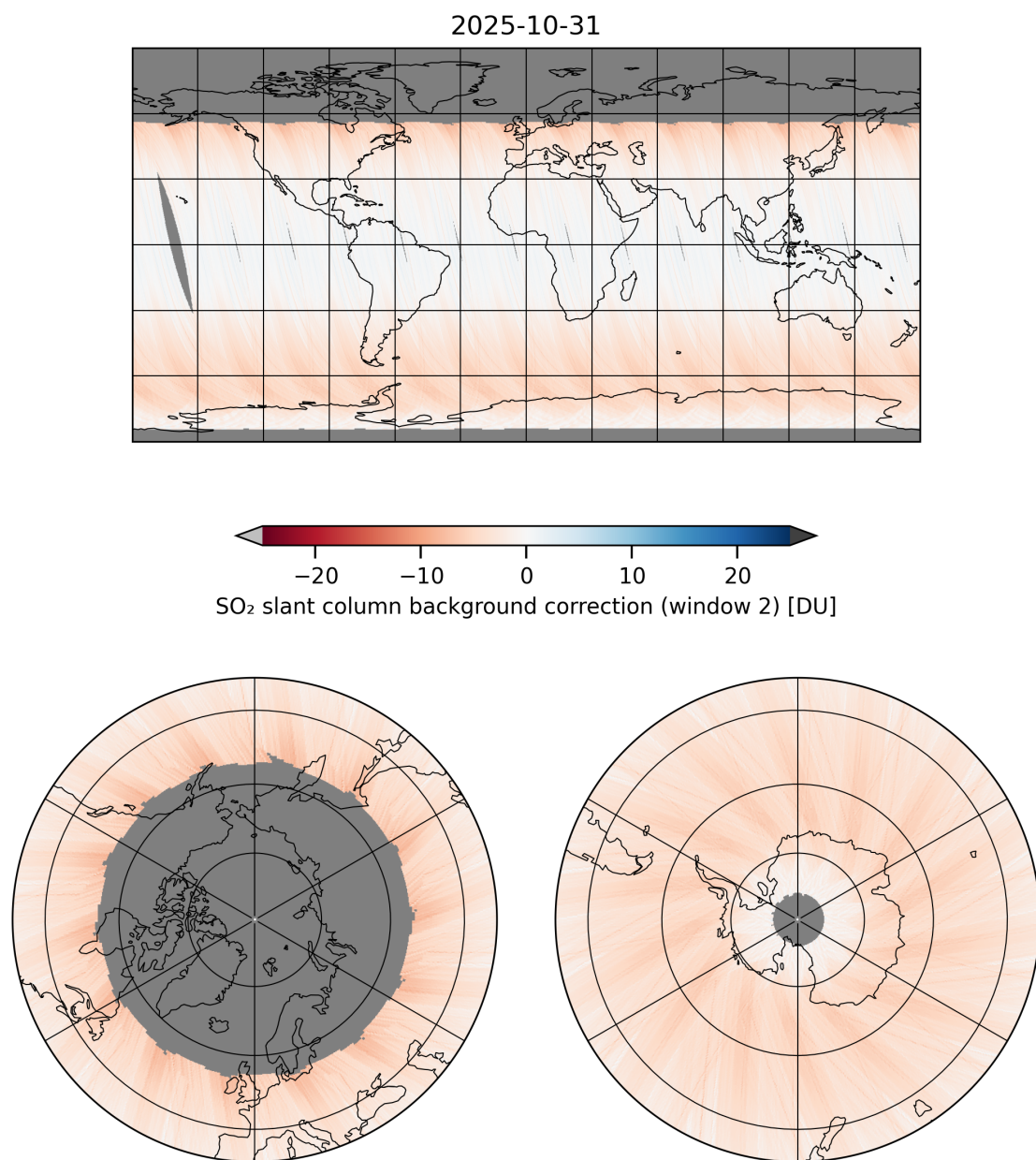


Figure 16: Map of “SO₂ slant column background correction (window 2)” for 2025-10-31 to 2025-10-31

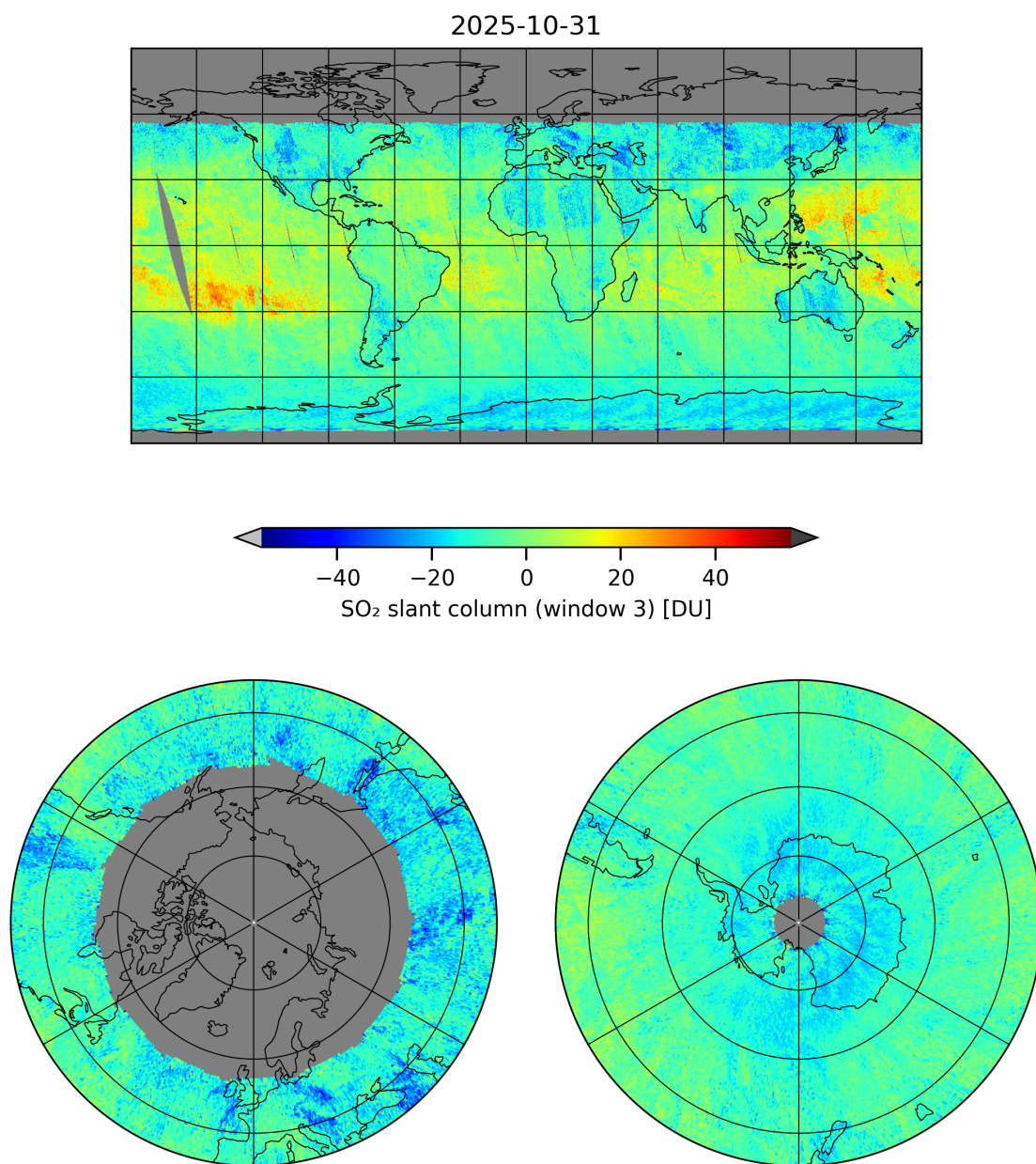


Figure 17: Map of “SO₂ slant column (window 3)” for 2025-10-31 to 2025-10-31

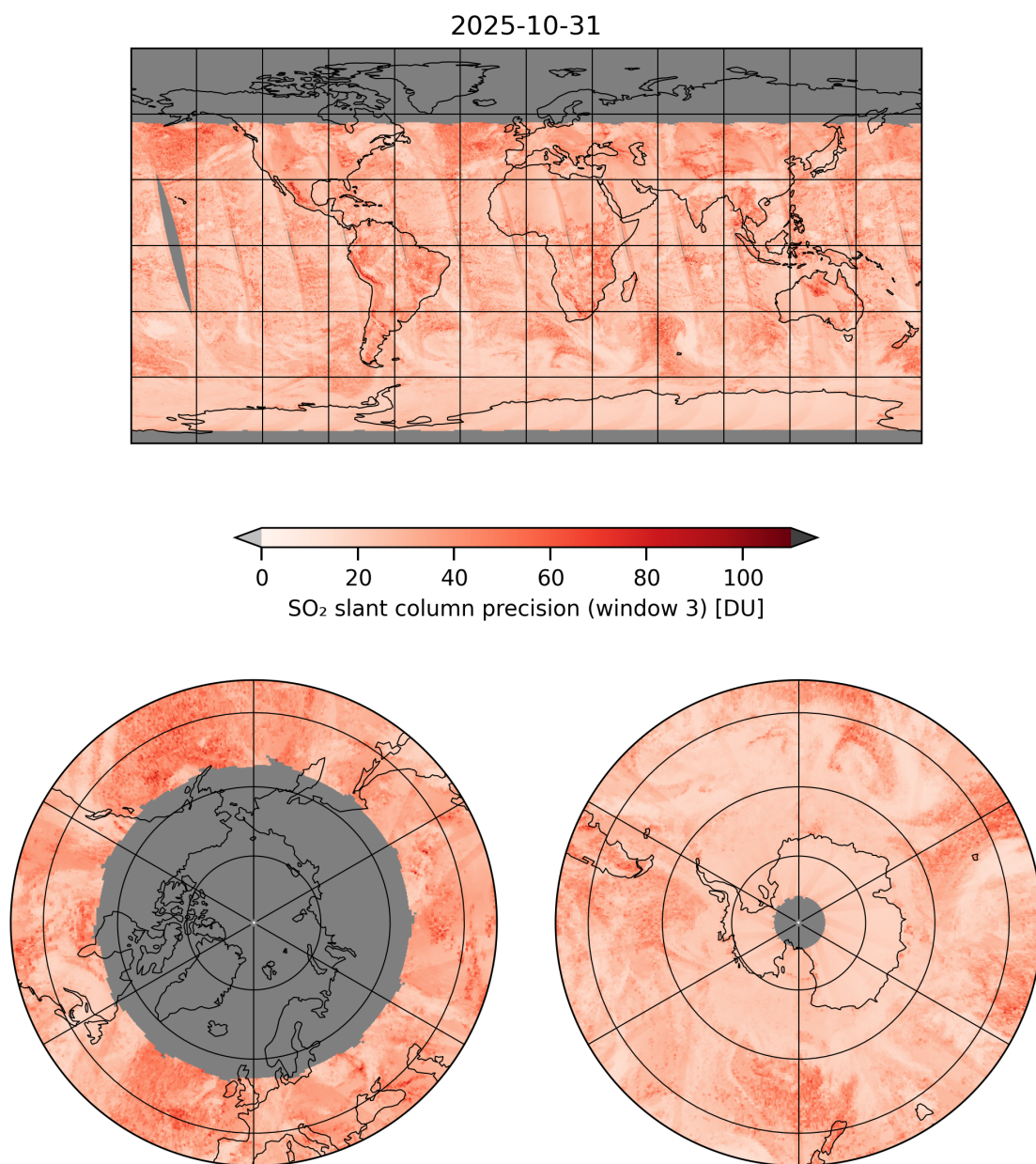


Figure 18: Map of “SO₂ slant column precision (window 3)” for 2025-10-31 to 2025-10-31

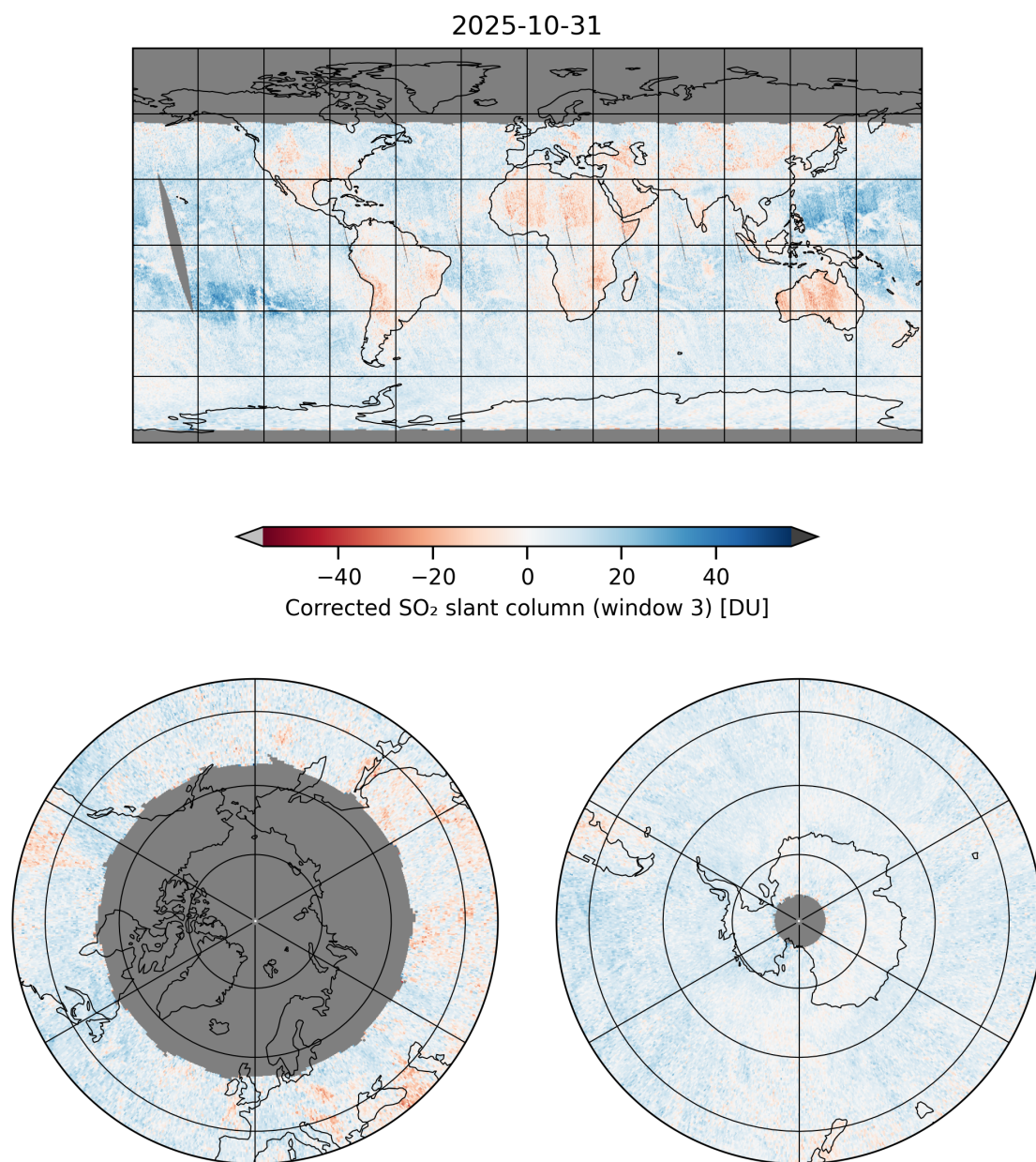


Figure 19: Map of “Corrected SO₂ slant column (window 3)” for 2025-10-31 to 2025-10-31

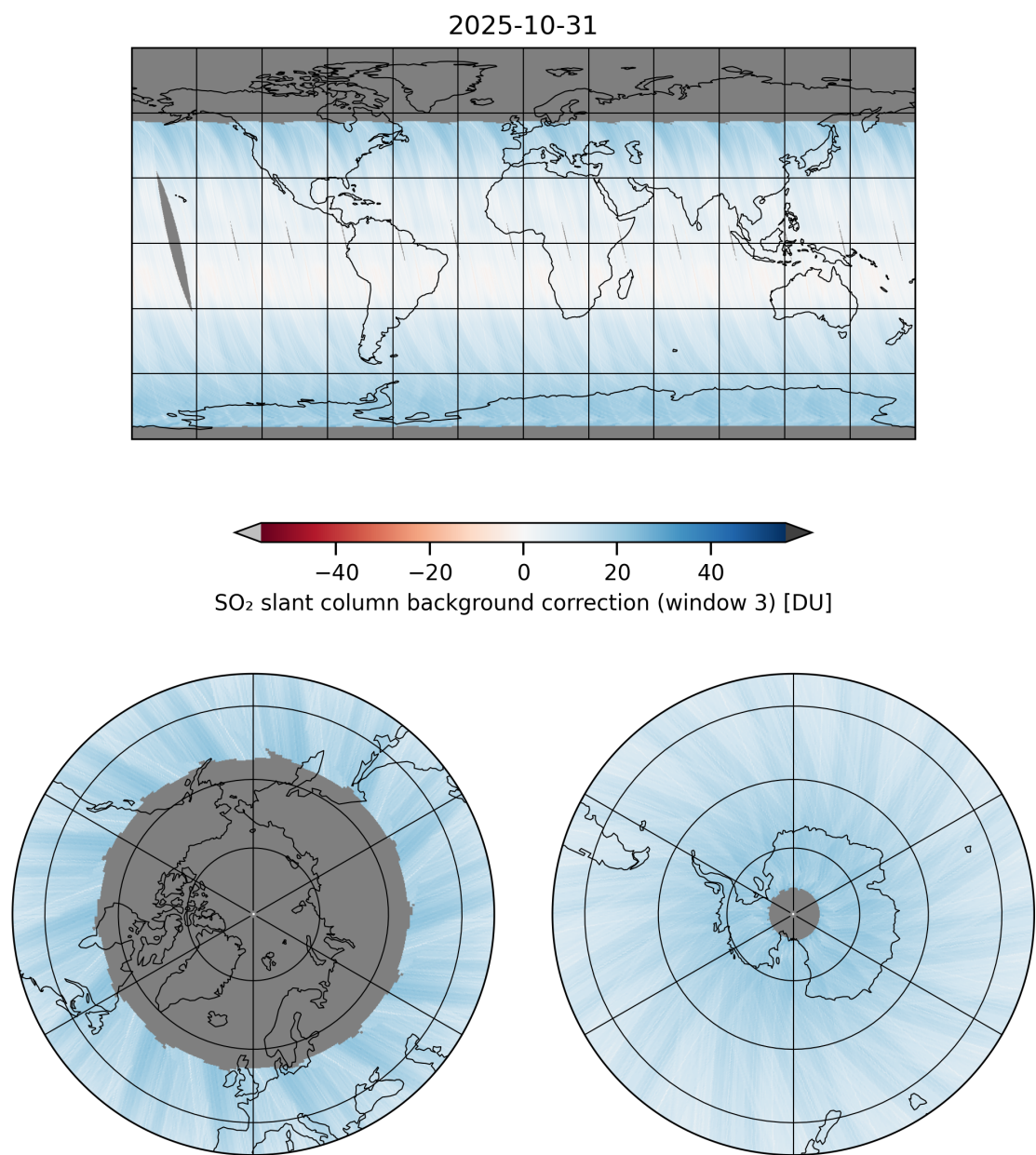


Figure 20: Map of “SO₂ slant column background correction (window 3)” for 2025-10-31 to 2025-10-31

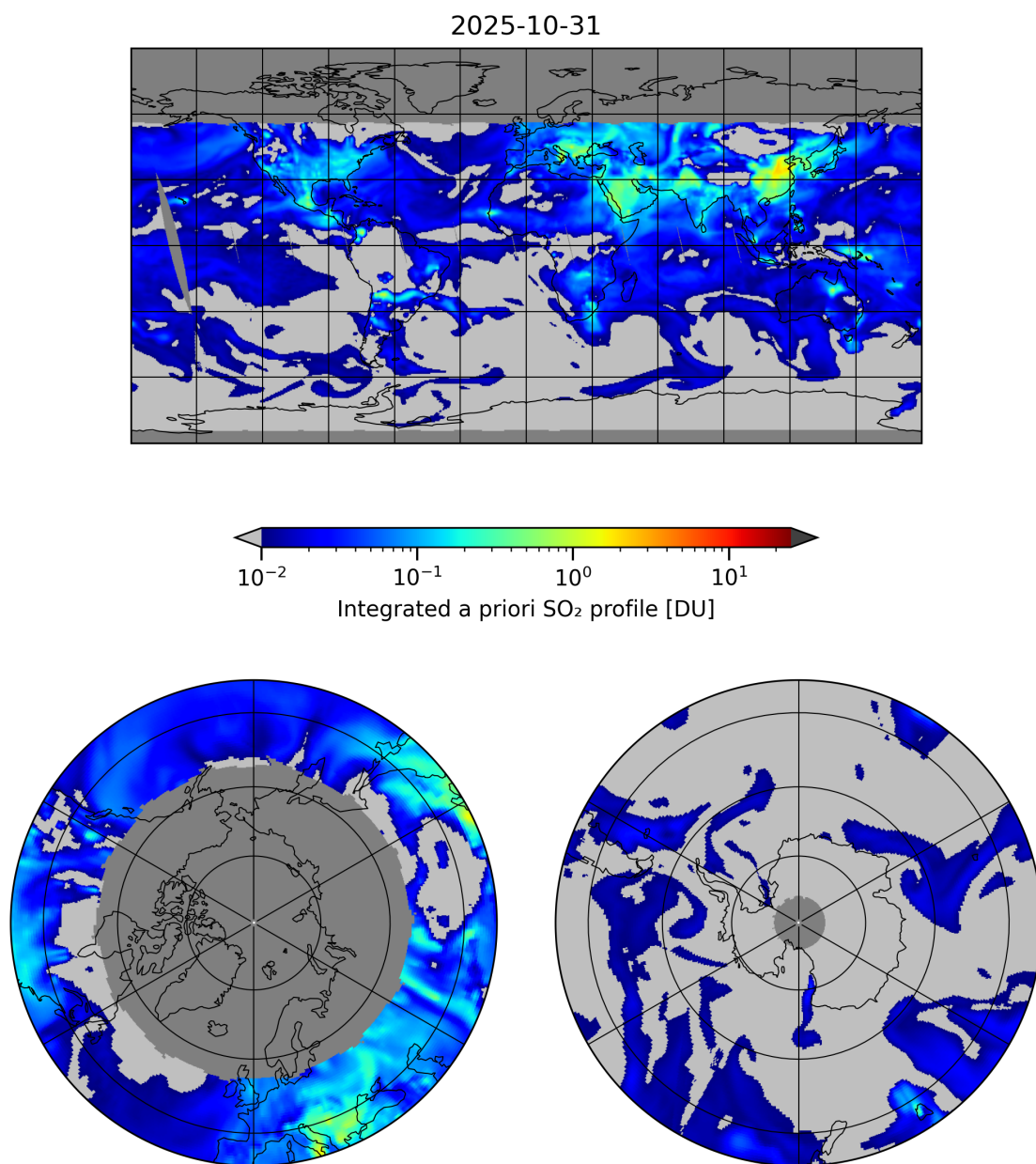


Figure 21: Map of “Integrated a priori SO₂ profile” for 2025-10-31 to 2025-10-31

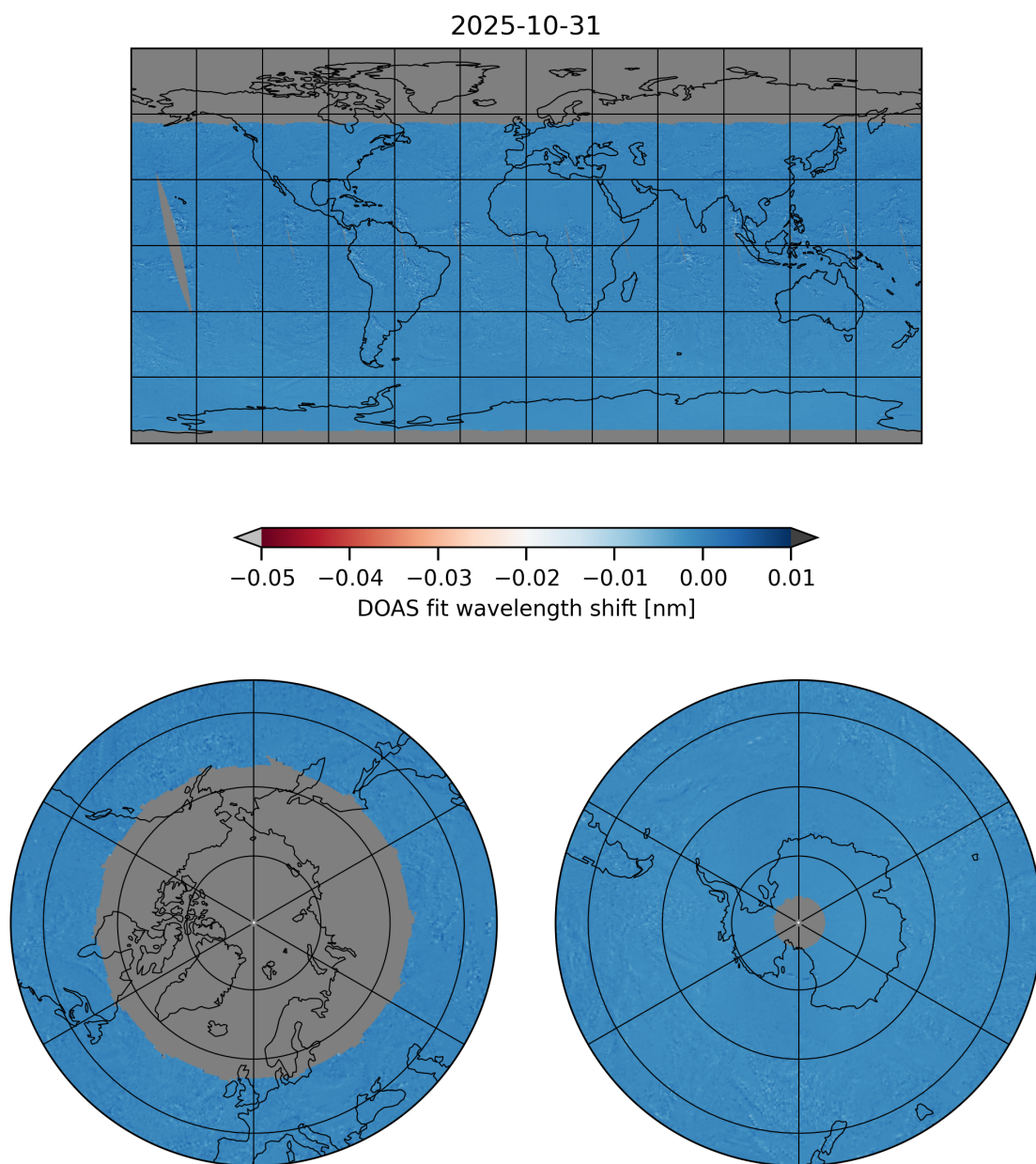


Figure 22: Map of “DOAS fit wavelength shift” for 2025-10-31 to 2025-10-31

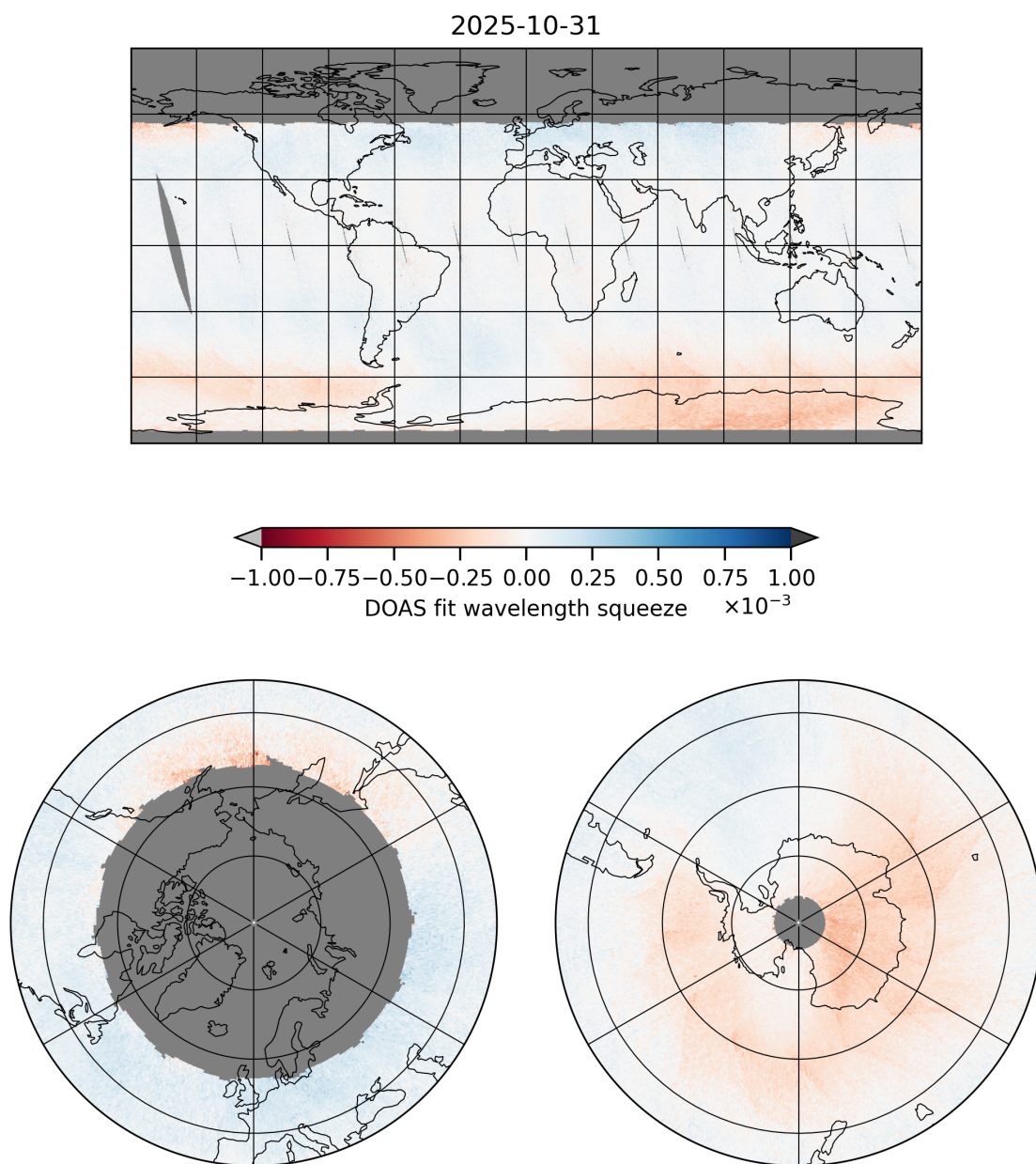


Figure 23: Map of “DOAS fit wavelength squeeze” for 2025-10-31 to 2025-10-31

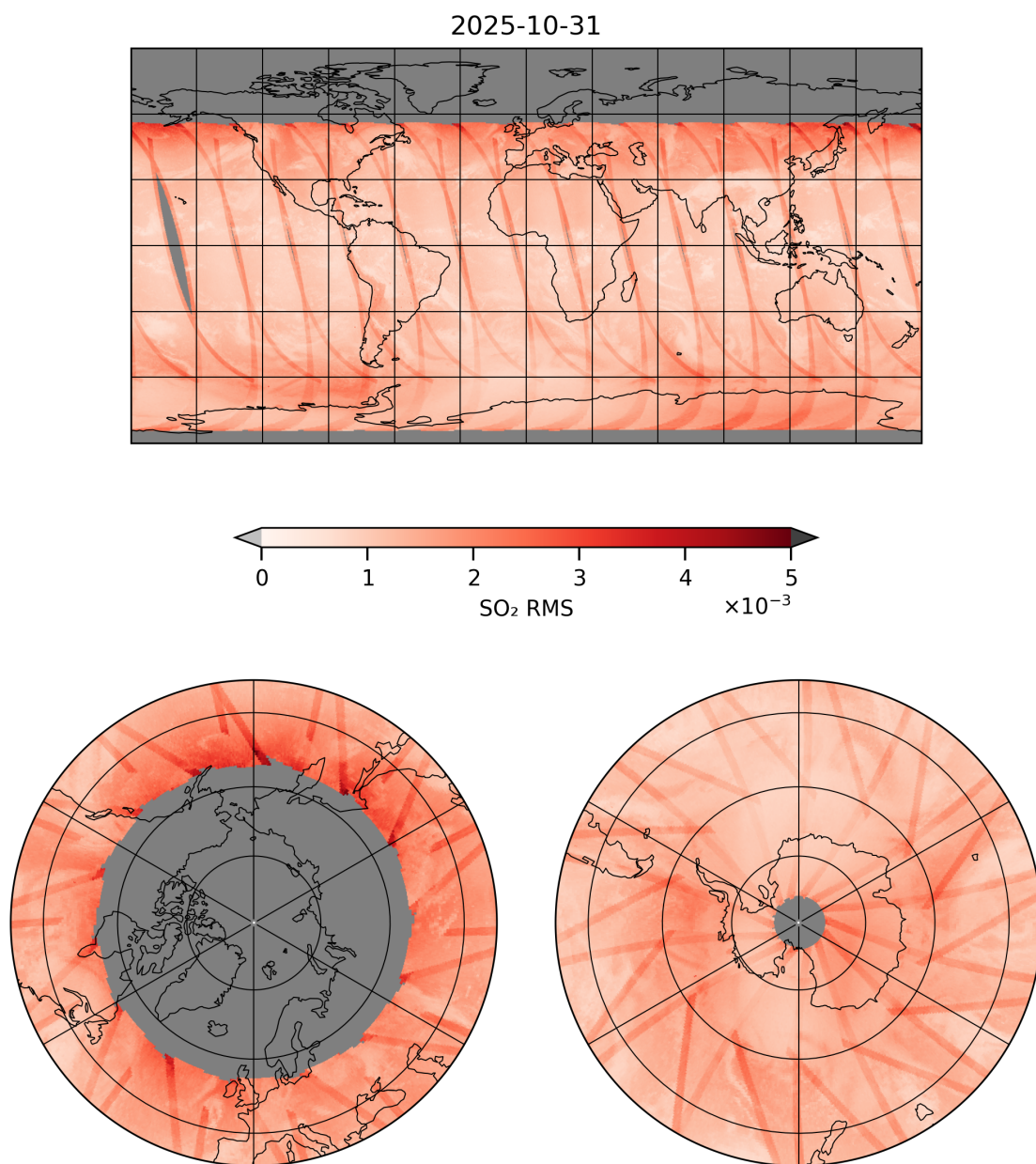


Figure 24: Map of “SO₂ RMS” for 2025-10-31 to 2025-10-31

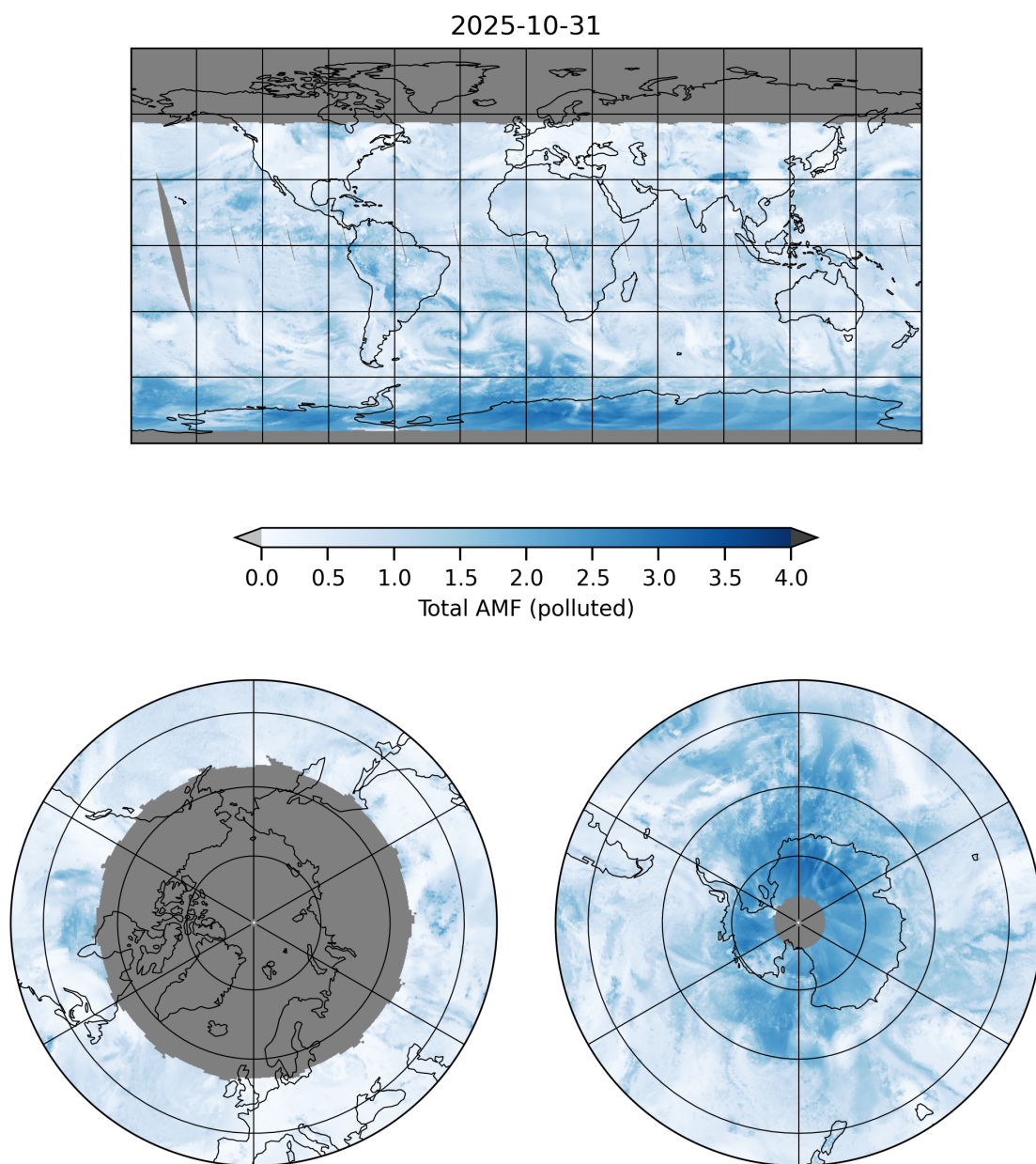


Figure 25: Map of “Total AMF (polluted)” for 2025-10-31 to 2025-10-31

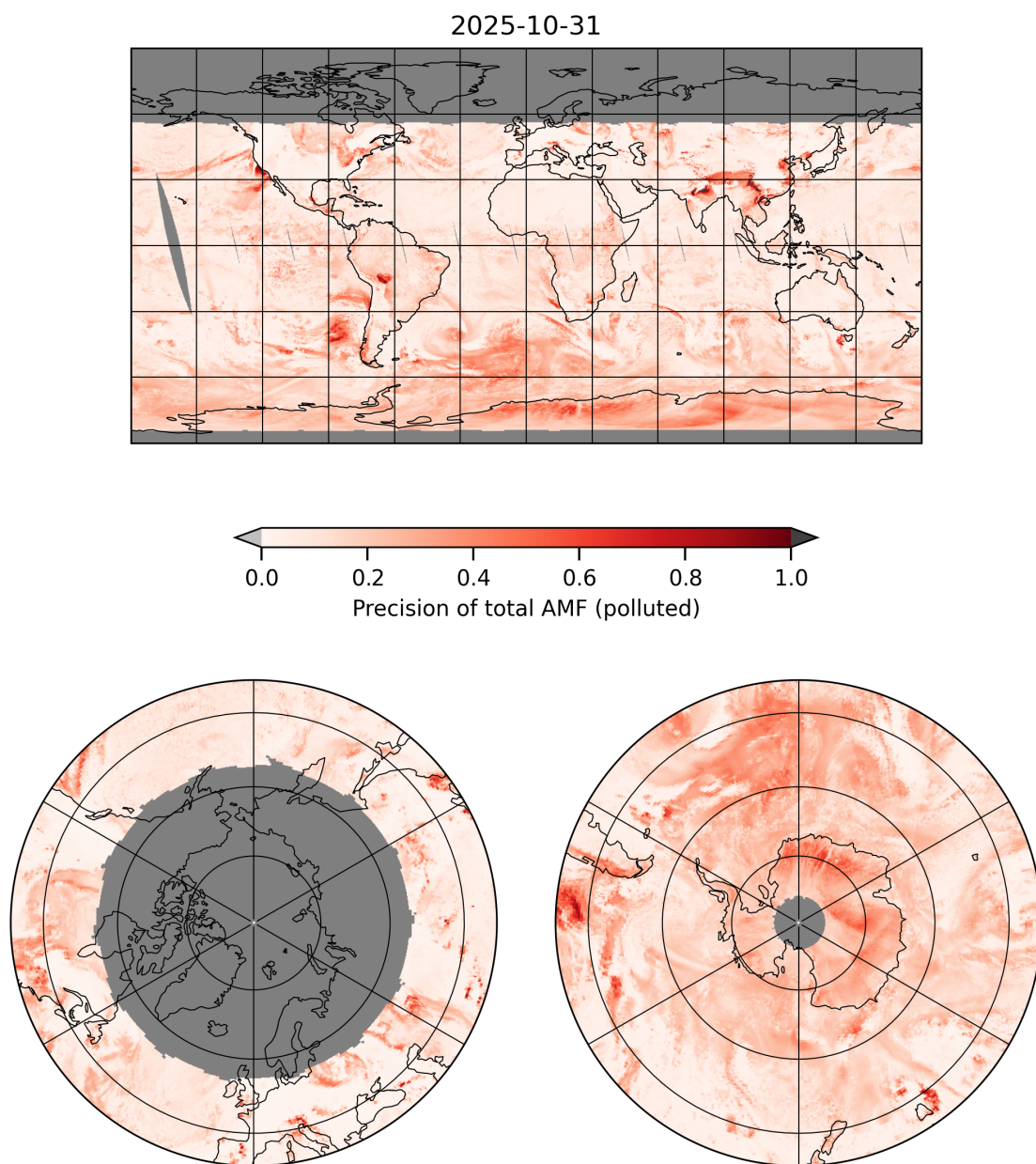


Figure 26: Map of “Precision of total AMF (polluted)” for 2025-10-31 to 2025-10-31

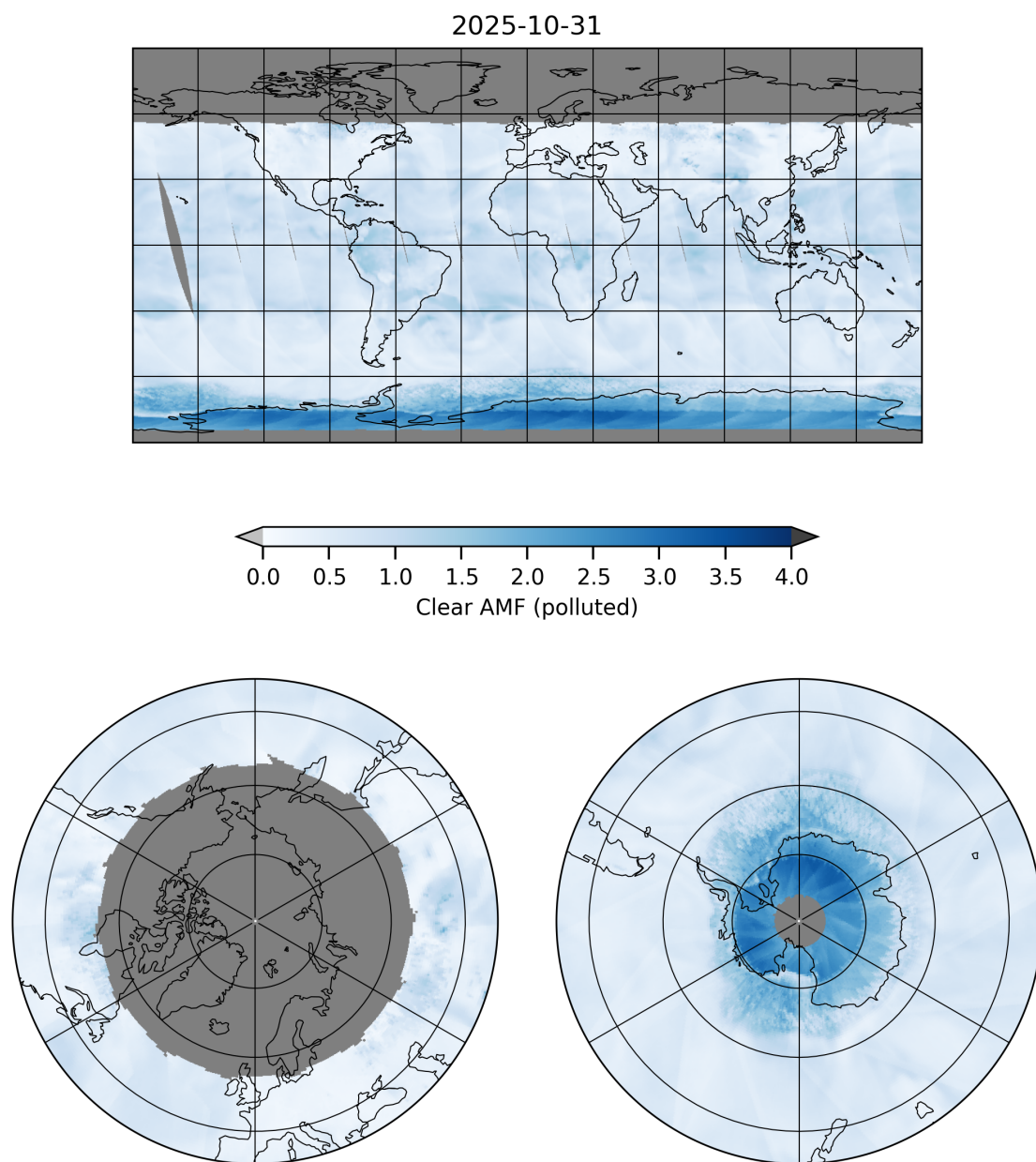


Figure 27: Map of “Clear AMF (polluted)” for 2025-10-31 to 2025-10-31

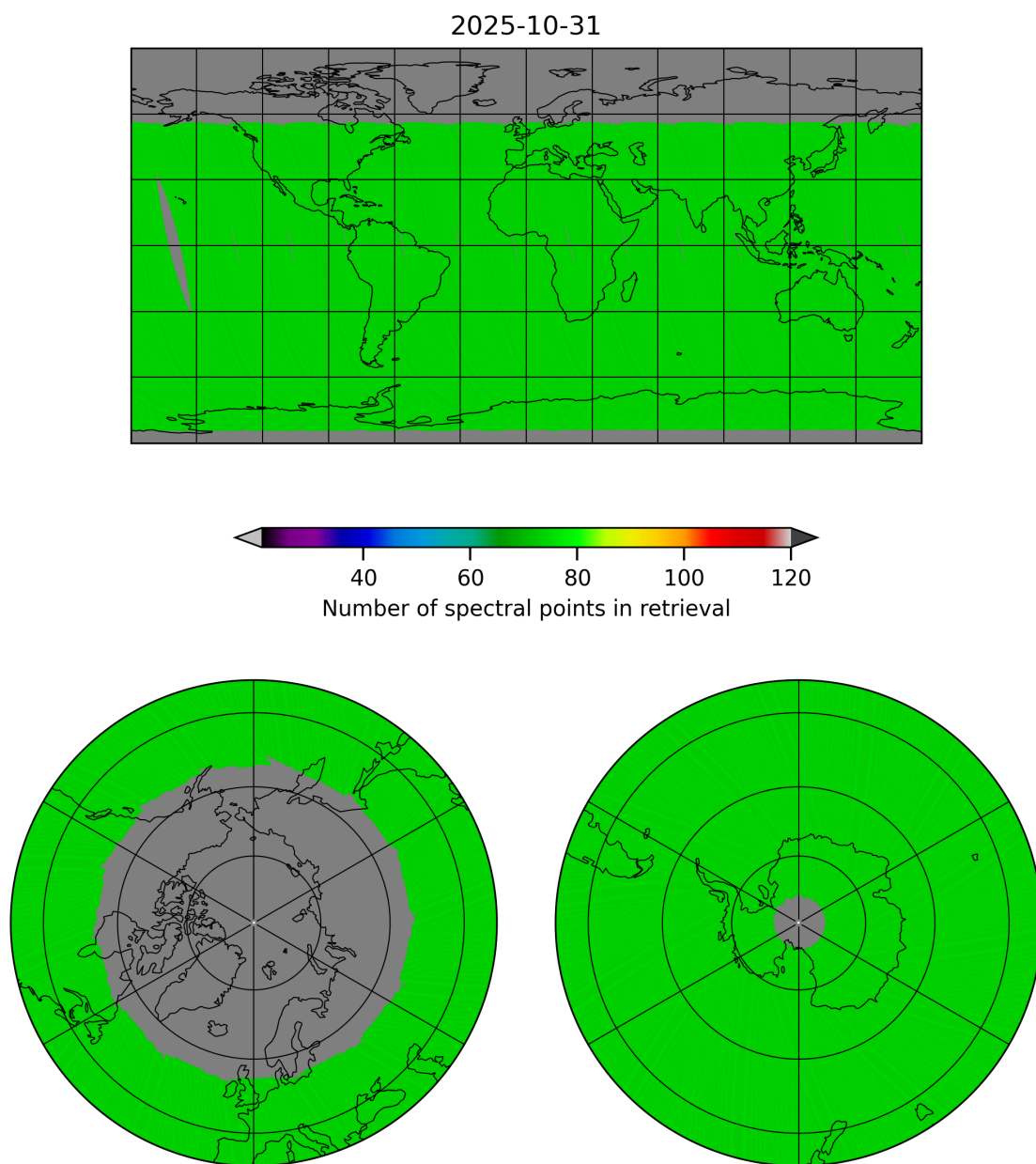


Figure 28: Map of “Number of spectral points in retrieval” for 2025-10-31 to 2025-10-31

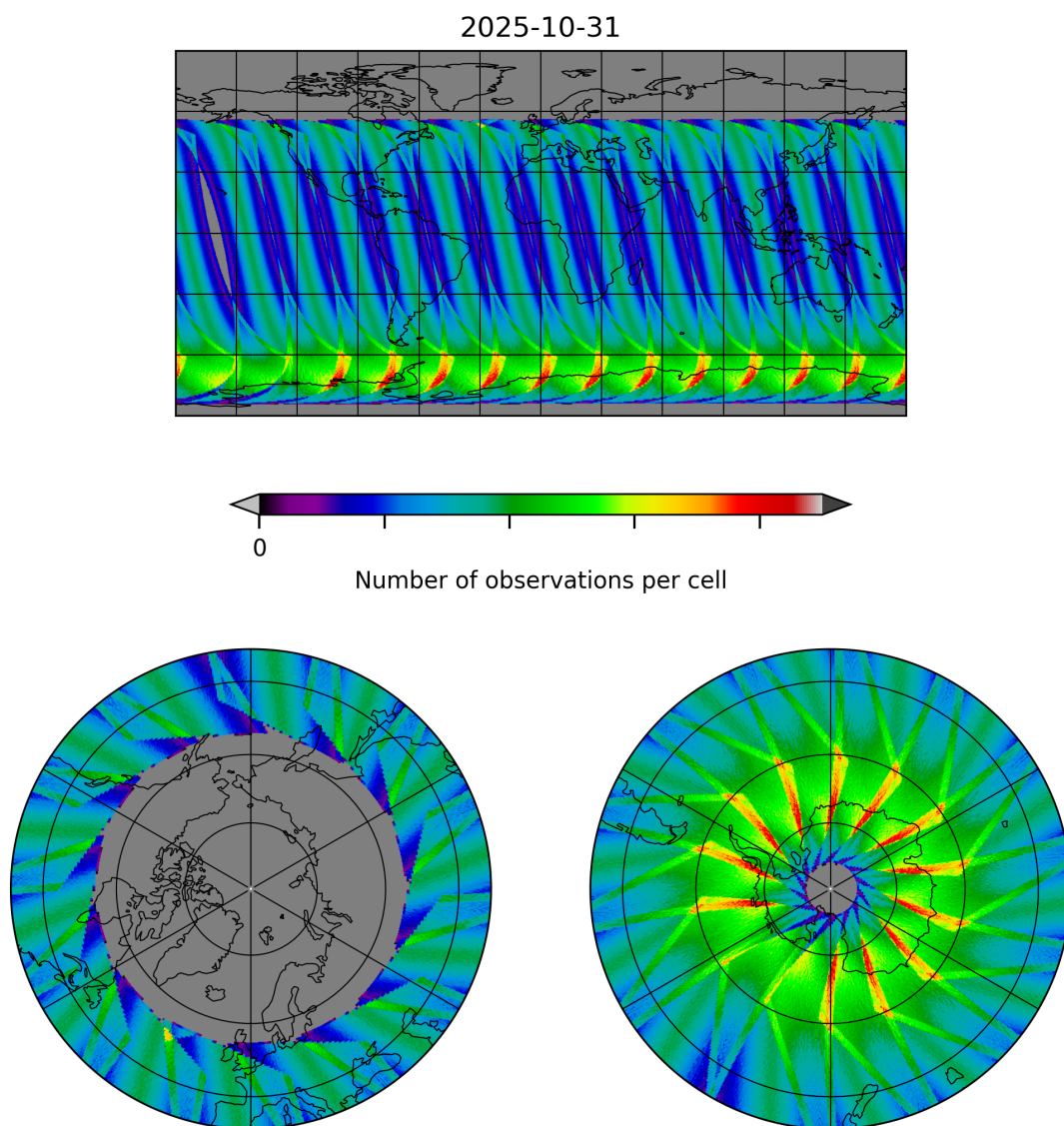


Figure 29: Map of the number of observations for 2025-10-31 to 2025-10-31

7 Zonal average

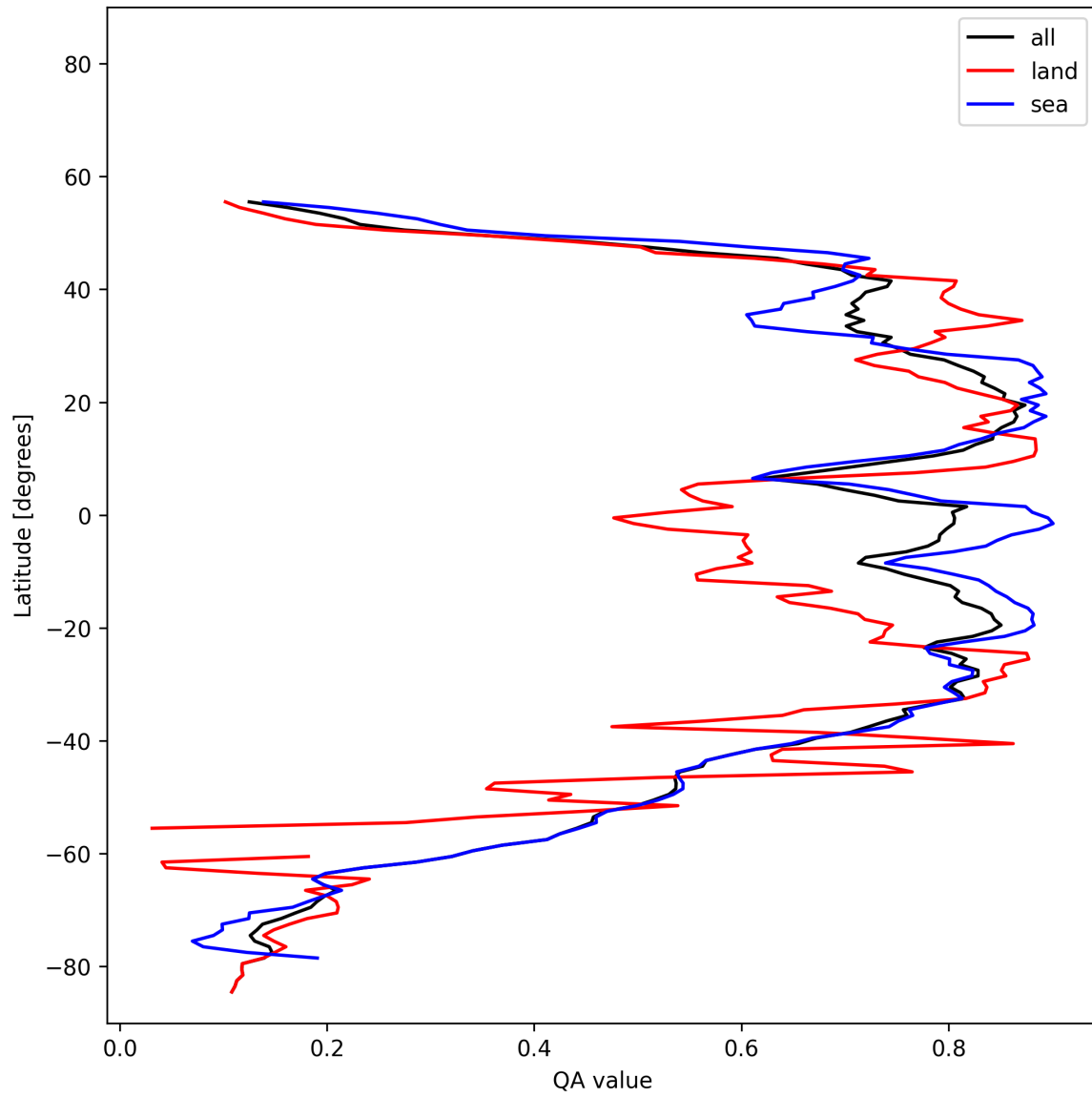


Figure 30: Zonal average of “QA value” for 2025-10-31 to 2025-10-31.

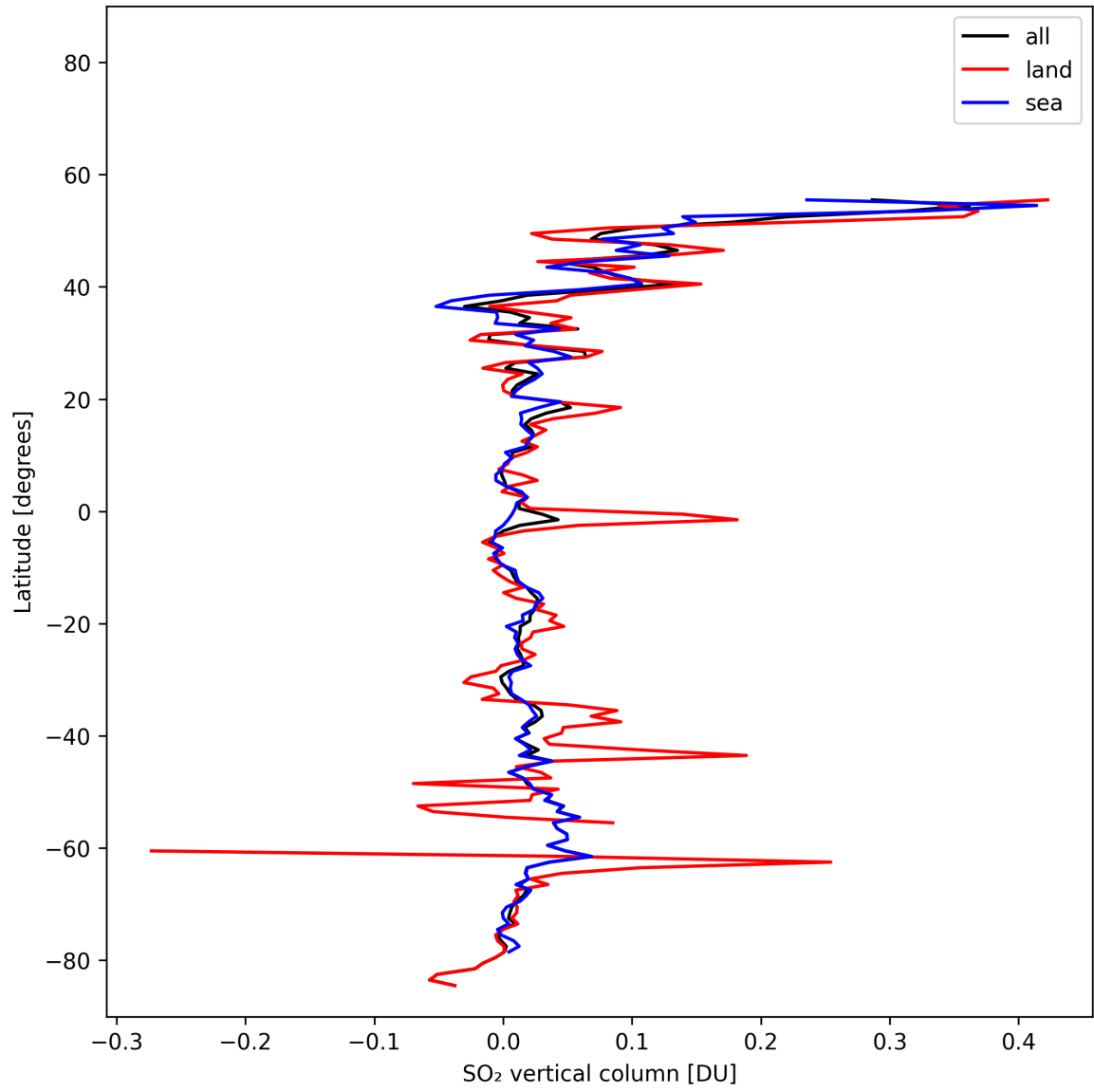


Figure 31: Zonal average of “SO₂ vertical column” for 2025-10-31 to 2025-10-31.

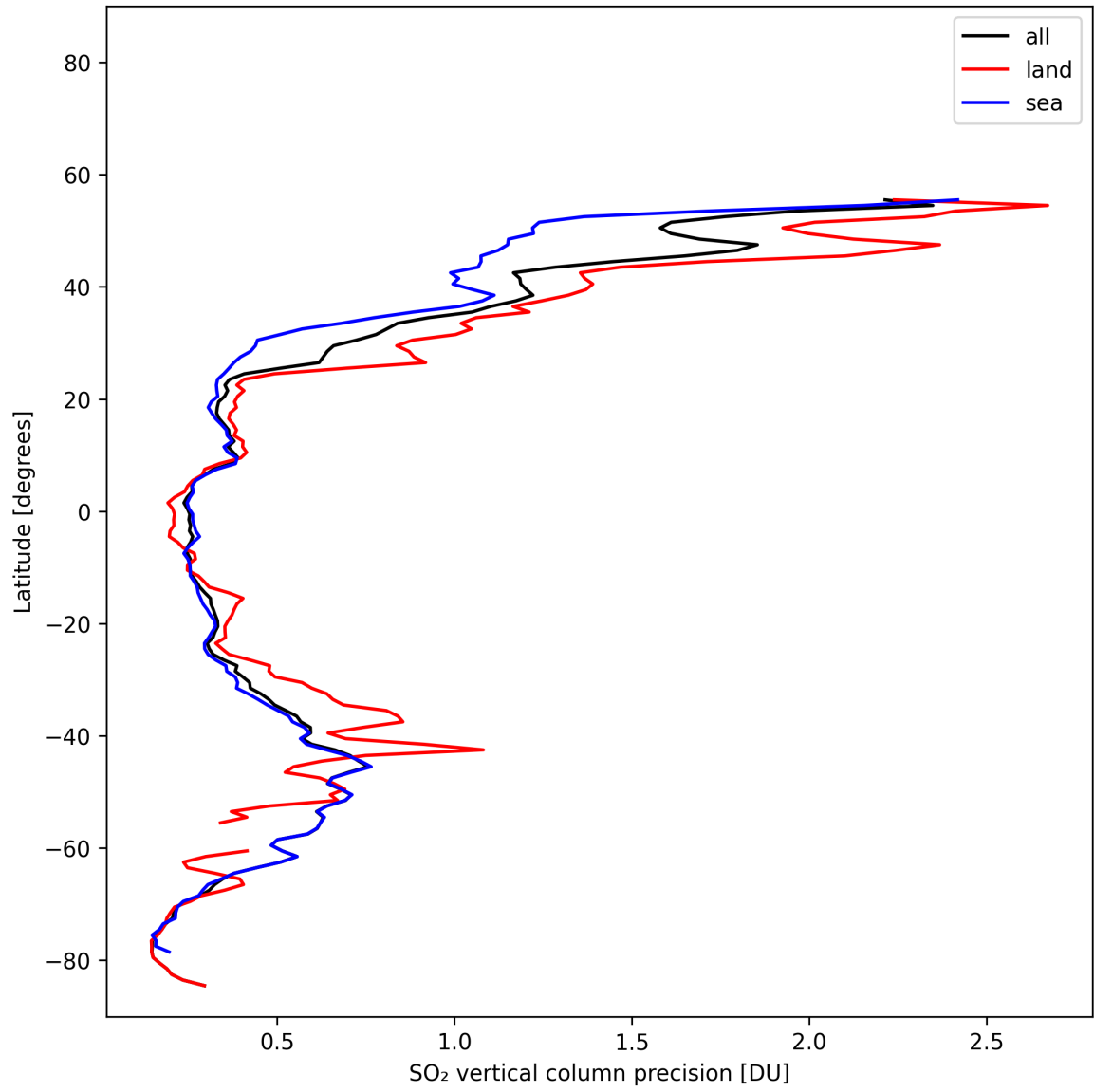


Figure 32: Zonal average of “SO₂ vertical column precision” for 2025-10-31 to 2025-10-31.

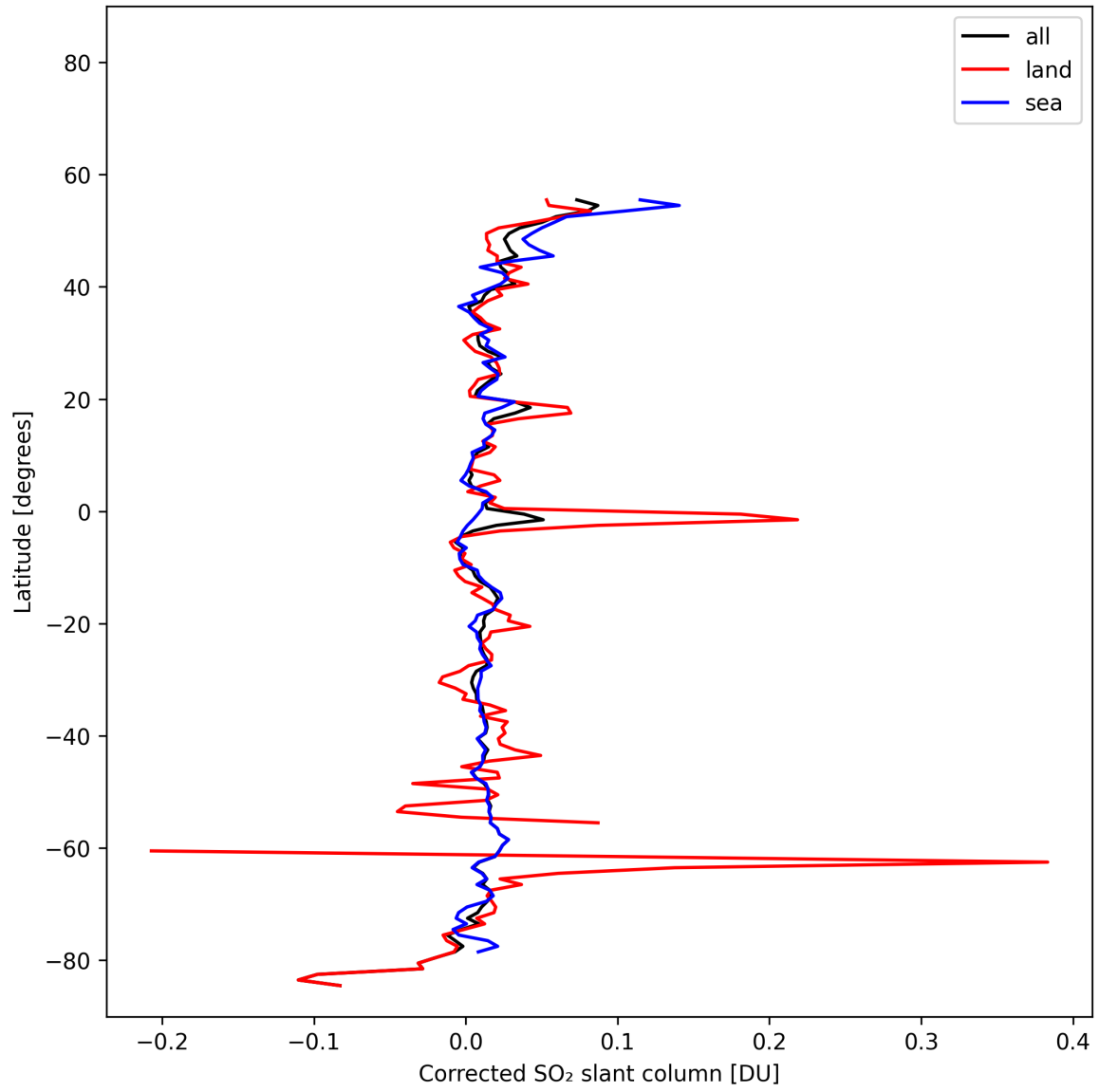


Figure 33: Zonal average of "Corrected SO₂ slant column" for 2025-10-31 to 2025-10-31.

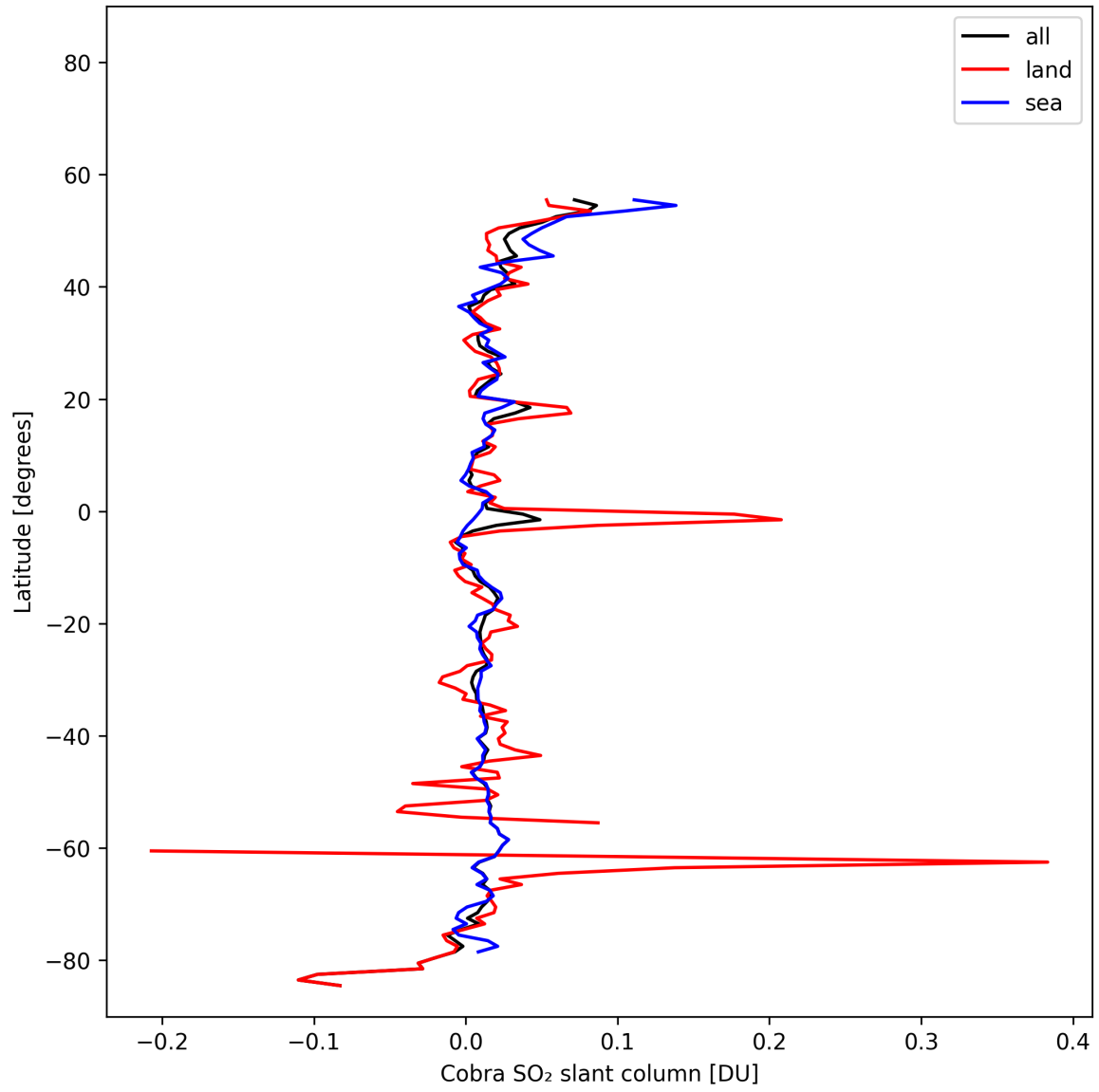


Figure 34: Zonal average of “Cobra SO₂ slant column” for 2025-10-31 to 2025-10-31.

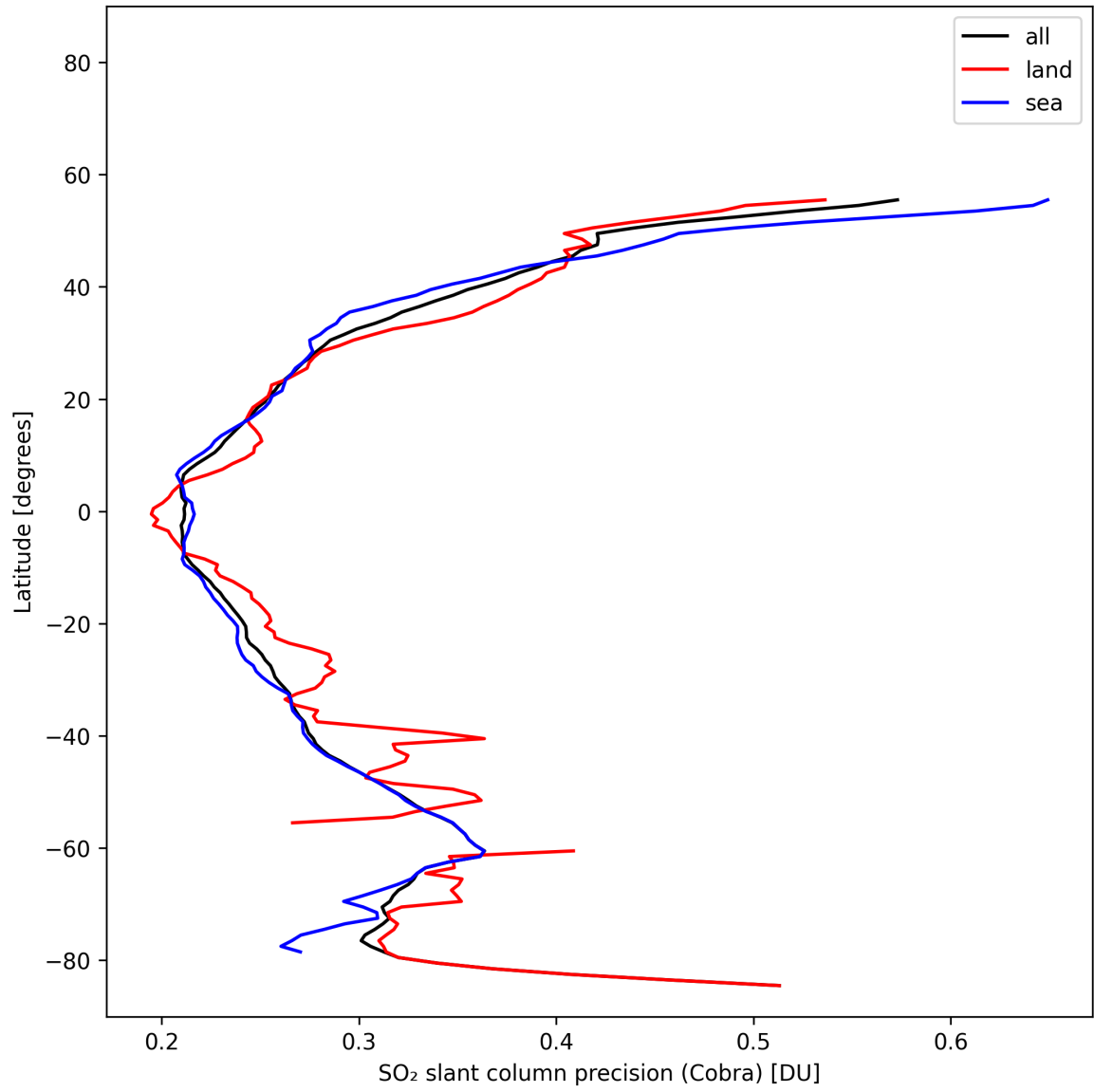


Figure 35: Zonal average of “SO₂ slant column precision (Cobra)” for 2025-10-31 to 2025-10-31.

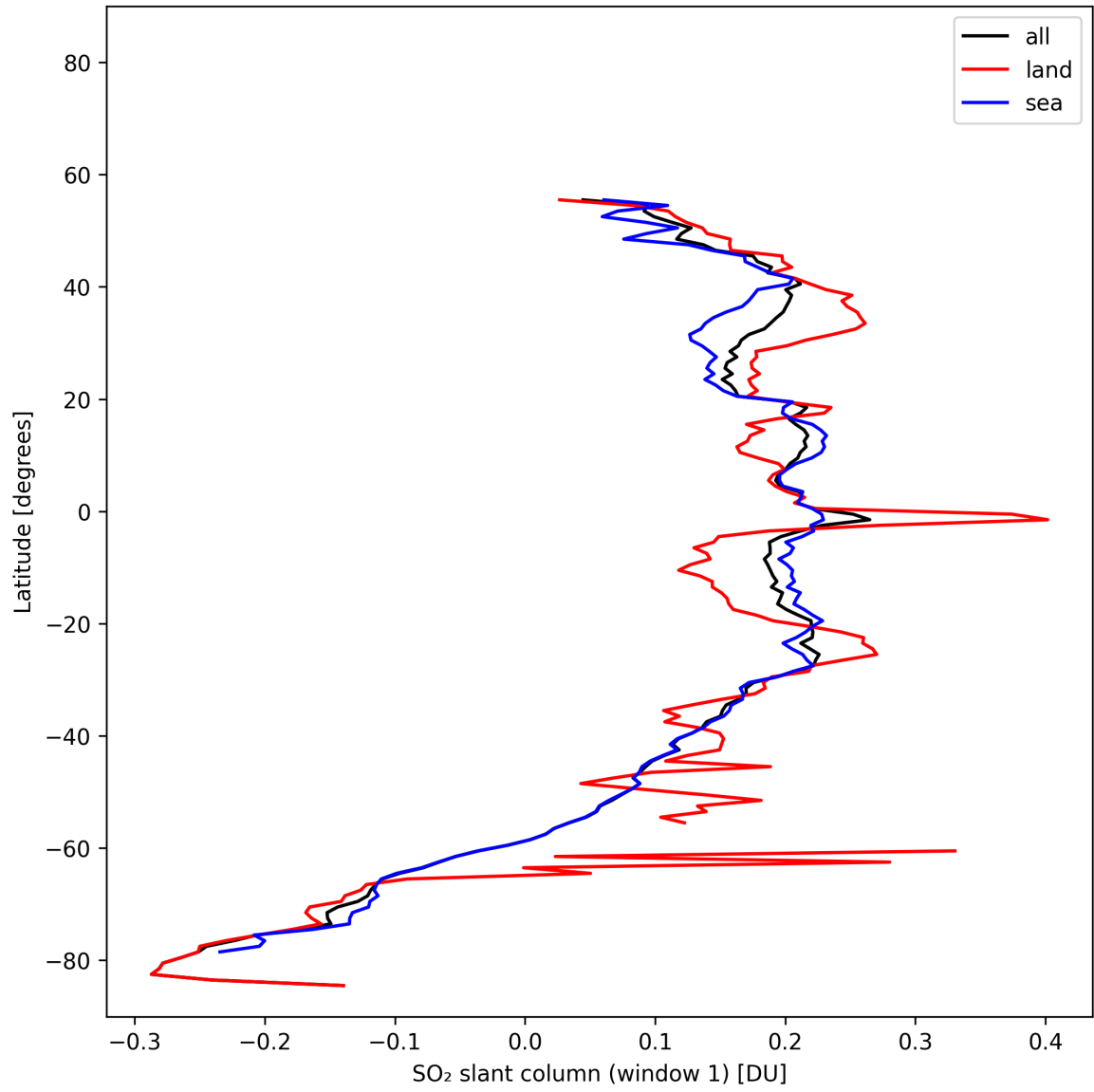


Figure 36: Zonal average of “SO₂ slant column (window 1)” for 2025-10-31 to 2025-10-31.

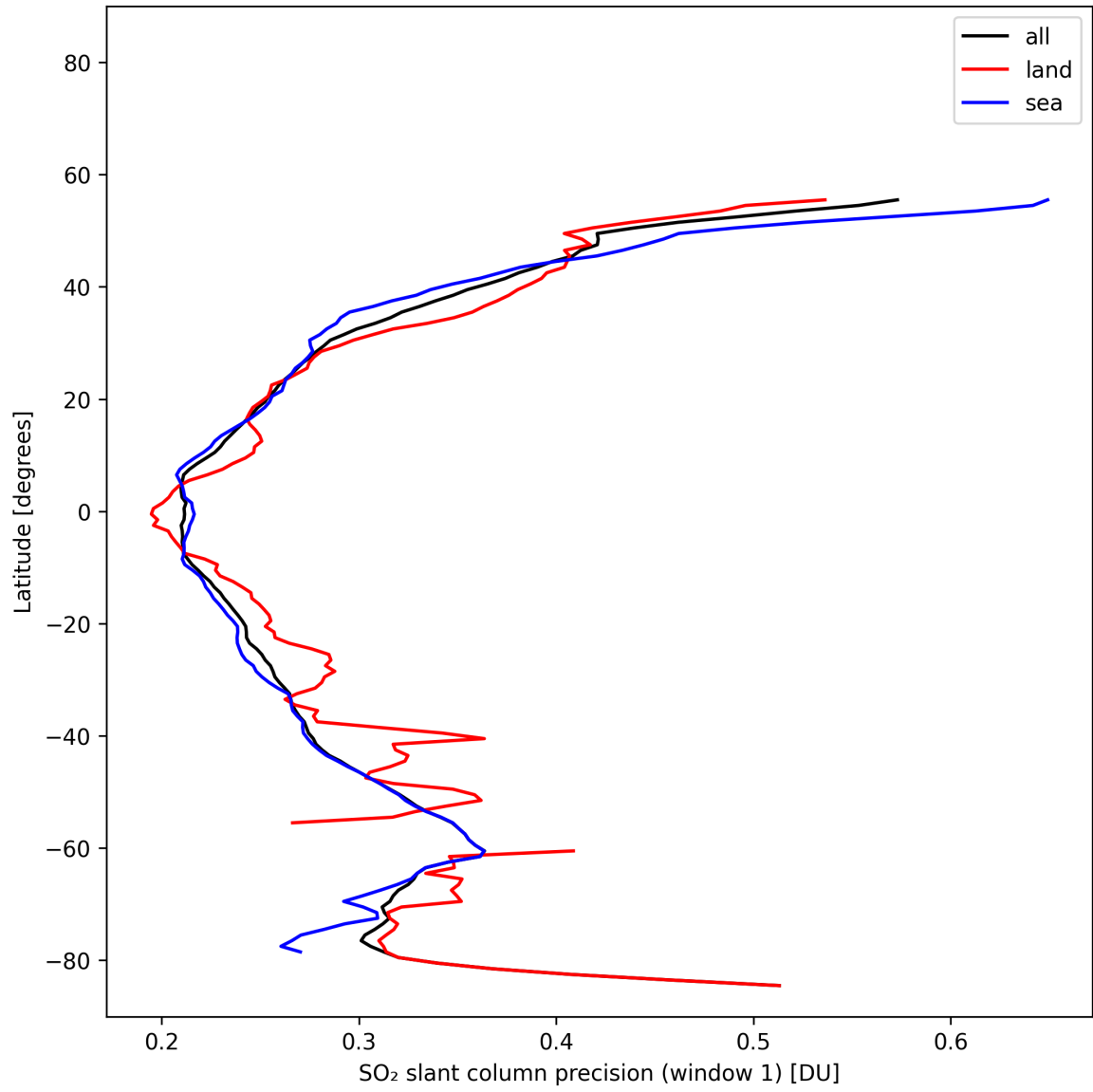


Figure 37: Zonal average of “SO₂ slant column precision (window 1)” for 2025-10-31 to 2025-10-31.

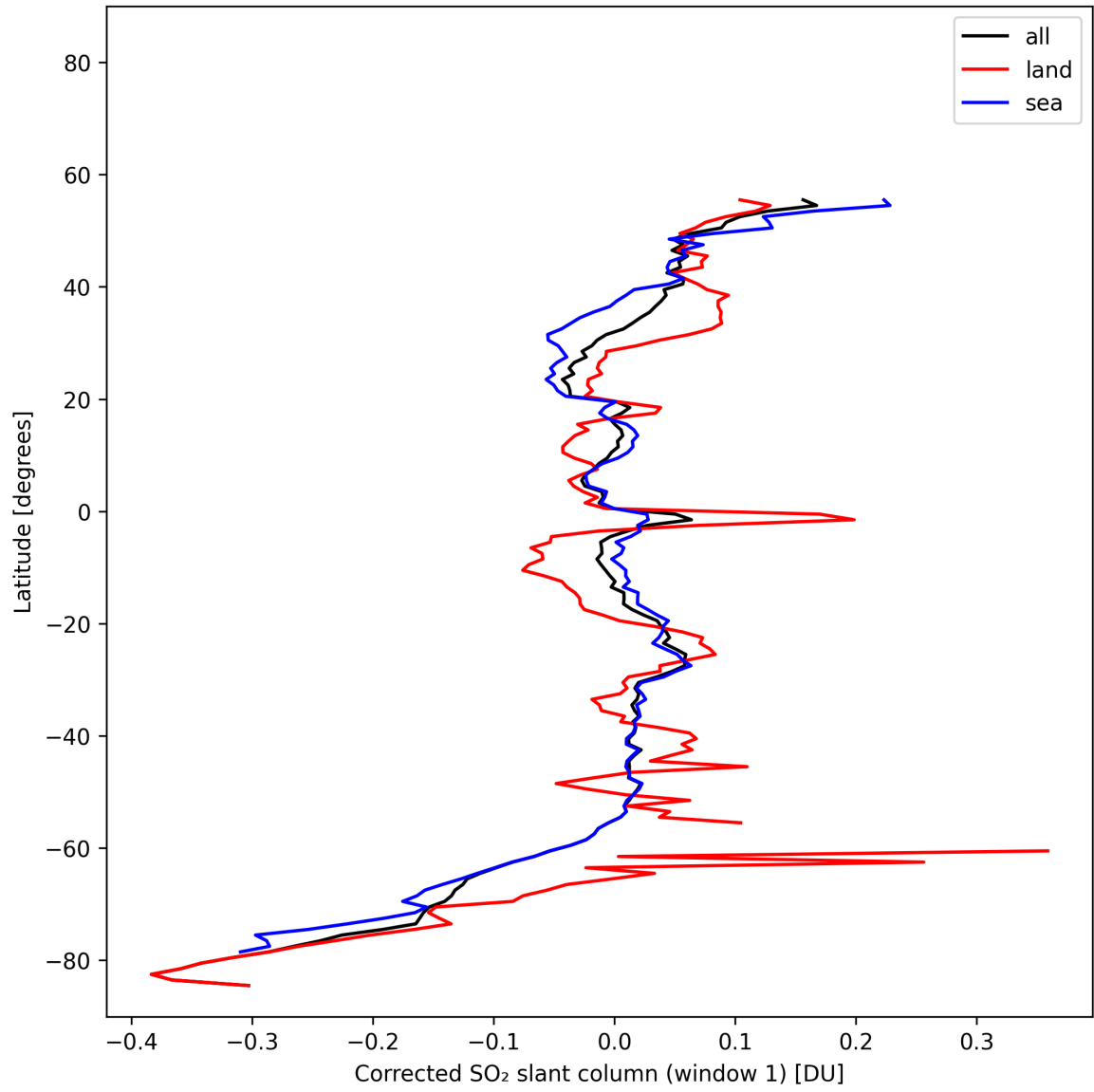


Figure 38: Zonal average of “Corrected SO₂ slant column (window 1)” for 2025-10-31 to 2025-10-31.

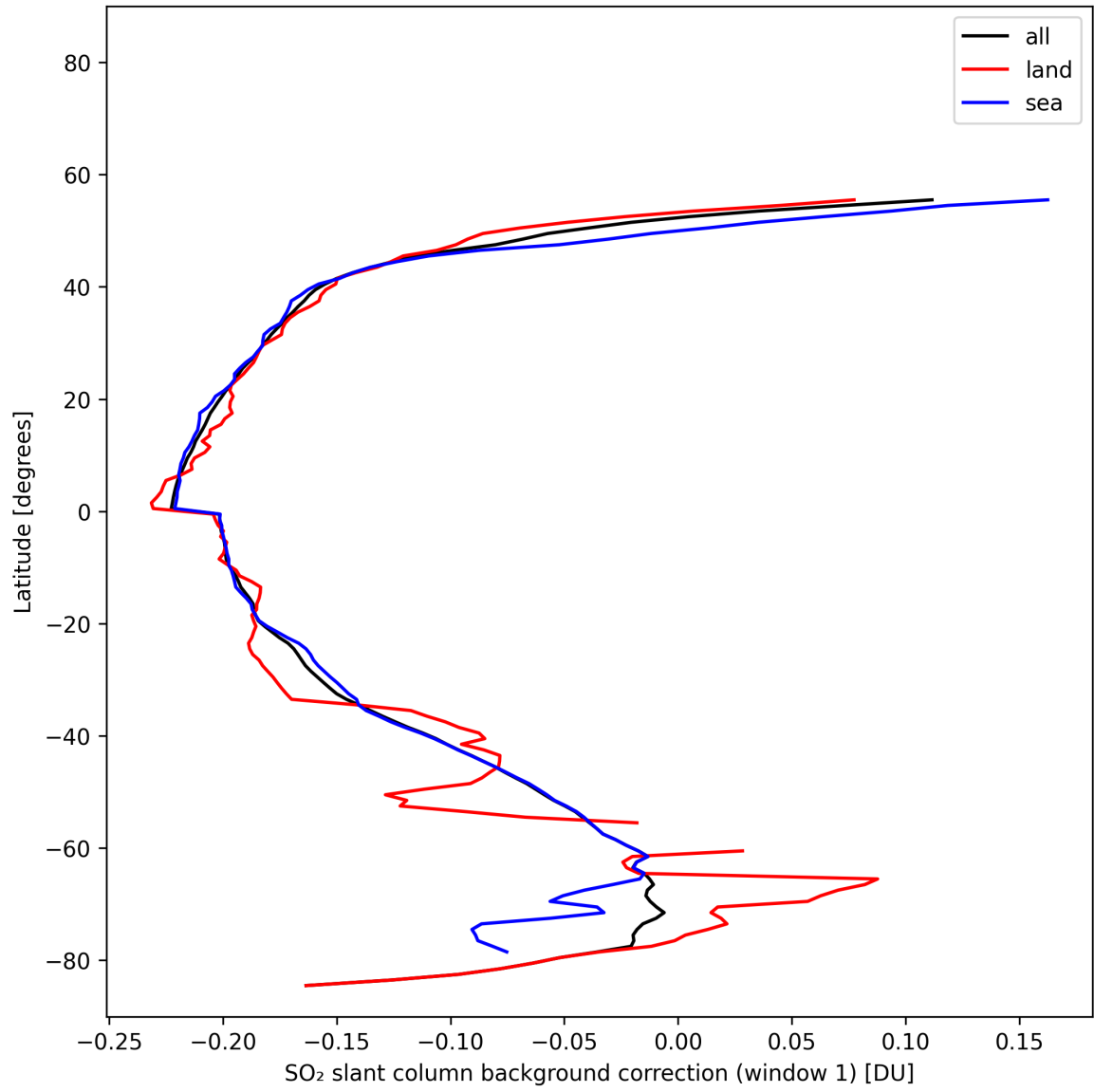


Figure 39: Zonal average of “SO₂ slant column background correction (window 1)” for 2025-10-31 to 2025-10-31.

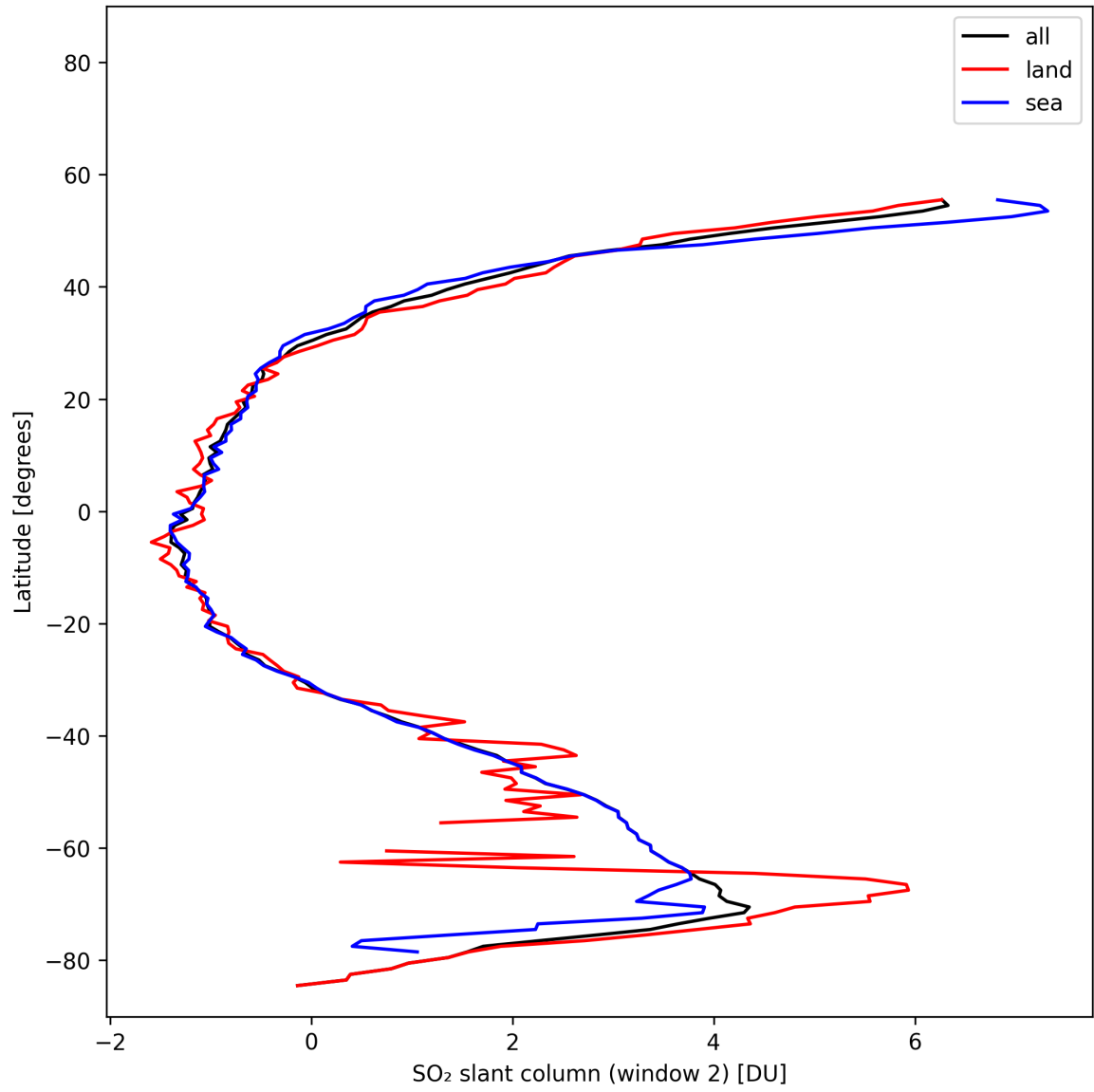


Figure 40: Zonal average of “SO₂ slant column (window 2)” for 2025-10-31 to 2025-10-31.

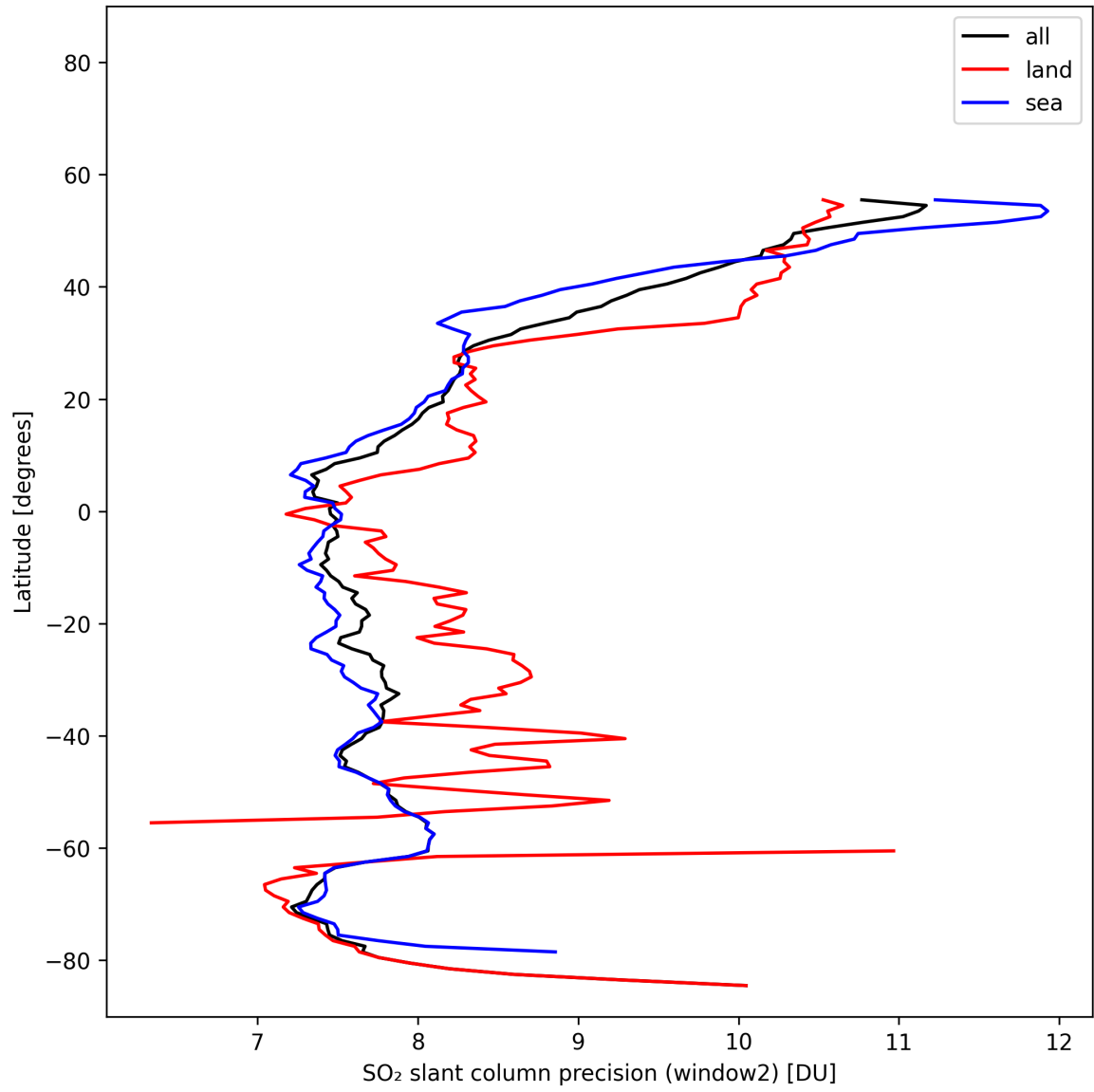


Figure 41: Zonal average of “SO₂ slant column precision (window2)” for 2025-10-31 to 2025-10-31.

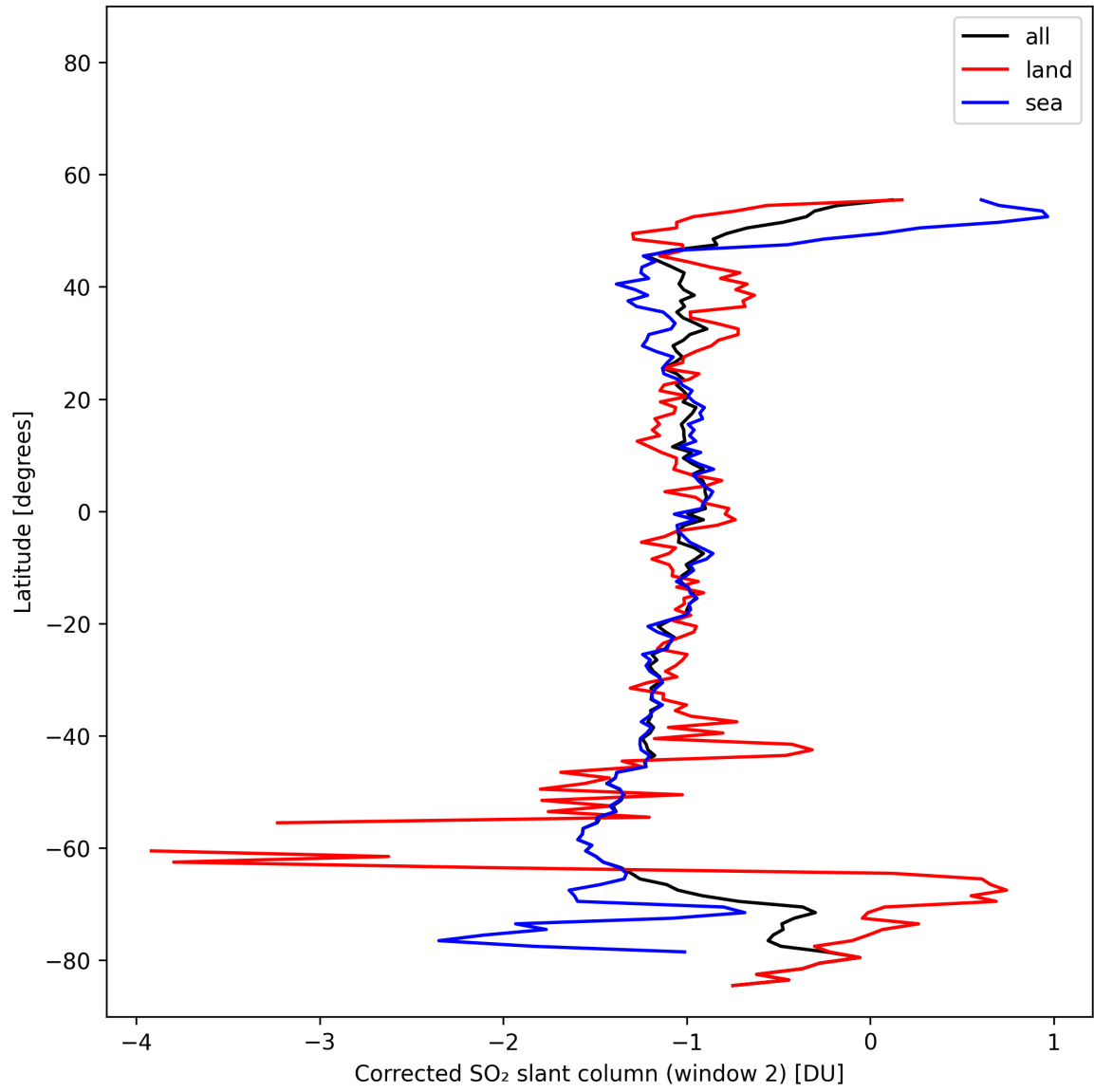


Figure 42: Zonal average of “Corrected SO₂ slant column (window 2)” for 2025-10-31 to 2025-10-31.

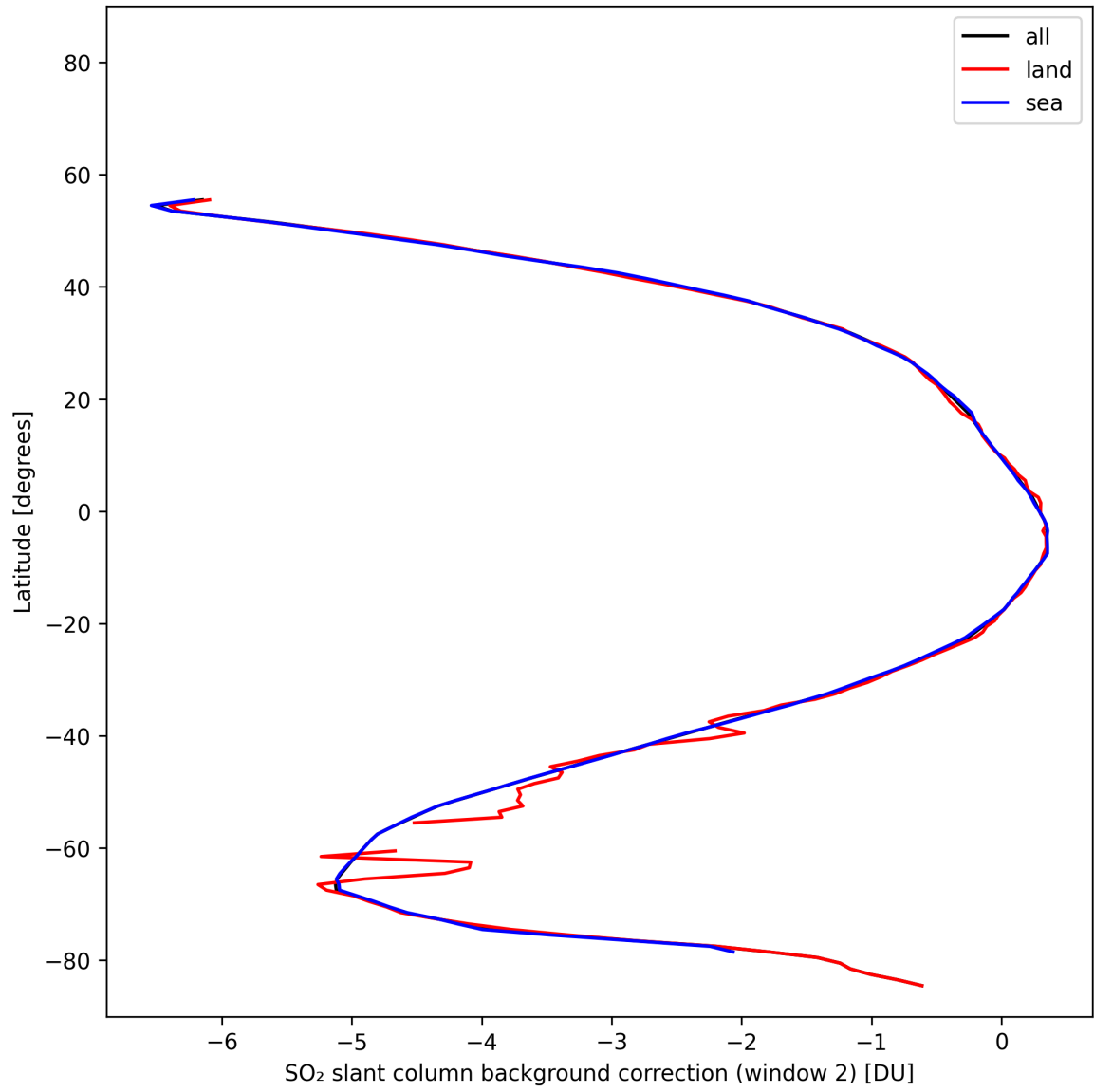


Figure 43: Zonal average of “SO₂ slant column background correction (window 2)” for 2025-10-31 to 2025-10-31.

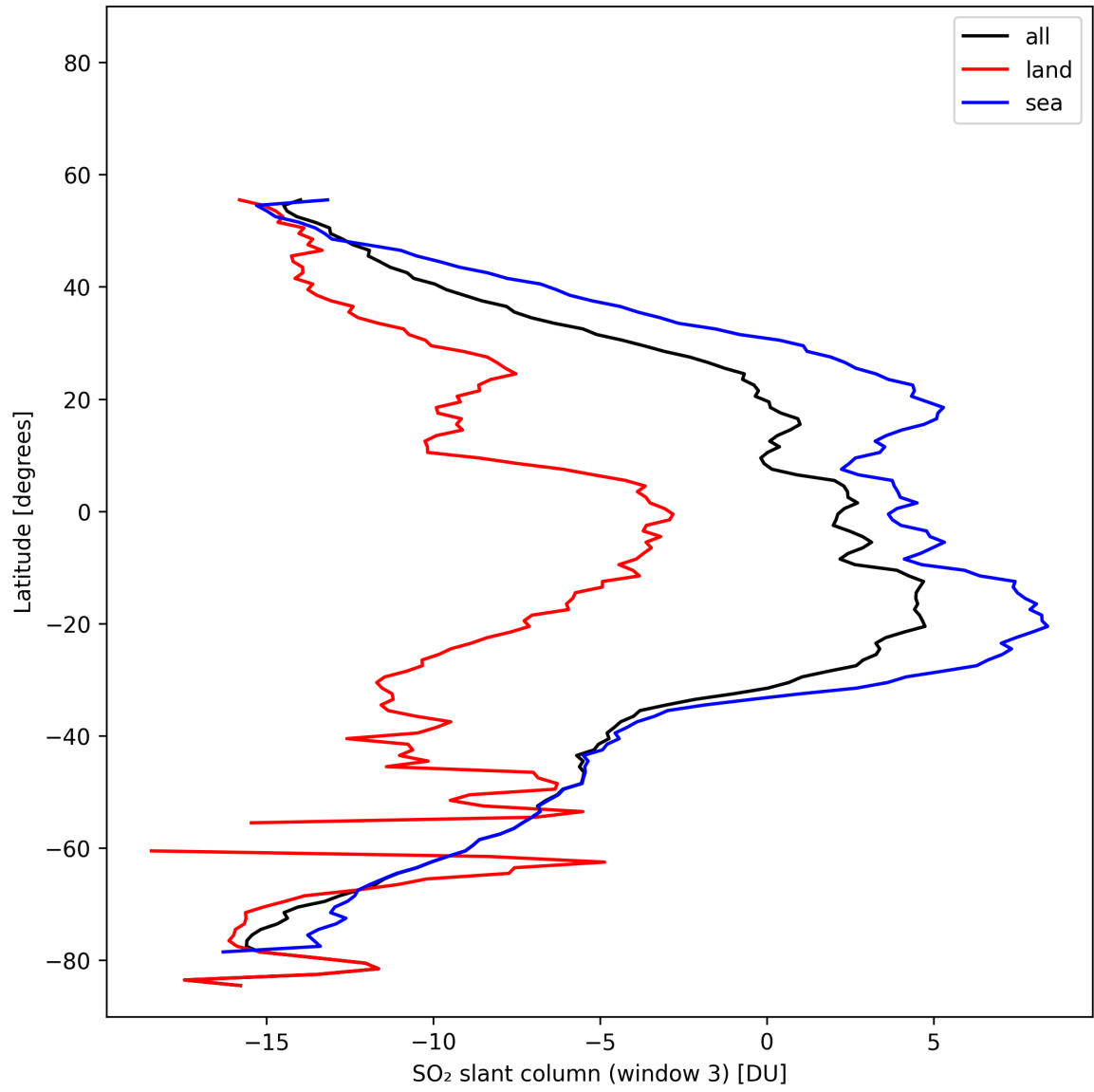


Figure 44: Zonal average of “SO₂ slant column (window 3)” for 2025-10-31 to 2025-10-31.

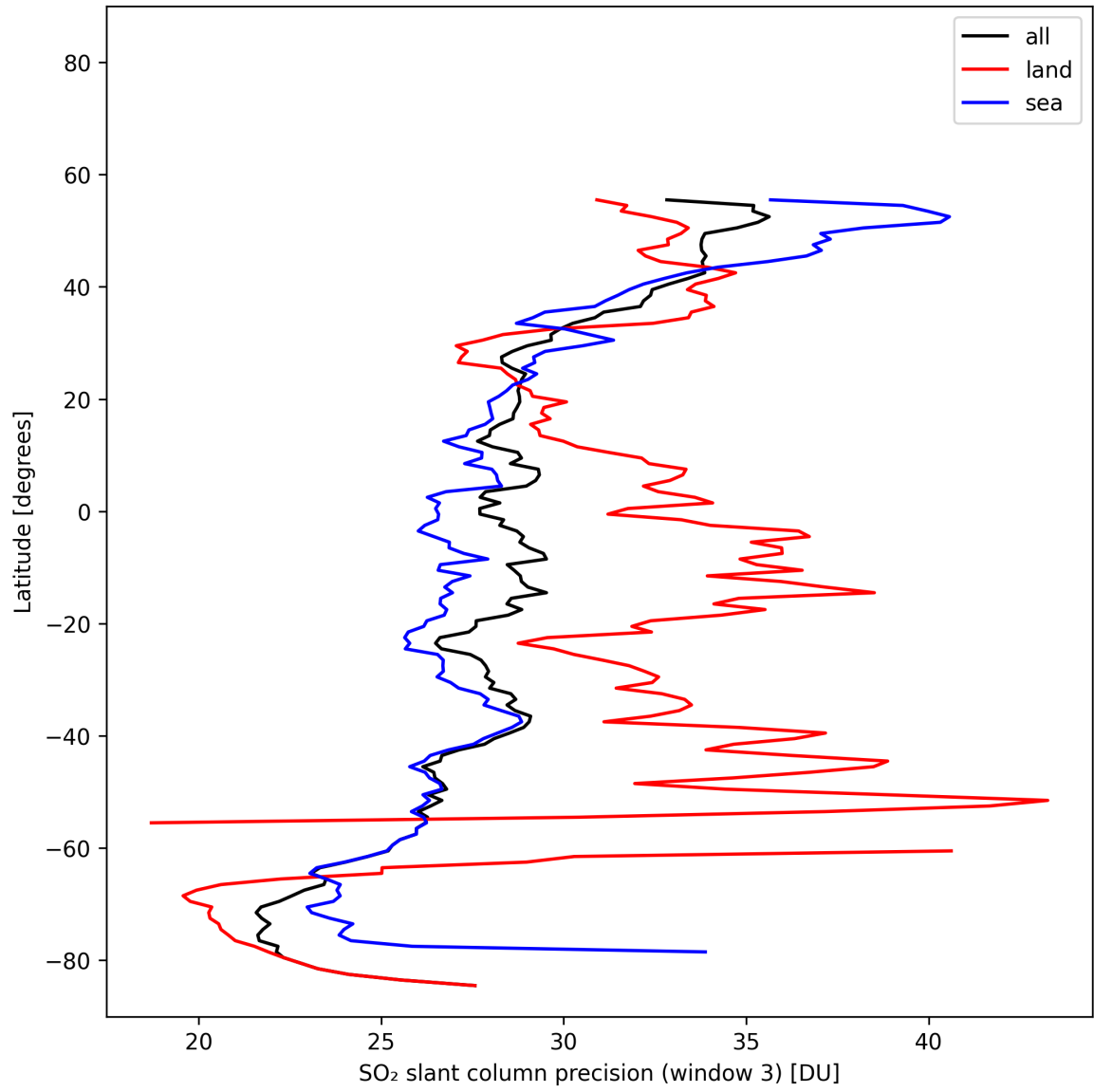


Figure 45: Zonal average of “SO₂ slant column precision (window 3)” for 2025-10-31 to 2025-10-31.

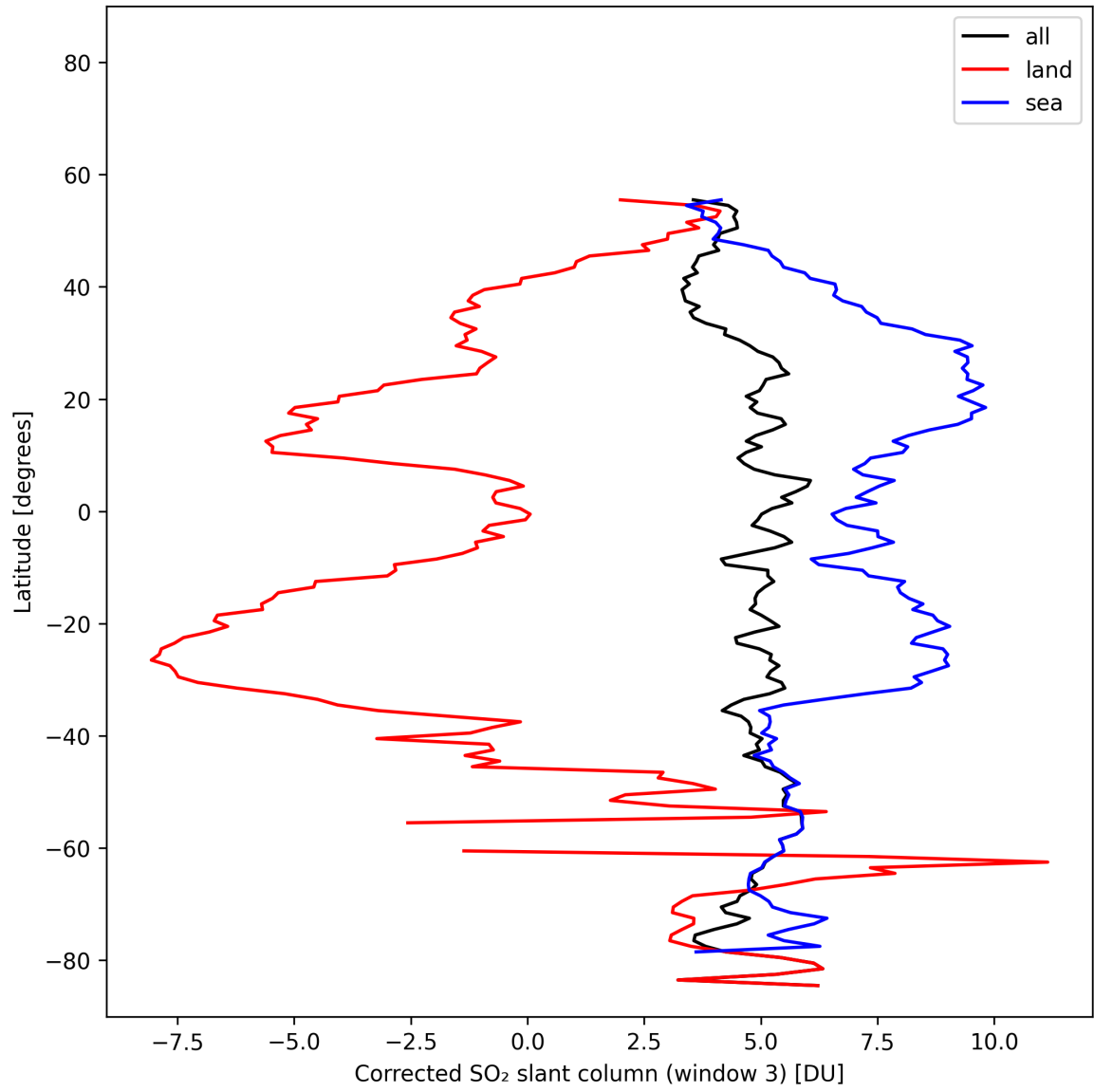


Figure 46: Zonal average of “Corrected SO₂ slant column (window 3)” for 2025-10-31 to 2025-10-31.

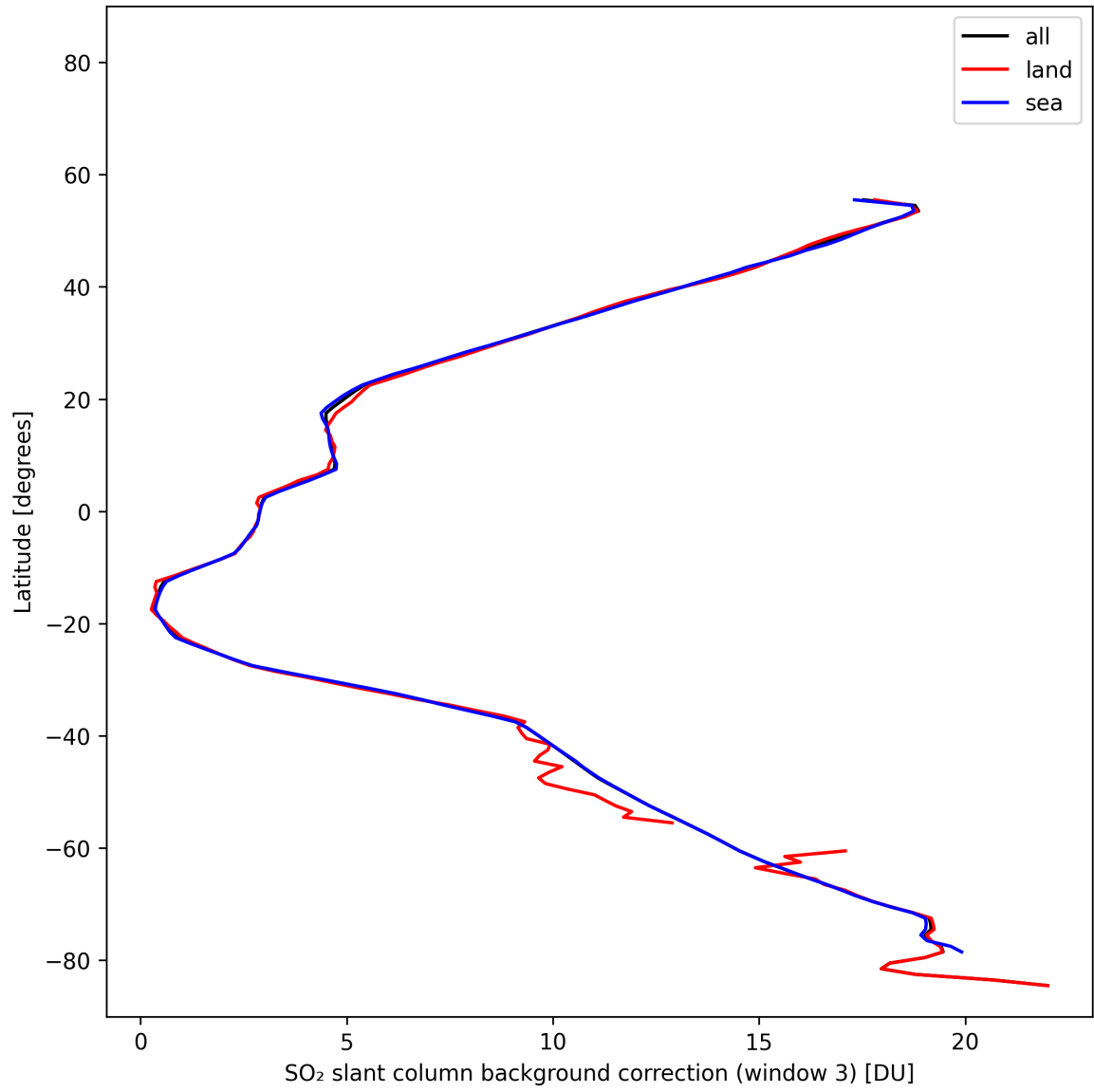


Figure 47: Zonal average of “SO₂ slant column background correction (window 3)” for 2025-10-31 to 2025-10-31.

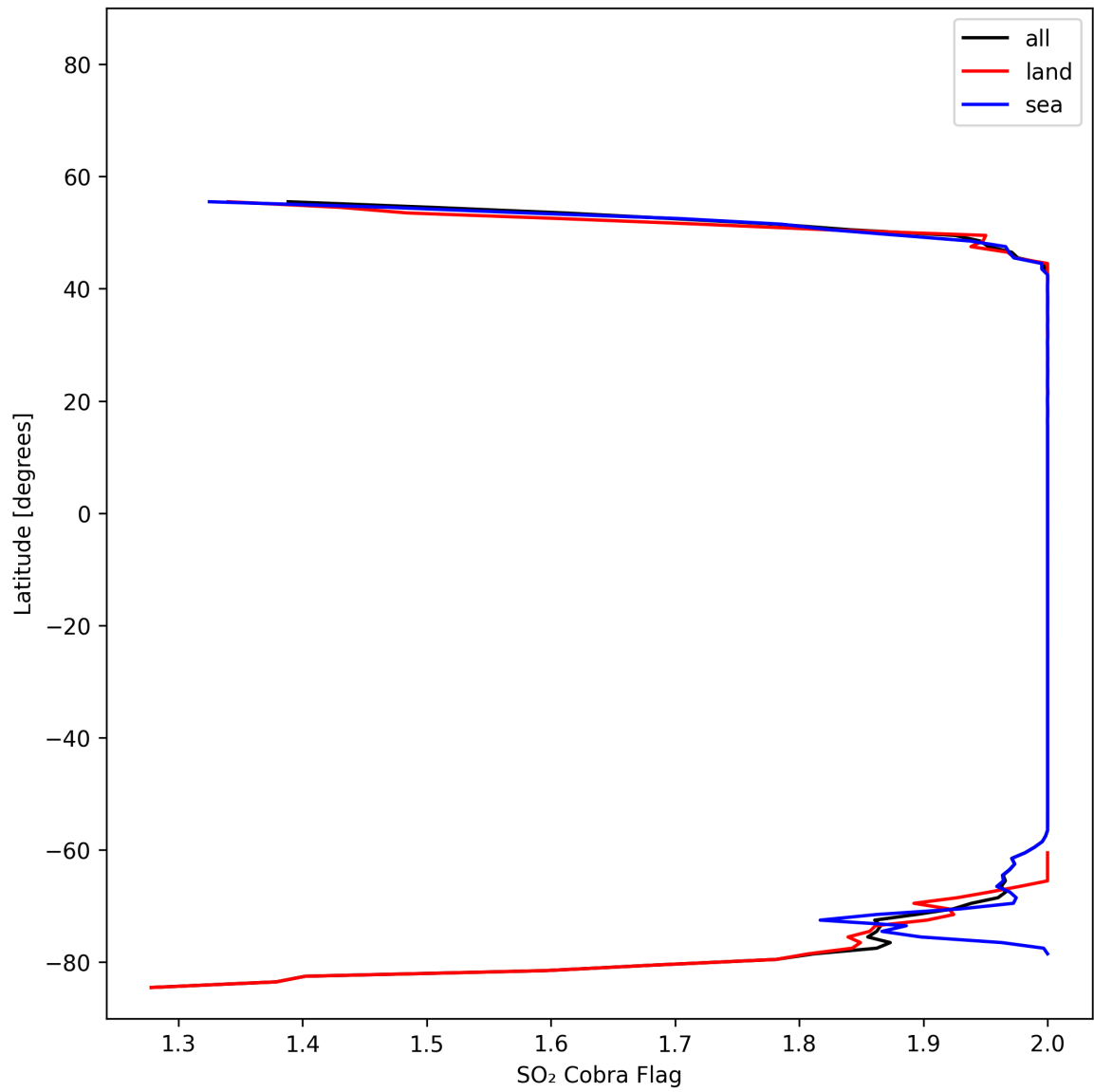


Figure 48: Zonal average of "SO₂ Cobra Flag" for 2025-10-31 to 2025-10-31.

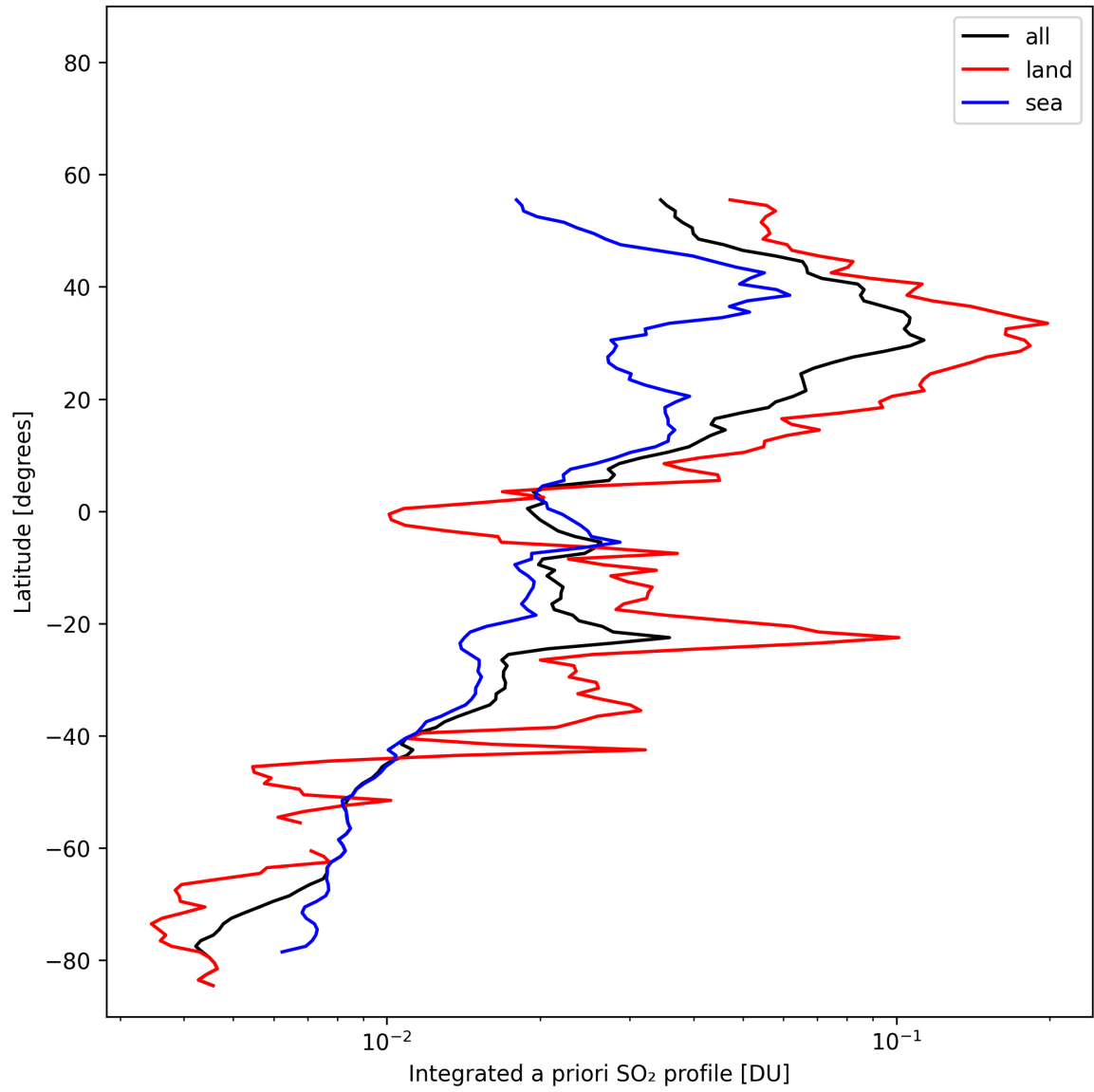


Figure 49: Zonal average of “Integrated a priori SO₂ profile” for 2025-10-31 to 2025-10-31.

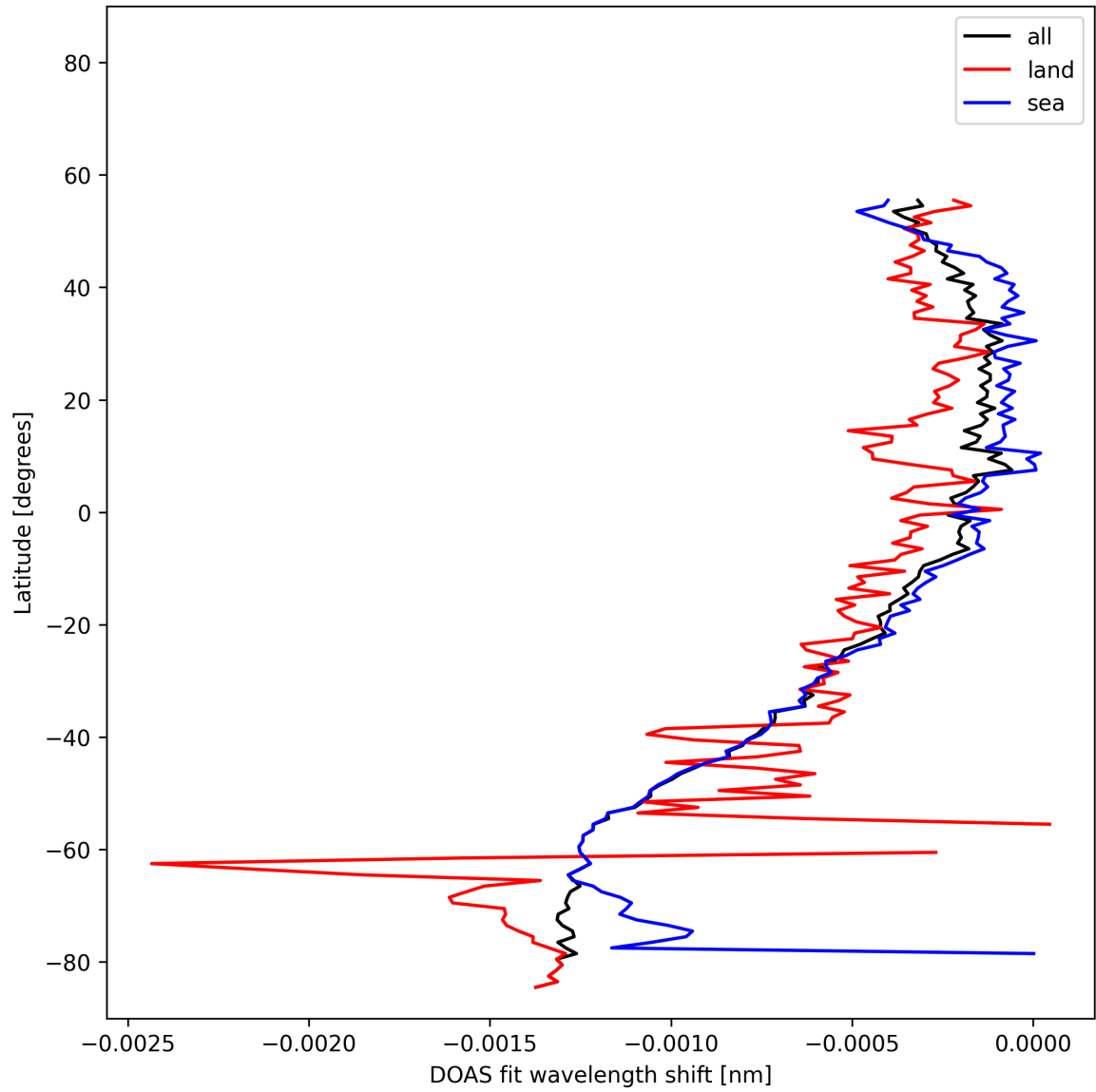


Figure 50: Zonal average of “DOAS fit wavelength shift” for 2025-10-31 to 2025-10-31.

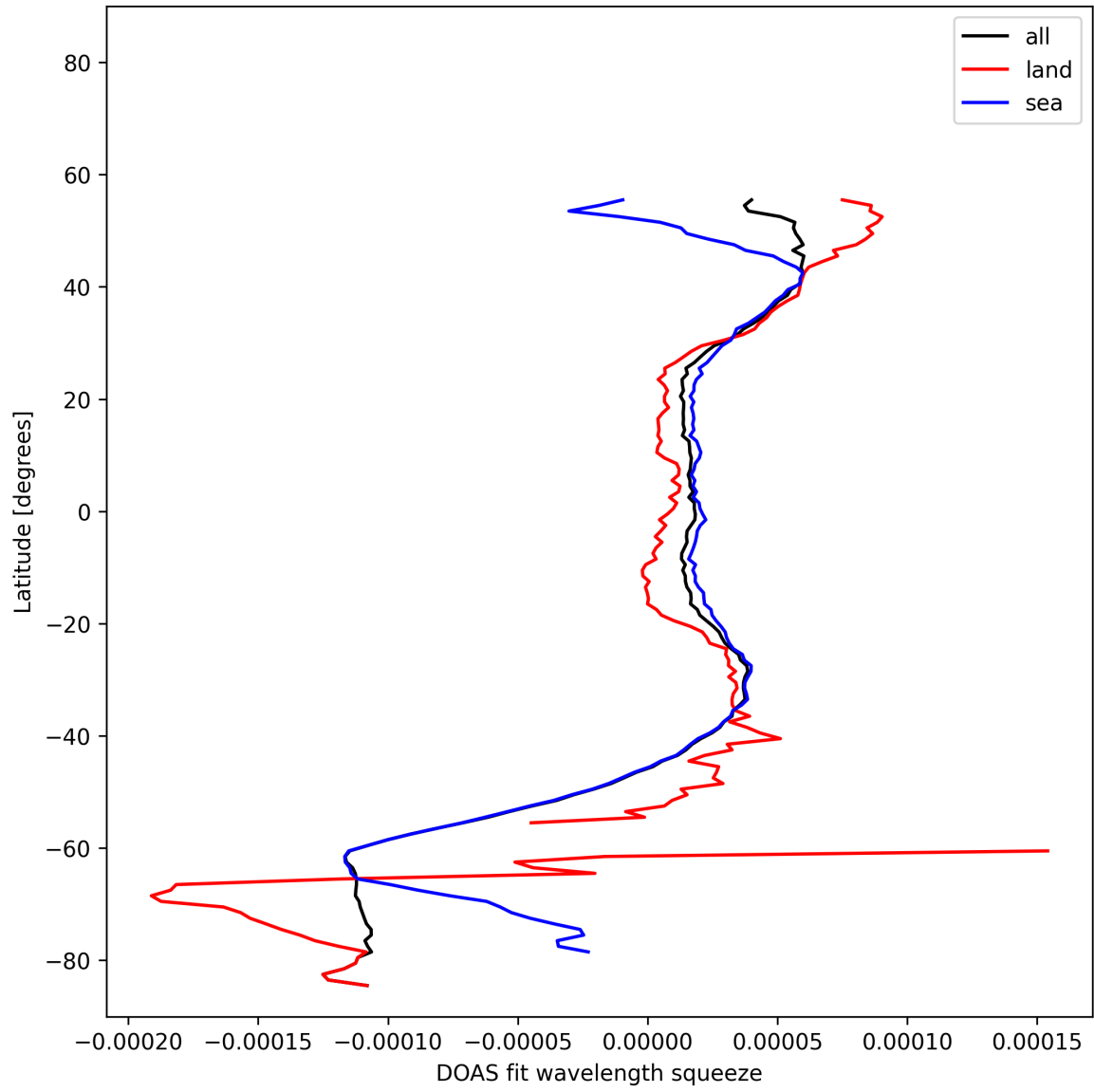


Figure 51: Zonal average of “DOAS fit wavelength squeeze” for 2025-10-31 to 2025-10-31.

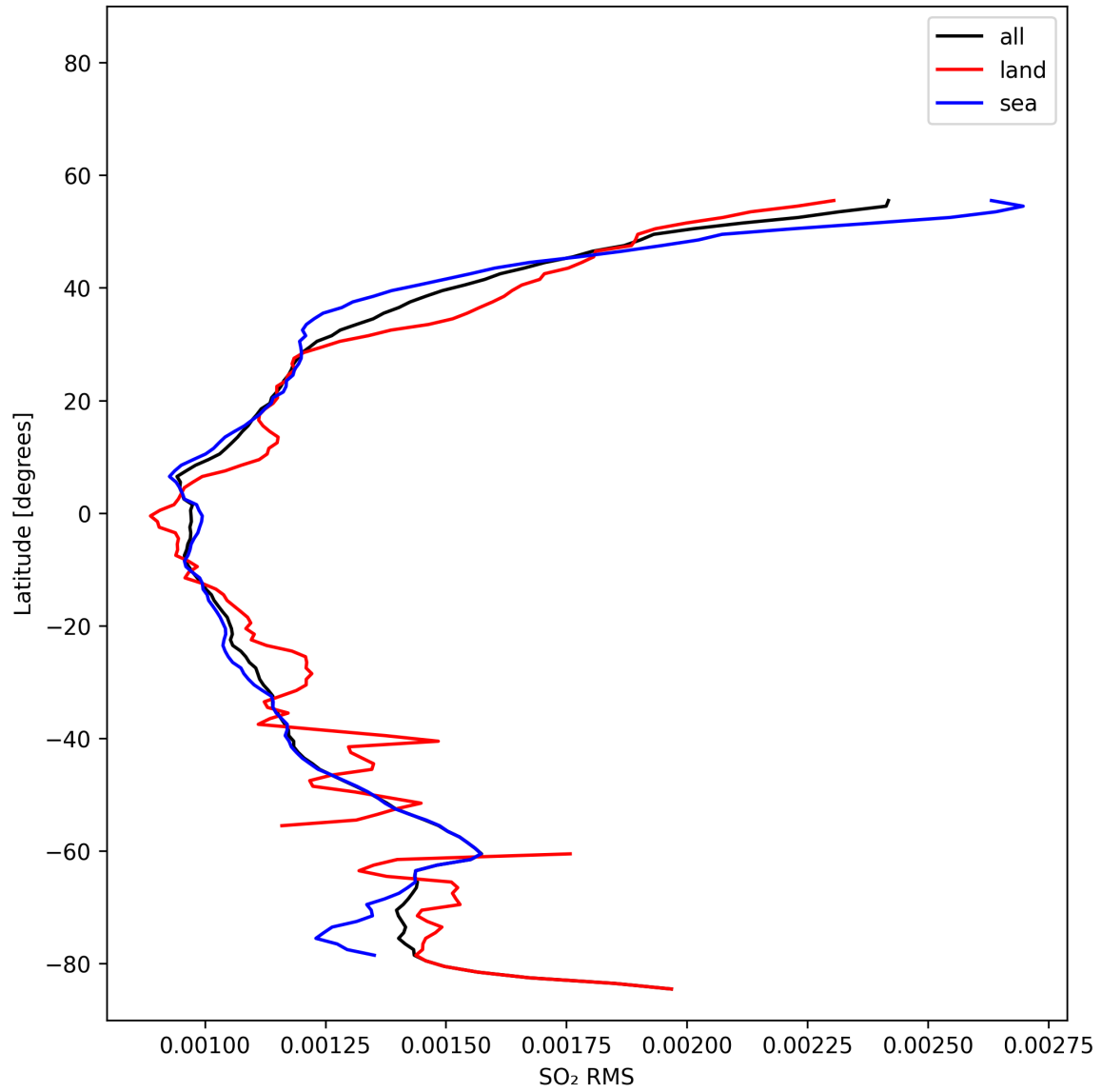


Figure 52: Zonal average of “SO₂ RMS” for 2025-10-31 to 2025-10-31.

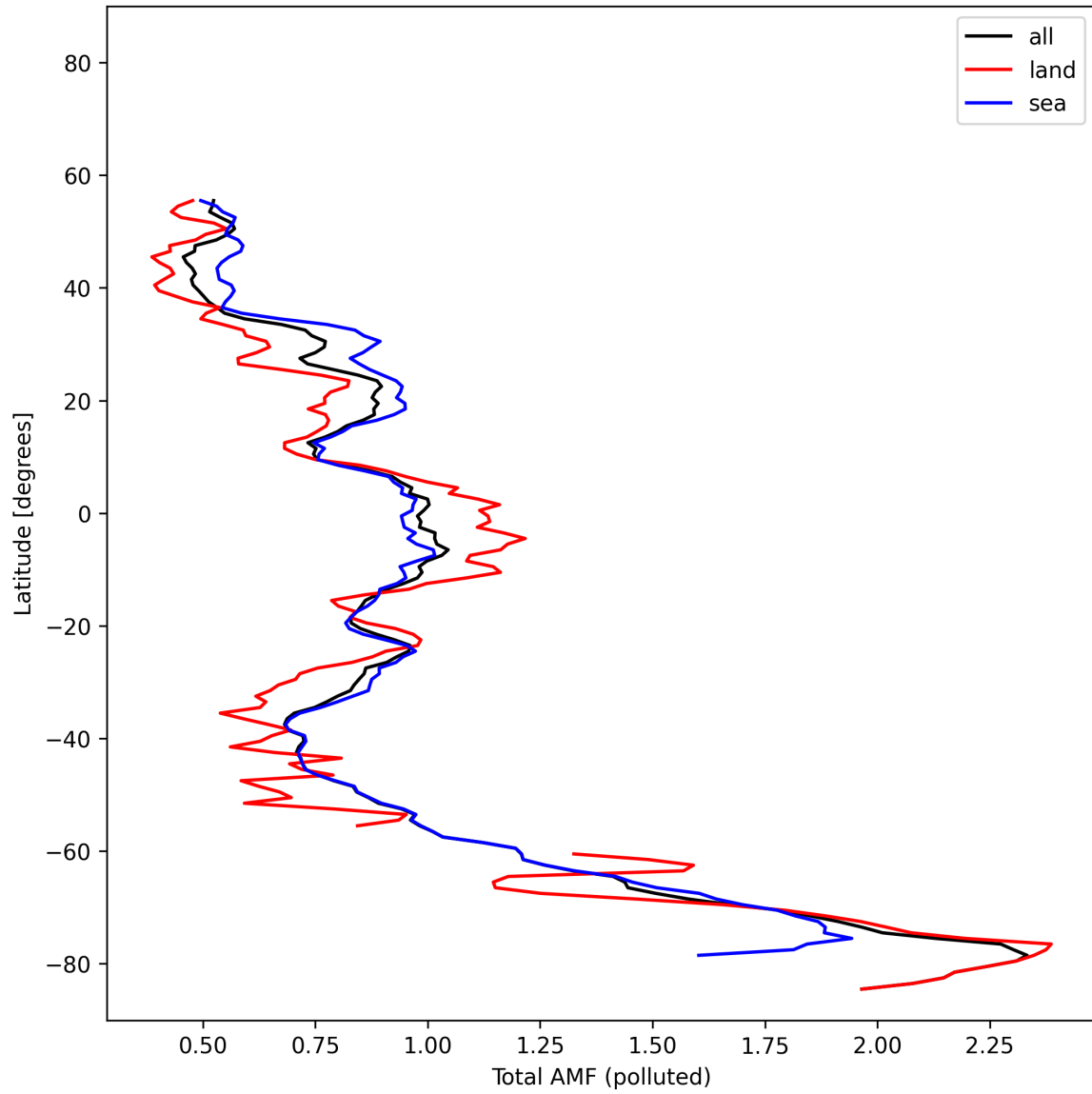


Figure 53: Zonal average of “Total AMF (polluted)” for 2025-10-31 to 2025-10-31.

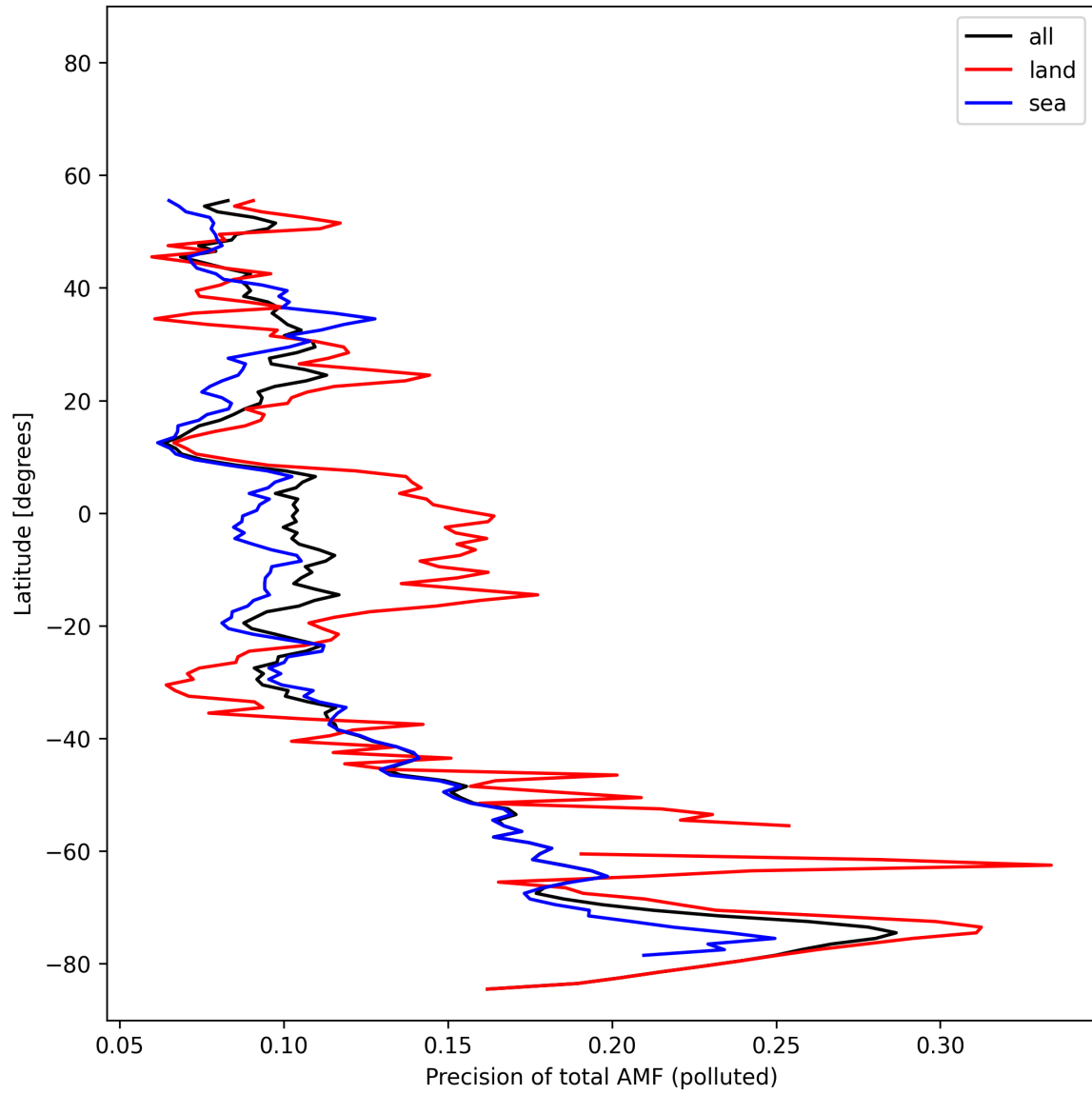


Figure 54: Zonal average of “Precision of total AMF (polluted)” for 2025-10-31 to 2025-10-31.

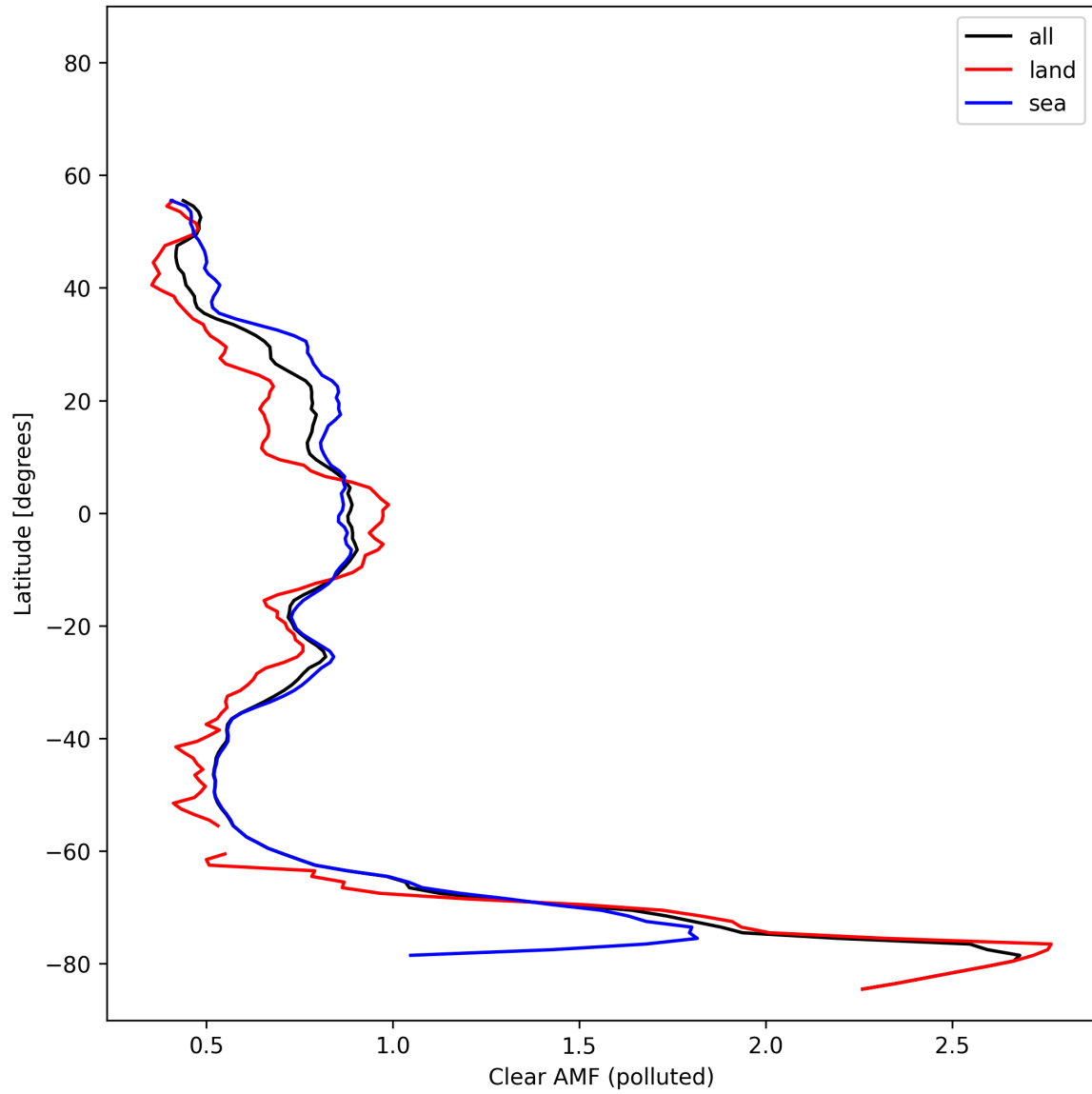


Figure 55: Zonal average of “Clear AMF (polluted)” for 2025-10-31 to 2025-10-31.

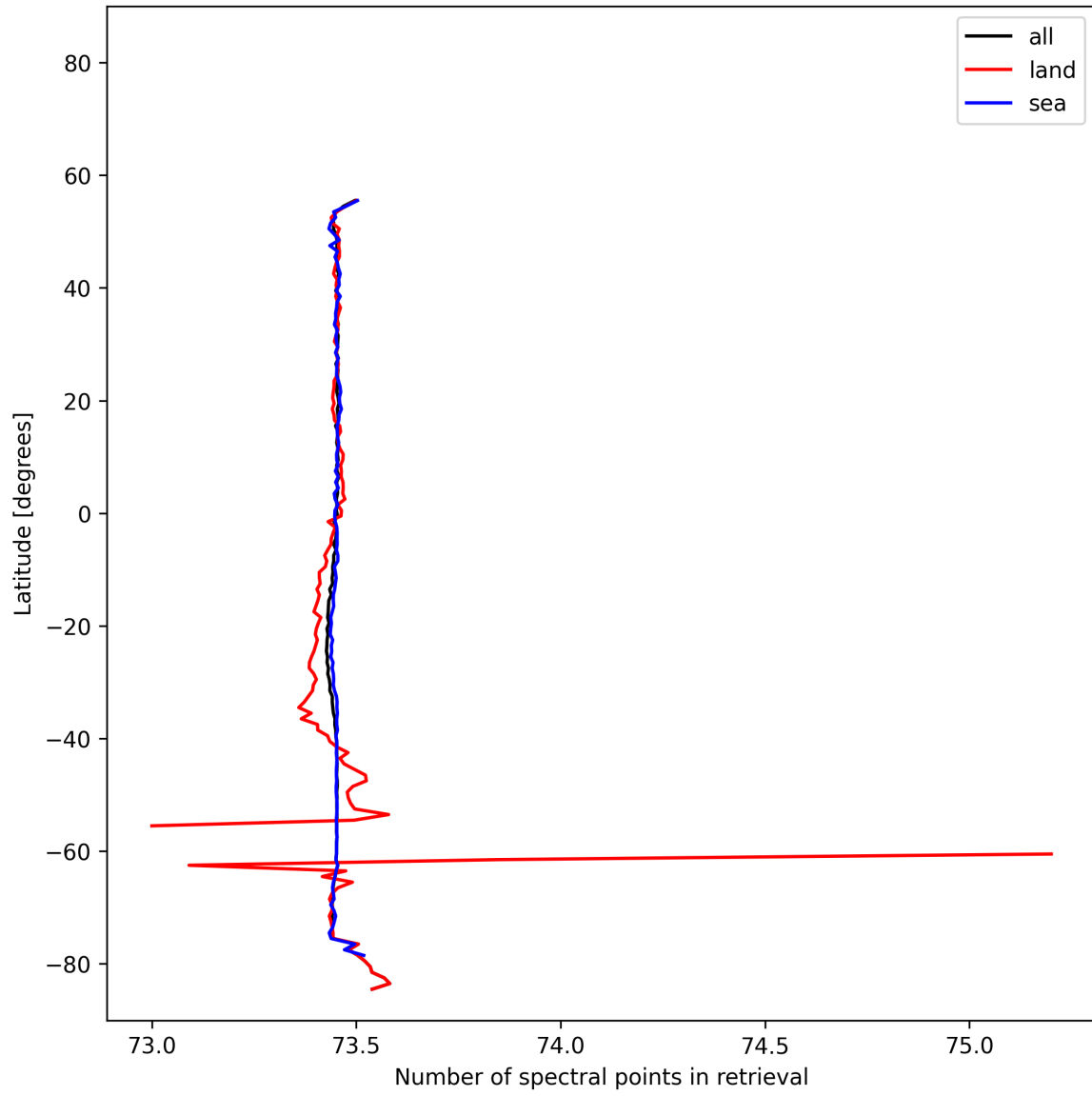


Figure 56: Zonal average of “Number of spectral points in retrieval” for 2025-10-31 to 2025-10-31.

8 Histograms

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

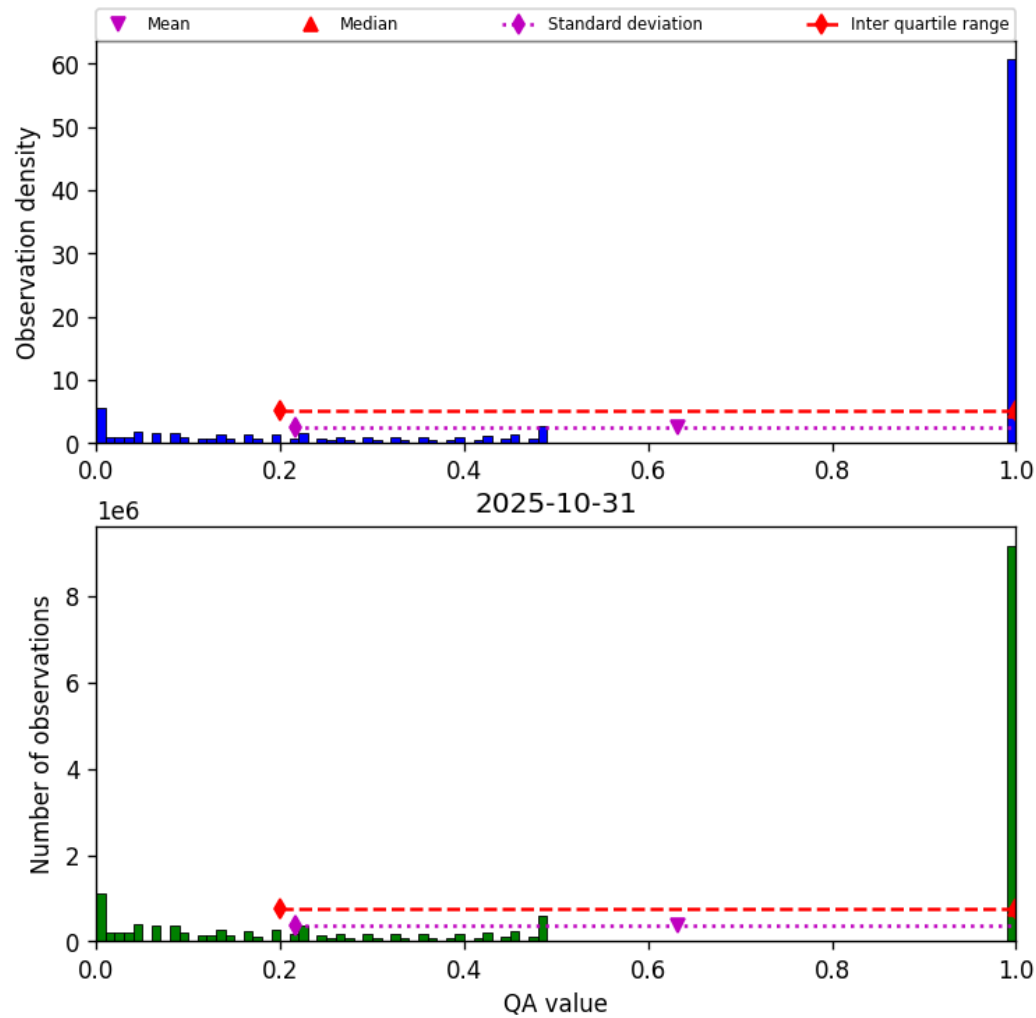


Figure 57: Histogram of “QA value” for 2025-10-31 to 2025-10-31

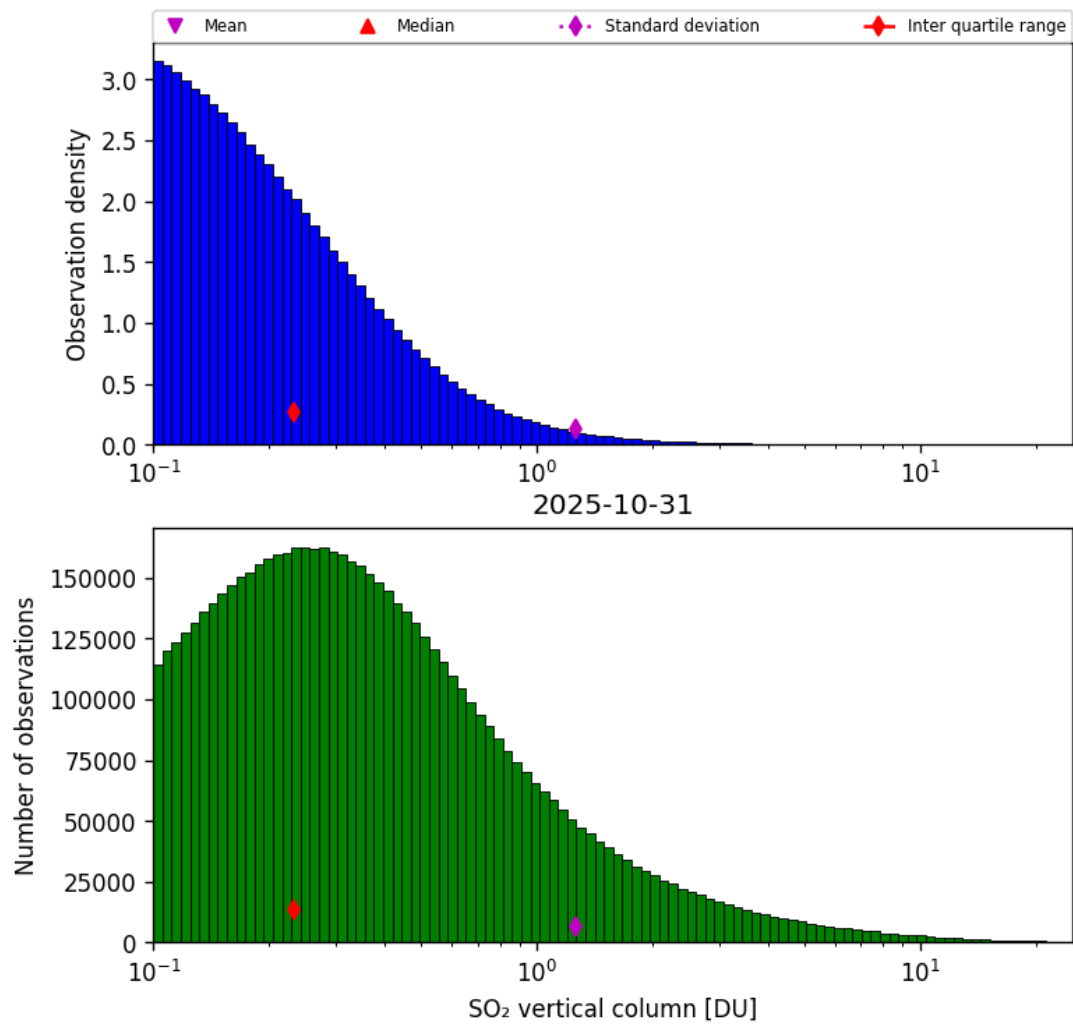


Figure 58: Histogram of “SO₂ vertical column” for 2025-10-31 to 2025-10-31

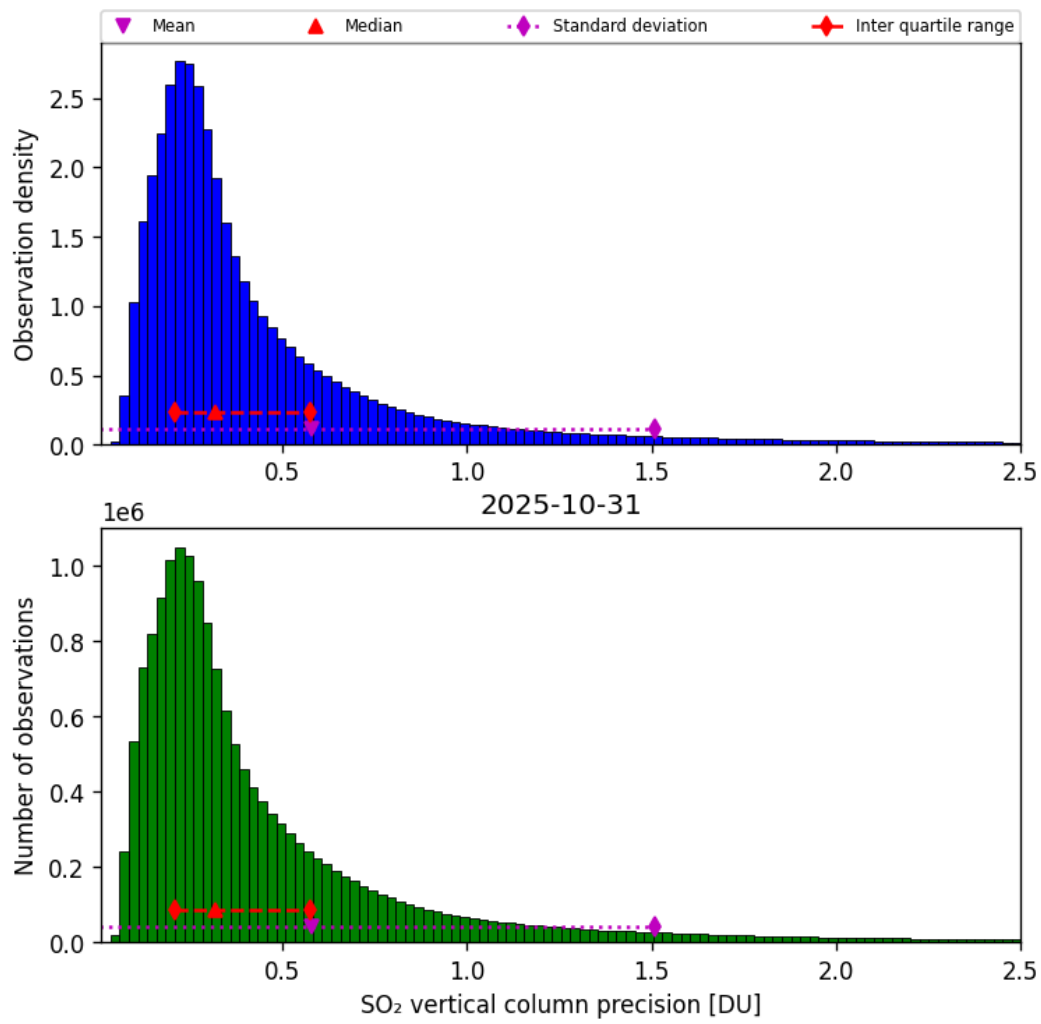


Figure 59: Histogram of “SO₂ vertical column precision” for 2025-10-31 to 2025-10-31

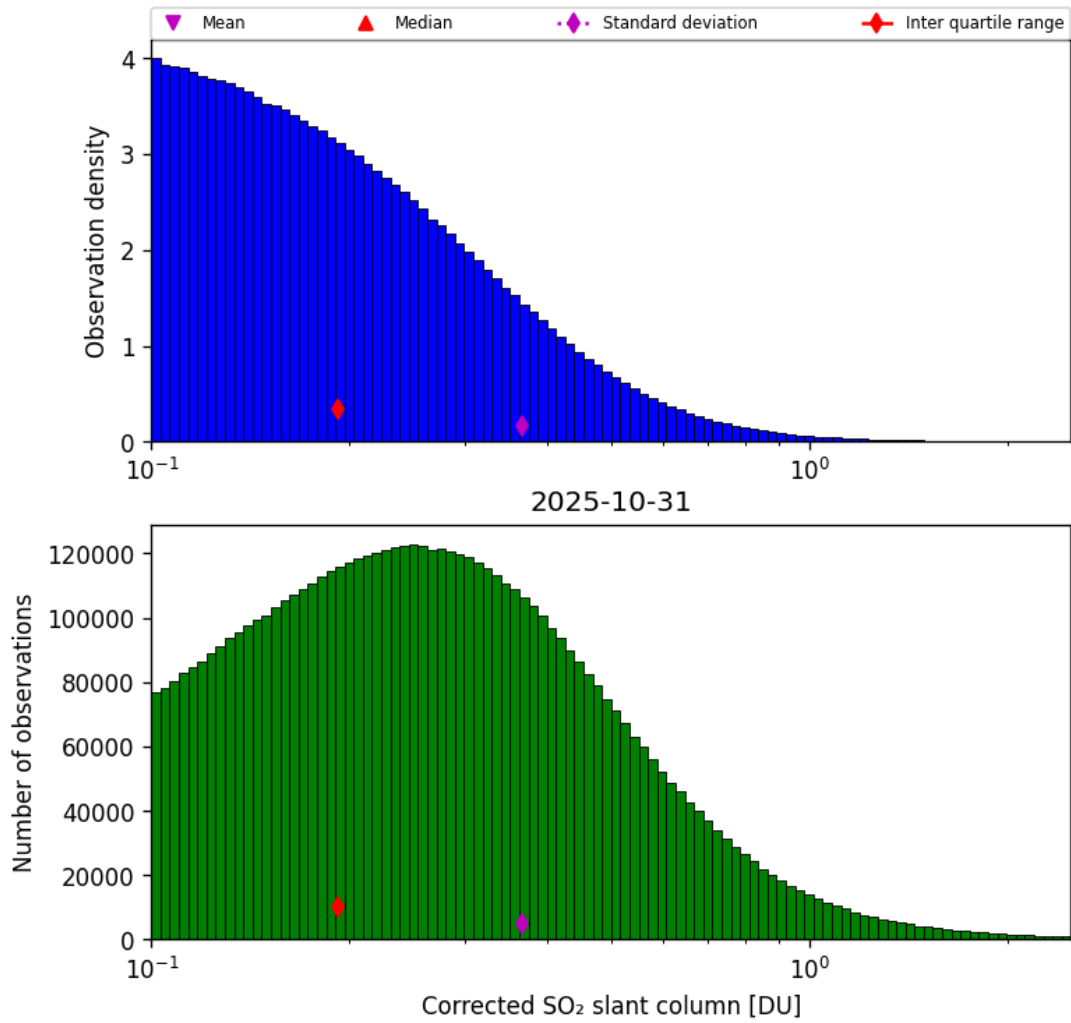


Figure 60: Histogram of “Corrected SO₂ slant column” for 2025-10-31 to 2025-10-31

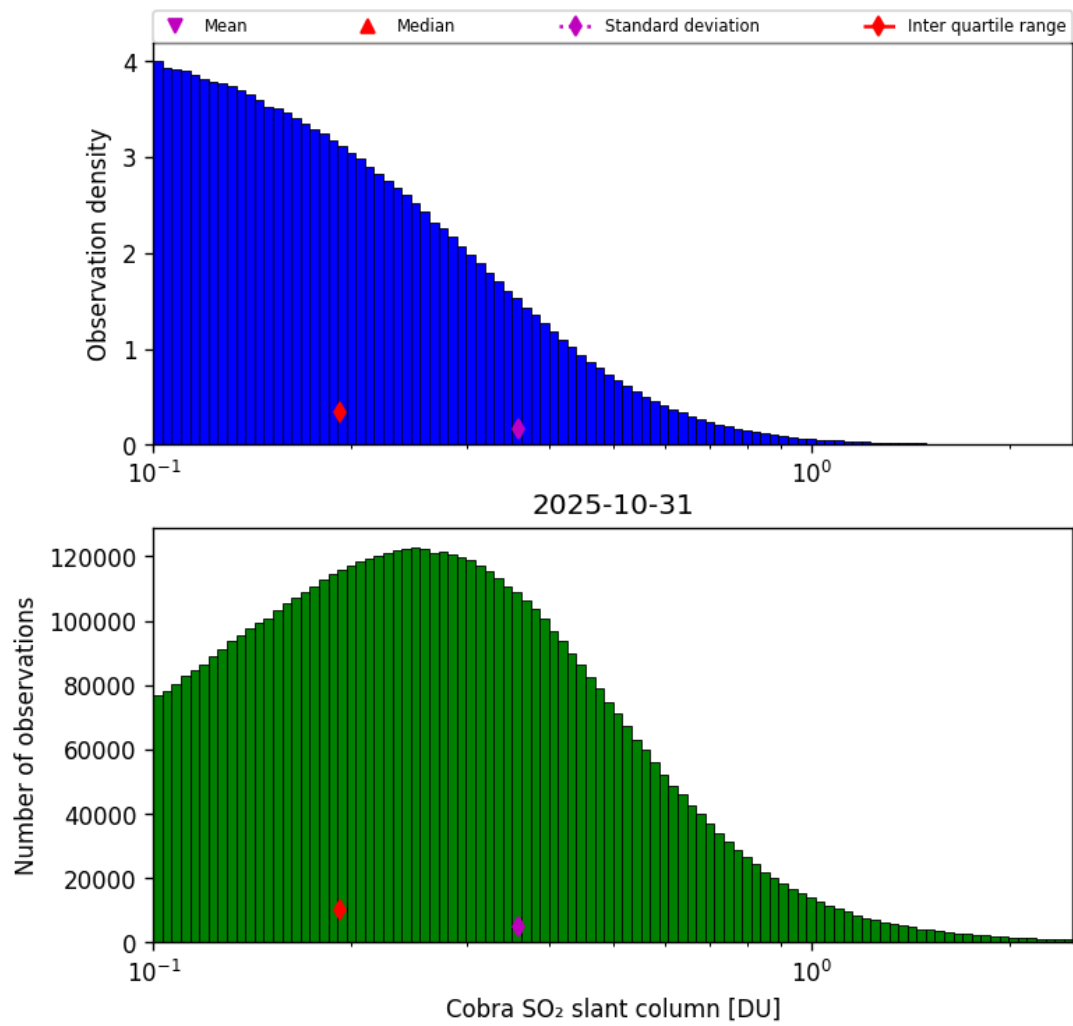


Figure 61: Histogram of “Cobra SO₂ slant column” for 2025-10-31 to 2025-10-31

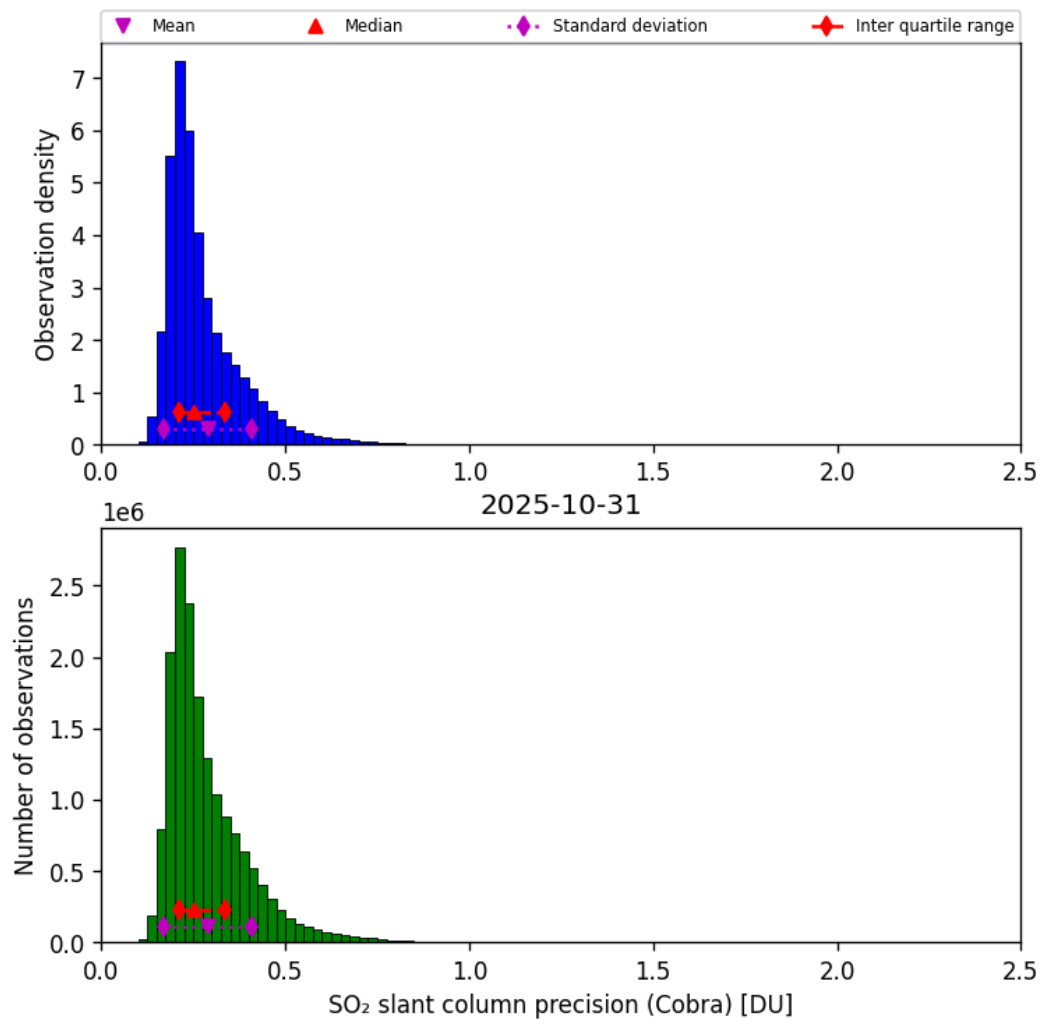


Figure 62: Histogram of “SO₂ slant column precision (Cobra)” for 2025-10-31 to 2025-10-31

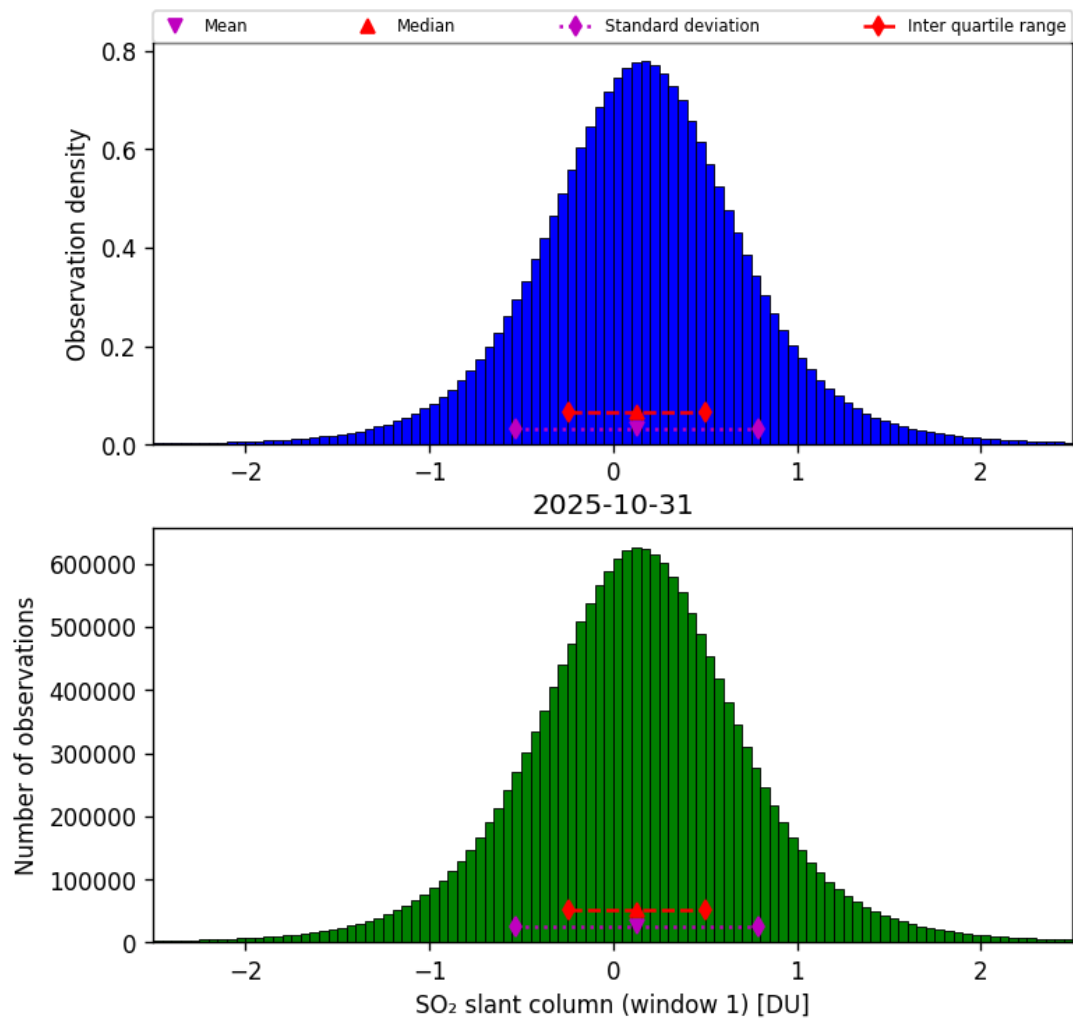


Figure 63: Histogram of “SO₂ slant column (window 1)” for 2025-10-31 to 2025-10-31

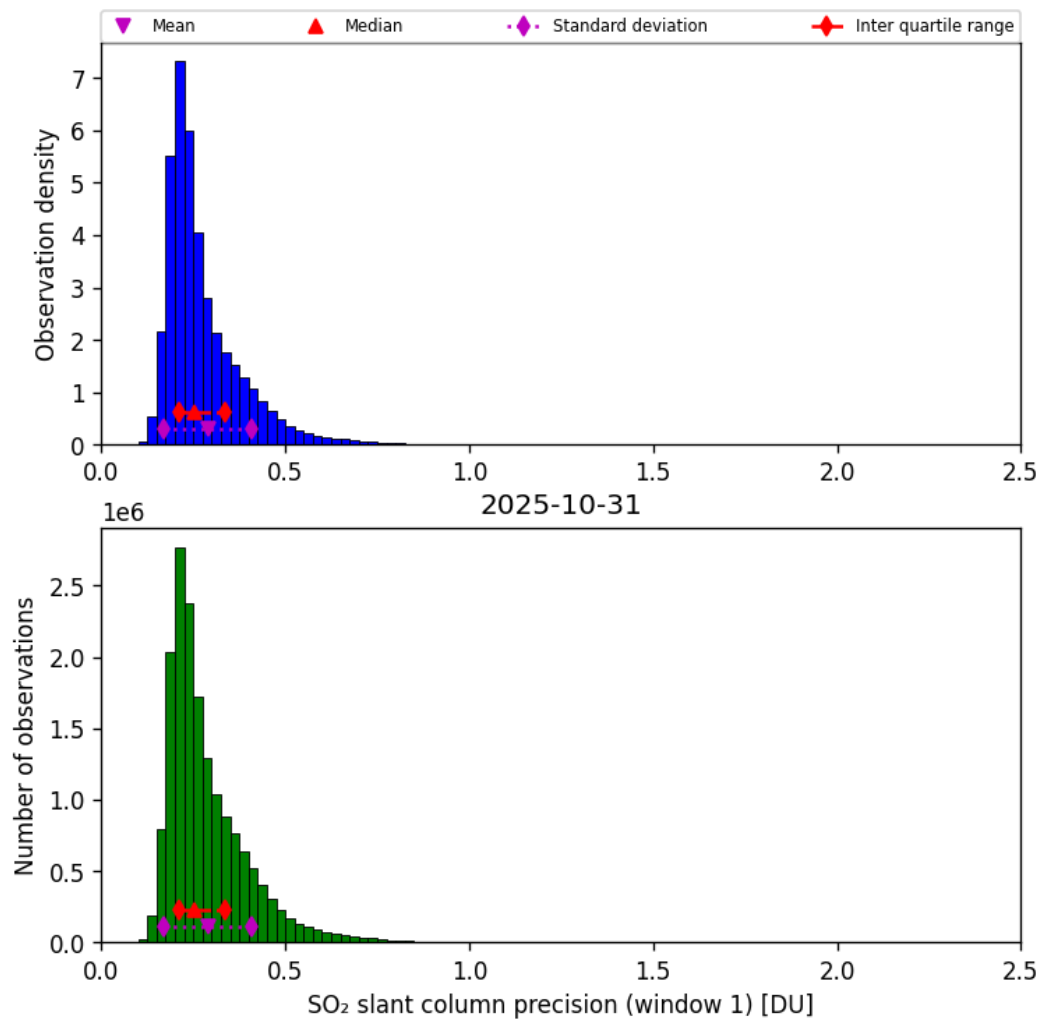


Figure 64: Histogram of “SO₂ slant column precision (window 1)” for 2025-10-31 to 2025-10-31

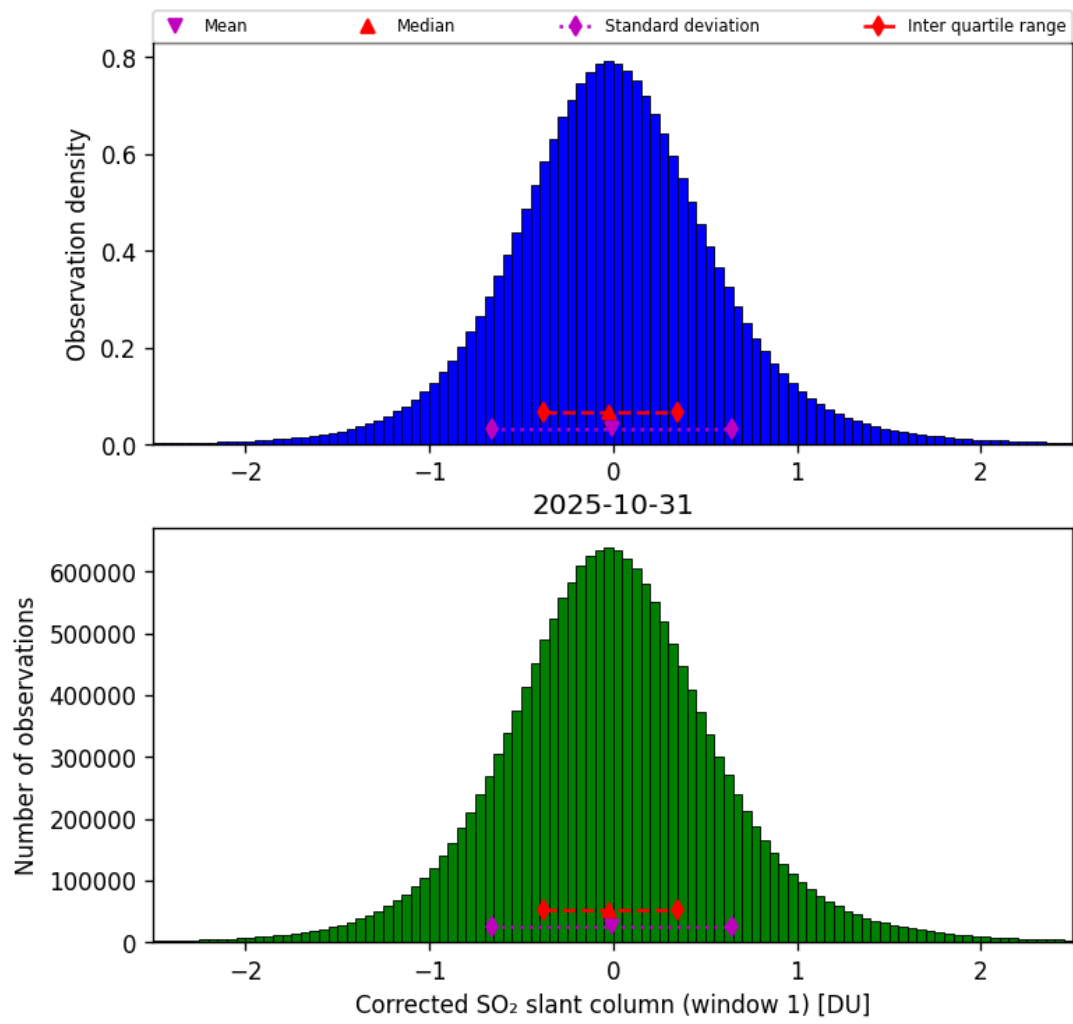


Figure 65: Histogram of “Corrected SO₂ slant column (window 1)” for 2025-10-31 to 2025-10-31

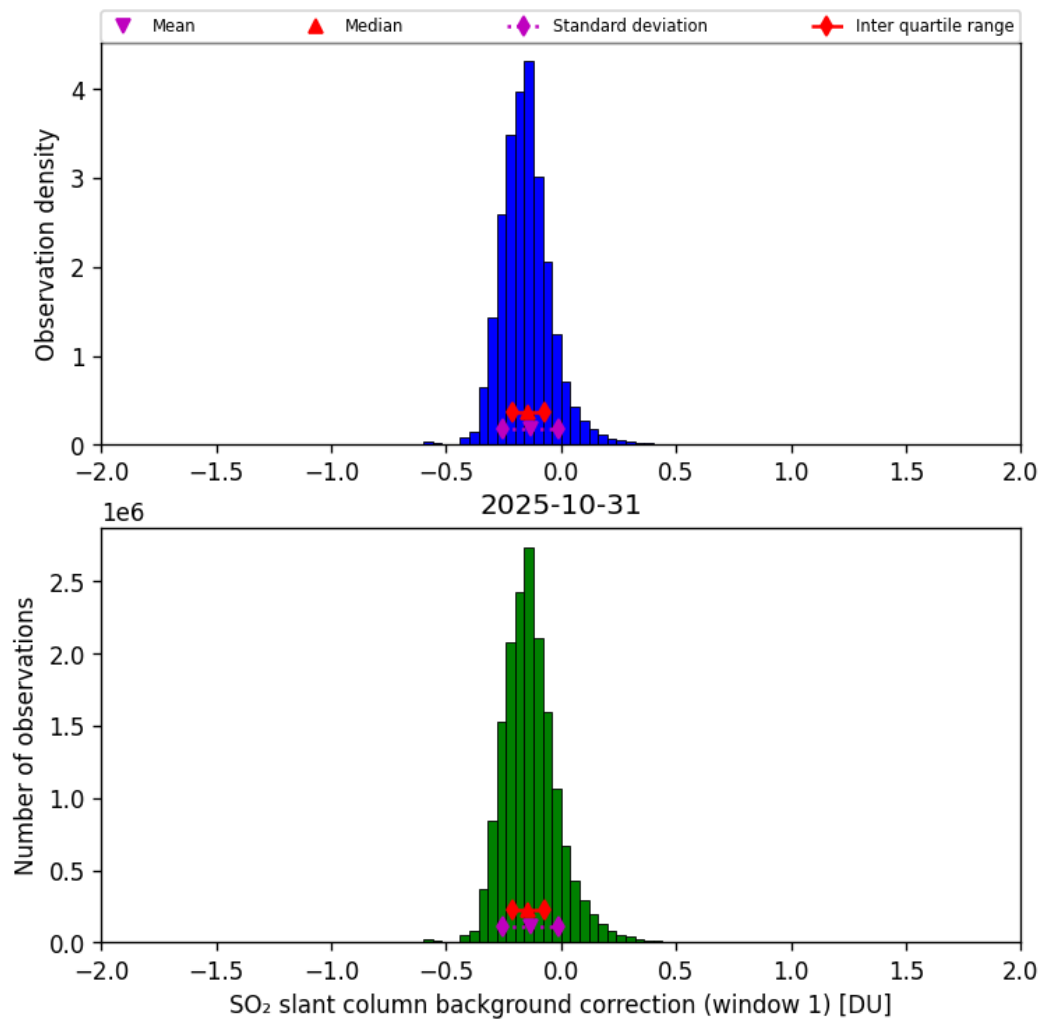


Figure 66: Histogram of “SO₂ slant column background correction (window 1)” for 2025-10-31 to 2025-10-31

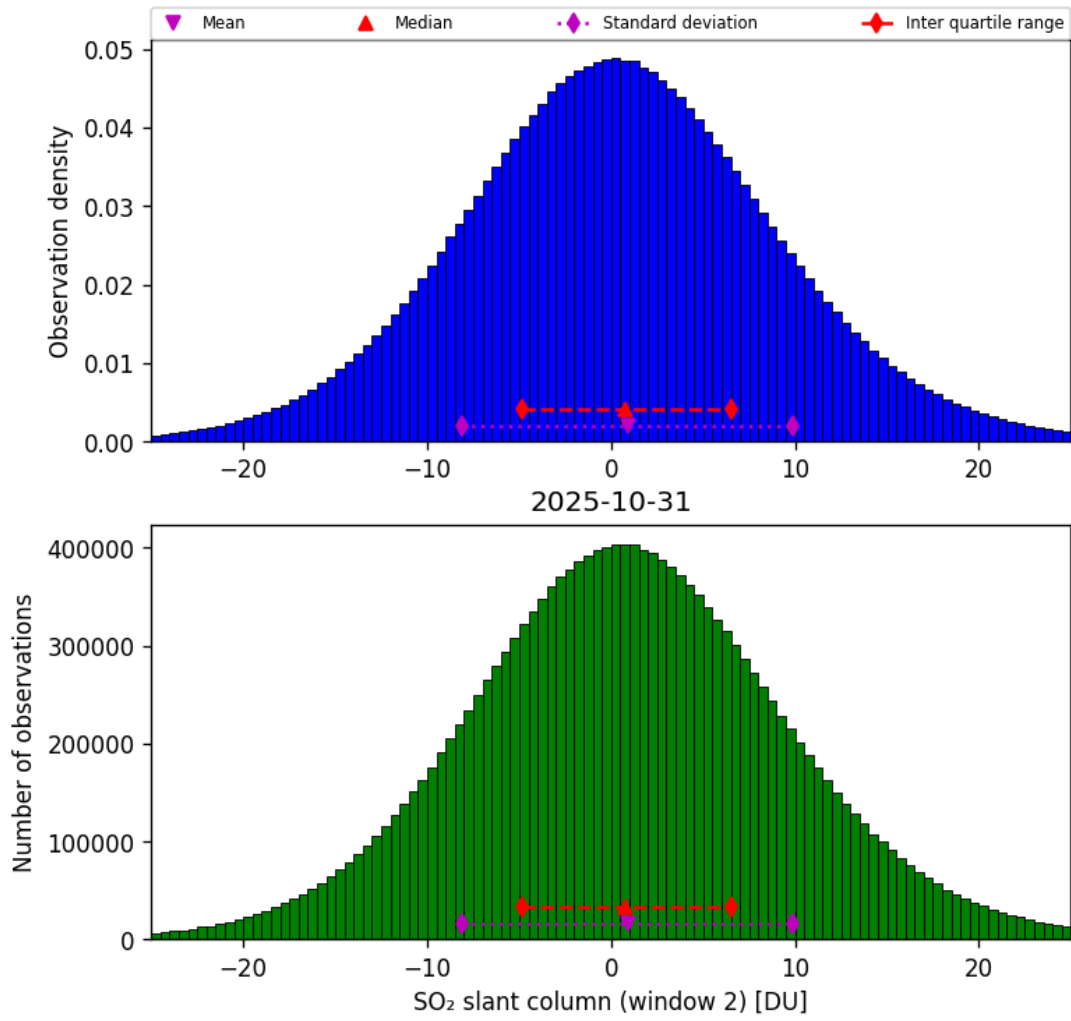


Figure 67: Histogram of “SO₂ slant column (window 2)” for 2025-10-31 to 2025-10-31

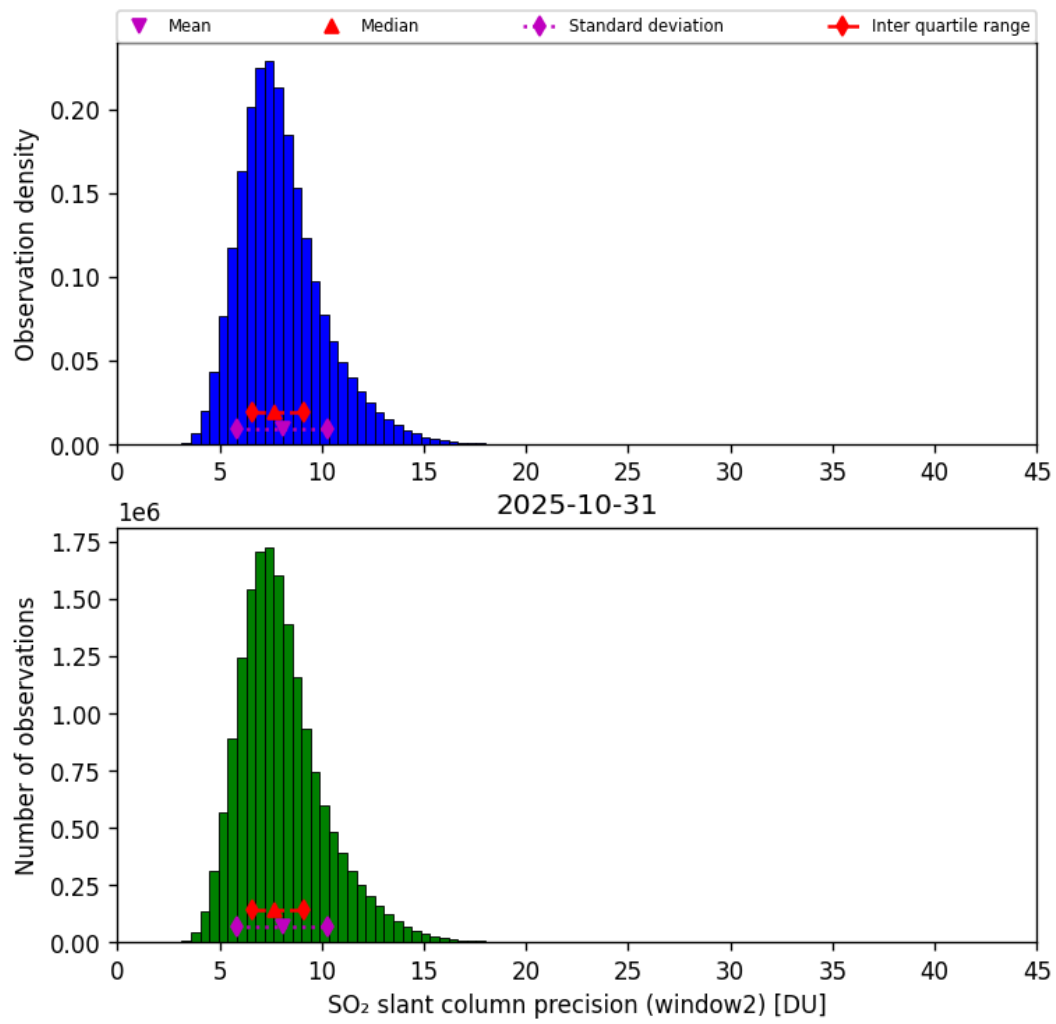


Figure 68: Histogram of “SO₂ slant column precision (window2)” for 2025-10-31 to 2025-10-31

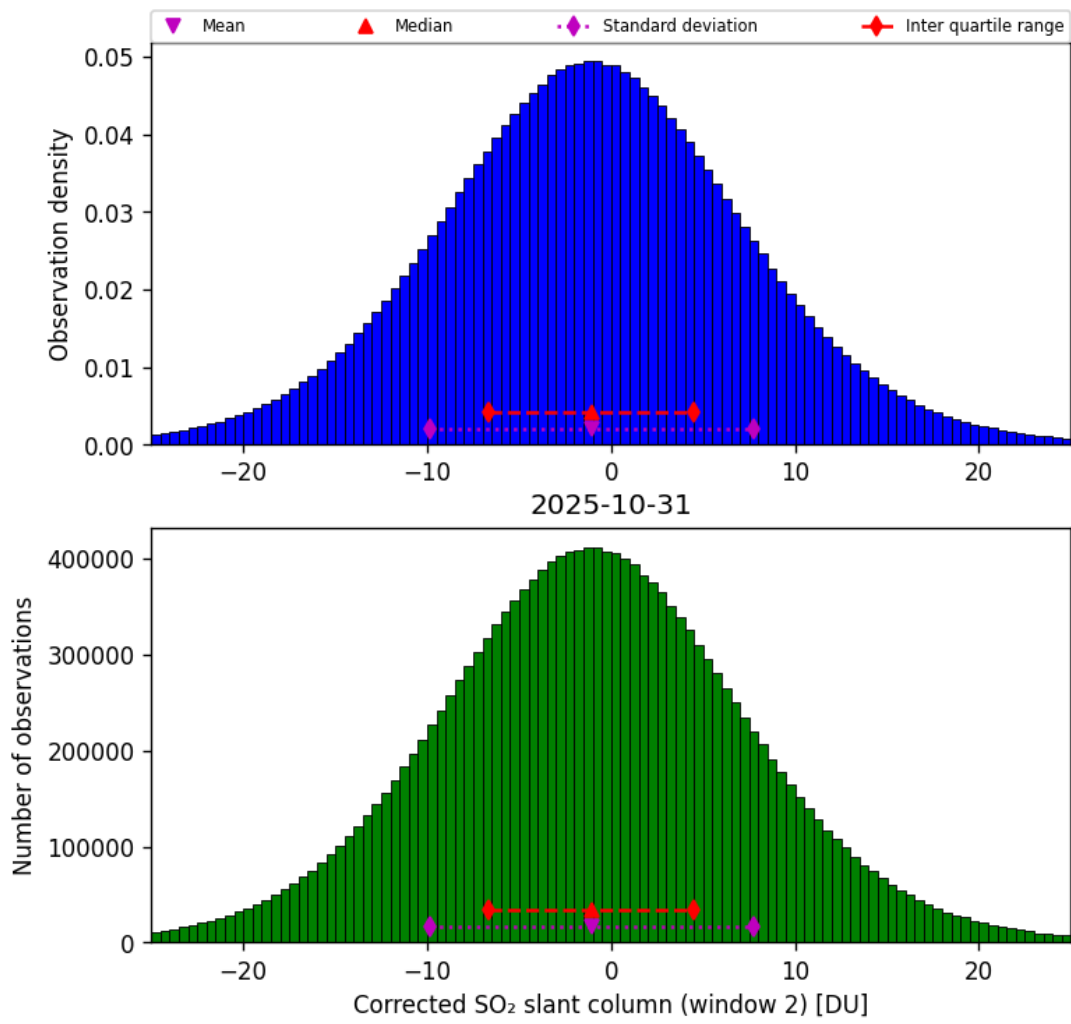


Figure 69: Histogram of “Corrected SO₂ slant column (window 2)” for 2025-10-31 to 2025-10-31

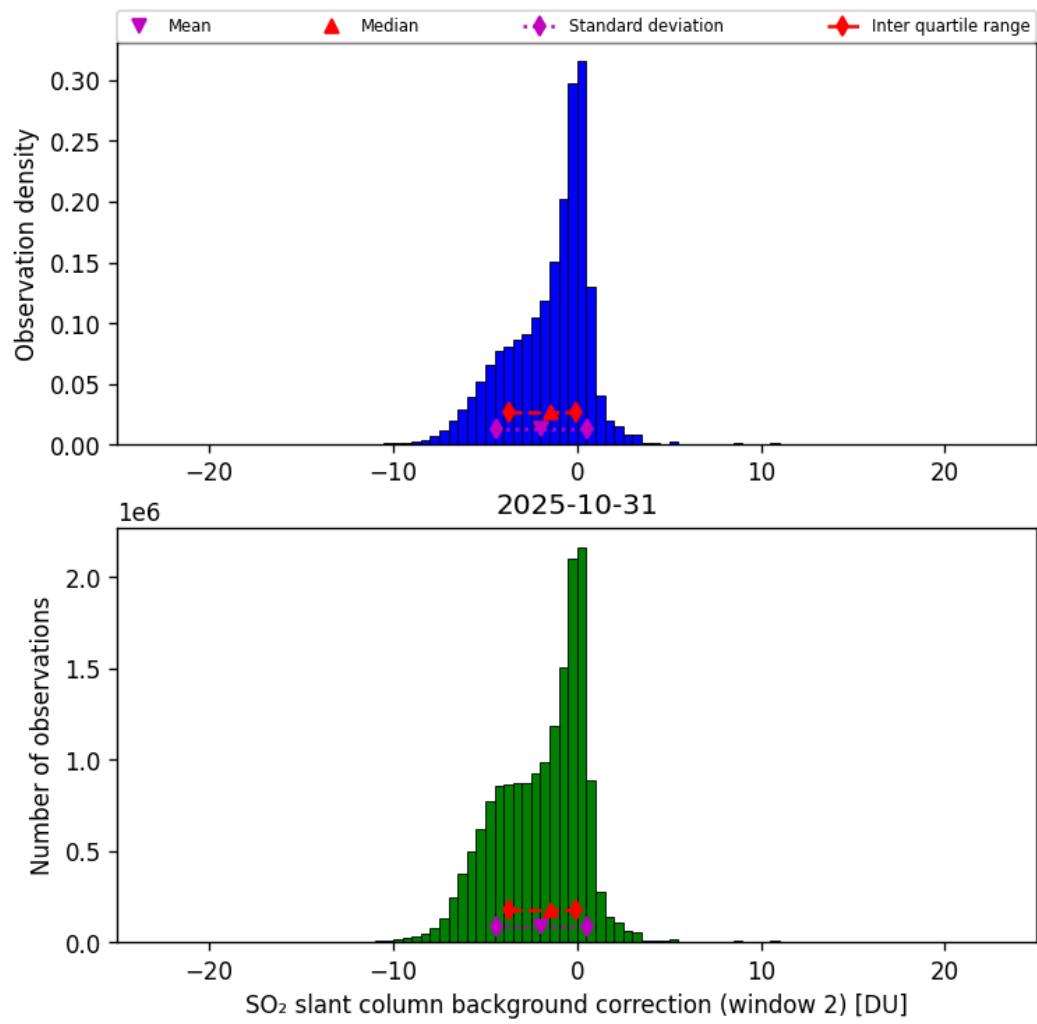


Figure 70: Histogram of “SO₂ slant column background correction (window 2)” for 2025-10-31 to 2025-10-31

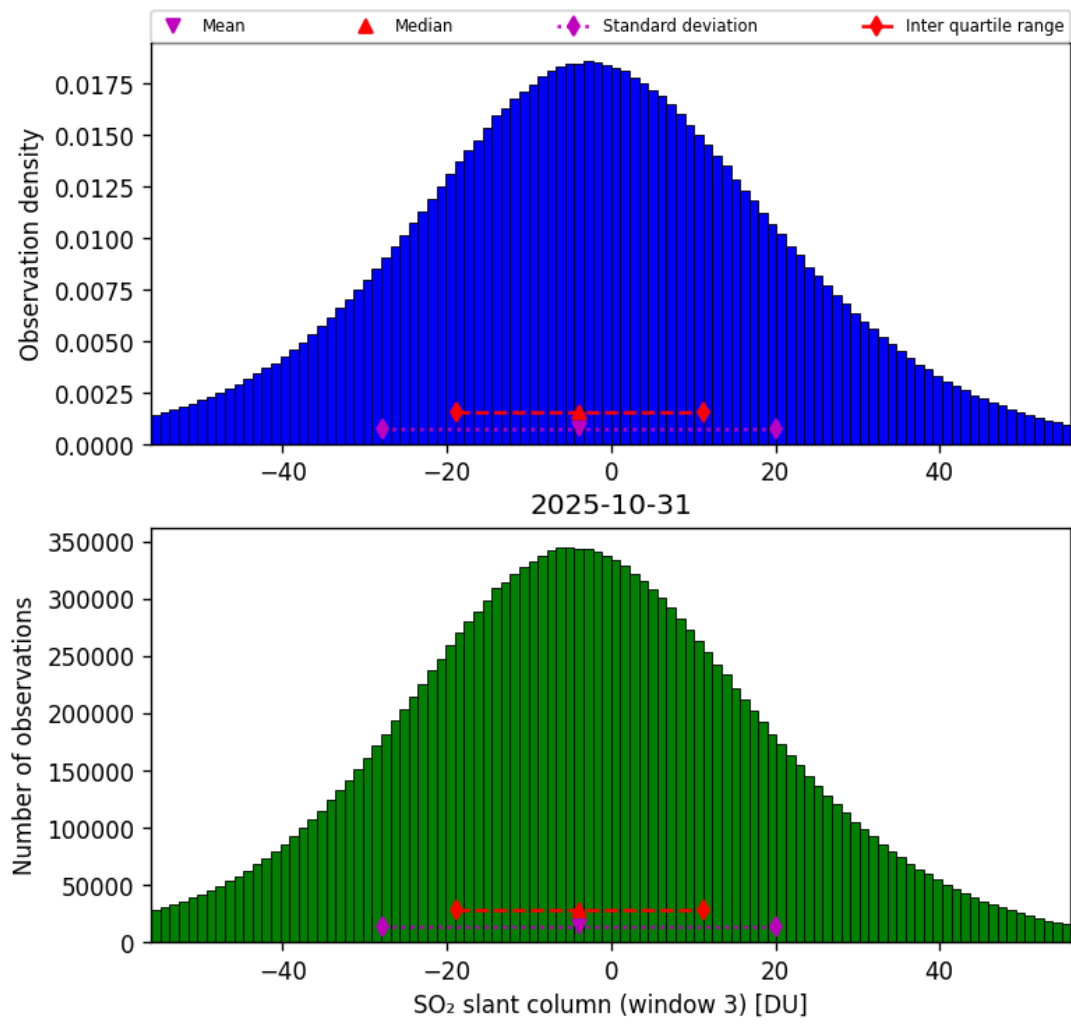


Figure 71: Histogram of “SO₂ slant column (window 3)” for 2025-10-31 to 2025-10-31

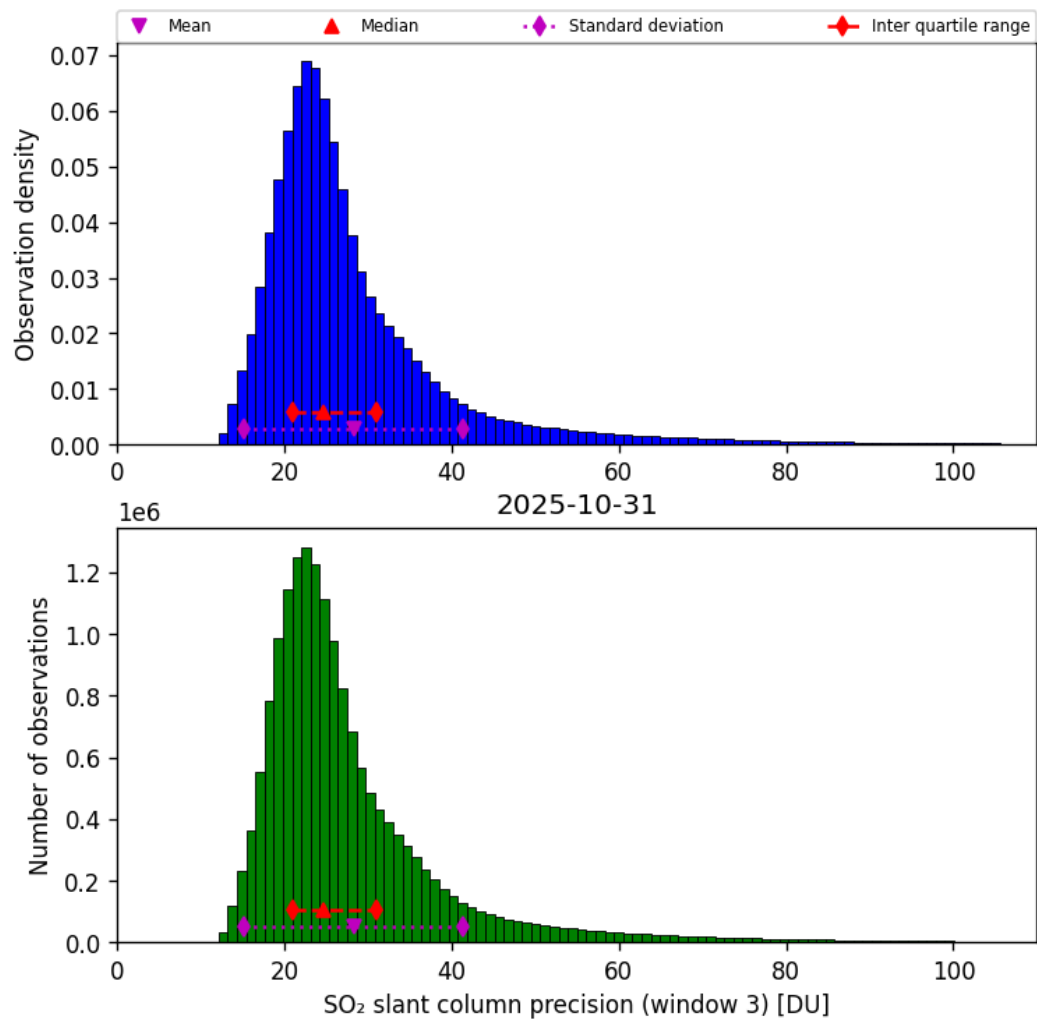


Figure 72: Histogram of “SO₂ slant column precision (window 3)” for 2025-10-31 to 2025-10-31

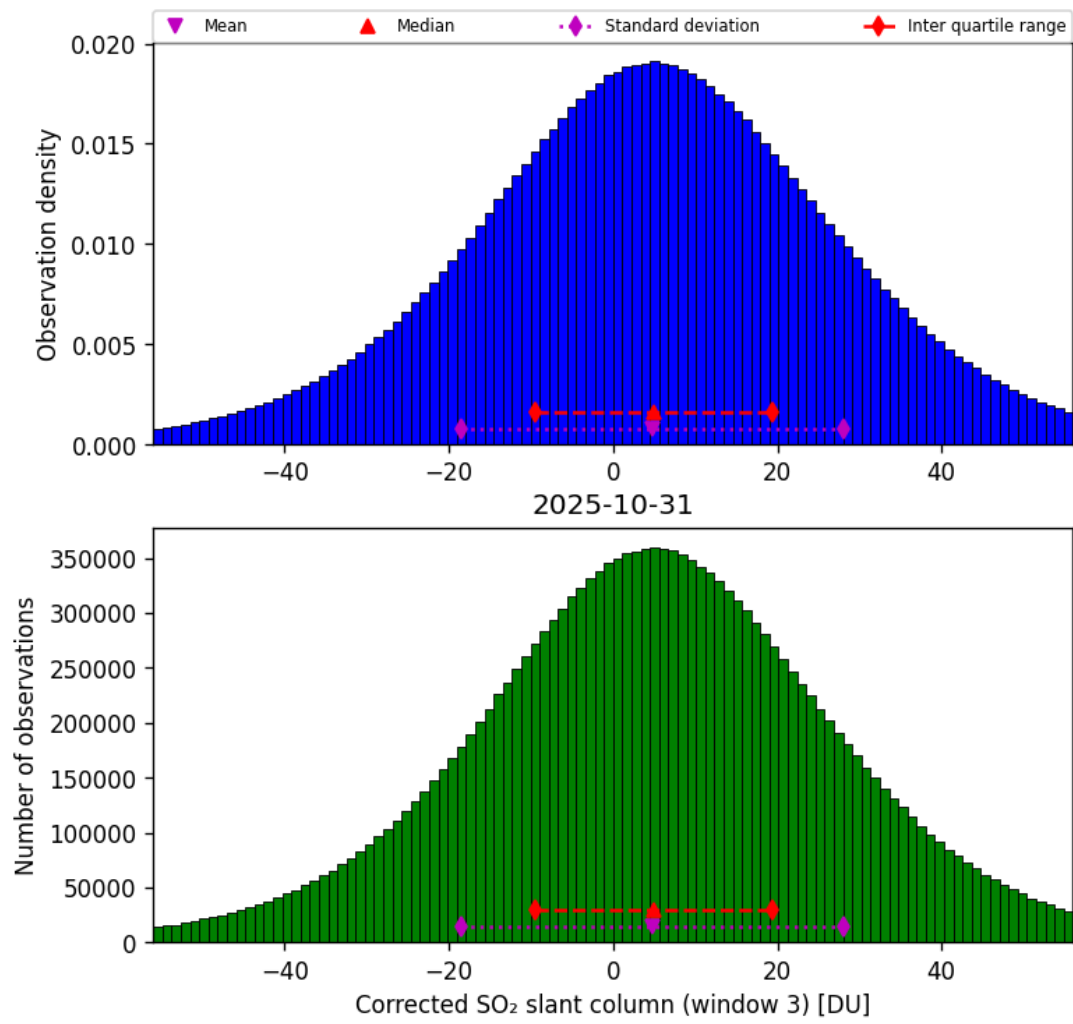


Figure 73: Histogram of “Corrected SO₂ slant column (window 3)” for 2025-10-31 to 2025-10-31

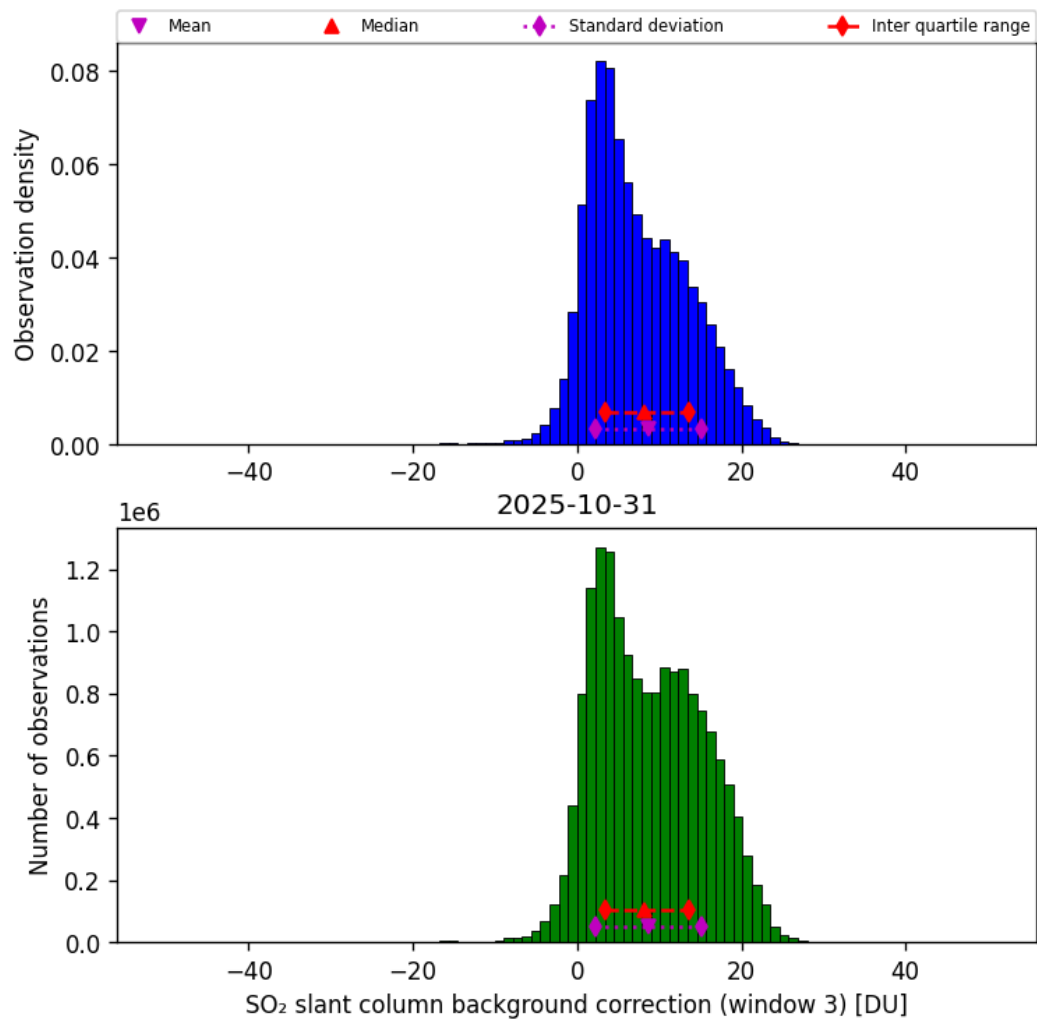


Figure 74: Histogram of “SO₂ slant column background correction (window 3)” for 2025-10-31 to 2025-10-31

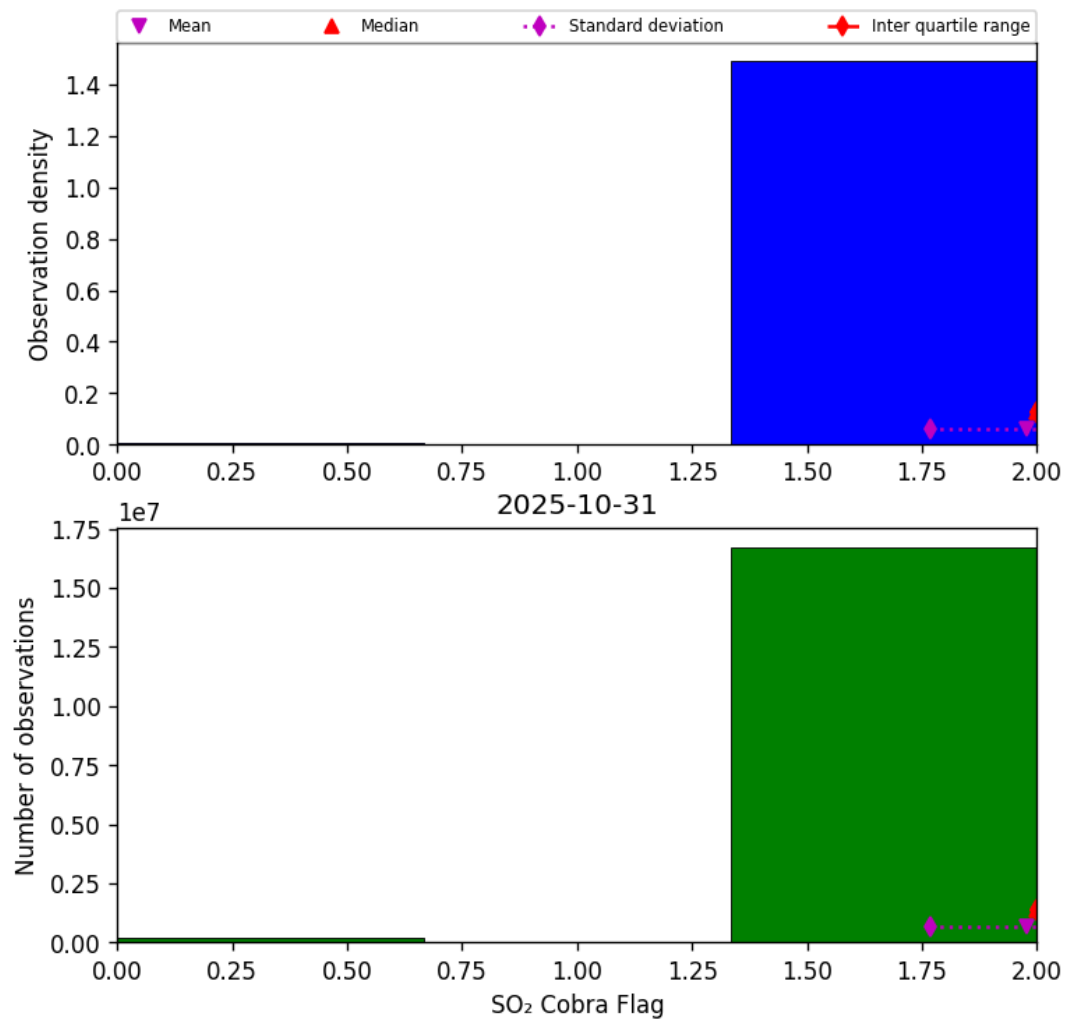


Figure 75: Histogram of “SO₂ Cobra Flag” for 2025-10-31 to 2025-10-31

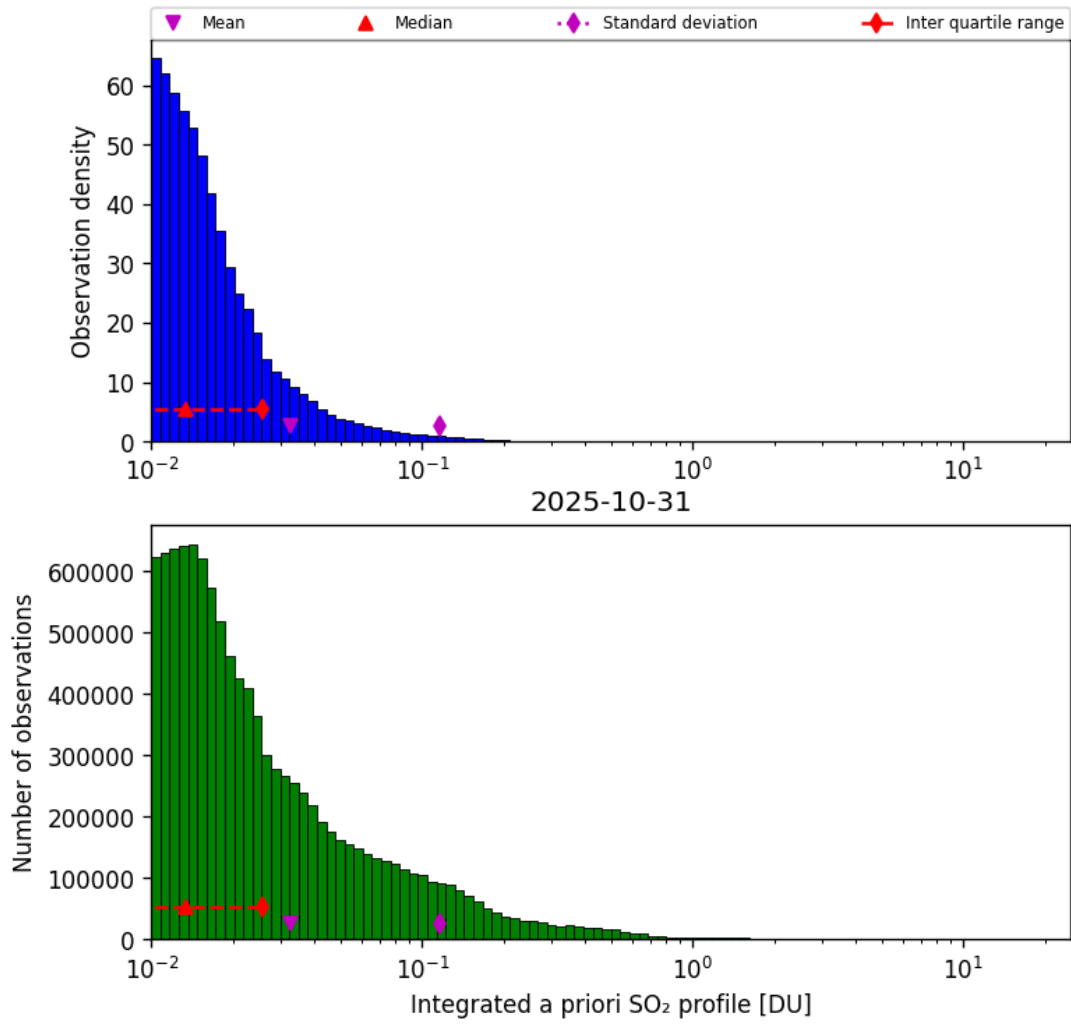


Figure 76: Histogram of “Integrated a priori SO₂ profile” for 2025-10-31 to 2025-10-31

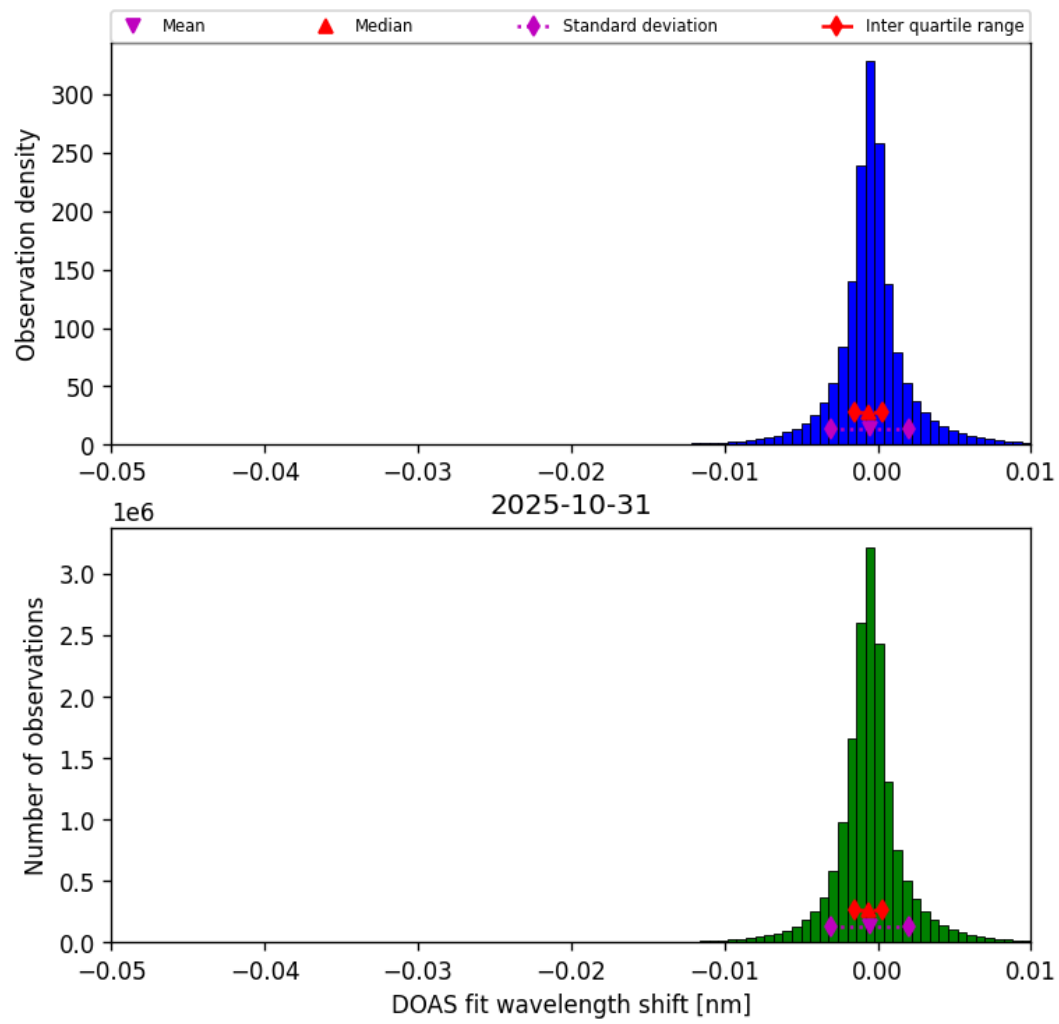


Figure 77: Histogram of “DOAS fit wavelength shift” for 2025-10-31 to 2025-10-31

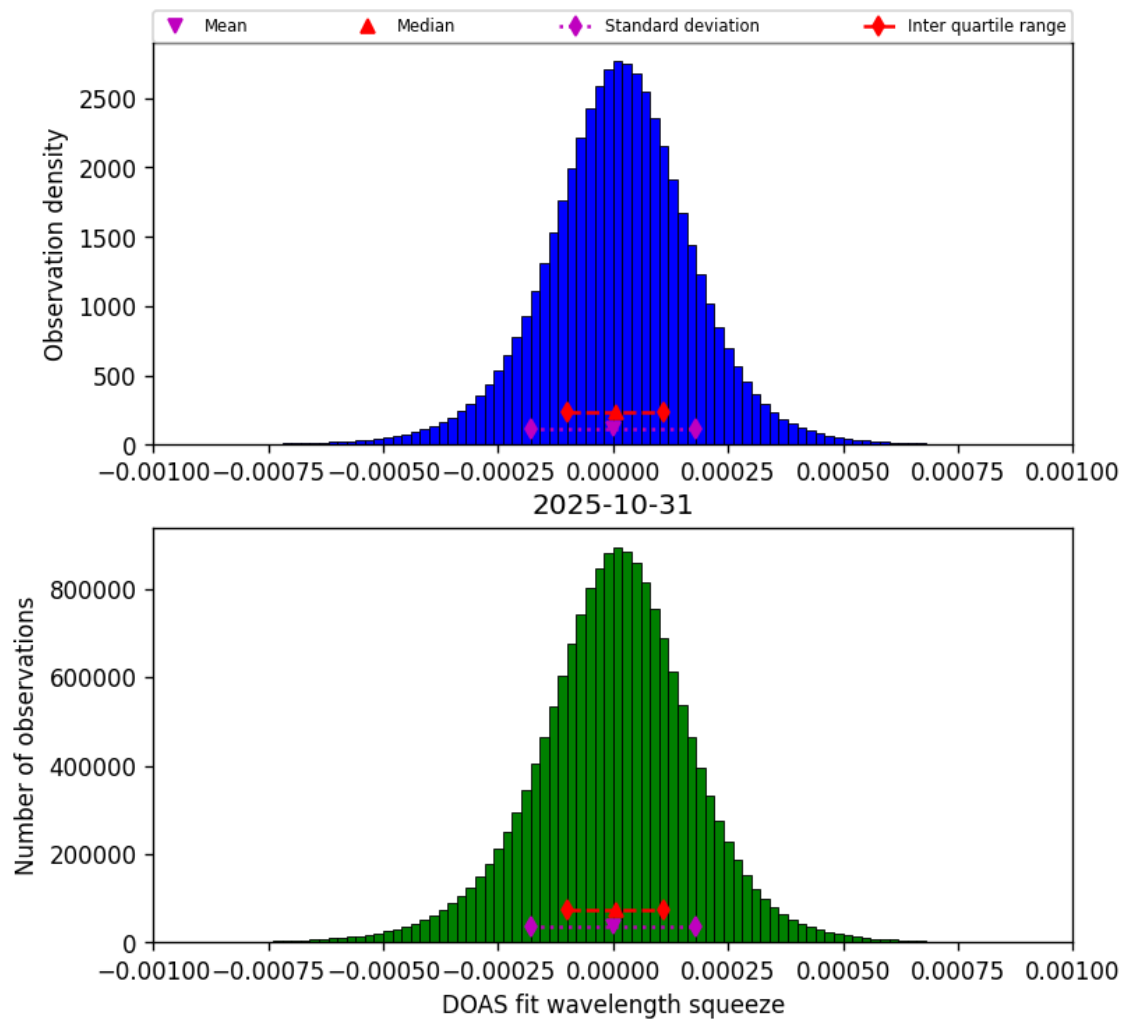


Figure 78: Histogram of “DOAS fit wavelength squeeze” for 2025-10-31 to 2025-10-31

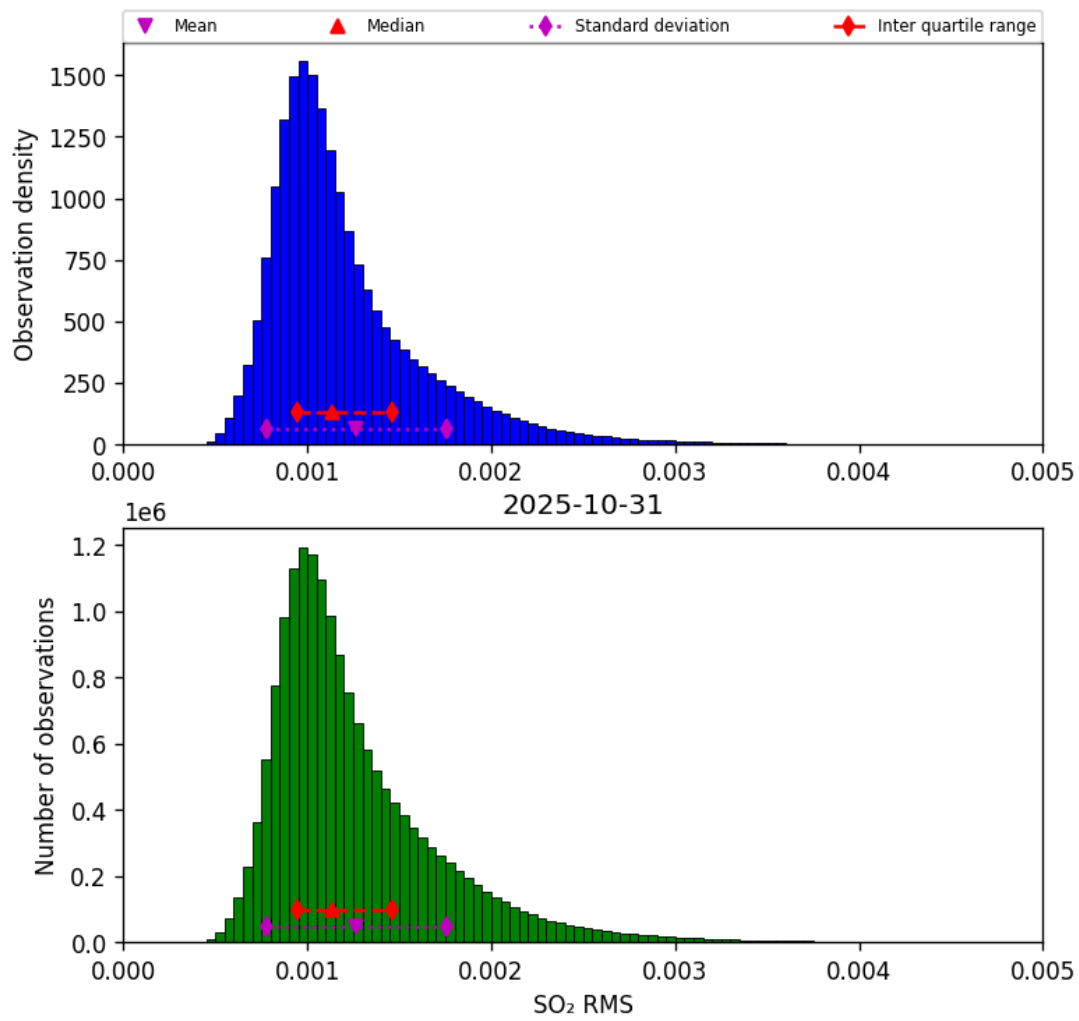


Figure 79: Histogram of “SO₂ RMS” for 2025-10-31 to 2025-10-31

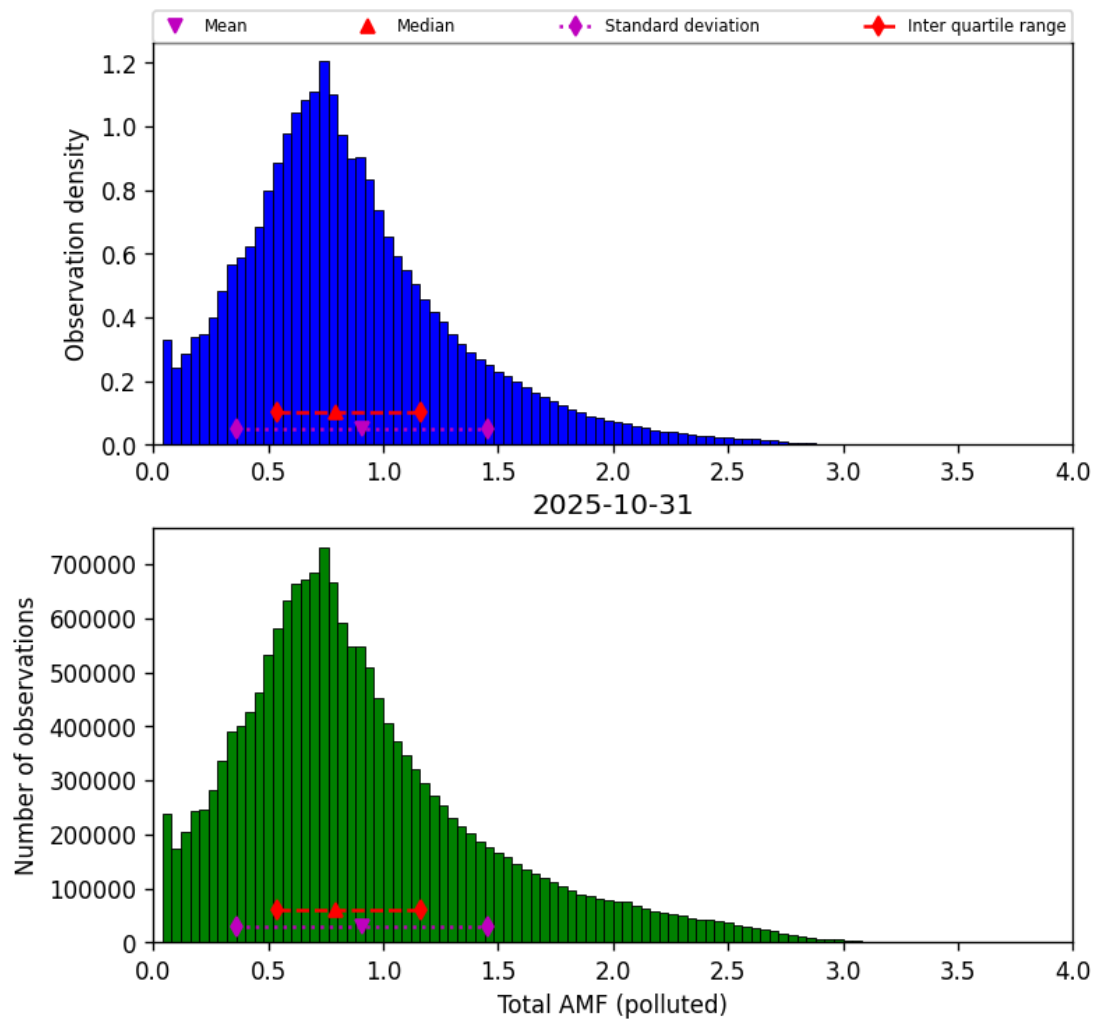


Figure 80: Histogram of “Total AMF (polluted)” for 2025-10-31 to 2025-10-31

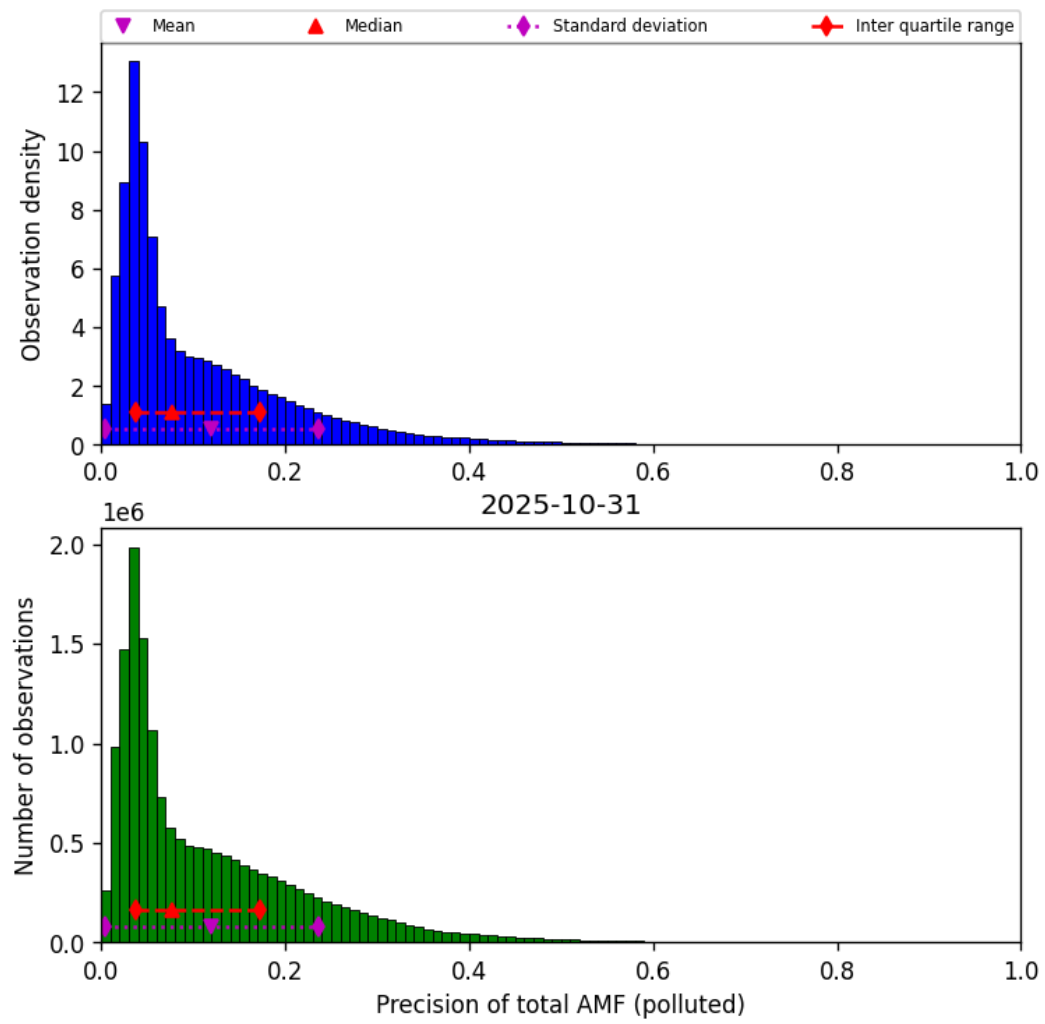


Figure 81: Histogram of “Precision of total AMF (polluted)” for 2025-10-31 to 2025-10-31

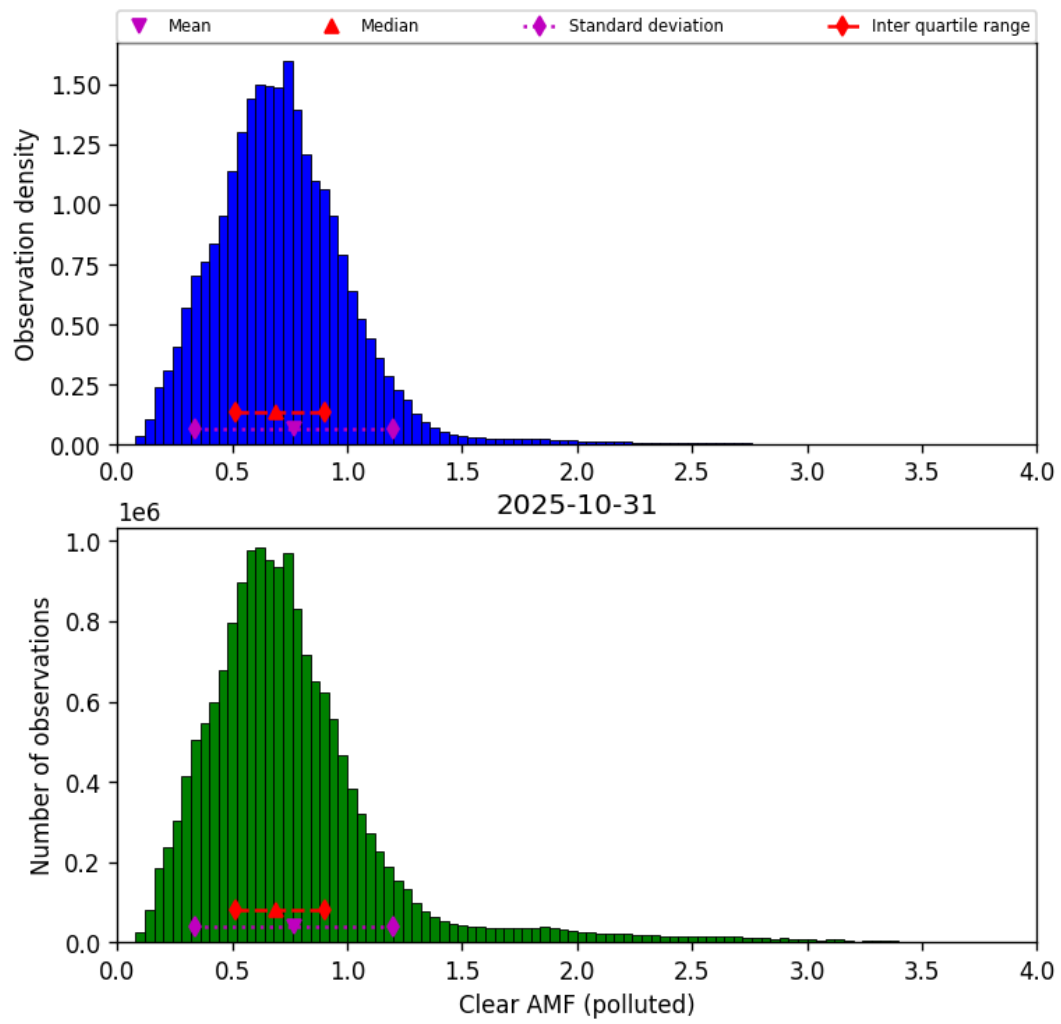


Figure 82: Histogram of “Clear AMF (polluted)” for 2025-10-31 to 2025-10-31

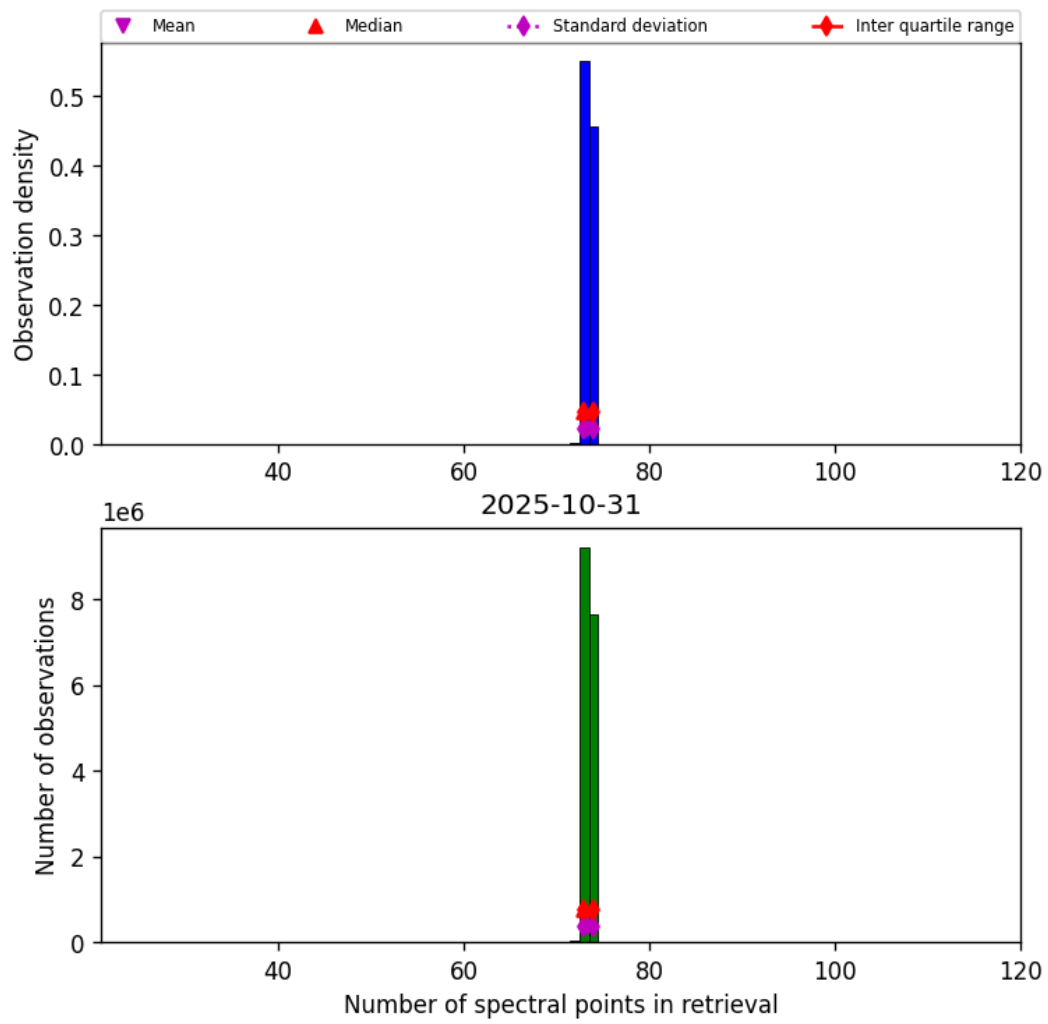


Figure 83: Histogram of “Number of spectral points in retrieval” for 2025-10-31 to 2025-10-31

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.

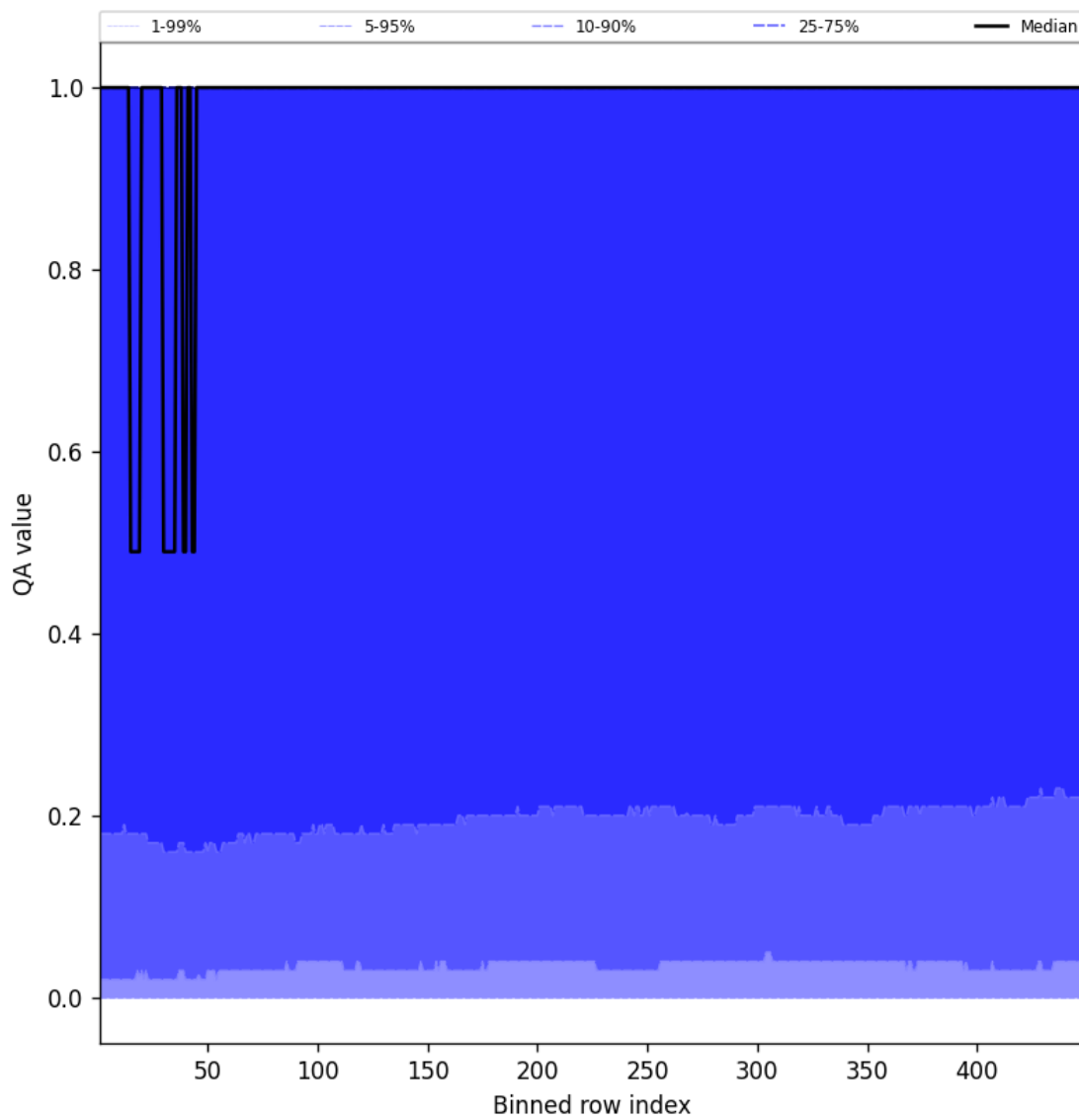


Figure 84: Along track statistics of “QA value” for 2025-10-31 to 2025-10-31

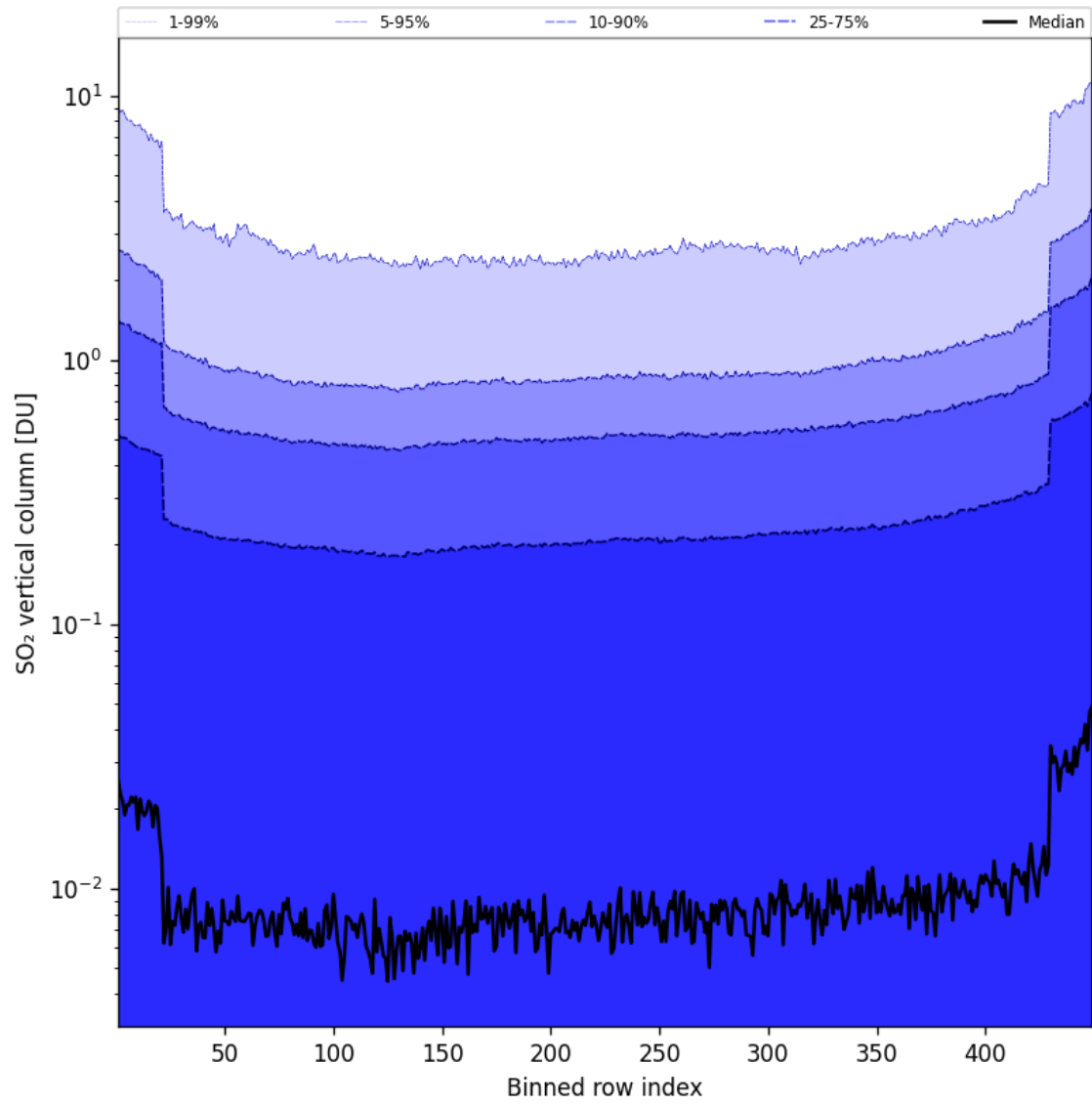


Figure 85: Along track statistics of “SO₂ vertical column” for 2025-10-31 to 2025-10-31

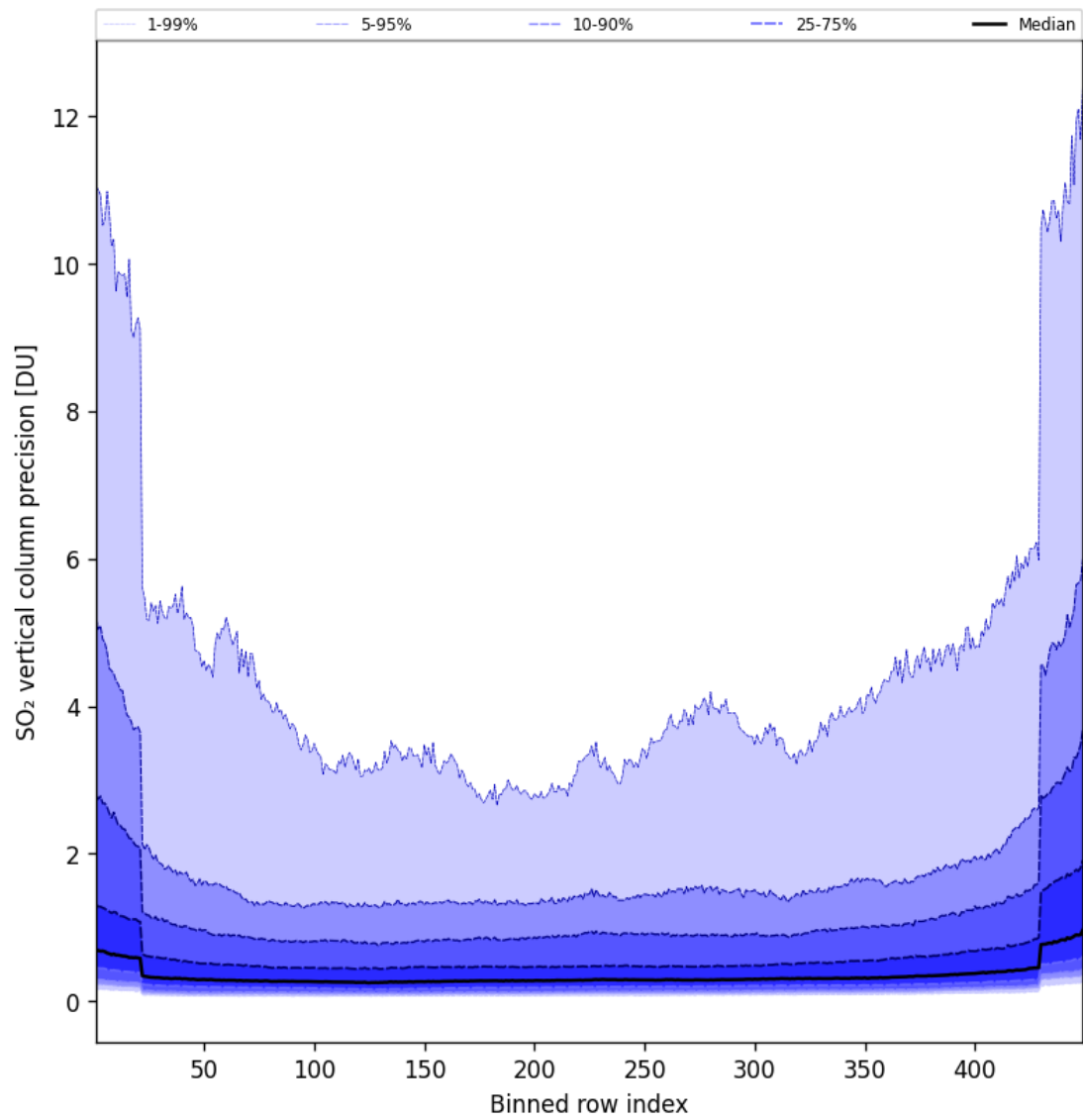


Figure 86: Along track statistics of “SO₂ vertical column precision” for 2025-10-31 to 2025-10-31

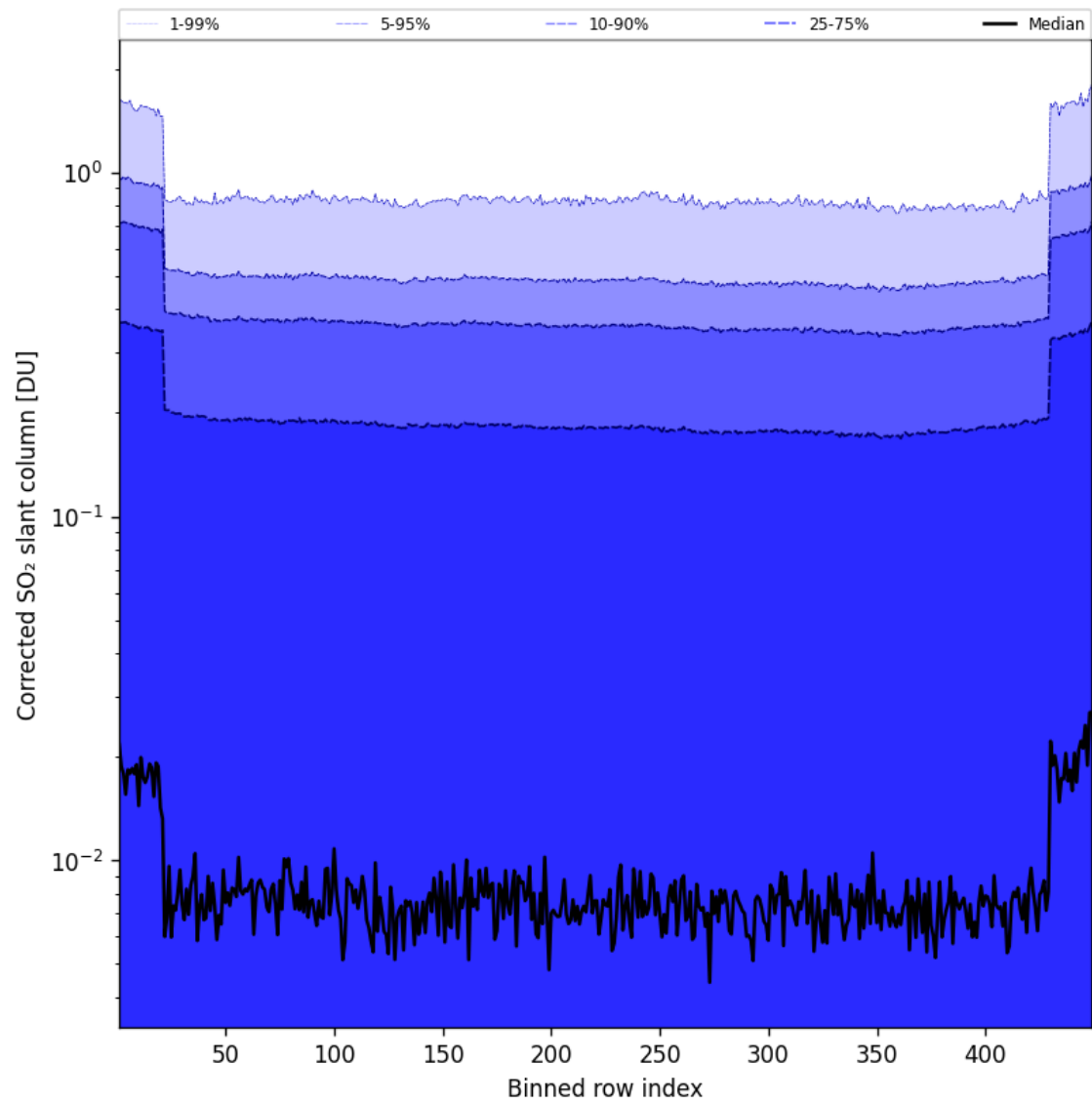


Figure 87: Along track statistics of “Corrected SO₂ slant column” for 2025-10-31 to 2025-10-31

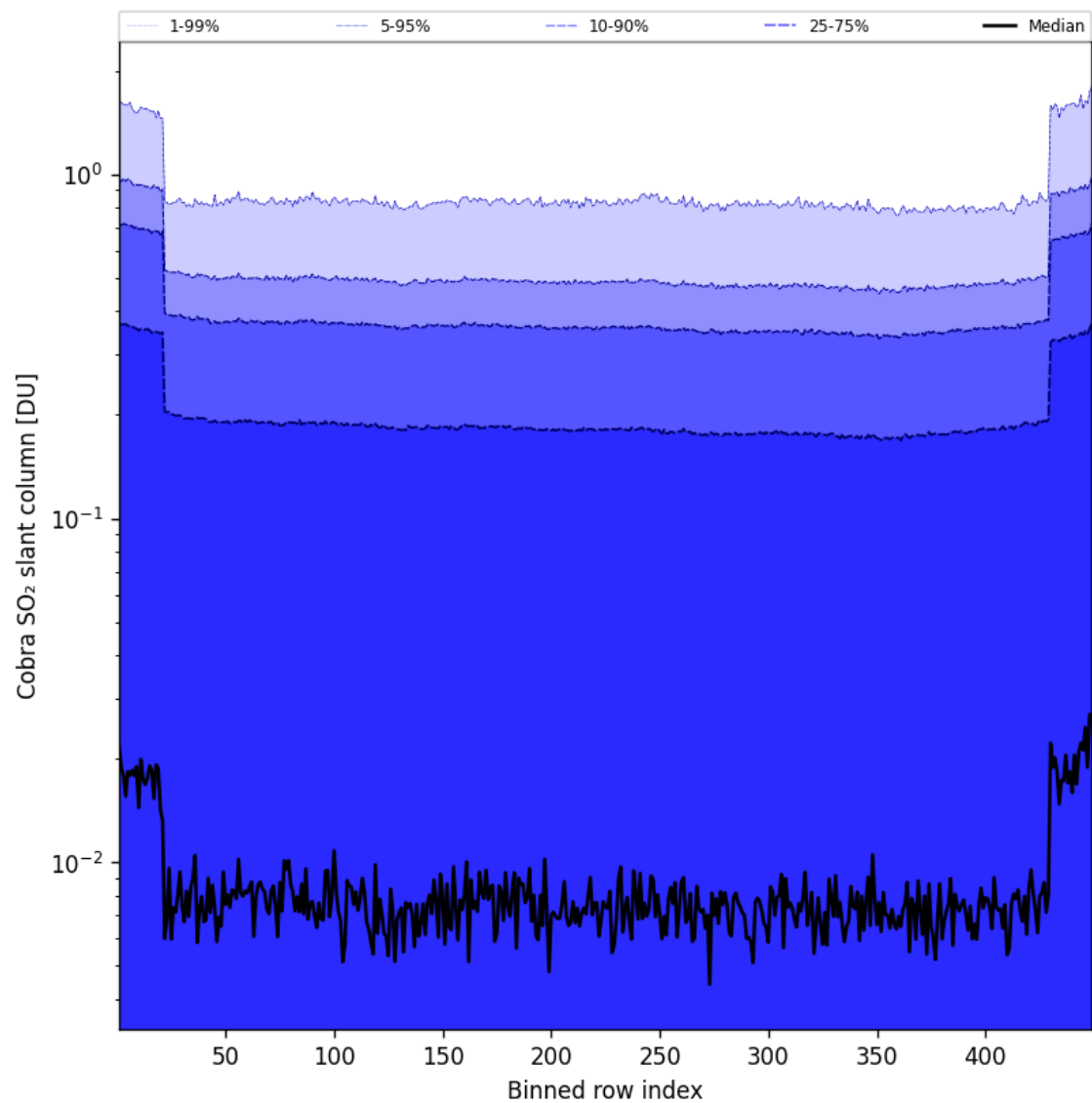


Figure 88: Along track statistics of “Cobra SO₂ slant column” for 2025-10-31 to 2025-10-31

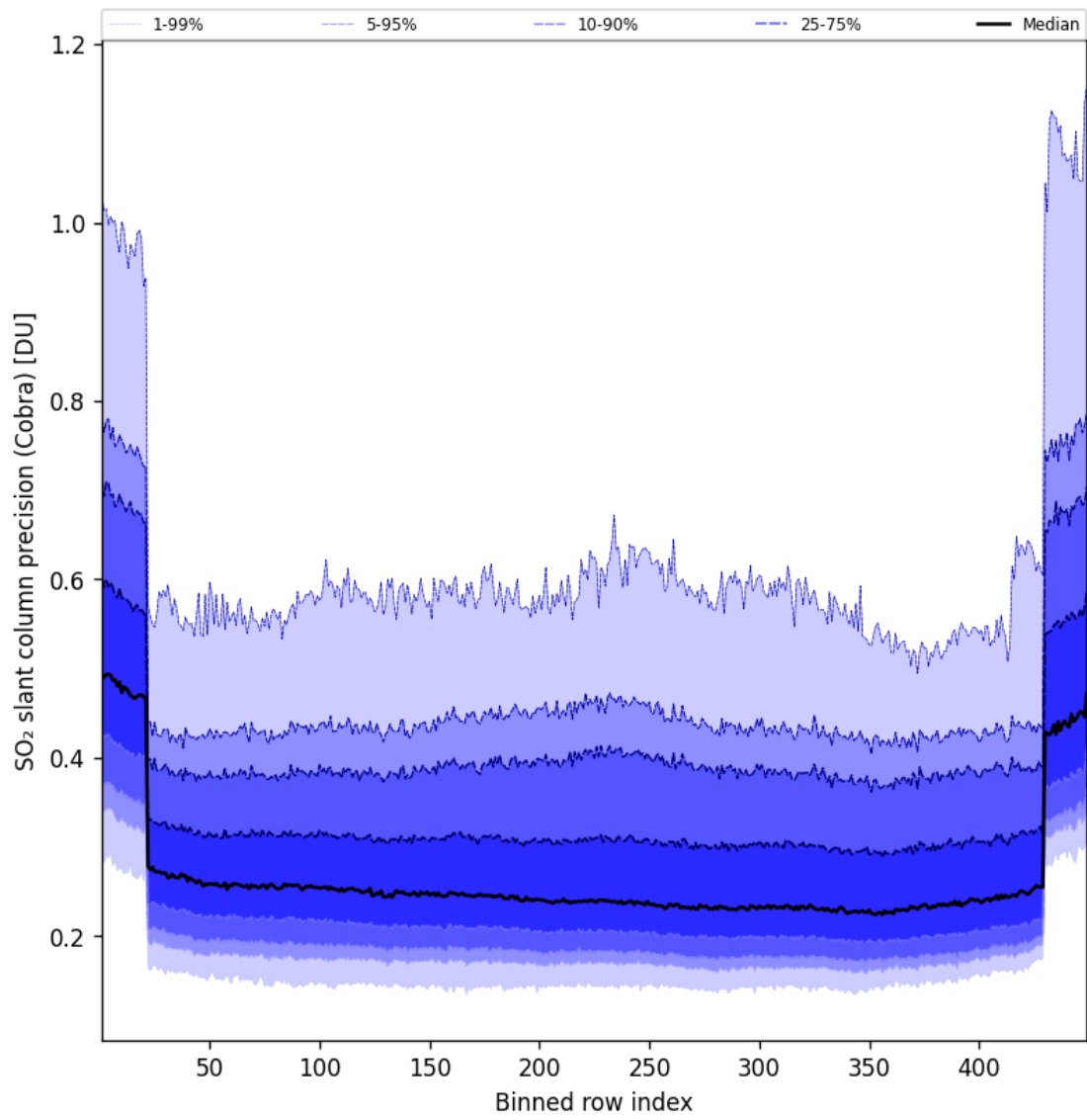


Figure 89: Along track statistics of “SO₂ slant column precision (Cobra)” for 2025-10-31 to 2025-10-31

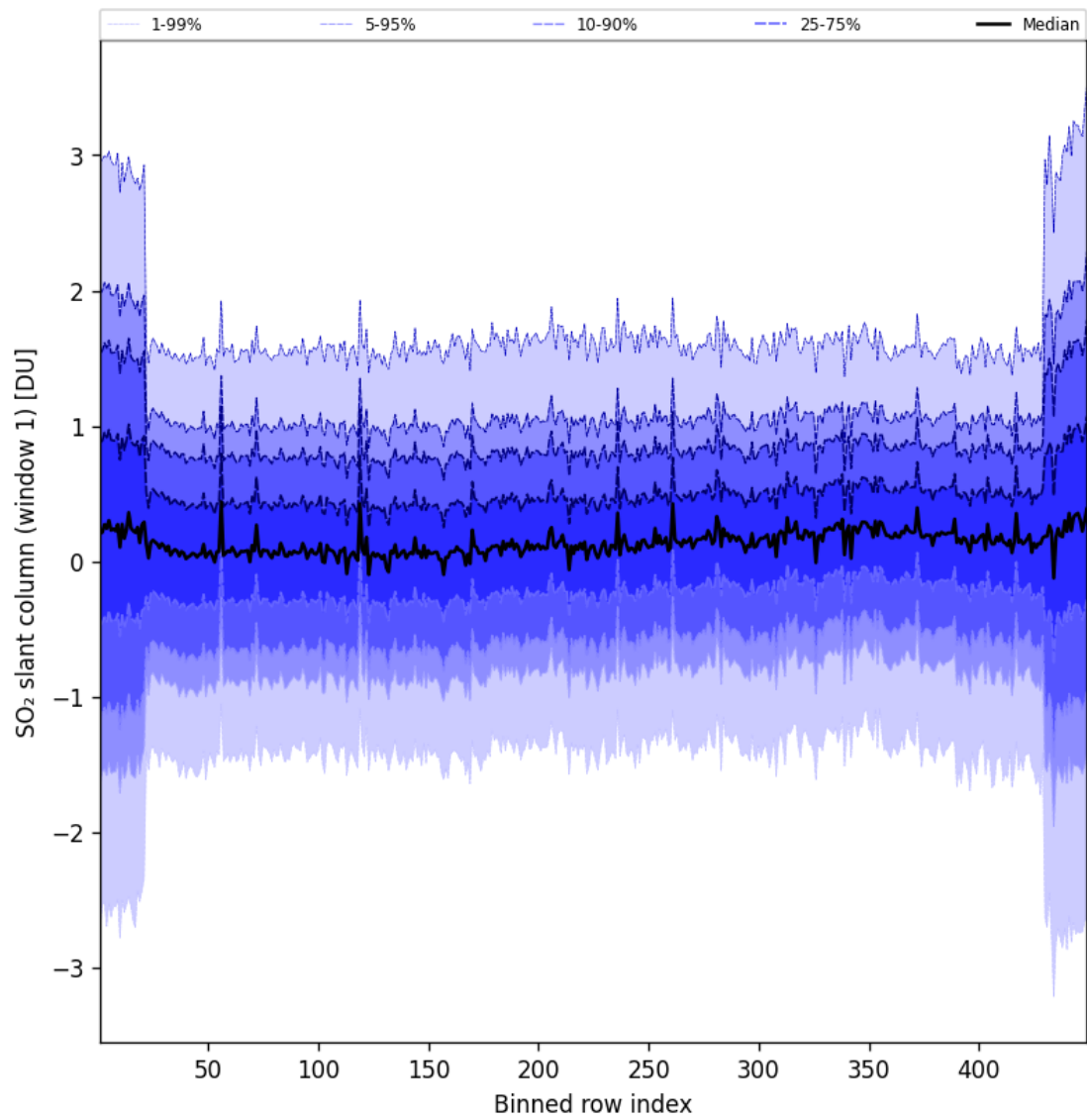


Figure 90: Along track statistics of “SO₂ slant column (window 1)” for 2025-10-31 to 2025-10-31

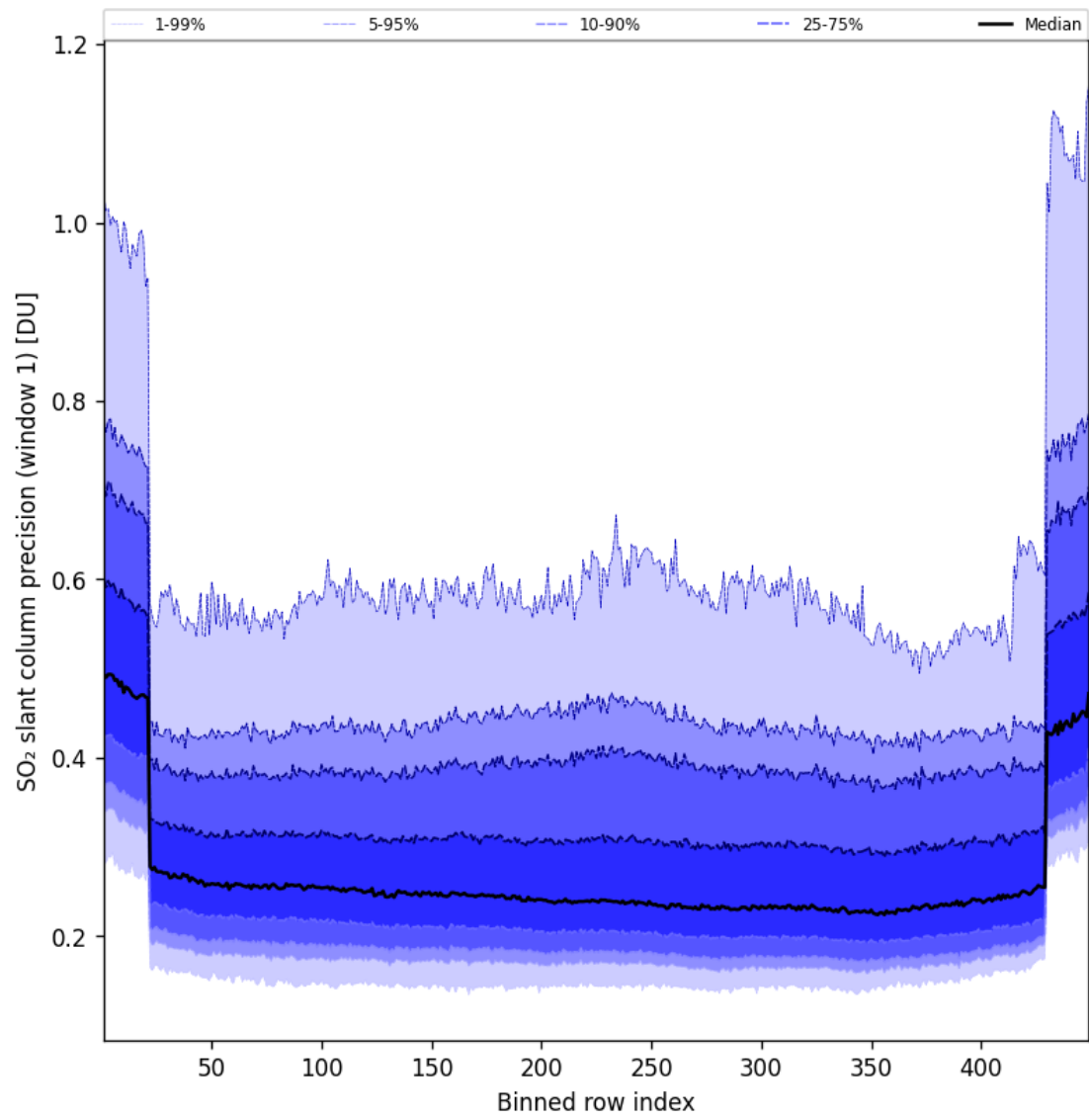


Figure 91: Along track statistics of “SO₂ slant column precision (window 1)” for 2025-10-31 to 2025-10-31

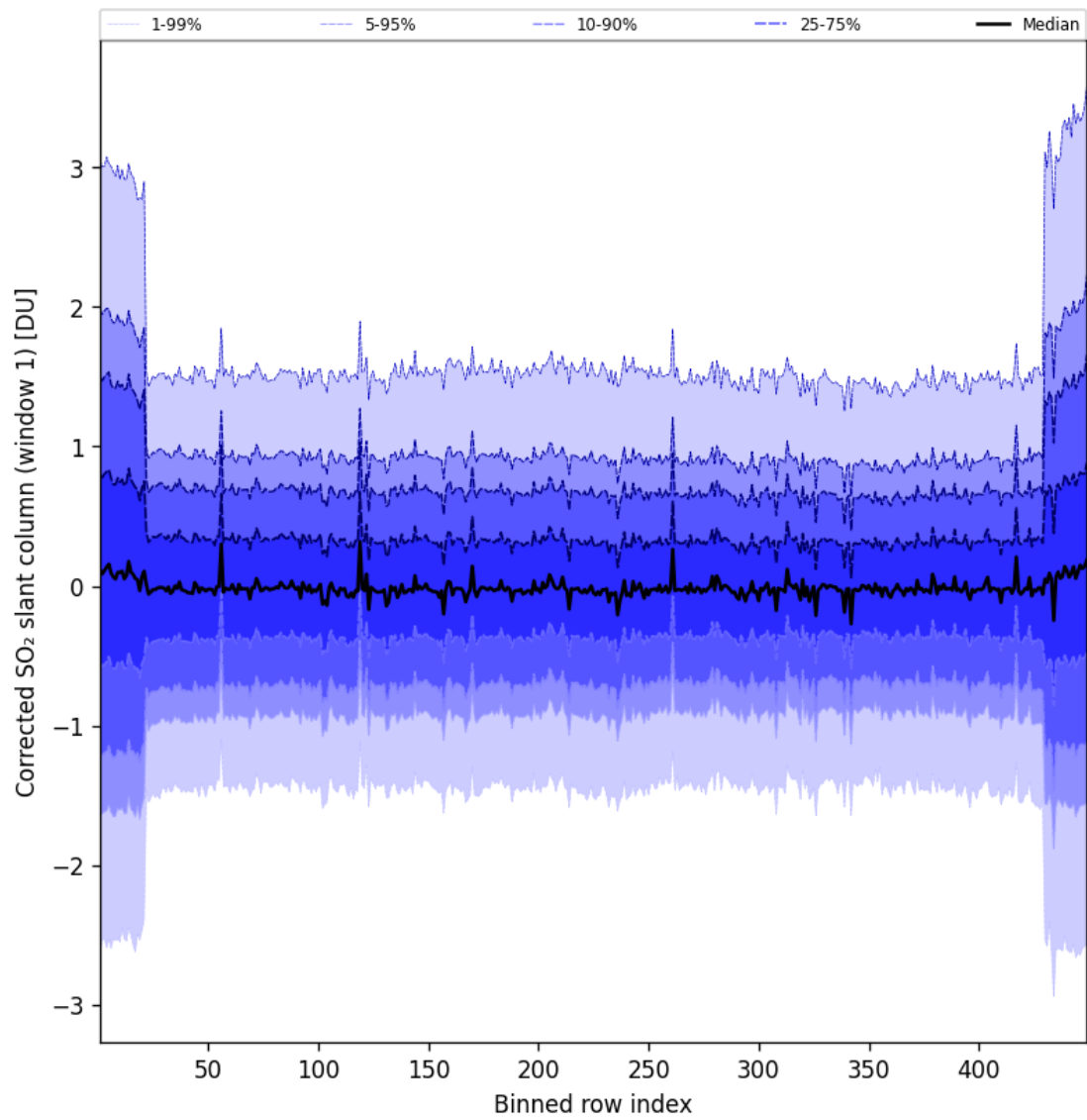


Figure 92: Along track statistics of “Corrected SO₂ slant column (window 1)” for 2025-10-31 to 2025-10-31

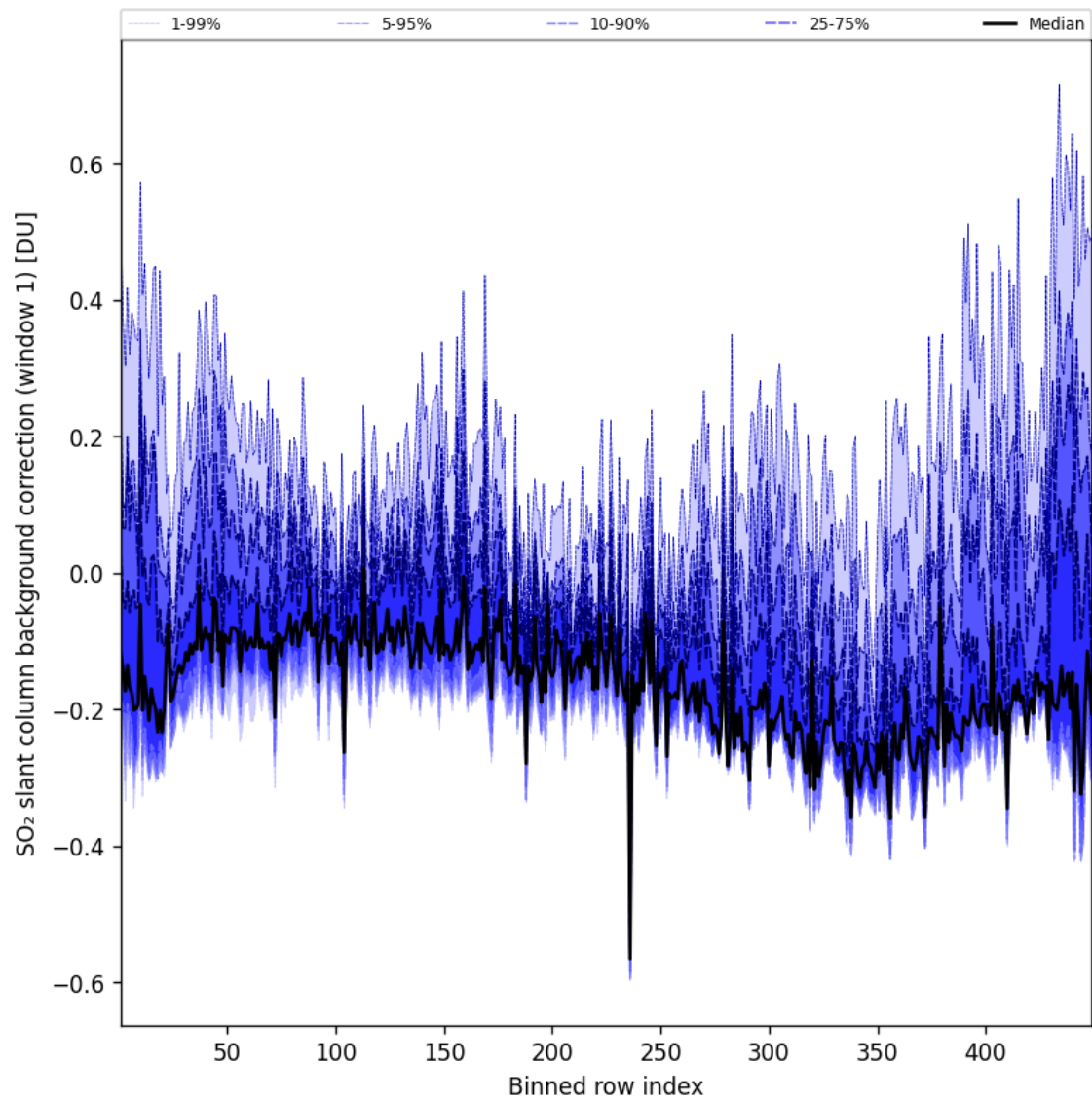


Figure 93: Along track statistics of “SO₂ slant column background correction (window 1)” for 2025-10-31 to 2025-10-31

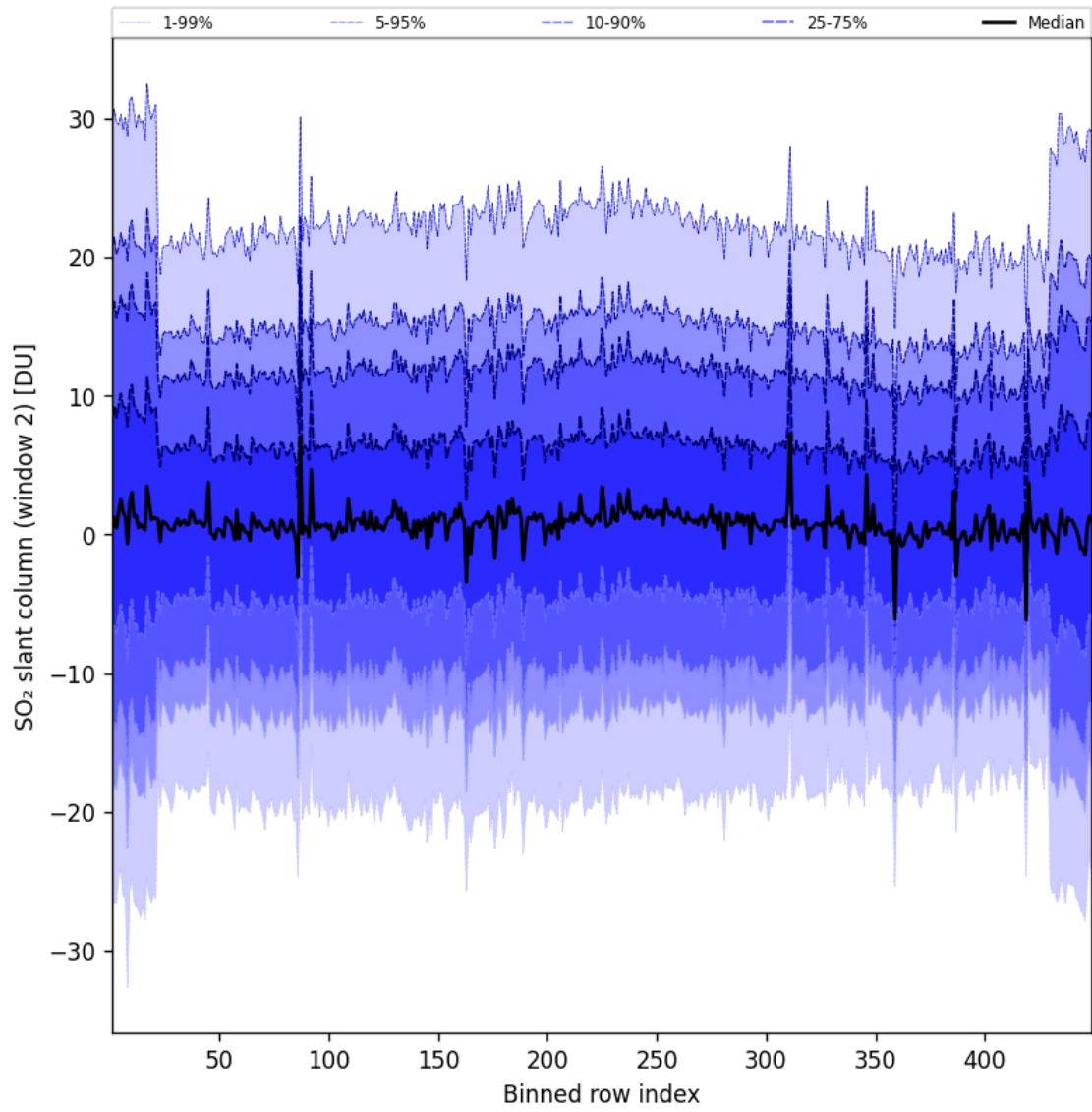


Figure 94: Along track statistics of “SO₂ slant column (window 2)” for 2025-10-31 to 2025-10-31

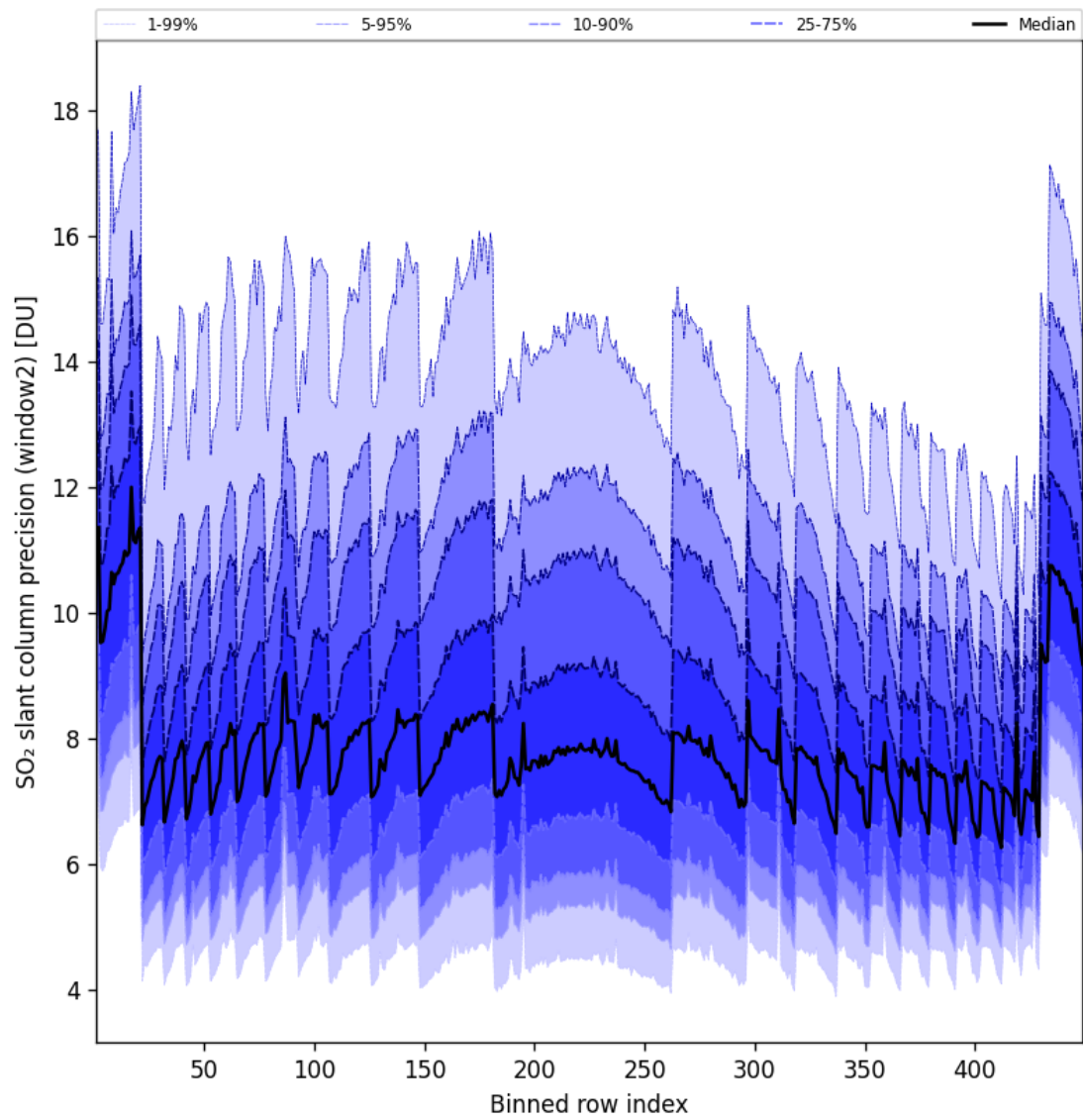


Figure 95: Along track statistics of “SO₂ slant column precision (window2)” for 2025-10-31 to 2025-10-31

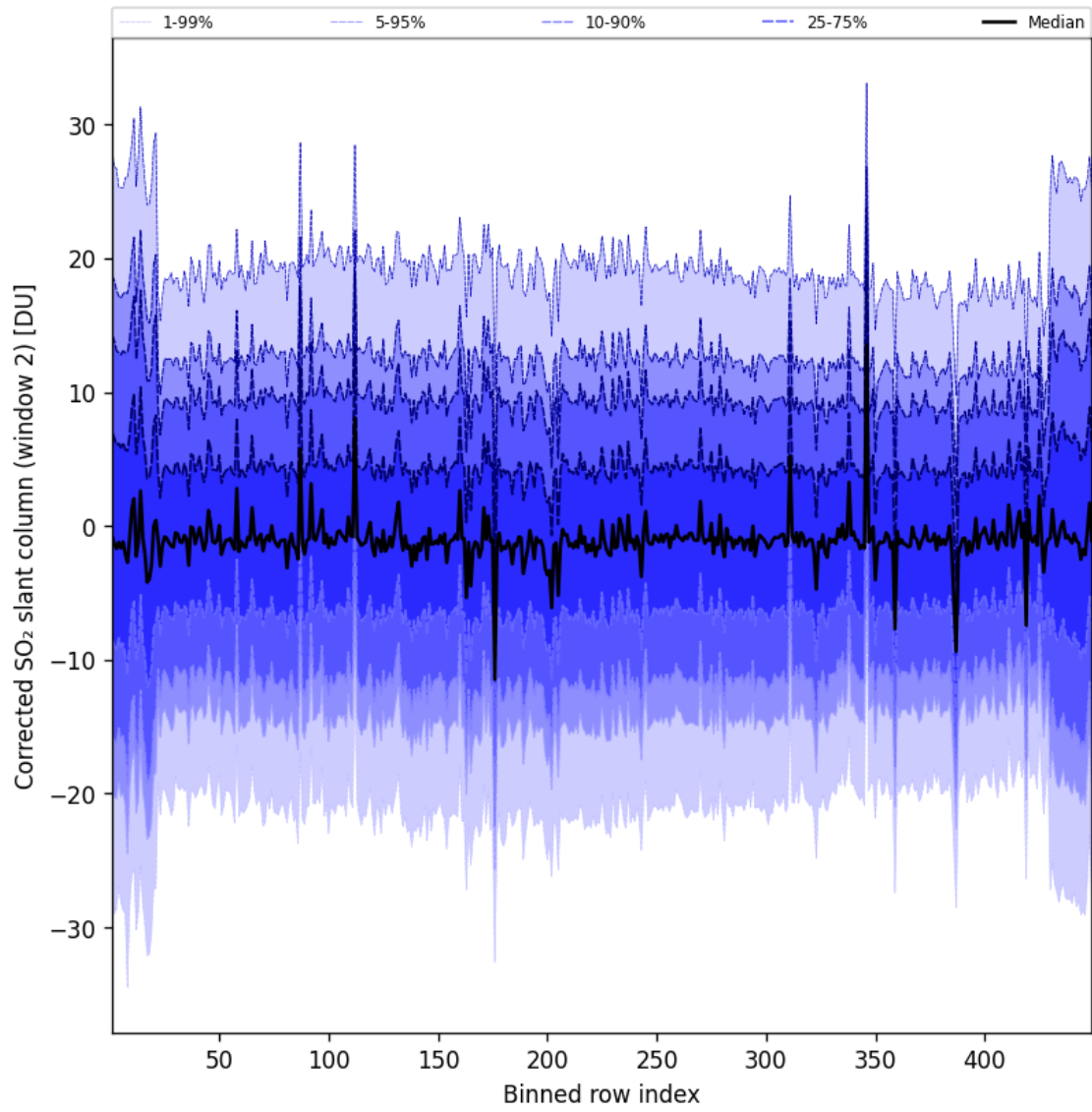


Figure 96: Along track statistics of “Corrected SO₂ slant column (window 2)” for 2025-10-31 to 2025-10-31

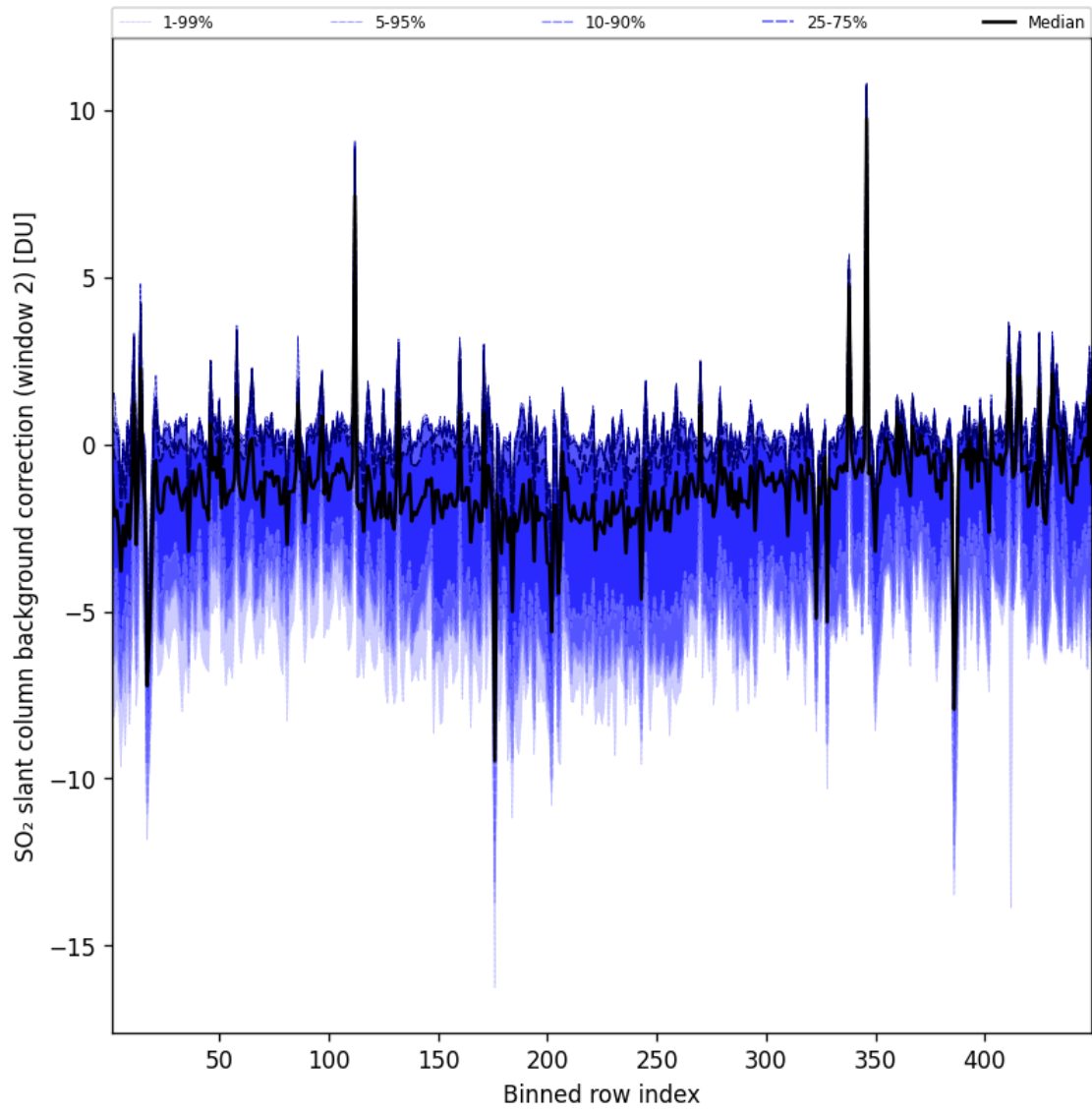


Figure 97: Along track statistics of “SO₂ slant column background correction (window 2)” for 2025-10-31 to 2025-10-31

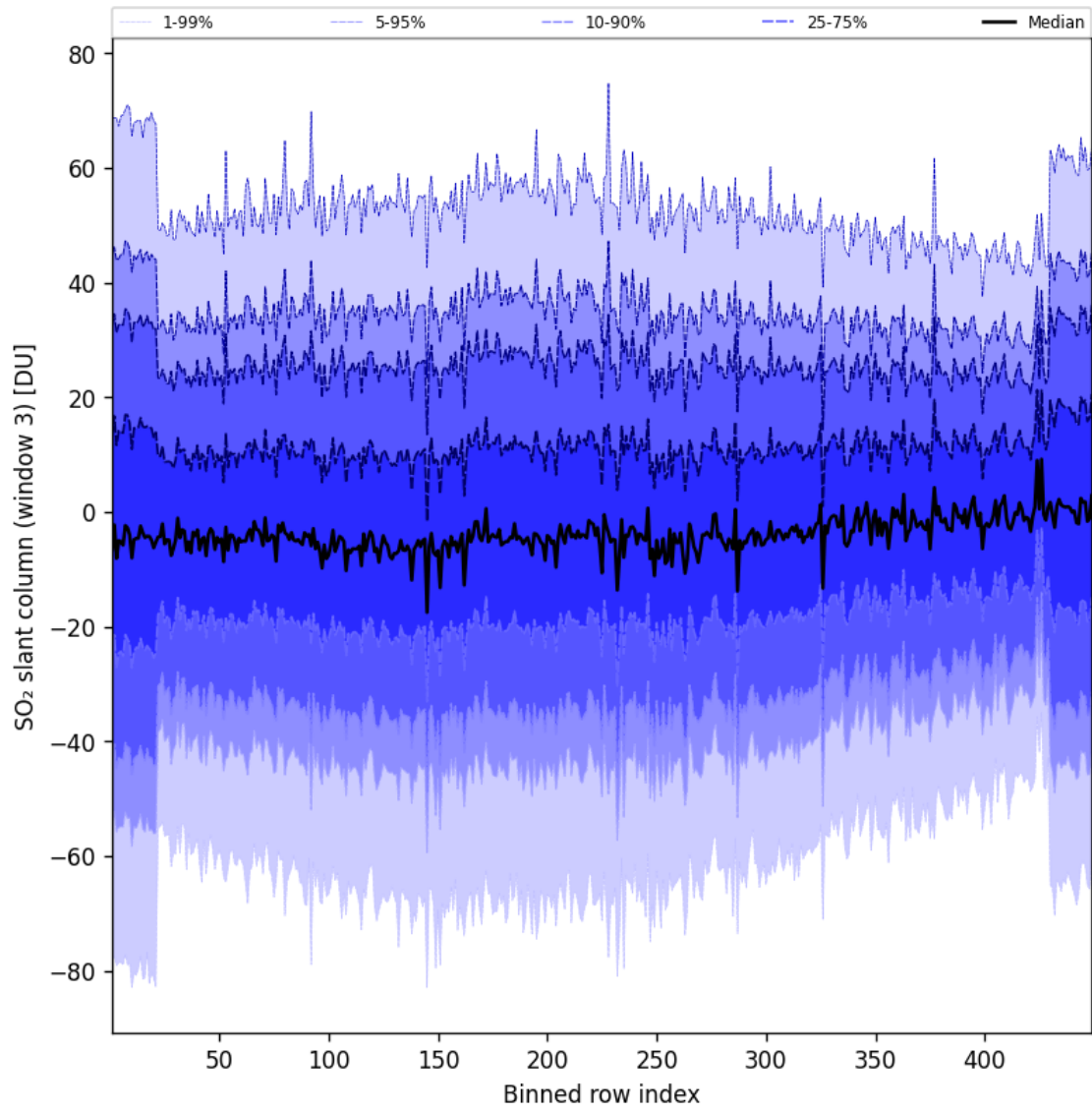


Figure 98: Along track statistics of "SO₂ slant column (window 3)" for 2025-10-31 to 2025-10-31

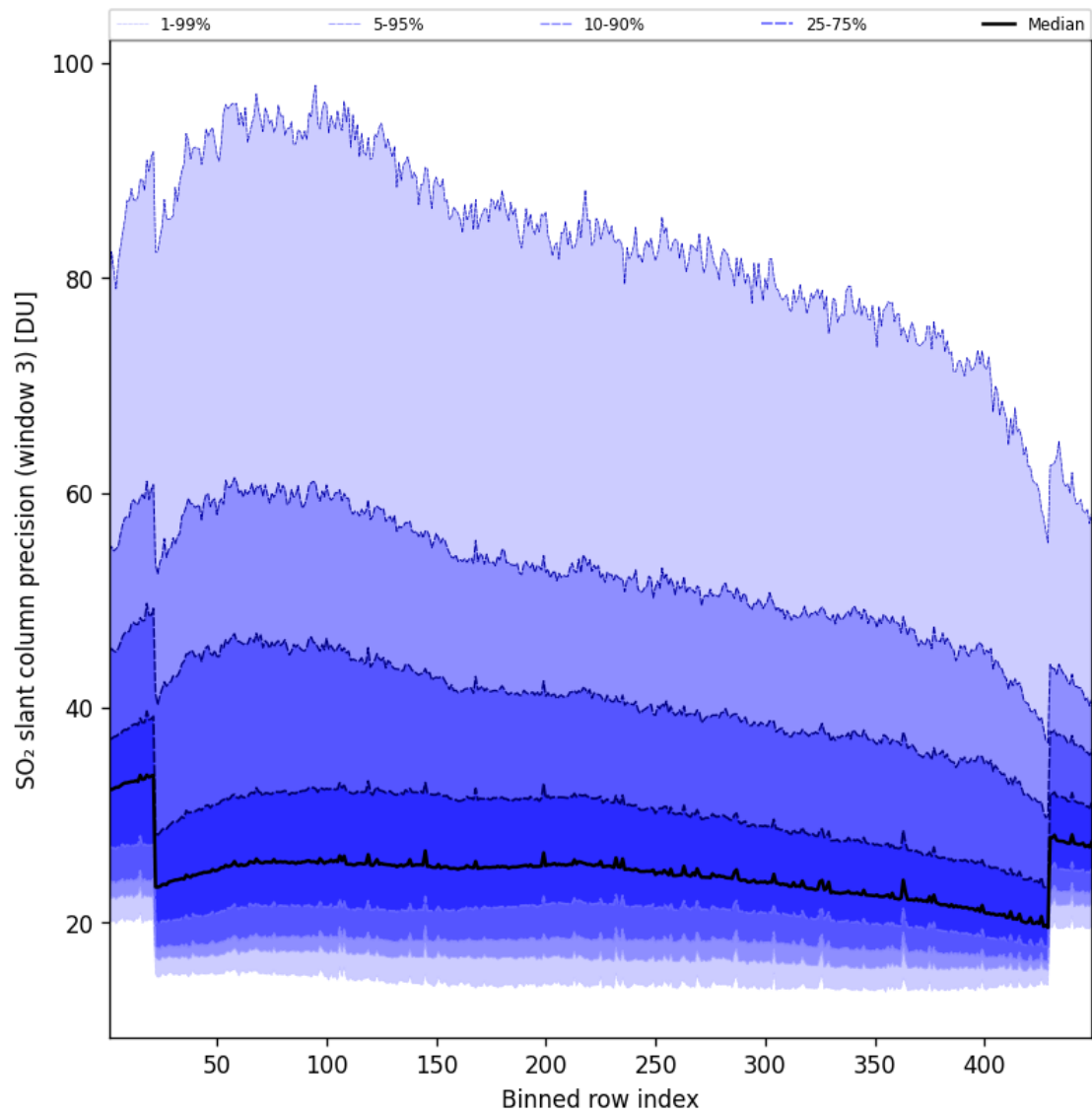


Figure 99: Along track statistics of “SO₂ slant column precision (window 3)” for 2025-10-31 to 2025-10-31

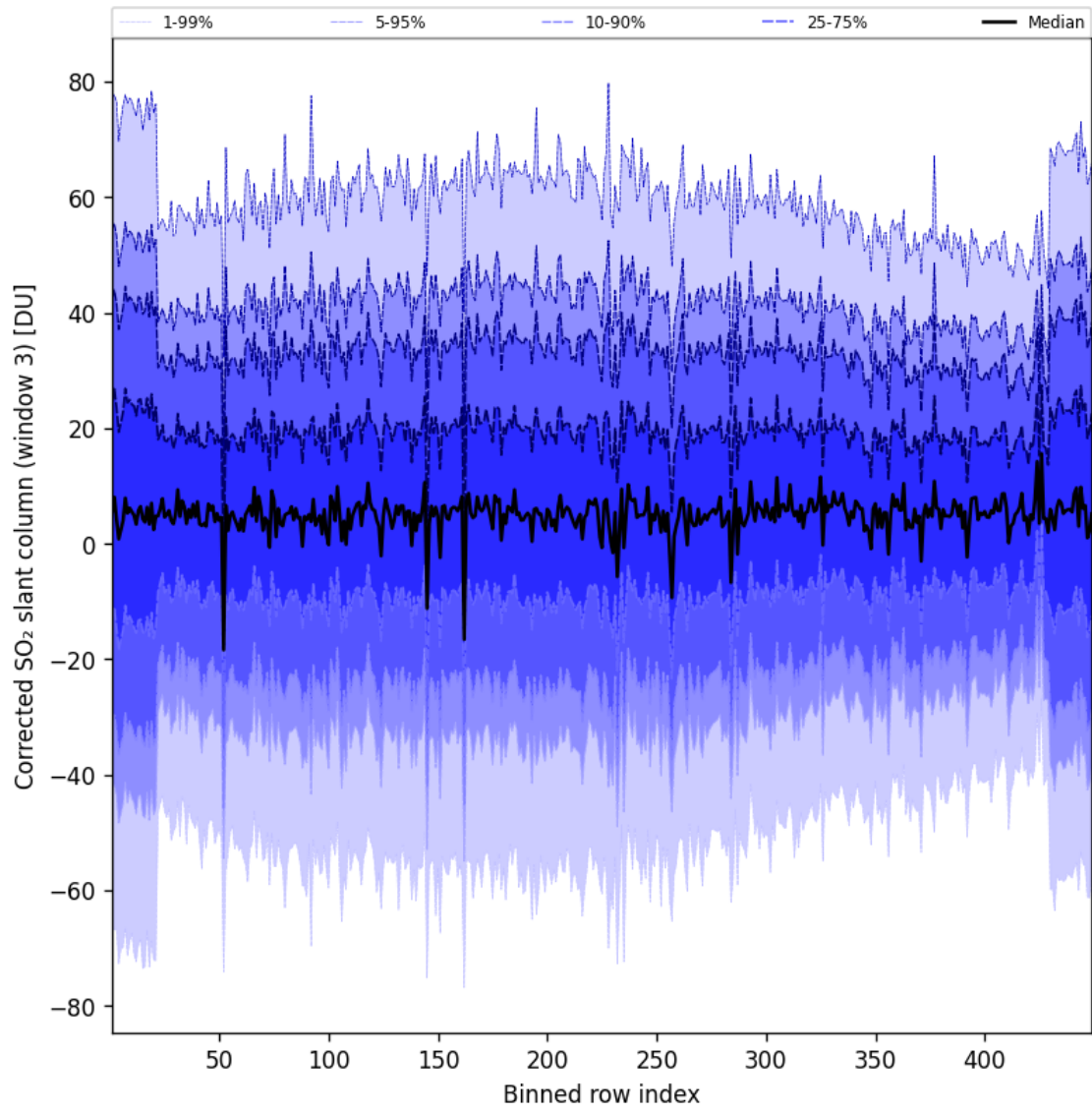


Figure 100: Along track statistics of “Corrected SO₂ slant column (window 3)” for 2025-10-31 to 2025-10-31

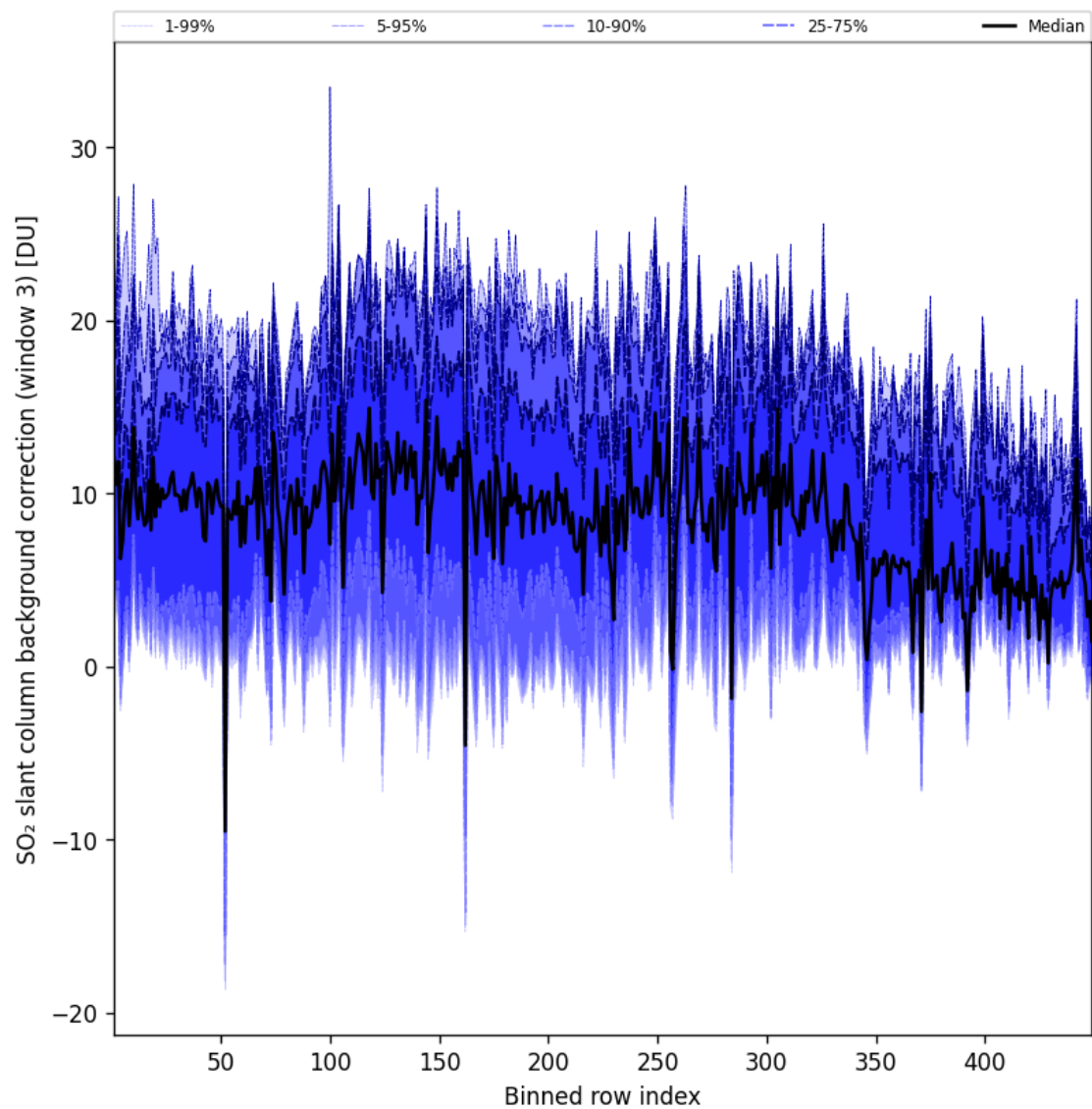


Figure 101: Along track statistics of “SO₂ slant column background correction (window 3)” for 2025-10-31 to 2025-10-31

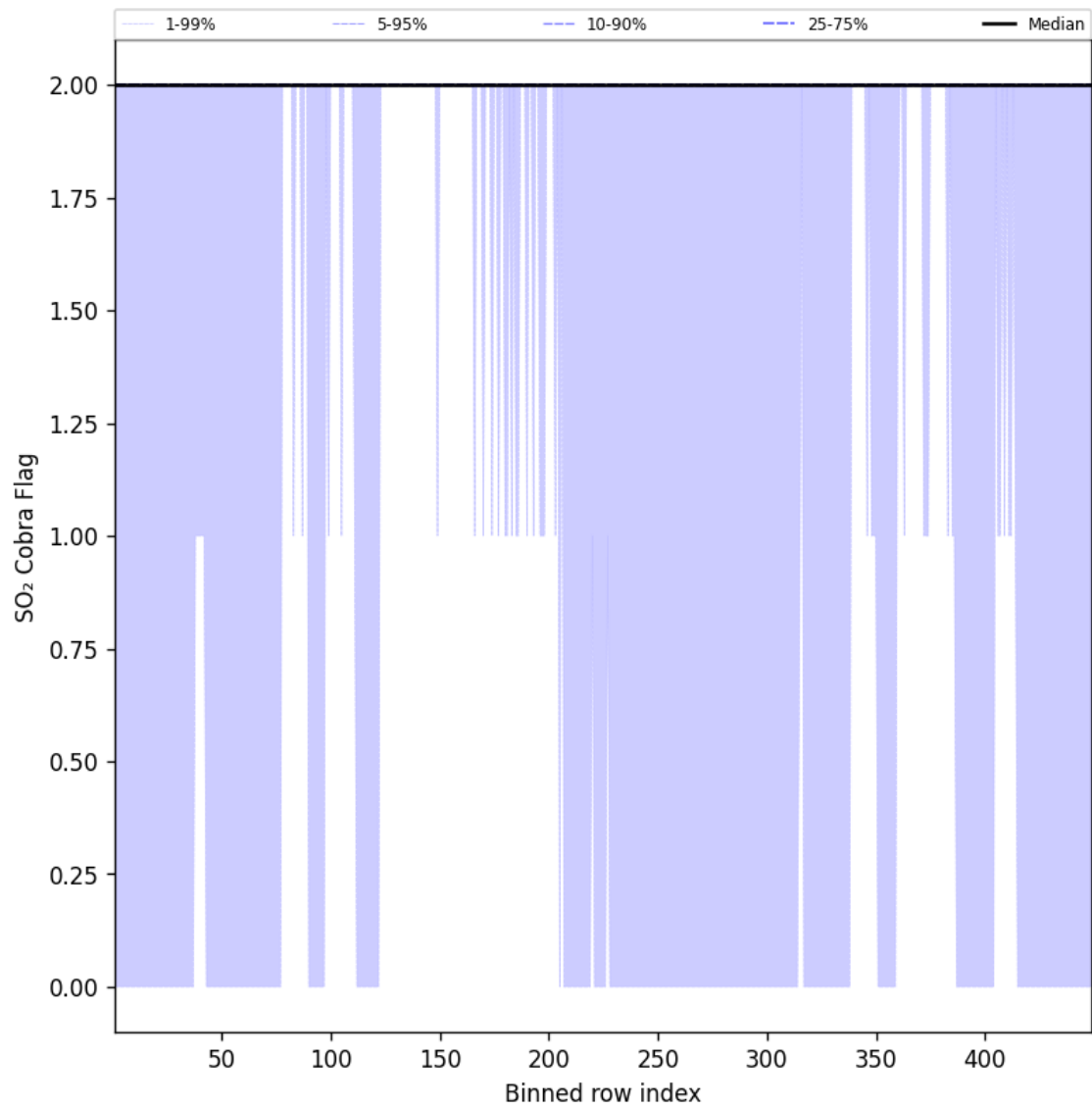


Figure 102: Along track statistics of “SO₂ Cobra Flag” for 2025-10-31 to 2025-10-31

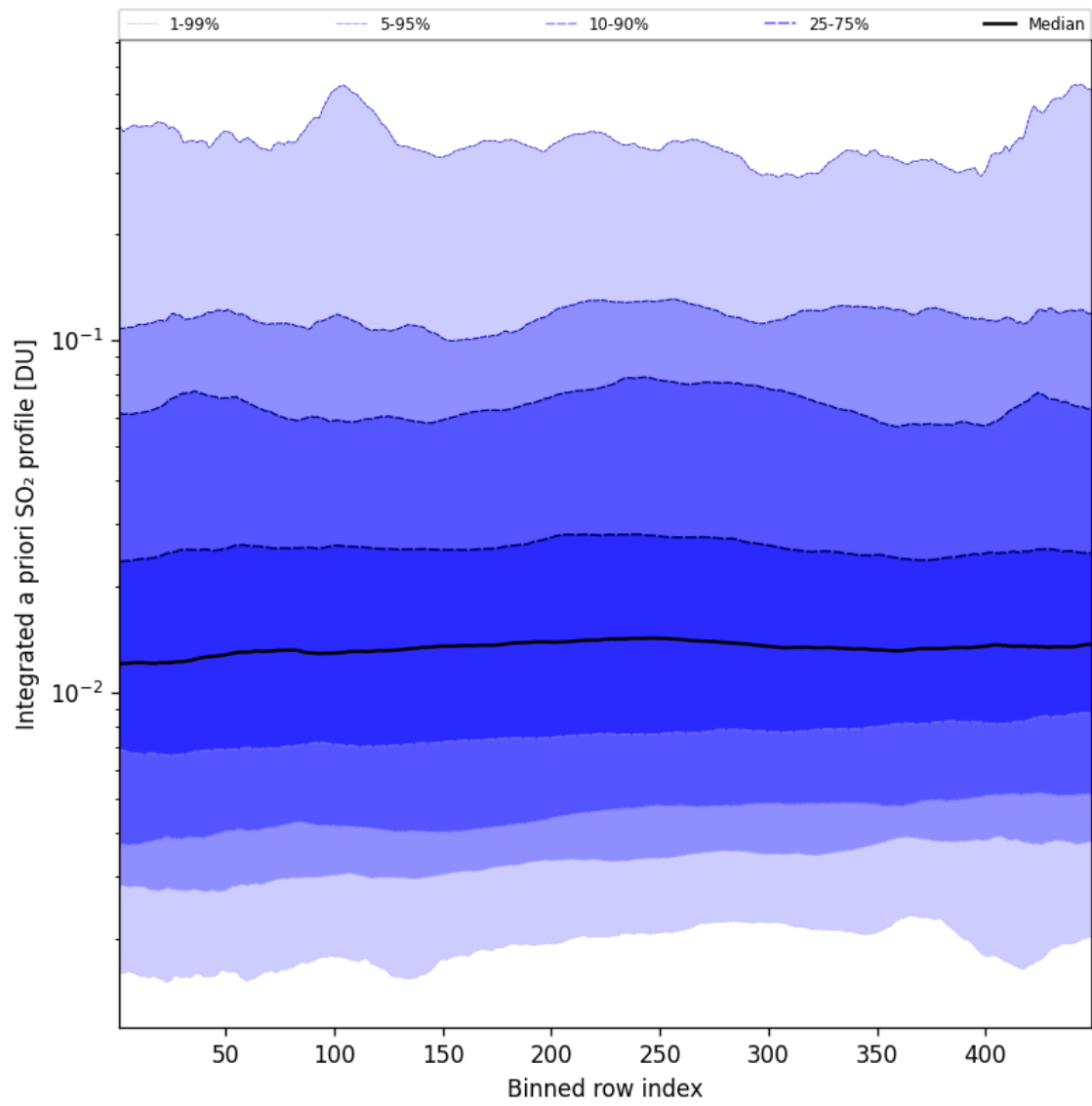


Figure 103: Along track statistics of “Integrated a priori SO₂ profile” for 2025-10-31 to 2025-10-31

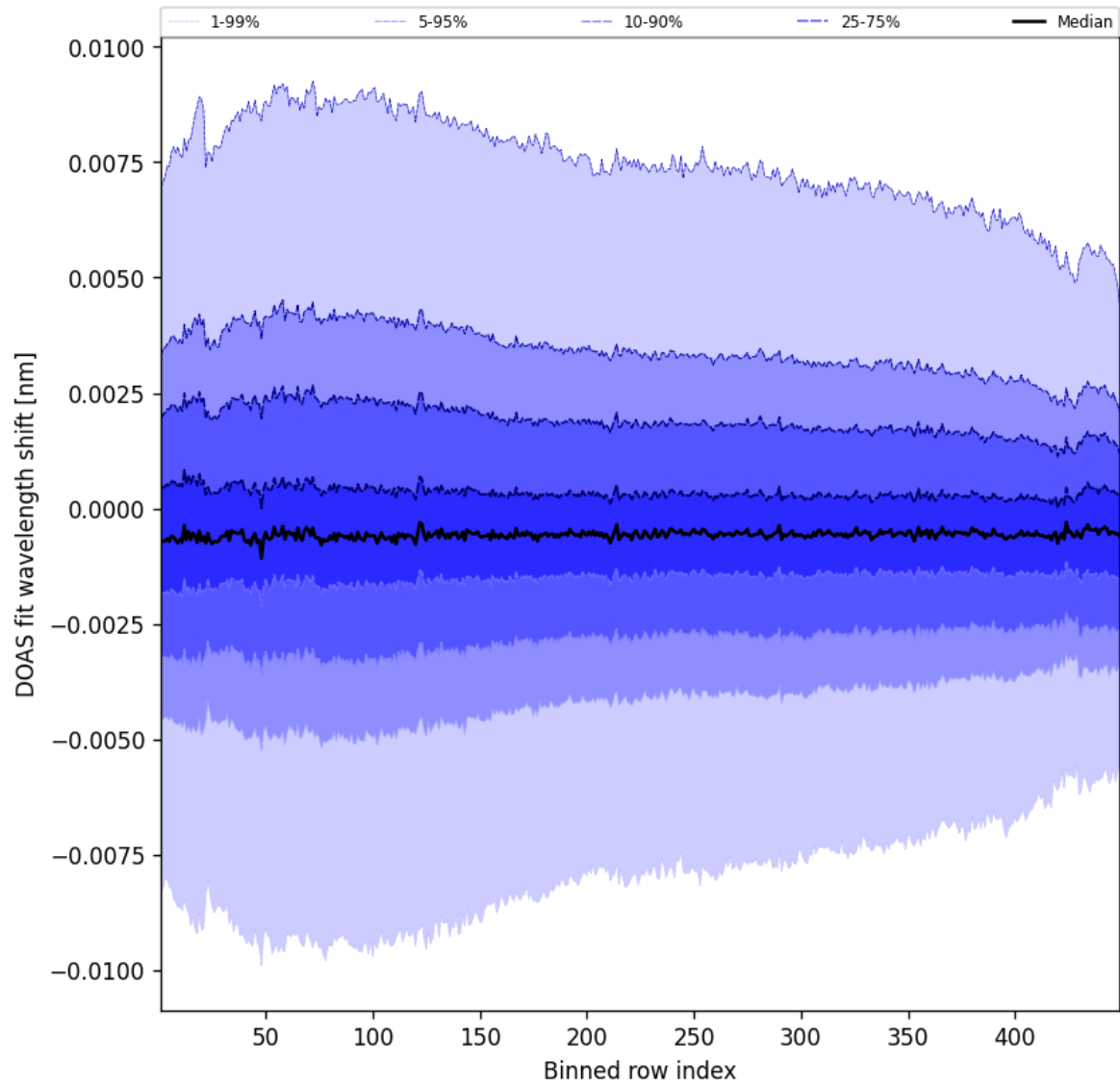


Figure 104: Along track statistics of “DOAS fit wavelength shift” for 2025-10-31 to 2025-10-31

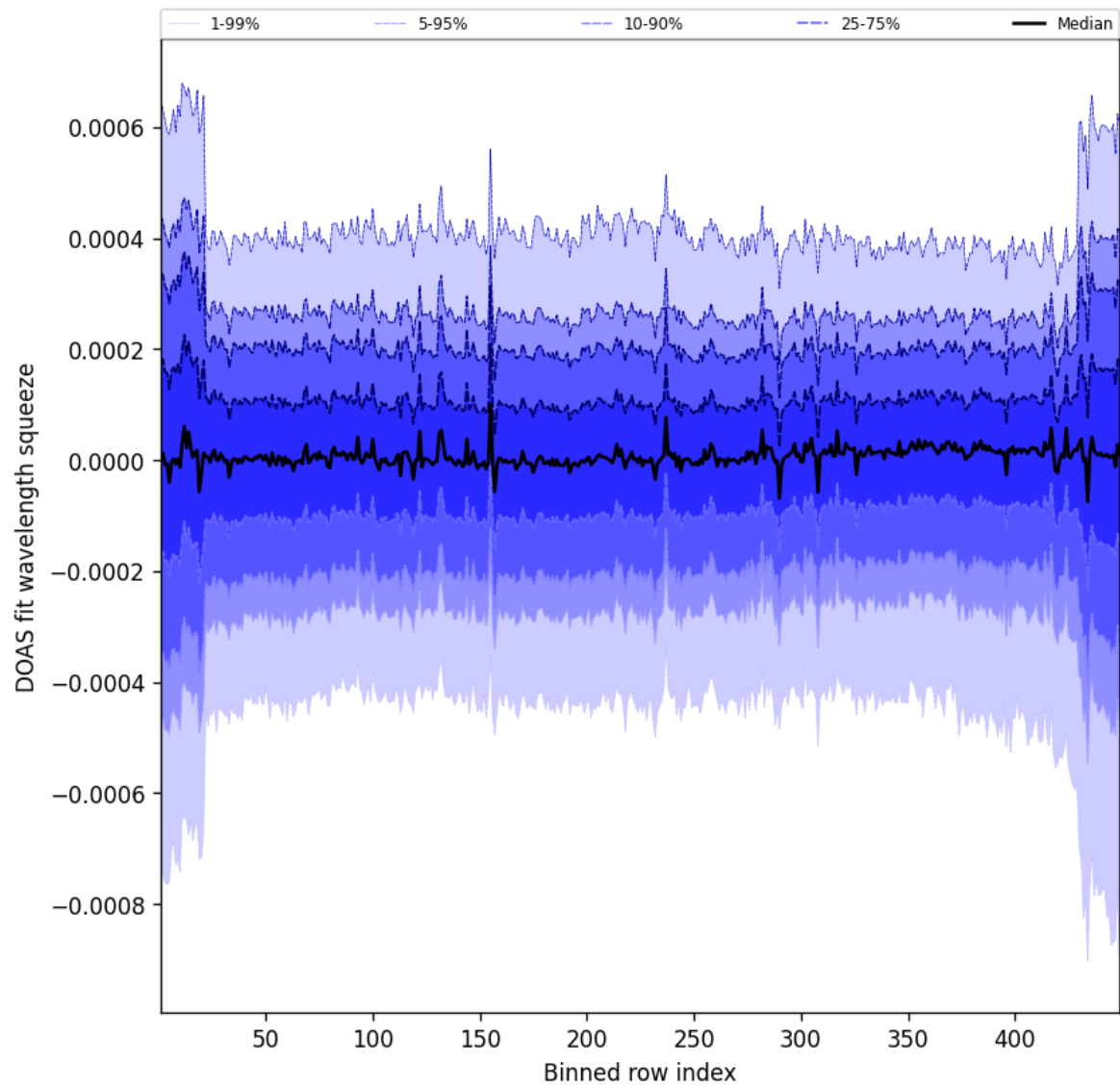


Figure 105: Along track statistics of “DOAS fit wavelength squeeze” for 2025-10-31 to 2025-10-31

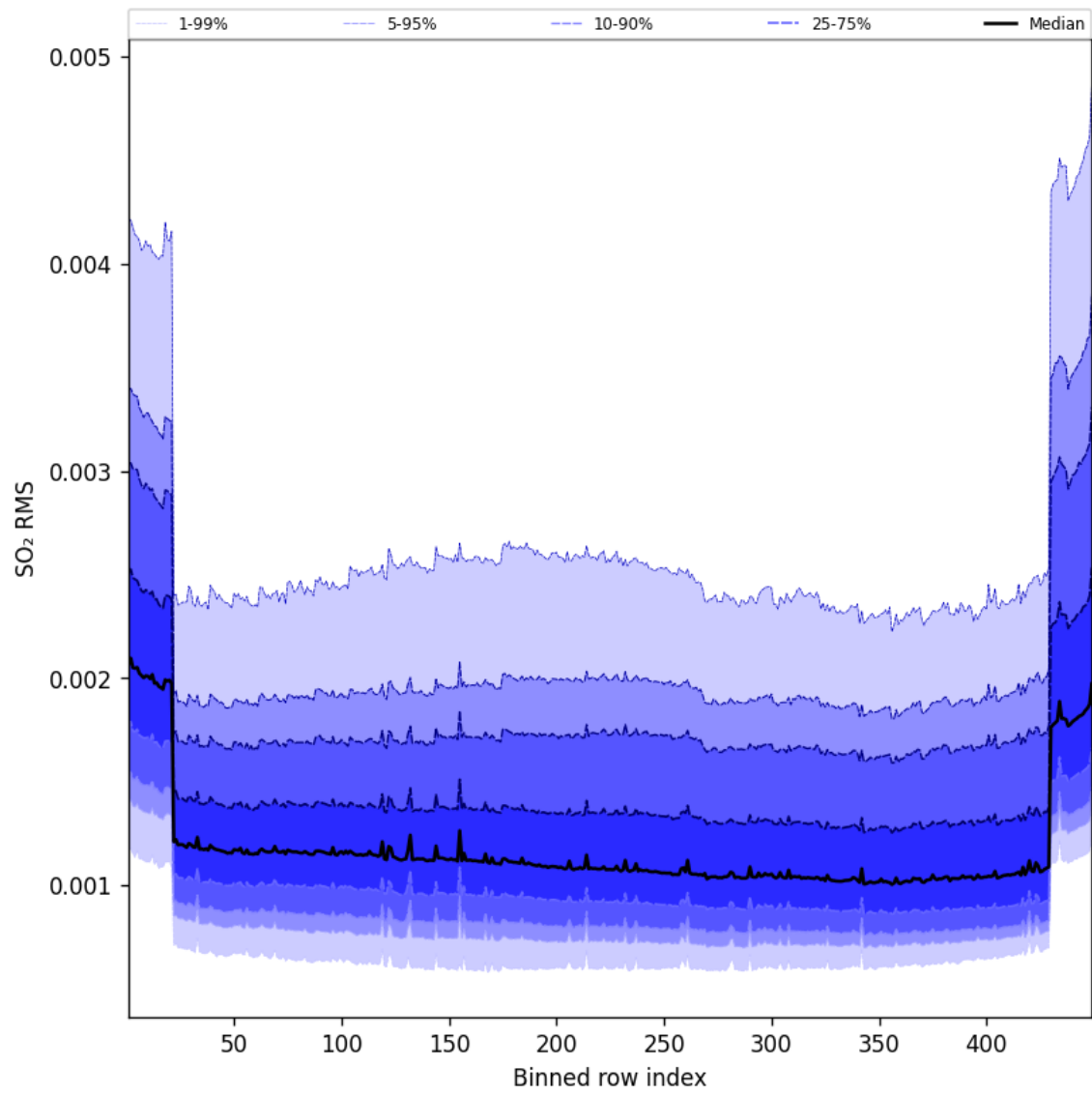


Figure 106: Along track statistics of “SO₂ RMS” for 2025-10-31 to 2025-10-31

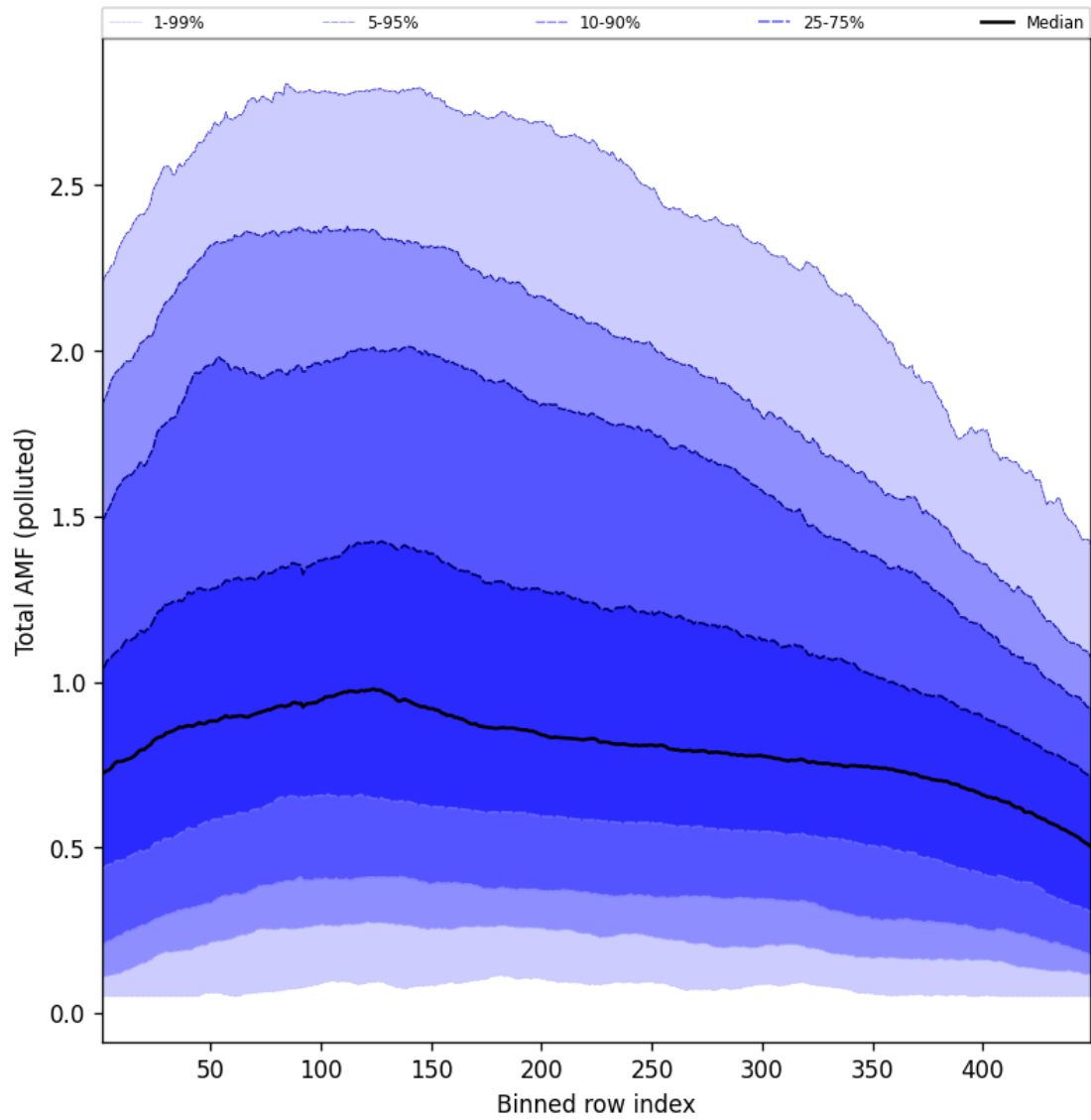


Figure 107: Along track statistics of “Total AMF (polluted)” for 2025-10-31 to 2025-10-31

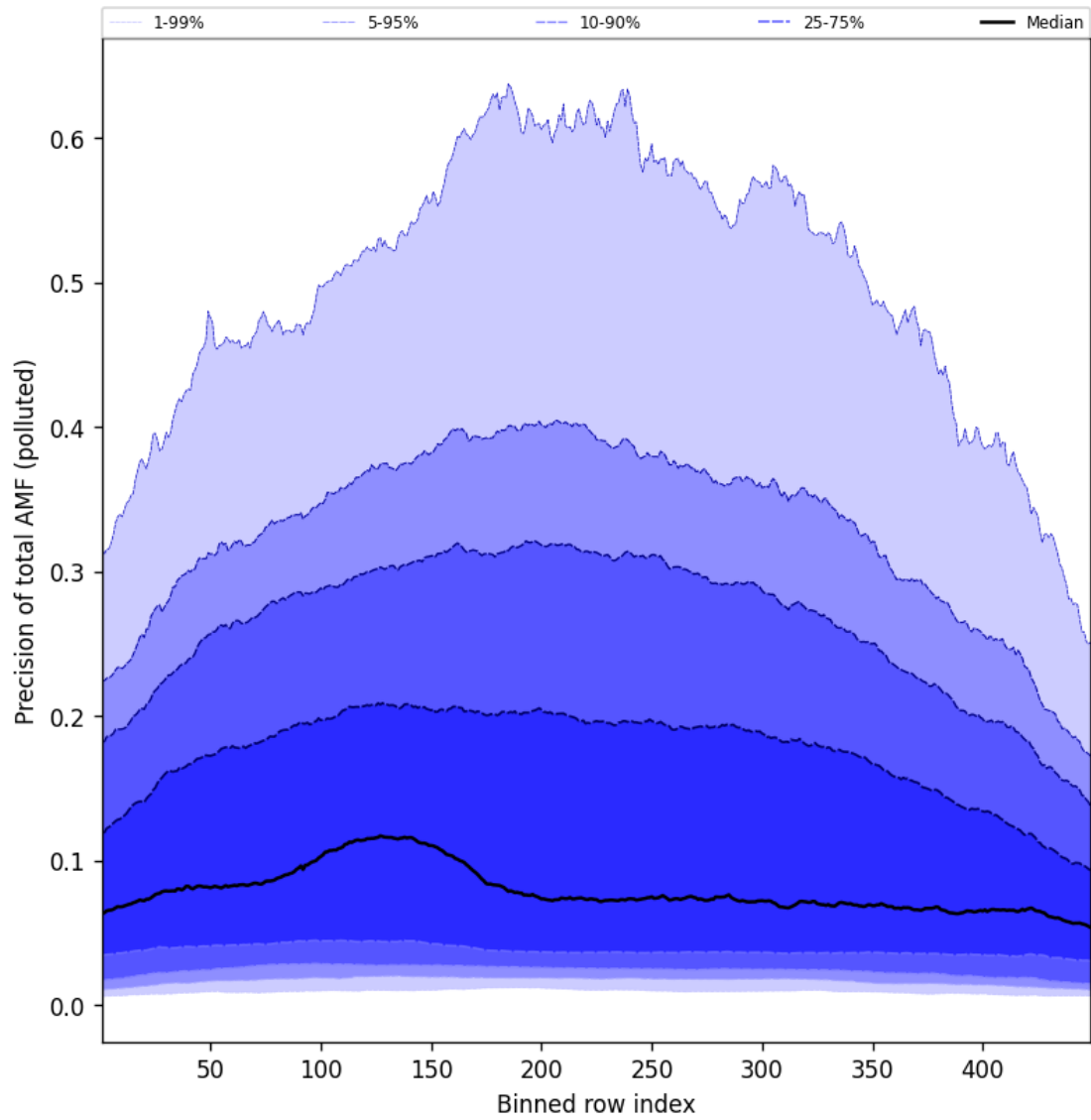


Figure 108: Along track statistics of “Precision of total AMF (polluted)” for 2025-10-31 to 2025-10-31

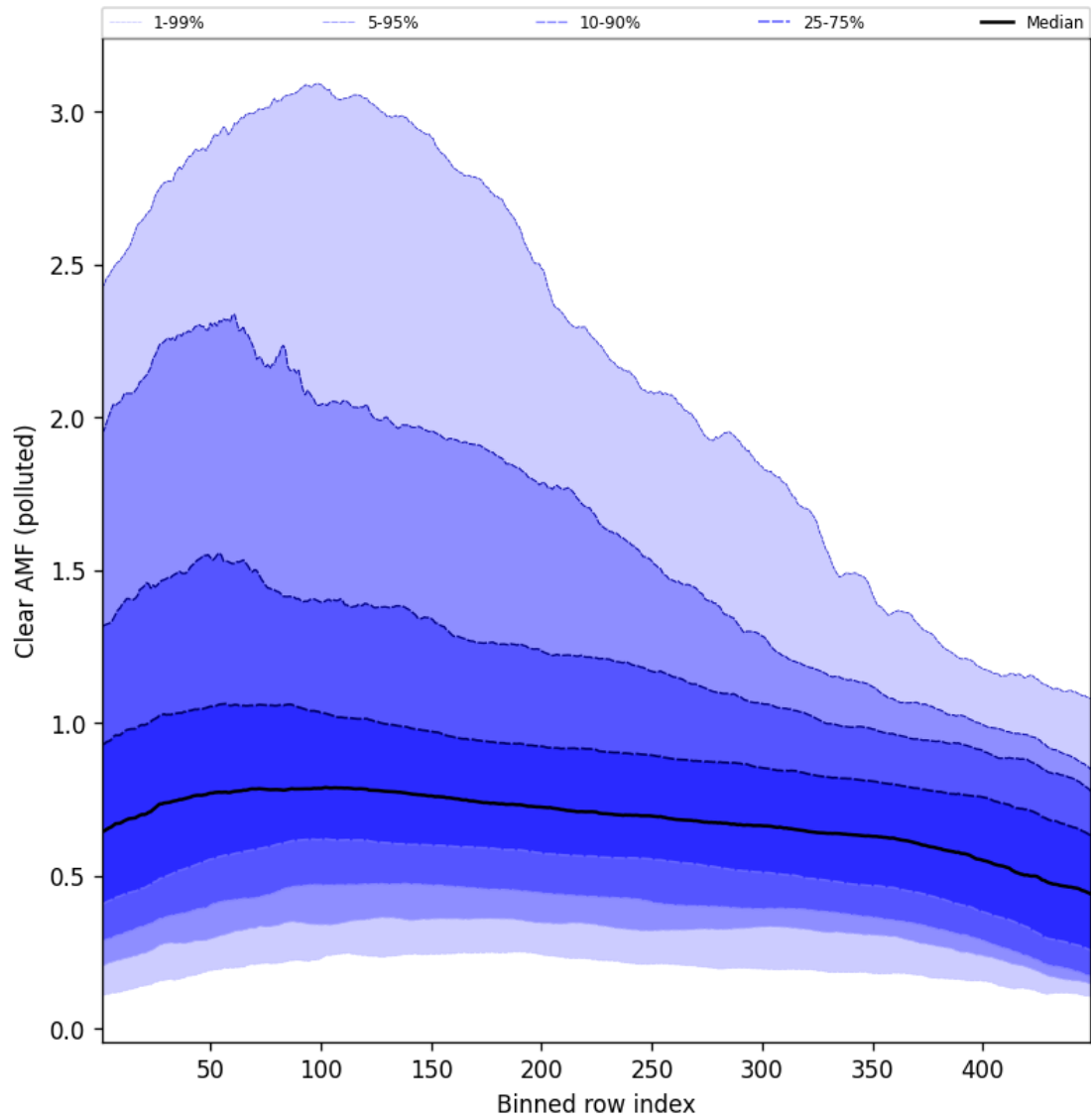


Figure 109: Along track statistics of “Clear AMF (polluted)” for 2025-10-31 to 2025-10-31

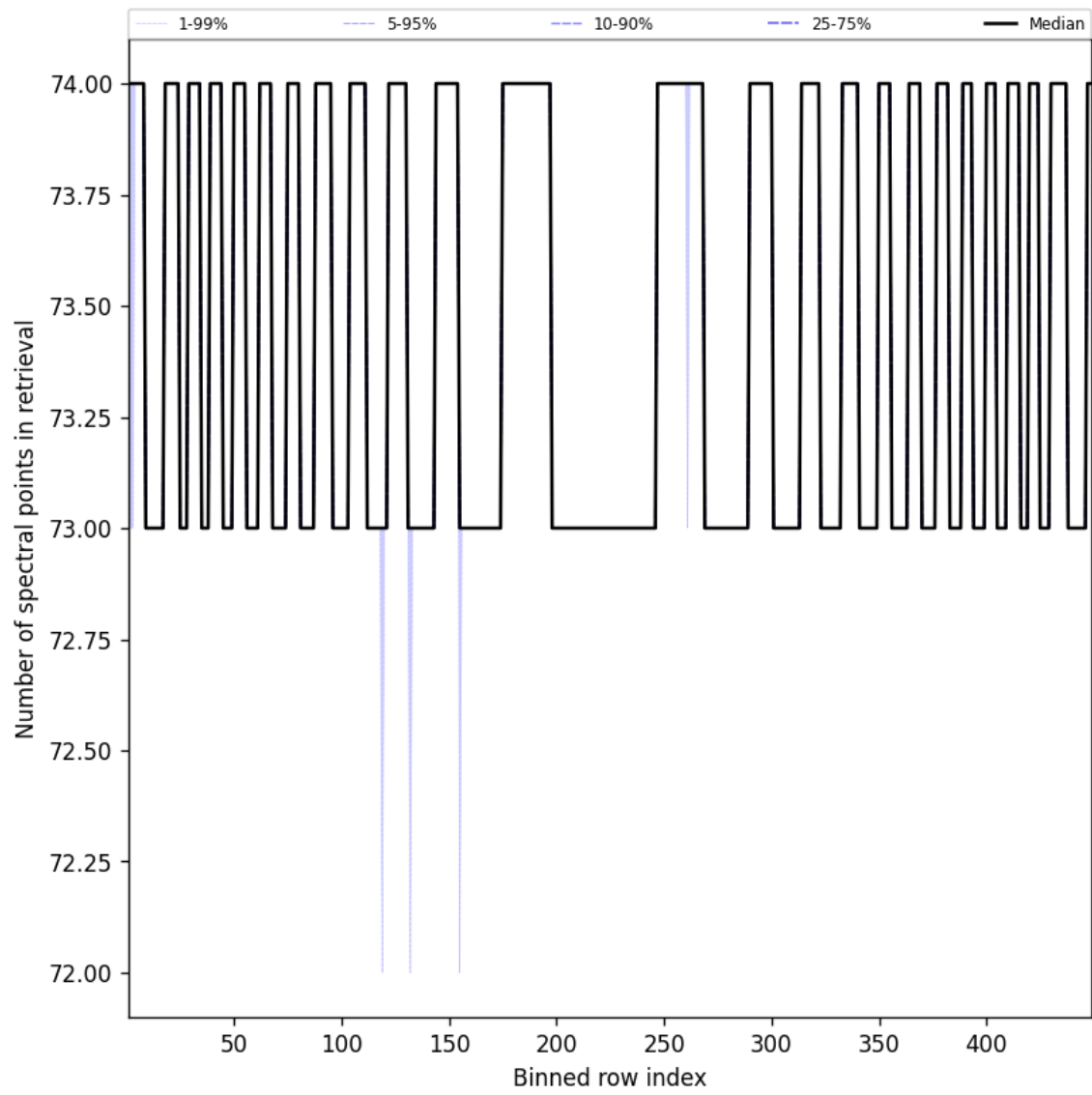


Figure 110: Along track statistics of “Number of spectral points in retrieval” for 2025-10-31 to 2025-10-31

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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